

MARIA WESTON CHAPMAN MIDDLE SCHOOL
1051 COMMERCIAL STREET
Weymouth, MA 02189

STORMWATER MANAGEMENT REPORT

Submitted to:

Town of Weymouth Board of Zoning Appeals and Planning Board

Applicant:

Town of Weymouth
75 Middle Street
Weymouth, MA 02189

Architect:

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

Landscape Architect:

IBI Group
21 Custom House St. #300
Boston, MA 02110

Civil Engineer/Land Surveyor:

Samiotes Consultants, Inc.
20 A Street
Framingham, MA 01701

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MARIA WESTON CHAPMAN MIDDLE SCHOOL STORMWATER MANAGEMENT NARRATIVE WEYMOUTH, MA

Existing Stormwater Management:

The existing campus, located at 1051 Commercial Street in Weymouth, MA, consists of an existing middle school with associated paved parking areas, landscaped and play areas, and infrastructure/utilities. The site is bounded by Commercial Street to the northeast, Chard Street to the southwest, Anthony Road to the west, and residential properties along the remaining perimeter not abutting the right of ways. The impervious areas on site consist of the existing parking lots, access drives, walkways, sheds, and the existing school building. The pervious areas include grassed/ landscaped areas and a small wooded area in the southern corner of the site.

In the existing condition, the site has minimal stormwater management control and treatment. Stormwater generally sheet flows west to east and is collected in the main parking areas through a system of catch basins and drain manholes. It is then conveyed off site to the east through parallel 18 inch and 42 inch reinforced concrete pipes to the Putnam Street drainage system.

In addition to the site drainage collection, there is also a 36" RCP drainage main that bisects the site, entering through the parking area on Chard Street and connecting to the 42" RCP drain at the eastern edge of the property. This existing 36" RCP drain will be maintained and protected throughout the project.

Methodology/ Procedure

The proposed stormwater system will consist of deep sump catch basins, rain gardens, a bioswale, water quality units, and an underground infiltration system. The runoff from the primary parking areas, driveways, walkways, and landscaped areas will be collected via a network of deep sump catch basins and manholes, before discharging to the infiltration system. For storm events where stormwater cannot be held entirely within the underground system, an outlet control structure is proposed discharging to the existing 42" RCP stormwater pipe on the east side of the site.

The runoff from the driveways, walkways, parking, and landscaped areas to the northeast of the proposed building will be collected via a network of deep sump catch basins and manholes with a proprietary water quality unit at the terminal end of the system prior to discharge to the 18" and 42" RCP existing stormwater pipes on the east side of the site. See the Proposed Watersheds section within this report for additional information.

The runoff from the west side loading area with the dumpster enclosure, paved parking and walkways, and proposed landscaping will be collected via a network of deep sump catch basins, trench drains, and manholes with a proprietary water quality unit at the terminal end of the system prior to discharge to the existing 36" drainage main that bisects the site.

Runoff from the building roof will be split up into four different sections, with the main roof being routed directly to the east side of the site to the 42" RCP existing stormwater pipe. Three of the outer roof wings will be routed through a series of rain gardens where they will be treated, and then will discharge to the 18" and 42" RCP municipal drain on the east side of the site. See the Proposed Watersheds section for details.

Watershed Routing

Below is a summary of the various existing and proposed watersheds with a brief narrative describing the routing. The descriptions of the watersheds are depicted in sketches Ex-HYD and P-HYD located in the Appendices of this report. The hydrology maps show three points of analysis (POA) in both the existing conditions and the proposed plan. POA-1 represents the culmination point of stormwater within the Putnam Street municipal drainage system on the east side of the property. POA-2 represents the area north and east of the site that is not collected in the existing or proposed stormwater system and sheet flows to the municipal stormwater system within Commercial Street. POA-3 represents sheet flows to the east side of the site flowing overland to the residential properties on the east side of the site.

Existing Watersheds:

Ex- Watershed-1: This watershed consists of the existing building, parking lot, access road, landscaped areas, playground areas, and existing wooded areas. The runoff from this watershed sheets directly to the east side of the site, or into a network of catch basins as part of the existing stormwater management system that outlets through the two drain easements at the southeast boundary, defined as POA-1.

Ex- Watershed-2: This watershed consists of a small area of landscaping and a portion of the driveway in the north of the site. This area sheets directly off site into Commercial Street and is collected by the existing stormwater system in the right of way, defined as POA-2.

Ex- Watershed-3: This watershed consists of a small landscaped area at the east entrance to the site that sheets off site into the neighboring property, defined as POA-3.

Proposed Watersheds:

P- Watershed-1: This watershed consists of the primary parking areas on the southeast side of the site. This area consists of paved parking areas, paved driveways, walkways, landscaping, and wooded areas. Stormwater sheet flows to the proposed deep sump catch basins and is conveyed to proposed infiltration system UGS-1. In larger storm events, the infiltration system utilizes an outlet control structure to control stormwater flows from the system, which discharge to the existing 42" RCP municipal drain pipe on the east side of the site, culminating in the Putnam Street drainage system defined as Point of Analysis 1 (POA-1).

P- Watershed-2: This watershed consists of proposed landscaped areas and paved driveways, walkways, and parking in the northeast portion of the site. Stormwater runoff is captured by a network of deep sump catch basins and area drains and conveyed to a proposed water quality unit prior to discharge to the existing 18" RCP stormwater pipe on the east side of the site. Flows from this watershed culminate within the Putnam Street drainage system defined as Point of Analysis 1 (POA-1).

P- Watershed-3: This watershed consists of proposed landscaped areas and paved driveways, walkways, and parking on the east side of the site. Stormwater runoff is captured by a network of deep sump catch basins and conveyed to a proposed water quality unit prior to discharge to the existing 42" RCP stormwater pipe on the east side of the site. Flows from this watershed culminate within the Putnam Street drainage system defined as Point of Analysis 1 (POA-1).

P- Watershed-4: This watershed consists of a portion of landscaped area at the north west edge of the site along Commercial Street. Stormwater sheet flows overland to the existing Commercial Street drainage system, defined as Point of Analysis 2 (POA-2).

P- Watershed-5: This watershed consists of a portion of landscaped area at the northeast end of the site along Commercial Street. The runoff from this watershed sheet flows overland to the residential properties to the east of the site, defined as Point of Analysis 3 (POA-3).

P- Watershed-6: This watershed consists of paved parking area, walkways, and landscaping on the west side of the site. Stormwater sheet flows to a series of deep sump catch basins and a trench drain for the proposed loading area. Flows are conveyed to a proposed water quality unit prior to discharge to the existing 15" RCP drain pipe on the south side of the site. This existing pipe connects to the 36" stormwater main that is proposed to be maintained as part of the project, discharging to the existing 42" RCP stormwater pipe on the east side of the site, which culminates at POA-1.

BLDG: This watershed consists of the main portion of the roof that is routed via roof drain downspouts and underground piping to the existing 36" RCP drainage main on the property that is proposed to be maintained throughout construction. Flows from the existing 36" pipe discharge to the existing 42" RCP pipe on the east side of the site and to the Putnam Street drainage system, defined as Point of Analysis 1 (POA-1).

BLDG-B: This watershed consists of the "B" wing of the roof that is being routed through a bioswale and into rain garden RG-2, before discharging to the municipal system in the event of a larger stormwater event. (POA-1)

BLDG-E: This watershed consists of the "E" wing of the roof that is being routed into rain garden RG-3, before discharging to the municipal system in the event of a larger stormwater event. (POA-1)

BLDG-F: This watershed consists of the "F" wing of the roof that is being routed into rain garden RG-1, before discharging to the municipal system in the event of a larger stormwater event. (POA-1)

Results/ Summary

Analysis:

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

Results of Analysis:

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

As shown in Tables 1, 2, and 3, the post development peak rates of runoff from the site will be mitigated.

Table 1 – POA-1 : Peak Rates of Runoff				
	2-year storm (cfs)	10-year storm (cfs)	25-year storm (cfs)	100-year storm (cfs)
Existing	37.16	53.44	66.05	88.23
Proposed	22.99	49.36	64.97	86.93

Table 2 – POA-2 : Peak Rates of Runoff				
	2-year storm (cfs)	10-year storm (cfs)	25-year storm (cfs)	100-year storm (cfs)
Existing	0.07	0.33	0.57	1.05
Proposed	0.01	0.15	0.39	0.92

Table 2 – POA-3 : Peak Rates of Runoff				
	2-year storm (cfs)	10-year storm (cfs)	25-year storm (cfs)	100-year storm (cfs)
Existing	0.00	0.03	0.07	0.18
Proposed	0.00	0.00	0.03	0.13

Stormwater Management Standards

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

Standard #1: Untreated Stormwater

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

Therefore Standard #1 is met.

Standard #2: Post-development peak discharge rates

The proposed construction of the Maria Weston Chapman Middle School will result in an overall site increase in impervious area. The proposed stormwater management system has been designed so that there is no increase in post construction discharge rates from the site for each point of analysis. See Tables 1, 2 and 3 of this report for existing and proposed flows to the Points of Analysis, showing that Standard #2 is met.

Standard #3: Recharge to groundwater

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

Soil types have been identified based on the information contained in the Soil Report. Based on the soil borings and test pits that were performed, logs of which are located in the appendices of this report, we have determined that the soils are consistent with Hydrologic soil types "A", "C", and "D" which require runoff to be infiltrated (as listed in the table below) from new impervious areas.

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

Area of new impervious is located within "A", "C" and "D" soils, however the calculations for required recharge volume have been conservative based on HSG "A" requirements.

"A" Soils

Infiltration Rate: 0.60 inches of runoff
Proposed Site New Impervious Area in "C" Soils: 33,976 sf
 $33,976 \text{ sf} \times 0.60 \times (1/12) = 1,698 \text{ cf}$

Total required recharge volume: 1,698 cf

Proposed Recharge Volume:
Rain Garden RG-1 = 1,559 cf
Rain Garden RG-2 = 1,290 cf
Rain Garden RG-3 = 678 cf
Infiltration System UGS-1 = 11,507 cf
Total provided recharge volume: 15,034 cf

Drawdown Time:

UGS-1 (maximum time 72 hours) = $11,507 \text{ cf} / (2.40 \text{ in/hr} \times 4,784 \text{ sf} / 12 \text{ in/ft}) = 12.03 \text{ hours}$

RG-1 (maximum time 72 hours) = $1,559 \text{ cf} / (1.02 \text{ in/hr} \times 2,502 \text{ sf} / 12 \text{ in/ft}) = 7.33 \text{ hours}$

RG-2 (maximum time 72 hours) = $1,087 \text{ cf} / (0.52 \text{ in/hr} \times 1,980 \text{ sf} / 12 \text{ in/ft}) = 12.67 \text{ hours}$

RG-3 (maximum time 72 hours) = $513 \text{ cf} / (0.52 \text{ in/hr} \times 1,049 \text{ sf} / 12 \text{ in/ft}) = 11.29 \text{ hours}$

Therefore Standard #3 is met.

Standard #4: TSS removal

The BMP's selected to remove TSS from impervious areas for this include: Deep Sump Catch Basins (CB), Water Quality Units (WQU), & Infiltration systems. Building roof runoff is considered "clean" and therefore does not require TSS removal, however the rain garden systems proposed do provide TSS removal for the BLDG-B, BLDG-E, and BLDG-F watersheds.

P-Watershed-1: (Road, Walkways, Main Building Roof Area)

Deep Sump Catch Basin: $(1.00)(1.00-0.25) = 0.75$

Infiltration System: $(0.75)(1.00-0.80) = 0.15$

Total TSS Removal = 85%

BLDG-B, BLDG-E, BLDG-F: ("B", "E", & "F" Wings Building Roof Areas)

Rain Garden: $(1.00)(1.00-0.90) = 0.10$

Total TSS Removal = 90%

P-Watershed-2: (Road, Walkways)

Deep Sump Catch Basin: $(1.00)(1.00-0.25) = 0.75$

Water Quality Unit: $(0.75)(1.00-0.80) = 0.15$

Total TSS Removal = 85%

P-Watershed-3: (Road, Walkways)

Deep Sump Catch Basin: $(1.00)(1.00-0.25) = 0.75$

Water Quality Unit: $(0.75)(1.00-0.80) = 0.15$

Total TSS Removal = 85%

P-Watershed-6: (Road, Walkways)

Deep Sump Catch Basin: $(1.00)(1.00-0.25) = 0.75$

Water Quality Unit: $(0.75)(1.00-0.80) = 0.15$

Total TSS Removal = 85%

Water Quality Volume:

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

Impervious area requiring water quality treatment = 330,657 sf

$330,657 \text{ sf} * .0417 \text{ ft} = 13,788 \text{ CF}$

Total Water Quality Volume Required = 13,788 CF

Proposed Recharge Volume:

Rain Garden RG-1 = 1,559 cf

Rain Garden RG-2 = 1,290 cf

Rain Garden RG-3 = 678 cf

Infiltration System UGS-1 = 11,507 cf

Total provided water quality volume: 14,097 cf

Therefore Standard #4 is met.

Standard #5: Higher potential pollutant loads

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

Standard #6: Protection of critical areas

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

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

Standard #7: Redevelopment projects

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

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

Soil Erosion and Sediment Control Plan:

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

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

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

The soil erosion and sediment control BMP's for the site are straw wattles with silt fence, catch basin filters, construction entrance as shown on sheet C-1.1 of the design plans.

Therefore Standard #8 is met.

Standard #9: Operation/maintenance plan

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

Therefore Standard #9 is met.

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

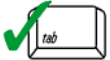
It is not anticipated that there will be any Illicit discharges for the project, therefore Standard #10 is met.



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

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

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

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

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

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



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

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

- ☐ New development
- ☐ Redevelopment
- ☒ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☒ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☒ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- ☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☒ Description and delineation of public safety features;
 - ☒ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☐ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

APPENDIX 1:
Operations and Maintenance Plan

APPENDIX 2:
Existing Hydrology Report

APPENDIX 3:
Proposed Hydrology Report

APPENDIX 4:
Soils Report

APPENDIX 5:
Calculations

APPENDIX 1:
Operations and Maintenance Plan

**MARIA WESTON CHAPMAN MIDDLE SCHOOL
CONSTRUCTION PERIOD POLLUTION PREVENTION PLAN AND EROSION CONTROL
OPERATION AND MAINTENANCE PLAN
OCTOBER 2019**

During The Construction Period the General Contractor shall be responsible for the following:

1. Erosion Control

Erosion control barriers will be placed along down-gradient portion of the site as indicated on the project plans. Additional erosion control barriers will be placed at the limit of work as needed and in any sensitive areas as work progresses.

A stockpile of additional erosion control barriers shall be kept on site at all times

2. Site Access

Site access for construction equipment will be from Commercial Street and Chard Street via two existing access drives as shown on the Utility Preparation and Soil Erosion Plans, and all construction entrances will be installed at the onset of the project.

3. Construction Staging

A construction staging area will be established by the Contractor.

4. Site Grading/Site Work

The site activities may only commence when the site is stable from erosion and all required control measures are in place and functional.

5. Slope Stabilization

All surfaces and slopes shall be checked at least once every 7 calendar days and within 24 hours of the occurrence of a storm event 0.25 inches or greater to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the General Contractor shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately or stabilized in a manner acceptable to the Conservation Commission if it is outside of the growing season. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation. If stabilization is required during the non-growing season, straw mulch, or a commercially manufactured blanket must be employed to prevent erosion.

6. Permanent Stabilization

Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 14 days after the last construction activity. The permanent seed mix, fertilizer, and mulch shall be specified on the project plans. Permanent seeding shall occur in the Spring or Fall.

7. Drainage Structures (Infiltration Systems, Catch Basins, Area Drains, Manholes, WQU's, Trench Drains, Roof Drains)

All structures shall be inspected on a bi-weekly basis and/or after every rain storm and repairs made as necessary. Sediment shall be removed from the sump after the sediment has reached a maximum of one half the depth of the sump. The sediment shall be removed from the site and properly disposed of. Drainage structures/sumps shall be cleaned completely at the end of construction.

8. Dust and Sediment Control

Siltsacks:

Catch basin/Area drain filters shall be placed at all inlets to drainage structures as structures are installed and prior to pavement removal. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system. Construction and location of catch basin filters shall be as indicated on the Drawings.

Silt Fence with Straw Wattles:

The silt fence with straw wattles shall be installed as indicated on the Drawings.

Wattles shall be placed in a row with ends tightly abutting the adjacent wattles. Each wattle shall be securely anchored in place by stakes spaced 8' apart maximum. The first stake in each wattle shall be angled toward the previously laid wattle to force the wattles together, with a 1'-2' overlap at each junction.

Construction Entrance:

The area of the construction entrance should be cleared of all vegetation, roots, and other objectionable material. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans.

The Construction entrance shall be a minimum of 50-feet in length and 25-feet wide.

Dust Control:

A mechanical street sweeper shall be utilized to clean the existing paved areas on an as-needed basis.

For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.

Diversion Swales:

A diversion swale shall be utilized in the interim phase to convey water away from the proposed building.

Check Dams:

Stone check dams shall be utilized within the diversion swales to reduce runoff velocity and erosion while allowing sediments to settle.

Pollution Prevention Measures

1. Before, during, and after construction, functional erosion and sedimentation controls shall be implemented to prevent the silting of the wetland areas down-gradient of the site. Straw wattles, silt sacks, crushed stone, temporary stabilization and other controls shall be properly maintained and are not to be removed until the site is permanently stabilized. Other controls shall be added as warranted during construction to protect environmentally-sensitive areas. Sufficient extra materials (e.g. straw wattles and other control materials) shall be stored on site for emergencies.

2. Silt sacks and straw bale check dams shall be installed at all existing and proposed infiltration areas to protect from soils and sediment.
3. Casting of excavated materials shall be stored away from wetland areas and sensitive land areas.
4. Any stockpiling of loose materials shall be properly stabilized to prevent erosion and siltation. Preventative controls such as straw wattles, temporary seeding/mulching and jute covering shall be implemented to prevent such an occurrence.
5. There shall be no flooding, ponding, or flood related damage caused by the project or surface run-off emanating from the project on lands of an abutter, nearby or down-gradient of the site.
6. There shall be no contaminant migration caused by the project to nearby and down-gradient properties, nearby aquifers, and nearby resource areas.
7. The contractor shall make sufficient provisions to control any unexpected drainage and erosion conditions that may arise during construction that may create damage on abutting properties. Said control measures are to be implemented at once.
8. During construction flood prevention, erosion, and sedimentation controls shall be in place before the natural ground cover is disturbed. Said controls shall be in place prior to other construction work and shall be monitored and approved by the Contractor. They shall be properly maintained and are not to be removed until the site is stabilized.
9. The Contractor shall designate a person or persons to inspect and supervise the erosion controls for the project. The Conservation Commission shall be notified as to the means to contact said individual or individuals on a 24-hour basis on all working and non-working days of the project. Said means of contact shall include at least 2 separate telephone number of said designated person or persons.
10. There shall be periodic inspection of straw wattles and other erosion controls by the Contractor's Designee to assure their continued effectiveness.
11. The Contractor shall make adequate provisions for controlling erosion and sediment from activities that might yield water at high volumes with high suspended solid contents, such as dewatering excavations.
12. Street sweeping shall be used to keep public ways free and clear of sediment and dirt from the site activities.

Other Control Measures

Waste Materials. All trash and construction debris from the site will be hauled to an approved landfill or recycling facility. No construction waste material will be buried on the site. All personnel will receive instructions regarding the correct procedure for waste disposal. Notices describing these practices will be posted in the construction office. The site superintendent will be responsible for seeing that these procedures are followed. Employee waste and other loose materials will be collected so as to prevent the release of floatables during rainfall events.

Hazardous Waste. No Hazardous materials are expected to be encountered. The mandated State and Local permits for removal of such materials, if located, will be implemented when such materials are encountered.

After Construction, the owner shall be responsible for the following:

General Land Grading and Slopes Stabilization

All surfaces and slopes shall be checked bi-annually to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the Owner shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation.

Areas of steep slopes (2.5:1 or greater) shall be stabilized using jute mesh or a similar approved erosion blanket.

Erosion Controls

Erosion controls shall not be removed or dismantled without approval from the Engineer or Conservation Commission. Sediment deposits that are removed or left in place after the barriers have been dismantled shall be graded manually to conform to the existing topography and vegetated using seeding or other long term cover as approved in the Landscape Plan. Bare ground that cannot be permanently stabilized within 30 days shall be stabilized by temporary measures.

Street Sweeping (\$500 per sweeping)

It is proposed that the parking and drive areas be swept with a wet brush street sweeper on a semi-annual basis, with at least two sweepings per year. One sweep shall be done at the end of the winter season (prior to the heavy rains), and the other sweep at the end of autumn (prior to snowfall).

Stormwater Management System

Catch Basins, Area Drains, WQU's, Trench Drains, Roof Drains and Drain Manholes (\$500 per structure per inspection/cleaning):

The catch basins, drain manholes, WQU's, roof drains, trench drains and area drains shall be inspected semi-annually, and cleaned out when sumps are approximately one foot full. The use of "clam shells" for sediment removal shall not be allowed; a vacuum truck shall be the approved method of cleaning. Integrity and functionality of oil hoods shall also be checked at the time of the inspection.

Water Quality Unit (WQU) (\$1000 per structure per inspection/cleaning):

Water Quality Unit shall be as follows and per manufacturer's recommendations:

- Units should be inspected post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate. In subsequent years, inspections can be based on first-year observations
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer).
- Inspect the unit immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical or fuel spills and dispose responsibly

Infiltration System (\$2,500 per system per cleaning; \$1,000 per system per inspection)

The proposed infiltration system shall be inspected semi-annually, and shall follow the suggested schedule for routine maintenance during the regular operation of the stormwater system:

Inlets and Outlets	Every 3 years	<ul style="list-style-type: none"> Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	<ul style="list-style-type: none"> Check inlet and outlets for clogging and remove any debris as required.
Stormwater Chambers	2 years after commissioning	<ul style="list-style-type: none"> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. Attain the appropriate approvals as required. Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1 st year	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	<ul style="list-style-type: none"> Confirm that no unauthorized modifications have been performed to the site.

Maintenance and Emergency Repairs

Any maintenance or emergency repairs to the system will be the responsibility of the Owner.

1051 Commercial Street, Weymouth, MA

INSPECTOR: _____ DATE: _____

Regular Inspection: ☐

Inspection after Rainfall: ☐

Amount of Rainfall: _____ inches

[illegible]

[illegible]

[illegible]

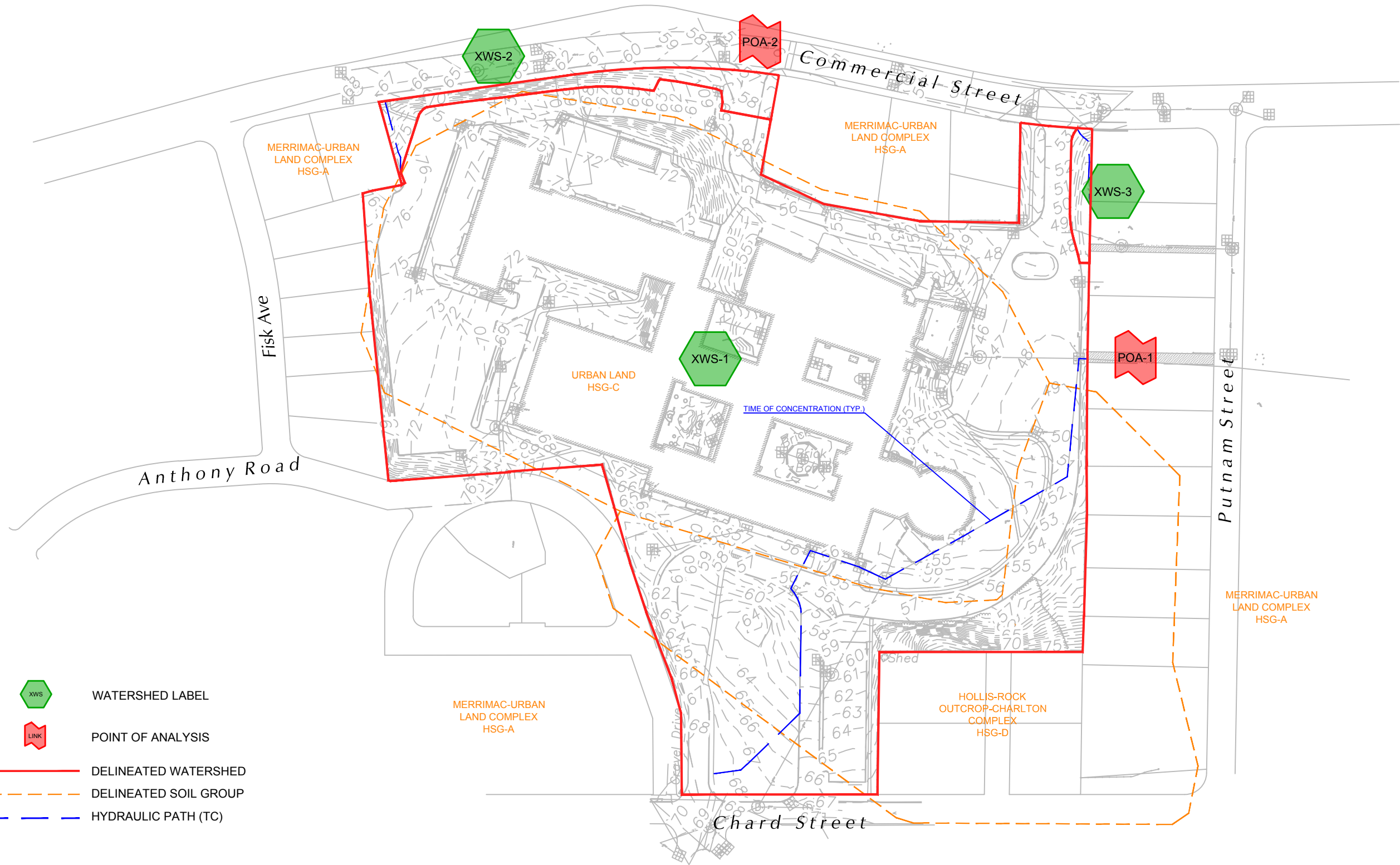
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	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	






Additional Observations: _____

Action Required: _____

To be performed by: _____ On or Before: _____

APPENDIX 2:
Exisiting Hydrology Report



-  WATERSHED LABEL
-  POINT OF ANALYSIS
-  DELINEATED WATERSHED
-  DELINEATED SOIL GROUP
-  HYDRAULIC PATH (TC)

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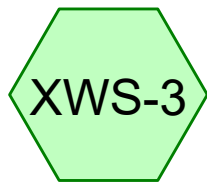
Sketch No.
EX-HYD
Reference Drawing
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Drawn by:	MJH
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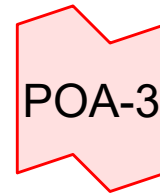
Project: Weston Chapman Middle
School
Title: Existing Hydrology

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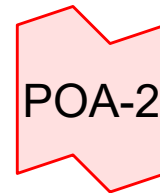
Existing Watershed 3



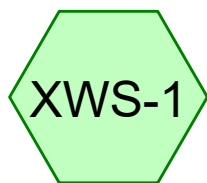
Point of Analysis 3



Existing Watershed 2



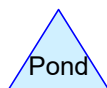
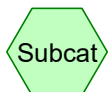
Point of Analysis 2



Existing Watershed 1



Point of Analysis 1



17127.00 - Maria Weston Chapman MS - EXISTING

Prepared by Samiotes Engineering

Printed 10/17/2019

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.924	49	50-75% Grass cover, Fair, HSG A (XWS-1, XWS-2, XWS-3)
2.163	79	50-75% Grass cover, Fair, HSG C (XWS-1, XWS-2)
0.843	84	50-75% Grass cover, Fair, HSG D (XWS-1)
10.557	98	Paved parking & roofs (XWS-1, XWS-2)
0.318	43	Woods/grass comb., Fair, HSG A (XWS-1, XWS-2)
0.383	76	Woods/grass comb., Fair, HSG C (XWS-1)
0.793	82	Woods/grass comb., Fair, HSG D (XWS-1)
15.980	89	TOTAL AREA

Summary for Subcatchment XWS-1: Existing Watershed 1

Runoff = 35.16 cfs @ 12.14 hrs, Volume= 2.913 af, Depth= 2.26"

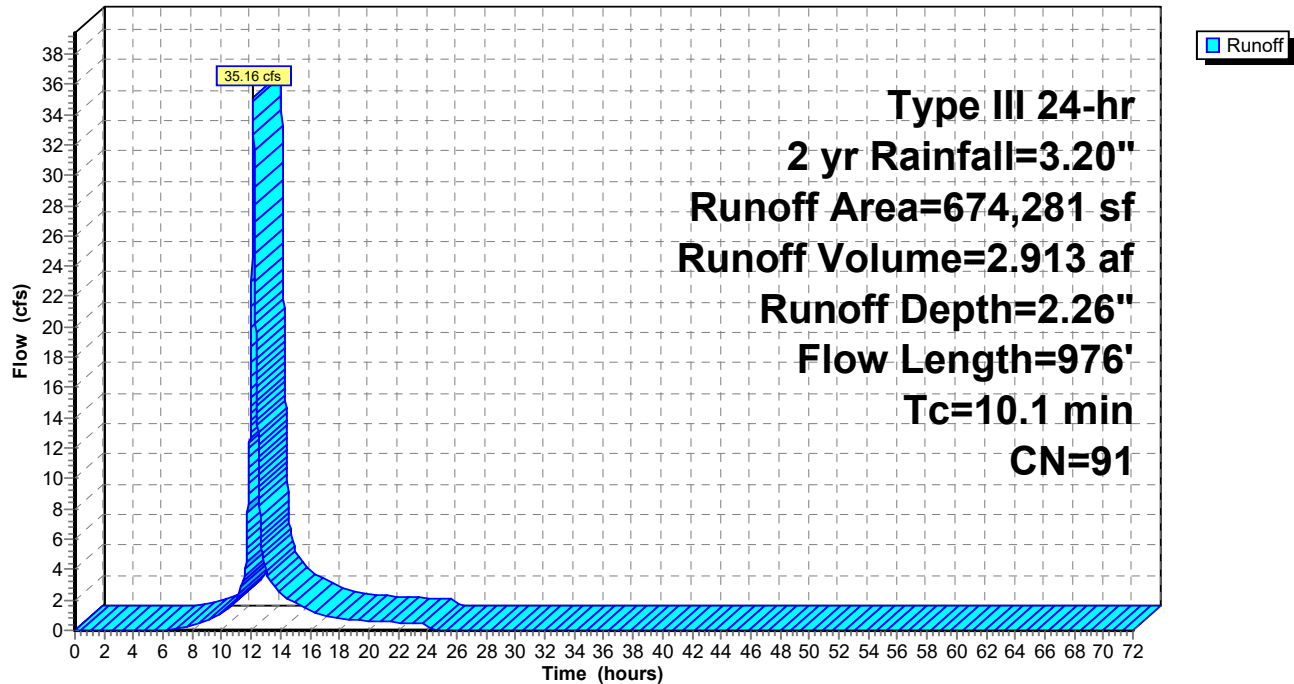
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
456,873	98	Paved parking & roofs
22,303	49	50-75% Grass cover, Fair, HSG A
94,090	79	50-75% Grass cover, Fair, HSG C
36,721	84	50-75% Grass cover, Fair, HSG D
13,068	43	Woods/grass comb., Fair, HSG A
16,683	76	Woods/grass comb., Fair, HSG C
34,543	82	Woods/grass comb., Fair, HSG D
674,281	91	Weighted Average
217,408		32.24% Pervious Area
456,873		67.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		Sheet Flow, 50' SF Grass: Dense n= 0.240 P2= 3.20"
1.2	103	0.0417	1.43		Shallow Concentrated Flow, 103' Shallow Flow Short Grass Pasture Kv= 7.0 fps
0.9	179	0.0283	3.41		Shallow Concentrated Flow, 172' Shallow Flow Paved Kv= 20.3 fps
0.1	60	0.0530	11.31	8.89	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.2	73	0.0052	5.63	17.67	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	39	0.0060	7.01	34.42	Pipe Channel, RCP_Round 30" 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
0.6	472	0.0190	14.09	99.60	Pipe Channel, RCP_Round 36" 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
10.1	976	Total			

Subcatchment XWS-1: Existing Watershed 1

Hydrograph



Summary for Subcatchment XWS-2: Existing Watershed 2

Runoff = 0.07 cfs @ 12.14 hrs, Volume= 0.011 af, Depth= 0.34"

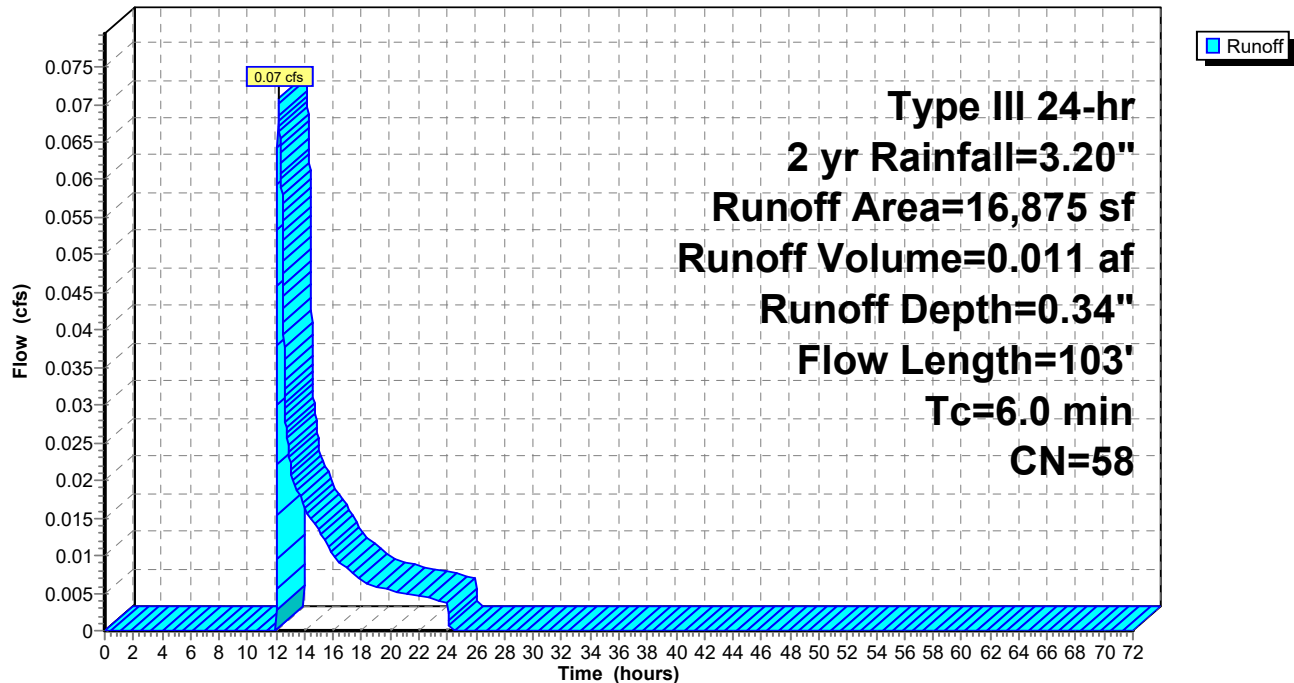
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
2,979	98	Paved parking & roofs
12,981	49	50-75% Grass cover, Fair, HSG A
131	79	50-75% Grass cover, Fair, HSG C
784	43	Woods/grass comb., Fair, HSG A
16,875	58	Weighted Average
13,896		82.35% Pervious Area
2,979		17.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0700	0.17		Sheet Flow, 50' Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
0.4	53	0.1038	2.26		Shallow Concentrated Flow, 53' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.4	103	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-2: Existing Watershed 2

Hydrograph



Summary for Subcatchment XWS-3: Existing Watershed 3

Runoff = 0.00 cfs @ 13.66 hrs, Volume= 0.001 af, Depth= 0.11"

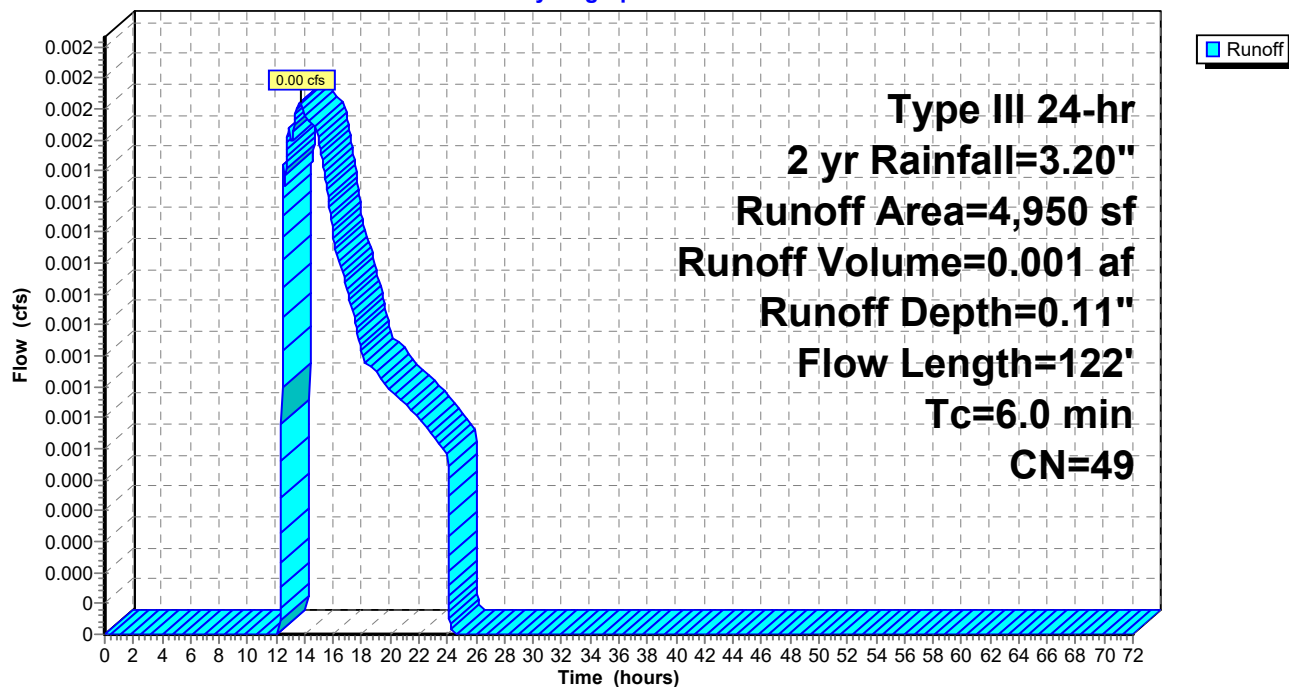
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
4,950	49	50-75% Grass cover, Fair, HSG A
4,950		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		Sheet Flow, Grass Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
1.2	72	0.0207	1.01		Shallow Concentrated Flow, 72' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.5	122	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-3: Existing Watershed 3

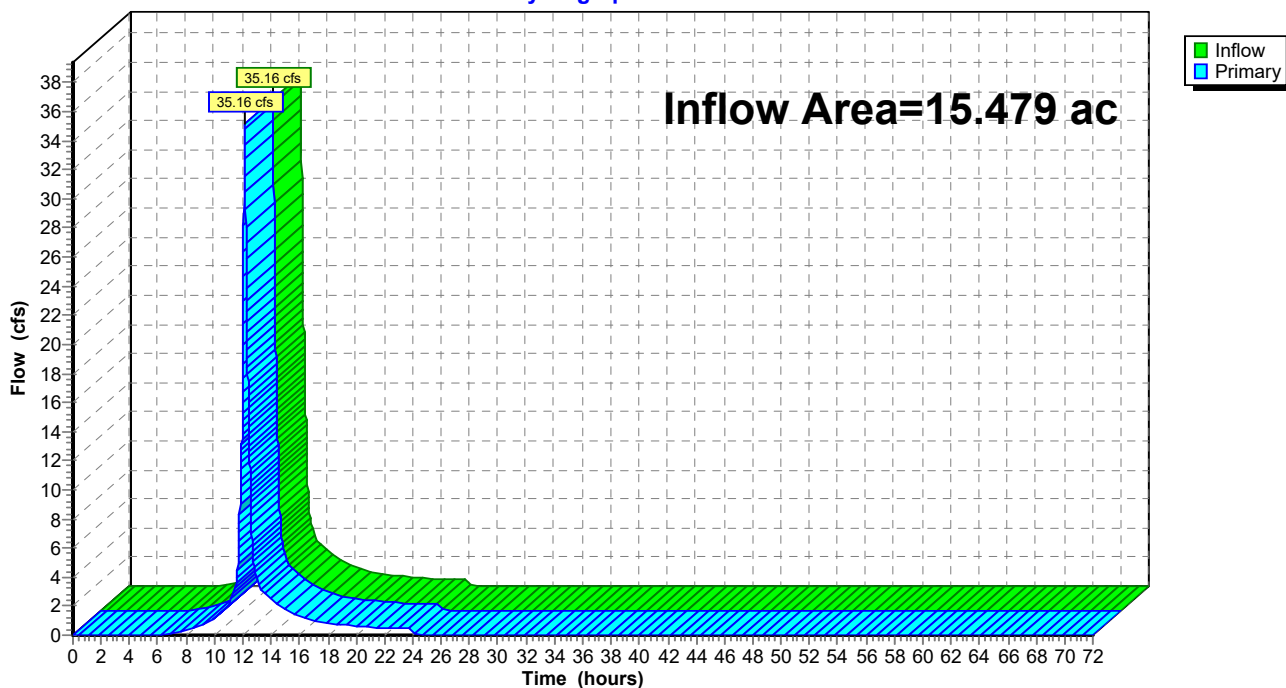
Hydrograph



Summary for Link POA-1: Point of Analysis 1

Inflow Area = 15.479 ac, 67.76% Impervious, Inflow Depth = 2.26" for 2 yr event
Inflow = 35.16 cfs @ 12.14 hrs, Volume= 2.913 af
Primary = 35.16 cfs @ 12.14 hrs, Volume= 2.913 af, Atten= 0%, Lag= 0.0 min

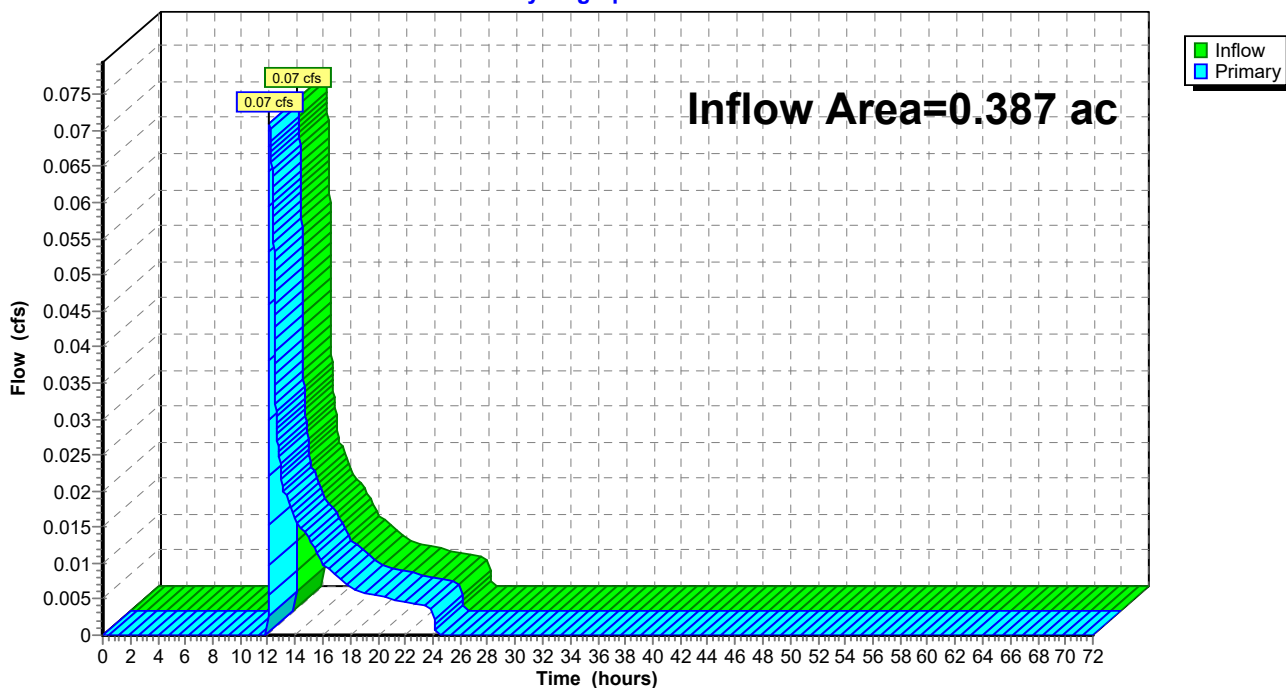
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-1: Point of Analysis 1**Hydrograph**

Summary for Link POA-2: Point of Analysis 2

Inflow Area = 0.387 ac, 17.65% Impervious, Inflow Depth = 0.34" for 2 yr event
Inflow = 0.07 cfs @ 12.14 hrs, Volume= 0.011 af
Primary = 0.07 cfs @ 12.14 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

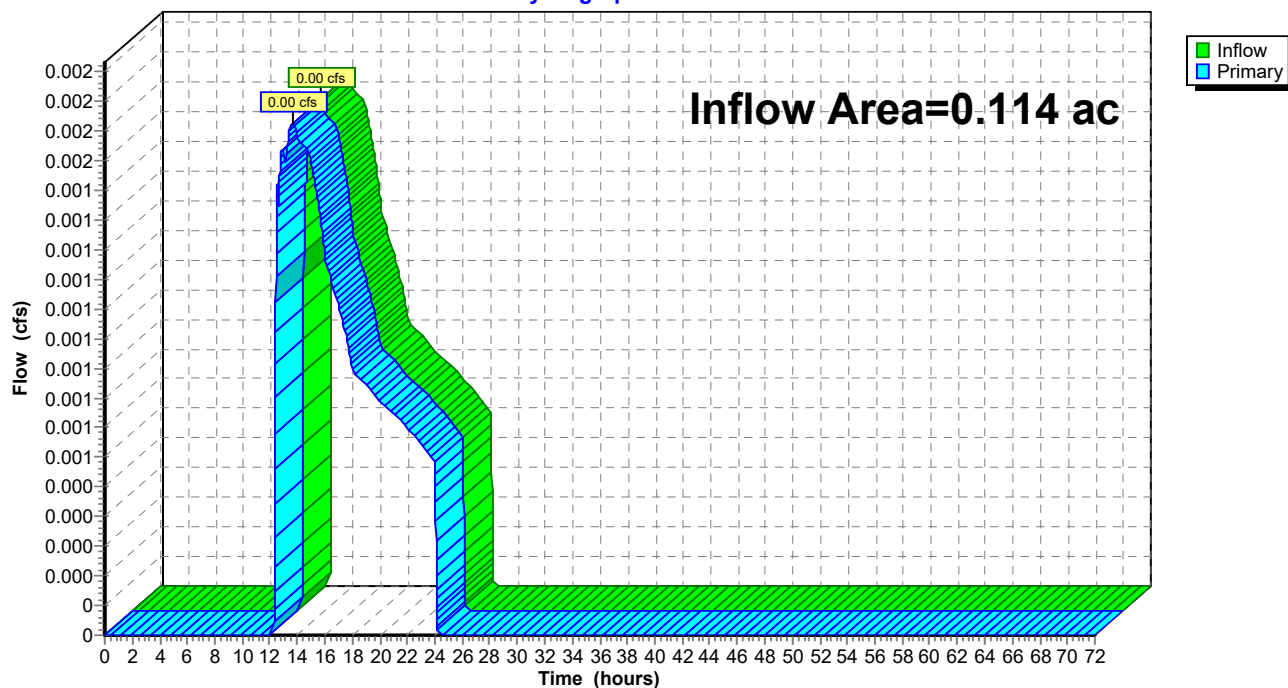
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-2: Point of Analysis 2**Hydrograph**

Summary for Link POA-3: Point of Analysis 3

Inflow Area = 0.114 ac, 0.00% Impervious, Inflow Depth = 0.11" for 2 yr event
Inflow = 0.00 cfs @ 13.66 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 13.66 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: Point of Analysis 3**Hydrograph**

Summary for Subcatchment XWS-1: Existing Watershed 1

Runoff = 53.44 cfs @ 12.14 hrs, Volume= 4.512 af, Depth= 3.50"

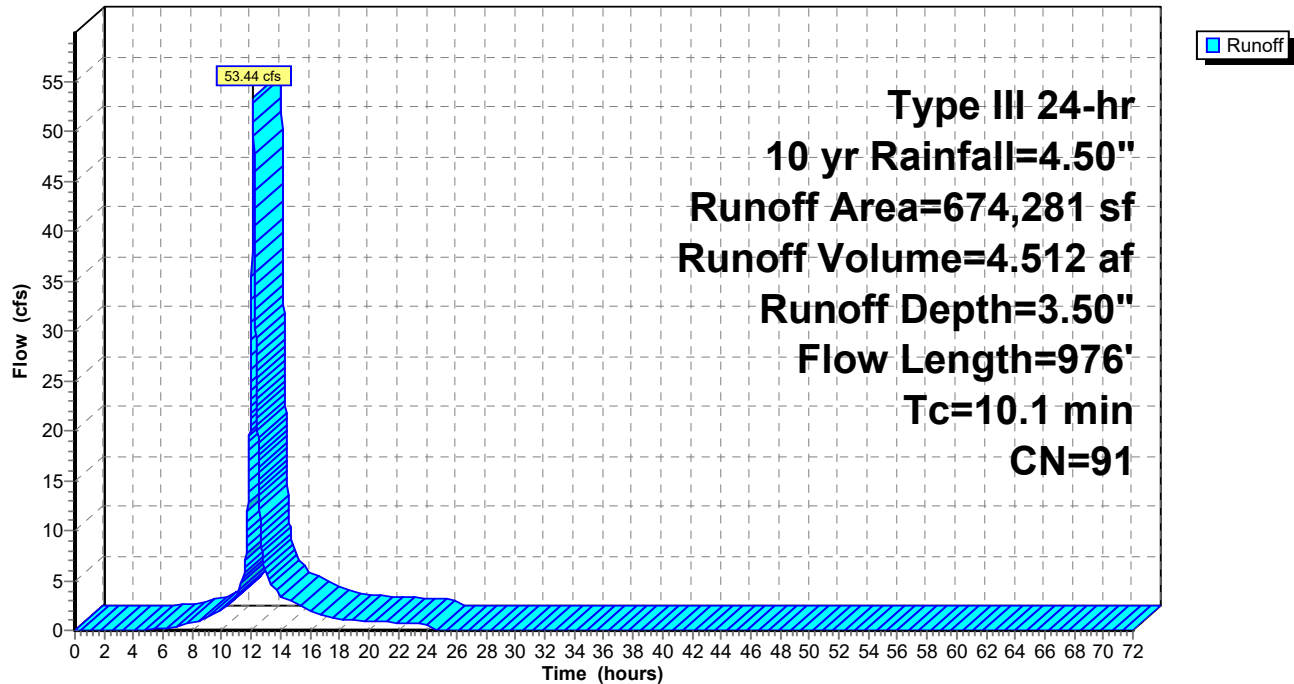
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
456,873	98	Paved parking & roofs
22,303	49	50-75% Grass cover, Fair, HSG A
94,090	79	50-75% Grass cover, Fair, HSG C
36,721	84	50-75% Grass cover, Fair, HSG D
13,068	43	Woods/grass comb., Fair, HSG A
16,683	76	Woods/grass comb., Fair, HSG C
34,543	82	Woods/grass comb., Fair, HSG D
674,281	91	Weighted Average
217,408		32.24% Pervious Area
456,873		67.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		Sheet Flow, 50' SF Grass: Dense n= 0.240 P2= 3.20"
1.2	103	0.0417	1.43		Shallow Concentrated Flow, 103' Shallow Flow Short Grass Pasture Kv= 7.0 fps
0.9	179	0.0283	3.41		Shallow Concentrated Flow, 172' Shallow Flow Paved Kv= 20.3 fps
0.1	60	0.0530	11.31	8.89	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.2	73	0.0052	5.63	17.67	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	39	0.0060	7.01	34.42	Pipe Channel, RCP_Round 30" 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
0.6	472	0.0190	14.09	99.60	Pipe Channel, RCP_Round 36" 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
10.1	976	Total			

Subcatchment XWS-1: Existing Watershed 1

Hydrograph



Summary for Subcatchment XWS-2: Existing Watershed 2

Runoff = 0.33 cfs @ 12.11 hrs, Volume= 0.029 af, Depth= 0.90"

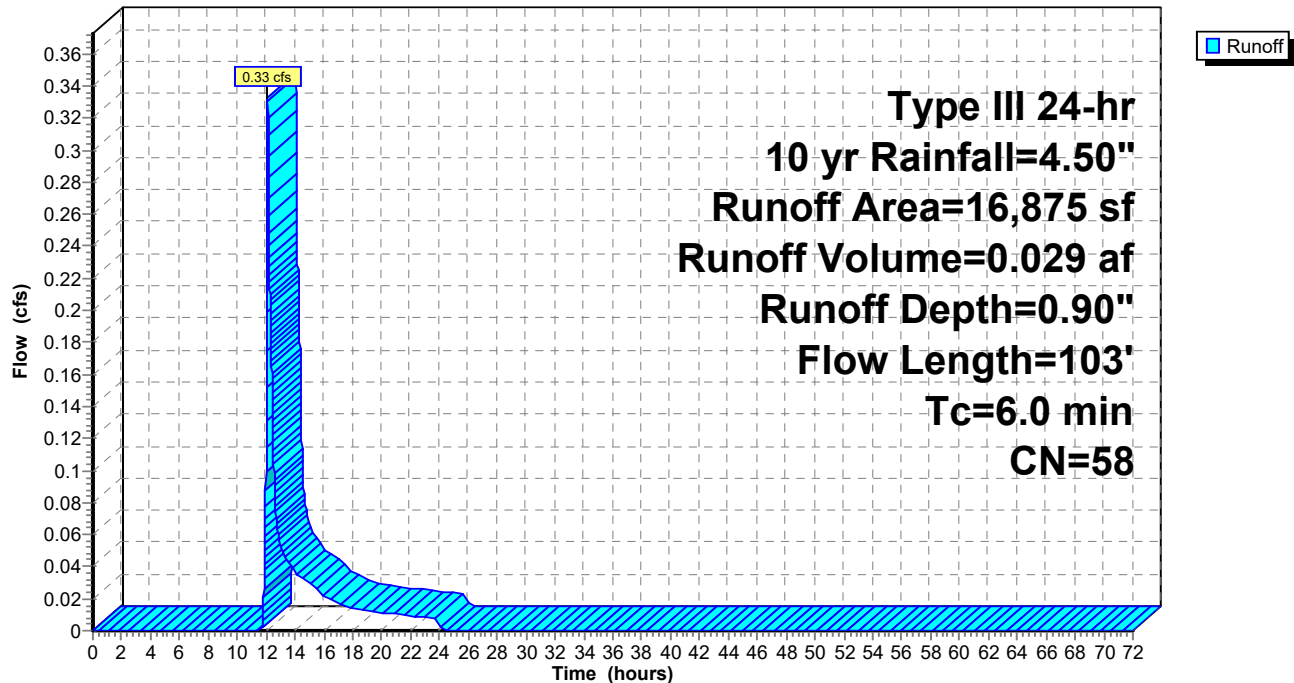
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
2,979	98	Paved parking & roofs
12,981	49	50-75% Grass cover, Fair, HSG A
131	79	50-75% Grass cover, Fair, HSG C
784	43	Woods/grass comb., Fair, HSG A
16,875	58	Weighted Average
13,896		82.35% Pervious Area
2,979		17.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0700	0.17		Sheet Flow, 50' Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
0.4	53	0.1038	2.26		Shallow Concentrated Flow, 53' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.4	103	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-2: Existing Watershed 2

Hydrograph



Summary for Subcatchment XWS-3: Existing Watershed 3

Runoff = 0.03 cfs @ 12.15 hrs, Volume= 0.004 af, Depth= 0.46"

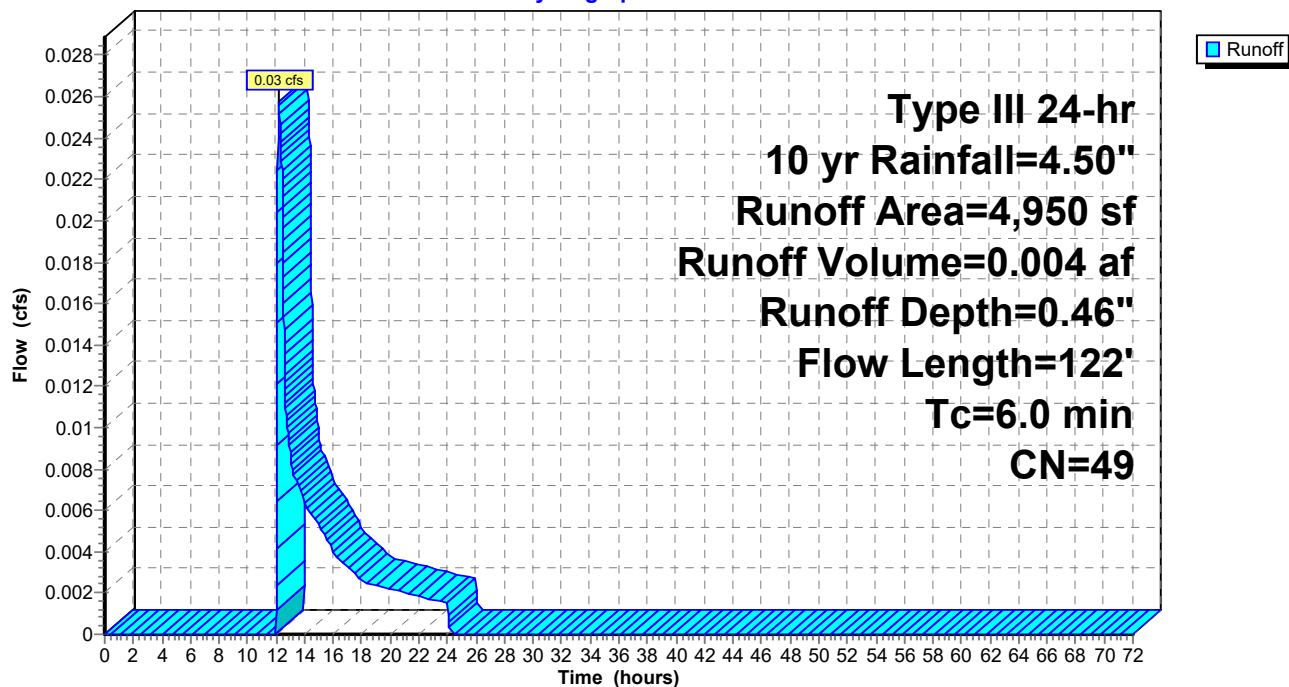
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
4,950	49	50-75% Grass cover, Fair, HSG A
4,950		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		Sheet Flow, Grass Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
1.2	72	0.0207	1.01		Shallow Concentrated Flow, 72' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.5	122	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-3: Existing Watershed 3

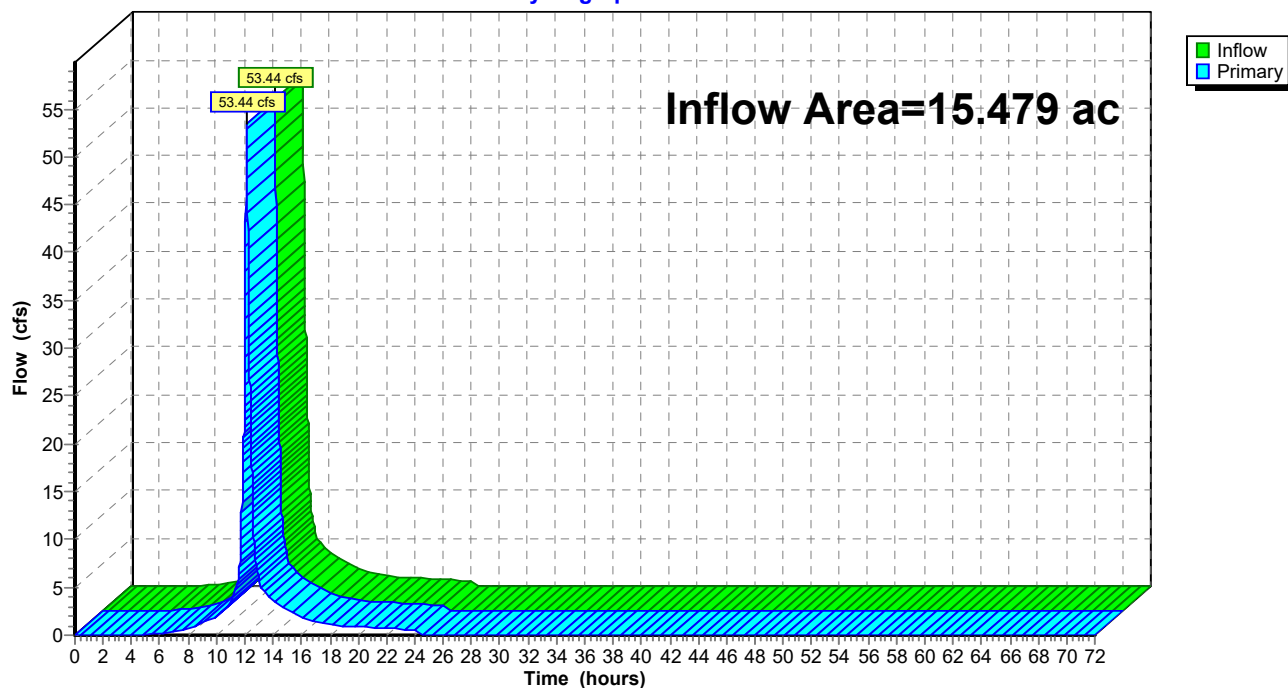
Hydrograph



Summary for Link POA-1: Point of Analysis 1

Inflow Area = 15.479 ac, 67.76% Impervious, Inflow Depth = 3.50" for 10 yr event
Inflow = 53.44 cfs @ 12.14 hrs, Volume= 4.512 af
Primary = 53.44 cfs @ 12.14 hrs, Volume= 4.512 af, Atten= 0%, Lag= 0.0 min

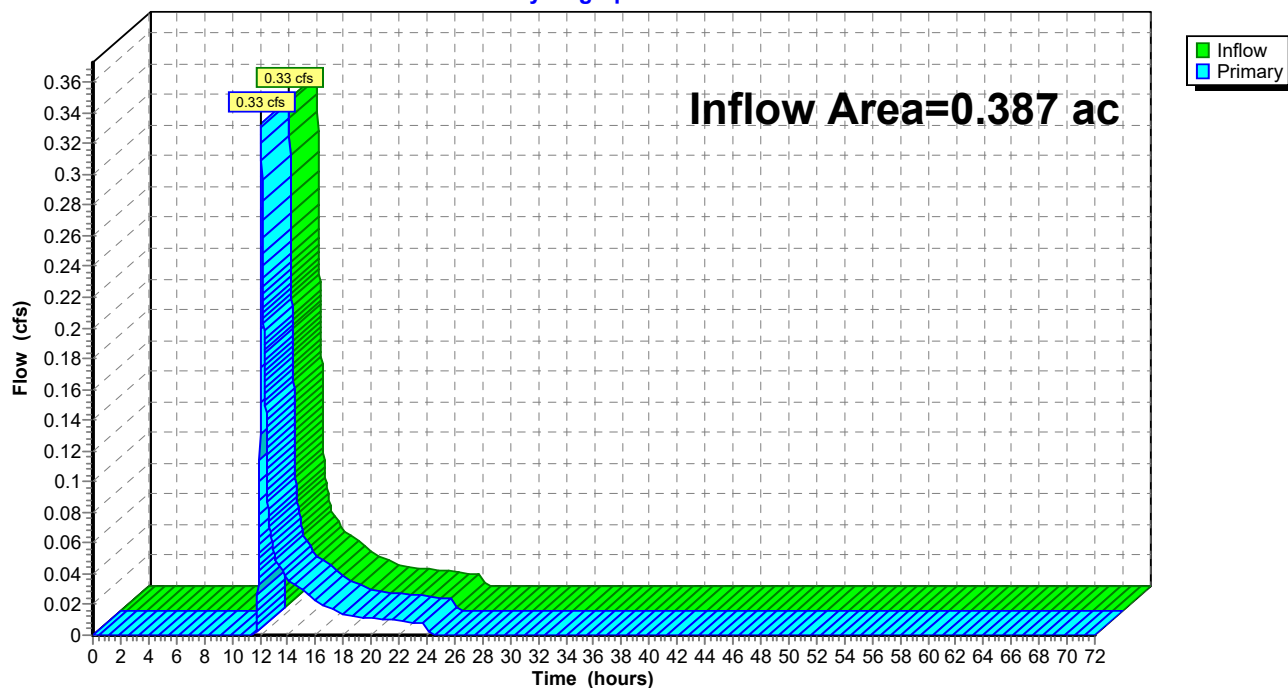
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-1: Point of Analysis 1**Hydrograph**

Summary for Link POA-2: Point of Analysis 2

Inflow Area = 0.387 ac, 17.65% Impervious, Inflow Depth = 0.90" for 10 yr event
Inflow = 0.33 cfs @ 12.11 hrs, Volume= 0.029 af
Primary = 0.33 cfs @ 12.11 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

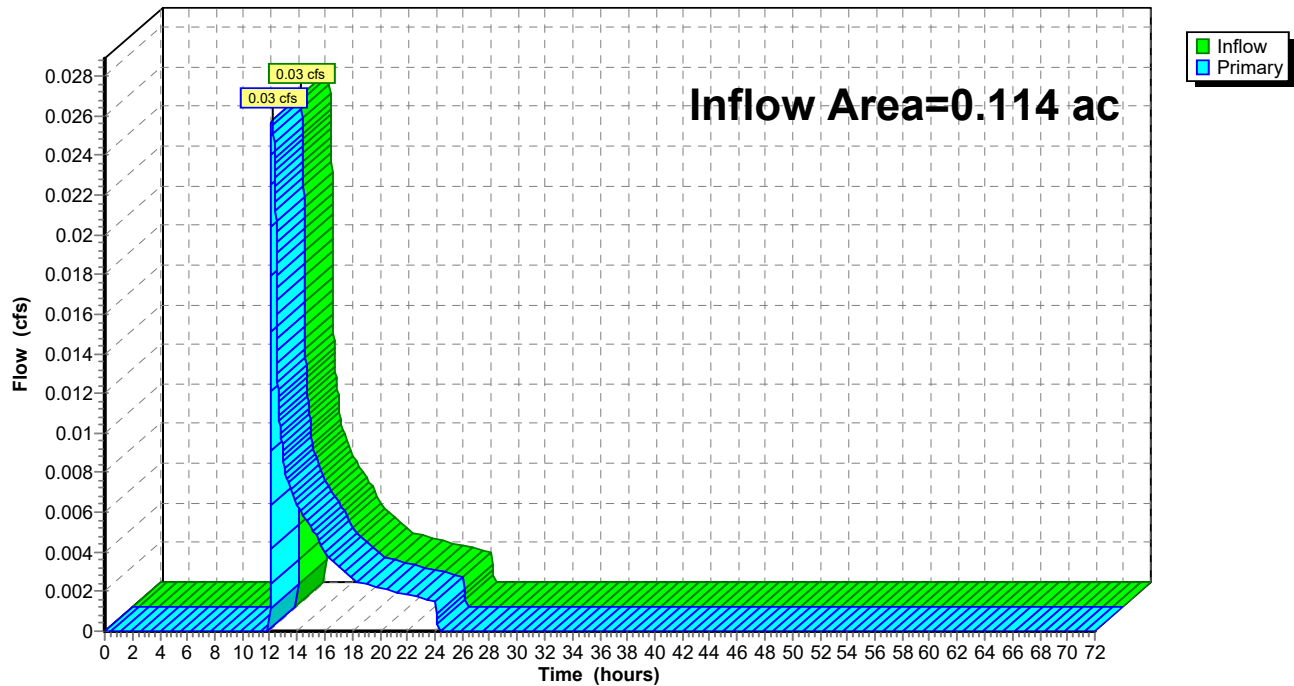
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-2: Point of Analysis 2**Hydrograph**

Summary for Link POA-3: Point of Analysis 3

Inflow Area = 0.114 ac, 0.00% Impervious, Inflow Depth = 0.46" for 10 yr event
Inflow = 0.03 cfs @ 12.15 hrs, Volume= 0.004 af
Primary = 0.03 cfs @ 12.15 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: Point of Analysis 3**Hydrograph**

Summary for Subcatchment XWS-1: Existing Watershed 1

Runoff = 66.05 cfs @ 12.13 hrs, Volume= 5.639 af, Depth= 4.37"

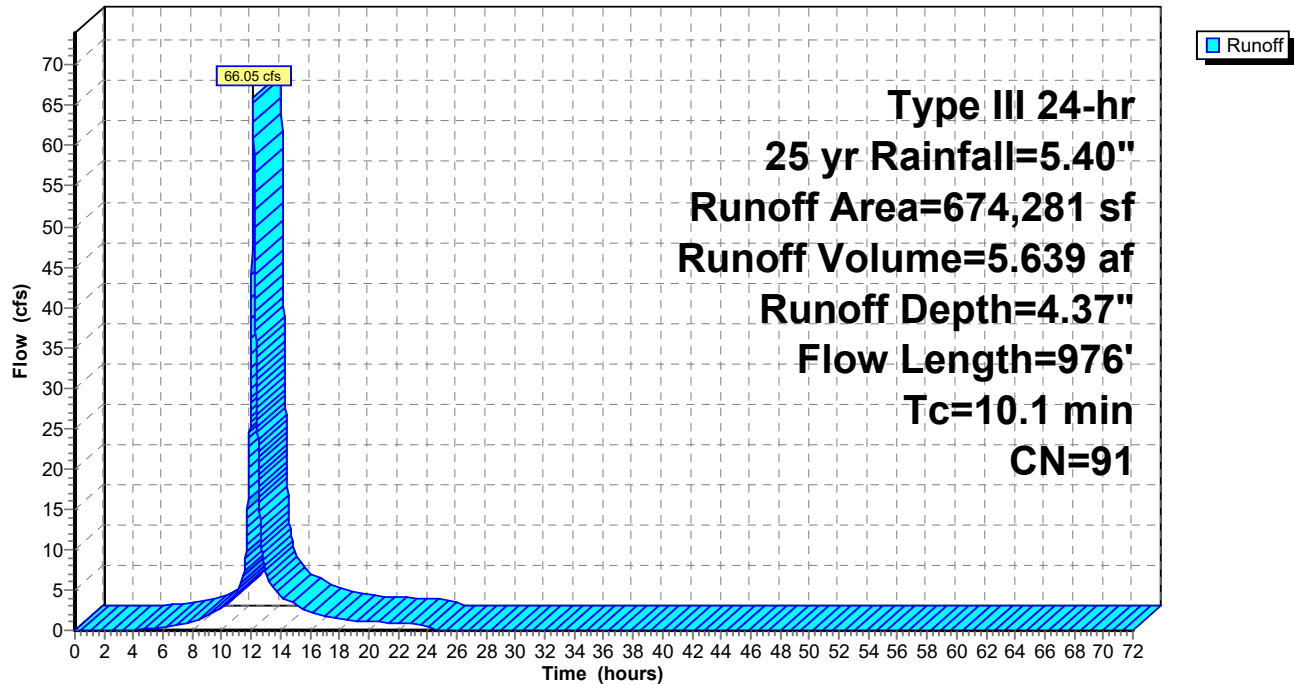
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
456,873	98	Paved parking & roofs
22,303	49	50-75% Grass cover, Fair, HSG A
94,090	79	50-75% Grass cover, Fair, HSG C
36,721	84	50-75% Grass cover, Fair, HSG D
13,068	43	Woods/grass comb., Fair, HSG A
16,683	76	Woods/grass comb., Fair, HSG C
34,543	82	Woods/grass comb., Fair, HSG D
674,281	91	Weighted Average
217,408		32.24% Pervious Area
456,873		67.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		Sheet Flow, 50' SF Grass: Dense n= 0.240 P2= 3.20"
1.2	103	0.0417	1.43		Shallow Concentrated Flow, 103' Shallow Flow Short Grass Pasture Kv= 7.0 fps
0.9	179	0.0283	3.41		Shallow Concentrated Flow, 172' Shallow Flow Paved Kv= 20.3 fps
0.1	60	0.0530	11.31	8.89	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.2	73	0.0052	5.63	17.67	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	39	0.0060	7.01	34.42	Pipe Channel, RCP_Round 30" 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
0.6	472	0.0190	14.09	99.60	Pipe Channel, RCP_Round 36" 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
10.1	976	Total			

Subcatchment XWS-1: Existing Watershed 1

Hydrograph



Summary for Subcatchment XWS-2: Existing Watershed 2

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.045 af, Depth= 1.40"

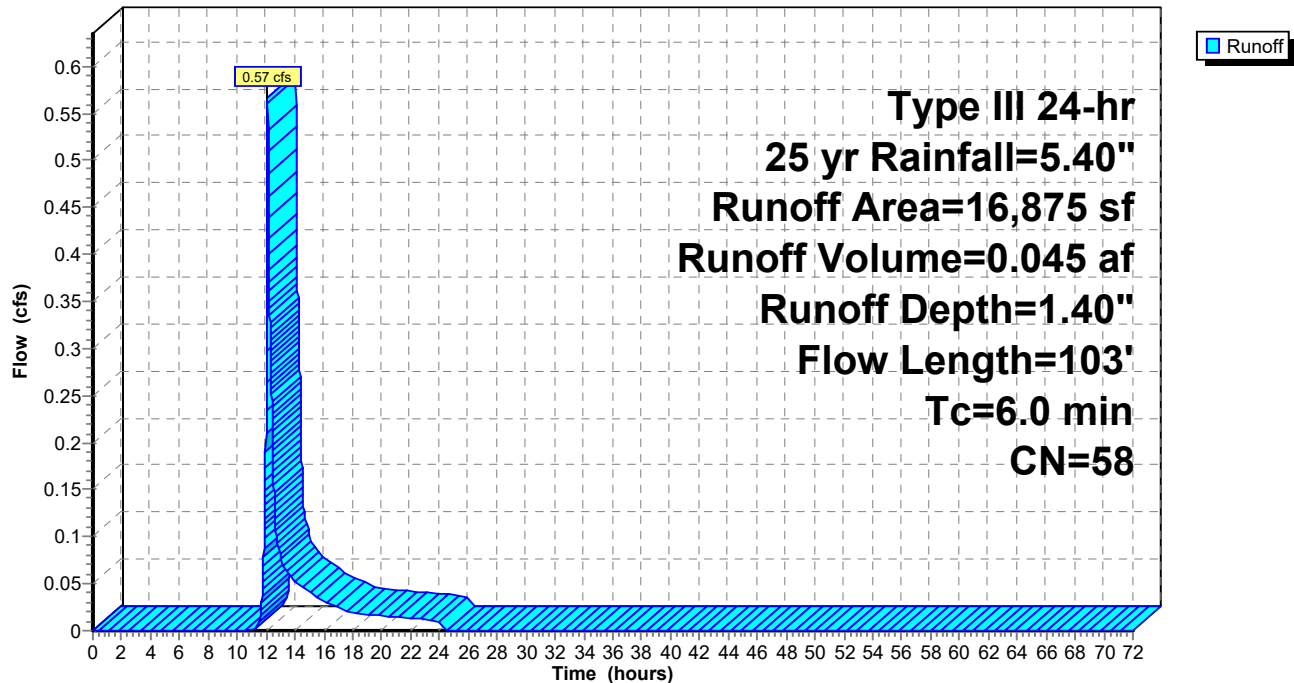
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
2,979	98	Paved parking & roofs
12,981	49	50-75% Grass cover, Fair, HSG A
131	79	50-75% Grass cover, Fair, HSG C
784	43	Woods/grass comb., Fair, HSG A
16,875	58	Weighted Average
13,896		82.35% Pervious Area
2,979		17.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0700	0.17		Sheet Flow, 50' Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
0.4	53	0.1038	2.26		Shallow Concentrated Flow, 53' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.4	103	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-2: Existing Watershed 2

Hydrograph



Summary for Subcatchment XWS-3: Existing Watershed 3

Runoff = 0.07 cfs @ 12.12 hrs, Volume= 0.008 af, Depth= 0.80"

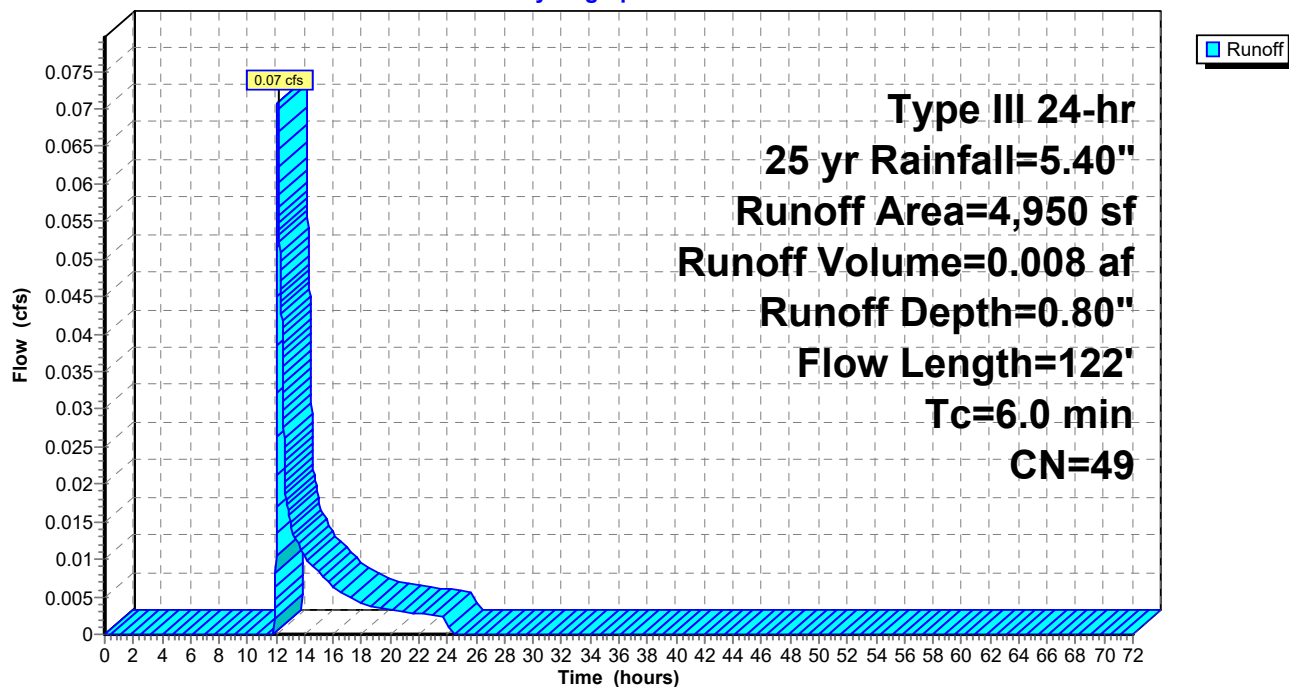
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
4,950	49	50-75% Grass cover, Fair, HSG A
4,950		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		Sheet Flow, Grass Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
1.2	72	0.0207	1.01		Shallow Concentrated Flow, 72' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.5	122	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-3: Existing Watershed 3

Hydrograph



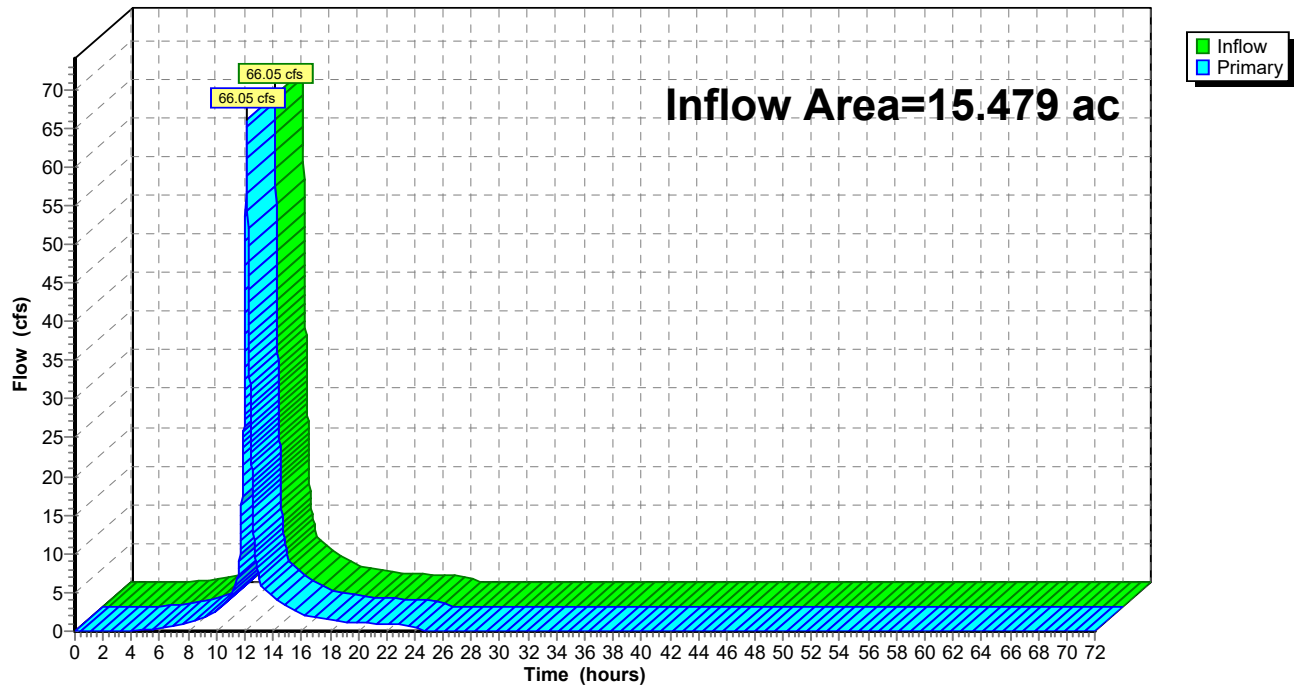
Summary for Link POA-1: Point of Analysis 1

Inflow Area = 15.479 ac, 67.76% Impervious, Inflow Depth = 4.37" for 25 yr event
 Inflow = 66.05 cfs @ 12.13 hrs, Volume= 5.639 af
 Primary = 66.05 cfs @ 12.13 hrs, Volume= 5.639 af, Atten= 0%, Lag= 0.0 min

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

Link POA-1: Point of Analysis 1

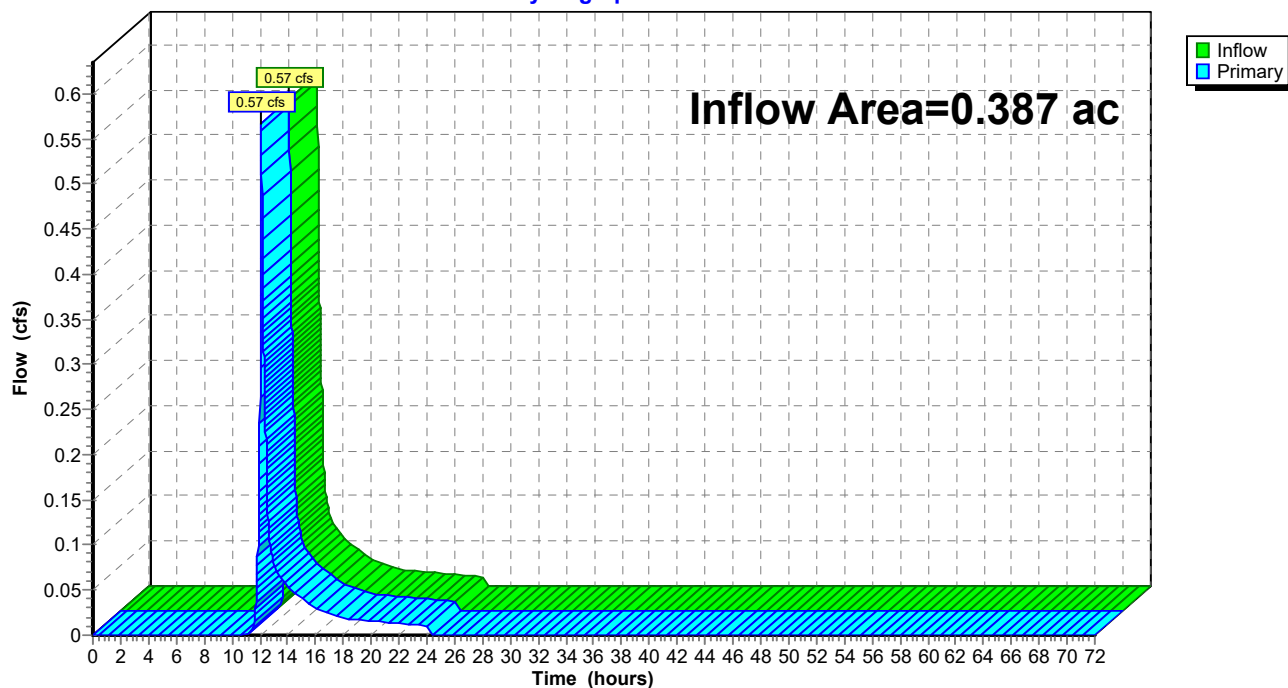
Hydrograph



Summary for Link POA-2: Point of Analysis 2

Inflow Area = 0.387 ac, 17.65% Impervious, Inflow Depth = 1.40" for 25 yr event
Inflow = 0.57 cfs @ 12.10 hrs, Volume= 0.045 af
Primary = 0.57 cfs @ 12.10 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

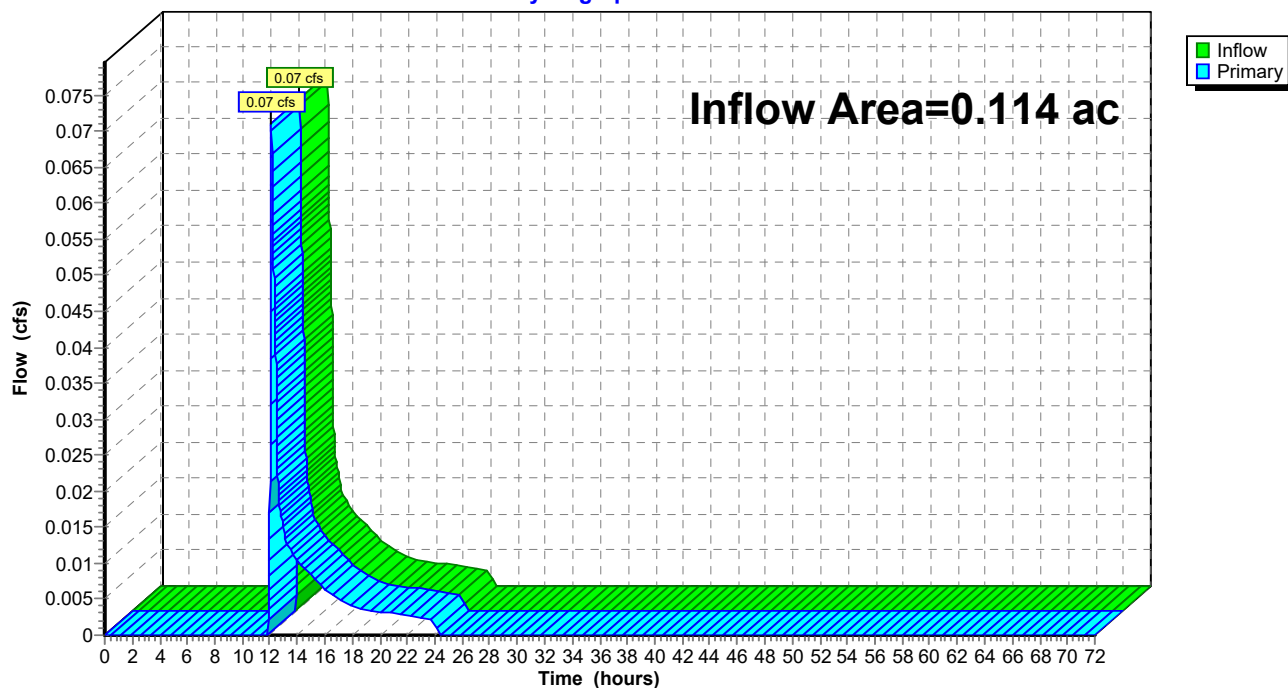
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-2: Point of Analysis 2**Hydrograph**

Summary for Link POA-3: Point of Analysis 3

Inflow Area = 0.114 ac, 0.00% Impervious, Inflow Depth = 0.80" for 25 yr event
Inflow = 0.07 cfs @ 12.12 hrs, Volume= 0.008 af
Primary = 0.07 cfs @ 12.12 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: Point of Analysis 3**Hydrograph**

Summary for Subcatchment XWS-1: Existing Watershed 1

Runoff = 88.23 cfs @ 12.13 hrs, Volume= 7.661 af, Depth= 5.94"

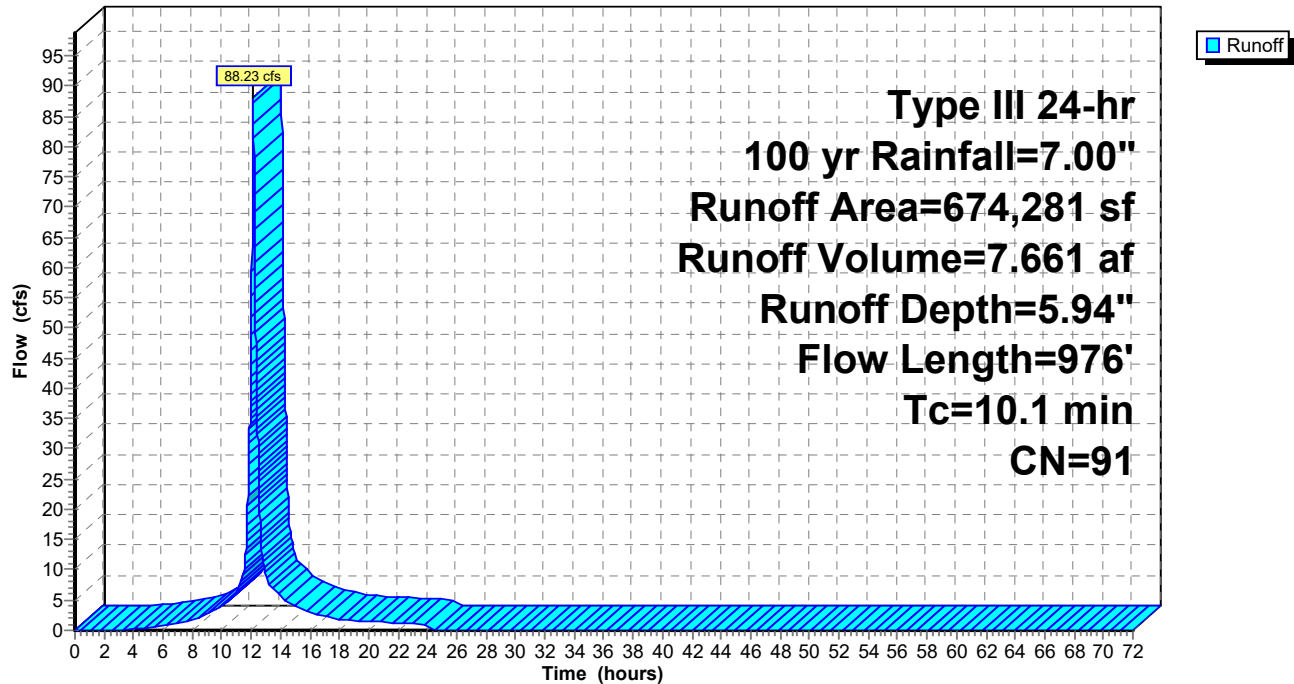
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
456,873	98	Paved parking & roofs
22,303	49	50-75% Grass cover, Fair, HSG A
94,090	79	50-75% Grass cover, Fair, HSG C
36,721	84	50-75% Grass cover, Fair, HSG D
13,068	43	Woods/grass comb., Fair, HSG A
16,683	76	Woods/grass comb., Fair, HSG C
34,543	82	Woods/grass comb., Fair, HSG D
674,281	91	Weighted Average
217,408		32.24% Pervious Area
456,873		67.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		Sheet Flow, 50' SF Grass: Dense n= 0.240 P2= 3.20"
1.2	103	0.0417	1.43		Shallow Concentrated Flow, 103' Shallow Flow Short Grass Pasture Kv= 7.0 fps
0.9	179	0.0283	3.41		Shallow Concentrated Flow, 172' Shallow Flow Paved Kv= 20.3 fps
0.1	60	0.0530	11.31	8.89	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.2	73	0.0052	5.63	17.67	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	39	0.0060	7.01	34.42	Pipe Channel, RCP_Round 30" 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
0.6	472	0.0190	14.09	99.60	Pipe Channel, RCP_Round 36" 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012 Concrete pipe, finished
10.1	976	Total			

Subcatchment XWS-1: Existing Watershed 1

Hydrograph



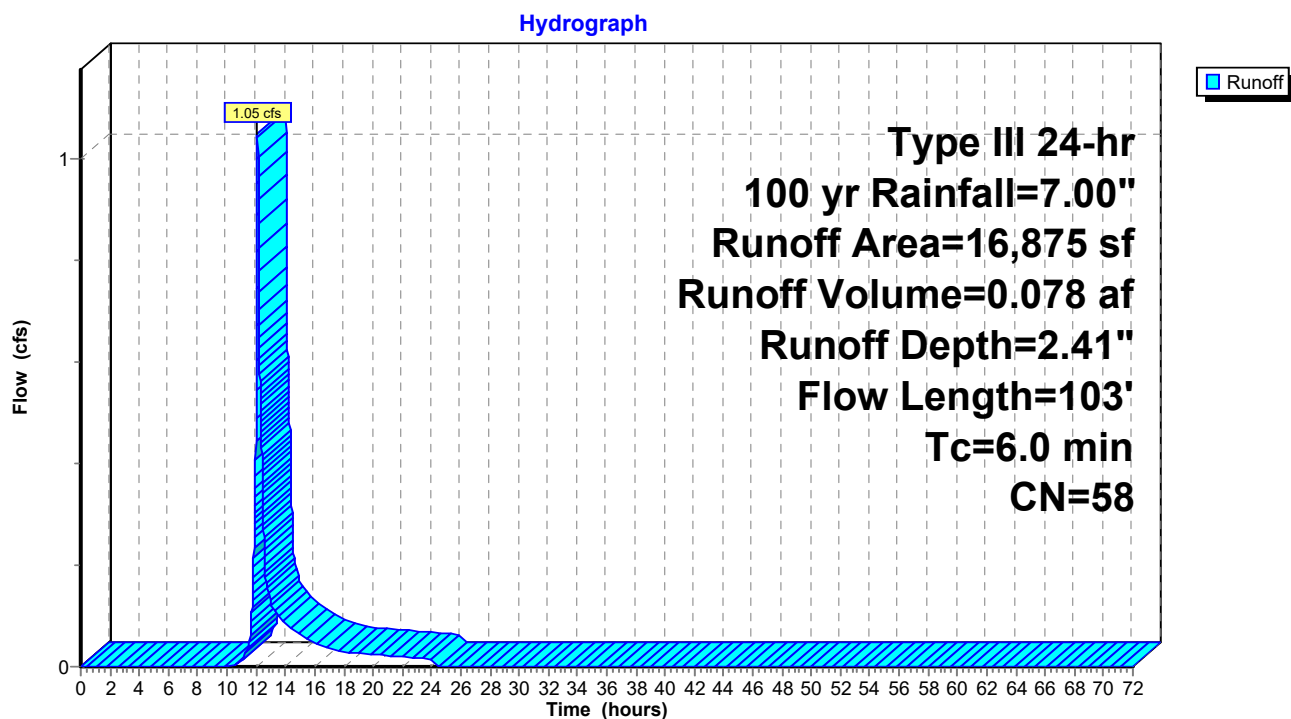
Summary for Subcatchment XWS-2: Existing Watershed 2

Runoff = 1.05 cfs @ 12.09 hrs, Volume= 0.078 af, Depth= 2.41"

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

Area (sf)	CN	Description
2,979	98	Paved parking & roofs
12,981	49	50-75% Grass cover, Fair, HSG A
131	79	50-75% Grass cover, Fair, HSG C
784	43	Woods/grass comb., Fair, HSG A
16,875	58	Weighted Average
13,896		82.35% Pervious Area
2,979		17.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0700	0.17		Sheet Flow, 50' Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
0.4	53	0.1038	2.26		Shallow Concentrated Flow, 53' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.4	103	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-2: Existing Watershed 2

Summary for Subcatchment XWS-3: Existing Watershed 3

Runoff = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af, Depth= 1.58"

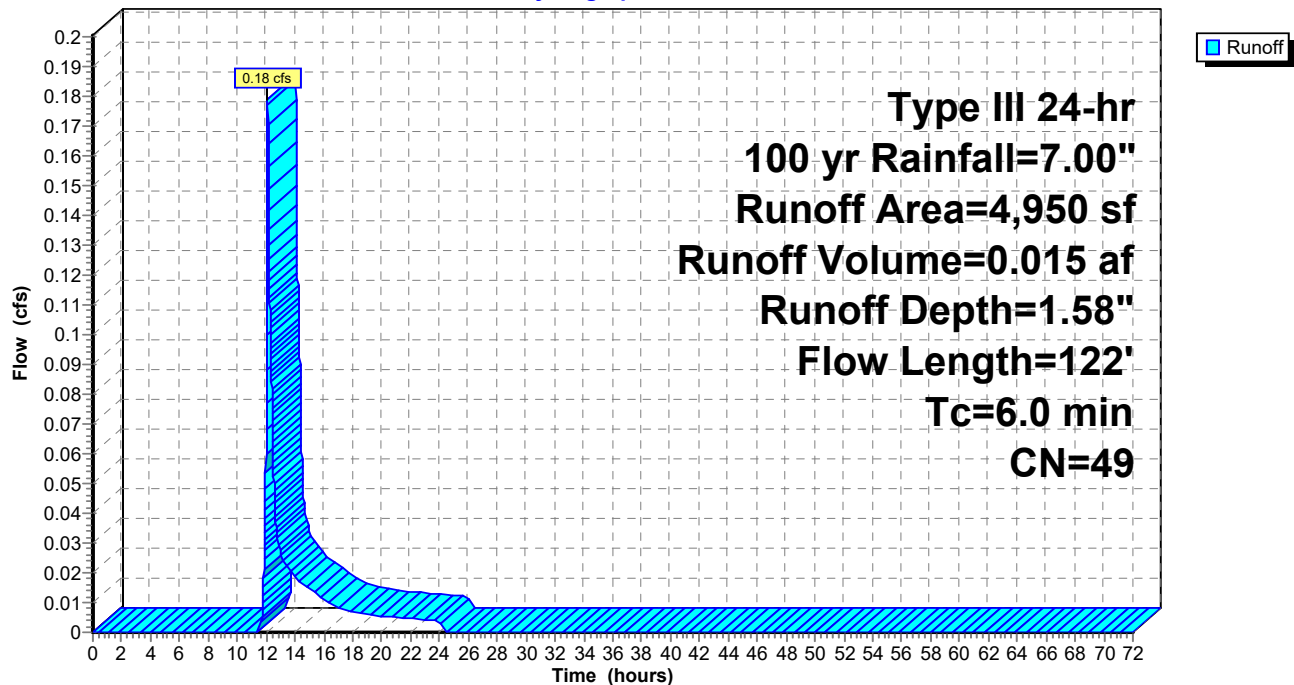
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
4,950	49	50-75% Grass cover, Fair, HSG A
4,950		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.1000	0.19		Sheet Flow, Grass Sheet Flow
					Grass: Dense n= 0.240 P2= 3.20"
1.2	72	0.0207	1.01		Shallow Concentrated Flow, 72' Shallow Concentrated Flow
					Short Grass Pasture Kv= 7.0 fps
5.5	122	Total, Increased to minimum Tc = 6.0 min			

Subcatchment XWS-3: Existing Watershed 3

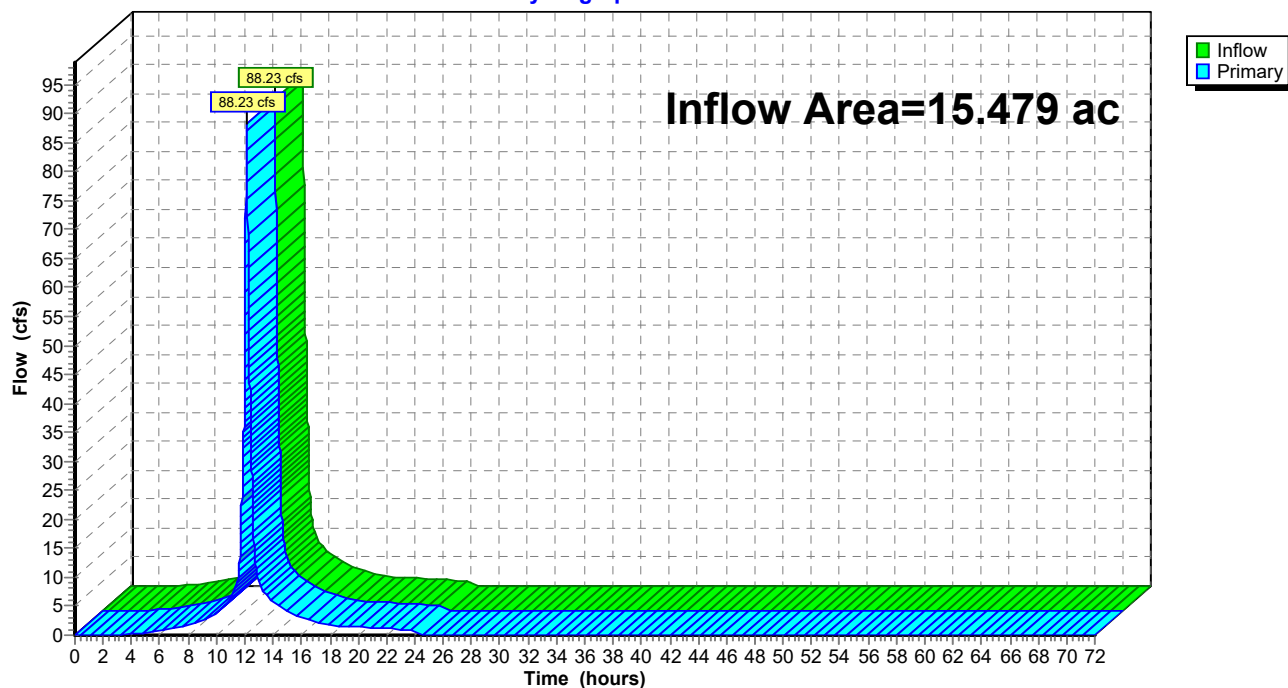
Hydrograph



Summary for Link POA-1: Point of Analysis 1

Inflow Area = 15.479 ac, 67.76% Impervious, Inflow Depth = 5.94" for 100 yr event
Inflow = 88.23 cfs @ 12.13 hrs, Volume= 7.661 af
Primary = 88.23 cfs @ 12.13 hrs, Volume= 7.661 af, Atten= 0%, Lag= 0.0 min

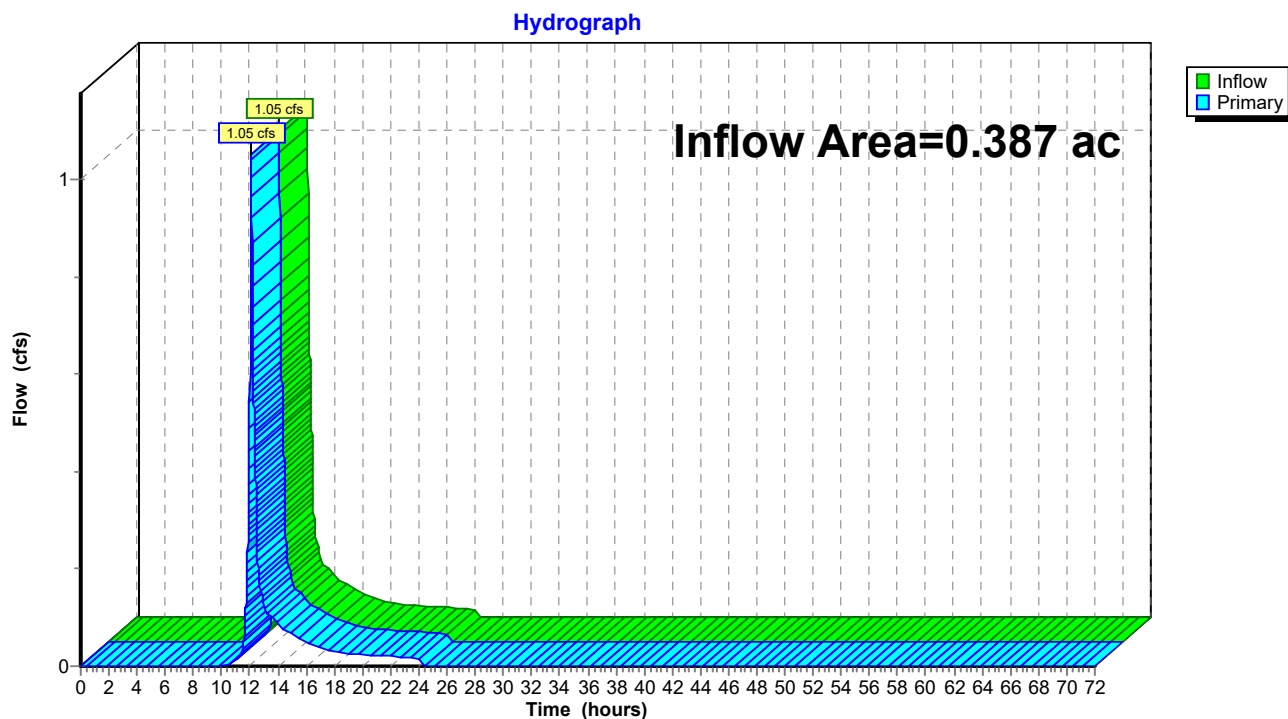
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-1: Point of Analysis 1**Hydrograph**

Summary for Link POA-2: Point of Analysis 2

Inflow Area = 0.387 ac, 17.65% Impervious, Inflow Depth = 2.41" for 100 yr event
Inflow = 1.05 cfs @ 12.09 hrs, Volume= 0.078 af
Primary = 1.05 cfs @ 12.09 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

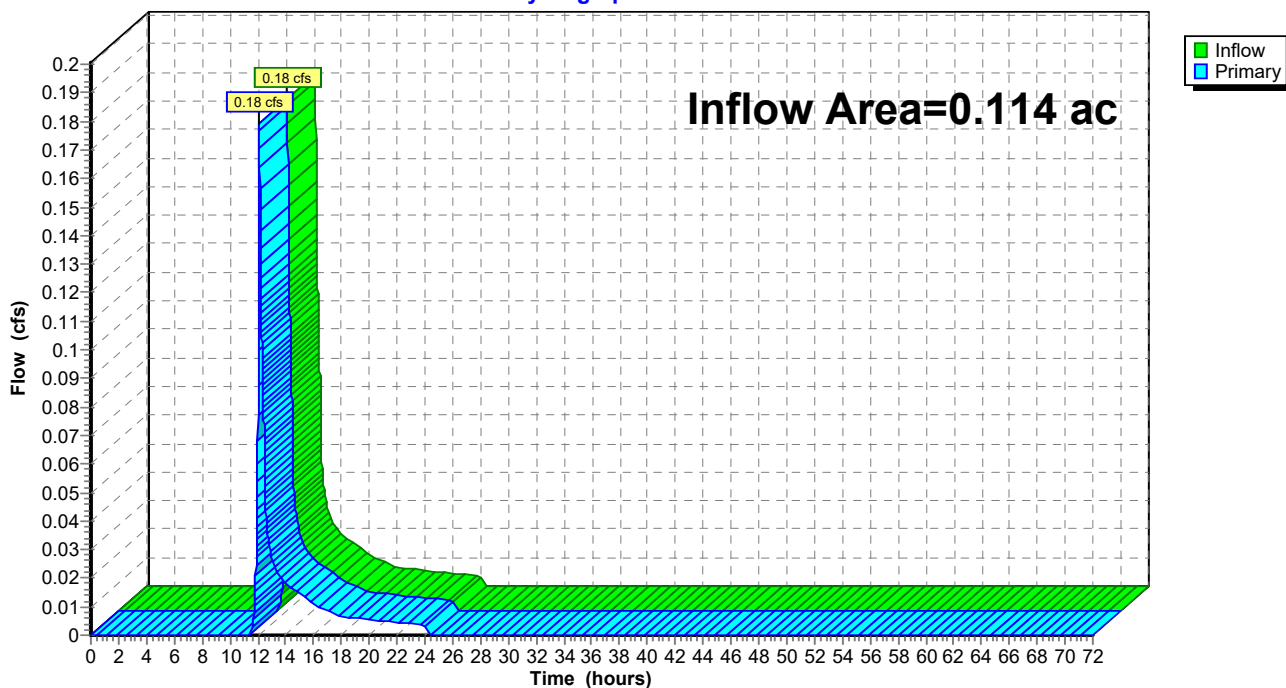
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-2: Point of Analysis 2

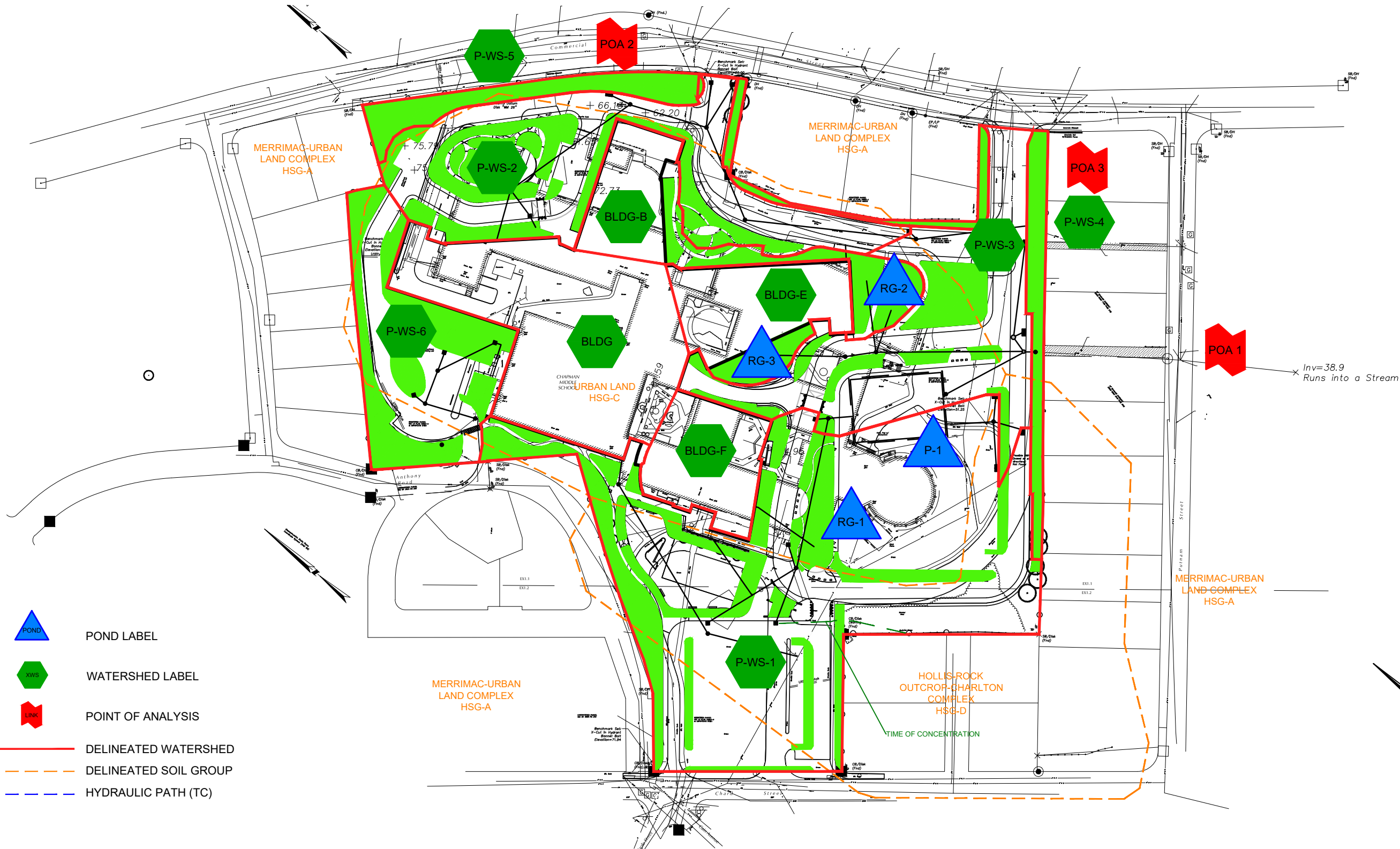
Summary for Link POA-3: Point of Analysis 3

Inflow Area = 0.114 ac, 0.00% Impervious, Inflow Depth = 1.58" for 100 yr event
Inflow = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af
Primary = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: Point of Analysis 3**Hydrograph**

APPENDIX 3:
Proposed Hydrology Report



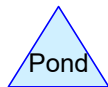
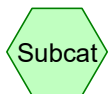
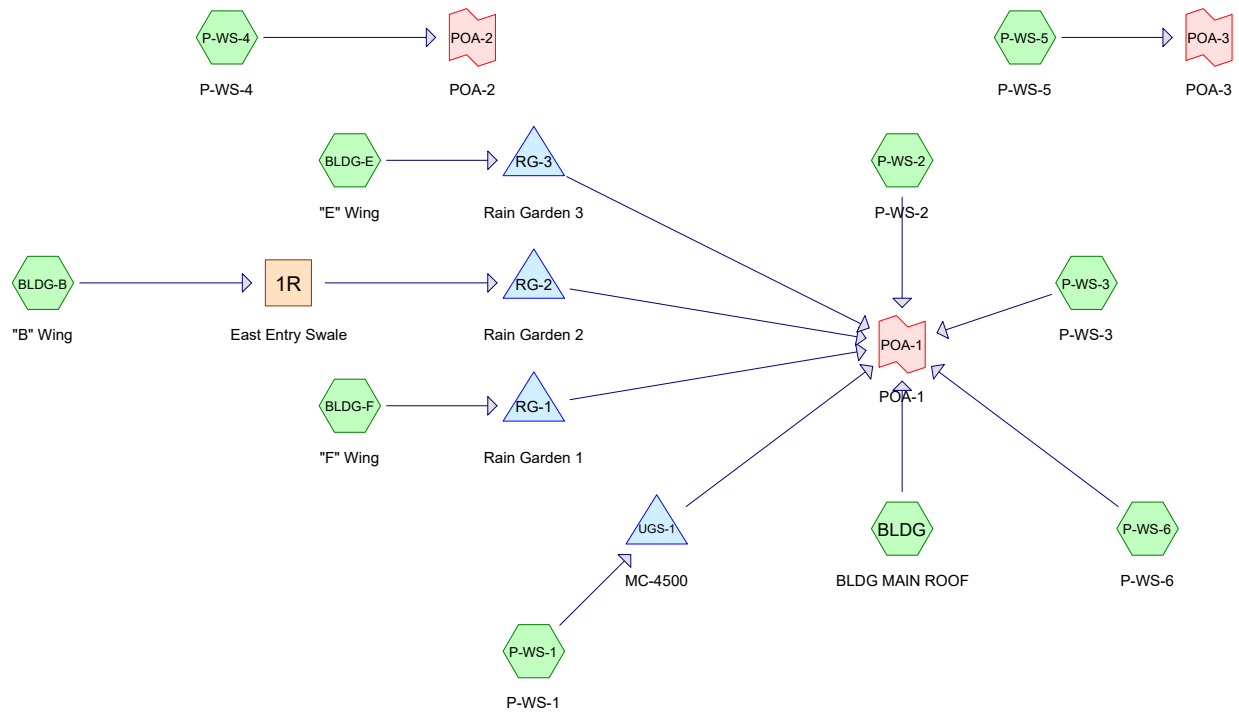
Sketch No.
P-HYD
Reference Drawing
-

Job #:	17127.00
Drawn by:	MJZ
Scale:	1" = 150'
Date:	10/18/2019

Project:	Maria Weston Chapman
	Middle School
Title:	Proposed Hydrology

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Civil Engineers + Land Surveyors
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Framingham, MA 01701
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Routing Diagram for 17127.00 - Maria Weston Chapman MS - PROPOSED

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17127.00 - Maria Weston Chapman MS - PROPOSED

Prepared by Samiotes Engineering

Printed 10/17/2019

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.749	98	"F" Wing (BLDG-B, BLDG-E, BLDG-F)
1.202	39	>75% Grass cover, Good, HSG A (P-WS-1, P-WS-2, P-WS-3, P-WS-4, P-WS-5)
2.446	74	>75% Grass cover, Good, HSG C (BLDG-B, BLDG-E, P-WS-1, P-WS-2, P-WS-3, P-WS-4, P-WS-6)
0.678	80	>75% Grass cover, Good, HSG D (P-WS-1, P-WS-3, P-WS-4)
6.932	98	Paved parking, HSG A (P-WS-1, P-WS-2, P-WS-3)
0.610	98	Paved parking, HSG C (P-WS-6)
0.093	98	Paved walkways, HSG C (BLDG-B)
0.313	82	Woods/grass comb., Fair, HSG D (P-WS-1)
1.956	98	impervious (BLDG)
15.980	89	TOTAL AREA

Summary for Subcatchment BLDG: BLDG MAIN ROOF

Runoff = 6.08 cfs @ 12.08 hrs, Volume= 0.484 af, Depth= 2.97"

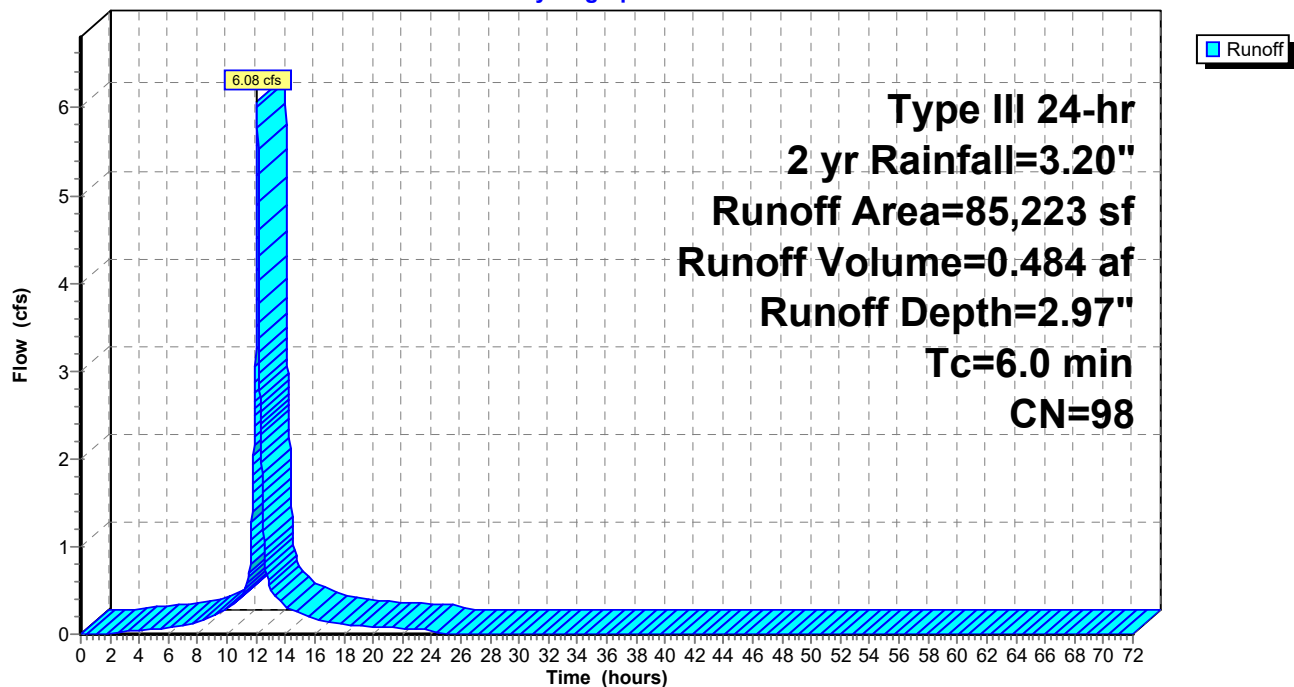
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
* 85,223	98	impervious
85,223		100.00% Impervious Area

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

Subcatchment BLDG: BLDG MAIN ROOF

Hydrograph



Summary for Subcatchment BLDG-B: "B" Wing

Runoff = 2.18 cfs @ 12.09 hrs, Volume= 0.156 af, Depth= 2.08"

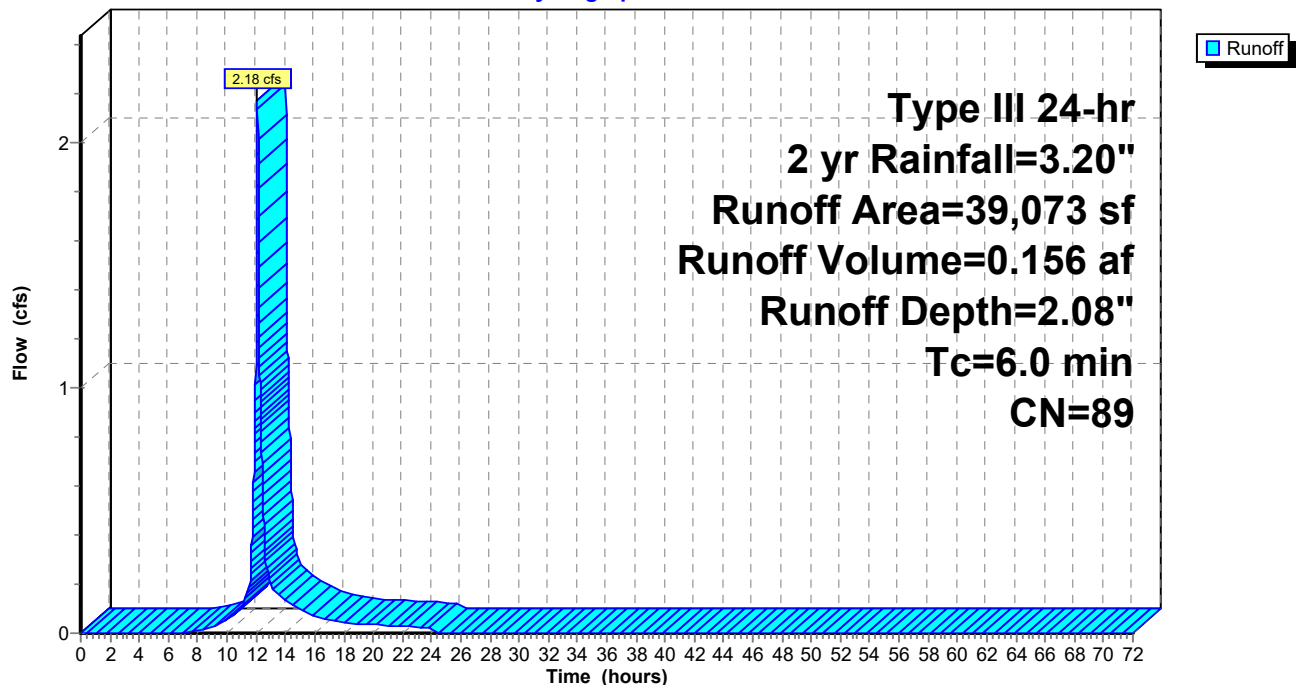
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	20,500	98	"F" Wing
	14,505	74	>75% Grass cover, Good, HSG C
*	4,068	98	Paved walkways, HSG C
	39,073	89	Weighted Average
	14,505		37.12% Pervious Area
	24,568		62.88% Impervious Area

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

Subcatchment BLDG-B: "B" Wing

Hydrograph



Summary for Subcatchment BLDG-E: "E" Wing

Runoff = 2.32 cfs @ 12.08 hrs, Volume= 0.172 af, Depth= 2.54"

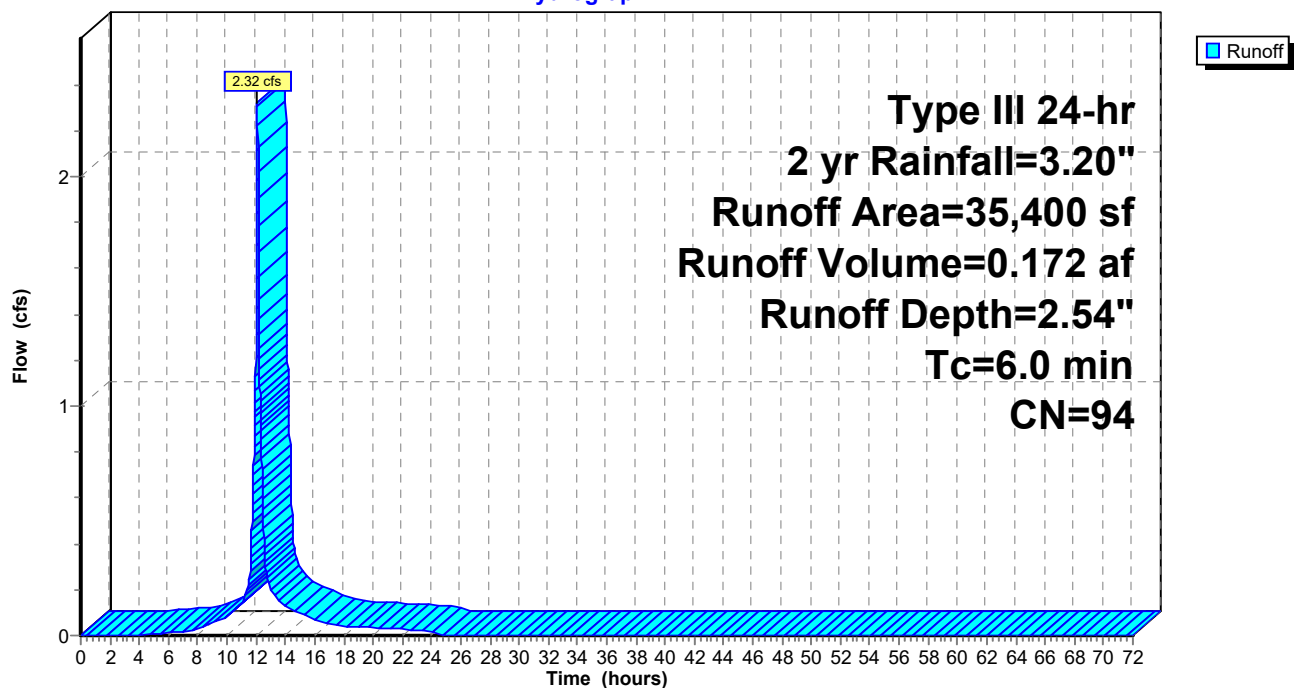
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	29,050	98	"F" Wing
	6,350	74	>75% Grass cover, Good, HSG C
	35,400	94	Weighted Average
	6,350		17.94% Pervious Area
	29,050		82.06% Impervious Area

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

Subcatchment BLDG-E: "E" Wing

Hydrograph



Summary for Subcatchment BLDG-F: "F" Wing

Runoff = 1.90 cfs @ 12.08 hrs, Volume= 0.151 af, Depth= 2.97"

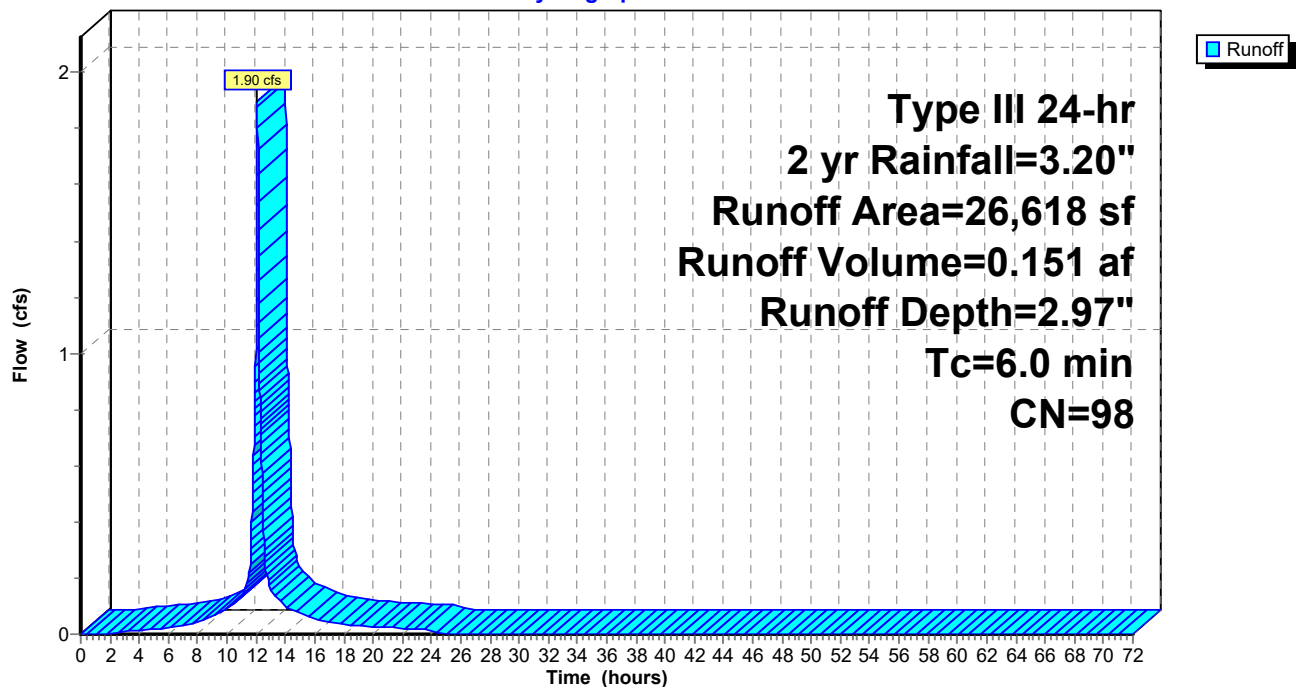
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
* 26,618	98	"F" Wing
26,618		100.00% Impervious Area

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

Subcatchment BLDG-F: "F" Wing

Hydrograph



Summary for Subcatchment P-WS-1: P-WS-1

Runoff = 13.12 cfs @ 12.09 hrs, Volume= 0.943 af, Depth= 2.17"

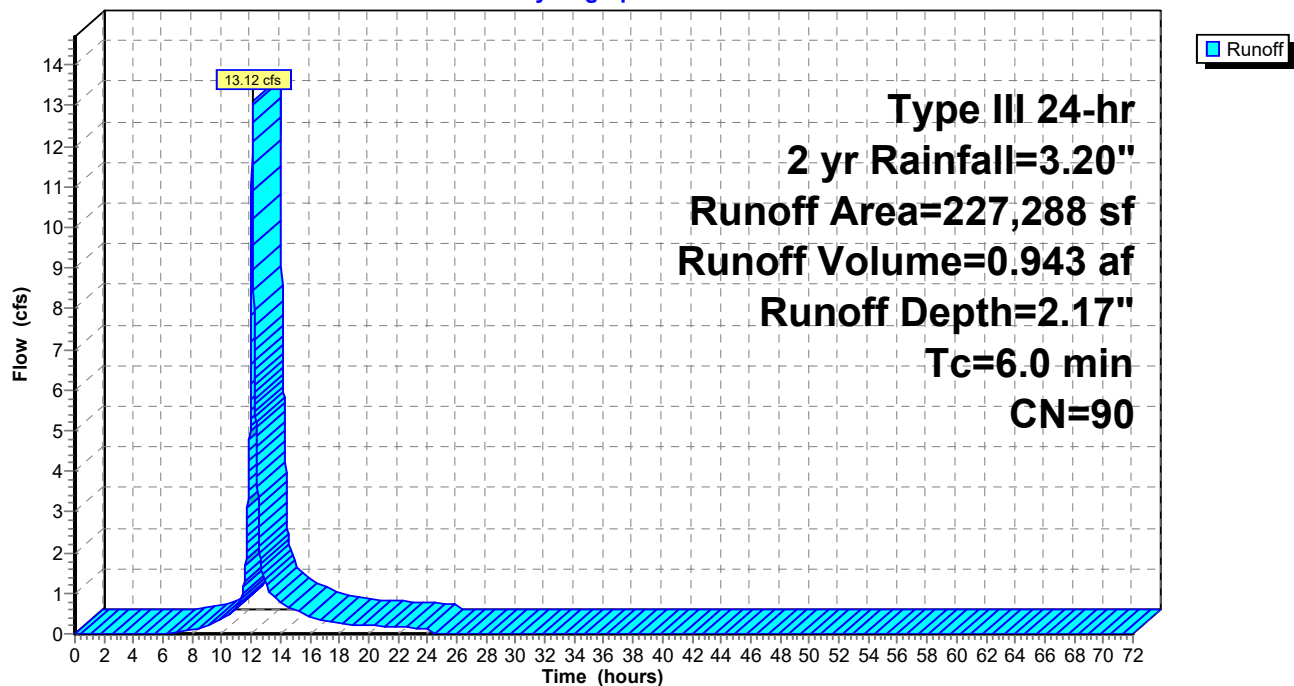
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
165,375	98	Paved parking, HSG A
16,947	39	>75% Grass cover, Good, HSG A
7,940	74	>75% Grass cover, Good, HSG C
23,392	80	>75% Grass cover, Good, HSG D
* 13,634	82	Woods/grass comb., Fair, HSG D
227,288	90	Weighted Average
61,913		27.24% Pervious Area
165,375		72.76% Impervious Area

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

Subcatchment P-WS-1: P-WS-1

Hydrograph



Summary for Subcatchment P-WS-2: P-WS-2

Runoff = 5.02 cfs @ 12.09 hrs, Volume= 0.361 af, Depth= 2.17"

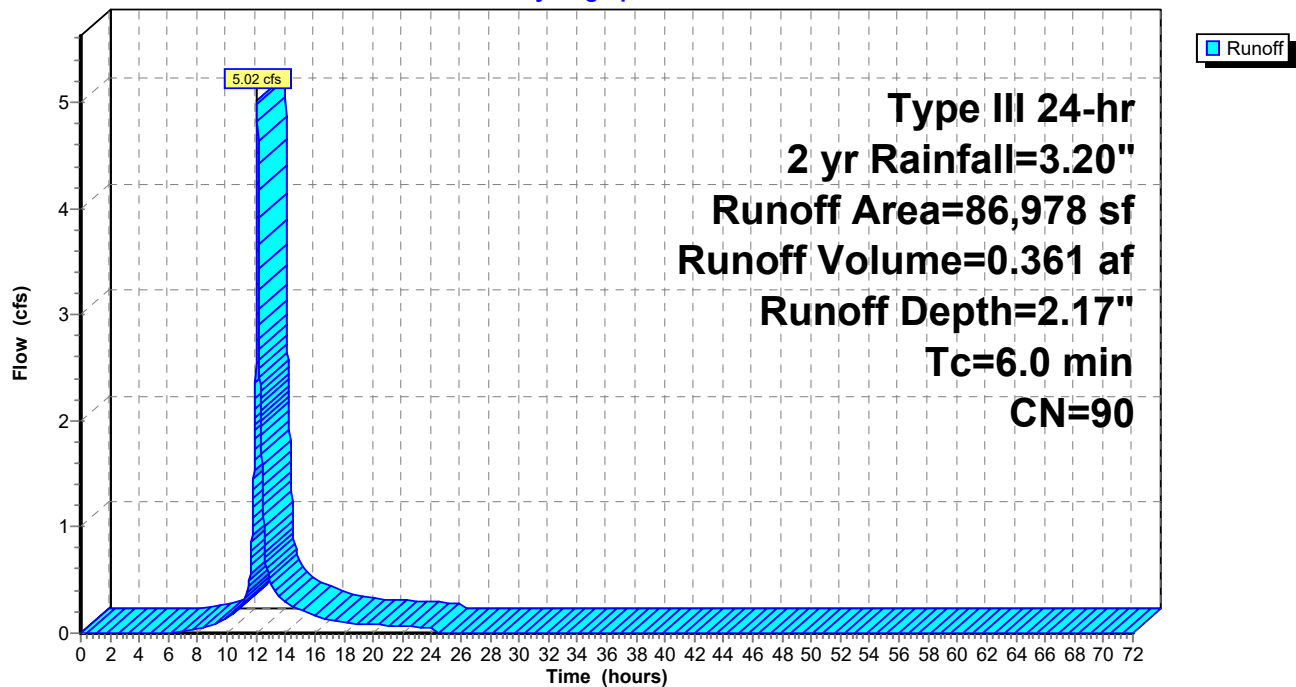
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
58,838	98	Paved parking, HSG A
1,568	39	>75% Grass cover, Good, HSG A
26,572	74	>75% Grass cover, Good, HSG C
86,978	90	Weighted Average
28,140		32.35% Pervious Area
58,838		67.65% Impervious Area

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

Subcatchment P-WS-2: P-WS-2

Hydrograph



Summary for Subcatchment P-WS-3: P-WS-3

Runoff = 5.90 cfs @ 12.09 hrs, Volume= 0.429 af, Depth= 2.35"

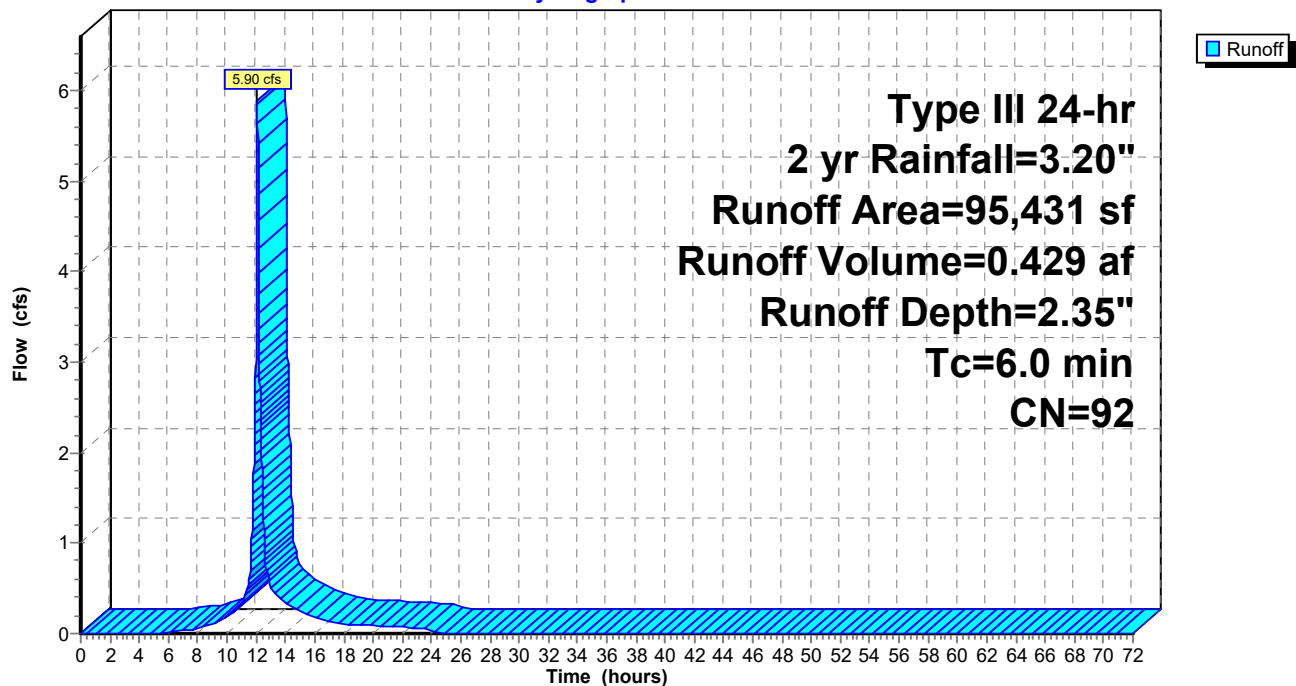
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
77,755	98	Paved parking, HSG A
3,258	39	>75% Grass cover, Good, HSG A
12,632	74	>75% Grass cover, Good, HSG C
1,786	80	>75% Grass cover, Good, HSG D
95,431	92	Weighted Average
17,676		18.52% Pervious Area
77,755		81.48% Impervious Area

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

Subcatchment P-WS-3: P-WS-3

Hydrograph



Summary for Subcatchment P-WS-4: P-WS-4

Runoff = 0.01 cfs @ 12.47 hrs, Volume= 0.006 af, Depth= 0.13"

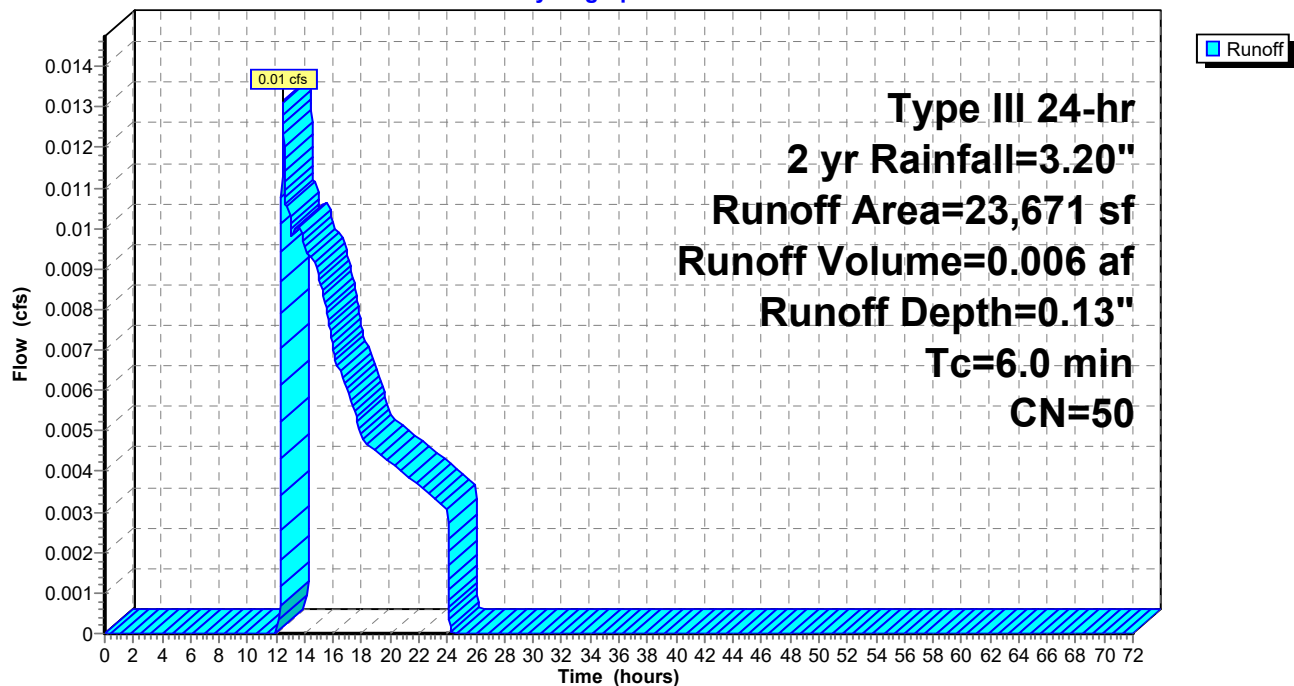
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
16,953	39	>75% Grass cover, Good, HSG A
2,352	74	>75% Grass cover, Good, HSG C
4,366	80	>75% Grass cover, Good, HSG D
23,671	50	Weighted Average
23,671		100.00% Pervious Area

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

Subcatchment P-WS-4: P-WS-4

Hydrograph



Summary for Subcatchment P-WS-5: P-WS-5

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Depth= 0.00"

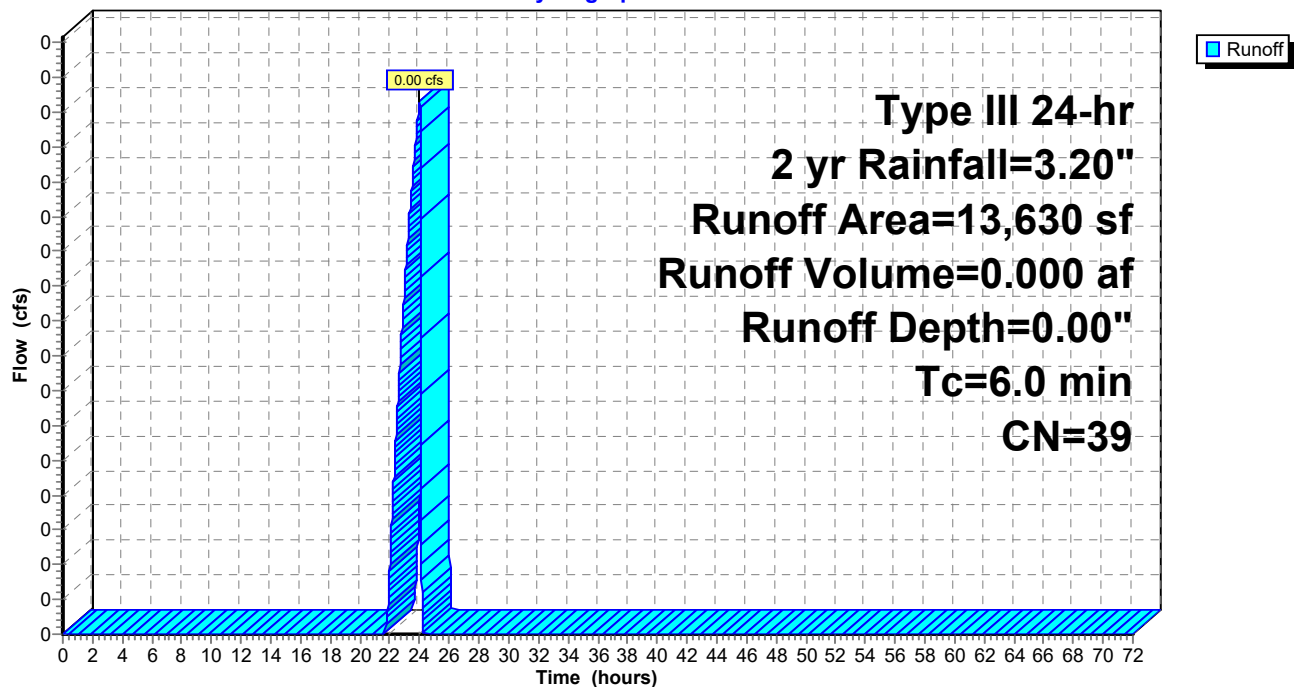
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
13,630	39	>75% Grass cover, Good, HSG A
13,630		100.00% Pervious Area

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

Subcatchment P-WS-5: P-WS-5

Hydrograph



Summary for Subcatchment P-WS-6: P-WS-6

Runoff = 2.84 cfs @ 12.09 hrs, Volume= 0.202 af, Depth= 1.68"

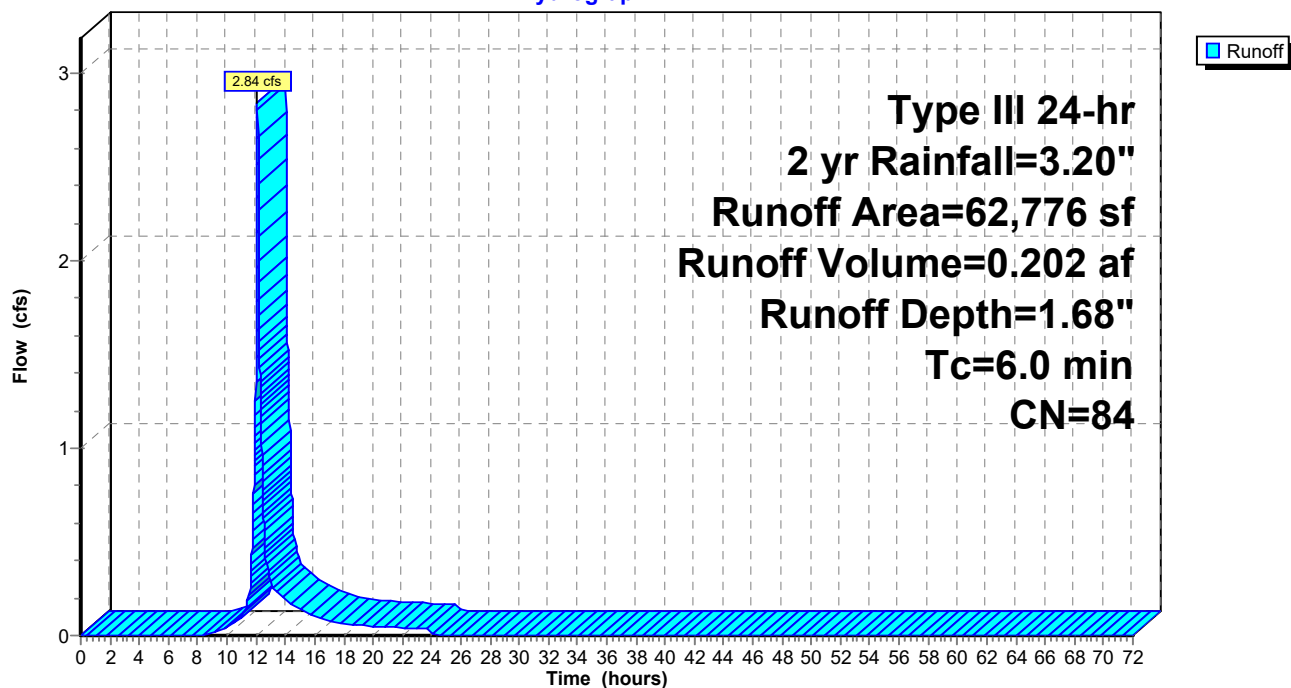
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
26,590	98	Paved parking, HSG C
36,186	74	>75% Grass cover, Good, HSG C
62,776	84	Weighted Average
36,186		57.64% Pervious Area
26,590		42.36% Impervious Area

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

Subcatchment P-WS-6: P-WS-6

Hydrograph



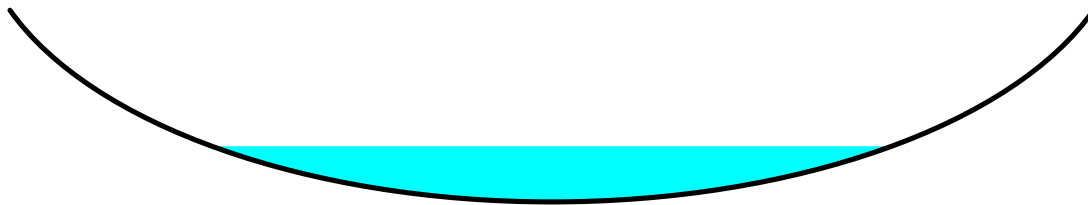
Summary for Reach 1R: East Entry Swale

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 2.08" for 2 yr event
 Inflow = 2.18 cfs @ 12.09 hrs, Volume= 0.156 af
 Outflow = 2.09 cfs @ 12.14 hrs, Volume= 0.156 af, Atten= 4%, Lag= 3.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.34 fps, Min. Travel Time= 2.0 min
 Avg. Velocity = 1.07 fps, Avg. Travel Time= 6.2 min

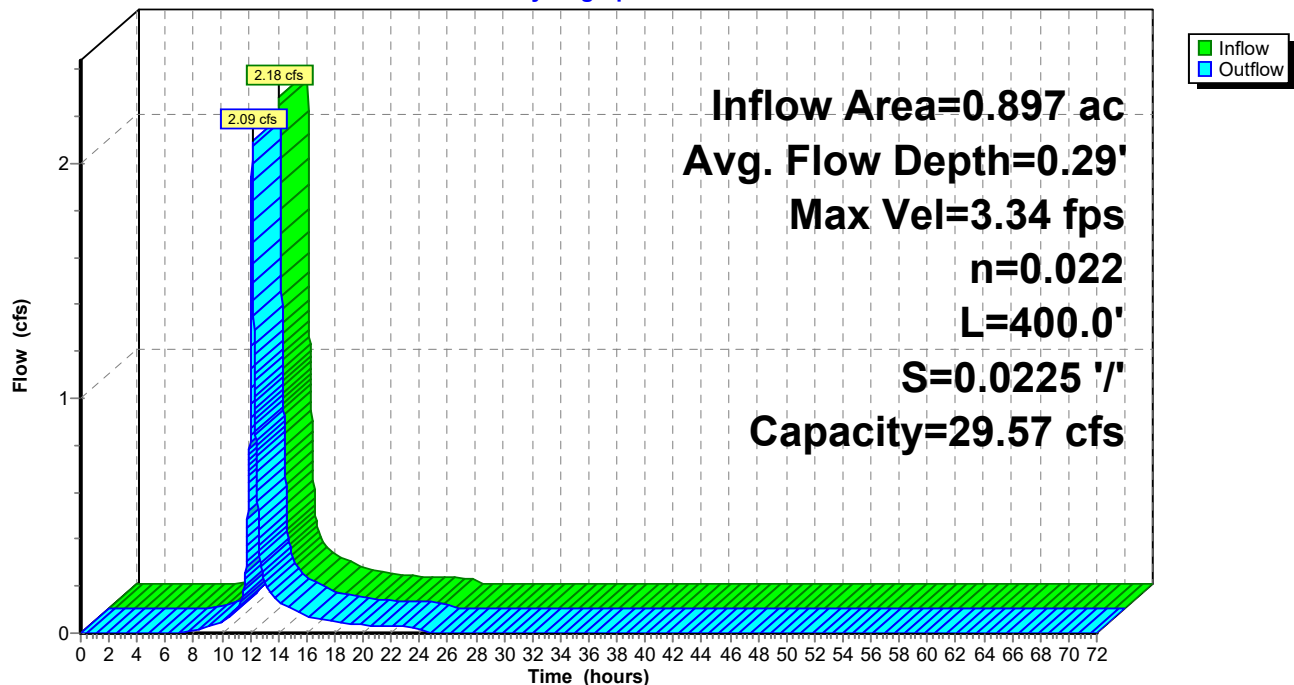
Peak Storage= 250 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.29'
 Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 29.57 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
 Length= 400.0' Slope= 0.0225 '/'
 Inlet Invert= 67.00', Outlet Invert= 58.00'



Reach 1R: East Entry Swale

Hydrograph



Summary for Pond RG-1: Rain Garden 1

Inflow Area = 0.611 ac, 100.00% Impervious, Inflow Depth = 2.97" for 2 yr event
 Inflow = 1.90 cfs @ 12.08 hrs, Volume= 0.151 af
 Outflow = 1.52 cfs @ 12.14 hrs, Volume= 0.151 af, Atten= 20%, Lag= 3.6 min
 Discarded = 0.06 cfs @ 12.14 hrs, Volume= 0.098 af
 Primary = 1.46 cfs @ 12.14 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 58.90' @ 12.14 hrs Surf.Area= 2,666 sf Storage= 1,935 cf

Plug-Flow detention time= 177.4 min calculated for 0.151 af (100% of inflow)
 Center-of-Mass det. time= 177.4 min (933.8 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1	58.00'	5,551 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.00	1,655	0	0
59.00	2,784	2,220	2,220
60.00	3,878	3,331	5,551

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.00'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	58.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	54.00'	12.0" Round Culvert L= 400.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 54.00' / 50.00' S= 0.0100 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.06 cfs @ 12.14 hrs HW=58.90' (Free Discharge)

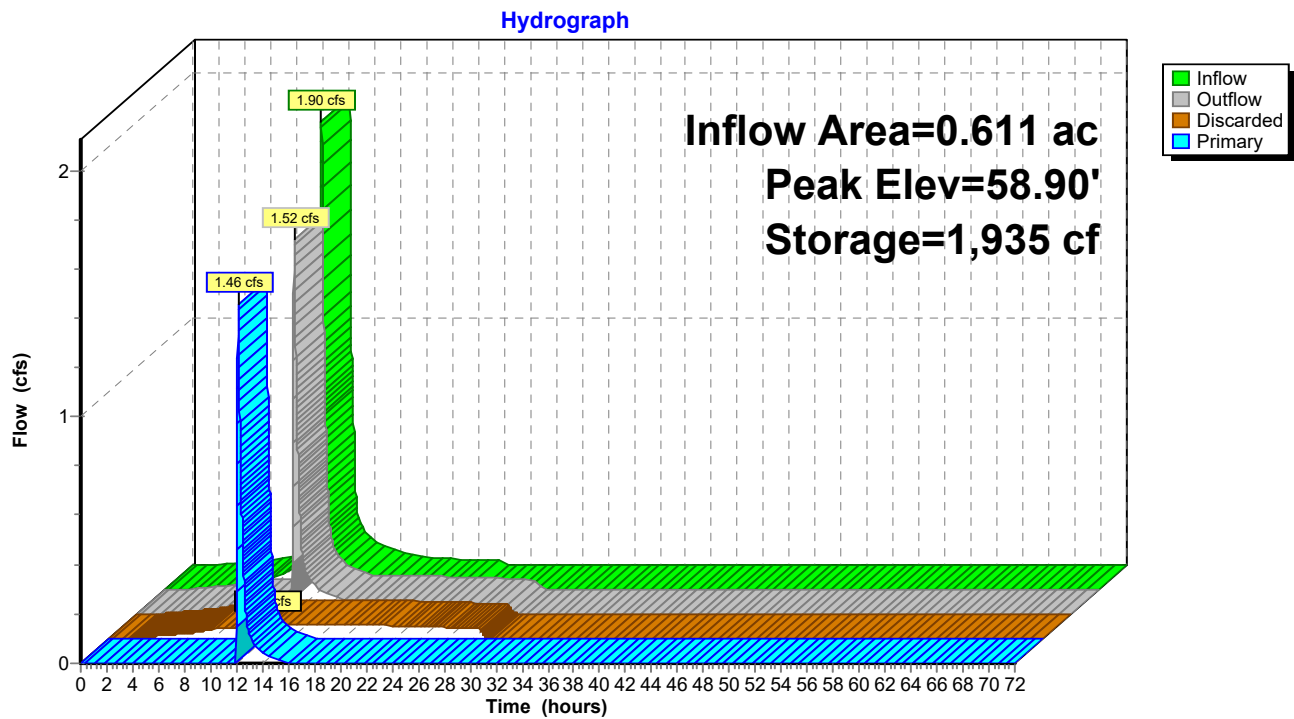
↑ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.45 cfs @ 12.14 hrs HW=58.90' (Free Discharge)

↑ **3=Culvert** (Passes 1.45 cfs of 4.99 cfs potential flow)

↑ **2=Orifice/Grate** (Weir Controls 1.45 cfs @ 1.25 fps)

Pond RG-1: Rain Garden 1



Summary for Pond RG-2: Rain Garden 2

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 2.08" for 2 yr event
 Inflow = 2.09 cfs @ 12.14 hrs, Volume= 0.156 af
 Outflow = 0.89 cfs @ 12.38 hrs, Volume= 0.156 af, Atten= 57%, Lag= 13.9 min
 Discarded = 0.03 cfs @ 12.38 hrs, Volume= 0.061 af
 Primary = 0.86 cfs @ 12.38 hrs, Volume= 0.095 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 55.12' @ 12.38 hrs Surf.Area= 2,444 sf Storage= 2,132 cf

Plug-Flow detention time= 245.0 min calculated for 0.156 af (100% of inflow)
 Center-of-Mass det. time= 245.1 min (1,062.3 - 817.2)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	6,519 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

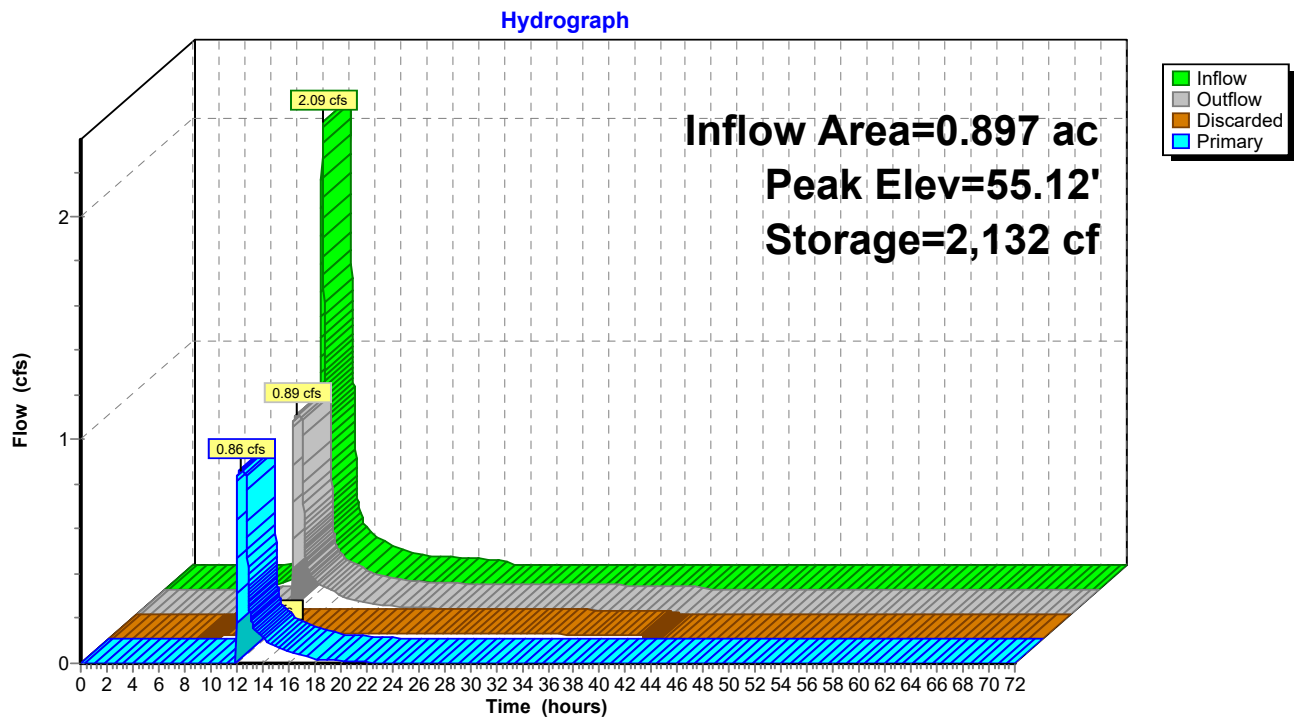
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,365	0	0
55.00	2,311	1,838	1,838
56.00	3,385	2,848	4,686
56.50	3,945	1,833	6,519

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	54.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	51.75'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.75' / 50.00' S= 0.0088 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.03 cfs @ 12.38 hrs HW=55.12' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.86 cfs @ 12.38 hrs HW=55.12' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 0.86 cfs @ 4.40 fps)
 ↑ **2=Orifice/Grate** (Passes 0.86 cfs of 5.97 cfs potential flow)

Pond RG-2: Rain Garden 2



Summary for Pond RG-3: Rain Garden 3

Inflow Area = 0.813 ac, 82.06% Impervious, Inflow Depth = 2.54" for 2 yr event
 Inflow = 2.32 cfs @ 12.08 hrs, Volume= 0.172 af
 Outflow = 1.27 cfs @ 12.21 hrs, Volume= 0.172 af, Atten= 45%, Lag= 7.3 min
 Discarded = 0.02 cfs @ 12.21 hrs, Volume= 0.035 af
 Primary = 1.25 cfs @ 12.21 hrs, Volume= 0.137 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 60.23' @ 12.21 hrs Surf.Area= 1,476 sf Storage= 1,300 cf

Plug-Flow detention time= 126.3 min calculated for 0.172 af (100% of inflow)
 Center-of-Mass det. time= 126.4 min (913.6 - 787.1)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	5,155 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

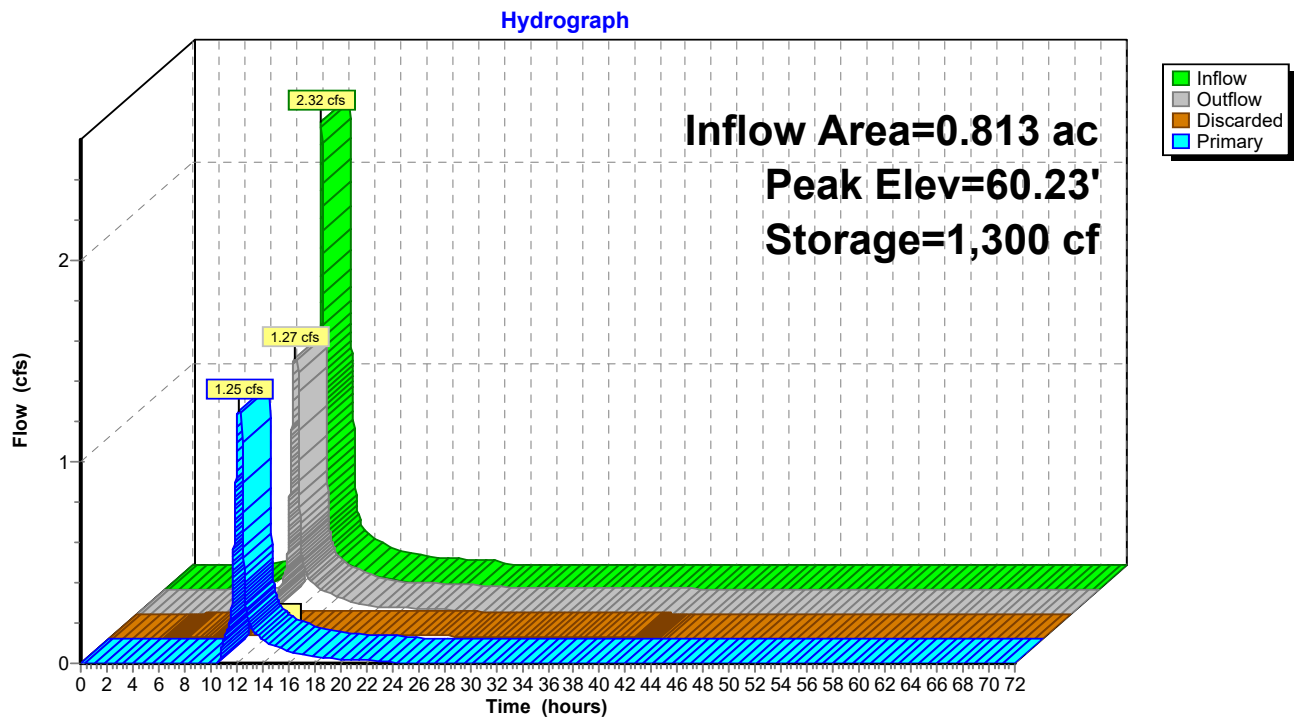
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	660	0	0
60.00	1,309	985	985
61.00	2,048	1,679	2,663
62.00	2,936	2,492	5,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	59.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	53.50'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.50' / 50.00' S= 0.0175 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 12.21 hrs HW=60.23' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.25 cfs @ 12.21 hrs HW=60.23' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 1.25 cfs @ 6.38 fps)
 ↑ **2=Orifice/Grate** (Passes 1.25 cfs of 8.60 cfs potential flow)

Pond RG-3: Rain Garden 3



Summary for Pond UGS-1: MC-4500

Inflow Area = 5.218 ac, 72.76% Impervious, Inflow Depth = 2.17" for 2 yr event
 Inflow = 13.12 cfs @ 12.09 hrs, Volume= 0.943 af
 Outflow = 4.87 cfs @ 12.35 hrs, Volume= 0.943 af, Atten= 63%, Lag= 15.6 min
 Discarded = 0.26 cfs @ 9.67 hrs, Volume= 0.572 af
 Primary = 4.61 cfs @ 12.35 hrs, Volume= 0.371 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 51.66' @ 12.35 hrs Surf.Area= 4,732 sf Storage= 15,424 cf

Plug-Flow detention time= 294.8 min calculated for 0.943 af (100% of inflow)
 Center-of-Mass det. time= 294.8 min (1,101.7 - 806.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	8,279 cf	92.08'W x 51.39'L x 7.00'H Field A 33,126 cf Overall - 12,428 cf Embedded = 20,698 cf x 40.0% Voids
#2A	48.00'	12,428 cf	ADS_StormTech MC-4500 +Cap x 110 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 110 Chambers in 10 Rows Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf
		20,707 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	2.400 in/hr Exfiltration over Surface area
#2	Primary	47.00'	24.0" Round Culvert L= 140.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.00' S= 0.0071 ' S= 0.0071 ' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	50.50'	12.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 2	52.00'	5.0' long x 5.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 5.0' Crest Height

Discarded OutFlow Max=0.26 cfs @ 9.67 hrs HW=47.10' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=4.61 cfs @ 12.35 hrs HW=51.66' (Free Discharge)

↑ **2=Culvert** (Passes 4.61 cfs of 27.92 cfs potential flow)

↑ **3=Orifice/Grate** (Orifice Controls 4.61 cfs @ 3.44 fps)

↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UGS-1: MC-4500 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length

10 Rows x 100.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 92.08' Base Width

12.0" Base + 60.0" Chamber Height + 12.0" Cover = 7.00' Field Height

110 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 10 Rows = 12,427.9 cf Chamber Storage

33,126.2 cf Field - 12,427.9 cf Chambers = 20,698.3 cf Stone x 40.0% Voids = 8,279.3 cf Stone Storage

Chamber Storage + Stone Storage = 20,707.3 cf = 0.475 af

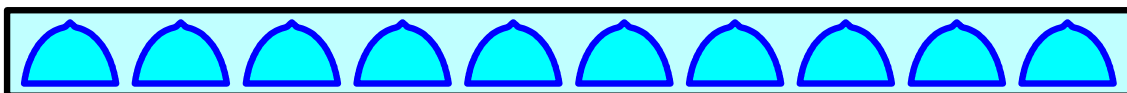
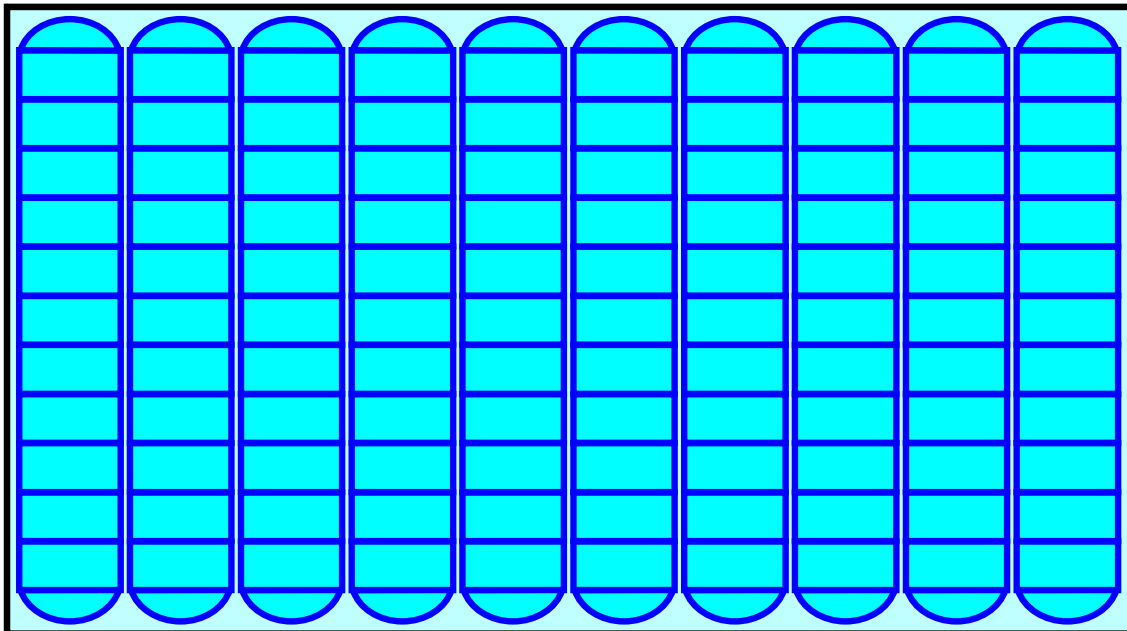
Overall Storage Efficiency = 62.5%

Overall System Size = 51.39' x 92.08' x 7.00'

110 Chambers

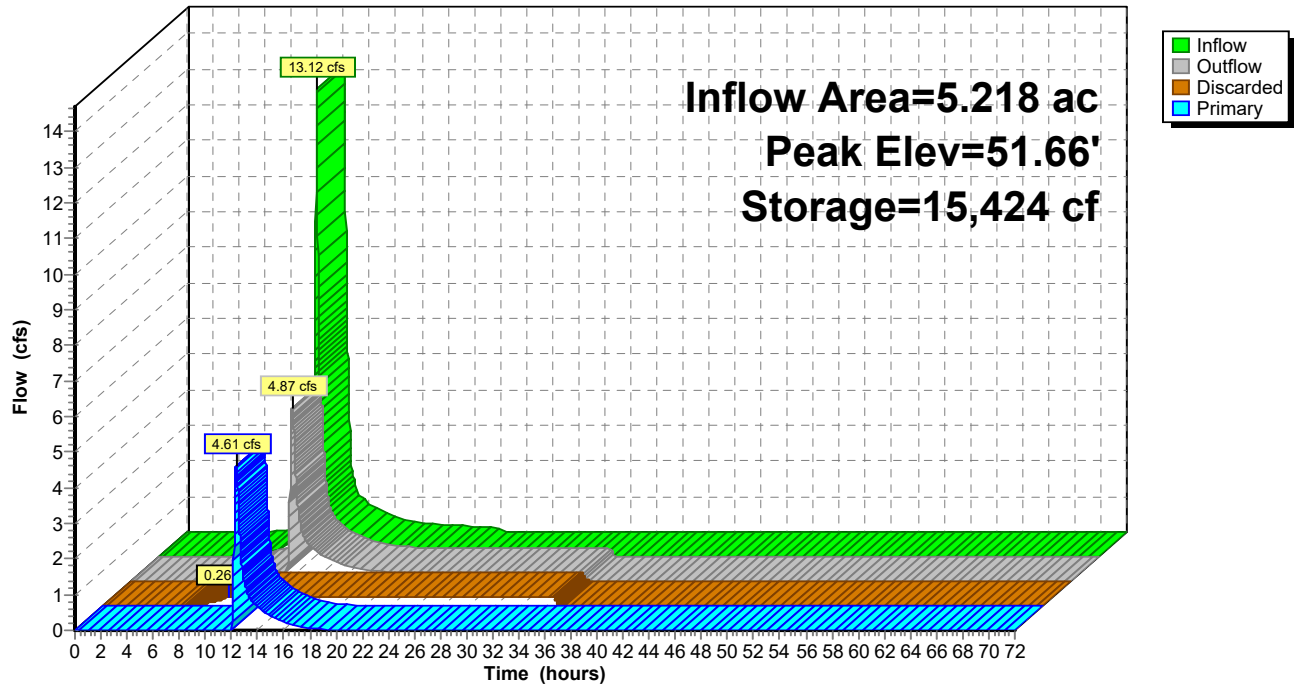
1,226.9 cy Field

766.6 cy Stone



Pond UGS-1: MC-4500

Hydrograph



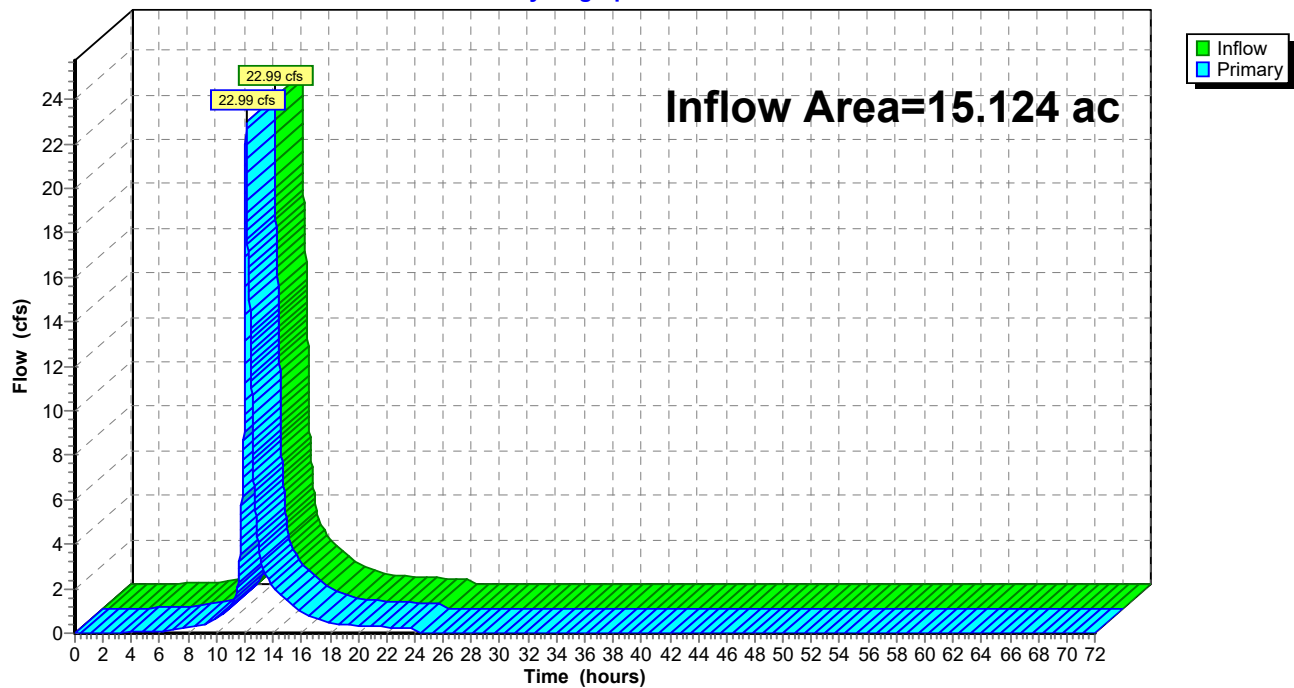
Summary for Link POA-1: POA-1

Inflow Area = 15.124 ac, 74.99% Impervious, Inflow Depth = 1.69" for 2 yr event
Inflow = 22.99 cfs @ 12.09 hrs, Volume= 2.132 af
Primary = 22.99 cfs @ 12.09 hrs, Volume= 2.132 af, Atten= 0%, Lag= 0.0 min

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

Link POA-1: POA-1

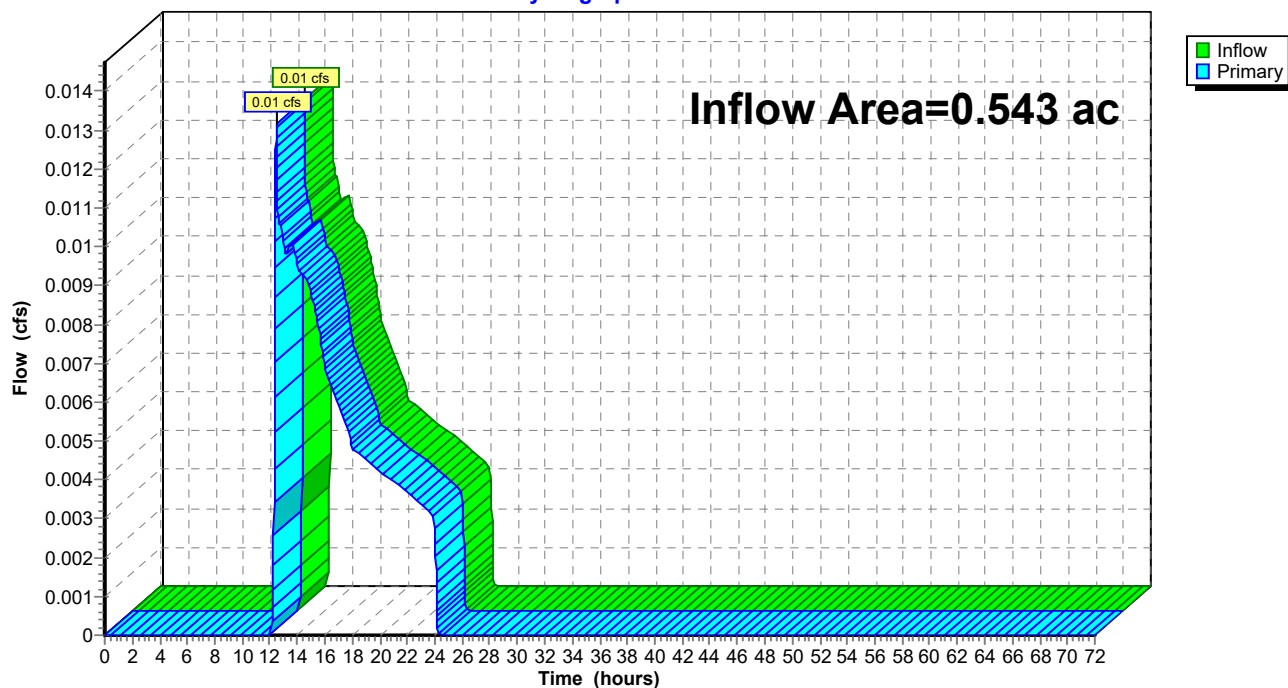
Hydrograph



Summary for Link POA-2: POA-2

Inflow Area = 0.543 ac, 0.00% Impervious, Inflow Depth = 0.13" for 2 yr event
Inflow = 0.01 cfs @ 12.47 hrs, Volume= 0.006 af
Primary = 0.01 cfs @ 12.47 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

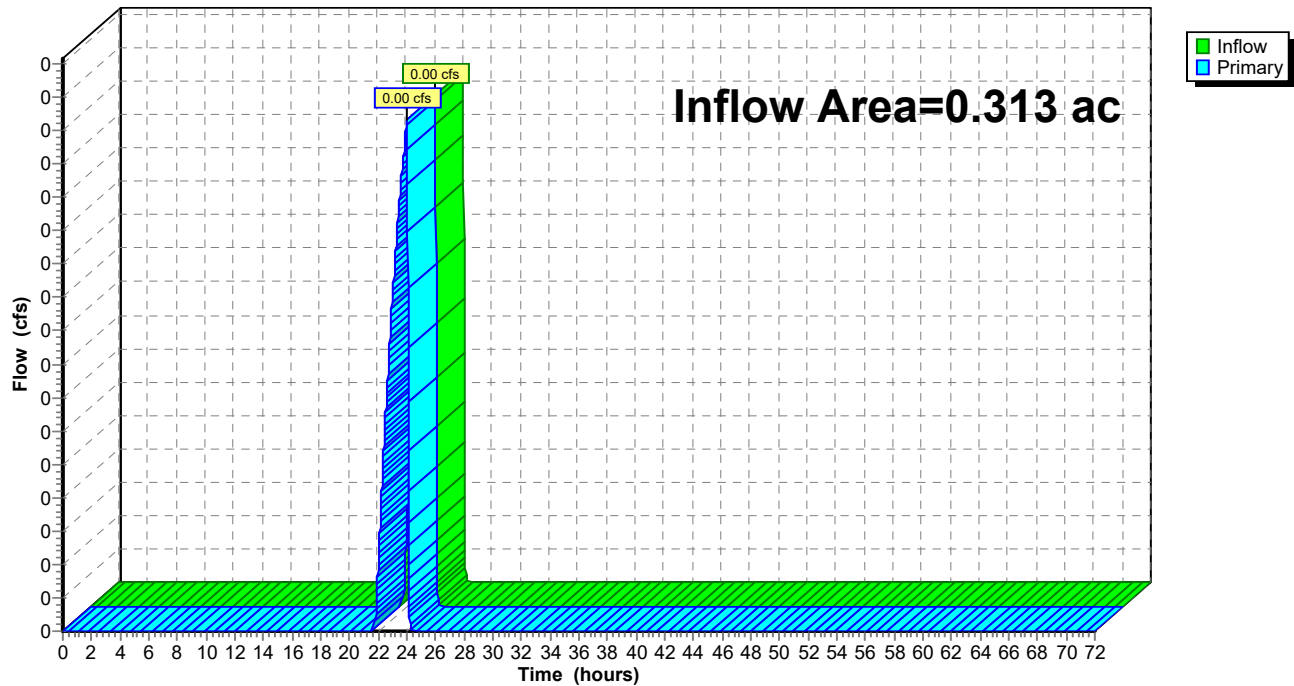
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA-2: POA-2**Hydrograph**

Summary for Link POA-3: POA-3

Inflow Area = 0.313 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: POA-3**Hydrograph**

Summary for Subcatchment BLDG: BLDG MAIN ROOF

Runoff = 8.60 cfs @ 12.08 hrs, Volume= 0.695 af, Depth= 4.26"

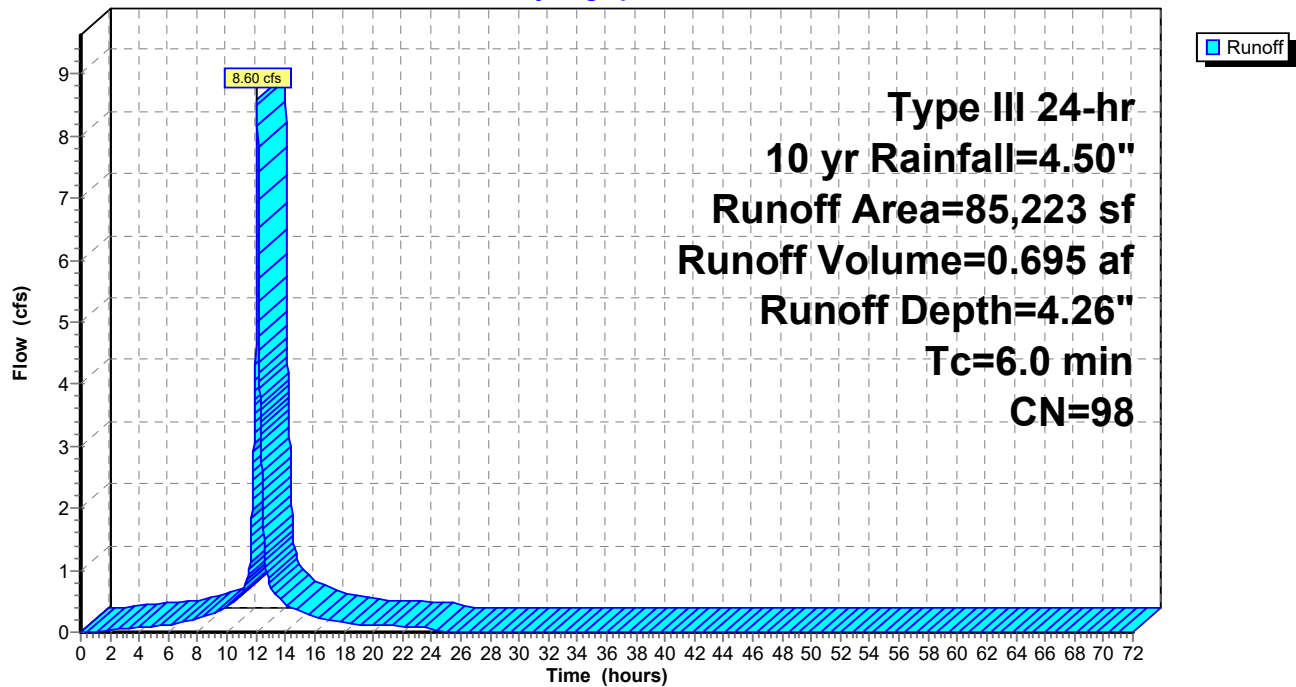
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	85,223	98	impervious
	85,223		100.00% Impervious Area

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

Subcatchment BLDG: BLDG MAIN ROOF

Hydrograph



Summary for Subcatchment BLDG-B: "B" Wing

Runoff = 3.39 cfs @ 12.09 hrs, Volume= 0.246 af, Depth= 3.30"

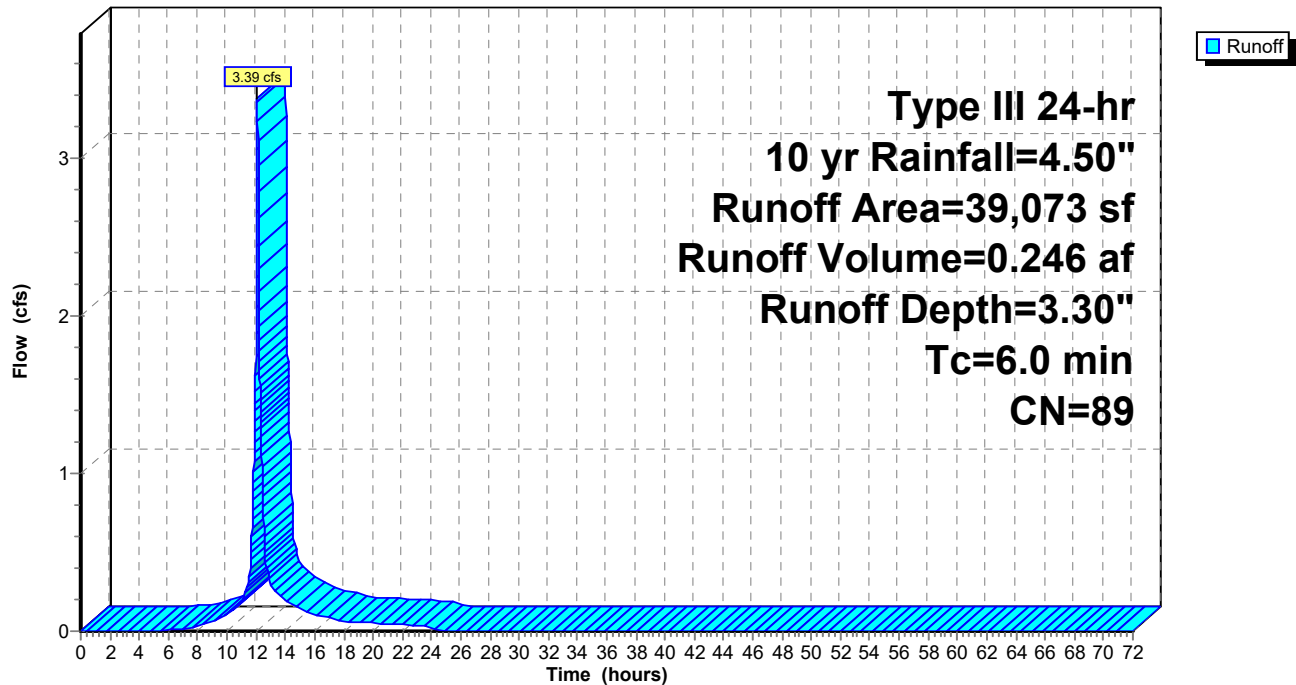
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	20,500	98	"F" Wing
	14,505	74	>75% Grass cover, Good, HSG C
*	4,068	98	Paved walkways, HSG C
	39,073	89	Weighted Average
	14,505		37.12% Pervious Area
	24,568		62.88% Impervious Area

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

Subcatchment BLDG-B: "B" Wing

Hydrograph



Summary for Subcatchment BLDG-E: "E" Wing

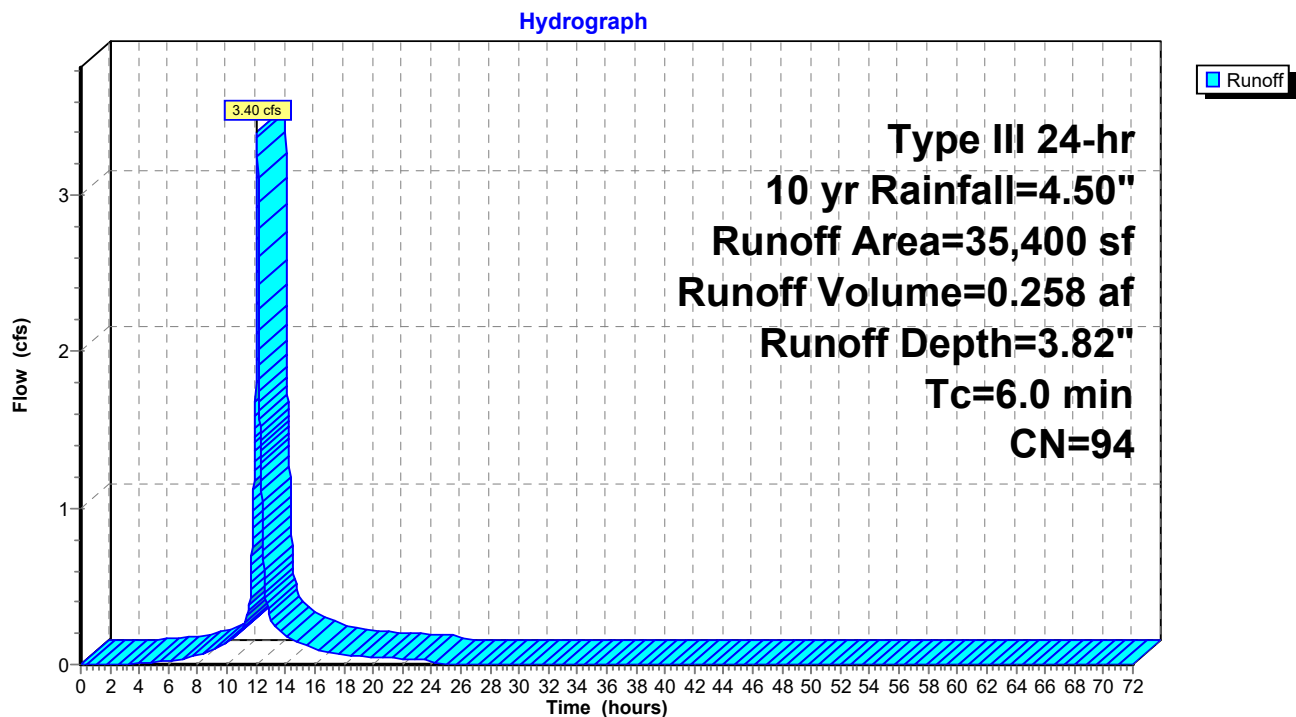
Runoff = 3.40 cfs @ 12.08 hrs, Volume= 0.258 af, Depth= 3.82"

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

	Area (sf)	CN	Description
*	29,050	98	"F" Wing
	6,350	74	>75% Grass cover, Good, HSG C
	35,400	94	Weighted Average
	6,350		17.94% Pervious Area
	29,050		82.06% Impervious Area

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

Subcatchment BLDG-E: "E" Wing



Summary for Subcatchment BLDG-F: "F" Wing

Runoff = 2.69 cfs @ 12.08 hrs, Volume= 0.217 af, Depth= 4.26"

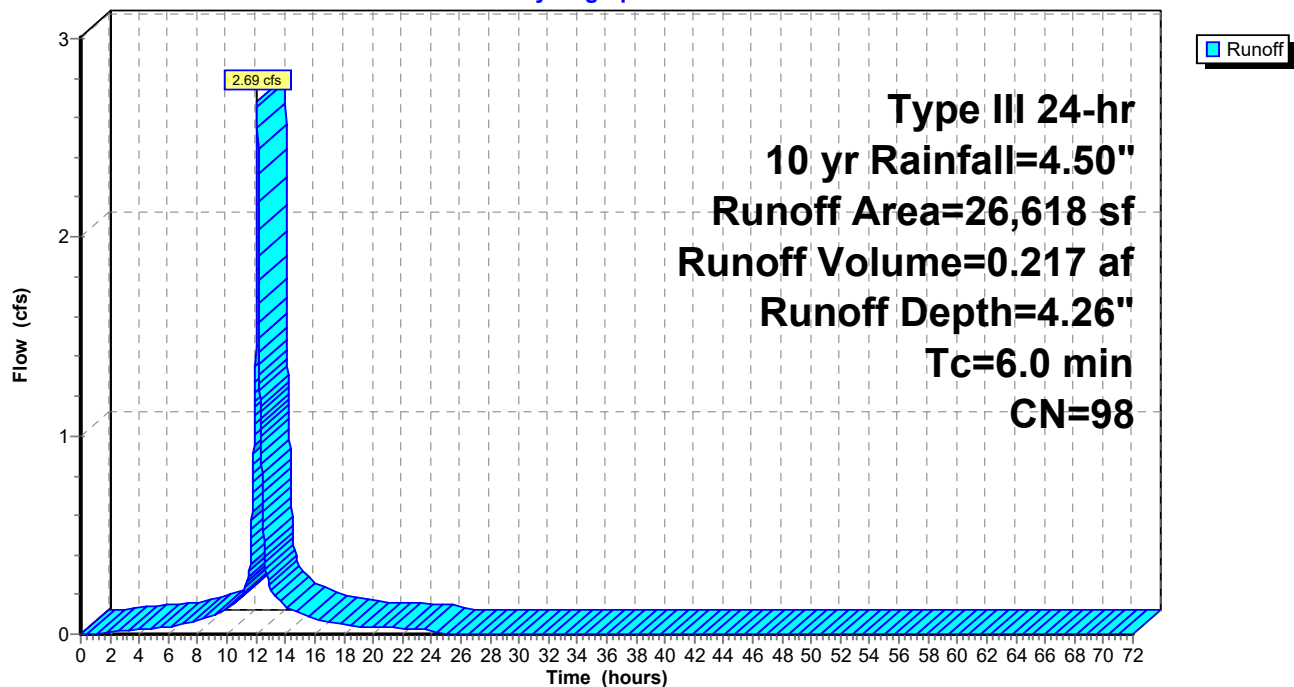
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	26,618	98	"F" Wing
	26,618		100.00% Impervious Area

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

Subcatchment BLDG-F: "F" Wing

Hydrograph



Summary for Subcatchment P-WS-1: P-WS-1

Runoff = 20.17 cfs @ 12.09 hrs, Volume= 1.477 af, Depth= 3.40"

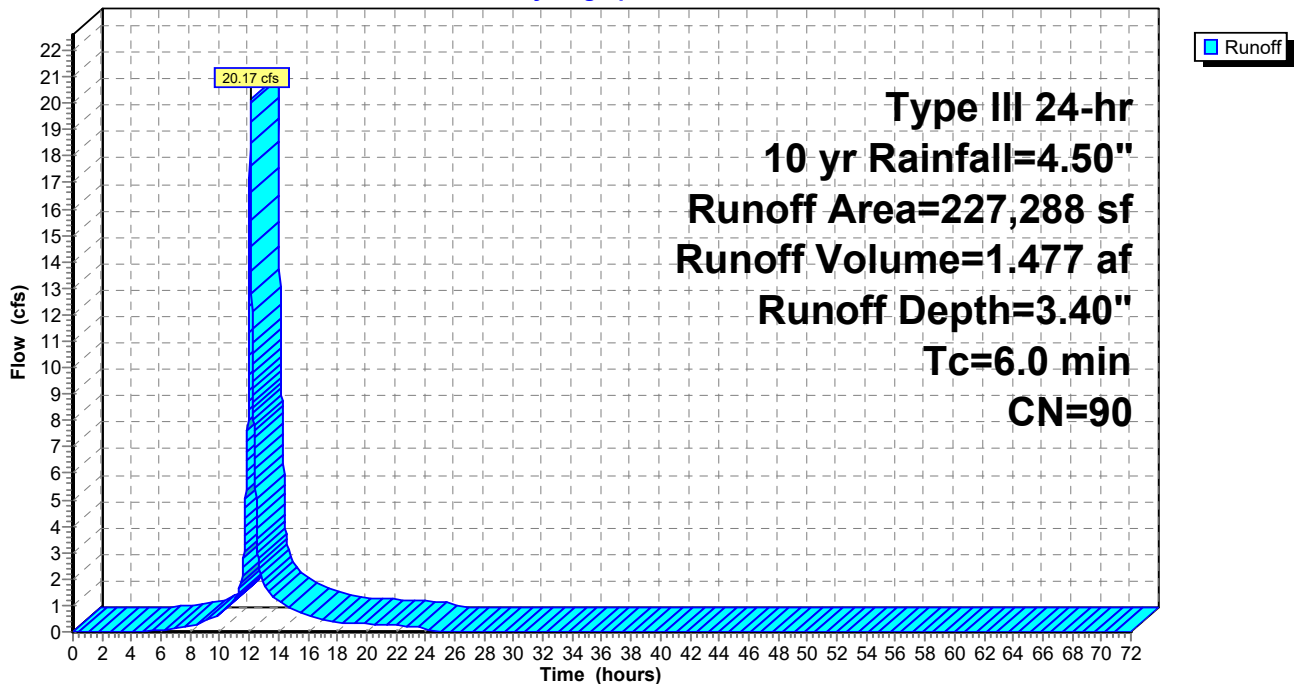
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
165,375	98	Paved parking, HSG A
16,947	39	>75% Grass cover, Good, HSG A
7,940	74	>75% Grass cover, Good, HSG C
23,392	80	>75% Grass cover, Good, HSG D
* 13,634	82	Woods/grass comb., Fair, HSG D
227,288	90	Weighted Average
61,913		27.24% Pervious Area
165,375		72.76% Impervious Area

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

Subcatchment P-WS-1: P-WS-1

Hydrograph



Summary for Subcatchment P-WS-2: P-WS-2

Runoff = 7.72 cfs @ 12.09 hrs, Volume= 0.565 af, Depth= 3.40"

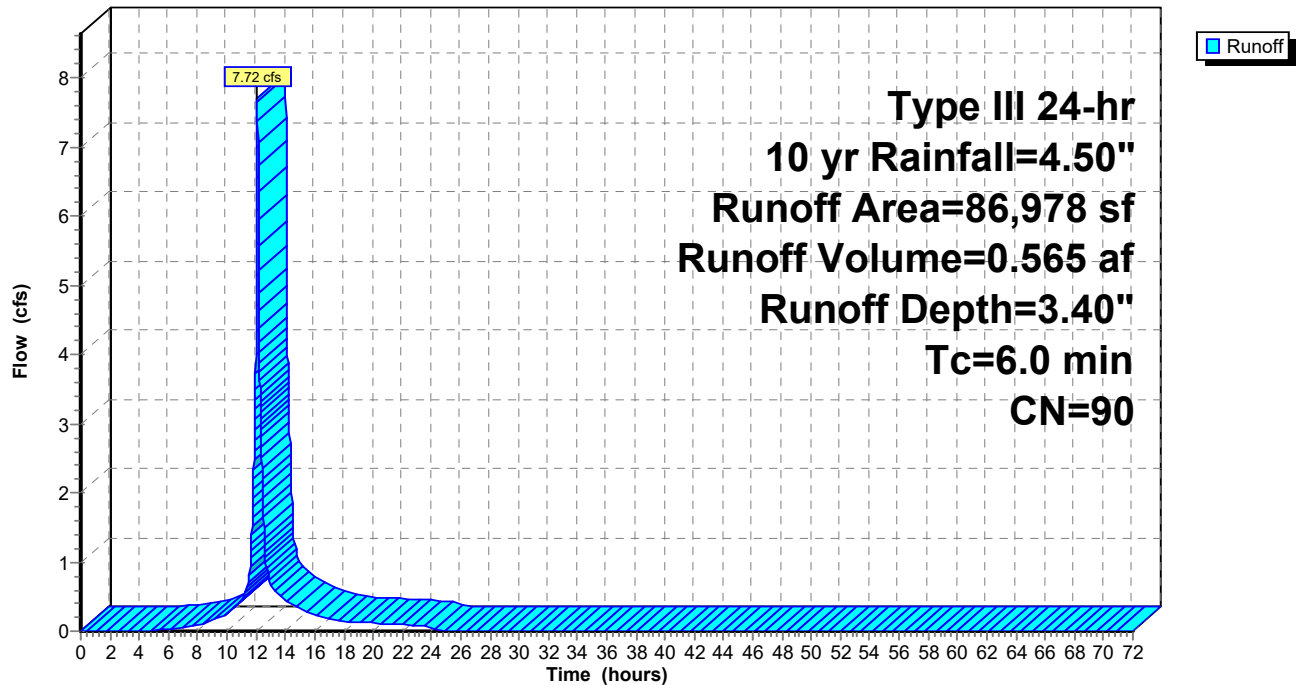
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
58,838	98	Paved parking, HSG A
1,568	39	>75% Grass cover, Good, HSG A
26,572	74	>75% Grass cover, Good, HSG C
86,978	90	Weighted Average
28,140		32.35% Pervious Area
58,838		67.65% Impervious Area

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

Subcatchment P-WS-2: P-WS-2

Hydrograph



Summary for Subcatchment P-WS-3: P-WS-3

Runoff = 8.84 cfs @ 12.08 hrs, Volume= 0.658 af, Depth= 3.60"

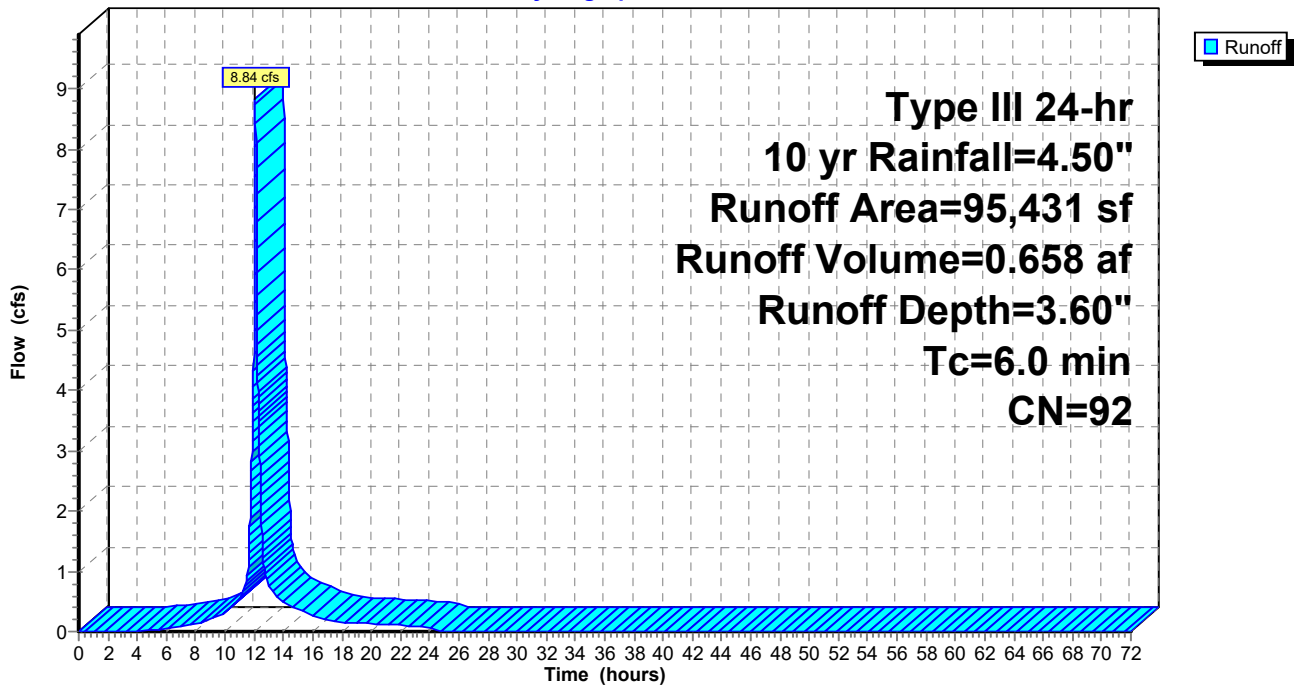
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
77,755	98	Paved parking, HSG A
3,258	39	>75% Grass cover, Good, HSG A
12,632	74	>75% Grass cover, Good, HSG C
1,786	80	>75% Grass cover, Good, HSG D
95,431	92	Weighted Average
17,676		18.52% Pervious Area
77,755		81.48% Impervious Area

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

Subcatchment P-WS-3: P-WS-3

Hydrograph



Summary for Subcatchment P-WS-4: P-WS-4

Runoff = 0.15 cfs @ 12.14 hrs, Volume= 0.023 af, Depth= 0.50"

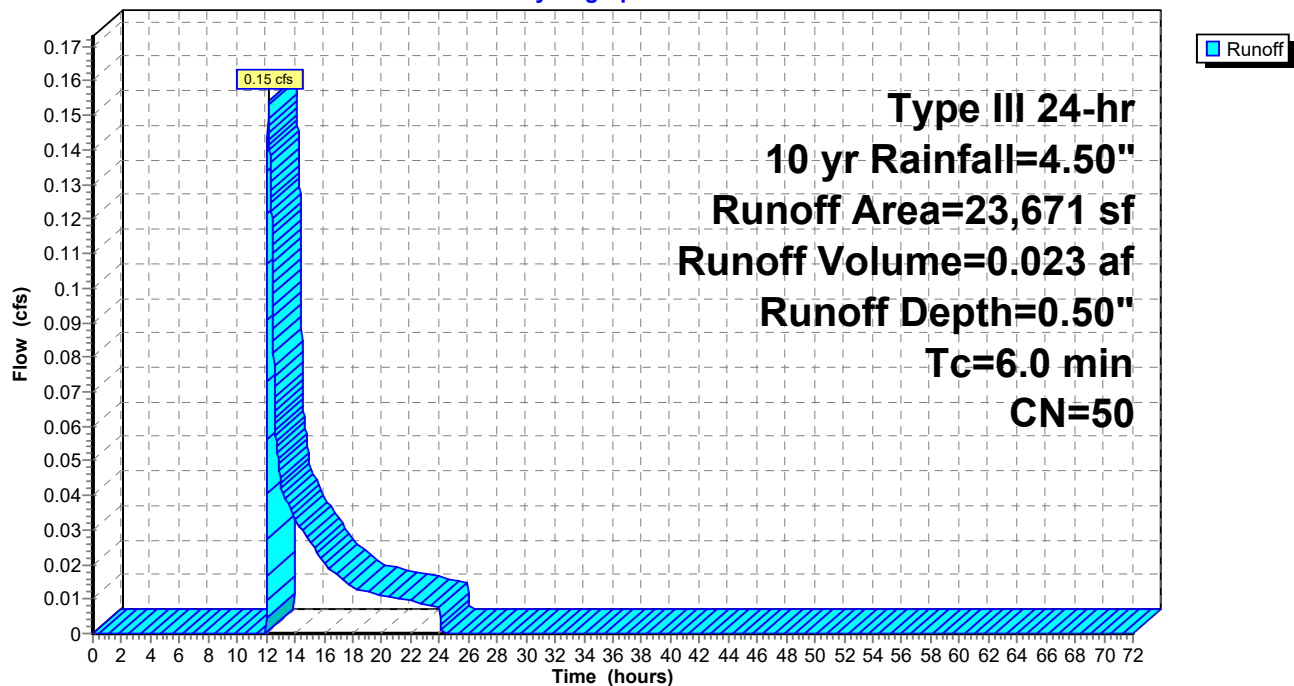
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
16,953	39	>75% Grass cover, Good, HSG A
2,352	74	>75% Grass cover, Good, HSG C
4,366	80	>75% Grass cover, Good, HSG D
23,671	50	Weighted Average
23,671		100.00% Pervious Area

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

Subcatchment P-WS-4: P-WS-4

Hydrograph



Summary for Subcatchment P-WS-5: P-WS-5

Runoff = 0.00 cfs @ 14.70 hrs, Volume= 0.003 af, Depth= 0.11"

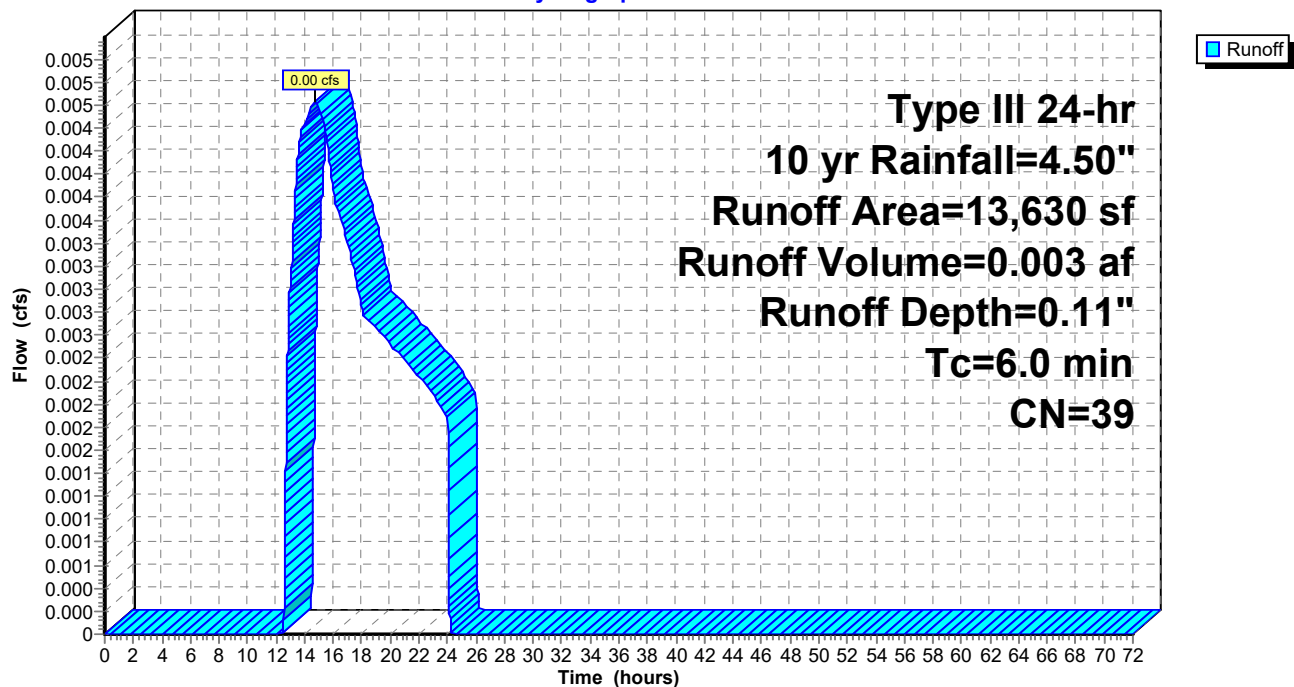
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
13,630	39	>75% Grass cover, Good, HSG A
13,630		100.00% Pervious Area

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

Subcatchment P-WS-5: P-WS-5

Hydrograph



Summary for Subcatchment P-WS-6: P-WS-6

Runoff = 4.74 cfs @ 12.09 hrs, Volume= 0.338 af, Depth= 2.82"

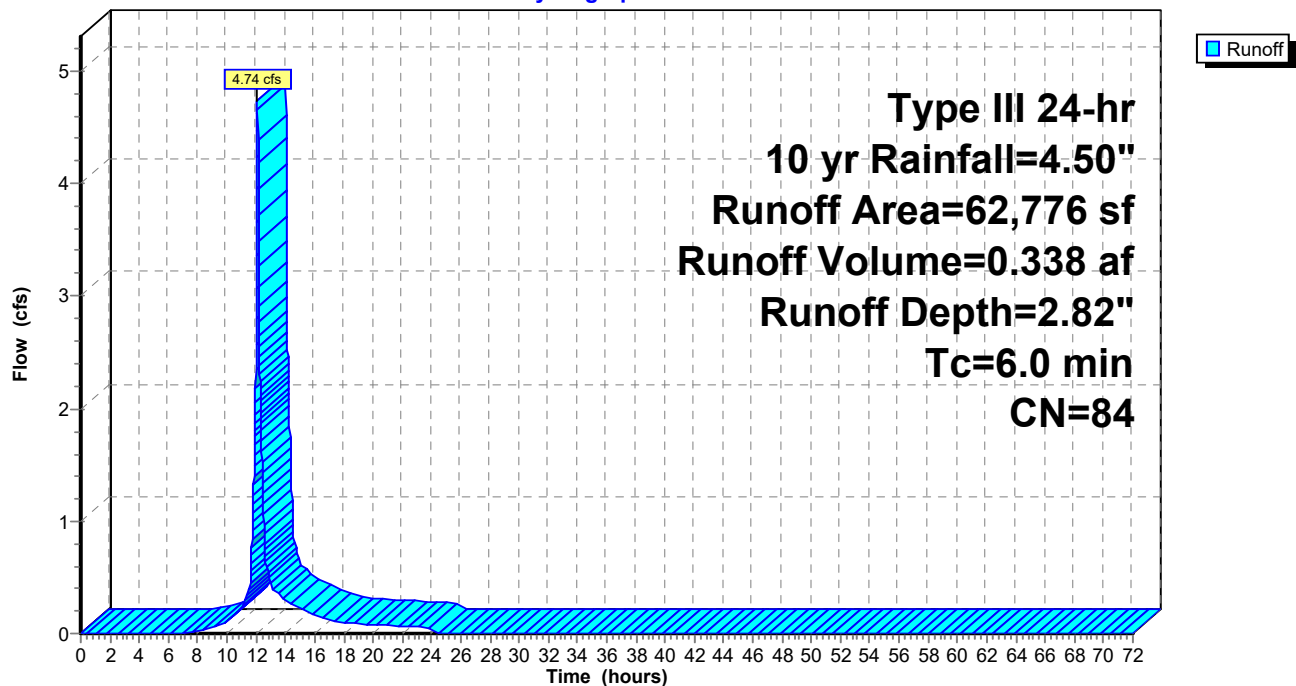
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
26,590	98	Paved parking, HSG C
36,186	74	>75% Grass cover, Good, HSG C
62,776	84	Weighted Average
36,186		57.64% Pervious Area
26,590		42.36% Impervious Area

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

Subcatchment P-WS-6: P-WS-6

Hydrograph



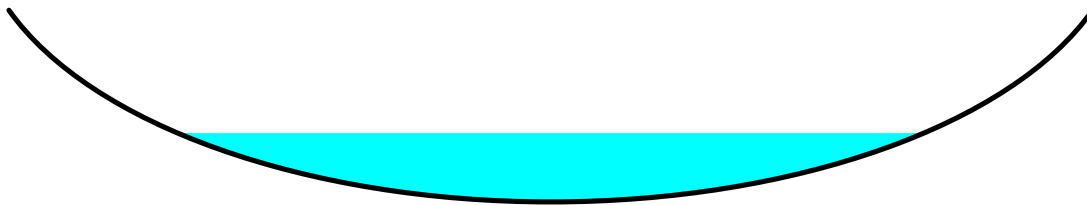
Summary for Reach 1R: East Entry Swale

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 3.30" for 10 yr event
 Inflow = 3.39 cfs @ 12.09 hrs, Volume= 0.246 af
 Outflow = 3.29 cfs @ 12.13 hrs, Volume= 0.246 af, Atten= 3%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.83 fps, Min. Travel Time= 1.7 min
 Avg. Velocity = 1.19 fps, Avg. Travel Time= 5.6 min

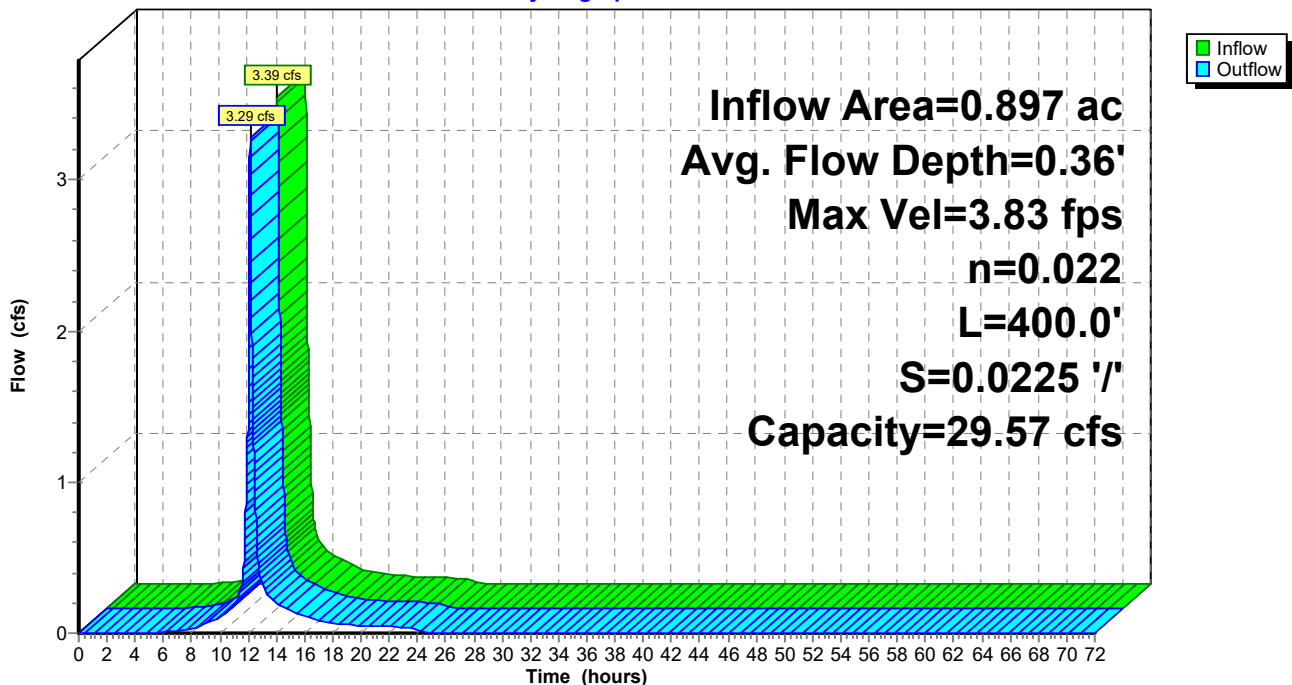
Peak Storage= 343 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.36'
 Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 29.57 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
 Length= 400.0' Slope= 0.0225 '/'
 Inlet Invert= 67.00', Outlet Invert= 58.00'



Reach 1R: East Entry Swale

Hydrograph



Summary for Pond RG-1: Rain Garden 1

Inflow Area = 0.611 ac, 100.00% Impervious, Inflow Depth = 4.26" for 10 yr event
 Inflow = 2.69 cfs @ 12.08 hrs, Volume= 0.217 af
 Outflow = 2.44 cfs @ 12.12 hrs, Volume= 0.217 af, Atten= 9%, Lag= 2.2 min
 Discarded = 0.06 cfs @ 12.12 hrs, Volume= 0.111 af
 Primary = 2.37 cfs @ 12.12 hrs, Volume= 0.106 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 58.95' @ 12.12 hrs Surf.Area= 2,730 sf Storage= 2,087 cf

Plug-Flow detention time= 148.6 min calculated for 0.217 af (100% of inflow)
 Center-of-Mass det. time= 148.7 min (898.5 - 749.8)

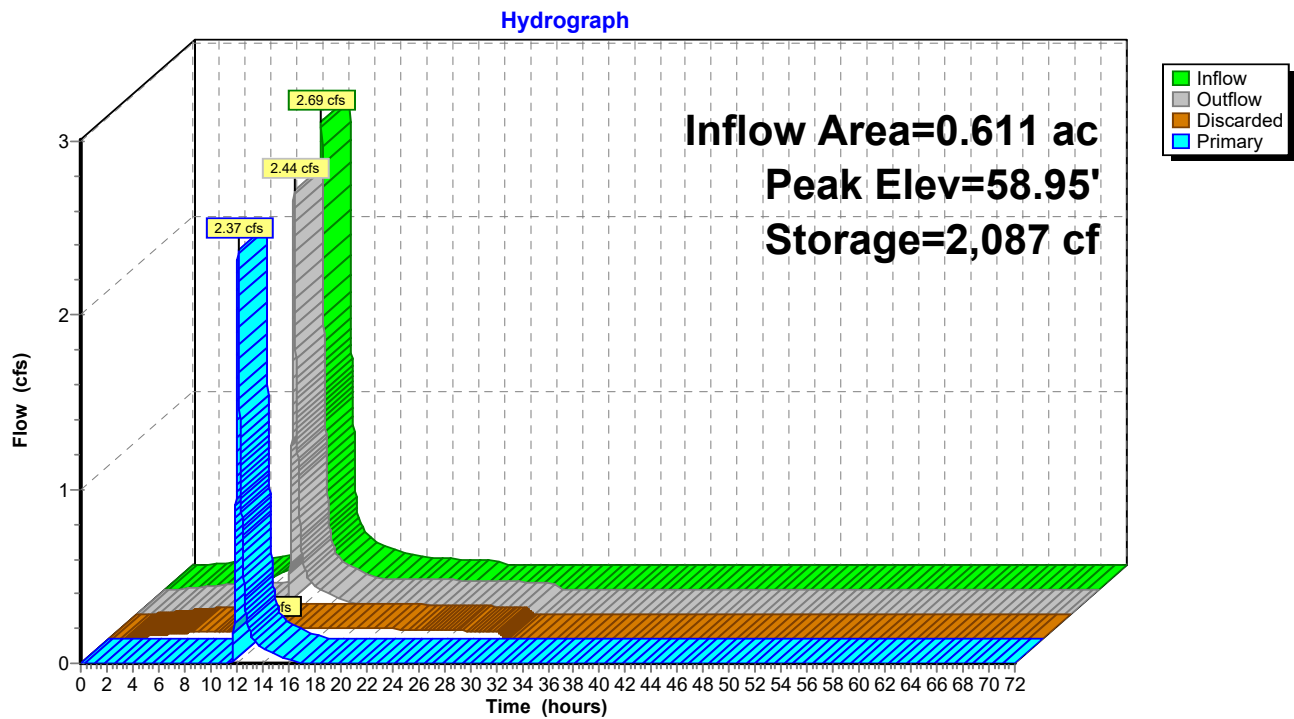
Volume	Invert	Avail.Storage	Storage Description
#1	58.00'	5,551 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.00	1,655	0	0
59.00	2,784	2,220	2,220
60.00	3,878	3,331	5,551

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.00'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	58.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	54.00'	12.0" Round Culvert L= 400.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 54.00' / 50.00' S= 0.0100 ' / ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.06 cfs @ 12.12 hrs HW=58.95' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=2.37 cfs @ 12.12 hrs HW=58.95' (Free Discharge)
 ↑ **3=Culvert** (Passes 2.37 cfs of 5.01 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 2.37 cfs @ 1.47 fps)

Pond RG-1: Rain Garden 1



Summary for Pond RG-2: Rain Garden 2

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 3.30" for 10 yr event
 Inflow = 3.29 cfs @ 12.13 hrs, Volume= 0.246 af
 Outflow = 0.95 cfs @ 12.49 hrs, Volume= 0.246 af, Atten= 71%, Lag= 21.5 min
 Discarded = 0.04 cfs @ 12.49 hrs, Volume= 0.064 af
 Primary = 0.91 cfs @ 12.49 hrs, Volume= 0.182 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 55.63' @ 12.49 hrs Surf.Area= 2,984 sf Storage= 3,498 cf

Plug-Flow detention time= 172.4 min calculated for 0.246 af (100% of inflow)
 Center-of-Mass det. time= 172.4 min (975.9 - 803.5)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	6,519 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

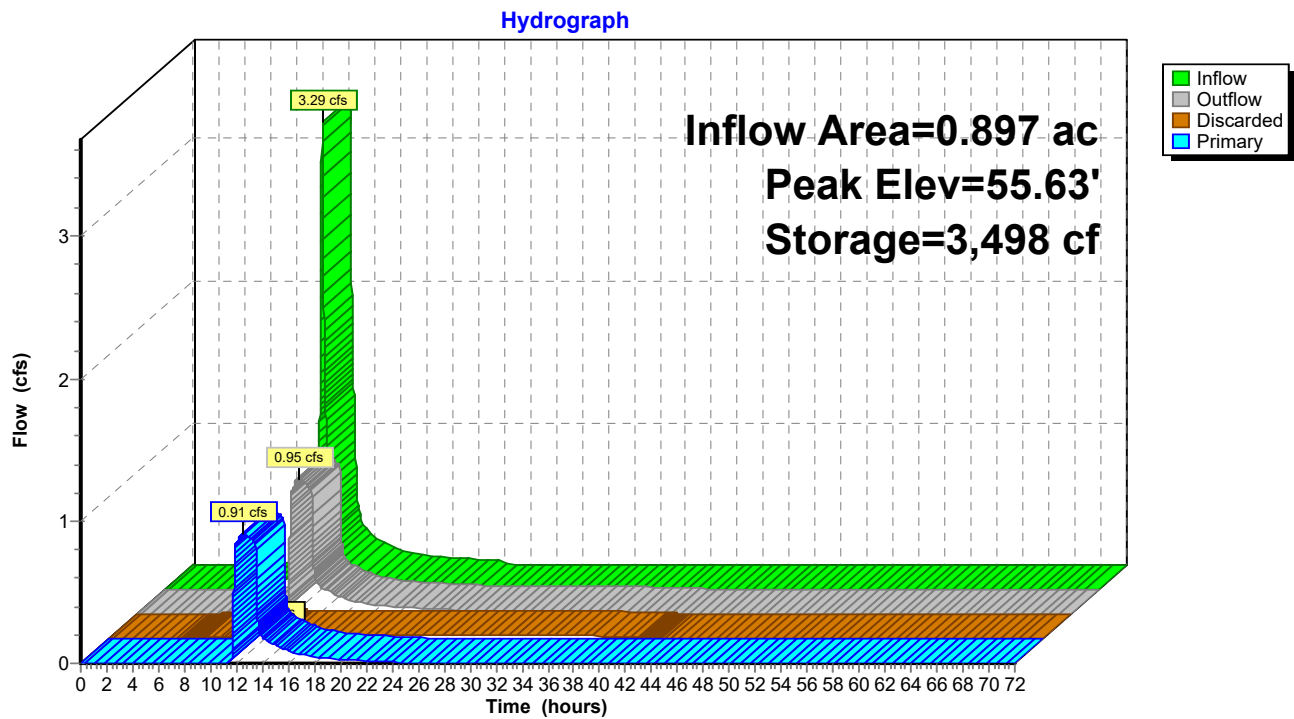
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,365	0	0
55.00	2,311	1,838	1,838
56.00	3,385	2,848	4,686
56.50	3,945	1,833	6,519

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	54.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	51.75'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.75' / 50.00' S= 0.0088 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.04 cfs @ 12.49 hrs HW=55.63' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.91 cfs @ 12.49 hrs HW=55.63' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 0.91 cfs @ 4.63 fps)
 ↑ **2=Orifice/Grate** (Passes 0.91 cfs of 18.04 cfs potential flow)

Pond RG-2: Rain Garden 2



Summary for Pond RG-3: Rain Garden 3

Inflow Area = 0.813 ac, 82.06% Impervious, Inflow Depth = 3.82" for 10 yr event
 Inflow = 3.40 cfs @ 12.08 hrs, Volume= 0.258 af
 Outflow = 1.31 cfs @ 12.31 hrs, Volume= 0.258 af, Atten= 62%, Lag= 13.8 min
 Discarded = 0.02 cfs @ 12.31 hrs, Volume= 0.037 af
 Primary = 1.29 cfs @ 12.31 hrs, Volume= 0.221 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 60.74' @ 12.31 hrs Surf.Area= 1,855 sf Storage= 2,153 cf

Plug-Flow detention time= 93.3 min calculated for 0.258 af (100% of inflow)
 Center-of-Mass det. time= 93.5 min (870.0 - 776.5)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	5,155 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

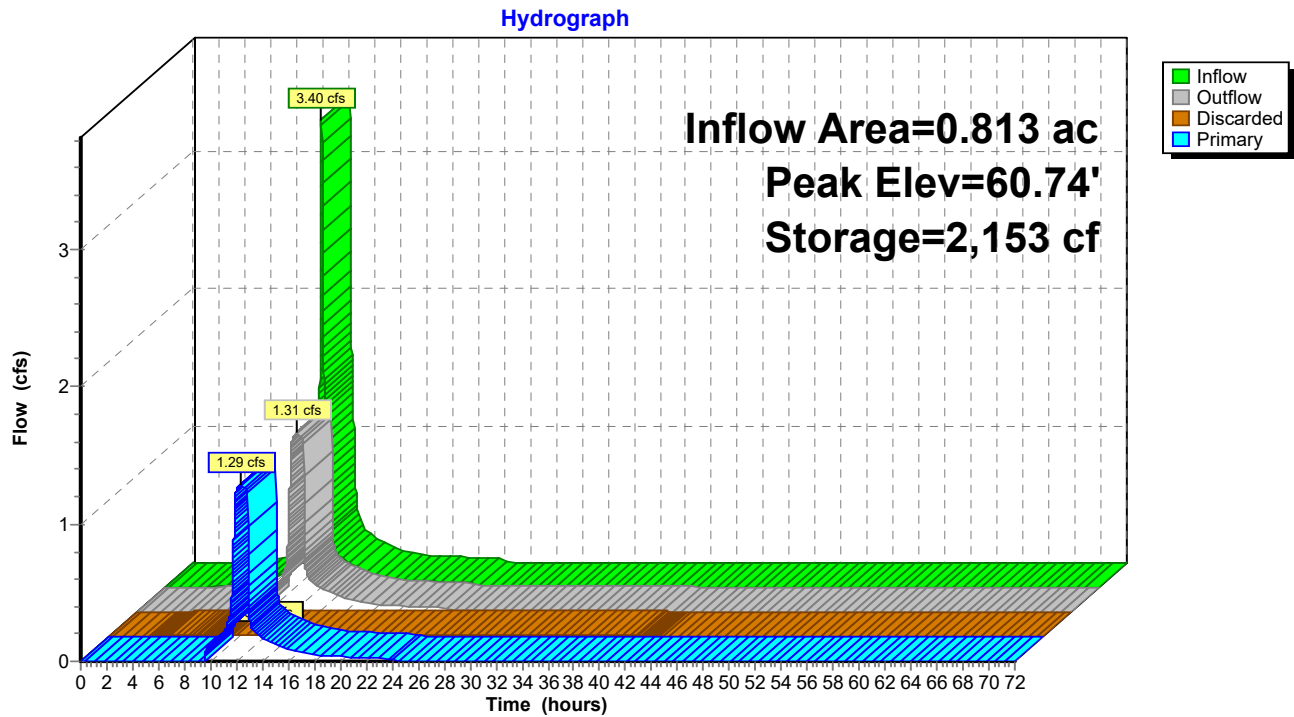
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	660	0	0
60.00	1,309	985	985
61.00	2,048	1,679	2,663
62.00	2,936	2,492	5,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	59.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	53.50'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.50' / 50.00' S= 0.0175 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 12.31 hrs HW=60.74' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.29 cfs @ 12.31 hrs HW=60.74' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 1.29 cfs @ 6.55 fps)
 ↑ **2=Orifice/Grate** (Passes 1.29 cfs of 19.15 cfs potential flow)

Pond RG-3: Rain Garden 3



Summary for Pond UGS-1: MC-4500

Inflow Area = 5.218 ac, 72.76% Impervious, Inflow Depth = 3.40" for 10 yr event
 Inflow = 20.17 cfs @ 12.09 hrs, Volume= 1.477 af
 Outflow = 17.56 cfs @ 12.13 hrs, Volume= 1.477 af, Atten= 13%, Lag= 2.8 min
 Discarded = 0.26 cfs @ 8.48 hrs, Volume= 0.630 af
 Primary = 17.30 cfs @ 12.13 hrs, Volume= 0.847 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 52.65' @ 12.13 hrs Surf.Area= 4,732 sf Storage= 18,102 cf

Plug-Flow detention time= 214.6 min calculated for 1.476 af (100% of inflow)
 Center-of-Mass det. time= 214.7 min (1,009.0 - 794.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	8,279 cf	92.08'W x 51.39'L x 7.00'H Field A 33,126 cf Overall - 12,428 cf Embedded = 20,698 cf x 40.0% Voids
#2A	48.00'	12,428 cf	ADS_StormTech MC-4500 +Cap x 110 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 110 Chambers in 10 Rows Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf
		20,707 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	2.400 in/hr Exfiltration over Surface area
#2	Primary	47.00'	24.0" Round Culvert L= 140.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.00' S= 0.0071 ' S= 0.0071 ' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	50.50'	12.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 2	52.00'	5.0' long x 5.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 5.0' Crest Height

Discarded OutFlow Max=0.26 cfs @ 8.48 hrs HW=47.10' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=17.27 cfs @ 12.13 hrs HW=52.64' (Free Discharge)
 ↑ **2=Culvert** (Passes 17.27 cfs of 31.44 cfs potential flow)
 ↑ **3=Orifice/Grate** (Orifice Controls 8.90 cfs @ 5.66 fps)
 ↑ **4=Sharp-Crested Rectangular Weir** (Weir Controls 8.37 cfs @ 2.67 fps)

Pond UGS-1: MC-4500 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length

10 Rows x 100.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 92.08' Base Width

12.0" Base + 60.0" Chamber Height + 12.0" Cover = 7.00' Field Height

110 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 10 Rows = 12,427.9 cf Chamber Storage

33,126.2 cf Field - 12,427.9 cf Chambers = 20,698.3 cf Stone x 40.0% Voids = 8,279.3 cf Stone Storage

Chamber Storage + Stone Storage = 20,707.3 cf = 0.475 af

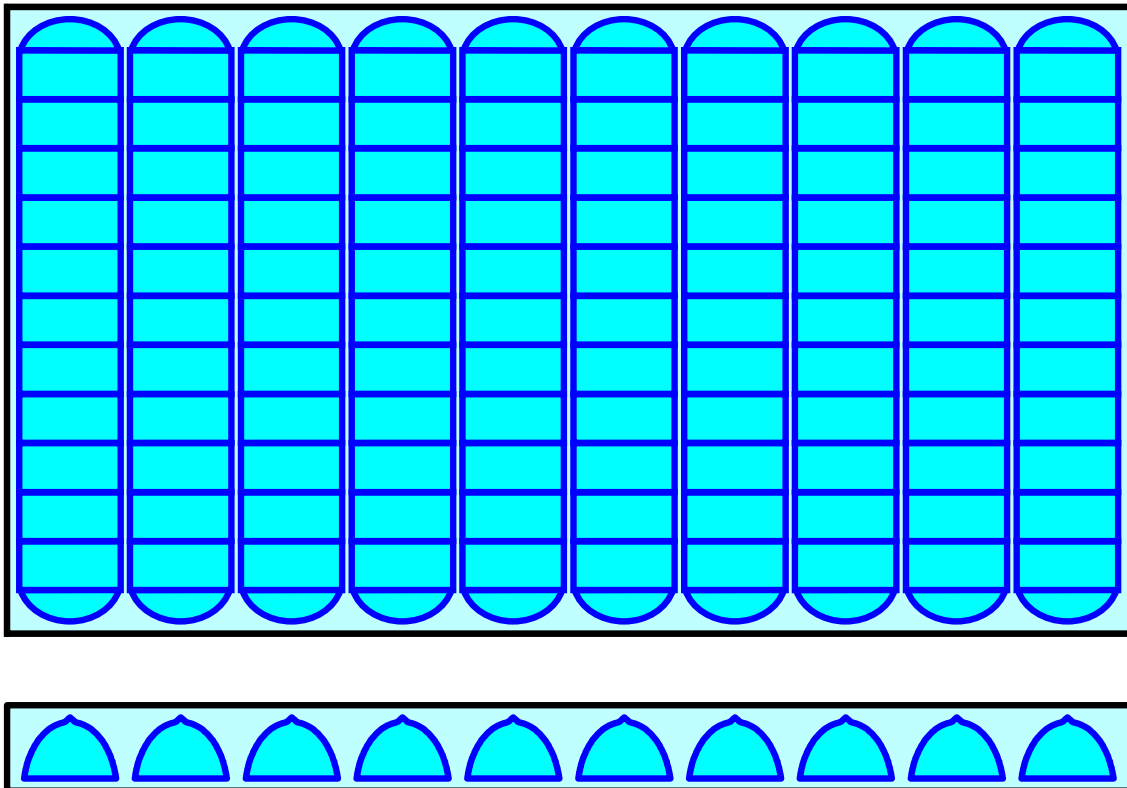
Overall Storage Efficiency = 62.5%

Overall System Size = 51.39' x 92.08' x 7.00'

110 Chambers

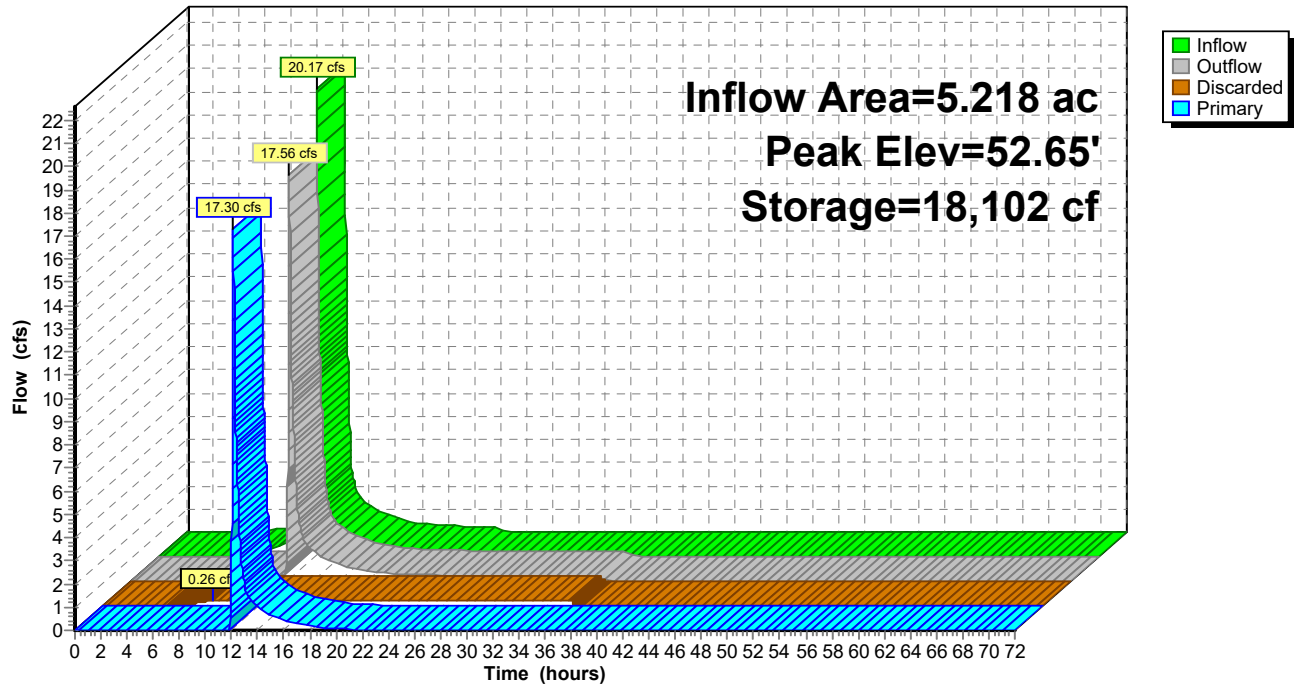
1,226.9 cy Field

766.6 cy Stone



Pond UGS-1: MC-4500

Hydrograph



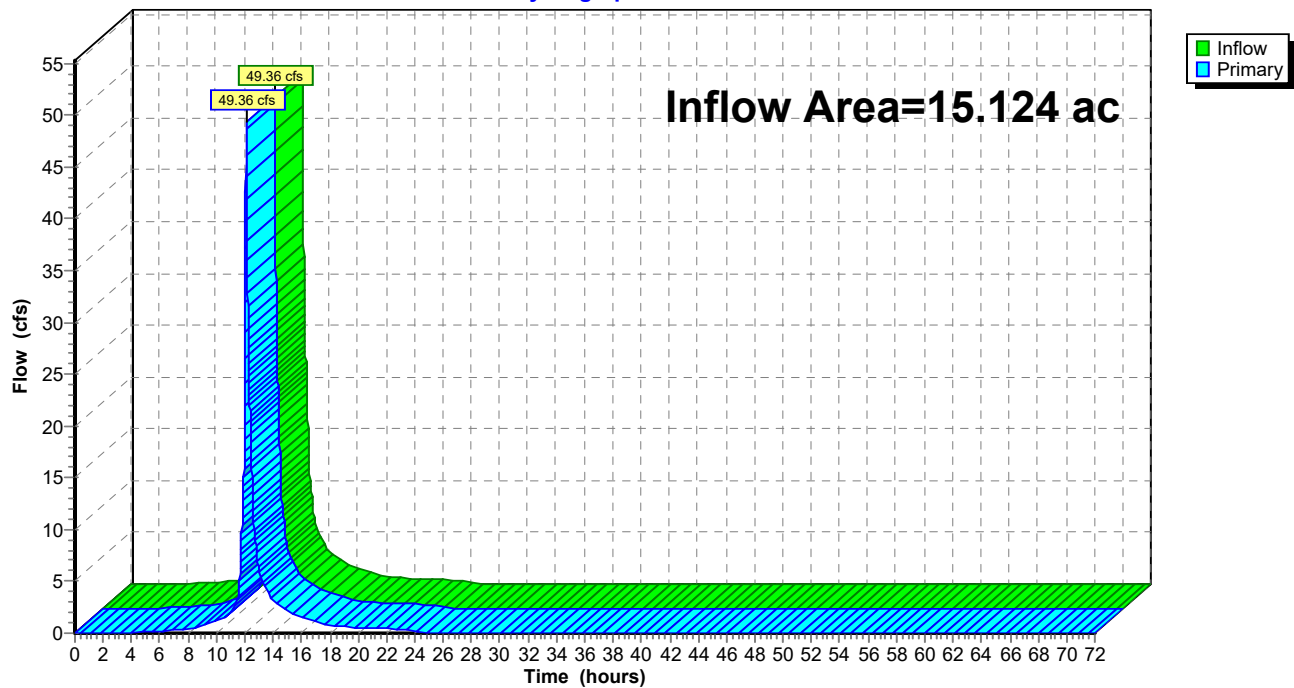
Summary for Link POA-1: POA-1

Primary = 49.36 cfs @ 12.11 hrs, Volume= 3.612 af, Atten= 0%, Lag= 0.0 min

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

Link POA-1: POA-1

Hydrograph



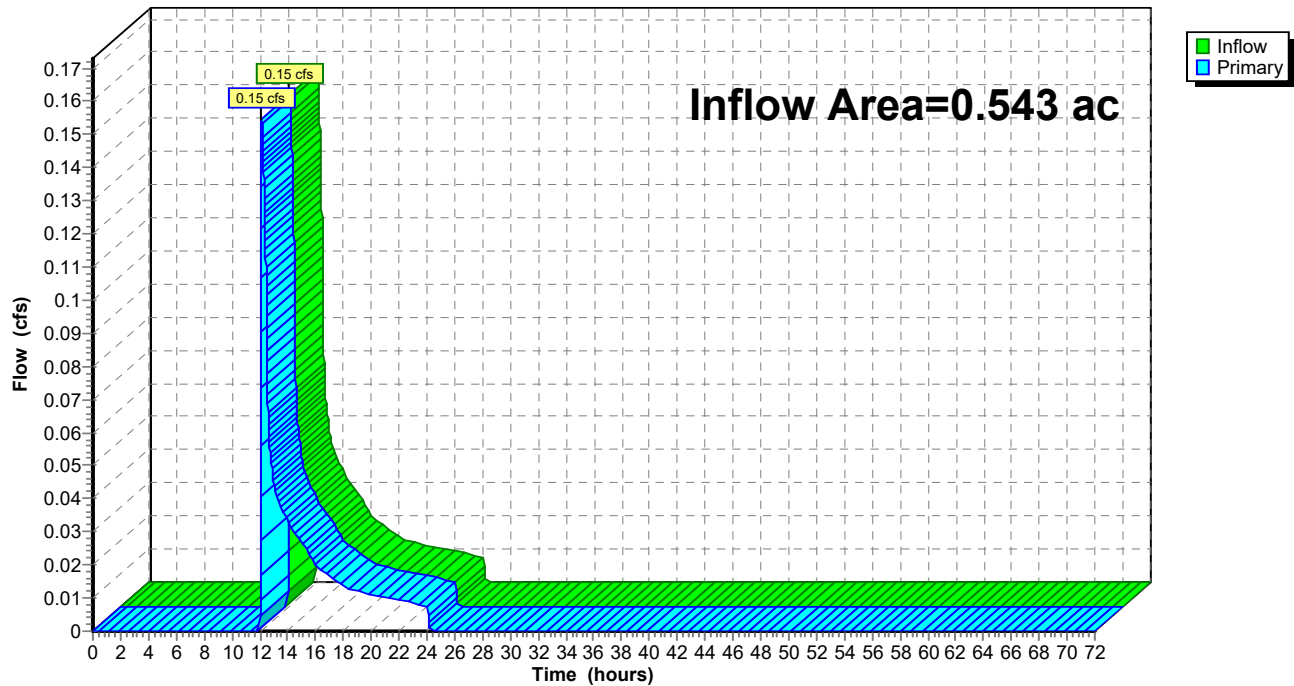
Summary for Link POA-2: POA-2

Inflow Area = 0.543 ac, 0.00% Impervious, Inflow Depth = 0.50" for 10 yr event
Inflow = 0.15 cfs @ 12.14 hrs, Volume= 0.023 af
Primary = 0.15 cfs @ 12.14 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

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

Link POA-2: POA-2

Hydrograph



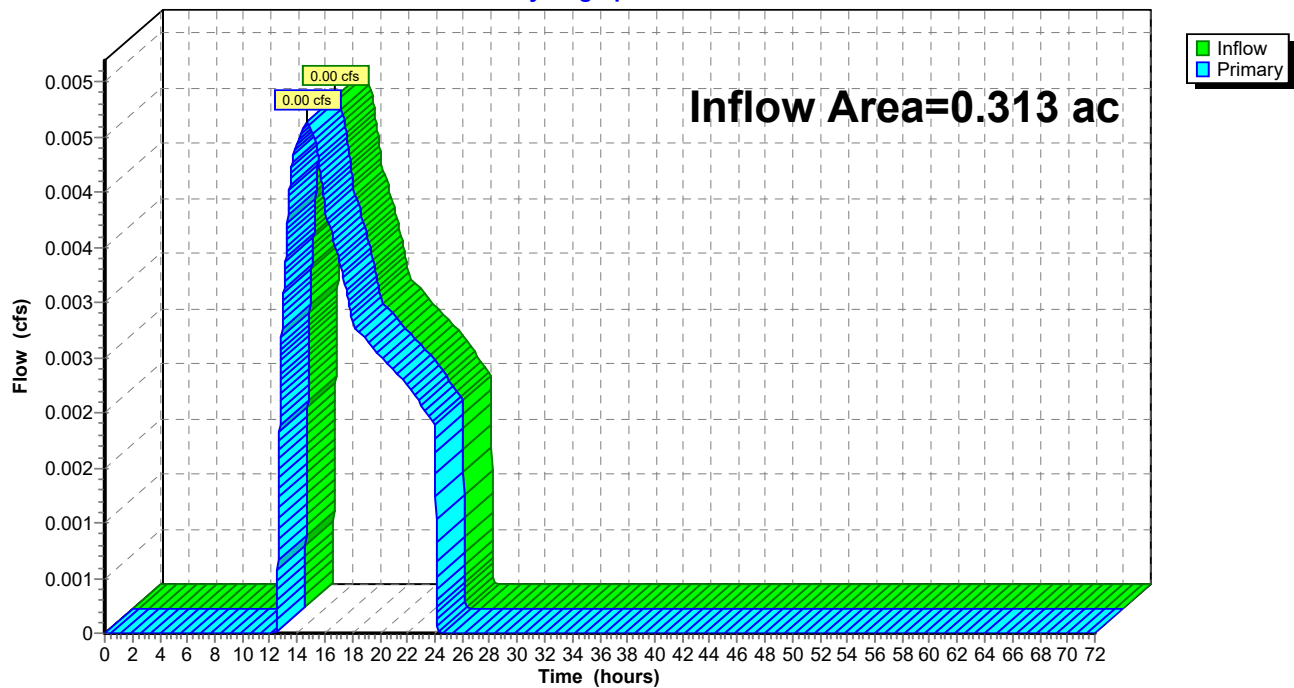
Summary for Link POA-3: POA-3

Inflow Area = 0.313 ac, 0.00% Impervious, Inflow Depth = 0.11" for 10 yr event
 Inflow = 0.00 cfs @ 14.70 hrs, Volume= 0.003 af
 Primary = 0.00 cfs @ 14.70 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: POA-3

Hydrograph



Summary for Subcatchment BLDG: BLDG MAIN ROOF

Runoff = 10.34 cfs @ 12.08 hrs, Volume= 0.842 af, Depth= 5.16"

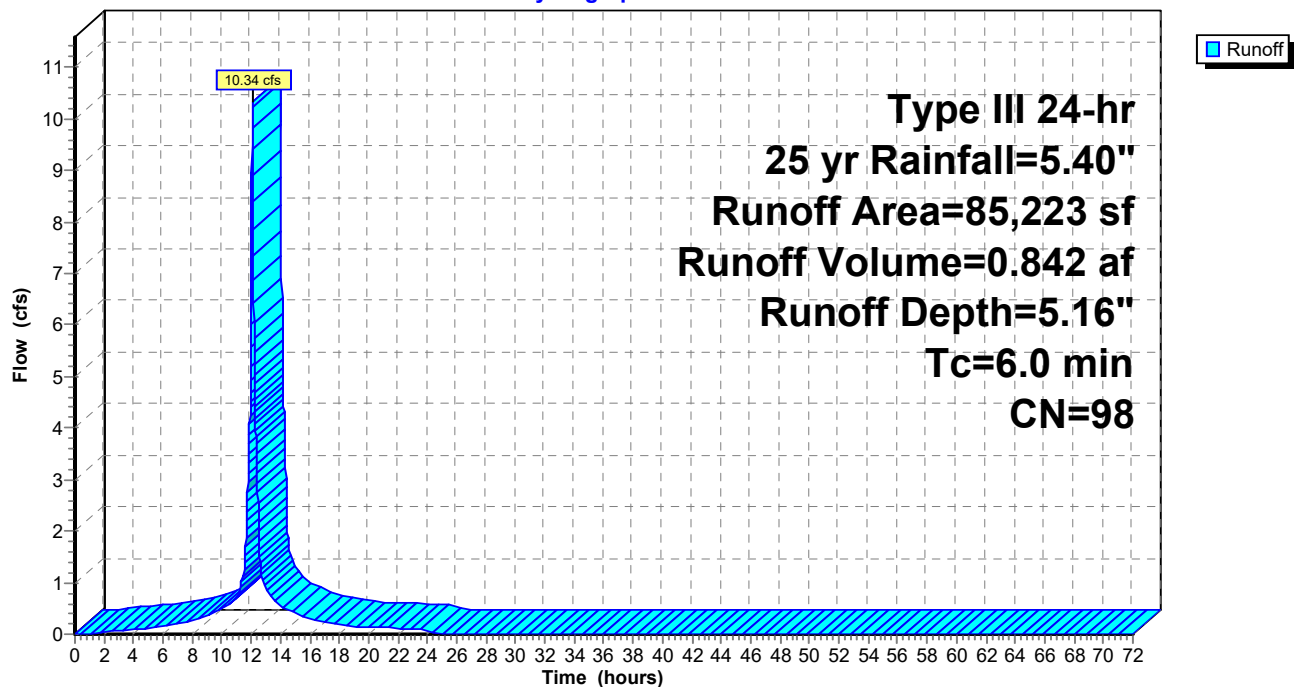
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
* 85,223	98	impervious
85,223		100.00% Impervious Area

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

Subcatchment BLDG: BLDG MAIN ROOF

Hydrograph



Summary for Subcatchment BLDG-B: "B" Wing

Runoff = 4.22 cfs @ 12.09 hrs, Volume= 0.311 af, Depth= 4.16"

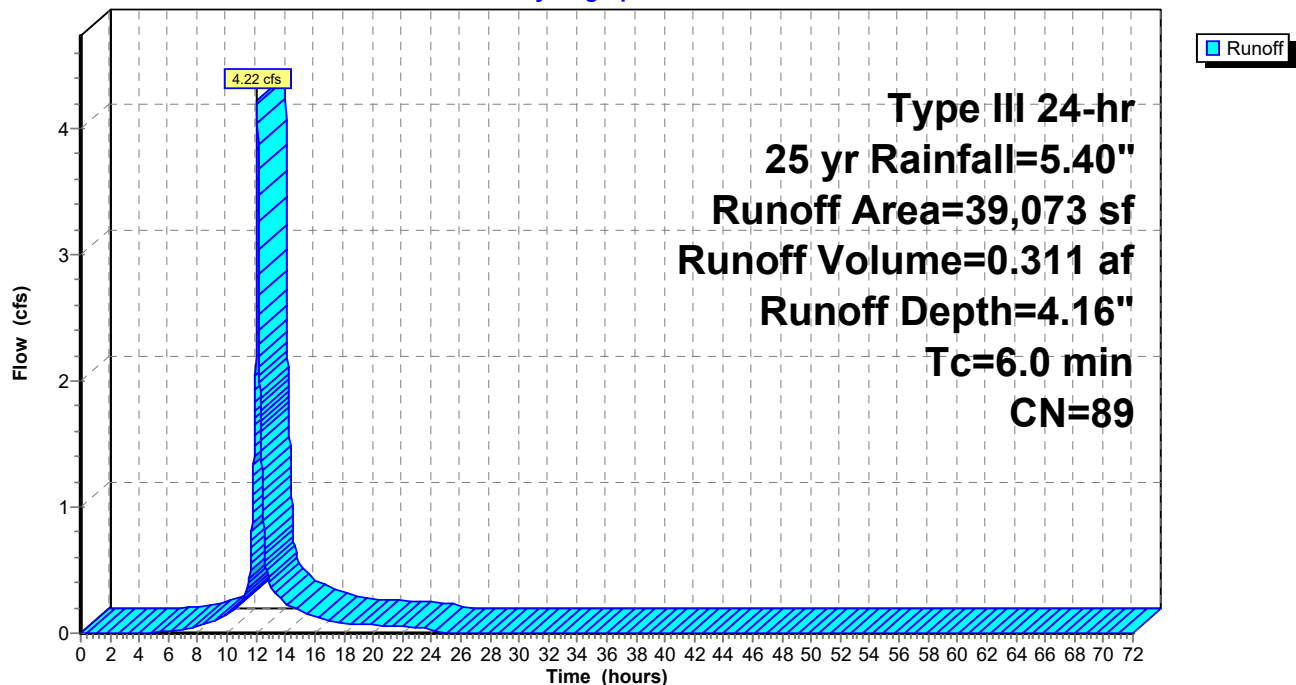
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	20,500	98	"F" Wing
	14,505	74	>75% Grass cover, Good, HSG C
*	4,068	98	Paved walkways, HSG C
	39,073	89	Weighted Average
	14,505		37.12% Pervious Area
	24,568		62.88% Impervious Area

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

Subcatchment BLDG-B: "B" Wing

Hydrograph



Summary for Subcatchment BLDG-E: "E" Wing

Runoff = 4.15 cfs @ 12.08 hrs, Volume= 0.318 af, Depth= 4.70"

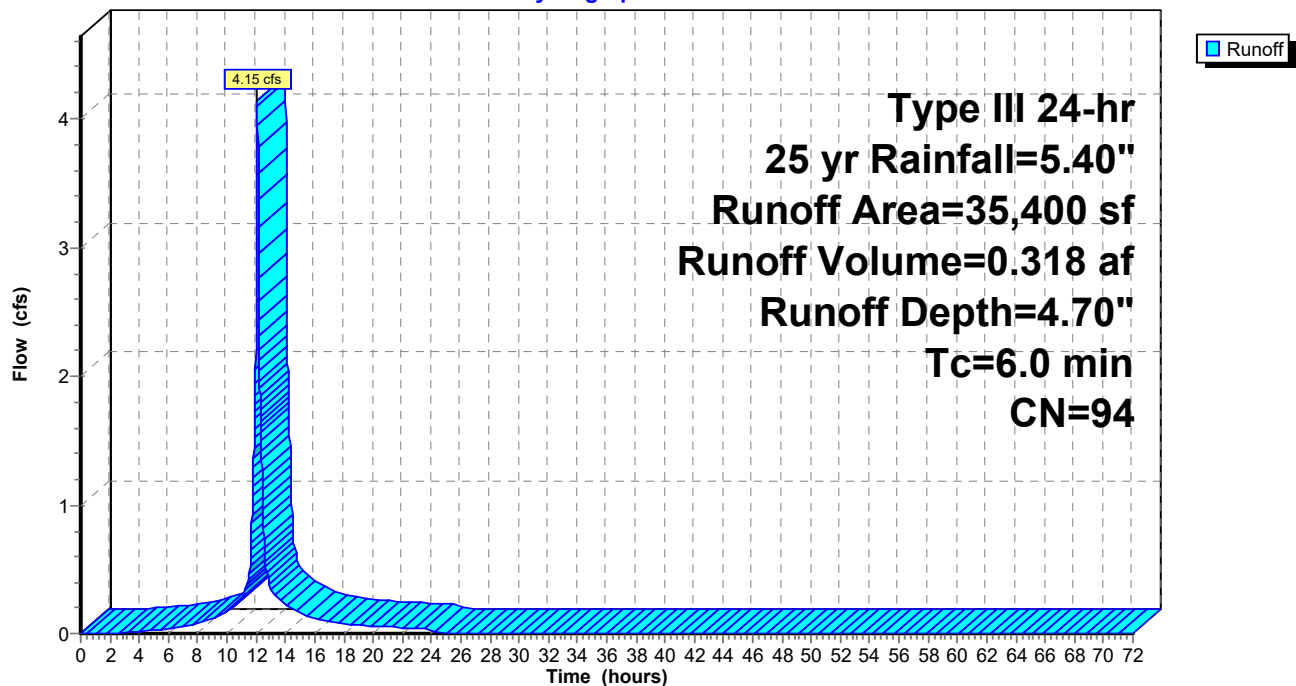
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	29,050	98	"F" Wing
	6,350	74	>75% Grass cover, Good, HSG C
	35,400	94	Weighted Average
	6,350		17.94% Pervious Area
	29,050		82.06% Impervious Area

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

Subcatchment BLDG-E: "E" Wing

Hydrograph



Summary for Subcatchment BLDG-F: "F" Wing

Runoff = 3.23 cfs @ 12.08 hrs, Volume= 0.263 af, Depth= 5.16"

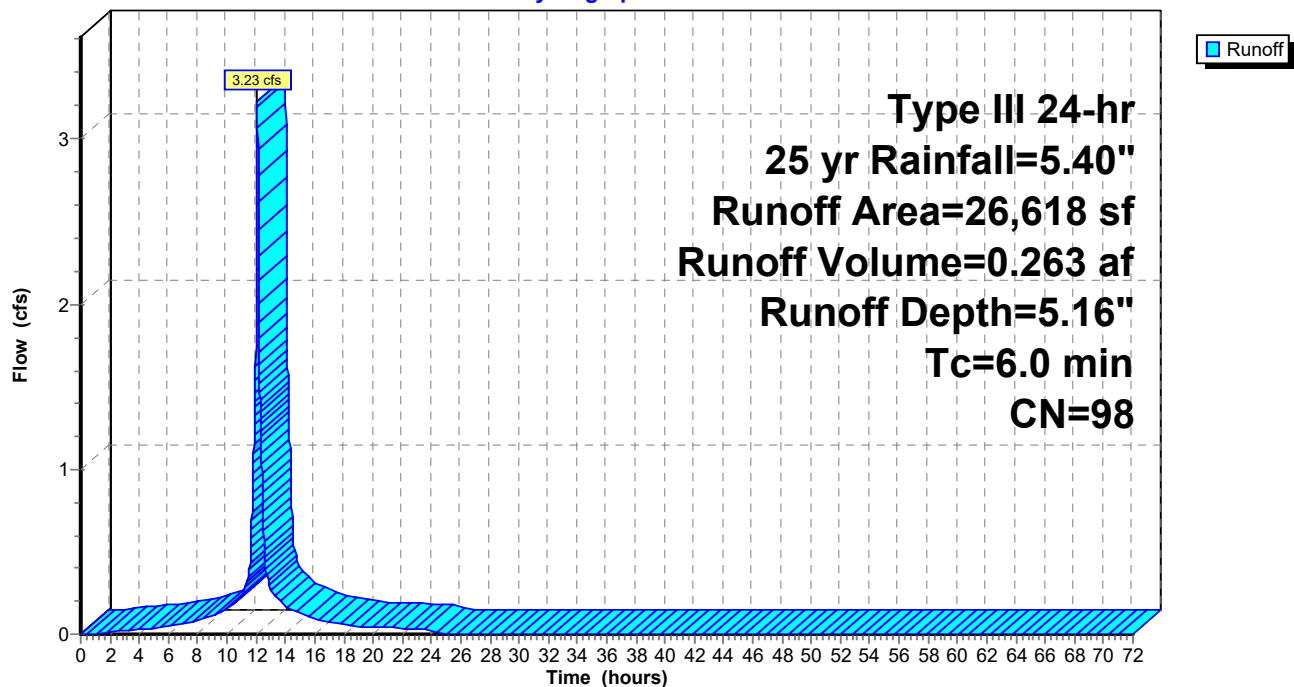
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	26,618	98	"F" Wing
	26,618		100.00% Impervious Area

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

Subcatchment BLDG-F: "F" Wing

Hydrograph



Summary for Subcatchment P-WS-1: P-WS-1

Runoff = 25.03 cfs @ 12.08 hrs, Volume= 1.854 af, Depth= 4.26"

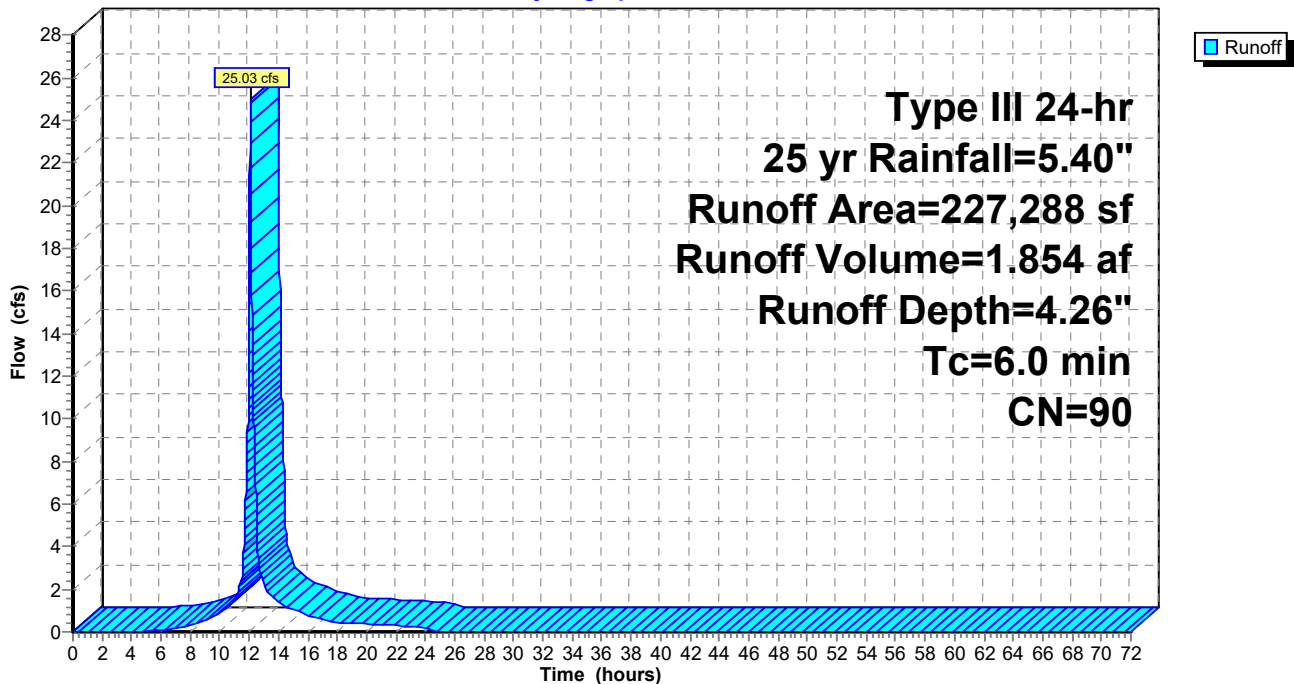
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
165,375	98	Paved parking, HSG A
16,947	39	>75% Grass cover, Good, HSG A
7,940	74	>75% Grass cover, Good, HSG C
23,392	80	>75% Grass cover, Good, HSG D
* 13,634	82	Woods/grass comb., Fair, HSG D
227,288	90	Weighted Average
61,913		27.24% Pervious Area
165,375		72.76% Impervious Area

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

Subcatchment P-WS-1: P-WS-1

Hydrograph



Summary for Subcatchment P-WS-2: P-WS-2

Runoff = 9.58 cfs @ 12.08 hrs, Volume= 0.709 af, Depth= 4.26"

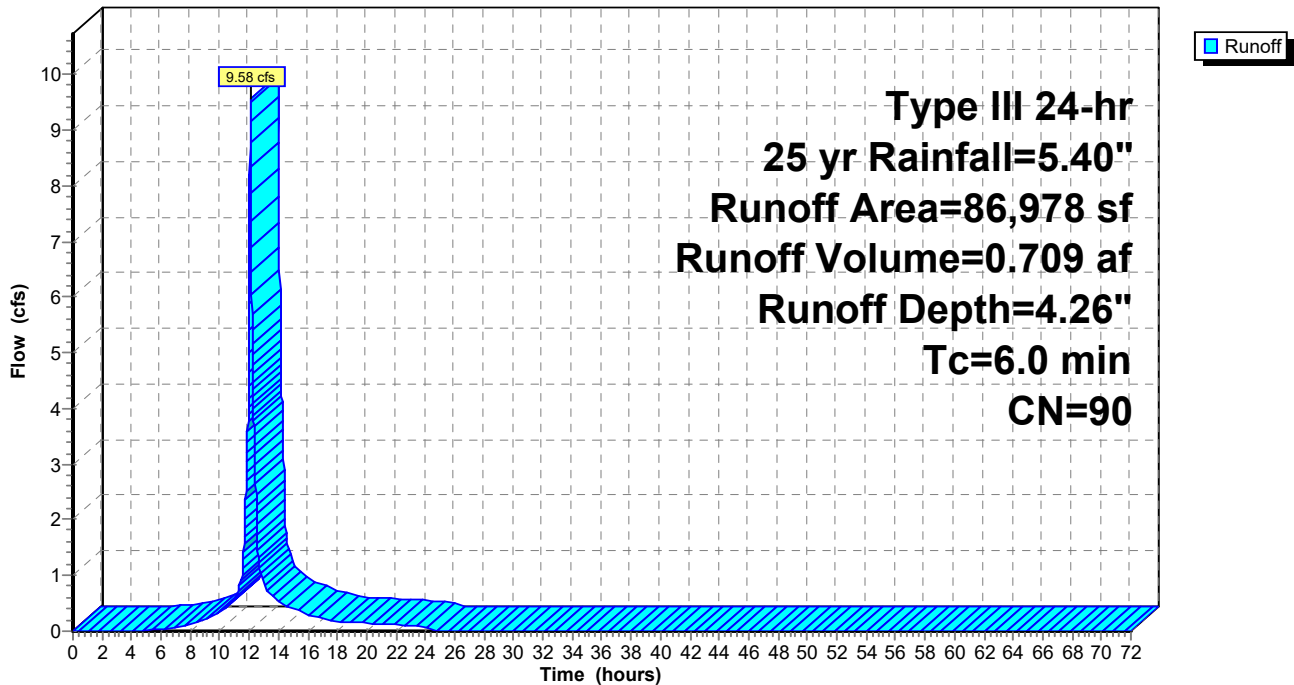
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
58,838	98	Paved parking, HSG A
1,568	39	>75% Grass cover, Good, HSG A
26,572	74	>75% Grass cover, Good, HSG C
86,978	90	Weighted Average
28,140		32.35% Pervious Area
58,838		67.65% Impervious Area

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

Subcatchment P-WS-2: P-WS-2

Hydrograph



Summary for Subcatchment P-WS-3: P-WS-3

Runoff = 10.87 cfs @ 12.08 hrs, Volume= 0.818 af, Depth= 4.48"

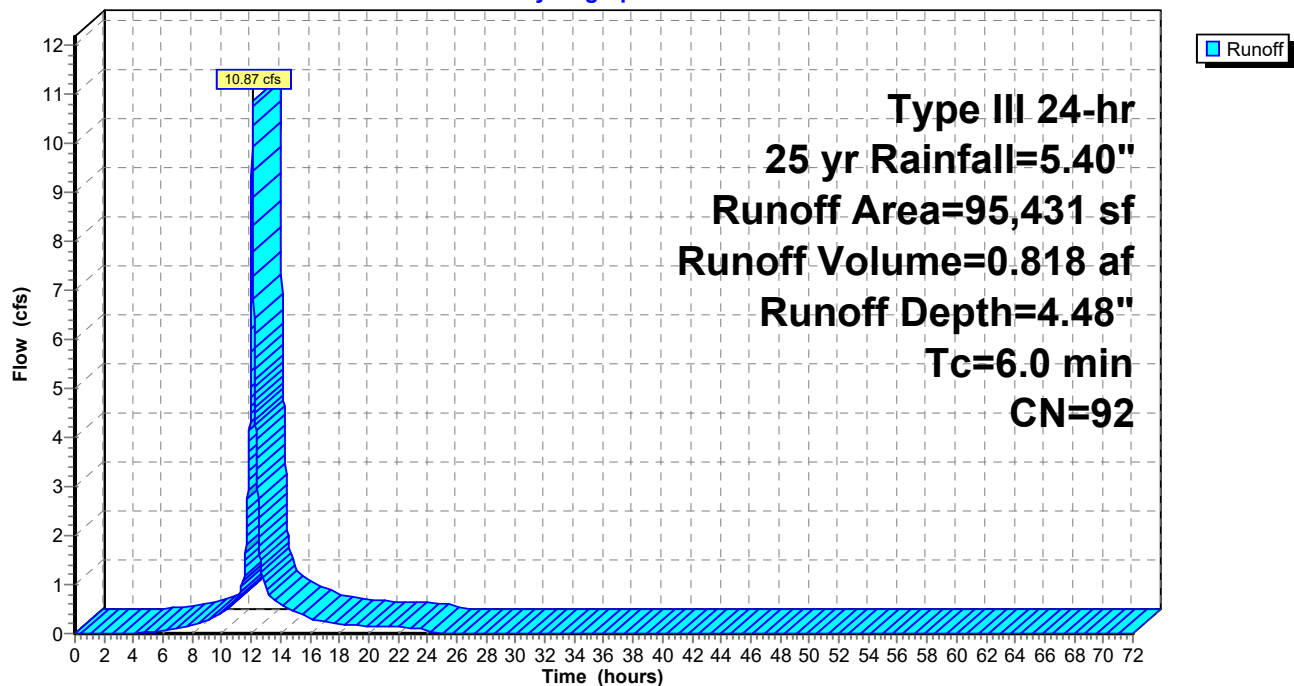
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
77,755	98	Paved parking, HSG A
3,258	39	>75% Grass cover, Good, HSG A
12,632	74	>75% Grass cover, Good, HSG C
1,786	80	>75% Grass cover, Good, HSG D
95,431	92	Weighted Average
17,676		18.52% Pervious Area
77,755		81.48% Impervious Area

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

Subcatchment P-WS-3: P-WS-3

Hydrograph



Summary for Subcatchment P-WS-4: P-WS-4

Runoff = 0.39 cfs @ 12.11 hrs, Volume= 0.039 af, Depth= 0.86"

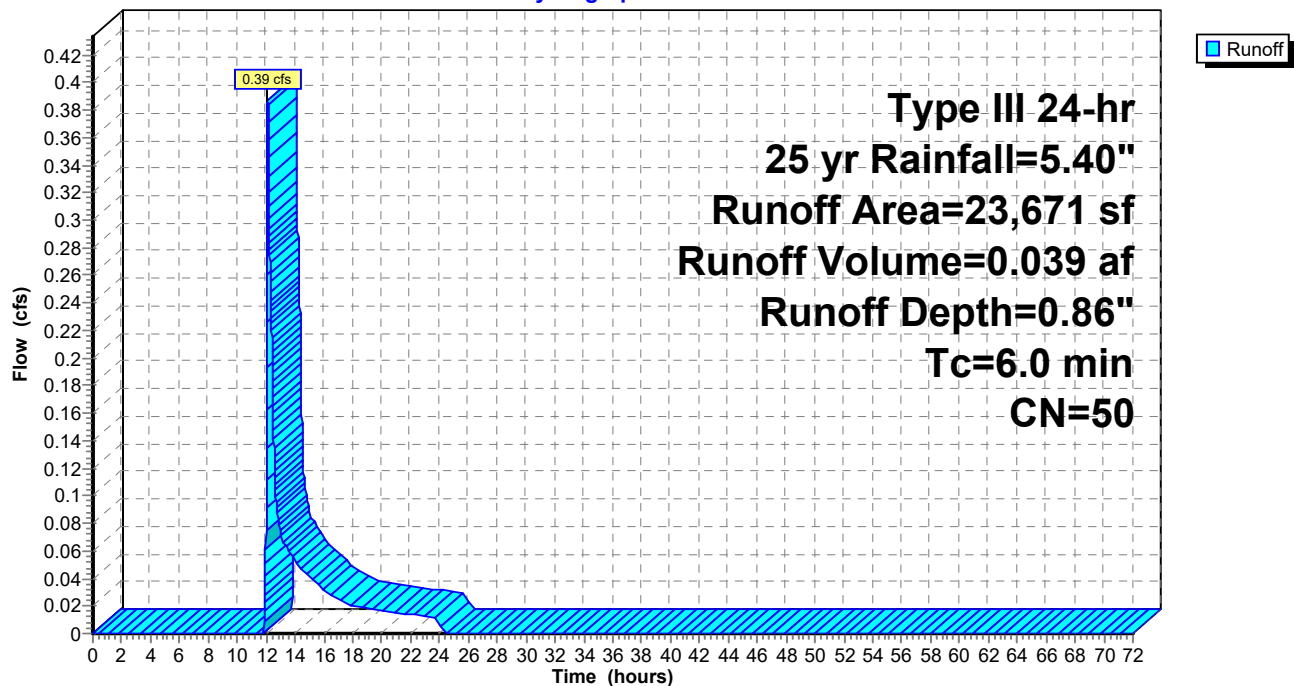
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
16,953	39	>75% Grass cover, Good, HSG A
2,352	74	>75% Grass cover, Good, HSG C
4,366	80	>75% Grass cover, Good, HSG D
23,671	50	Weighted Average
23,671		100.00% Pervious Area

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

Subcatchment P-WS-4: P-WS-4

Hydrograph



Summary for Subcatchment P-WS-5: P-WS-5

Runoff = 0.03 cfs @ 12.41 hrs, Volume= 0.008 af, Depth= 0.29"

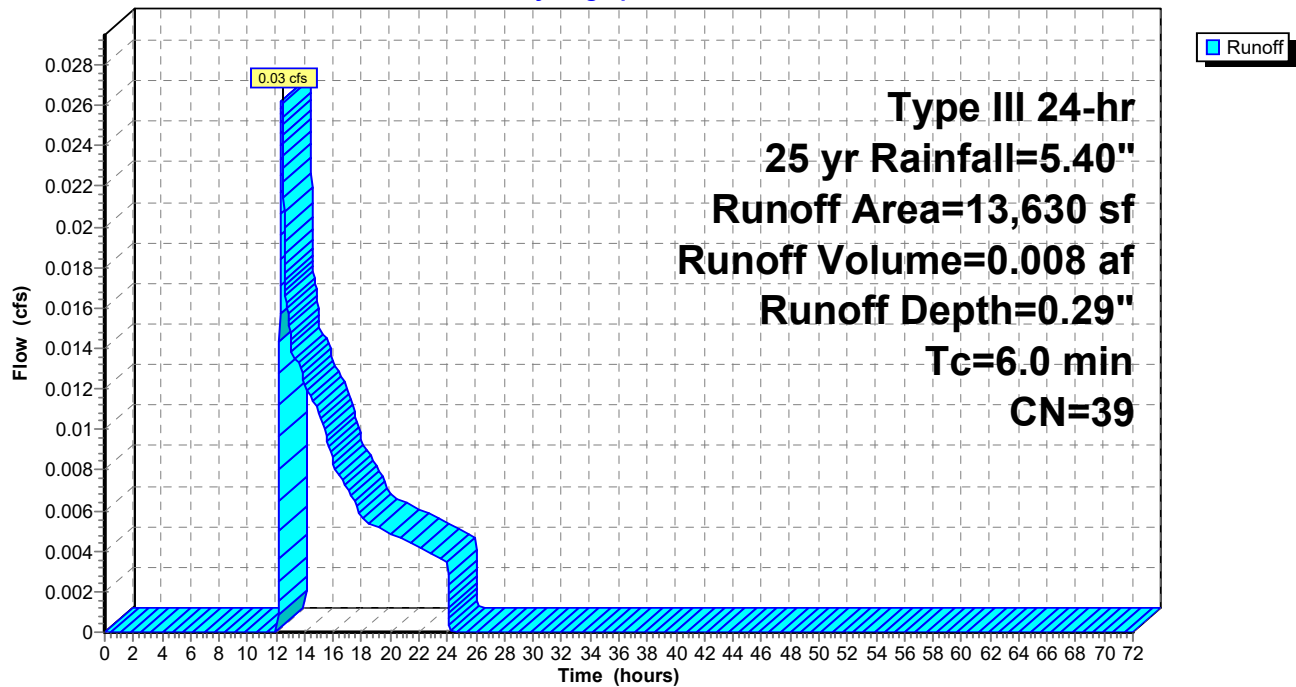
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
13,630	39	>75% Grass cover, Good, HSG A
13,630		100.00% Pervious Area

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

Subcatchment P-WS-5: P-WS-5

Hydrograph



Summary for Subcatchment P-WS-6: P-WS-6

Runoff = 6.09 cfs @ 12.09 hrs, Volume= 0.437 af, Depth= 3.64"

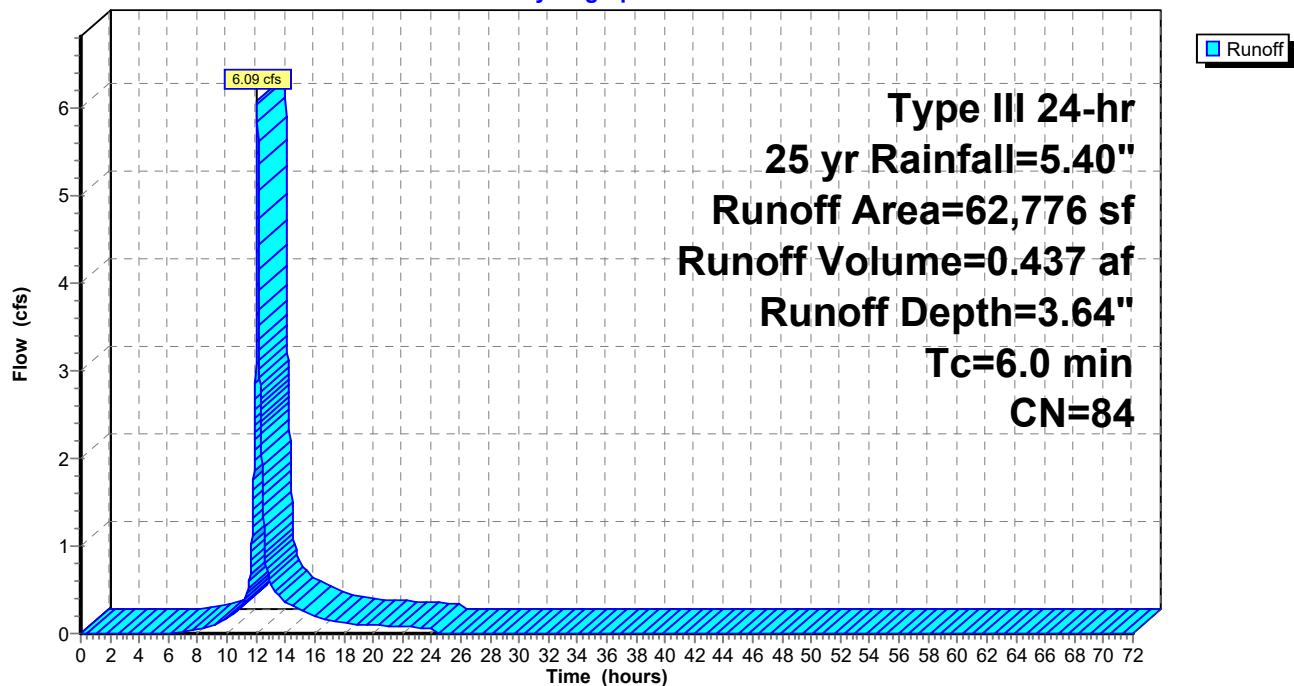
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
26,590	98	Paved parking, HSG C
36,186	74	>75% Grass cover, Good, HSG C
62,776	84	Weighted Average
36,186		57.64% Pervious Area
26,590		42.36% Impervious Area

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

Subcatchment P-WS-6: P-WS-6

Hydrograph



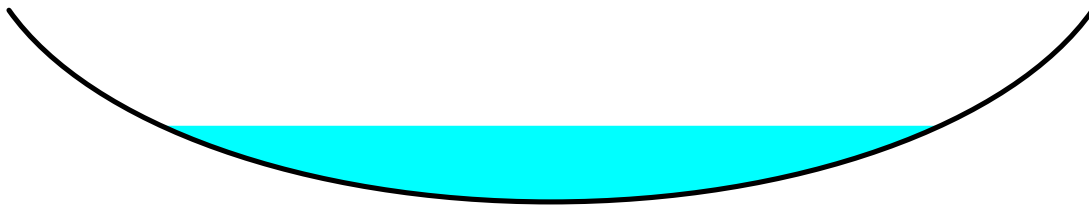
Summary for Reach 1R: East Entry Swale

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 4.16" for 25 yr event
 Inflow = 4.22 cfs @ 12.09 hrs, Volume= 0.311 af
 Outflow = 4.11 cfs @ 12.13 hrs, Volume= 0.311 af, Atten= 3%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.10 fps, Min. Travel Time= 1.6 min
 Avg. Velocity = 1.26 fps, Avg. Travel Time= 5.3 min

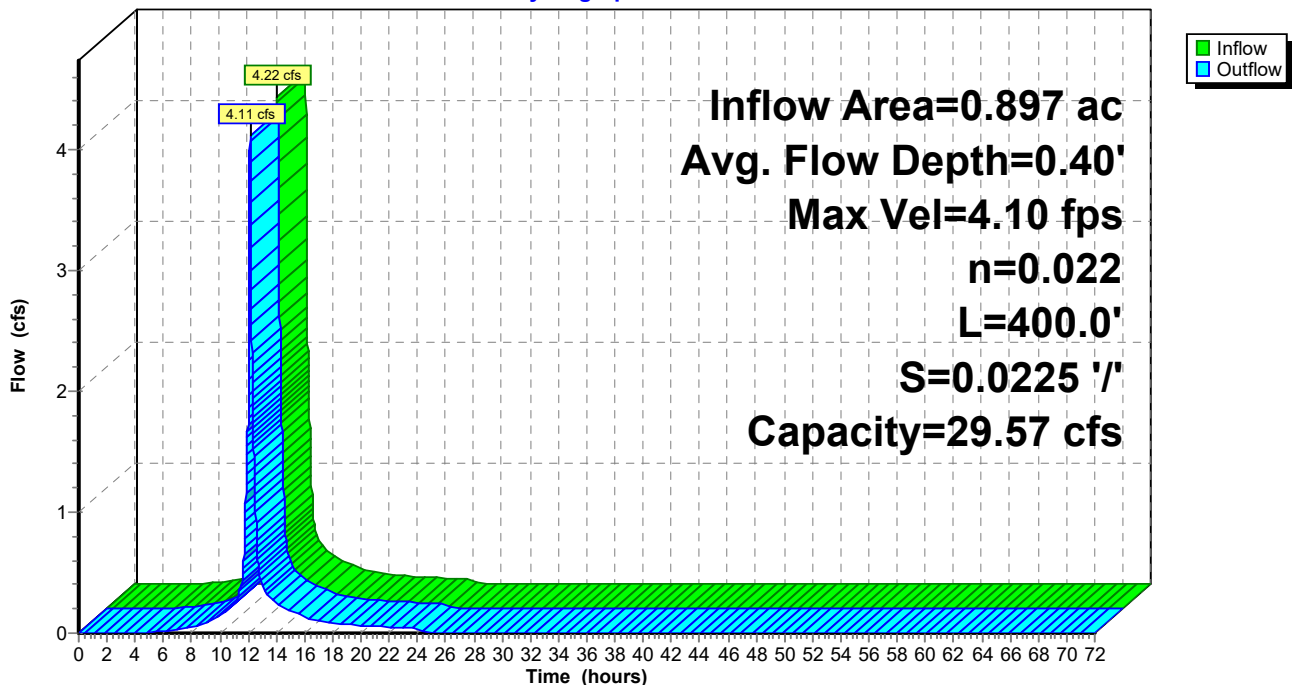
Peak Storage= 401 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.40'
 Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 29.57 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
 Length= 400.0' Slope= 0.0225 '/'
 Inlet Invert= 67.00', Outlet Invert= 58.00'



Reach 1R: East Entry Swale

Hydrograph



Summary for Pond RG-1: Rain Garden 1

Inflow Area = 0.611 ac, 100.00% Impervious, Inflow Depth = 5.16" for 25 yr event
 Inflow = 3.23 cfs @ 12.08 hrs, Volume= 0.263 af
 Outflow = 2.95 cfs @ 12.12 hrs, Volume= 0.263 af, Atten= 9%, Lag= 2.1 min
 Discarded = 0.07 cfs @ 12.12 hrs, Volume= 0.119 af
 Primary = 2.89 cfs @ 12.12 hrs, Volume= 0.144 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 58.98' @ 12.12 hrs Surf.Area= 2,762 sf Storage= 2,165 cf

Plug-Flow detention time= 135.7 min calculated for 0.263 af (100% of inflow)
 Center-of-Mass det. time= 135.8 min (882.5 - 746.8)

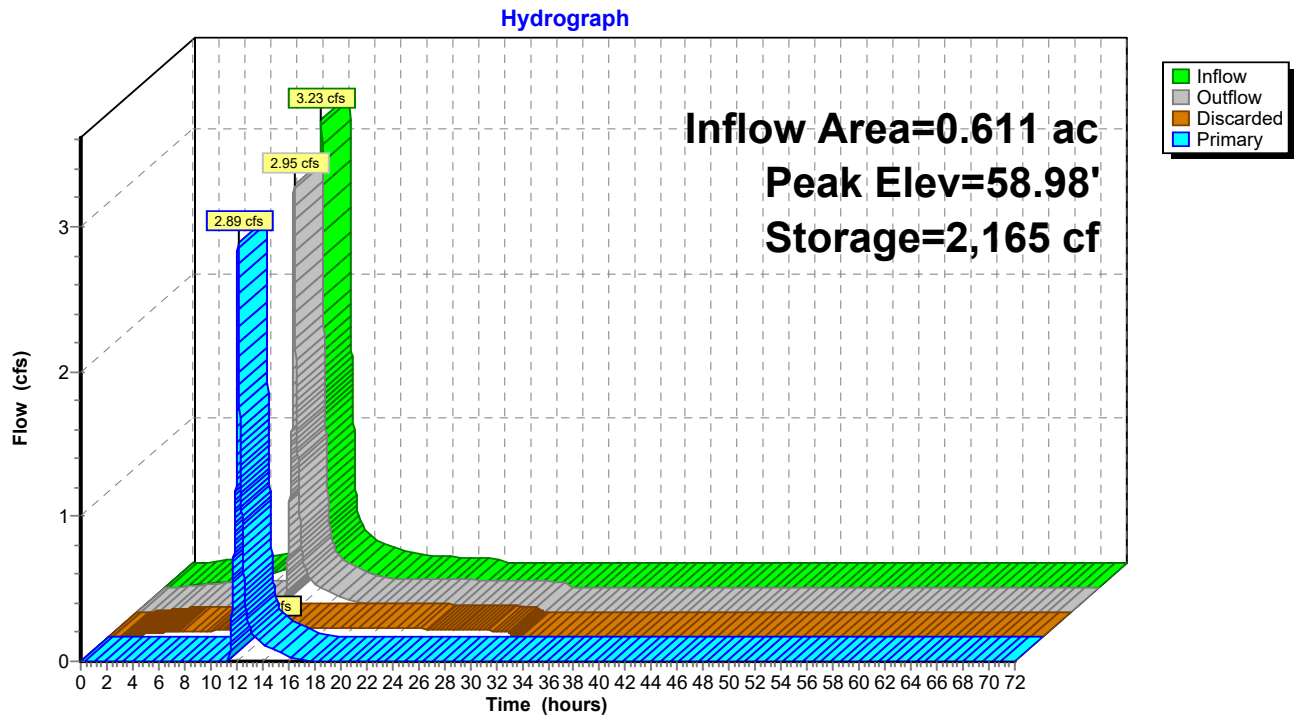
Volume	Invert	Avail.Storage	Storage Description
#1	58.00'	5,551 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.00	1,655	0	0
59.00	2,784	2,220	2,220
60.00	3,878	3,331	5,551

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.00'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	58.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	54.00'	12.0" Round Culvert L= 400.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 54.00' / 50.00' S= 0.0100 ' / ' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 12.12 hrs HW=58.98' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=2.89 cfs @ 12.12 hrs HW=58.98' (Free Discharge)
 ↑ **3=Culvert** (Passes 2.89 cfs of 5.02 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 2.89 cfs @ 1.57 fps)

Pond RG-1: Rain Garden 1



Summary for Pond RG-2: Rain Garden 2

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 4.16" for 25 yr event
 Inflow = 4.11 cfs @ 12.13 hrs, Volume= 0.311 af
 Outflow = 0.98 cfs @ 12.54 hrs, Volume= 0.311 af, Atten= 76%, Lag= 24.4 min
 Discarded = 0.04 cfs @ 12.54 hrs, Volume= 0.067 af
 Primary = 0.94 cfs @ 12.54 hrs, Volume= 0.244 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 55.95' @ 12.54 hrs Surf.Area= 3,336 sf Storage= 4,531 cf

Plug-Flow detention time= 149.7 min calculated for 0.311 af (100% of inflow)
 Center-of-Mass det. time= 149.7 min (946.4 - 796.7)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	6,519 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

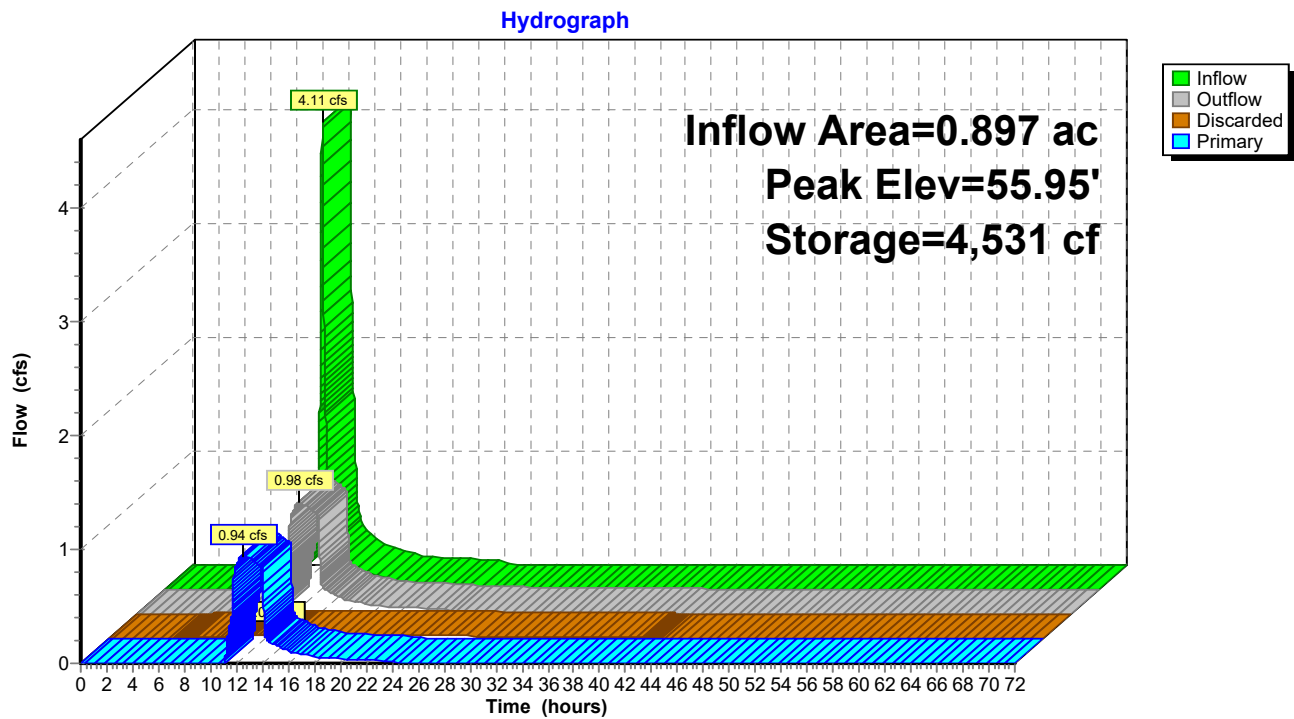
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,365	0	0
55.00	2,311	1,838	1,838
56.00	3,385	2,848	4,686
56.50	3,945	1,833	6,519

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	54.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	51.75'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.75' / 50.00' S= 0.0088 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.04 cfs @ 12.54 hrs HW=55.95' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.94 cfs @ 12.54 hrs HW=55.95' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 0.94 cfs @ 4.78 fps)
 ↑ **2=Orifice/Grate** (Passes 0.94 cfs of 21.13 cfs potential flow)

Pond RG-2: Rain Garden 2



Summary for Pond RG-3: Rain Garden 3

Inflow Area = 0.813 ac, 82.06% Impervious, Inflow Depth = 4.70" for 25 yr event
 Inflow = 4.15 cfs @ 12.08 hrs, Volume= 0.318 af
 Outflow = 1.34 cfs @ 12.38 hrs, Volume= 0.318 af, Atten= 68%, Lag= 17.6 min
 Discarded = 0.03 cfs @ 12.38 hrs, Volume= 0.039 af
 Primary = 1.31 cfs @ 12.38 hrs, Volume= 0.280 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 61.12' @ 12.38 hrs Surf.Area= 2,156 sf Storage= 2,918 cf

Plug-Flow detention time= 81.9 min calculated for 0.318 af (100% of inflow)
 Center-of-Mass det. time= 82.1 min (853.4 - 771.3)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	5,155 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

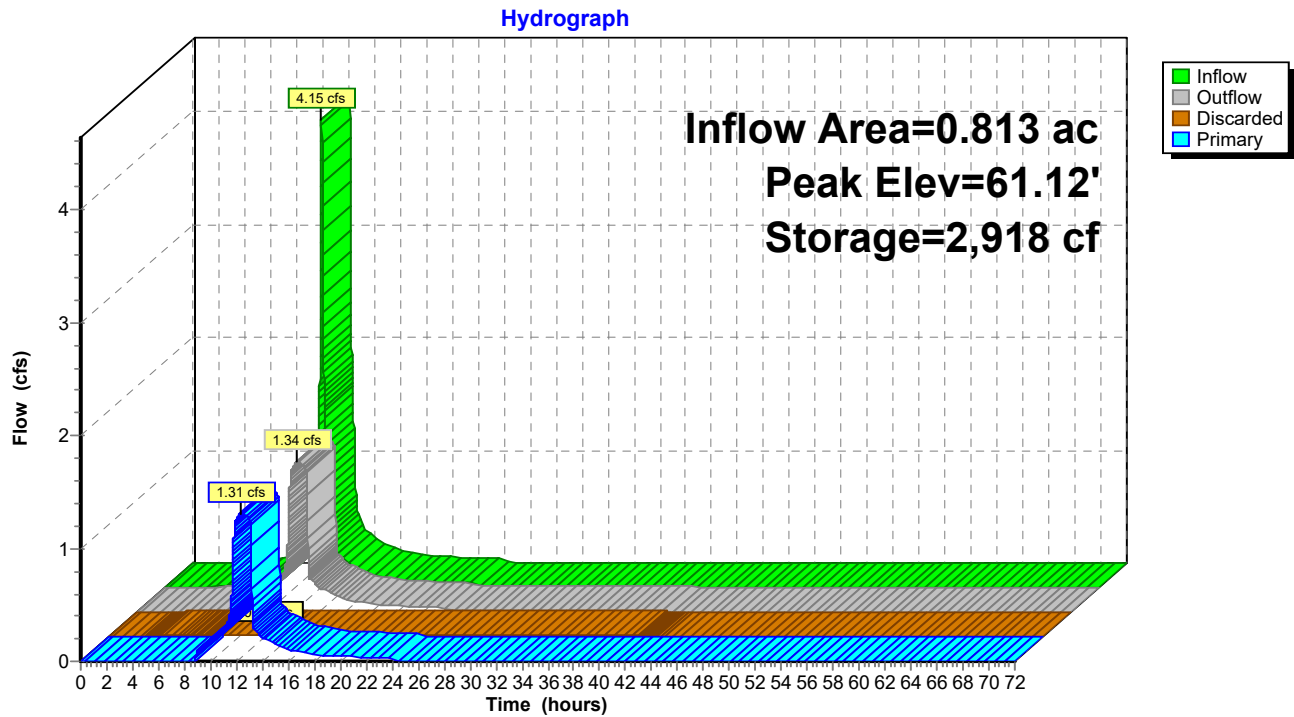
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	660	0	0
60.00	1,309	985	985
61.00	2,048	1,679	2,663
62.00	2,936	2,492	5,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	59.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	53.50'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.50' / 50.00' S= 0.0175 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.03 cfs @ 12.38 hrs HW=61.12' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.31 cfs @ 12.38 hrs HW=61.12' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 1.31 cfs @ 6.67 fps)
 ↑ **2=Orifice/Grate** (Passes 1.31 cfs of 22.55 cfs potential flow)

Pond RG-3: Rain Garden 3



Summary for Pond UGS-1: MC-4500

Inflow Area = 5.218 ac, 72.76% Impervious, Inflow Depth = 4.26" for 25 yr event
 Inflow = 25.03 cfs @ 12.08 hrs, Volume= 1.854 af
 Outflow = 24.06 cfs @ 12.11 hrs, Volume= 1.854 af, Atten= 4%, Lag= 1.4 min
 Discarded = 0.26 cfs @ 7.75 hrs, Volume= 0.654 af
 Primary = 23.80 cfs @ 12.11 hrs, Volume= 1.199 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 52.91' @ 12.11 hrs Surf.Area= 4,732 sf Storage= 18,648 cf

Plug-Flow detention time= 180.4 min calculated for 1.853 af (100% of inflow)
 Center-of-Mass det. time= 180.5 min (968.7 - 788.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	8,279 cf	92.08'W x 51.39'L x 7.00'H Field A 33,126 cf Overall - 12,428 cf Embedded = 20,698 cf x 40.0% Voids
#2A	48.00'	12,428 cf	ADS_StormTech MC-4500 +Cap x 110 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 110 Chambers in 10 Rows Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf
		20,707 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	2.400 in/hr Exfiltration over Surface area
#2	Primary	47.00'	24.0" Round Culvert L= 140.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.00' S= 0.0071 ' S= 0.0071 ' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	50.50'	12.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 2	52.00'	5.0' long x 5.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 5.0' Crest Height

Discarded OutFlow Max=0.26 cfs @ 7.75 hrs HW=47.10' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=23.77 cfs @ 12.11 hrs HW=52.91' (Free Discharge)
 ↑ **2=Culvert** (Passes 23.77 cfs of 32.33 cfs potential flow)
 ↑ **3=Orifice/Grate** (Orifice Controls 9.73 cfs @ 6.19 fps)
 ↑ **4=Sharp-Crested Rectangular Weir** (Weir Controls 14.04 cfs @ 3.19 fps)

Pond UGS-1: MC-4500 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length

10 Rows x 100.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 92.08' Base Width

12.0" Base + 60.0" Chamber Height + 12.0" Cover = 7.00' Field Height

110 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 10 Rows = 12,427.9 cf Chamber Storage

33,126.2 cf Field - 12,427.9 cf Chambers = 20,698.3 cf Stone x 40.0% Voids = 8,279.3 cf Stone Storage

Chamber Storage + Stone Storage = 20,707.3 cf = 0.475 af

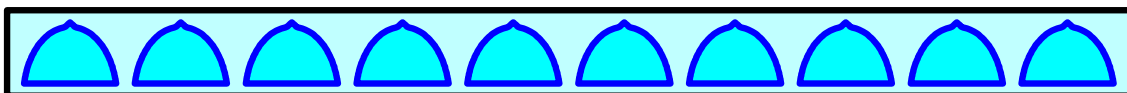
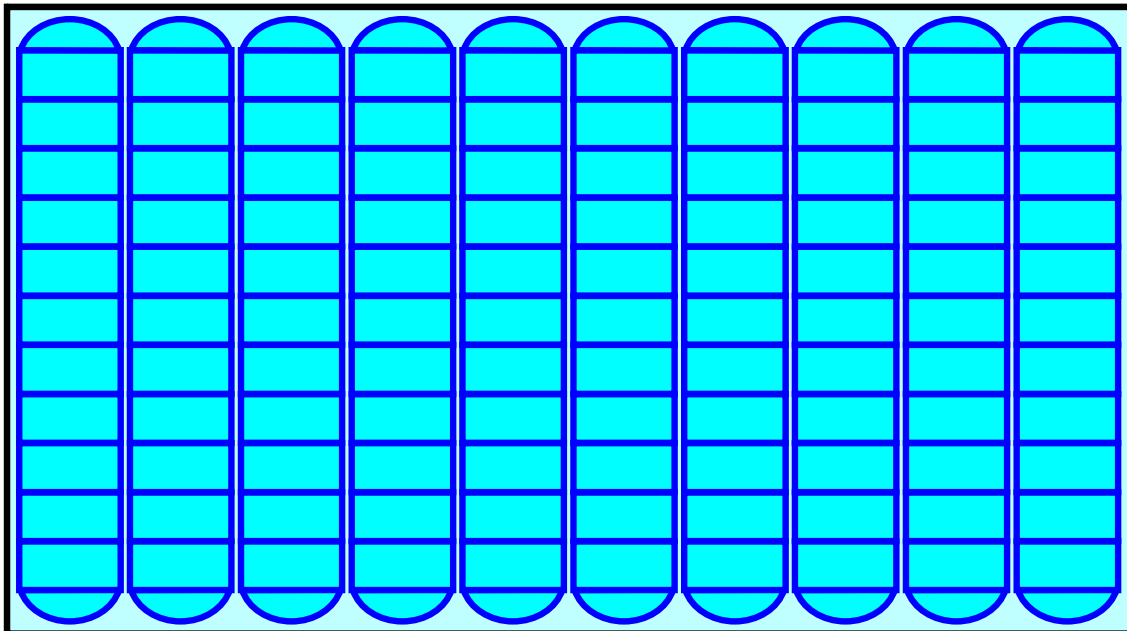
Overall Storage Efficiency = 62.5%

Overall System Size = 51.39' x 92.08' x 7.00'

110 Chambers

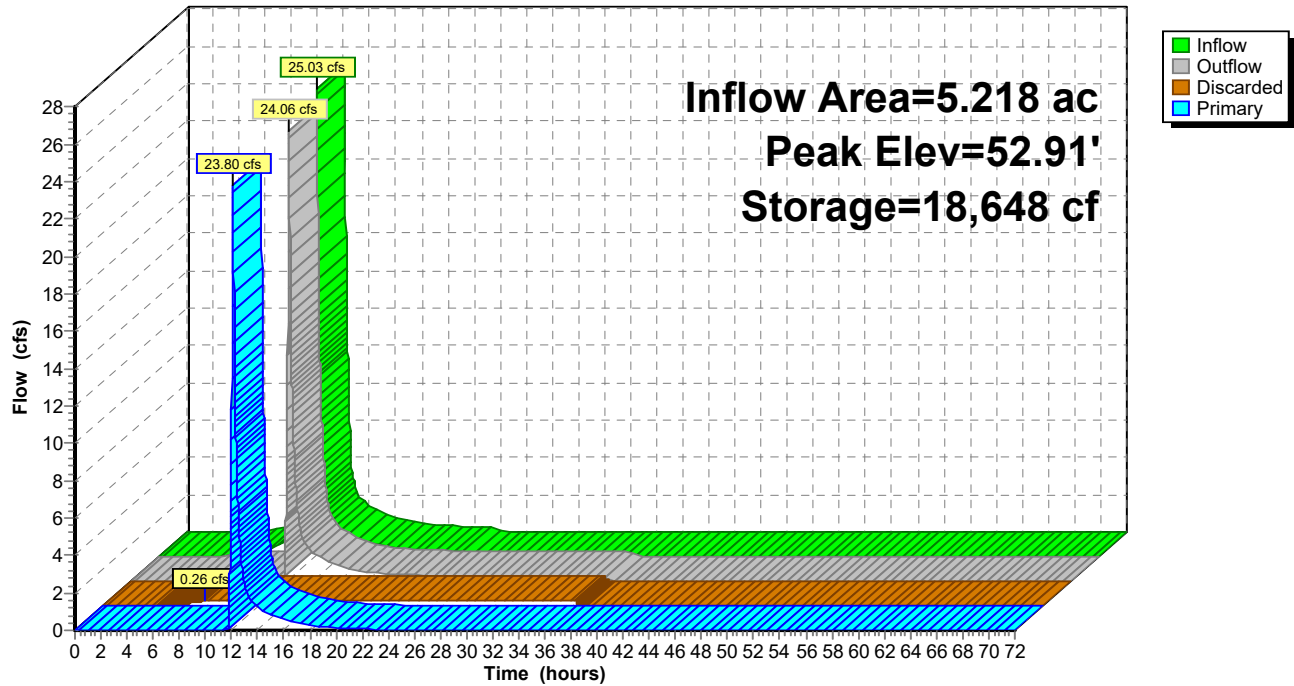
1,226.9 cy Field

766.6 cy Stone



Pond UGS-1: MC-4500

Hydrograph



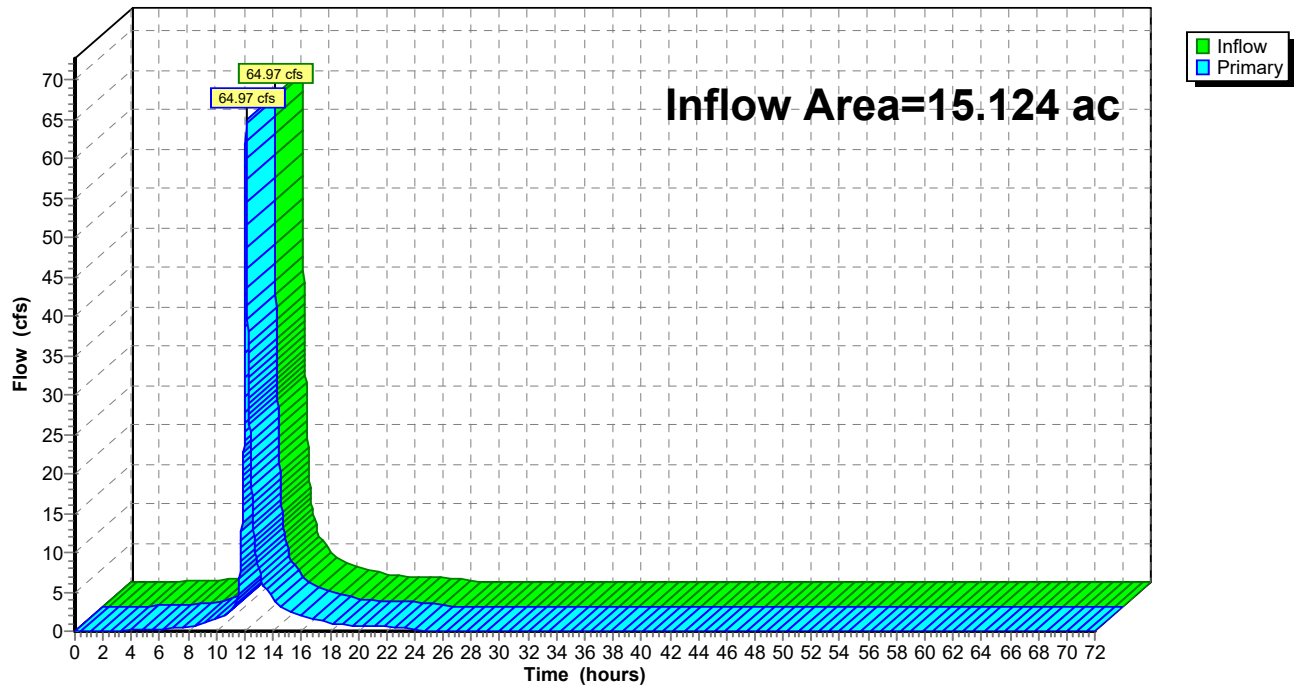
Summary for Link POA-1: POA-1

Inflow Area = 15.124 ac, 74.99% Impervious, Inflow Depth = 3.71" for 25 yr event
Inflow = 64.97 cfs @ 12.10 hrs, Volume= 4.673 af
Primary = 64.97 cfs @ 12.10 hrs, Volume= 4.673 af, Atten= 0%, Lag= 0.0 min

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

Link POA-1: POA-1

Hydrograph



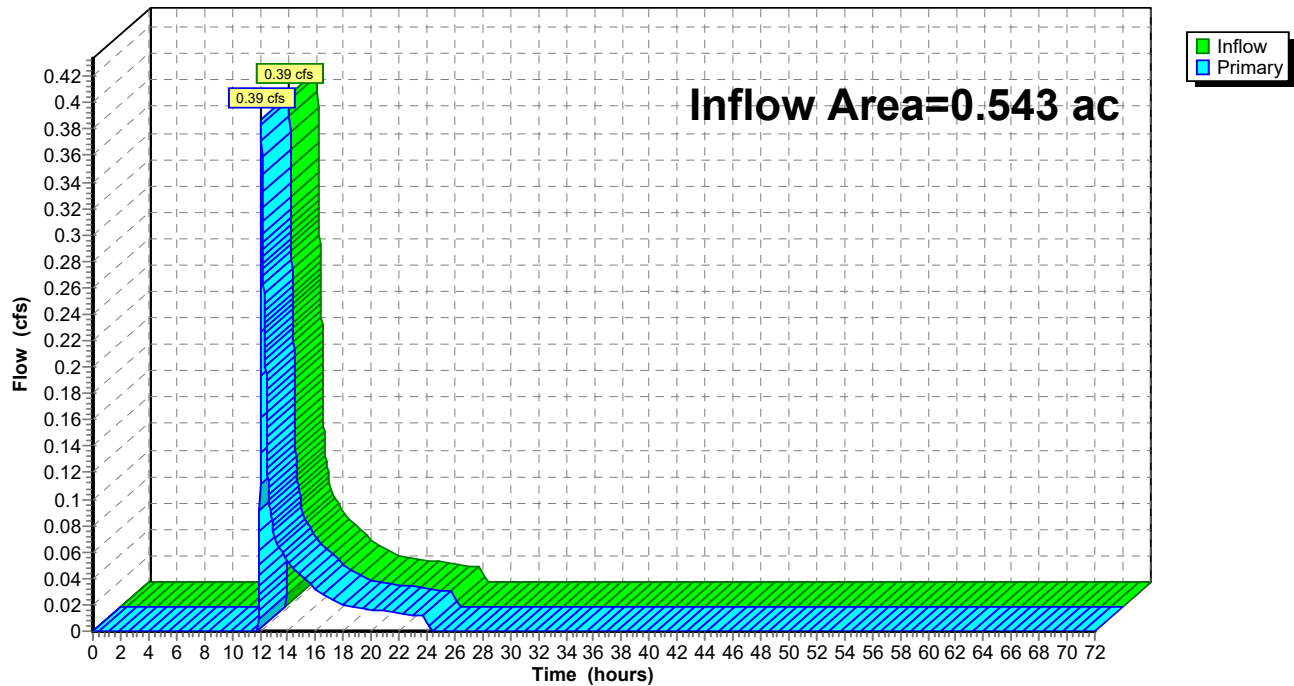
Summary for Link POA-2: POA-2

Inflow Area = 0.543 ac, 0.00% Impervious, Inflow Depth = 0.86" for 25 yr event
Inflow = 0.39 cfs @ 12.11 hrs, Volume= 0.039 af
Primary = 0.39 cfs @ 12.11 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

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

Link POA-2: POA-2

Hydrograph



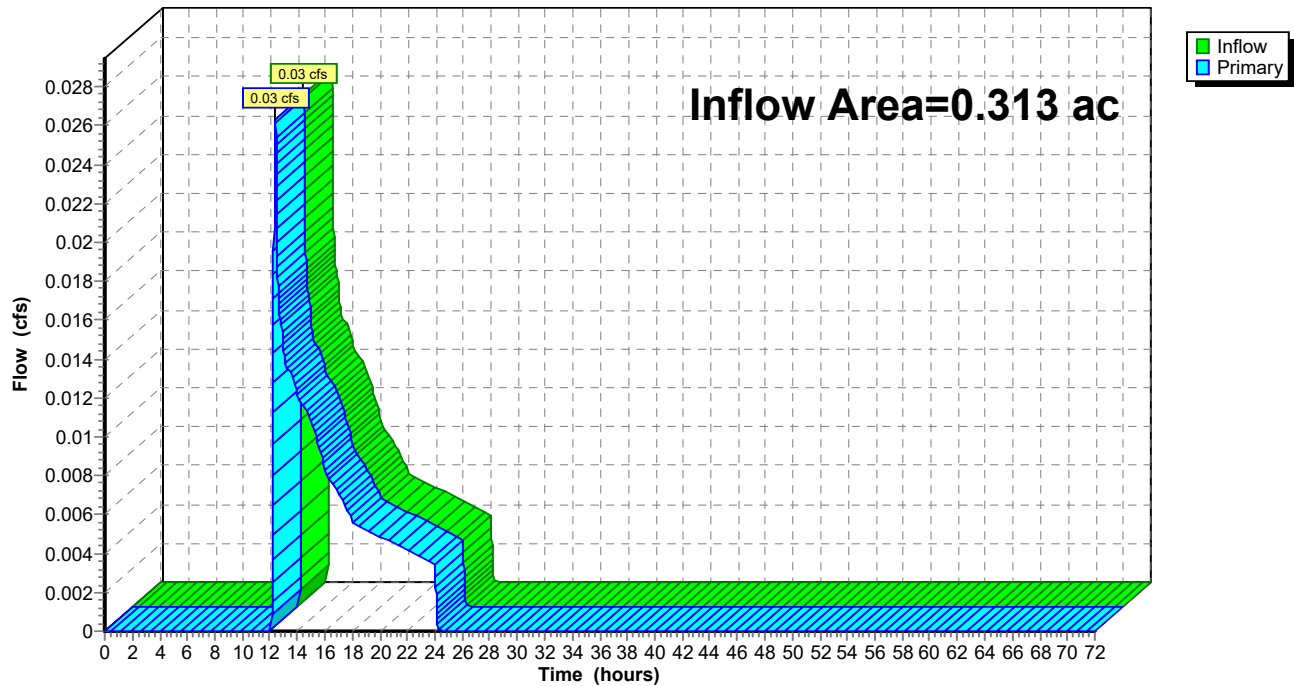
Summary for Link POA-3: POA-3

Inflow Area = 0.313 ac, 0.00% Impervious, Inflow Depth = 0.29" for 25 yr event
Inflow = 0.03 cfs @ 12.41 hrs, Volume= 0.008 af
Primary = 0.03 cfs @ 12.41 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: POA-3

Hydrograph



Summary for Subcatchment BLDG: BLDG MAIN ROOF

Runoff = 13.44 cfs @ 12.08 hrs, Volume= 1.102 af, Depth= 6.76"

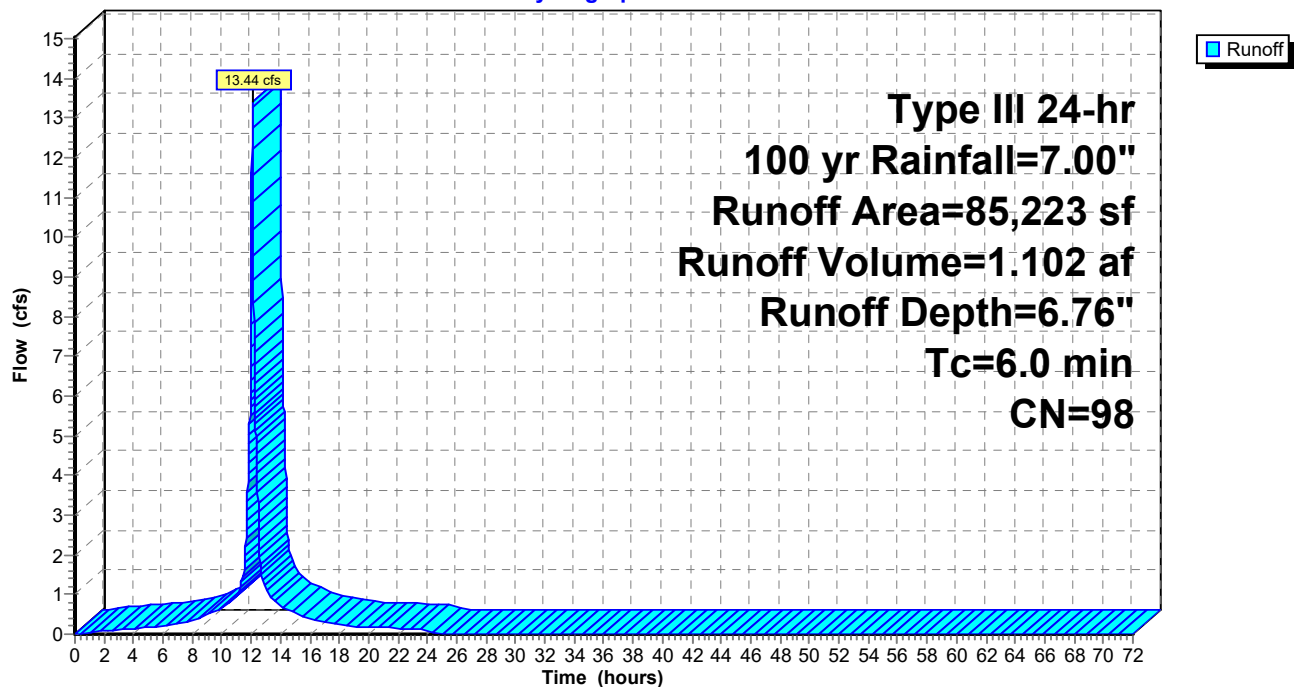
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	85,223	98	impervious
	85,223		100.00% Impervious Area

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

Subcatchment BLDG: BLDG MAIN ROOF

Hydrograph



Summary for Subcatchment BLDG-B: "B" Wing

Runoff = 5.70 cfs @ 12.08 hrs, Volume= 0.427 af, Depth= 5.71"

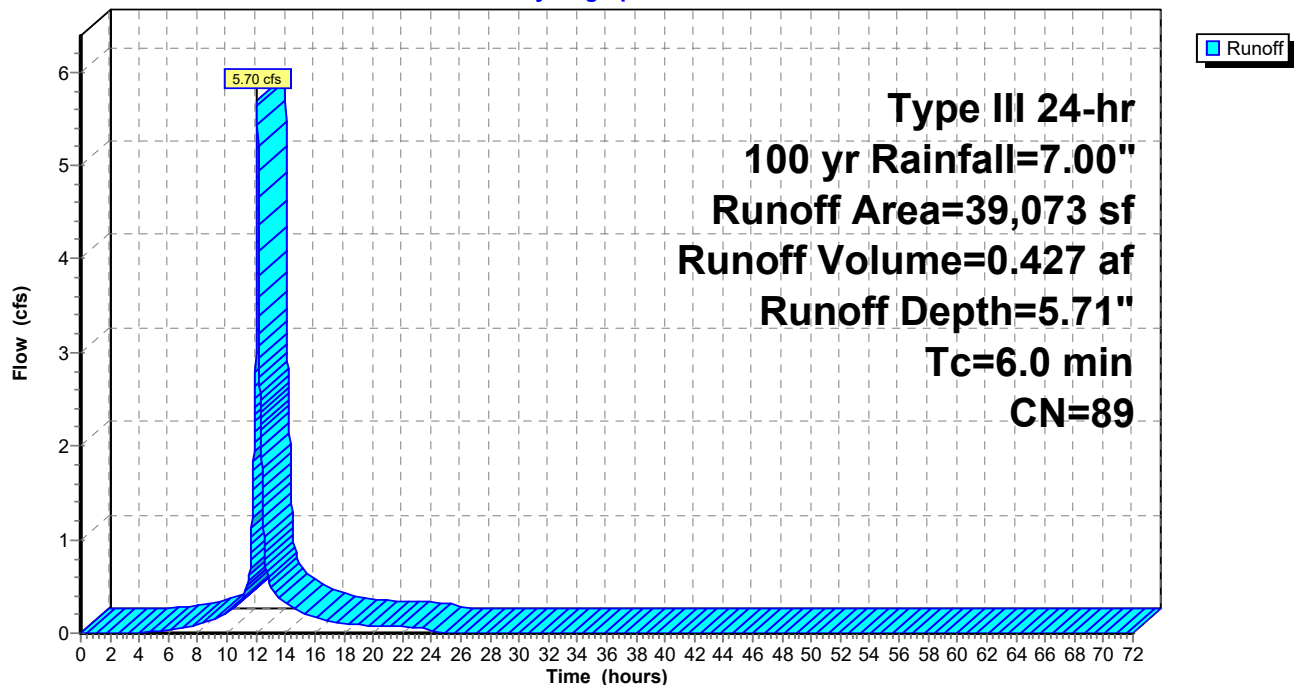
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	20,500	98	"F" Wing
	14,505	74	>75% Grass cover, Good, HSG C
*	4,068	98	Paved walkways, HSG C
	39,073	89	Weighted Average
	14,505		37.12% Pervious Area
	24,568		62.88% Impervious Area

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

Subcatchment BLDG-B: "B" Wing

Hydrograph



Summary for Subcatchment BLDG-E: "E" Wing

Runoff = 5.45 cfs @ 12.08 hrs, Volume= 0.426 af, Depth= 6.29"

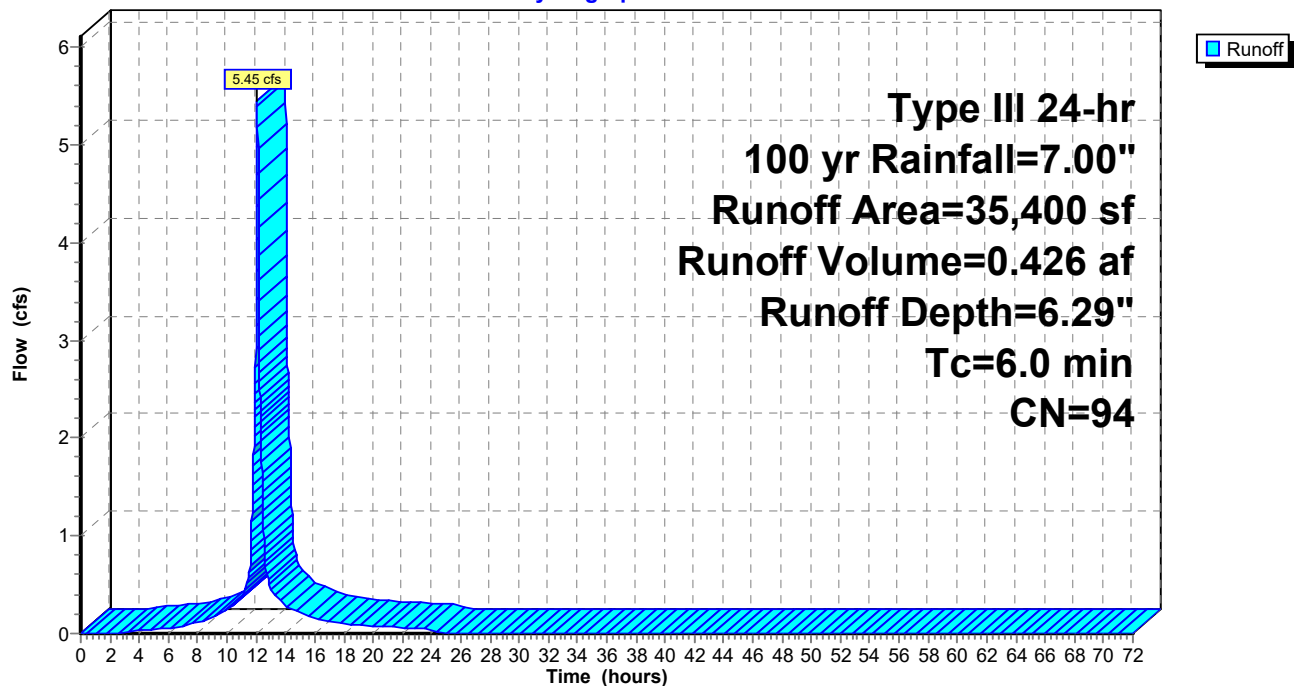
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	29,050	98	"F" Wing
	6,350	74	>75% Grass cover, Good, HSG C
	35,400	94	Weighted Average
	6,350		17.94% Pervious Area
	29,050		82.06% Impervious Area

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

Subcatchment BLDG-E: "E" Wing

Hydrograph



Summary for Subcatchment BLDG-F: "F" Wing

Runoff = 4.20 cfs @ 12.08 hrs, Volume= 0.344 af, Depth= 6.76"

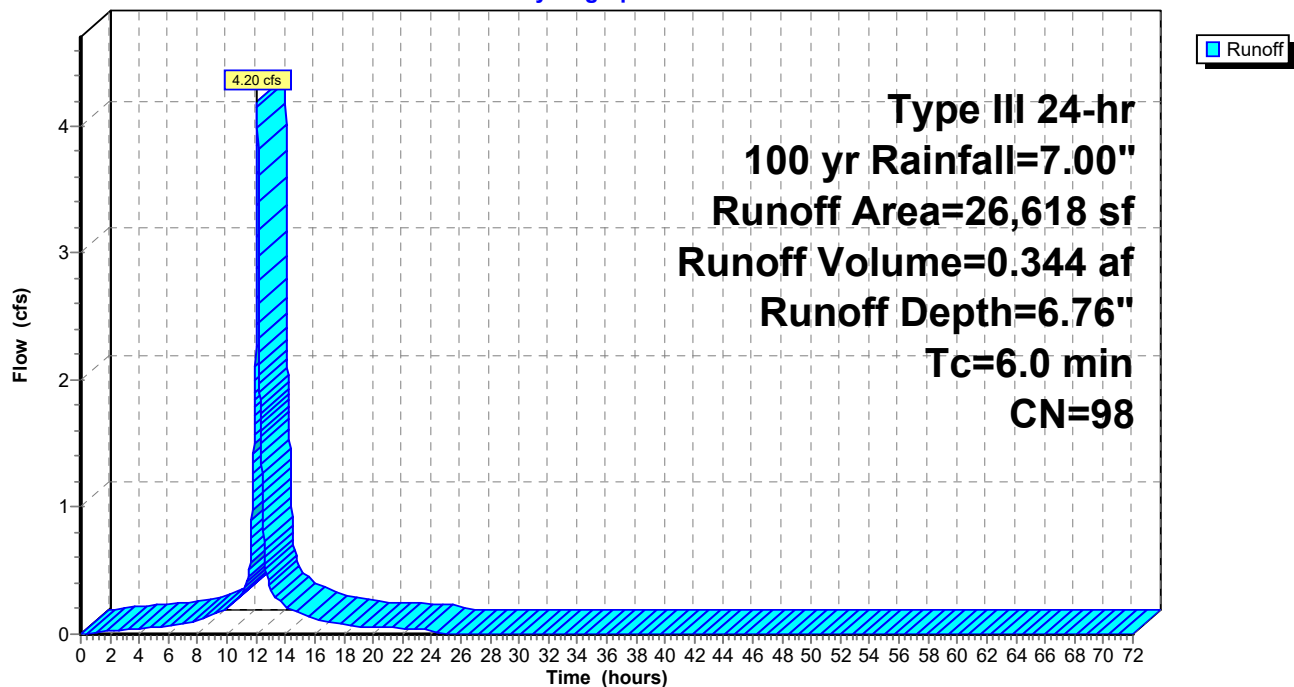
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	26,618	98	"F" Wing
	26,618		100.00% Impervious Area

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

Subcatchment BLDG-F: "F" Wing

Hydrograph



Summary for Subcatchment P-WS-1: P-WS-1

Runoff = 33.60 cfs @ 12.08 hrs, Volume= 2.532 af, Depth= 5.82"

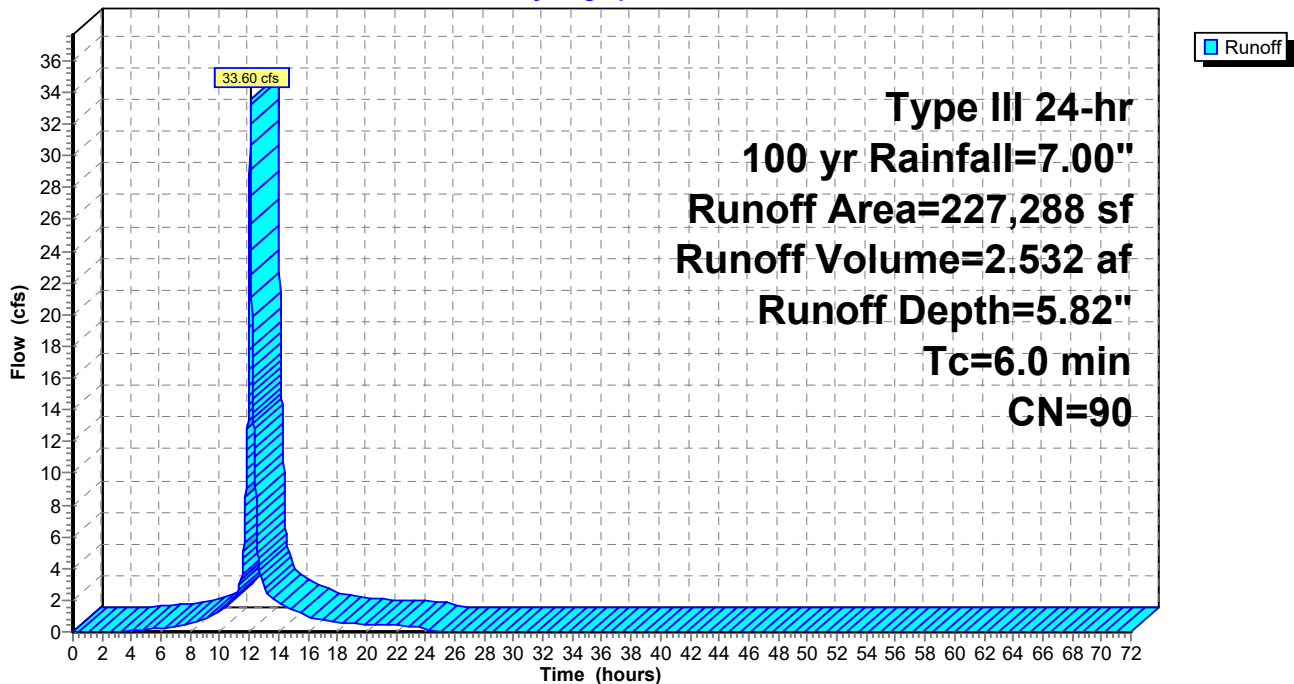
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
165,375	98	Paved parking, HSG A
16,947	39	>75% Grass cover, Good, HSG A
7,940	74	>75% Grass cover, Good, HSG C
23,392	80	>75% Grass cover, Good, HSG D
* 13,634	82	Woods/grass comb., Fair, HSG D
227,288	90	Weighted Average
61,913		27.24% Pervious Area
165,375		72.76% Impervious Area

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

Subcatchment P-WS-1: P-WS-1

Hydrograph



Summary for Subcatchment P-WS-2: P-WS-2

Runoff = 12.86 cfs @ 12.08 hrs, Volume= 0.969 af, Depth= 5.82"

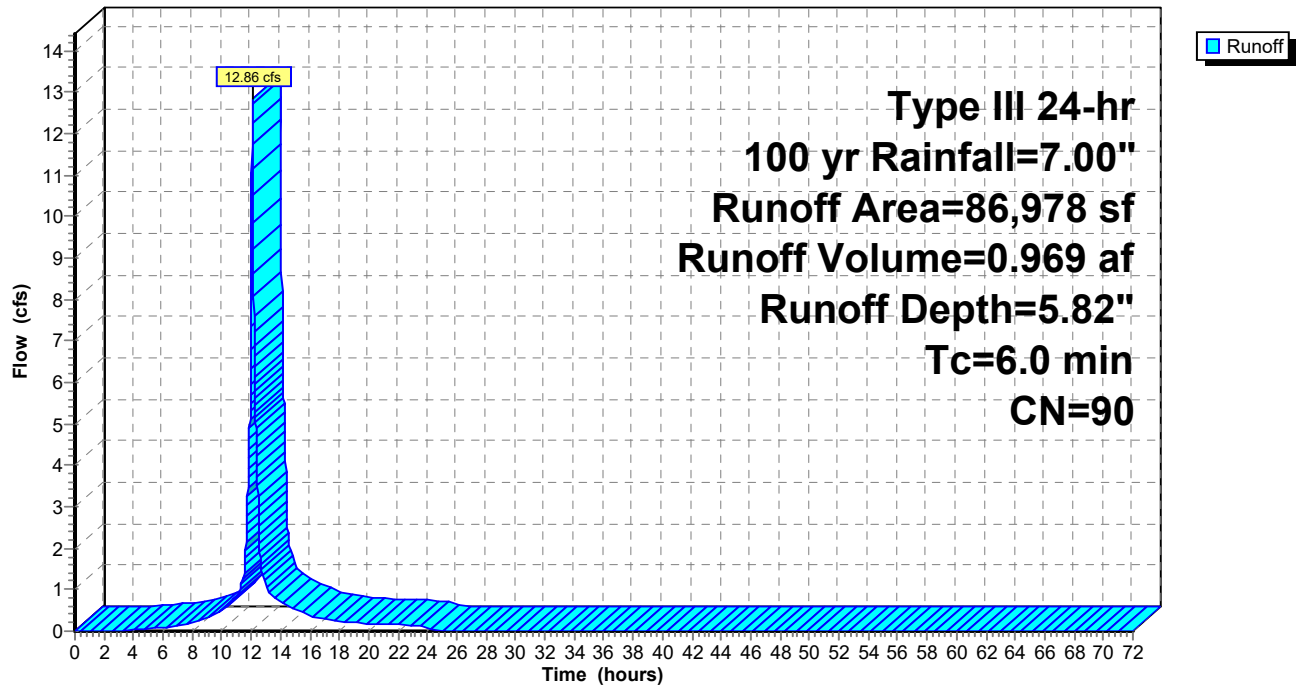
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
58,838	98	Paved parking, HSG A
1,568	39	>75% Grass cover, Good, HSG A
26,572	74	>75% Grass cover, Good, HSG C
86,978	90	Weighted Average
28,140		32.35% Pervious Area
58,838		67.65% Impervious Area

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

Subcatchment P-WS-2: P-WS-2

Hydrograph



Summary for Subcatchment P-WS-3: P-WS-3

Runoff = 14.43 cfs @ 12.08 hrs, Volume= 1.105 af, Depth= 6.05"

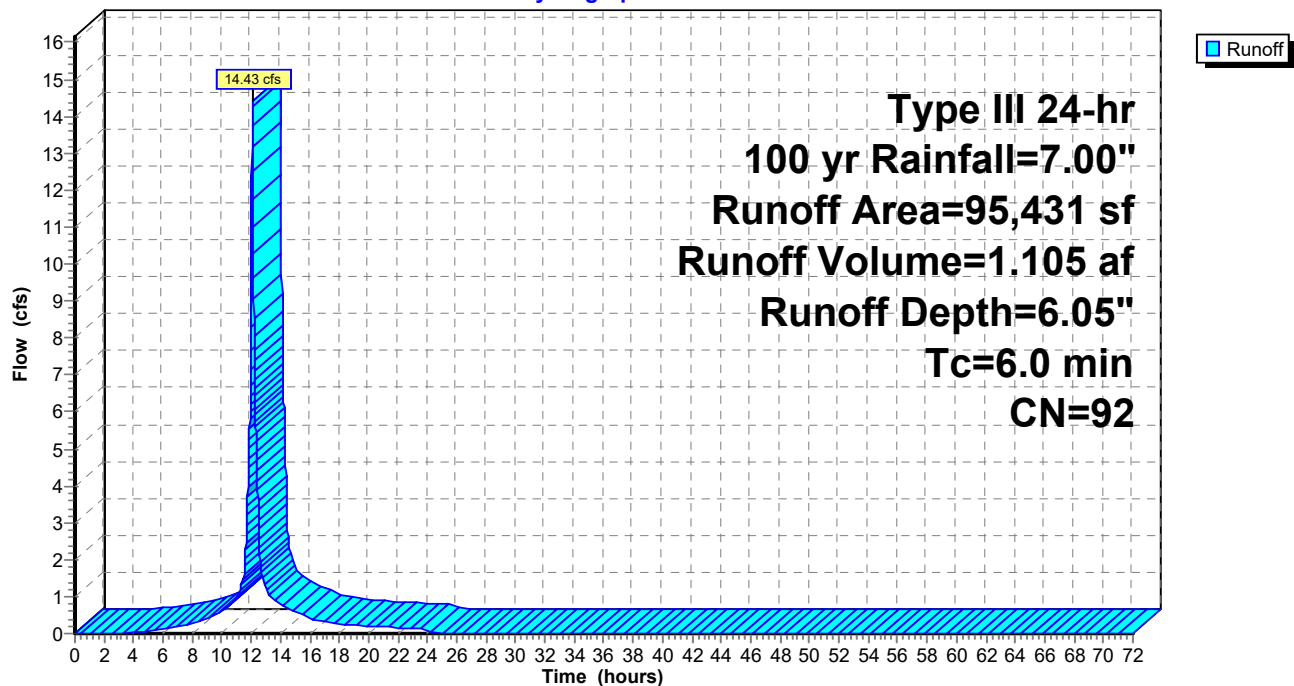
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
77,755	98	Paved parking, HSG A
3,258	39	>75% Grass cover, Good, HSG A
12,632	74	>75% Grass cover, Good, HSG C
1,786	80	>75% Grass cover, Good, HSG D
95,431	92	Weighted Average
17,676		18.52% Pervious Area
77,755		81.48% Impervious Area

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

Subcatchment P-WS-3: P-WS-3

Hydrograph



Summary for Subcatchment P-WS-4: P-WS-4

Runoff = 0.92 cfs @ 12.10 hrs, Volume= 0.075 af, Depth= 1.67"

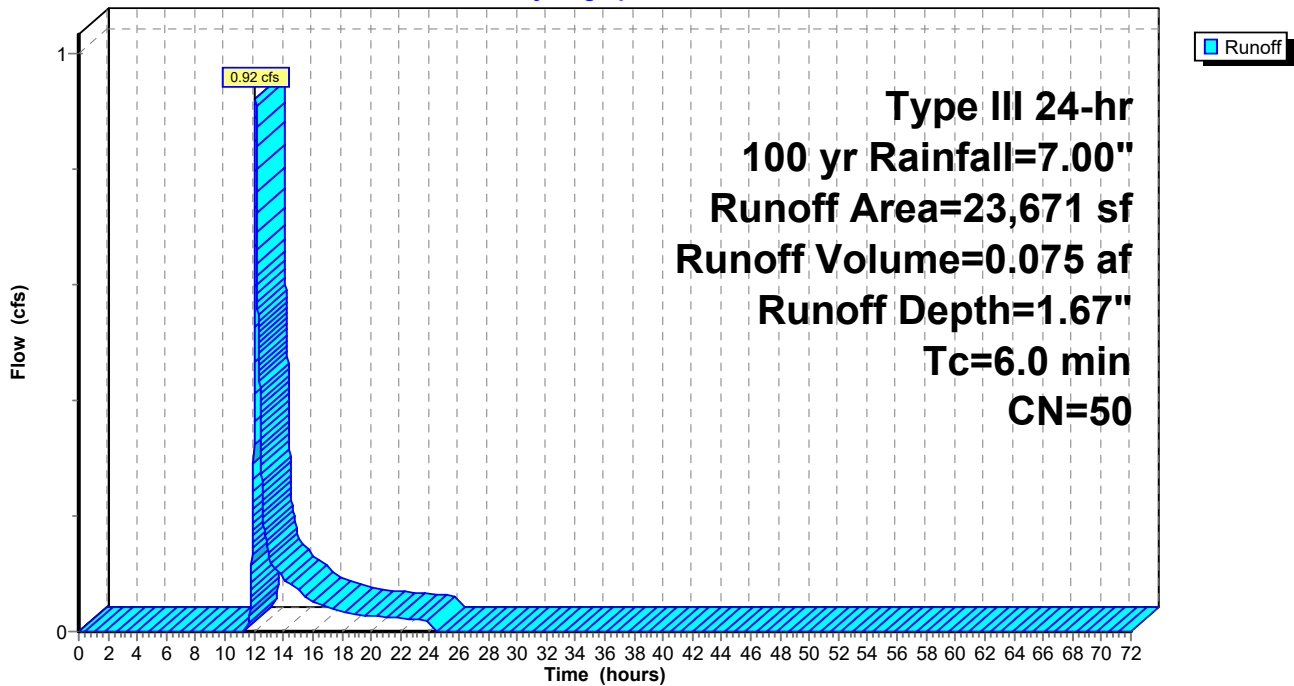
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
16,953	39	>75% Grass cover, Good, HSG A
2,352	74	>75% Grass cover, Good, HSG C
4,366	80	>75% Grass cover, Good, HSG D
23,671	50	Weighted Average
23,671		100.00% Pervious Area

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

Subcatchment P-WS-4: P-WS-4

Hydrograph



Summary for Subcatchment P-WS-5: P-WS-5

Runoff = 0.13 cfs @ 12.14 hrs, Volume= 0.020 af, Depth= 0.77"

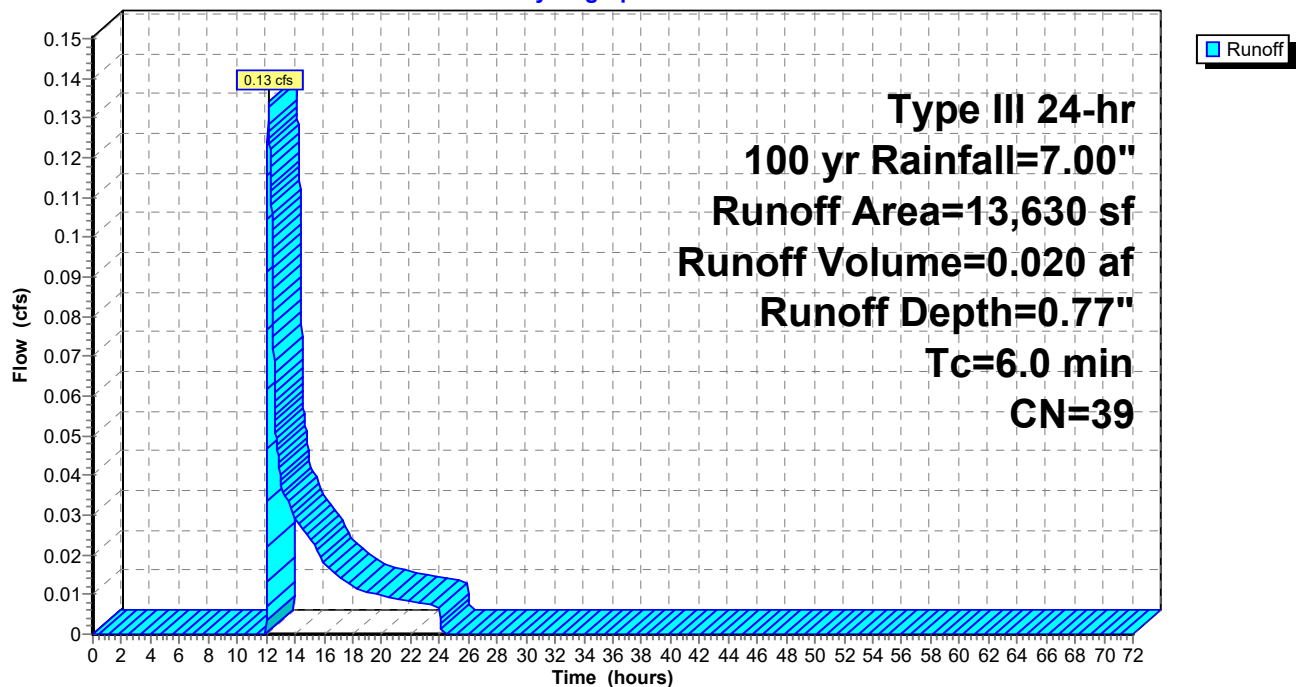
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
13,630	39	>75% Grass cover, Good, HSG A
13,630		100.00% Pervious Area

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

Subcatchment P-WS-5: P-WS-5

Hydrograph



Summary for Subcatchment P-WS-6: P-WS-6

Runoff = 8.48 cfs @ 12.09 hrs, Volume= 0.617 af, Depth= 5.14"

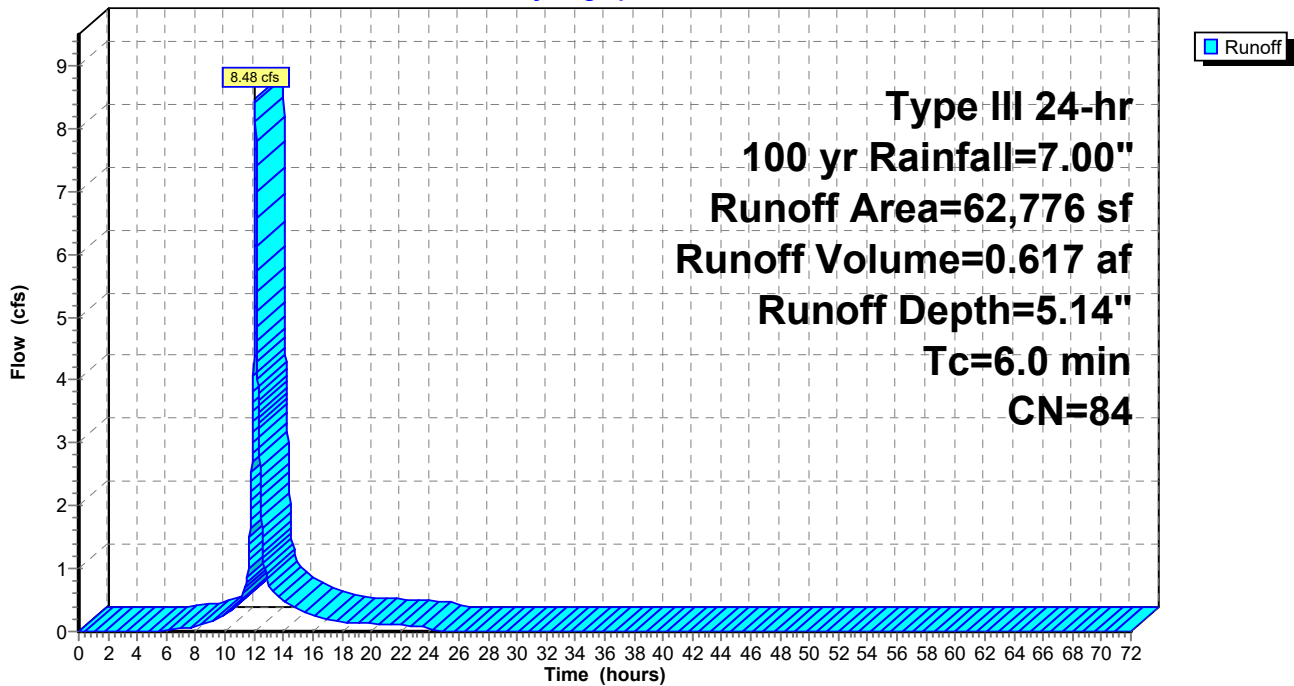
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
26,590	98	Paved parking, HSG C
36,186	74	>75% Grass cover, Good, HSG C
62,776	84	Weighted Average
36,186		57.64% Pervious Area
26,590		42.36% Impervious Area

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

Subcatchment P-WS-6: P-WS-6

Hydrograph



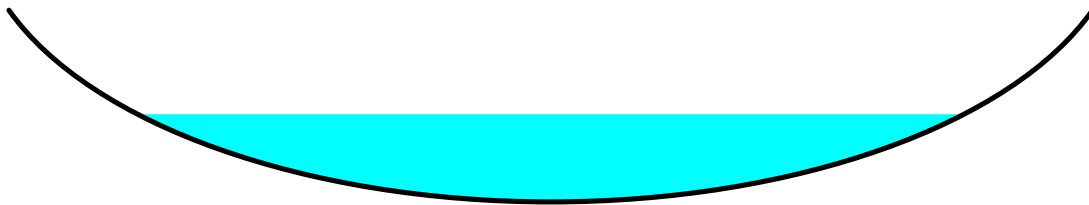
Summary for Reach 1R: East Entry Swale

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 5.71" for 100 yr event
 Inflow = 5.70 cfs @ 12.08 hrs, Volume= 0.427 af
 Outflow = 5.57 cfs @ 12.13 hrs, Volume= 0.427 af, Atten= 2%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.50 fps, Min. Travel Time= 1.5 min
 Avg. Velocity = 1.37 fps, Avg. Travel Time= 4.9 min

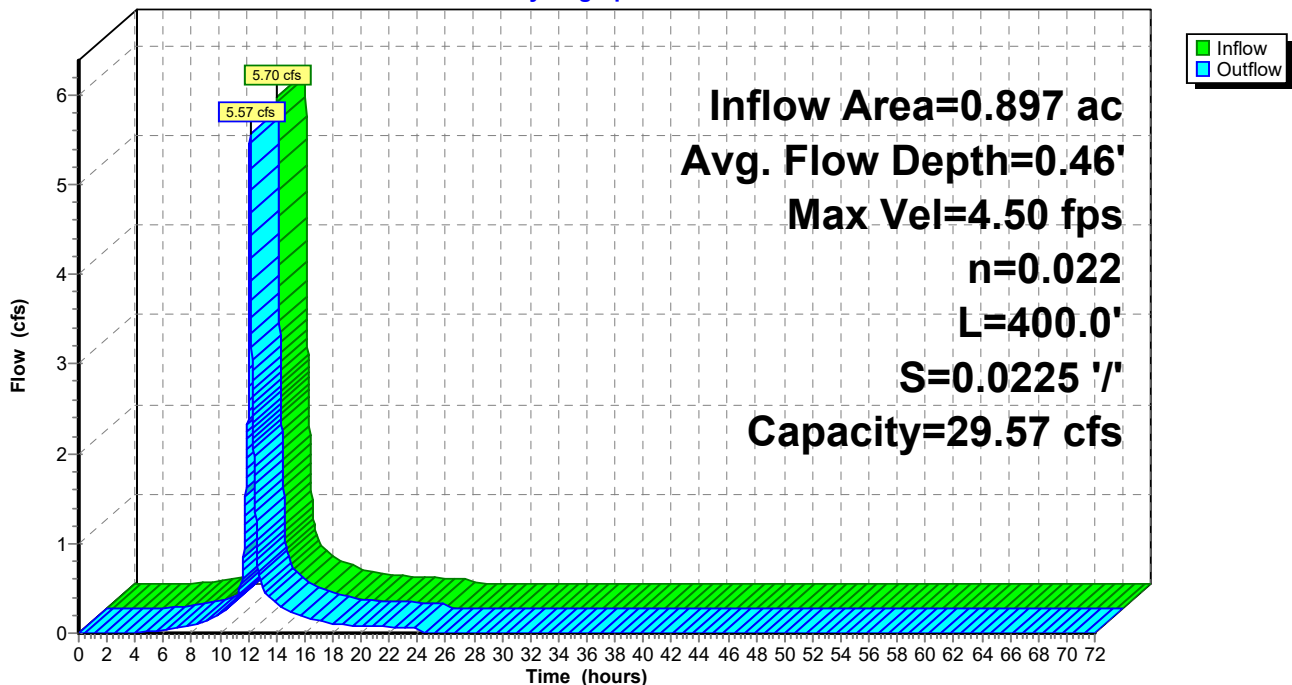
Peak Storage= 496 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.46'
 Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 29.57 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.022 Earth, clean & straight
 Length= 400.0' Slope= 0.0225 '/'
 Inlet Invert= 67.00', Outlet Invert= 58.00'



Reach 1R: East Entry Swale

Hydrograph



Summary for Pond RG-1: Rain Garden 1

Inflow Area = 0.611 ac, 100.00% Impervious, Inflow Depth = 6.76" for 100 yr event
 Inflow = 4.20 cfs @ 12.08 hrs, Volume= 0.344 af
 Outflow = 3.87 cfs @ 12.12 hrs, Volume= 0.344 af, Atten= 8%, Lag= 2.0 min
 Discarded = 0.07 cfs @ 12.12 hrs, Volume= 0.129 af
 Primary = 3.81 cfs @ 12.12 hrs, Volume= 0.215 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 59.03' @ 12.12 hrs Surf.Area= 2,813 sf Storage= 2,294 cf

Plug-Flow detention time= 119.2 min calculated for 0.344 af (100% of inflow)
 Center-of-Mass det. time= 119.2 min (862.2 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1	58.00'	5,551 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

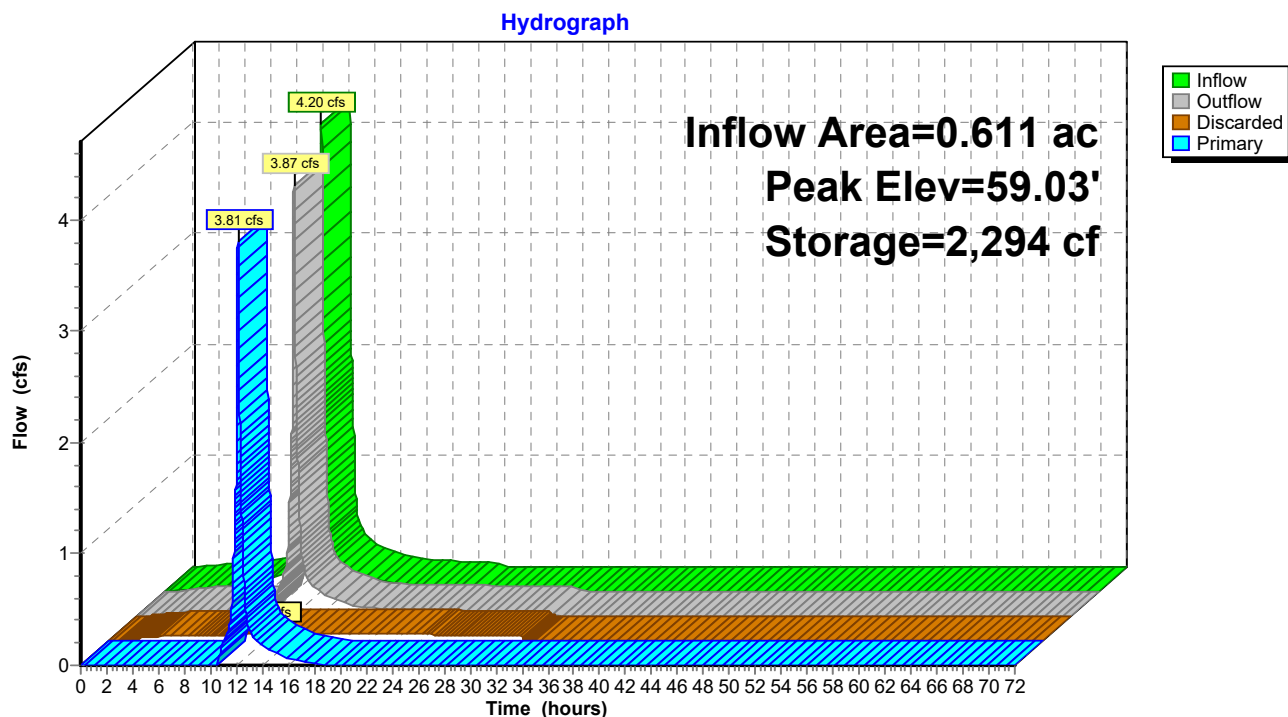
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.00	1,655	0	0
59.00	2,784	2,220	2,220
60.00	3,878	3,331	5,551

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.00'	1.020 in/hr Exfiltration over Surface area
#2	Device 3	58.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	54.00'	12.0" Round Culvert L= 400.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 54.00' / 50.00' S= 0.0100 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 12.12 hrs HW=59.03' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=3.80 cfs @ 12.12 hrs HW=59.03' (Free Discharge)
 ↑ **3=Culvert** (Passes 3.80 cfs of 5.03 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 3.80 cfs @ 1.72 fps)

Pond RG-1: Rain Garden 1



Summary for Pond RG-2: Rain Garden 2

Inflow Area = 0.897 ac, 62.88% Impervious, Inflow Depth = 5.71" for 100 yr event
 Inflow = 5.57 cfs @ 12.13 hrs, Volume= 0.427 af
 Outflow = 1.03 cfs @ 12.59 hrs, Volume= 0.427 af, Atten= 81%, Lag= 27.7 min
 Discarded = 0.05 cfs @ 12.59 hrs, Volume= 0.071 af
 Primary = 0.98 cfs @ 12.59 hrs, Volume= 0.356 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 56.49' @ 12.59 hrs Surf.Area= 3,938 sf Storage= 6,496 cf

Plug-Flow detention time= 131.1 min calculated for 0.427 af (100% of inflow)
 Center-of-Mass det. time= 131.1 min (918.9 - 787.8)

Volume	Invert	Avail.Storage	Storage Description
#1	54.00'	6,519 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

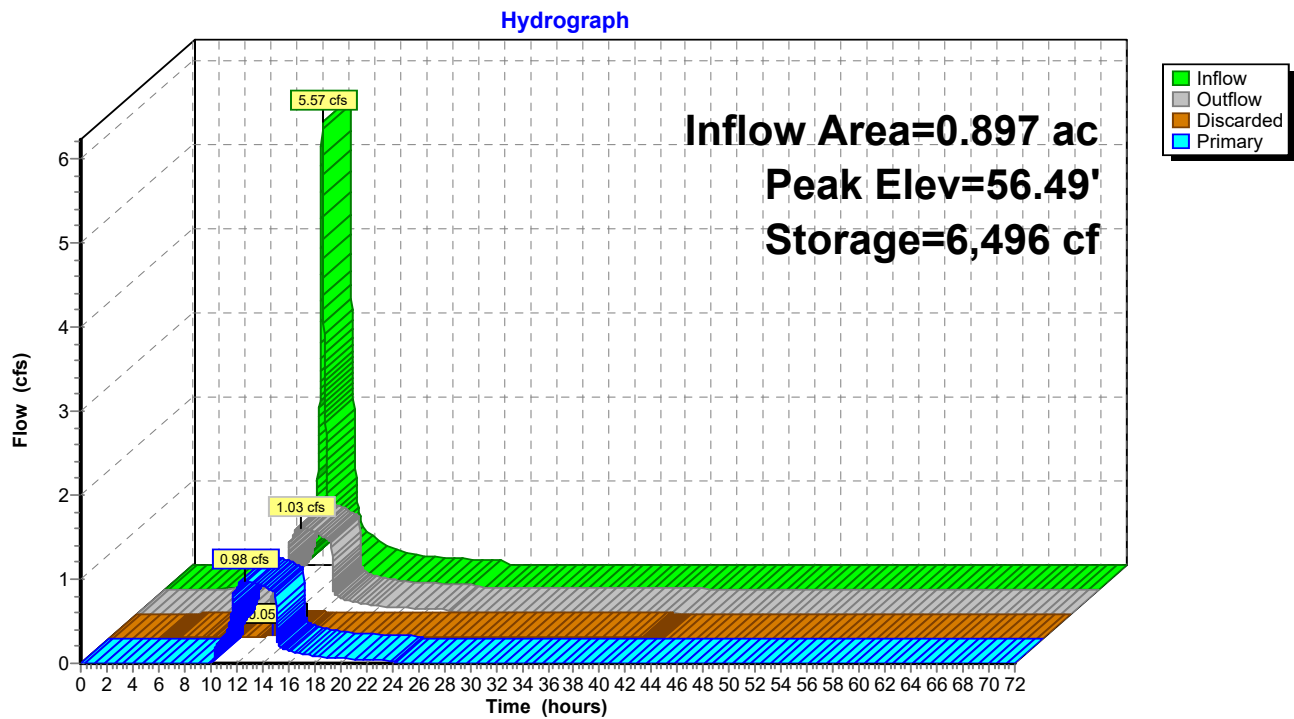
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
54.00	1,365	0	0
55.00	2,311	1,838	1,838
56.00	3,385	2,848	4,686
56.50	3,945	1,833	6,519

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	54.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	51.75'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.75' / 50.00' S= 0.0088 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 12.59 hrs HW=56.49' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.98 cfs @ 12.59 hrs HW=56.49' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 0.98 cfs @ 5.01 fps)
 ↑ **2=Orifice/Grate** (Passes 0.98 cfs of 25.44 cfs potential flow)

Pond RG-2: Rain Garden 2



Summary for Pond RG-3: Rain Garden 3

Inflow Area = 0.813 ac, 82.06% Impervious, Inflow Depth = 6.29" for 100 yr event
 Inflow = 5.45 cfs @ 12.08 hrs, Volume= 0.426 af
 Outflow = 1.38 cfs @ 12.45 hrs, Volume= 0.426 af, Atten= 75%, Lag= 22.0 min
 Discarded = 0.03 cfs @ 12.45 hrs, Volume= 0.041 af
 Primary = 1.35 cfs @ 12.45 hrs, Volume= 0.385 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 61.76' @ 12.45 hrs Surf.Area= 2,723 sf Storage= 4,476 cf

Plug-Flow detention time= 71.8 min calculated for 0.426 af (100% of inflow)
 Center-of-Mass det. time= 72.0 min (836.5 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1	59.00'	5,155 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

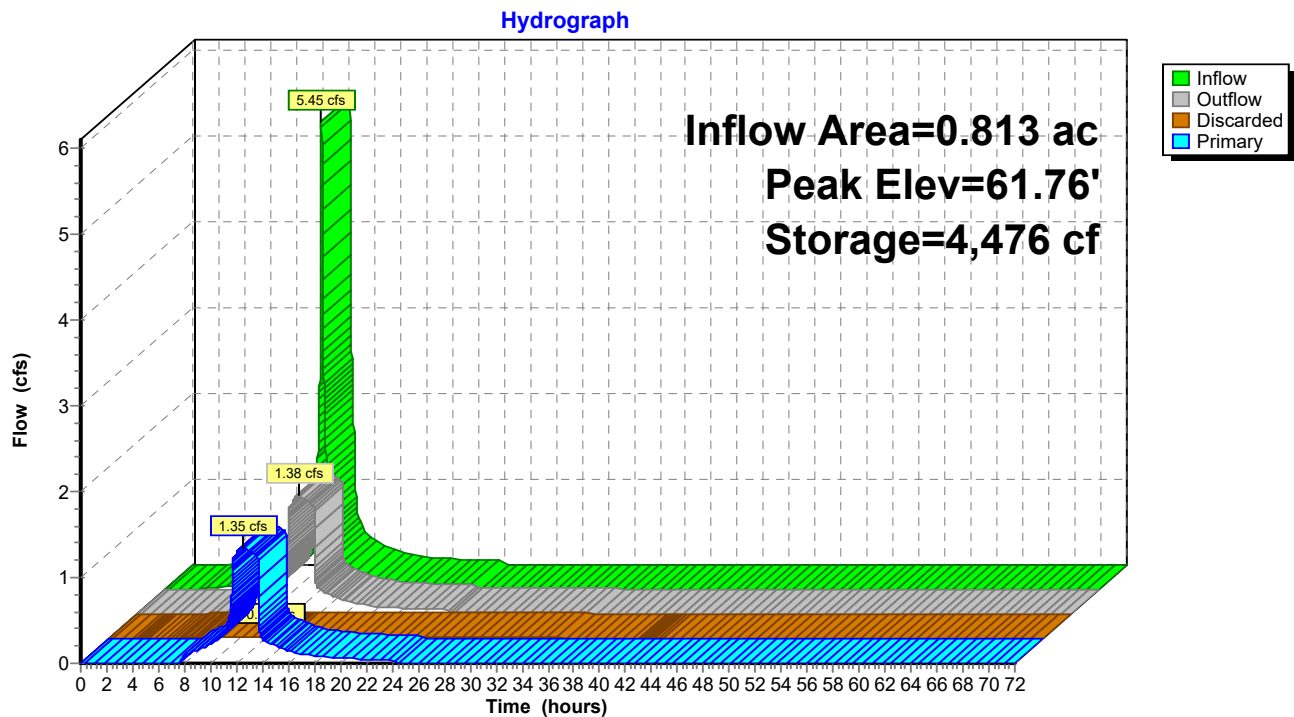
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.00	660	0	0
60.00	1,309	985	985
61.00	2,048	1,679	2,663
62.00	2,936	2,492	5,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.00'	0.520 in/hr Exfiltration over Surface area
#2	Device 3	59.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	53.50'	6.0" Round Culvert L= 200.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.50' / 50.00' S= 0.0175 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.20 sf

Discarded OutFlow Max=0.03 cfs @ 12.45 hrs HW=61.76' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.35 cfs @ 12.45 hrs HW=61.76' (Free Discharge)
 ↑ **3=Culvert** (Barrel Controls 1.35 cfs @ 6.87 fps)
 ↑ **2=Orifice/Grate** (Passes 1.35 cfs of 27.31 cfs potential flow)

Pond RG-3: Rain Garden 3



Summary for Pond UGS-1: MC-4500

Inflow Area = 5.218 ac, 72.76% Impervious, Inflow Depth = 5.82" for 100 yr event
 Inflow = 33.60 cfs @ 12.08 hrs, Volume= 2.532 af
 Outflow = 32.60 cfs @ 12.10 hrs, Volume= 2.532 af, Atten= 3%, Lag= 1.2 min
 Discarded = 0.26 cfs @ 6.65 hrs, Volume= 0.685 af
 Primary = 32.34 cfs @ 12.10 hrs, Volume= 1.847 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 53.24' @ 12.10 hrs Surf.Area= 4,732 sf Storage= 19,263 cf

Plug-Flow detention time= 142.1 min calculated for 2.532 af (100% of inflow)
 Center-of-Mass det. time= 142.2 min (922.1 - 779.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.00'	8,279 cf	92.08'W x 51.39'L x 7.00'H Field A 33,126 cf Overall - 12,428 cf Embedded = 20,698 cf x 40.0% Voids
#2A	48.00'	12,428 cf	ADS_StormTech MC-4500 +Cap x 110 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 110 Chambers in 10 Rows Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf
		20,707 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.00'	2.400 in/hr Exfiltration over Surface area
#2	Primary	47.00'	24.0" Round Culvert L= 140.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 47.00' / 46.00' S= 0.0071 ' S= 0.0071 ' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	50.50'	12.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 2	52.00'	5.0' long x 5.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 5.0' Crest Height

Discarded OutFlow Max=0.26 cfs @ 6.65 hrs HW=47.10' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=32.61 cfs @ 12.10 hrs HW=53.23' (Free Discharge)

↑ **2=Culvert** (Passes 32.61 cfs of 33.38 cfs potential flow)

↑ **3=Orifice/Grate** (Orifice Controls 10.63 cfs @ 6.77 fps)

↑ **4=Sharp-Crested Rectangular Weir** (Weir Controls 21.97 cfs @ 3.74 fps)

Pond UGS-1: MC-4500 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)

Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf

Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap

Cap Storage= +35.7 cf x 2 x 10 rows = 714.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39'
Base Length

10 Rows x 100.0" Wide + 9.0" Spacing x 9 + 12.0" Side Stone x 2 = 92.08' Base Width

12.0" Base + 60.0" Chamber Height + 12.0" Cover = 7.00' Field Height

110 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 10 Rows = 12,427.9 cf Chamber Storage

33,126.2 cf Field - 12,427.9 cf Chambers = 20,698.3 cf Stone x 40.0% Voids = 8,279.3 cf Stone Storage

Chamber Storage + Stone Storage = 20,707.3 cf = 0.475 af

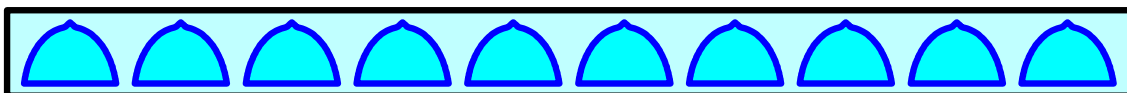
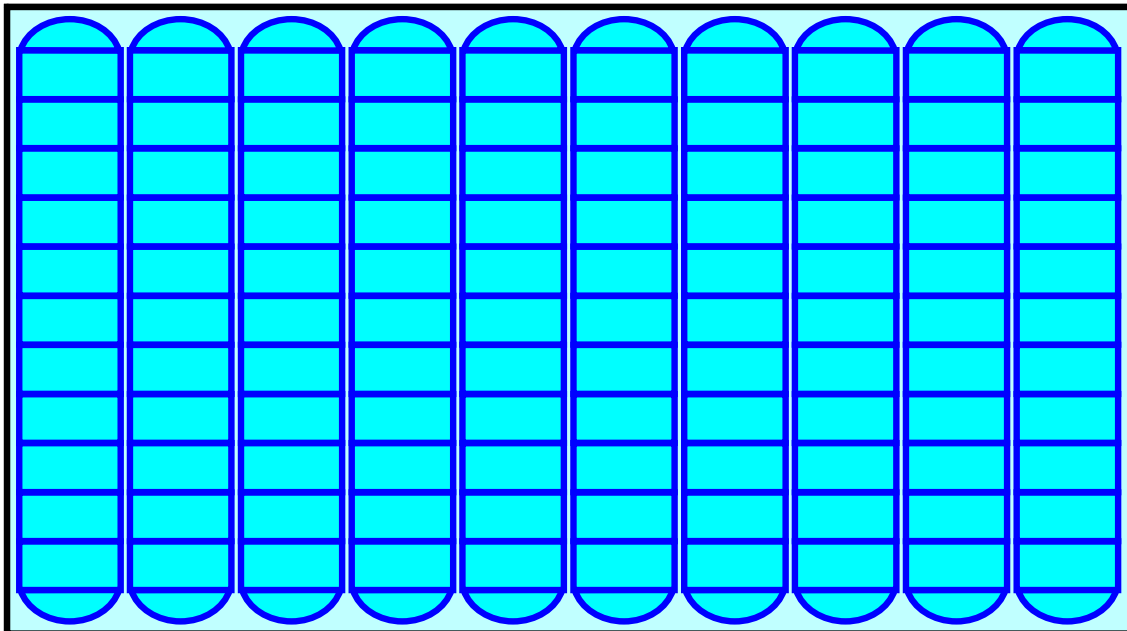
Overall Storage Efficiency = 62.5%

Overall System Size = 51.39' x 92.08' x 7.00'

110 Chambers

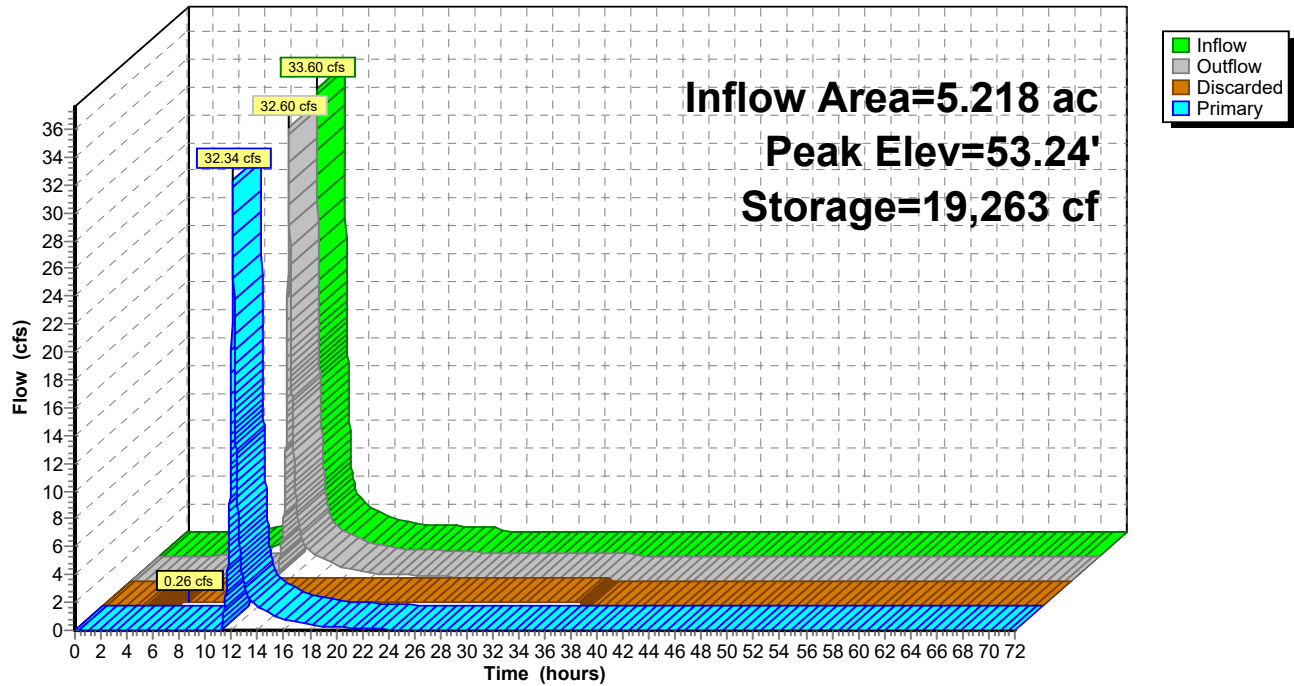
1,226.9 cy Field

766.6 cy Stone



Pond UGS-1: MC-4500

Hydrograph



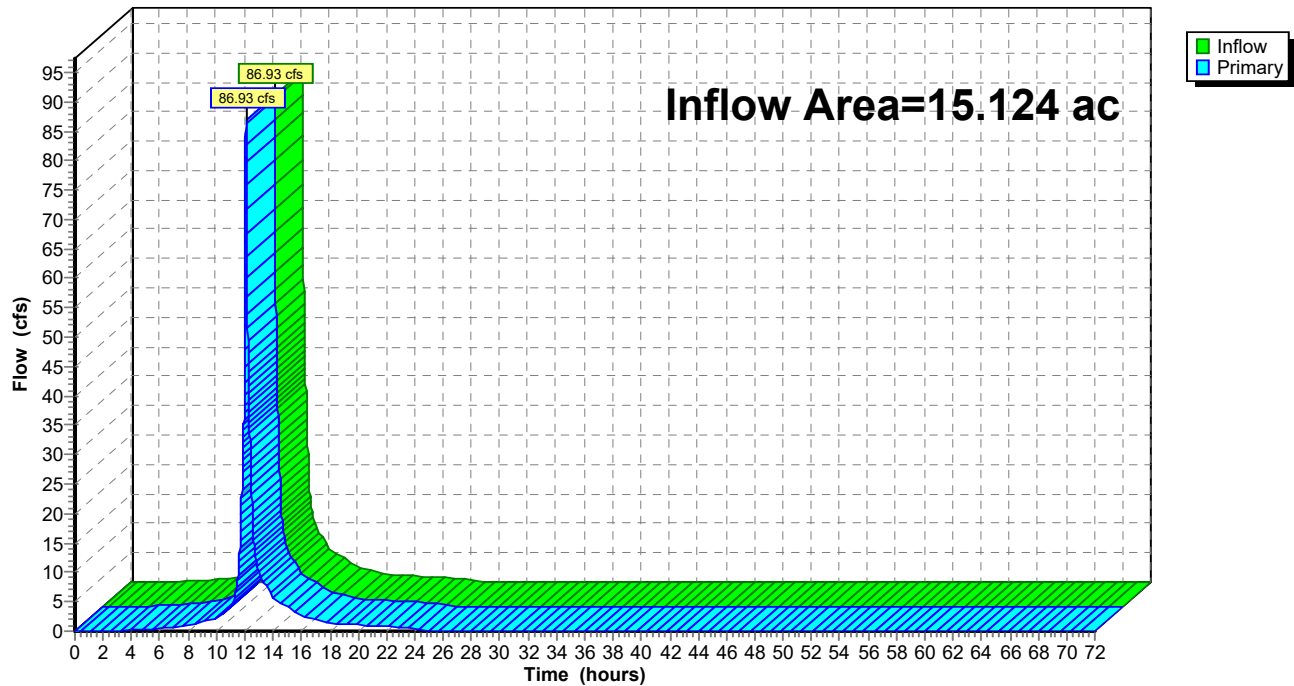
Summary for Link POA-1: POA-1

Inflow Area = 15.124 ac, 74.99% Impervious, Inflow Depth = 5.23" for 100 yr event
Inflow = 86.93 cfs @ 12.09 hrs, Volume= 6.597 af
Primary = 86.93 cfs @ 12.09 hrs, Volume= 6.597 af, Atten= 0%, Lag= 0.0 min

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

Link POA-1: POA-1

Hydrograph



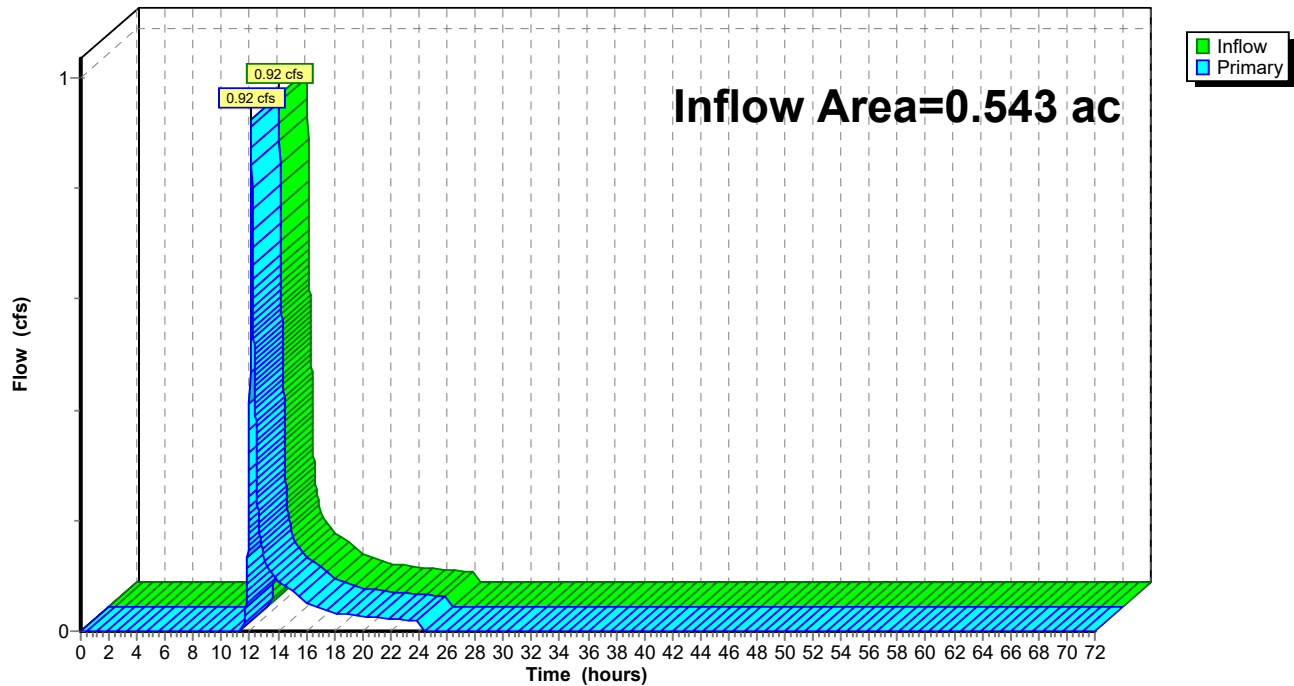
Summary for Link POA-2: POA-2

Inflow Area = 0.543 ac, 0.00% Impervious, Inflow Depth = 1.67" for 100 yr event
Inflow = 0.92 cfs @ 12.10 hrs, Volume= 0.075 af
Primary = 0.92 cfs @ 12.10 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

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

Link POA-2: POA-2

Hydrograph



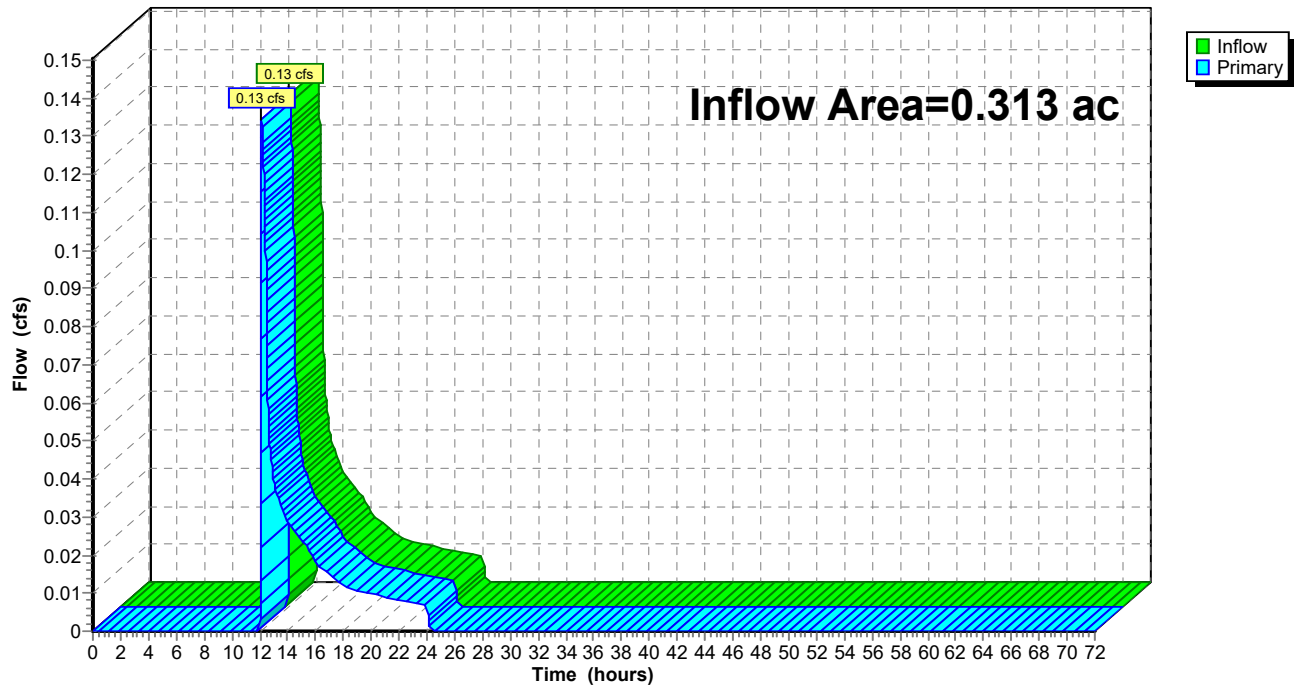
Summary for Link POA-3: POA-3

Inflow Area = 0.313 ac, 0.00% Impervious, Inflow Depth = 0.77" for 100 yr event
Inflow = 0.13 cfs @ 12.14 hrs, Volume= 0.020 af
Primary = 0.13 cfs @ 12.14 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

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

Link POA-3: POA-3

Hydrograph



APPENDIX 4:
Soils report

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts



Map Scale: 1:4,170 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 200 400 800 1200 Feet

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




**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

10/17/2019
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points





 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
 Survey Area Data: Version 15, Sep 12, 2019

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

Date(s) aerial images were photographed: Aug 10, 2014—Aug 25, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10	Scarboro and Birdsall soils, 0 to 3 percent slopes	A/D	0.7	1.0%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	D	6.2	8.6%
105D	Rock outcrop-Hollis complex, 3 to 25 percent slopes		1.2	1.7%
245C	Hinckley loamy sand, 8 to 15 percent slopes	A	3.0	4.1%
255C	Windsor loamy sand, 8 to 15 percent slopes	A	3.4	4.8%
602	Urban land, 0 to 15 percent slopes		10.6	14.7%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	40.9	56.7%
653	Udorthents, sandy	A	1.7	2.4%
654	Udorthents, loamy	A	4.4	6.1%
Totals for Area of Interest			72.2	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

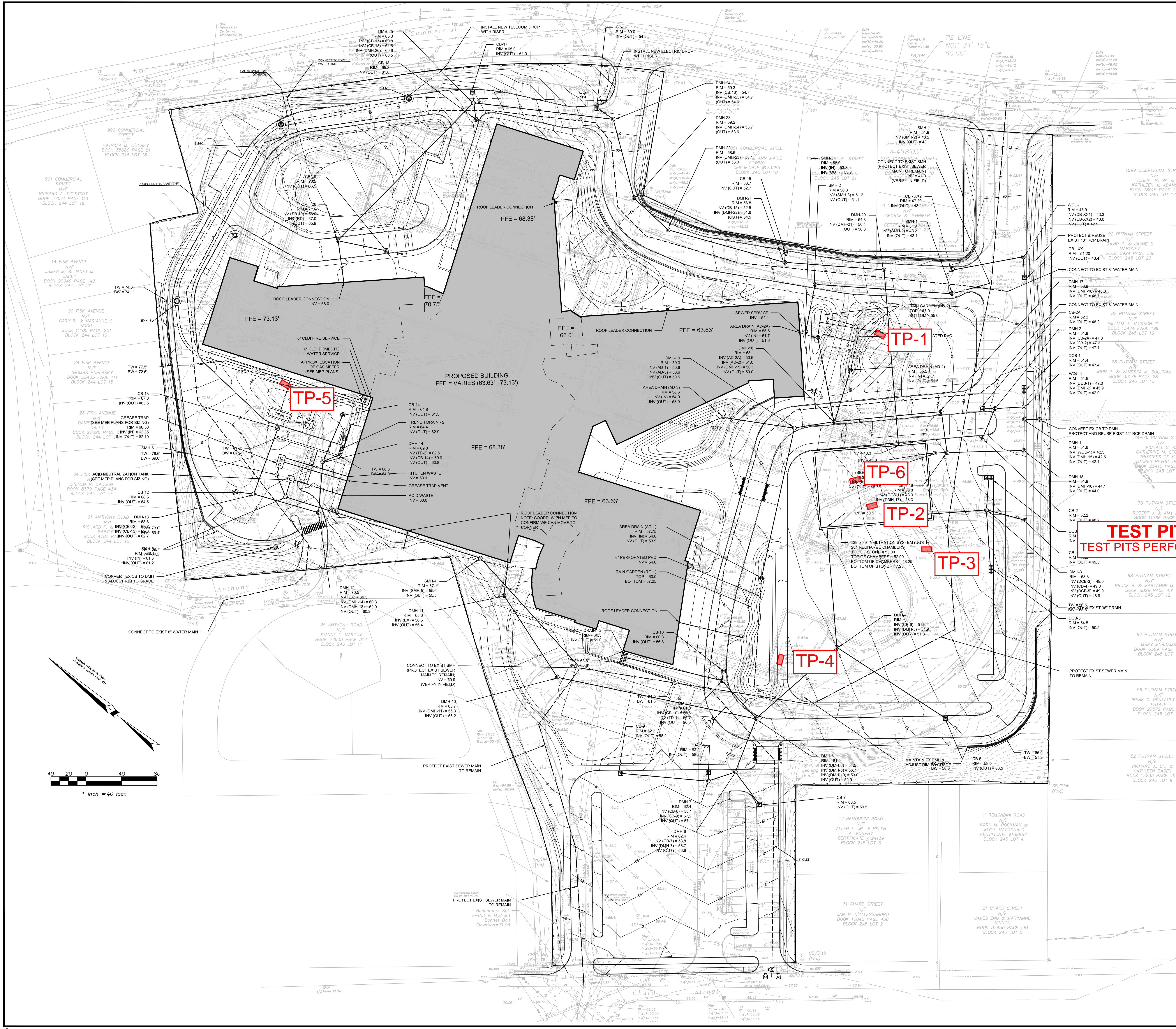
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



LEGEND:

- D — PROPOSED STORM DRAINAGE LINE
- RD — PROPOSED ROOF DRAIN LINE
- UD — PROPOSED UNDERDRAIN LINE
- W — PROPOSED WATER LINE
- FP — PROPOSED FIRE PROTECTION LINE
- SS — PROPOSED SANITARY SEWER LINE
- FM — PROPOSED FORCE MAIN
- KW — PROPOSED KITCHEN WASTE LINE
- SW — PROPOSED SEWAGE WASTE LINE
- GS — PROPOSED GAS LINE (BY OTHERS)
- E — PROPOSED UNDERGROUND ELECTRIC LINE
- OH — PROPOSED OVERHEAD ELECTRIC LINE
- T — PROPOSED TELEPHONE LINE
- SMH — PROPOSED SANITARY SEWER MANHOLE
- DMH — PROPOSED STORM DRAINAGE MANHOLE
- CB — PROPOSED CATCH BASIN
- DCB — PROPOSED DOUBLE CATCH BASIN
- OS — PROPOSED DOWNSPOUT (DISCHARGE AT GRADE)
- OD — PROPOSED PROPOSED ROOF LEADER
- OC — PROPOSED CLEANOUT
- OV — PROPOSED OVERHEAD VALVE
- OW — PROPOSED WATER GATE VALVE
- OP — PROPOSED CORPORATION STOP
- UP — PROPOSED UTILITY POLE (SEE ELECTRICAL DWGS)

KEYPLAN

TEST PIT LOCATIONS
TEST PITS PERFORMED ON AUG. 29, 2019

TP-1
TP-2
TP-3
TP-4
TP-5
TP-6

DESIGN DEVELOPMENT
08/30/2019

UTILITY PLAN

SCALE: 1"=40'

PROJECT: Maria Weston Chapman Middle School
Weymouth, MA

CHECKED BY: SRG

DRAWN BY: MLZ

DATE: 08/30/2019

PROJECT NUMBER: C-4.1

PROJECT NUMBER: 424117



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name

1051 Commercial Street

Street Address

Weymouth

City

MA

State

Map/Lot #

02189

Zip Code

B. Site Information

1. (Check one) ☐ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes:

USDA
Source

602
Soil Map Unit

Urban land

Soil Name

Soil Limitations

Excavated and filled

Soil Parent material

Excavated and filled land

Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No

If yes:

2018

Year Published/Source

Stone/Cohen

Map Unit

Coarse deposits - Consists of gravel deposits and sand deposits.

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No

If yes, MassGIS Wetland Data Layer:

N/A

Wetland Type

7. Current Water Resource Conditions (USGS):

08.20.19

Month/Day/ Year

Range: ☒ Above Normal

☐ Normal

☐ Below Normal

8. Other references reviewed:



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP#1 08.29.19 10:00 Sunny 70's
Hole # Date Time Weather Latitude Longitude:
1. Land Use School yard Grass None 2%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)
Description of Location: _____

2. Soil Parent Material: Coarse deposits Excavated/filled land BS
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 20+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth Weeping from Pit 120" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	Loamy Sand	10YR 3/2						Granular	Friable	
8-36	Fill										
36-72	C1	Sand	2.5Y 5/4				10%	5%	Massive	Friable	
72-120"	C2	Sandy Loam	2.5Y 5/2	96"	10YR 5/8	10%	2%	2%	Massive	Friable	

Additional Notes:

NRCS Hydrologic Soil Group B: , ESHGW=42.00



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 08.29.19 11:00 Sunny 70's _____
Hole # Date Time Weather Latitude Longitude:

1. Land Use: School yard Grass None 2%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)
10' from driveway

Description of Location: _____

2. Soil Parent Material: Thin Till Excavated/filled land BS
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 20+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable
Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: --- Depth Weeping from Pit --- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	Loamy Sand	10YR 3/2						Granular	Friable	
8-48	Fill										
48-120	C1	Sand	2.5Y 5/3	120"	10YR 5/8	5%	5%	10%	Massive	Friable	

Additional Notes:

NRCS Hydrologic Soil Group A: , ESHGW=42.00



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

Obs. Hole # TP#1

_____ inches

Obs. Hole # TP#2

_____ inches

☐ Depth weeping from side of observation hole

_____ inches

_____ inches

☒ Depth to soil redoximorphic features (mottles)

96" inches

120" inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: Varies inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?

Upper boundary:

Varies
inches

Lower boundary:

Varies
inches

c. If no, at what depth was impervious material observed?

Upper boundary:

inches

Lower boundary:

inches



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

David Scharlacken

Signature of Soil Evaluator

David Scharlacken/SE14279

Typed or Printed Name of Soil Evaluator / License #

10-15-19

Date

12/1/2021

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name

1051 Commercial Street

Street Address

Weymouth

City

MA

State

Map/Lot #

02189

Zip Code

B. Site Information

1. (Check one) ☐ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes:

USDA
Source

602
Soil Map Unit

Urban land

Soil Name

Soil Limitations

Excavated and filled

Soil Parent material

Excavated and filled land

Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No

If yes: 2018

Year Published/Source

Stone/Cohen

Map Unit

Coarse deposits - Consists of gravel deposits and sand deposits. / Thin till- Nonsorted matrix of sand, some silt, and little clay with scattered pebble, cobble.

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No

If yes, MassGIS Wetland Data Layer:

N/A

Wetland Type

7. Current Water Resource Conditions (USGS):

08.20.19

Month/Day/ Year

Range: ☒ Above Normal

☐ Normal

☐ Below Normal

8. Other references reviewed:



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP#3 08.29.19 12:00 Sunny 70's
Hole # Date Time Weather Latitude Longitude:

1. Land Use School yard Grass None
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)

Description of Location: _____

2. Soil Parent Material: Thin Till Excavated/filled land
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 20+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☒ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	Loamy Sand	10YR 3/2						Granular	Friable	
8-36	Fill										
36-48	Ab	Loamy Sand	10YR 3/1						Granular	Friable	
48-60	C1	Loamy Sand	2.5Y 5/4				5%	15%	Massive	Friable	
60+	Cr	Bedrock									

Additional Notes:

NRCS Hydrologic Soil Group N/A: , ESHGW=N/A



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-4 08.29.19 1:00 Sunny 70's
Hole # Date Time Weather Latitude Longitude:

1. Land Use: School yard Grass None 2%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)
Description of Location: 10' from building

2. Soil Parent Material: Thin Till Excavated/filled land SH
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 20+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable
Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	Loamy Sand	10YR 3/2						Granular	Friable	
8-48	Fill										
48-108	C1	Sand	2.5Y 5/4				10%	5%	Massive	Friable	
108-120	C2	Sand	2.5Y 5/2	120"	10YR 5/8	2%	10%	5%	Massive	Friable	

Additional Notes:

NRCS Hydrologic Soil Group A: ESHGW=45.00



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

Obs. Hole # TP#3

_____ inches

Obs. Hole # TP#4

_____ inches

☐ Depth weeping from side of observation hole

_____ inches

_____ inches

☒ Depth to soil redoximorphic features (mottles)

_____ inches

120" inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 120" inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?

Upper boundary:

Varies
inches

Lower boundary:

Varies
inches

c. If no, at what depth was impervious material observed?

Upper boundary:

inches

Lower boundary:

inches



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

David Scharlacken

Signature of Soil Evaluator

David Scharlacken/SE14279

Typed or Printed Name of Soil Evaluator / License #

10-15-19

Date

12/1/2021

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name

1051 Commercial Street

Street Address

Weymouth

City

MA

State

Map/Lot #

02189

Zip Code

B. Site Information

1. (Check one) ☐ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes:

USDA
Source

602
Soil Map Unit

Urban land

Soil Name

Soil Limitations

Excavated and filled

Soil Parent material

Excavated and filled land

Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No

If yes: 2018
Year Published/Source

Stone/Cohen
Map Unit

Thin till- Nonsorted matrix of sand, some silt, and little clay with scattered pebble, cobble.

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No

If yes, MassGIS Wetland Data Layer: N/A
Wetland Type

7. Current Water Resource Conditions (USGS): 08.20.19
Month/Day/ Year Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP#5 08.29.19 Sunny 70's
Hole # Date Time Weather Latitude Longitude:
1. Land Use School yard Grass None
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)
Description of Location: _____
2. Soil Parent Material: Thin Till Excavated/filled land SH
Landform Position on Landscape (SU, SH, BS, FS, TS)
3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 20+ feet Drinking Water Well 100+ feet Other _____ feet
4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock
5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	HTM	Asphalt									
4-36	Fill										
36-72	C1	Silt Loam	2.5Y 5/4				10%	5%	Massive	Friable	
72-120	C2	Sand	2.5Y 5/4				2%	2%	Massive	Friable	

Additional Notes:

NRCS Hydrologic Soil Group A: ESHGW=N/A



Commonwealth of Massachusetts
City/Town of Braintree

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP#6 08/29/19 8:00 Sunny 70's
Hole # Date Time Weather Latitude Longitude:

1. Land Use: School yard Grass N/A 2%
(e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)
Description of Location: 10' from driveway to the North

2. Soil Parent Material: Thin till Excavated and filled land SH
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 20+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable
Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Ap	Loamy Sand	10YR 3/2						Granular	Friable	
8-60	Fill										
60-120	C1	Sand	2.5Y 5/4				2%		Massive	Friable	

Additional Notes:

NRCS Hydrologic Soil Group A; ESHGW= N/A



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D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

Obs. Hole # TP#5

_____ inches

Obs. Hole # TP#6

_____ inches

☐ Depth weeping from side of observation hole

_____ inches

_____ inches

☐ Depth to soil redoximorphic features (mottles)

_____ inches

_____ inches

☐ Depth to adjusted seasonal high groundwater (S_h)
(USGS methodology)

_____ inches

_____ inches

Index Well Number _____

Reading Date _____

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: N/A inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?

Upper boundary:

Varies
inches

Lower boundary:

Varies
inches

c. If no, at what depth was impervious material observed?

Upper boundary:

inches

Lower boundary:

inches



Commonwealth of Massachusetts
City/Town of Braintree

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F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

David Scharlacken

Signature of Soil Evaluator

David Scharlacken/SE14279

Typed or Printed Name of Soil Evaluator / License #

10-15-19

Date

12/1/2021

Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

APPENDIX 5:
Calculations

Stage-Area-Storage for Pond RG-1: Rain Garden 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
58.00	1,655	0	59.04	2,828	2,332
58.02	1,678	33	59.06	2,850	2,389
58.04	1,700	67	59.08	2,872	2,446
58.06	1,723	101	59.10	2,893	2,503
58.08	1,745	136	59.12	2,915	2,561
58.10	1,768	171	59.14	2,937	2,620
58.12	1,790	207	59.16	2,959	2,679
58.14	1,813	243	59.18	2,981	2,738
58.16	1,836	279	59.20	3,003	2,798
58.18	1,858	316	59.22	3,025	2,858
58.20	1,881	354	59.24	3,047	2,919
58.22	1,903	391	59.26	3,068	2,980
58.24	1,926	430	59.28	3,090	3,042
58.26	1,949	468	59.30	3,112	3,104
58.28	1,971	508	59.32	3,134	3,166
58.30	1,994	547	59.34	3,156	3,229
58.32	2,016	587	59.36	3,178	3,293
58.34	2,039	628	59.38	3,200	3,356
58.36	2,061	669	59.40	3,222	3,421
58.38	2,084	710	59.42	3,243	3,485
58.40	2,107	752	59.44	3,265	3,550
58.42	2,129	795	59.46	3,287	3,616
58.44	2,152	837	59.48	3,309	3,682
58.46	2,174	881	59.50	3,331	3,748
58.48	2,197	924	59.52	3,353	3,815
58.50	2,220	969	59.54	3,375	3,882
58.52	2,242	1,013	59.56	3,397	3,950
58.54	2,265	1,058	59.58	3,419	4,018
58.56	2,287	1,104	59.60	3,440	4,087
58.58	2,310	1,150	59.62	3,462	4,156
58.60	2,332	1,196	59.64	3,484	4,225
58.62	2,355	1,243	59.66	3,506	4,295
58.64	2,378	1,290	59.68	3,528	4,366
58.66	2,400	1,338	59.70	3,550	4,436
58.68	2,423	1,386	59.72	3,572	4,508
58.70	2,445	1,435	59.74	3,594	4,579
58.72	2,468	1,484	59.76	3,615	4,651
58.74	2,490	1,534	59.78	3,637	4,724
58.76	2,513	1,584	59.80	3,659	4,797
58.78	2,536	1,634	59.82	3,681	4,870
58.80	2,558	1,685	59.84	3,703	4,944
58.82	2,581	1,737	59.86	3,725	5,018
58.84	2,603	1,789	59.88	3,747	5,093
58.86	2,626	1,841	59.90	3,769	5,168
58.88	2,649	1,894	59.92	3,790	5,244
58.90	2,671	1,947	59.94	3,812	5,320
58.92	2,694	2,000	59.96	3,834	5,396
58.94	2,716	2,054	59.98	3,856	5,473
58.96	2,739	2,109	60.00	3,878	5,551
58.98	2,761	2,164			
59.00	2,784	2,220			
59.02	2,806	2,275			

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Stage-Area-Storage for Pond RG-2: Rain Garden 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
54.00	1,365	0
54.05	1,412	69
54.10	1,460	141
54.15	1,507	215
54.20	1,554	292
54.25	1,602	371
54.30	1,649	452
54.35	1,696	536
54.40	1,743	622
54.45	1,791	710
54.50	1,838	801
54.55	1,885	894
54.60	1,933	989
54.65	1,980	1,087
54.70	2,027	1,187
54.75	2,075	1,290
54.80	2,122	1,395
54.85	2,169	1,502
54.90	2,216	1,612
54.95	2,264	1,724
55.00	2,311	1,838
55.05	2,365	1,955
55.10	2,418	2,074
55.15	2,472	2,197
55.20	2,526	2,322
55.25	2,580	2,449
55.30	2,633	2,580
55.35	2,687	2,713
55.40	2,741	2,848
55.45	2,794	2,987
55.50	2,848	3,128
55.55	2,902	3,271
55.60	2,955	3,418
55.65	3,009	3,567
55.70	3,063	3,719
55.75	3,117	3,873
55.80	3,170	4,030
55.85	3,224	4,190
55.90	3,278	4,353
55.95	3,331	4,518
56.00	3,385	4,686
56.05	3,441	4,857
56.10	3,497	5,030
56.15	3,553	5,206
56.20	3,609	5,385
56.25	3,665	5,567
56.30	3,721	5,752
56.35	3,777	5,939
56.40	3,833	6,130
56.45	3,889	6,323
56.50	3,945	6,519

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Stage-Area-Storage for Pond RG-3: Rain Garden 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
59.00	660	0	61.60	2,581	4,052
59.05	692	34	61.65	2,625	4,182
59.10	725	69	61.70	2,670	4,314
59.15	757	106	61.75	2,714	4,449
59.20	790	145	61.80	2,758	4,586
59.25	822	185	61.85	2,803	4,725
59.30	855	227	61.90	2,847	4,866
59.35	887	271	61.95	2,892	5,009
59.40	920	316	62.00	2,936	5,155
59.45	952	363			
59.50	985	411			
59.55	1,017	461			
59.60	1,049	513			
59.65	1,082	566			
59.70	1,114	621			
59.75	1,147	678			
59.80	1,179	736			
59.85	1,212	795			
59.90	1,244	857			
59.95	1,277	920			
60.00	1,309	985			
60.05	1,346	1,051			
60.10	1,383	1,119			
60.15	1,420	1,189			
60.20	1,457	1,261			
60.25	1,494	1,335			
60.30	1,531	1,410			
60.35	1,568	1,488			
60.40	1,605	1,567			
60.45	1,642	1,648			
60.50	1,679	1,731			
60.55	1,715	1,816			
60.60	1,752	1,903			
60.65	1,789	1,991			
60.70	1,826	2,082			
60.75	1,863	2,174			
60.80	1,900	2,268			
60.85	1,937	2,364			
60.90	1,974	2,462			
60.95	2,011	2,562			
61.00	2,048	2,663			
61.05	2,092	2,767			
61.10	2,137	2,872			
61.15	2,181	2,980			
61.20	2,226	3,090			
61.25	2,270	3,203			
61.30	2,314	3,317			
61.35	2,359	3,434			
61.40	2,403	3,553			
61.45	2,448	3,675			
61.50	2,492	3,798			
61.55	2,536	3,924			

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Stage-Area-Storage for Pond UGS-1: MC-4500

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
47.00	4,732	0	52.20	4,732	17,004
47.10	4,732	189	52.30	4,732	17,274
47.20	4,732	379	52.40	4,732	17,533
47.30	4,732	568	52.50	4,732	17,778
47.40	4,732	757	52.60	4,732	18,004
47.50	4,732	946	52.70	4,732	18,216
47.60	4,732	1,136	52.80	4,732	18,421
47.70	4,732	1,325	52.90	4,732	18,621
47.80	4,732	1,514	53.00	4,732	18,814
47.90	4,732	1,704	53.10	4,732	19,004
48.00	4,732	1,893	53.20	4,732	19,193
48.10	4,732	2,294	53.30	4,732	19,382
48.20	4,732	2,695	53.40	4,732	19,571
48.30	4,732	3,094	53.50	4,732	19,761
48.40	4,732	3,493	53.60	4,732	19,950
48.50	4,732	3,891	53.70	4,732	20,139
48.60	4,732	4,287	53.80	4,732	20,329
48.70	4,732	4,683	53.90	4,732	20,518
48.80	4,732	5,077	54.00	4,732	20,707
48.90	4,732	5,469	54.10	4,732	20,707
49.00	4,732	5,861	54.20	4,732	20,707
49.10	4,732	6,251	54.30	4,732	20,707
49.20	4,732	6,640	54.40	4,732	20,707
49.30	4,732	7,026	54.50	4,732	20,707
49.40	4,732	7,411	54.60	4,732	20,707
49.50	4,732	7,795	54.70	4,732	20,707
49.60	4,732	8,176	54.80	4,732	20,707
49.70	4,732	8,556	54.90	4,732	20,707
49.80	4,732	8,933	55.00	4,732	20,707
49.90	4,732	9,308	55.10	4,732	20,707
50.00	4,732	9,681	55.20	4,732	20,707
50.10	4,732	10,051	55.30	4,732	20,707
50.20	4,732	10,419	55.40	4,732	20,707
50.30	4,732	10,785	55.50	4,732	20,707
50.40	4,732	11,147	55.60	4,732	20,707
50.50	4,732	11,507	55.70	4,732	20,707
50.60	4,732	11,864	55.80	4,732	20,707
50.70	4,732	12,217	55.90	4,732	20,707
50.80	4,732	12,567	56.00	4,732	20,707
50.90	4,732	12,914	56.10	4,732	20,707
51.00	4,732	13,257	56.20	4,732	20,707
51.10	4,732	13,597	56.30	4,732	20,707
51.20	4,732	13,932	56.40	4,732	20,707
51.30	4,732	14,263	56.50	4,732	20,707
51.40	4,732	14,590	56.60	4,732	20,707
51.50	4,732	14,912	56.70	4,732	20,707
51.60	4,732	15,229	56.80	4,732	20,707
51.70	4,732	15,540	56.90	4,732	20,707
51.80	4,732	15,846	57.00	4,732	20,707
51.90	4,732	16,146			
52.00	4,732	16,440			
52.10	4,732	16,726			

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