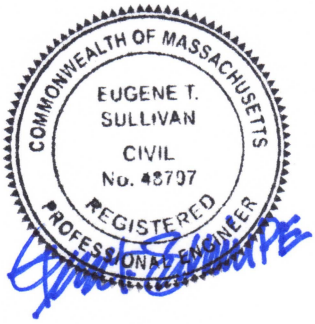
STORM DRAINAGE MANAGEMENT REPORT

4 MacArthur Avenue

Devens, Massachusetts



December 3, 2020

Prepared by:

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1.0 INTRODUCTION:

This Stormwater Report represents the hydraulic analysis for the proposed 55,500 square foot Industrial Building and associated site improvements for 4 MacArthur Avenue, Devens, Massachusetts. The existing building will be demolished, the existing parking lot will be pulverized, regraded and paved to suit the new grades. New Stormwater systems components will be constructed to provide the ability to capture sediments, trap oil and grease, and use groundwater recharge principles through recharge thru porous pavement and infiltration basins for the site. All new pavement run-off after the site improvements will be routed thru a deep sump catch basins and a Contechs water quality unit prior to discharge into the subsurface infiltration system. The purpose of this analysis is to demonstrate that the proposed project will not cause any adverse impact on the downstream site in accordance with the Department of Environmental Protection Regulations under the two, ten, twenty-five and one-hundred-year storm events.

2.0 EXISTING WATERSHED ANALYSIS

Currently, the runoff generated by the existing site [roof and pavement] sheet flow untreated into a storm drain system along the Northern property line.

The storm run-off management systems were analyzed using a 2-year, 10-year, 25-year, 50-year and 100-year frequency storm event. The rainfall distribution used in this study is based on synthetic 24-hour storm events. The synthetic distribution was developed by the United States Department of Agriculture [USDA] Soil Conservation Service [SCS] for different geographical regions in the United States using National Weather Service [NWS] duration-frequency data or compiled local storm data. A NRCC distribution was used to simulate New England Rainfall.

Based upon the US Department of Commerce a 2-year frequency, 24-hour duration storm results in a precipitation of 3.13 inches, a 10-year frequency storm results in a precipitation of 4.68 inches, a 25-year frequency storm results in a precipitation of 5.88 inches, and a 100-year frequency storm results into a precipitation of 8.34 inches for the property location. The storm runoff produced was estimated using the Modified Soil Cover Complex Model.

The Analysis was performed using the Hydro CAD Version 10.00-25 software. Using the USDA SCS method of estimated runoff, the program uses the measured hydraulic characteristics of drainage structures to predict hydrologic conditions in the various drainage areas of the site. The model computes runoff for the given rainfall events, produces runoffs hydrographs and routes the flow through the designated detention facilities to calculate one outflow hydrograph per drainage basin. The results generated by this analysis are used to evaluate the suitability of the proposed storm run-off management system.

The drainage areas boundaries are based upon a site survey and the proposed site plans for the project. Hydrologic soil groups and curve numbers [CN] were estimated using available soil information obtained from the NCRS Soil Maps and onsite Soil test pits. The soils are classified as sands [NCRS Hydrologic Soil Group “A”]. The infiltration rate of 8.27 inches per hour was taken from Volume 3, Documenting Compliance with the Massachusetts Stormwater Management Standards, Table 2.3.3 Rawls Rates.

RUNOFF SUMMARY TOTALS: PRE-DEVELOPMENT

DESIGN POINT #1

STORM EVENT	PEAK RUNOFF RATE [CFS]	RUN-OFF VOLUMES [ACRE-FEET]
2 YEAR EVENT	0.04 cfs	1,263 cubic feet
10 YEAR EVENT	0.67 cfs	6,926 cubic feet
25 YEAR EVENT	1.98 cfs	13,547 cubic feet
100 YEAR EVENT	5.65 cfs	31,406 cubic feet

3.0 POST DEVELOPMENT WATERSHED ANALYSIS AND METHODLOGY

The Roof runoff for the new building will be collected and directed to an Infiltration Basin. The basin is designed to infiltrate all runoff in all storm events. The parking area runoff is routed thru deep sump catch basins and a water quality unit prior to discharge into a subsurface infiltration basin. The subsurface basin is comprised of stormtech recharge chambers encased in a stone trench. Additionally, the primary office parking area is a porous pavement section which will also promote groundwater recharge.

RUNOFF SUMMARY TOTALS: POST-DEVELOPMENT

DESIGN POINT #1

STORM EVENT	PEAK RUNOFF RATE [CFS]	RUN-OFF VOLUMES [ACRE-FEET]
2 YEAR EVENT	0.00 cfs	0 cubic feet
10 YEAR EVENT	0.01 cfs	348 cubic feet
25 YEAR EVENT	0.06 cfs	1,045 cubic feet
100 YEAR EVENT	0.78 cfs	3,485 cubic feet

4.0 SUMMARY:

The new drainage system will provide the ability to capture sediments, trap oil and grease, and use groundwater recharge principles through the porous pavement and Infiltration Basins. All runoff generated by this property will be recharged which is a significant upgrade over the existing condition.

OPERATION & MAINTENANCE

MANUAL

FOR THE STORM

DRAINAGE FACILITIES

LOCATED AT:

4 MacArthur Avenue

Devens, Massachusetts

December 3, 2020

Prepared By:

Eugene T. Sullivan, Inc.
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230 Lowell Street – Suite 2A
Wilmington, Massachusetts
978.657.6469

Contact Information/ Responsible Parties

Operator(s) / Emergency Contact:

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Boston, MA 02110
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Email: wdeshler@gfipartners.com

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1.0 INTRODUCTION

The Site Stormwater management system for the new parking area have been designed to capture solids. Proper maintenance is essential to the continued effectiveness of the storm drainage facilities.

The drainage facility components include deep sump catch basin, water quality structure, and a Subsurface Infiltration Basin. The drainage facility is designed to limit peak runoff to below the predevelopment conditions, reduce solids load to the outfall and recharge groundwater.

An estimated annual budget of $ 15,000 should be allocated by the site operator for the maintenance and proper operation of the stormwater system.

The following outline contains the procedures and frequency of tasks necessary to manage the system and avoid costly premature component failure. Refer to the labeled project site plan to assist in locating all drainage structures.

2.0 INITIAL NEW SYSTEM INSPECTION

The new system must be initially inspected within the first two months.

2.1 Deep Sump Catch Basin

The drainage system includes new catch basin. All catch basins shall be inspected initially after a major rainfall event for the first couple of months. Initial inspection is intended to observe proper stabilization of the catch basin foundation. There after the catch basins shall be inspected regularly as outlined in Section 3.1.

2.2 CONTECH Water Quality Structure

The drainage system includes a Contechs Water Quality CDS Unit. The unit should be inspected after any major rainfall events for the first couple of months. Initial Inspection is intended to observe proper stabilization of the tank's foundation. There after the tanks should be inspected regularly as outlined in Section 3.2.

2.3 Porous Pavement

Visual inspections are an integral part of system maintenance, this includes monitoring pavement to ensure water drainage, debris accumulation and surface deterioration.

- Check for standing water on the surface of the pavement after a precipitation event. If standing water remains on the pavement 30 minutes after the rainfall has ended, cleaning of the porous pavement is recommended.
- Controlling run-on and debris tracking is key to extending the life of the porous surface. Erosion and sedimentation control of adjacent areas is critical.
- Do not store materials such as sand/salt, and other stockpiles on the porous surfaces.
- Stockpiling snow on porous surfaces is not recommended and will lead to premature clogging.

2.4 StormTech Recharge Chambers

The drainage system includes new StormTech recharge chambers. The chambers operate at peak performance when installed in series with pretreatment. Without proper pretreatment, the effectiveness of the chambers will be severely compromised. The chamber rows will be equipped with 6" diameter access ports located on the piping. These access ports will allow access to the piping rows below to measure sediment.

2.5 Infiltration Basin

The Drainage system contains a new Infiltration Basin. The Basin should be inspected frequently during the first few months to ensure that the vegetation becomes adequately established. The basin should also be inspected after any major rainfall events during the first year. Initial Inspection is intended to observe proper stabilization of the soils, slopes and connected piping. Thereafter the infiltration basin should be inspected regularly as outlined in Section 3.3.

3.0 REGULAR INSPECTION AND MAINTENANCE OF STRUCTURES

3.1 Deep Sump Catch Basins

The actual removal of sediments, associated pollutants and trash occurs only when sumps are cleaned out; therefore, regular maintenance is required. Most studies have linked the failure of deep sumps to lack of regular maintenance. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged or carried over.

Inspection
Inspect for sediment accumulation every month.

Maintenance:

Deep sumps shall be cleaned at least four times a year and at the end of the foliage and snow removal seasons or whenever the depth of the sediments is greater than or equal to ½ the depth from the bottom of the Invert of the lowest pipe in the basin. *See sediment disposal section*.

3.2 CONTECH Water Quality CDS Unit

Inspection of the CDS Unit is essential to effective maintenance to ensure optimum performance.

Inspection:

Visual Inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen.
The Inspection should also quantify the accumulations of hydrocarbons, trash and sediment in the system.
Inspect for sediment accumulation.
Inspect for cracking on the walls.
Inspect for sediment accumulation around the outlet.
Inspect for oil and grease accumulation after every major storm event but at least every month.

Cleaning:
Access to the CDS Units is typically achieved through manhole access covers. This allows for the inspection and cleanout of the separation chamber [cylinder and screen] and isolated sump. Also inspect and cleanout the sediment captured and retained outside the screen.

The CDS system should be cleaned when the level of the sediment has reached 75% of the capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated.

Cleaning of the CDS system should be done during dry weather conditions when no flow is entering the system. Cleanout of the CDS system with a vacuum truck is the most effective method of removing pollutants from the separator. Cleaning of the CDS system is typically done by inserting a vacuum hose into the sump and evacuating the sump of water and pollutants. The area outside the screen should also be cleaned out. In installations were the risk of petroleum spills is small, liquid containments may not

accumulate as quickly as sediments. However, the system should be cleaned out immediately in the event of an oil or gasoline spill.

Maintenance:

The Separator unit shall be cleaned as necessary or as required by inspection. At minimum the separator tanks should be cleaned at least two times a year, (fall and spring). *See sediment disposal section*.

3.3 Porous Pavement

Regular inspection and maintenance are critical to the effective operation of porous pavement.

Maintenance:

Pavement vacuuming should occur in the spring and fall at a minimum.
A vacuum sweeper shall be used to remove sediment and organic debris on the pavement surface. The sweeper may be fitted with water jets.
Power washing can be an effective tool for cleaning clogged areas. This should occur at mid=pressure typically less than 500 psi and at angle of 30 degrees or less.
For loose debris accumulating on the pavement, a power/leaf blower or gutter broom can be used.

3.4 StormTech Recharge Chambers

The chamber rows will be equipped with a 6" pipe to the chamber rows below. The pipe will be capped with an at grade circular cast box placed in a rectangular concrete collar. From the surface thru the access ports sediment may be measured using a stadia rod. If the depth of the sediment is greater than 3", then the row shall be cleaned with high pressure water and back-flushed out thru an upstream manhole. The sediment and water are then removed from the manhole using a vacuum truck.

Maintenance:

Monthly in the first year:	Check inlets and outlets for clogging and remove any debris as required:
Spring and Fall:	Check inlets and outlets for clogging and remove any debris as required:

3.5 Infiltration Basin

The highest efficiency of sediment removal takes place in the deep sump catch basins, and the water quality units. The actual removal of sediments and trash occurs when the basin is cleaned out, therefore maintenance is required. The more frequent the cleaning, the less likely the sediments will become re-suspended and subsequently discharged and carried over into the adjacent wetlands. Inspection and cleaning of pre-treatment devices is critical to ensure proper functioning of the Infiltration Basin.

Inspection:

Inspections shall be performed initially and every six months thereafter.
Inspect for sediment accumulation.
Inspect for erosion within or around the basin area.
Inspect for sediment accumulation around the outlet.
Inspect for adequacy of the inlet/outlet erosion measures.
Inspect for erosion of the basin and the basin side slopes.

Maintenance:

The Basin shall be cleaned as necessary or as required by inspection. At a minimum, the Basin shall be cleaned at least two times a year, (fall and spring) and when there are discharges over the emergency spillway. The grass side slopes, and bottom of the basin should be mowed, and the grass clippings and the accumulated organic matter should be removed. When mowing the grasses, keep the grass height no greater than 6". Check for signs of riling and gullying and repair as needed. After removing sediments, replace any vegetation damaged by re-seeding *See sediment disposal section*.

The Inspection and Cleaning of all deep sump catch basins, water quality units and recharge chambers shall be performed in April and October of each year. A report detailing the inspections and cleaning of the structures is to be submitted to the Public Works Department after each cleaning and shall be prepared by an appropriate Professional.

4.0 PAVED AREA AND PARKING LOT SWEEPING

An effective measure to the removal of total suspended solids is through frequent sweeping. Based on data collected throughout the country, effective regular sweeping can reduce the total suspended solids by 50% to 80%. Infrequent sweepings have shown that the removal efficiencies are 20% of the total suspended solids. Vacuum type sweepers have demonstrated higher efficiencies.

Maintenance

Sweeping shall occur a minimum of 4 times per year [each quarter] and additionally as necessary to control yard sediments from entering the drainage systems.

5.0 SEDIMENT DISPOSAL

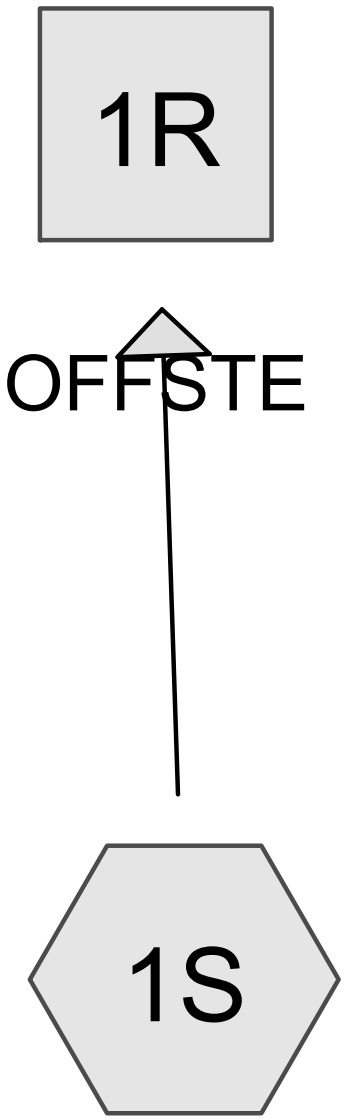
All sediments, grease and hydrocarbons are considered hazardous waste and therefore should be handled properly and disposed of in accordance with applicable local, state and federal laws and regulations.

6.0 SPILL KITS

A Spill Kit, absorbent pads and/or socks shall always be provided onsite to prevent any spills from entering the stormwater collection system.

THE MAINTENANCE OF THE STORM DRAINAGE SYSTEMS IS THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY.

PRE-DEVELOPMENT CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for 4 MacArthur-PRE
Prepared by ETS INC, Printed 12/6/2020
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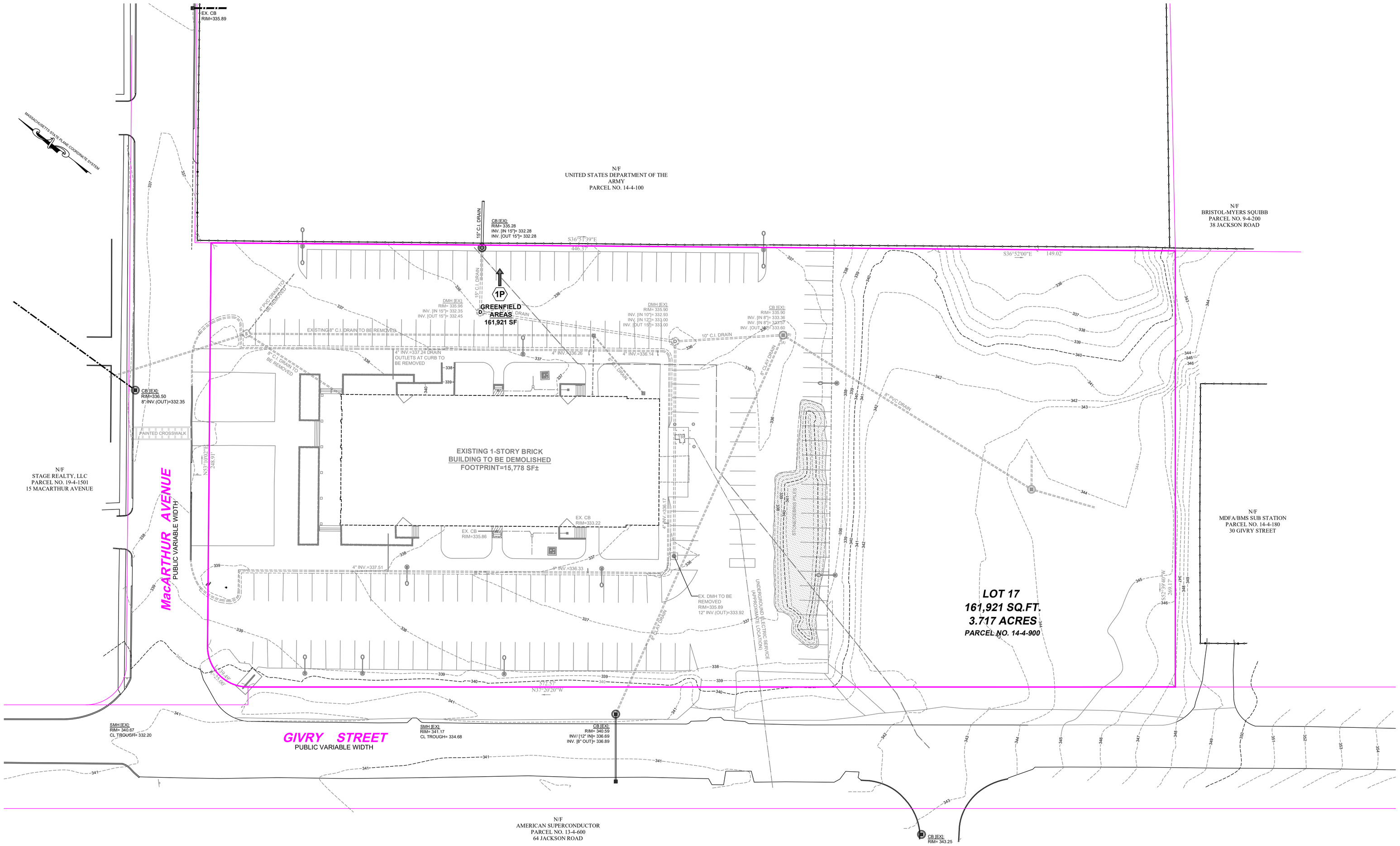

PRE-DEVELOPMENT WATERSHED

PD.1 SCALE: 1" = 30'-0"

GRAPHIC SCALE

30 15 0 15 30 60 120

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NO	DATE	REVISIONS

APPROVED BY THE
DEVENS ENTERPRISE
COMMISSION:

DATE:

PREPARED FOR:

MacArthur Avenue, LLC
133 Pearl Street
Boston, MA

PROJECT:

PROPOSED BUILDING
4 MacArthur Avenue
Devens, Massachusetts

DRAWING:

PRE-DEVELOPMENT WATERSHED

SCALE: SCALE:

DATE: SCALE:

DRAWING NUMBER

PD.1

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.717	49	50-75% Grass cover, Fair, HSG A (1S)

Summary for Subcatchment 1S: GREENFIELD

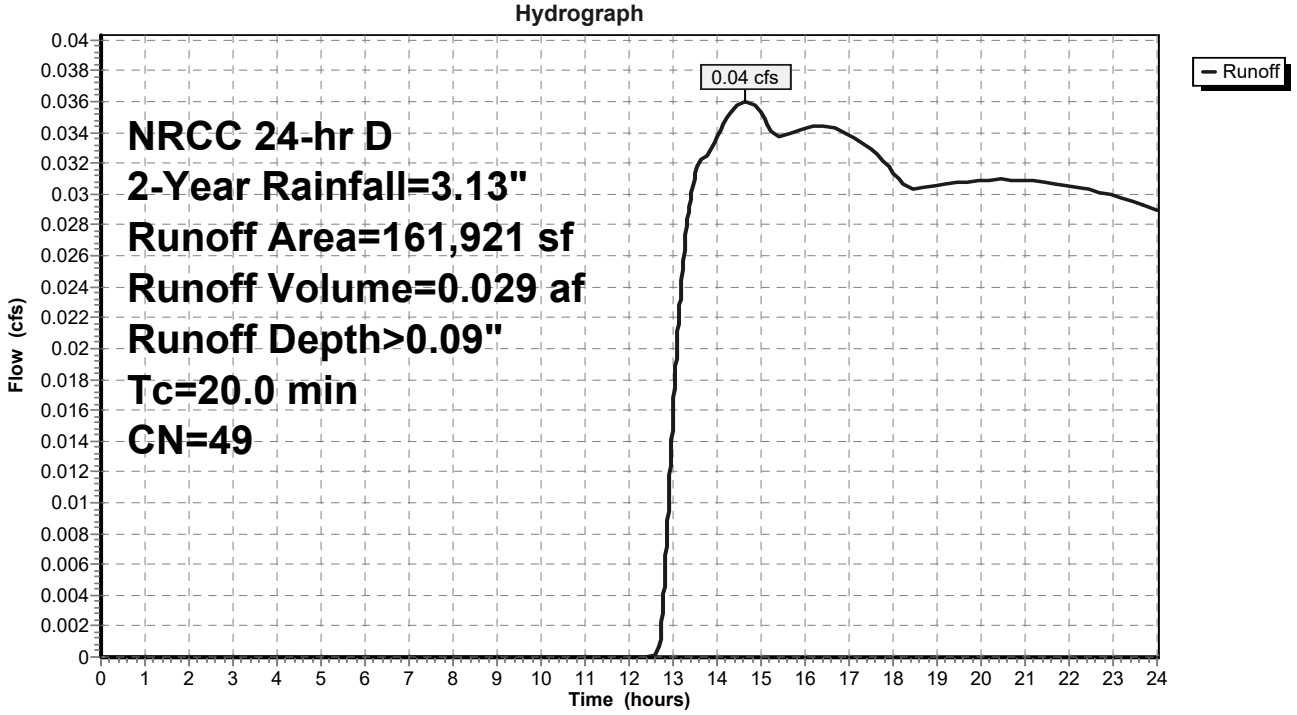
Runoff = 0.04 cfs @ 14.64 hrs, Volume= 0.029 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
161,921	49	50-75% Grass cover, Fair, HSG A
161,921		100.00% Pervious Area

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

Subcatchment 1S: GREENFIELD

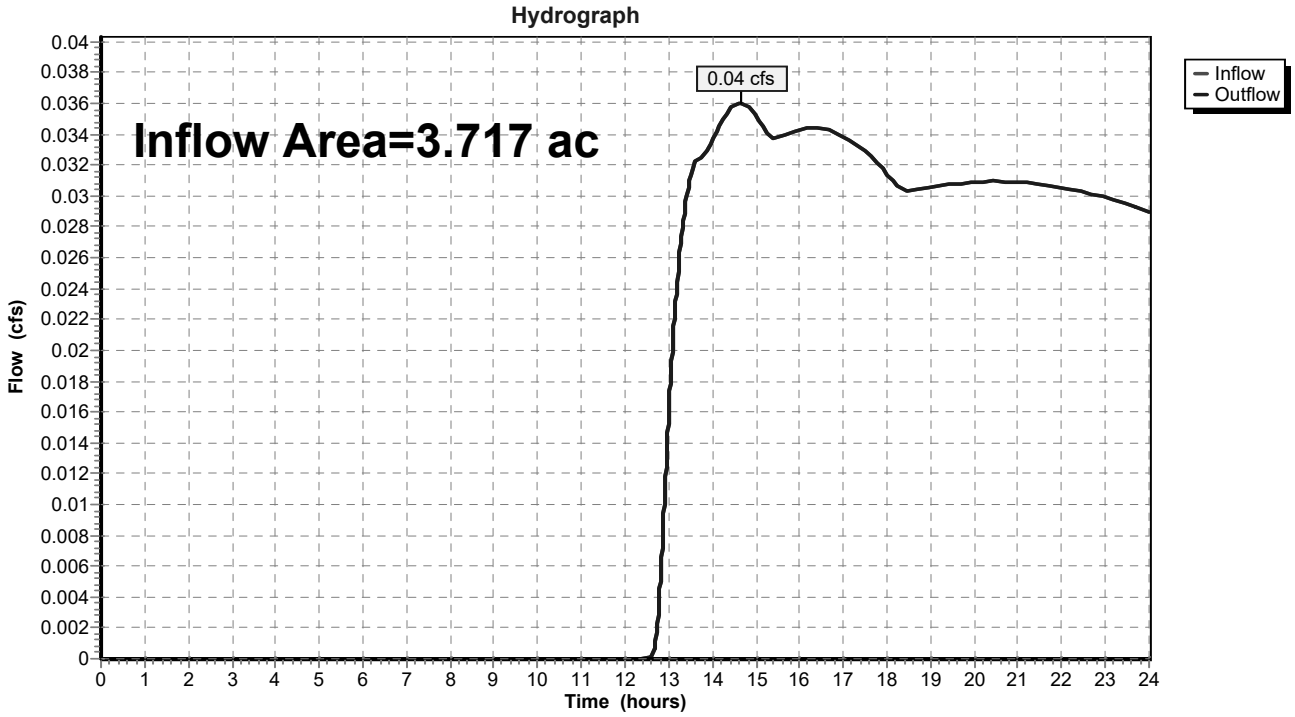


Summary for Reach 1R: OFFSTE

Inflow Area = 3.717 ac, 0.00% Impervious, Inflow Depth > 0.09" for 2-Year event
Inflow = 0.04 cfs @ 14.64 hrs, Volume= 0.029 af
Outflow = 0.04 cfs @ 14.64 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



Summary for Subcatchment 1S: GREENFIELD

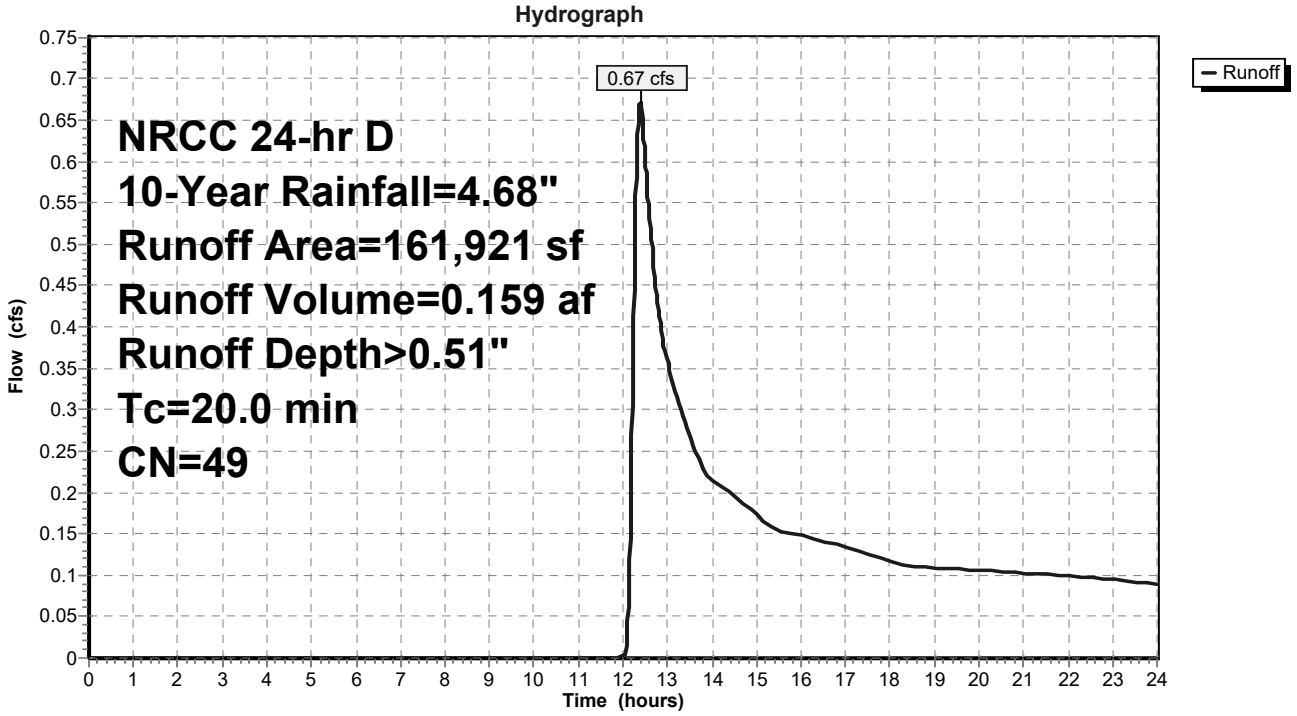
Runoff = 0.67 cfs @ 12.38 hrs, Volume= 0.159 af, Depth> 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
161,921	49	50-75% Grass cover, Fair, HSG A
161,921		100.00% Pervious Area

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

Subcatchment 1S: GREENFIELD

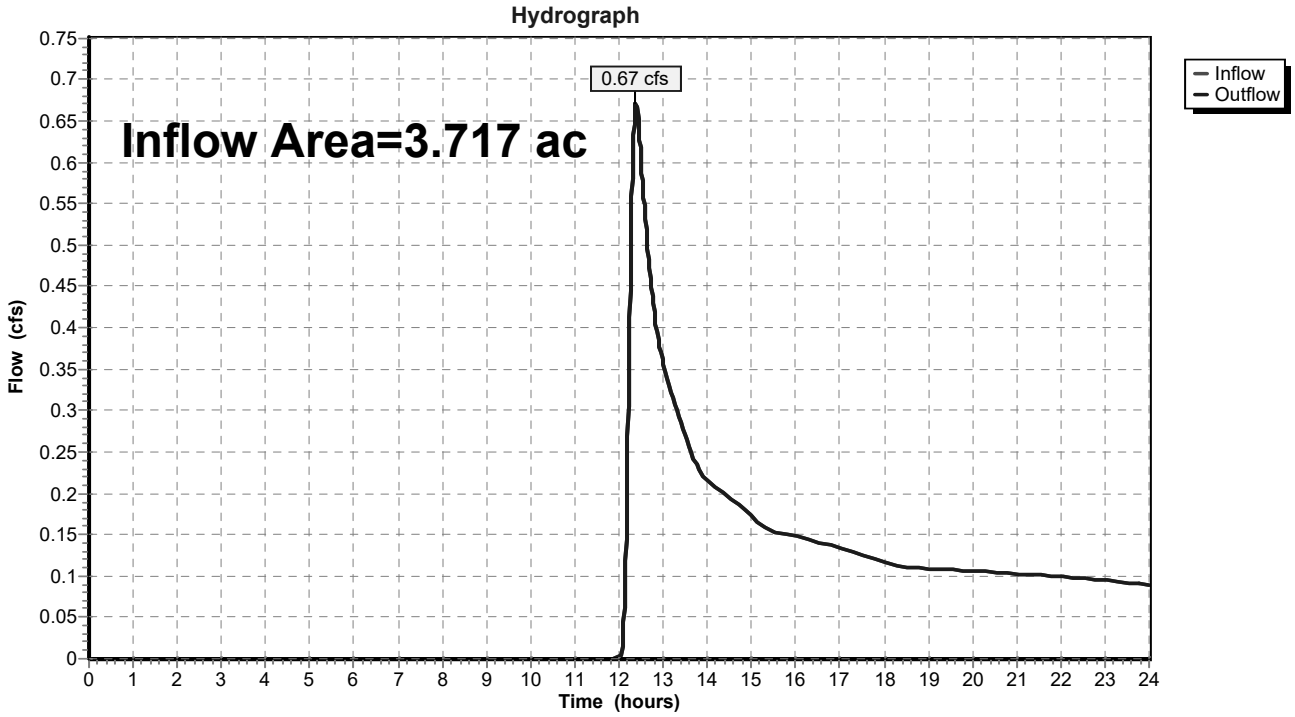


Summary for Reach 1R: OFFSTE

Inflow Area = 3.717 ac, 0.00% Impervious, Inflow Depth > 0.51" for 10-Year event
Inflow = 0.67 cfs @ 12.38 hrs, Volume= 0.159 af
Outflow = 0.67 cfs @ 12.38 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



Summary for Subcatchment 1S: GREENFIELD

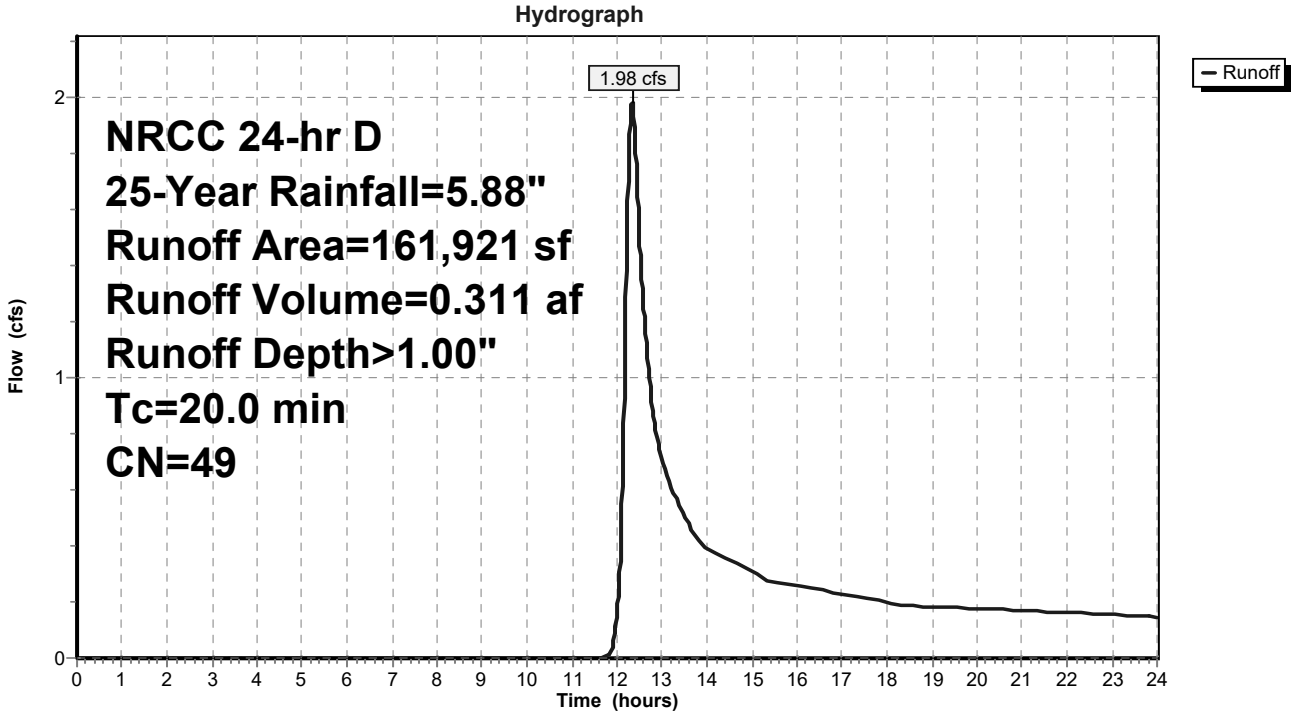
Runoff = 1.98 cfs @ 12.33 hrs, Volume= 0.311 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
161,921	49	50-75% Grass cover, Fair, HSG A
161,921		100.00% Pervious Area

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

Subcatchment 1S: GREENFIELD

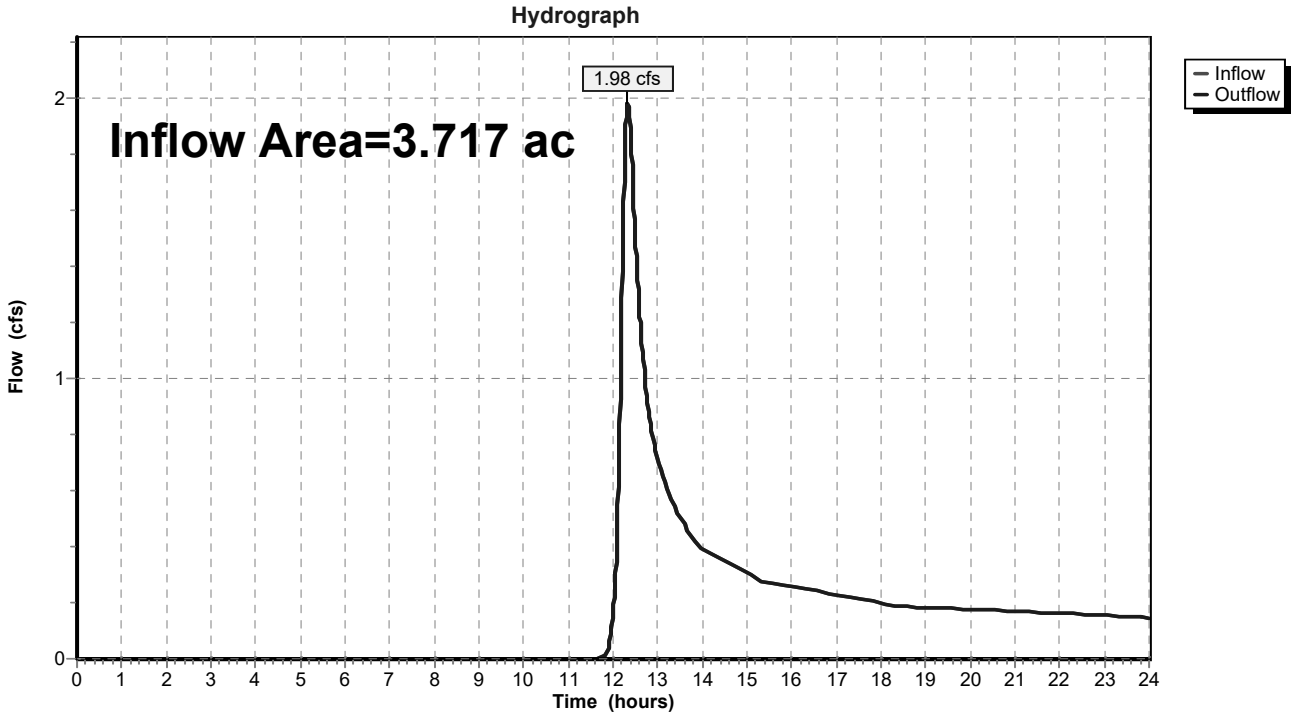


Summary for Reach 1R: OFFSTE

Inflow Area = 3.717 ac, 0.00% Impervious, Inflow Depth > 1.00" for 25-Year event
Inflow = 1.98 cfs @ 12.33 hrs, Volume= 0.311 af
Outflow = 1.98 cfs @ 12.33 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



Summary for Subcatchment 1S: GREENFIELD

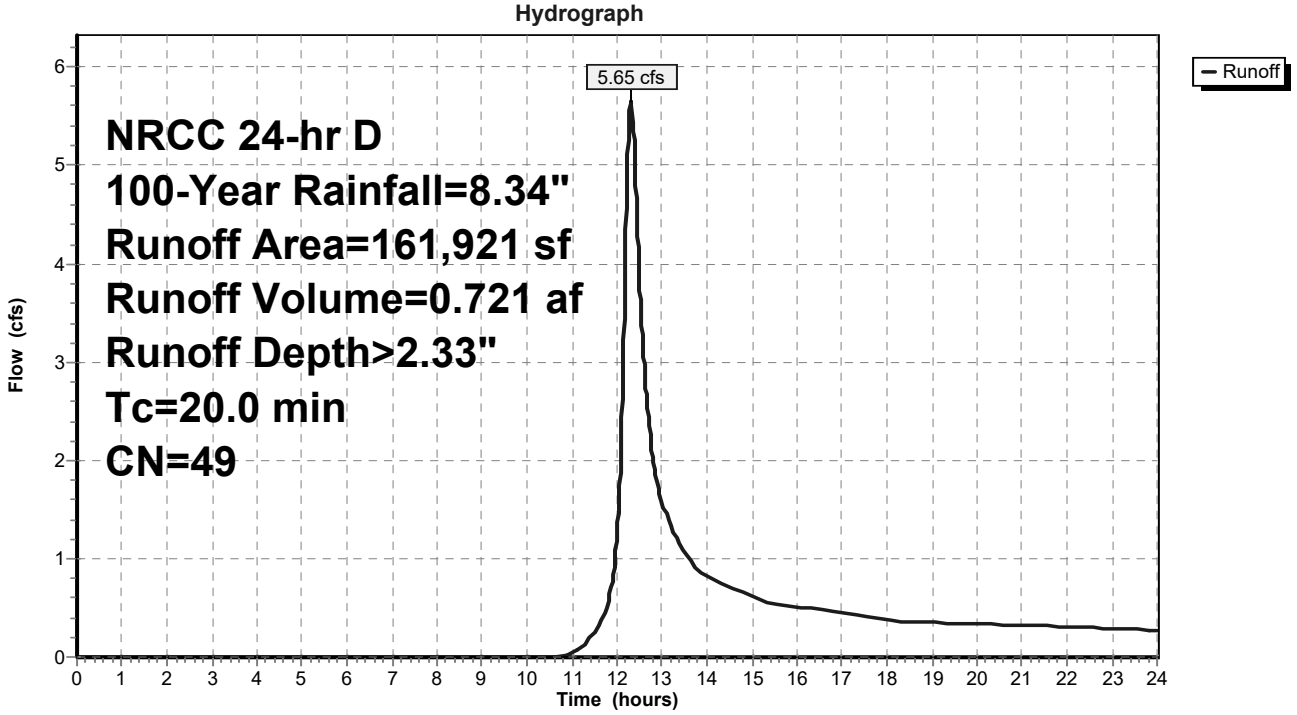
Runoff = 5.65 cfs @ 12.31 hrs, Volume= 0.721 af, Depth> 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
161,921	49	50-75% Grass cover, Fair, HSG A
161,921		100.00% Pervious Area

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

Subcatchment 1S: GREENFIELD

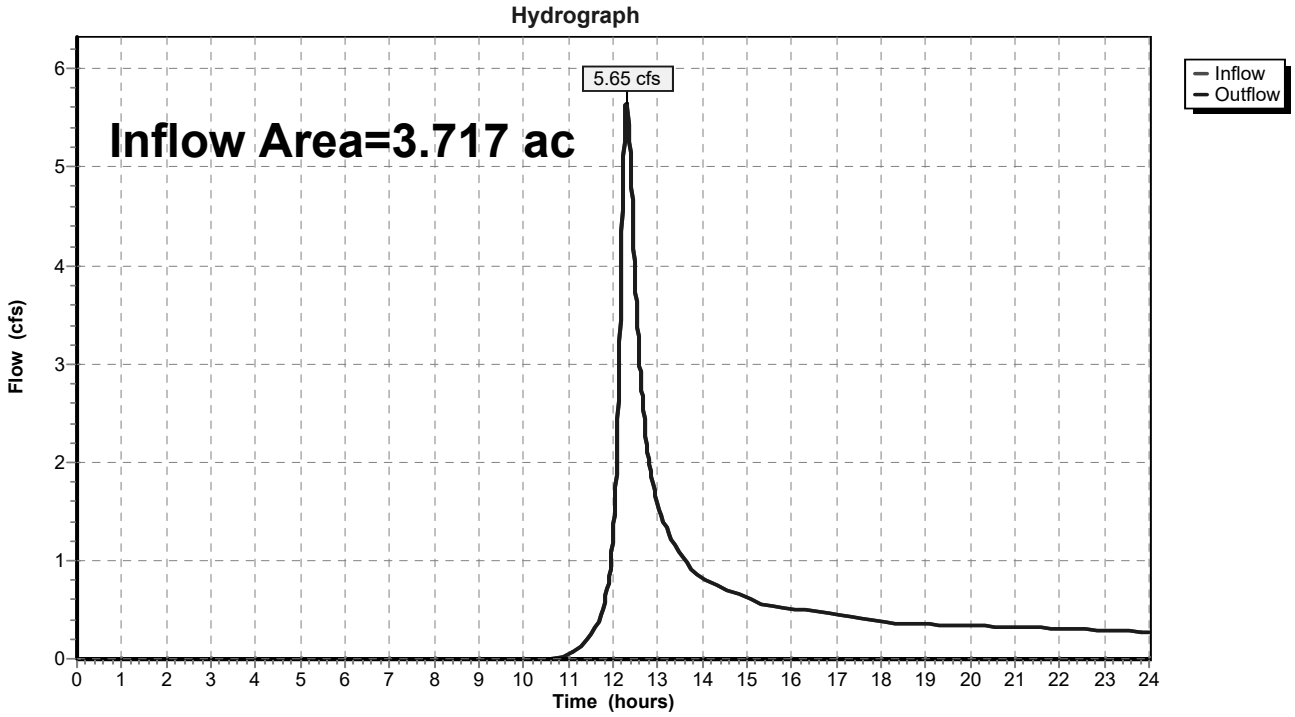


Summary for Reach 1R: OFFSTE

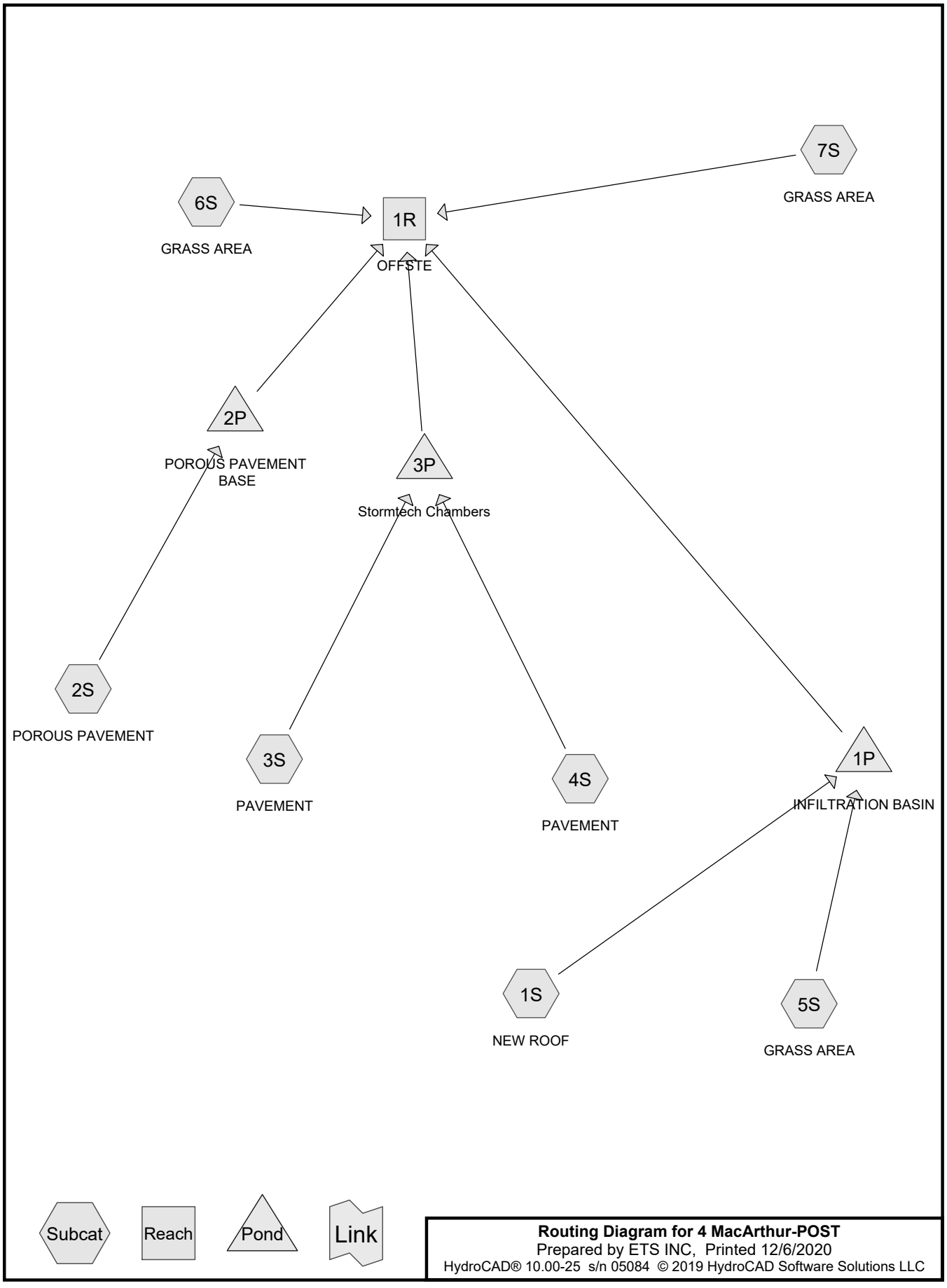
Inflow Area = 3.717 ac, 0.00% Impervious, Inflow Depth > 2.33" for 100-Year event
Inflow = 5.65 cfs @ 12.31 hrs, Volume= 0.721 af
Outflow = 5.65 cfs @ 12.31 hrs, Volume= 0.721 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



POST DEVELOPMENT CALCULATIONS



Routing Diagram for 4 MacArthur-POST
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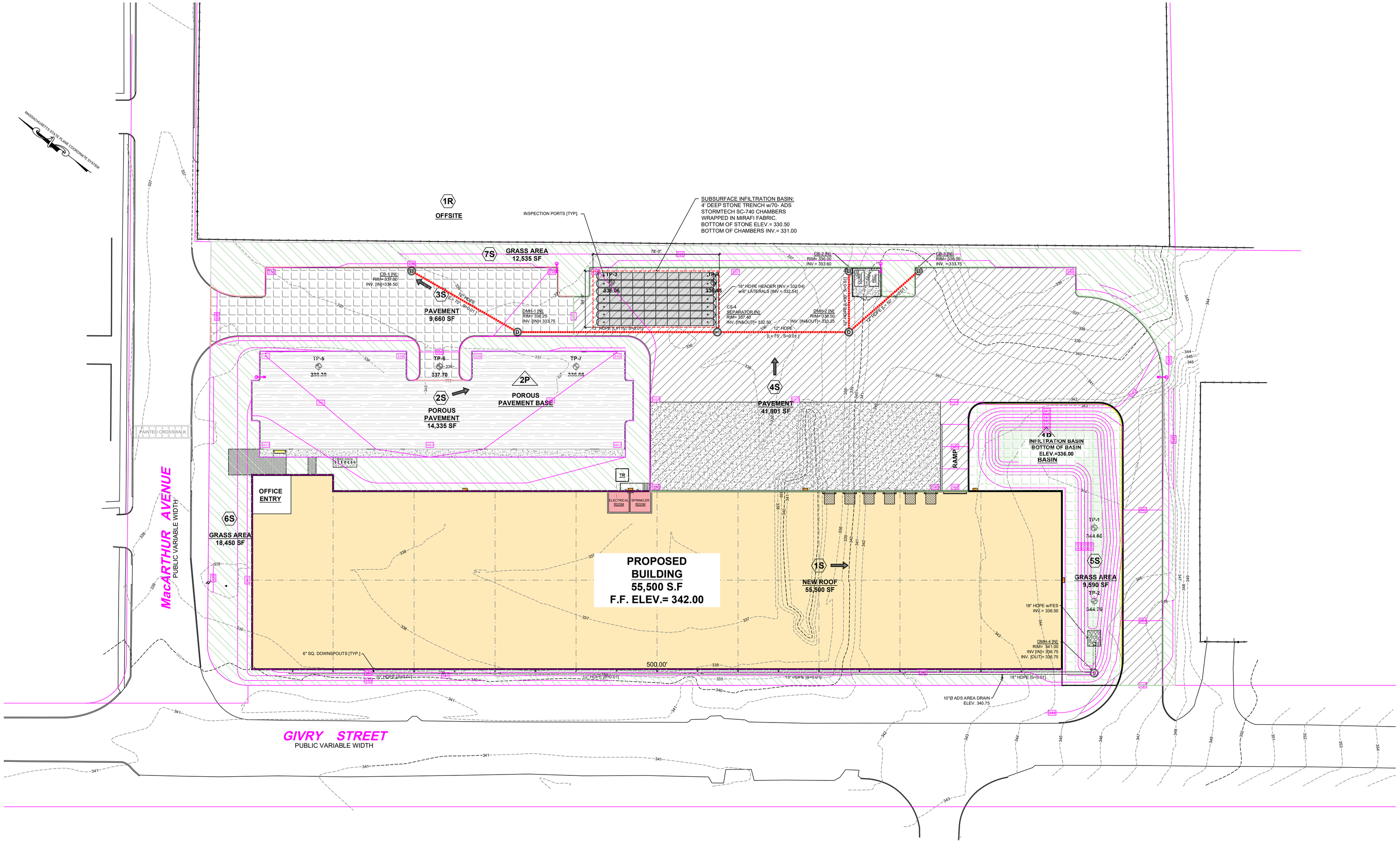

POST-DEVELOPMENT WATERSHED

PD.2 SCALE: 1" = 30'-0"

GRAPHIC SCALE

30 15 0 15 30 60 120

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NO	DATE	REVISIONS

APPROVED BY THE DEVENS ENTERPRISE COMMISSION:

DATE:

PREPARED FOR:

MacArthur Avenue, LLC
133 Pearl Street
Boston, MA

PROJECT:

PROPOSED BUILDING
4 MacArthur Avenue
Devens, Massachusetts

DRAWING:

POST-DEVELOPMENT WATERSHED

SCALE: SCALE:
DATE: SCALE:
DRAWING NUMBER

PD.2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.931	39	>75% Grass cover, Good, HSG A (5S, 6S, 7S)
1.510	98	Paved parking, HSG A (2S, 3S, 4S)
1.274	98	Roofs, HSG A (1S)

Summary for Subcatchment 1S: NEW ROOF

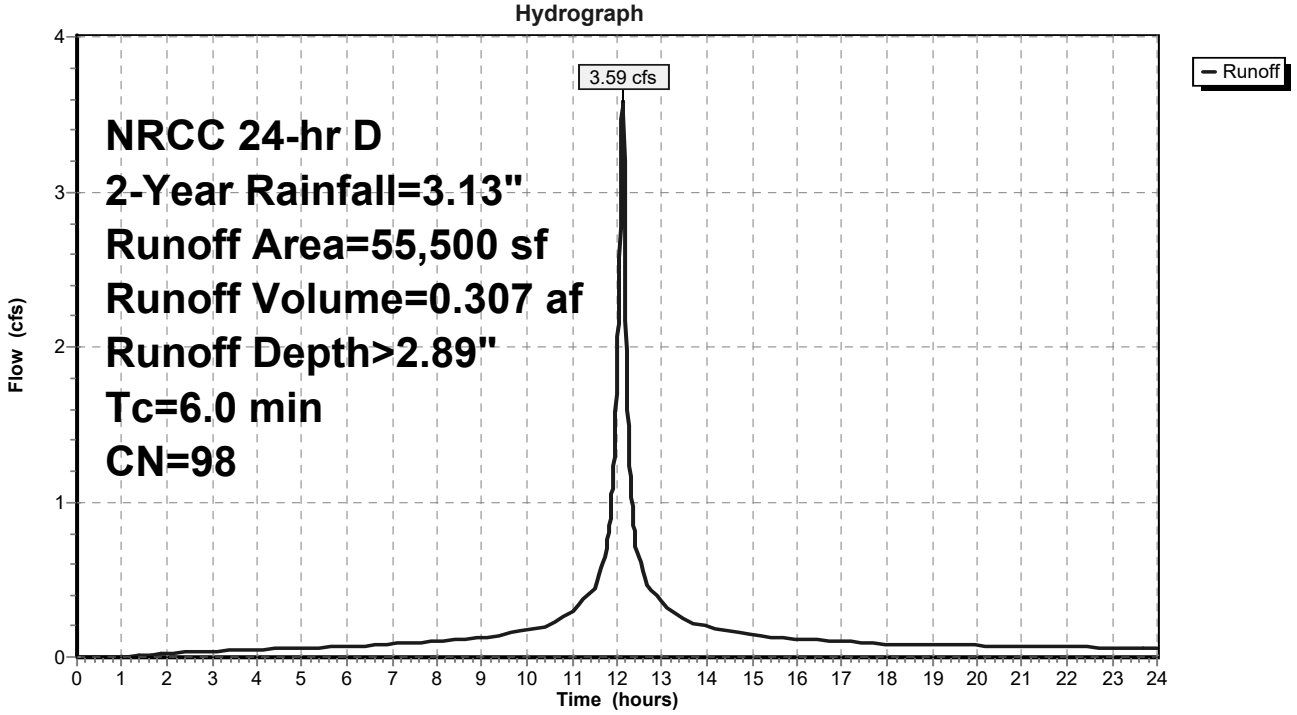
Runoff = 3.59 cfs @ 12.13 hrs, Volume= 0.307 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
55,500	98	Roofs, HSG A
55,500		100.00% Impervious Area

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

Subcatchment 1S: NEW ROOF



Summary for Subcatchment 2S: POROUS PAVEMENT

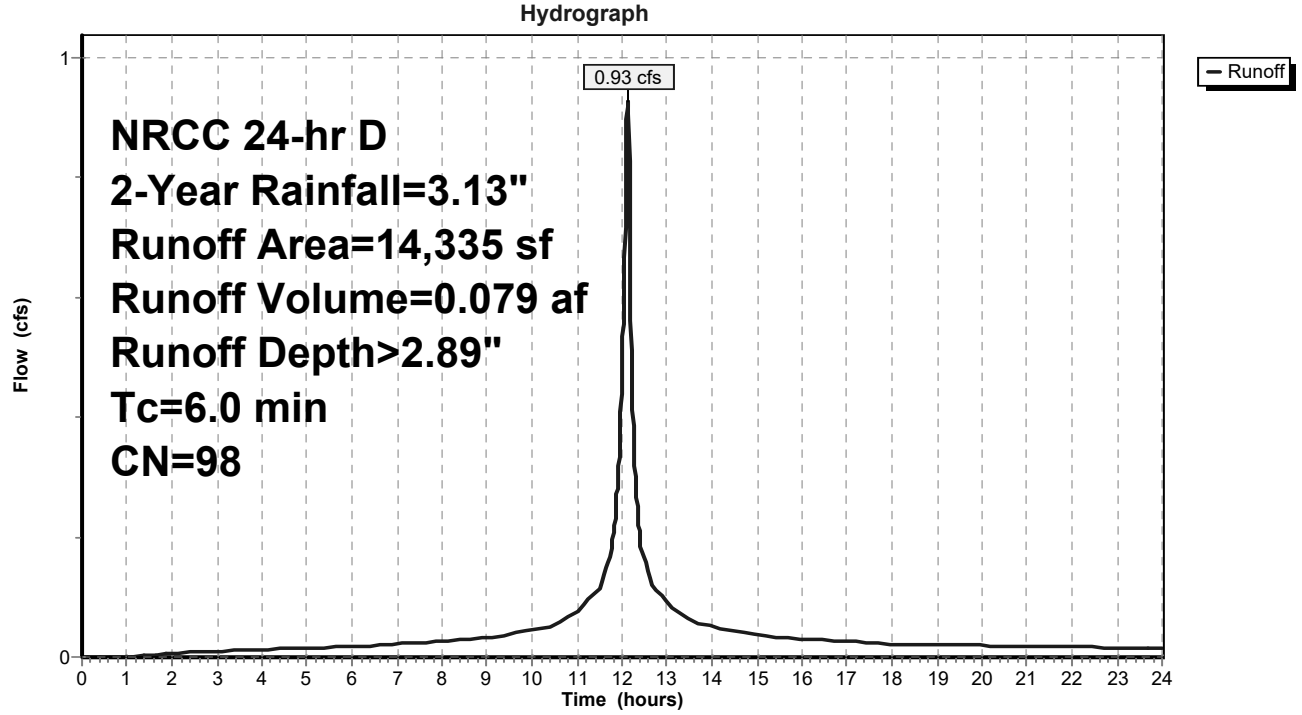
Runoff = 0.93 cfs @ 12.13 hrs, Volume= 0.079 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
14,335	98	Paved parking, HSG A
14,335		100.00% Impervious Area

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

Subcatchment 2S: POROUS PAVEMENT



Summary for Subcatchment 3S: PAVEMENT

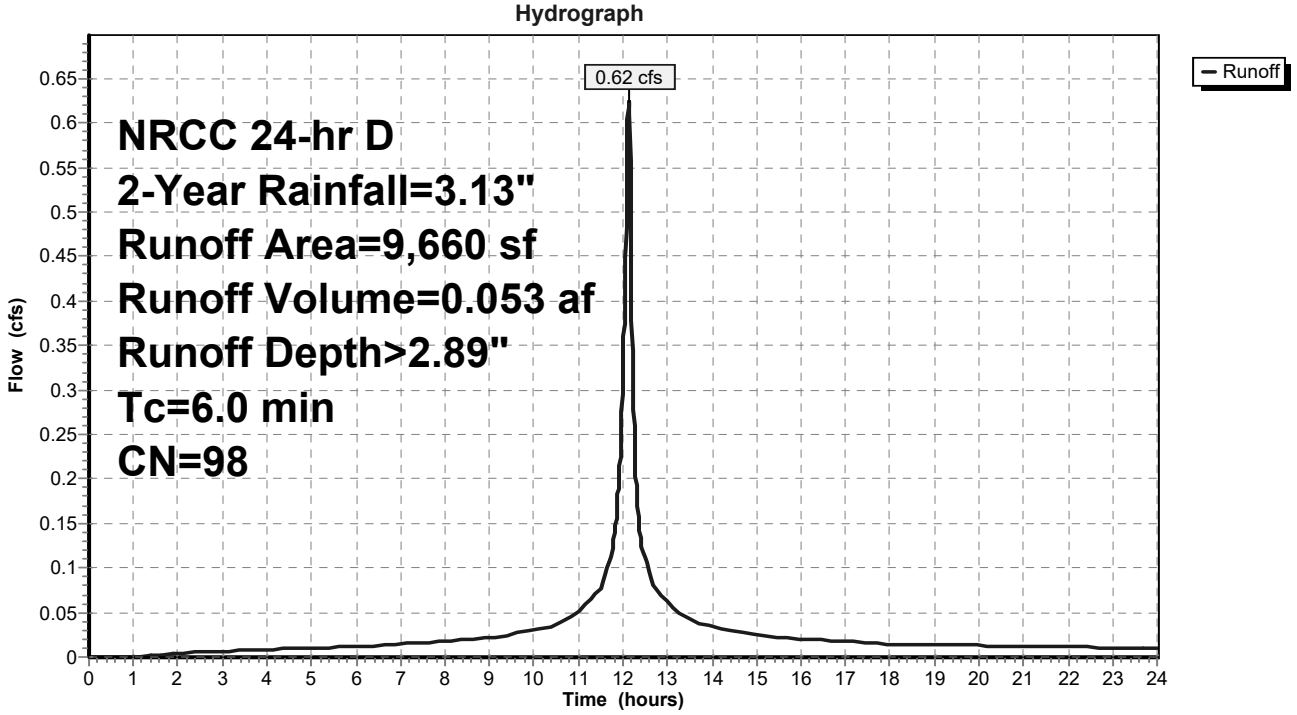
Runoff = 0.62 cfs @ 12.13 hrs, Volume= 0.053 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
9,660	98	Paved parking, HSG A
9,660		100.00% Impervious Area

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

Subcatchment 3S: PAVEMENT



Summary for Subcatchment 4S: PAVEMENT

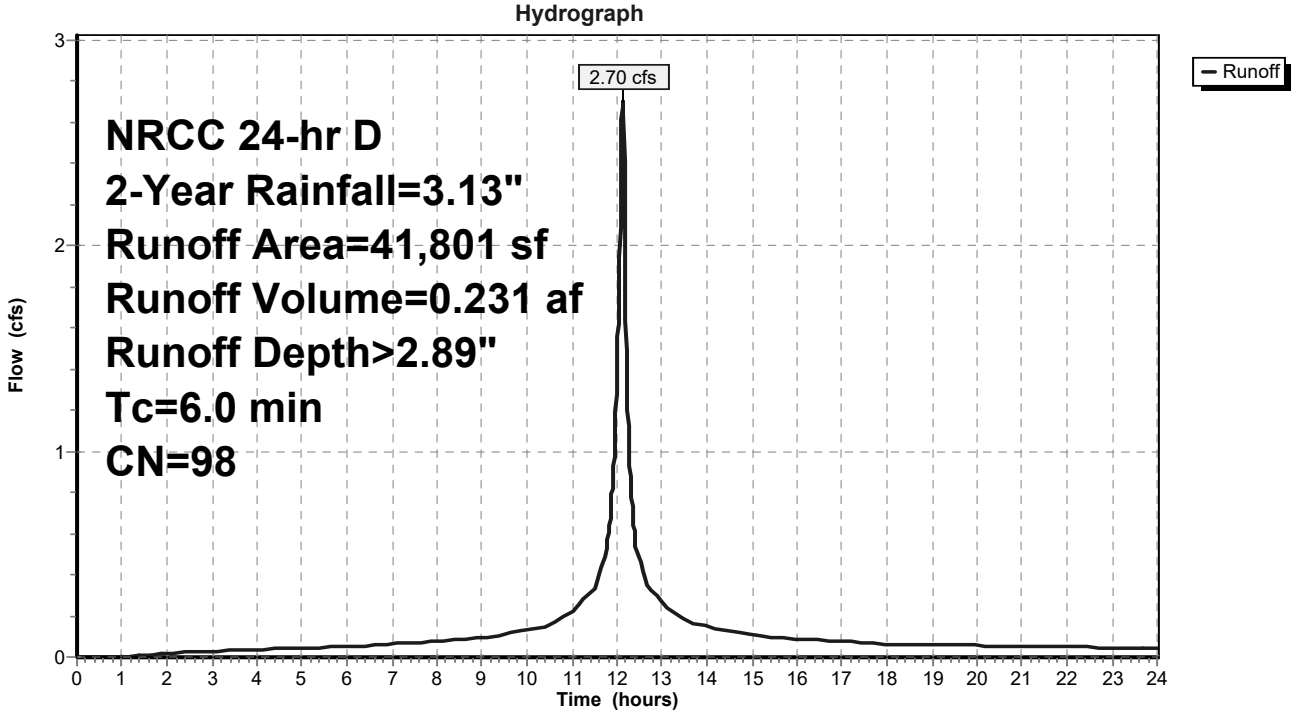
Runoff = 2.70 cfs @ 12.13 hrs, Volume= 0.231 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
41,801	98	Paved parking, HSG A
41,801		100.00% Impervious Area

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

Subcatchment 4S: PAVEMENT



Summary for Subcatchment 5S: GRASS AREA

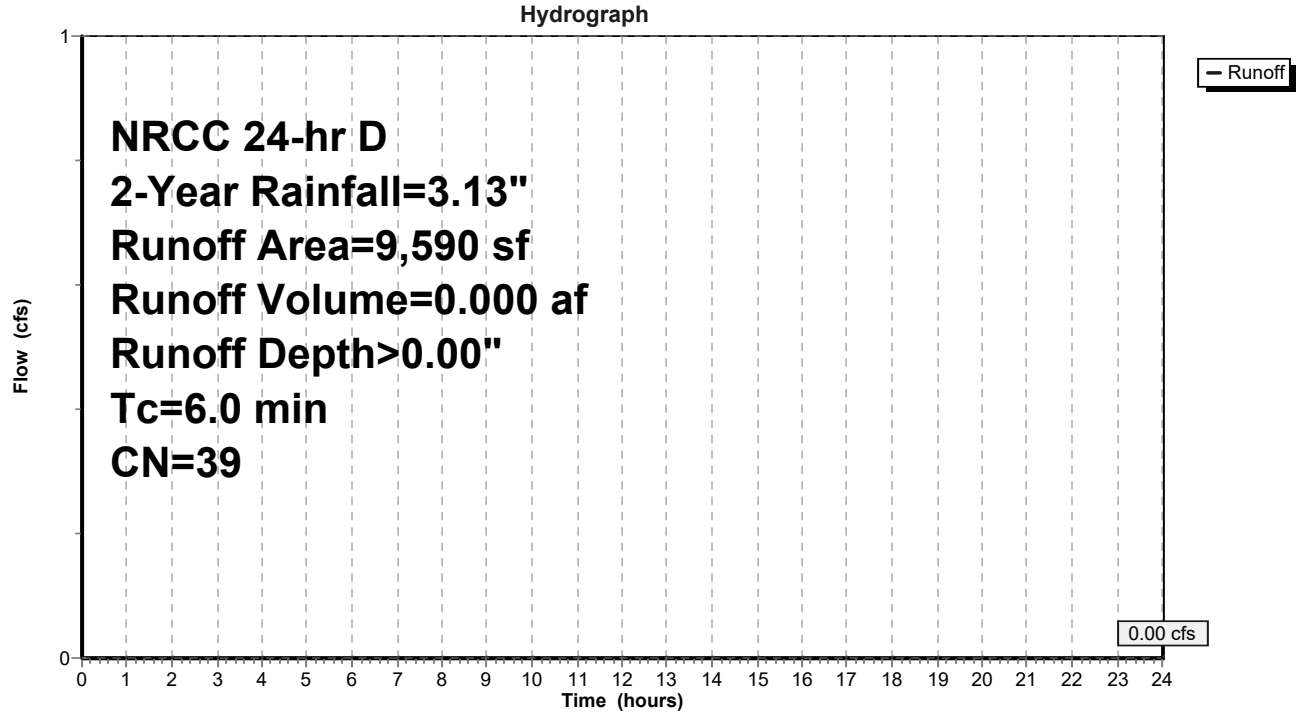
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
9,590	39	>75% Grass cover, Good, HSG A
9,590		100.00% Pervious Area

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

Subcatchment 5S: GRASS AREA



Summary for Subcatchment 6S: GRASS AREA

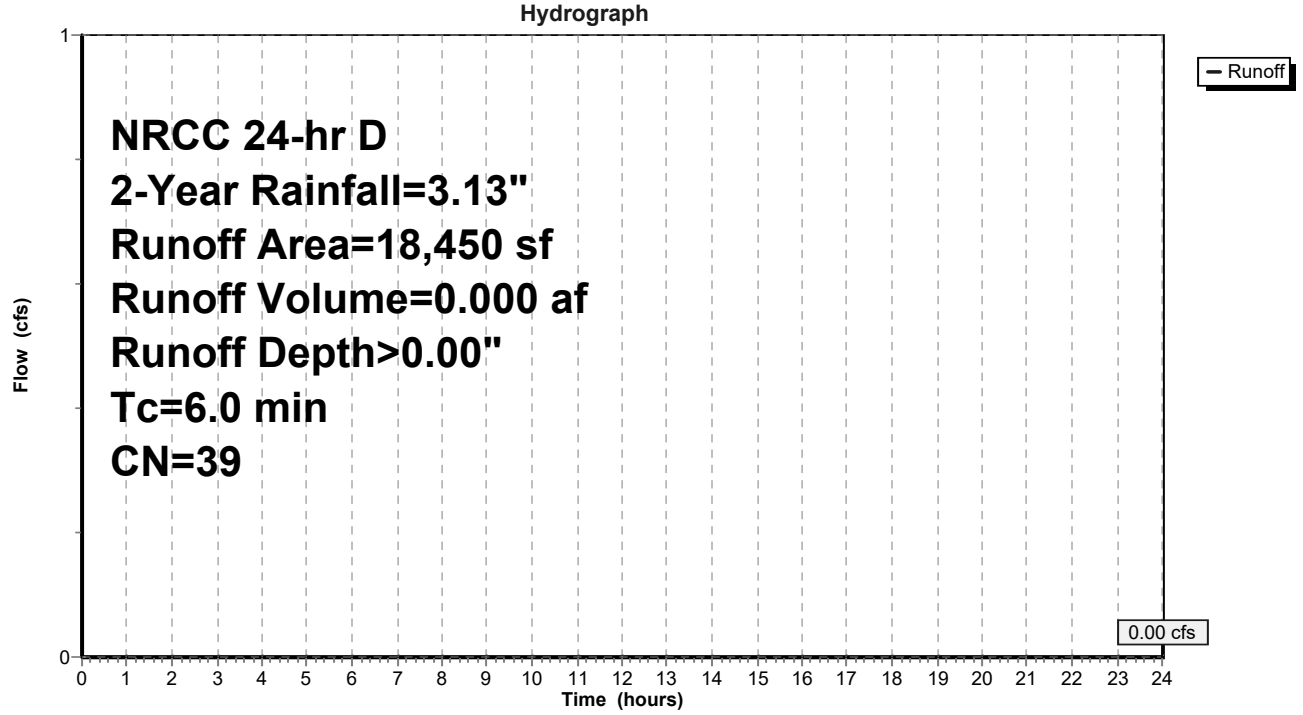
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
18,450	39	>75% Grass cover, Good, HSG A
18,450		100.00% Pervious Area

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

Subcatchment 6S: GRASS AREA



Summary for Subcatchment 7S: GRASS AREA

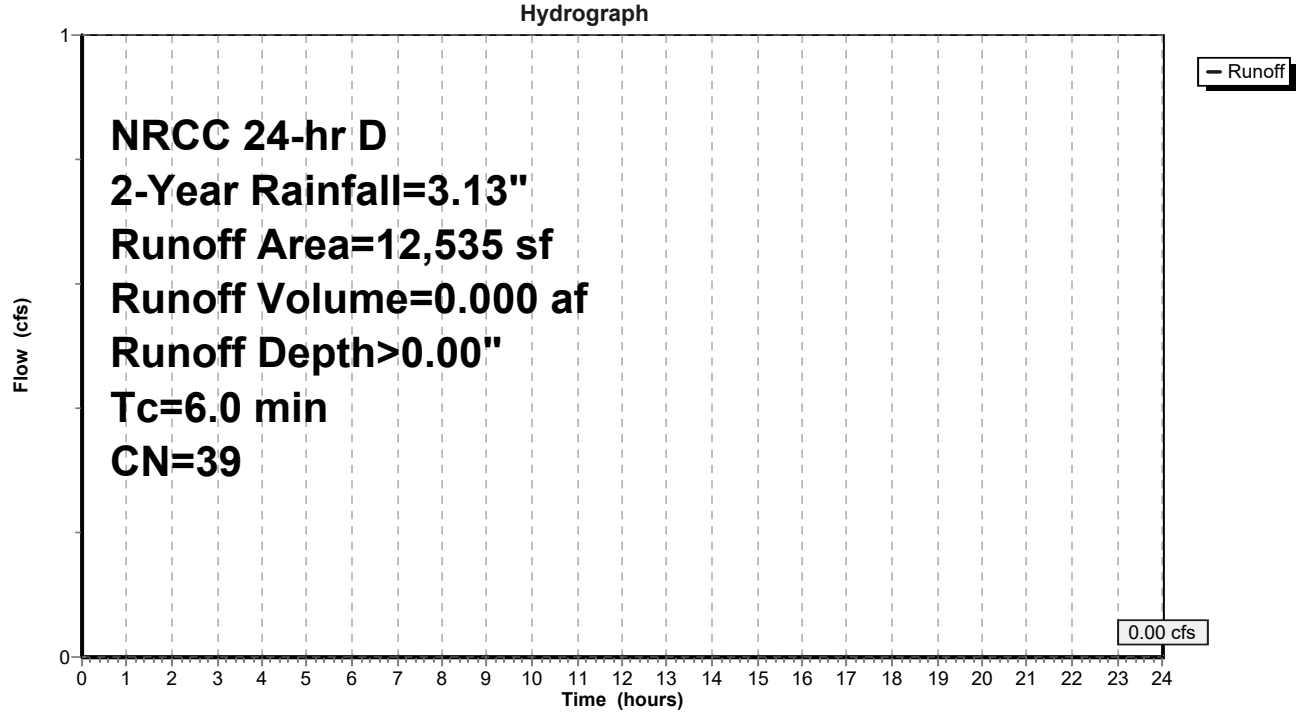
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.13"

Area (sf)	CN	Description
12,535	39	>75% Grass cover, Good, HSG A
12,535		100.00% Pervious Area

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

Subcatchment 7S: GRASS AREA

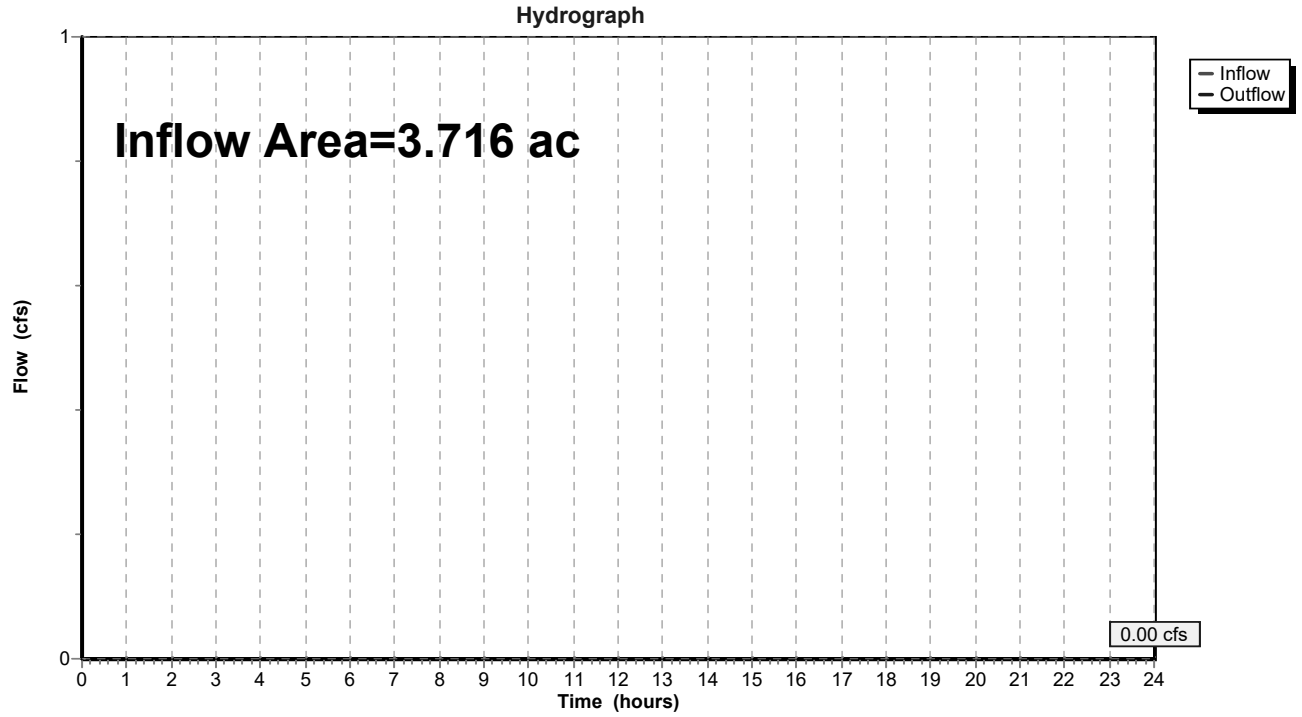


Summary for Reach 1R: OFFSTE

Inflow Area = 3.716 ac, 74.93% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



Summary for Pond 1P: INFILTRATION BASIN

Inflow Area = 1.494 ac, 85.27% Impervious, Inflow Depth > 2.47" for 2-Year event
Inflow = 3.59 cfs @ 12.13 hrs, Volume= 0.307 af
Outflow = 0.55 cfs @ 12.58 hrs, Volume= 0.307 af, Atten= 85%, Lag= 27.0 min
Discarded = 0.55 cfs @ 12.58 hrs, Volume= 0.307 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 337.36' @ 12.58 hrs Surf.Area= 2,888 sf Storage= 3,186 cf

Plug-Flow detention time= 35.7 min calculated for 0.307 af (100% of inflow)
Center-of-Mass det. time= 35.1 min (795.2 - 760.1)

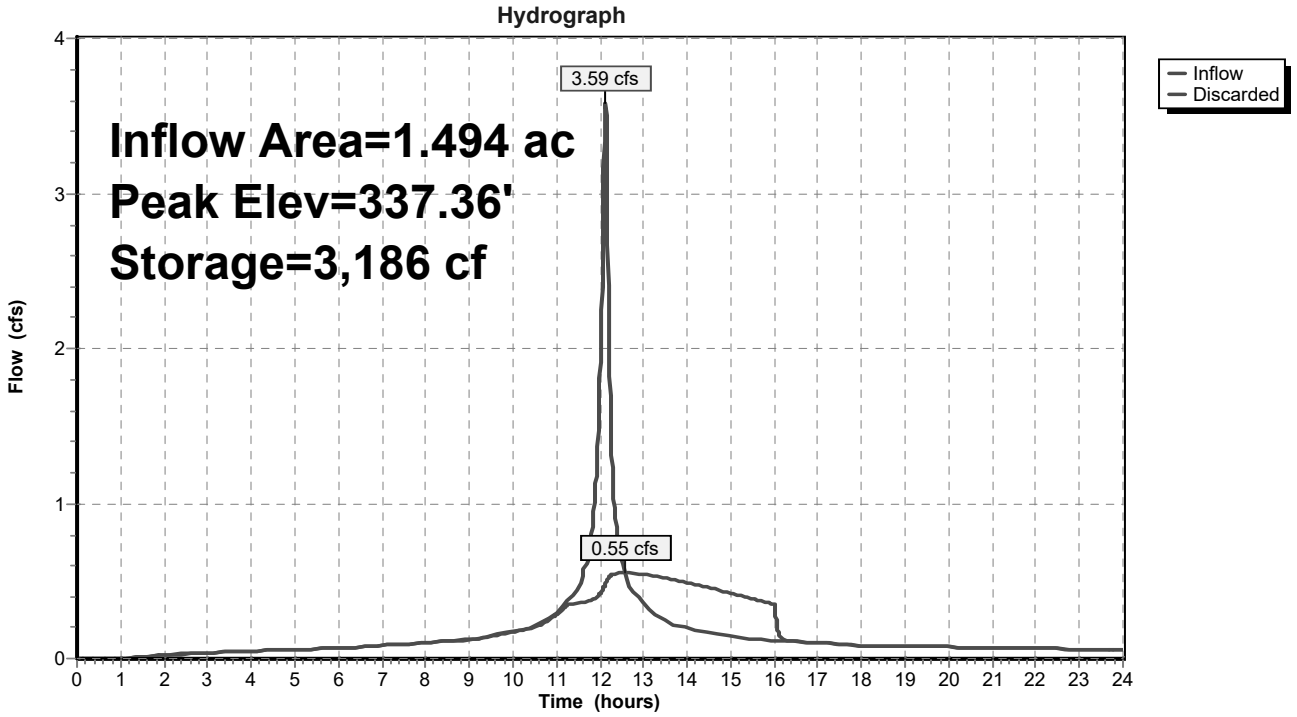
Volume	Invert	Avail.Storage	Storage Description
#1	336.00'	13,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
336.00	1,800	0	0
337.00	2,600	2,200	2,200
338.00	3,400	3,000	5,200
339.00	4,300	3,850	9,050
340.00	5,100	4,700	13,750

Device	Routing	Invert	Outlet Devices
#1	Discarded	336.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.55 cfs @ 12.58 hrs HW=337.36' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.55 cfs)

Pond 1P: INFILTRATION BASIN



Summary for Pond 2P: POROUS PAVEMENT BASE

Inflow Area = 0.329 ac,100.00% Impervious, Inflow Depth > 2.89" for 2-Year event
Inflow = 0.93 cfs @ 12.13 hrs, Volume= 0.079 af
Outflow = 0.92 cfs @ 12.13 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.92 cfs @ 12.13 hrs, Volume= 0.079 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 334.00' @ 12.13 hrs Surf.Area= 14,125 sf Storage= 19 cf

Plug-Flow detention time= 0.3 min calculated for 0.079 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (760.3 - 760.1)

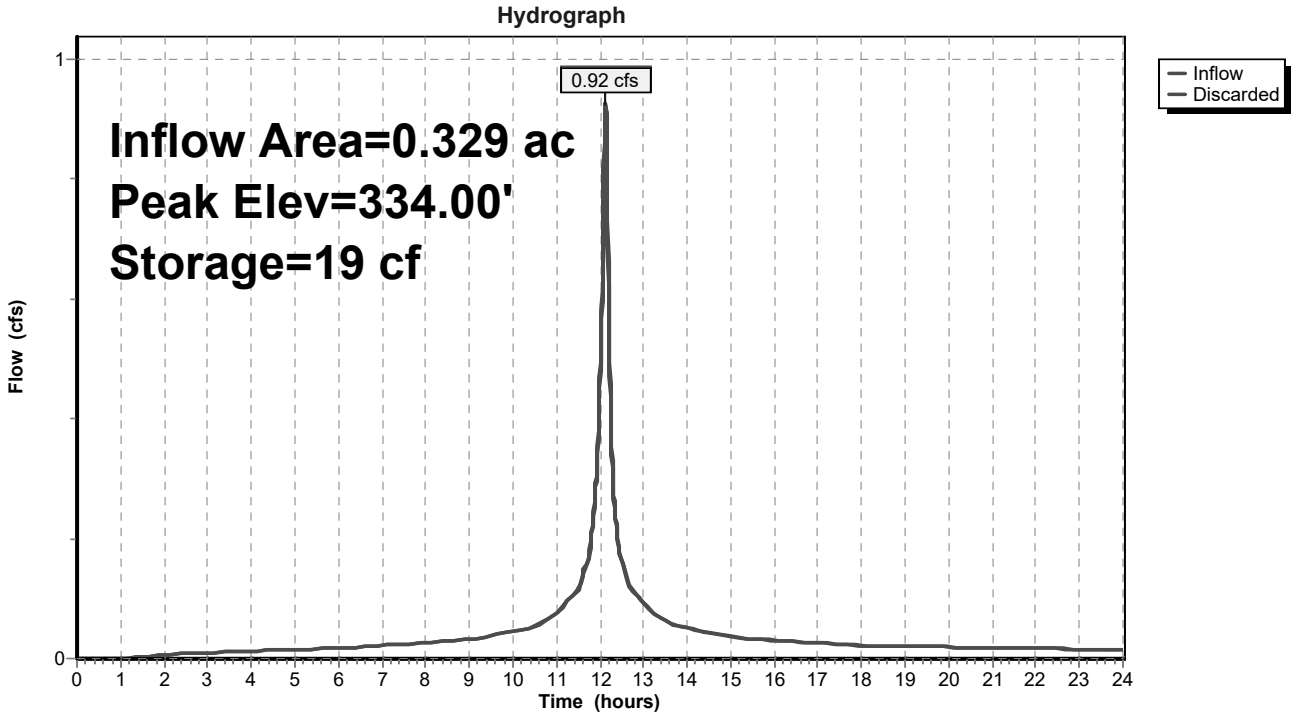
Volume	Invert	Avail.Storage	Storage Description
#1	334.00'	5,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 14,125 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
334.00	14,125	0	0
335.00	14,125	14,125	14,125

Device	Routing	Invert	Outlet Devices
#1	Discarded	334.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.70 cfs @ 12.13 hrs HW=334.00' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.70 cfs)

Pond 2P: POROUS PAVEMENT BASE



Summary for Pond 3P: Stormtech Chambers

Inflow Area = 1.181 ac,100.00% Impervious, Inflow Depth > 2.89" for 2-Year event
Inflow = 3.32 cfs @ 12.13 hrs, Volume= 0.285 af
Outflow = 1.06 cfs @ 12.29 hrs, Volume= 0.285 af, Atten= 68%, Lag= 10.0 min
Discarded = 1.06 cfs @ 12.29 hrs, Volume= 0.285 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 331.88' @ 12.29 hrs Surf.Area= 4,870 sf Storage= 1,775 cf

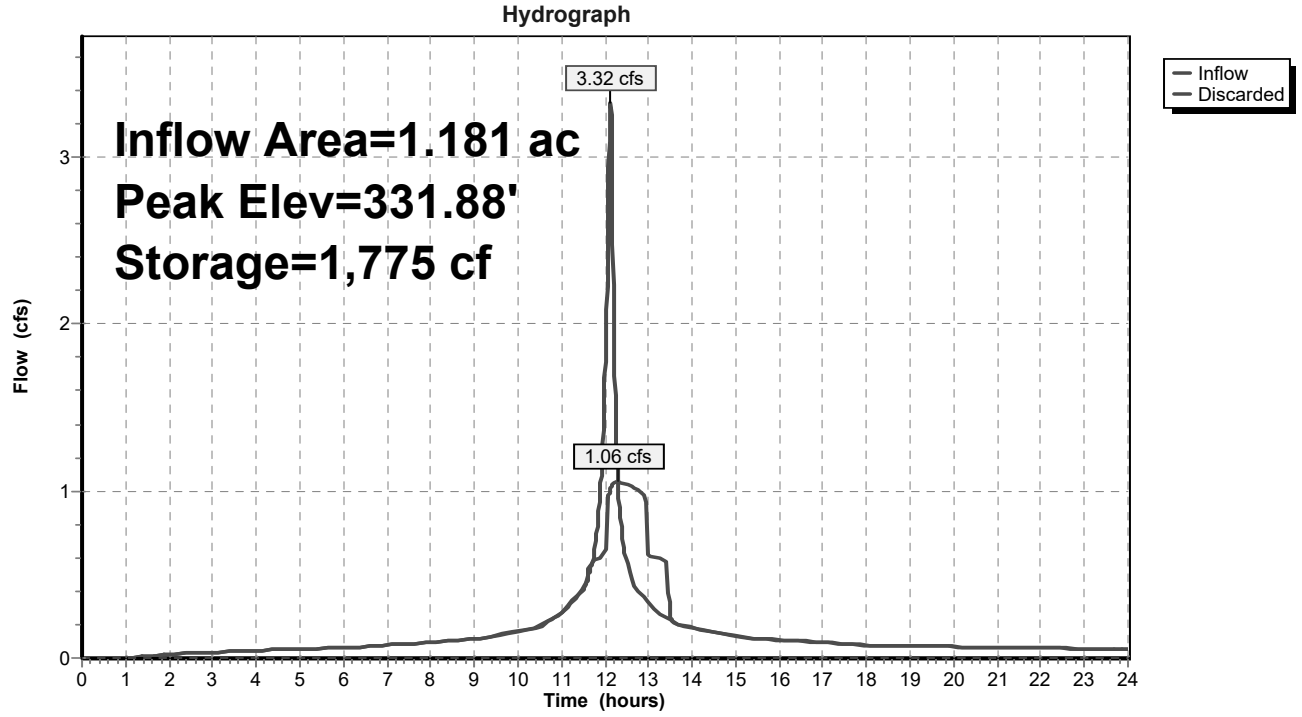
Plug-Flow detention time= 7.7 min calculated for 0.285 af (100% of inflow)
Center-of-Mass det. time= 7.4 min (767.5 - 760.1)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	4,930 cf	**39.50'W x 78.00'L x 4.00'H Prismatoid** 12,324 cf Overall x 40.0% Voids
#2	331.50'	3,216 cf	**ADS_StormTech SC-740 +Cap** x 70 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		8,145 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	331.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.06 cfs @ 12.29 hrs HW=331.88' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.06 cfs)

Pond 3P: Stormtech Chambers



Summary for Subcatchment 1S: NEW ROOF

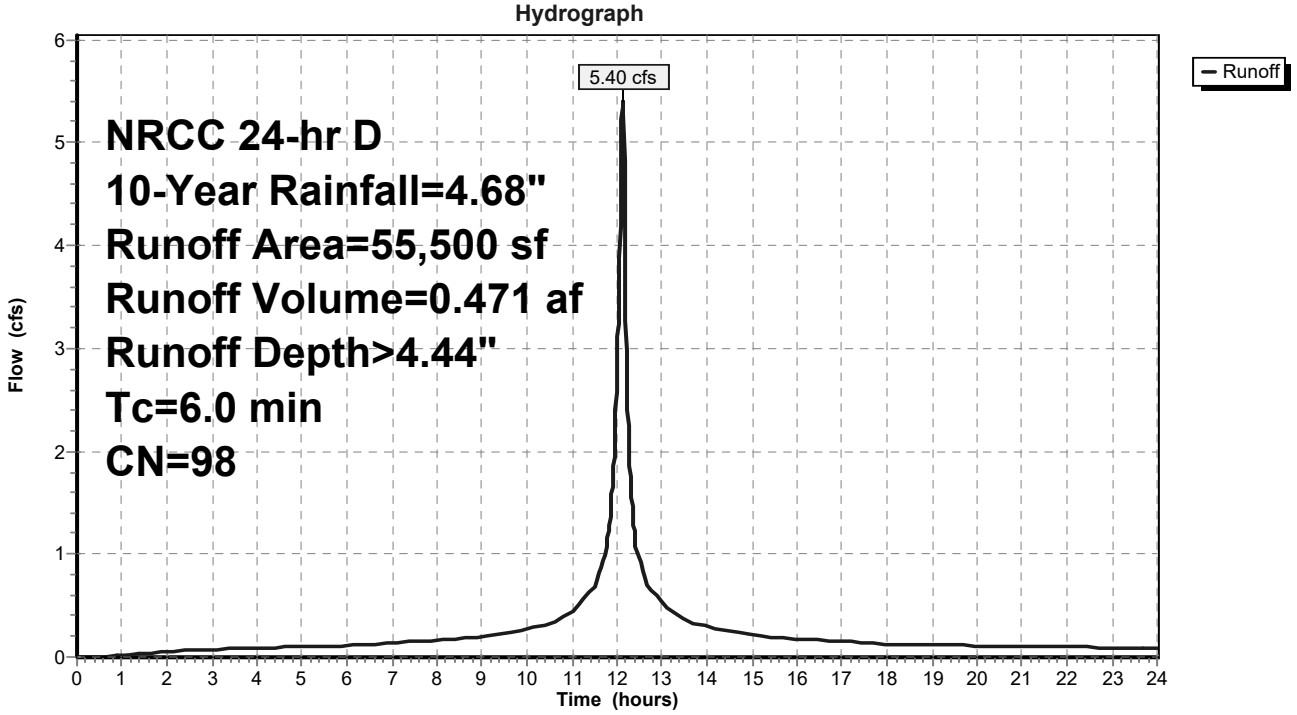
Runoff = 5.40 cfs @ 12.13 hrs, Volume= 0.471 af, Depth> 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
55,500	98	Roofs, HSG A
55,500		100.00% Impervious Area

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

Subcatchment 1S: NEW ROOF



Summary for Subcatchment 2S: POROUS PAVEMENT

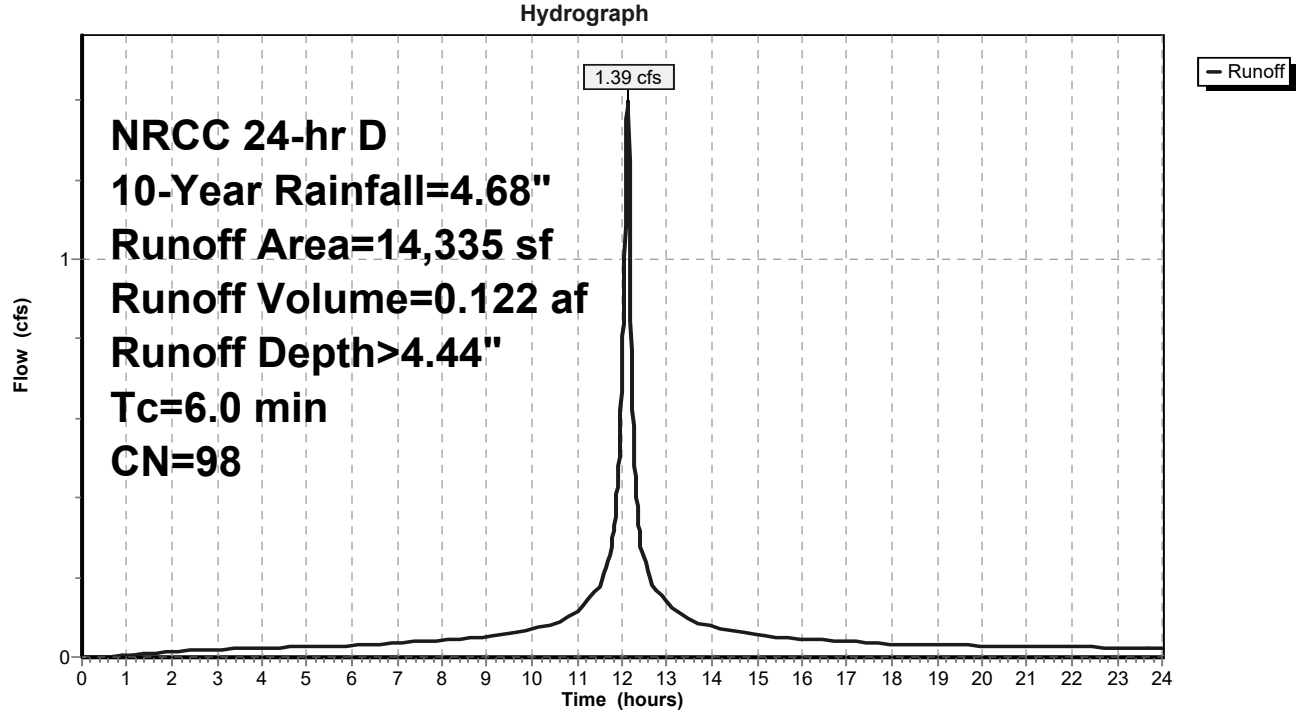
Runoff = 1.39 cfs @ 12.13 hrs, Volume= 0.122 af, Depth> 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
14,335	98	Paved parking, HSG A
14,335		100.00% Impervious Area

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

Subcatchment 2S: POROUS PAVEMENT



Summary for Subcatchment 3S: PAVEMENT

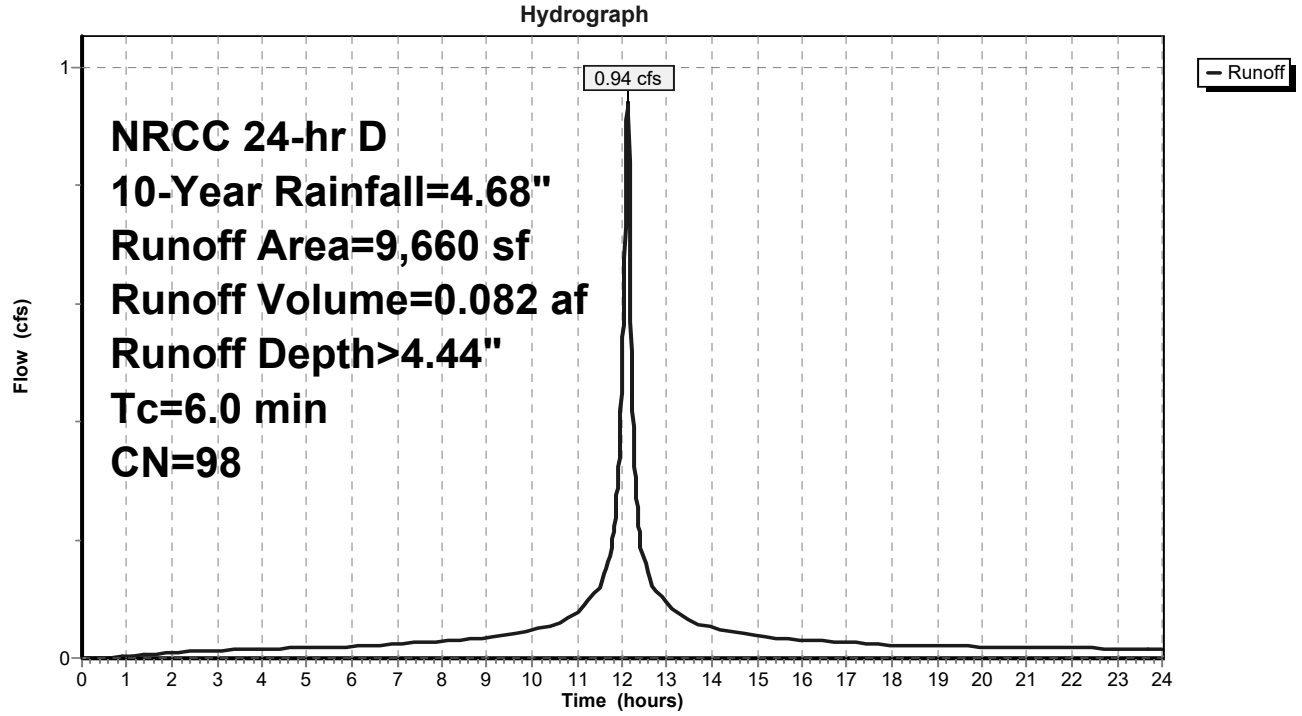
Runoff = 0.94 cfs @ 12.13 hrs, Volume= 0.082 af, Depth> 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
9,660	98	Paved parking, HSG A
9,660		100.00% Impervious Area

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

Subcatchment 3S: PAVEMENT



Summary for Subcatchment 4S: PAVEMENT

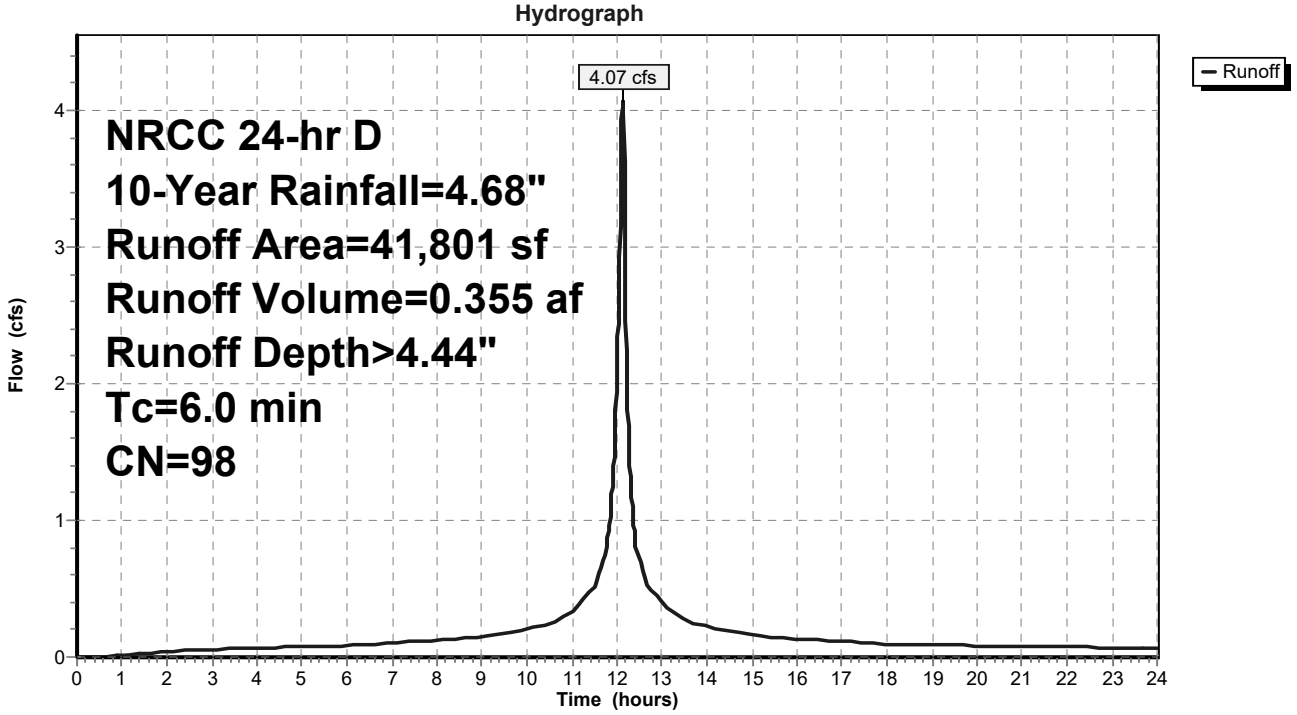
Runoff = 4.07 cfs @ 12.13 hrs, Volume= 0.355 af, Depth> 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
41,801	98	Paved parking, HSG A
41,801		100.00% Impervious Area

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

Subcatchment 4S: PAVEMENT



Summary for Subcatchment 5S: GRASS AREA

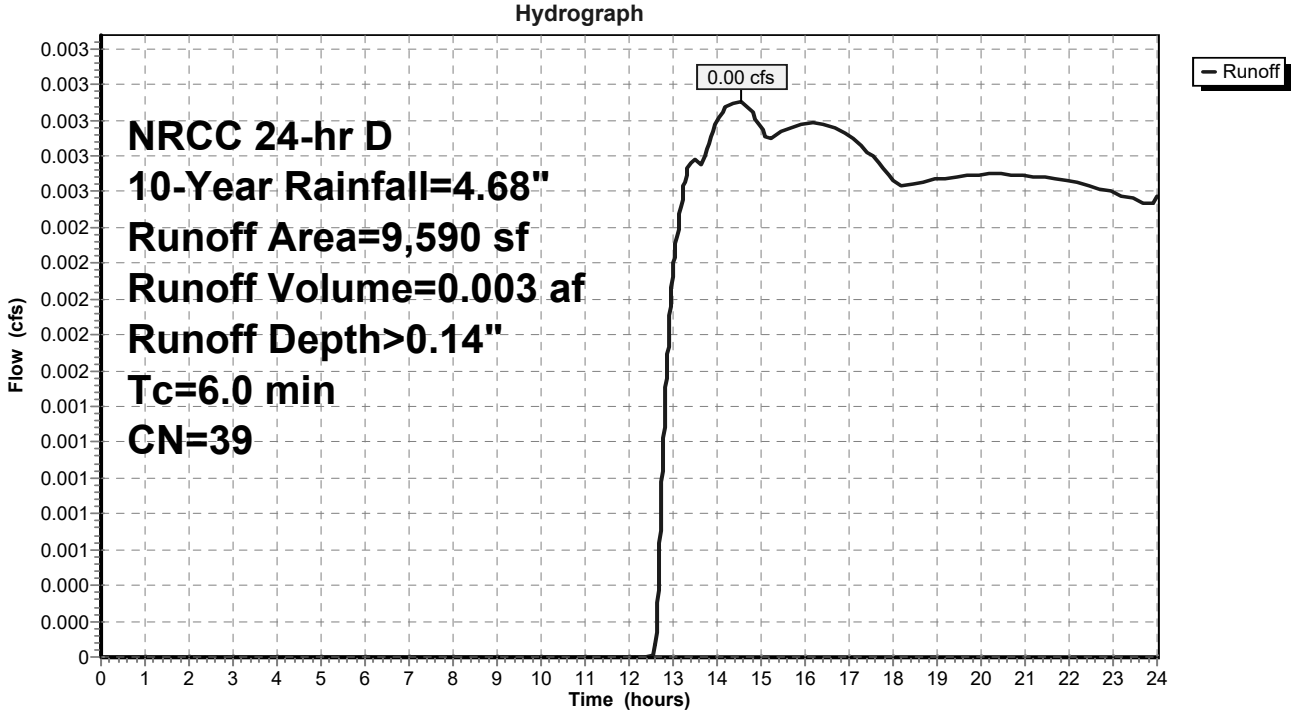
Runoff = 0.00 cfs @ 14.54 hrs, Volume= 0.003 af, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
9,590	39	>75% Grass cover, Good, HSG A
9,590		100.00% Pervious Area

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

Subcatchment 5S: GRASS AREA



Summary for Subcatchment 6S: GRASS AREA

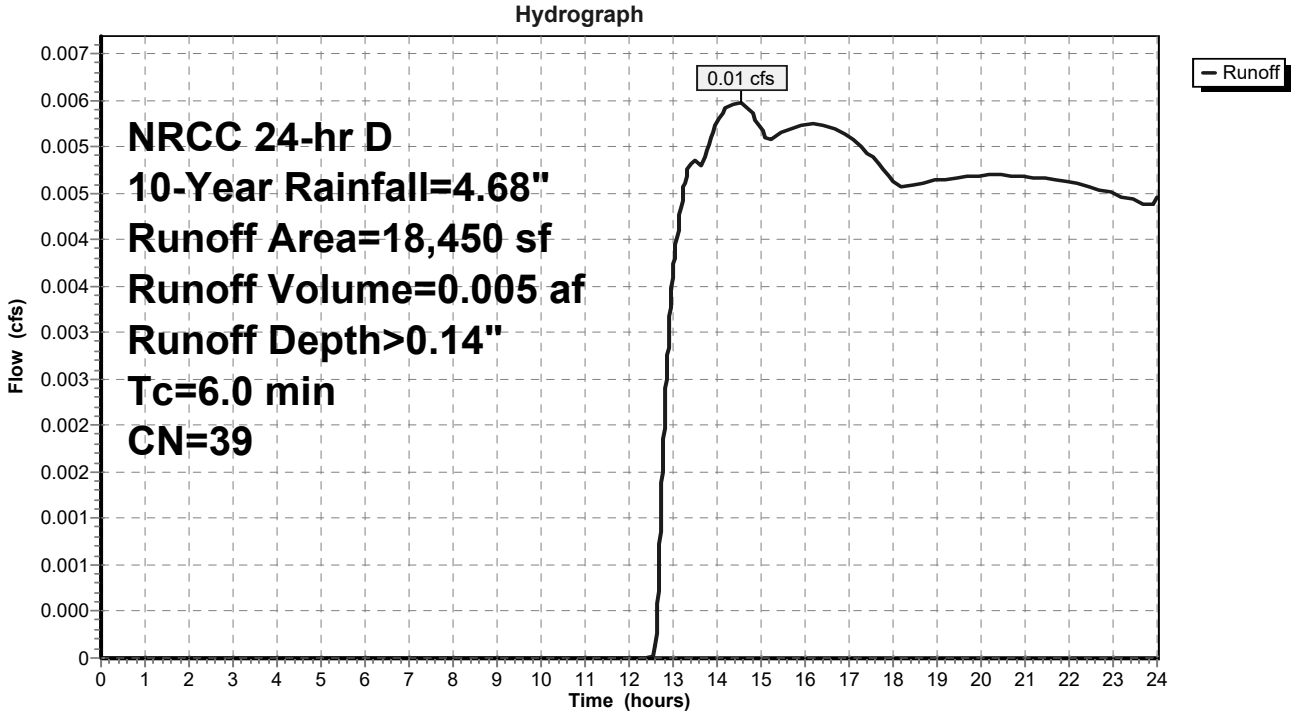
Runoff = 0.01 cfs @ 14.54 hrs, Volume= 0.005 af, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
18,450	39	>75% Grass cover, Good, HSG A
18,450		100.00% Pervious Area

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

Subcatchment 6S: GRASS AREA



Summary for Subcatchment 7S: GRASS AREA

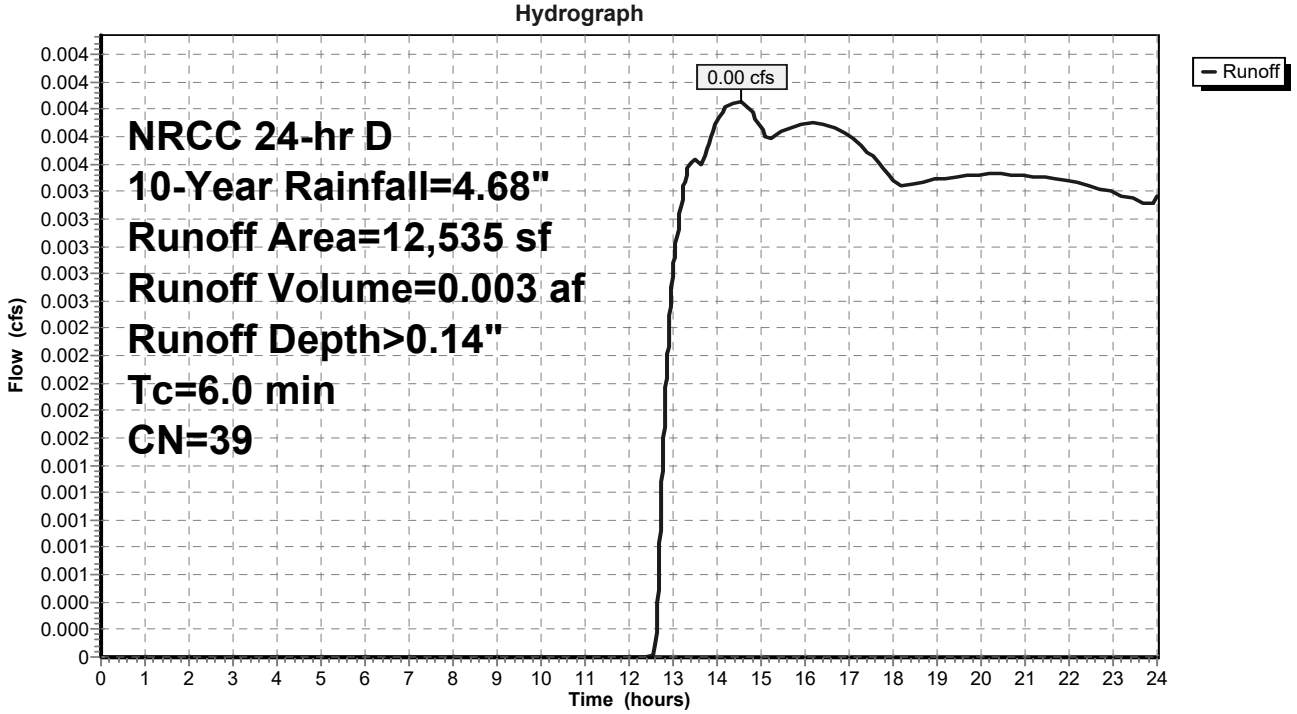
Runoff = 0.00 cfs @ 14.54 hrs, Volume= 0.003 af, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.68"

Area (sf)	CN	Description
12,535	39	>75% Grass cover, Good, HSG A
12,535		100.00% Pervious Area

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

Subcatchment 7S: GRASS AREA

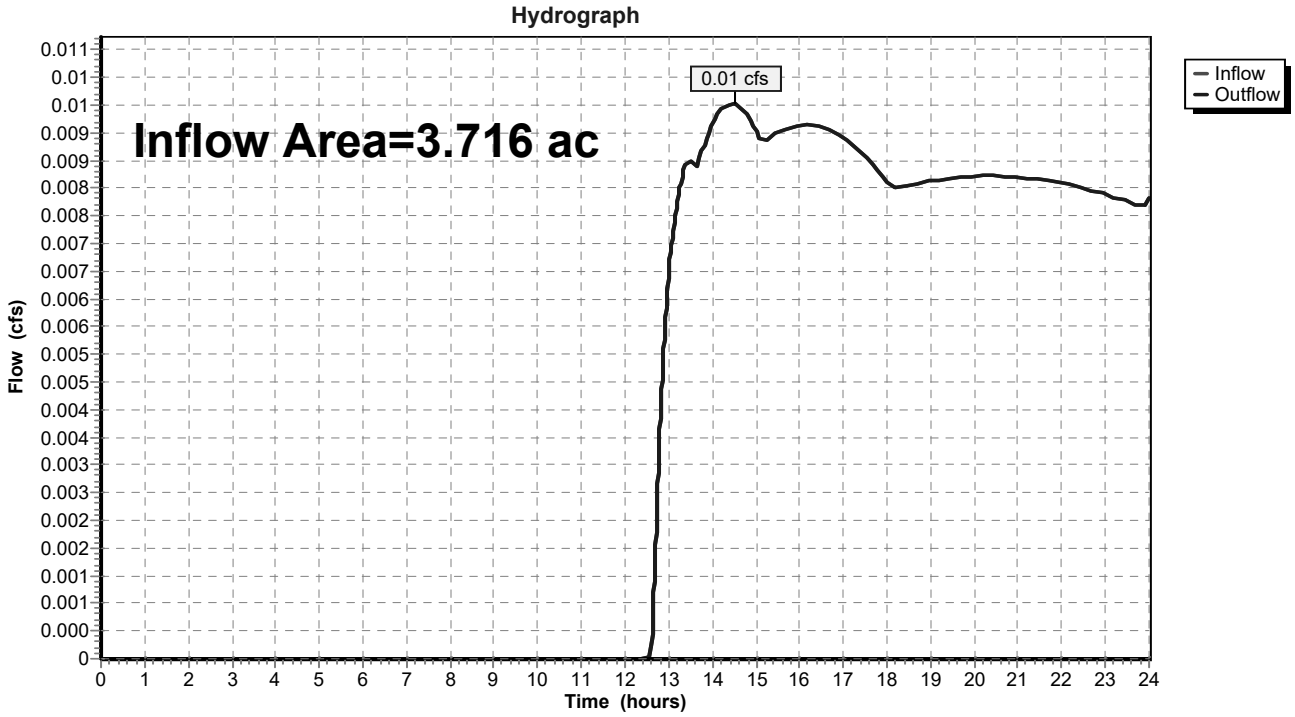


Summary for Reach 1R: OFFSTE

Inflow Area = 3.716 ac, 74.93% Impervious, Inflow Depth > 0.03" for 10-Year event
Inflow = 0.01 cfs @ 14.54 hrs, Volume= 0.008 af
Outflow = 0.01 cfs @ 14.54 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



Summary for Pond 1P: INFILTRATION BASIN

Inflow Area = 1.494 ac, 85.27% Impervious, Inflow Depth > 3.80" for 10-Year event
Inflow = 5.40 cfs @ 12.13 hrs, Volume= 0.474 af
Outflow = 0.68 cfs @ 12.71 hrs, Volume= 0.473 af, Atten= 87%, Lag= 34.8 min
Discarded = 0.68 cfs @ 12.71 hrs, Volume= 0.473 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 338.15' @ 12.71 hrs Surf.Area= 3,534 sf Storage= 5,716 cf

Plug-Flow detention time= 59.9 min calculated for 0.473 af (100% of inflow)
Center-of-Mass det. time= 59.3 min (812.1 - 752.7)

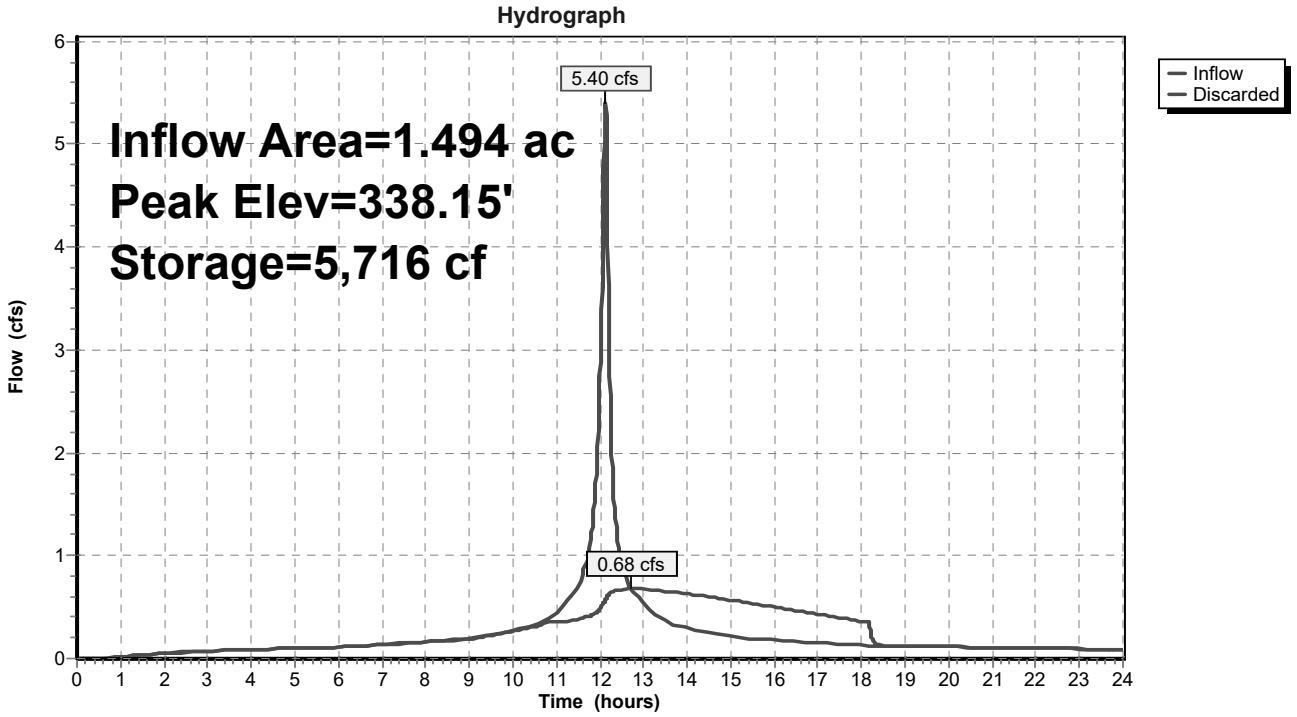
Volume	Invert	Avail.Storage	Storage Description
#1	336.00'	13,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
336.00	1,800	0	0
337.00	2,600	2,200	2,200
338.00	3,400	3,000	5,200
339.00	4,300	3,850	9,050
340.00	5,100	4,700	13,750

Device	Routing	Invert	Outlet Devices
#1	Discarded	336.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.68 cfs @ 12.71 hrs HW=338.15' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.68 cfs)

Pond 1P: INFILTRATION BASIN



Summary for Pond 2P: POROUS PAVEMENT BASE

Inflow Area = 0.329 ac,100.00% Impervious, Inflow Depth > 4.44" for 10-Year event
Inflow = 1.39 cfs @ 12.13 hrs, Volume= 0.122 af
Outflow = 1.39 cfs @ 12.13 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.3 min
Discarded = 1.39 cfs @ 12.13 hrs, Volume= 0.122 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 334.01' @ 12.13 hrs Surf.Area= 14,125 sf Storage= 29 cf

Plug-Flow detention time= 0.3 min calculated for 0.122 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (751.2 - 750.9)

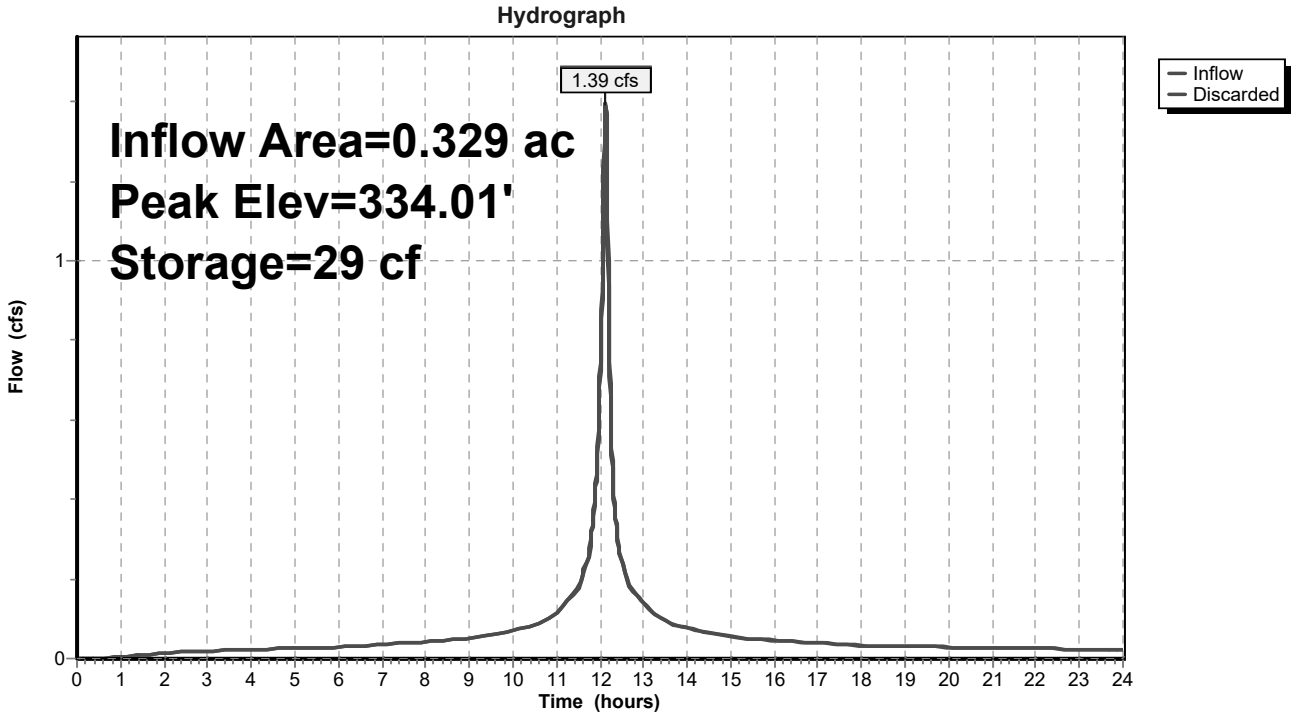
Volume	Invert	Avail.Storage	Storage Description
#1	334.00'	5,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 14,125 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
334.00	14,125	0	0
335.00	14,125	14,125	14,125

Device	Routing	Invert	Outlet Devices
#1	Discarded	334.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.70 cfs @ 12.13 hrs HW=334.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 2.70 cfs)

Pond 2P: POROUS PAVEMENT BASE



Summary for Pond 3P: Stormtech Chambers

Inflow Area = 1.181 ac,100.00% Impervious, Inflow Depth > 4.44" for 10-Year event
Inflow = 5.01 cfs @ 12.13 hrs, Volume= 0.437 af
Outflow = 1.19 cfs @ 12.37 hrs, Volume= 0.437 af, Atten= 76%, Lag= 14.4 min
Discarded = 1.19 cfs @ 12.37 hrs, Volume= 0.437 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 332.43' @ 12.37 hrs Surf.Area= 4,683 sf Storage= 3,406 cf

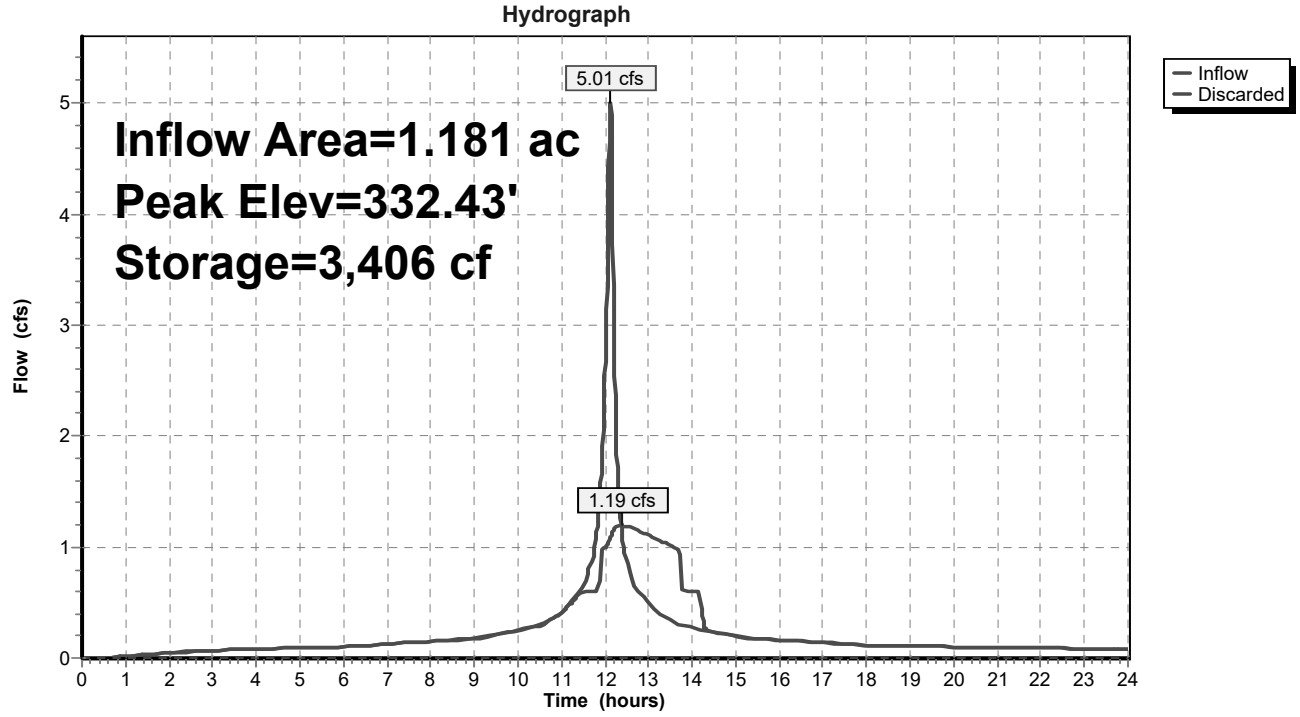
Plug-Flow detention time= 14.2 min calculated for 0.437 af (100% of inflow)
Center-of-Mass det. time= 13.9 min (764.8 - 750.9)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	4,930 cf	**39.50'W x 78.00'L x 4.00'H Prismatoid** 12,324 cf Overall x 40.0% Voids
#2	331.50'	3,216 cf	**ADS_StormTech SC-740 +Cap** x 70 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		8,145 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	331.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.19 cfs @ 12.37 hrs HW=332.43' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.19 cfs)

Pond 3P: Stormtech Chambers



Summary for Subcatchment 1S: NEW ROOF

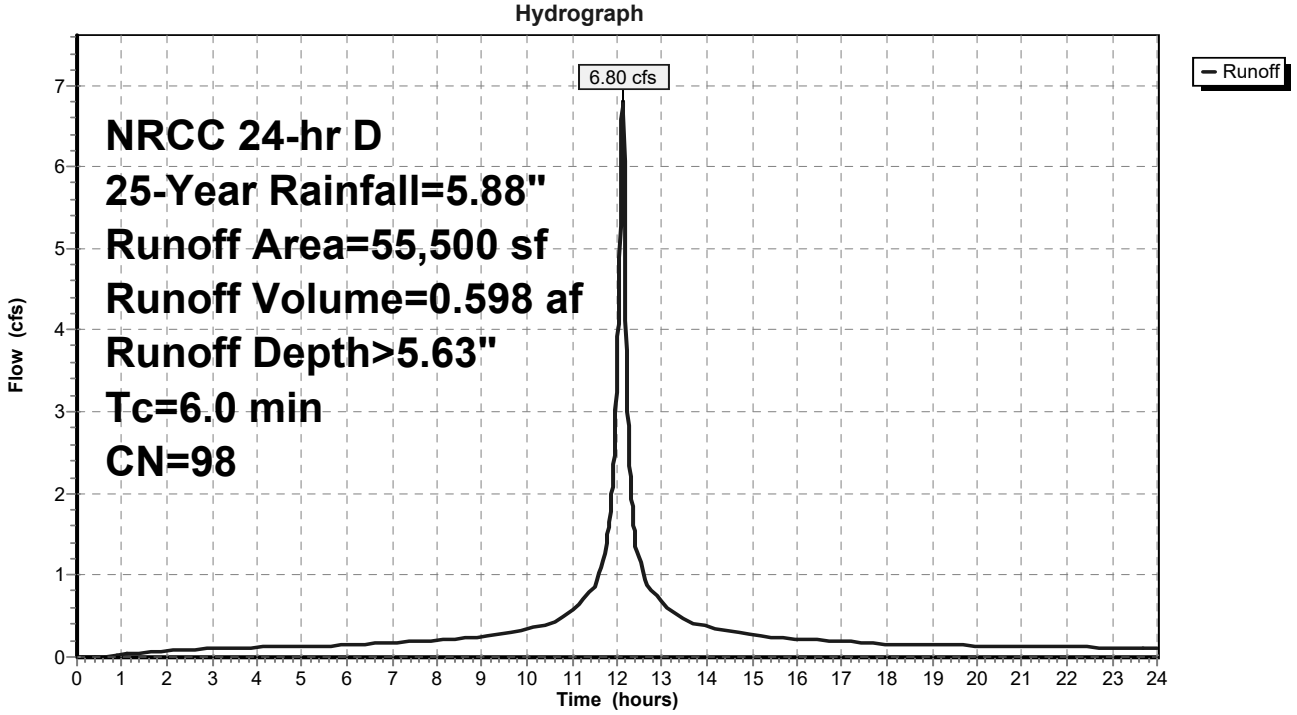
Runoff = 6.80 cfs @ 12.13 hrs, Volume= 0.598 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
55,500	98	Roofs, HSG A
55,500		100.00% Impervious Area

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

Subcatchment 1S: NEW ROOF



Summary for Subcatchment 2S: POROUS PAVEMENT

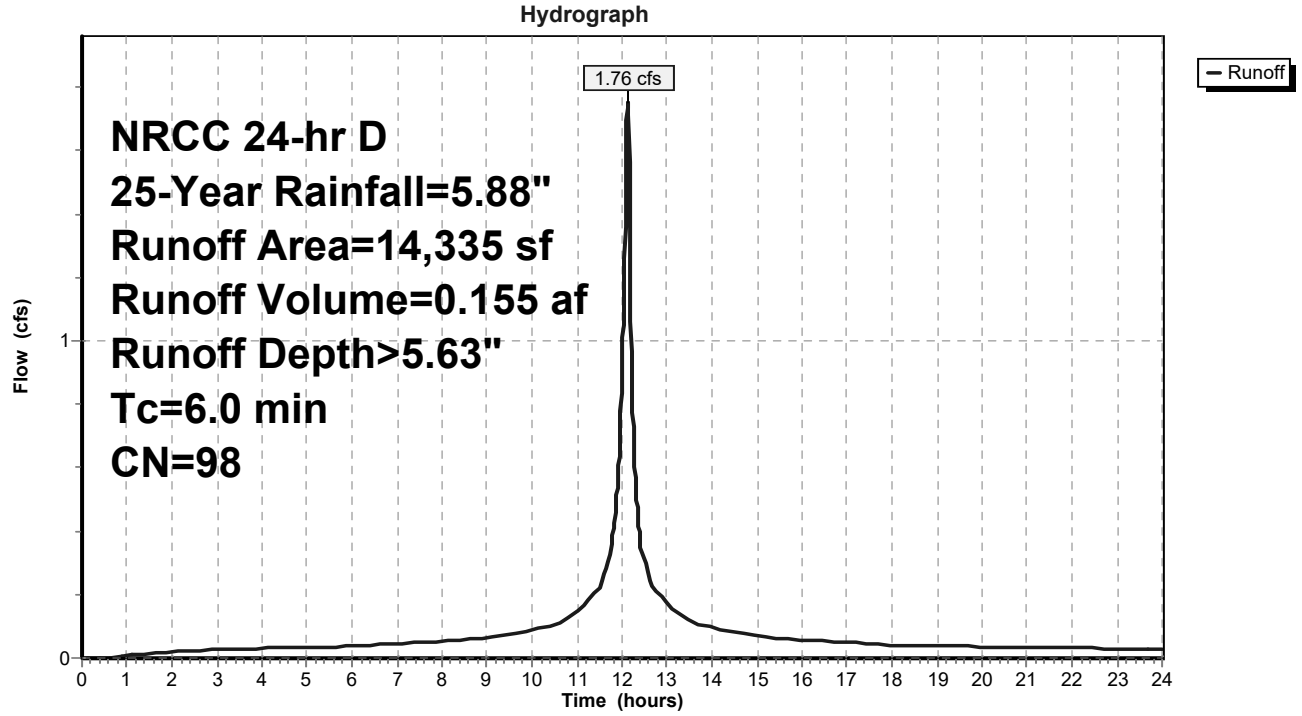
Runoff = 1.76 cfs @ 12.13 hrs, Volume= 0.155 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
14,335	98	Paved parking, HSG A
14,335		100.00% Impervious Area

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

Subcatchment 2S: POROUS PAVEMENT



Summary for Subcatchment 3S: PAVEMENT

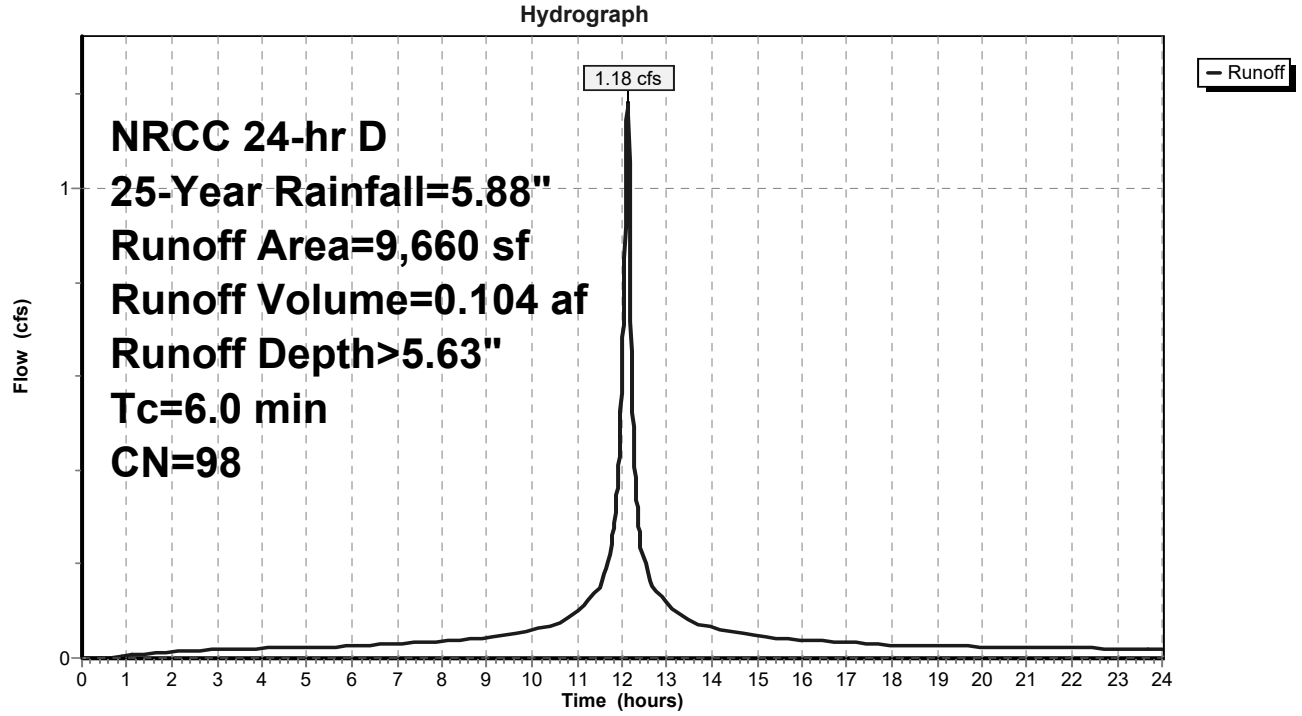
Runoff = 1.18 cfs @ 12.13 hrs, Volume= 0.104 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
9,660	98	Paved parking, HSG A
9,660		100.00% Impervious Area

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

Subcatchment 3S: PAVEMENT



Summary for Subcatchment 4S: PAVEMENT

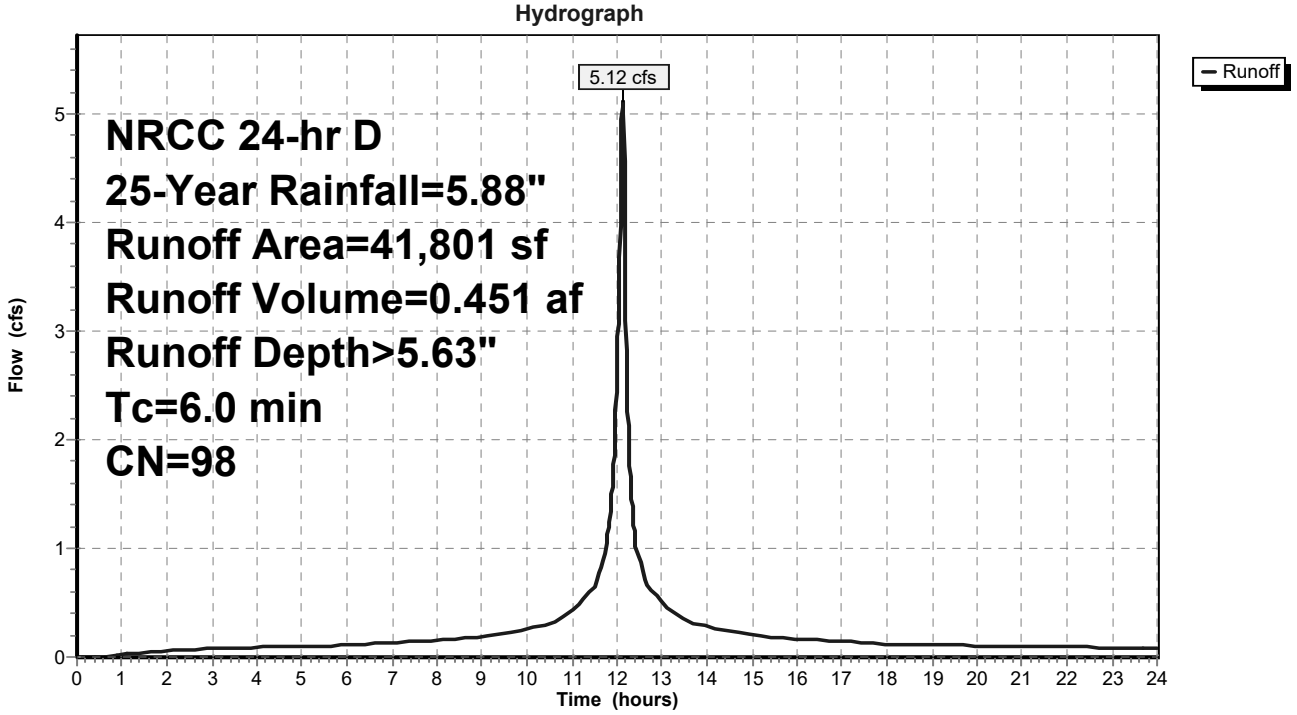
Runoff = 5.12 cfs @ 12.13 hrs, Volume= 0.451 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
41,801	98	Paved parking, HSG A
41,801		100.00% Impervious Area

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

Subcatchment 4S: PAVEMENT



Summary for Subcatchment 5S: GRASS AREA

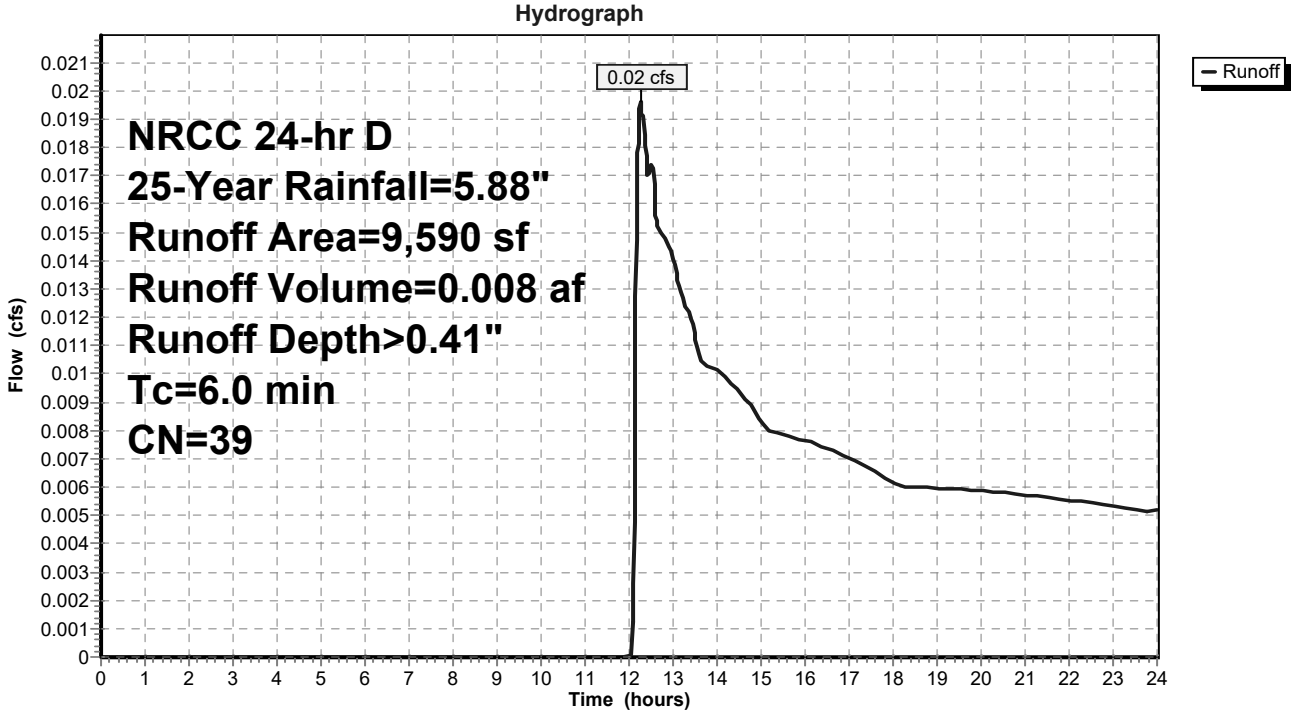
Runoff = 0.02 cfs @ 12.26 hrs, Volume= 0.008 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
9,590	39	>75% Grass cover, Good, HSG A
9,590		100.00% Pervious Area

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

Subcatchment 5S: GRASS AREA



Summary for Subcatchment 6S: GRASS AREA

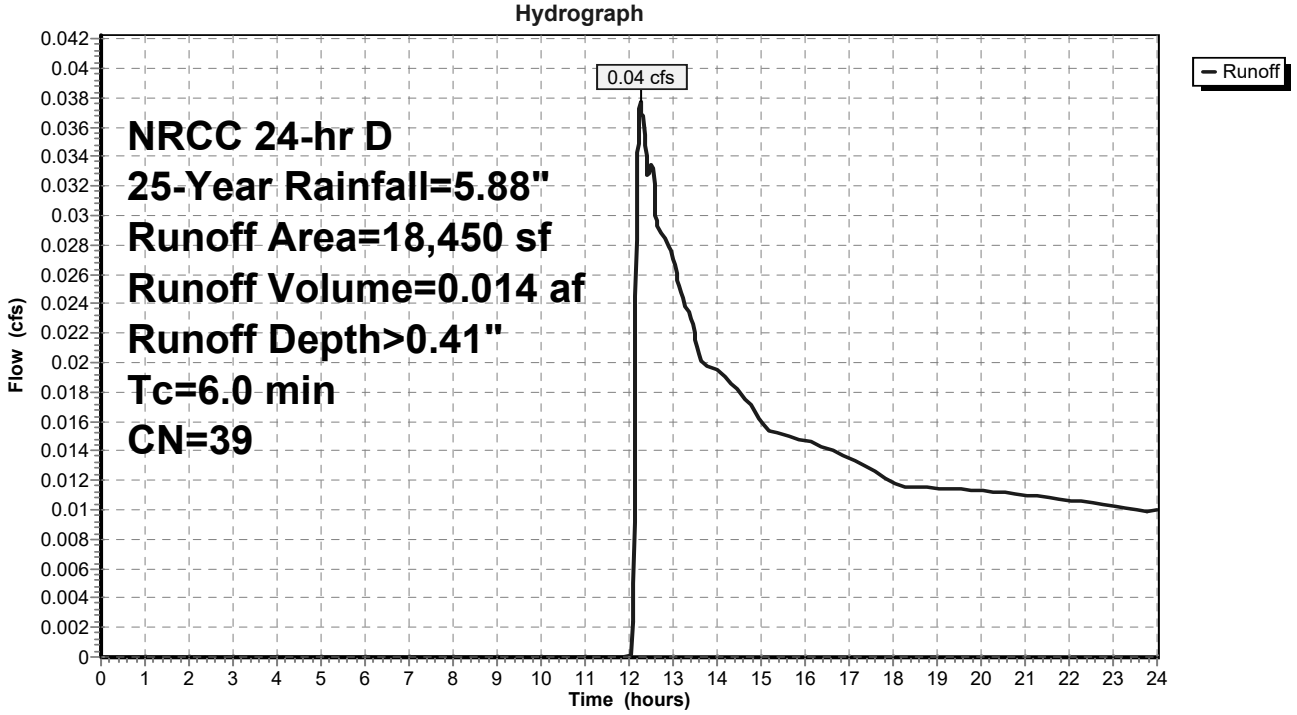
Runoff = 0.04 cfs @ 12.26 hrs, Volume= 0.014 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
18,450	39	>75% Grass cover, Good, HSG A
18,450		100.00% Pervious Area

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

Subcatchment 6S: GRASS AREA



Summary for Subcatchment 7S: GRASS AREA

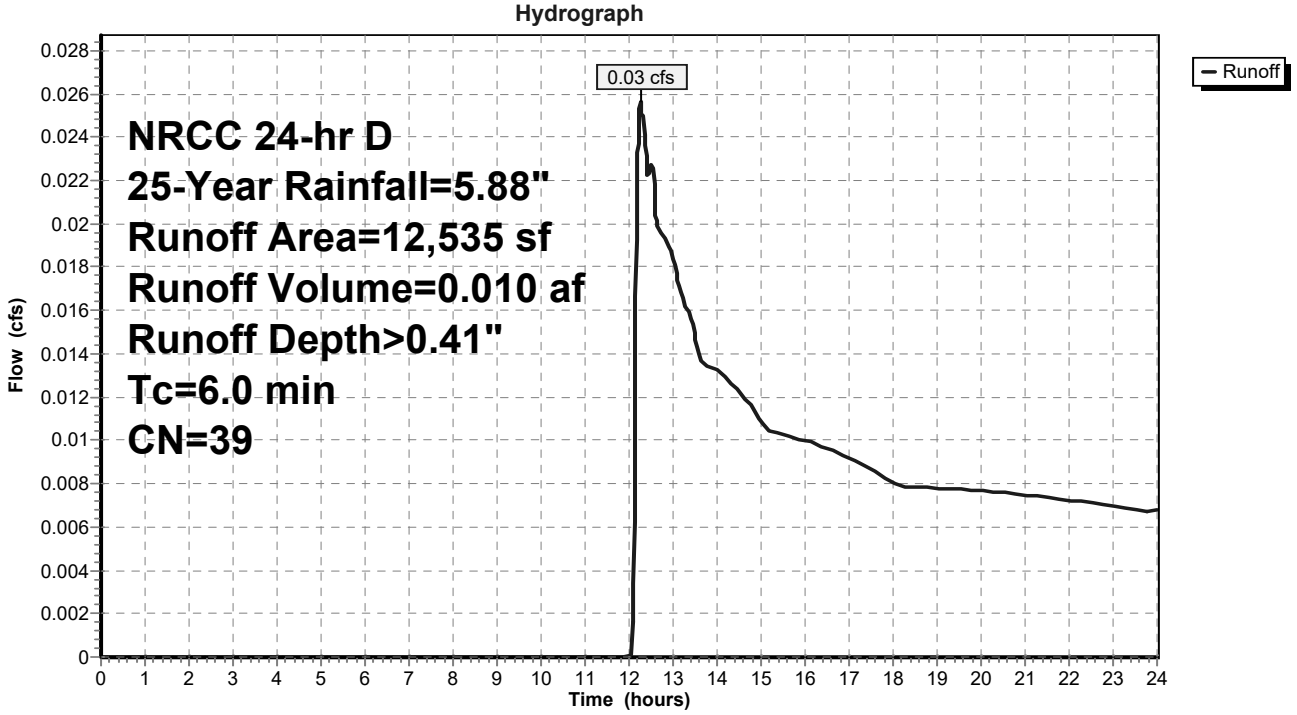
Runoff = 0.03 cfs @ 12.26 hrs, Volume= 0.010 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 25-Year Rainfall=5.88"

Area (sf)	CN	Description
12,535	39	>75% Grass cover, Good, HSG A
12,535		100.00% Pervious Area

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

Subcatchment 7S: GRASS AREA

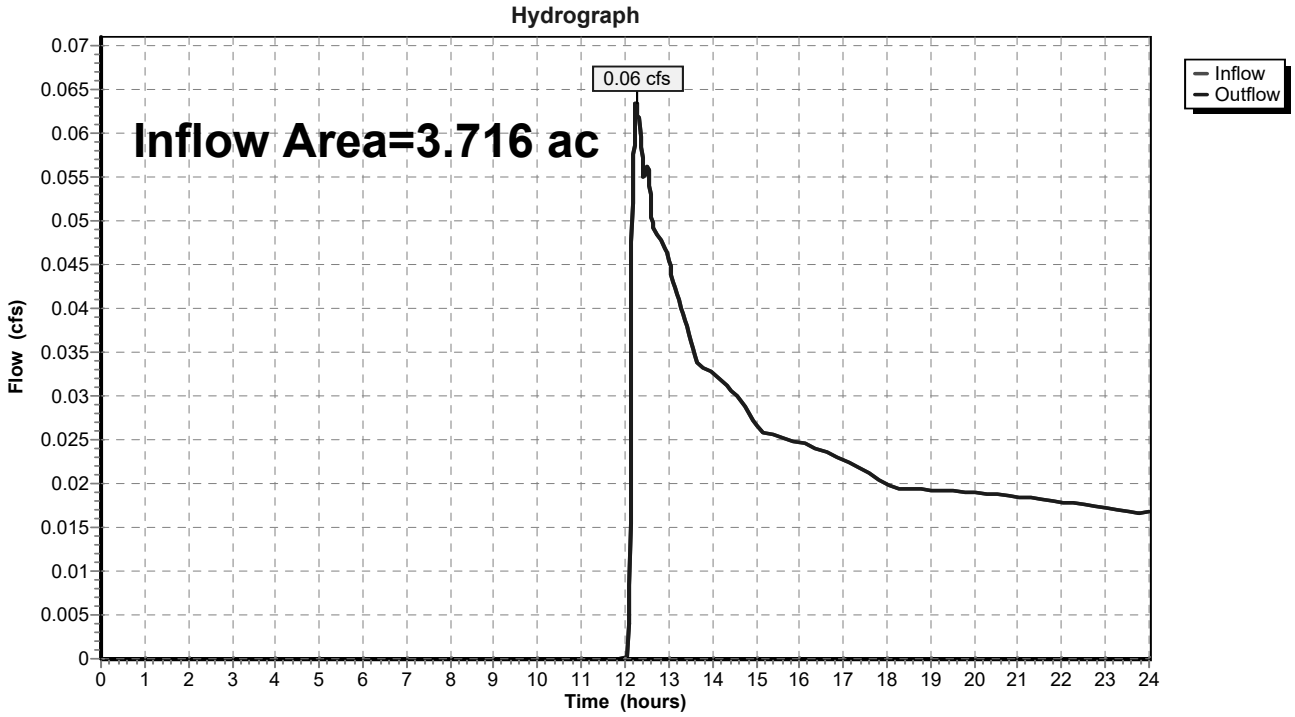


Summary for Reach 1R: OFFSTE

Inflow Area = 3.716 ac, 74.93% Impervious, Inflow Depth > 0.08" for 25-Year event
Inflow = 0.06 cfs @ 12.26 hrs, Volume= 0.024 af
Outflow = 0.06 cfs @ 12.26 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



Summary for Pond 1P: INFILTRATION BASIN

Inflow Area = 1.494 ac, 85.27% Impervious, Inflow Depth > 4.86" for 25-Year event
Inflow = 6.80 cfs @ 12.13 hrs, Volume= 0.606 af
Outflow = 0.77 cfs @ 12.86 hrs, Volume= 0.605 af, Atten= 89%, Lag= 43.9 min
Discarded = 0.77 cfs @ 12.86 hrs, Volume= 0.605 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 338.72' @ 12.86 hrs Surf.Area= 4,047 sf Storage= 7,878 cf

Plug-Flow detention time= 78.2 min calculated for 0.605 af (100% of inflow)
Center-of-Mass det. time= 77.6 min (827.6 - 749.9)

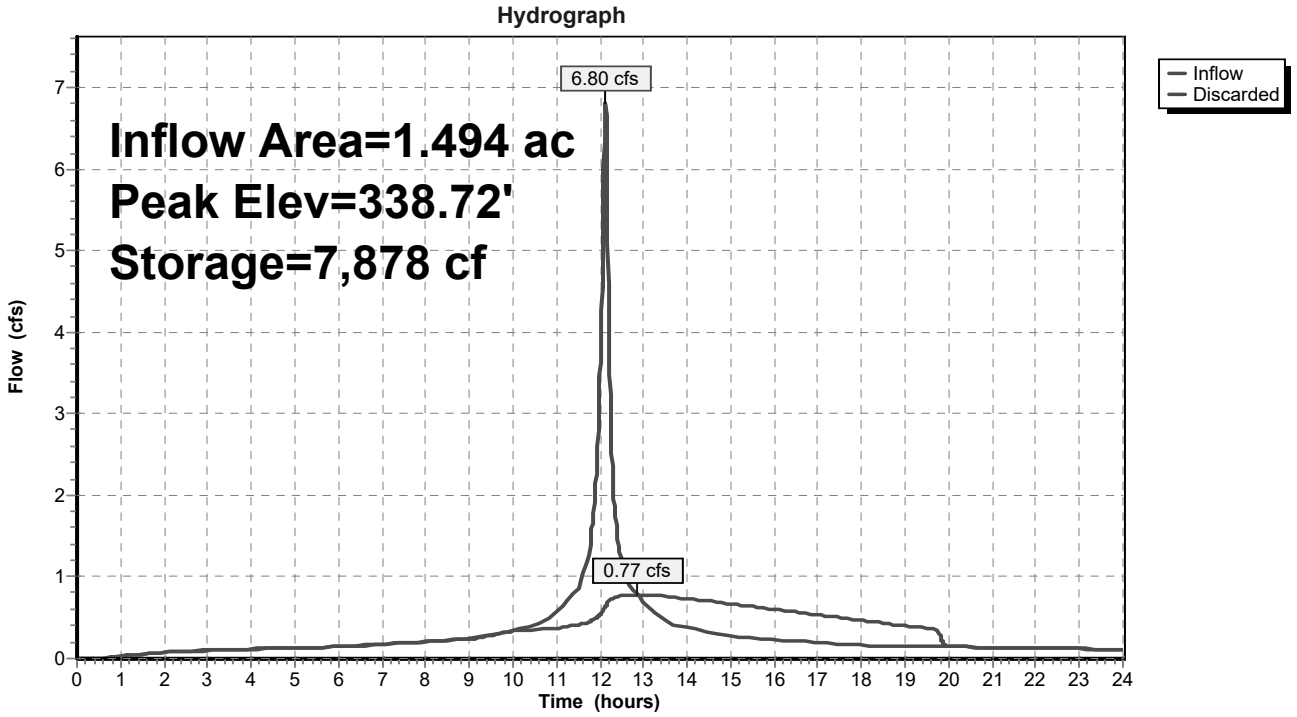
Volume	Invert	Avail.Storage	Storage Description
#1	336.00'	13,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
336.00	1,800	0	0
337.00	2,600	2,200	2,200
338.00	3,400	3,000	5,200
339.00	4,300	3,850	9,050
340.00	5,100	4,700	13,750

Device	Routing	Invert	Outlet Devices
#1	Discarded	336.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.77 cfs @ 12.86 hrs HW=338.72' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.77 cfs)

Pond 1P: INFILTRATION BASIN



Summary for Pond 2P: POROUS PAVEMENT BASE

Inflow Area = 0.329 ac,100.00% Impervious, Inflow Depth > 5.63" for 25-Year event
Inflow = 1.76 cfs @ 12.13 hrs, Volume= 0.155 af
Outflow = 1.75 cfs @ 12.13 hrs, Volume= 0.155 af, Atten= 0%, Lag= 0.3 min
Discarded = 1.75 cfs @ 12.13 hrs, Volume= 0.155 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 334.01' @ 12.13 hrs Surf.Area= 14,125 sf Storage= 37 cf

Plug-Flow detention time= 0.3 min calculated for 0.155 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (746.9 - 746.6)

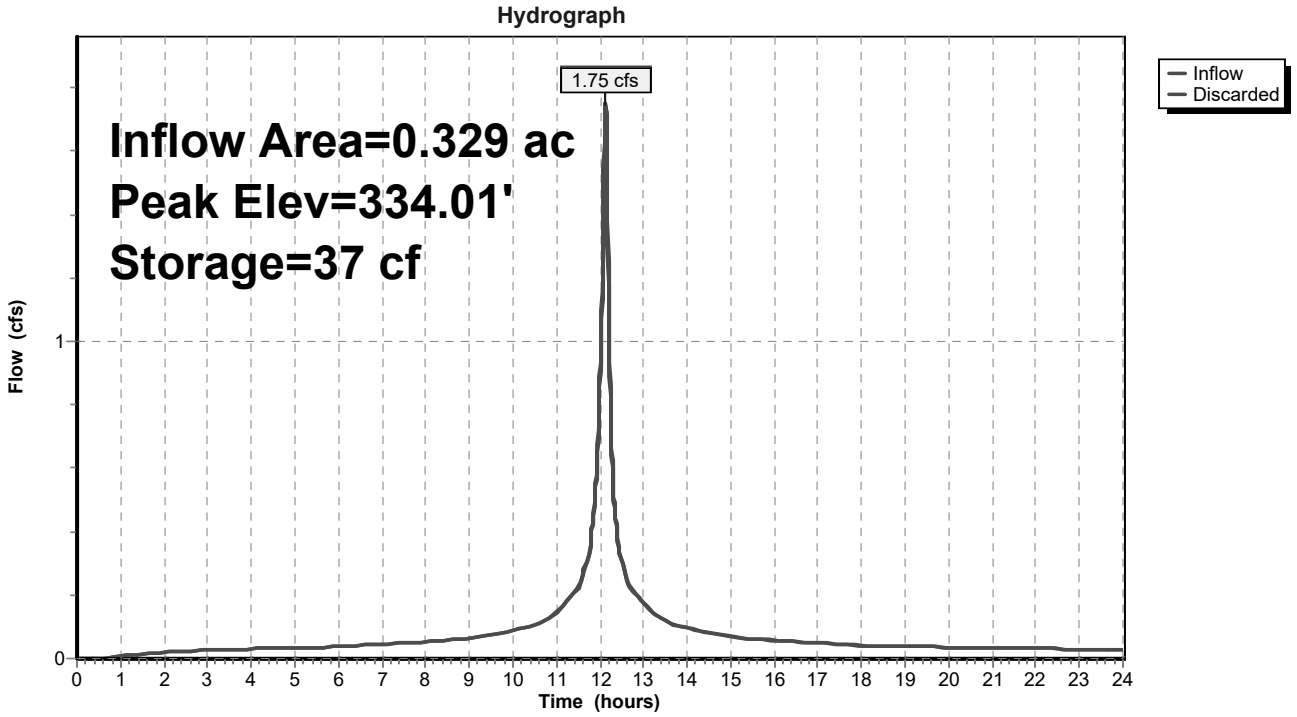
Volume	Invert	Avail.Storage	Storage Description
#1	334.00'	5,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 14,125 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
334.00	14,125	0	0
335.00	14,125	14,125	14,125

Device	Routing	Invert	Outlet Devices
#1	Discarded	334.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.70 cfs @ 12.13 hrs HW=334.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.70 cfs)

Pond 2P: POROUS PAVEMENT BASE



Summary for Pond 3P: Stormtech Chambers

Inflow Area = 1.181 ac,100.00% Impervious, Inflow Depth > 5.63" for 25-Year event
Inflow = 6.30 cfs @ 12.13 hrs, Volume= 0.555 af
Outflow = 1.33 cfs @ 12.40 hrs, Volume= 0.555 af, Atten= 79%, Lag= 16.1 min
Discarded = 1.33 cfs @ 12.40 hrs, Volume= 0.555 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 332.95' @ 12.40 hrs Surf.Area= 4,418 sf Storage= 4,793 cf

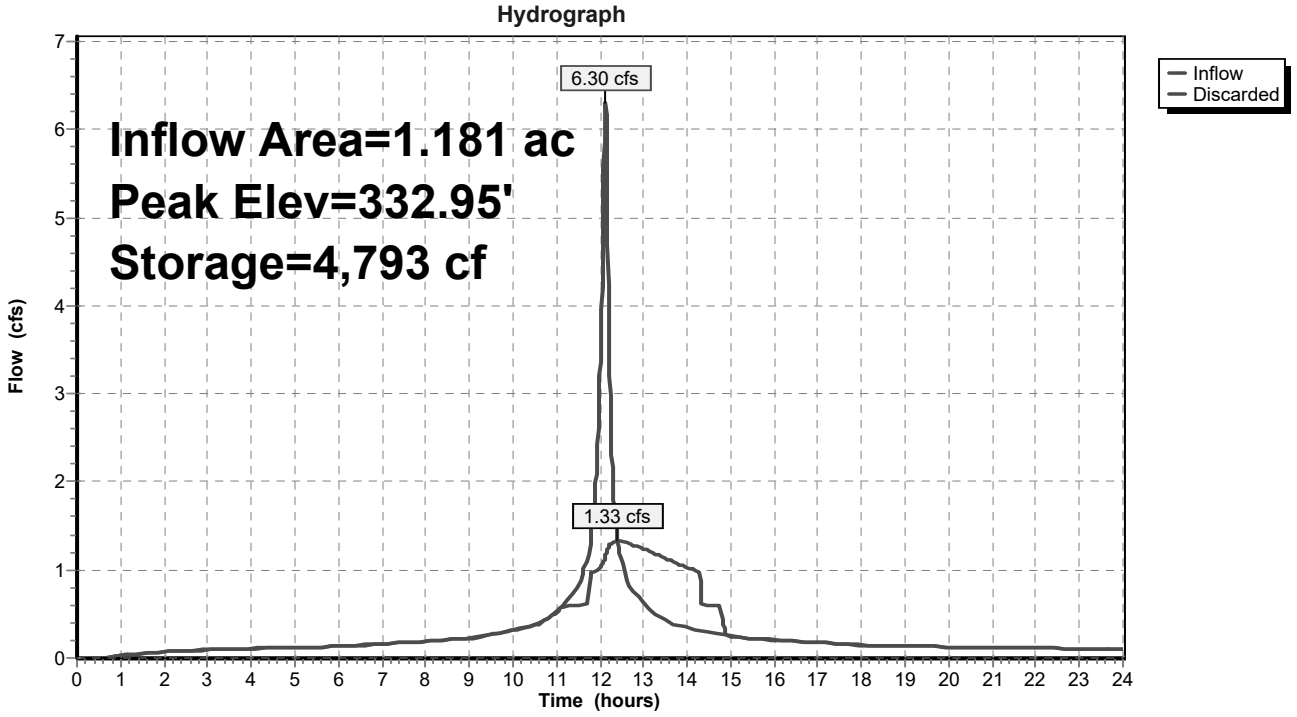
Plug-Flow detention time= 19.5 min calculated for 0.554 af (100% of inflow)
Center-of-Mass det. time= 19.3 min (765.9 - 746.6)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	4,930 cf	**39.50'W x 78.00'L x 4.00'H Prismatoid** 12,324 cf Overall x 40.0% Voids
#2	331.50'	3,216 cf	**ADS_StormTech SC-740 +Cap** x 70 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		8,145 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	331.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.33 cfs @ 12.40 hrs HW=332.95' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.33 cfs)

Pond 3P: Stormtech Chambers



Summary for Subcatchment 1S: NEW ROOF

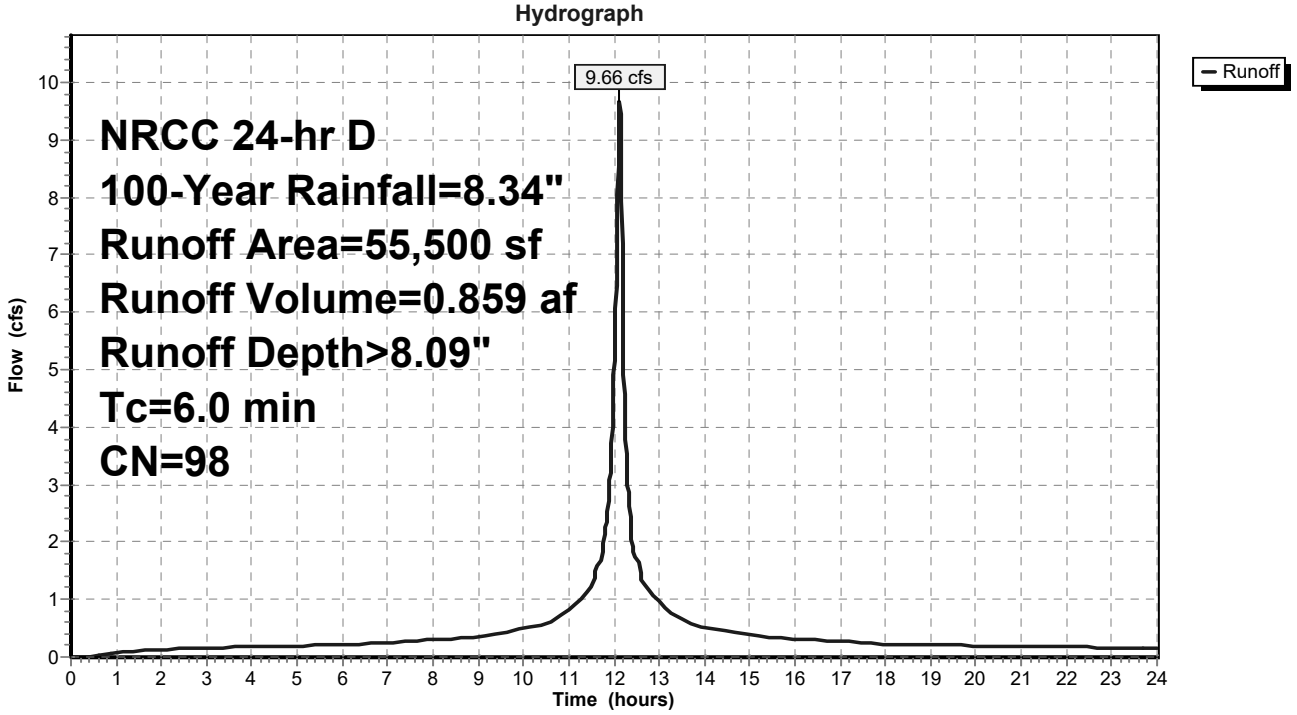
Runoff = 9.66 cfs @ 12.13 hrs, Volume= 0.859 af, Depth> 8.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
55,500	98	Roofs, HSG A
55,500		100.00% Impervious Area

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

Subcatchment 1S: NEW ROOF



Summary for Subcatchment 2S: POROUS PAVEMENT

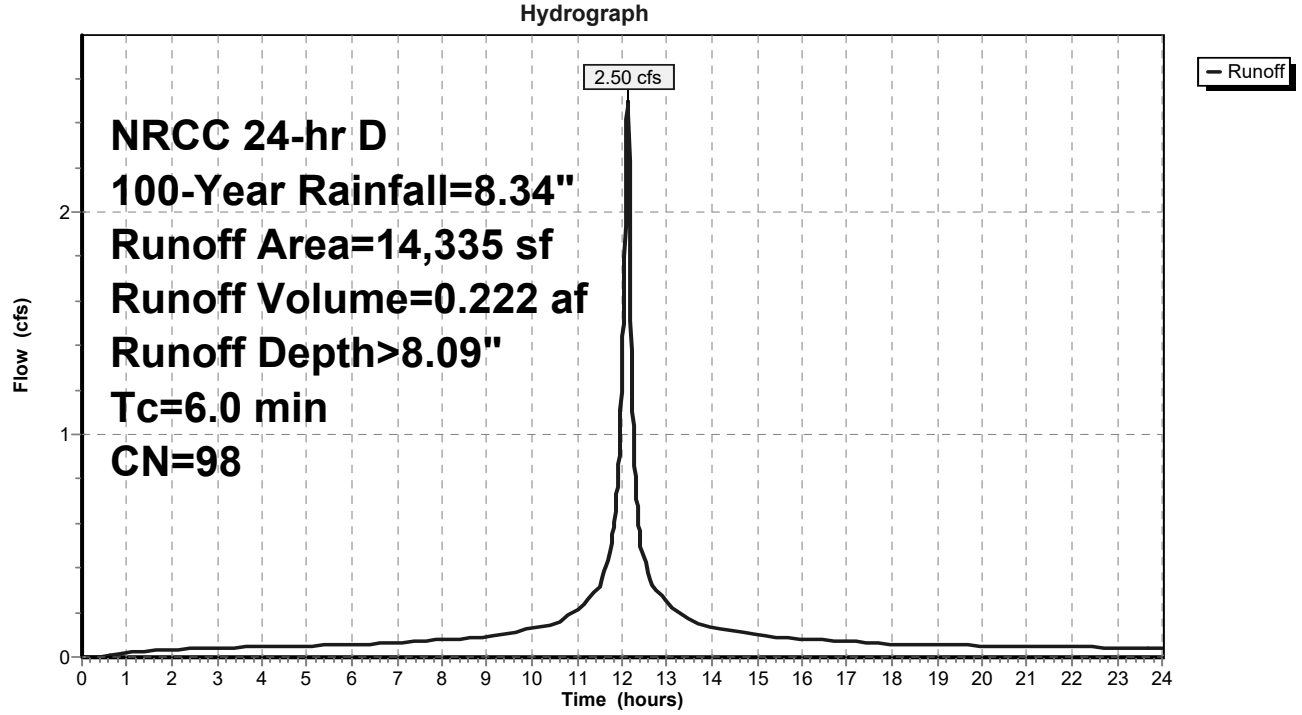
Runoff = 2.50 cfs @ 12.13 hrs, Volume= 0.222 af, Depth> 8.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
14,335	98	Paved parking, HSG A
14,335		100.00% Impervious Area

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

Subcatchment 2S: POROUS PAVEMENT



Summary for Subcatchment 3S: PAVEMENT

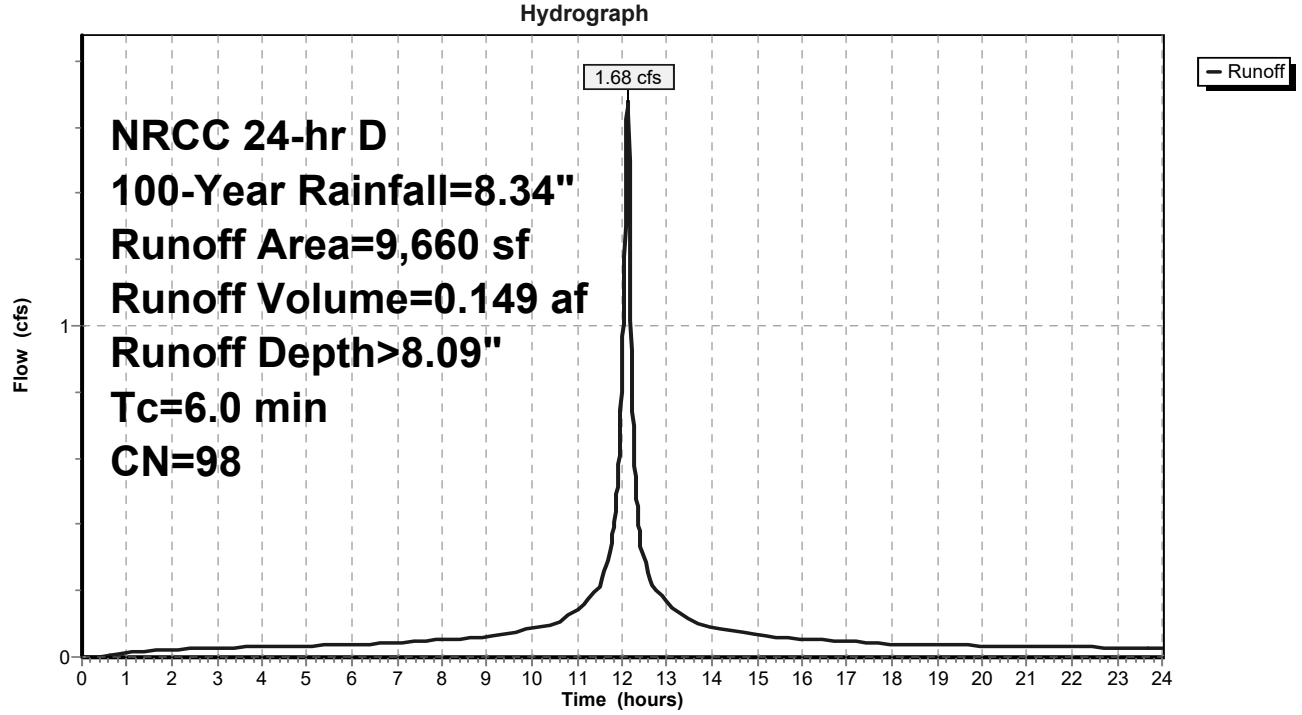
Runoff = 1.68 cfs @ 12.13 hrs, Volume= 0.149 af, Depth> 8.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
9,660	98	Paved parking, HSG A
9,660		100.00% Impervious Area

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

Subcatchment 3S: PAVEMENT



Summary for Subcatchment 4S: PAVEMENT

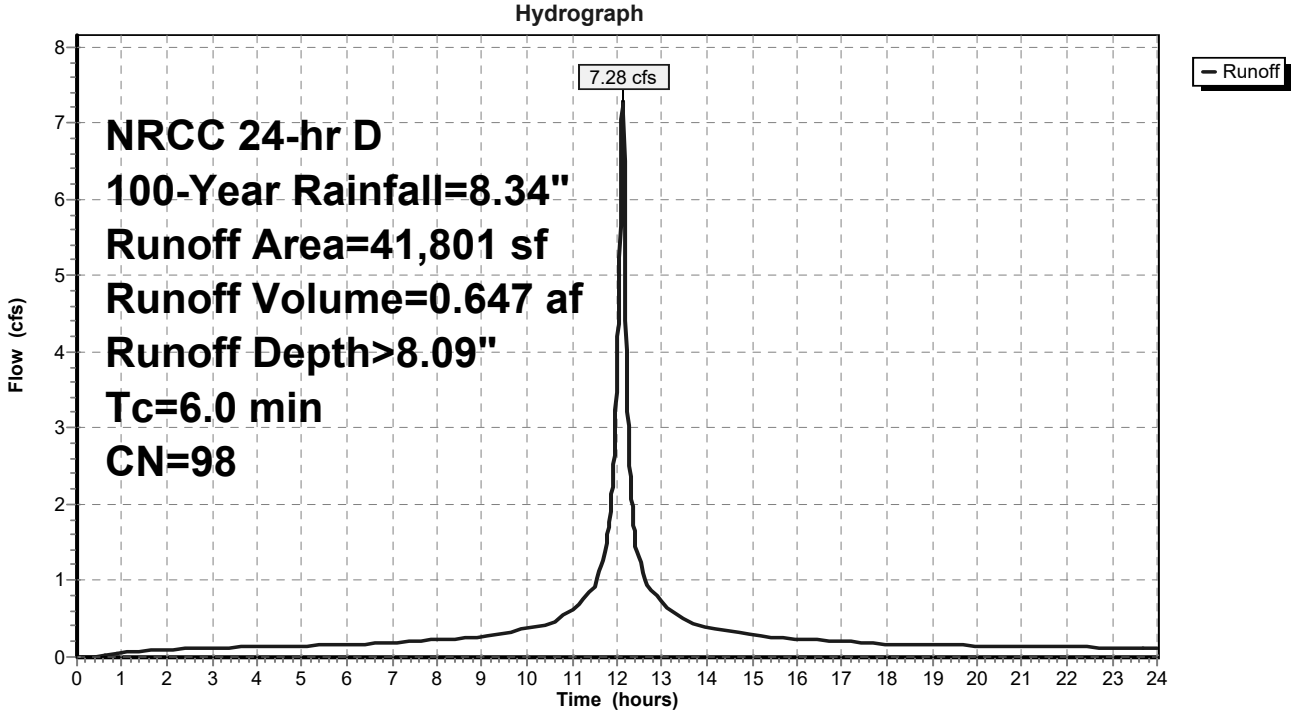
Runoff = 7.28 cfs @ 12.13 hrs, Volume= 0.647 af, Depth> 8.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
41,801	98	Paved parking, HSG A
41,801		100.00% Impervious Area

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

Subcatchment 4S: PAVEMENT



Summary for Subcatchment 5S: GRASS AREA

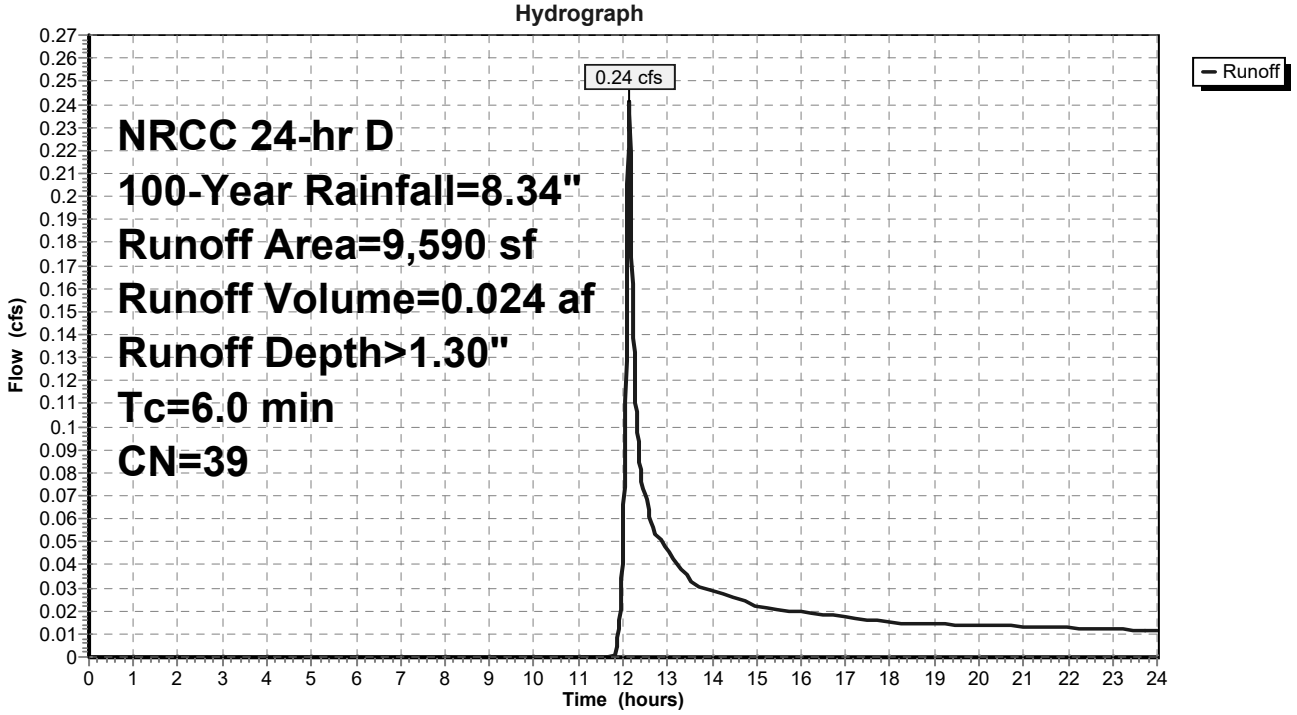
Runoff = 0.24 cfs @ 12.14 hrs, Volume= 0.024 af, Depth> 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
9,590	39	>75% Grass cover, Good, HSG A
9,590		100.00% Pervious Area

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

Subcatchment 5S: GRASS AREA



Summary for Subcatchment 6S: GRASS AREA

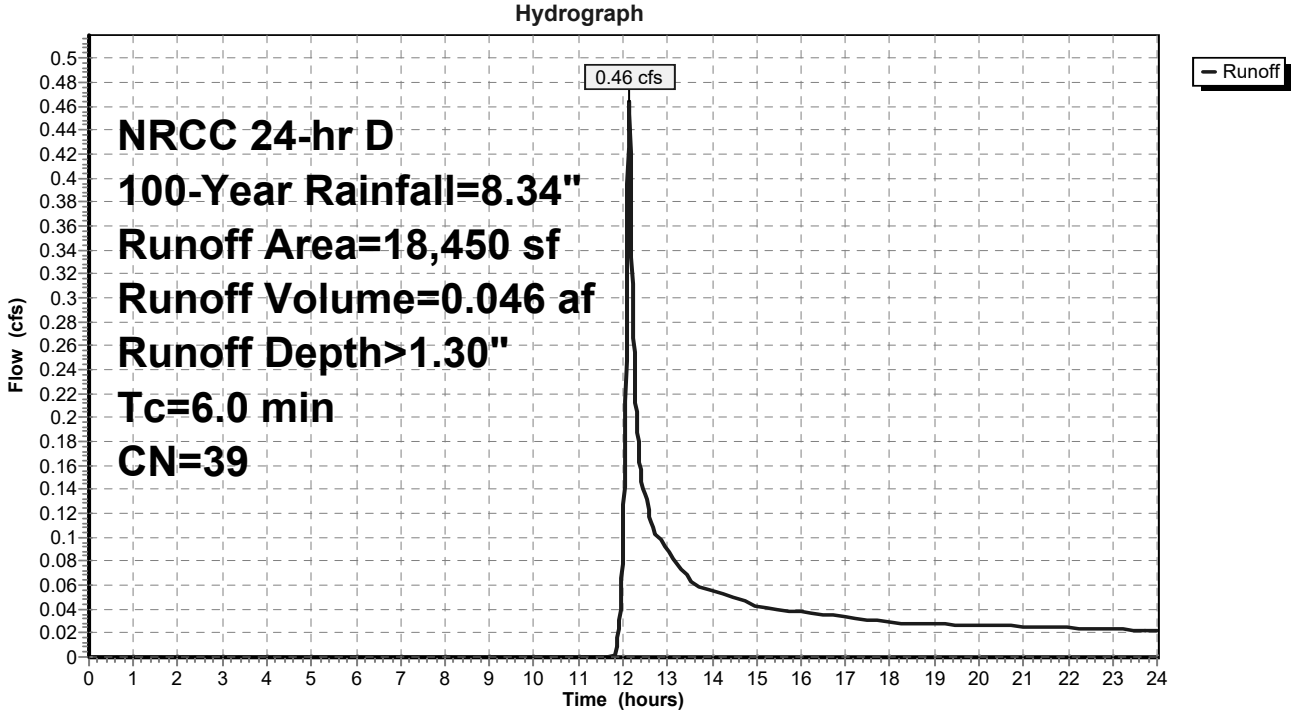
Runoff = 0.46 cfs @ 12.14 hrs, Volume= 0.046 af, Depth> 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
18,450	39	>75% Grass cover, Good, HSG A
18,450		100.00% Pervious Area

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

Subcatchment 6S: GRASS AREA



Summary for Subcatchment 7S: GRASS AREA

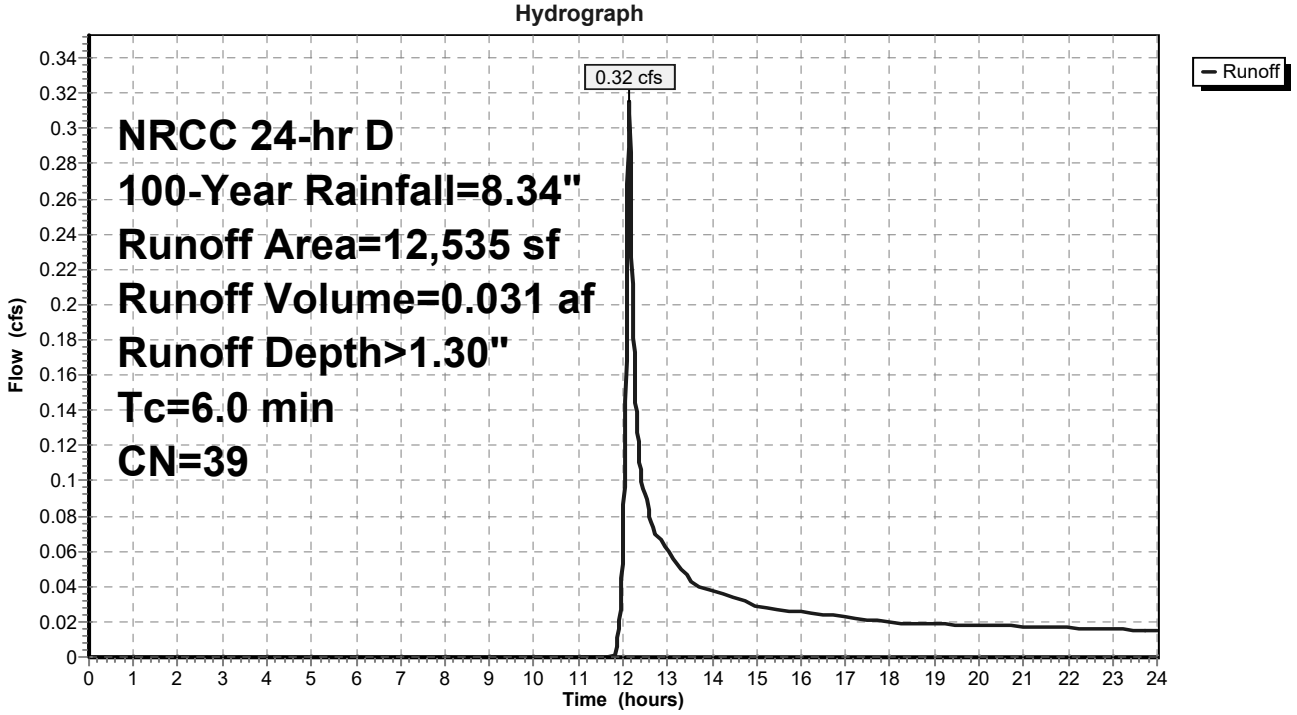
Runoff = 0.32 cfs @ 12.14 hrs, Volume= 0.031 af, Depth> 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.34"

Area (sf)	CN	Description
12,535	39	>75% Grass cover, Good, HSG A
12,535		100.00% Pervious Area

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

Subcatchment 7S: GRASS AREA

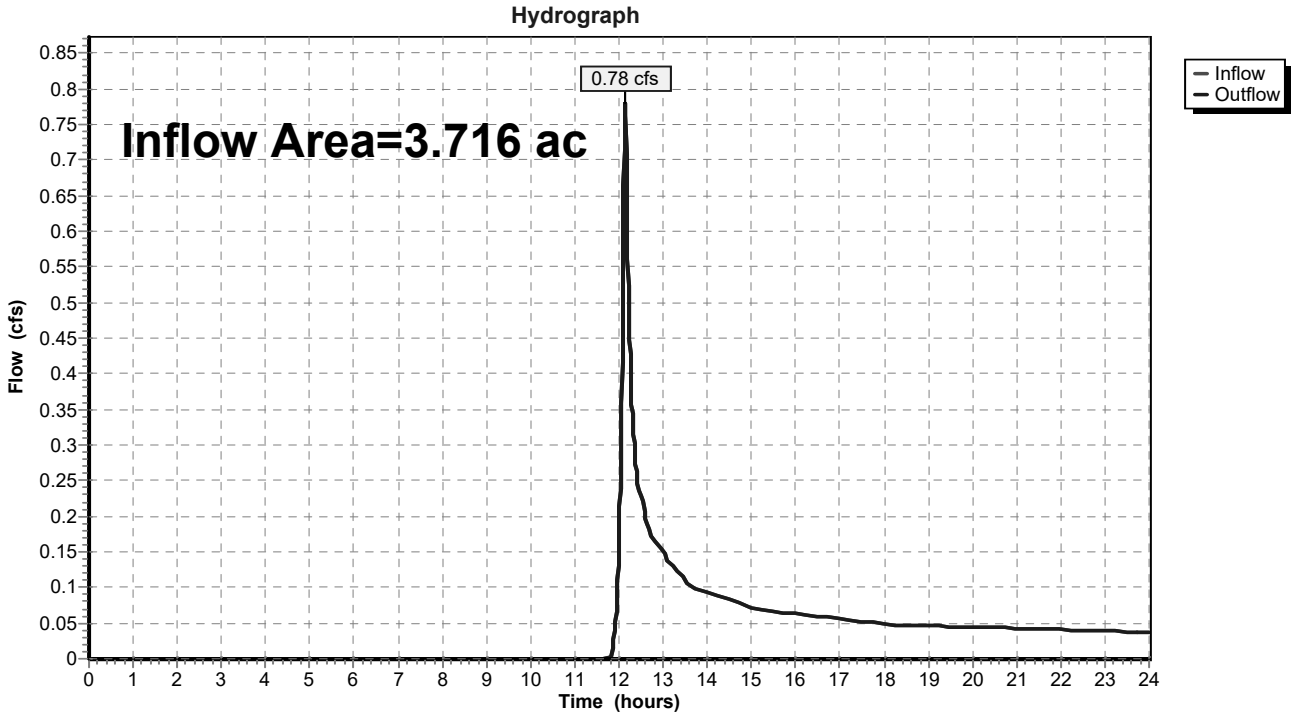


Summary for Reach 1R: OFFSTE

Inflow Area = 3.716 ac, 74.93% Impervious, Inflow Depth > 0.25" for 100-Year event
Inflow = 0.78 cfs @ 12.14 hrs, Volume= 0.077 af
Outflow = 0.78 cfs @ 12.14 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: OFFSTE



Summary for Pond 1P: INFILTRATION BASIN

Inflow Area = 1.494 ac, 85.27% Impervious, Inflow Depth > 7.09" for 100-Year event
Inflow = 9.89 cfs @ 12.13 hrs, Volume= 0.883 af
Outflow = 0.95 cfs @ 13.06 hrs, Volume= 0.882 af, Atten= 90%, Lag= 56.0 min
Discarded = 0.95 cfs @ 13.06 hrs, Volume= 0.882 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 339.84' @ 13.06 hrs Surf.Area= 4,972 sf Storage= 12,943 cf

Plug-Flow detention time= 117.4 min calculated for 0.882 af (100% of inflow)
Center-of-Mass det. time= 116.7 min (863.5 - 746.8)

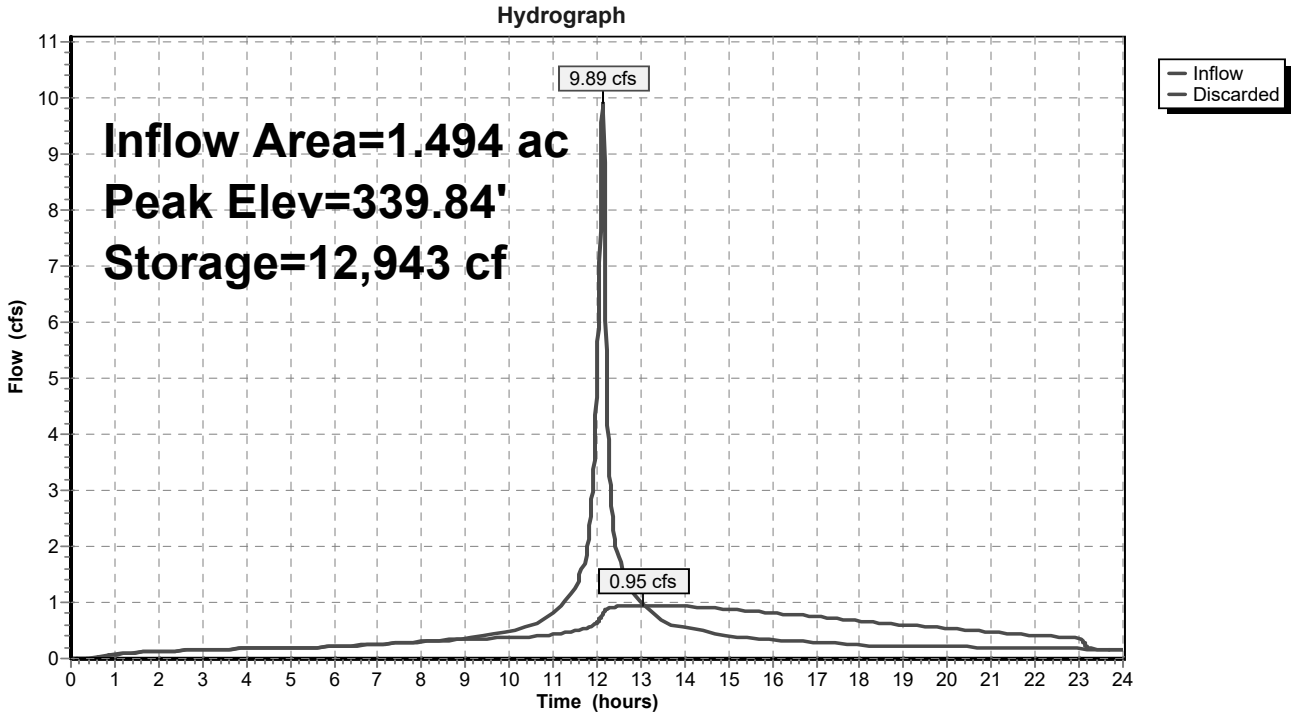
Volume	Invert	Avail.Storage	Storage Description
#1	336.00'	13,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
336.00	1,800	0	0
337.00	2,600	2,200	2,200
338.00	3,400	3,000	5,200
339.00	4,300	3,850	9,050
340.00	5,100	4,700	13,750

Device	Routing	Invert	Outlet Devices
#1	Discarded	336.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.95 cfs @ 13.06 hrs HW=339.84' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.95 cfs)

Pond 1P: INFILTRATION BASIN



Summary for Pond 2P: POROUS PAVEMENT BASE

Inflow Area = 0.329 ac,100.00% Impervious, Inflow Depth > 8.09" for 100-Year event
Inflow = 2.50 cfs @ 12.13 hrs, Volume= 0.222 af
Outflow = 2.49 cfs @ 12.13 hrs, Volume= 0.222 af, Atten= 0%, Lag= 0.3 min
Discarded = 2.49 cfs @ 12.13 hrs, Volume= 0.222 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 334.01' @ 12.13 hrs Surf.Area= 14,125 sf Storage= 52 cf

Plug-Flow detention time= 0.3 min calculated for 0.222 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (741.5 - 741.2)

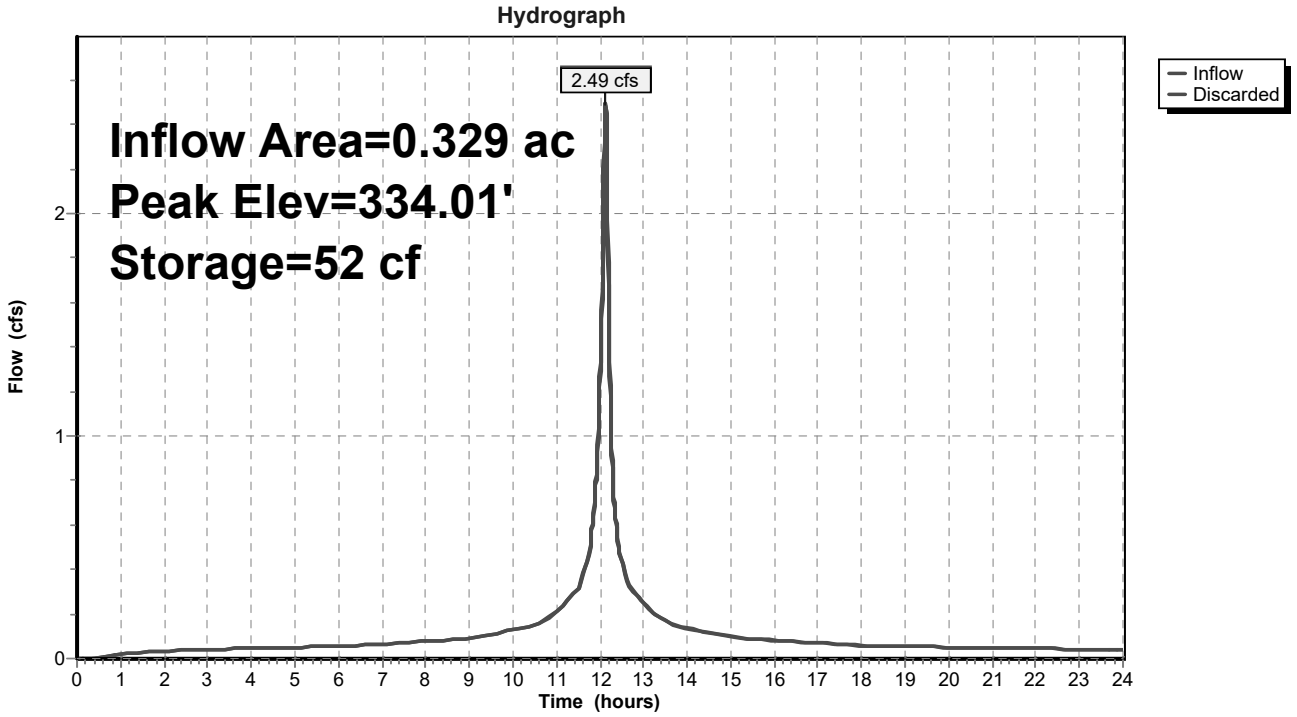
Volume	Invert	Avail.Storage	Storage Description
#1	334.00'	5,650 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 14,125 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
334.00	14,125	0	0
335.00	14,125	14,125	14,125

Device	Routing	Invert	Outlet Devices
#1	Discarded	334.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.70 cfs @ 12.13 hrs HW=334.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 2.70 cfs)

Pond 2P: POROUS PAVEMENT BASE



Summary for Pond 3P: Stormtech Chambers

Inflow Area = 1.181 ac,100.00% Impervious, Inflow Depth > 8.09" for 100-Year event
Inflow = 8.96 cfs @ 12.13 hrs, Volume= 0.796 af
Outflow = 1.74 cfs @ 12.43 hrs, Volume= 0.796 af, Atten= 81%, Lag= 17.9 min
Discarded = 1.74 cfs @ 12.43 hrs, Volume= 0.796 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 334.62' @ 12.43 hrs Surf.Area= 3,084 sf Storage= 7,672 cf

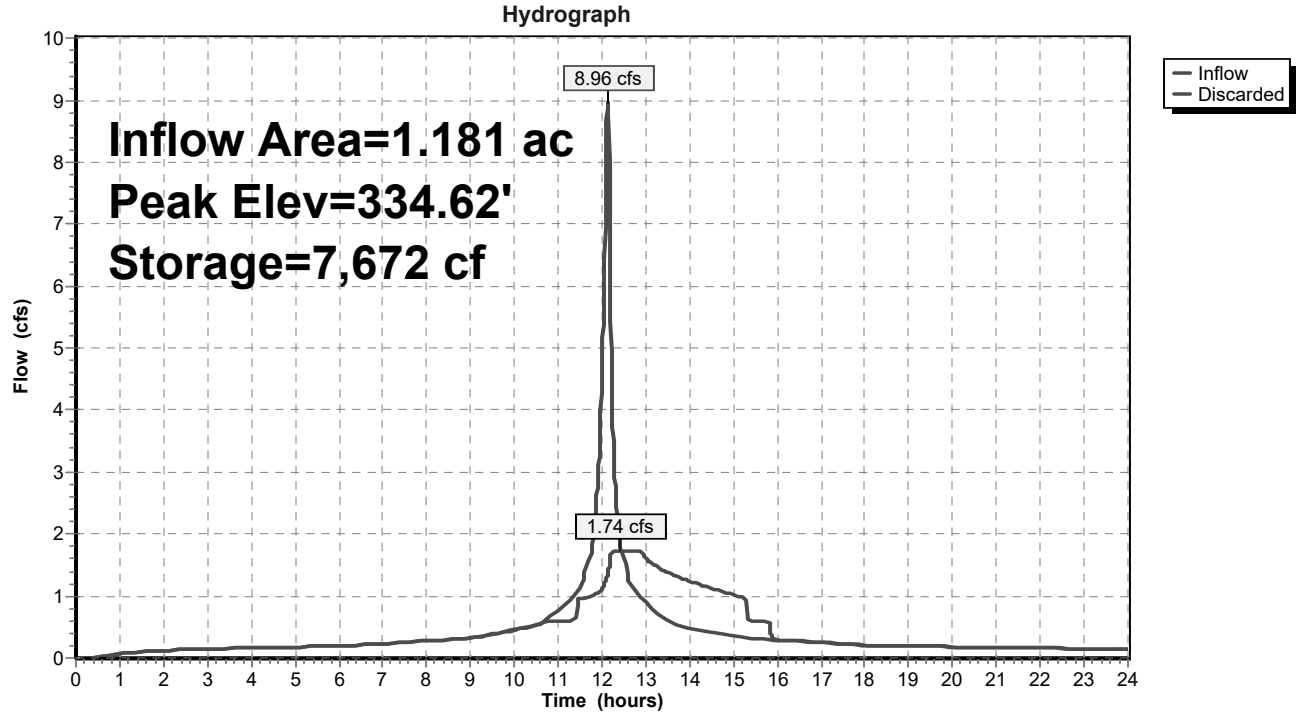
Plug-Flow detention time= 28.0 min calculated for 0.796 af (100% of inflow)
Center-of-Mass det. time= 27.7 min (768.9 - 741.2)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	4,930 cf	**39.50'W x 78.00'L x 4.00'H Prismatoid** 12,324 cf Overall x 40.0% Voids
#2	331.50'	3,216 cf	**ADS_StormTech SC-740 +Cap** x 70 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		8,145 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	331.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.74 cfs @ 12.43 hrs HW=334.62' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.74 cfs)

Pond 3P: Stormtech Chambers



DEP STORMWATER CHECKLIST/ ILLICIT DISCHARGE STATEMENT

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

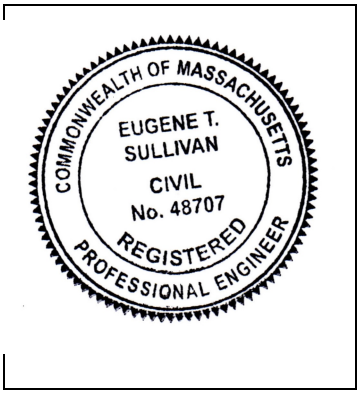
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Grant Sullivan P.E.

12/3/2020

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

ILLICIT DISCHARGE COMPLIANCE STATEMENT

SITE ADDRESS: 4 MacArthur Avenue, Devens, Massachusetts

OWNER: MacARTHUR AVENUE, LLC

PLAN REFERENCE: DRAINAGE & UTILITIES PLAN PREPARED BY EUGENE T. SULLIVAN, INC.

DATE: DECEMBER 3, 2020

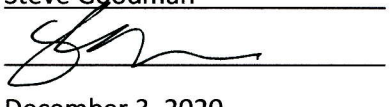
As required by Standard 10 of the Massachusetts Stormwater Standards, I, the undersigned, being the authorized owner/responsible party of the above referenced property do hereby certify that no illicit discharges exist on the site and that the stormwater management system, as shown on the above referenced plan, does not contain or permit any illicit discharges to enter the stormwater management system. Furthermore discharges from interior building drains or plumbing within the buildings are prohibited. Illicit discharges do not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

The pollution prevention plan measures to implements in this project to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease, include:

1. Identifying the responsible personnel for the implementation of an effective Illicit Discharge Detection and Elimination [IDDE] program.
2. Identify potential sources of Illicit Discharges.
3. Implement the Spill Prevention and Control Plan contained in the property Stormwater Pollution Prevention Plan [SWPPP].

Further, I certify that the stormwater management system ass shown on the referenced plan will be maintained in accordance with the conditions of the Long Term Pollution Prevention Plan.

NAME: Steve Goodman

SIGNED: 

DATE: December 3, 2020

TSS REMOVAL / RECHARGE CALCS

TSS REMOVAL CALCULATION WORKSHEET					
PROJECT:	***PROPOSED BUILDING***				
	4 MacArthur Avenue				
	Devens, Massachusetts				
LOCATION:	***Pavement Runoff to Subsurface Infiltration Basin***				
Infiltration Basin- PRE-TREATMENT					
BMP	***TSS REMOVAL RATE***	***STARTING TSS LOAD***	***AMOUNT REMOVED***	***REMAINING LOAD***	
DEEP SUMP CATCH BASIN	***$ 0.25***	***$ 1.00***	$ 0.25	$ 0.75	
CDS 2014-5 WATER QUALITY STRUCTURE [WC-1]	***$ 0.25***	***$ 0.75***	$ 0.19	$ 0.56	
SUBSURFACE INFILTRATION BASIN	***$ 0.70***	***$ 0.56***	$ 0.39	$ 0.17	
TOTAL TSS REMOVAL	***$ 0.83***				

Project: 4 MacArthur Avenue
Location: Devens, MA
Prepared For: Eugene T. Sullivan, Inc.

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

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

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
CS-4	1.51	0.0023516	6.0	0.100	1.00	774.00	1.82

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

CONTECH ENGINEERED SOLUTIONS

CASCADE separator™

4 MacArthur Avenue

Devens

WC-1

AREA	1.51	acres	**CASCADE MODEL**	CS-4	
WEIGHTED C	0.90		**PARTICLE SIZE**	110	microns
TC	6.00	minutes	**RAINFALL STATION**	69	

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	0.97	100.0	10.2
0.04	9.6%	1.94	100.0	9.6
0.06	9.4%	2.90	100.0	9.4
0.08	7.7%	3.87	100.0	7.7
0.10	8.6%	4.84	100.0	8.6
0.12	6.3%	5.81	100.0	6.3
0.14	4.7%	6.77	100.0	4.7
0.16	4.6%	7.74	100.0	4.6
0.18	3.5%	8.71	100.0	3.5
0.20	4.3%	9.68	100.0	4.3
0.25	8.0%	12.09	100.0	8.0
0.30	5.6%	14.51	98.3	5.5
0.35	4.4%	16.93	96.0	4.2
0.40	2.5%	19.35	93.7	2.4
0.45	2.5%	21.77	91.4	2.3
0.50	1.4%	24.19	89.2	1.2
0.75	5.0%	36.28	77.8	3.9
1.00	1.0%	48.38	66.4	0.7
				97.4
			Removal Efficiency Adjustment[2] =	6.5%
			Predicted % Annual Rainfall Treated =	93.3%
			Predicted Net Annual Load Removal Efficiency =	**90.9%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

PROJECT: *Proposed Building*
4 MacArthur Avenue
Devens, Massachusetts

RECHARGE CALCULATIONS:

Recharge Requirement: 0.60 inches of run-off [Group A Hydrologic Soils] of Total Impervious Area

TOTAL IMPERVIOUS AREA:

Roof Runoff:	=	55,500 SF
Paved Areas:	=	52,427 SF
Total Impervious Area:		107,927 SF

Volume of Recharge Required: 55,177 s.f. x 0.60/12 inches of run-off = 5,396.35 cubic feet

Recharge Provided:

Infiltration Basin:	26,353 CF [25-year storm event]
Subsurface Infiltration Basin:	24,175 CF [25-year storm event]
TOTAL RECAHRGE:	50,528 CF

The Stormwater drainage system significantly exceeds the recharge requirements to satisfy the MA DEP Stormwater Management Standards under all storm events.

DRAWDOWN CALCULATIONS:

Infiltration Basin:

Storage Volume:	26,353 CF [25-year storm event]
Total Bottom Area:	1,800 sf
Drawdown Time:	26,353 / [(8.27/12) * 1,800]= 21.24 hours

Subsurface Infiltration Basin:

Storage Volume:	24,175 CF [25-year storm event]
Total Bottom Area:	3,080 sf
Drawdown Time:	24,175 / [(8.27/12) * 3,080]= 11.39 hours

SOILS DATA

Commonwealth of Massachusetts
City/Town of Devens

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

A. Facility Information

MacArthur Avenue, LLC
Owner Name

4 MacArthur Avenue
Street Address

14-4-900
Map/Lot #

Devens
City

MA
State

01434
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS WEB SOIL SURVEY — 262A (Soil Map Unit)

Quonset loamy sand
Soil Name

Excessively drained
Soil Limitations

Sandy-skeletal
Soil Parent material

Outwash terrace
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: MassGIS Oliver (Year Published/Source) — Sand and Gravel (Map Unit)

Sand and Gravel
Description of Geologic Map Unit:

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

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: _____ (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/17/20 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Devens

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

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

Deep Observation Hole Number: 20-1 (Hole #) | 11/17/20 (Date) | 12:00PM (Time) | Sun, 40 (Weather) | 42.536380 (Latitude) | -71.622800 (Longitude:)

1. Land Use: Commercial/industrial – currently vacant (e.g., woodland, agricultural field, vacant lot, etc.) | Shrubs (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Shrub/vegetated area behind building

2. Soil Parent Material: Sandy outwash material | Outwash terrace/plain (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-90	Fill	SL									
90-100	Ab	FSL	10YR 3/2						M	F	
100-115	Bwb	LS	10YR 6/8						M	F	
115-140	C	Md. Sand	10YR 7/6						M	F	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Devens

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

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

Deep Observation Hole Number: 20-2 (Hole #) | 11/17/20 (Date) | 12:00PM (Time) | Sun, 40 (Weather) | 42.536380 (Latitude) | -71.622800 (Longitude:)

1. Land Use: Commercial/industrial – currently vacant (e.g., woodland, agricultural field, vacant lot, etc.) | Shrubs (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Shrub/vegetated area behind building

2. Soil Parent Material: Sandy outwash material | Outwash terrace/plain (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-90	Fill	SL									
90-100	Ab	FSL	10YR 3/2						M	F	
100-115	Bwb	LS	10YR 6/8						M	F	
115-140	C	Md. Sand	10YR 7/6						M	F	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Devens

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

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

Deep Observation Hole Number: 20-3 (Hole #) | 11/17/20 (Date) | 12:00PM (Time) | Sun, 40 (Weather) | 42.536380 (Latitude) | -71.622800 (Longitude:

1. Land Use: Commercial/industrial – currently vacant (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Parking lot

2. Soil Parent Material: Sandy outwash material | Outwash terrace/plain (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-48	Fill	LS									
48-120	C	Md. Sand	5Y 6/4						Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Devens

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

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

Deep Observation Hole Number: 20-4 (Hole #) | 11/17/20 (Date) | 1:00PM (Time) | Sun, 40 (Weather) | 42.578745 (Latitude) | -71.262487 (Longitude:)

1. Land Use: Commercial/industrial – currently vacant (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Parking lot

2. Soil Parent Material: Sandy outwash material | Outwash plain/terrace (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-48	Fill	LS									
48-120	C	Md. Sand	5Y 6/4						Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Devens

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

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

Deep Observation Hole Number: 20-5 (Hole #) | 11/17/20 (Date) | 1:00PM (Time) | Sun, 40 (Weather) | 42.578745 (Latitude) | -71.262487 (Longitude:

1. Land Use: Commercial/industrial – currently vacant (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Parking lot

2. Soil Parent Material: Sandy outwash material | Outwash terrace (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-55	Fill	LS									
55-120	C	Md. Sand	5Y 6/4						Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Devens

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

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

Deep Observation Hole Number: 20-6 (Hole #) | 11/17/20 (Date) | 1:00PM (Time) | Sun, 40 (Weather) | 42.578745 (Latitude) | -71.262487 (Longitude:)

1. Land Use: Commercial/industrial – currently vacant (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Parking lot

2. Soil Parent Material: Sandy outwash material | Outwash terrace (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-60	Fill	LS									
60-120	C	Md. Sand	5Y 6/4						Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Devens

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

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

Deep Observation Hole Number: 20-7 (Hole #) | 11/17/20 (Date) | 1:00PM (Time) | Sun, 40 (Weather) | 42.578745 (Latitude) | -71.262487 (Longitude:)

1. Land Use: Commercial/industrial – currently vacant (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Parking lot

2. Soil Parent Material: Sandy outwash material | Outwash terrace (Landform) | SH (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

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

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

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-62	Fill	LS									
62-120	C	Md. Sand	5Y 6/4						Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Devens

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

F. Certification

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

Thorsen Akerley	11/23/2020
Signature of Soil Evaluator	Date
Thorsen Akerley / #14016	6/30/2022
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Name of Approving Authority Witness	Approving Authority

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

Field Diagrams: Use this area for field diagrams:

OPERATION AND MAINTENANCE PLAN

STORMWATER POLLUTION PREVENTION PLAN [SWPPP]

4 MacArthur Avenue

Devens, Massachusetts

December 3, 2020

Prepared by:

EUGENE T. SULLIVAN, INC.

230 Lowell Street, Suite 2A

Wilmington, MA 01887

[978] 657.6469

EROSION AND SEDIMENT CONTROLS PLAN:

This report represents the Erosion and Sediment Controls Plan for the proposed Industrial Building at 4 MacArthur Avenue, Devens, Massachusetts.

The purpose of this report is to outline the methods and procedures to provide Erosion and Sediment controls to eliminate any adverse impact thru stormwater runoff or sediment accumulations to the adjacent properties, wetlands, and or roadways.

Erosion Control Notes and a Construction Sequence are identified on drawing C.1. As outlined on drawing EC.1, the following Erosion Controls are to be Installed and Maintained throughout the Construction Project:

- Siltsoxx are to be installed around the perimeter of the Limit of Work.

Additional Erosion Controls Measures and Procedures are contained in the attached Stormwater Pollution Prevention Plan prepared for this project.

INSPECTIONS OF EROSION CONTROLS:

To ensure that ensure that erosion controls are installed and maintained throughout the construction project, the project Civil Engineer, Eugene T. Sullivan, Inc. will conduct onsite inspections of all erosion control measures at least once every fourteen [14] calendar days and within 24 hours of the end of a ½" or greater storm event from the start of construction until the site is permanently stabilized. For each inspection, a site inspection log [contained in Appendix A of the SWPPP] must be completed. The Inspection logs must be maintained and available for review by the Planning Commission or its representatives.

All erosion and sediment controls and other protective measures identified in the SWPPP must be maintained in effective condition. If the Inspections identify measures which need to be maintained or are not functioning effectively, repairs, maintenance or additional erosion control measures must be implemented immediately to correct any deficiencies.

STORMWATER POLLUTION PREVENTION PLAN

APPENDIX “A”

Stormwater Pollution Prevention Plan

for:

4 MacArthur Avenue
Devens, Massachusetts

Operators and Contacts:

MacArthur Avenue, LLC
133 Pearl Street
Boston, Massachusetts

Prepared by:

EUGENE T. SULLIVAN, INC.
230 Lowell Street, Suite 2A
Wilmington, Massachusetts

SWPPP Preparation Date:

December 3, 2020

Estimated Project Dates:

Project Start Date: 03 / 01 / 2021
Project Completion Date: 04 / 15 / 2022

Contact Information/ Responsible Parties

Operator(s) / Emergency Contact:
MacArthur Avenue, LLC
133 Pearl Street
Boston, MA 02110
Attention: Will Deshler
Phone: 617.292.0101
Email: wdeshler@gfipartners.com

This SWPPP was Prepared by:
Eugene T. Sullivan Inc.
Gene Sullivan
230 Lowell Street, Suite 2A
Wilmington, MA 01887
978.657.6469
etspe@outlook.com

SECTION 1: PROJECT DESCRIPTION

1.0 Nature 0f Construction Activity

The proposed project consists of a 55,500 SF Industrial Building and associated parking areas.

What is the function of the construction activity?

Residential Commercial X Industrial ☐ Road Construction ☐ Linear Utility

Other (please specify):

Estimated Project Start Date: 03 / 01 / 2020

Estimated Project Completion Date: 04 / 15 / 2022

1.1 Soils, Slopes, Vegetation, and Current Drainage Patterns

Soil type(s): Sands

Slopes (describe current slopes and note any changes due to grading or fill activities):
The property is relatively flat.

Drainage Patterns: The existing building and paved area runoff sheet flow untreated into a drainage system along the northern property line.

Vegetation: Existing vegetation will remain to the maximum extent possible.

1.2 Site Features and Sensitive Areas to be Protected

Siltsoxx will be installed at the limit of work perimeter. The erosion controls will be maintained throughout construction activities.

1.3 Potential Sources of Pollution

Potential sources of sediment to Stormwater runoff:
Clearing and Grubbing Operations
Topsoil stripping and stockpiling operations.
Grading and Site Excavation Operations
Landscaping Operations
Potential pollutants and sources, other than sediment, to Stormwater runoff:
Ordinary Construction Activities
Concrete washout of trucks.

1.4 Maps

Site Plans and Maps are attached to this SWPPP.

SECTION 2: EROSION AND SEDIMENT CONTROL BMPS

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

After the installation of erosion controls has been completed, Topsoil will be removed from the construction area. The erosion controls shall be inspected weekly and after every significant [greater than ½"] storm event. Any erosion will be addressed and stabilized immediately.

2.2 Stabilize Soils

Temporary Stabilization:

The site topography has very little slope, therefore there should not be much need to stabilize exposed soils temporarily during construction activities. However, if stabilization is required, straw mulch will be applied to eliminate erosion. Disturbed areas will be inspected weekly or after storm events to check for movement or erosion. If erosion occurs, the surface will be repaired, and more mulch will be applied.

Permanent Stabilization:

Permanent stabilization will be done after final design grades have been achieved. All areas disturbed during construction will be loamed and seeded. All seeded areas will be inspected weekly and after during storm events after installation, if failure is noticed, the area will be addressed and reseeded.

Dust Control:

Dust from the site will be controlled using a mobile pressure-type water truck to apply water to disturbed areas as necessary.

2.3 Protect Slopes

If slopes need to be protected, Geotextile Erosion Control Blankets will be used on the slopes.

2.4 Protect Storm Drain Inlets

Catch basin siltsacks will be installed in the existing and new catch basins throughout the construction process until the drainage system is completed. The siltsacks will installed on the top of the structure beneath the catch basin grate to capture any sediments.

2.5 Establish Perimeter Controls and Sediment Barriers

Prior to any disturbances on-site siltsoxx will be installed along the project limit as indicated on the Erosion Controls drawing C.2. These erosion controls will prevent sediment from leaving the site. The siltsoxx will be secured using 2x2 wooden stakes.

2.6 Retain Sediment On-Site

Any sediment which may be created during the construction process will be collected by the erosion controls along the limit of work. The erosion controls will be inspected weekly and after every storm event. Any erosion will be addressed and stabilized immediately. Sediments which may be collected will be removed, hauled and disposed of off-site as necessary.

2.7 Establish Stabilized Construction Exits

A deep stone mud trap will be constructed at the southern driveway entrance from Dunham Road to prevent the off-site transport of sediment by construction vehicles. The stabilized exit will be installed before construction begins on the site. The stone will remain in place until the sub-base of the pavement is installed. The exit will be inspected weekly, after significant storm events, and after periods of heavy use. The exit will be maintained so that it will prevent the tracking of sediment off-site.

2.8 Additional BMPs

Eugene T. Sullivan Inc. [the project Civil Engineer] will perform bi-weekly inspections of the site to ensure compliance with this SWPPP. ETS Inc. will maintain the SWPPP documentation and will conduct and document inspections in all areas of the site.

SECTION 3: GOOD HOUSEKEEPING BMPS

3.1 Material Handling and Waste Management

Construction Waste:

All waste materials will be collected and disposed of into metal trash dumpsters. The dumpsters will be located away from the wetlands and/or property lines, stormwater conveyances and drains and will meet all federal, state, and municipal regulations. Only trash and construction debris from the site will be deposited in the dumpster. No debris and/or construction materials will be buried on-site. The dumpsters will be inspected weekly and after storm events. The dumpsters will be emptied as necessary and disposed of in accordance with regulations.

Sanitary Waste:

At a minimum, two temporary portable toilets will be provided onsite throughout the construction phase. The portable toilets will be located away from the wetland areas and/or property lines, stormwater conveyances and drains. Sanitary waste will be cleaned and collected from the portable toilets weekly.

3.2 Establish Proper Building Material Staging Areas

Construction Equipment and Materials will be staged in the area of the site away from the drainage systems and wetlands. The storage areas will be inspected weekly and after significant storm events to ensure that materials and/or sediment are not being created by the staging area. If necessary, erosion controls will be installed around the perimeter of the staging area.

3.3 Designate Washout Areas

A temporary above-grade concrete washout area will be constructed prior to any concrete deliveries to the site. A 10' x 10' washout will be constructed of staked hay bales and filter fabric. The washout area will be located adjacent to the materials staging area.

Concrete pours will not be conducted during or before an anticipated storm event. Concrete trucks and chutes will be washed in the designated area or concrete wastes will be properly disposed off-site. When the temporary washout area is no longer needed, the hardened concrete and materials used to construct the area will be removed and disposed of properly.

3.4 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices

Vehicles and Equipment to be used on-site throughout the project include excavators, loaders, dump trucks and trailers, paving equipment etc. All major equipment/vehicle fueling will occur within the materials staging area. Absorbent, spill-cleanup materials will be available at the materials staging area. Vehicles and equipment will be inspected each day for leaks, leaks will be repaired immediately, or the problem equipment will be removed from the site immediately.

3.6 Spill Prevention and Control Plan

Contractor awareness is the key to an effective spill prevention and response program. Anticipated spills for this project would be a result of oil or gas leaks. These spills should be brought to the attention of the project manager immediately. The project manager should have an adequate supply of absorbent compounds, rags etc. readily available at all time. The project manager will be trained to handle small spill events using the following procedures:

1. Stop the spill at the source.
2. Contain the spilled materials.
3. Collect the spilled materials as necessary using absorbent compounds, rags etc.
4. Dispose of the materials properly.

If the spill occurs near a storm drain structure, absorbent pads and/or socks shall be placed around the drains to prevent the spill from entering the collection system.

Spills should not be washed down with water unless the water can be contained and disposed of properly.

If a significant spill event occurs and cannot be handled by the project manager, contact the Fire Department or Local Environmental Emergency Response Team as required.

SECTION 4: INSPECTIONS

4.1 Inspections

Eugene Sullivan PE, the Project Civil Engineer who prepared the Civil Engineering Drawings for the project, prepared this SWPPP is responsible for site compliance with this SWPPP and the EPA's Construction General Permit. Inspections will be conducted for all areas of the site disturbed during construction activities. Inspections will be performed weekly and after storm events as detailed in this SWPPP. These inspections will verify that all BMP's required in sections 2 and 3 of this plan are implemented, maintained and effectively minimizing erosion and preventing Stormwater contamination from construction activities.

4.2 Delegation of Authority

Duly Authorized Representative(s) or Position(s):

EUGENE T. SULLIVAN, INC.
Gene Sullivan
President
230 Lowell Street, Suite 2A
Wilmington, MA 01887
978.657.6469
etspe@aol.com

SECTION 5: FINAL STABILIZATION

After the entire site has been stabilized, any sediment collected during the construction process will be removed and hauled off-site. Construction debris, trash and temporary BMP's [material and equipment storage areas, portable toilets etc.] will be removed and areas disturbed will be prepared for final seeding. Permanent seeding will be applied after all final grades have been established.

SECTION 6: CERTIFICATION AND NOTIFICATION

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Name: Eugene T. Sullivan PE Title: President

Signature:

Date: _____

Appendix A:

Stormwater Construction Site Inspection Report

General Information			
Project Name	***PROPOSED BUILDING***		
NPDES Tracking No.		**Location**	4 MacArthur Avenue, Devens, MA
Date of Inspection		**Start/End Time**	
Inspector's Name(s)	GENE SULLIVAN, P.E.		
Inspector's Title(s)	PROJECT ENGINEER		
Inspector's Contact Information	978.657.6469 etspe@outlook.com		
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Overall Site Issues

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

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Signature:_____ **Date:**_____