STORMWATER COMPARATIVE ANALYSIS

THE ARCADIA

PROPOSED MODIFICATIONS TO THE BRIGADOON RESIDENCES PROJECT
WEYMOUTH STREET
HOLBROOK, MA 02343

JULY 11, 2022

Owner/Applicant:

DAKOTA PARTNERS
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BSC Job Number: 50017.10

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SECTION 1.0

PROJECT INFORMATION

1.01 PROJECT DESCRIPTION

Dakota Partners (The Applicant) is proposing to modify the site layout of a portion of the previously approved Brigadoon Residences project. These modifications will take place entirely within the approved limits of work with the goal of creating more open space for residents, improving pedestrian and traffic flow, reducing the number of building stories and parking spaces and reducing the environmental impact of the development. The Applicant feels that the proposed site modifications will also create a more desirable place to live for residents.

The project description for the Approved Project is in italics below:

Siddharth Siddharth (The Owner/ Applicant) is seeking to construct a new age restricted residential housing development in Holbrook, Massachusetts, hereinafter referred to as "the Project". The total site area is approximately 51.53 acres. The project will disturb approximately 21 acres of land located along Weymouth Street. The project is bounded on the north and east by Boston Edison Right of Way, bounded on the west by Town Conservation Land and bounded on the south by Weymouth Street. The location is shown on the USGS map in appendix A.

The Project involves construction of four (4) five story residential buildings with structured parking underneath the buildings, a two-story amenity building, and a two-story function hall. The project includes associated surface parking areas, walkways, utility services, and stormwater management systems.

The Project is a new development project designed to comply with the Massachusetts Wetlands Protection Act (The Act) and its enacting regulations (310 CMR 10.00), as well as the Department of Environmental Protection's Stormwater Management Standards and the Town of Holbrook Wetlands Protection Bylaw. Portions of the project will occur within the 100-foot buffer to bordering vegetated wetlands (BVW). While the property contains bordering land subject to flooding (BLSF), the project itself is located outside of the 1% chance of annual flood zone according to the most recent FEMA Flood Insurance Rate Map included in Appendix B.

Dakota Partners' proposal is to make site design modifications to the easternmost portion of the Approved Project site. This portion of the project originally included two residential buildings combining for a total footprint area of 60,040 square feet, 176 residential units along with 261 proposed parking spaces. As part of the proposed modifications, The Applicant is proposing to maintain the same amount of units, divided between two buildings with a total combined footprint of 37,440 square feet. Additionally, since the percentage of units will now include a vast majority of single bedroom units, The Applicant is proposing to reduce the total number of parking spaces to 220.

The purpose of this comparative analysis is to prove that the proposed site modifications will not create additional (and in some cases REDUCE) environmental impact beyond what was approved as part of this portion of the Brigadoon Residences project. This will be done by comparing stormwater conditions stemming from the proposed site modifications to conditions of the previously approved Brigadoon Residences project.

1.02 APPROVED POST DEVELOPMENT SITE CONDITIONS

The portion of the site to undergo design modifications can be described as the "easternmost" section of the approved Brigadoon Residences project, containing Residential Buildings 1 and 2. This portion of the approved Brigadoon Residences site contributes to comparative points 1R and 4R from the approved stormwater design. This portion of the site had two main outlet locations for stormwater discharge including Flared End Section 1 at the northern end of the developed site and Flared end Section 2 located near the easternmost property line of the site.

Flared End Section 1 was the proposed outlet from Precast Infiltration System 1 which was a proposed pre-cast concrete "StormTrap" system. This system was fed from roof drains from Building 1 and catch basins located in the parking areas surrounding the rear portion of Building 1.

Flared End Section 2 was the proposed outlet from Precast Infiltration System 2, which was also a pre-cast concrete "StormTrap" system. This infiltration system was to receive stormwater runoff from the paved cul-de-sac at the center of Building 1 and catch basins located in several parking fields closer to the front portion of the site.

Stormwater runoff from the roof of Residential Building 2, the paved access driveway to this portion of the site and the main access road was to be collected, treated and conveyed to Precast Infiltration System 8. Infiltration System 8 was proposed as an additional pre-cast concrete StormTrap system which would then overflow to a bioretention area adjacent to Weymouth Street and, in an overflow scenario, spill over to Weymouth Street over a rip rap overflow spillway. The approved drainage system design can be seen on the Brigadoon Residences Site Plan revised through 2/13/2019.

1.03 PROPOSED MODIFIED POST DEVELOPMENT SITE CONDITIONS

Because of the relatively minor nature of proposed site modifications, there will be very little change to the approved stormwater system. The stormwater system will be comprised of the same StormTrap systems described in the approved design, with the exception of the addition of several chambers to accommodate minor changes in flows to each individual system. Outflow locations at Flared End Sections 1 and 2 will not change along with the location/elevations of the bioretention area and riprap spillway. The grades of the site will be generally the same with stormwater routed to infiltration systems with relocated catch basins and manholes to accommodate the layout modifications. Because comparative points 1R and 4R receive stormwater runoff from this portion of the site, these will be the basis of comparison for any changes to environmental impact from a stormwater perspective.

This report is an analysis to prove there is no increased environmental impact as a result of the proposed site modifications. All erosion control methods, stormwater system components, maintenance, Best Management Practices, inspections and reporting to be in compliance with the approved Stormwater Report for the Brigadoon Residences Project. Approved Brigadoon Residences Construction Period Pollution Prevention Plan and Long Term Pollution Prevention Plan to be adhered to by the Applicant.

SECTION 2.0

DRAINAGE SUMMARY

2.01 Stormwater Standard 1 – New Stormwater Conveyances

The proposed site modifications will maintain the same discharge locations, and maintain (or reduce) the previously approved peak flow rates from the Brigadoon Residences project. The MA stormwater standard is below.

Per Massachusetts Stormwater Management Standard #1, no new outfalls may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. All new stormwater outlets will be through flared end sections with rip-rap dissipation bowls to prevent downstream erosion. All stormwater discharges will be treated to achieve 80% annual total suspended solids (TSS) removal prior to discharge. Section 7.0 of this report includes rip-rap dissipation bowl sizing calculations. Stormwater treatment is discussed in more detail in Stormwater Standard 4 below.

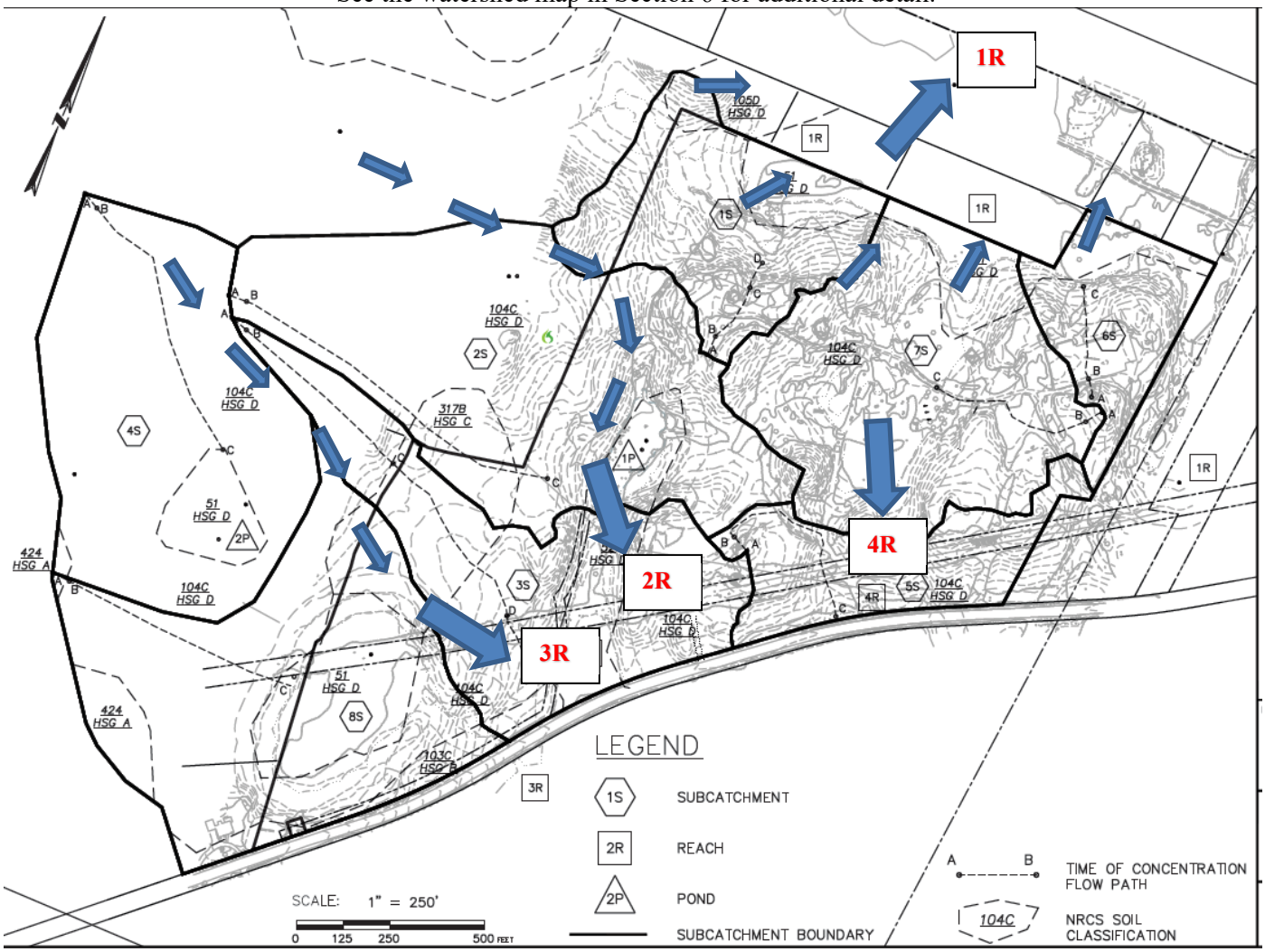
2.02 Stormwater Standard 2 – Stormwater Runoff Rates

Watershed modeling was performed using HydroCAD Stormwater Modeling Software version 10.0, a computer aided design program that combines SCS runoff methodology with standard hydraulic calculations. A model of the proposed project site, including site layout modifications was developed and compared to the stormwater analysis performed for this portion of the Approved Project.

The stormwater management system for the project has been designed such that the post-development conditions including all proposed modifications as part of this project do not increase the peak runoff rates for the 2-year, 10-year, 25-year and 100-year, 24-hour storm events, as detailed in the tables below. Previously approved pre-development hydrology calculations are not included in this report as no revisions are being made.

The figure below shows the schematic layout of the of watersheds and the general location of the points of analysis summarized on the tables below. This schematic watershed plan depicts entire approved Brigadoon Residences Project. The proposed modifications by Dakota Partners will take place on the easternmost portion of the site, and affect comparison points 1R and 4R. These comparison points are used as part of this report.

See the watershed map in Section 6 for additional detail.



Schematic Watershed Plan: Approved Brigadoon Residences Project

Peak Flow Discharge Rates

Node 1R – Flow to North Wetlands

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Approved-Development Peak Discharge Rate (cfs)	Proposed-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs) (From approved)
2-Year	29.95	26.51	26.43	-0.08
10-Year	59.43	58.44	52.27	-6.17
25-Year	76.10	74.99	69.41	-5.58
100-Year	101.69	98.19	96.60	-1.59

Node 4R – Southward Flow to Roadside Depression

Storm Event	Pre-Development Peak Discharge Rate (cfs)	Approved -Development Peak Discharge Rate (cfs)	Proposed-Development Peak Discharge Rate (cfs)	Change in Peak Discharge Rate (cfs) (From approved)
2-Year	6.38	3.10	3.10	-0.00
10-Year	12.60	6.12	6.12	-0.00
25-Year	16.11	7.83	7.82	-0.01
100-Year	21.49	10.44	10.44	-0.00

2.03 Stormwater Standard 3 – Groundwater Recharge

The ground water recharge is estimated based on the Massachusetts Stormwater Management Standard #3, as follows:

Rv = F x impervious area

Rv= *Required Recharge Volume*, expressed in Ft^3, cubic yards, or acre-feet
F= Target Depth Factor associated with each Hydrologic Soil Group
Impervious Area= pavement and rooftop area on site

Table 1.2 Recharge Target Depth by Hydrologic Soil Group

NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TARGET DEPTH FACTOR (F)
A	sand	**0.60-inch**
B	loam	**0.35-inch**
C	silty loam	**0.25-inch**
D	clay	**0.10-inch**

The Natural Resources Conservation Service (NRCS) has classified the site as 104C Hollis-Rock outcrop and Charlton complex soil in the area of Infiltration Systems 1, 2 and 8 which falls under Hydrologic Soils Group D. Test pit logs performed by BSC Group in May, 2017 and April, 2018, submitted with the previously approved stormwater report confirm that the soils and groundwater elevations in the location of the proposed infiltration systems can be used for recharge.

To determine the recharge volume provided in the recharge systems for the previously Approved Project, the *Static Method* was used as described in the DEP's Massachusetts Stormwater Handbook, Volume 3. A drawdown calculation was performed in accordance with the DEP's Massachusetts Stormwater Handbook, Volume 3, to verify that the proposed recharge systems would drain completely within 72-hours. This drawdown calculation along with calculations to determine the recharge required are provided in Section 7.0 of this report.

2.04 Stormwater Standard 4 – TSS Removal

The Approved Project was designed as a new development and was designed to achieve a TSS removal greater than 80%. The proposed modifications to the approved stormwater management system are minor in nature and have been designed to provide treatment of runoff in order to reduce suspended solids prior to discharge off-site through the implementation of the following best management practices:

- Deep Sump Hooded Catch Basins (Pre-treatment)
- Contech® water quality units (or approved equal) (Pre-treatment)
- Underground Stormwater Infiltration Systems (StormTrap units or approved equal) (80% TSS removal)
- Bio-Retention Area (90% TSS removal)

The water quality volume is defined as the runoff volume requiring TSS Removal for the site, and is equal to 1-inch of runoff over the total impervious area of the post-development site. The required water quality volume required for the Approved Project is calculated below based on the post-development impervious area.

$$WQV = 1\,\cancel{in}\; x\; \frac{1\,ft}{12\,\cancel{in}} x\;\; 12.553ac\; x\; 43{,}560ft^2 = \;\mathbf{45,567ft^3}$$

∴ Water Quality Volume (Approved Project) = 45,567

The underground infiltration systems incorporated into the Approved Project design have been sized checked and slightly modified to treat the required water quality volume and calculation are included in Section 7.0 of this Report.

A long-term pollution prevention plan complying with the requirements of Standard 4 is included in Section 5.0 of this Report.

2.05 Stormwater Standard 5 – Land Uses with Higher Potential Pollutant Loads

The Approved Project was designed to meet LUHPPL standards with expected vehicle trips per day exceeding 1000. The site modifications proposed by the applicant will maintain these standards by implementing the following.

- Deep Sump Hooded Catch Basins (Pre-treatment)
- Contech® water quality units (or approved equal) (Pre-treatment)
- Underground Stormwater Infiltration Systems (StormTrap units or approved equal) (80% TSS removal)
- Bio-Retention Area

2.06 Stormwater Standard 6 – Stormwater Discharges to a Critical Area

According to MassGIS, portions of the site, including the stormwater discharge areas to the north and south, are located within the Zone A to a public drinking water supply. Therefore, the water quality volumes calculated for Standard 4 have been performed using 1-inch of rainfall over the impervious surface and at least 44 percent TSS removal is achieved in pre-treatment prior to discharging to infiltration BMP's that have been selected in accordance with the Stormwater Handbook. The underground infiltration systems have been sized to treat the required water quality volume and calculations are included in Section 7.0 of this Report.

2.07 Stormwater Standard 7 – Redevelopment Projects

This project is a new development and therefore has been designed to fully comply with the Stormwater Management Standards.

2.08 Stormwater Standard 8 – Sedimentation and Erosion Control Plan

Erosion and sedimentation controls are shown on the Project Plans. Additionally, a Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Section 4.0 of this Report.

2.09 Stormwater Standard 9 – Long Term Operation and Maintenance Plan

A Long-Term Operation and Maintenance Plan is included in Section 5.0 of this Report.

2.10 Stormwater Standard 10 – Illicit Discharges

There are no known illicit discharges on the project site and none are proposed. A signed, illicit discharge compliance statement will be submitted prior to the start of construction.

2.11 Conclusion

The proposed site modifications have been designed to meet the applicable provisions of the Stormwater Management Standards and at a minimum, meet the performance of the Approved Project. . The use of infiltration areas, along with pre-treatment such as deep-sump, hooded catch basins and hydrodynamic separators will attenuate peak runoff rates, provide treatment to stormwater prior to discharge, and promote infiltration to groundwater. Combined with rip-rap protected flared end section outfalls, the project will protect the adjacent wetlands and meet the requirements of the Massachusetts Stormwater Standards and no new point source discharges (recharge system overflow pipes) will occur within the 100 foot wetlands buffer zone.

SECTION 3.0

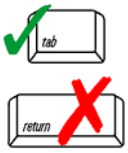
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION CHECKLIST FOR STORMWATER REPORT

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

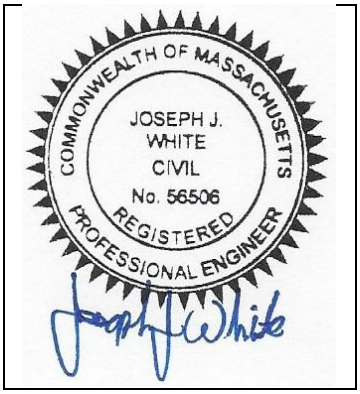
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



7/8/2022

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

- [X] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [ ] 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
- [X] Bioretention Cells (includes Rain Gardens)
- [ ] Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- [ ] Treebox Filter
- [ ] Water Quality Swale
- [ ] Grass Channel
- [ ] Green Roof
- [X] Other (describe): Underground infiltration areas

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☐ An Illicit Discharge Compliance Statement is attached;

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

SECTION 4.0

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

4.0 CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

This Section specifies requirements and suggestions for implementation of a Stormwater Pollution Prevention Plan (SWPPP) for **The Arcadia, in Holbrook, Massachusetts**. **This SWPPP is consistent with the SWPPP for the previously approved Brigadoon Residences project with only minor changes to account for proposed site modifications by the Applicant.** The SWPPP shall be provided and maintained on-site by the Contractor(s) during all construction activities. The SWPPP shall be updated as required to reflect changes to construction activity.

The stormwater pollution prevention measures contained in the SWPPP shall be at least the minimum required by Local Regulations. The Contractor shall provide additional measures to prevent pollution from stormwater discharges in compliance with the National Pollution Discharge Elimination System (NPDES) Phase II permit requirements and all other local, state and federal requirements.

The SWPPP shall include provisions for, but not be limited to, the following:

1. Construction Trailers
2. Lay-down Areas
3. Equipment Storage Areas
4. Stockpile Areas
5. Disturbed Areas

The Contractor shall NOT begin construction without submitting evidence that a NPDES Notice of Intent (NOI) governing the discharge of stormwater from the construction site for the entire construction period has been filed **at least fourteen (14) days prior to construction**. It is the Contractor's responsibility to complete and file the NOI, unless otherwise determined by the project team.

The cost of any fines, construction delays and remedial actions resulting from the Contractor's failure to comply with all provisions of local regulations and Federal NPDES permit requirements shall be paid for by the Contractor at no additional cost to the Owner.

As a requirement of the EPA's NPDES permitting program, each Contractor and Subcontractor responsible for implementing and maintaining stormwater Best Management Practices shall execute a Contractor's Certification form.

Erosion and Sedimentation Control

The Contractor shall be solely responsible for erosion and sedimentation control at the site. The Contractor shall utilize a system of operations and all necessary erosion and sedimentation control measures, even if not specified herein or elsewhere, to minimize erosion damage at the site to prevent the migration of sediment into environmentally sensitive areas. Environmentally sensitive areas include all wetland resource areas within, and downstream of, the site, and those areas of the site that are not being altered.

Erosion and sedimentation control shall be in accordance with this Section, the design drawings, and the following:

- "National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities (EPA Construction General Permit February 17, 2022).
- Massachusetts Stormwater Management Policy Handbook issued by the Massachusetts Department of Environmental Protection, January 2008.
- Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, A Guide for Planners, Designers and Municipal Officials, March 1997.

The BMP's presented herein should be used as a guide for erosion and sedimentation control and are not

intended to be considered specifications for construction. The most important BMP is maintaining a rapid construction process, resulting in prompt stabilization of surfaces, thereby reducing erosion potential. Given the primacy of rapid construction, these guidelines have been designed to allow construction to progress with essentially no hindrance by the erosion control methods prescribed. These guidelines have also been designed with sufficient flexibility to allow the Contractor to modify the suggested methods as required to suit seasonal, atmospheric, and site-specific physical constraints.

Another important BMP is the prevention of concentrated water flow. Sheet flow does not have the erosive potential of a concentrated rivulet. These guidelines recommend construction methods that allow localized erosion control and a system of construction, which inhibits the development of shallow concentrated flow. These BMP's shall be maintained throughout the construction process.

CONTACT INFORMATION AND RESPONSIBLE PARTIES

The following is a list of all project-associated parties:

Owner/Applicant*
Dakota Partners
235 Bear Hill Road, Suite 400
Waltham, MA 02451

* In the event the property ownership is transferred, the "Owner/Applicant" shall mean the owner or his heirs or assigns as established by a chain of title.

Contractor
To be determined

Environmental Consultant
BSC Group, Inc.
300 Brickstone Square
Andover, MA 01810

Contact: Joseph White, P.E.
Phone: (617) 896–4582
Email: jjwhite@bscgroup.com

Qualified SWPPP Inspectors
To Be Determined

4.1 Procedural Conditions of the Construction General Permit (CGP)

The following list outlines the Stormwater Responsibilities for all construction operators working on the Project. The operators below agree through a cooperative agreement to abide by the following conditions throughout the duration of the construction project, effective the date of signature of the required SWPPP. These conditions apply to all operators on the project site.

The project is subject to EPA's NPDES General Permit through the CGP. The goal of this permit is to prevent the discharge of pollutants associated with construction activity from entering the existing and proposed storm drain system or surface waters.

All contractors/operators involved in clearing, grading and excavation construction activities must sign the appropriate certification statement required, which will remain with the SWPPP. The owner must also sign

a certification, which is to remain with the SWPPP in accordance with the signatory requirements of the SWPPP.

Once the SWPPP is finalized, a signed copy, plus supporting documents, must be held at the project site during construction. A copy must remain available to EPA, State and Local agencies, and other interested parties during normal business hours.

The following items associated with this SWPPP must be posted in a prominent place at the construction site until final stabilization has been achieved:

- The completed/submitted NOI form
- Location where the public can view the SWPPP during normal business hours
- A copy of the signed/submitted NOI, permit number issued by the EPA and a copy of the current CGP.

Project specific SWPPP documents are not submitted to the US EPA unless the agency specifically requests a copy for review. SWPPP documents requested by a permitting authority, the permitee(s) will submit it in a timely manner.

EPA inspectors will be allowed free and unrestricted access to the project site and all related documentation and records kept under the conditions of the permit.

The permitee is expected to keep all BMP's and Stormwater controls operating correctly and maintained regularly.

Any additions to the project which will significantly change the anticipated discharges of pollutants, must be reported to the EPA. The EPA should also be notified in advance of any anticipated events of noncompliance. The permitee must also orally inform the EPA of any discharge, which may endanger health or the environment within 24 hours, with a written report following within 5 days.

In maintaining the SWPPP, all records and supporting documents will be compiled together in an orderly fashion. Inspection reports and amendments to the SWPPP must remain with the document. Federal regulations require permitee(s) to keep their Project Specific SWPPP and all reports and documents for at least three (3) years after the project is complete.

4.2 Existing Site and Soil Conditions

The proposed total site area is approximately 12.91 acres of the 51.53 acres previously approved as part of the Brigadoon Residences project. The project will disturb approximately 6.66 acres located along and off of Weymouth Street. Test pits were performed as part of the Brigadoon Residences project by BSC Group in May, 2017 and April 2018. The results of the soil testing indicate that the soil is acceptable for recharge in the areas tested.

4.3 Project Description and Intended Construction Sequence

The site is currently comprised of woods and wetlands. There is no change from the Approved Project when comparing what will be constructed on this portion of the property. The proposed activities will include the following major components:

- The construction of two (2) residential housing buildings.
- The construction of stormwater management systems, and
- Site grading, utility installation, and landscape areas.

The proposed project will disturb a total of approximately (6.66± acres).

Soil disturbing activities will include site demolition, clearing and grubbing, installing stabilized construction exits, installation of erosion and sedimentation controls, grading, storm drain inlets, stormwater management systems, utilities, building foundations, construction of site driveways and preparation for final landscaping. Please refer to Table 1 for the projects anticipated construction timetable. A description of BMP's associated with project timetable and construction-phasing elements is provided in this Erosion and Sediment Control Plan.

Table 1 – Anticipated Construction Timetable

Construction Phasing Activity	Anticipated Timetable
Demolition, Grubbing and Stripping of Limits of Construction Phase	To be determined
Rough Site Grading and Site Utilities	To be determined
Utility Plan Construction	To be determined
Landscaping	To be determined

4.4 Potential Sources of Pollution

Any project site activities that have the potential to add pollutants to runoff are subject to the requirements of the SWPPP. Listed below are a description of potential sources of pollution from both sedimentation to Stormwater runoff, and pollutants from sources other than sedimentation.

Table 2 – Potential Sources of Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Construction Site Entrance and Site Vehicles	Vehicles leaving the site can track soils onto public roadways. Site Vehicles can readily transport exposed soils throughout the site and off-site areas.
Grading Operations	Exposed soils have the potential for erosion and discharge of sediment to off-site areas.
Material Excavation, Relocation, and Stockpiling	Stockpiling of materials during excavation and relocation of soils can contribute to erosion and sedimentation. In addition, fugitive dust from stockpiled material, vehicle transport and site grading can be deposited in wetlands and waterway.
Landscaping Operations	Landscaping operations specifically associated with exposed soils can contribute to erosion and sedimentation. Hydroseeding, if not properly applied, can runoff to adjacent wetlands and waterways.

Table 3 – Potential Pollutants and Sources, other than Sediment to Stormwater Runoff

Potential Source	Activities/Comments
Staging Areas and Construction Vehicles	Vehicle refueling, minor equipment maintenance, sanitary facilities and hazardous waste storage
Materials Storage Area	General building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
Construction Activities	Construction, paving, curb/gutter installation, concrete pouring/mortar/stucco

4.5 Erosion and Sedimentation Control Best Management Practices

The project site is characterized by primarily pervious surface. All construction activities will implement Best Management Practices (BMP's) in order to minimize overall site disturbance and impacts to the sites natural features. Please refer to the following sections for a detailed description of site specific BMP's. In addition, an Erosion and Sedimentation Control Plan is provided in the Site Plans.

4.6 Timetable and Construction Phasing

This section provides the Owner and Contractor with a suggested order of construction that shall minimize erosion and the transport of sediments. The individual objectives of the construction techniques described herein shall be considered an integral component of the project design intent of each project phase. The construction sequence is not intended to prescribe definitive construction methods and should not be interpreted as a construction specification document. However, the Contractor shall follow the general construction phase principles provided below:

- Protect and maintain existing vegetation wherever possible.
- Minimize the area of disturbance.
- To the extent possible, route unpolluted flows around disturbed areas.
- Install mitigation devices as early as possible.
- Minimize the time disturbed areas are left unstabilized.
- Maintain siltation control devices in proper condition.
- The contractor should use the suggested sequence and techniques as a general guide and modify the suggested methods and procedures as required to best suit seasonal, atmospheric, and site specific physical constraints for the purpose of minimizing the environmental impact of construction.

Demolition, Grubbing and Stripping of Limits of Construction Phase

- Install Temporary Erosion Control (TEC) devices as required to prevent sediment transport into resource areas.
- Place a ring of silt socks and/or haybales around stockpiles.
- Stabilize all exposed surfaces that will not be under immediate construction.
- Store and/or dispose all pavement and building demolition debris as indicated in accordance with all applicable local, state, and federal regulations.

Driveway Area Sub-base Construction

- Install temporary culverts and diversion ditches and additional TEC devices as required by individual construction area constraints to direct potential runoff toward detention areas designated for the current construction phase.
- Compact gravel as work progresses to control erosion potential.
- Apply water to control air suspension of dust.
- Avoid creating an erosive condition due to over-watering.

- Install piped utility systems as required as work progresses, keeping all inlets sealed until all downstream drainage system components are functional.

Binder Construction

- Fine grade gravel base and install processed gravel to the design grades.
- Compact pavement base as work progresses.
- Install pavement binder coat starting from the downhill end of the site and work toward the top.

Finish Paving

- Repair and stabilize damaged side slopes.
- Clean inverts of drainage structures.
- Install final top coat of pavement.

Final Clean-up

- Clean inverts of culverts and catch basins.
- Remove sediment and debris from rip-rap outlet areas.
- Remove TEC devices only after permanent vegetation and erosion control has been fully established.

4.7 Site Stabilization

Grubbing Stripping and Grading

- Erosion control devices shall be in place as shown on the design plans before grading commences.
- Stripping shall be done in a manner, which will not concentrate runoff. If precipitation is expected, earthen berms shall be constructed around the area being stripped, with a silt sock, silt fence or haybale dike situated in an arc at the low point of the berm.
- If intense precipitation is anticipated, silt socks, haybales, dikes and /or silt fences shall be used as required to prevent erosion and sediment transport. The materials required shall be stored on site at all time.
- If water is required for soil compaction, it shall be added in a uniform manner that does not allow excess water to flow off the area being compacted.
- Dust shall be held at a minimum by sprinkling exposed soil with an appropriate amount of water.

Maintenance of Disturbed Surfaces

- Runoff shall be diverted from disturbed side slopes in both cut and fill.
- Mulching may be used for temporary stabilization.
- Silt sock, haybale or silt fences shall be set where required to trap products of erosion and shall be maintained on a continuing basis during the construction process.

Loaming and Seeding

- Loam shall not be placed unless it is to be seeded directly thereafter.
- All disturbed areas shall have a minimum of 4" of loam placed before seeded and mulched.
- Consideration shall be given to hydro-mulching, especially on slopes in excess of 3 to 1.
- Loamed and seeded slopes shall be protected from washout by mulching or other acceptable slope protection until vegetation begins to grow.

Stormwater Collection System Installation

- The Stormwater drainage system shall be installed from the downstream end up and in a manner which will not allow runoff from disturbed areas to enter pipes.

- Excavation for the drainage system shall not be left open when rainfall is expected overnight. If left open under other circumstances, pipe ends shall be closed by a staked board or by an equivalent method.
- All catch basin openings shall be covered by a silt bag between the grate and the frame or protected from sediment by silt fence surrounding the catch basin grate.

Completion of Paved Areas

- During the placement of sub-base and pavement, the entrance to the Stormwater drainage systems shall be sealed when rain is expected. When these entrances are closed, consideration must be given to the direction of run-off and measures shall be undertaken to minimize erosion and to provide for the collection of sediment.
- In some situations, it may be necessary to keep catch basins open.
- Appropriate arrangements shall be made downstream to remove all sediment deposition.

Stabilization of Surfaces

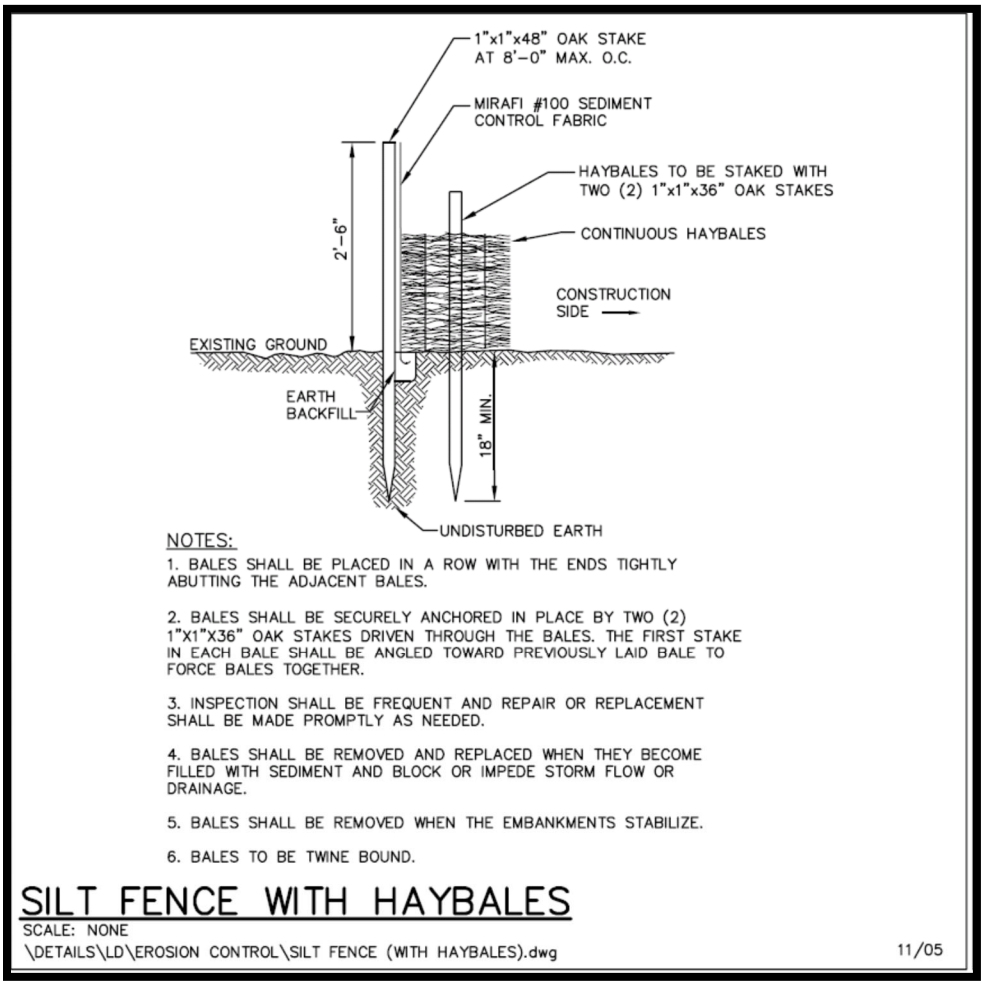
- Stabilization of surfaces includes the placement of pavement, rip-rap, wood bark mulch and the establishment of vegetated surfaces.
- Upon completion of construction, all surfaces shall be stabilized even though it is apparent that future construction efforts will cause their disturbance.
- Vegetated cover shall be established during the proper growing season and shall be enhanced by soil adjustment for proper pH, nutrients and moisture content.
- Surfaces that are disturbed by erosion processes or vandalism shall be stabilized as soon as possible.
- Areas where construction activities have permanently or temporarily ceased shall be stabilized within 14 days from the last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days).
- Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season.
- Hay mulch is an effective method of temporarily stabilizing surfaces, but only if it is properly secured by branches, weighted snow fences or weighted chicken wire.

4.8 Temporary Structural Erosion Control Measures

Temporary erosion control measures serve to minimize construction-associated impacts to wetland resource and undisturbed areas. Please refer to the following sections for a description of temporary erosion control measures implemented as part of the project and this sample SWPPP.

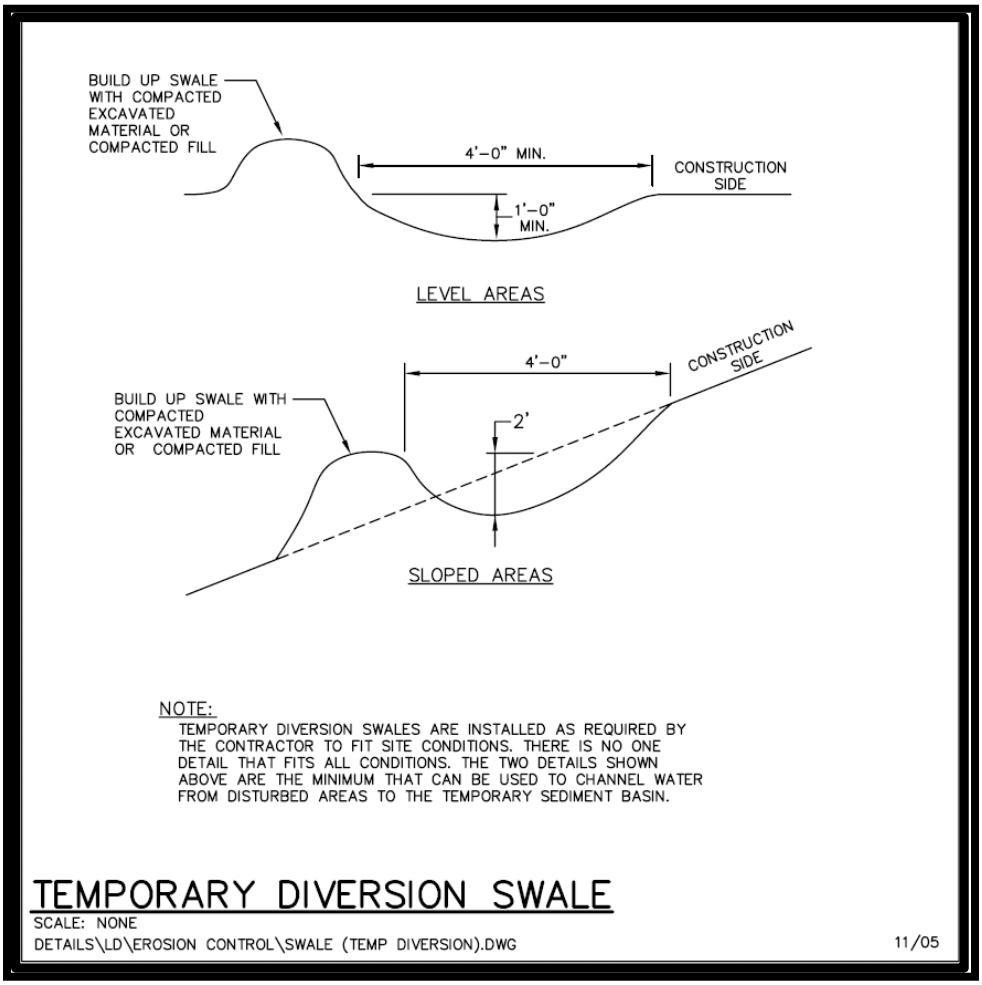
4.8.1 Silt Socks, Haybales, and Silt Fencing

The siltation barriers will demarcate the limit of work, form a work envelope and provide additional assurance that construction equipment will not enter the adjacent wetlands or undisturbed portions of the site. All barriers will remain in place until disturbed areas are stabilized.



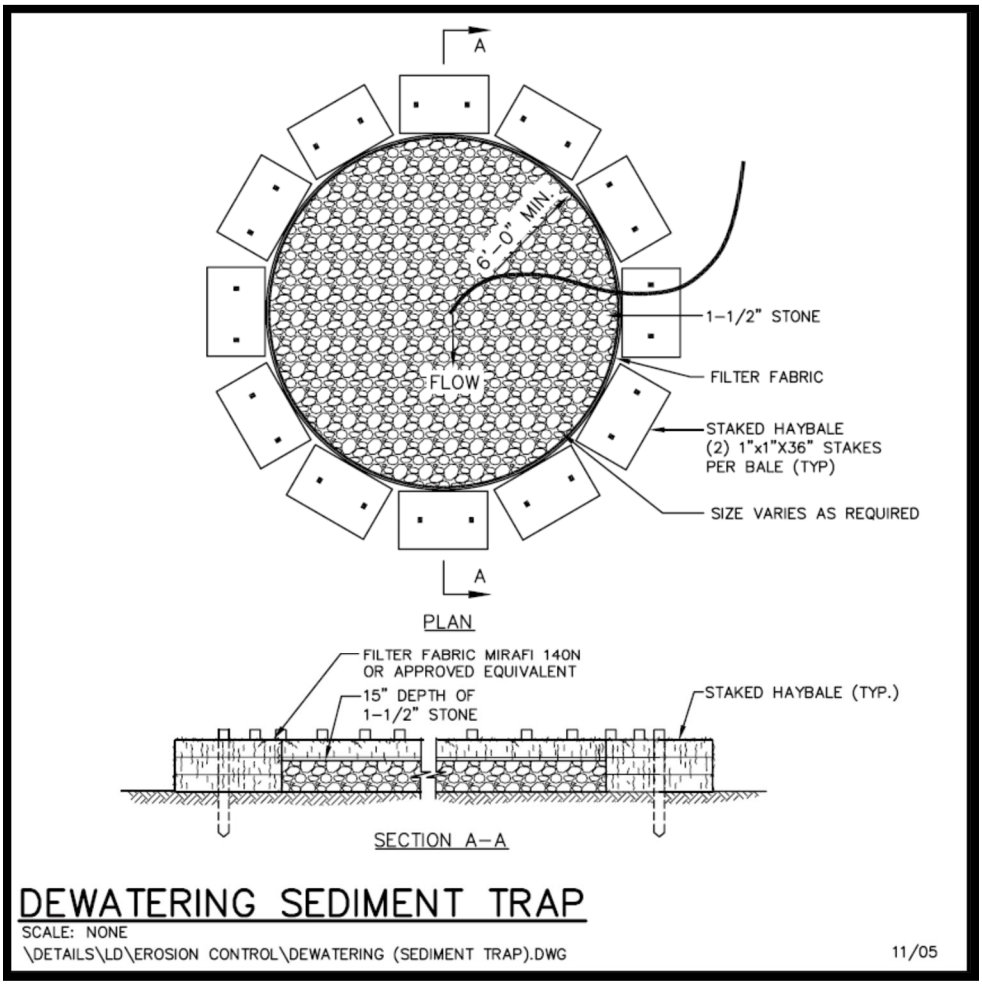
4.8.2 Temporary Stormwater Diversion Swale

A temporary diversion swale is an effective practice for temporarily diverting stormwater flows and to reduce stormwater runoff velocities during storm events. The swale channel can be installed before infrastructure construction begins at the site, or as needed throughout the construction process. The diversion swale should be routinely compacted or seeded to minimize the amount of exposed soil.



4.8.3 Dewatering Basins

Dewatering may be required during stormwater system, foundation construction and utility installation. Should the need for dewatering arise, groundwater will be pumped directly into a temporary settling basin, which will act as a sediment trap during construction. All temporary settling basins will be located within close proximity of daily work activities. Prior to discharge, all groundwater will be treated by means of the settling basin or acceptable substitute. Discharges from sediment basins will be free of visible floating, suspended and settleable solids that would impair the functions of a wetland or degrade the chemical composition of the wetland resource area receiving ground or surface water flows and will be to the combined system.



4.8.4 Material Stockpiling Locations

Piping and trench excavate associated with the subsurface utility work will be contained with a single row of silt socks and/or haybales.

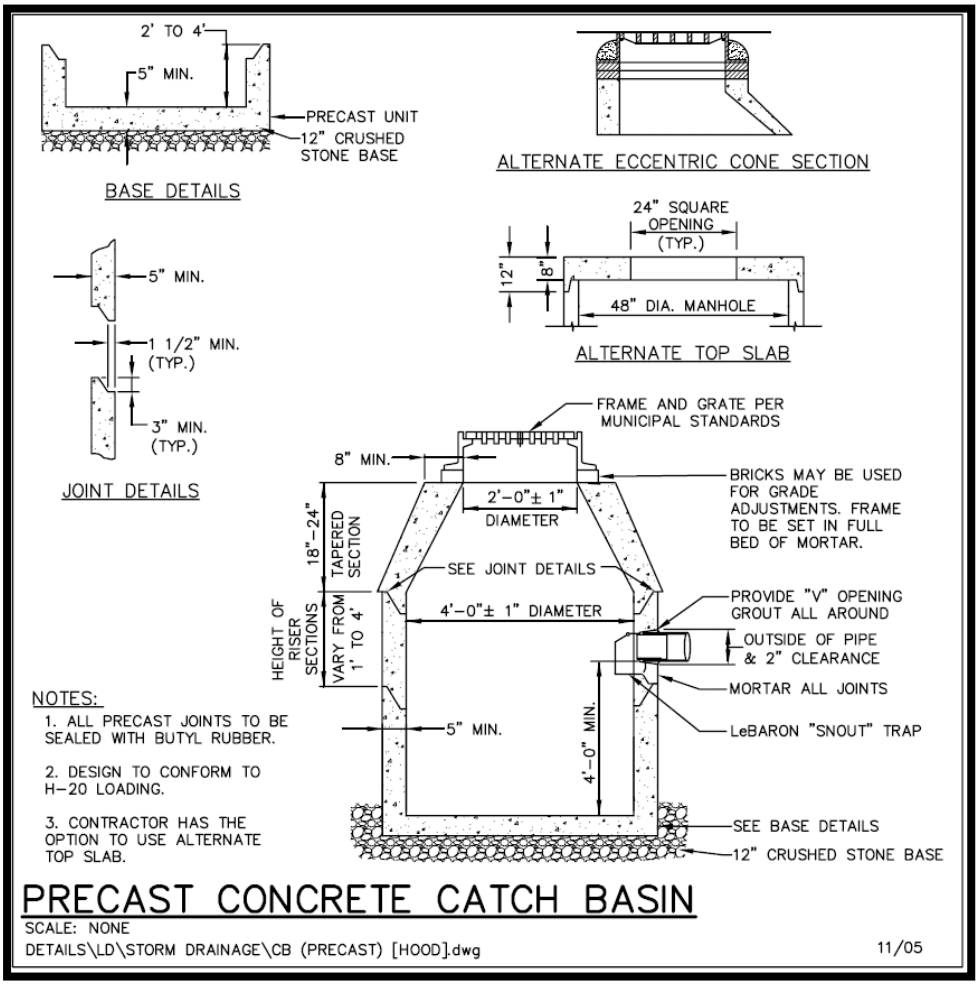
4.9 Permanent Structural Erosion Control Measures

Permanent erosion control measures serve to minimize post-construction impacts to wetland resource areas and undisturbed areas. Please refer to the following sections for a description of permanent erosion control measures implemented as part of the project and this SWPPP.

4.9.1 Catch Basins with Deep Sumps and Hooded Traps

Driveways will be bermed (or curbed) and provided with catch basins to collect runoff. The entire drainage system for each respective project phase will be installed during the initial phases of construction. The collection system will be installed from the downstream end up, and in a manner which will not allow runoff from disturbed areas to enter the pipes.

The catch basins will be inspected and cleaned as necessary (sediment depth of 12") at least two times per year. The optimum time for cleaning is during the period just after the snowmelt of late winter and prior to the onset of heavy spring precipitation. All sediments and hydrocarbons will be properly handled and disposed of in accordance with local state and federal guidelines and regulations.



4.10 Good Housekeeping Best Management Practices

4.10.1 Material Handling and Waste Management

Solid waste generation during the construction period will be primarily construction debris. The debris will include scrap lumber (used forming and shoring pallets and other shipping containers), waste packaging materials (plastic sheeting and cardboard), scrap cable and wire, roll-off containers (or dumpsters) and will be removed by a contract hauler to a properly licensed landfill. The roll-off containers will be covered with a properly secured tarp before the hauler exits the site. In addition to construction debris, the construction

work force will generate some amount of household-type wastes (food packing, soft drink containers, and other paper). Trash containers for these wastes will be located around the site and will be emptied regularly so as to prevent wind-blown litter. This waste will also be removed by a contract hauler.

All hazardous waste material such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed shipping containers in the hazardous-materials storage area and segregated from other non-waste materials. Secondary containment will be provided for all materials in the hazardous materials storage area and will consist of commercially available spill pallets. Additionally, all hazardous materials will be disposed of in accordance with federal, state and municipal regulations.

Two temporary sanitary facilities (portable toilets) will be provided at the site in the combined staging area. The toilets will be away from a concentrated flow path and traffic flow and will have collection pans underneath as secondary treatment. All sanitary waste will be collected from an approved party at a minimum of three times per week.

4.10.2 Building Material Staging Areas

Construction equipment and maintenance materials will be stored at the combined staging area and materials storage areas. Silt fence will be installed around the perimeter to designate the staging and materials storage area. A watertight shipping container will be used to store hand tools, small parts and other construction materials.

Non-hazardous building materials such as packaging material (wood, plastic and glass) and construction scrap material (brick, wood, steel, metal scraps, and pine cuttings) will be stored in a separate covered storage facility adjacent to other stored materials. All hazardous-waste materials such as oil filters, petroleum products, paint and equipment maintenance fluids will be stored in structurally sound and sealed containers under cover within the hazardous materials storage area.

Large items such as framing materials and stockpiled lumber will be stored in the open storage area. Such materials will be elevated on wood blocks to minimize contact with runoff.

The combined storage areas are expected to remain clean, well-organized and equipped with ample cleaning supplies as appropriate for the materials being stored. Perimeter controls such as containment structures, covers and liners will be repaired or replaced as necessary to maintain proper function.

4.10.3 Designated Washout Areas

Designated temporary, below-ground concrete washout areas will be constructed, as required, to minimize the pollution potential associated with concrete, paint, stucco, mixers etc. Signs will, if required, be posted marking the location of the washout area to ensure that concrete equipment operators use the proper facility. Concrete pours will not be conducted during or before an anticipated precipitation event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes will be discharged to the washout area or hauled off-site for disposal.

4.10.4 Equipment/Vehicle Maintenance and Fueling Areas

Several types of vehicles and equipment will be used on-site throughout the project including graders, scrapers, excavators, loaders, paving equipment, rollers, trucks and trailers, backhoes and forklifts. All major equipment/vehicle fueling and maintenance will be performed off-site. A small, 20-gallon pickup bed fuel tank will be kept on-site in the combined staging area. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area. Only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

4.10.5 Equipment/Vehicle Wash down Area

All equipment and vehicle washing will be performed off-site.

4.10.6 Spill Prevention Plan

A spill containment kit will be kept on-site in the Contractor's trailer and/or the designated staging area throughout the duration of construction. Should there be an accidental release of petroleum product into a resource area, the appropriate agencies will be immediately notified.

4.10.7 Inspections

Maintenance of existing and proposed BMP's to address stormwater management facilities during construction is an on-going process. The purpose of the inspections is to observe all sources of stormwater or non-stormwater discharge as identified in the SWPPP as well as the status of the receiving waters and fulfill the requirements of the Order of Conditions. The following sections describe the appropriate inspection measures to adequately implement the project's SWPPP. A blank inspection form is provided at the end of this section. Completed inspection forms are to be maintained on site.

Inspection Personnel

The owner's appointed representative will be responsible for performing regular inspections of erosion controls and ordering repairs as necessary.

Inspection Frequency

Inspections will be performed by qualified personnel once every 7 days and within 24-hours after a storm event of greater than one-quarter inch, in accordance with the CGP. The inspections must be documented on the inspection form provided at the end of this section, and completed forms will be provided to the on-site supervisor and maintained at the Owner's office throughout the entire duration of construction.

Inspection Reporting

Each inspection report will summarize the scope of the inspection, name(s) and qualifications of personnel making the inspection, and major observations relating to the implementation of the SWPPP, including compliance and non-compliance items. Completed inspection reports will remain with the completed SWPPP on site.

4.10.8 Amendment Requirements

The final SWPPP is intended to be a working document that is utilized regularly on the construction site, and provides guidance to the Contractor. It must reflect changes made to the originally proposed plan and will be updated to include project specific activities and ensure that they are in compliance with the NPDES General Permit and state and local laws and regulations. It should be amended whenever there is a change in design, construction, operation or maintenance that affects discharge of pollutants. The following items should be addressed should an amendment to the SWPPP occur:

- Dates of certain construction activities such as major grading activities, clearing and initiation of and completion of stabilization measures should be recorded.
- Future amendments to the SWPPP will be recorded as required. As this SWPPP is amended, all amendments will be kept on site and made part of the SWPPP.
- Upon completion of site stabilization (completed as designed and/or 70% background vegetative cover), it can be documented and marked on the plans. Inspections are no longer required at this time.

- Inspections often identify areas not included in the original SWPPP, which will require the SWPPP to be amended. These updates should be made within seven days of being recognized by the inspector.

4.11 SWPPP Inspection and Maintenance Report

The following form is an example to be used for SWPPP Inspection Reporting.

Stormwater Construction Site Inspection and Maintenance Report

TO BE COMPLETED AT LEAST EVERY 7 DAYS AND WITHIN 24 HOURS OF A STORM EVENT OF AT LEAST 0.25 INCHES. AFTER SITE STABILIZATION, TO BE COMPLETED AT LEAST ONCE PER MONTH FOR THREE YEARS OR UNTIL A NOTICE OF TERMINATION IS FILED (IF APPLICABLE).

General Information			
Project Name	The Arcadia		
NPDES Tracking No. (if applicable)		**Location**	Weymouth Street Holbrook, MA
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	**BMP Installed?**	**BMP Maintenance Required?**	**Corrective Action Needed and Notes Action required by whom and when**
1	Catch Basin Protection	❑Yes ❑No	❑Yes ❑No	
2	Haybale & Silt Fencing	❑Yes ❑No	❑Yes ❑No	
3	Straw Wattles	❑Yes ❑No	❑Yes ❑No	
4	Construction Entrance	❑Yes ❑No	❑Yes ❑No	
5	Sediment Basins	❑Yes ❑No	❑Yes ❑No	
6	Dewatering Pit	❑Yes ❑No	❑Yes ❑No	
7		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	Vehicle Maintenance not allowed on site
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes Action required by whom and when
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____
(Qualified Person Performing the Inspection)

Signature:_____ **Date:** _____

Print name and title: _____
(Contractor/Operator)

Signature:_____ **Date:**_____

SECTION 5.0

LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

5.0 LONG-TERM POLLUTION PREVENTION & OPERATION AND MAINTENANCE PLAN

As required by Standard #4 of the Stormwater Management Policy, this Long-Term Pollution Prevention Plan has been developed for source control and pollution prevention at the site after construction. **This LTPPP / O&M plan is consistent with that of the previously approved Brigadoon Residences project. All guidelines and standards are to be followed by the applicant.**

MAINTENANCE RESPONSIBILITY

Ensuring that the provisions of the Long-Term Pollution Prevention Plan are followed will be the responsibility of The Owner / Applicant. * In the event the property ownership is transferred, the "Owner/Applicant" shall mean the owner or his heirs or assigns as established by a chain of title.

GOOD HOUSEKEEPING PRACTICES

The site to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside.

VEHICLE WASHING CONTROLS

The following BMP's, or equivalent measures, methods or practices are required if you are engaged in vehicle washing and/or steam cleaning:

It is allowable to rinse down the body or a vehicle, including the bed of a truck, with just water without doing any wash water control BMP's.

If you wash (with mild detergents) on an area that infiltrates water, such as gravel, grass, or loose soil, it is acceptable to let the wash water infiltrate as long as you only wash the body of vehicles.

However, if you wash on a paved area and use detergents or other cleansers, or if you wash/rinse the engine compartment or the underside of vehicles, you must take the vehicles to a commercial vehicle wash.

REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORMWATER BMPS

All stormwater BMPs are to be inspected and maintain as follows;

Haybales, Silt Fence, and other temporary measures

The temporary erosion control measures will be installed up gradient of any wetland resource area where any disturbance or alteration might otherwise allow for erosion or sedimentation. They will be regularly inspected to ensure that they are functioning adequately. Additional supplies of these temporary measures will be stockpiled on site for any immediate needs or routine replacement.

Deep Sump Hooded Catch Basins

Regular maintenance is essential. Catch basins remain effective at removing pollutants only if they are cleaned out frequently. Inspect or clean basins at least four times per year and at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of the deposits in the catch basin sump is greater than or equal to one half the depth form the bottom of the invert of the lowest pipe in the basin.

Water Quality Treatment Units

The water quality treatment structures require periodic inspection and cleaning to maintain operation and function. Owners should have these units inspected on a semi-annual basis and after periods of intense precipitation. Inspections can be done by using a clear Plexiglas tube ("sludge judge") to extract a water column sample. When sediment accumulation reaches 15% of storage capacity, cleaning of the unit is required.

These water quality structures must and will be checked and cleaned immediately after petroleum spills; contact appropriate regulatory agencies.

Maintenance of these units should be done by a vacuum truck that will remove the water, sediment, debris, floating hydrocarbons and other materials in unit. Proper cleaning and disposal of the removed materials and liquid must be followed.

Underground Infiltration System

Maintenance is required for the proper operation of the underground precast infiltration systems. Infiltration systems are prone to failure due to clogging if the upstream water quality units are not maintained. The use of pretreatment BMPs will minimize failure and maintenance requirements.

After construction, the infiltration system should be inspected after every major storm for the first few months to ensure proper stabilization. Water levels in the access ports should be recorded over several days to check the drainage of the systems. It is recommended that a log book be maintained showing the depth of water in the systems at each observation in order to determine the rate at which the system dewaters after runoff producing storm events. Once the performance characteristics of the system have been verified, the monitoring schedule can be reduced to an annual basis, unless the performance data suggests that a more frequent schedule is required.

Preventive maintenance on the systems should be performed at least twice a year, and sediment should be removed from any and all pretreatment and collection structures. Sediment should be removed when deposits approach within six inches of the invert heights of connecting pipes, or in sumped inlet structures.

The system is designed with access covers such that a vacuum truck tube that can be used to remove sediment.

Bio-Retention Area

Bio-retention areas require routine maintenance to ensure that the system functions well as a stormwater BMP and maintains an aesthetic element. A landscaping contractor working elsewhere on the site can complete maintenance tasks in many cases.

Systems require careful attention while plants are being established and seasonal landscaping thereafter. Proper selection of plant species and support during establishment of vegetation should minimize—if not eliminate—the need for fertilizers and pesticides.

Bio-retention areas should be inspected on a semi-annual basis and after major storm events. The system should be inspected monthly for erosion. Eroded areas shall be repaired by reseeding or mulching as necessary. Vegetated areas should be properly maintained and mowed to a height of 2-inches. Accumulated litter and debris should be periodically removed to ensure that the storage areas will function properly. Outlet structures should be inspected periodically and after every storm to ensure that the outlet is functioning properly. Paved surfaces directed to the bio-retention area should be cleaned periodically to remove litter, debris, and vehicle-generated residues and other non-point source pollutants to provide increased pollution control.

Vegetation should be inspected twice per year, at the beginning and end of the growing season. Dead and diseased vegetation should be removed and replaced. Weeds and invasive species should be removed and woody vegetation should be pruned as necessary.

Pre-treatment devices, inflow locations, and overflows should be inspected annually to ensure proper functioning. Any sediment build-up should be removed.

Pipe Outlet Protection

The outlet protection should be checked at least annually and after every major storm. If the rip-rap has been displaced, undermined or damaged, it should be repaired immediately. The channel immediately below the outlet should be checked to see that erosion is not occurring. The downstream channel should be kept clear of obstructions such as fallen trees, debris, and sediment that could change flow patterns and/or tailwater depths on the pipes. Repairs must be carried out immediately to avoid additional damage to the outlet protection apron.

PROVISIONS FOR MAINTENANCE OF LAWNS, GARDENS AND OTHER LANDSCAPE AREAS

Suggested Maintenance Operations

A. Trees and Shrubs

Disease and Pest Management - Prevention of disease or infestation is the first step of Pest Management. A plant that is in overall good health is far less susceptible to disease. Good general landscape maintenance can reduce problems from disease.

Inspections of plant materials for signs of disease or infestation are to be performed monthly by the Landscape Maintenance Contractor's Certified Arborist. This is a critical step for early diagnosis. Trees and Shrubs that have been diagnosed to have a plant disease or an infestation of insect pests are to be treated promptly with an appropriate material by a licensed applicator.

Fertilization - Trees and shrubs live outside their natural environment and should be given proper care to maintain health and vigor. Fertilizing trees and shrubs provides the plants with nutrients needed to resist insect attack, to resist drought and to grow thicker foliage. Fertilizing of new and old trees may be done in one of three ways, in either the early spring or the late fall.

- Systemic Injection of new and existing trees on trees 2 inches or greater in diameter. You must be licensed to apply this method.
- Soil Injection – a liquid fertilizer with a product such as Arbor Green or Rapid Grow injected into the soil under the drip zone of a tree or shrub. Material must be used according to manufacturers' specifications to be effective. Outside contracting is recommended.
- Punch Bar Method – a dry fertilizer such as 10-10-10, may be used by punched holes in the drip zone of the tree 12-18" deep, two feet apart around the circumference, to the edge of the drip line. Three pounds of fertilizer should be used per diameter inch for trees with trunks six inches or more in diameter.
- Fertilizer of shrubs – use a fertilizer such as 10-10-10, broadcast over the planting area according to the manufacturers' rate and water in.
- All fertilization must be noted on daily maintenance log.

Watering - Trees and Shrubs will need supplemental watering to remain in vigorous health. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Trees and shrubs should be watered in such a manner as to totally saturate the soil in the root zone area. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

Plant Replacement - Unhealthy plants that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the daily maintenance log. The area shall be treated to prevent further infestation. The plant shall then be replaced with a healthy specimen of the same species and size. This work shall have a pre-established budget allowance for the year.

A spring inspection of all plant materials shall be performed to identify those plant materials that are not in vigorously healthy condition. Unhealthy plant materials shall be evaluated. If the problem is determined to be minor the plant material shall be given appropriate restorative care in accordance with this maintenance guideline until it is restored to a vigorously healthy condition. Unhealthy plant materials that do not respond to restorative care or are determined to be beyond saving shall be replaced with a healthy specimen of the same species and size. In the case of the necessity of replacing extremely large plant materials the Landscape Architect shall determine the size of the replacement plant.

Pruning - Proper pruning is the selective removal of branches without changing the plant's natural appearance, or habit of growth. All tree pruning is to be performed by a licensed Arborist. All branches that are dead, broken, scared or crossing should be removed. All cuts should be made at the collar and not cut flush with the base.

Pruning on the site shall be done for the following purposes;

- To maintain or reduce the size of a tree or shrub
- To remove dead, diseased or damaged branches
- To rejuvenate old shrubs and encourage new growth
- To stimulate future flower and fruit development
- To maximize the visibility of twig color
- To prevent damage and reduce hazards to people and properties

All shrubs are recommended to be pruned on an annual basis to prevent the shrub from becoming overgrown and eliminate the need for drastic pruning. There are several types of pruning for deciduous shrubs. Hand snips should be used to maintain a more natural look or hand shears can be used for a more formal appearance.

Winter Protection - All trees and shrubs are to be watered, fertilized, and mulched before the first frost. All stakes should be checked and ties adjusted. Damaged branches should be pruned.

Broadleaf and Coniferous Evergreen plant materials are to be sprayed with an anti-desiccant product to prevent winter burn. The application shall be repeated during a suitable mid-winter thaw.

Shrubs located in areas likely to be piled with snow during snow removal (but not designated as Snow Storage Areas) shall be marked by six-foot high poles with bright green banner flags. Stockpiles of snow are not to be located in these areas due to potential damage to the plant materials from both the weight of the snow and the snow melting chemicals.

At the fall landscape maintenance conference parameters will be discussed between the Landscape Maintenance Contractor and the snow removal contractor to assure minimal damage and loss of landscape amenities during the winter season.

Seasonal Clean Up - A thorough spring cleanup is to be performed. This includes the removal and replacement of dead or unhealthy plant materials and the cleanup of plant debris and any general debris that has accumulated over the winter season. Mulch is to be lightly raked to clean debris from the surface without removing any mulch. Twigs and debris are to be removed from the planting beds throughout the growing season.

Mulching - Planting beds shall be mulched with a treated shredded hardwood mulch free from dirt, debris, and insects. A sample of this mulch shall be given to the Owner for approval prior to installation.

Maintain a 2-3" maximum depth and keep free of weeds either by hand weeding or by the use of a pre-emergent weed control such as Treflan or Serfian. Seasonal re-mulching shall occur as necessary in the spring and the fall to maintain this minimum depth. When new mulch is added to the planting bed it shall be spread to create a total depth of no more than three inches. Edges should be maintained in a cleanly edged fashion.

Mulch shall not be placed directly against the trunk of any tree or shrub.

B. Groundcover and Perennials

Disease and Pest Management – Pesticides and herbicides should be applied only as problems occur, with the proper chemical applied only by a trained professional or in the case of pesticide, a Certified Pesticide Applicator. Plants should be monitored weekly and treated accordingly.

Fertilizer – The health of the plants can be maintained or improved, and their growth encouraged by an application of complete fertilizer. Apply a fertilizer such as 4-12-4 as growth becomes apparent and before mulching. Apply to all groundcover and perennial planting areas by hand and avoid letting the fertilizer come in contact with the foliage, or use a liquid fertilizer and apply by soaking the soil. Apply according to the manufacturers' specifications.

Fertilization shall stop at the end of July.

Water – Groundcovers and Perennials will need supplemental watering in order to become established, healthy plants. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Until established, groundcovers and perennials should be watered in such a manner as to totally saturate the soil in the root zone area, to a depth of 6 inches. Once established,

perennials shall continue to be watered as necessary to maintain them in a vigorous healthy condition. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

On-site water shall be furnished by the Owner. Hose and other watering equipment shall be furnished by the Landscape Maintenance Contractor.

Replacement – Any unhealthy plant/s that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the landscape maintenance log. The area shall be treated to prevent further infestation. The plant/s shall then be replaced with healthy specimen/s of the same species and size. Old Forge shall have a pre-established budget allowance for this type of replacement, each year.

Plant material that is damaged as a result of other landscape maintenance activities, such as mowing, shall be replaced with healthy specimens of the same species and size, at no additional cost to the owner.

Deadheading – Perennials shall be checked on a weekly basis and dead-headed once flowers have faded or as necessary based on plant type and duration of flower. Spent flowers can be pinched off with the thumb and forefinger. Continue to remove all faded flowers until Fall. All associated debris shall be removed from site daily.

Staking – Upright-growing perennials need support especially when in flower. Use of bamboo stakes, galvanized wire hoops or mesh may be necessary for their support. Supports should be put in place before they have become too difficult to handle. The supports should not be taller than the mature height of the perennial plant.

Division of Perennials – Two or three year-old perennials are easily divided in the spring if more plants are needed. To divide, cut out the entire section of plant to be divided, including roots. The larger divisions (those with three or more shoots), can be set out immediately in their permanent location, where they can be expected to bloom the same season. Smaller divisions are best planted in an out-of-the-way planting bed until the following autumn or spring, when they can be moved to their permanent location.

Weeding – All planting beds should be kept weed-free. Weed either by hand or with a pre-emergent herbicide such as Treflen used according to manufacturers' specifications. Manual weeding is to be used in combination with the use of spot applications of herbicides. Both live and dead weeds are to be pulled and removed from the site.

All herbicide applications shall be documented in the Landscape Maintenance Log. The actual product label or the manufacturer's product specification sheet for the specific product shall also be included in the Log.

Only personnel with appropriate applicator licenses shall supervise and/or perform the application of pesticide products requiring a license.

Winterizing – Perennial gardens should be cleaned-up when growth ceases in the fall. Remove foliage of plants that normally die down to the ground. Divide and replant over-grown clumps.

C. Lawn Areas - Turf Systems

Mowing – Proper mowing is an integral part of any good turf maintenance program. Without it, the finest in fertilization, watering and other vital maintenance practices would be completely ineffective. Proper mowing will help control dicot weeds; help the turf survive during periods of extreme heat, and gain strength and vigor to resist disease and other infestations.

Mowing height – The proper mowing height will vary somewhat according to the type of grass. The most common type of seed & sod lawns contain a mixture of bluegrass, fine fescue and perennial rye, which should be mowed at 2-3 inches.

Mowing frequency – The basic rule of thumb for mowing frequency is to never remove more than 1/3 of the grass blade in one mowing. Example: if you want to mow your turf at 2 inches, you should cut it when it reaches 3 inches. Removing more than ½ of the grass plant at a time can put the plant into shock, thus making it more susceptible to stress disease and weed infestation.

Mowing frequency will vary with the growing season and should be set by the plant height and not a set date. It will often be necessary to mow twice a week during periods of surge growth to help maintain plant health and color. Mowing should be cut back during periods of stress.

Grass clippings should be removed whenever they are thick enough to layer the turf. The return of clippings to the soil actually adds nutrients and helps retain moisture. Heavily clumped grass clippings are a sign of infrequent mowing, calling for an adjustment in the mowing schedule.

When mowing any area, try to alternate mowing patterns. This tends to keep grass blades more erect and assures an even cut. A dull mower will cause color loss due to tearing of the turf plant, and since mowing will ultimately determine the appearance of any turf area there is an absolute necessity for a clean sharp cut.

Weed & Pest Control and Fertilizing- In order to maintain turf grass health, vigor color, and nutrients, fertilizer must be added to the soil. Recommendations for fertilization of lawn areas are as follows; fertilize at the rate of one (1) pound of nitrogen per thousand square feet, per year is optimum. Fertilizer should be a balanced slow release, sulfur coated type fertilizer.

Weed Control - All turf areas will require some weed control, for both weed grasses and dicot weeds. Weeds should be treated at the appropriate time and with a material labeled for the target weed. Please refer to the fertilizer weed and pest schedule for timing.

Pest Control - All turf areas will require some pest control. Pests should be treated at the appropriate time with a material labeled for the target pest. Please refer to the fertilizer, weed and pest schedule for timing.

Lime - A common cause for an unhealthy lawn is acidic soil. When the PH is below the neutral range (between 6-7) vital plant nutrients become fixed in the soil and cannot be absorbed by the grass plant. Lime corrects an acid soil condition, supplies calcium for plant growth and improves air and water circulation. Limestone applied at the rate of 50 lbs. per thousand square feet will adjust the soil PH one point over a period of 6-9 months.

D. Fertilizer, Weed & Pest Control Schedule – Turf Systems

Spring - (April)	Fertilize one (1) pound of nitrogen per 1,000 square feet Pre-emergent weed grass control Broadleaf weed control
Late Spring - (June)	Fertilize one (1) pound of nitrogen per 1,000 square feet Pre-emergent weed grass control Broadleaf weed control Insect Control (if needed)
*Summer - (August)	Fertilize one (1) pound of nitrogen per 1,000 square feet Broadleaf weed control (if needed) Insect Control (if needed)
Fall - (September)	Fertilize one (1) pound of nitrogen per 1,000 square feet

*Omit if area is not to be irrigated

Lawn Maintenance Task Schedule

MARCH (Weather permitting)
- Clean up winter debris, sand, leaves, trash etc.
- Re-edge mulch beds, maintain at 2-3" maximum.
- Fertilize plants
- Aerate and thatch turf (conditions permitting)

APRIL
- Reseed or sod all areas needing attention.
- Fertilize and weed control
- Lime
- Start mowing when grass reaches 2-1/2", mow to 2"

MAY
- Mow turf to 2-2-1/2"
- Weed as necessary.
- Check for disease and pest problems in both turf and plants.

JUNE
- Mow turf to 2-1/2" – 3"
- Fertilize and weed control.
- Weed
- Check for disease and pest problems in both turf and plants, treat as necessary.

PROVISIONS FOR SOLID WASTE MANAGEMENT (SITE TRASH)

Trash will be placed in on-site dumpsters and the Owner will make provisions for its regular and timely removal.

SNOW DISPOSAL AND PLOWING PLANS

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Protection. For the areas that require snow removal, snow storage onsite will largely be accomplished by using pervious areas along the shoulder of the roadway and development as windrowed by plows.

- Avoid dumping of snow into any water body, including rivers, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.
- In significant storm events, the melting or off-site trucking of snow may be implemented. These activities shall be conducted in accordance with all local, state and federal regulations.
- Reference is made to the porous pavement section of this document prohibiting sanding of the porous pavement.

WINTER ROAD SALT AND/OR SAND USE AND STORAGE RESTRICTIONS

The owner/ applicant will be responsible for sanding and salting the site. When possible, sanding is the preferred treatment for improved traction. Salt and deicing chemicals are to be used sparingly and as needed to provide safe conditions to vehicles and pedestrians. No Salt storage is to occur on site. Reference is made to the porous pavement section of this document prohibiting sanding on the porous pavement.

STREET SWEEPING SCHEDULES

There are three types of sweepers: Mechanical, Regenerative Air, and Vacuum Filter.

1) Mechanical: Mechanical sweepers use brooms or rotary brushes to scour the pavement.
2) Regenerative Air: These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed.
3) Vacuum filter: These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available - wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem.

This project has not included street sweeping as part of the TSS removal calculations. However, it is recommended that street sweeping of the parking areas occur four times a year, including once after the spring snow melt.

Reuse and Disposal of Street Sweepings

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Mass DEP's Bureau of Waste Prevention has issued a written policy regarding the reuse and disposal of street sweepings. These sweepings are regulated as a solid waste, and can be used in three ways:

- In one of the ways already approved by Mass DEP (e.g., daily cover in a landfill, additive to compost, fill in a public way)
- If approved under a Beneficial Use Determination
- Disposed in a landfill

TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Long-Term Pollution Prevention Plan is to be implemented by property owner of the site. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The owner / applicant will be required to implement the Long-Term Pollution Prevention Plan and will create and maintain a list of emergency contacts.

POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

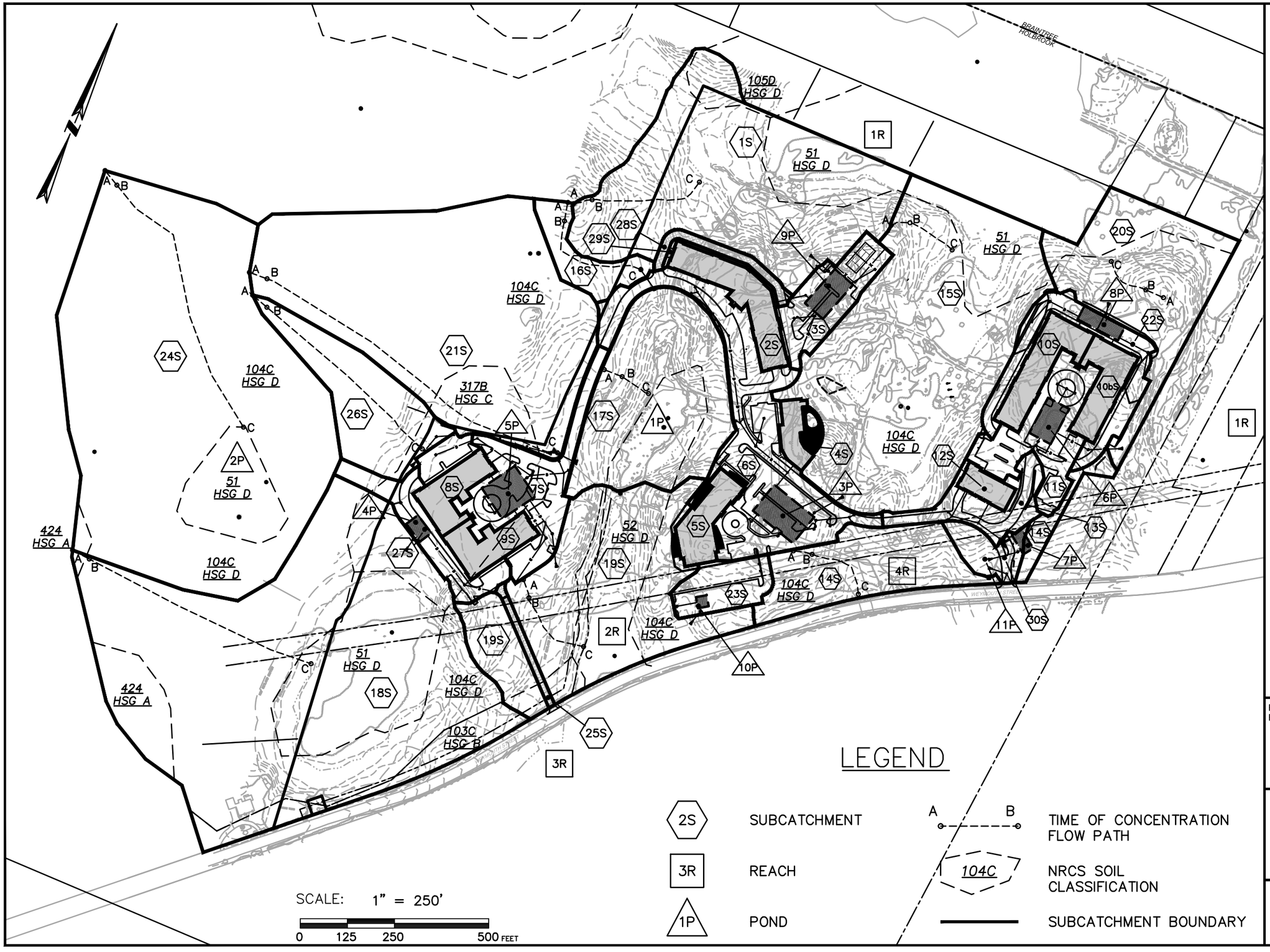
Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Catch Basin	Four times a year			
		Water Quality Units	Four times a year			
		Infiltration System	Twice a year			
		Bio-Retention Area	Twice a year			
		Pipe Outlet Protection	Once a year			

1. Refer to the Massachusetts Stormwater Handbook Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's
2. Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.
3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
4. Other Notes: (Include deviations from Conservation Commission Approvals, Planning Board Approvals and Approved Plans)

SECTION 6.0

HYDROLOGY CALCULATIONS

6.01 APPROVED PROJECT WATERSHED PLAN



BRIGADOON

WEYMOUTH STREET

HOLBROOK
MASSACHUSETTS
(NORFOLK COUNTY)

POST-DEVELOPMENT WATERSHED MAP

APRIL, 2018

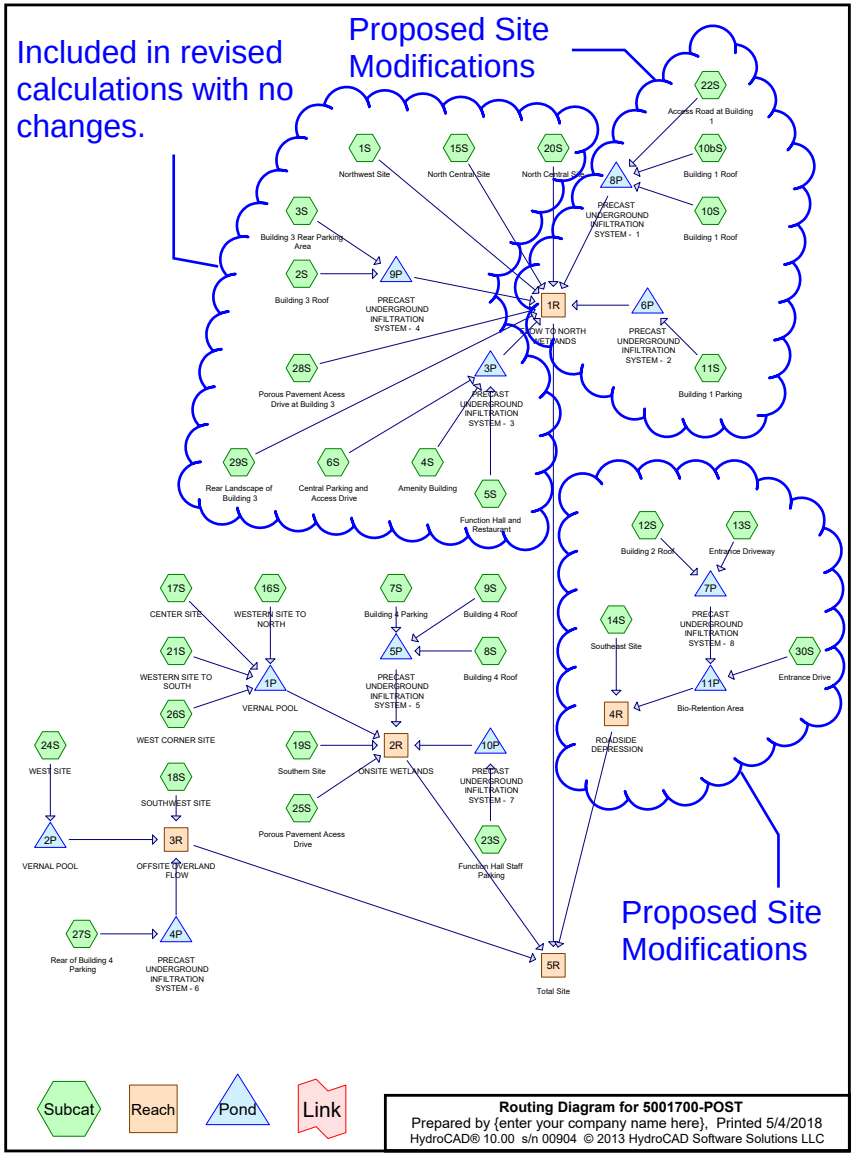
PREPARED FOR:

SIDDHARTH SIDDHARTH
1 SIDDHARTH LANE
HOLBROOK, MA

BSC GROUP
349 Main Street - Route 28
West Yarmouth, Massachusetts
02673
508 778 8919

Job No.: 50017.00 Date: 4/16/2018
Scale: 1" = 250' Revised:
Dwg No:
File: 5001700-WS.dwg

6.02 APPROVED PROJECT HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.687	74	>75% Grass cover, Good, HSG C (7S, 21S, 26S, 27S)
5.719	80	>75% Grass cover, Good, HSG D (1S, 3S, 6S, 7S, 11S, 13S, 14S, 15S, 16S, 19S, 20S, 21S, 22S, 23S, 27S, 29S, 30S)
0.022	98	Patio (19S)
8.177	98	Paved parking (3S, 4S, 6S, 7S, 11S, 18S, 22S, 23S, 27S, 28S, 30S)
0.465	98	Paved parking, HSG D (13S)
0.150	98	Paved roads (25S)
3.851	98	Roof (2S, 4S, 5S, 8S, 9S, 10bS, 10S, 12S)
0.828	30	Woods, Good, HSG A (18S)
0.951	55	Woods, Good, HSG B (18S, 19S)
1.932	70	Woods, Good, HSG C (18S, 21S, 26S, 27S)
52.073	77	Woods, Good, HSG D (1S, 14S, 15S, 16S, 17S, 18S, 19S, 20S, 21S, 24S, 26S, 27S)
0.152	32	Woods/grass comb., Good, HSG A (18S)
0.181	58	Woods/grass comb., Good, HSG B (18S)
12.490	79	Woods/grass comb., Good, HSG D (1S, 14S, 15S, 17S, 18S, 19S, 20S)
87.678	**80**	**TOTAL AREA**

"TOTAL AREA IMPACTED = 32.894 AC

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.152	0.181	0.000	12.490	0.000	12.823	Woods/grass comb., Good	1S, 14S, 15S, 17S, 18S, 19S, 20S
0.980	**1.132**	**2.619**	**70.747**	**12.200**	**87.678**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3P	177.37	176.63	74.0	0.0100	0.013	15.0	0.0	0.0
2	4P	188.67	188.55	23.0	0.0052	0.013	12.0	0.0	0.0
3	5P	186.00	185.62	76.0	0.0050	0.013	15.0	0.0	0.0
4	6P	178.50	178.11	78.0	0.0050	0.013	12.0	0.0	0.0
5	7P	165.97	164.00	73.0	0.0270	0.013	12.0	0.0	0.0
6	8P	174.97	174.81	16.0	0.0100	0.013	15.0	0.0	0.0
7	9P	188.37	188.12	51.0	0.0049	0.013	12.0	0.0	0.0
8	10P	170.87	170.00	35.0	0.0249	0.013	12.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>1.21"
Flow Length=356' Tc=7.4 min CN=77 Runoff=8.94 cfs 0.685 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=2.39 cfs 0.190 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>2.64"
Tc=6.0 min CN=95 Runoff=3.03 cfs 0.228 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.14 cfs 0.091 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.55 cfs 0.123 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>2.54"
Tc=6.0 min CN=94 Runoff=9.66 cfs 0.717 af

Subcatchment 7S: Building 4 Parking Runoff Area=85,450 sf 75.32% Impervious Runoff Depth>2.44"
Tc=6.0 min CN=93 Runoff=5.45 cfs 0.399 af

Subcatchment 8S: Building 4 Roof Runoff Area=21,010 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.50 cfs 0.119 af

Subcatchment 9S: Building 4 Roof Runoff Area=21,018 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.50 cfs 0.119 af

Subcatchment 10bS: Building 1 Roof Runoff Area=22,843 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.63 cfs 0.130 af

Subcatchment 10S: Building 1 Roof Runoff Area=27,703 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.98 cfs 0.157 af

Subcatchment 11S: Building 1 Parking Runoff Area=61,272 sf 67.99% Impervious Runoff Depth>2.35"
Tc=6.0 min CN=92 Runoff=3.79 cfs 0.275 af

Subcatchment 12S: Building 2 Roof Runoff Area=9,490 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=0.68 cfs 0.054 af

Subcatchment 13S: Entrance Driveway Runoff Area=35,925 sf 56.34% Impervious Runoff Depth>2.17"
Tc=6.0 min CN=90 Runoff=2.07 cfs 0.149 af

Subcatchment 14S: Southeast Site Runoff Area=105,636 sf 0.00% Impervious Runoff Depth>1.27"
Flow Length=236' Tc=9.9 min CN=78 Runoff=3.10 cfs 0.257 af

Subcatchment 15S: North Central Site Runoff Area=369,489 sf 0.00% Impervious Runoff Depth>1.27"
Flow Length=185' Tc=5.8 min CN=78 Runoff=12.49 cfs 0.899 af

Subcatchment 16S: WESTERN SITE TO Runoff Area=31,580 sf 0.00% Impervious Runoff Depth>1.27"
Flow Length=354' Tc=6.5 min CN=78 Runoff=1.04 cfs 0.077 af

Subcatchment 17S: CENTER SITE Runoff Area=169,775 sf 0.00% Impervious Runoff Depth>1.27"
Flow Length=134' Tc=7.3 min CN=78 Runoff=5.44 cfs 0.413 af

Subcatchment 18S: SOUTHWEST SITE Runoff Area=649,615 sf 0.75% Impervious Runoff Depth>0.98"
Flow Length=702' Slope=0.0700 '/' Tc=10.1 min CN=73 Runoff=13.93 cfs 1.218 af

Subcatchment 19S: Southern Site Runoff Area=241,566 sf 0.41% Impervious Runoff Depth>1.21"
Flow Length=262' Tc=4.1 min CN=77 Runoff=8.22 cfs 0.559 af

Subcatchment 20S: North Central Site Runoff Area=143,769 sf 0.00% Impervious Runoff Depth>1.33"
Flow Length=180' Tc=5.8 min CN=79 Runoff=5.13 cfs 0.367 af

Subcatchment 21S: WESTERN SITE TO Runoff Area=401,163 sf 0.00% Impervious Runoff Depth>1.15"
Flow Length=959' Tc=15.0 min CN=76 Runoff=9.03 cfs 0.881 af

Subcatchment 22S: Access Road at Runoff Area=50,837 sf 69.51% Impervious Runoff Depth>2.44"
Tc=6.0 min CN=93 Runoff=3.24 cfs 0.238 af

Subcatchment 23S: Function Hall Staff Runoff Area=31,111 sf 56.03% Impervious Runoff Depth>2.17"
Tc=6.0 min CN=90 Runoff=1.80 cfs 0.129 af

Subcatchment 24S: WEST SITE Runoff Area=605,999 sf 0.00% Impervious Runoff Depth>1.21"
Flow Length=800' Tc=11.4 min CN=77 Runoff=16.02 cfs 1.401 af

Subcatchment 25S: Porous Pavement Runoff Area=6,516 sf 100.00% Impervious Runoff Depth>2.48"
Tc=462.0 min CN=98 Runoff=0.05 cfs 0.031 af

Subcatchment 26S: WEST CORNER SITE Runoff Area=89,427 sf 0.00% Impervious Runoff Depth>1.15"
Flow Length=609' Tc=12.9 min CN=76 Runoff=2.13 cfs 0.196 af

Subcatchment 27S: Rear of Building 4 Runoff Area=38,647 sf 52.96% Impervious Runoff Depth>1.91"
Tc=6.0 min CN=87 Runoff=1.99 cfs 0.141 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>2.48"
Tc=462.0 min CN=98 Runoff=0.08 cfs 0.055 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>1.40"
Tc=6.0 min CN=80 Runoff=0.14 cfs 0.010 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>1.54"
Tc=6.0 min CN=82 Runoff=1.00 cfs 0.071 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=26.51 cfs 2.134 af
Outflow=26.51 cfs 2.134 af

Reach 2R: ONSITE WETLANDS Inflow=8.22 cfs 0.635 af
Outflow=8.22 cfs 0.635 af

Reach 3R: OFFSITE OVERLAND FLOW Inflow=13.93 cfs 1.716 af
Outflow=13.93 cfs 1.716 af

Reach 4R: ROADSIDE DEPRESSION Inflow=3.10 cfs 0.257 af
Outflow=3.10 cfs 0.257 af

Reach 5R: Total Site Inflow=49.00 cfs 4.742 af
Outflow=49.00 cfs 4.742 af

Pond 1P: VERNAL POOL Peak Elev=171.51' Storage=1.567 af Inflow=15.94 cfs 1.567 af
Outflow=0.00 cfs 0.000 af

Pond 2P: VERNAL POOL Peak Elev=216.08' Storage=0.946 af Inflow=16.02 cfs 1.401 af
Outflow=1.10 cfs 0.498 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=179.84' Storage=25,577 cf Inflow=12.35 cfs 0.931 af
Discarded=0.29 cfs 0.409 af Primary=0.00 cfs 0.000 af Outflow=0.29 cfs 0.409 af

Pond 4P: PRECAST UNDERGROUND Peak Elev=187.33' Storage=2,705 cf Inflow=1.99 cfs 0.141 af
Discarded=0.13 cfs 0.141 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.141 af

Pond 5P: PRECAST UNDERGROUND Peak Elev=187.83' Storage=11,260 cf Inflow=8.44 cfs 0.638 af
Discarded=0.58 cfs 0.638 af Primary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.638 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=179.04' Storage=6,172 cf Inflow=3.79 cfs 0.275 af
Discarded=0.16 cfs 0.200 af Primary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.200 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=171.01' Storage=4,779 cf Inflow=2.75 cfs 0.203 af
Discarded=0.10 cfs 0.130 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.130 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=176.90' Storage=7,930 cf Inflow=6.84 cfs 0.524 af
Discarded=0.26 cfs 0.357 af Primary=2.15 cfs 0.118 af Outflow=2.41 cfs 0.475 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=189.50' Storage=6,800 cf Inflow=5.42 cfs 0.418 af
Discarded=0.43 cfs 0.418 af Primary=0.00 cfs 0.000 af Outflow=0.43 cfs 0.418 af

Pond 10P: PRECAST UNDERGROUND Peak Elev=173.20' Storage=1,654 cf Inflow=1.80 cfs 0.129 af
Discarded=0.05 cfs 0.062 af Primary=1.15 cfs 0.045 af Outflow=1.20 cfs 0.106 af

Pond 11P: Bio-Retention Area Peak Elev=165.29' Storage=3,107 cf Inflow=1.00 cfs 0.071 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 87.678 ac Runoff Volume = 10.379 af Average Runoff Depth = 1.42"
85.56% Pervious = 75.013 ac 14.44% Impervious = 12.665 ac

Summary for Subcatchment 1S: Northwest Site

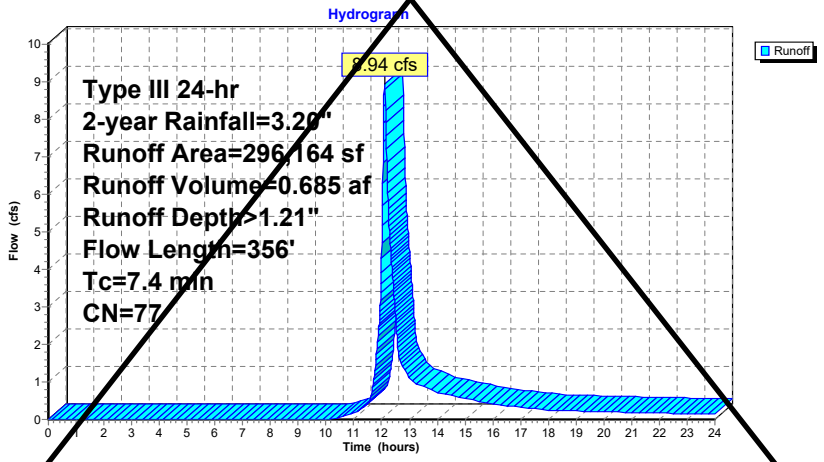
Runoff = 8.94 cfs @ 12.11 hrs, Volume= 0.685 af, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 10bS: Building 1 Roof

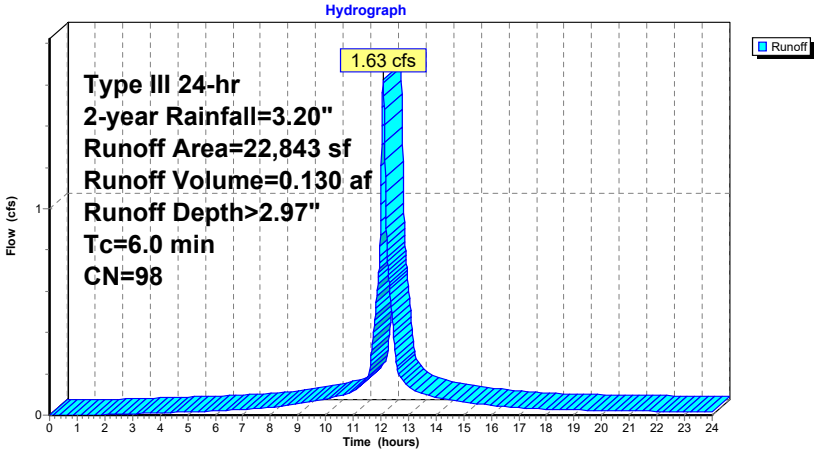
Runoff = 1.63 cfs @ 12.08 hrs, Volume= 0.130 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	22,843	98	Roof
	22,843		100.00% Impervious Area

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

Subcatchment 10bS: Building 1 Roof



Summary for Subcatchment 10S: Building 1 Roof

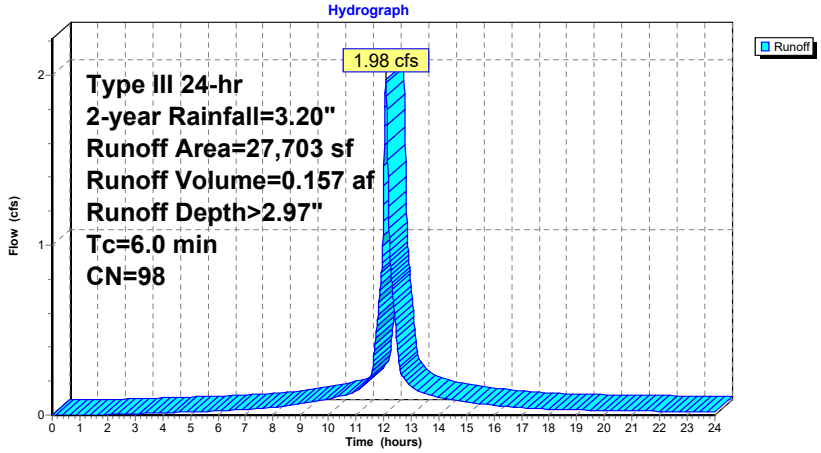
Runoff = 1.98 cfs @ 12.08 hrs, Volume= 0.157 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	27,703	98	Roof
	27,703		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

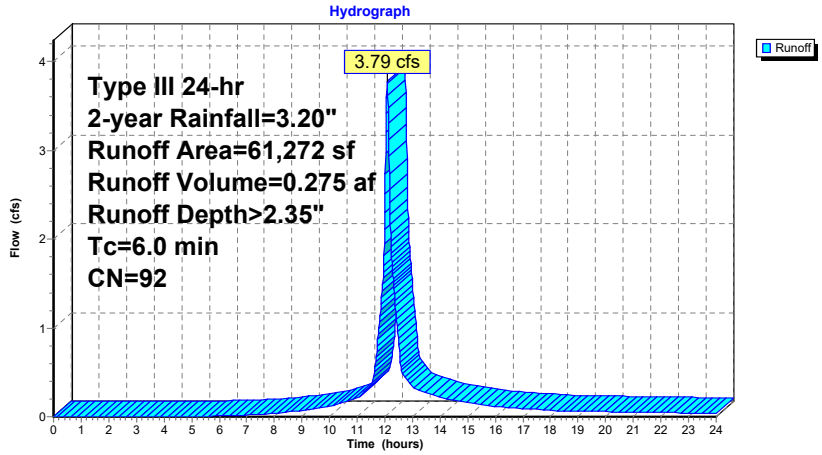
Runoff = 3.79 cfs @ 12.09 hrs, Volume= 0.275 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
	19,615	80	>75% Grass cover, Good, HSG D
*	41,657	98	Paved parking
	61,272	92	Weighted Average
	19,615		32.01% Pervious Area
	41,657		67.99% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

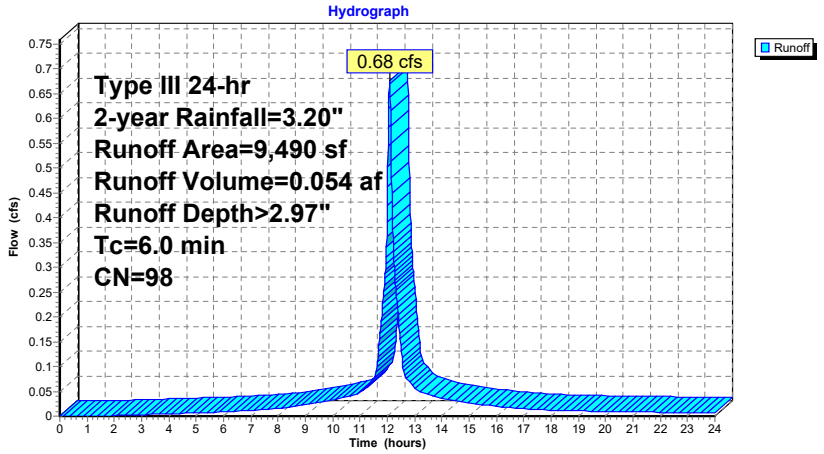
Runoff = 0.68 cfs @ 12.08 hrs, Volume= 0.054 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	9,490	98	Roof
	9,490		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

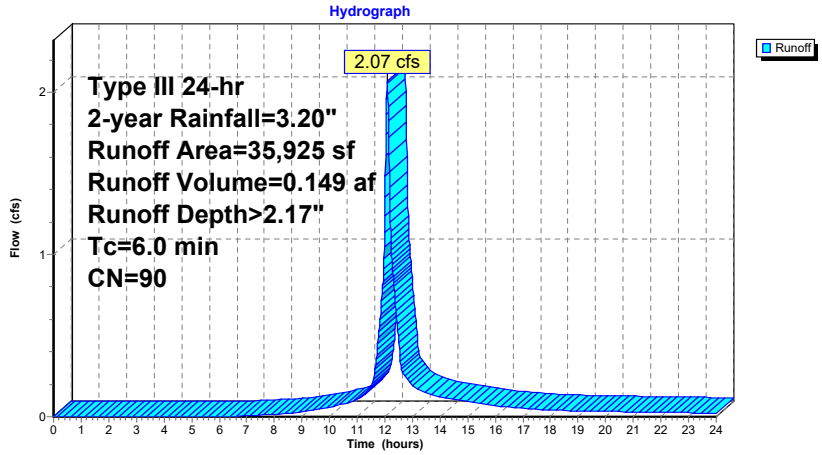
Runoff = 2.07 cfs @ 12.09 hrs, Volume= 0.149 af, Depth> 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
15,684	80	>75% Grass cover, Good, HSG D
20,241	98	Paved parking, HSG D
35,925	90	Weighted Average
15,684		43.66% Pervious Area
20,241		56.34% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

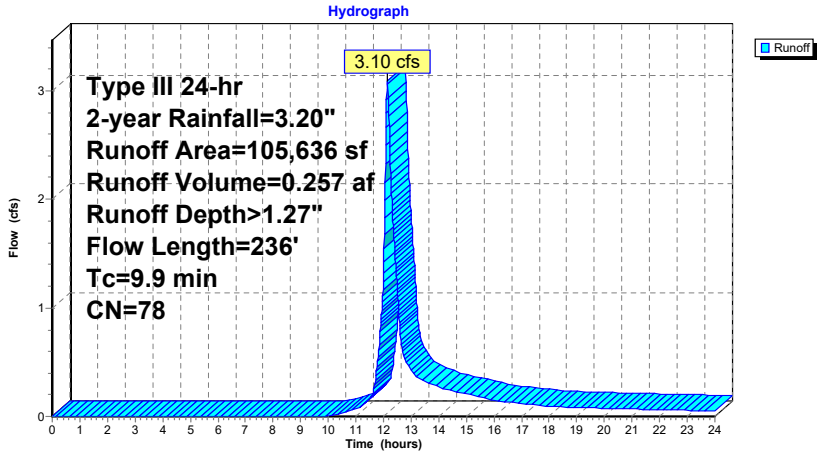
Runoff = 3.10 cfs @ 12.14 hrs, Volume= 0.257 af, Depth> 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
50,615	79	Woods/grass comb., Good, HSG D
10,545	80	>75% Grass cover, Good, HSG D
105,636	78	Weighted Average
105,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 20S: North Central Site

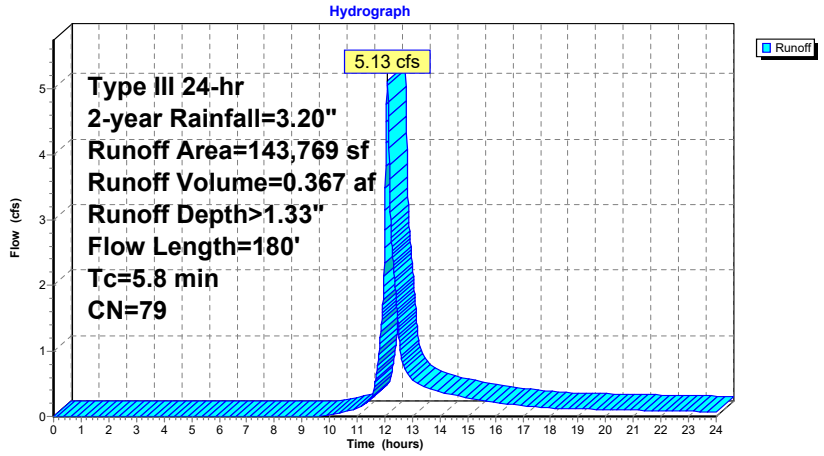
Runoff = 5.13 cfs @ 12.09 hrs, Volume= 0.367 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
108,663	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
143,769	79	Weighted Average
143,769		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total			

Subcatchment 20S: North Central Site



Summary for Subcatchment 21S: WESTERN SITE TO SOUTH

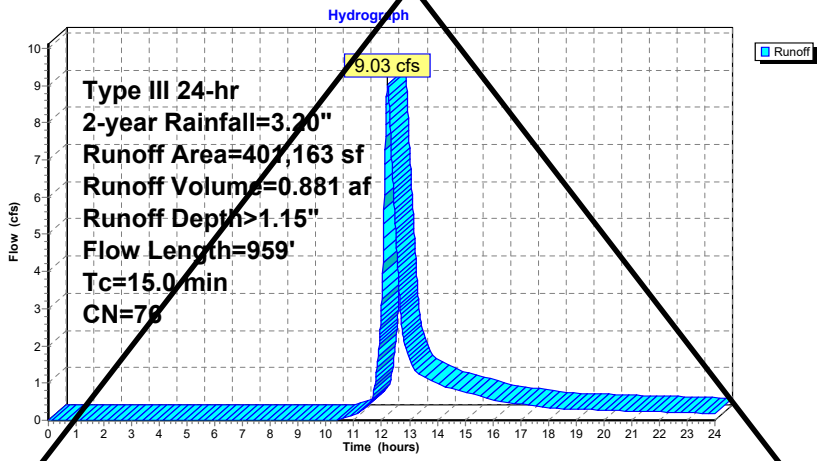
Runoff = 9.03 cfs @ 12.22 hrs, Volume= 0.881 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
348,163	77	Woods, Good, HSG D
11,804	80	>75% Grass cover, Good, HSG D
37,306	70	Woods, Good, HSG C
3,890	74	>75% Grass cover, Good, HSG C
401,163	76	Weighted Average
401,163		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
4.5	909	0.0430	3.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
15.0	959	Total			

Subcatchment 21S: WESTERN SITE TO SOUTH



Summary for Subcatchment 22S: Access Road at Building 1

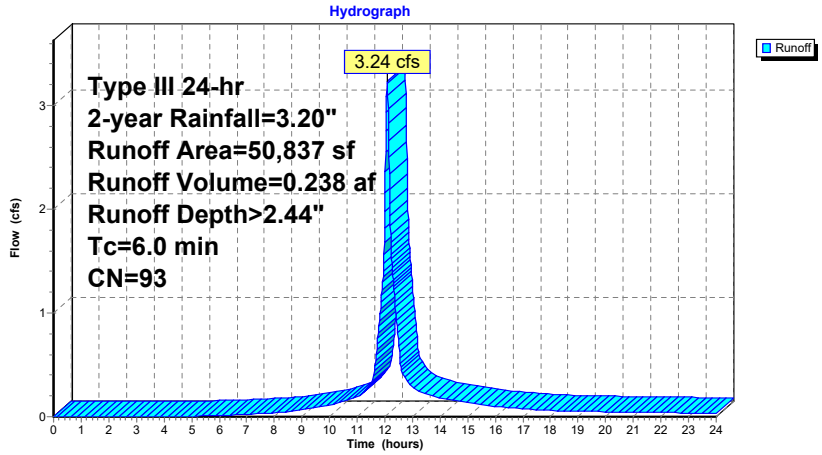
Runoff = 3.24 cfs @ 12.09 hrs, Volume= 0.238 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	35,337	98	Paved parking
	15,500	80	>75% Grass cover, Good, HSG D
	50,837	93	Weighted Average
	15,500		30.49% Pervious Area
	35,337		69.51% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 23S: Function Hall Staff Parking

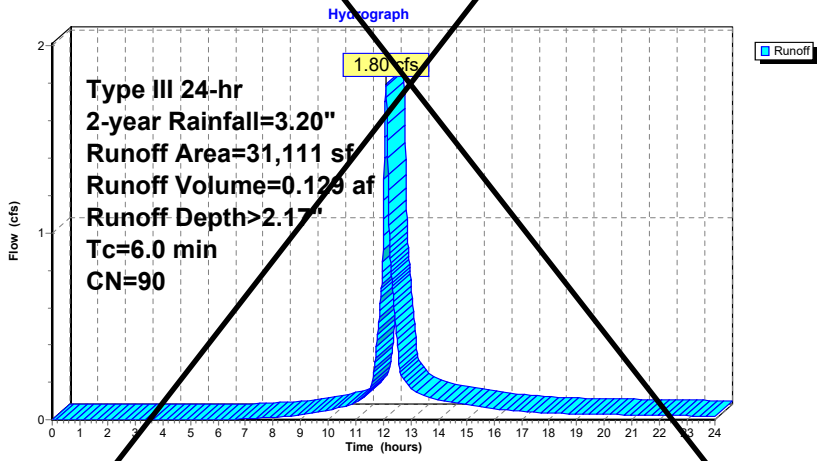
Runoff = 1.80 cfs @ 12.09 hrs, Volume= 0.129 af, Depth> 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	17,432	98	Paved parking
	13,679	80	>75% Grass cover, Good, HSG D
	31,111	90	Weighted Average
	13,679		43.97% Pervious Area
	17,432		56.03% Impervious Area

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

Subcatchment 23S: Function Hall Staff Parking



Summary for Subcatchment 30S: Entrance Drive

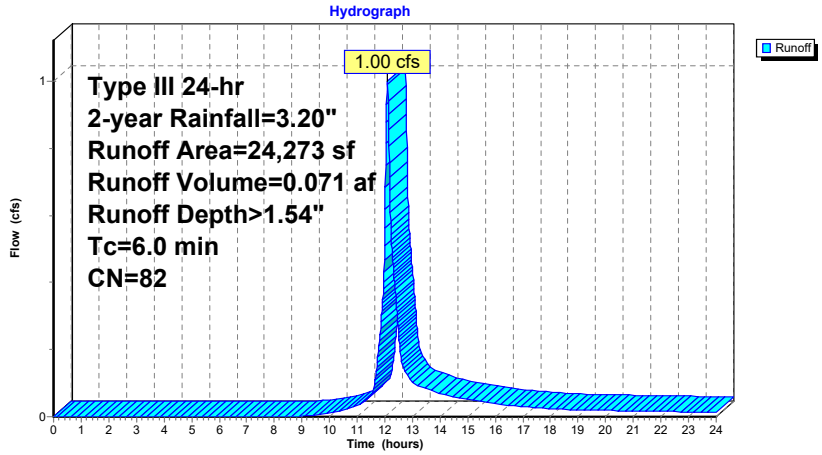
Runoff = 1.00 cfs @ 12.09 hrs, Volume= 0.071 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive

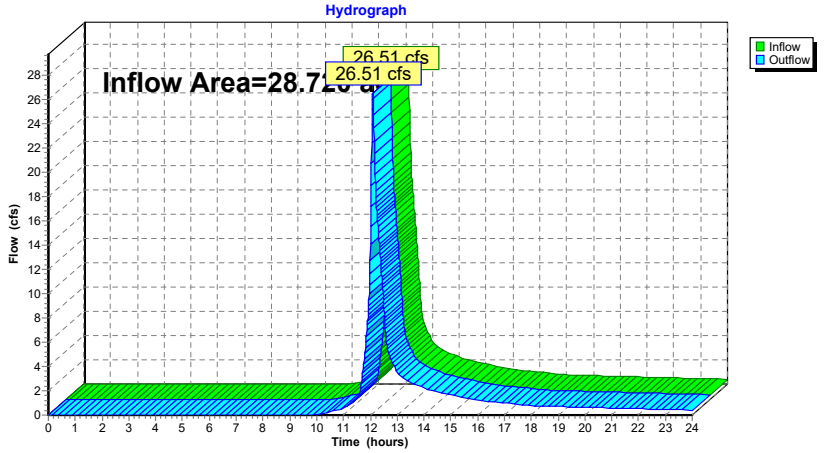


Summary for Reach 1R: FLOW TO NORTH WETLANDS

Inflow Area = 28.720 ac, 28.94% Impervious, Inflow Depth > 0.89" for 2-year event
Inflow = 26.51 cfs @ 12.10 hrs, Volume= 2.134 af
Outflow = 26.51 cfs @ 12.10 hrs, Volume= 2.134 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS

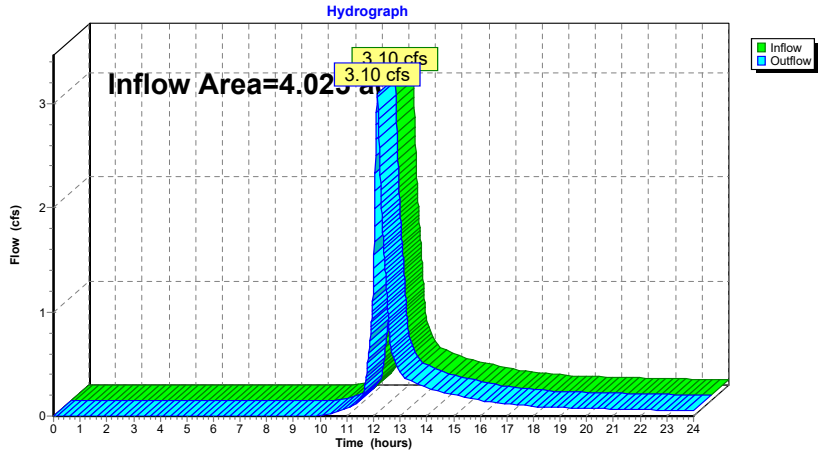


Summary for Reach 4R: ROADSIDE DEPRESSION

Inflow Area = 4.025 ac, 18.84% Impervious, Inflow Depth > 0.77" for 2-year event
Inflow = 3.10 cfs @ 12.14 hrs, Volume= 0.257 af
Outflow = 3.10 cfs @ 12.14 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION

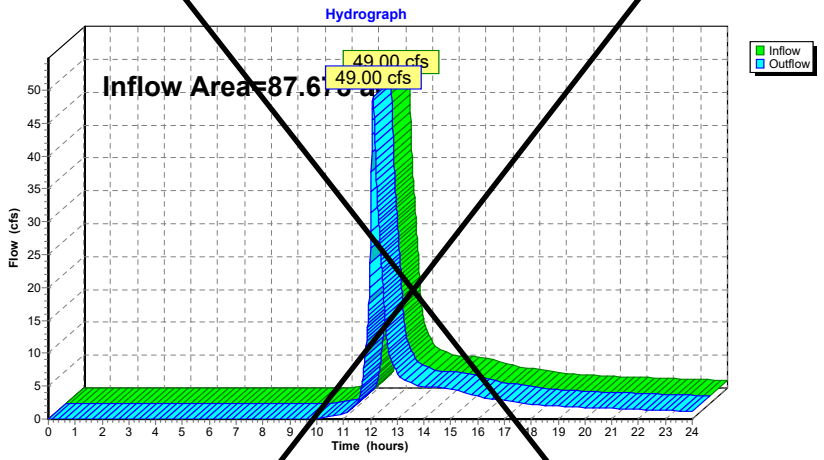


Summary for Reach 5R: Total Site

Inflow Area = 87.678 ac, 14.44% Impervious, Inflow Depth > 0.65" for 2-year event
Inflow = 49.00 cfs @ 12.11 hrs, Volume= 4.742 af
Outflow = 49.00 cfs @ 12.11 hrs, Volume= 4.742 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 5R: Total Site



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.407 ac, 67.99% Impervious, Inflow Depth > 2.35" for 2-year event
Inflow = 3.79 cfs @ 12.09 hrs, Volume= 0.275 af
Outflow = 0.16 cfs @ 11.34 hrs, Volume= 0.200 af, Atten= 96%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.34 hrs, Volume= 0.200 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.04' @ 15.07 hrs Surf.Area= 6,784 sf Storage= 6,172 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 185.6 min (982.7 - 797.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

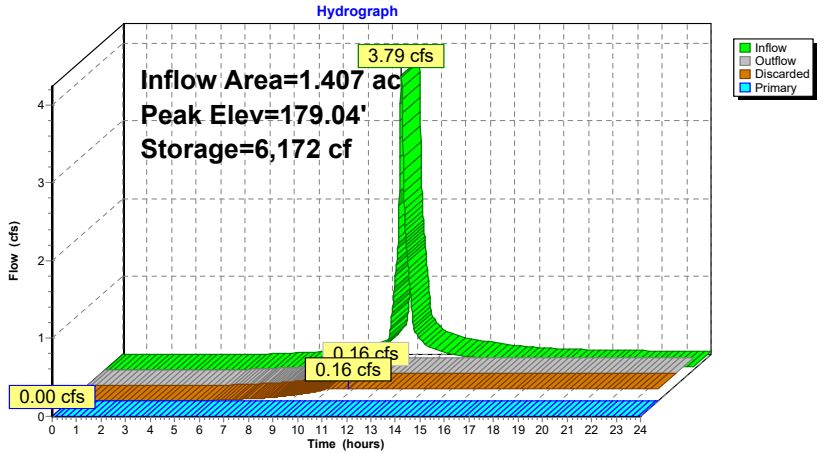
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 11.34 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.043 ac, 65.47% Impervious, Inflow Depth > 2.33" for 2-year event
Inflow = 2.75 cfs @ 12.09 hrs, Volume= 0.203 af
Outflow = 0.10 cfs @ 11.03 hrs, Volume= 0.130 af, Atten= 96%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.03 hrs, Volume= 0.130 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.01' @ 15.55 hrs Surf.Area= 1,801 sf Storage= 4,779 cf
Flood Elev= 172.00' Surf.Area= 1,801 sf Storage= 6,342 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 172.5 min (965.4 - 792.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**30.27'W x 59.50'L x 4.50'H Field A** 8,105 cf Overall - 8,105 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	6,342 cf	**StormTrap SingleTrap 4-0** x 6 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 16.96' x 46.19' Core + 6.66' Border = 30.27' x 59.50' System
		6,342 cf	Total Available Storage

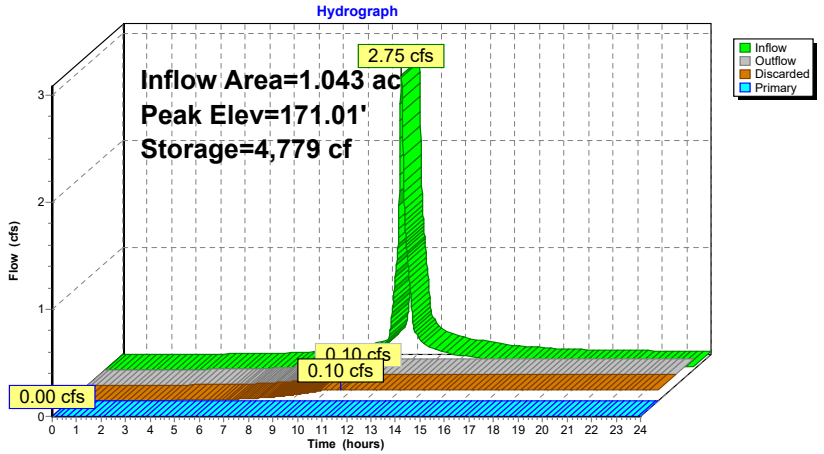
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 11.03 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' TW=163.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.00 cfs of 4.68 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.327 ac, 84.71% Impervious, Inflow Depth > 2.70" for 2-year event
Inflow = 6.84 cfs @ 12.08 hrs, Volume= 0.524 af
Outflow = 2.41 cfs @ 12.35 hrs, Volume= 0.475 af, Atten= 65%, Lag= 15.9 min
Discarded = 0.26 cfs @ 10.65 hrs, Volume= 0.357 af
Primary = 2.15 cfs @ 12.35 hrs, Volume= 0.118 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 176.90' @ 12.35 hrs Surf.Area= 4,692 sf Storage= 7,930 cf
Flood Elev= 178.00' Surf.Area= 4,692 sf Storage= 12,503 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 122.9 min (895.1 - 772.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 121.08'L x 3.50'H Field A** 16,422 cf Overall - 16,422 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	12,503 cf	**StormTrap SingleTrap 3-0** x 21 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
		12,503 cf	Total Available Storage

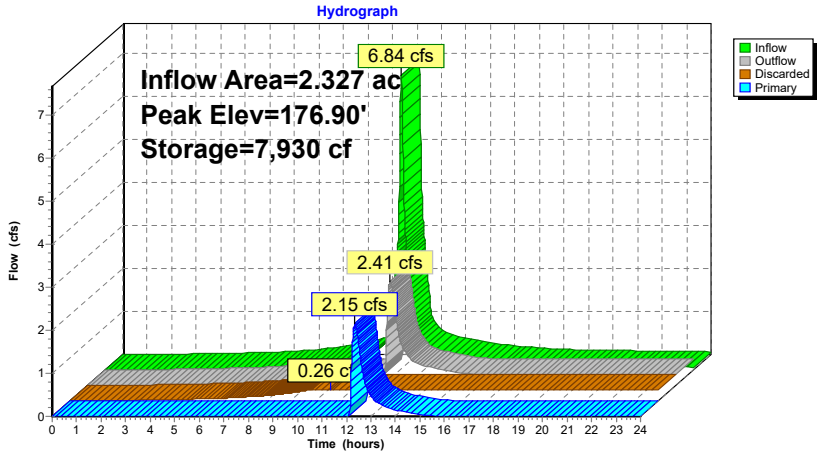
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.97'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.97' / 174.81' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	176.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 10.65 hrs HW=175.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=2.14 cfs @ 12.35 hrs HW=176.90' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 2.14 cfs of 6.61 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.14 cfs @ 1.80 fps)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.600 ac, 47.41% Impervious, Inflow Depth > 0.54" for 2-year event
Inflow = 1.00 cfs @ 12.09 hrs, Volume= 0.071 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 165.29' @ 24.00 hrs Surf.Area= 2,120 sf Storage= 3,107 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

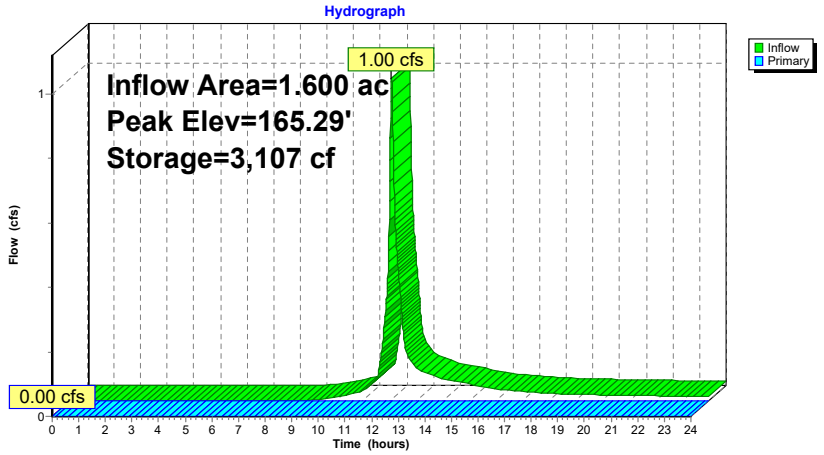
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

Device	Routing	Invert	Outlet Devices
#1	Primary	167.30'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Bio-Retention Area



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>2.37"
Flow Length=356' Tc=7.4 min CN=77 Runoff=18.00 cfs 1.343 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=3.53 cfs 0.286 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>4.12"
Tc=6.0 min CN=95 Runoff=4.61 cfs 0.355 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=1.69 cfs 0.136 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=2.29 cfs 0.186 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>4.01"
Tc=6.0 min CN=94 Runoff=14.86 cfs 1.130 af

Subcatchment 7S: Building 4 Parking Runoff Area=85,450 sf 75.32% Impervious Runoff Depth>3.90"
Tc=6.0 min CN=93 Runoff=8.47 cfs 0.638 af

Subcatchment 8S: Building 4 Roof Runoff Area=21,010 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=2.22 cfs 0.179 af

Subcatchment 9S: Building 4 Roof Runoff Area=21,018 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=2.22 cfs 0.179 af

Subcatchment 10bS: Building 1 Roof Runoff Area=22,843 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=2.41 cfs 0.195 af

Subcatchment 10S: Building 1 Roof Runoff Area=27,703 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=2.92 cfs 0.236 af

Subcatchment 11S: Building 1 Parking Runoff Area=61,272 sf 67.99% Impervious Runoff Depth>3.79"
Tc=6.0 min CN=92 Runoff=5.97 cfs 0.445 af

Subcatchment 12S: Building 2 Roof Runoff Area=9,490 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=1.00 cfs 0.081 af

Subcatchment 13S: Entrance Driveway Runoff Area=35,925 sf 56.34% Impervious Runoff Depth>3.58"
Tc=6.0 min CN=90 Runoff=3.46 cfs 0.246 af

Subcatchment 14S: Southeast Site Runoff Area=105,636 sf 0.00% Impervious Runoff Depth>2.45"
Flow Length=236' Tc=9.9 min CN=78 Runoff=6.12 cfs 0.496 af

Subcatchment 15S: North Central Site Runoff Area=369,489 sf 0.00% Impervious Runoff Depth>2.46"
Flow Length=185' Tc=5.8 min CN=78 Runoff=24.62 cfs 1.736 af

Subcatchment 16S: WESTERN SITE TO Runoff Area=31,580 sf 0.00% Impervious Runoff Depth>2.46"
Flow Length=354' Tc=6.5 min CN=78 Runoff=2.05 cfs 0.148 af

Subcatchment 17S: CENTER SITE Runoff Area=169,775 sf 0.00% Impervious Runoff Depth>2.46"
Flow Length=134' Tc=7.3 min CN=78 Runoff=10.74 cfs 0.797 af

Subcatchment 18S: SOUTHWEST SITE Runoff Area=649,615 sf 0.75% Impervious Runoff Depth>2.04"
Flow Length=702' Slope=0.0700 '/' Tc=10.1 min CN=73 Runoff=30.77 cfs 2.539 af

Subcatchment 19S: Southern Site Runoff Area=241,566 sf 0.41% Impervious Runoff Depth>2.37"
Flow Length=262' Tc=4.1 min CN=77 Runoff=16.52 cfs 1.096 af

Subcatchment 20S: North Central Site Runoff Area=143,769 sf 0.00% Impervious Runoff Depth>2.54"
Flow Length=180' Tc=5.8 min CN=79 Runoff=9.92 cfs 0.699 af

Subcatchment 21S: WESTERN SITE TO Runoff Area=401,163 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=959' Tc=15.0 min CN=76 Runoff=18.61 cfs 1.752 af

Subcatchment 22S: Access Road at Runoff Area=50,837 sf 69.51% Impervious Runoff Depth>3.90"
Tc=6.0 min CN=93 Runoff=5.04 cfs 0.379 af

Subcatchment 23S: Function Hall Staff Runoff Area=31,111 sf 56.03% Impervious Runoff Depth>3.58"
Tc=6.0 min CN=90 Runoff=2.91 cfs 0.213 af

Subcatchment 24S: WEST SITE Runoff Area=605,999 sf 0.00% Impervious Runoff Depth>2.37"
Flow Length=800' Tc=11.4 min CN=77 Runoff=32.29 cfs 2.746 af

Subcatchment 25S: Porous Pavement Runoff Area=6,516 sf 100.00% Impervious Runoff Depth>3.74"
Tc=462.0 min CN=98 Runoff=0.07 cfs 0.047 af

Subcatchment 26S: WEST CORNER SITE Runoff Area=89,427 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=609' Tc=12.9 min CN=76 Runoff=4.39 cfs 0.391 af

Subcatchment 27S: Rear of Building 4 Runoff Area=38,647 sf 52.96% Impervious Runoff Depth>3.28"
Tc=6.0 min CN=87 Runoff=3.37 cfs 0.243 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>3.74"
Tc=462.0 min CN=98 Runoff=0.13 cfs 0.083 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>2.63"
Tc=6.0 min CN=80 Runoff=0.27 cfs 0.019 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>2.81"
Tc=6.0 min CN=82 Runoff=1.84 cfs 0.130 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=58.44 cfs 4.548 af
Outflow=58.44 cfs 4.548 af

Reach 2R: ONSITE WETLANDS Inflow=19.02 cfs 2.360 af
Outflow=19.02 cfs 2.360 af

Reach 3R: OFFSITE OVERLAND FLOW Inflow=30.77 cfs 4.368 af
Outflow=30.77 cfs 4.368 af

Reach 4R: ROADSIDE DEPRESSION Inflow=6.12 cfs 0.514 af
Outflow=6.12 cfs 0.514 af

Reach 5R: Total Site Inflow=109.63 cfs 11.790 af
Outflow=109.63 cfs 11.790 af

Pond 1P: VERNAL POOL Peak Elev=172.13' Storage=2.166 af Inflow=32.55 cfs 3.089 af
Outflow=2.31 cfs 1.004 af

Pond 2P: VERNAL POOL Peak Elev=216.35' Storage=1.211 af Inflow=32.29 cfs 2.746 af
Outflow=10.38 cfs 1.829 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=180.88' Storage=36,847 cf Inflow=18.83 cfs 1.452 af
Discarded=0.29 cfs 0.448 af Primary=0.96 cfs 0.224 af Outflow=1.25 cfs 0.672 af

Pond 4P: PRECAST UNDERGROUND Peak Elev=188.80' Storage=5,713 cf Inflow=3.37 cfs 0.243 af
Discarded=0.13 cfs 0.160 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.160 af

Pond 5P: PRECAST UNDERGROUND Peak Elev=188.58' Storage=18,101 cf Inflow=12.91 cfs 0.996 af
Discarded=0.58 cfs 0.780 af Primary=1.02 cfs 0.098 af Outflow=1.60 cfs 0.878 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=179.60' Storage=9,542 cf Inflow=5.97 cfs 0.445 af
Discarded=0.16 cfs 0.220 af Primary=0.43 cfs 0.063 af Outflow=0.59 cfs 0.283 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=171.64' Storage=5,767 cf Inflow=4.36 cfs 0.327 af
Discarded=0.10 cfs 0.142 af Primary=1.49 cfs 0.083 af Outflow=1.59 cfs 0.225 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=177.30' Storage=9,594 cf Inflow=10.37 cfs 0.811 af
Discarded=0.26 cfs 0.390 af Primary=7.42 cfs 0.336 af Outflow=7.68 cfs 0.726 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=190.12' Storage=11,062 cf Inflow=8.14 cfs 0.640 af
Discarded=0.43 cfs 0.582 af Primary=0.55 cfs 0.044 af Outflow=0.98 cfs 0.626 af

Pond 10P: PRECAST UNDERGROUND Peak Elev=173.36' Storage=1,776 cf Inflow=2.91 cfs 0.213 af
Discarded=0.05 cfs 0.068 af Primary=2.79 cfs 0.116 af Outflow=2.84 cfs 0.183 af

Pond 11P: Bio-Retention Area Peak Elev=167.32' Storage=8,559 cf Inflow=2.23 cfs 0.214 af
Outflow=0.04 cfs 0.018 af

Total Runoff Area = 87.678 ac Runoff Volume = 19.150 af Average Runoff Depth = 2.62"
85.56% Pervious = 75.013 ac 14.44% Impervious = 12.665 ac

Summary for Subcatchment 1S: Northwest Site

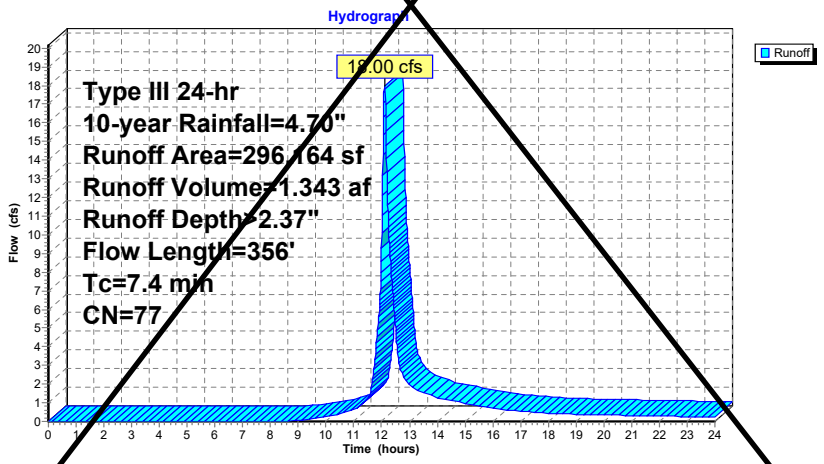
Runoff = 18.00 cfs @ 12.11 hrs, Volume= 1.343 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 10bS: Building 1 Roof

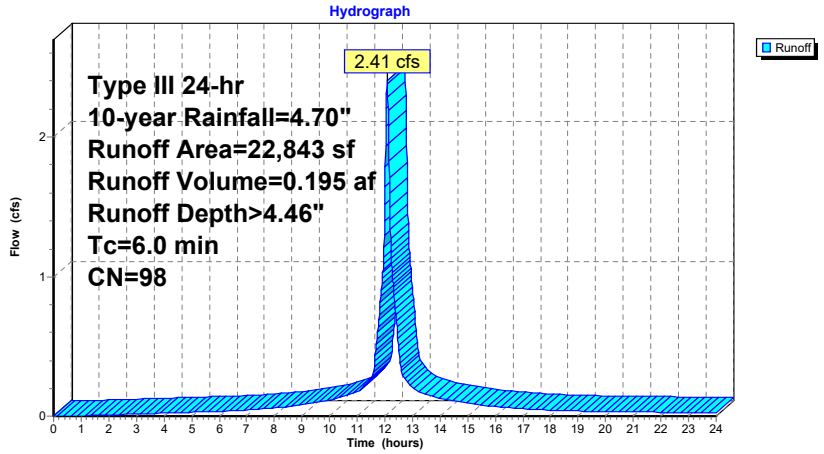
Runoff = 2.41 cfs @ 12.08 hrs, Volume= 0.195 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	22,843	98	Roof
	22,843		100.00% Impervious Area

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

Subcatchment 10bS: Building 1 Roof



Summary for Subcatchment 10S: Building 1 Roof

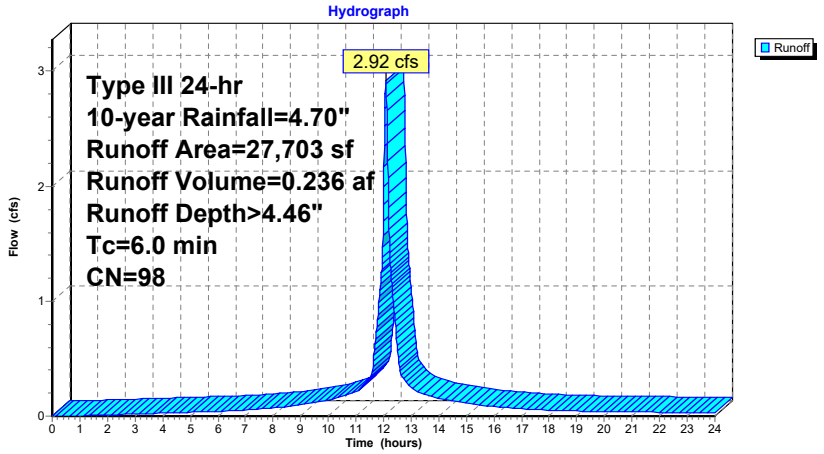
Runoff = 2.92 cfs @ 12.08 hrs, Volume= 0.236 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	27,703	98	Roof
	27,703		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

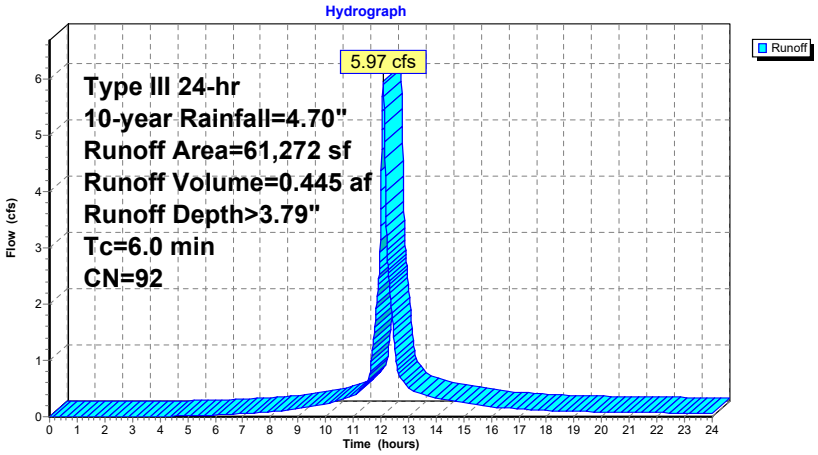
Runoff = 5.97 cfs @ 12.08 hrs, Volume= 0.445 af, Depth> 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
	19,615	80	>75% Grass cover, Good, HSG D
*	41,657	98	Paved parking
	61,272	92	Weighted Average
	19,615		32.01% Pervious Area
	41,657		67.99% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

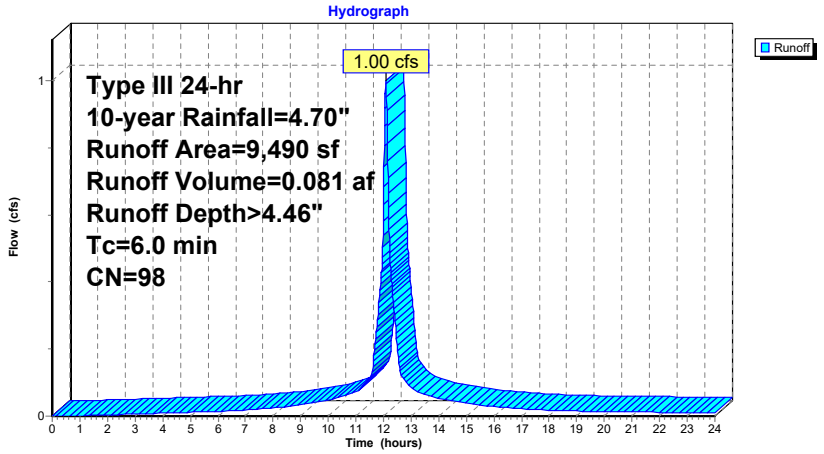
Runoff = 1.00 cfs @ 12.08 hrs, Volume= 0.081 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	9,490	98	Roof
	9,490		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

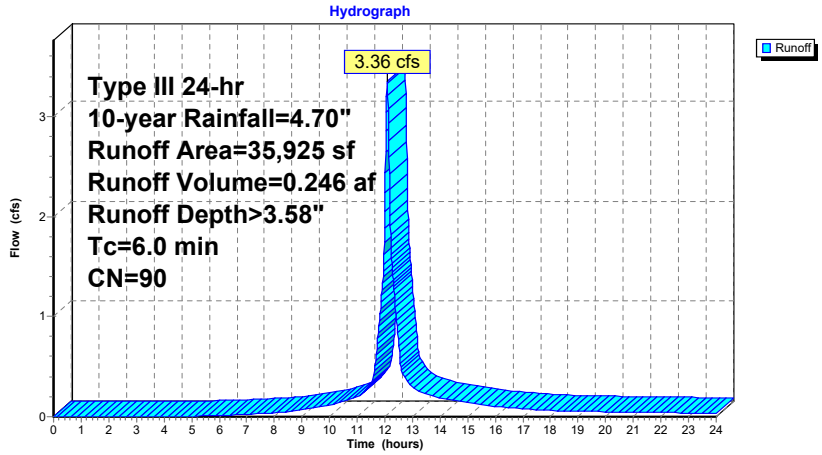
Runoff = 3.36 cfs @ 12.09 hrs, Volume= 0.246 af, Depth> 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
15,684	80	>75% Grass cover, Good, HSG D
20,241	98	Paved parking, HSG D
35,925	90	Weighted Average
15,684		43.66% Pervious Area
20,241		56.34% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

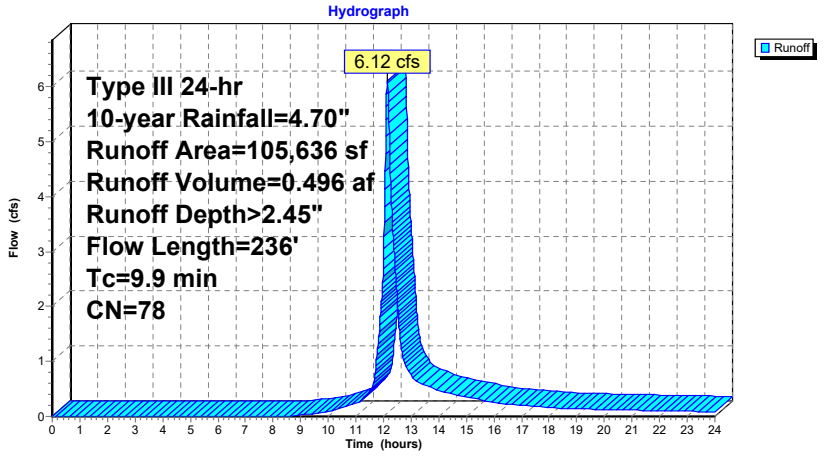
Runoff = 6.12 cfs @ 12.14 hrs, Volume= 0.496 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
50,615	79	Woods/grass comb., Good, HSG D
10,545	80	>75% Grass cover, Good, HSG D
105,636	78	Weighted Average
105,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 20S: North Central Site

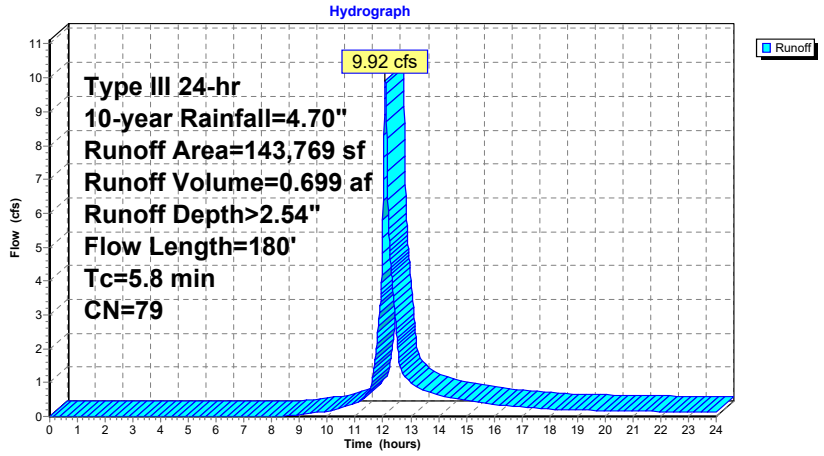
Runoff = 9.92 cfs @ 12.09 hrs, Volume= 0.699 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
108,663	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
143,769	79	Weighted Average
143,769		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total			

Subcatchment 20S: North Central Site



Summary for Subcatchment 21S: WESTERN SITE TO SOUTH

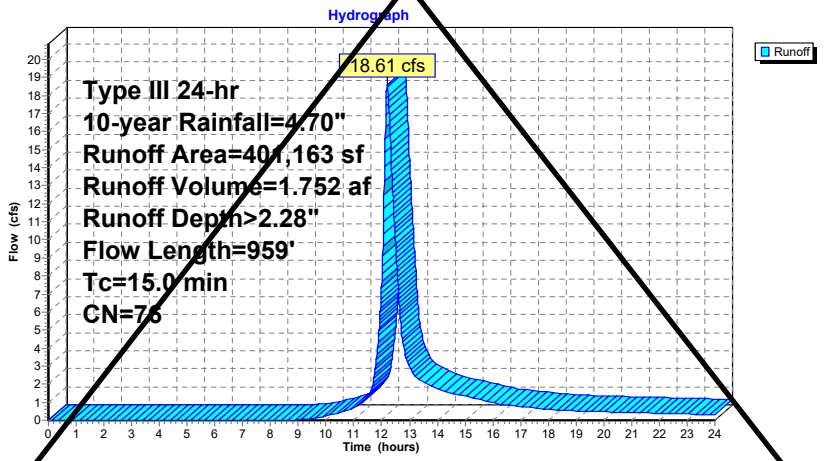
Runoff = 18.61 cfs @ 12.21 hrs, Volume= 1.752 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
348,163	77	Woods, Good, HSG D
11,804	80	>75% Grass cover, Good, HSG D
37,306	70	Woods, Good, HSG C
3,890	74	>75% Grass cover, Good, HSG C
401,163	76	Weighted Average
401,163		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
4.5	909	0.0430	3.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
15.0	959	Total			

Subcatchment 21S: WESTERN SITE TO SOUTH



Summary for Subcatchment 22S: Access Road at Building 1

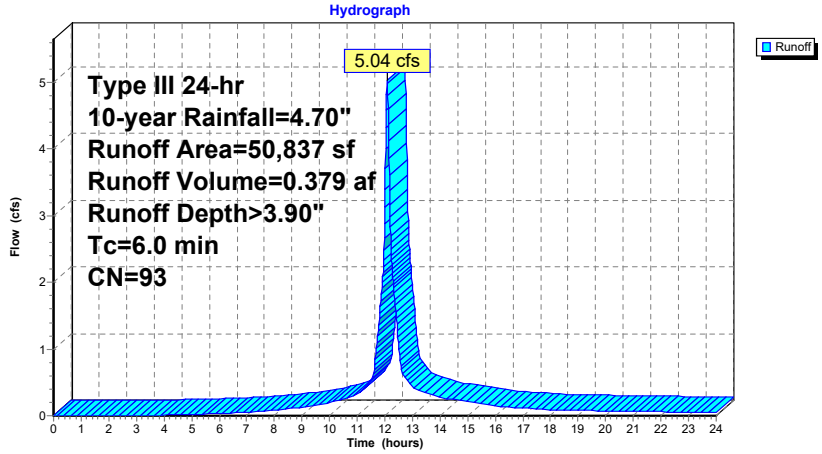
Runoff = 5.04 cfs @ 12.08 hrs, Volume= 0.379 af, Depth> 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	35,337	98	Paved parking
	15,500	80	>75% Grass cover, Good, HSG D
	50,837	93	Weighted Average
	15,500		30.49% Pervious Area
	35,337		69.51% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 23S: Function Hall Staff Parking

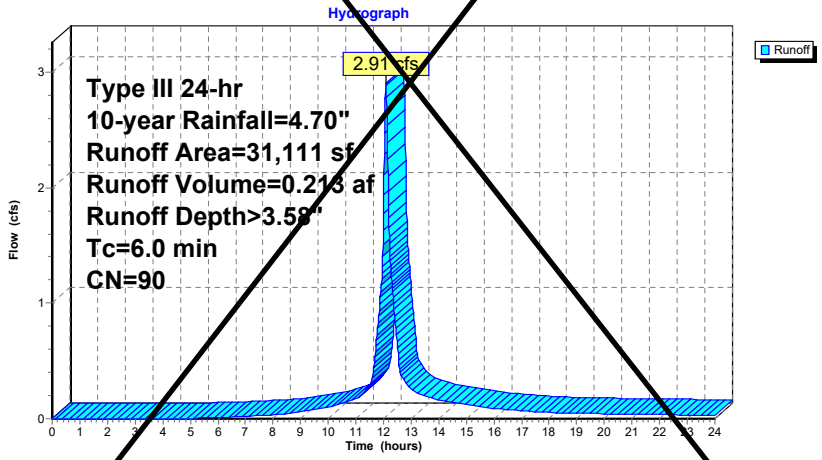
Runoff = 2.91 cfs @ 12.09 hrs, Volume= 0.213 af, Depth> 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	17,432	98	Paved parking
	13,679	80	>75% Grass cover, Good, HSG D
	31,111	90	Weighted Average
	13,679		43.97% Pervious Area
	17,432		56.03% Impervious Area

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

Subcatchment 23S: Function Hall Staff Parking



Summary for Subcatchment 30S: Entrance Drive

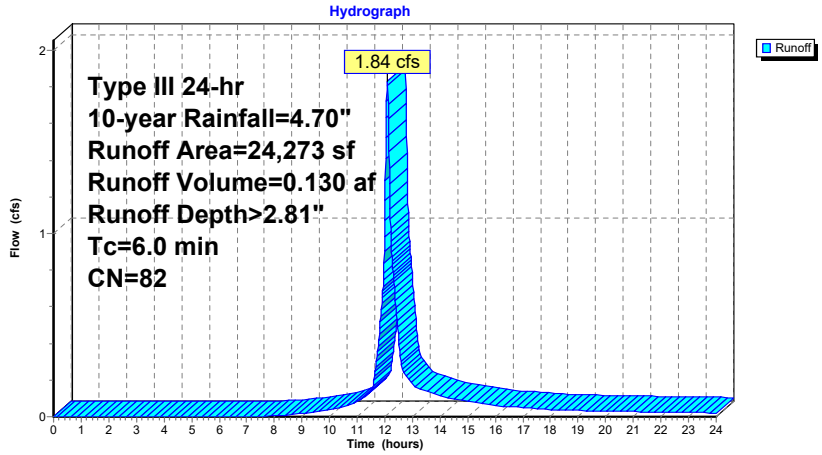
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 0.130 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive

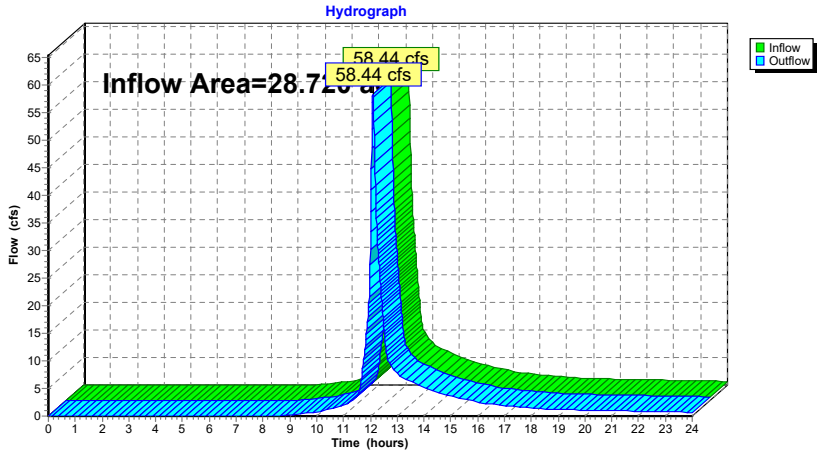


Summary for Reach 1R: FLOW TO NORTH WETLANDS

Inflow Area = 28.720 ac, 28.94% Impervious, Inflow Depth > 1.90" for 10-year event
Inflow = 58.44 cfs @ 12.10 hrs, Volume= 4.548 af
Outflow = 58.44 cfs @ 12.10 hrs, Volume= 4.548 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS

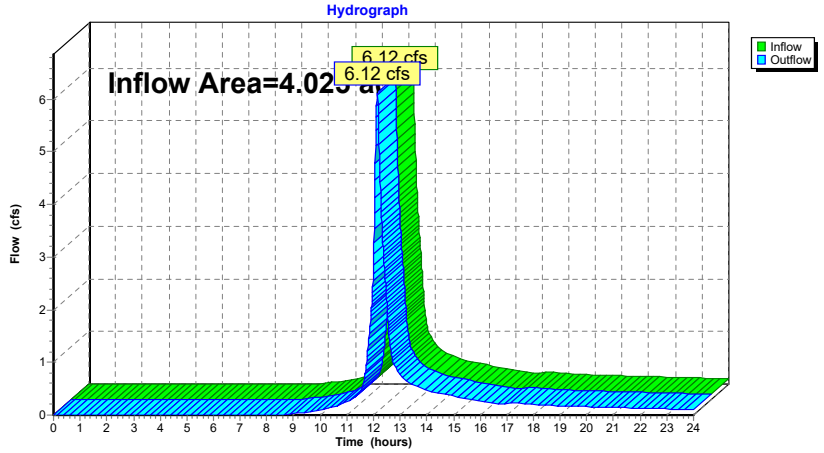


Summary for Reach 4R: ROADSIDE DEPRESSION

Inflow Area = 4.025 ac, 18.84% Impervious, Inflow Depth > 1.53" for 10-year event
Inflow = 6.12 cfs @ 12.14 hrs, Volume= 0.514 af
Outflow = 6.12 cfs @ 12.14 hrs, Volume= 0.514 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION

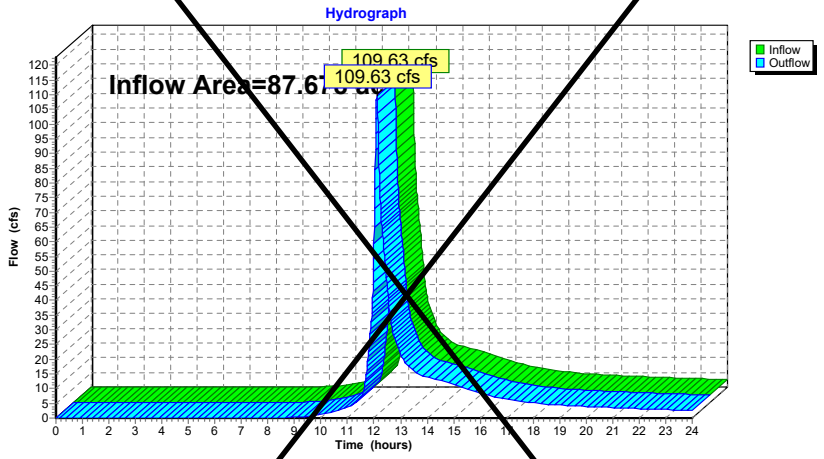


Summary for Reach 5R: Total Site

Inflow Area = 87.678 ac, 14.44% Impervious, Inflow Depth > 1.61" for 10-year event
Inflow = 109.63 cfs @ 12.11 hrs, Volume= 11.790 af
Outflow = 109.63 cfs @ 12.11 hrs, Volume= 11.790 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 5R: Total Site



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.407 ac, 67.99% Impervious, Inflow Depth > 3.79" for 10-year event
Inflow = 5.97 cfs @ 12.08 hrs, Volume= 0.445 af
Outflow = 0.59 cfs @ 12.88 hrs, Volume= 0.283 af, Atten= 90%, Lag= 47.5 min
Discarded = 0.16 cfs @ 10.25 hrs, Volume= 0.220 af
Primary = 0.43 cfs @ 12.88 hrs, Volume= 0.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.60' @ 12.88 hrs Surf.Area= 6,784 sf Storage= 9,542 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 130.1 min (914.1 - 784.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

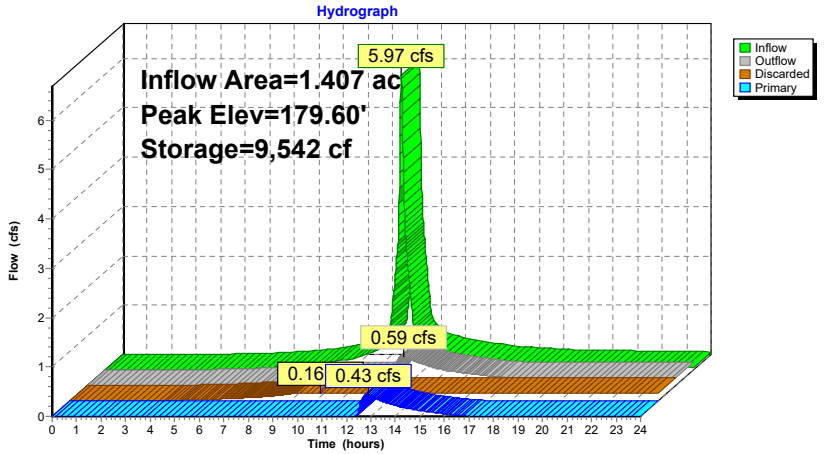
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 10.25 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.43 cfs @ 12.88 hrs HW=179.60' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.43 cfs of 2.47 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 1.05 fps)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.043 ac, 65.47% Impervious, Inflow Depth > 3.77" for 10-year event
Inflow = 4.36 cfs @ 12.08 hrs, Volume= 0.327 af
Outflow = 1.59 cfs @ 12.34 hrs, Volume= 0.225 af, Atten= 63%, Lag= 15.2 min
Discarded = 0.10 cfs @ 9.78 hrs, Volume= 0.142 af
Primary = 1.49 cfs @ 12.34 hrs, Volume= 0.083 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.64' @ 12.34 hrs Surf.Area= 1,801 sf Storage= 5,767 cf
Flood Elev= 172.00' Surf.Area= 1,801 sf Storage= 6,342 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 91.8 min (873.2 - 781.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**30.27'W x 59.50'L x 4.50'H Field A** 8,105 cf Overall - 8,105 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	6,342 cf	**StormTrap SingleTrap 4-0** x 6 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 16.96' x 46.19' Core + 6.66' Border = 30.27' x 59.50' System
		6,342 cf	Total Available Storage

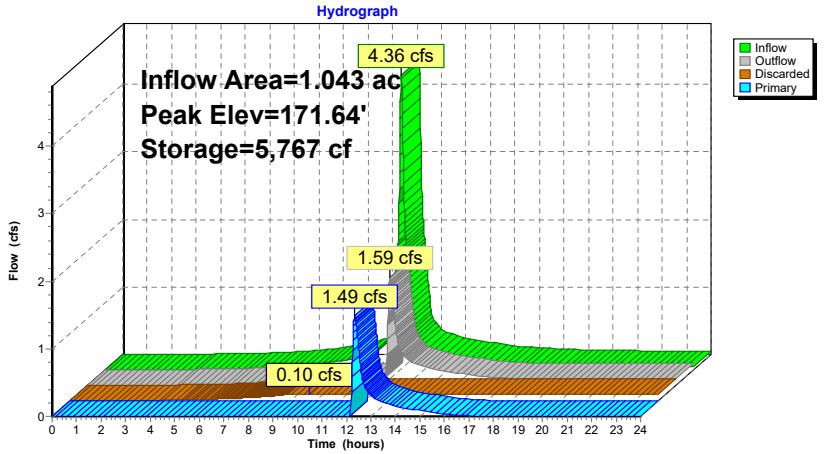
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 9.78 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=1.49 cfs @ 12.34 hrs HW=171.64' TW=165.38' (Dynamic Tailwater)
└**3=Culvert** (Passes 1.49 cfs of 8.10 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.49 cfs @ 1.59 fps)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.327 ac, 84.71% Impervious, Inflow Depth > 4.18" for 10-year event
Inflow = 10.37 cfs @ 12.08 hrs, Volume= 0.811 af
Outflow = 7.68 cfs @ 12.15 hrs, Volume= 0.726 af, Atten= 26%, Lag= 4.2 min
Discarded = 0.26 cfs @ 9.35 hrs, Volume= 0.390 af
Primary = 7.42 cfs @ 12.15 hrs, Volume= 0.336 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.30' @ 12.15 hrs Surf.Area= 4,692 sf Storage= 9,594 cf
Flood Elev= 178.00' Surf.Area= 4,692 sf Storage= 12,503 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 69.7 min (832.8 - 763.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 121.08'L x 3.50'H Field A** 16,422 cf Overall - 16,422 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	12,503 cf	**StormTrap SingleTrap 3-0** x 21 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
		12,503 cf	Total Available Storage

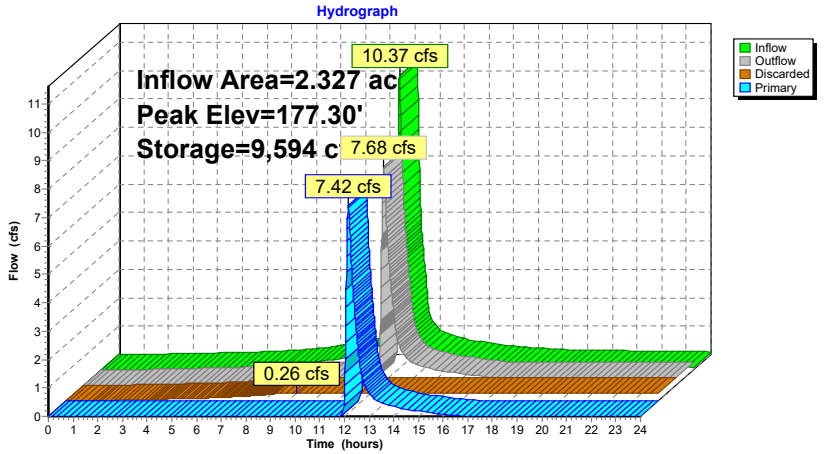
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.97'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.97' / 174.81' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	176.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 9.35 hrs HW=175.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=7.41 cfs @ 12.15 hrs HW=177.30' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 7.41 cfs of 7.72 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 7.41 cfs @ 2.74 fps)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.600 ac, 47.41% Impervious, Inflow Depth > 1.60" for 10-year event
Inflow = 2.23 cfs @ 12.32 hrs, Volume= 0.214 af
Outflow = 0.04 cfs @ 17.46 hrs, Volume= 0.018 af, Atten= 98%, Lag= 308.1 min
Primary = 0.04 cfs @ 17.46 hrs, Volume= 0.018 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 167.32' @ 17.46 hrs Surf.Area= 3,215 sf Storage= 8,559 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= 554.1 min calculated for 0.018 af (8% of inflow)
Center-of-Mass det. time= 396.3 min (1,204.1 - 807.8)

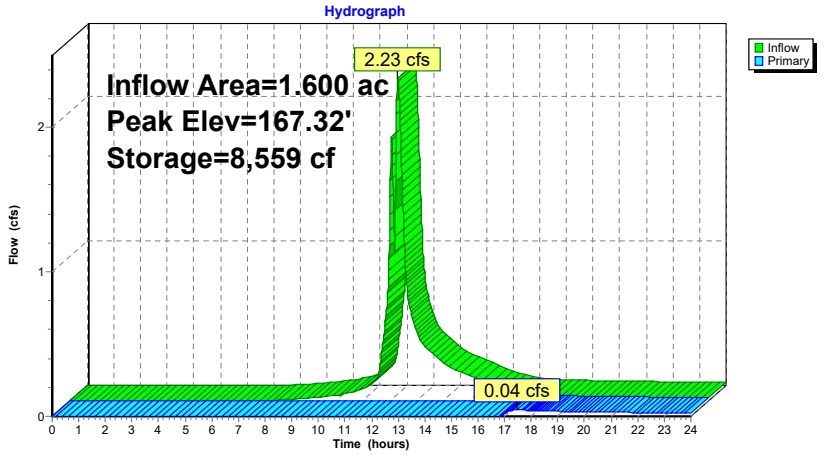
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

Device	Routing	Invert	Outlet Devices
#1	Primary	167.30'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.04 cfs @ 17.46 hrs HW=167.32' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.33 fps)

Pond 11P: Bio-Retention Area



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>3.04"
Flow Length=356' Tc=7.4 min CN=77 Runoff=[illegible] cfs 1.724 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=4.14 cfs 0.337 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>4.91"
Tc=6.0 min CN=95 Runoff=5.44 cfs 0.423 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=1.98 cfs 0.161 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=2.69 cfs 0.219 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>4.80"
Tc=6.0 min CN=94 Runoff=17.60 cfs 1.353 af

Subcatchment 7S: Building 4 Parking Runoff Area=85,450 sf 75.32% Impervious Runoff Depth>4.69"
Tc=6.0 min CN=93 Runoff=10.07 cfs 0.766 af

Subcatchment 8S: Building 4 Roof Runoff Area=21,010 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=2.60 cfs 0.211 af

Subcatchment 9S: Building 4 Roof Runoff Area=21,018 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=2.60 cfs 0.211 af

Subcatchment 10bS: Building 1 Roof Runoff Area=22,843 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=2.82 cfs 0.230 af

Subcatchment 10S: Building 1 Roof Runoff Area=27,703 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=3.43 cfs 0.279 af

Subcatchment 11S: Building 1 Parking Runoff Area=61,272 sf 67.99% Impervious Runoff Depth>4.57"
Tc=6.0 min CN=92 Runoff=7.12 cfs 0.536 af

Subcatchment 12S: Building 2 Roof Runoff Area=9,490 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=1.17 cfs 0.095 af

Subcatchment 13S: Entrance Driveway Runoff Area=35,925 sf 56.34% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=90 Runoff=4.04 cfs 0.299 af

Subcatchment 14S: Southeast Site Runoff Area=105,636 sf 0.00% Impervious Runoff Depth>3.13"
Flow Length=236' Tc=9.9 min CN=78 Runoff=7.83 cfs 0.634 af

Subcatchment 15S: North Central Site Runoff Area=369,489 sf 0.00% Impervious Runoff Depth>3.14"
Flow Length=185' Tc=5.8 min CN=78 Runoff=31.46 cfs 2.218 af

Subcatchment 16S: WESTERN SITE TO Runoff Area=31,580 sf 0.00% Impervious Runoff Depth>3.14"
Flow Length=354' Tc=6.5 min CN=78 Runoff=2.62 cfs 0.190 af

Subcatchment 17S: CENTER SITE Runoff Area=169,775 sf 0.00% Impervious Runoff Depth>3.14"
Flow Length=134' Tc=7.3 min CN=78 Runoff=13.72 cfs 1.019 af

Subcatchment 18S: SOUTHWEST SITE Runoff Area=649,615 sf 0.75% Impervious Runoff Depth>2.67"
Flow Length=702' Slope=0.0700 '/' Tc=10.1 min CN=73 Runoff=40.59 cfs 3.322 af

Subcatchment 19S: Southern Site Runoff Area=241,566 sf 0.41% Impervious Runoff Depth>3.04"
Flow Length=262' Tc=4.1 min CN=77 Runoff=21.23 cfs 1.407 af

Subcatchment 20S: North Central Site Runoff Area=143,769 sf 0.00% Impervious Runoff Depth>3.23"
Flow Length=180' Tc=5.8 min CN=79 Runoff=12.61 cfs 0.889 af

Subcatchment 21S: WESTERN SITE TO Runoff Area=401,163 sf 0.00% Impervious Runoff Depth>2.94"
Flow Length=959' Tc=15.0 min CN=76 Runoff=24.10 cfs 2.259 af

Subcatchment 22S: Access Road at Runoff Area=50,837 sf 69.51% Impervious Runoff Depth>4.69"
Tc=6.0 min CN=93 Runoff=5.99 cfs 0.456 af

Subcatchment 23S: Function Hall Staff Runoff Area=31,111 sf 56.03% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=90 Runoff=3.50 cfs 0.259 af

Subcatchment 24S: WEST SITE Runoff Area=605,999 sf 0.00% Impervious Runoff Depth>3.04"
Flow Length=800' Tc=11.4 min CN=77 Runoff=41.55 cfs 3.524 af

Subcatchment 25S: Porous Pavement Runoff Area=6,516 sf 100.00% Impervious Runoff Depth>4.41"
Tc=462.0 min CN=98 Runoff=0.08 cfs 0.055 af

Subcatchment 26S: WEST CORNER SITE Runoff Area=89,427 sf 0.00% Impervious Runoff Depth>2.95"
Flow Length=609' Tc=12.9 min CN=76 Runoff=5.69 cfs 0.504 af

Subcatchment 27S: Rear of Building 4 Runoff Area=38,647 sf 52.96% Impervious Runoff Depth>4.04"
Tc=6.0 min CN=87 Runoff=4.10 cfs 0.298 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>4.41"
Tc=462.0 min CN=98 Runoff=0.15 cfs 0.098 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>3.33"
Tc=6.0 min CN=80 Runoff=0.34 cfs 0.024 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>3.53"
Tc=6.0 min CN=82 Runoff=2.29 cfs 0.164 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=74.99 cfs 6.146 af
Outflow=74.99 cfs 6.146 af

Reach 2R: ONSITE WETLANDS Inflow=24.26 cfs 3.729 af
Outflow=24.26 cfs 3.729 af

Reach 3R: OFFSITE OVERLAND FLOW Inflow=43.33 cfs 5.944 af
Outflow=43.33 cfs 5.944 af

Reach 4R: ROADSIDE DEPRESSION Inflow=7.83 cfs 0.741 af
Outflow=7.83 cfs 0.741 af

Reach 5R: Total Site Inflow=141.24 cfs 16.560 af
Outflow=141.24 cfs 16.560 af

Pond 1P: VERNAL POOL Peak Elev=172.24' Storage=2.271 af Inflow=42.03 cfs 3.971 af
Outflow=5.52 cfs 1.879 af

Pond 2P: VERNAL POOL Peak Elev=216.51' Storage=1.376 af Inflow=41.55 cfs 3.524 af
Outflow=19.27 cfs 2.601 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=181.11' Storage=39,431 cf Inflow=22.26 cfs 1.732 af
Discarded=0.29 cfs 0.464 af Primary=3.40 cfs 0.476 af Outflow=3.69 cfs 0.940 af

Pond 4P: PRECAST UNDERGROUND Peak Elev=189.30' Storage=6,736 cf Inflow=4.10 cfs 0.298 af
Discarded=0.13 cfs 0.166 af Primary=0.17 cfs 0.021 af Outflow=0.30 cfs 0.187 af

Pond 5P: PRECAST UNDERGROUND Peak Elev=188.79' Storage=20,005 cf Inflow=15.27 cfs 1.189 af
Discarded=0.58 cfs 0.808 af Primary=3.15 cfs 0.232 af Outflow=3.73 cfs 1.040 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=179.75' Storage=10,386 cf Inflow=7.12 cfs 0.536 af
Discarded=0.16 cfs 0.228 af Primary=1.57 cfs 0.137 af Outflow=1.73 cfs 0.365 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=171.78' Storage=5,998 cf Inflow=5.21 cfs 0.395 af
Discarded=0.10 cfs 0.147 af Primary=3.04 cfs 0.140 af Outflow=3.14 cfs 0.287 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=177.52' Storage=10,513 cf Inflow=12.24 cfs 0.964 af
Discarded=0.26 cfs 0.404 af Primary=8.20 cfs 0.461 af Outflow=8.47 cfs 0.865 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=190.28' Storage=12,153 cf Inflow=9.58 cfs 0.760 af
Discarded=0.43 cfs 0.603 af Primary=1.93 cfs 0.121 af Outflow=2.36 cfs 0.724 af

Pond 10P: PRECAST UNDERGROUND Peak Elev=173.41' Storage=1,813 cf Inflow=3.50 cfs 0.259 af
Discarded=0.05 cfs 0.070 af Primary=3.38 cfs 0.157 af Outflow=3.42 cfs 0.227 af

Pond 11P: Bio-Retention Area Peak Elev=167.38' Storage=8,768 cf Inflow=4.53 cfs 0.304 af
Outflow=0.48 cfs 0.107 af

Total Runoff Area = 87.678 ac Runoff Volume = 24.162 af Average Runoff Depth = 3.31"
85.56% Pervious = 75.013 ac 14.44% Impervious = 12.665 ac

Summary for Subcatchment 1S: Northwest Site

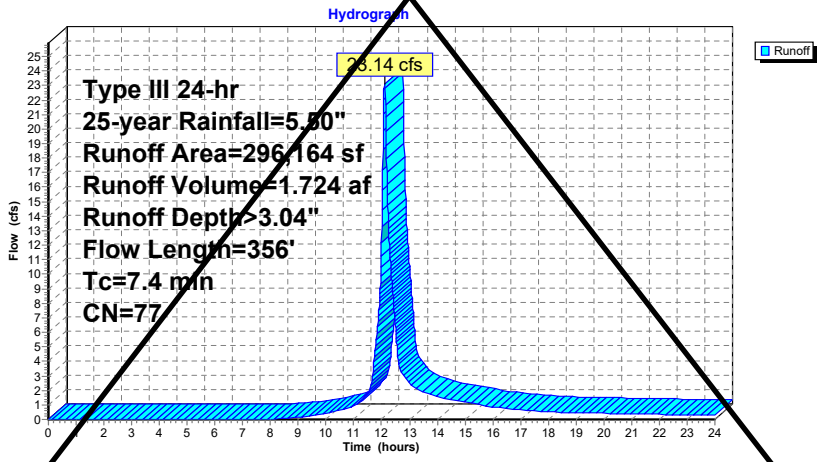
Runoff = 23.14 cfs @ 12.11 hrs, Volume= 1.724 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 10bS: Building 1 Roof

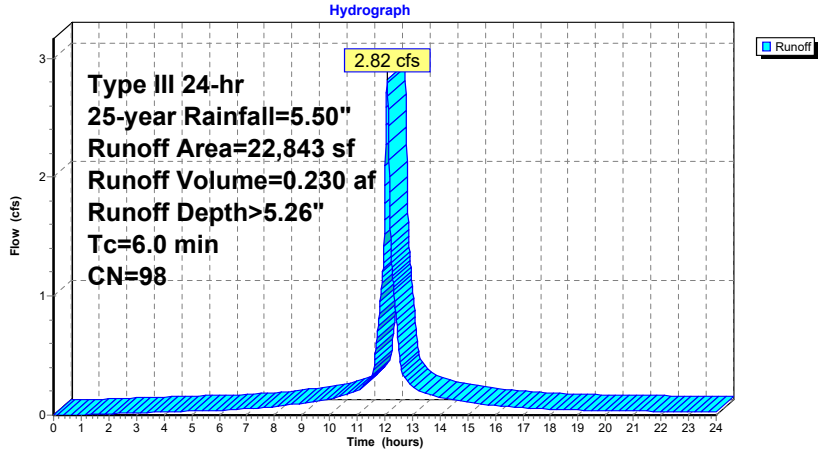
Runoff = 2.82 cfs @ 12.08 hrs, Volume= 0.230 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	22,843	98	Roof
	22,843		100.00% Impervious Area

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

Subcatchment 10bS: Building 1 Roof



Summary for Subcatchment 10S: Building 1 Roof

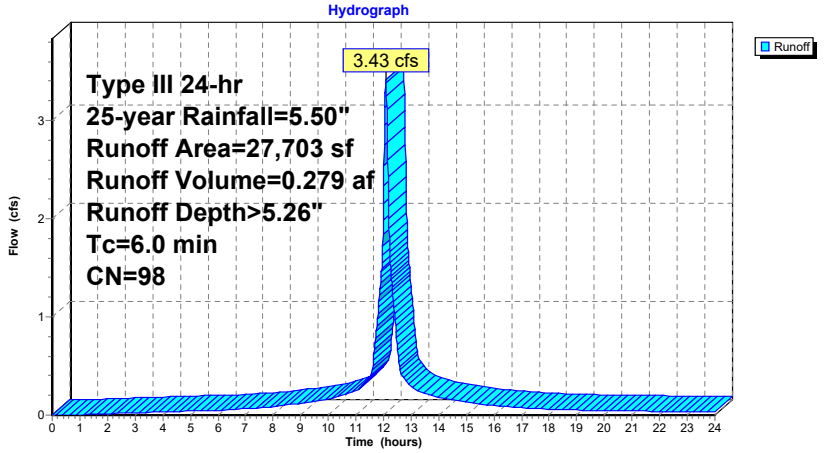
Runoff = 3.43 cfs @ 12.08 hrs, Volume= 0.279 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	27,703	98	Roof
	27,703		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

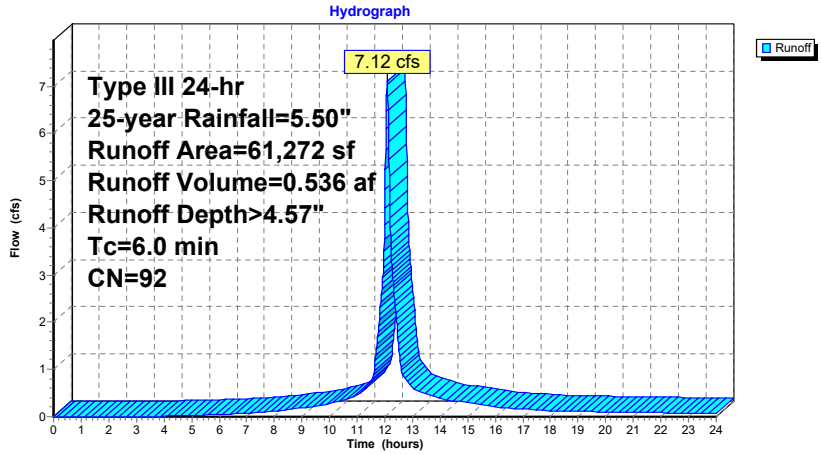
Runoff = 7.12 cfs @ 12.08 hrs, Volume= 0.536 af, Depth> 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
	19,615	80	>75% Grass cover, Good, HSG D
*	41,657	98	Paved parking
	61,272	92	Weighted Average
	19,615		32.01% Pervious Area
	41,657		67.99% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

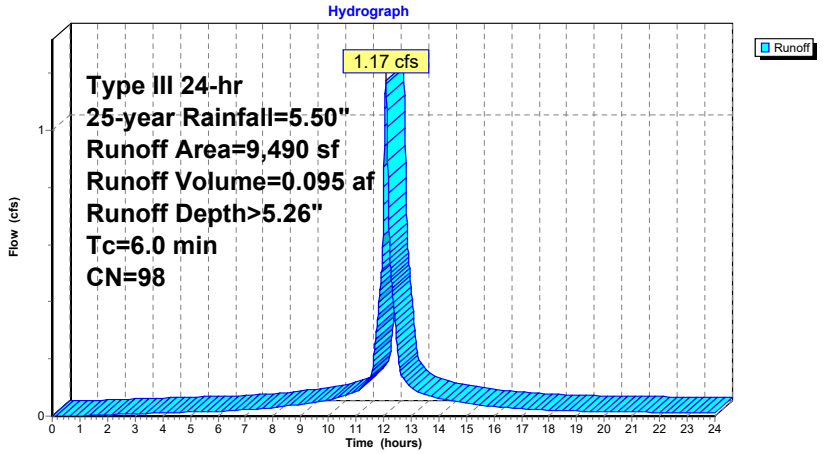
Runoff = 1.17 cfs @ 12.08 hrs, Volume= 0.095 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	9,490	98	Roof
	9,490		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

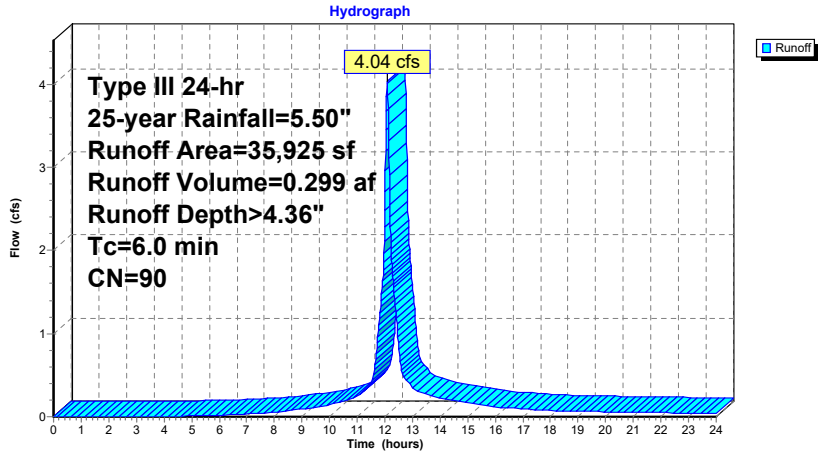
Runoff = 4.04 cfs @ 12.08 hrs, Volume= 0.299 af, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
15,684	80	>75% Grass cover, Good, HSG D
20,241	98	Paved parking, HSG D
35,925	90	Weighted Average
15,684		43.66% Pervious Area
20,241		56.34% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

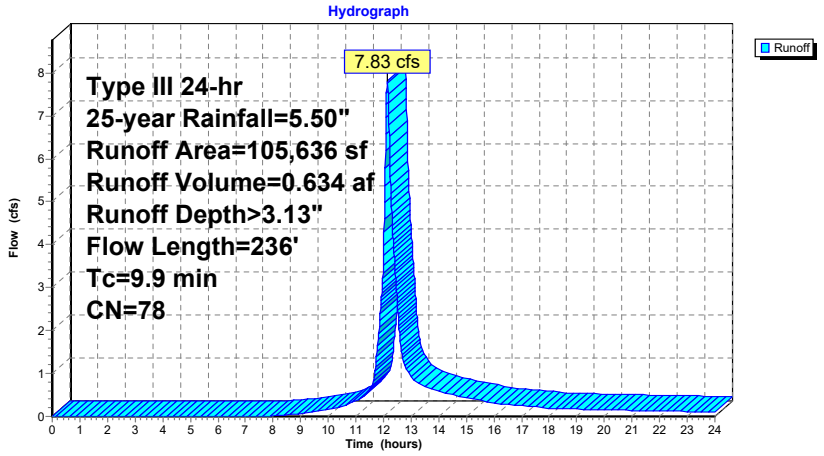
Runoff = 7.83 cfs @ 12.14 hrs, Volume= 0.634 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
50,615	79	Woods/grass comb., Good, HSG D
10,545	80	>75% Grass cover, Good, HSG D
105,636	78	Weighted Average
105,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 20S: North Central Site

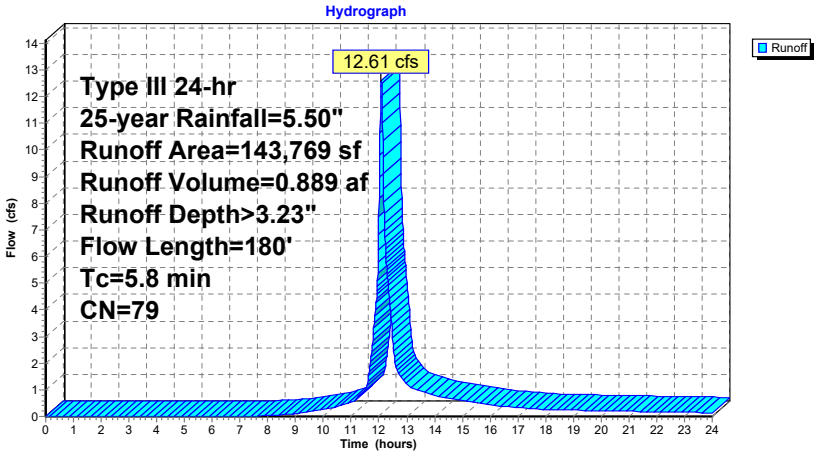
Runoff = 12.61 cfs @ 12.09 hrs, Volume= 0.889 af, Depth> 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
108,663	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
143,769	79	Weighted Average
143,769		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total			

Subcatchment 20S: North Central Site



Summary for Subcatchment 21S: WESTERN SITE TO SOUTH

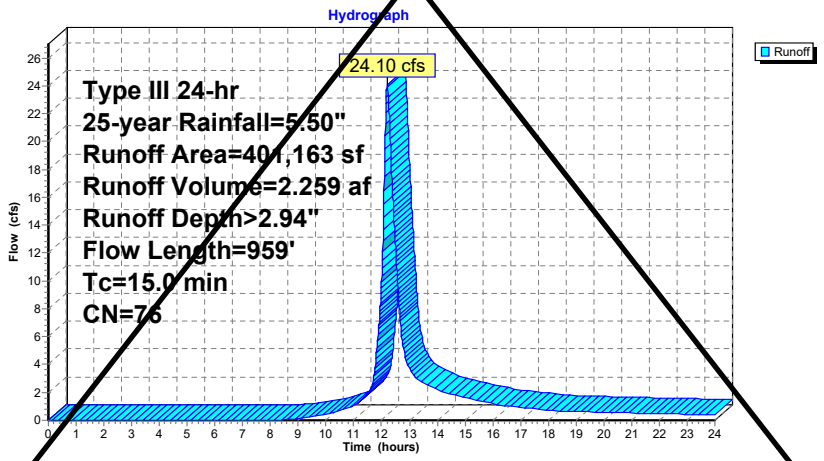
Runoff = 24.10 cfs @ 12.21 hrs, Volume= 2.259 af, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
348,163	77	Woods, Good, HSG D
11,804	80	>75% Grass cover, Good, HSG D
37,306	70	Woods, Good, HSG C
3,890	74	>75% Grass cover, Good, HSG C
401,163	76	Weighted Average
401,163		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
4.5	909	0.0430	3.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
15.0	959	Total			

Subcatchment 21S: WESTERN SITE TO SOUTH



Summary for Subcatchment 22S: Access Road at Building 1

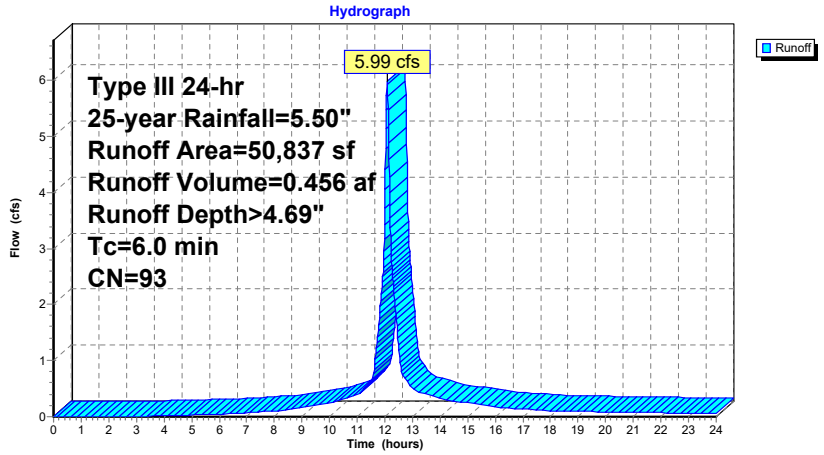
Runoff = 5.99 cfs @ 12.08 hrs, Volume= 0.456 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	35,337	98	Paved parking
	15,500	80	>75% Grass cover, Good, HSG D
	50,837	93	Weighted Average
	15,500		30.49% Pervious Area
	35,337		69.51% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 23S: Function Hall Staff Parking

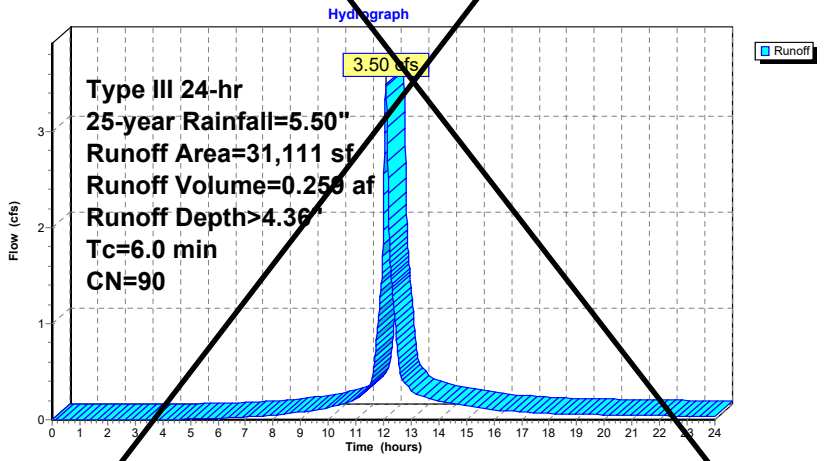
Runoff = 3.50 cfs @ 12.08 hrs, Volume= 0.259 af, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	17,432	98	Paved parking
	13,679	80	>75% Grass cover, Good, HSG D
	31,111	90	Weighted Average
	13,679		43.97% Pervious Area
	17,432		56.03% Impervious Area

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

Subcatchment 23S: Function Hall Staff Parking



Summary for Subcatchment 30S: Entrance Drive

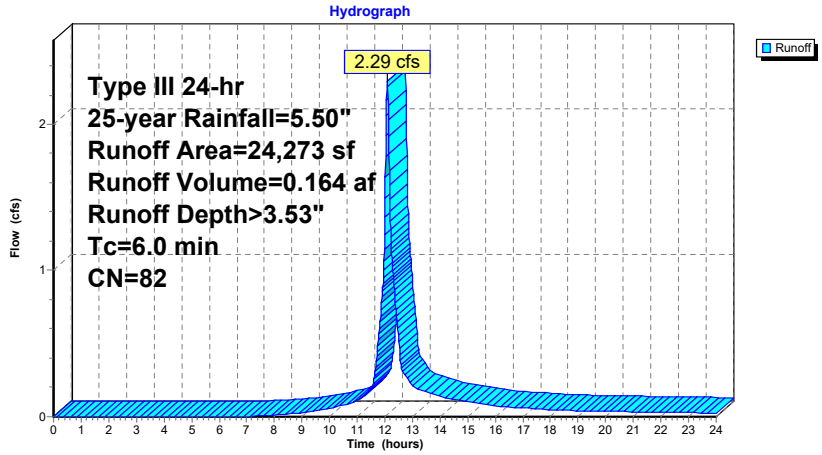
Runoff = 2.29 cfs @ 12.09 hrs, Volume= 0.164 af, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive

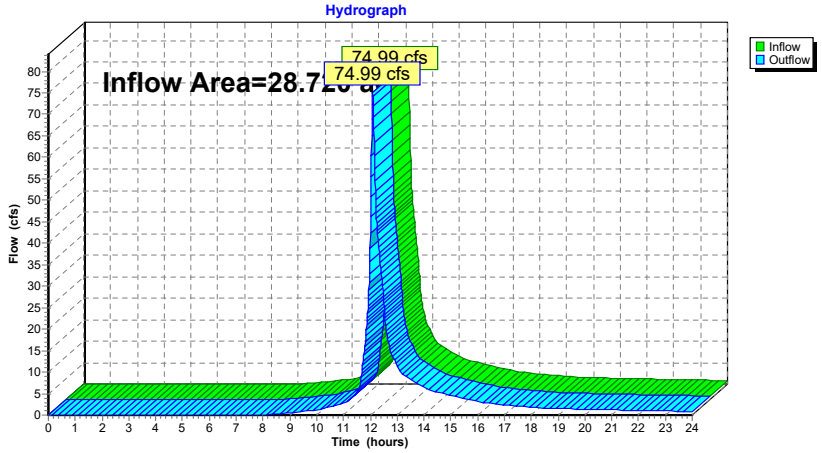


Summary for Reach 1R: FLOW TO NORTH WETLANDS

Inflow Area = 28.720 ac, 28.94% Impervious, Inflow Depth > 2.57" for 25-year event
Inflow = 74.99 cfs @ 12.09 hrs, Volume= 6.146 af
Outflow = 74.99 cfs @ 12.09 hrs, Volume= 6.146 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS

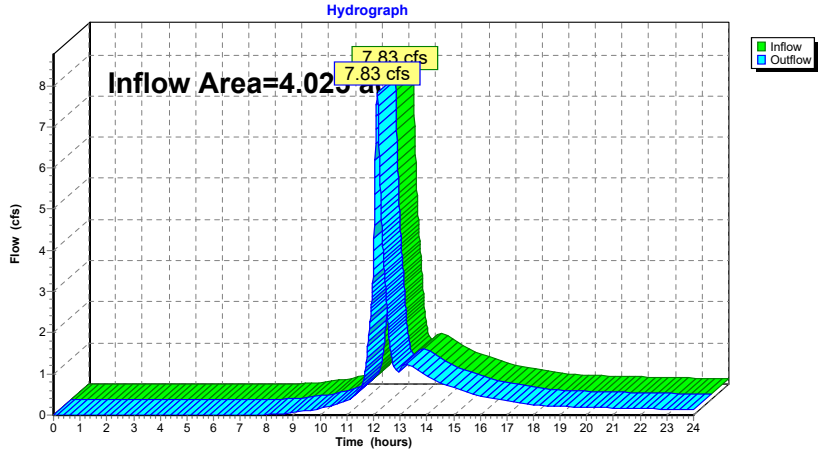


Summary for Reach 4R: ROADSIDE DEPRESSION

Inflow Area = 4.025 ac, 18.84% Impervious, Inflow Depth > 2.21" for 25-year event
Inflow = 7.83 cfs @ 12.14 hrs, Volume= 0.741 af
Outflow = 7.83 cfs @ 12.14 hrs, Volume= 0.741 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION

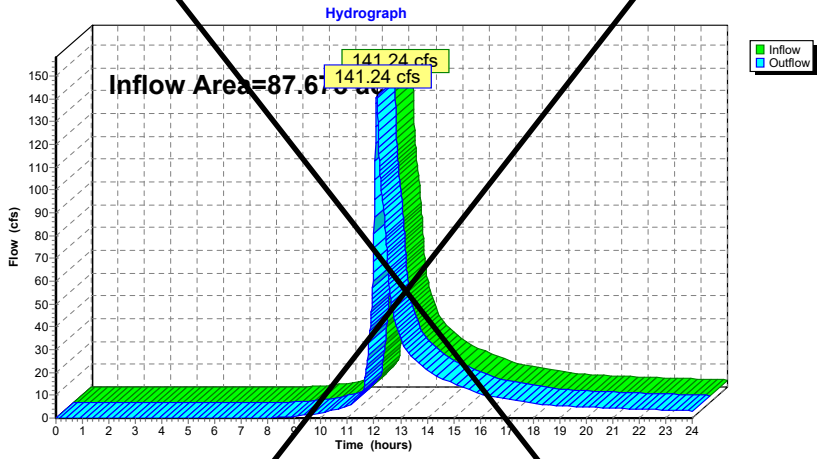


Summary for Reach 5R: Total Site

Inflow Area = 87.678 ac, 14.44% Impervious, Inflow Depth > 2.27" for 25-year event
Inflow = 141.24 cfs @ 12.10 hrs, Volume= 16.560 af
Outflow = 141.24 cfs @ 12.10 hrs, Volume= 16.560 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 5R: Total Site



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.407 ac, 67.99% Impervious, Inflow Depth > 4.57" for 25-year event
Inflow = 7.12 cfs @ 12.08 hrs, Volume= 0.536 af
Outflow = 1.73 cfs @ 12.47 hrs, Volume= 0.365 af, Atten= 76%, Lag= 22.9 min
Discarded = 0.16 cfs @ 9.68 hrs, Volume= 0.228 af
Primary = 1.57 cfs @ 12.47 hrs, Volume= 0.137 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.75' @ 12.47 hrs Surf.Area= 6,784 sf Storage= 10,386 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 97.5 min (876.7 - 779.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

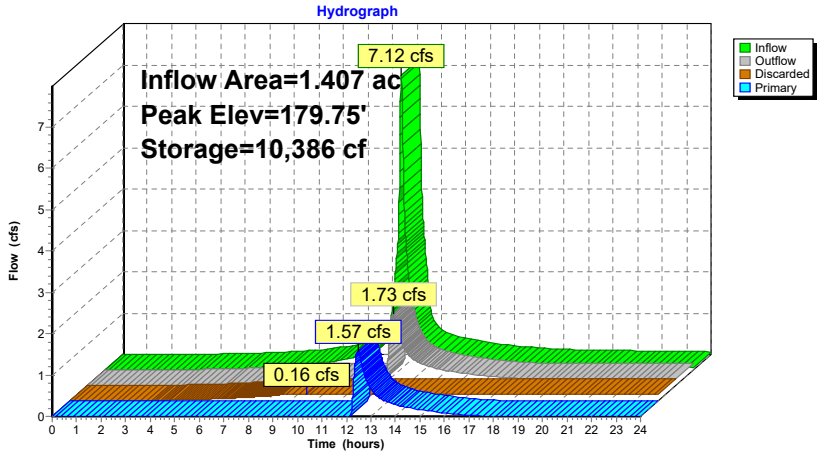
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 9.68 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=1.57 cfs @ 12.47 hrs HW=179.75' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.57 cfs of 2.74 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.57 cfs @ 1.62 fps)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.043 ac, 65.47% Impervious, Inflow Depth > 4.54" for 25-year event
Inflow = 5.21 cfs @ 12.08 hrs, Volume= 0.395 af
Outflow = 3.14 cfs @ 12.19 hrs, Volume= 0.287 af, Atten= 40%, Lag= 6.2 min
Discarded = 0.10 cfs @ 9.24 hrs, Volume= 0.147 af
Primary = 3.04 cfs @ 12.19 hrs, Volume= 0.140 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.78' @ 12.19 hrs Surf.Area= 1,801 sf Storage= 5,998 cf
Flood Elev= 172.00' Surf.Area= 1,801 sf Storage= 6,342 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 67.2 min (844.2 - 777.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**30.27'W x 59.50'L x 4.50'H Field A** 8,105 cf Overall - 8,105 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	6,342 cf	**StormTrap SingleTrap 4-0** x 6 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 16.96' x 46.19' Core + 6.66' Border = 30.27' x 59.50' System
		6,342 cf	Total Available Storage

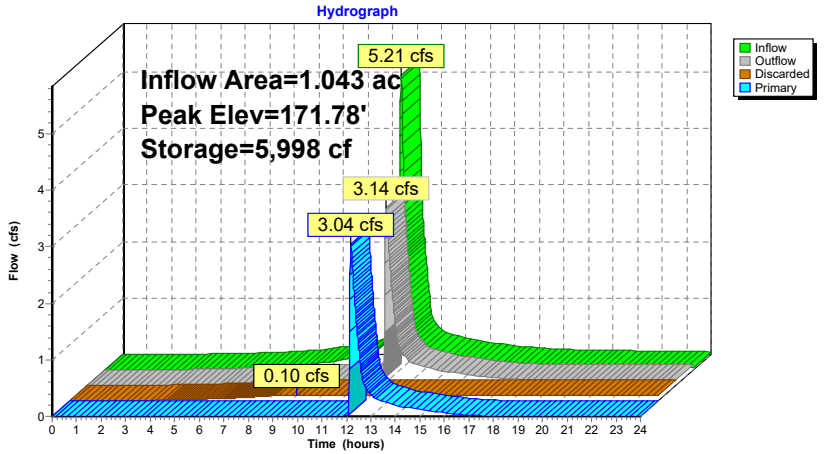
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 9.24 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=3.04 cfs @ 12.19 hrs HW=171.78' TW=165.55' (Dynamic Tailwater)
└**3=Culvert** (Passes 3.04 cfs of 8.08 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.04 cfs @ 2.02 fps)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.327 ac, 84.71% Impervious, Inflow Depth > 4.97" for 25-year event
Inflow = 12.24 cfs @ 12.08 hrs, Volume= 0.964 af
Outflow = 8.47 cfs @ 12.16 hrs, Volume= 0.865 af, Atten= 31%, Lag= 4.8 min
Discarded = 0.26 cfs @ 8.86 hrs, Volume= 0.404 af
Primary = 8.20 cfs @ 12.16 hrs, Volume= 0.461 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.52' @ 12.16 hrs Surf.Area= 4,692 sf Storage= 10,513 cf
Flood Elev= 178.00' Surf.Area= 4,692 sf Storage= 12,503 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 55.3 min (814.9 - 759.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 121.08'L x 3.50'H Field A** 16,422 cf Overall - 16,422 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	12,503 cf	**StormTrap SingleTrap 3-0** x 21 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
		12,503 cf	Total Available Storage

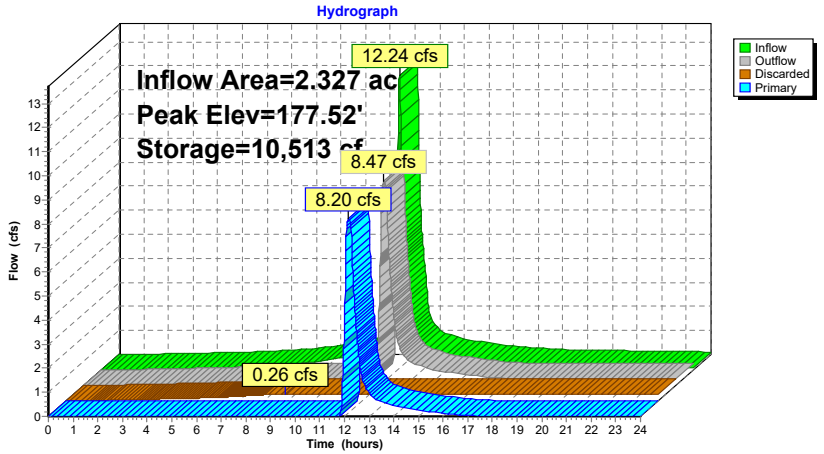
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.97'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.97' / 174.81' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	176.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 8.86 hrs HW=175.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=8.20 cfs @ 12.16 hrs HW=177.52' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 8.20 cfs @ 6.68 fps)
└**3=Sharp-Crested Rectangular Weir** (Passes 8.20 cfs of 11.04 cfs potential flow)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.600 ac, 47.41% Impervious, Inflow Depth > 2.28" for 25-year event
Inflow = 4.53 cfs @ 12.17 hrs, Volume= 0.304 af
Outflow = 0.48 cfs @ 13.28 hrs, Volume= 0.107 af, Atten= 89%, Lag= 66.6 min
Primary = 0.48 cfs @ 13.28 hrs, Volume= 0.107 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 167.38' @ 13.28 hrs Surf.Area= 3,247 sf Storage= 8,768 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= 232.1 min calculated for 0.107 af (35% of inflow)
Center-of-Mass det. time= 140.2 min (938.7 - 798.5)

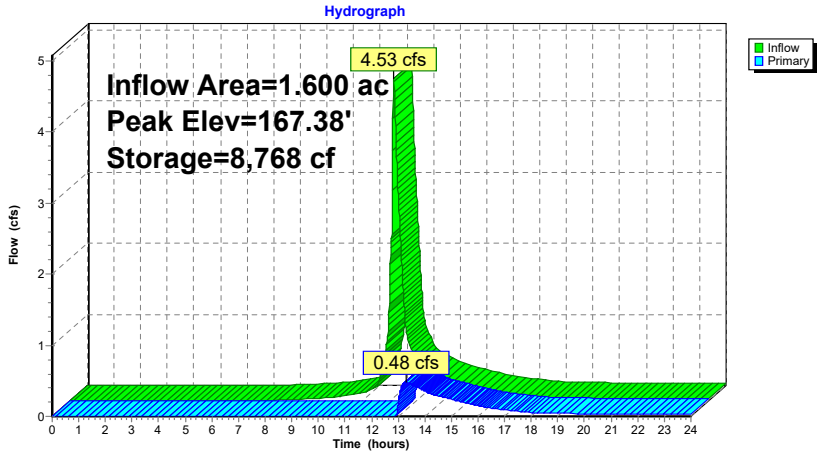
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

Device	Routing	Invert	Outlet Devices
#1	Primary	167.30'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.48 cfs @ 13.28 hrs HW=167.38' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.48 cfs @ 0.73 fps)

Pond 11P: Bio-Retention Area



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>4.09"
Flow Length=356' Tc=7.4 min CN=77 Runoff=31.05 cfs 2.318 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=5.05 cfs 0.413 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>6.10"
Tc=6.0 min CN=95 Runoff=6.68 cfs 0.526 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=2.41 cfs 0.197 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=3.28 cfs 0.269 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>5.99"
Tc=6.0 min CN=94 Runoff=21.69 cfs 1.687 af

Subcatchment 7S: Building 4 Parking Runoff Area=85,450 sf 75.32% Impervious Runoff Depth>5.87"
Tc=6.0 min CN=93 Runoff=12.46 cfs 0.959 af

Subcatchment 8S: Building 4 Roof Runoff Area=21,010 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=3.17 cfs 0.259 af

Subcatchment 9S: Building 4 Roof Runoff Area=21,018 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=3.17 cfs 0.260 af

Subcatchment 10bS: Building 1 Roof Runoff Area=22,843 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=3.45 cfs 0.282 af

Subcatchment 10S: Building 1 Roof Runoff Area=27,703 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=4.18 cfs 0.342 af

Subcatchment 11S: Building 1 Parking Runoff Area=61,272 sf 67.99% Impervious Runoff Depth>5.75"
Tc=6.0 min CN=92 Runoff=8.84 cfs 0.674 af

Subcatchment 12S: Building 2 Roof Runoff Area=9,490 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=1.43 cfs 0.117 af

Subcatchment 13S: Entrance Driveway Runoff Area=35,925 sf 56.34% Impervious Runoff Depth>5.52"
Tc=6.0 min CN=90 Runoff=5.06 cfs 0.380 af

Subcatchment 14S: Southeast Site Runoff Area=105,636 sf 0.00% Impervious Runoff Depth>4.20"
Flow Length=236' Tc=9.9 min CN=78 Runoff=10.44 cfs 0.848 af

Subcatchment 15S: North Central Site Runoff Area=369,489 sf 0.00% Impervious Runoff Depth>4.20"
Flow Length=185' Tc=5.8 min CN=78 Runoff=41.96 cfs 2.968 af

Subcatchment 16S: WESTERN SITE TO Runoff Area=31,580 sf 0.00% Impervious Runoff Depth>4.20"
Flow Length=354' Tc=6.5 min CN=78 Runoff=3.50 cfs 0.254 af

Subcatchment 17S: CENTER SITE Runoff Area=169,775 sf 0.00% Impervious Runoff Depth>4.20"
Flow Length=134' Tc=7.3 min CN=78 Runoff=18.29 cfs 1.363 af

Subcatchment 18S: SOUTHWEST SITE Runoff Area=649,615 sf 0.75% Impervious Runoff Depth>3.67"
Flow Length=702' Slope=0.0700 '/' Tc=10.1 min CN=73 Runoff=55.97 cfs 4.562 af

Subcatchment 19S: Southern Site Runoff Area=241,566 sf 0.41% Impervious Runoff Depth>4.09"
Flow Length=262' Tc=4.1 min CN=77 Runoff=28.47 cfs 1.892 af

Subcatchment 20S: North Central Site Runoff Area=143,769 sf 0.00% Impervious Runoff Depth>4.31"
Flow Length=180' Tc=5.8 min CN=79 Runoff=16.71 cfs 1.184 af

Subcatchment 21S: WESTERN SITE TO Runoff Area=401,163 sf 0.00% Impervious Runoff Depth>3.98"
Flow Length=959' Tc=15.0 min CN=76 Runoff=32.59 cfs 3.054 af

Subcatchment 22S: Access Road at Runoff Area=50,837 sf 69.51% Impervious Runoff Depth>5.87"
Tc=6.0 min CN=93 Runoff=7.41 cfs 0.571 af

Subcatchment 23S: Function Hall Staff Runoff Area=31,111 sf 56.03% Impervious Runoff Depth>5.52"
Tc=6.0 min CN=90 Runoff=4.38 cfs 0.329 af

Subcatchment 24S: WEST SITE Runoff Area=605,999 sf 0.00% Impervious Runoff Depth>4.09"
Flow Length=800' Tc=11.4 min CN=77 Runoff=55.81 cfs 4.740 af

Subcatchment 25S: Porous Pavement Runoff Area=6,516 sf 100.00% Impervious Runoff Depth>5.42"
Tc=462.0 min CN=98 Runoff=0.10 cfs 0.068 af

Subcatchment 26S: WEST CORNER SITE Runoff Area=89,427 sf 0.00% Impervious Runoff Depth>3.98"
Flow Length=609' Tc=12.9 min CN=76 Runoff=7.69 cfs 0.681 af

Subcatchment 27S: Rear of Building 4 Runoff Area=38,647 sf 52.96% Impervious Runoff Depth>5.18"
Tc=6.0 min CN=87 Runoff=5.21 cfs 0.383 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>5.42"
Tc=462.0 min CN=98 Runoff=0.18 cfs 0.120 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=80 Runoff=0.45 cfs 0.032 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>4.63"
Tc=6.0 min CN=82 Runoff=2.99 cfs 0.215 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=98.19 cfs 8.642 af
Outflow=98.19 cfs 8.642 af

Reach 2R: ONSITE WETLANDS Inflow=32.31 cfs 5.877 af
Outflow=32.31 cfs 5.877 af

Reach 3R: OFFSITE OVERLAND FLOW Inflow=76.18 cfs 8.458 af
Outflow=76.18 cfs 8.458 af

Reach 4R: ROADSIDE DEPRESSION Inflow=10.44 cfs 1.094 af
Outflow=10.44 cfs 1.094 af

Reach 5R: Total Site Inflow=202.06 cfs 24.071 af
Outflow=202.06 cfs 24.071 af

Pond 1P: VERNAL POOL Peak Elev=172.53' Storage=2.575 af Inflow=56.69 cfs 5.353 af
Outflow=20.27 cfs 3.250 af

Pond 2P: VERNAL POOL Peak Elev=216.73' Storage=1.610 af Inflow=55.81 cfs 4.740 af
Outflow=33.61 cfs 3.808 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=181.48' Storage=43,465 cf Inflow=27.38 cfs 2.153 af
Discarded=0.29 cfs 0.485 af Primary=8.70 cfs 0.866 af Outflow=8.99 cfs 1.351 af

Pond 4P: PRECAST UNDERGROUND Peak Elev=189.48' Storage=7,098 cf Inflow=5.21 cfs 0.383 af
Discarded=0.13 cfs 0.174 af Primary=1.45 cfs 0.088 af Outflow=1.58 cfs 0.262 af

Pond 5P: PRECAST UNDERGROUND Peak Elev=189.05' Storage=22,344 cf Inflow=18.80 cfs 1.479 af
Discarded=0.58 cfs 0.845 af Primary=6.61 cfs 0.446 af Outflow=7.19 cfs 1.291 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=179.96' Storage=11,640 cf Inflow=8.84 cfs 0.674 af
Discarded=0.16 cfs 0.239 af Primary=2.92 cfs 0.253 af Outflow=3.08 cfs 0.491 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=171.99' Storage=6,323 cf Inflow=6.49 cfs 0.497 af
Discarded=0.10 cfs 0.154 af Primary=5.72 cfs 0.228 af Outflow=5.82 cfs 0.382 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=177.88' Storage=12,018 cf Inflow=15.04 cfs 1.195 af
Discarded=0.26 cfs 0.423 af Primary=8.94 cfs 0.654 af Outflow=9.20 cfs 1.077 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=190.47' Storage=13,442 cf Inflow=11.73 cfs 0.939 af
Discarded=0.43 cfs 0.630 af Primary=4.12 cfs 0.245 af Outflow=4.55 cfs 0.875 af

Pond 10P: PRECAST UNDERGROUND Peak Elev=173.48' Storage=1,866 cf Inflow=4.38 cfs 0.329 af
Discarded=0.05 cfs 0.074 af Primary=4.25 cfs 0.221 af Outflow=4.30 cfs 0.295 af

Pond 11P: Bio-Retention Area Peak Elev=167.57' Storage=9,381 cf Inflow=8.50 cfs 0.443 af
Outflow=2.86 cfs 0.246 af

Total Runoff Area = 87.678 ac Runoff Volume = 31.949 af Average Runoff Depth = 4.37"
85.56% Pervious = 75.013 ac 14.44% Impervious = 12.665 ac

Summary for Subcatchment 1S: Northwest Site

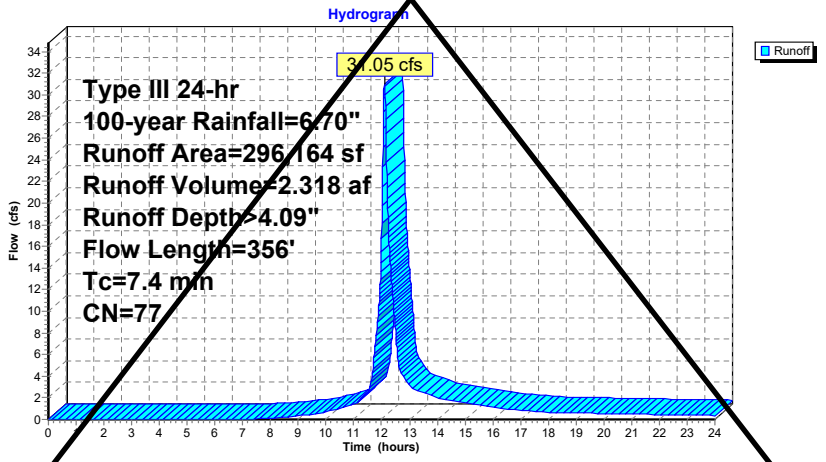
Runoff = 31.05 cfs @ 12.11 hrs, Volume= 2.318 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 10bS: Building 1 Roof

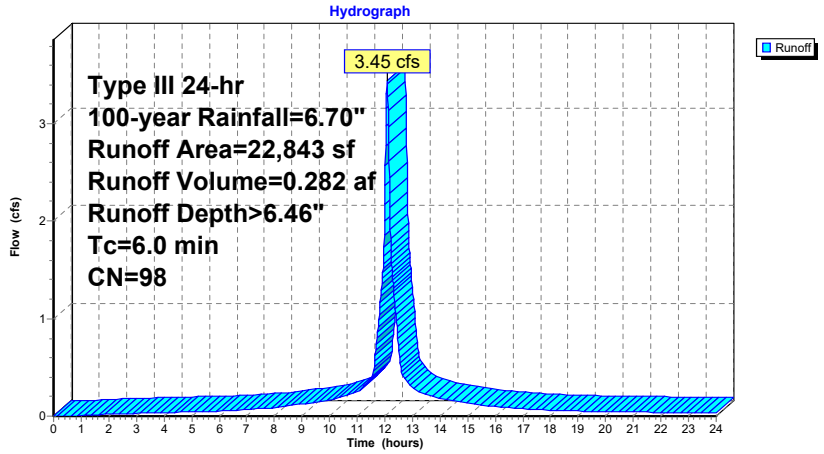
Runoff = 3.45 cfs @ 12.08 hrs, Volume= 0.282 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	22,843	98	Roof
	22,843		100.00% Impervious Area

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

Subcatchment 10bS: Building 1 Roof



Summary for Subcatchment 10S: Building 1 Roof

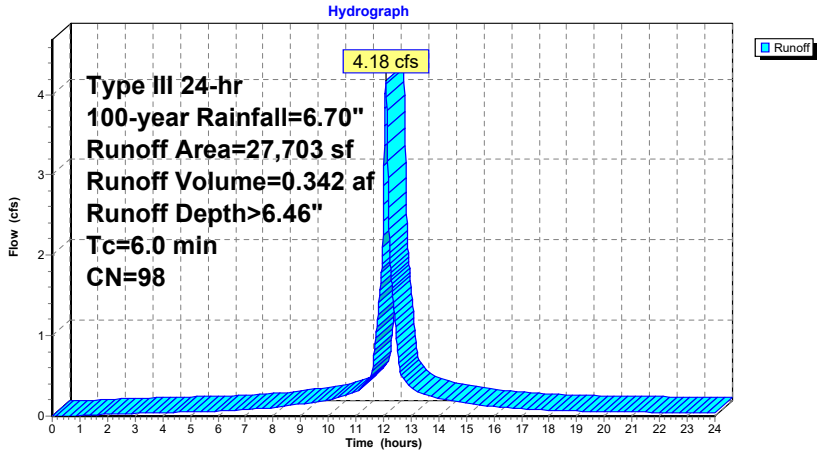
Runoff = 4.18 cfs @ 12.08 hrs, Volume= 0.342 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	27,703	98	Roof
	27,703		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

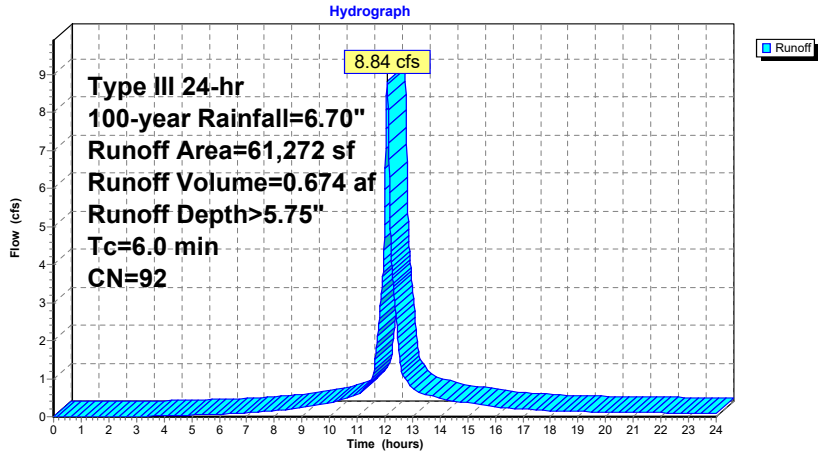
Runoff = 8.84 cfs @ 12.08 hrs, Volume= 0.674 af, Depth> 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
	19,615	80	>75% Grass cover, Good, HSG D
*	41,657	98	Paved parking
	61,272	92	Weighted Average
	19,615		32.01% Pervious Area
	41,657		67.99% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

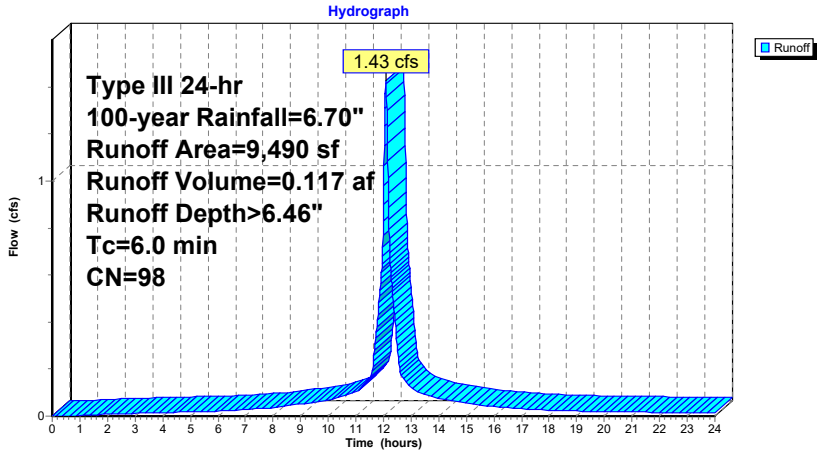
Runoff = 1.43 cfs @ 12.08 hrs, Volume= 0.117 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	9,490	98	Roof
	9,490		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

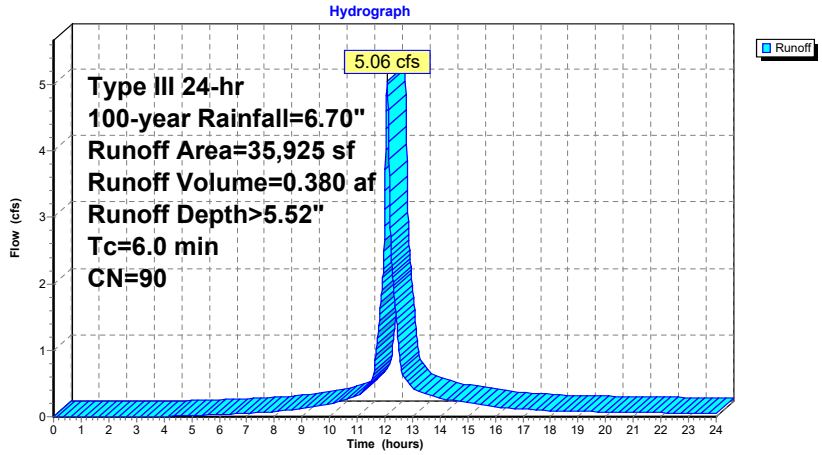
Runoff = 5.06 cfs @ 12.08 hrs, Volume= 0.380 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
15,684	80	>75% Grass cover, Good, HSG D
20,241	98	Paved parking, HSG D
35,925	90	Weighted Average
15,684		43.66% Pervious Area
20,241		56.34% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

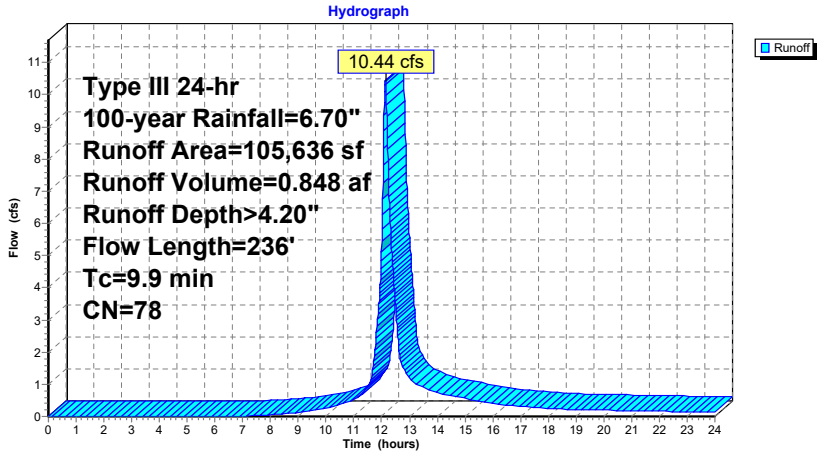
Runoff = 10.44 cfs @ 12.14 hrs, Volume= 0.848 af, Depth> 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
50,615	79	Woods/grass comb., Good, HSG D
10,545	80	>75% Grass cover, Good, HSG D
105,636	78	Weighted Average
105,636		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 20S: North Central Site

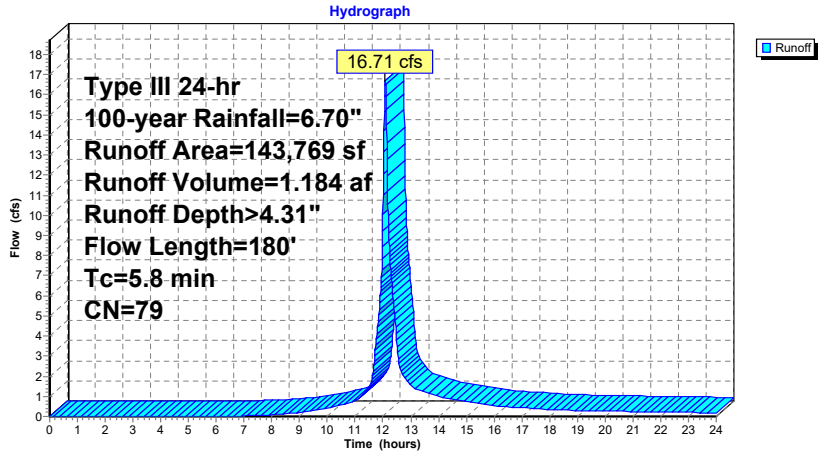
Runoff = 16.71 cfs @ 12.08 hrs, Volume= 1.184 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
108,663	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
143,769	79	Weighted Average
143,769		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total			

Subcatchment 20S: North Central Site



Summary for Subcatchment 21S: WESTERN SITE TO SOUTH

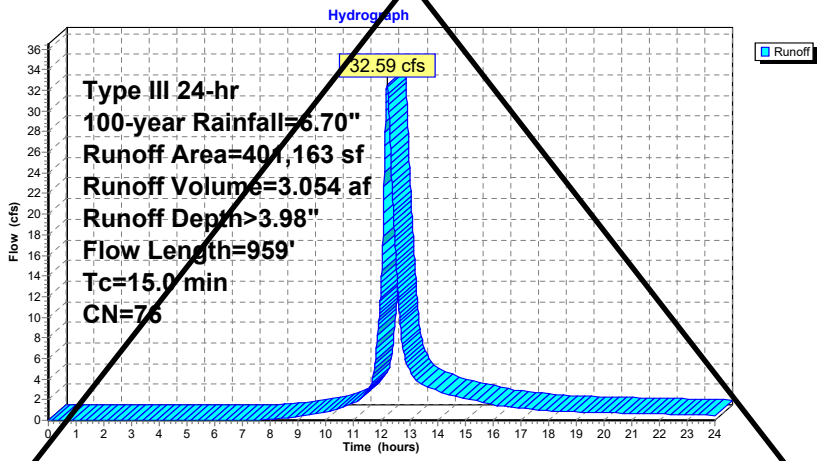
Runoff = 32.59 cfs @ 12.21 hrs, Volume= 3.054 af, Depth> 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
348,163	77	Woods, Good, HSG D
11,804	80	>75% Grass cover, Good, HSG D
37,306	70	Woods, Good, HSG C
3,890	74	>75% Grass cover, Good, HSG C
401,163	76	Weighted Average
401,163		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
4.5	909	0.0430	3.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
15.0	959	Total			

Subcatchment 21S: WESTERN SITE TO SOUTH



Summary for Subcatchment 22S: Access Road at Building 1

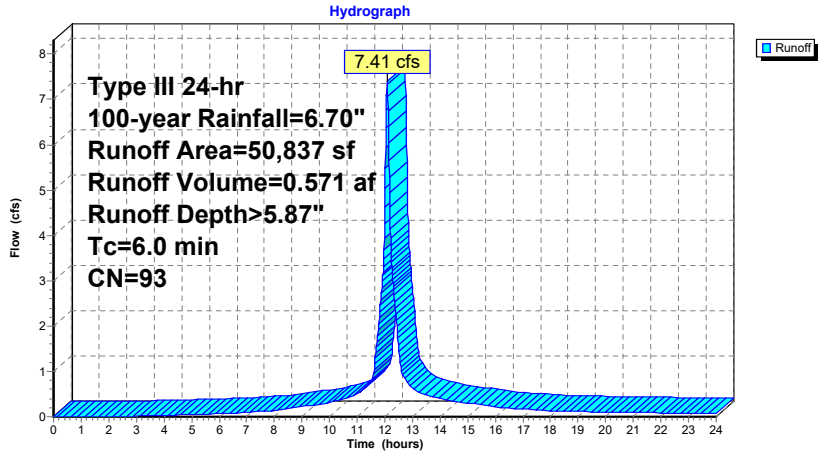
Runoff = 7.41 cfs @ 12.08 hrs, Volume= 0.571 af, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	35,337	98	Paved parking
	15,500	80	>75% Grass cover, Good, HSG D
	50,837	93	Weighted Average
	15,500		30.49% Pervious Area
	35,337		69.51% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 23S: Function Hall Staff Parking

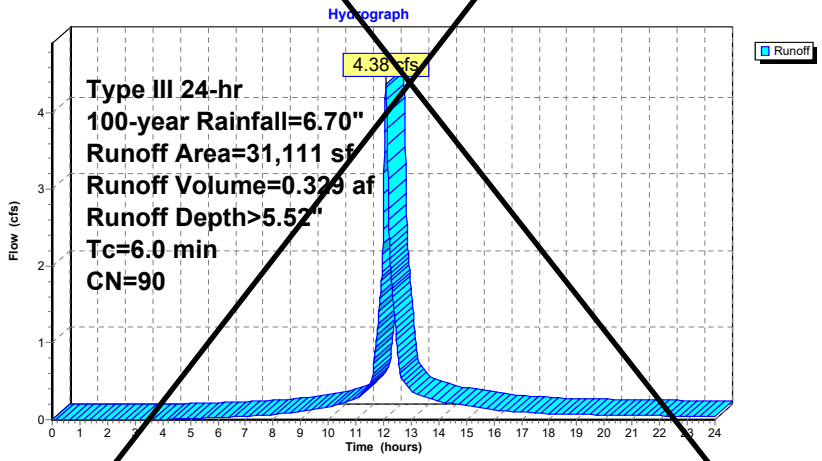
Runoff = 4.38 cfs @ 12.08 hrs, Volume= 0.329 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	17,432	98	Paved parking
	13,679	80	>75% Grass cover, Good, HSG D
	31,111	90	Weighted Average
	13,679		43.97% Pervious Area
	17,432		56.03% Impervious Area

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

Subcatchment 23S: Function Hall Staff Parking



Summary for Subcatchment 30S: Entrance Drive

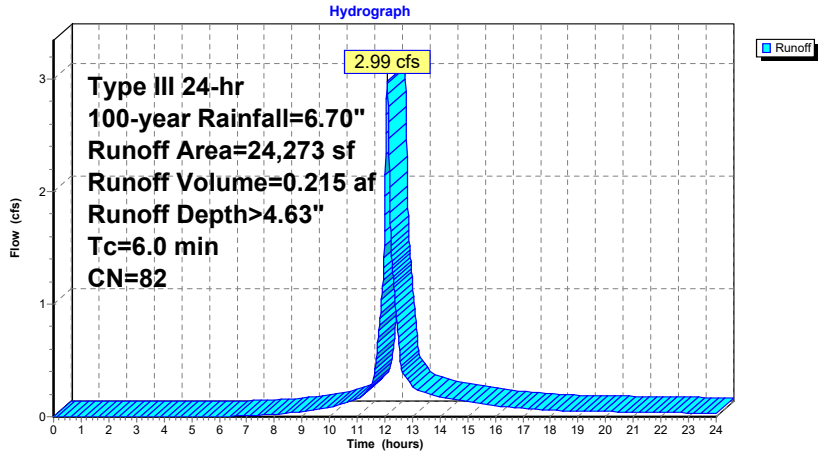
Runoff = 2.99 cfs @ 12.09 hrs, Volume= 0.215 af, Depth> 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive

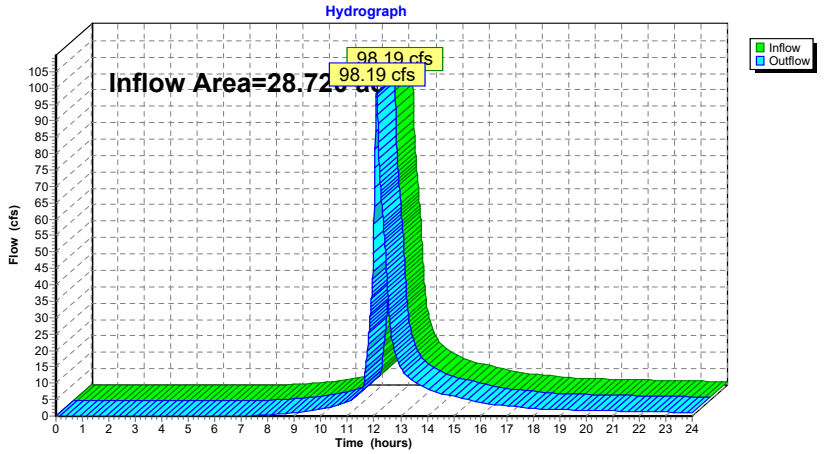


Summary for Reach 1R: FLOW TO NORTH WETLANDS

Inflow Area = 28.720 ac, 28.94% Impervious, Inflow Depth > 3.61" for 100-year event
Inflow = 98.19 cfs @ 12.10 hrs, Volume= 8.642 af
Outflow = 98.19 cfs @ 12.10 hrs, Volume= 8.642 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS

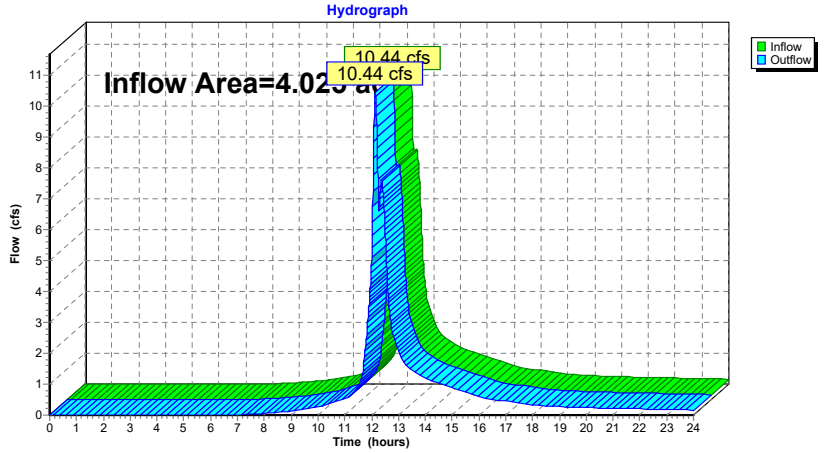


Summary for Reach 4R: ROADSIDE DEPRESSION

Inflow Area = 4.025 ac, 18.84% Impervious, Inflow Depth > 3.26" for 100-year event
Inflow = 10.44 cfs @ 12.14 hrs, Volume= 1.094 af
Outflow = 10.44 cfs @ 12.14 hrs, Volume= 1.094 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION

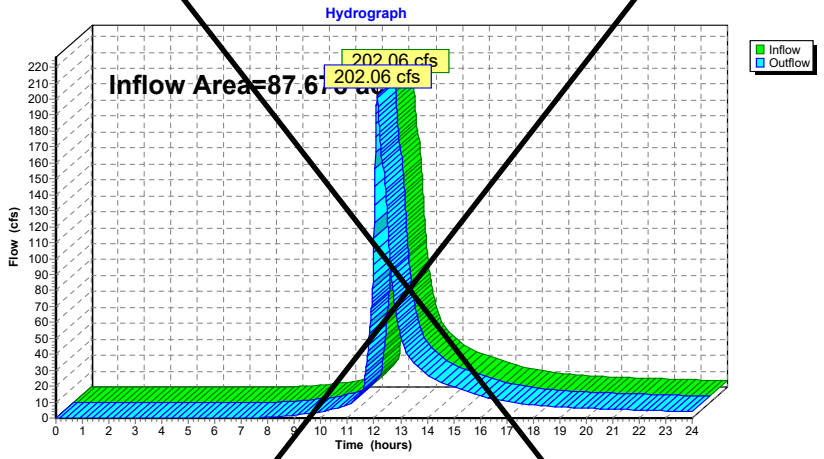


Summary for Reach 5R: Total Site

Inflow Area = 87.678 ac, 14.44% Impervious, Inflow Depth > 3.29" for 100-year event
Inflow = 202.06 cfs @ 12.12 hrs, Volume= 24.071 af
Outflow = 202.06 cfs @ 12.12 hrs, Volume= 24.071 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 5R: Total Site



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.407 ac, 67.99% Impervious, Inflow Depth > 5.75" for 100-year event
Inflow = 8.84 cfs @ 12.08 hrs, Volume= 0.674 af
Outflow = 3.08 cfs @ 12.35 hrs, Volume= 0.491 af, Atten= 65%, Lag= 16.0 min
Discarded = 0.16 cfs @ 9.03 hrs, Volume= 0.239 af
Primary = 2.92 cfs @ 12.35 hrs, Volume= 0.253 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.96' @ 12.35 hrs Surf.Area= 6,784 sf Storage= 11,640 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 69.7 min (843.1 - 773.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

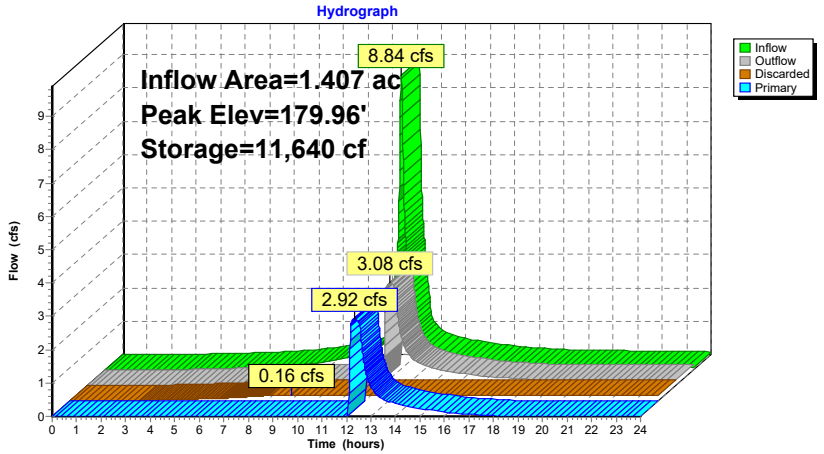
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 9.03 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=2.92 cfs @ 12.35 hrs HW=179.96' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 2.92 cfs @ 3.71 fps)
└**3=Sharp-Crested Rectangular Weir** (Passes 2.92 cfs of 3.93 cfs potential flow)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.043 ac, 65.47% Impervious, Inflow Depth > 5.72" for 100-year event
Inflow = 6.49 cfs @ 12.08 hrs, Volume= 0.497 af
Outflow = 5.82 cfs @ 12.12 hrs, Volume= 0.382 af, Atten= 10%, Lag= 2.4 min
Discarded = 0.10 cfs @ 8.60 hrs, Volume= 0.154 af
Primary = 5.72 cfs @ 12.12 hrs, Volume= 0.228 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.99' @ 12.12 hrs Surf.Area= 1,801 sf Storage= 6,323 cf
Flood Elev= 172.00' Surf.Area= 1,801 sf Storage= 6,342 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 46.9 min (818.7 - 771.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**30.27'W x 59.50'L x 4.50'H Field A** 8,105 cf Overall - 8,105 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	6,342 cf	**StormTrap SingleTrap 4-0** x 6 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 16.96' x 46.19' Core + 6.66' Border = 30.27' x 59.50' System
		6,342 cf	Total Available Storage

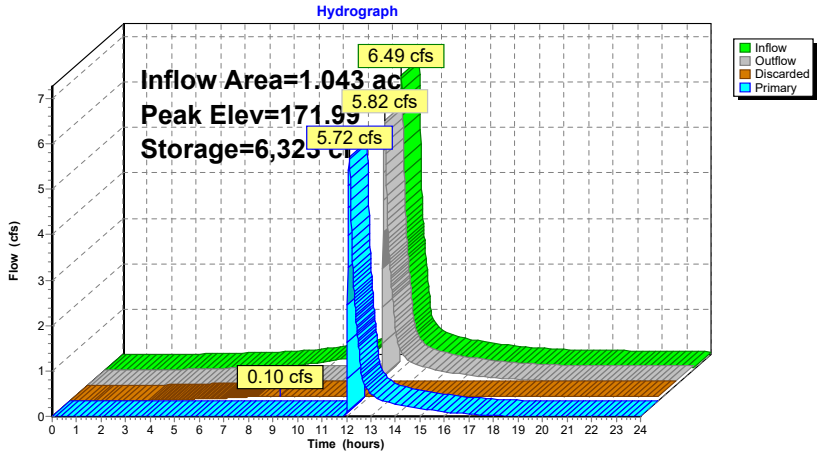
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 8.60 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=5.71 cfs @ 12.12 hrs HW=171.99' TW=166.12' (Dynamic Tailwater)
└**3=Culvert** (Passes 5.71 cfs of 7.84 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 5.71 cfs @ 2.51 fps)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.327 ac, 84.71% Impervious, Inflow Depth > 6.16" for 100-year event
Inflow = 15.04 cfs @ 12.08 hrs, Volume= 1.195 af
Outflow = 9.20 cfs @ 12.18 hrs, Volume= 1.077 af, Atten= 39%, Lag= 6.0 min
Discarded = 0.26 cfs @ 8.18 hrs, Volume= 0.423 af
Primary = 8.94 cfs @ 12.18 hrs, Volume= 0.654 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.88' @ 12.18 hrs Surf.Area= 4,692 sf Storage= 12,018 cf
Flood Elev= 178.00' Surf.Area= 4,692 sf Storage= 12,503 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 42.2 min (797.8 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 121.08'L x 3.50'H Field A** 16,422 cf Overall - 16,422 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	12,503 cf	**StormTrap SingleTrap 3-0** x 21 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 25.44' x 107.77' Core + 6.66' Border = 38.75' x 121.08' System
		12,503 cf	Total Available Storage

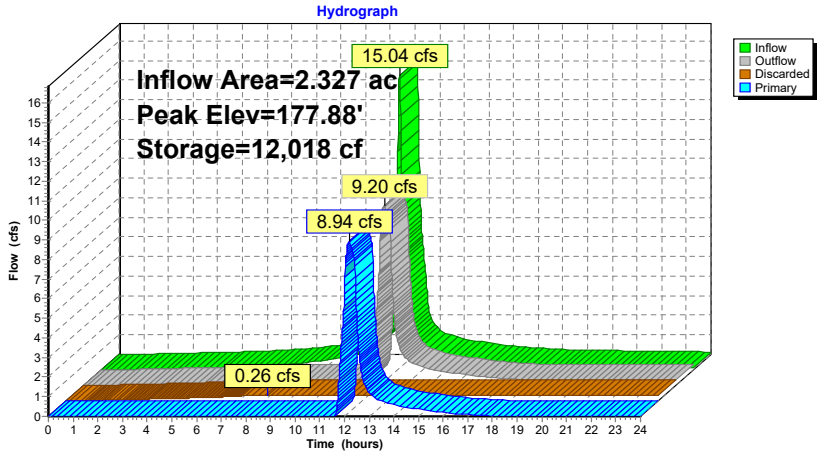
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	174.97'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.97' / 174.81' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	176.60'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 8.18 hrs HW=175.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=8.94 cfs @ 12.18 hrs HW=177.88' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 8.94 cfs @ 7.28 fps)
└**3=Sharp-Crested Rectangular Weir** (Passes 8.94 cfs of 17.79 cfs potential flow)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.600 ac, 47.41% Impervious, Inflow Depth > 3.32" for 100-year event
Inflow = 8.50 cfs @ 12.11 hrs, Volume= 0.443 af
Outflow = 2.86 cfs @ 12.42 hrs, Volume= 0.246 af, Atten= 66%, Lag= 18.6 min
Primary = 2.86 cfs @ 12.42 hrs, Volume= 0.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 167.57' @ 12.42 hrs Surf.Area= 3,340 sf Storage= 9,381 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= 147.6 min calculated for 0.246 af (56% of inflow)
Center-of-Mass det. time= 72.1 min (863.2 - 791.1)

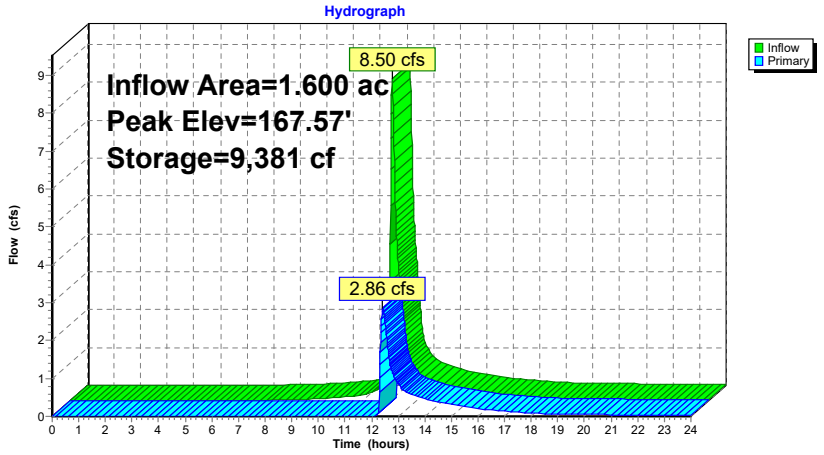
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

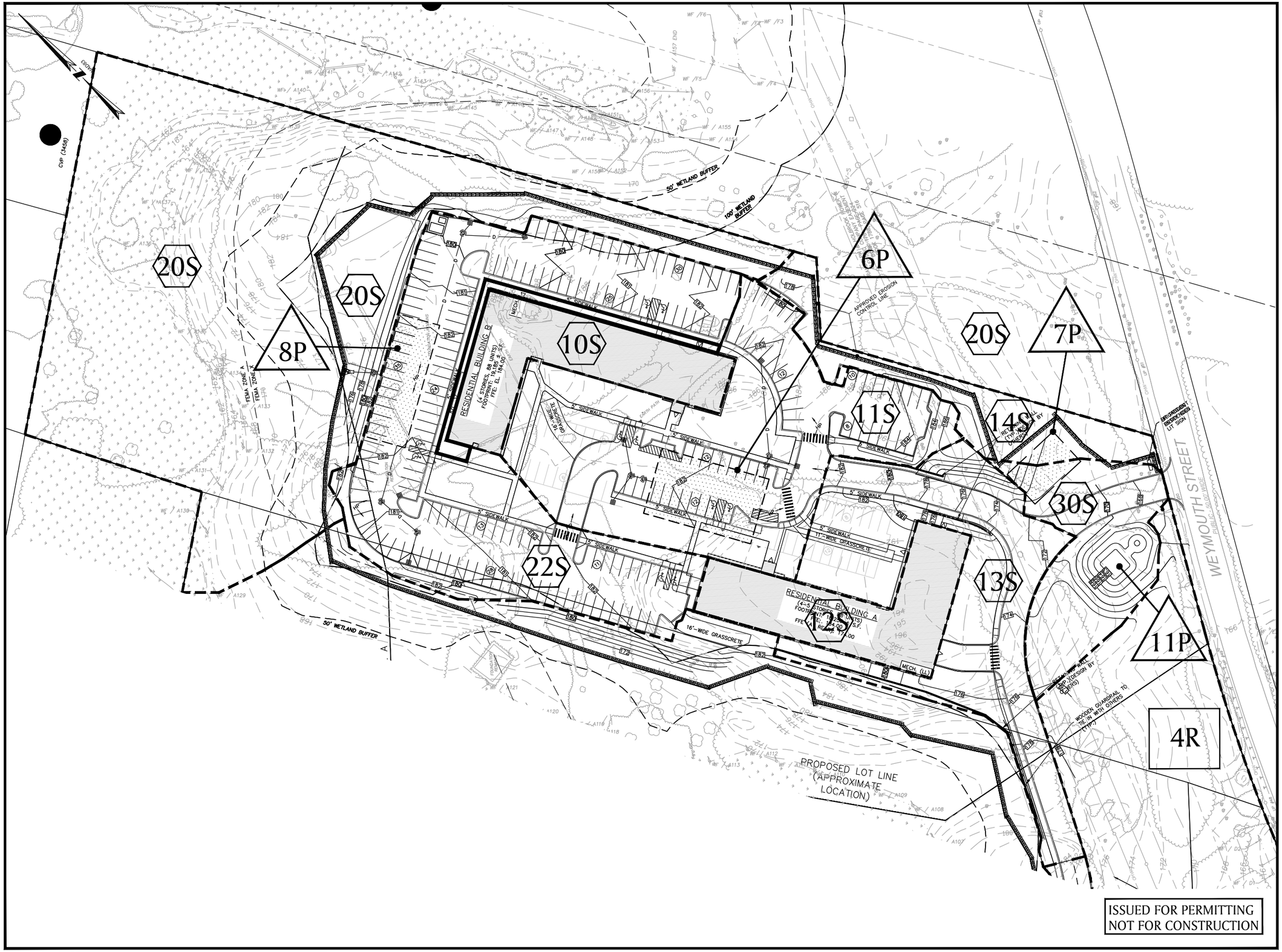
Device	Routing	Invert	Outlet Devices
#1	Primary	167.30'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.86 cfs @ 12.42 hrs HW=167.57' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 2.86 cfs @ 1.34 fps)

Pond 11P: Bio-Retention Area



6.03 PROPOSED MODIFIED WATERSHED PLAN



DAKOTA PARTNERS

JOSEPH J. WHITE
CIVIL
No. 36006
REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

7/8/2022
JOSEPH J. WHITE — DATE
PROFESSIONAL ENGINEER

THE ARCADIA

WEYMOUTH STREET
IN
HOLBROOK
MASSACHUSETTS
(NORFOLK COUNTY)

WATERSHED PLAN

JULY 11, 2022

REVISIONS:

NO.	DATE	DESC.

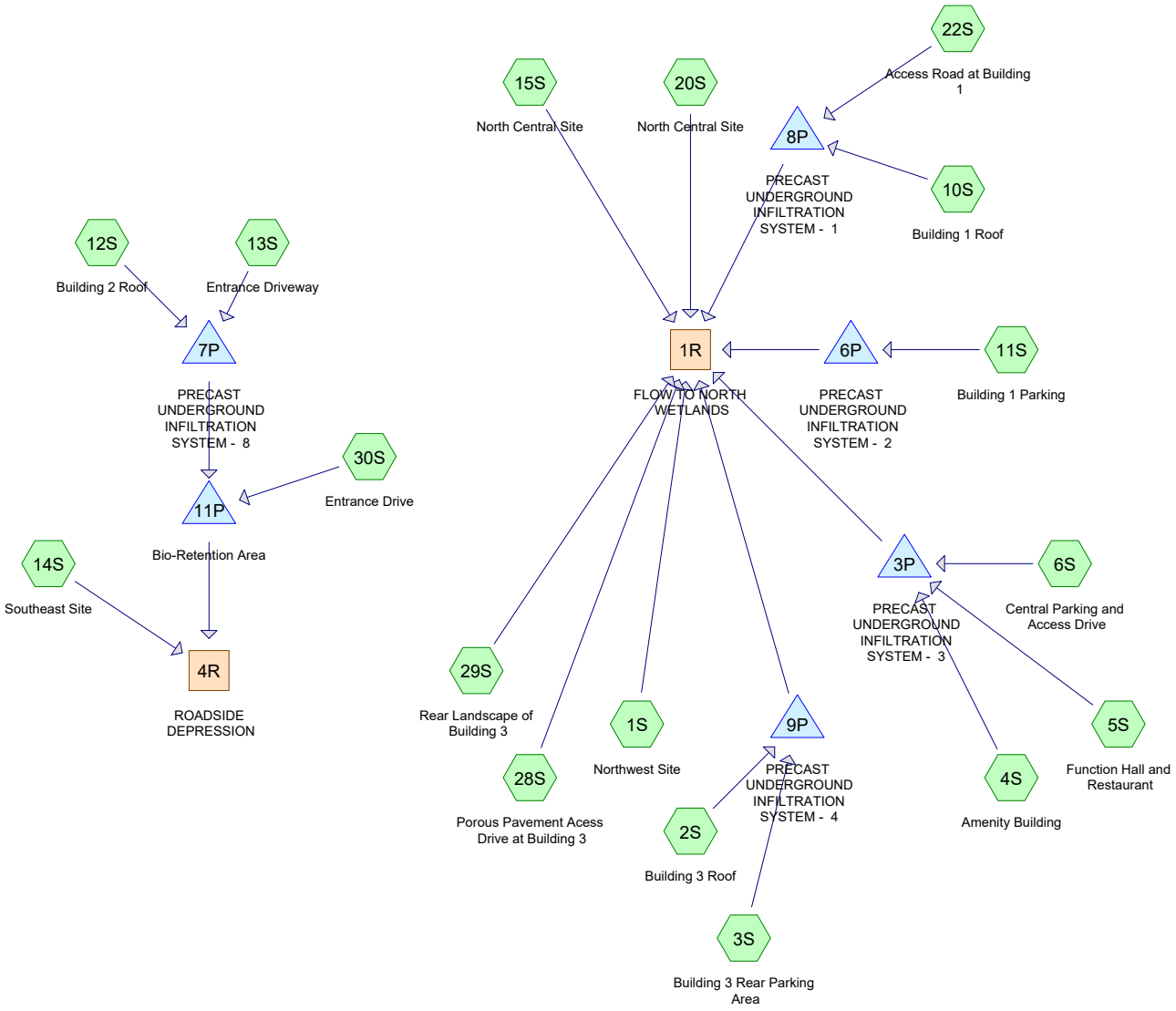
PREPARED FOR:
DAKOTA PARTNERS
253 BEAR HILL ROAD, SUITE 400
WALTHAM, MA 02451

BSC GROUP
300 Brickstone Square
Andover, Massachusetts 01810
617 896 4300

SCALE: 1" = 40'
0 20 40 80 FEET

FILE: AND\5001710\C\D\5001710-Watershed
DWG.:
JOB. NO: 5-0017.10
SHEET C-100

6.04 PROPOSED MODIFIED HYDROLOGY CALCULATIONS (HYDROCAD™ PRINTOUTS)



Subcat Reach Pond Link

Routing Diagram for 5001710-(NEW Comparison)
Prepared by {enter your company name here}, Printed 7/8/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.807	80	>75% Grass cover, Good, HSG D (1S, 3S, 6S, 11S, 13S, 14S, 15S, 20S, 22S, 29S, 30S)
6.083	98	Paved parking (3S, 4S, 6S, 11S, 22S, 28S, 30S)
0.468	98	Paved parking, HSG D (13S)
2.368	98	Roof (2S, 4S, 5S, 10S, 12S)
11.114	77	Woods, Good, HSG D (1S, 14S, 15S, 20S)
8.054	79	Woods/grass comb., Good, HSG D (1S, 14S, 15S, 20S)
32.893	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
24.443	HSG D	1S, 3S, 6S, 11S, 13S, 14S, 15S, 20S, 22S, 29S, 30S
8.451	Other	2S, 3S, 4S, 5S, 6S, 10S, 11S, 12S, 22S, 28S, 30S
32.893		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	4.807	0.000	4.807	>75% Grass cover, Good	1S, 3S, 6S, 11S, 13S, 14S, 15S, 20S, 22S, 29S, 30S
0.000	0.000	0.000	0.468	6.083	6.551	Paved parking	3S, 4S, 6S, 11S, 13S, 22S, 28S, 30S
0.000	0.000	0.000	0.000	2.368	2.368	Roof	2S, 4S, 5S, 10S, 12S
0.000	0.000	0.000	11.114	0.000	11.114	Woods, Good	1S, 14S, 15S, 20S
0.000	0.000	0.000	8.054	0.000	8.054	Woods/grass comb., Good	1S, 14S, 15S, 20S
0.000	**0.000**	**0.000**	**24.443**	**8.451**	**32.893**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3P	177.37	176.63	74.0	0.0100	0.013	15.0	0.0	0.0
2	6P	178.50	178.11	78.0	0.0050	0.013	12.0	0.0	0.0
3	7P	165.97	164.00	73.0	0.0270	0.013	12.0	0.0	0.0
4	8P	175.60	174.81	16.0	0.0494	0.013	15.0	0.0	0.0
5	9P	188.37	188.12	51.0	0.0049	0.013	12.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>1.21"
Flow Length=356' Tc=7.4 min CN=77 Runoff=8.94 cfs 0.685 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=2.39 cfs 0.190 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>2.64"
Tc=6.0 min CN=95 Runoff=3.03 cfs 0.228 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.14 cfs 0.091 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.55 cfs 0.123 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>2.54"
Tc=6.0 min CN=94 Runoff=9.66 cfs 0.717 af

Subcatchment 10S: Building 1 Roof Runoff Area=19,185 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.37 cfs 0.109 af

Subcatchment 11S: Building 1 Parking Runoff Area=62,276 sf 54.19% Impervious Runoff Depth>2.17"
Tc=6.0 min CN=90 Runoff=3.60 cfs 0.258 af

Subcatchment 12S: Building 2 Roof Runoff Area=18,255 sf 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=1.30 cfs 0.104 af

Subcatchment 13S: Entrance Driveway Runoff Area=42,665 sf 47.80% Impervious Runoff Depth>2.08"
Tc=6.0 min CN=89 Runoff=2.38 cfs 0.170 af

Subcatchment 14S: Southeast Site Runoff Area=105,624 sf 0.00% Impervious Runoff Depth>1.27"
Flow Length=236' Tc=9.9 min CN=78 Runoff=3.10 cfs 0.257 af

Subcatchment 15S: North Central Site Runoff Area=370,279 sf 0.00% Impervious Runoff Depth>1.27"
Flow Length=185' Tc=6.0 min CN=78 Runoff=12.44 cfs 0.901 af

Subcatchment 20S: North Central Site Runoff Area=142,597 sf 0.00% Impervious Runoff Depth>1.33"
Flow Length=180' Tc=6.0 min CN=79 Runoff=5.06 cfs 0.364 af

Subcatchment 22S: Access Road at Runoff Area=72,531 sf 81.56% Impervious Runoff Depth>2.64"
Tc=6.0 min CN=95 Runoff=4.88 cfs 0.367 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>2.48"
Tc=462.0 min CN=98 Runoff=0.08 cfs 0.055 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>1.40"
Tc=6.0 min CN=80 Runoff=0.14 cfs 0.010 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>1.54"
Tc=6.0 min CN=82 Runoff=1.00 cfs 0.071 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=26.43 cfs 2.025 af
Outflow=26.43 cfs 2.025 af

Reach 4R: ROADSIDE DEPRESSION Inflow=3.10 cfs 0.257 af
Outflow=3.10 cfs 0.257 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=179.84' Storage=25,577 cf Inflow=12.35 cfs 0.931 af
Discarded=0.29 cfs 0.409 af Primary=0.00 cfs 0.000 af Outflow=0.29 cfs 0.409 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=178.96' Storage=5,721 cf Inflow=3.60 cfs 0.258 af
Discarded=0.16 cfs 0.194 af Primary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.194 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=170.41' Storage=6,000 cf Inflow=3.68 cfs 0.273 af
Discarded=0.16 cfs 0.201 af Primary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.201 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=177.04' Storage=9,585 cf Inflow=6.25 cfs 0.475 af
Discarded=0.30 cfs 0.388 af Primary=0.10 cfs 0.009 af Outflow=0.40 cfs 0.397 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=189.50' Storage=6,800 cf Inflow=5.42 cfs 0.418 af
Discarded=0.43 cfs 0.418 af Primary=0.00 cfs 0.000 af Outflow=0.43 cfs 0.418 af

Pond 11P: Bio-Retention Area Peak Elev=165.29' Storage=3,107 cf Inflow=1.00 cfs 0.071 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 32.893 ac Runoff Volume = 4.698 af Average Runoff Depth = 1.71"
72.89% Pervious = 23.975 ac 27.11% Impervious = 8.919 ac

Summary for Subcatchment 1S: Northwest Site

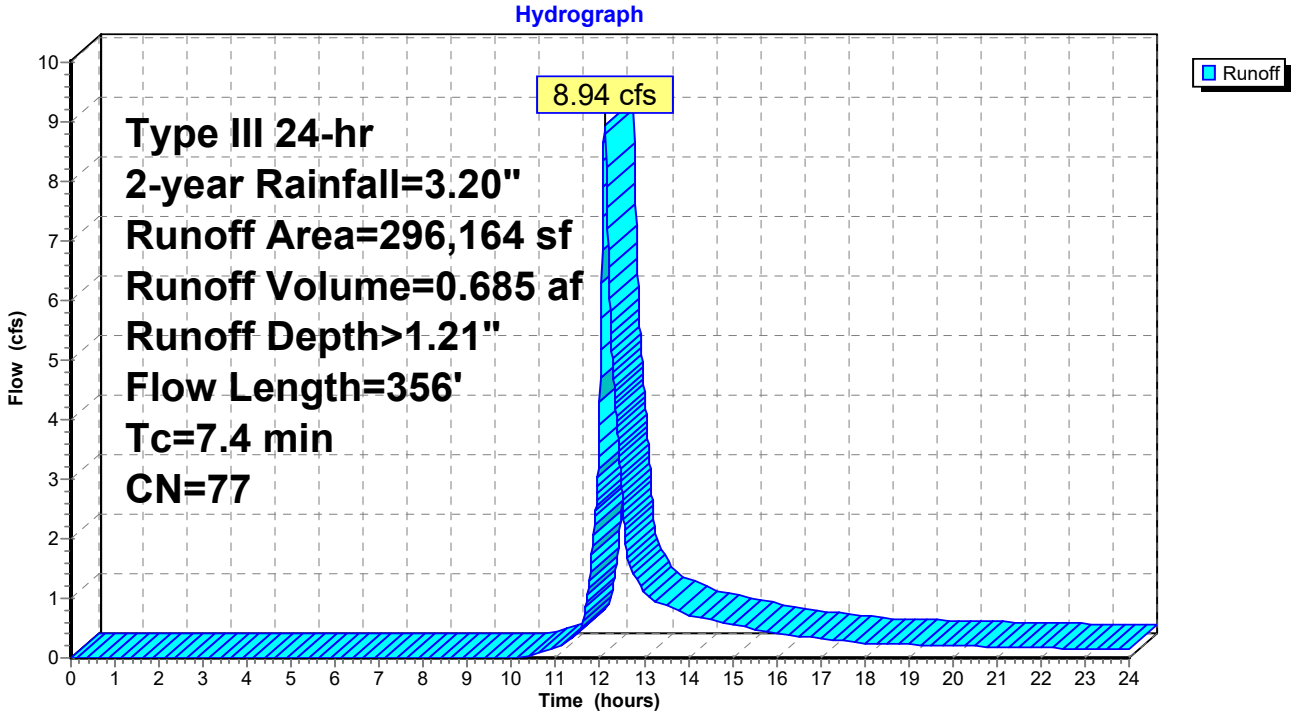
Runoff = 8.94 cfs @ 12.11 hrs, Volume= 0.685 af, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 2S: Building 3 Roof

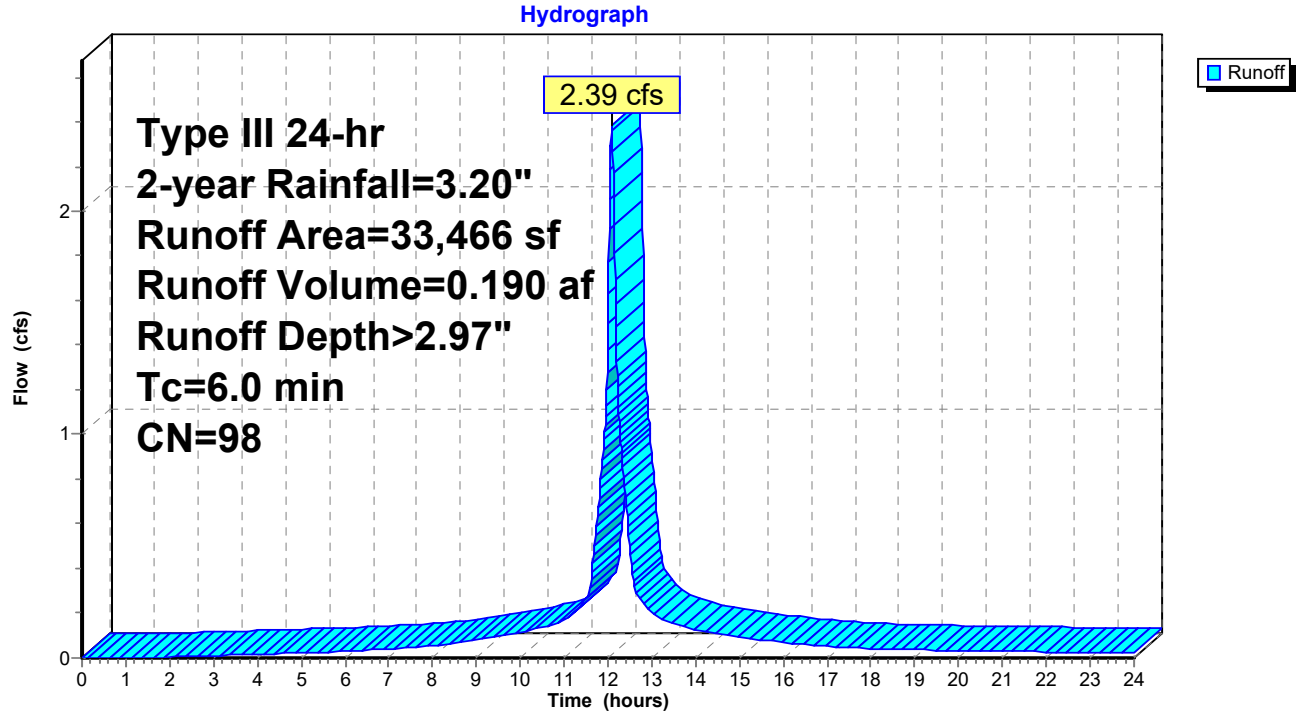
Runoff = 2.39 cfs @ 12.08 hrs, Volume= 0.190 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	33,466	98	Roof
	33,466		100.00% Impervious Area

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

Subcatchment 2S: Building 3 Roof



Summary for Subcatchment 3S: Building 3 Rear Parking Area

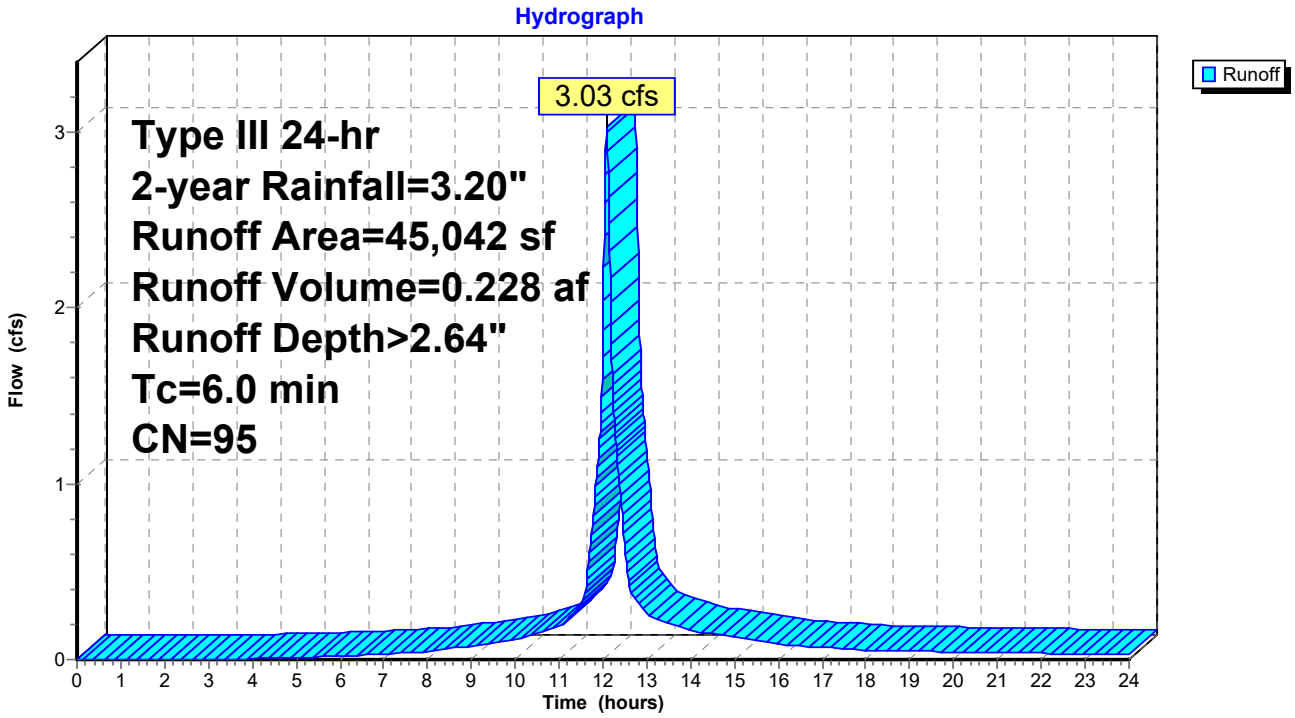
Runoff = 3.03 cfs @ 12.08 hrs, Volume= 0.228 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
	7,808	80	>75% Grass cover, Good, HSG D
*	37,234	98	Paved parking
	45,042	95	Weighted Average
	7,808		17.33% Pervious Area
	37,234		82.67% Impervious Area

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

Subcatchment 3S: Building 3 Rear Parking Area



Summary for Subcatchment 4S: Amenity Building

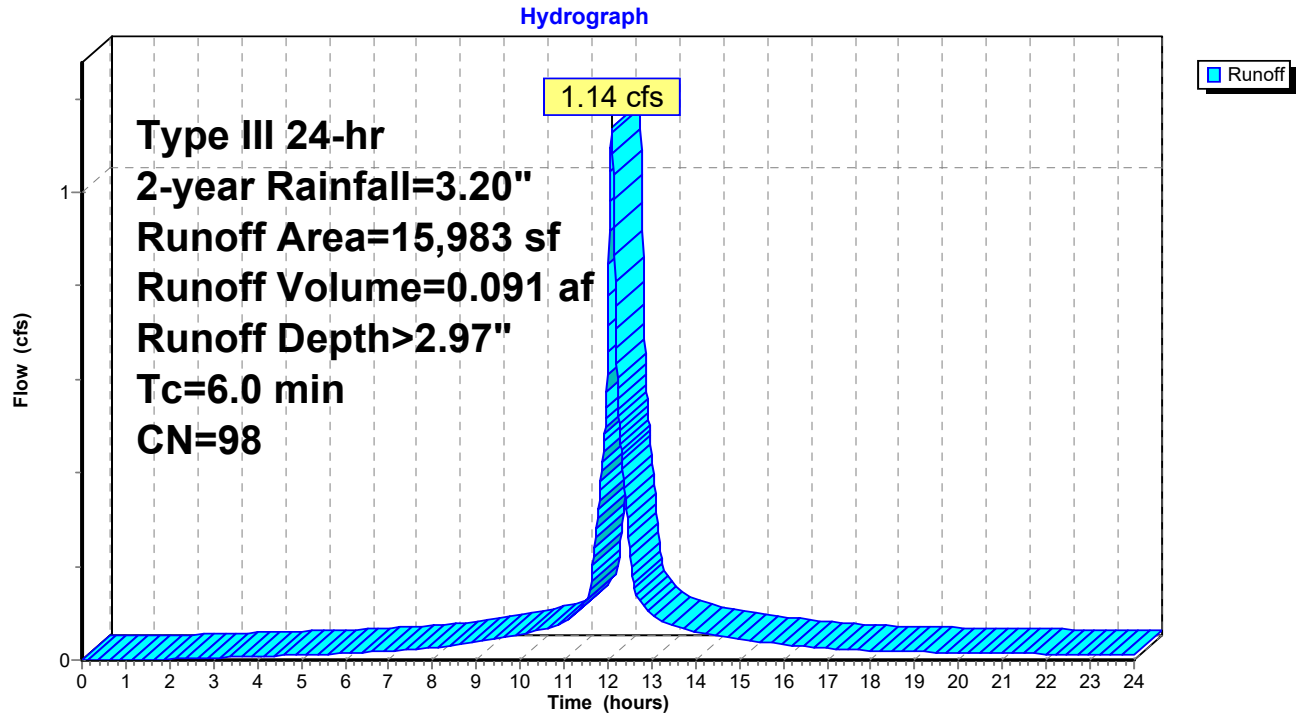
Runoff = 1.14 cfs @ 12.08 hrs, Volume= 0.091 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	10,495	98	Roof
*	5,488	98	Paved parking
	15,983	98	Weighted Average
	15,983		100.00% Impervious Area

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

Subcatchment 4S: Amenity Building



Summary for Subcatchment 5S: Function Hall and Restaurant

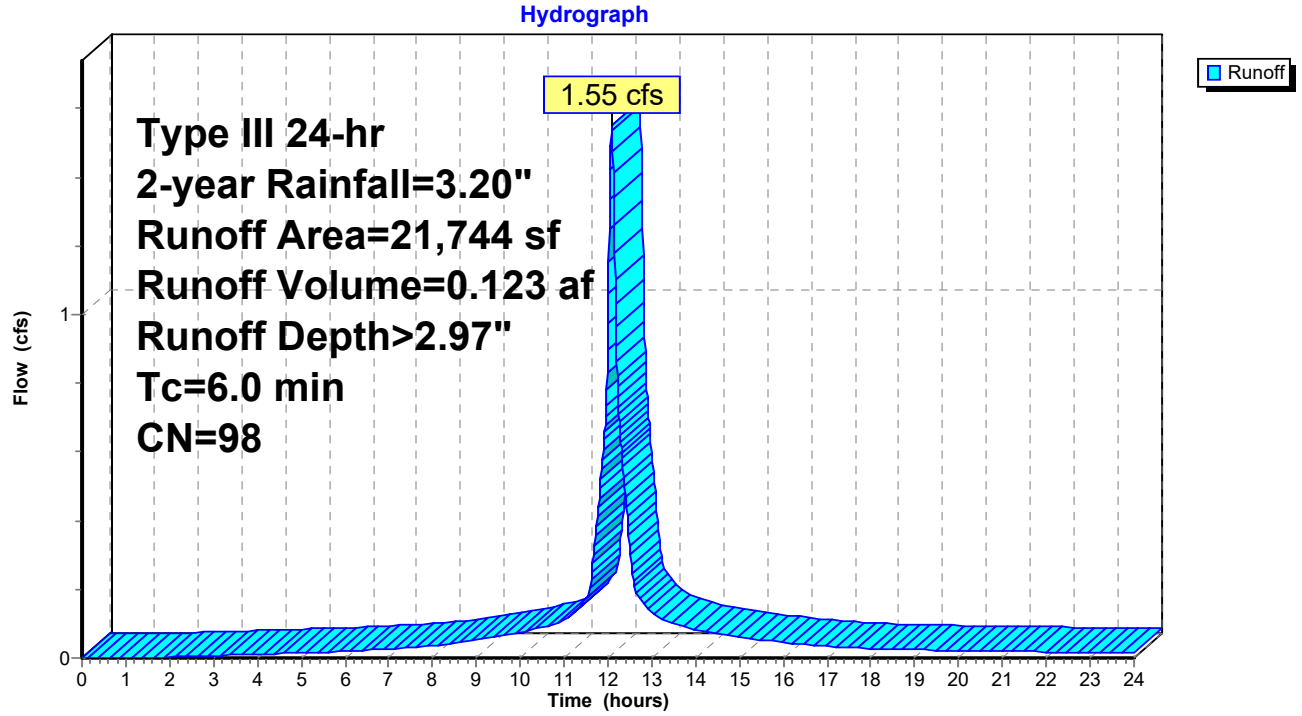
Runoff = 1.55 cfs @ 12.08 hrs, Volume= 0.123 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	21,744	98	Roof
	21,744		100.00% Impervious Area

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

Subcatchment 5S: Function Hall and Restaurant



Summary for Subcatchment 6S: Central Parking and Access Drive

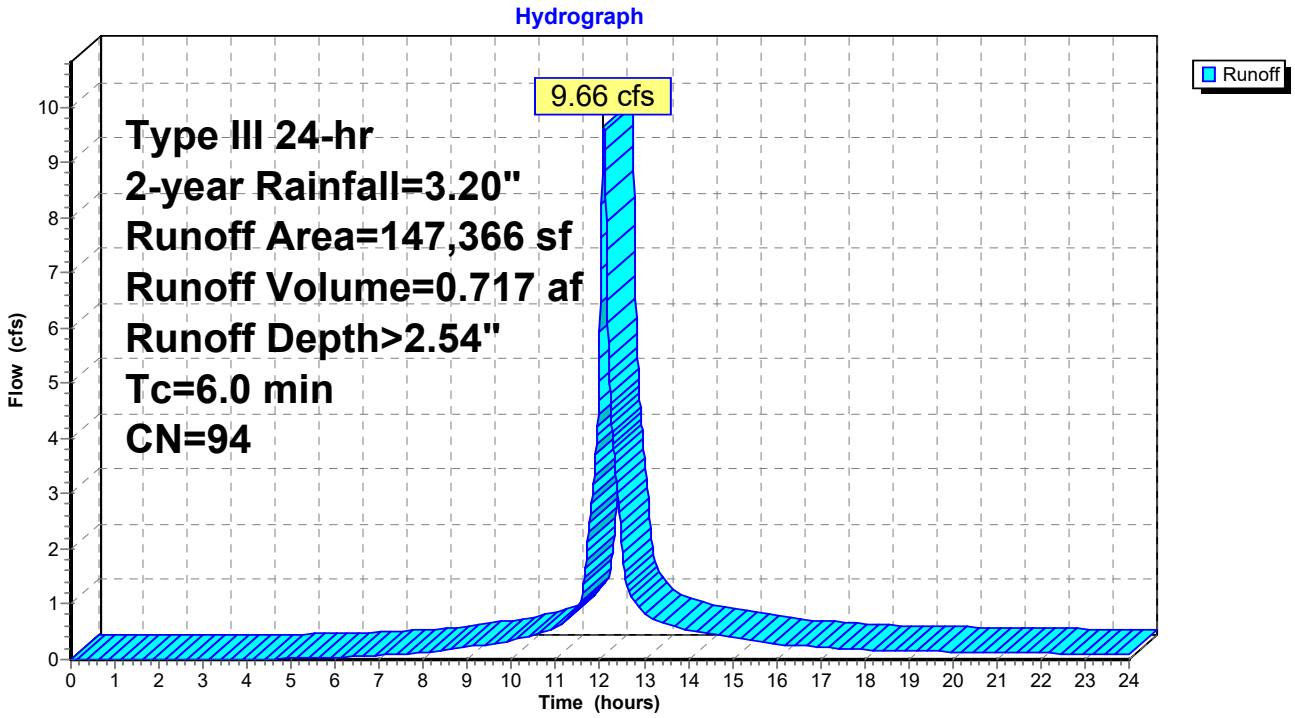
Runoff = 9.66 cfs @ 12.08 hrs, Volume= 0.717 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
	32,897	80	>75% Grass cover, Good, HSG D
*	114,469	98	Paved parking
	147,366	94	Weighted Average
	32,897		22.32% Pervious Area
	114,469		77.68% Impervious Area

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

Subcatchment 6S: Central Parking and Access Drive



Summary for Subcatchment 10S: Building 1 Roof

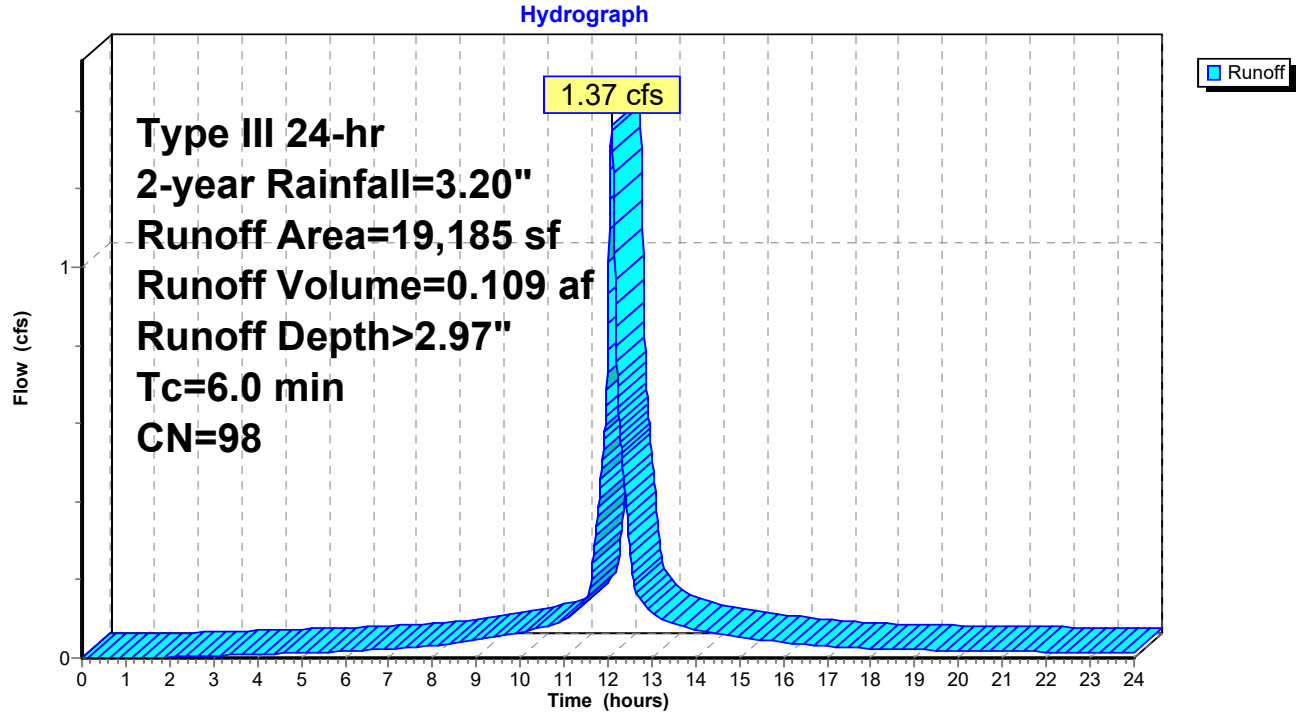
Runoff = 1.37 cfs @ 12.08 hrs, Volume= 0.109 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	19,185	98	Roof
	19,185		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

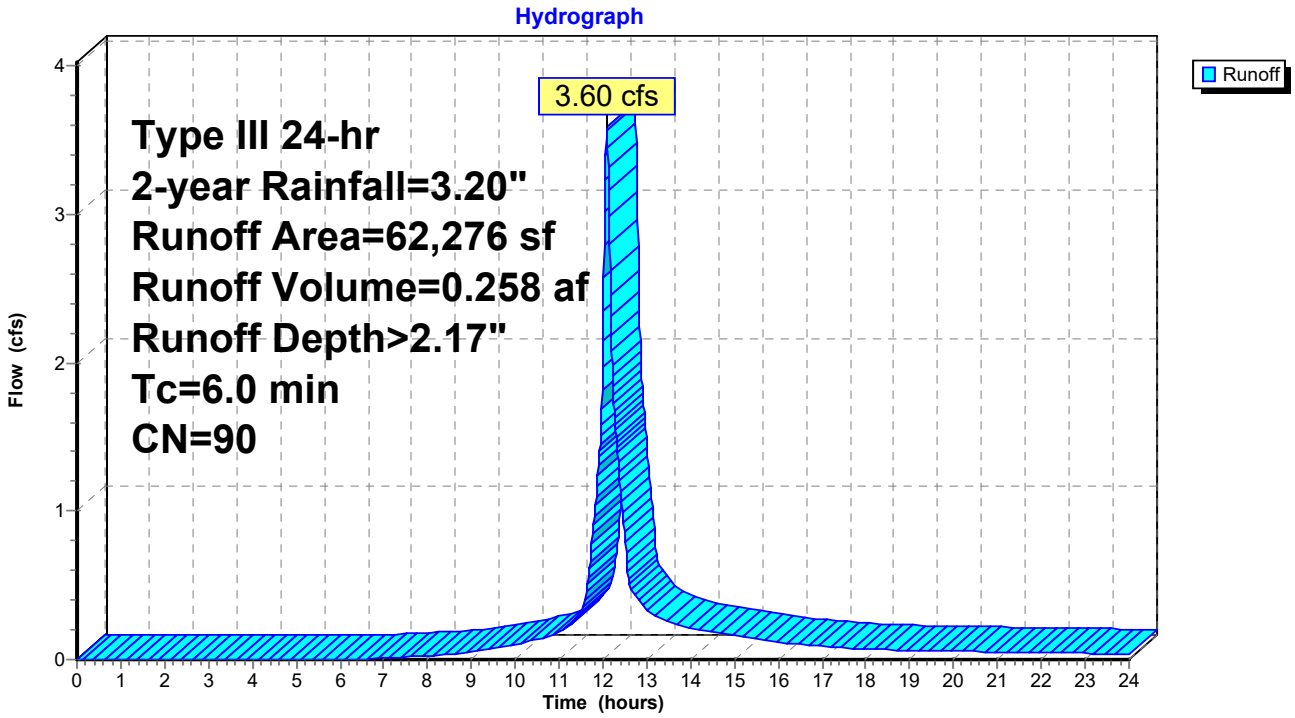
Runoff = 3.60 cfs @ 12.09 hrs, Volume= 0.258 af, Depth> 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
	28,529	80	>75% Grass cover, Good, HSG D
*	33,747	98	Paved parking
	62,276	90	Weighted Average
	28,529		45.81% Pervious Area
	33,747		54.19% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

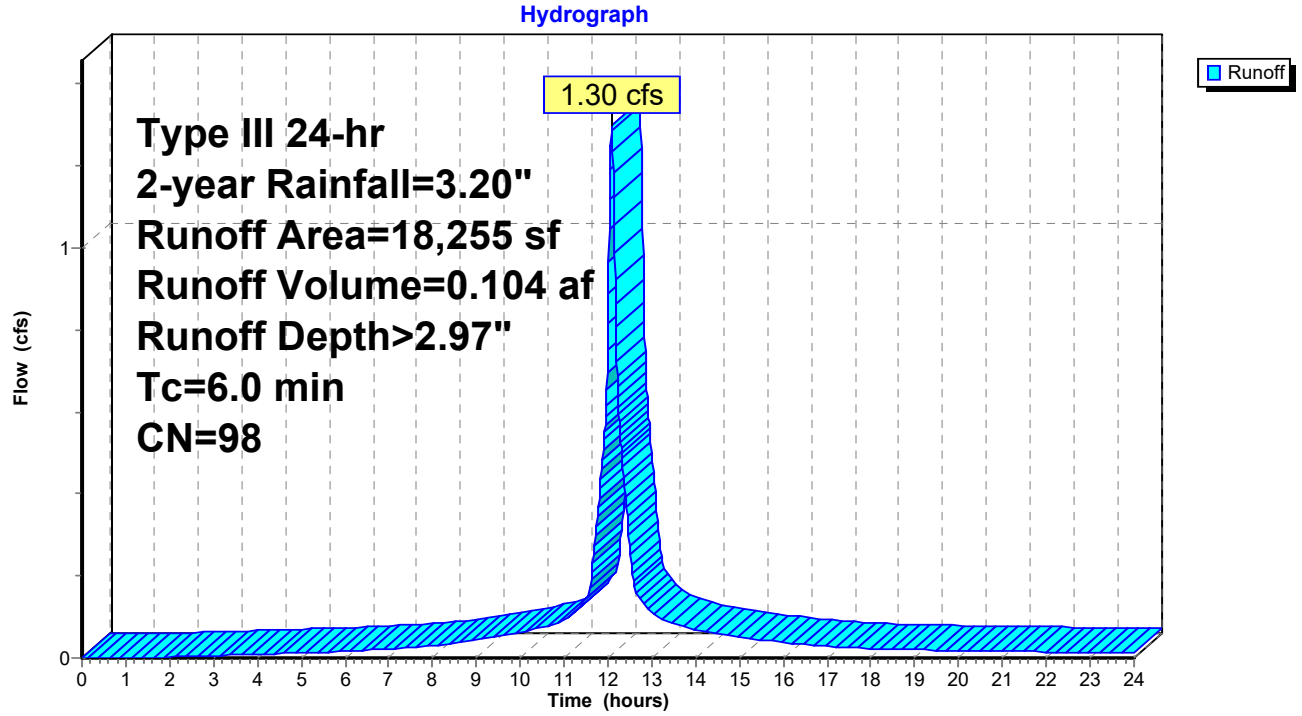
Runoff = 1.30 cfs @ 12.08 hrs, Volume= 0.104 af, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	18,255	98	Roof
	18,255		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

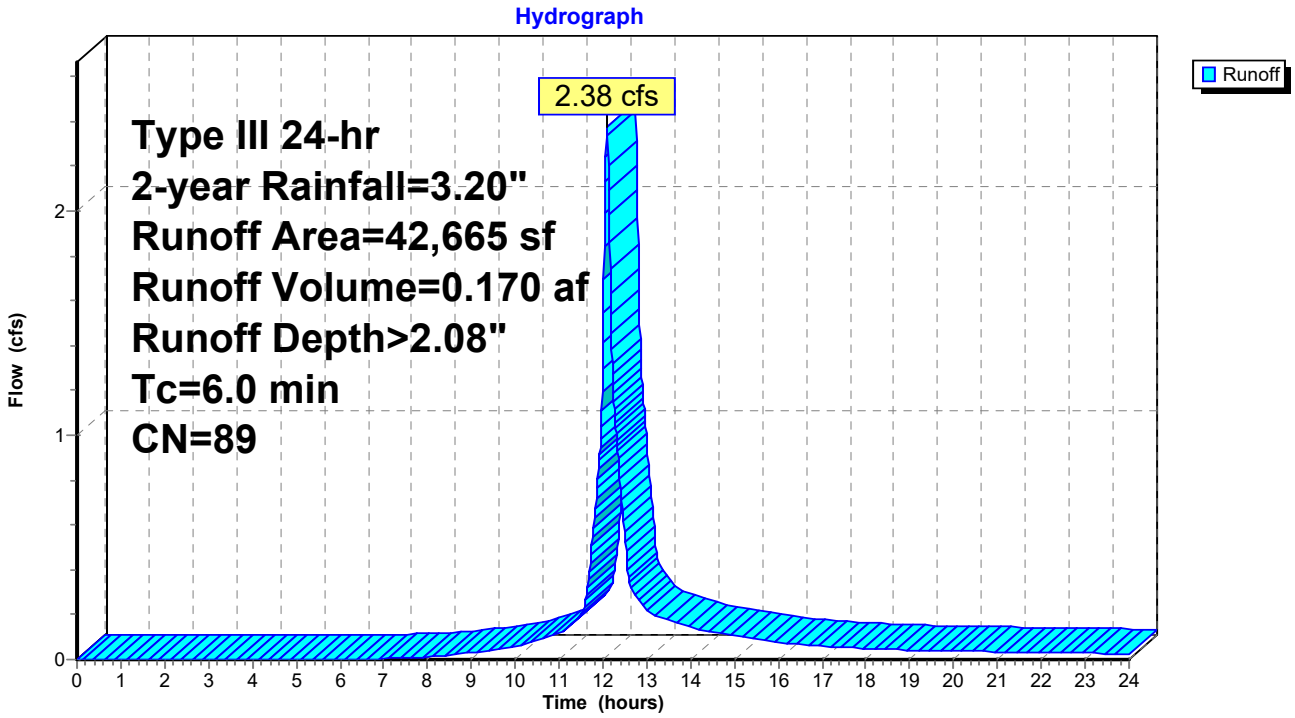
Runoff = 2.38 cfs @ 12.09 hrs, Volume= 0.170 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
22,273	80	>75% Grass cover, Good, HSG D
20,392	98	Paved parking, HSG D
42,665	89	Weighted Average
22,273		52.20% Pervious Area
20,392		47.80% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

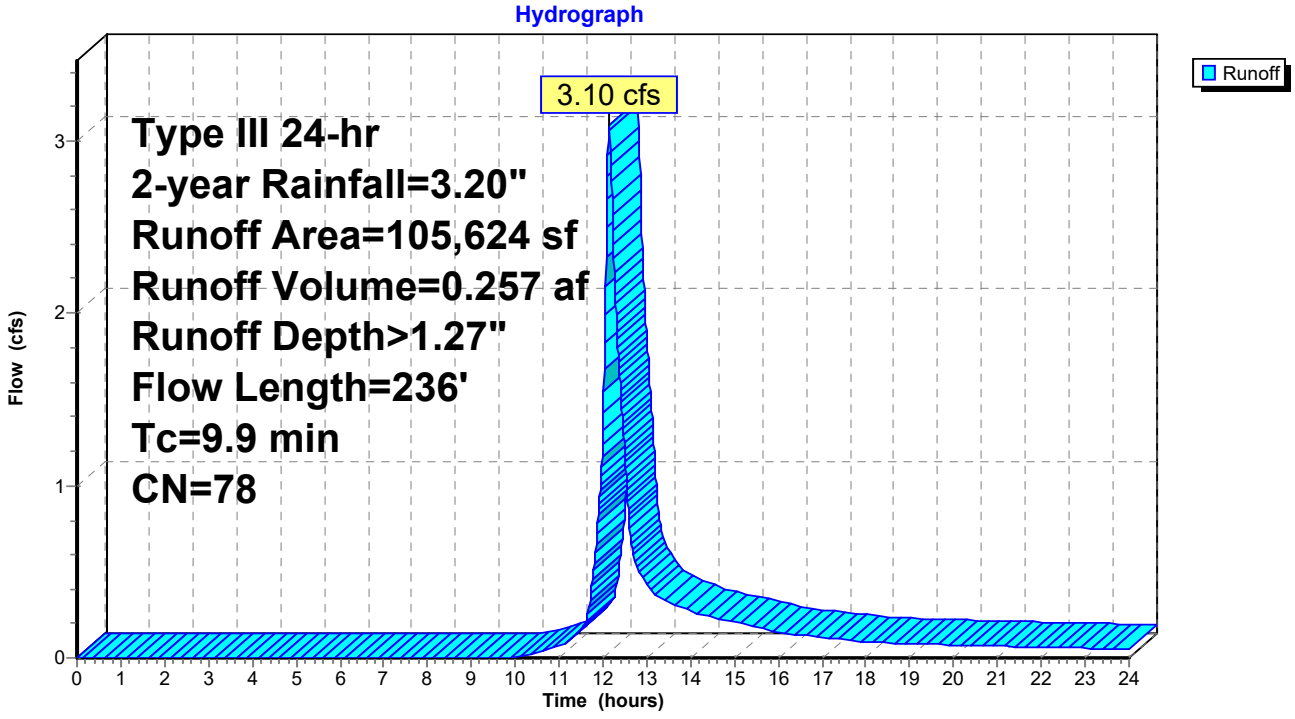
Runoff = 3.10 cfs @ 12.14 hrs, Volume= 0.257 af, Depth> 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
48,324	79	Woods/grass comb., Good, HSG D
12,824	80	>75% Grass cover, Good, HSG D
105,624	78	Weighted Average
105,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 15S: North Central Site

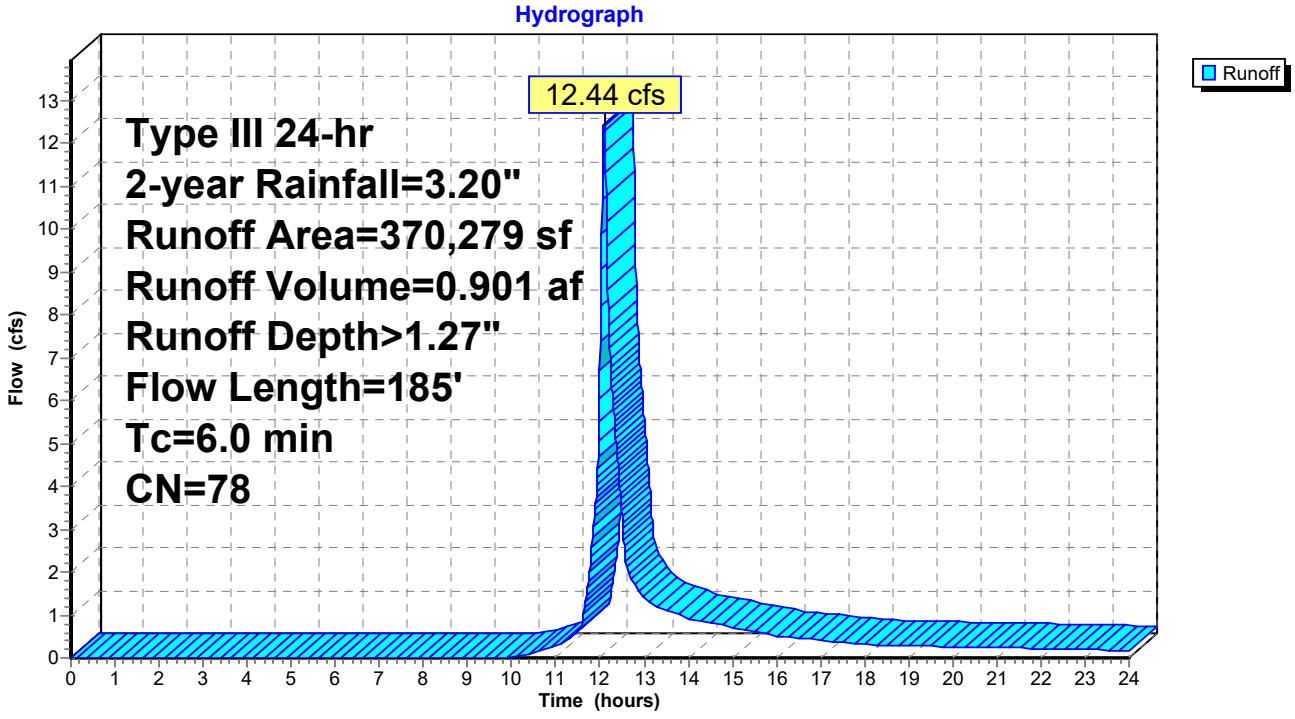
Runoff = 12.44 cfs @ 12.09 hrs, Volume= 0.901 af, Depth> 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
177,116	77	Woods, Good, HSG D
154,471	79	Woods/grass comb., Good, HSG D
38,692	80	>75% Grass cover, Good, HSG D
370,279	78	Weighted Average
370,279		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.4	135	0.0980	5.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 15S: North Central Site



Summary for Subcatchment 20S: North Central Site

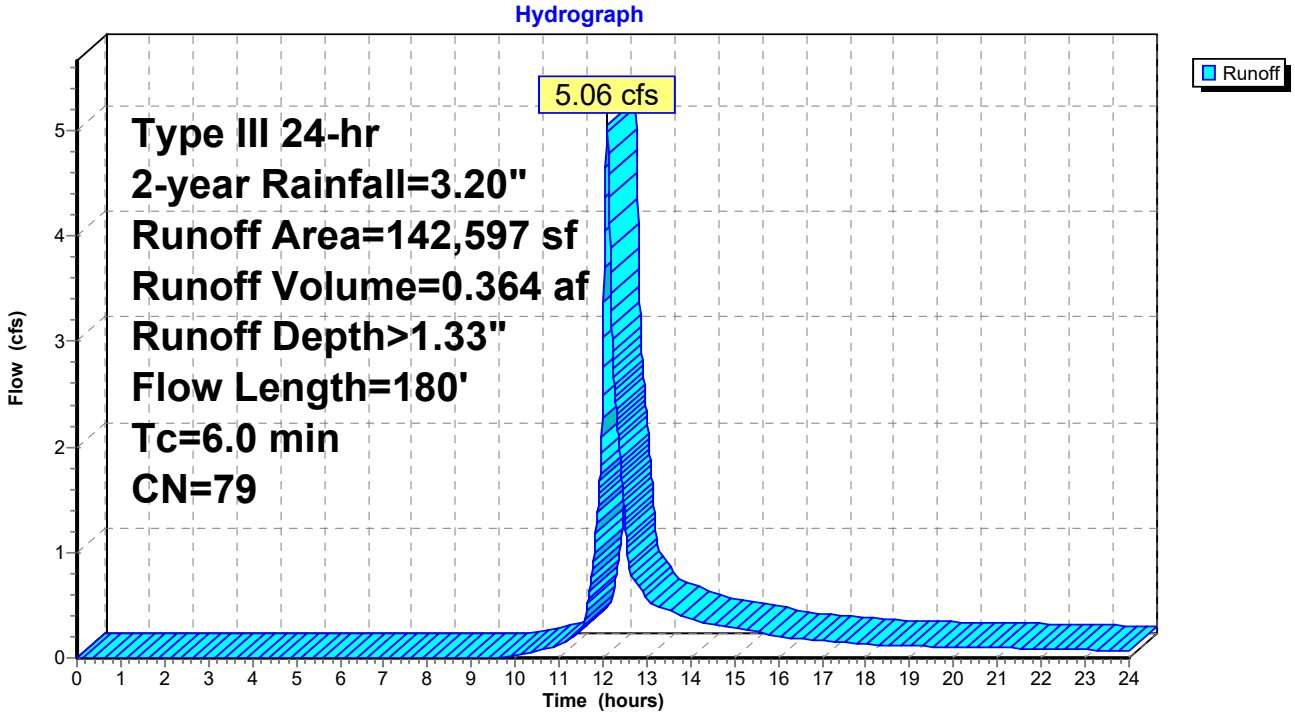
Runoff = 5.06 cfs @ 12.09 hrs, Volume= 0.364 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
107,491	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
142,597	79	Weighted Average
142,597		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 20S: North Central Site



Summary for Subcatchment 22S: Access Road at Building 1

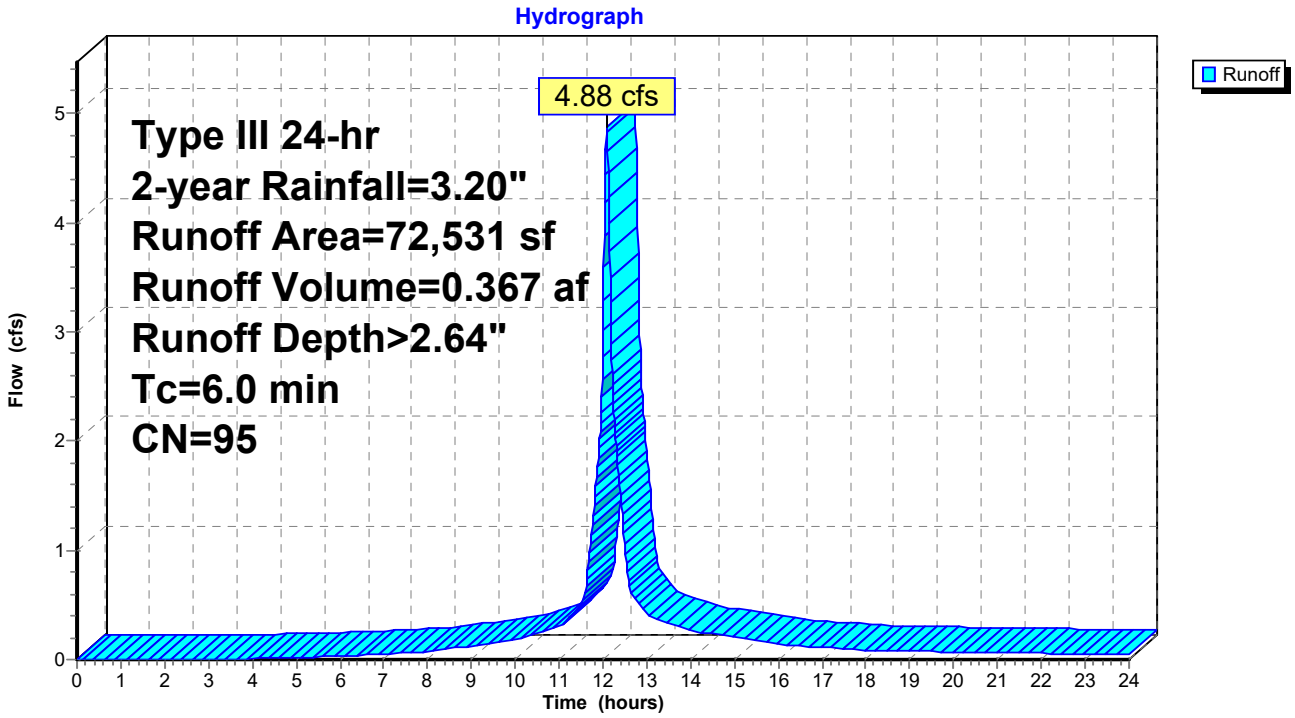
Runoff = 4.88 cfs @ 12.08 hrs, Volume= 0.367 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	59,159	98	Paved parking
	13,372	80	>75% Grass cover, Good, HSG D
	72,531	95	Weighted Average
	13,372		18.44% Pervious Area
	59,159		81.56% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 28S: Porous Pavement Acess Drive at Building 3

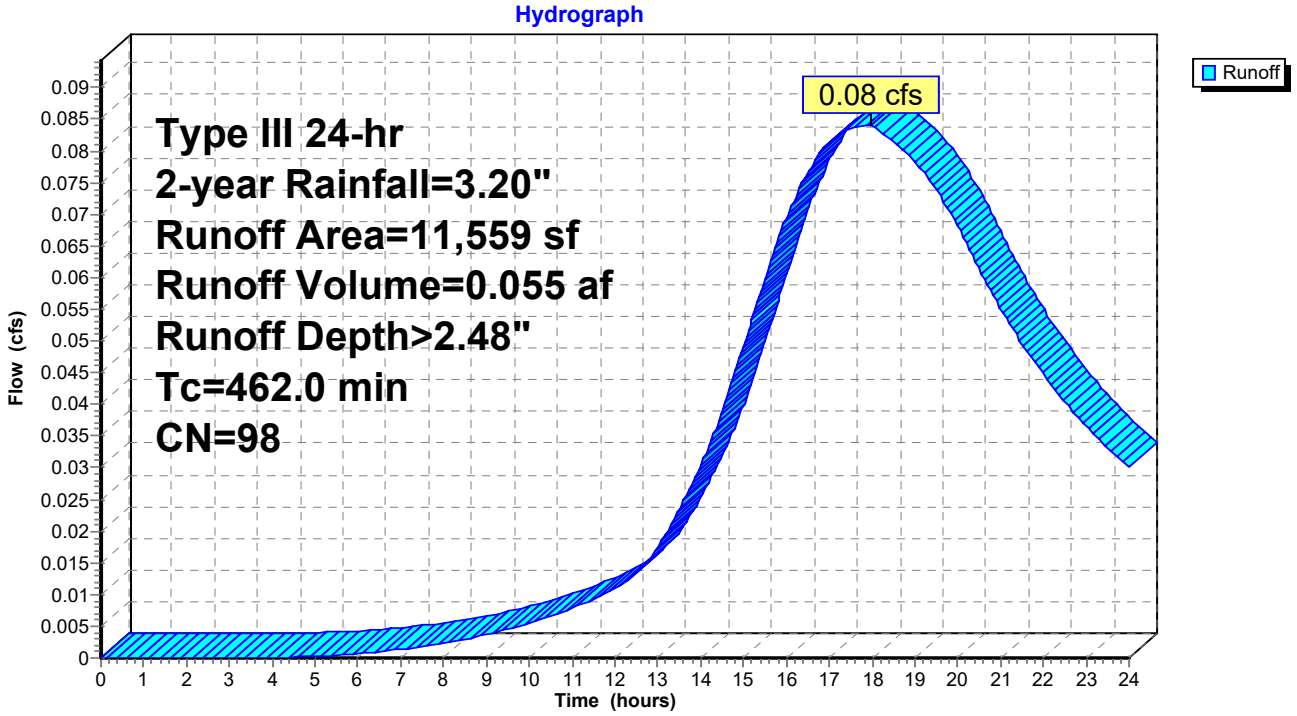
Runoff = 0.08 cfs @ 17.96 hrs, Volume= 0.055 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	11,559	98	Paved parking
	11,559		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
462.0					**Direct Entry, UNH Stormwater for Infiltrating Pavement Section**

Subcatchment 28S: Porous Pavement Acess Drive at Building 3



Summary for Subcatchment 29S: Rear Landscape of Building 3

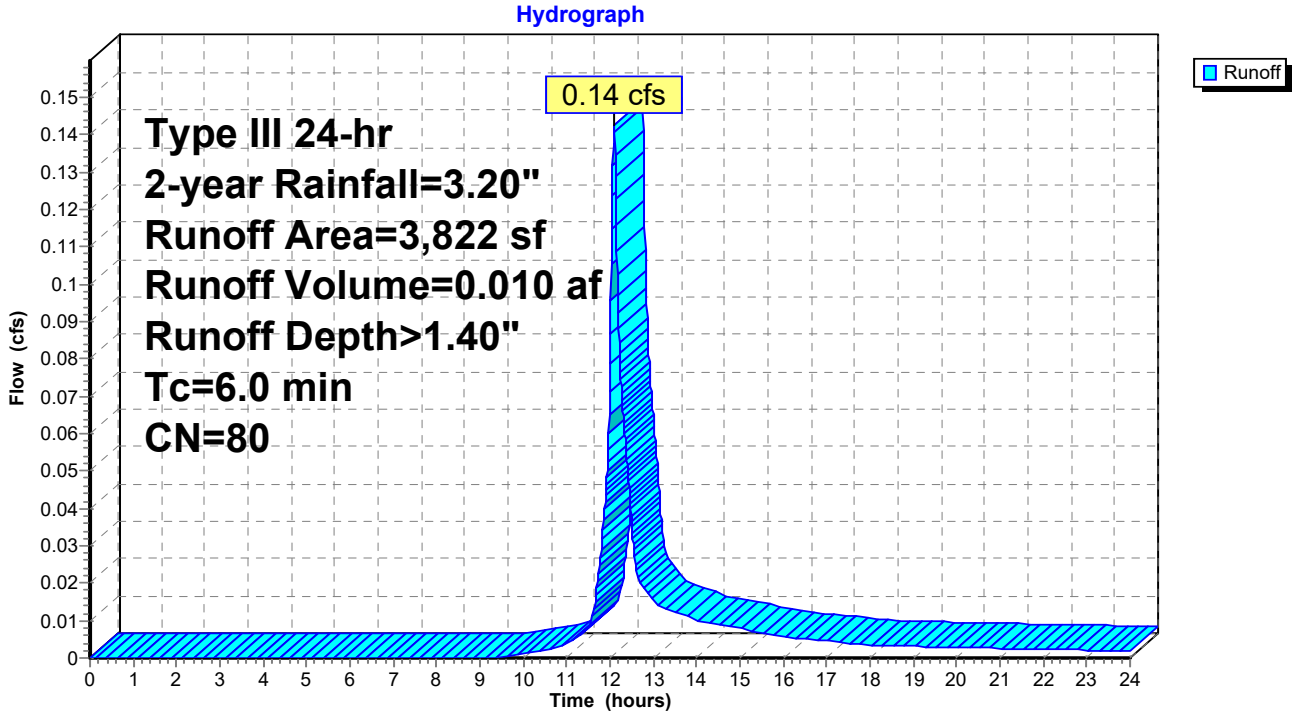
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.010 af, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
3,822	80	>75% Grass cover, Good, HSG D
3,822		100.00% Pervious Area

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

Subcatchment 29S: Rear Landscape of Building 3



Summary for Subcatchment 30S: Entrance Drive

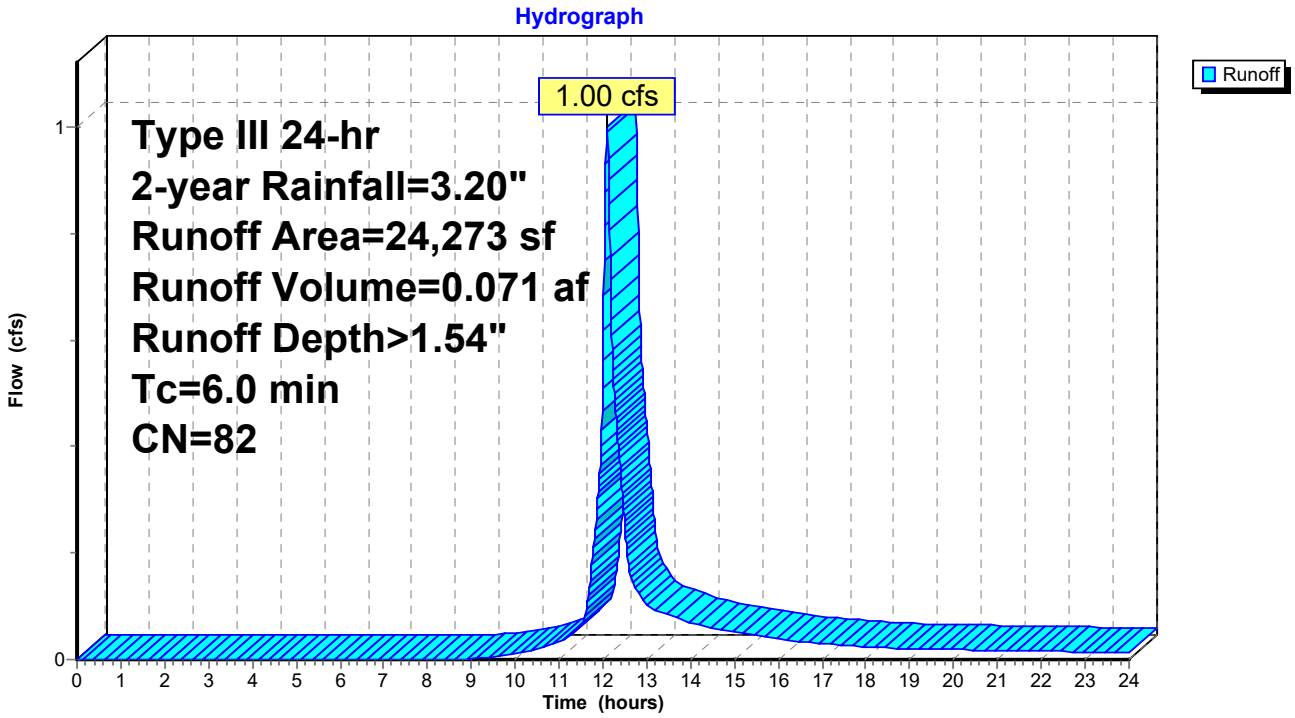
Runoff = 1.00 cfs @ 12.09 hrs, Volume= 0.071 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive



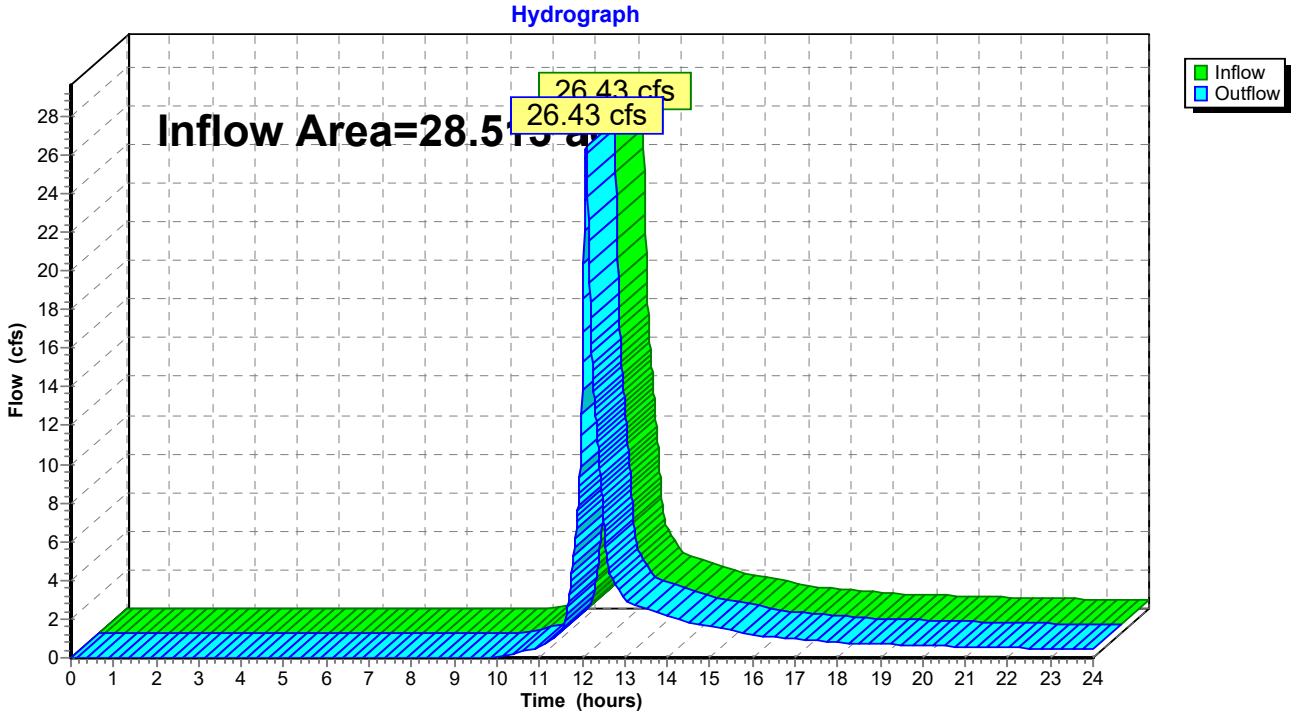
Summary for Reach 1R: FLOW TO NORTH WETLANDS

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

Inflow Area = 28.513 ac, 27.90% Impervious, Inflow Depth > 0.85" for 2-year event
Inflow = 26.43 cfs @ 12.10 hrs, Volume= 2.025 af
Outflow = 26.43 cfs @ 12.10 hrs, Volume= 2.025 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS



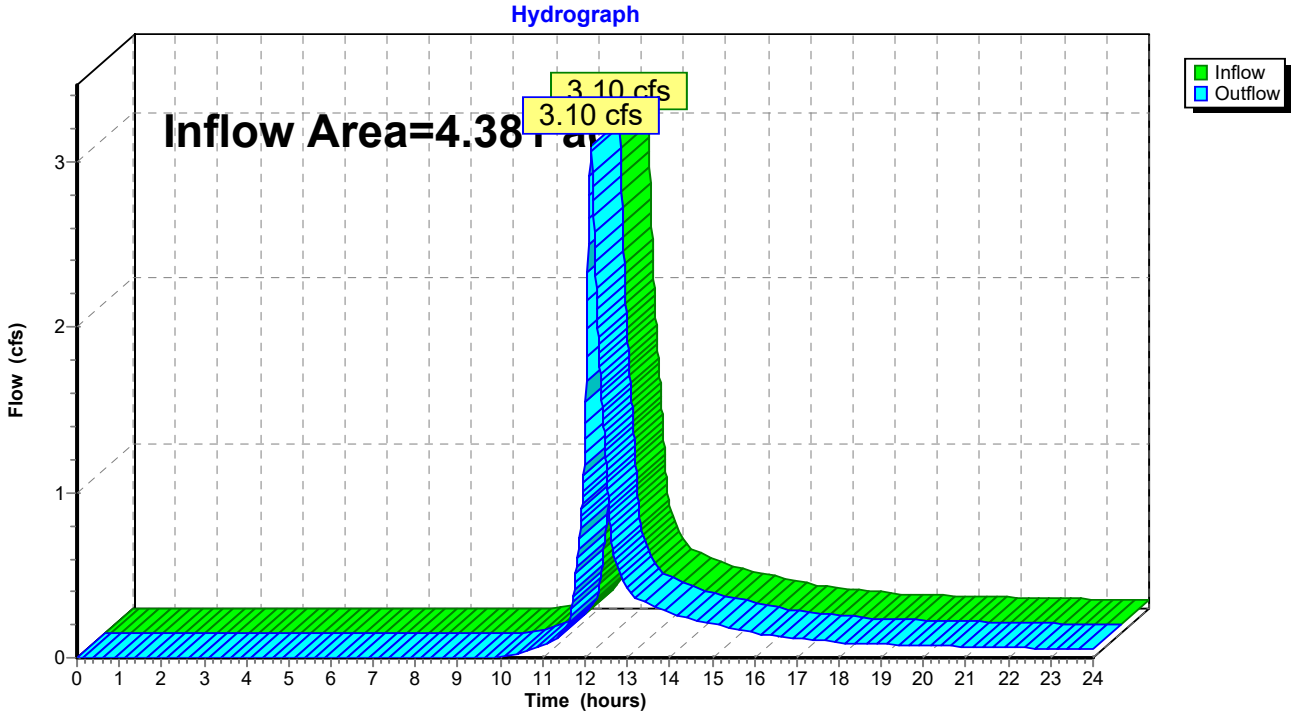
Summary for Reach 4R: ROADSIDE DEPRESSION

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

Inflow Area = 4.381 ac, 21.99% Impervious, Inflow Depth > 0.70" for 2-year event
Inflow = 3.10 cfs @ 12.14 hrs, Volume= 0.257 af
Outflow = 3.10 cfs @ 12.14 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION



Summary for Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3

Inflow Area = 4.249 ac, 82.23% Impervious, Inflow Depth > 2.63" for 2-year event
Inflow = 12.35 cfs @ 12.08 hrs, Volume= 0.931 af
Outflow = 0.29 cfs @ 10.16 hrs, Volume= 0.409 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.29 cfs @ 10.16 hrs, Volume= 0.409 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.84' @ 16.95 hrs Surf.Area= 12,232 sf Storage= 25,577 cf
Flood Elev= 181.50' Surf.Area= 12,232 sf Storage= 43,656 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 141.1 min (920.5 - 779.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	0 cf	**89.63'W x 136.48'L x 4.50'H Field A** 55,044 cf Overall - 55,044 cf Embedded = 0 cf x 40.0% Voids
#2A	177.50'	43,656 cf	**StormTrap ST2 SingleTrap 4-0** x 72 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 9 Rows of 8 Chambers 76.31' x 123.17' Core + 6.66' Border = 89.63' x 136.48' System
		43,656 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	180.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	177.37'	**15.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.37' / 176.63' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.29 cfs @ 10.16 hrs HW=177.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=177.50' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.00 cfs of 0.08 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3 - Chamber Wizard Field A

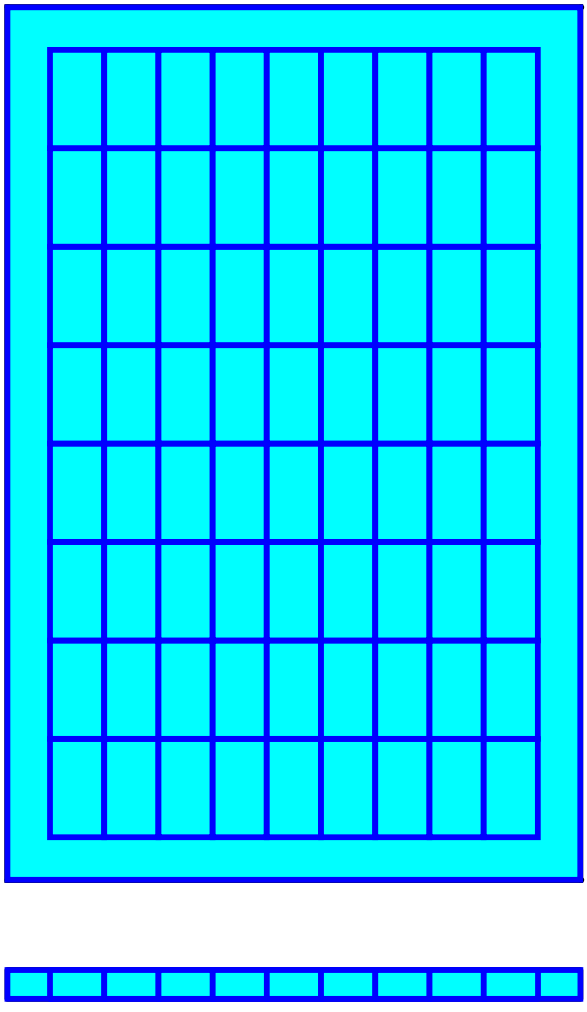
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
54.0" Chamber Height = 4.50' Field Height

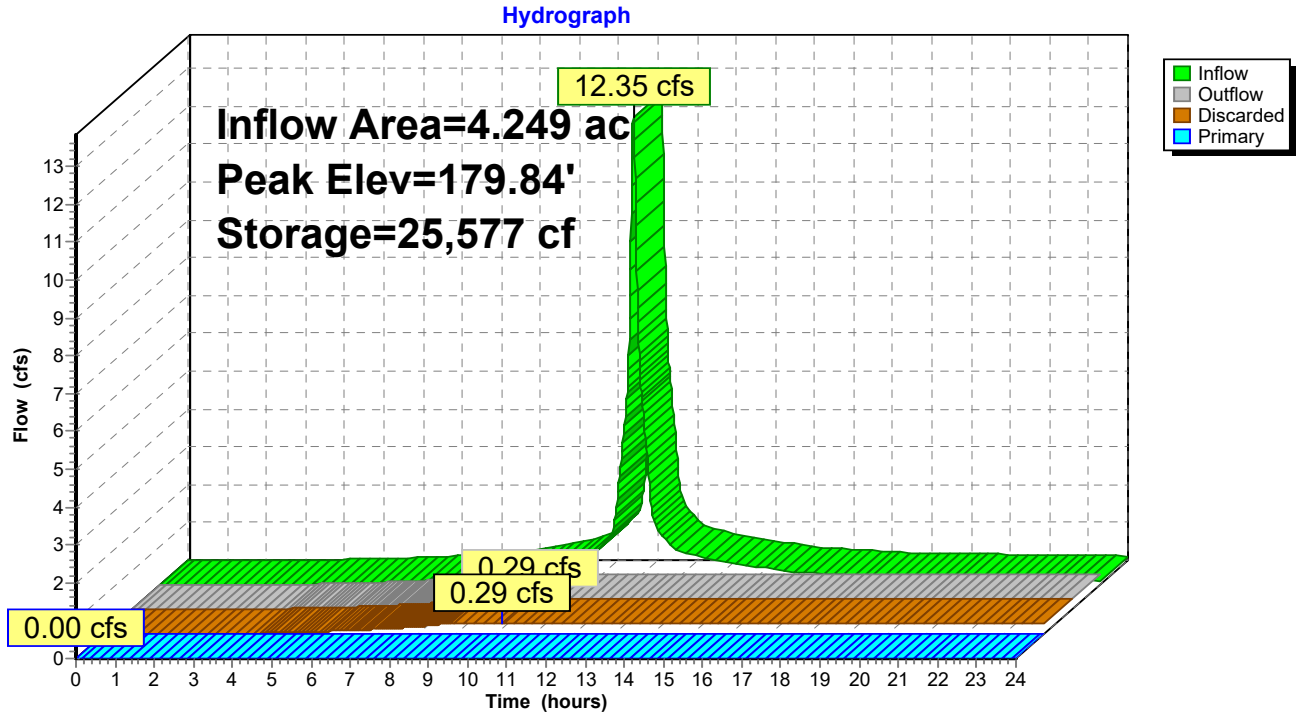
72 Chambers x 470.3 cf + 9,796.6 cf Border = 43,656.2 cf Chamber Storage
72 Chambers x 587.4 cf + 12,747.6 cf Border = 55,043.8 cf Displacement

Chamber Storage = 43,656.2 cf = 1.002 af
Overall Storage Efficiency = 79.3%
Overall System Size = 136.48' x 89.63' x 4.50'

72 Chambers (plus border)
2,038.7 cy Field



Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.430 ac, 54.19% Impervious, Inflow Depth > 2.17" for 2-year event
Inflow = 3.60 cfs @ 12.09 hrs, Volume= 0.258 af
Outflow = 0.16 cfs @ 11.50 hrs, Volume= 0.194 af, Atten= 96%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.50 hrs, Volume= 0.194 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 178.96' @ 15.02 hrs Surf.Area= 6,784 sf Storage= 5,721 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 191.3 min (997.5 - 806.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap ST2 SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 6 Chambers 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 11.50 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2 - Chamber Wizard Field A

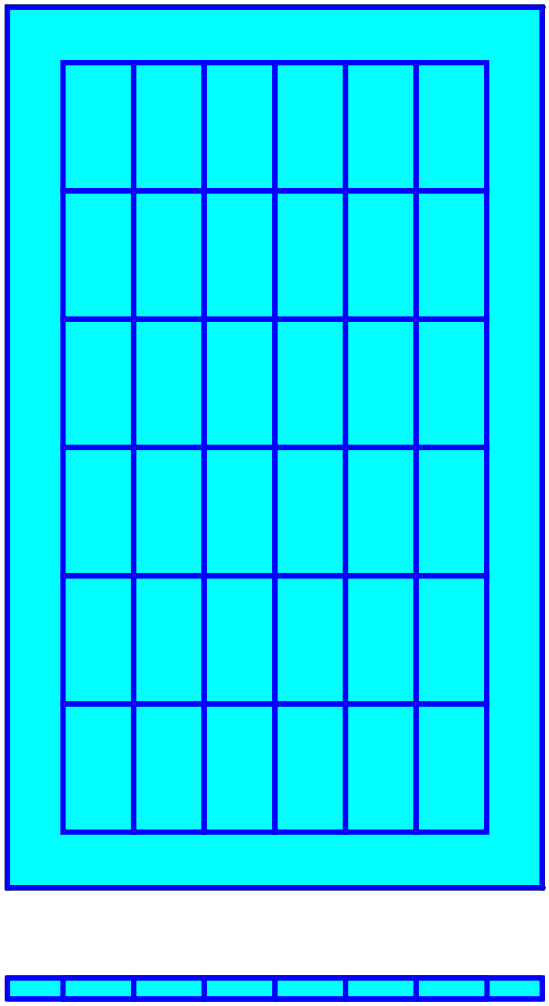
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

6 Chambers/Row x 15.40' Long = 92.38' Row Length +79.9" Border x 2 = 105.69' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

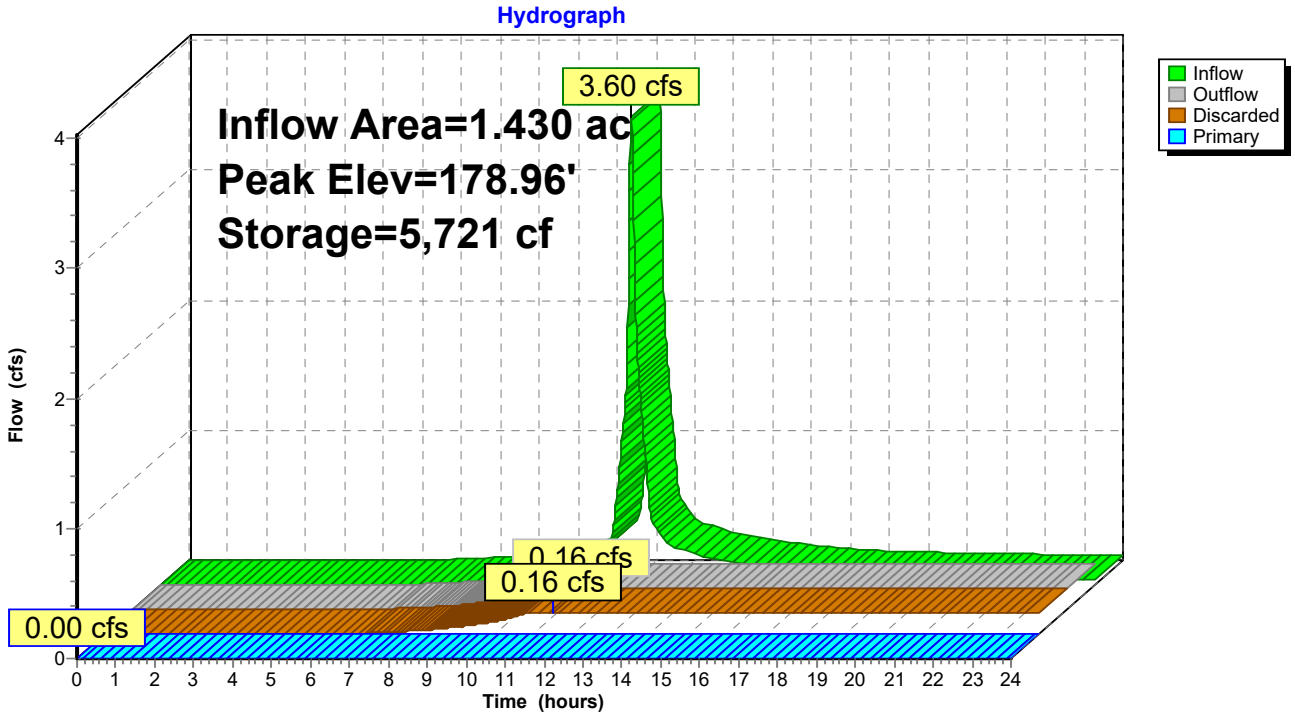
36 Chambers x 231.7 cf + 3,563.4 cf Border = 11,903.6 cf Chamber Storage
36 Chambers x 326.4 cf + 5,210.6 cf Border = 16,959.5 cf Displacement

Chamber Storage = 11,903.6 cf = 0.273 af
Overall Storage Efficiency = 70.2%
Overall System Size = 105.69' x 64.19' x 2.50'

36 Chambers (plus border)
628.1 cy Field



Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.399 ac, 63.44% Impervious, Inflow Depth > 2.34" for 2-year event
Inflow = 3.68 cfs @ 12.09 hrs, Volume= 0.273 af
Outflow = 0.16 cfs @ 11.26 hrs, Volume= 0.201 af, Atten= 96%, Lag= 0.0 min
Discarded = 0.16 cfs @ 11.26 hrs, Volume= 0.201 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 170.41' @ 15.07 hrs Surf.Area= 2,810 sf Storage= 6,000 cf
Flood Elev= 172.00' Surf.Area= 2,810 sf Storage= 9,944 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 178.1 min (967.8 - 789.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**47.23'W x 59.50'L x 4.50'H Field A** 12,646 cf Overall - 12,646 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	9,944 cf	**StormTrap ST2 SingleTrap 4-0** x 12 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 4 Rows of 3 Chambers 33.92' x 46.19' Core + 6.66' Border = 47.23' x 59.50' System
		9,944 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.16 cfs @ 11.26 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' TW=163.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.00 cfs of 4.68 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8 - Chamber Wizard Field A

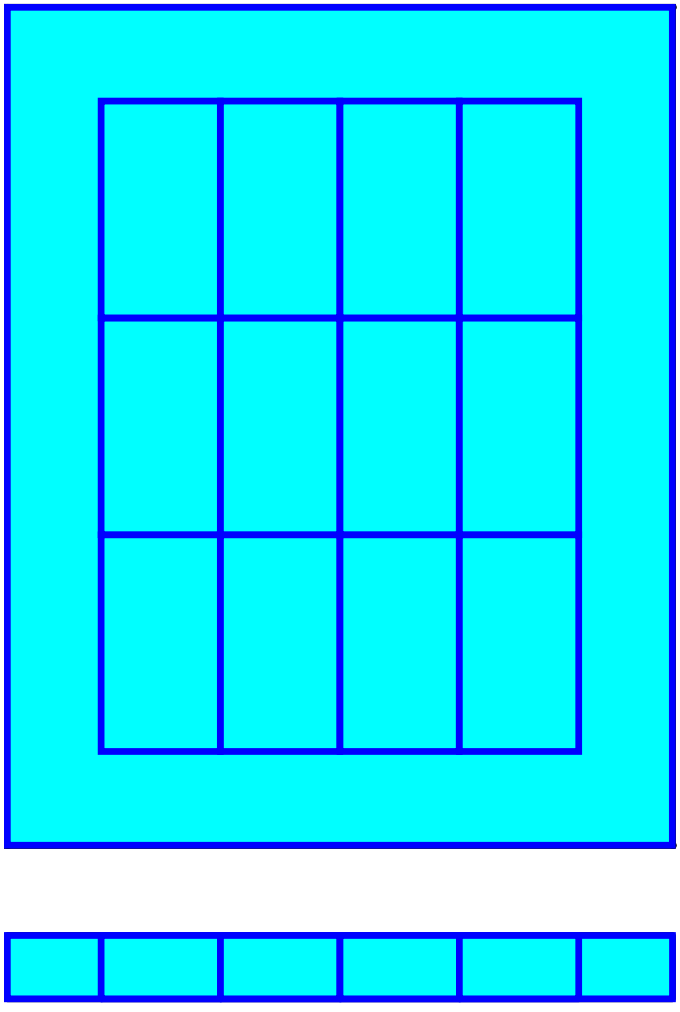
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 = 59.50' Base Length
4 Rows x 101.7" Wide + 79.9" Side Border x 2 = 47.23' Base Width
54.0" Chamber Height = 4.50' Field Height

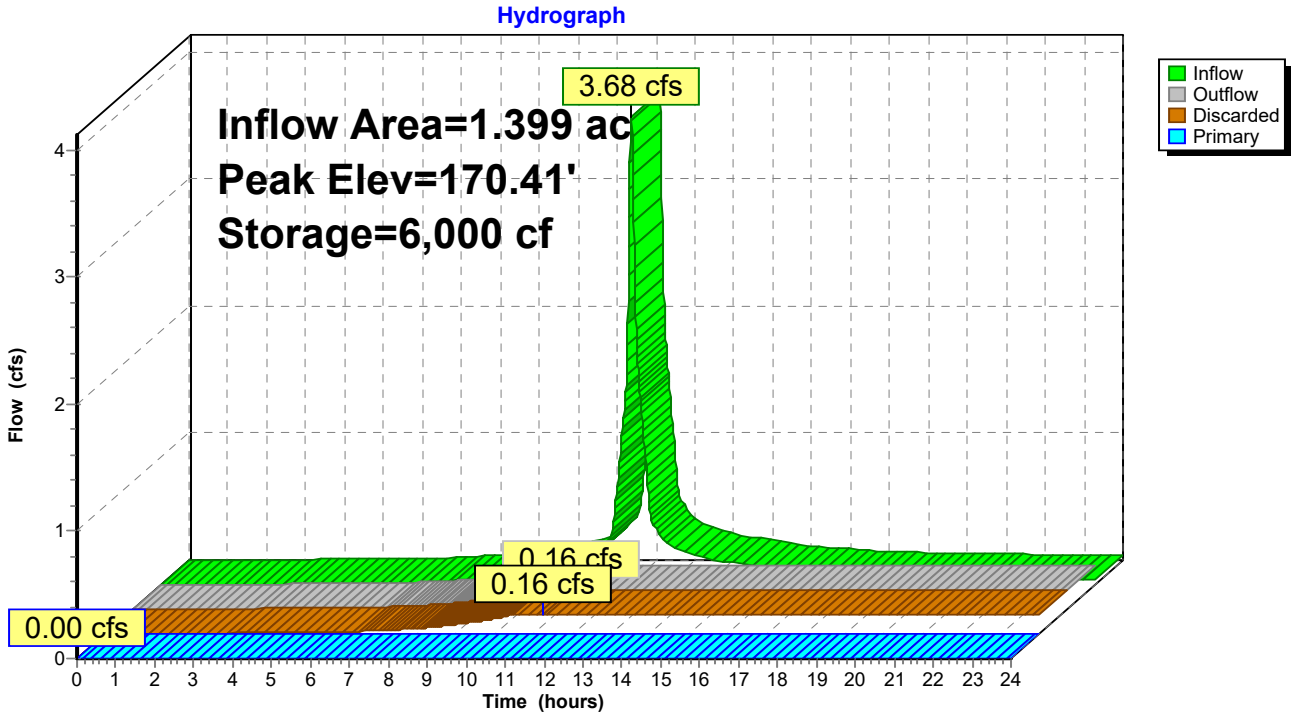
12 Chambers x 470.3 cf + 4,300.8 cf Border = 9,944.0 cf Chamber Storage
12 Chambers x 587.4 cf + 5,596.2 cf Border = 12,645.6 cf Displacement

Chamber Storage = 9,944.0 cf = 0.228 af
Overall Storage Efficiency = 78.6%
Overall System Size = 59.50' x 47.23' x 4.50'

12 Chambers (plus border)
468.4 cy Field



Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.106 ac, 85.42% Impervious, Inflow Depth > 2.71" for 2-year event
Inflow = 6.25 cfs @ 12.08 hrs, Volume= 0.475 af
Outflow = 0.40 cfs @ 13.62 hrs, Volume= 0.397 af, Atten= 94%, Lag= 92.4 min
Discarded = 0.30 cfs @ 11.09 hrs, Volume= 0.388 af
Primary = 0.10 cfs @ 13.62 hrs, Volume= 0.009 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.04' @ 13.62 hrs Surf.Area= 5,289 sf Storage= 9,585 cf
Flood Elev= 178.00' Surf.Area= 5,289 sf Storage= 14,098 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 178.0 min (952.8 - 774.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 136.48'L x 3.50'H Field A** 18,510 cf Overall - 18,510 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	14,098 cf	**StormTrap ST2 SingleTrap 3-0** x 24 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 3 Rows of 8 Chambers 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		14,098 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	175.60'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.60' / 174.81' S= 0.0494 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	177.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.30 cfs @ 11.09 hrs HW=175.04' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=0.10 cfs @ 13.62 hrs HW=177.04' TW=0.00' (Dynamic Tailwater)
↑└**2=Culvert** (Passes 0.10 cfs of 5.33 cfs potential flow)
↑└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.65 fps)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1 - Chamber Wizard Field A

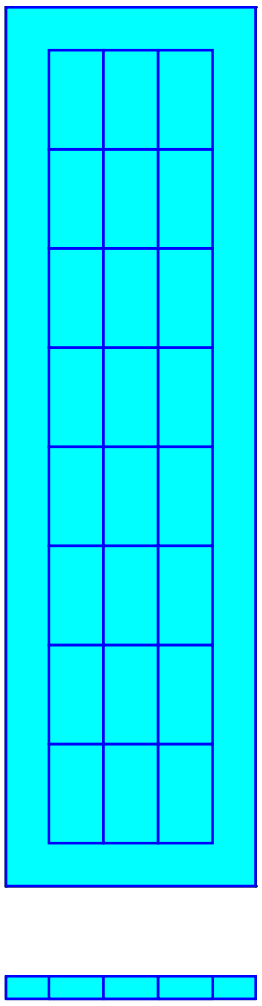
Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf
Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
42.0" Chamber Height = 3.50' Field Height

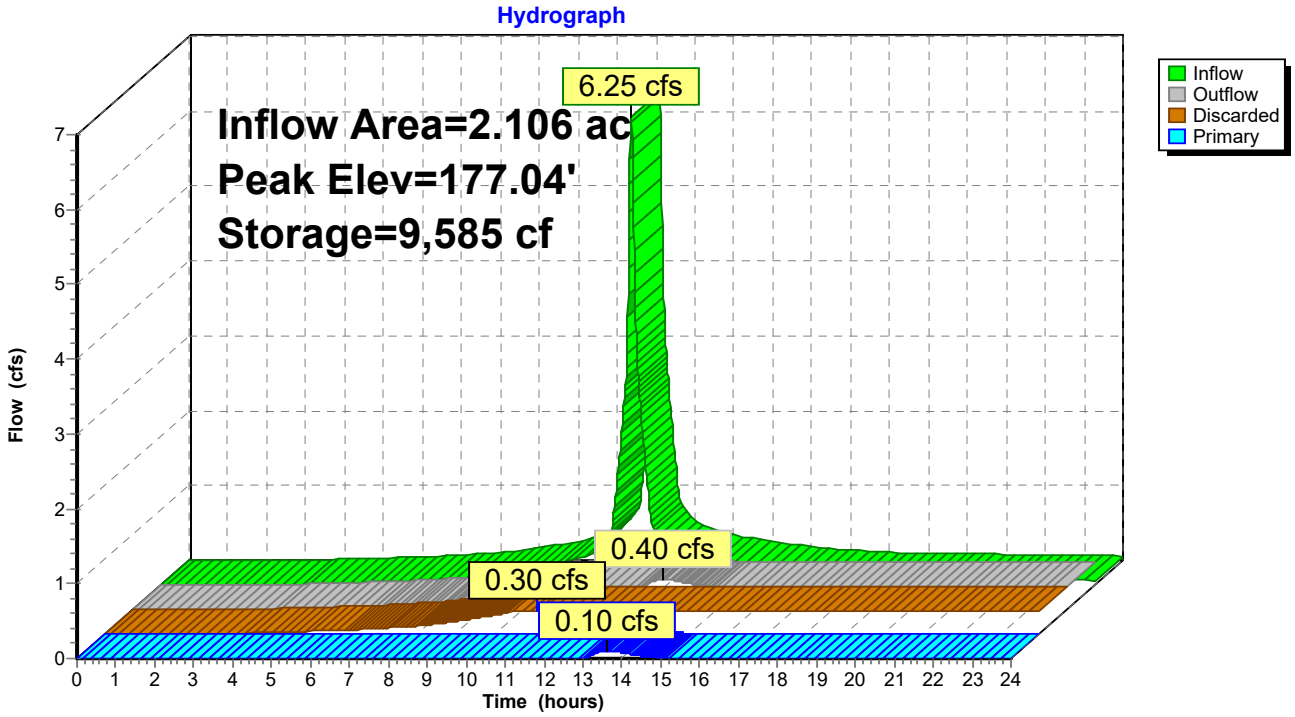
24 Chambers x 354.0 cf + 5,601.9 cf Border = 14,097.7 cf Chamber Storage
24 Chambers x 456.9 cf + 7,544.3 cf Border = 18,510.0 cf Displacement

Chamber Storage = 14,097.7 cf = 0.324 af
Overall Storage Efficiency = 76.2%
Overall System Size = 136.48' x 38.75' x 3.50'

24 Chambers (plus border)
685.6 cy Field



Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=188)

Inflow Area = 1.802 ac, 90.05% Impervious, Inflow Depth > 2.78" for 2-year event
Inflow = 5.42 cfs @ 12.08 hrs, Volume= 0.418 af
Outflow = 0.43 cfs @ 11.63 hrs, Volume= 0.418 af, Atten= 92%, Lag= 0.0 min
Discarded = 0.43 cfs @ 11.63 hrs, Volume= 0.418 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 189.50' @ 13.06 hrs Surf.Area= 7,772 sf Storage= 6,800 cf
Flood Elev= 190.50' Surf.Area= 7,772 sf Storage= 13,644 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 116.8 min (886.0 - 769.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	188.50'	0 cf	**64.19'W x 121.08'L x 2.50'H Field A** 19,430 cf Overall - 19,430 cf Embedded = 0 cf x 40.0% Voids
#2A	188.50'	13,644 cf	**StormTrap ST2 SingleTrap 2-0** x 42 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 7 Chambers 50.88' x 107.77' Core + 6.66' Border = 64.19' x 121.08' System
		13,644 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	188.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	190.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	188.37'	**12.0" Round Culvert** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.37' / 188.12' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.43 cfs @ 11.63 hrs HW=188.53' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.43 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=188.50' TW=0.00' (Dynamic Tailwater)
↑—**3=Culvert** (Passes 0.00 cfs of 0.05 cfs potential flow)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4 - Chamber Wizard Field A

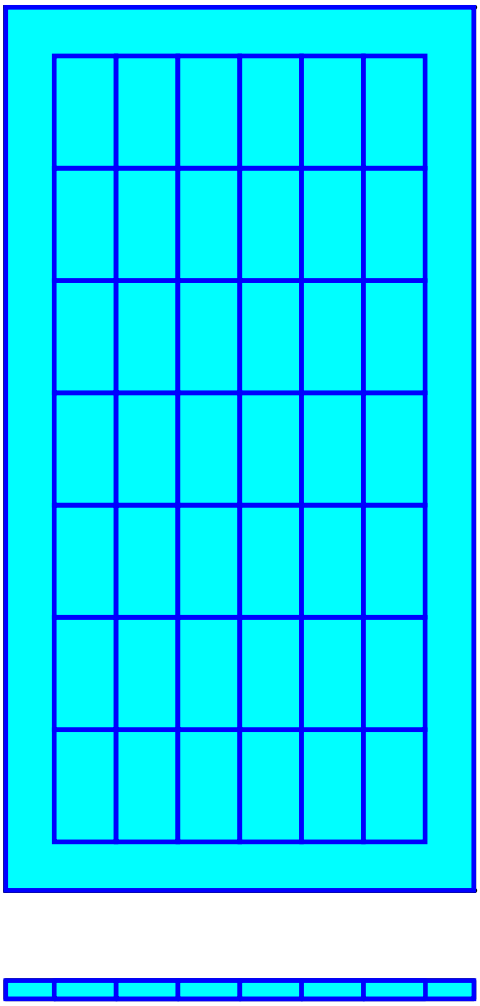
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

7 Chambers/Row x 15.40' Long = 107.77' Row Length +79.9" Border x 2 = 121.08' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

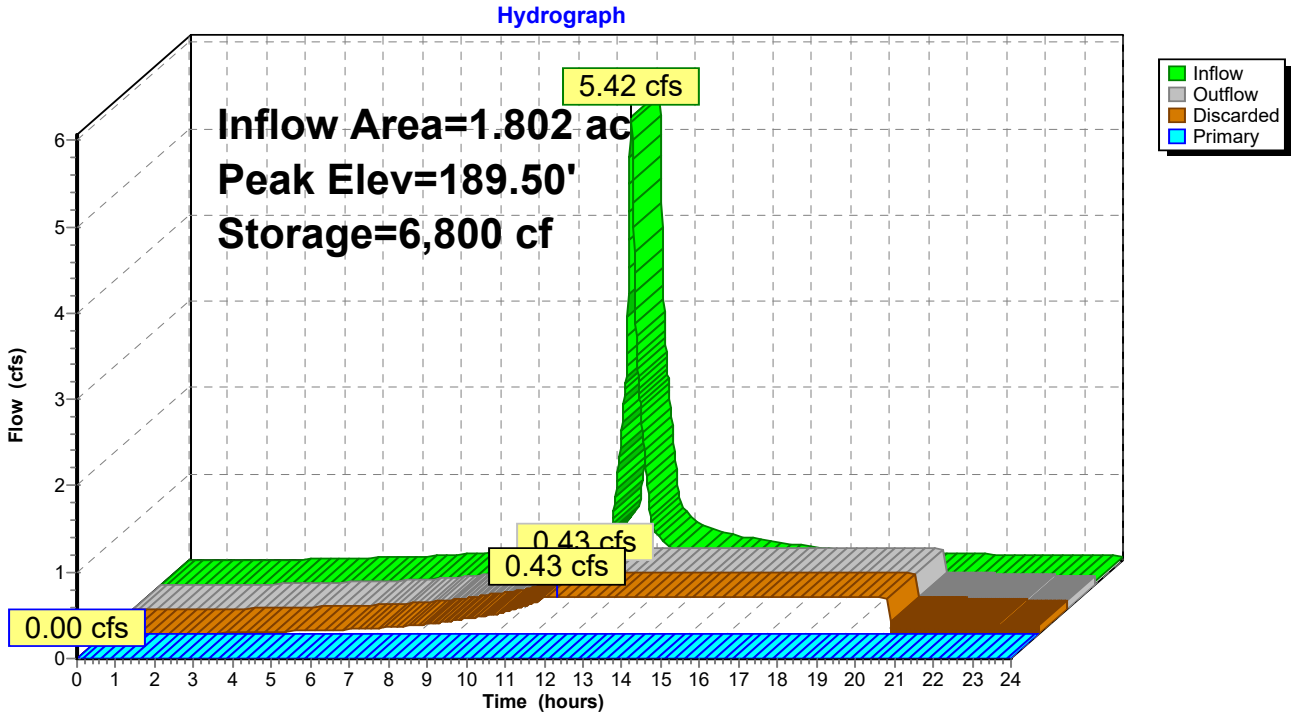
42 Chambers x 231.7 cf + 3,913.9 cf Border = 13,644.0 cf Chamber Storage
42 Chambers x 326.4 cf + 5,723.0 cf Border = 19,430.1 cf Displacement

Chamber Storage = 13,644.0 cf = 0.313 af
Overall Storage Efficiency = 70.2%
Overall System Size = 121.08' x 64.19' x 2.50'

42 Chambers (plus border)
719.6 cy Field



Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.956 ac, 49.24% Impervious, Inflow Depth > 0.44" for 2-year event
Inflow = 1.00 cfs @ 12.09 hrs, Volume= 0.071 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 165.29' @ 24.00 hrs Surf.Area= 2,120 sf Storage= 3,107 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

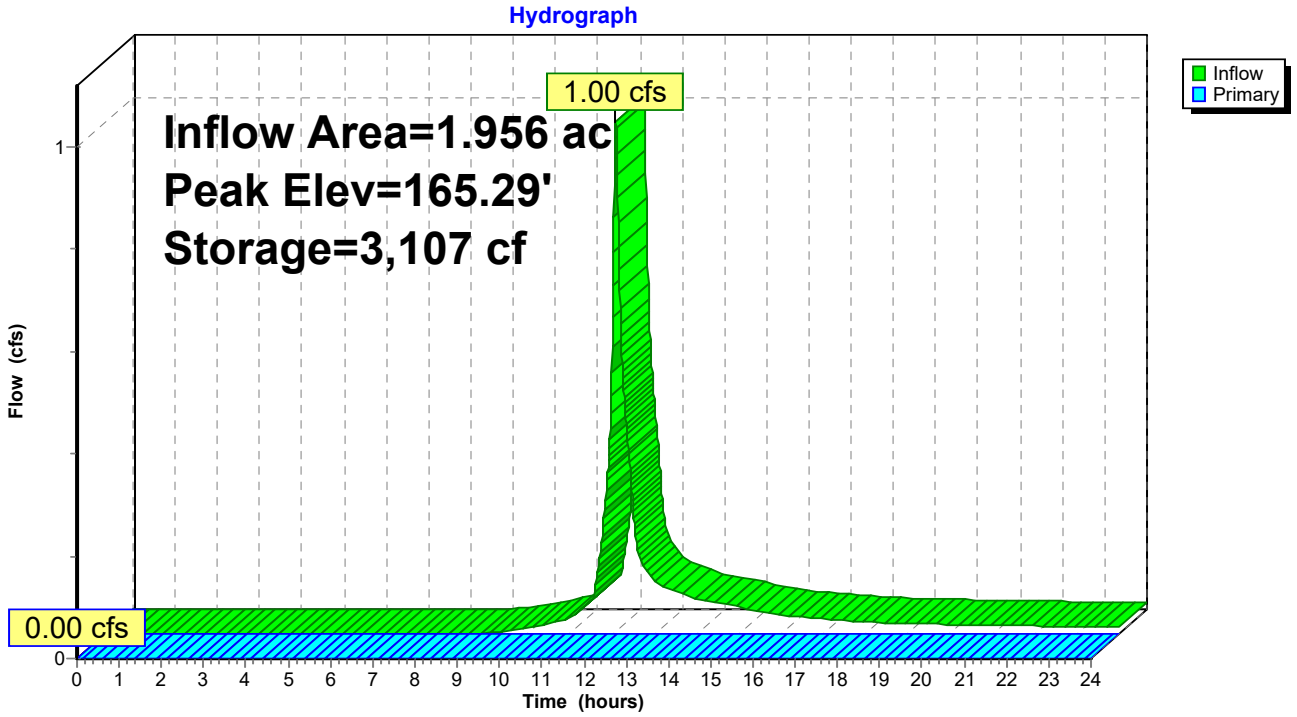
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

Device	Routing	Invert	Outlet Devices
#1	Primary	167.55'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 11P: Bio-Retention Area



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>2.37"
Flow Length=356' Tc=7.4 min CN=77 Runoff=18.00 cfs 1.343 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=3.53 cfs 0.286 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>4.12"
Tc=6.0 min CN=95 Runoff=4.61 cfs 0.355 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=1.69 cfs 0.136 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=2.29 cfs 0.186 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>4.01"
Tc=6.0 min CN=94 Runoff=14.86 cfs 1.130 af

Subcatchment 10S: Building 1 Roof Runoff Area=19,185 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=2.02 cfs 0.164 af

Subcatchment 11S: Building 1 Parking Runoff Area=62,276 sf 54.19% Impervious Runoff Depth>3.58"
Tc=6.0 min CN=90 Runoff=5.82 cfs 0.427 af

Subcatchment 12S: Building 2 Roof Runoff Area=18,255 sf 100.00% Impervious Runoff Depth>4.46"
Tc=6.0 min CN=98 Runoff=1.93 cfs 0.156 af

Subcatchment 13S: Entrance Driveway Runoff Area=42,665 sf 47.80% Impervious Runoff Depth>3.48"
Tc=6.0 min CN=89 Runoff=3.90 cfs 0.284 af

Subcatchment 14S: Southeast Site Runoff Area=105,624 sf 0.00% Impervious Runoff Depth>2.45"
Flow Length=236' Tc=9.9 min CN=78 Runoff=6.12 cfs 0.496 af

Subcatchment 15S: North Central Site Runoff Area=370,279 sf 0.00% Impervious Runoff Depth>2.46"
Flow Length=185' Tc=6.0 min CN=78 Runoff=24.51 cfs 1.740 af

Subcatchment 20S: North Central Site Runoff Area=142,597 sf 0.00% Impervious Runoff Depth>2.54"
Flow Length=180' Tc=6.0 min CN=79 Runoff=9.77 cfs 0.694 af

Subcatchment 22S: Access Road at Runoff Area=72,531 sf 81.56% Impervious Runoff Depth>4.12"
Tc=6.0 min CN=95 Runoff=7.42 cfs 0.572 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>3.74"
Tc=462.0 min CN=98 Runoff=0.13 cfs 0.083 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>2.63"
Tc=6.0 min CN=80 Runoff=0.27 cfs 0.019 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>2.81"
Tc=6.0 min CN=82 Runoff=1.84 cfs 0.130 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=52.27 cfs 4.394 af
Outflow=52.27 cfs 4.394 af

Reach 4R: ROADSIDE DEPRESSION Inflow=6.12 cfs 0.496 af
Outflow=6.12 cfs 0.496 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=180.88' Storage=36,847 cf Inflow=18.83 cfs 1.452 af
Discarded=0.29 cfs 0.448 af Primary=0.96 cfs 0.224 af Outflow=1.25 cfs 0.672 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=179.58' Storage=9,430 cf Inflow=5.82 cfs 0.427 af
Discarded=0.16 cfs 0.213 af Primary=0.32 cfs 0.052 af Outflow=0.48 cfs 0.265 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=171.54' Storage=8,811 cf Inflow=5.83 cfs 0.440 af
Discarded=0.16 cfs 0.220 af Primary=0.89 cfs 0.069 af Outflow=1.05 cfs 0.289 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=177.41' Storage=11,338 cf Inflow=9.44 cfs 0.735 af
Discarded=0.30 cfs 0.424 af Primary=3.40 cfs 0.195 af Outflow=3.69 cfs 0.619 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=190.12' Storage=11,062 cf Inflow=8.14 cfs 0.640 af
Discarded=0.43 cfs 0.582 af Primary=0.55 cfs 0.044 af Outflow=0.98 cfs 0.626 af

Pond 11P: Bio-Retention Area Peak Elev=167.36' Storage=8,684 cf Inflow=1.84 cfs 0.199 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 32.893 ac Runoff Volume = 8.199 af Average Runoff Depth = 2.99"
72.89% Pervious = 23.975 ac 27.11% Impervious = 8.919 ac

Summary for Subcatchment 1S: Northwest Site

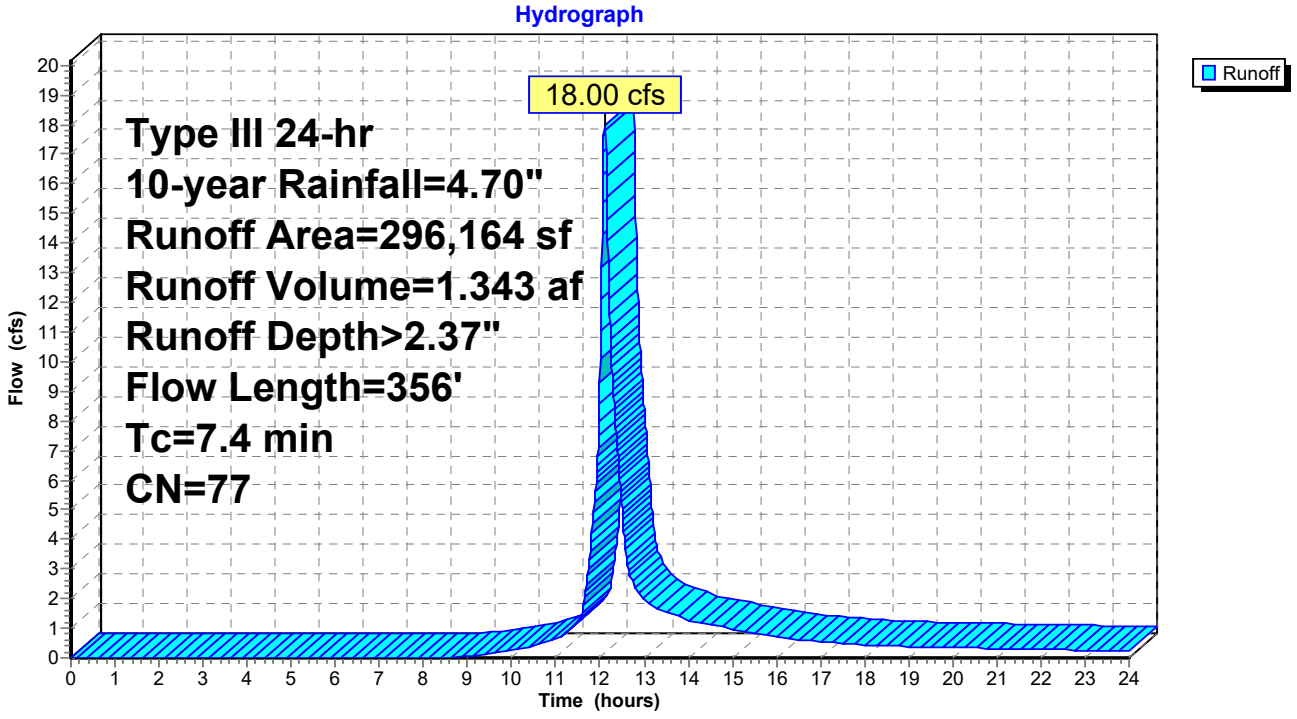
Runoff = 18.00 cfs @ 12.11 hrs, Volume= 1.343 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 2S: Building 3 Roof

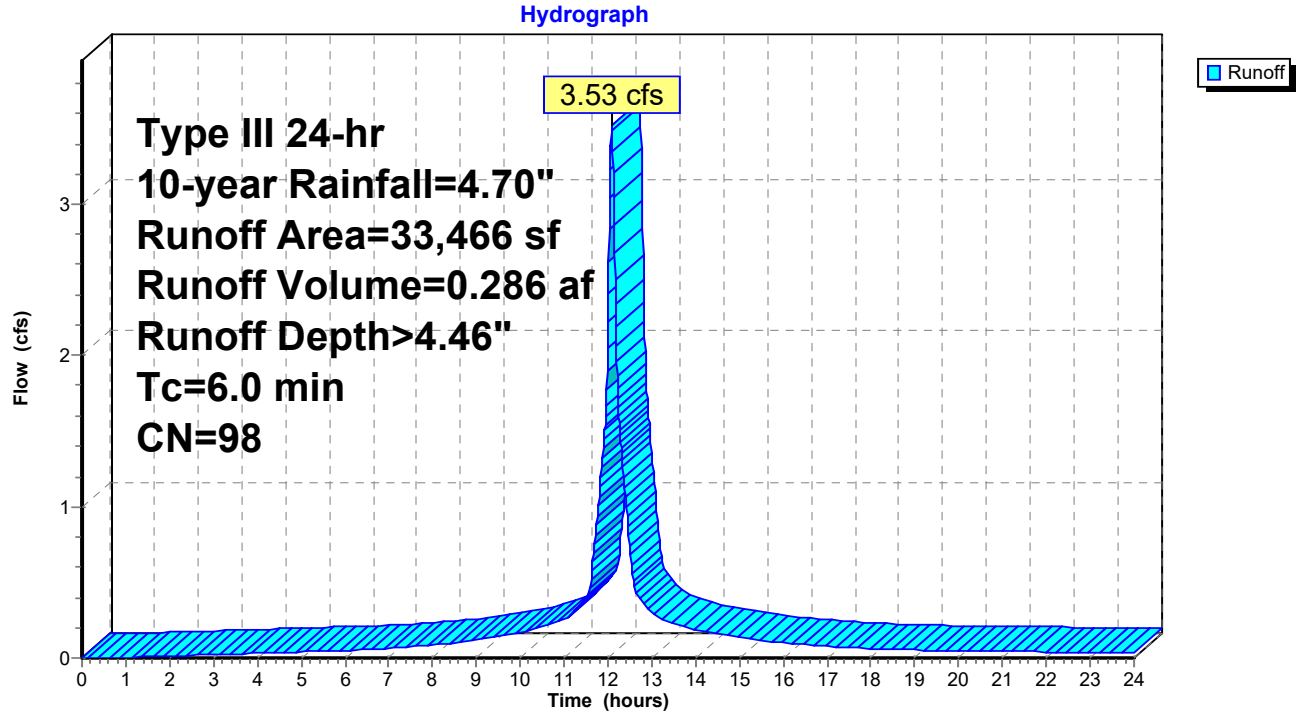
Runoff = 3.53 cfs @ 12.08 hrs, Volume= 0.286 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	33,466	98	Roof
	33,466		100.00% Impervious Area

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

Subcatchment 2S: Building 3 Roof



Summary for Subcatchment 3S: Building 3 Rear Parking Area

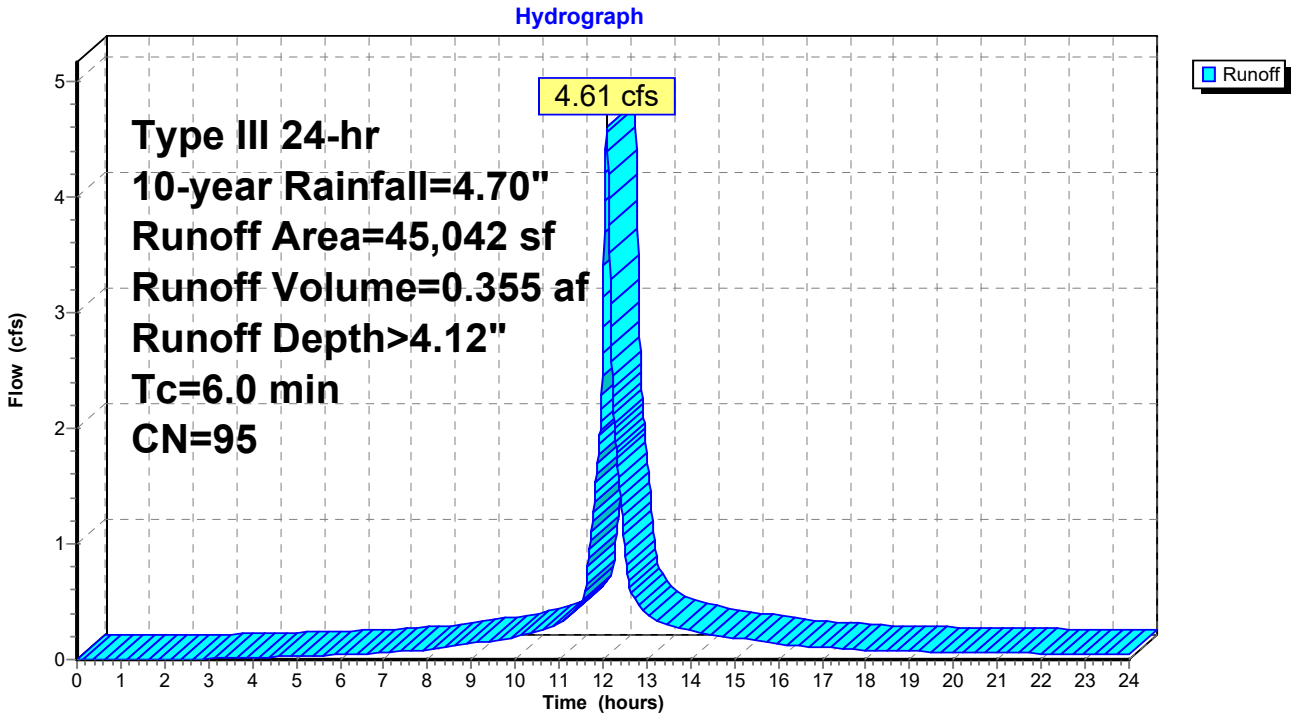
Runoff = 4.61 cfs @ 12.08 hrs, Volume= 0.355 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
	7,808	80	>75% Grass cover, Good, HSG D
*	37,234	98	Paved parking
	45,042	95	Weighted Average
	7,808		17.33% Pervious Area
	37,234		82.67% Impervious Area

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

Subcatchment 3S: Building 3 Rear Parking Area



Summary for Subcatchment 4S: Amenity Building

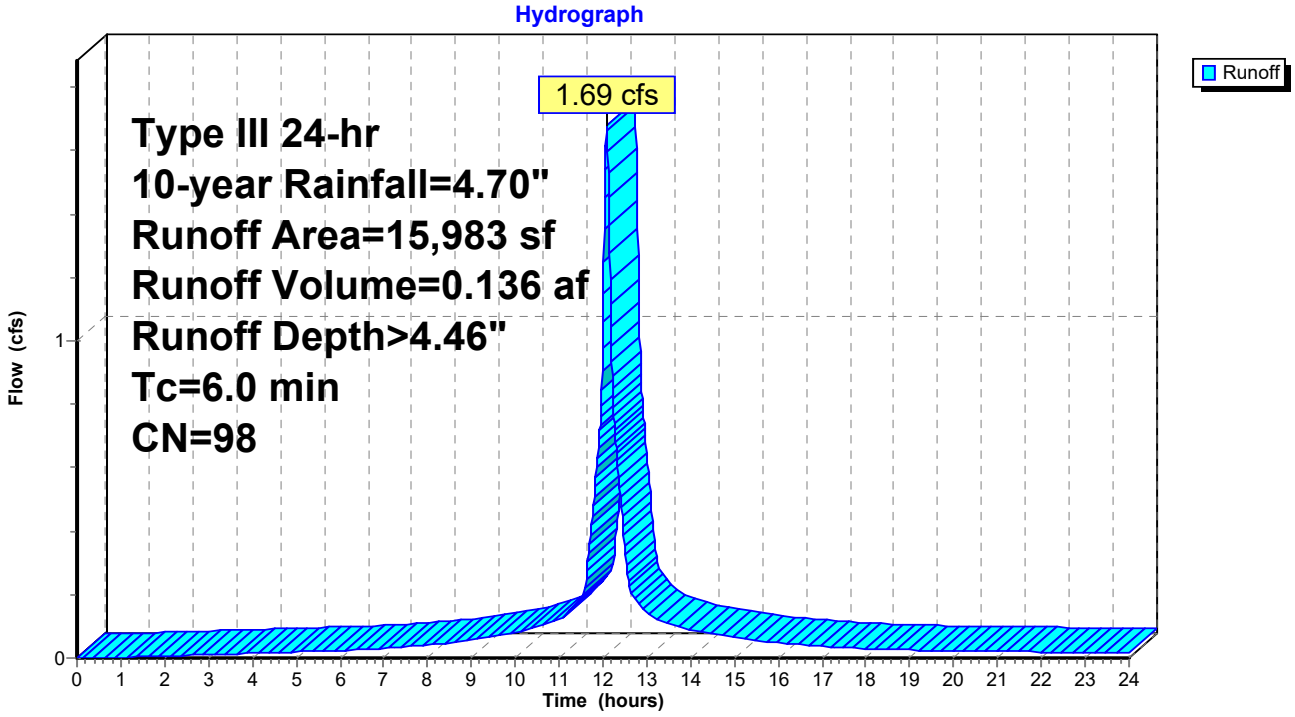
Runoff = 1.69 cfs @ 12.08 hrs, Volume= 0.136 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	10,495	98	Roof
*	5,488	98	Paved parking
	15,983	98	Weighted Average
	15,983		100.00% Impervious Area

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

Subcatchment 4S: Amenity Building



Summary for Subcatchment 5S: Function Hall and Restaurant

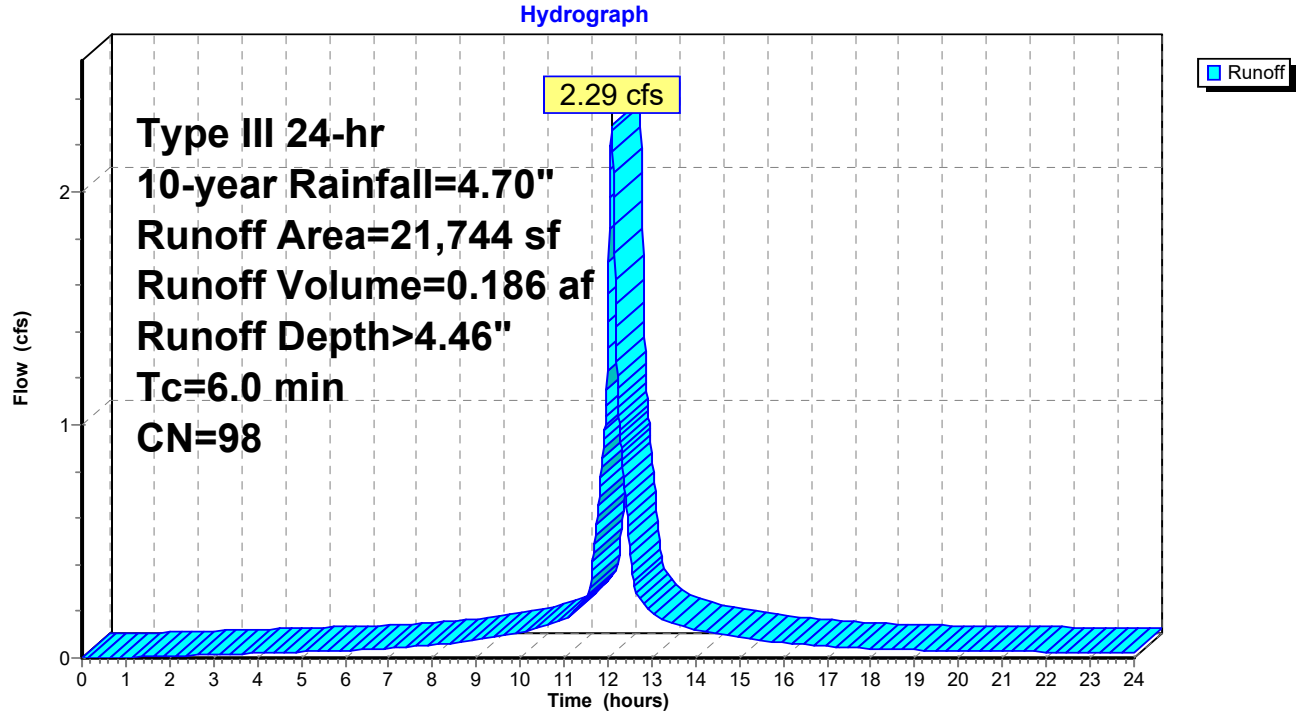
Runoff = 2.29 cfs @ 12.08 hrs, Volume= 0.186 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	21,744	98	Roof
	21,744		100.00% Impervious Area

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

Subcatchment 5S: Function Hall and Restaurant



Summary for Subcatchment 6S: Central Parking and Access Drive

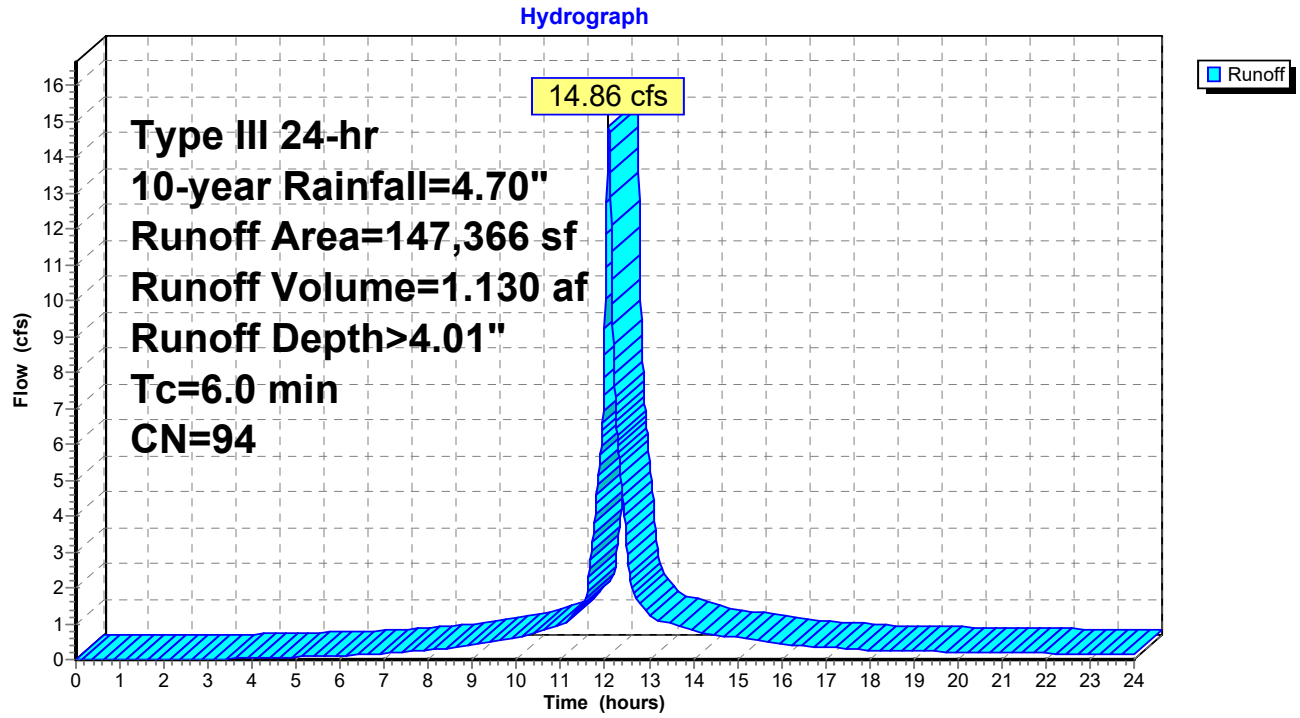
Runoff = 14.86 cfs @ 12.08 hrs, Volume= 1.130 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
	32,897	80	>75% Grass cover, Good, HSG D
*	114,469	98	Paved parking
	147,366	94	Weighted Average
	32,897		22.32% Pervious Area
	114,469		77.68% Impervious Area

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

Subcatchment 6S: Central Parking and Access Drive



Summary for Subcatchment 10S: Building 1 Roof

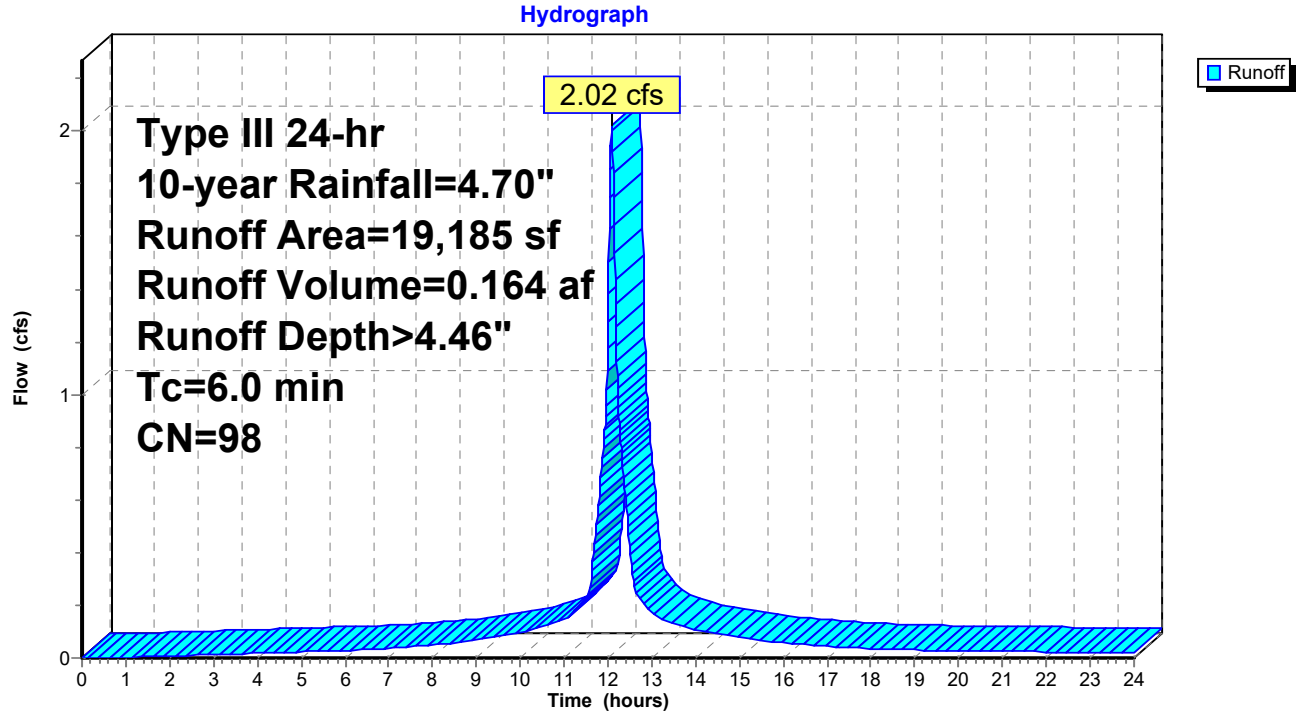
Runoff = 2.02 cfs @ 12.08 hrs, Volume= 0.164 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	19,185	98	Roof
	19,185		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

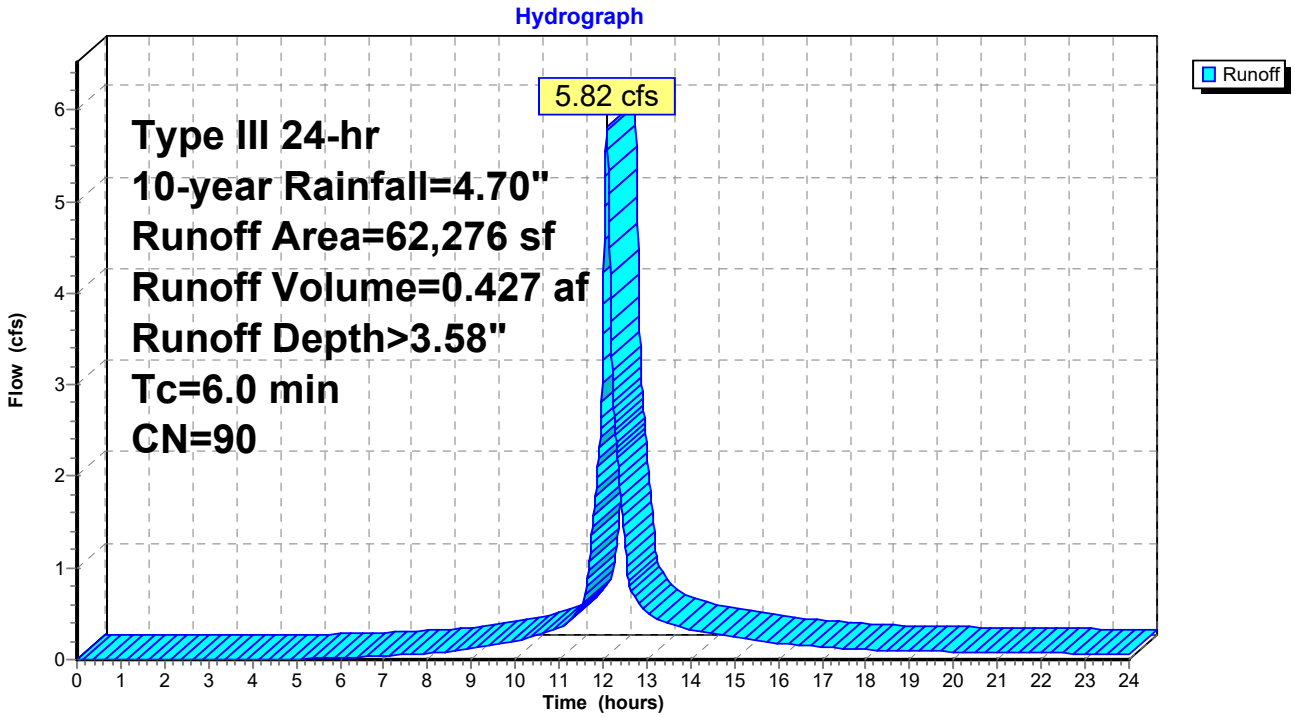
Runoff = 5.82 cfs @ 12.09 hrs, Volume= 0.427 af, Depth> 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
	28,529	80	>75% Grass cover, Good, HSG D
*	33,747	98	Paved parking
	62,276	90	Weighted Average
	28,529		45.81% Pervious Area
	33,747		54.19% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

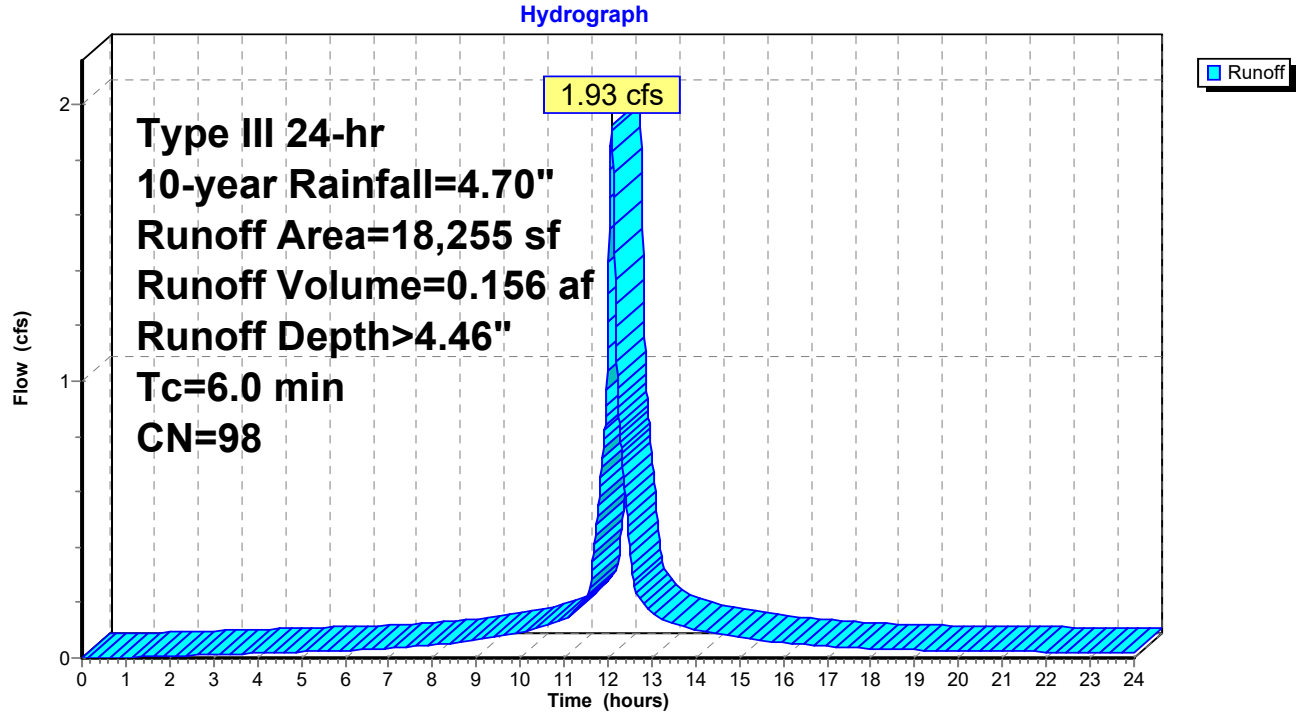
Runoff = 1.93 cfs @ 12.08 hrs, Volume= 0.156 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	18,255	98	Roof
	18,255		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

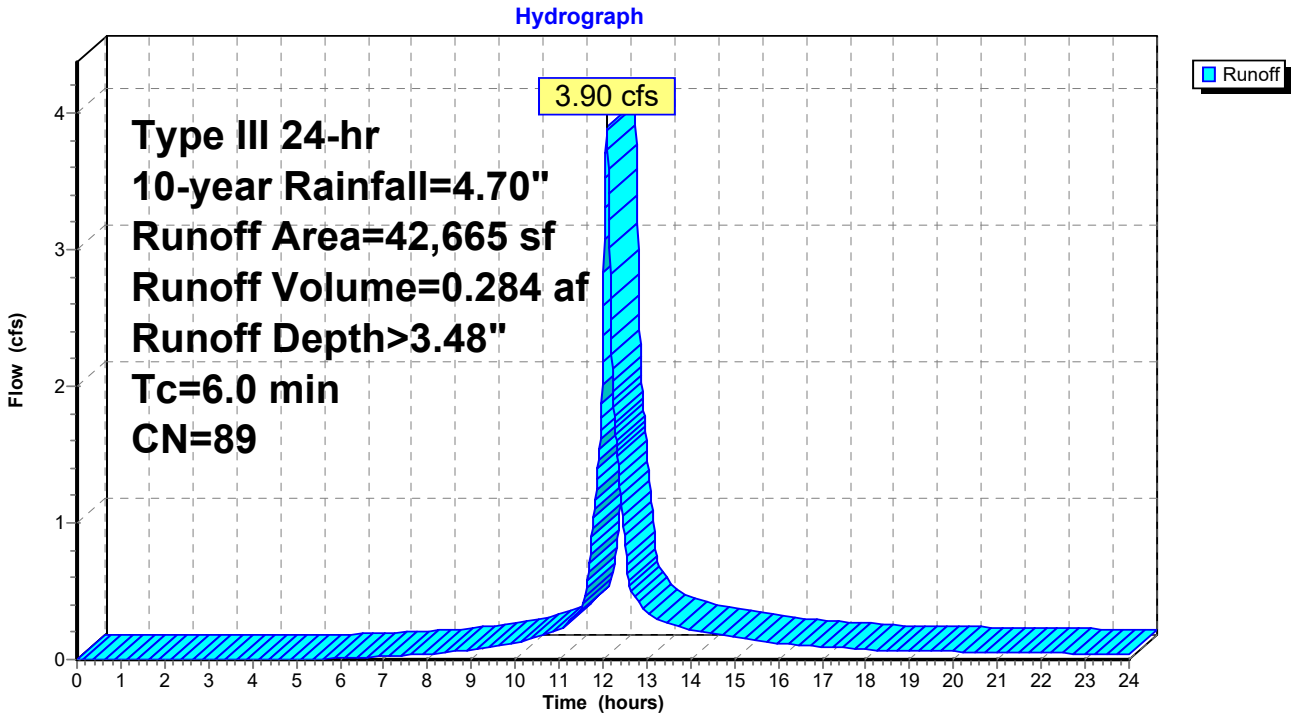
Runoff = 3.90 cfs @ 12.09 hrs, Volume= 0.284 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
22,273	80	>75% Grass cover, Good, HSG D
20,392	98	Paved parking, HSG D
42,665	89	Weighted Average
22,273		52.20% Pervious Area
20,392		47.80% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

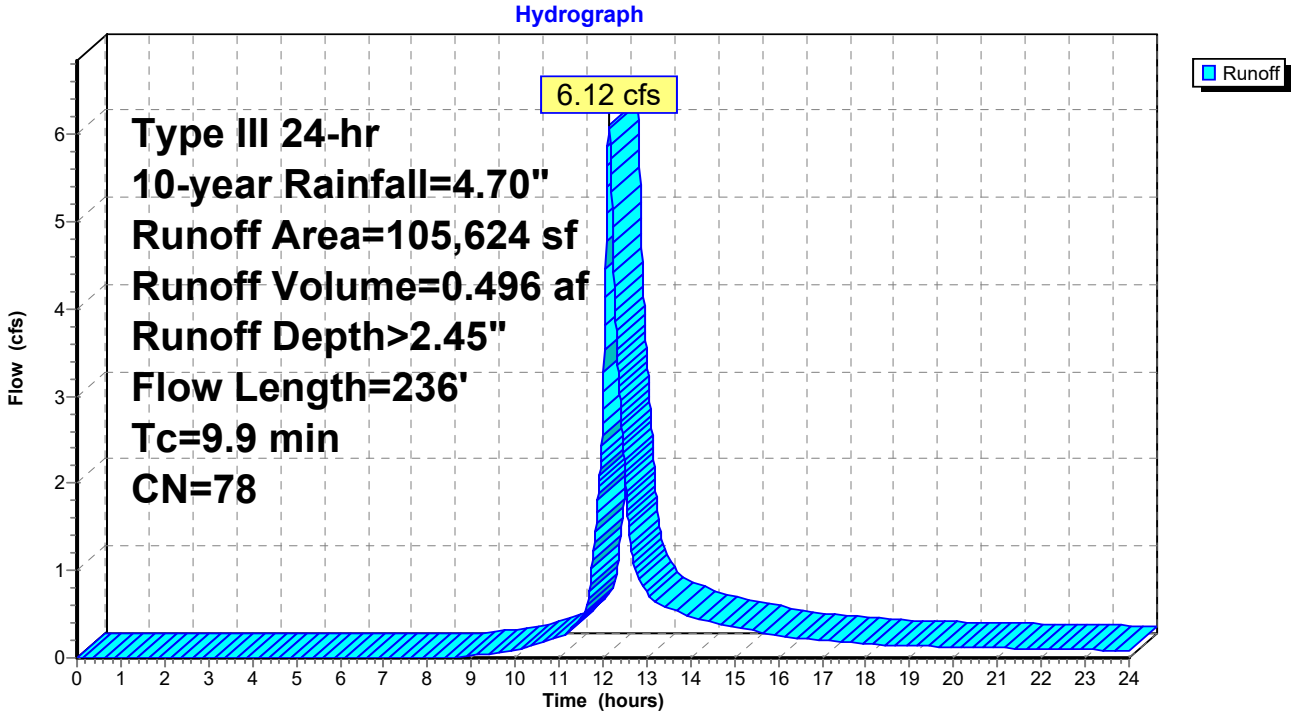
Runoff = 6.12 cfs @ 12.14 hrs, Volume= 0.496 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
48,324	79	Woods/grass comb., Good, HSG D
12,824	80	>75% Grass cover, Good, HSG D
105,624	78	Weighted Average
105,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 15S: North Central Site

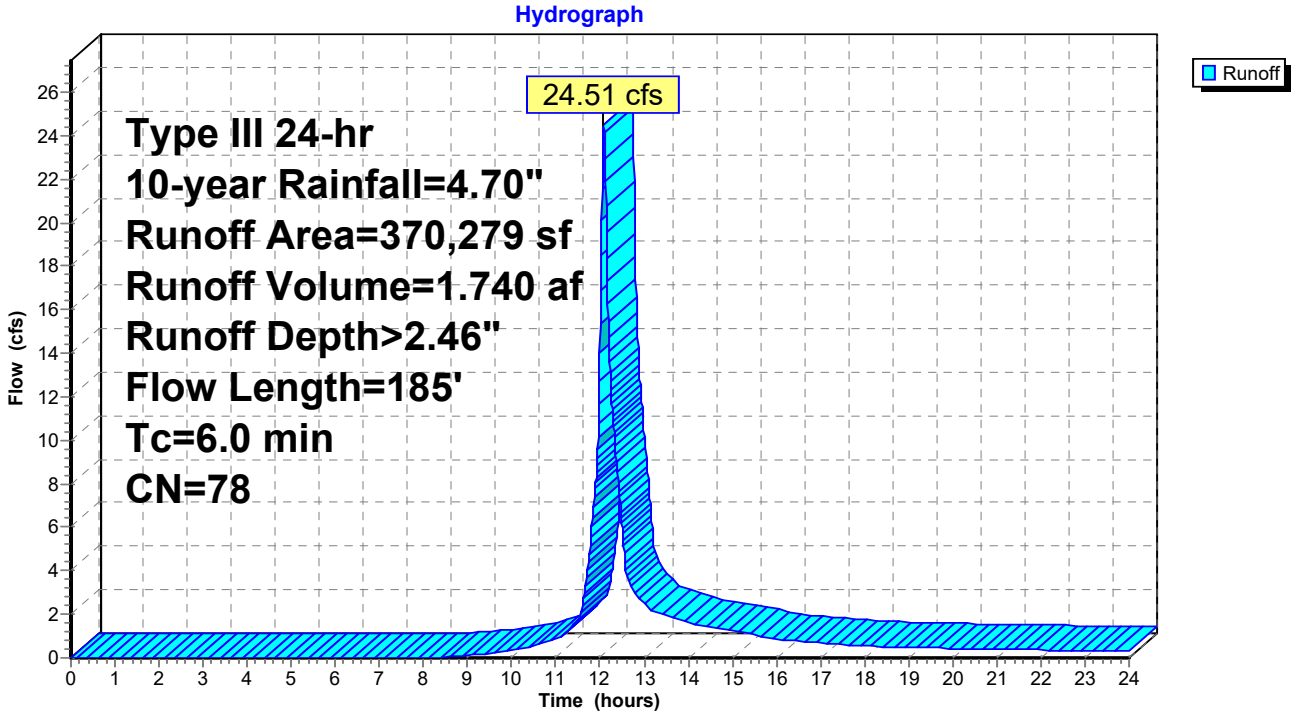
Runoff = 24.51 cfs @ 12.09 hrs, Volume= 1.740 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
177,116	77	Woods, Good, HSG D
154,471	79	Woods/grass comb., Good, HSG D
38,692	80	>75% Grass cover, Good, HSG D
370,279	78	Weighted Average
370,279		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.4	135	0.0980	5.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 15S: North Central Site



Summary for Subcatchment 20S: North Central Site

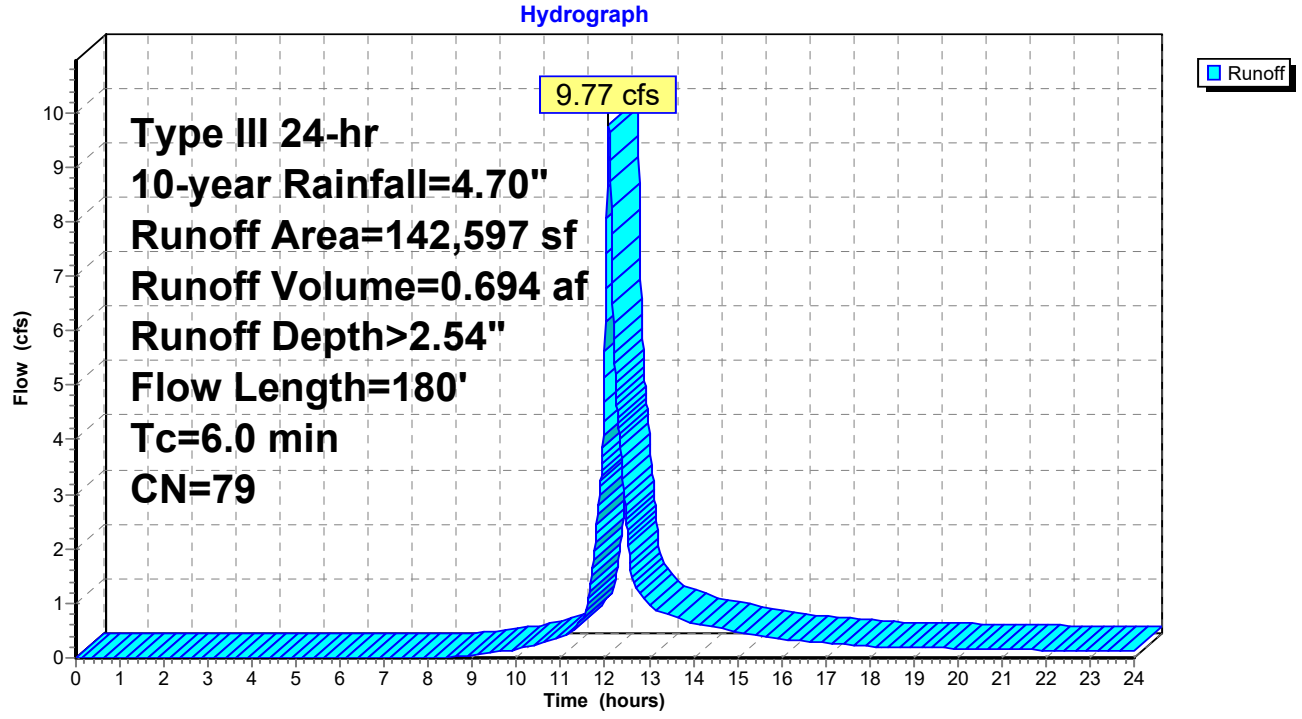
Runoff = 9.77 cfs @ 12.09 hrs, Volume= 0.694 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
107,491	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
142,597	79	Weighted Average
142,597		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 20S: North Central Site



Summary for Subcatchment 22S: Access Road at Building 1

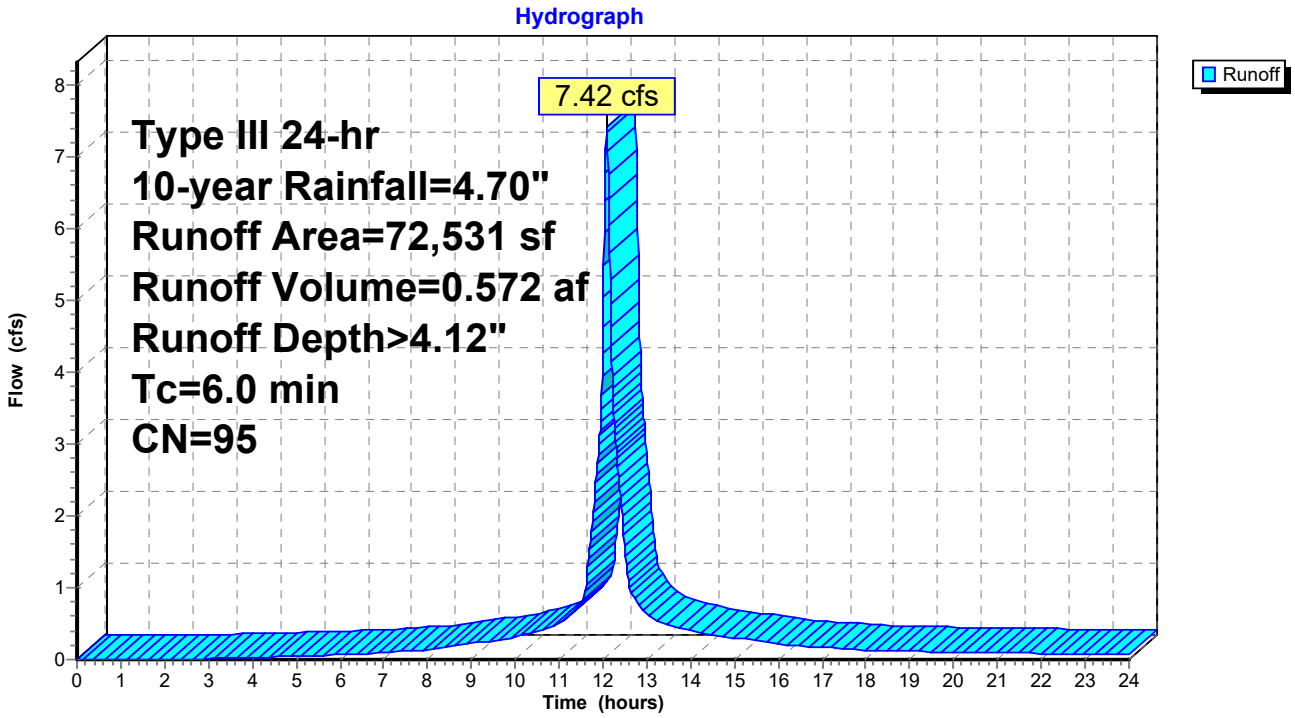
Runoff = 7.42 cfs @ 12.08 hrs, Volume= 0.572 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	59,159	98	Paved parking
	13,372	80	>75% Grass cover, Good, HSG D
	72,531	95	Weighted Average
	13,372		18.44% Pervious Area
	59,159		81.56% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 28S: Porous Pavement Acess Drive at Building 3

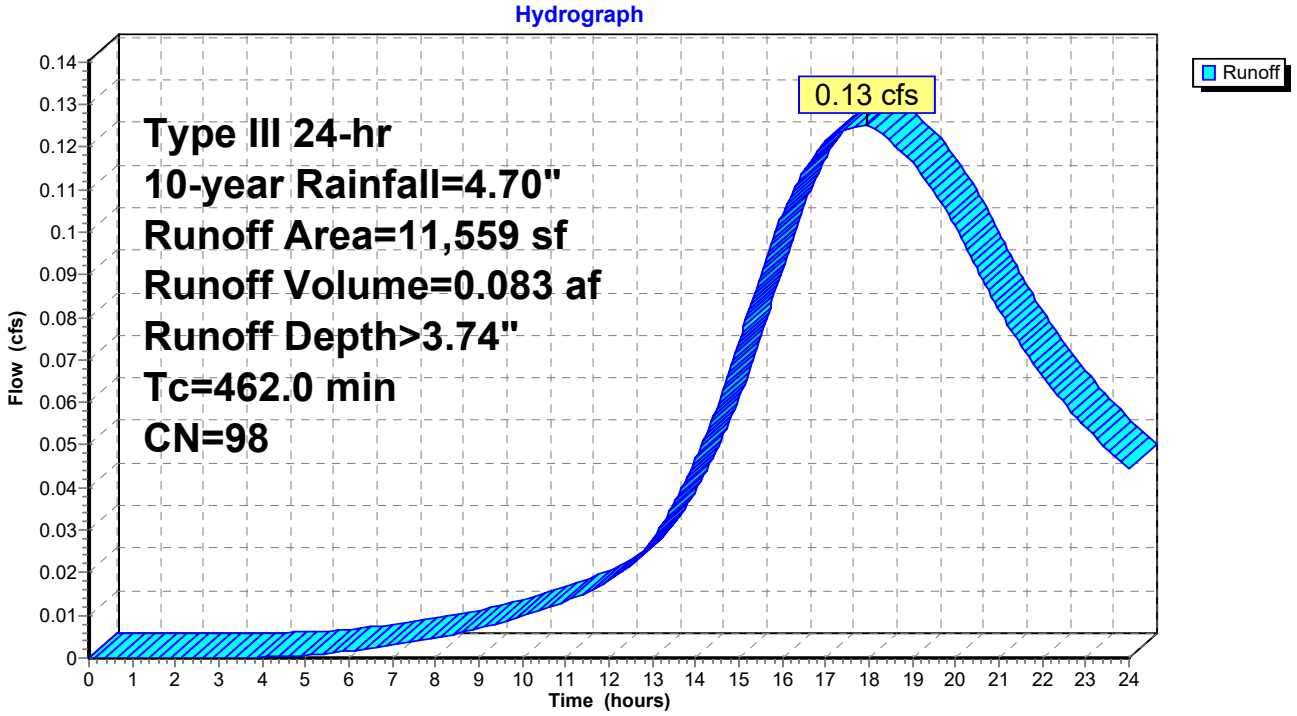
Runoff = 0.13 cfs @ 17.96 hrs, Volume= 0.083 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
*	11,559	98	Paved parking
	11,559		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
462.0					**Direct Entry, UNH Stormwater for Infiltrating Pavement Section**

Subcatchment 28S: Porous Pavement Acess Drive at Building 3



Summary for Subcatchment 29S: Rear Landscape of Building 3

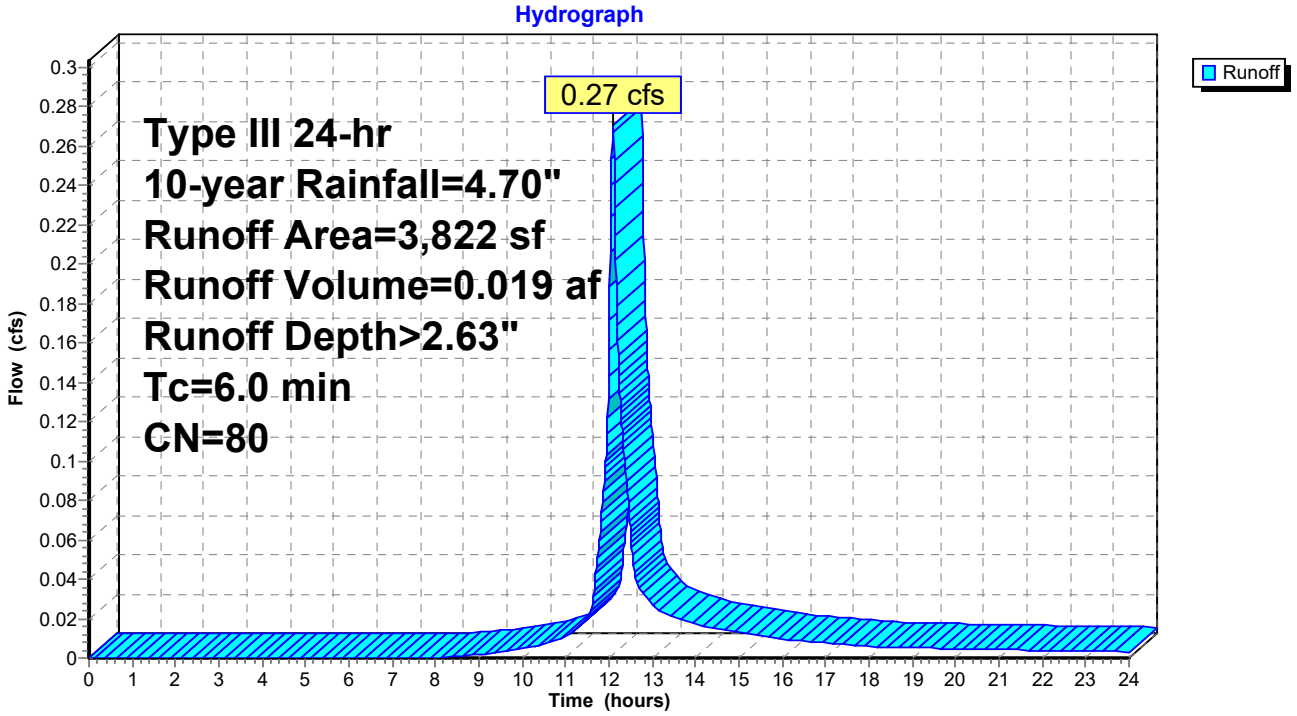
Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.019 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (sf)	CN	Description
3,822	80	>75% Grass cover, Good, HSG D
3,822		100.00% Pervious Area

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

Subcatchment 29S: Rear Landscape of Building 3



Summary for Subcatchment 30S: Entrance Drive

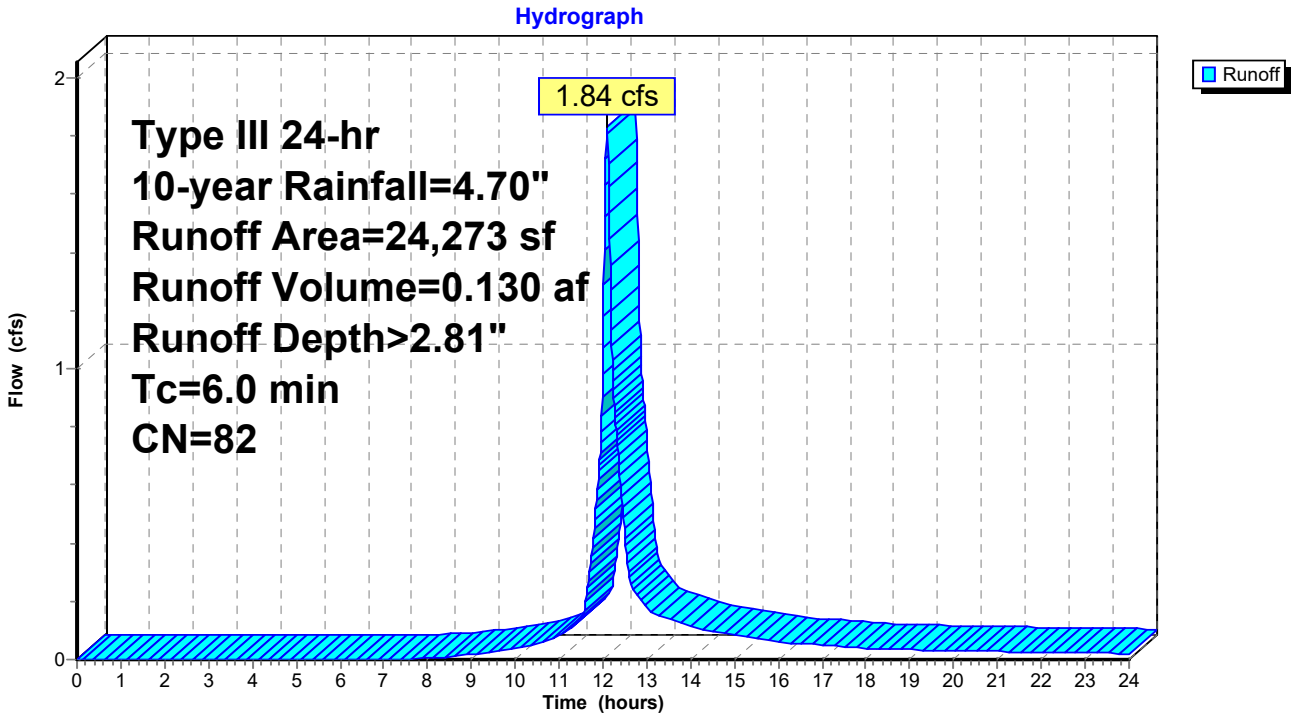
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 0.130 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.70"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive



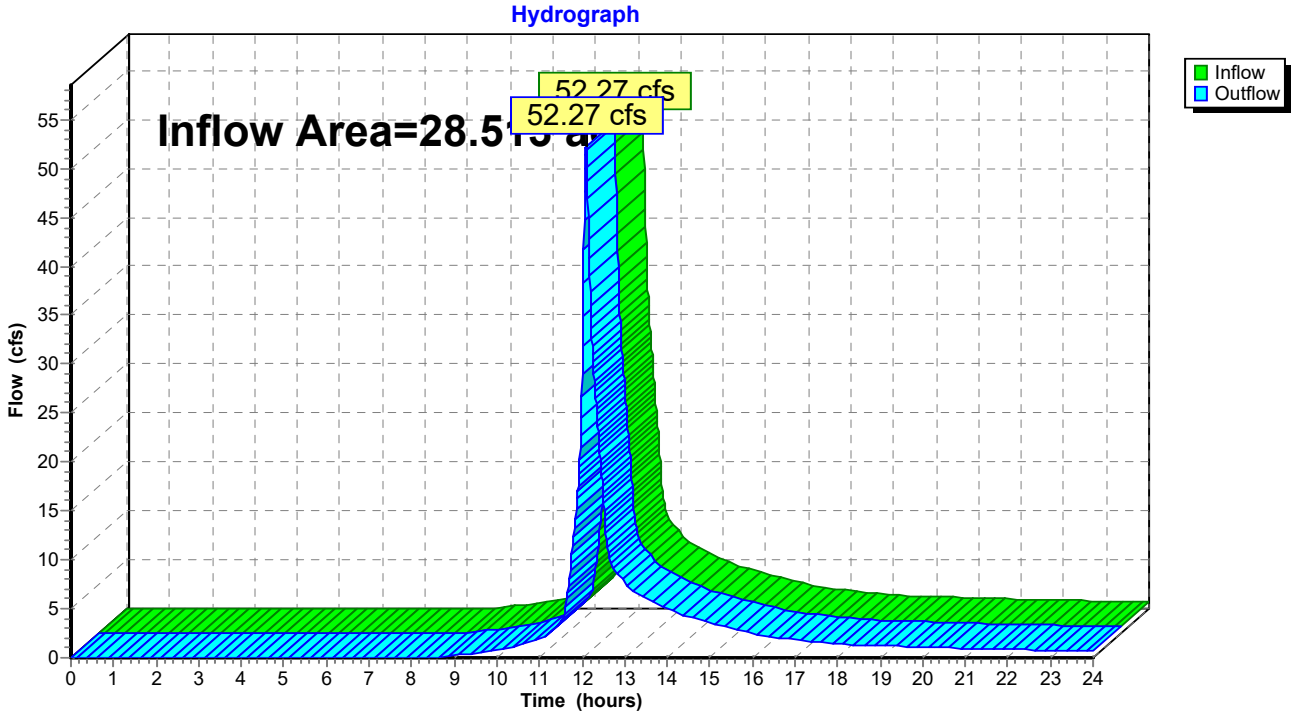
Summary for Reach 1R: FLOW TO NORTH WETLANDS

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

Inflow Area = 28.513 ac, 27.90% Impervious, Inflow Depth > 1.85" for 10-year event
Inflow = 52.27 cfs @ 12.10 hrs, Volume= 4.394 af
Outflow = 52.27 cfs @ 12.10 hrs, Volume= 4.394 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS



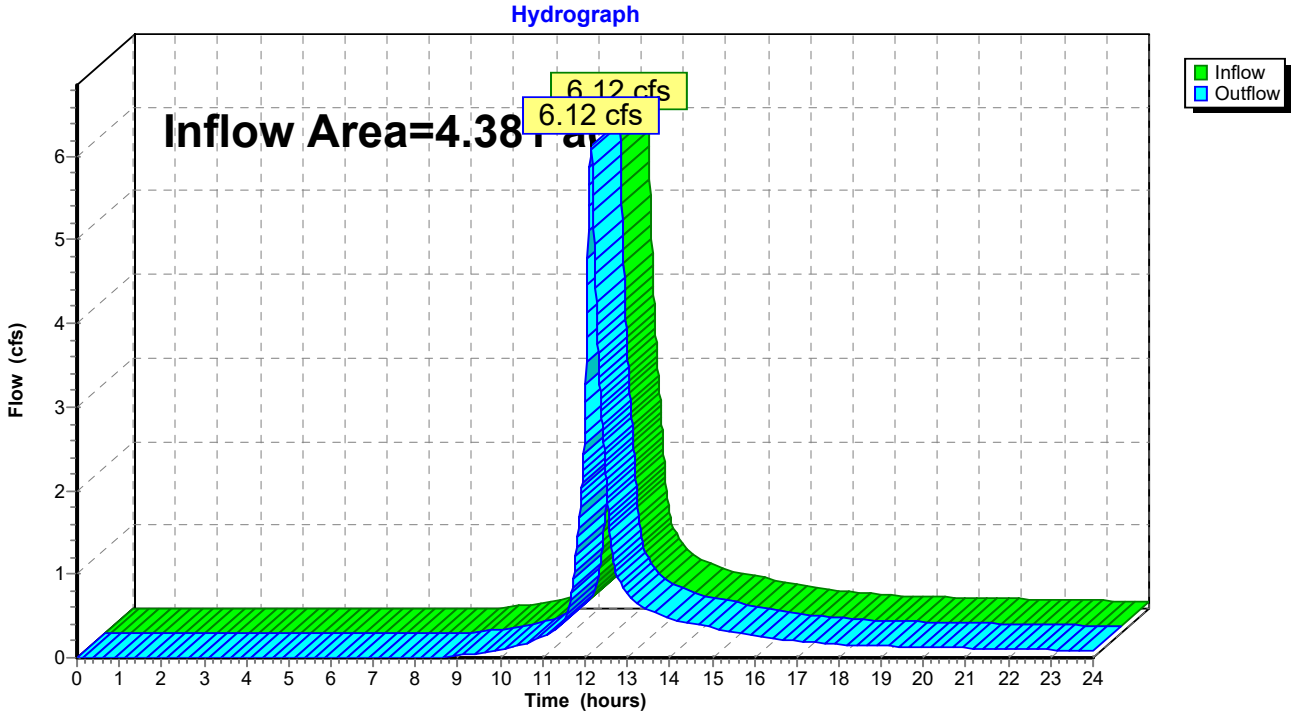
Summary for Reach 4R: ROADSIDE DEPRESSION

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

Inflow Area = 4.381 ac, 21.99% Impervious, Inflow Depth > 1.36" for 10-year event
Inflow = 6.12 cfs @ 12.14 hrs, Volume= 0.496 af
Outflow = 6.12 cfs @ 12.14 hrs, Volume= 0.496 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION



Summary for Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3

Inflow Area = 4.249 ac, 82.23% Impervious, Inflow Depth > 4.10" for 10-year event
Inflow = 18.83 cfs @ 12.08 hrs, Volume= 1.452 af
Outflow = 1.25 cfs @ 13.50 hrs, Volume= 0.672 af, Atten= 93%, Lag= 85.2 min
Discarded = 0.29 cfs @ 8.85 hrs, Volume= 0.448 af
Primary = 0.96 cfs @ 13.50 hrs, Volume= 0.224 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 180.88' @ 13.50 hrs Surf.Area= 12,232 sf Storage= 36,847 cf
Flood Elev= 181.50' Surf.Area= 12,232 sf Storage= 43,656 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 108.6 min (877.5 - 768.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	0 cf	**89.63'W x 136.48'L x 4.50'H Field A** 55,044 cf Overall - 55,044 cf Embedded = 0 cf x 40.0% Voids
#2A	177.50'	43,656 cf	**StormTrap ST2 SingleTrap 4-0** x 72 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 9 Rows of 8 Chambers 76.31' x 123.17' Core + 6.66' Border = 89.63' x 136.48' System
		43,656 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	180.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	177.37'	**15.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.37' / 176.63' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.29 cfs @ 8.85 hrs HW=177.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.96 cfs @ 13.50 hrs HW=180.88' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.96 cfs of 9.49 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.96 cfs @ 1.37 fps)

Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3 - Chamber Wizard Field A

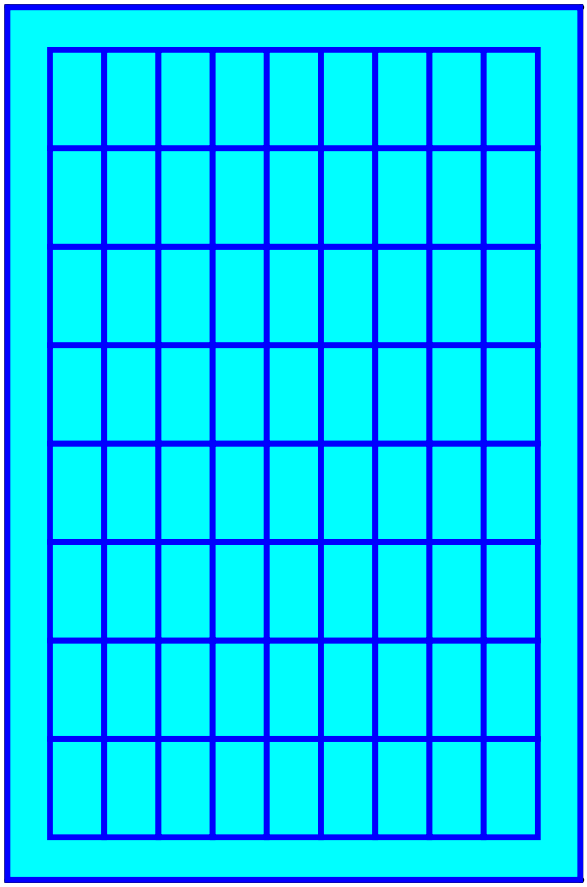
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
54.0" Chamber Height = 4.50' Field Height

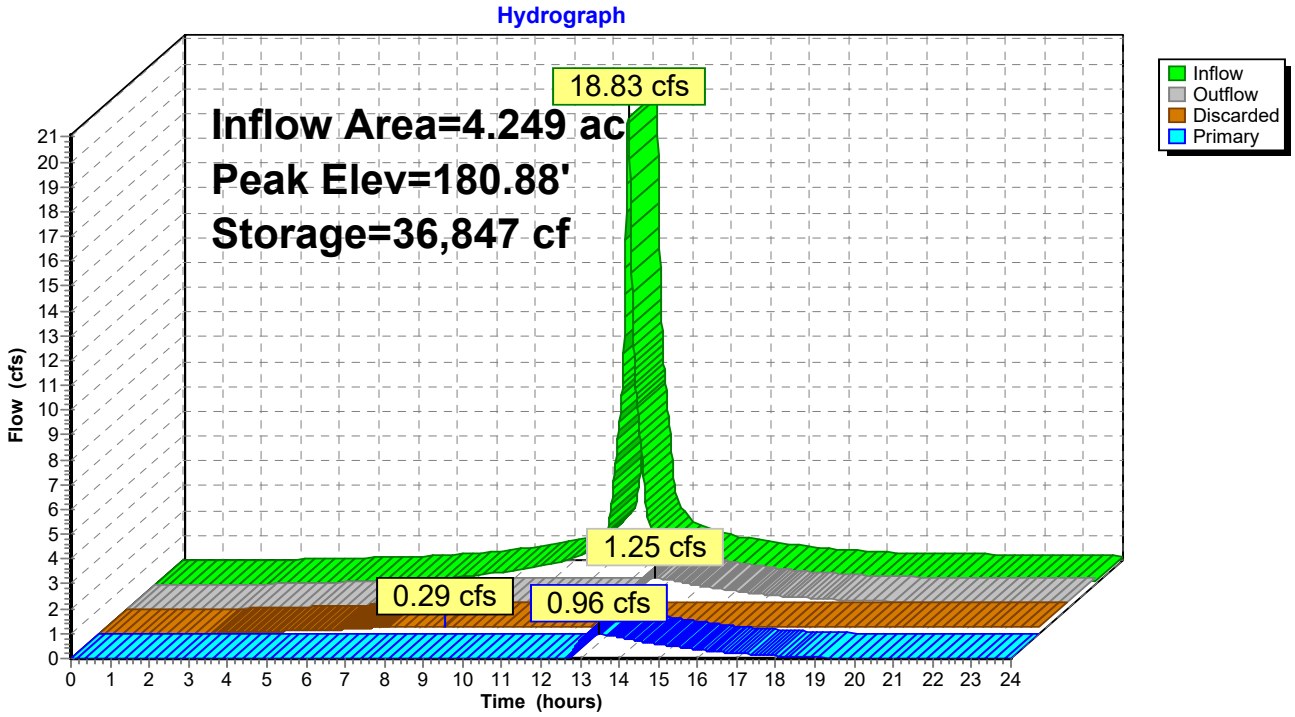
72 Chambers x 470.3 cf + 9,796.6 cf Border = 43,656.2 cf Chamber Storage
72 Chambers x 587.4 cf + 12,747.6 cf Border = 55,043.8 cf Displacement

Chamber Storage = 43,656.2 cf = 1.002 af
Overall Storage Efficiency = 79.3%
Overall System Size = 136.48' x 89.63' x 4.50'

72 Chambers (plus border)
2,038.7 cy Field



Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.430 ac, 54.19% Impervious, Inflow Depth > 3.58" for 10-year event
Inflow = 5.82 cfs @ 12.09 hrs, Volume= 0.427 af
Outflow = 0.48 cfs @ 13.07 hrs, Volume= 0.265 af, Atten= 92%, Lag= 59.1 min
Discarded = 0.16 cfs @ 10.52 hrs, Volume= 0.213 af
Primary = 0.32 cfs @ 13.07 hrs, Volume= 0.052 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.58' @ 13.07 hrs Surf.Area= 6,784 sf Storage= 9,430 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 139.8 min (932.1 - 792.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap ST2 SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 6 Chambers 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 10.52 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.32 cfs @ 13.07 hrs HW=179.58' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.32 cfs of 2.43 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.32 cfs @ 0.95 fps)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2 - Chamber Wizard Field A

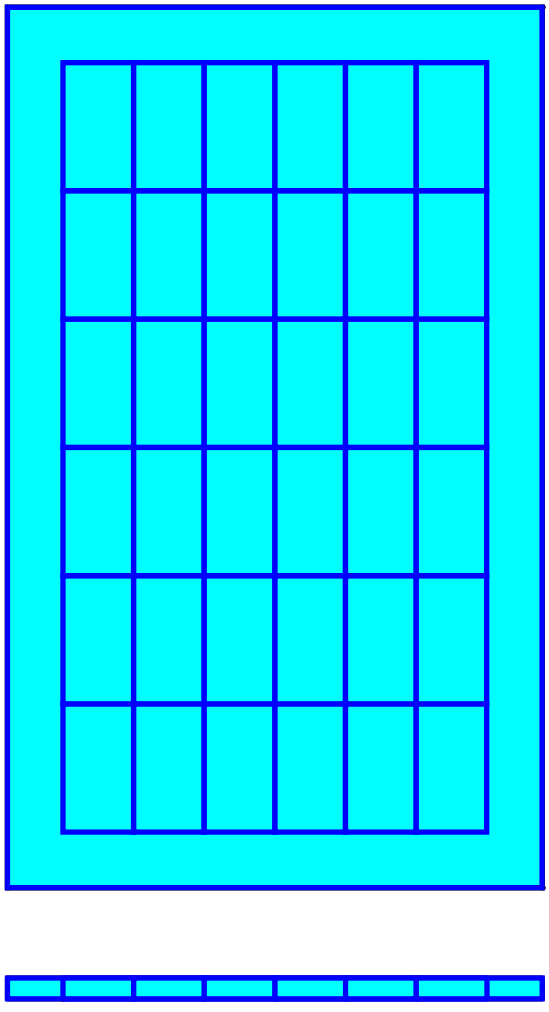
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

6 Chambers/Row x 15.40' Long = 92.38' Row Length +79.9" Border x 2 = 105.69' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

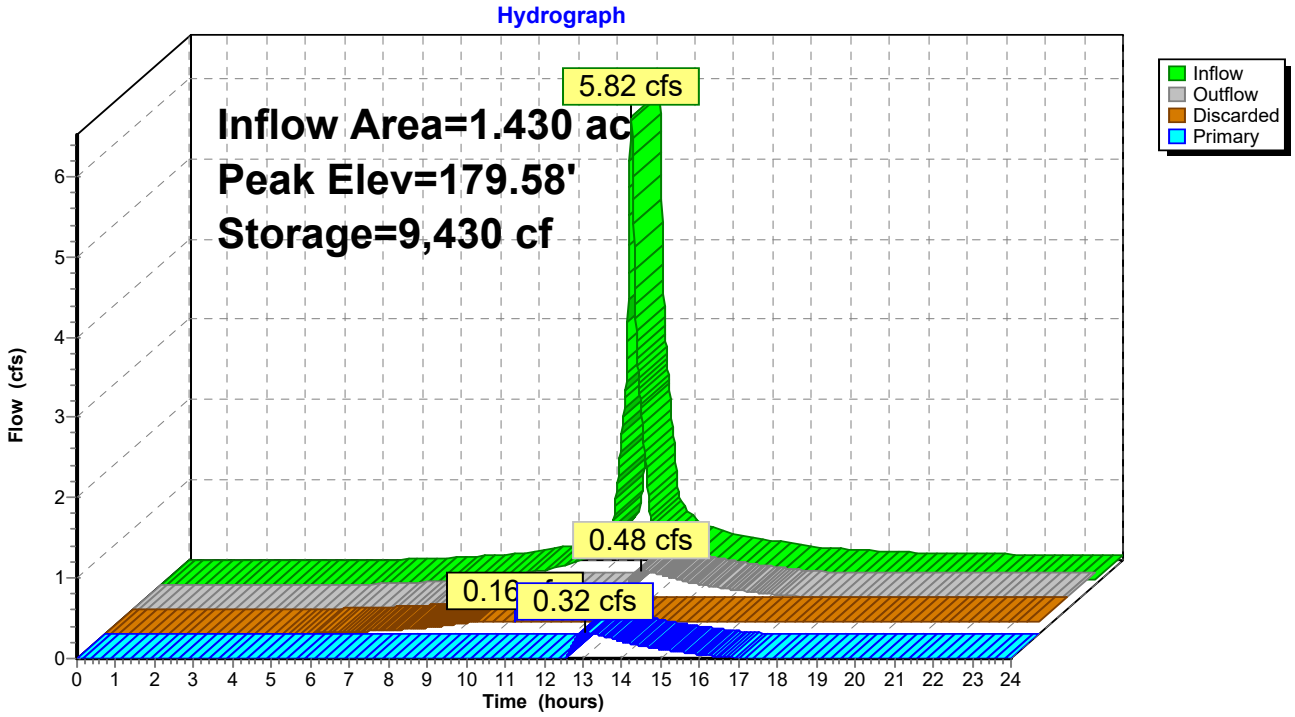
36 Chambers x 231.7 cf + 3,563.4 cf Border = 11,903.6 cf Chamber Storage
36 Chambers x 326.4 cf + 5,210.6 cf Border = 16,959.5 cf Displacement

Chamber Storage = 11,903.6 cf = 0.273 af
Overall Storage Efficiency = 70.2%
Overall System Size = 105.69' x 64.19' x 2.50'

36 Chambers (plus border)
628.1 cy Field



Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.399 ac, 63.44% Impervious, Inflow Depth > 3.78" for 10-year event
Inflow = 5.83 cfs @ 12.08 hrs, Volume= 0.440 af
Outflow = 1.05 cfs @ 12.54 hrs, Volume= 0.289 af, Atten= 82%, Lag= 27.2 min
Discarded = 0.16 cfs @ 10.13 hrs, Volume= 0.220 af
Primary = 0.89 cfs @ 12.54 hrs, Volume= 0.069 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.54' @ 12.54 hrs Surf.Area= 2,810 sf Storage= 8,811 cf
Flood Elev= 172.00' Surf.Area= 2,810 sf Storage= 9,944 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 117.3 min (896.4 - 779.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**47.23'W x 59.50'L x 4.50'H Field A** 12,646 cf Overall - 12,646 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	9,944 cf	**StormTrap ST2 SingleTrap 4-0** x 12 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 4 Rows of 3 Chambers 33.92' x 46.19' Core + 6.66' Border = 47.23' x 59.50' System
		9,944 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.16 cfs @ 10.13 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.89 cfs @ 12.54 hrs HW=171.54' TW=165.47' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.89 cfs of 7.98 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.89 cfs @ 1.24 fps)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8 - Chamber Wizard Field A

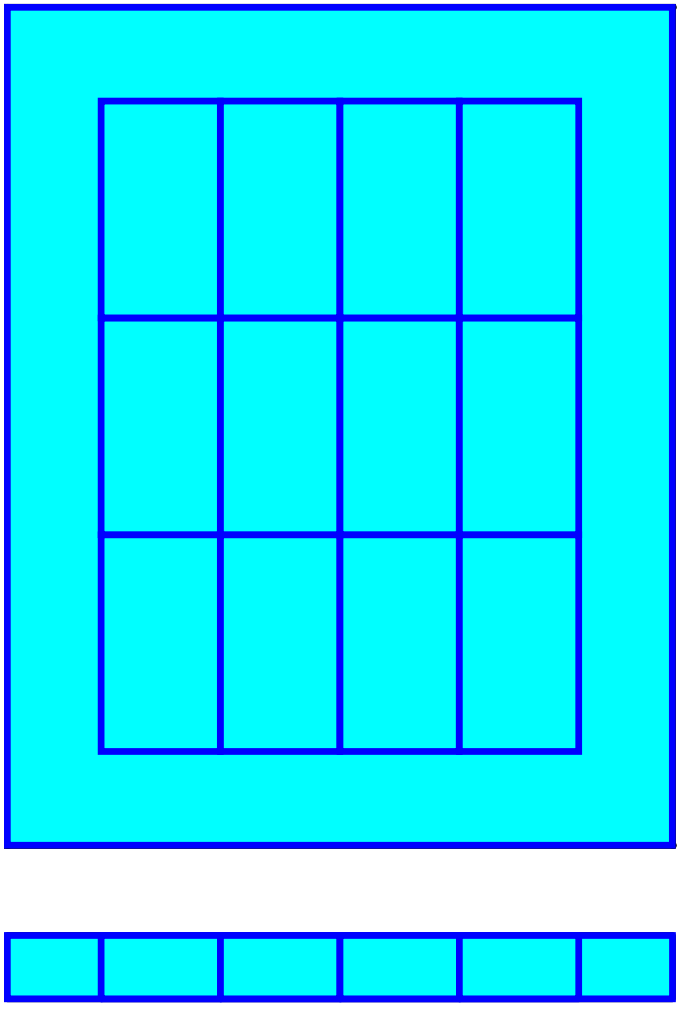
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 = 59.50' Base Length
4 Rows x 101.7" Wide + 79.9" Side Border x 2 = 47.23' Base Width
54.0" Chamber Height = 4.50' Field Height

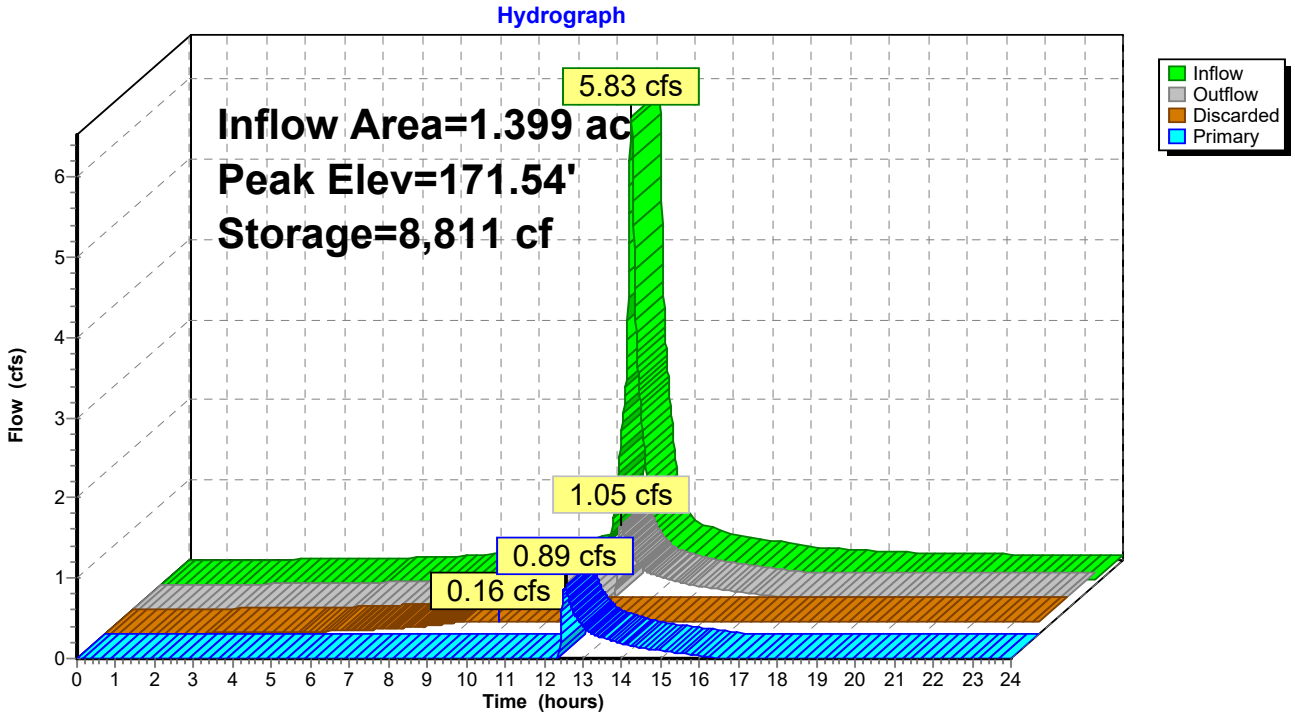
12 Chambers x 470.3 cf + 4,300.8 cf Border = 9,944.0 cf Chamber Storage
12 Chambers x 587.4 cf + 5,596.2 cf Border = 12,645.6 cf Displacement

Chamber Storage = 9,944.0 cf = 0.228 af
Overall Storage Efficiency = 78.6%
Overall System Size = 59.50' x 47.23' x 4.50'

12 Chambers (plus border)
468.4 cy Field



Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.106 ac, 85.42% Impervious, Inflow Depth > 4.19" for 10-year event
Inflow = 9.44 cfs @ 12.08 hrs, Volume= 0.735 af
Outflow = 3.69 cfs @ 12.31 hrs, Volume= 0.619 af, Atten= 61%, Lag= 13.3 min
Discarded = 0.30 cfs @ 9.91 hrs, Volume= 0.424 af
Primary = 3.40 cfs @ 12.31 hrs, Volume= 0.195 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.41' @ 12.31 hrs Surf.Area= 5,289 sf Storage= 11,338 cf
Flood Elev= 178.00' Surf.Area= 5,289 sf Storage= 14,098 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 103.1 min (867.8 - 764.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 136.48'L x 3.50'H Field A** 18,510 cf Overall - 18,510 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	14,098 cf	**StormTrap ST2 SingleTrap 3-0** x 24 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 3 Rows of 8 Chambers 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		14,098 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	175.60'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.60' / 174.81' S= 0.0494 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	177.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.30 cfs @ 9.91 hrs HW=175.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=3.40 cfs @ 12.31 hrs HW=177.41' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 3.40 cfs of 6.44 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 3.40 cfs @ 2.10 fps)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1 - Chamber Wizard Field A

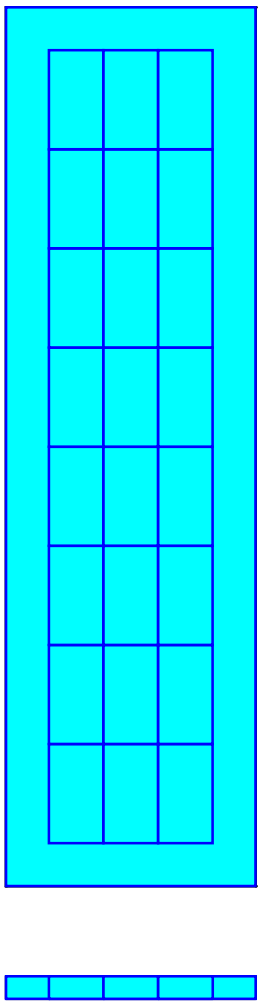
Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf
Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
42.0" Chamber Height = 3.50' Field Height

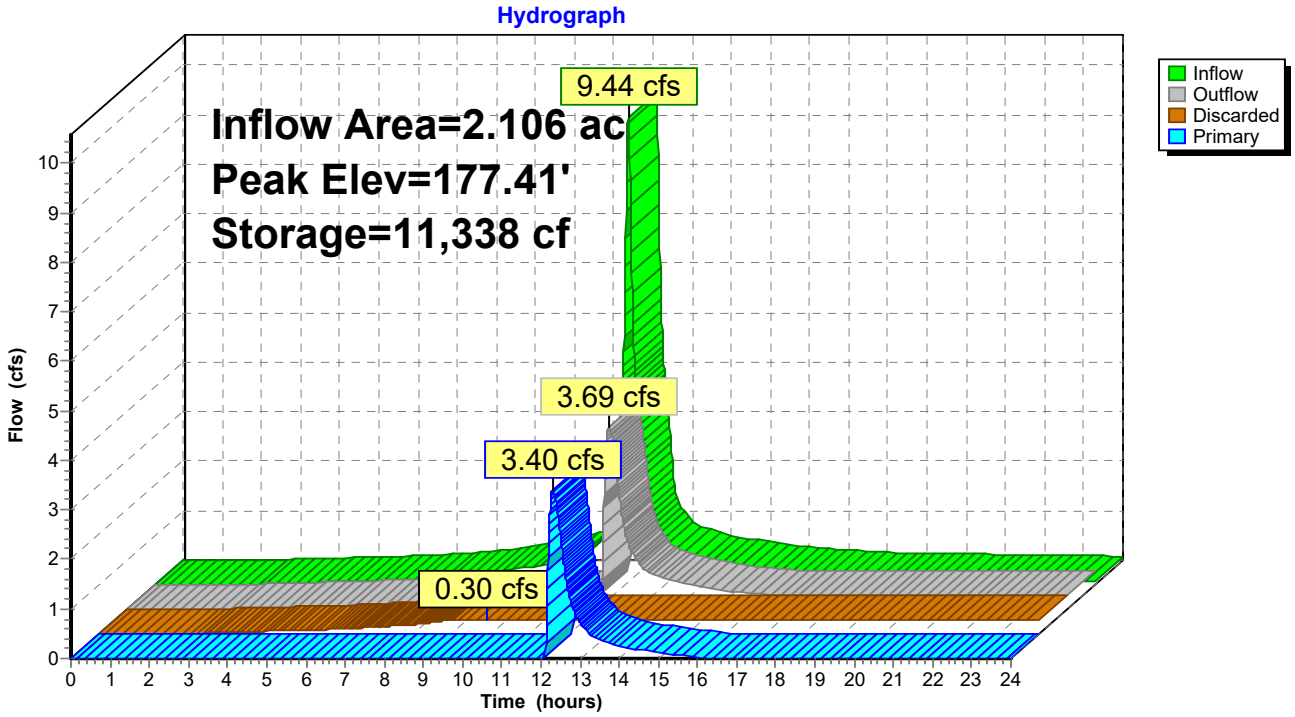
24 Chambers x 354.0 cf + 5,601.9 cf Border = 14,097.7 cf Chamber Storage
24 Chambers x 456.9 cf + 7,544.3 cf Border = 18,510.0 cf Displacement

Chamber Storage = 14,097.7 cf = 0.324 af
Overall Storage Efficiency = 76.2%
Overall System Size = 136.48' x 38.75' x 3.50'

24 Chambers (plus border)
685.6 cy Field



Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4

Inflow Area = 1.802 ac, 90.05% Impervious, Inflow Depth > 4.26" for 10-year event
Inflow = 8.14 cfs @ 12.08 hrs, Volume= 0.640 af
Outflow = 0.98 cfs @ 12.65 hrs, Volume= 0.626 af, Atten= 88%, Lag= 34.0 min
Discarded = 0.43 cfs @ 11.07 hrs, Volume= 0.582 af
Primary = 0.55 cfs @ 12.65 hrs, Volume= 0.044 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 190.12' @ 12.65 hrs Surf.Area= 7,772 sf Storage= 11,062 cf
Flood Elev= 190.50' Surf.Area= 7,772 sf Storage= 13,644 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 171.5 min (931.5 - 760.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	188.50'	0 cf	**64.19'W x 121.08'L x 2.50'H Field A** 19,430 cf Overall - 19,430 cf Embedded = 0 cf x 40.0% Voids
#2A	188.50'	13,644 cf	**StormTrap ST2 SingleTrap 2-0** x 42 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 7 Chambers 50.88' x 107.77' Core + 6.66' Border = 64.19' x 121.08' System
		13,644 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	188.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	190.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	188.37'	**12.0" Round Culvert** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.37' / 188.12' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.43 cfs @ 11.07 hrs HW=188.53' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.43 cfs)

Primary OutFlow Max=0.55 cfs @ 12.65 hrs HW=190.12' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 0.55 cfs of 3.58 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 1.14 fps)

Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4 - Chamber Wizard Field A

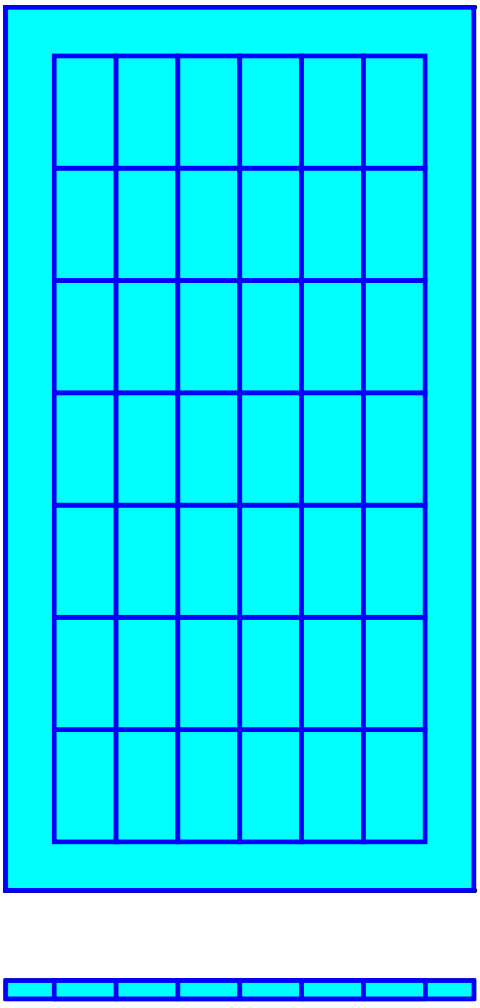
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

7 Chambers/Row x 15.40' Long = 107.77' Row Length +79.9" Border x 2 = 121.08' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

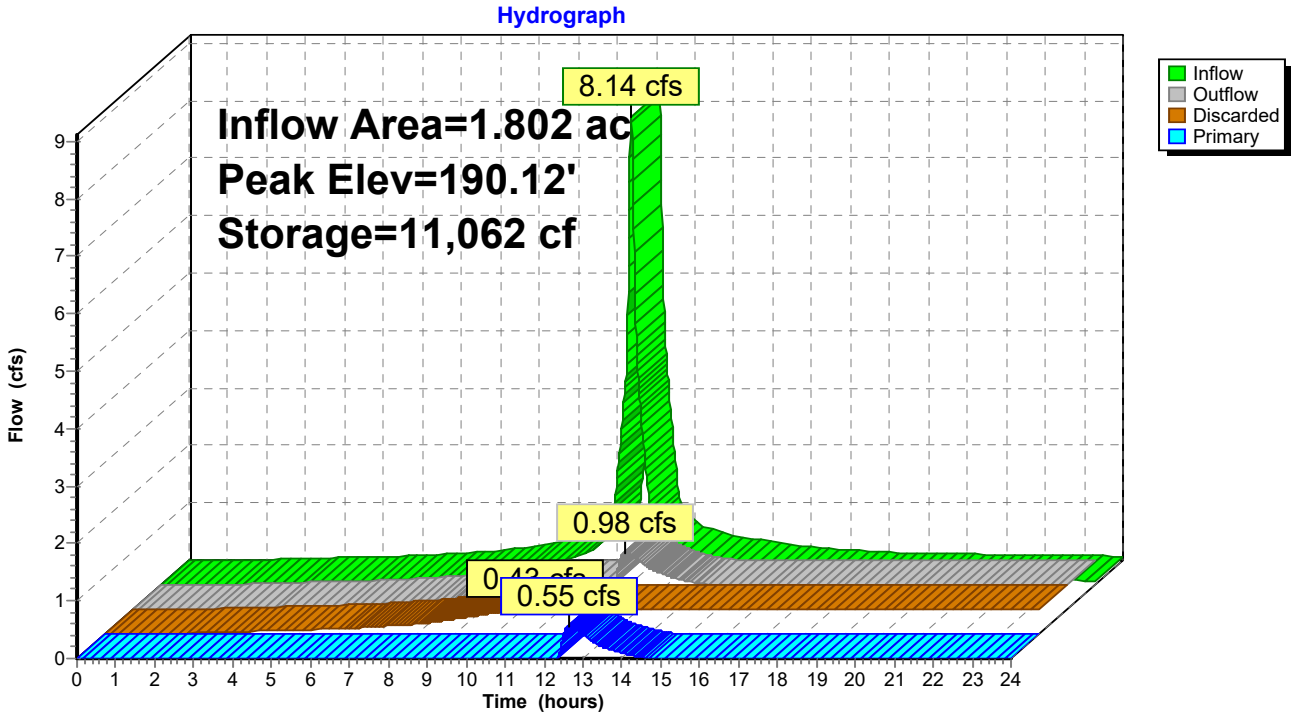
42 Chambers x 231.7 cf + 3,913.9 cf Border = 13,644.0 cf Chamber Storage
42 Chambers x 326.4 cf + 5,723.0 cf Border = 19,430.1 cf Displacement

Chamber Storage = 13,644.0 cf = 0.313 af
Overall Storage Efficiency = 70.2%
Overall System Size = 121.08' x 64.19' x 2.50'

42 Chambers (plus border)
719.6 cy Field



Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.956 ac, 49.24% Impervious, Inflow Depth > 1.22" for 10-year event
Inflow = 1.84 cfs @ 12.09 hrs, Volume= 0.199 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 167.36' @ 24.00 hrs Surf.Area= 3,234 sf Storage= 8,684 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

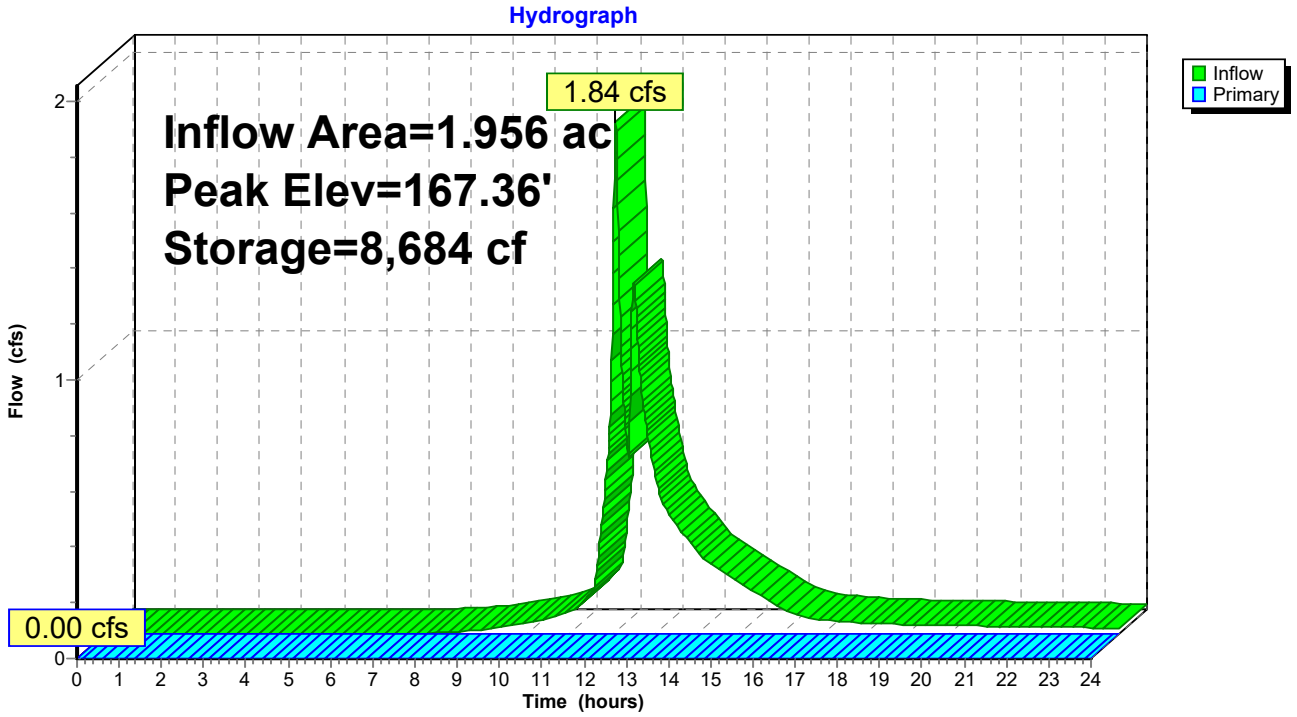
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

Device	Routing	Invert	Outlet Devices
#1	Primary	167.55'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 11P: Bio-Retention Area



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>3.04"
Flow Length=356' Tc=7.4 min CN=77 Runoff=23.14 cfs 1.724 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=4.14 cfs 0.337 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>4.91"
Tc=6.0 min CN=95 Runoff=5.44 cfs 0.423 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=1.98 cfs 0.161 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=2.69 cfs 0.219 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>4.80"
Tc=6.0 min CN=94 Runoff=17.60 cfs 1.353 af

Subcatchment 10S: Building 1 Roof Runoff Area=19,185 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=2.37 cfs 0.193 af

Subcatchment 11S: Building 1 Parking Runoff Area=62,276 sf 54.19% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=90 Runoff=7.01 cfs 0.519 af

Subcatchment 12S: Building 2 Roof Runoff Area=18,255 sf 100.00% Impervious Runoff Depth>5.26"
Tc=6.0 min CN=98 Runoff=2.26 cfs 0.184 af

Subcatchment 13S: Entrance Driveway Runoff Area=42,665 sf 47.80% Impervious Runoff Depth>4.25"
Tc=6.0 min CN=89 Runoff=4.71 cfs 0.347 af

Subcatchment 14S: Southeast Site Runoff Area=105,624 sf 0.00% Impervious Runoff Depth>3.13"
Flow Length=236' Tc=9.9 min CN=78 Runoff=7.82 cfs 0.633 af

Subcatchment 15S: North Central Site Runoff Area=370,279 sf 0.00% Impervious Runoff Depth>3.14"
Flow Length=185' Tc=6.0 min CN=78 Runoff=31.32 cfs 2.222 af

Subcatchment 20S: North Central Site Runoff Area=142,597 sf 0.00% Impervious Runoff Depth>3.23"
Flow Length=180' Tc=6.0 min CN=79 Runoff=12.42 cfs 0.882 af

Subcatchment 22S: Access Road at Runoff Area=72,531 sf 81.56% Impervious Runoff Depth>4.91"
Tc=6.0 min CN=95 Runoff=8.76 cfs 0.681 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>4.41"
Tc=462.0 min CN=98 Runoff=0.15 cfs 0.098 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>3.33"
Tc=6.0 min CN=80 Runoff=0.34 cfs 0.024 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>3.53"
Tc=6.0 min CN=82 Runoff=2.29 cfs 0.164 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=69.41 cfs 5.975 af
Outflow=69.41 cfs 5.975 af

Reach 4R: ROADSIDE DEPRESSION Inflow=7.82 cfs 0.724 af
Outflow=7.82 cfs 0.724 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=181.11' Storage=39,431 cf Inflow=22.26 cfs 1.732 af
Discarded=0.29 cfs 0.464 af Primary=3.40 cfs 0.476 af Outflow=3.69 cfs 0.940 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=179.72' Storage=10,243 cf Inflow=7.01 cfs 0.519 af
Discarded=0.16 cfs 0.221 af Primary=1.34 cfs 0.126 af Outflow=1.50 cfs 0.347 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=171.69' Storage=9,171 cf Inflow=6.97 cfs 0.530 af
Discarded=0.16 cfs 0.228 af Primary=2.51 cfs 0.142 af Outflow=2.67 cfs 0.370 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=177.60' Storage=12,234 cf Inflow=11.13 cfs 0.874 af
Discarded=0.30 cfs 0.439 af Primary=5.94 cfs 0.303 af Outflow=6.24 cfs 0.742 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=190.28' Storage=12,153 cf Inflow=9.58 cfs 0.760 af
Discarded=0.43 cfs 0.603 af Primary=1.93 cfs 0.121 af Outflow=2.36 cfs 0.724 af

Pond 11P: Bio-Retention Area Peak Elev=167.63' Storage=9,575 cf Inflow=3.46 cfs 0.306 af
Outflow=0.42 cfs 0.091 af

Total Runoff Area = 32.893 ac Runoff Volume = 10.163 af Average Runoff Depth = 3.71"
72.89% Pervious = 23.975 ac 27.11% Impervious = 8.919 ac

Summary for Subcatchment 1S: Northwest Site

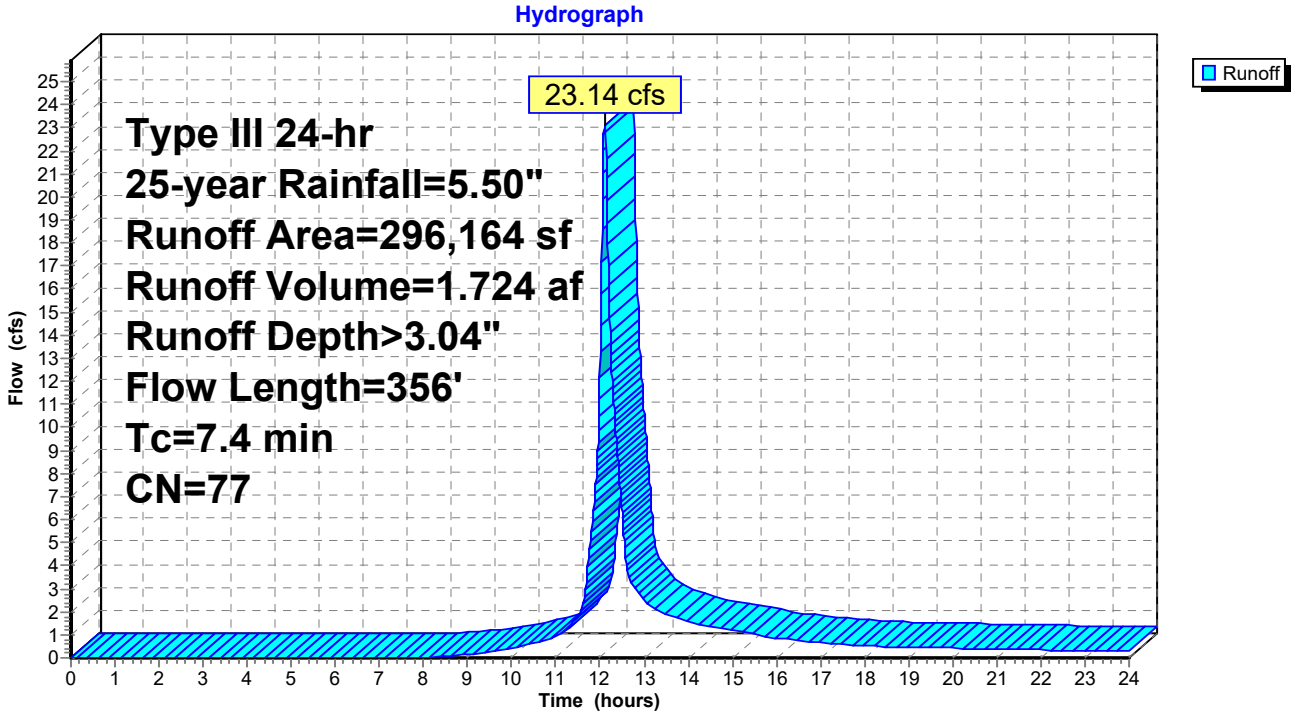
Runoff = 23.14 cfs @ 12.11 hrs, Volume= 1.724 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 2S: Building 3 Roof

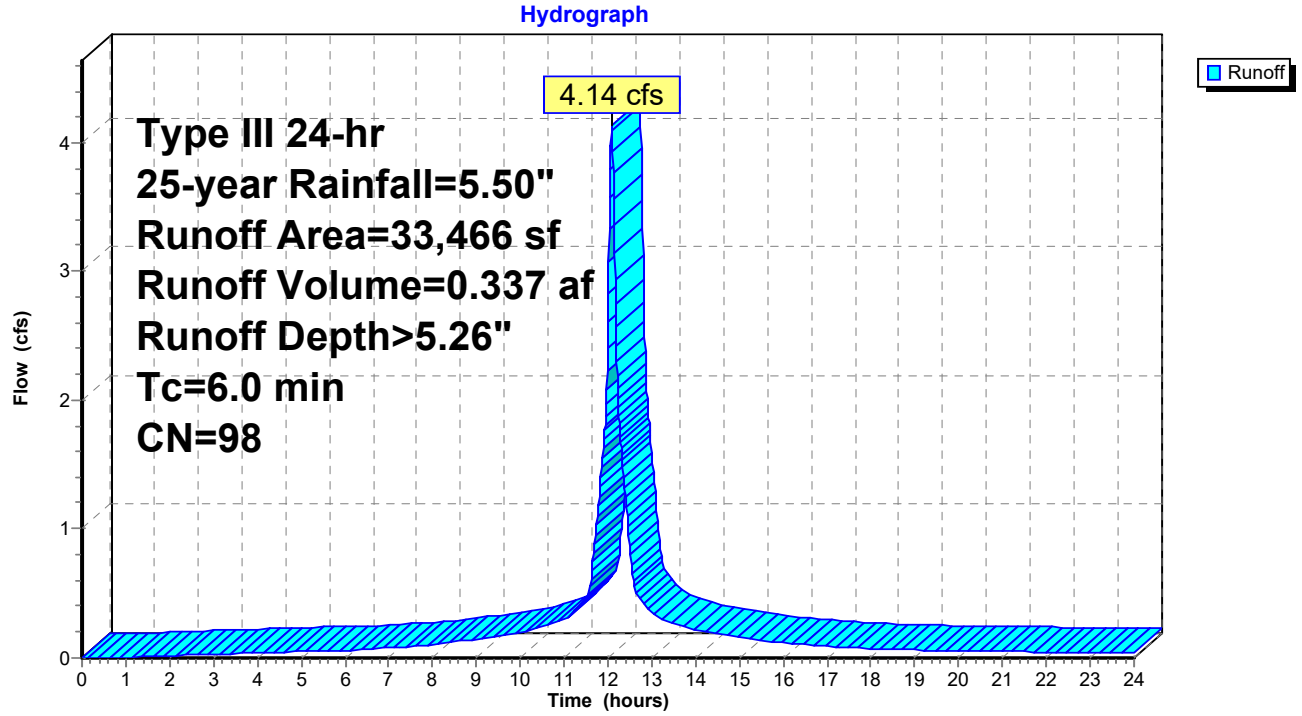
Runoff = 4.14 cfs @ 12.08 hrs, Volume= 0.337 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	33,466	98	Roof
	33,466		100.00% Impervious Area

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

Subcatchment 2S: Building 3 Roof



Summary for Subcatchment 3S: Building 3 Rear Parking Area

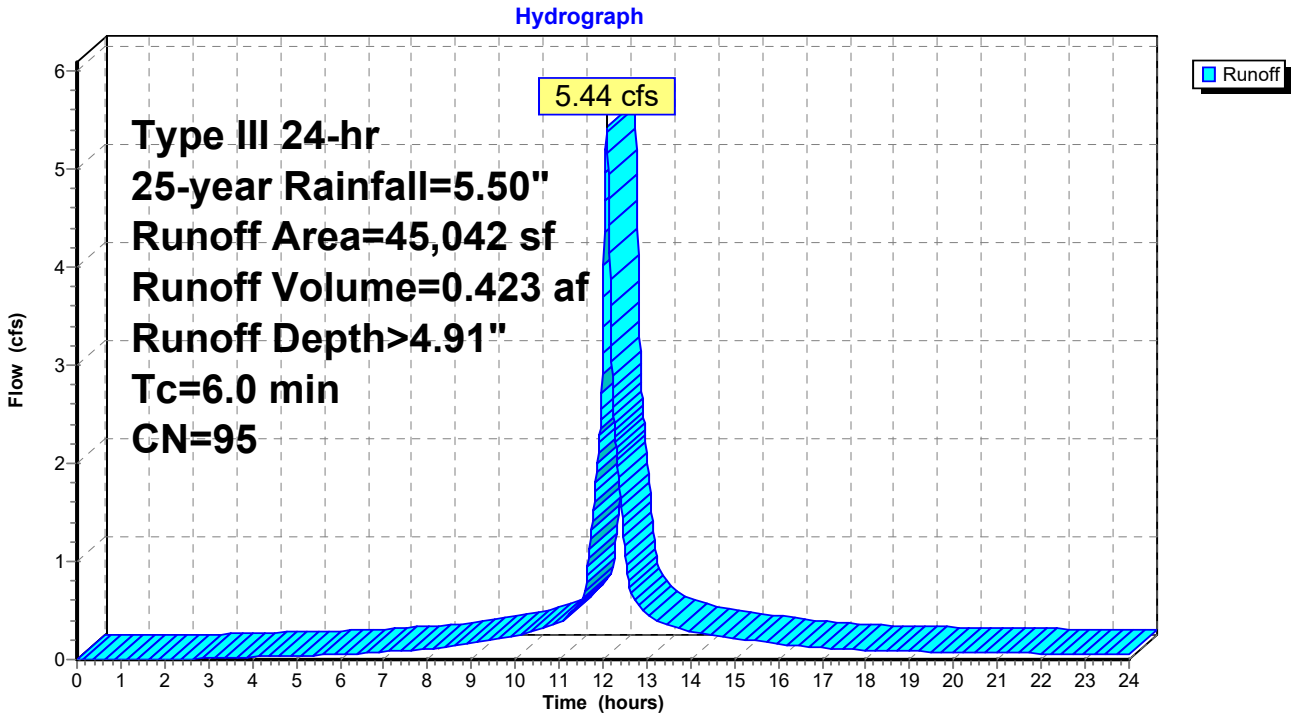
Runoff = 5.44 cfs @ 12.08 hrs, Volume= 0.423 af, Depth> 4.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
	7,808	80	>75% Grass cover, Good, HSG D
*	37,234	98	Paved parking
	45,042	95	Weighted Average
	7,808		17.33% Pervious Area
	37,234		82.67% Impervious Area

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

Subcatchment 3S: Building 3 Rear Parking Area



Summary for Subcatchment 4S: Amenity Building

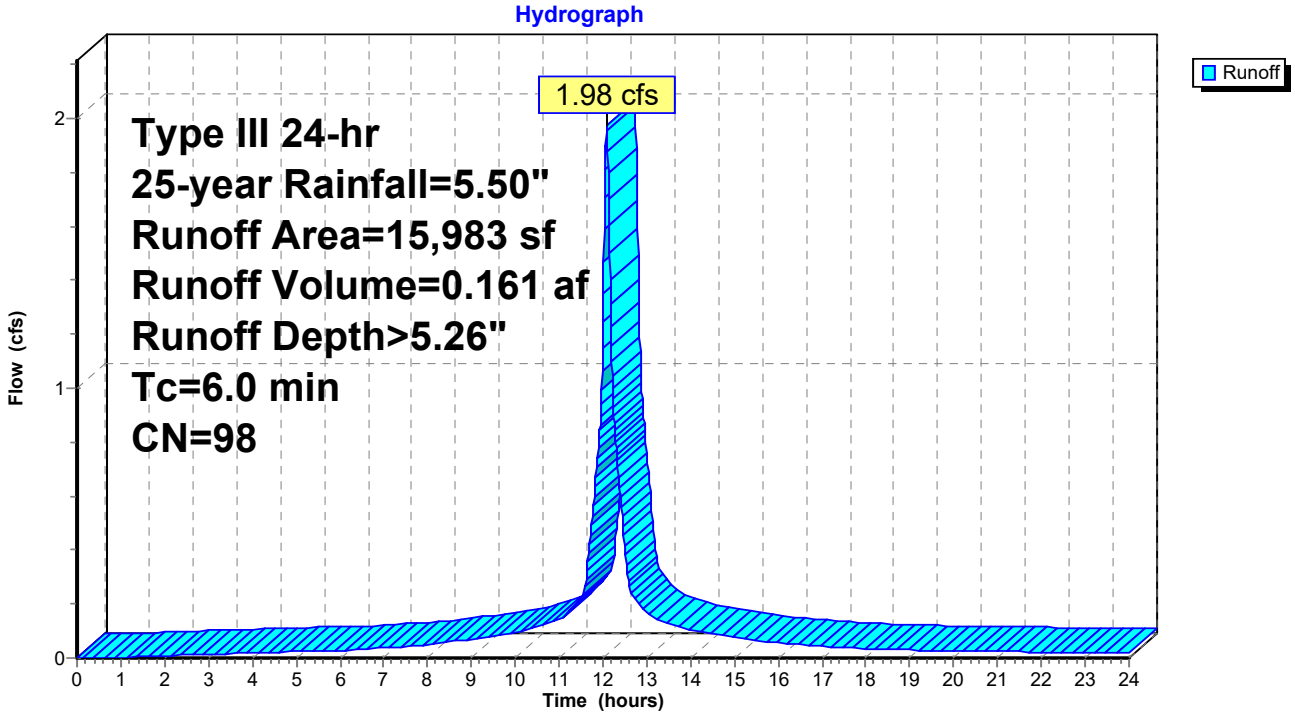
Runoff = 1.98 cfs @ 12.08 hrs, Volume= 0.161 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	10,495	98	Roof
*	5,488	98	Paved parking
	15,983	98	Weighted Average
	15,983		100.00% Impervious Area

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

Subcatchment 4S: Amenity Building



Summary for Subcatchment 5S: Function Hall and Restaurant

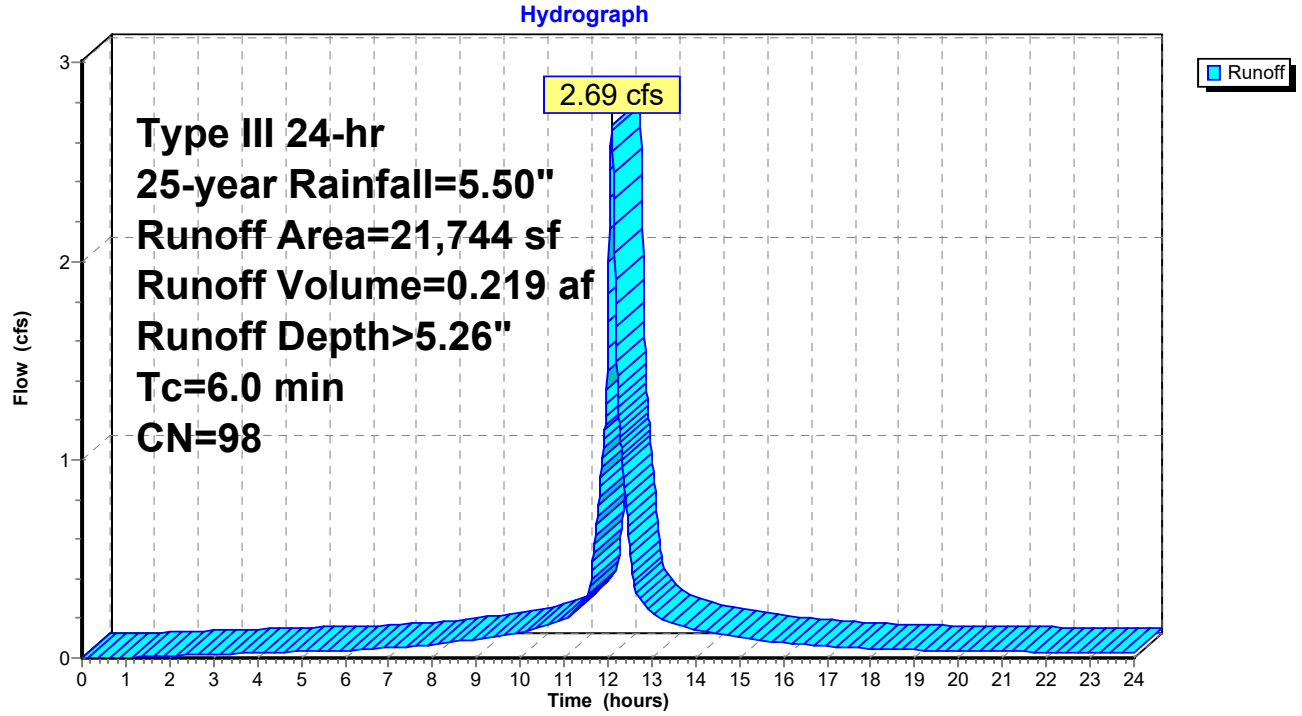
Runoff = 2.69 cfs @ 12.08 hrs, Volume= 0.219 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	21,744	98	Roof
	21,744		100.00% Impervious Area

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

Subcatchment 5S: Function Hall and Restaurant



Summary for Subcatchment 6S: Central Parking and Access Drive

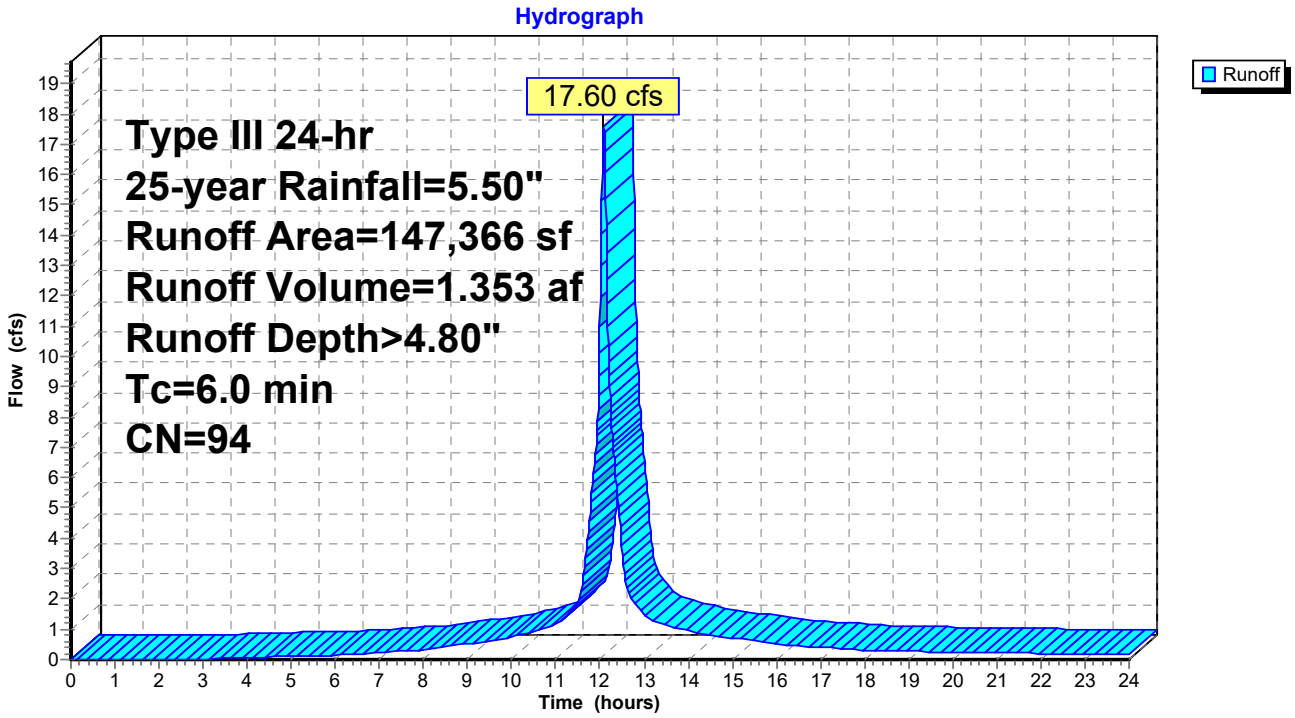
Runoff = 17.60 cfs @ 12.08 hrs, Volume= 1.353 af, Depth> 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
	32,897	80	>75% Grass cover, Good, HSG D
*	114,469	98	Paved parking
	147,366	94	Weighted Average
	32,897		22.32% Pervious Area
	114,469		77.68% Impervious Area

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

Subcatchment 6S: Central Parking and Access Drive



Summary for Subcatchment 10S: Building 1 Roof

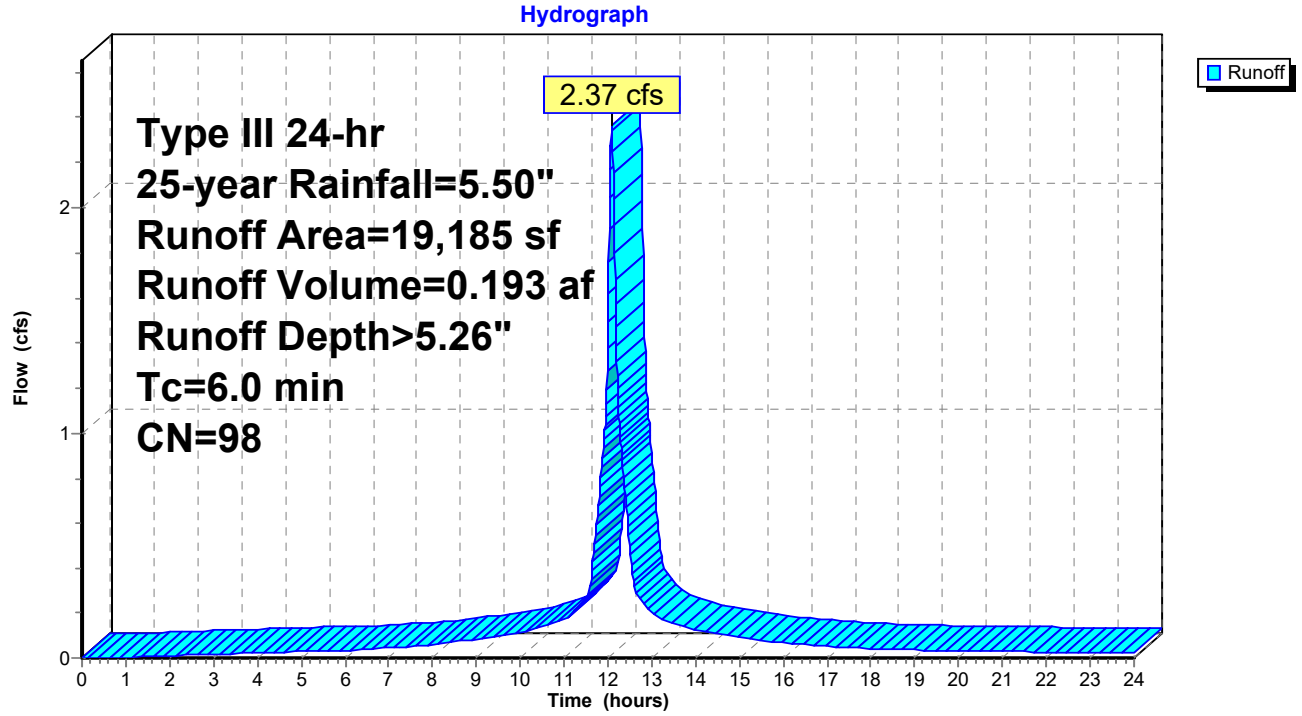
Runoff = 2.37 cfs @ 12.08 hrs, Volume= 0.193 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	19,185	98	Roof
	19,185		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

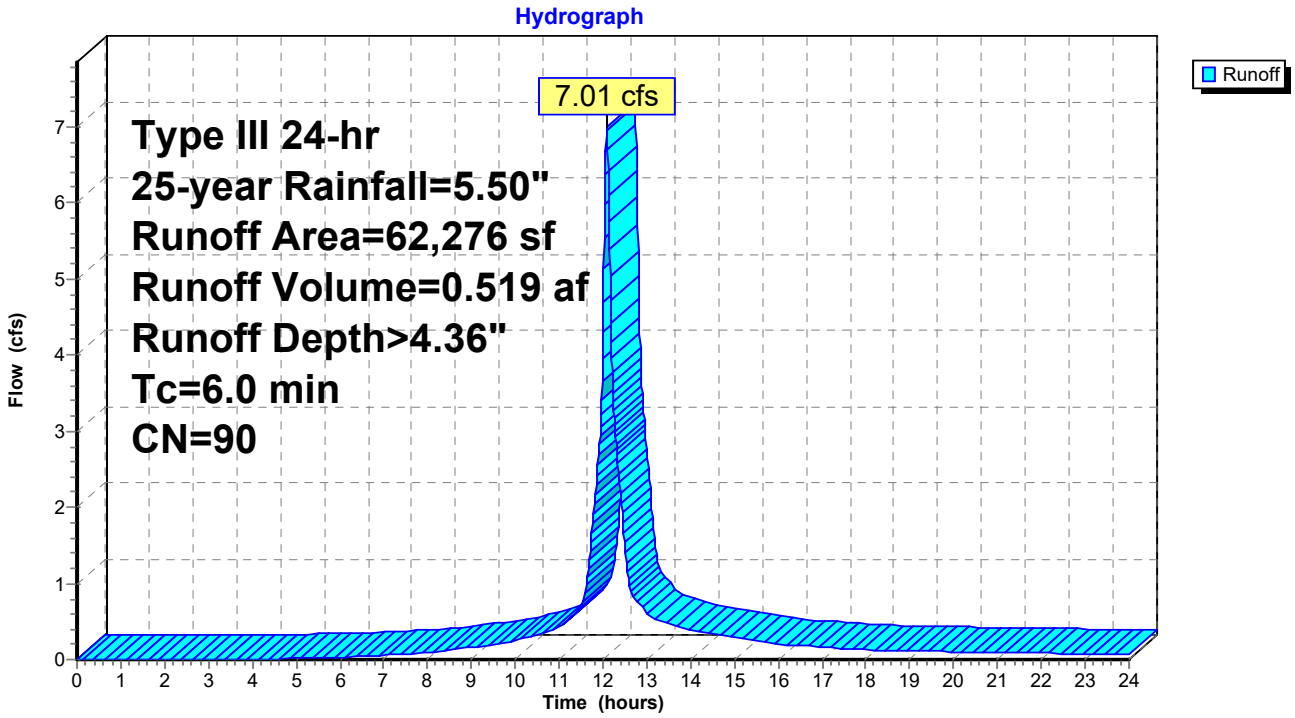
Runoff = 7.01 cfs @ 12.08 hrs, Volume= 0.519 af, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
	28,529	80	>75% Grass cover, Good, HSG D
*	33,747	98	Paved parking
	62,276	90	Weighted Average
	28,529		45.81% Pervious Area
	33,747		54.19% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

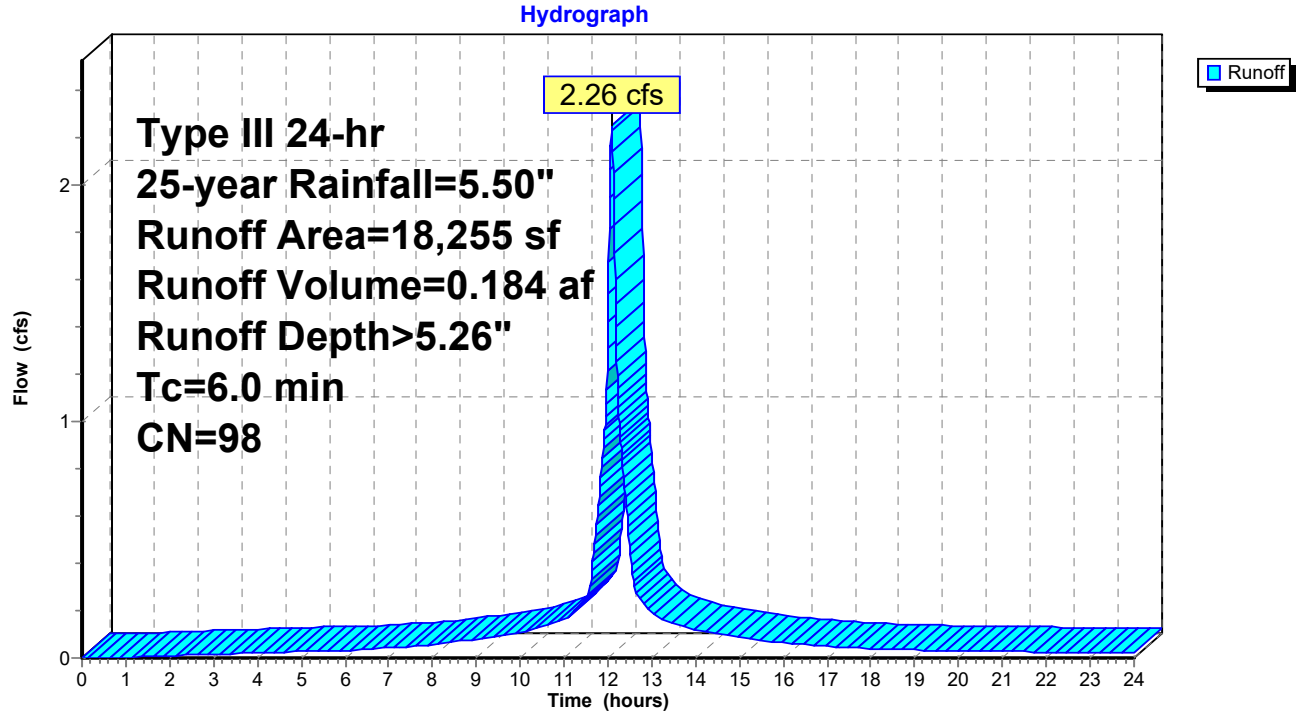
Runoff = 2.26 cfs @ 12.08 hrs, Volume= 0.184 af, Depth> 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	18,255	98	Roof
	18,255		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

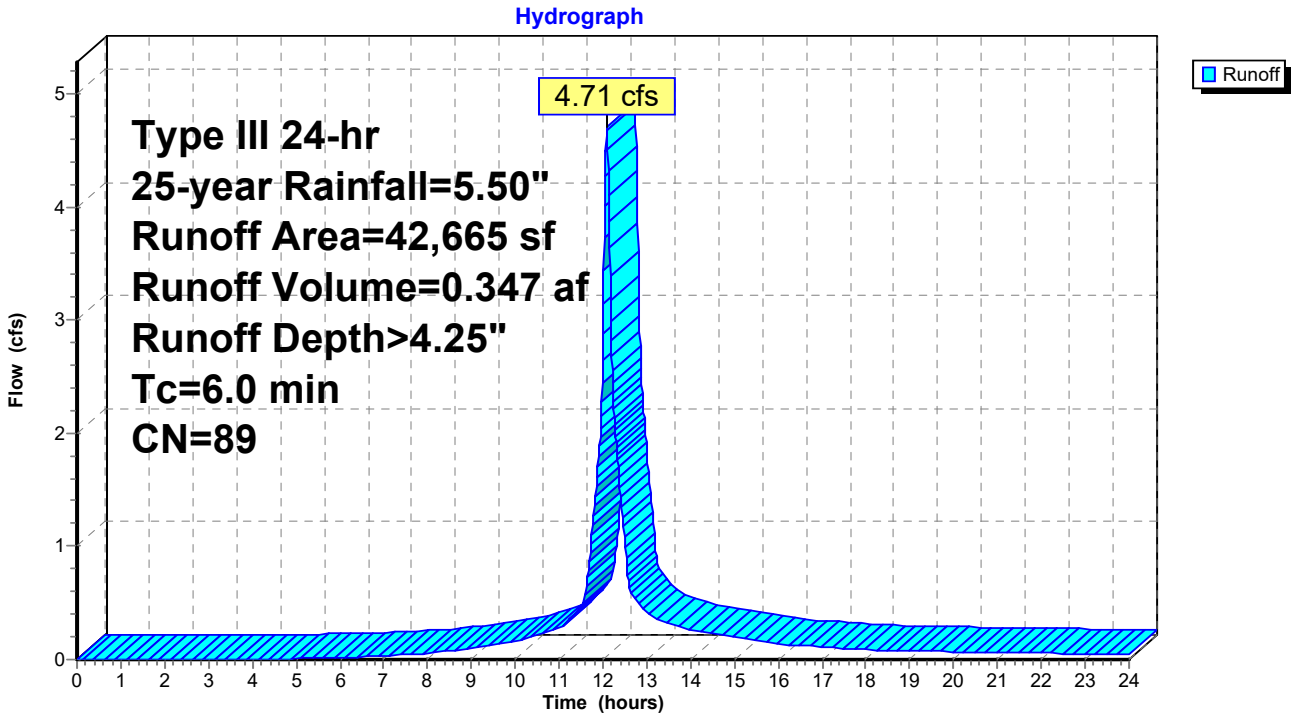
Runoff = 4.71 cfs @ 12.09 hrs, Volume= 0.347 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
22,273	80	>75% Grass cover, Good, HSG D
20,392	98	Paved parking, HSG D
42,665	89	Weighted Average
22,273		52.20% Pervious Area
20,392		47.80% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

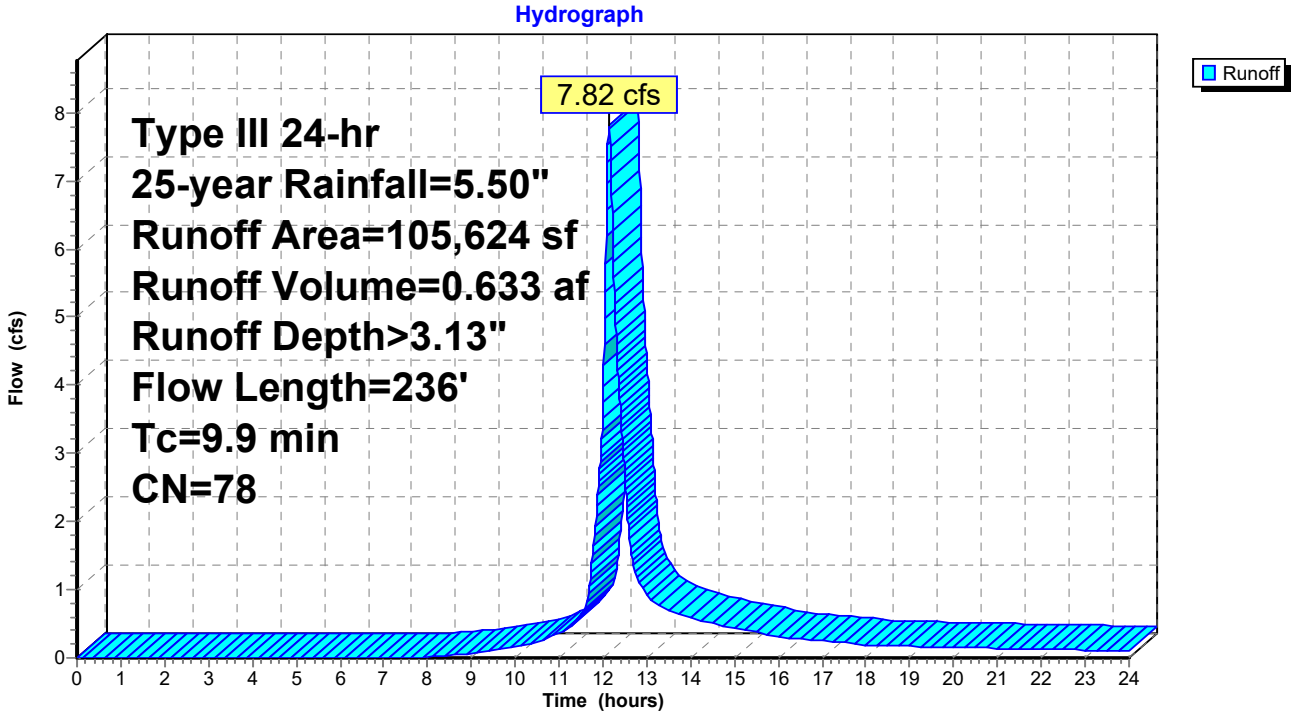
Runoff = 7.82 cfs @ 12.14 hrs, Volume= 0.633 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
48,324	79	Woods/grass comb., Good, HSG D
12,824	80	>75% Grass cover, Good, HSG D
105,624	78	Weighted Average
105,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 15S: North Central Site

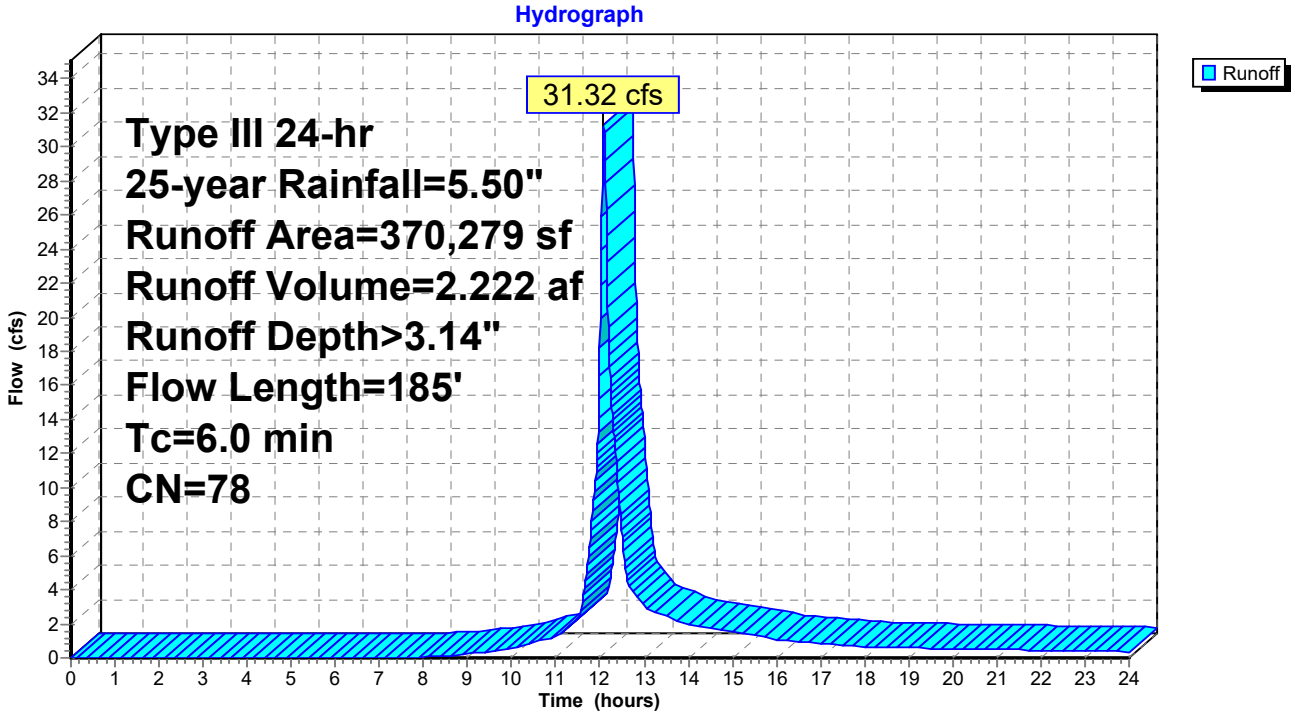
Runoff = 31.32 cfs @ 12.09 hrs, Volume= 2.222 af, Depth> 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
177,116	77	Woods, Good, HSG D
154,471	79	Woods/grass comb., Good, HSG D
38,692	80	>75% Grass cover, Good, HSG D
370,279	78	Weighted Average
370,279		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.4	135	0.0980	5.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 15S: North Central Site



Summary for Subcatchment 20S: North Central Site

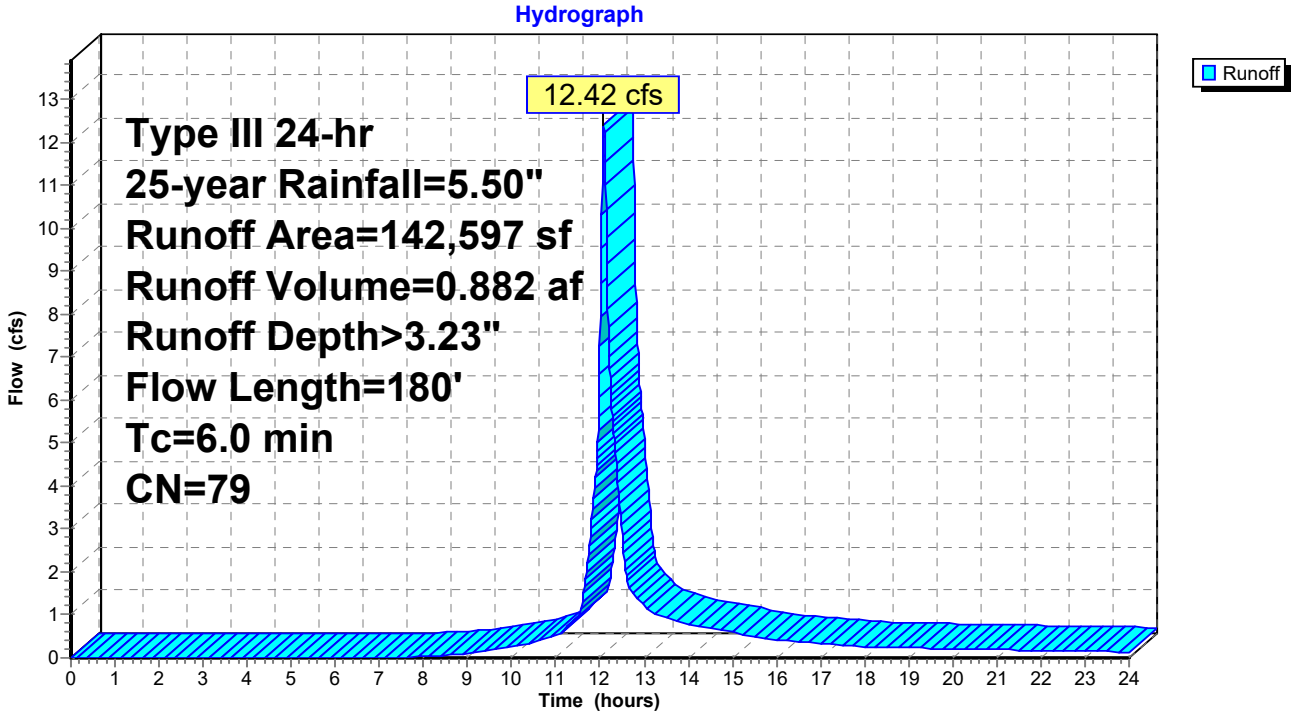
Runoff = 12.42 cfs @ 12.09 hrs, Volume= 0.882 af, Depth> 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
107,491	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
142,597	79	Weighted Average
142,597		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 20S: North Central Site



Summary for Subcatchment 22S: Access Road at Building 1

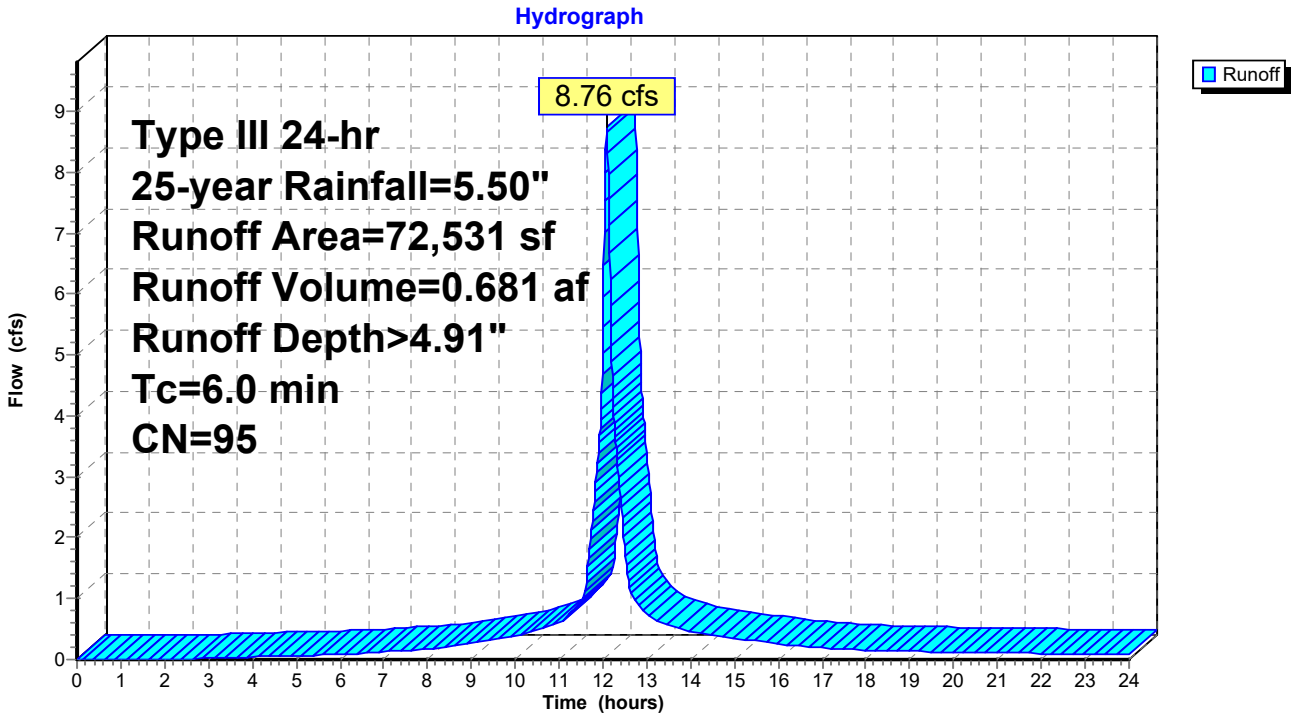
Runoff = 8.76 cfs @ 12.08 hrs, Volume= 0.681 af, Depth> 4.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	59,159	98	Paved parking
	13,372	80	>75% Grass cover, Good, HSG D
	72,531	95	Weighted Average
	13,372		18.44% Pervious Area
	59,159		81.56% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 28S: Porous Pavement Acess Drive at Building 3

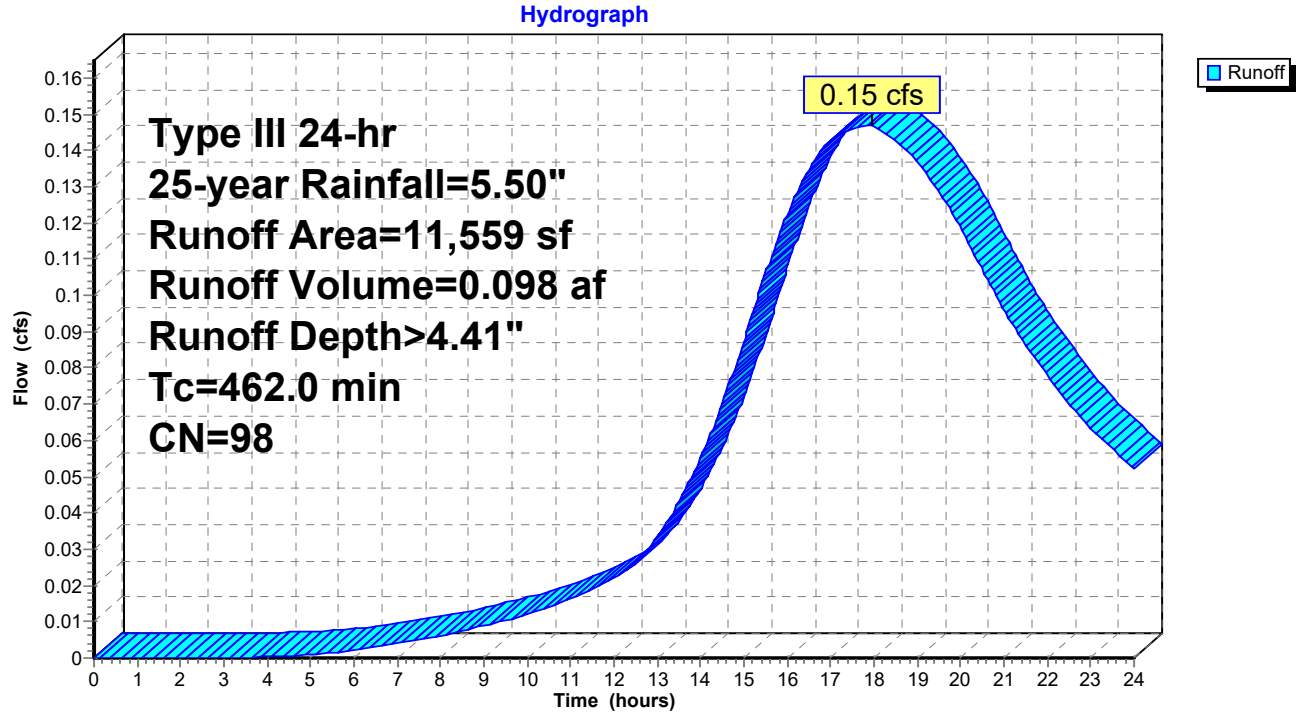
Runoff = 0.15 cfs @ 17.96 hrs, Volume= 0.098 af, Depth> 4.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
*	11,559	98	Paved parking
	11,559		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
462.0					**Direct Entry, UNH Stormwater for Infiltrating Pavement Section**

Subcatchment 28S: Porous Pavement Acess Drive at Building 3



Summary for Subcatchment 29S: Rear Landscape of Building 3

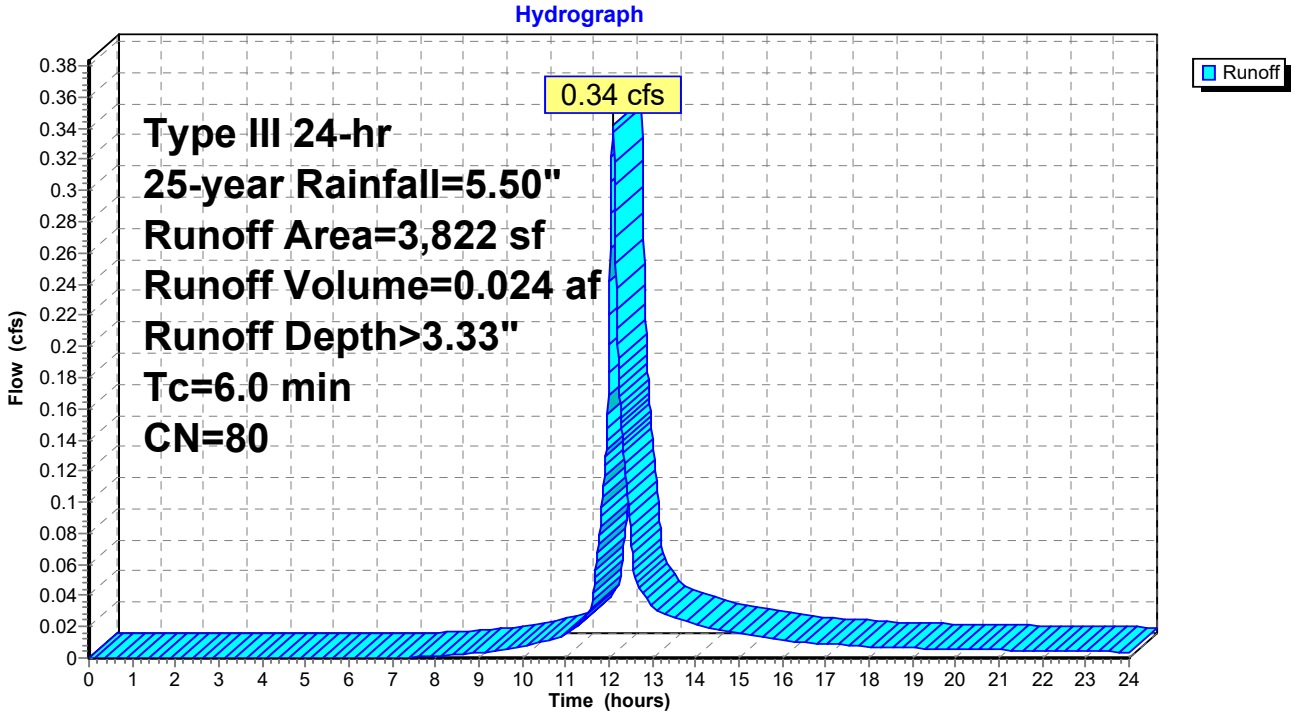
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

Area (sf)	CN	Description
3,822	80	>75% Grass cover, Good, HSG D
3,822		100.00% Pervious Area

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

Subcatchment 29S: Rear Landscape of Building 3



Summary for Subcatchment 30S: Entrance Drive

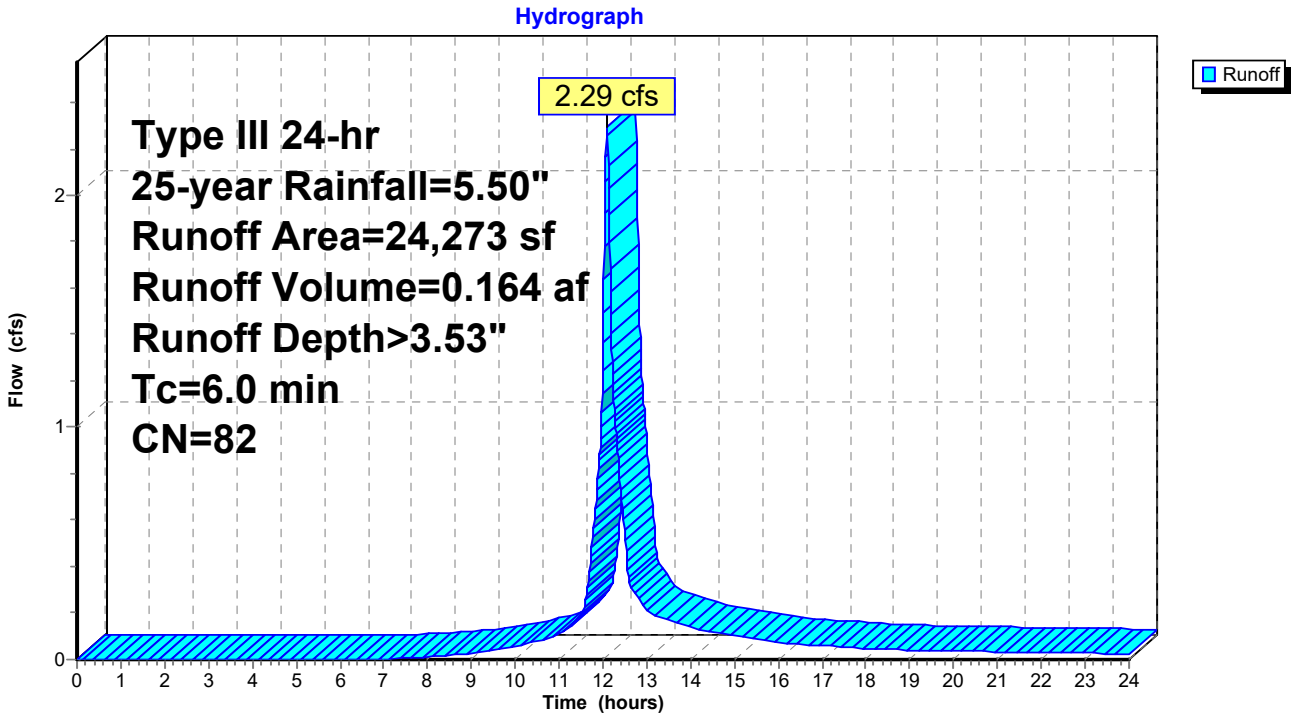
Runoff = 2.29 cfs @ 12.09 hrs, Volume= 0.164 af, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.50"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive



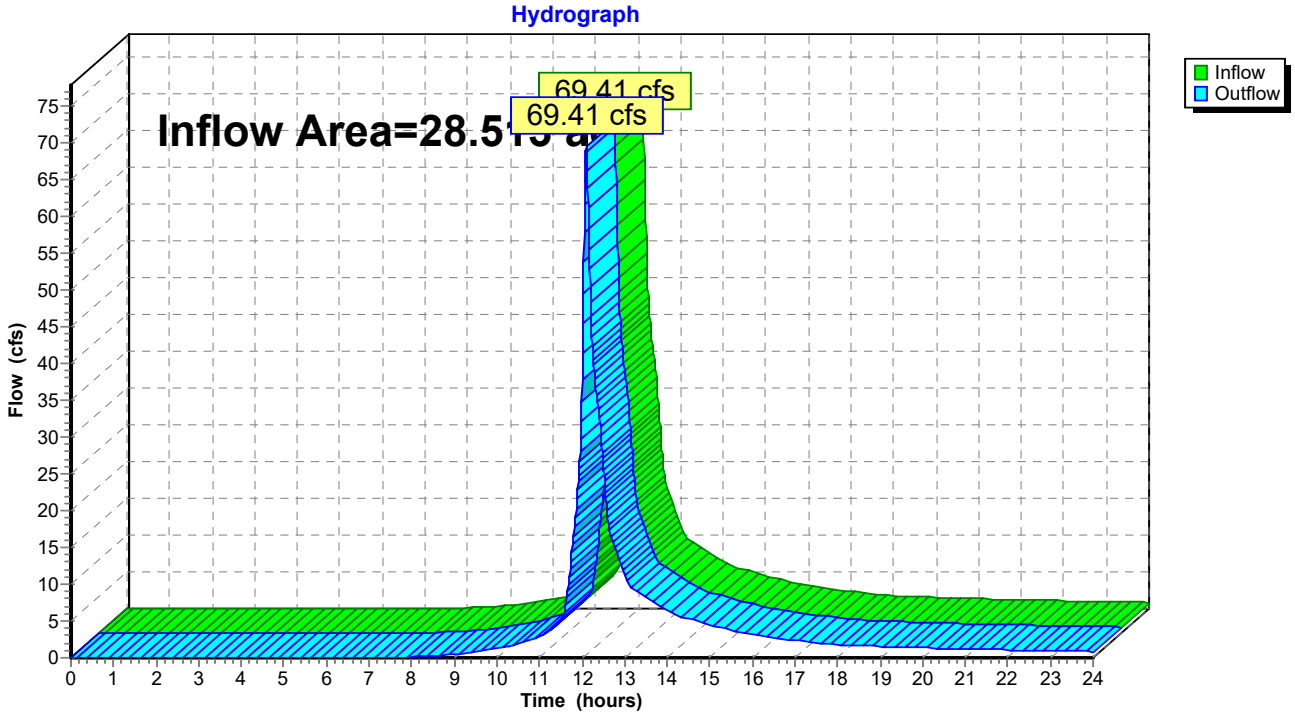
Summary for Reach 1R: FLOW TO NORTH WETLANDS

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

Inflow Area = 28.513 ac, 27.90% Impervious, Inflow Depth > 2.51" for 25-year event
Inflow = 69.41 cfs @ 12.10 hrs, Volume= 5.975 af
Outflow = 69.41 cfs @ 12.10 hrs, Volume= 5.975 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS



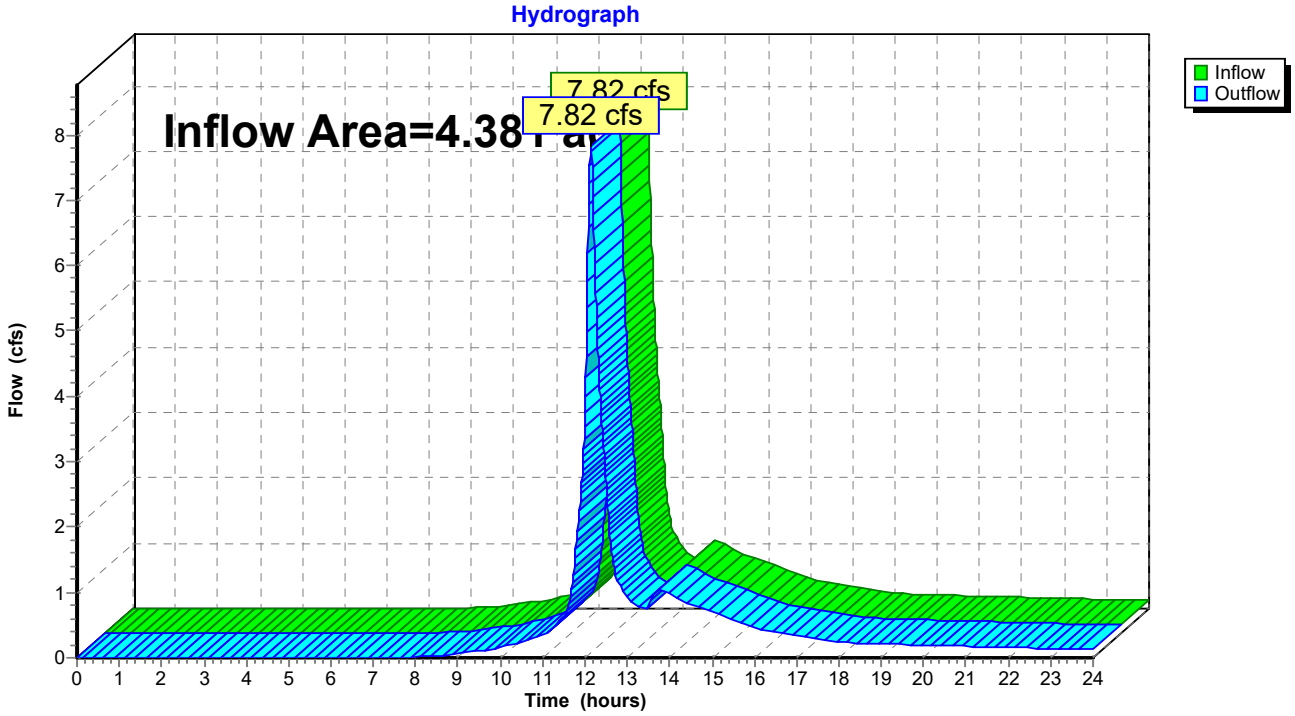
Summary for Reach 4R: ROADSIDE DEPRESSION

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

Inflow Area = 4.381 ac, 21.99% Impervious, Inflow Depth > 1.98" for 25-year event
Inflow = 7.82 cfs @ 12.14 hrs, Volume= 0.724 af
Outflow = 7.82 cfs @ 12.14 hrs, Volume= 0.724 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION



Summary for Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3

Inflow Area = 4.249 ac, 82.23% Impervious, Inflow Depth > 4.89" for 25-year event
Inflow = 22.26 cfs @ 12.08 hrs, Volume= 1.732 af
Outflow = 3.69 cfs @ 12.55 hrs, Volume= 0.940 af, Atten= 83%, Lag= 27.9 min
Discarded = 0.29 cfs @ 8.26 hrs, Volume= 0.464 af
Primary = 3.40 cfs @ 12.55 hrs, Volume= 0.476 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 181.11' @ 12.55 hrs Surf.Area= 12,232 sf Storage= 39,431 cf
Flood Elev= 181.50' Surf.Area= 12,232 sf Storage= 43,656 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 85.6 min (850.6 - 764.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	0 cf	**89.63'W x 136.48'L x 4.50'H Field A** 55,044 cf Overall - 55,044 cf Embedded = 0 cf x 40.0% Voids
#2A	177.50'	43,656 cf	**StormTrap ST2 SingleTrap 4-0** x 72 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 9 Rows of 8 Chambers 76.31' x 123.17' Core + 6.66' Border = 89.63' x 136.48' System
		43,656 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	180.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	177.37'	**15.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.37' / 176.63' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.29 cfs @ 8.26 hrs HW=177.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=3.40 cfs @ 12.55 hrs HW=181.11' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 3.40 cfs of 9.86 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.40 cfs @ 2.10 fps)

Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3 - Chamber Wizard Field A

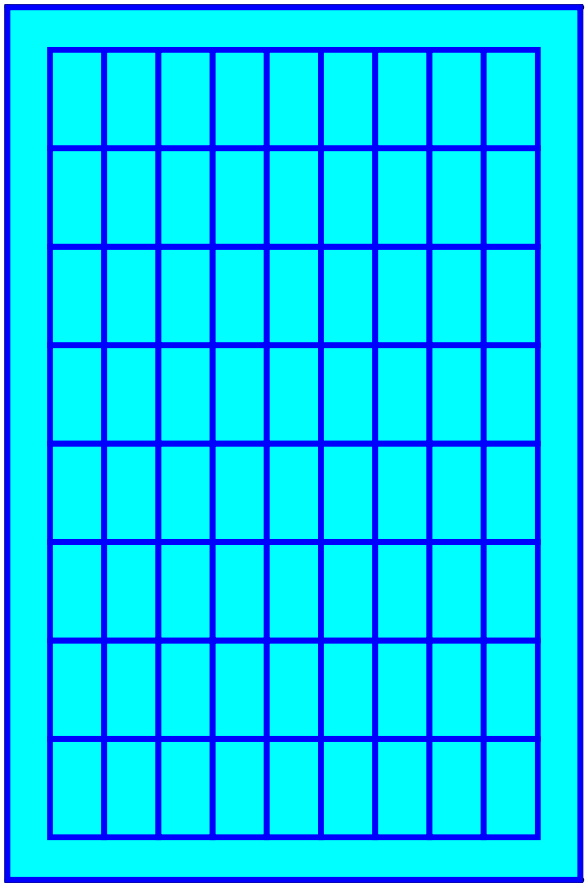
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
54.0" Chamber Height = 4.50' Field Height

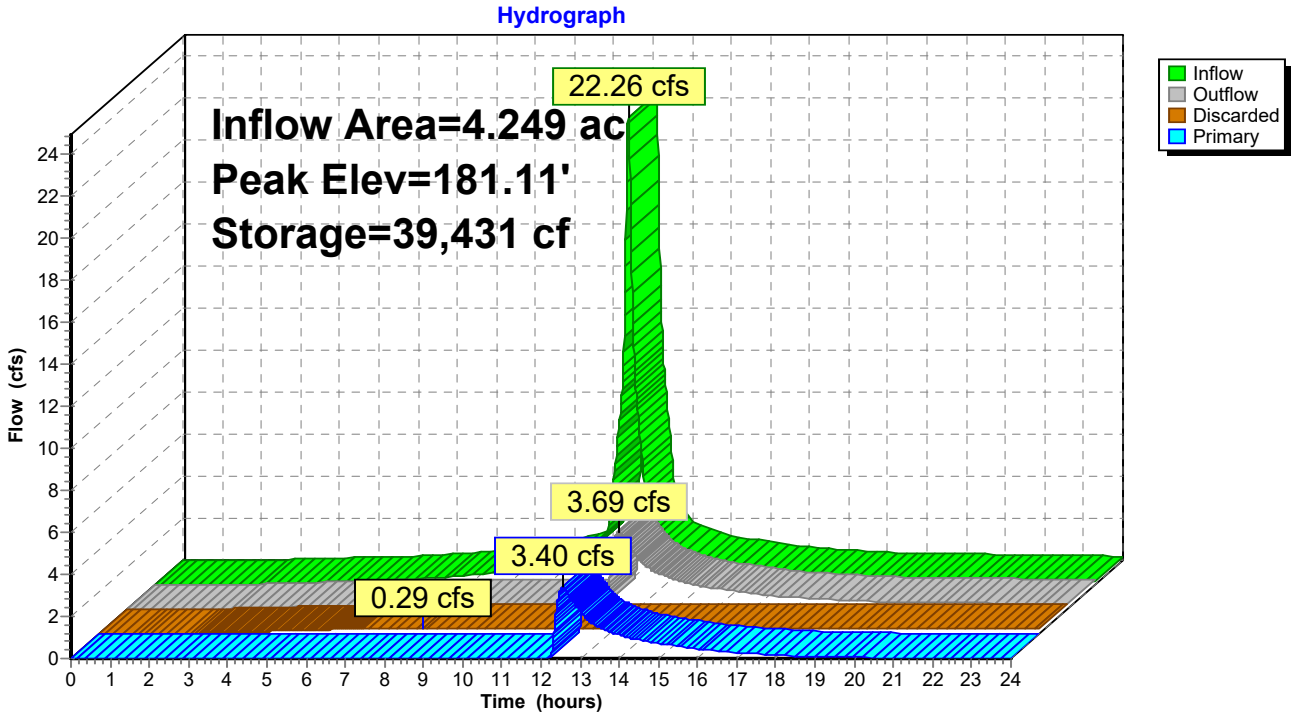
72 Chambers x 470.3 cf + 9,796.6 cf Border = 43,656.2 cf Chamber Storage
72 Chambers x 587.4 cf + 12,747.6 cf Border = 55,043.8 cf Displacement

Chamber Storage = 43,656.2 cf = 1.002 af
Overall Storage Efficiency = 79.3%
Overall System Size = 136.48' x 89.63' x 4.50'

72 Chambers (plus border)
2,038.7 cy Field



Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.430 ac, 54.19% Impervious, Inflow Depth > 4.36" for 25-year event
Inflow = 7.01 cfs @ 12.08 hrs, Volume= 0.519 af
Outflow = 1.50 cfs @ 12.50 hrs, Volume= 0.347 af, Atten= 79%, Lag= 24.9 min
Discarded = 0.16 cfs @ 9.97 hrs, Volume= 0.221 af
Primary = 1.34 cfs @ 12.50 hrs, Volume= 0.126 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.72' @ 12.50 hrs Surf.Area= 6,784 sf Storage= 10,243 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 103.1 min (890.1 - 786.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap ST2 SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 6 Chambers 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 9.97 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=1.34 cfs @ 12.50 hrs HW=179.72' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.34 cfs of 2.71 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.34 cfs @ 1.54 fps)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2 - Chamber Wizard Field A

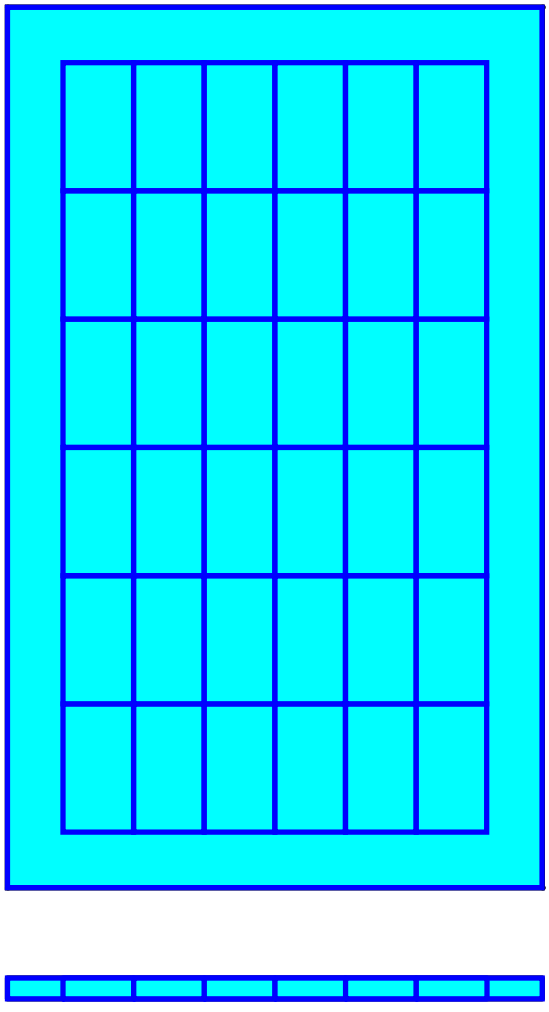
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

6 Chambers/Row x 15.40' Long = 92.38' Row Length +79.9" Border x 2 = 105.69' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

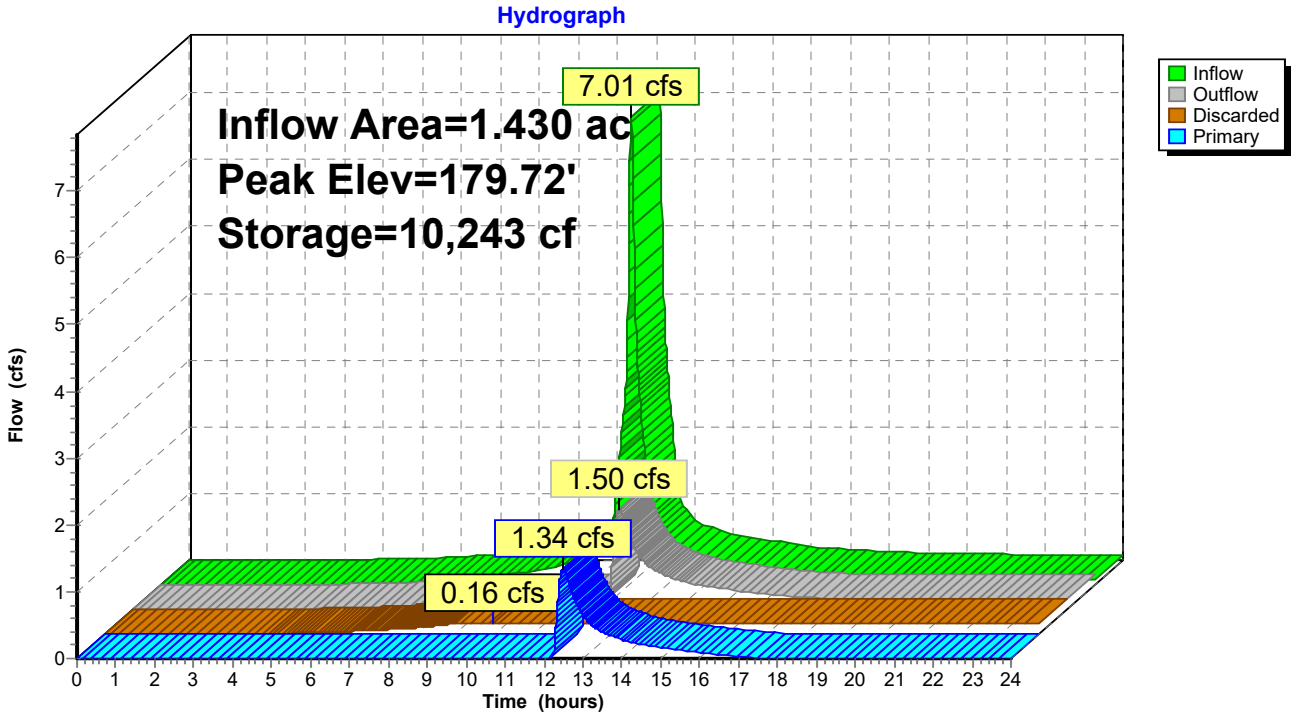
36 Chambers x 231.7 cf + 3,563.4 cf Border = 11,903.6 cf Chamber Storage
36 Chambers x 326.4 cf + 5,210.6 cf Border = 16,959.5 cf Displacement

Chamber Storage = 11,903.6 cf = 0.273 af
Overall Storage Efficiency = 70.2%
Overall System Size = 105.69' x 64.19' x 2.50'

36 Chambers (plus border)
628.1 cy Field



Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.399 ac, 63.44% Impervious, Inflow Depth > 4.55" for 25-year event
Inflow = 6.97 cfs @ 12.08 hrs, Volume= 0.530 af
Outflow = 2.67 cfs @ 12.32 hrs, Volume= 0.370 af, Atten= 62%, Lag= 14.1 min
Discarded = 0.16 cfs @ 9.56 hrs, Volume= 0.228 af
Primary = 2.51 cfs @ 12.32 hrs, Volume= 0.142 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.69' @ 12.32 hrs Surf.Area= 2,810 sf Storage= 9,171 cf
Flood Elev= 172.00' Surf.Area= 2,810 sf Storage= 9,944 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 86.1 min (861.2 - 775.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**47.23'W x 59.50'L x 4.50'H Field A** 12,646 cf Overall - 12,646 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	9,944 cf	**StormTrap ST2 SingleTrap 4-0** x 12 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 4 Rows of 3 Chambers 33.92' x 46.19' Core + 6.66' Border = 47.23' x 59.50' System
		9,944 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.16 cfs @ 9.56 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=2.51 cfs @ 12.32 hrs HW=171.69' TW=165.87' (Dynamic Tailwater)
└**3=Culvert** (Passes 2.51 cfs of 7.81 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.51 cfs @ 1.76 fps)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8 - Chamber Wizard Field A

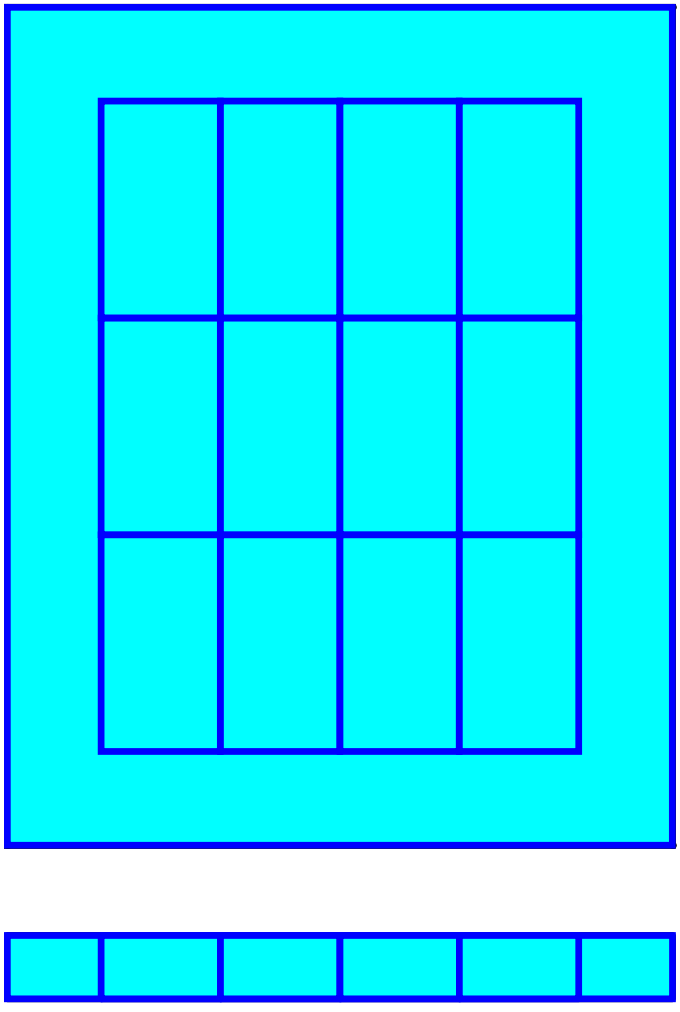
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 = 59.50' Base Length
4 Rows x 101.7" Wide + 79.9" Side Border x 2 = 47.23' Base Width
54.0" Chamber Height = 4.50' Field Height

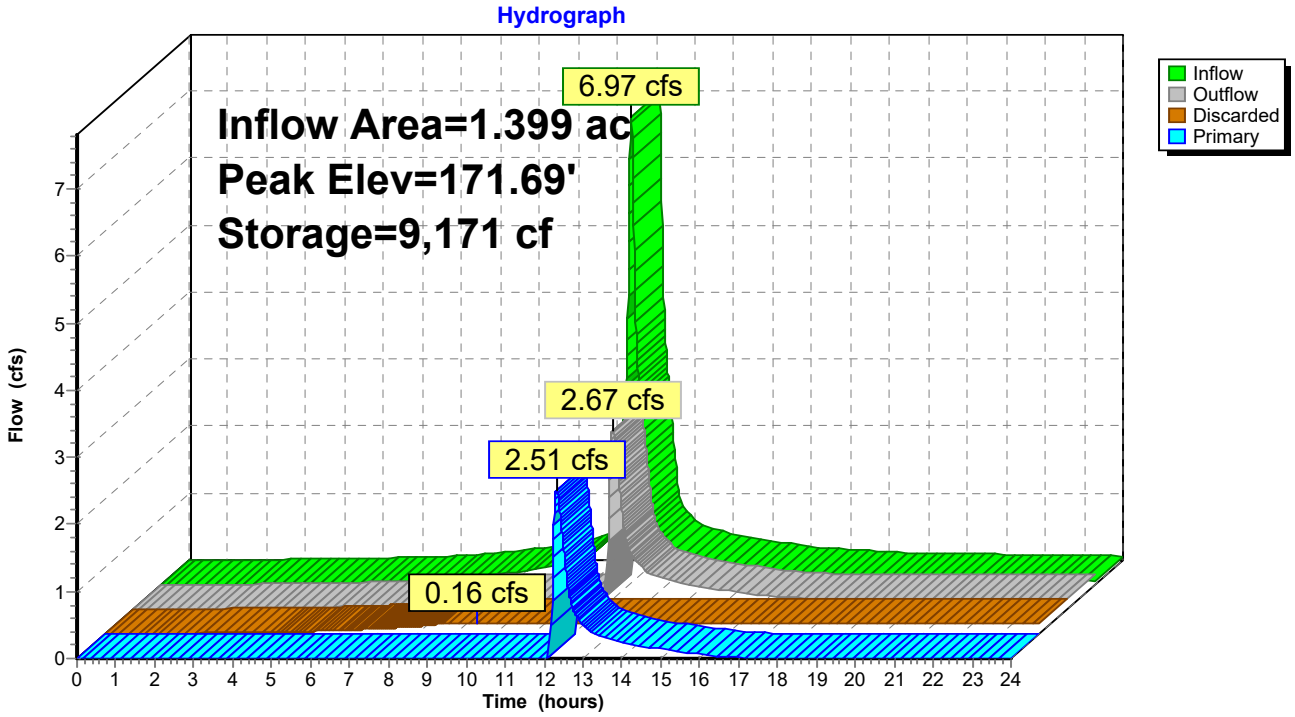
12 Chambers x 470.3 cf + 4,300.8 cf Border = 9,944.0 cf Chamber Storage
12 Chambers x 587.4 cf + 5,596.2 cf Border = 12,645.6 cf Displacement

Chamber Storage = 9,944.0 cf = 0.228 af
Overall Storage Efficiency = 78.6%
Overall System Size = 59.50' x 47.23' x 4.50'

12 Chambers (plus border)
468.4 cy Field



Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.106 ac, 85.42% Impervious, Inflow Depth > 4.98" for 25-year event
Inflow = 11.13 cfs @ 12.08 hrs, Volume= 0.874 af
Outflow = 6.24 cfs @ 12.20 hrs, Volume= 0.742 af, Atten= 44%, Lag= 6.9 min
Discarded = 0.30 cfs @ 9.37 hrs, Volume= 0.439 af
Primary = 5.94 cfs @ 12.20 hrs, Volume= 0.303 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.60' @ 12.20 hrs Surf.Area= 5,289 sf Storage= 12,234 cf
Flood Elev= 178.00' Surf.Area= 5,289 sf Storage= 14,098 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 81.6 min (842.5 - 761.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 136.48'L x 3.50'H Field A** 18,510 cf Overall - 18,510 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	14,098 cf	**StormTrap ST2 SingleTrap 3-0** x 24 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 3 Rows of 8 Chambers 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		14,098 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	175.60'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.60' / 174.81' S= 0.0494 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	177.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.30 cfs @ 9.37 hrs HW=175.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=5.94 cfs @ 12.20 hrs HW=177.60' TW=0.00' (Dynamic Tailwater)
2=Culvert (Passes 5.94 cfs of 6.94 cfs potential flow)
3=Sharp-Crested Rectangular Weir (Weir Controls 5.94 cfs @ 2.54 fps)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1 - Chamber Wizard Field A

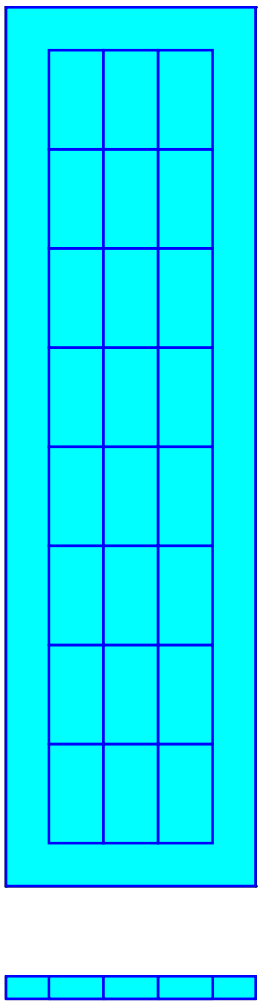
Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf
Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
42.0" Chamber Height = 3.50' Field Height

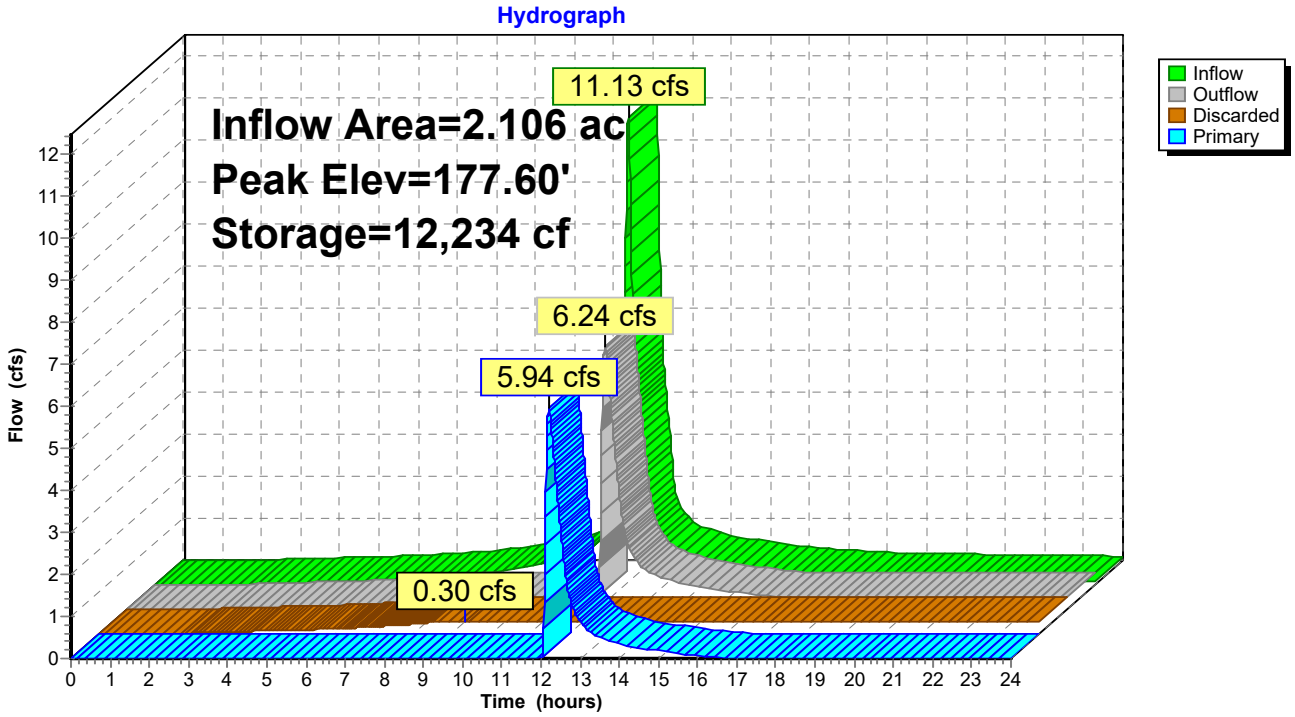
24 Chambers x 354.0 cf + 5,601.9 cf Border = 14,097.7 cf Chamber Storage
24 Chambers x 456.9 cf + 7,544.3 cf Border = 18,510.0 cf Displacement

Chamber Storage = 14,097.7 cf = 0.324 af
Overall Storage Efficiency = 76.2%
Overall System Size = 136.48' x 38.75' x 3.50'

24 Chambers (plus border)
685.6 cy Field



Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4

Inflow Area = 1.802 ac, 90.05% Impervious, Inflow Depth > 5.06" for 25-year event
Inflow = 9.58 cfs @ 12.08 hrs, Volume= 0.760 af
Outflow = 2.36 cfs @ 12.46 hrs, Volume= 0.724 af, Atten= 75%, Lag= 22.4 min
Discarded = 0.43 cfs @ 10.67 hrs, Volume= 0.603 af
Primary = 1.93 cfs @ 12.46 hrs, Volume= 0.121 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 190.28' @ 12.46 hrs Surf.Area= 7,772 sf Storage= 12,153 cf
Flood Elev= 190.50' Surf.Area= 7,772 sf Storage= 13,644 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 143.0 min (899.6 - 756.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	188.50'	0 cf	**64.19'W x 121.08'L x 2.50'H Field A** 19,430 cf Overall - 19,430 cf Embedded = 0 cf x 40.0% Voids
#2A	188.50'	13,644 cf	**StormTrap ST2 SingleTrap 2-0** x 42 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 7 Chambers 50.88' x 107.77' Core + 6.66' Border = 64.19' x 121.08' System
		13,644 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	188.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	190.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	188.37'	**12.0" Round Culvert** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.37' / 188.12' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.43 cfs @ 10.67 hrs HW=188.53' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.43 cfs)

Primary OutFlow Max=1.93 cfs @ 12.46 hrs HW=190.28' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 1.93 cfs of 3.86 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.93 cfs @ 1.73 fps)

Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4 - Chamber Wizard Field A

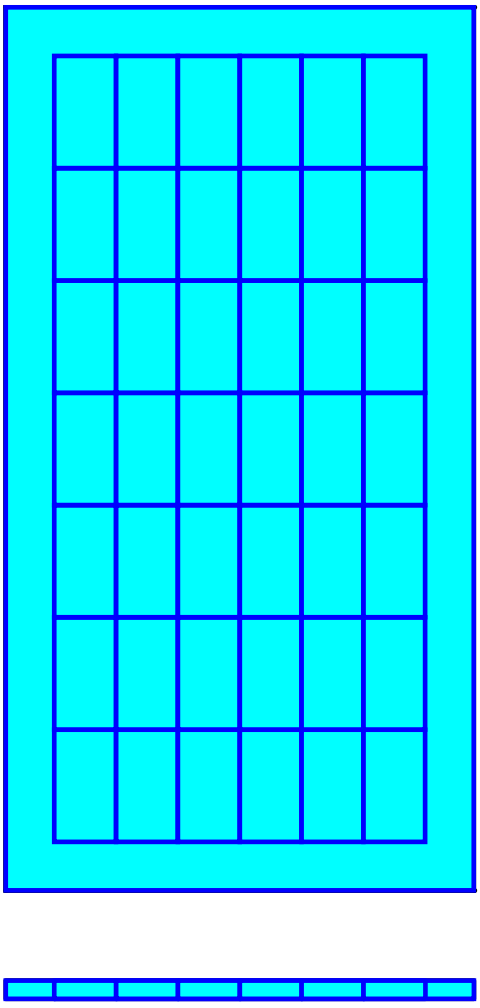
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

7 Chambers/Row x 15.40' Long = 107.77' Row Length +79.9" Border x 2 = 121.08' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

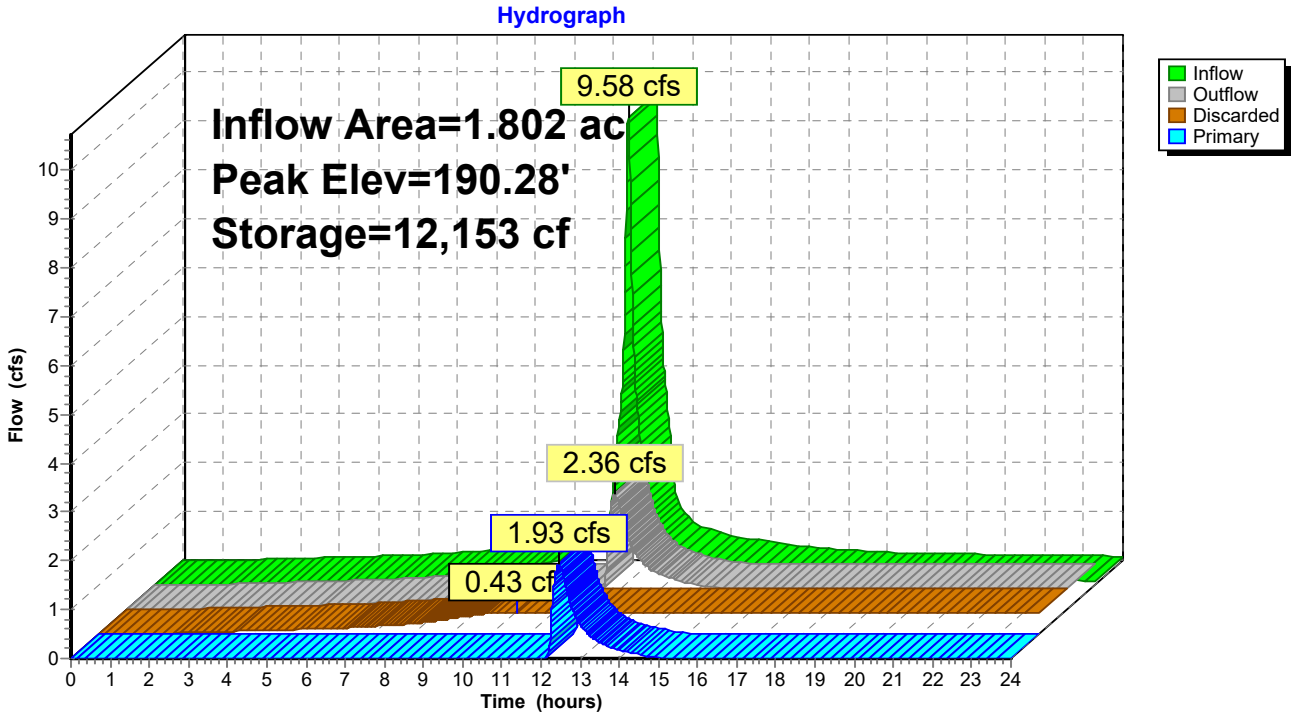
42 Chambers x 231.7 cf + 3,913.9 cf Border = 13,644.0 cf Chamber Storage
42 Chambers x 326.4 cf + 5,723.0 cf Border = 19,430.1 cf Displacement

Chamber Storage = 13,644.0 cf = 0.313 af
Overall Storage Efficiency = 70.2%
Overall System Size = 121.08' x 64.19' x 2.50'

42 Chambers (plus border)
719.6 cy Field



Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.956 ac, 49.24% Impervious, Inflow Depth > 1.88" for 25-year event
Inflow = 3.46 cfs @ 12.30 hrs, Volume= 0.306 af
Outflow = 0.42 cfs @ 13.83 hrs, Volume= 0.091 af, Atten= 88%, Lag= 91.8 min
Primary = 0.42 cfs @ 13.83 hrs, Volume= 0.091 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 167.63' @ 13.83 hrs Surf.Area= 3,369 sf Storage= 9,575 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= 262.7 min calculated for 0.091 af (30% of inflow)
Center-of-Mass det. time= 164.2 min (965.6 - 801.4)

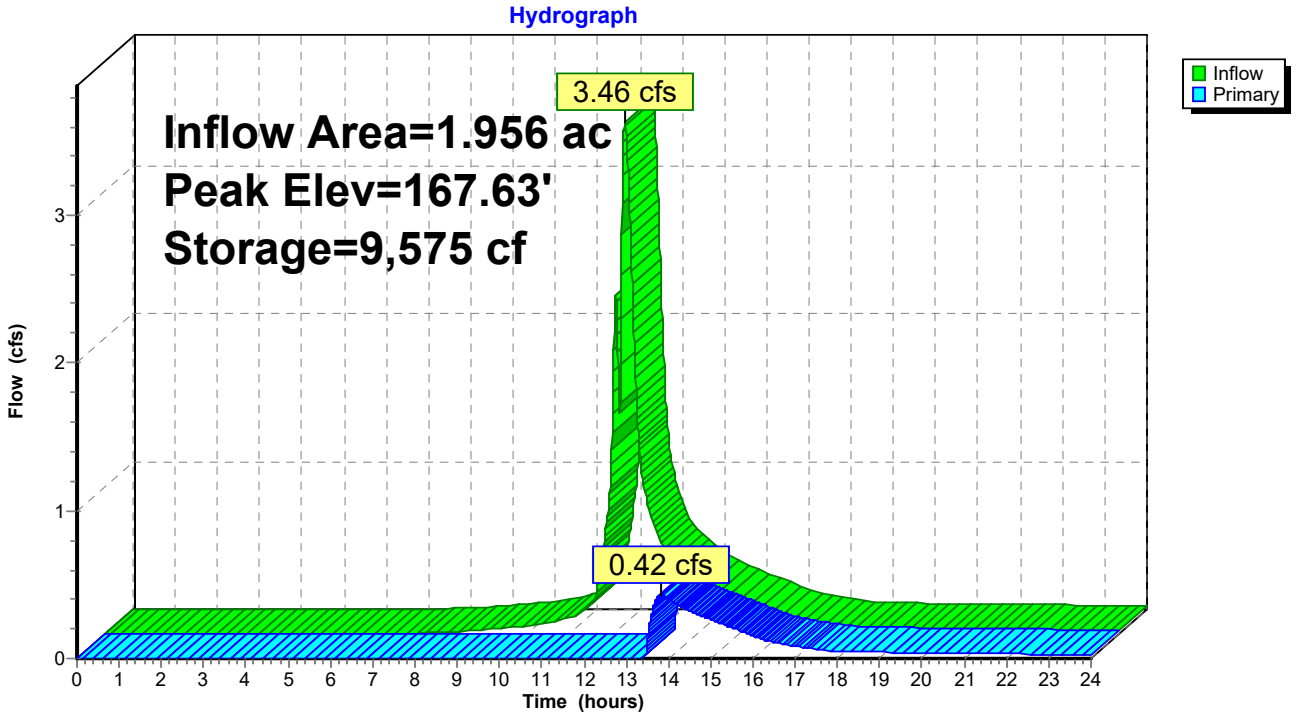
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

Device	Routing	Invert	Outlet Devices
#1	Primary	167.55'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.42 cfs @ 13.83 hrs HW=167.63' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.42 cfs @ 0.70 fps)

Pond 11P: Bio-Retention Area



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Northwest Site Runoff Area=296,164 sf 0.00% Impervious Runoff Depth>4.09"
Flow Length=356' Tc=7.4 min CN=77 Runoff=31.05 cfs 2.318 af

Subcatchment 2S: Building 3 Roof Runoff Area=33,466 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=5.05 cfs 0.413 af

Subcatchment 3S: Building 3 Rear Parking Runoff Area=45,042 sf 82.67% Impervious Runoff Depth>6.10"
Tc=6.0 min CN=95 Runoff=6.68 cfs 0.526 af

Subcatchment 4S: Amenity Building Runoff Area=15,983 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=2.41 cfs 0.197 af

Subcatchment 5S: Function Hall and Runoff Area=21,744 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=3.28 cfs 0.269 af

Subcatchment 6S: Central Parking and Runoff Area=147,366 sf 77.68% Impervious Runoff Depth>5.99"
Tc=6.0 min CN=94 Runoff=21.69 cfs 1.687 af

Subcatchment 10S: Building 1 Roof Runoff Area=19,185 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=2.89 cfs 0.237 af

Subcatchment 11S: Building 1 Parking Runoff Area=62,276 sf 54.19% Impervious Runoff Depth>5.52"
Tc=6.0 min CN=90 Runoff=8.77 cfs 0.658 af

Subcatchment 12S: Building 2 Roof Runoff Area=18,255 sf 100.00% Impervious Runoff Depth>6.46"
Tc=6.0 min CN=98 Runoff=2.75 cfs 0.225 af

Subcatchment 13S: Entrance Driveway Runoff Area=42,665 sf 47.80% Impervious Runoff Depth>5.41"
Tc=6.0 min CN=89 Runoff=5.93 cfs 0.442 af

Subcatchment 14S: Southeast Site Runoff Area=105,624 sf 0.00% Impervious Runoff Depth>4.20"
Flow Length=236' Tc=9.9 min CN=78 Runoff=10.44 cfs 0.848 af

Subcatchment 15S: North Central Site Runoff Area=370,279 sf 0.00% Impervious Runoff Depth>4.20"
Flow Length=185' Tc=6.0 min CN=78 Runoff=41.75 cfs 2.974 af

Subcatchment 20S: North Central Site Runoff Area=142,597 sf 0.00% Impervious Runoff Depth>4.31"
Flow Length=180' Tc=6.0 min CN=79 Runoff=16.45 cfs 1.175 af

Subcatchment 22S: Access Road at Runoff Area=72,531 sf 81.56% Impervious Runoff Depth>6.10"
Tc=6.0 min CN=95 Runoff=10.76 cfs 0.847 af

Subcatchment 28S: Porous Pavement Runoff Area=11,559 sf 100.00% Impervious Runoff Depth>5.42"
Tc=462.0 min CN=98 Runoff=0.18 cfs 0.120 af

Subcatchment 29S: Rear Landscape of Runoff Area=3,822 sf 0.00% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=80 Runoff=0.45 cfs 0.032 af

Subcatchment 30S: Entrance Drive Runoff Area=24,273 sf 13.62% Impervious Runoff Depth>4.63"
Tc=6.0 min CN=82 Runoff=2.99 cfs 0.215 af

Reach 1R: FLOW TO NORTH WETLANDS Inflow=96.60 cfs 8.445 af
Outflow=96.60 cfs 8.445 af

Reach 4R: ROADSIDE DEPRESSION Inflow=10.44 cfs 1.104 af
Outflow=10.44 cfs 1.104 af

Pond 3P: PRECAST UNDERGROUND Peak Elev=181.48' Storage=43,465 cf Inflow=27.38 cfs 2.153 af
Discarded=0.29 cfs 0.485 af Primary=8.70 cfs 0.866 af Outflow=8.99 cfs 1.351 af

Pond 6P: PRECAST UNDERGROUND Peak Elev=179.92' Storage=11,416 cf Inflow=8.77 cfs 0.658 af
Discarded=0.16 cfs 0.232 af Primary=2.85 cfs 0.243 af Outflow=3.01 cfs 0.475 af

Pond 7P: PRECAST UNDERGROUND Peak Elev=171.91' Storage=9,725 cf Inflow=8.68 cfs 0.667 af
Discarded=0.16 cfs 0.238 af Primary=5.86 cfs 0.257 af Outflow=6.02 cfs 0.495 af

Pond 8P: PRECAST UNDERGROUND Peak Elev=177.97' Storage=13,959 cf Inflow=13.66 cfs 1.084 af
Discarded=0.30 cfs 0.459 af Primary=7.81 cfs 0.471 af Outflow=8.10 cfs 0.930 af

Pond 9P: PRECAST UNDERGROUND Peak Elev=190.47' Storage=13,442 cf Inflow=11.73 cfs 0.939 af
Discarded=0.43 cfs 0.630 af Primary=4.12 cfs 0.245 af Outflow=4.55 cfs 0.875 af

Pond 11P: Bio-Retention Area Peak Elev=167.81' Storage=10,222 cf Inflow=8.06 cfs 0.472 af
Outflow=2.82 cfs 0.257 af

Total Runoff Area = 32.893 ac Runoff Volume = 13.184 af Average Runoff Depth = 4.81"
72.89% Pervious = 23.975 ac 27.11% Impervious = 8.919 ac

Summary for Subcatchment 1S: Northwest Site

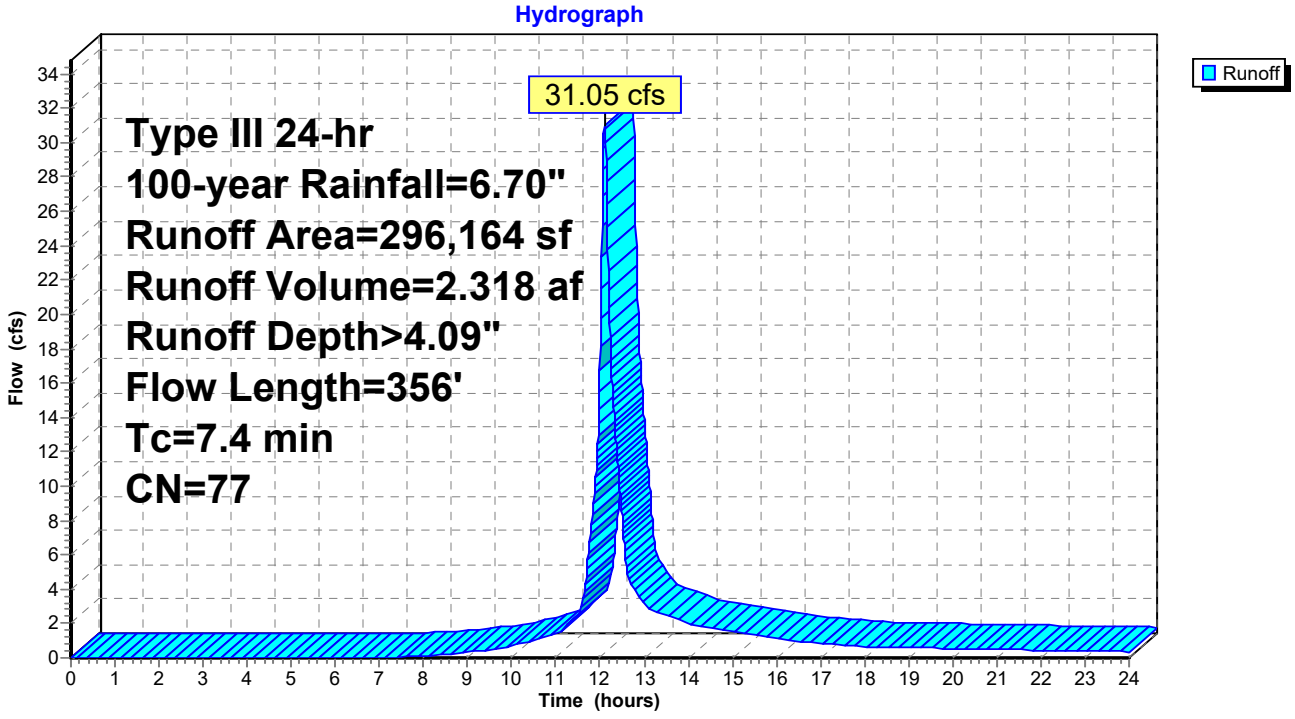
Runoff = 31.05 cfs @ 12.11 hrs, Volume= 2.318 af, Depth> 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
234,960	77	Woods, Good, HSG D
40,554	79	Woods/grass comb., Good, HSG D
20,650	80	>75% Grass cover, Good, HSG D
296,164	77	Weighted Average
296,164		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	306	0.1200	5.58		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
7.4	356	Total			

Subcatchment 1S: Northwest Site



Summary for Subcatchment 2S: Building 3 Roof

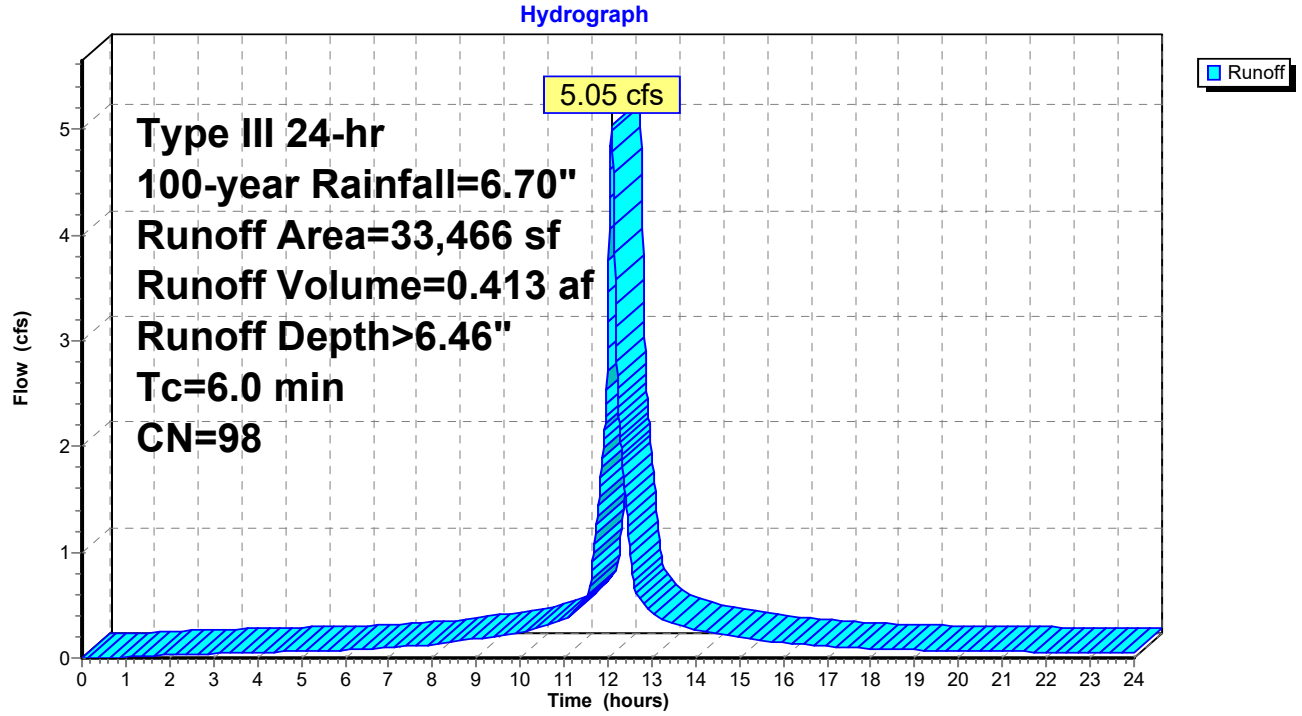
Runoff = 5.05 cfs @ 12.08 hrs, Volume= 0.413 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	33,466	98	Roof
	33,466		100.00% Impervious Area

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

Subcatchment 2S: Building 3 Roof



Summary for Subcatchment 3S: Building 3 Rear Parking Area

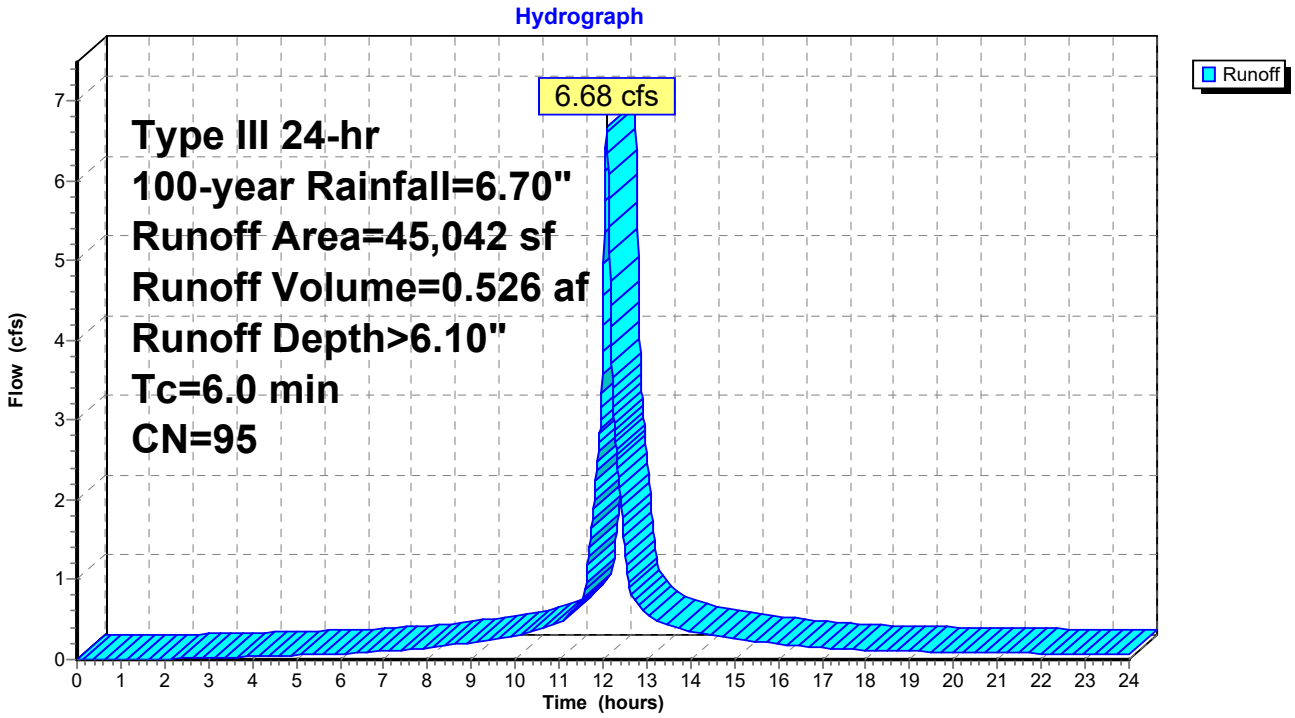
Runoff = 6.68 cfs @ 12.08 hrs, Volume= 0.526 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
	7,808	80	>75% Grass cover, Good, HSG D
*	37,234	98	Paved parking
	45,042	95	Weighted Average
	7,808		17.33% Pervious Area
	37,234		82.67% Impervious Area

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

Subcatchment 3S: Building 3 Rear Parking Area



Summary for Subcatchment 4S: Amenity Building

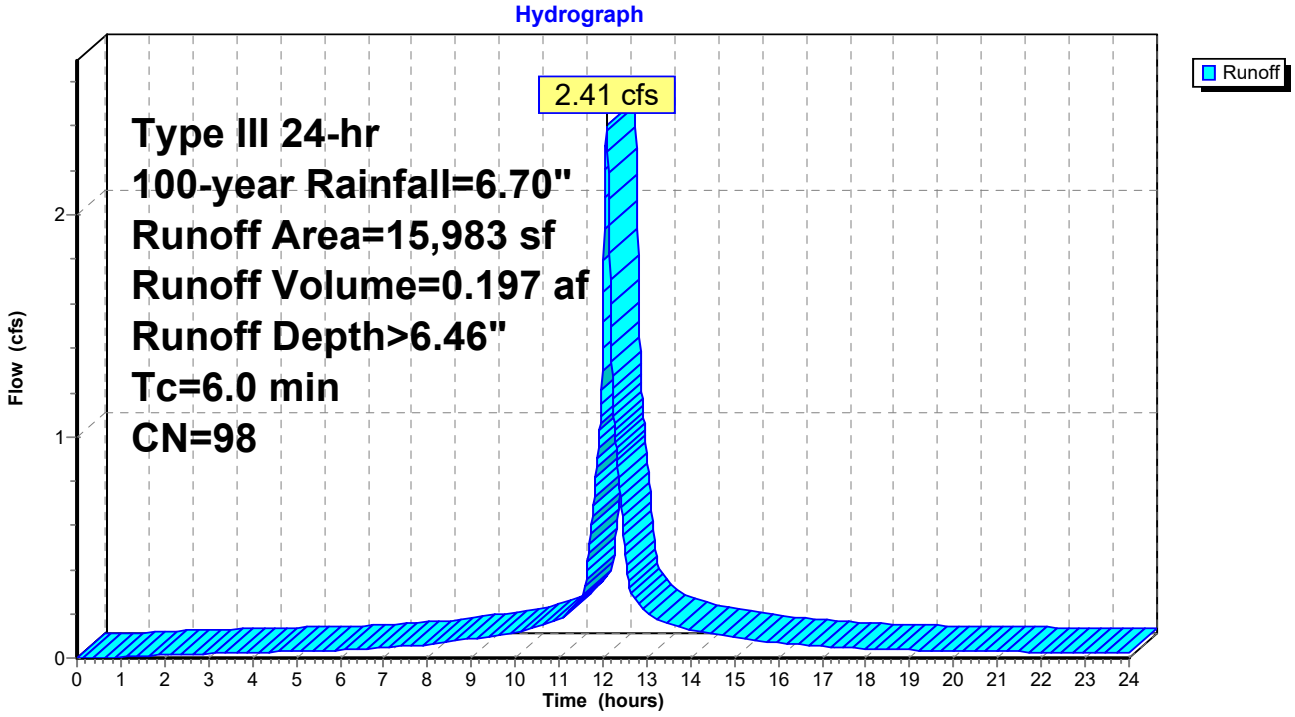
Runoff = 2.41 cfs @ 12.08 hrs, Volume= 0.197 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	10,495	98	Roof
*	5,488	98	Paved parking
	15,983	98	Weighted Average
	15,983		100.00% Impervious Area

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

Subcatchment 4S: Amenity Building



Summary for Subcatchment 5S: Function Hall and Restaurant

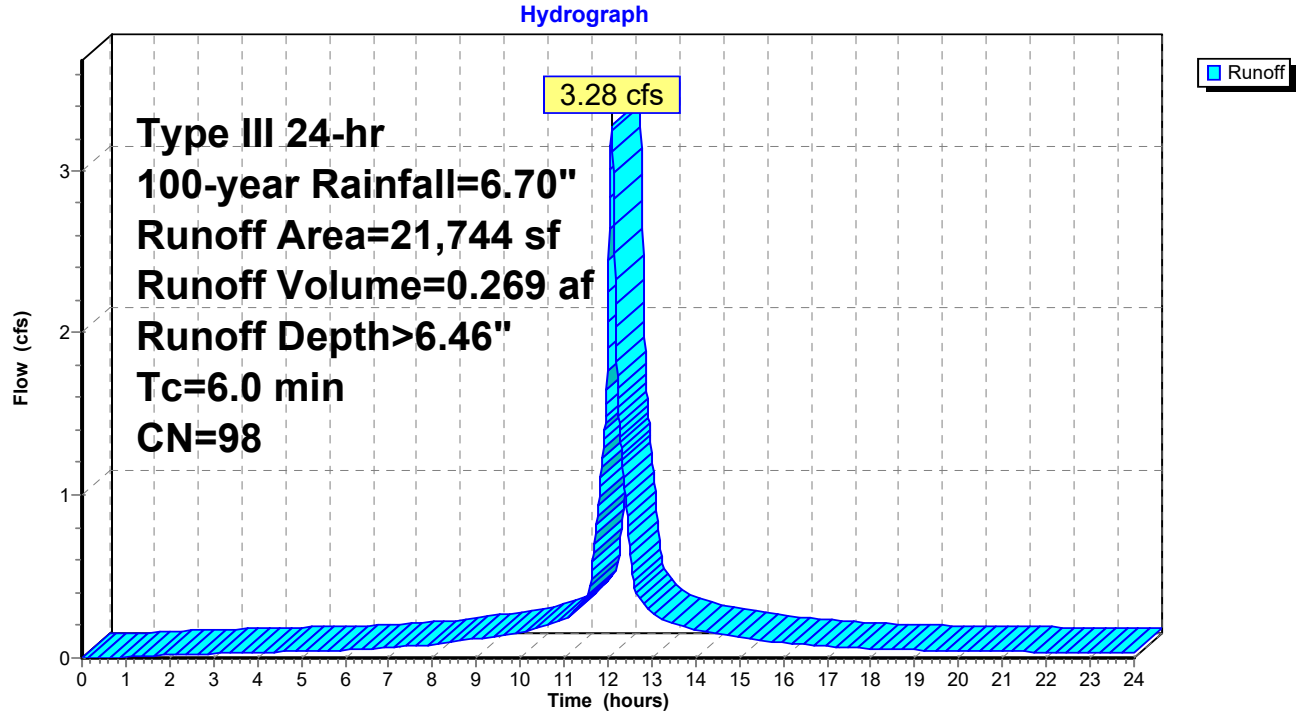
Runoff = 3.28 cfs @ 12.08 hrs, Volume= 0.269 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	21,744	98	Roof
	21,744		100.00% Impervious Area

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

Subcatchment 5S: Function Hall and Restaurant



Summary for Subcatchment 6S: Central Parking and Access Drive

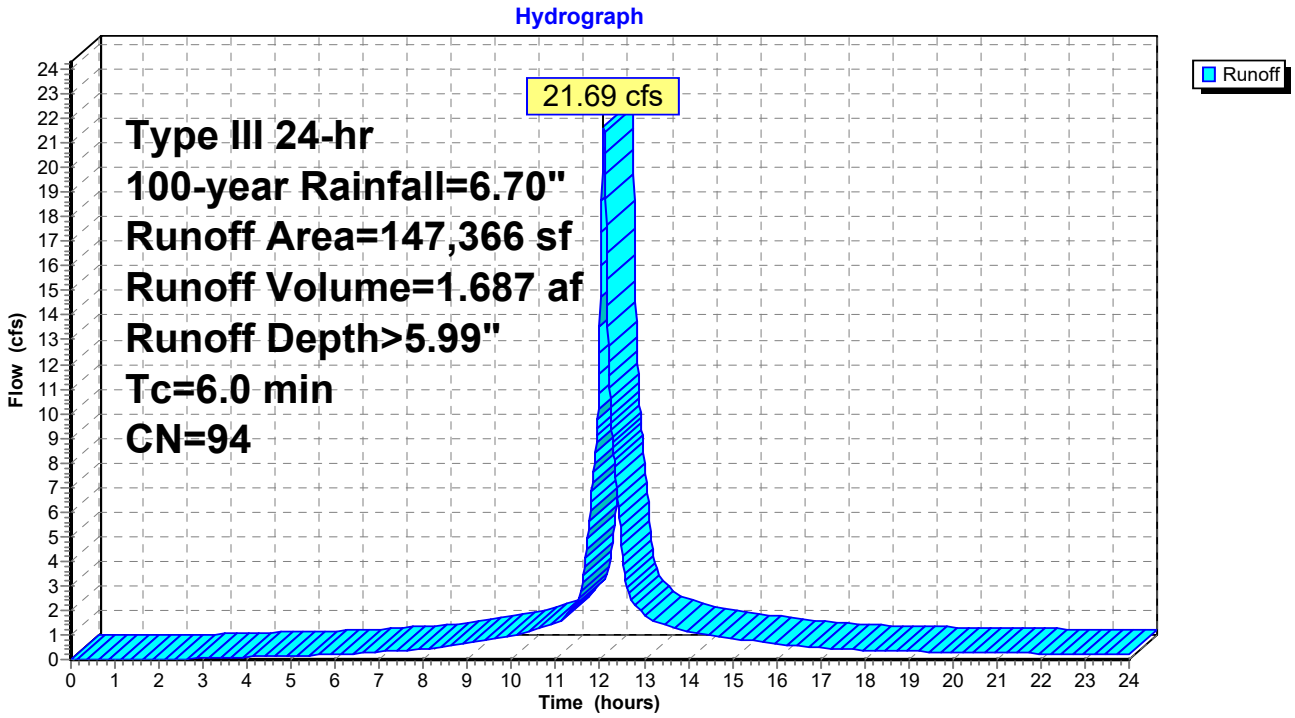
Runoff = 21.69 cfs @ 12.08 hrs, Volume= 1.687 af, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
	32,897	80	>75% Grass cover, Good, HSG D
*	114,469	98	Paved parking
	147,366	94	Weighted Average
	32,897		22.32% Pervious Area
	114,469		77.68% Impervious Area

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

Subcatchment 6S: Central Parking and Access Drive



Summary for Subcatchment 10S: Building 1 Roof

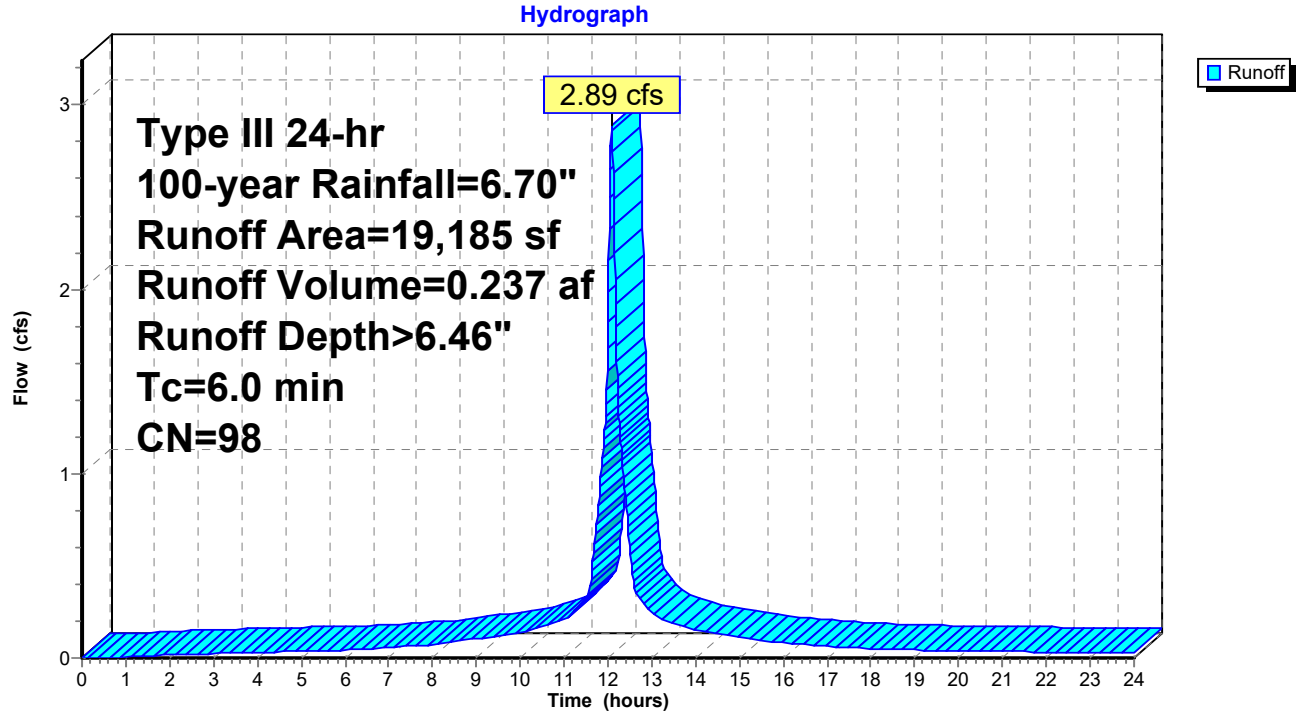
Runoff = 2.89 cfs @ 12.08 hrs, Volume= 0.237 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	19,185	98	Roof
	19,185		100.00% Impervious Area

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

Subcatchment 10S: Building 1 Roof



Summary for Subcatchment 11S: Building 1 Parking

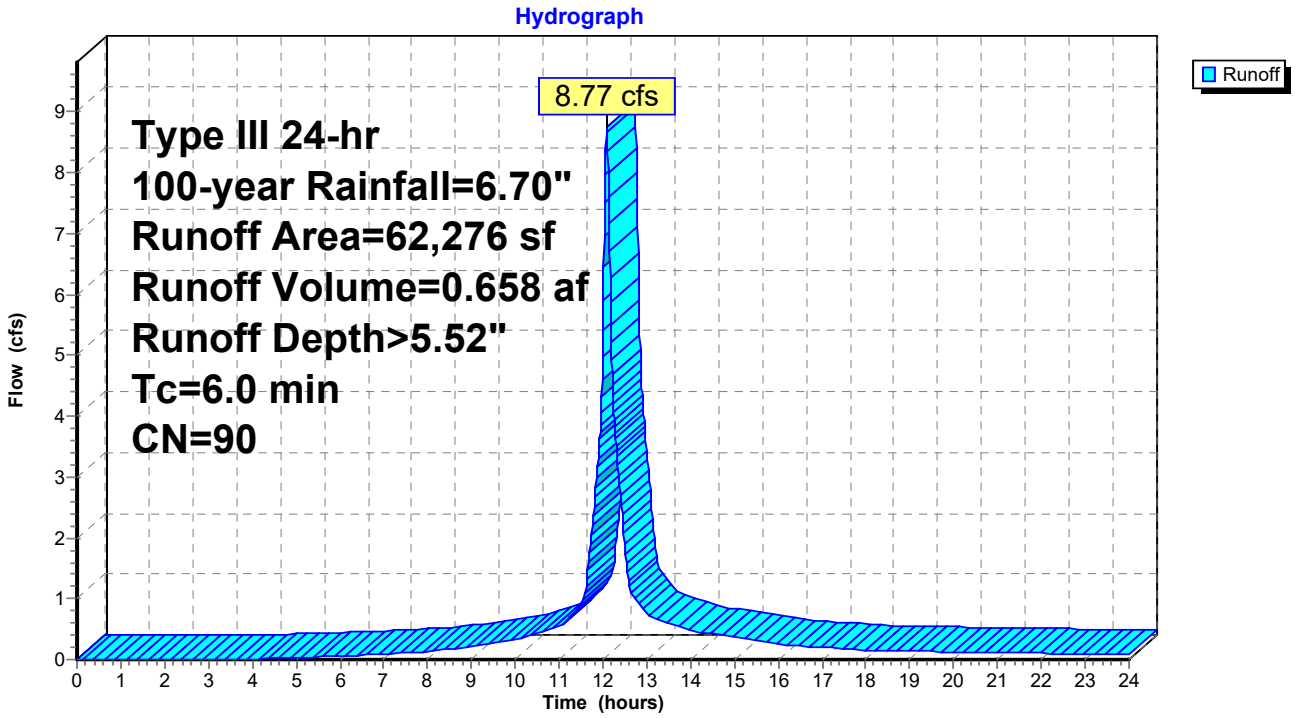
Runoff = 8.77 cfs @ 12.08 hrs, Volume= 0.658 af, Depth> 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
	28,529	80	>75% Grass cover, Good, HSG D
*	33,747	98	Paved parking
	62,276	90	Weighted Average
	28,529		45.81% Pervious Area
	33,747		54.19% Impervious Area

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

Subcatchment 11S: Building 1 Parking



Summary for Subcatchment 12S: Building 2 Roof

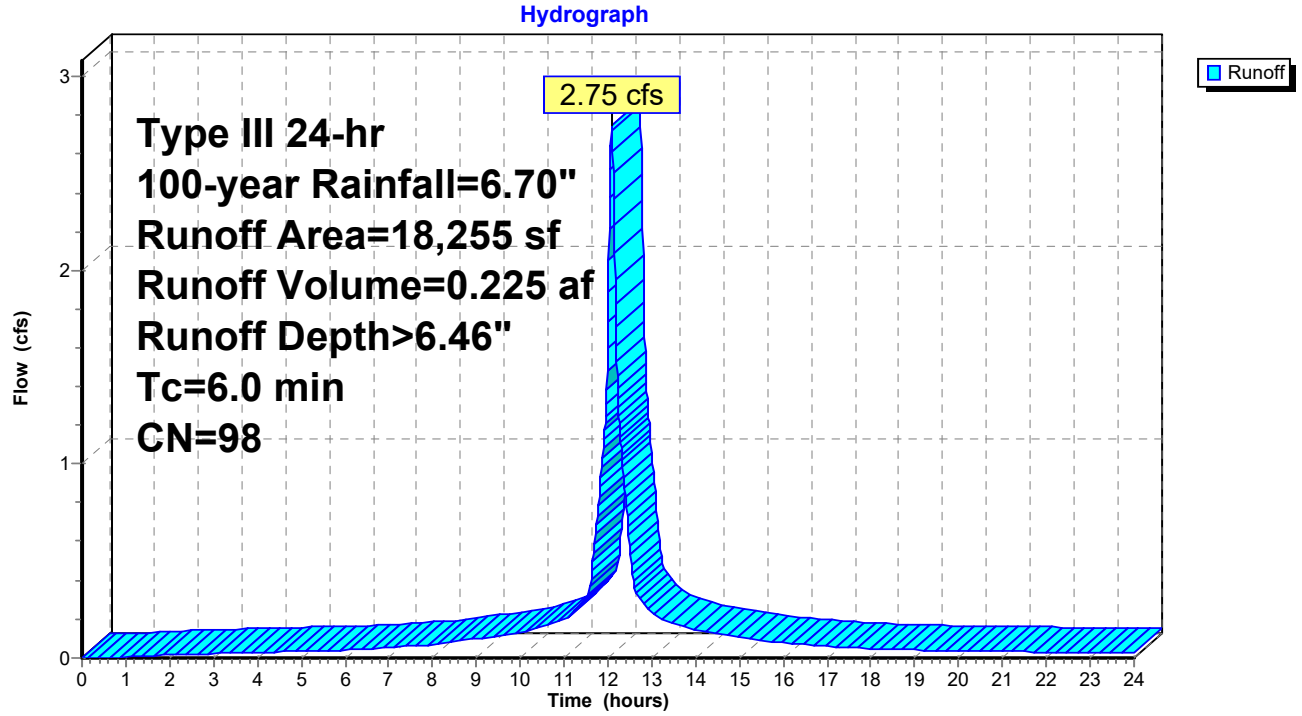
Runoff = 2.75 cfs @ 12.08 hrs, Volume= 0.225 af, Depth> 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	18,255	98	Roof
	18,255		100.00% Impervious Area

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

Subcatchment 12S: Building 2 Roof



Summary for Subcatchment 13S: Entrance Driveway

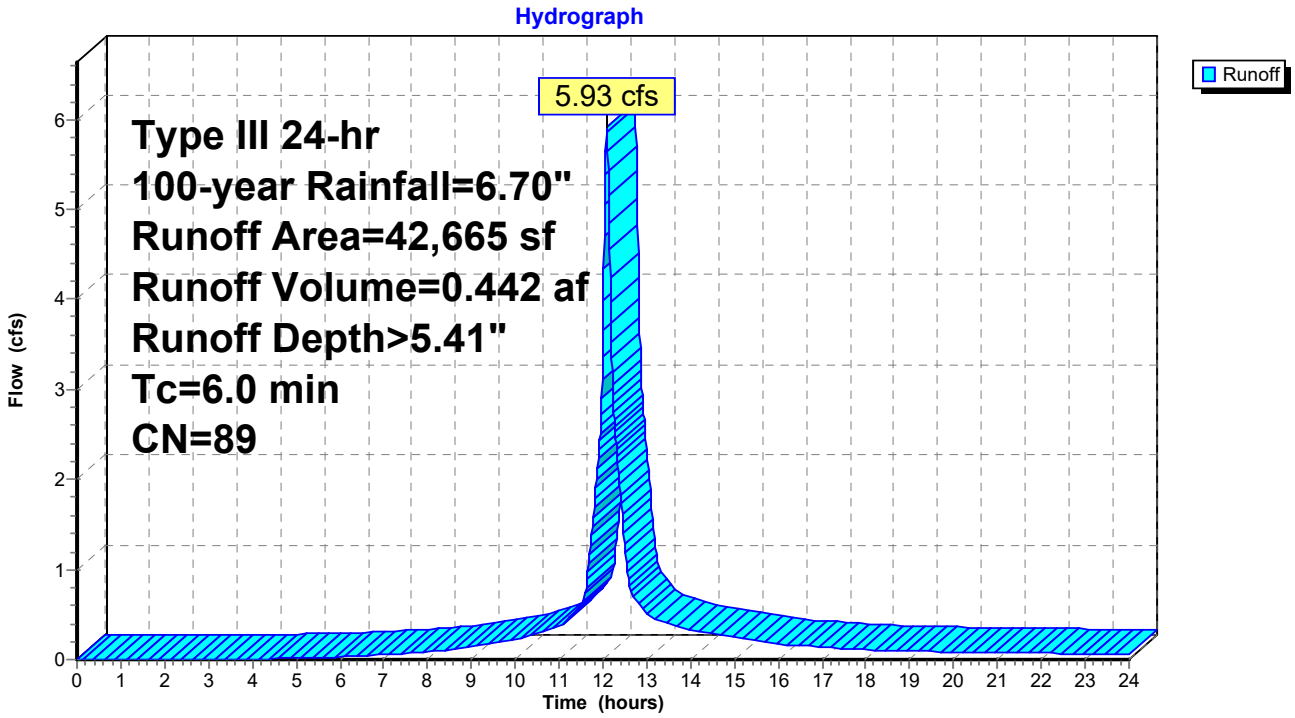
Runoff = 5.93 cfs @ 12.08 hrs, Volume= 0.442 af, Depth> 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
22,273	80	>75% Grass cover, Good, HSG D
20,392	98	Paved parking, HSG D
42,665	89	Weighted Average
22,273		52.20% Pervious Area
20,392		47.80% Impervious Area

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

Subcatchment 13S: Entrance Driveway



Summary for Subcatchment 14S: Southeast Site

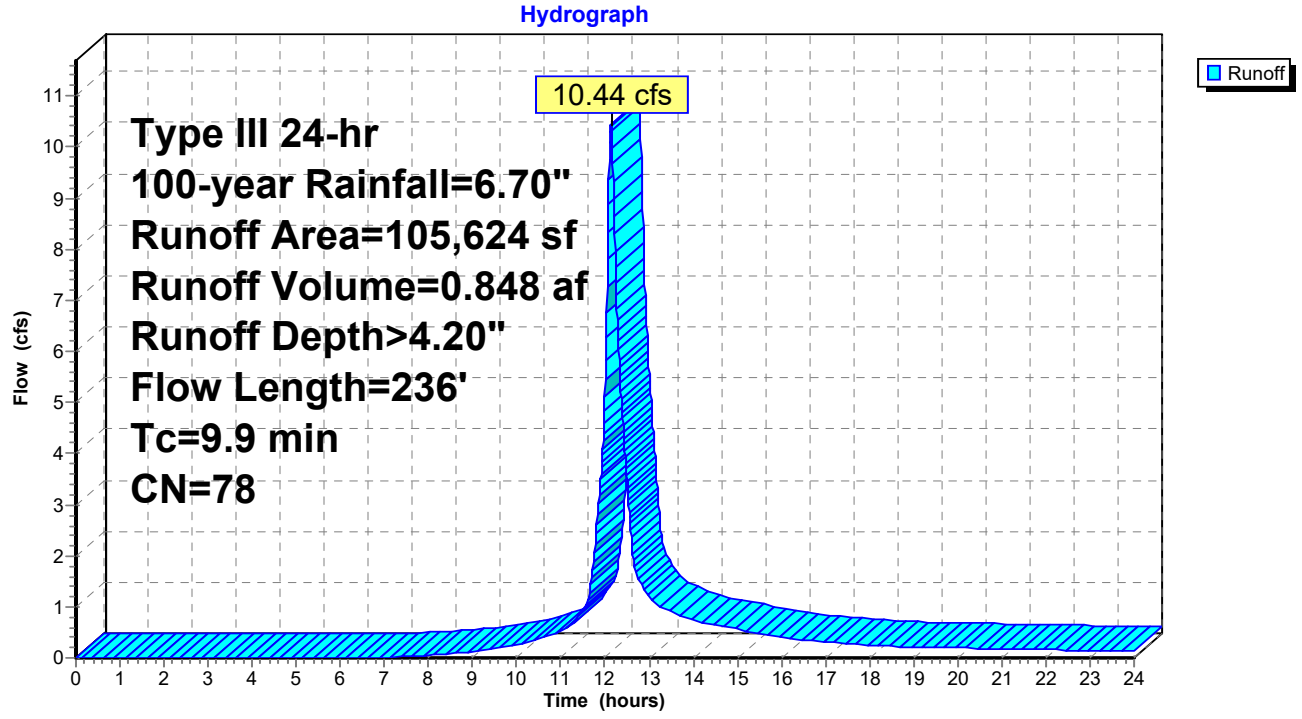
Runoff = 10.44 cfs @ 12.14 hrs, Volume= 0.848 af, Depth> 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
44,476	77	Woods, Good, HSG D
48,324	79	Woods/grass comb., Good, HSG D
12,824	80	>75% Grass cover, Good, HSG D
105,624	78	Weighted Average
105,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0430	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	186	0.0620	4.01		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.9	236	Total			

Subcatchment 14S: Southeast Site



Summary for Subcatchment 15S: North Central Site

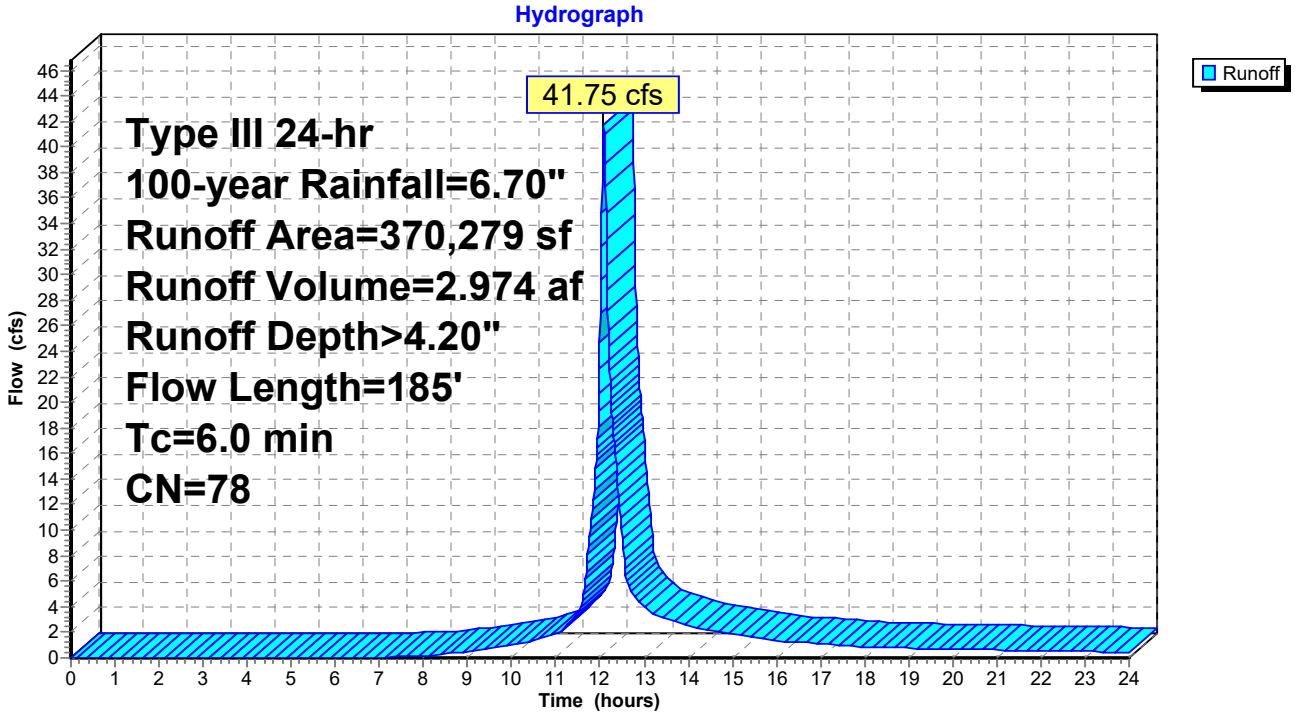
Runoff = 41.75 cfs @ 12.09 hrs, Volume= 2.974 af, Depth> 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
177,116	77	Woods, Good, HSG D
154,471	79	Woods/grass comb., Good, HSG D
38,692	80	>75% Grass cover, Good, HSG D
370,279	78	Weighted Average
370,279		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.4	135	0.0980	5.04		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 15S: North Central Site



Summary for Subcatchment 20S: North Central Site

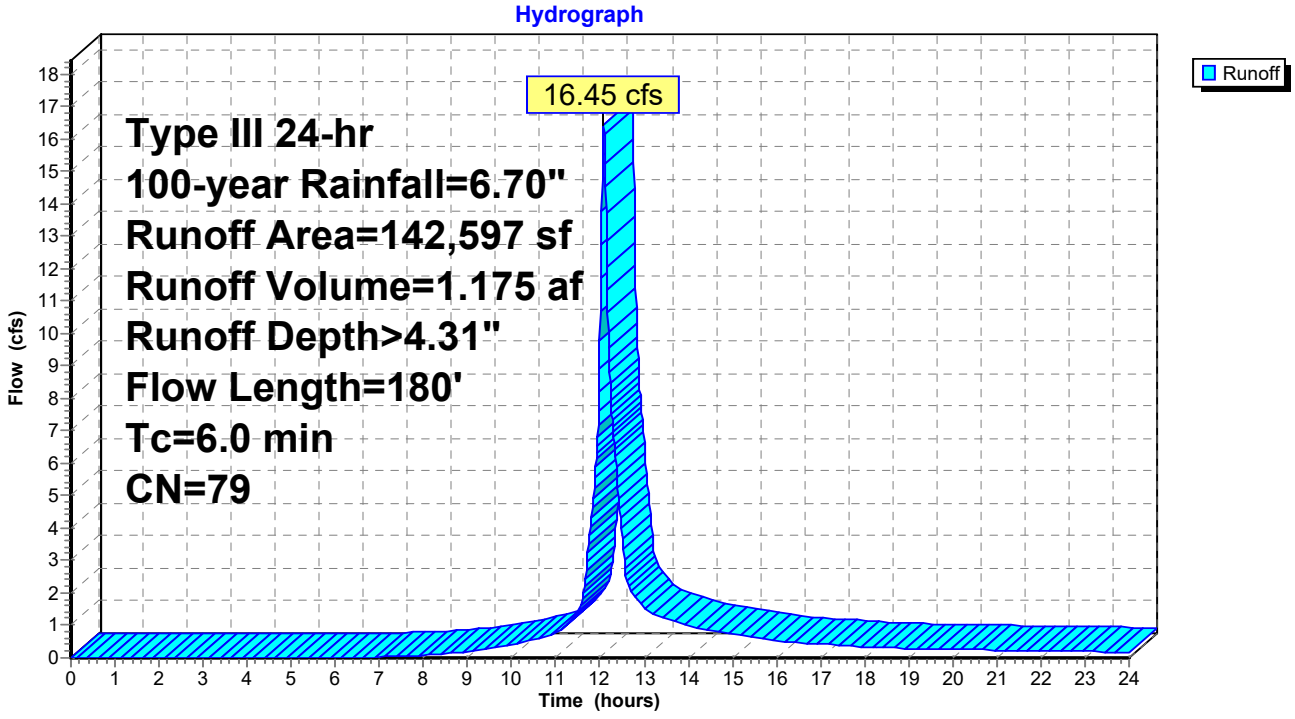
Runoff = 16.45 cfs @ 12.09 hrs, Volume= 1.175 af, Depth> 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
27,557	77	Woods, Good, HSG D
107,491	79	Woods/grass comb., Good, HSG D
7,549	80	>75% Grass cover, Good, HSG D
142,597	79	Weighted Average
142,597		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.1670	0.16		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	130	0.0860	4.72		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
5.8	180	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 20S: North Central Site



Summary for Subcatchment 22S: Access Road at Building 1

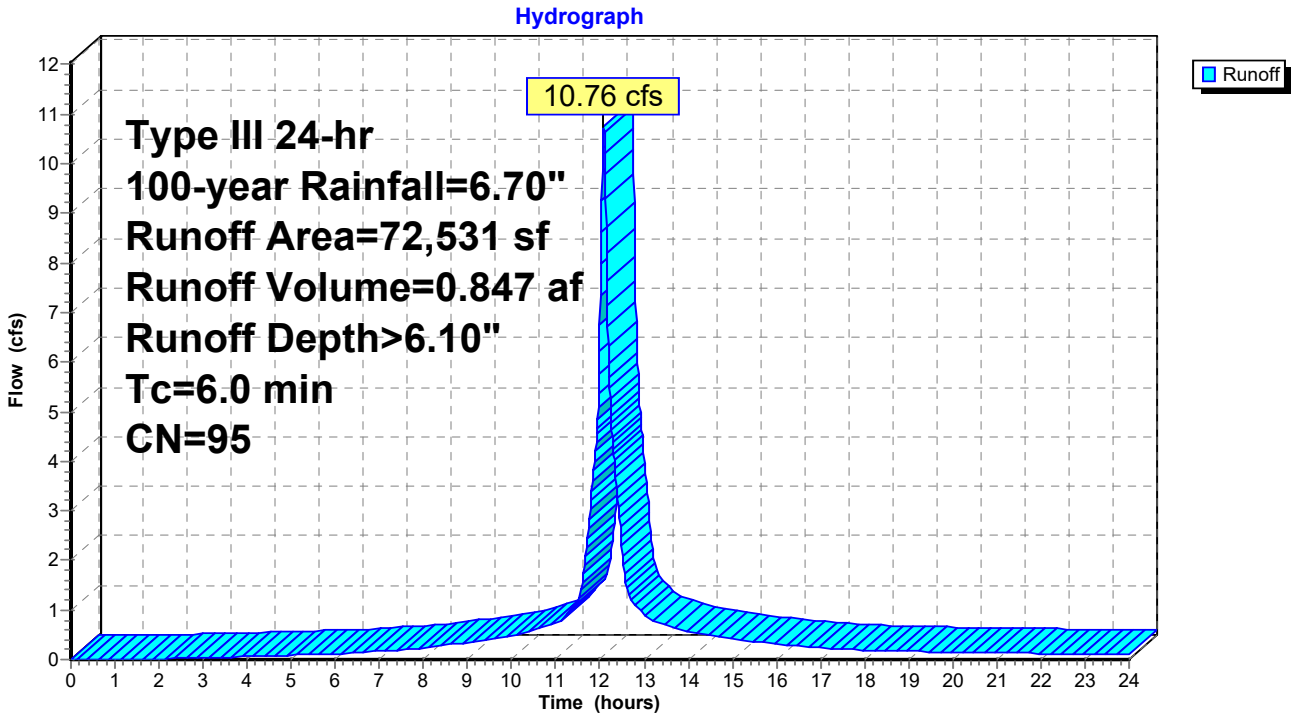
Runoff = 10.76 cfs @ 12.08 hrs, Volume= 0.847 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	59,159	98	Paved parking
	13,372	80	>75% Grass cover, Good, HSG D
	72,531	95	Weighted Average
	13,372		18.44% Pervious Area
	59,159		81.56% Impervious Area

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

Subcatchment 22S: Access Road at Building 1



Summary for Subcatchment 28S: Porous Pavement Acess Drive at Building 3

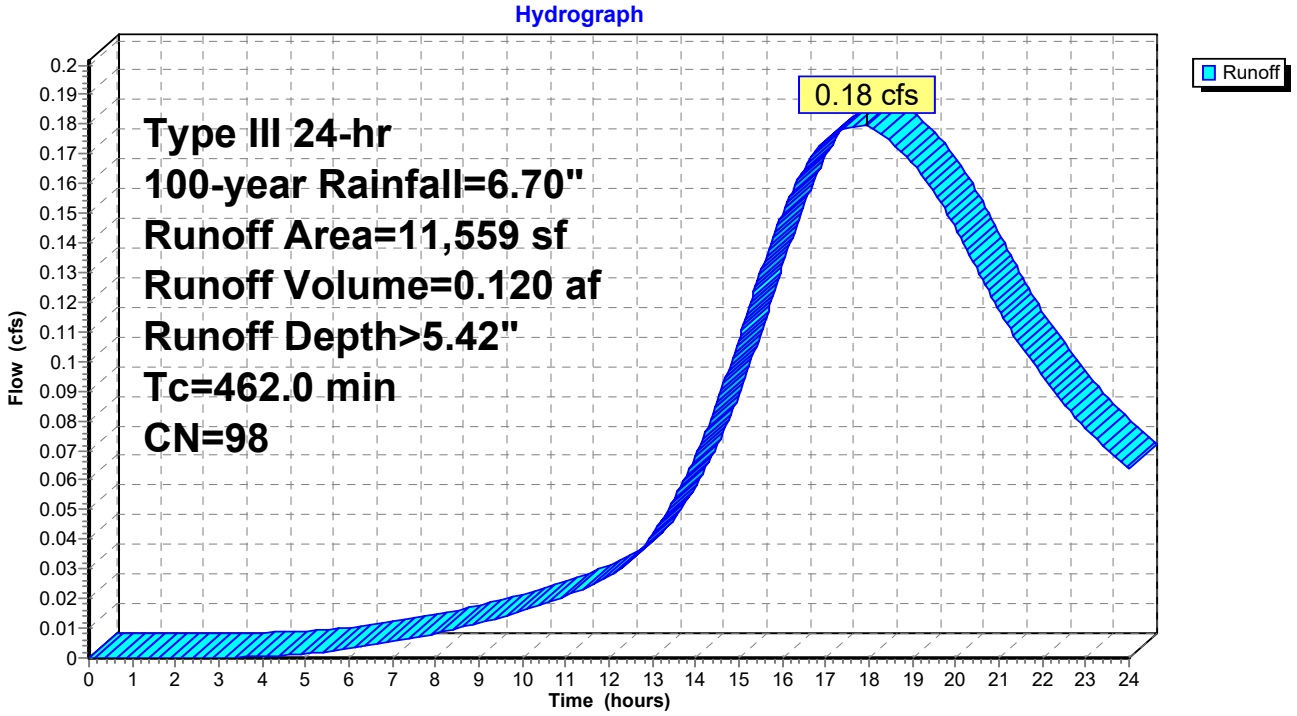
Runoff = 0.18 cfs @ 17.96 hrs, Volume= 0.120 af, Depth> 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
*	11,559	98	Paved parking
	11,559		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
462.0					**Direct Entry, UNH Stormwater for Infiltrating Pavement Section**

Subcatchment 28S: Porous Pavement Acess Drive at Building 3



Summary for Subcatchment 29S: Rear Landscape of Building 3

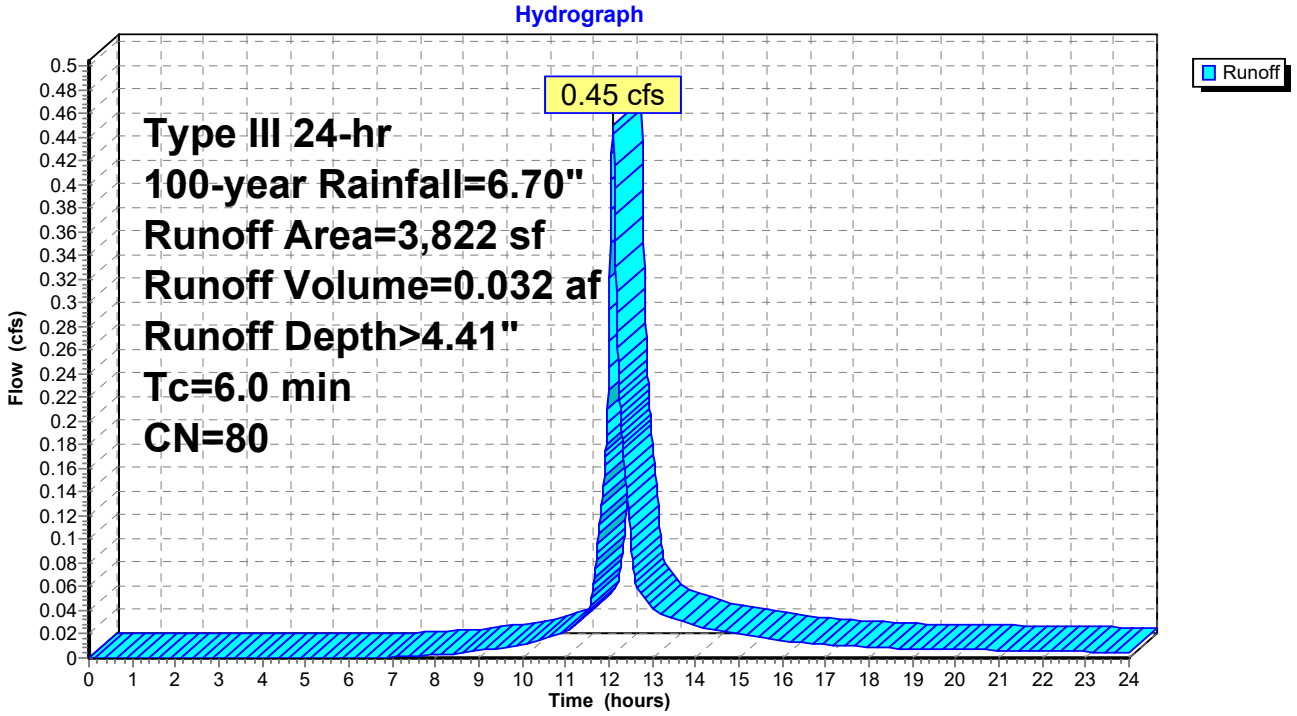
Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.032 af, Depth> 4.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

Area (sf)	CN	Description
3,822	80	>75% Grass cover, Good, HSG D
3,822		100.00% Pervious Area

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

Subcatchment 29S: Rear Landscape of Building 3



Summary for Subcatchment 30S: Entrance Drive

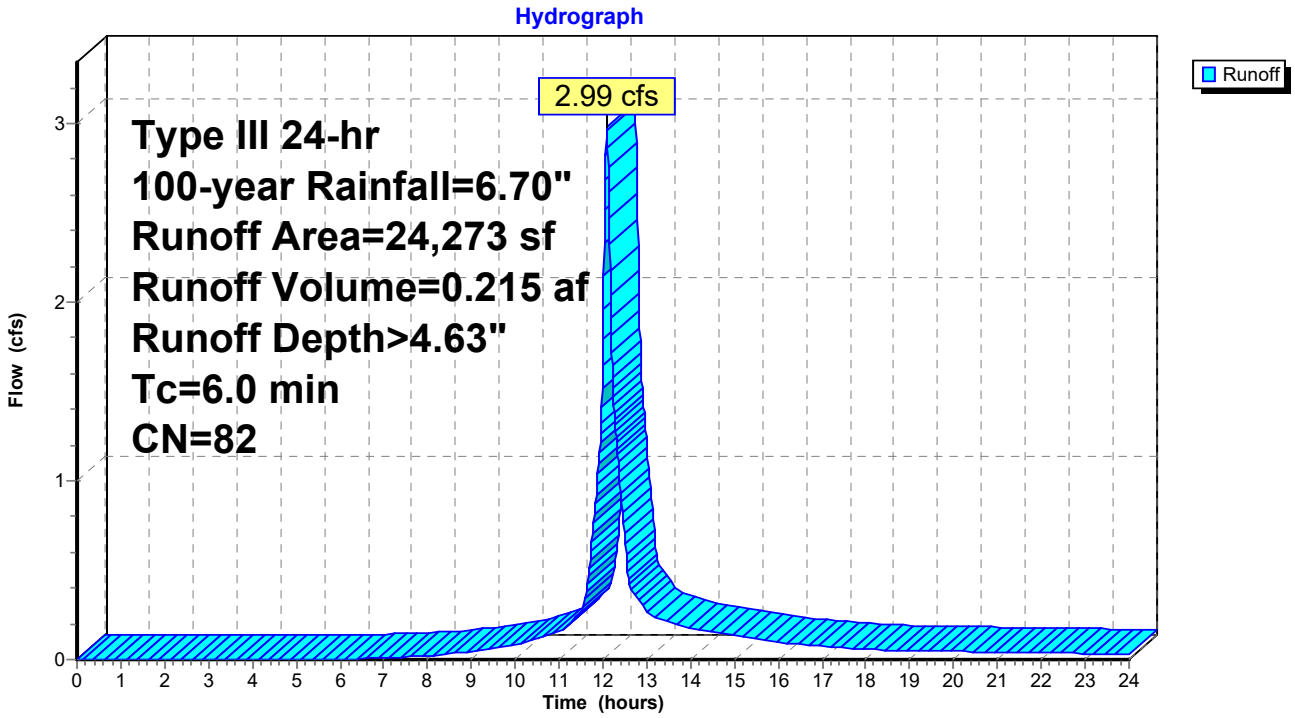
Runoff = 2.99 cfs @ 12.09 hrs, Volume= 0.215 af, Depth> 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=6.70"

	Area (sf)	CN	Description
	20,967	80	>75% Grass cover, Good, HSG D
*	3,306	98	Paved parking
	24,273	82	Weighted Average
	20,967		86.38% Pervious Area
	3,306		13.62% Impervious Area

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

Subcatchment 30S: Entrance Drive



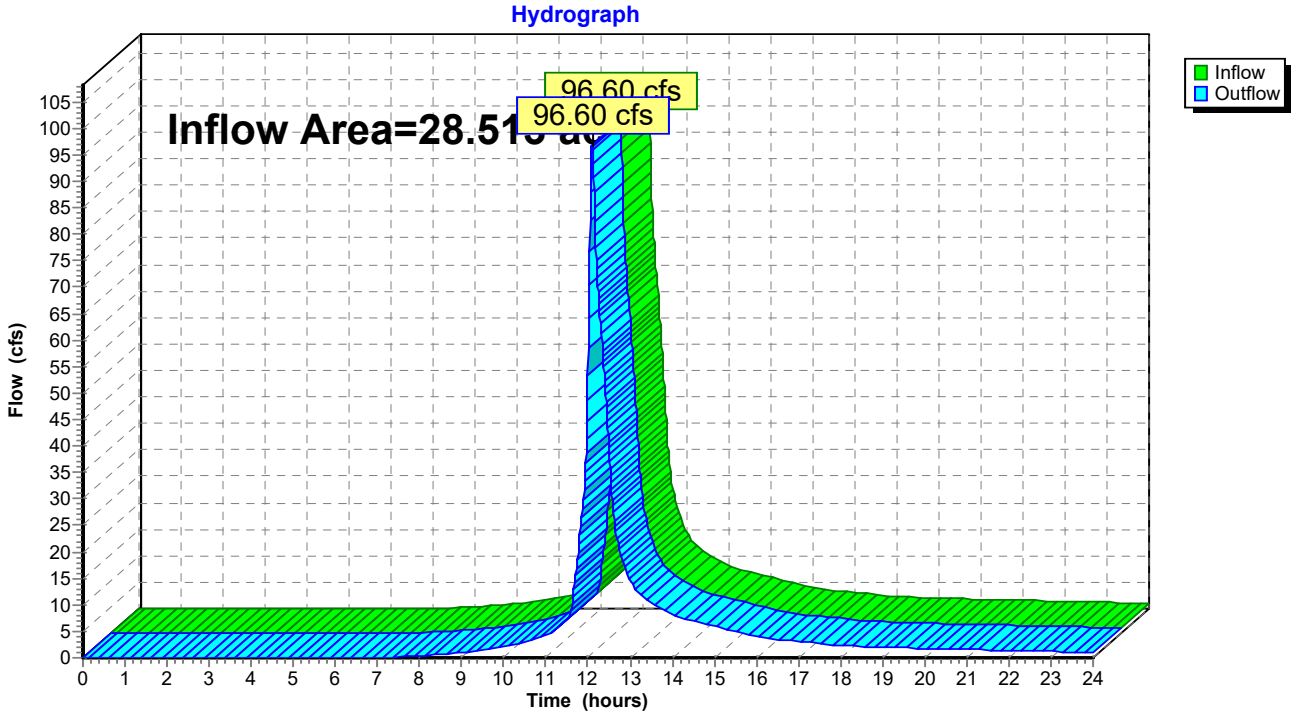
Summary for Reach 1R: FLOW TO NORTH WETLANDS

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

Inflow Area = 28.513 ac, 27.90% Impervious, Inflow Depth > 3.55" for 100-year event
Inflow = 96.60 cfs @ 12.10 hrs, Volume= 8.445 af
Outflow = 96.60 cfs @ 12.10 hrs, Volume= 8.445 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: FLOW TO NORTH WETLANDS



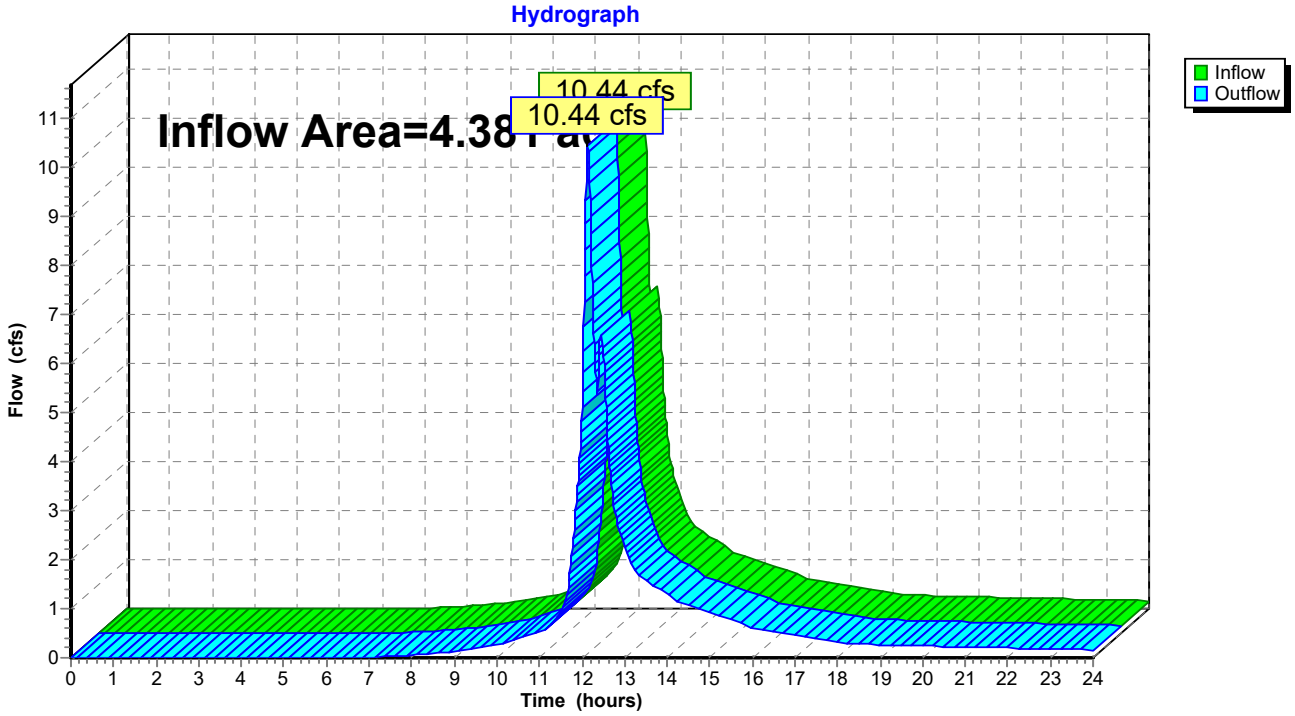
Summary for Reach 4R: ROADSIDE DEPRESSION

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

Inflow Area = 4.381 ac, 21.99% Impervious, Inflow Depth > 3.03" for 100-year event
Inflow = 10.44 cfs @ 12.14 hrs, Volume= 1.104 af
Outflow = 10.44 cfs @ 12.14 hrs, Volume= 1.104 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 4R: ROADSIDE DEPRESSION



Summary for Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3

Inflow Area = 4.249 ac, 82.23% Impervious, Inflow Depth > 6.08" for 100-year event
Inflow = 27.38 cfs @ 12.08 hrs, Volume= 2.153 af
Outflow = 8.99 cfs @ 12.37 hrs, Volume= 1.351 af, Atten= 67%, Lag= 17.1 min
Discarded = 0.29 cfs @ 7.43 hrs, Volume= 0.485 af
Primary = 8.70 cfs @ 12.37 hrs, Volume= 0.866 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 181.48' @ 12.37 hrs Surf.Area= 12,232 sf Storage= 43,465 cf
Flood Elev= 181.50' Surf.Area= 12,232 sf Storage= 43,656 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 69.5 min (829.8 - 760.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	0 cf	**89.63'W x 136.48'L x 4.50'H Field A** 55,044 cf Overall - 55,044 cf Embedded = 0 cf x 40.0% Voids
#2A	177.50'	43,656 cf	**StormTrap ST2 SingleTrap 4-0** x 72 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 9 Rows of 8 Chambers 76.31' x 123.17' Core + 6.66' Border = 89.63' x 136.48' System
		43,656 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Device 3	180.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	177.37'	**15.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.37' / 176.63' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.29 cfs @ 7.43 hrs HW=177.55' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=8.70 cfs @ 12.37 hrs HW=181.48' TW=0.00' (Dynamic Tailwater)
3=Culvert (Passes 8.70 cfs of 10.41 cfs potential flow)
2=Sharp-Crested Rectangular Weir (Weir Controls 8.70 cfs @ 2.89 fps)

Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3 - Chamber Wizard Field A

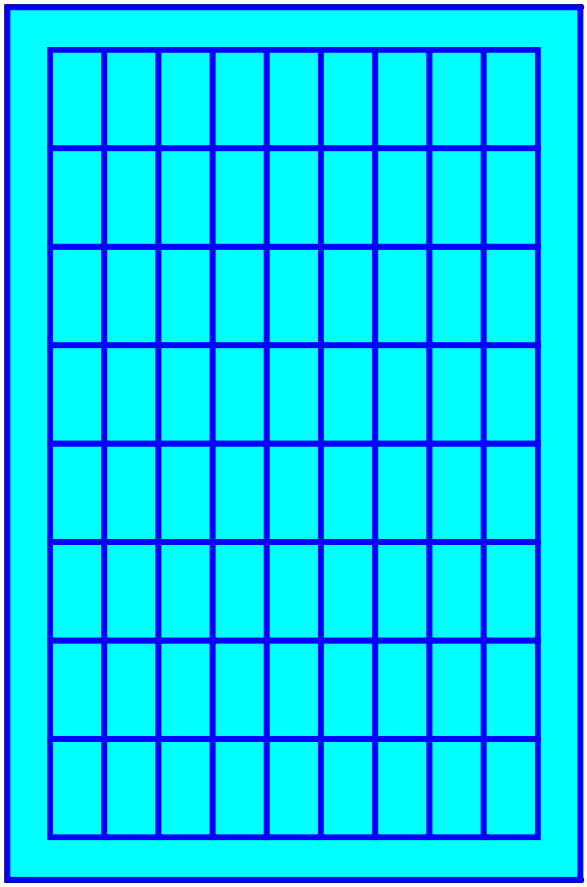
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
54.0" Chamber Height = 4.50' Field Height

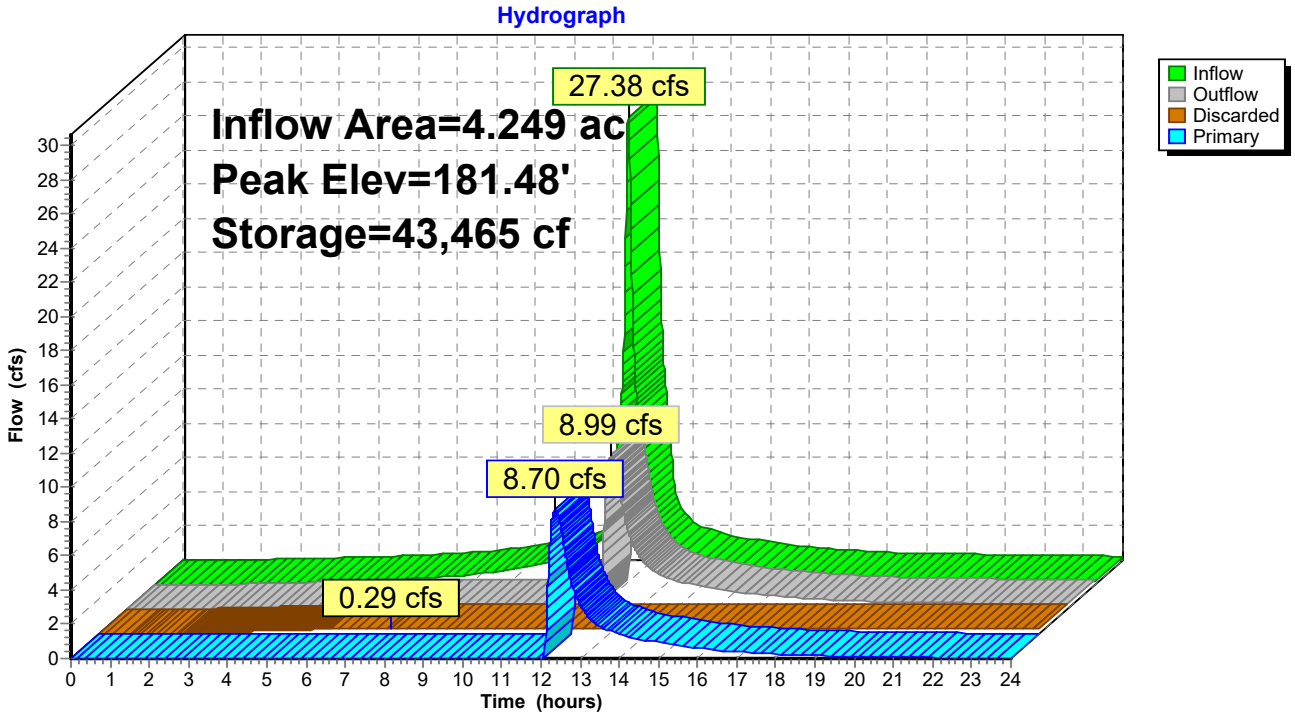
72 Chambers x 470.3 cf + 9,796.6 cf Border = 43,656.2 cf Chamber Storage
72 Chambers x 587.4 cf + 12,747.6 cf Border = 55,043.8 cf Displacement

Chamber Storage = 43,656.2 cf = 1.002 af
Overall Storage Efficiency = 79.3%
Overall System Size = 136.48' x 89.63' x 4.50'

72 Chambers (plus border)
2,038.7 cy Field



Pond 3P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 3



Summary for Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2

Inflow Area = 1.430 ac, 54.19% Impervious, Inflow Depth > 5.52" for 100-year event
Inflow = 8.77 cfs @ 12.08 hrs, Volume= 0.658 af
Outflow = 3.01 cfs @ 12.36 hrs, Volume= 0.475 af, Atten= 66%, Lag= 16.4 min
Discarded = 0.16 cfs @ 9.27 hrs, Volume= 0.232 af
Primary = 2.85 cfs @ 12.36 hrs, Volume= 0.243 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 179.92' @ 12.36 hrs Surf.Area= 6,784 sf Storage= 11,416 cf
Flood Elev= 180.00' Surf.Area= 6,784 sf Storage= 11,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 72.1 min (852.7 - 780.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	178.00'	0 cf	**64.19'W x 105.69'L x 2.50'H Field A** 16,960 cf Overall - 16,960 cf Embedded = 0 cf x 40.0% Voids
#2A	178.00'	11,904 cf	**StormTrap ST2 SingleTrap 2-0** x 36 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 6 Chambers 50.88' x 92.38' Core + 6.66' Border = 64.19' x 105.69' System
		11,904 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	178.50'	**12.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 178.11' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	178.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Device 1	179.50'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 9.27 hrs HW=178.03' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=2.85 cfs @ 12.36 hrs HW=179.92' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 2.85 cfs @ 3.63 fps)
└**3=Sharp-Crested Rectangular Weir** (Passes 2.85 cfs of 3.46 cfs potential flow)

Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2 - Chamber Wizard Field A

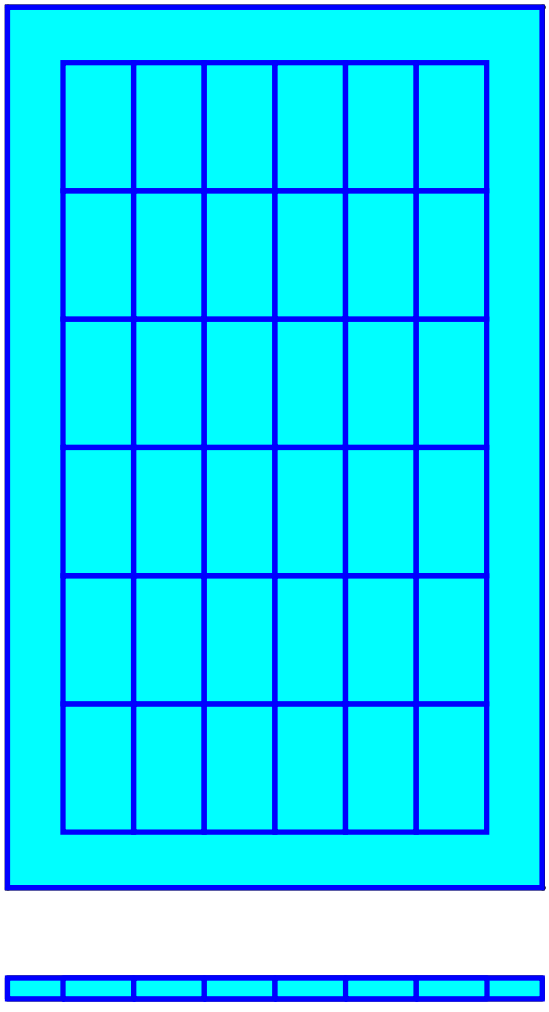
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

6 Chambers/Row x 15.40' Long = 92.38' Row Length +79.9" Border x 2 = 105.69' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

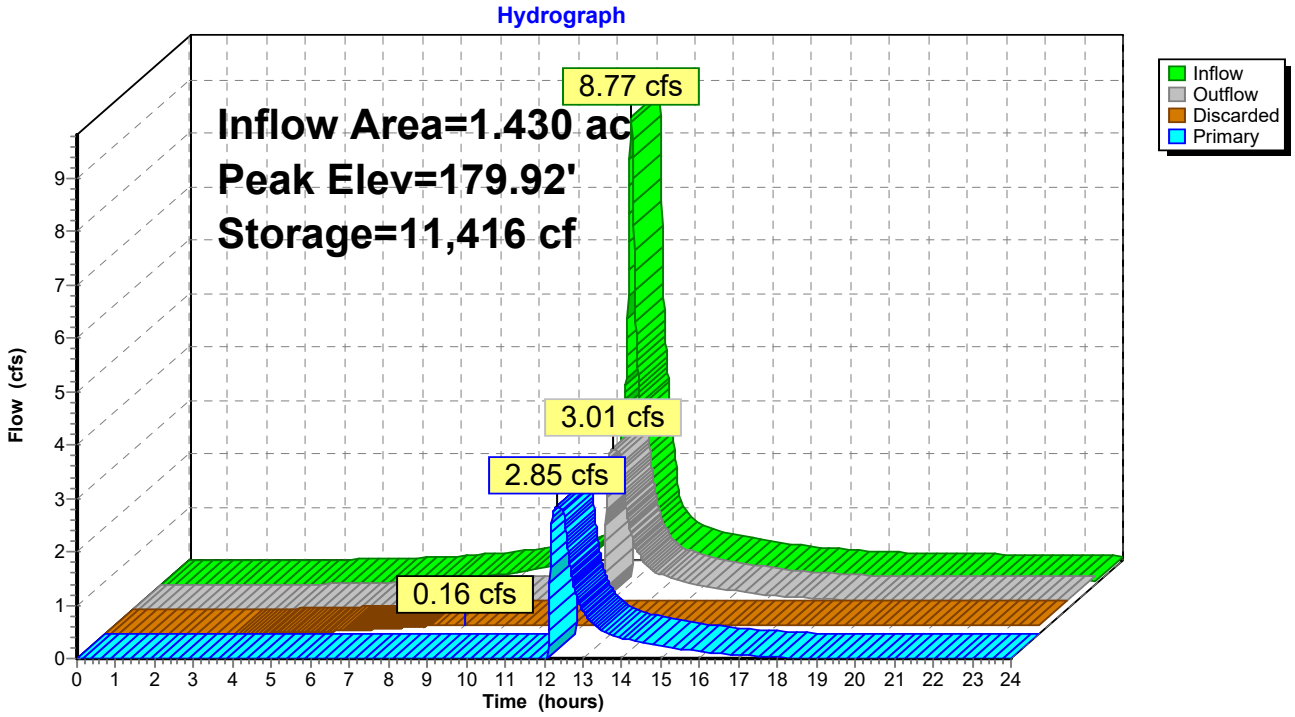
36 Chambers x 231.7 cf + 3,563.4 cf Border = 11,903.6 cf Chamber Storage
36 Chambers x 326.4 cf + 5,210.6 cf Border = 16,959.5 cf Displacement

Chamber Storage = 11,903.6 cf = 0.273 af
Overall Storage Efficiency = 70.2%
Overall System Size = 105.69' x 64.19' x 2.50'

36 Chambers (plus border)
628.1 cy Field



Pond 6P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 2



Summary for Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8

Inflow Area = 1.399 ac, 63.44% Impervious, Inflow Depth > 5.72" for 100-year event
Inflow = 8.68 cfs @ 12.08 hrs, Volume= 0.667 af
Outflow = 6.02 cfs @ 12.16 hrs, Volume= 0.495 af, Atten= 31%, Lag= 4.8 min
Discarded = 0.16 cfs @ 8.92 hrs, Volume= 0.238 af
Primary = 5.86 cfs @ 12.16 hrs, Volume= 0.257 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 171.91' @ 12.16 hrs Surf.Area= 2,810 sf Storage= 9,725 cf
Flood Elev= 172.00' Surf.Area= 2,810 sf Storage= 9,944 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 59.4 min (829.5 - 770.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	168.00'	0 cf	**47.23'W x 59.50'L x 4.50'H Field A** 12,646 cf Overall - 12,646 cf Embedded = 0 cf x 40.0% Voids
#2A	168.00'	9,944 cf	**StormTrap ST2 SingleTrap 4-0** x 12 Inside #1 Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf 4 Rows of 3 Chambers 33.92' x 46.19' Core + 6.66' Border = 47.23' x 59.50' System
		9,944 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	168.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	171.40'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	165.97'	**12.0" Round Culvert** L= 73.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.97' / 164.00' S= 0.0270 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.16 cfs @ 8.92 hrs HW=168.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=5.85 cfs @ 12.16 hrs HW=171.91' TW=166.20' (Dynamic Tailwater)
└**3=Culvert** (Passes 5.85 cfs of 7.73 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 5.85 cfs @ 2.34 fps)

Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8 - Chamber Wizard Field A

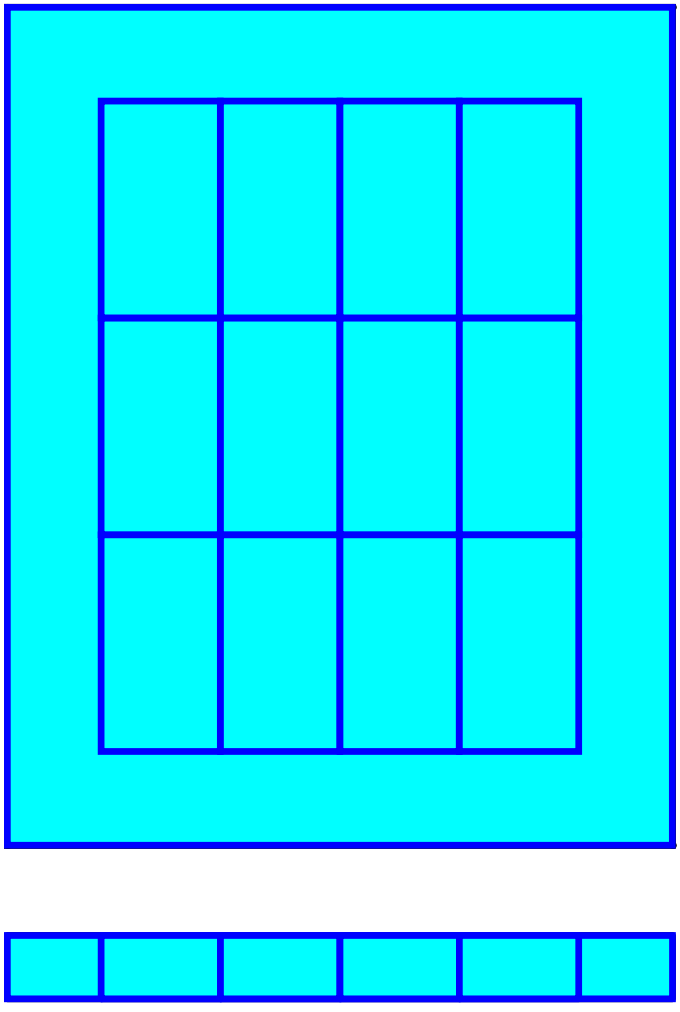
Chamber Model = StormTrap ST2 SingleTrap 4-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 48.0"H => 30.55 sf x 15.40'L = 470.3 cf
Outside= 101.7"W x 54.0"H => 38.16 sf x 15.40'L = 587.4 cf

3 Chambers/Row x 15.40' Long = 46.19' Row Length +79.9" Border x 2 = 59.50' Base Length
4 Rows x 101.7" Wide + 79.9" Side Border x 2 = 47.23' Base Width
54.0" Chamber Height = 4.50' Field Height

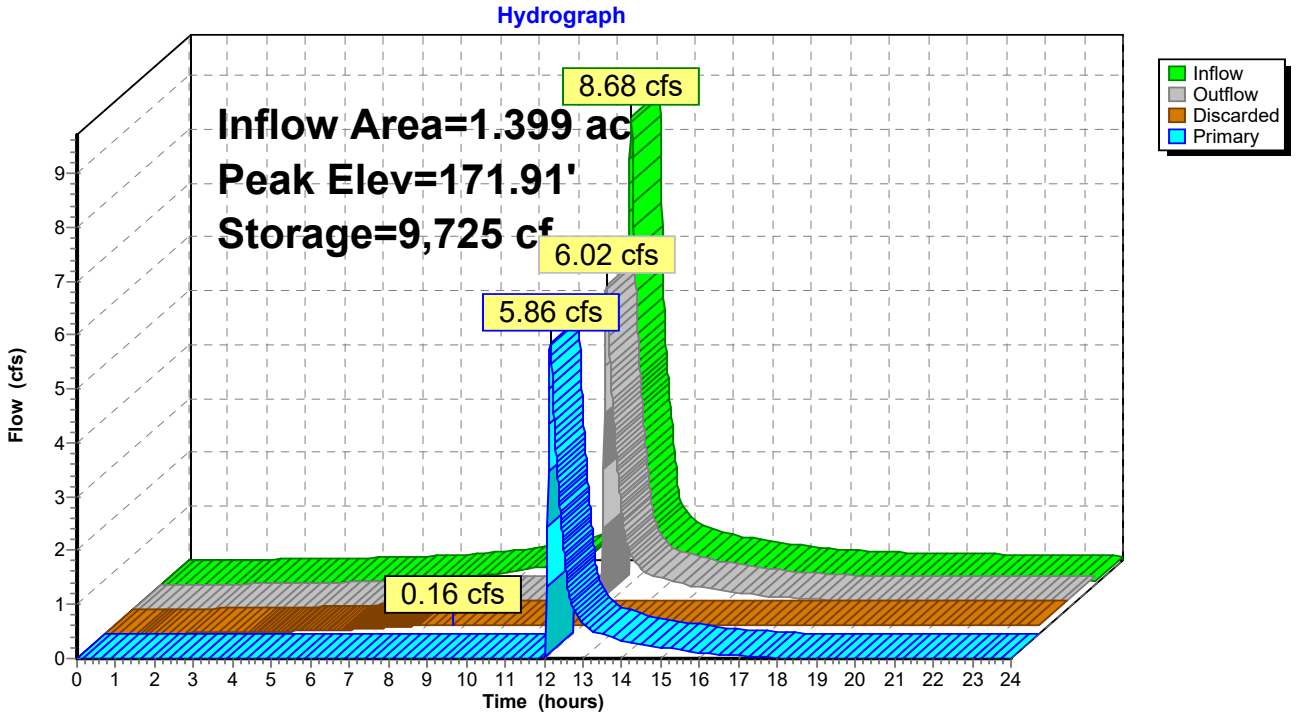
12 Chambers x 470.3 cf + 4,300.8 cf Border = 9,944.0 cf Chamber Storage
12 Chambers x 587.4 cf + 5,596.2 cf Border = 12,645.6 cf Displacement

Chamber Storage = 9,944.0 cf = 0.228 af
Overall Storage Efficiency = 78.6%
Overall System Size = 59.50' x 47.23' x 4.50'

12 Chambers (plus border)
468.4 cy Field



Pond 7P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 8



Summary for Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1

Inflow Area = 2.106 ac, 85.42% Impervious, Inflow Depth > 6.18" for 100-year event
Inflow = 13.66 cfs @ 12.08 hrs, Volume= 1.084 af
Outflow = 8.10 cfs @ 12.19 hrs, Volume= 0.930 af, Atten= 41%, Lag= 6.3 min
Discarded = 0.30 cfs @ 8.77 hrs, Volume= 0.459 af
Primary = 7.81 cfs @ 12.19 hrs, Volume= 0.471 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 177.97' @ 12.19 hrs Surf.Area= 5,289 sf Storage= 13,959 cf
Flood Elev= 178.00' Surf.Area= 5,289 sf Storage= 14,098 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 61.3 min (817.9 - 756.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.00'	0 cf	**38.75'W x 136.48'L x 3.50'H Field A** 18,510 cf Overall - 18,510 cf Embedded = 0 cf x 4.0% Voids
#2A	175.00'	14,098 cf	**StormTrap ST2 SingleTrap 3-0** x 24 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 3 Rows of 8 Chambers 25.44' x 123.17' Core + 6.66' Border = 38.75' x 136.48' System
		14,098 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	175.60'	**15.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.60' / 174.81' S= 0.0494 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#3	Device 2	177.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.30 cfs @ 8.77 hrs HW=175.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=7.81 cfs @ 12.19 hrs HW=177.97' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 7.81 cfs @ 6.36 fps)
└**3=Sharp-Crested Rectangular Weir** (Passes 7.81 cfs of 11.90 cfs potential flow)

Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1 - Chamber Wizard Field A

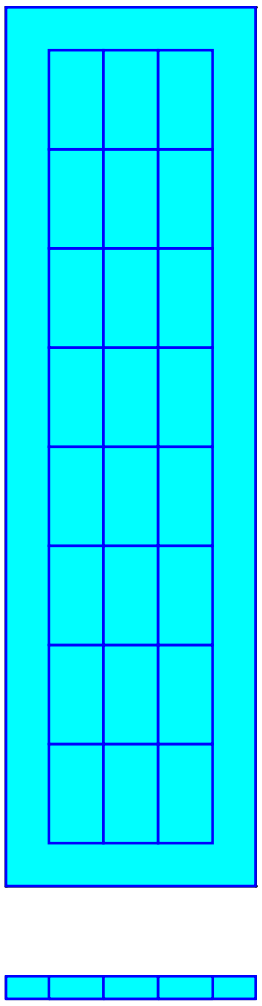
Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf
Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
42.0" Chamber Height = 3.50' Field Height

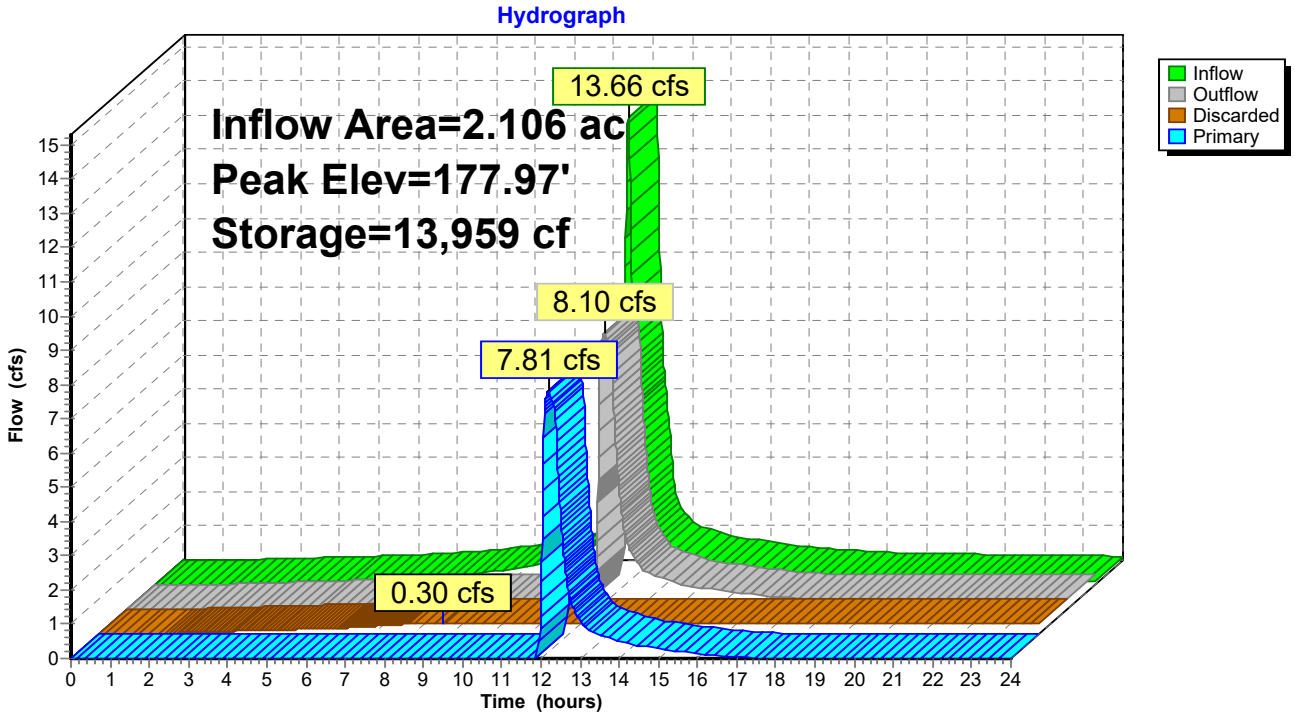
24 Chambers x 354.0 cf + 5,601.9 cf Border = 14,097.7 cf Chamber Storage
24 Chambers x 456.9 cf + 7,544.3 cf Border = 18,510.0 cf Displacement

Chamber Storage = 14,097.7 cf = 0.324 af
Overall Storage Efficiency = 76.2%
Overall System Size = 136.48' x 38.75' x 3.50'

24 Chambers (plus border)
685.6 cy Field



Pond 8P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 1



Summary for Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4

Inflow Area = 1.802 ac, 90.05% Impervious, Inflow Depth > 6.25" for 100-year event
Inflow = 11.73 cfs @ 12.08 hrs, Volume= 0.939 af
Outflow = 4.55 cfs @ 12.31 hrs, Volume= 0.875 af, Atten= 61%, Lag= 13.3 min
Discarded = 0.43 cfs @ 10.05 hrs, Volume= 0.630 af
Primary = 4.12 cfs @ 12.31 hrs, Volume= 0.245 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 190.47' @ 12.31 hrs Surf.Area= 7,772 sf Storage= 13,442 cf
Flood Elev= 190.50' Surf.Area= 7,772 sf Storage= 13,644 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 111.8 min (864.6 - 752.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	188.50'	0 cf	**64.19'W x 121.08'L x 2.50'H Field A** 19,430 cf Overall - 19,430 cf Embedded = 0 cf x 40.0% Voids
#2A	188.50'	13,644 cf	**StormTrap ST2 SingleTrap 2-0** x 42 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 6 Rows of 7 Chambers 50.88' x 107.77' Core + 6.66' Border = 64.19' x 121.08' System
		13,644 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	188.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Device 3	190.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Primary	188.37'	**12.0" Round Culvert** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.37' / 188.12' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.43 cfs @ 10.05 hrs HW=188.53' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.43 cfs)

Primary OutFlow Max=4.12 cfs @ 12.31 hrs HW=190.47' TW=0.00' (Dynamic Tailwater)
└**3=Culvert** (Passes 4.12 cfs of 4.16 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 4.12 cfs @ 2.24 fps)

Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4 - Chamber Wizard Field A

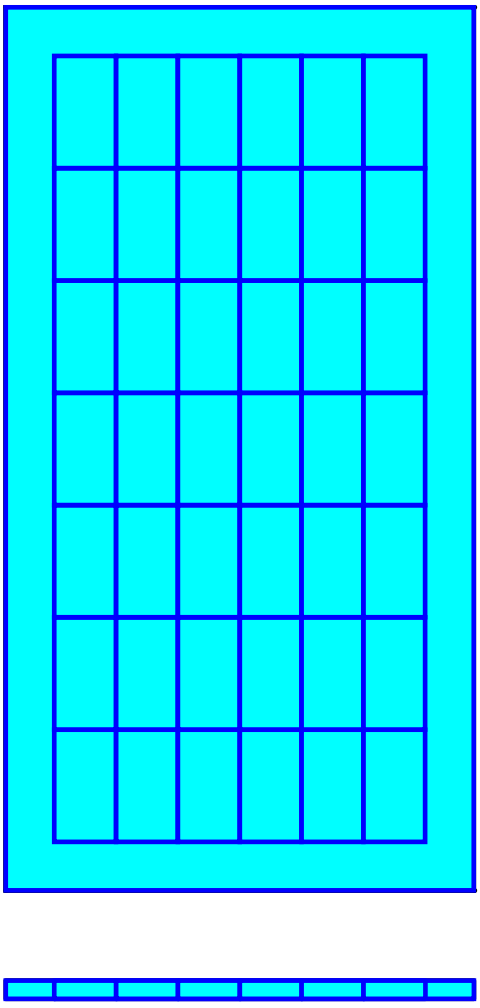
Chamber Model = StormTrap ST2 SingleTrap 2-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf
Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

7 Chambers/Row x 15.40' Long = 107.77' Row Length +79.9" Border x 2 = 121.08' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
30.0" Chamber Height = 2.50' Field Height

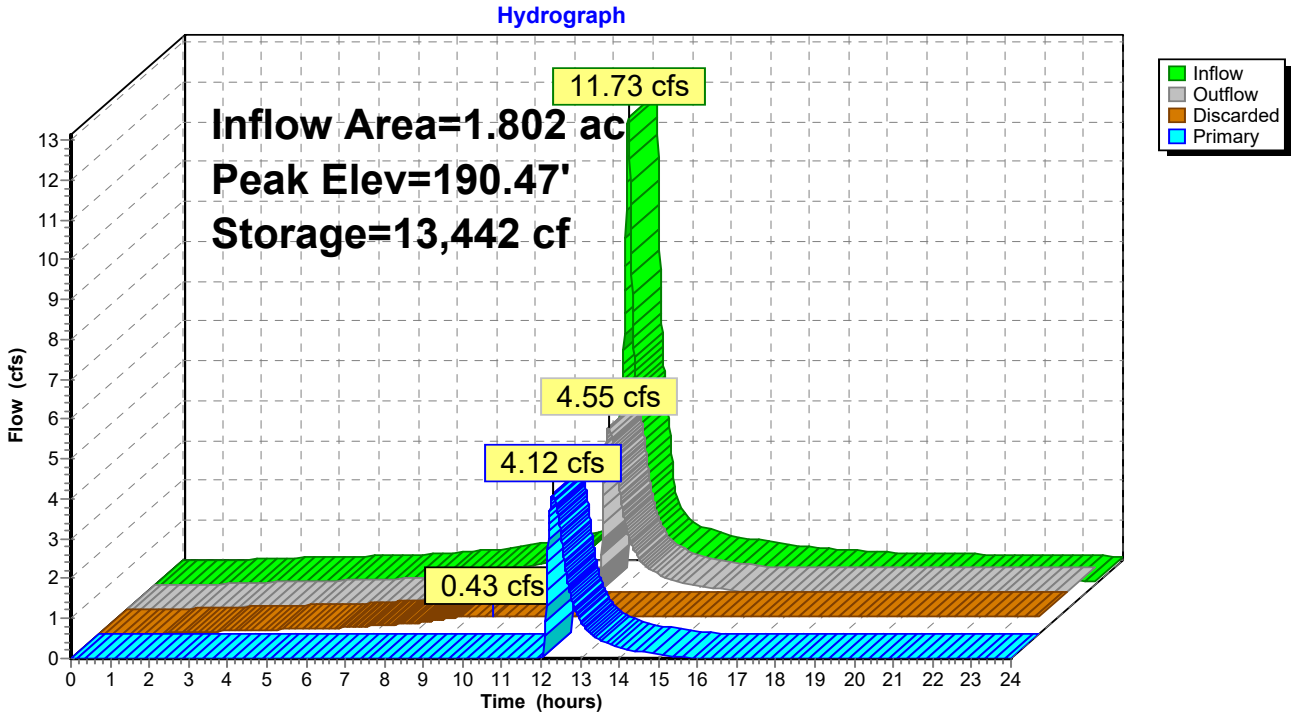
42 Chambers x 231.7 cf + 3,913.9 cf Border = 13,644.0 cf Chamber Storage
42 Chambers x 326.4 cf + 5,723.0 cf Border = 19,430.1 cf Displacement

Chamber Storage = 13,644.0 cf = 0.313 af
Overall Storage Efficiency = 70.2%
Overall System Size = 121.08' x 64.19' x 2.50'

42 Chambers (plus border)
719.6 cy Field



Pond 9P: PRECAST UNDERGROUND INFILTRATION SYSTEM - 4



Summary for Pond 11P: Bio-Retention Area

Inflow Area = 1.956 ac, 49.24% Impervious, Inflow Depth > 2.89" for 100-year event
Inflow = 8.06 cfs @ 12.15 hrs, Volume= 0.472 af
Outflow = 2.82 cfs @ 12.50 hrs, Volume= 0.257 af, Atten= 65%, Lag= 20.6 min
Primary = 2.82 cfs @ 12.50 hrs, Volume= 0.257 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 167.81' @ 12.50 hrs Surf.Area= 3,463 sf Storage= 10,222 cf
Flood Elev= 168.00' Surf.Area= 3,556 sf Storage= 10,873 cf

Plug-Flow detention time= 146.3 min calculated for 0.257 af (54% of inflow)
Center-of-Mass det. time= 72.9 min (864.4 - 791.5)

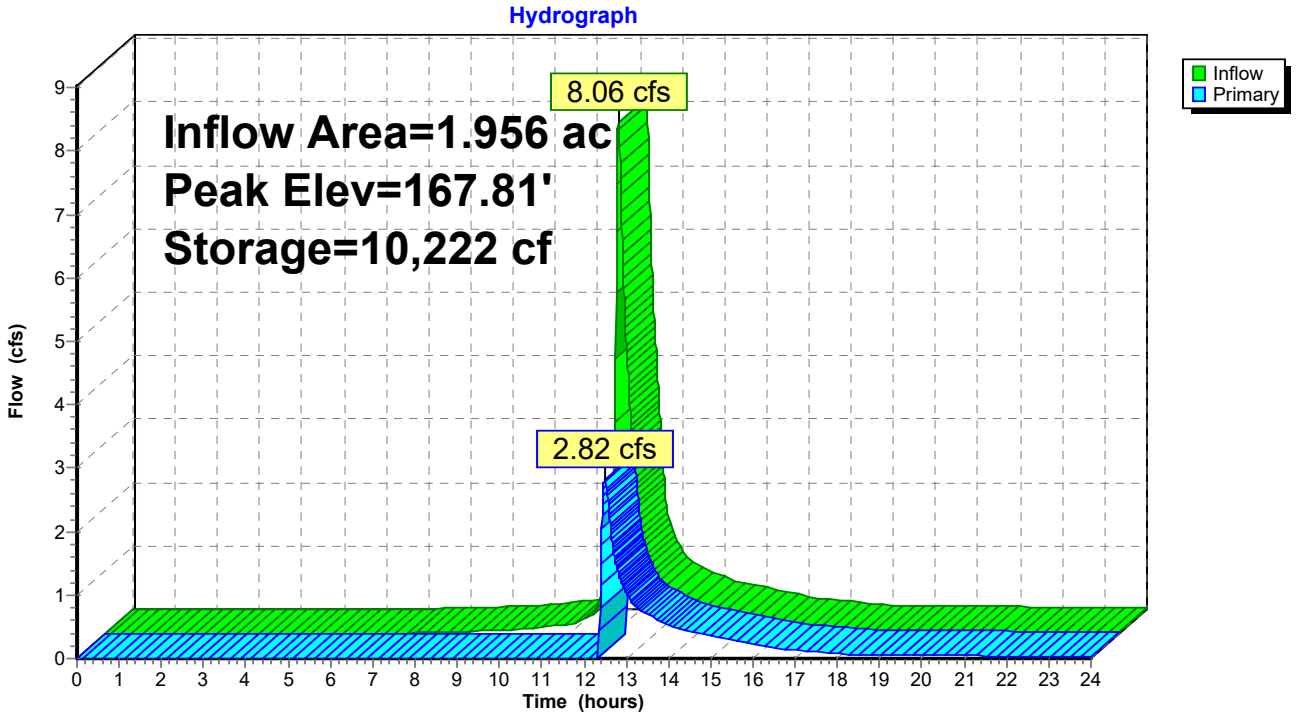
Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	10,873 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	448	0	0
164.00	1,319	884	884
166.00	2,557	3,876	4,760
168.00	3,556	6,113	10,873

Device	Routing	Invert	Outlet Devices
#1	Primary	167.55'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.82 cfs @ 12.50 hrs HW=167.81' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.82 cfs @ 1.33 fps)

Pond 11P: Bio-Retention Area



SECTION 7.0

ADDITIONAL DRAINAGE CALCULATIONS

7.01 TSS REMOVAL CALCULATIONS

TSS Removal Calculation Worksheet

Location: Holbrook, MA

Project: 50017.10

BSC GROUP

Prepared By: J. Daley

Date: 07/6/2022

Proposed Watershed Areas - 11S, 13S, 22S

Pretreatment - CB/WQU

Total Impervious Area, Acres= 2.620

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Deep Sump and Hooded Catchbasins	0.25	1.00	0.25	0.75
Water Quality Unit	0.77	0.75	0.58	0.17
Infiltration Basin	0.8	0.17	0.14	0.03

TSS Removal = 0.97

Proposed Watershed Areas - 30S

Pretreatment - CB/Forebay

Total Impervious Area, Acres= 0.076

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Deep Sump and Hooded Catchbasins	0.25	1.00	0.25	0.75
Forebay	0.25	0.75	0.19	0.56
Bio-Retention Area	0.9	0.56	0.50	0.06

TSS Removal = 0.94

Proposed Watershed Areas - 10S, 12S

Pretreatment - None (roof)

Total Impervious Area, Acres= 0.859

A	B	C	D	E
BMP	TSS Removal Rate	Starting TSS Load*	Amount Removed (BxC)	Remaining Load (C-D)
Infiltration Basin	0.8	1.00	0.80	0.20

TSS Removal = 0.80

WEIGHTED AVERAGE

Total =Sum(Watershed Impervious Area * TSS Removal Rate)

Sum(Impervious Area)

Total Site TSS Removal = 0.93

*Equals remaining load from previous BMP (E)

7.02 GROUNDWATER RECHARGE VOLUME CALCULATIONS

Required Recharge Volume

Rv = F x Impervious Area

Where:

Rv = Recharge Volume

F=Target Depth Factor associated with each Hydrologic Soil Group

(F=0.10-inch for Soil Type D)

Impervious Area = Proposed Pavement and Rooftop area on The Arcadia site

$$Rv = \frac{0.10in}{12}\left(8.919\text{ac x } 43{,}560\,\frac{\text{sf}}{\text{ac}}\right) =$$

Rv = 3,237 cf (required recharge volume)

Structural Storage Provided:

- Underground Infiltration Systems=26,751 cubic feet provided for The Arcadia site. Refer to the HydroCAD calculations for more information.

7.03 STORAGE DRAWDOWN CALCULATIONS

CALCULATION SHEET

BSC GROUP

Project No	50017.10	**Calc By**	JD
Subject	Drawdown Time	**Date**	7/6/2022
Location	Weymouth Street	**Checked By**	DR
	Holbrook, MA	**Date**	

Standard 3 - Infiltration BMPs must drain fully within 72 hours

Infiltration System 1

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$ *(← from MA Stormwater Handbook)*

Where:
Rv = Storage Volume
K = Saturated Hydraulic Conductivity (for "Static Method" use Rawls Rate)
K = 2.41 in/hr ("A" Soils) = 0.201 ft/hr
Bottom Area = Bottom Area of Recharge Structure

Subsurface infiltartion System
Storage Volume from Elevation 175.00 - 176.60 = 9,398 cf

$$Time_{drawdown} = \frac{9{,}398\ ft^3}{(0.201\ \frac{ft}{hr})(5{,}289\ ft^2)}$$

$$Time_{drawdown} = 8.84\ hours$$

Infiltration System 2

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$ *(← from MA Stormwater Handbook)*

Where:
Rv = Storage Volume
K = Saturated Hydraulic Conductivity (for "Static Method" use Rawls Rate)
K = 1.02 in/hr ("B" Soils) = 0.085 ft/hr
Bottom Area = Bottom Area of Recharge Structure

Subsurface infiltartion System
Storage Volume from Elevation 178.00 - 179.50 = 8,928 cf

$$Time_{drawdown} = \frac{8{,}928\ ft^3}{(0.085\ \frac{ft}{hr})(6{,}784\ ft^2)}$$

$$Time_{drawdown} = 15.48\ hours$$

CALCULATION SHEET

BSC GROUP

Project No	50017.10	**Calc By**	JD
Subject	Drawdown Time	**Date**	7/6/2022
Location	Weymouth Street	**Checked By**	DR
	Holbrook, MA	**Date**	

Standard 3 - Infiltration BMPs must drain fully within 72 hours

Infiltration System 8

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$ *(← from MA Stormwater Handbook)*

Where:

Rv = Storage Volume

K = Saturated Hydraulic Conductivity (for "Static Method" use Rawls Rate)

K = 2.41 in/hr ("A" Soils) = 0.201 ft/hr

Bottom Area = Bottom Area of Recharge Structure

Subsurface infiltartion System

Storage Volume from Elevation 168.00 - 171.40 = 8,425 cf

$$Time_{drawdown} = \frac{8{,}425\ ft^3}{(0.201\ \frac{ft}{hr})(2{,}810\ ft^2)}$$

$$Time_{drawdown} = 14.92\ hours$$

7.04 WATER QUALITY SIZING CALCULATIONS

Calculation Sheet

BSC GROUP

Project No.	50017.10	**Calc By**	JW
Subject	Proprietary WQV Sizing	**Date**	7/6/2022
Location	Holbrook, MA	**Checked by**	DR
		Date	

Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Systems

WQU #1

For 1-inch Water Quality Volume Requirement

Q = (qu)(A)(WQV) **0.74** **cfs**

Q = peak flow rate associated with the first 1-inch of runoff

qu = the unit peak discharge (csm/in) 774 see Figure 4 for Tc=0.1 hours)

A = impervious surface (sq.miles) 0.0010

WQV = water quality volume (in) 1

Treatment Capacity of CDS Model 1515-3 = 1.0 CFS

Calculation Sheet

BSC GROUP

Project No.	50017.10	**Calc By**	JW
Subject	Proprietary WQV Sizing	**Date**	7/6/2022
Location	Holbrook, MA	**Checked by**	DR
		Date	

Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Systems

WQU #2

For 1-inch Water Quality Volume Requirement

Q = (qu)(A)(WQV) **0.67** **cfs**

Q = peak flow rate associated with the first 1-inch of runoff

qu = the unit peak discharge (csm/in) 774 see Figure 4 for Tc=0.1 hours)

A = impervious surface (sq.miles) 0.0009

WQV = water quality volume (in) 1

Treatment Capacity of CDS Model 1515-3 = 1.0 CFS

Calculation Sheet

BSC GROUP

Project No.	50017.10	**Calc By**	JW
Subject	Proprietary WQV Sizing	**Date**	7/6/2022
Location	Holbrook, MA	**Checked by**	DR
		Date	

Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Systems

WQU #3

For 1-inch Water Quality Volume Requirement

Q = (qu)(A)(WQV) **0.16** **cfs**

Q = peak flow rate associated with the first 1-inch of runoff

qu = the unit peak discharge (csm/in) 774 see Figure 4 for Tc=0.1 hours)

A = impervious surface (sq.miles) 0.0002

WQV = water quality volume (in) 1

Treatment Capacity of CDS Model 2015-4 = 1.4 CFS

Calculation Sheet

BSC GROUP

Project No.	50017.10	**Calc By**	JW
Subject	Proprietary WQV Sizing	**Date**	7/6/2022
Location	Holbrook, MA	**Checked by**	DR
		Date	
			REV 9-28-18

Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Systems

WQU #4

For 1-inch Water Quality Volume Requirement

Q = (qu)(A)(WQV) **0.58** **cfs**

Q = peak flow rate associated with the first 1-inch of runoff

qu = the unit peak discharge (csm/in) 774 see Figure 4 for Tc=0.1 hours)

A = impervious surface (sq.miles) 0.0008

WQV = water quality volume (in) 1

Treatment Capacity of CDS Model 1515-3 = 1.0 CFS

Calculation Sheet

BSC GROUP

Project No.	50017.00	**Calc By**	CT
Subject	Proprietary WQV Sizing	**Date**	4/26/2018
Location	Holbrook, MA	**Checked by**	DR
		Date	4/26/2018
			REV 9-28-18

Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Systems

WQU #5

For 1-inch Water Quality Volume Requirement

Q = (qu)(A)(WQV) **0.51** **cfs**

Q = peak flow rate associated with the first 1-inch of runoff

qu = the unit peak discharge (csm/in) 774 see Figure 4 for Tc=0.1 hours)

A = impervious surface (sq.miles) 0.0007

WQV = water quality volume (in) 1

Treatment Capacity of CDS Model 1515-3 = 1.0 CFS

7.05 WATER QUALITY VOLUME CALCULATIONS

Water Quality Volume Calculation

V_{WQ} = (D_{WQ}/12 inches/foot) * (A_{IMP} square feet)

V_{WQ} = Required Water Quality Volume (in cubic feet)
D_{WQ} = Water Quality Depth: **1.0-inch** used for discharges to other areas.
A_{IMP} = Total Impervious Area (in acres) used for driveways, parking, etc.

Underground Infiltration Systems

A_{IMP} = 8.919 ac

V_{WQ} = (1 inches/12 inches/foot) * (8.919 ac x 43,560 square feet/ac)

V_{WQ} = 32,375 cubic feet (required volume), provided volume = 35,946 cubic feet (refer to HydroCAD)

7.06 RIP-RAP OUTLET PROTECTION SIZING

OUTLET PROTECTION SIZING

BSC GROUP

Project No. 50017.10
Subject Outlet Protection Sizing Calcs
Location Holbrook, MA

Calc By J. Daley
Date 7/6/2022
Checked by D. Rinaldi
Date

FES-1

Q=Design Discharge, (ft^3/s) = 7.68 cfs
D=Culvert Diameter, (ft) = 1.25 ft
TW=Tailwater Depth, (ft) = 0.5 ft, (0.4xD for unknow tailwater, or enter known tailwater)
(Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$$D_{50} = 0.2D\left[\frac{Q}{\sqrt{gD^{2.5}}}\right]^{4/3}\left[\frac{D}{TW}\right]$$

g=32.2 fps
D_{50} = median rock size, ft

$$D_{50} = 0.28\,\frac{7.68}{9.91}\,(4/3)\,\frac{1.25}{0.50} = 0.50 \text{ ft}$$

= **5.98 inches**

Table 1 : Riprap Classes and Apron Dimensions

Class	D_{50} (in)	Apron Length	Apron Depth	
1	5	4D	$3.5D_{50}$	
2	**6**	**4D**	**$3.5D_{50}$**	**Use Class 2**
3	10	5D	$3.3D_{50}$	
4	14	6D	$2.2D_{50}$	
5	20	7D	$2.0D_{50}$	
6	22	8D	$2.0D_{50}$	

Apron Dimensions
Length, L=4D = **5 ft**
Depth=$3.5D_{50}$ = **21.00 Inches**
Width=3D+(2/3)L = **7.08 ft** (at apron end)

Riprap Rock Sizing Gradation

Given Size	Size of Stone, inches		
100	**9**	to	**12**
85	**8**	to	**11**
50	**6**	to	**9**
15	**3**	to	**8**

FES-2

Q=Design Discharge, (ft^3/s) = 2.77 cfs
D=Culvert Diameter, (ft) = 1.00 ft
TW=Tailwater Depth, (ft) = 0.4 ft, (0.4xD for unknow tailwater, or enter known tailwater)
(Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$$D_{50} = 0.2D\left[\frac{Q}{\sqrt{gD^{2.5}}}\right]^{4/3}\left[\frac{D}{TW}\right]$$

g=32.2 fps
D_{50} = median rock size, ft

$$D_{50} = 0.28\,\frac{2.77}{5.67}\,(4/3)\,\frac{1.00}{0.40} = 0.27 \text{ ft}$$

= **3.23 inches**

Table 1 : Riprap Classes and Apron Dimensions

Class	D_{50} (in)	Apron Length	Apron Depth	
1	5	4D	$3.5D_{50}$	
2	**6**	**4D**	**$3.5D_{50}$**	**Use Class 2**
3	10	5D	$3.3D_{50}$	
4	14	6D	$2.2D_{50}$	
5	20	7D	$2.0D_{50}$	
6	22	8D	$2.0D_{50}$	

Apron Dimensions
Length, L=4D = **4 ft**
Depth=$3.5D_{50}$ = **21.00 Inches**
Width=3D+(2/3)L = **5.67 ft** (at apron end)

Riprap Rock Sizing Gradation

Given Size	Size of Stone, inches		
100	**9**	to	**12**
85	**8**	to	**11**
50	**6**	to	**9**
15	**3**	to	**8**

Reference Note: Sizing based in accordance with HEC #14 as required by MassHighway Design Manual

OUTLET PROTECTION SIZING

BSC GROUP

Project No. 50017.10
Subject Outlet Protection Sizing Calcs
Location Holbrook, MA

Calc By J. Daley
Date 7/6/2022
Checked by D. Rinaldi
Date

FES-3

Q=Design Discharge, (ft^3/s) = 5.83 cfs
D=Culvert Diameter, (ft) = 1.00 ft
TW=Tailwater Depth, (ft) = 0.4 ft, (0.4xD for unknow tailwater, or enter known tailwater)
(Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$$D_{50} = 0.2D\left[\frac{Q}{\sqrt{gD^{2.5}}}\right]^{4/3}\left[\frac{D}{TW}\right]$$

g=32.2 fps
D_{50} = median rock size, ft

$$D_{50} = 0.28\,\frac{5.83}{5.67}\,(4/3)\,\frac{1.00}{0.40} = 0.73 \text{ ft}$$

= **8.71 inches**

Table 1 : Riprap Classes and Apron Dimensions

Class	D_{50} (in)	Apron Length	Apron Depth	
1	5	4D	$3.5D_{50}$	
2	**6**	**4D**	**$3.5D_{50}$**	
3	10	5D	$3.3D_{50}$	**Use Class 3**
4	14	6D	$2.2D_{50}$	
5	20	7D	$2.0D_{50}$	
6	22	8D	$2.0D_{50}$	

Apron Dimensions
Length, L=5D = **5 ft**
Depth=$3.3D_{50}$ = **19.80 Inches**
Width=3D+(2/3)L = **6.33 ft** (at apron end)

Riprap Rock Sizing Gradation

Given Size	Size of Stone, inches		
100	**9**	to	**12**
85	**8**	to	**11**
50	**6**	to	**9**
15	**3**	to	**8**

FES-14

Q=Design Discharge, (ft^3/s) = 2.99 cfs
D=Culvert Diameter, (ft) = 1.00 ft
TW=Tailwater Depth, (ft) = 0.4 ft, (0.4xD for unknow tailwater, or enter known tailwater)
(Tailwater depth is to be limited to between 0.4D and 1.0D)

Riprap Rock Sizing

$$D_{50} = 0.2D\left[\frac{Q}{\sqrt{gD^{2.5}}}\right]^{4/3}\left[\frac{D}{TW}\right]$$

g=32.2 fps
D_{50} = median rock size, ft

$$D_{50} = 0.28\,\frac{2.99}{5.67}\,(4/3)\,\frac{1.00}{0.40} = 0.30 \text{ ft}$$

= **3.57 inches**

Table 1 : Riprap Classes and Apron Dimensions

Class	D_{50} (in)	Apron Length	Apron Depth	
1	5	4D	$3.5D_{50}$	
2	**6**	**4D**	**$3.5D_{50}$**	**Use Class 2**
3	10	5D	$3.3D_{50}$	
4	14	6D	$2.2D_{50}$	
5	20	7D	$2.0D_{50}$	
6	22	8D	$2.0D_{50}$	

Apron Dimensions
Length, L=4D = **4 ft**
Depth=$2.5D_{50}$ = **15.00 Inches**
Width=3D+(2/3)L = **5.67 ft** (at apron end)

Riprap Rock Sizing Gradation

Given Size	Size of Stone, inches		
100	**9**	to	**12**
85	**8**	to	**11**
50	**6**	to	**9**
15	**3**	to	**8**

Reference Note: Sizing based in accordance with HEC #14 as required by MassHighway Design Manual

APPENDIX A

USGS LOCUS MAP

Document Path: \\bscbos\yar\GIS-YAR\GISPrj\0000000\5001700\MXD\20160729_Portrait_Locus.mxd
Date Saved: 7/29/2016 2:16:35 PM

Scale:
1 inch = 2,000 feet
(page size, 8.5 X 11)
0 1,000 2,000
Feet

WEYMOUTH STREET, HOLBROOK

USGS Site Location Map

Source: USGS, 1982-1990; MADOT, 2005; MassGIS, 2008

BSC GROUP

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