

Appendix H

Stormwater Engineering Report

Carlson Complex PICKLEBALL COURTS Drainage Report March 2026



Prepared by:



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This drainage summary summarizes proposed changes to the existing drainage system at 25 Bare Cove Park Dr in the Town of Hingham. The proposed project is the redevelopment of the existing building and parking at the site to provide a pickleball facility. The Project consists of demolitions of the existing building and associated site improvements, inclusive of asphalt repaving, concrete sidewalks, playing courts area, and site retaining walls to accommodate grade changes adjacent to the building structure. The scope of work will also include the addition of four (4) area drain structures, trench drains, and an underdrain system. These structures which will outlet to the existing stormwater drainage system which consists of an infiltration basin.

The current proposed project will retain the existing stormwater quality treatment features but will create improvements by reducing the impervious area within the site by approximately 6,500 square feet (0.15 Ac.). The existing basin outfall will be cleared and a riprap apron at the outfall will be installed. The existing catch basin sump will be cleaned as part of the proposed project.

The Project does not alter the existing drainage patterns at the site and meets the criteria of a redevelopment project as defined by the current 2008 Stormwater Management Standards in the Massachusetts Stormwater Handbook. A detailed summary of compliance with the Stormwater Management Standards has been provided below:

Standard 1: There will be no new untreated discharges from the site. Runoff from the site will continue to discharge through the noted treatment features before discharging to a riprapped outflow point.

Standard 2: There will be no net increase in peak rates of stormwater runoff across the site, and there will be a decrease in runoff rates and volumes due to the decrease in impervious area. The proposed stormwater management systems will manage the stormwater runoff generated from impervious surface area on-site.

Standard 3: The proposed redevelopment will reduce impervious surface area as compared to existing site conditions and therefore new groundwater recharge facilities are not required, although the proposed infiltration basin will provide additional groundwater recharge. Additionally the proposed French drain will provide groundwater recharge.

Standard 4: The average annual Total Suspended Solids (TSS) loading conditions are unchanged from existing conditions as the total impervious surface area across the site will be reduced.

Standard 5: The proposed Project is not considered to be a “Land Use with Higher Potential Pollutant Loads” (LUHPPL).

Standard 6: The project follows the standards as outline in the standard 6 section “Stormwater Discharges Near or To Outstanding Resource Waters including Vernal Pools and Surface Water Sources for Public Water Systems” as well as listed below:

1. Construction Sites of 1 acre or more must file a Notice of Intent (WM 09) with MassDEP requesting approval of the Stormwater Pollution Prevention Plan (SWPPP), if they discharge to an ORW.

2. Stormwater discharges to ORWs must be set back from the receiving water or wetland and receive the highest and best practical method of treatment.
3. Stormwater BMPs must be set back 100' from a certified vernal pool and comply with 310 CMR 10.60¹. Proponents must perform a habitat evaluation and demonstrate that the stormwater BMPs meet the performance standard of having no adverse impact on the habitat functions of a certified vernal pool.
4. Unless essential to operation of a public water system, stormwater BMPs are prohibited within the Zone A.
5. BMPs must be designed according to the specifications and sizing methodologies in Volumes 2 and 3 of the Massachusetts Stormwater Handbook.
6. Required Water Quality Volume = 1.0 inch times impervious area.
7. At least 44% TSS must be removed prior to discharge to infiltration BMP.
8. For discharges near or to ORWs, proprietary BMPs may be used for pretreatment only unless verified by TARP or STEP for other uses. For the purpose of this requirement, subsurface structures, even those that have a storage chamber that has been manufactured are not proprietary BMPs, since the pretreatment occurs in the soil below the structure, not in the structure itself. See Volume 2.

Standard 7: This Project qualifies as a redevelopment as the scope of work consists of a rehabilitation of a previously developed site that results in results in no net increase in impervious surface area.

Standard 8: The proposed Project will provide erosion and sedimentation controls that are detailed in the Site Development Plans provided for this Project, inclusive of inlet protection to properly filter stormwater discharges.

Standard 9: The Long-Term Operation and Maintenance (O&M) Plan for the stormwater management system components will continue to be followed after the construction of the proposed redevelopment ends.

Standard 10: No illicit discharges will be created as part of the site construction in the area in question.

An Operation and Maintenance Plan is attached to this report.



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.

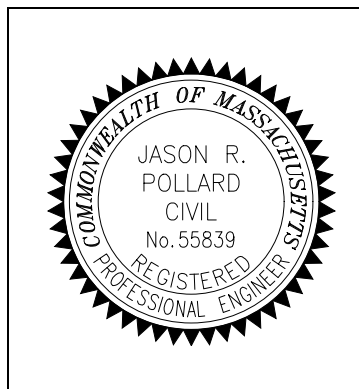
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Jason Pollard 03/30/2026
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.

LONG-TERM STORMWATER SYSTEM OPERATION AND MAINTENANCE PLAN

The Stormwater Management Standards

Standard 9: A Long-term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The Long-term Operation and Maintenance Plan shall at a minimum identify:

1. Stormwater management system(s) owners;
2. The party or parties responsible for operation and maintenance, including how future property owners will be notified of the presence of the stormwater management system and the requirement for proper operation and maintenance;
3. The routine and non-routine maintenance tasks to be undertaken after construction is complete and a schedule for implementing those tasks;
4. Plan that is drawn to scale and shows the location of all stormwater BMPs in each treatment train along with the discharge point;
5. Description and delineation of public safety features; and
6. Estimated operations and maintenance budget.

The Operation and Maintenance Plan shall identify best management practices for implementing maintenance activities in a manner that minimizes impacts to wetland resource areas.

The Proposal is for a private development.

Stormwater Management System

Owner:

General Contractor:

The General Contractor shall have all logs and reports as stated within the Stormwater Pollution Prevention Plan readily available at all times for inspection by the Town of Hingham.

Method of recording for future Owners

- ☐ Deed
☐ Order of Conditions
☐ Other: _____

DRAINAGE SYSTEM

The following components shall be inspected:

- Inspection during or immediately following initial installation of sediment controls.
- Inspection following severe rainstorms to check for damage to controls.
- Inspection prior to seeding deadlines, particularly in the fall.
- Final inspection of projects nearing completion to ensure that temporary controls have been removed, stabilization is complete, drainage ways are in proper condition, and the final contours agree with the proposed contours on the approved plan.

Storm Events

2 year storm= 3.4 inches

10 year storm=5.24 inches

100 year storm=8.16 inches

After the occurrence of any of the storm events noted above, or any other heavy rainfall that may have affected stormwater management facilities, the designated inspector shall inspect the components listed below for evidence of scouring or erosion, excessive sediment deposits, clogging of stormwater structures, or any other condition that may adversely affect stormwater management operations.

If any of these conditions are observed, then appropriate actions should be taken to restore the stormwater management facility so that it operates as intended.

COMPONENT: Bioretention Areas (Rain Gardens)

RESPONSIBILITY:

During Construction: Fortunato Construction

Post Construction: Owner

ACTION: Inspection / cleaning

FREQUENCY: To be inspected and cleared of trash monthly

DESCRIPTION: mowed 2 to 12 times per year; mulched annually; fertilized annually; dead vegetation removed annually; pruned annually; replace entire media and all vegetation as needed. Sediment shall be removed once accumulated to 3 or more inches. Any sediment removed shall be disposed of in accordance with MADEP and other applicable requirements.

Carlson Complex
Bare Cove Park Dr, Hingham, MA

[illegible]

LONG-TERM POLLUTION PREVENTION PLAN

*The Carlson Complex
Hingham, MA*

RESPONSIBLE PARTY DURING CONSTRUCTION:

RESPONSIBLE PARTY POST CONSTRUCTION:

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

- The property owner shall be responsible for “good housekeeping” including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Proper storage and removal of solid waste (dumpsters).
- Sweeping of parking lots, drive aisles and access aisles a minimum of twice per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the “O&M Plan”.
- Snow removal shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, infiltration basins or similar stormwater controls. Salting and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.
- Reseed any bare areas as soon as they occur. Erosion control measures shall be installed in these areas to prevent deposits of sediment from entering the drainage system.

- Grass shall be maintained at a minimum blade height of two to three inches and only 1/3 of the plant height shall be removed at a time. Clippings shall not be disposed of within stormwater management areas or adjacent resource areas.
- Plants shall be pruned as necessary.
- Snow piles shall be located adjacent to or on pervious surfaces in upland areas. This will allow snow melt water to filter into the soil, leaving behind sand and debris which can be removed in the springtime.
- If necessary, stockpiled snow will be removed from the Site and disposed of at an off-site location in accordance with all local, state and federal regulations.
- The amount of sand and deicing chemicals shall be kept at the minimum amount required to provide safe pedestrian and vehicle travel.
- Deicing chemicals are recommended as a pretreatment to storm events to minimize the amount of applied sand.

OPERATON AND MAINTENANCE TRAINING PROGRAM

The Owner will coordinate an annual in-house training session to discuss the Operations and Maintenance Plan, the Long-Term Pollution Prevention Plan, and the Spill Prevention Plan and response procedures. Annual training will include the following:

Discuss the Operations and Maintenance Plan:

- Explain the general operations of the stormwater management system and its BMPs
- Identify potential sources of stormwater pollution and measures / methods of reducing or eliminating that pollution
- Emphasize good housekeeping measures

Discuss the Spill Prevention and Response Procedures:

- Explain the process in the event of a spill
- Identify potential sources of spills and procedures for cleanup and /or reporting and notification
- Complete a yearly inventory or Materials Safety Data sheets of all tenants and confirm that no potentially harmful chemicals are in use.

ILLICIT DISCHARGE STATEMENT

Certain types of non-stormwater discharges are allowed under the U.S. Environmental Protection Agency Construction General Permit. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Any existing illicit discharges, if discovered during the course of the work, will be reported to MassDEP and the local DPW, as applicable, to be addressed in accordance with their respective policies. No illicit discharges will be allowed in conjunction with the proposed improvements.

Duly Acknowledged:

Name & Title

Date

SPILL PREVENTION AND RESPONSE PROCEDURES **(POST CONSTRUCTION)**

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil or come into contact with stormwater, the following steps will be implemented:

1. All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.
2. The minimum practical quantity of all such materials will be kept on site.
3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on site.
4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.
5. It is the OWNER's responsibility to ensure that all Hazardous Waste on site is disposed of properly by a licensed hazardous material disposal company. The OWNER is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authorities.

In the event of a spill of Hazardous Substances or Oil, the following procedures should be followed:

1. All measures should be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to stormwater or off-site. (The spill area should be kept well ventilated and personnel should wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)
2. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.
3. For spills greater than five (5) gallons of material immediately contact the MADEP at the toll-free 24-hour statewide emergency number: **1-888-304-1133**, the local fire department (**9-1-1**) and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired. (Use the form provided, or similar).
4. If there is a Reportable Quantity (RQ) release, then the National Response Center should be notified immediately at (800) 424-8802; within 14 days a report should be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan should be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

[illegible]

Cause of Spill: _____

Measures Taken to Clean up Spill: _____

Type of equipment: _____ Make: _____ Size: _____

License or S/N: _____

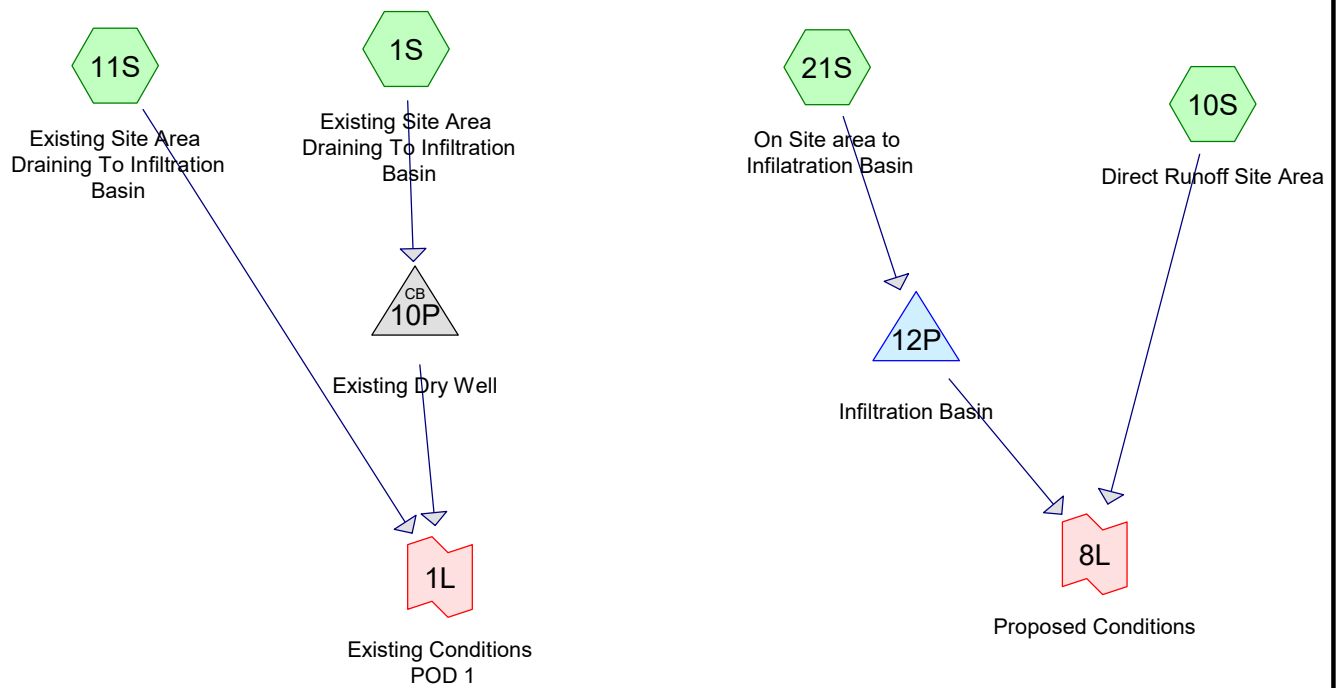
Location and Method of Disposal _____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring: _____

Additional Contact Numbers:

- DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) EMERGENCY
PHONE: 1-888-304-1133
- NATIONAL RESPONSE CENTER PHONE: (800) 424-8802
- U.S. ENVIRONMENTAL PROTECTION AGENCY PHONE: (888) 372-7341

Stormwater Computations



Routing Diagram for Hingham Pickleball

Prepared by CHA Consulting, Inc, Printed 3/24/2026
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Hingham Pickleball

Prepared by CHA Consulting, Inc

HydroCAD® 10.20-5c s/n 00409 © 2023 HydroCAD Software Solutions LLC

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type II 24-hr		Default	24.00	1	3.40	2
2	10-Year	Type II 24-hr		Default	24.00	1	5.24	2
3	100-Year	Type II 24-hr		Default	24.00	1	8.16	2
4	WQ Storm	Type II 24-hr		Default	24.00	1	1.00	2

Hingham Pickleball

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.630	98	(21S)
0.740	61	>75% Grass cover, Good, HSG B (10S, 11S, 21S)
0.250	98	Paved parking, HSG B (11S)
0.420	98	Rooftop, HSG B (1S)
2.040	85	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.410	HSG B	1S, 10S, 11S, 21S
0.000	HSG C	
0.000	HSG D	
0.630	Other	21S
2.040		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.630	0.630		21S
0.000	0.740	0.000	0.000	0.000	0.740	>75% Grass cover, Good	10S, 11S, 21S
0.000	0.250	0.000	0.000	0.000	0.250	Paved parking	11S
0.000	0.420	0.000	0.000	0.000	0.420	Rooftop	1S
0.000	1.410	0.000	0.000	0.630	2.040	TOTAL AREA	

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Type II 24-hr 2-Year Rainfall=3.40"

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Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Site Area Runoff Area=0.420 ac 100.00% Impervious Runoff Depth=3.17"
Tc=5.0 min CN=98 Runoff=2.06 cfs 0.111 af

Subcatchment 10S: Direct Runoff Site Area Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=0.53"
Tc=5.0 min CN=61 Runoff=0.11 cfs 0.006 af

Subcatchment 11S: Existing Site Area Runoff Area=0.600 ac 41.67% Impervious Runoff Depth=1.29"
Tc=5.0 min CN=76 Runoff=1.42 cfs 0.065 af

Subcatchment 21S: On Site area to Runoff Area=0.880 ac 71.59% Impervious Runoff Depth=2.09"
Tc=15.0 min CN=87 Runoff=2.36 cfs 0.153 af

Pond 10P: Existing Dry Well Peak Elev=16.89' Inflow=2.06 cfs 0.111 af
Discarded=0.31 cfs 1.231 af Primary=1.71 cfs 0.031 af Outflow=2.02 cfs 1.262 af

Pond 12P: Infiltration Basin Peak Elev=17.87' Storage=2,543 cf Inflow=2.36 cfs 0.153 af
Outflow=2.07 cfs 0.099 af

Link 1L: Existing Conditions POD 1 Inflow=3.12 cfs 0.096 af
Primary=3.12 cfs 0.096 af

Link 8L: Proposed Conditions Inflow=2.09 cfs 0.105 af
Primary=2.09 cfs 0.105 af

Total Runoff Area = 2.040 ac Runoff Volume = 0.335 af Average Runoff Depth = 1.97"
36.27% Pervious = 0.740 ac 63.73% Impervious = 1.300 ac

Summary for Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Runoff = 2.06 cfs @ 11.95 hrs, Volume= 0.111 af, Depth= 3.17"

Routed to Pond 10P : Existing Dry Well

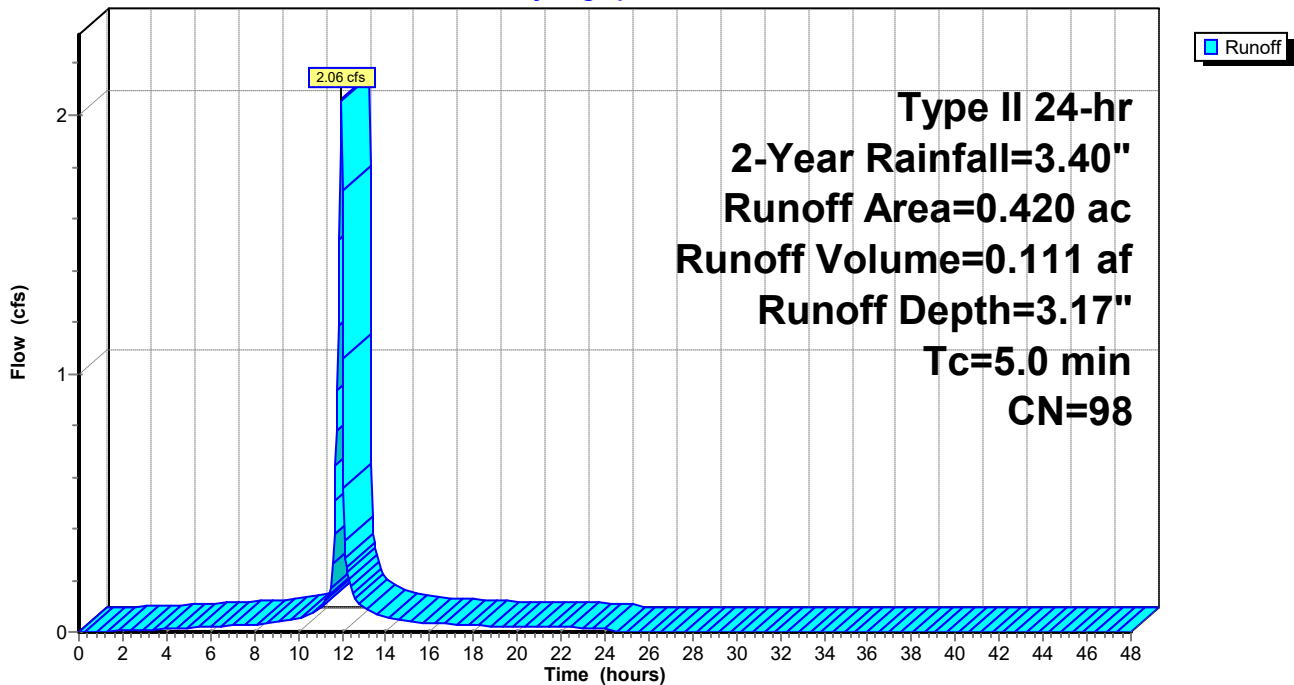
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
* 0.420	98	Rooftop, HSG B
0.420		100.00% Impervious Area

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

Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Hydrograph



Summary for Subcatchment 10S: Direct Runoff Site Area

Runoff = 0.11 cfs @ 11.98 hrs, Volume= 0.006 af, Depth= 0.53"
Routed to Link 8L : Proposed Conditions

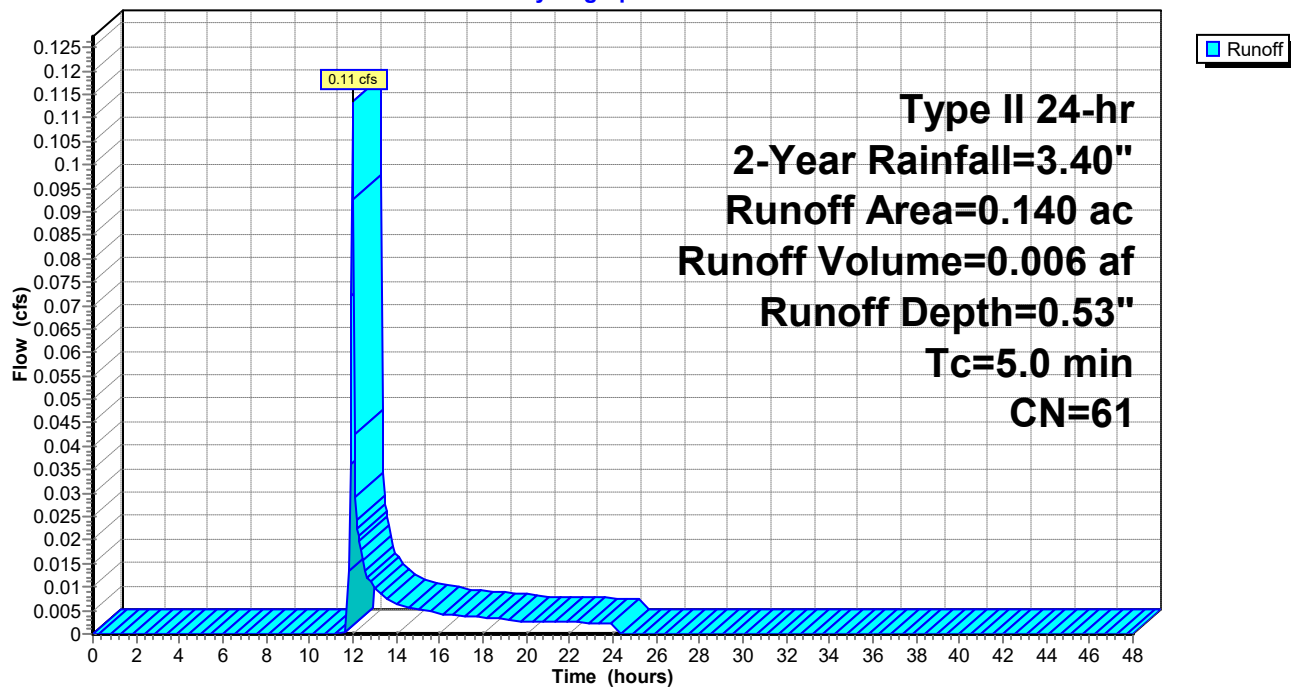
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
0.140	61	>75% Grass cover, Good, HSG B
0.140		100.00% Pervious Area

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

Subcatchment 10S: Direct Runoff Site Area

Hydrograph



Summary for Subcatchment 11S: Existing Site Area Draining To Infiltration Basin

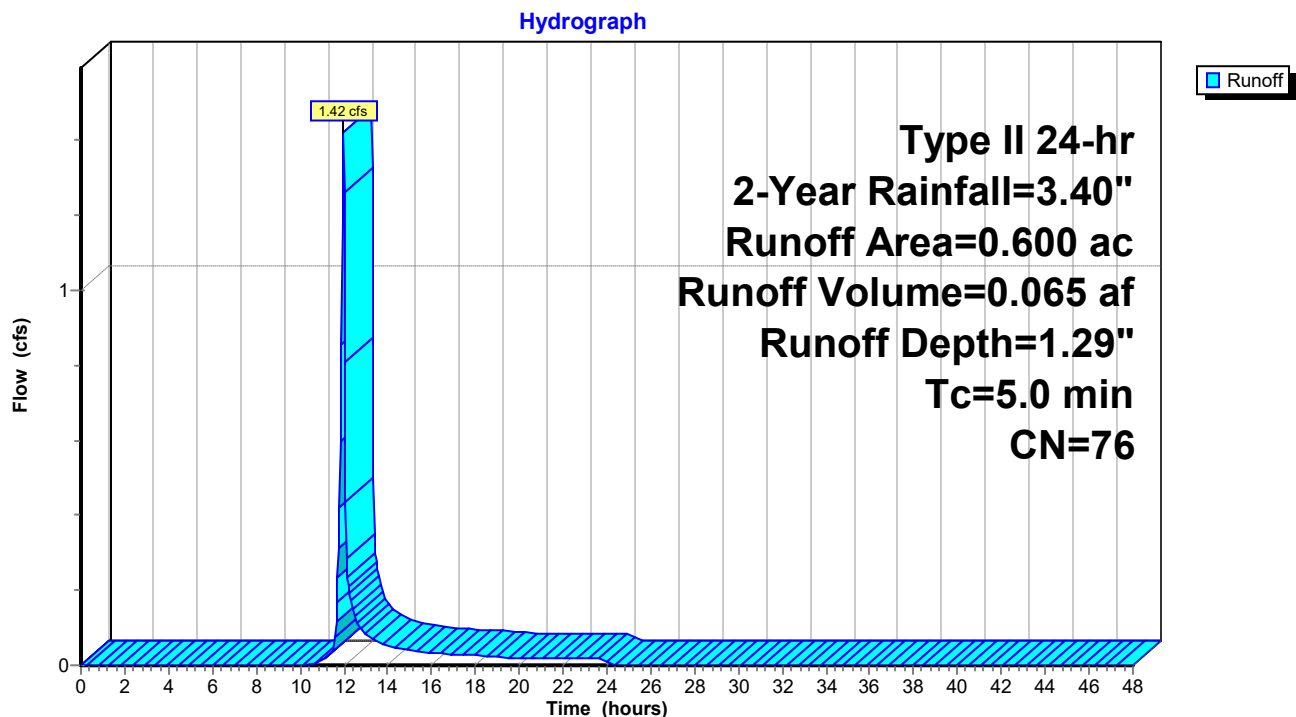
Runoff = 1.42 cfs @ 11.96 hrs, Volume= 0.065 af, Depth= 1.29"
Routed to Link 1L : Existing Conditions POD 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
0.350	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
0.600	76	Weighted Average
0.350		58.33% Pervious Area
0.250		41.67% Impervious Area

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

Subcatchment 11S: Existing Site Area Draining To Infiltration Basin



Summary for Subcatchment 21S: On Site area to Infiltration Basin

Runoff = 2.36 cfs @ 12.07 hrs, Volume= 0.153 af, Depth= 2.09"
Routed to Pond 12P : Infiltration Basin

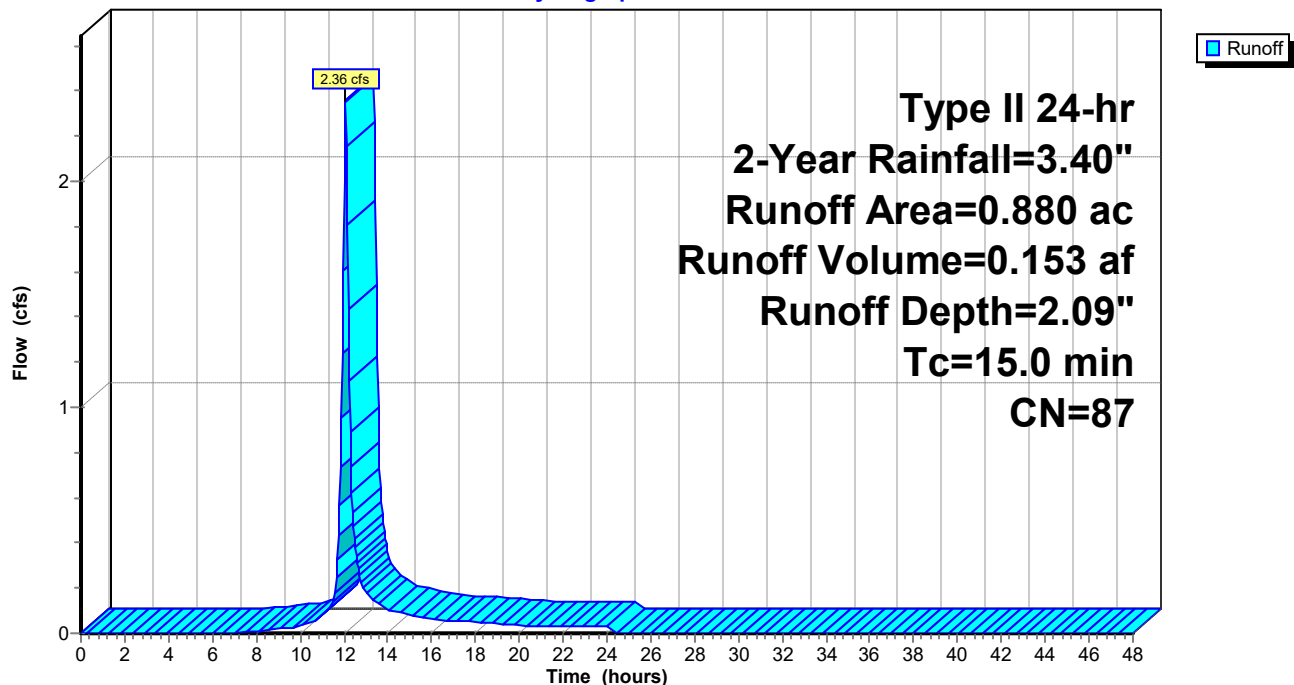
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 2-Year Rainfall=3.40"

Area (ac)	CN	Description
* 0.630	98	
0.250	61	>75% Grass cover, Good, HSG B
0.880	87	Weighted Average
0.250		28.41% Pervious Area
0.630		71.59% Impervious Area

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

Subcatchment 21S: On Site area to Infiltration Basin

Hydrograph



Summary for Pond 10P: Existing Dry Well

Inflow Area = 0.420 ac, 100.00% Impervious, Inflow Depth = 3.17" for 2-Year event
 Inflow = 2.06 cfs @ 11.95 hrs, Volume= 0.111 af
 Outflow = 2.02 cfs @ 11.95 hrs, Volume= 1.262 af, Atten= 2%, Lag= 0.0 min
 Discarded = 0.31 cfs @ 0.00 hrs, Volume= 1.231 af
 Primary = 1.71 cfs @ 11.95 hrs, Volume= 0.031 af
 Routed to Link 1L : Existing Conditions POD 1

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Peak Elev= 16.89' @ 11.95 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.73'	8.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	0.00'	
			0.31 cfs Exfiltration at all elevations

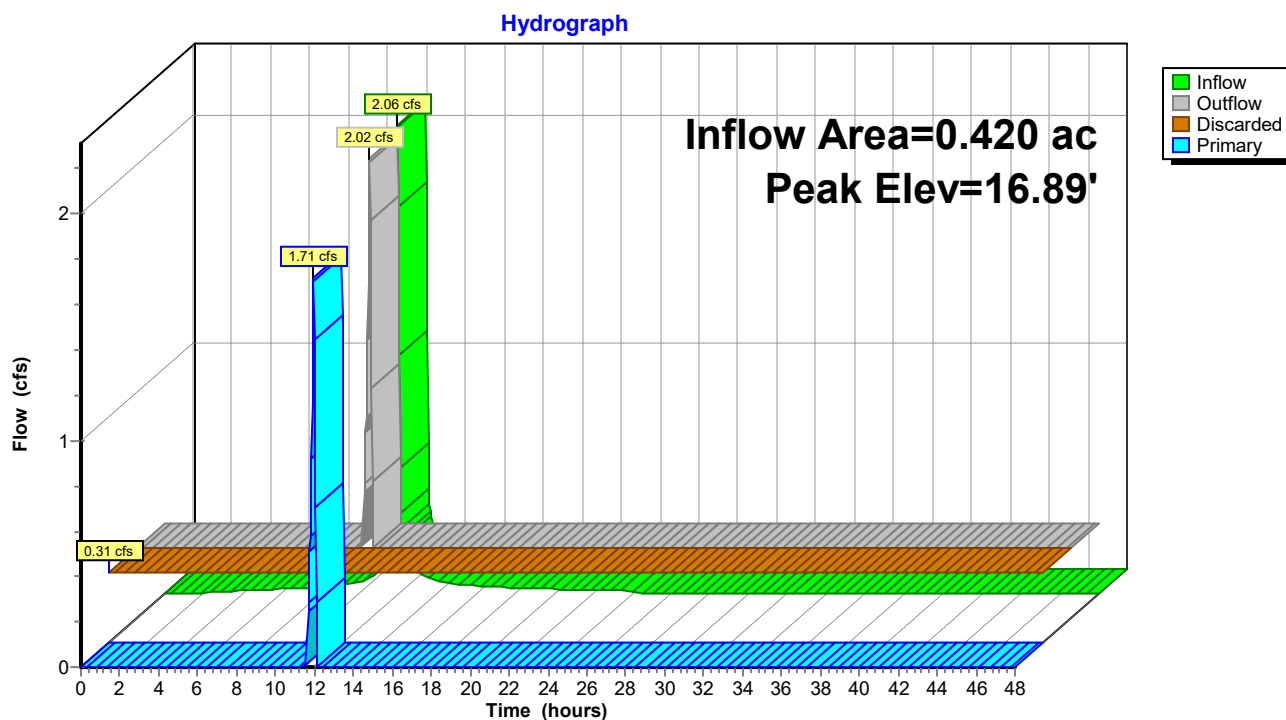
Discarded OutFlow Max=0.31 cfs @ 0.00 hrs HW=0.00' (Free Discharge)

↳ **2=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=1.63 cfs @ 11.95 hrs HW=16.89' (Free Discharge)

↳ **1=Sharp-Crested Rectangular Weir** (Weir Controls 1.63 cfs @ 1.30 fps)

Pond 10P: Existing Dry Well



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Type II 24-hr 2-Year Rainfall=3.40"

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Summary for Pond 12P: Infiltration Basin

Inflow Area = 0.880 ac, 71.59% Impervious, Inflow Depth = 2.09" for 2-Year event
Inflow = 2.36 cfs @ 12.07 hrs, Volume= 0.153 af
Outflow = 2.07 cfs @ 12.16 hrs, Volume= 0.099 af, Atten= 13%, Lag= 5.6 min
Primary = 2.07 cfs @ 12.16 hrs, Volume= 0.099 af
Routed to Link 8L : Proposed Conditions

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 17.87' @ 12.16 hrs Surf.Area= 1,312 sf Storage= 2,543 cf

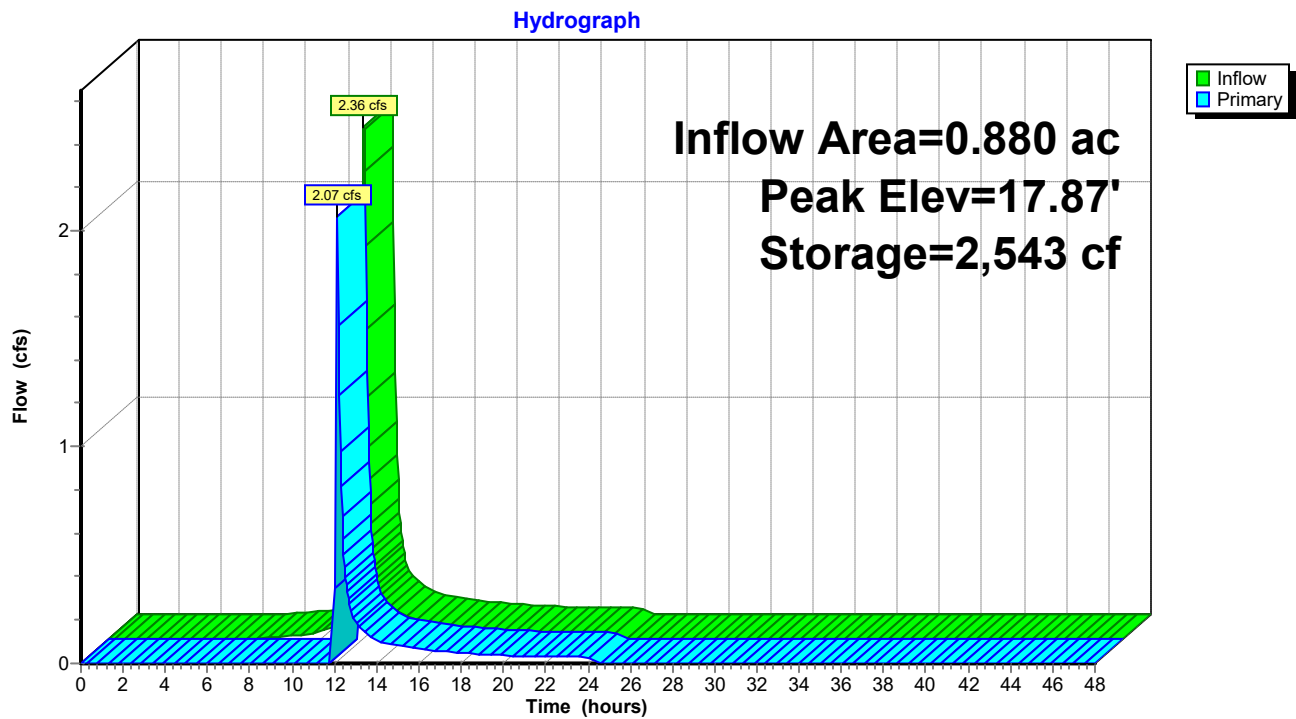
Plug-Flow detention time= 177.8 min calculated for 0.099 af (64% of inflow)
Center-of-Mass det. time= 71.9 min (893.5 - 821.6)

Volume	Invert	Avail.Storage	Storage Description
#1	14.00'	2,891 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	150	0	0
15.00	358	254	254
16.00	633	496	750
17.00	971	802	1,552
18.00	1,364	1,168	2,719
18.25	15	172	2,891

Device	Routing	Invert	Outlet Devices
#1	Primary	17.75'	20.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.02 cfs @ 12.16 hrs HW=17.87' (Free Discharge)
↑1=**Broad-Crested Rectangular Weir** (Weir Controls 2.02 cfs @ 0.87 fps)

Pond 12P: Infiltration Basin

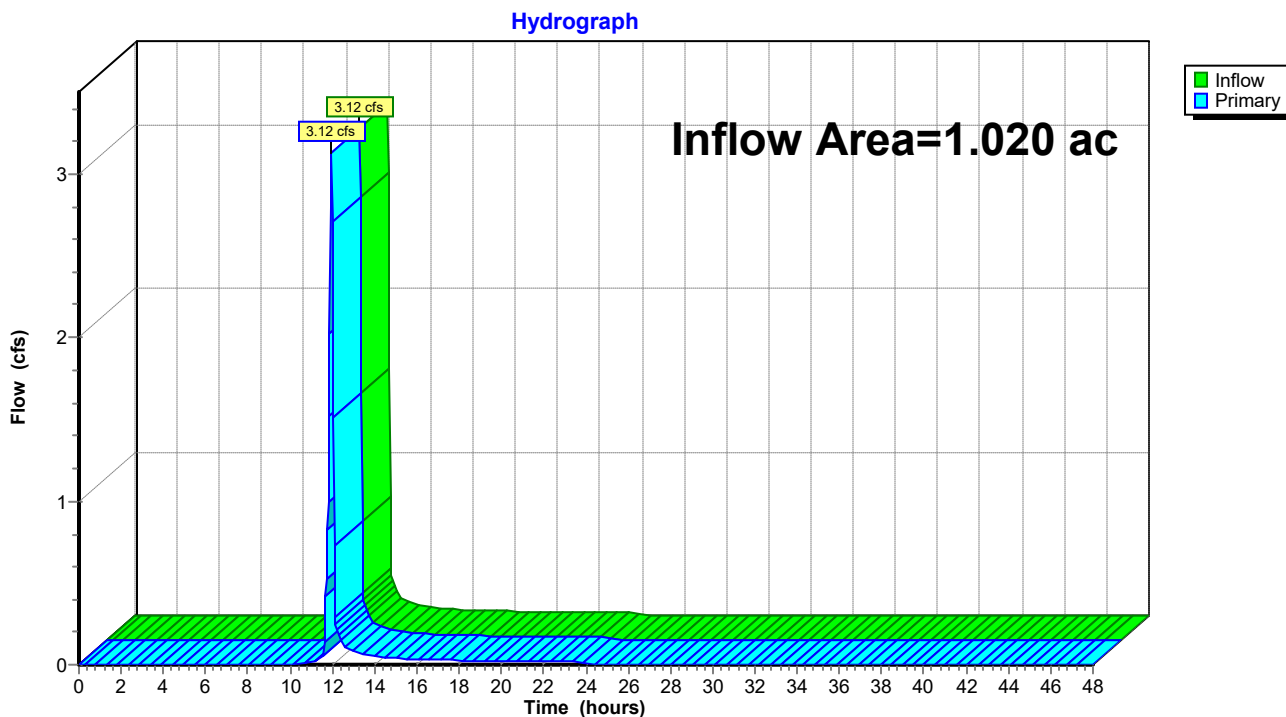


Summary for Link 1L: Existing Conditions POD 1

Inflow Area = 1.020 ac, 65.69% Impervious, Inflow Depth = 1.13" for 2-Year event
 Inflow = 3.12 cfs @ 11.96 hrs, Volume= 0.096 af
 Primary = 3.12 cfs @ 11.96 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 4L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Link 1L: Existing Conditions POD 1

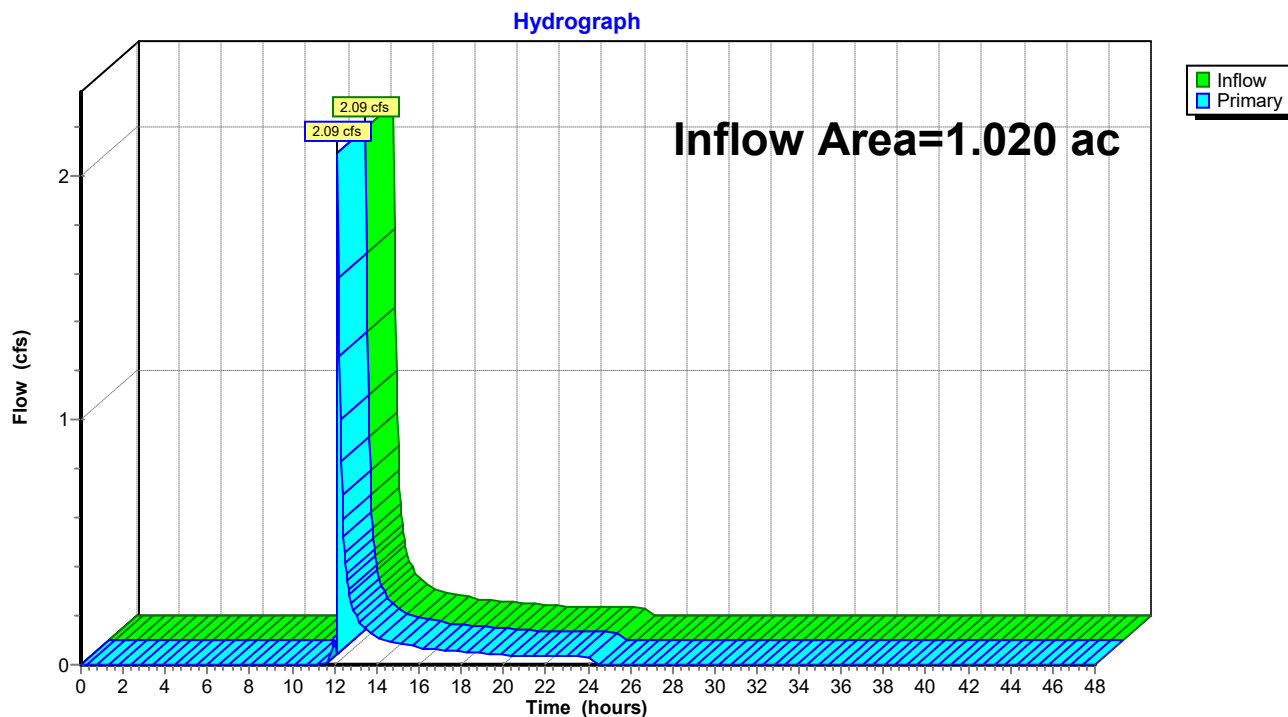


Summary for Link 8L: Proposed Conditions

Inflow Area = 1.020 ac, 61.76% Impervious, Inflow Depth = 1.23" for 2-Year event
 Inflow = 2.09 cfs @ 12.16 hrs, Volume= 0.105 af
 Primary = 2.09 cfs @ 12.16 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 6L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Link 8L: Proposed Conditions



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Type II 24-hr 10-Year Rainfall=5.24"

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Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Site Area Runoff Area=0.420 ac 100.00% Impervious Runoff Depth=5.00"
Tc=5.0 min CN=98 Runoff=3.20 cfs 0.175 af

Subcatchment 10S: Direct Runoff Site Area Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=1.52"
Tc=5.0 min CN=61 Runoff=0.38 cfs 0.018 af

Subcatchment 11S: Existing Site Area Runoff Area=0.600 ac 41.67% Impervious Runoff Depth=2.73"
Tc=5.0 min CN=76 Runoff=2.99 cfs 0.137 af

Subcatchment 21S: On Site area to Runoff Area=0.880 ac 71.59% Impervious Runoff Depth=3.79"
Tc=15.0 min CN=87 Runoff=4.20 cfs 0.278 af

Pond 10P: Existing Dry Well Peak Elev=16.96' Inflow=3.20 cfs 0.175 af
Discarded=0.31 cfs 1.231 af Primary=2.91 cfs 0.058 af Outflow=3.22 cfs 1.288 af

Pond 12P: Infiltration Basin Peak Elev=17.94' Storage=2,636 cf Inflow=4.20 cfs 0.278 af
Outflow=4.18 cfs 0.223 af

Link 1L: Existing Conditions POD 1 Inflow=5.90 cfs 0.194 af
Primary=5.90 cfs 0.194 af

Link 8L: Proposed Conditions Inflow=4.31 cfs 0.241 af
Primary=4.31 cfs 0.241 af

Total Runoff Area = 2.040 ac Runoff Volume = 0.608 af Average Runoff Depth = 3.57"
36.27% Pervious = 0.740 ac 63.73% Impervious = 1.300 ac

Summary for Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Runoff = 3.20 cfs @ 11.95 hrs, Volume= 0.175 af, Depth= 5.00"
Routed to Pond 10P : Existing Dry Well

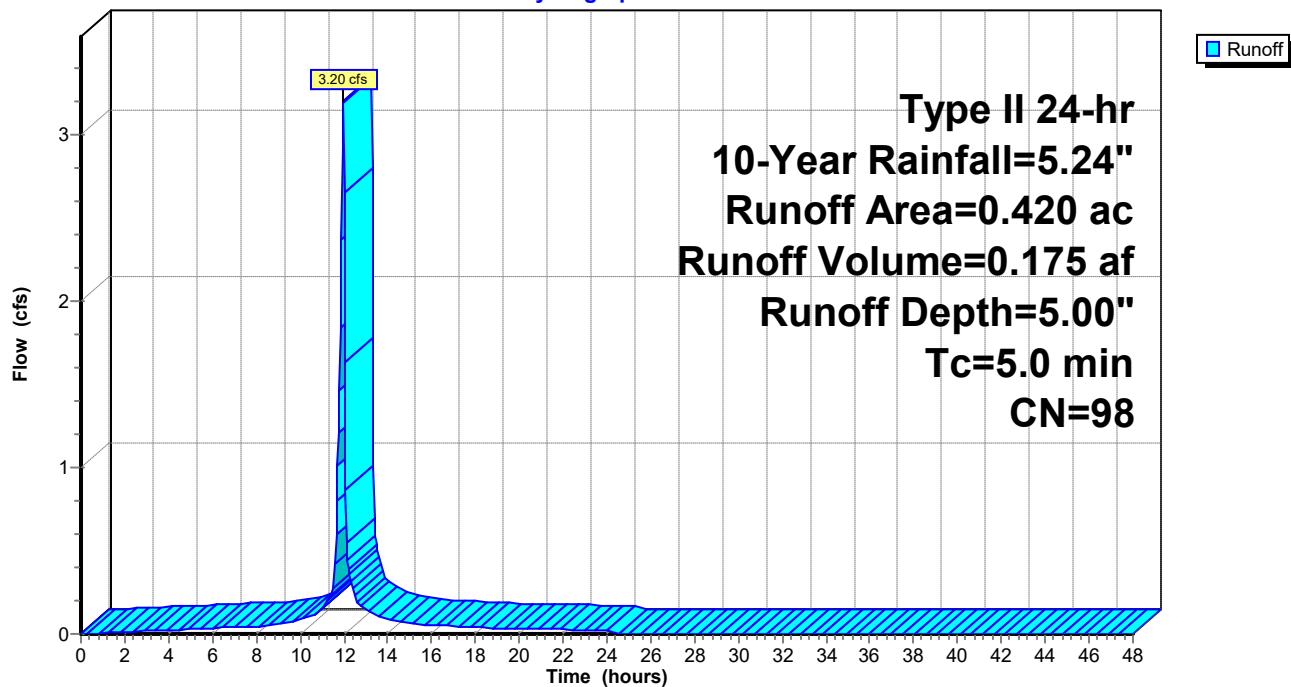
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=5.24"

Area (ac)	CN	Description
* 0.420	98	Rooftop, HSG B
0.420		100.00% Impervious Area

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

Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Hydrograph



Summary for Subcatchment 10S: Direct Runoff Site Area

Runoff = 0.38 cfs @ 11.97 hrs, Volume= 0.018 af, Depth= 1.52"
Routed to Link 8L : Proposed Conditions

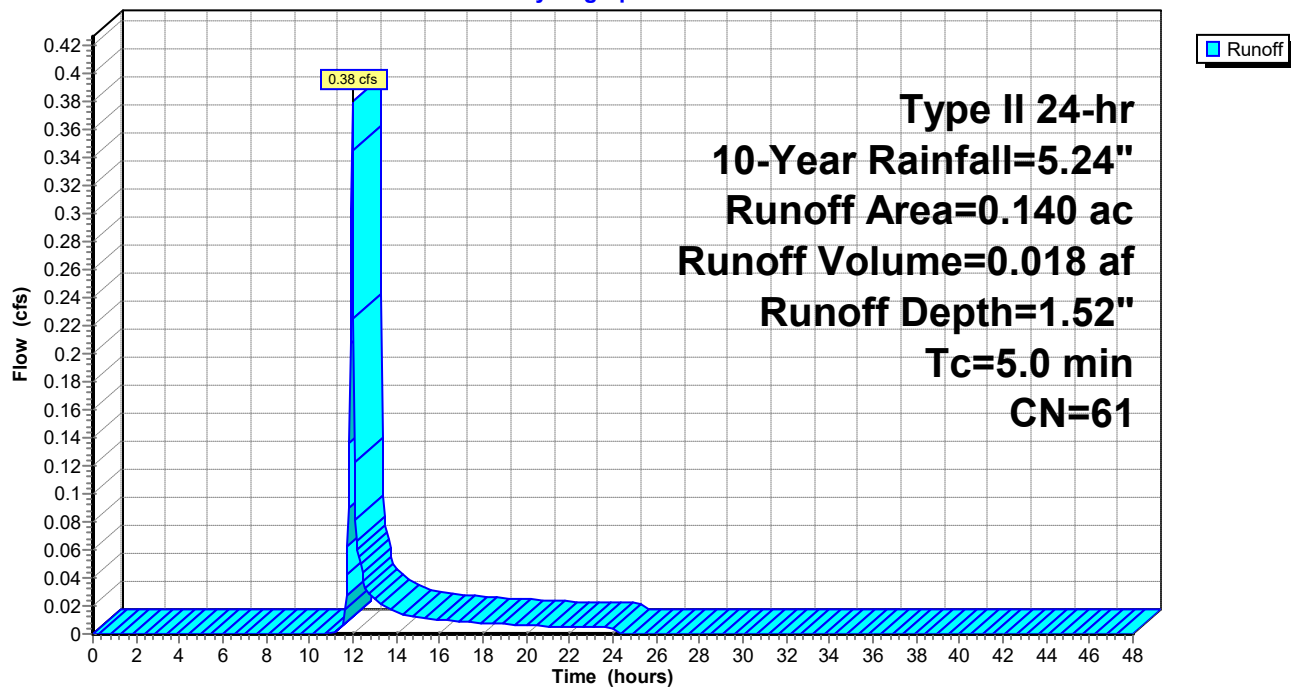
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=5.24"

Area (ac)	CN	Description
0.140	61	>75% Grass cover, Good, HSG B
0.140		100.00% Pervious Area

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

Subcatchment 10S: Direct Runoff Site Area

Hydrograph



Summary for Subcatchment 11S: Existing Site Area Draining To Infiltration Basin

Runoff = 2.99 cfs @ 11.96 hrs, Volume= 0.137 af, Depth= 2.73"
Routed to Link 1L : Existing Conditions POD 1

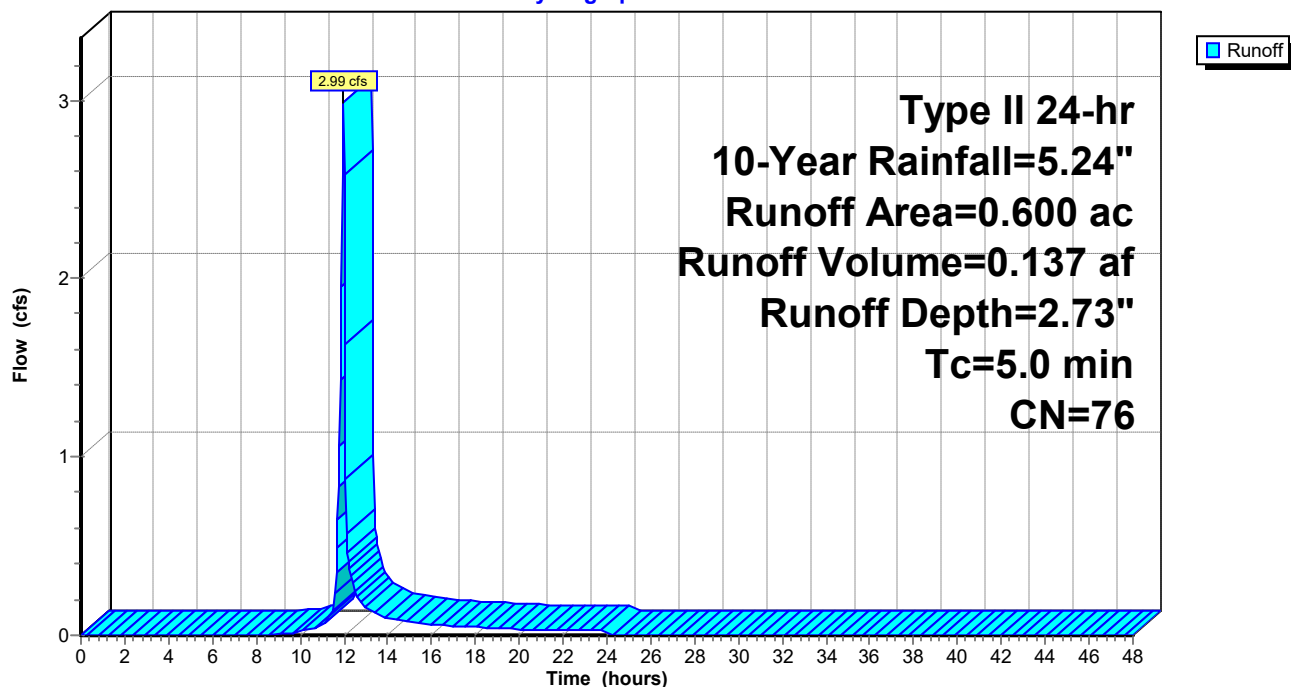
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=5.24"

Area (ac)	CN	Description
0.350	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
0.600	76	Weighted Average
0.350		58.33% Pervious Area
0.250		41.67% Impervious Area

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

Subcatchment 11S: Existing Site Area Draining To Infiltration Basin

Hydrograph



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Type II 24-hr 10-Year Rainfall=5.24"

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Summary for Subcatchment 21S: On Site area to Infiltration Basin

Runoff = 4.20 cfs @ 12.07 hrs, Volume= 0.278 af, Depth= 3.79"
Routed to Pond 12P : Infiltration Basin

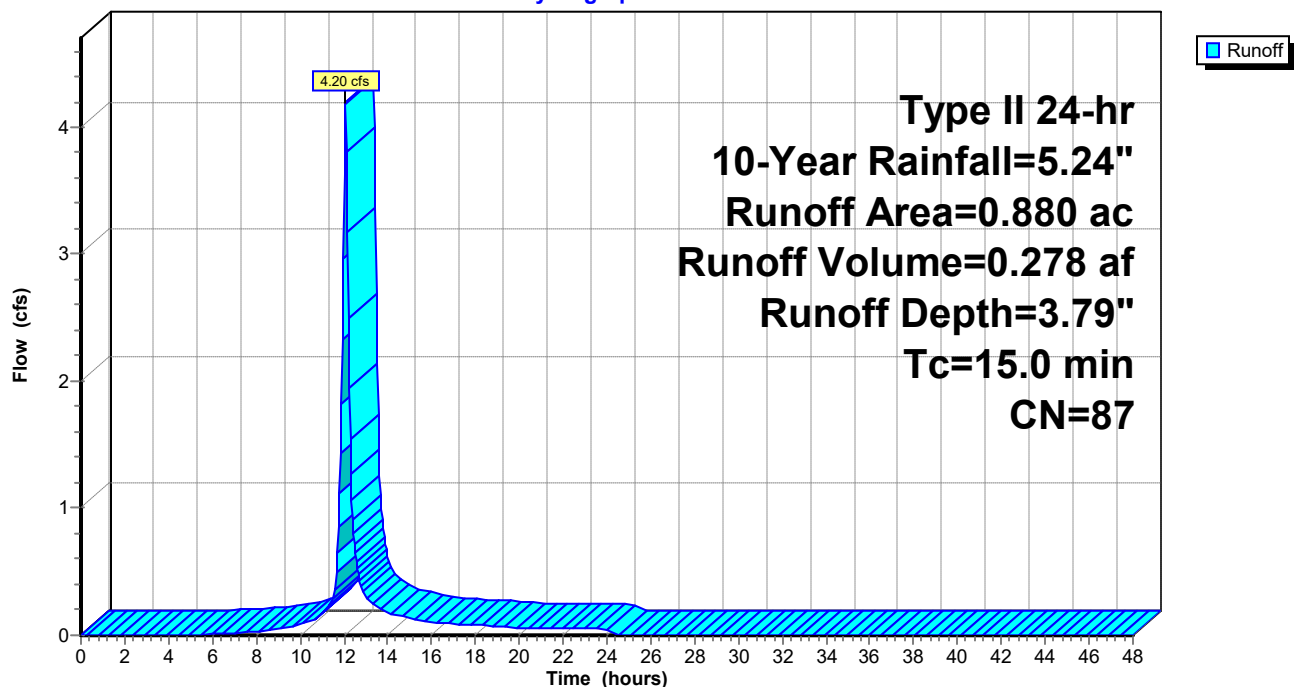
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 10-Year Rainfall=5.24"

Area (ac)	CN	Description
* 0.630	98	
0.250	61	>75% Grass cover, Good, HSG B
0.880	87	Weighted Average
0.250		28.41% Pervious Area
0.630		71.59% Impervious Area

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

Subcatchment 21S: On Site area to Infiltration Basin

Hydrograph



Summary for Pond 10P: Existing Dry Well

Inflow Area = 0.420 ac, 100.00% Impervious, Inflow Depth = 5.00" for 10-Year event
 Inflow = 3.20 cfs @ 11.95 hrs, Volume= 0.175 af
 Outflow = 3.22 cfs @ 11.95 hrs, Volume= 1.288 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.31 cfs @ 0.00 hrs, Volume= 1.231 af
 Primary = 2.91 cfs @ 11.95 hrs, Volume= 0.058 af
 Routed to Link 1L : Existing Conditions POD 1

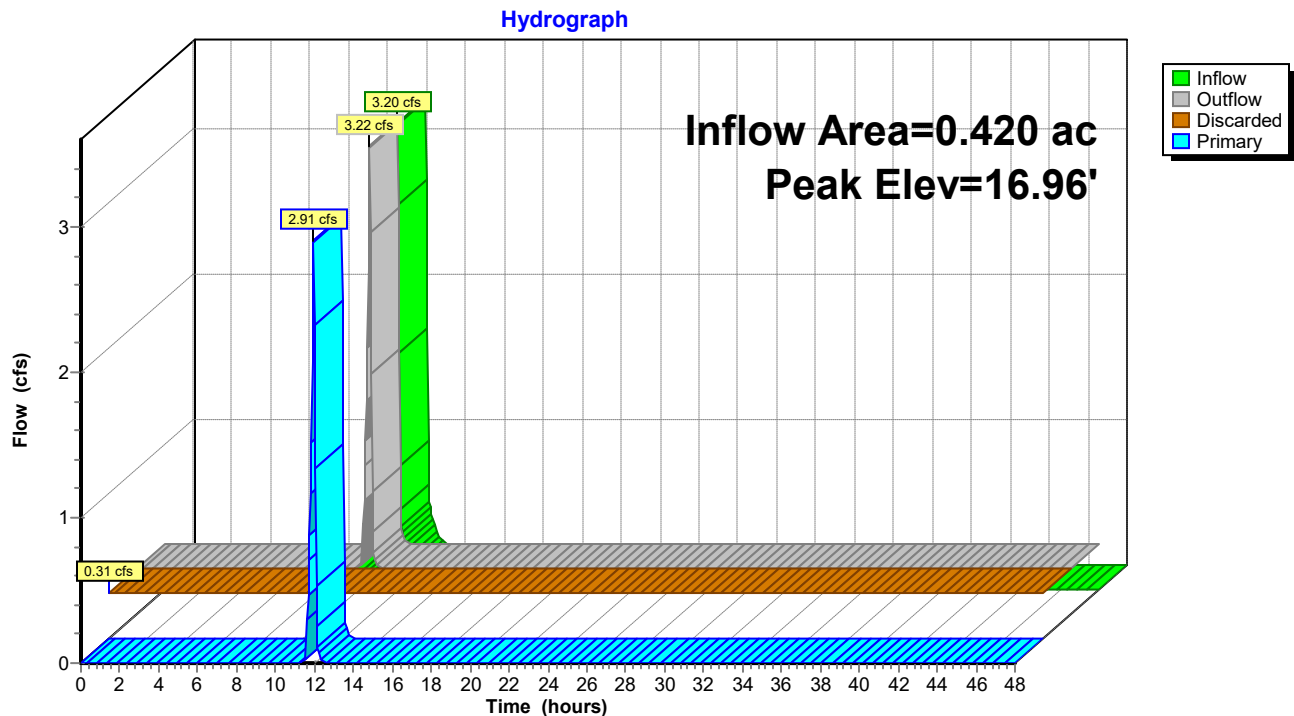
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
 Peak Elev= 16.96' @ 11.95 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.73'	8.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	0.00'	

Discarded OutFlow Max=0.31 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=2.73 cfs @ 11.95 hrs HW=16.95' (Free Discharge)
 ↳ **1=Sharp-Crested Rectangular Weir** (Weir Controls 2.73 cfs @ 1.54 fps)

Pond 10P: Existing Dry Well



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Type II 24-hr 10-Year Rainfall=5.24"

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Summary for Pond 12P: Infiltration Basin

Inflow Area = 0.880 ac, 71.59% Impervious, Inflow Depth = 3.79" for 10-Year event
Inflow = 4.20 cfs @ 12.07 hrs, Volume= 0.278 af
Outflow = 4.18 cfs @ 12.08 hrs, Volume= 0.223 af, Atten= 0%, Lag= 0.7 min
Primary = 4.18 cfs @ 12.08 hrs, Volume= 0.223 af
Routed to Link 8L : Proposed Conditions

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 17.94' @ 12.08 hrs Surf.Area= 1,340 sf Storage= 2,636 cf

Plug-Flow detention time= 121.2 min calculated for 0.223 af (80% of inflow)
Center-of-Mass det. time= 41.6 min (846.3 - 804.7)

Volume	Invert	Avail.Storage	Storage Description
#1	14.00'	2,891 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

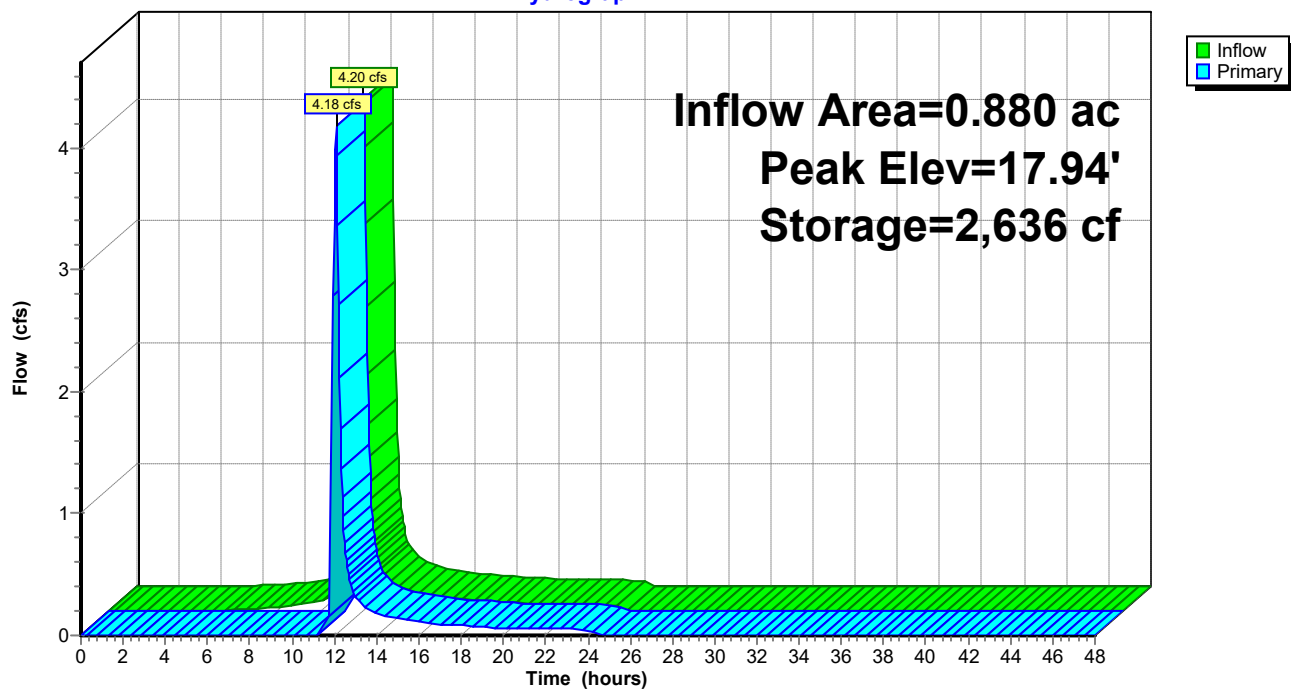
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	150	0	0
15.00	358	254	254
16.00	633	496	750
17.00	971	802	1,552
18.00	1,364	1,168	2,719
18.25	15	172	2,891

Device	Routing	Invert	Outlet Devices
#1	Primary	17.75'	20.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=4.14 cfs @ 12.08 hrs HW=17.94' (Free Discharge)
↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 4.14 cfs @ 1.10 fps)

Pond 12P: Infiltration Basin

Hydrograph

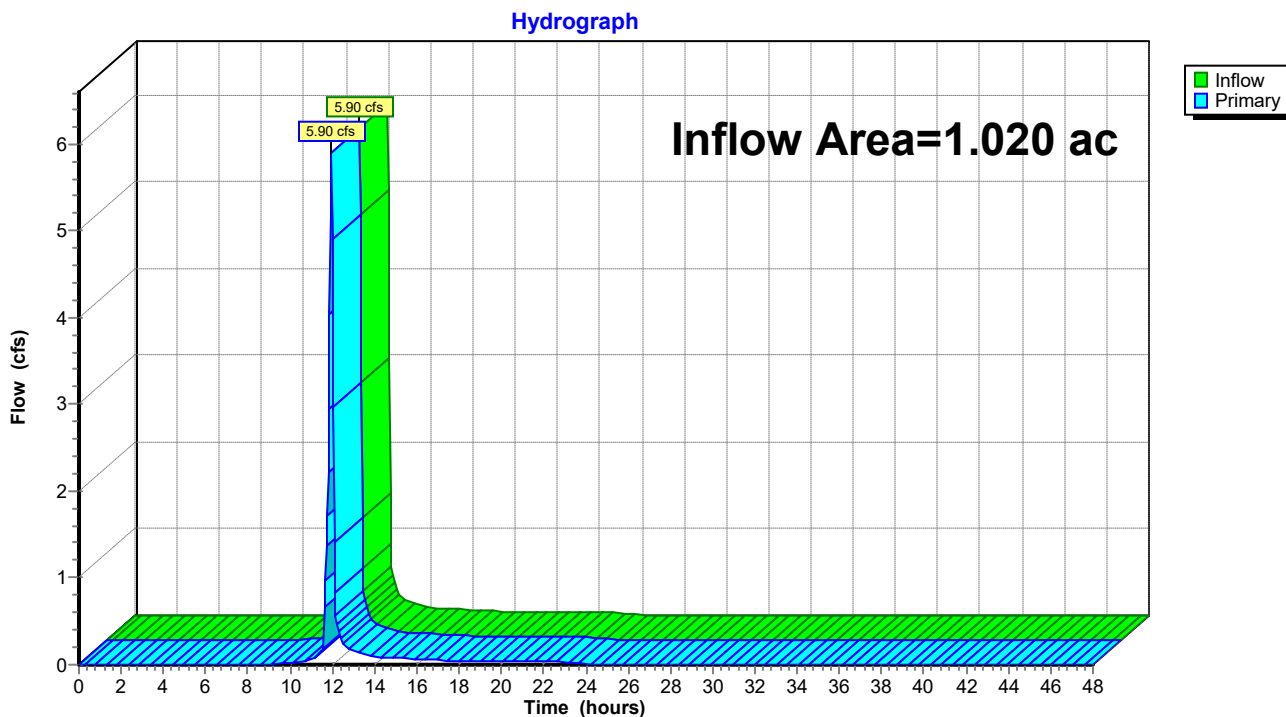


Summary for Link 1L: Existing Conditions POD 1

Inflow Area = 1.020 ac, 65.69% Impervious, Inflow Depth = 2.29" for 10-Year event
 Inflow = 5.90 cfs @ 11.96 hrs, Volume= 0.194 af
 Primary = 5.90 cfs @ 11.96 hrs, Volume= 0.194 af, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 4L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

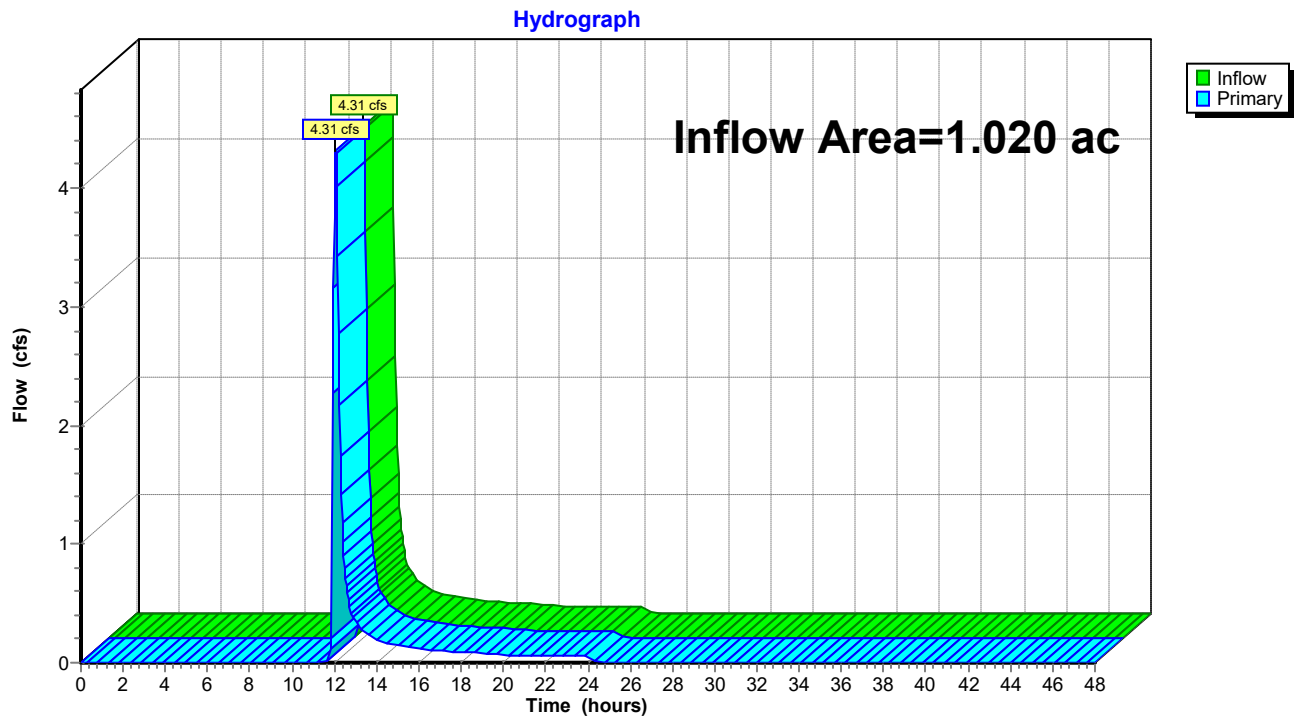
Link 1L: Existing Conditions POD 1



Summary for Link 8L: Proposed Conditions

Inflow Area = 1.020 ac, 61.76% Impervious, Inflow Depth = 2.84" for 10-Year event
Inflow = 4.31 cfs @ 12.07 hrs, Volume= 0.241 af
Primary = 4.31 cfs @ 12.07 hrs, Volume= 0.241 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 6L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Link 8L: Proposed Conditions

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Type II 24-hr 100-Year Rainfall=8.16"

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Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Site Area Runoff Area=0.420 ac 100.00% Impervious Runoff Depth=7.92"
Tc=5.0 min CN=98 Runoff=5.00 cfs 0.277 af

Subcatchment 10S: Direct Runoff Site Area Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=3.57"
Tc=5.0 min CN=61 Runoff=0.92 cfs 0.042 af

Subcatchment 11S: Existing Site Area Runoff Area=0.600 ac 41.67% Impervious Runoff Depth=5.30"
Tc=5.0 min CN=76 Runoff=5.66 cfs 0.265 af

Subcatchment 21S: On Site area to Runoff Area=0.880 ac 71.59% Impervious Runoff Depth=6.61"
Tc=15.0 min CN=87 Runoff=7.10 cfs 0.484 af

Pond 10P: Existing Dry Well Peak Elev=17.05' Inflow=5.00 cfs 0.277 af
Discarded=0.31 cfs 1.231 af Primary=4.69 cfs 0.104 af Outflow=5.00 cfs 1.335 af

Pond 12P: Infiltration Basin Peak Elev=18.02' Storage=2,741 cf Inflow=7.10 cfs 0.484 af
Outflow=7.09 cfs 0.430 af

Link 1L: Existing Conditions POD 1 Inflow=10.34 cfs 0.370 af
Primary=10.34 cfs 0.370 af

Link 8L: Proposed Conditions Inflow=7.42 cfs 0.471 af
Primary=7.42 cfs 0.471 af

Total Runoff Area = 2.040 ac Runoff Volume = 1.068 af Average Runoff Depth = 6.28"
36.27% Pervious = 0.740 ac 63.73% Impervious = 1.300 ac

Summary for Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Runoff = 5.00 cfs @ 11.95 hrs, Volume= 0.277 af, Depth= 7.92"
Routed to Pond 10P : Existing Dry Well

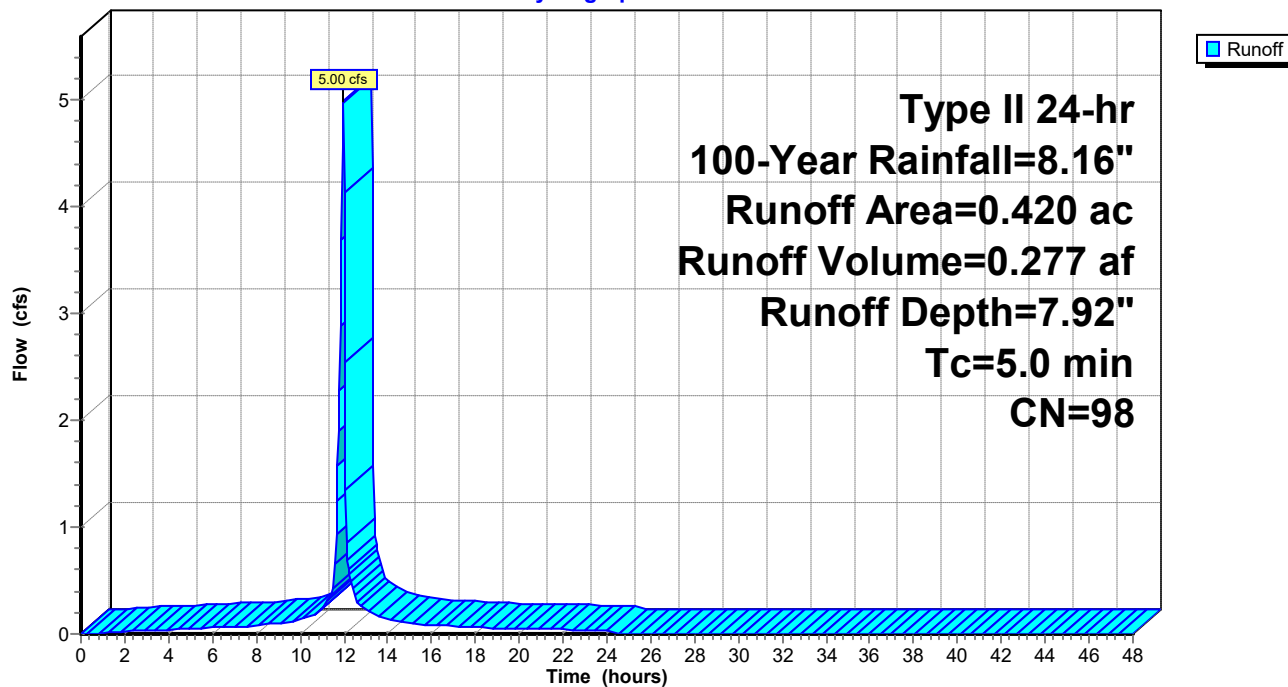
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=8.16"

Area (ac)	CN	Description
* 0.420	98	Rooftop, HSG B
0.420		100.00% Impervious Area

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

Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Hydrograph



Summary for Subcatchment 10S: Direct Runoff Site Area

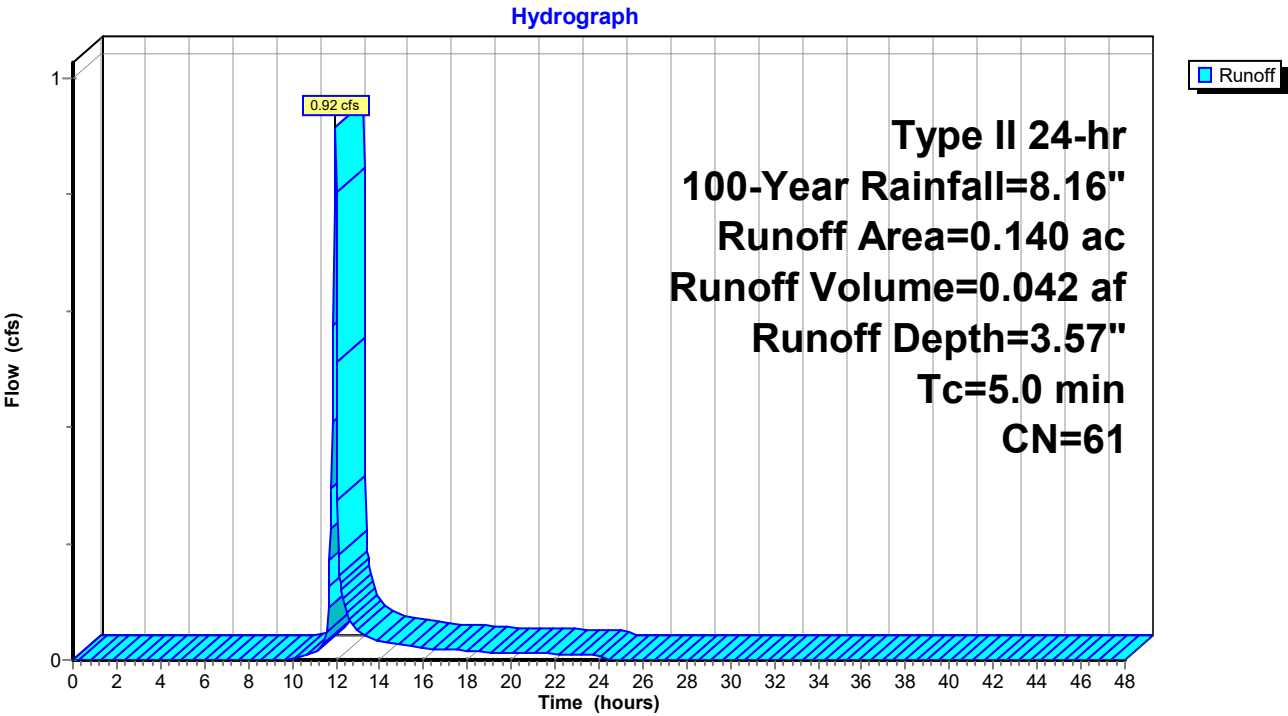
Runoff = 0.92 cfs @ 11.96 hrs, Volume= 0.042 af, Depth= 3.57"
Routed to Link 8L : Proposed Conditions

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=8.16"

Area (ac)	CN	Description
0.140	61	>75% Grass cover, Good, HSG B
0.140		100.00% Pervious Area

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

Subcatchment 10S: Direct Runoff Site Area



Summary for Subcatchment 11S: Existing Site Area Draining To Infiltration Basin

Runoff = 5.66 cfs @ 11.96 hrs, Volume= 0.265 af, Depth= 5.30"

Routed to Link 1L : Existing Conditions POD 1

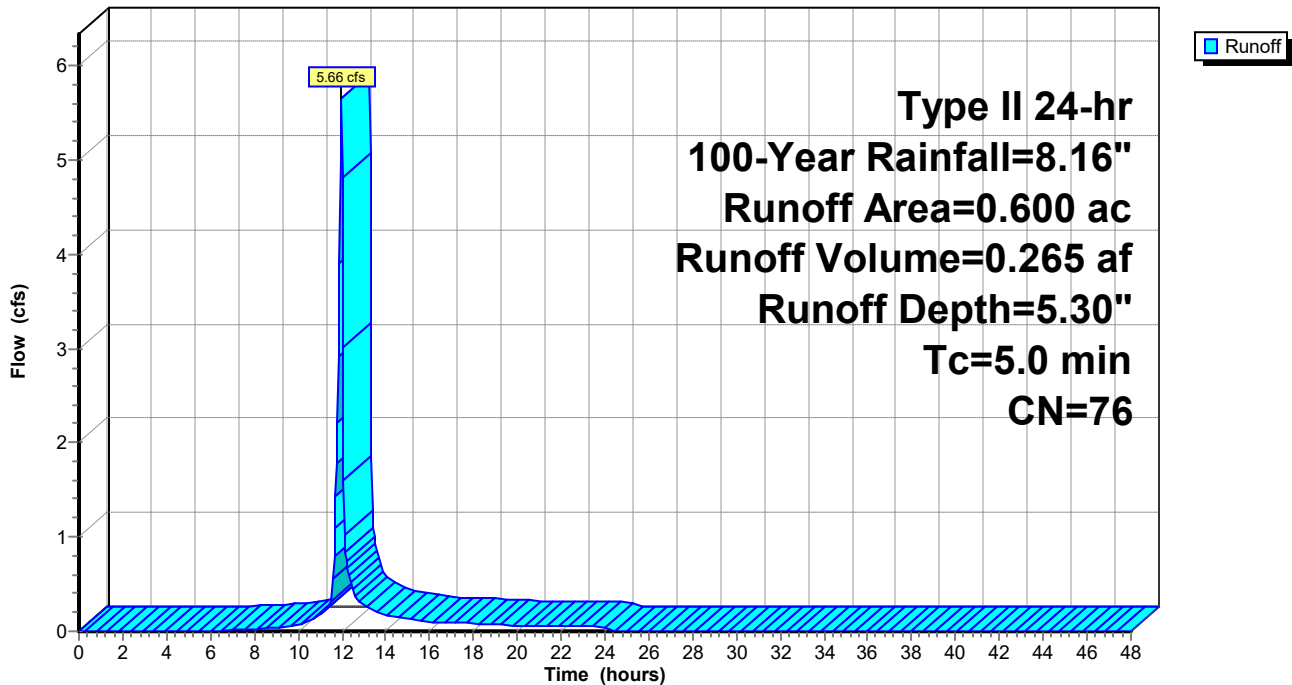
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=8.16"

Area (ac)	CN	Description
0.350	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
0.600	76	Weighted Average
0.350		58.33% Pervious Area
0.250		41.67% Impervious Area

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

Subcatchment 11S: Existing Site Area Draining To Infiltration Basin

Hydrograph



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Type II 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 21S: On Site area to Infiltration Basin

Runoff = 7.10 cfs @ 12.06 hrs, Volume= 0.484 af, Depth= 6.61"
Routed to Pond 12P : Infiltration Basin

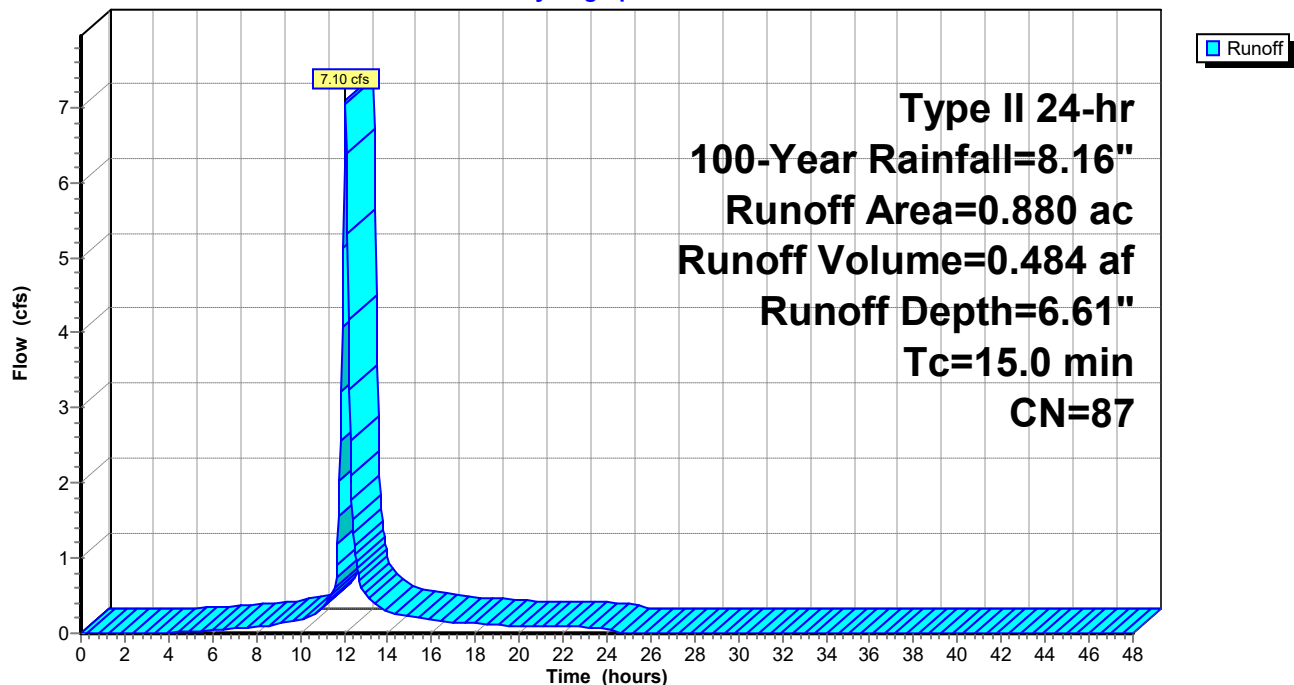
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr 100-Year Rainfall=8.16"

Area (ac)	CN	Description
* 0.630	98	
0.250	61	>75% Grass cover, Good, HSG B
0.880	87	Weighted Average
0.250		28.41% Pervious Area
0.630		71.59% Impervious Area

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

Subcatchment 21S: On Site area to Infiltration Basin

Hydrograph



Summary for Pond 10P: Existing Dry Well

Inflow Area = 0.420 ac, 100.00% Impervious, Inflow Depth = 7.92" for 100-Year event
 Inflow = 5.00 cfs @ 11.95 hrs, Volume= 0.277 af
 Outflow = 5.00 cfs @ 11.95 hrs, Volume= 1.335 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.31 cfs @ 0.00 hrs, Volume= 1.231 af
 Primary = 4.69 cfs @ 11.95 hrs, Volume= 0.104 af
 Routed to Link 1L : Existing Conditions POD 1

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Peak Elev= 17.05' @ 11.95 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.73'	8.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	0.00'	
			0.31 cfs Exfiltration at all elevations

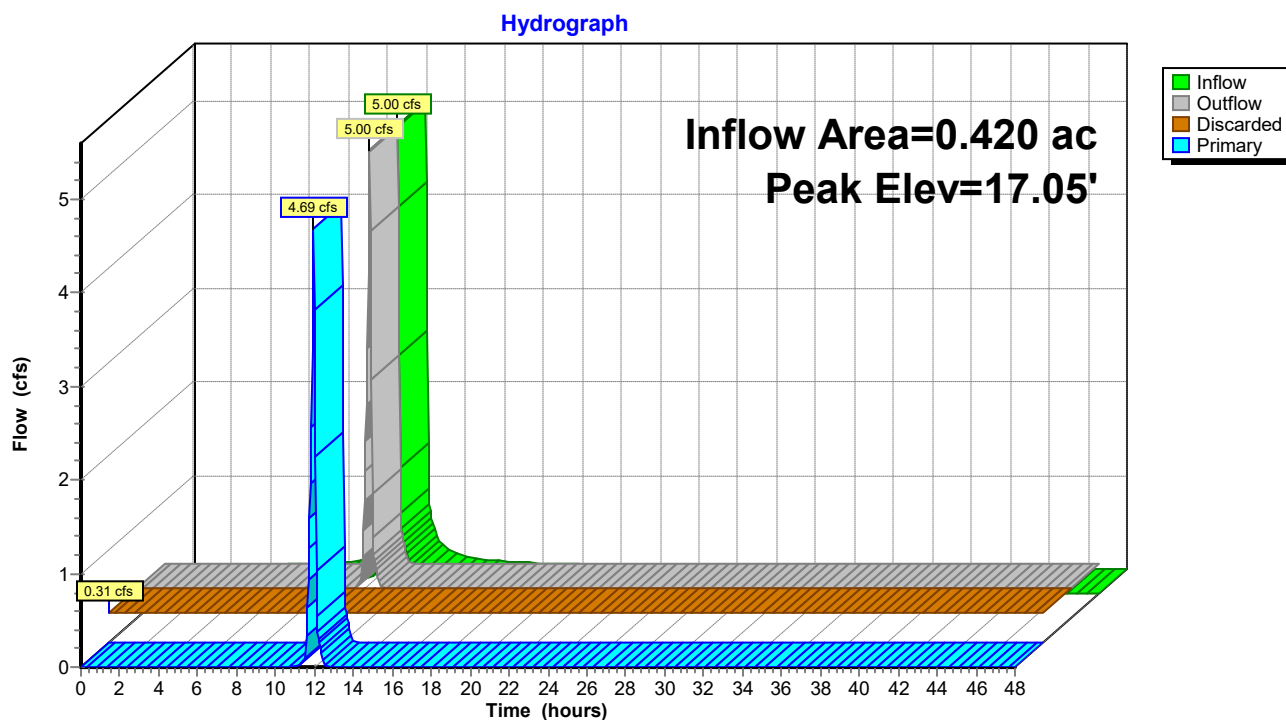
Discarded OutFlow Max=0.31 cfs @ 0.00 hrs HW=0.00' (Free Discharge)

↳ **2=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=4.55 cfs @ 11.95 hrs HW=17.04' (Free Discharge)

↳ **1=Sharp-Crested Rectangular Weir** (Weir Controls 4.55 cfs @ 1.83 fps)

Pond 10P: Existing Dry Well



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Type II 24-hr 100-Year Rainfall=8.16"

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Summary for Pond 12P: Infiltration Basin

Inflow Area = 0.880 ac, 71.59% Impervious, Inflow Depth = 6.61" for 100-Year event
Inflow = 7.10 cfs @ 12.06 hrs, Volume= 0.484 af
Outflow = 7.09 cfs @ 12.07 hrs, Volume= 0.430 af, Atten= 0%, Lag= 0.6 min
Primary = 7.09 cfs @ 12.07 hrs, Volume= 0.430 af
Routed to Link 8L : Proposed Conditions

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 18.02' @ 12.07 hrs Surf.Area= 1,272 sf Storage= 2,741 cf

Plug-Flow detention time= 89.2 min calculated for 0.429 af (89% of inflow)
Center-of-Mass det. time= 33.4 min (822.8 - 789.4)

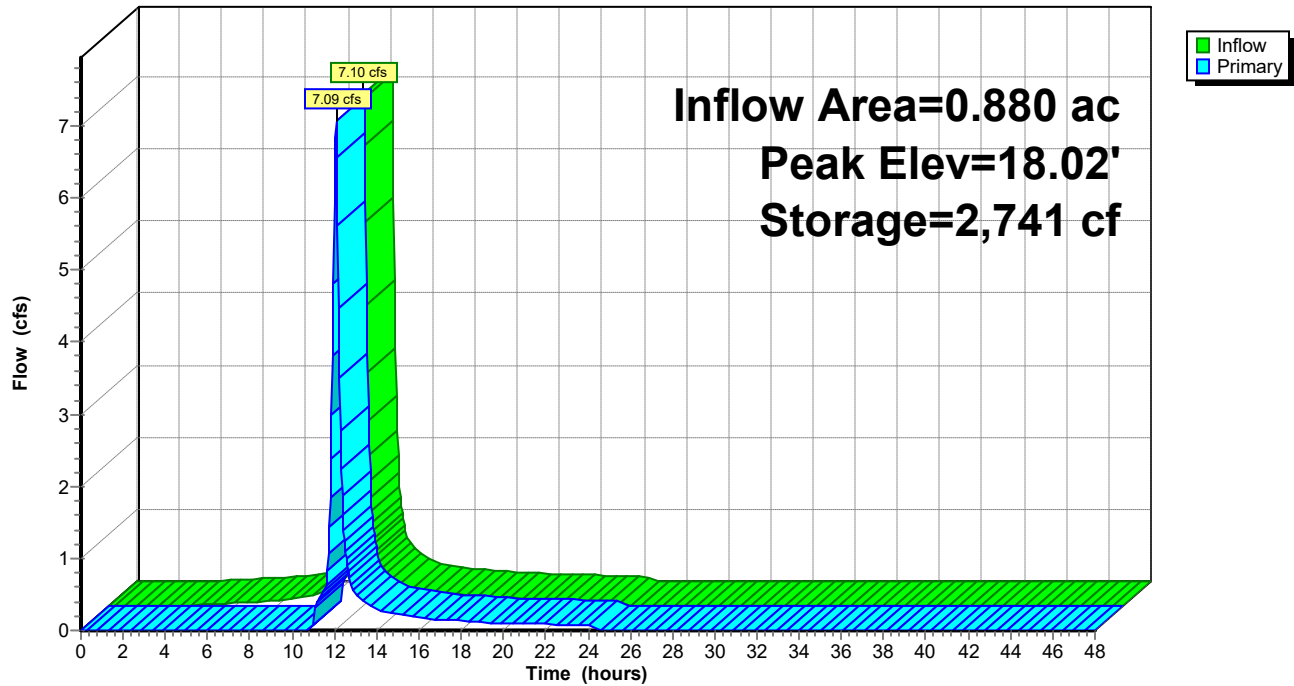
Volume	Invert	Avail.Storage	Storage Description
#1	14.00'	2,891 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	150	0	0
15.00	358	254	254
16.00	633	496	750
17.00	971	802	1,552
18.00	1,364	1,168	2,719
18.25	15	172	2,891

Device	Routing	Invert	Outlet Devices
#1	Primary	17.75'	20.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=7.02 cfs @ 12.07 hrs HW=18.02' (Free Discharge)
↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 7.02 cfs @ 1.32 fps)

Pond 12P: Infiltration Basin

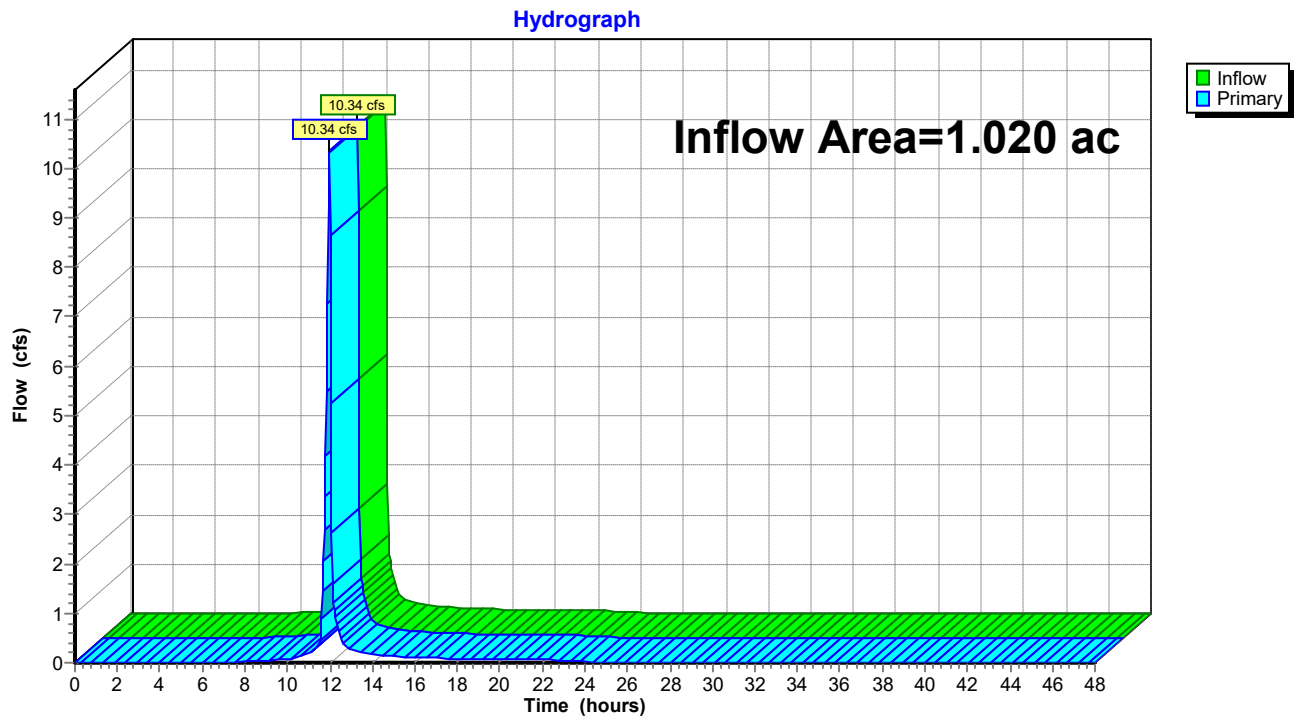
Hydrograph



Summary for Link 1L: Existing Conditions POD 1

Inflow Area = 1.020 ac, 65.69% Impervious, Inflow Depth = 4.35" for 100-Year event
Inflow = 10.34 cfs @ 11.96 hrs, Volume= 0.370 af
Primary = 10.34 cfs @ 11.96 hrs, Volume= 0.370 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 4L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

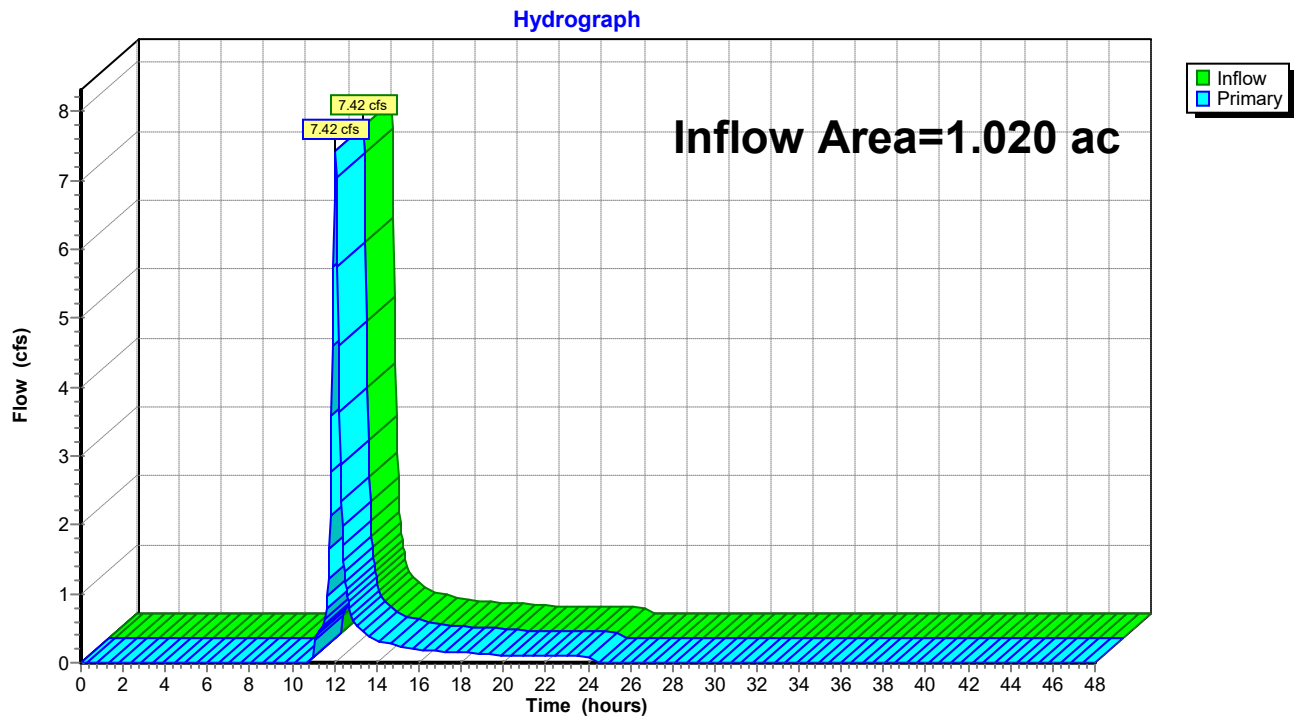
Link 1L: Existing Conditions POD 1

Summary for Link 8L: Proposed Conditions

Inflow Area = 1.020 ac, 61.76% Impervious, Inflow Depth = 5.54" for 100-Year event
 Inflow = 7.42 cfs @ 12.06 hrs, Volume= 0.471 af
 Primary = 7.42 cfs @ 12.06 hrs, Volume= 0.471 af, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 6L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Link 8L: Proposed Conditions



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Type II 24-hr WQ Storm Rainfall=1.00"

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Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Site Area Runoff Area=0.420 ac 100.00% Impervious Runoff Depth=0.79"
Tc=5.0 min CN=98 Runoff=0.56 cfs 0.028 af

Subcatchment 10S: Direct Runoff Site Area Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=61 Runoff=0.00 cfs 0.000 af

Subcatchment 11S: Existing Site Area Runoff Area=0.600 ac 41.67% Impervious Runoff Depth=0.04"
Tc=5.0 min CN=76 Runoff=0.00 cfs 0.002 af

Subcatchment 21S: On Site area to Runoff Area=0.880 ac 71.59% Impervious Runoff Depth=0.22"
Tc=15.0 min CN=87 Runoff=0.22 cfs 0.016 af

Pond 10P: Existing Dry Well Peak Elev=16.75' Inflow=0.56 cfs 0.028 af
Discarded=0.31 cfs 1.231 af Primary=0.25 cfs 0.002 af Outflow=0.56 cfs 1.233 af

Pond 12P: Infiltration Basin Peak Elev=15.95' Storage=715 cf Inflow=0.22 cfs 0.016 af
Outflow=0.00 cfs 0.000 af

Link 1L: Existing Conditions POD 1 Inflow=0.25 cfs 0.004 af
Primary=0.25 cfs 0.004 af

Link 8L: Proposed Conditions Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 2.040 ac Runoff Volume = 0.046 af Average Runoff Depth = 0.27"
36.27% Pervious = 0.740 ac 63.73% Impervious = 1.300 ac

Summary for Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Runoff = 0.56 cfs @ 11.96 hrs, Volume= 0.028 af, Depth= 0.79"
Routed to Pond 10P : Existing Dry Well

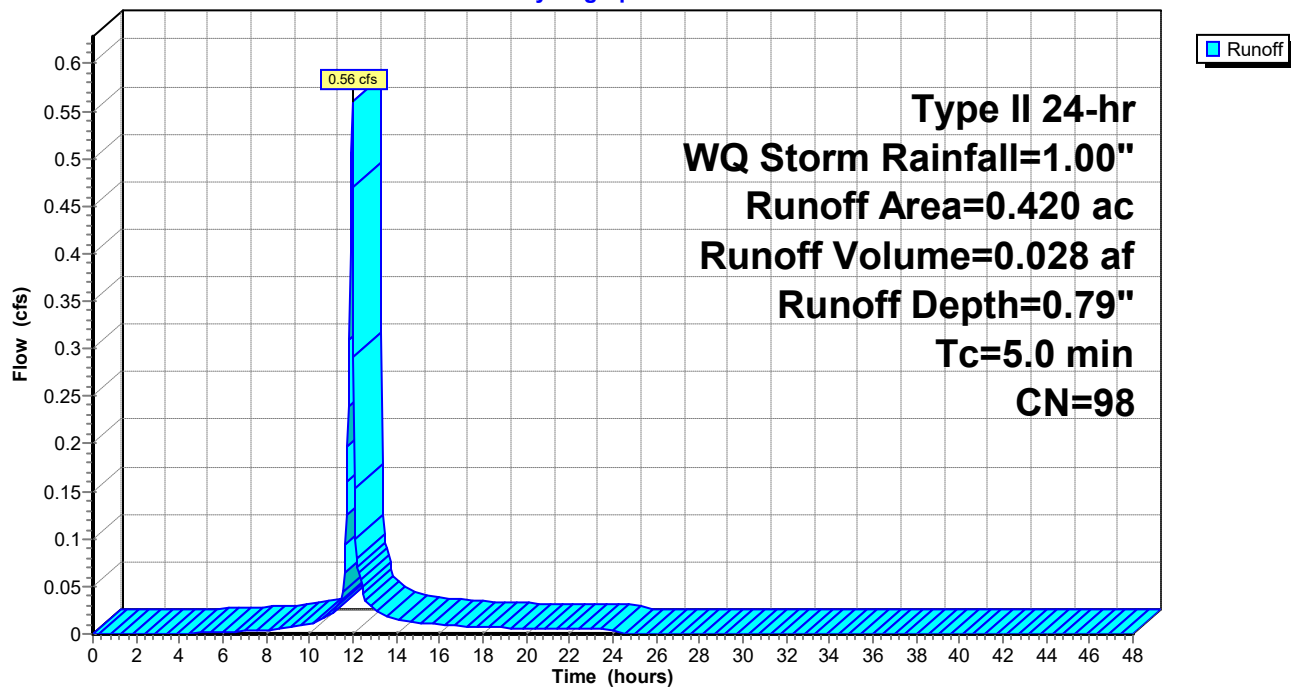
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr WQ Storm Rainfall=1.00"

Area (ac)	CN	Description
* 0.420	98	Rooftop, HSG B
0.420		100.00% Impervious Area

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

Subcatchment 1S: Existing Site Area Draining To Infiltration Basin

Hydrograph



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Type II 24-hr WQ Storm Rainfall=1.00"

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Summary for Subcatchment 10S: Direct Runoff Site Area

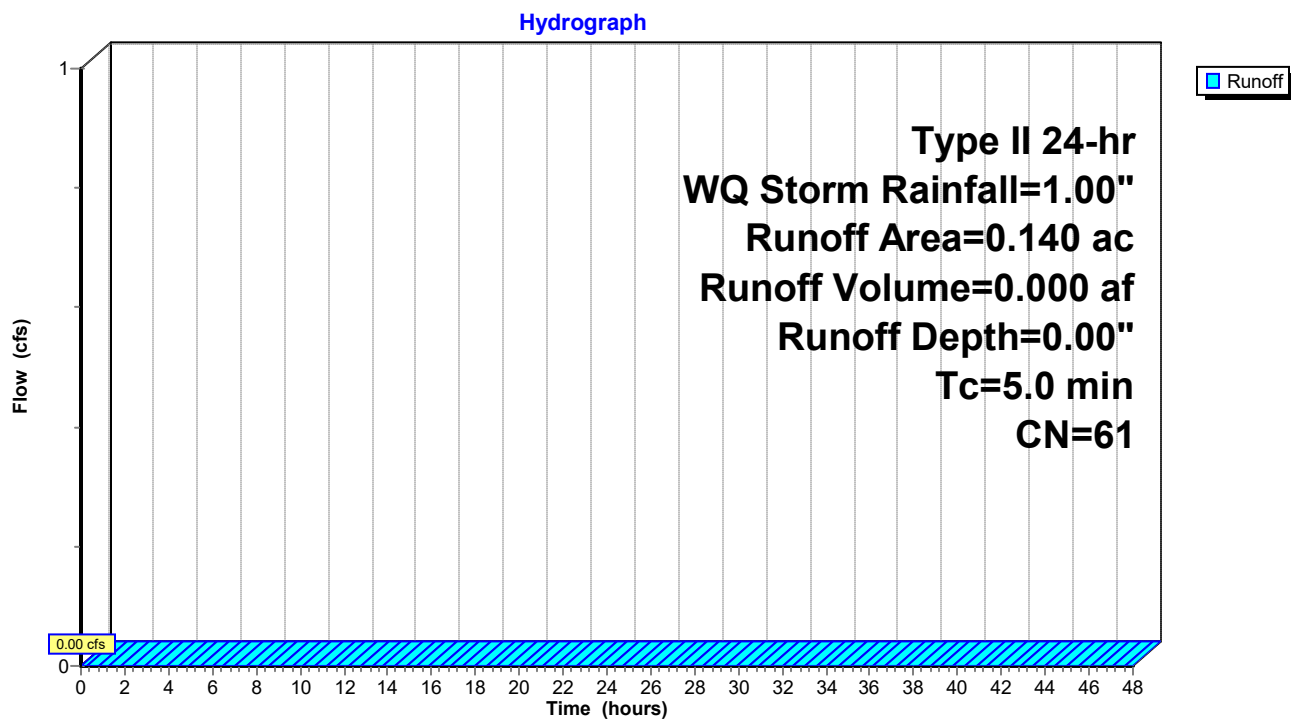
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link 8L : Proposed Conditions

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr WQ Storm Rainfall=1.00"

Area (ac)	CN	Description
0.140	61	>75% Grass cover, Good, HSG B
0.140		100.00% Pervious Area

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

Subcatchment 10S: Direct Runoff Site Area



Summary for Subcatchment 11S: Existing Site Area Draining To Infiltration Basin

Runoff = 0.00 cfs @ 12.36 hrs, Volume= 0.002 af, Depth= 0.04"

Routed to Link 1L : Existing Conditions POD 1

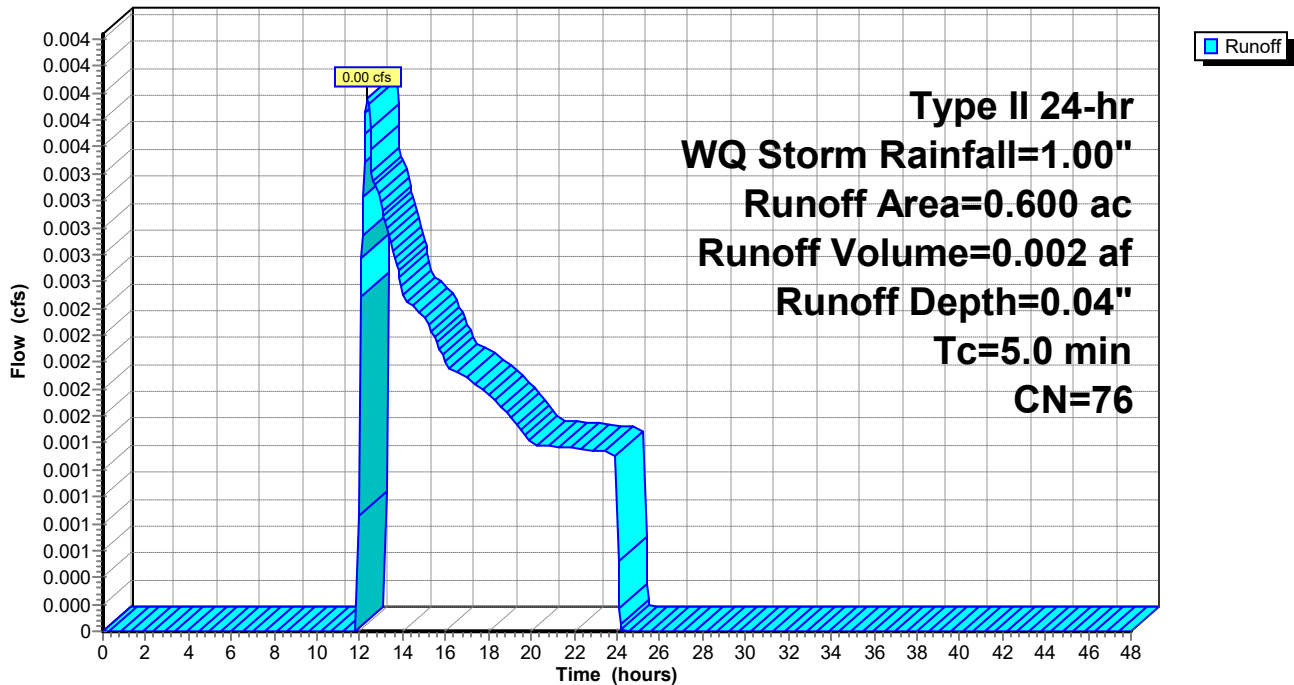
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr WQ Storm Rainfall=1.00"

Area (ac)	CN	Description
0.350	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
0.600	76	Weighted Average
0.350		58.33% Pervious Area
0.250		41.67% Impervious Area

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

Subcatchment 11S: Existing Site Area Draining To Infiltration Basin

Hydrograph



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Type II 24-hr WQ Storm Rainfall=1.00"

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Summary for Subcatchment 21S: On Site area to Infiltration Basin

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 0.22"
Routed to Pond 12P : Infiltration Basin

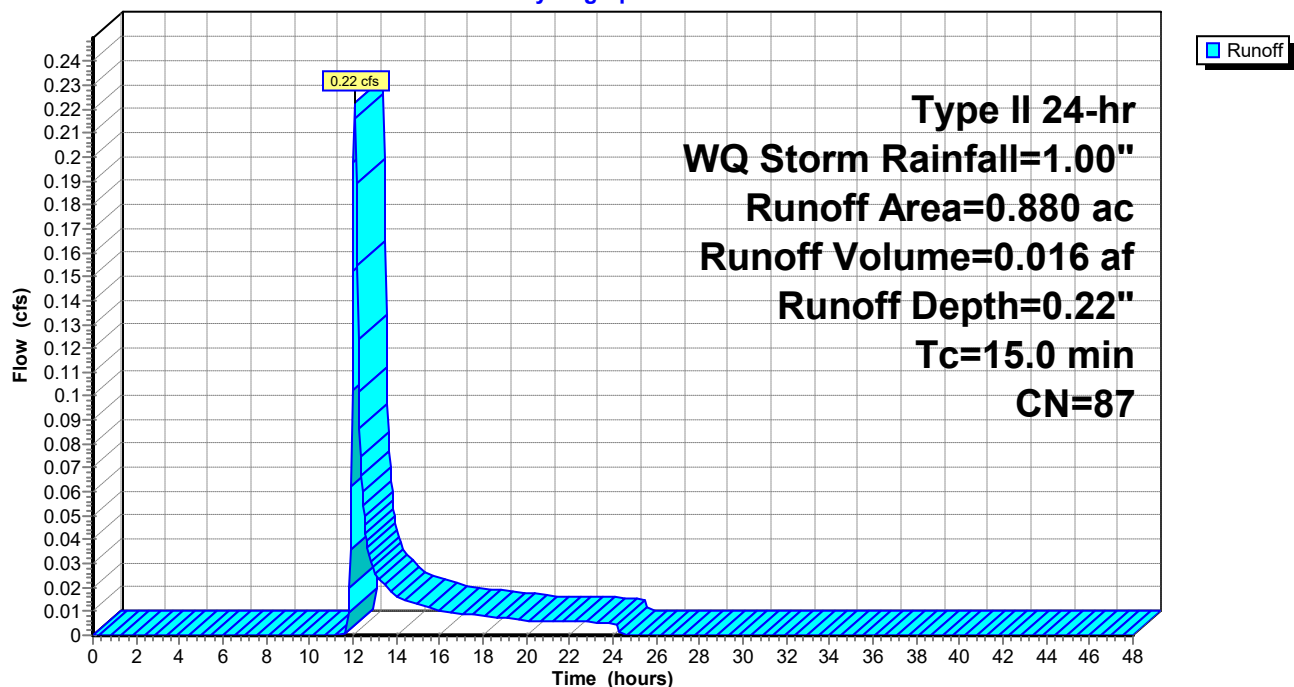
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type II 24-hr WQ Storm Rainfall=1.00"

Area (ac)	CN	Description
* 0.630	98	
0.250	61	>75% Grass cover, Good, HSG B
0.880	87	Weighted Average
0.250		28.41% Pervious Area
0.630		71.59% Impervious Area

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

Subcatchment 21S: On Site area to Infiltration Basin

Hydrograph



Summary for Pond 10P: Existing Dry Well

Inflow Area = 0.420 ac, 100.00% Impervious, Inflow Depth = 0.79" for WQ Storm event
 Inflow = 0.56 cfs @ 11.96 hrs, Volume= 0.028 af
 Outflow = 0.56 cfs @ 11.96 hrs, Volume= 1.233 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.31 cfs @ 0.00 hrs, Volume= 1.231 af
 Primary = 0.25 cfs @ 11.96 hrs, Volume= 0.002 af
 Routed to Link 1L : Existing Conditions POD 1

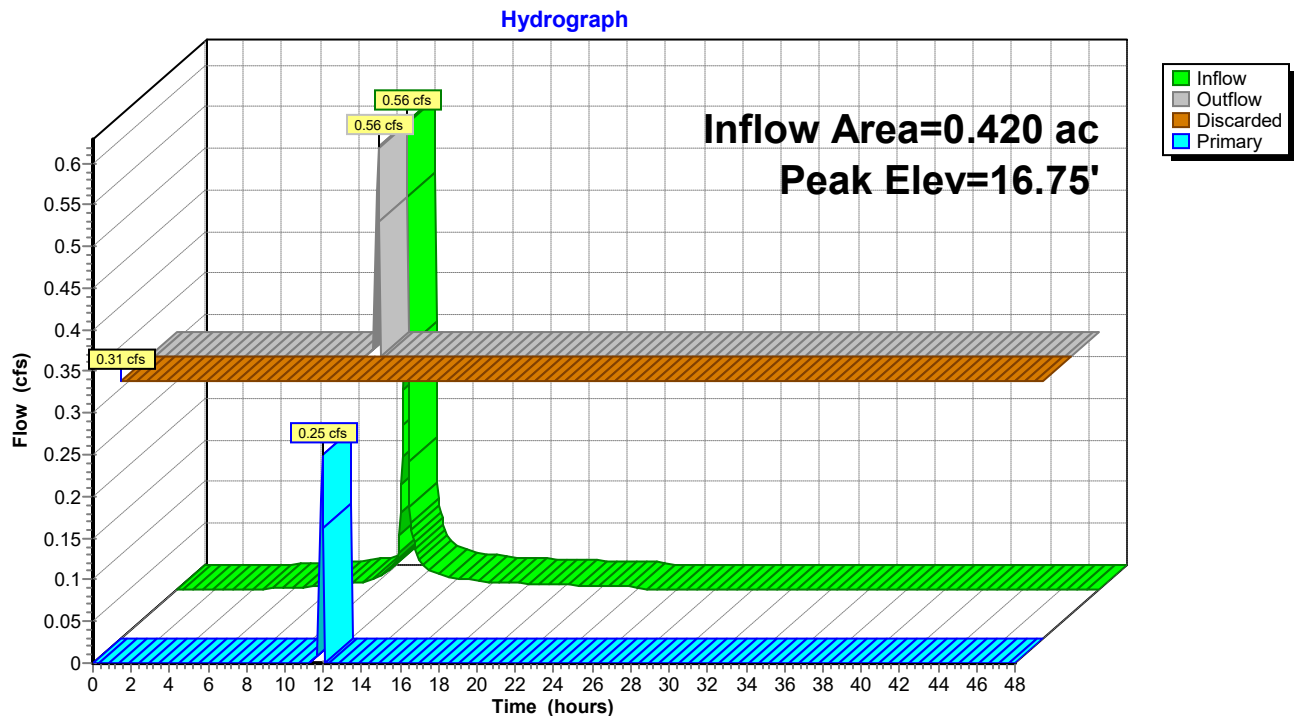
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
 Peak Elev= 16.75' @ 11.96 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	16.73'	8.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	0.00'	

Discarded OutFlow Max=0.31 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=0.09 cfs @ 11.96 hrs HW=16.75' (Free Discharge)
 ↳ **1=Sharp-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.49 fps)

Pond 10P: Existing Dry Well



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Type II 24-hr WQ Storm Rainfall=1.00"

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Summary for Pond 12P: Infiltration Basin

Inflow Area = 0.880 ac, 71.59% Impervious, Inflow Depth = 0.22" for WQ Storm event
Inflow = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 8L : Proposed Conditions

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Peak Elev= 15.95' @ 24.88 hrs Surf.Area= 618 sf Storage= 715 cf

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

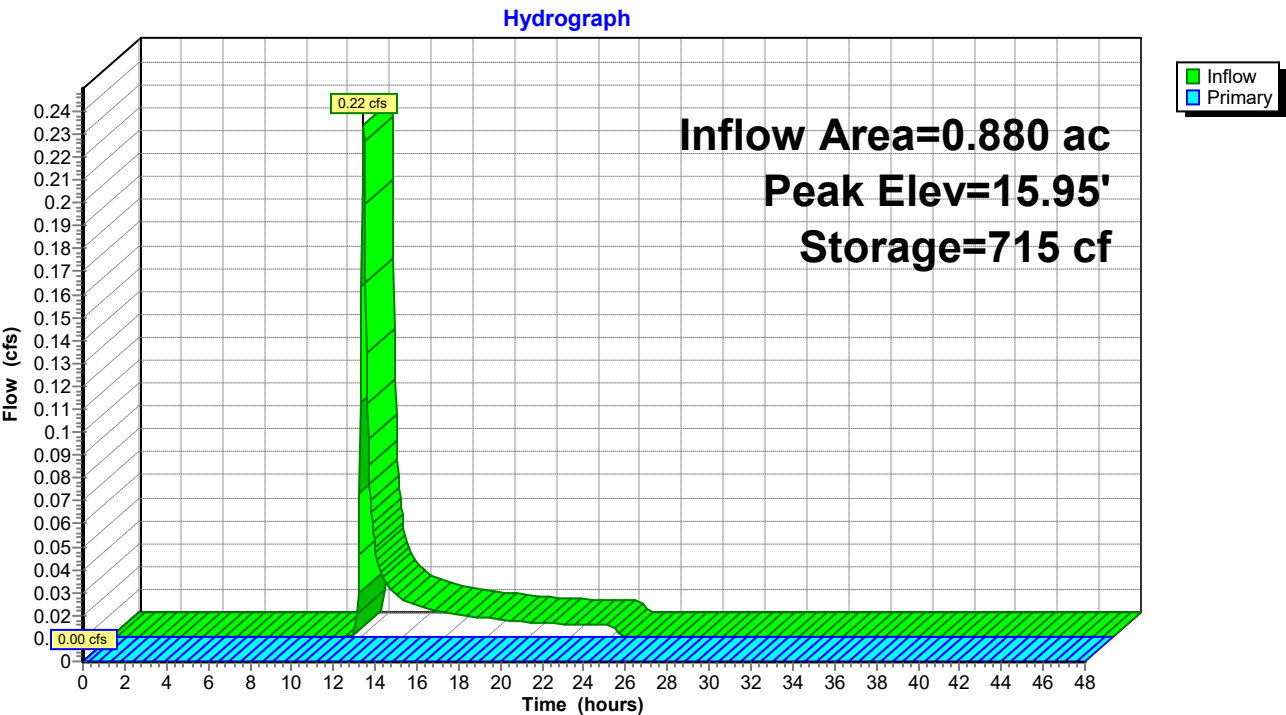
Volume	Invert	Avail.Storage	Storage Description
#1	14.00'	2,891 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	150	0	0
15.00	358	254	254
16.00	633	496	750
17.00	971	802	1,552
18.00	1,364	1,168	2,719
18.25	15	172	2,891

Device	Routing	Invert	Outlet Devices
#1	Primary	17.75'	20.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=14.00' (Free Discharge)
↑1=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: Infiltration Basin

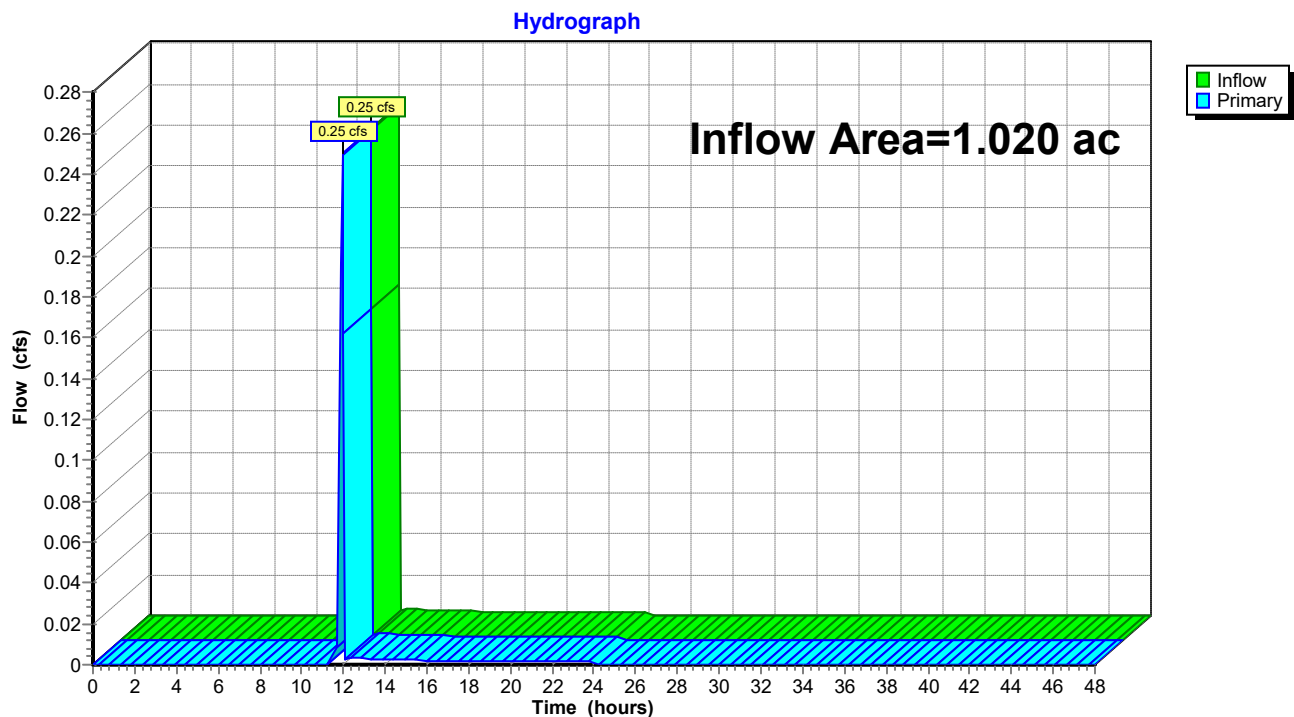


Summary for Link 1L: Existing Conditions POD 1

Inflow Area = 1.020 ac, 65.69% Impervious, Inflow Depth = 0.05" for WQ Storm event
 Inflow = 0.25 cfs @ 11.96 hrs, Volume= 0.004 af
 Primary = 0.25 cfs @ 11.96 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 4L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Link 1L: Existing Conditions POD 1

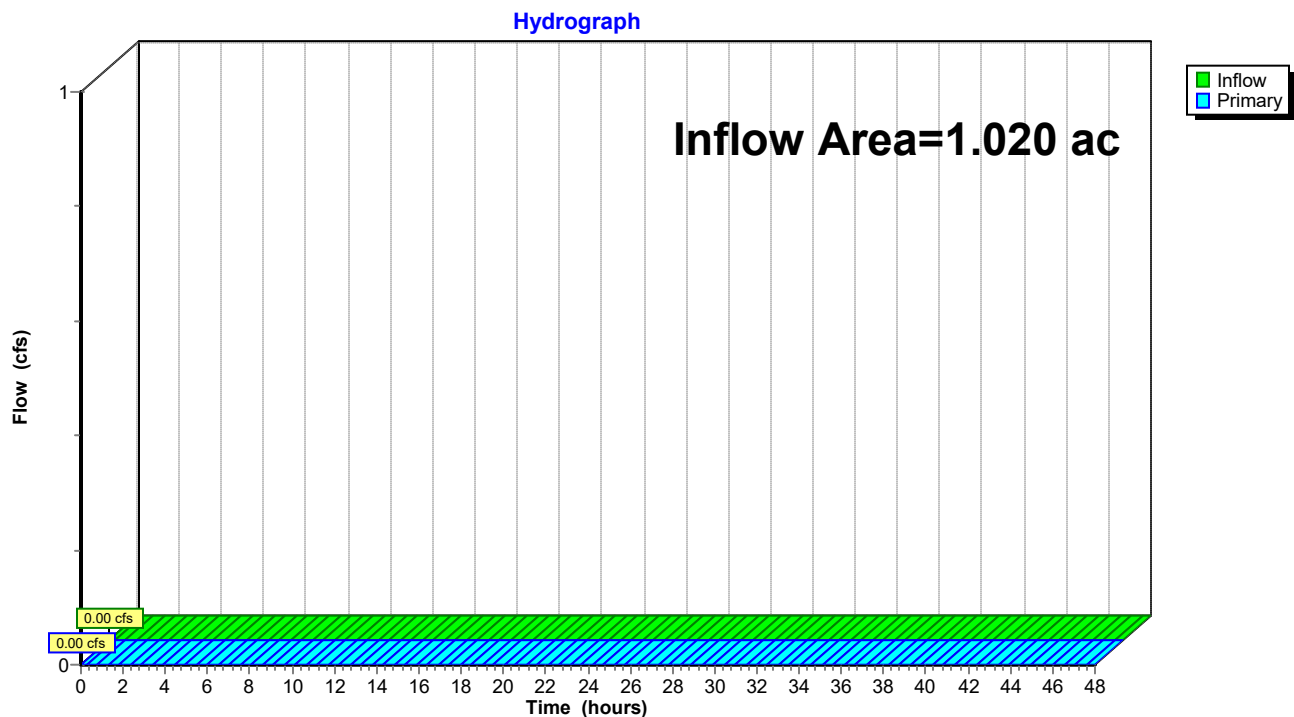


Summary for Link 8L: Proposed Conditions

Inflow Area = 1.020 ac, 61.76% Impervious, Inflow Depth = 0.00" for WQ Storm event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 6L

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs

Link 8L: Proposed Conditions



Section V

Project Plans
