
DRAINAGE REPORT

KING STREET COMMONS MIXED-USE SUBDIVISION

**ASSESSORS MAP U08, LOT 10-0
550 KING STREET
LITTLETON, MASSACHUSETTS**

Prepared for: **550 King Street, LLC**
290 Merrimack Street
Lawrence, MA 01843

Prepared by: **TEC, Inc.**
282 Merrimack Street
Lawrence, MA 01843





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.

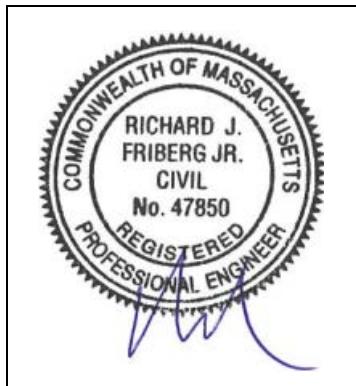
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

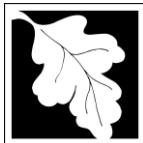


2/21/2024
Signature and Date

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): Water Quality Units

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 proprietary 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.

Table of Contents

MassDEP Checklist for Stormwater Report

List of Tables.....	ii
List of Figures.....	iii
Narrative	1
Introduction.....	1
Existing Conditions	2
Proposed Conditions.....	2
Methodology.....	3
Pre-Development Runoff	3
Post-Development Runoff	4
Regulatory Compliance.....	6
Standard 1: No New Untreated Discharges	11
Standard 2: Peak Rate Attenuation	12
Standard 3: Recharge	12
Standard 4: Water Quality	13
Standard 5: Land Uses with Higher Potential Pollutant Loads.....	15
Standard 6: Critical Areas	15
Standard 7: Redevelopment Projects.....	15
Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control	15
Standard 9: Operation and Maintenance Plan	15
Standard 10: Illicit Discharges	15
Conclusion.....	16

Appendix

A	Hydrologic Calculations
B	Water Quality Data
C	NRCS Soil Resource Report
D	Operation & Maintenance Plan
E	CPPP and Erosion Prevention & Sedimentation Control Plan
F	Illicit Discharge Compliance Statement
G	Test Pit Logs

List of Tables

Table No.	Title	Page
1	Peak Flow Summary.....	12
2	Required Recharge Volume.....	13
3	Water Quality Unit Summary.....	14

List of Figures

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
1	Project Location Map	16
2	NRCS Soil Map.....	17
3	FEMA FIRM (100-Year Floodplain).....	18
D-1	Pre-Development Drainage Areas.....	19
D-2	Post-Development Drainage Areas	20

1

Narrative

Introduction

550 King Street, LLC, “the Applicant” is proposing a mixed-use subdivision at 550 King Street comprised of 21 lots. The proposed development on these lots consists of approximately 865 residential units, 67 hotel units, 112,880 SF of commercial/retail space, 19,000 SF of office space, and a re-use of the existing IBM office buildings which total 545,500 SF. The project is identified on the Town of Littleton’s Assessors Map U08, Lot 10-0 within the King Street Common Zoning District. The project site, “the Site”, occupies a portion of the total 43.2 acreage, approximately 6.2 acres that will become a public right-of-way. The Site is situated between the intersection of King Street (southeasterly bound), Great Road (southwesterly bound), and Route 495 (northerly bound) as defined on the *Project Location Map* (Figure 1).

The Applicant is proposing to redevelop the Site by constructing a boulevard-style two lane road with 156 on-street parking spaces, utilities which will service the subdivided parcels, stormwater management infrastructure, and landscaped areas. The Preliminary Subdivision Plan has been approved by the Town of Littleton Planning Board and is seeking further review and approval from the Planning Board with the submittal of a Definitive Subdivision Plan.

This drainage study was performed in order to assess the potential impacts of the proposed improvements and to provide measures to mitigate any impacts of the project. Currently, the Site consists of paved roadway and parking areas, concrete sidewalks, and landscaped areas. Runoff from the existing Site is collected in catch basins and directed to one of three locations: a large, constructed stormwater wetland in the west corner of the parcel, an outlet near the northwest edge of the parcel, or the existing closed drainage system in King Street. The project will provide a stormwater management system incorporating traditional and Low Impact Design (LID) Best Management Practices (BMPs). This analysis has been prepared to verify that the project will not have an adverse effect on the stormwater conditions both on-site and off-site.

The Stormwater Management Plan has been designed to comply with all pertinent state and local standards including the Massachusetts Stormwater Handbook. The proposed project improves upon existing conditions by reducing peak runoff rates, decreasing the risk of erosion and sedimentation, and improving stormwater runoff quality by removing total suspended solids (TSS).

Existing Conditions

The existing Site is approximately 6.2 acres consisting of 52.7% impervious paved site driveways, parking areas, sidewalks, and 47.3% pervious landscaped islands and vegetated areas. Site topography generally grades away from the middle of the site, where runoff is conveyed via catch basins and drainage pipe networks to a constructed stormwater wetland at the west corner of the parcel or to the outfall near the northwest edge of the parcel. The elevation on Site ranges from approximately 301 feet in the center of the Site, to 257 feet at the west corner of the site and 281 feet at the east corner. The Site has two major 2:1 sloping hills, one in the center of the Site and one at the northwest corner of the Site. Another gently sloping hill exists at the west corner of the Site. The remainder of the Site is gently sloping.

The Site is comprised of a variety of soil groups according to the Natural Resources Conservation Service Web Soil Survey (NRCS), which includes Paxton-Urban land complex, Udorthents-urban land complex, Woodbridge fine sandy loam, Merrimac-Urban land complex, Scarboro mucky fine sandy loam, and Canton fine sandy loam, which span from hydrologic soil groups A to D. Please refer to Figure 2 to review the NRCS Soil Map which depicts the various soils present at and around the Site. Test pits were performed on December 21, 2023 and January 3, 2024. The test pits revealed that the Site is primarily composed of fill and sandy soils with locations of hydrologic soil groups A and C. Please see the attached Test Pit Logs in Appendix G.

According to the FEMA Flood Insurance Rate Maps (FIRM), map number 25017C0236F, dated July 7, 2014, the project is located within an area of minimal flood hazard, denoted Zone X. Please see attached FEMA National Flood Hazard Layer FIRMette.

Proposed Conditions

The proposed Site will consist of boulevard-style two lane road with 158 on-street parking spaces, utilities which will service the subdivided parcels, stormwater management infrastructure, and landscaped areas. The proposed conditions will have 69.4% impervious area consisting of paved roadway and parking areas, curbing, and cement concrete sidewalks, and 30.6% pervious landscaped areas. The proposed stormwater management system has been

designed in accordance with the Massachusetts Stormwater Handbook and includes traditional and LID BMPs. The proposed stormwater treatment system includes traditional deep sump and hooded catch basins, a subsurface CMP detention structure, a rain garden, and two water quality units for the reduction of the peak runoff and removal of TSS in post-construction conditions.

Methodology

The Stormwater Management Plan, which will be implemented as part of this project, will provide adequate collection, management, and treatment of the stormwater runoff. The proposed stormwater management system will comply with the standards set forth in the Massachusetts Stormwater Handbook.

Existing and proposed hydrologic conditions were analyzed using HydroCAD, an SCS TR-20 based program, to calculate existing and proposed peak discharge rates. This method takes into account existing and proposed pervious and impervious areas including soil types and hydrologic classifications. Peak rainfall data was collected for the Site from the NRCS rainfall data. The 2-, 10-, 25-, 50- and 100-year, 24-hour storm frequencies were used in the analysis in accordance with the Massachusetts Department of Environmental Protection (MassDEP) and Town of Littleton requirements. The "Regulatory Compliance" portion of this report addresses the ten MassDEP Stormwater Standards listed in the Massachusetts Stormwater Handbook.

Pre-Development Runoff

In the Site's current condition, there are six existing subcatchment areas. The *Pre-Development Drainage Areas* are depicted in Figure D-1 of this report. This figure presents the delineation of the existing catchment areas and design points DP-1, DP-2, and DP-3.

Existing Subcatchment Area 1 (EX-1) consists of 15,204 SF of pervious area consisting of landscaped and vegetated areas. Stormwater runoff from EX-1 either infiltrates into the ground or sheet flows into the constructed stormwater wetland, Design Point #1 (DP-1).

Existing Subcatchment Area 2 (EX-2) consists of 44,128 SF of impervious paved roadway, and 29,087 SF of pervious landscaped areas. Stormwater runoff from EX-2 either infiltrates into the ground or is captured in catch basins and routed to DP-1.

Existing Subcatchment Area 3 (EX-3) consists of 50,042 SF of impervious area consisting of paved roadway and parking areas, and 20,116 SF of pervious landscaped areas. Stormwater runoff from EX-3 either infiltrates into the ground or is captured in catch basins and routed to DP-1.

Existing Subcatchment Area 4 (EX-4) consists of 113,505 SF of impervious area consisting of paved roadway and parking areas, and cement concrete sidewalks, and 50,465 SF of pervious landscaped areas. Stormwater runoff from EX-4 is captured in catch basins and routed to the northwest edge of the Site, Design Point #3 (DP-3).

Existing Subcatchment Area 5 (EX-5) consists of 79,893 SF of impervious area consisting of paved roadway, paved parking areas, and cement concrete sidewalks, and 61,680 SF of pervious landscaped areas. Stormwater runoff from EX-5 either infiltrates into the ground or is captured in catch basins and routed to DP-3.

Existing Subcatchment Area 6 (EX-6) consists of 7,984 SF of impervious area consisting of paved roadway and cement concrete sidewalks, and 15,102 SF of pervious area consisting of landscaped and vegetated areas. Stormwater runoff from EX-6 either infiltrates into the ground or is captured in catch basins and routed to the closed drainage system which runs along King Street, Design Point #2 (DP-2).

Post-Development Runoff

The proposed stormwater management system is designed to mitigate the effects of the proposed development by reducing the peak runoff rates compared to the existing conditions. In the Site's proposed conditions, there are 37 subcatchment areas. The majority of the Site's runoff, including all runoff from impervious surfaces, is directed to the proposed CMP infiltration basin which is then routed to a water quality unit and then to the proposed rain garden that is equipped with an overflow directed towards the existing constructed stormwater wetland (DP-1). One fully pervious catchment area is directed to the northwest edge of the parcel (DP-3) via sheet flow. No proposed runoff is directed to the closed drainage system within King Street (DP-2). The post-development subcatchment areas are identified in Figure D-2, *Post-Development Drainage Areas*.

Proposed Subcatchment Area 1 (PR-1) is comprised of 17,020 SF of impervious area consisting of paved roadway and cement concrete sidewalks, and 47,501 SF of pervious landscaped area. Stormwater runoff from PR-1 either infiltrates into the ground or is captured in deep-sump and hooded catch basins or a headwall inlet, and routed to a water quality unit prior to discharge to DP-1.

Proposed Subcatchment Area 2 (PR-2) is comprised of 4,877 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,112 SF of pervious landscaped area. Stormwater runoff from PR-2 is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 3 (PR-3) is comprised of 4,253 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,505 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-3 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 4 (PR-4) is comprised of 5,665 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,015 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-4 either infiltrates into the ground or captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 5 (PR-5) is comprised of 5,641 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,673 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-5 either infiltrates into the ground or captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 6 (PR-6) is comprised of 8,558 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 6,970 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-6 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 7 (PR-7) is comprised of 7,033 SF of impervious area consisting of paved roadway and cement concrete sidewalks, and 1,770 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-7 either infiltrates into the ground or is captured

in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 8 (PR-8) is comprised of 8,596 SF of impervious area consisting of paved roadway and cement concrete sidewalks, and 7,543 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-8 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 9 (PR-9) is comprised of 5,434 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,746 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-9 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 10 (PR-10) is comprised of 4,103 SF of pervious landscaped area. Stormwater runoff from PR-10 either infiltrates into the ground or sheet flows to the northwest edge of the parcel, DP-3.

Proposed Subcatchment Area 11 (PR-11) is comprised of 9,523 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 2,826 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-11 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 12 (PR-12) is comprised of 9,087 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 3,677 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-12 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 13 (PR-13) is comprised of 3,019 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 4,574 SF of pervious area consisting of landscaped

islands and areas. Stormwater runoff from PR-13 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 14 (PR-14) is comprised of 2,653 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 572 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-14 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 15 (PR-15) is comprised of 2,331 SF of impervious area consisting of paved roadway, and parking areas, and 386 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-15 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 16 (PR-16) is comprised of 1,349 SF of impervious area consisting of paved roadway, and parking areas. Stormwater runoff from PR-16 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 17 (PR-17) is comprised of 10,249 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 4,046 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-17 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 18 (PR-18) is comprised of 9,108 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 308 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-18 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the

proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 19 (PR-19) is comprised of 1,343 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 444 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-19 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 20 (PR-20) is comprised of 6,017 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 877 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-20 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 21 (PR-21) is comprised of 6,037 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 840 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-21 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 22 (PR-22) is comprised of 3,757 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,367 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-22 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 23 (PR-23) is comprised of 5,228 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,383 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-23 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 24 (PR-24) is comprised of 4,259 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,054 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-24 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 25 (PR-25) is comprised of 4,904 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 3,308 SF of pervious area consisting of landscaped area. Stormwater runoff from PR-25 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 26 (PR-26) is comprised of 5,339 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 431 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-26 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 27 (PR-27) is comprised of 5,220 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 510 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-27 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 28 (PR-28) is comprised of 2,044 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 2,447 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-28 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 29 (PR-29) is comprised of 1,153 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 264 SF of pervious area consisting of landscaped

islands and areas. Stormwater runoff from PR-29 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 30 (PR-30) is comprised of 6,517 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 2,336 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-30 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 31 (PR-31) is comprised of 7,587 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 2,397 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-31 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 32 (PR-32) is comprised of 8,524 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 7,480 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-32 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 33 (PR-33) is comprised of 6,026 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 1,600 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-33 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 34 (PR-34) is comprised of 2,623 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 512 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-34 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the

proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 35 (PR-35) is comprised of 452 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 7 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-35 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 36 (PR-36) is comprised of 5,655 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 810 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-36 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Proposed Subcatchment Area 37 (PR-37) is comprised of 6,354 SF of impervious area consisting of paved roadway, parking areas, and cement concrete sidewalks, and 693 SF of pervious area consisting of landscaped islands and areas. Stormwater runoff from PR-37 either infiltrates into the ground or is captured in deep-sump and hooded catch basins, then routed through the proposed CMP infiltration basin, a water quality unit, and the proposed rain garden where water either infiltrates into the ground or overflows to the existing constructed stormwater wetland, DP-1.

Regulatory Compliance

The project is a combination of redevelopment and new development, with 142,149 SF of redevelopment, and 44,329 SF of new development. The Site's stormwater management design will improve upon existing conditions, and fully meets all Massachusetts Stormwater Management Standards for both the redevelopment and new development.

Standard 1: No New Untreated Discharges

No new untreated discharges are proposed or will be permitted as part of this development. The proposed point source discharge at DP-1 will receive treatment via deep-sump and hooded catch basins and water quality units. The minimal discharge to DP-3 solely consists of sheet flow over landscaped area and is anticipated to primarily infiltrate in the hydrologic soil group A soils prior to reaching DP-3.

Erosion will be prevented by the construction of rip-rap aprons in accordance with the Federal Highway Administration (FHWA) and the Natural Resource

Conservation Service (NRCS) design methods at all point source discharge locations, including inlets and outlets to the proposed rain garden. See Appendix B for apron sizing calculations. The proposed conditions will greatly improve upon the erosion control at the outfall location.

Standard 2: Peak Rate Attenuation

The proposed project meets Standard 2. The post-development peak flow is mitigated by the proposed subsurface CMP infiltration basin and rain garden. Peak discharges were calculated using HydroCAD, a TR-20 program, and include all land area within the Site and draining onto the Site. The post-development peak discharge rates do not exceed pre-development peak discharge rates for all storm events, as seen in Table 1. Please see Appendix A for the full hydrologic calculations.

Table 1 (Peak Flow Summary)

Design Point	2-Year Storm		10-Year Storm		25-Year Storm		50-Year Storm		100-Year Storm	
	Exist (cfs)	Prop (cfs)	Exist (cfs)	Prop (cfs)	Exist (cfs)	Prop (cfs)	Exist (cfs)	Prop (cfs)	Exist (cfs)	Prop (cfs)
DP-1 (Existing Constructed Stormwater Wetland)	6.76	0.06	11.94	7.05	16.06	14.04	19.89	18.28	24.50	23.03
DP-2 (King Street Closed Drainage System)	0.72	0.00	1.47	0.00	2.09	0.00	2.68	0.00	3.39	0.00
DP-3 (Northwest Edge of Parcel)	10.44	0.13	17.95	0.26	23.83	0.37	29.25	0.48	35.74	0.60

Standard 3: Recharge

Soil types were determined from the NRCS Soil Resource Report (Appendix C) and confirmed with test pits (Appendix G). The soils onsite are primarily hydrologic soil group (HSG) A, comprised of urban fill and gravelly sand. Two isolated locations were determined to have HSG C soils.

The required recharge volume has been calculated below in accordance with the Massachusetts Stormwater Manual. The new development volume and redevelopment volume will be fully infiltrated via a rain garden on the south corner of the Site. The rain garden receives pre-treatment from Contech Cascade® water quality units, receiving a minimum of 87% TSS removal.

Required Recharge Volume:

$$Rv = F \times \text{impervious area}$$

Rv = Required Recharge Volume, expressed in Ft³, cubic yards, or acre-feet

F = Target Depth Factor associated with each Hydrologic Soil Group

Impervious Area = pavement, cement concrete sidewalk

Table 2 (Required Recharge Volume)

Hydrologic Soil Group	New Development		
	F	Impervious Area (SF)	Rv (CF)
A	0.60 inch	49,018	2,451
C	0.25 inch	0	0
Total			2,451
Hydrologic Soil Group	Redevelopment		
	F	Impervious Area (SF)	Rv (CF)
A	0.60 inch	109,828	5,491
C	0.25 inch	28,500	594
Total			6,085

Because not all of the impervious area is directed to the infiltration BMP, the required recharge volume must be adjusted as seen below.

Adjusted Required Recharge Volume:

$$ARv = Rv \times (\text{Total Impervious Area} / \text{Impervious Area Directed to BMP})$$

$$ARv = (2,451 \text{ CF} + 6,085 \text{ CF}) (187,238 \text{ SF} / 167,589 \text{ SF}) = 9,537 \text{ CF}$$

The rain garden BMP has been designed to infiltrate the adjusted recharge volume for the new development and redevelopment. The BMP has a volume of 9,548 CF below the lowest outlet structure invert. The bottom of the BMP where infiltration occurs is located four feet above the estimated seasonal high groundwater table and the BMP will drain within 72 hours in accordance with the Massachusetts Stormwater Manual. The Rawls infiltration rate was determined from data from Test Pits #1 and #2 (Appendix G).

Drawdown Calculation.

$$K = \text{Saturated Hydraulic Conductivity (Rawls Rate)}$$

$$Rv = \text{Storage Volume}$$

$$Time_{drawdown} = Rv / (K)(Bottom Area)$$

$$Time_{drawdown} = [9,537 \text{ CF} / (8.27 \text{ in/hr})(5,369 \text{ SF})] \times [12 \text{ in} / 1 \text{ FT}] = 2.6 \text{ hours}$$

The adjusted required recharge volume will be fully pre-treated and infiltrated by the proposed rain garden BMP. The BMP will drain within 72 hours in accordance with the Massachusetts Stormwater Standards.

Further infiltration in excess of the adjusted required recharge volume will be provided by the subsurface corrugated metal pipe infiltration basin. A Rawl's rate of 2.41 in/hr was utilized in calculations, as determined by Test Pit #6 (Appendix G). The system will fully drain by an outlet pipe located at the bottom of the system.

Standard 4: Water Quality

Currently, there are no TSS removal BMPs onsite. Runoff flows directly into catch basins before being discharged to the constructed stormwater wetland

or to the closed drainage system along King Street, or it infiltrates into the ground.

Proposed water quality treatment includes deep-sump and hooded catch basins, three Contech Cascade® water quality units, and a rain garden located in the south corner of the Site.

The required water quality volume (WQV) has been calculated below in accordance with the Massachusetts Stormwater Manual.

Site Water Quality Volume:

V_{WQ} = Required Water Quality Volume (in cubic feet)

D_{WQ} = Water Quality Depth: 1-inch

A_{IMP} = Impervious Area (in acres)

New Development:

$$\begin{aligned} V_{WQ} &= D_{WQ} \times A_{IMP} \\ &= [(1 \text{ inch})(45,089 \text{ SF})] \times [1 \text{ FT} / 12 \text{ in}] \\ &= 3,757 \text{ CF (0.086 AF)} \end{aligned}$$

Redevelopment:

$$\begin{aligned} V_{WQ} &= D_{WQ} \times A_{IMP} \\ &= [(1 \text{ inch})(142,149 \text{ SF})] \times [1 \text{ FT} / 12 \text{ in}] \\ &= 11,846 \text{ CF (0.272 AF)} \end{aligned}$$

The water quality flow (WQF) has been calculated below to properly size the water quality units and is summarized in Table 3. All runoff from impervious areas will be treated by deep-sump and hooded catch basins prior to water quality unit treatment. Water quality units have been sized to provide a minimum of 87% annual net TSS removal, exceeding the 80% net TSS removal standard. Runoff from 92% of the impervious area will also pass through the proposed rain garden with 90% TSS removal credit after water quality unit treatment.

Example Water Quality Flow Calculation for WQU-56:

Q = Required Water Quality Flow (in cfs)

$CN = 98$

$T_c = 48 \text{ min}$

$qu = 398 \text{ csm/in}$

$$Q = (qu)(A)(WQV)$$

$$Q = (398 \text{ csm/in})(4.069 \text{ AC})(1 \text{ mi}^2 / 640 \text{ AC})(1 \text{ inch}) = 2.53 \text{ cfs}$$

Table 3 (Water Quality Unit Summary)

Unit	Contributing Impervious Area (AC)	Time of Concentration (hr)	qu (Type III Storm)	Water Quality Flow (CFS)	Model to Treat WQF	Treatment Capacity (CFS)	TSS Net Annual Removal Provided (%)
WQU-56	4.069	0.80	398	2.53	CS-5	2.00	86.99
WQU-59	0.263	0.083	795	0.33	CS-4	3.50	99.83
WQU-66	0.391	0.26	628	0.38	CS-4	3.50	99.30

Treatment Train #1 treats runoff from subcatchment areas PR-2 through PR-37 with the exception of PR-10. Groundcover includes a LUHPPL parking lot, roadway, sidewalks, and landscaped area. Runoff is collected in deep-sump and hooded catch basins which is routed to water quality units (WQU-56 and WQU-59) and then to the subsurface CMP infiltration basin. Runoff is then conveyed to the rain garden. This treatment train receives 99% TSS removal credit (See Appendix B).

Treatment Train #2 treats runoff from subcatchment area PR-1, which includes a roadway, sidewalks, and landscaped area. Runoff is collected in deep-sump and hooded catch basins and routed to a water quality unit (WQU-66). This treatment train receives 99% TSS removal credit (See Appendix B).

Subcatchment area PR-10 consists solely of landscaped area and does not receive any TSS treatment.

Standard 5: Land Uses with Higher Potential Pollutant Loads

The site includes a high-intensity use parking lot with an estimated greater than 1000 trips per day. Therefore, the site is a Land Use with a Higher Potential Pollutant Load (LUHPPL). This standard has been met by using 1 inch to calculate the required recharge volume (see Standard 3). The 44% LUHPPL TSS pre-treatment requirement prior to infiltration is exceeded (see Standard 4).

Standard 6: Critical Areas

Stormwater will not discharge to any critical areas.

Standard 7: Redevelopment Projects

This project is considered a new development and redevelopment project. New development accounts for 45,089 SF of impervious area and redevelopment accounts for 142,149 SF of impervious area.

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

This project is covered by an NPDES Construction General Permit. The CPPP and Erosion Prevention & Sedimentation Control Plan can be found in Appendix E of this report.

Standard 9: Operation and Maintenance Plan

The roadway will be maintained by the owner as described in the O&M procedures. Standard O&M procedures will be used on the parking lot including catch basin cleaning, and inspection of drainage infrastructure. Please see the Operation & Maintenance Plan in Appendix D of this report for more detail.

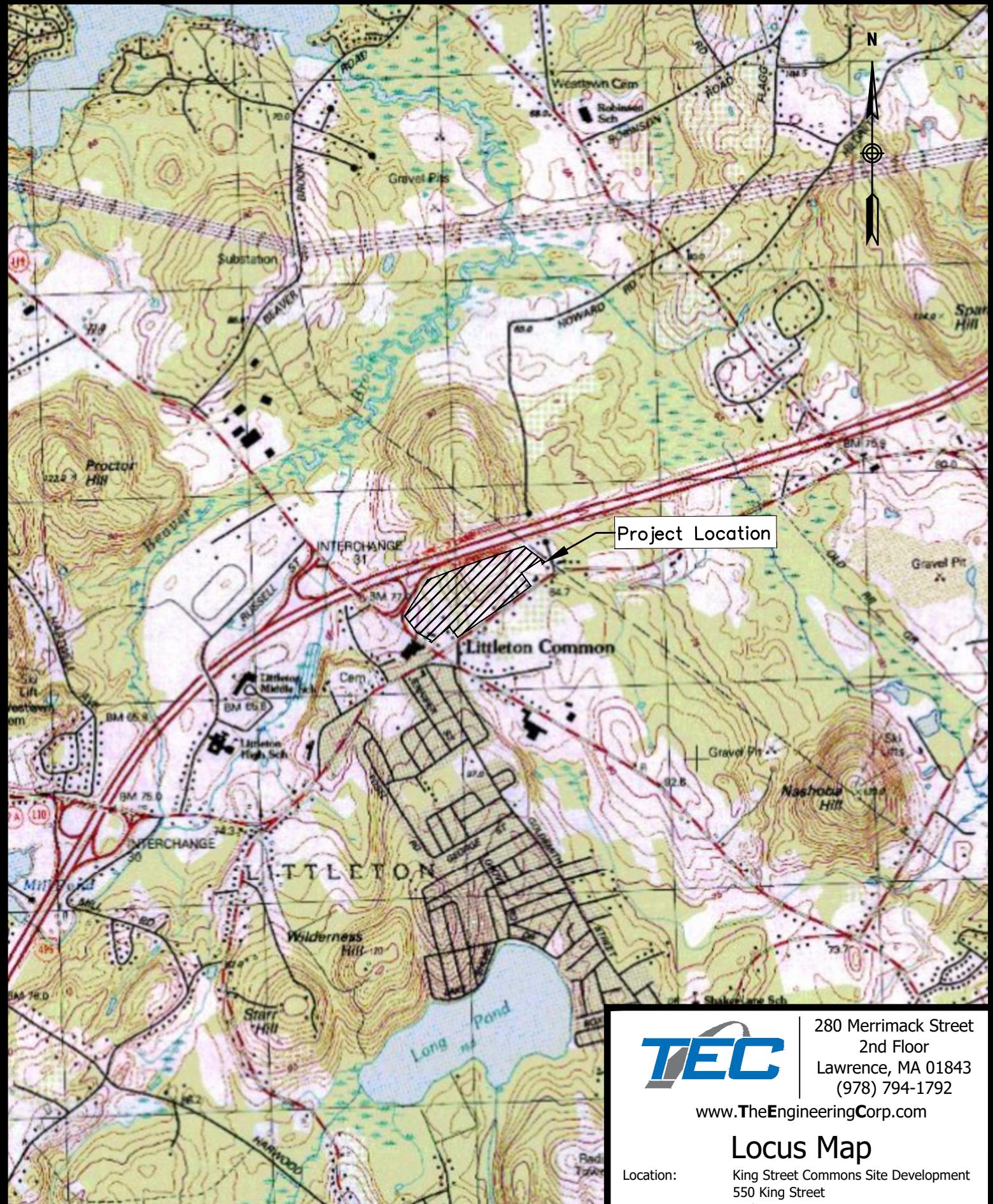
Standard 10: Illicit Discharges

No illicit discharges are expected nor will be permitted as part of the redevelopment project. An Illicit Discharge Compliance Statement can be found in Appendix F of this report.

Conclusion

The proposed site redevelopment will transform the existing site into a mixed-use development offering quality residential and commercial opportunities. The project also provides a stormwater management system to mitigate the increasing Site impervious cover associated with the project and drastically increase the quality of runoff leaving the site. The stormwater management plan controls the flow of stormwater, reduces peak runoff rates, promotes stormwater infiltration, and provides water quality treatment. The stormwater management plan provides erosion and sediment control resulting in cleaner stormwater runoff. The project has been designed in accordance with the Massachusetts Stormwater Handbook and will not adversely impact resource areas or abutting properties.

Figure 1 – Project Location Map
(Intentionally LEFT BLANK)



2000 0 2000 4000

SCALE IN FEET

February 21, 2024



280 Merrimack Street
2nd Floor
Lawrence, MA 01843
(978) 794-1792

www.TheEngineeringCorp.com

Locus Map

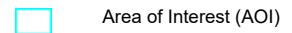
Location: King Street Commons Site Development
550 King Street
Littleton, MA 01460

Prepared For: 550 King Street, LLC
290 Merrimack Street
Lawrence, MA 01843

Figure 2 – NRCS Soil Map
(Intentionally LEFT BLANK)

Custom Soil Resource Report Soil Map



MAP LEGEND**Area of Interest (AOI)**

Area of Interest (AOI)

Soils

Soil Map Unit Polygons



Soil Map Unit Lines



Soil Map Unit Points

Special Point Features

Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, Massachusetts

Survey Area Data: Version 22, Sep 9, 2022

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

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

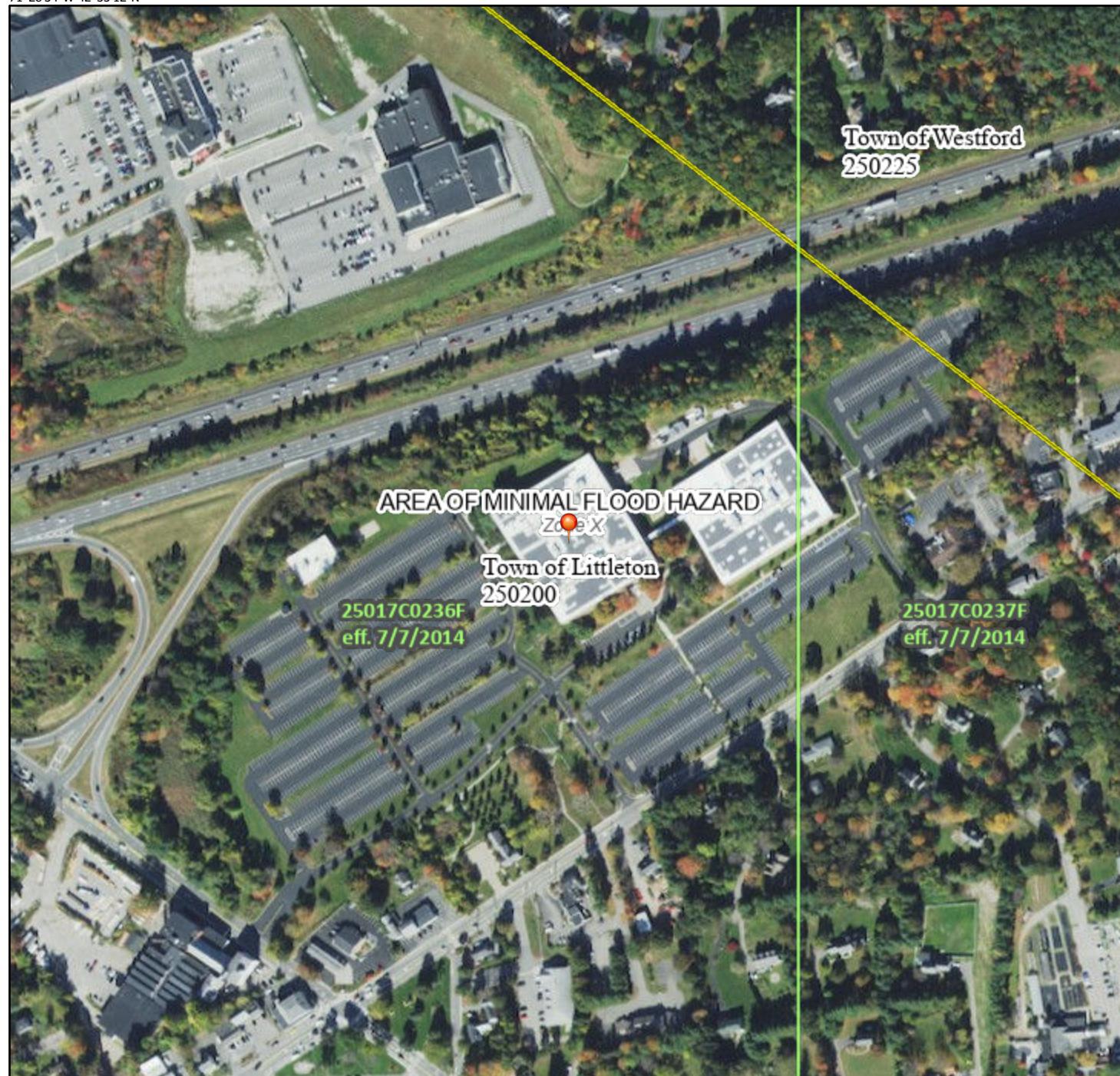
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure 3 – FEMA FIRM
(Intentionally LEFT BLANK)

National Flood Hazard Layer FIRMette



71°28'34"W 42°33'12"N



0 250 500

1,000

1,500

2,000

Feet

1:6,000

71°27'56"W 42°32'46"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X

Future Conditions 1% Annual Chance Flood Hazard Zone X

Area with Reduced Flood Risk due to Levee. See Notes. Zone X

Area with Flood Risk due to Levee Zone D

OTHER AREAS OF FLOOD HAZARD

NO SCREEN Area of Minimal Flood Hazard Zone X

Effective LOMRs

Area of Undetermined Flood Hazard Zone D

OTHER AREAS

— Channel, Culvert, or Storm Sewer

||||| Levee, Dike, or Floodwall

20.2 Cross Sections with 1% Annual Chance

17.5 Water Surface Elevation

8— Coastal Transect

~~~ 513 ~~~ Base Flood Elevation Line (BFE)

— Limit of Study

— Jurisdiction Boundary

— Coastal Transect Baseline

— Profile Baseline

— Hydrographic Feature

### OTHER FEATURES

Digital Data Available

No Digital Data Available

Unmapped



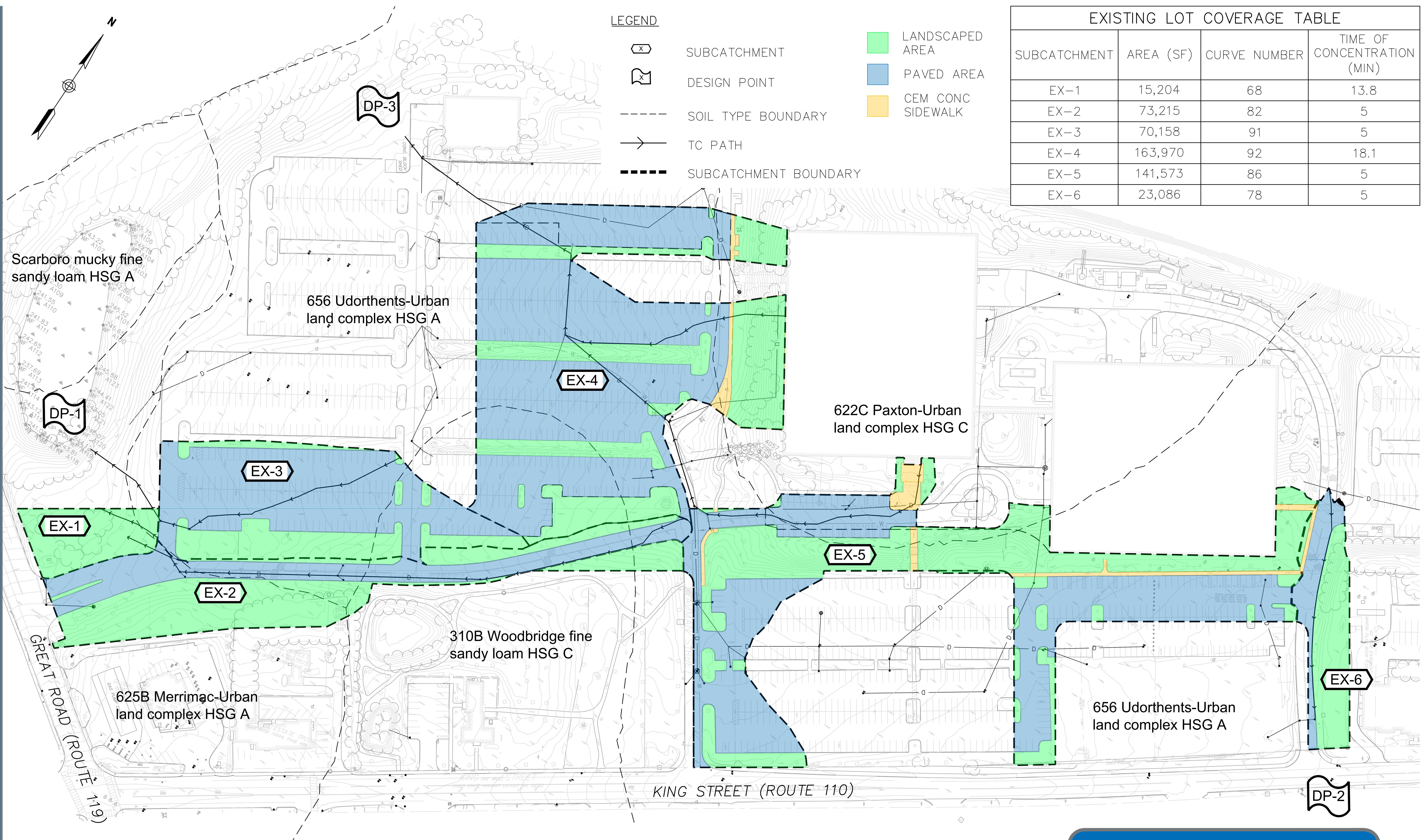
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

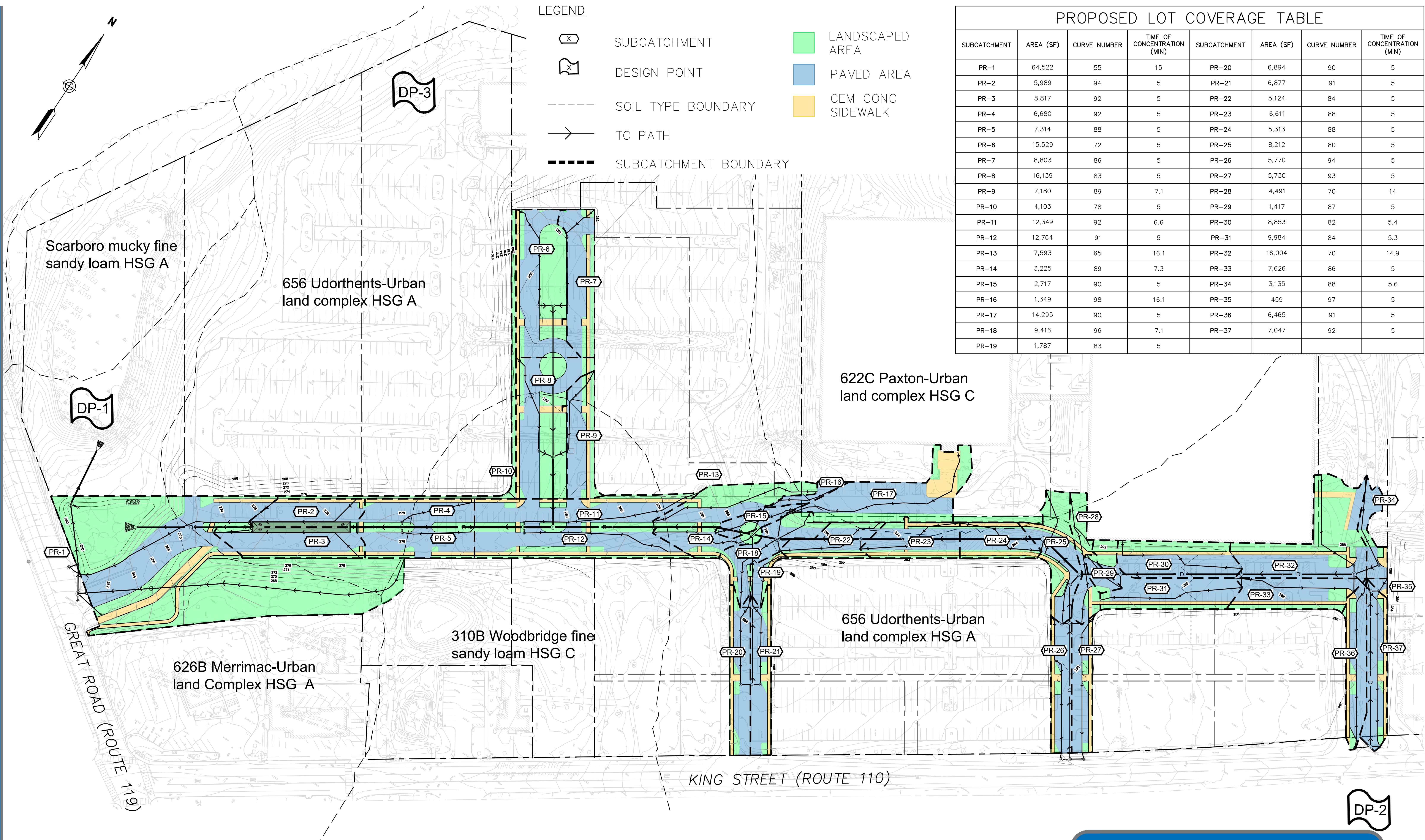
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/15/2023 at 10:23 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

**Figure D-1 Pre-Development Drainage Areas**  
(Intentionally LEFT BLANK)



**Figure D-2 – Post Development Drainage Areas  
(Intentionally LEFT BLANK)**



Post-Development Drainage Areas

550 King Street  
Littleton, Massachusetts



282 Merrimack Street  
2nd Floor  
Lawrence, MA 01843  
169 Ocean Boulevard  
Unit 101, PO Box 249  
Hampton, NH 03842  
t: (978) 794-1792  
TheEngineeringCorp.com

Scale: 1" = 60'

March 29, 2024

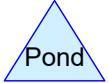
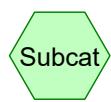
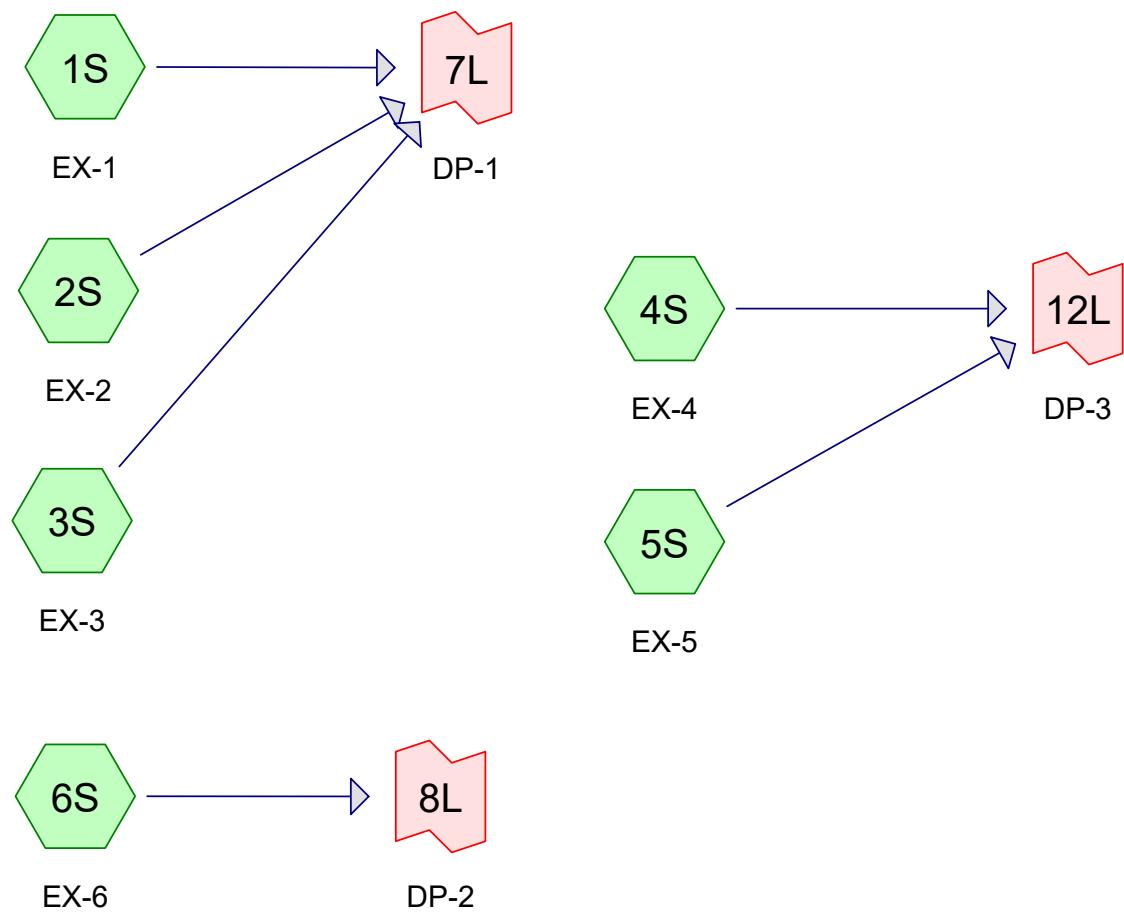
60 0 60 120  
SCALE IN FEET

# 2

## Appendix

# A

## Hydrologic Calculations



Routing Diagram for T1180\_PRE  
Prepared by TEC, Inc, Printed 1/12/2024  
HydroCAD® 10.20-4a s/n 02793 © 2023 HydroCAD Software Solutions LLC

**Rainfall Events Listing**

| Event# | Event Name | Storm Type | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|------------|-------|---------|------------------|-----|----------------|-----|
| 1      | 2-Year     | NRCC 24-hr | D     | Default | 24.00            | 1   | 3.09           | 2   |
| 2      | 10-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 4.65           | 2   |
| 3      | 25-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 5.87           | 2   |
| 4      | 50-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 7.00           | 2   |
| 5      | 100-Year   | NRCC 24-hr | D     | Default | 24.00            | 1   | 8.36           | 2   |

**Area Listing (all nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)                  |
|-----------------|-----------|--------------------------------------------------------|
| 3.551           | 68        | <50% Grass cover, Poor, HSG A (1S, 2S, 3S, 4S, 5S, 6S) |
| 1.194           | 86        | <50% Grass cover, Poor, HSG C (2S, 3S, 4S, 5S)         |
| 0.206           | 98        | Cement Concrete Sidewalk (4S, 5S, 6S)                  |
| 0.172           | 98        | Paved parking (6S)                                     |
| 4.913           | 98        | Paved parking, HSG A (2S, 4S, 5S)                      |
| 1.149           | 98        | Paved parking, HSG C (3S)                              |
| <b>11.185</b>   | <b>87</b> | <b>TOTAL AREA</b>                                      |

Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|                             |                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment1S: EX-1</b> | Runoff Area=15,204 sf 0.00% Impervious Runoff Depth=0.67"<br>Flow Length=92' Slope=0.0540 '/' Tc=13.8 min CN=68 Runoff=0.17 cfs 0.020 af |
| <b>Subcatchment2S: EX-2</b> | Runoff Area=73,215 sf 39.73% Impervious Runoff Depth=1.45"<br>Tc=5.0 min CN=82 Runoff=2.80 cfs 0.203 af                                  |
| <b>Subcatchment3S: EX-3</b> | Runoff Area=70,158 sf 71.33% Impervious Runoff Depth=2.16"<br>Tc=5.0 min CN=91 Runoff=3.87 cfs 0.289 af                                  |
| <b>Subcatchment4S: EX-4</b> | Runoff Area=163,970 sf 69.22% Impervious Runoff Depth=2.25"<br>Flow Length=302' Tc=18.1 min CN=92 Runoff=6.10 cfs 0.705 af               |
| <b>Subcatchment5S: EX-5</b> | Runoff Area=141,573 sf 56.43% Impervious Runoff Depth=1.74"<br>Tc=5.0 min CN=86 Runoff=6.46 cfs 0.471 af                                 |
| <b>Subcatchment6S: EX-6</b> | Runoff Area=23,086 sf 34.58% Impervious Runoff Depth=1.19"<br>Tc=5.0 min CN=78 Runoff=0.72 cfs 0.053 af                                  |
| <b>Link 7L: DP-1</b>        | Inflow=6.76 cfs 0.512 af<br>Primary=6.76 cfs 0.512 af                                                                                    |
| <b>Link 8L: DP-2</b>        | Inflow=0.72 cfs 0.053 af<br>Primary=0.72 cfs 0.053 af                                                                                    |
| <b>Link 12L: DP-3</b>       | Inflow=10.44 cfs 1.176 af<br>Primary=10.44 cfs 1.176 af                                                                                  |

**Total Runoff Area = 11.185 ac Runoff Volume = 1.741 af Average Runoff Depth = 1.87"**  
**42.42% Pervious = 4.745 ac 57.58% Impervious = 6.440 ac**

### Summary for Subcatchment 1S: EX-1

Runoff = 0.17 cfs @ 12.24 hrs, Volume= 0.020 af, Depth= 0.67"  
 Routed to Link 7L : DP-1

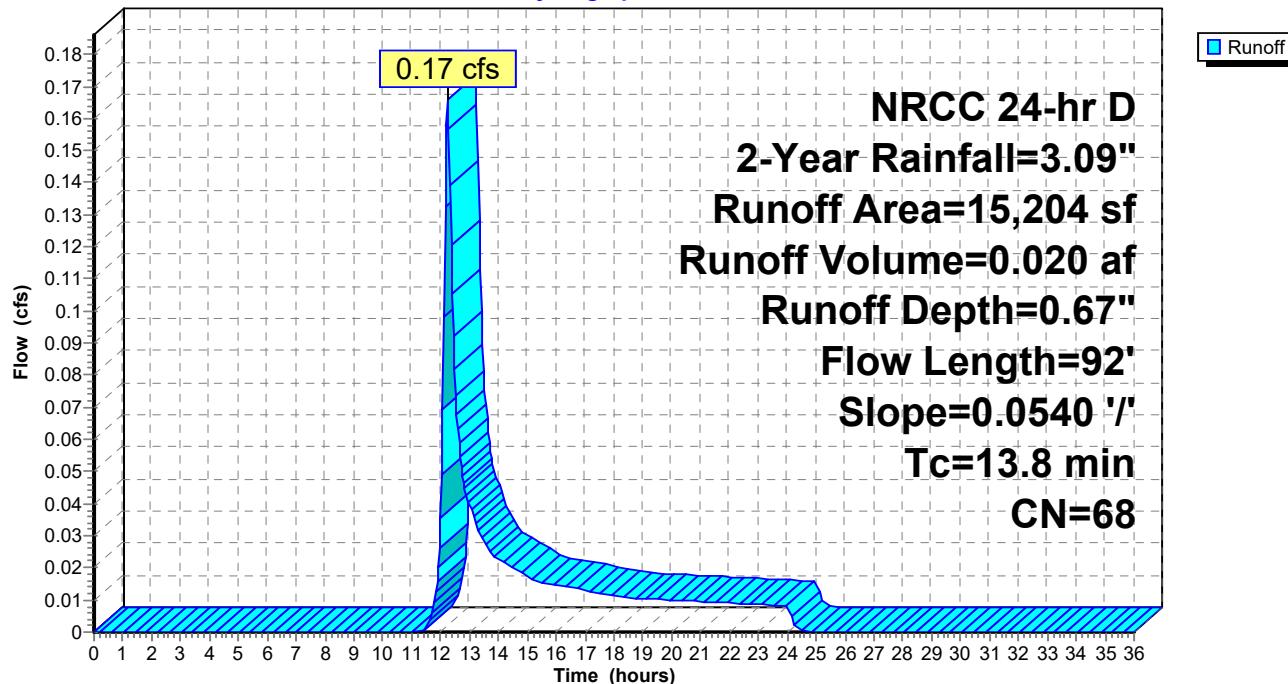
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 14,044    | 68 | <50% Grass cover, Poor, HSG A |
| 1,160     | 68 | <50% Grass cover, Poor, HSG A |
| 15,204    | 68 | Weighted Average              |
| 15,204    |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                   |
|-------------|------------------|------------------|----------------------|-------------------|---------------------------------------------------------------|
| 13.8        | 92               | 0.0540           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17" |

### Subcatchment 1S: EX-1

Hydrograph



## Summary for Subcatchment 2S: EX-2

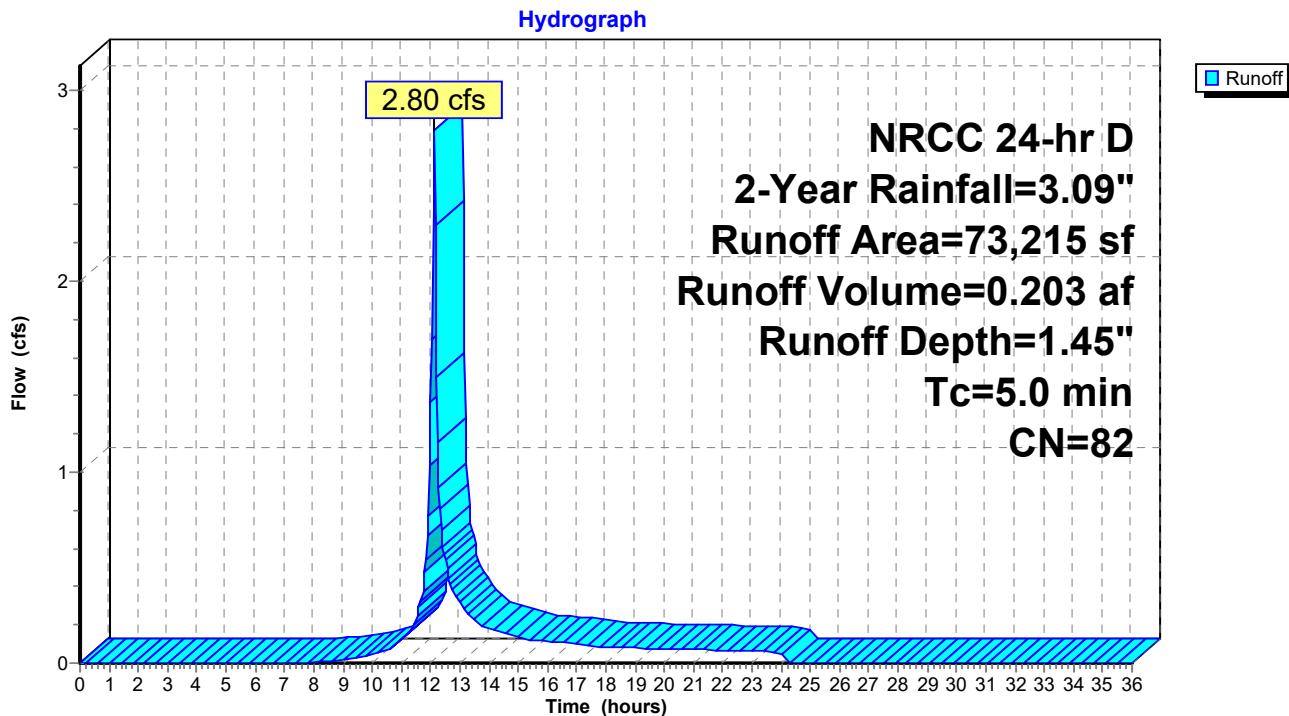
Runoff = 2.80 cfs @ 12.12 hrs, Volume= 0.203 af, Depth= 1.45"  
 Routed to Link 7L : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN     | Description                   |
|-----------|--------|-------------------------------|
| 26,739    | 68     | <50% Grass cover, Poor, HSG A |
| 9,853     | 86     | <50% Grass cover, Poor, HSG C |
| 7,536     | 68     | <50% Grass cover, Poor, HSG A |
| *         | 29,087 | Paved parking, HSG A          |
| 73,215    | 82     | Weighted Average              |
| 44,128    |        | 60.27% Pervious Area          |
| 29,087    |        | 39.73% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 2S: EX-2



### Summary for Subcatchment 3S: EX-3

Runoff = 3.87 cfs @ 12.12 hrs, Volume= 0.289 af, Depth= 2.16"  
 Routed to Link 7L : DP-1

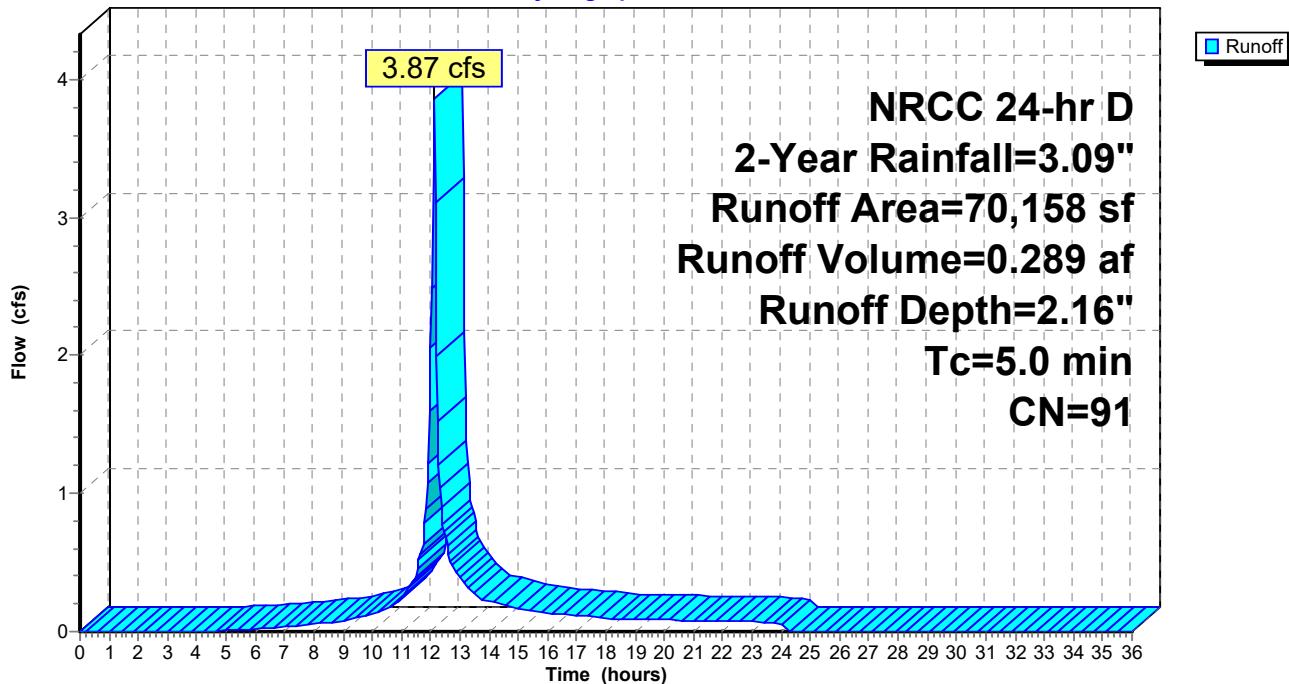
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 50,042    | 98 | Paved parking, HSG C          |
| 5,322     | 86 | <50% Grass cover, Poor, HSG C |
| 14,794    | 68 | <50% Grass cover, Poor, HSG A |
| 70,158    | 91 | Weighted Average              |
| 20,116    |    | 28.67% Pervious Area          |
| 50,042    |    | 71.33% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 3S: EX-3

Hydrograph



### Summary for Subcatchment 4S: EX-4

Runoff = 6.10 cfs @ 12.26 hrs, Volume= 0.705 af, Depth= 2.25"  
 Routed to Link 12L : DP-3

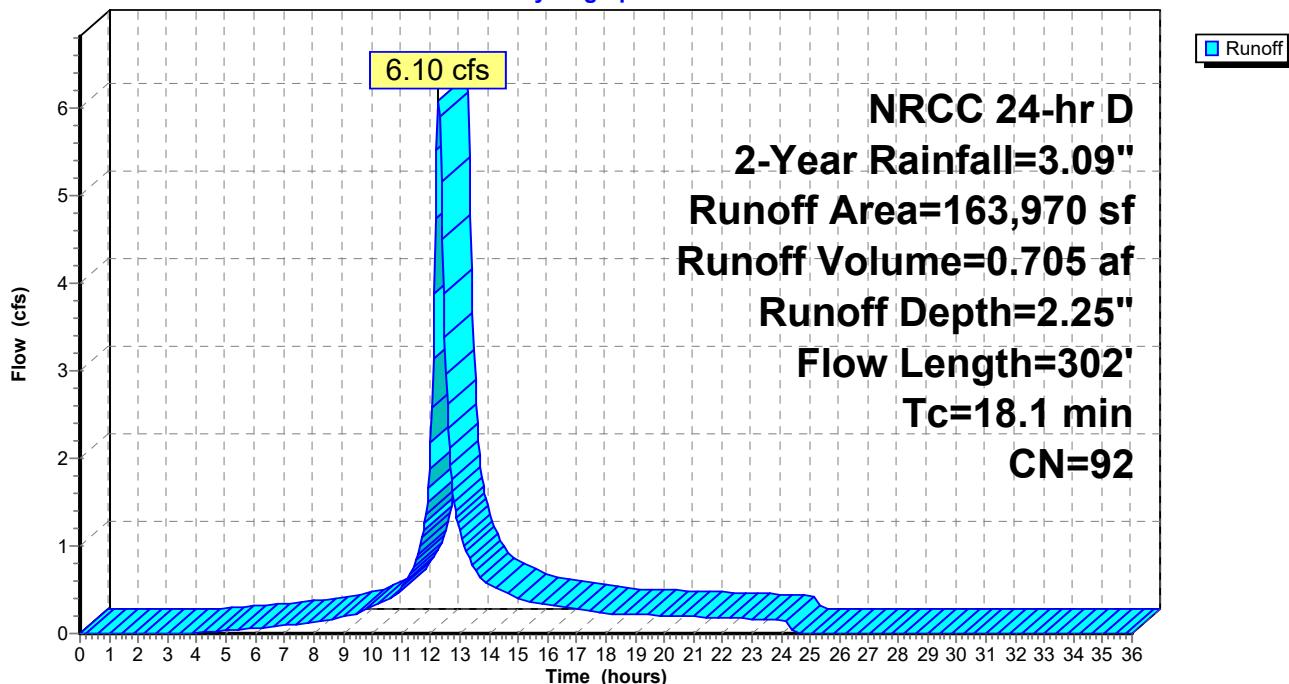
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 111,285 | 98 | Paved parking, HSG A          |
| * 2,220   | 98 | Cement Concrete Sidewalk      |
| 28,989    | 86 | <50% Grass cover, Poor, HSG C |
| 21,476    | 68 | <50% Grass cover, Poor, HSG A |
| 163,970   | 92 | Weighted Average              |
| 50,465    |    | 30.78% Pervious Area          |
| 113,505   |    | 69.22% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 17.0        | 76               | 0.0220           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17"     |
| 0.3         | 24               | 0.0400           | 1.36                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.17" |
| 0.8         | 202              | 0.0400           | 4.06                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 18.1        | 302              |                  |                      |                   | Total                                                             |

### Subcatchment 4S: EX-4

Hydrograph



## Summary for Subcatchment 5S: EX-5

Runoff = 6.46 cfs @ 12.12 hrs, Volume= 0.471 af, Depth= 1.74"  
 Routed to Link 12L : DP-3

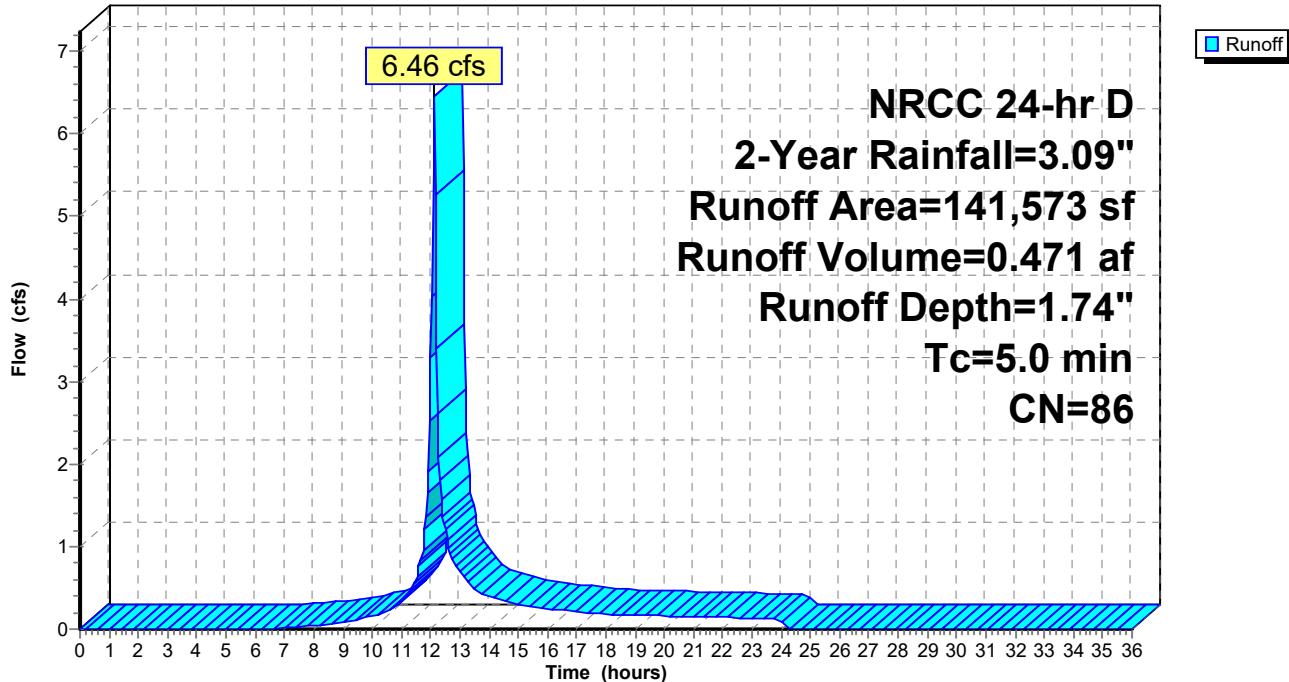
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN     | Description                   |
|-----------|--------|-------------------------------|
| *         | 73,632 | 98 Paved parking, HSG A       |
| *         | 6,261  | 98 Cement Concrete Sidewalk   |
|           | 53,820 | <50% Grass cover, Poor, HSG A |
|           | 7,860  | <50% Grass cover, Poor, HSG C |
| 141,573   | 86     | Weighted Average              |
| 61,680    |        | 43.57% Pervious Area          |
| 79,893    |        | 56.43% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 5S: EX-5

Hydrograph



## Summary for Subcatchment 6S: EX-6

Runoff = 0.72 cfs @ 12.12 hrs, Volume= 0.053 af, Depth= 1.19"  
 Routed to Link 8L : DP-2

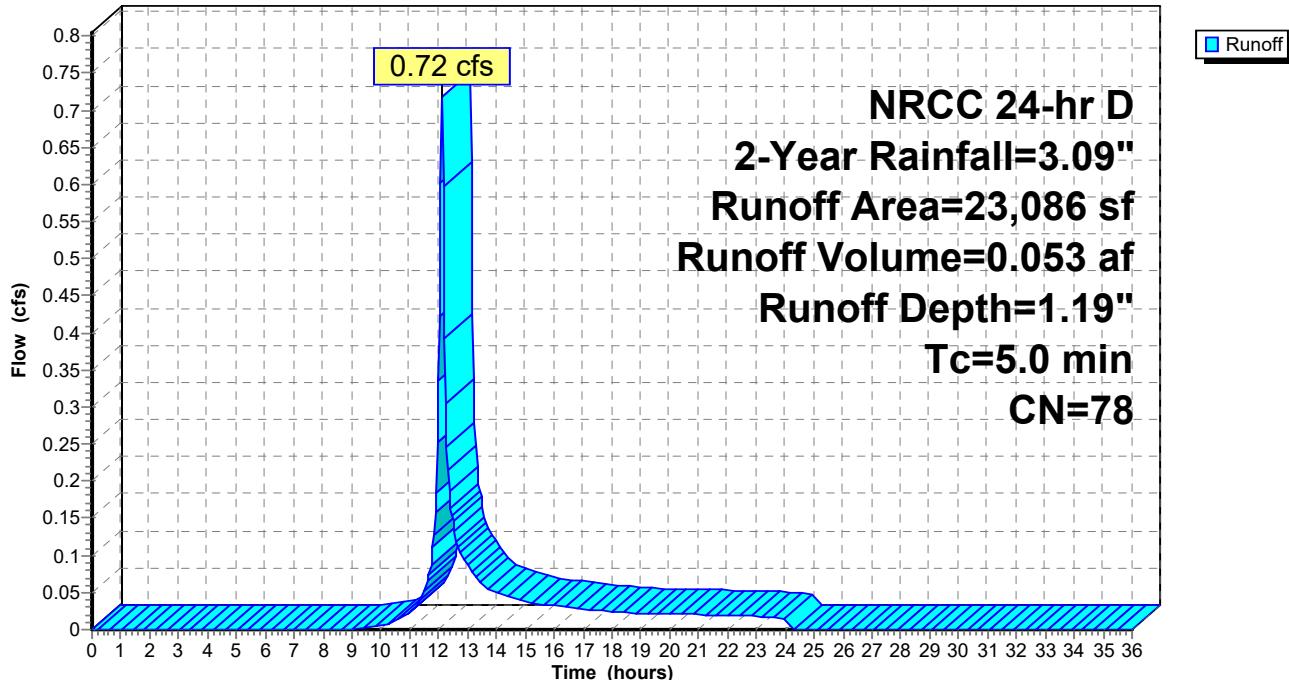
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                   |
|-----------|-------|-------------------------------|
| *         | 7,475 | 98 Paved parking              |
| *         | 509   | 98 Cement Concrete Sidewalk   |
| 15,102    | 68    | <50% Grass cover, Poor, HSG A |
| 23,086    | 78    | Weighted Average              |
| 15,102    |       | 65.42% Pervious Area          |
| 7,984     |       | 34.58% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 6S: EX-6

Hydrograph



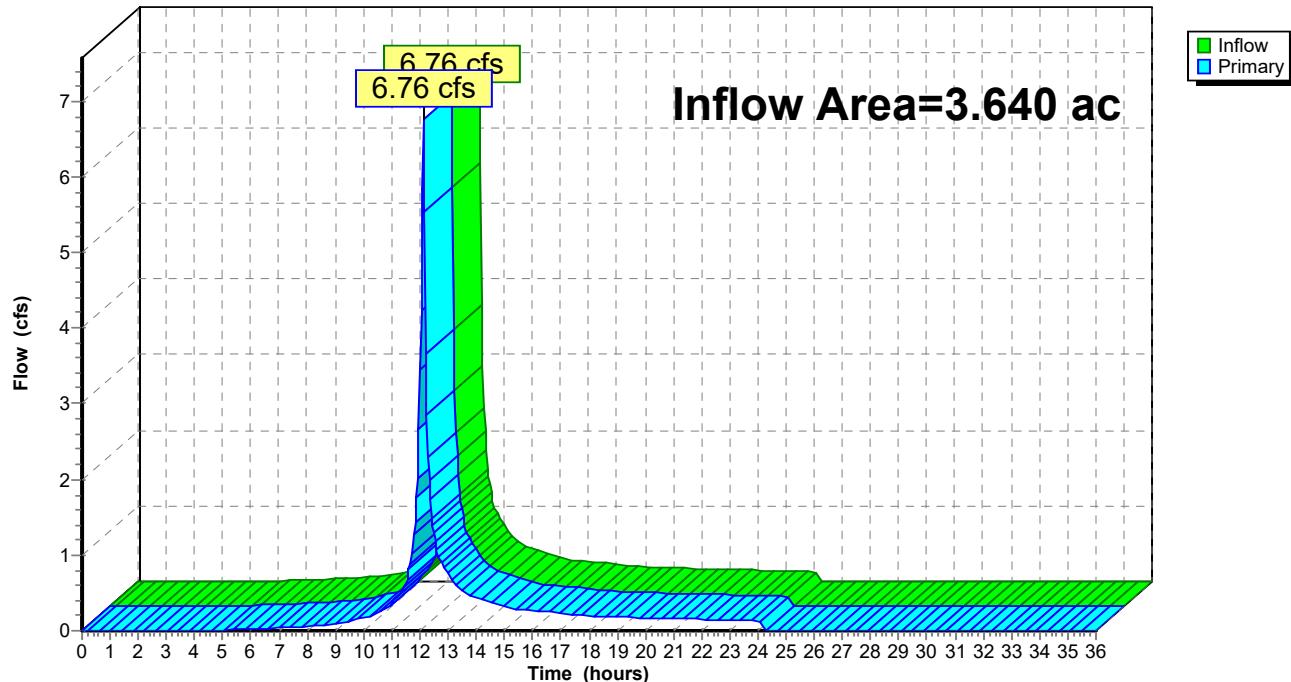
### Summary for Link 7L: DP-1

Inflow Area = 3.640 ac, 49.90% Impervious, Inflow Depth = 1.69" for 2-Year event  
Inflow = 6.76 cfs @ 12.12 hrs, Volume= 0.512 af  
Primary = 6.76 cfs @ 12.12 hrs, Volume= 0.512 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 7L: DP-1

Hydrograph



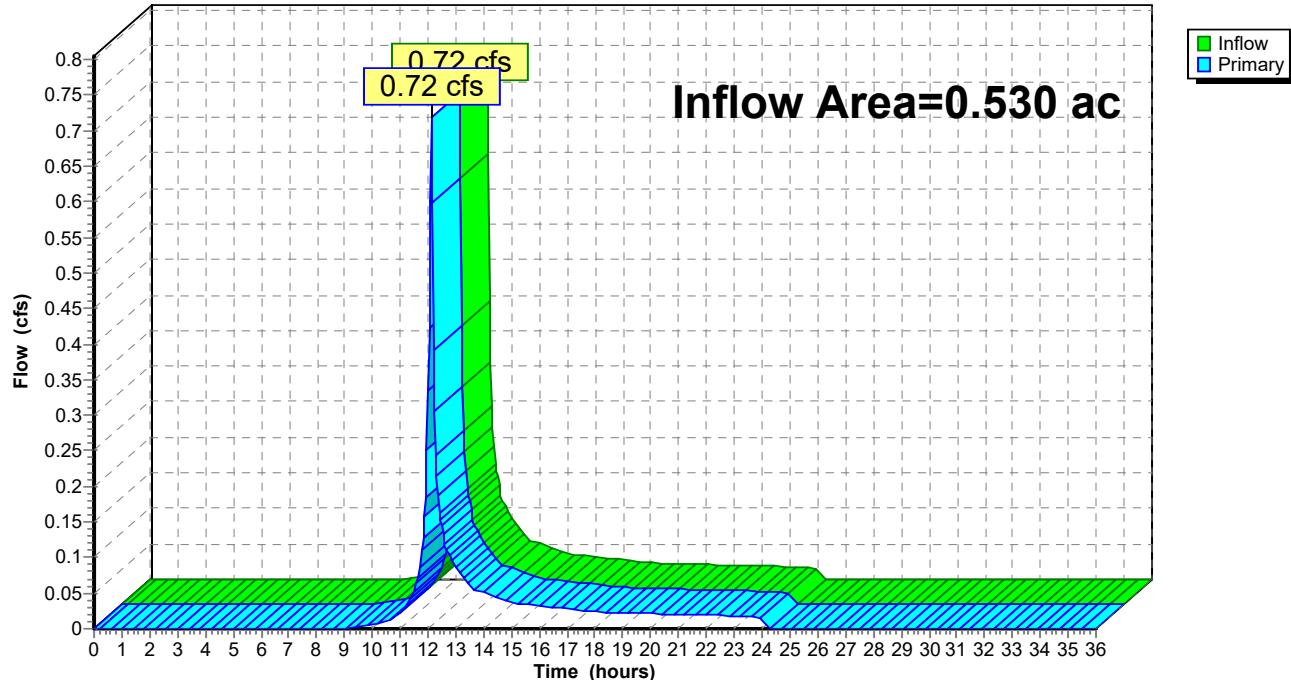
### Summary for Link 8L: DP-2

Inflow Area = 0.530 ac, 34.58% Impervious, Inflow Depth = 1.19" for 2-Year event  
Inflow = 0.72 cfs @ 12.12 hrs, Volume= 0.053 af  
Primary = 0.72 cfs @ 12.12 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 8L: DP-2

Hydrograph



### Summary for Link 12L: DP-3

Inflow Area = 7.014 ac, 63.30% Impervious, Inflow Depth = 2.01" for 2-Year event

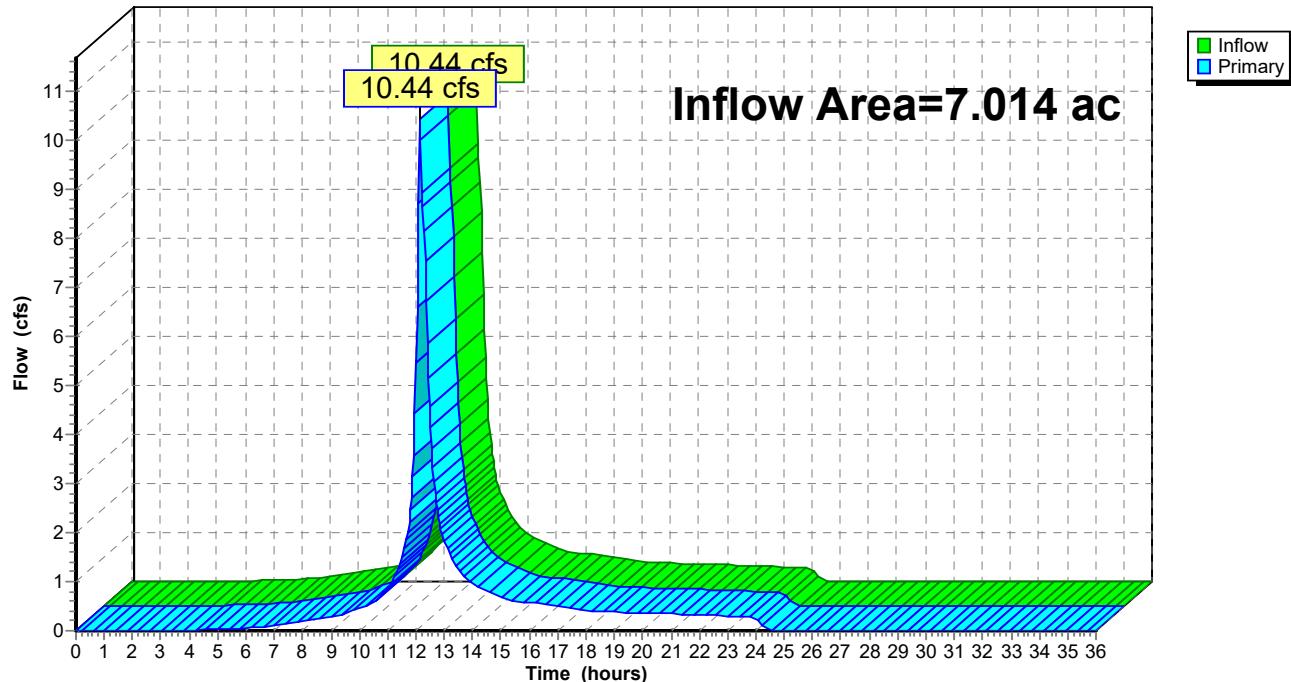
Inflow = 10.44 cfs @ 12.13 hrs, Volume= 1.176 af

Primary = 10.44 cfs @ 12.13 hrs, Volume= 1.176 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 12L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|                             |                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment1S: EX-1</b> | Runoff Area=15,204 sf 0.00% Impervious Runoff Depth=1.63"<br>Flow Length=92' Slope=0.0540 '/' Tc=13.8 min CN=68 Runoff=0.46 cfs 0.048 af |
| <b>Subcatchment2S: EX-2</b> | Runoff Area=73,215 sf 39.73% Impervious Runoff Depth=2.77"<br>Tc=5.0 min CN=82 Runoff=5.30 cfs 0.388 af                                  |
| <b>Subcatchment3S: EX-3</b> | Runoff Area=70,158 sf 71.33% Impervious Runoff Depth=3.64"<br>Tc=5.0 min CN=91 Runoff=6.34 cfs 0.489 af                                  |
| <b>Subcatchment4S: EX-4</b> | Runoff Area=163,970 sf 69.22% Impervious Runoff Depth=3.75"<br>Flow Length=302' Tc=18.1 min CN=92 Runoff=9.91 cfs 1.176 af               |
| <b>Subcatchment5S: EX-5</b> | Runoff Area=141,573 sf 56.43% Impervious Runoff Depth=3.14"<br>Tc=5.0 min CN=86 Runoff=11.44 cfs 0.851 af                                |
| <b>Subcatchment6S: EX-6</b> | Runoff Area=23,086 sf 34.58% Impervious Runoff Depth=2.42"<br>Tc=5.0 min CN=78 Runoff=1.47 cfs 0.107 af                                  |
| <b>Link 7L: DP-1</b>        | Inflow=11.94 cfs 0.924 af<br>Primary=11.94 cfs 0.924 af                                                                                  |
| <b>Link 8L: DP-2</b>        | Inflow=1.47 cfs 0.107 af<br>Primary=1.47 cfs 0.107 af                                                                                    |
| <b>Link 12L: DP-3</b>       | Inflow=17.95 cfs 2.027 af<br>Primary=17.95 cfs 2.027 af                                                                                  |

**Total Runoff Area = 11.185 ac Runoff Volume = 3.058 af Average Runoff Depth = 3.28"**  
**42.42% Pervious = 4.745 ac 57.58% Impervious = 6.440 ac**

## Summary for Subcatchment 1S: EX-1

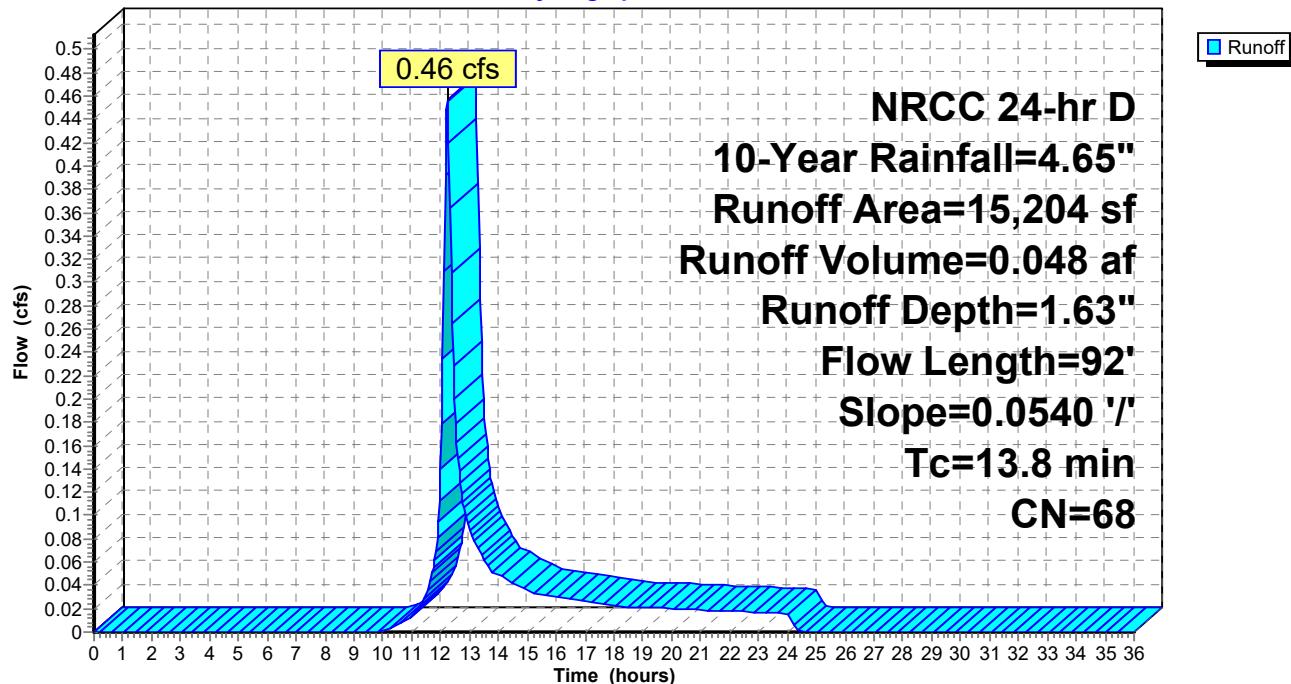
Runoff = 0.46 cfs @ 12.23 hrs, Volume= 0.048 af, Depth= 1.63"  
 Routed to Link 7L : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN            | Description                                                |      |                                                               |
|-----------|---------------|------------------------------------------------------------|------|---------------------------------------------------------------|
| 14,044    | 68            | <50% Grass cover, Poor, HSG A                              |      |                                                               |
| 1,160     | 68            | <50% Grass cover, Poor, HSG A                              |      |                                                               |
| 15,204    | 68            | Weighted Average                                           |      |                                                               |
| 15,204    |               | 100.00% Pervious Area                                      |      |                                                               |
| Tc (min)  | Length (feet) | Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description |      |                                                               |
| 13.8      | 92            | 0.0540                                                     | 0.11 | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17" |

## Subcatchment 1S: EX-1

Hydrograph



## Summary for Subcatchment 2S: EX-2

Runoff = 5.30 cfs @ 12.12 hrs, Volume= 0.388 af, Depth= 2.77"  
 Routed to Link 7L : DP-1

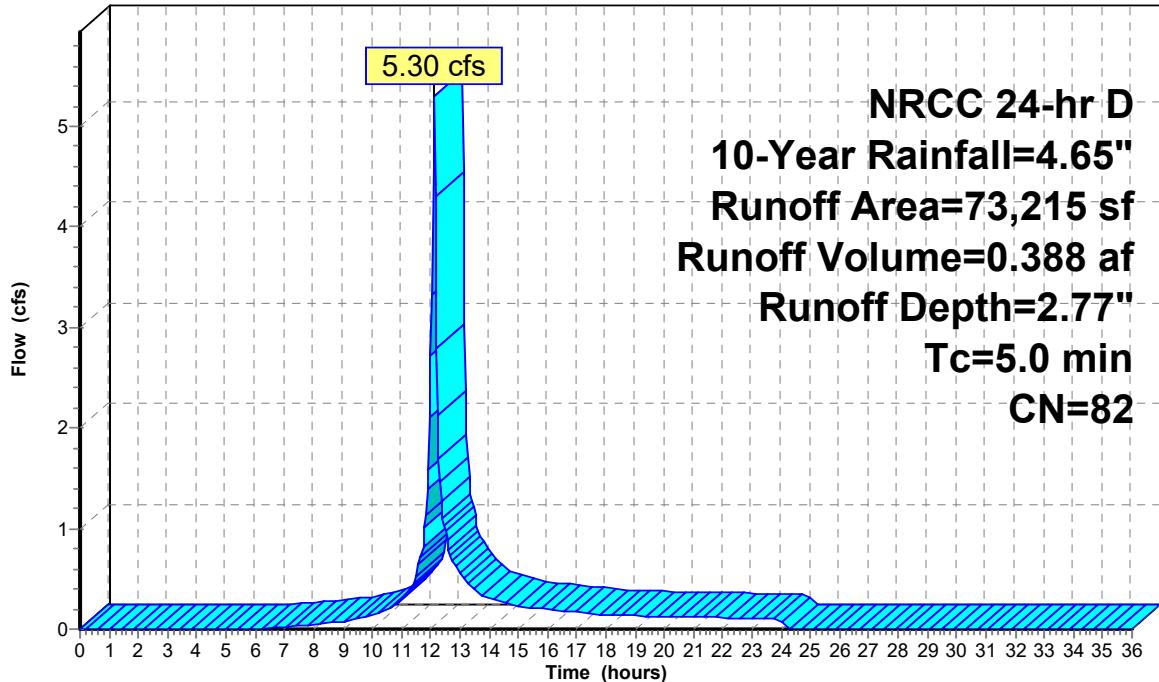
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN     | Description                   |
|-----------|--------|-------------------------------|
| 26,739    | 68     | <50% Grass cover, Poor, HSG A |
| 9,853     | 86     | <50% Grass cover, Poor, HSG C |
| 7,536     | 68     | <50% Grass cover, Poor, HSG A |
| *         | 29,087 | Paved parking, HSG A          |
| 73,215    | 82     | Weighted Average              |
| 44,128    |        | 60.27% Pervious Area          |
| 29,087    |        | 39.73% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 2S: EX-2

Hydrograph



### Summary for Subcatchment 3S: EX-3

Runoff = 6.34 cfs @ 12.12 hrs, Volume= 0.489 af, Depth= 3.64"  
 Routed to Link 7L : DP-1

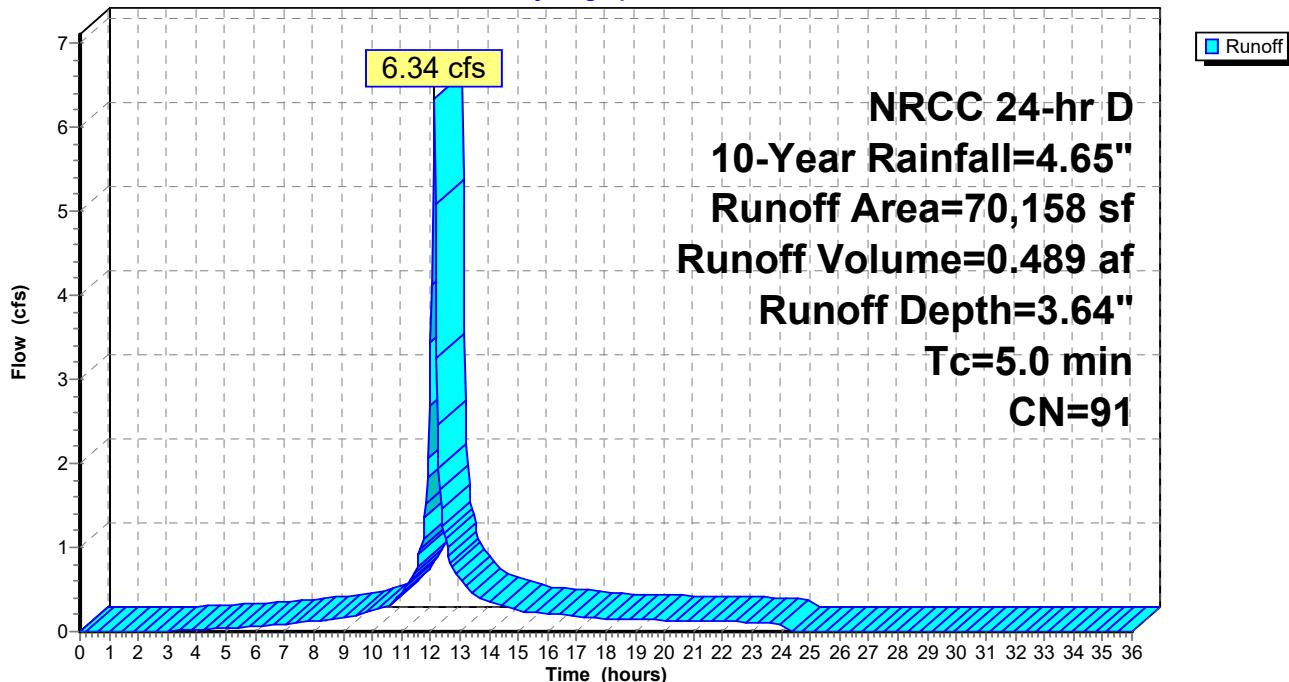
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 50,042    | 98 | Paved parking, HSG C          |
| 5,322     | 86 | <50% Grass cover, Poor, HSG C |
| 14,794    | 68 | <50% Grass cover, Poor, HSG A |
| 70,158    | 91 | Weighted Average              |
| 20,116    |    | 28.67% Pervious Area          |
| 50,042    |    | 71.33% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 3S: EX-3

Hydrograph



### Summary for Subcatchment 4S: EX-4

Runoff = 9.91 cfs @ 12.26 hrs, Volume= 1.176 af, Depth= 3.75"  
 Routed to Link 12L : DP-3

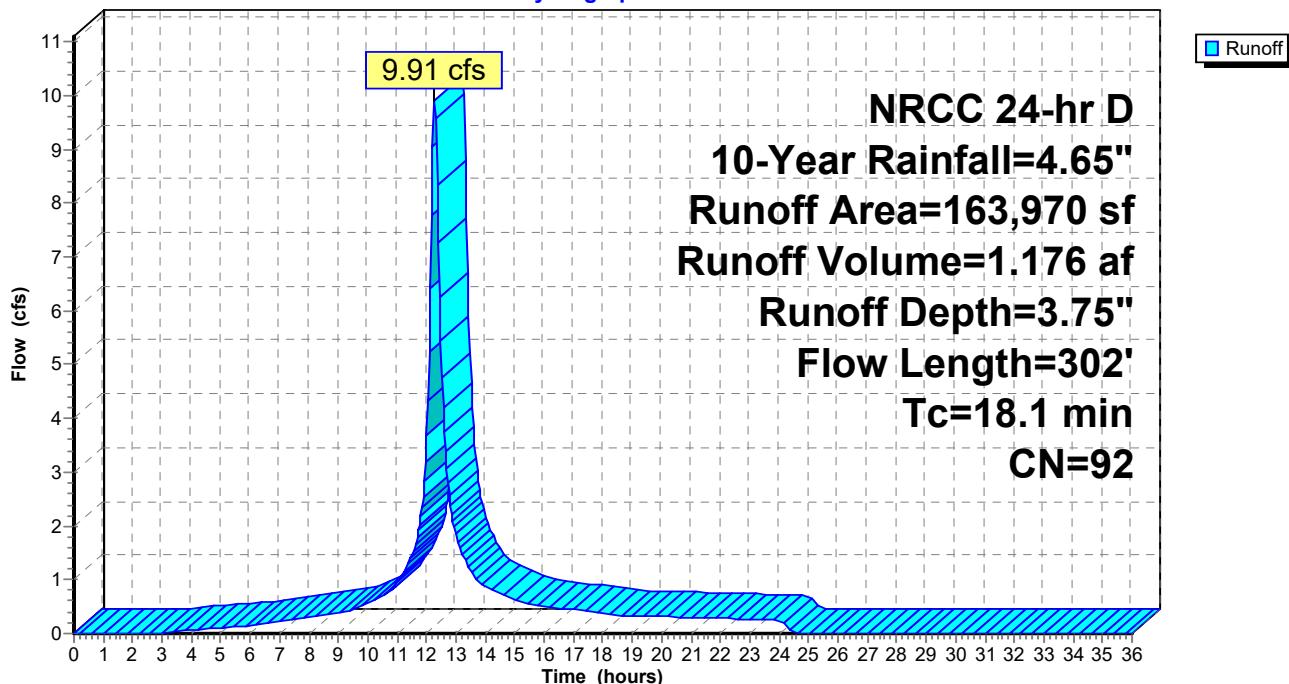
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 111,285 | 98 | Paved parking, HSG A          |
| * 2,220   | 98 | Cement Concrete Sidewalk      |
| 28,989    | 86 | <50% Grass cover, Poor, HSG C |
| 21,476    | 68 | <50% Grass cover, Poor, HSG A |
| 163,970   | 92 | Weighted Average              |
| 50,465    |    | 30.78% Pervious Area          |
| 113,505   |    | 69.22% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 17.0        | 76               | 0.0220           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17"     |
| 0.3         | 24               | 0.0400           | 1.36                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.17" |
| 0.8         | 202              | 0.0400           | 4.06                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 18.1        | 302              |                  |                      |                   | Total                                                             |

### Subcatchment 4S: EX-4

Hydrograph



### Summary for Subcatchment 5S: EX-5

Runoff = 11.44 cfs @ 12.12 hrs, Volume= 0.851 af, Depth= 3.14"  
 Routed to Link 12L : DP-3

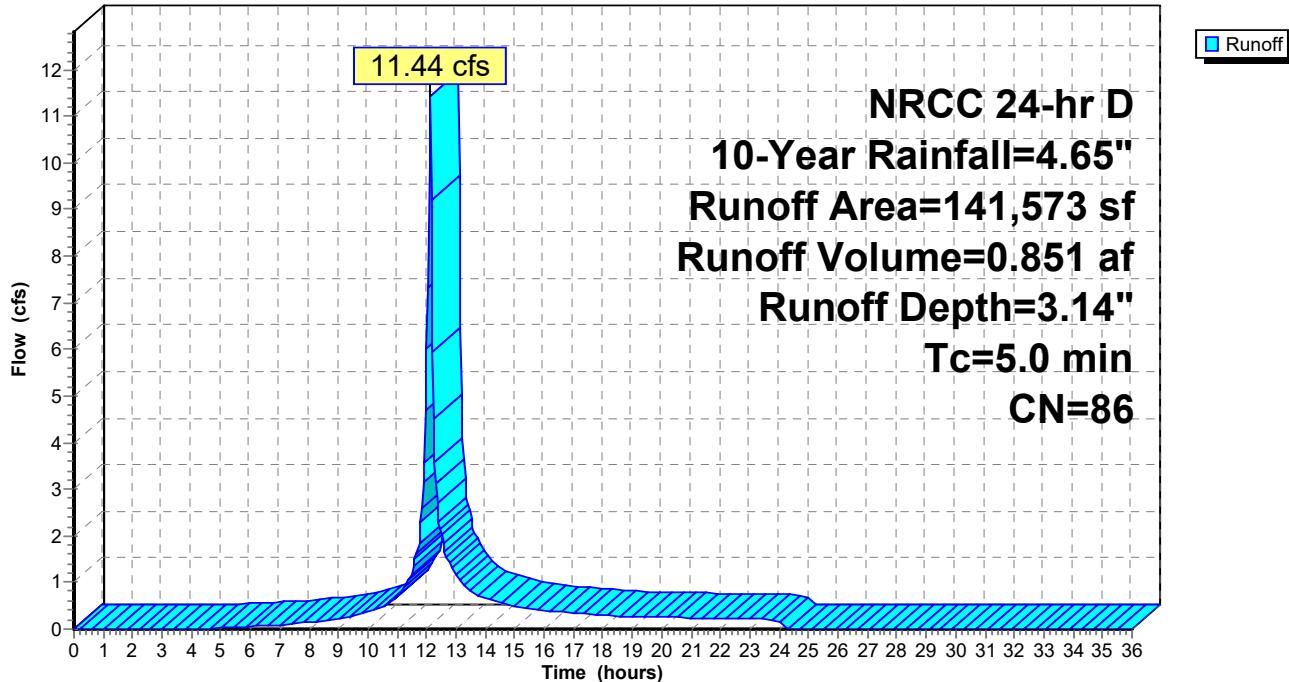
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 73,632  | 98 | Paved parking, HSG A          |
| * 6,261   | 98 | Cement Concrete Sidewalk      |
| 53,820    | 68 | <50% Grass cover, Poor, HSG A |
| 7,860     | 86 | <50% Grass cover, Poor, HSG C |
| 141,573   | 86 | Weighted Average              |
| 61,680    |    | 43.57% Pervious Area          |
| 79,893    |    | 56.43% Impervious Area        |

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

### Subcatchment 5S: EX-5

Hydrograph



## Summary for Subcatchment 6S: EX-6

Runoff = 1.47 cfs @ 12.12 hrs, Volume= 0.107 af, Depth= 2.42"  
 Routed to Link 8L : DP-2

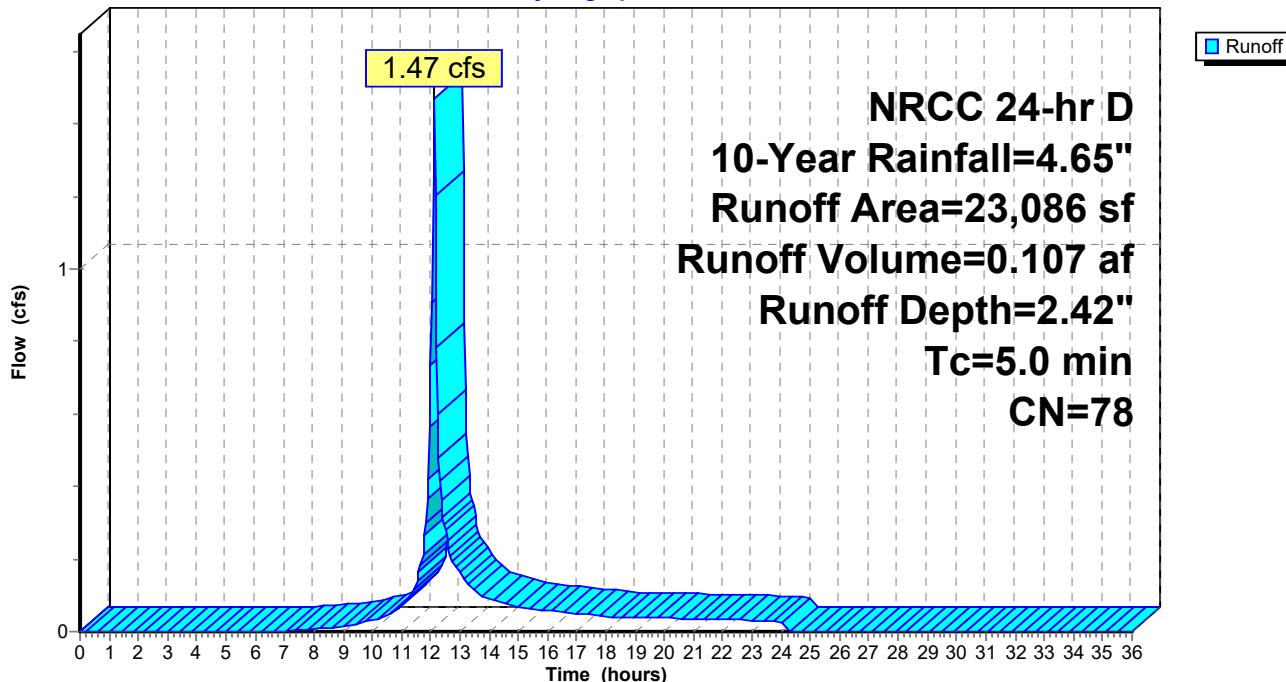
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                   |
|-----------|-------|-------------------------------|
| *         | 7,475 | 98 Paved parking              |
| *         | 509   | 98 Cement Concrete Sidewalk   |
| 15,102    | 68    | <50% Grass cover, Poor, HSG A |
| 23,086    | 78    | Weighted Average              |
| 15,102    |       | 65.42% Pervious Area          |
| 7,984     |       | 34.58% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 6S: EX-6

Hydrograph



### Summary for Link 7L: DP-1

Inflow Area = 3.640 ac, 49.90% Impervious, Inflow Depth = 3.05" for 10-Year event

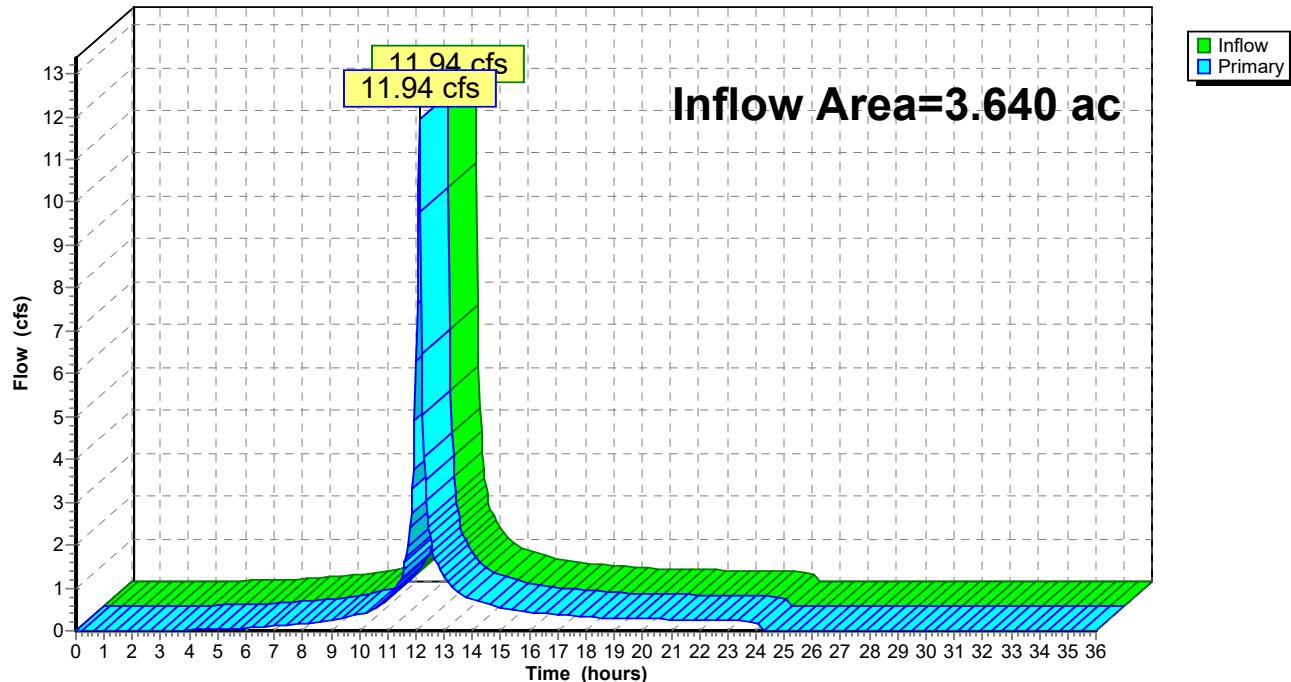
Inflow = 11.94 cfs @ 12.12 hrs, Volume= 0.924 af

Primary = 11.94 cfs @ 12.12 hrs, Volume= 0.924 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 7L: DP-1

Hydrograph



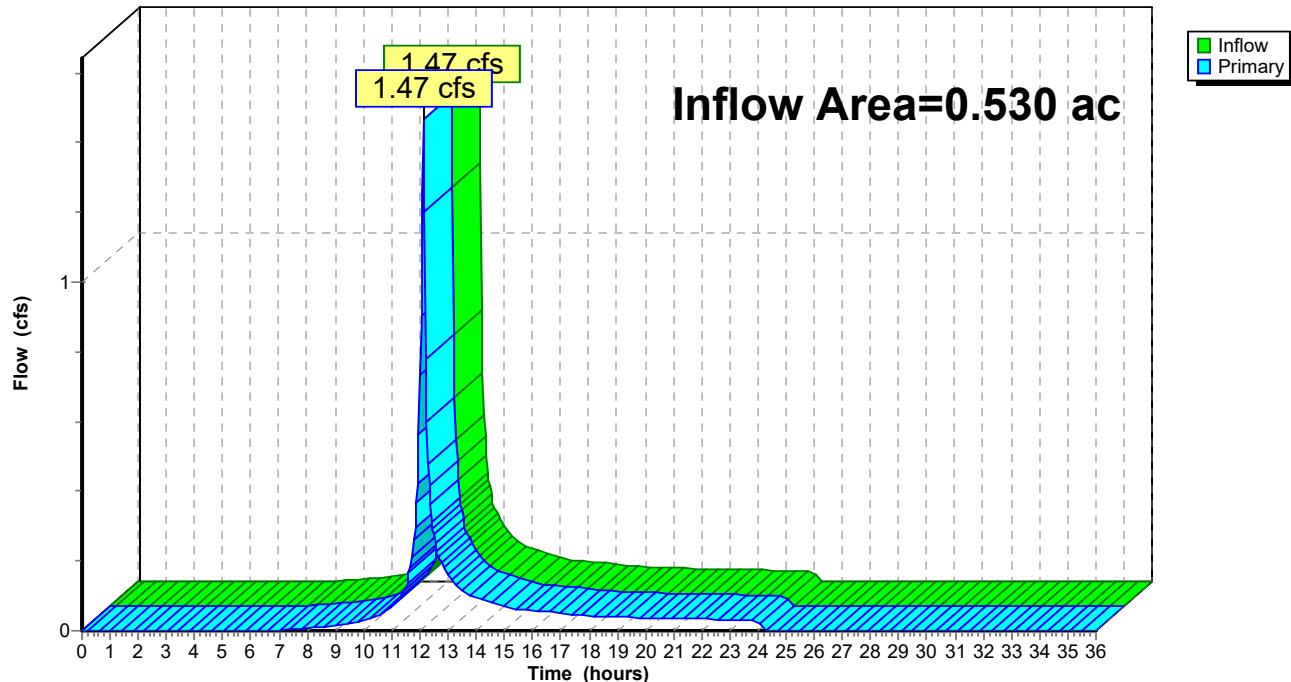
### Summary for Link 8L: DP-2

Inflow Area = 0.530 ac, 34.58% Impervious, Inflow Depth = 2.42" for 10-Year event  
Inflow = 1.47 cfs @ 12.12 hrs, Volume= 0.107 af  
Primary = 1.47 cfs @ 12.12 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 8L: DP-2

Hydrograph



### Summary for Link 12L: DP-3

Inflow Area = 7.014 ac, 63.30% Impervious, Inflow Depth = 3.47" for 10-Year event

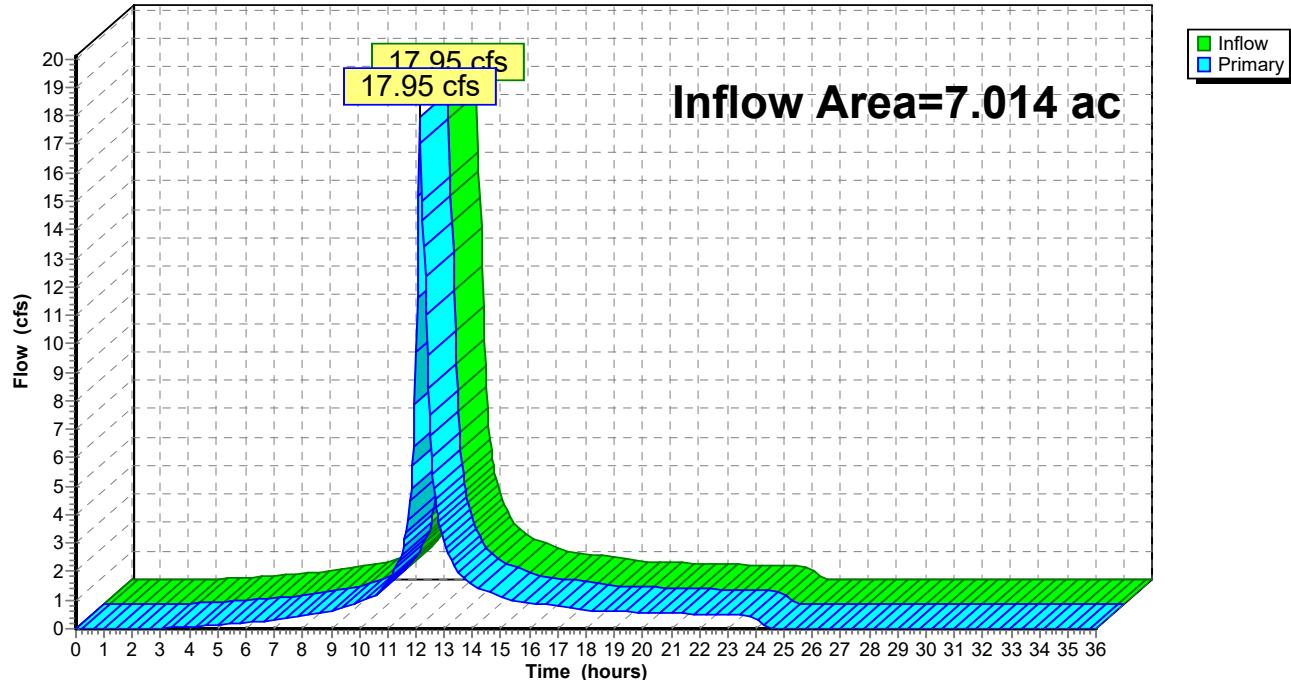
Inflow = 17.95 cfs @ 12.13 hrs, Volume= 2.027 af

Primary = 17.95 cfs @ 12.13 hrs, Volume= 2.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 12L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|                             |                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment1S: EX-1</b> | Runoff Area=15,204 sf 0.00% Impervious Runoff Depth=2.52"<br>Flow Length=92' Slope=0.0540 '/' Tc=13.8 min CN=68 Runoff=0.72 cfs 0.073 af |
| <b>Subcatchment2S: EX-2</b> | Runoff Area=73,215 sf 39.73% Impervious Runoff Depth=3.87"<br>Tc=5.0 min CN=82 Runoff=7.31 cfs 0.542 af                                  |
| <b>Subcatchment3S: EX-3</b> | Runoff Area=70,158 sf 71.33% Impervious Runoff Depth=4.83"<br>Tc=5.0 min CN=91 Runoff=8.26 cfs 0.648 af                                  |
| <b>Subcatchment4S: EX-4</b> | Runoff Area=163,970 sf 69.22% Impervious Runoff Depth=4.94"<br>Flow Length=302' Tc=18.1 min CN=92 Runoff=12.87 cfs 1.550 af              |
| <b>Subcatchment5S: EX-5</b> | Runoff Area=141,573 sf 56.43% Impervious Runoff Depth=4.29"<br>Tc=5.0 min CN=86 Runoff=15.36 cfs 1.161 af                                |
| <b>Subcatchment6S: EX-6</b> | Runoff Area=23,086 sf 34.58% Impervious Runoff Depth=3.46"<br>Tc=5.0 min CN=78 Runoff=2.09 cfs 0.153 af                                  |
| <b>Link 7L: DP-1</b>        | Inflow=16.06 cfs 1.263 af<br>Primary=16.06 cfs 1.263 af                                                                                  |
| <b>Link 8L: DP-2</b>        | Inflow=2.09 cfs 0.153 af<br>Primary=2.09 cfs 0.153 af                                                                                    |
| <b>Link 12L: DP-3</b>       | Inflow=23.83 cfs 2.711 af<br>Primary=23.83 cfs 2.711 af                                                                                  |

**Total Runoff Area = 11.185 ac Runoff Volume = 4.127 af Average Runoff Depth = 4.43"**  
**42.42% Pervious = 4.745 ac 57.58% Impervious = 6.440 ac**

### Summary for Subcatchment 1S: EX-1

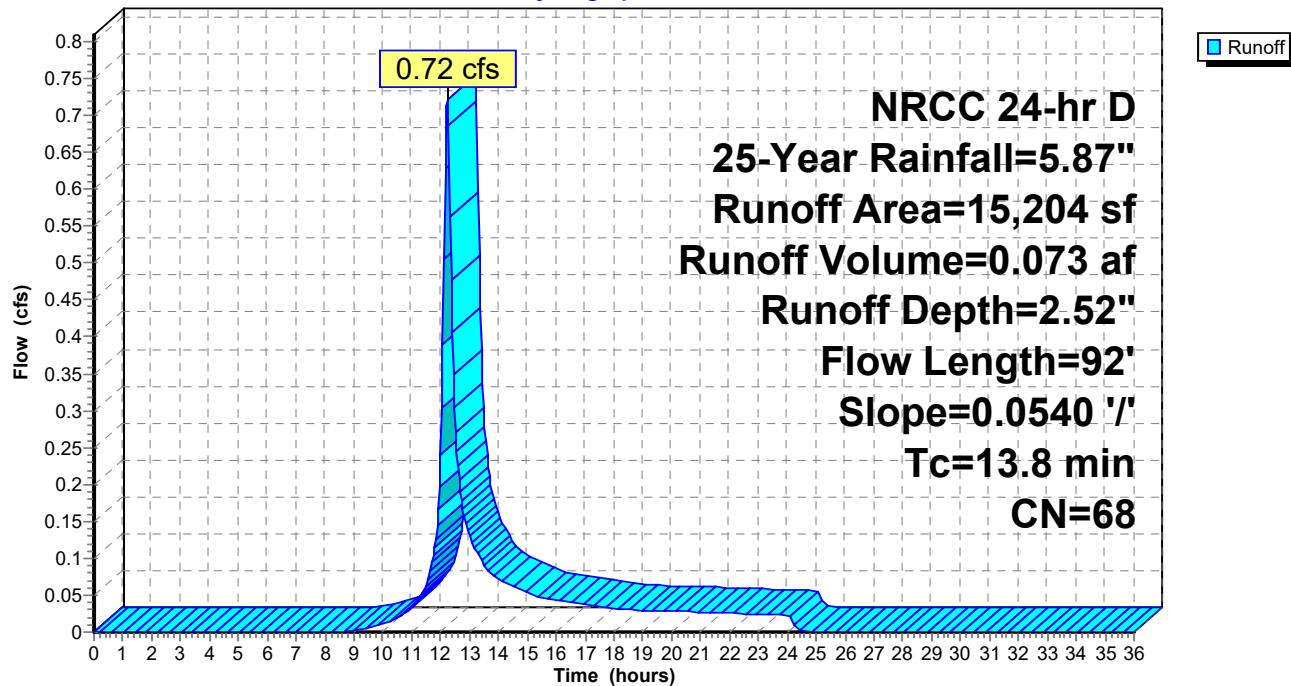
Runoff = 0.72 cfs @ 12.22 hrs, Volume= 0.073 af, Depth= 2.52"  
 Routed to Link 7L : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN            | Description                                                |      |                                                               |
|-----------|---------------|------------------------------------------------------------|------|---------------------------------------------------------------|
| 14,044    | 68            | <50% Grass cover, Poor, HSG A                              |      |                                                               |
| 1,160     | 68            | <50% Grass cover, Poor, HSG A                              |      |                                                               |
| 15,204    | 68            | Weighted Average                                           |      |                                                               |
| 15,204    |               | 100.00% Pervious Area                                      |      |                                                               |
| Tc (min)  | Length (feet) | Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description |      |                                                               |
| 13.8      | 92            | 0.0540                                                     | 0.11 | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17" |

### Subcatchment 1S: EX-1

Hydrograph



## Summary for Subcatchment 2S: EX-2

Runoff = 7.31 cfs @ 12.12 hrs, Volume= 0.542 af, Depth= 3.87"  
 Routed to Link 7L : DP-1

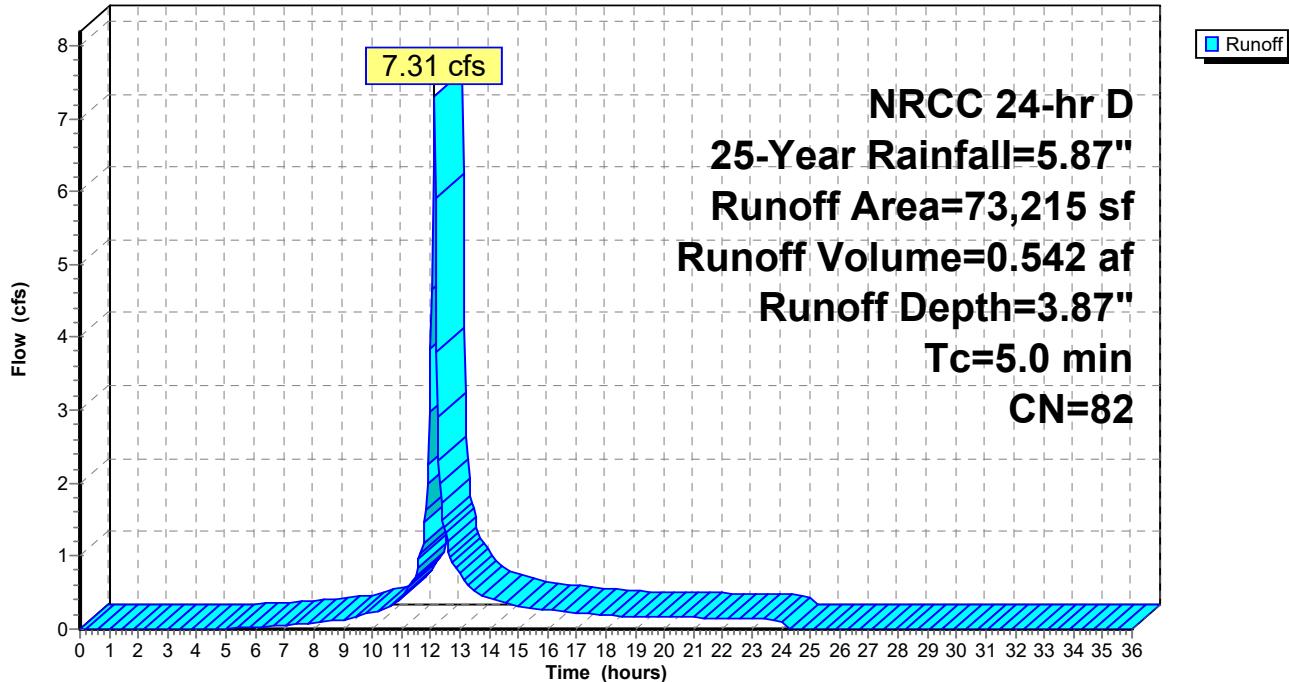
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN     | Description                   |
|-----------|--------|-------------------------------|
| 26,739    | 68     | <50% Grass cover, Poor, HSG A |
| 9,853     | 86     | <50% Grass cover, Poor, HSG C |
| 7,536     | 68     | <50% Grass cover, Poor, HSG A |
| *         | 29,087 | Paved parking, HSG A          |
| 73,215    | 82     | Weighted Average              |
| 44,128    |        | 60.27% Pervious Area          |
| 29,087    |        | 39.73% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 2S: EX-2

Hydrograph



### Summary for Subcatchment 3S: EX-3

Runoff = 8.26 cfs @ 12.11 hrs, Volume= 0.648 af, Depth= 4.83"  
 Routed to Link 7L : DP-1

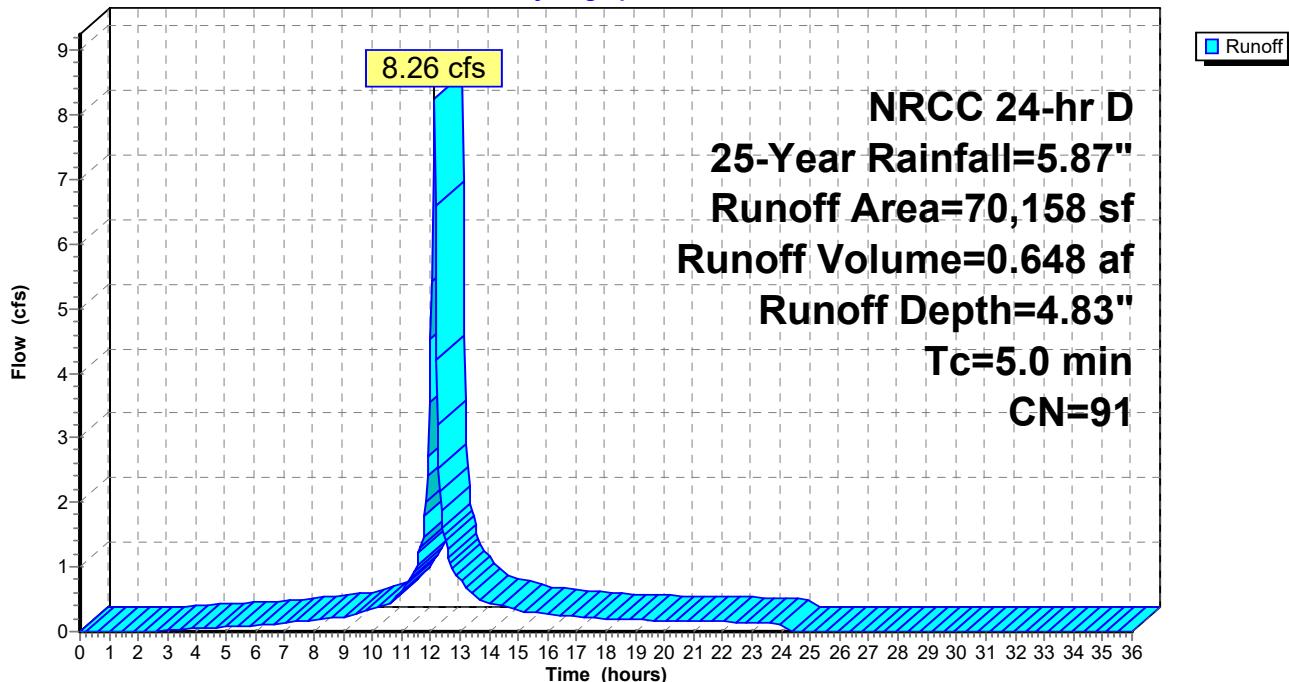
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 50,042    | 98 | Paved parking, HSG C          |
| 5,322     | 86 | <50% Grass cover, Poor, HSG C |
| 14,794    | 68 | <50% Grass cover, Poor, HSG A |
| 70,158    | 91 | Weighted Average              |
| 20,116    |    | 28.67% Pervious Area          |
| 50,042    |    | 71.33% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 3S: EX-3

Hydrograph



### Summary for Subcatchment 4S: EX-4

Runoff = 12.87 cfs @ 12.26 hrs, Volume= 1.550 af, Depth= 4.94"  
 Routed to Link 12L : DP-3

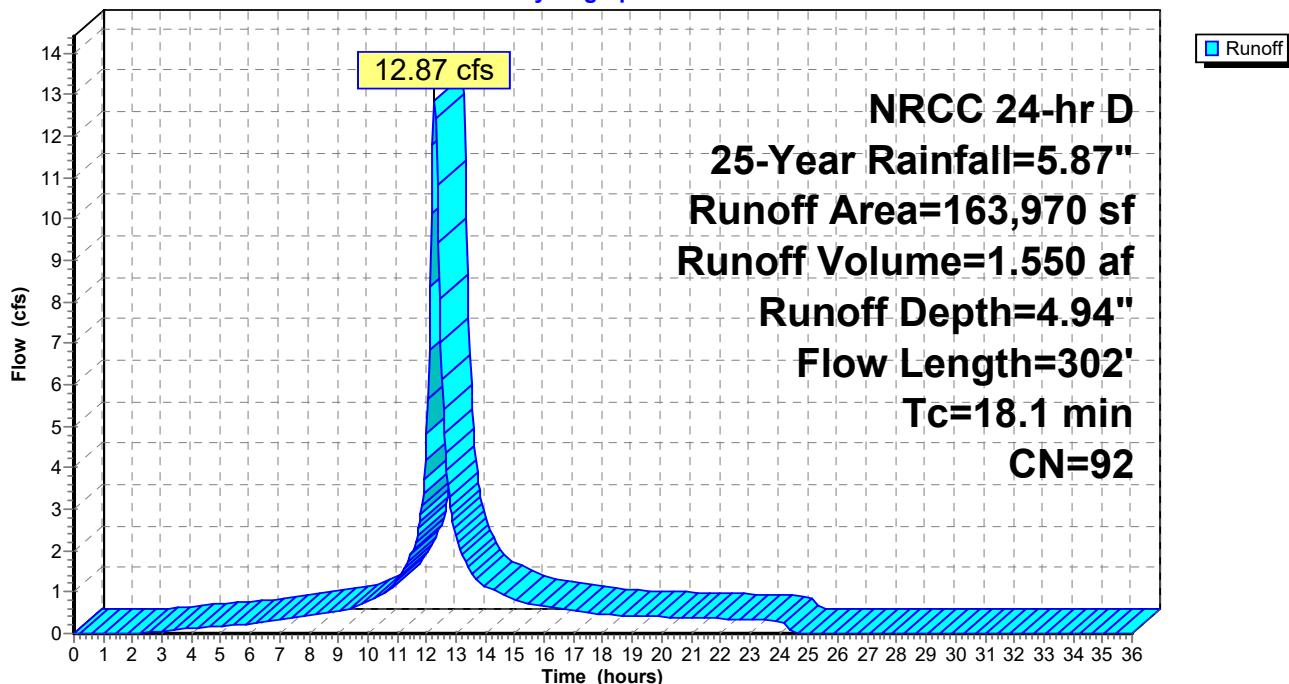
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN      | Description                   |
|-----------|---------|-------------------------------|
| *         | 111,285 | 98 Paved parking, HSG A       |
| *         | 2,220   | 98 Cement Concrete Sidewalk   |
| 28,989    | 86      | <50% Grass cover, Poor, HSG C |
| 21,476    | 68      | <50% Grass cover, Poor, HSG A |
| 163,970   | 92      | Weighted Average              |
| 50,465    |         | 30.78% Pervious Area          |
| 113,505   |         | 69.22% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 17.0        | 76               | 0.0220           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17"     |
| 0.3         | 24               | 0.0400           | 1.36                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.17" |
| 0.8         | 202              | 0.0400           | 4.06                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 18.1        | 302              | Total            |                      |                   |                                                                   |

### Subcatchment 4S: EX-4

Hydrograph



### Summary for Subcatchment 5S: EX-5

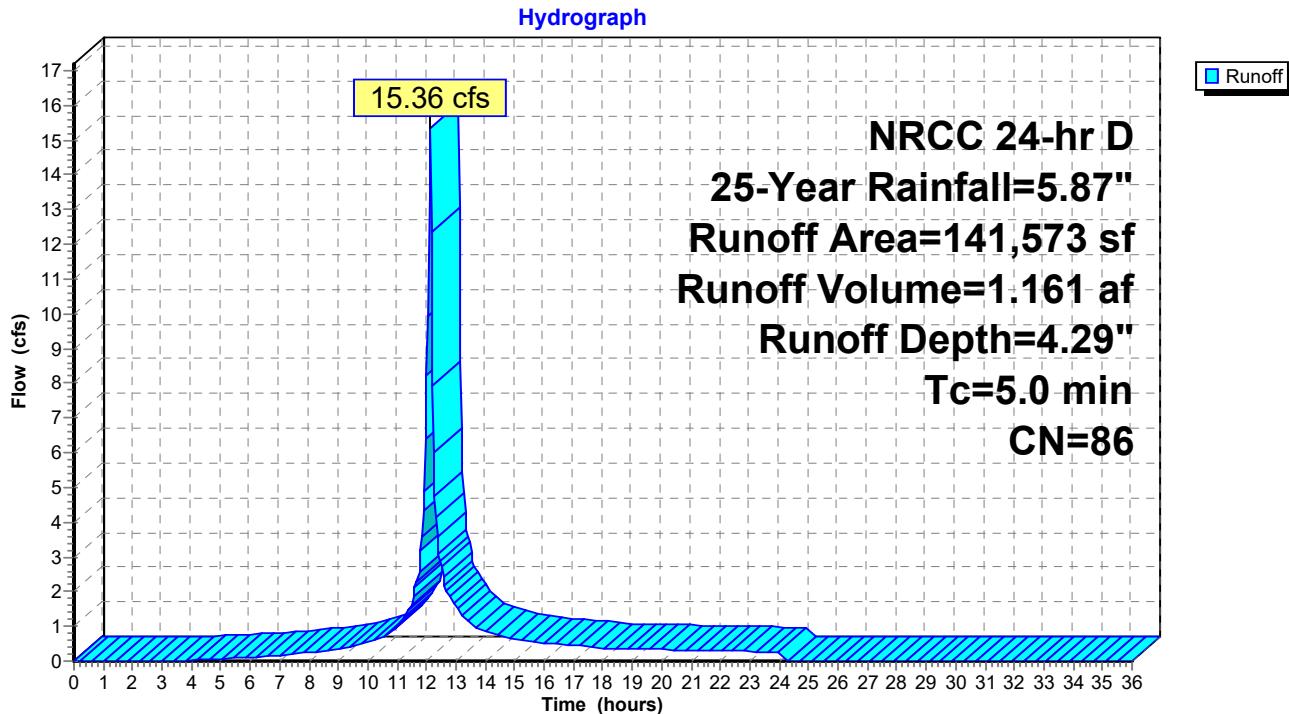
Runoff = 15.36 cfs @ 12.12 hrs, Volume= 1.161 af, Depth= 4.29"  
 Routed to Link 12L : DP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 73,632  | 98 | Paved parking, HSG A          |
| * 6,261   | 98 | Cement Concrete Sidewalk      |
| 53,820    | 68 | <50% Grass cover, Poor, HSG A |
| 7,860     | 86 | <50% Grass cover, Poor, HSG C |
| 141,573   | 86 | Weighted Average              |
| 61,680    |    | 43.57% Pervious Area          |
| 79,893    |    | 56.43% Impervious Area        |

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

### Subcatchment 5S: EX-5



## Summary for Subcatchment 6S: EX-6

Runoff = 2.09 cfs @ 12.12 hrs, Volume= 0.153 af, Depth= 3.46"  
 Routed to Link 8L : DP-2

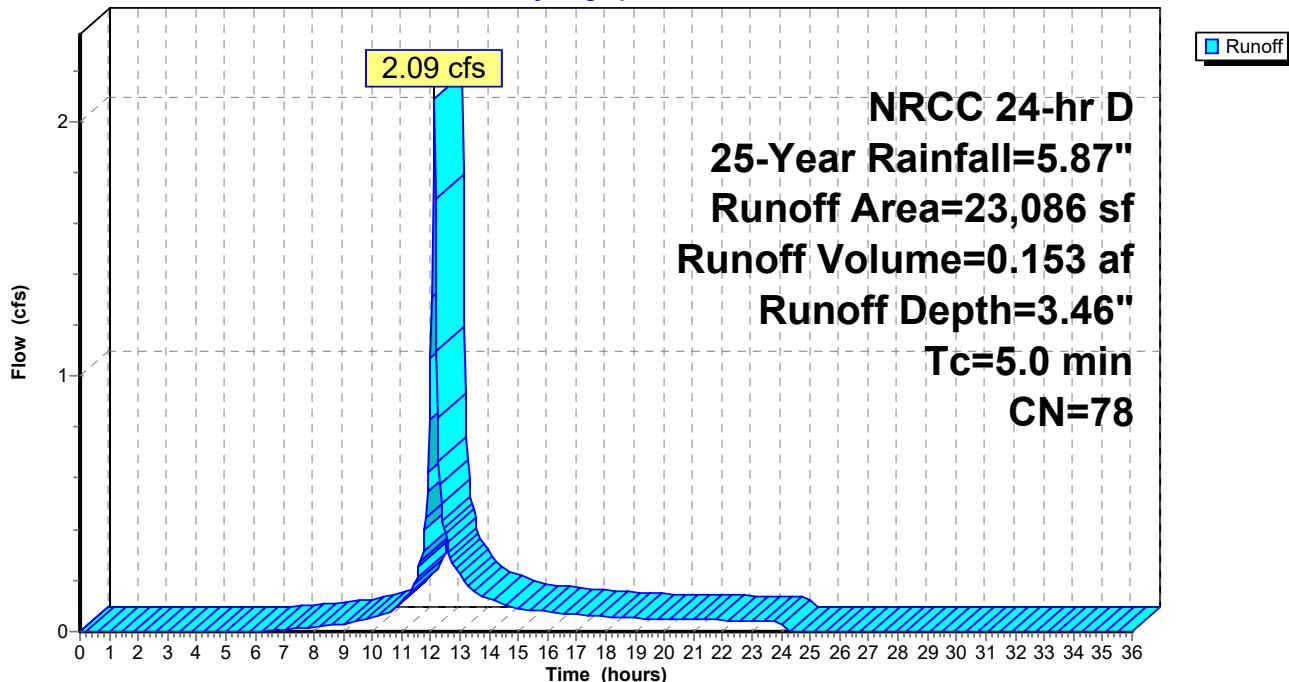
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                   |
|-----------|-------|-------------------------------|
| *         | 7,475 | 98 Paved parking              |
| *         | 509   | 98 Cement Concrete Sidewalk   |
| 15,102    | 68    | <50% Grass cover, Poor, HSG A |
| 23,086    | 78    | Weighted Average              |
| 15,102    |       | 65.42% Pervious Area          |
| 7,984     |       | 34.58% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 6S: EX-6

Hydrograph



### Summary for Link 7L: DP-1

Inflow Area = 3.640 ac, 49.90% Impervious, Inflow Depth = 4.16" for 25-Year event

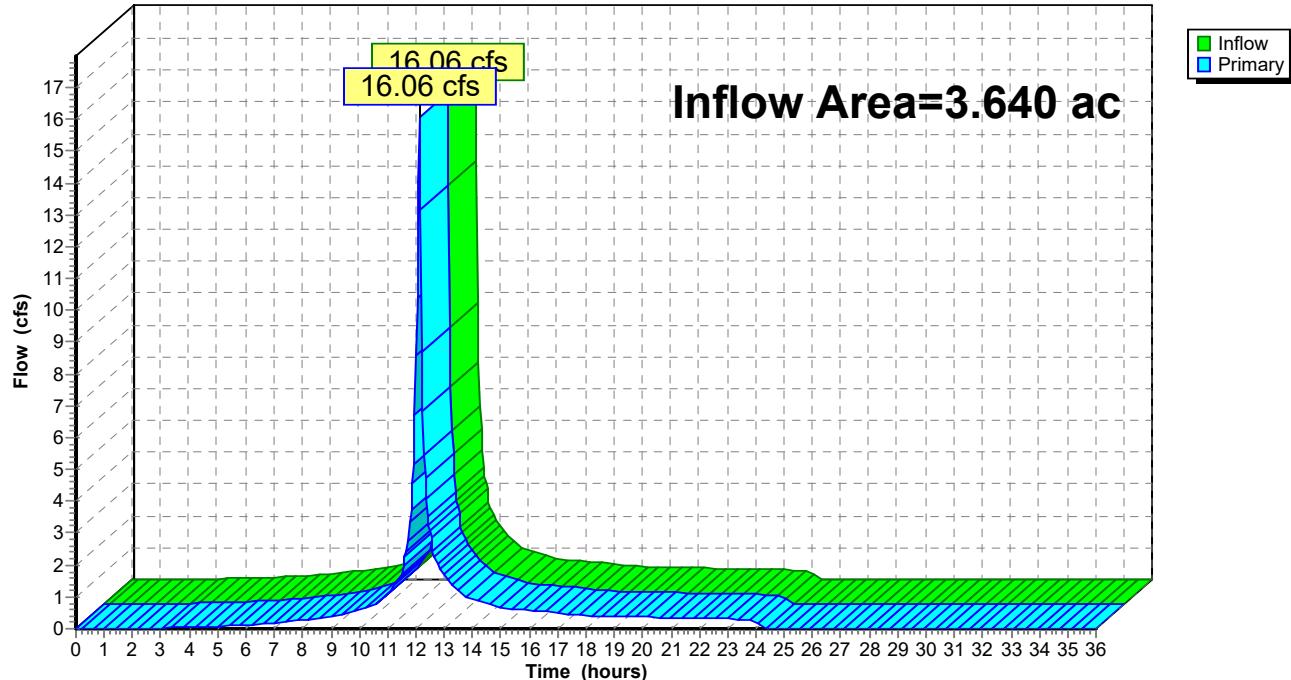
Inflow = 16.06 cfs @ 12.12 hrs, Volume= 1.263 af

Primary = 16.06 cfs @ 12.12 hrs, Volume= 1.263 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 7L: DP-1

Hydrograph



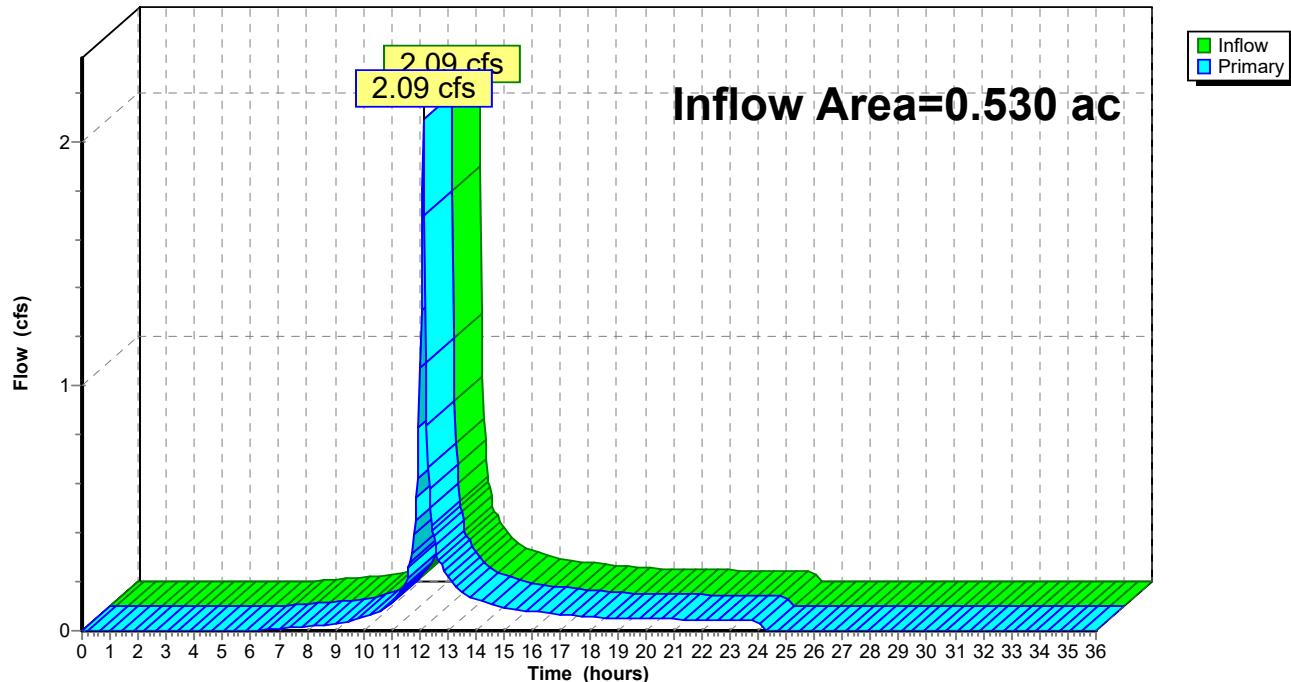
### Summary for Link 8L: DP-2

Inflow Area = 0.530 ac, 34.58% Impervious, Inflow Depth = 3.46" for 25-Year event  
Inflow = 2.09 cfs @ 12.12 hrs, Volume= 0.153 af  
Primary = 2.09 cfs @ 12.12 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 8L: DP-2

Hydrograph



### Summary for Link 12L: DP-3

Inflow Area = 7.014 ac, 63.30% Impervious, Inflow Depth = 4.64" for 25-Year event

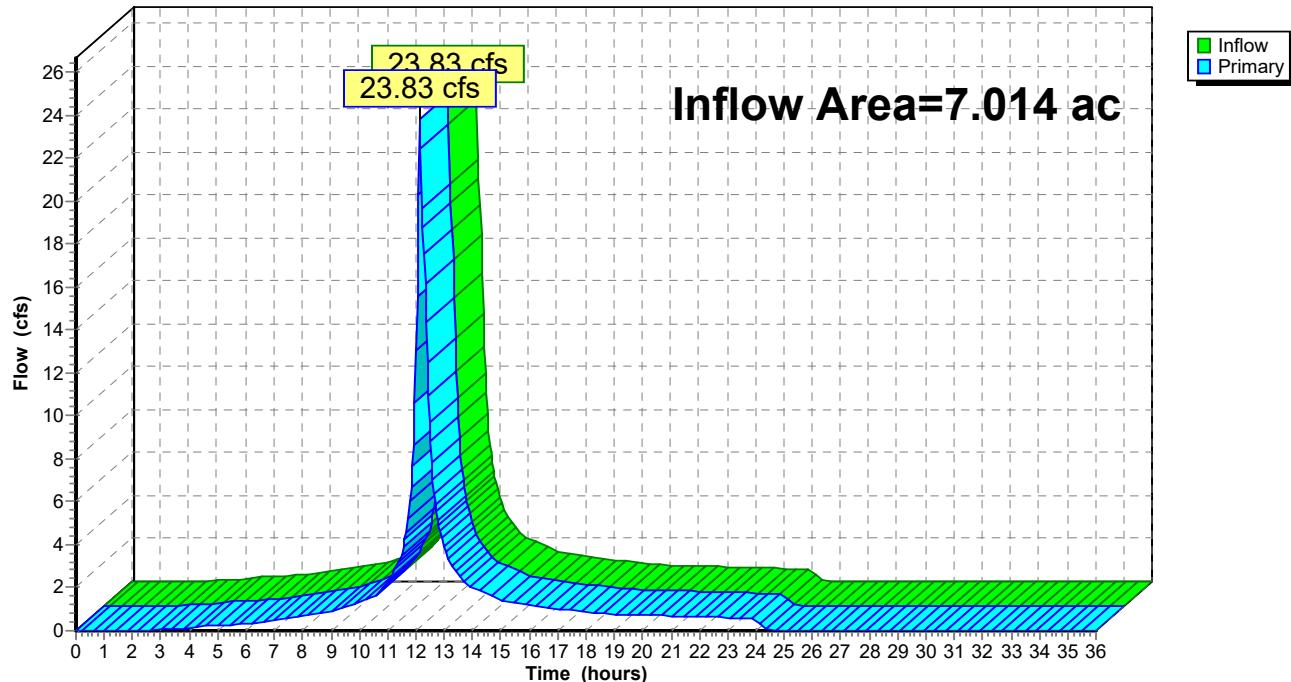
Inflow = 23.83 cfs @ 12.13 hrs, Volume= 2.711 af

Primary = 23.83 cfs @ 12.13 hrs, Volume= 2.711 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 12L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|                             |                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment1S: EX-1</b> | Runoff Area=15,204 sf 0.00% Impervious Runoff Depth=3.41"<br>Flow Length=92' Slope=0.0540 '/' Tc=13.8 min CN=68 Runoff=0.98 cfs 0.099 af |
| <b>Subcatchment2S: EX-2</b> | Runoff Area=73,215 sf 39.73% Impervious Runoff Depth=4.92"<br>Tc=5.0 min CN=82 Runoff=9.19 cfs 0.689 af                                  |
| <b>Subcatchment3S: EX-3</b> | Runoff Area=70,158 sf 71.33% Impervious Runoff Depth=5.94"<br>Tc=5.0 min CN=91 Runoff=10.02 cfs 0.797 af                                 |
| <b>Subcatchment4S: EX-4</b> | Runoff Area=163,970 sf 69.22% Impervious Runoff Depth=6.05"<br>Flow Length=302' Tc=18.1 min CN=92 Runoff=15.58 cfs 1.899 af              |
| <b>Subcatchment5S: EX-5</b> | Runoff Area=141,573 sf 56.43% Impervious Runoff Depth=5.37"<br>Tc=5.0 min CN=86 Runoff=18.98 cfs 1.453 af                                |
| <b>Subcatchment6S: EX-6</b> | Runoff Area=23,086 sf 34.58% Impervious Runoff Depth=4.47"<br>Tc=5.0 min CN=78 Runoff=2.68 cfs 0.198 af                                  |
| <b>Link 7L: DP-1</b>        | Inflow=19.89 cfs 1.585 af<br>Primary=19.89 cfs 1.585 af                                                                                  |
| <b>Link 8L: DP-2</b>        | Inflow=2.68 cfs 0.198 af<br>Primary=2.68 cfs 0.198 af                                                                                    |
| <b>Link 12L: DP-3</b>       | Inflow=29.25 cfs 3.353 af<br>Primary=29.25 cfs 3.353 af                                                                                  |

**Total Runoff Area = 11.185 ac Runoff Volume = 5.135 af Average Runoff Depth = 5.51"**  
**42.42% Pervious = 4.745 ac 57.58% Impervious = 6.440 ac**

### Summary for Subcatchment 1S: EX-1

Runoff = 0.98 cfs @ 12.22 hrs, Volume= 0.099 af, Depth= 3.41"  
 Routed to Link 7L : DP-1

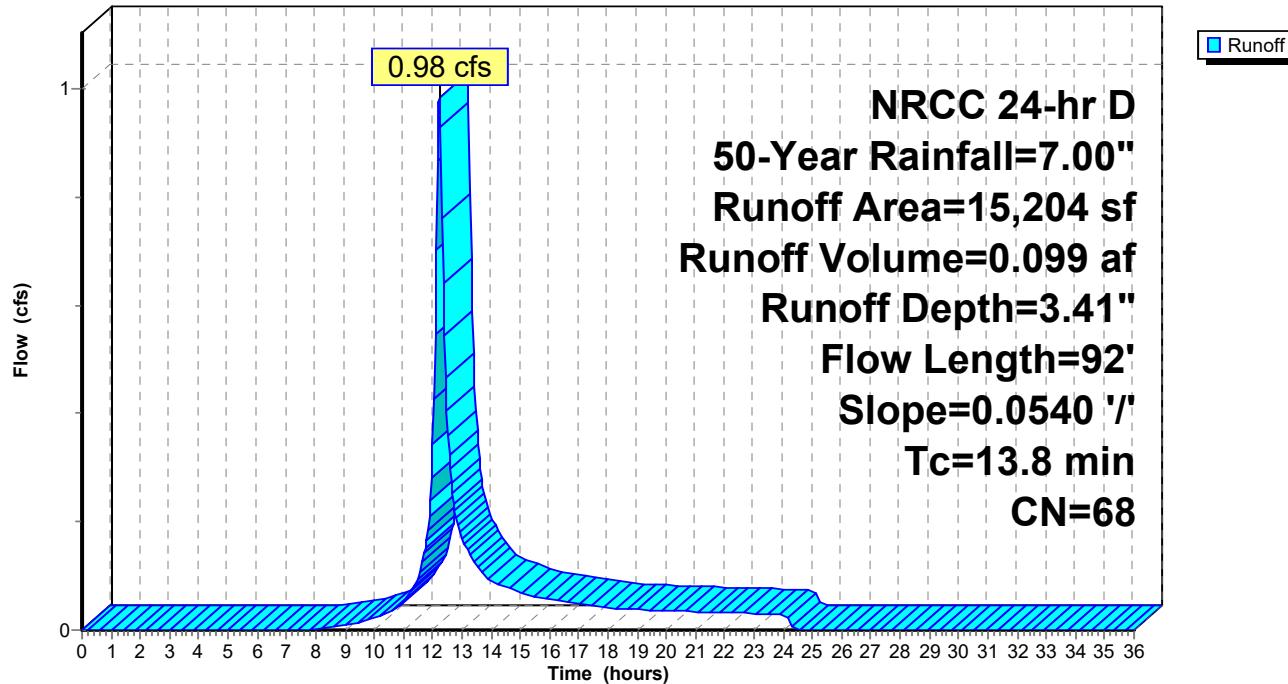
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 14,044    | 68 | <50% Grass cover, Poor, HSG A |
| 1,160     | 68 | <50% Grass cover, Poor, HSG A |
| 15,204    | 68 | Weighted Average              |
| 15,204    |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                   |
|-------------|------------------|------------------|----------------------|-------------------|---------------------------------------------------------------|
| 13.8        | 92               | 0.0540           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17" |

### Subcatchment 1S: EX-1

Hydrograph



## Summary for Subcatchment 2S: EX-2

Runoff = 9.19 cfs @ 12.12 hrs, Volume= 0.689 af, Depth= 4.92"  
 Routed to Link 7L : DP-1

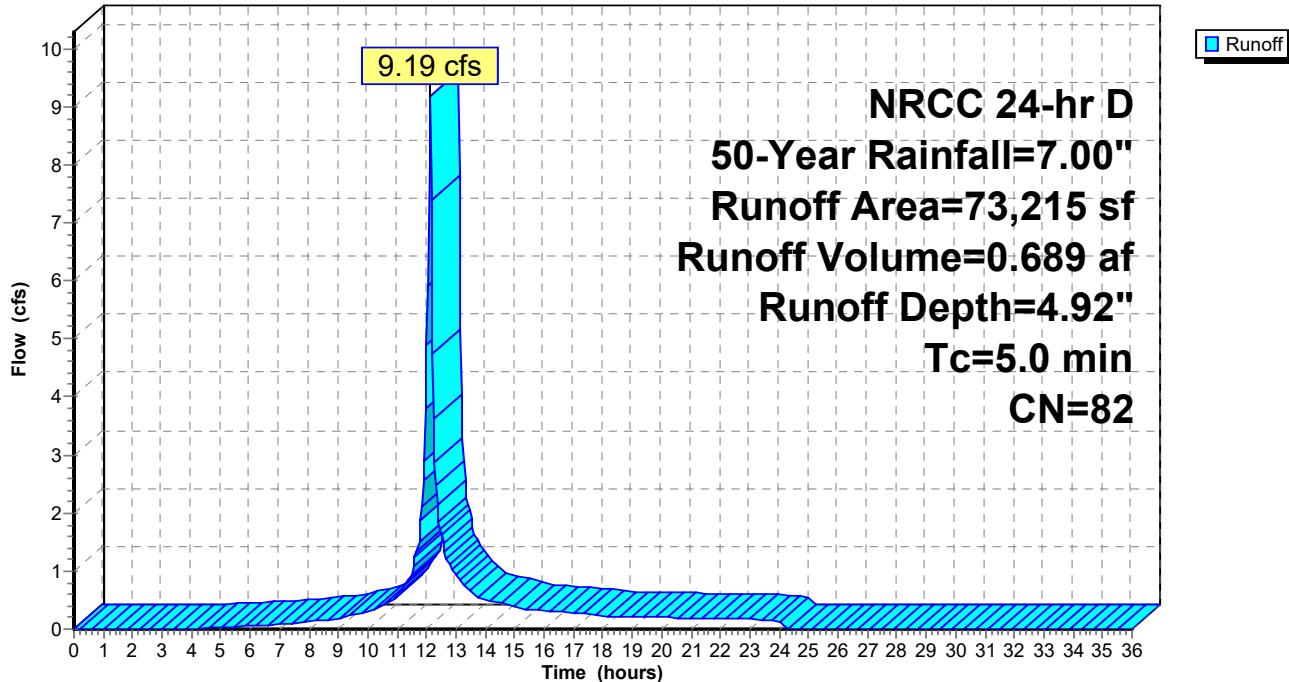
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN     | Description                   |
|-----------|--------|-------------------------------|
| 26,739    | 68     | <50% Grass cover, Poor, HSG A |
| 9,853     | 86     | <50% Grass cover, Poor, HSG C |
| 7,536     | 68     | <50% Grass cover, Poor, HSG A |
| *         | 29,087 | Paved parking, HSG A          |
| 73,215    | 82     | Weighted Average              |
| 44,128    |        | 60.27% Pervious Area          |
| 29,087    |        | 39.73% Impervious Area        |

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

## Subcatchment 2S: EX-2

Hydrograph



### Summary for Subcatchment 3S: EX-3

Runoff = 10.02 cfs @ 12.11 hrs, Volume= 0.797 af, Depth= 5.94"  
 Routed to Link 7L : DP-1

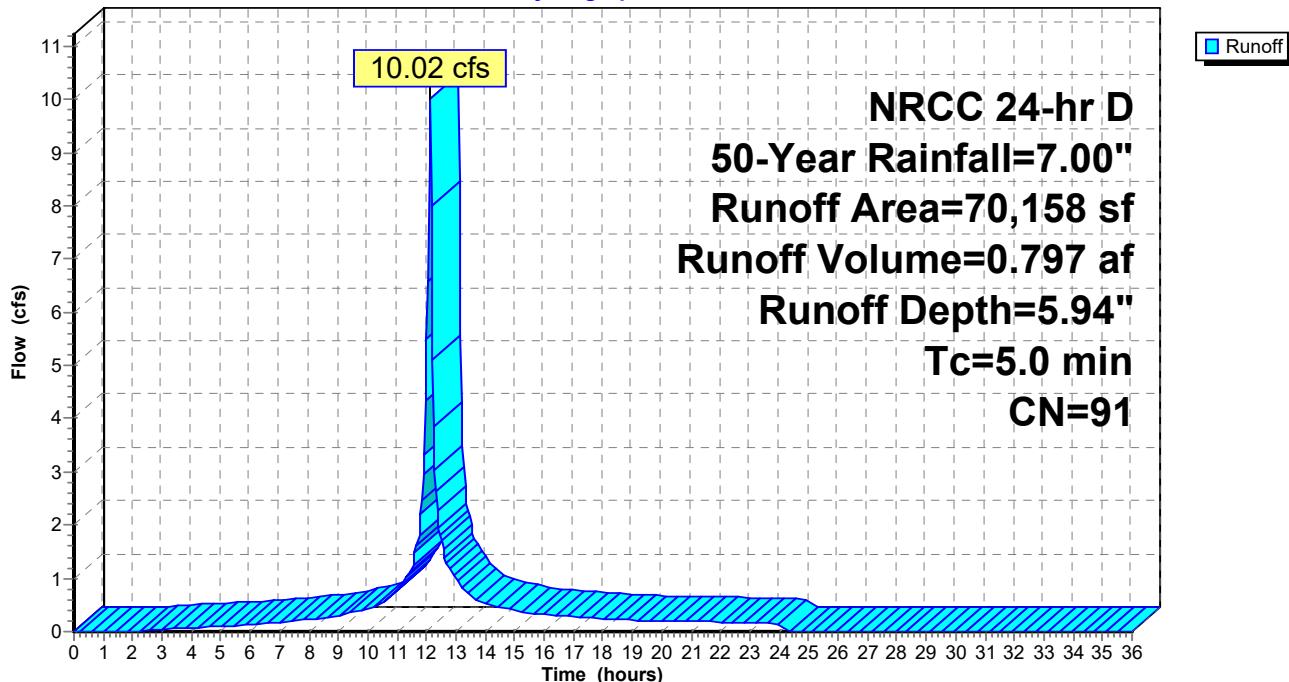
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 50,042    | 98 | Paved parking, HSG C          |
| 5,322     | 86 | <50% Grass cover, Poor, HSG C |
| 14,794    | 68 | <50% Grass cover, Poor, HSG A |
| 70,158    | 91 | Weighted Average              |
| 20,116    |    | 28.67% Pervious Area          |
| 50,042    |    | 71.33% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 3S: EX-3

Hydrograph



### Summary for Subcatchment 4S: EX-4

Runoff = 15.58 cfs @ 12.26 hrs, Volume= 1.899 af, Depth= 6.05"  
 Routed to Link 12L : DP-3

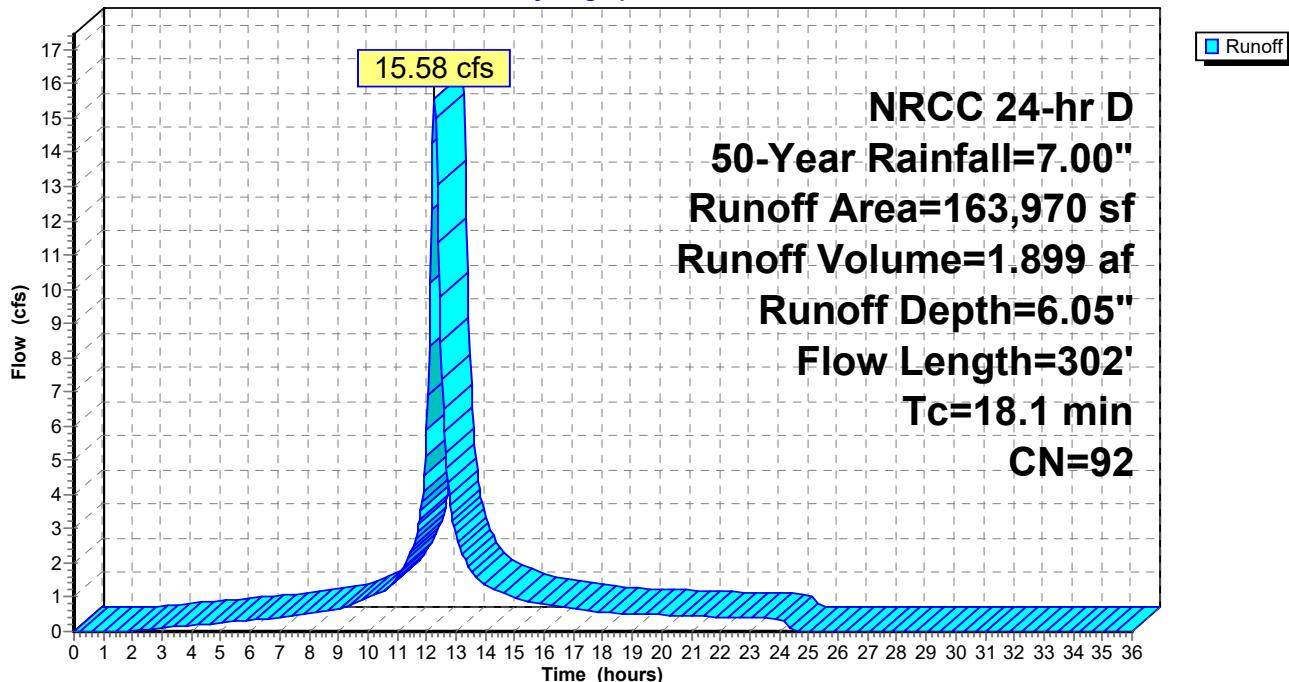
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 111,285 | 98 | Paved parking, HSG A          |
| * 2,220   | 98 | Cement Concrete Sidewalk      |
| 28,989    | 86 | <50% Grass cover, Poor, HSG C |
| 21,476    | 68 | <50% Grass cover, Poor, HSG A |
| 163,970   | 92 | Weighted Average              |
| 50,465    |    | 30.78% Pervious Area          |
| 113,505   |    | 69.22% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 17.0        | 76               | 0.0220           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17"     |
| 0.3         | 24               | 0.0400           | 1.36                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.17" |
| 0.8         | 202              | 0.0400           | 4.06                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 18.1        | 302              |                  |                      |                   | Total                                                             |

### Subcatchment 4S: EX-4

Hydrograph



### Summary for Subcatchment 5S: EX-5

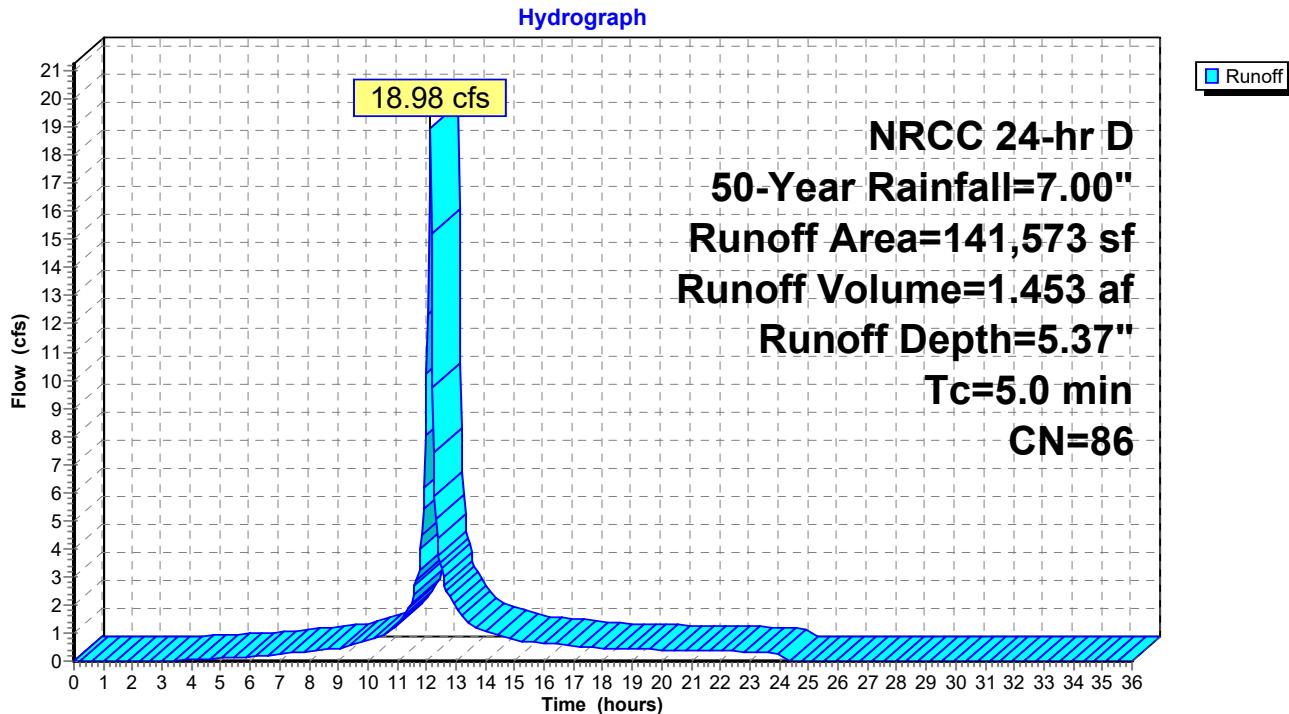
Runoff = 18.98 cfs @ 12.12 hrs, Volume= 1.453 af, Depth= 5.37"  
 Routed to Link 12L : DP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 73,632  | 98 | Paved parking, HSG A          |
| * 6,261   | 98 | Cement Concrete Sidewalk      |
| 53,820    | 68 | <50% Grass cover, Poor, HSG A |
| 7,860     | 86 | <50% Grass cover, Poor, HSG C |
| 141,573   | 86 | Weighted Average              |
| 61,680    |    | 43.57% Pervious Area          |
| 79,893    |    | 56.43% Impervious Area        |

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

### Subcatchment 5S: EX-5



## Summary for Subcatchment 6S: EX-6

Runoff = 2.68 cfs @ 12.12 hrs, Volume= 0.198 af, Depth= 4.47"  
 Routed to Link 8L : DP-2

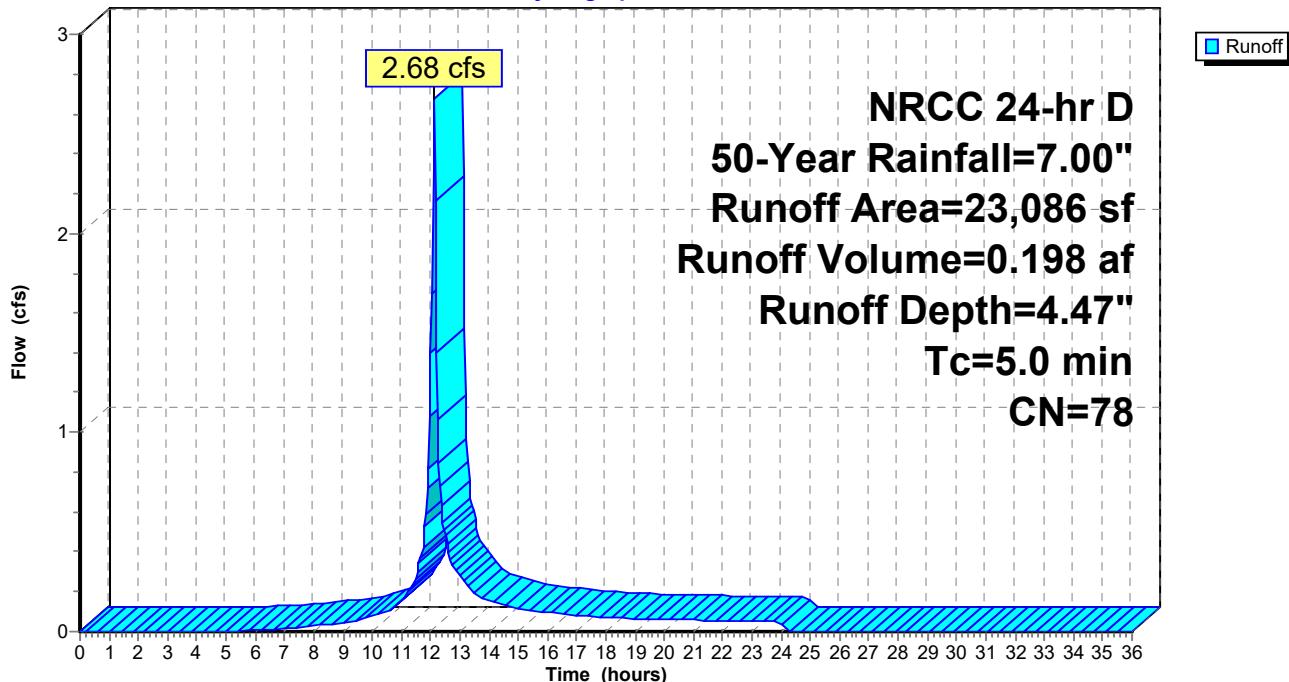
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                   |
|-----------|-------|-------------------------------|
| *         | 7,475 | 98 Paved parking              |
| *         | 509   | 98 Cement Concrete Sidewalk   |
| 15,102    | 68    | <50% Grass cover, Poor, HSG A |
| 23,086    | 78    | Weighted Average              |
| 15,102    |       | 65.42% Pervious Area          |
| 7,984     |       | 34.58% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 6S: EX-6

Hydrograph



### Summary for Link 7L: DP-1

Inflow Area = 3.640 ac, 49.90% Impervious, Inflow Depth = 5.22" for 50-Year event

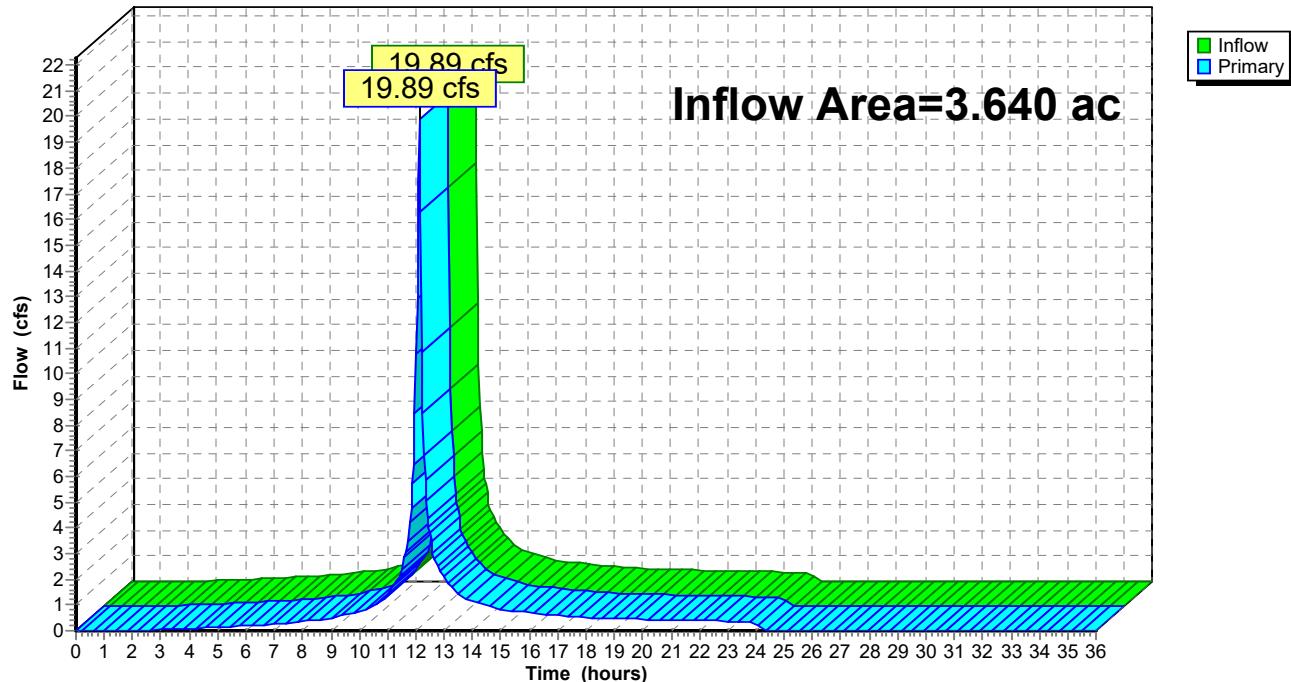
Inflow = 19.89 cfs @ 12.12 hrs, Volume= 1.585 af

Primary = 19.89 cfs @ 12.12 hrs, Volume= 1.585 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 7L: DP-1

Hydrograph



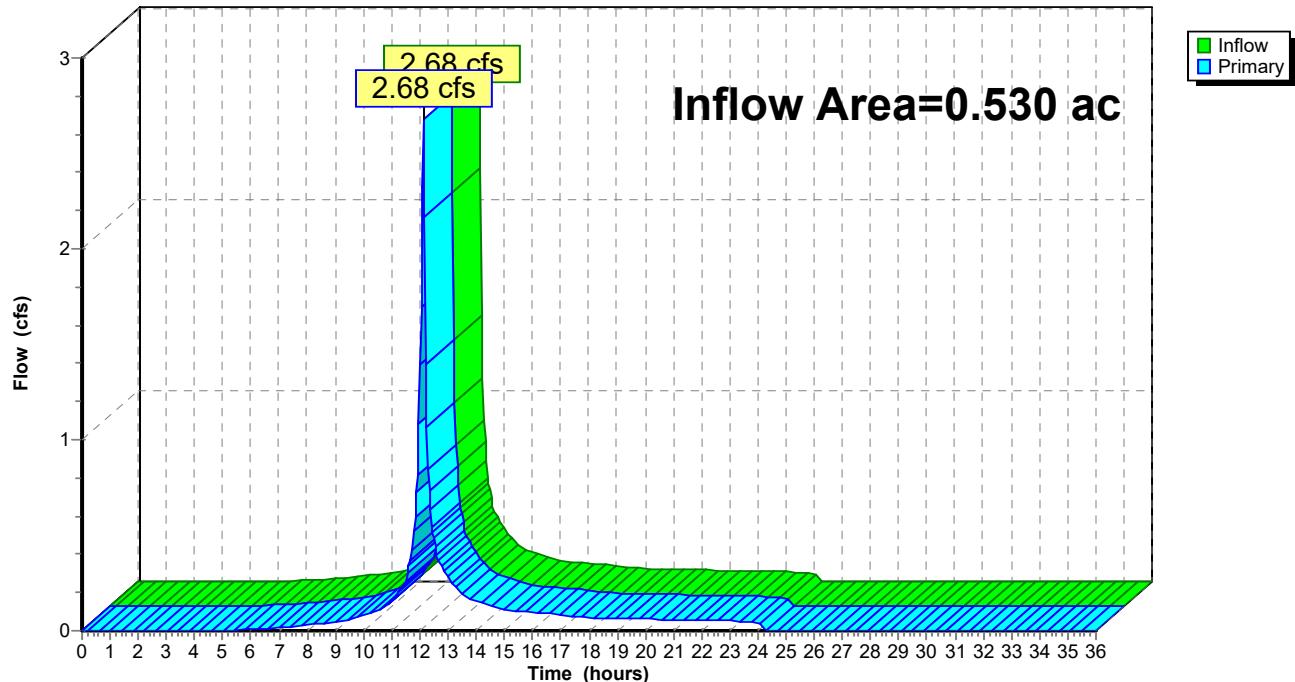
### Summary for Link 8L: DP-2

Inflow Area = 0.530 ac, 34.58% Impervious, Inflow Depth = 4.47" for 50-Year event  
Inflow = 2.68 cfs @ 12.12 hrs, Volume= 0.198 af  
Primary = 2.68 cfs @ 12.12 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 8L: DP-2

Hydrograph



### Summary for Link 12L: DP-3

Inflow Area = 7.014 ac, 63.30% Impervious, Inflow Depth = 5.74" for 50-Year event

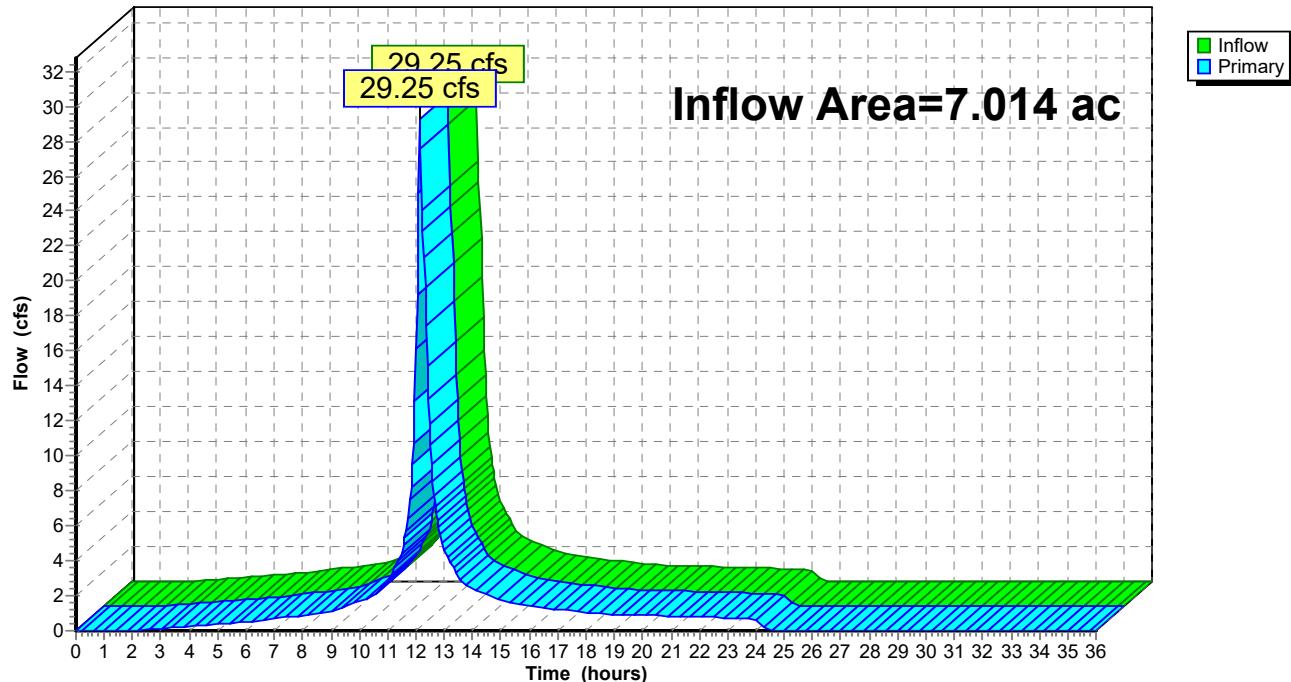
Inflow = 29.25 cfs @ 12.13 hrs, Volume= 3.353 af

Primary = 29.25 cfs @ 12.13 hrs, Volume= 3.353 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 12L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|                             |                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment1S: EX-1</b> | Runoff Area=15,204 sf 0.00% Impervious Runoff Depth=4.54"<br>Flow Length=92' Slope=0.0540 '/' Tc=13.8 min CN=68 Runoff=1.32 cfs 0.132 af |
| <b>Subcatchment2S: EX-2</b> | Runoff Area=73,215 sf 39.73% Impervious Runoff Depth=6.20"<br>Tc=5.0 min CN=82 Runoff=11.45 cfs 0.869 af                                 |
| <b>Subcatchment3S: EX-3</b> | Runoff Area=70,158 sf 71.33% Impervious Runoff Depth=7.28"<br>Tc=5.0 min CN=91 Runoff=12.13 cfs 0.977 af                                 |
| <b>Subcatchment4S: EX-4</b> | Runoff Area=163,970 sf 69.22% Impervious Runoff Depth=7.40"<br>Flow Length=302' Tc=18.1 min CN=92 Runoff=18.83 cfs 2.321 af              |
| <b>Subcatchment5S: EX-5</b> | Runoff Area=141,573 sf 56.43% Impervious Runoff Depth=6.68"<br>Tc=5.0 min CN=86 Runoff=23.31 cfs 1.809 af                                |
| <b>Subcatchment6S: EX-6</b> | Runoff Area=23,086 sf 34.58% Impervious Runoff Depth=5.72"<br>Tc=5.0 min CN=78 Runoff=3.39 cfs 0.253 af                                  |
| <b>Link 7L: DP-1</b>        | Inflow=24.50 cfs 1.978 af<br>Primary=24.50 cfs 1.978 af                                                                                  |
| <b>Link 8L: DP-2</b>        | Inflow=3.39 cfs 0.253 af<br>Primary=3.39 cfs 0.253 af                                                                                    |
| <b>Link 12L: DP-3</b>       | Inflow=35.74 cfs 4.131 af<br>Primary=35.74 cfs 4.131 af                                                                                  |

**Total Runoff Area = 11.185 ac Runoff Volume = 6.361 af Average Runoff Depth = 6.83"**  
**42.42% Pervious = 4.745 ac 57.58% Impervious = 6.440 ac**

### Summary for Subcatchment 1S: EX-1

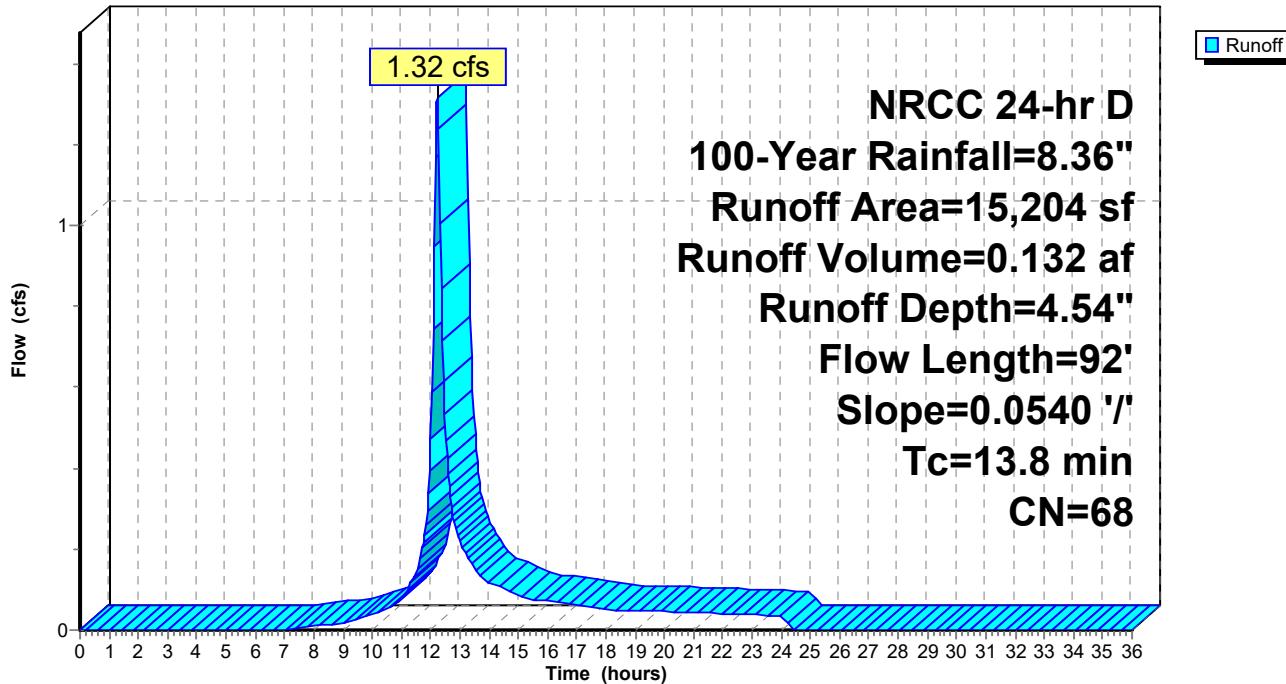
Runoff = 1.32 cfs @ 12.22 hrs, Volume= 0.132 af, Depth= 4.54"  
 Routed to Link 7L : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN            | Description                                                |      |                                                               |
|-----------|---------------|------------------------------------------------------------|------|---------------------------------------------------------------|
| 14,044    | 68            | <50% Grass cover, Poor, HSG A                              |      |                                                               |
| 1,160     | 68            | <50% Grass cover, Poor, HSG A                              |      |                                                               |
| 15,204    | 68            | Weighted Average                                           |      |                                                               |
| 15,204    |               | 100.00% Pervious Area                                      |      |                                                               |
| Tc (min)  | Length (feet) | Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description |      |                                                               |
| 13.8      | 92            | 0.0540                                                     | 0.11 | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17" |

### Subcatchment 1S: EX-1

Hydrograph



## Summary for Subcatchment 2S: EX-2

Runoff = 11.45 cfs @ 12.12 hrs, Volume= 0.869 af, Depth= 6.20"  
 Routed to Link 7L : DP-1

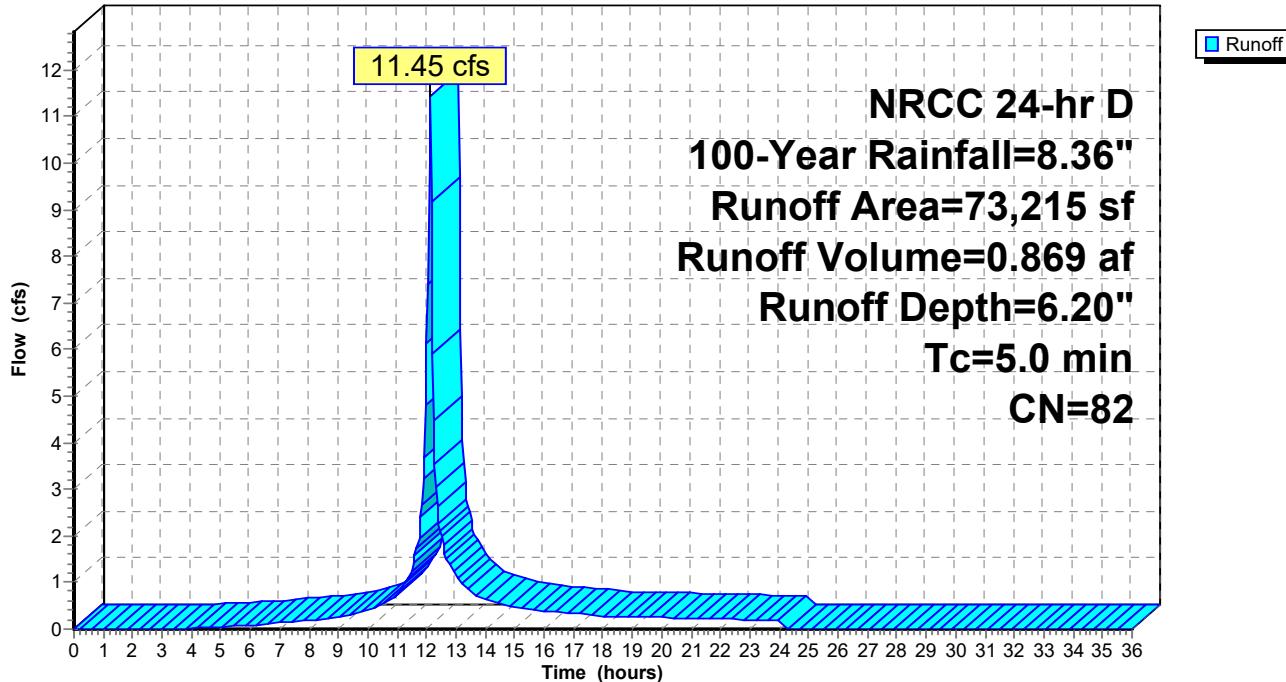
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN     | Description                   |
|-----------|--------|-------------------------------|
| 26,739    | 68     | <50% Grass cover, Poor, HSG A |
| 9,853     | 86     | <50% Grass cover, Poor, HSG C |
| 7,536     | 68     | <50% Grass cover, Poor, HSG A |
| *         | 29,087 | Paved parking, HSG A          |
| 73,215    | 82     | Weighted Average              |
| 44,128    |        | 60.27% Pervious Area          |
| 29,087    |        | 39.73% Impervious Area        |

| Tc  | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-----|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0 |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 2S: EX-2

Hydrograph



### Summary for Subcatchment 3S: EX-3

Runoff = 12.13 cfs @ 12.11 hrs, Volume= 0.977 af, Depth= 7.28"  
 Routed to Link 7L : DP-1

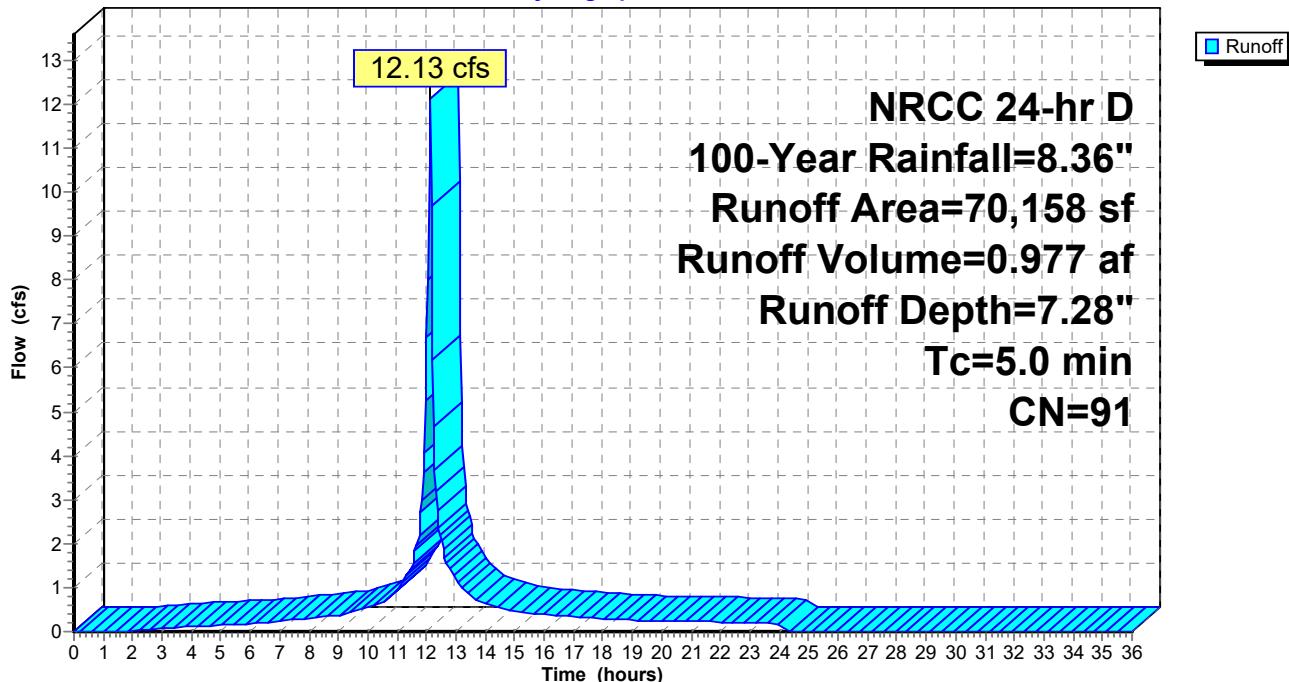
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 50,042    | 98 | Paved parking, HSG C          |
| 5,322     | 86 | <50% Grass cover, Poor, HSG C |
| 14,794    | 68 | <50% Grass cover, Poor, HSG A |
| 70,158    | 91 | Weighted Average              |
| 20,116    |    | 28.67% Pervious Area          |
| 50,042    |    | 71.33% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 3S: EX-3

Hydrograph



### Summary for Subcatchment 4S: EX-4

Runoff = 18.83 cfs @ 12.26 hrs, Volume= 2.321 af, Depth= 7.40"  
 Routed to Link 12L : DP-3

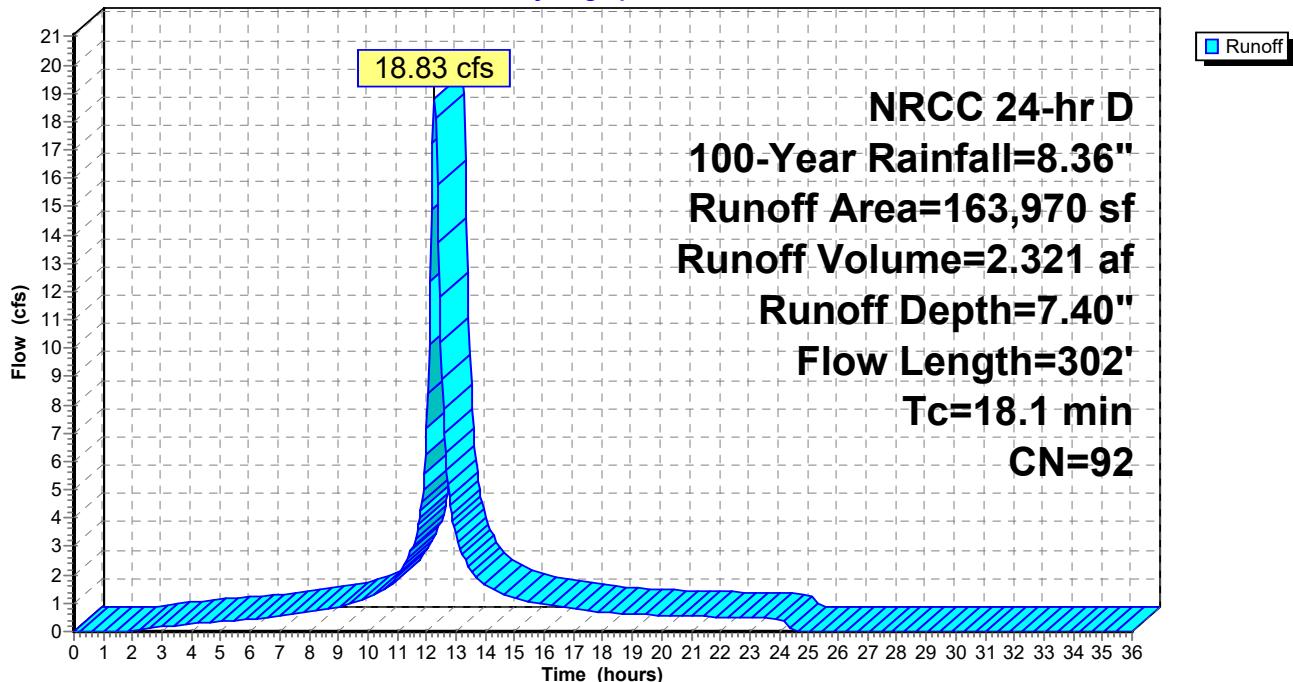
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 111,285 | 98 | Paved parking, HSG A          |
| * 2,220   | 98 | Cement Concrete Sidewalk      |
| 28,989    | 86 | <50% Grass cover, Poor, HSG C |
| 21,476    | 68 | <50% Grass cover, Poor, HSG A |
| 163,970   | 92 | Weighted Average              |
| 50,465    |    | 30.78% Pervious Area          |
| 113,505   |    | 69.22% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 17.0        | 76               | 0.0220           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.17"     |
| 0.3         | 24               | 0.0400           | 1.36                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.17" |
| 0.8         | 202              | 0.0400           | 4.06                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 18.1        | 302              |                  |                      |                   | Total                                                             |

### Subcatchment 4S: EX-4

Hydrograph



### Summary for Subcatchment 5S: EX-5

Runoff = 23.31 cfs @ 12.11 hrs, Volume= 1.809 af, Depth= 6.68"  
 Routed to Link 12L : DP-3

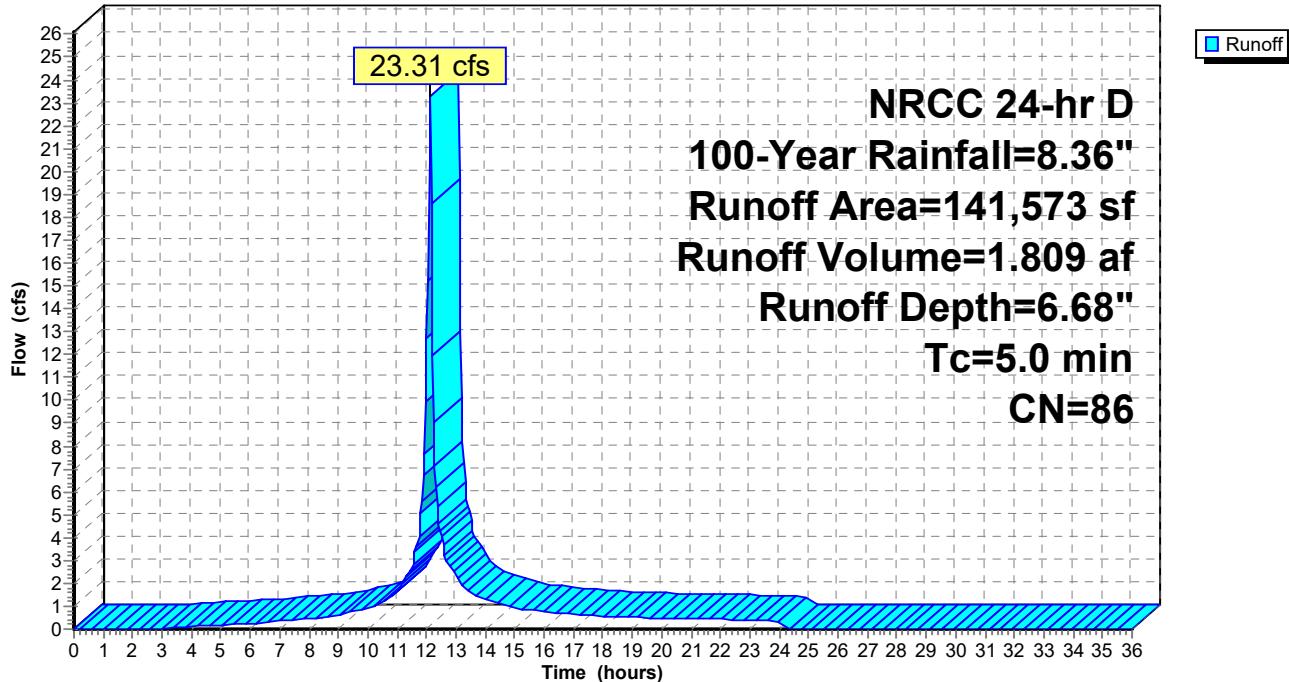
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 73,632  | 98 | Paved parking, HSG A          |
| * 6,261   | 98 | Cement Concrete Sidewalk      |
| 53,820    | 68 | <50% Grass cover, Poor, HSG A |
| 7,860     | 86 | <50% Grass cover, Poor, HSG C |
| 141,573   | 86 | Weighted Average              |
| 61,680    |    | 43.57% Pervious Area          |
| 79,893    |    | 56.43% Impervious Area        |

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

### Subcatchment 5S: EX-5

Hydrograph



## Summary for Subcatchment 6S: EX-6

Runoff = 3.39 cfs @ 12.12 hrs, Volume= 0.253 af, Depth= 5.72"  
Routed to Link 8L : DP-2

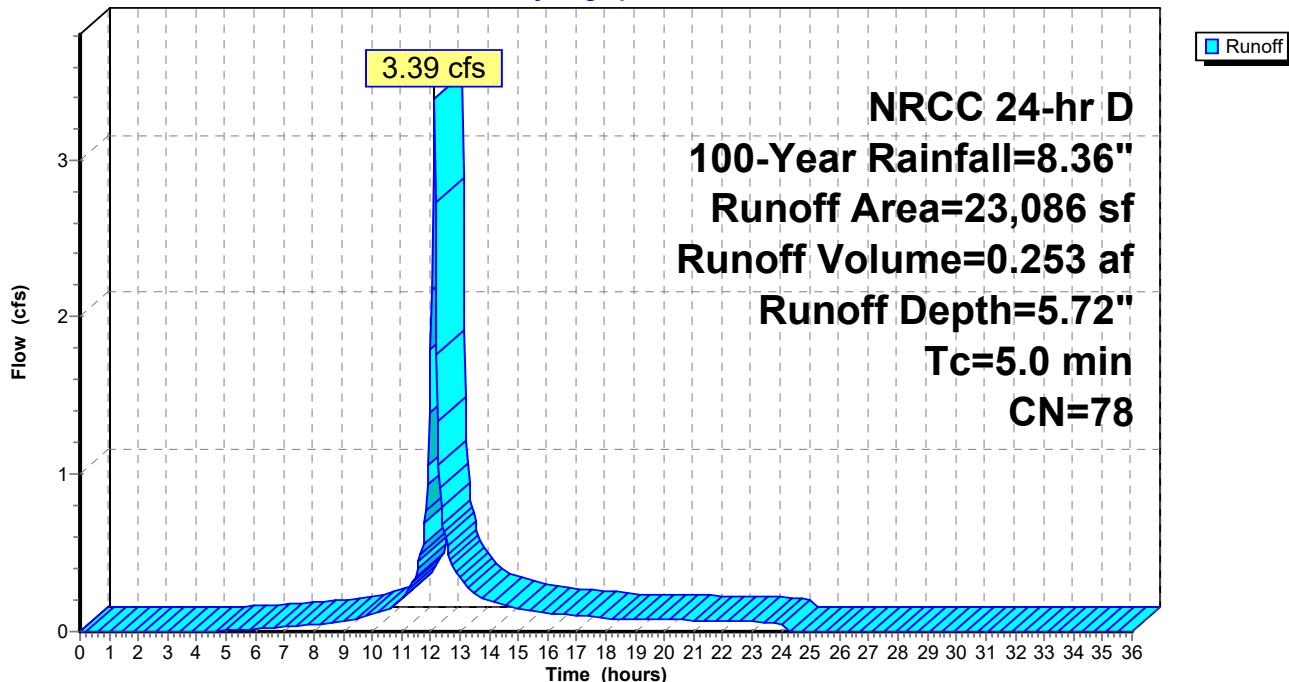
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                   |
|-----------|-------|-------------------------------|
| *         | 7,475 | 98 Paved parking              |
| *         | 509   | 98 Cement Concrete Sidewalk   |
| 15,102    | 68    | <50% Grass cover, Poor, HSG A |
| 23,086    | 78    | Weighted Average              |
| 15,102    |       | 65.42% Pervious Area          |
| 7,984     |       | 34.58% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

## Subcatchment 6S: EX-6

Hydrograph



### Summary for Link 7L: DP-1

Inflow Area = 3.640 ac, 49.90% Impervious, Inflow Depth = 6.52" for 100-Year event

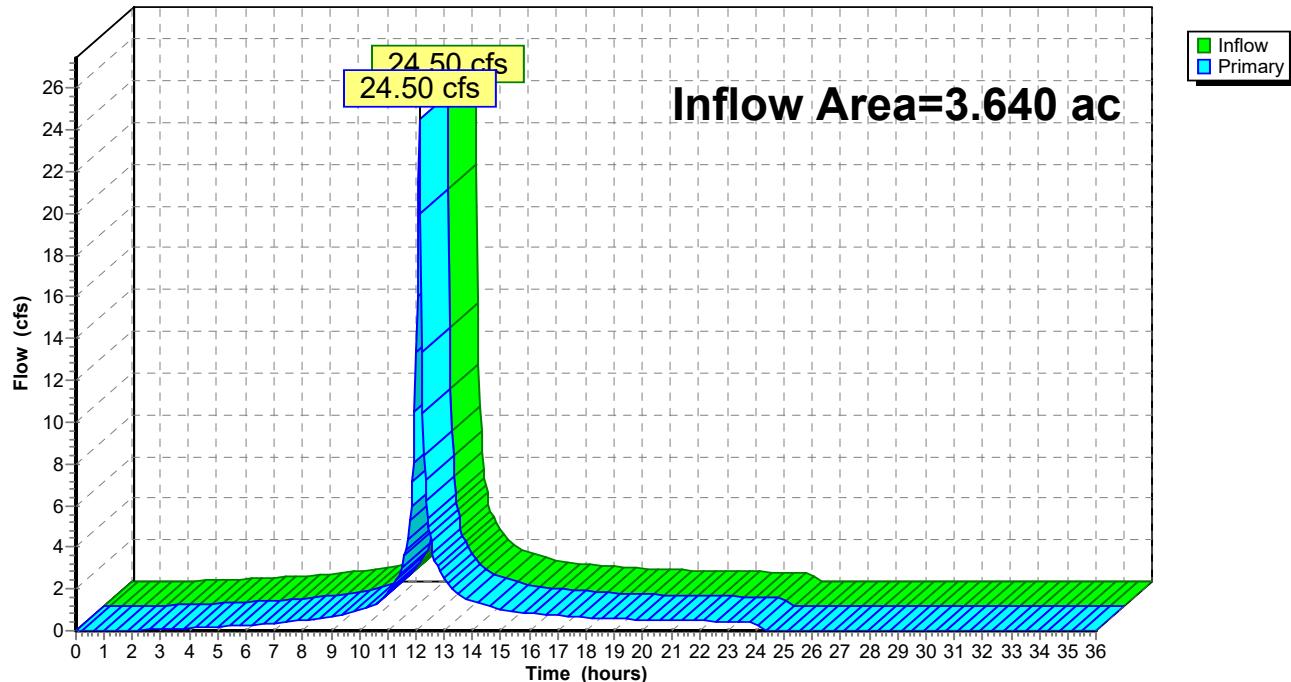
Inflow = 24.50 cfs @ 12.12 hrs, Volume= 1.978 af

Primary = 24.50 cfs @ 12.12 hrs, Volume= 1.978 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 7L: DP-1

Hydrograph



### Summary for Link 8L: DP-2

Inflow Area = 0.530 ac, 34.58% Impervious, Inflow Depth = 5.72" for 100-Year event

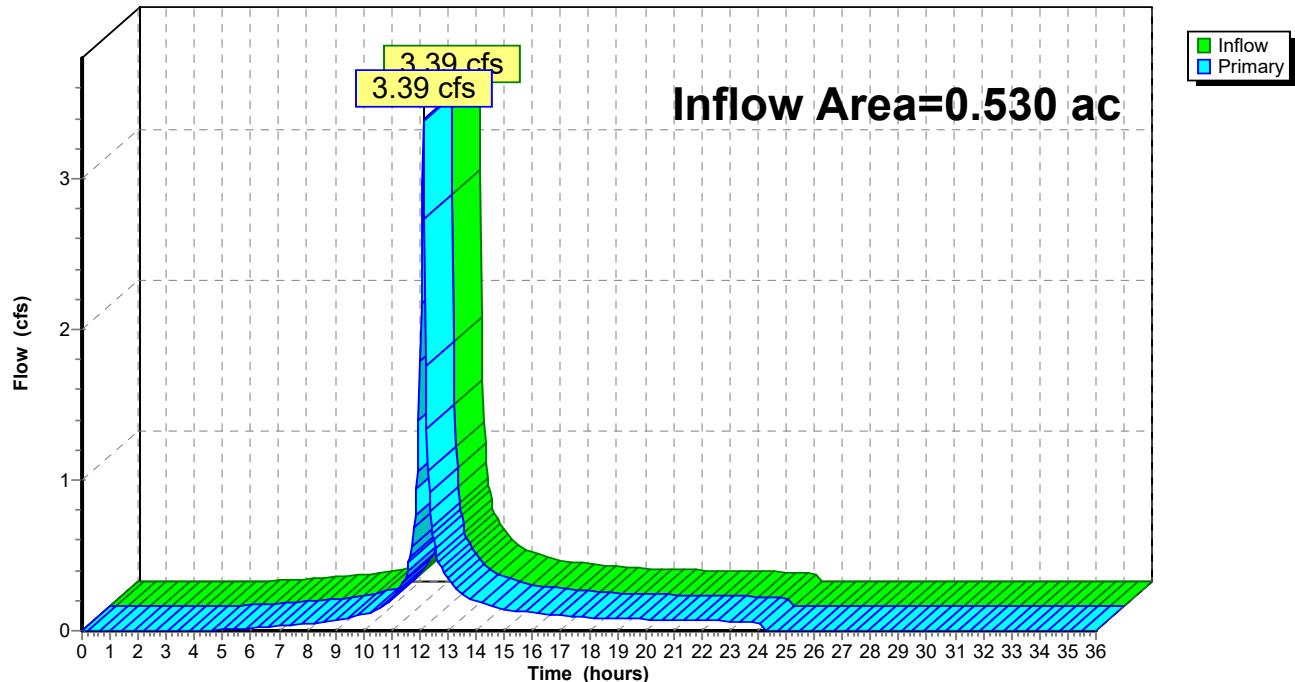
Inflow = 3.39 cfs @ 12.12 hrs, Volume= 0.253 af

Primary = 3.39 cfs @ 12.12 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 8L: DP-2

Hydrograph



### Summary for Link 12L: DP-3

Inflow Area = 7.014 ac, 63.30% Impervious, Inflow Depth = 7.07" for 100-Year event

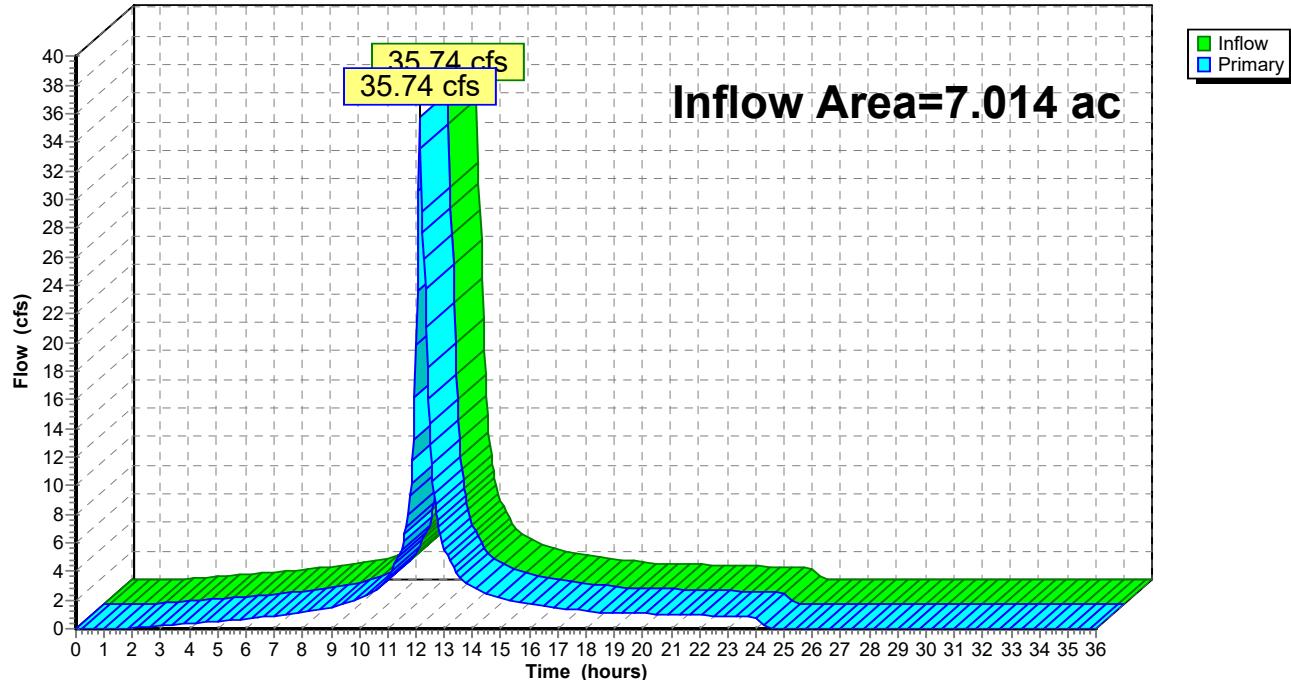
Inflow = 35.74 cfs @ 12.13 hrs, Volume= 4.131 af

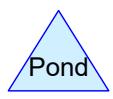
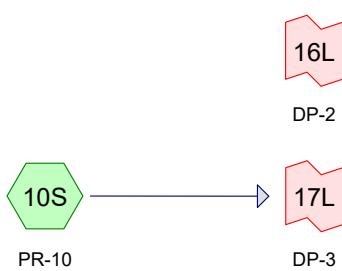
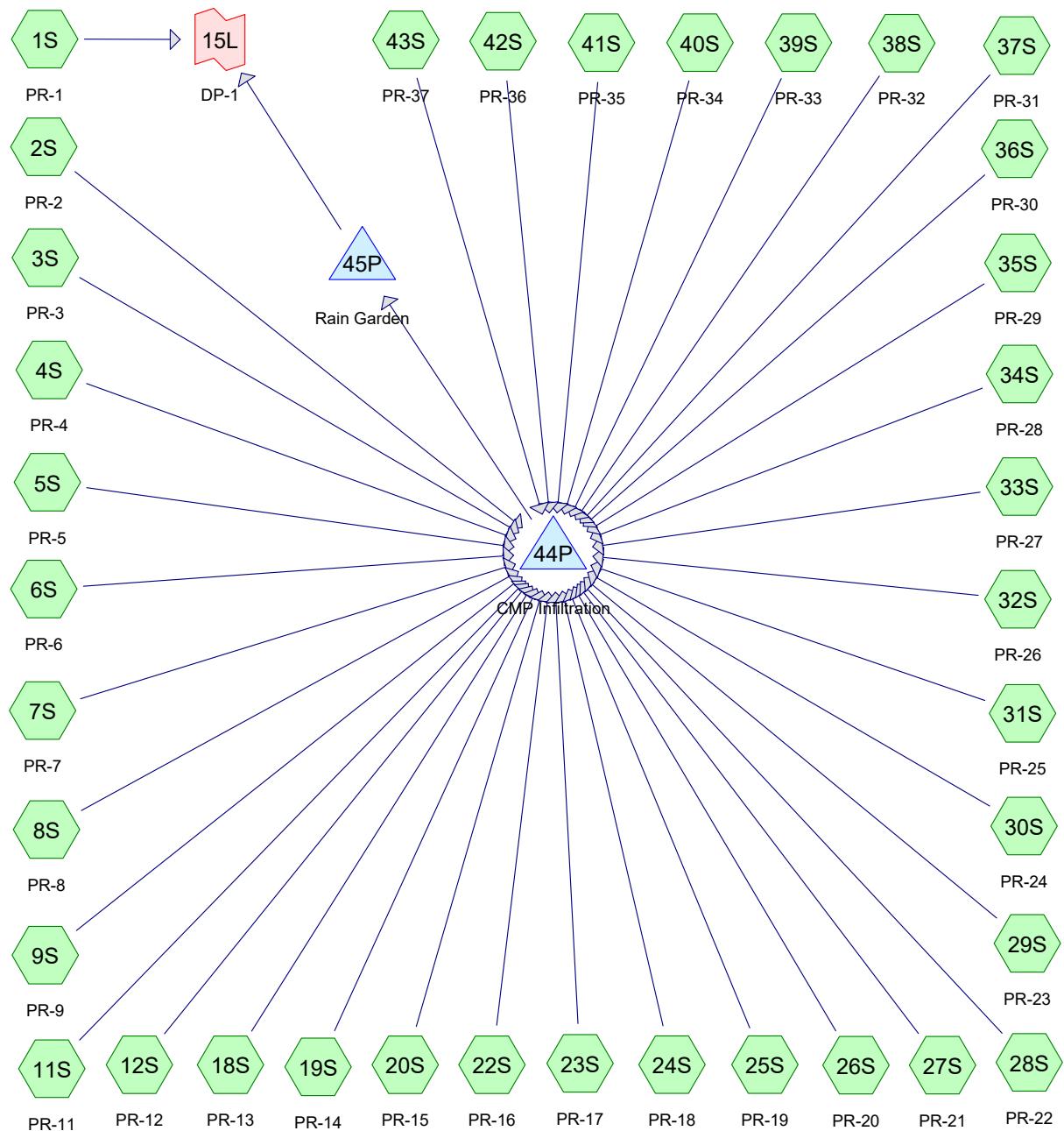
Primary = 35.74 cfs @ 12.13 hrs, Volume= 4.131 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 12L: DP-3

Hydrograph





**Routing Diagram for T1180\_POST - Contech Edit- TEC Edit**

Prepared by TEC, Inc, Printed 3/21/2024  
HydroCAD® 10.20-4a s/n 02793 © 2023 HydroCAD Software Solutions LLC

**T1180\_POST - Contech Edit- TEC Edit**

Prepared by TEC, Inc

HydroCAD® 10.20-4a s/n 02793 © 2023 HydroCAD Software Solutions LLC

Printed 3/21/2024

Page 2

**Rainfall Events Listing (selected events)**

| Event# | Event Name | Storm Type | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|------------|-------|---------|------------------|-----|----------------|-----|
| 1      | 2-Year     | NRCC 24-hr | D     | Default | 24.00            | 1   | 3.09           | 2   |
| 2      | 10-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 4.65           | 2   |
| 3      | 25-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 5.87           | 2   |
| 4      | 50-Year    | NRCC 24-hr | D     | Default | 24.00            | 1   | 7.00           | 2   |
| 5      | 100-Year   | NRCC 24-hr | D     | Default | 24.00            | 1   | 8.36           | 2   |

**T1180\_POST - Contech Edit- TEC Edit**

Prepared by TEC, Inc

HydroCAD® 10.20-4a s/n 02793 © 2023 HydroCAD Software Solutions LLC

Printed 3/21/2024

Page 3

**Area Listing (all nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)                                                                                                                                                        |
|-----------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.090           | 39        | >75% Grass cover, Good, HSG A (1S, 4S, 5S, 6S, 7S, 8S, 9S, 11S, 12S, 18S, 19S, 20S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S, 39S, 40S, 41S, 42S, 43S) |
| 0.627           | 74        | >75% Grass cover, Good, HSG C (1S, 2S, 3S, 4S, 5S, 8S, 9S, 10S, 11S, 12S, 18S, 19S, 23S, 28S, 29S, 30S, 31S, 34S)                                                                            |
| 0.058           | 80        | >75% Grass cover, Good, HSG D (10S)                                                                                                                                                          |
| 0.654           | 98        | Cement Concrete Sidewalk, HSG A (1S, 4S, 5S, 6S, 7S, 8S, 9S, 11S, 12S, 19S, 24S, 25S, 26S, 27S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S, 39S, 40S, 41S, 42S, 43S)                   |
| 0.262           | 98        | Cement Concrete Sidewalk, HSG C (2S, 3S, 4S, 5S, 8S, 9S, 11S, 12S, 18S, 23S, 28S, 29S, 30S, 31S)                                                                                             |
| 2.721           | 98        | Paved parking, HSG A (1S, 4S, 5S, 6S, 7S, 8S, 9S, 11S, 12S, 18S, 19S, 20S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S, 39S, 40S, 41S, 42S, 43S)     |
| 1.086           | 98        | Paved parking, HSG C (2S, 3S, 4S, 5S, 8S, 9S, 11S, 12S, 18S, 19S, 22S, 23S, 28S, 29S, 30S)                                                                                                   |
| <b>7.497</b>    | <b>79</b> | <b>TOTAL AREA</b>                                                                                                                                                                            |

Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points x 3  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1S: PR-1**

Runoff Area=64,521 sf 26.38% Impervious Runoff Depth=0.22"  
Flow Length=350' Tc=15.5 min CN=55 Runoff=0.06 cfs 0.027 af

**Subcatchment2S: PR-2**

Runoff Area=5,989 sf 81.43% Impervious Runoff Depth=2.44"  
Tc=5.0 min CN=94 Runoff=0.36 cfs 0.028 af

**Subcatchment3S: PR-3**

Runoff Area=8,817 sf 74.45% Impervious Runoff Depth=2.25"  
Tc=5.0 min CN=92 Runoff=0.50 cfs 0.038 af

**Subcatchment4S: PR-4**

Runoff Area=6,680 sf 84.81% Impervious Runoff Depth=2.25"  
Tc=5.0 min CN=92 Runoff=0.38 cfs 0.029 af

**Subcatchment5S: PR-5**

Runoff Area=7,314 sf 77.13% Impervious Runoff Depth=1.90"  
Tc=5.0 min CN=88 Runoff=0.36 cfs 0.027 af

**Subcatchment6S: PR-6**

Runoff Area=15,528 sf 55.11% Impervious Runoff Depth=0.86"  
Tc=5.0 min CN=72 Runoff=0.33 cfs 0.026 af

**Subcatchment7S: PR-7**

Runoff Area=8,803 sf 79.89% Impervious Runoff Depth=1.74"  
Tc=5.0 min CN=86 Runoff=0.40 cfs 0.029 af

**Subcatchment8S: PR-8**

Runoff Area=16,139 sf 53.26% Impervious Runoff Depth=1.52"  
Tc=5.0 min CN=83 Runoff=0.65 cfs 0.047 af

**Subcatchment9S: PR-9**

Runoff Area=7,180 sf 75.68% Impervious Runoff Depth=1.98"  
Flow Length=127' Tc=7.1 min CN=89 Runoff=0.34 cfs 0.027 af

**Subcatchment10S: PR-10**

Runoff Area=4,103 sf 0.00% Impervious Runoff Depth=1.19"  
Tc=5.0 min CN=78 Runoff=0.13 cfs 0.009 af

**Subcatchment11S: PR-11**

Runoff Area=12,349 sf 77.12% Impervious Runoff Depth=2.25"  
Flow Length=257' Tc=6.6 min CN=92 Runoff=0.66 cfs 0.053 af

**Subcatchment12S: PR-12**

Runoff Area=12,764 sf 71.19% Impervious Runoff Depth=2.16"  
Tc=5.0 min CN=91 Runoff=0.70 cfs 0.053 af

**Subcatchment13S: PR-13**

Runoff Area=7,593 sf 39.33% Impervious Runoff Depth=0.55"  
Flow Length=246' Tc=16.1 min CN=65 Runoff=0.06 cfs 0.008 af

**Subcatchment14S: PR-14**

Runoff Area=3,225 sf 82.26% Impervious Runoff Depth=1.98"  
Flow Length=166' Tc=7.3 min CN=89 Runoff=0.15 cfs 0.012 af

**Subcatchment15S: PR-15**

Runoff Area=2,717 sf 85.79% Impervious Runoff Depth=2.07"  
Tc=5.0 min CN=90 Runoff=0.14 cfs 0.011 af

**Subcatchment16S: PR-16**

Runoff Area=1,349 sf 100.00% Impervious Runoff Depth=2.86"  
Flow Length=247' Tc=16.1 min CN=98 Runoff=0.06 cfs 0.007 af

|                               |                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment23S: PR-17</b> | Runoff Area=14,295 sf 71.70% Impervious Runoff Depth=2.07"<br>Tc=5.0 min CN=90 Runoff=0.76 cfs 0.057 af                   |
| <b>Subcatchment24S: PR-18</b> | Runoff Area=9,416 sf 96.73% Impervious Runoff Depth=2.64"<br>Flow Length=189' Tc=7.1 min CN=96 Runoff=0.54 cfs 0.048 af   |
| <b>Subcatchment25S: PR-19</b> | Runoff Area=1,787 sf 75.15% Impervious Runoff Depth=1.52"<br>Tc=5.0 min CN=83 Runoff=0.07 cfs 0.005 af                    |
| <b>Subcatchment26S: PR-20</b> | Runoff Area=6,894 sf 87.28% Impervious Runoff Depth=2.07"<br>Tc=5.0 min CN=90 Runoff=0.37 cfs 0.027 af                    |
| <b>Subcatchment27S: PR-21</b> | Runoff Area=6,877 sf 87.79% Impervious Runoff Depth=2.16"<br>Tc=5.0 min CN=91 Runoff=0.38 cfs 0.028 af                    |
| <b>Subcatchment28S: PR-22</b> | Runoff Area=5,124 sf 73.32% Impervious Runoff Depth=1.59"<br>Tc=5.0 min CN=84 Runoff=0.21 cfs 0.016 af                    |
| <b>Subcatchment29S: PR-23</b> | Runoff Area=6,611 sf 79.08% Impervious Runoff Depth=1.90"<br>Tc=5.0 min CN=88 Runoff=0.33 cfs 0.024 af                    |
| <b>Subcatchment30S: PR-24</b> | Runoff Area=5,313 sf 80.16% Impervious Runoff Depth=1.90"<br>Tc=5.0 min CN=88 Runoff=0.26 cfs 0.019 af                    |
| <b>Subcatchment31S: PR-25</b> | Runoff Area=8,212 sf 59.72% Impervious Runoff Depth=1.32"<br>Flow Length=218' Tc=11.9 min CN=80 Runoff=0.22 cfs 0.021 af  |
| <b>Subcatchment32S: PR-26</b> | Runoff Area=5,770 sf 92.53% Impervious Runoff Depth=2.44"<br>Tc=5.0 min CN=94 Runoff=0.35 cfs 0.027 af                    |
| <b>Subcatchment33S: PR-27</b> | Runoff Area=5,730 sf 91.10% Impervious Runoff Depth=2.34"<br>Tc=5.0 min CN=93 Runoff=0.34 cfs 0.026 af                    |
| <b>Subcatchment34S: PR-28</b> | Runoff Area=4,491 sf 45.51% Impervious Runoff Depth=0.76"<br>Flow Length=193' Tc=14.0 min CN=70 Runoff=0.06 cfs 0.007 af  |
| <b>Subcatchment35S: PR-29</b> | Runoff Area=1,417 sf 81.37% Impervious Runoff Depth=1.82"<br>Tc=5.0 min CN=87 Runoff=0.07 cfs 0.005 af                    |
| <b>Subcatchment36S: PR-30</b> | Runoff Area=8,853 sf 73.61% Impervious Runoff Depth=1.45"<br>Flow Length=198' Tc=5.4 min CN=82 Runoff=0.33 cfs 0.025 af   |
| <b>Subcatchment37S: PR-31</b> | Runoff Area=9,984 sf 75.99% Impervious Runoff Depth=1.59"<br>Flow Length=205' Tc=5.3 min CN=84 Runoff=0.41 cfs 0.030 af   |
| <b>Subcatchment38S: PR-32</b> | Runoff Area=16,004 sf 53.26% Impervious Runoff Depth=0.76"<br>Flow Length=154' Tc=14.9 min CN=70 Runoff=0.20 cfs 0.023 af |
| <b>Subcatchment39S: PR-33</b> | Runoff Area=7,626 sf 79.02% Impervious Runoff Depth=1.74"<br>Tc=5.0 min CN=86 Runoff=0.35 cfs 0.025 af                    |
| <b>Subcatchment40S: PR-34</b> | Runoff Area=3,135 sf 83.67% Impervious Runoff Depth=1.90"<br>Flow Length=134' Tc=5.6 min CN=88 Runoff=0.15 cfs 0.011 af   |

|                                   |                                                                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment41S: PR-35</b>     | Runoff Area=459 sf 98.47% Impervious Runoff Depth=2.75"<br>Tc=5.0 min CN=97 Runoff=0.03 cfs 0.002 af                                            |
| <b>Subcatchment42S: PR-36</b>     | Runoff Area=6,465 sf 87.47% Impervious Runoff Depth=2.16"<br>Tc=5.0 min CN=91 Runoff=0.36 cfs 0.027 af                                          |
| <b>Subcatchment43S: PR-37</b>     | Runoff Area=7,047 sf 90.17% Impervious Runoff Depth=2.25"<br>Tc=5.0 min CN=92 Runoff=0.40 cfs 0.030 af                                          |
| <b>Pond 44P: CMP Infiltration</b> | Peak Elev=268.40' Storage=0.062 af Inflow=11.02 cfs 0.877 af<br>Discarded=0.17 cfs 0.229 af Primary=9.48 cfs 0.649 af Outflow=9.65 cfs 0.877 af |
| <b>Pond 45P: Rain Garden</b>      | Peak Elev=258.68' Storage=7,446 cf Inflow=9.48 cfs 0.649 af<br>Discarded=2.93 cfs 0.650 af Primary=0.00 cfs 0.000 af Outflow=2.93 cfs 0.650 af  |
| <b>Link 15L: DP-1</b>             | Inflow=0.06 cfs 0.027 af<br>Primary=0.06 cfs 0.027 af                                                                                           |
| <b>Link 16L: DP-2</b>             | Primary=0.00 cfs 0.000 af                                                                                                                       |
| <b>Link 17L: DP-3</b>             | Inflow=0.13 cfs 0.009 af<br>Primary=0.13 cfs 0.009 af                                                                                           |

**Total Runoff Area = 7.497 ac Runoff Volume = 0.914 af Average Runoff Depth = 1.46"**  
**37.01% Pervious = 2.775 ac 62.99% Impervious = 4.723 ac**

### Summary for Subcatchment 1S: PR-1

Runoff = 0.06 cfs @ 12.48 hrs, Volume= 0.027 af, Depth= 0.22"  
 Routed to Link 15L : DP-1

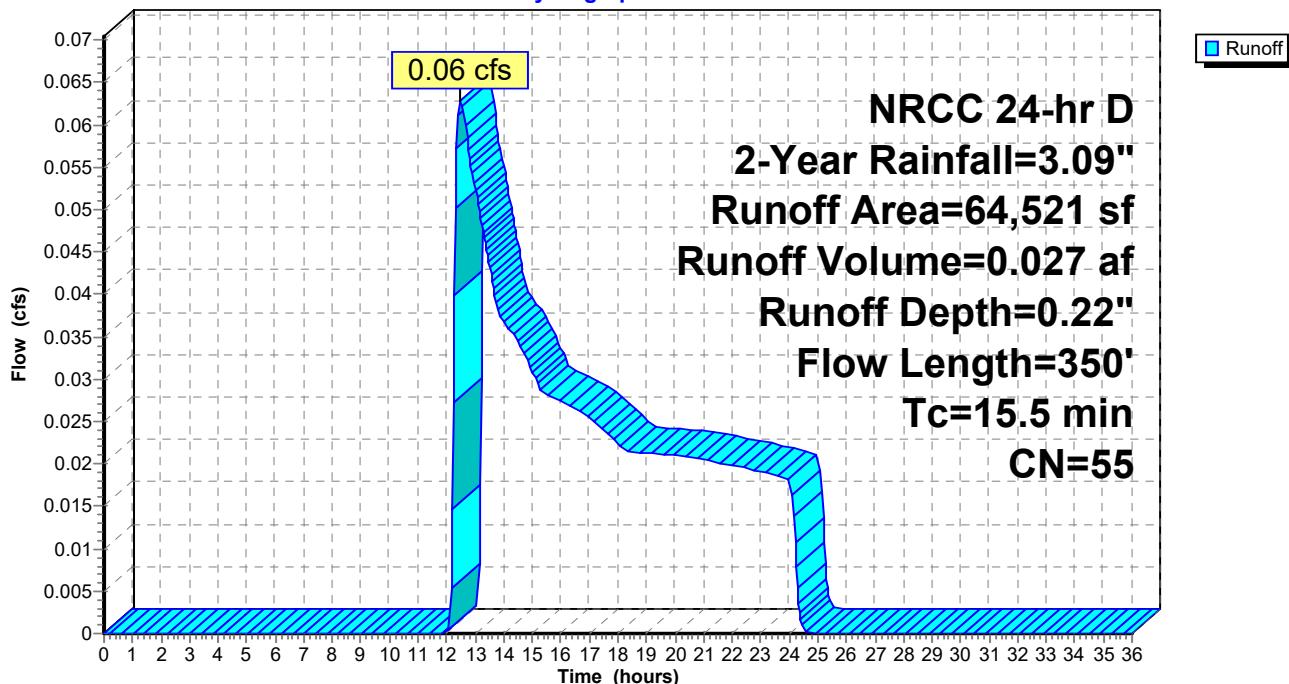
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 12,935    | 98 | Paved parking, HSG A            |
| 4,085     | 98 | Cement Concrete Sidewalk, HSG A |
| 46,449    | 39 | >75% Grass cover, Good, HSG A   |
| 1,052     | 74 | >75% Grass cover, Good, HSG C   |
| 64,521    | 55 | Weighted Average                |
| 47,501    |    | 73.62% Pervious Area            |
| 17,020    |    | 26.38% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                               |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------------------------------------------|
| 2.7         | 50               | 0.3333           | 0.31                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 10.8        | 60               | 0.0150           | 0.09                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 2.0         | 240              | 0.0150           | 1.97                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps |
| 15.5        | 350              |                  |                      |                   | Total                                                     |

### Subcatchment 1S: PR-1

Hydrograph



## Summary for Subcatchment 2S: PR-2

Runoff = 0.36 cfs @ 12.11 hrs, Volume= 0.028 af, Depth= 2.44"  
 Routed to Pond 44P : CMP Infiltration

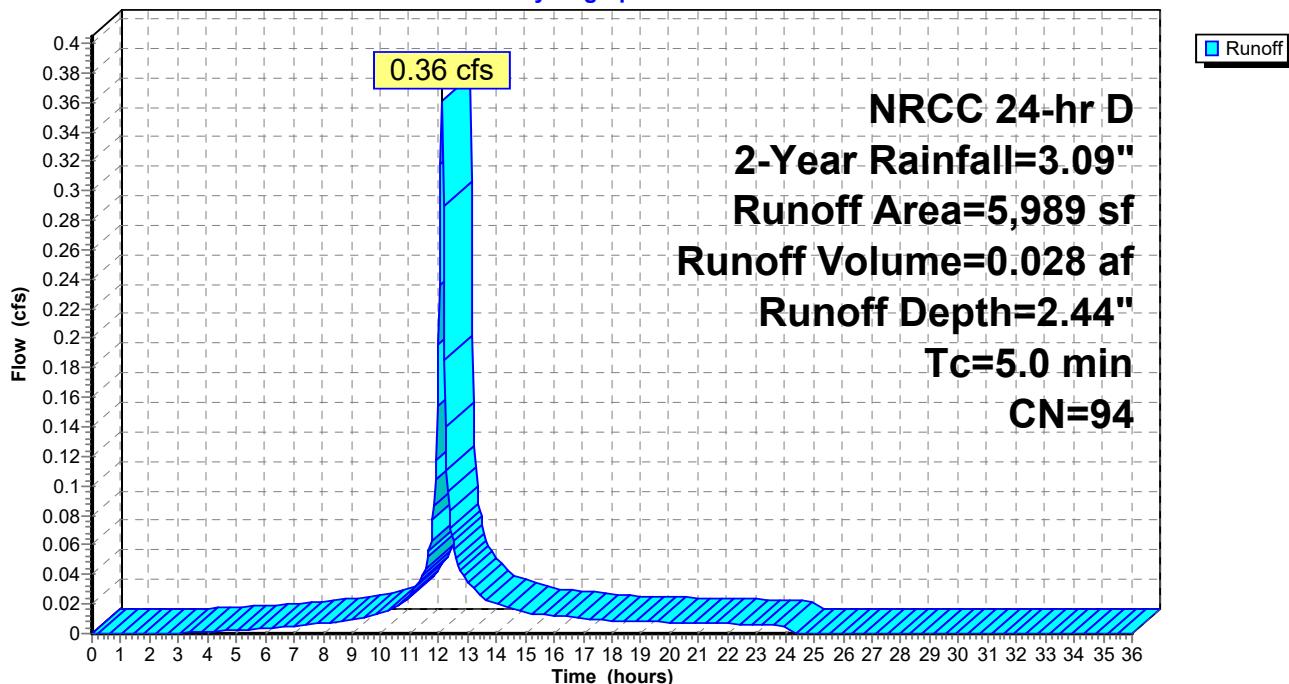
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 4,187     | 98 | Paved parking, HSG C            |
| 690       | 98 | Cement Concrete Sidewalk, HSG C |
| 1,112     | 74 | >75% Grass cover, Good, HSG C   |
| 5,989     | 94 | Weighted Average                |
| 1,112     |    | 18.57% Pervious Area            |
| 4,877     |    | 81.43% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

## Subcatchment 2S: PR-2

Hydrograph



### Summary for Subcatchment 3S: PR-3

Runoff = 0.50 cfs @ 12.12 hrs, Volume= 0.038 af, Depth= 2.25"  
 Routed to Pond 44P : CMP Infiltration

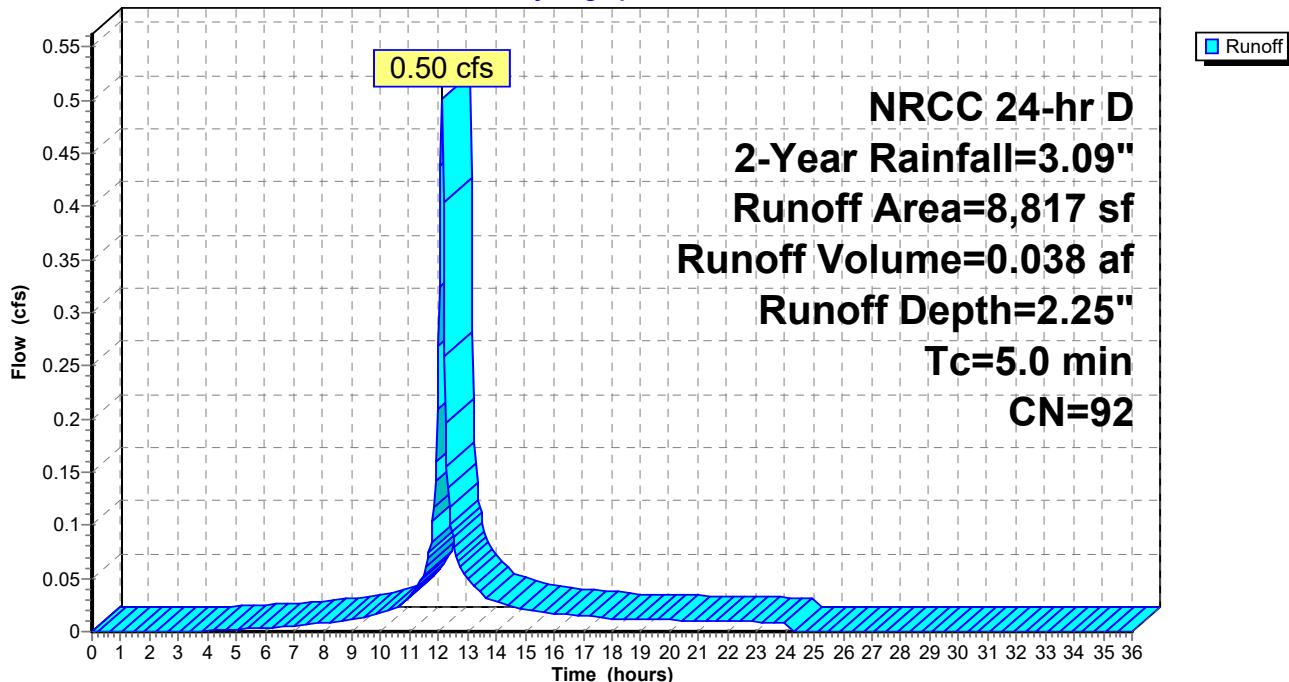
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,618     | 98 | Paved parking, HSG C            |
| 946       | 98 | Cement Concrete Sidewalk, HSG C |
| 2,253     | 74 | >75% Grass cover, Good, HSG C   |
| 8,817     | 92 | Weighted Average                |
| 2,253     |    | 25.55% Pervious Area            |
| 6,564     |    | 74.45% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 3S: PR-3

Hydrograph



### Summary for Subcatchment 4S: PR-4

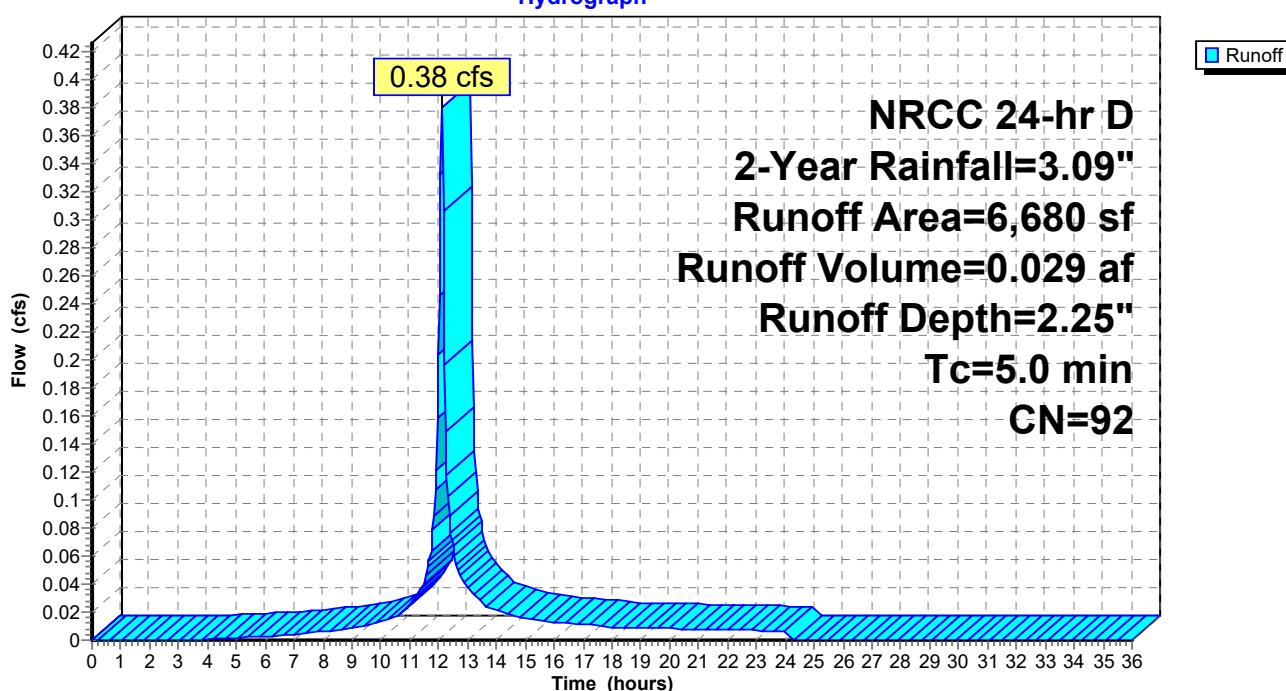
Runoff = 0.38 cfs @ 12.12 hrs, Volume= 0.029 af, Depth= 2.25"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf)            | CN                | Description                     |                      |
|----------------------|-------------------|---------------------------------|----------------------|
| 2,045                | 98                | Paved parking, HSG C            |                      |
| *                    | 2,781             | Paved parking, HSG A            |                      |
| *                    | 424               | Cement Concrete Sidewalk, HSG C |                      |
| *                    | 415               | Cement Concrete Sidewalk, HSG A |                      |
| 559                  | 74                | >75% Grass cover, Good, HSG C   |                      |
| 456                  | 39                | >75% Grass cover, Good, HSG A   |                      |
| 6,680                | 92                | Weighted Average                |                      |
| 1,015                |                   | 15.19% Pervious Area            |                      |
| 5,665                |                   | 84.81% Impervious Area          |                      |
|                      |                   |                                 |                      |
| Tc<br>(min)          | Length<br>(feet)  | Slope<br>(ft/ft)                |                      |
| Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                     |                      |
| 5.0                  |                   |                                 | Direct Entry, Direct |

### Subcatchment 4S: PR-4

Hydrograph



### Summary for Subcatchment 5S: PR-5

Runoff = 0.36 cfs @ 12.12 hrs, Volume= 0.027 af, Depth= 1.90"  
 Routed to Pond 44P : CMP Infiltration

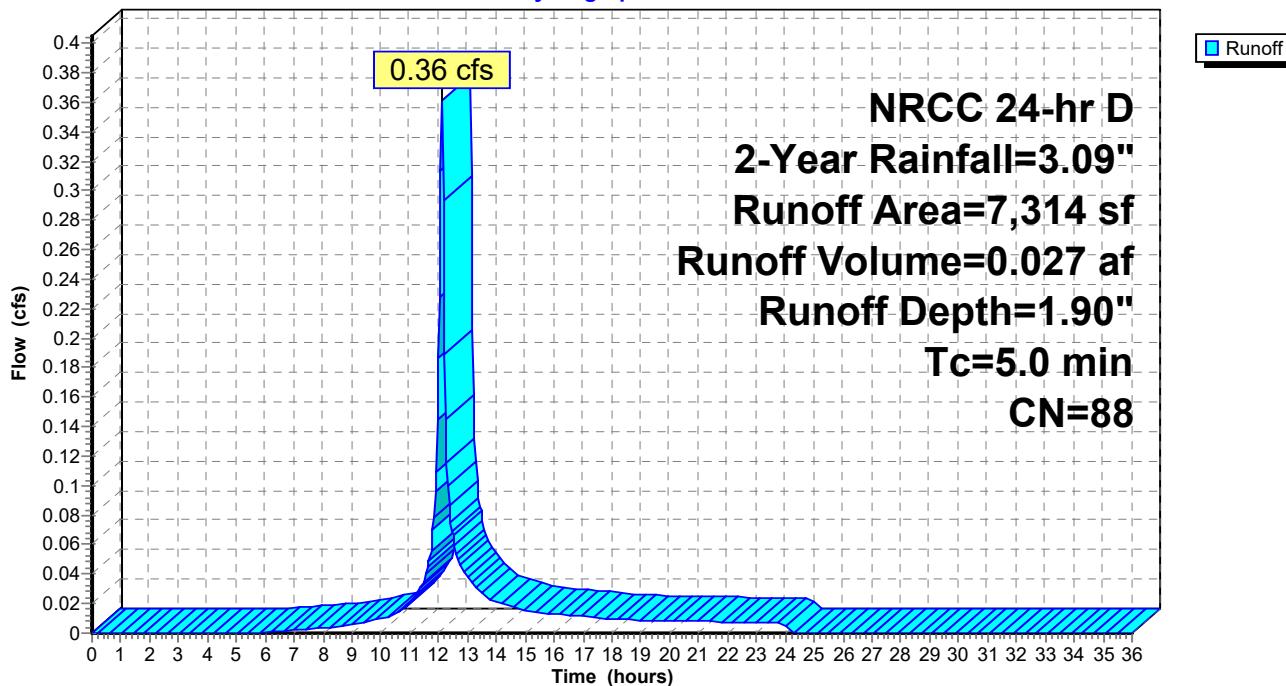
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,817 | 98 Paved parking, HSG A            |
| *         | 3,106 | 98 Paved parking, HSG C            |
| *         | 327   | 98 Cement Concrete Sidewalk, HSG C |
| *         | 391   | 98 Cement Concrete Sidewalk, HSG A |
|           | 725   | >75% Grass cover, Good, HSG C      |
|           | 948   | >75% Grass cover, Good, HSG A      |
| 7,314     | 88    | Weighted Average                   |
| 1,673     |       | 22.87% Pervious Area               |
| 5,641     |       | 77.13% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 5S: PR-5

Hydrograph



### Summary for Subcatchment 6S: PR-6

Runoff = 0.33 cfs @ 12.12 hrs, Volume= 0.026 af, Depth= 0.86"  
 Routed to Pond 44P : CMP Infiltration

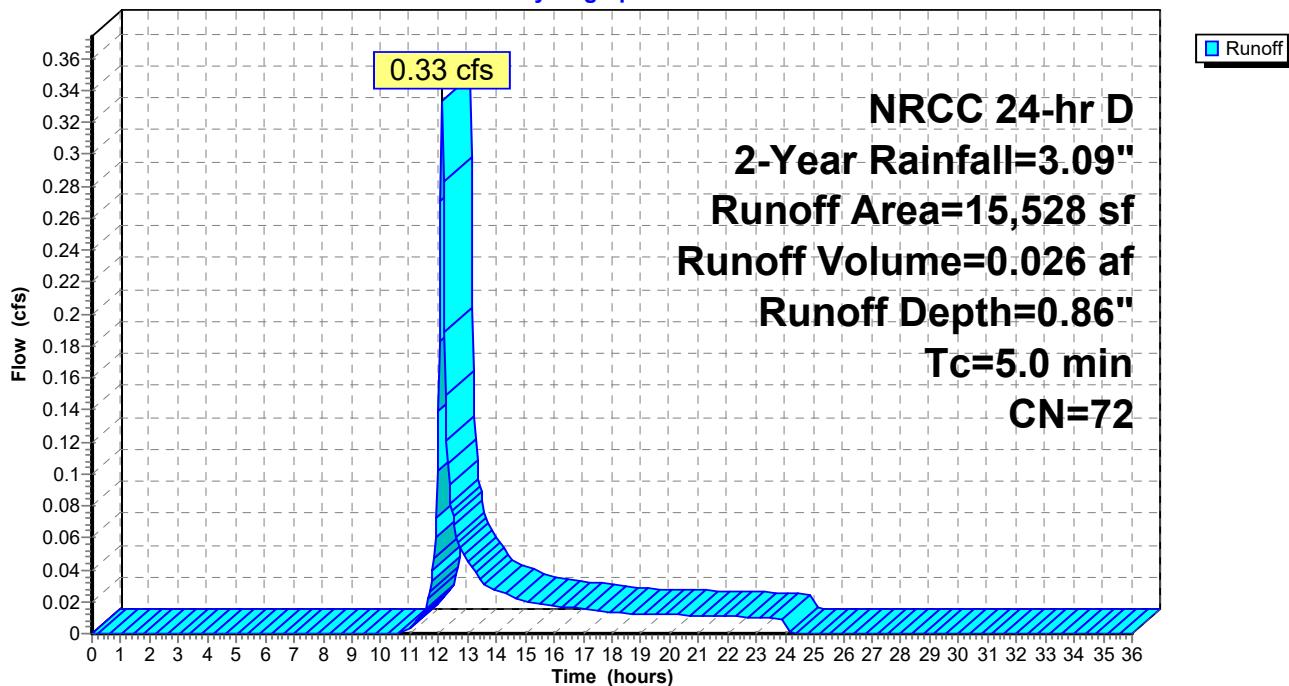
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 7,081     | 98 | Paved parking, HSG A            |
| 1,477     | 98 | Cement Concrete Sidewalk, HSG A |
| 6,970     | 39 | >75% Grass cover, Good, HSG A   |
| 15,528    | 72 | Weighted Average                |
| 6,970     |    | 44.89% Pervious Area            |
| 8,558     |    | 55.11% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 6S: PR-6

Hydrograph



### Summary for Subcatchment 7S: PR-7

Runoff = 0.40 cfs @ 12.12 hrs, Volume= 0.029 af, Depth= 1.74"  
 Routed to Pond 44P : CMP Infiltration

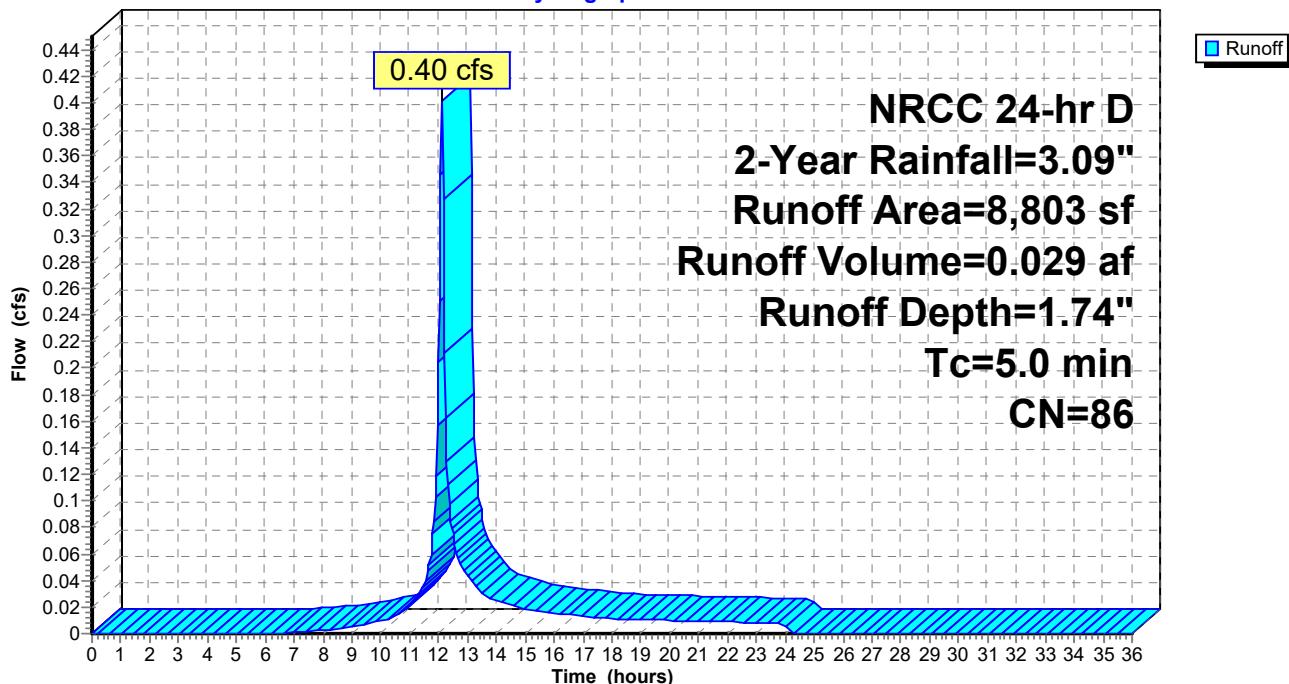
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,946     | 98 | Paved parking, HSG A            |
| 1,087     | 98 | Cement Concrete Sidewalk, HSG A |
| 1,770     | 39 | >75% Grass cover, Good, HSG A   |
| 8,803     | 86 | Weighted Average                |
| 1,770     |    | 20.11% Pervious Area            |
| 7,033     |    | 79.89% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 7S: PR-7

Hydrograph



### Summary for Subcatchment 8S: PR-8

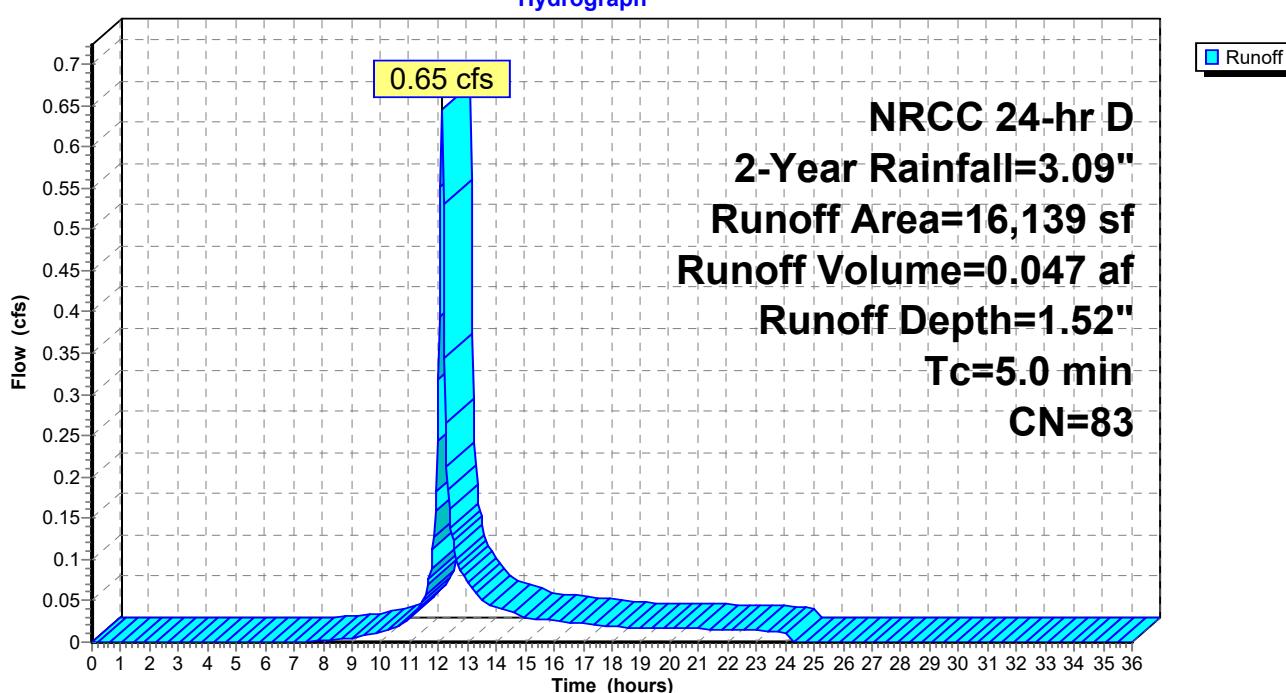
Runoff = 0.65 cfs @ 12.12 hrs, Volume= 0.047 af, Depth= 1.52"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 2,974         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 4,084         | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 1,148         | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
| *         | 390           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
|           | 1,872         | >75% Grass cover, Good, HSG A      |                   |                |                      |
|           | 5,671         | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 16,139    | 83            | Weighted Average                   |                   |                |                      |
| 7,543     |               | 46.74% Pervious Area               |                   |                |                      |
| 8,596     |               | 53.26% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 8S: PR-8

Hydrograph



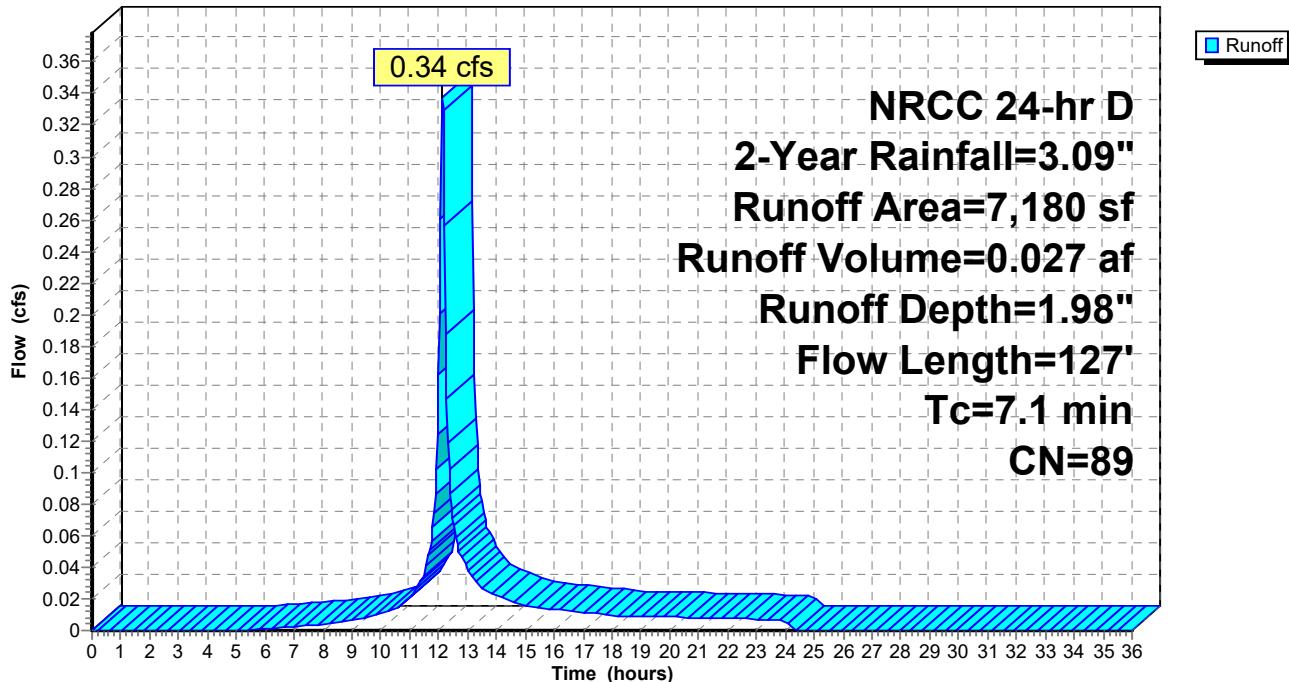
### Summary for Subcatchment 9S: PR-9

Runoff = 0.34 cfs @ 12.14 hrs, Volume= 0.027 af, Depth= 1.98"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 532   | 98 Paved parking, HSG A            |
| *         | 3,859 | 98 Paved parking, HSG C            |
| *         | 216   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 827   | 98 Cement Concrete Sidewalk, HSG C |
|           | 570   | >75% Grass cover, Good, HSG A      |
|           | 1,176 | >75% Grass cover, Good, HSG C      |
| 7,180     | 89    | Weighted Average                   |
| 1,746     |       | 24.32% Pervious Area               |
| 5,434     |       | 75.68% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.7         | 75               | 0.0050           | 0.74                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 27               | 0.0050           | 1.44                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 127              | Total            |                      |                   |                                                                   |

**Subcatchment 9S: PR-9****Hydrograph**

### Summary for Subcatchment 10S: PR-10

Runoff = 0.13 cfs @ 12.12 hrs, Volume= 0.009 af, Depth= 1.19"  
 Routed to Link 17L : DP-3

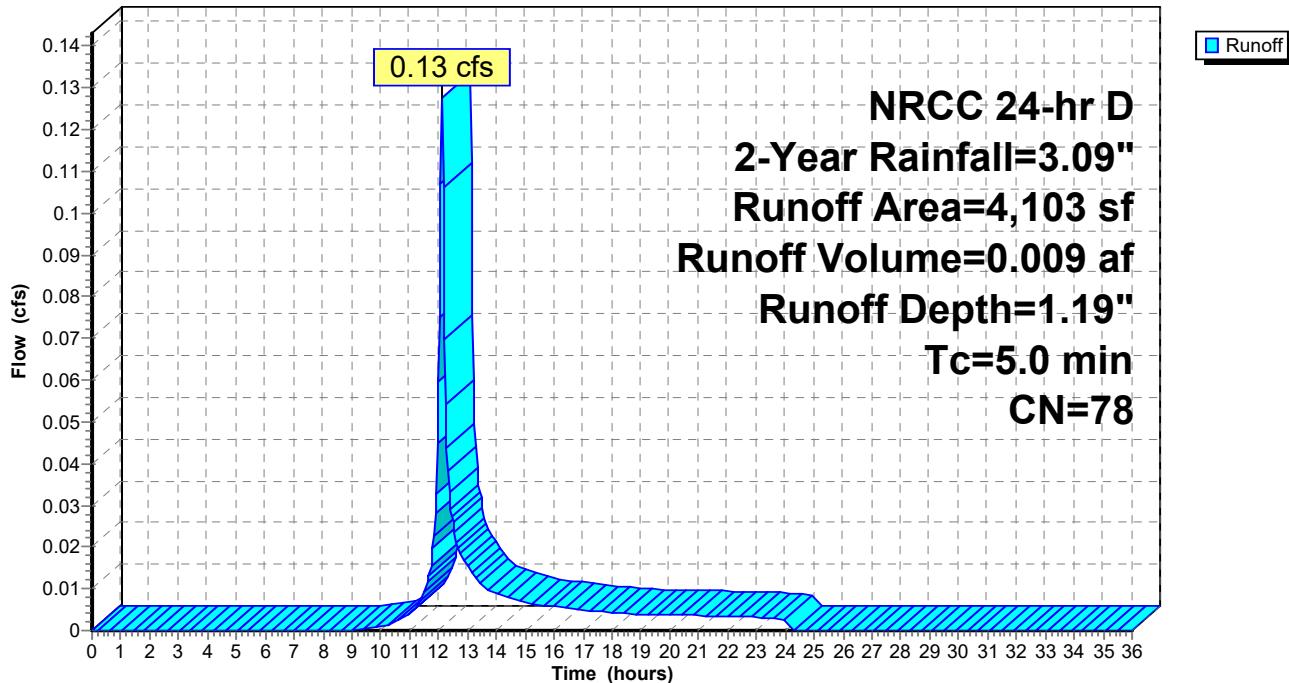
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 1,584     | 74 | >75% Grass cover, Good, HSG C |
| 2,519     | 80 | >75% Grass cover, Good, HSG D |
| 4,103     | 78 | Weighted Average              |
| 4,103     |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet)     | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description |
|-------------|----------------------|------------------|----------------------|-------------------|-------------|
| 5.0         | Direct Entry, DIRECT |                  |                      |                   |             |

### Subcatchment 10S: PR-10

Hydrograph



### Summary for Subcatchment 11S: PR-11

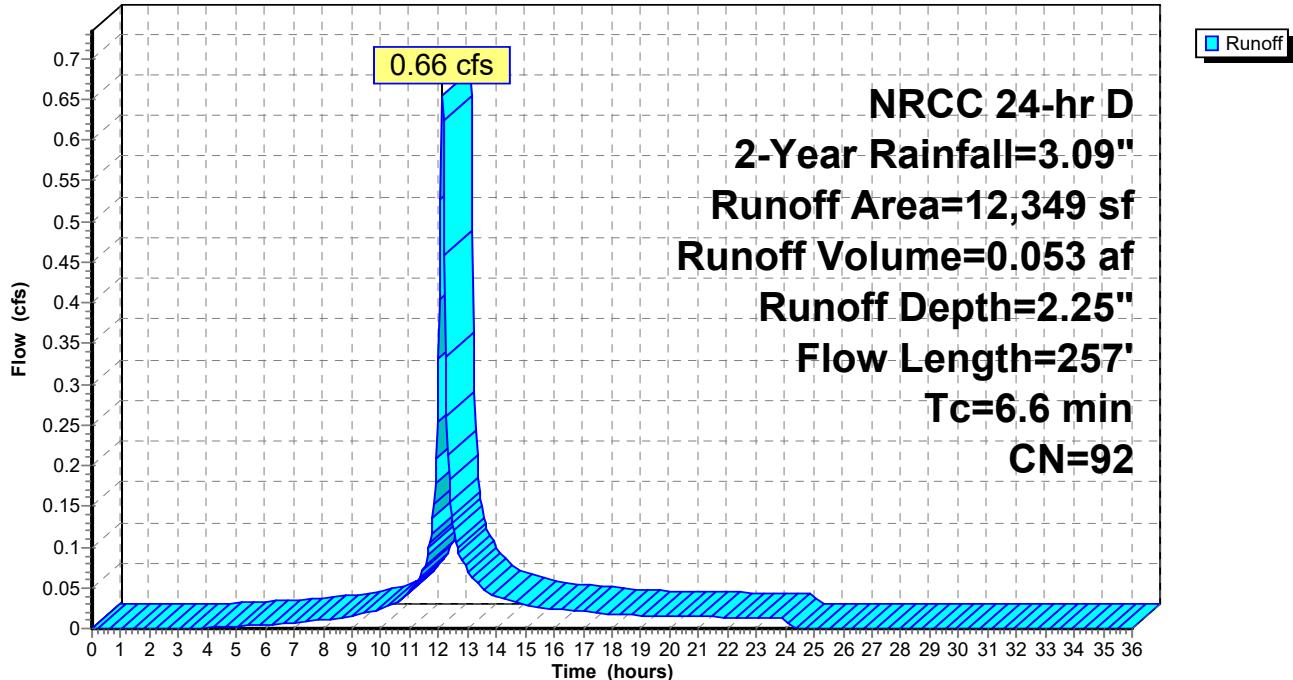
Runoff = 0.66 cfs @ 12.13 hrs, Volume= 0.053 af, Depth= 2.25"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,691 | 98 Paved parking, HSG C            |
| *         | 276   | 98 Paved parking, HSG A            |
| *         | 1,371 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 185   | 98 Cement Concrete Sidewalk, HSG A |
| 2,481     | 74    | >75% Grass cover, Good, HSG C      |
| 345       | 39    | >75% Grass cover, Good, HSG A      |

|        |    |                        |
|--------|----|------------------------|
| 12,349 | 92 | Weighted Average       |
| 2,826  |    | 22.88% Pervious Area   |
| 9,523  |    | 77.12% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.8         | 75               | 0.0350           | 1.61                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 157              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 6.6         | 257              | Total            |                      |                   |                                                                   |

**Subcatchment 11S: PR-11****Hydrograph**

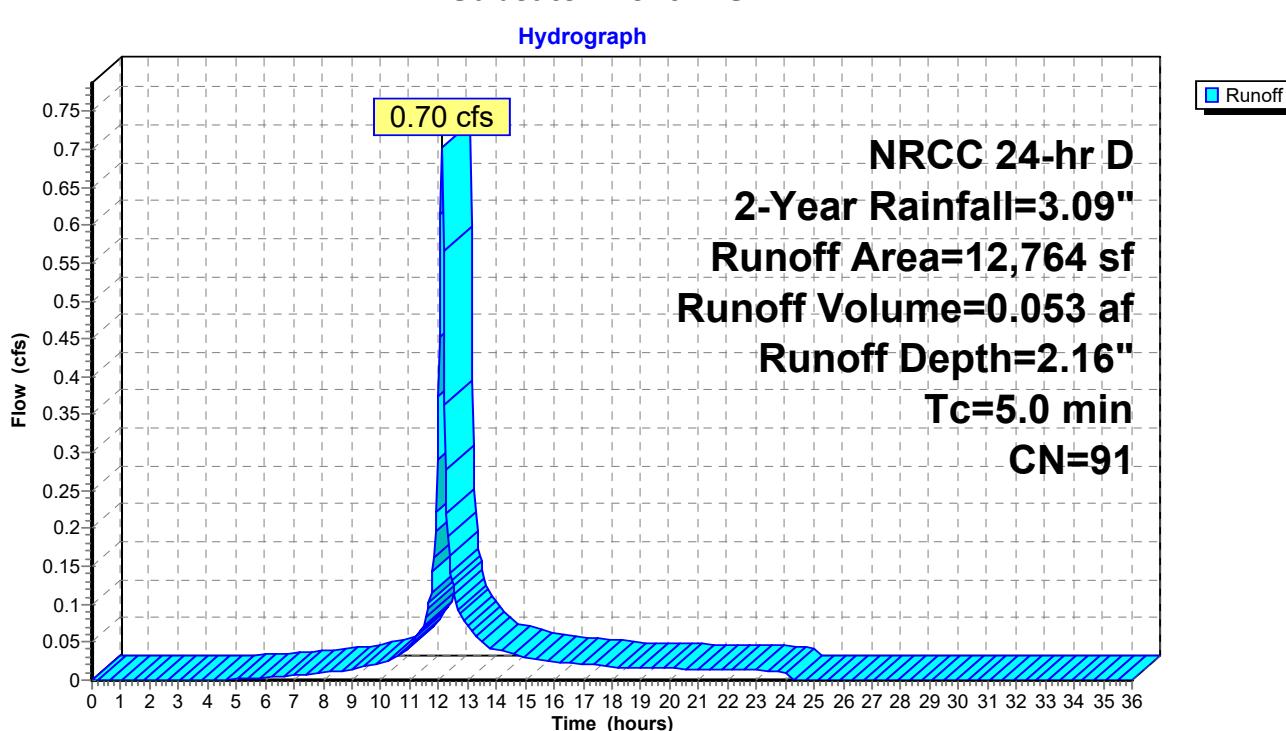
## Summary for Subcatchment 12S: PR-12

Runoff = 0.70 cfs @ 12.12 hrs, Volume= 0.053 af, Depth= 2.16"  
Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,226 | 98 Paved parking, HSG C            |
| *         | 139   | 98 Paved parking, HSG A            |
| *         | 1,592 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 130   | 98 Cement Concrete Sidewalk, HSG A |
| 3,543     | 74    | >75% Grass cover, Good, HSG C      |
| 134       | 39    | >75% Grass cover, Good, HSG A      |
| 12,764    | 91    | Weighted Average                   |
| 3,677     |       | 28.81% Pervious Area               |
| 9,087     |       | 71.19% Impervious Area             |

### Subcatchment 12S: RR 12



### Summary for Subcatchment 18S: PR-13

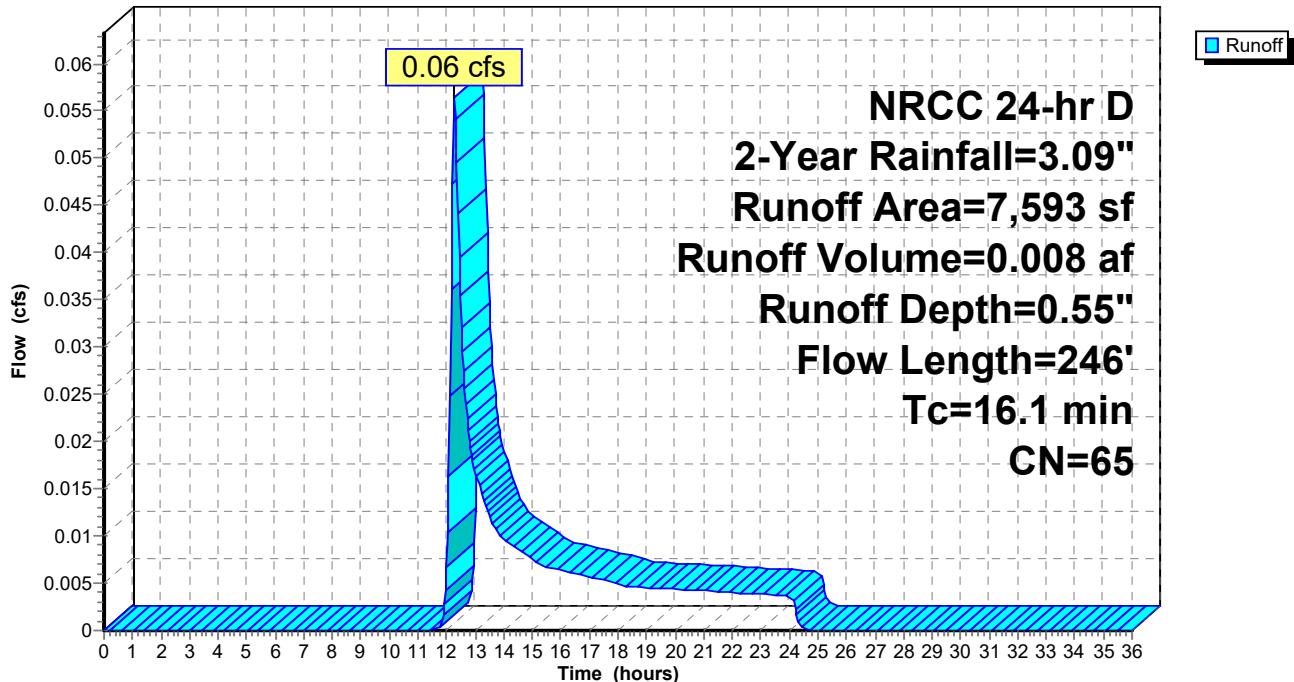
Runoff = 0.06 cfs @ 12.28 hrs, Volume= 0.008 af, Depth= 0.55"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 131       | 98 | Paved parking, HSG C            |
| * 2,672   | 98 | Paved parking, HSG A            |
| * 183     | 98 | Cement Concrete Sidewalk, HSG C |
| 499       | 74 | >75% Grass cover, Good, HSG C   |
| 4,108     | 39 | >75% Grass cover, Good, HSG A   |

|       |    |                        |
|-------|----|------------------------|
| 7,593 | 65 | Weighted Average       |
| 4,607 |    | 60.67% Pervious Area   |
| 2,986 |    | 39.33% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 108              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 246              | Total            |                      |                   |                                                                          |

**Subcatchment 18S: PR-13****Hydrograph**

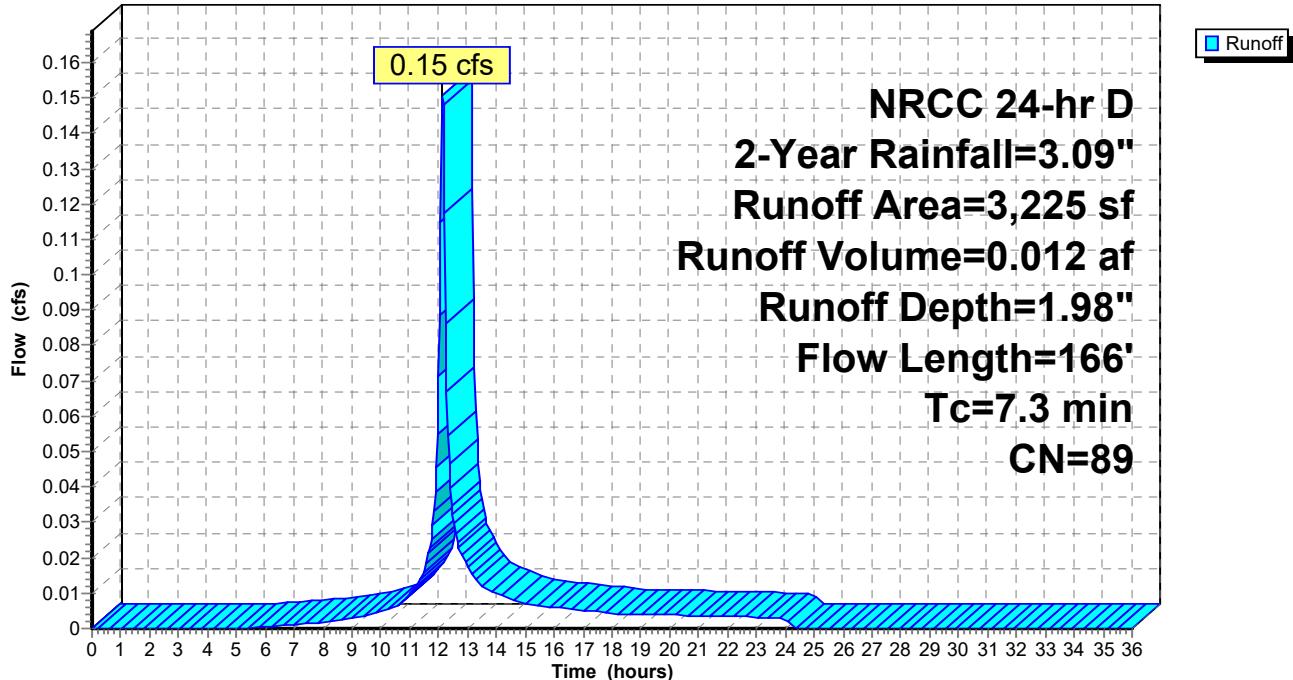
### Summary for Subcatchment 19S: PR-14

Runoff = 0.15 cfs @ 12.14 hrs, Volume= 0.012 af, Depth= 1.98"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 199   | 98 Paved parking, HSG C            |
| *         | 2,132 | 98 Paved parking, HSG A            |
| *         | 322   | 98 Cement Concrete Sidewalk, HSG A |
|           | 126   | >75% Grass cover, Good, HSG C      |
|           | 446   | >75% Grass cover, Good, HSG A      |
| 3,225     | 89    | Weighted Average                   |
| 572       |       | 17.74% Pervious Area               |
| 2,653     |       | 82.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 6.3         | 33               | 0.0500           | 0.09                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.7         | 67               | 0.0350           | 1.57                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 66               | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.3         | 166              | Total            |                      |                   |                                                                   |

**Subcatchment 19S: PR-14****Hydrograph**

### Summary for Subcatchment 20S: PR-15

Runoff = 0.14 cfs @ 12.12 hrs, Volume= 0.011 af, Depth= 2.07"  
 Routed to Pond 44P : CMP Infiltration

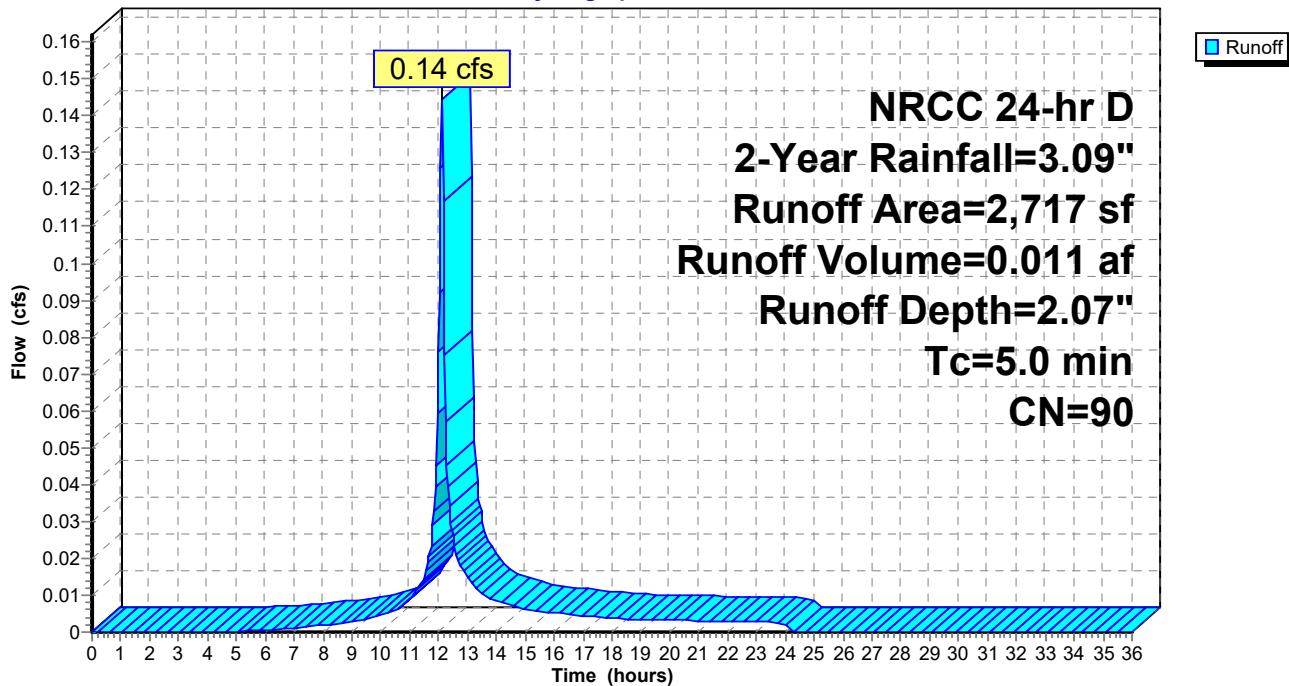
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,331     | 98 | Paved parking, HSG A          |
| 386       | 39 | >75% Grass cover, Good, HSG A |
| 2,717     | 90 | Weighted Average              |
| 386       |    | 14.21% Pervious Area          |
| 2,331     |    | 85.79% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 20S: PR-15

Hydrograph



### Summary for Subcatchment 22S: PR-16

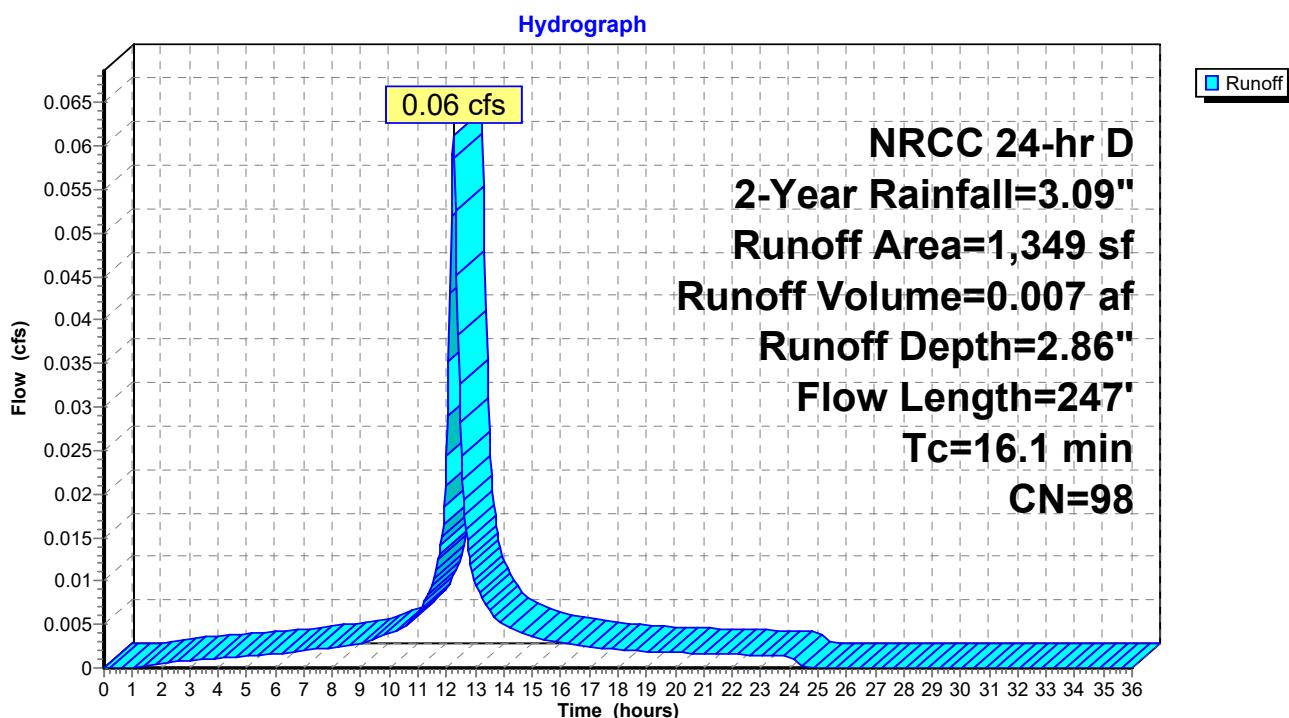
Runoff = 0.06 cfs @ 12.24 hrs, Volume= 0.007 af, Depth= 2.86"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description             |
|-----------|-------|-------------------------|
| *         | 614   | 98 Paved parking, HSG A |
| *         | 735   | 98 Paved parking, HSG C |
|           | 1,349 | Weighted Average        |
|           | 1,349 | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                              |
|----------|---------------|---------------|-------------------|----------------|--------------------------------------------------------------------------|
| 15.4     | 100           | 0.0500        | 0.11              |                | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2      | 38            | 0.0500        | 3.35              |                | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5      | 109           | 0.0350        | 3.80              |                | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1     | 247           | Total         |                   |                |                                                                          |

### Subcatchment 22S: PR-16



### Summary for Subcatchment 23S: PR-17

Runoff = 0.76 cfs @ 12.12 hrs, Volume= 0.057 af, Depth= 2.07"  
 Routed to Pond 44P : CMP Infiltration

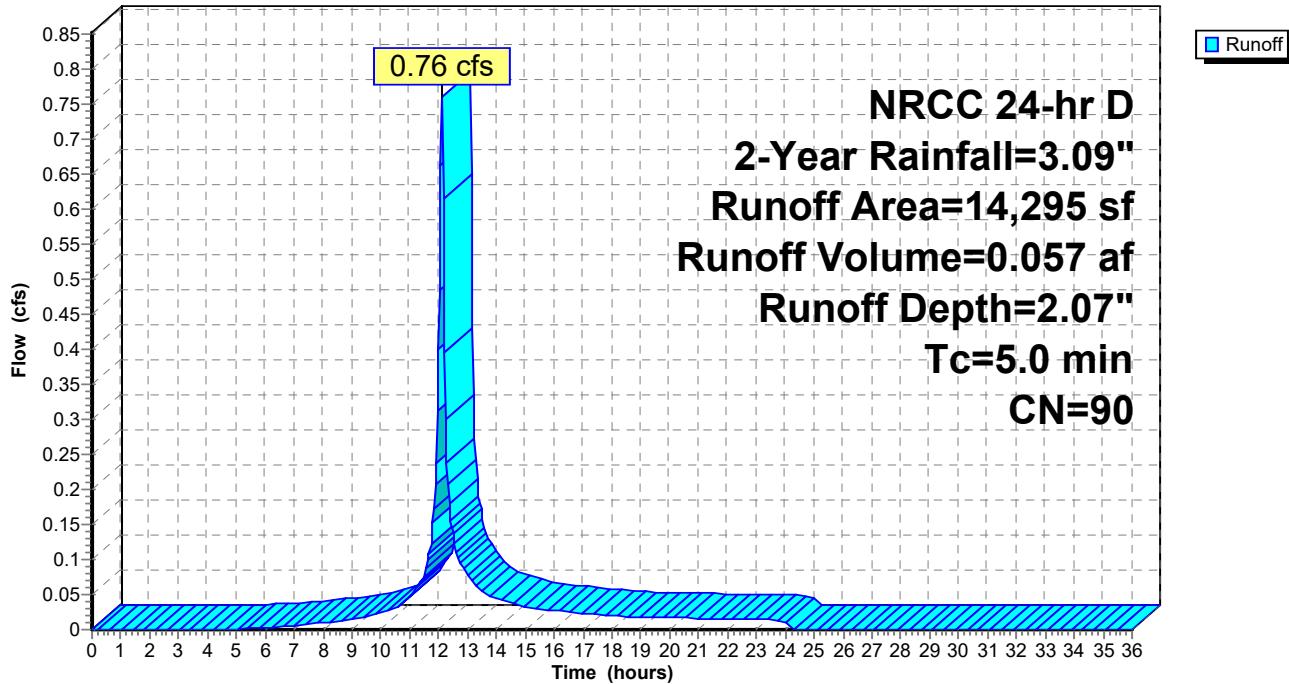
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 447   | 98 Paved parking, HSG A            |
| *         | 7,461 | 98 Paved parking, HSG C            |
| *         | 2,341 | 98 Cement Concrete Sidewalk, HSG C |
|           | 488   | >75% Grass cover, Good, HSG A      |
|           | 3,558 | >75% Grass cover, Good, HSG C      |
| 14,295    | 90    | Weighted Average                   |
| 4,046     |       | 28.30% Pervious Area               |
| 10,249    |       | 71.70% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 23S: PR-17

Hydrograph



### Summary for Subcatchment 24S: PR-18

Runoff = 0.54 cfs @ 12.14 hrs, Volume= 0.048 af, Depth= 2.64"  
 Routed to Pond 44P : CMP Infiltration

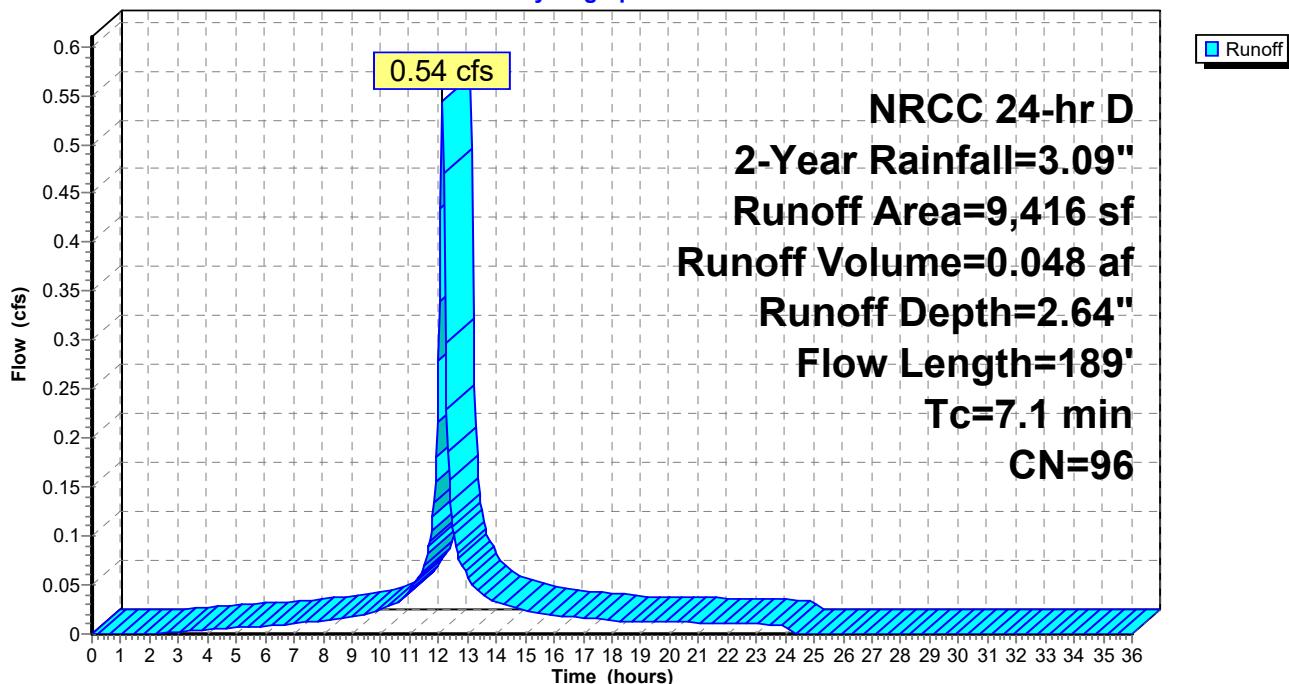
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,554 | 98 Paved parking, HSG A            |
| *         | 4,554 | 98 Cement Concrete Sidewalk, HSG A |
| 308       | 39    | >75% Grass cover, Good, HSG A      |
| 9,416     | 96    | Weighted Average                   |
| 308       |       | 3.27% Pervious Area                |
| 9,108     |       | 96.73% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.7         | 29               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.9         | 71               | 0.0200           | 1.27                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.5         | 89               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 189              | Total            |                      |                   |                                                                   |

### Subcatchment 24S: PR-18

Hydrograph



### Summary for Subcatchment 25S: PR-19

Runoff = 0.07 cfs @ 12.12 hrs, Volume= 0.005 af, Depth= 1.52"  
 Routed to Pond 44P : CMP Infiltration

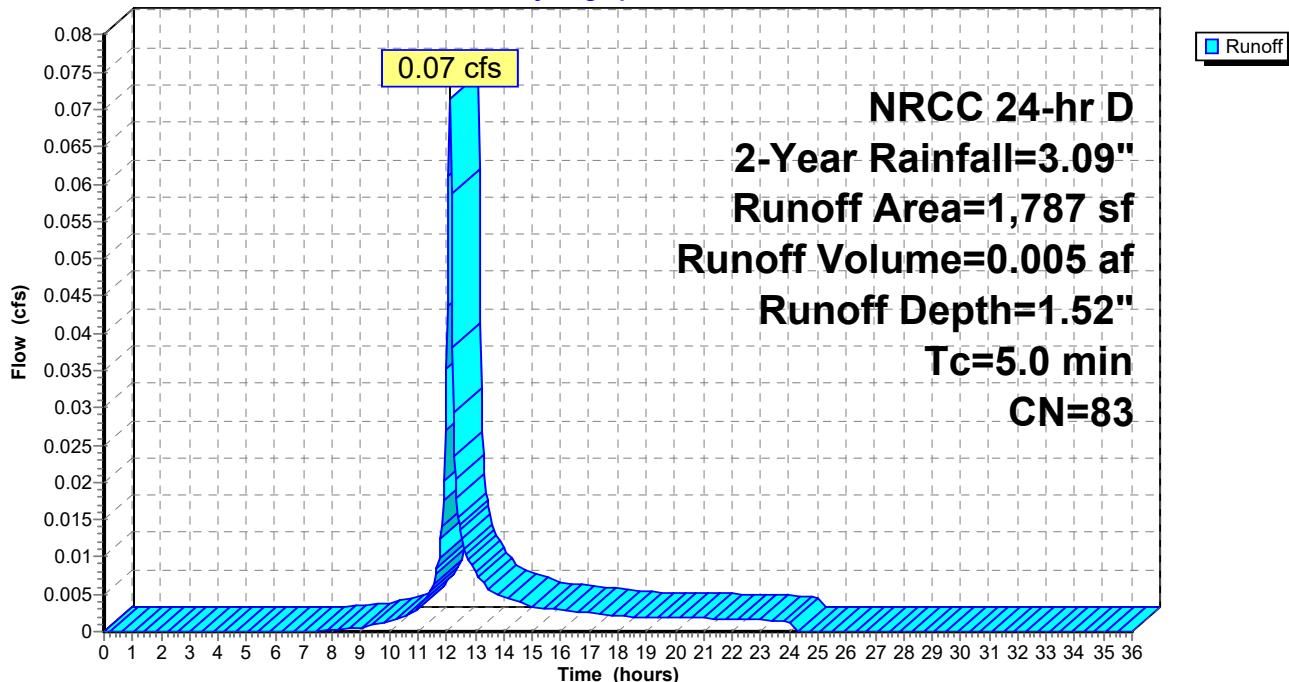
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 1,006 | 98 Paved parking, HSG A         |
| *         | 337   | Cement Concrete Sidewalk, HSG A |
|           | 444   | >75% Grass cover, Good, HSG A   |
| 1,787     | 83    | Weighted Average                |
| 444       |       | 24.85% Pervious Area            |
| 1,343     |       | 75.15% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 25S: PR-19

Hydrograph



### Summary for Subcatchment 26S: PR-20

Runoff = 0.37 cfs @ 12.12 hrs, Volume= 0.027 af, Depth= 2.07"  
 Routed to Pond 44P : CMP Infiltration

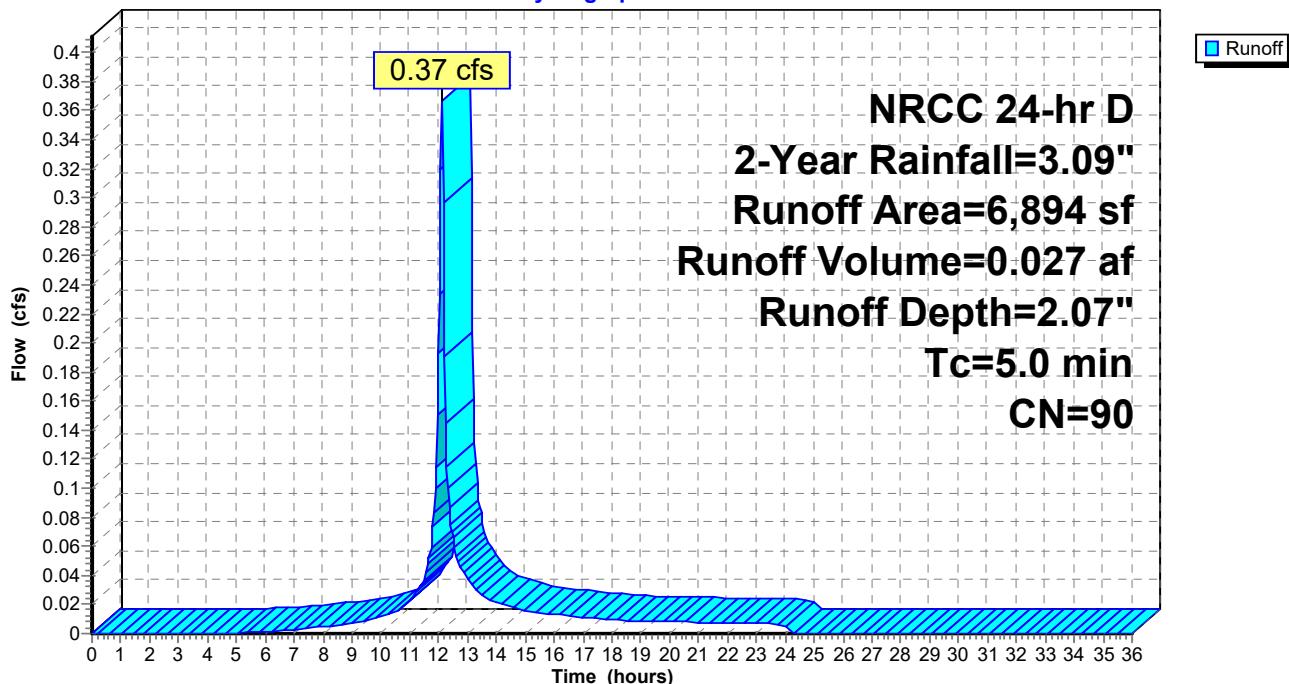
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,689 | 98 Paved parking, HSG A         |
| *         | 1,328 | Cement Concrete Sidewalk, HSG A |
|           | 877   | >75% Grass cover, Good, HSG A   |
|           | 6,894 | Weighted Average                |
|           | 877   | 12.72% Pervious Area            |
|           | 6,017 | 87.28% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 26S: PR-20

Hydrograph



### Summary for Subcatchment 27S: PR-21

Runoff = 0.38 cfs @ 12.12 hrs, Volume= 0.028 af, Depth= 2.16"  
 Routed to Pond 44P : CMP Infiltration

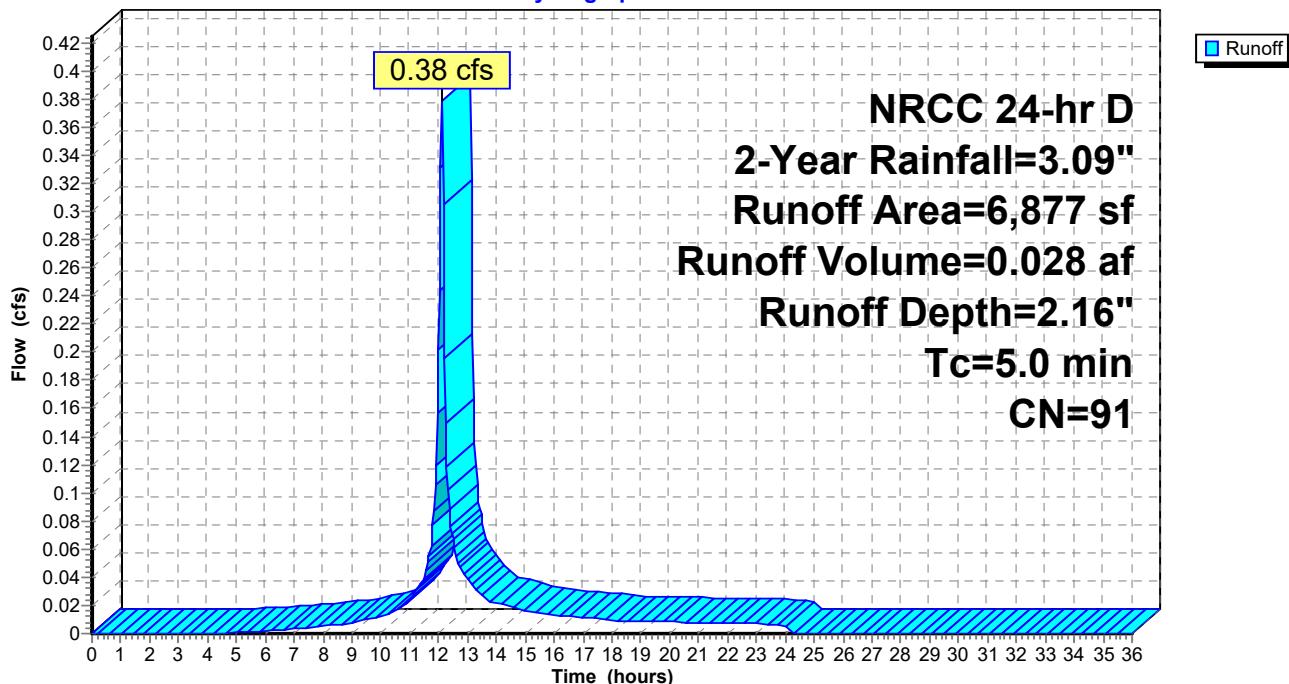
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,706 | 98 Paved parking, HSG A         |
| *         | 1,331 | Cement Concrete Sidewalk, HSG A |
|           | 840   | >75% Grass cover, Good, HSG A   |
|           | 6,877 | Weighted Average                |
|           | 840   | 12.21% Pervious Area            |
|           | 6,037 | 87.79% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 27S: PR-21

Hydrograph



### Summary for Subcatchment 28S: PR-22

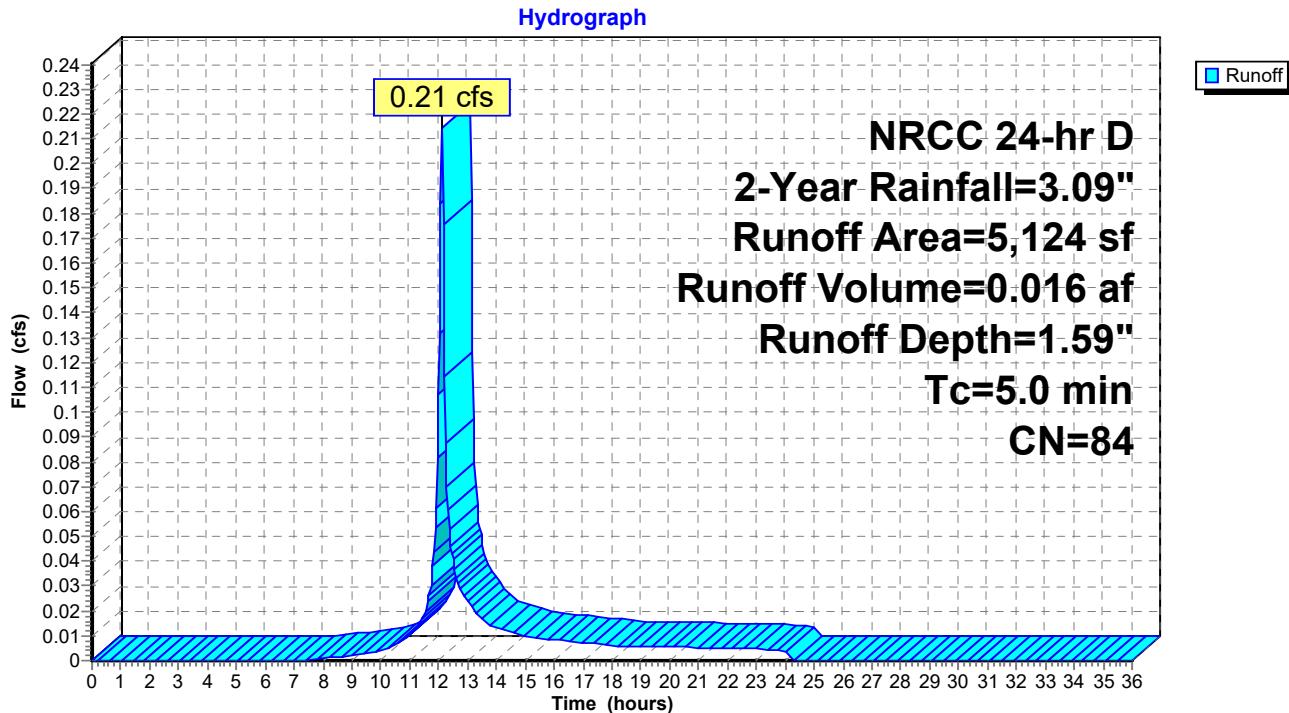
Runoff = 0.21 cfs @ 12.12 hrs, Volume= 0.016 af, Depth= 1.59"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,097 | 98 Paved parking, HSG A            |
| *         | 72    | 98 Paved parking, HSG C            |
| *         | 588   | 98 Cement Concrete Sidewalk, HSG C |
|           | 1,052 | >75% Grass cover, Good, HSG A      |
|           | 315   | >75% Grass cover, Good, HSG C      |
| 5,124     | 84    | Weighted Average                   |
| 1,367     |       | 26.68% Pervious Area               |
| 3,757     |       | 73.32% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 28S: PR-22



### Summary for Subcatchment 29S: PR-23

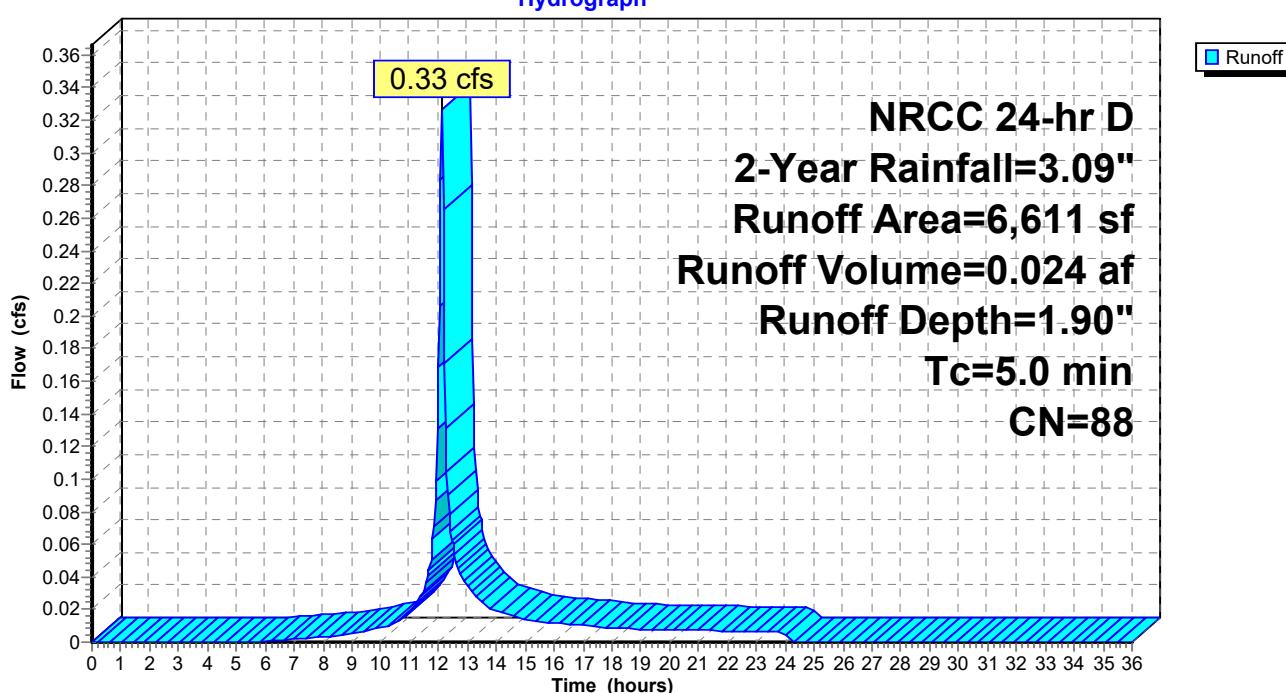
Runoff = 0.33 cfs @ 12.12 hrs, Volume= 0.024 af, Depth= 1.90"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 3,322         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 748           | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 695           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
| *         | 463           | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
|           | 914           | >75% Grass cover, Good, HSG A      |                   |                |                      |
|           | 469           | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 6,611     | 88            | Weighted Average                   |                   |                |                      |
| 1,383     |               | 20.92% Pervious Area               |                   |                |                      |
| 5,228     |               | 79.08% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 29S: PR-23

#### Hydrograph



### Summary for Subcatchment 30S: PR-24

Runoff = 0.26 cfs @ 12.12 hrs, Volume= 0.019 af, Depth= 1.90"  
 Routed to Pond 44P : CMP Infiltration

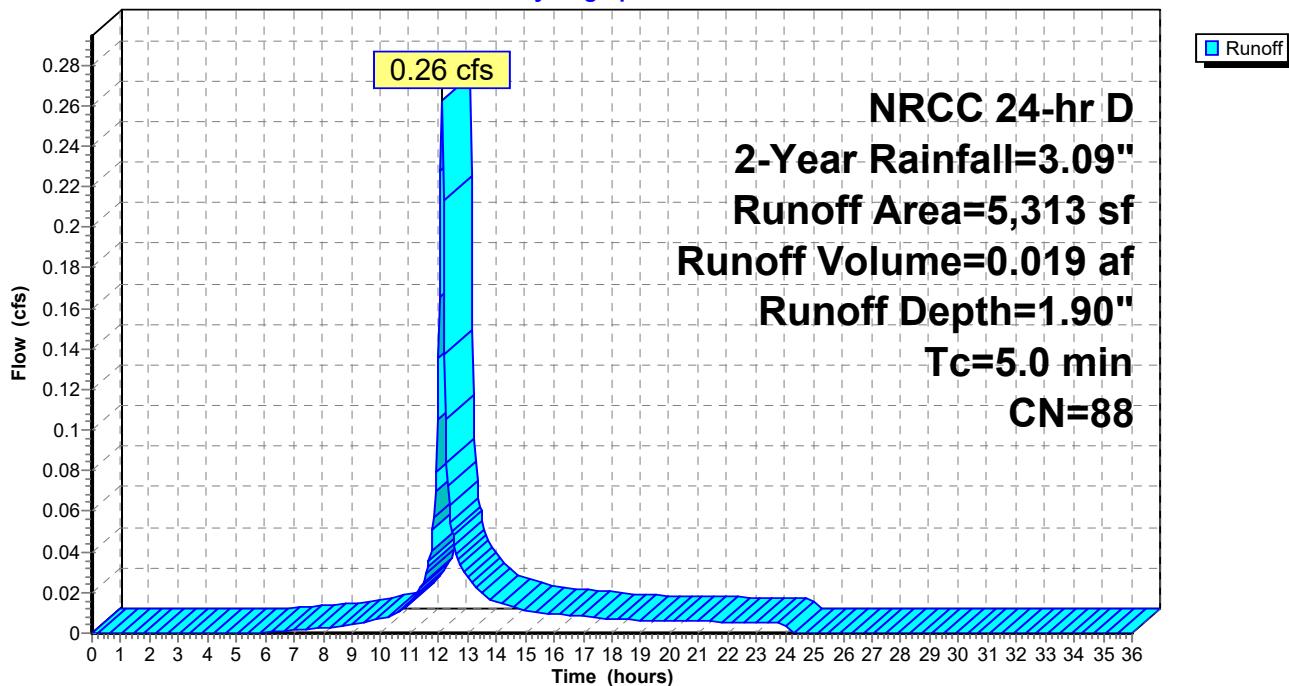
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,109 | 98 Paved parking, HSG A            |
| *         | 146   | 98 Paved parking, HSG C            |
| *         | 572   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 432   | 98 Cement Concrete Sidewalk, HSG C |
|           | 819   | >75% Grass cover, Good, HSG A      |
|           | 235   | >75% Grass cover, Good, HSG C      |
| 5,313     | 88    | Weighted Average                   |
| 1,054     |       | 19.84% Pervious Area               |
| 4,259     |       | 80.16% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 30S: PR-24

Hydrograph



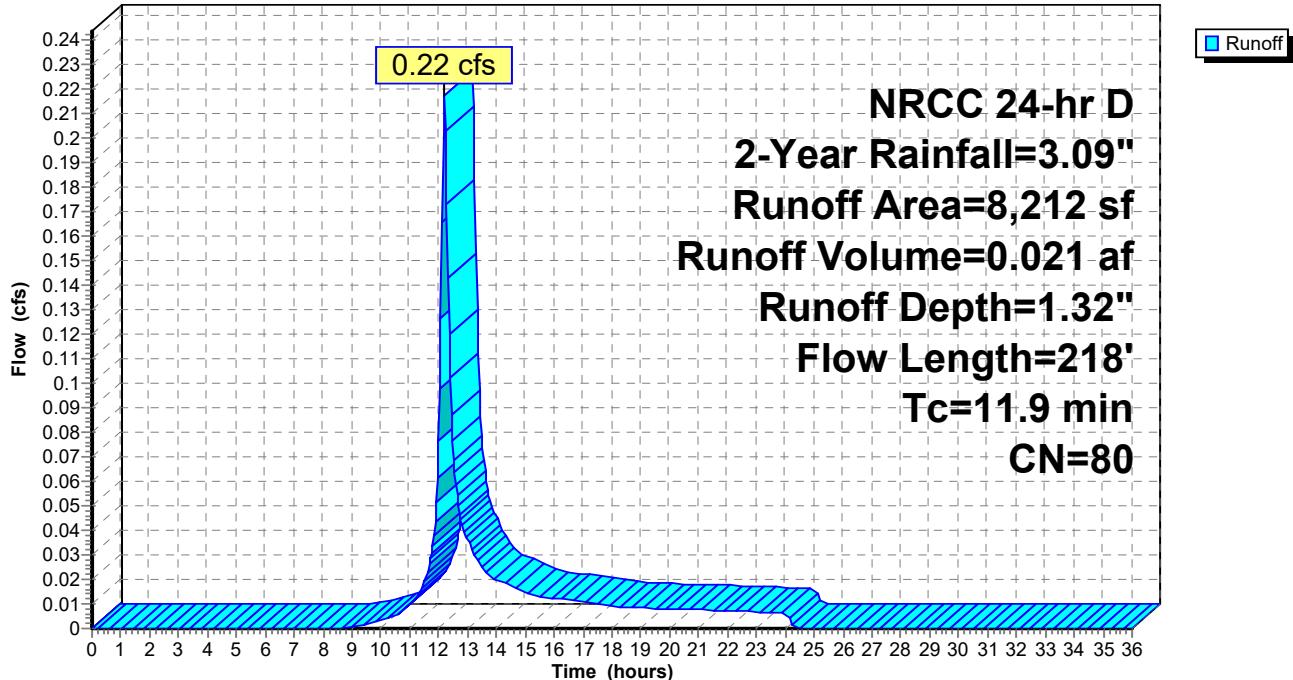
### Summary for Subcatchment 31S: PR-25

Runoff = 0.22 cfs @ 12.20 hrs, Volume= 0.021 af, Depth= 1.32"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,851 | 98 Paved parking, HSG A            |
| *         | 988   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 65    | 98 Cement Concrete Sidewalk, HSG C |
| 1,910     | 39    | >75% Grass cover, Good, HSG A      |
| 1,398     | 74    | >75% Grass cover, Good, HSG C      |
| 8,212     | 80    | Weighted Average                   |
| 3,308     |       | 40.28% Pervious Area               |
| 4,904     |       | 59.72% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 10.6        | 63               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.6         | 37               | 0.0150           | 0.99                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 118              | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 11.9        | 218              | Total            |                      |                   |                                                                   |

**Subcatchment 31S: PR-25****Hydrograph**

### Summary for Subcatchment 32S: PR-26

Runoff = 0.35 cfs @ 12.11 hrs, Volume= 0.027 af, Depth= 2.44"  
 Routed to Pond 44P : CMP Infiltration

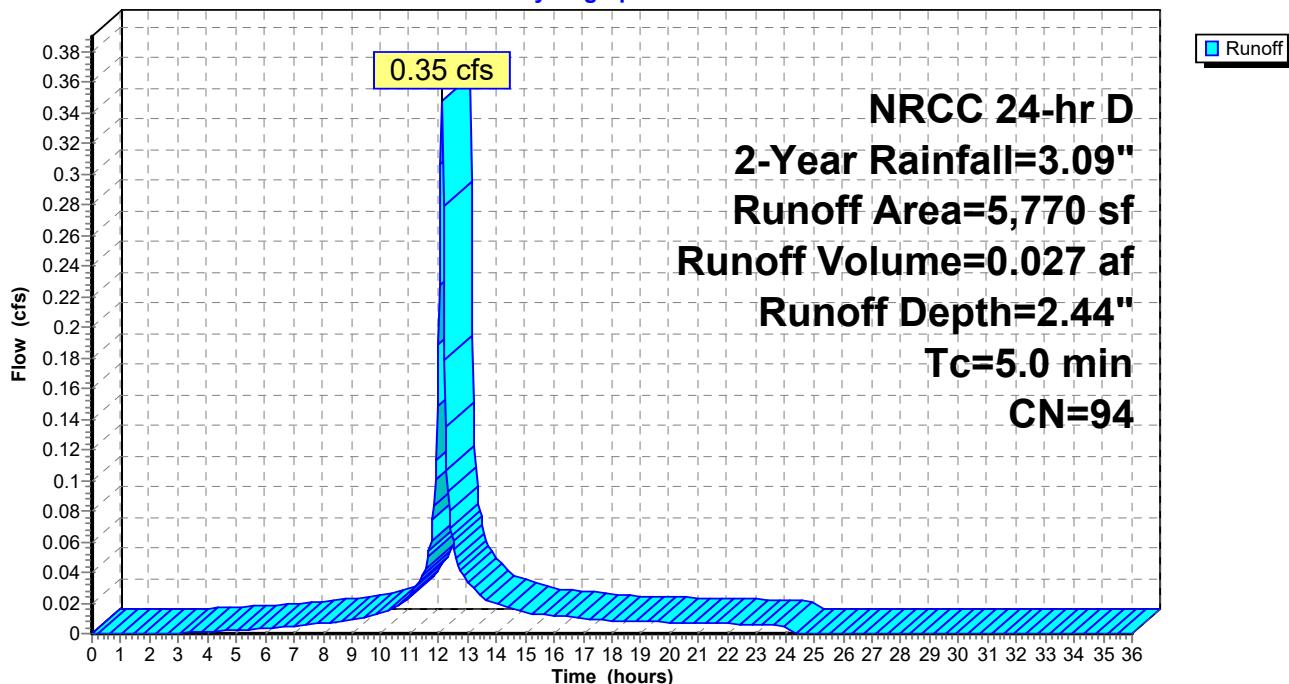
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,263 | 98 Paved parking, HSG A            |
| *         | 1,076 | 98 Cement Concrete Sidewalk, HSG A |
|           | 431   | >75% Grass cover, Good, HSG A      |
|           | 5,770 | Weighted Average                   |
|           | 431   | 7.47% Pervious Area                |
|           | 5,339 | 92.53% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 32S: PR-26

Hydrograph



### Summary for Subcatchment 33S: PR-27

Runoff = 0.34 cfs @ 12.12 hrs, Volume= 0.026 af, Depth= 2.34"  
 Routed to Pond 44P : CMP Infiltration

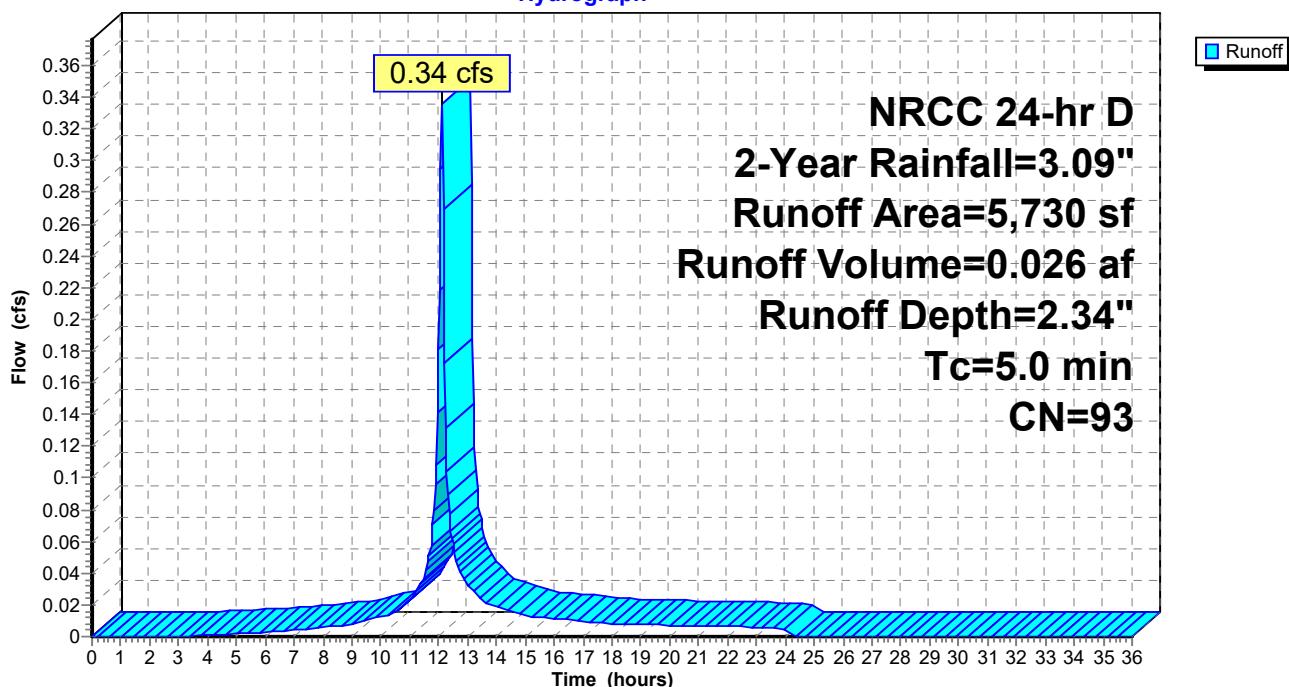
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,151 | 98 Paved parking, HSG A            |
| *         | 1,069 | 98 Cement Concrete Sidewalk, HSG A |
|           | 510   | >75% Grass cover, Good, HSG A      |
|           | 5,730 | Weighted Average                   |
|           | 510   | 8.90% Pervious Area                |
|           | 5,220 | 91.10% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 33S: PR-27

Hydrograph



### Summary for Subcatchment 34S: PR-28

Runoff = 0.06 cfs @ 12.24 hrs, Volume= 0.007 af, Depth= 0.76"  
 Routed to Pond 44P : CMP Infiltration

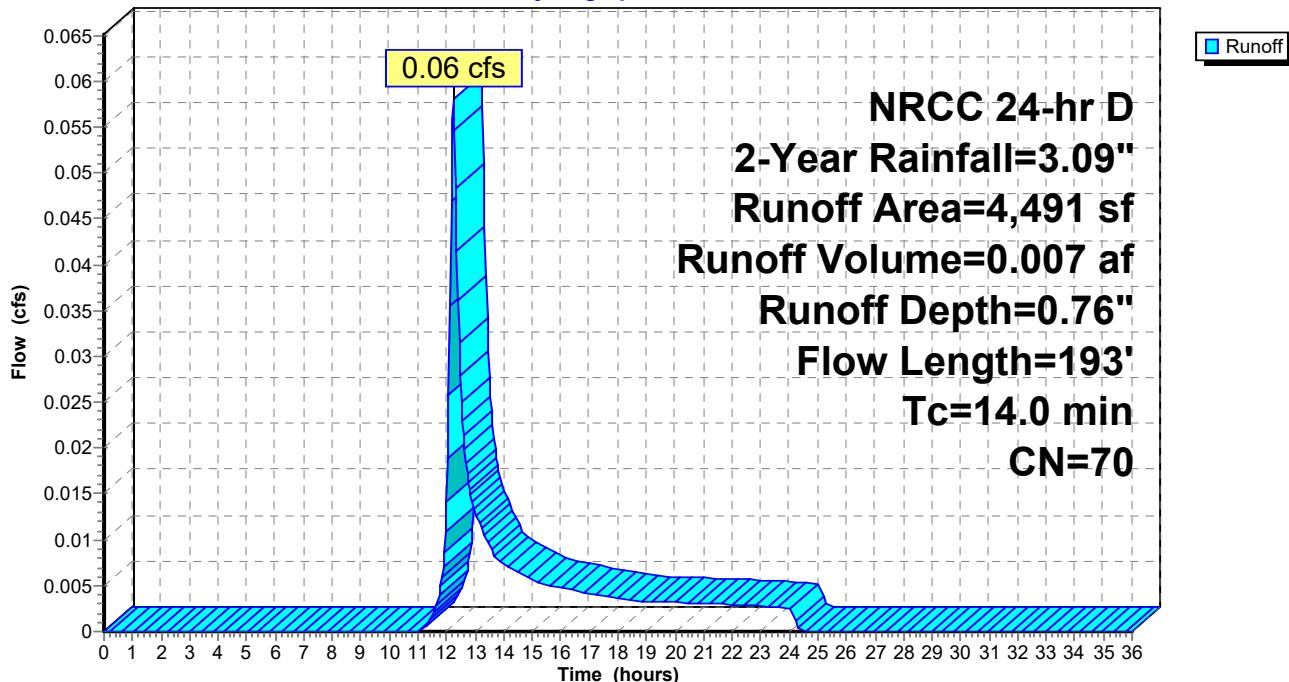
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,588 | 98 Paved parking, HSG A            |
| *         | 456   | 98 Cement Concrete Sidewalk, HSG A |
| 1,899     | 39    | >75% Grass cover, Good, HSG A      |
| 548       | 74    | >75% Grass cover, Good, HSG C      |
| 4,491     | 70    | Weighted Average                   |
| 2,447     |       | 54.49% Pervious Area               |
| 2,044     |       | 45.51% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 13.0        | 81               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.4         | 19               | 0.0150           | 0.87                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.6         | 93               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 14.0        | 193              | Total            |                      |                   |                                                                   |

### Subcatchment 34S: PR-28

Hydrograph



### Summary for Subcatchment 35S: PR-29

Runoff = 0.07 cfs @ 12.12 hrs, Volume= 0.005 af, Depth= 1.82"  
 Routed to Pond 44P : CMP Infiltration

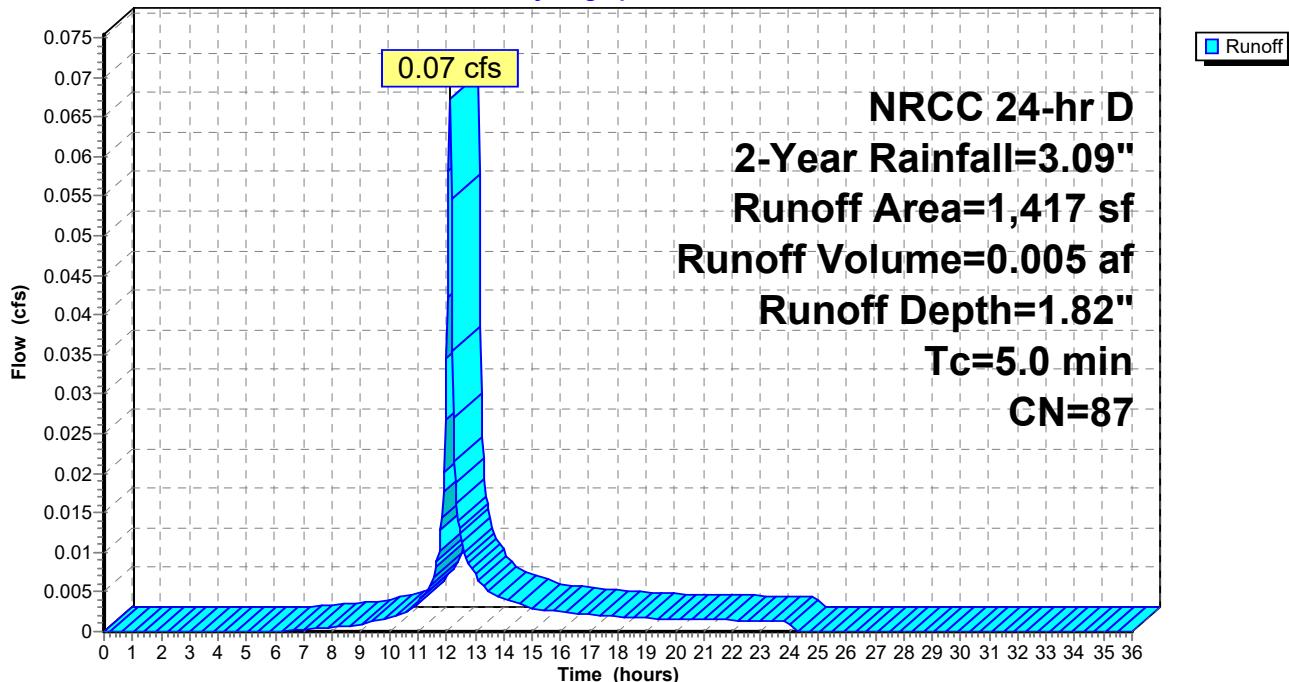
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,137 | 98 Paved parking, HSG A            |
| *         | 16    | 98 Cement Concrete Sidewalk, HSG A |
|           | 264   | >75% Grass cover, Good, HSG A      |
|           | 1,417 | Weighted Average                   |
|           | 264   | 18.63% Pervious Area               |
|           | 1,153 | 81.37% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 35S: PR-29

Hydrograph



### Summary for Subcatchment 36S: PR-30

Runoff = 0.33 cfs @ 12.12 hrs, Volume= 0.025 af, Depth= 1.45"  
 Routed to Pond 44P : CMP Infiltration

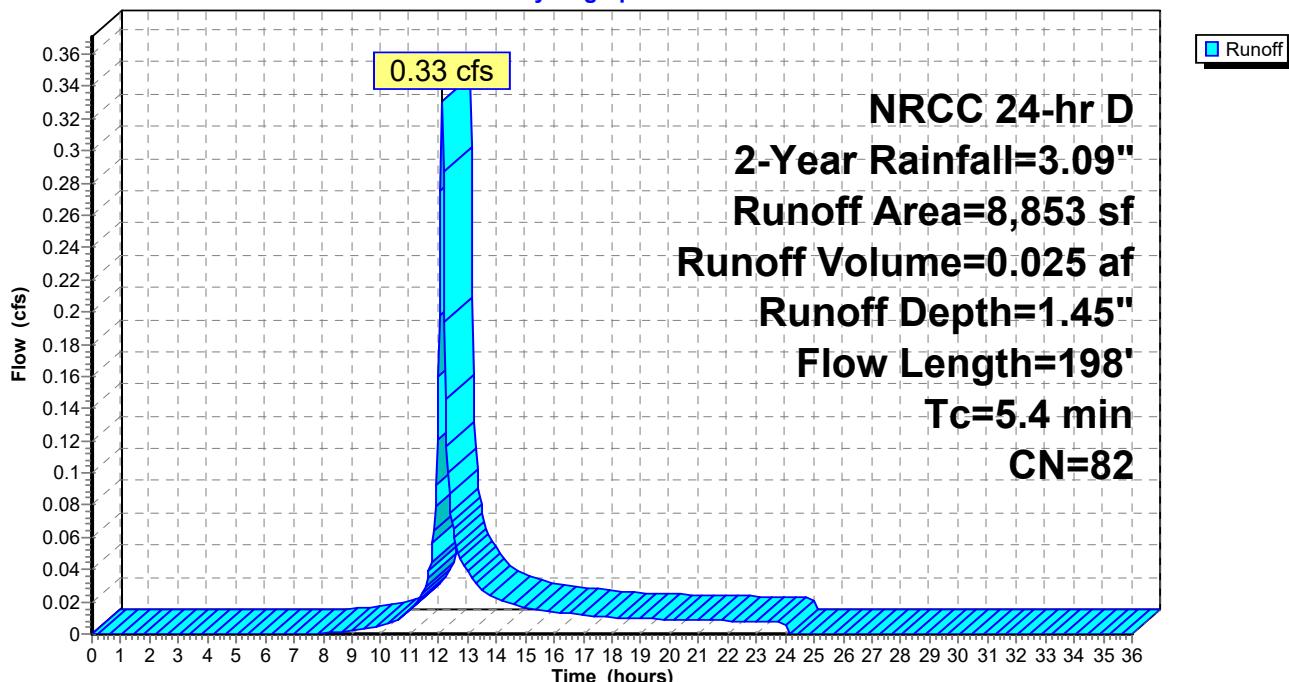
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,691 | 98 Paved parking, HSG A            |
| *         | 826   | 98 Cement Concrete Sidewalk, HSG A |
| 2,336     | 39    | >75% Grass cover, Good, HSG A      |
| 8,853     | 82    | Weighted Average                   |
| 2,336     |       | 26.39% Pervious Area               |
| 6,517     |       | 73.61% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.5         | 16               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 84               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 98               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.4         | 198              | Total            |                      |                   |                                                                   |

### Subcatchment 36S: PR-30

Hydrograph



### Summary for Subcatchment 37S: PR-31

Runoff = 0.41 cfs @ 12.12 hrs, Volume= 0.030 af, Depth= 1.59"  
 Routed to Pond 44P : CMP Infiltration

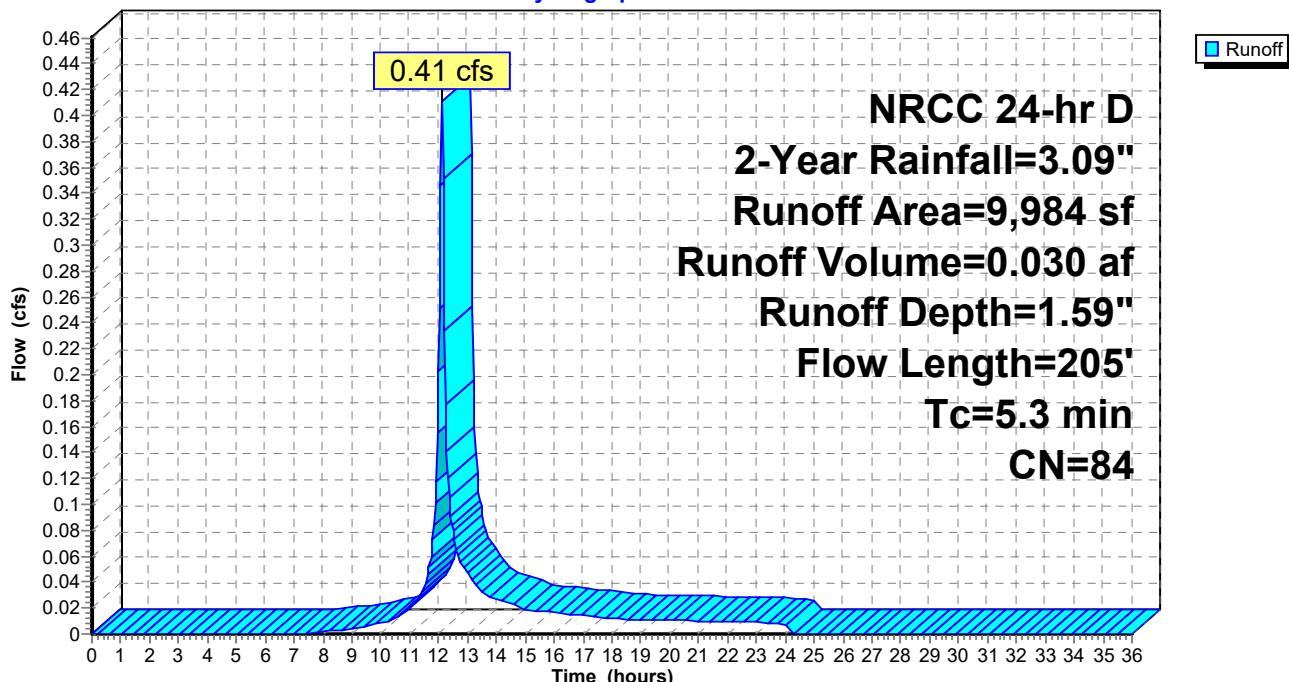
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 6,479   | 98 | Paved parking, HSG A            |
| * 1,108   | 98 | Cement Concrete Sidewalk, HSG A |
| 2,397     | 39 | >75% Grass cover, Good, HSG A   |
| 9,984     | 84 | Weighted Average                |
| 2,397     |    | 24.01% Pervious Area            |
| 7,587     |    | 75.99% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.4         | 15               | 0.0500           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 85               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 105              | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.3         | 205              | Total            |                      |                   |                                                                   |

### Subcatchment 37S: PR-31

Hydrograph



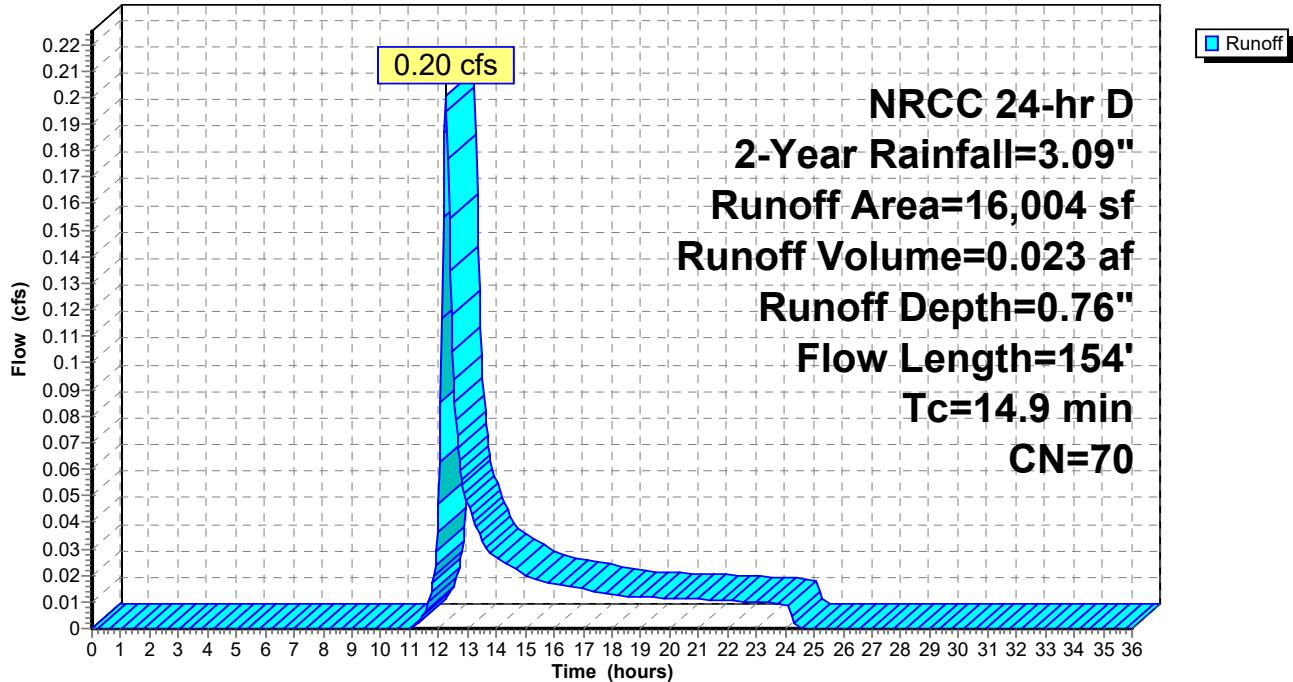
### Summary for Subcatchment 38S: PR-32

Runoff = 0.20 cfs @ 12.25 hrs, Volume= 0.023 af, Depth= 0.76"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN     | Description                        |
|-----------|--------|------------------------------------|
| *         | 6,711  | 98 Paved parking, HSG A            |
| *         | 1,813  | 98 Cement Concrete Sidewalk, HSG A |
|           | 7,480  | >75% Grass cover, Good, HSG A      |
|           | 16,004 | Weighted Average                   |
|           | 7,480  | 46.74% Pervious Area               |
|           | 8,524  | 53.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 14.4        | 92               | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 8                | 0.0200           | 0.82                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.2         | 34               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1         | 20               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 14.9        | 154              | Total            |                      |                   |                                                                          |

**Subcatchment 38S: PR-32****Hydrograph**

### Summary for Subcatchment 39S: PR-33

Runoff = 0.35 cfs @ 12.12 hrs, Volume= 0.025 af, Depth= 1.74"  
 Routed to Pond 44P : CMP Infiltration

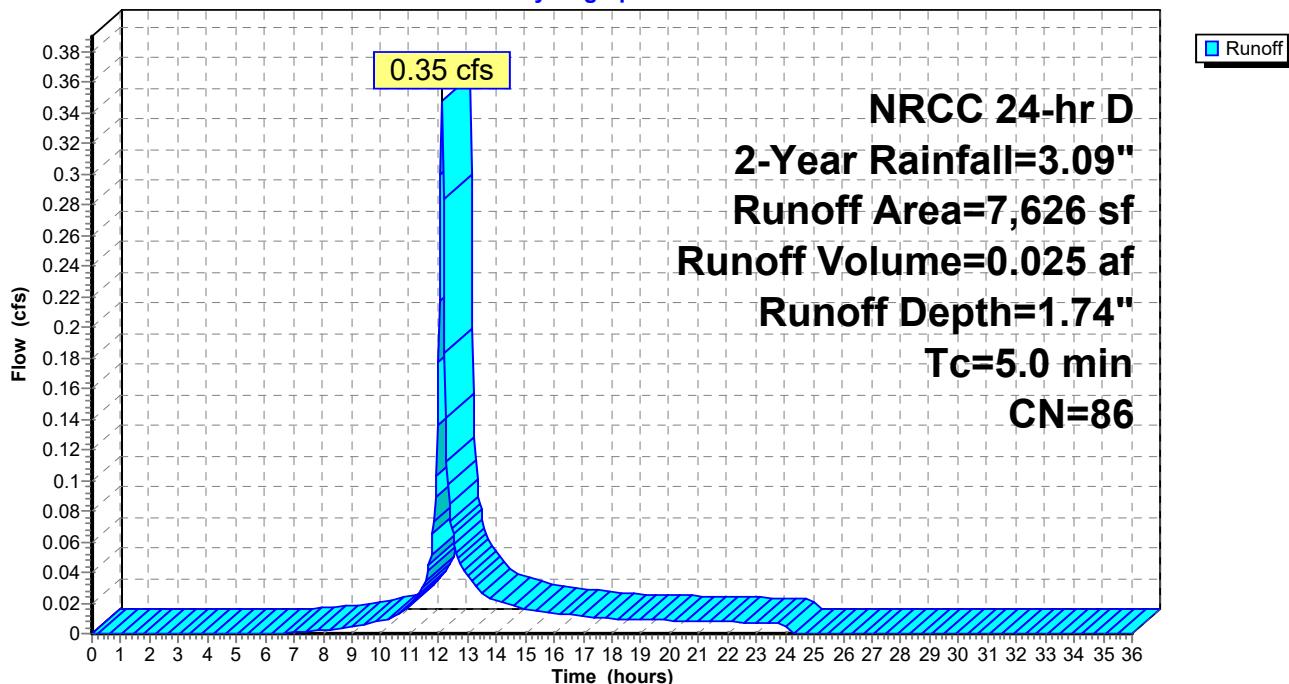
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,106     | 98 | Paved parking, HSG A            |
| 920       | 98 | Cement Concrete Sidewalk, HSG A |
| 1,600     | 39 | >75% Grass cover, Good, HSG A   |
| 7,626     | 86 | Weighted Average                |
| 1,600     |    | 20.98% Pervious Area            |
| 6,026     |    | 79.02% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 39S: PR-33

Hydrograph



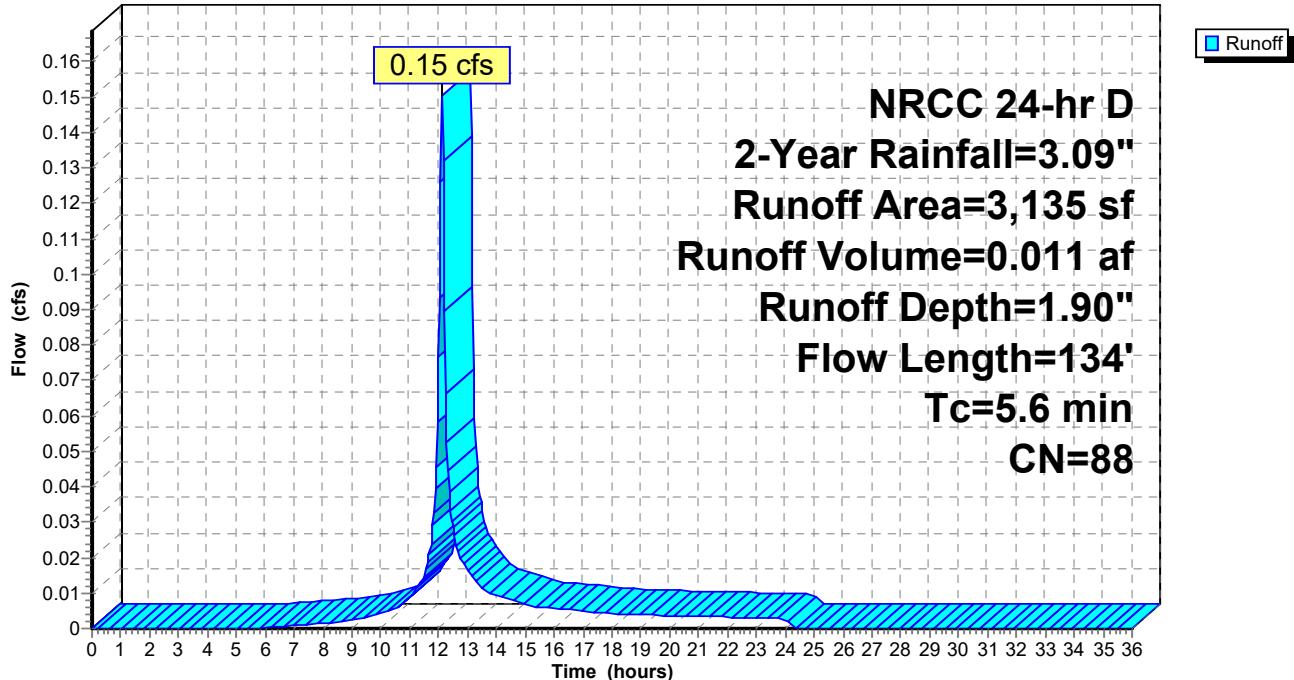
### Summary for Subcatchment 40S: PR-34

Runoff = 0.15 cfs @ 12.12 hrs, Volume= 0.011 af, Depth= 1.90"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 2,389 | 98 Paved parking, HSG A            |
| *         | 234   | 98 Cement Concrete Sidewalk, HSG A |
|           | 512   | >75% Grass cover, Good, HSG A      |
|           | 3,135 | Weighted Average                   |
|           | 512   | 16.33% Pervious Area               |
|           | 2,623 | 83.67% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 4.4         | 21               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 1.0         | 79               | 0.0200           | 1.30                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.0         | 7                | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.2         | 27               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 5.6         | 134              | Total            |                      |                   |                                                                          |

**Subcatchment 40S: PR-34****Hydrograph**

### Summary for Subcatchment 41S: PR-35

Runoff = 0.03 cfs @ 12.11 hrs, Volume= 0.002 af, Depth= 2.75"  
 Routed to Pond 44P : CMP Infiltration

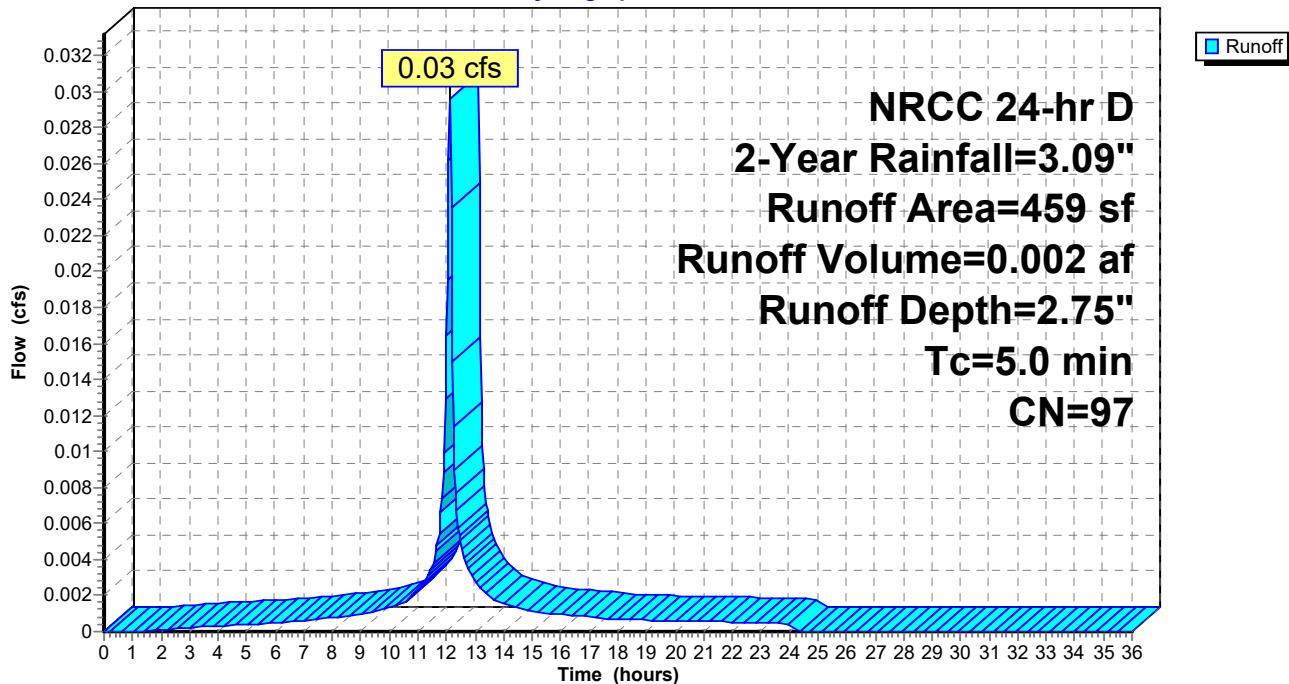
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN  | Description                        |
|-----------|-----|------------------------------------|
| *         | 366 | 98 Paved parking, HSG A            |
| *         | 86  | 98 Cement Concrete Sidewalk, HSG A |
|           | 7   | >75% Grass cover, Good, HSG A      |
|           | 459 | Weighted Average                   |
|           | 7   | 1.53% Pervious Area                |
|           | 452 | 98.47% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 41S: PR-35

Hydrograph



### Summary for Subcatchment 42S: PR-36

Runoff = 0.36 cfs @ 12.12 hrs, Volume= 0.027 af, Depth= 2.16"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

#### Area (sf) CN Description

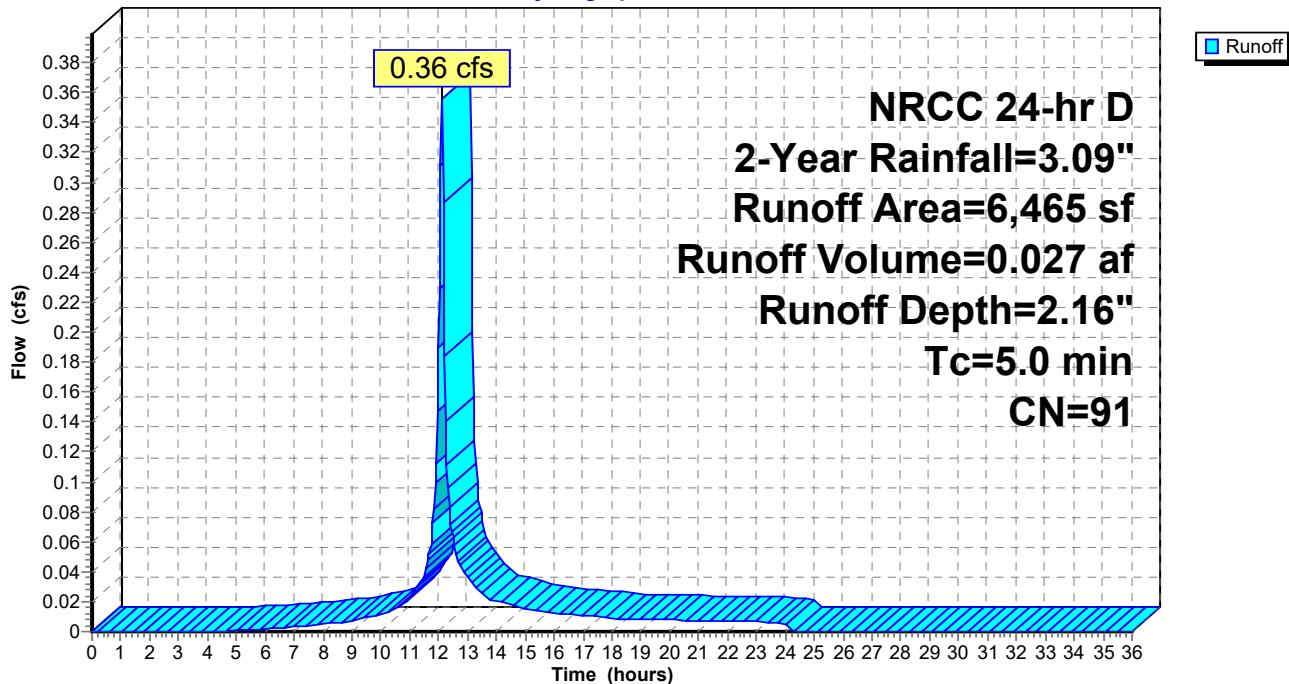
|   |       |    |                                 |
|---|-------|----|---------------------------------|
| * | 4,448 | 98 | Paved parking, HSG A            |
| * | 1,207 | 98 | Cement Concrete Sidewalk, HSG A |
|   | 810   | 39 | >75% Grass cover, Good, HSG A   |
|   | 6,465 | 91 | Weighted Average                |
|   | 810   |    | 12.53% Pervious Area            |
|   | 5,655 |    | 87.47% Impervious Area          |

#### Tc Length Slope Velocity Capacity Description

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

### Subcatchment 42S: PR-36

#### Hydrograph



### Summary for Subcatchment 43S: PR-37

Runoff = 0.40 cfs @ 12.12 hrs, Volume= 0.030 af, Depth= 2.25"  
 Routed to Pond 44P : CMP Infiltration

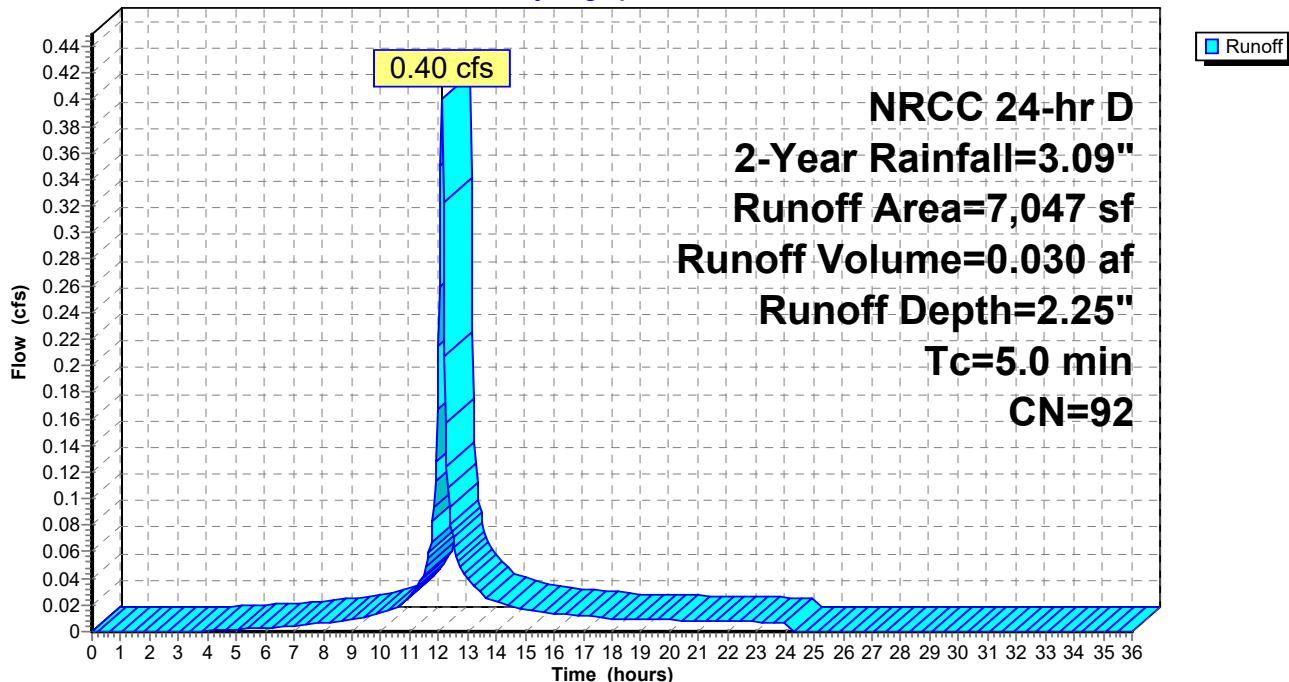
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 2-Year Rainfall=3.09"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 5,177   | 98 | Paved parking, HSG A            |
| * 1,177   | 98 | Cement Concrete Sidewalk, HSG A |
| 693       | 39 | >75% Grass cover, Good, HSG A   |
| 7,047     | 92 | Weighted Average                |
| 693       |    | 9.83% Pervious Area             |
| 6,354     |    | 90.17% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 43S: PR-37

Hydrograph



### Summary for Pond 44P: CMP Infiltration

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 1.78" for 2-Year event  
 Inflow = 11.02 cfs @ 12.12 hrs, Volume= 0.877 af  
 Outflow = 9.65 cfs @ 12.16 hrs, Volume= 0.877 af, Atten= 12%, Lag= 2.3 min  
 Discarded = 0.17 cfs @ 12.16 hrs, Volume= 0.229 af  
 Primary = 9.48 cfs @ 12.16 hrs, Volume= 0.649 af

Routed to Pond 45P : Rain Garden

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 268.40' @ 12.16 hrs Surf.Area= 0.055 ac Storage= 0.062 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 18.8 min ( 851.7 - 832.9 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                      |
|----------|---------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1C      | 266.50' | 0.081 af      | <b>17.00'W x 142.00'L x 7.00'H Field C</b><br>0.388 af Overall - 0.186 af Embedded = 0.202 af x 40.0% Voids                                                                                                                                              |
| #2C      | 267.00' | 0.186 af      | <b>CMP Round 72 x 12 Inside #1</b><br>Effective Size= 72.0"W x 72.0"H => 28.27 sf x 20.00'L = 565.5 cf<br>Overall Size= 72.0"W x 72.0"H x 20.00'L<br>Row Length Adjustment= +8.00' x 28.27 sf x 2 rows<br>15.00' Header x 28.27 sf x 2 = 848.2 cf Inside |
| 0.267 af |         |               | Total Available Storage                                                                                                                                                                                                                                  |

Storage Group C created with Chamber Wizard

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                       |
|--------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 267.00' | <b>21.0" Round Culvert</b><br>L= 169.0' RCP, rounded edge headwall, Ke= 0.100<br>Inlet / Outlet Invert= 267.00' / 265.31' S= 0.0100 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf |
| #2     | Discarded | 266.50' | <b>2.410 in/hr Exfiltration over Wetted area</b>                                                                                                                                                                     |

**Discarded OutFlow** Max=0.17 cfs @ 12.16 hrs HW=268.39' (Free Discharge)  
 ↗ 2=Exfiltration (Exfiltration Controls 0.17 cfs)

**Primary OutFlow** Max=9.45 cfs @ 12.16 hrs HW=268.39' TW=257.53' (Dynamic Tailwater)  
 ↗ 1=Culvert (Barrel Controls 9.45 cfs @ 6.31 fps)

**Pond 44P: CMP Infiltration - Chamber Wizard Field C****Chamber Model = CMP Round 72 (Round Corrugated Metal Pipe)**

Effective Size= 72.0"W x 72.0"H =&gt; 28.27 sf x 20.00'L = 565.5 cf

Overall Size= 72.0"W x 72.0"H x 20.00'L

Row Length Adjustment= +8.00' x 28.27 sf x 2 rows

72.0" Wide + 36.0" Spacing = 108.0" C-C Row Spacing

6 Chambers/Row x 20.00' Long +8.00' Row Adjustment +6.00' Header x 2 = 140.00' Row Length +12.0"

End Stone x 2 = 142.00' Base Length

2 Rows x 72.0" Wide + 36.0" Spacing x 1 + 12.0" Side Stone x 2 = 17.00' Base Width

6.0" Stone Base + 72.0" Chamber Height + 6.0" Stone Cover = 7.00' Field Height

12 Chambers x 565.5 cf +8.00' Row Adjustment x 28.27 sf x 2 Rows + 15.00' Header x 28.27 sf x 2 = 8,086.5 cf Chamber Storage

16,898.0 cf Field - 8,086.5 cf Chambers = 8,811.5 cf Stone x 40.0% Voids = 3,524.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,611.1 cf = 0.267 af

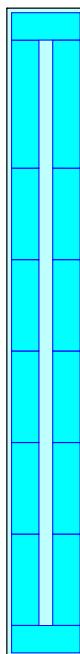
Overall Storage Efficiency = 68.7%

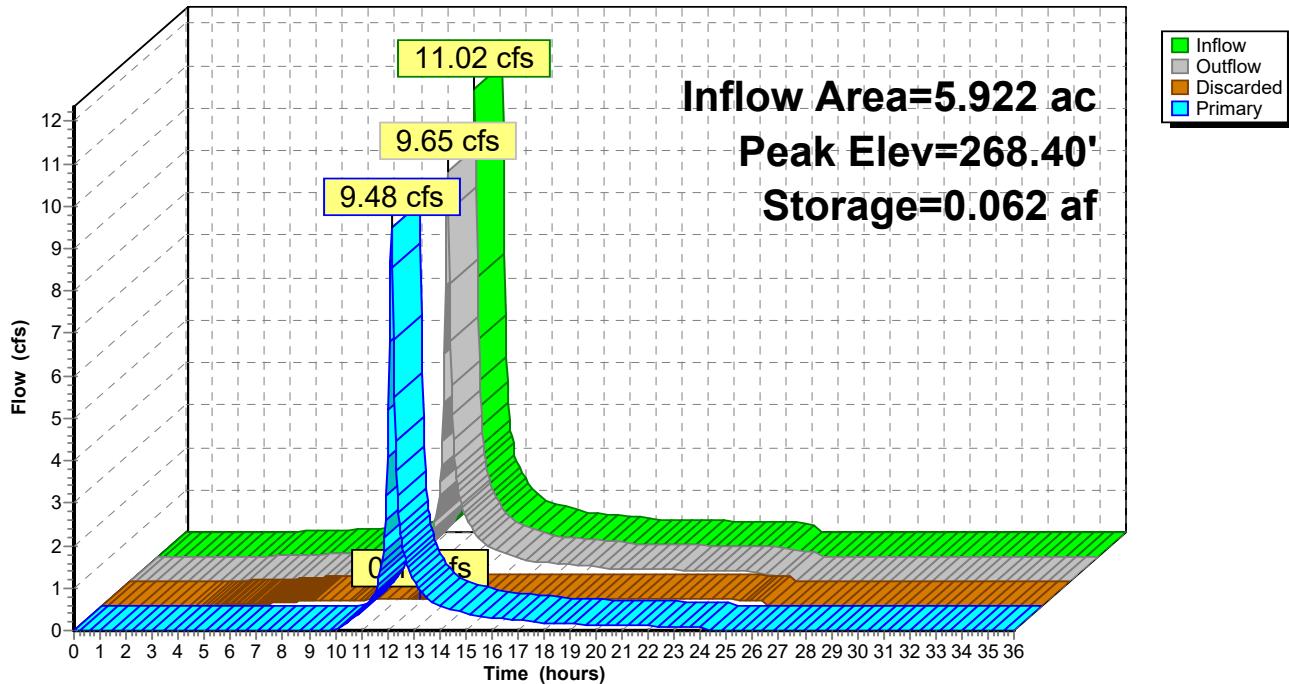
Overall System Size = 142.00' x 17.00' x 7.00'

12 Chambers

625.9 cy Field

326.4 cy Stone



**Pond 44P: CMP Infiltration****Hydrograph**

**Stage-Area-Storage for Pond 44P: CMP Infiltration**

| Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) | Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) |
|---------------------|-------------------|------------------------|---------------------|-------------------|------------------------|
| 266.50              | 0.055             | 0.000                  | 271.80              | 0.094             | 0.213                  |
| 266.60              | 0.056             | 0.002                  | 271.90              | 0.095             | 0.217                  |
| 266.70              | 0.057             | 0.004                  | 272.00              | 0.096             | 0.221                  |
| 266.80              | 0.058             | 0.007                  | 272.10              | 0.096             | 0.225                  |
| 266.90              | 0.058             | 0.009                  | 272.20              | 0.097             | 0.229                  |
| 267.00              | 0.059             | 0.011                  | 272.30              | 0.098             | 0.233                  |
| 267.10              | 0.060             | 0.014                  | 272.40              | 0.098             | 0.236                  |
| 267.20              | 0.061             | 0.017                  | 272.50              | 0.099             | 0.240                  |
| 267.30              | 0.061             | 0.020                  | 272.60              | 0.100             | 0.243                  |
| 267.40              | 0.062             | 0.023                  | 272.70              | 0.101             | 0.247                  |
| 267.50              | 0.063             | 0.027                  | 272.80              | 0.101             | 0.250                  |
| 267.60              | 0.063             | 0.030                  | 272.90              | 0.102             | 0.253                  |
| 267.70              | 0.064             | 0.034                  | 273.00              | 0.103             | 0.255                  |
| 267.80              | 0.065             | 0.038                  | 273.10              | 0.104             | 0.258                  |
| 267.90              | 0.066             | 0.042                  | 273.20              | 0.104             | 0.260                  |
| 268.00              | 0.066             | 0.045                  | 273.30              | 0.105             | 0.262                  |
| 268.10              | 0.067             | 0.049                  | 273.40              | 0.106             | 0.264                  |
| 268.20              | 0.068             | 0.054                  | 273.50              | 0.107             | 0.267                  |
| 268.30              | 0.069             | 0.058                  |                     |                   |                        |
| 268.40              | 0.069             | 0.062                  |                     |                   |                        |
| 268.50              | 0.070             | 0.066                  |                     |                   |                        |
| 268.60              | 0.071             | 0.070                  |                     |                   |                        |
| 268.70              | 0.071             | 0.075                  |                     |                   |                        |
| 268.80              | 0.072             | 0.079                  |                     |                   |                        |
| 268.90              | 0.073             | 0.083                  |                     |                   |                        |
| 269.00              | 0.074             | 0.088                  |                     |                   |                        |
| 269.10              | 0.074             | 0.092                  |                     |                   |                        |
| 269.20              | 0.075             | 0.097                  |                     |                   |                        |
| 269.30              | 0.076             | 0.101                  |                     |                   |                        |
| 269.40              | 0.077             | 0.106                  |                     |                   |                        |
| 269.50              | 0.077             | 0.110                  |                     |                   |                        |
| 269.60              | 0.078             | 0.115                  |                     |                   |                        |
| 269.70              | 0.079             | 0.120                  |                     |                   |                        |
| 269.80              | 0.080             | 0.124                  |                     |                   |                        |
| 269.90              | 0.080             | 0.129                  |                     |                   |                        |
| 270.00              | 0.081             | 0.133                  |                     |                   |                        |
| 270.10              | 0.082             | 0.138                  |                     |                   |                        |
| 270.20              | 0.082             | 0.142                  |                     |                   |                        |
| 270.30              | 0.083             | 0.147                  |                     |                   |                        |
| 270.40              | 0.084             | 0.152                  |                     |                   |                        |
| 270.50              | 0.085             | 0.156                  |                     |                   |                        |
| 270.60              | 0.085             | 0.161                  |                     |                   |                        |
| 270.70              | 0.086             | 0.165                  |                     |                   |                        |
| 270.80              | 0.087             | 0.170                  |                     |                   |                        |
| 270.90              | 0.088             | 0.174                  |                     |                   |                        |
| 271.00              | 0.088             | 0.179                  |                     |                   |                        |
| 271.10              | 0.089             | 0.183                  |                     |                   |                        |
| 271.20              | 0.090             | 0.187                  |                     |                   |                        |
| 271.30              | 0.090             | 0.192                  |                     |                   |                        |
| 271.40              | 0.091             | 0.196                  |                     |                   |                        |
| 271.50              | 0.092             | 0.200                  |                     |                   |                        |
| 271.60              | 0.093             | 0.205                  |                     |                   |                        |
| 271.70              | 0.093             | 0.209                  |                     |                   |                        |

## Summary for Pond 45P: Rain Garden

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=111)

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 1.31" for 2-Year event  
 Inflow = 9.48 cfs @ 12.16 hrs, Volume= 0.649 af  
 Outflow = 2.93 cfs @ 12.43 hrs, Volume= 0.650 af, Atten= 69%, Lag= 16.0 min  
 Discarded = 2.93 cfs @ 12.43 hrs, Volume= 0.650 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Routed to Link 15L : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 258.68' @ 12.43 hrs Surf.Area= 10,919 sf Storage= 7,446 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 27.3 min ( 845.6 - 818.3 )

| Volume    | Invert  | Avail.Storage | Storage Description                                                                           |
|-----------|---------|---------------|-----------------------------------------------------------------------------------------------|
| #1        | 255.50' | 6,443 cf      | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)<br>16,107 cf Overall x 40.0% Voids |
| #2        | 258.50' | 10,400 cf     | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)                                    |
| 16,843 cf |         |               | Total Available Storage                                                                       |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 255.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 258.50           | 5,369             | 313.0         | 16,107                 | 16,107                 | 6,308            |

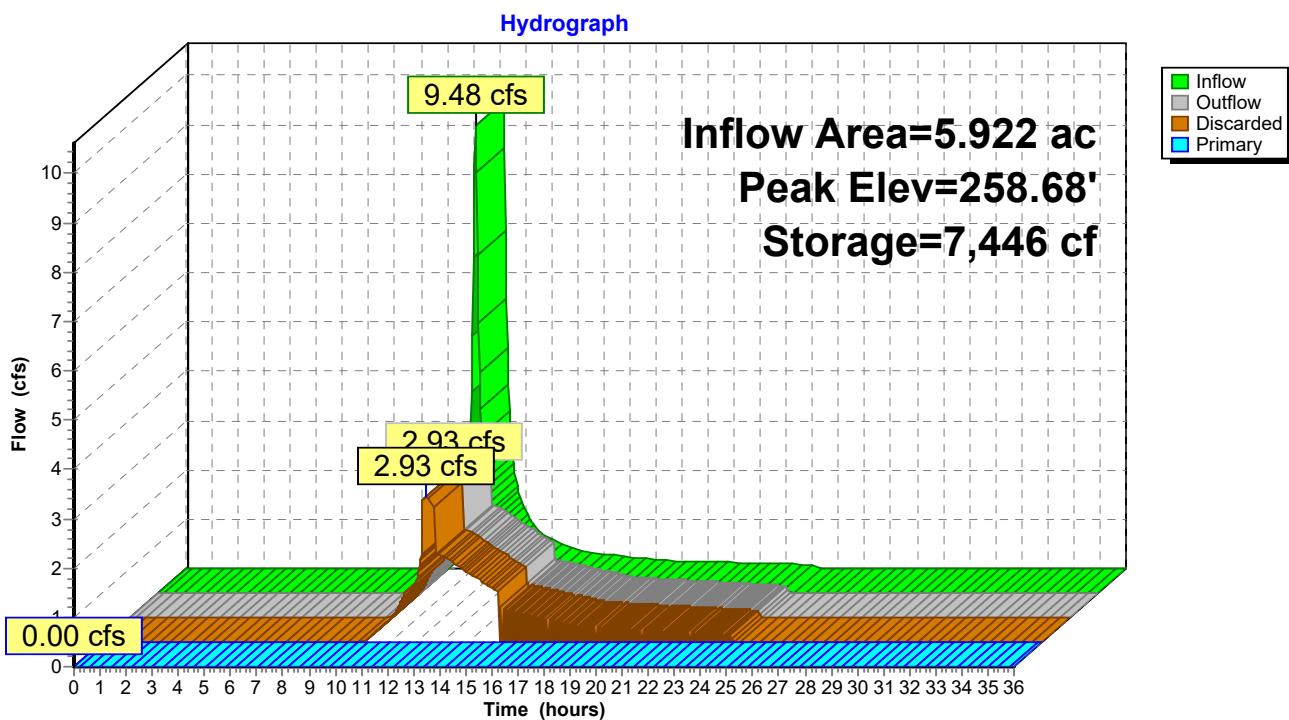
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 258.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 260.00           | 6,938             | 357.4         | 9,205                  | 9,205                  | 7,790            |
| 260.17           | 7,118             | 360.5         | 1,195                  | 10,400                 | 7,978            |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                    |
|--------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 253.71' | <b>24.0" Round Culvert</b><br>L= 32.0' CMP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 253.71' / 253.36' S= 0.0109 '/' Cc= 0.900<br>n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf |
| #2     | Discarded | 255.50' | <b>8.270 in/hr Exfiltration over Surface area</b><br>Conductivity to Groundwater Elevation = 251.50'                                                                                                              |
| #3     | Device 1  | 259.55' | <b>2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows</b> C= 0.600<br>Limited to weir flow at low heads                                                                                                     |
| #4     | Primary   | 259.05' | <b>6.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40<br>Coef. (English) 2.80 2.92                                                                                              |

**Discarded OutFlow** Max=2.93 cfs @ 12.43 hrs HW=258.68' (Free Discharge)  
 ↗  
 ↗ 2=Exfiltration (Controls 2.93 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=255.50' TW=0.00' (Dynamic Tailwater)  
 ↗ 1=Culvert (Passes 0.00 cfs of 10.67 cfs potential flow)  
 ↗ 3=Orifice/Grate (Controls 0.00 cfs)  
 ↗ 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

### Pond 45P: Rain Garden



**Stage-Area-Storage for Pond 45P: Rain Garden**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|
| 255.50              | 5,369              | 0                       |
| 255.60              | 5,369              | 215                     |
| 255.70              | 5,369              | 430                     |
| 255.80              | 5,369              | 644                     |
| 255.90              | 5,369              | 859                     |
| 256.00              | 5,369              | 1,074                   |
| 256.10              | 5,369              | 1,289                   |
| 256.20              | 5,369              | 1,503                   |
| 256.30              | 5,369              | 1,718                   |
| 256.40              | 5,369              | 1,933                   |
| 256.50              | 5,369              | 2,148                   |
| 256.60              | 5,369              | 2,362                   |
| 256.70              | 5,369              | 2,577                   |
| 256.80              | 5,369              | 2,792                   |
| 256.90              | 5,369              | 3,007                   |
| 257.00              | 5,369              | 3,221                   |
| 257.10              | 5,369              | 3,436                   |
| 257.20              | 5,369              | 3,651                   |
| 257.30              | 5,369              | 3,866                   |
| 257.40              | 5,369              | 4,080                   |
| 257.50              | 5,369              | 4,295                   |
| 257.60              | 5,369              | 4,510                   |
| 257.70              | 5,369              | 4,725                   |
| 257.80              | 5,369              | 4,939                   |
| 257.90              | 5,369              | 5,154                   |
| 258.00              | 5,369              | 5,369                   |
| 258.10              | 5,369              | 5,584                   |
| 258.20              | 5,369              | 5,799                   |
| 258.30              | 5,369              | 6,013                   |
| 258.40              | 5,369              | 6,228                   |
| 258.50              | 10,738             | 6,443                   |
| 258.60              | 10,836             | 6,985                   |
| 258.70              | 10,936             | 7,536                   |
| 258.80              | 11,036             | 8,098                   |
| 258.90              | 11,137             | 8,670                   |
| 259.00              | 11,239             | 9,252                   |
| 259.10              | 11,341             | 9,844                   |
| 259.20              | 11,445             | 10,446                  |
| 259.30              | 11,550             | 11,059                  |
| 259.40              | 11,655             | 11,682                  |
| 259.50              | 11,762             | 12,316                  |
| 259.60              | 11,869             | 12,961                  |
| 259.70              | 11,977             | 13,616                  |
| 259.80              | 12,086             | 14,282                  |
| 259.90              | 12,196             | 14,960                  |
| 260.00              | 12,307             | 15,648                  |
| 260.10              | 12,413             | 16,347                  |

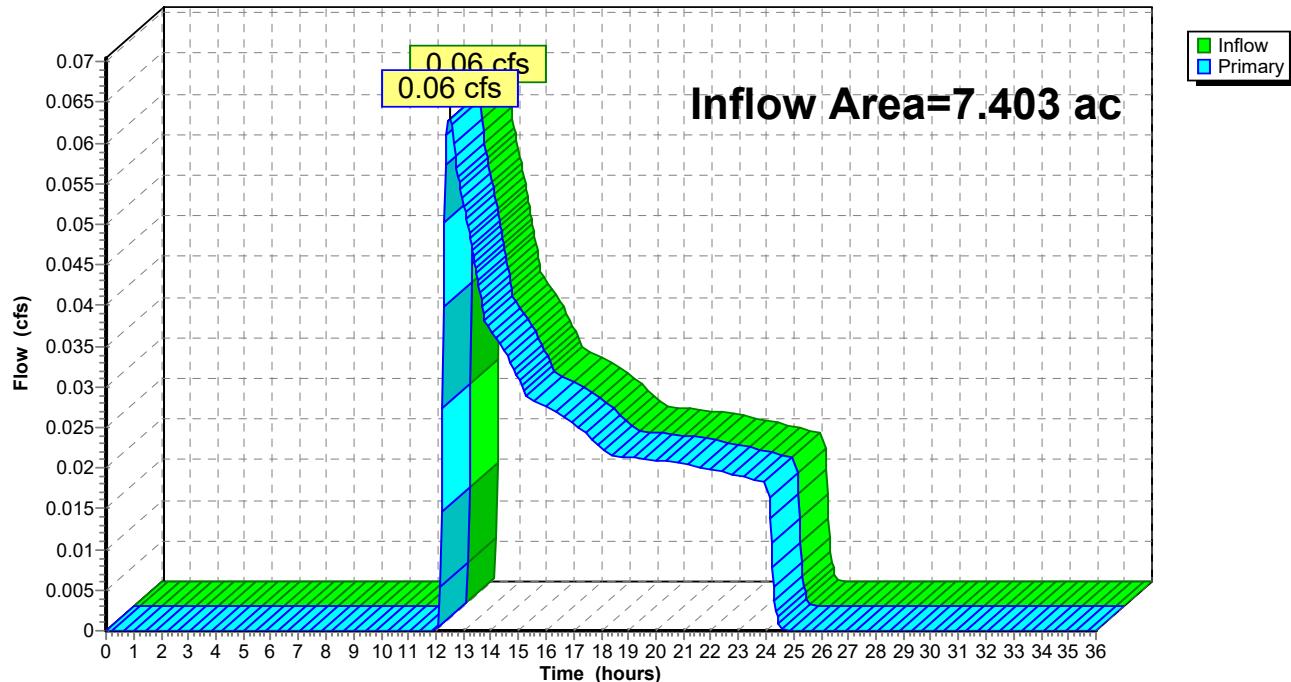
### Summary for Link 15L: DP-1

Inflow Area = 7.403 ac, 63.79% Impervious, Inflow Depth = 0.04" for 2-Year event  
Inflow = 0.06 cfs @ 12.48 hrs, Volume= 0.027 af  
Primary = 0.06 cfs @ 12.48 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 15L: DP-1

Hydrograph

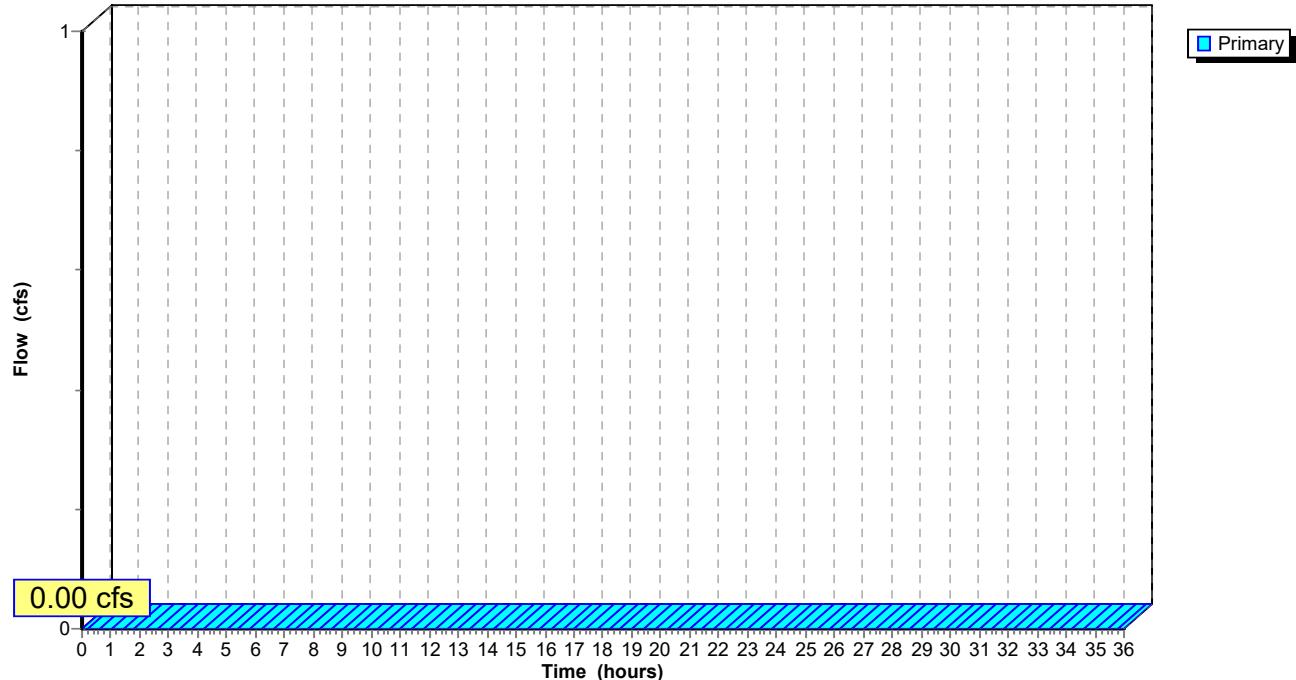


**Summary for Link 16L: DP-2**

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

**Link 16L: DP-2****Hydrograph**

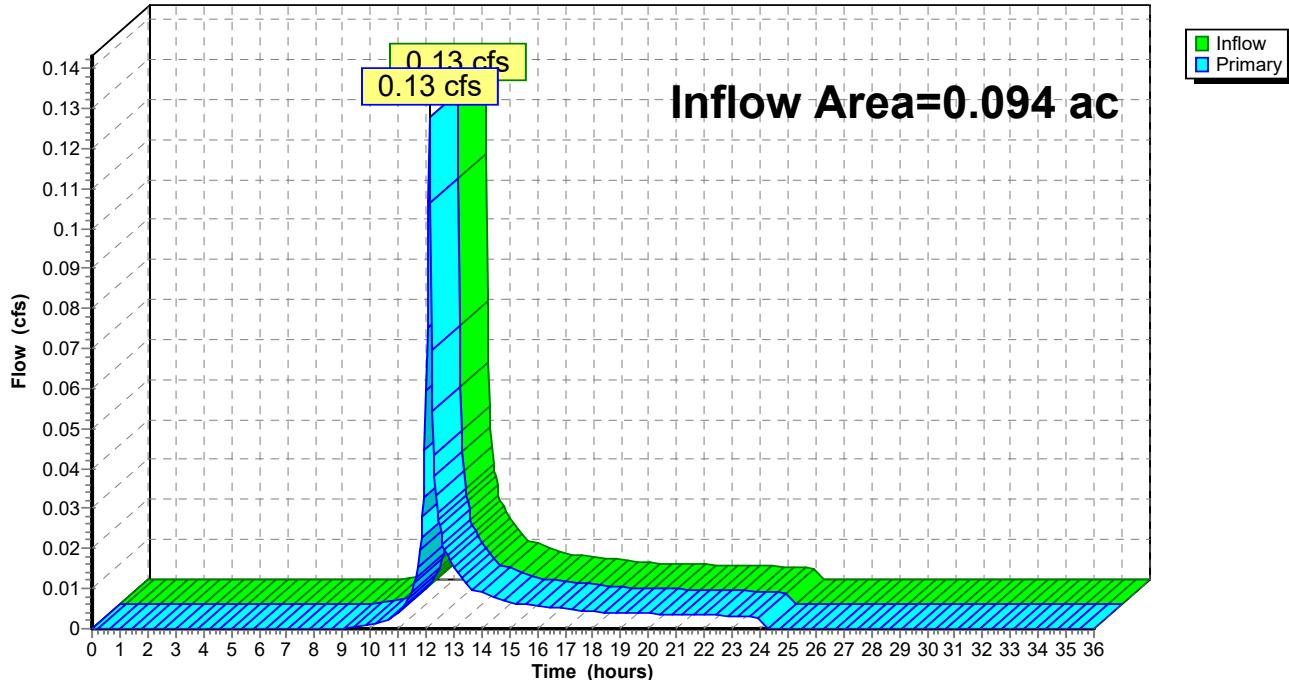
### Summary for Link 17L: DP-3

Inflow Area = 0.094 ac, 0.00% Impervious, Inflow Depth = 1.19" for 2-Year event  
Inflow = 0.13 cfs @ 12.12 hrs, Volume= 0.009 af  
Primary = 0.13 cfs @ 12.12 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 17L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points x 3  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1S: PR-1**

Runoff Area=64,521 sf 26.38% Impervious Runoff Depth=0.81"  
Flow Length=350' Tc=15.5 min CN=55 Runoff=0.72 cfs 0.100 af

**Subcatchment2S: PR-2**

Runoff Area=5,989 sf 81.43% Impervious Runoff Depth=3.96"  
Tc=5.0 min CN=94 Runoff=0.57 cfs 0.045 af

**Subcatchment3S: PR-3**

Runoff Area=8,817 sf 74.45% Impervious Runoff Depth=3.75"  
Tc=5.0 min CN=92 Runoff=0.81 cfs 0.063 af

**Subcatchment4S: PR-4**

Runoff Area=6,680 sf 84.81% Impervious Runoff Depth=3.75"  
Tc=5.0 min CN=92 Runoff=0.62 cfs 0.048 af

**Subcatchment5S: PR-5**

Runoff Area=7,314 sf 77.13% Impervious Runoff Depth=3.34"  
Tc=5.0 min CN=88 Runoff=0.62 cfs 0.047 af

**Subcatchment6S: PR-6**

Runoff Area=15,528 sf 55.11% Impervious Runoff Depth=1.93"  
Tc=5.0 min CN=72 Runoff=0.79 cfs 0.057 af

**Subcatchment7S: PR-7**

Runoff Area=8,803 sf 79.89% Impervious Runoff Depth=3.14"  
Tc=5.0 min CN=86 Runoff=0.71 cfs 0.053 af

**Subcatchment8S: PR-8**

Runoff Area=16,139 sf 53.26% Impervious Runoff Depth=2.86"  
Tc=5.0 min CN=83 Runoff=1.20 cfs 0.088 af

**Subcatchment9S: PR-9**

Runoff Area=7,180 sf 75.68% Impervious Runoff Depth=3.44"  
Flow Length=127' Tc=7.1 min CN=89 Runoff=0.57 cfs 0.047 af

**Subcatchment10S: PR-10**

Runoff Area=4,103 sf 0.00% Impervious Runoff Depth=2.42"  
Tc=5.0 min CN=78 Runoff=0.26 cfs 0.019 af

**Subcatchment11S: PR-11**

Runoff Area=12,349 sf 77.12% Impervious Runoff Depth=3.75"  
Flow Length=257' Tc=6.6 min CN=92 Runoff=1.06 cfs 0.089 af

**Subcatchment12S: PR-12**

Runoff Area=12,764 sf 71.19% Impervious Runoff Depth=3.64"  
Tc=5.0 min CN=91 Runoff=1.15 cfs 0.089 af

**Subcatchment13S: PR-13**

Runoff Area=7,593 sf 39.33% Impervious Runoff Depth=1.43"  
Flow Length=246' Tc=16.1 min CN=65 Runoff=0.18 cfs 0.021 af

**Subcatchment14S: PR-14**

Runoff Area=3,225 sf 82.26% Impervious Runoff Depth=3.44"  
Flow Length=166' Tc=7.3 min CN=89 Runoff=0.26 cfs 0.021 af

**Subcatchment15S: PR-15**

Runoff Area=2,717 sf 85.79% Impervious Runoff Depth=3.54"  
Tc=5.0 min CN=90 Runoff=0.24 cfs 0.018 af

**Subcatchment16S: PR-16**

Runoff Area=1,349 sf 100.00% Impervious Runoff Depth=4.41"  
Flow Length=247' Tc=16.1 min CN=98 Runoff=0.09 cfs 0.011 af

|                               |                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment23S: PR-17</b> | Runoff Area=14,295 sf 71.70% Impervious Runoff Depth=3.54"<br>Tc=5.0 min CN=90 Runoff=1.27 cfs 0.097 af                   |
| <b>Subcatchment24S: PR-18</b> | Runoff Area=9,416 sf 96.73% Impervious Runoff Depth=4.18"<br>Flow Length=189' Tc=7.1 min CN=96 Runoff=0.84 cfs 0.075 af   |
| <b>Subcatchment25S: PR-19</b> | Runoff Area=1,787 sf 75.15% Impervious Runoff Depth=2.86"<br>Tc=5.0 min CN=83 Runoff=0.13 cfs 0.010 af                    |
| <b>Subcatchment26S: PR-20</b> | Runoff Area=6,894 sf 87.28% Impervious Runoff Depth=3.54"<br>Tc=5.0 min CN=90 Runoff=0.61 cfs 0.047 af                    |
| <b>Subcatchment27S: PR-21</b> | Runoff Area=6,877 sf 87.79% Impervious Runoff Depth=3.64"<br>Tc=5.0 min CN=91 Runoff=0.62 cfs 0.048 af                    |
| <b>Subcatchment28S: PR-22</b> | Runoff Area=5,124 sf 73.32% Impervious Runoff Depth=2.95"<br>Tc=5.0 min CN=84 Runoff=0.39 cfs 0.029 af                    |
| <b>Subcatchment29S: PR-23</b> | Runoff Area=6,611 sf 79.08% Impervious Runoff Depth=3.34"<br>Tc=5.0 min CN=88 Runoff=0.56 cfs 0.042 af                    |
| <b>Subcatchment30S: PR-24</b> | Runoff Area=5,313 sf 80.16% Impervious Runoff Depth=3.34"<br>Tc=5.0 min CN=88 Runoff=0.45 cfs 0.034 af                    |
| <b>Subcatchment31S: PR-25</b> | Runoff Area=8,212 sf 59.72% Impervious Runoff Depth=2.59"<br>Flow Length=218' Tc=11.9 min CN=80 Runoff=0.43 cfs 0.041 af  |
| <b>Subcatchment32S: PR-26</b> | Runoff Area=5,770 sf 92.53% Impervious Runoff Depth=3.96"<br>Tc=5.0 min CN=94 Runoff=0.55 cfs 0.044 af                    |
| <b>Subcatchment33S: PR-27</b> | Runoff Area=5,730 sf 91.10% Impervious Runoff Depth=3.85"<br>Tc=5.0 min CN=93 Runoff=0.54 cfs 0.042 af                    |
| <b>Subcatchment34S: PR-28</b> | Runoff Area=4,491 sf 45.51% Impervious Runoff Depth=1.78"<br>Flow Length=193' Tc=14.0 min CN=70 Runoff=0.15 cfs 0.015 af  |
| <b>Subcatchment35S: PR-29</b> | Runoff Area=1,417 sf 81.37% Impervious Runoff Depth=3.24"<br>Tc=5.0 min CN=87 Runoff=0.12 cfs 0.009 af                    |
| <b>Subcatchment36S: PR-30</b> | Runoff Area=8,853 sf 73.61% Impervious Runoff Depth=2.77"<br>Flow Length=198' Tc=5.4 min CN=82 Runoff=0.63 cfs 0.047 af   |
| <b>Subcatchment37S: PR-31</b> | Runoff Area=9,984 sf 75.99% Impervious Runoff Depth=2.95"<br>Flow Length=205' Tc=5.3 min CN=84 Runoff=0.75 cfs 0.056 af   |
| <b>Subcatchment38S: PR-32</b> | Runoff Area=16,004 sf 53.26% Impervious Runoff Depth=1.78"<br>Flow Length=154' Tc=14.9 min CN=70 Runoff=0.51 cfs 0.055 af |
| <b>Subcatchment39S: PR-33</b> | Runoff Area=7,626 sf 79.02% Impervious Runoff Depth=3.14"<br>Tc=5.0 min CN=86 Runoff=0.62 cfs 0.046 af                    |
| <b>Subcatchment40S: PR-34</b> | Runoff Area=3,135 sf 83.67% Impervious Runoff Depth=3.34"<br>Flow Length=134' Tc=5.6 min CN=88 Runoff=0.26 cfs 0.020 af   |

**Subcatchment41S: PR-35** Runoff Area=459 sf 98.47% Impervious Runoff Depth=4.30"  
Tc=5.0 min CN=97 Runoff=0.05 cfs 0.004 af

**Subcatchment42S: PR-36** Runoff Area=6,465 sf 87.47% Impervious Runoff Depth=3.64"  
Tc=5.0 min CN=91 Runoff=0.58 cfs 0.045 af

**Subcatchment43S: PR-37** Runoff Area=7,047 sf 90.17% Impervious Runoff Depth=3.75"  
Tc=5.0 min CN=92 Runoff=0.65 cfs 0.051 af

**Pond 44P: CMP Infiltration** Peak Elev=269.14' Storage=0.094 af Inflow=19.07 cfs 1.554 af  
Discarded=0.18 cfs 0.258 af Primary=15.68 cfs 1.296 af Outflow=15.86 cfs 1.554 af

**Pond 45P: Rain Garden** Peak Elev=259.56' Storage=12,681 cf Inflow=15.68 cfs 1.296 af  
Discarded=3.47 cfs 1.144 af Primary=6.34 cfs 0.153 af Outflow=9.81 cfs 1.296 af

**Link 15L: DP-1** Inflow=7.05 cfs 0.253 af  
Primary=7.05 cfs 0.253 af

**Link 16L: DP-2** Primary=0.00 cfs 0.000 af

**Link 17L: DP-3** Inflow=0.26 cfs 0.019 af  
Primary=0.26 cfs 0.019 af

**Total Runoff Area = 7.497 ac Runoff Volume = 1.673 af Average Runoff Depth = 2.68"**  
**37.01% Pervious = 2.775 ac 62.99% Impervious = 4.723 ac**

### Summary for Subcatchment 1S: PR-1

Runoff = 0.72 cfs @ 12.27 hrs, Volume= 0.100 af, Depth= 0.81"  
 Routed to Link 15L : DP-1

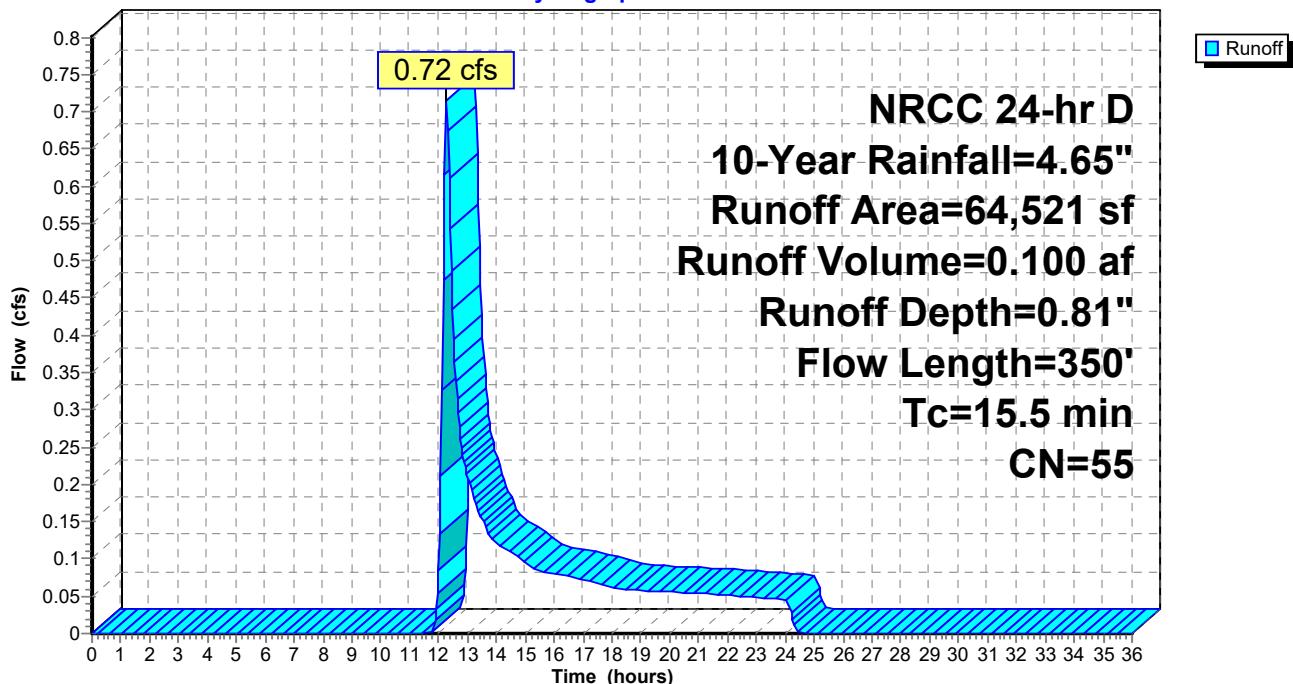
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 12,935    | 98 | Paved parking, HSG A            |
| 4,085     | 98 | Cement Concrete Sidewalk, HSG A |
| 46,449    | 39 | >75% Grass cover, Good, HSG A   |
| 1,052     | 74 | >75% Grass cover, Good, HSG C   |
| 64,521    | 55 | Weighted Average                |
| 47,501    |    | 73.62% Pervious Area            |
| 17,020    |    | 26.38% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                               |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------------------------------------------|
| 2.7         | 50               | 0.3333           | 0.31                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 10.8        | 60               | 0.0150           | 0.09                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 2.0         | 240              | 0.0150           | 1.97                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps |
| 15.5        | 350              |                  |                      |                   | Total                                                     |

### Subcatchment 1S: PR-1

Hydrograph



## Summary for Subcatchment 2S: PR-2

Runoff = 0.57 cfs @ 12.11 hrs, Volume= 0.045 af, Depth= 3.96"  
 Routed to Pond 44P : CMP Infiltration

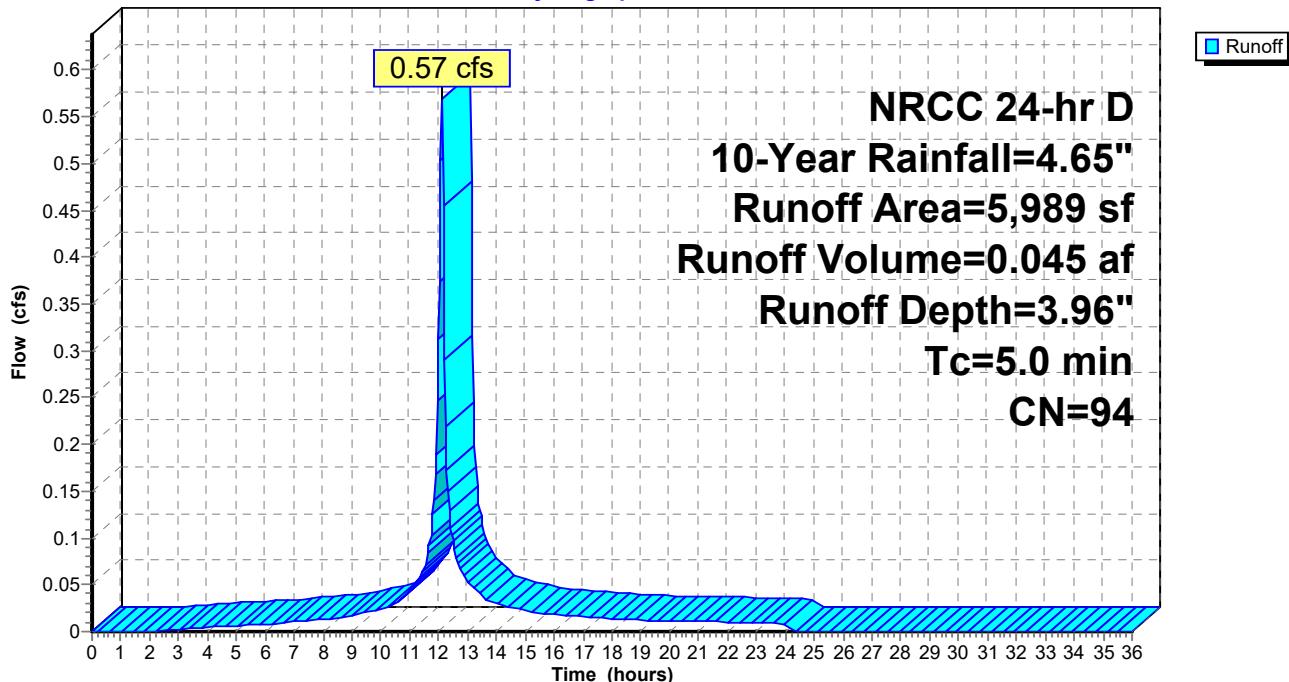
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,187 | 98 Paved parking, HSG C            |
| *         | 690   | 98 Cement Concrete Sidewalk, HSG C |
| 1,112     | 74    | >75% Grass cover, Good, HSG C      |
| 5,989     | 94    | Weighted Average                   |
| 1,112     |       | 18.57% Pervious Area               |
| 4,877     |       | 81.43% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

## Subcatchment 2S: PR-2

Hydrograph



### Summary for Subcatchment 3S: PR-3

Runoff = 0.81 cfs @ 12.11 hrs, Volume= 0.063 af, Depth= 3.75"  
 Routed to Pond 44P : CMP Infiltration

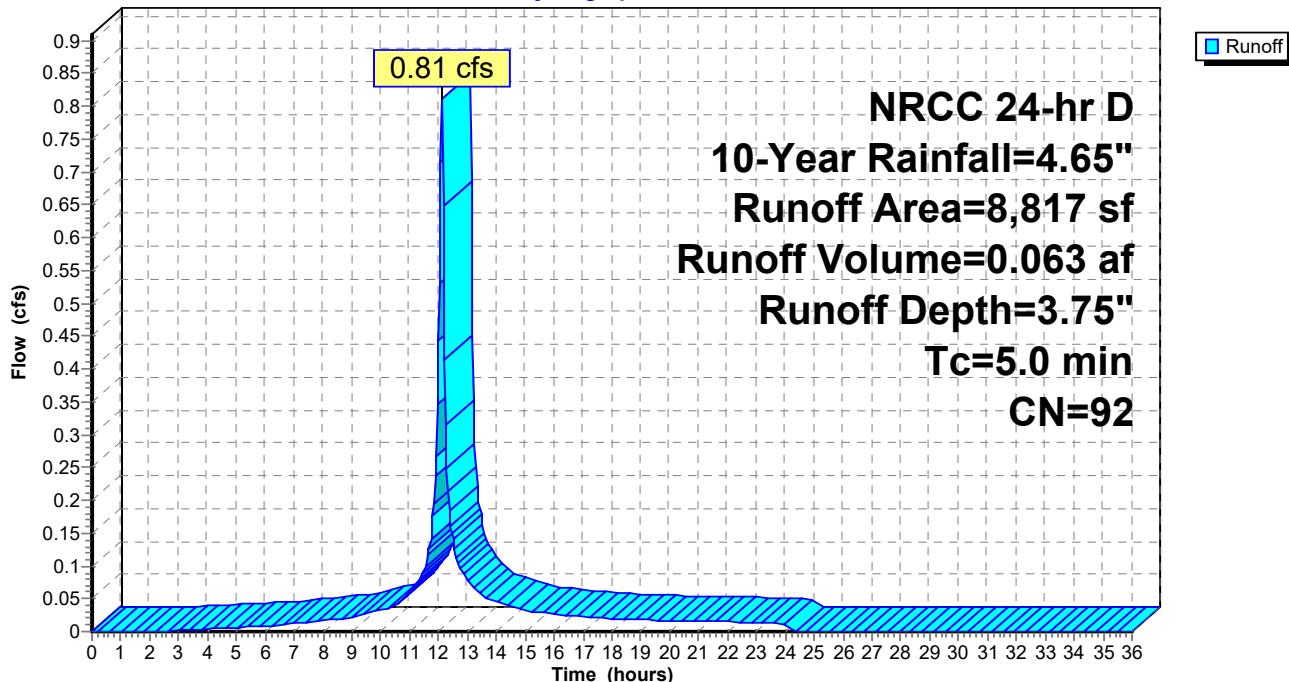
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,618     | 98 | Paved parking, HSG C            |
| 946       | 98 | Cement Concrete Sidewalk, HSG C |
| 2,253     | 74 | >75% Grass cover, Good, HSG C   |
| 8,817     | 92 | Weighted Average                |
| 2,253     |    | 25.55% Pervious Area            |
| 6,564     |    | 74.45% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 3S: PR-3

Hydrograph



### Summary for Subcatchment 4S: PR-4

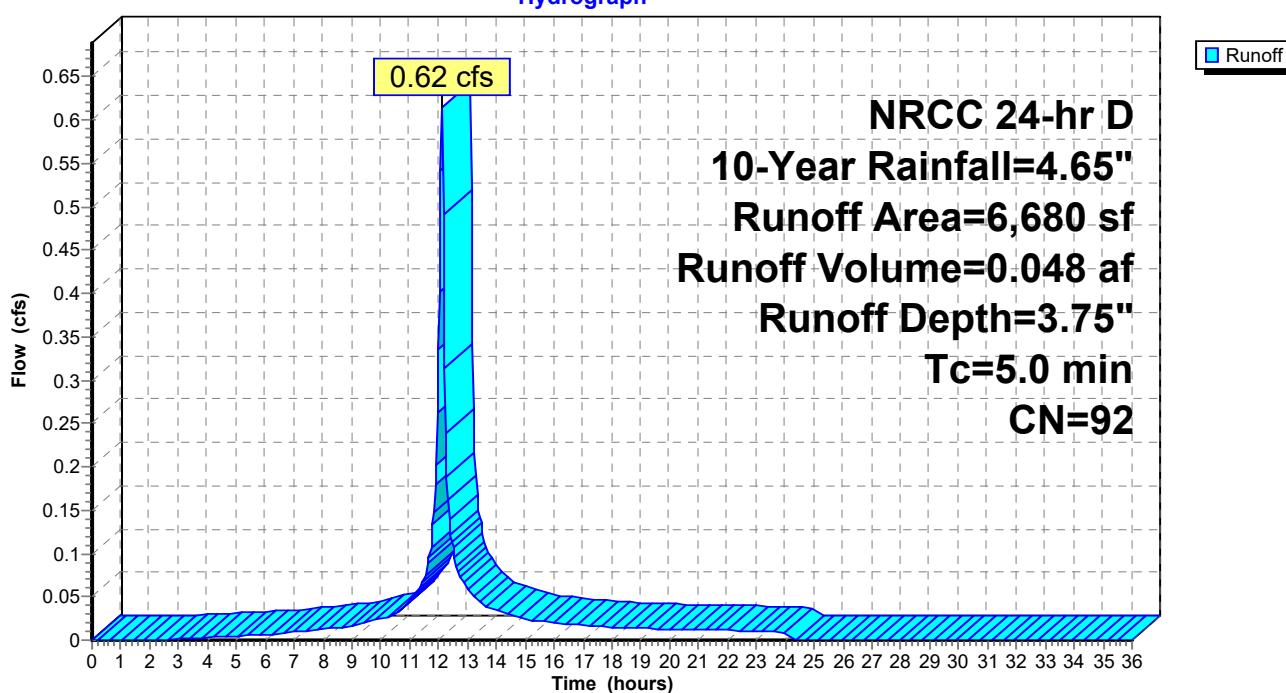
Runoff = 0.62 cfs @ 12.11 hrs, Volume= 0.048 af, Depth= 3.75"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf)            | CN                | Description                     |                      |
|----------------------|-------------------|---------------------------------|----------------------|
| 2,045                | 98                | Paved parking, HSG C            |                      |
| *                    | 2,781             | Paved parking, HSG A            |                      |
| *                    | 424               | Cement Concrete Sidewalk, HSG C |                      |
| *                    | 415               | Cement Concrete Sidewalk, HSG A |                      |
| 559                  | 74                | >75% Grass cover, Good, HSG C   |                      |
| 456                  | 39                | >75% Grass cover, Good, HSG A   |                      |
| 6,680                | 92                | Weighted Average                |                      |
| 1,015                |                   | 15.19% Pervious Area            |                      |
| 5,665                |                   | 84.81% Impervious Area          |                      |
|                      |                   |                                 |                      |
| Tc<br>(min)          | Length<br>(feet)  | Slope<br>(ft/ft)                |                      |
| Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                     |                      |
| 5.0                  |                   |                                 | Direct Entry, Direct |

### Subcatchment 4S: PR-4

Hydrograph



### Summary for Subcatchment 5S: PR-5

Runoff = 0.62 cfs @ 12.12 hrs, Volume= 0.047 af, Depth= 3.34"  
 Routed to Pond 44P : CMP Infiltration

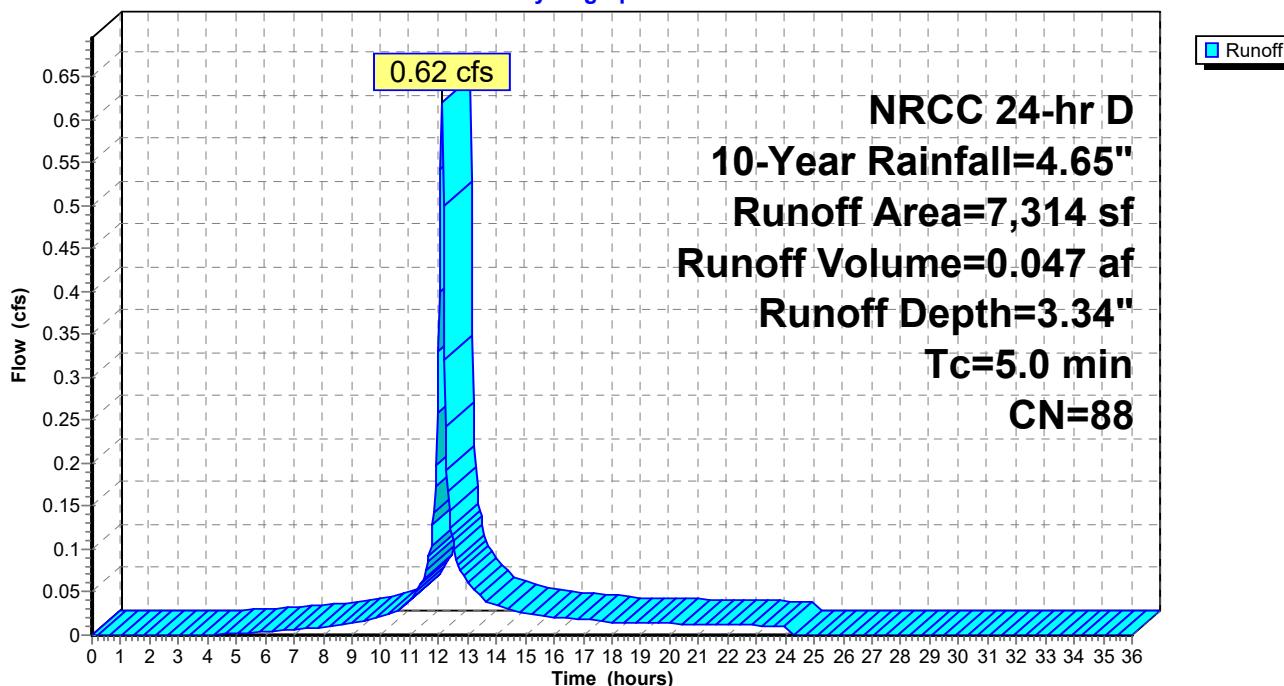
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,817 | 98 Paved parking, HSG A            |
| *         | 3,106 | 98 Paved parking, HSG C            |
| *         | 327   | 98 Cement Concrete Sidewalk, HSG C |
| *         | 391   | 98 Cement Concrete Sidewalk, HSG A |
|           | 725   | >75% Grass cover, Good, HSG C      |
|           | 948   | >75% Grass cover, Good, HSG A      |
| 7,314     | 88    | Weighted Average                   |
| 1,673     |       | 22.87% Pervious Area               |
| 5,641     |       | 77.13% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 5S: PR-5

Hydrograph



### Summary for Subcatchment 6S: PR-6

Runoff = 0.79 cfs @ 12.12 hrs, Volume= 0.057 af, Depth= 1.93"  
 Routed to Pond 44P : CMP Infiltration

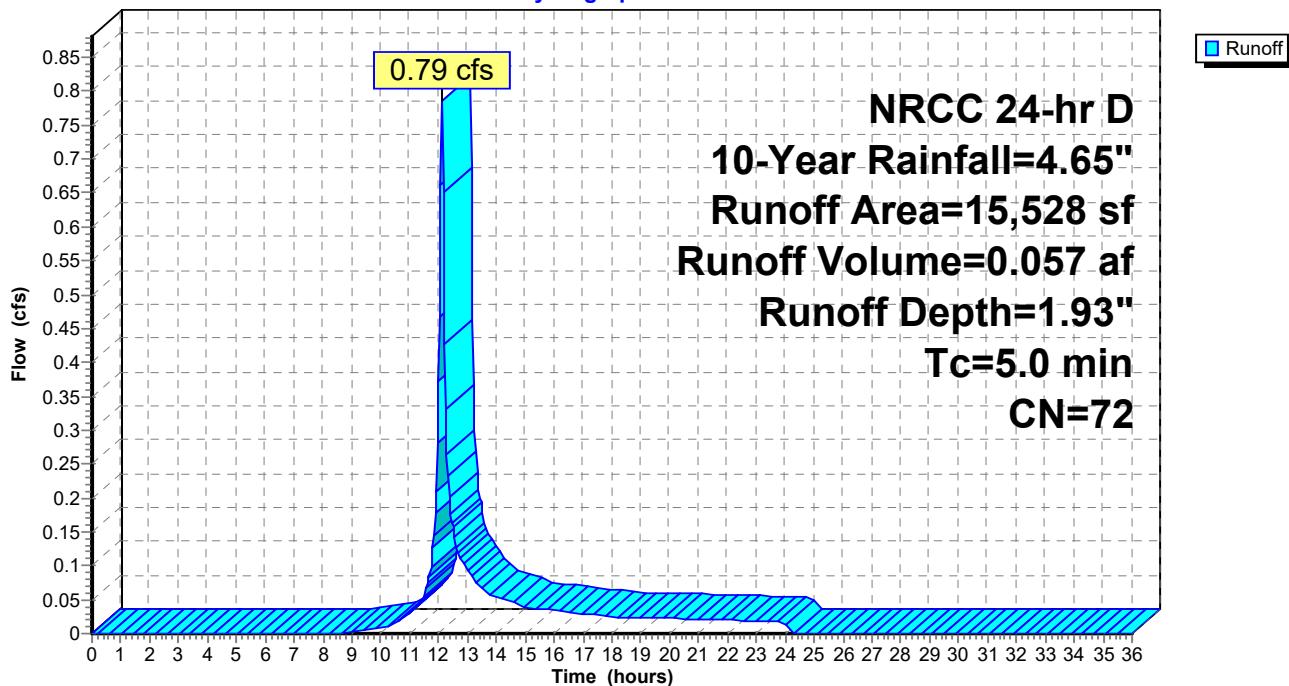
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,081 | 98 Paved parking, HSG A            |
| *         | 1,477 | 98 Cement Concrete Sidewalk, HSG A |
| 6,970     | 39    | >75% Grass cover, Good, HSG A      |
| 15,528    | 72    | Weighted Average                   |
| 6,970     |       | 44.89% Pervious Area               |
| 8,558     |       | 55.11% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 6S: PR-6

Hydrograph



### Summary for Subcatchment 7S: PR-7

Runoff = 0.71 cfs @ 12.12 hrs, Volume= 0.053 af, Depth= 3.14"  
 Routed to Pond 44P : CMP Infiltration

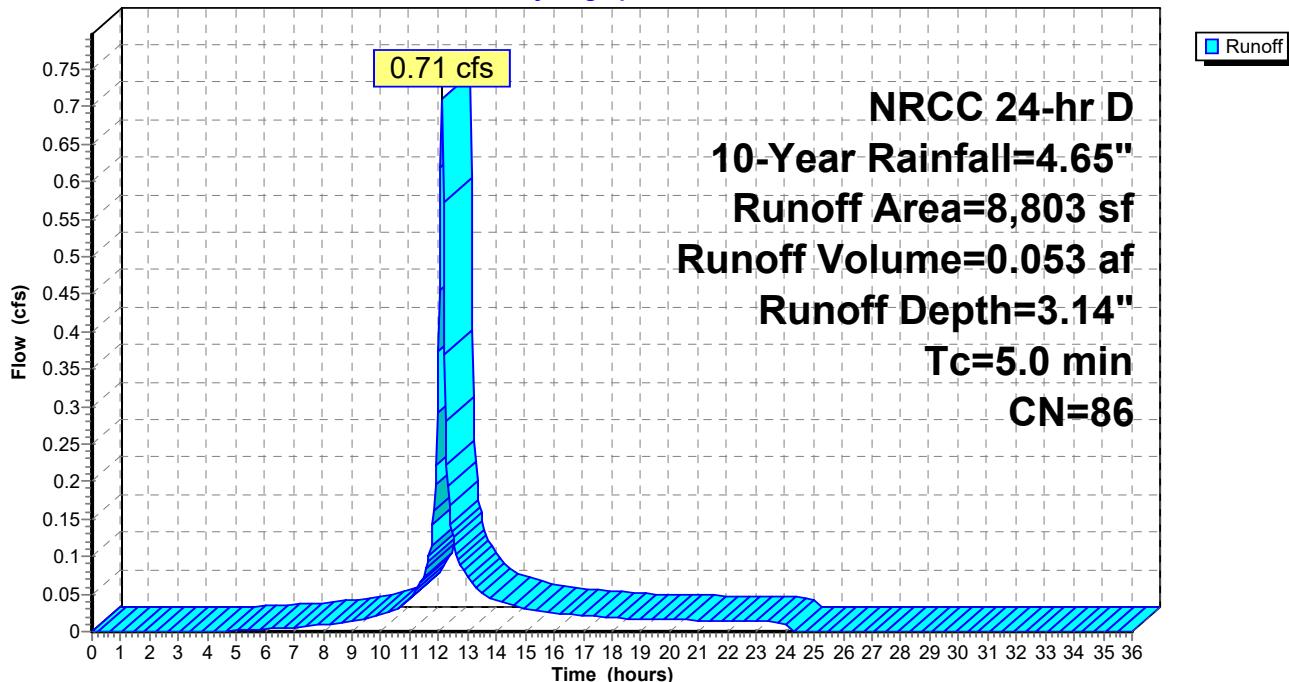
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,946 | 98 Paved parking, HSG A            |
| *         | 1,087 | 98 Cement Concrete Sidewalk, HSG A |
|           | 1,770 | >75% Grass cover, Good, HSG A      |
|           | 8,803 | Weighted Average                   |
|           | 1,770 | 20.11% Pervious Area               |
|           | 7,033 | 79.89% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 7S: PR-7

Hydrograph



### Summary for Subcatchment 8S: PR-8

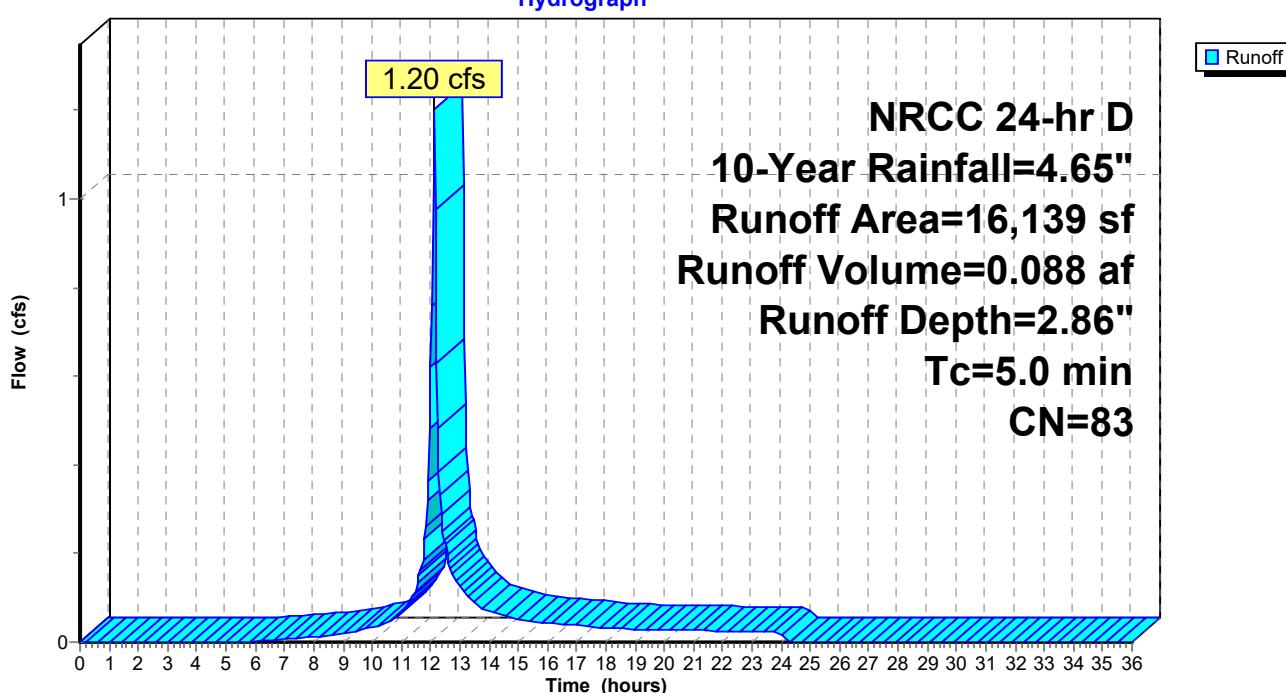
Runoff = 1.20 cfs @ 12.12 hrs, Volume= 0.088 af, Depth= 2.86"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 2,974         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 4,084         | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 1,148         | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
| *         | 390           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
|           | 1,872         | >75% Grass cover, Good, HSG A      |                   |                |                      |
|           | 5,671         | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 16,139    | 83            | Weighted Average                   |                   |                |                      |
| 7,543     |               | 46.74% Pervious Area               |                   |                |                      |
| 8,596     |               | 53.26% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 8S: PR-8

Hydrograph



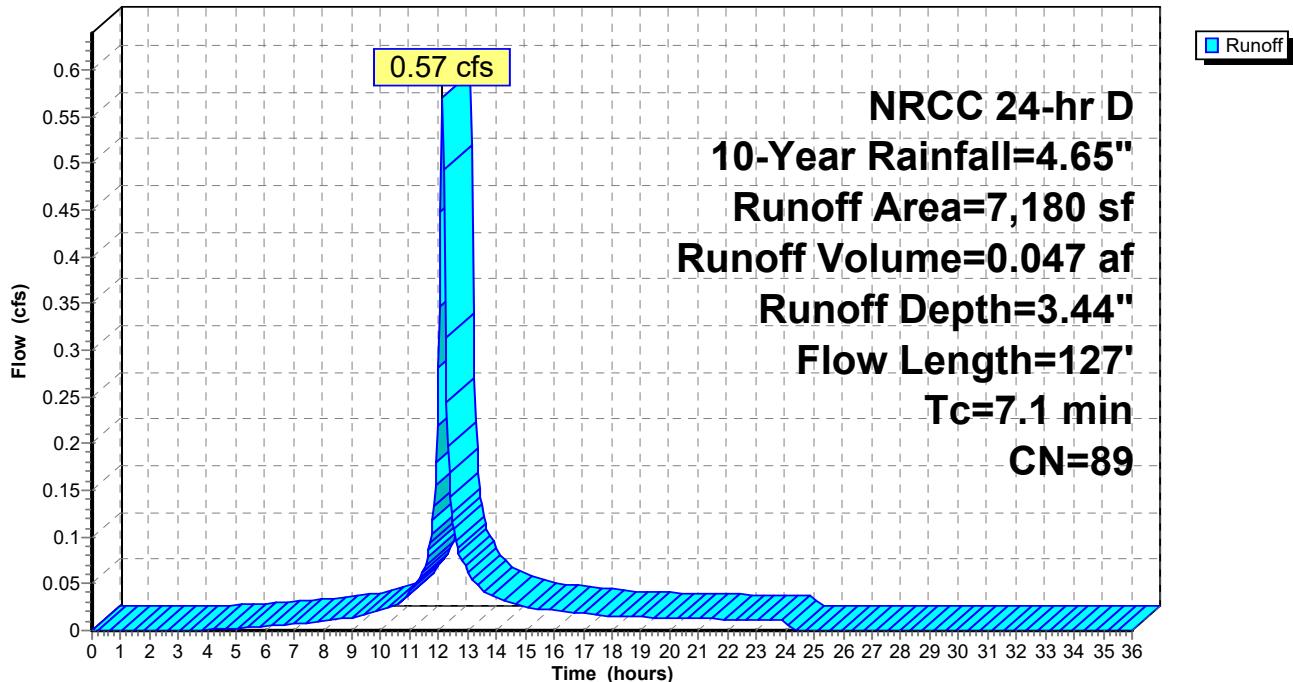
### Summary for Subcatchment 9S: PR-9

Runoff = 0.57 cfs @ 12.14 hrs, Volume= 0.047 af, Depth= 3.44"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 532   | 98 Paved parking, HSG A            |
| *         | 3,859 | 98 Paved parking, HSG C            |
| *         | 216   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 827   | 98 Cement Concrete Sidewalk, HSG C |
|           | 570   | >75% Grass cover, Good, HSG A      |
|           | 1,176 | >75% Grass cover, Good, HSG C      |
| 7,180     | 89    | Weighted Average                   |
| 1,746     |       | 24.32% Pervious Area               |
| 5,434     |       | 75.68% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.7         | 75               | 0.0050           | 0.74                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 27               | 0.0050           | 1.44                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 127              | Total            |                      |                   |                                                                   |

**Subcatchment 9S: PR-9****Hydrograph**

### Summary for Subcatchment 10S: PR-10

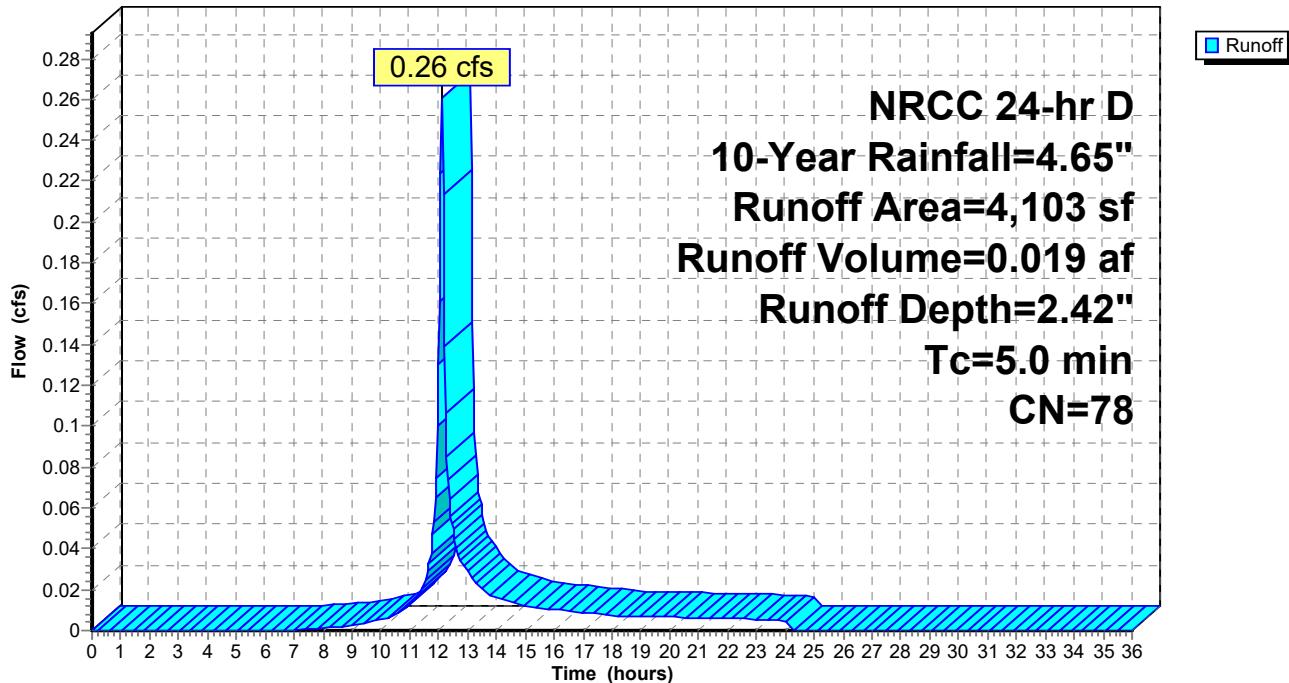
Runoff = 0.26 cfs @ 12.12 hrs, Volume= 0.019 af, Depth= 2.42"  
 Routed to Link 17L : DP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN            | Description                                                |  |                      |
|-----------|---------------|------------------------------------------------------------|--|----------------------|
| 1,584     | 74            | >75% Grass cover, Good, HSG C                              |  |                      |
| 2,519     | 80            | >75% Grass cover, Good, HSG D                              |  |                      |
| 4,103     | 78            | Weighted Average                                           |  |                      |
| 4,103     |               | 100.00% Pervious Area                                      |  |                      |
| Tc (min)  | Length (feet) | Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description |  |                      |
| 5.0       |               |                                                            |  | Direct Entry, DIRECT |

### Subcatchment 10S: PR-10

Hydrograph



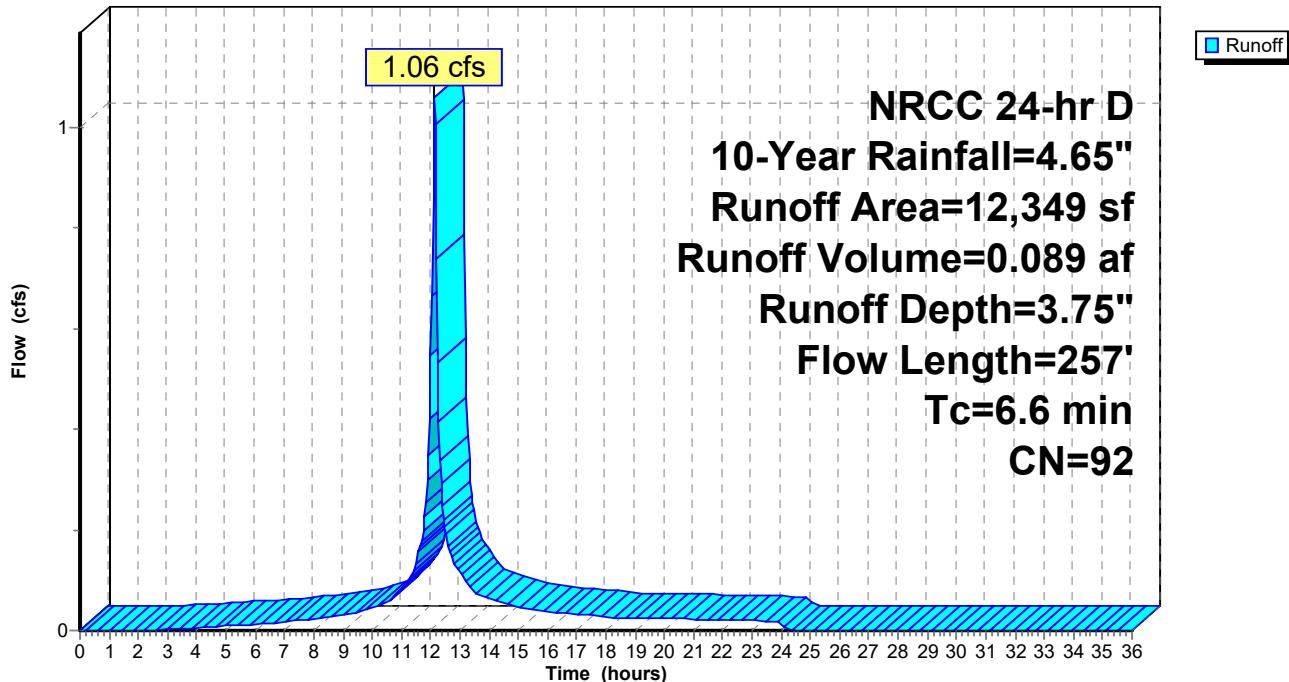
### Summary for Subcatchment 11S: PR-11

Runoff = 1.06 cfs @ 12.13 hrs, Volume= 0.089 af, Depth= 3.75"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,691 | 98 Paved parking, HSG C            |
| *         | 276   | 98 Paved parking, HSG A            |
| *         | 1,371 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 185   | 98 Cement Concrete Sidewalk, HSG A |
| 2,481     | 74    | >75% Grass cover, Good, HSG C      |
| 345       | 39    | >75% Grass cover, Good, HSG A      |
| 12,349    | 92    | Weighted Average                   |
| 2,826     |       | 22.88% Pervious Area               |
| 9,523     |       | 77.12% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.8         | 75               | 0.0350           | 1.61                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 157              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 6.6         | 257              | Total            |                      |                   |                                                                   |

**Subcatchment 11S: PR-11****Hydrograph**

### Summary for Subcatchment 12S: PR-12

Runoff = 1.15 cfs @ 12.12 hrs, Volume= 0.089 af, Depth= 3.64"  
 Routed to Pond 44P : CMP Infiltration

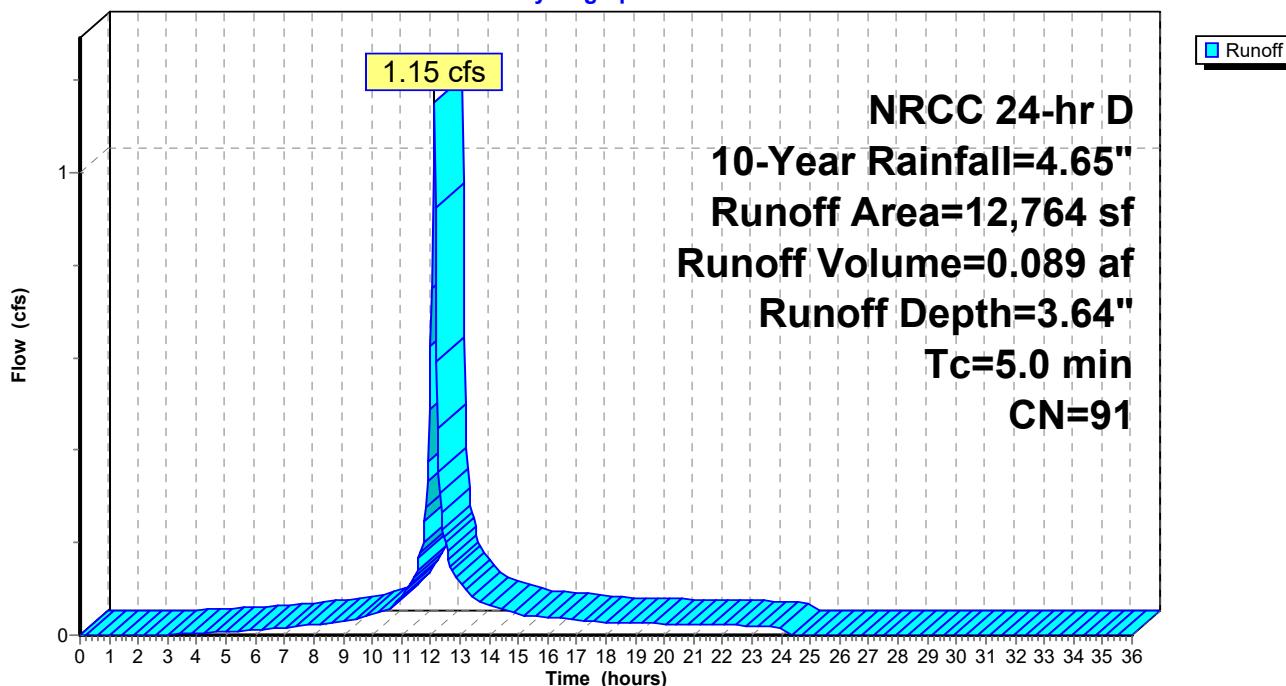
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,226 | 98 Paved parking, HSG C            |
| *         | 139   | 98 Paved parking, HSG A            |
| *         | 1,592 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 130   | 98 Cement Concrete Sidewalk, HSG A |
| 3,543     | 74    | >75% Grass cover, Good, HSG C      |
| 134       | 39    | >75% Grass cover, Good, HSG A      |
| 12,764    | 91    | Weighted Average                   |
| 3,677     |       | 28.81% Pervious Area               |
| 9,087     |       | 71.19% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 12S: PR-12

Hydrograph



### Summary for Subcatchment 18S: PR-13

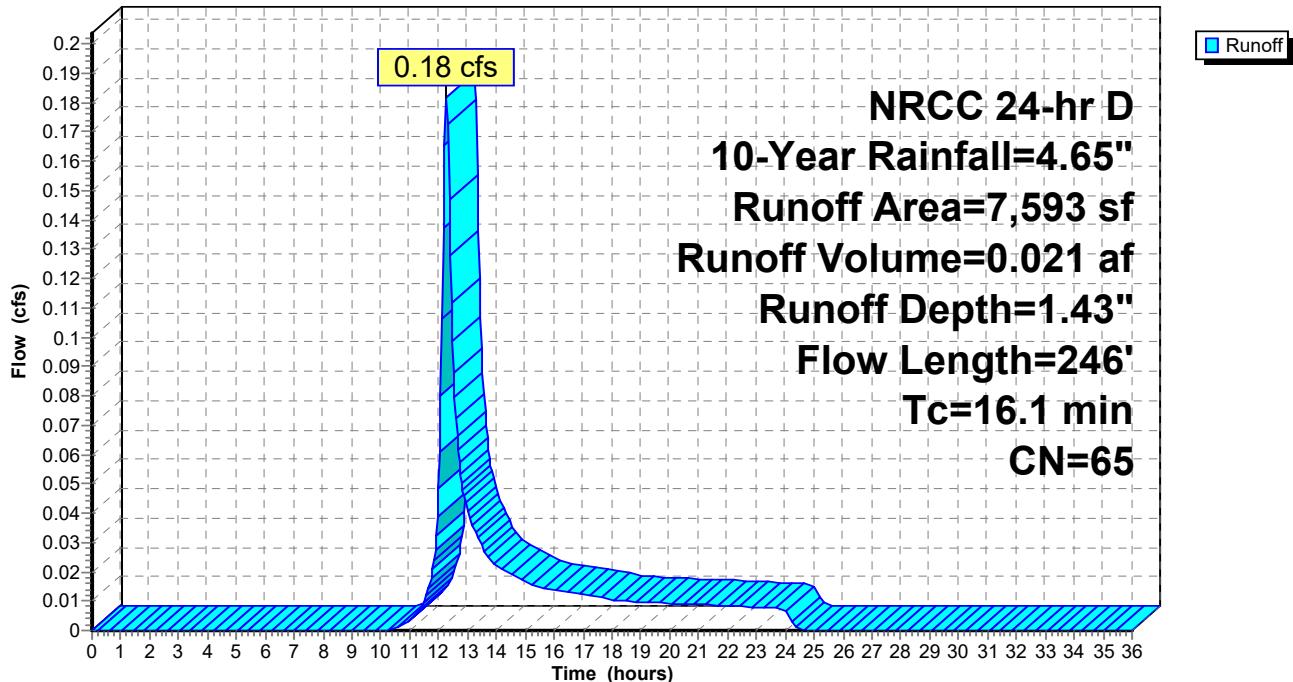
Runoff = 0.18 cfs @ 12.26 hrs, Volume= 0.021 af, Depth= 1.43"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 131       | 98 | Paved parking, HSG C            |
| * 2,672   | 98 | Paved parking, HSG A            |
| * 183     | 98 | Cement Concrete Sidewalk, HSG C |
| 499       | 74 | >75% Grass cover, Good, HSG C   |
| 4,108     | 39 | >75% Grass cover, Good, HSG A   |

|       |    |                        |
|-------|----|------------------------|
| 7,593 | 65 | Weighted Average       |
| 4,607 |    | 60.67% Pervious Area   |
| 2,986 |    | 39.33% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 108              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 246              | Total            |                      |                   |                                                                          |

**Subcatchment 18S: PR-13****Hydrograph**

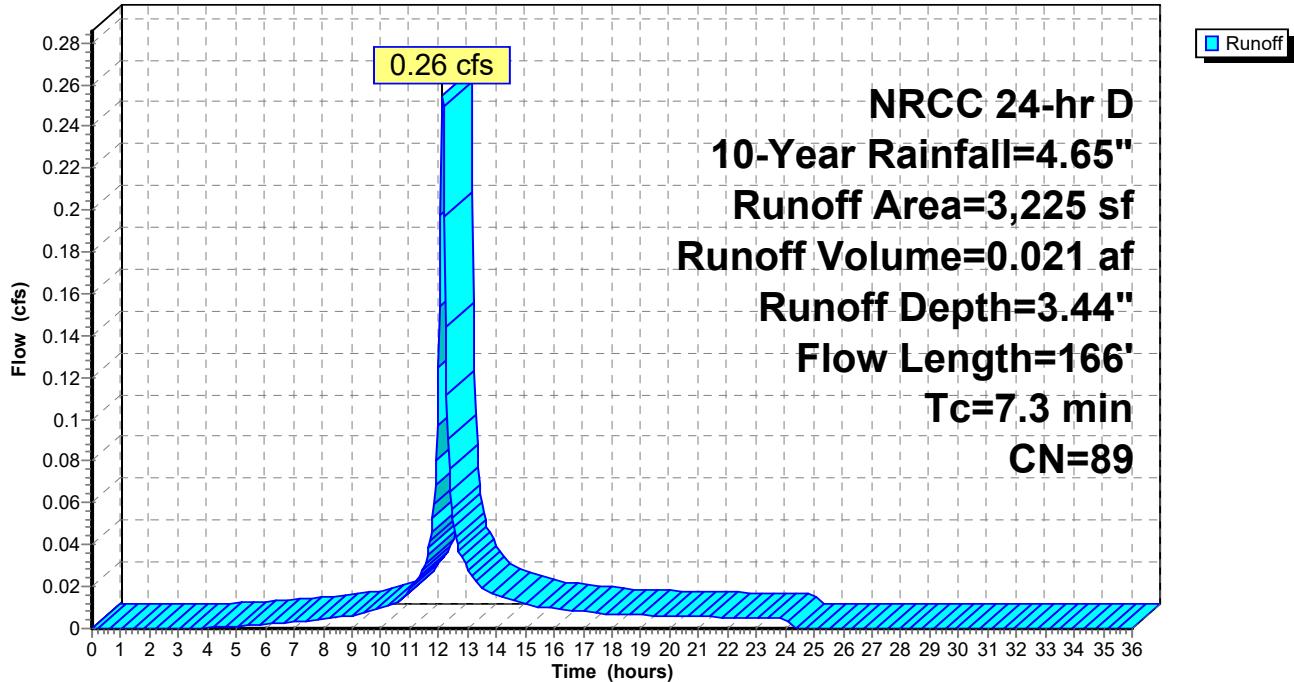
### Summary for Subcatchment 19S: PR-14

Runoff = 0.26 cfs @ 12.14 hrs, Volume= 0.021 af, Depth= 3.44"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 199   | 98 Paved parking, HSG C            |
| *         | 2,132 | 98 Paved parking, HSG A            |
| *         | 322   | 98 Cement Concrete Sidewalk, HSG A |
|           | 126   | >75% Grass cover, Good, HSG C      |
|           | 446   | >75% Grass cover, Good, HSG A      |
| 3,225     | 89    | Weighted Average                   |
| 572       |       | 17.74% Pervious Area               |
| 2,653     |       | 82.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 6.3         | 33               | 0.0500           | 0.09                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.7         | 67               | 0.0350           | 1.57                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 66               | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.3         | 166              | Total            |                      |                   |                                                                   |

**Subcatchment 19S: PR-14****Hydrograph**

### Summary for Subcatchment 20S: PR-15

Runoff = 0.24 cfs @ 12.12 hrs, Volume= 0.018 af, Depth= 3.54"  
 Routed to Pond 44P : CMP Infiltration

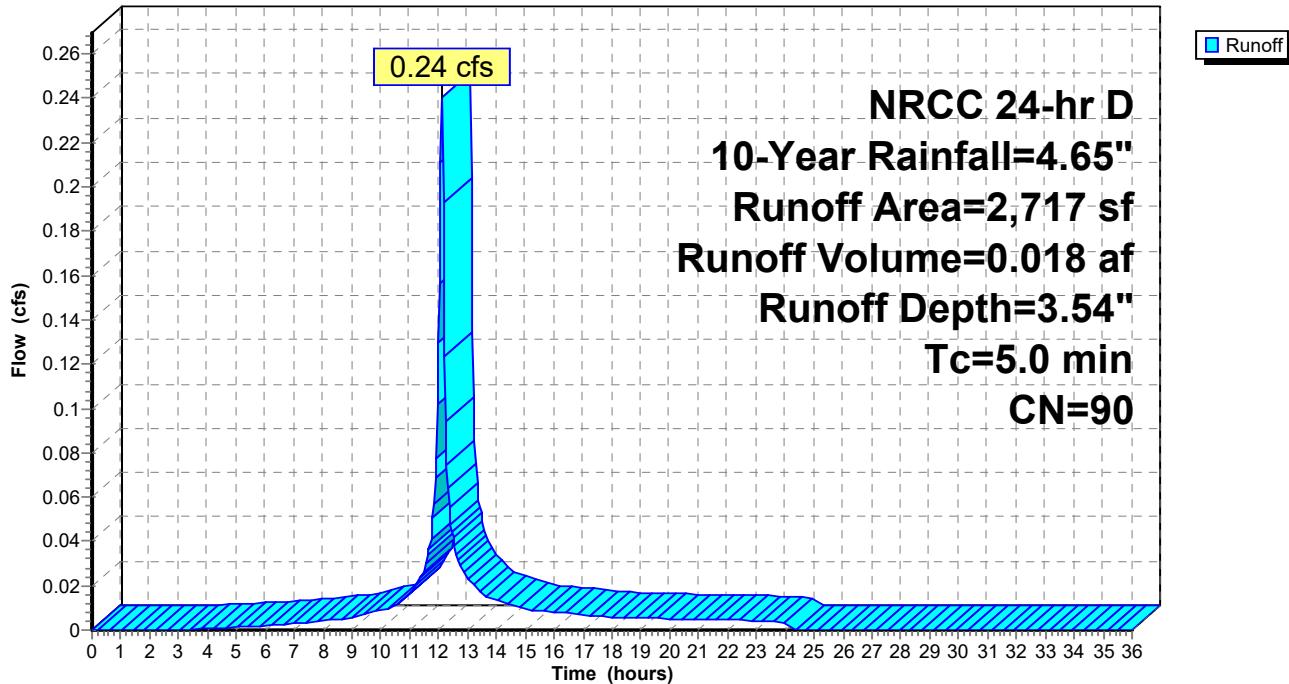
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,331     | 98 | Paved parking, HSG A          |
| 386       | 39 | >75% Grass cover, Good, HSG A |
| 2,717     | 90 | Weighted Average              |
| 386       |    | 14.21% Pervious Area          |
| 2,331     |    | 85.79% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 20S: PR-15

Hydrograph



### Summary for Subcatchment 22S: PR-16

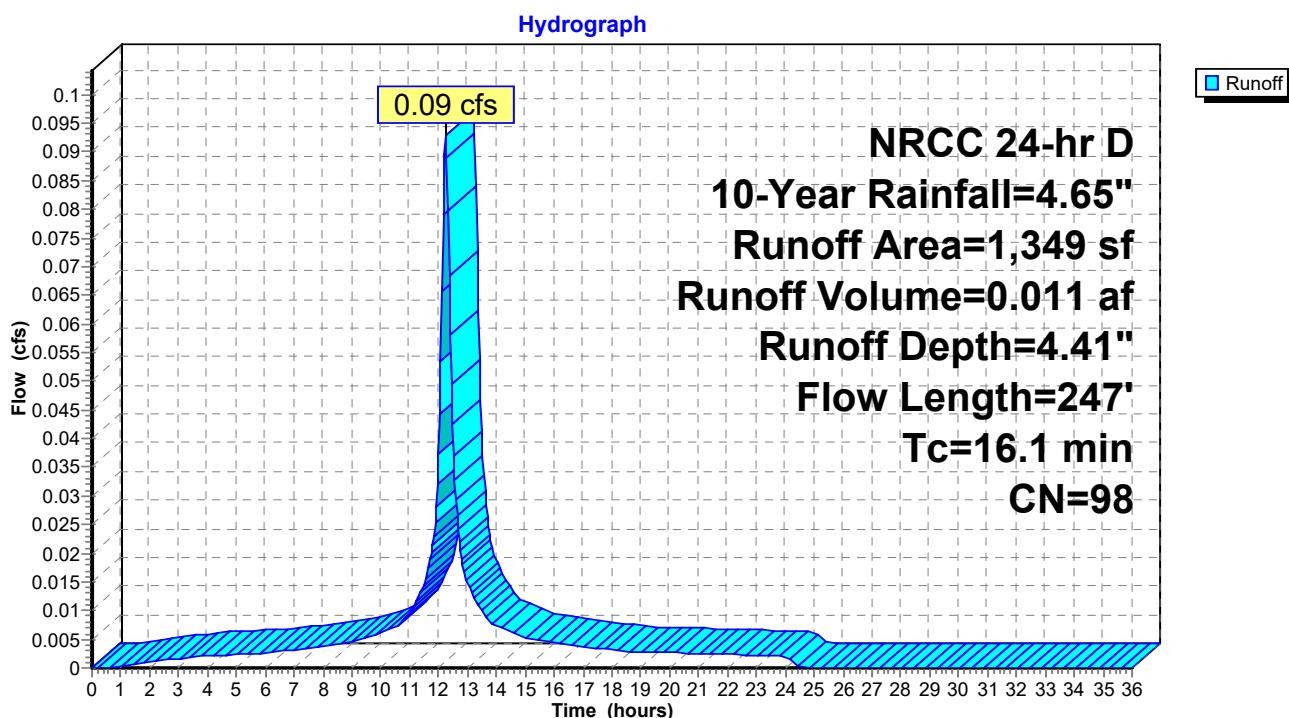
Runoff = 0.09 cfs @ 12.24 hrs, Volume= 0.011 af, Depth= 4.41"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN  | Description             |
|-----------|-----|-------------------------|
| *         | 614 | Paved parking, HSG A    |
| *         | 735 | Paved parking, HSG C    |
| 1,349     | 98  | Weighted Average        |
| 1,349     |     | 100.00% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 109              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 247              | Total            |                      |                   |                                                                          |

### Subcatchment 22S: PR-16



### Summary for Subcatchment 23S: PR-17

Runoff = 1.27 cfs @ 12.12 hrs, Volume= 0.097 af, Depth= 3.54"  
 Routed to Pond 44P : CMP Infiltration

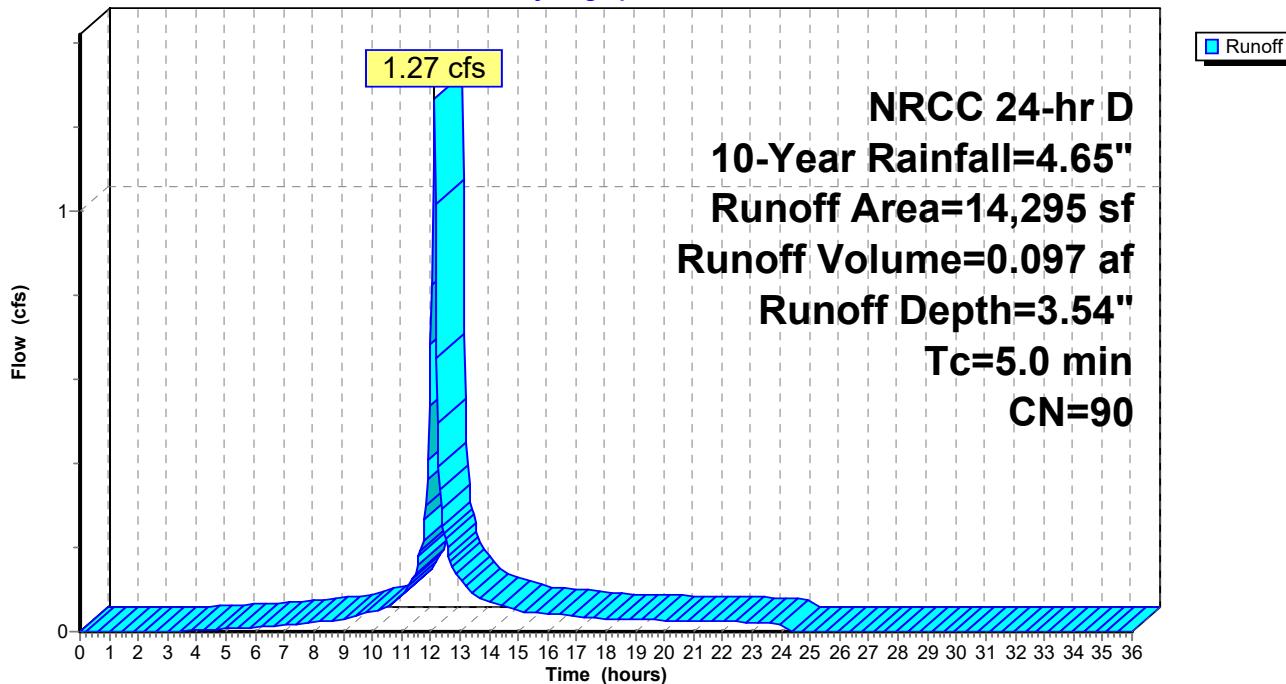
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 447   | 98 Paved parking, HSG A            |
| *         | 7,461 | 98 Paved parking, HSG C            |
| *         | 2,341 | 98 Cement Concrete Sidewalk, HSG C |
|           | 488   | >75% Grass cover, Good, HSG A      |
|           | 3,558 | >75% Grass cover, Good, HSG C      |
| 14,295    | 90    | Weighted Average                   |
| 4,046     |       | 28.30% Pervious Area               |
| 10,249    |       | 71.70% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 23S: PR-17

Hydrograph



### Summary for Subcatchment 24S: PR-18

Runoff = 0.84 cfs @ 12.14 hrs, Volume= 0.075 af, Depth= 4.18"  
 Routed to Pond 44P : CMP Infiltration

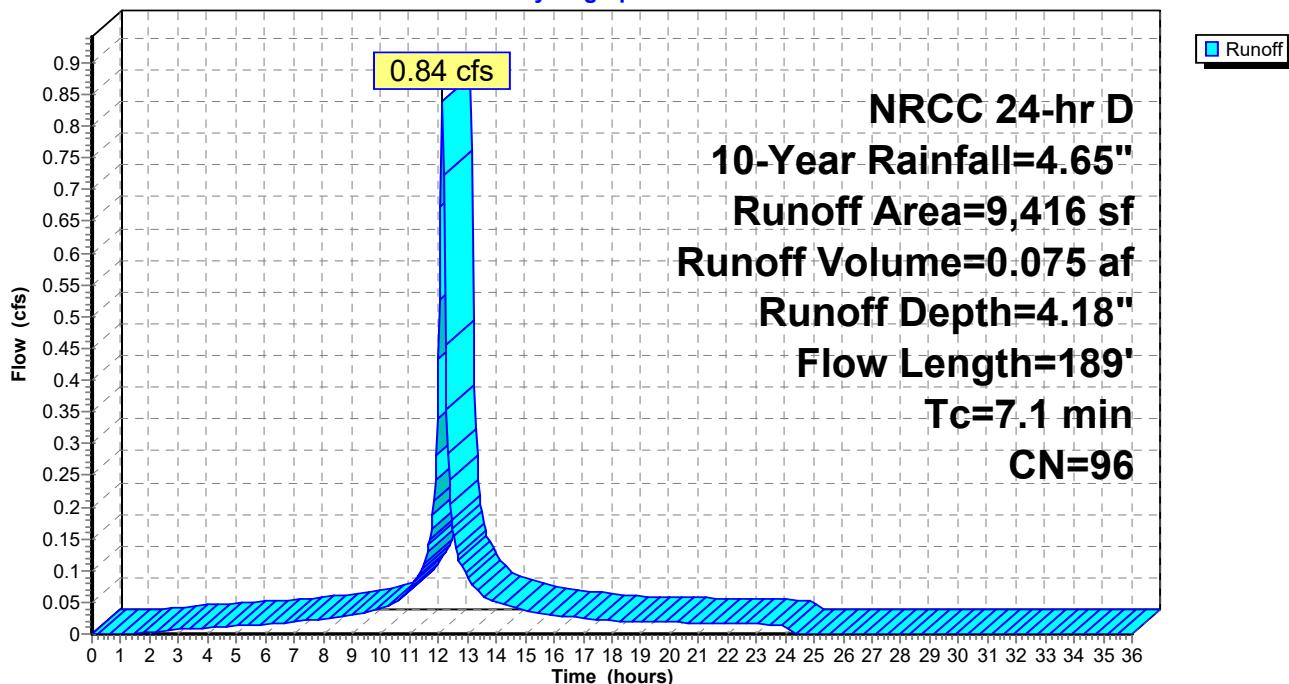
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,554 | 98 Paved parking, HSG A            |
| *         | 4,554 | 98 Cement Concrete Sidewalk, HSG A |
| 308       | 39    | >75% Grass cover, Good, HSG A      |
| 9,416     | 96    | Weighted Average                   |
| 308       |       | 3.27% Pervious Area                |
| 9,108     |       | 96.73% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.7         | 29               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.9         | 71               | 0.0200           | 1.27                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.5         | 89               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 189              | Total            |                      |                   |                                                                   |

### Subcatchment 24S: PR-18

Hydrograph



### Summary for Subcatchment 25S: PR-19

Runoff = 0.13 cfs @ 12.12 hrs, Volume= 0.010 af, Depth= 2.86"  
 Routed to Pond 44P : CMP Infiltration

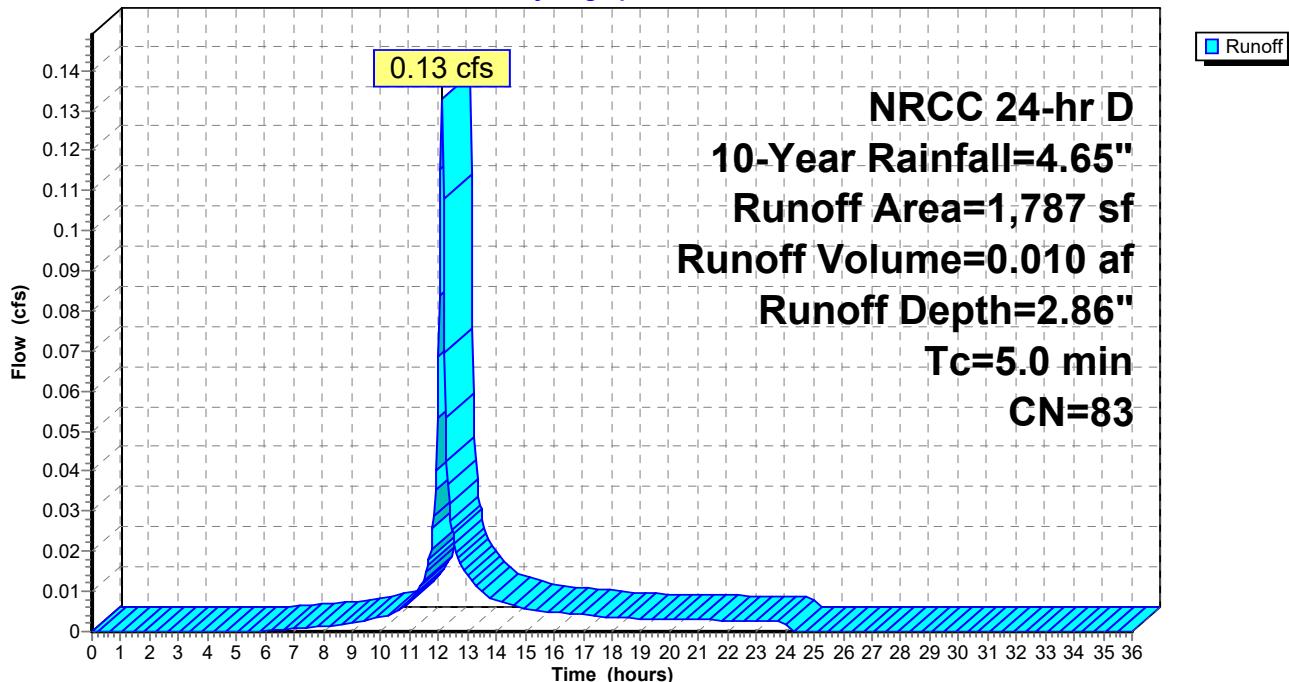
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 1,006 | 98 Paved parking, HSG A         |
| *         | 337   | Cement Concrete Sidewalk, HSG A |
|           | 444   | >75% Grass cover, Good, HSG A   |
| 1,787     | 83    | Weighted Average                |
| 444       |       | 24.85% Pervious Area            |
| 1,343     |       | 75.15% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 25S: PR-19

Hydrograph



### Summary for Subcatchment 26S: PR-20

Runoff = 0.61 cfs @ 12.12 hrs, Volume= 0.047 af, Depth= 3.54"  
 Routed to Pond 44P : CMP Infiltration

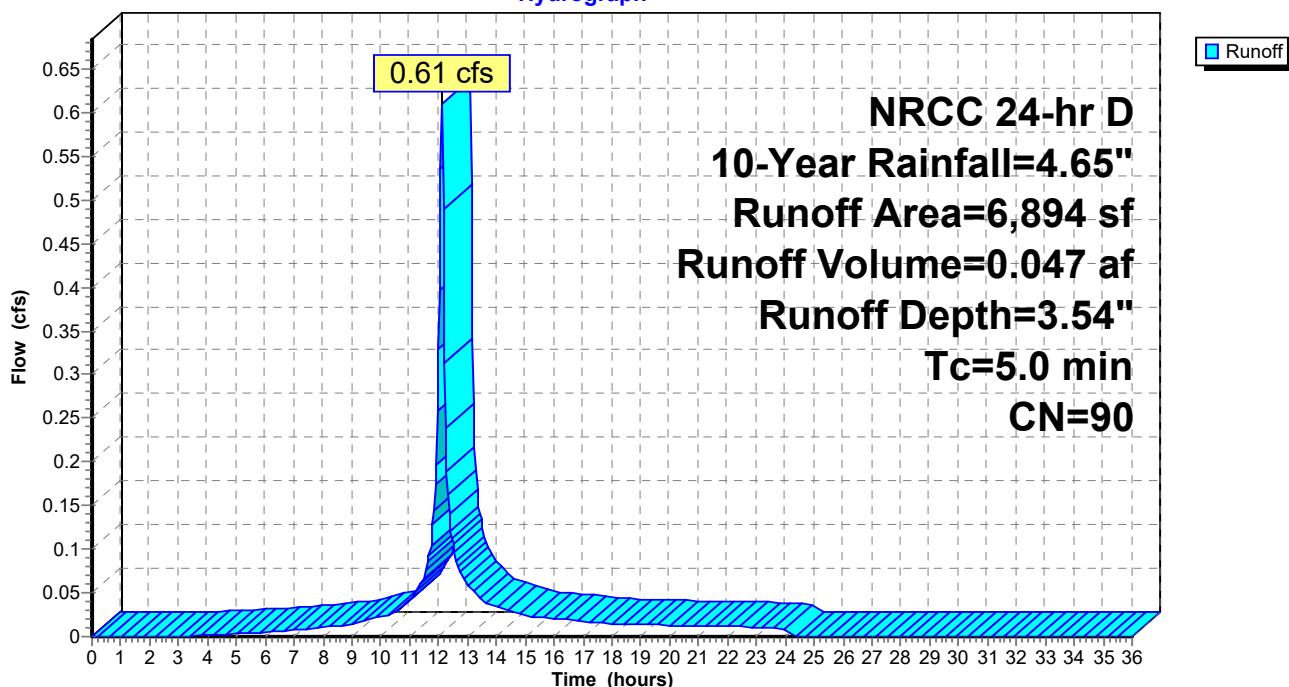
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,689 | 98 Paved parking, HSG A         |
| *         | 1,328 | Cement Concrete Sidewalk, HSG A |
| 877       | 39    | >75% Grass cover, Good, HSG A   |
| 6,894     | 90    | Weighted Average                |
| 877       |       | 12.72% Pervious Area            |
| 6,017     |       | 87.28% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 26S: PR-20

Hydrograph



### Summary for Subcatchment 27S: PR-21

Runoff = 0.62 cfs @ 12.12 hrs, Volume= 0.048 af, Depth= 3.64"  
 Routed to Pond 44P : CMP Infiltration

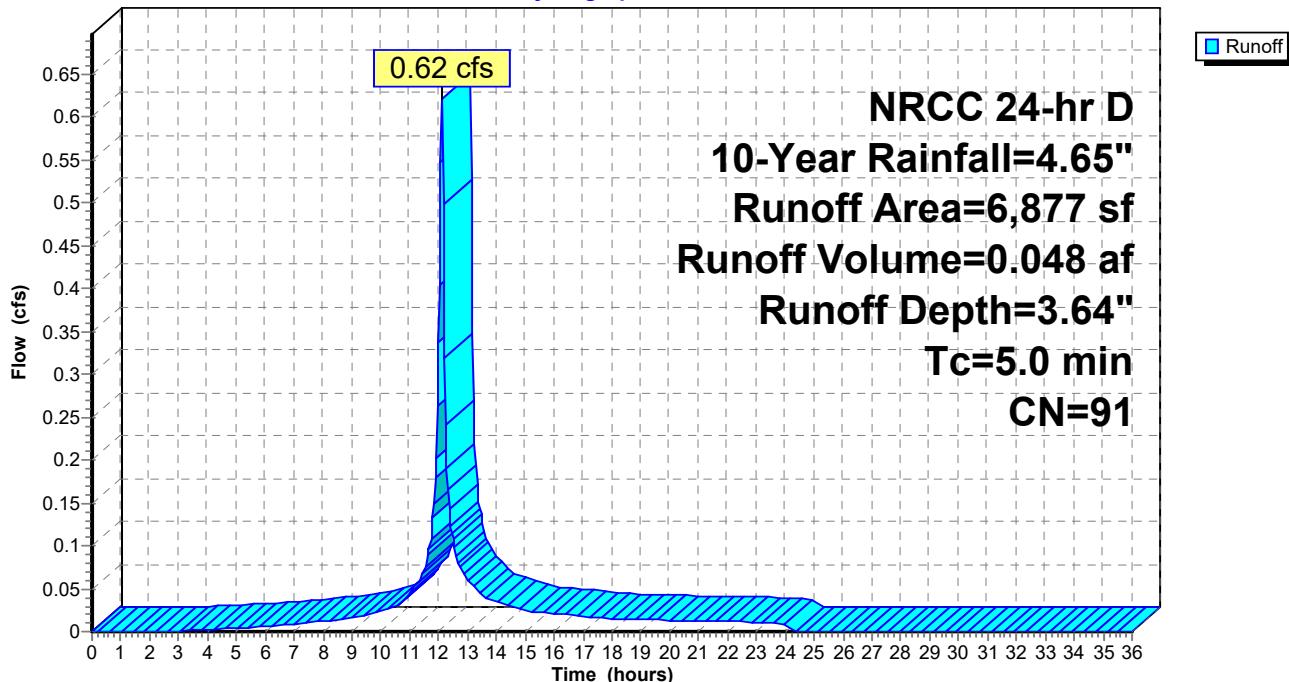
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,706 | 98 Paved parking, HSG A         |
| *         | 1,331 | Cement Concrete Sidewalk, HSG A |
|           | 840   | >75% Grass cover, Good, HSG A   |
|           | 6,877 | Weighted Average                |
|           | 840   | 12.21% Pervious Area            |
|           | 6,037 | 87.79% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 27S: PR-21

Hydrograph



### Summary for Subcatchment 28S: PR-22

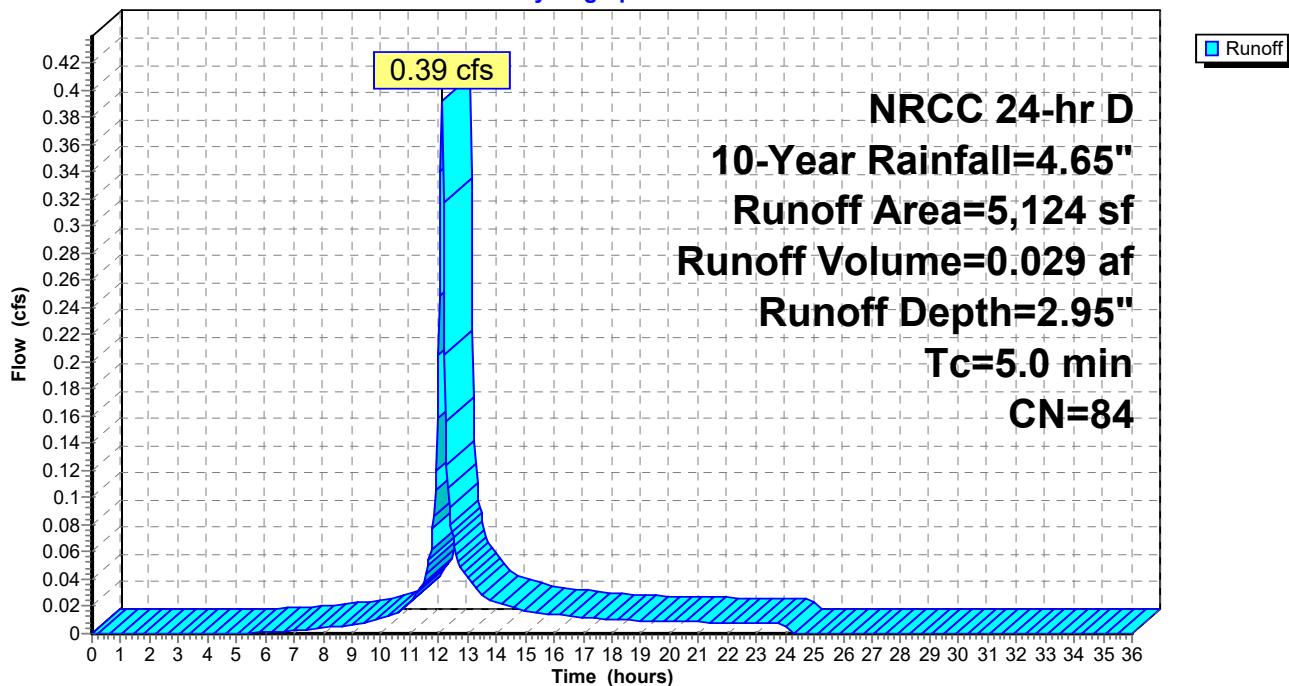
Runoff = 0.39 cfs @ 12.12 hrs, Volume= 0.029 af, Depth= 2.95"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf)   | CN               | Description                        |                      |                   |                      |
|-------------|------------------|------------------------------------|----------------------|-------------------|----------------------|
| *           | 3,097            | 98 Paved parking, HSG A            |                      |                   |                      |
| *           | 72               | 98 Paved parking, HSG C            |                      |                   |                      |
| *           | 588              | 98 Cement Concrete Sidewalk, HSG C |                      |                   |                      |
|             | 1,052            | >75% Grass cover, Good, HSG A      |                      |                   |                      |
|             | 315              | >75% Grass cover, Good, HSG C      |                      |                   |                      |
| 5,124       | 84               | Weighted Average                   |                      |                   |                      |
| 1,367       |                  | 26.68% Pervious Area               |                      |                   |                      |
| 3,757       |                  | 73.32% Impervious Area             |                      |                   |                      |
| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft)                   | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
| 5.0         |                  |                                    |                      |                   | Direct Entry, Direct |

### Subcatchment 28S: PR-22

Hydrograph



### Summary for Subcatchment 29S: PR-23

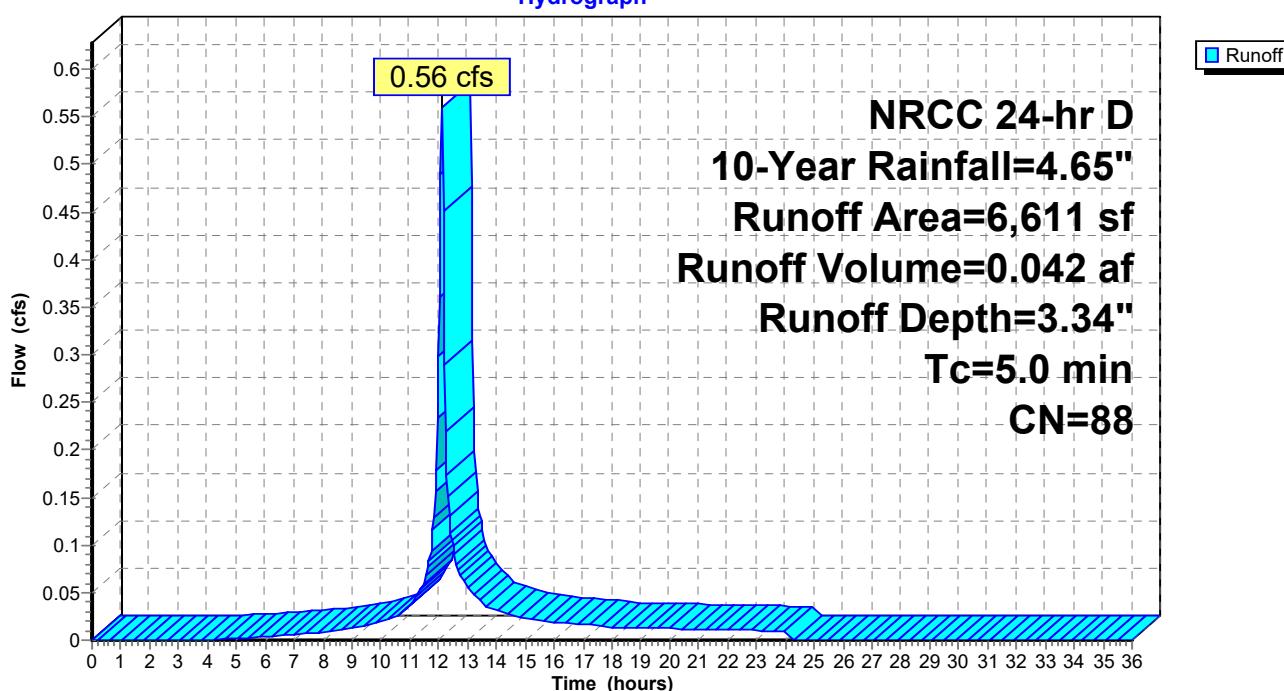
Runoff = 0.56 cfs @ 12.12 hrs, Volume= 0.042 af, Depth= 3.34"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 3,322         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 748           | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 695           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
| *         | 463           | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
| 914       | 39            | >75% Grass cover, Good, HSG A      |                   |                |                      |
| 469       | 74            | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 6,611     | 88            | Weighted Average                   |                   |                |                      |
| 1,383     |               | 20.92% Pervious Area               |                   |                |                      |
| 5,228     |               | 79.08% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 29S: PR-23

Hydrograph



### Summary for Subcatchment 30S: PR-24

Runoff = 0.45 cfs @ 12.12 hrs, Volume= 0.034 af, Depth= 3.34"  
 Routed to Pond 44P : CMP Infiltration

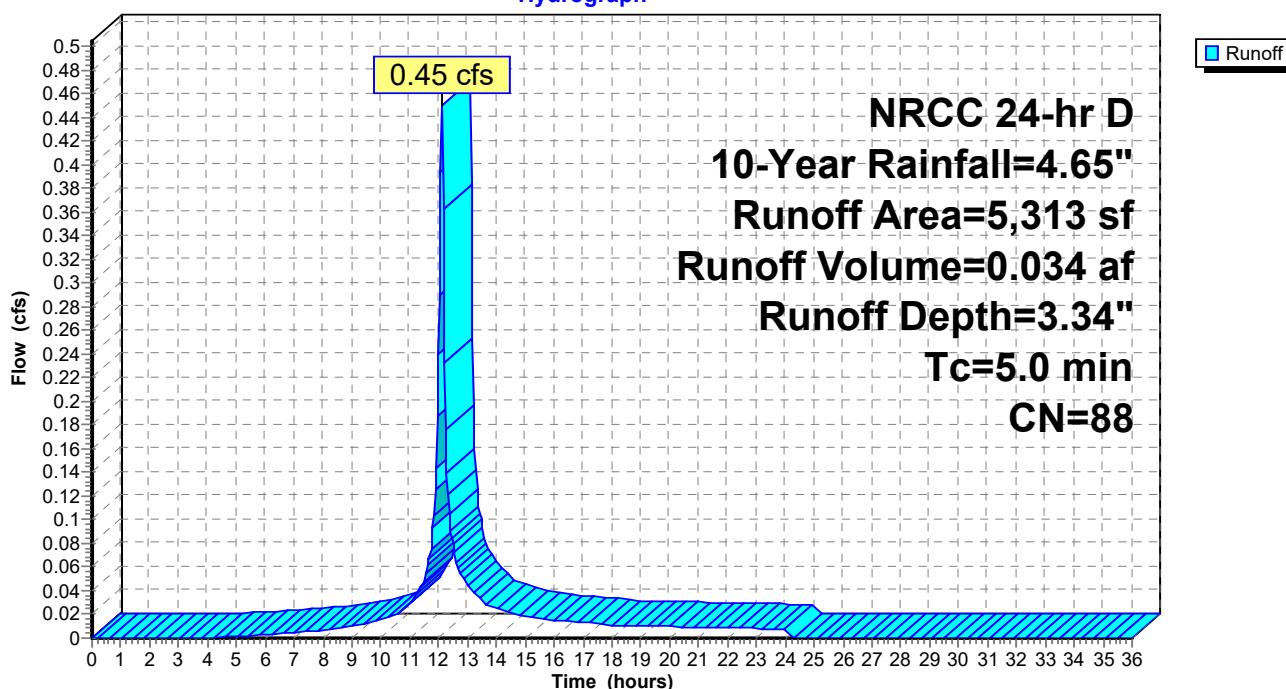
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,109 | 98 Paved parking, HSG A            |
| *         | 146   | 98 Paved parking, HSG C            |
| *         | 572   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 432   | 98 Cement Concrete Sidewalk, HSG C |
| 819       | 39    | >75% Grass cover, Good, HSG A      |
| 235       | 74    | >75% Grass cover, Good, HSG C      |
| 5,313     | 88    | Weighted Average                   |
| 1,054     |       | 19.84% Pervious Area               |
| 4,259     |       | 80.16% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 30S: PR-24

Hydrograph



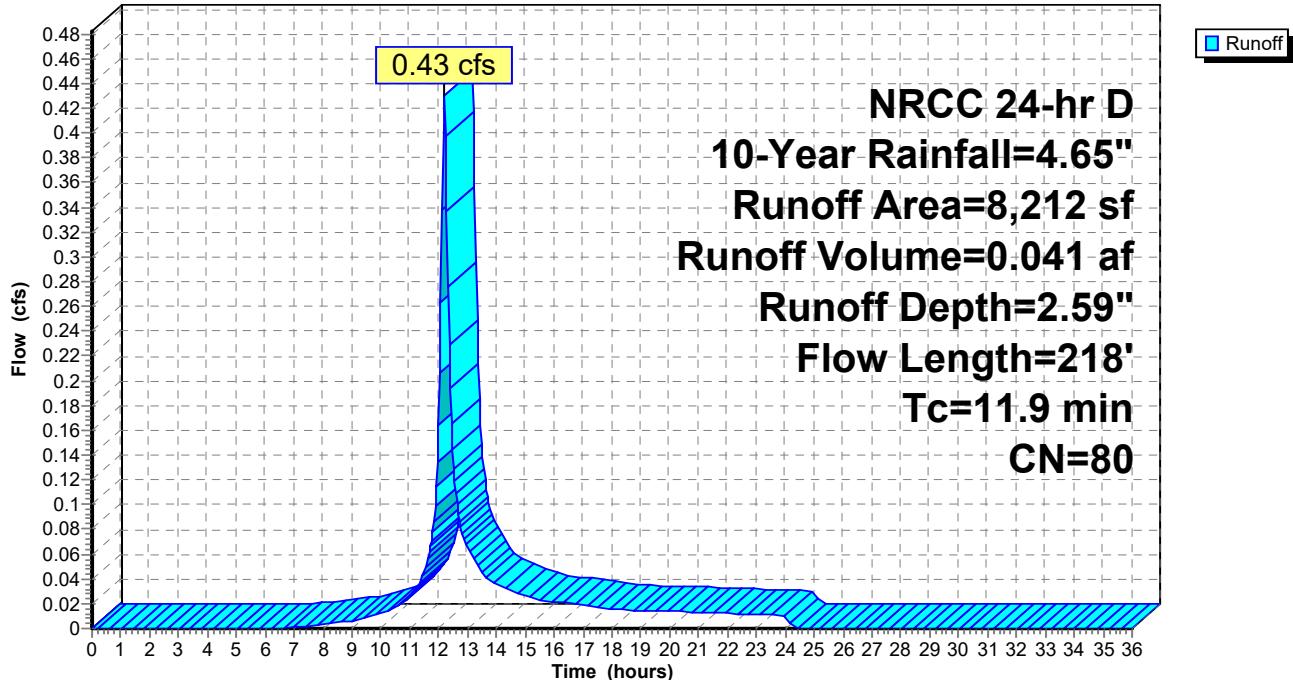
### Summary for Subcatchment 31S: PR-25

Runoff = 0.43 cfs @ 12.20 hrs, Volume= 0.041 af, Depth= 2.59"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,851 | 98 Paved parking, HSG A            |
| *         | 988   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 65    | 98 Cement Concrete Sidewalk, HSG C |
| 1,910     | 39    | >75% Grass cover, Good, HSG A      |
| 1,398     | 74    | >75% Grass cover, Good, HSG C      |
| 8,212     | 80    | Weighted Average                   |
| 3,308     |       | 40.28% Pervious Area               |
| 4,904     |       | 59.72% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 10.6        | 63               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.6         | 37               | 0.0150           | 0.99                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 118              | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 11.9        | 218              | Total            |                      |                   |                                                                   |

**Subcatchment 31S: PR-25****Hydrograph**

### Summary for Subcatchment 32S: PR-26

Runoff = 0.55 cfs @ 12.11 hrs, Volume= 0.044 af, Depth= 3.96"  
 Routed to Pond 44P : CMP Infiltration

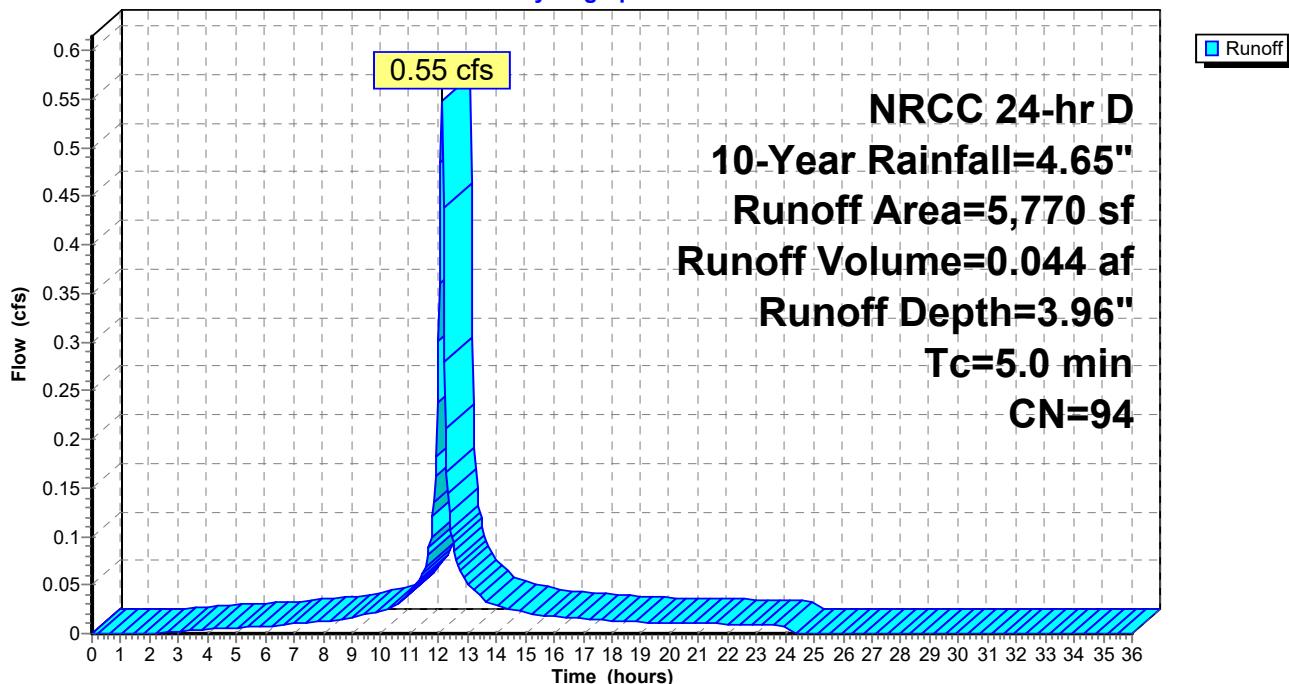
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,263 | 98 Paved parking, HSG A            |
| *         | 1,076 | 98 Cement Concrete Sidewalk, HSG A |
|           | 431   | >75% Grass cover, Good, HSG A      |
|           | 5,770 | Weighted Average                   |
|           | 431   | 7.47% Pervious Area                |
|           | 5,339 | 92.53% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 32S: PR-26

Hydrograph



### Summary for Subcatchment 33S: PR-27

Runoff = 0.54 cfs @ 12.11 hrs, Volume= 0.042 af, Depth= 3.85"  
 Routed to Pond 44P : CMP Infiltration

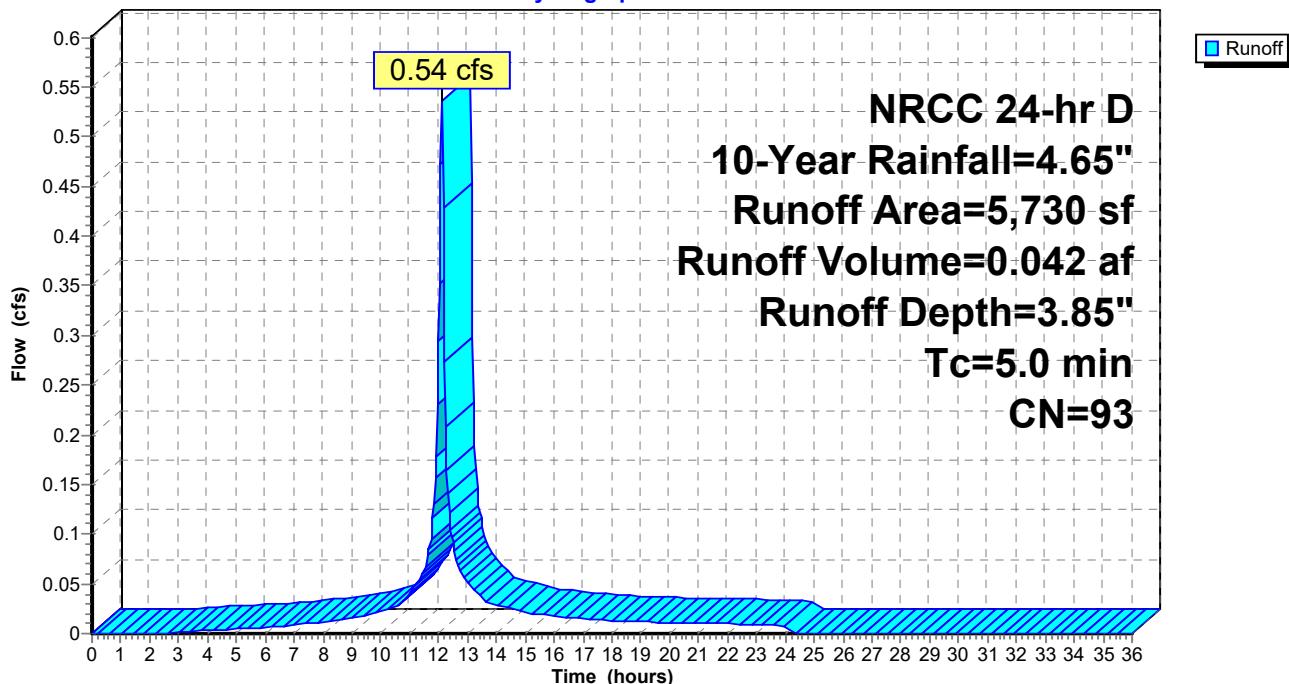
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,151 | 98 Paved parking, HSG A         |
| *         | 1,069 | Cement Concrete Sidewalk, HSG A |
| 510       | 39    | >75% Grass cover, Good, HSG A   |
| 5,730     | 93    | Weighted Average                |
| 510       |       | 8.90% Pervious Area             |
| 5,220     |       | 91.10% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 33S: PR-27

Hydrograph



### Summary for Subcatchment 34S: PR-28

Runoff = 0.15 cfs @ 12.23 hrs, Volume= 0.015 af, Depth= 1.78"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

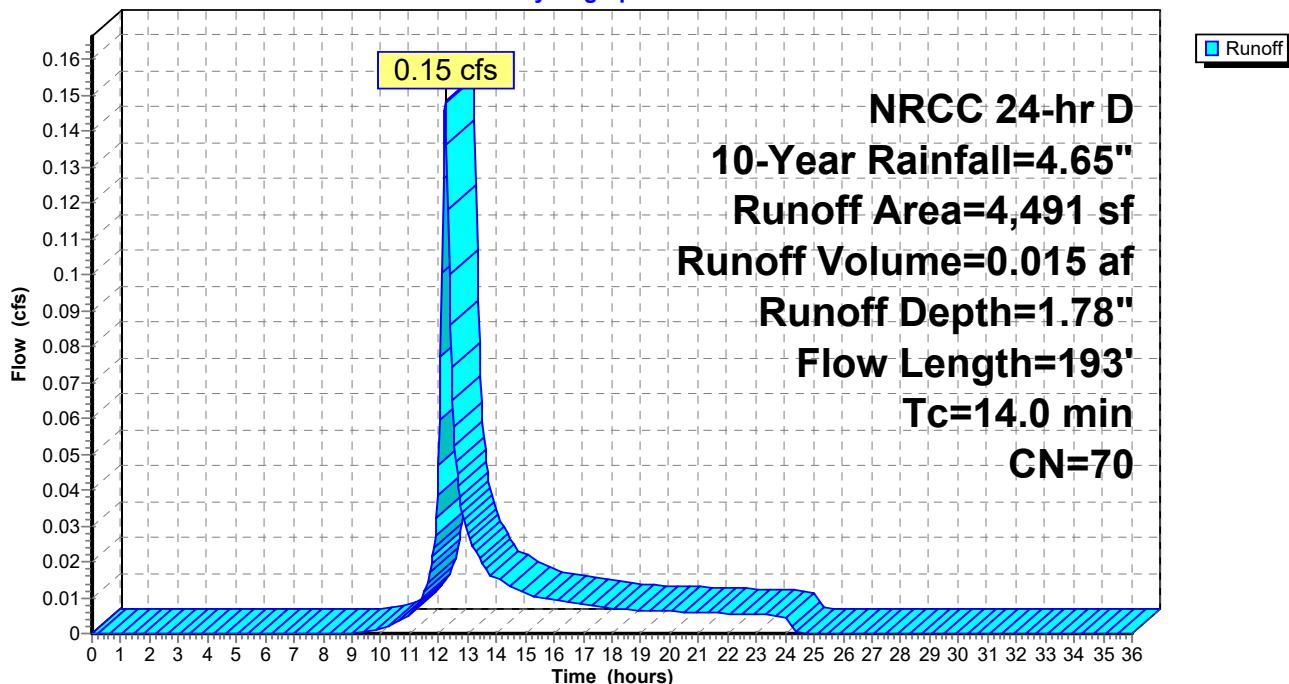
| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,588 | 98 Paved parking, HSG A            |
| *         | 456   | 98 Cement Concrete Sidewalk, HSG A |
| 1,899     | 39    | >75% Grass cover, Good, HSG A      |
| 548       | 74    | >75% Grass cover, Good, HSG C      |

|       |    |                        |
|-------|----|------------------------|
| 4,491 | 70 | Weighted Average       |
| 2,447 |    | 54.49% Pervious Area   |
| 2,044 |    | 45.51% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 13.0        | 81               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.4         | 19               | 0.0150           | 0.87                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.6         | 93               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 14.0        | 193              | Total            |                      |                   |                                                                   |

### Subcatchment 34S: PR-28

Hydrograph



### Summary for Subcatchment 35S: PR-29

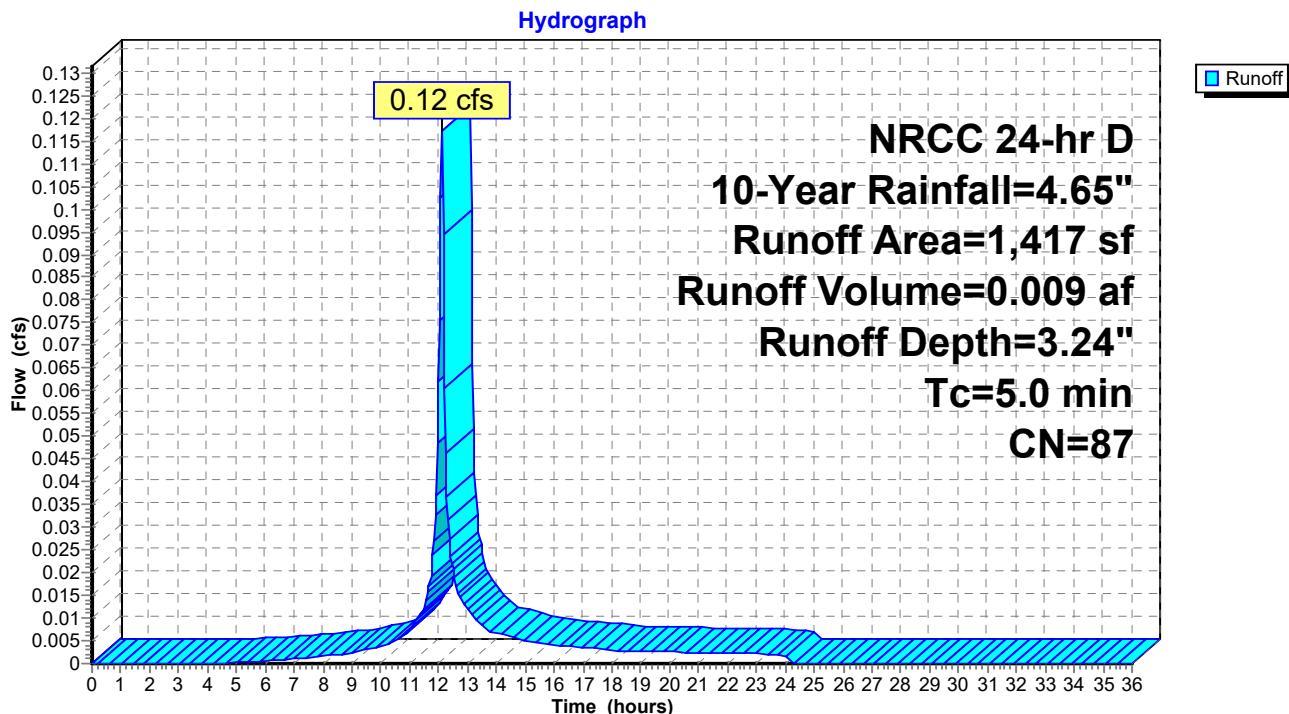
Runoff = 0.12 cfs @ 12.12 hrs, Volume= 0.009 af, Depth= 3.24"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,137 | 98 Paved parking, HSG A            |
| *         | 16    | 98 Cement Concrete Sidewalk, HSG A |
|           | 264   | >75% Grass cover, Good, HSG A      |
|           | 1,417 | Weighted Average                   |
|           | 264   | 18.63% Pervious Area               |
|           | 1,153 | 81.37% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 35S: PR-29



### Summary for Subcatchment 36S: PR-30

Runoff = 0.63 cfs @ 12.12 hrs, Volume= 0.047 af, Depth= 2.77"  
 Routed to Pond 44P : CMP Infiltration

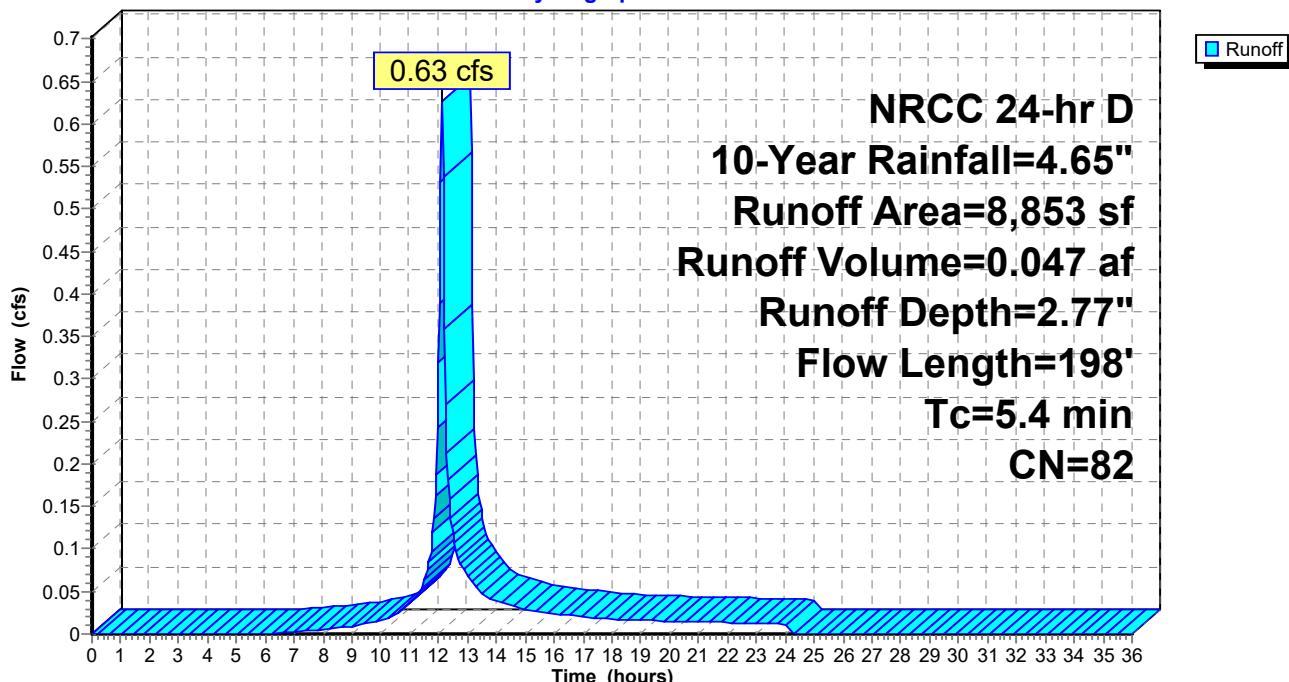
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 5,691   | 98 | Paved parking, HSG A            |
| * 826     | 98 | Cement Concrete Sidewalk, HSG A |
| 2,336     | 39 | >75% Grass cover, Good, HSG A   |
| 8,853     | 82 | Weighted Average                |
| 2,336     |    | 26.39% Pervious Area            |
| 6,517     |    | 73.61% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.5         | 16               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 84               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 98               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.4         | 198              | Total            |                      |                   |                                                                   |

### Subcatchment 36S: PR-30

Hydrograph



### Summary for Subcatchment 37S: PR-31

Runoff = 0.75 cfs @ 12.12 hrs, Volume= 0.056 af, Depth= 2.95"  
 Routed to Pond 44P : CMP Infiltration

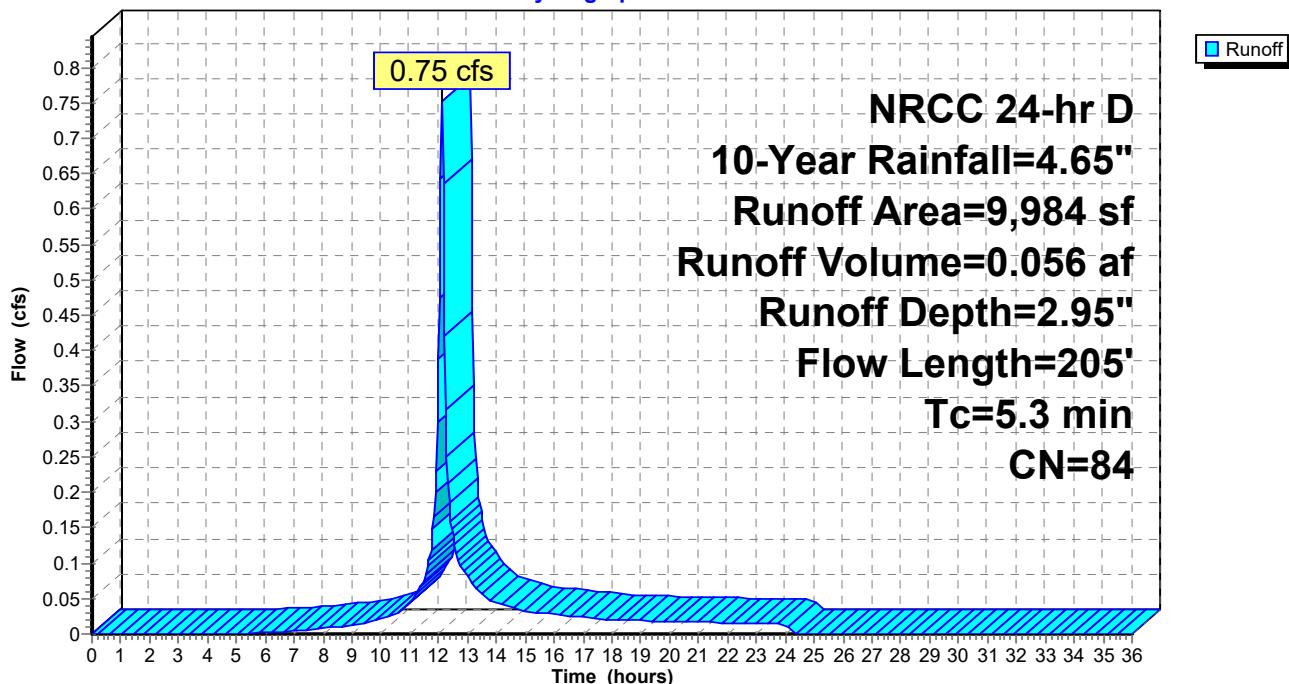
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 6,479 | 98 Paved parking, HSG A            |
| *         | 1,108 | 98 Cement Concrete Sidewalk, HSG A |
|           | 2,397 | >75% Grass cover, Good, HSG A      |
|           | 9,984 | Weighted Average                   |
|           | 2,397 | 24.01% Pervious Area               |
|           | 7,587 | 75.99% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.4         | 15               | 0.0500           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 85               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 105              | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.3         | 205              | Total            |                      |                   |                                                                   |

### Subcatchment 37S: PR-31

Hydrograph



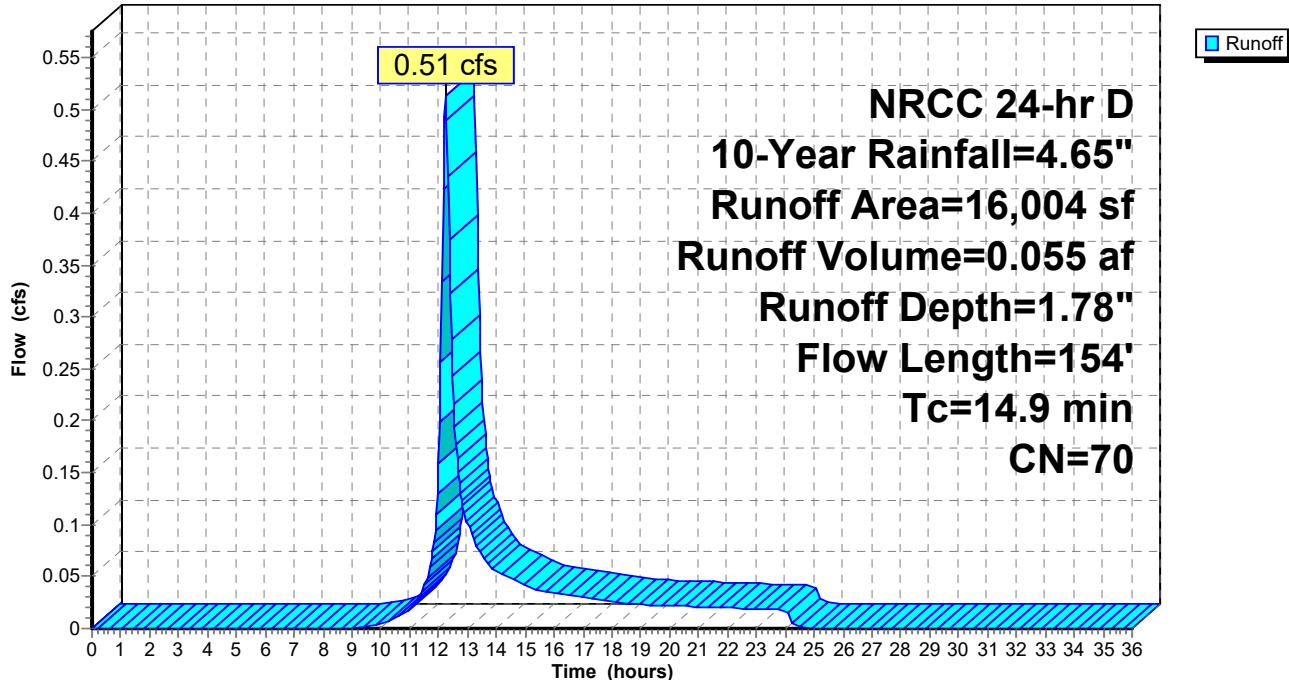
### Summary for Subcatchment 38S: PR-32

Runoff = 0.51 cfs @ 12.24 hrs, Volume= 0.055 af, Depth= 1.78"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN     | Description                        |
|-----------|--------|------------------------------------|
| *         | 6,711  | 98 Paved parking, HSG A            |
| *         | 1,813  | 98 Cement Concrete Sidewalk, HSG A |
|           | 7,480  | >75% Grass cover, Good, HSG A      |
|           | 16,004 | Weighted Average                   |
|           | 7,480  | 46.74% Pervious Area               |
|           | 8,524  | 53.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 14.4        | 92               | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 8                | 0.0200           | 0.82                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.2         | 34               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1         | 20               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 14.9        | 154              | Total            |                      |                   |                                                                          |

**Subcatchment 38S: PR-32****Hydrograph**

### Summary for Subcatchment 39S: PR-33

Runoff = 0.62 cfs @ 12.12 hrs, Volume= 0.046 af, Depth= 3.14"  
 Routed to Pond 44P : CMP Infiltration

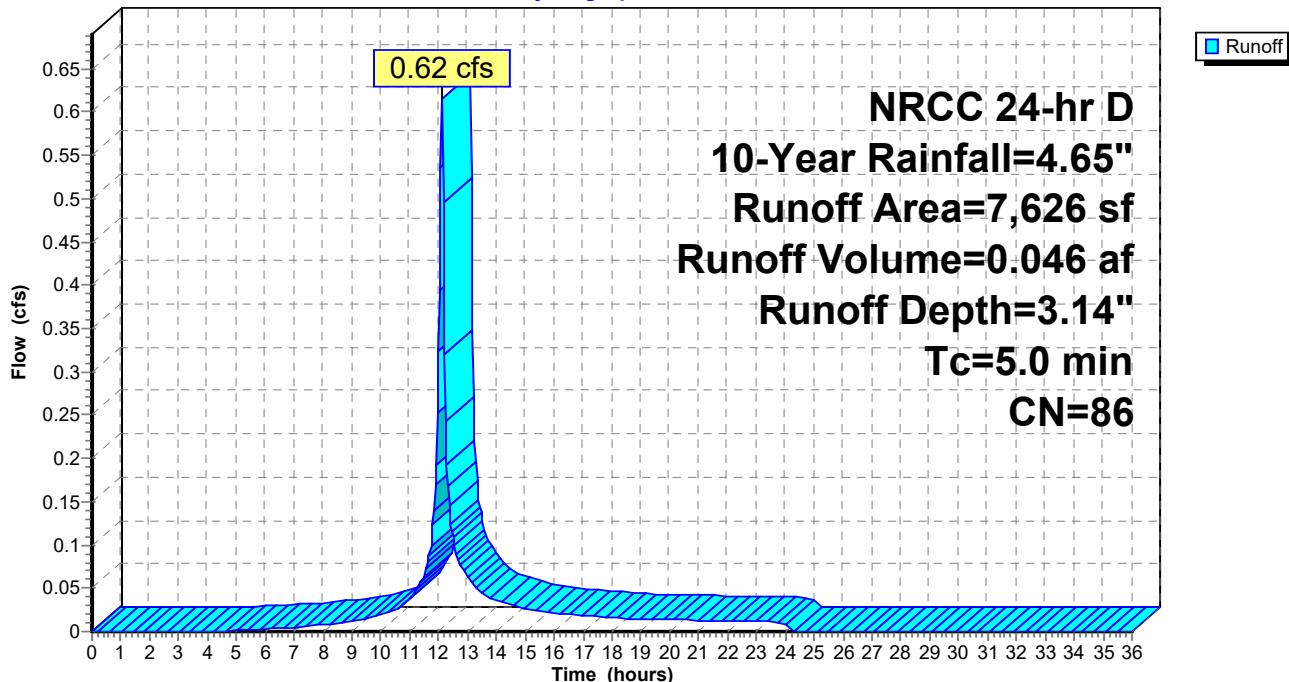
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,106     | 98 | Paved parking, HSG A            |
| 920       | 98 | Cement Concrete Sidewalk, HSG A |
| 1,600     | 39 | >75% Grass cover, Good, HSG A   |
| 7,626     | 86 | Weighted Average                |
| 1,600     |    | 20.98% Pervious Area            |
| 6,026     |    | 79.02% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 39S: PR-33

Hydrograph



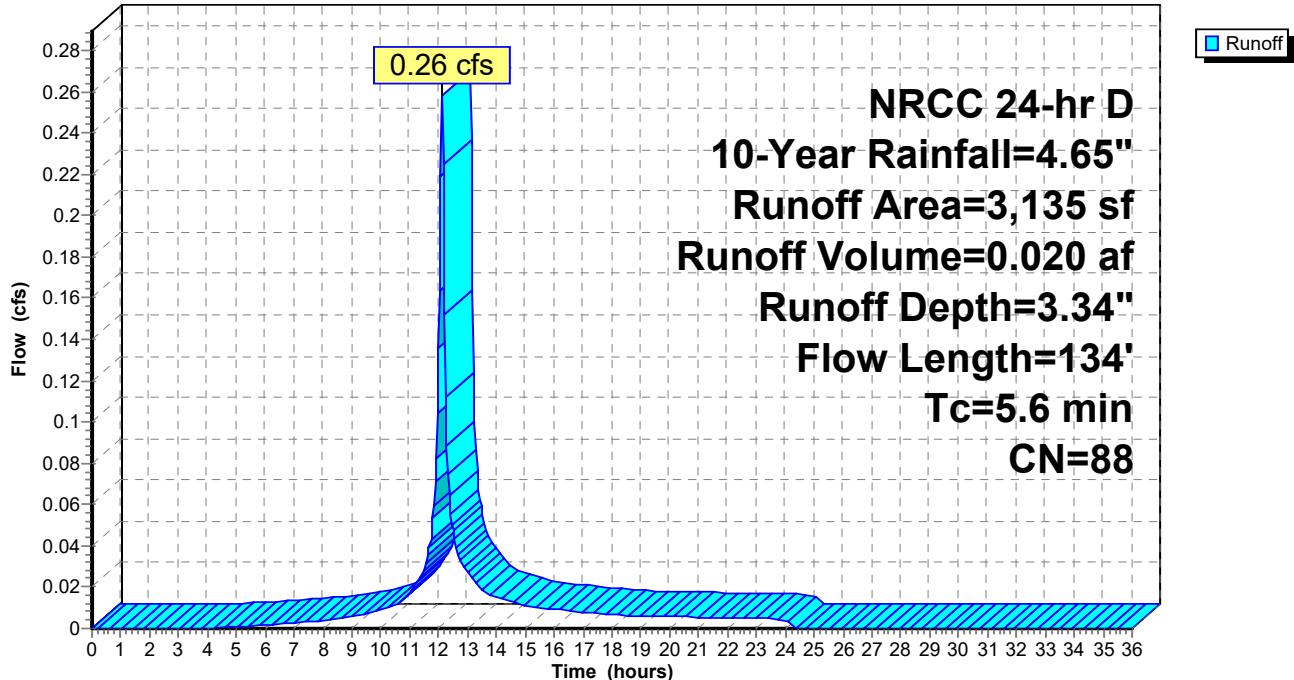
### Summary for Subcatchment 40S: PR-34

Runoff = 0.26 cfs @ 12.12 hrs, Volume= 0.020 af, Depth= 3.34"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 2,389 | 98 Paved parking, HSG A            |
| *         | 234   | 98 Cement Concrete Sidewalk, HSG A |
|           | 512   | >75% Grass cover, Good, HSG A      |
|           | 3,135 | Weighted Average                   |
|           | 512   | 16.33% Pervious Area               |
|           | 2,623 | 83.67% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 4.4         | 21               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 1.0         | 79               | 0.0200           | 1.30                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.0         | 7                | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.2         | 27               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 5.6         | 134              | Total            |                      |                   |                                                                          |

**Subcatchment 40S: PR-34****Hydrograph**

### Summary for Subcatchment 41S: PR-35

Runoff = 0.05 cfs @ 12.11 hrs, Volume= 0.004 af, Depth= 4.30"  
 Routed to Pond 44P : CMP Infiltration

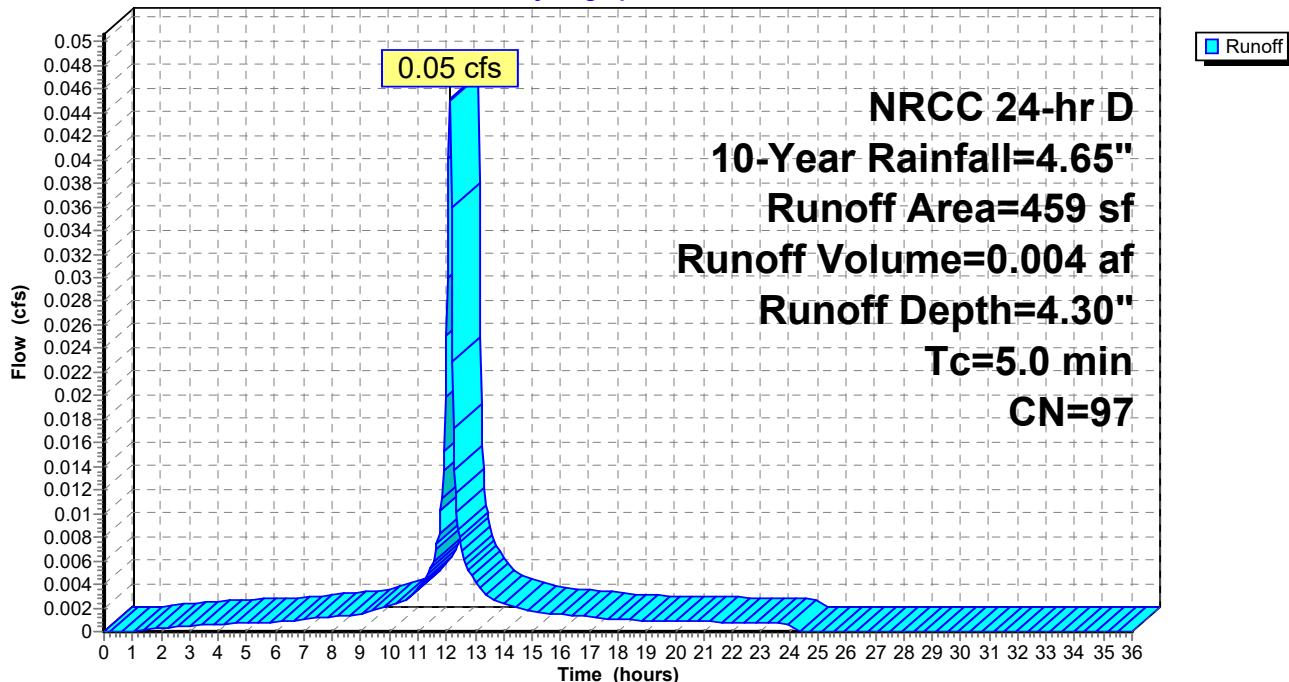
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN  | Description                        |
|-----------|-----|------------------------------------|
| *         | 366 | 98 Paved parking, HSG A            |
| *         | 86  | 98 Cement Concrete Sidewalk, HSG A |
|           | 7   | >75% Grass cover, Good, HSG A      |
|           | 459 | Weighted Average                   |
|           | 7   | 1.53% Pervious Area                |
|           | 452 | 98.47% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 41S: PR-35

Hydrograph



### Summary for Subcatchment 42S: PR-36

Runoff = 0.58 cfs @ 12.12 hrs, Volume= 0.045 af, Depth= 3.64"  
 Routed to Pond 44P : CMP Infiltration

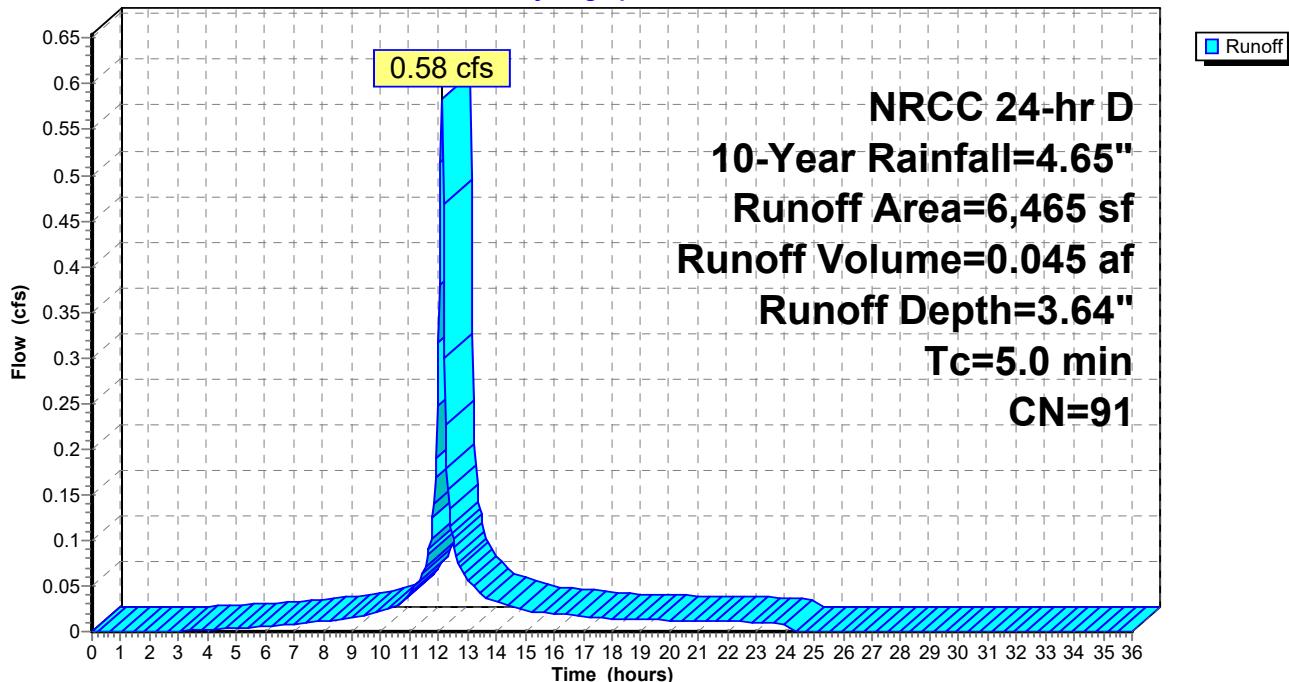
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,448 | 98 Paved parking, HSG A         |
| *         | 1,207 | Cement Concrete Sidewalk, HSG A |
| 810       | 39    | >75% Grass cover, Good, HSG A   |
| 6,465     | 91    | Weighted Average                |
| 810       |       | 12.53% Pervious Area            |
| 5,655     |       | 87.47% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 42S: PR-36

Hydrograph



### Summary for Subcatchment 43S: PR-37

Runoff = 0.65 cfs @ 12.11 hrs, Volume= 0.051 af, Depth= 3.75"  
 Routed to Pond 44P : CMP Infiltration

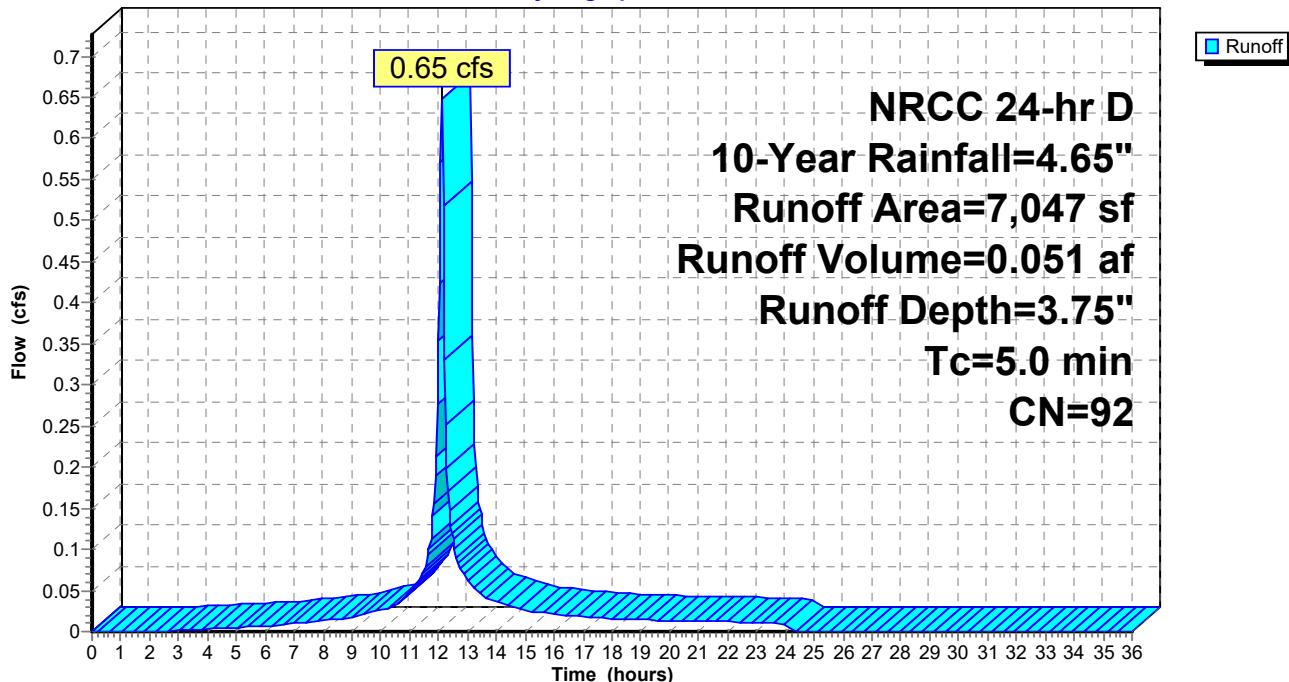
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 10-Year Rainfall=4.65"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 5,177   | 98 | Paved parking, HSG A            |
| * 1,177   | 98 | Cement Concrete Sidewalk, HSG A |
| 693       | 39 | >75% Grass cover, Good, HSG A   |
| 7,047     | 92 | Weighted Average                |
| 693       |    | 9.83% Pervious Area             |
| 6,354     |    | 90.17% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 43S: PR-37

Hydrograph



### Summary for Pond 44P: CMP Infiltration

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 3.15" for 10-Year event  
 Inflow = 19.07 cfs @ 12.12 hrs, Volume= 1.554 af  
 Outflow = 15.86 cfs @ 12.16 hrs, Volume= 1.554 af, Atten= 17%, Lag= 2.7 min  
 Discarded = 0.18 cfs @ 12.16 hrs, Volume= 0.258 af  
 Primary = 15.68 cfs @ 12.16 hrs, Volume= 1.296 af  
 Routed to Pond 45P : Rain Garden

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 269.14' @ 12.16 hrs Surf.Area= 0.055 ac Storage= 0.094 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 14.3 min ( 829.5 - 815.3 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                      |
|----------|---------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1C      | 266.50' | 0.081 af      | <b>17.00'W x 142.00'L x 7.00'H Field C</b><br>0.388 af Overall - 0.186 af Embedded = 0.202 af x 40.0% Voids                                                                                                                                              |
| #2C      | 267.00' | 0.186 af      | <b>CMP Round 72 x 12 Inside #1</b><br>Effective Size= 72.0"W x 72.0"H => 28.27 sf x 20.00'L = 565.5 cf<br>Overall Size= 72.0"W x 72.0"H x 20.00'L<br>Row Length Adjustment= +8.00' x 28.27 sf x 2 rows<br>15.00' Header x 28.27 sf x 2 = 848.2 cf Inside |
| 0.267 af |         |               | Total Available Storage                                                                                                                                                                                                                                  |

Storage Group C created with Chamber Wizard

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                       |
|--------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 267.00' | <b>21.0" Round Culvert</b><br>L= 169.0' RCP, rounded edge headwall, Ke= 0.100<br>Inlet / Outlet Invert= 267.00' / 265.31' S= 0.0100 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf |
| #2     | Discarded | 266.50' | <b>2.410 in/hr Exfiltration over Wetted area</b>                                                                                                                                                                     |

**Discarded OutFlow** Max=0.18 cfs @ 12.16 hrs HW=269.13' (Free Discharge)  
 ↗ 2=Exfiltration (Exfiltration Controls 0.18 cfs)

**Primary OutFlow** Max=15.63 cfs @ 12.16 hrs HW=269.13' TW=259.14' (Dynamic Tailwater)  
 ↗ 1=Culvert (Barrel Controls 15.63 cfs @ 6.78 fps)

**Pond 44P: CMP Infiltration - Chamber Wizard Field C****Chamber Model = CMP Round 72 (Round Corrugated Metal Pipe)**

Effective Size= 72.0"W x 72.0"H =&gt; 28.27 sf x 20.00'L = 565.5 cf

Overall Size= 72.0"W x 72.0"H x 20.00'L

Row Length Adjustment= +8.00' x 28.27 sf x 2 rows

72.0" Wide + 36.0" Spacing = 108.0" C-C Row Spacing

6 Chambers/Row x 20.00' Long +8.00' Row Adjustment +6.00' Header x 2 = 140.00' Row Length +12.0"

End Stone x 2 = 142.00' Base Length

2 Rows x 72.0" Wide + 36.0" Spacing x 1 + 12.0" Side Stone x 2 = 17.00' Base Width

6.0" Stone Base + 72.0" Chamber Height + 6.0" Stone Cover = 7.00' Field Height

12 Chambers x 565.5 cf +8.00' Row Adjustment x 28.27 sf x 2 Rows + 15.00' Header x 28.27 sf x 2 = 8,086.5 cf Chamber Storage

16,898.0 cf Field - 8,086.5 cf Chambers = 8,811.5 cf Stone x 40.0% Voids = 3,524.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,611.1 cf = 0.267 af

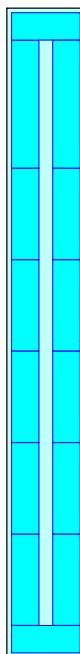
Overall Storage Efficiency = 68.7%

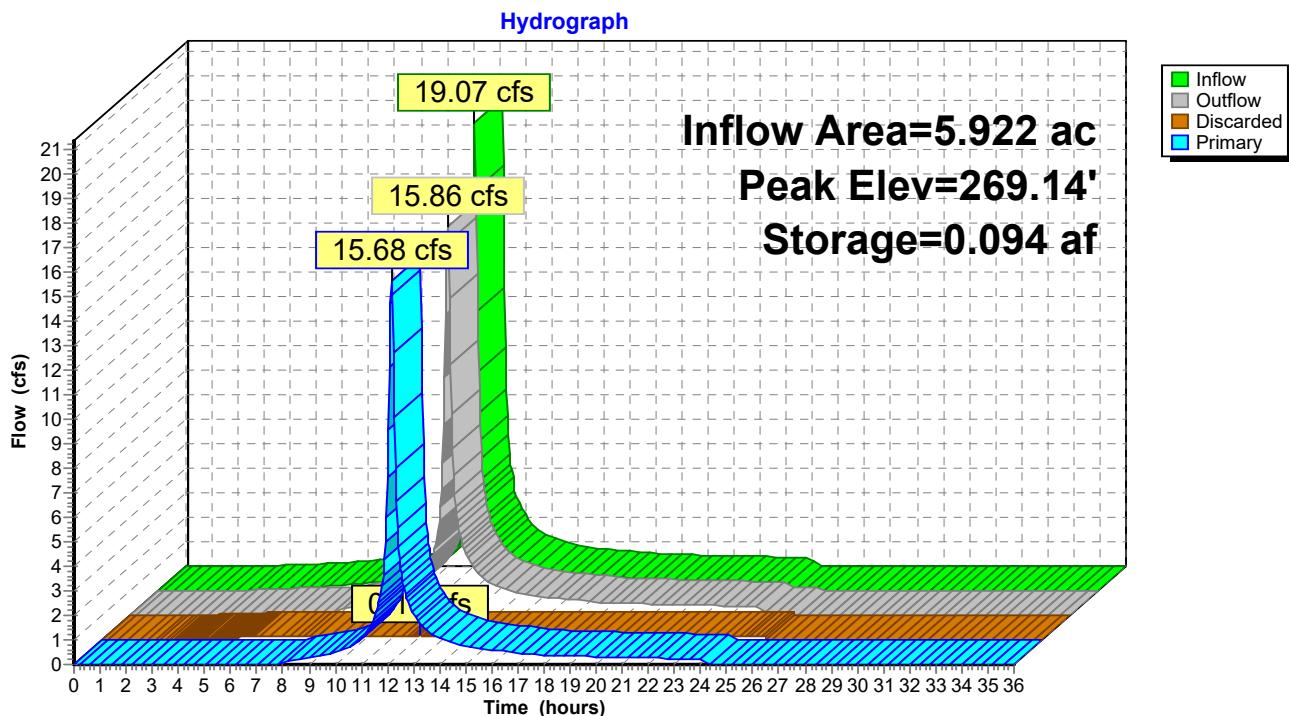
Overall System Size = 142.00' x 17.00' x 7.00'

12 Chambers

625.9 cy Field

326.4 cy Stone



**Pond 44P: CMP Infiltration**

**Stage-Area-Storage for Pond 44P: CMP Infiltration**

| Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) | Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) |
|---------------------|-------------------|------------------------|---------------------|-------------------|------------------------|
| 266.50              | 0.055             | 0.000                  | 271.80              | 0.094             | 0.213                  |
| 266.60              | 0.056             | 0.002                  | 271.90              | 0.095             | 0.217                  |
| 266.70              | 0.057             | 0.004                  | 272.00              | 0.096             | 0.221                  |
| 266.80              | 0.058             | 0.007                  | 272.10              | 0.096             | 0.225                  |
| 266.90              | 0.058             | 0.009                  | 272.20              | 0.097             | 0.229                  |
| 267.00              | 0.059             | 0.011                  | 272.30              | 0.098             | 0.233                  |
| 267.10              | 0.060             | 0.014                  | 272.40              | 0.098             | 0.236                  |
| 267.20              | 0.061             | 0.017                  | 272.50              | 0.099             | 0.240                  |
| 267.30              | 0.061             | 0.020                  | 272.60              | 0.100             | 0.243                  |
| 267.40              | 0.062             | 0.023                  | 272.70              | 0.101             | 0.247                  |
| 267.50              | 0.063             | 0.027                  | 272.80              | 0.101             | 0.250                  |
| 267.60              | 0.063             | 0.030                  | 272.90              | 0.102             | 0.253                  |
| 267.70              | 0.064             | 0.034                  | 273.00              | 0.103             | 0.255                  |
| 267.80              | 0.065             | 0.038                  | 273.10              | 0.104             | 0.258                  |
| 267.90              | 0.066             | 0.042                  | 273.20              | 0.104             | 0.260                  |
| 268.00              | 0.066             | 0.045                  | 273.30              | 0.105             | 0.262                  |
| 268.10              | 0.067             | 0.049                  | 273.40              | 0.106             | 0.264                  |
| 268.20              | 0.068             | 0.054                  | 273.50              | 0.107             | 0.267                  |
| 268.30              | 0.069             | 0.058                  |                     |                   |                        |
| 268.40              | 0.069             | 0.062                  |                     |                   |                        |
| 268.50              | 0.070             | 0.066                  |                     |                   |                        |
| 268.60              | 0.071             | 0.070                  |                     |                   |                        |
| 268.70              | 0.071             | 0.075                  |                     |                   |                        |
| 268.80              | 0.072             | 0.079                  |                     |                   |                        |
| 268.90              | 0.073             | 0.083                  |                     |                   |                        |
| 269.00              | 0.074             | 0.088                  |                     |                   |                        |
| 269.10              | 0.074             | 0.092                  |                     |                   |                        |
| 269.20              | 0.075             | 0.097                  |                     |                   |                        |
| 269.30              | 0.076             | 0.101                  |                     |                   |                        |
| 269.40              | 0.077             | 0.106                  |                     |                   |                        |
| 269.50              | 0.077             | 0.110                  |                     |                   |                        |
| 269.60              | 0.078             | 0.115                  |                     |                   |                        |
| 269.70              | 0.079             | 0.120                  |                     |                   |                        |
| 269.80              | 0.080             | 0.124                  |                     |                   |                        |
| 269.90              | 0.080             | 0.129                  |                     |                   |                        |
| 270.00              | 0.081             | 0.133                  |                     |                   |                        |
| 270.10              | 0.082             | 0.138                  |                     |                   |                        |
| 270.20              | 0.082             | 0.142                  |                     |                   |                        |
| 270.30              | 0.083             | 0.147                  |                     |                   |                        |
| 270.40              | 0.084             | 0.152                  |                     |                   |                        |
| 270.50              | 0.085             | 0.156                  |                     |                   |                        |
| 270.60              | 0.085             | 0.161                  |                     |                   |                        |
| 270.70              | 0.086             | 0.165                  |                     |                   |                        |
| 270.80              | 0.087             | 0.170                  |                     |                   |                        |
| 270.90              | 0.088             | 0.174                  |                     |                   |                        |
| 271.00              | 0.088             | 0.179                  |                     |                   |                        |
| 271.10              | 0.089             | 0.183                  |                     |                   |                        |
| 271.20              | 0.090             | 0.187                  |                     |                   |                        |
| 271.30              | 0.090             | 0.192                  |                     |                   |                        |
| 271.40              | 0.091             | 0.196                  |                     |                   |                        |
| 271.50              | 0.092             | 0.200                  |                     |                   |                        |
| 271.60              | 0.093             | 0.205                  |                     |                   |                        |
| 271.70              | 0.093             | 0.209                  |                     |                   |                        |

## Summary for Pond 45P: Rain Garden

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=95)

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 2.63" for 10-Year event  
 Inflow = 15.68 cfs @ 12.16 hrs, Volume= 1.296 af  
 Outflow = 9.81 cfs @ 12.29 hrs, Volume= 1.296 af, Atten= 37%, Lag= 7.6 min  
 Discarded = 3.47 cfs @ 12.29 hrs, Volume= 1.144 af  
 Primary = 6.34 cfs @ 12.29 hrs, Volume= 0.153 af  
 Routed to Link 15L : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 259.56' @ 12.29 hrs Surf.Area= 11,823 sf Storage= 12,681 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 26.8 min ( 844.4 - 817.5 )

| Volume    | Invert  | Avail.Storage | Storage Description                                                                           |
|-----------|---------|---------------|-----------------------------------------------------------------------------------------------|
| #1        | 255.50' | 6,443 cf      | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)<br>16,107 cf Overall x 40.0% Voids |
| #2        | 258.50' | 10,400 cf     | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)                                    |
| 16,843 cf |         |               | Total Available Storage                                                                       |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 255.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 258.50           | 5,369             | 313.0         | 16,107                 | 16,107                 | 6,308            |

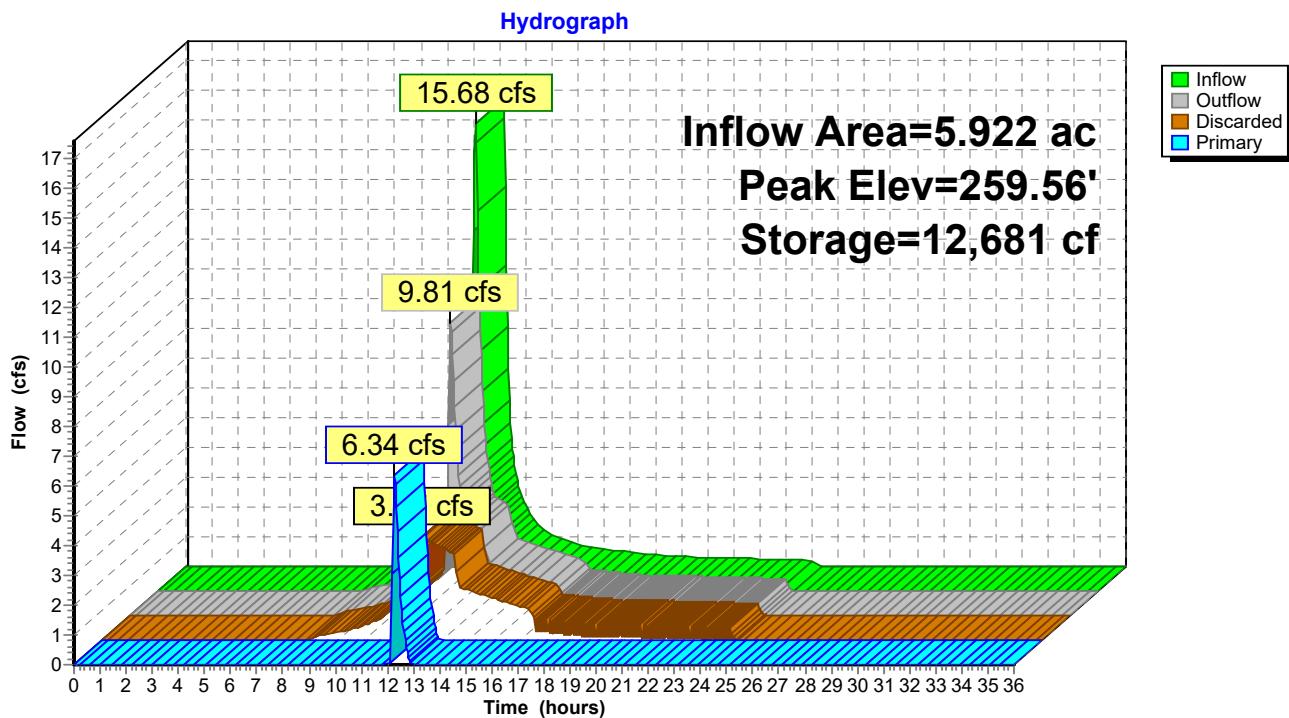
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 258.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 260.00           | 6,938             | 357.4         | 9,205                  | 9,205                  | 7,790            |
| 260.17           | 7,118             | 360.5         | 1,195                  | 10,400                 | 7,978            |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                    |
|--------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 253.71' | <b>24.0" Round Culvert</b><br>L= 32.0' CMP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 253.71' / 253.36' S= 0.0109 '/' Cc= 0.900<br>n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf |
| #2     | Discarded | 255.50' | <b>8.270 in/hr Exfiltration over Surface area</b><br>Conductivity to Groundwater Elevation = 251.50'                                                                                                              |
| #3     | Device 1  | 259.55' | <b>2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows</b> C= 0.600<br>Limited to weir flow at low heads                                                                                                     |
| #4     | Primary   | 259.05' | <b>6.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40<br>Coef. (English) 2.80 2.92                                                                                              |

**Discarded OutFlow** Max=3.47 cfs @ 12.29 hrs HW=259.55' (Free Discharge)  
 ↗ 2=Exfiltration (Controls 3.47 cfs)

**Primary OutFlow** Max=6.21 cfs @ 12.29 hrs HW=259.55' TW=0.00' (Dynamic Tailwater)  
 ↗ 1=Culvert (Passes 0.00 cfs of 26.28 cfs potential flow)  
 ↗ 3=Orifice/Grate (Weir Controls 0.00 cfs @ 0.10 fps)  
 ↗ 4=Broad-Crested Rectangular Weir (Weir Controls 6.21 cfs @ 2.07 fps)

### Pond 45P: Rain Garden



**Stage-Area-Storage for Pond 45P: Rain Garden**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|
| 255.50              | 5,369              | 0                       |
| 255.60              | 5,369              | 215                     |
| 255.70              | 5,369              | 430                     |
| 255.80              | 5,369              | 644                     |
| 255.90              | 5,369              | 859                     |
| 256.00              | 5,369              | 1,074                   |
| 256.10              | 5,369              | 1,289                   |
| 256.20              | 5,369              | 1,503                   |
| 256.30              | 5,369              | 1,718                   |
| 256.40              | 5,369              | 1,933                   |
| 256.50              | 5,369              | 2,148                   |
| 256.60              | 5,369              | 2,362                   |
| 256.70              | 5,369              | 2,577                   |
| 256.80              | 5,369              | 2,792                   |
| 256.90              | 5,369              | 3,007                   |
| 257.00              | 5,369              | 3,221                   |
| 257.10              | 5,369              | 3,436                   |
| 257.20              | 5,369              | 3,651                   |
| 257.30              | 5,369              | 3,866                   |
| 257.40              | 5,369              | 4,080                   |
| 257.50              | 5,369              | 4,295                   |
| 257.60              | 5,369              | 4,510                   |
| 257.70              | 5,369              | 4,725                   |
| 257.80              | 5,369              | 4,939                   |
| 257.90              | 5,369              | 5,154                   |
| 258.00              | 5,369              | 5,369                   |
| 258.10              | 5,369              | 5,584                   |
| 258.20              | 5,369              | 5,799                   |
| 258.30              | 5,369              | 6,013                   |
| 258.40              | 5,369              | 6,228                   |
| 258.50              | 10,738             | 6,443                   |
| 258.60              | 10,836             | 6,985                   |
| 258.70              | 10,936             | 7,536                   |
| 258.80              | 11,036             | 8,098                   |
| 258.90              | 11,137             | 8,670                   |
| 259.00              | 11,239             | 9,252                   |
| 259.10              | 11,341             | 9,844                   |
| 259.20              | 11,445             | 10,446                  |
| 259.30              | 11,550             | 11,059                  |
| 259.40              | 11,655             | 11,682                  |
| 259.50              | 11,762             | 12,316                  |
| 259.60              | 11,869             | 12,961                  |
| 259.70              | 11,977             | 13,616                  |
| 259.80              | 12,086             | 14,282                  |
| 259.90              | 12,196             | 14,960                  |
| 260.00              | 12,307             | 15,648                  |
| 260.10              | 12,413             | 16,347                  |

### Summary for Link 15L: DP-1

Inflow Area = 7.403 ac, 63.79% Impervious, Inflow Depth = 0.41" for 10-Year event

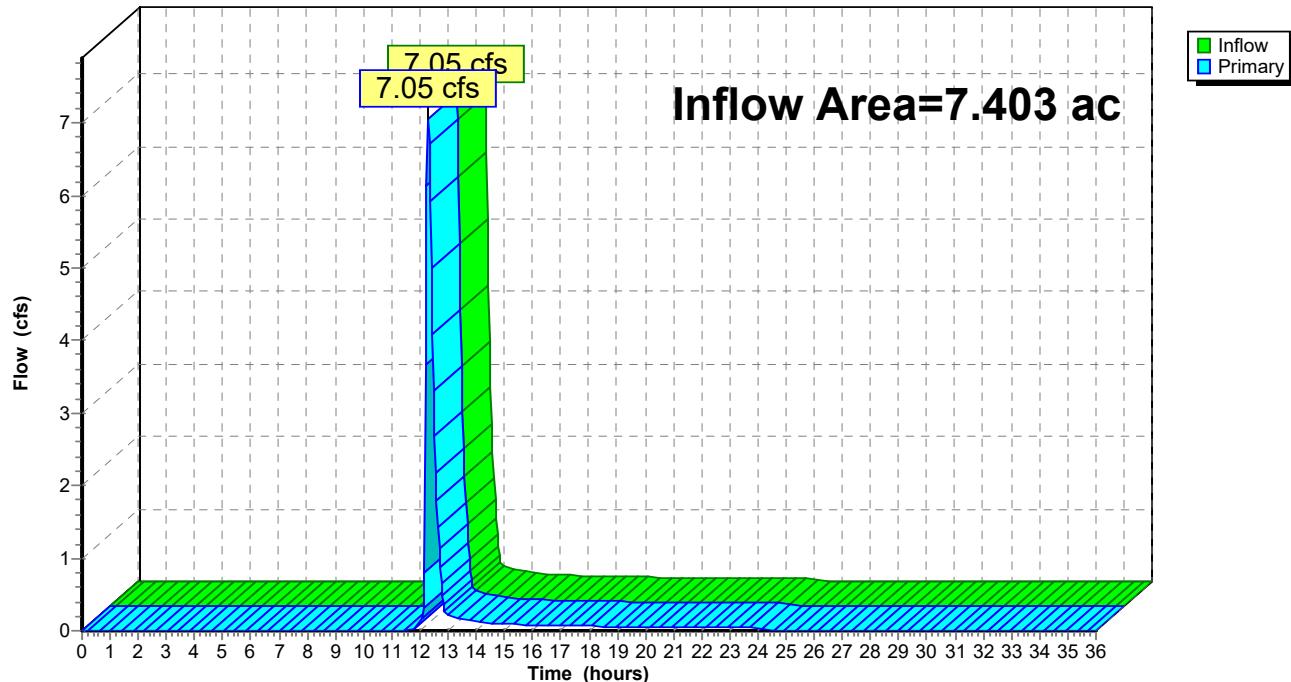
Inflow = 7.05 cfs @ 12.29 hrs, Volume= 0.253 af

Primary = 7.05 cfs @ 12.29 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 15L: DP-1

Hydrograph

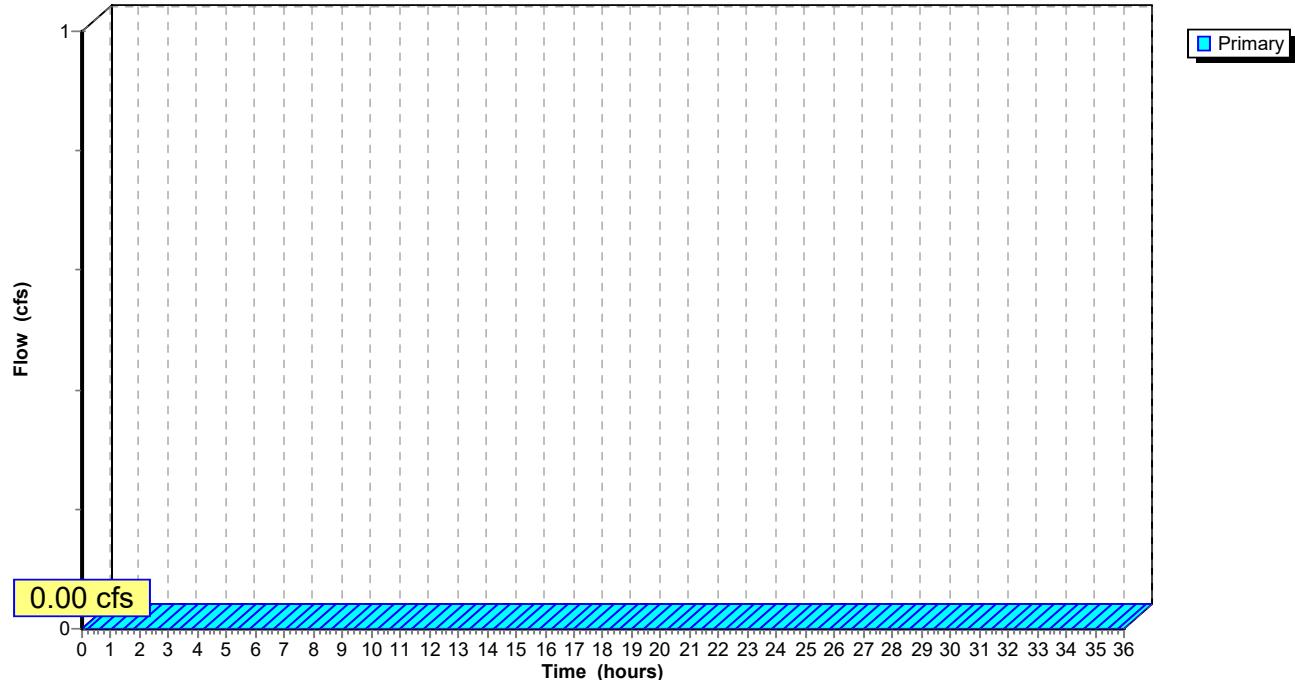


**Summary for Link 16L: DP-2**

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

**Link 16L: DP-2****Hydrograph**

### Summary for Link 17L: DP-3

Inflow Area = 0.094 ac, 0.00% Impervious, Inflow Depth = 2.42" for 10-Year event

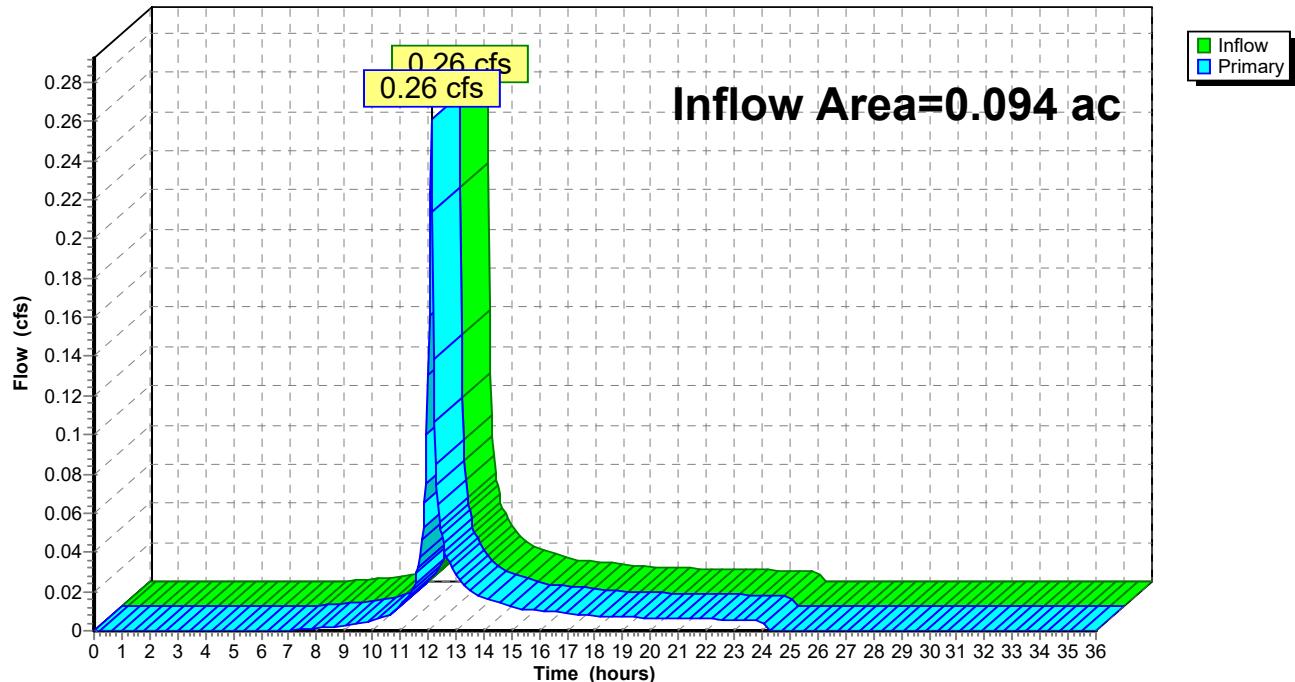
Inflow = 0.26 cfs @ 12.12 hrs, Volume= 0.019 af

Primary = 0.26 cfs @ 12.12 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 17L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points x 3  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1S: PR-1**

Runoff Area=64,521 sf 26.38% Impervious Runoff Depth=1.44"  
Flow Length=350' Tc=15.5 min CN=55 Runoff=1.50 cfs 0.178 af

**Subcatchment2S: PR-2**

Runoff Area=5,989 sf 81.43% Impervious Runoff Depth=5.17"  
Tc=5.0 min CN=94 Runoff=0.73 cfs 0.059 af

**Subcatchment3S: PR-3**

Runoff Area=8,817 sf 74.45% Impervious Runoff Depth=4.94"  
Tc=5.0 min CN=92 Runoff=1.05 cfs 0.083 af

**Subcatchment4S: PR-4**

Runoff Area=6,680 sf 84.81% Impervious Runoff Depth=4.94"  
Tc=5.0 min CN=92 Runoff=0.80 cfs 0.063 af

**Subcatchment5S: PR-5**

Runoff Area=7,314 sf 77.13% Impervious Runoff Depth=4.50"  
Tc=5.0 min CN=88 Runoff=0.82 cfs 0.063 af

**Subcatchment6S: PR-6**

Runoff Area=15,528 sf 55.11% Impervious Runoff Depth=2.89"  
Tc=5.0 min CN=72 Runoff=1.18 cfs 0.086 af

**Subcatchment7S: PR-7**

Runoff Area=8,803 sf 79.89% Impervious Runoff Depth=4.29"  
Tc=5.0 min CN=86 Runoff=0.95 cfs 0.072 af

**Subcatchment8S: PR-8**

Runoff Area=16,139 sf 53.26% Impervious Runoff Depth=3.97"  
Tc=5.0 min CN=83 Runoff=1.65 cfs 0.123 af

**Subcatchment9S: PR-9**

Runoff Area=7,180 sf 75.68% Impervious Runoff Depth=4.61"  
Flow Length=127' Tc=7.1 min CN=89 Runoff=0.75 cfs 0.063 af

**Subcatchment10S: PR-10**

Runoff Area=4,103 sf 0.00% Impervious Runoff Depth=3.46"  
Tc=5.0 min CN=78 Runoff=0.37 cfs 0.027 af

**Subcatchment11S: PR-11**

Runoff Area=12,349 sf 77.12% Impervious Runoff Depth=4.94"  
Flow Length=257' Tc=6.6 min CN=92 Runoff=1.38 cfs 0.117 af

**Subcatchment12S: PR-12**

Runoff Area=12,764 sf 71.19% Impervious Runoff Depth=4.83"  
Tc=5.0 min CN=91 Runoff=1.50 cfs 0.118 af

**Subcatchment13S: PR-13**

Runoff Area=7,593 sf 39.33% Impervious Runoff Depth=2.26"  
Flow Length=246' Tc=16.1 min CN=65 Runoff=0.30 cfs 0.033 af

**Subcatchment14S: PR-14**

Runoff Area=3,225 sf 82.26% Impervious Runoff Depth=4.61"  
Flow Length=166' Tc=7.3 min CN=89 Runoff=0.34 cfs 0.028 af

**Subcatchment15S: PR-15**

Runoff Area=2,717 sf 85.79% Impervious Runoff Depth=4.72"  
Tc=5.0 min CN=90 Runoff=0.32 cfs 0.025 af

**Subcatchment16S: PR-16**

Runoff Area=1,349 sf 100.00% Impervious Runoff Depth=5.63"  
Flow Length=247' Tc=16.1 min CN=98 Runoff=0.12 cfs 0.015 af

|                               |                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment23S: PR-17</b> | Runoff Area=14,295 sf 71.70% Impervious Runoff Depth=4.72"<br>Tc=5.0 min CN=90 Runoff=1.66 cfs 0.129 af                   |
| <b>Subcatchment24S: PR-18</b> | Runoff Area=9,416 sf 96.73% Impervious Runoff Depth=5.40"<br>Flow Length=189' Tc=7.1 min CN=96 Runoff=1.07 cfs 0.097 af   |
| <b>Subcatchment25S: PR-19</b> | Runoff Area=1,787 sf 75.15% Impervious Runoff Depth=3.97"<br>Tc=5.0 min CN=83 Runoff=0.18 cfs 0.014 af                    |
| <b>Subcatchment26S: PR-20</b> | Runoff Area=6,894 sf 87.28% Impervious Runoff Depth=4.72"<br>Tc=5.0 min CN=90 Runoff=0.80 cfs 0.062 af                    |
| <b>Subcatchment27S: PR-21</b> | Runoff Area=6,877 sf 87.79% Impervious Runoff Depth=4.83"<br>Tc=5.0 min CN=91 Runoff=0.81 cfs 0.064 af                    |
| <b>Subcatchment28S: PR-22</b> | Runoff Area=5,124 sf 73.32% Impervious Runoff Depth=4.07"<br>Tc=5.0 min CN=84 Runoff=0.53 cfs 0.040 af                    |
| <b>Subcatchment29S: PR-23</b> | Runoff Area=6,611 sf 79.08% Impervious Runoff Depth=4.50"<br>Tc=5.0 min CN=88 Runoff=0.74 cfs 0.057 af                    |
| <b>Subcatchment30S: PR-24</b> | Runoff Area=5,313 sf 80.16% Impervious Runoff Depth=4.50"<br>Tc=5.0 min CN=88 Runoff=0.60 cfs 0.046 af                    |
| <b>Subcatchment31S: PR-25</b> | Runoff Area=8,212 sf 59.72% Impervious Runoff Depth=3.66"<br>Flow Length=218' Tc=11.9 min CN=80 Runoff=0.61 cfs 0.058 af  |
| <b>Subcatchment32S: PR-26</b> | Runoff Area=5,770 sf 92.53% Impervious Runoff Depth=5.17"<br>Tc=5.0 min CN=94 Runoff=0.70 cfs 0.057 af                    |
| <b>Subcatchment33S: PR-27</b> | Runoff Area=5,730 sf 91.10% Impervious Runoff Depth=5.05"<br>Tc=5.0 min CN=93 Runoff=0.69 cfs 0.055 af                    |
| <b>Subcatchment34S: PR-28</b> | Runoff Area=4,491 sf 45.51% Impervious Runoff Depth=2.70"<br>Flow Length=193' Tc=14.0 min CN=70 Runoff=0.23 cfs 0.023 af  |
| <b>Subcatchment35S: PR-29</b> | Runoff Area=1,417 sf 81.37% Impervious Runoff Depth=4.39"<br>Tc=5.0 min CN=87 Runoff=0.16 cfs 0.012 af                    |
| <b>Subcatchment36S: PR-30</b> | Runoff Area=8,853 sf 73.61% Impervious Runoff Depth=3.87"<br>Flow Length=198' Tc=5.4 min CN=82 Runoff=0.87 cfs 0.066 af   |
| <b>Subcatchment37S: PR-31</b> | Runoff Area=9,984 sf 75.99% Impervious Runoff Depth=4.07"<br>Flow Length=205' Tc=5.3 min CN=84 Runoff=1.03 cfs 0.078 af   |
| <b>Subcatchment38S: PR-32</b> | Runoff Area=16,004 sf 53.26% Impervious Runoff Depth=2.70"<br>Flow Length=154' Tc=14.9 min CN=70 Runoff=0.79 cfs 0.083 af |
| <b>Subcatchment39S: PR-33</b> | Runoff Area=7,626 sf 79.02% Impervious Runoff Depth=4.29"<br>Tc=5.0 min CN=86 Runoff=0.83 cfs 0.063 af                    |
| <b>Subcatchment40S: PR-34</b> | Runoff Area=3,135 sf 83.67% Impervious Runoff Depth=4.50"<br>Flow Length=134' Tc=5.6 min CN=88 Runoff=0.34 cfs 0.027 af   |

**Subcatchment41S: PR-35** Runoff Area=459 sf 98.47% Impervious Runoff Depth=5.51"  
Tc=5.0 min CN=97 Runoff=0.06 cfs 0.005 af

**Subcatchment42S: PR-36** Runoff Area=6,465 sf 87.47% Impervious Runoff Depth=4.83"  
Tc=5.0 min CN=91 Runoff=0.76 cfs 0.060 af

**Subcatchment43S: PR-37** Runoff Area=7,047 sf 90.17% Impervious Runoff Depth=4.94"  
Tc=5.0 min CN=92 Runoff=0.84 cfs 0.067 af

**Pond 44P: CMP Infiltration** Peak Elev=270.18' Storage=0.142 af Inflow=25.47 cfs 2.108 af  
Discarded=0.20 cfs 0.273 af Primary=17.93 cfs 1.835 af Outflow=18.13 cfs 2.108 af

**Pond 45P: Rain Garden** Peak Elev=259.76' Storage=13,983 cf Inflow=17.93 cfs 1.835 af  
Discarded=3.60 cfs 1.462 af Primary=12.56 cfs 0.374 af Outflow=16.15 cfs 1.836 af

**Link 15L: DP-1** Inflow=14.04 cfs 0.552 af  
Primary=14.04 cfs 0.552 af

**Link 16L: DP-2** Primary=0.00 cfs 0.000 af

**Link 17L: DP-3** Inflow=0.37 cfs 0.027 af  
Primary=0.37 cfs 0.027 af

**Total Runoff Area = 7.497 ac Runoff Volume = 2.313 af Average Runoff Depth = 3.70"**  
**37.01% Pervious = 2.775 ac 62.99% Impervious = 4.723 ac**

### Summary for Subcatchment 1S: PR-1

Runoff = 1.50 cfs @ 12.26 hrs, Volume= 0.178 af, Depth= 1.44"  
 Routed to Link 15L : DP-1

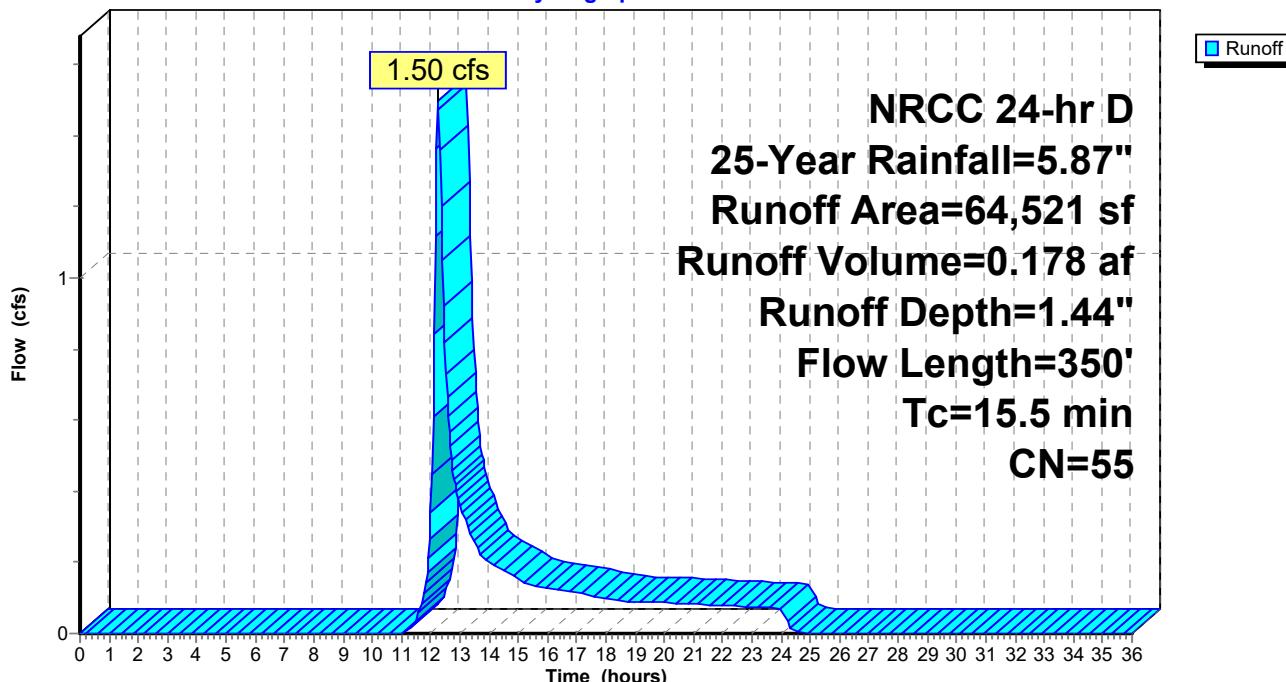
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 12,935    | 98 | Paved parking, HSG A            |
| 4,085     | 98 | Cement Concrete Sidewalk, HSG A |
| 46,449    | 39 | >75% Grass cover, Good, HSG A   |
| 1,052     | 74 | >75% Grass cover, Good, HSG C   |
| 64,521    | 55 | Weighted Average                |
| 47,501    |    | 73.62% Pervious Area            |
| 17,020    |    | 26.38% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                               |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------------------------------------------|
| 2.7         | 50               | 0.3333           | 0.31                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 10.8        | 60               | 0.0150           | 0.09                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 2.0         | 240              | 0.0150           | 1.97                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps |
| 15.5        | 350              |                  |                      |                   | Total                                                     |

### Subcatchment 1S: PR-1

Hydrograph



### Summary for Subcatchment 2S: PR-2

Runoff = 0.73 cfs @ 12.11 hrs, Volume= 0.059 af, Depth= 5.17"  
 Routed to Pond 44P : CMP Infiltration

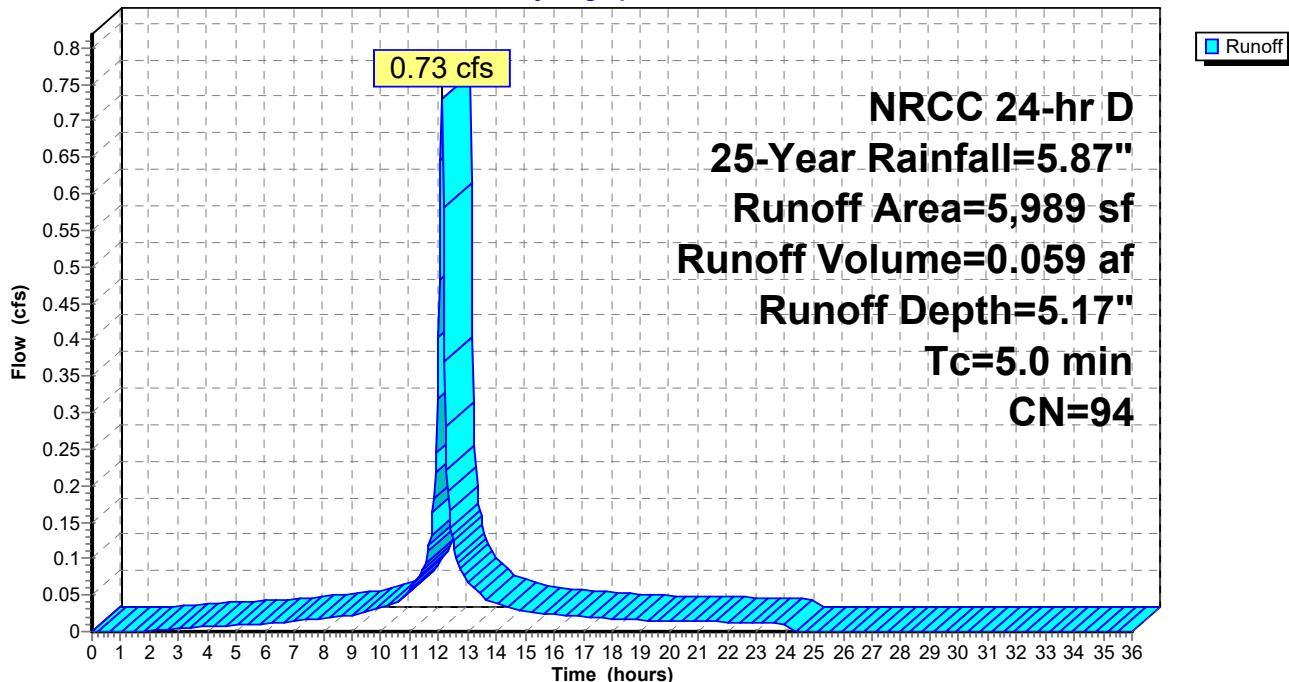
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,187 | 98 Paved parking, HSG C            |
| *         | 690   | 98 Cement Concrete Sidewalk, HSG C |
| 1,112     | 74    | >75% Grass cover, Good, HSG C      |
| 5,989     | 94    | Weighted Average                   |
| 1,112     |       | 18.57% Pervious Area               |
| 4,877     |       | 81.43% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 2S: PR-2

Hydrograph



### Summary for Subcatchment 3S: PR-3

Runoff = 1.05 cfs @ 12.11 hrs, Volume= 0.083 af, Depth= 4.94"  
 Routed to Pond 44P : CMP Infiltration

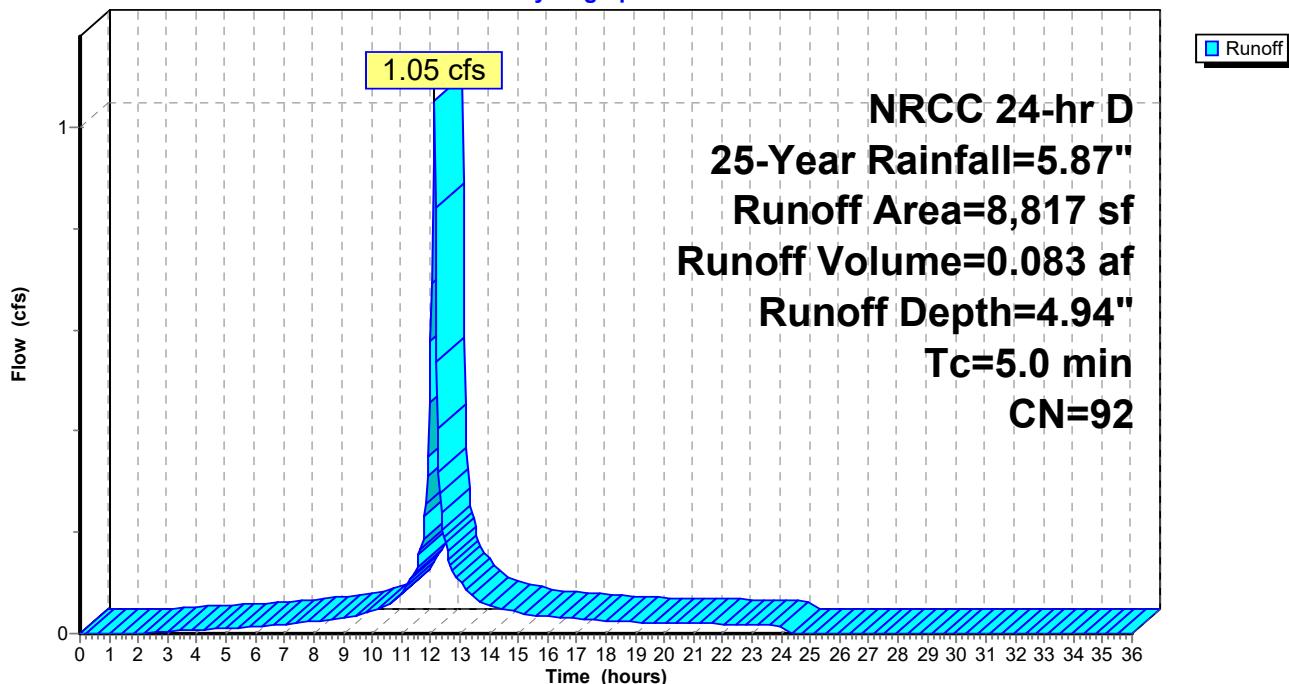
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,618     | 98 | Paved parking, HSG C            |
| 946       | 98 | Cement Concrete Sidewalk, HSG C |
| 2,253     | 74 | >75% Grass cover, Good, HSG C   |
| 8,817     | 92 | Weighted Average                |
| 2,253     |    | 25.55% Pervious Area            |
| 6,564     |    | 74.45% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 3S: PR-3

Hydrograph



### Summary for Subcatchment 4S: PR-4

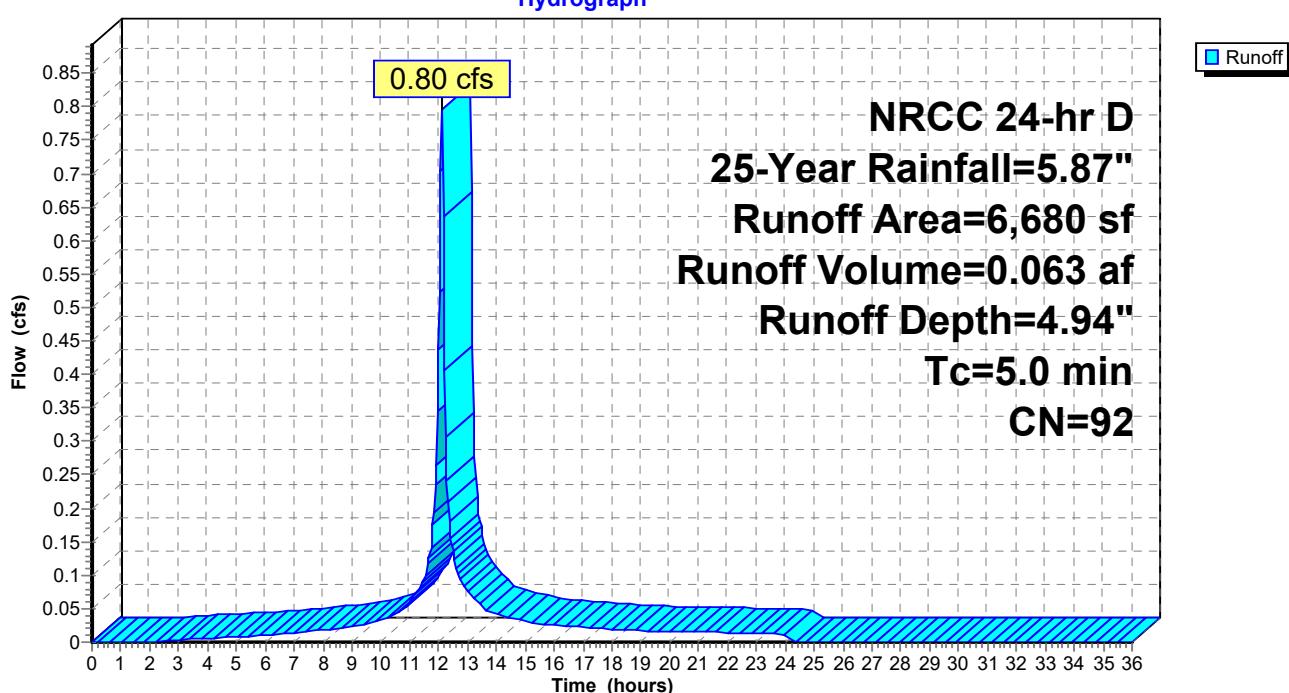
Runoff = 0.80 cfs @ 12.11 hrs, Volume= 0.063 af, Depth= 4.94"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf)            | CN                | Description                     |                      |
|----------------------|-------------------|---------------------------------|----------------------|
| 2,045                | 98                | Paved parking, HSG C            |                      |
| *                    | 2,781             | Paved parking, HSG A            |                      |
| *                    | 424               | Cement Concrete Sidewalk, HSG C |                      |
| *                    | 415               | Cement Concrete Sidewalk, HSG A |                      |
| 559                  | 74                | >75% Grass cover, Good, HSG C   |                      |
| 456                  | 39                | >75% Grass cover, Good, HSG A   |                      |
| 6,680                | 92                | Weighted Average                |                      |
| 1,015                |                   | 15.19% Pervious Area            |                      |
| 5,665                |                   | 84.81% Impervious Area          |                      |
|                      |                   |                                 |                      |
| Tc<br>(min)          | Length<br>(feet)  | Slope<br>(ft/ft)                |                      |
| Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                     |                      |
| 5.0                  |                   |                                 | Direct Entry, Direct |

### Subcatchment 4S: PR-4

Hydrograph



### Summary for Subcatchment 5S: PR-5

Runoff = 0.82 cfs @ 12.12 hrs, Volume= 0.063 af, Depth= 4.50"  
 Routed to Pond 44P : CMP Infiltration

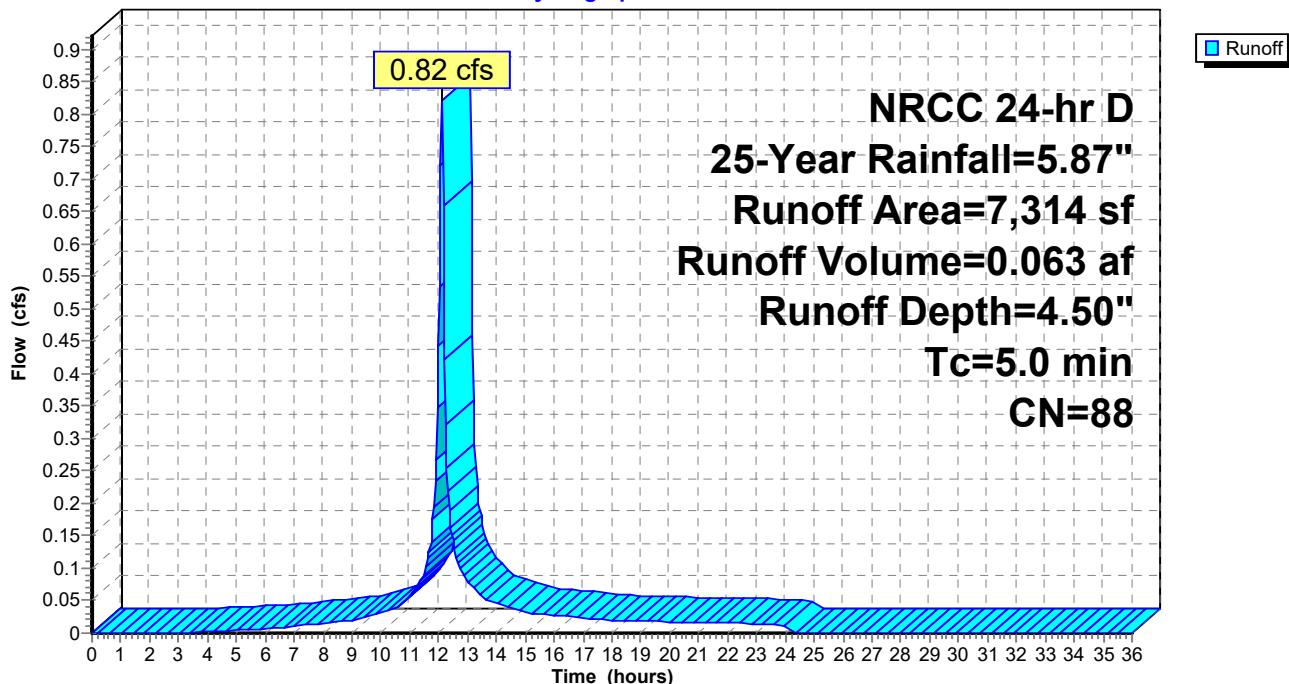
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,817 | 98 Paved parking, HSG A            |
| *         | 3,106 | 98 Paved parking, HSG C            |
| *         | 327   | 98 Cement Concrete Sidewalk, HSG C |
| *         | 391   | 98 Cement Concrete Sidewalk, HSG A |
|           | 725   | >75% Grass cover, Good, HSG C      |
|           | 948   | >75% Grass cover, Good, HSG A      |
| 7,314     | 88    | Weighted Average                   |
| 1,673     |       | 22.87% Pervious Area               |
| 5,641     |       | 77.13% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 5S: PR-5

Hydrograph



### Summary for Subcatchment 6S: PR-6

Runoff = 1.18 cfs @ 12.12 hrs, Volume= 0.086 af, Depth= 2.89"  
 Routed to Pond 44P : CMP Infiltration

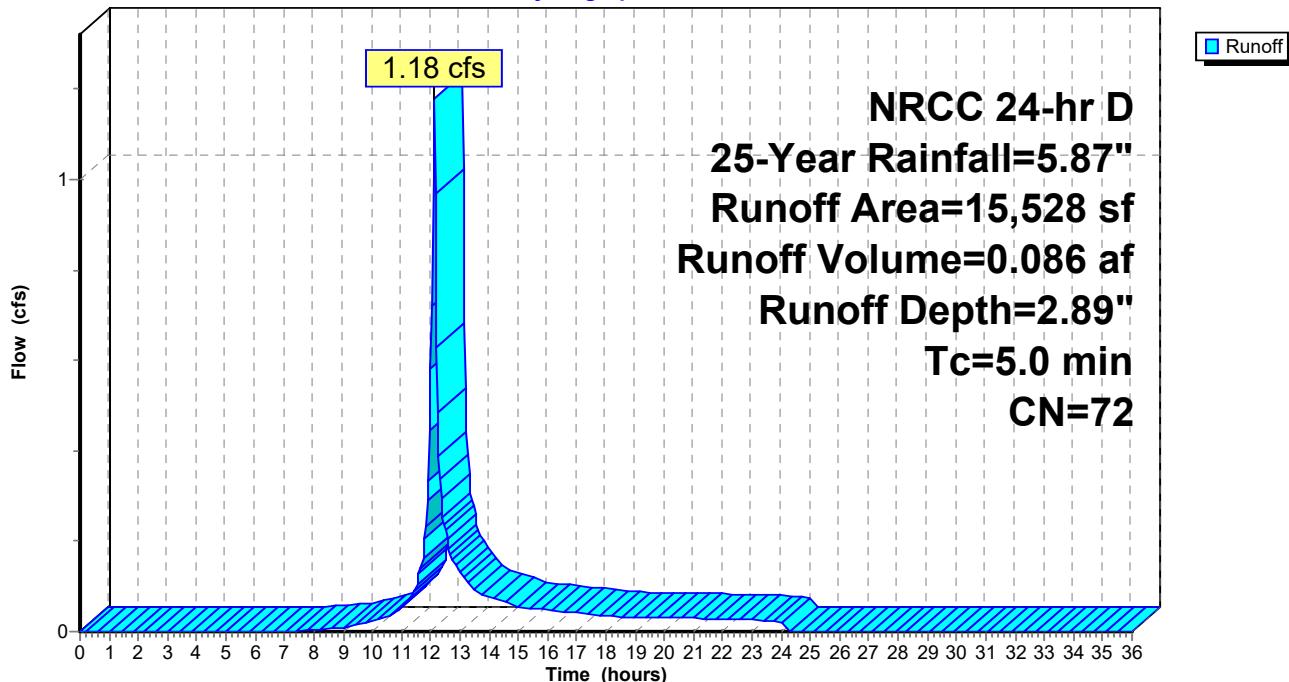
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,081 | 98 Paved parking, HSG A            |
| *         | 1,477 | 98 Cement Concrete Sidewalk, HSG A |
| 6,970     | 39    | >75% Grass cover, Good, HSG A      |
| 15,528    | 72    | Weighted Average                   |
| 6,970     |       | 44.89% Pervious Area               |
| 8,558     |       | 55.11% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 6S: PR-6

Hydrograph



### Summary for Subcatchment 7S: PR-7

Runoff = 0.95 cfs @ 12.12 hrs, Volume= 0.072 af, Depth= 4.29"  
 Routed to Pond 44P : CMP Infiltration

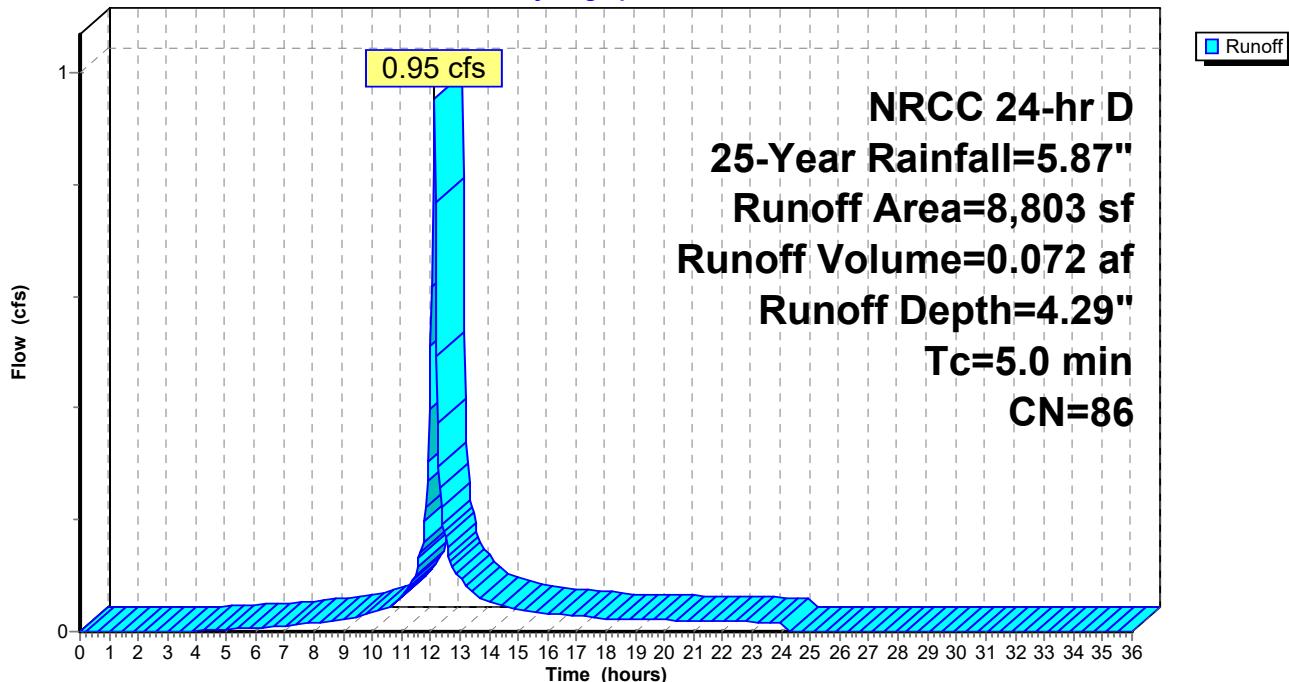
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,946 | 98 Paved parking, HSG A            |
| *         | 1,087 | 98 Cement Concrete Sidewalk, HSG A |
|           | 1,770 | >75% Grass cover, Good, HSG A      |
|           | 8,803 | Weighted Average                   |
|           | 1,770 | 20.11% Pervious Area               |
|           | 7,033 | 79.89% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 7S: PR-7

Hydrograph



### Summary for Subcatchment 8S: PR-8

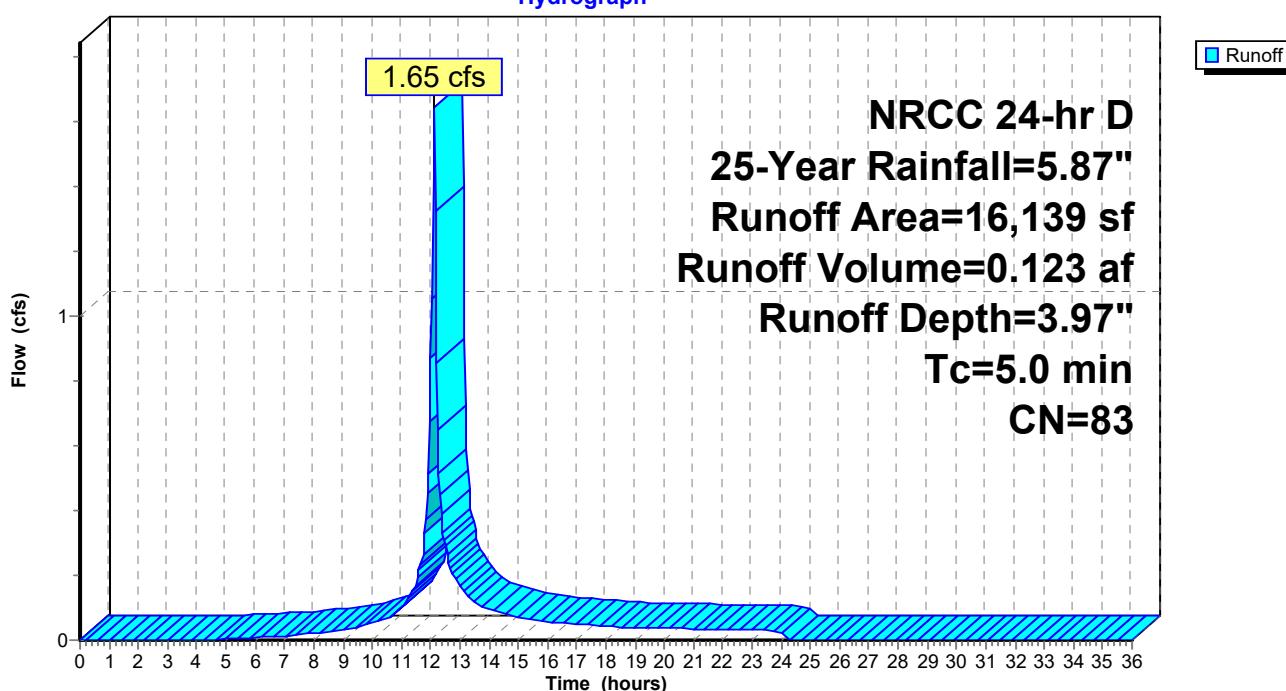
Runoff = 1.65 cfs @ 12.12 hrs, Volume= 0.123 af, Depth= 3.97"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 2,974         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 4,084         | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 1,148         | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
| *         | 390           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
|           | 1,872         | >75% Grass cover, Good, HSG A      |                   |                |                      |
|           | 5,671         | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 16,139    | 83            | Weighted Average                   |                   |                |                      |
| 7,543     |               | 46.74% Pervious Area               |                   |                |                      |
| 8,596     |               | 53.26% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 8S: PR-8

Hydrograph



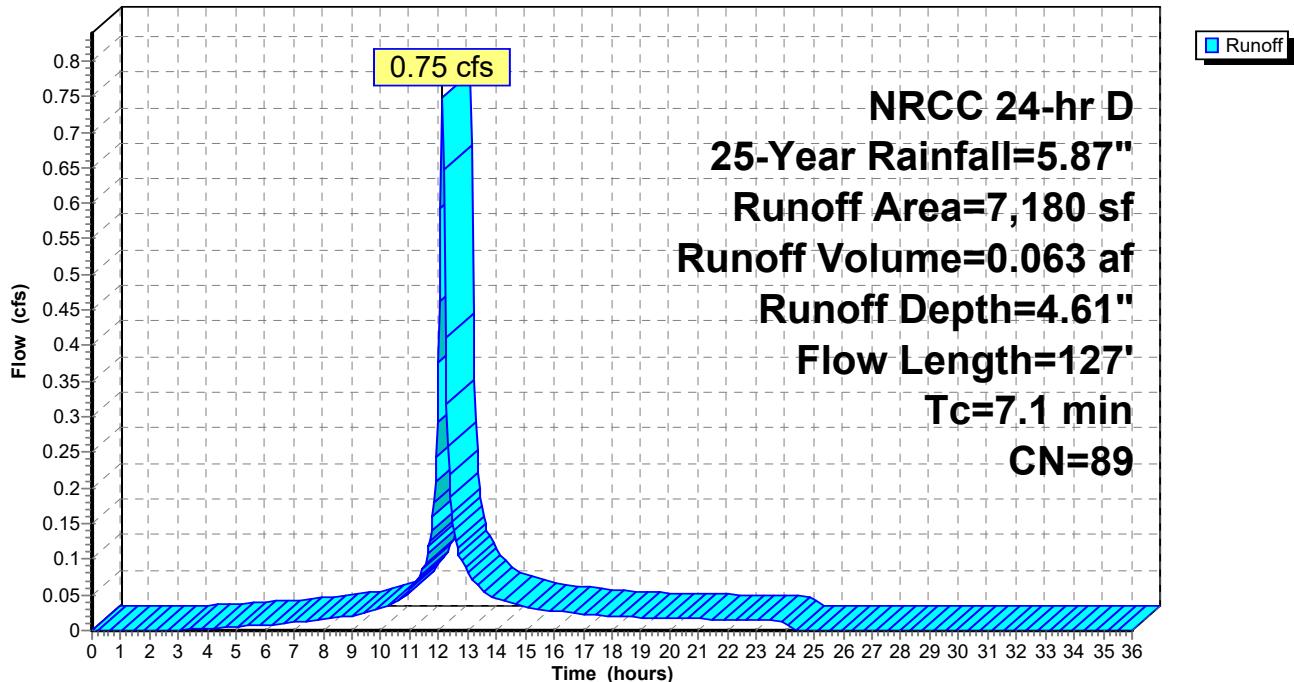
### Summary for Subcatchment 9S: PR-9

Runoff = 0.75 cfs @ 12.14 hrs, Volume= 0.063 af, Depth= 4.61"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 532   | 98 Paved parking, HSG A            |
| *         | 3,859 | 98 Paved parking, HSG C            |
| *         | 216   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 827   | 98 Cement Concrete Sidewalk, HSG C |
|           | 570   | >75% Grass cover, Good, HSG A      |
|           | 1,176 | >75% Grass cover, Good, HSG C      |
| 7,180     | 89    | Weighted Average                   |
| 1,746     |       | 24.32% Pervious Area               |
| 5,434     |       | 75.68% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.7         | 75               | 0.0050           | 0.74                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 27               | 0.0050           | 1.44                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 127              | Total            |                      |                   |                                                                   |

**Subcatchment 9S: PR-9****Hydrograph**

### Summary for Subcatchment 10S: PR-10

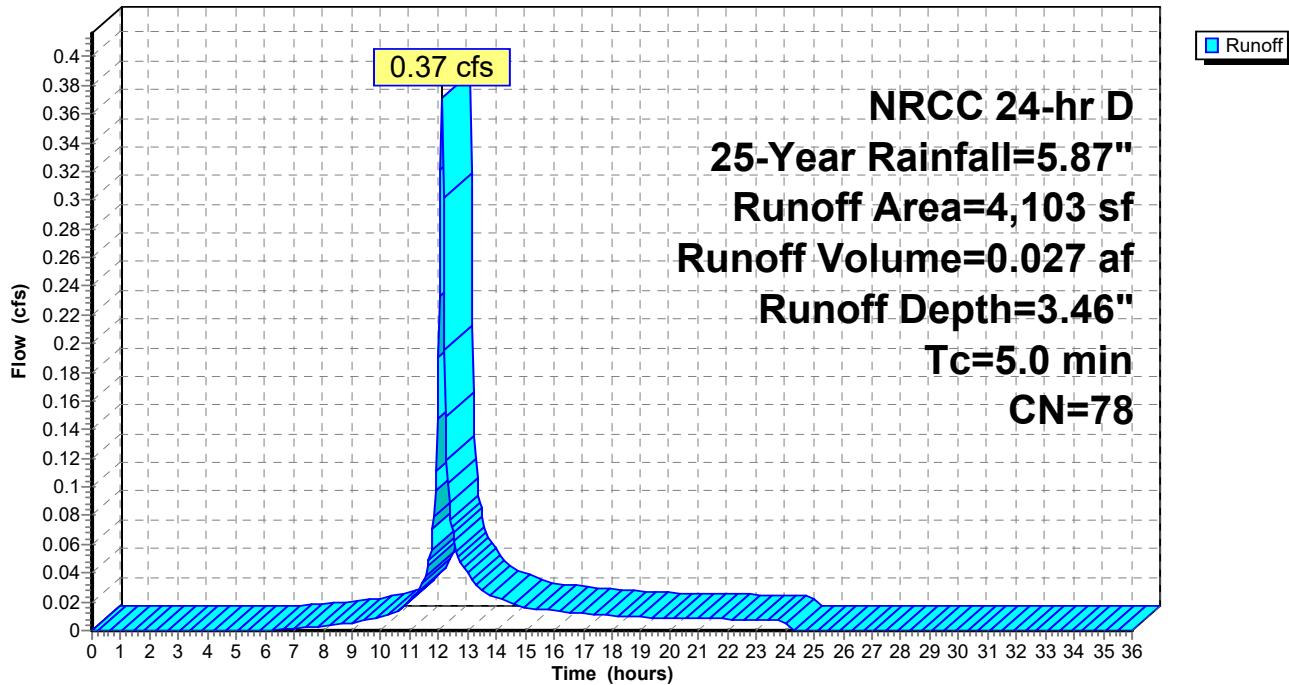
Runoff = 0.37 cfs @ 12.12 hrs, Volume= 0.027 af, Depth= 3.46"  
 Routed to Link 17L : DP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN            | Description                                                |  |                      |
|-----------|---------------|------------------------------------------------------------|--|----------------------|
| 1,584     | 74            | >75% Grass cover, Good, HSG C                              |  |                      |
| 2,519     | 80            | >75% Grass cover, Good, HSG D                              |  |                      |
| 4,103     | 78            | Weighted Average                                           |  |                      |
| 4,103     |               | 100.00% Pervious Area                                      |  |                      |
| Tc (min)  | Length (feet) | Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description |  |                      |
| 5.0       |               |                                                            |  | Direct Entry, DIRECT |

### Subcatchment 10S: PR-10

Hydrograph



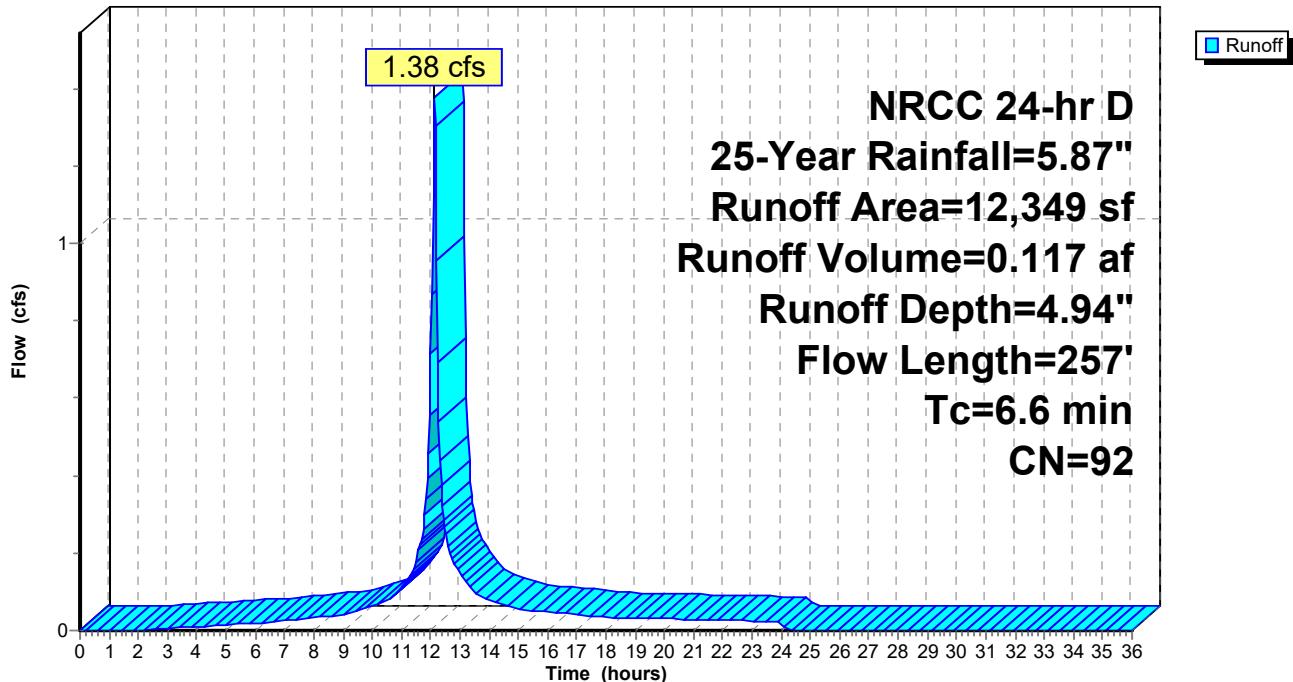
### Summary for Subcatchment 11S: PR-11

Runoff = 1.38 cfs @ 12.13 hrs, Volume= 0.117 af, Depth= 4.94"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,691 | 98 Paved parking, HSG C            |
| *         | 276   | 98 Paved parking, HSG A            |
| *         | 1,371 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 185   | 98 Cement Concrete Sidewalk, HSG A |
| 2,481     | 74    | >75% Grass cover, Good, HSG C      |
| 345       | 39    | >75% Grass cover, Good, HSG A      |
| 12,349    | 92    | Weighted Average                   |
| 2,826     |       | 22.88% Pervious Area               |
| 9,523     |       | 77.12% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.8         | 75               | 0.0350           | 1.61                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 157              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 6.6         | 257              | Total            |                      |                   |                                                                   |

**Subcatchment 11S: PR-11****Hydrograph**

### Summary for Subcatchment 12S: PR-12

Runoff = 1.50 cfs @ 12.11 hrs, Volume= 0.118 af, Depth= 4.83"  
 Routed to Pond 44P : CMP Infiltration

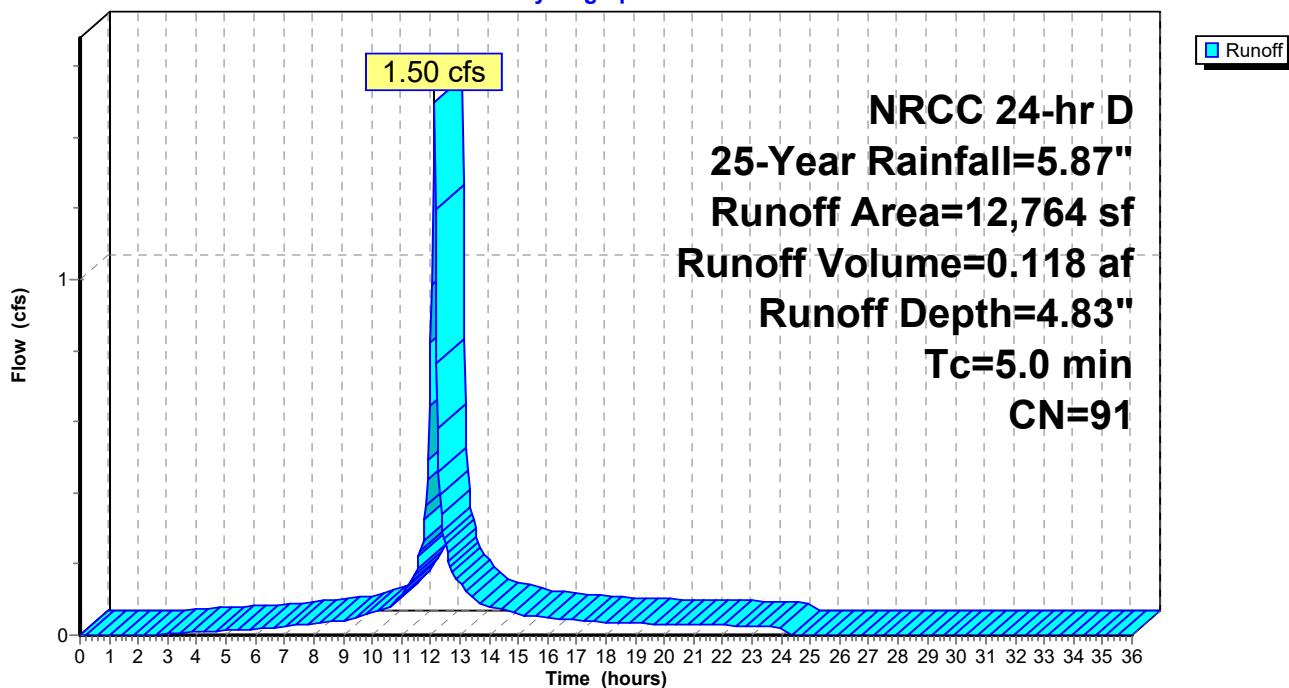
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,226 | 98 Paved parking, HSG C            |
| *         | 139   | 98 Paved parking, HSG A            |
| *         | 1,592 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 130   | 98 Cement Concrete Sidewalk, HSG A |
| 3,543     | 74    | >75% Grass cover, Good, HSG C      |
| 134       | 39    | >75% Grass cover, Good, HSG A      |
| 12,764    | 91    | Weighted Average                   |
| 3,677     |       | 28.81% Pervious Area               |
| 9,087     |       | 71.19% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 12S: PR-12

Hydrograph



### Summary for Subcatchment 18S: PR-13

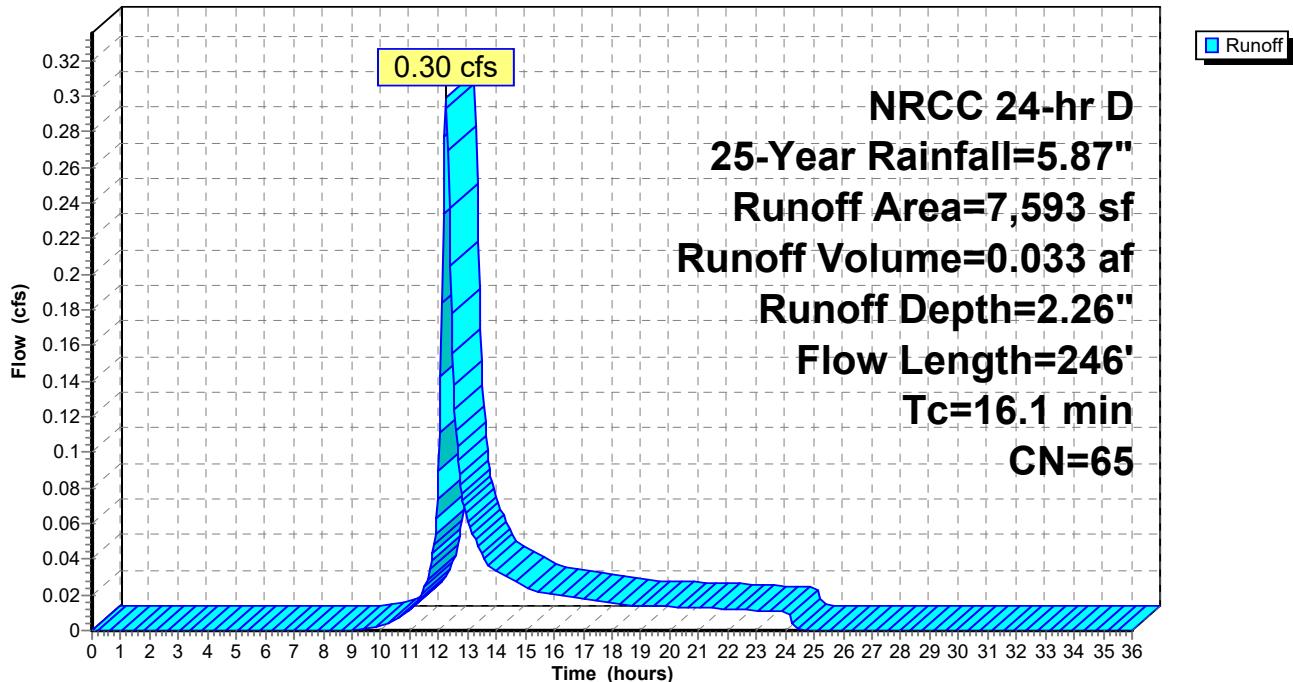
Runoff = 0.30 cfs @ 12.25 hrs, Volume= 0.033 af, Depth= 2.26"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| 131       | 98    | Paved parking, HSG C            |
| *         | 2,672 | Paved parking, HSG A            |
| *         | 183   | Cement Concrete Sidewalk, HSG C |
| 499       | 74    | >75% Grass cover, Good, HSG C   |
| 4,108     | 39    | >75% Grass cover, Good, HSG A   |

|       |    |                        |
|-------|----|------------------------|
| 7,593 | 65 | Weighted Average       |
| 4,607 |    | 60.67% Pervious Area   |
| 2,986 |    | 39.33% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 108              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 246              | Total            |                      |                   |                                                                          |

**Subcatchment 18S: PR-13****Hydrograph**

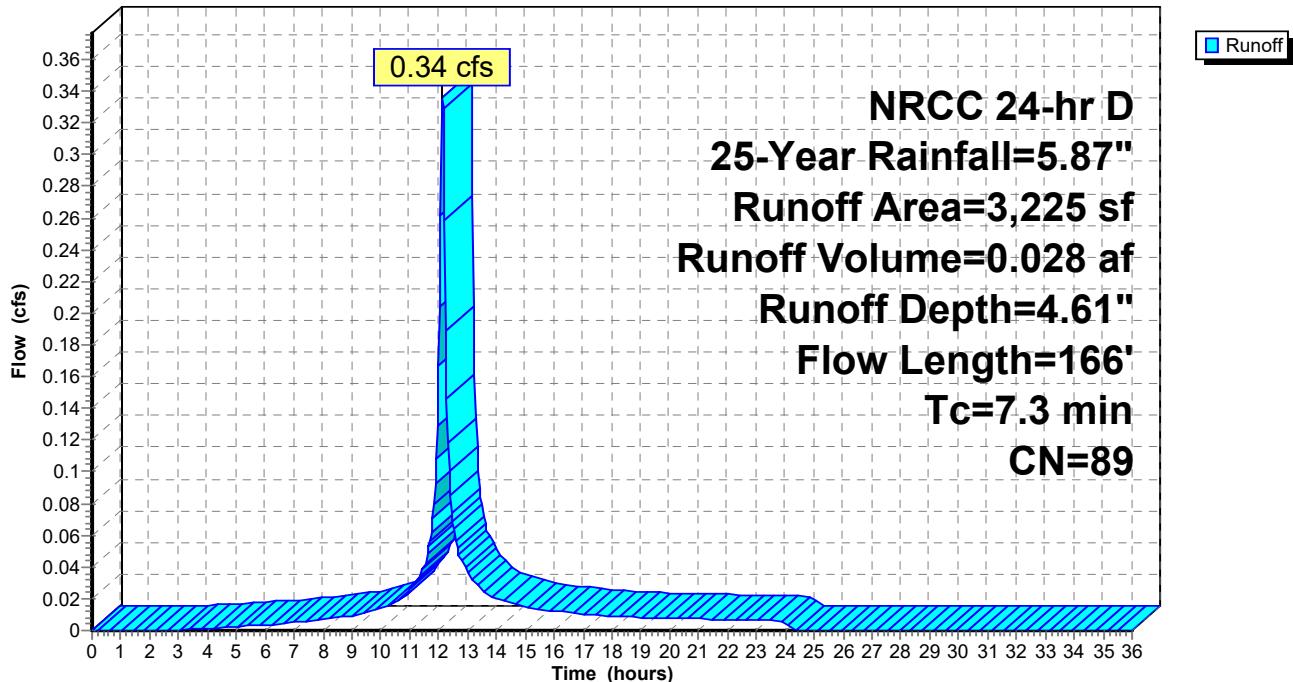
### Summary for Subcatchment 19S: PR-14

Runoff = 0.34 cfs @ 12.14 hrs, Volume= 0.028 af, Depth= 4.61"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 199   | 98 Paved parking, HSG C            |
| *         | 2,132 | 98 Paved parking, HSG A            |
| *         | 322   | 98 Cement Concrete Sidewalk, HSG A |
|           | 126   | >75% Grass cover, Good, HSG C      |
|           | 446   | >75% Grass cover, Good, HSG A      |
| 3,225     | 89    | Weighted Average                   |
| 572       |       | 17.74% Pervious Area               |
| 2,653     |       | 82.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 6.3         | 33               | 0.0500           | 0.09                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.7         | 67               | 0.0350           | 1.57                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 66               | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.3         | 166              | Total            |                      |                   |                                                                   |

**Subcatchment 19S: PR-14****Hydrograph**

## Summary for Subcatchment 20S: PR-15

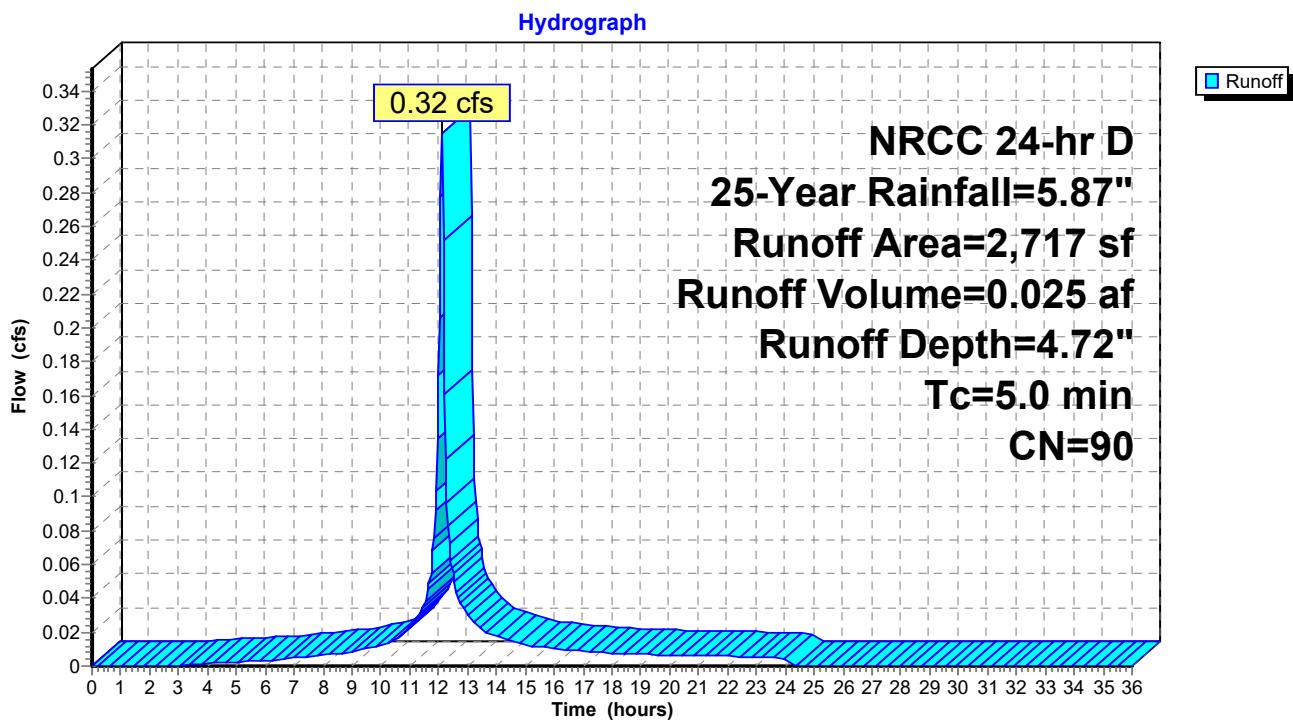
Runoff = 0.32 cfs @ 12.11 hrs, Volume= 0.025 af, Depth= 4.72"  
Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,331     | 98 | Paved parking, HSG A          |
| 386       | 39 | >75% Grass cover, Good, HSG A |
| 2,717     | 90 | Weighted Average              |
| 386       |    | 14.21% Pervious Area          |
| 2,331     |    | 85.79% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                 |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------------|
| 5.0         |                  |                  |                      |                   | <b>Direct Entry, Direct</b> |

## Subcatchment 20S: PR-15



### Summary for Subcatchment 22S: PR-16

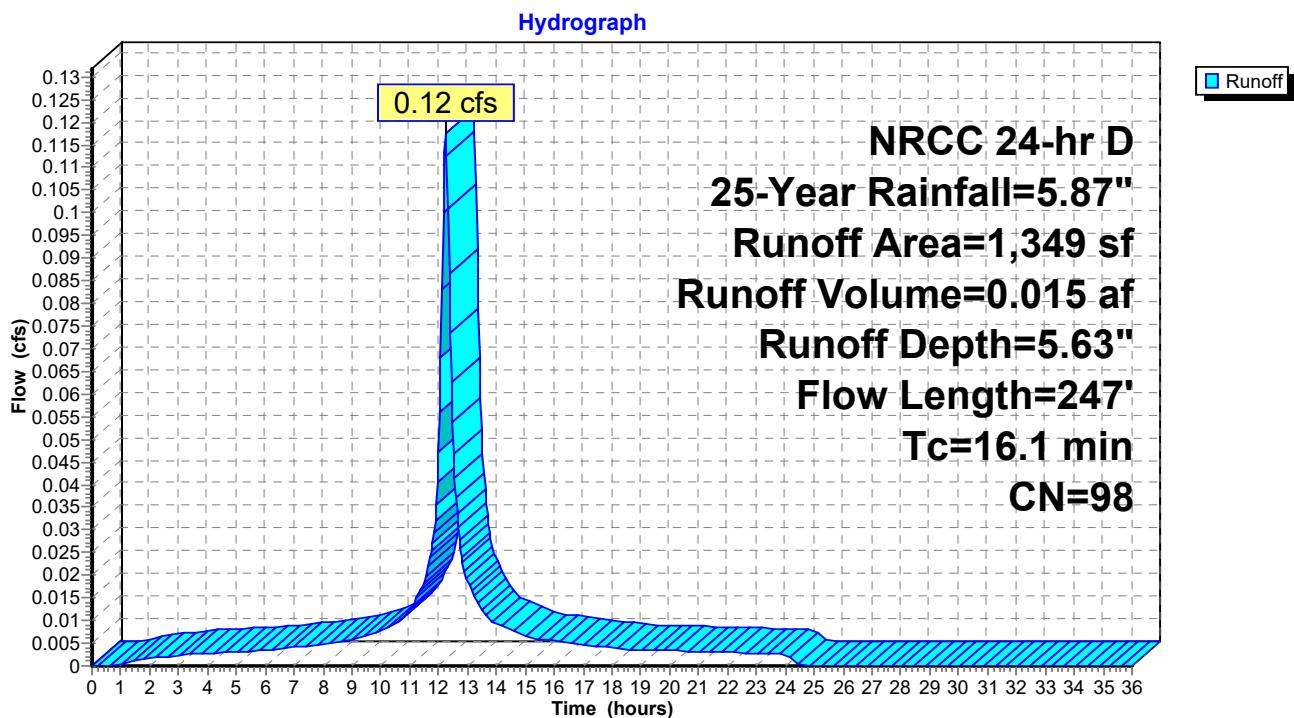
Runoff = 0.12 cfs @ 12.24 hrs, Volume= 0.015 af, Depth= 5.63"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN  | Description             |
|-----------|-----|-------------------------|
| *         | 614 | 98 Paved parking, HSG A |
| *         | 735 | 98 Paved parking, HSG C |
| 1,349     | 98  | Weighted Average        |
| 1,349     |     | 100.00% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 109              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 247              | Total            |                      |                   |                                                                          |

### Subcatchment 22S: PR-16



### Summary for Subcatchment 23S: PR-17

Runoff = 1.66 cfs @ 12.11 hrs, Volume= 0.129 af, Depth= 4.72"  
 Routed to Pond 44P : CMP Infiltration

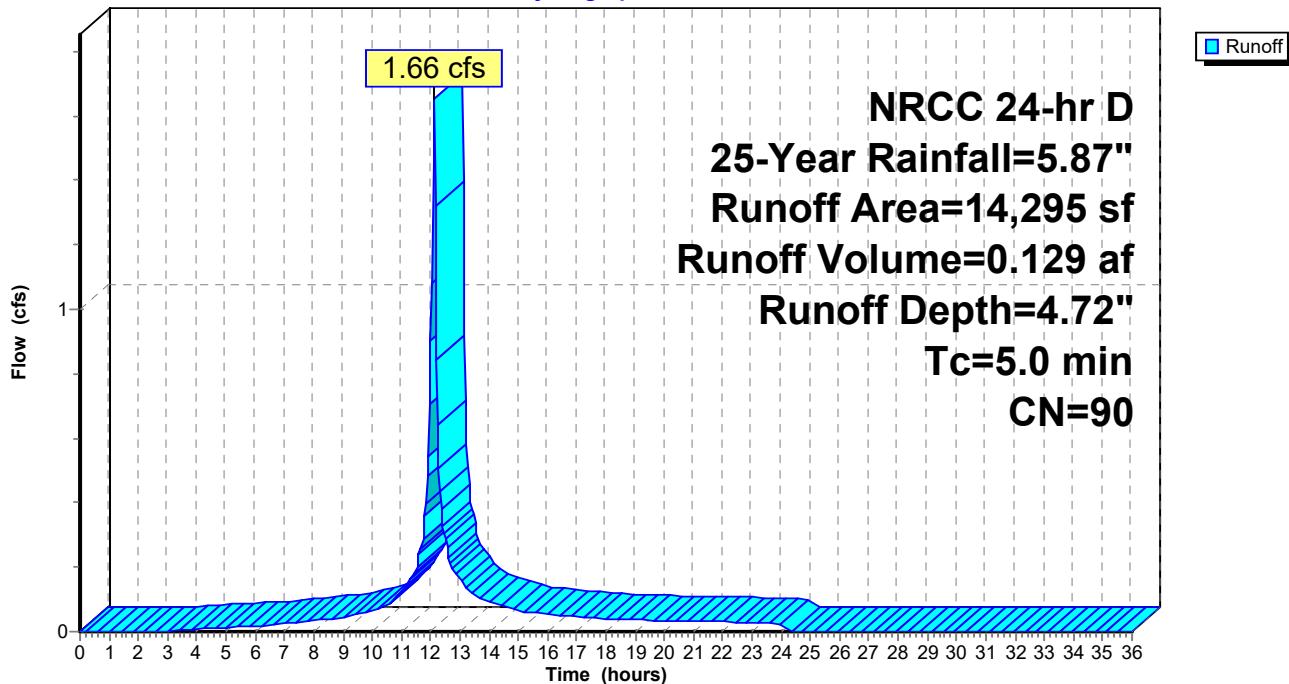
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 447   | 98 Paved parking, HSG A            |
| *         | 7,461 | 98 Paved parking, HSG C            |
| *         | 2,341 | 98 Cement Concrete Sidewalk, HSG C |
|           | 488   | >75% Grass cover, Good, HSG A      |
|           | 3,558 | >75% Grass cover, Good, HSG C      |
| 14,295    | 90    | Weighted Average                   |
| 4,046     |       | 28.30% Pervious Area               |
| 10,249    |       | 71.70% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 23S: PR-17

Hydrograph



### Summary for Subcatchment 24S: PR-18

Runoff = 1.07 cfs @ 12.14 hrs, Volume= 0.097 af, Depth= 5.40"  
 Routed to Pond 44P : CMP Infiltration

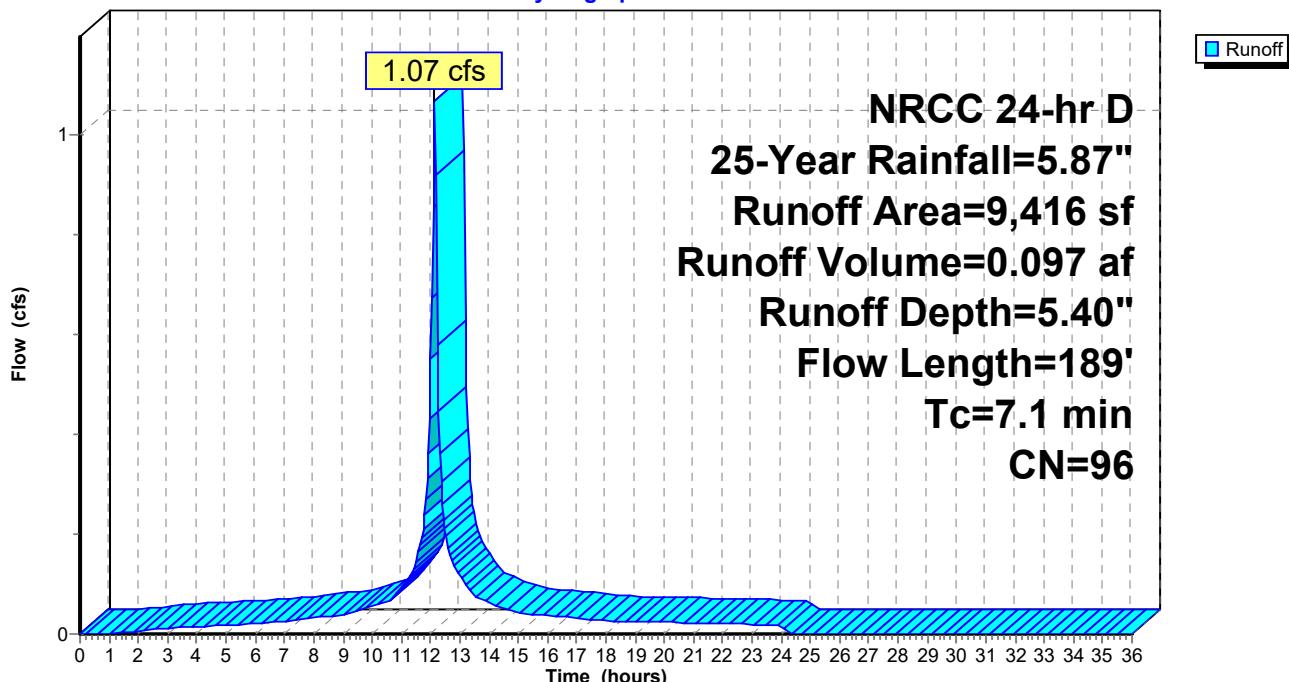
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,554 | 98 Paved parking, HSG A            |
| *         | 4,554 | 98 Cement Concrete Sidewalk, HSG A |
| 308       | 39    | >75% Grass cover, Good, HSG A      |
| 9,416     | 96    | Weighted Average                   |
| 308       |       | 3.27% Pervious Area                |
| 9,108     |       | 96.73% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.7         | 29               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.9         | 71               | 0.0200           | 1.27                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.5         | 89               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 189              | Total            |                      |                   |                                                                   |

### Subcatchment 24S: PR-18

Hydrograph



### Summary for Subcatchment 25S: PR-19

Runoff = 0.18 cfs @ 12.12 hrs, Volume= 0.014 af, Depth= 3.97"  
 Routed to Pond 44P : CMP Infiltration

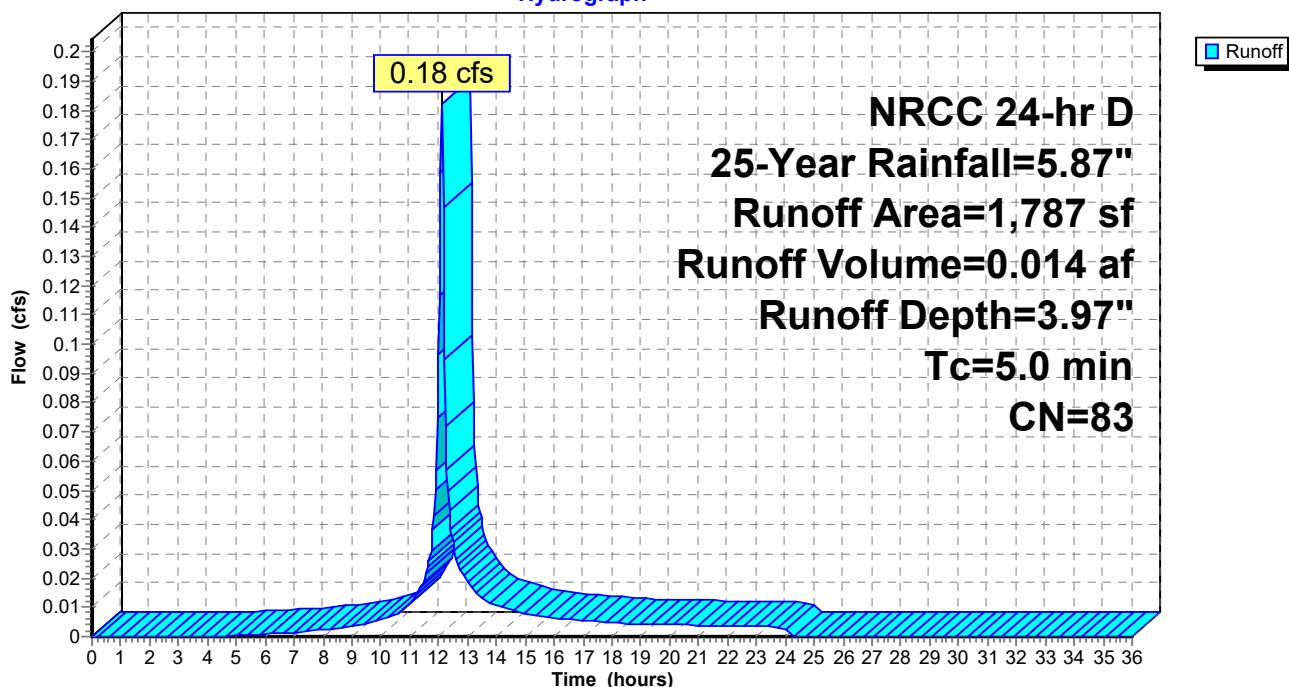
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 1,006 | 98 Paved parking, HSG A         |
| *         | 337   | Cement Concrete Sidewalk, HSG A |
|           | 444   | >75% Grass cover, Good, HSG A   |
|           | 1,787 | Weighted Average                |
|           | 444   | 24.85% Pervious Area            |
|           | 1,343 | 75.15% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 25S: PR-19

Hydrograph



### Summary for Subcatchment 26S: PR-20

Runoff = 0.80 cfs @ 12.11 hrs, Volume= 0.062 af, Depth= 4.72"  
 Routed to Pond 44P : CMP Infiltration

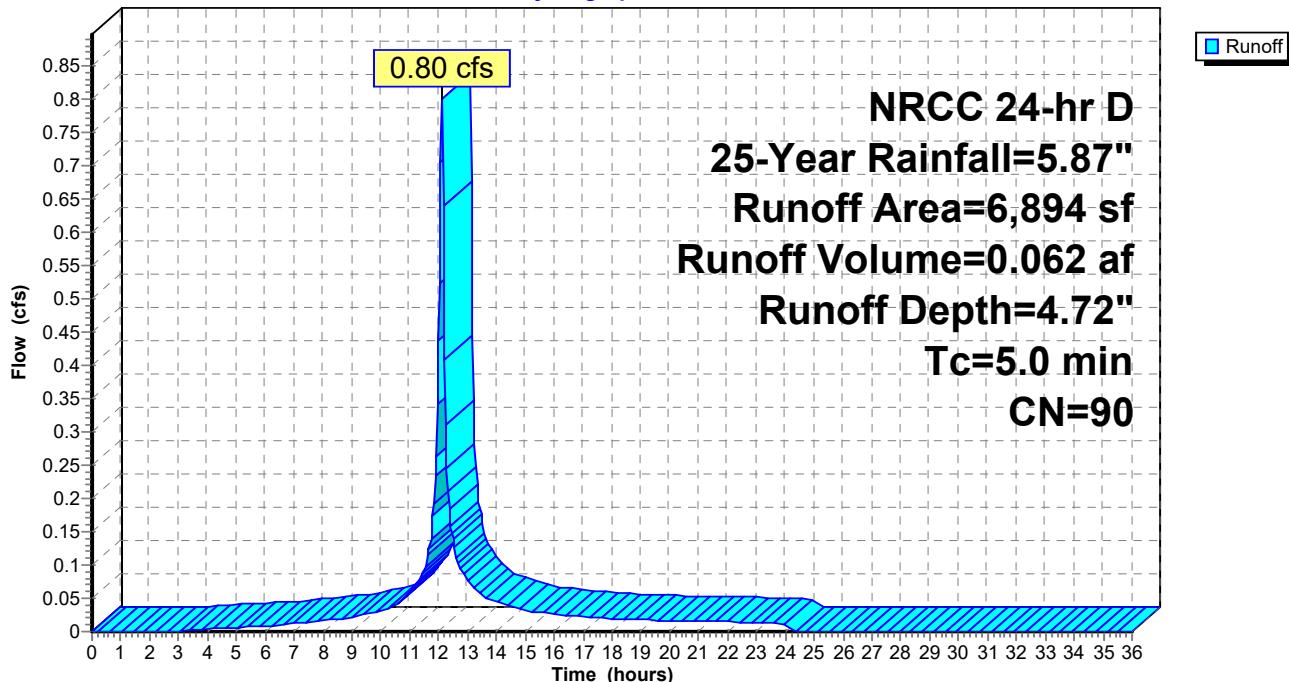
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,689 | 98 Paved parking, HSG A         |
| *         | 1,328 | Cement Concrete Sidewalk, HSG A |
| 877       | 39    | >75% Grass cover, Good, HSG A   |
| 6,894     | 90    | Weighted Average                |
| 877       |       | 12.72% Pervious Area            |
| 6,017     |       | 87.28% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 26S: PR-20

Hydrograph



### Summary for Subcatchment 27S: PR-21

Runoff = 0.81 cfs @ 12.11 hrs, Volume= 0.064 af, Depth= 4.83"  
 Routed to Pond 44P : CMP Infiltration

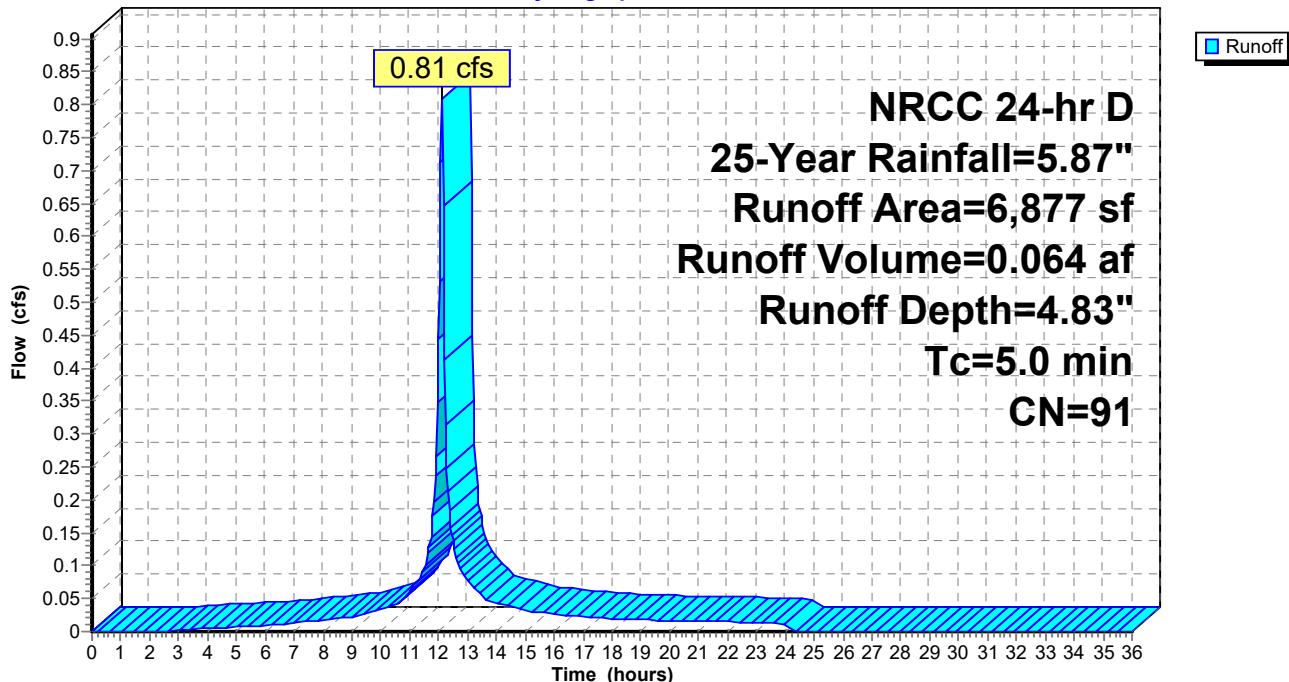
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,706 | 98 Paved parking, HSG A         |
| *         | 1,331 | Cement Concrete Sidewalk, HSG A |
|           | 840   | >75% Grass cover, Good, HSG A   |
|           | 6,877 | Weighted Average                |
|           | 840   | 12.21% Pervious Area            |
|           | 6,037 | 87.79% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 27S: PR-21

Hydrograph



### Summary for Subcatchment 28S: PR-22

Runoff = 0.53 cfs @ 12.12 hrs, Volume= 0.040 af, Depth= 4.07"  
 Routed to Pond 44P : CMP Infiltration

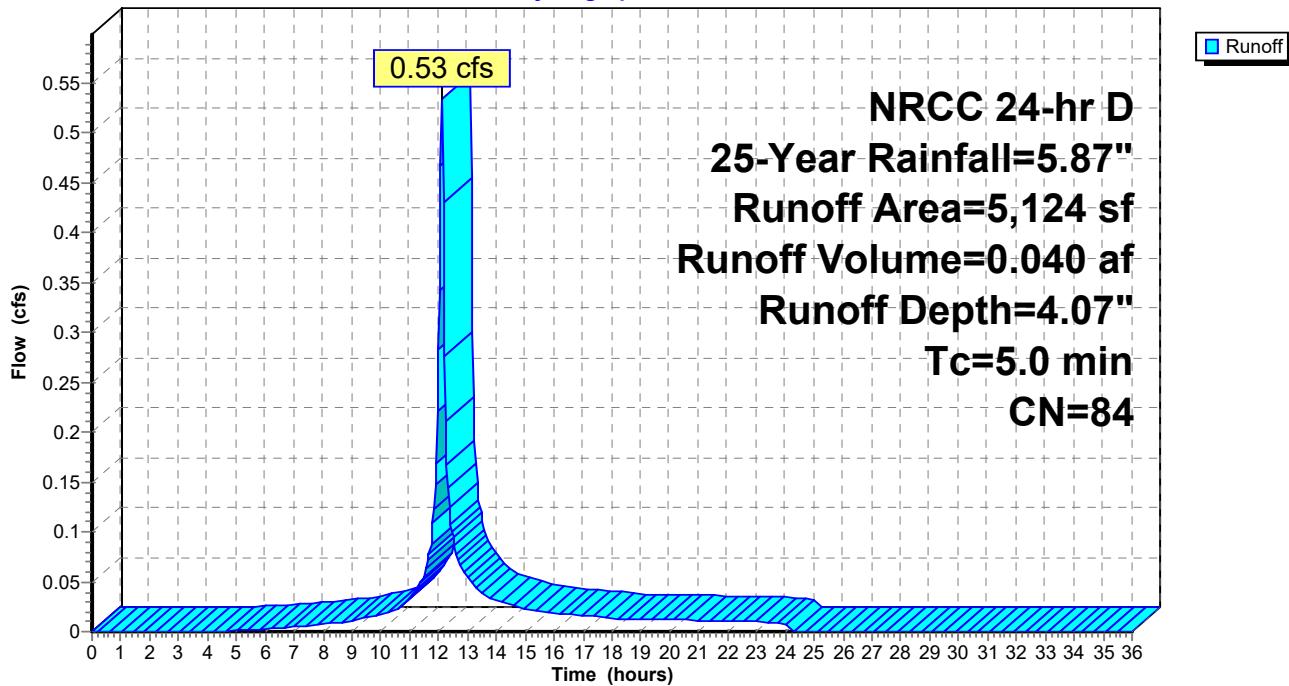
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,097 | 98 Paved parking, HSG A            |
| *         | 72    | 98 Paved parking, HSG C            |
| *         | 588   | 98 Cement Concrete Sidewalk, HSG C |
|           | 1,052 | >75% Grass cover, Good, HSG A      |
|           | 315   | >75% Grass cover, Good, HSG C      |
| 5,124     | 84    | Weighted Average                   |
| 1,367     |       | 26.68% Pervious Area               |
| 3,757     |       | 73.32% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 28S: PR-22

Hydrograph



### Summary for Subcatchment 29S: PR-23

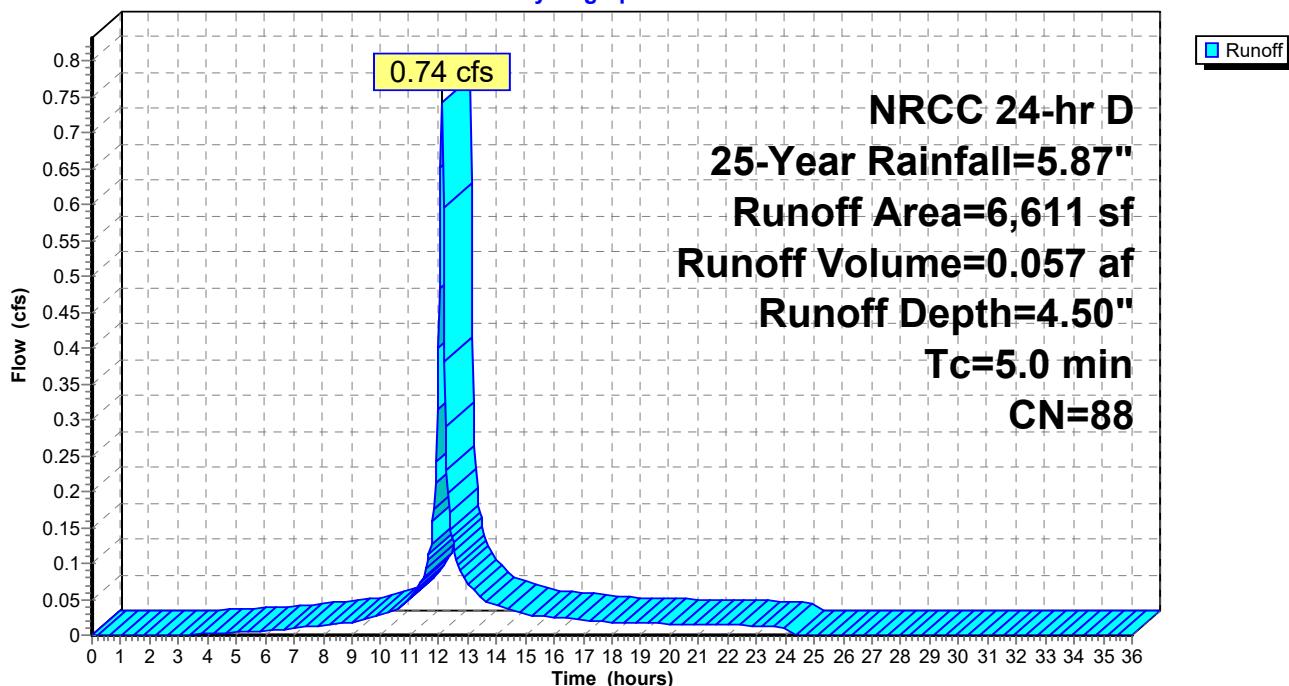
Runoff = 0.74 cfs @ 12.12 hrs, Volume= 0.057 af, Depth= 4.50"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 3,322         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 748           | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 695           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
| *         | 463           | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
|           | 914           | >75% Grass cover, Good, HSG A      |                   |                |                      |
|           | 469           | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 6,611     | 88            | Weighted Average                   |                   |                |                      |
| 1,383     |               | 20.92% Pervious Area               |                   |                |                      |
| 5,228     |               | 79.08% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 29S: PR-23

Hydrograph



### Summary for Subcatchment 30S: PR-24

Runoff = 0.60 cfs @ 12.12 hrs, Volume= 0.046 af, Depth= 4.50"  
 Routed to Pond 44P : CMP Infiltration

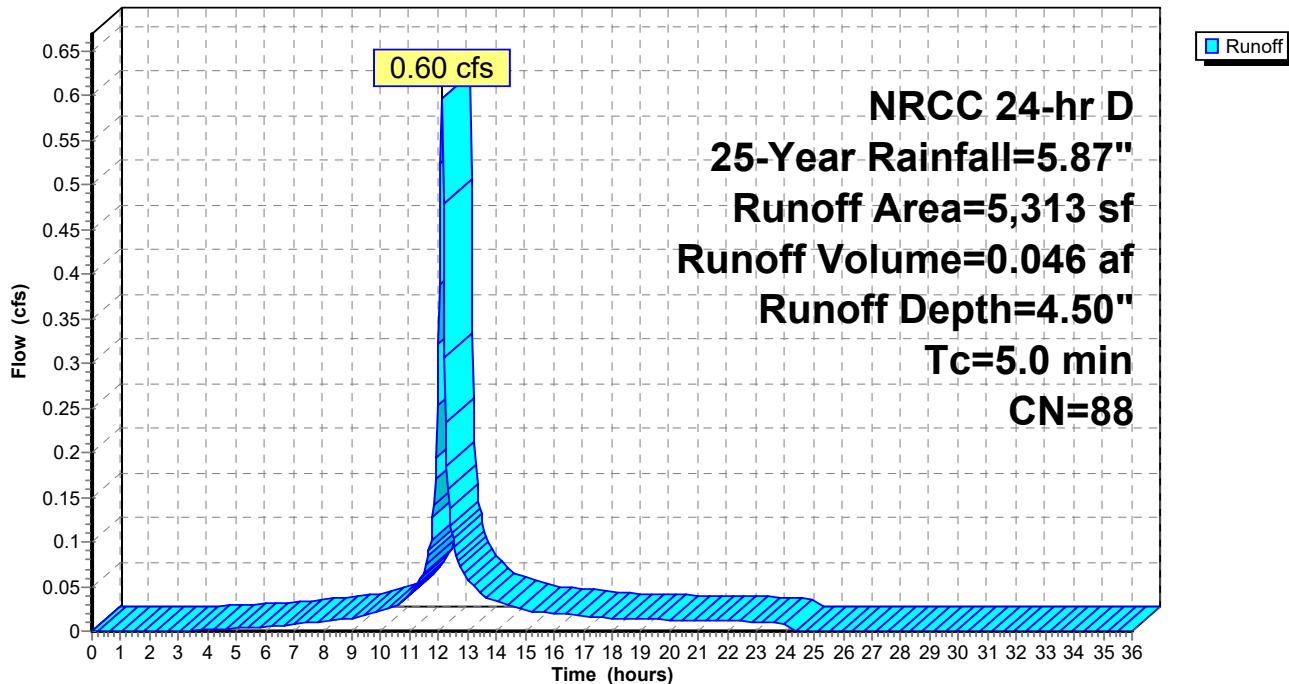
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,109 | 98 Paved parking, HSG A            |
| *         | 146   | 98 Paved parking, HSG C            |
| *         | 572   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 432   | 98 Cement Concrete Sidewalk, HSG C |
| 819       | 39    | >75% Grass cover, Good, HSG A      |
| 235       | 74    | >75% Grass cover, Good, HSG C      |
| 5,313     | 88    | Weighted Average                   |
| 1,054     |       | 19.84% Pervious Area               |
| 4,259     |       | 80.16% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 30S: PR-24

#### Hydrograph



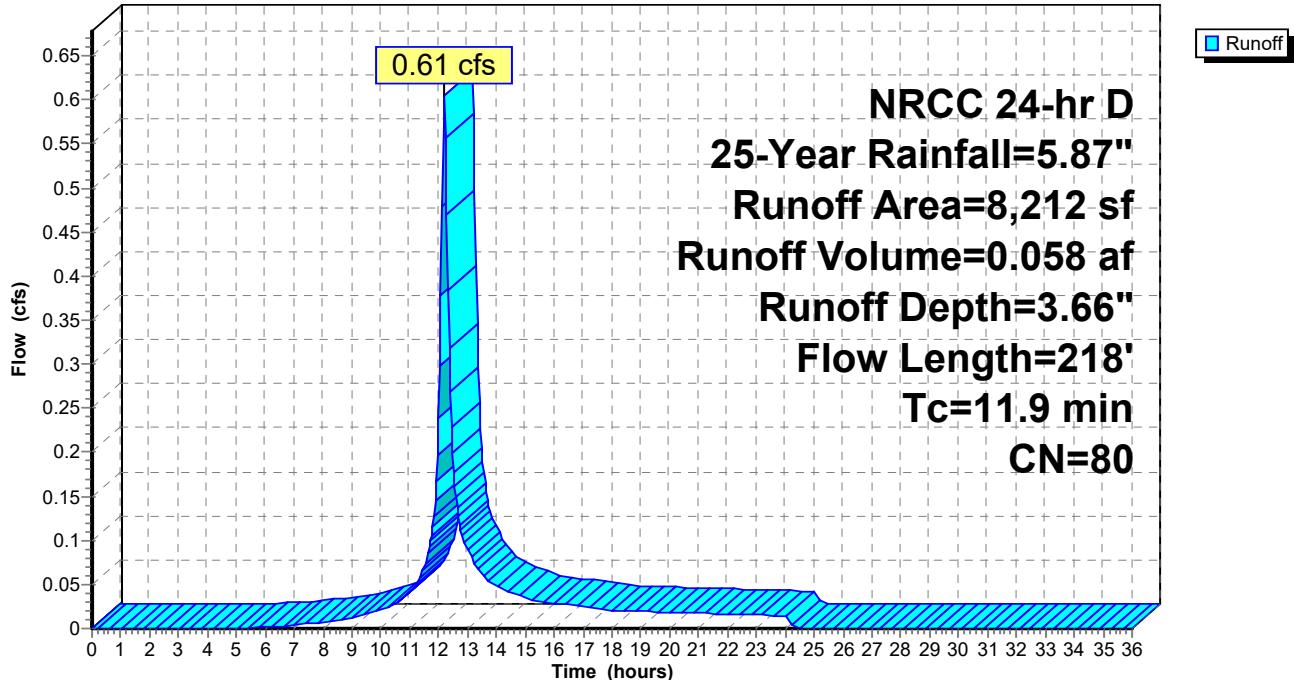
### Summary for Subcatchment 31S: PR-25

Runoff = 0.61 cfs @ 12.20 hrs, Volume= 0.058 af, Depth= 3.66"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,851 | 98 Paved parking, HSG A            |
| *         | 988   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 65    | 98 Cement Concrete Sidewalk, HSG C |
| 1,910     | 39    | >75% Grass cover, Good, HSG A      |
| 1,398     | 74    | >75% Grass cover, Good, HSG C      |
| 8,212     | 80    | Weighted Average                   |
| 3,308     |       | 40.28% Pervious Area               |
| 4,904     |       | 59.72% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 10.6        | 63               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.6         | 37               | 0.0150           | 0.99                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 118              | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 11.9        | 218              | Total            |                      |                   |                                                                   |

**Subcatchment 31S: PR-25****Hydrograph**

### Summary for Subcatchment 32S: PR-26

Runoff = 0.70 cfs @ 12.11 hrs, Volume= 0.057 af, Depth= 5.17"  
 Routed to Pond 44P : CMP Infiltration

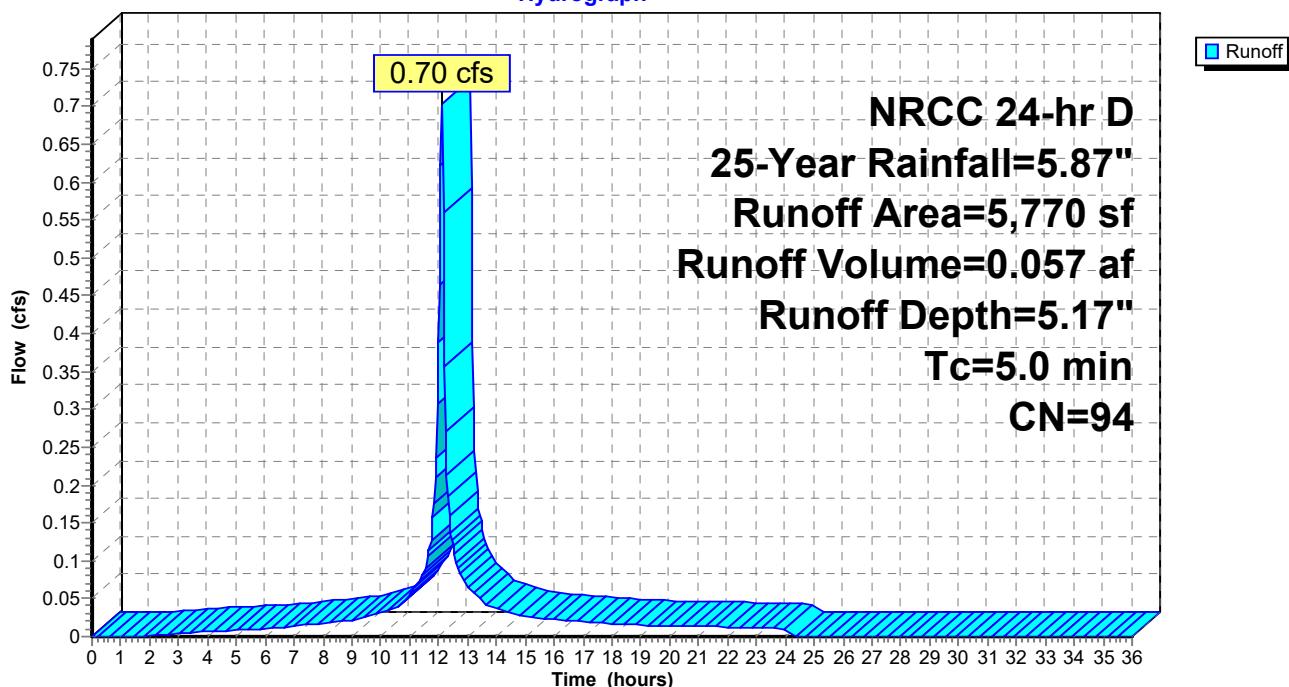
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,263 | 98 Paved parking, HSG A            |
| *         | 1,076 | 98 Cement Concrete Sidewalk, HSG A |
|           | 431   | >75% Grass cover, Good, HSG A      |
|           | 5,770 | Weighted Average                   |
|           | 431   | 7.47% Pervious Area                |
|           | 5,339 | 92.53% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 32S: PR-26

Hydrograph



### Summary for Subcatchment 33S: PR-27

Runoff = 0.69 cfs @ 12.11 hrs, Volume= 0.055 af, Depth= 5.05"  
 Routed to Pond 44P : CMP Infiltration

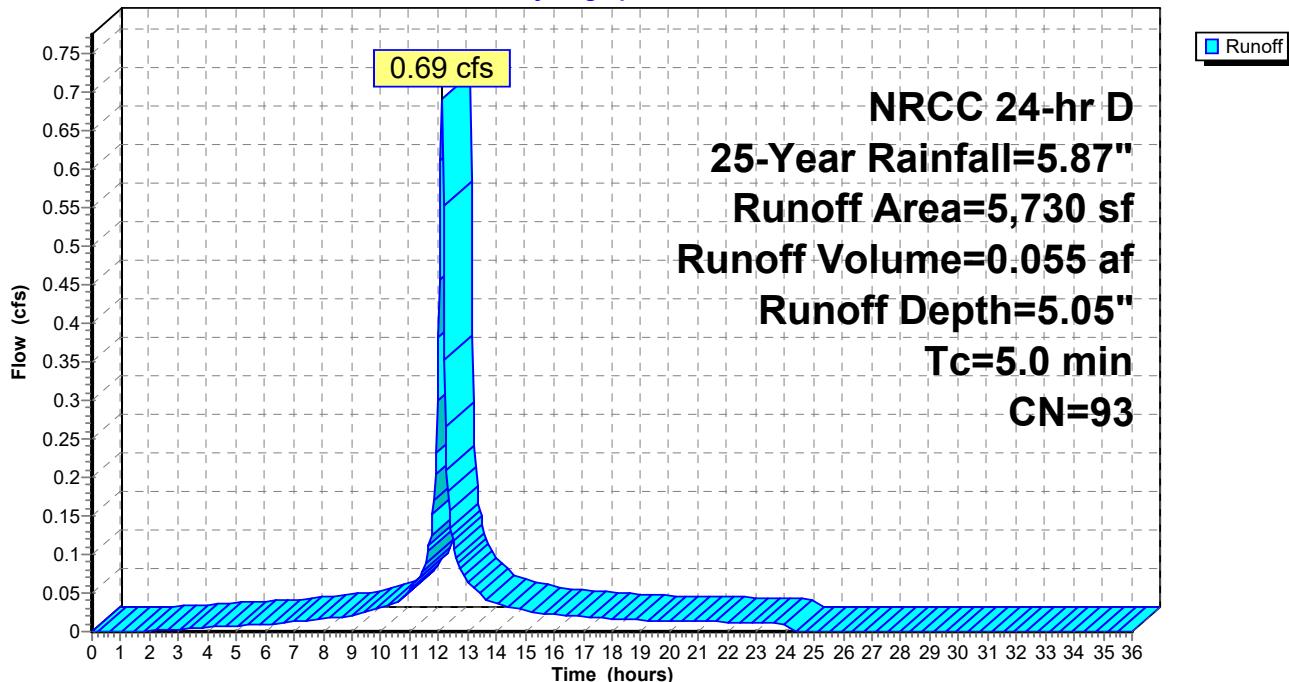
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,151 | 98 Paved parking, HSG A            |
| *         | 1,069 | 98 Cement Concrete Sidewalk, HSG A |
|           | 510   | >75% Grass cover, Good, HSG A      |
|           | 5,730 | Weighted Average                   |
|           | 510   | 8.90% Pervious Area                |
|           | 5,220 | 91.10% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 33S: PR-27

Hydrograph



### Summary for Subcatchment 34S: PR-28

Runoff = 0.23 cfs @ 12.22 hrs, Volume= 0.023 af, Depth= 2.70"  
 Routed to Pond 44P : CMP Infiltration

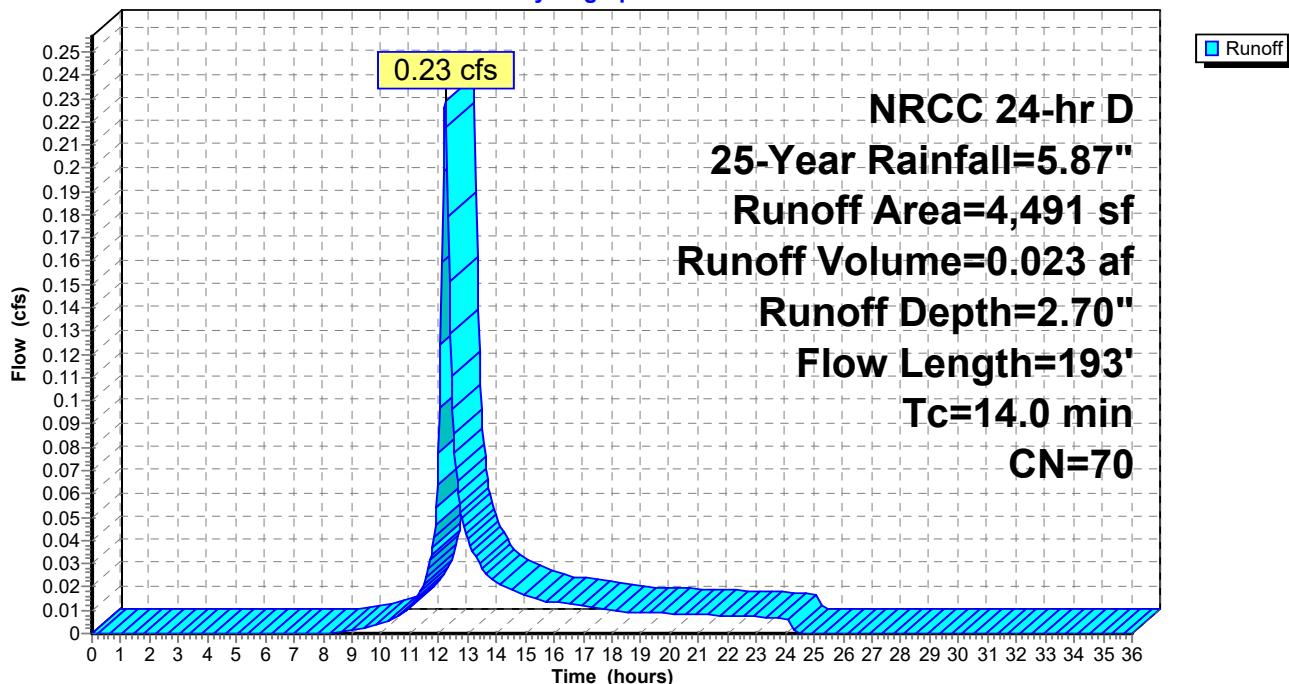
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,588 | 98 Paved parking, HSG A            |
| *         | 456   | 98 Cement Concrete Sidewalk, HSG A |
| 1,899     | 39    | >75% Grass cover, Good, HSG A      |
| 548       | 74    | >75% Grass cover, Good, HSG C      |
| 4,491     | 70    | Weighted Average                   |
| 2,447     |       | 54.49% Pervious Area               |
| 2,044     |       | 45.51% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 13.0        | 81               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.4         | 19               | 0.0150           | 0.87                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.6         | 93               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 14.0        | 193              | Total            |                      |                   |                                                                   |

### Subcatchment 34S: PR-28

Hydrograph



### Summary for Subcatchment 35S: PR-29

Runoff = 0.16 cfs @ 12.12 hrs, Volume= 0.012 af, Depth= 4.39"  
 Routed to Pond 44P : CMP Infiltration

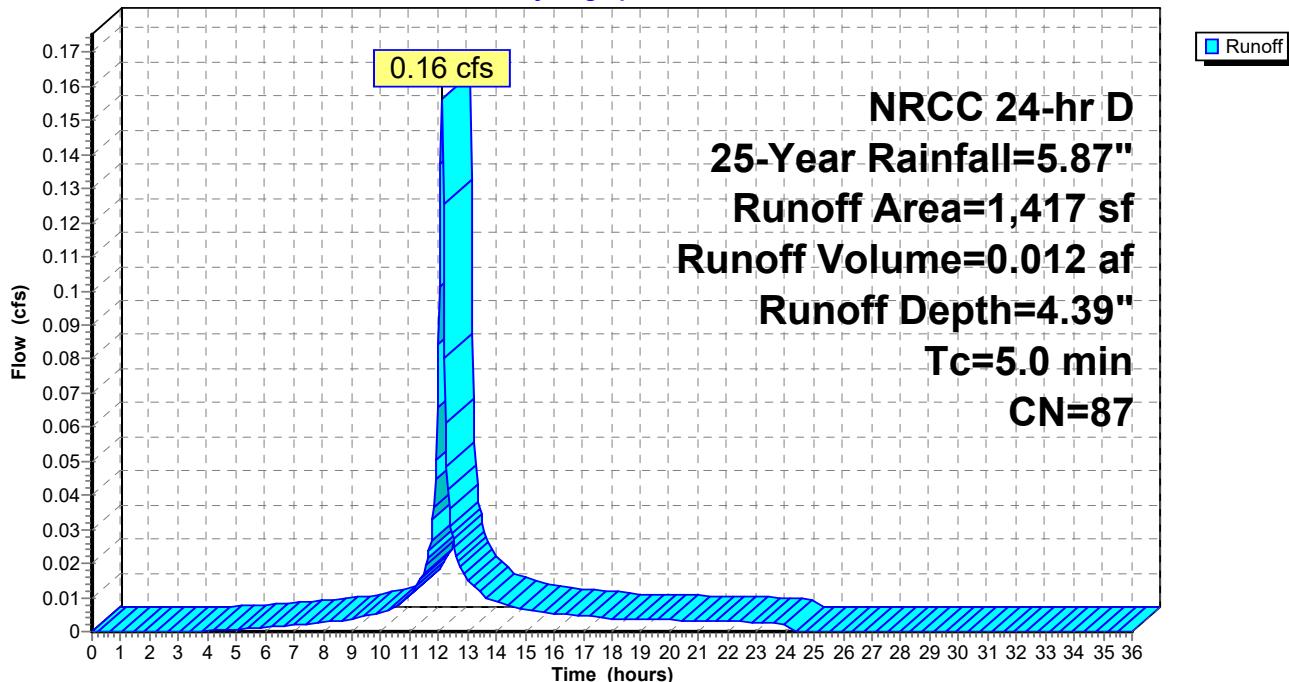
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,137 | 98 Paved parking, HSG A            |
| *         | 16    | 98 Cement Concrete Sidewalk, HSG A |
| 264       | 39    | >75% Grass cover, Good, HSG A      |
| 1,417     | 87    | Weighted Average                   |
| 264       |       | 18.63% Pervious Area               |
| 1,153     |       | 81.37% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 35S: PR-29

Hydrograph



### Summary for Subcatchment 36S: PR-30

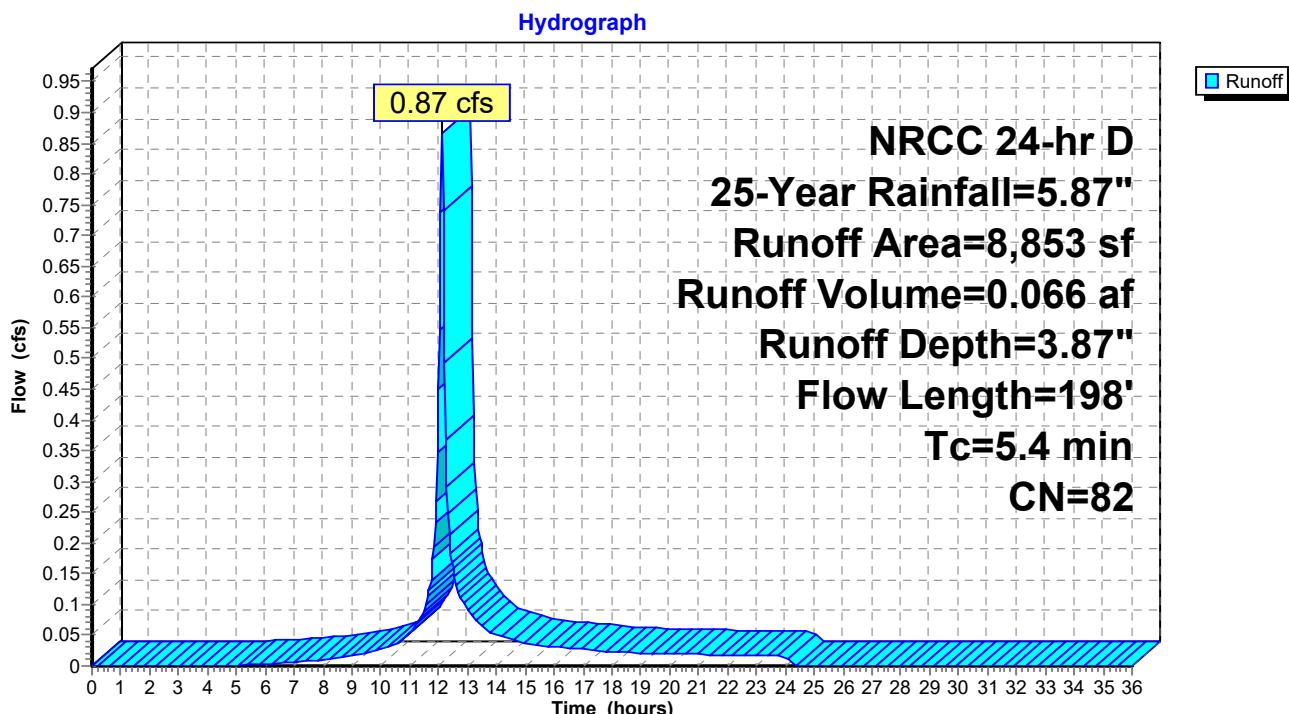
Runoff = 0.87 cfs @ 12.12 hrs, Volume= 0.066 af, Depth= 3.87"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,691 | 98 Paved parking, HSG A            |
| *         | 826   | 98 Cement Concrete Sidewalk, HSG A |
| 2,336     | 39    | >75% Grass cover, Good, HSG A      |
| 8,853     | 82    | Weighted Average                   |
| 2,336     |       | 26.39% Pervious Area               |
| 6,517     |       | 73.61% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.5         | 16               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 84               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 98               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.4         | 198              | Total            |                      |                   |                                                                   |

### Subcatchment 36S: PR-30



### Summary for Subcatchment 37S: PR-31

Runoff = 1.03 cfs @ 12.12 hrs, Volume= 0.078 af, Depth= 4.07"  
 Routed to Pond 44P : CMP Infiltration

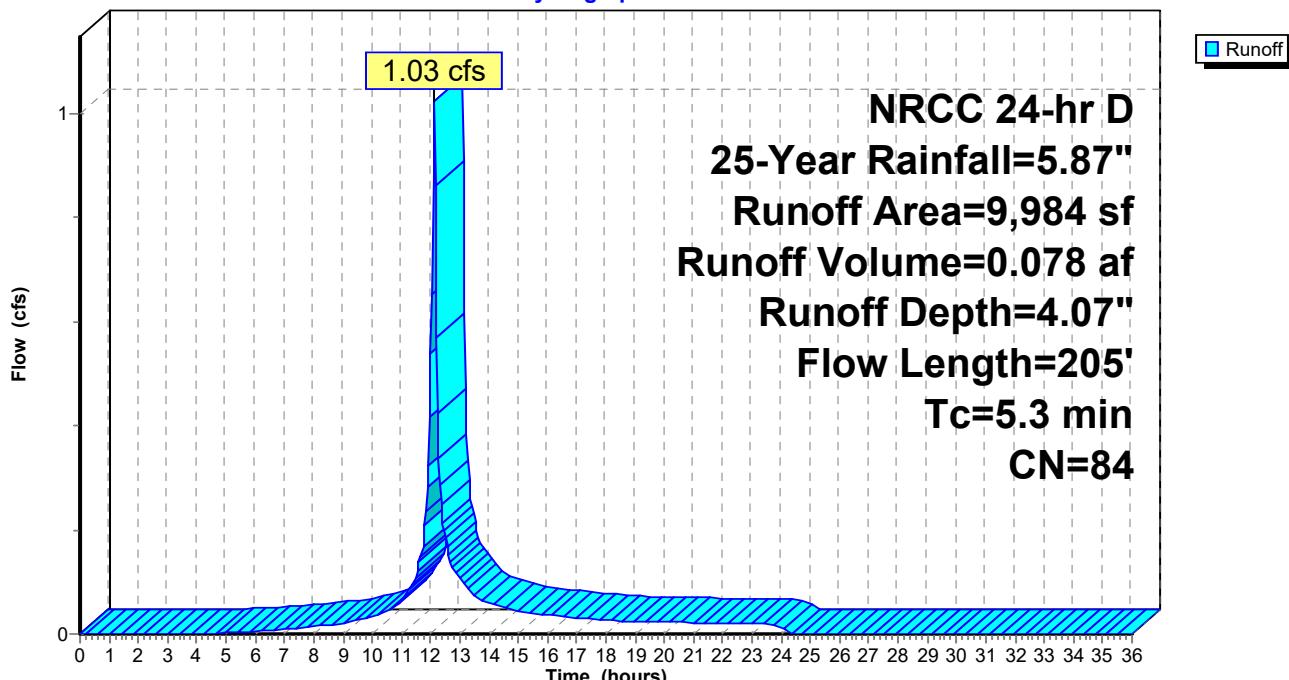
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 6,479   | 98 | Paved parking, HSG A            |
| * 1,108   | 98 | Cement Concrete Sidewalk, HSG A |
| 2,397     | 39 | >75% Grass cover, Good, HSG A   |
| 9,984     | 84 | Weighted Average                |
| 2,397     |    | 24.01% Pervious Area            |
| 7,587     |    | 75.99% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.4         | 15               | 0.0500           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 85               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 105              | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.3         | 205              | Total            |                      |                   |                                                                   |

### Subcatchment 37S: PR-31

Hydrograph



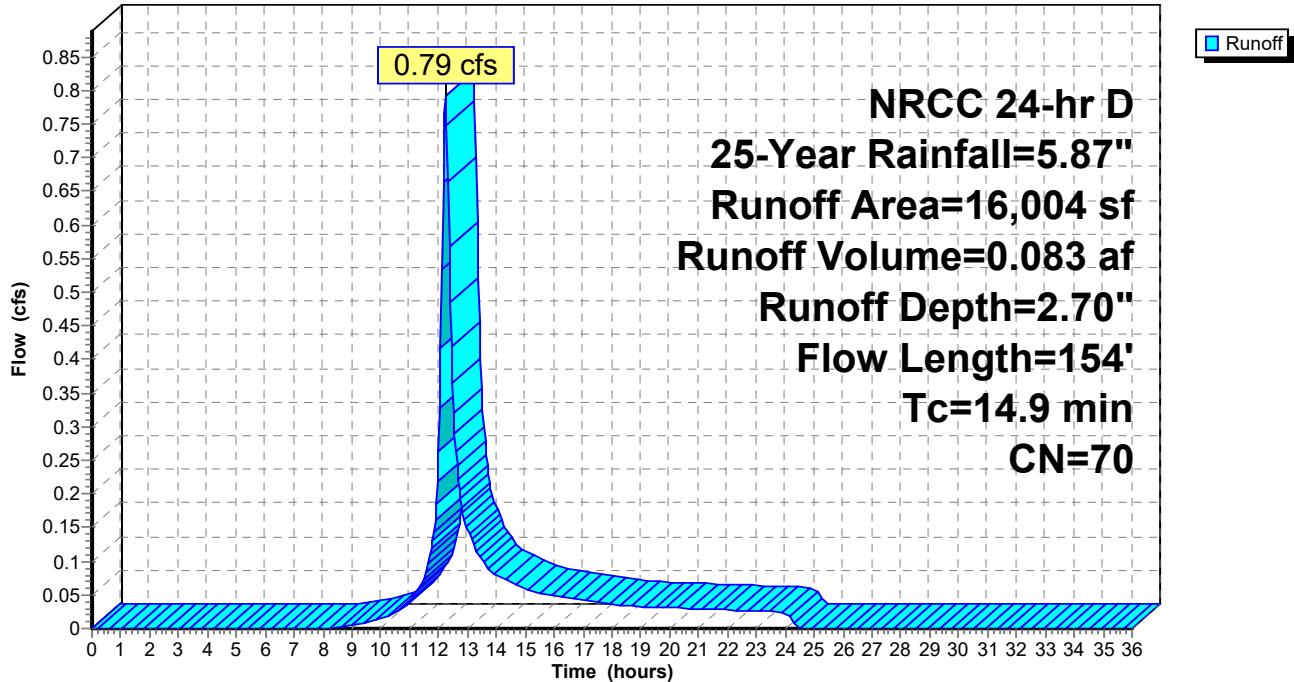
### Summary for Subcatchment 38S: PR-32

Runoff = 0.79 cfs @ 12.24 hrs, Volume= 0.083 af, Depth= 2.70"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN     | Description                        |
|-----------|--------|------------------------------------|
| *         | 6,711  | 98 Paved parking, HSG A            |
| *         | 1,813  | 98 Cement Concrete Sidewalk, HSG A |
|           | 7,480  | >75% Grass cover, Good, HSG A      |
|           | 16,004 | Weighted Average                   |
|           | 7,480  | 46.74% Pervious Area               |
|           | 8,524  | 53.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 14.4        | 92               | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 8                | 0.0200           | 0.82                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.2         | 34               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1         | 20               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 14.9        | 154              | Total            |                      |                   |                                                                          |

**Subcatchment 38S: PR-32****Hydrograph**

### Summary for Subcatchment 39S: PR-33

Runoff = 0.83 cfs @ 12.12 hrs, Volume= 0.063 af, Depth= 4.29"  
 Routed to Pond 44P : CMP Infiltration

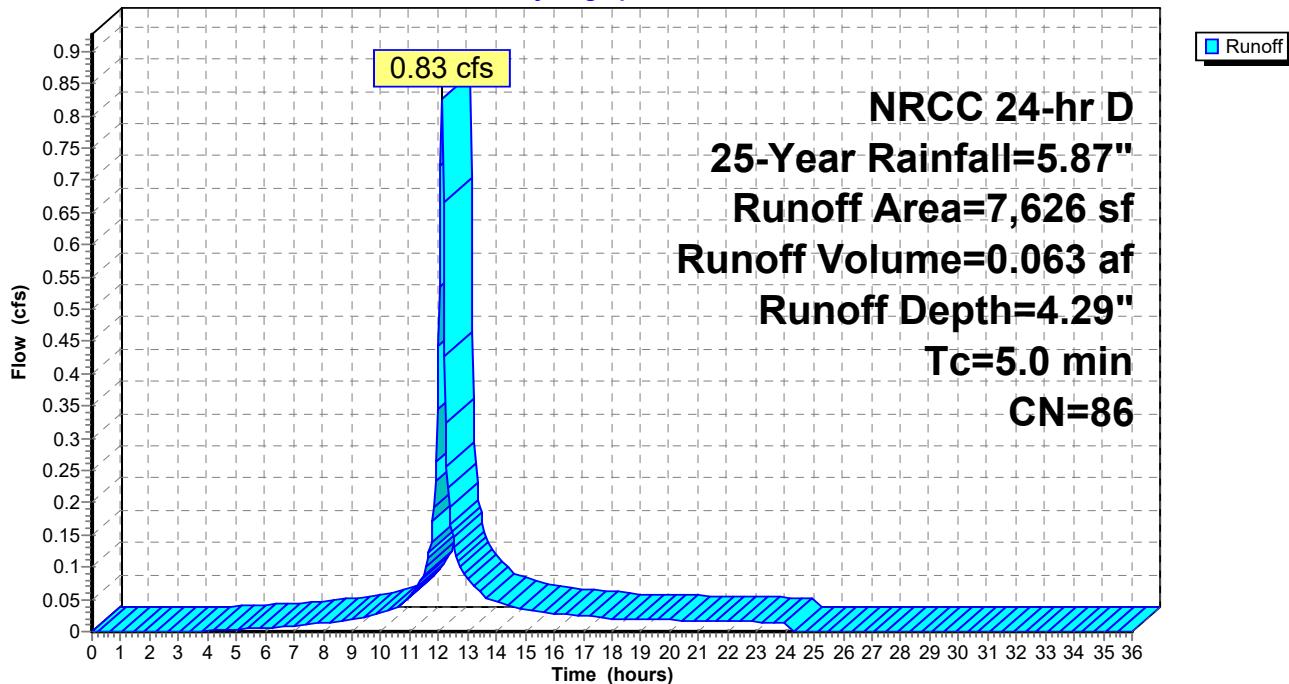
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,106     | 98 | Paved parking, HSG A            |
| 920       | 98 | Cement Concrete Sidewalk, HSG A |
| 1,600     | 39 | >75% Grass cover, Good, HSG A   |
| 7,626     | 86 | Weighted Average                |
| 1,600     |    | 20.98% Pervious Area            |
| 6,026     |    | 79.02% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 39S: PR-33

Hydrograph



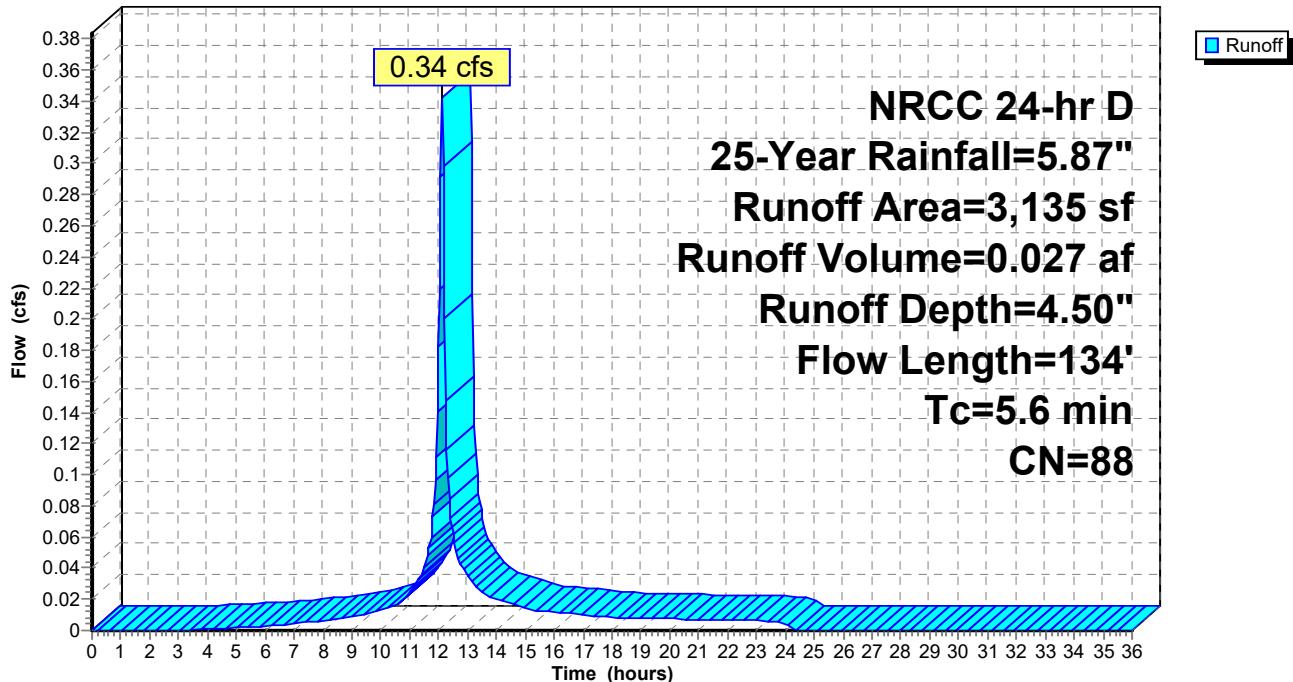
### Summary for Subcatchment 40S: PR-34

Runoff = 0.34 cfs @ 12.12 hrs, Volume= 0.027 af, Depth= 4.50"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 2,389 | 98 Paved parking, HSG A            |
| *         | 234   | 98 Cement Concrete Sidewalk, HSG A |
|           | 512   | >75% Grass cover, Good, HSG A      |
|           | 3,135 | Weighted Average                   |
|           | 512   | 16.33% Pervious Area               |
|           | 2,623 | 83.67% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 4.4         | 21               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 1.0         | 79               | 0.0200           | 1.30                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.0         | 7                | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.2         | 27               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 5.6         | 134              | Total            |                      |                   |                                                                          |

**Subcatchment 40S: PR-34****Hydrograph**

### Summary for Subcatchment 41S: PR-35

Runoff = 0.06 cfs @ 12.11 hrs, Volume= 0.005 af, Depth= 5.51"  
 Routed to Pond 44P : CMP Infiltration

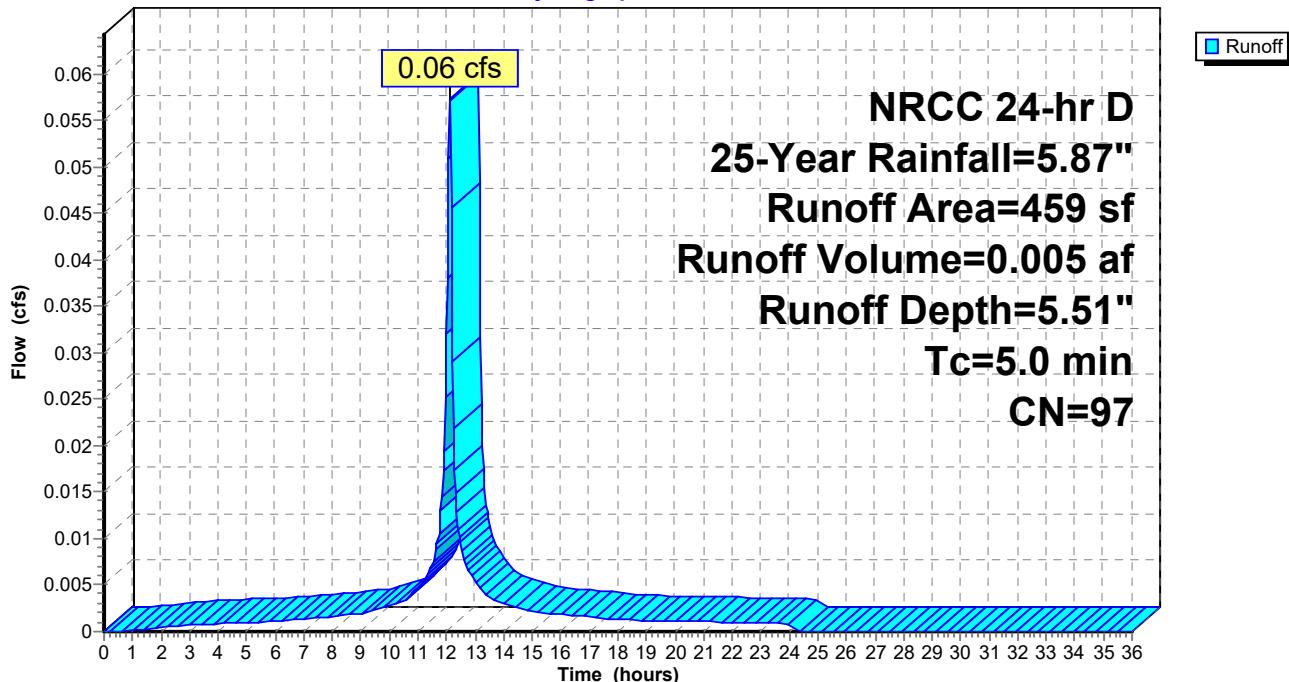
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN  | Description                     |
|-----------|-----|---------------------------------|
| *         | 366 | 98 Paved parking, HSG A         |
| *         | 86  | Cement Concrete Sidewalk, HSG A |
|           | 7   | >75% Grass cover, Good, HSG A   |
|           | 459 | Weighted Average                |
|           | 7   | 1.53% Pervious Area             |
|           | 452 | 98.47% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 41S: PR-35

Hydrograph



### Summary for Subcatchment 42S: PR-36

Runoff = 0.76 cfs @ 12.11 hrs, Volume= 0.060 af, Depth= 4.83"  
 Routed to Pond 44P : CMP Infiltration

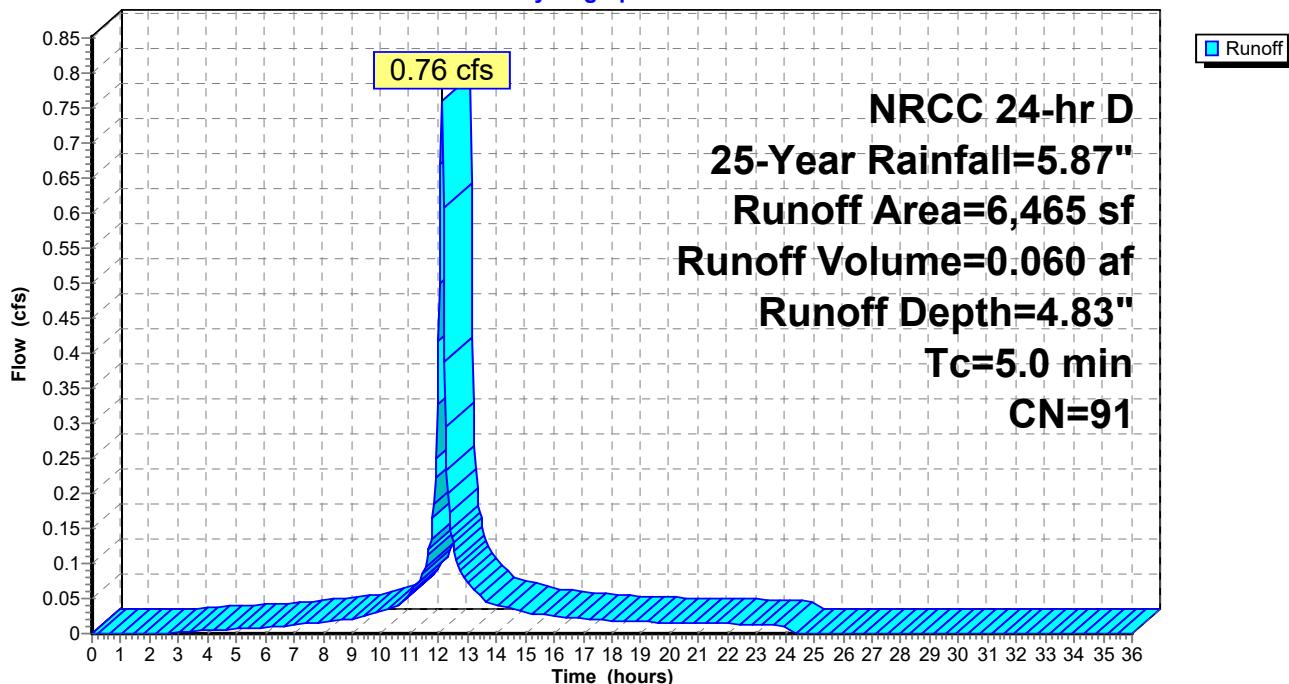
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,448 | 98 Paved parking, HSG A         |
| *         | 1,207 | Cement Concrete Sidewalk, HSG A |
| 810       | 39    | >75% Grass cover, Good, HSG A   |
| 6,465     | 91    | Weighted Average                |
| 810       |       | 12.53% Pervious Area            |
| 5,655     |       | 87.47% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 42S: PR-36

Hydrograph



### Summary for Subcatchment 43S: PR-37

Runoff = 0.84 cfs @ 12.11 hrs, Volume= 0.067 af, Depth= 4.94"  
 Routed to Pond 44P : CMP Infiltration

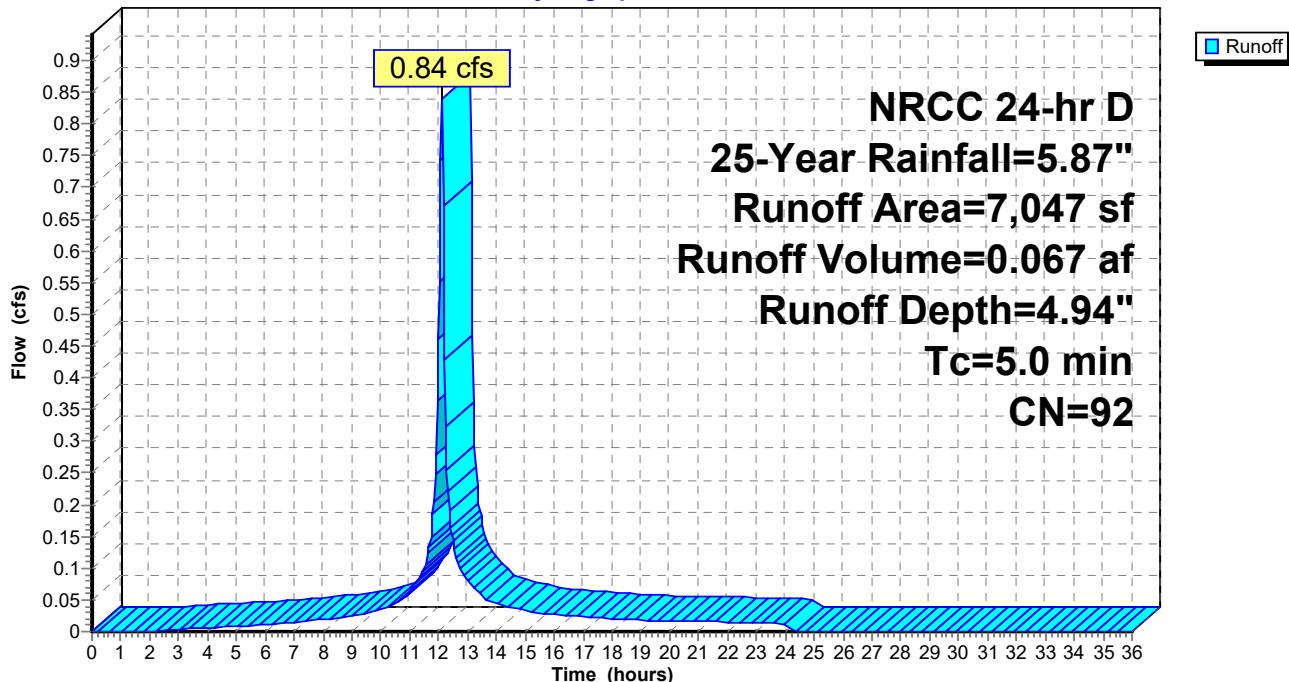
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 25-Year Rainfall=5.87"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 5,177   | 98 | Paved parking, HSG A            |
| * 1,177   | 98 | Cement Concrete Sidewalk, HSG A |
| 693       | 39 | >75% Grass cover, Good, HSG A   |
| 7,047     | 92 | Weighted Average                |
| 693       |    | 9.83% Pervious Area             |
| 6,354     |    | 90.17% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 43S: PR-37

Hydrograph



### Summary for Pond 44P: CMP Infiltration

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 4.27" for 25-Year event  
 Inflow = 25.47 cfs @ 12.12 hrs, Volume= 2.108 af  
 Outflow = 18.13 cfs @ 12.18 hrs, Volume= 2.108 af, Atten= 29%, Lag= 3.9 min  
 Discarded = 0.20 cfs @ 12.18 hrs, Volume= 0.273 af  
 Primary = 17.93 cfs @ 12.18 hrs, Volume= 1.835 af  
 Routed to Pond 45P : Rain Garden

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 270.18' @ 12.18 hrs Surf.Area= 0.055 ac Storage= 0.142 af

Plug-Flow detention time= 12.4 min calculated for 2.106 af (100% of inflow)  
 Center-of-Mass det. time= 12.5 min ( 818.4 - 805.9 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                      |
|----------|---------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1C      | 266.50' | 0.081 af      | <b>17.00'W x 142.00'L x 7.00'H Field C</b><br>0.388 af Overall - 0.186 af Embedded = 0.202 af x 40.0% Voids                                                                                                                                              |
| #2C      | 267.00' | 0.186 af      | <b>CMP Round 72 x 12 Inside #1</b><br>Effective Size= 72.0"W x 72.0"H => 28.27 sf x 20.00'L = 565.5 cf<br>Overall Size= 72.0"W x 72.0"H x 20.00'L<br>Row Length Adjustment= +8.00' x 28.27 sf x 2 rows<br>15.00' Header x 28.27 sf x 2 = 848.2 cf Inside |
| 0.267 af |         |               | Total Available Storage                                                                                                                                                                                                                                  |

Storage Group C created with Chamber Wizard

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                       |
|--------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 267.00' | <b>21.0" Round Culvert</b><br>L= 169.0' RCP, rounded edge headwall, Ke= 0.100<br>Inlet / Outlet Invert= 267.00' / 265.31' S= 0.0100 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf |
| #2     | Discarded | 266.50' | <b>2.410 in/hr Exfiltration over Wetted area</b>                                                                                                                                                                     |

**Discarded OutFlow** Max=0.20 cfs @ 12.18 hrs HW=270.14' (Free Discharge)  
 ↗ 2=Exfiltration (Exfiltration Controls 0.20 cfs)

**Primary OutFlow** Max=17.82 cfs @ 12.18 hrs HW=270.14' TW=259.66' (Dynamic Tailwater)  
 ↗ 1=Culvert (Barrel Controls 17.82 cfs @ 7.41 fps)

**Pond 44P: CMP Infiltration - Chamber Wizard Field C****Chamber Model = CMP Round 72 (Round Corrugated Metal Pipe)**

Effective Size= 72.0"W x 72.0"H =&gt; 28.27 sf x 20.00'L = 565.5 cf

Overall Size= 72.0"W x 72.0"H x 20.00'L

Row Length Adjustment= +8.00' x 28.27 sf x 2 rows

72.0" Wide + 36.0" Spacing = 108.0" C-C Row Spacing

6 Chambers/Row x 20.00' Long +8.00' Row Adjustment +6.00' Header x 2 = 140.00' Row Length +12.0"

End Stone x 2 = 142.00' Base Length

2 Rows x 72.0" Wide + 36.0" Spacing x 1 + 12.0" Side Stone x 2 = 17.00' Base Width

6.0" Stone Base + 72.0" Chamber Height + 6.0" Stone Cover = 7.00' Field Height

12 Chambers x 565.5 cf +8.00' Row Adjustment x 28.27 sf x 2 Rows + 15.00' Header x 28.27 sf x 2 = 8,086.5 cf Chamber Storage

16,898.0 cf Field - 8,086.5 cf Chambers = 8,811.5 cf Stone x 40.0% Voids = 3,524.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,611.1 cf = 0.267 af

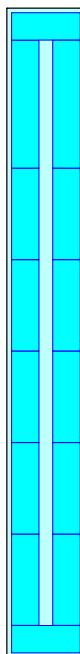
Overall Storage Efficiency = 68.7%

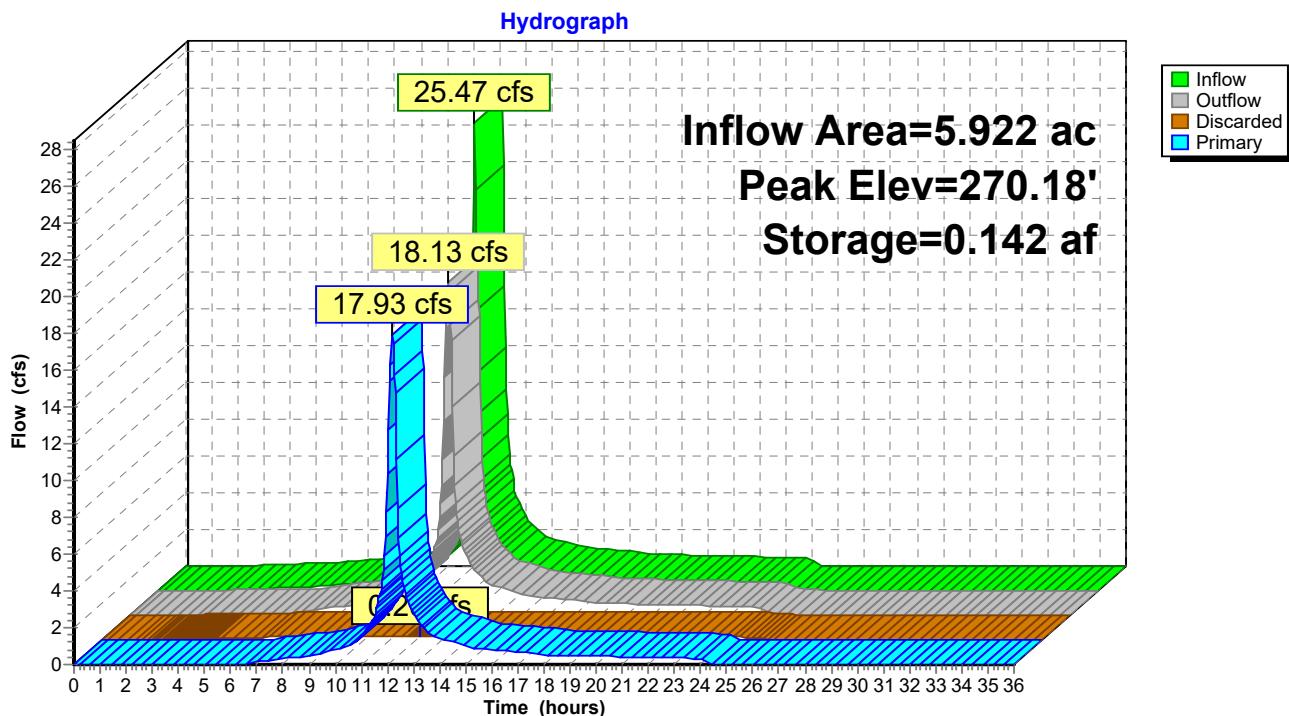
Overall System Size = 142.00' x 17.00' x 7.00'

12 Chambers

625.9 cy Field

326.4 cy Stone



**Pond 44P: CMP Infiltration**

**Stage-Area-Storage for Pond 44P: CMP Infiltration**

| Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) | Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) |
|---------------------|-------------------|------------------------|---------------------|-------------------|------------------------|
| 266.50              | 0.055             | 0.000                  | 271.80              | 0.094             | 0.213                  |
| 266.60              | 0.056             | 0.002                  | 271.90              | 0.095             | 0.217                  |
| 266.70              | 0.057             | 0.004                  | 272.00              | 0.096             | 0.221                  |
| 266.80              | 0.058             | 0.007                  | 272.10              | 0.096             | 0.225                  |
| 266.90              | 0.058             | 0.009                  | 272.20              | 0.097             | 0.229                  |
| 267.00              | 0.059             | 0.011                  | 272.30              | 0.098             | 0.233                  |
| 267.10              | 0.060             | 0.014                  | 272.40              | 0.098             | 0.236                  |
| 267.20              | 0.061             | 0.017                  | 272.50              | 0.099             | 0.240                  |
| 267.30              | 0.061             | 0.020                  | 272.60              | 0.100             | 0.243                  |
| 267.40              | 0.062             | 0.023                  | 272.70              | 0.101             | 0.247                  |
| 267.50              | 0.063             | 0.027                  | 272.80              | 0.101             | 0.250                  |
| 267.60              | 0.063             | 0.030                  | 272.90              | 0.102             | 0.253                  |
| 267.70              | 0.064             | 0.034                  | 273.00              | 0.103             | 0.255                  |
| 267.80              | 0.065             | 0.038                  | 273.10              | 0.104             | 0.258                  |
| 267.90              | 0.066             | 0.042                  | 273.20              | 0.104             | 0.260                  |
| 268.00              | 0.066             | 0.045                  | 273.30              | 0.105             | 0.262                  |
| 268.10              | 0.067             | 0.049                  | 273.40              | 0.106             | 0.264                  |
| 268.20              | 0.068             | 0.054                  | 273.50              | 0.107             | 0.267                  |
| 268.30              | 0.069             | 0.058                  |                     |                   |                        |
| 268.40              | 0.069             | 0.062                  |                     |                   |                        |
| 268.50              | 0.070             | 0.066                  |                     |                   |                        |
| 268.60              | 0.071             | 0.070                  |                     |                   |                        |
| 268.70              | 0.071             | 0.075                  |                     |                   |                        |
| 268.80              | 0.072             | 0.079                  |                     |                   |                        |
| 268.90              | 0.073             | 0.083                  |                     |                   |                        |
| 269.00              | 0.074             | 0.088                  |                     |                   |                        |
| 269.10              | 0.074             | 0.092                  |                     |                   |                        |
| 269.20              | 0.075             | 0.097                  |                     |                   |                        |
| 269.30              | 0.076             | 0.101                  |                     |                   |                        |
| 269.40              | 0.077             | 0.106                  |                     |                   |                        |
| 269.50              | 0.077             | 0.110                  |                     |                   |                        |
| 269.60              | 0.078             | 0.115                  |                     |                   |                        |
| 269.70              | 0.079             | 0.120                  |                     |                   |                        |
| 269.80              | 0.080             | 0.124                  |                     |                   |                        |
| 269.90              | 0.080             | 0.129                  |                     |                   |                        |
| 270.00              | 0.081             | 0.133                  |                     |                   |                        |
| 270.10              | 0.082             | 0.138                  |                     |                   |                        |
| 270.20              | 0.082             | 0.142                  |                     |                   |                        |
| 270.30              | 0.083             | 0.147                  |                     |                   |                        |
| 270.40              | 0.084             | 0.152                  |                     |                   |                        |
| 270.50              | 0.085             | 0.156                  |                     |                   |                        |
| 270.60              | 0.085             | 0.161                  |                     |                   |                        |
| 270.70              | 0.086             | 0.165                  |                     |                   |                        |
| 270.80              | 0.087             | 0.170                  |                     |                   |                        |
| 270.90              | 0.088             | 0.174                  |                     |                   |                        |
| 271.00              | 0.088             | 0.179                  |                     |                   |                        |
| 271.10              | 0.089             | 0.183                  |                     |                   |                        |
| 271.20              | 0.090             | 0.187                  |                     |                   |                        |
| 271.30              | 0.090             | 0.192                  |                     |                   |                        |
| 271.40              | 0.091             | 0.196                  |                     |                   |                        |
| 271.50              | 0.092             | 0.200                  |                     |                   |                        |
| 271.60              | 0.093             | 0.205                  |                     |                   |                        |
| 271.70              | 0.093             | 0.209                  |                     |                   |                        |

## Summary for Pond 45P: Rain Garden

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=82)

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 3.72" for 25-Year event  
 Inflow = 17.93 cfs @ 12.18 hrs, Volume= 1.835 af  
 Outflow = 16.15 cfs @ 12.27 hrs, Volume= 1.836 af, Atten= 10%, Lag= 5.2 min  
 Discarded = 3.60 cfs @ 12.27 hrs, Volume= 1.462 af  
 Primary = 12.56 cfs @ 12.27 hrs, Volume= 0.374 af  
 Routed to Link 15L : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 259.76' @ 12.27 hrs Surf.Area= 12,037 sf Storage= 13,983 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 25.1 min ( 837.2 - 812.0 )

| Volume    | Invert  | Avail.Storage | Storage Description                                                                           |
|-----------|---------|---------------|-----------------------------------------------------------------------------------------------|
| #1        | 255.50' | 6,443 cf      | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)<br>16,107 cf Overall x 40.0% Voids |
| #2        | 258.50' | 10,400 cf     | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)                                    |
| 16,843 cf |         |               | Total Available Storage                                                                       |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 255.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 258.50           | 5,369             | 313.0         | 16,107                 | 16,107                 | 6,308            |

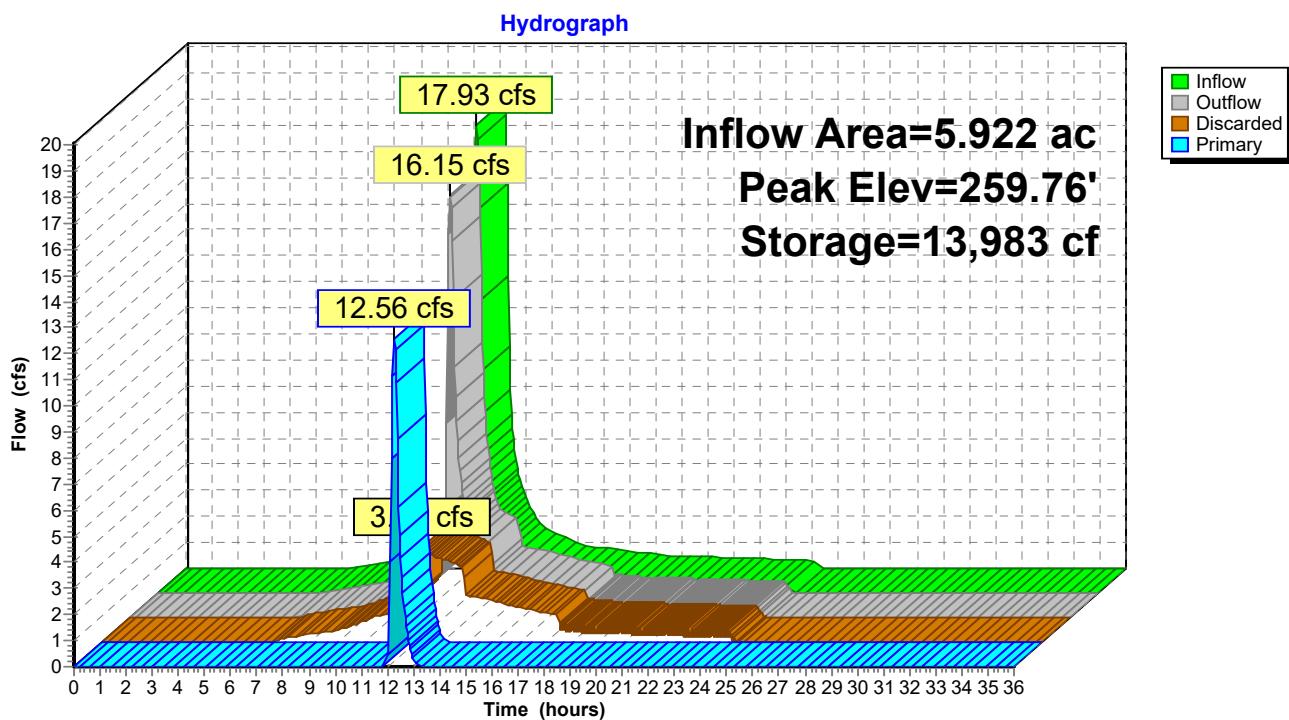
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 258.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 260.00           | 6,938             | 357.4         | 9,205                  | 9,205                  | 7,790            |
| 260.17           | 7,118             | 360.5         | 1,195                  | 10,400                 | 7,978            |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                    |
|--------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 253.71' | <b>24.0" Round Culvert</b><br>L= 32.0' CMP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 253.71' / 253.36' S= 0.0109 '/' Cc= 0.900<br>n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf |
| #2     | Discarded | 255.50' | <b>8.270 in/hr Exfiltration over Surface area</b><br>Conductivity to Groundwater Elevation = 251.50'                                                                                                              |
| #3     | Device 1  | 259.55' | <b>2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows</b> C= 0.600<br>Limited to weir flow at low heads                                                                                                     |
| #4     | Primary   | 259.05' | <b>6.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40<br>Coef. (English) 2.80 2.92                                                                                              |

**Discarded OutFlow** Max=3.59 cfs @ 12.27 hrs HW=259.75' (Free Discharge)  
 ↗  
 ↗ 2=Exfiltration (Controls 3.59 cfs)

**Primary OutFlow** Max=12.51 cfs @ 12.27 hrs HW=259.75' TW=0.00' (Dynamic Tailwater)  
 ↗ 1=Culvert (Passes 2.17 cfs of 26.82 cfs potential flow)  
 ↗ 3=Orifice/Grate (Orifice Controls 2.17 cfs @ 2.17 fps)  
 ↗ 4=Broad-Crested Rectangular Weir (Weir Controls 10.34 cfs @ 2.45 fps)

### Pond 45P: Rain Garden



**Stage-Area-Storage for Pond 45P: Rain Garden**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|
| 255.50              | 5,369              | 0                       |
| 255.60              | 5,369              | 215                     |
| 255.70              | 5,369              | 430                     |
| 255.80              | 5,369              | 644                     |
| 255.90              | 5,369              | 859                     |
| 256.00              | 5,369              | 1,074                   |
| 256.10              | 5,369              | 1,289                   |
| 256.20              | 5,369              | 1,503                   |
| 256.30              | 5,369              | 1,718                   |
| 256.40              | 5,369              | 1,933                   |
| 256.50              | 5,369              | 2,148                   |
| 256.60              | 5,369              | 2,362                   |
| 256.70              | 5,369              | 2,577                   |
| 256.80              | 5,369              | 2,792                   |
| 256.90              | 5,369              | 3,007                   |
| 257.00              | 5,369              | 3,221                   |
| 257.10              | 5,369              | 3,436                   |
| 257.20              | 5,369              | 3,651                   |
| 257.30              | 5,369              | 3,866                   |
| 257.40              | 5,369              | 4,080                   |
| 257.50              | 5,369              | 4,295                   |
| 257.60              | 5,369              | 4,510                   |
| 257.70              | 5,369              | 4,725                   |
| 257.80              | 5,369              | 4,939                   |
| 257.90              | 5,369              | 5,154                   |
| 258.00              | 5,369              | 5,369                   |
| 258.10              | 5,369              | 5,584                   |
| 258.20              | 5,369              | 5,799                   |
| 258.30              | 5,369              | 6,013                   |
| 258.40              | 5,369              | 6,228                   |
| 258.50              | 10,738             | 6,443                   |
| 258.60              | 10,836             | 6,985                   |
| 258.70              | 10,936             | 7,536                   |
| 258.80              | 11,036             | 8,098                   |
| 258.90              | 11,137             | 8,670                   |
| 259.00              | 11,239             | 9,252                   |
| 259.10              | 11,341             | 9,844                   |
| 259.20              | 11,445             | 10,446                  |
| 259.30              | 11,550             | 11,059                  |
| 259.40              | 11,655             | 11,682                  |
| 259.50              | 11,762             | 12,316                  |
| 259.60              | 11,869             | 12,961                  |
| 259.70              | 11,977             | 13,616                  |
| 259.80              | 12,086             | 14,282                  |
| 259.90              | 12,196             | 14,960                  |
| 260.00              | 12,307             | 15,648                  |
| 260.10              | 12,413             | 16,347                  |

### Summary for Link 15L: DP-1

Inflow Area = 7.403 ac, 63.79% Impervious, Inflow Depth = 0.90" for 25-Year event

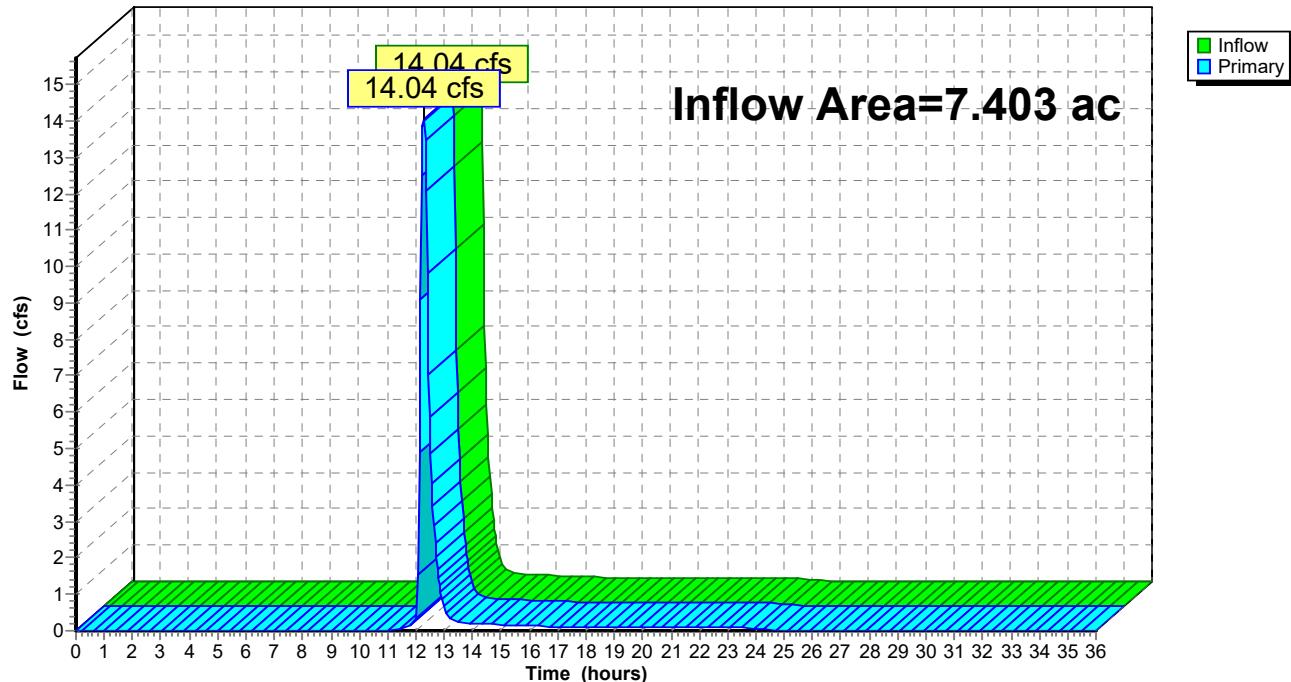
Inflow = 14.04 cfs @ 12.27 hrs, Volume= 0.552 af

Primary = 14.04 cfs @ 12.27 hrs, Volume= 0.552 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 15L: DP-1

Hydrograph

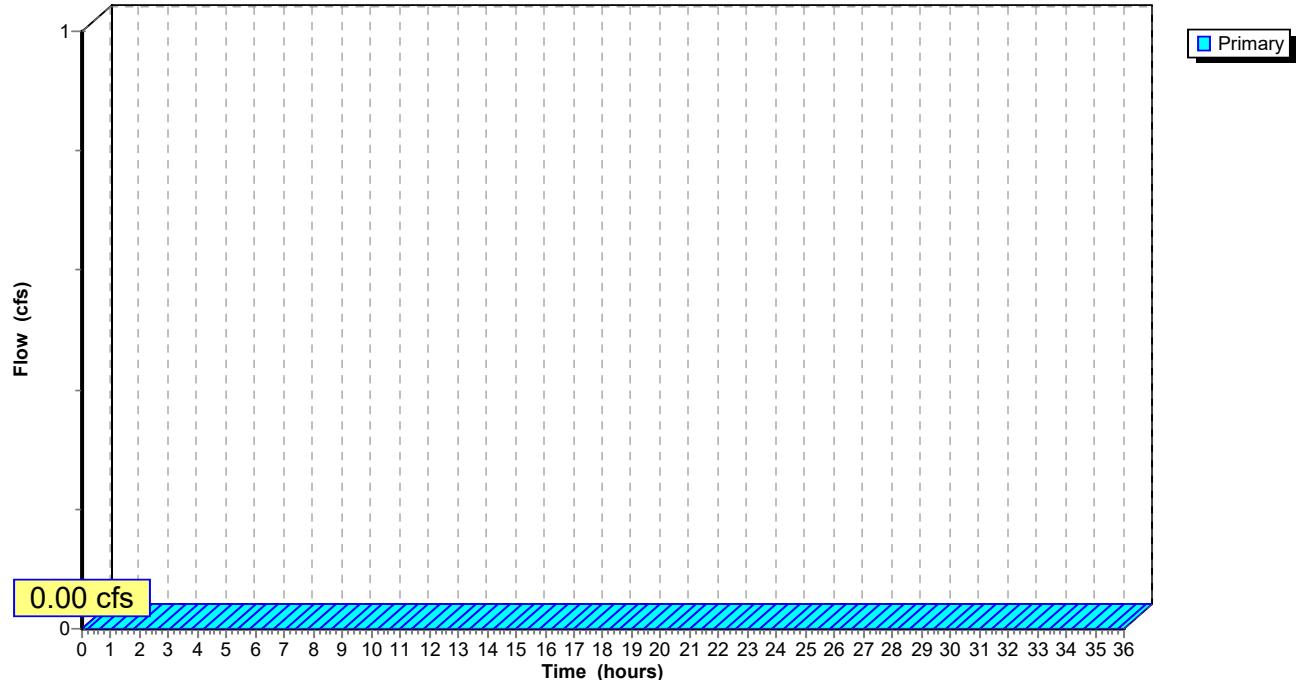


**Summary for Link 16L: DP-2**

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

**Link 16L: DP-2****Hydrograph**

### Summary for Link 17L: DP-3

Inflow Area = 0.094 ac, 0.00% Impervious, Inflow Depth = 3.46" for 25-Year event

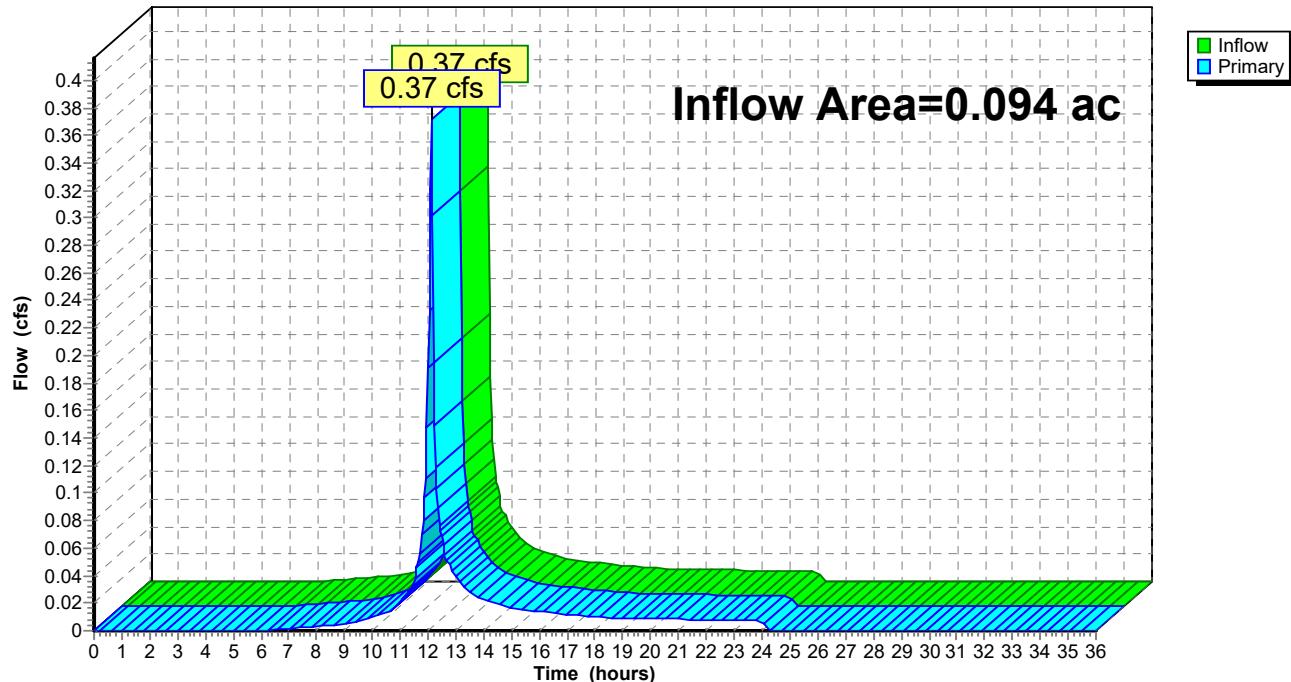
Inflow = 0.37 cfs @ 12.12 hrs, Volume= 0.027 af

Primary = 0.37 cfs @ 12.12 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 17L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points x 3  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1S: PR-1**

Runoff Area=64,521 sf 26.38% Impervious Runoff Depth=2.12"  
Flow Length=350' Tc=15.5 min CN=55 Runoff=2.34 cfs 0.262 af

**Subcatchment2S: PR-2**

Runoff Area=5,989 sf 81.43% Impervious Runoff Depth=6.29"  
Tc=5.0 min CN=94 Runoff=0.88 cfs 0.072 af

**Subcatchment3S: PR-3**

Runoff Area=8,817 sf 74.45% Impervious Runoff Depth=6.05"  
Tc=5.0 min CN=92 Runoff=1.27 cfs 0.102 af

**Subcatchment4S: PR-4**

Runoff Area=6,680 sf 84.81% Impervious Runoff Depth=6.05"  
Tc=5.0 min CN=92 Runoff=0.96 cfs 0.077 af

**Subcatchment5S: PR-5**

Runoff Area=7,314 sf 77.13% Impervious Runoff Depth=5.59"  
Tc=5.0 min CN=88 Runoff=1.01 cfs 0.078 af

**Subcatchment6S: PR-6**

Runoff Area=15,528 sf 55.11% Impervious Runoff Depth=3.83"  
Tc=5.0 min CN=72 Runoff=1.56 cfs 0.114 af

**Subcatchment7S: PR-7**

Runoff Area=8,803 sf 79.89% Impervious Runoff Depth=5.37"  
Tc=5.0 min CN=86 Runoff=1.18 cfs 0.090 af

**Subcatchment8S: PR-8**

Runoff Area=16,139 sf 53.26% Impervious Runoff Depth=5.03"  
Tc=5.0 min CN=83 Runoff=2.06 cfs 0.155 af

**Subcatchment9S: PR-9**

Runoff Area=7,180 sf 75.68% Impervious Runoff Depth=5.71"  
Flow Length=127' Tc=7.1 min CN=89 Runoff=0.92 cfs 0.078 af

**Subcatchment10S: PR-10**

Runoff Area=4,103 sf 0.00% Impervious Runoff Depth=4.47"  
Tc=5.0 min CN=78 Runoff=0.48 cfs 0.035 af

**Subcatchment11S: PR-11**

Runoff Area=12,349 sf 77.12% Impervious Runoff Depth=6.05"  
Flow Length=257' Tc=6.6 min CN=92 Runoff=1.66 cfs 0.143 af

**Subcatchment12S: PR-12**

Runoff Area=12,764 sf 71.19% Impervious Runoff Depth=5.94"  
Tc=5.0 min CN=91 Runoff=1.82 cfs 0.145 af

**Subcatchment13S: PR-13**

Runoff Area=7,593 sf 39.33% Impervious Runoff Depth=3.10"  
Flow Length=246' Tc=16.1 min CN=65 Runoff=0.42 cfs 0.045 af

**Subcatchment14S: PR-14**

Runoff Area=3,225 sf 82.26% Impervious Runoff Depth=5.71"  
Flow Length=166' Tc=7.3 min CN=89 Runoff=0.41 cfs 0.035 af

**Subcatchment15S: PR-15**

Runoff Area=2,717 sf 85.79% Impervious Runoff Depth=5.82"  
Tc=5.0 min CN=90 Runoff=0.38 cfs 0.030 af

**Subcatchment16S: PR-16**

Runoff Area=1,349 sf 100.00% Impervious Runoff Depth=6.76"  
Flow Length=247' Tc=16.1 min CN=98 Runoff=0.14 cfs 0.017 af

|                               |                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment23S: PR-17</b> | Runoff Area=14,295 sf 71.70% Impervious Runoff Depth=5.82"<br>Tc=5.0 min CN=90 Runoff=2.02 cfs 0.159 af                   |
| <b>Subcatchment24S: PR-18</b> | Runoff Area=9,416 sf 96.73% Impervious Runoff Depth=6.52"<br>Flow Length=189' Tc=7.1 min CN=96 Runoff=1.28 cfs 0.118 af   |
| <b>Subcatchment25S: PR-19</b> | Runoff Area=1,787 sf 75.15% Impervious Runoff Depth=5.03"<br>Tc=5.0 min CN=83 Runoff=0.23 cfs 0.017 af                    |
| <b>Subcatchment26S: PR-20</b> | Runoff Area=6,894 sf 87.28% Impervious Runoff Depth=5.82"<br>Tc=5.0 min CN=90 Runoff=0.97 cfs 0.077 af                    |
| <b>Subcatchment27S: PR-21</b> | Runoff Area=6,877 sf 87.79% Impervious Runoff Depth=5.94"<br>Tc=5.0 min CN=91 Runoff=0.98 cfs 0.078 af                    |
| <b>Subcatchment28S: PR-22</b> | Runoff Area=5,124 sf 73.32% Impervious Runoff Depth=5.14"<br>Tc=5.0 min CN=84 Runoff=0.67 cfs 0.050 af                    |
| <b>Subcatchment29S: PR-23</b> | Runoff Area=6,611 sf 79.08% Impervious Runoff Depth=5.59"<br>Tc=5.0 min CN=88 Runoff=0.91 cfs 0.071 af                    |
| <b>Subcatchment30S: PR-24</b> | Runoff Area=5,313 sf 80.16% Impervious Runoff Depth=5.59"<br>Tc=5.0 min CN=88 Runoff=0.73 cfs 0.057 af                    |
| <b>Subcatchment31S: PR-25</b> | Runoff Area=8,212 sf 59.72% Impervious Runoff Depth=4.69"<br>Flow Length=218' Tc=11.9 min CN=80 Runoff=0.77 cfs 0.074 af  |
| <b>Subcatchment32S: PR-26</b> | Runoff Area=5,770 sf 92.53% Impervious Runoff Depth=6.29"<br>Tc=5.0 min CN=94 Runoff=0.85 cfs 0.069 af                    |
| <b>Subcatchment33S: PR-27</b> | Runoff Area=5,730 sf 91.10% Impervious Runoff Depth=6.17"<br>Tc=5.0 min CN=93 Runoff=0.83 cfs 0.068 af                    |
| <b>Subcatchment34S: PR-28</b> | Runoff Area=4,491 sf 45.51% Impervious Runoff Depth=3.62"<br>Flow Length=193' Tc=14.0 min CN=70 Runoff=0.31 cfs 0.031 af  |
| <b>Subcatchment35S: PR-29</b> | Runoff Area=1,417 sf 81.37% Impervious Runoff Depth=5.48"<br>Tc=5.0 min CN=87 Runoff=0.19 cfs 0.015 af                    |
| <b>Subcatchment36S: PR-30</b> | Runoff Area=8,853 sf 73.61% Impervious Runoff Depth=4.92"<br>Flow Length=198' Tc=5.4 min CN=82 Runoff=1.09 cfs 0.083 af   |
| <b>Subcatchment37S: PR-31</b> | Runoff Area=9,984 sf 75.99% Impervious Runoff Depth=5.14"<br>Flow Length=205' Tc=5.3 min CN=84 Runoff=1.28 cfs 0.098 af   |
| <b>Subcatchment38S: PR-32</b> | Runoff Area=16,004 sf 53.26% Impervious Runoff Depth=3.62"<br>Flow Length=154' Tc=14.9 min CN=70 Runoff=1.07 cfs 0.111 af |
| <b>Subcatchment39S: PR-33</b> | Runoff Area=7,626 sf 79.02% Impervious Runoff Depth=5.37"<br>Tc=5.0 min CN=86 Runoff=1.02 cfs 0.078 af                    |
| <b>Subcatchment40S: PR-34</b> | Runoff Area=3,135 sf 83.67% Impervious Runoff Depth=5.59"<br>Flow Length=134' Tc=5.6 min CN=88 Runoff=0.42 cfs 0.034 af   |

**Subcatchment41S: PR-35** Runoff Area=459 sf 98.47% Impervious Runoff Depth=6.64"  
Tc=5.0 min CN=97 Runoff=0.07 cfs 0.006 af

**Subcatchment42S: PR-36** Runoff Area=6,465 sf 87.47% Impervious Runoff Depth=5.94"  
Tc=5.0 min CN=91 Runoff=0.92 cfs 0.073 af

**Subcatchment43S: PR-37** Runoff Area=7,047 sf 90.17% Impervious Runoff Depth=6.05"  
Tc=5.0 min CN=92 Runoff=1.02 cfs 0.082 af

**Pond 44P: CMP Infiltration** Peak Elev=271.31' Storage=0.192 af Inflow=31.41 cfs 2.632 af  
Discarded=0.22 cfs 0.282 af Primary=20.92 cfs 2.350 af Outflow=21.14 cfs 2.632 af

**Pond 45P: Rain Garden** Peak Elev=259.88' Storage=14,801 cf Inflow=20.92 cfs 2.350 af  
Discarded=3.67 cfs 1.749 af Primary=15.92 cfs 0.602 af Outflow=19.59 cfs 2.350 af

**Link 15L: DP-1** Inflow=18.28 cfs 0.864 af  
Primary=18.28 cfs 0.864 af

**Link 16L: DP-2** Primary=0.00 cfs 0.000 af

**Link 17L: DP-3** Inflow=0.48 cfs 0.035 af  
Primary=0.48 cfs 0.035 af

**Total Runoff Area = 7.497 ac Runoff Volume = 2.929 af Average Runoff Depth = 4.69"**  
**37.01% Pervious = 2.775 ac 62.99% Impervious = 4.723 ac**

### Summary for Subcatchment 1S: PR-1

Runoff = 2.34 cfs @ 12.25 hrs, Volume= 0.262 af, Depth= 2.12"  
 Routed to Link 15L : DP-1

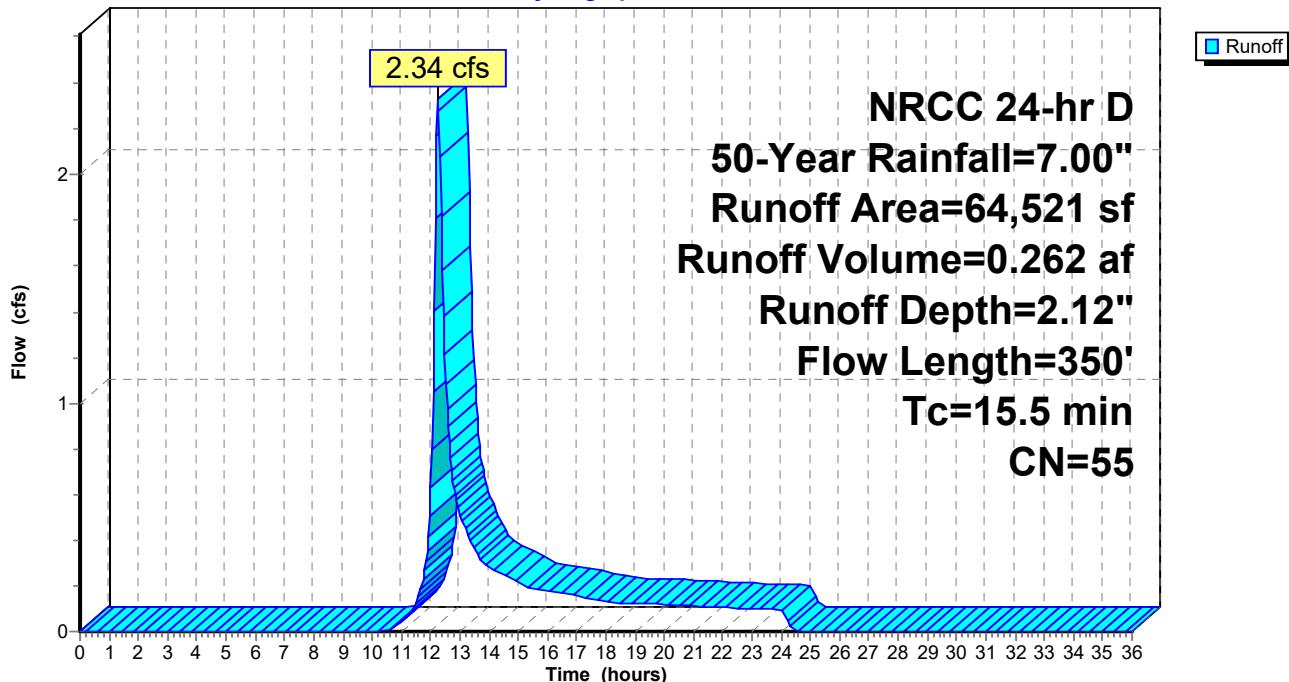
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 12,935    | 98 | Paved parking, HSG A            |
| *         | 98 | Cement Concrete Sidewalk, HSG A |
|           | 39 | >75% Grass cover, Good, HSG A   |
|           | 74 | >75% Grass cover, Good, HSG C   |
|           | 55 | Weighted Average                |
| 46,449    |    | 73.62% Pervious Area            |
| 1,052     |    | 26.38% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                               |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------------------------------------------|
| 2.7         | 50               | 0.3333           | 0.31                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 10.8        | 60               | 0.0150           | 0.09                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 2.0         | 240              | 0.0150           | 1.97                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps |
| 15.5        | 350              |                  |                      |                   | Total                                                     |

### Subcatchment 1S: PR-1

Hydrograph



### Summary for Subcatchment 2S: PR-2

Runoff = 0.88 cfs @ 12.11 hrs, Volume= 0.072 af, Depth= 6.29"  
 Routed to Pond 44P : CMP Infiltration

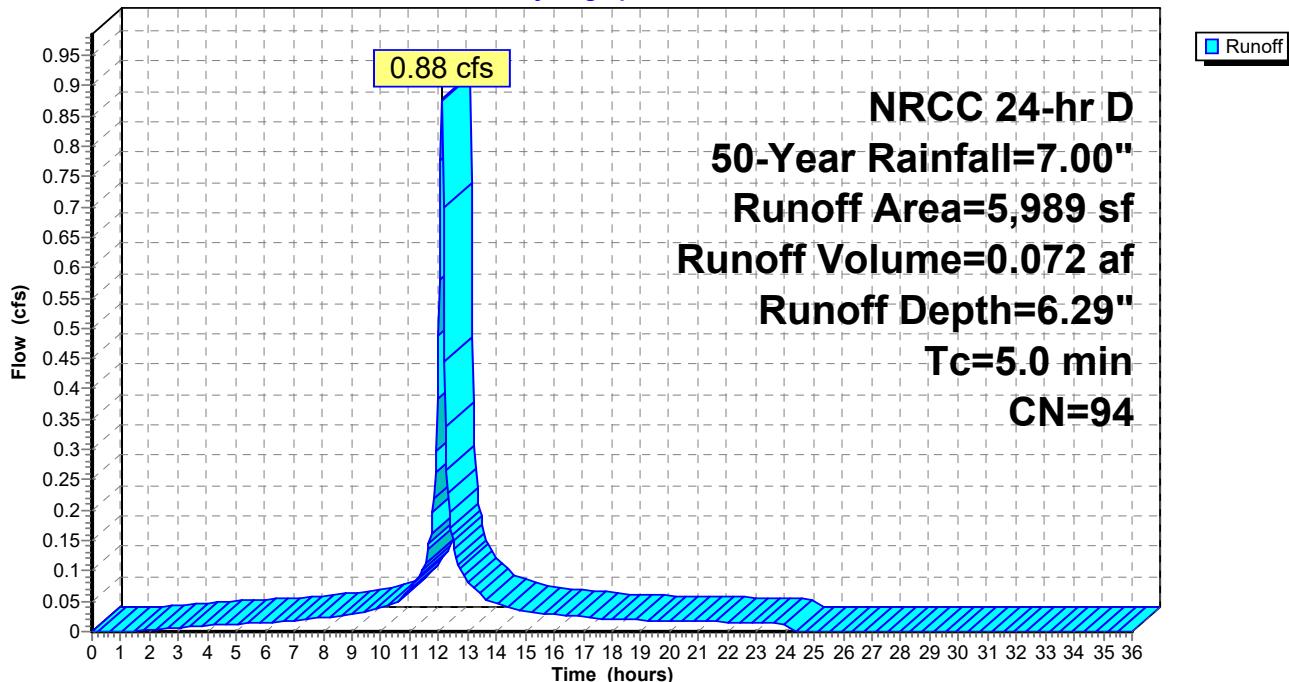
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,187 | 98 Paved parking, HSG C            |
| *         | 690   | 98 Cement Concrete Sidewalk, HSG C |
| 1,112     | 74    | >75% Grass cover, Good, HSG C      |
| 5,989     | 94    | Weighted Average                   |
| 1,112     |       | 18.57% Pervious Area               |
| 4,877     |       | 81.43% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 2S: PR-2

Hydrograph



### Summary for Subcatchment 3S: PR-3

Runoff = 1.27 cfs @ 12.11 hrs, Volume= 0.102 af, Depth= 6.05"  
 Routed to Pond 44P : CMP Infiltration

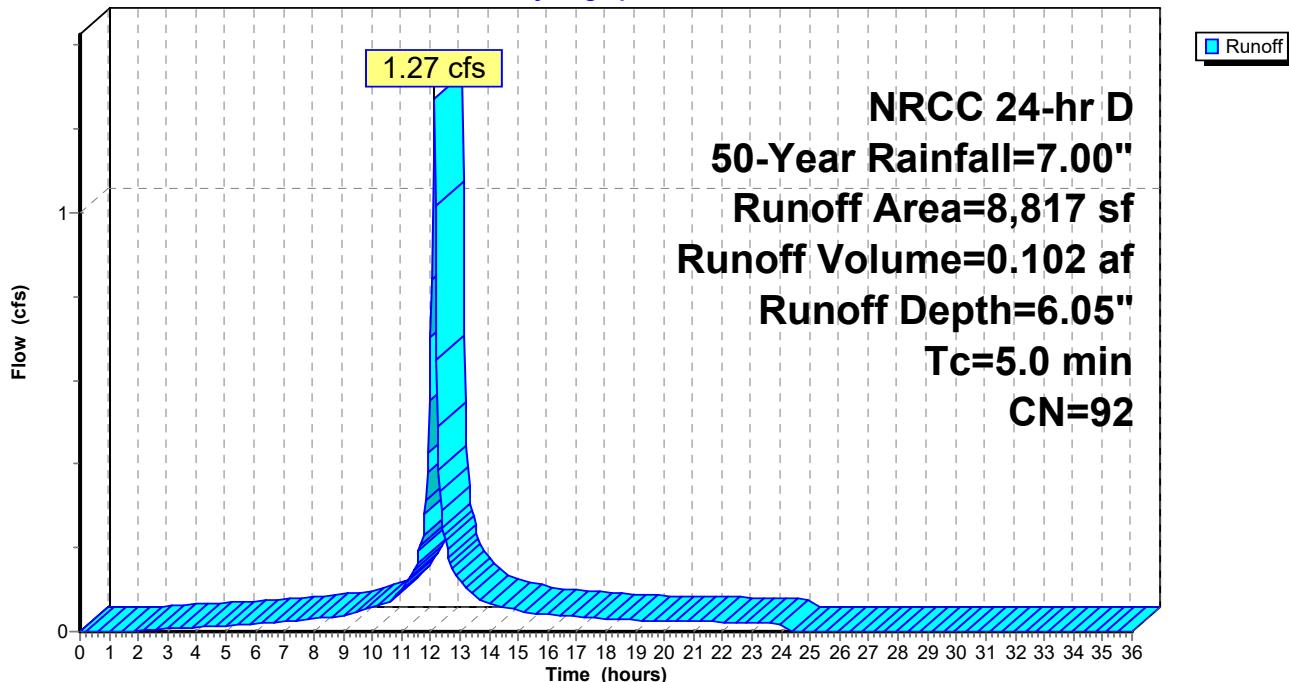
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf)               | CN | Description                     |
|-------------------------|----|---------------------------------|
| * 5,618<br>946<br>2,253 | 98 | Paved parking, HSG C            |
|                         | 98 | Cement Concrete Sidewalk, HSG C |
|                         | 74 | >75% Grass cover, Good, HSG C   |
| 8,817                   | 92 | Weighted Average                |
| 2,253                   |    | 25.55% Pervious Area            |
| 6,564                   |    | 74.45% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 3S: PR-3

Hydrograph



### Summary for Subcatchment 4S: PR-4

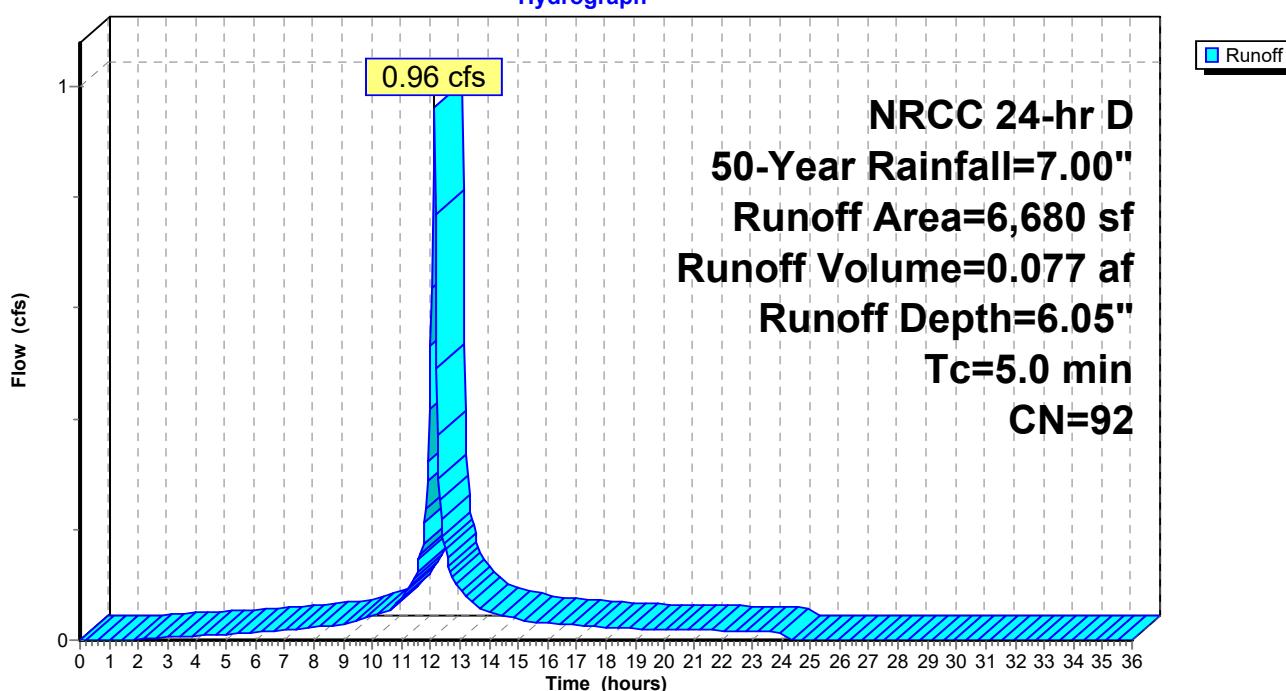
Runoff = 0.96 cfs @ 12.11 hrs, Volume= 0.077 af, Depth= 6.05"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf)            | CN                | Description                     |                      |
|----------------------|-------------------|---------------------------------|----------------------|
| 2,045                | 98                | Paved parking, HSG C            |                      |
| *                    | 2,781             | Paved parking, HSG A            |                      |
| *                    | 424               | Cement Concrete Sidewalk, HSG C |                      |
| *                    | 415               | Cement Concrete Sidewalk, HSG A |                      |
| 559                  | 74                | >75% Grass cover, Good, HSG C   |                      |
| 456                  | 39                | >75% Grass cover, Good, HSG A   |                      |
| 6,680                | 92                | Weighted Average                |                      |
| 1,015                |                   | 15.19% Pervious Area            |                      |
| 5,665                |                   | 84.81% Impervious Area          |                      |
|                      |                   |                                 |                      |
| Tc<br>(min)          | Length<br>(feet)  | Slope<br>(ft/ft)                |                      |
| Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                     |                      |
| 5.0                  |                   |                                 | Direct Entry, Direct |

### Subcatchment 4S: PR-4

Hydrograph



### Summary for Subcatchment 5S: PR-5

Runoff = 1.01 cfs @ 12.11 hrs, Volume= 0.078 af, Depth= 5.59"  
 Routed to Pond 44P : CMP Infiltration

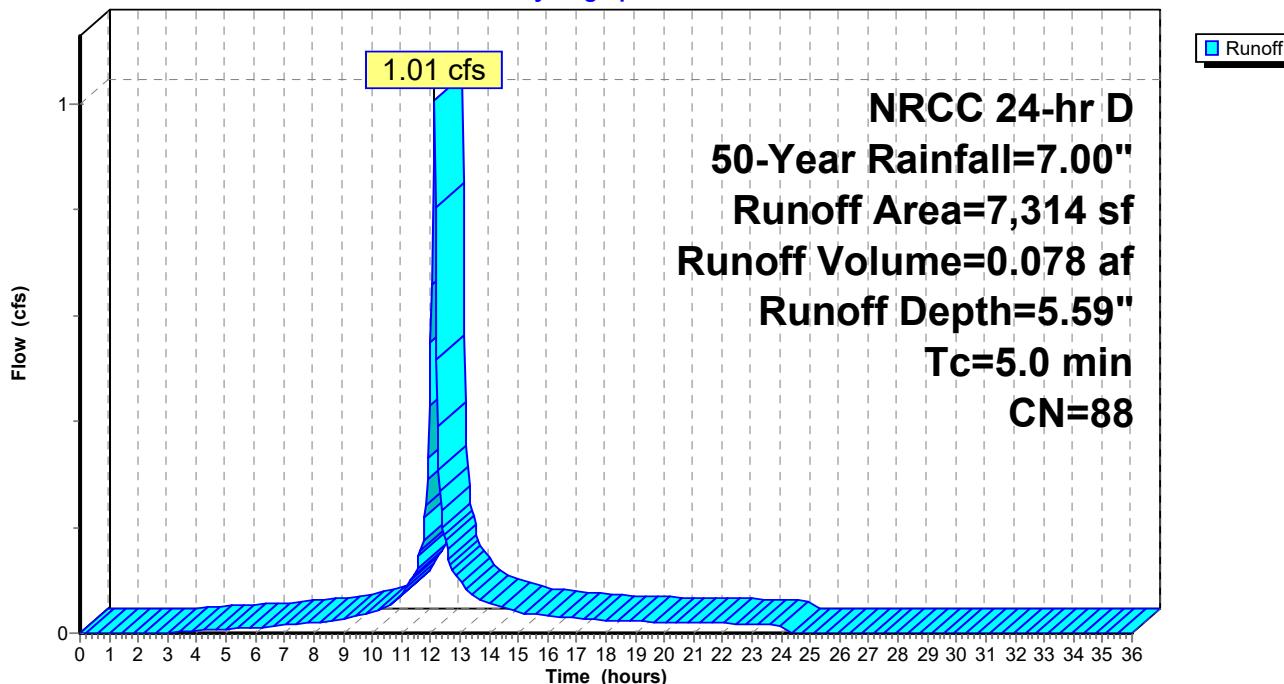
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,817 | 98 Paved parking, HSG A            |
| *         | 3,106 | 98 Paved parking, HSG C            |
| *         | 327   | 98 Cement Concrete Sidewalk, HSG C |
| *         | 391   | 98 Cement Concrete Sidewalk, HSG A |
|           | 725   | >75% Grass cover, Good, HSG C      |
|           | 948   | >75% Grass cover, Good, HSG A      |
| 7,314     | 88    | Weighted Average                   |
| 1,673     |       | 22.87% Pervious Area               |
| 5,641     |       | 77.13% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 5S: PR-5

Hydrograph



### Summary for Subcatchment 6S: PR-6

Runoff = 1.56 cfs @ 12.12 hrs, Volume= 0.114 af, Depth= 3.83"  
 Routed to Pond 44P : CMP Infiltration

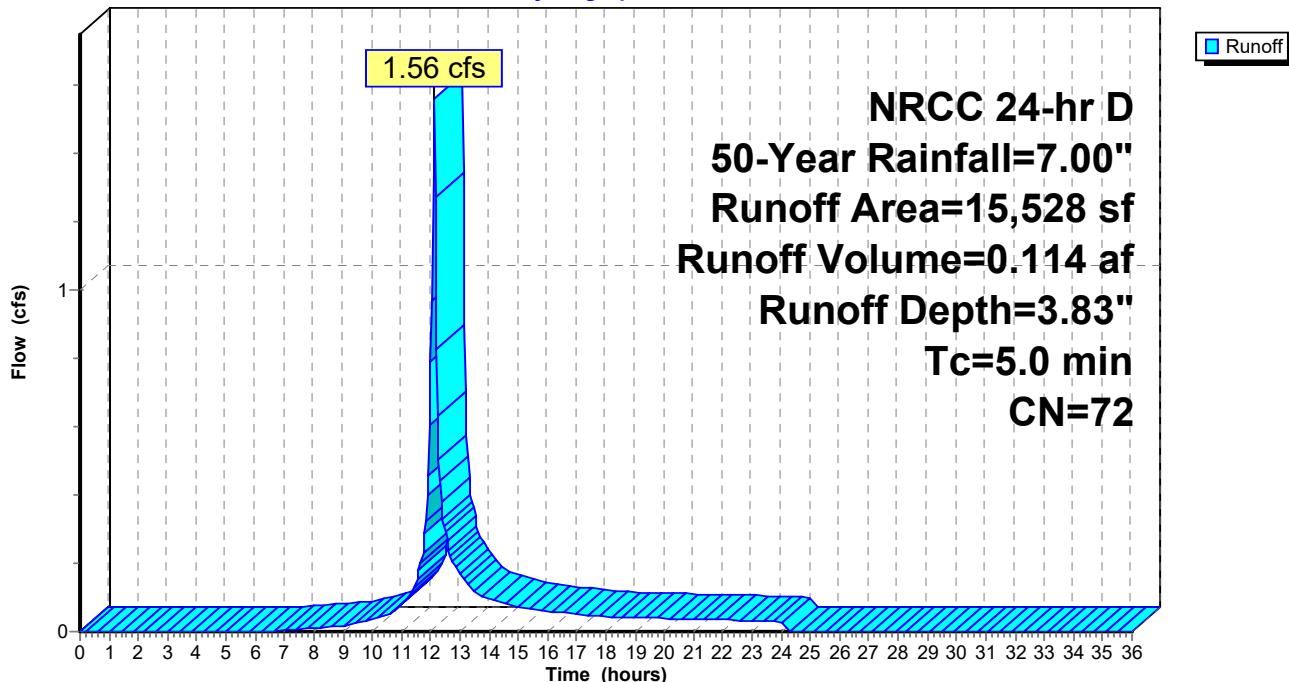
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,081 | 98 Paved parking, HSG A            |
| *         | 1,477 | 98 Cement Concrete Sidewalk, HSG A |
| 6,970     | 39    | >75% Grass cover, Good, HSG A      |
| 15,528    | 72    | Weighted Average                   |
| 6,970     |       | 44.89% Pervious Area               |
| 8,558     |       | 55.11% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 6S: PR-6

Hydrograph



### Summary for Subcatchment 7S: PR-7

Runoff = 1.18 cfs @ 12.12 hrs, Volume= 0.090 af, Depth= 5.37"  
 Routed to Pond 44P : CMP Infiltration

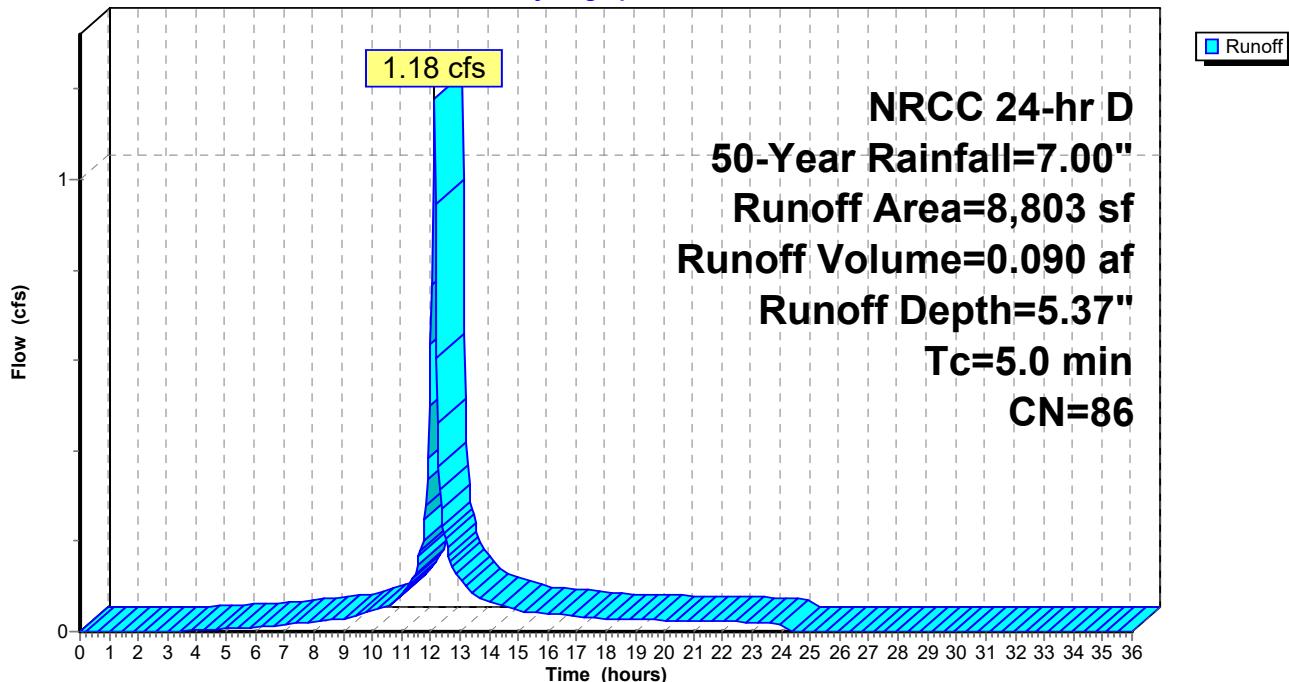
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,946 | 98 Paved parking, HSG A            |
| *         | 1,087 | 98 Cement Concrete Sidewalk, HSG A |
|           | 1,770 | >75% Grass cover, Good, HSG A      |
|           | 8,803 | Weighted Average                   |
|           | 1,770 | 20.11% Pervious Area               |
|           | 7,033 | 79.89% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 7S: PR-7

Hydrograph



### Summary for Subcatchment 8S: PR-8

Runoff = 2.06 cfs @ 12.12 hrs, Volume= 0.155 af, Depth= 5.03"  
 Routed to Pond 44P : CMP Infiltration

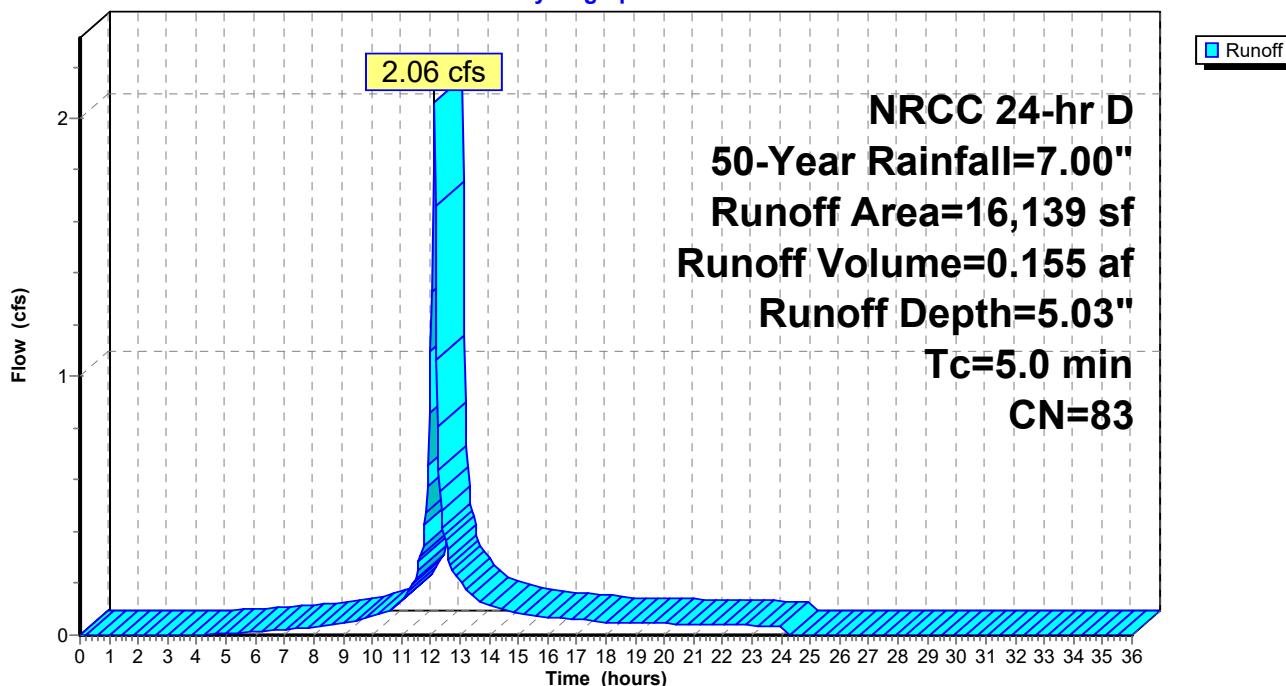
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 2,974 | 98 Paved parking, HSG A            |
| *         | 4,084 | 98 Paved parking, HSG C            |
| *         | 1,148 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 390   | 98 Cement Concrete Sidewalk, HSG A |
|           | 1,872 | >75% Grass cover, Good, HSG A      |
|           | 5,671 | >75% Grass cover, Good, HSG C      |
| 16,139    | 83    | Weighted Average                   |
| 7,543     |       | 46.74% Pervious Area               |
| 8,596     |       | 53.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 8S: PR-8

Hydrograph



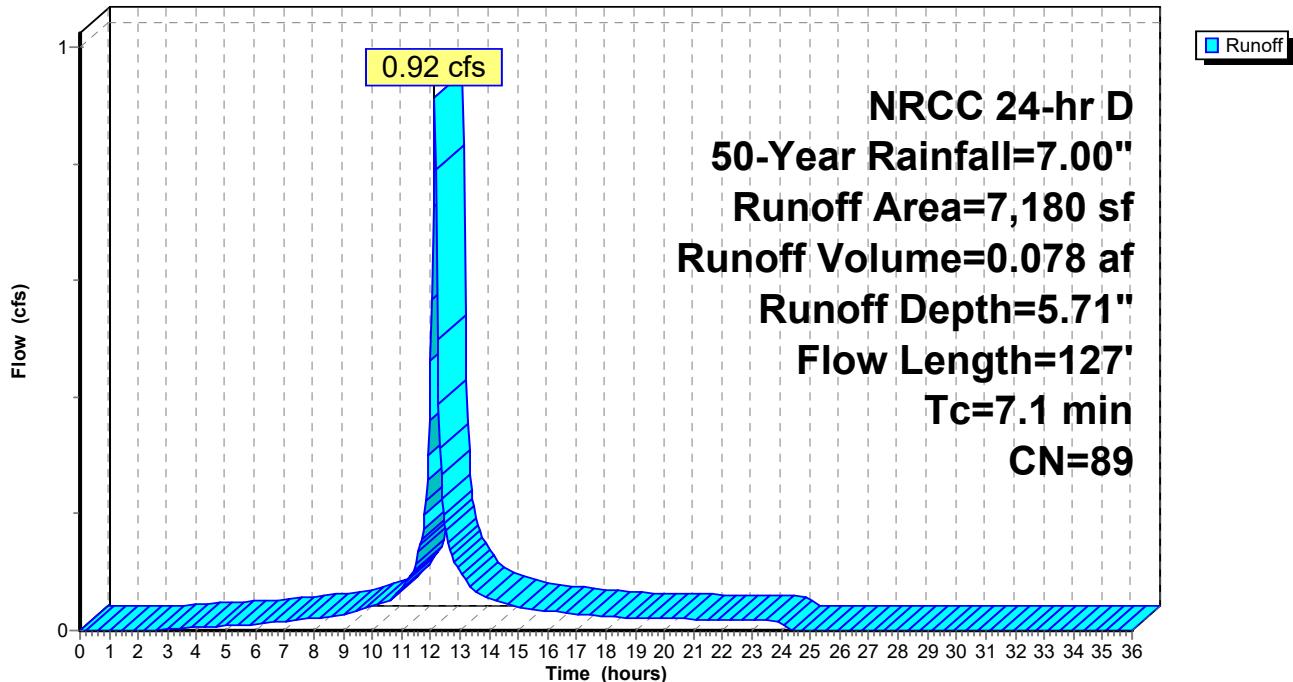
### Summary for Subcatchment 9S: PR-9

Runoff = 0.92 cfs @ 12.14 hrs, Volume= 0.078 af, Depth= 5.71"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 532   | 98 Paved parking, HSG A            |
| *         | 3,859 | 98 Paved parking, HSG C            |
| *         | 216   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 827   | 98 Cement Concrete Sidewalk, HSG C |
|           | 570   | >75% Grass cover, Good, HSG A      |
|           | 1,176 | >75% Grass cover, Good, HSG C      |
| 7,180     | 89    | Weighted Average                   |
| 1,746     |       | 24.32% Pervious Area               |
| 5,434     |       | 75.68% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.7         | 75               | 0.0050           | 0.74                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 27               | 0.0050           | 1.44                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 127              | Total            |                      |                   |                                                                   |

**Subcatchment 9S: PR-9****Hydrograph**

### Summary for Subcatchment 10S: PR-10

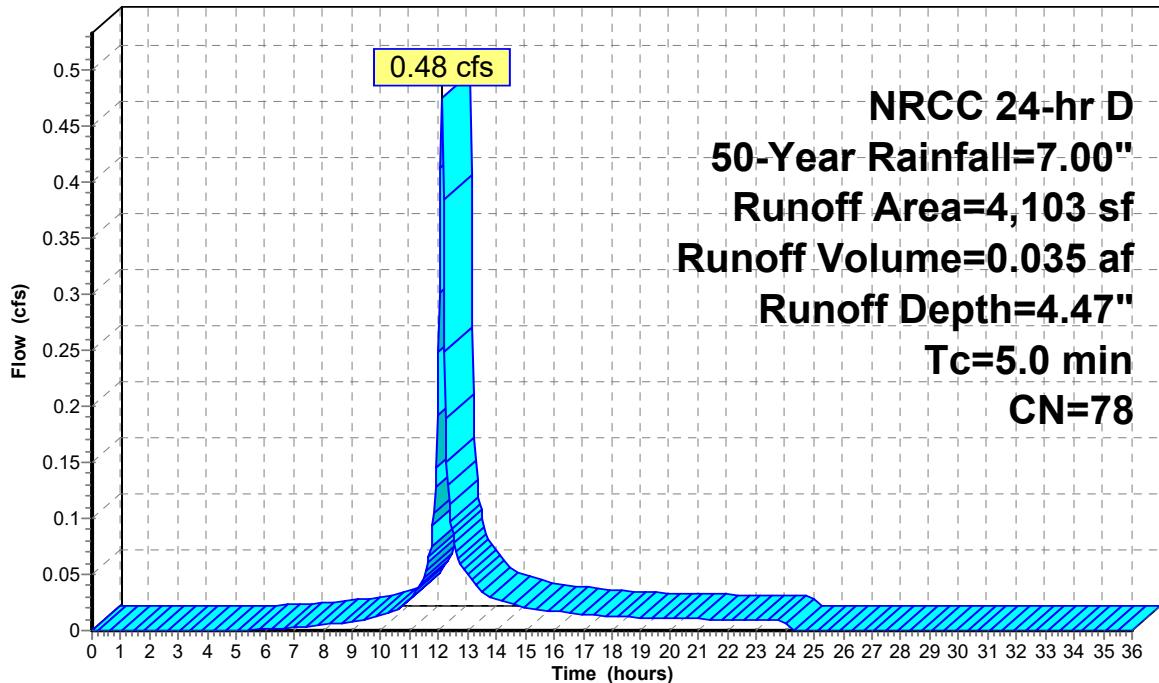
Runoff = 0.48 cfs @ 12.12 hrs, Volume= 0.035 af, Depth= 4.47"  
 Routed to Link 17L : DP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN            | Description                                                |  |                      |
|-----------|---------------|------------------------------------------------------------|--|----------------------|
| 1,584     | 74            | >75% Grass cover, Good, HSG C                              |  |                      |
| 2,519     | 80            | >75% Grass cover, Good, HSG D                              |  |                      |
| 4,103     | 78            | Weighted Average                                           |  |                      |
| 4,103     |               | 100.00% Pervious Area                                      |  |                      |
| Tc (min)  | Length (feet) | Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description |  |                      |
| 5.0       |               |                                                            |  | Direct Entry, DIRECT |

### Subcatchment 10S: PR-10

Hydrograph



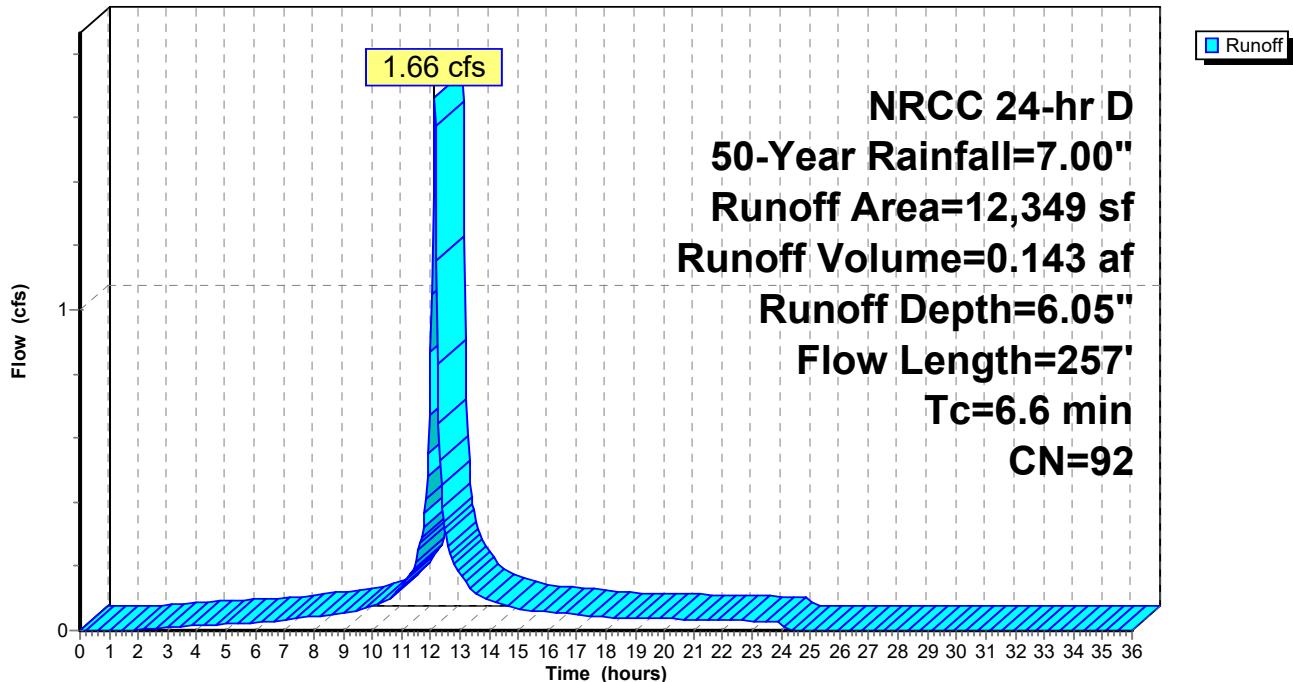
### Summary for Subcatchment 11S: PR-11

Runoff = 1.66 cfs @ 12.13 hrs, Volume= 0.143 af, Depth= 6.05"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,691 | 98 Paved parking, HSG C            |
| *         | 276   | 98 Paved parking, HSG A            |
| *         | 1,371 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 185   | 98 Cement Concrete Sidewalk, HSG A |
| 2,481     | 74    | >75% Grass cover, Good, HSG C      |
| 345       | 39    | >75% Grass cover, Good, HSG A      |
| 12,349    | 92    | Weighted Average                   |
| 2,826     |       | 22.88% Pervious Area               |
| 9,523     |       | 77.12% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.8         | 75               | 0.0350           | 1.61                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 157              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 6.6         | 257              | Total            |                      |                   |                                                                   |

**Subcatchment 11S: PR-11****Hydrograph**

### Summary for Subcatchment 12S: PR-12

Runoff = 1.82 cfs @ 12.11 hrs, Volume= 0.145 af, Depth= 5.94"  
 Routed to Pond 44P : CMP Infiltration

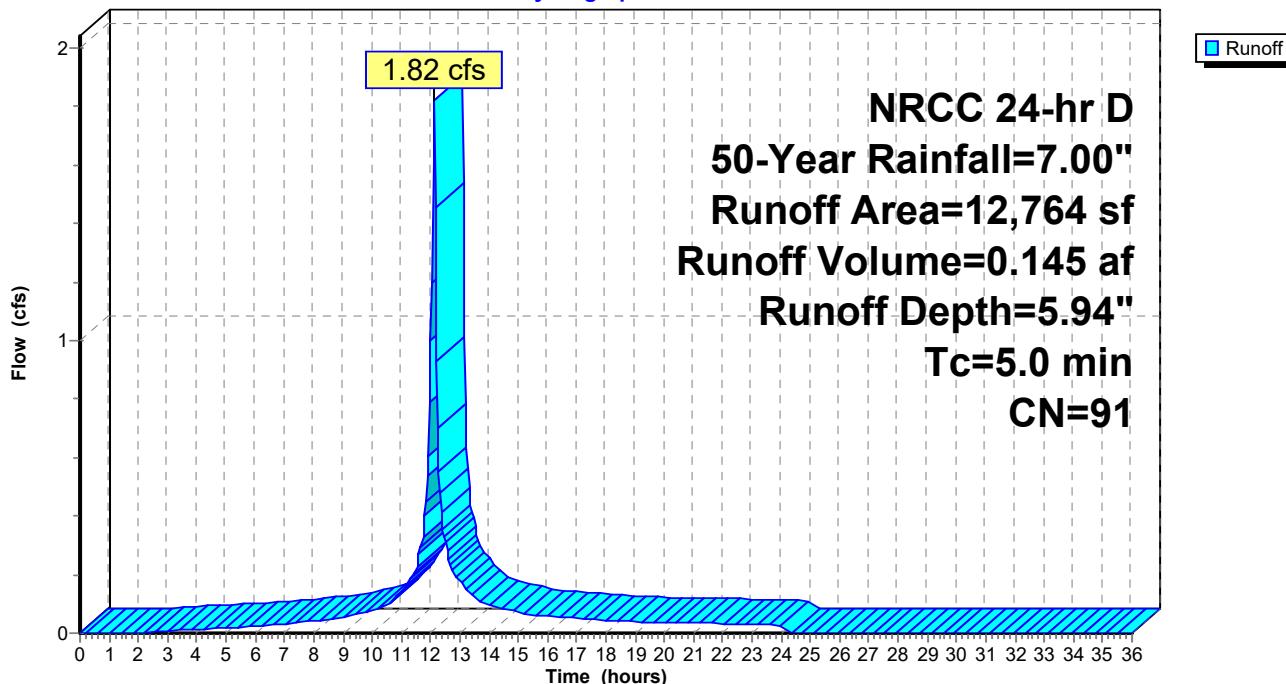
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,226 | 98 Paved parking, HSG C            |
| *         | 139   | 98 Paved parking, HSG A            |
| *         | 1,592 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 130   | 98 Cement Concrete Sidewalk, HSG A |
| 3,543     | 74    | >75% Grass cover, Good, HSG C      |
| 134       | 39    | >75% Grass cover, Good, HSG A      |
| 12,764    | 91    | Weighted Average                   |
| 3,677     |       | 28.81% Pervious Area               |
| 9,087     |       | 71.19% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 12S: PR-12

Hydrograph



### Summary for Subcatchment 18S: PR-13

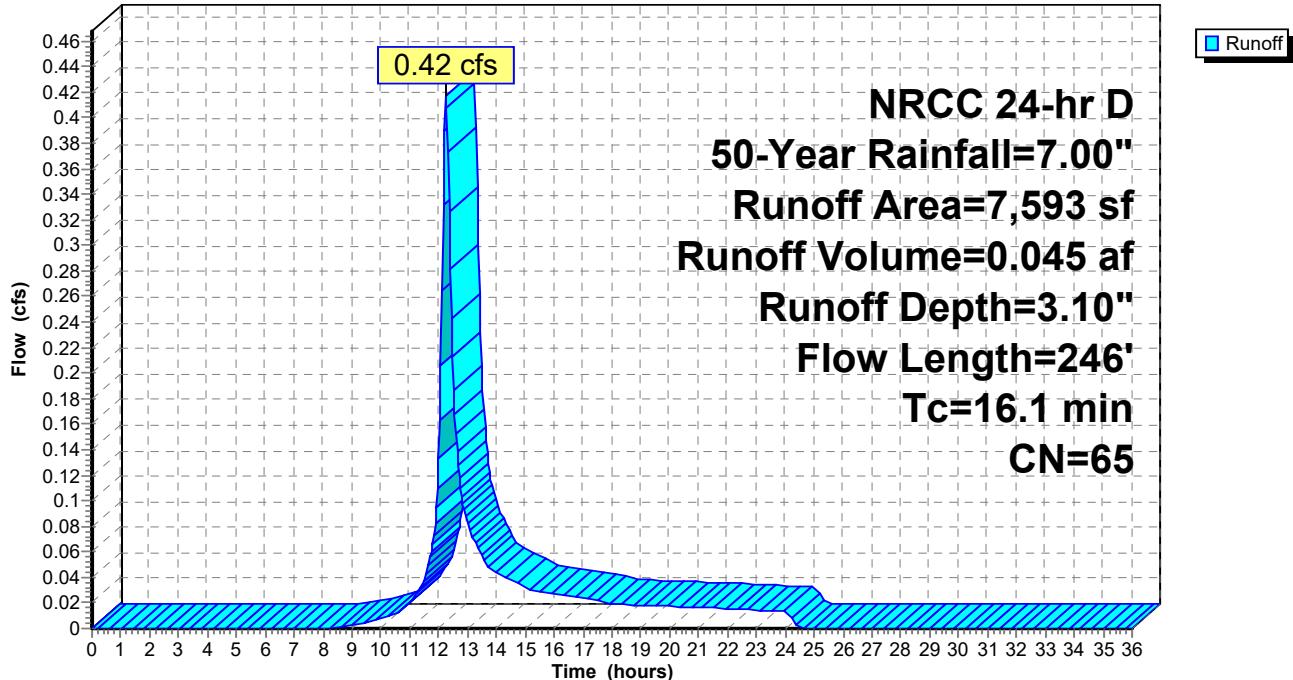
Runoff = 0.42 cfs @ 12.25 hrs, Volume= 0.045 af, Depth= 3.10"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 131       | 98 | Paved parking, HSG C            |
| * 2,672   | 98 | Paved parking, HSG A            |
| * 183     | 98 | Cement Concrete Sidewalk, HSG C |
| 499       | 74 | >75% Grass cover, Good, HSG C   |
| 4,108     | 39 | >75% Grass cover, Good, HSG A   |

|       |    |                        |
|-------|----|------------------------|
| 7,593 | 65 | Weighted Average       |
| 4,607 |    | 60.67% Pervious Area   |
| 2,986 |    | 39.33% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 108              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 246              | Total            |                      |                   |                                                                          |

**Subcatchment 18S: PR-13****Hydrograph**

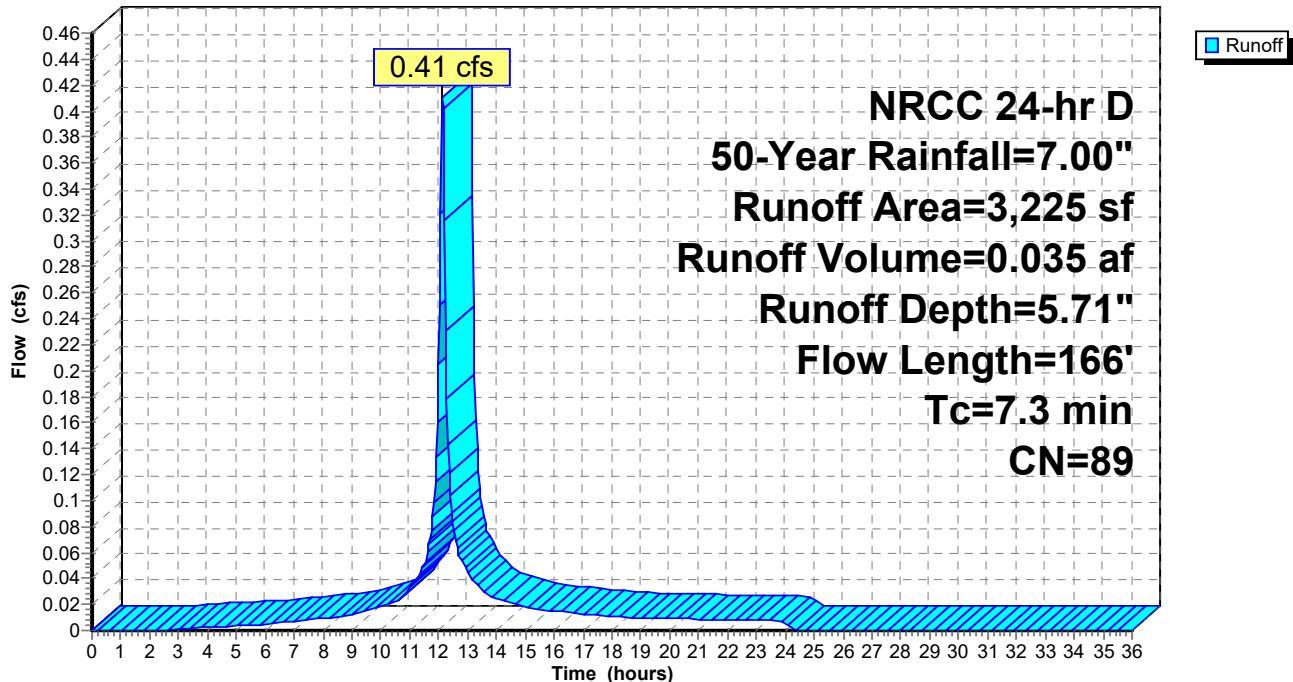
### Summary for Subcatchment 19S: PR-14

Runoff = 0.41 cfs @ 12.14 hrs, Volume= 0.035 af, Depth= 5.71"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 199   | 98 Paved parking, HSG C            |
| *         | 2,132 | 98 Paved parking, HSG A            |
| *         | 322   | 98 Cement Concrete Sidewalk, HSG A |
|           | 126   | >75% Grass cover, Good, HSG C      |
|           | 446   | >75% Grass cover, Good, HSG A      |
| 3,225     | 89    | Weighted Average                   |
| 572       |       | 17.74% Pervious Area               |
| 2,653     |       | 82.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 6.3         | 33               | 0.0500           | 0.09                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.7         | 67               | 0.0350           | 1.57                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 66               | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.3         | 166              | Total            |                      |                   |                                                                   |

**Subcatchment 19S: PR-14****Hydrograph**

### Summary for Subcatchment 20S: PR-15

Runoff = 0.38 cfs @ 12.11 hrs, Volume= 0.030 af, Depth= 5.82"  
 Routed to Pond 44P : CMP Infiltration

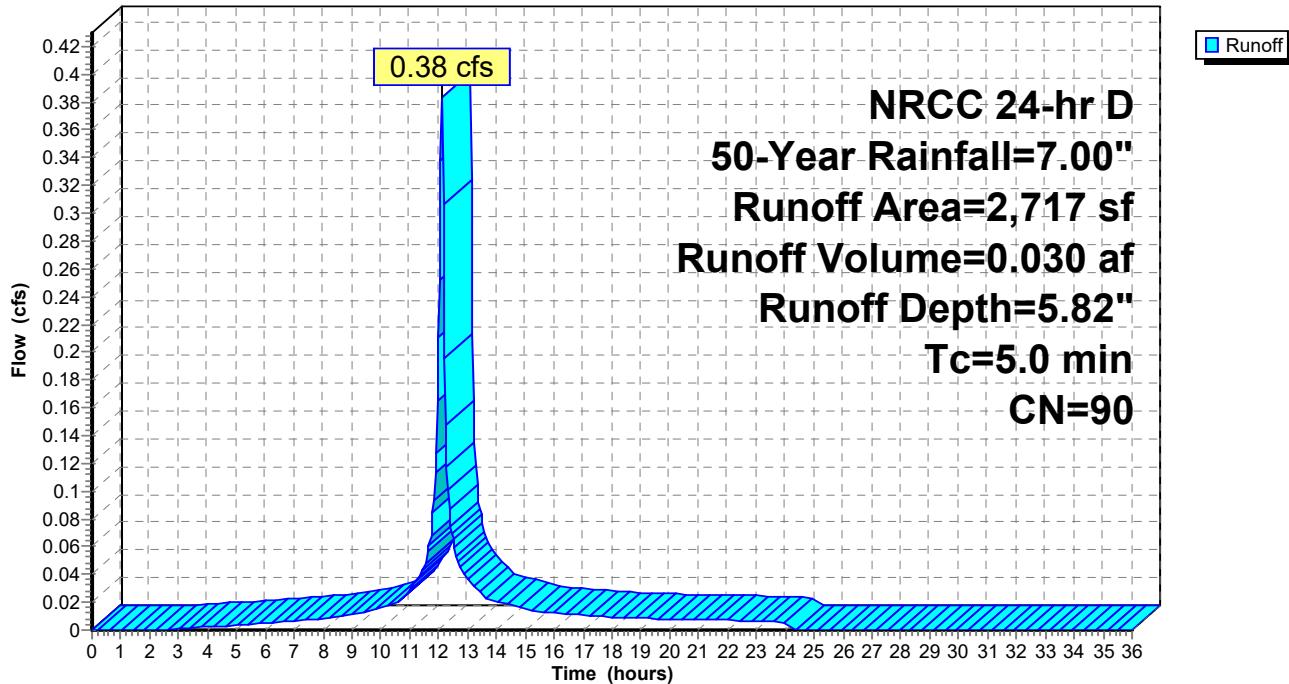
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,331     | 98 | Paved parking, HSG A          |
| 386       | 39 | >75% Grass cover, Good, HSG A |
| 2,717     | 90 | Weighted Average              |
| 386       |    | 14.21% Pervious Area          |
| 2,331     |    | 85.79% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 20S: PR-15

Hydrograph



### Summary for Subcatchment 22S: PR-16

Runoff = 0.14 cfs @ 12.24 hrs, Volume= 0.017 af, Depth= 6.76"  
 Routed to Pond 44P : CMP Infiltration

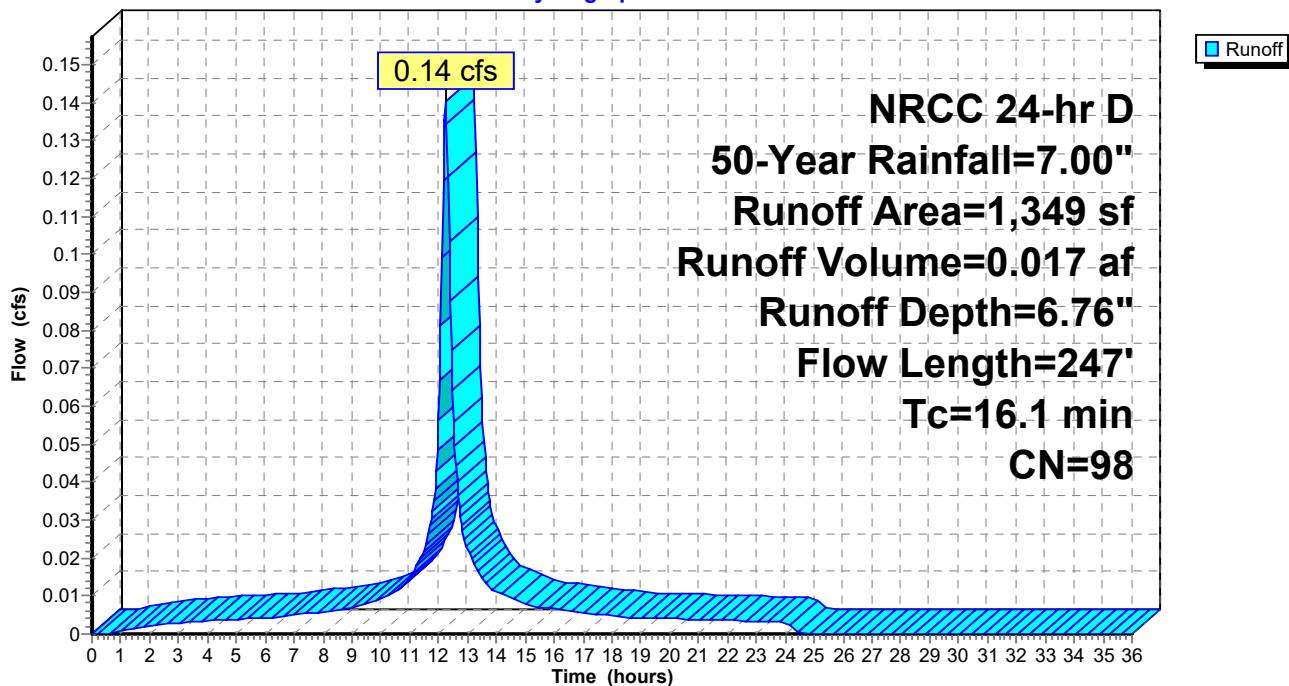
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN  | Description             |
|-----------|-----|-------------------------|
| *         | 614 | Paved parking, HSG A    |
| *         | 735 | Paved parking, HSG C    |
| 1,349     | 98  | Weighted Average        |
| 1,349     |     | 100.00% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 109              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 247              | Total            |                      |                   |                                                                          |

### Subcatchment 22S: PR-16

Hydrograph



### Summary for Subcatchment 23S: PR-17

Runoff = 2.02 cfs @ 12.11 hrs, Volume= 0.159 af, Depth= 5.82"  
 Routed to Pond 44P : CMP Infiltration

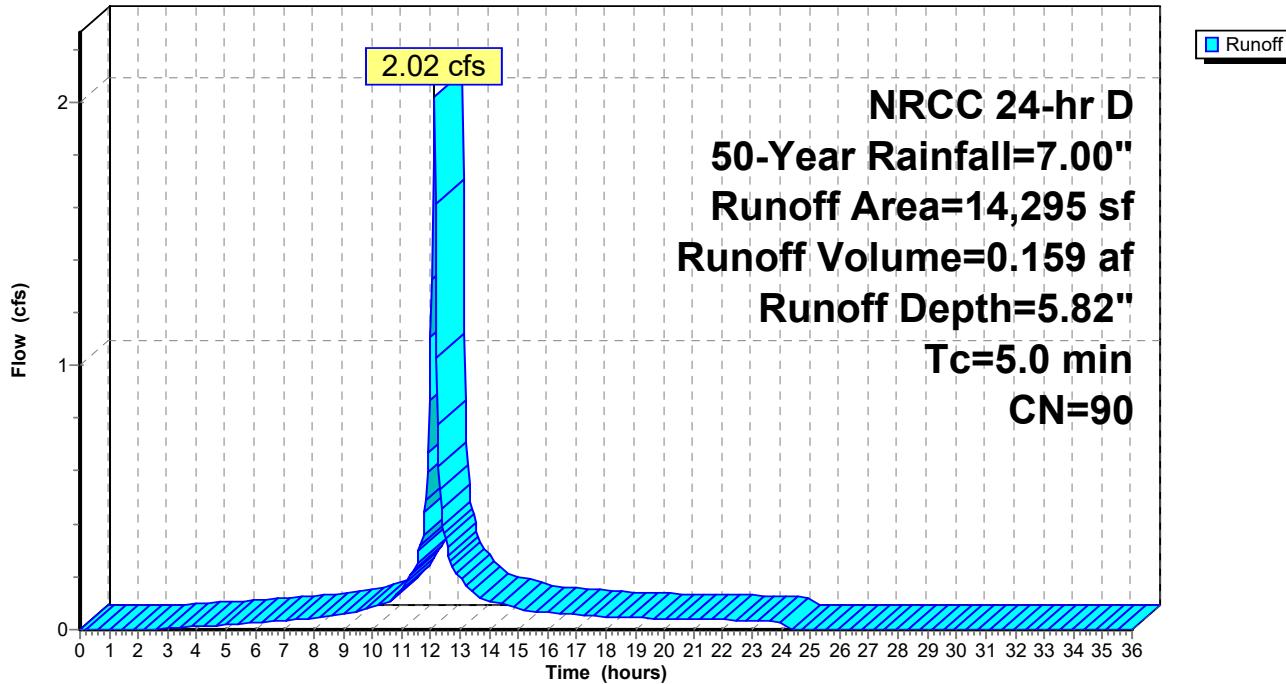
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 447   | 98 Paved parking, HSG A            |
| *         | 7,461 | 98 Paved parking, HSG C            |
| *         | 2,341 | 98 Cement Concrete Sidewalk, HSG C |
|           | 488   | >75% Grass cover, Good, HSG A      |
|           | 3,558 | >75% Grass cover, Good, HSG C      |
| 14,295    | 90    | Weighted Average                   |
| 4,046     |       | 28.30% Pervious Area               |
| 10,249    |       | 71.70% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 23S: PR-17

Hydrograph



### Summary for Subcatchment 24S: PR-18

Runoff = 1.28 cfs @ 12.14 hrs, Volume= 0.118 af, Depth= 6.52"  
 Routed to Pond 44P : CMP Infiltration

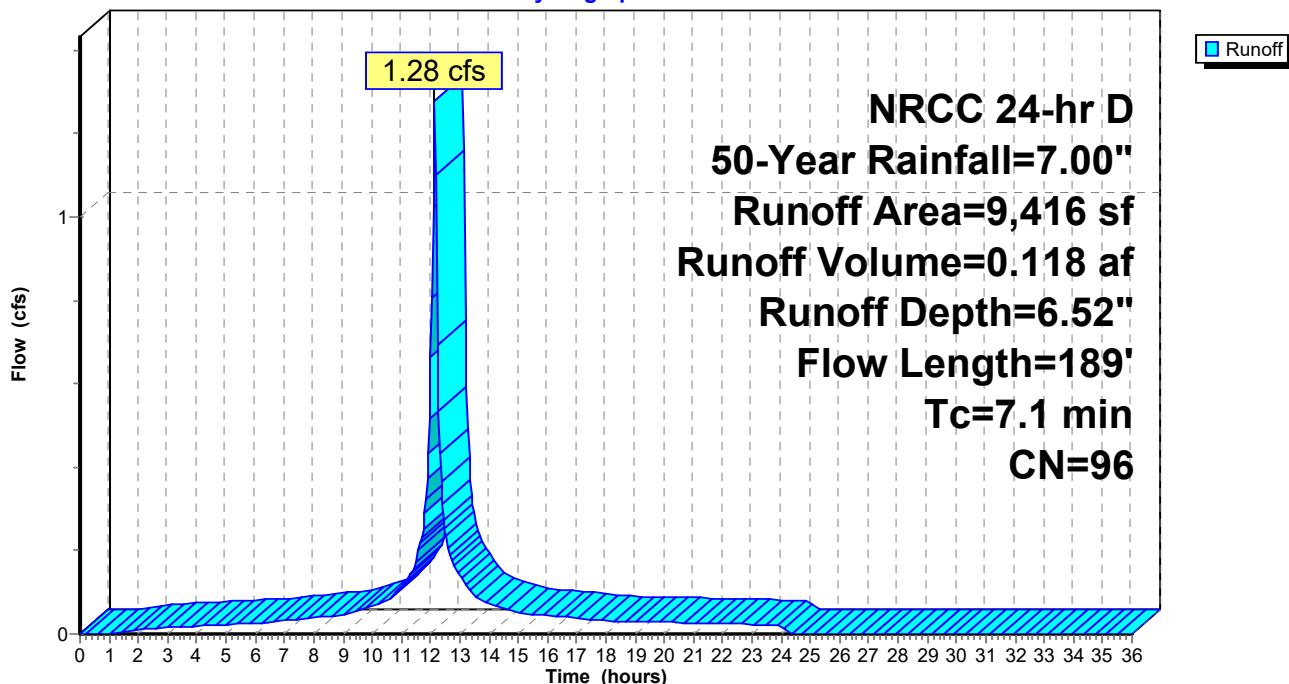
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,554 | 98 Paved parking, HSG A            |
| *         | 4,554 | 98 Cement Concrete Sidewalk, HSG A |
| 308       | 39    | >75% Grass cover, Good, HSG A      |
| 9,416     | 96    | Weighted Average                   |
| 308       |       | 3.27% Pervious Area                |
| 9,108     |       | 96.73% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.7         | 29               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.9         | 71               | 0.0200           | 1.27                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.5         | 89               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 189              | Total            |                      |                   |                                                                   |

### Subcatchment 24S: PR-18

Hydrograph



### Summary for Subcatchment 25S: PR-19

Runoff = 0.23 cfs @ 12.12 hrs, Volume= 0.017 af, Depth= 5.03"  
 Routed to Pond 44P : CMP Infiltration

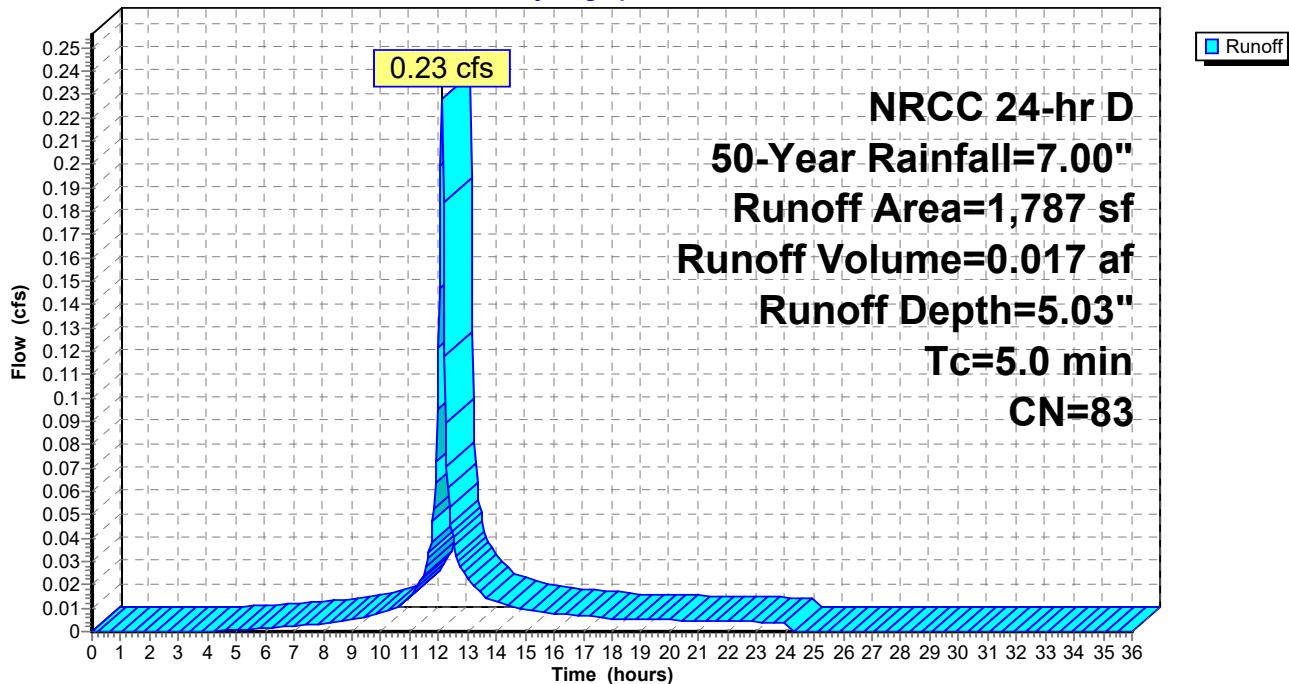
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 1,006 | 98 Paved parking, HSG A         |
| *         | 337   | Cement Concrete Sidewalk, HSG A |
|           | 444   | >75% Grass cover, Good, HSG A   |
| 1,787     | 83    | Weighted Average                |
| 444       |       | 24.85% Pervious Area            |
| 1,343     |       | 75.15% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 25S: PR-19

Hydrograph



### Summary for Subcatchment 26S: PR-20

Runoff = 0.97 cfs @ 12.11 hrs, Volume= 0.077 af, Depth= 5.82"  
 Routed to Pond 44P : CMP Infiltration

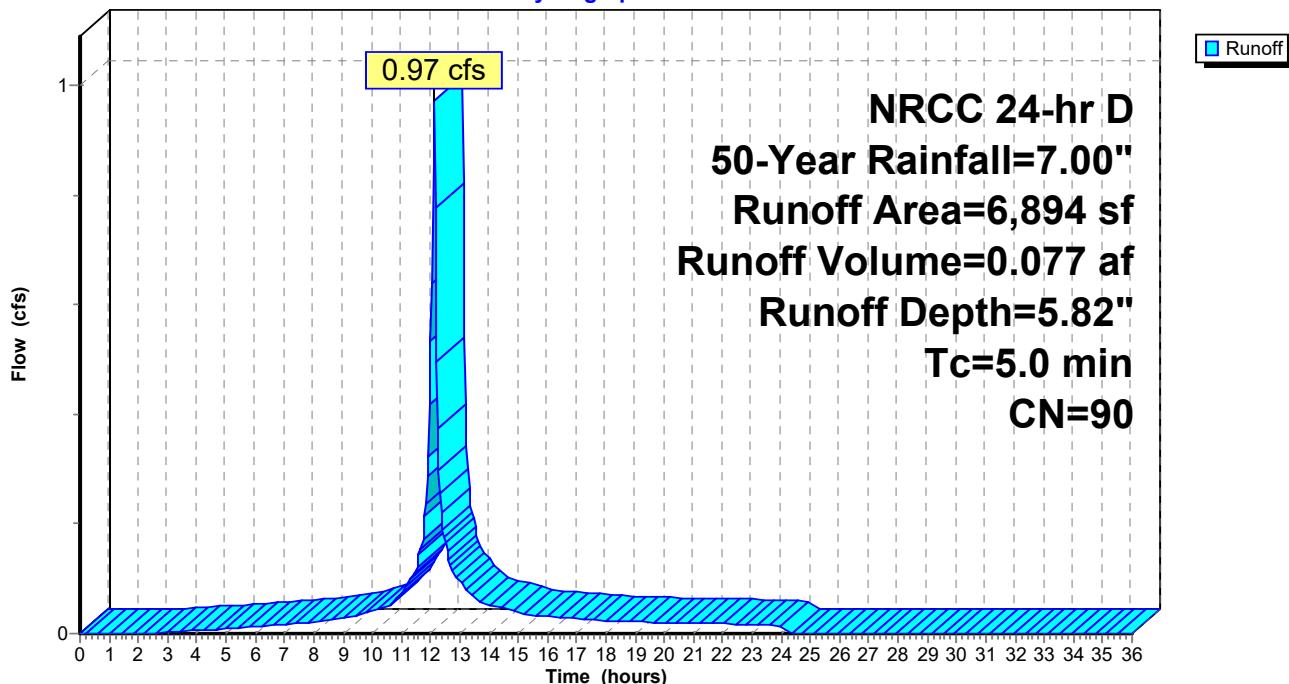
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,689 | 98 Paved parking, HSG A         |
| *         | 1,328 | Cement Concrete Sidewalk, HSG A |
|           | 877   | >75% Grass cover, Good, HSG A   |
|           | 6,894 | Weighted Average                |
|           | 877   | 12.72% Pervious Area            |
|           | 6,017 | 87.28% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 26S: PR-20

Hydrograph



## Summary for Subcatchment 27S: PR-21

Runoff = 0.98 cfs @ 12.11 hrs, Volume= 0.078 af, Depth= 5.94"  
 Routed to Pond 44P : CMP Infiltration

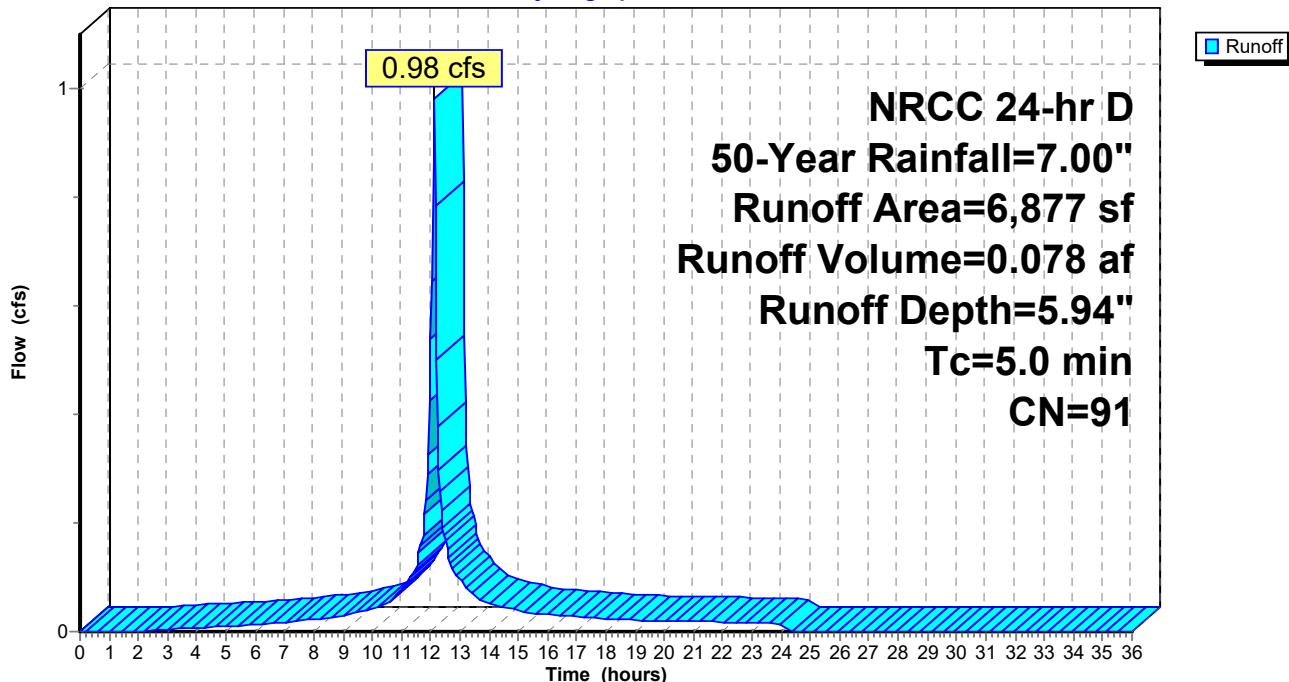
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,706 | 98 Paved parking, HSG A         |
| *         | 1,331 | Cement Concrete Sidewalk, HSG A |
|           | 840   | >75% Grass cover, Good, HSG A   |
|           | 6,877 | Weighted Average                |
|           | 840   | 12.21% Pervious Area            |
|           | 6,037 | 87.79% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

## Subcatchment 27S: PR-21

Hydrograph



### Summary for Subcatchment 28S: PR-22

Runoff = 0.67 cfs @ 12.12 hrs, Volume= 0.050 af, Depth= 5.14"  
 Routed to Pond 44P : CMP Infiltration

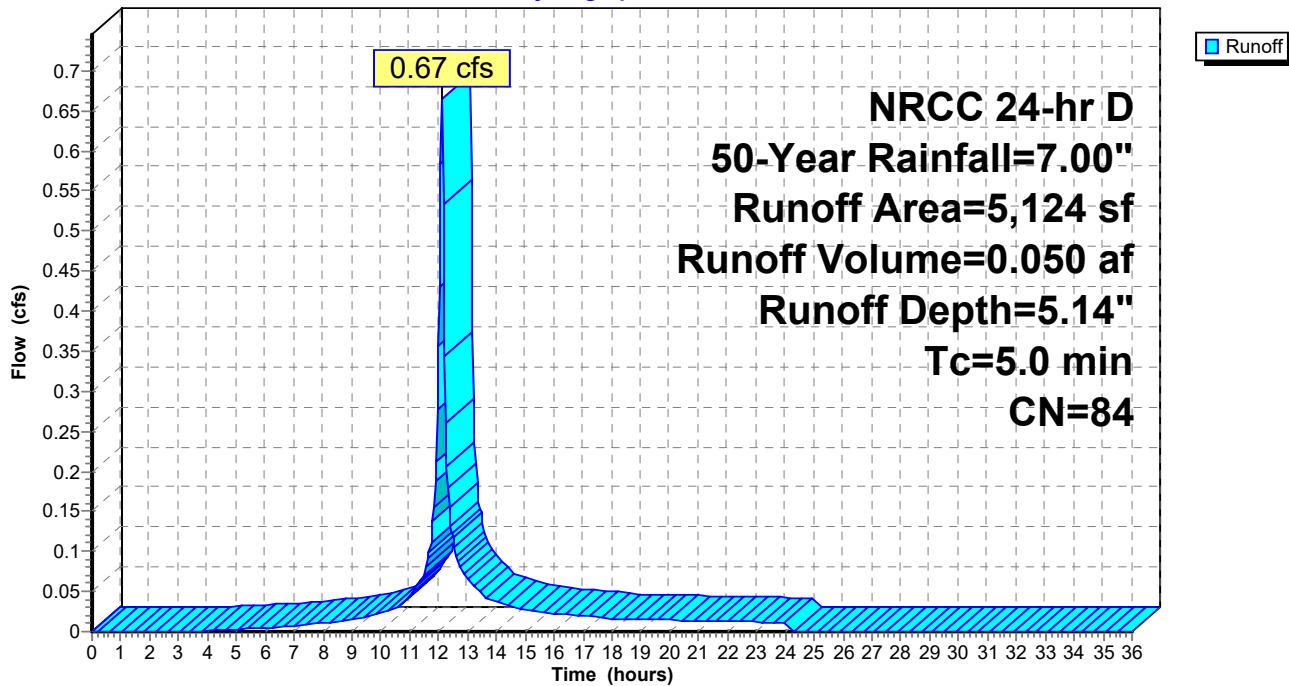
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,097 | 98 Paved parking, HSG A            |
| *         | 72    | 98 Paved parking, HSG C            |
| *         | 588   | 98 Cement Concrete Sidewalk, HSG C |
|           | 1,052 | >75% Grass cover, Good, HSG A      |
|           | 315   | >75% Grass cover, Good, HSG C      |
| 5,124     | 84    | Weighted Average                   |
| 1,367     |       | 26.68% Pervious Area               |
| 3,757     |       | 73.32% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 28S: PR-22

Hydrograph



### Summary for Subcatchment 29S: PR-23

Runoff = 0.91 cfs @ 12.11 hrs, Volume= 0.071 af, Depth= 5.59"  
 Routed to Pond 44P : CMP Infiltration

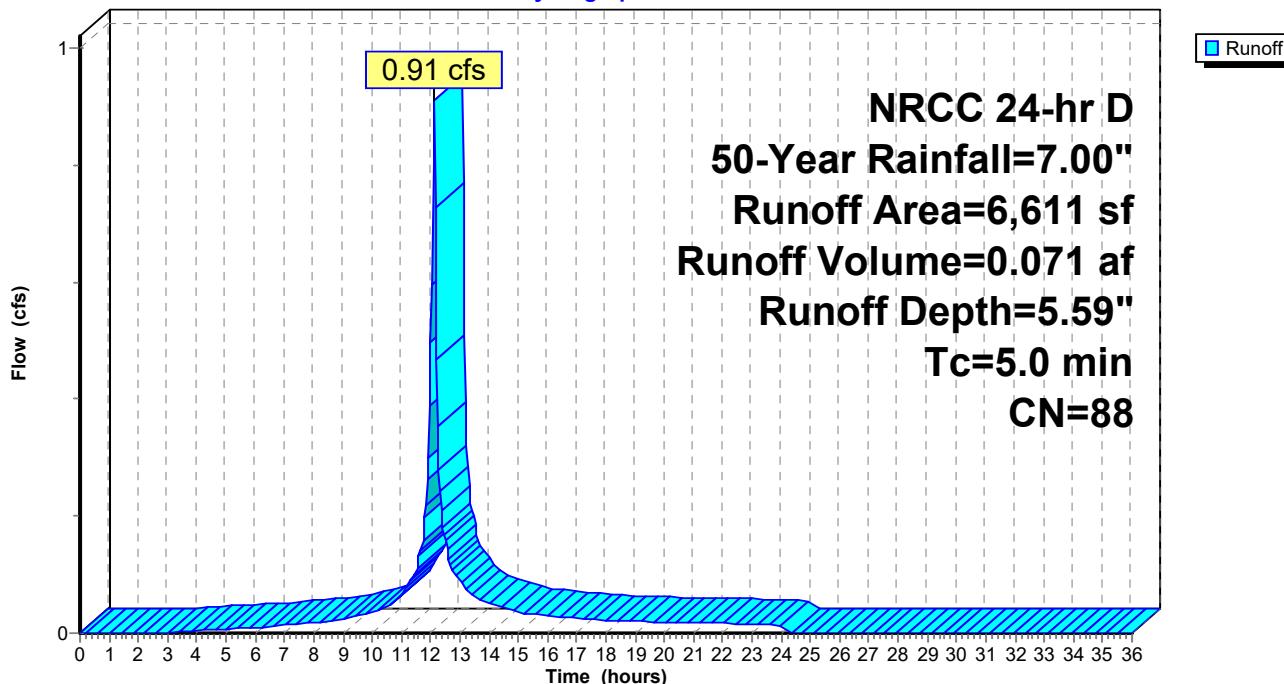
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,322 | 98 Paved parking, HSG A            |
| *         | 748   | 98 Paved parking, HSG C            |
| *         | 695   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 463   | 98 Cement Concrete Sidewalk, HSG C |
| 914       | 39    | >75% Grass cover, Good, HSG A      |
| 469       | 74    | >75% Grass cover, Good, HSG C      |
| 6,611     | 88    | Weighted Average                   |
| 1,383     |       | 20.92% Pervious Area               |
| 5,228     |       | 79.08% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 29S: PR-23

Hydrograph



### Summary for Subcatchment 30S: PR-24

Runoff = 0.73 cfs @ 12.11 hrs, Volume= 0.057 af, Depth= 5.59"  
 Routed to Pond 44P : CMP Infiltration

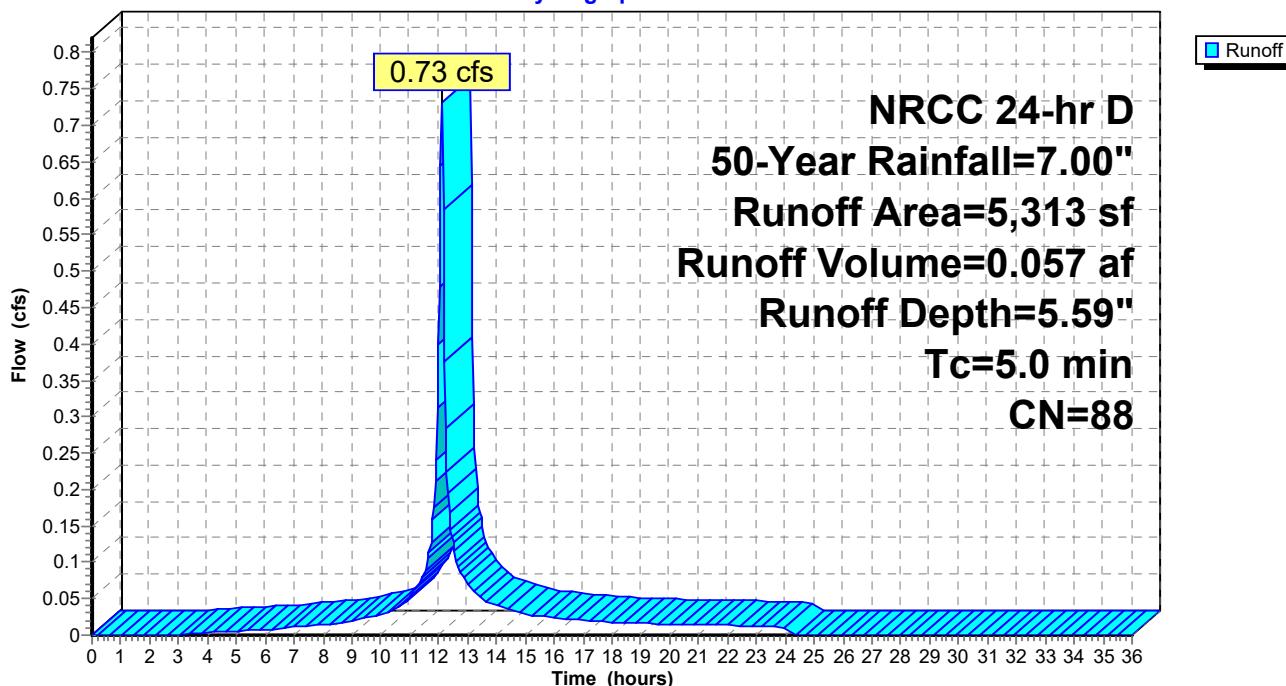
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,109 | 98 Paved parking, HSG A            |
| *         | 146   | 98 Paved parking, HSG C            |
| *         | 572   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 432   | 98 Cement Concrete Sidewalk, HSG C |
| 819       | 39    | >75% Grass cover, Good, HSG A      |
| 235       | 74    | >75% Grass cover, Good, HSG C      |
| 5,313     | 88    | Weighted Average                   |
| 1,054     |       | 19.84% Pervious Area               |
| 4,259     |       | 80.16% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 30S: PR-24

Hydrograph



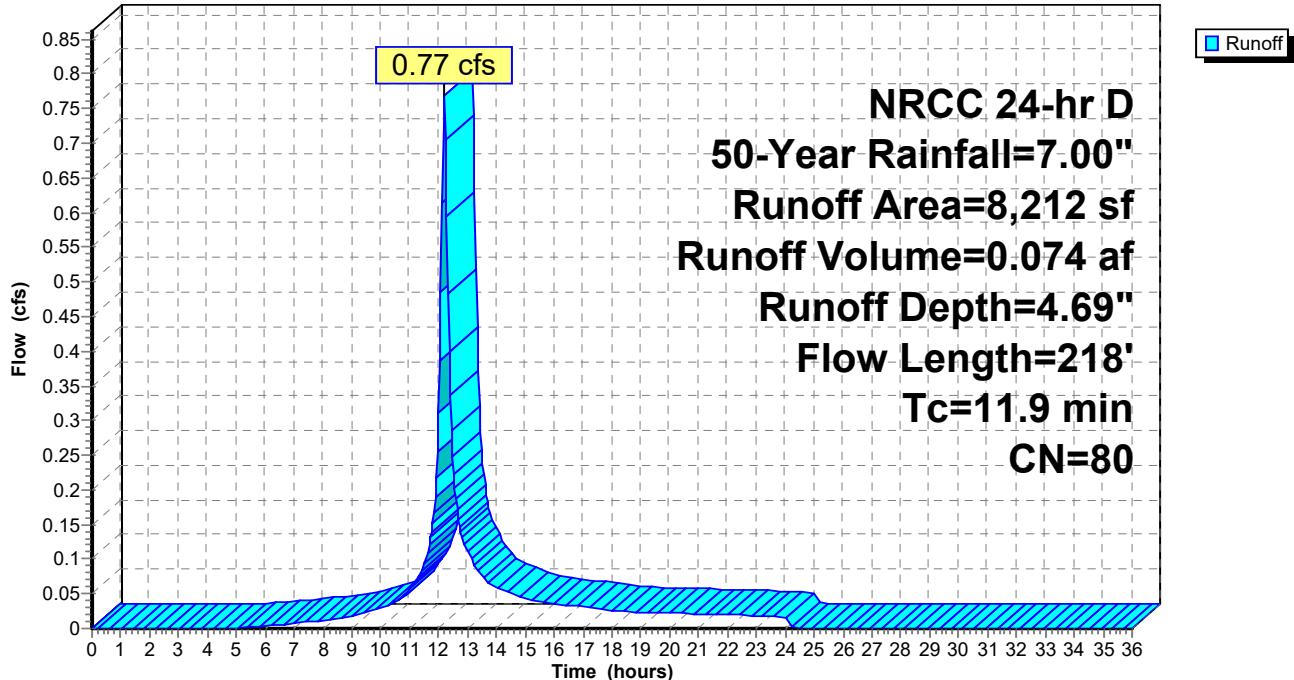
### Summary for Subcatchment 31S: PR-25

Runoff = 0.77 cfs @ 12.19 hrs, Volume= 0.074 af, Depth= 4.69"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,851 | 98 Paved parking, HSG A            |
| *         | 988   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 65    | 98 Cement Concrete Sidewalk, HSG C |
| 1,910     | 39    | >75% Grass cover, Good, HSG A      |
| 1,398     | 74    | >75% Grass cover, Good, HSG C      |
| 8,212     | 80    | Weighted Average                   |
| 3,308     |       | 40.28% Pervious Area               |
| 4,904     |       | 59.72% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 10.6        | 63               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.6         | 37               | 0.0150           | 0.99                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 118              | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 11.9        | 218              | Total            |                      |                   |                                                                   |

**Subcatchment 31S: PR-25****Hydrograph**

### Summary for Subcatchment 32S: PR-26

Runoff = 0.85 cfs @ 12.11 hrs, Volume= 0.069 af, Depth= 6.29"  
 Routed to Pond 44P : CMP Infiltration

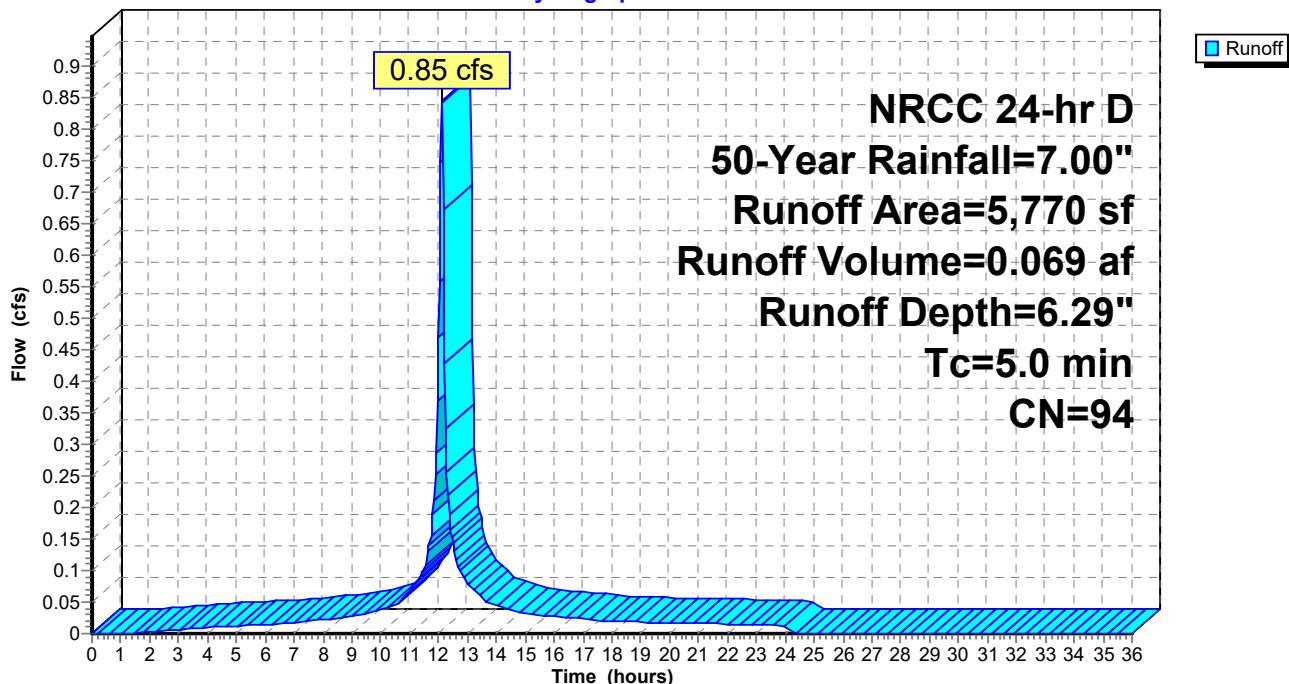
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,263 | 98 Paved parking, HSG A            |
| *         | 1,076 | 98 Cement Concrete Sidewalk, HSG A |
|           | 431   | >75% Grass cover, Good, HSG A      |
|           | 5,770 | Weighted Average                   |
|           | 431   | 7.47% Pervious Area                |
|           | 5,339 | 92.53% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 32S: PR-26

Hydrograph



### Summary for Subcatchment 33S: PR-27

Runoff = 0.83 cfs @ 12.11 hrs, Volume= 0.068 af, Depth= 6.17"  
 Routed to Pond 44P : CMP Infiltration

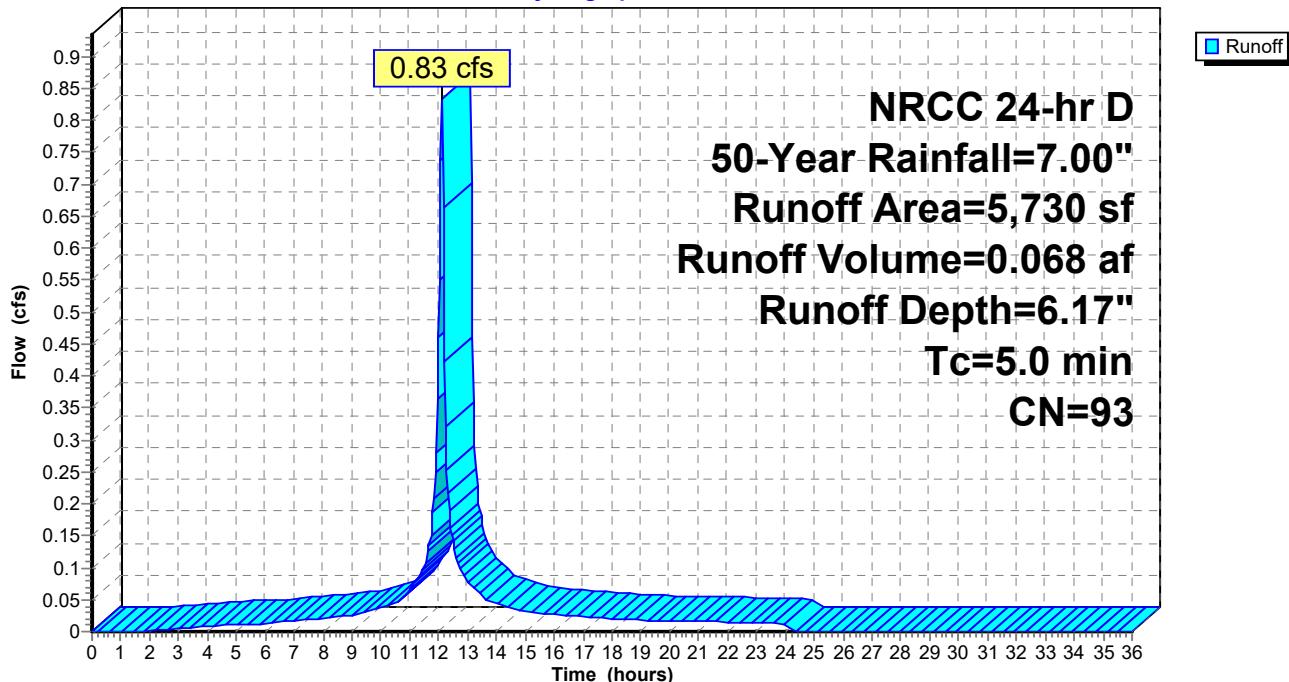
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,151 | 98 Paved parking, HSG A            |
| *         | 1,069 | 98 Cement Concrete Sidewalk, HSG A |
|           | 510   | >75% Grass cover, Good, HSG A      |
|           | 5,730 | Weighted Average                   |
|           | 510   | 8.90% Pervious Area                |
|           | 5,220 | 91.10% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 33S: PR-27

Hydrograph



### Summary for Subcatchment 34S: PR-28

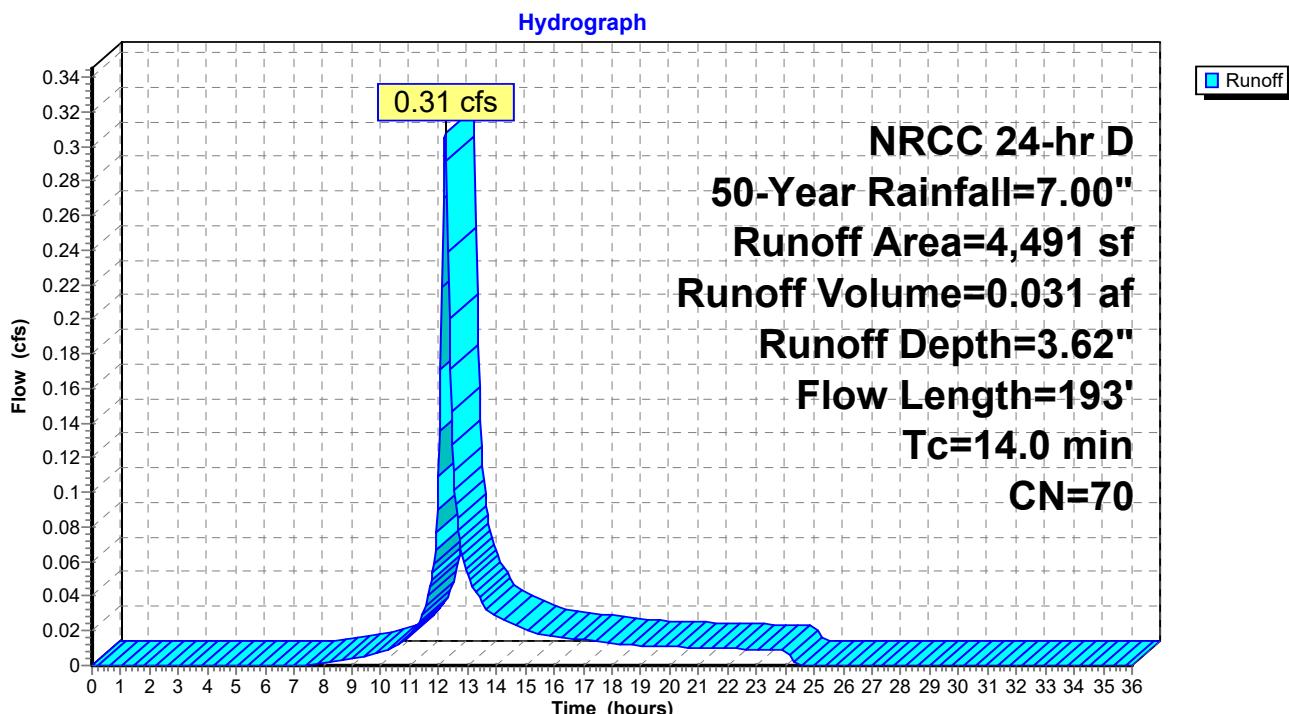
Runoff = 0.31 cfs @ 12.22 hrs, Volume= 0.031 af, Depth= 3.62"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,588 | 98 Paved parking, HSG A            |
| *         | 456   | 98 Cement Concrete Sidewalk, HSG A |
| 1,899     | 39    | >75% Grass cover, Good, HSG A      |
| 548       | 74    | >75% Grass cover, Good, HSG C      |
| 4,491     | 70    | Weighted Average                   |
| 2,447     |       | 54.49% Pervious Area               |
| 2,044     |       | 45.51% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 13.0        | 81               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.4         | 19               | 0.0150           | 0.87                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.6         | 93               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 14.0        | 193              | Total            |                      |                   |                                                                   |

### Subcatchment 34S: PR-28



### Summary for Subcatchment 35S: PR-29

Runoff = 0.19 cfs @ 12.12 hrs, Volume= 0.015 af, Depth= 5.48"  
 Routed to Pond 44P : CMP Infiltration

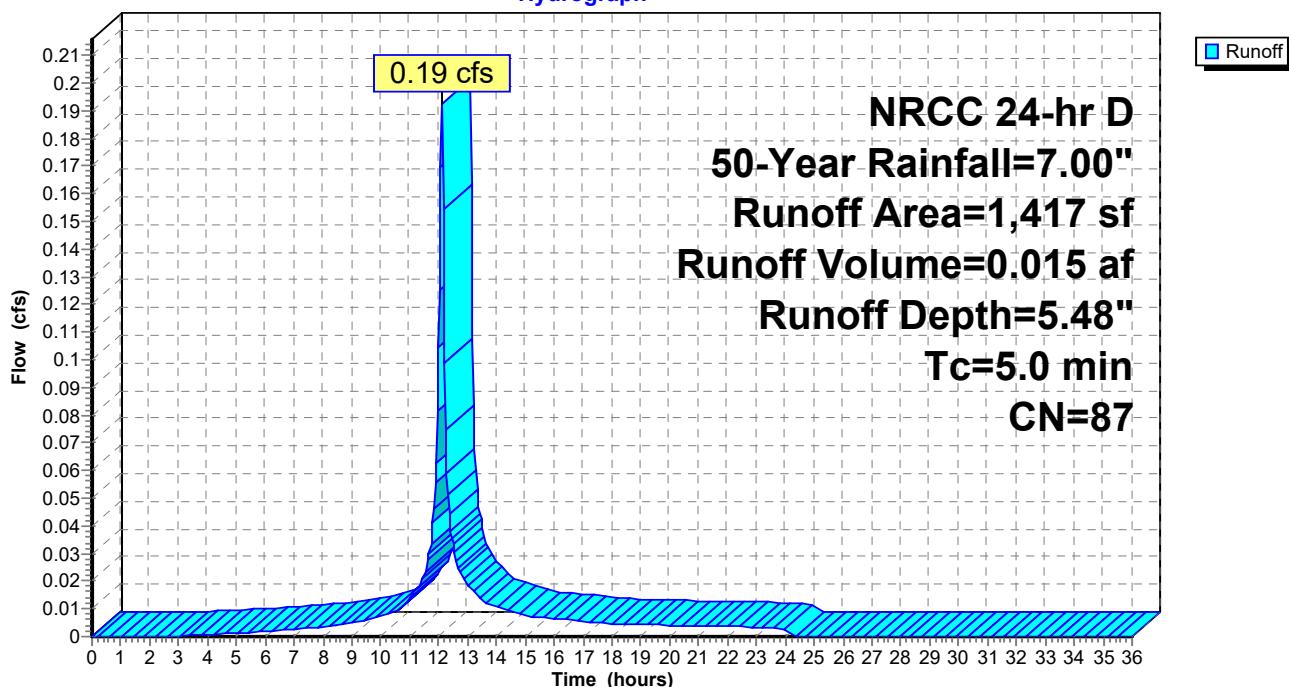
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,137 | 98 Paved parking, HSG A            |
| *         | 16    | 98 Cement Concrete Sidewalk, HSG A |
|           | 264   | >75% Grass cover, Good, HSG A      |
|           | 1,417 | Weighted Average                   |
|           | 264   | 18.63% Pervious Area               |
|           | 1,153 | 81.37% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 35S: PR-29

Hydrograph



### Summary for Subcatchment 36S: PR-30

Runoff = 1.09 cfs @ 12.12 hrs, Volume= 0.083 af, Depth= 4.92"  
 Routed to Pond 44P : CMP Infiltration

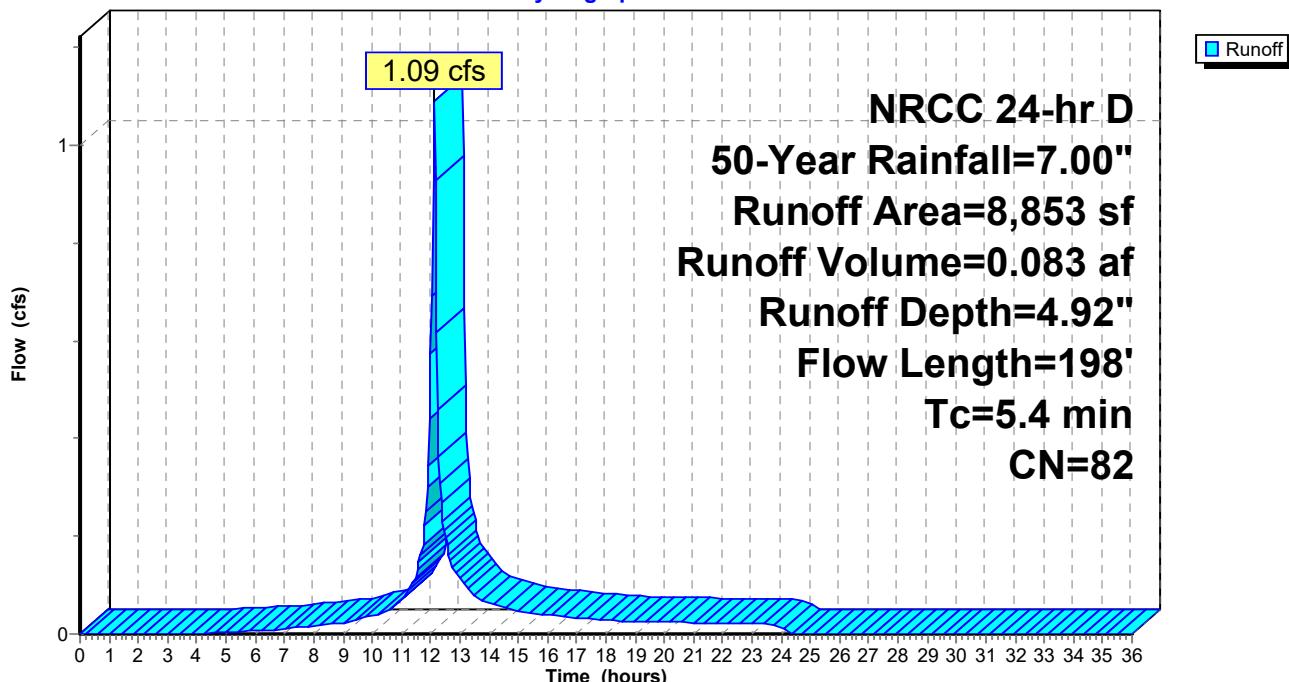
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 5,691   | 98 | Paved parking, HSG A            |
| * 826     | 98 | Cement Concrete Sidewalk, HSG A |
| 2,336     | 39 | >75% Grass cover, Good, HSG A   |
| 8,853     | 82 | Weighted Average                |
| 2,336     |    | 26.39% Pervious Area            |
| 6,517     |    | 73.61% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.5         | 16               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 84               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 98               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.4         | 198              | Total            |                      |                   |                                                                   |

### Subcatchment 36S: PR-30

Hydrograph



### Summary for Subcatchment 37S: PR-31

Runoff = 1.28 cfs @ 12.12 hrs, Volume= 0.098 af, Depth= 5.14"  
 Routed to Pond 44P : CMP Infiltration

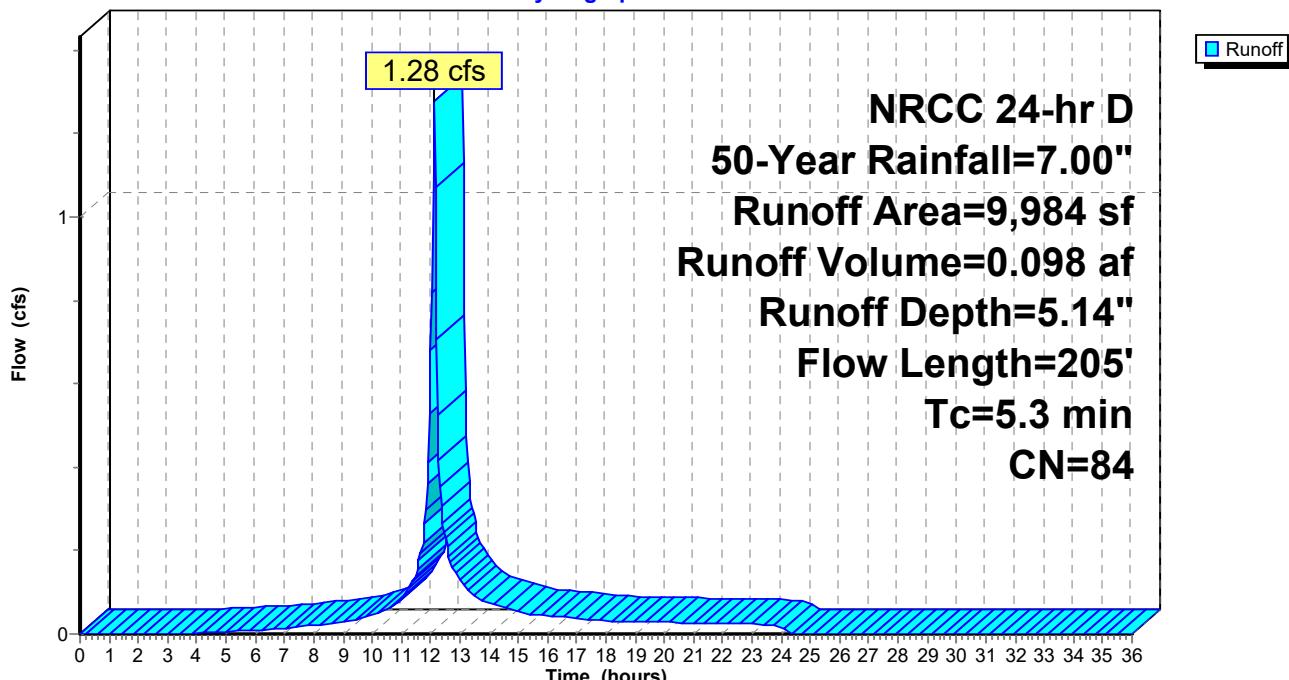
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 6,479 | 98 Paved parking, HSG A            |
| *         | 1,108 | 98 Cement Concrete Sidewalk, HSG A |
|           | 2,397 | >75% Grass cover, Good, HSG A      |
|           | 9,984 | Weighted Average                   |
|           | 2,397 | 24.01% Pervious Area               |
|           | 7,587 | 75.99% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.4         | 15               | 0.0500           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 85               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 105              | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.3         | 205              | Total            |                      |                   |                                                                   |

### Subcatchment 37S: PR-31

Hydrograph



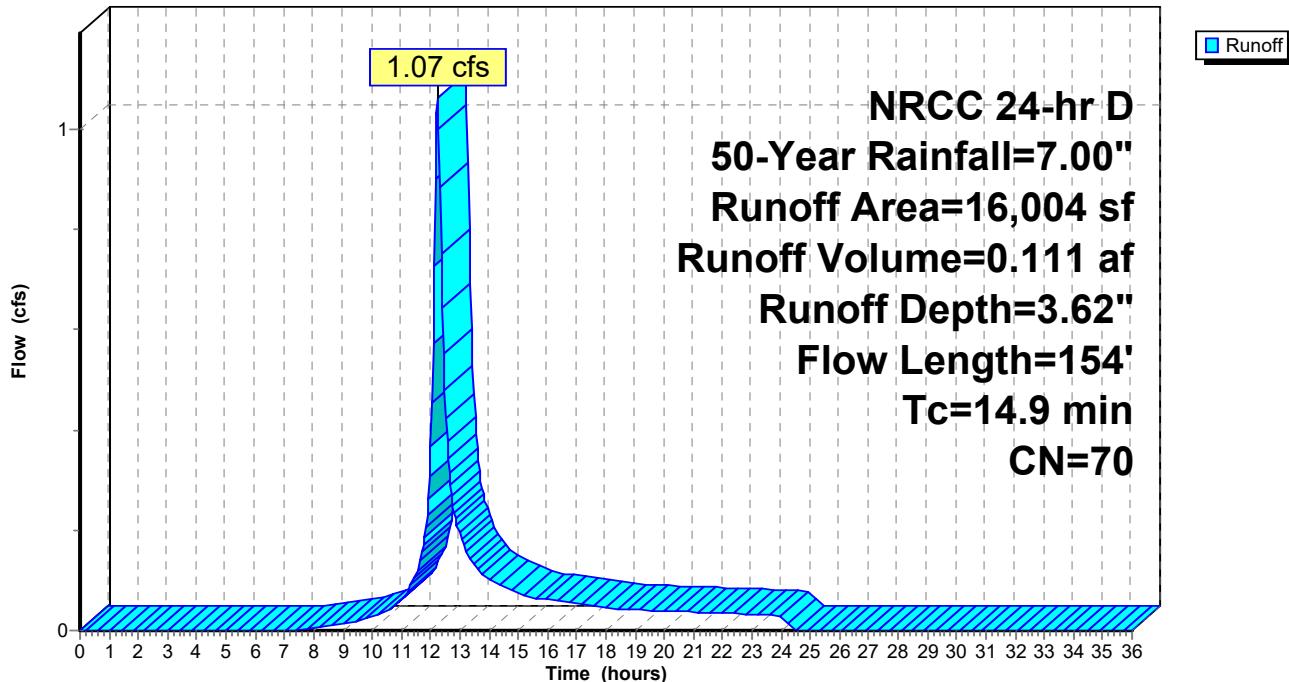
### Summary for Subcatchment 38S: PR-32

Runoff = 1.07 cfs @ 12.23 hrs, Volume= 0.111 af, Depth= 3.62"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN     | Description                     |
|-----------|--------|---------------------------------|
| *         | 6,711  | 98 Paved parking, HSG A         |
| *         | 1,813  | Cement Concrete Sidewalk, HSG A |
|           | 7,480  | >75% Grass cover, Good, HSG A   |
|           | 16,004 | Weighted Average                |
|           | 7,480  | 46.74% Pervious Area            |
|           | 8,524  | 53.26% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 14.4        | 92               | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 8                | 0.0200           | 0.82                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.2         | 34               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1         | 20               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 14.9        | 154              | Total            |                      |                   |                                                                          |

**Subcatchment 38S: PR-32****Hydrograph**

### Summary for Subcatchment 39S: PR-33

Runoff = 1.02 cfs @ 12.12 hrs, Volume= 0.078 af, Depth= 5.37"  
 Routed to Pond 44P : CMP Infiltration

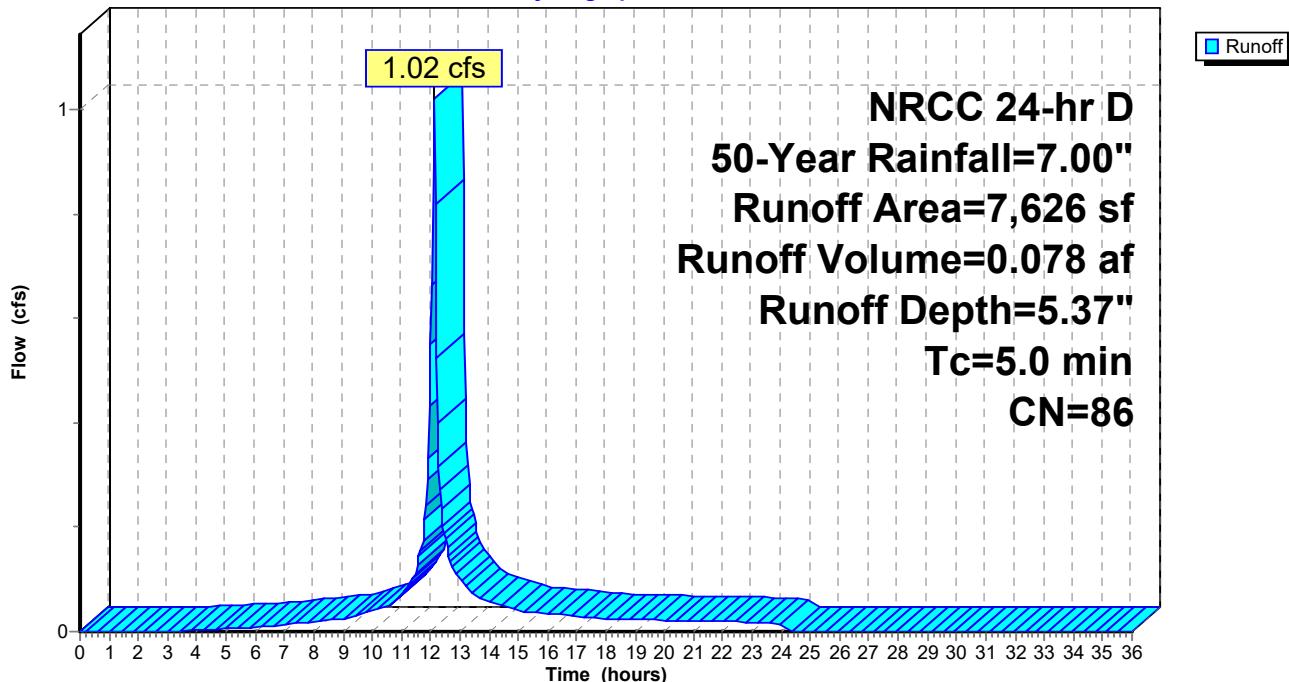
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 5,106   | 98 | Paved parking, HSG A            |
| * 920     | 98 | Cement Concrete Sidewalk, HSG A |
| 1,600     | 39 | >75% Grass cover, Good, HSG A   |
| 7,626     | 86 | Weighted Average                |
| 1,600     |    | 20.98% Pervious Area            |
| 6,026     |    | 79.02% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 39S: PR-33

Hydrograph



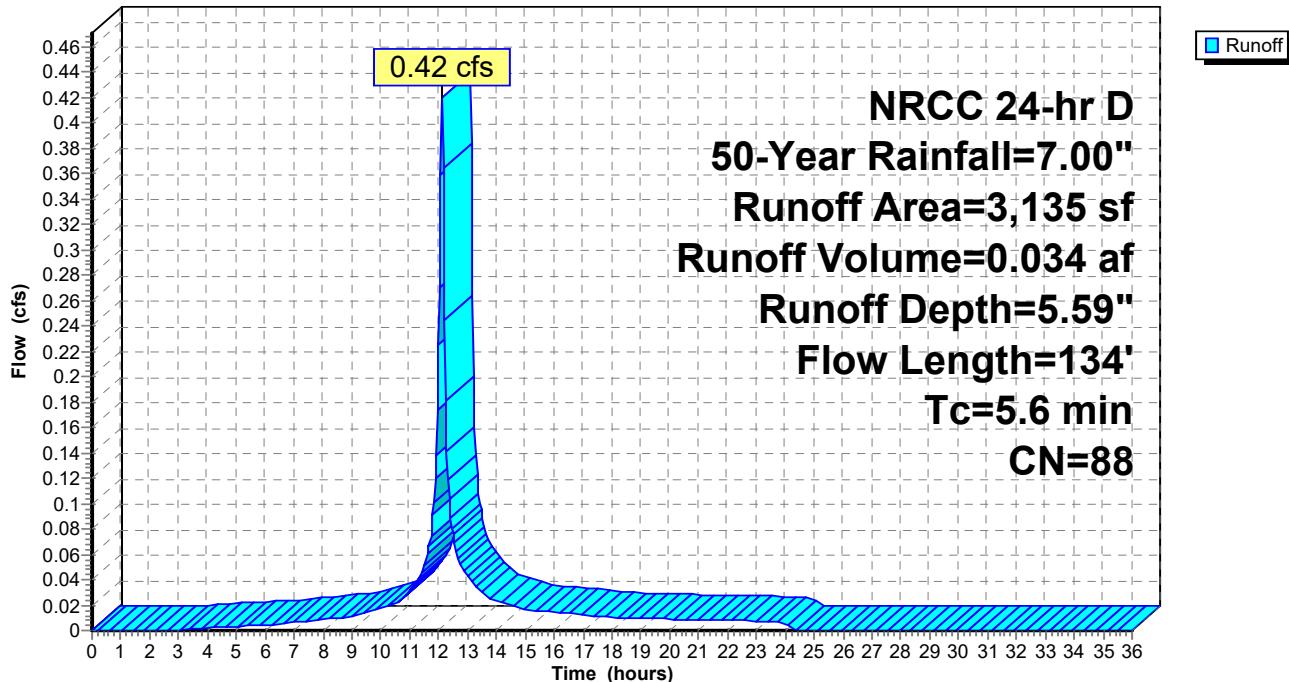
### Summary for Subcatchment 40S: PR-34

Runoff = 0.42 cfs @ 12.12 hrs, Volume= 0.034 af, Depth= 5.59"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 2,389 | 98 Paved parking, HSG A            |
| *         | 234   | 98 Cement Concrete Sidewalk, HSG A |
|           | 512   | >75% Grass cover, Good, HSG A      |
|           | 3,135 | Weighted Average                   |
|           | 512   | 16.33% Pervious Area               |
|           | 2,623 | 83.67% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 4.4         | 21               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 1.0         | 79               | 0.0200           | 1.30                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.0         | 7                | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.2         | 27               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 5.6         | 134              | Total            |                      |                   |                                                                          |

**Subcatchment 40S: PR-34****Hydrograph**

### Summary for Subcatchment 41S: PR-35

Runoff = 0.07 cfs @ 12.11 hrs, Volume= 0.006 af, Depth= 6.64"  
 Routed to Pond 44P : CMP Infiltration

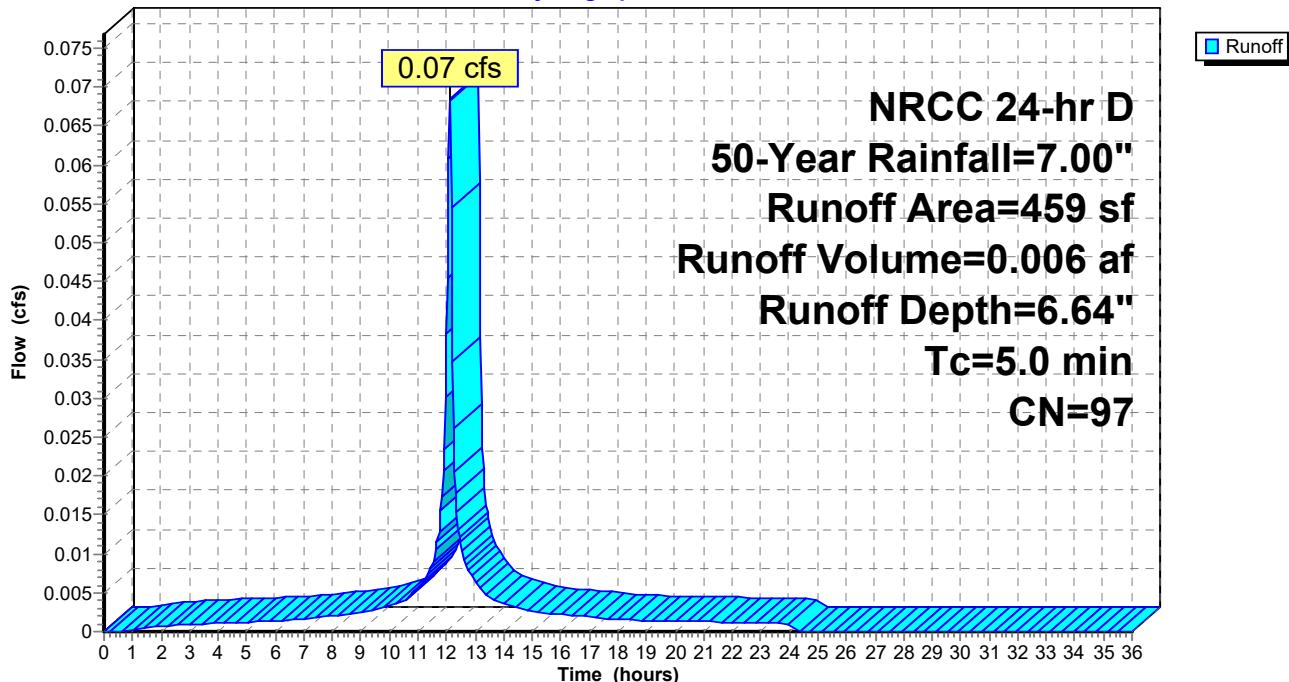
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN  | Description                     |
|-----------|-----|---------------------------------|
| *         | 366 | 98 Paved parking, HSG A         |
| *         | 86  | Cement Concrete Sidewalk, HSG A |
|           | 7   | >75% Grass cover, Good, HSG A   |
|           | 459 | Weighted Average                |
|           | 7   | 1.53% Pervious Area             |
|           | 452 | 98.47% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 41S: PR-35

Hydrograph



### Summary for Subcatchment 42S: PR-36

Runoff = 0.92 cfs @ 12.11 hrs, Volume= 0.073 af, Depth= 5.94"  
 Routed to Pond 44P : CMP Infiltration

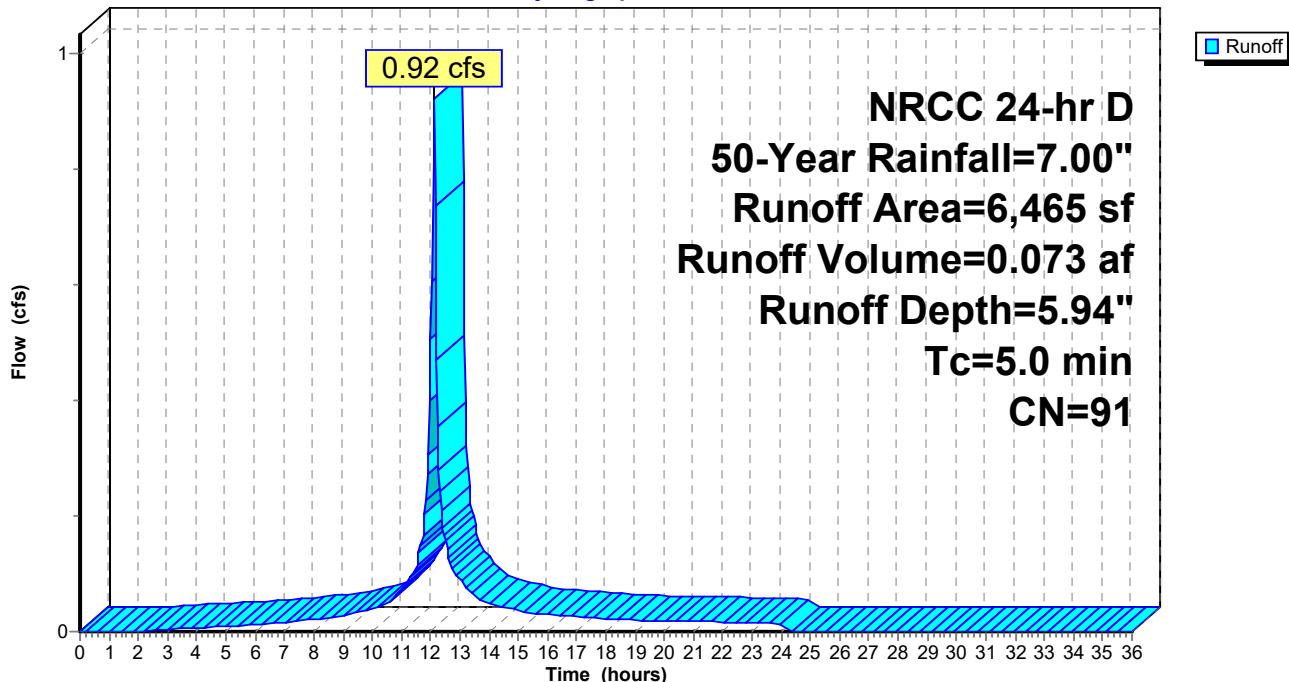
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,448 | 98 Paved parking, HSG A         |
| *         | 1,207 | Cement Concrete Sidewalk, HSG A |
| 810       | 39    | >75% Grass cover, Good, HSG A   |
| 6,465     | 91    | Weighted Average                |
| 810       |       | 12.53% Pervious Area            |
| 5,655     |       | 87.47% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 42S: PR-36

Hydrograph



### Summary for Subcatchment 43S: PR-37

Runoff = 1.02 cfs @ 12.11 hrs, Volume= 0.082 af, Depth= 6.05"  
 Routed to Pond 44P : CMP Infiltration

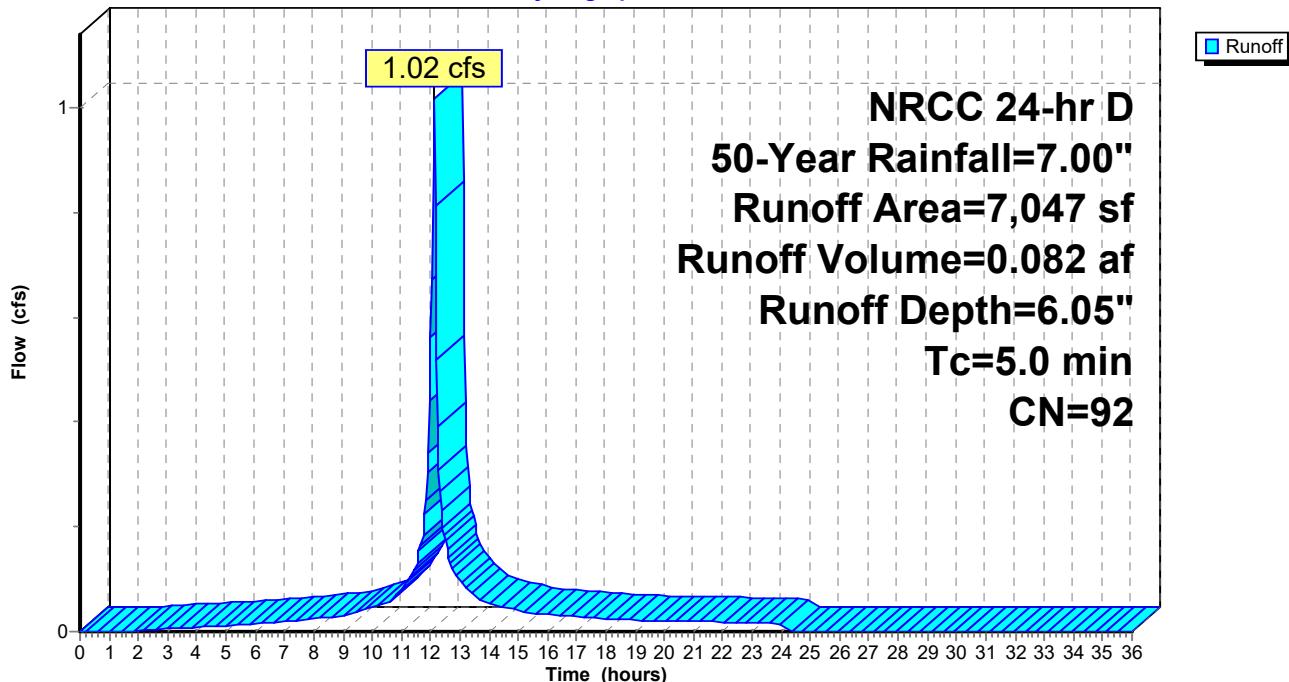
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 50-Year Rainfall=7.00"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,177     | 98 | Paved parking, HSG A            |
| 1,177     | 98 | Cement Concrete Sidewalk, HSG A |
| 693       | 39 | >75% Grass cover, Good, HSG A   |
| 7,047     | 92 | Weighted Average                |
| 693       |    | 9.83% Pervious Area             |
| 6,354     |    | 90.17% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 43S: PR-37

Hydrograph



### Summary for Pond 44P: CMP Infiltration

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 5.33" for 50-Year event  
 Inflow = 31.41 cfs @ 12.12 hrs, Volume= 2.632 af  
 Outflow = 21.14 cfs @ 12.19 hrs, Volume= 2.632 af, Atten= 33%, Lag= 4.4 min  
 Discarded = 0.22 cfs @ 12.19 hrs, Volume= 0.282 af  
 Primary = 20.92 cfs @ 12.19 hrs, Volume= 2.350 af  
 Routed to Pond 45P : Rain Garden

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 271.31' @ 12.19 hrs Surf.Area= 0.055 ac Storage= 0.192 af

Plug-Flow detention time= 11.3 min calculated for 2.629 af (100% of inflow)  
 Center-of-Mass det. time= 11.4 min ( 810.7 - 799.2 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                      |
|----------|---------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1C      | 266.50' | 0.081 af      | <b>17.00'W x 142.00'L x 7.00'H Field C</b><br>0.388 af Overall - 0.186 af Embedded = 0.202 af x 40.0% Voids                                                                                                                                              |
| #2C      | 267.00' | 0.186 af      | <b>CMP Round 72 x 12 Inside #1</b><br>Effective Size= 72.0"W x 72.0"H => 28.27 sf x 20.00'L = 565.5 cf<br>Overall Size= 72.0"W x 72.0"H x 20.00'L<br>Row Length Adjustment= +8.00' x 28.27 sf x 2 rows<br>15.00' Header x 28.27 sf x 2 = 848.2 cf Inside |
| 0.267 af |         |               | Total Available Storage                                                                                                                                                                                                                                  |

Storage Group C created with Chamber Wizard

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                       |
|--------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 267.00' | <b>21.0" Round Culvert</b><br>L= 169.0' RCP, rounded edge headwall, Ke= 0.100<br>Inlet / Outlet Invert= 267.00' / 265.31' S= 0.0100 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf |
| #2     | Discarded | 266.50' | <b>2.410 in/hr Exfiltration over Wetted area</b>                                                                                                                                                                     |

**Discarded OutFlow** Max=0.22 cfs @ 12.19 hrs HW=271.28' (Free Discharge)  
 ↗ 2=Exfiltration (Exfiltration Controls 0.22 cfs)

**Primary OutFlow** Max=20.84 cfs @ 12.19 hrs HW=271.28' TW=259.83' (Dynamic Tailwater)  
 ↗ 1=Culvert (Barrel Controls 20.84 cfs @ 8.67 fps)

**Pond 44P: CMP Infiltration - Chamber Wizard Field C****Chamber Model = CMP Round 72 (Round Corrugated Metal Pipe)**

Effective Size= 72.0"W x 72.0"H =&gt; 28.27 sf x 20.00'L = 565.5 cf

Overall Size= 72.0"W x 72.0"H x 20.00'L

Row Length Adjustment= +8.00' x 28.27 sf x 2 rows

72.0" Wide + 36.0" Spacing = 108.0" C-C Row Spacing

6 Chambers/Row x 20.00' Long +8.00' Row Adjustment +6.00' Header x 2 = 140.00' Row Length +12.0"

End Stone x 2 = 142.00' Base Length

2 Rows x 72.0" Wide + 36.0" Spacing x 1 + 12.0" Side Stone x 2 = 17.00' Base Width

6.0" Stone Base + 72.0" Chamber Height + 6.0" Stone Cover = 7.00' Field Height

12 Chambers x 565.5 cf +8.00' Row Adjustment x 28.27 sf x 2 Rows + 15.00' Header x 28.27 sf x 2 = 8,086.5 cf Chamber Storage

16,898.0 cf Field - 8,086.5 cf Chambers = 8,811.5 cf Stone x 40.0% Voids = 3,524.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,611.1 cf = 0.267 af

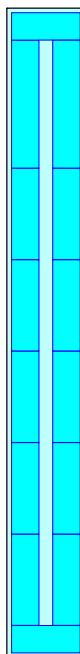
Overall Storage Efficiency = 68.7%

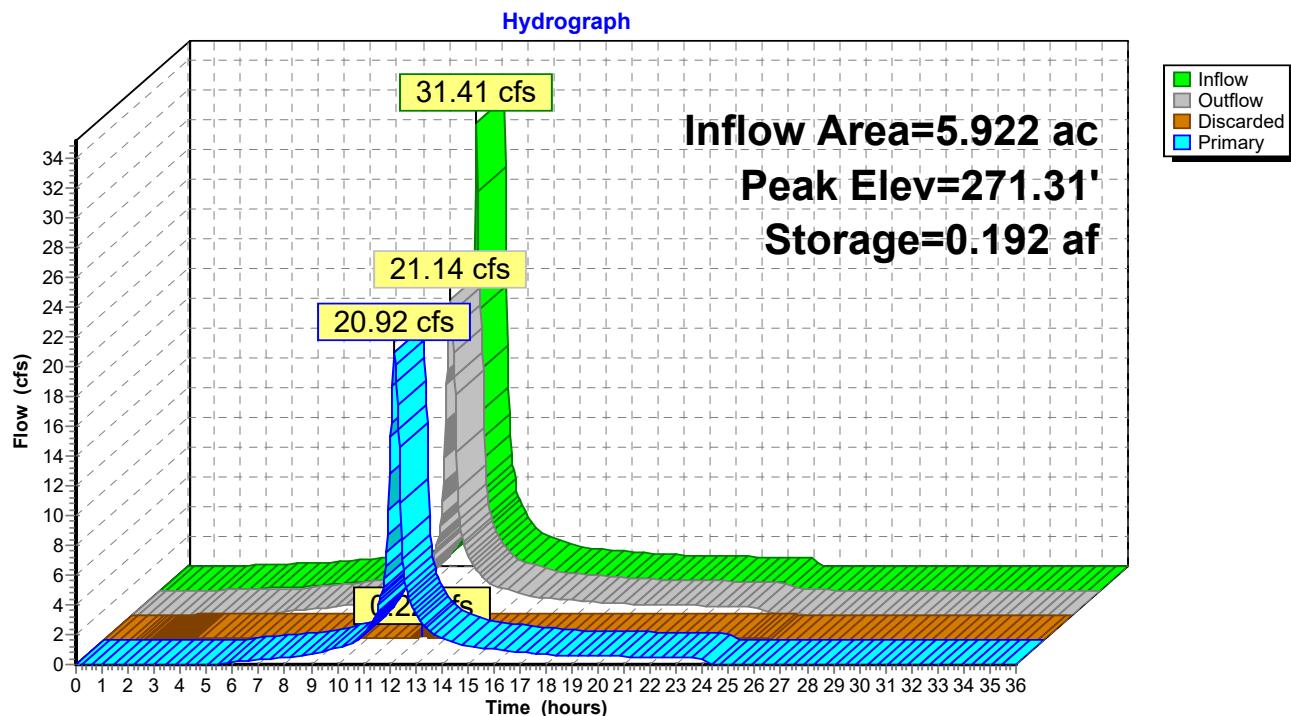
Overall System Size = 142.00' x 17.00' x 7.00'

12 Chambers

625.9 cy Field

326.4 cy Stone



**Pond 44P: CMP Infiltration**

**Stage-Area-Storage for Pond 44P: CMP Infiltration**

| Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) | Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) |
|---------------------|-------------------|------------------------|---------------------|-------------------|------------------------|
| 266.50              | 0.055             | 0.000                  | 271.80              | 0.094             | 0.213                  |
| 266.60              | 0.056             | 0.002                  | 271.90              | 0.095             | 0.217                  |
| 266.70              | 0.057             | 0.004                  | 272.00              | 0.096             | 0.221                  |
| 266.80              | 0.058             | 0.007                  | 272.10              | 0.096             | 0.225                  |
| 266.90              | 0.058             | 0.009                  | 272.20              | 0.097             | 0.229                  |
| 267.00              | 0.059             | 0.011                  | 272.30              | 0.098             | 0.233                  |
| 267.10              | 0.060             | 0.014                  | 272.40              | 0.098             | 0.236                  |
| 267.20              | 0.061             | 0.017                  | 272.50              | 0.099             | 0.240                  |
| 267.30              | 0.061             | 0.020                  | 272.60              | 0.100             | 0.243                  |
| 267.40              | 0.062             | 0.023                  | 272.70              | 0.101             | 0.247                  |
| 267.50              | 0.063             | 0.027                  | 272.80              | 0.101             | 0.250                  |
| 267.60              | 0.063             | 0.030                  | 272.90              | 0.102             | 0.253                  |
| 267.70              | 0.064             | 0.034                  | 273.00              | 0.103             | 0.255                  |
| 267.80              | 0.065             | 0.038                  | 273.10              | 0.104             | 0.258                  |
| 267.90              | 0.066             | 0.042                  | 273.20              | 0.104             | 0.260                  |
| 268.00              | 0.066             | 0.045                  | 273.30              | 0.105             | 0.262                  |
| 268.10              | 0.067             | 0.049                  | 273.40              | 0.106             | 0.264                  |
| 268.20              | 0.068             | 0.054                  | 273.50              | 0.107             | 0.267                  |
| 268.30              | 0.069             | 0.058                  |                     |                   |                        |
| 268.40              | 0.069             | 0.062                  |                     |                   |                        |
| 268.50              | 0.070             | 0.066                  |                     |                   |                        |
| 268.60              | 0.071             | 0.070                  |                     |                   |                        |
| 268.70              | 0.071             | 0.075                  |                     |                   |                        |
| 268.80              | 0.072             | 0.079                  |                     |                   |                        |
| 268.90              | 0.073             | 0.083                  |                     |                   |                        |
| 269.00              | 0.074             | 0.088                  |                     |                   |                        |
| 269.10              | 0.074             | 0.092                  |                     |                   |                        |
| 269.20              | 0.075             | 0.097                  |                     |                   |                        |
| 269.30              | 0.076             | 0.101                  |                     |                   |                        |
| 269.40              | 0.077             | 0.106                  |                     |                   |                        |
| 269.50              | 0.077             | 0.110                  |                     |                   |                        |
| 269.60              | 0.078             | 0.115                  |                     |                   |                        |
| 269.70              | 0.079             | 0.120                  |                     |                   |                        |
| 269.80              | 0.080             | 0.124                  |                     |                   |                        |
| 269.90              | 0.080             | 0.129                  |                     |                   |                        |
| 270.00              | 0.081             | 0.133                  |                     |                   |                        |
| 270.10              | 0.082             | 0.138                  |                     |                   |                        |
| 270.20              | 0.082             | 0.142                  |                     |                   |                        |
| 270.30              | 0.083             | 0.147                  |                     |                   |                        |
| 270.40              | 0.084             | 0.152                  |                     |                   |                        |
| 270.50              | 0.085             | 0.156                  |                     |                   |                        |
| 270.60              | 0.085             | 0.161                  |                     |                   |                        |
| 270.70              | 0.086             | 0.165                  |                     |                   |                        |
| 270.80              | 0.087             | 0.170                  |                     |                   |                        |
| 270.90              | 0.088             | 0.174                  |                     |                   |                        |
| 271.00              | 0.088             | 0.179                  |                     |                   |                        |
| 271.10              | 0.089             | 0.183                  |                     |                   |                        |
| 271.20              | 0.090             | 0.187                  |                     |                   |                        |
| 271.30              | 0.090             | 0.192                  |                     |                   |                        |
| 271.40              | 0.091             | 0.196                  |                     |                   |                        |
| 271.50              | 0.092             | 0.200                  |                     |                   |                        |
| 271.60              | 0.093             | 0.205                  |                     |                   |                        |
| 271.70              | 0.093             | 0.209                  |                     |                   |                        |

## Summary for Pond 45P: Rain Garden

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=71)

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 4.76" for 50-Year event  
 Inflow = 20.92 cfs @ 12.19 hrs, Volume= 2.350 af  
 Outflow = 19.59 cfs @ 12.26 hrs, Volume= 2.350 af, Atten= 6%, Lag= 4.1 min  
 Discarded = 3.67 cfs @ 12.26 hrs, Volume= 1.749 af  
 Primary = 15.92 cfs @ 12.26 hrs, Volume= 0.602 af  
 Routed to Link 15L : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 259.88' @ 12.26 hrs Surf.Area= 12,170 sf Storage= 14,801 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 24.7 min ( 831.4 - 806.7 )

| Volume    | Invert  | Avail.Storage | Storage Description                                                                           |
|-----------|---------|---------------|-----------------------------------------------------------------------------------------------|
| #1        | 255.50' | 6,443 cf      | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)<br>16,107 cf Overall x 40.0% Voids |
| #2        | 258.50' | 10,400 cf     | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)                                    |
| 16,843 cf |         |               | Total Available Storage                                                                       |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 255.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 258.50           | 5,369             | 313.0         | 16,107                 | 16,107                 | 6,308            |

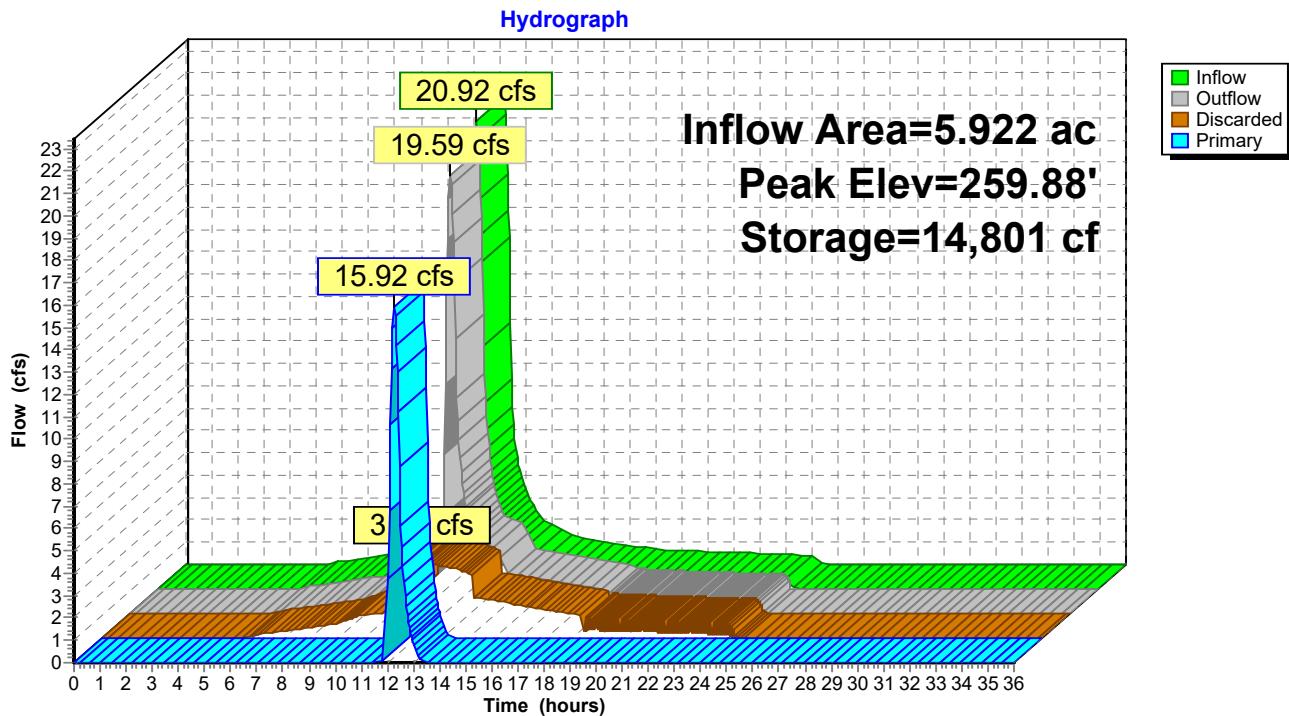
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 258.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 260.00           | 6,938             | 357.4         | 9,205                  | 9,205                  | 7,790            |
| 260.17           | 7,118             | 360.5         | 1,195                  | 10,400                 | 7,978            |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                    |
|--------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 253.71' | <b>24.0" Round Culvert</b><br>L= 32.0' CMP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 253.71' / 253.36' S= 0.0109 '/' Cc= 0.900<br>n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf |
| #2     | Discarded | 255.50' | <b>8.270 in/hr Exfiltration over Surface area</b><br>Conductivity to Groundwater Elevation = 251.50'                                                                                                              |
| #3     | Device 1  | 259.55' | <b>2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows</b> C= 0.600<br>Limited to weir flow at low heads                                                                                                     |
| #4     | Primary   | 259.05' | <b>6.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40<br>Coef. (English) 2.80 2.92                                                                                              |

**Discarded OutFlow** Max=3.67 cfs @ 12.26 hrs HW=259.87' (Free Discharge)  
↑-2=Exfiltration (Controls 3.67 cfs)

**Primary OutFlow** Max=15.84 cfs @ 12.26 hrs HW=259.87' TW=0.00' (Dynamic Tailwater)  
1=Culvert (Passes 2.74 cfs of 27.14 cfs potential flow)  
3=Orifice/Grate (Orifice Controls 2.74 cfs @ 2.74 fps)  
4=Broad-Crested Rectangular Weir (Weir Controls 13.10 cfs @ 2.65 fps)

## Pond 45P: Rain Garden



**Stage-Area-Storage for Pond 45P: Rain Garden**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|
| 255.50              | 5,369              | 0                       |
| 255.60              | 5,369              | 215                     |
| 255.70              | 5,369              | 430                     |
| 255.80              | 5,369              | 644                     |
| 255.90              | 5,369              | 859                     |
| 256.00              | 5,369              | 1,074                   |
| 256.10              | 5,369              | 1,289                   |
| 256.20              | 5,369              | 1,503                   |
| 256.30              | 5,369              | 1,718                   |
| 256.40              | 5,369              | 1,933                   |
| 256.50              | 5,369              | 2,148                   |
| 256.60              | 5,369              | 2,362                   |
| 256.70              | 5,369              | 2,577                   |
| 256.80              | 5,369              | 2,792                   |
| 256.90              | 5,369              | 3,007                   |
| 257.00              | 5,369              | 3,221                   |
| 257.10              | 5,369              | 3,436                   |
| 257.20              | 5,369              | 3,651                   |
| 257.30              | 5,369              | 3,866                   |
| 257.40              | 5,369              | 4,080                   |
| 257.50              | 5,369              | 4,295                   |
| 257.60              | 5,369              | 4,510                   |
| 257.70              | 5,369              | 4,725                   |
| 257.80              | 5,369              | 4,939                   |
| 257.90              | 5,369              | 5,154                   |
| 258.00              | 5,369              | 5,369                   |
| 258.10              | 5,369              | 5,584                   |
| 258.20              | 5,369              | 5,799                   |
| 258.30              | 5,369              | 6,013                   |
| 258.40              | 5,369              | 6,228                   |
| 258.50              | 10,738             | 6,443                   |
| 258.60              | 10,836             | 6,985                   |
| 258.70              | 10,936             | 7,536                   |
| 258.80              | 11,036             | 8,098                   |
| 258.90              | 11,137             | 8,670                   |
| 259.00              | 11,239             | 9,252                   |
| 259.10              | 11,341             | 9,844                   |
| 259.20              | 11,445             | 10,446                  |
| 259.30              | 11,550             | 11,059                  |
| 259.40              | 11,655             | 11,682                  |
| 259.50              | 11,762             | 12,316                  |
| 259.60              | 11,869             | 12,961                  |
| 259.70              | 11,977             | 13,616                  |
| 259.80              | 12,086             | 14,282                  |
| 259.90              | 12,196             | 14,960                  |
| 260.00              | 12,307             | 15,648                  |
| 260.10              | 12,413             | 16,347                  |

### Summary for Link 15L: DP-1

Inflow Area = 7.403 ac, 63.79% Impervious, Inflow Depth = 1.40" for 50-Year event

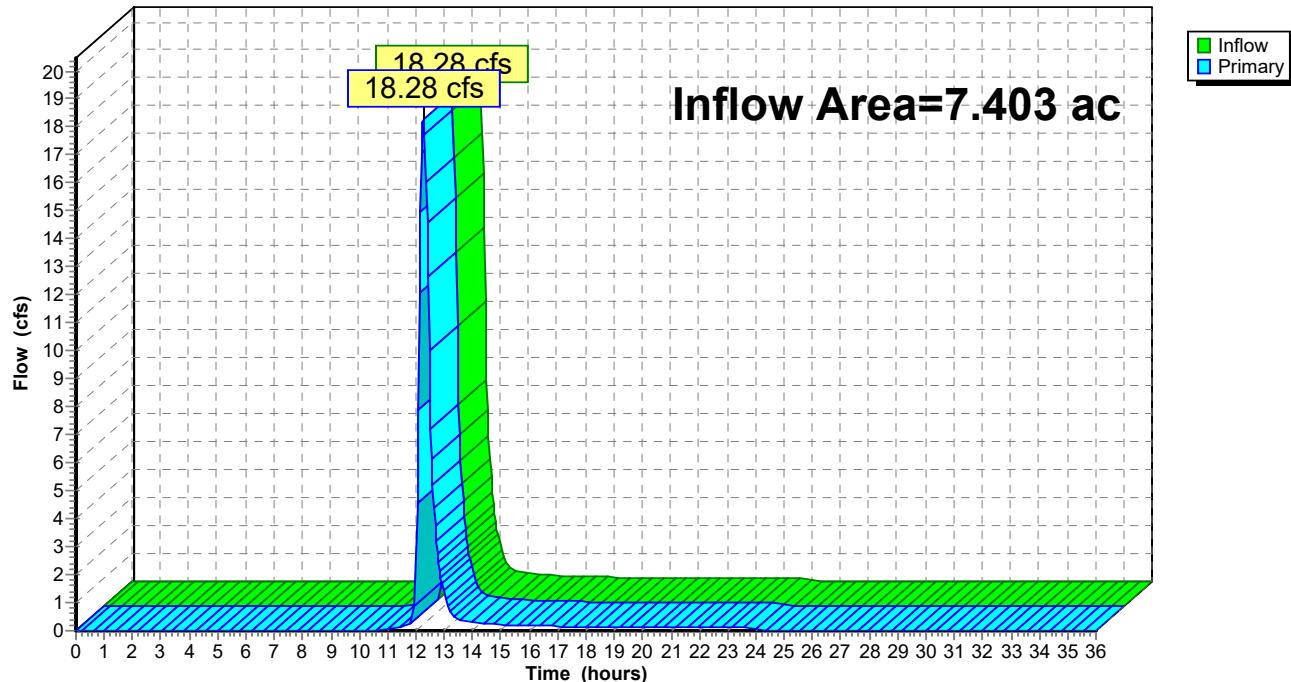
Inflow = 18.28 cfs @ 12.26 hrs, Volume= 0.864 af

Primary = 18.28 cfs @ 12.26 hrs, Volume= 0.864 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 15L: DP-1

Hydrograph

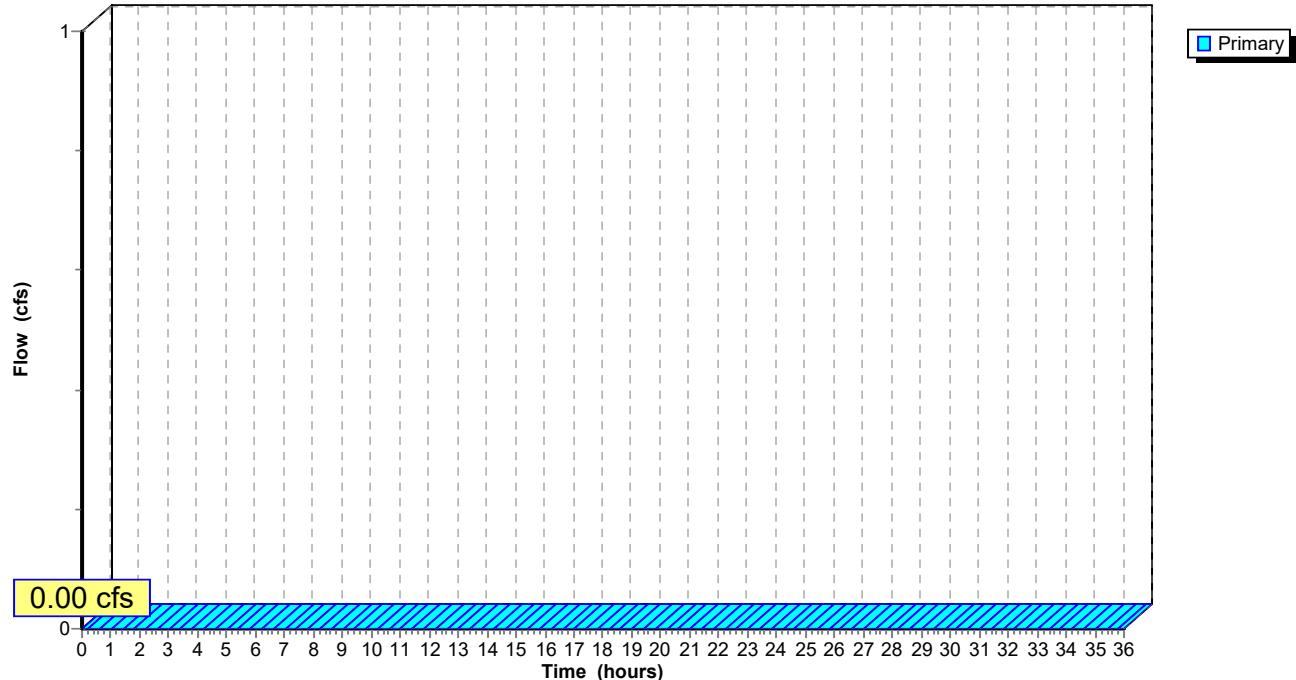


**Summary for Link 16L: DP-2**

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

**Link 16L: DP-2****Hydrograph**

### Summary for Link 17L: DP-3

Inflow Area = 0.094 ac, 0.00% Impervious, Inflow Depth = 4.47" for 50-Year event

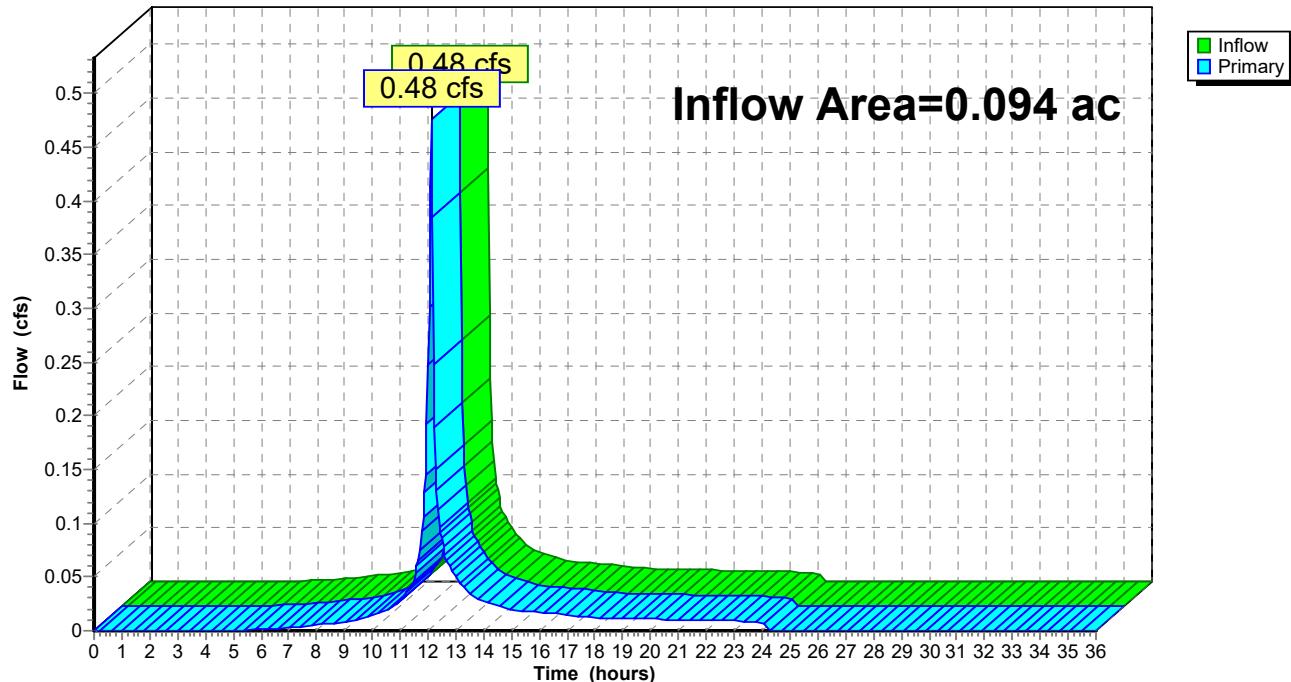
Inflow = 0.48 cfs @ 12.12 hrs, Volume= 0.035 af

Primary = 0.48 cfs @ 12.12 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 17L: DP-3

Hydrograph



Time span=0.00-36.00 hrs, dt=0.04 hrs, 901 points x 3  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1S: PR-1**

Runoff Area=64,521 sf 26.38% Impervious Runoff Depth=3.03"  
Flow Length=350' Tc=15.5 min CN=55 Runoff=3.45 cfs 0.374 af

**Subcatchment2S: PR-2**

Runoff Area=5,989 sf 81.43% Impervious Runoff Depth=7.64"  
Tc=5.0 min CN=94 Runoff=1.06 cfs 0.088 af

**Subcatchment3S: PR-3**

Runoff Area=8,817 sf 74.45% Impervious Runoff Depth=7.40"  
Tc=5.0 min CN=92 Runoff=1.54 cfs 0.125 af

**Subcatchment4S: PR-4**

Runoff Area=6,680 sf 84.81% Impervious Runoff Depth=7.40"  
Tc=5.0 min CN=92 Runoff=1.16 cfs 0.095 af

**Subcatchment5S: PR-5**

Runoff Area=7,314 sf 77.13% Impervious Runoff Depth=6.92"  
Tc=5.0 min CN=88 Runoff=1.23 cfs 0.097 af

**Subcatchment6S: PR-6**

Runoff Area=15,528 sf 55.11% Impervious Runoff Depth=5.01"  
Tc=5.0 min CN=72 Runoff=2.03 cfs 0.149 af

**Subcatchment7S: PR-7**

Runoff Area=8,803 sf 79.89% Impervious Runoff Depth=6.68"  
Tc=5.0 min CN=86 Runoff=1.45 cfs 0.113 af

**Subcatchment8S: PR-8**

Runoff Area=16,139 sf 53.26% Impervious Runoff Depth=6.32"  
Tc=5.0 min CN=83 Runoff=2.56 cfs 0.195 af

**Subcatchment9S: PR-9**

Runoff Area=7,180 sf 75.68% Impervious Runoff Depth=7.04"  
Flow Length=127' Tc=7.1 min CN=89 Runoff=1.11 cfs 0.097 af

**Subcatchment10S: PR-10**

Runoff Area=4,103 sf 0.00% Impervious Runoff Depth=5.72"  
Tc=5.0 min CN=78 Runoff=0.60 cfs 0.045 af

**Subcatchment11S: PR-11**

Runoff Area=12,349 sf 77.12% Impervious Runoff Depth=7.40"  
Flow Length=257' Tc=6.6 min CN=92 Runoff=2.01 cfs 0.175 af

**Subcatchment12S: PR-12**

Runoff Area=12,764 sf 71.19% Impervious Runoff Depth=7.28"  
Tc=5.0 min CN=91 Runoff=2.21 cfs 0.178 af

**Subcatchment13S: PR-13**

Runoff Area=7,593 sf 39.33% Impervious Runoff Depth=4.19"  
Flow Length=246' Tc=16.1 min CN=65 Runoff=0.57 cfs 0.061 af

**Subcatchment14S: PR-14**

Runoff Area=3,225 sf 82.26% Impervious Runoff Depth=7.04"  
Flow Length=166' Tc=7.3 min CN=89 Runoff=0.50 cfs 0.043 af

**Subcatchment15S: PR-15**

Runoff Area=2,717 sf 85.79% Impervious Runoff Depth=7.16"  
Tc=5.0 min CN=90 Runoff=0.47 cfs 0.037 af

**Subcatchment16S: PR-16**

Runoff Area=1,349 sf 100.00% Impervious Runoff Depth=8.12"  
Flow Length=247' Tc=16.1 min CN=98 Runoff=0.17 cfs 0.021 af

|                               |                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment23S: PR-17</b> | Runoff Area=14,295 sf 71.70% Impervious Runoff Depth=7.16"<br>Tc=5.0 min CN=90 Runoff=2.45 cfs 0.196 af                   |
| <b>Subcatchment24S: PR-18</b> | Runoff Area=9,416 sf 96.73% Impervious Runoff Depth=7.88"<br>Flow Length=189' Tc=7.1 min CN=96 Runoff=1.53 cfs 0.142 af   |
| <b>Subcatchment25S: PR-19</b> | Runoff Area=1,787 sf 75.15% Impervious Runoff Depth=6.32"<br>Tc=5.0 min CN=83 Runoff=0.28 cfs 0.022 af                    |
| <b>Subcatchment26S: PR-20</b> | Runoff Area=6,894 sf 87.28% Impervious Runoff Depth=7.16"<br>Tc=5.0 min CN=90 Runoff=1.18 cfs 0.094 af                    |
| <b>Subcatchment27S: PR-21</b> | Runoff Area=6,877 sf 87.79% Impervious Runoff Depth=7.28"<br>Tc=5.0 min CN=91 Runoff=1.19 cfs 0.096 af                    |
| <b>Subcatchment28S: PR-22</b> | Runoff Area=5,124 sf 73.32% Impervious Runoff Depth=6.44"<br>Tc=5.0 min CN=84 Runoff=0.82 cfs 0.063 af                    |
| <b>Subcatchment29S: PR-23</b> | Runoff Area=6,611 sf 79.08% Impervious Runoff Depth=6.92"<br>Tc=5.0 min CN=88 Runoff=1.11 cfs 0.088 af                    |
| <b>Subcatchment30S: PR-24</b> | Runoff Area=5,313 sf 80.16% Impervious Runoff Depth=6.92"<br>Tc=5.0 min CN=88 Runoff=0.89 cfs 0.070 af                    |
| <b>Subcatchment31S: PR-25</b> | Runoff Area=8,212 sf 59.72% Impervious Runoff Depth=5.96"<br>Flow Length=218' Tc=11.9 min CN=80 Runoff=0.97 cfs 0.094 af  |
| <b>Subcatchment32S: PR-26</b> | Runoff Area=5,770 sf 92.53% Impervious Runoff Depth=7.64"<br>Tc=5.0 min CN=94 Runoff=1.02 cfs 0.084 af                    |
| <b>Subcatchment33S: PR-27</b> | Runoff Area=5,730 sf 91.10% Impervious Runoff Depth=7.52"<br>Tc=5.0 min CN=93 Runoff=1.01 cfs 0.082 af                    |
| <b>Subcatchment34S: PR-28</b> | Runoff Area=4,491 sf 45.51% Impervious Runoff Depth=4.78"<br>Flow Length=193' Tc=14.0 min CN=70 Runoff=0.41 cfs 0.041 af  |
| <b>Subcatchment35S: PR-29</b> | Runoff Area=1,417 sf 81.37% Impervious Runoff Depth=6.80"<br>Tc=5.0 min CN=87 Runoff=0.24 cfs 0.018 af                    |
| <b>Subcatchment36S: PR-30</b> | Runoff Area=8,853 sf 73.61% Impervious Runoff Depth=6.20"<br>Flow Length=198' Tc=5.4 min CN=82 Runoff=1.36 cfs 0.105 af   |
| <b>Subcatchment37S: PR-31</b> | Runoff Area=9,984 sf 75.99% Impervious Runoff Depth=6.44"<br>Flow Length=205' Tc=5.3 min CN=84 Runoff=1.58 cfs 0.123 af   |
| <b>Subcatchment38S: PR-32</b> | Runoff Area=16,004 sf 53.26% Impervious Runoff Depth=4.78"<br>Flow Length=154' Tc=14.9 min CN=70 Runoff=1.41 cfs 0.146 af |
| <b>Subcatchment39S: PR-33</b> | Runoff Area=7,626 sf 79.02% Impervious Runoff Depth=6.68"<br>Tc=5.0 min CN=86 Runoff=1.26 cfs 0.097 af                    |
| <b>Subcatchment40S: PR-34</b> | Runoff Area=3,135 sf 83.67% Impervious Runoff Depth=6.92"<br>Flow Length=134' Tc=5.6 min CN=88 Runoff=0.51 cfs 0.042 af   |

**Subcatchment41S: PR-35** Runoff Area=459 sf 98.47% Impervious Runoff Depth=8.00"  
Tc=5.0 min CN=97 Runoff=0.08 cfs 0.007 af

**Subcatchment42S: PR-36** Runoff Area=6,465 sf 87.47% Impervious Runoff Depth=7.28"  
Tc=5.0 min CN=91 Runoff=1.12 cfs 0.090 af

**Subcatchment43S: PR-37** Runoff Area=7,047 sf 90.17% Impervious Runoff Depth=7.40"  
Tc=5.0 min CN=92 Runoff=1.23 cfs 0.100 af

**Pond 44P: CMP Infiltration** Peak Elev=273.10' Storage=0.258 af Inflow=38.55 cfs 3.273 af  
Discarded=0.25 cfs 0.291 af Primary=24.94 cfs 2.981 af Outflow=25.19 cfs 3.273 af

**Pond 45P: Rain Garden** Peak Elev=260.00' Storage=15,673 cf Inflow=24.94 cfs 2.981 af  
Discarded=3.76 cfs 2.085 af Primary=19.56 cfs 0.896 af Outflow=23.32 cfs 2.981 af

**Link 15L: DP-1** Inflow=23.03 cfs 1.270 af  
Primary=23.03 cfs 1.270 af

**Link 16L: DP-2** Primary=0.00 cfs 0.000 af

**Link 17L: DP-3** Inflow=0.60 cfs 0.045 af  
Primary=0.60 cfs 0.045 af

**Total Runoff Area = 7.497 ac Runoff Volume = 3.692 af Average Runoff Depth = 5.91"**  
**37.01% Pervious = 2.775 ac 62.99% Impervious = 4.723 ac**

### Summary for Subcatchment 1S: PR-1

Runoff = 3.45 cfs @ 12.25 hrs, Volume= 0.374 af, Depth= 3.03"  
 Routed to Link 15L : DP-1

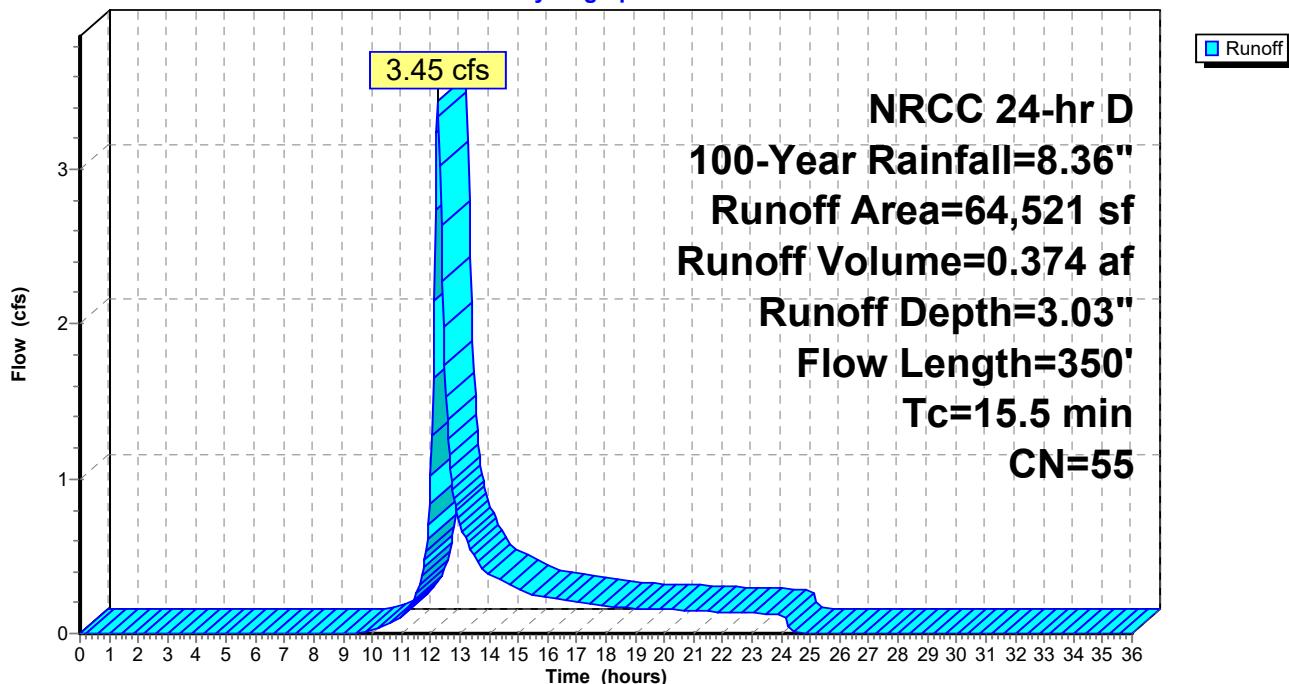
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 12,935    | 98 | Paved parking, HSG A            |
| 4,085     | 98 | Cement Concrete Sidewalk, HSG A |
| 46,449    | 39 | >75% Grass cover, Good, HSG A   |
| 1,052     | 74 | >75% Grass cover, Good, HSG C   |
| 64,521    | 55 | Weighted Average                |
| 47,501    |    | 73.62% Pervious Area            |
| 17,020    |    | 26.38% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                               |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------------------------------------------|
| 2.7         | 50               | 0.3333           | 0.31                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 10.8        | 60               | 0.0150           | 0.09                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.13"     |
| 2.0         | 240              | 0.0150           | 1.97                 |                   | <b>Shallow Concentrated Flow,</b><br>Unpaved Kv= 16.1 fps |
| 15.5        | 350              |                  |                      |                   | Total                                                     |

### Subcatchment 1S: PR-1

Hydrograph



## Summary for Subcatchment 2S: PR-2

Runoff = 1.06 cfs @ 12.11 hrs, Volume= 0.088 af, Depth= 7.64"  
 Routed to Pond 44P : CMP Infiltration

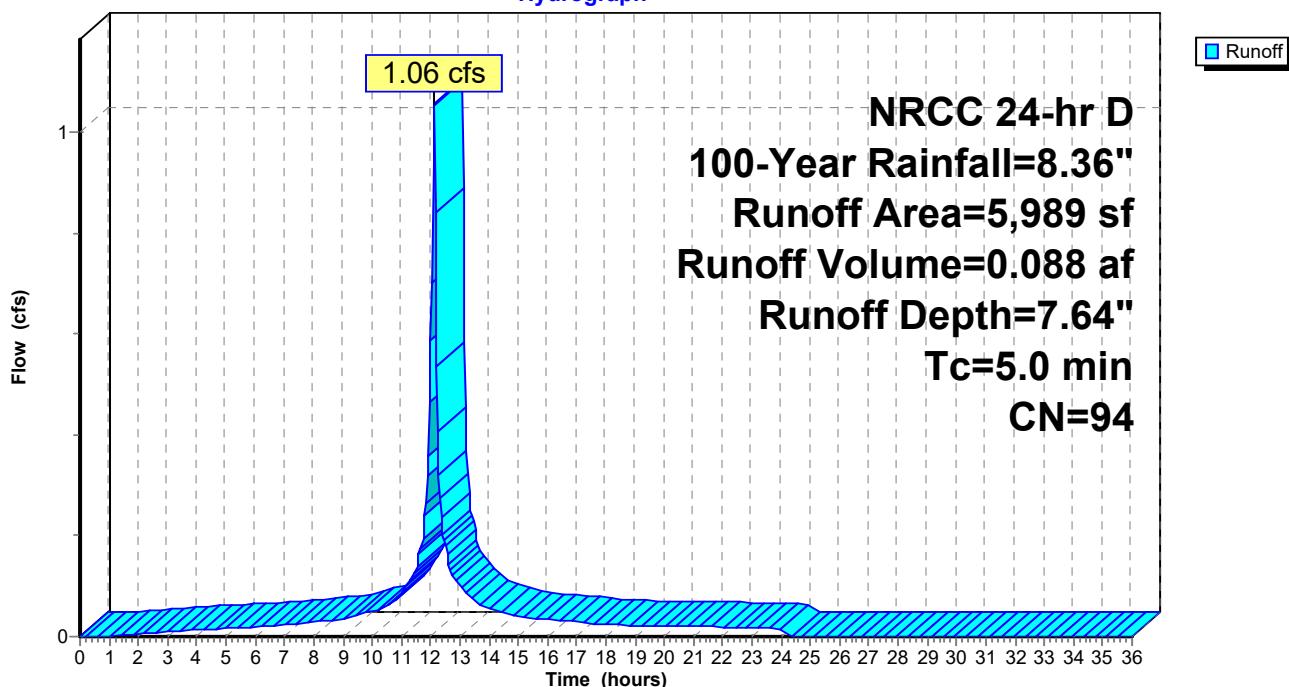
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,187 | 98 Paved parking, HSG C            |
| *         | 690   | 98 Cement Concrete Sidewalk, HSG C |
| 1,112     | 74    | >75% Grass cover, Good, HSG C      |
| 5,989     | 94    | Weighted Average                   |
| 1,112     |       | 18.57% Pervious Area               |
| 4,877     |       | 81.43% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

## Subcatchment 2S: PR-2

Hydrograph



### Summary for Subcatchment 3S: PR-3

Runoff = 1.54 cfs @ 12.11 hrs, Volume= 0.125 af, Depth= 7.40"  
 Routed to Pond 44P : CMP Infiltration

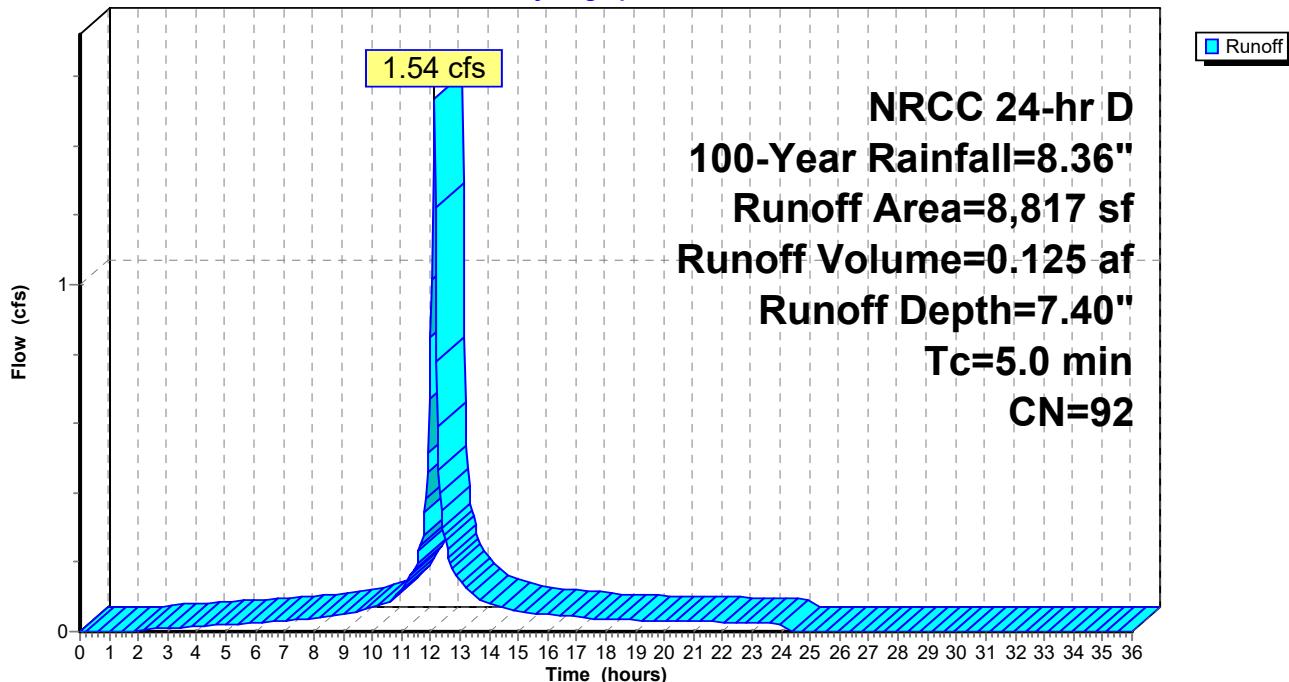
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| 5,618     | 98 | Paved parking, HSG C            |
| 946       | 98 | Cement Concrete Sidewalk, HSG C |
| 2,253     | 74 | >75% Grass cover, Good, HSG C   |
| 8,817     | 92 | Weighted Average                |
| 2,253     |    | 25.55% Pervious Area            |
| 6,564     |    | 74.45% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 3S: PR-3

Hydrograph



### Summary for Subcatchment 4S: PR-4

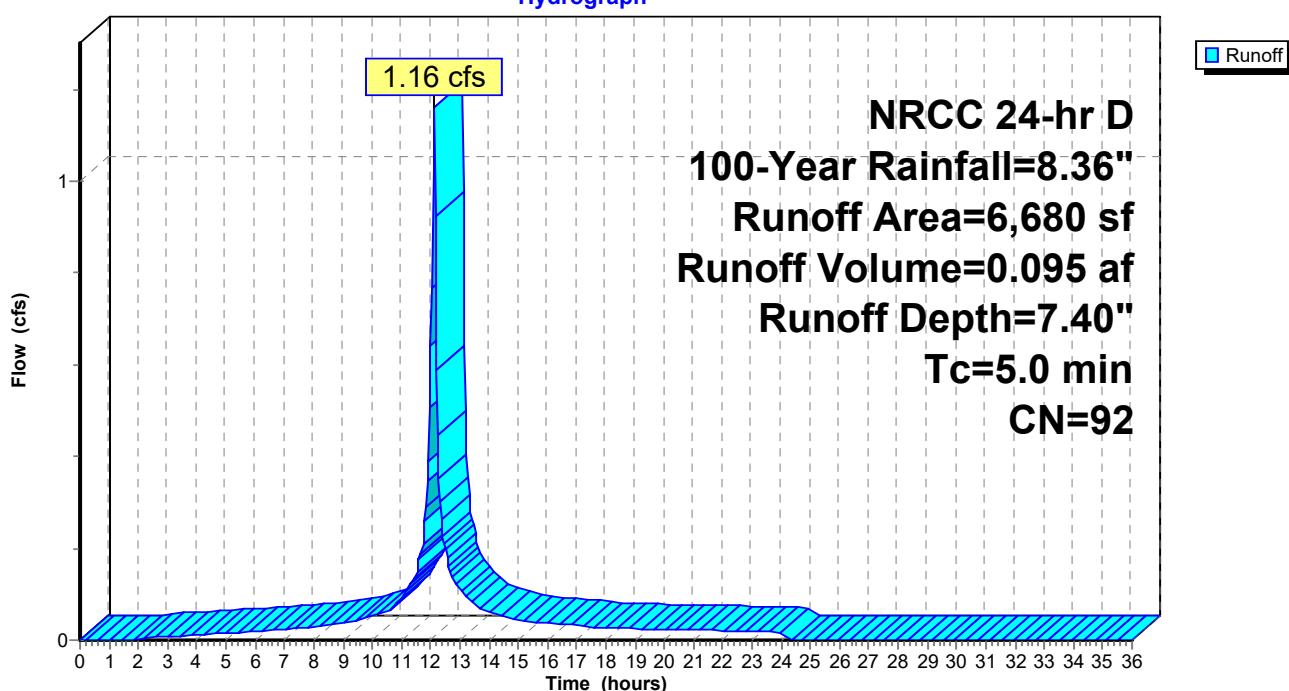
Runoff = 1.16 cfs @ 12.11 hrs, Volume= 0.095 af, Depth= 7.40"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf)            | CN                | Description                     |                      |
|----------------------|-------------------|---------------------------------|----------------------|
| 2,045                | 98                | Paved parking, HSG C            |                      |
| *                    | 2,781             | Paved parking, HSG A            |                      |
| *                    | 424               | Cement Concrete Sidewalk, HSG C |                      |
| *                    | 415               | Cement Concrete Sidewalk, HSG A |                      |
| 559                  | 74                | >75% Grass cover, Good, HSG C   |                      |
| 456                  | 39                | >75% Grass cover, Good, HSG A   |                      |
| 6,680                | 92                | Weighted Average                |                      |
| 1,015                |                   | 15.19% Pervious Area            |                      |
| 5,665                |                   | 84.81% Impervious Area          |                      |
|                      |                   |                                 |                      |
| Tc<br>(min)          | Length<br>(feet)  | Slope<br>(ft/ft)                |                      |
| Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                     |                      |
| 5.0                  |                   |                                 | Direct Entry, Direct |

### Subcatchment 4S: PR-4

Hydrograph



### Summary for Subcatchment 5S: PR-5

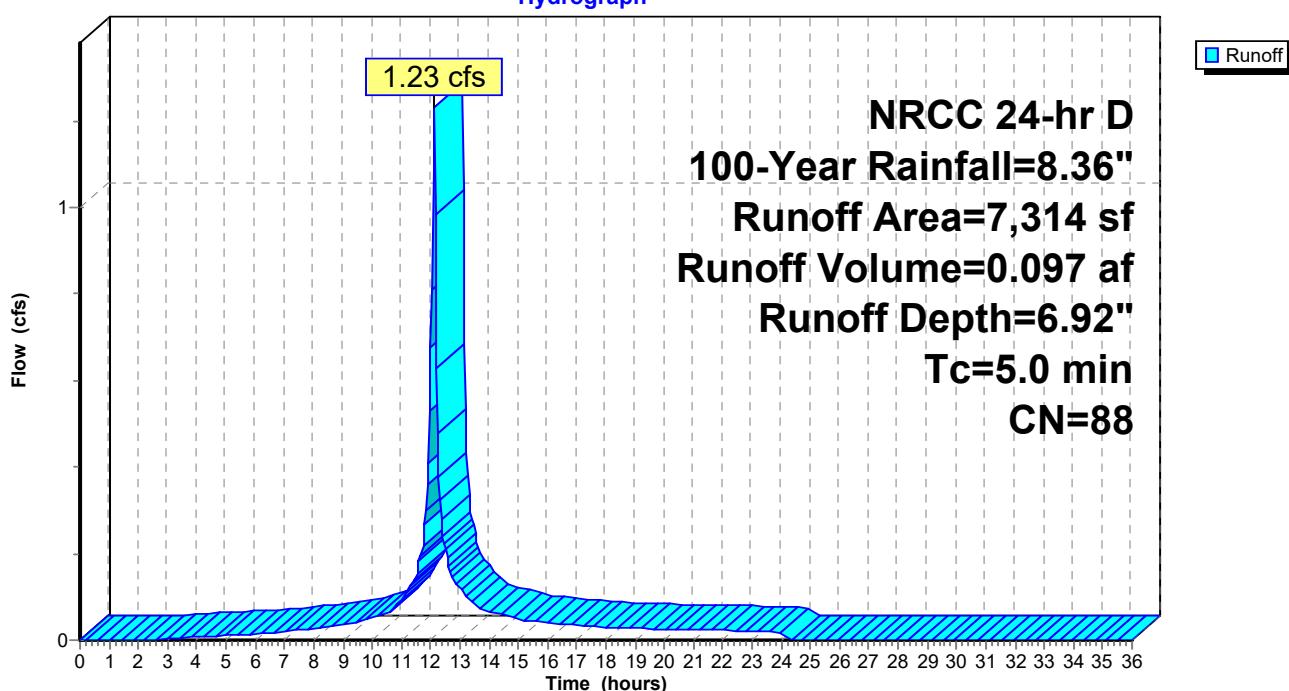
Runoff = 1.23 cfs @ 12.11 hrs, Volume= 0.097 af, Depth= 6.92"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 1,817         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 3,106         | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 327           | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
| *         | 391           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
| 725       | 74            | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 948       | 39            | >75% Grass cover, Good, HSG A      |                   |                |                      |
| 7,314     | 88            | Weighted Average                   |                   |                |                      |
| 1,673     |               | 22.87% Pervious Area               |                   |                |                      |
| 5,641     |               | 77.13% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 5S: PR-5

Hydrograph



### Summary for Subcatchment 6S: PR-6

Runoff = 2.03 cfs @ 12.12 hrs, Volume= 0.149 af, Depth= 5.01"  
 Routed to Pond 44P : CMP Infiltration

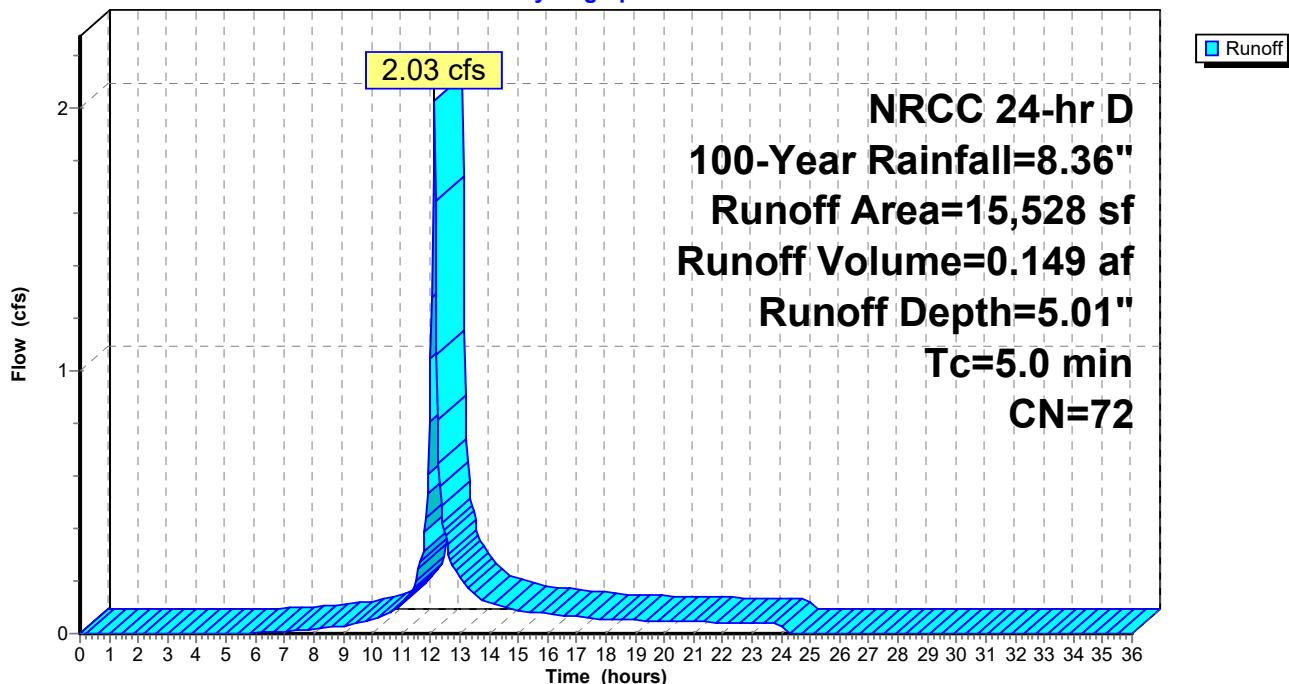
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN     | Description                        |
|-----------|--------|------------------------------------|
| *         | 7,081  | 98 Paved parking, HSG A            |
| *         | 1,477  | 98 Cement Concrete Sidewalk, HSG A |
|           | 6,970  | >75% Grass cover, Good, HSG A      |
|           | 15,528 | Weighted Average                   |
|           | 6,970  | 44.89% Pervious Area               |
|           | 8,558  | 55.11% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 6S: PR-6

Hydrograph



### Summary for Subcatchment 7S: PR-7

Runoff = 1.45 cfs @ 12.11 hrs, Volume= 0.113 af, Depth= 6.68"  
 Routed to Pond 44P : CMP Infiltration

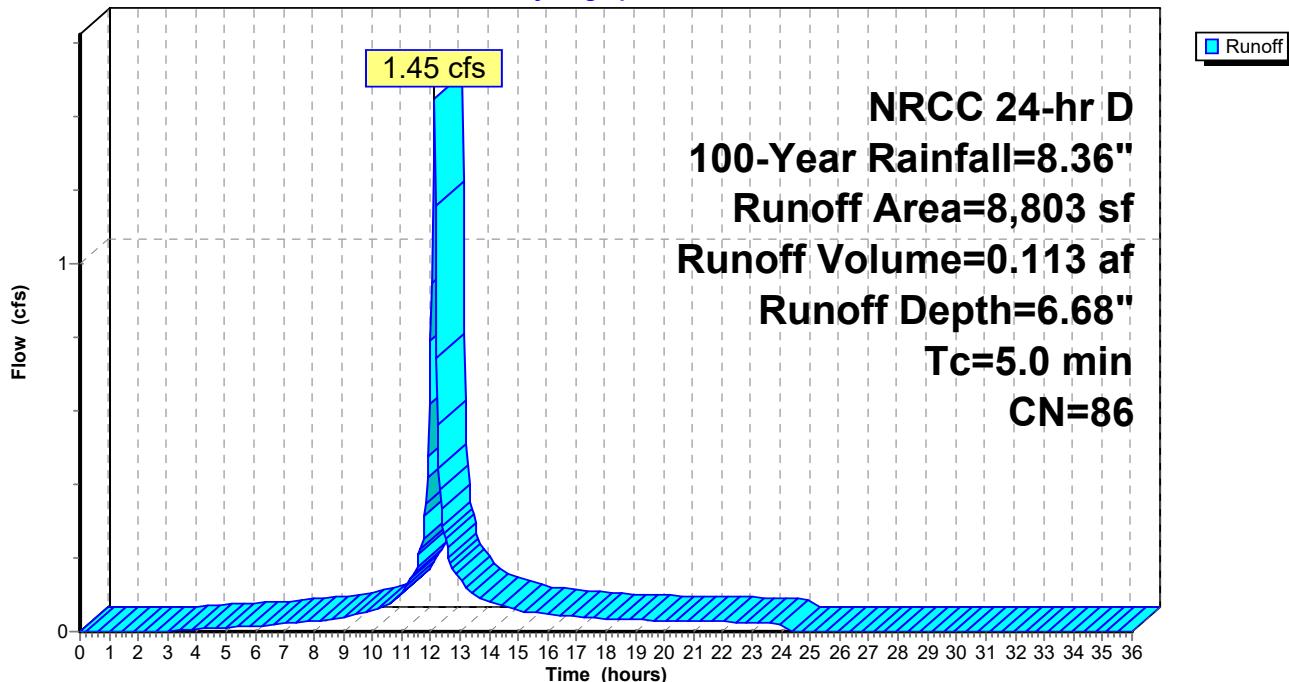
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,946 | 98 Paved parking, HSG A            |
| *         | 1,087 | 98 Cement Concrete Sidewalk, HSG A |
|           | 1,770 | >75% Grass cover, Good, HSG A      |
|           | 8,803 | Weighted Average                   |
|           | 1,770 | 20.11% Pervious Area               |
|           | 7,033 | 79.89% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 7S: PR-7

Hydrograph



### Summary for Subcatchment 8S: PR-8

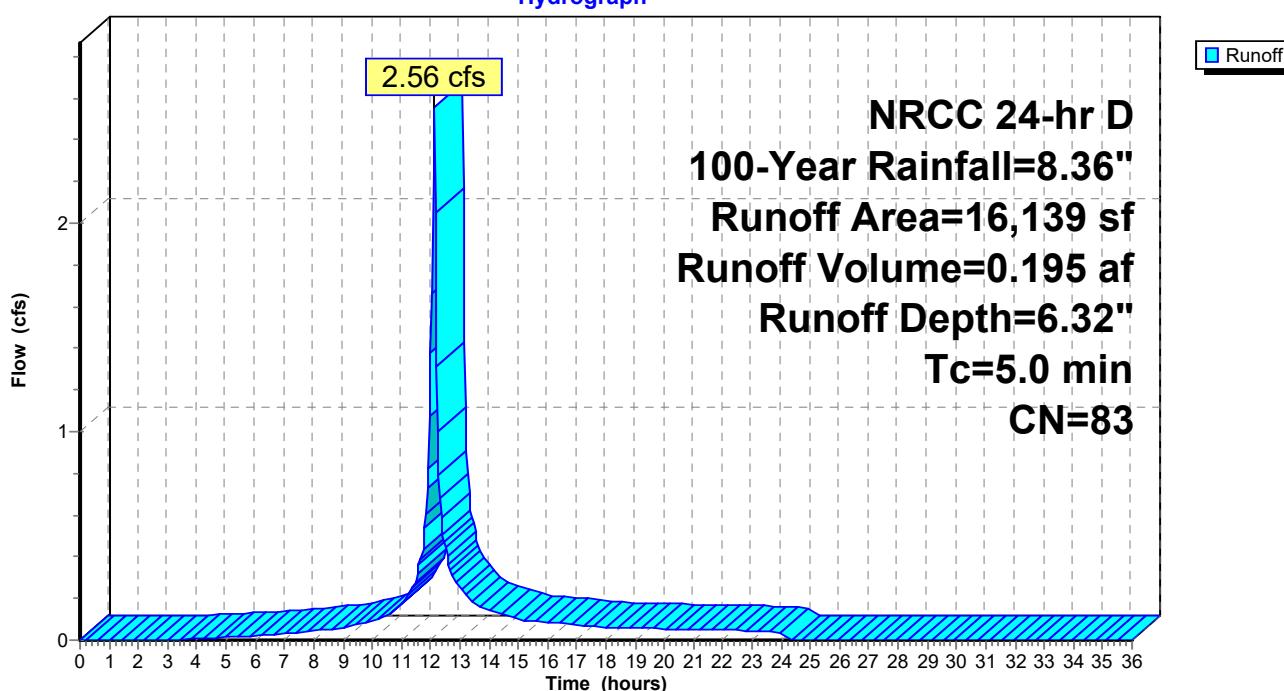
Runoff = 2.56 cfs @ 12.12 hrs, Volume= 0.195 af, Depth= 6.32"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 2,974         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 4,084         | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 1,148         | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
| *         | 390           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
|           | 1,872         | >75% Grass cover, Good, HSG A      |                   |                |                      |
|           | 5,671         | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 16,139    | 83            | Weighted Average                   |                   |                |                      |
| 7,543     |               | 46.74% Pervious Area               |                   |                |                      |
| 8,596     |               | 53.26% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 8S: PR-8

Hydrograph



### Summary for Subcatchment 9S: PR-9

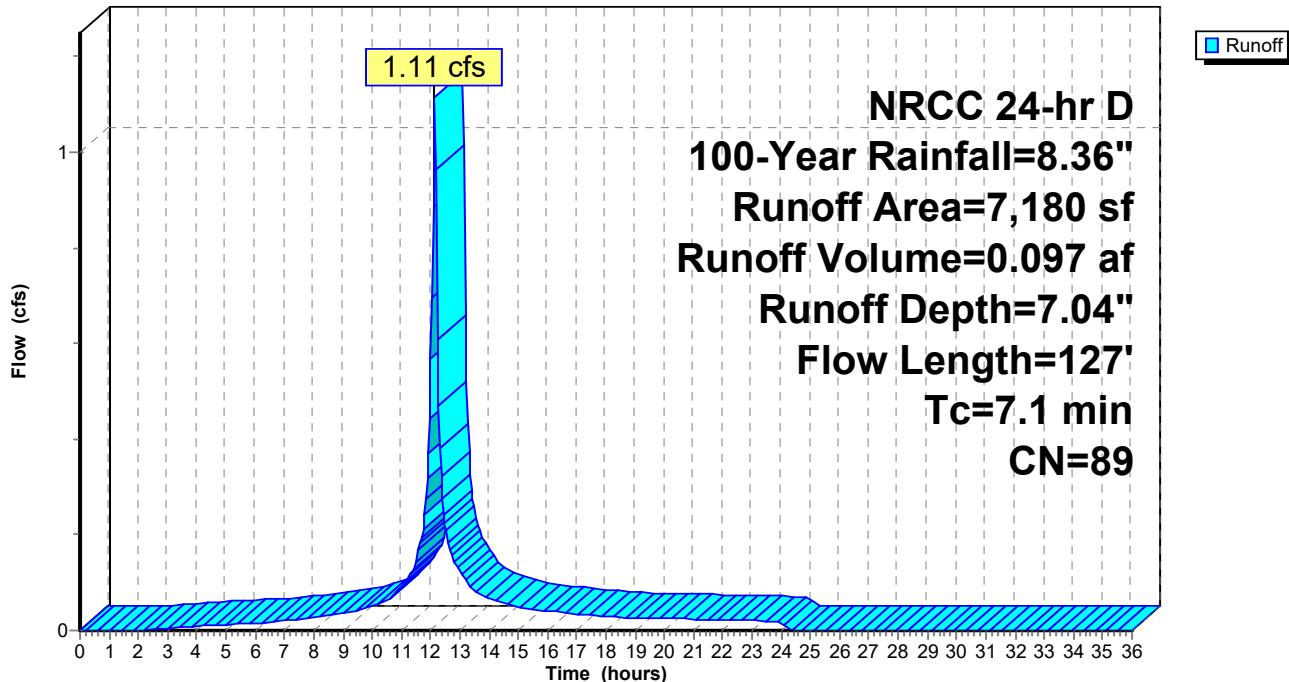
Runoff = 1.11 cfs @ 12.14 hrs, Volume= 0.097 af, Depth= 7.04"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 532   | 98 Paved parking, HSG A            |
| *         | 3,859 | 98 Paved parking, HSG C            |
| *         | 216   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 827   | 98 Cement Concrete Sidewalk, HSG C |
|           | 570   | >75% Grass cover, Good, HSG A      |
|           | 1,176 | >75% Grass cover, Good, HSG C      |

7,180 89 Weighted Average  
 1,746 24.32% Pervious Area  
 5,434 75.68% Impervious Area

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.7         | 75               | 0.0050           | 0.74                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 27               | 0.0050           | 1.44                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 127              | Total            |                      |                   |                                                                   |

**Subcatchment 9S: PR-9****Hydrograph**

### Summary for Subcatchment 10S: PR-10

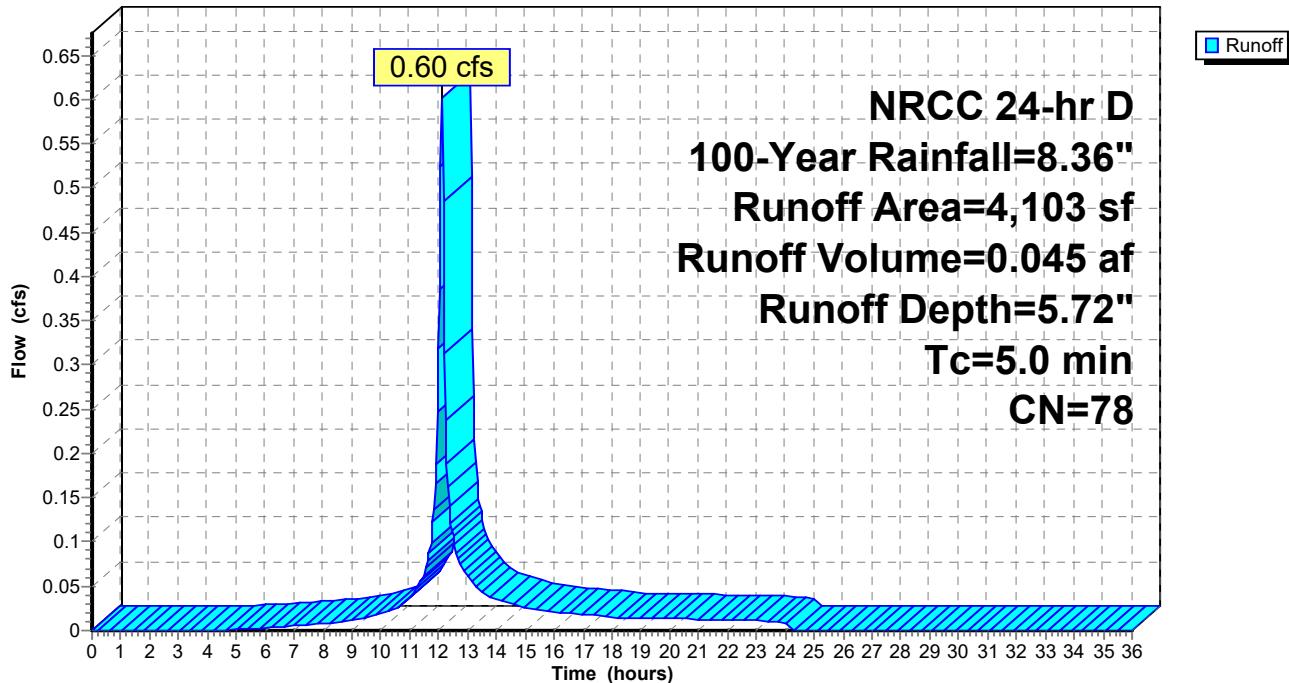
Runoff = 0.60 cfs @ 12.12 hrs, Volume= 0.045 af, Depth= 5.72"  
 Routed to Link 17L : DP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN            | Description                                                |  |                      |
|-----------|---------------|------------------------------------------------------------|--|----------------------|
| 1,584     | 74            | >75% Grass cover, Good, HSG C                              |  |                      |
| 2,519     | 80            | >75% Grass cover, Good, HSG D                              |  |                      |
| 4,103     | 78            | Weighted Average                                           |  |                      |
| 4,103     |               | 100.00% Pervious Area                                      |  |                      |
| Tc (min)  | Length (feet) | Slope (ft/ft) Velocity (ft/sec) Capacity (cfs) Description |  |                      |
| 5.0       |               |                                                            |  | Direct Entry, DIRECT |

### Subcatchment 10S: PR-10

Hydrograph



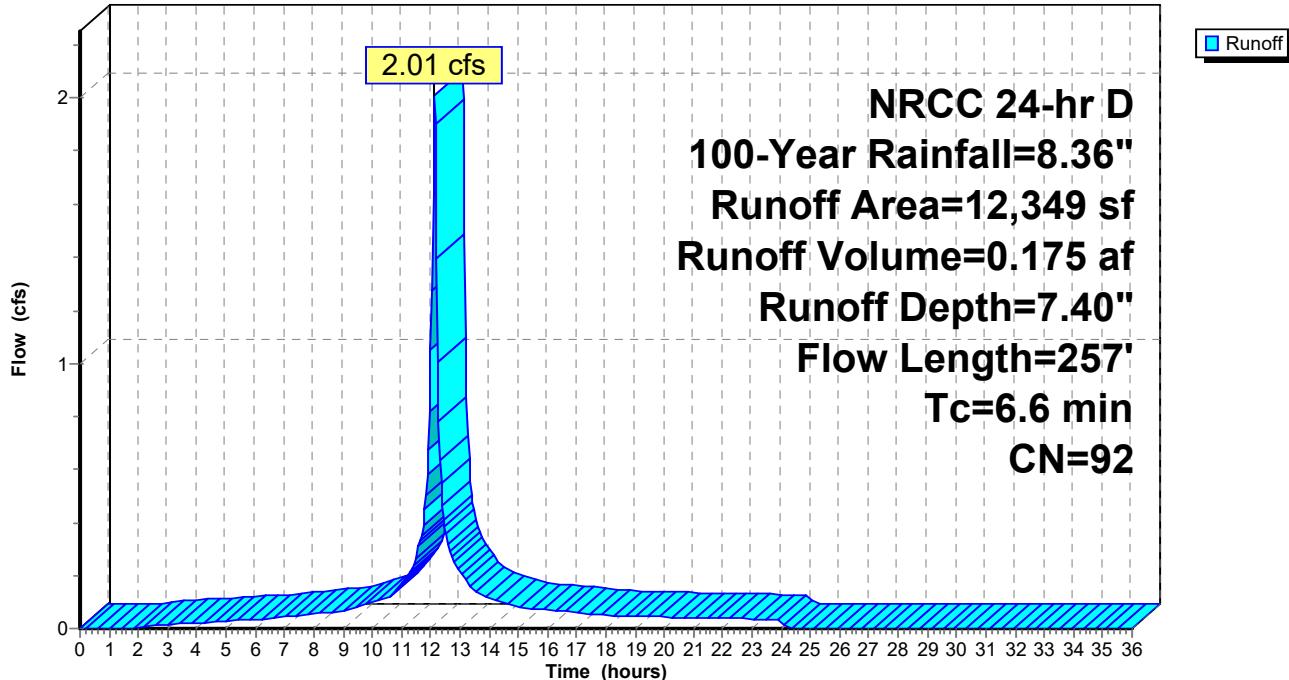
### Summary for Subcatchment 11S: PR-11

Runoff = 2.01 cfs @ 12.13 hrs, Volume= 0.175 af, Depth= 7.40"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,691 | 98 Paved parking, HSG C            |
| *         | 276   | 98 Paved parking, HSG A            |
| *         | 1,371 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 185   | 98 Cement Concrete Sidewalk, HSG A |
| 2,481     | 74    | >75% Grass cover, Good, HSG C      |
| 345       | 39    | >75% Grass cover, Good, HSG A      |
| 12,349    | 92    | Weighted Average                   |
| 2,826     |       | 22.88% Pervious Area               |
| 9,523     |       | 77.12% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.1         | 25               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.8         | 75               | 0.0350           | 1.61                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 157              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 6.6         | 257              | Total            |                      |                   |                                                                   |

**Subcatchment 11S: PR-11****Hydrograph**

### Summary for Subcatchment 12S: PR-12

Runoff = 2.21 cfs @ 12.11 hrs, Volume= 0.178 af, Depth= 7.28"  
 Routed to Pond 44P : CMP Infiltration

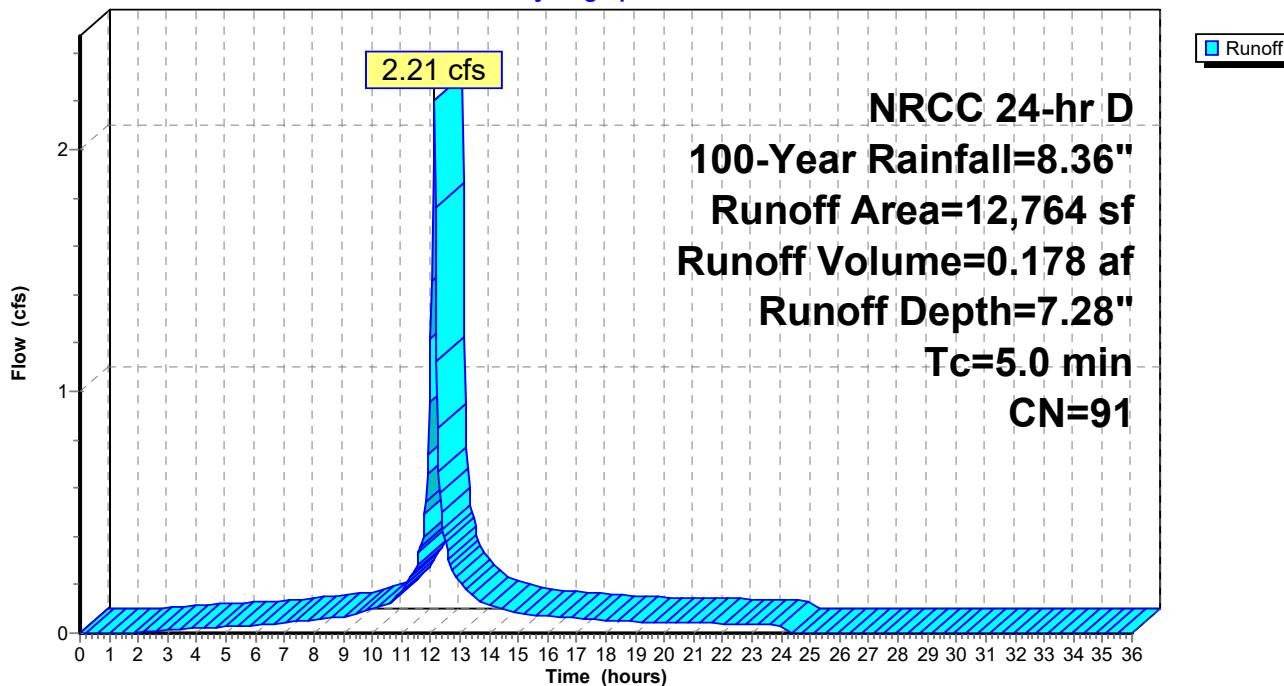
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 7,226 | 98 Paved parking, HSG C            |
| *         | 139   | 98 Paved parking, HSG A            |
| *         | 1,592 | 98 Cement Concrete Sidewalk, HSG C |
| *         | 130   | 98 Cement Concrete Sidewalk, HSG A |
| 3,543     | 74    | >75% Grass cover, Good, HSG C      |
| 134       | 39    | >75% Grass cover, Good, HSG A      |
| 12,764    | 91    | Weighted Average                   |
| 3,677     |       | 28.81% Pervious Area               |
| 9,087     |       | 71.19% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 12S: PR-12

Hydrograph



### Summary for Subcatchment 18S: PR-13

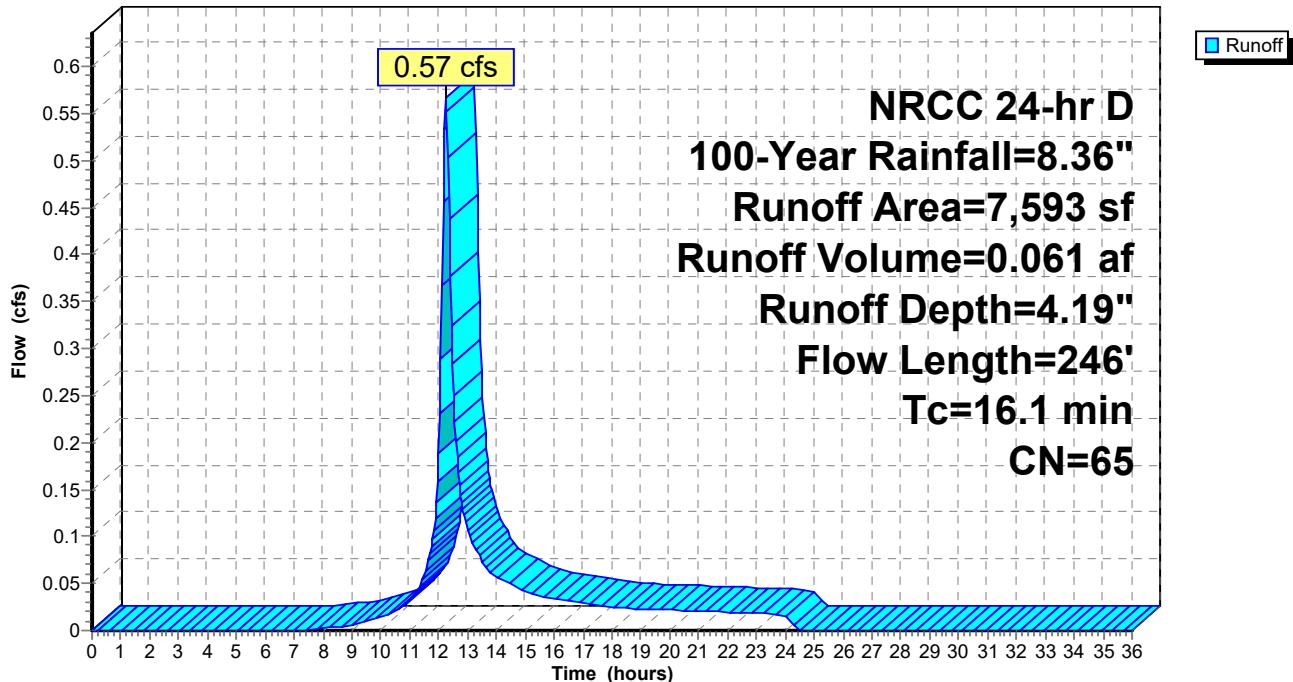
Runoff = 0.57 cfs @ 12.25 hrs, Volume= 0.061 af, Depth= 4.19"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| 131       | 98    | Paved parking, HSG C            |
| *         | 2,672 | Paved parking, HSG A            |
| *         | 183   | Cement Concrete Sidewalk, HSG C |
| 499       | 74    | >75% Grass cover, Good, HSG C   |
| 4,108     | 39    | >75% Grass cover, Good, HSG A   |

|       |    |                        |
|-------|----|------------------------|
| 7,593 | 65 | Weighted Average       |
| 4,607 |    | 60.67% Pervious Area   |
| 2,986 |    | 39.33% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 108              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 246              | Total            |                      |                   |                                                                          |

**Subcatchment 18S: PR-13****Hydrograph**

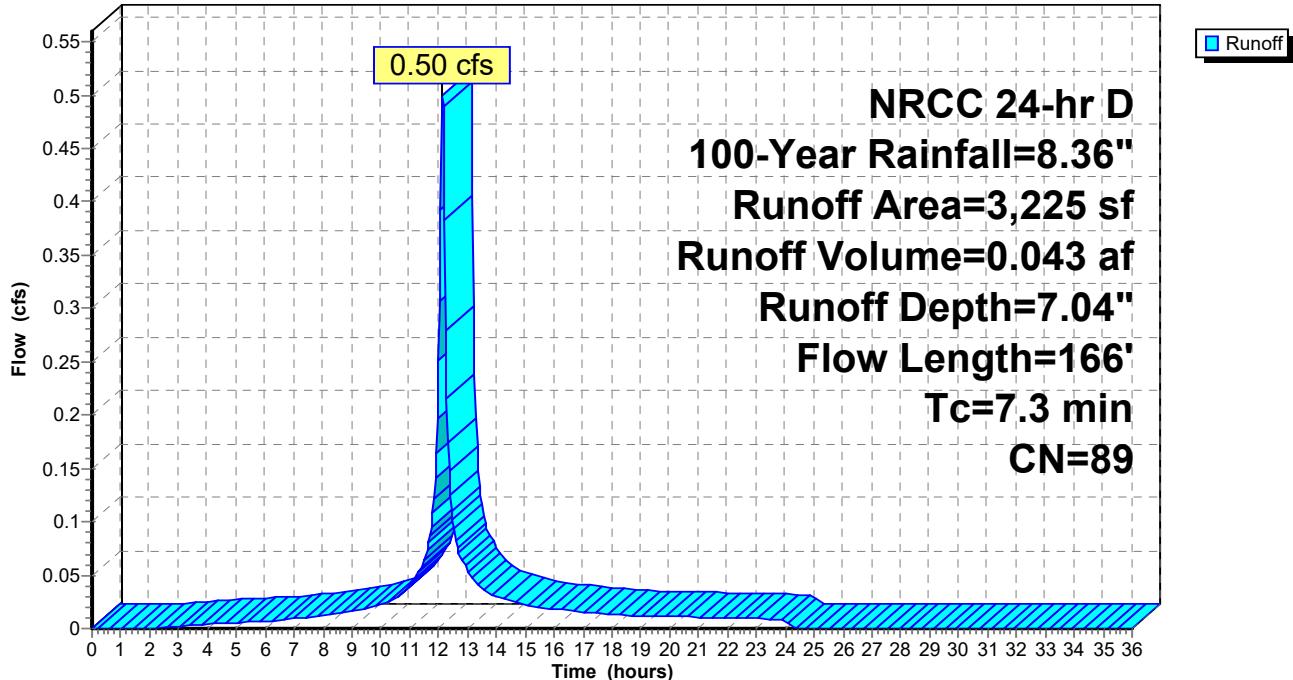
### Summary for Subcatchment 19S: PR-14

Runoff = 0.50 cfs @ 12.14 hrs, Volume= 0.043 af, Depth= 7.04"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 199   | 98 Paved parking, HSG C            |
| *         | 2,132 | 98 Paved parking, HSG A            |
| *         | 322   | 98 Cement Concrete Sidewalk, HSG A |
|           | 126   | >75% Grass cover, Good, HSG C      |
|           | 446   | >75% Grass cover, Good, HSG A      |
| 3,225     | 89    | Weighted Average                   |
| 572       |       | 17.74% Pervious Area               |
| 2,653     |       | 82.26% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 6.3         | 33               | 0.0500           | 0.09                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.7         | 67               | 0.0350           | 1.57                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.3         | 66               | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.3         | 166              | Total            |                      |                   |                                                                   |

**Subcatchment 19S: PR-14****Hydrograph**

### Summary for Subcatchment 20S: PR-15

Runoff = 0.47 cfs @ 12.11 hrs, Volume= 0.037 af, Depth= 7.16"  
 Routed to Pond 44P : CMP Infiltration

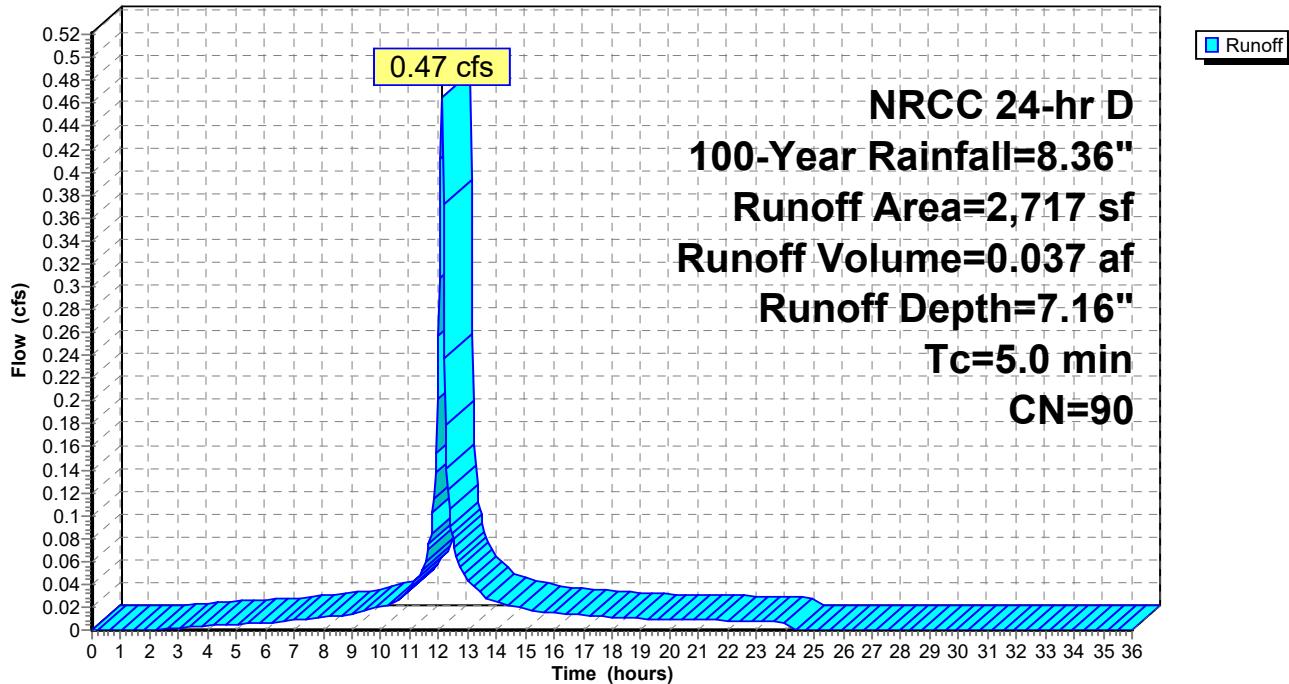
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,331     | 98 | Paved parking, HSG A          |
| 386       | 39 | >75% Grass cover, Good, HSG A |
| 2,717     | 90 | Weighted Average              |
| 386       |    | 14.21% Pervious Area          |
| 2,331     |    | 85.79% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 20S: PR-15

Hydrograph



### Summary for Subcatchment 22S: PR-16

Runoff = 0.17 cfs @ 12.24 hrs, Volume= 0.021 af, Depth= 8.12"  
 Routed to Pond 44P : CMP Infiltration

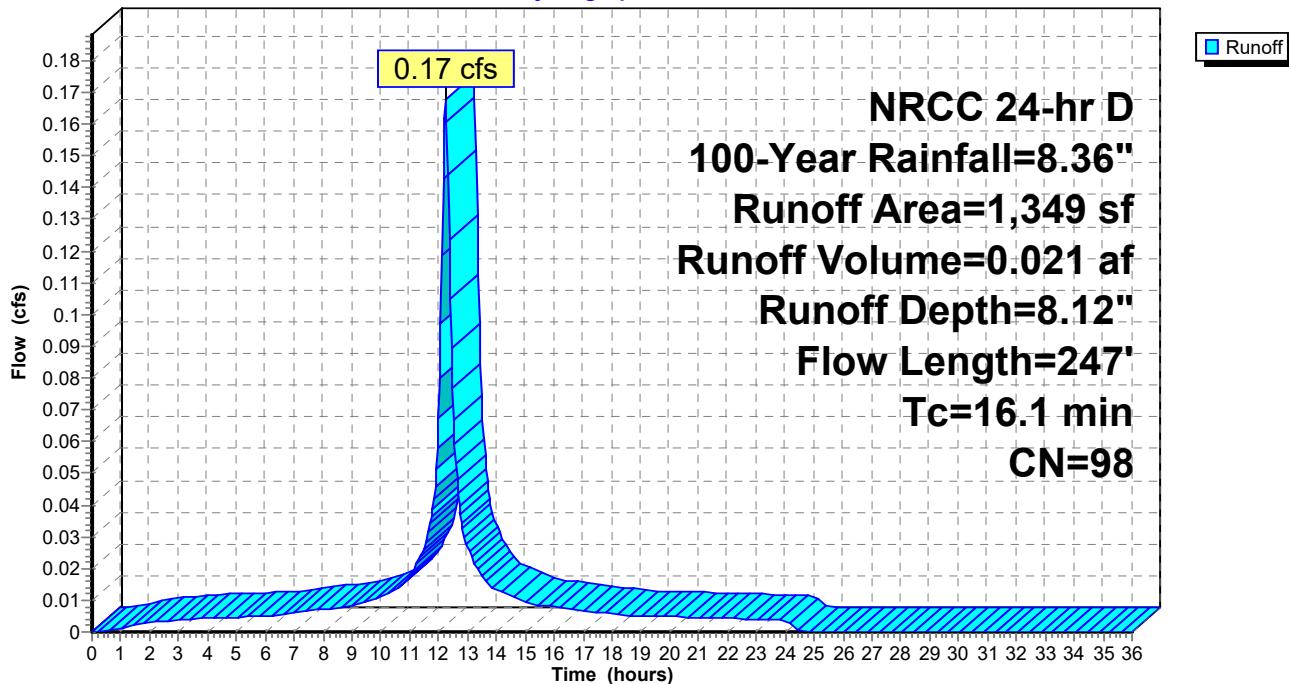
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description             |
|-----------|-------|-------------------------|
| *         | 614   | 98 Paved parking, HSG A |
| *         | 735   | 98 Paved parking, HSG C |
|           | 1,349 | Weighted Average        |
|           | 1,349 | 100.00% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 15.4        | 100              | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 38               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.5         | 109              | 0.0350           | 3.80                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 16.1        | 247              | Total            |                      |                   |                                                                          |

### Subcatchment 22S: PR-16

Hydrograph



### Summary for Subcatchment 23S: PR-17

Runoff = 2.45 cfs @ 12.11 hrs, Volume= 0.196 af, Depth= 7.16"  
 Routed to Pond 44P : CMP Infiltration

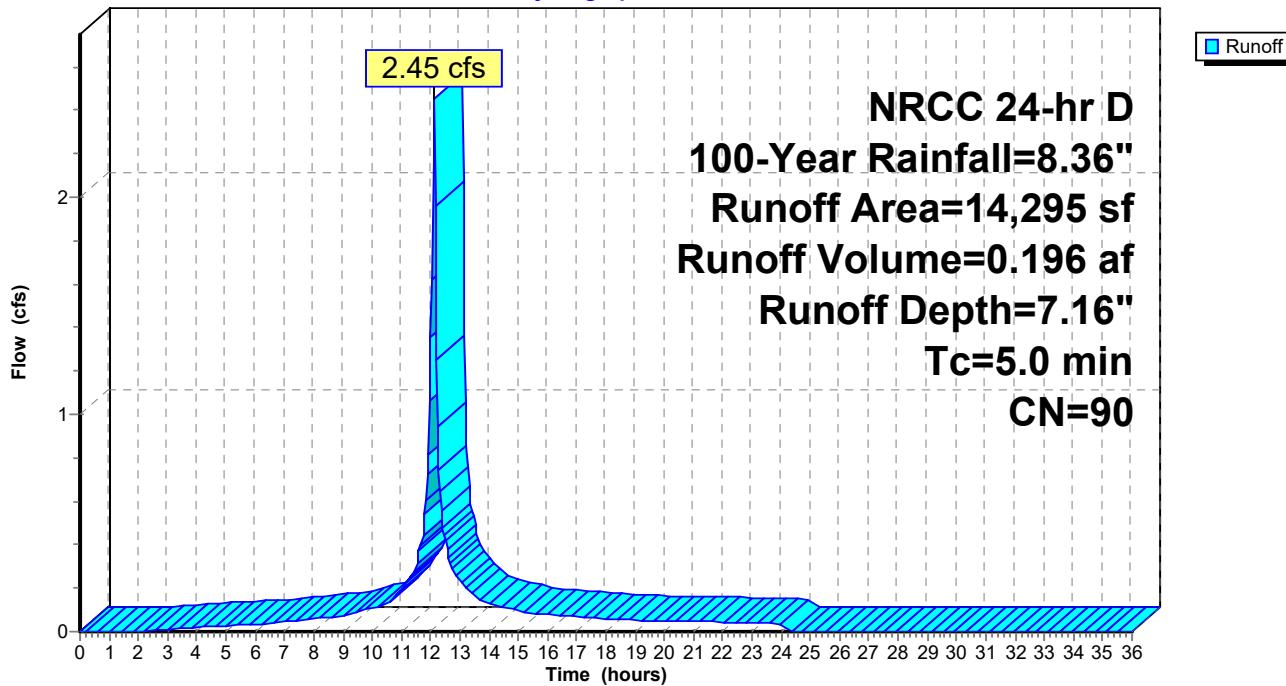
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 447   | 98 Paved parking, HSG A            |
| *         | 7,461 | 98 Paved parking, HSG C            |
| *         | 2,341 | 98 Cement Concrete Sidewalk, HSG C |
|           | 488   | >75% Grass cover, Good, HSG A      |
|           | 3,558 | >75% Grass cover, Good, HSG C      |
| 14,295    | 90    | Weighted Average                   |
| 4,046     |       | 28.30% Pervious Area               |
| 10,249    |       | 71.70% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 23S: PR-17

Hydrograph



### Summary for Subcatchment 24S: PR-18

Runoff = 1.53 cfs @ 12.14 hrs, Volume= 0.142 af, Depth= 7.88"  
 Routed to Pond 44P : CMP Infiltration

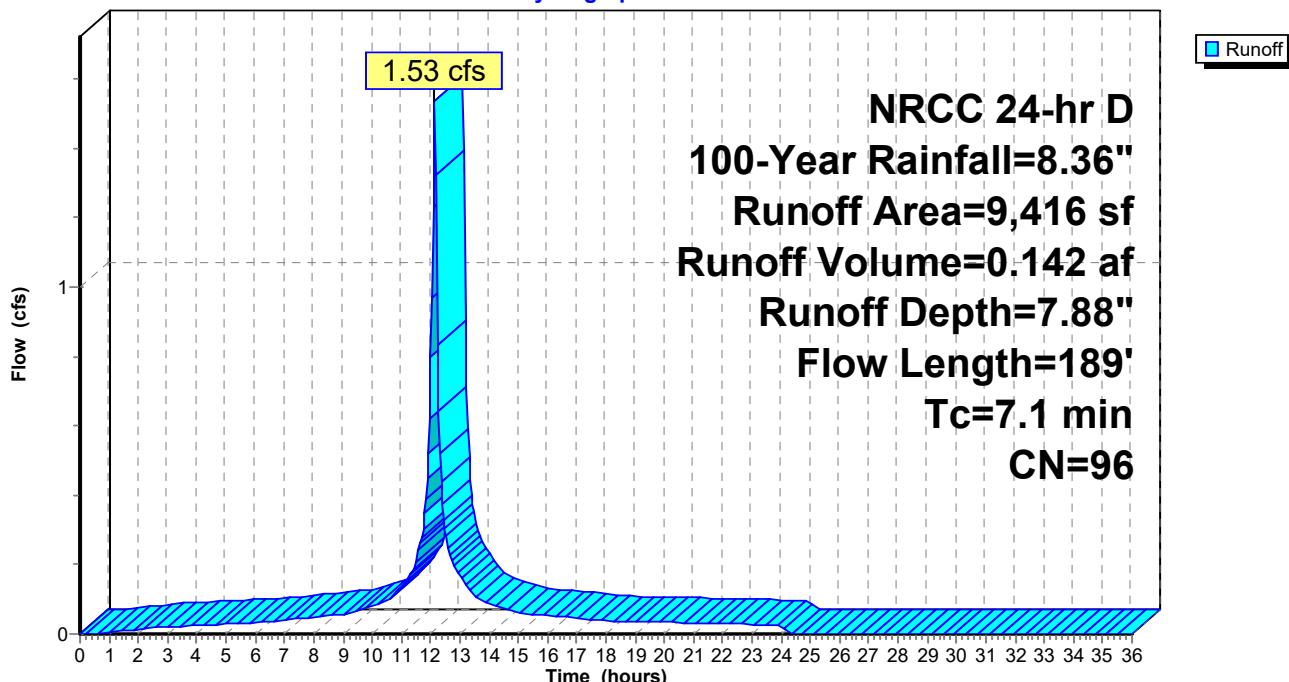
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,554 | 98 Paved parking, HSG A            |
| *         | 4,554 | 98 Cement Concrete Sidewalk, HSG A |
| 308       | 39    | >75% Grass cover, Good, HSG A      |
| 9,416     | 96    | Weighted Average                   |
| 308       |       | 3.27% Pervious Area                |
| 9,108     |       | 96.73% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 5.7         | 29               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.9         | 71               | 0.0200           | 1.27                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.5         | 89               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 7.1         | 189              | Total            |                      |                   |                                                                   |

### Subcatchment 24S: PR-18

Hydrograph



### Summary for Subcatchment 25S: PR-19

Runoff = 0.28 cfs @ 12.12 hrs, Volume= 0.022 af, Depth= 6.32"  
 Routed to Pond 44P : CMP Infiltration

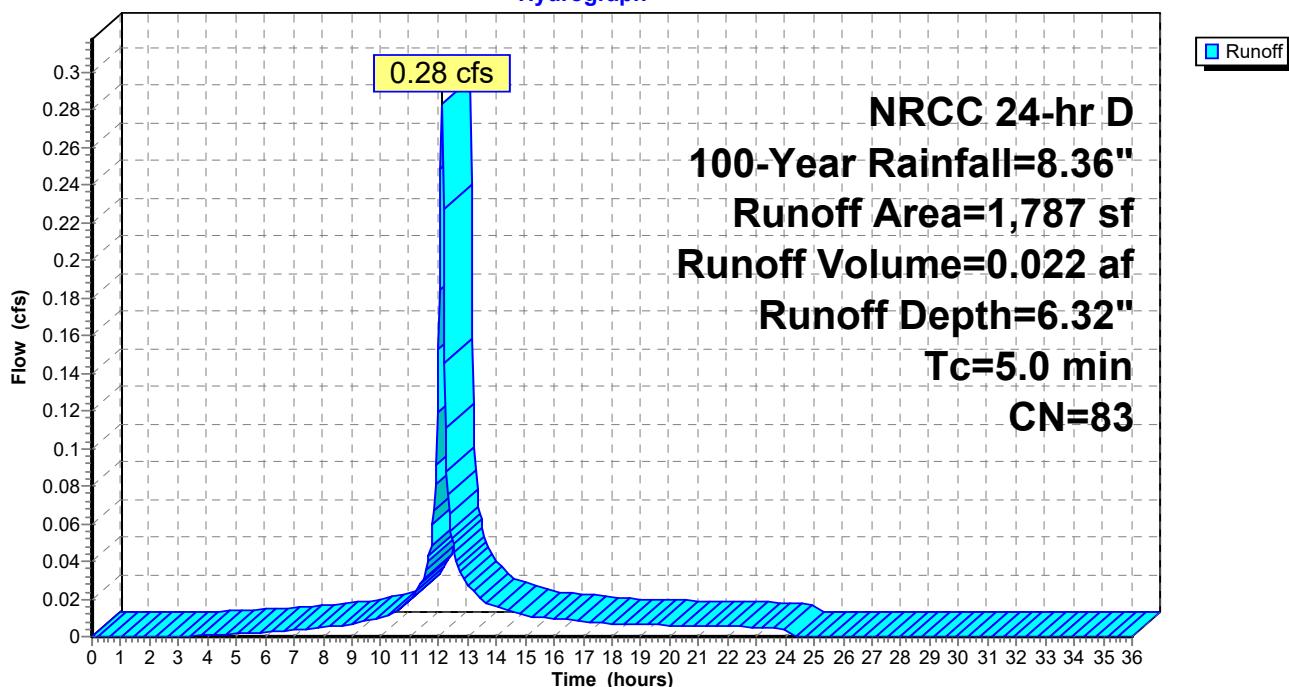
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 1,006 | 98 Paved parking, HSG A         |
| *         | 337   | Cement Concrete Sidewalk, HSG A |
|           | 444   | >75% Grass cover, Good, HSG A   |
| 1,787     | 83    | Weighted Average                |
| 444       |       | 24.85% Pervious Area            |
| 1,343     |       | 75.15% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 25S: PR-19

Hydrograph



### Summary for Subcatchment 26S: PR-20

Runoff = 1.18 cfs @ 12.11 hrs, Volume= 0.094 af, Depth= 7.16"  
 Routed to Pond 44P : CMP Infiltration

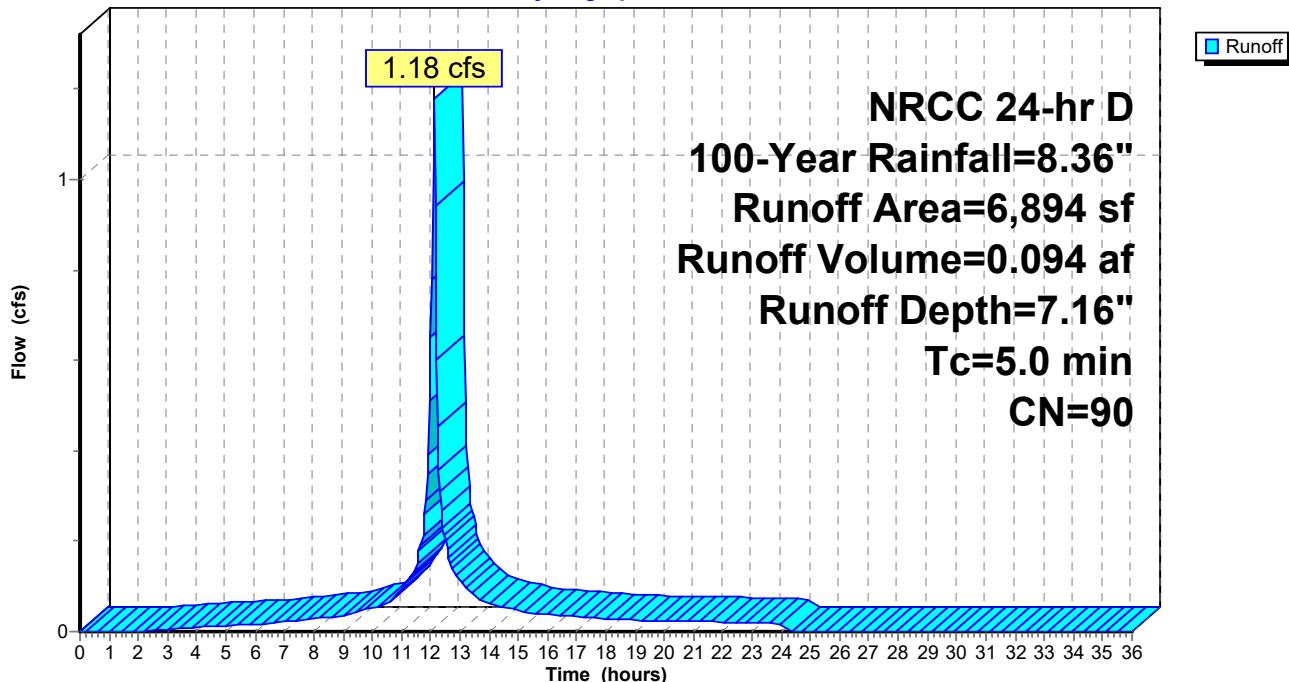
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,689 | 98 Paved parking, HSG A         |
| *         | 1,328 | Cement Concrete Sidewalk, HSG A |
|           | 877   | >75% Grass cover, Good, HSG A   |
|           | 6,894 | Weighted Average                |
|           | 877   | 12.72% Pervious Area            |
|           | 6,017 | 87.28% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 26S: PR-20

Hydrograph



### Summary for Subcatchment 27S: PR-21

Runoff = 1.19 cfs @ 12.11 hrs, Volume= 0.096 af, Depth= 7.28"  
 Routed to Pond 44P : CMP Infiltration

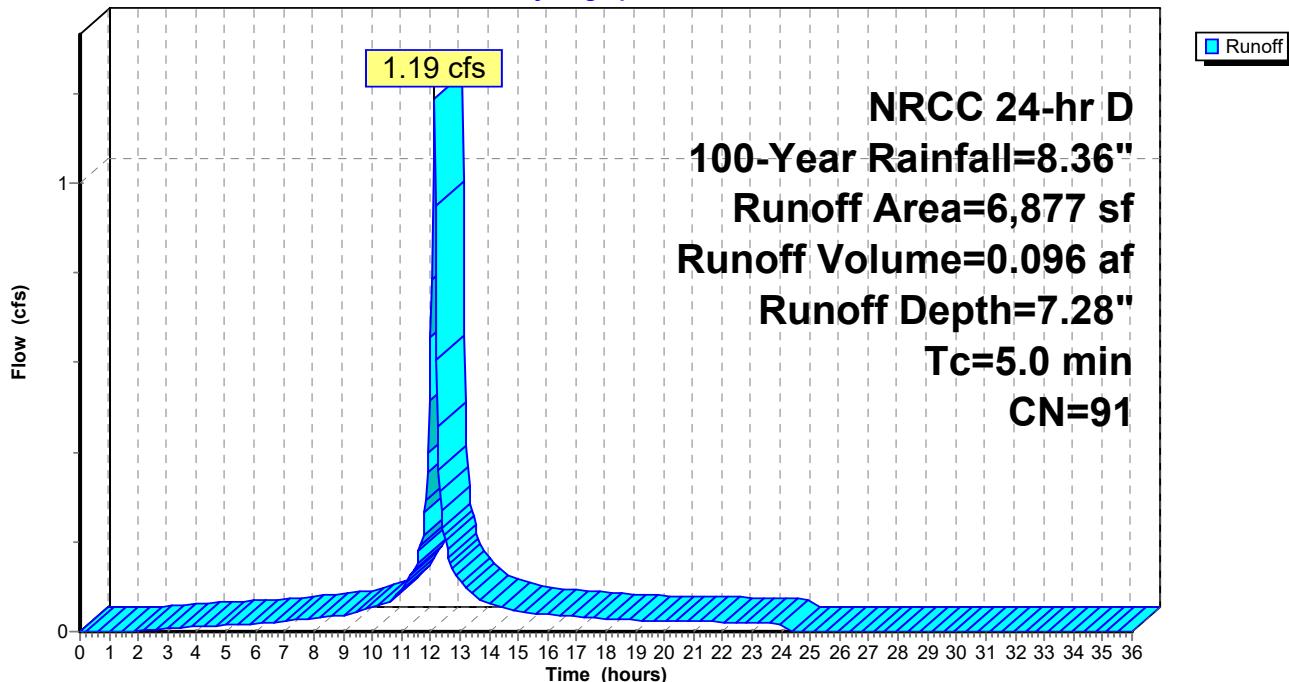
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,706 | 98 Paved parking, HSG A         |
| *         | 1,331 | Cement Concrete Sidewalk, HSG A |
|           | 840   | >75% Grass cover, Good, HSG A   |
|           | 6,877 | Weighted Average                |
|           | 840   | 12.21% Pervious Area            |
|           | 6,037 | 87.79% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 27S: PR-21

Hydrograph



### Summary for Subcatchment 28S: PR-22

Runoff = 0.82 cfs @ 12.12 hrs, Volume= 0.063 af, Depth= 6.44"  
 Routed to Pond 44P : CMP Infiltration

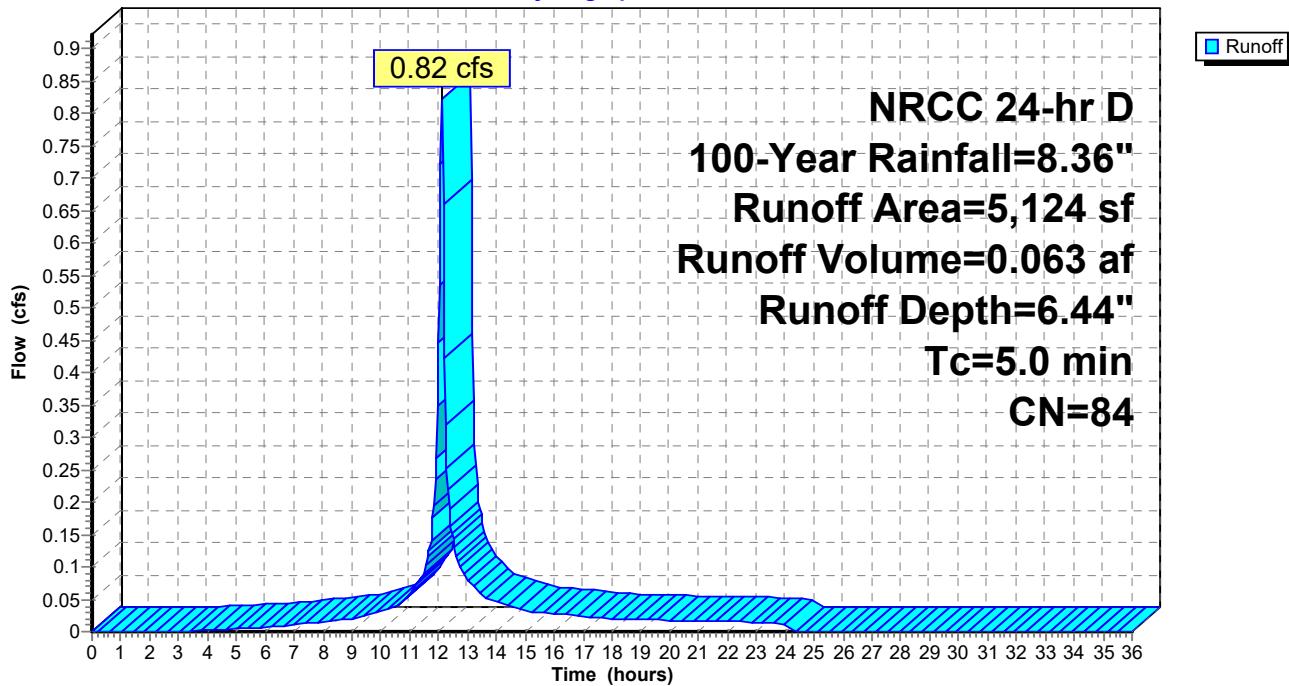
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,097 | 98 Paved parking, HSG A            |
| *         | 72    | 98 Paved parking, HSG C            |
| *         | 588   | 98 Cement Concrete Sidewalk, HSG C |
|           | 1,052 | >75% Grass cover, Good, HSG A      |
|           | 315   | >75% Grass cover, Good, HSG C      |
| 5,124     | 84    | Weighted Average                   |
| 1,367     |       | 26.68% Pervious Area               |
| 3,757     |       | 73.32% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 28S: PR-22

Hydrograph



### Summary for Subcatchment 29S: PR-23

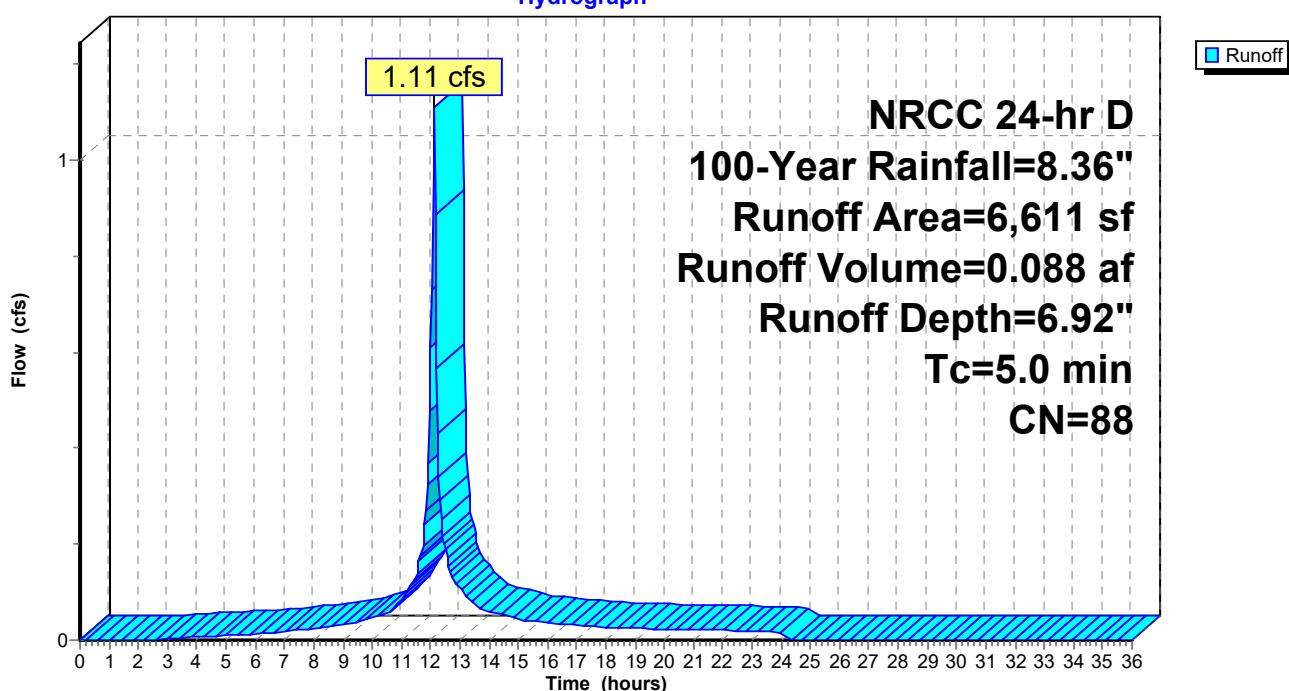
Runoff = 1.11 cfs @ 12.11 hrs, Volume= 0.088 af, Depth= 6.92"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 3,322         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 748           | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 695           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
| *         | 463           | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
| 914       | 39            | >75% Grass cover, Good, HSG A      |                   |                |                      |
| 469       | 74            | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 6,611     | 88            | Weighted Average                   |                   |                |                      |
| 1,383     |               | 20.92% Pervious Area               |                   |                |                      |
| 5,228     |               | 79.08% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 29S: PR-23

Hydrograph



### Summary for Subcatchment 30S: PR-24

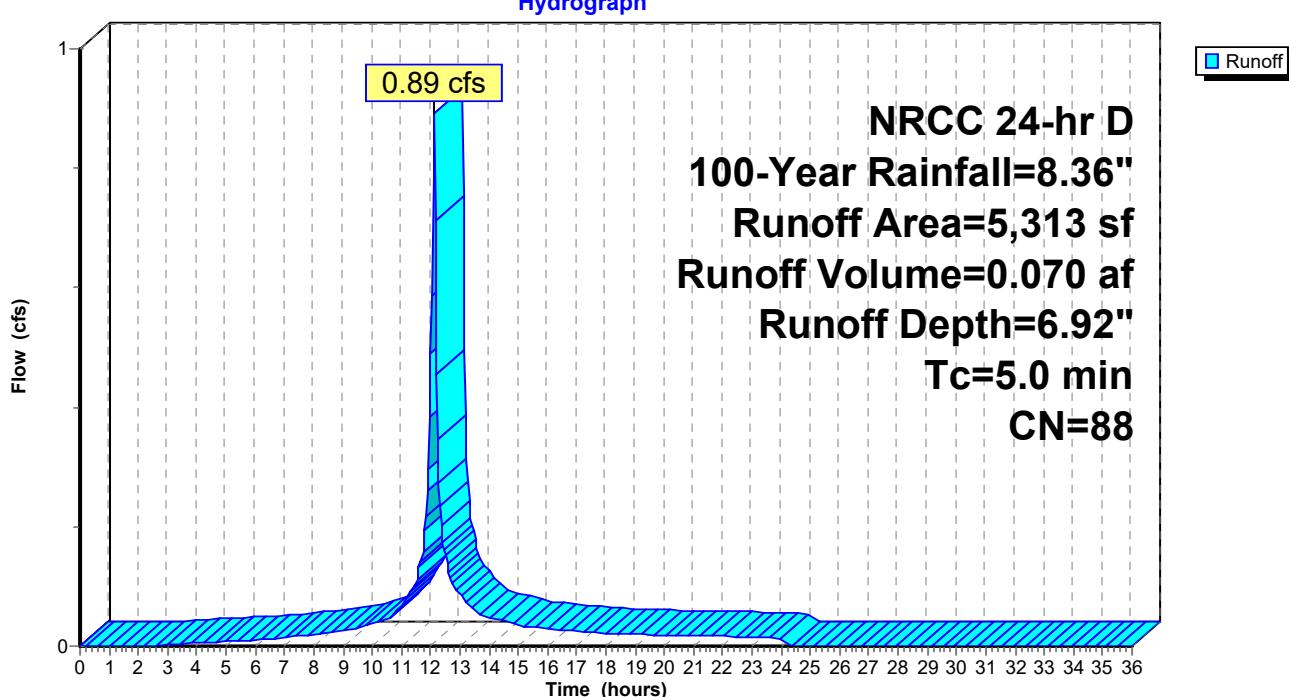
Runoff = 0.89 cfs @ 12.11 hrs, Volume= 0.070 af, Depth= 6.92"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN            | Description                        |                   |                |                      |
|-----------|---------------|------------------------------------|-------------------|----------------|----------------------|
| *         | 3,109         | 98 Paved parking, HSG A            |                   |                |                      |
| *         | 146           | 98 Paved parking, HSG C            |                   |                |                      |
| *         | 572           | 98 Cement Concrete Sidewalk, HSG A |                   |                |                      |
| *         | 432           | 98 Cement Concrete Sidewalk, HSG C |                   |                |                      |
|           | 819           | >75% Grass cover, Good, HSG A      |                   |                |                      |
|           | 235           | >75% Grass cover, Good, HSG C      |                   |                |                      |
| 5,313     | 88            | Weighted Average                   |                   |                |                      |
| 1,054     |               | 19.84% Pervious Area               |                   |                |                      |
| 4,259     |               | 80.16% Impervious Area             |                   |                |                      |
| Tc        | Length (feet) | Slope (ft/ft)                      | Velocity (ft/sec) | Capacity (cfs) | Description          |
| 5.0       |               |                                    |                   |                | Direct Entry, Direct |

### Subcatchment 30S: PR-24

Hydrograph



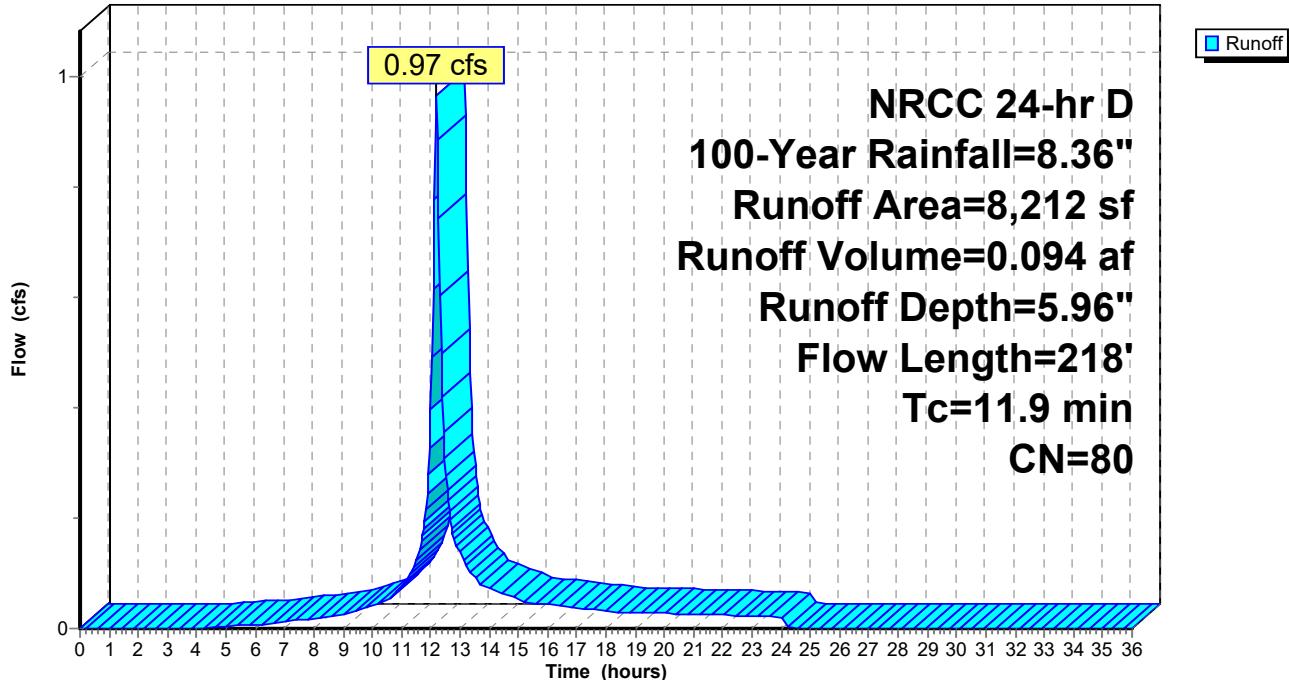
### Summary for Subcatchment 31S: PR-25

Runoff = 0.97 cfs @ 12.19 hrs, Volume= 0.094 af, Depth= 5.96"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 3,851 | 98 Paved parking, HSG A            |
| *         | 988   | 98 Cement Concrete Sidewalk, HSG A |
| *         | 65    | 98 Cement Concrete Sidewalk, HSG C |
| 1,910     | 39    | >75% Grass cover, Good, HSG A      |
| 1,398     | 74    | >75% Grass cover, Good, HSG C      |
| 8,212     | 80    | Weighted Average                   |
| 3,308     |       | 40.28% Pervious Area               |
| 4,904     |       | 59.72% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 10.6        | 63               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.6         | 37               | 0.0150           | 0.99                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 118              | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 11.9        | 218              | Total            |                      |                   |                                                                   |

**Subcatchment 31S: PR-25****Hydrograph**

### Summary for Subcatchment 32S: PR-26

Runoff = 1.02 cfs @ 12.11 hrs, Volume= 0.084 af, Depth= 7.64"  
 Routed to Pond 44P : CMP Infiltration

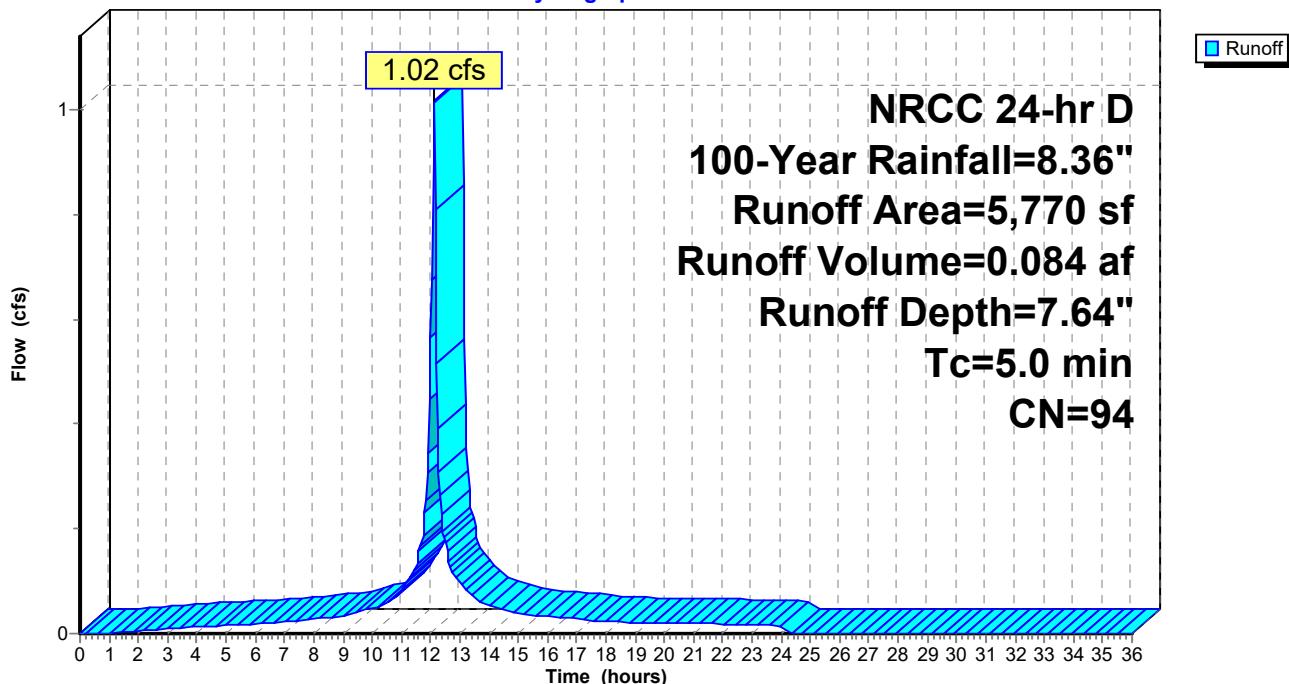
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,263 | 98 Paved parking, HSG A            |
| *         | 1,076 | 98 Cement Concrete Sidewalk, HSG A |
|           | 431   | >75% Grass cover, Good, HSG A      |
|           | 5,770 | Weighted Average                   |
|           | 431   | 7.47% Pervious Area                |
|           | 5,339 | 92.53% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 32S: PR-26

Hydrograph



### Summary for Subcatchment 33S: PR-27

Runoff = 1.01 cfs @ 12.11 hrs, Volume= 0.082 af, Depth= 7.52"  
 Routed to Pond 44P : CMP Infiltration

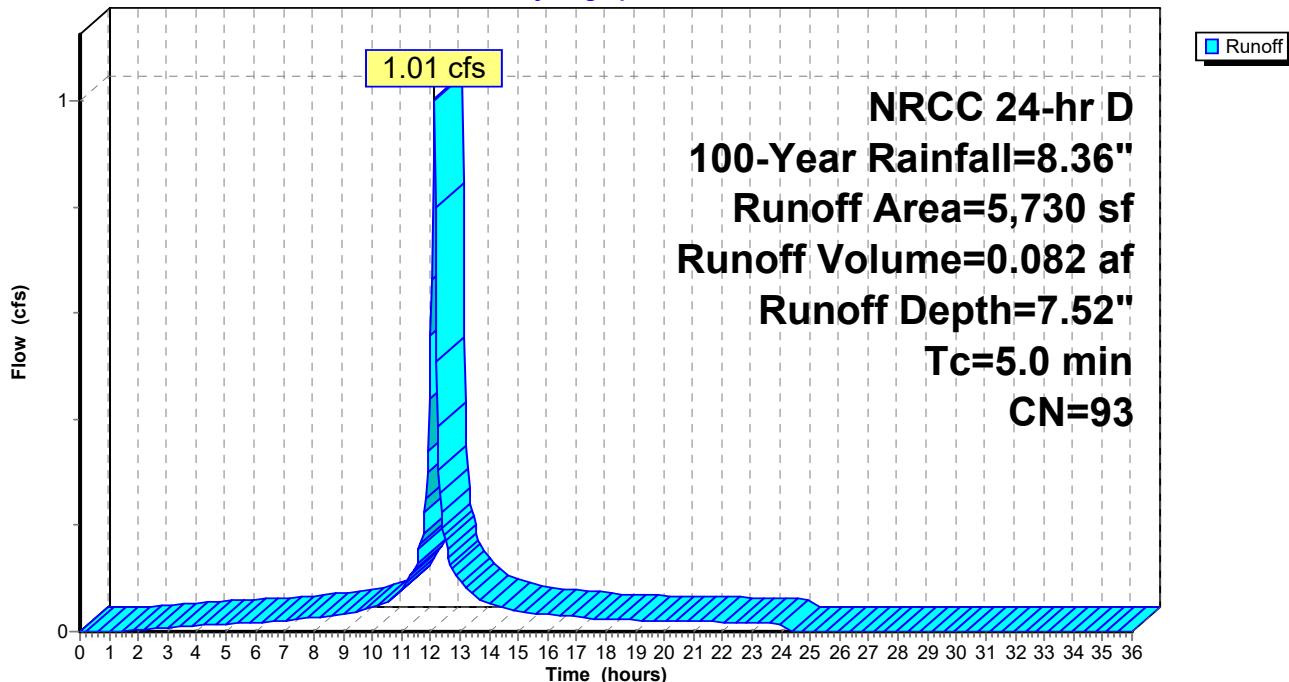
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 4,151 | 98 Paved parking, HSG A            |
| *         | 1,069 | 98 Cement Concrete Sidewalk, HSG A |
| 510       | 39    | >75% Grass cover, Good, HSG A      |
| 5,730     | 93    | Weighted Average                   |
| 510       |       | 8.90% Pervious Area                |
| 5,220     |       | 91.10% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 33S: PR-27

Hydrograph



### Summary for Subcatchment 34S: PR-28

Runoff = 0.41 cfs @ 12.22 hrs, Volume= 0.041 af, Depth= 4.78"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

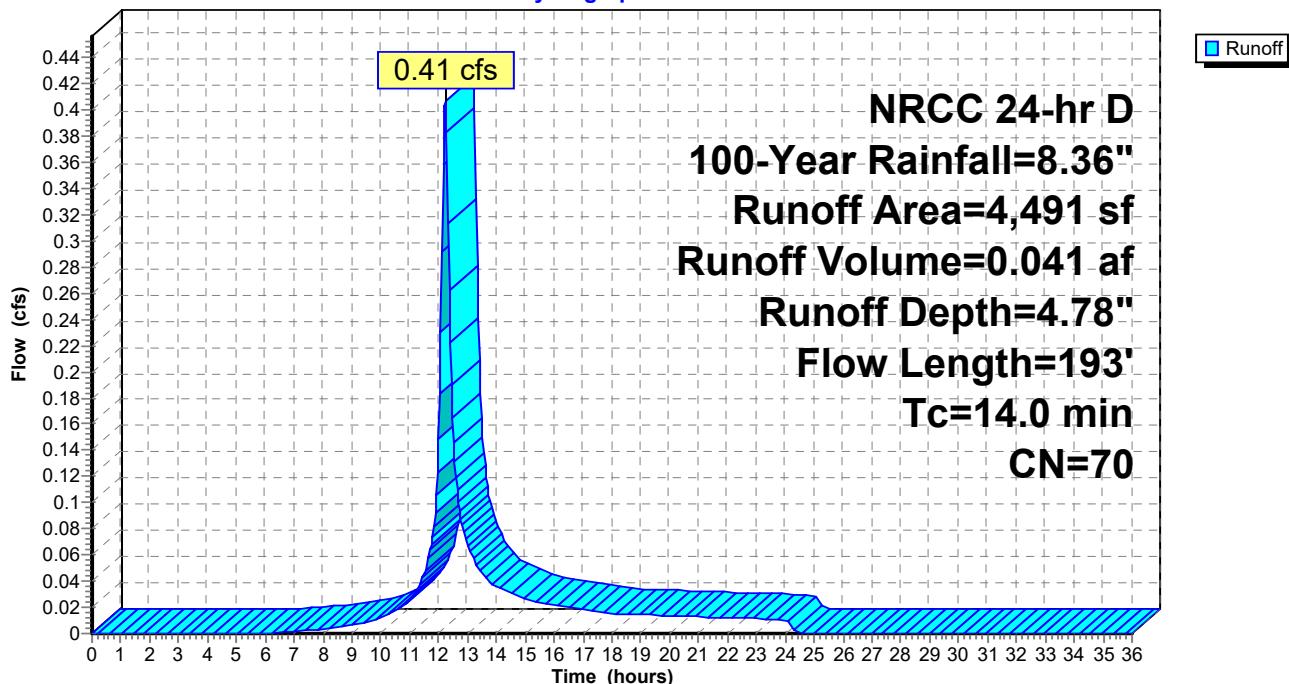
| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,588 | 98 Paved parking, HSG A            |
| *         | 456   | 98 Cement Concrete Sidewalk, HSG A |
| 1,899     | 39    | >75% Grass cover, Good, HSG A      |
| 548       | 74    | >75% Grass cover, Good, HSG C      |

|       |    |                        |
|-------|----|------------------------|
| 4,491 | 70 | Weighted Average       |
| 2,447 |    | 54.49% Pervious Area   |
| 2,044 |    | 45.51% Impervious Area |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 13.0        | 81               | 0.0500           | 0.10                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 0.4         | 19               | 0.0150           | 0.87                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.6         | 93               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 14.0        | 193              | Total            |                      |                   |                                                                   |

### Subcatchment 34S: PR-28

Hydrograph



### Summary for Subcatchment 35S: PR-29

Runoff = 0.24 cfs @ 12.11 hrs, Volume= 0.018 af, Depth= 6.80"  
 Routed to Pond 44P : CMP Infiltration

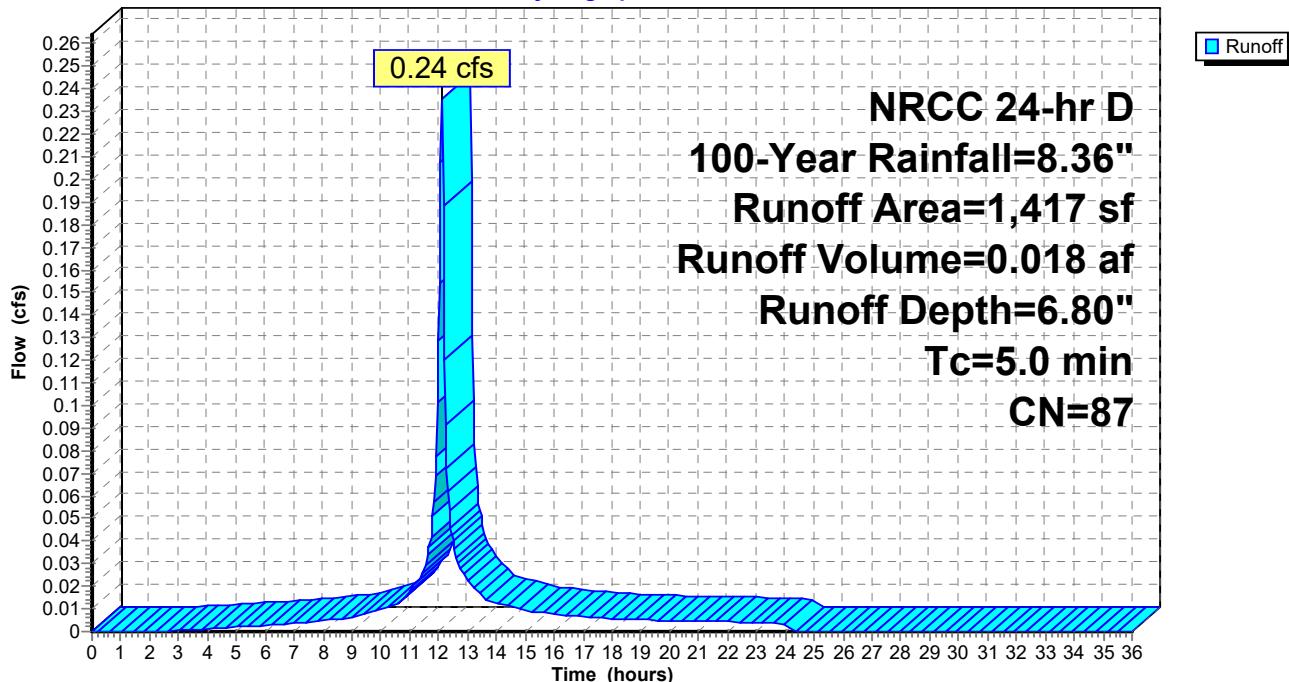
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 1,137 | 98 Paved parking, HSG A            |
| *         | 16    | 98 Cement Concrete Sidewalk, HSG A |
|           | 264   | >75% Grass cover, Good, HSG A      |
|           | 1,417 | Weighted Average                   |
|           | 264   | 18.63% Pervious Area               |
|           | 1,153 | 81.37% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 35S: PR-29

Hydrograph



### Summary for Subcatchment 36S: PR-30

Runoff = 1.36 cfs @ 12.12 hrs, Volume= 0.105 af, Depth= 6.20"  
 Routed to Pond 44P : CMP Infiltration

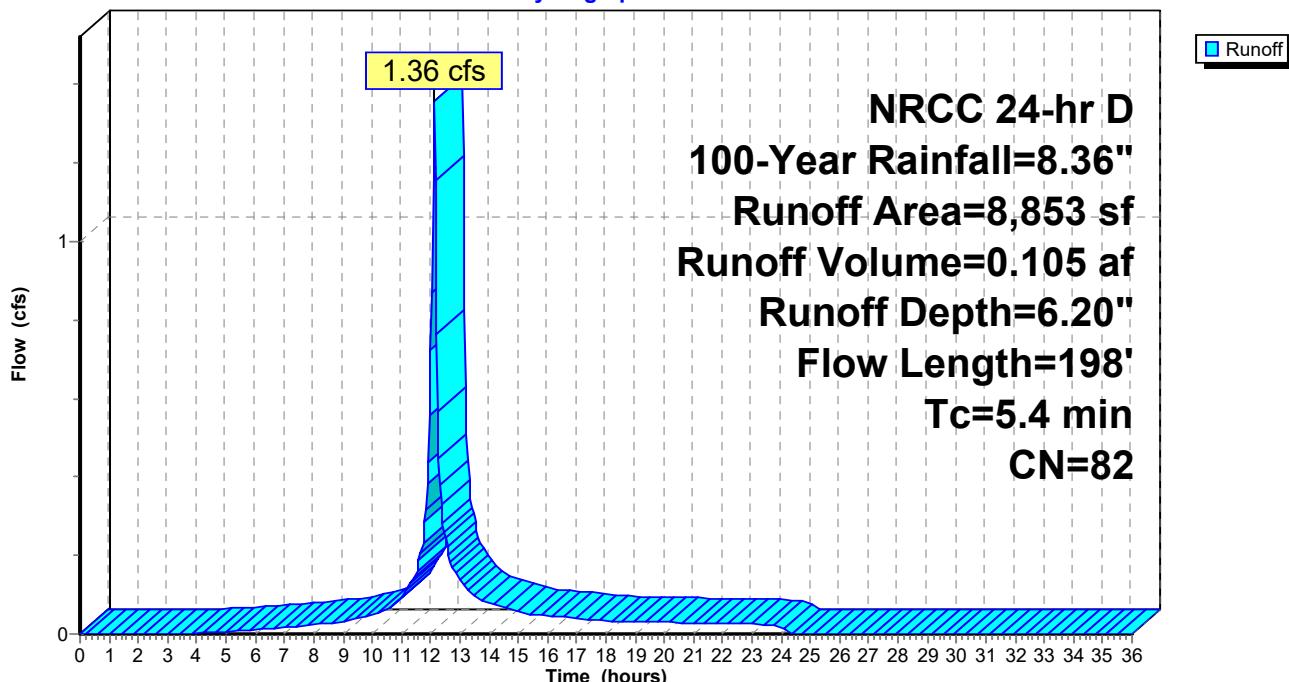
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 5,691   | 98 | Paved parking, HSG A            |
| * 826     | 98 | Cement Concrete Sidewalk, HSG A |
| 2,336     | 39 | >75% Grass cover, Good, HSG A   |
| 8,853     | 82 | Weighted Average                |
| 2,336     |    | 26.39% Pervious Area            |
| 6,517     |    | 73.61% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.5         | 16               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 84               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 98               | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.4         | 198              | Total            |                      |                   |                                                                   |

### Subcatchment 36S: PR-30

Hydrograph



### Summary for Subcatchment 37S: PR-31

Runoff = 1.58 cfs @ 12.12 hrs, Volume= 0.123 af, Depth= 6.44"  
 Routed to Pond 44P : CMP Infiltration

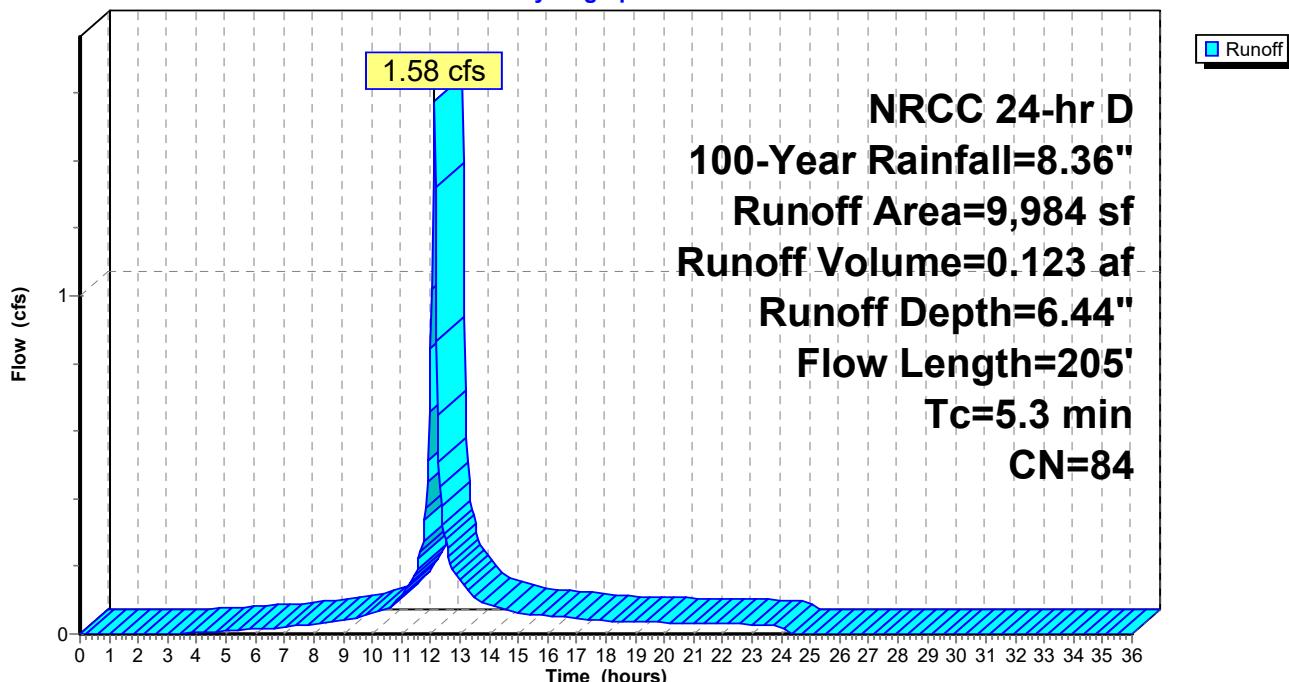
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN | Description                     |
|-----------|----|---------------------------------|
| * 6,479   | 98 | Paved parking, HSG A            |
| * 1,108   | 98 | Cement Concrete Sidewalk, HSG A |
| 2,397     | 39 | >75% Grass cover, Good, HSG A   |
| 9,984     | 84 | Weighted Average                |
| 2,397     |    | 24.01% Pervious Area            |
| 7,587     |    | 75.99% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                       |
|-------------|------------------|------------------|----------------------|-------------------|-------------------------------------------------------------------|
| 3.4         | 15               | 0.0500           | 0.07                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"     |
| 1.2         | 85               | 0.0150           | 1.17                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13" |
| 0.7         | 105              | 0.0150           | 2.49                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps  |
| 5.3         | 205              | Total            |                      |                   |                                                                   |

### Subcatchment 37S: PR-31

Hydrograph



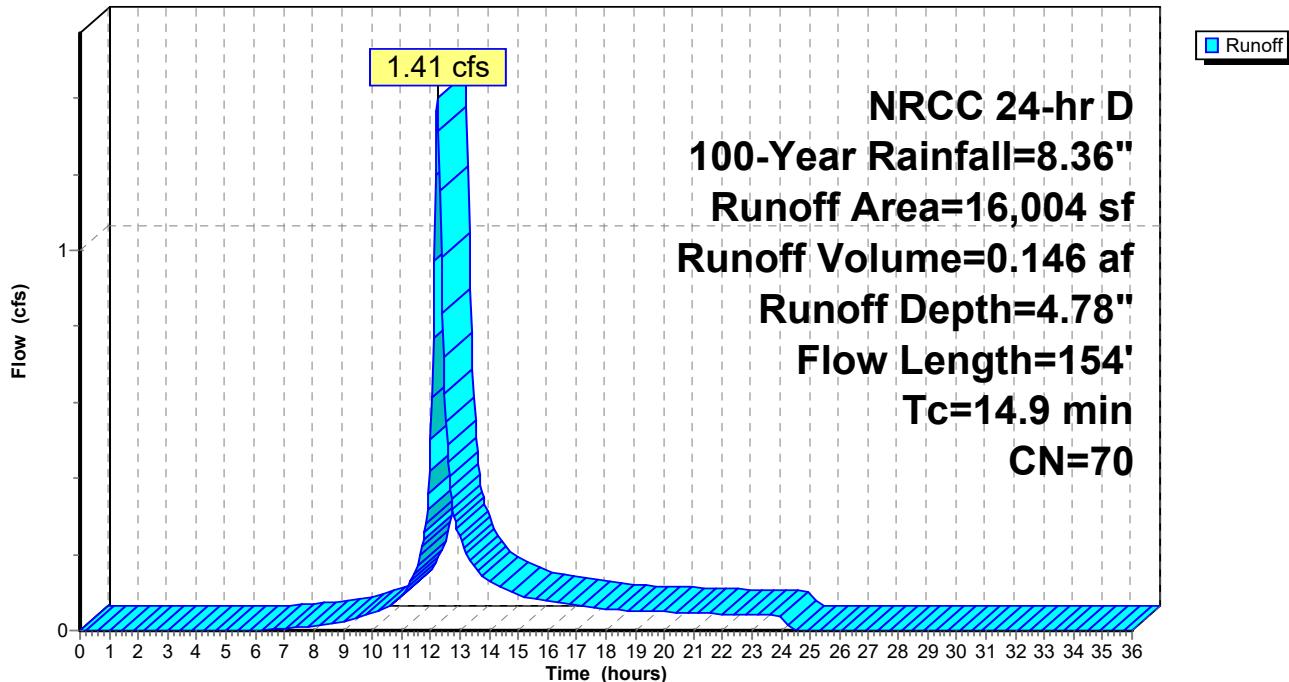
### Summary for Subcatchment 38S: PR-32

Runoff = 1.41 cfs @ 12.23 hrs, Volume= 0.146 af, Depth= 4.78"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN     | Description                     |
|-----------|--------|---------------------------------|
| *         | 6,711  | 98 Paved parking, HSG A         |
| *         | 1,813  | Cement Concrete Sidewalk, HSG A |
|           | 7,480  | >75% Grass cover, Good, HSG A   |
|           | 16,004 | Weighted Average                |
|           | 7,480  | 46.74% Pervious Area            |
|           | 8,524  | 53.26% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 14.4        | 92               | 0.0500           | 0.11                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 0.2         | 8                | 0.0200           | 0.82                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.2         | 34               | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1         | 20               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 14.9        | 154              | Total            |                      |                   |                                                                          |

**Subcatchment 38S: PR-32****Hydrograph**

### Summary for Subcatchment 39S: PR-33

Runoff = 1.26 cfs @ 12.11 hrs, Volume= 0.097 af, Depth= 6.68"  
 Routed to Pond 44P : CMP Infiltration

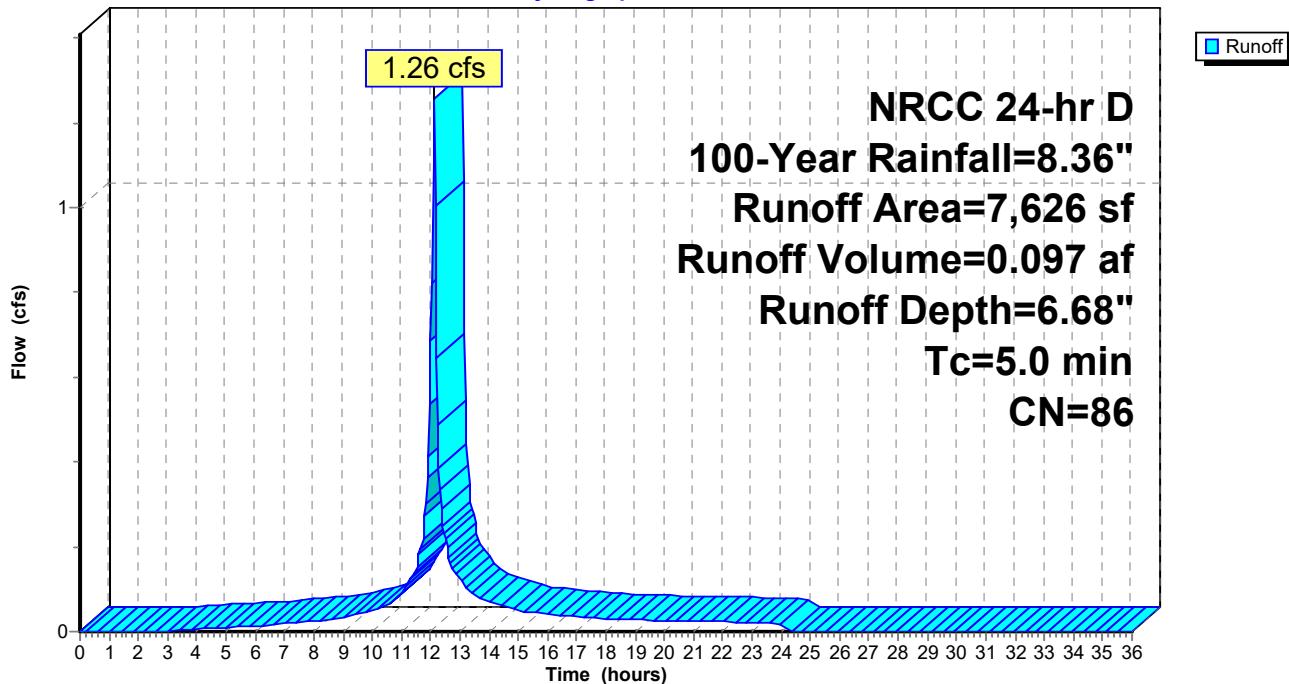
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,106 | 98 Paved parking, HSG A            |
| *         | 920   | 98 Cement Concrete Sidewalk, HSG A |
| 1,600     | 39    | >75% Grass cover, Good, HSG A      |
| 7,626     | 86    | Weighted Average                   |
| 1,600     |       | 20.98% Pervious Area               |
| 6,026     |       | 79.02% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 39S: PR-33

Hydrograph



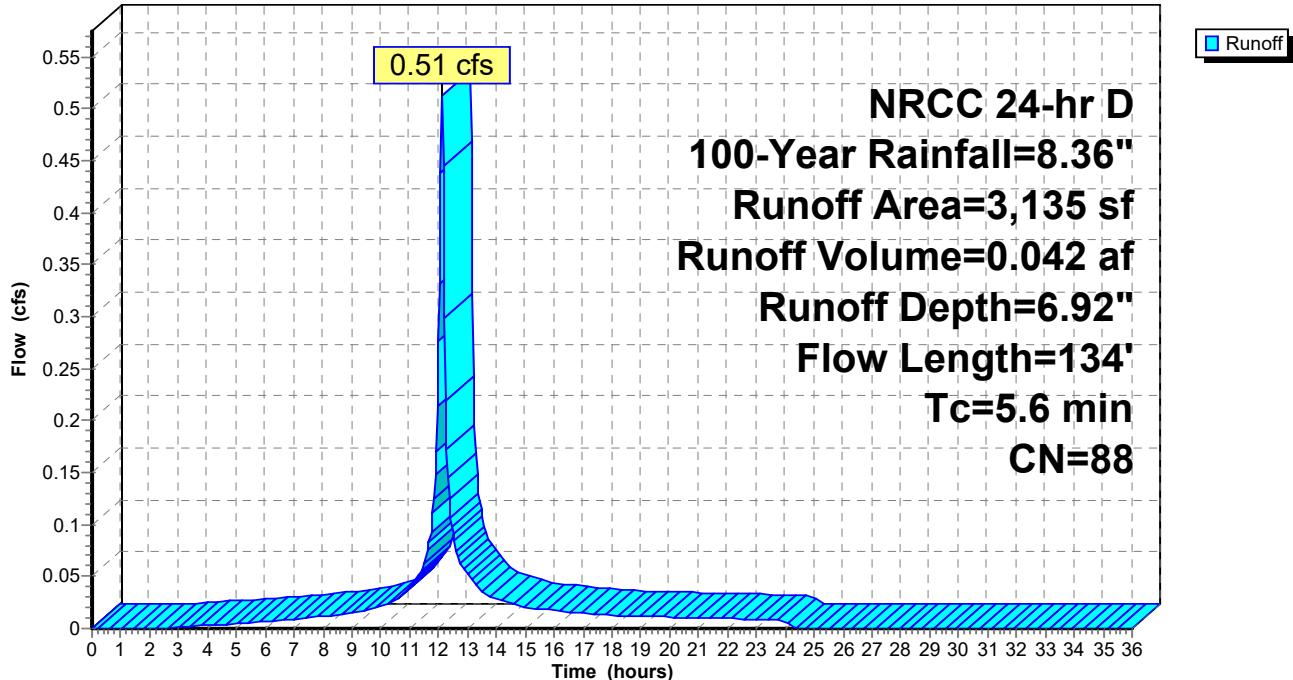
### Summary for Subcatchment 40S: PR-34

Runoff = 0.51 cfs @ 12.12 hrs, Volume= 0.042 af, Depth= 6.92"  
 Routed to Pond 44P : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 2,389 | 98 Paved parking, HSG A            |
| *         | 234   | 98 Cement Concrete Sidewalk, HSG A |
|           | 512   | >75% Grass cover, Good, HSG A      |
|           | 3,135 | Weighted Average                   |
|           | 512   | 16.33% Pervious Area               |
|           | 2,623 | 83.67% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------------------------------------|
| 4.4         | 21               | 0.0500           | 0.08                 |                   | <b>Sheet Flow, GRASS</b><br>Grass: Bermuda n= 0.410 P2= 3.13"            |
| 1.0         | 79               | 0.0200           | 1.30                 |                   | <b>Sheet Flow, PAVEMENT</b><br>Smooth surfaces n= 0.011 P2= 3.13"        |
| 0.0         | 7                | 0.0500           | 3.35                 |                   | <b>Shallow Concentrated Flow, GRASS</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.2         | 27               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow, PAVEMENT</b><br>Paved Kv= 20.3 fps         |
| 5.6         | 134              | Total            |                      |                   |                                                                          |

**Subcatchment 40S: PR-34****Hydrograph**

### Summary for Subcatchment 41S: PR-35

Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af, Depth= 8.00"  
 Routed to Pond 44P : CMP Infiltration

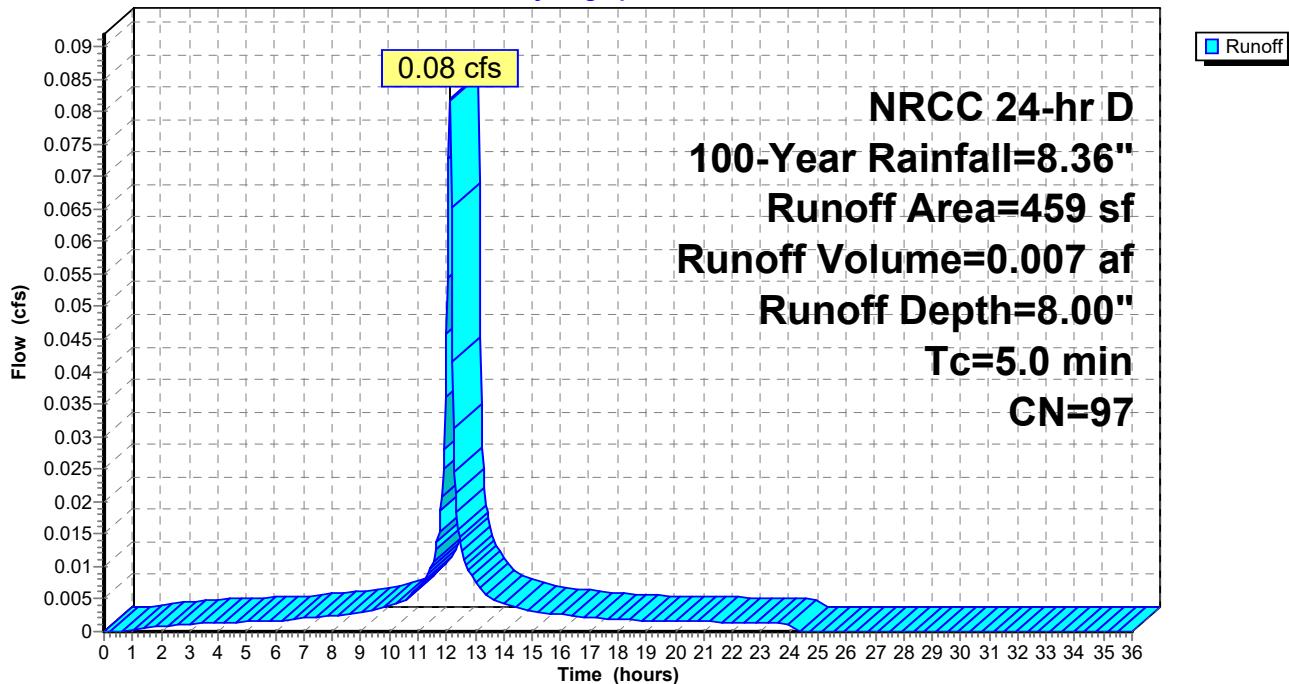
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN  | Description                     |
|-----------|-----|---------------------------------|
| *         | 366 | 98 Paved parking, HSG A         |
| *         | 86  | Cement Concrete Sidewalk, HSG A |
|           | 7   | >75% Grass cover, Good, HSG A   |
|           | 459 | Weighted Average                |
|           | 7   | 1.53% Pervious Area             |
|           | 452 | 98.47% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, Direct |

### Subcatchment 41S: PR-35

Hydrograph



### Summary for Subcatchment 42S: PR-36

Runoff = 1.12 cfs @ 12.11 hrs, Volume= 0.090 af, Depth= 7.28"  
 Routed to Pond 44P : CMP Infiltration

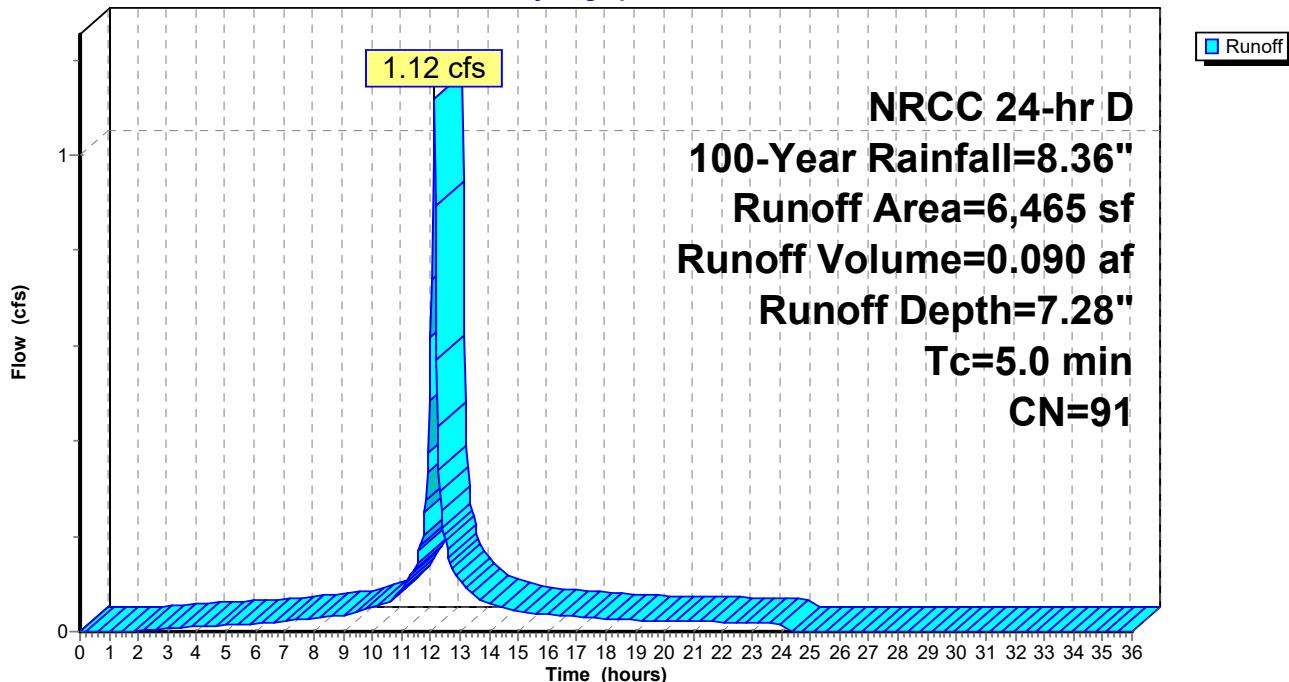
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                     |
|-----------|-------|---------------------------------|
| *         | 4,448 | 98 Paved parking, HSG A         |
| *         | 1,207 | Cement Concrete Sidewalk, HSG A |
| 810       | 39    | >75% Grass cover, Good, HSG A   |
| 6,465     | 91    | Weighted Average                |
| 810       |       | 12.53% Pervious Area            |
| 5,655     |       | 87.47% Impervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 42S: PR-36

Hydrograph



### Summary for Subcatchment 43S: PR-37

Runoff = 1.23 cfs @ 12.11 hrs, Volume= 0.100 af, Depth= 7.40"  
 Routed to Pond 44P : CMP Infiltration

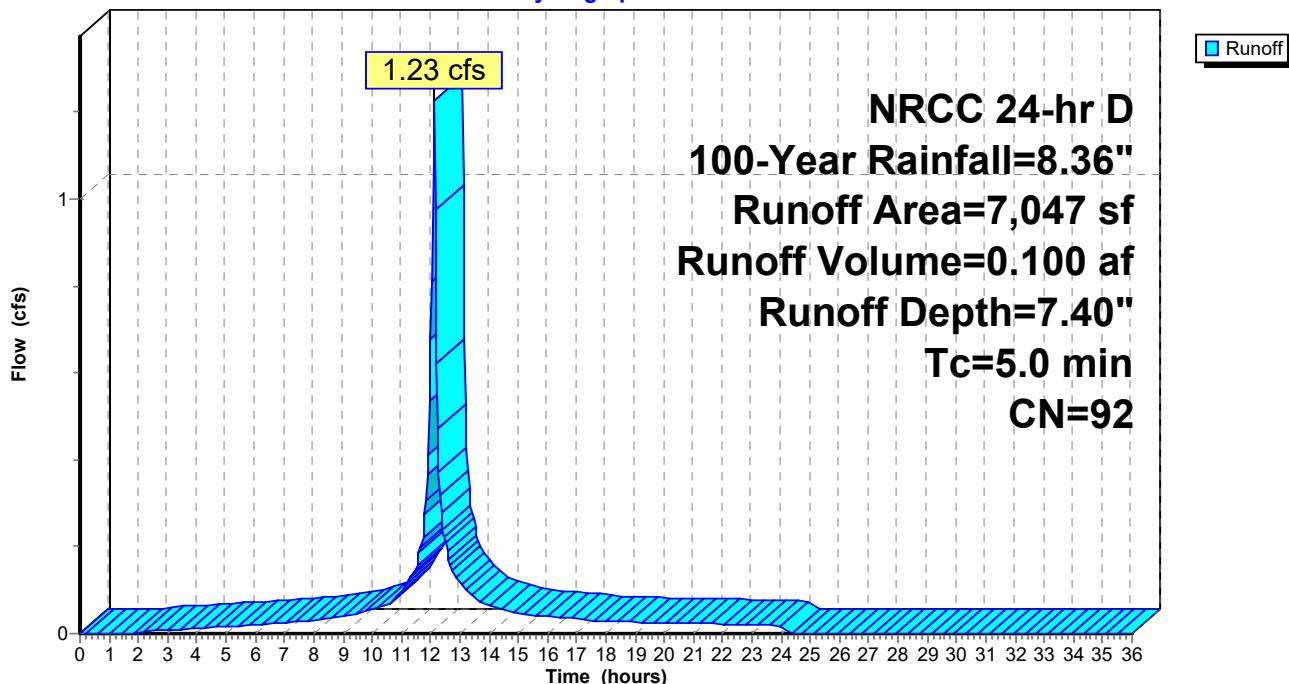
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs  
 NRCC 24-hr D 100-Year Rainfall=8.36"

| Area (sf) | CN    | Description                        |
|-----------|-------|------------------------------------|
| *         | 5,177 | 98 Paved parking, HSG A            |
| *         | 1,177 | 98 Cement Concrete Sidewalk, HSG A |
|           | 693   | >75% Grass cover, Good, HSG A      |
|           | 7,047 | Weighted Average                   |
|           | 693   | 9.83% Pervious Area                |
|           | 6,354 | 90.17% Impervious Area             |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------|
| 5.0         |                  |                  |                      |                   | Direct Entry, DIRECT |

### Subcatchment 43S: PR-37

Hydrograph



### Summary for Pond 44P: CMP Infiltration

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 6.63" for 100-Year event  
 Inflow = 38.55 cfs @ 12.12 hrs, Volume= 3.273 af  
 Outflow = 25.19 cfs @ 12.20 hrs, Volume= 3.273 af, Atten= 35%, Lag= 4.8 min  
 Discarded = 0.25 cfs @ 12.20 hrs, Volume= 0.291 af  
 Primary = 24.94 cfs @ 12.20 hrs, Volume= 2.981 af

Routed to Pond 45P : Rain Garden

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 273.10' @ 12.20 hrs Surf.Area= 0.055 ac Storage= 0.258 af

Plug-Flow detention time= 10.5 min calculated for 3.269 af (100% of inflow)  
 Center-of-Mass det. time= 10.6 min ( 803.4 - 792.8 )

| Volume   | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                      |
|----------|---------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1C      | 266.50' | 0.081 af      | <b>17.00'W x 142.00'L x 7.00'H Field C</b><br>0.388 af Overall - 0.186 af Embedded = 0.202 af x 40.0% Voids                                                                                                                                              |
| #2C      | 267.00' | 0.186 af      | <b>CMP Round 72 x 12 Inside #1</b><br>Effective Size= 72.0"W x 72.0"H => 28.27 sf x 20.00'L = 565.5 cf<br>Overall Size= 72.0"W x 72.0"H x 20.00'L<br>Row Length Adjustment= +8.00' x 28.27 sf x 2 rows<br>15.00' Header x 28.27 sf x 2 = 848.2 cf Inside |
| 0.267 af |         |               | Total Available Storage                                                                                                                                                                                                                                  |

Storage Group C created with Chamber Wizard

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                       |
|--------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 267.00' | <b>21.0" Round Culvert</b><br>L= 169.0' RCP, rounded edge headwall, Ke= 0.100<br>Inlet / Outlet Invert= 267.00' / 265.31' S= 0.0100 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 2.41 sf |
| #2     | Discarded | 266.50' | <b>2.410 in/hr Exfiltration over Wetted area</b>                                                                                                                                                                     |

**Discarded OutFlow** Max=0.25 cfs @ 12.20 hrs HW=273.08' (Free Discharge)  
 ↗ 2=Exfiltration (Exfiltration Controls 0.25 cfs)

**Primary OutFlow** Max=24.91 cfs @ 12.20 hrs HW=273.08' TW=259.96' (Dynamic Tailwater)  
 ↗ 1=Culvert (Barrel Controls 24.91 cfs @ 10.35 fps)

**Pond 44P: CMP Infiltration - Chamber Wizard Field C****Chamber Model = CMP Round 72 (Round Corrugated Metal Pipe)**

Effective Size= 72.0"W x 72.0"H =&gt; 28.27 sf x 20.00'L = 565.5 cf

Overall Size= 72.0"W x 72.0"H x 20.00'L

Row Length Adjustment= +8.00' x 28.27 sf x 2 rows

72.0" Wide + 36.0" Spacing = 108.0" C-C Row Spacing

6 Chambers/Row x 20.00' Long +8.00' Row Adjustment +6.00' Header x 2 = 140.00' Row Length +12.0"

End Stone x 2 = 142.00' Base Length

2 Rows x 72.0" Wide + 36.0" Spacing x 1 + 12.0" Side Stone x 2 = 17.00' Base Width

6.0" Stone Base + 72.0" Chamber Height + 6.0" Stone Cover = 7.00' Field Height

12 Chambers x 565.5 cf +8.00' Row Adjustment x 28.27 sf x 2 Rows + 15.00' Header x 28.27 sf x 2 = 8,086.5 cf Chamber Storage

16,898.0 cf Field - 8,086.5 cf Chambers = 8,811.5 cf Stone x 40.0% Voids = 3,524.6 cf Stone Storage

Chamber Storage + Stone Storage = 11,611.1 cf = 0.267 af

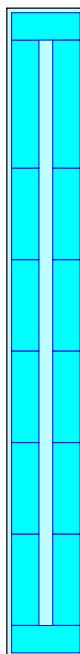
Overall Storage Efficiency = 68.7%

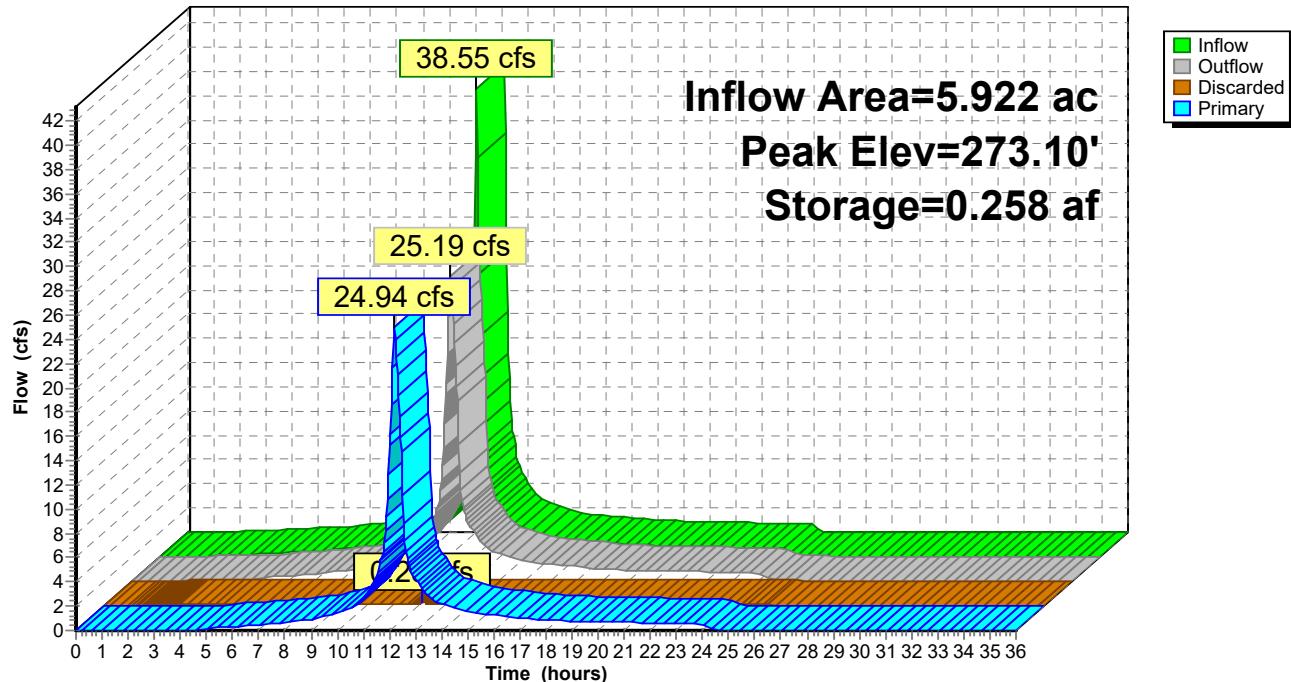
Overall System Size = 142.00' x 17.00' x 7.00'

12 Chambers

625.9 cy Field

326.4 cy Stone



**Pond 44P: CMP Infiltration****Hydrograph**

**Stage-Area-Storage for Pond 44P: CMP Infiltration**

| Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) | Elevation<br>(feet) | Wetted<br>(acres) | Storage<br>(acre-feet) |
|---------------------|-------------------|------------------------|---------------------|-------------------|------------------------|
| 266.50              | 0.055             | 0.000                  | 271.80              | 0.094             | 0.213                  |
| 266.60              | 0.056             | 0.002                  | 271.90              | 0.095             | 0.217                  |
| 266.70              | 0.057             | 0.004                  | 272.00              | 0.096             | 0.221                  |
| 266.80              | 0.058             | 0.007                  | 272.10              | 0.096             | 0.225                  |
| 266.90              | 0.058             | 0.009                  | 272.20              | 0.097             | 0.229                  |
| 267.00              | 0.059             | 0.011                  | 272.30              | 0.098             | 0.233                  |
| 267.10              | 0.060             | 0.014                  | 272.40              | 0.098             | 0.236                  |
| 267.20              | 0.061             | 0.017                  | 272.50              | 0.099             | 0.240                  |
| 267.30              | 0.061             | 0.020                  | 272.60              | 0.100             | 0.243                  |
| 267.40              | 0.062             | 0.023                  | 272.70              | 0.101             | 0.247                  |
| 267.50              | 0.063             | 0.027                  | 272.80              | 0.101             | 0.250                  |
| 267.60              | 0.063             | 0.030                  | 272.90              | 0.102             | 0.253                  |
| 267.70              | 0.064             | 0.034                  | 273.00              | 0.103             | 0.255                  |
| 267.80              | 0.065             | 0.038                  | 273.10              | 0.104             | 0.258                  |
| 267.90              | 0.066             | 0.042                  | 273.20              | 0.104             | 0.260                  |
| 268.00              | 0.066             | 0.045                  | 273.30              | 0.105             | 0.262                  |
| 268.10              | 0.067             | 0.049                  | 273.40              | 0.106             | 0.264                  |
| 268.20              | 0.068             | 0.054                  | 273.50              | 0.107             | 0.267                  |
| 268.30              | 0.069             | 0.058                  |                     |                   |                        |
| 268.40              | 0.069             | 0.062                  |                     |                   |                        |
| 268.50              | 0.070             | 0.066                  |                     |                   |                        |
| 268.60              | 0.071             | 0.070                  |                     |                   |                        |
| 268.70              | 0.071             | 0.075                  |                     |                   |                        |
| 268.80              | 0.072             | 0.079                  |                     |                   |                        |
| 268.90              | 0.073             | 0.083                  |                     |                   |                        |
| 269.00              | 0.074             | 0.088                  |                     |                   |                        |
| 269.10              | 0.074             | 0.092                  |                     |                   |                        |
| 269.20              | 0.075             | 0.097                  |                     |                   |                        |
| 269.30              | 0.076             | 0.101                  |                     |                   |                        |
| 269.40              | 0.077             | 0.106                  |                     |                   |                        |
| 269.50              | 0.077             | 0.110                  |                     |                   |                        |
| 269.60              | 0.078             | 0.115                  |                     |                   |                        |
| 269.70              | 0.079             | 0.120                  |                     |                   |                        |
| 269.80              | 0.080             | 0.124                  |                     |                   |                        |
| 269.90              | 0.080             | 0.129                  |                     |                   |                        |
| 270.00              | 0.081             | 0.133                  |                     |                   |                        |
| 270.10              | 0.082             | 0.138                  |                     |                   |                        |
| 270.20              | 0.082             | 0.142                  |                     |                   |                        |
| 270.30              | 0.083             | 0.147                  |                     |                   |                        |
| 270.40              | 0.084             | 0.152                  |                     |                   |                        |
| 270.50              | 0.085             | 0.156                  |                     |                   |                        |
| 270.60              | 0.085             | 0.161                  |                     |                   |                        |
| 270.70              | 0.086             | 0.165                  |                     |                   |                        |
| 270.80              | 0.087             | 0.170                  |                     |                   |                        |
| 270.90              | 0.088             | 0.174                  |                     |                   |                        |
| 271.00              | 0.088             | 0.179                  |                     |                   |                        |
| 271.10              | 0.089             | 0.183                  |                     |                   |                        |
| 271.20              | 0.090             | 0.187                  |                     |                   |                        |
| 271.30              | 0.090             | 0.192                  |                     |                   |                        |
| 271.40              | 0.091             | 0.196                  |                     |                   |                        |
| 271.50              | 0.092             | 0.200                  |                     |                   |                        |
| 271.60              | 0.093             | 0.205                  |                     |                   |                        |
| 271.70              | 0.093             | 0.209                  |                     |                   |                        |

## Summary for Pond 45P: Rain Garden

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=52)

Inflow Area = 5.922 ac, 73.15% Impervious, Inflow Depth = 6.04" for 100-Year event  
 Inflow = 24.94 cfs @ 12.20 hrs, Volume= 2.981 af  
 Outflow = 23.32 cfs @ 12.26 hrs, Volume= 2.981 af, Atten= 7%, Lag= 3.8 min  
 Discarded = 3.76 cfs @ 12.26 hrs, Volume= 2.085 af  
 Primary = 19.56 cfs @ 12.26 hrs, Volume= 0.896 af  
 Routed to Link 15L : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3  
 Peak Elev= 260.00' @ 12.26 hrs Surf.Area= 12,311 sf Storage= 15,673 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 24.5 min ( 825.4 - 800.8 )

| Volume    | Invert  | Avail.Storage | Storage Description                                                                           |
|-----------|---------|---------------|-----------------------------------------------------------------------------------------------|
| #1        | 255.50' | 6,443 cf      | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)<br>16,107 cf Overall x 40.0% Voids |
| #2        | 258.50' | 10,400 cf     | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc)                                    |
| 16,843 cf |         |               | Total Available Storage                                                                       |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 255.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 258.50           | 5,369             | 313.0         | 16,107                 | 16,107                 | 6,308            |

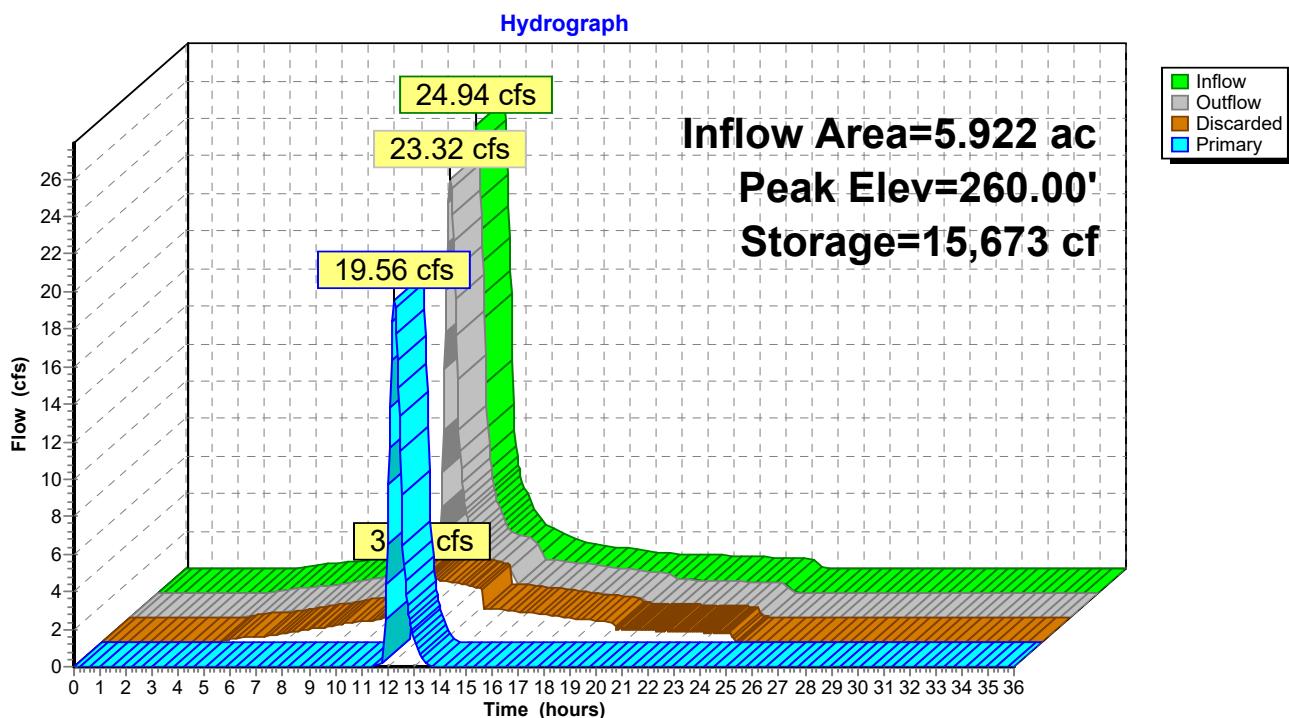
| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|---------------|------------------------|------------------------|------------------|
| 258.50           | 5,369             | 313.0         | 0                      | 0                      | 5,369            |
| 260.00           | 6,938             | 357.4         | 9,205                  | 9,205                  | 7,790            |
| 260.17           | 7,118             | 360.5         | 1,195                  | 10,400                 | 7,978            |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                    |
|--------|-----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 253.71' | <b>24.0" Round Culvert</b><br>L= 32.0' CMP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 253.71' / 253.36' S= 0.0109 '/' Cc= 0.900<br>n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf |
| #2     | Discarded | 255.50' | <b>8.270 in/hr Exfiltration over Surface area</b><br>Conductivity to Groundwater Elevation = 251.50'                                                                                                              |
| #3     | Device 1  | 259.55' | <b>2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows</b> C= 0.600<br>Limited to weir flow at low heads                                                                                                     |
| #4     | Primary   | 259.05' | <b>6.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40<br>Coef. (English) 2.80 2.92                                                                                              |

**Discarded OutFlow** Max=3.76 cfs @ 12.26 hrs HW=260.00' (Free Discharge)  
 ↗ 2=Exfiltration (Controls 3.76 cfs)

**Primary OutFlow** Max=19.47 cfs @ 12.26 hrs HW=260.00' TW=0.00' (Dynamic Tailwater)  
 ↗ 1=Culvert (Passes 3.23 cfs of 27.47 cfs potential flow)  
 ↗ 3=Orifice/Grate (Orifice Controls 3.23 cfs @ 3.23 fps)  
 ↗ 4=Broad-Crested Rectangular Weir (Weir Controls 16.24 cfs @ 2.85 fps)

### Pond 45P: Rain Garden



**Stage-Area-Storage for Pond 45P: Rain Garden**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|
| 255.50              | 5,369              | 0                       |
| 255.60              | 5,369              | 215                     |
| 255.70              | 5,369              | 430                     |
| 255.80              | 5,369              | 644                     |
| 255.90              | 5,369              | 859                     |
| 256.00              | 5,369              | 1,074                   |
| 256.10              | 5,369              | 1,289                   |
| 256.20              | 5,369              | 1,503                   |
| 256.30              | 5,369              | 1,718                   |
| 256.40              | 5,369              | 1,933                   |
| 256.50              | 5,369              | 2,148                   |
| 256.60              | 5,369              | 2,362                   |
| 256.70              | 5,369              | 2,577                   |
| 256.80              | 5,369              | 2,792                   |
| 256.90              | 5,369              | 3,007                   |
| 257.00              | 5,369              | 3,221                   |
| 257.10              | 5,369              | 3,436                   |
| 257.20              | 5,369              | 3,651                   |
| 257.30              | 5,369              | 3,866                   |
| 257.40              | 5,369              | 4,080                   |
| 257.50              | 5,369              | 4,295                   |
| 257.60              | 5,369              | 4,510                   |
| 257.70              | 5,369              | 4,725                   |
| 257.80              | 5,369              | 4,939                   |
| 257.90              | 5,369              | 5,154                   |
| 258.00              | 5,369              | 5,369                   |
| 258.10              | 5,369              | 5,584                   |
| 258.20              | 5,369              | 5,799                   |
| 258.30              | 5,369              | 6,013                   |
| 258.40              | 5,369              | 6,228                   |
| 258.50              | 10,738             | 6,443                   |
| 258.60              | 10,836             | 6,985                   |
| 258.70              | 10,936             | 7,536                   |
| 258.80              | 11,036             | 8,098                   |
| 258.90              | 11,137             | 8,670                   |
| 259.00              | 11,239             | 9,252                   |
| 259.10              | 11,341             | 9,844                   |
| 259.20              | 11,445             | 10,446                  |
| 259.30              | 11,550             | 11,059                  |
| 259.40              | 11,655             | 11,682                  |
| 259.50              | 11,762             | 12,316                  |
| 259.60              | 11,869             | 12,961                  |
| 259.70              | 11,977             | 13,616                  |
| 259.80              | 12,086             | 14,282                  |
| 259.90              | 12,196             | 14,960                  |
| 260.00              | 12,307             | 15,648                  |
| 260.10              | 12,413             | 16,347                  |

### Summary for Link 15L: DP-1

Inflow Area = 7.403 ac, 63.79% Impervious, Inflow Depth = 2.06" for 100-Year event

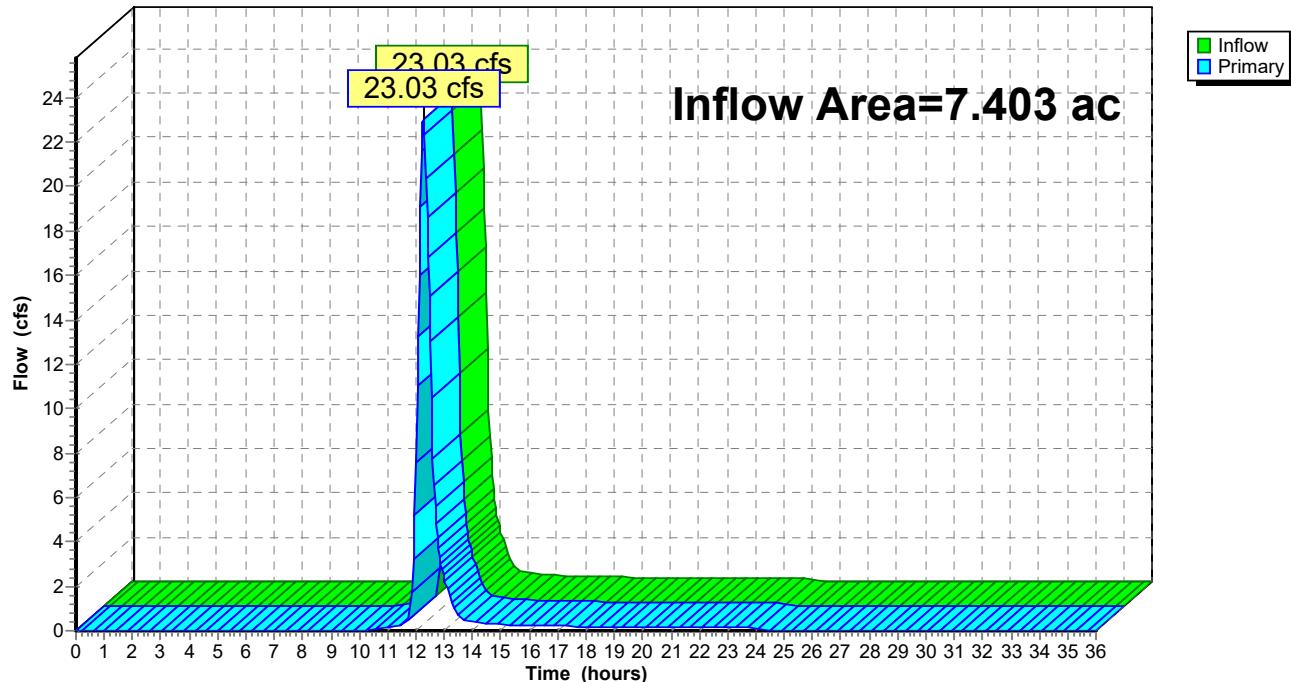
Inflow = 23.03 cfs @ 12.26 hrs, Volume= 1.270 af

Primary = 23.03 cfs @ 12.26 hrs, Volume= 1.270 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 15L: DP-1

Hydrograph

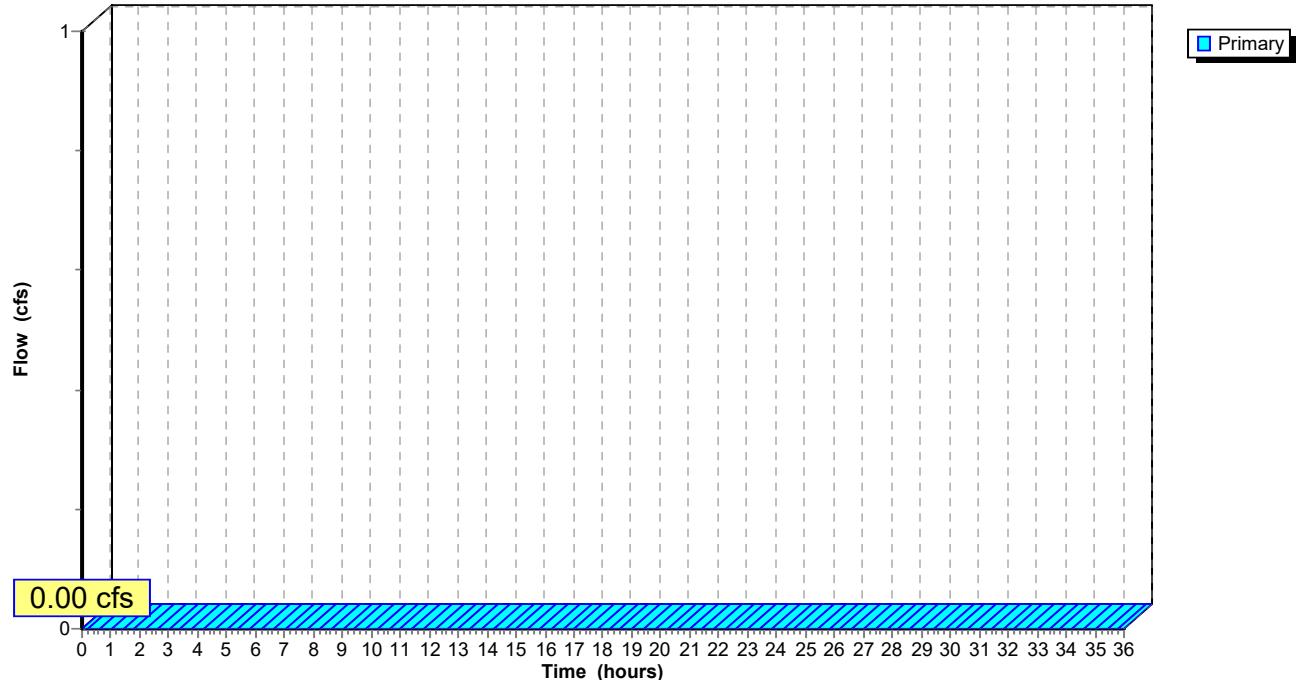


**Summary for Link 16L: DP-2**

[43] Hint: Has no inflow (Outflow=Zero)

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

**Link 16L: DP-2****Hydrograph**

### Summary for Link 17L: DP-3

Inflow Area = 0.094 ac, 0.00% Impervious, Inflow Depth = 5.72" for 100-Year event

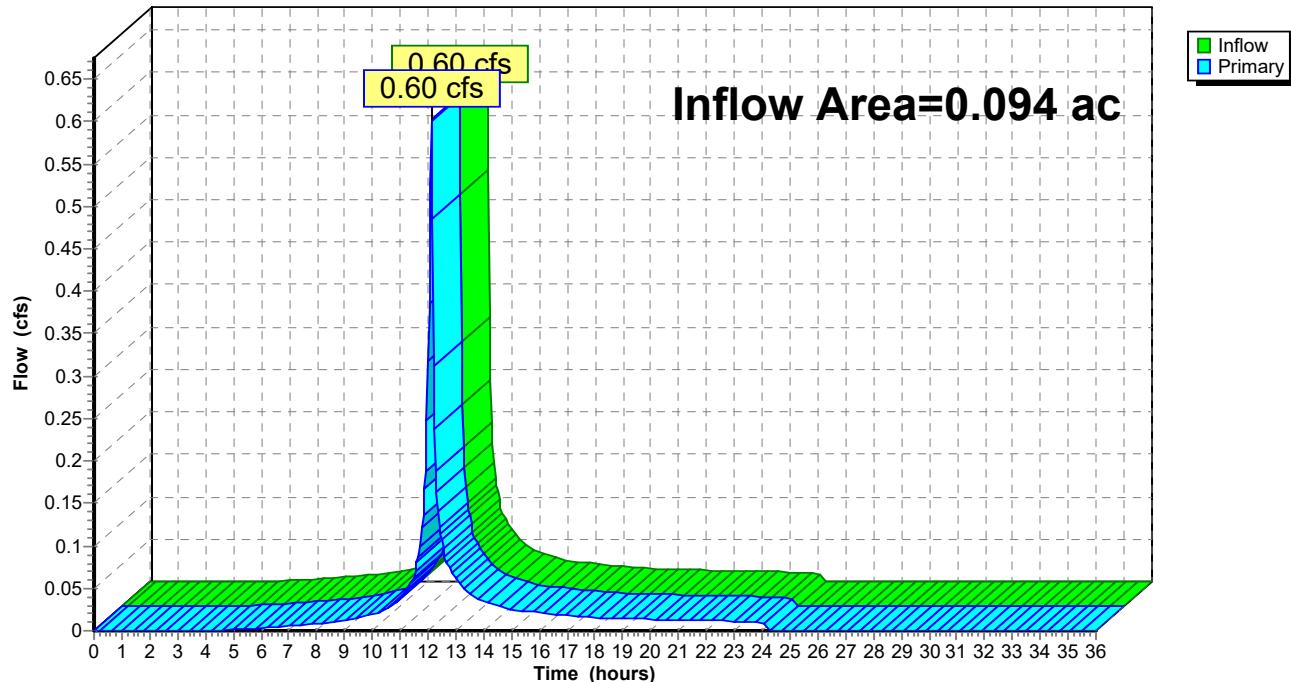
Inflow = 0.60 cfs @ 12.12 hrs, Volume= 0.045 af

Primary = 0.60 cfs @ 12.12 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs

### Link 17L: DP-3

Hydrograph



**B**

## **Water Quality Data**

## Riprap Sizing Computations for King Street Commons

*Taken from:*

- FHWA Hydraulic Design of Energy Dissipators for Culverts and Channels (Chapter 10)  
FHWA-NHI-06-086 July 2006
- NRCS Rock Outlet Protection 2012 Fact Sheet (attached)

By: P. Gunter - TEC, Inc. 2/21/2024

Checked By: C. Raymond - TEC, Inc. 2/21/2024

$$D_{50} = 0.2D \left( \frac{Q}{\sqrt{gD^{2.5}}} \right)^{4/3} \left( \frac{D}{TW} \right)$$

$D_{50}$  = riprap size (ft)

$$Q = \text{design discharge} \left( \frac{ft^3}{s} \right)$$

Used 10-year storm peak flow from drainage calculations unless otherwise noted

$D$  = culvert diameter (ft)

$TW$  = tailwater depth (ft)

Use 0.4D as minimum

$$g = \text{acceleration due to gravity} (32.2 \frac{ft}{s^2})$$

**Table 10.1. Example Riprap Classes and Apron Dimensions**

| Class | $D_{50}$ (mm) | $D_{50}$ (in) | Apron Length <sup>1</sup> | Apron Depth |
|-------|---------------|---------------|---------------------------|-------------|
| 1     | 125           | 5             | 4D                        | $3.5D_{50}$ |
| 2     | 150           | 6             | 4D                        | $3.3D_{50}$ |
| 3     | 250           | 10            | 5D                        | $2.4D_{50}$ |
| 4     | 350           | 14            | 6D                        | $2.2D_{50}$ |
| 5     | 500           | 20            | 7D                        | $2.0D_{50}$ |
| 6     | 550           | 22            | 8D                        | $2.0D_{50}$ |

<sup>1</sup>D is the culvert rise.

$$W_U = 3D$$

$$W_D = D + \text{Length}$$

$$W_U = \text{upstream width (ft)}$$

$$W_D = \text{downstream width (ft)}$$

### FES-63

$$D_{50} = 0.2(1.5 \text{ ft}) \left( \frac{\frac{14.67 \frac{\text{ft}^3}{\text{s}}}{\sqrt{(32.2 \frac{\text{ft}}{\text{s}^2})(1.5 \text{ ft})^{2.5}}}}{\sqrt{(32.2 \frac{\text{ft}}{\text{s}^2})(1.5 \text{ ft})^{2.5}}} \right)^{4/3} \left( \frac{1.5 \text{ ft}}{0.6 \text{ ft}} \right) = 1.35 \text{ feet} = 16.2 \text{ inches}$$

16.2 inches = Class 5 (Table 10.1) -> Class 5 min. = 20 inches

$$\text{Length} = 7D = 7(1.5 \text{ ft}) = 10.5 \text{ feet}$$

$$\text{Depth} = 2.0(D_{50}) = 2.0(20 \text{ in}) = 40 \text{ inches} = 3.3 \text{ feet}$$

$$W_U = 3(1.5 \text{ ft}) = 4.5 \text{ feet}$$

$$W_D = 1.5 \text{ ft} + 3.3 \text{ ft} = 4.8 \text{ feet}$$

TEC recommends the rip-rap apron be 11 feet long by 3.5 feet deep with an upstream width of 4.5 feet and a downstream width of 5 feet.

### FES-69

$$D_{50} = 0.2(2.0 \text{ ft}) \left( \frac{\frac{6.62 \frac{\text{ft}^3}{\text{s}}}{\sqrt{(32.2 \frac{\text{ft}}{\text{s}^2})(2.0 \text{ ft})^{2.5}}}}{\sqrt{(32.2 \frac{\text{ft}}{\text{s}^2})(2.0 \text{ ft})^{2.5}}} \right)^{4/3} \left( \frac{2.0 \text{ ft}}{0.8 \text{ ft}} \right) = 0.387 \text{ feet} = 4.64 \text{ inches}$$

4.62 inches = Class 1 (Table 10.1) -> Class 1 min. = 5 inches

$$\text{Length} = 4D = 4(2.0 \text{ ft}) = 8 \text{ feet}$$

$$\text{Depth} = 3.5(D_{50}) = 3.5(5 \text{ in}) = 17.5 \text{ inches} = 1.5 \text{ feet}$$

$$W_U = 3(2.0 \text{ ft}) = 6.0 \text{ feet}$$

$$W_D = 2.0 \text{ ft} + 8.0 \text{ ft} = 10.0 \text{ feet}$$

TEC recommends the rip-rap apron be 8.0 feet long by 1.5 feet deep with an upstream width of 6.0 feet and a downstream width of 10.0 feet.

Location: Treatment Train #1

| A<br>BMP <sup>1</sup>                | B<br>TSS Removal<br>Rate <sup>1</sup> | C<br>Starting TSS<br>Load* | D<br>Amount<br>Removed (B*C) | E<br>Remaining<br>Load (C-D) |
|--------------------------------------|---------------------------------------|----------------------------|------------------------------|------------------------------|
| Street Sweeping                      | 0.05                                  | 1.00                       | 0.05                         | 0.95                         |
| Deep Sump and Hooded<br>Catch Basins | 0.25                                  | 0.95                       | 0.24                         | 0.71                         |
| Water Quality Unit                   | 0.87                                  | 0.71                       | 0.62                         | 0.09                         |
| Rain Garden                          | 0.90                                  | 0.09                       | 0.08                         | 0.01                         |

**Total TSS Removal =**

99%

Separate Form Needs  
to be Completed for  
Each Outlet or BMP  
Train

Project: King Street Commons  
Prepared By: TEC, Inc.  
Date: 2/21/2024

\*Equals remaining load from previous BMP (E)  
which enters the BMP

Location: Treatment Train #2

| A<br>BMP <sup>1</sup>                | B<br>TSS Removal<br>Rate <sup>1</sup> | C<br>Starting TSS<br>Load* | D<br>Amount<br>Removed (B*C) | E<br>Remaining<br>Load (C-D) |
|--------------------------------------|---------------------------------------|----------------------------|------------------------------|------------------------------|
| Street Sweeping                      | 0.05                                  | 1.00                       | 0.05                         | 0.95                         |
| Deep Sump and Hooded<br>Catch Basins | 0.25                                  | 0.95                       | 0.24                         | 0.71                         |
| Water Quality Unit                   | 0.99                                  | 0.71                       | 0.71                         | 0.01                         |

**Total TSS Removal =**

99%

Separate Form Needs  
to be Completed for  
Each Outlet or BMP  
Train

Project: King Street Commons  
Prepared By: TEC, Inc.  
Date: 2/21/2024

\*Equals remaining load from previous BMP (E)  
which enters the BMP

## Hydrodynamic Separation Product Calculator

King Street Commons

WQU-56

CASCADE SEPARATOR CS-5

| Project Information |               |       |               |          |           |
|---------------------|---------------|-------|---------------|----------|-----------|
| Project Name        | king st       |       |               | Option # | A         |
| Country             | UNITED STATES | State | Massachusetts | City     | Littleton |

| Contact Information |                                 |  |           |              |  |
|---------------------|---------------------------------|--|-----------|--------------|--|
| First Name          | Megan                           |  | Last Name | Cramton      |  |
| Company             | TEC, Inc.                       |  | Phone #   | 603-801-3997 |  |
| Email               | mcramton@theengineeringcorp.com |  |           |              |  |

| Design Criteria                      |        |                         |                    |                                |            |
|--------------------------------------|--------|-------------------------|--------------------|--------------------------------|------------|
| Site Designation                     | WQU-56 |                         |                    | Sizing Method                  | Net Annual |
| Screening Required?                  | No     | Drainage Area (ac)      | 5.83               | Peak Flow (cfs)                | 13.54      |
| Groundwater Depth (ft)               | >15    | Pipe Invert Depth (ft)  | 5 - 10             | Bedrock Depth (ft)             | >15        |
| Multiple Inlets?                     | No     | Grate Inlet Required?   | No                 | Pipe Size (in)                 | 36.00      |
| Required Particle Size Distribution? | No     | 90° between two inlets? | N/A                | 180° between inlet and outlet? | No         |
| Runoff Coefficient                   | 0.86   | Rainfall Station        | 67 - Groveland, MA | TC (Min)                       | 48         |

| Treatment Selection |                   |                                  |      |                              |        |
|---------------------|-------------------|----------------------------------|------|------------------------------|--------|
| Treatment Unit      | CASCADE SEPARATOR | System Model                     | CS-5 |                              |        |
| Target Removal      | 80%               | Particle Size Distribution (PSD) | 110  | Predicted Net Annual Removal | 86.99% |

# Hydrodynamic Separation Product Calculator

King Street Commons

WQU-56

CASCADE SEPARATOR CS-5

| CASCADE SEPARATOR ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD |                                |                            |                         |                      |                        |                            |                        |                         |
|----------------------------------------------------------------------------------------------------|--------------------------------|----------------------------|-------------------------|----------------------|------------------------|----------------------------|------------------------|-------------------------|
| Rainfall Intensity <sup>1</sup> (in/hr)                                                            | % Rainfall Volume <sup>1</sup> | Cumulative Rainfall Volume | Rainfall Volume Treated | Total Flowrate (cfs) | Treated Flowrate (cfs) | Hydraulic Loading Rate (%) | Removal Efficiency (%) | Incremental Removal (%) |
| 0.0800                                                                                             | 41.00%                         | 41.00%                     | 41.00%                  | 0.4000               | 0.4000                 | 9.15%                      | 100.00%                | 41.04%                  |
| 0.1600                                                                                             | 23.90%                         | 64.90%                     | 23.90%                  | 0.8000               | 0.8000                 | 18.29%                     | 94.71%                 | 22.62%                  |
| 0.2400                                                                                             | 11.50%                         | 76.40%                     | 11.50%                  | 1.2000               | 1.2000                 | 27.44%                     | 86.11%                 | 9.93%                   |
| 0.3200                                                                                             | 7.40%                          | 83.80%                     | 7.40%                   | 1.6000               | 1.6000                 | 36.58%                     | 77.51%                 | 5.75%                   |
| 0.4000                                                                                             | 4.50%                          | 88.30%                     | 4.50%                   | 2.0100               | 2.0100                 | 45.96%                     | 68.70%                 | 3.06%                   |
| 0.4800                                                                                             | 2.90%                          | 91.20%                     | 2.90%                   | 2.4100               | 2.4100                 | 55.10%                     | 60.11%                 | 1.74%                   |
| 0.5600                                                                                             | 1.80%                          | 93.00%                     | 1.80%                   | 2.8100               | 2.8100                 | 64.25%                     | 51.51%                 | 0.92%                   |
| 0.6400                                                                                             | 1.20%                          | 94.20%                     | 1.20%                   | 3.2100               | 3.2100                 | 73.40%                     | 42.90%                 | 0.51%                   |
| 0.7200                                                                                             | 1.60%                          | 95.80%                     | 1.55%                   | 3.6100               | 3.5000                 | 80.03%                     | 35.55%                 | 0.57%                   |
| 0.8000                                                                                             | 0.80%                          | 96.60%                     | 0.70%                   | 4.0100               | 3.5000                 | 80.03%                     | 32.01%                 | 0.25%                   |
| 1.0000                                                                                             | 0.60%                          | 97.20%                     | 0.42%                   | 5.0100               | 3.5000                 | 80.03%                     | 25.62%                 | 0.15%                   |
| 1.4000                                                                                             | 1.40%                          | 98.60%                     | 0.70%                   | 7.0200               | 3.5000                 | 80.03%                     | 18.28%                 | 0.26%                   |
| 1.8000                                                                                             | 0.90%                          | 99.50%                     | 0.35%                   | 9.0200               | 3.5000                 | 80.03%                     | 14.23%                 | 0.13%                   |
| 2.2000                                                                                             | 0.50%                          | 100.00%                    | 0.16%                   | 11.0300              | 3.5000                 | 80.03%                     | 11.64%                 | 0.06%                   |
|                                                                                                    |                                |                            |                         |                      |                        |                            |                        | 86.99%                  |
| Removal Efficiency Adjustment <sup>2</sup> =                                                       |                                |                            |                         |                      |                        |                            |                        |                         |
| Predicted % Annual Rainfall Treated =                                                              |                                |                            |                         |                      |                        |                            |                        | 98.08%                  |
| Predicted Net Annual Load Removal Efficiency =                                                     |                                |                            |                         |                      |                        |                            |                        | 86.99%                  |

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

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

# Hydrodynamic Separation Product Calculator

King Street Commons

WQU-59

CASCADE SEPARATOR CS-4

| Project Information |               |       |               |      |
|---------------------|---------------|-------|---------------|------|
| Project Name        | king st       |       | Option #      | A    |
| Country             | UNITED STATES | State | Massachusetts | City |

| Contact Information |                                 |           |              |
|---------------------|---------------------------------|-----------|--------------|
| First Name          | Megan                           | Last Name | Cramton      |
| Company             | TEC, Inc.                       | Phone #   | 603-801-3997 |
| Email               | mcramton@theengineeringcorp.com |           |              |

| Design Criteria                      |        |                         |                    |                                |       |
|--------------------------------------|--------|-------------------------|--------------------|--------------------------------|-------|
| Site Designation                     | WQU-59 |                         | Sizing Method      | Net Annual                     |       |
| Screening Required?                  | No     | Drainage Area (ac)      | 0.34               | Peak Flow (cfs)                | 2.59  |
| Groundwater Depth (ft)               | >15    | Pipe Invert Depth (ft)  | 5 - 10             | Bedrock Depth (ft)             | >15   |
| Multiple Inlets?                     | Yes    | Grate Inlet Required?   | No                 | Pipe Size (in)                 | 12.00 |
| Required Particle Size Distribution? | No     | 90° between two inlets? | Yes                | 180° between inlet and outlet? | No    |
| Runoff Coefficient                   | 0.93   | Rainfall Station        | 67 - Groveland, MA | TC (Min)                       | 5     |

| Treatment Selection |                   |                                  |              |                              |        |
|---------------------|-------------------|----------------------------------|--------------|------------------------------|--------|
| Treatment Unit      | CASCADE SEPARATOR |                                  | System Model | CS-4                         |        |
| Target Removal      | 80%               | Particle Size Distribution (PSD) | 110          | Predicted Net Annual Removal | 99.83% |

# Hydrodynamic Separation Product Calculator

King Street Commons

WQU-59

CASCADE SEPARATOR CS-4

## CASCADE SEPARATOR ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

| Rainfall Intensity <sup>1</sup> (in/hr) | % Rainfall Volume <sup>1</sup> | Cumulative Rainfall Volume | Rainfall Volume Treated | Total Flowrate (cfs) | Treated Flowrate (cfs) | Hydraulic Loading Rate (%) | Removal Efficiency (%)                         | Incremental Removal (%) |
|-----------------------------------------|--------------------------------|----------------------------|-------------------------|----------------------|------------------------|----------------------------|------------------------------------------------|-------------------------|
| 0.0800                                  | 41.00%                         | 41.00%                     | 41.00%                  | 0.0300               | 0.0300                 | %                          | 100.00%                                        | 41.04%                  |
| 0.1600                                  | 23.90%                         | 64.90%                     | 23.90%                  | 0.0500               | 0.0500                 | %                          | 100.00%                                        | 23.88%                  |
| 0.2400                                  | 11.50%                         | 76.40%                     | 11.50%                  | 0.0800               | 0.0800                 | %                          | 100.00%                                        | 11.53%                  |
| 0.3200                                  | 7.40%                          | 83.80%                     | 7.40%                   | 0.1000               | 0.1000                 | %                          | 100.00%                                        | 7.42%                   |
| 0.4000                                  | 4.50%                          | 88.30%                     | 4.50%                   | 0.1300               | 0.1300                 | %                          | 100.00%                                        | 4.45%                   |
| 0.4800                                  | 2.90%                          | 91.20%                     | 2.90%                   | 0.1500               | 0.1500                 | %                          | 100.00%                                        | 2.90%                   |
| 0.5600                                  | 1.80%                          | 93.00%                     | 1.80%                   | 0.1800               | 0.1800                 | %                          | 100.00%                                        | 1.78%                   |
| 0.6400                                  | 1.20%                          | 94.20%                     | 1.20%                   | 0.2000               | 0.2000                 | %                          | 100.00%                                        | 1.18%                   |
| 0.7200                                  | 1.60%                          | 95.80%                     | 1.60%                   | 0.2300               | 0.2300                 | %                          | 100.00%                                        | 1.60%                   |
| 0.8000                                  | 0.80%                          | 96.60%                     | 0.80%                   | 0.2500               | 0.2500                 | %                          | 100.00%                                        | 0.79%                   |
| 1.0000                                  | 0.60%                          | 97.20%                     | 0.60%                   | 0.3200               | 0.3200                 | %                          | 100.00%                                        | 0.57%                   |
| 1.4000                                  | 1.40%                          | 98.60%                     | 1.40%                   | 0.4400               | 0.4400                 | %                          | 97.13%                                         | 1.40%                   |
| 1.8000                                  | 0.90%                          | 99.50%                     | 0.90%                   | 0.5700               | 0.5700                 | %                          | 92.77%                                         | 0.84%                   |
| 2.2000                                  | 0.50%                          | 100.00%                    | 0.50%                   | 0.7000               | 0.7000                 | %                          | 88.41%                                         | 0.45%                   |
|                                         |                                |                            |                         |                      |                        |                            |                                                | 99.83%                  |
|                                         |                                |                            |                         |                      |                        |                            | Removal Efficiency Adjustment <sup>2</sup> =   |                         |
|                                         |                                |                            |                         |                      |                        |                            | Predicted % Annual Rainfall Treated =          | 100.00%                 |
|                                         |                                |                            |                         |                      |                        |                            | Predicted Net Annual Load Removal Efficiency = | 99.83%                  |

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

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

# Hydrodynamic Separation Product Calculator

King Street Commons

WQU-66

CASCADE SEPARATOR CS-4

## Project Information

|              |               |       |               |          |           |
|--------------|---------------|-------|---------------|----------|-----------|
| Project Name | king st       |       |               | Option # | A         |
| Country      | UNITED STATES | State | Massachusetts | City     | Littleton |

## Contact Information

|            |                                 |           |              |
|------------|---------------------------------|-----------|--------------|
| First Name | Megan                           | Last Name | Cramton      |
| Company    | TEC, Inc.                       | Phone #   | 603-801-3997 |
| Email      | mcramton@theengineeringcorp.com |           |              |

## Design Criteria

|                                      |        |                         |                    |                                |            |
|--------------------------------------|--------|-------------------------|--------------------|--------------------------------|------------|
| Site Designation                     | WQU-66 |                         |                    | Sizing Method                  | Net Annual |
| Screening Required?                  | No     | Drainage Area (ac)      | 0.90               | Peak Flow (cfs)                | 4.19       |
| Groundwater Depth (ft)               | >15    | Pipe Invert Depth (ft)  | 5 - 10             | Bedrock Depth (ft)             | >15        |
| Multiple Inlets?                     | Yes    | Grate Inlet Required?   | No                 | Pipe Size (in)                 | 12.00      |
| Required Particle Size Distribution? | No     | 90° between two inlets? | Yes                | 180° between inlet and outlet? | No         |
| Runoff Coefficient                   | 0.64   | Rainfall Station        | 67 - Groveland, MA | TC (Min)                       | 5          |

## Treatment Selection

|                |                   |                                  |      |                              |        |
|----------------|-------------------|----------------------------------|------|------------------------------|--------|
| Treatment Unit | CASCADE SEPARATOR | System Model                     | CS-4 |                              |        |
| Target Removal | 80%               | Particle Size Distribution (PSD) | 110  | Predicted Net Annual Removal | 99.30% |

# Hydrodynamic Separation Product Calculator

King Street Commons

WQU-66

CASCADE SEPARATOR CS-4

## CASCADE SEPARATOR ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

| Rainfall Intensity <sup>1</sup> (in/hr) | % Rainfall Volume <sup>1</sup> | Cumulative Rainfall Volume | Rainfall Volume Treated | Total Flowrate (cfs) | Treated Flowrate (cfs) | Hydraulic Loading Rate (%) | Removal Efficiency (%)                         | Incremental Removal (%) |
|-----------------------------------------|--------------------------------|----------------------------|-------------------------|----------------------|------------------------|----------------------------|------------------------------------------------|-------------------------|
| 0.0800                                  | 41.00%                         | 41.00%                     | 41.00%                  | 0.0500               | 0.0500                 | %                          | 100.00%                                        | 41.04%                  |
| 0.1600                                  | 23.90%                         | 64.90%                     | 23.90%                  | 0.0900               | 0.0900                 | %                          | 100.00%                                        | 23.88%                  |
| 0.2400                                  | 11.50%                         | 76.40%                     | 11.50%                  | 0.1400               | 0.1400                 | %                          | 100.00%                                        | 11.53%                  |
| 0.3200                                  | 7.40%                          | 83.80%                     | 7.40%                   | 0.1800               | 0.1800                 | %                          | 100.00%                                        | 7.42%                   |
| 0.4000                                  | 4.50%                          | 88.30%                     | 4.50%                   | 0.2300               | 0.2300                 | %                          | 100.00%                                        | 4.45%                   |
| 0.4800                                  | 2.90%                          | 91.20%                     | 2.90%                   | 0.2800               | 0.2800                 | %                          | 100.00%                                        | 2.90%                   |
| 0.5600                                  | 1.80%                          | 93.00%                     | 1.80%                   | 0.3200               | 0.3200                 | %                          | 100.00%                                        | 1.78%                   |
| 0.6400                                  | 1.20%                          | 94.20%                     | 1.20%                   | 0.3700               | 0.3700                 | %                          | 99.48%                                         | 1.17%                   |
| 0.7200                                  | 1.60%                          | 95.80%                     | 1.60%                   | 0.4100               | 0.4100                 | %                          | 98.14%                                         | 1.57%                   |
| 0.8000                                  | 0.80%                          | 96.60%                     | 0.80%                   | 0.4600               | 0.4600                 | %                          | 96.47%                                         | 0.76%                   |
| 1.0000                                  | 0.60%                          | 97.20%                     | 0.60%                   | 0.5800               | 0.5800                 | %                          | 92.43%                                         | 0.53%                   |
| 1.4000                                  | 1.40%                          | 98.60%                     | 1.40%                   | 0.8100               | 0.8100                 | %                          | 84.72%                                         | 1.22%                   |
| 1.8000                                  | 0.90%                          | 99.50%                     | 0.90%                   | 1.0400               | 1.0400                 | %                          | 77.00%                                         | 0.70%                   |
| 2.2000                                  | 0.50%                          | 100.00%                    | 0.50%                   | 1.2700               | 1.2700                 | %                          | 69.27%                                         | 0.35%                   |
|                                         |                                |                            |                         |                      |                        |                            | 99.30%                                         |                         |
|                                         |                                |                            |                         |                      |                        |                            | Removal Efficiency Adjustment <sup>2</sup> =   |                         |
|                                         |                                |                            |                         |                      |                        |                            | Predicted % Annual Rainfall Treated =          | 100.00%                 |
|                                         |                                |                            |                         |                      |                        |                            | Predicted Net Annual Load Removal Efficiency = | 99.30%                  |

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

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

**C**

# **NRCS Soil Resource Report**



United States  
Department of  
Agriculture

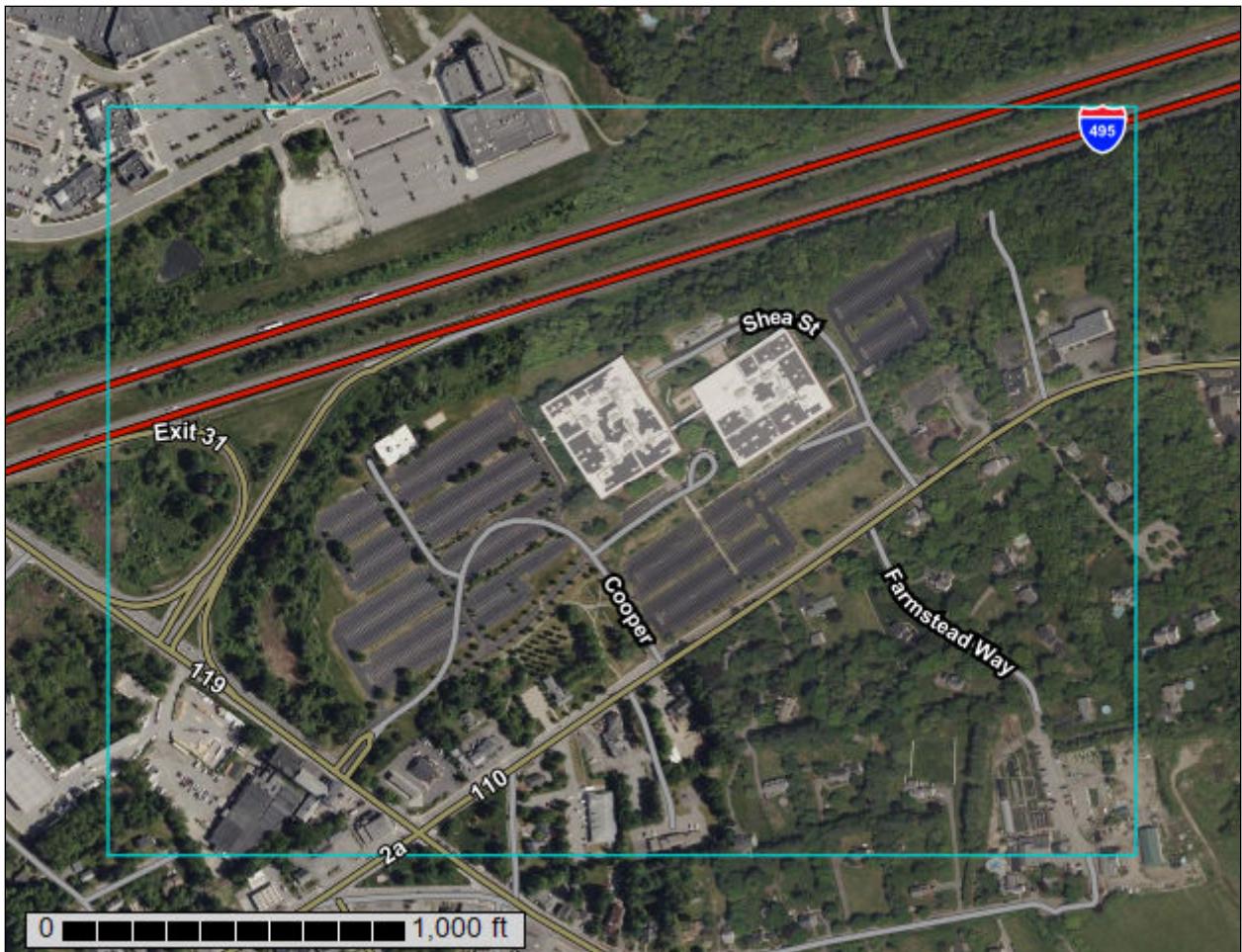
**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for Middlesex County, Massachusetts

**550 King Street**



# Preface

---

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

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

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

# Contents

---

|                                                                               |    |
|-------------------------------------------------------------------------------|----|
| <b>Preface</b> .....                                                          | 2  |
| <b>How Soil Surveys Are Made</b> .....                                        | 5  |
| <b>Soil Map</b> .....                                                         | 8  |
| Soil Map.....                                                                 | 9  |
| Legend.....                                                                   | 10 |
| Map Unit Legend.....                                                          | 11 |
| Map Unit Descriptions.....                                                    | 11 |
| Middlesex County, Massachusetts.....                                          | 14 |
| 6A—Scarboro mucky fine sandy loam, 0 to 3 percent slopes.....                 | 14 |
| 103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes.....        | 15 |
| 307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony....       | 18 |
| 307E—Paxton fine sandy loam, 25 to 35 percent slopes, extremely<br>stony..... | 20 |
| 310B—Woodbridge fine sandy loam, 3 to 8 percent slopes.....                   | 21 |
| 310C—Woodbridge fine sandy loam, 8 to 15 percent slopes.....                  | 23 |
| 311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony....        | 24 |
| 422B—Canton fine sandy loam, 0 to 8 percent slopes, extremely stony....       | 26 |
| 422C—Canton fine sandy loam, 8 to 15 percent slopes, extremely stony..        | 27 |
| 622C—Paxton-Urban land complex, 3 to 15 percent slopes.....                   | 29 |
| 623C—Woodbridge-Urban land complex, 3 to 15 percent slopes.....               | 31 |
| 626B—Merrimac-Urban land complex, 0 to 8 percent slopes.....                  | 33 |
| 654—Udorthents, loamy.....                                                    | 35 |
| 655—Udorthents, wet substratum.....                                           | 36 |
| 656—Udorthents-Urban land complex.....                                        | 37 |
| <b>References</b> .....                                                       | 39 |

# How Soil Surveys Are Made

---

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

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

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units).

Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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

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

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

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

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

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

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

## Custom Soil Resource Report

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

# **Soil Map**

---

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

## Custom Soil Resource Report Soil Map



## MAP LEGEND

## Area of Interest (AOI)

 Area of Interest (AOI)

## Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

## Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

## Water Features

 Streams and Canals

## Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

## Background

 Aerial Photography

## MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, Massachusetts

Survey Area Data: Version 22, Sep 9, 2022

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

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

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

## Map Unit Legend

| Map Unit Symbol                    | Map Unit Name                                                    | Acres in AOI | Percent of AOI |
|------------------------------------|------------------------------------------------------------------|--------------|----------------|
| 6A                                 | Scarboro mucky fine sandy loam, 0 to 3 percent slopes            | 3.5          | 2.3%           |
| 103C                               | Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes     | 0.2          | 0.1%           |
| 307B                               | Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony   | 2.9          | 2.0%           |
| 307E                               | Paxton fine sandy loam, 25 to 35 percent slopes, extremely stony | 4.1          | 2.7%           |
| 310B                               | Woodbridge fine sandy loam, 3 to 8 percent slopes                | 30.2         | 20.1%          |
| 310C                               | Woodbridge fine sandy loam, 8 to 15 percent slopes               | 8.8          | 5.8%           |
| 311B                               | Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony    | 3.5          | 2.3%           |
| 422B                               | Canton fine sandy loam, 0 to 8 percent slopes, extremely stony   | 7.3          | 4.8%           |
| 422C                               | Canton fine sandy loam, 8 to 15 percent slopes, extremely stony  | 0.1          | 0.1%           |
| 622C                               | Paxton-Urban land complex, 3 to 15 percent slopes                | 10.3         | 6.9%           |
| 623C                               | Woodbridge-Urban land complex, 3 to 15 percent slopes            | 0.3          | 0.2%           |
| 626B                               | Merrimac-Urban land complex, 0 to 8 percent slopes               | 12.6         | 8.4%           |
| 654                                | Udorthents, loamy                                                | 3.2          | 2.1%           |
| 655                                | Udorthents, wet substratum                                       | 7.3          | 4.9%           |
| 656                                | Udorthents-Urban land complex                                    | 56.1         | 37.3%          |
| <b>Totals for Area of Interest</b> |                                                                  | <b>150.3</b> | <b>100.0%</b>  |

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named

according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Middlesex County, Massachusetts

### 6A—Scarboro mucky fine sandy loam, 0 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2svky  
*Elevation:* 0 to 1,320 feet  
*Mean annual precipitation:* 36 to 71 inches  
*Mean annual air temperature:* 39 to 55 degrees F  
*Frost-free period:* 140 to 250 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Scarboro and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Scarboro

##### Setting

*Landform:* Drainageways, outwash deltas, outwash terraces, depressions  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope, tread, dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Parent material:* Sandy glaciofluvial deposits derived from schist and/or sandy glaciofluvial deposits derived from gneiss and/or sandy glaciofluvial deposits derived from granite

##### Typical profile

*Oe - 0 to 3 inches:* mucky peat  
*A - 3 to 11 inches:* mucky fine sandy loam  
*Cg1 - 11 to 21 inches:* sand  
*Cg2 - 21 to 65 inches:* gravelly coarse sand

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Very poorly drained  
*Runoff class:* Negligible  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (1.42 to 14.17 in/hr)  
*Depth to water table:* About 0 to 2 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* Frequent  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 4.7 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 5w  
*Hydrologic Soil Group:* A/D  
*Ecological site:* F144AY031MA - Very Wet Outwash  
*Hydric soil rating:* Yes

## Minor Components

### Swansea

*Percent of map unit:* 10 percent  
*Landform:* Bogs, swamps  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

### Wareham

*Percent of map unit:* 5 percent  
*Landform:* Depressions  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

### Walpole

*Percent of map unit:* 5 percent  
*Landform:* Deltas, depressions, outwash terraces, depressions, outwash plains  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Tread, talus, dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

## 103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 2wzp1  
*Elevation:* 0 to 1,390 feet  
*Mean annual precipitation:* 36 to 71 inches  
*Mean annual air temperature:* 39 to 55 degrees F  
*Frost-free period:* 140 to 240 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Charlton, extremely stony, and similar soils:* 50 percent  
*Hollis, extremely stony, and similar soils:* 20 percent  
*Rock outcrop:* 10 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Charlton, Extremely Stony

#### Setting

*Landform:* Ridges, hills  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

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

**Typical profile**

*Oe - 0 to 2 inches:* moderately decomposed plant material

*A - 2 to 4 inches:* fine sandy loam

*Bw - 4 to 27 inches:* gravelly fine sandy loam

*C - 27 to 65 inches:* gravelly fine sandy loam

**Properties and qualities**

*Slope:* 8 to 15 percent

*Surface area covered with cobbles, stones or boulders:* 9.0 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Runoff class:* Low

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

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Moderate (about 8.7 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* B

*Ecological site:* F144AY034CT - Well Drained Till Uplands

*Hydric soil rating:* No

**Description of Hollis, Extremely Stony**

**Setting**

*Landform:* Ridges, hills

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

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

*Down-slope shape:* Convex

*Across-slope shape:* Linear, convex

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

**Typical profile**

*Oi - 0 to 2 inches:* slightly decomposed plant material

*A - 2 to 7 inches:* gravelly fine sandy loam

*Bw - 7 to 16 inches:* gravelly fine sandy loam

*2R - 16 to 26 inches:* bedrock

**Properties and qualities**

*Slope:* 8 to 15 percent

*Surface area covered with cobbles, stones or boulders:* 9.0 percent

*Depth to restrictive feature:* 8 to 23 inches to lithic bedrock

*Drainage class:* Somewhat excessively drained

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

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

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* D

*Ecological site:* F144AY033MA - Shallow Dry Till Uplands

*Hydric soil rating:* No

#### **Description of Rock Outcrop**

##### **Setting**

*Landform:* Ridges, hills

*Parent material:* Igneous and metamorphic rock

##### **Typical profile**

*R - 0 to 79 inches:* bedrock

##### **Properties and qualities**

*Slope:* 8 to 15 percent

*Depth to restrictive feature:* 0 inches to lithic bedrock

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)

*Available water supply, 0 to 60 inches:* Very low (about 0.0 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydrologic Soil Group:* D

*Hydric soil rating:* No

#### **Minor Components**

##### **Woodbridge, extremely stony**

*Percent of map unit:* 8 percent

*Landform:* Ground moraines, hills, drumlins

*Landform position (two-dimensional):* Backslope, footslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Hydric soil rating:* No

##### **Canton, extremely stony**

*Percent of map unit:* 5 percent

*Landform:* Moraines, hills, ridges

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Hydric soil rating:* No

##### **Chatfield, extremely stony**

*Percent of map unit:* 5 percent

*Landform:* Ridges, hills

*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Nose slope, side slope, crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear, convex  
*Hydric soil rating:* No

**Ridgebury, extremely stony**

*Percent of map unit:* 2 percent  
*Landform:* Hills, drainageways, drumlins, depressions, ground moraines  
*Landform position (two-dimensional):* Footslope, toeslope  
*Landform position (three-dimensional):* Head slope, base slope  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

**307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony**

**Map Unit Setting**

*National map unit symbol:* 2w675  
*Elevation:* 0 to 1,580 feet  
*Mean annual precipitation:* 36 to 71 inches  
*Mean annual air temperature:* 39 to 55 degrees F  
*Frost-free period:* 140 to 240 days  
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Paxton, extremely stony, and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Paxton, Extremely Stony**

**Setting**

*Landform:* Ground moraines, hills, drumlins  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Side slope, crest  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Linear, convex  
*Parent material:* Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

**Typical profile**

*Oe - 0 to 2 inches:* moderately decomposed plant material  
*A - 2 to 10 inches:* fine sandy loam  
*Bw1 - 10 to 17 inches:* fine sandy loam  
*Bw2 - 17 to 28 inches:* fine sandy loam  
*Cd - 28 to 67 inches:* gravelly fine sandy loam

**Properties and qualities**

*Slope:* 0 to 8 percent

*Surface area covered with cobbles, stones or boulders:* 9.0 percent

*Depth to restrictive feature:* 20 to 43 inches to densic material

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)

*Depth to water table:* About 18 to 37 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 4.7 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* C

*Ecological site:* F144AY007CT - Well Drained Dense Till Uplands

*Hydric soil rating:* No

**Minor Components**

**Woodbridge, extremely stony**

*Percent of map unit:* 10 percent

*Landform:* Hills, drumlins, ground moraines

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

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

*Down-slope shape:* Concave

*Across-slope shape:* Linear

*Hydric soil rating:* No

**Charlton, extremely stony**

*Percent of map unit:* 5 percent

*Landform:* Hills

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

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

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Hydric soil rating:* No

**Ridgebury, extremely stony**

*Percent of map unit:* 4 percent

*Landform:* Drumlins, drainageways, depressions, ground moraines, hills

*Landform position (two-dimensional):* Footslope, toeslope

*Landform position (three-dimensional):* Head slope, base slope

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

**Whitman, extremely stony**

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

## 307E—Paxton fine sandy loam, 25 to 35 percent slopes, extremely stony

### Map Unit Setting

*National map unit symbol:* 2w67q

*Elevation:* 0 to 1,400 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 145 to 240 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Paxton, extremely stony, and similar soils:* 90 percent

*Minor components:* 10 percent

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

### Description of Paxton, Extremely Stony

#### Setting

*Landform:* Ground moraines, hills, drumlins

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex, linear

*Across-slope shape:* Linear, convex

*Parent material:* Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

#### Typical profile

*Oe - 0 to 2 inches:* moderately decomposed plant material

*A - 2 to 10 inches:* fine sandy loam

*Bw1 - 10 to 17 inches:* fine sandy loam

*Bw2 - 17 to 28 inches:* fine sandy loam

*Cd - 28 to 67 inches:* gravelly fine sandy loam

#### Properties and qualities

*Slope:* 25 to 35 percent

*Surface area covered with cobbles, stones or boulders:* 9.0 percent

*Depth to restrictive feature:* 20 to 43 inches to densic material

*Drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)

*Depth to water table:* About 18 to 37 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 4.7 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* C

*Ecological site:* F144AY007CT - Well Drained Dense Till Uplands

*Hydric soil rating:* No

### Minor Components

#### **Charlton, extremely stony**

*Percent of map unit:* 8 percent

*Landform:* Hills

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Hydric soil rating:* No

#### **Woodbridge, extremely stony**

*Percent of map unit:* 1 percent

*Landform:* Hills, drumlins, ground moraines

*Landform position (two-dimensional):* Backslope, footslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Concave

*Across-slope shape:* Linear

*Hydric soil rating:* No

#### **Chatfield, extremely stony**

*Percent of map unit:* 1 percent

*Landform:* Ridges, hills

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Hydric soil rating:* No

## **310B—Woodbridge fine sandy loam, 3 to 8 percent slopes**

### Map Unit Setting

*National map unit symbol:* 2t2ql

*Elevation:* 0 to 1,470 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 240 days

*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Woodbridge, fine sandy loam, and similar soils:* 82 percent

*Minor components:* 18 percent

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

## Description of Woodbridge, Fine Sandy Loam

### Setting

*Landform:* Ground moraines, drumlins, hills

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

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Concave

*Across-slope shape:* Linear

*Parent material:* Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

### Typical profile

*Ap - 0 to 7 inches:* fine sandy loam

*Bw1 - 7 to 18 inches:* fine sandy loam

*Bw2 - 18 to 30 inches:* fine sandy loam

*Cd - 30 to 65 inches:* gravelly fine sandy loam

### Properties and qualities

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* 20 to 39 inches to densic material

*Drainage class:* Moderately well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)

*Depth to water table:* About 18 to 30 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 3.6 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2w

*Hydrologic Soil Group:* C/D

*Ecological site:* F144AY037MA - Moist Dense Till Uplands

*Hydric soil rating:* No

## Minor Components

### Paxton

*Percent of map unit:* 10 percent

*Landform:* Drumlins, ground moraines, hills

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

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

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Hydric soil rating:* No

### Ridgebury

*Percent of map unit:* 8 percent

*Landform:* Depressions, ground moraines, hills, drainageways

*Landform position (two-dimensional):* Toeslope, backslope, footslope

*Landform position (three-dimensional):* Base slope, head slope, dip

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

## 310C—Woodbridge fine sandy loam, 8 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 2w689

*Elevation:* 0 to 1,370 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 240 days

*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Woodbridge and similar soils:* 85 percent

*Minor components:* 15 percent

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

### Description of Woodbridge

#### Setting

*Landform:* Ground moraines, hills, drumlins

*Landform position (two-dimensional):* Backslope, footslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Parent material:* Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

#### Typical profile

*Ap - 0 to 7 inches:* fine sandy loam

*Bw1 - 7 to 18 inches:* fine sandy loam

*Bw2 - 18 to 30 inches:* fine sandy loam

*Cd - 30 to 65 inches:* gravelly fine sandy loam

#### Properties and qualities

*Slope:* 8 to 15 percent

*Depth to restrictive feature:* 20 to 39 inches to densic material

*Drainage class:* Moderately well drained

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)

*Depth to water table:* About 18 to 30 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 4.7 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* C/D

*Ecological site:* F144AY037MA - Moist Dense Till Uplands

*Hydric soil rating:* No

### **Minor Components**

#### **Paxton**

*Percent of map unit:* 10 percent

*Landform:* Ground moraines, hills, drumlins

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Hydric soil rating:* No

#### **Ridgebury**

*Percent of map unit:* 4 percent

*Landform:* Depressions, ground moraines, hills, drainageways, drumlins

*Landform position (two-dimensional):* Footslope, toeslope

*Landform position (three-dimensional):* Head slope, base slope

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

#### **Sutton**

*Percent of map unit:* 1 percent

*Landform:* Ground moraines, hills

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Concave

*Across-slope shape:* Linear

*Hydric soil rating:* No

## **311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony**

### **Map Unit Setting**

*National map unit symbol:* 2t2qr

*Elevation:* 0 to 1,440 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 240 days

*Farmland classification:* Farmland of statewide importance

### **Map Unit Composition**

*Woodbridge, very stony, and similar soils:* 82 percent

*Minor components:* 18 percent

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

### **Description of Woodbridge, Very Stony**

#### **Setting**

*Landform:* Ground moraines, hills, drumlins

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

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Concave

*Across-slope shape:* Linear

*Parent material:* Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

#### **Typical profile**

*Oe - 0 to 2 inches:* moderately decomposed plant material

*A - 2 to 9 inches:* fine sandy loam

*Bw1 - 9 to 20 inches:* fine sandy loam

*Bw2 - 20 to 32 inches:* fine sandy loam

*Cd - 32 to 67 inches:* gravelly fine sandy loam

#### **Properties and qualities**

*Slope:* 0 to 8 percent

*Surface area covered with cobbles, stones or boulders:* 1.6 percent

*Depth to restrictive feature:* 20 to 43 inches to densic material

*Drainage class:* Moderately well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)

*Depth to water table:* About 19 to 27 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 4.0 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* C/D

*Ecological site:* F144AY037MA - Moist Dense Till Uplands

*Hydric soil rating:* No

#### **Minor Components**

##### **Paxton, very stony**

*Percent of map unit:* 10 percent

*Landform:* Ground moraines, hills, drumlins

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

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

*Down-slope shape:* Convex, linear

*Across-slope shape:* Linear, convex

*Hydric soil rating:* No

##### **Ridgebury, very stony**

*Percent of map unit:* 8 percent

*Landform:* Hills, drainageways, drumlins, depressions, ground moraines

*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Head slope, base slope

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

## 422B—Canton fine sandy loam, 0 to 8 percent slopes, extremely stony

### Map Unit Setting

*National map unit symbol:* 2w818  
*Elevation:* 0 to 1,180 feet  
*Mean annual precipitation:* 36 to 71 inches  
*Mean annual air temperature:* 39 to 55 degrees F  
*Frost-free period:* 145 to 240 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Canton, extremely stony, and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Canton, Extremely Stony

#### Setting

*Landform:* Moraines, hills, ridges  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Nose slope, side slope, crest  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex  
*Parent material:* Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

#### Typical profile

*Oi - 0 to 2 inches:* slightly decomposed plant material  
*A - 2 to 5 inches:* fine sandy loam  
*Bw1 - 5 to 16 inches:* fine sandy loam  
*Bw2 - 16 to 22 inches:* gravelly fine sandy loam  
*2C - 22 to 67 inches:* gravelly loamy sand

#### Properties and qualities

*Slope:* 0 to 8 percent  
*Surface area covered with cobbles, stones or boulders:* 9.0 percent  
*Depth to restrictive feature:* 19 to 39 inches to strongly contrasting textural stratification  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high (0.14 to 14.17 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 3.4 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated): 7s*

*Hydrologic Soil Group: B*

*Ecological site: F144AY034CT - Well Drained Till Uplands*

*Hydric soil rating: No*

### **Minor Components**

#### **Charlton, extremely stony**

*Percent of map unit: 6 percent*

*Landform: Ridges, ground moraines, hills*

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

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

*Down-slope shape: Convex, linear*

*Across-slope shape: Convex*

*Hydric soil rating: No*

#### **Scituate, extremely stony**

*Percent of map unit: 6 percent*

*Landform: Hills, ground moraines, drumlins*

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

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

*Down-slope shape: Convex, linear*

*Across-slope shape: Convex*

*Hydric soil rating: No*

#### **Montauk, extremely stony**

*Percent of map unit: 4 percent*

*Landform: Recessional moraines, ground moraines, hills, drumlins*

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

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

*Down-slope shape: Convex, linear*

*Across-slope shape: Convex*

*Hydric soil rating: No*

#### **Swansea**

*Percent of map unit: 4 percent*

*Landform: Marshes, depressions, bogs, swamps, kettles*

*Down-slope shape: Concave*

*Across-slope shape: Concave*

*Hydric soil rating: Yes*

## **422C—Canton fine sandy loam, 8 to 15 percent slopes, extremely stony**

### **Map Unit Setting**

*National map unit symbol: 2w815*

*Elevation: 0 to 1,310 feet*

*Mean annual precipitation: 36 to 71 inches*

*Mean annual air temperature: 39 to 55 degrees F*

*Frost-free period: 145 to 240 days*

*Farmland classification: Not prime farmland*

### Map Unit Composition

*Canton, extremely stony, and similar soils:* 80 percent

*Minor components:* 20 percent

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

### Description of Canton, Extremely Stony

#### Setting

*Landform:* Moraines, hills, ridges

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

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

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

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

#### Typical profile

*Oi - 0 to 2 inches:* slightly decomposed plant material

*A - 2 to 5 inches:* fine sandy loam

*Bw1 - 5 to 16 inches:* fine sandy loam

*Bw2 - 16 to 22 inches:* gravelly fine sandy loam

*2C - 22 to 67 inches:* gravelly loamy sand

#### Properties and qualities

*Slope:* 8 to 15 percent

*Surface area covered with cobbles, stones or boulders:* 9.0 percent

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

*Drainage class:* Well drained

*Runoff class:* Low

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

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 3.4 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* B

*Ecological site:* F144AY034CT - Well Drained Till Uplands

*Hydric soil rating:* No

### Minor Components

#### Scituate, extremely stony

*Percent of map unit:* 6 percent

*Landform:* Hills, drumlins, ground moraines

*Landform position (two-dimensional):* Backslope, footslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Hydric soil rating:* No

**Montauk, extremely stony**

*Percent of map unit:* 5 percent

*Landform:* Recessional moraines, ground moraines, hills, drumlins

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Hydric soil rating:* No

**Charlton, extremely stony**

*Percent of map unit:* 5 percent

*Landform:* Ridges, ground moraines, hills

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Hydric soil rating:* No

**Hollis, extremely stony**

*Percent of map unit:* 4 percent

*Landform:* Ridges, hills

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

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

*Down-slope shape:* Convex

*Across-slope shape:* Linear, convex

*Hydric soil rating:* No

## 622C—Paxton-Urban land complex, 3 to 15 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2w67k

*Elevation:* 0 to 930 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 145 to 240 days

*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Paxton and similar soils:* 45 percent

*Urban land:* 35 percent

*Minor components:* 20 percent

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

**Description of Paxton**

**Setting**

*Landform:* Ground moraines, hills, drumlins

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

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

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Parent material:* Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

#### **Typical profile**

*Ap - 0 to 8 inches:* fine sandy loam

*Bw1 - 8 to 15 inches:* fine sandy loam

*Bw2 - 15 to 26 inches:* fine sandy loam

*Cd - 26 to 65 inches:* gravelly fine sandy loam

#### **Properties and qualities**

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 20 to 39 inches to densic material

*Drainage class:* Well drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)

*Depth to water table:* About 18 to 37 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 4.1 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* C

*Ecological site:* F144AY007CT - Well Drained Dense Till Uplands

*Hydric soil rating:* No

### **Description of Urban Land**

#### **Typical profile**

*M - 0 to 10 inches:* cemented material

#### **Properties and qualities**

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 0 inches to manufactured layer

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)

*Available water supply, 0 to 60 inches:* Very low (about 0.0 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydrologic Soil Group:* D

*Hydric soil rating:* Unranked

### **Minor Components**

#### **Woodbridge**

*Percent of map unit:* 9 percent

*Landform:* Ground moraines, hills, drumlins

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

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

*Down-slope shape:* Concave

*Across-slope shape:* Linear

*Hydric soil rating:* No

**Charlton**

*Percent of map unit:* 6 percent

*Landform:* Hills

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

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

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Hydric soil rating:* No

**Udorthents**

*Percent of map unit:* 4 percent

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Hydric soil rating:* No

**Ridgebury**

*Percent of map unit:* 1 percent

*Landform:* Drumlins, depressions, ground moraines, hills, drainageways

*Landform position (two-dimensional):* Footslope, toeslope

*Landform position (three-dimensional):* Head slope, base slope

*Down-slope shape:* Concave, linear

*Across-slope shape:* Concave, linear

*Hydric soil rating:* Yes

## **623C—Woodbridge-Urban land complex, 3 to 15 percent slopes**

**Map Unit Setting**

*National map unit symbol:* 2w68b

*Elevation:* 0 to 550 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 145 to 240 days

*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Woodbridge and similar soils:* 58 percent

*Urban land:* 28 percent

*Minor components:* 14 percent

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

**Description of Woodbridge**

**Setting**

*Landform:* Ground moraines, hills, drumlins

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

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

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Parent material:* Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

**Typical profile**

*Ap - 0 to 7 inches:* fine sandy loam

*Bw1 - 7 to 18 inches:* fine sandy loam

*Bw2 - 18 to 30 inches:* fine sandy loam

*Cd - 30 to 65 inches:* gravelly fine sandy loam

**Properties and qualities**

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 20 to 39 inches to densic material

*Drainage class:* Moderately well drained

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)

*Depth to water table:* About 18 to 30 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

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

*Available water supply, 0 to 60 inches:* Low (about 4.7 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* C/D

*Ecological site:* F144AY037MA - Moist Dense Till Uplands

*Hydric soil rating:* No

**Description of Urban Land**

**Typical profile**

*M - 0 to 10 inches:* cemented material

**Properties and qualities**

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 0 inches to manufactured layer

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)

*Available water supply, 0 to 60 inches:* Very low (about 0.0 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydrologic Soil Group:* D

*Hydric soil rating:* Unranked

**Minor Components**

**Paxton**

*Percent of map unit:* 9 percent

*Landform:* Ground moraines, hills, drumlins

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

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

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex

*Hydric soil rating:* No

### Ridgebury

*Percent of map unit:* 5 percent

*Landform:* Hills, drainageways, drumlins, depressions, ground moraines

*Landform position (two-dimensional):* Footslope, toeslope

*Landform position (three-dimensional):* Head slope, base slope

*Down-slope shape:* Concave, linear

*Across-slope shape:* Concave, linear

*Hydric soil rating:* Yes

## 626B—Merrimac-Urban land complex, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2tyr9

*Elevation:* 0 to 820 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 250 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Merrimac and similar soils:* 45 percent

*Urban land:* 40 percent

*Minor components:* 15 percent

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

### Description of Merrimac

#### Setting

*Landform:* Outwash plains, outwash terraces, moraines, eskers, kames

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

*Landform position (three-dimensional):* Crest, side slope, riser, tread

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

#### Typical profile

*Ap - 0 to 10 inches:* fine sandy loam

*Bw1 - 10 to 22 inches:* fine sandy loam

*Bw2 - 22 to 26 inches:* stratified gravel to gravelly loamy sand

*2C - 26 to 65 inches:* stratified gravel to very gravelly sand

#### Properties and qualities

*Slope:* 0 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Somewhat excessively drained

*Runoff class:* Very low

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to very high (1.42 to 99.90 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 2 percent  
*Maximum salinity:* Nonsaline (0.0 to 1.4 mmhos/cm)  
*Sodium adsorption ratio, maximum:* 1.0  
*Available water supply, 0 to 60 inches:* Low (about 4.6 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 2e  
*Hydrologic Soil Group:* A  
*Ecological site:* F144AY022MA - Dry Outwash  
*Hydric soil rating:* No

#### **Description of Urban Land**

##### **Typical profile**

*M - 0 to 10 inches:* cemented material

##### **Properties and qualities**

*Slope:* 0 to 8 percent  
*Depth to restrictive feature:* 0 inches to manufactured layer  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)  
*Available water supply, 0 to 60 inches:* Very low (about 0.0 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 8  
*Hydrologic Soil Group:* D  
*Hydric soil rating:* Unranked

#### **Minor Components**

##### **Windsor**

*Percent of map unit:* 5 percent  
*Landform:* Outwash terraces, dunes, outwash plains, deltas  
*Landform position (three-dimensional):* Tread, riser  
*Down-slope shape:* Linear, convex  
*Across-slope shape:* Linear, convex  
*Hydric soil rating:* No

##### **Sudbury**

*Percent of map unit:* 5 percent  
*Landform:* Deltas, terraces, outwash plains  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Tread, dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

##### **Hinckley**

*Percent of map unit:* 5 percent  
*Landform:* Deltas, kames, eskers, outwash plains

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

*Landform position (three-dimensional):* Head slope, nose slope, crest, side slope, rise

*Down-slope shape:* Convex

*Across-slope shape:* Convex, linear

*Hydric soil rating:* No

## 654—Udorthents, loamy

### Map Unit Setting

*National map unit symbol:* vr1l

*Elevation:* 0 to 3,000 feet

*Mean annual precipitation:* 32 to 50 inches

*Mean annual air temperature:* 45 to 50 degrees F

*Frost-free period:* 110 to 200 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Udorthents, loamy, and similar soils:* 80 percent

*Minor components:* 20 percent

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

### Description of Udorthents, Loamy

#### Setting

*Parent material:* Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

#### Properties and qualities

*Depth to restrictive feature:* More than 80 inches

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

### Minor Components

#### Udorthents, sandy

*Percent of map unit:* 10 percent

*Hydric soil rating:* No

#### Urban land

*Percent of map unit:* 5 percent

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

#### Udorthents, wet substratum

*Percent of map unit:* 5 percent

*Hydric soil rating:* Yes

## 655—Udorthents, wet substratum

### Map Unit Setting

*National map unit symbol:* vr1n

*Elevation:* 0 to 3,000 feet

*Mean annual precipitation:* 32 to 54 inches

*Mean annual air temperature:* 43 to 54 degrees F

*Frost-free period:* 110 to 240 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Udorthents, wet substratum, and similar soils:* 85 percent

*Minor components:* 15 percent

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

### Description of Udorthents, Wet Substratum

#### Setting

*Parent material:* Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

#### Properties and qualities

*Slope:* 0 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

### Minor Components

#### Urban land

*Percent of map unit:* 8 percent

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

#### Freetown

*Percent of map unit:* 4 percent

*Landform:* Depressions, bogs

*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Dip

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

#### Swansea

*Percent of map unit:* 3 percent

*Landform:* Depressions, bogs  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

## 656—Udorthents-Urban land complex

### Map Unit Setting

*National map unit symbol:* 995k  
*Elevation:* 0 to 3,000 feet  
*Mean annual precipitation:* 32 to 54 inches  
*Mean annual air temperature:* 43 to 54 degrees F  
*Frost-free period:* 110 to 240 days  
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Udorthents and similar soils:* 45 percent  
*Urban land:* 35 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Udorthents

#### Setting

*Parent material:* Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

#### Properties and qualities

*Slope:* 0 to 15 percent  
*Depth to restrictive feature:* More than 80 inches  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None

### Description of Urban Land

#### Setting

*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Excavated and filled land

### Minor Components

#### Canton

*Percent of map unit:* 10 percent  
*Landform:* Hills

*Landform position (two-dimensional):* Backslope, toeslope  
*Landform position (three-dimensional):* Side slope, base slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

**Merrimac**

*Percent of map unit:* 5 percent  
*Landform:* Terraces, plains  
*Landform position (two-dimensional):* Shoulder  
*Landform position (three-dimensional):* Tread, rise  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

**Paxton**

*Percent of map unit:* 5 percent  
*Landform:* Hillslopes  
*Landform position (two-dimensional):* Summit, backslope  
*Landform position (three-dimensional):* Head slope, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

# References

---

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

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_054262](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262)

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053577](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577)

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053580](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580)

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)

**D**

# **Operation & Maintenance Plan**

---

# **Stormwater Management Operations and Maintenance Plan**

---

## **KING STREET COMMONS MIXED-USE SUBDIVISION**

**ASSESSORS MAP U08, LOT 10-0  
550 KING STREET  
LITTLETON, MASSACHUSETTS**

---

Prepared for:

**550 King Street, LLC**  
280 Merrimack Street  
Lawrence, MA 01843

Prepared by:

**TEC, Inc.**  
282 Merrimack Street  
Lawrence, MA 01843



---

August 22, 2023 Revised  
February 21, 2024

**Stormwater Management Operation and Maintenance Plan**  
**August 22, 2023**  
**Revised February 21, 2024**

**Name of Owner:** **550 King Street, LLC**  
**Name of Facility:** **King Street Commons**  
**Location:** **550 King Street, Littleton, MA**

A detailed, written log of all scheduled preventative and corrective maintenance performed for the stormwater management measures must be kept by the Applicant, including a record of all inspections and copies of maintenance-related work orders. An "Inspection and Maintenance Check List" shall be maintained as a record of regularly scheduled inspection and maintenance items as outlined below for every year. Maintenance required and actions taken shall be recorded in an "Inspection and Maintenance Log". The funding, operation, and maintenance of all stormwater management Best Management Practices (BMPs) shall be provided by the Owners, or their appointee.

**Maintenance routine and schedule:** Routine inspections will be conducted on a monthly basis and thorough investigations will be conducted twice a year. Tasks that are common to all systems include regular removal of accumulated sediments, floatables and debris. Inspections will be conducted by a qualified person experienced in drainage design and stormwater management systems.

Subsurface systems have access points located within the parking lots and roadways for ease of access by both personnel and vehicles necessary for maintenance. The BMP locations allow for safe vehicle and pedestrian travel across the site during maintenance activities. Please see Figure 1 for the BMP locations and maintenance areas. The routine inspection and maintenance of BMPs will ensure public safety by preventing clogging and failure of the system.

Annual reports will be prepared detailing the status of the stormwater system and the maintenance performed. A copy of the annual report will be sent to the Town of Littleton Conservation Commission, if requested. Please refer to the Site Plans submitted to the Town of Littleton Conservation Commission for BMP locations.

The Owner agrees to comply with a minimum maintenance schedule as follows:

**1. Inspection and cleaning of Rain Garden**

The rain garden shall be inspected and cleared of trash monthly to maintain efficacy. The BMP shall be mulched and fertilized annually. Dead vegetation and pruning shall be done annually. All sediments shall be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations.

**2. Inspection and cleaning of catch basins**

Catch basin grates shall be inspected monthly and cleared of debris to maintain inlet capacity. Sumps and inlets shall be cleaned four (4) times per year and inspected monthly. All sediments shall be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations.

**3. Inspection and cleaning of drainage pipes and manholes**

All retained and proposed drainage pipes and manhole structures shall be inspected and cleaned of sediment at least every five (5) years or as required to maintain adequate functionality of the stormwater conveyance system. All sediments shall be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations.

**4. Annual cleaning of outlet control structure**

Sumps and inlets shall be cleaned once per year and inspected on a monthly basis. All sediments shall be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations.

**5. Quarterly street sweeping of all parking lots and roadways**

The parking lots and roadways shall be swept on a quarterly basis. Sweepings shall be concentrated in the late spring after winter sanding and late fall after the leaves have fallen.

**6. Semi-annual inspection and maintenance of Contech Cascade Separator water quality units**

The water quality units shall be inspected every six months (spring and fall) for the first year to determine oil and sediment accumulation rates. Subsequent inspections will be planned based on the first year's inspection observations, and after any oil or chemical spill. All maintenance including removal and disposal of sediments shall be performed at the time of inspection. All sediments shall be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations. Please see the attached Cascade Separator® Inspection and Maintenance Guide provided by Contech.

**7. Semi-annual inspection and maintenance of Contech CMP infiltration structure**

The CMP detention structure shall be inspected every six months (spring and fall) for the first year. Subsequent inspection frequency shall be based on the first year's inspection observations, after any oil or chemical spill, and no less than once per year. All maintenance including removal and disposal of sediments shall be performed at the time of inspection. All sediments shall be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations. Please see the attached Contech® CMP Detention Inspection and Maintenance Guide provided by Contech.

**8. Landscaping**

Landscaping will be inspected after every major storm event for two (2) months after seeding to ensure functionality. Thereafter, inspections should take place every six (6) months in the spring and fall and after severe storm events. Grass and mulched landscaping showing signs of wear and erosion will be re-loamed/re-seeded or re-mulched as necessary to prevent further erosion from taking place.

**9. Snow Removal**

Snow will be stored within the landscape islands onsite. Salting and/or sanding will be performed as necessary to promote the public's safety.

## **Public Safety Features**

The stormwater infrastructure has been designed to collect and treat surface runoff from the development to prevent negative impacts to the resource area on site and groundwater. Measures shall be taken to prevent surface flooding and erosion as outlined in the Stormwater Operation and Maintenance Plan and the Site Plans.

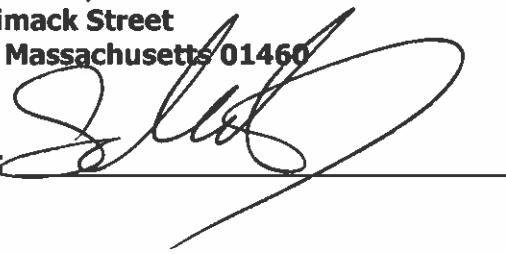
## **The Long-Term Pollution Prevention Plan**

The Owner agrees to comply with the following Long-Term Pollution Prevention Plan to ensure long-term stormwater quality discharge from the site:

- Good housekeeping practices: The site will be maintained by the owners, including snow removal, de-icing, street sweeping and BMP inspection/maintenance.
- Provisions for storing materials and solid waste products inside or under cover: Residential, retail, and restaurant produced waste will be stored in dumpsters onsite prior to regularly scheduled removal. Hazardous wastes are not anticipated to be produced on this site.
- Vehicle washing controls: Vehicle washing is not anticipated as a reasonably foreseeable use of the site.
- Requirements for routine inspections and maintenance of stormwater BMPs: BMPs will be inspected and maintained by qualified personnel as described in the Stormwater Management Operation and Maintenance Plan.
- Spill prevention and response plans: There are no proposed uses at the site that would provide an opportunity for a spill of oil or hazardous materials, other than a sudden, catastrophic, vehicle failure. If a vehicle release is the result of an accident, the police and fire department will respond and address any release.
- Provisions for maintenance of lawns, gardens, and other landscaped areas: The owner will provide long-term maintenance for the landscaped areas and stormwater BMPs.
- Requirements for storage and use of fertilizers, herbicides, and pesticides: At this time there would be no foreseeable need for the storage of fertilizers, herbicides, and pesticides.
- Pet waste management provisions: Pet waste will be removed by individual dog owners. The site is not anticipated to host a large number of pets.
- Provisions for operation and management of septic systems: Not Applicable.
- Provisions for solid waste management: Solid waste will be stored in dumpsters onsite prior to regularly scheduled removal.
- Snow disposal and plowing plans relative to Wetland Resource Areas: No snow will be stored or disposed of in surrounding resource areas.

- Street sweeping schedules: The owner will be responsible for quarterly street sweeping with sweepings concentrated in the Spring and Fall as stated in the Operations and Maintenance Plan.
- Winter road salt and/or sand use and storage restrictions: Road salt and/or sand will be stored under cover in a subcatchment area that receives TSS treatment prior to drainage to the bordering vegetated wetlands.
- Street sweeping schedule: The owner will perform street sweeping that is consistent with the Town of Littleton's current scheduled sweeping.
- Provisions for prevention of illicit discharges to the stormwater management system: Only stormwater is proposed to be conveyed through the stormwater management system. No illicit materials will be permitted. The owners will be responsible to maintain this 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: The project location is not considered a LUHPPL.
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan: Prior to implementation of the LTPPP, the owners shall provide an on-site meeting with the maintenance personnel to present the contents and requirements of the Stormwater Operation and Maintenance Plan and the LTPPP.
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan:

**550 King Street, LLC  
280 Merrimack Street  
Littleton, Massachusetts 01460**

Signature: 

**INSPECTION AND MAINTENANCE CHECK LIST –**  
**King Street Commons at 550 King Street, Littleton, MA 01460**

| For Year: _____  |                                               | Inspection Frequency*  |     |     |     |     |     |     |     |      |     |     |     |
|------------------|-----------------------------------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| Inspection Item  |                                               | Jan                    | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
| 1                | Rain Garden                                   |                        |     |     |     |     |     |     |     |      |     |     |     |
| 2                | Catch Basin Inlet                             |                        |     |     |     |     |     |     |     |      |     |     |     |
| 3                | Drainage Pipes and Manholes                   |                        |     |     |     |     |     |     |     |      |     |     |     |
| 4                | Outlet Control Structure                      |                        |     |     |     |     |     |     |     |      |     |     |     |
| 6                | Contech Cascade Separator Water Quality Units |                        |     |     |     |     |     |     |     |      |     |     |     |
| 7                | Contech CMP Infiltration                      |                        |     |     |     |     |     |     |     |      |     |     |     |
| 8                | Landscaping                                   |                        |     |     |     |     |     |     |     |      |     |     |     |
| Maintenance Item |                                               | Maintenance Frequency* |     |     |     |     |     |     |     |      |     |     |     |
| 1                | Rain Garden                                   |                        |     |     |     |     |     |     |     |      |     |     |     |
| 2                | Catch Basin Cleaning                          |                        |     |     |     |     |     |     |     |      |     |     |     |
| 3                | Drainage Pipes and Manholes                   |                        |     |     |     |     |     |     |     |      |     |     |     |
| 4                | Outlet Control Structure                      |                        |     |     |     |     |     |     |     |      |     |     |     |
| 6                | Street Sweeping                               |                        |     |     |     |     |     |     |     |      |     |     |     |
| 6                | Contech Cascade Separator Water Quality Units |                        |     |     |     |     |     |     |     |      |     |     |     |
| 7                | Contech CMP Infiltration                      |                        |     |     |     |     |     |     |     |      |     |     |     |
| 8                | Landscaping                                   |                        |     |     |     |     |     |     |     |      |     |     |     |
| 9                | Snow Removal                                  |                        |     |     |     |     |     |     |     |      |     |     |     |

\* Actual time of inspecting and maintaining items may vary. Chart shall be used to indicate frequency of events.

\*\* This chart shall be used in conjunction with the attached “Stormwater Management Operation and Maintenance Plan”, dated August 22, 2023 and revised January 19, 2024.

**Name of Applicant: 550 King Street, LLC**  
**Name of Project: King Street Commons**  
**Location: 550 King Street, Littleton, MA 01460**

**Inspection and Maintenance Log**

| Inspection No. | Date | Inspections Performed | Maintenance Actions Taken |
|----------------|------|-----------------------|---------------------------|
| 1              |      |                       |                           |
| 2              |      |                       |                           |
| 3              |      |                       |                           |
| 4              |      |                       |                           |
| 5              |      |                       |                           |
| 6              |      |                       |                           |
| 7              |      |                       |                           |
| 8              |      |                       |                           |
| 9              |      |                       |                           |
| 10             |      |                       |                           |
| 11             |      |                       |                           |
| 12             |      |                       |                           |
| 13             |      |                       |                           |
| 14             |      |                       |                           |
| 15             |      |                       |                           |
| 16             |      |                       |                           |
| 17             |      |                       |                           |
| 18             |      |                       |                           |
| 19             |      |                       |                           |
| 20             |      |                       |                           |
| 21             |      |                       |                           |

Additional Sheets shall be added as needed



## Cascade Separator® Inspection and Maintenance Guide



CASCADE  
separator®

## Maintenance

The Cascade Separator® system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

## Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided in this Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

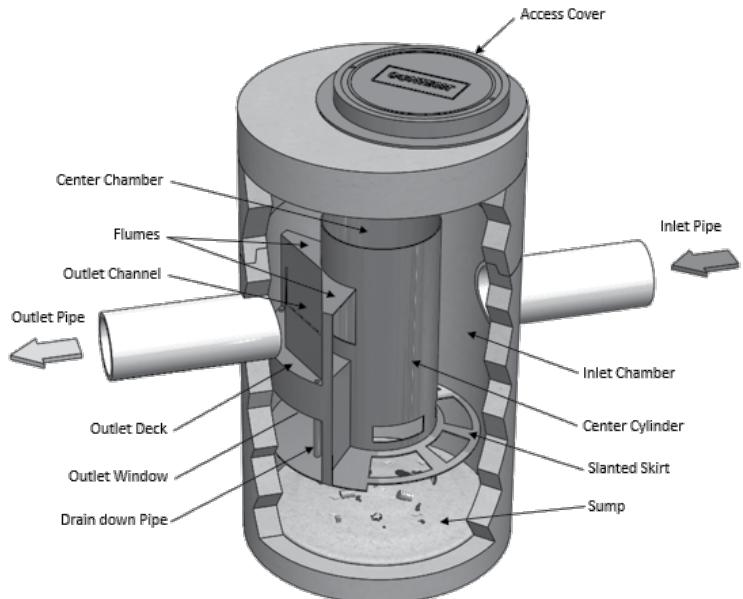
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. Contech recommends maintaining the system when sediment level reaches 50% of maximum storage volume. The level of sediment is easily determined by measuring the distance from the system outlet invert (standing water level) to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the chart in this document to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage.

## Cleaning

Cleaning of a Cascade Separator system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum tube down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. Then the system should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.



## Cascade Separator® Maintenance Indicators and Sediment Storage Capacities

| Model Number | Diameter |     | Distance from Water Surface to Top of Sediment Pile |     | Sediment Storage Capacity |                |
|--------------|----------|-----|-----------------------------------------------------|-----|---------------------------|----------------|
|              | ft       | m   | ft                                                  | m   | y <sup>3</sup>            | m <sup>3</sup> |
| CS-3         | 3        | 0.9 | 1.5                                                 | 0.5 | 0.4                       | 0.3            |
| CS-4         | 4        | 1.2 | 2.5                                                 | 0.8 | 0.7                       | 0.5            |
| CS-5         | 5        | 1.3 | 3                                                   | 0.9 | 1.1                       | 0.8            |
| CS-6         | 6        | 1.8 | 3.5                                                 | 1   | 1.6                       | 1.2            |
| CS-8         | 8        | 2.4 | 4.8                                                 | 1.4 | 2.8                       | 2.1            |
| CS-10        | 10       | 3.0 | 6.2                                                 | 1.9 | 4.4                       | 3.3            |
| CS-12        | 12       | 3.6 | 7.5                                                 | 2.3 | 6.3                       | 4.8            |

Note: The information in the chart is for standard units. Units may have been designed with non-standard sediment storage depth.



A Cascade Separator unit can be easily cleaned in less than 30 minutes.



A vacuum truck excavates pollutants from the systems.

## Cascade Separator® Inspection & Maintenance Log

| Cascade Model: |                                                    |                                        | Location:                      |                       |          |
|----------------|----------------------------------------------------|----------------------------------------|--------------------------------|-----------------------|----------|
| Date           | Depth Below Invert to Top of Sediment <sup>1</sup> | Floatable Layer Thickness <sup>2</sup> | Describe Maintenance Performed | Maintenance Personnel | Comments |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |
|                |                                                    |                                        |                                |                       |          |

1. The depth to sediment is determined by taking a measurement from the manhole outlet invert (standing water level) to the top of the sediment pile.

Once this measurement is recorded, it should be compared to the chart in the maintenance guide to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

### SUPPORT

- Drawings and specifications are available at [www.ContechES.com](http://www.ContechES.com).
- Site-specific design support is available from our engineers.

©2021 Contech Engineered Solutions LLC, a QUIKRETE Company

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, and earth stabilization products. For information, visit [www.ContechES.com](http://www.ContechES.com) or call 800.338.1122

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT [WWW.CONTECHES.COM/COS](http://WWW.CONTECHES.COM/COS)) FOR MORE INFORMATION.

# ConTech® CMP Detention Inspection and Maintenance Guide

Underground stormwater detention and infiltration systems must be inspected and maintained at regular intervals for purposes of performance and longevity.

## Inspection

Inspection is the key to effective maintenance of CMP detention systems and is easily performed. ConTech recommends ongoing, annual inspections. Sites with high trash load or small outlet control orifices may need more frequent inspections. The rate at which the system collects pollutants will depend more on-site specific activities rather than the size or configuration of the system.

Inspections should be performed more often in equipment washdown areas, in climates where sanding and/or salting operations take place, and in other various instances in which one would expect higher accumulations of sediment or abrasive/corrosive conditions. A record of each inspection is to be maintained for the life of the system.

## Maintenance

CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice.

Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities. ConTech suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

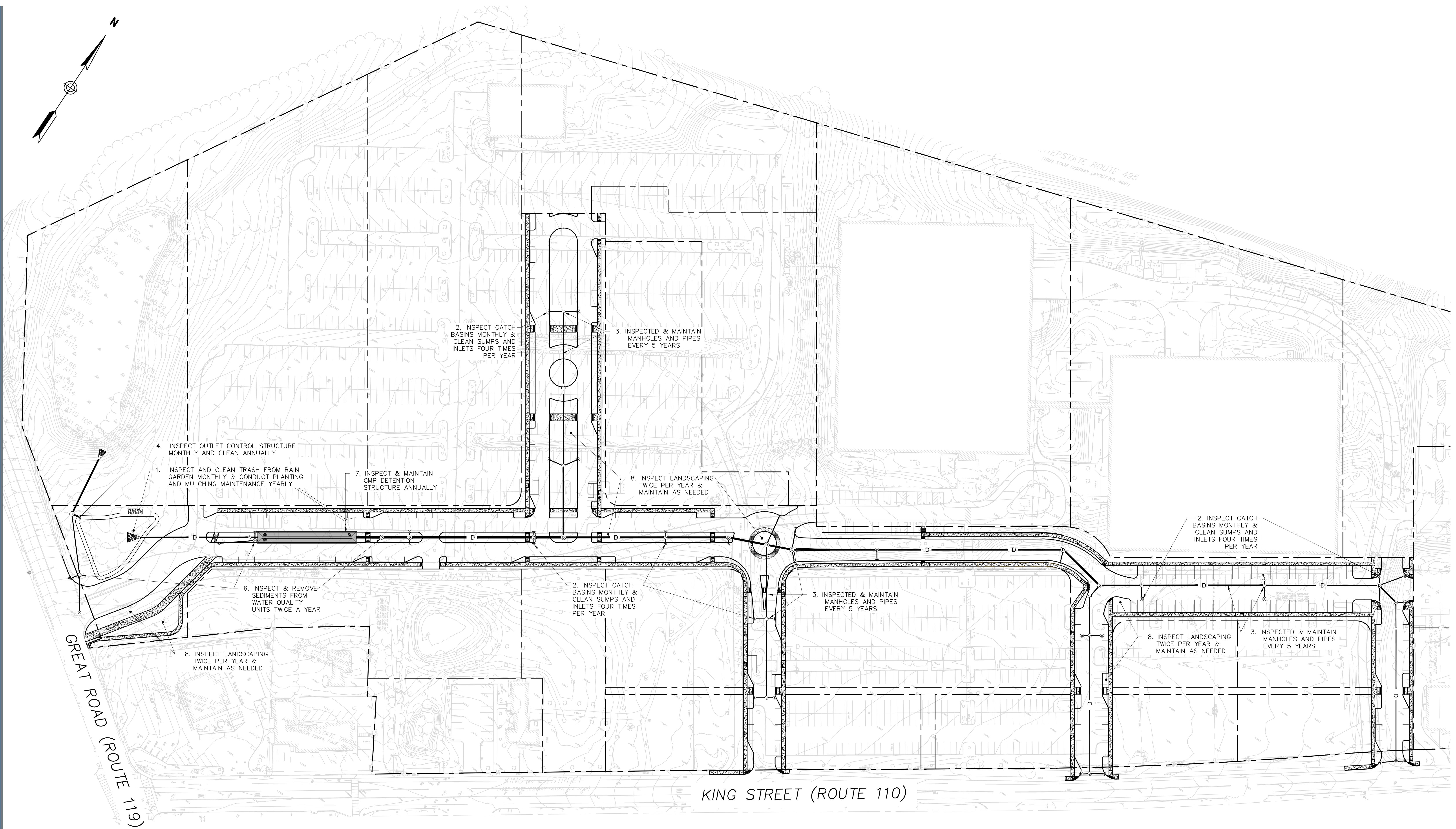
Annual inspections are best practice for all underground systems. During this inspection if evidence of salting/de-icing agents is observed within the system, it is best practice for the system to be rinsed, including above the spring line soon after the spring thaw as part of the maintenance program for the system.

Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

The foregoing inspection and maintenance efforts help ensure underground pipe systems used for stormwater storage continue to function as intended by identifying recommended regular inspection and maintenance practices. Inspection and maintenance related to the structural integrity of the pipe or the soundness of pipe joint connections is beyond the scope of this guide.



NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT [WWW.CONTECHES.COM/COS](http://WWW.CONTECHES.COM/COS)) FOR MORE INFORMATION.



### O&M Site Plan

**550 King Street  
Littleton, Massachusetts**



282 Merrimack Street  
2nd Floor  
Lawrence, MA 01843  
169 Ocean Boulevard  
Unit 101, PO Box 249  
Hampton, NH 03842  
t: (978) 794-1792  
TheEngineeringCorp.com

Scale: 1" = 60'

January 12, 2024

60 0 60 120  
SCALE IN FEET

**E**

# **CPPP and Erosion Prevention & Sedimentation Control Plan**

**CONSTRUCTION PERIOD POLLUTION PREVENTION AND  
EROSION AND SEDIMENTATION CONTROL PLAN**

**August 22, 2023**  
**Revised February 21, 2024**

**Name of Owner:** **550 King Street, LLC**  
**Name of Facility:** **King Street Commons**  
**Location:** **550 King Street**  
**Littleton, MA**

This plan presents the minimum measures for the contractor to utilize in preparation of the Stormwater Pollution Prevention Plan (SWPPP) as required by the EPA National Pollutant Discharge Elimination System (NPDES) Construction General Permit. Contractor to provide SWPPP to the Conservation Commission and EPA at least fourteen (14) days prior to start of construction.

**Good Housekeeping BMPs**

**Goals**

Minimize the potential for contaminants to enter or runoff the site during construction activities. Fuel and other equipment related fluids will be properly stored. The Contractor shall establish secure storage areas that collect any spillage to meet requirements of the Town of Littleton Fire Department regarding the storage of flammable materials. The Contractor shall complete and submit the plans to the Engineer.

**General Requirements**

The following presents a proactive approach to all of the best management practices, erosion and sedimentation controls, mitigation measures, and monitoring activities for this Project.

**Compost Filter Sock**

A compost filter sock is a type of contained compost filter berm. It is a mesh tube filled with composted material that is placed perpendicular to sheet-flow runoff to control erosion and retain sediment in disturbed areas. The filter sock can be used in place of a traditional sediment and erosion control tool such as a silt fence or straw bale barrier.

Compost filter socks are flexible and can be placed along the perimeter of a site, or at intervals along a slope, to capture and treat stormwater that runs off as sheet flow. Filter socks can also be used on pavement as inlet protection for storm drains and to slow water flow in small ditches. Filter socks used for erosion control are usually 12 inches in diameter, although 8 inch, 18 inch, and 24 inch- diameter socks are used in some applications. The smaller, 8 inch-diameter filter socks are commonly used for stormwater inlet protection. The outer shell of a compost filter sock is typically biodegradable and can remain on pervious surfaces post construction versus having to be removed as construction waste.

### **Pavement Sweeping**

Paved areas within the active construction site can be swept on a regular basis to remove larger sediment particles from construction activities. Pavement areas adjacent to the Site will be swept if dirt and debris is tracked from the construction site.

### **General Maintenance**

Refer to the Inspection and Maintenance Checklist (at the end of this section) identifying inspection and maintenance measures for each specific practice.

The contractor or subcontractor will be responsible for implementing each control shown on the Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.

The onsite contractor will inspect all sediment and erosion control structures weekly and after each rainfall event meeting the minimum requirements as defined in the Plan. Records of the inspections will be prepared and maintained onsite by the contractor as required by the Plan.

- Silt shall be removed from behind barriers if greater than 6-inches deep, 2/3rds the height of the erosion control barrier, or as needed.
- Damaged or deteriorated items will be repaired immediately after identification.
- The underside of the compost filter sock should be kept in close contact with the earth and reset as necessary.
- Contractor to use rip-rap stone when necessary to manage stormwater during construction.
- Contractor to use erosion control blankets (ECBs) to stabilize sloped areas as necessary to minimize erosion during construction.
- Soil stockpiles in grass areas shall be enclosed by a silt fence and soil stockpiles in paved areas shall be enclosed by compost filter sock or straw bales. All soil stockpiles are to be covered with tarps.
- At a minimum establish good housekeeping BMPs for:
  - Material handling and waste management
  - Staging areas
  - Designate washout areas
  - Equipment vehicle fueling and maintenance

- Spill prevention and control

Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

### **Spill Prevention and Control**

The Contractor will actively maintain and manage the site activities with the procedures outlined in this Plan. In the event of petroleum or other deleterious substance spill, action will be taken by the Contractor to contain and remove the spill. The Contractor will comply with the relevant section(s) of the Oil Pollution Prevention Act, 40 CFR 112.7.

### **Responsibility**

All project personnel share the responsibility for the initial control and reporting of the oil and other substance spill, especially the personnel that first discover the spill. The Site Safety and Health Officer (SSHO) will be responsible for determining the necessary safety equipment and for establishing safety practices to be followed by the Contractor during the clean-up operations. All personnel will be trained in the use of and location of this equipment, prior to the commencement of the construction.

The Contractor's goal is to provide effective, efficient and coordinated action to minimize or mitigate damages to the environment and public health and welfare from oil or other substance discharges, conforming to applicable federal, state, and local regulations, as well as other provisions and restrictions. In the event of spills or releases that may occur during the Project, a representative on-site qualified by OSHA training requirements (29 CFR 1910.120) for a Level 3 Hazmat Technician will be provided and will have the responsibility and authority for supervising the cleanup. If the representative determines that the clean-up operations are beyond the capacity of the Contractor, assistance shall be requested from its Subcontractor.

In the event of an emergency spill, the Contractor will be responsible for retaining the environmental Subcontractor. The selected environmental subcontractor will develop a Hazardous Materials Health and Safety Plan, which will be referenced when a spill or release is discovered, and the control of the spill or release is beyond the scope of the Spill Prevention Control and Countermeasure plan. The Contractor's Project Manager is responsible for giving the SSHO directions for initiating the Hazardous Materials Health and Safety Plan.

Alert and reporting procedures will become effective immediately upon observance and indication of a spill or discharge of oil or other substances on the project.

Reportable observations are:

1. Leaks or spills
2. Soils which are discolored or have an odor
3. Discharge of oil or other similar substances from drain pipes

The Engineer will be informed immediately of all substantial spills, releases, or other substance discharges. All telephone numbers for the Emergency Response agencies will

be posted on site. The Contractor or its Subcontractors will implement control and countermeasures immediately.

### **Fuel and Oil Delivery Trucks**

The equipment superintendent or designee will monitor all truck unloading procedures to verify all hoses are tight and do not leak, and if necessary, will tighten, adjust, or replace them to prevent a release of any kind. In the event of a major spill, alert and initial report procedures will be implemented, and an emergency response contractor will be called in to perform the cleanup.

### **Equipment**

Motorized equipment that require fuel and oil to operate will be inspected prior to the start of each work shift by the operator (in the field) to ensure there is no leakage of oil, fuel, or other material. Trucks will be inspected prior to use for potential leaks or drips. If a leak is found, repairs will be made immediately, and spillage will be cleaned up manually using sorbent material. Vehicles that are found to be leaking will be immediately taken out of service until repairs can be made.

### **Drum Storage**

Drum storage, if any, will be located in a secure area within the Project limits away from environmental areas of concern. Petroleum liquids and other substances stored in drums will be kept in a drum container that consists of a drum rack and drip containment pan that is capable of containing 110% of the stored volume should the drum rupture.

### **Lubrication / Oil Maintenance**

Replacement lubrication will be directly deposited from the lubrication truck to the equipment lubrication reservoir. No other container system will be used to transport oil to the equipment. Mobile equipment will be serviced off site or in the lay-down area. Equipment that cannot be moved will be serviced in the field. The Contractor will place a containment pan or absorbent below the service area prior to initiating service activities in the field. Waste disposal will be completed by the Contractor or by a waste disposal firm. Miscellaneous lubricants for operating equipment will be limited to daily quantities.

### **Spent Oil**

Oil that has already been used on the job will be disposed of via a certified waste disposal firm. Spent oil will be stored in a labeled (hazardous waste signs) and vented fuel storage cell located at the staging area awaiting disposal by a certified waste disposal firm (i.e. Enpro, Inc.). The staging area will be located within the boundary of the project and inspected daily for leaks or spills. The storage cell will be bermed to contain 110% of the largest container or 10% of the total volume in storage, whichever is greater.

### **Special Oil Spill Equipment**

#### **Sorbent Pads**

Sorbent pads will be available to absorb oil and petroleum compounds. If necessary, the pads will be used to absorb oil spills or leaks by placing them on the oil and giving

them antiquated time to absorb it. The sorbent pads will be stored in equipment box located in the maintenance area. The pads shall float and be water repellent, so they can absorb oil on water. Saturated/contaminated pads will be placed in an appropriate container and stored within the maintenance area. A certified waste disposal firm will dispose of the approved containers.

### **Sorbent Compound**

The compound will be used for contaminants spilled on decks or hard surfaces. In most cases, it can be applied directly to spills, but if the spill is large, it can be used to form a dike around the spill to prevent further migration.

### **Construction and Erosion Control Sequencing Plan**

1. Selectively remove vegetation for compost filter tube installation;
2. Install compost filter tube;
3. Install construction fencing at limits of work, and no-disturb/tree save areas, if any;
4. Stabilize construction entrances;
5. Prepare construction trailer/staging location;
6. Strip and stockpile topsoil and pavement;
7. Temporarily stabilize topsoil stockpiles (seed and silt fence (grassed area) or compost filter tube or straw bales (pavement area) around toe of slope);
8. Conduct earthwork cuts and fills to bring site to grade;
9. Construct utilities (water, sewer, storm drain, etc.);
10. Construct roadway/parking/sidewalk pavement areas through binder course;
11. Finish grade landscaping area;
12. Permanently stabilize landscaping areas with seed/landscaping;
13. Construct roadway/parking areas through top course; and
14. Remove all temporary soil erosion and sediment control measures upon permanent site stabilization and approval by the engineer and Town of Littleton.

**Best Management Practices – Maintenance/Evaluation Checklist**  
**Construction Practices**

| <b>Best Management Practice</b> | <b>Inspection Frequency</b>                                                      | <b>Date Inspected</b> | <b>Inspector</b> | <b>Minimum Maintenance and Key Items to Check</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Cleaning/Repair Needed</b><br><input type="checkbox"/> yes <input type="checkbox"/> no<br><b>(List Items)</b> | <b>Date of Cleaning/Repair</b> | <b>Performed by</b> |
|---------------------------------|----------------------------------------------------------------------------------|-----------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------|
| Compost Filter Sock             | Inspect at least once per week and after each rainstorm of 0.25 inch or greater. |                       |                  | <ul style="list-style-type: none"> <li>• Ensure that compost filter sock is intact and the area behind the sock is not filled with sediment. If there is excessive ponding behind the filter sock or accumulated sediments reach the top of the sock, an additional sock should be added on top or in front of the existing filter sock in these areas, without disturbing the soil or accumulated sediment.</li> <li>• If the filter sock was overtopped during a storm event, the operator should consider installing an additional filter sock on top of the original, placing an additional filter sock further up the slope.</li> </ul> |                                                                                                                  |                                |                     |
| Catch Basin Silt Sack           | Inspect at least once per week and after each rainstorm of 0.25 inch or greater. |                       |                  | <ul style="list-style-type: none"> <li>• Ensure that silt sack is intact. The silt sack should be removed, emptied, and replaced into the catch basin as needed for proper functioning.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                  |                                |                     |
| Pavement Sweeping               | To be monitored as needed.                                                       |                       |                  | <ul style="list-style-type: none"> <li>• Paved areas within the active construction site can be swept on a regular basis to remove larger sediment particles from construction activities. Pavement areas adjacent to the Site will be swept if dirt and debris is tracked from the construction site.</li> </ul>                                                                                                                                                                                                                                                                                                                            |                                                                                                                  |                                |                     |

**Stormwater Supervisor Contact Information:**

---



---



---



---

**F**

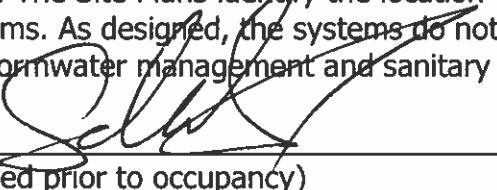
# **Illicit Discharge Compliance Statement**

### **Illicit Discharge Compliance Statement**

**Name of Owner:** **550 King Street, LLC**  
**Name of Facility:** **King Street Commons Mixed-Use Development**  
**Location:** **550 King Street, Littleton, MA 01460**

The Subdivision Plans and Drainage Report for the Proposed Site Development, located at 550 King Street, Littleton, MA, meets the requirements of Standard 10 of the Massachusetts Stormwater Handbook.

The Site Plans were prepared by qualified personnel at the direction of 550 King Street, LLC. The Site Plans identify the location of stormwater management and utility systems. As designed, the systems do not allow for any connections between stormwater management and sanitary sewer utilities.

Signature:   
(To be signed prior to occupancy)

**G**

# **Test Pit Logs**



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

Date: 12/21/2023 Wetlands: 150'+ Zone II: 310'+ Soil Symbol: 626B Soil Name: Complex Soil Class: A

Merrimac-  
Urban land

**Test Pit:** TP-1 **Elevation:** 259.5

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other                                     |
|---------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|-------------------------------------------|
|         |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                                           |
| 0-48"   | Fill         | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Pipes, bricks, stone<br>curbs, and stones |
| 48-102" | 2C           | 10YR 5/4                                 | -                      | -     | -       | Gravely Sand | 35                              | 20                  | SG                | Loose                          | -                                         |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                           |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                           |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                           |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                           |

Loamy  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

**Standing Water:** 96"

**ESHGW:** -

**Additional Notes:**

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 12/21/2023    **Wetlands:** 115'+    **Zone II:** 260'+    **Soil Symbol:** 626B    **Soil Name:** Complex    **Soil Class:** A

**Test Pit:** TP-2    **Elevation:** 257

| Depth  | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other                            |
|--------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|----------------------------------|
|        |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                                  |
| 0-48"  | Fill         | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Gravel, Sand,<br>Stones, and Ash |
| 48-50" | Apb          | 10YR 2/1                                 | -                      | -     | -       | Sandy Loam   | 5                               | -                   | Massive           | Friable                        | -                                |
| 50-57" | Bw           | 10YR 3/6                                 | -                      | -     | -       | Sandy Loam   | 10                              | -                   | Massive           | Friable                        | -                                |
| 57-96" | 2C           | 10YR 5/4                                 | -                      | -     | -       | Gravely Sand | 35                              | 20                  | SG                | Loose                          | Large Stones                     |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                  |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                  |

Loamy  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

**Standing Water:** 93"

**ESHGW:** -

**Additional Notes:**

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

Merrimac-  
Urban land

**Date:** 12/21/2023    **Wetlands:** 135'+    **Zone II:** 200'+    **Soil Symbol:** 626B    **Soil Name:** Complex    **Soil Class:** A

**Test Pit:** TP-3    **Elevation:** 260.5

| Depth  | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|--------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|        |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-8"   | Fill 1       | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 8-108" | Fill 2       | 10YR 8/4                                 | -                      | -     | -       | Sand         | 10                              | -                   | SG                | Loose                          | See add. notes   |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |

Loamy  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

**Standing Water:** -

**ESHGW:** Not encountered

**Additional Notes:** Sand (Fill 2) collaprisng around excavation, with no water observed. Test pit located approximately 50' away from existing leach field.

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 12/21/2023    **Wetlands:** 190'+    **Zone II:** 180'+    **Soil Symbol:** 656    **Soil Name:** Complex    **Soil Class:** -

**Test Pit:** TP-4    **Elevation:** 262

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|---------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|         |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-42"   | Fill 1       | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 42-102" | Fill 2       | 10YR 8/4                                 | -                      | -     | -       | Sand         | 5                               | -                   | SG                | Loose                          | See add. notes   |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |

Loamy  
alluvium &  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

**Standing Water:** -

**ESHGW:** Not encountered

**Additional Notes:** Sand (Fill 2) collapsing around excavation, with no water observed. Test pit located approximately 30' away from existing leach field.

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 12/21/2023    **Wetlands:** 235'+    **Zone II:** 180'+    **Soil Symbol:** 656    **Soil Name:** Complex    **Soil Class:** -

**Test Pit:** TP-5    **Elevation:** 262

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other                                           |
|---------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|-------------------------------------------------|
|         |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                                                 |
| 0-10"   | Fill 1       | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Topsoil material                                |
| 10-102" | Fill 2       | 10YR 4/3                                 | -                      | -     | -       | Sand         | 30                              | 10                  | SG                | Loose                          | Gravel, stones,<br>bricks, and filter<br>fabric |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                                 |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                                 |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                                 |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                                                 |

Loamy  
alluvium &  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

**Standing Water:** -

**ESHGW:** 72"

**Additional Notes:** Filter fabric present at 72", with water seeping at all sides of filter fabric "layer". Majority of fill 2 material comprised on sand material.  
Test Pit Located appoximately 100' from existing leach field.

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 12/21/2023    **Wetlands:** 350'+    **Zone II:** 500'+    **Soil Symbol:** 656    **Soil Name:** Complex    **Soil Class:** -

**Test Pit:** TP-6    **Elevation:** 267.5

| Depth  | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |           |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|--------|--------------|------------------------------------------|------------------------|-----------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|        |              |                                          | Depth                  | Color     | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-25"  | Fill         | -                                        | -                      | -         | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 25-29" | Apb          | 10YR 2/1                                 | -                      | -         | -       | Loamy Sand   | 5                               | -                   | Massive           | Friable                        | -                |
| 29-37" | Bw           | 10YR 3/6                                 | -                      | -         | -       | Loamy Sand   | 10                              | 5                   | Massive           | Friable                        | -                |
| 37-78" | 2C           | 10YR 5/4                                 | 60"                    | 7.5YR 6/8 | 10      | Gravely Sand | 40                              | 10                  | SG                | Loose                          | Very Gravely     |
|        |              |                                          |                        |           |         |              |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |           |         |              |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |           |         |              |                                 |                     |                   |                                |                  |

Loamy  
alluvium &  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

**Standing Water:** 70"

**ESHGW:** 60"

**Additional Notes:** Redoximorphic features present at 60"

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 12/21/2023    **Wetlands:** 720'+    **Zone II:** 800'+    **Soil Symbol:** 310B    **Soil Name:** loam    **Soil Class:** C/D

**Test Pit:** TP-7    **Elevation:** 284

| Depth  | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other          |
|--------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|----------------|
|        |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                |
| 0-114" | Fill         | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | See add. notes |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                |

**Parent Material:** Coarse-loamy lodgement till    **Depth to Bedrock:** -    **Standing Water:** 112"    **ESHGW:** -

**Additional Notes:** Fill material made up of topsoil, stones, brick, branches, trash, and gravel.

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

Date: 1/3/2024      Wetlands: 730'+      Zone II: 850'+      Soil Symbol: 310B      Soil Name: loam      Soil Class: C/D

Test Pit: TP-8      Elevation: 280

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|---------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|         |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-6"    | Fill 1       | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 6-24"   | Fill 2       | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Dense material   |
| 24-44"  | Apb          | 10YR 2/1                                 | -                      | -     | -       | Loamy Sand   | 10                              | -                   | Massive           | Friable                        | See add. notes   |
| 44-52"  | Bw           | 10YR 4/6                                 | -                      | -     | -       | Gravely Sand | 30                              | 10                  | SG                | Loose                          | -                |
| 52-120" | Cd           | 10YR 4/4                                 | -                      | -     | -       | Gravely Sand | 30                              | 40                  | SG                | Loose                          | -                |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |

Parent Material: Coarse-loamy lodgement till      Depth to Bedrock: -      Standing Water: -      ESHGW: Not encountered

**Additional Notes:** No signs of redoximorphic features within test pit. Dense layer (Cd) contained large boulders/stones. Apb layer contained a mixture of "natural" A-layer soil with topsoil fill material (similar to Fill 1).

Test Pit Performed by: William Burnham, E.I.T.

Soil Evaluator Number: 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons

**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC

**Address:** 290 Merrimack Street, Lawrence, MA 01843

Woodbridge  
fine sandy

**Date:** 1/3/2024    **Wetlands:** 770'+    **Zone II:** 900'+    **Soil Symbol:** 310B    **Soil Name:** loam    **Soil Class:** C/D

**Test Pit:** TP-9    **Elevation:** 279.5

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |          |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|---------|--------------|------------------------------------------|------------------------|----------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|         |              |                                          | Depth                  | Color    | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-6"    | Fill 1       | -                                        | -                      | -        | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 6-54"   | Fill 2       | -                                        | -                      | -        | -       | -            | -                               | -                   | -                 | -                              | See add. notes   |
| 54-102" | Cd           | 10YR 4/4                                 | 58"                    | 10YR 8/3 | 50      | Gravely Sand | 50                              | 30                  | SG                | Loose                          | -                |
|         |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                  |

**Parent Material:** Coarse-loamy lodgement till

**Depth to Bedrock:** 102"

**Standing Water:** -

**ESHGW:** 58"

**Additional Notes:** Fill 2 contained large boulders and dense material. Dense, bedrock-like material reached at 102". Large gray depletions observed between 58-64", with the color of the depletions noted above.

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

Date: 1/3/2024      Wetlands: 800'+      Zone II: 950'+      Soil Symbol: 310B      Soil Name: loam      Soil Class: C/D

Test Pit: TP-10      Elevation: 277

| Depth  | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |          |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other          |
|--------|--------------|------------------------------------------|------------------------|----------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|----------------|
|        |              |                                          | Depth                  | Color    | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                |
| 0-8"   | Ap           | 10YR 2/2                                 | -                      | -        | -       | Loamy Sand   | 10                              | -                   | Massive           | Friable                        | -              |
| 8-30"  | Bw           | 10YR 5/4                                 | -                      | -        | -       | Loamy Sand   | 20                              | -                   | Massive           | Friable                        | -              |
| 30-84" | C            | 10YR 6/3                                 | 42"                    | 10YR 5/6 | 5       | Sand         | 30                              | 20                  | SG                | Loose                          | See add. notes |
|        |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                |
|        |              |                                          |                        |          |         |              |                                 |                     |                   |                                |                |

Parent Material: Coarse-loamy lodgement till      Depth to Bedrock: -      Standing Water: -      ESHGW: 42"

**Additional Notes:** C horizon contained gravel, fine sand, and cobbles/stones. Sand collapsing around bottom of test pit. Thin redoximorphic feature line observed within C horizon.

Test Pit Performed by: William Burnham, E.I.T.

Soil Evaluator Number: 14752

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

Date: 1/3/2024      Wetlands: 850'+      Zone II: 1000'+      Soil Symbol: 310B      Soil Name: loam      Soil Class: C/D

Woodbridge  
 fine sandy

**Test Pit:** TP-11      **Elevation:** 277

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |         |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|---------|--------------|------------------------------------------|------------------------|---------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|         |              |                                          | Depth                  | Color   | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-6"    | Fill 1       | -                                        | -                      | -       | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 6-36"   | Fill 2       | -                                        | -                      | -       | -       | -            | -                               | -                   | -                 | -                              | See add. notes   |
| 36-102" | Cd           | 10YR 6/3                                 | 42"                    | 5YR 4/6 | 10      | Gravely Sand | 40                              | 30                  | SG                | Loose                          | See add. notes   |
|         |              |                                          |                        |         |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |         |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |         |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |         |         |              |                                 |                     |                   |                                |                  |

Parent Material: Coarse-loamy lodgement till      Depth to Bedrock: 102"      Standing Water: -      ESHGW: 42"

**Additional Notes:** Fill 2 contained sandy fill with organics present. Cd horizon contained large stones, gravel, and sand. Dense material located across bottom of test pit, with sandy collapsing in at bottom of test pit. Small amounts of trash present within Fill 1 material.

Test Pit Performed by: William Burnham, E.I.T.

Soil Evaluator Number: 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 12/21/2023    **Wetlands:** 910'+    **Zone II:** 930'+    **Soil Symbol:** 622C    **Soil Name:** complex    **Soil Class:** C

Paxton-  
Urban land

**Test Pit:** TP-12    **Elevation:** 289.5

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|---------|--------------|------------------------------------------|------------------------|-------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|         |              |                                          | Depth                  | Color | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-24"   | Fill         | -                                        | -                      | -     | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 24"-90" | Cd           | 10YR 5/4                                 | -                      | -     | -       | Sandy Loam   | 50                              | 20                  | Massive           | friable                        | -                |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |       |         |              |                                 |                     |                   |                                |                  |

**Parent Material:** lodgement till    **Depth to Bedrock:** -    **Standing Water:** 88"    **ESHGW:** 46"

**Additional Notes:** TP-12 approximately 20' off parking lot corner, and 15' from fence line. Water observed seeping from sidewall at 46"

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 1/3/2024    **Wetlands:** 950'+    **Zone II:** 1000'+    **Soil Symbol:** 656    **Soil Name:** Complex    **Soil Class:** -

**Test Pit:** TP-13    **Elevation:** 289

| Depth  | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |       |         | Soil Texture          | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|--------|--------------|------------------------------------------|------------------------|-------|---------|-----------------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|        |              |                                          | Depth                  | Color | Percent |                       | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-10"  | Fill         | -                                        | -                      | -     | -       | -                     | -                               | -                   | -                 | -                              | Topsoil Material |
| 10-90" | Cd           | 2.5Y 4/2                                 | -                      | -     | -       | Gravely Sandy<br>Loam | 50                              | 10                  | Massive           | Firm                           | See add. notes   |
|        |              |                                          |                        |       |         |                       |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |                       |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |                       |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |                       |                                 |                     |                   |                                |                  |
|        |              |                                          |                        |       |         |                       |                                 |                     |                   |                                |                  |

Loamy  
alluvium &  
glaciofluvial

**Parent Material:** deposits    **Depth to Bedrock:** -    **Standing Water:** -    **ESHGW:** Not encountered

**Additional Notes:** Side slopes of test pit started to collapse at bottom of excavation. Cd horizon contained dense, gravel filled soil.

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 1/3/2024    **Wetlands:** 350'+    **Zone II:** 1000'+    **Soil Symbol:** 656    **Soil Name:** Complex    **Soil Class:** -

**Test Pit:** TP-14    **Elevation:** 287.5

| Depth   | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |         |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other            |
|---------|--------------|------------------------------------------|------------------------|---------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|------------------|
|         |              |                                          | Depth                  | Color   | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |                  |
| 0-14"   | Fill 1       | -                                        | -                      | -       | -       | -            | -                               | -                   | -                 | -                              | Topsoil material |
| 14-36"  | Fill 2       | -                                        | -                      | -       | -       | -            | -                               | -                   | -                 | -                              | See add. notes   |
| 36-40"  | Apb          | 10YR 2/2                                 | -                      | -       | -       | Loamy Sand   | 5                               | -                   | Massive           | Friable                        | -                |
| 40-108" | C            | 10YR 4/4                                 | 44"                    | 5YR 5/8 | 10      | Sand         | 20                              | 5                   | SG                | Loose                          | -                |
|         |              |                                          |                        |         |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |         |         |              |                                 |                     |                   |                                |                  |
|         |              |                                          |                        |         |         |              |                                 |                     |                   |                                |                  |

Loamy  
alluvium &  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

**Standing Water:** -

**ESHGW:** 44"

**Additional Notes:** Fill 2 contains organic material, trash, old pipes, and stones. Redoximorphic features observed just below the Apb horizon.

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



282 Merrimack Street, 2nd Floor  
Lawrence, MA 01843  
978.794.1792  
TheEngineeringCorp.com  
Create | Design | Innovate

**Project:** King Street Commons  
**Location:** 550 King Street, Littleton, MA 01460

**Client:** 550 King Street, LLC  
**Address:** 290 Merrimack Street, Lawrence, MA 01843

**Date:** 1/3/2024    **Wetlands:** 300'+    **Zone II:** 1000'+    **Soil Symbol:** 656    **Soil Name:** Complex    **Soil Class:** -

Udorthents-  
Urban land

**Test Pit:** TP-15    **Elevation:** 282

| Depth  | Soil Horizon | Soil Matrix:<br>Color-Moist<br>(Munsell) | Redoximorphic Features |         |         | Soil Texture | Coarse Fragments % by<br>Volume |                     | Soil<br>Structure | Soil<br>Consistence<br>(Moist) | Other |
|--------|--------------|------------------------------------------|------------------------|---------|---------|--------------|---------------------------------|---------------------|-------------------|--------------------------------|-------|
|        |              |                                          | Depth                  | Color   | Percent |              | Gravel                          | Cobbles &<br>Stones |                   |                                |       |
| 0-12"  | Ap           | 10YR 2/1                                 | -                      | -       | -       | Loamy Sand   | 5                               | -                   | Massive           | Friable                        | -     |
| 12-30" | Bw           | 7.5YR 4/6                                | -                      | -       | -       | Loamy Sand   | 10                              | -                   | Massive           | Friable                        | -     |
| 30-84" | C            | 10YR 4/4                                 | 48"                    | 5YR 4/6 | 5       | Gravely Sand | 40                              | 10                  | Massive           | Friable                        | -     |
|        |              |                                          |                        |         |         |              |                                 |                     |                   |                                |       |
|        |              |                                          |                        |         |         |              |                                 |                     |                   |                                |       |
|        |              |                                          |                        |         |         |              |                                 |                     |                   |                                |       |
|        |              |                                          |                        |         |         |              |                                 |                     |                   |                                |       |

Loamy  
alluvium &  
glaciofluvial

**Parent Material:** deposits

**Depth to Bedrock:** -

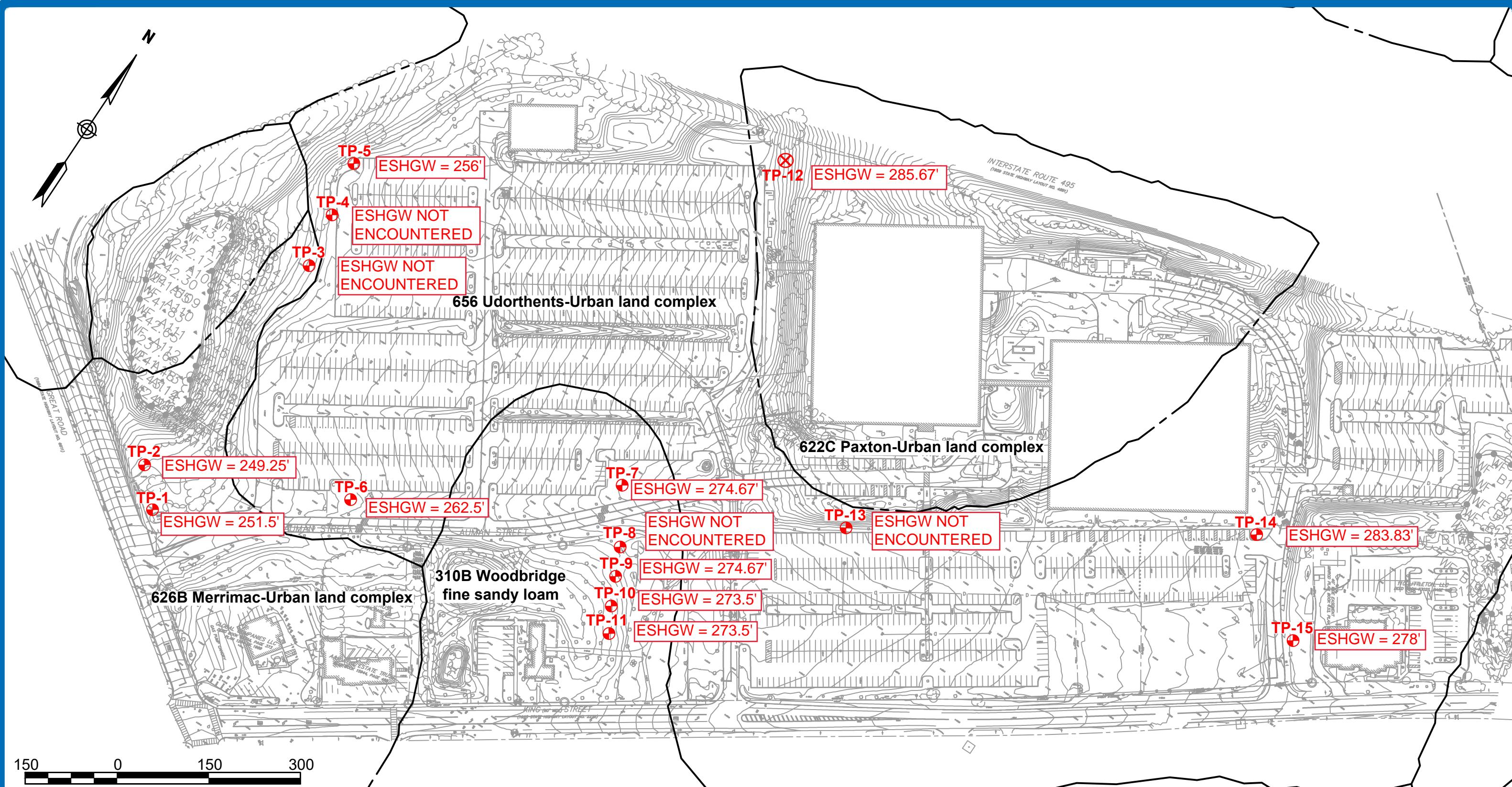
**Standing Water:** 82"

**ESHGW:** 48"

**Additional Notes:** Water was observed seeping at approximately 54".

**Test Pit Performed by:** William Burnham, E.I.T.

**Soil Evaluator Number:** 14752



NOTES:

1. TEST PITS SHALL BE CONDUCTED IN ACCORDANCE WITH THE MASSACHUSETTS STORMWATER HANDBOOK VOLUME 3 CHAPTER 1.

Test Pit Plan

King Street Commons  
550 King Street  
Littleton, Massachusetts  
December 15, 2023