ENGINEERING REPORT:

ROADWAY DESIGN, DRAINAGE CALCULATIONS AND STORMWATER MANAGEMENT PLAN

For:

PLANNED UNIT TOWNHOUSE DEVELOPMENT
TO BE KNOWN AS
WOODMERE AT BRUSH HILL

Located:

865 BRUSH HILL ROAD
(ASSESSORS MAP B 12, LOTS 8A, 8B & 2B)
MILTON, MASSACHUSETTS 02186

Submitted to:

TOWN OF MILTON

Prepared For:

NORTHLAND RESIDENTIAL CORPORATION
20 MALL ROAD, SUITE 220
BURLINGTON, MASSACHUSETTS 01803

MAY 13, 2015

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Planned Unit Townhouse Development

to be known as

Woodmere at Brush Hill

865 Brush Hill Road, Milton, MA

(Assessor's Map B12, Lots 8A, 8B & 2B)

Project Summary

The project proponent, Northland Residential Corporation (NRC), proposes to redevelop an approximate 8.36 acre parcel of land located at 865 Brush Hill Road in Milton, Massachusetts. The proposed Planned Unit Townhouse Development (PUTD) consists of thirty-six (36) residential units comprised of thirty-four (34) townhouse units and two (2) mansion units. The development will involve the construction of fourteen (14) residential buildings, the renovation of the "Dupee House", an existing 2 1/2 story historic mansion-style building, approximately 1,500 linear feet of bituminous roadway, landscaping, stormwater management facilities, utility systems and associated infrastructure.

The parcel has frontage on Brush Hill Road to the southeast and is shown on the Milton Assessor's Maps as Lots 8A, 8B and 2B on Assessor's Map B12. The site is located within the Residence A Zoning District and is bordered by developed residential zoned property to the southwest (Cushing Road), developed residential property to the northeast (Dana Avenue), developed residential property to the northwest (Boston Housing Authority) and Brush Hill Road to the southeast. (Refer to Figure 1- USGS Locus Map for the location of the parcel.)

This report contains a description of the roadway design and calculations of stormwater runoff for the pre- and post-development conditions and includes the sizing of the proposed drainage system and stormwater best management practices (BMPs) in accordance with the Planned Unit Townhouse Development provisions, Section III, L of the Town of Milton Zoning By-Law, the Rules and Regulations of the Planning Board, and the Stormwater Management By-Law. The proposed and existing site conditions are illustrated on the project *site plans* entitled "Planned Townhouse Unit Development, Woodmere At Brush Hill, 865 Brush Hill Road, Milton, Massachusetts" dated May 13, 2015 and as revised.

Roadway Design & Requested Waivers

The project will have a main entrance off of Brush Hill Road in approximately the same location as the existing driveway. The entrance road (Road A) will be widened by approximately 5 feet from 17 feet to 22 feet to accommodate large vehicles such as fire trucks. The main loop road (Road B) and a dead-end road (Road C) will provide circulation throughout the site and is proposed to be 20 feet in traveled width curbed with 1 foot wide Cape Cod berm. A sidewalk/gravel walking path network is proposed

from the Brush Hill entrance through the site and linking to Cushing Road. The project roadways will be constructed in compliance with the requirements of the Town of Milton's Rules and Regulations of the Planning Board Governing the Subdivision of Land and Laying out of Ways with the following requested waivers:

Section	Requirement	Proposed Waiver Request
Section 6.0 Design Standards:		
6.1.1. Design Speeds:	Design speed for streets shall be 30 MPH	Minimum design speed = 20 MPH
6.1.7. Curves:	Min. centerline radii = 150 ft.	Min. centerline radii = 65 ft (Road B)
6.1.12. Dead Ends:	Max. dead end = 500 ft. Shall terminate in a 50 ft radius	Max. dead end = 1,041 ft. 22 ft wide hammerhead turnaround
Section 7.0 Required Improvements		
7.4.1.	Roadway Cross Section Appendix A	Proposed Cross Section
7.4.3.4.	5" crown (3.57% slope)	2.4" crown (2.0% slope)
7.4.3.7.	6" asphalt pavement	4" asphalt pavement
7.4.5.2.	Sidewalk cross slope= 3/8" per foot	Sidewalk cross slope= 1/4" per foot
7.4.6.1.	4'-6" grass strip between curb and sidewalk	4'-0" grass strip between curb and sidewalk
7.4.6.2.	8" loam and seed	6" loam and seed
7.5.2.	Water mains to be 14 ft off street line on opposite side of street from drainage	Varies as shown on plans
Section 8.0 Storm Drainage		
8.2.	Pipe material - vitrified clay, concrete, corrugated metal Min. pipe cover = 3 ft.	Pipe material - high density polyethylene (HPDE) Min. pipe cover = 1.5 ft.
Section 10.0 Utilities		
10.4.	Street lighting shall have a height of 15 ft. or more as approved by the Board	Street lighting shall have a height of 10 ft.

Water and Sewer Service

The project will require a connection to the municipal water system for water and fire services. Currently, there is an existing 8" water main within Brush Hill Road at the site's frontage. The project will loop a proposed 8" water main from a connection within Brush Hill Road through the site to a connection to the existing 8" water main within Cushing Road. The looped water main should ensure that adequate flows and pressures will be maintained by adding redundancy to the system.

The project will also require a connection to the municipal sewer system for sanitary services. Currently there is an existing 8" sewer main within Brush Hill Road at the site's frontage. The wastewater generated from the project will be collected and conveyed by a proposed 8" gravity sewer system to the existing sewer collection system within Brush Hill Road. The proposed sewer main connection to the existing sewer system will be provided with a new sewer manhole within Brush Hill Road.

Stormwater Design & Analysis

Pre-Development Condition

The site presently is comprised of an existing mansion-style building, containing approximately 6,155 s.f. previously used as a rectory, surrounding landscaped grounds, accessory garage, access drive and remaining wooded areas. The site's topography consists of gentle to moderate slopes ranging from approximately 0 to 20 percent with the majority of the stormwater runoff flowing towards the low lying areas on the site along its Brush Hill Road frontage.

The entire site is located within a Zone X, as shown on the current FEMA Flood Insurance Rate Map Panel No. 25021C 0201E with an effective date of July 17, 2012. (Refer to Figure 2 – FEMA Flood Map.)

Soils information was obtained from the Natural Resources Conservation Service (NRCS) Survey of Plymouth County, Massachusetts. The soils on the site are classified as Hinckley, sandy loam, 8-15 percent slopes (245C, Hydrologic Soil Group (HSG) A); Merrimac, fine sandy loam, 0 to 3 percent slopes (254A, HSG A); Merrimac, fine sandy loam, 3 to 8 percent slopes (254B, HSG A); and Merrimac, urban land, 3 to 8 percent slopes (626B, HSG A). (Refer to Figure 3 – NRCS Soils Map for a delineation of the boundaries of the soil with respect to the subject parcel. Refer to Appendix D for supporting soil testing data and results.)

The existing watershed analyzed in this report is comprised of approximately 17.4 acres consisting of the subject parcel and offsite tributary areas. The watershed consists of four (4) subcatchments. (Refer to the Pre-Development Watershed Plan WS-1 in Appendix A for a delineation of drainage subareas for the pre-development design condition. Refer to Appendix A for computer results, soil characteristics, cover descriptions and times of concentrations for all subareas.)

Post-Development Condition

Watershed areas were analyzed in the post-development condition stormwater analysis to design low impact stormwater management facilities to mitigate impacts resulting from developing the property. The objective in designing the proposed drainage facilities for the project was to maintain existing drainage patterns to the extent practicable and to ensure that the post-development rates of runoff are equal to or less than pre-development rates.

Refer to Post-Development Watershed Plan WS-2 in Appendix B for a delineation of the post-development drainage subareas. The design points for the post-development design conditions correspond to those analyzed for the pre-development design condition. All BMPs shall be supported by a comprehensive Best Management Practices (BMP) Operation and Maintenance Plan.

Stormwater Detention and Infiltration Facilities

The natural depression areas, proposed stormwater infiltration basin, and subsurface infiltration chambers were designed to attenuate peak flows generated by all storm events to ensure that post-development peak flows are less than pre-development flows at the design points and allow for recharge to groundwater. The proposed facilities were analyzed using the SCS TR-20 computer based program, HydroCAD for the 2, 10, 25, and 100-year Type III storm events. (Refer to Appendix B for the Stage Storage Curves and the HydroCAD computer results for the storage characteristics of the detention and infiltration facilities.)

Stormwater Best Management Practices (BMP's)

The stormwater management system was designed to be in full compliance with the DEP Stormwater Management Policy. A treatment stream consisting of a combination of deep-sump catch basins with hooded outlets, infiltration basin or subsurface infiltration chambers with pretreatment proprietary units will be employed in the design of drainage facilities for the project to achieve the required removal of 80% total suspended solids. The proposed treatment streams will renovate the stormwater by promoting the settlement of sediments and pollutants before runoff is released into down gradient areas or groundwater. (Refer to the TSS Removal Worksheets in Appendix C for TSS removal rates.)

Sustainable Design Elements

The proposed stormwater management system incorporates natural depression areas and infiltration systems to attenuate peak flows generated by all storm events to ensure that post-development peak flows are less than pre-development flows at the design points and allow for recharge to groundwater. These "low impact" stormwater management techniques will reduce the site's dependence on proprietary subsurface stormwater systems. The natural depression areas and infiltration basin will utilize

vegetation, enhanced soil media and other "natural" site features to renovate and mitigate stormwater runoff from impervious surfaces.

Erosion and Siltation Control

Silt sock will be placed at the limit of work as the site's erosion control barrier prior to the commencement of any construction activity. The integrity of the erosion control barriers will be maintained by periodic inspection and replacement as necessary. The erosion control barrier will remain in place until the first course of pavement has been placed and all side slopes have been loamed and seeded and vegetation has been established. Riprap outlet protection for all pipe outlets is proposed to ensure that minimal velocities will be realized before flows are discharged into wetland areas. (Refer to the Erosion Control Details, Construction Detail Plan and Best Management Practices Operation and Maintenance Plans for proposed erosion control measures to be employed for the project.)

Compliance with Stormwater Management Standards

Standard 1 – No New Untreated Discharges

The site development is designed so that new stormwater conveyances do not discharge untreated pavement runoff into, or cause erosion to, down gradient areas. (Refer to Appendix C for stormwater discharge velocity and ground surface erosion resistance calculations for the proposed discharge points.)

Standard 2 – Peak Rate Attenuation

In the pre-development and post-development stormwater analysis, the watershed area analyzed was approximately 17.2 acres consisting of the subject parcel to be developed and offsite tributary areas. Refer to Pre-Development Watershed Delineation Plan (WS-1) for a delineation of drainage subareas for the pre-development design condition and refer to Post-Development Watershed Delineation Plan (WS-2) for a delineation of drainage subareas for the post-development design condition. The SCS technical release 20 (TR-20) based program, HydroCAD was employed to develop pre and post-development peak flows.

All closed drainage structures were designed employing the Rational Method and the Mass DOT Design Manual and Milton Subdivision Regulations to accommodate peak flows generated by a minimum of a 100-year storm event. The stormwater facilities were designed to accommodate peak flows generated by a 100-year storm event. (Refer to Appendix C for the roadway closed drainage system design and all associated reference data.)

Design point locations are illustrated on the Watershed Delineation Plans within Appendix A and B.

The peak rates of runoff are as follows:

Pre-Development vs. Post-Development Peak Rates of Runoff

Design Point	2 Year Storm (3.20 Inches)		10 Year Storm (4.70 Inches)		25 Year Storm (5.50 Inches)		100 Year Storm (6.70 Inches)	
	Exist. (CFS)	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**	**Exist. (CFS)**	**Prop. (CFS)**
Design Point 1 (SE - Natural Depression)	*0.00*	0.00	*0.00*	0.00	*0.00*	0.00	*0.00*	0.00
Design Point 2 (SW - Natural Depression)	*0.00*	0.00	*0.00*	0.00	*0.00*	0.00	*0.00*	0.00
Design Point 3 (NW - Natural Depression)	*0.00*	0.00	*0.06*	0.04	*0.12*	0.06	*0.22*	0.15
Design Point 4 (North - Natural Depression)	*0.00*	0.00	*0.00*	0.00	*0.00*	0.00	*0.00*	0.00

A comparison of the pre-development and post-development peak rates of runoff demonstrates that the proposed development will control all stormwater runoff on site. In existing conditions, design point 3 discharges towards design point 4 and is contained with the natural depression. In proposed conditions, a portion of the design point 3 catchment area is redirected towards the proposed subsurface chamber system while the remaining portion of the catchment area is still directed towards design point 4. The central natural depression was utilized as part of the infiltration basin within the project site. The southeastern natural depression (DP1 SE Natural Depression) was replaced with a proposed subsurface infiltration chamber system (DP1).

Pre-Development vs. Post-Development Peak Flood Elevations

Design Point	2 Year Storm (3.40 Inches)		10 Year Storm (4.70 Inches)		25 Year Storm (5.60 Inches)		100 Year Storm (7.00 Inches)	
	Exist. (FT)	**Prop. (FT)**	**Exist. (FT)**	**Prop. (FT)**	**Exist. (FT)**	**Prop. (FT)**	**Exist. (FT)**	**Prop. (FT)**
P1b (Central-Natural Depression)	*102.0*	101.56	*102.06*	102.26	*102.17*	*102.62*	*102.40*	103.11
Design Point 2 (SW - Natural Depression)	*100.46*	100.66	*101.01*	101.66	*101.38*	*102.14*	*102.02*	102.77
Design Point 3 (NW - Natural Depression)	*104.30*	104.30	*104.44*	104.49	*104.70*	*104.83*	*105.08*	105.07

Design Point 4 (North-Natural Depression)	*103.83*	103.83	*104.02*	103.99	*104.17*	*104.18*	*104.40*	104.44

The central infiltration/natural basin (P1b) discharge is directed towards the subsurface infiltration chamber system and contained on site. As well, the southwestern natural depression (DP 2) has a moderate increase in ponding elevation but is contained on site. Natural depressions - DP 3 and DP 4 straddle the northwestern and north property lines respectively. These natural depressions were analyzed to meet the existing conditions with negligible ponding impacts and therefore do not impact flooding on adjacent properties. Both natural depressions have outlet relief via proposed 12" pipe outlets directing flow towards the site's proposed stormwater management system.

Standard 3 – Groundwater Recharge

Runoff will be infiltrated by natural depressions, an infiltration basin and subsurface infiltration chambers, which will the meet the Stormwater Guidelines for infiltration:

- Infiltration structures will be a minimum of two feet above seasonal high groundwater.
- Utilize the "Simple Dynamic" method for sizing the storage volume, which takes into account the fact that stormwater is exfiltrating from the infiltration facilities at the same time that the system is filling.
- Hydraulic conductivity are based on test pits and values developed from Rawls, Brakensiek and Saxton, 1982, Estimation of Soil Water Properties, *Transcations of the American Society of Agricultural Engineers*, vol.25, no. 5.
- The infiltration component of the subsurface chamber systems (DP 1) and infiltration basin (P1b) are required to attenuate larger storm events and therefore a four foot separation to seasonal high groundwater is provided.
- Refer to Appendix C for infiltration and drawdown calculations and Appendix D for soil testing data.

Groundwater Recharge Volume

Infiltration BMP	**Soil Type**	**Target Depth Factor (F) (in)**	**Total Impervious Area (ac)**	**Required Recharge Volume (cf)[1]**	**Provided Recharge Volume (cf)[2]**
	A	0.60	3.329	7,251	
P1b (nat. dep./ infiltration basin)					11,043
DP1 (subsurface chambers)					14,417
P3b (subsurface chambers)					651

DP2 (natural depression)				3,057
DP3 (natural depression)				2,055
P3a (subsurface chambers)				5,691
DP4 (natural depression)				3,926
P1c (natural depression)				518
			7,251	**41,358**

[Simple dynamic method]

1. Required Recharge Volume = Target Depth Factor x Impervious Area / (d+Kt) (Refer to supplemental calculations in Appendix C)
2. Provided Recharge Volume = Volume Provided from Bottom of Basin to lowest outlet invert.

Standard 4 – Water Quality

The Long-Term Pollution Prevention Plan has been incorporated into the Post-Development Operation and Maintenance Plan. The total required water quality treatment volume was calculated to be 5,020 cubic feet. The one-inch rule has been applied to the water quality volume calculations since the project site soil conditions are considered to have rapid infiltration rates, greater than 2.4 inches per hour. Pretreatment BMPs are provided to obtain 44% TSS removal prior to infiltration treatment facilities. Refer to Appendix C for supporting calculations. The water quality treatment volume is provided within the stormwater management facilities as follows:

Water Quality Treatment Volume

Stormwater Facility	Required WQ Volume (cf)	Proposed WQ Volume (cf)	
P1b	1,311	11,043	Natural/Infiltration Basin
DP1	3,310	14,417	Subsurface Infiltration
P3b	399	651	Subsurface Infiltration
DP2 (roof & offsite)	0	0	Natural Depression
DP3 (roof & offsite)	0	0	Natural Depression
P3a (offsite)	0	0	Subsurface Infiltration
DP4 (roof & offsite)	0	0	Natural Depression
P1c (roof)	0	0	Natural Depression
	5,020	**26,111**	

Standard 5 – Land Use with Higher Potential Pollutant Loads (LUHPPL)

The proposed project does not include land uses with higher potential pollutant loads. Not Applicable.

Standard 6 – Critical Areas

The proposed project is not located within a critical area. Not Applicable.

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

The proposed project will not be considered a redevelopment project. Not Applicable.

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

The project will require a NPDES Construction General Permit but the Stormwater Pollution Prevention Plan (SWPPP) has not been submitted. The SWPPP will be submitted prior to any proposed construction. A Construction Phase BMP Operation and Maintenance Plan has been provided as a basis for the SWPPP.

Standard 9 – Operation and Maintenance Plan

The Post Construction Operation and Maintenance Plan and Long-Term Pollution Prevention Plan are provided in Appendix D.

Standard 10 – Prohibition of Illicit Discharges

No illicit discharges are anticipated on site. Measures to prevent illicit discharges are included in the Long-Term Pollution Prevention Plan. An Illicit Discharge Compliance Statement will be provided prior to construction.

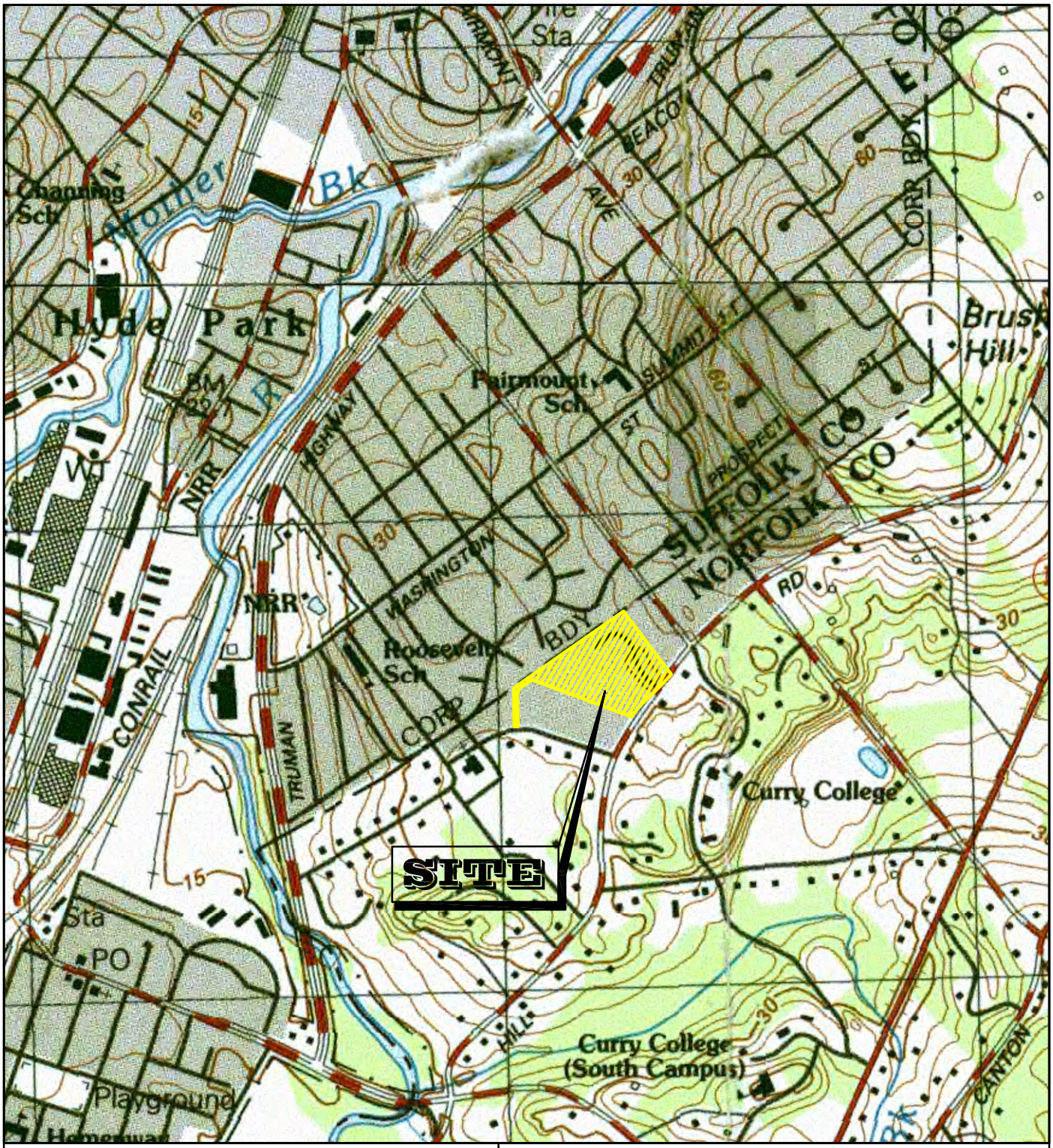

FIGURE - 1

0 1000' 2000' 2500'

U.S. GEOLOGICAL SURVEY
7.5 X 15 MINUTE SERIES

McKENZIE ENGINEERING GROUP, INC.
150 LONGWATER DRIVE, SUITE 101
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USGS Locus Map

865 Brush Hill Road
MAP B12, LOTS 8A, 8B & 2B
MILTON, MASSACHUSETTS

FIGURE - 2

0 400' 800' 1000'

NATIONAL FLOOD INSURANCE PROGRAM
TOWN OF MILTON, MA
NORFOLK COUNTY
COMMUNITY PANEL NO: 25021C0201E
EFFECTIVE DATE: JULY 17, 2012

McKENZIE ENGINEERING GROUP, INC.
150 LONGWATER DRIVE, SUITE 101
NORWELL, MASSACHUSETTS 02061
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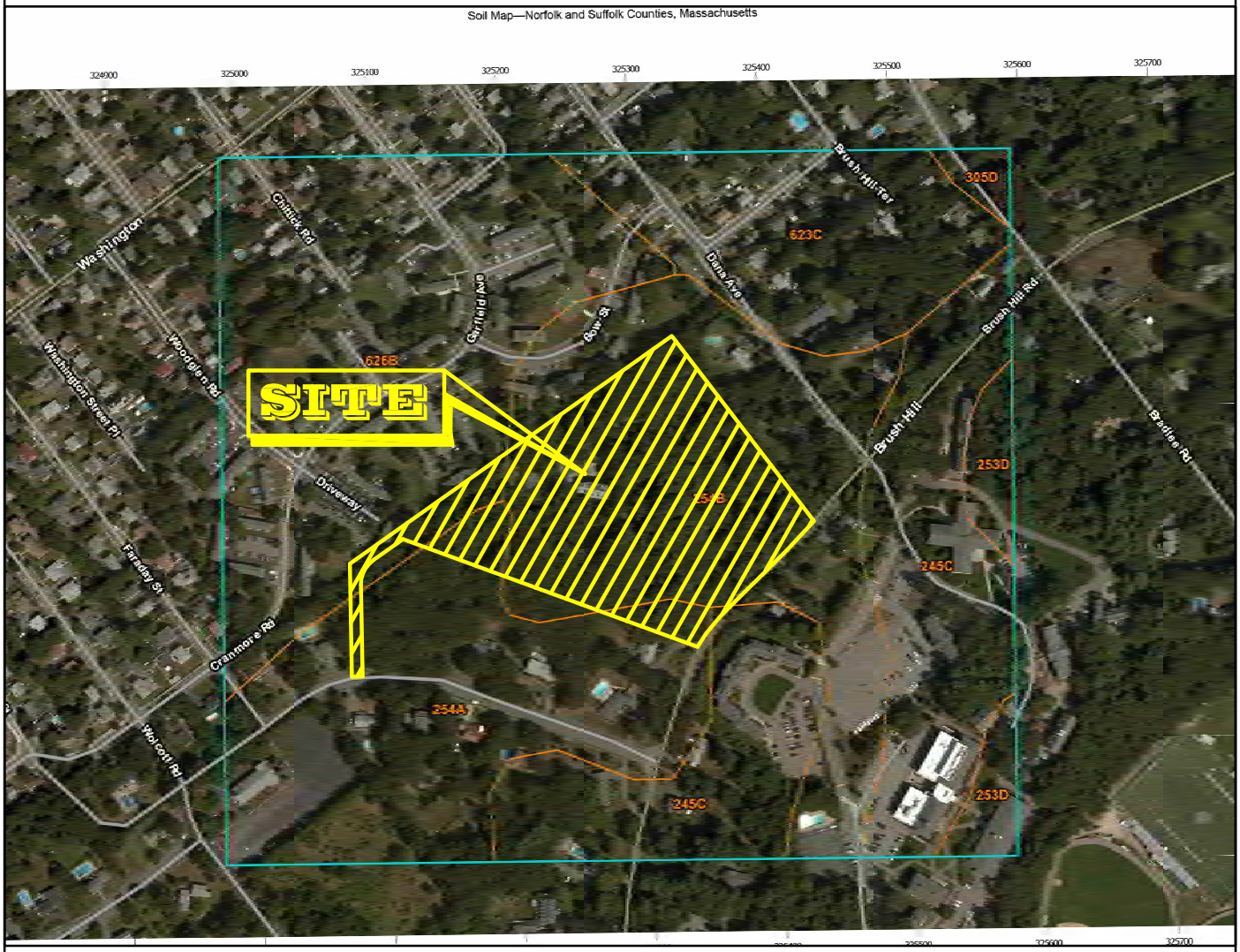
PROFESSIONAL CIVIL ENGINEERING • LAND PLANNING • PROJECT MANAGEMENT

FEMA Flood Map

865 Brush Hill Road
MAP B12, LOTS 8A, 8B & 2B
MILTON, MASSACHUSETTS



SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
245C	HINCKLEY SANDY LOAM, 8 TO 15 PERCENT SLOPES	A
254A	MERRIMAC FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES	A
254B	MERRIMAC FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES	A
626B	MERRIMAC URBAN LAND, 3 TO 8 PERCENT SLOPES	A

FIGURE - 3

0 400' 800' 1000'

NRCS SOIL SURVEY
TOWN OF MILTON, MA
NORFOLK COUNTY

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NRCS Soils Map

865 Brush Hill Road
MAP B12, LOTS 8A, 8B & 2B
MILTON, MASSACHUSETTS

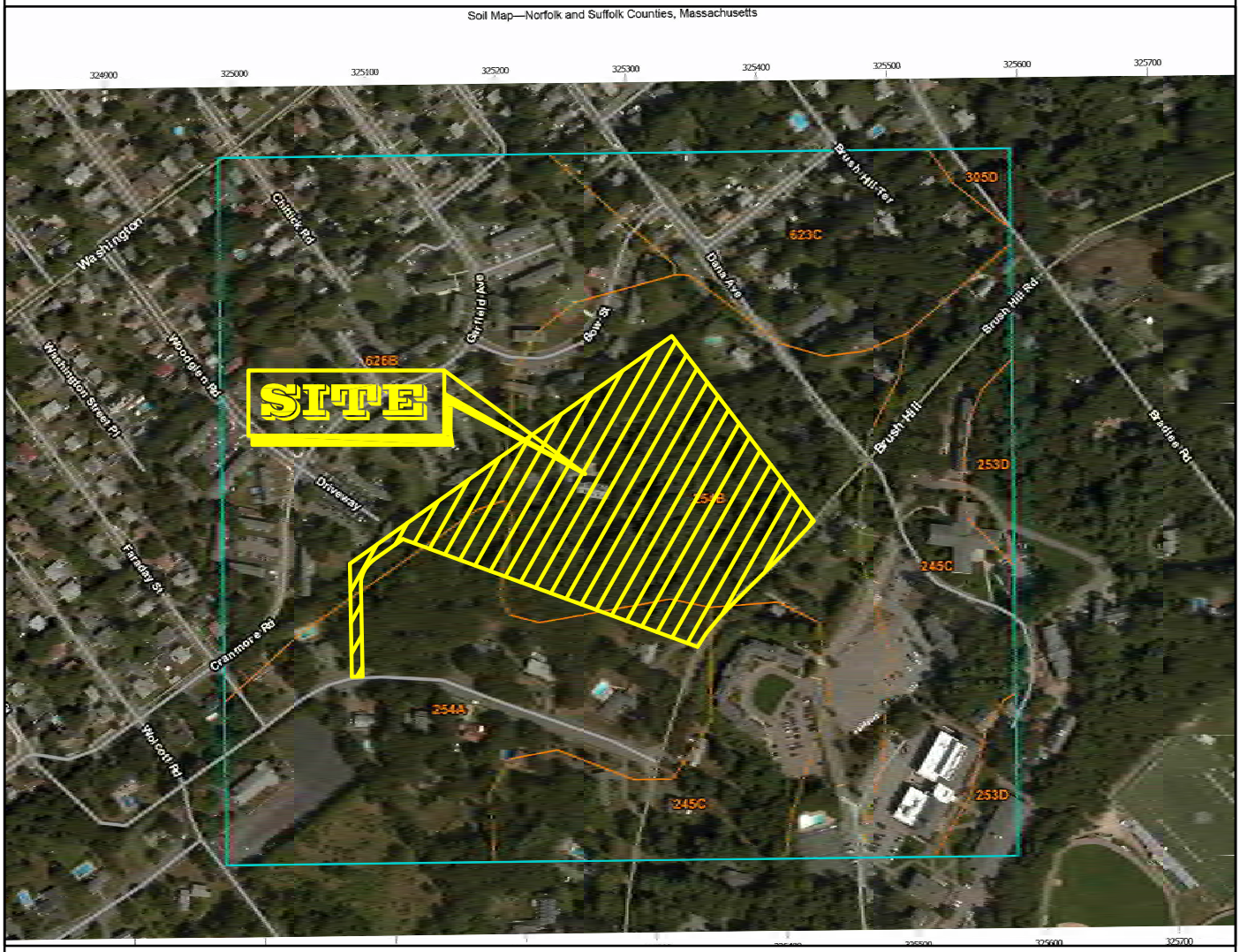

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FIGURE - 3

0 400' 800' 1000'

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TOWN OF MILTON, MA
NORFOLK COUNTY

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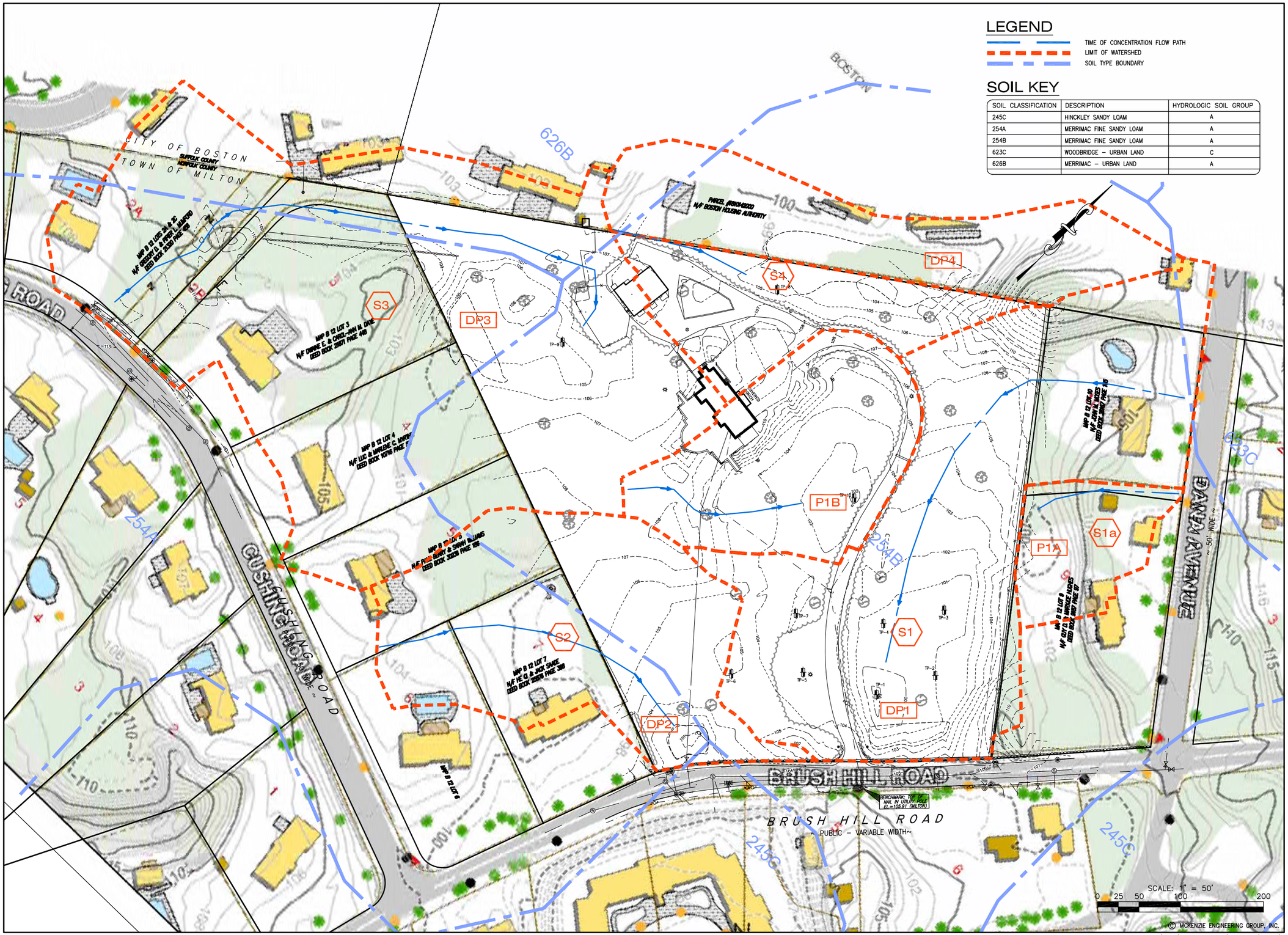
NRCS Soils Map

865 Brush Hill Road
MAP B12, LOTS 8A, 8B & 2B
MILTON, MASSACHUSETTS

A P P E N D I X A

Pre-Development Design Condition



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REV	DATE	DESCRIPTION	BY	APP
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PREPARED BY:
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PLANNED UNIT TOWNHOUSE DEVELOPMENT

865 BRUSH HILL ROAD
(ASSESSORS MAP B 12, LOTS 8A, 8B & 2B)
MILTON, MASSACHUSETTS

PROFESSIONAL ENGINEER:

NOT FOR CONSTRUCTION

OWNER/APPLICANT:
Milton NRC, LLC
20 Mall Road
Suite 220
Burlington, MA 01803

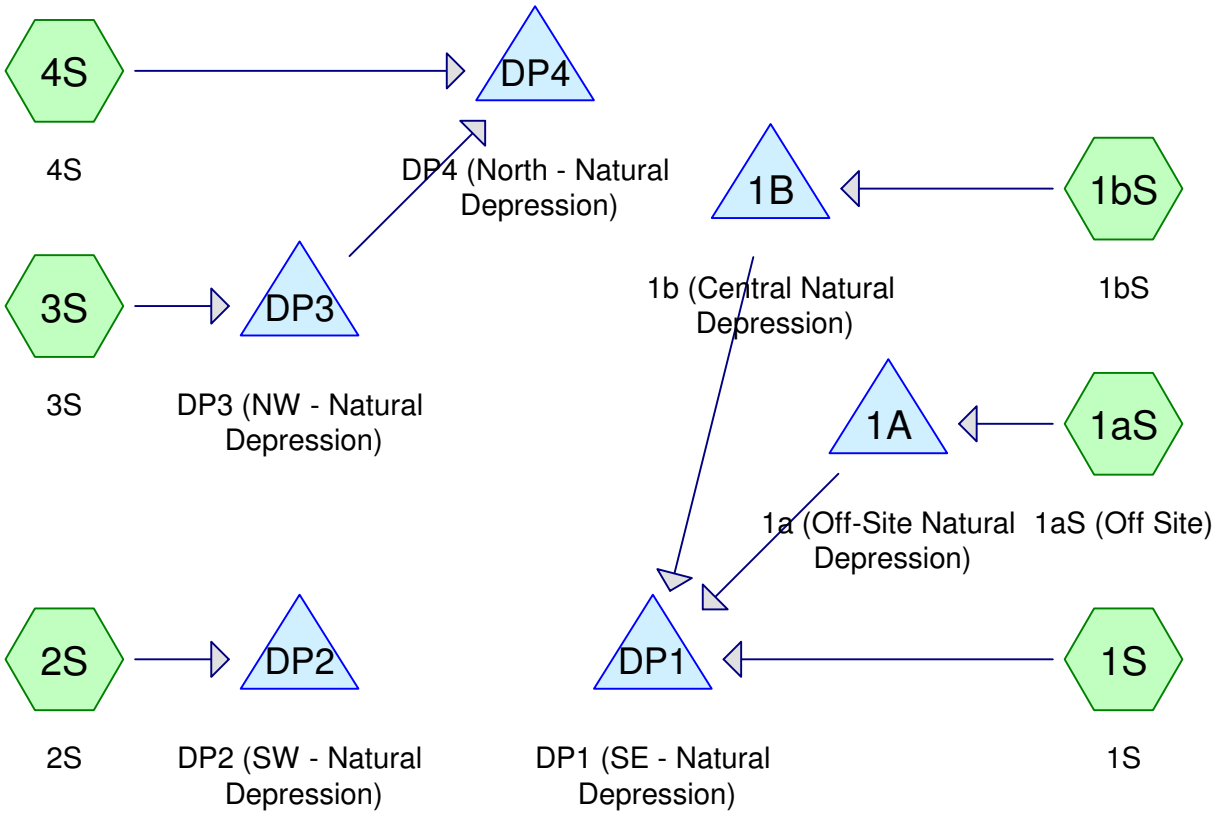
DRAWN BY:	JS
DESIGNED BY:	DWK
CHECKED BY:	DWK
APPROVED BY:	BCM
DATE:	MAY 13, 2015
SCALE:	1"=50'
PROJECT NO.:	214-122

DWG. TITLE:

Pre-Development Watershed Plan

DWG. No:

WS-1



Subcat Reach Pond Link

Routing Diagram for Pre-Dev

Prepared by McKenzie Engineering Group, Inc., Printed 5/8/2015

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.575	39	>75% Grass cover, Good, HSG A (1aS, 1bS, 1S, 2S, 3S, 4S)
0.085	74	>75% Grass cover, Good, HSG C (1S)
0.151	76	Gravel roads, HSG A (1bS, 4S)
0.255	98	Paved parking, HSG A (1bS, 1S)
1.221	98	Roofs, HSG A (1aS, 1S, 2S, 3S, 4S)
10.955	30	Woods, Good, HSG A (1aS, 1bS, 1S, 2S, 3S, 4S)
17.241	**39**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
17.157	HSG A	1aS, 1bS, 1S, 2S, 3S, 4S
0.000	HSG B	
0.085	HSG C	1S
0.000	HSG D	
0.000	Other	
17.241		**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.00"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.00 cfs 0.000 af

Subcatchment 1bS: 1bS Runoff Area=64,083 sf 10.26% Impervious Runoff Depth=0.00"
Flow Length=221' Tc=20.1 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 1S: 1S Runoff Area=174,734 sf 5.65% Impervious Runoff Depth=0.00"
Flow Length=583' Tc=18.0 min CN=36 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: 2S Runoff Area=101,102 sf 5.13% Impervious Runoff Depth=0.00"
Flow Length=402' Tc=14.1 min CN=36 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: 3S Runoff Area=278,077 sf 8.71% Impervious Runoff Depth=0.00"
Flow Length=702' Tc=34.0 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: 4S Runoff Area=108,485 sf 14.74% Impervious Runoff Depth=0.06"
Flow Length=170' Tc=11.8 min CN=46 Runoff=0.02 cfs 0.012 af

Pond 1A: 1a (Off-Site Natural Depression) Peak Elev=105.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 1B: 1b (Central Natural Depression) Peak Elev=102.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: DP1 (SE - Natural Depression) Peak Elev=98.74' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=100.46' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=104.30' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=103.83' Storage=0 cf Inflow=0.02 cfs 0.012 af
Discarded=0.02 cfs 0.012 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.012 af

Total Runoff Area = 17.241 ac Runoff Volume = 0.012 af Average Runoff Depth = 0.01"
91.44% Pervious = 15.766 ac 8.56% Impervious = 1.476 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

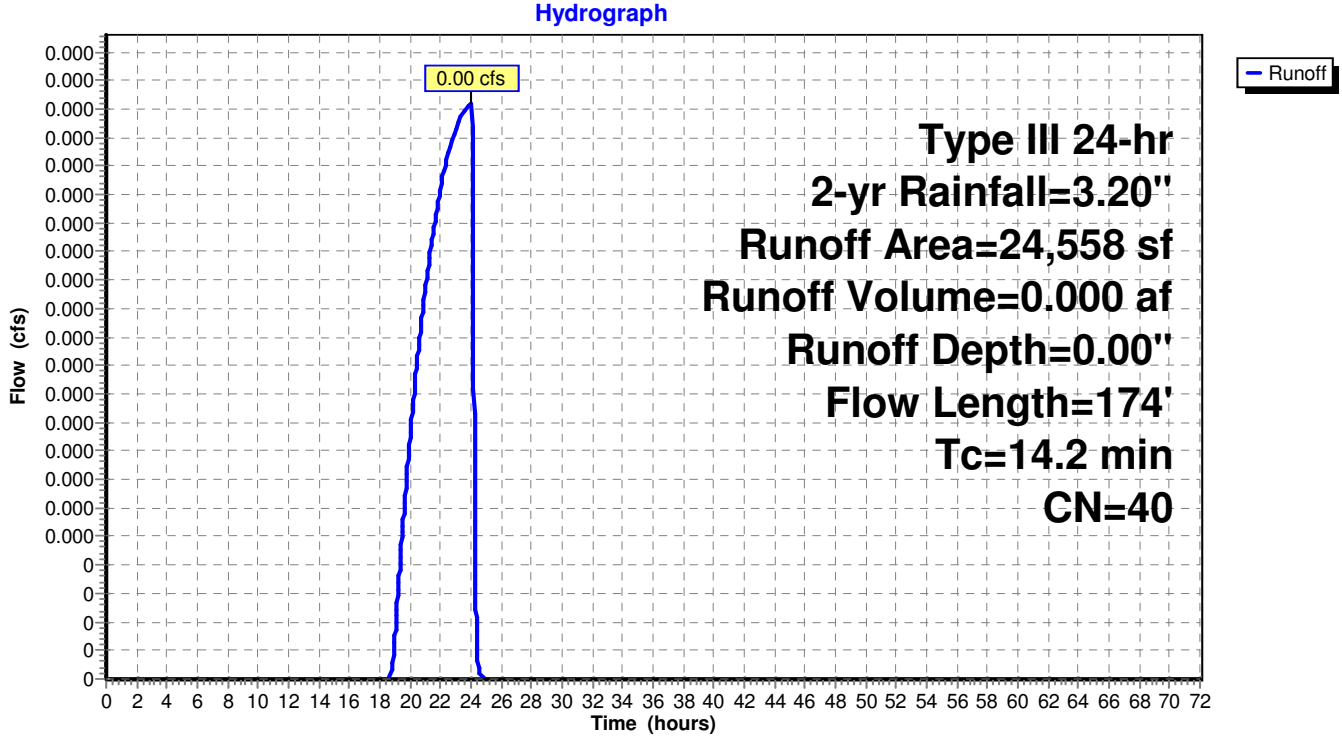
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

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

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

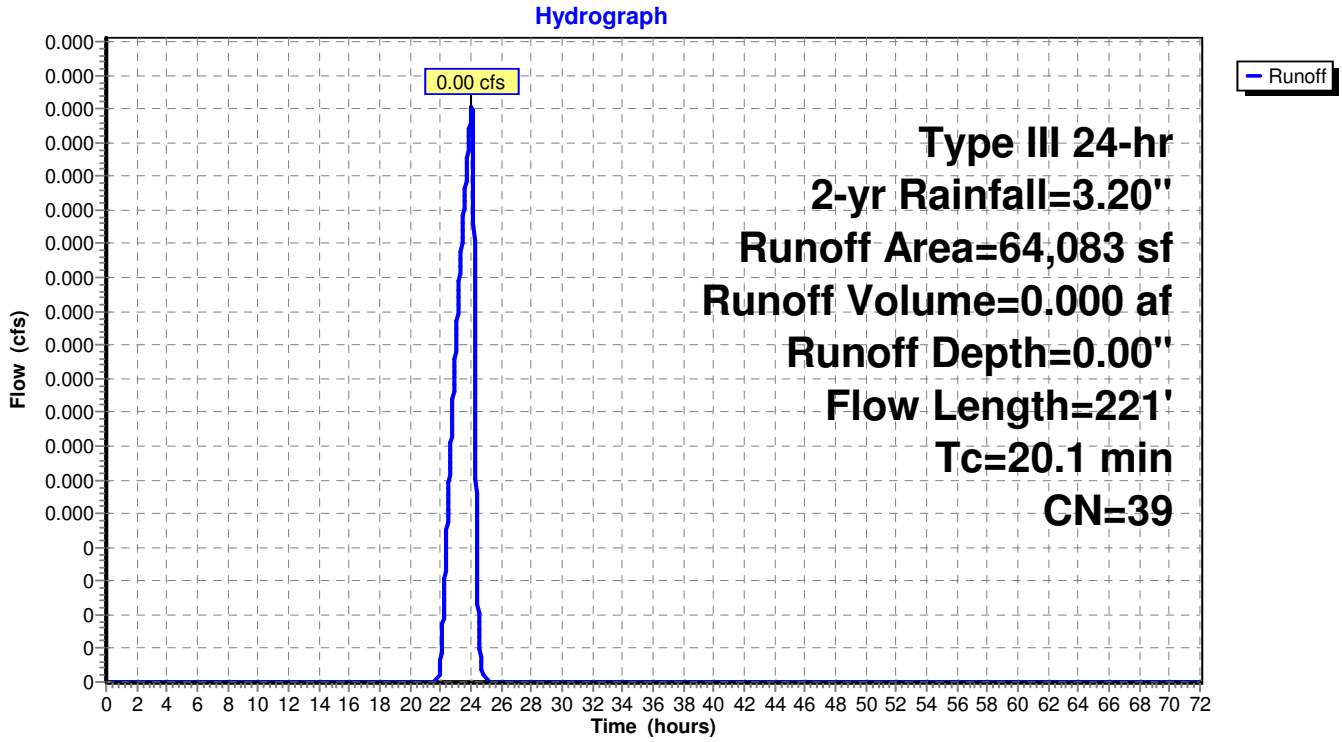
Runoff = 0.00 cfs @ 24.05 hrs, Volume= 0.000 af, Depth= 0.00"

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

Area (sf)	CN	Description
6,573	98	Paved parking, HSG A
2,228	76	Gravel roads, HSG A
4,988	39	>75% Grass cover, Good, HSG A
50,294	30	Woods, Good, HSG A
64,083	39	Weighted Average
57,510		89.74% Pervious Area
6,573		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	171	0.0230	0.76		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	221	Total			

Subcatchment 1bS: 1bS



Summary for Subcatchment 1S: 1S

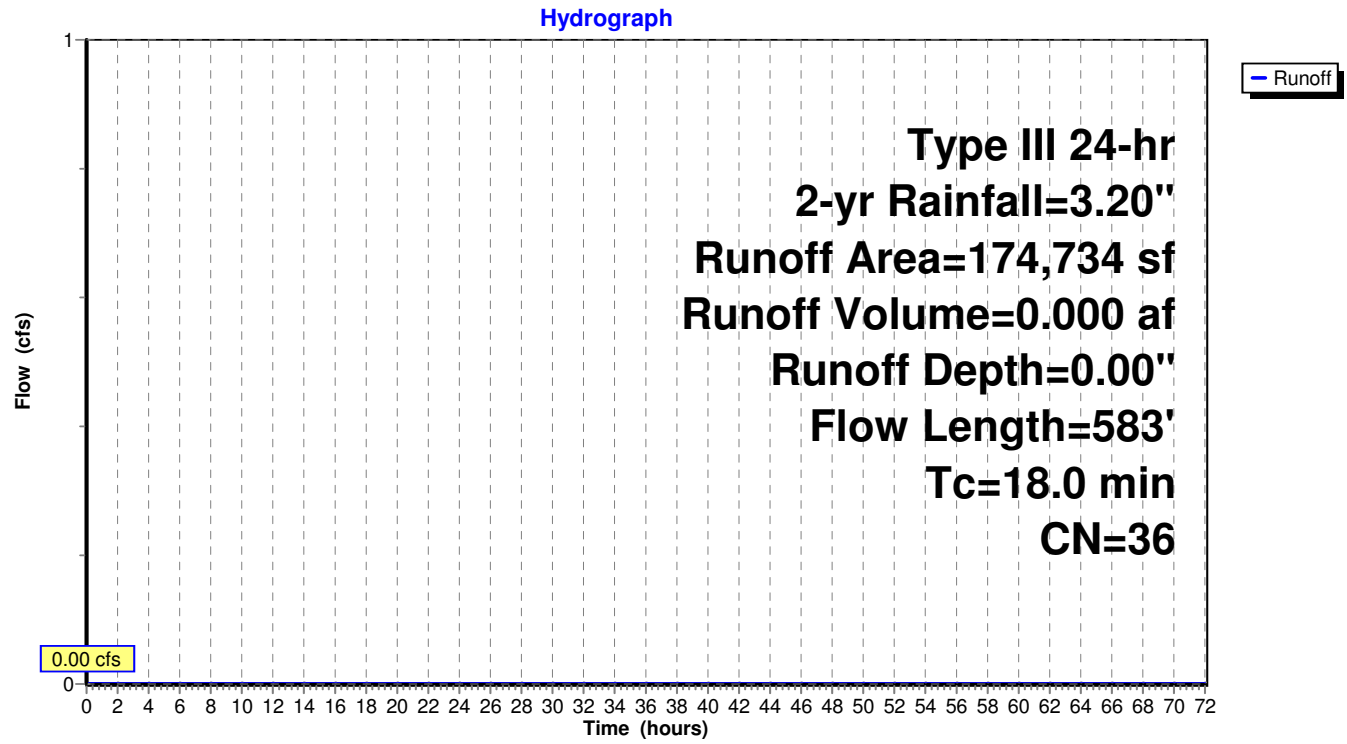
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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

Area (sf)	CN	Description
4,524	98	Paved parking, HSG A
5,354	98	Roofs, HSG A
6,609	39	>75% Grass cover, Good, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
133,756	30	Woods, Good, HSG A
174,734	36	Weighted Average
164,856		94.35% Pervious Area
9,878		5.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

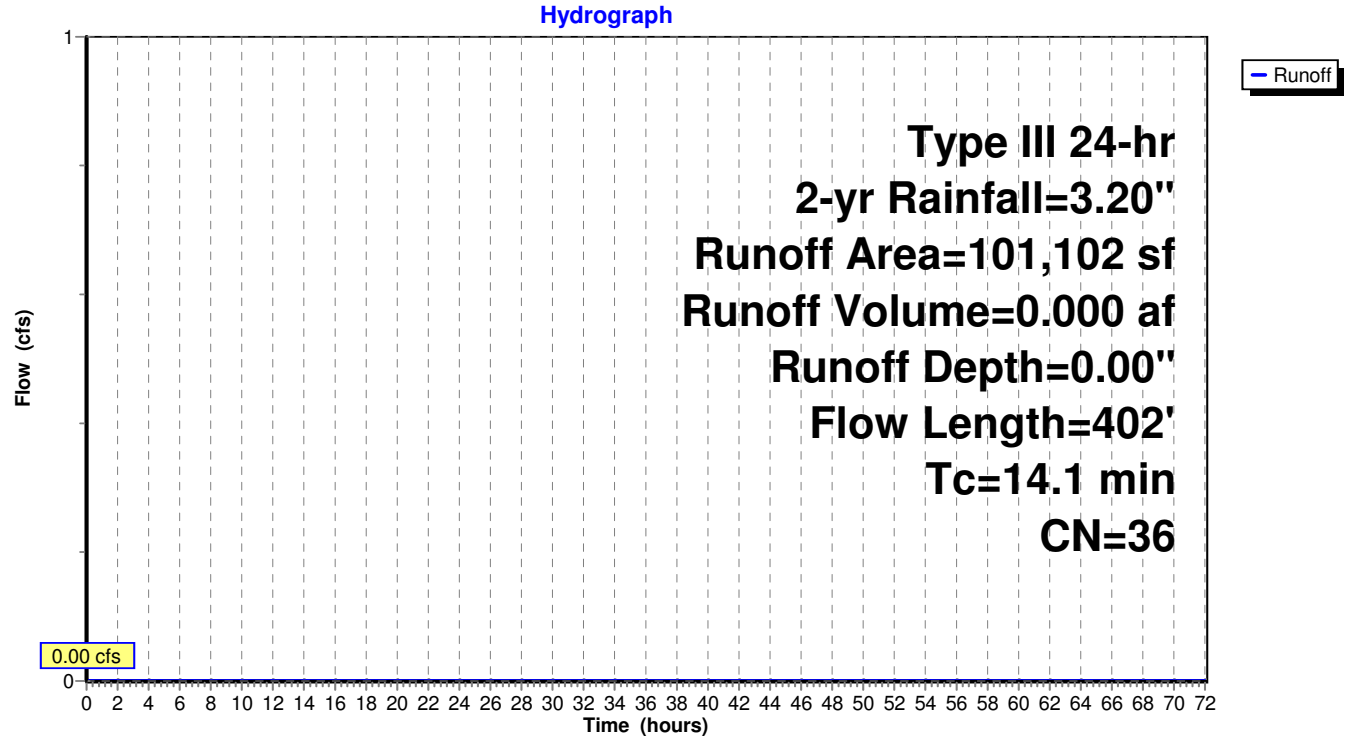
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
65,543	30	Woods, Good, HSG A
101,102	36	Weighted Average
95,914		94.87% Pervious Area
5,188		5.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

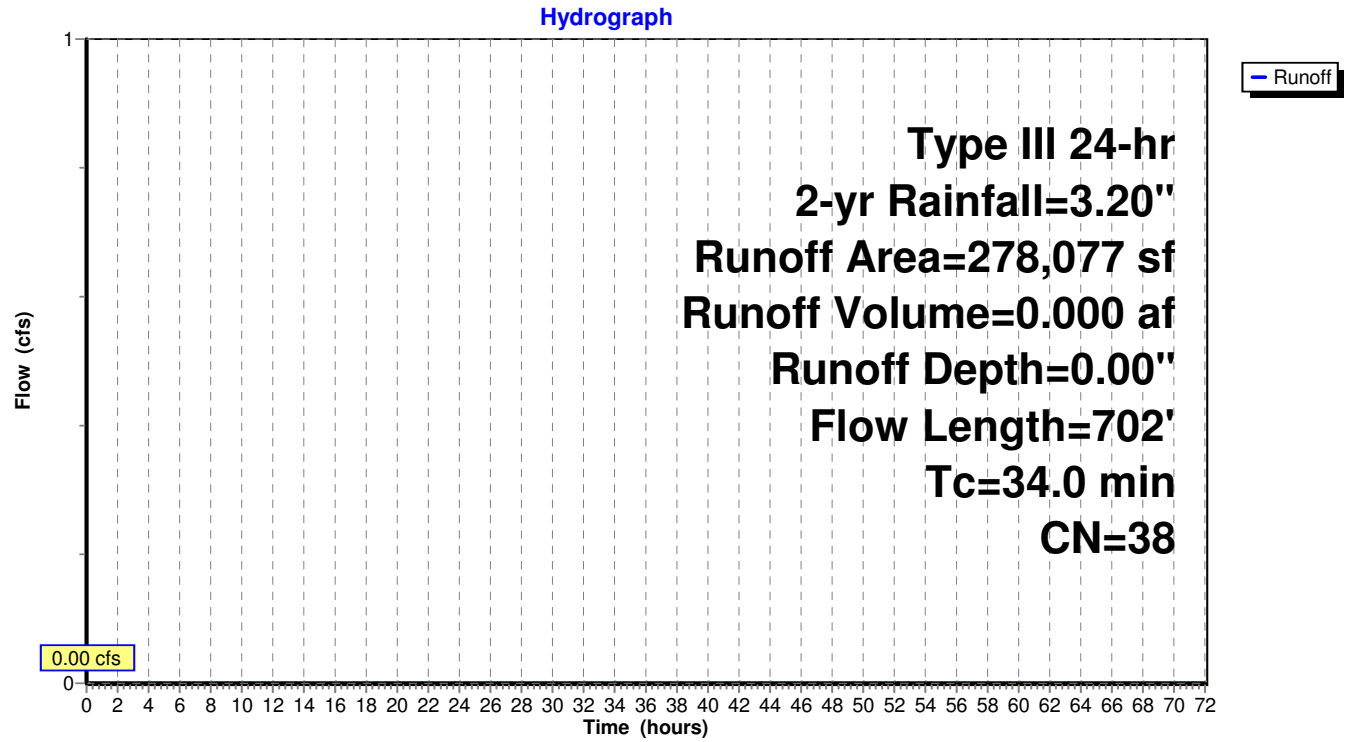
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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

Area (sf)	CN	Description
12,946	98	Roofs, HSG A
44,703	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
3,521	98	Roofs, HSG A
9,219	39	>75% Grass cover, Good, HSG A
178,664	30	Woods, Good, HSG A
278,077	38	Weighted Average
253,847		91.29% Pervious Area
24,230		8.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

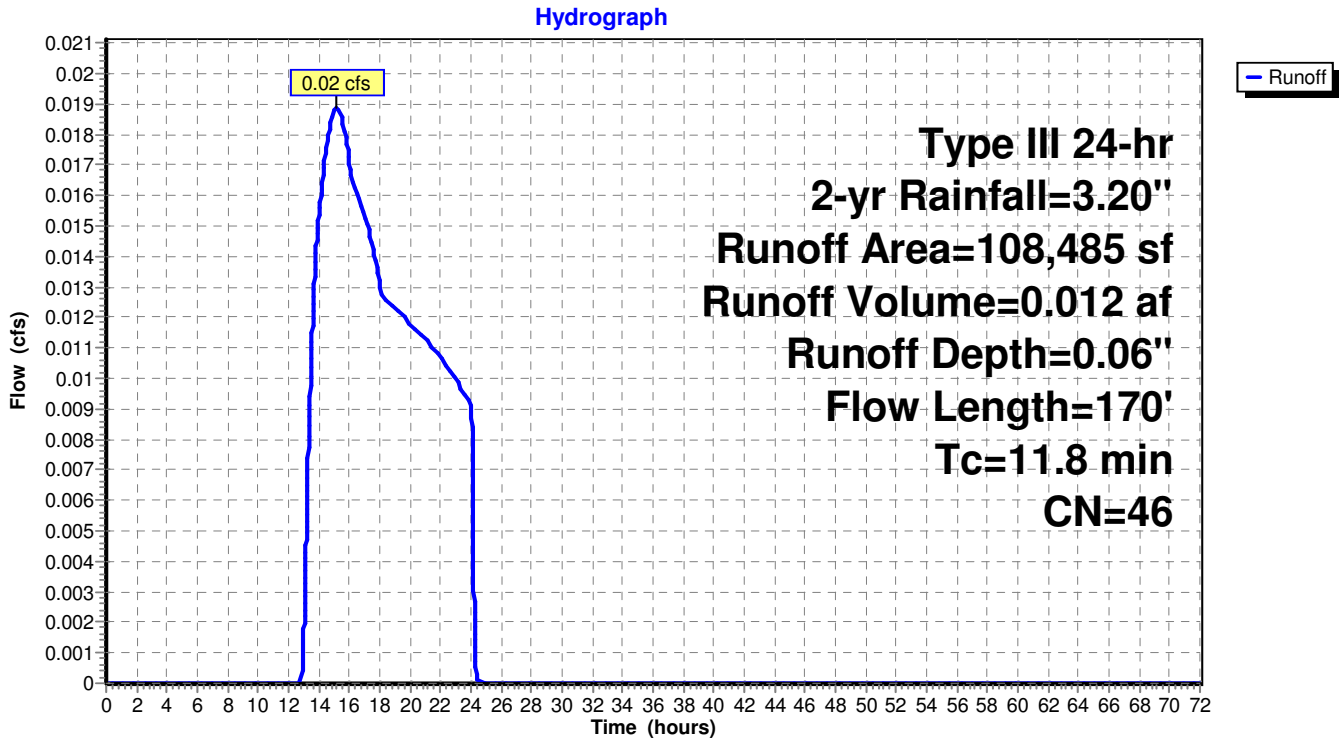
Runoff = 0.02 cfs @ 15.17 hrs, Volume= 0.012 af, Depth= 0.06"

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

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
10,060	98	Roofs, HSG A
6,475	39	>75% Grass cover, Good, HSG A
4,345	76	Gravel roads, HSG A
22,949	30	Woods, Good, HSG A
108,485	46	Weighted Average
92,489		85.26% Pervious Area
15,996		14.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off-Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.00" for 2-yr 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
Discarded = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.00' @ 0.00 hrs Surf.Area= 1,231 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,329.5 - 1,329.5)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

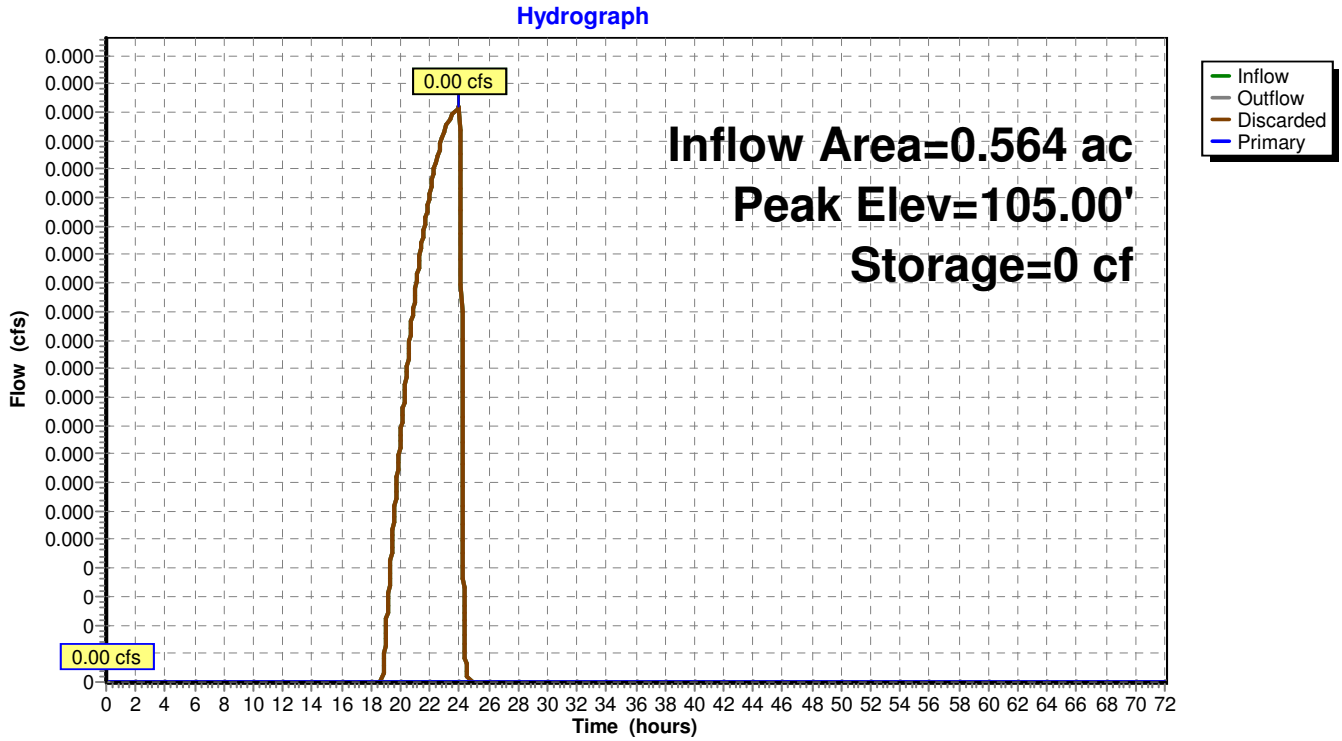
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 24.00 hrs HW=105.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.07 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off-Site Natural Depression)



Summary for Pond 1B: 1b (Central Natural Depression)

Inflow Area = 1.471 ac, 10.26% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 24.05 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.05 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 24.05 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.00' @ 0.00 hrs Surf.Area= 134 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,409.7 - 1,409.7)

Volume	Invert	Avail.Storage	Storage Description
#1	102.00'	8,485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

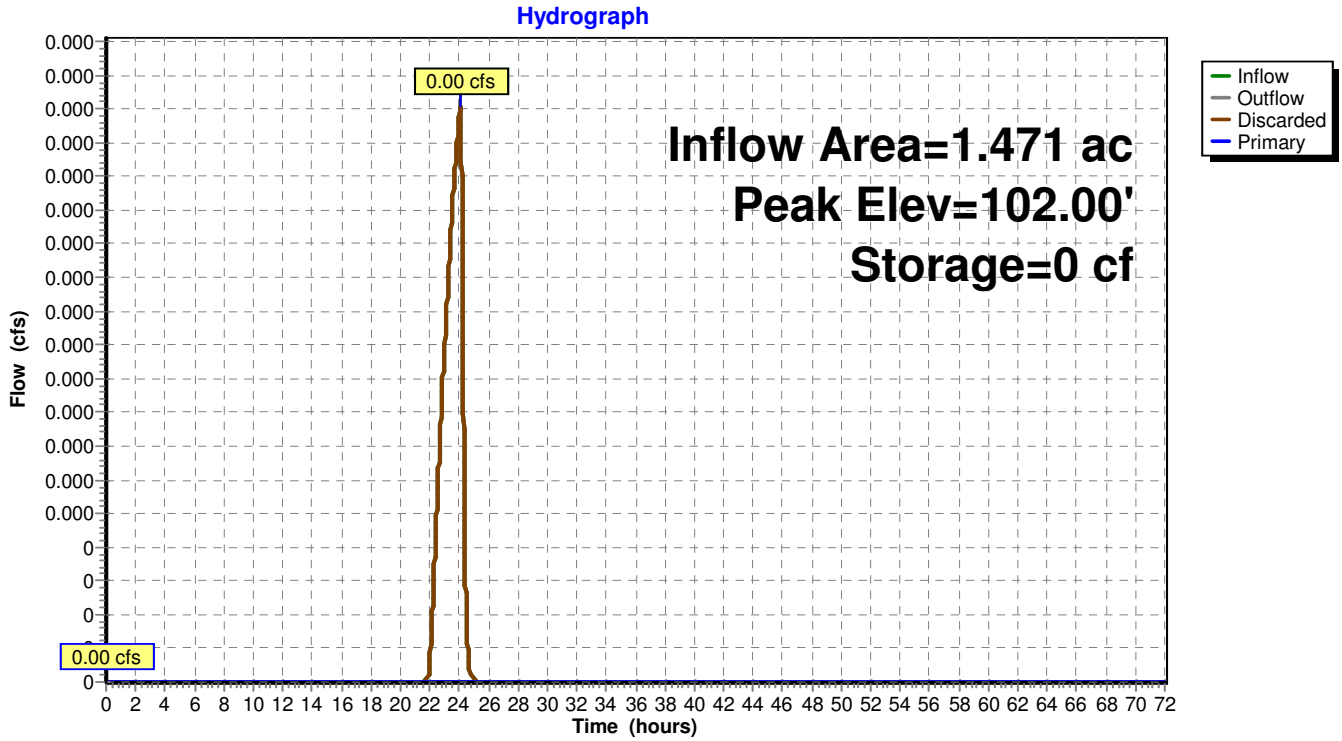
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
102.00	134	0	0
103.00	6,577	3,356	3,356
103.50	13,940	5,129	8,485

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.39'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.00 cfs @ 24.05 hrs HW=102.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.01 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=102.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: 1b (Central Natural Depression)



Summary for Pond DP1: DP1 (SE - Natural Depression)

Inflow Area = 6.046 ac, 7.16% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 98.74' @ 0.00 hrs Surf.Area= 50 sf Storage= 0 cf

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

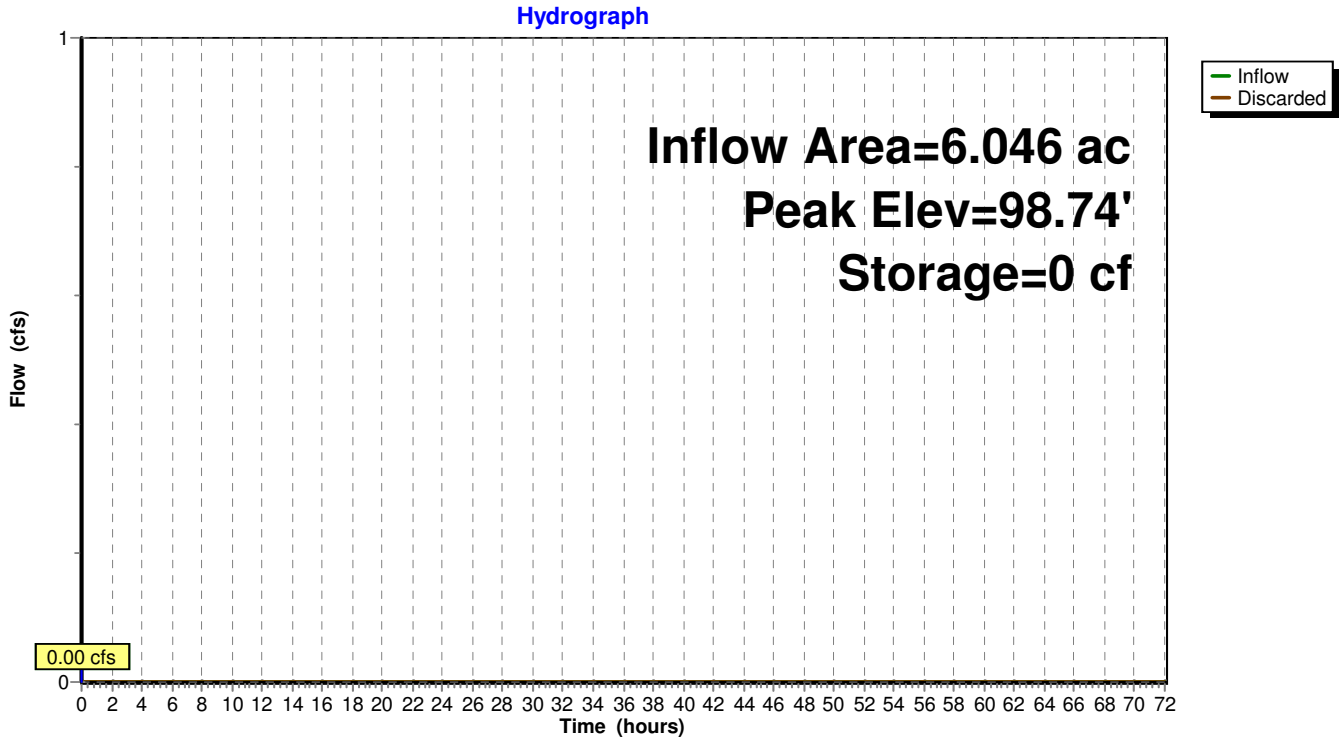
Volume	Invert	Avail.Storage	Storage Description
#1	98.74'	73,208 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.74	50	0	0
99.00	247	39	39
100.00	3,035	1,641	1,680
101.00	17,736	10,386	12,065
102.00	30,108	23,922	35,987
103.00	44,334	37,221	73,208

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.74'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 94.40'

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.74' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)

Pond DP1: DP1 (SE - Natural Depression)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.321 ac, 5.13% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 100.46' @ 0.00 hrs Surf.Area= 50 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	9,761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

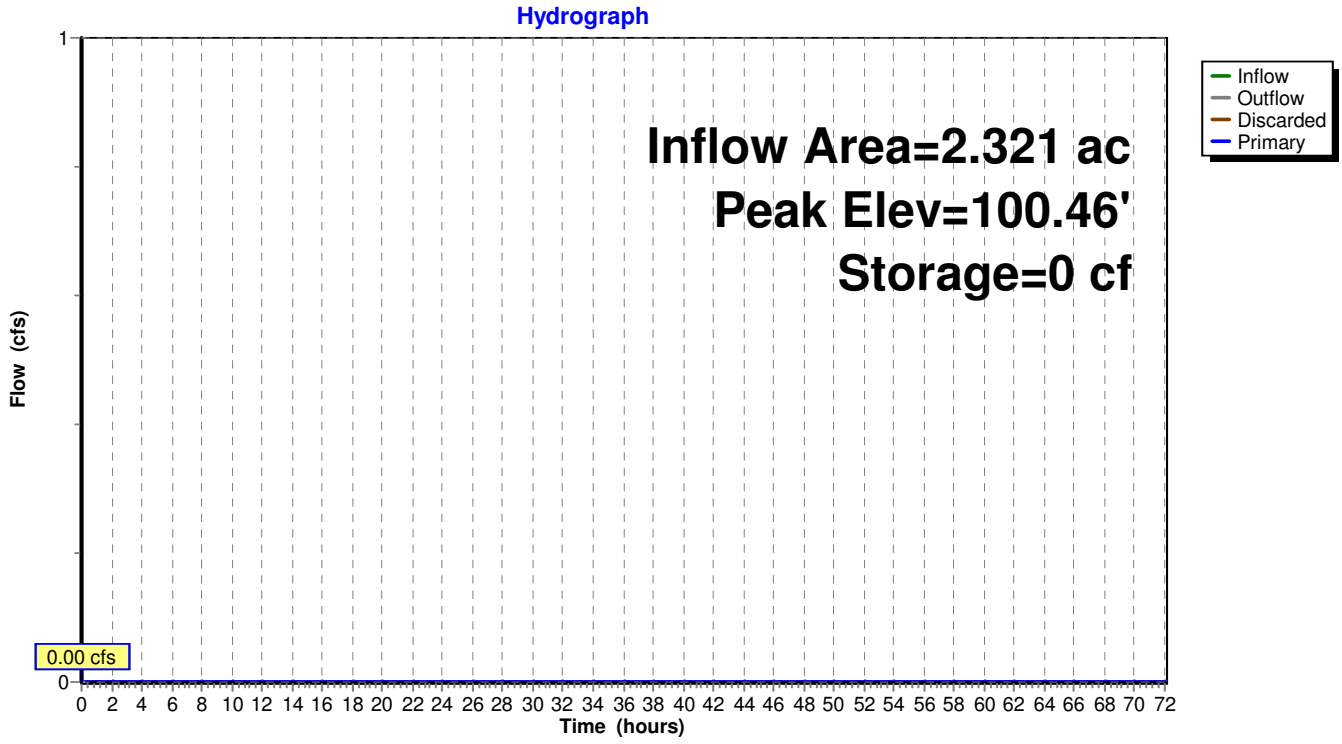
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,671	966	1,050
103.00	4,177	2,924	3,974
104.00	7,398	5,788	9,761

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.50'	**13.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.46' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.46' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 6.384 ac, 8.71% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.30' @ 0.00 hrs Surf.Area= 2,831 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	66,553 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

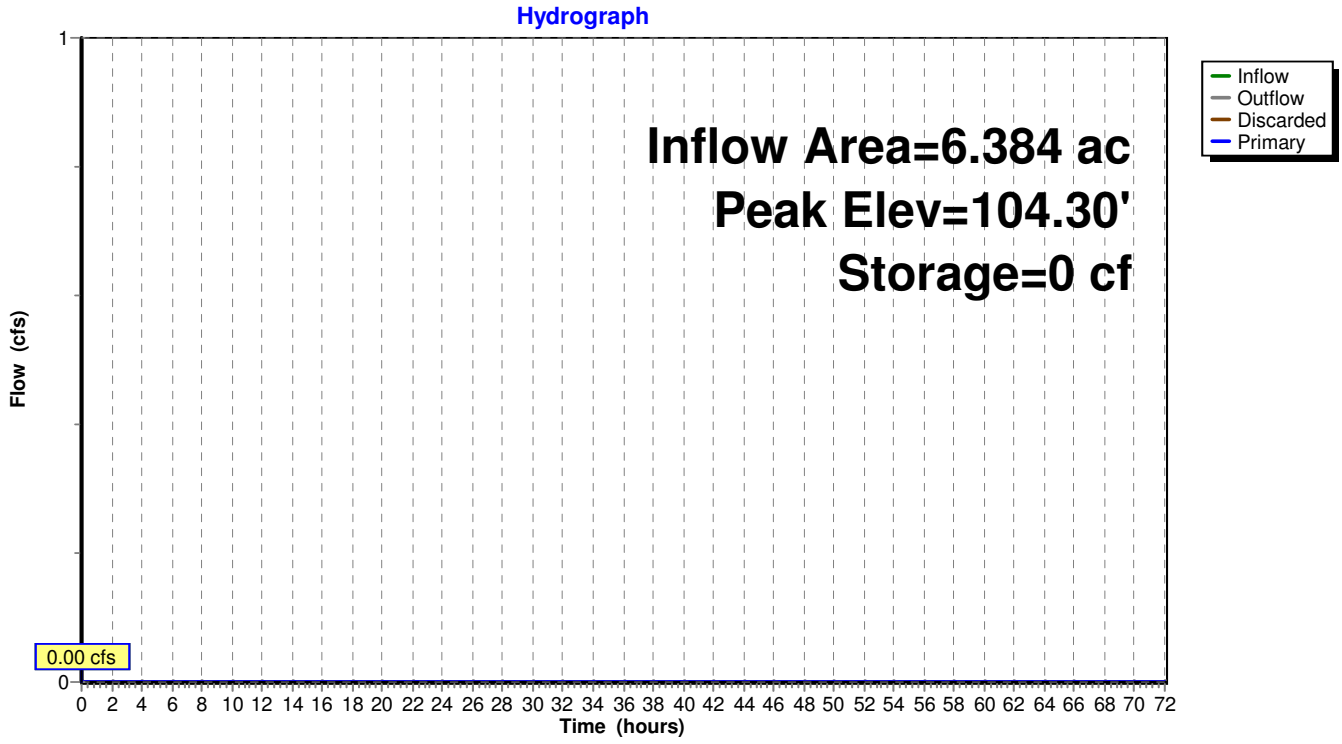
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,831	0	0
105.00	12,175	5,252	5,252
106.00	28,206	20,191	25,443
107.00	54,015	41,111	66,553

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.58'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.03 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' TW=103.83' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 8.874 ac, 10.41% Impervious, Inflow Depth = 0.02" for 2-yr event
Inflow = 0.02 cfs @ 15.17 hrs, Volume= 0.012 af
Outflow = 0.02 cfs @ 15.17 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.02 cfs @ 15.17 hrs, Volume= 0.012 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 103.83' @ 0.00 hrs Surf.Area= 2,495 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,087.6 - 1,087.6)

Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	23,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

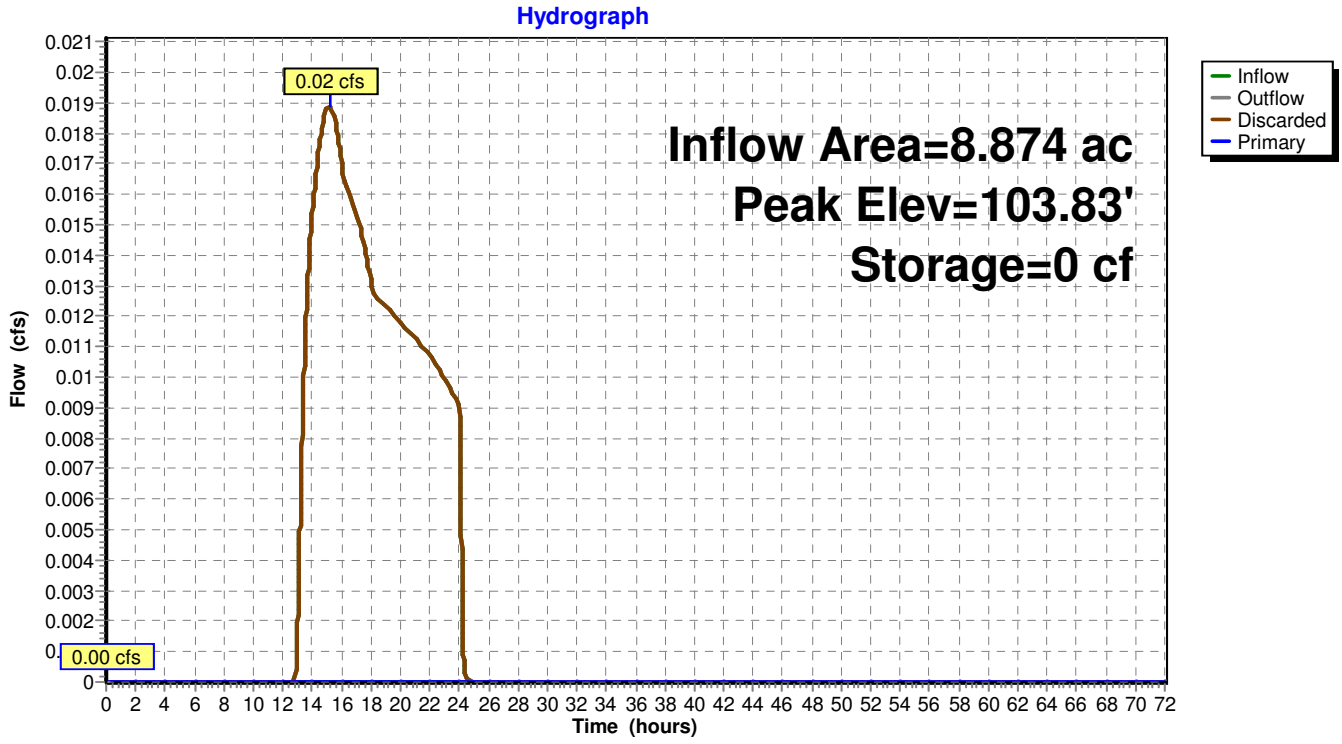
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,495	0	0
104.00	4,313	579	579
105.00	20,285	12,299	12,878
105.50	23,818	11,026	23,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'
#2	Primary	105.07'	**20.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.00 cfs @ 15.17 hrs HW=103.83' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.06 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.83' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP4: DP4 (North - Natural Depression)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.17"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.01 cfs 0.008 af

Subcatchment 1bS: 1bS Runoff Area=64,083 sf 10.26% Impervious Runoff Depth=0.14"
Flow Length=221' Tc=20.1 min CN=39 Runoff=0.03 cfs 0.018 af

Subcatchment 1S: 1S Runoff Area=174,734 sf 5.65% Impervious Runoff Depth=0.07"
Flow Length=583' Tc=18.0 min CN=36 Runoff=0.04 cfs 0.023 af

Subcatchment 2S: 2S Runoff Area=101,102 sf 5.13% Impervious Runoff Depth=0.07"
Flow Length=402' Tc=14.1 min CN=36 Runoff=0.02 cfs 0.013 af

Subcatchment 3S: 3S Runoff Area=278,077 sf 8.71% Impervious Runoff Depth=0.12"
Flow Length=702' Tc=34.0 min CN=38 Runoff=0.10 cfs 0.062 af

Subcatchment 4S: 4S Runoff Area=108,485 sf 14.74% Impervious Runoff Depth=0.39"
Flow Length=170' Tc=11.8 min CN=46 Runoff=0.40 cfs 0.081 af

Pond 1A: 1a (Off-Site Natural Depression) Peak Elev=105.00' Storage=0 cf Inflow=0.01 cfs 0.008 af
Discarded=0.01 cfs 0.008 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.008 af

Pond 1B: 1b (Central Natural Depression) Peak Elev=102.06' Storage=18 cf Inflow=0.03 cfs 0.018 af
Discarded=0.03 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.018 af

Pond DP1: DP1 (SE - Natural Depression) Peak Elev=99.11' Storage=84 cf Inflow=0.04 cfs 0.023 af
Outflow=0.03 cfs 0.023 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=101.01' Storage=86 cf Inflow=0.02 cfs 0.013 af
Discarded=0.02 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.013 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=104.44' Storage=549 cf Inflow=0.10 cfs 0.062 af
Discarded=0.06 cfs 0.062 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.062 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=104.02' Storage=659 cf Inflow=0.40 cfs 0.081 af
Discarded=0.12 cfs 0.081 af Primary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.081 af

Total Runoff Area = 17.241 ac Runoff Volume = 0.206 af Average Runoff Depth = 0.14"
91.44% Pervious = 15.766 ac 8.56% Impervious = 1.476 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

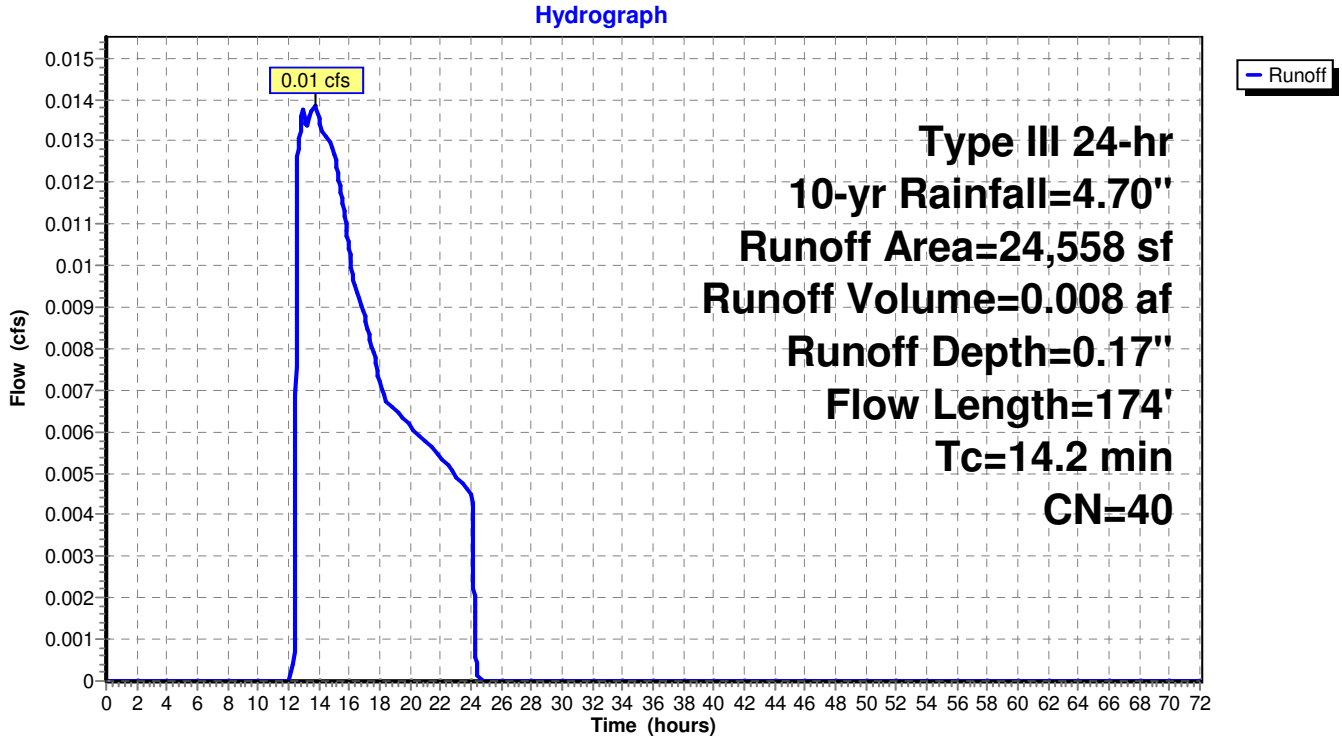
Runoff = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

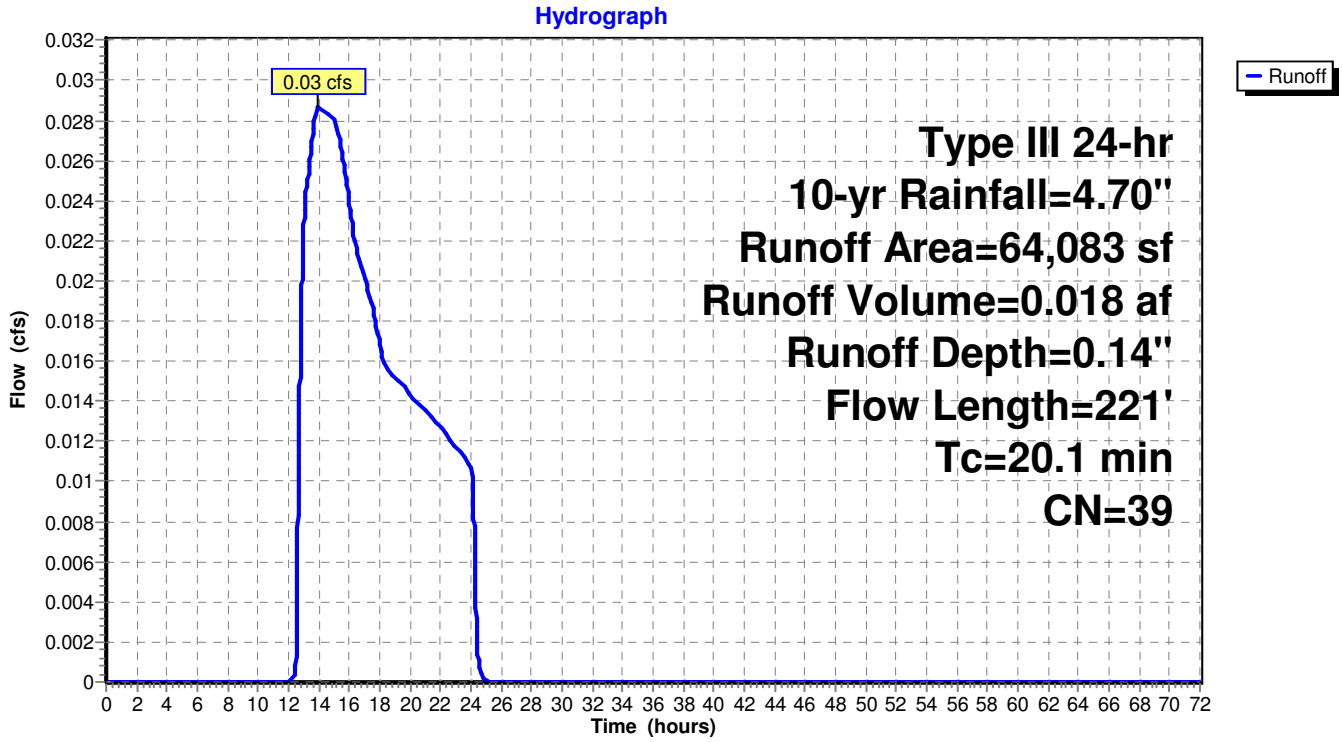
Runoff = 0.03 cfs @ 13.96 hrs, Volume= 0.018 af, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
6,573	98	Paved parking, HSG A
2,228	76	Gravel roads, HSG A
4,988	39	>75% Grass cover, Good, HSG A
50,294	30	Woods, Good, HSG A
64,083	39	Weighted Average
57,510		89.74% Pervious Area
6,573		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	171	0.0230	0.76		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	221	Total			

Subcatchment 1bS: 1bS



Summary for Subcatchment 1S: 1S

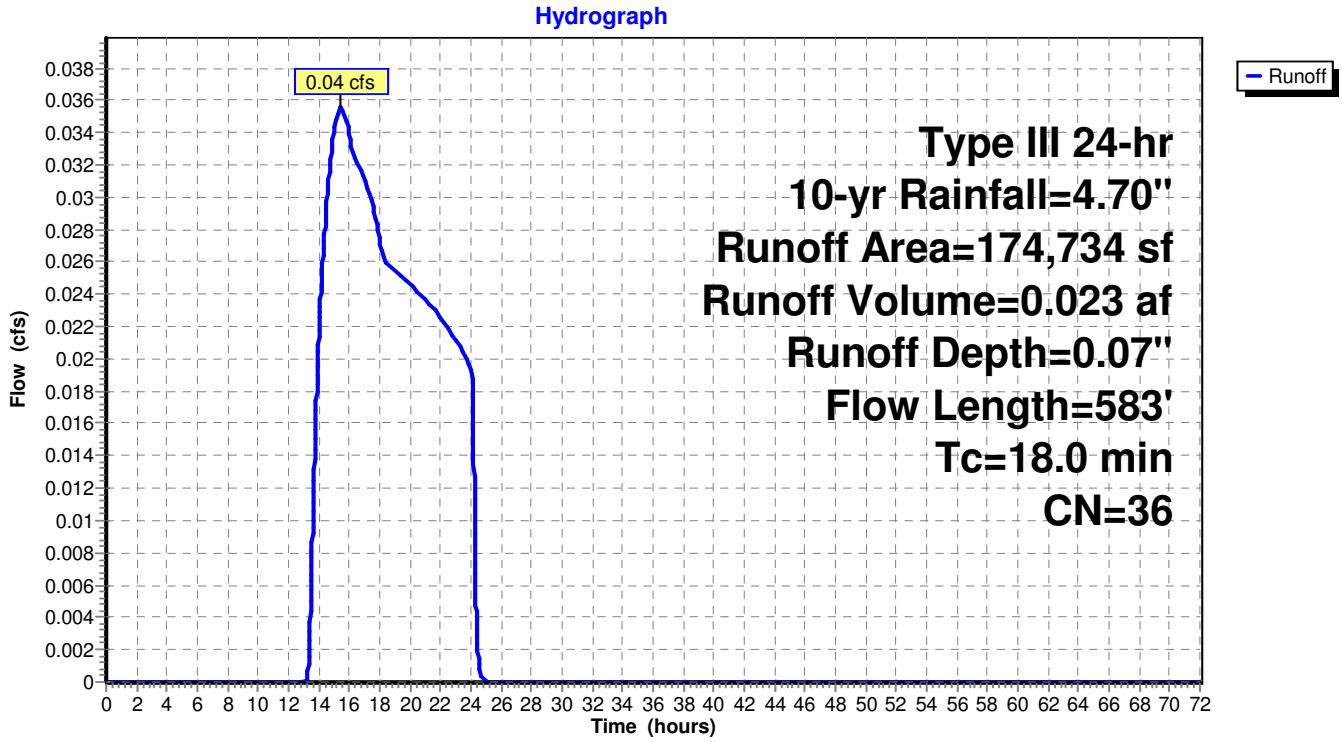
Runoff = 0.04 cfs @ 15.46 hrs, Volume= 0.023 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
4,524	98	Paved parking, HSG A
5,354	98	Roofs, HSG A
6,609	39	>75% Grass cover, Good, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
133,756	30	Woods, Good, HSG A
174,734	36	Weighted Average
164,856		94.35% Pervious Area
9,878		5.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

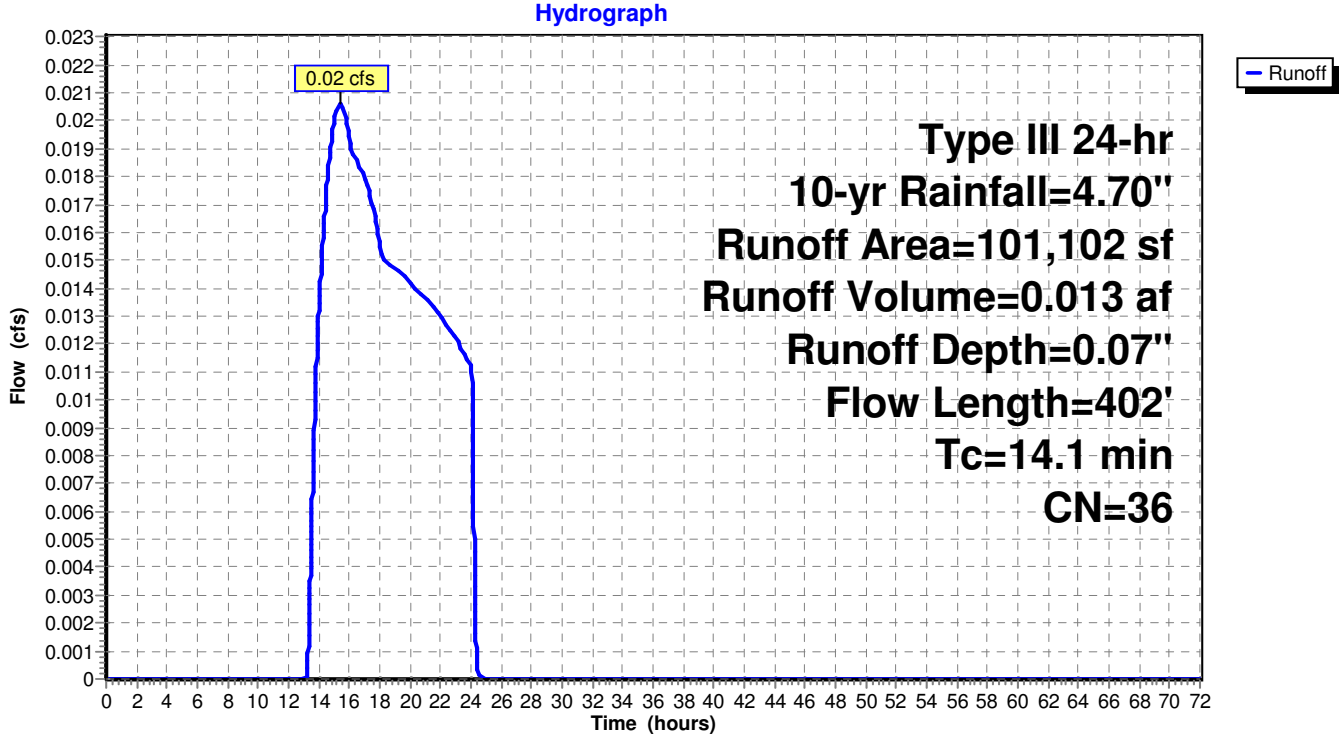
Runoff = 0.02 cfs @ 15.40 hrs, Volume= 0.013 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
65,543	30	Woods, Good, HSG A
101,102	36	Weighted Average
95,914		94.87% Pervious Area
5,188		5.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

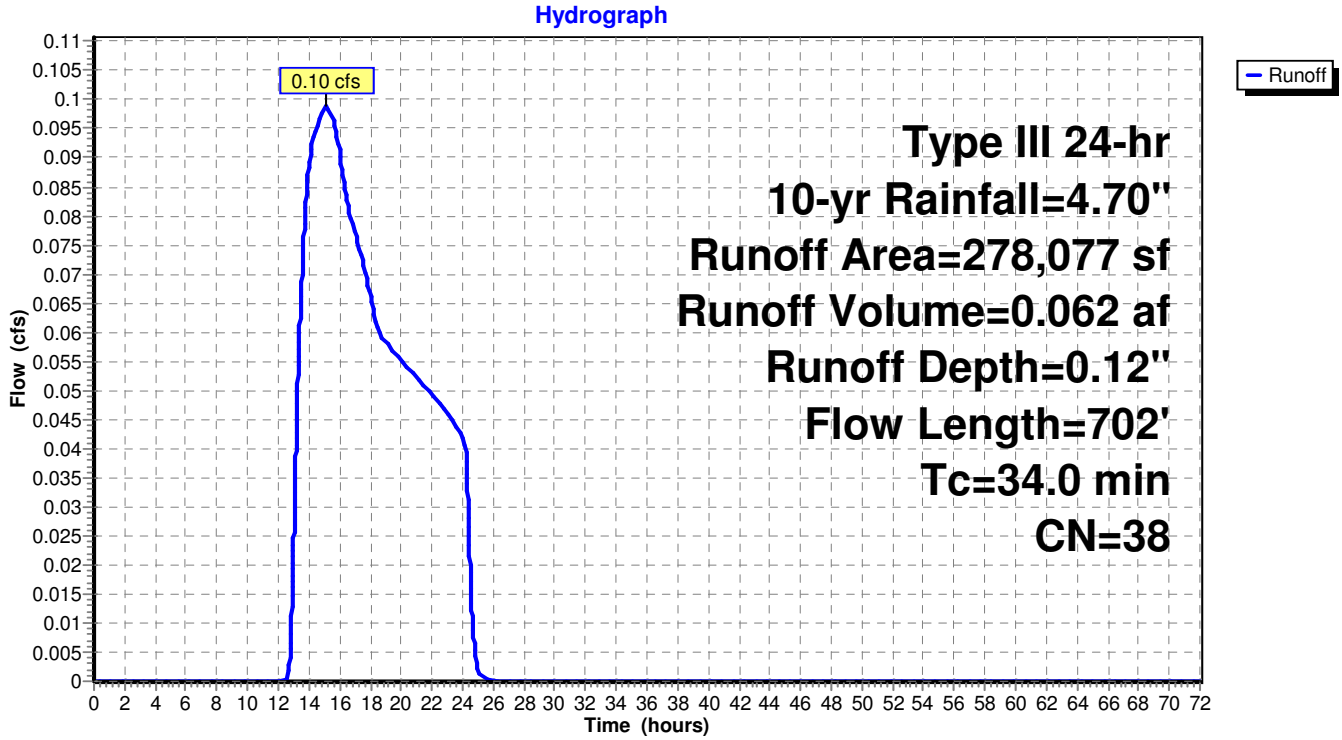
Runoff = 0.10 cfs @ 15.15 hrs, Volume= 0.062 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
12,946	98	Roofs, HSG A
44,703	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
3,521	98	Roofs, HSG A
9,219	39	>75% Grass cover, Good, HSG A
178,664	30	Woods, Good, HSG A
278,077	38	Weighted Average
253,847		91.29% Pervious Area
24,230		8.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

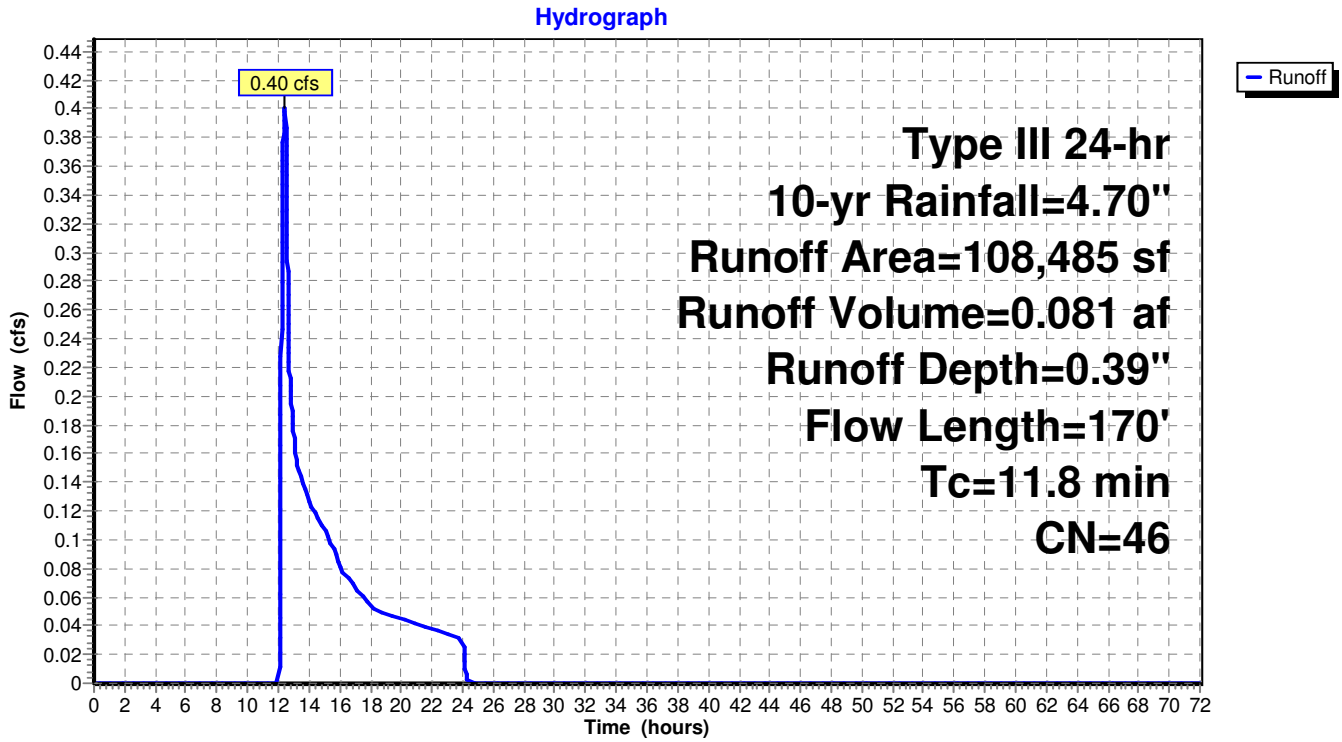
Runoff = 0.40 cfs @ 12.41 hrs, Volume= 0.081 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
10,060	98	Roofs, HSG A
6,475	39	>75% Grass cover, Good, HSG A
4,345	76	Gravel roads, HSG A
22,949	30	Woods, Good, HSG A
108,485	46	Weighted Average
92,489		85.26% Pervious Area
15,996		14.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off-Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.17" for 10-yr event
Inflow = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af
Outflow = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.00' @ 0.00 hrs Surf.Area= 1,231 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,025.2 - 1,025.2)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

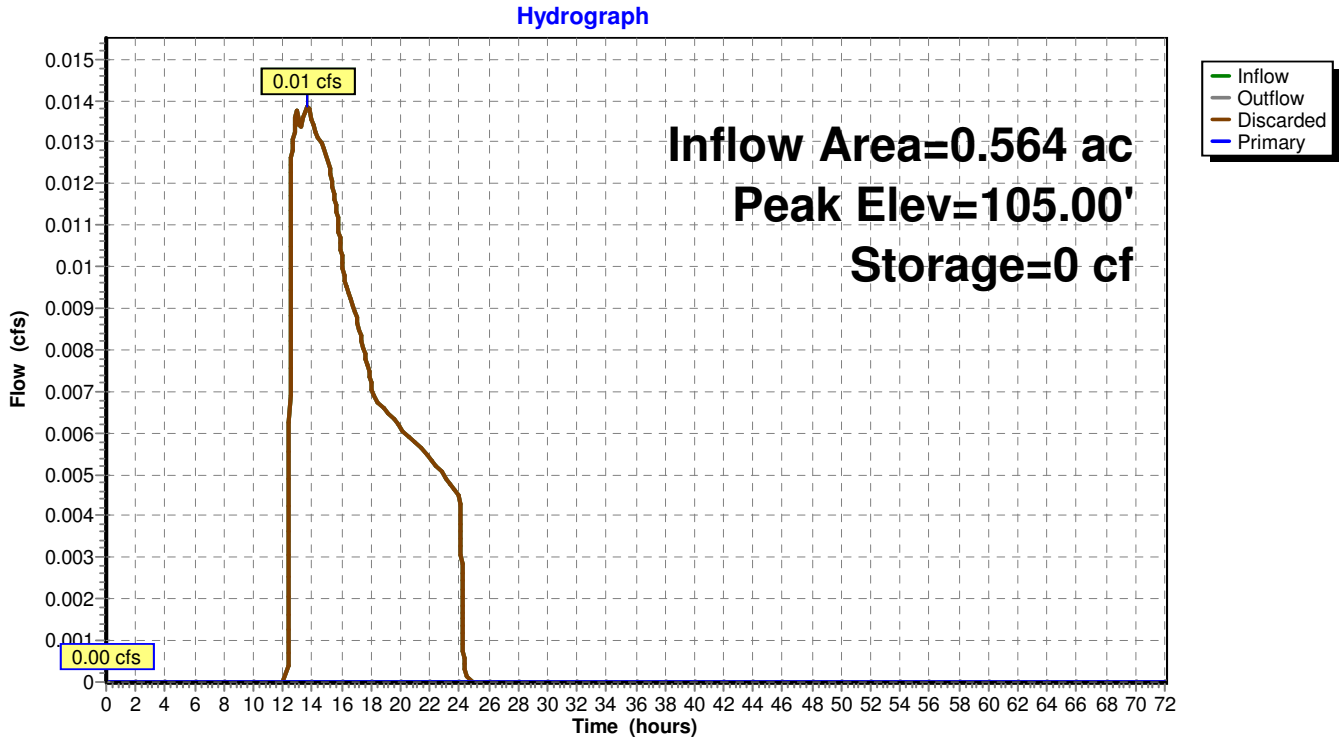
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 13.71 hrs HW=105.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.07 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off-Site Natural Depression)



Summary for Pond 1B: 1b (Central Natural Depression)

Inflow Area = 1.471 ac, 10.26% Impervious, Inflow Depth = 0.14" for 10-yr event
Inflow = 0.03 cfs @ 13.96 hrs, Volume= 0.018 af
Outflow = 0.03 cfs @ 14.87 hrs, Volume= 0.018 af, Atten= 2%, Lag= 54.8 min
Discarded = 0.03 cfs @ 14.87 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.06' @ 14.87 hrs Surf.Area= 503 sf Storage= 18 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 7.0 min (1,054.2 - 1,047.3)

Volume	Invert	Avail.Storage	Storage Description
#1	102.00'	8,485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

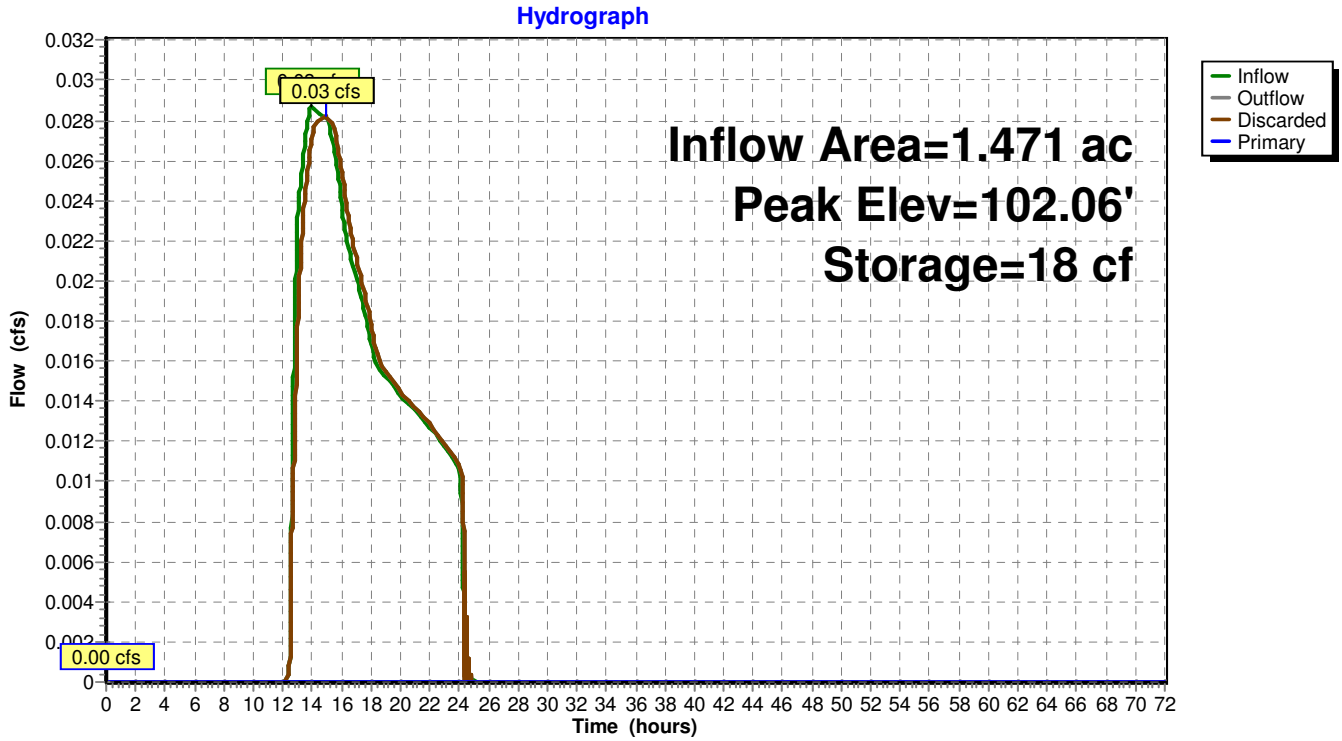
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
102.00	134	0	0
103.00	6,577	3,356	3,356
103.50	13,940	5,129	8,485

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.39'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.03 cfs @ 14.87 hrs HW=102.06' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=102.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: 1b (Central Natural Depression)



Summary for Pond DP1: DP1 (SE - Natural Depression)

Inflow Area = 6.046 ac, 7.16% Impervious, Inflow Depth = 0.05" for 10-yr event
Inflow = 0.04 cfs @ 15.46 hrs, Volume= 0.023 af
Outflow = 0.03 cfs @ 16.46 hrs, Volume= 0.023 af, Atten= 10%, Lag= 60.1 min
Discarded = 0.03 cfs @ 16.46 hrs, Volume= 0.023 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 99.11' @ 16.46 hrs Surf.Area= 560 sf Storage= 84 cf

Plug-Flow detention time= 41.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 41.1 min (1,152.9 - 1,111.9)

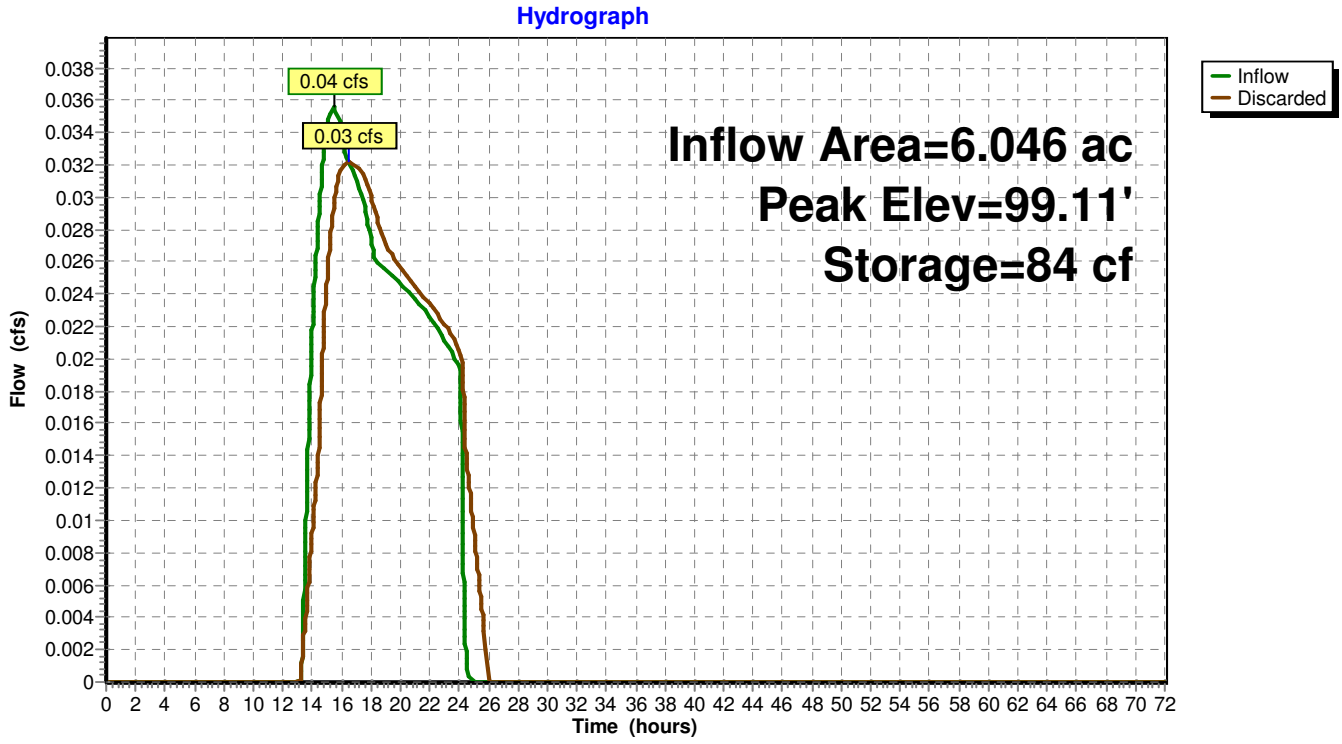
Volume	Invert	Avail.Storage	Storage Description
#1	98.74'	73,208 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.74	50	0	0
99.00	247	39	39
100.00	3,035	1,641	1,680
101.00	17,736	10,386	12,065
102.00	30,108	23,922	35,987
103.00	44,334	37,221	73,208

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.74'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 94.40'

Discarded OutFlow Max=0.03 cfs @ 16.46 hrs HW=99.11' (Free Discharge)
↑**1=Exfiltration** (Controls 0.03 cfs)

Pond DP1: DP1 (SE - Natural Depression)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.321 ac, 5.13% Impervious, Inflow Depth = 0.07" for 10-yr event
Inflow = 0.02 cfs @ 15.40 hrs, Volume= 0.013 af
Outflow = 0.02 cfs @ 17.80 hrs, Volume= 0.013 af, Atten= 21%, Lag= 143.7 min
Discarded = 0.02 cfs @ 17.80 hrs, Volume= 0.013 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.01' @ 17.80 hrs Surf.Area= 273 sf Storage= 86 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 78.1 min (1,186.3 - 1,108.3)

Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	9,761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

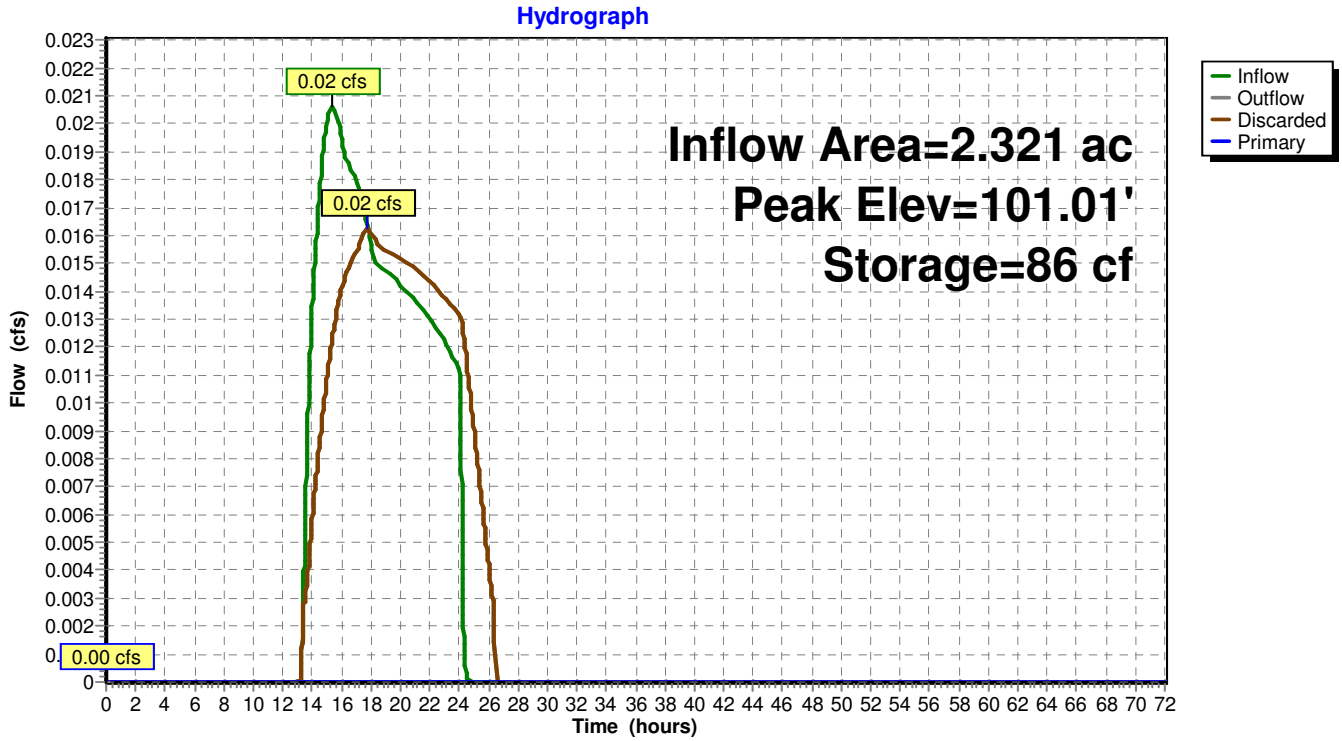
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,671	966	1,050
103.00	4,177	2,924	3,974
104.00	7,398	5,788	9,761

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.50'	**13.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.02 cfs @ 17.80 hrs HW=101.01' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.46' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 6.384 ac, 8.71% Impervious, Inflow Depth = 0.12" for 10-yr event
Inflow = 0.10 cfs @ 15.15 hrs, Volume= 0.062 af
Outflow = 0.06 cfs @ 18.26 hrs, Volume= 0.062 af, Atten= 36%, Lag= 186.4 min
Discarded = 0.06 cfs @ 18.26 hrs, Volume= 0.062 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.44' @ 18.26 hrs Surf.Area= 4,762 sf Storage= 549 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 112.8 min (1,192.0 - 1,079.2)

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	66,553 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

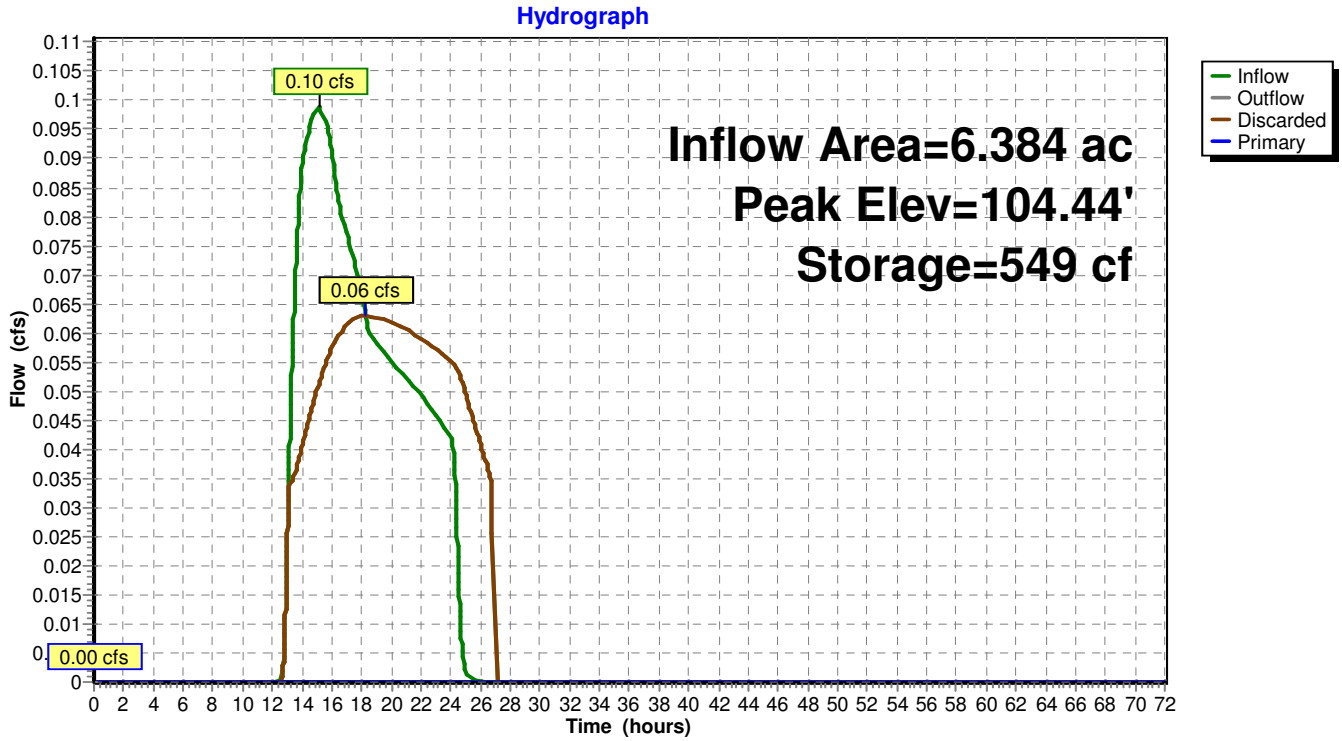
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,831	0	0
105.00	12,175	5,252	5,252
106.00	28,206	20,191	25,443
107.00	54,015	41,111	66,553

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.58'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.06 cfs @ 18.26 hrs HW=104.44' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' TW=103.83' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 8.874 ac, 10.41% Impervious, Inflow Depth = 0.11" for 10-yr event
Inflow = 0.40 cfs @ 12.41 hrs, Volume= 0.081 af
Outflow = 0.12 cfs @ 14.15 hrs, Volume= 0.081 af, Atten= 69%, Lag= 104.1 min
Discarded = 0.12 cfs @ 14.15 hrs, Volume= 0.081 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.02' @ 14.15 hrs Surf.Area= 4,600 sf Storage= 659 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 58.3 min (1,014.2 - 956.0)

Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	23,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

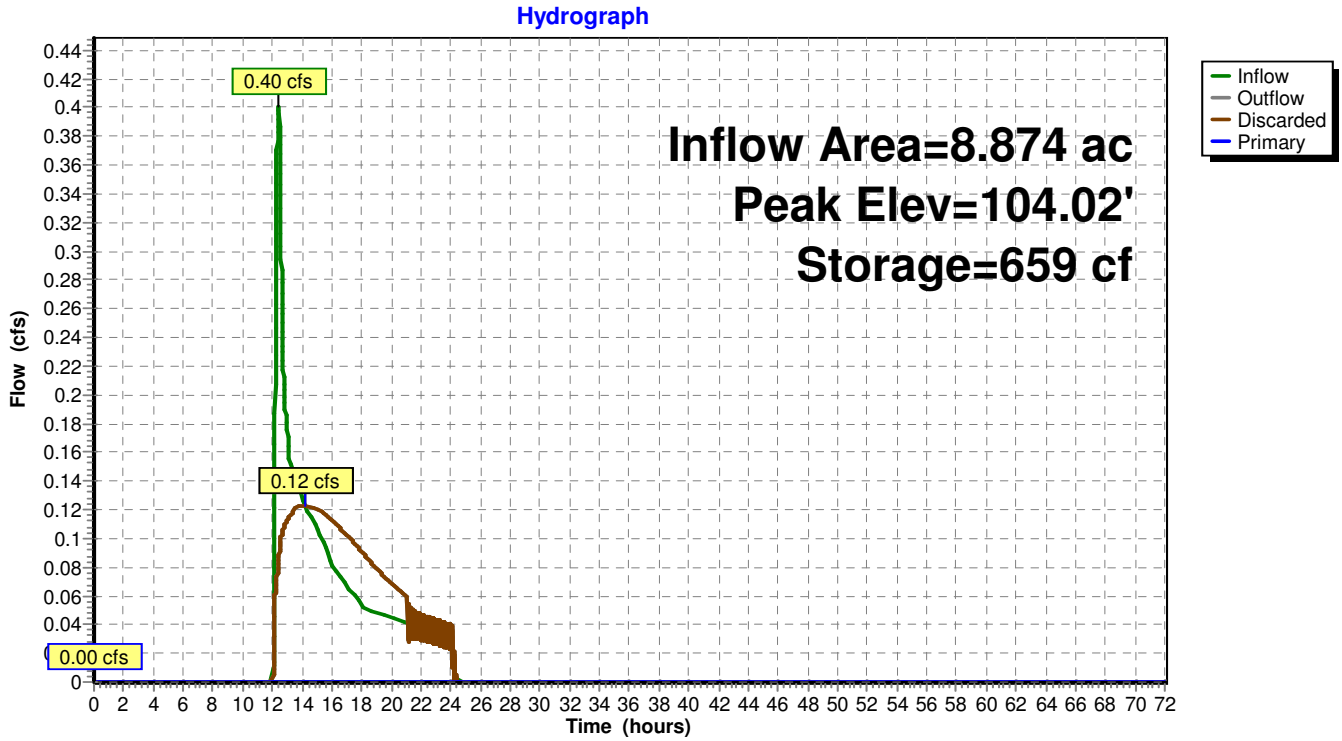
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,495	0	0
104.00	4,313	579	579
105.00	20,285	12,299	12,878
105.50	23,818	11,026	23,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'
#2	Primary	105.07'	**20.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.12 cfs @ 14.15 hrs HW=104.02' (Free Discharge)
↑**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.83' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP4: DP4 (North - Natural Depression)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.36"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.06 cfs 0.017 af

Subcatchment 1bS: 1bS Runoff Area=64,083 sf 10.26% Impervious Runoff Depth=0.31"
Flow Length=221' Tc=20.1 min CN=39 Runoff=0.12 cfs 0.038 af

Subcatchment 1S: 1S Runoff Area=174,734 sf 5.65% Impervious Runoff Depth=0.19"
Flow Length=583' Tc=18.0 min CN=36 Runoff=0.11 cfs 0.064 af

Subcatchment 2S: 2S Runoff Area=101,102 sf 5.13% Impervious Runoff Depth=0.19"
Flow Length=402' Tc=14.1 min CN=36 Runoff=0.06 cfs 0.037 af

Subcatchment 3S: 3S Runoff Area=278,077 sf 8.71% Impervious Runoff Depth=0.27"
Flow Length=702' Tc=34.0 min CN=38 Runoff=0.30 cfs 0.143 af

Subcatchment 4S: 4S Runoff Area=108,485 sf 14.74% Impervious Runoff Depth=0.67"
Flow Length=170' Tc=11.8 min CN=46 Runoff=0.88 cfs 0.138 af

Pond 1A: 1a (Off-Site Natural Depression) Peak Elev=105.00' Storage=0 cf Inflow=0.06 cfs 0.017 af
Discarded=0.06 cfs 0.017 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.017 af

Pond 1B: 1b (Central Natural Depression) Peak Elev=102.17' Storage=119 cf Inflow=0.12 cfs 0.038 af
Discarded=0.07 cfs 0.038 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.038 af

Pond DP1: DP1 (SE - Natural Depression) Peak Elev=99.44' Storage=411 cf Inflow=0.11 cfs 0.064 af
Outflow=0.09 cfs 0.064 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=101.38' Storage=287 cf Inflow=0.06 cfs 0.037 af
Discarded=0.05 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.037 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=104.70' Storage=2,180 cf Inflow=0.30 cfs 0.143 af
Discarded=0.12 cfs 0.143 af Primary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.143 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=104.17' Storage=1,574 cf Inflow=0.88 cfs 0.138 af
Discarded=0.20 cfs 0.138 af Primary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.138 af

Total Runoff Area = 17.241 ac Runoff Volume = 0.438 af Average Runoff Depth = 0.30"
91.44% Pervious = 15.766 ac 8.56% Impervious = 1.476 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

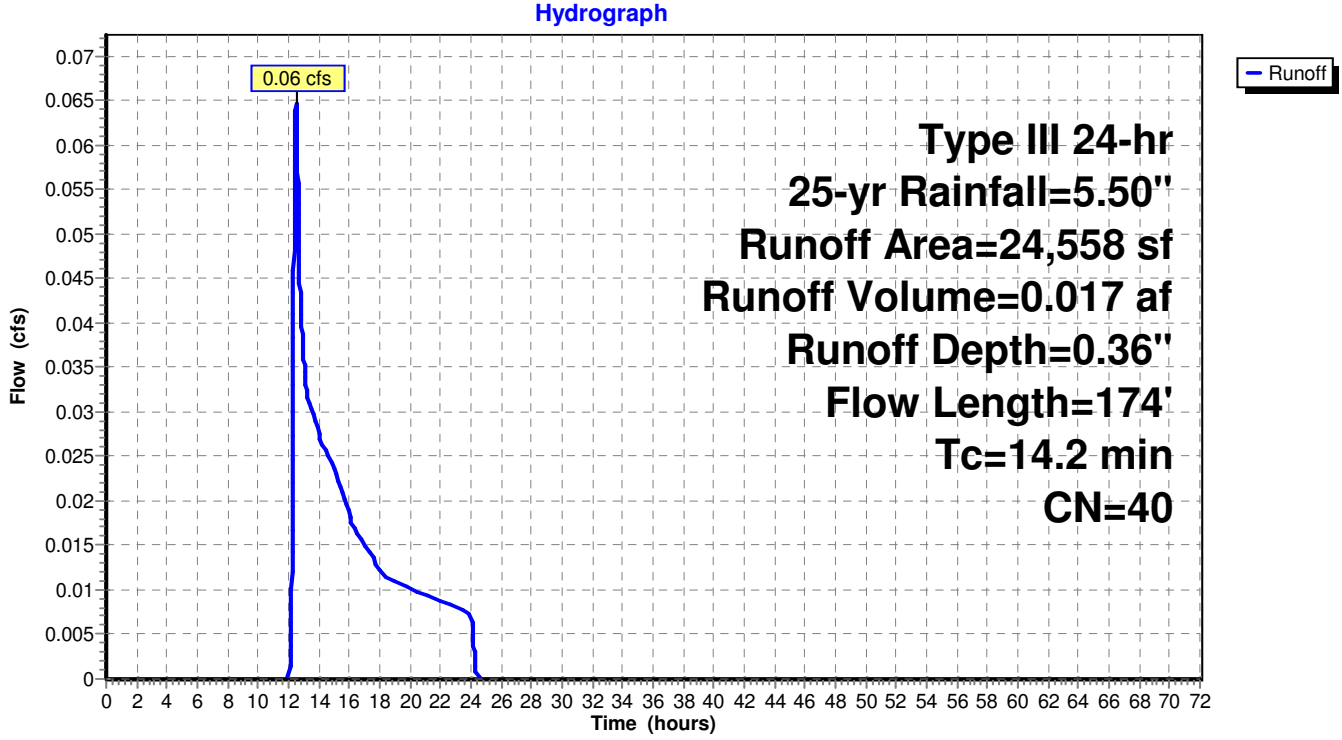
Runoff = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

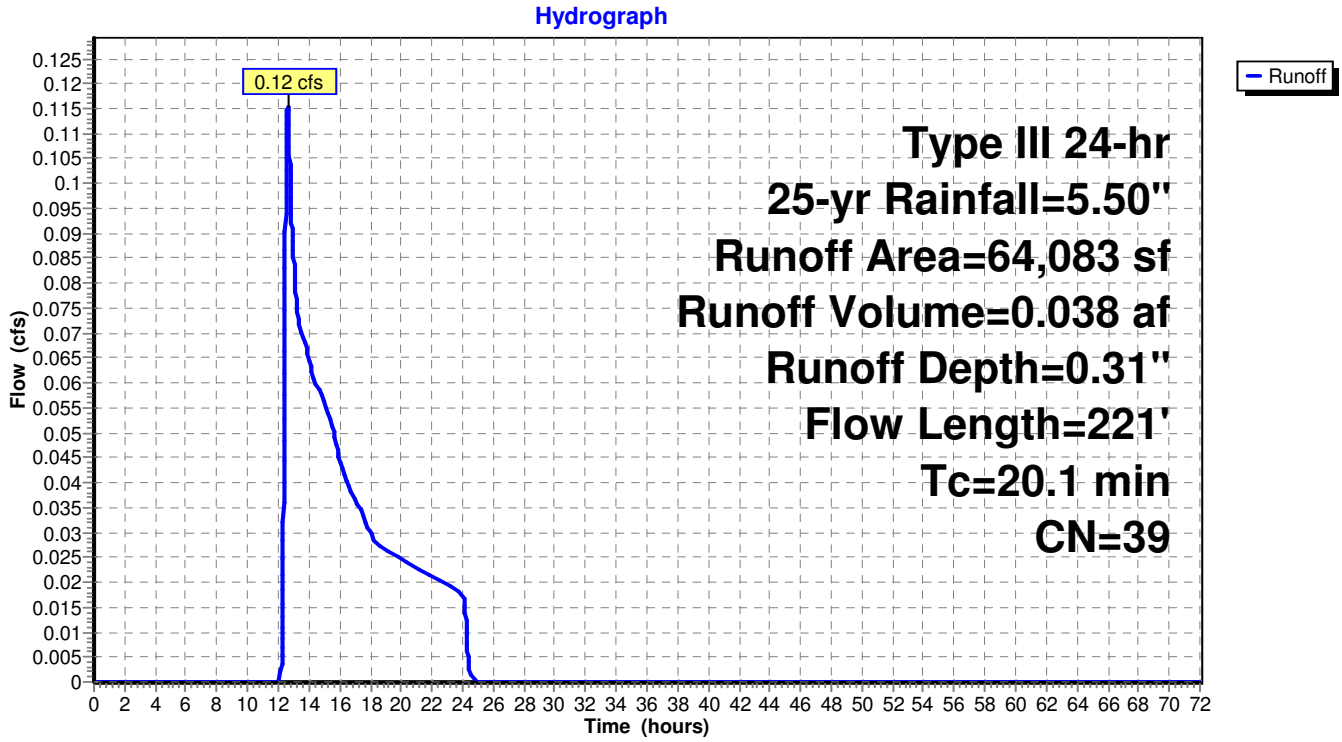
Runoff = 0.12 cfs @ 12.62 hrs, Volume= 0.038 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
6,573	98	Paved parking, HSG A
2,228	76	Gravel roads, HSG A
4,988	39	>75% Grass cover, Good, HSG A
50,294	30	Woods, Good, HSG A
64,083	39	Weighted Average
57,510		89.74% Pervious Area
6,573		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	171	0.0230	0.76		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	221	Total			

Subcatchment 1bS: 1bS



Summary for Subcatchment 1S: 1S

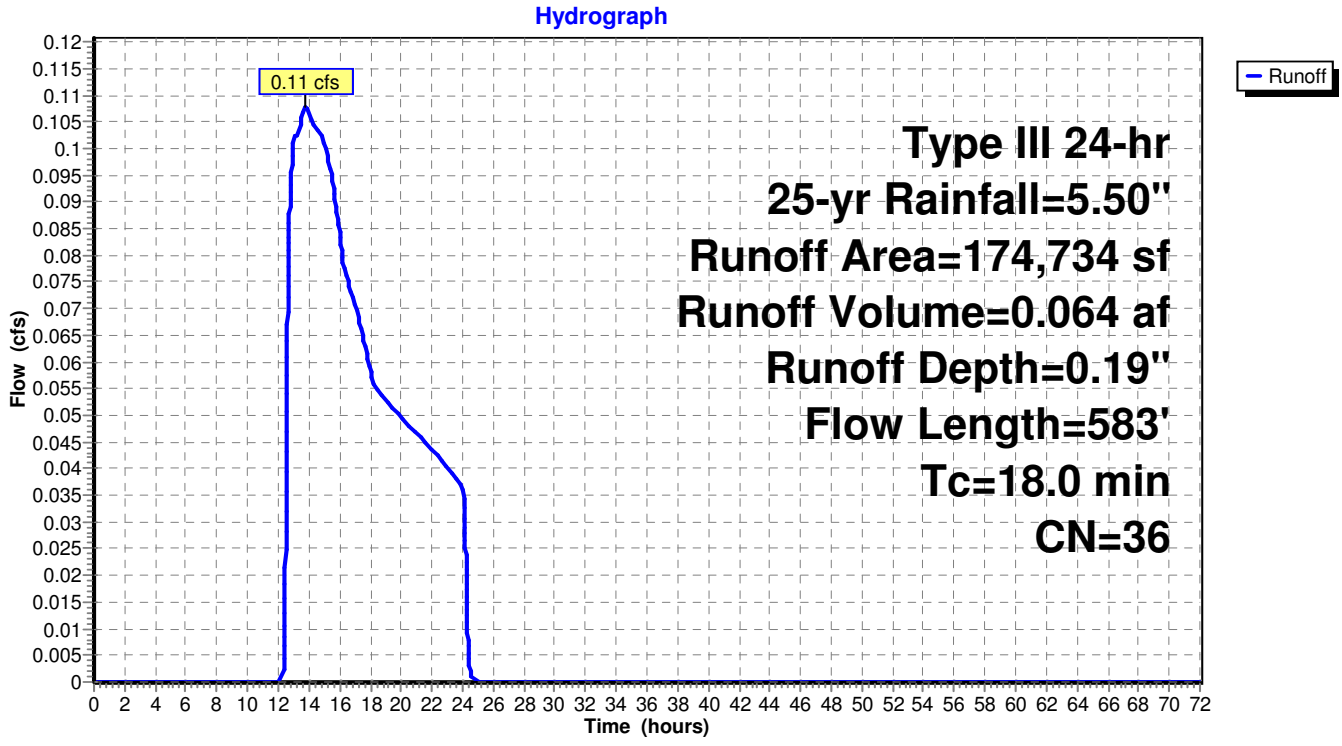
Runoff = 0.11 cfs @ 13.82 hrs, Volume= 0.064 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
4,524	98	Paved parking, HSG A
5,354	98	Roofs, HSG A
6,609	39	>75% Grass cover, Good, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
133,756	30	Woods, Good, HSG A
174,734	36	Weighted Average
164,856		94.35% Pervious Area
9,878		5.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

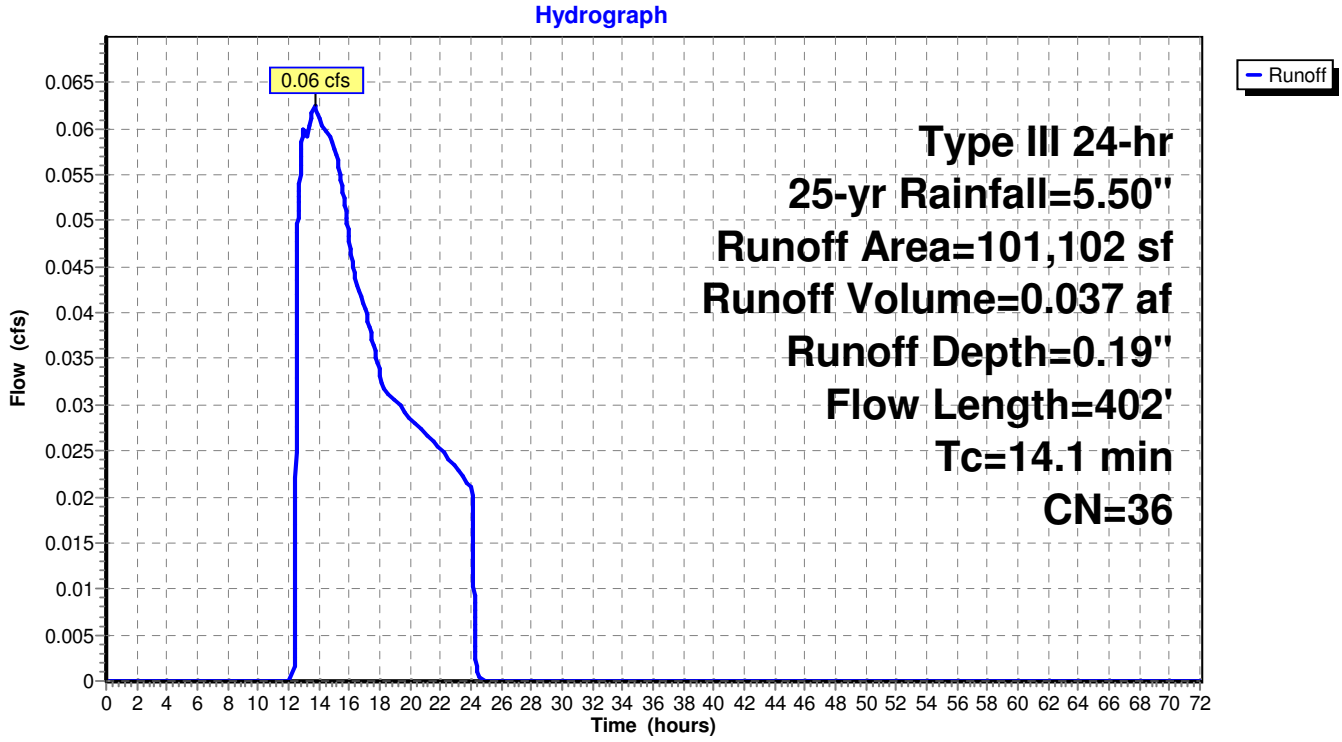
Runoff = 0.06 cfs @ 13.77 hrs, Volume= 0.037 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
65,543	30	Woods, Good, HSG A
101,102	36	Weighted Average
95,914		94.87% Pervious Area
5,188		5.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

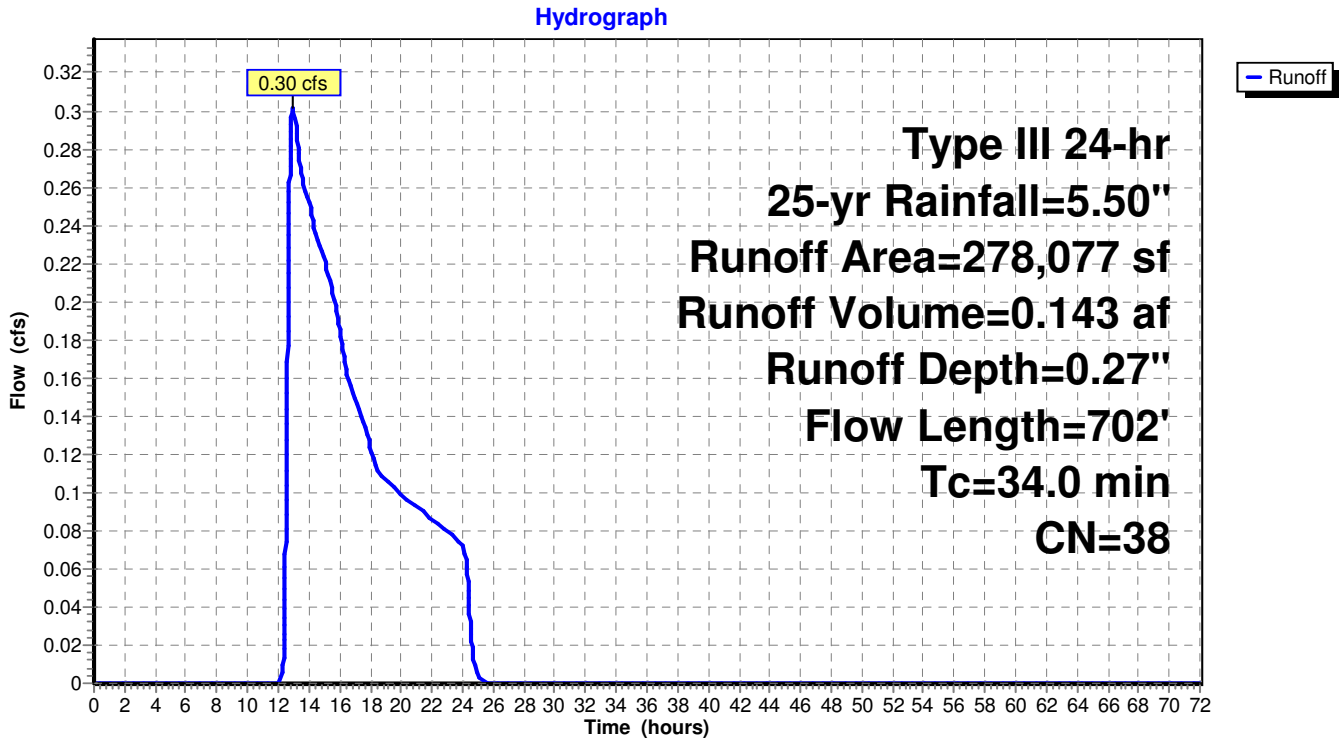
Runoff = 0.30 cfs @ 12.96 hrs, Volume= 0.143 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
12,946	98	Roofs, HSG A
44,703	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
3,521	98	Roofs, HSG A
9,219	39	>75% Grass cover, Good, HSG A
178,664	30	Woods, Good, HSG A
278,077	38	Weighted Average
253,847		91.29% Pervious Area
24,230		8.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

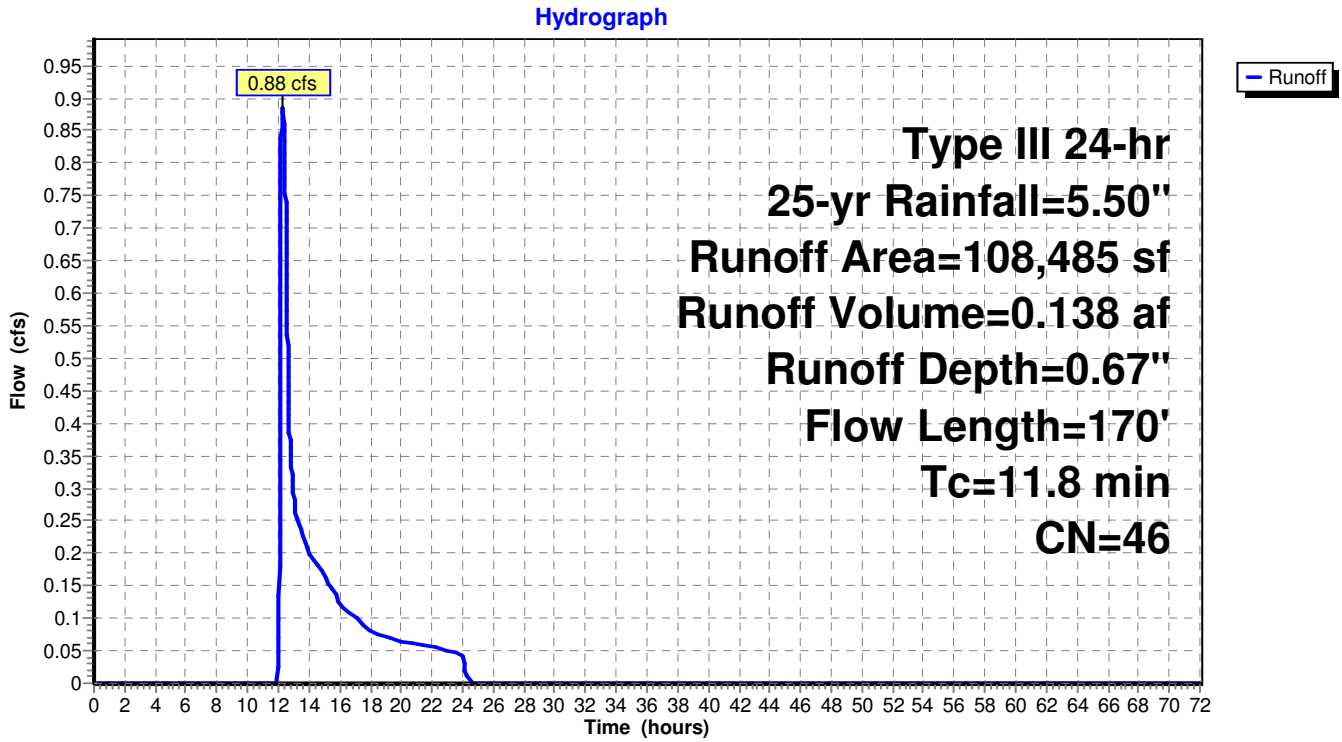
Runoff = 0.88 cfs @ 12.26 hrs, Volume= 0.138 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
10,060	98	Roofs, HSG A
6,475	39	>75% Grass cover, Good, HSG A
4,345	76	Gravel roads, HSG A
22,949	30	Woods, Good, HSG A
108,485	46	Weighted Average
92,489		85.26% Pervious Area
15,996		14.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off-Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.36" for 25-yr event
Inflow = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af
Outflow = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.1 min
Discarded = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.00' @ 12.50 hrs Surf.Area= 1,231 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (977.6 - 977.6)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

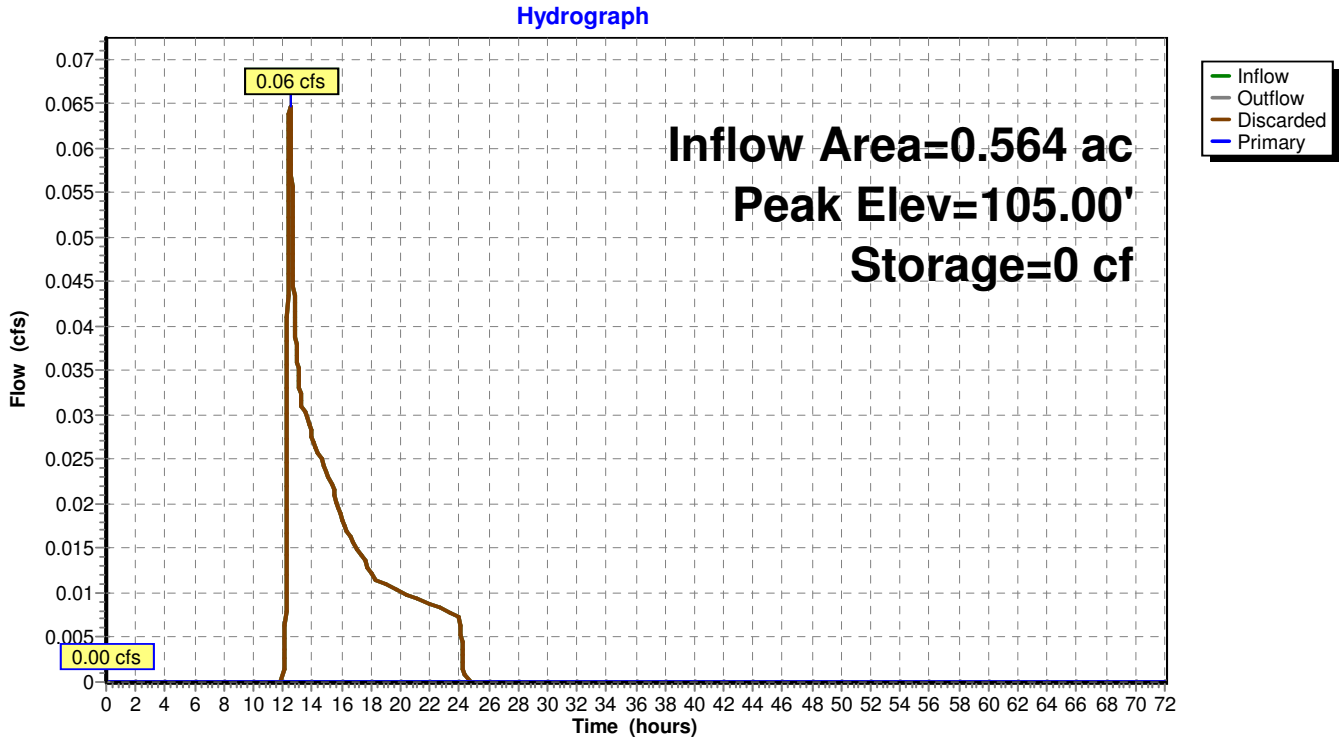
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 12.50 hrs HW=105.00' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off-Site Natural Depression)



Summary for Pond 1B: 1b (Central Natural Depression)

Inflow Area = 1.471 ac, 10.26% Impervious, Inflow Depth = 0.31" for 25-yr event
Inflow = 0.12 cfs @ 12.62 hrs, Volume= 0.038 af
Outflow = 0.07 cfs @ 13.41 hrs, Volume= 0.038 af, Atten= 39%, Lag= 47.7 min
Discarded = 0.07 cfs @ 13.41 hrs, Volume= 0.038 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.17' @ 13.41 hrs Surf.Area= 1,248 sf Storage= 119 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 18.4 min (1,012.3 - 993.9)

Volume	Invert	Avail.Storage	Storage Description
#1	102.00'	8,485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

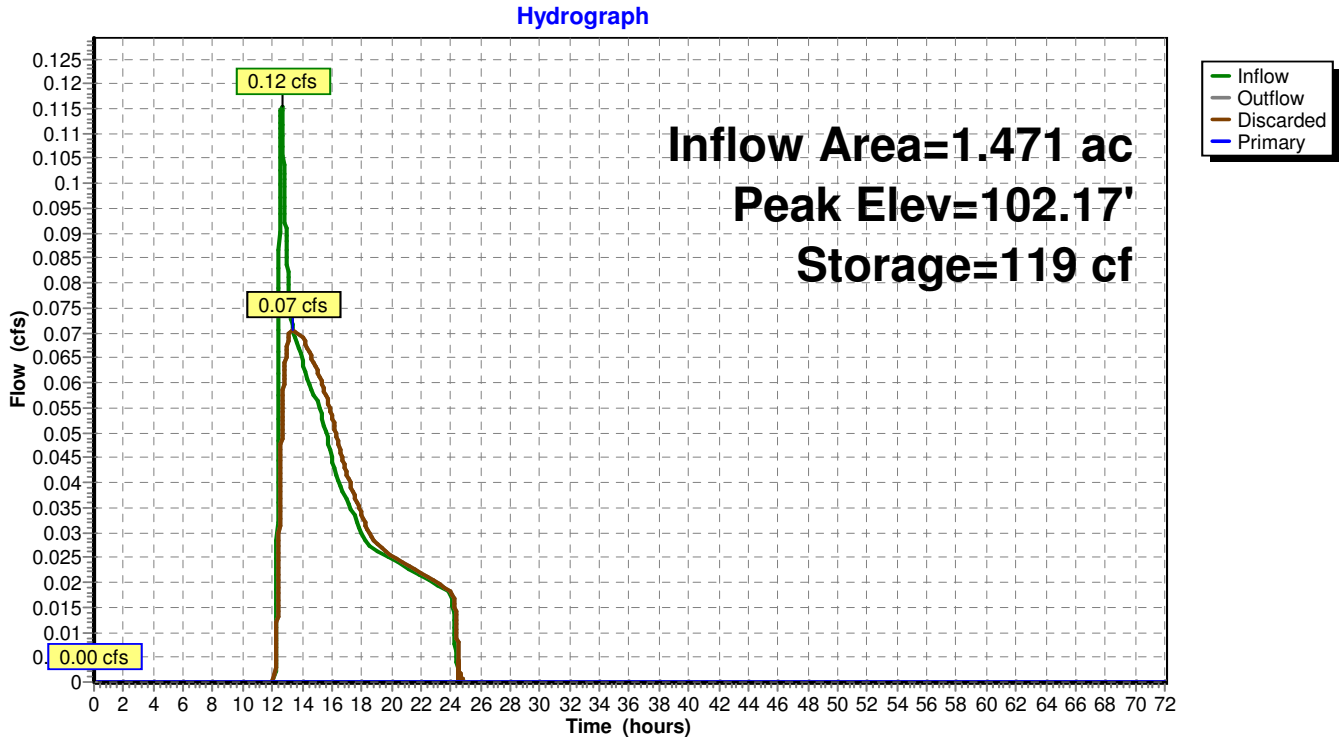
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
102.00	134	0	0
103.00	6,577	3,356	3,356
103.50	13,940	5,129	8,485

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.39'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 13.41 hrs HW=102.17' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=102.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: 1b (Central Natural Depression)



Summary for Pond DP1: DP1 (SE - Natural Depression)

Inflow Area = 6.046 ac, 7.16% Impervious, Inflow Depth = 0.13" for 25-yr event
Inflow = 0.11 cfs @ 13.82 hrs, Volume= 0.064 af
Outflow = 0.09 cfs @ 15.90 hrs, Volume= 0.064 af, Atten= 20%, Lag= 125.0 min
Discarded = 0.09 cfs @ 15.90 hrs, Volume= 0.064 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 99.44' @ 15.90 hrs Surf.Area= 1,463 sf Storage= 411 cf

Plug-Flow detention time= 65.2 min calculated for 0.064 af (100% of inflow)
Center-of-Mass det. time= 65.2 min (1,098.7 - 1,033.5)

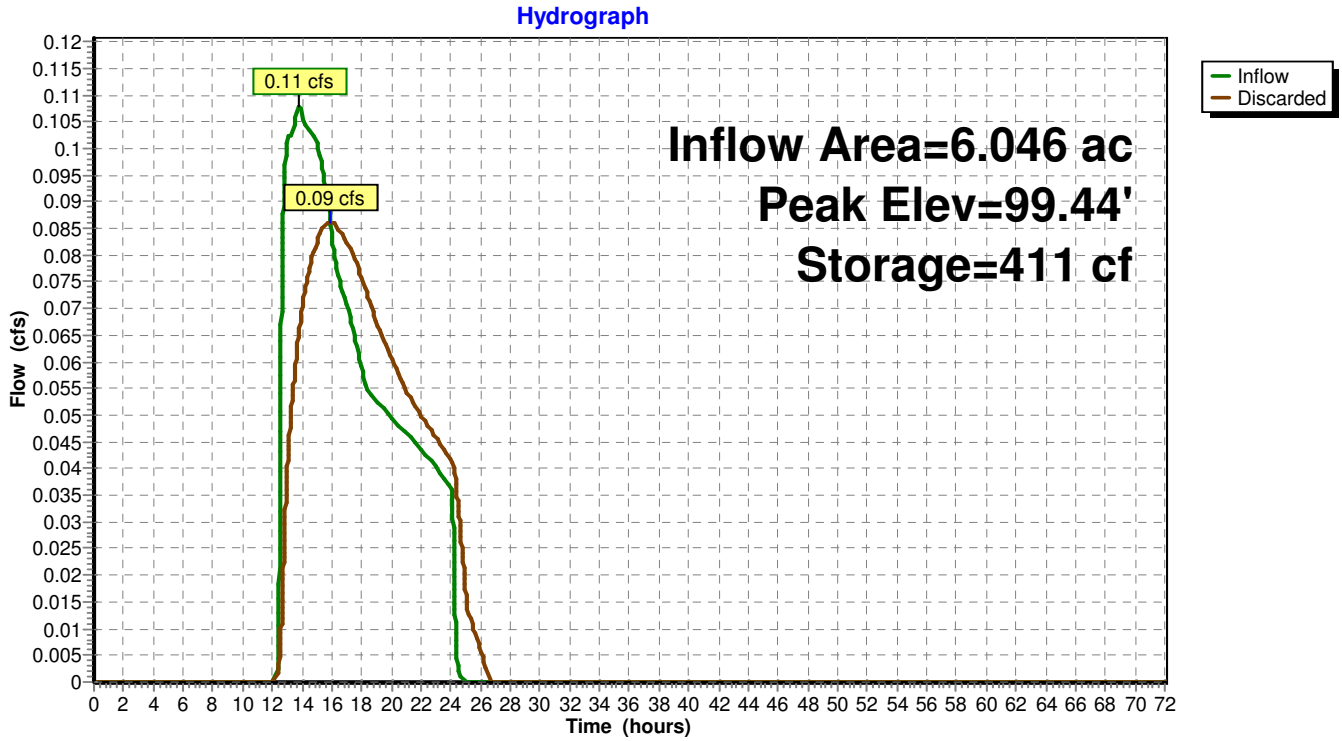
Volume	Invert	Avail.Storage	Storage Description
#1	98.74'	73,208 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.74	50	0	0
99.00	247	39	39
100.00	3,035	1,641	1,680
101.00	17,736	10,386	12,065
102.00	30,108	23,922	35,987
103.00	44,334	37,221	73,208

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.74'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 94.40'

Discarded OutFlow Max=0.09 cfs @ 15.90 hrs HW=99.44' (Free Discharge)
↑**1=Exfiltration** (Controls 0.09 cfs)

Pond DP1: DP1 (SE - Natural Depression)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.321 ac, 5.13% Impervious, Inflow Depth = 0.19" for 25-yr event
Inflow = 0.06 cfs @ 13.77 hrs, Volume= 0.037 af
Outflow = 0.05 cfs @ 15.99 hrs, Volume= 0.037 af, Atten= 23%, Lag= 133.4 min
Discarded = 0.05 cfs @ 15.99 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.38' @ 15.99 hrs Surf.Area= 801 sf Storage= 287 cf

Plug-Flow detention time= 89.1 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 89.1 min (1,119.0 - 1,029.9)

Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	9,761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

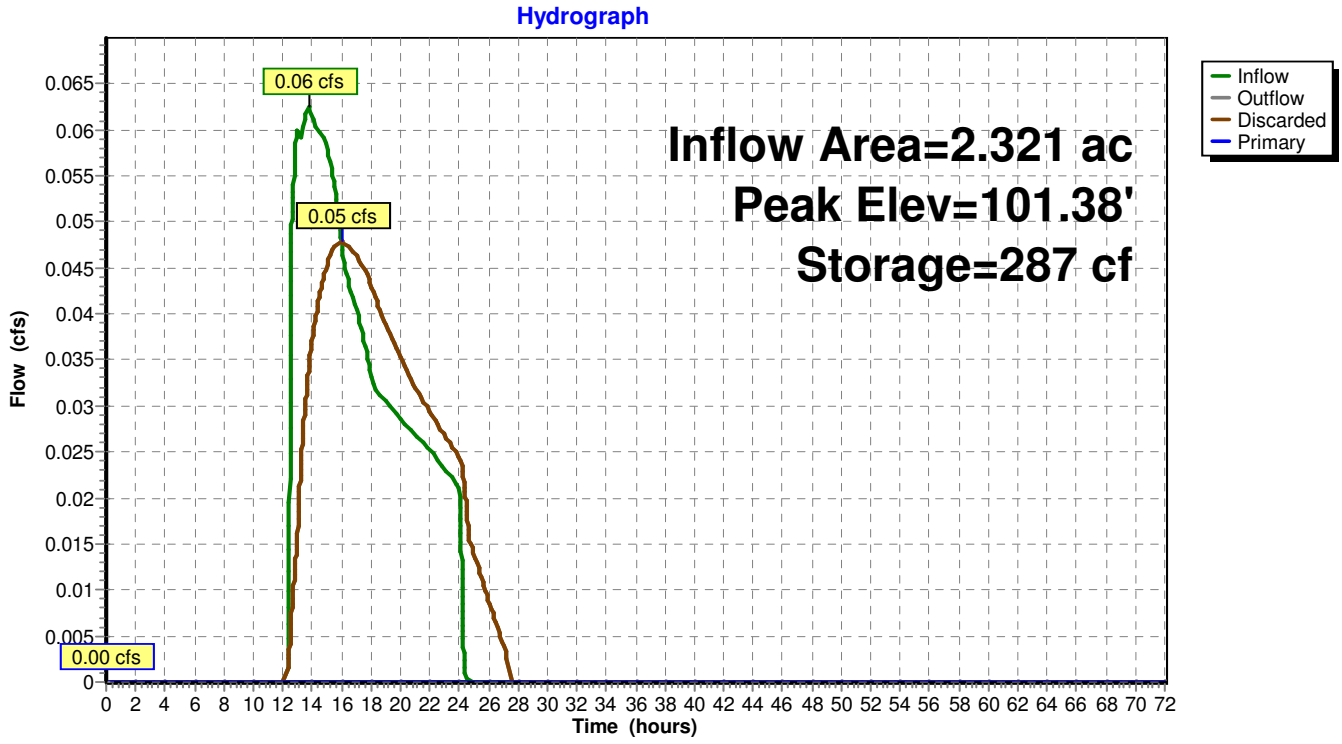
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,671	966	1,050
103.00	4,177	2,924	3,974
104.00	7,398	5,788	9,761

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.50'	**13.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.05 cfs @ 15.99 hrs HW=101.38' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.46' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 6.384 ac, 8.71% Impervious, Inflow Depth = 0.27" for 25-yr event
Inflow = 0.30 cfs @ 12.96 hrs, Volume= 0.143 af
Outflow = 0.12 cfs @ 18.14 hrs, Volume= 0.143 af, Atten= 60%, Lag= 311.2 min
Discarded = 0.12 cfs @ 18.14 hrs, Volume= 0.143 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.70' @ 18.14 hrs Surf.Area= 8,138 sf Storage= 2,180 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 247.3 min (1,266.3 - 1,018.9)

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	66,553 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

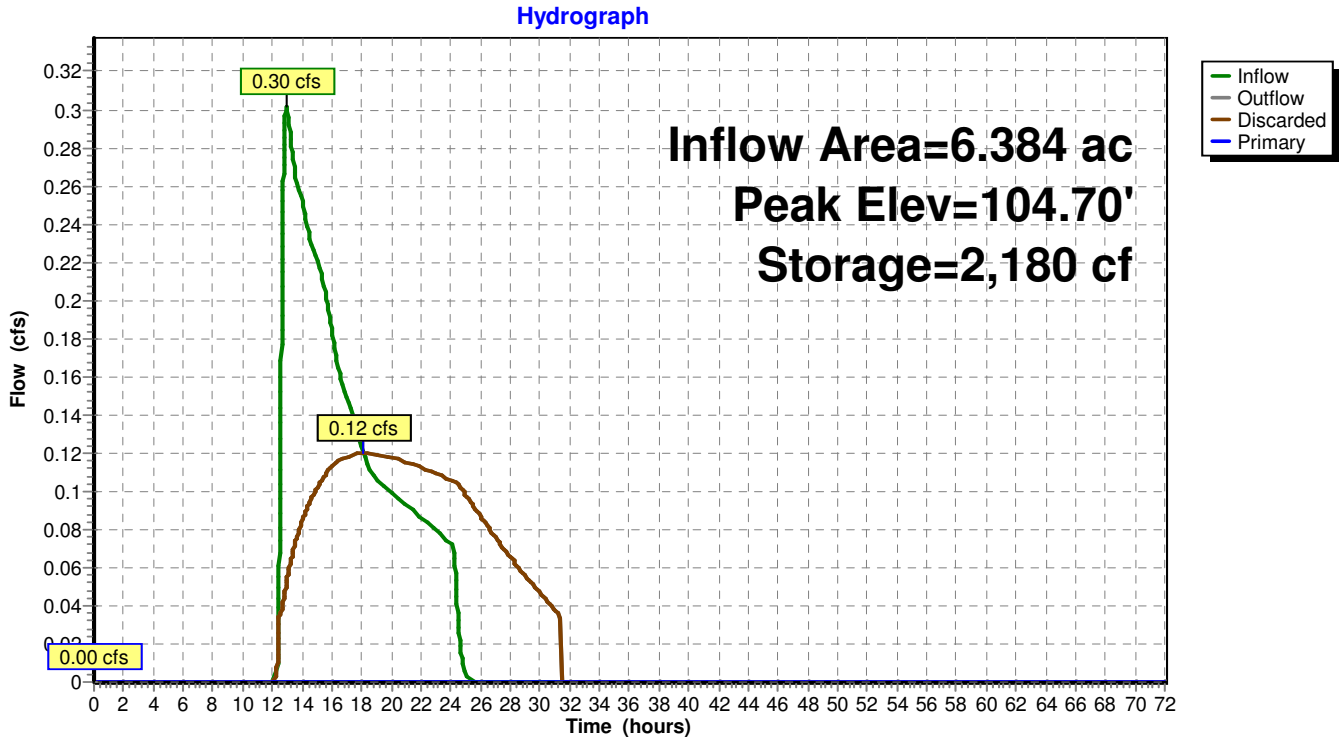
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,831	0	0
105.00	12,175	5,252	5,252
106.00	28,206	20,191	25,443
107.00	54,015	41,111	66,553

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.58'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.12 cfs @ 18.14 hrs HW=104.70' (Free Discharge)
1=Exfiltration (Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' TW=103.83' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 8.874 ac, 10.41% Impervious, Inflow Depth = 0.19" for 25-yr event
Inflow = 0.88 cfs @ 12.26 hrs, Volume= 0.138 af
Outflow = 0.20 cfs @ 14.04 hrs, Volume= 0.138 af, Atten= 77%, Lag= 106.6 min
Discarded = 0.20 cfs @ 14.04 hrs, Volume= 0.138 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.17' @ 14.04 hrs Surf.Area= 7,099 sf Storage= 1,574 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 99.4 min (1,028.6 - 929.2)

Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	23,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

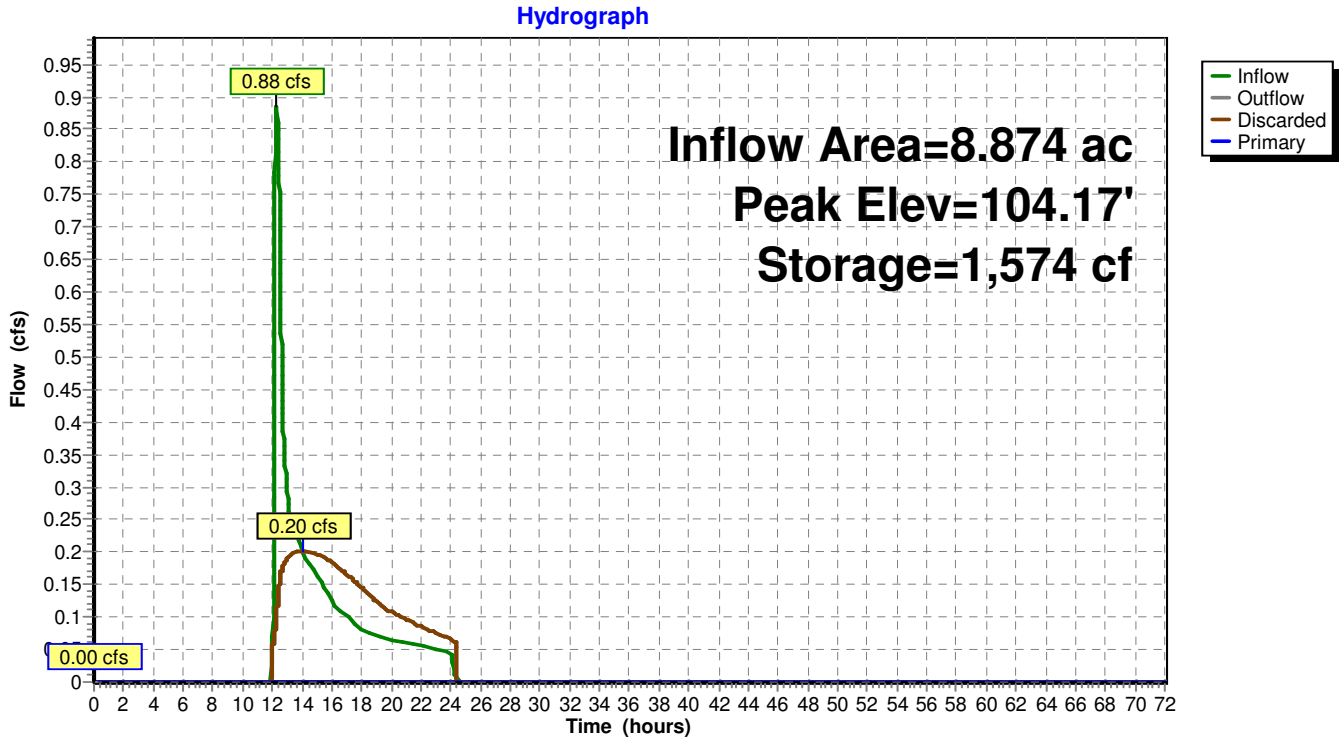
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,495	0	0
104.00	4,313	579	579
105.00	20,285	12,299	12,878
105.50	23,818	11,026	23,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'
#2	Primary	105.07'	**20.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.20 cfs @ 14.04 hrs HW=104.17' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.83' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP4: DP4 (North - Natural Depression)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.73"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.20 cfs 0.034 af

Subcatchment 1bS: 1bS Runoff Area=64,083 sf 10.26% Impervious Runoff Depth=0.66"
Flow Length=221' Tc=20.1 min CN=39 Runoff=0.41 cfs 0.081 af

Subcatchment 1S: 1S Runoff Area=174,734 sf 5.65% Impervious Runoff Depth=0.47"
Flow Length=583' Tc=18.0 min CN=36 Runoff=0.62 cfs 0.158 af

Subcatchment 2S: 2S Runoff Area=101,102 sf 5.13% Impervious Runoff Depth=0.47"
Flow Length=402' Tc=14.1 min CN=36 Runoff=0.38 cfs 0.091 af

Subcatchment 3S: 3S Runoff Area=278,077 sf 8.71% Impervious Runoff Depth=0.60"
Flow Length=702' Tc=34.0 min CN=38 Runoff=1.21 cfs 0.318 af

Subcatchment 4S: 4S Runoff Area=108,485 sf 14.74% Impervious Runoff Depth=1.18"
Flow Length=170' Tc=11.8 min CN=46 Runoff=2.10 cfs 0.244 af

Pond 1A: 1a (Off-Site Natural Depression) Peak Elev=105.11' Storage=159 cf Inflow=0.20 cfs 0.034 af
Discarded=0.10 cfs 0.034 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.034 af

Pond 1B: 1b (Central Natural Depression) Peak Elev=102.40' Storage=581 cf Inflow=0.41 cfs 0.081 af
Discarded=0.16 cfs 0.081 af Primary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.081 af

Pond DP1: DP1 (SE - Natural Depression) Peak Elev=100.01' Storage=1,721 cf Inflow=0.62 cfs 0.158 af
Outflow=0.20 cfs 0.158 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=102.02' Storage=1,079 cf Inflow=0.38 cfs 0.091 af
Discarded=0.11 cfs 0.091 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.091 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=105.08' Storage=6,341 cf Inflow=1.21 cfs 0.318 af
Discarded=0.22 cfs 0.318 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.318 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=104.40' Storage=3,579 cf Inflow=2.10 cfs 0.244 af
Discarded=0.33 cfs 0.244 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.244 af

Total Runoff Area = 17.241 ac Runoff Volume = 0.928 af Average Runoff Depth = 0.65"
91.44% Pervious = 15.766 ac 8.56% Impervious = 1.476 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

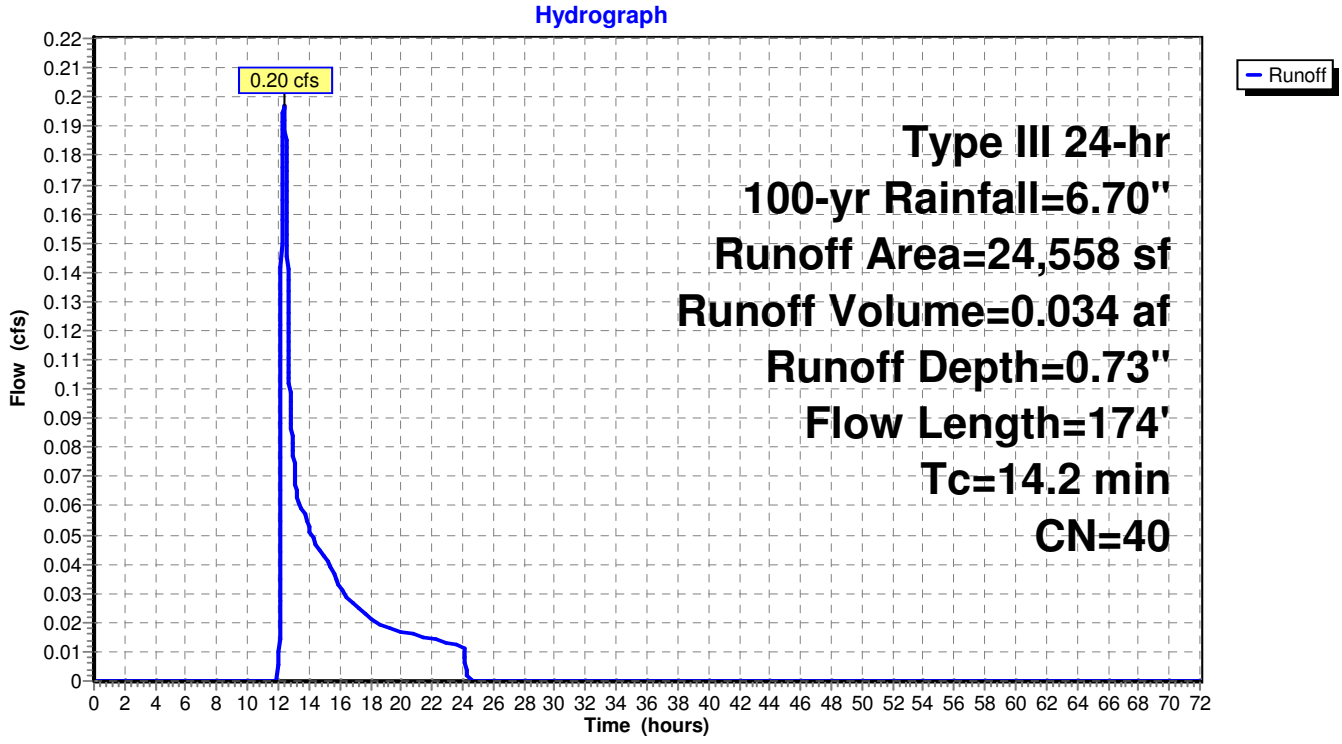
Runoff = 0.20 cfs @ 12.38 hrs, Volume= 0.034 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

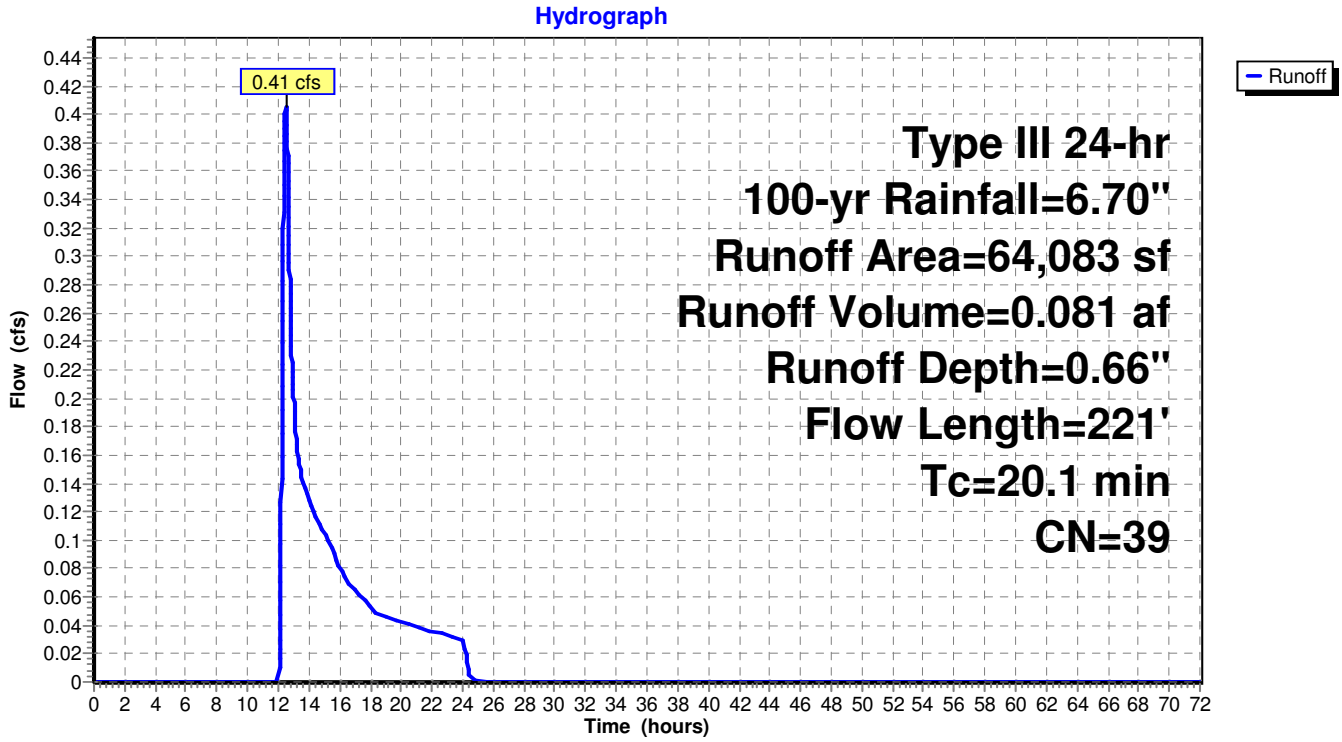
Runoff = 0.41 cfs @ 12.49 hrs, Volume= 0.081 af, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
6,573	98	Paved parking, HSG A
2,228	76	Gravel roads, HSG A
4,988	39	>75% Grass cover, Good, HSG A
50,294	30	Woods, Good, HSG A
64,083	39	Weighted Average
57,510		89.74% Pervious Area
6,573		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	171	0.0230	0.76		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	221	Total			

Subcatchment 1bS: 1bS



Summary for Subcatchment 1S: 1S

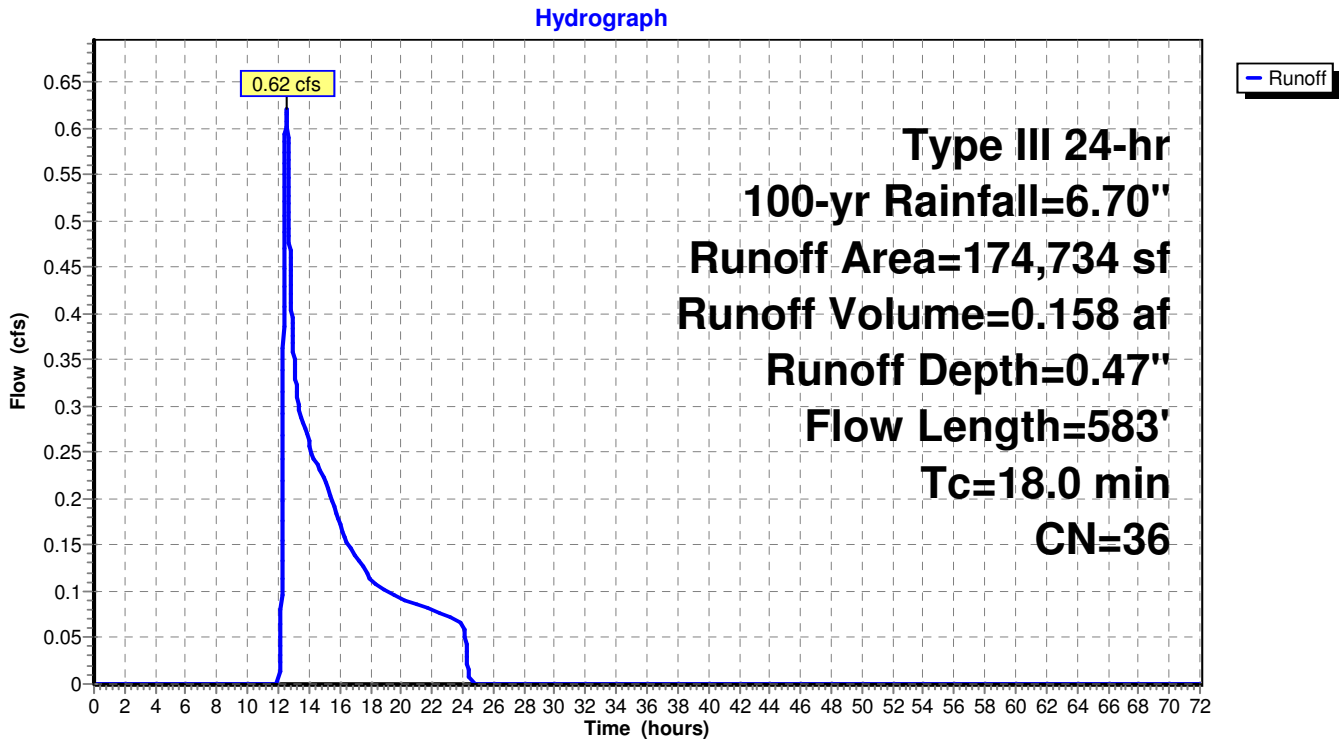
Runoff = 0.62 cfs @ 12.54 hrs, Volume= 0.158 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
4,524	98	Paved parking, HSG A
5,354	98	Roofs, HSG A
6,609	39	>75% Grass cover, Good, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
133,756	30	Woods, Good, HSG A
174,734	36	Weighted Average
164,856		94.35% Pervious Area
9,878		5.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

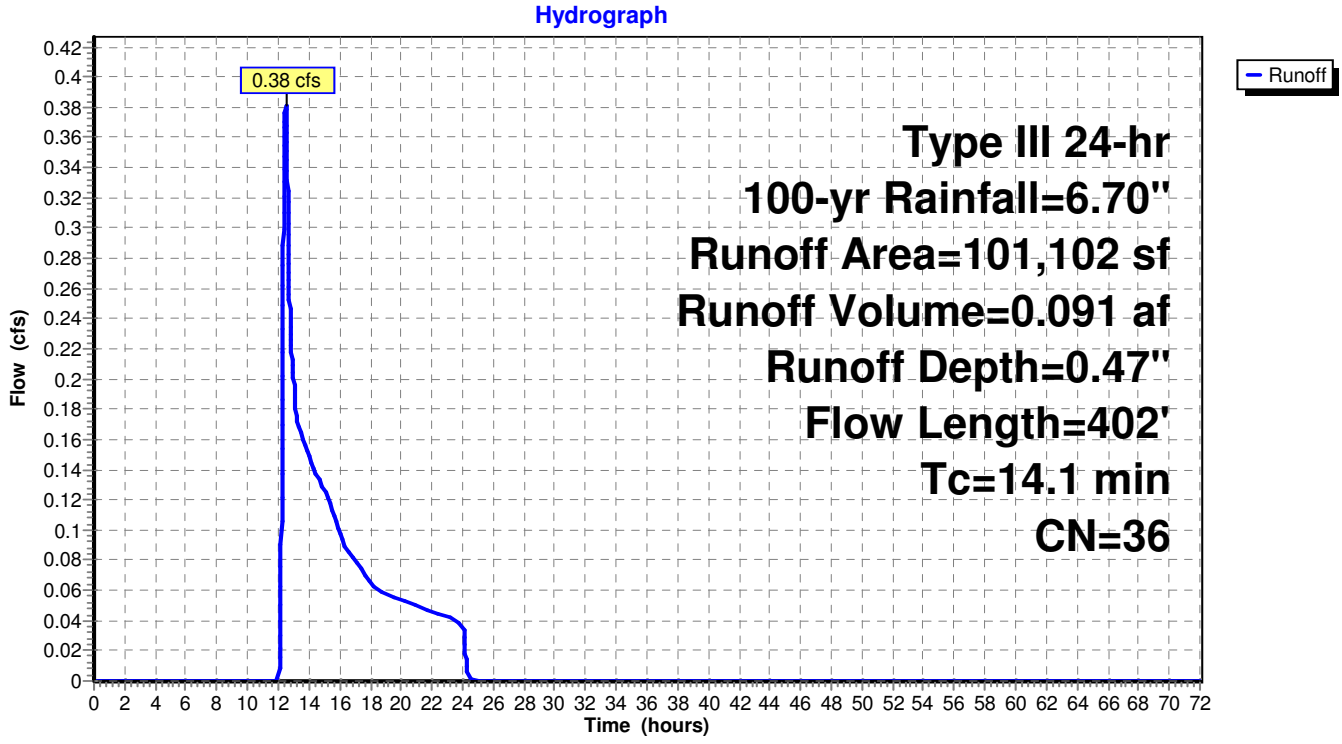
Runoff = 0.38 cfs @ 12.48 hrs, Volume= 0.091 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
65,543	30	Woods, Good, HSG A
101,102	36	Weighted Average
95,914		94.87% Pervious Area
5,188		5.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

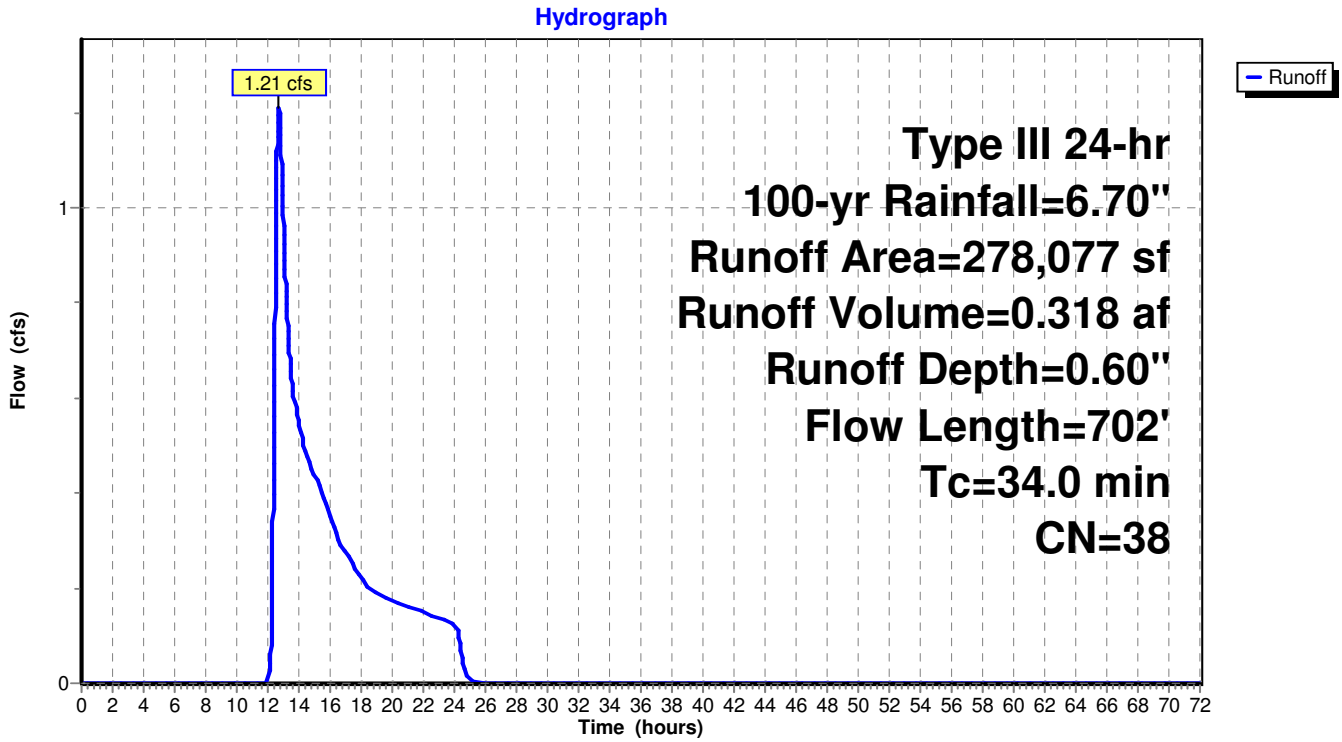
Runoff = 1.21 cfs @ 12.73 hrs, Volume= 0.318 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
12,946	98	Roofs, HSG A
44,703	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
3,521	98	Roofs, HSG A
9,219	39	>75% Grass cover, Good, HSG A
178,664	30	Woods, Good, HSG A
278,077	38	Weighted Average
253,847		91.29% Pervious Area
24,230		8.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

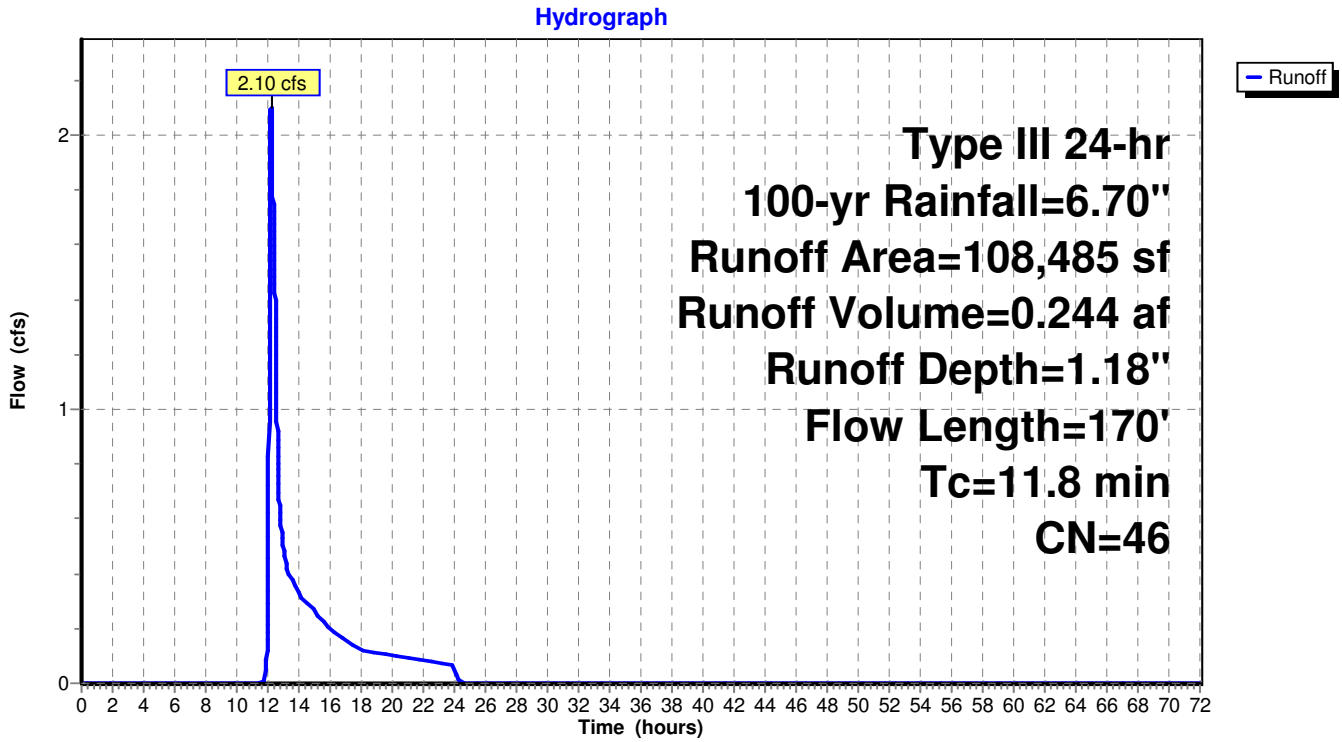
Runoff = 2.10 cfs @ 12.20 hrs, Volume= 0.244 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
10,060	98	Roofs, HSG A
6,475	39	>75% Grass cover, Good, HSG A
4,345	76	Gravel roads, HSG A
22,949	30	Woods, Good, HSG A
108,485	46	Weighted Average
92,489		85.26% Pervious Area
15,996		14.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off-Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.73" for 100-yr event
Inflow = 0.20 cfs @ 12.38 hrs, Volume= 0.034 af
Outflow = 0.10 cfs @ 12.76 hrs, Volume= 0.034 af, Atten= 50%, Lag= 22.9 min
Discarded = 0.10 cfs @ 12.76 hrs, Volume= 0.034 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.11' @ 12.76 hrs Surf.Area= 1,736 sf Storage= 159 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.4 min (947.1 - 938.7)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

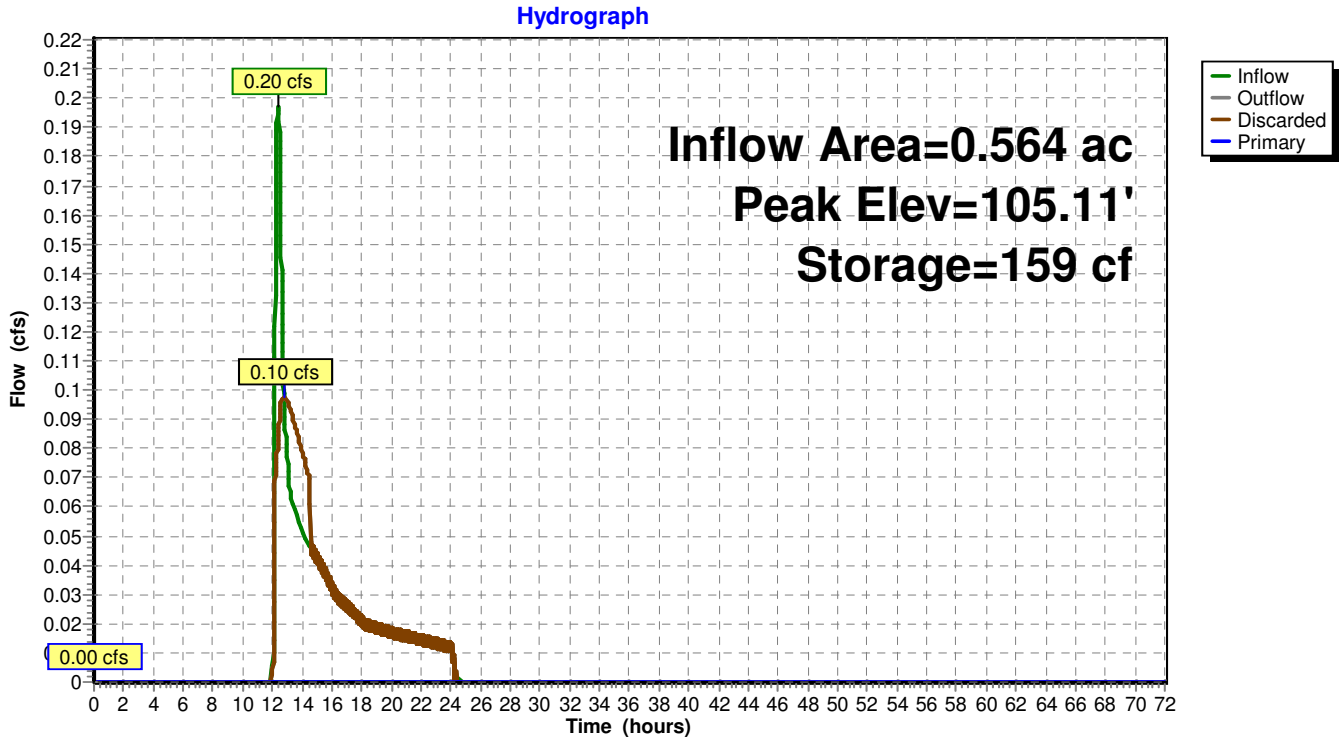
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.10 cfs @ 12.76 hrs HW=105.11' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off-Site Natural Depression)



Summary for Pond 1B: 1b (Central Natural Depression)

Inflow Area = 1.471 ac, 10.26% Impervious, Inflow Depth = 0.66" for 100-yr event
Inflow = 0.41 cfs @ 12.49 hrs, Volume= 0.081 af
Outflow = 0.16 cfs @ 13.29 hrs, Volume= 0.081 af, Atten= 61%, Lag= 47.9 min
Discarded = 0.16 cfs @ 13.29 hrs, Volume= 0.081 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.40' @ 13.29 hrs Surf.Area= 2,740 sf Storage= 581 cf

Plug-Flow detention time= 41.1 min calculated for 0.081 af (100% of inflow)
Center-of-Mass det. time= 41.1 min (992.2 - 951.1)

Volume	Invert	Avail.Storage	Storage Description
#1	102.00'	8,485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

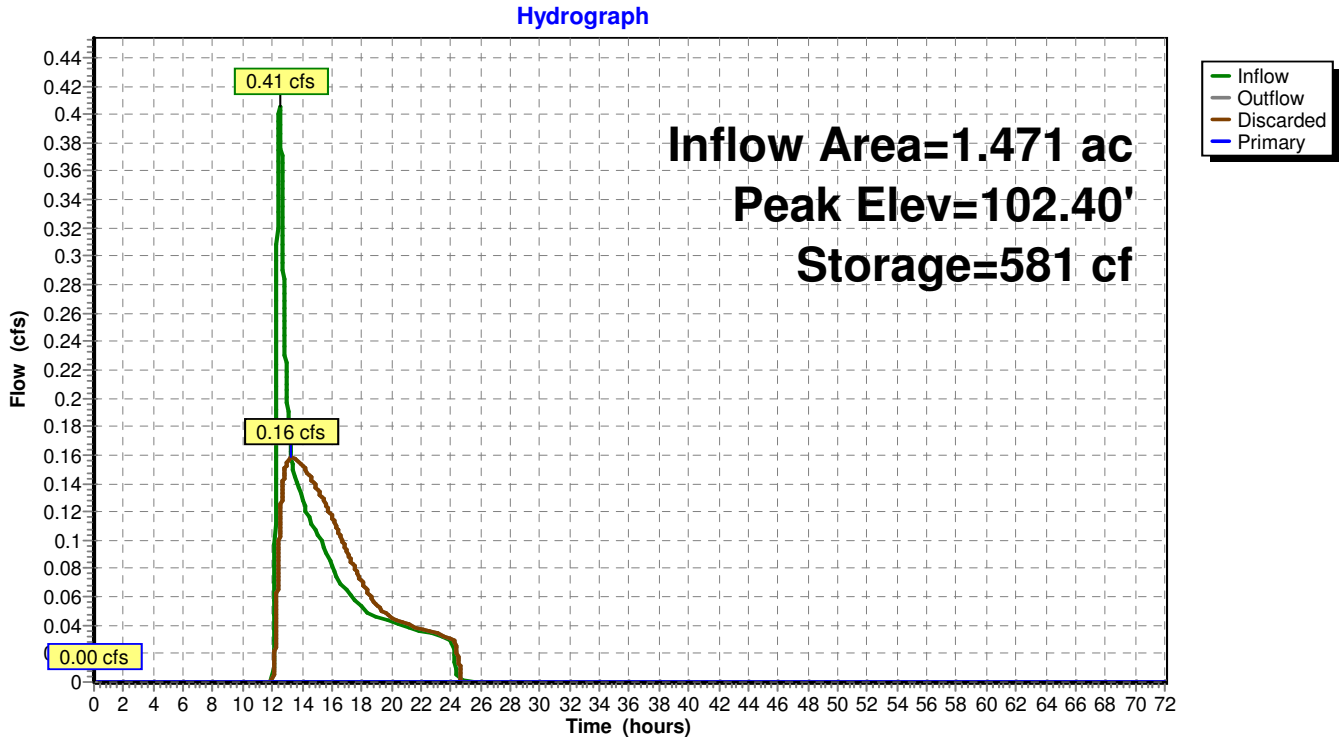
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
102.00	134	0	0
103.00	6,577	3,356	3,356
103.50	13,940	5,129	8,485

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.39'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.16 cfs @ 13.29 hrs HW=102.40' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=102.00' TW=98.74' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: 1b (Central Natural Depression)



Summary for Pond DP1: DP1 (SE - Natural Depression)

Inflow Area = 6.046 ac, 7.16% Impervious, Inflow Depth = 0.31" for 100-yr event
Inflow = 0.62 cfs @ 12.54 hrs, Volume= 0.158 af
Outflow = 0.20 cfs @ 15.48 hrs, Volume= 0.158 af, Atten= 68%, Lag= 176.7 min
Discarded = 0.20 cfs @ 15.48 hrs, Volume= 0.158 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 100.01' @ 15.48 hrs Surf.Area= 3,231 sf Storage= 1,721 cf

Plug-Flow detention time= 122.6 min calculated for 0.158 af (100% of inflow)
Center-of-Mass det. time= 122.6 min (1,097.3 - 974.7)

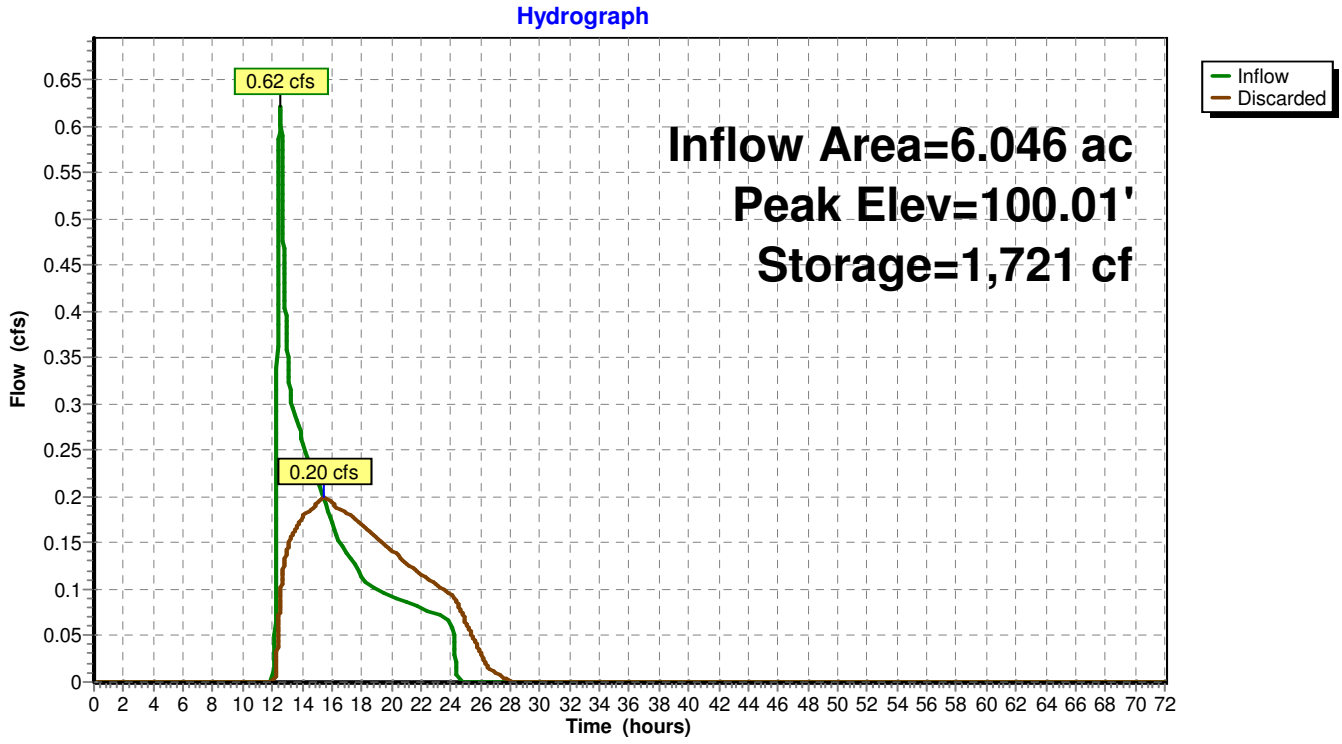
Volume	Invert	Avail.Storage	Storage Description
#1	98.74'	73,208 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.74	50	0	0
99.00	247	39	39
100.00	3,035	1,641	1,680
101.00	17,736	10,386	12,065
102.00	30,108	23,922	35,987
103.00	44,334	37,221	73,208

Device	Routing	Invert	Outlet Devices
#1	Discarded	98.74'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 94.40'

Discarded OutFlow Max=0.20 cfs @ 15.48 hrs HW=100.01' (Free Discharge)
↑**1=Exfiltration** (Controls 0.20 cfs)

Pond DP1: DP1 (SE - Natural Depression)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.321 ac, 5.13% Impervious, Inflow Depth = 0.47" for 100-yr event
Inflow = 0.38 cfs @ 12.48 hrs, Volume= 0.091 af
Outflow = 0.11 cfs @ 15.71 hrs, Volume= 0.091 af, Atten= 72%, Lag= 193.6 min
Discarded = 0.11 cfs @ 15.71 hrs, Volume= 0.091 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.02' @ 15.71 hrs Surf.Area= 1,714 sf Storage= 1,079 cf

Plug-Flow detention time= 142.0 min calculated for 0.091 af (100% of inflow)
Center-of-Mass det. time= 142.1 min (1,113.1 - 971.0)

Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	9,761 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

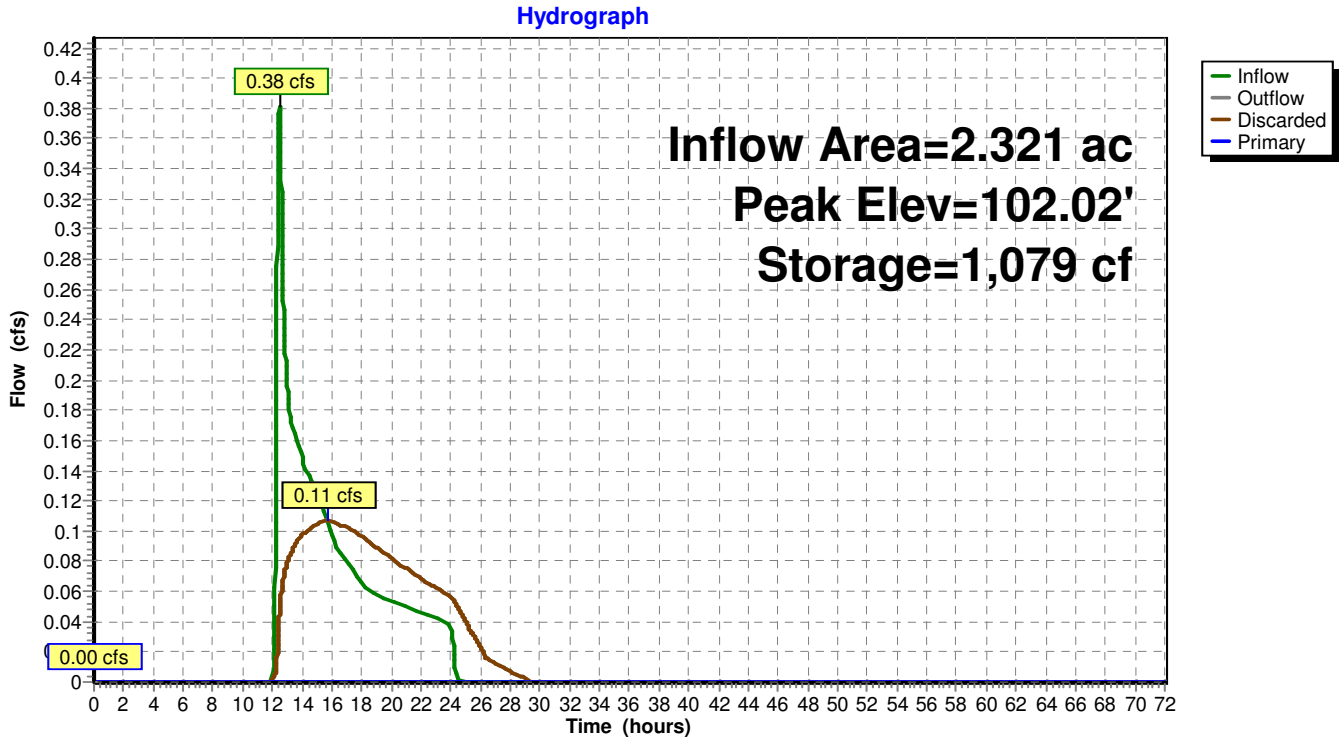
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,671	966	1,050
103.00	4,177	2,924	3,974
104.00	7,398	5,788	9,761

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	103.50'	**13.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.11 cfs @ 15.71 hrs HW=102.02' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.46' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 6.384 ac, 8.71% Impervious, Inflow Depth = 0.60" for 100-yr event
Inflow = 1.21 cfs @ 12.73 hrs, Volume= 0.318 af
Outflow = 0.22 cfs @ 18.02 hrs, Volume= 0.318 af, Atten= 82%, Lag= 317.6 min
Discarded = 0.22 cfs @ 18.02 hrs, Volume= 0.318 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.08' @ 18.02 hrs Surf.Area= 13,533 sf Storage= 6,341 cf

Plug-Flow detention time= 393.7 min calculated for 0.318 af (100% of inflow)
Center-of-Mass det. time= 393.7 min (1,365.4 - 971.6)

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	66,553 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

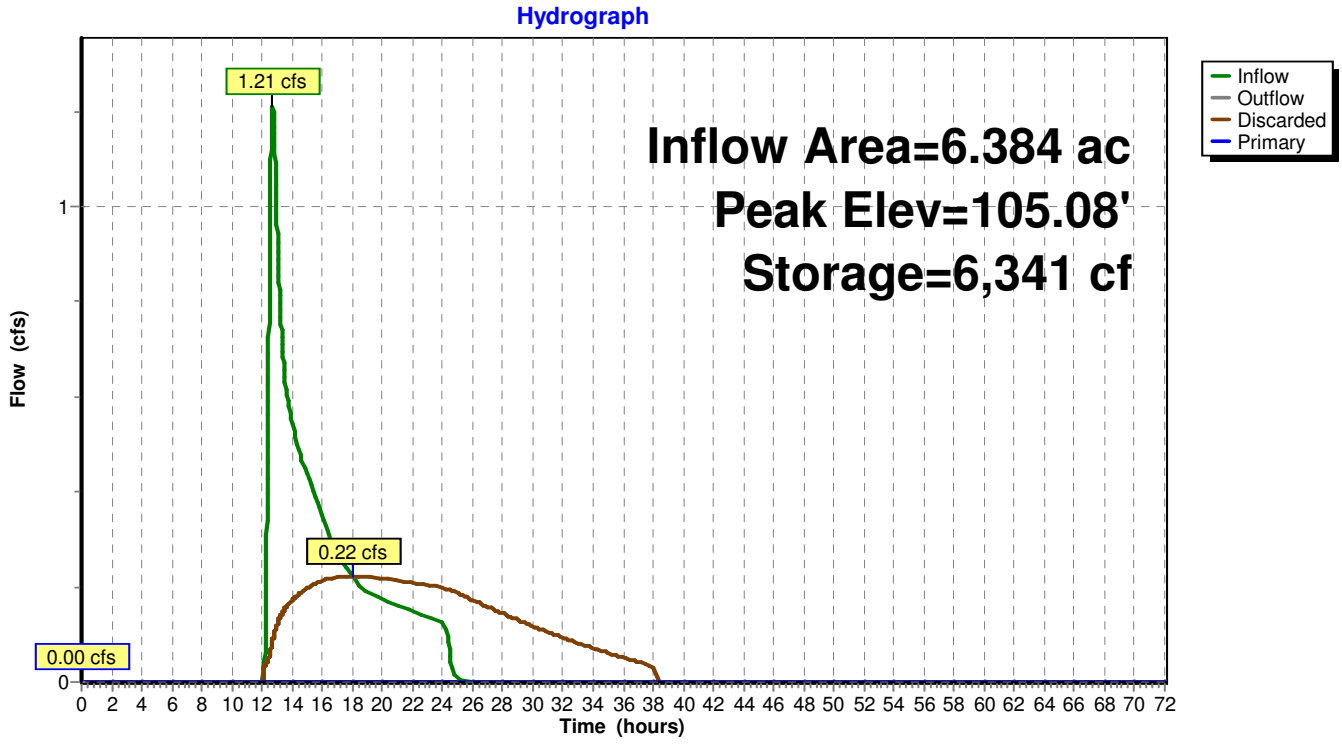
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,831	0	0
105.00	12,175	5,252	5,252
106.00	28,206	20,191	25,443
107.00	54,015	41,111	66,553

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.58'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.22 cfs @ 18.02 hrs HW=105.08' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' TW=103.83' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 8.874 ac, 10.41% Impervious, Inflow Depth = 0.33" for 100-yr event
Inflow = 2.10 cfs @ 12.20 hrs, Volume= 0.244 af
Outflow = 0.33 cfs @ 14.04 hrs, Volume= 0.244 af, Atten= 85%, Lag= 110.3 min
Discarded = 0.33 cfs @ 14.04 hrs, Volume= 0.244 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.40' @ 14.04 hrs Surf.Area= 10,698 sf Storage= 3,579 cf

Plug-Flow detention time= 146.8 min calculated for 0.244 af (100% of inflow)
Center-of-Mass det. time= 146.8 min (1,051.7 - 904.9)

Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	23,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

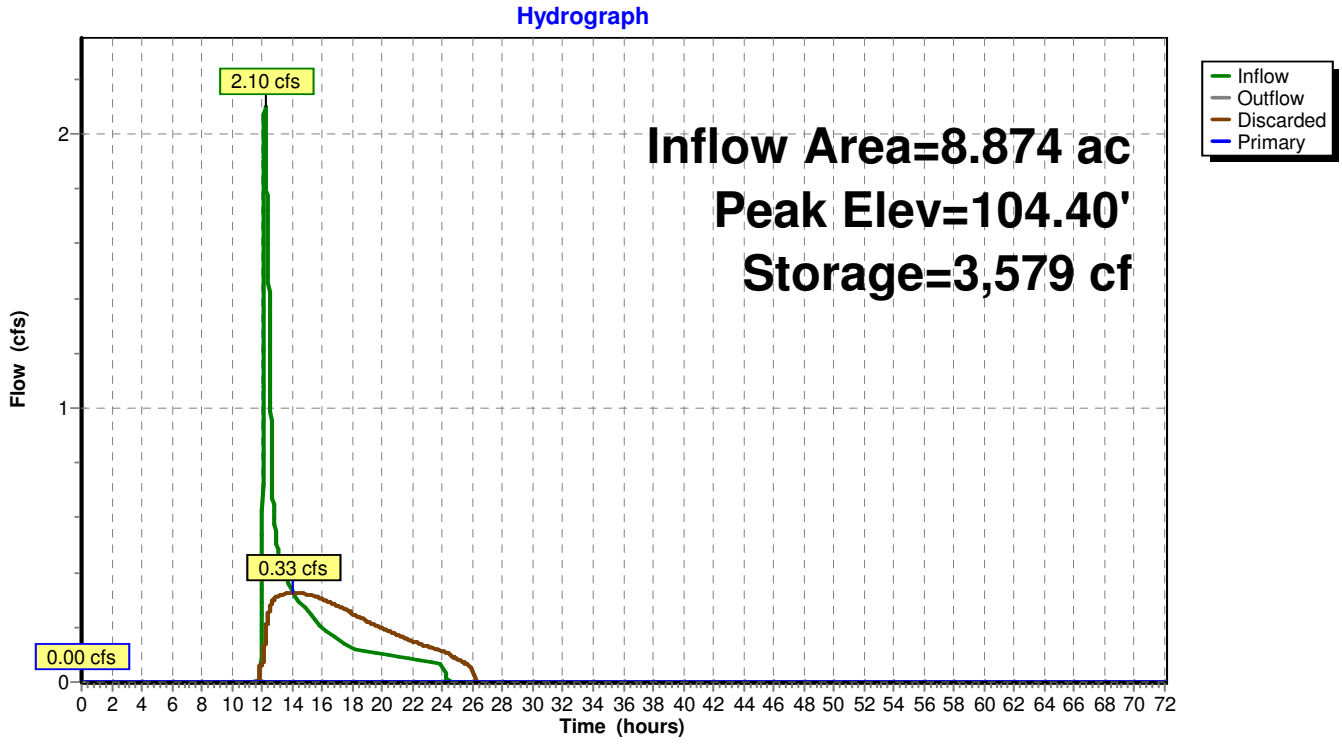
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,495	0	0
104.00	4,313	579	579
105.00	20,285	12,299	12,878
105.50	23,818	11,026	23,903

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'
#2	Primary	105.07'	**20.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.33 cfs @ 14.04 hrs HW=104.40' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.33 cfs)

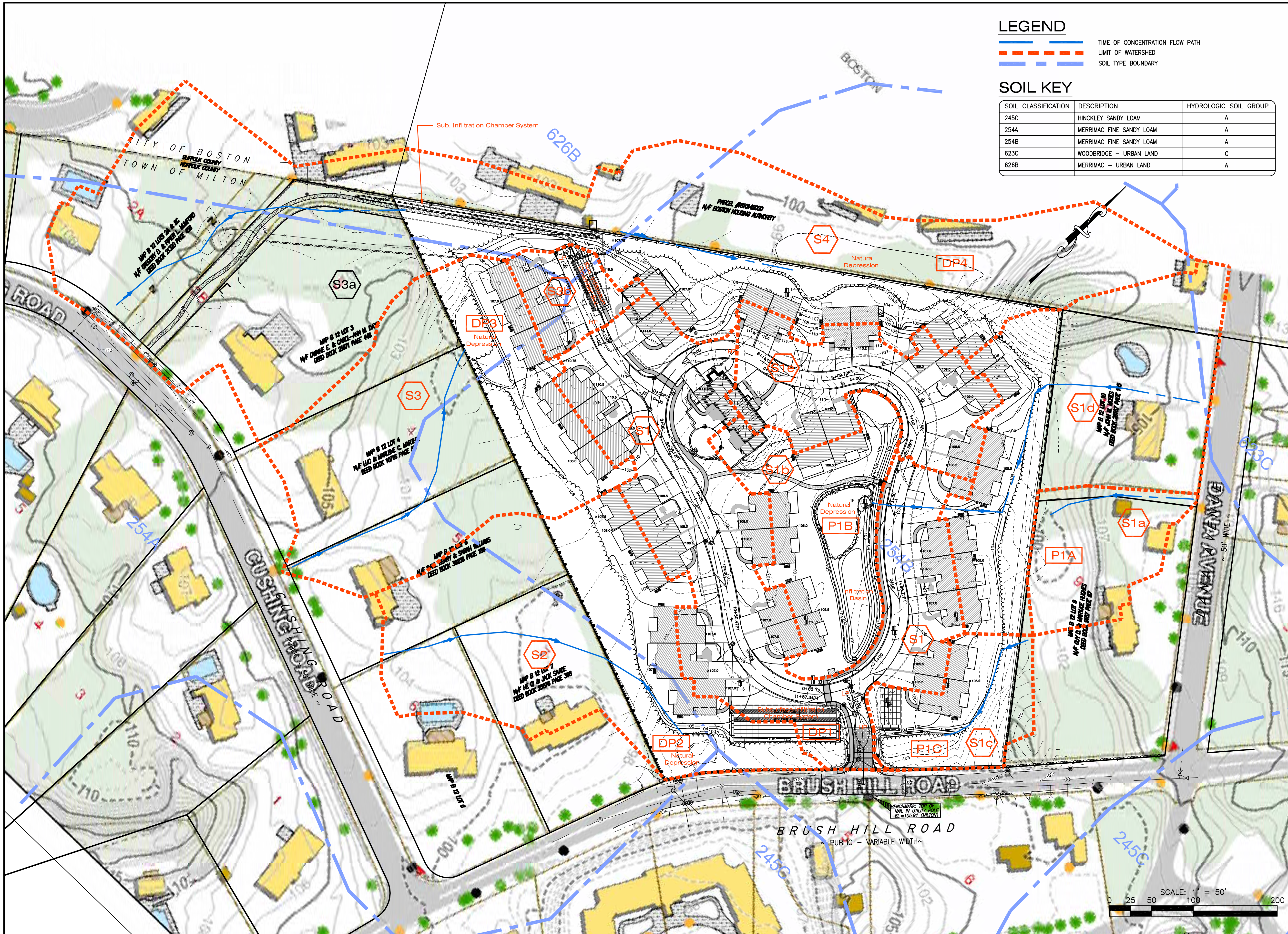
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.83' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP4: DP4 (North - Natural Depression)



A P P E N D I X B

Post-Development Design Condition



LEGEND

- TIME OF CONCENTRATION FLOW PATH
- LIMIT OF WATERSHED
- SOIL TYPE BOUNDARY

SOIL KEY

SOIL CLASSIFICATION	DESCRIPTION	HYDROLOGIC SOIL GROUP
245C	HINCKLEY SANDY LOAM	A
254A	MERRIMAC FINE SANDY LOAM	A
254B	MERRIMAC FINE SANDY LOAM	A
623C	WOODBRIDGE – URBAN LAND	C
626B	MERRIMAC – URBAN LAND	A

REV	DATE	DESCRIPTION	BY	APP
–	–	–	–	–

PREPARED BY:

McKenzie Engineering Group, Inc.

PROFESSIONAL CIVIL ENGINEERING AND LAND SURVEYING
150 LONGWATER DRIVE
SUITE 101
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PHONE: (781) 792-3900
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PLANNED UNIT TOWNHOUSE DEVELOPMENT

865 BRUSH HILL ROAD
(ASSESSOR'S MAP B 12, LOTS 8A, 8B & 2B)
MILTON, MASSACHUSETTS

PROFESSIONAL ENGINEER:

OWNER/APPLICANT:
Milton NRC, LLC
20 Mall Road
Suite 220
Burlington, MA 01803

NOT FOR CONSTRUCTION

DRAWN BY:	JS
DESIGNED BY:	DWK
CHECKED BY:	DWK
APPROVED BY:	BCM
DATE:	MAY 13, 2015
SCALE:	1"=50'
PROJECT NO.:	214–122

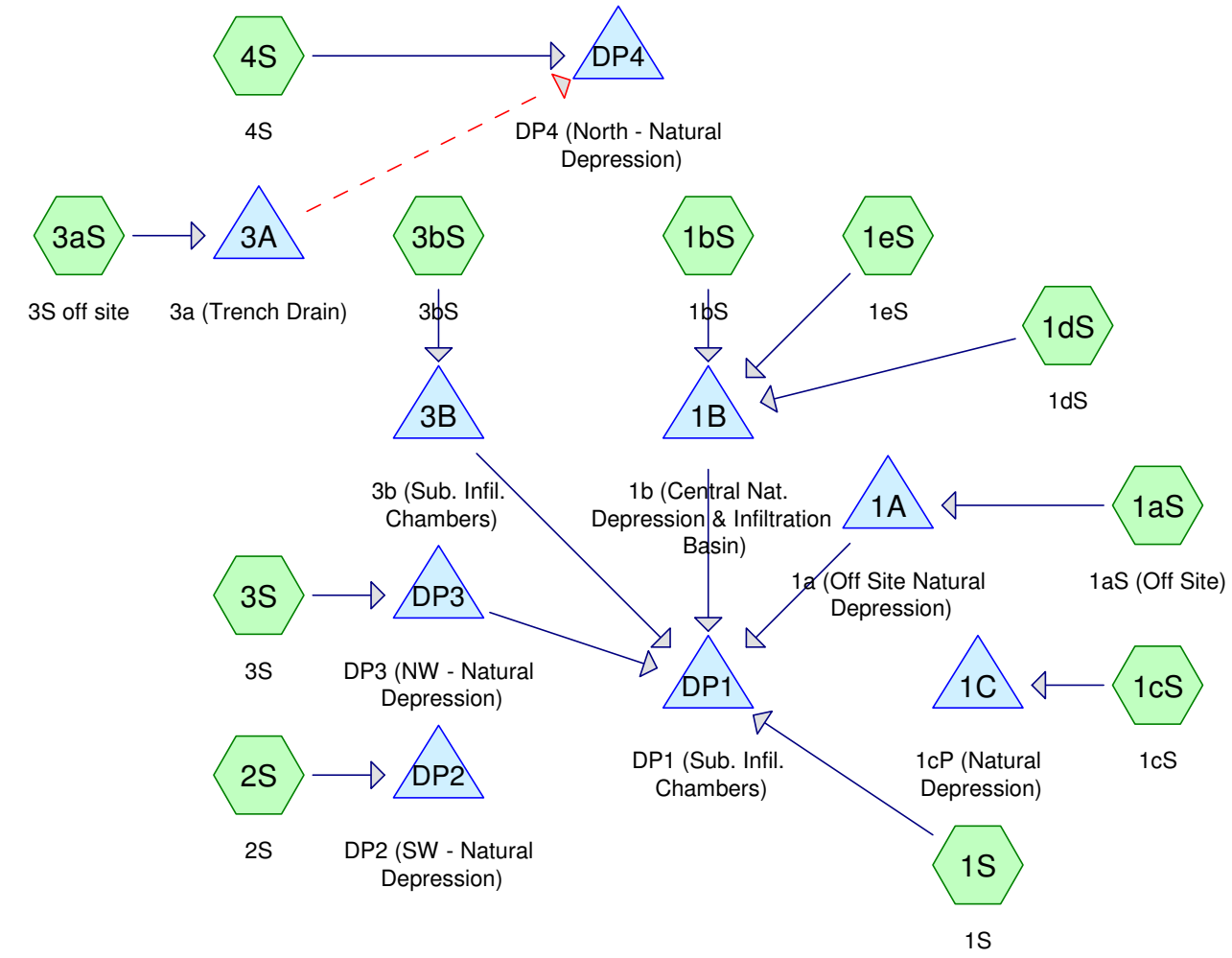
DWG. TITLE:

Post-Development Watershed Plan

DWG. No:

WS-2

FILE LOCATION: M:\MEG\2014 Projects\214–122\DWGS\214–122Prop.DWG



Subcat Reach Pond Link

Routing Diagram for Post-Dev

Prepared by McKenzie Engineering Group, Inc., Printed 5/8/2015

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.214	39	>75% Grass cover, Good, HSG A (1aS, 1bS, 1cS, 1dS, 1eS, 1S, 2S, 3aS, 3bS, 3S, 4S)
0.085	74	>75% Grass cover, Good, HSG C (1dS)
0.019	76	Gravel roads, HSG A (1bS)
1.383	98	Paved parking, HSG A (1eS, 1S, 3bS)
2.841	98	Roofs, HSG A (1aS, 1bS, 1cS, 1dS, 1eS, 1S, 2S, 3aS, 3bS, 3S, 4S)
5.699	30	Woods, Good, HSG A (1aS, 1bS, 1cS, 1dS, 1S, 2S, 3aS, 3S, 4S)
17.241	**51**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
17.157	HSG A	1aS, 1bS, 1cS, 1dS, 1eS, 1S, 2S, 3aS, 3bS, 3S, 4S
0.000	HSG B	
0.085	HSG C	1dS
0.000	HSG D	
0.000	Other	
17.241		**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.00"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.00 cfs 0.000 af

Subcatchment 1bS: 1bS Runoff Area=40,744 sf 19.15% Impervious Runoff Depth=0.13"
Tc=10.0 min CN=50 Runoff=0.02 cfs 0.010 af

Subcatchment 1cS: 1cS Runoff Area=23,675 sf 12.27% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=42 Runoff=0.00 cfs 0.001 af

Subcatchment 1dS: 1dS Runoff Area=80,131 sf 16.36% Impervious Runoff Depth=0.07"
Flow Length=583' Tc=18.0 min CN=47 Runoff=0.02 cfs 0.011 af

Subcatchment 1eS: 1eS Runoff Area=38,668 sf 76.01% Impervious Runoff Depth=1.68"
Tc=5.0 min CN=84 Runoff=1.81 cfs 0.124 af

Subcatchment 1S: 1S Runoff Area=104,111 sf 64.15% Impervious Runoff Depth=1.21"
Tc=8.0 min CN=77 Runoff=3.08 cfs 0.241 af

Subcatchment 2S: 2S Runoff Area=93,156 sf 14.02% Impervious Runoff Depth=0.03"
Flow Length=402' Tc=14.1 min CN=44 Runoff=0.01 cfs 0.006 af

Subcatchment 3aS: 3S off site Runoff Area=138,732 sf 11.36% Impervious Runoff Depth=0.00"
Flow Length=702' Tc=34.0 min CN=40 Runoff=0.00 cfs 0.001 af

Subcatchment 3bS: 3bS Runoff Area=12,198 sf 78.82% Impervious Runoff Depth=1.84"
Tc=5.0 min CN=86 Runoff=0.62 cfs 0.043 af

Subcatchment 3S: 3S Runoff Area=98,908 sf 12.03% Impervious Runoff Depth=0.01"
Tc=10.0 min CN=42 Runoff=0.00 cfs 0.003 af

Subcatchment 4S: 4S Runoff Area=96,150 sf 11.71% Impervious Runoff Depth=0.03"
Flow Length=170' Tc=11.8 min CN=44 Runoff=0.01 cfs 0.006 af

Pond 1A: 1a (Off Site Natural Depression) Peak Elev=105.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 1B: 1b (Central Nat. Depression & Peak Elev=101.56' Storage=1,871 cf Inflow=1.81 cfs 0.146 af
Discarded=0.24 cfs 0.146 af Primary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.146 af

Pond 1C: 1cP (Natural Depression) Peak Elev=101.00' Storage=0 cf Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Pond 3A: 3a (Trench Drain) Peak Elev=105.00' Storage=0 cf Inflow=0.00 cfs 0.001 af
Discarded=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond 3B: 3b (Sub. Infil. Chambers) Peak Elev=106.39' Storage=722 cf Inflow=0.62 cfs 0.043 af
Discarded=0.05 cfs 0.040 af Primary=0.04 cfs 0.003 af Outflow=0.08 cfs 0.043 af

Pond DP1: DP1 (Sub. Infil. Chambers) Peak Elev=100.43' Storage=1,149 cf Inflow=3.08 cfs 0.244 af
Outflow=1.41 cfs 0.244 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=100.66' Storage=18 cf Inflow=0.01 cfs 0.006 af
Outflow=0.01 cfs 0.006 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=104.30' Storage=0 cf Inflow=0.00 cfs 0.003 af
Discarded=0.00 cfs 0.003 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.003 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=103.83' Storage=0 cf Inflow=0.01 cfs 0.006 af
Outflow=0.01 cfs 0.006 af

Total Runoff Area = 17.241 ac Runoff Volume = 0.445 af Average Runoff Depth = 0.31"
75.50% Pervious = 13.018 ac 24.50% Impervious = 4.224 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

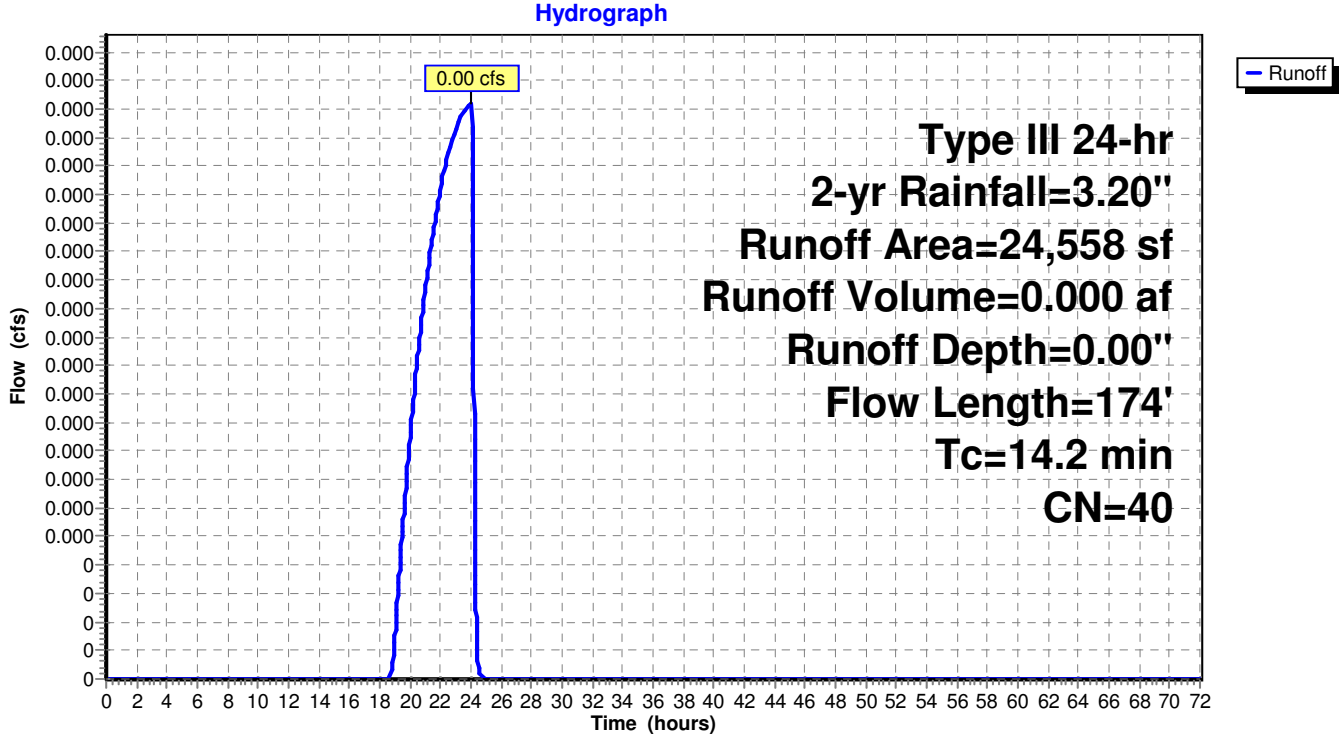
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

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

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

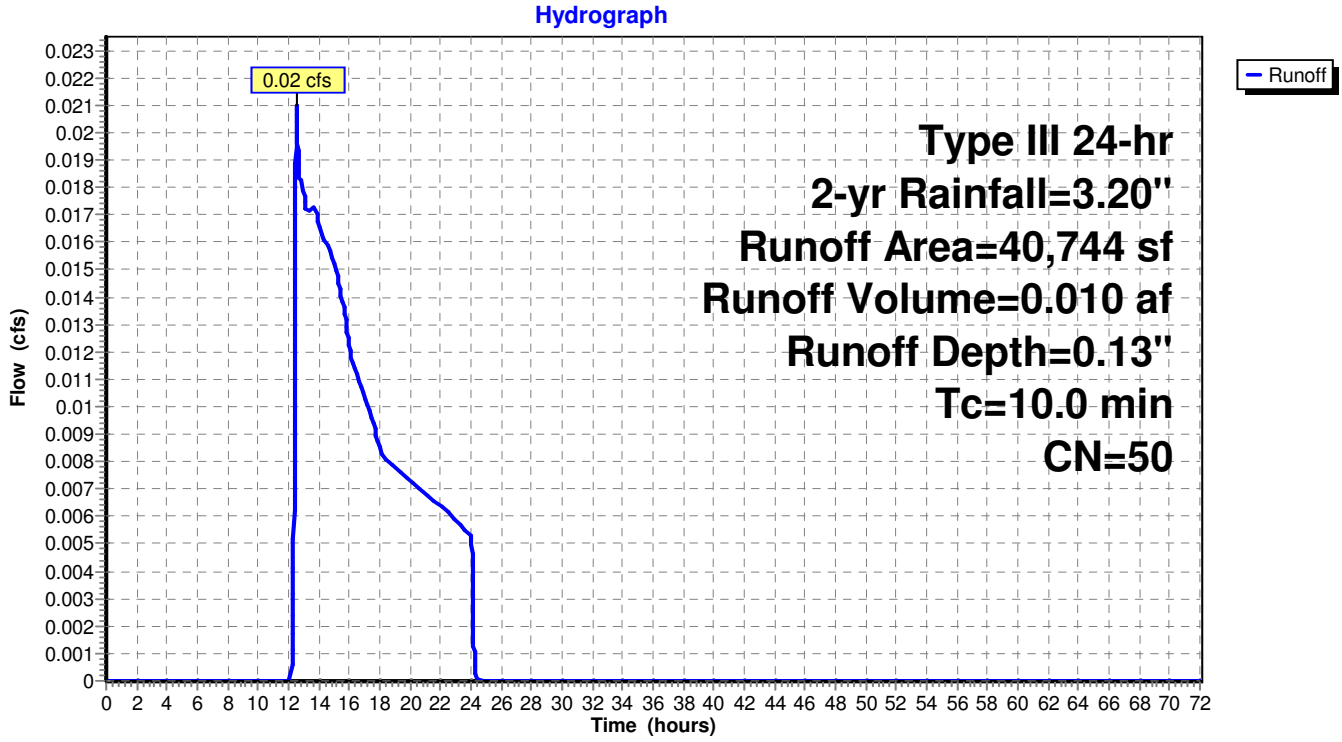
Runoff = 0.02 cfs @ 12.54 hrs, Volume= 0.010 af, Depth= 0.13"

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

Area (sf)	CN	Description
833	76	Gravel roads, HSG A
7,801	98	Roofs, HSG A
28,513	39	>75% Grass cover, Good, HSG A
3,597	30	Woods, Good, HSG A
40,744	50	Weighted Average
32,943		80.85% Pervious Area
7,801		19.15% Impervious Area

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

Subcatchment 1bS: 1bS



Summary for Subcatchment 1cS: 1cS

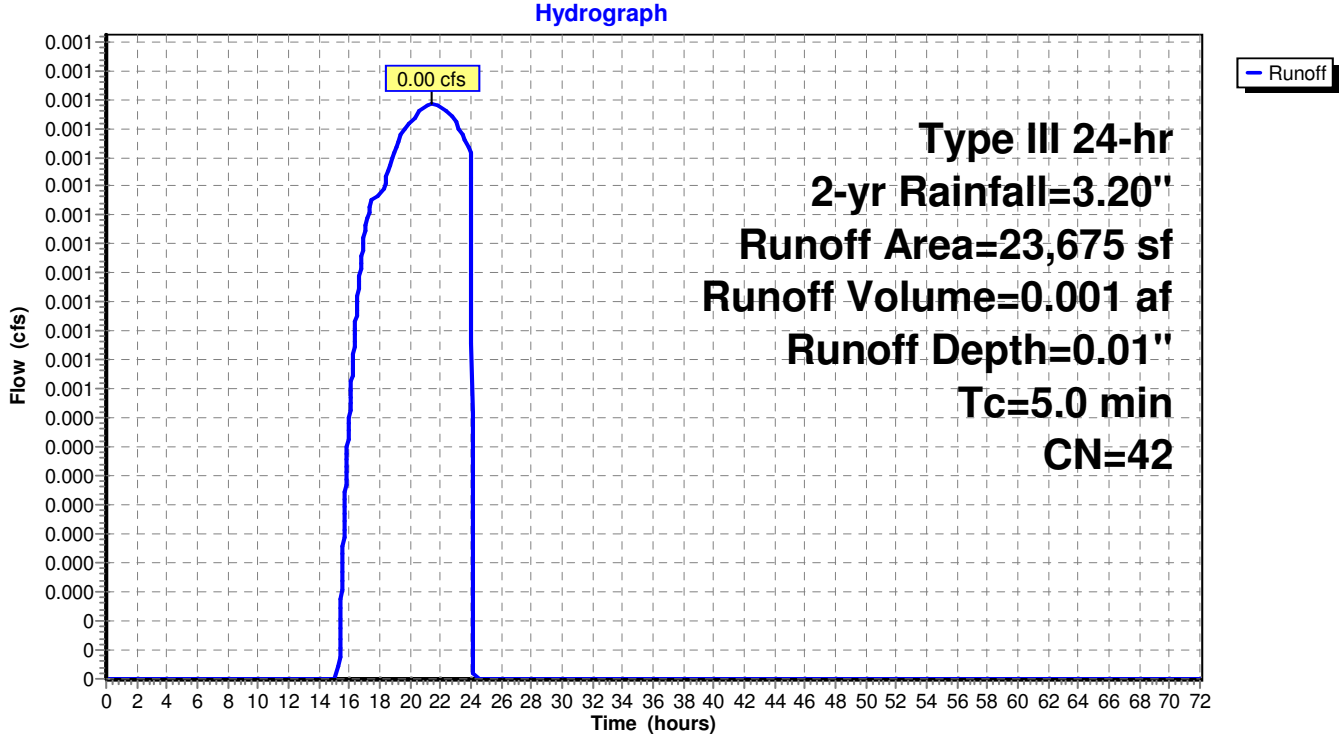
Runoff = 0.00 cfs @ 21.45 hrs, Volume= 0.001 af, Depth= 0.01"

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

Area (sf)	CN	Description
11,369	30	Woods, Good, HSG A
2,905	98	Roofs, HSG A
9,401	39	>75% Grass cover, Good, HSG A
23,675	42	Weighted Average
20,770		87.73% Pervious Area
2,905		12.27% Impervious Area

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

Subcatchment 1cS: 1cS



Summary for Subcatchment 1dS: 1dS

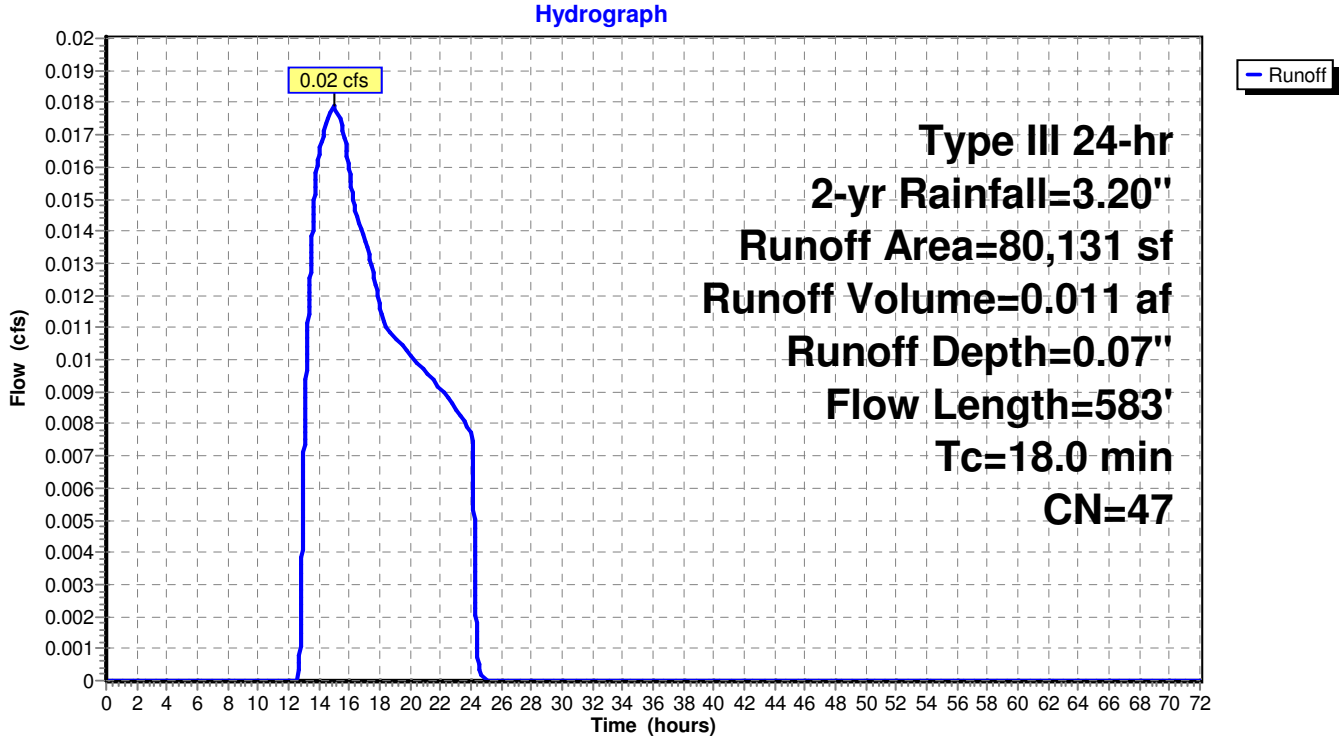
Runoff = 0.02 cfs @ 14.98 hrs, Volume= 0.011 af, Depth= 0.07"

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

Area (sf)	CN	Description
5,354	98	Roofs, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
17,837	30	Woods, Good, HSG A
7,757	98	Roofs, HSG A
13,831	39	>75% Grass cover, Good, HSG A
10,861	30	Woods, Good, HSG A
80,131	47	Weighted Average
67,020		83.64% Pervious Area
13,111		16.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1dS: 1dS



Summary for Subcatchment 1eS: 1eS

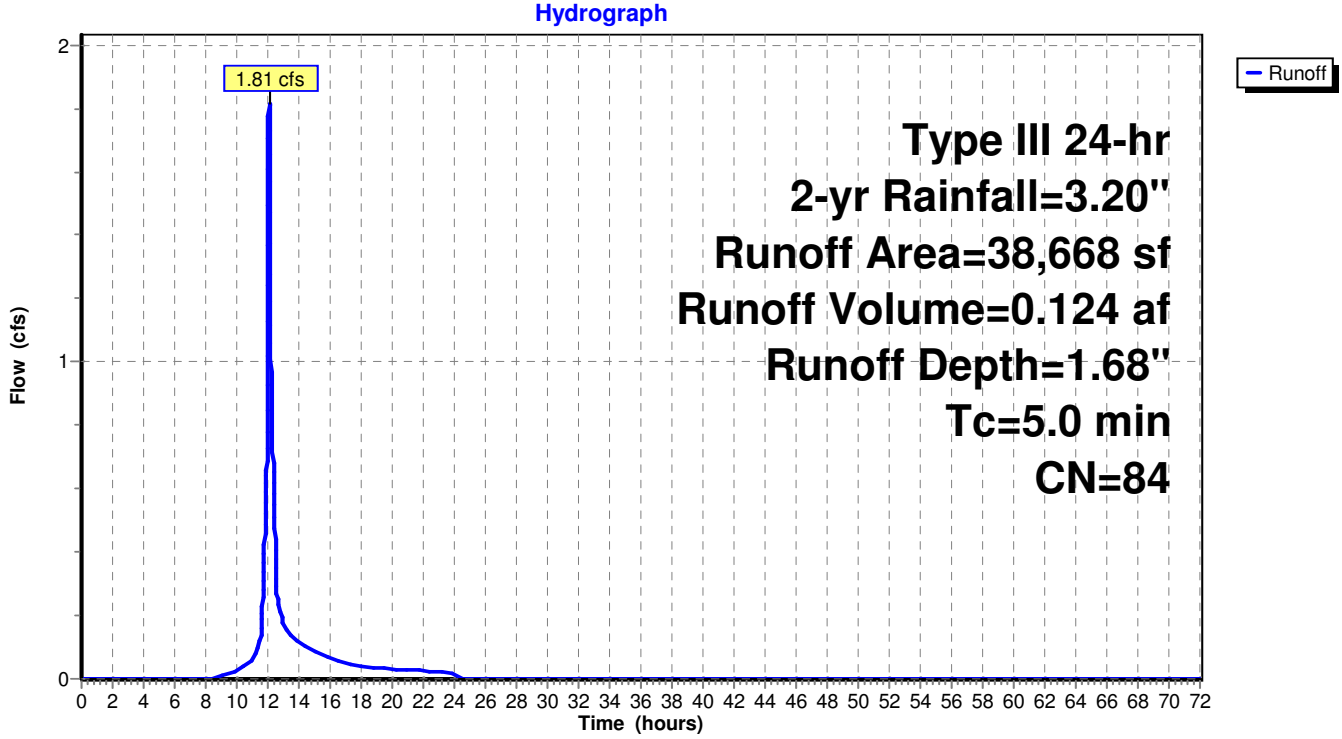
Runoff = 1.81 cfs @ 12.08 hrs, Volume= 0.124 af, Depth= 1.68"

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

Area (sf)	CN	Description
15,724	98	Paved parking, HSG A
13,666	98	Roofs, HSG A
9,278	39	>75% Grass cover, Good, HSG A
38,668	84	Weighted Average
9,278		23.99% Pervious Area
29,390		76.01% Impervious Area

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

Subcatchment 1eS: 1eS



Summary for Subcatchment 1S: 1S

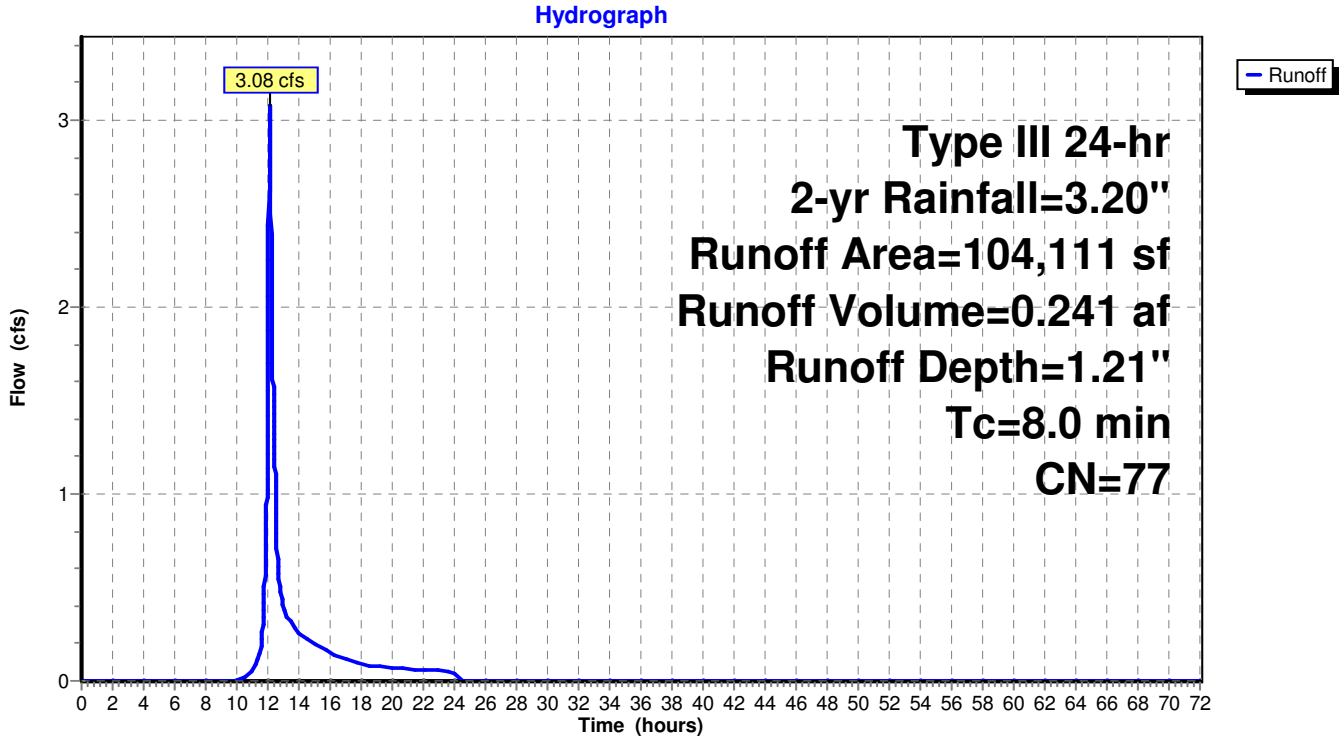
Runoff = 3.08 cfs @ 12.12 hrs, Volume= 0.241 af, Depth= 1.21"

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

Area (sf)	CN	Description
39,719	98	Paved parking, HSG A
27,065	98	Roofs, HSG A
35,819	39	>75% Grass cover, Good, HSG A
1,508	30	Woods, Good, HSG A
104,111	77	Weighted Average
37,327		35.85% Pervious Area
66,784		64.15% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

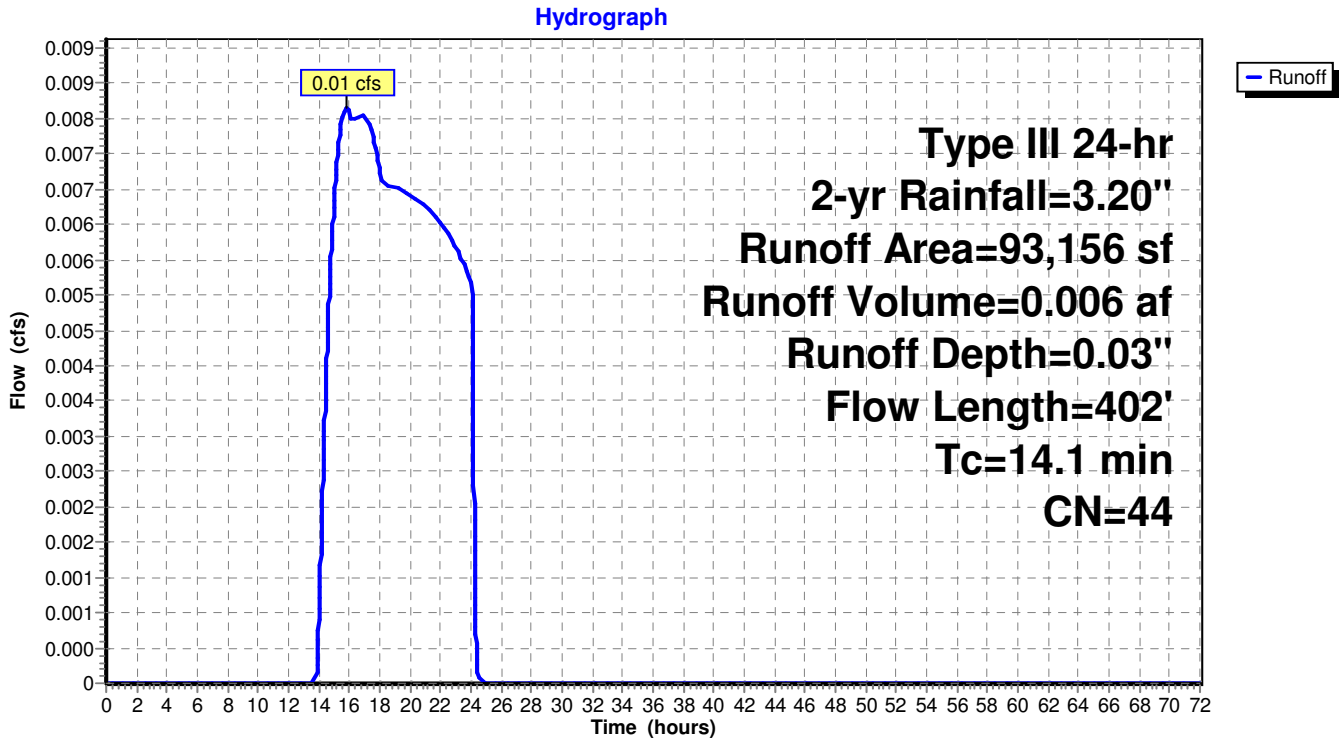
Runoff = 0.01 cfs @ 15.81 hrs, Volume= 0.006 af, Depth= 0.03"

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

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
37,337	30	Woods, Good, HSG A
12,390	39	>75% Grass cover, Good, HSG A
7,870	98	Roofs, HSG A
93,156	44	Weighted Average
80,098		85.98% Pervious Area
13,058		14.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3aS: 3S off site

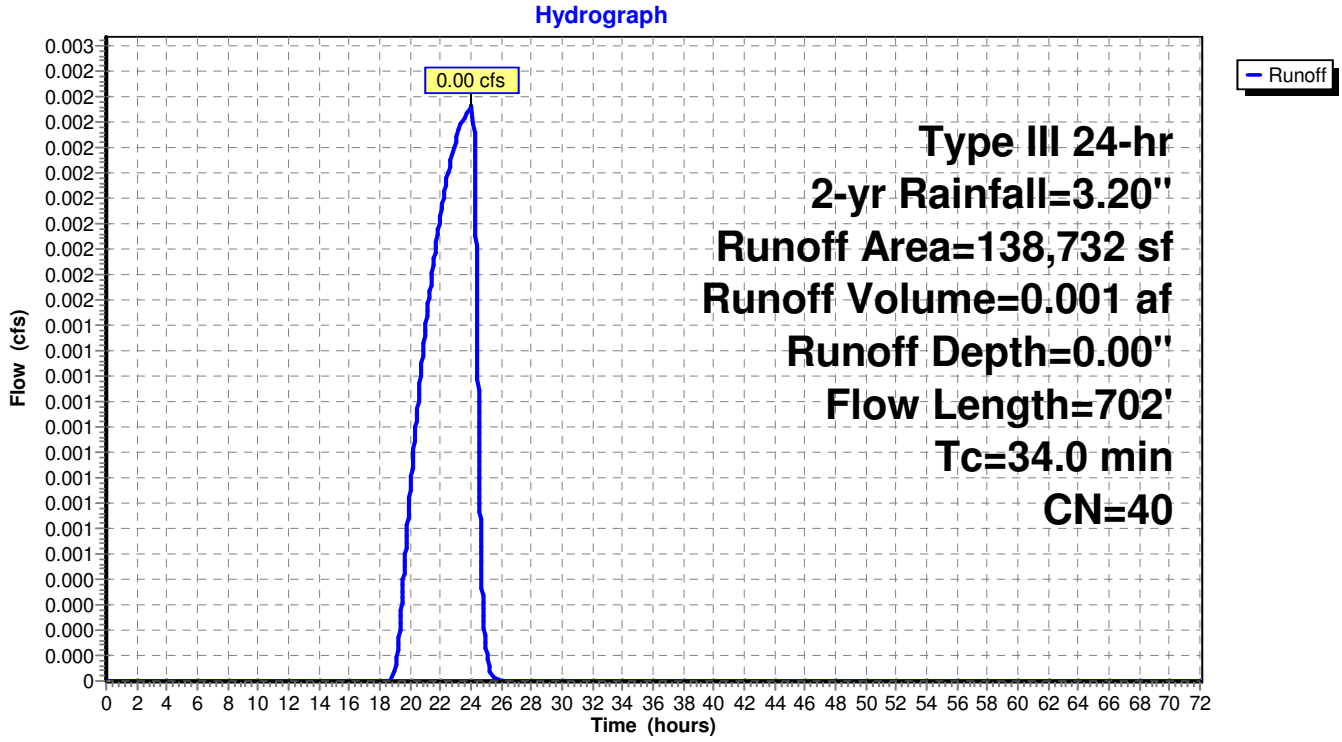
Runoff = 0.00 cfs @ 24.06 hrs, Volume= 0.001 af, Depth= 0.00"

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

Area (sf)	CN	Description
7,998	98	Roofs, HSG A
20,884	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
80,826	30	Woods, Good, HSG A
138,732	40	Weighted Average
122,971		88.64% Pervious Area
15,761		11.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3aS: 3S off site



Summary for Subcatchment 3bS: 3bS

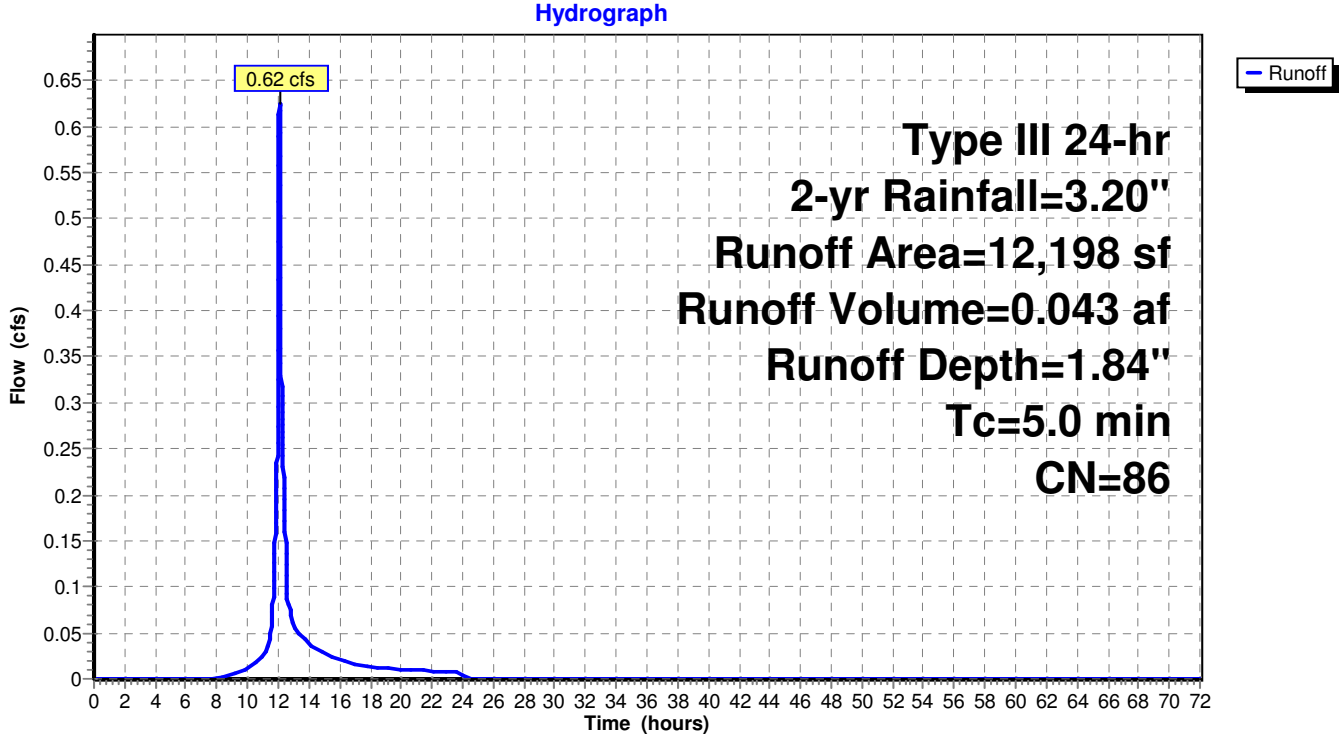
Runoff = 0.62 cfs @ 12.07 hrs, Volume= 0.043 af, Depth= 1.84"

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

Area (sf)	CN	Description
4,827	98	Roofs, HSG A
4,787	98	Paved parking, HSG A
2,584	39	>75% Grass cover, Good, HSG A
12,198	86	Weighted Average
2,584		21.18% Pervious Area
9,614		78.82% Impervious Area

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

Subcatchment 3bS: 3bS



Summary for Subcatchment 3S: 3S

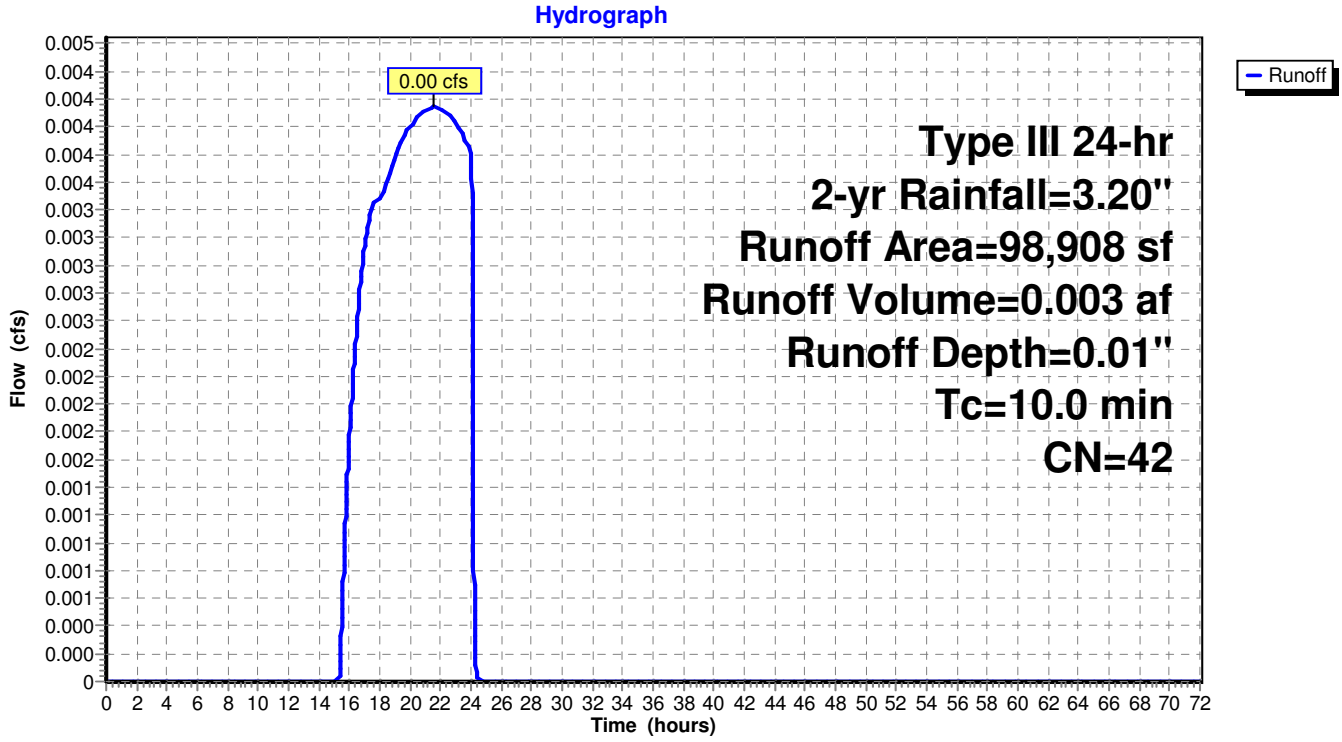
Runoff = 0.00 cfs @ 21.59 hrs, Volume= 0.003 af, Depth= 0.01"

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

Area (sf)	CN	Description
4,948	98	Roofs, HSG A
23,819	39	>75% Grass cover, Good, HSG A
6,947	98	Roofs, HSG A
14,369	39	>75% Grass cover, Good, HSG A
48,825	30	Woods, Good, HSG A
98,908	42	Weighted Average
87,013		87.97% Pervious Area
11,895		12.03% Impervious Area

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

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

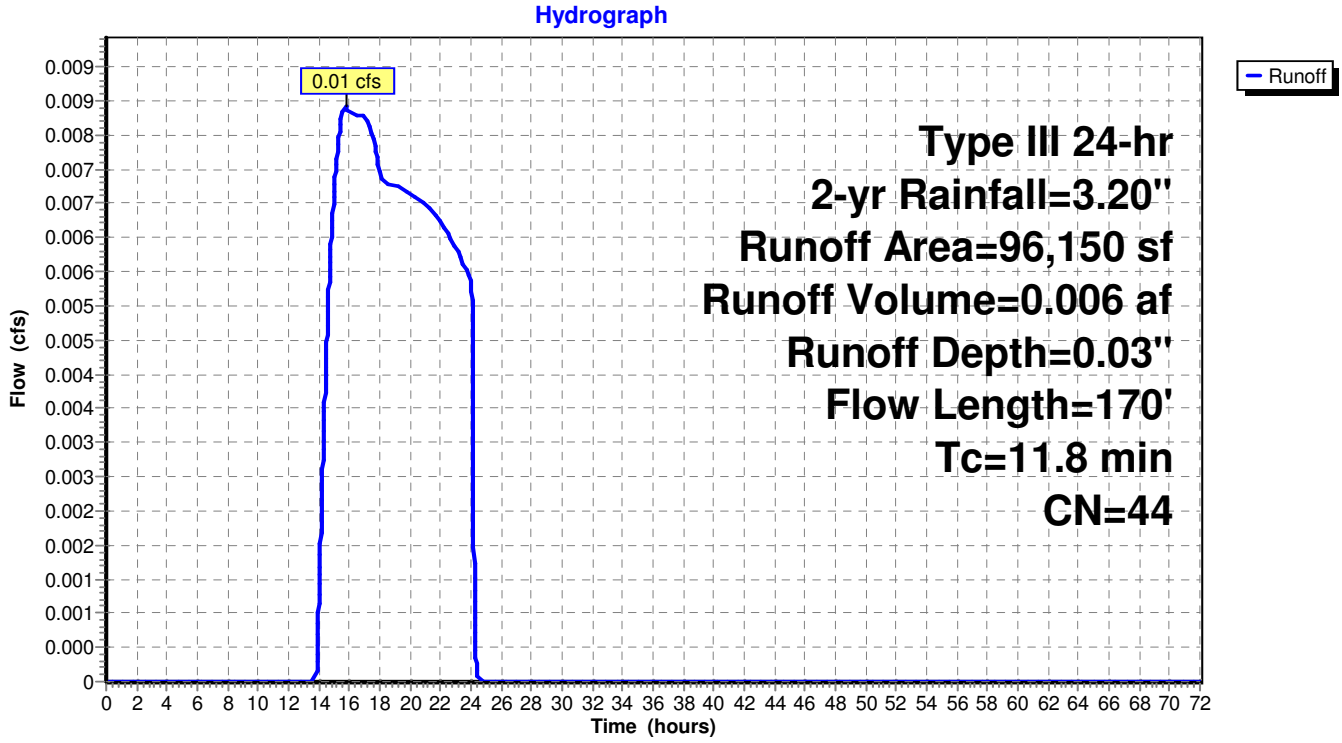
Runoff = 0.01 cfs @ 15.80 hrs, Volume= 0.006 af, Depth= 0.03"

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

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
5,319	98	Roofs, HSG A
16,063	39	>75% Grass cover, Good, HSG A
10,112	30	Woods, Good, HSG A
96,150	44	Weighted Average
84,895		88.29% Pervious Area
11,255		11.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.00" for 2-yr 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
Discarded = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.00' @ 0.00 hrs Surf.Area= 1,231 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,329.5 - 1,329.5)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

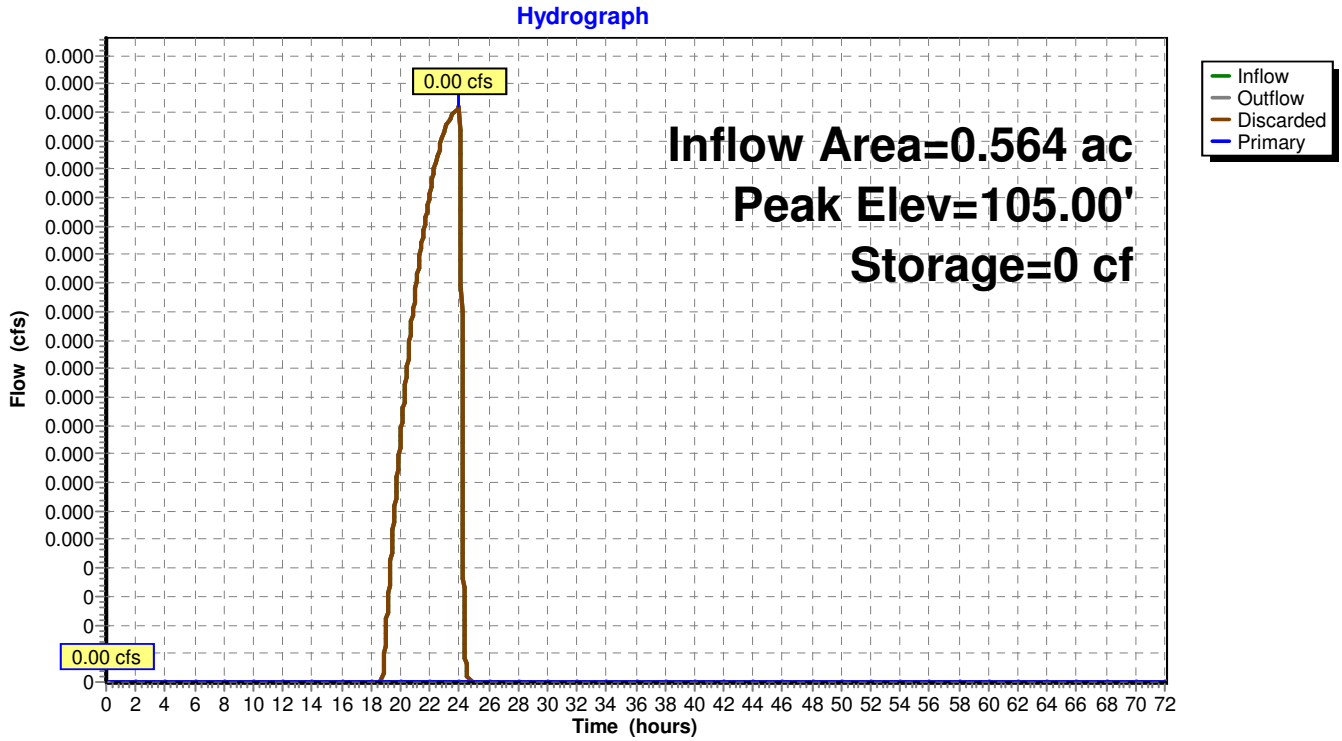
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 24.00 hrs HW=105.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.07 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=100.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off Site Natural Depression)



Summary for Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)

Inflow Area = 3.663 ac, 31.53% Impervious, Inflow Depth = 0.48" for 2-yr event
Inflow = 1.81 cfs @ 12.08 hrs, Volume= 0.146 af
Outflow = 0.24 cfs @ 12.77 hrs, Volume= 0.146 af, Atten= 87%, Lag= 41.4 min
Discarded = 0.24 cfs @ 12.77 hrs, Volume= 0.146 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.56' @ 12.77 hrs Surf.Area= 3,917 sf Storage= 1,871 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 67.6 min (927.7 - 860.0)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	33,502 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

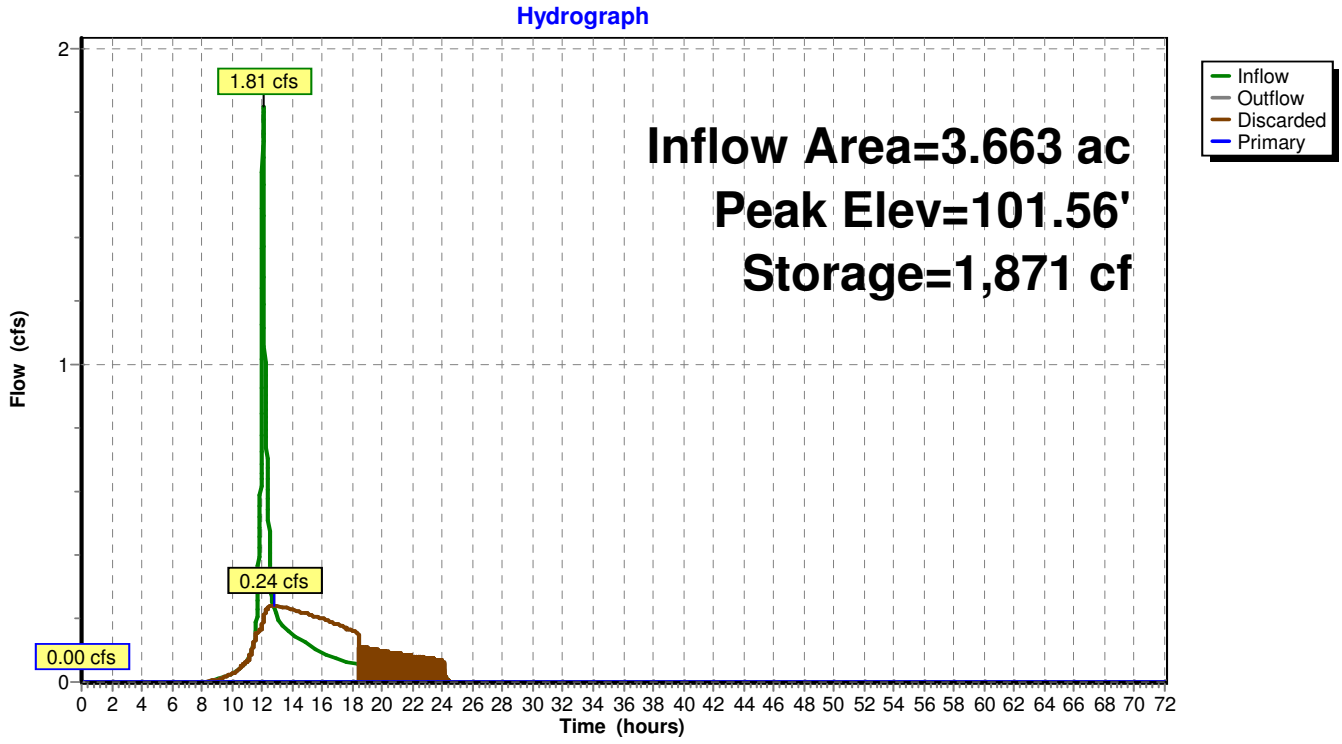
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	2,755	0	0
102.00	4,827	3,791	3,791
103.00	9,677	7,252	11,043
104.00	11,211	10,444	21,487
105.00	12,819	12,015	33,502

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	101.96'	**12.0" Round Culvert** L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 101.96' / 101.67' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	103.00'	**1.0' long x 0.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height

Discarded OutFlow Max=0.24 cfs @ 12.77 hrs HW=101.56' (Free Discharge)
└**1=Exfiltration** (Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.00' TW=100.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)



Summary for Pond 1C: 1cP (Natural Depression)

Inflow Area = 0.544 ac, 12.27% Impervious, Inflow Depth = 0.01" for 2-yr event
Inflow = 0.00 cfs @ 21.45 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 21.45 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 21.45 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.00' @ 0.00 hrs Surf.Area= 550 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,210.1 - 1,210.1)

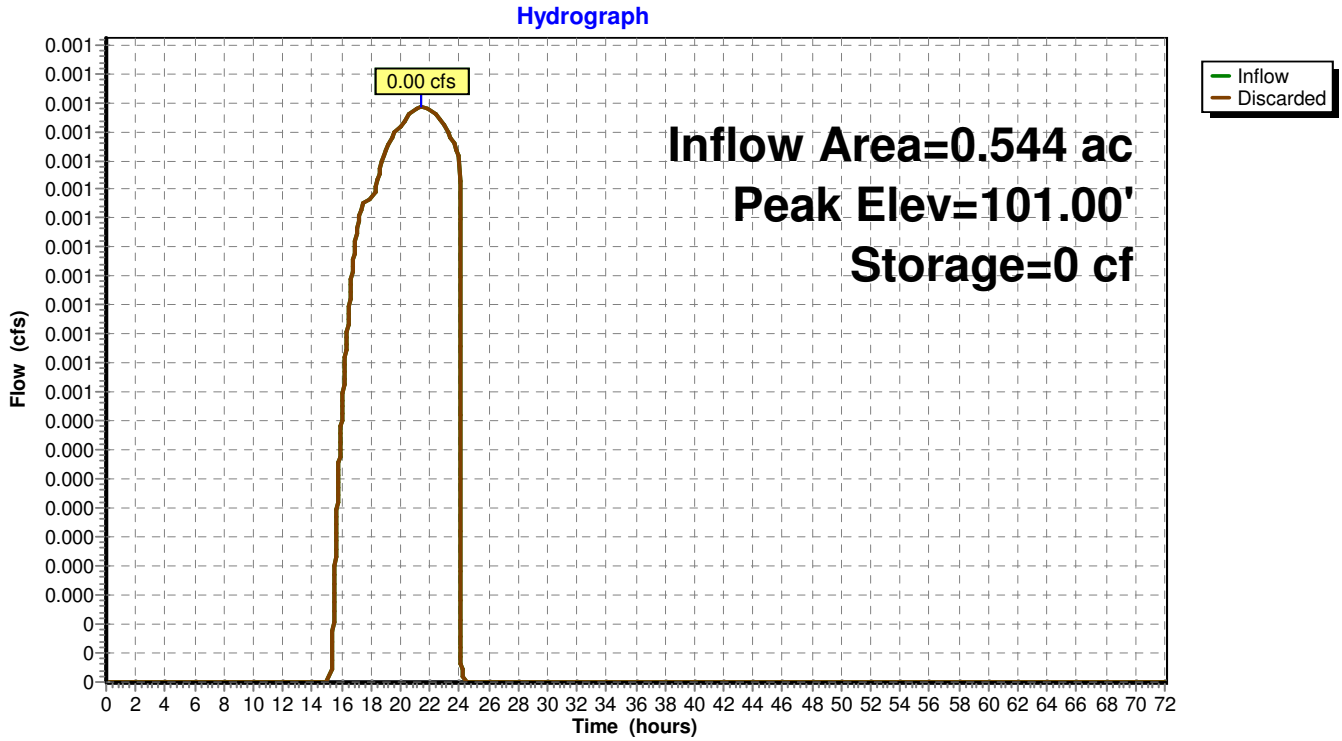
Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	13,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	550	0	0
102.00	1,807	1,179	1,179
103.00	3,213	2,510	3,689
104.00	4,741	3,977	7,666
105.00	6,304	5,523	13,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.00 cfs @ 21.45 hrs HW=101.00' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.03 cfs potential flow)

Pond 1C: 1cP (Natural Depression)



Summary for Pond 3A: 3a (Trench Drain)

Inflow Area = 3.185 ac, 11.36% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 24.06 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 24.06 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 24.06 hrs, Volume= 0.001 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.00' @ 0.00 hrs Surf.Area= 1,440 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,347.9 - 1,347.9)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,106 cf	**5.00'W x 288.00'L x 2.33'H Prismatoid** 3,355 cf Overall - 591 cf Embedded = 2,765 cf x 40.0% Voids
#2	105.50'	591 cf	**StormTech SC-310** x 40 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 1 rows
#3	107.33'	3,995 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,691 cf	Total Available Storage

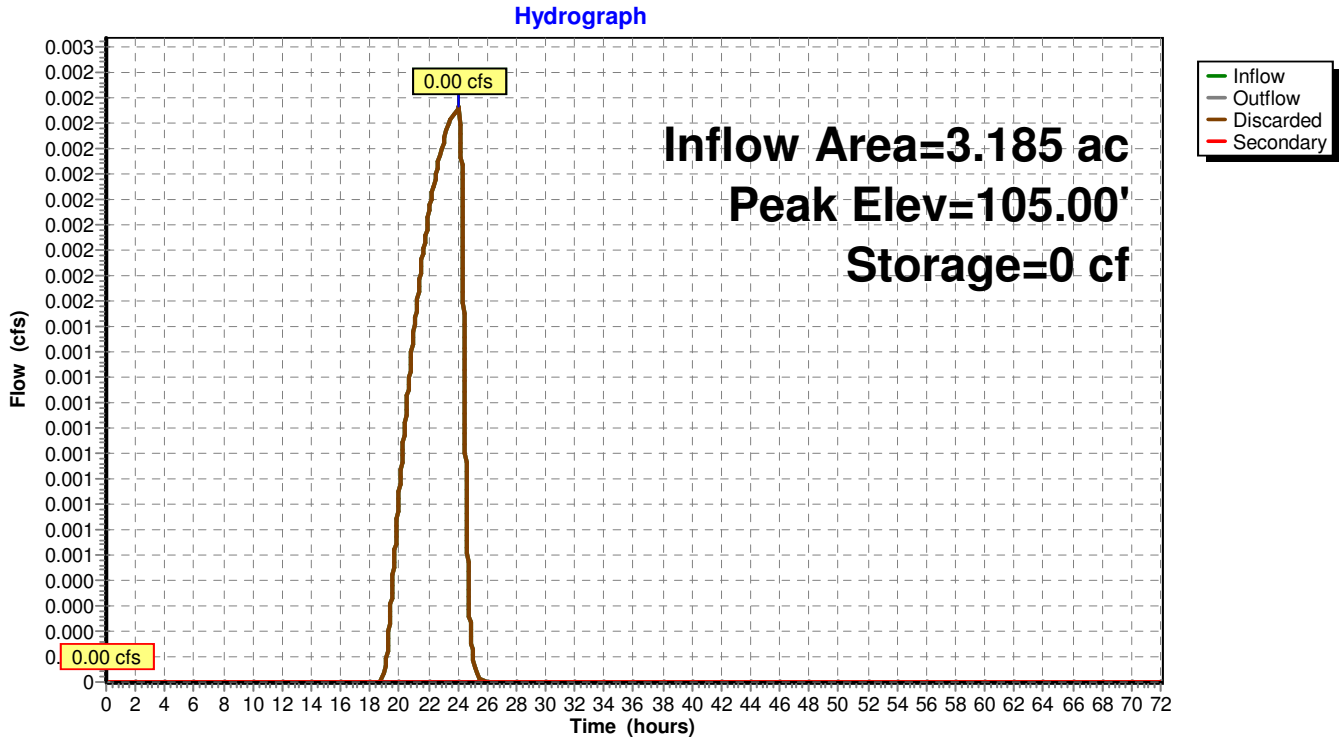
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
107.33	1,438	0	0
108.00	10,487	3,995	3,995

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Secondary	107.75'	**5.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.00 cfs @ 24.06 hrs HW=105.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.03 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=103.83' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3A: 3a (Trench Drain)



Summary for Pond 3B: 3b (Sub. Infil. Chambers)

Inflow Area = 0.280 ac, 78.82% Impervious, Inflow Depth = 1.84" for 2-yr event
Inflow = 0.62 cfs @ 12.07 hrs, Volume= 0.043 af
Outflow = 0.08 cfs @ 12.63 hrs, Volume= 0.043 af, Atten= 87%, Lag= 33.1 min
Discarded = 0.05 cfs @ 12.63 hrs, Volume= 0.040 af
Primary = 0.04 cfs @ 12.63 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 106.39' @ 12.63 hrs Surf.Area= 1,441 sf Storage= 722 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 128.7 min (950.3 - 821.6)

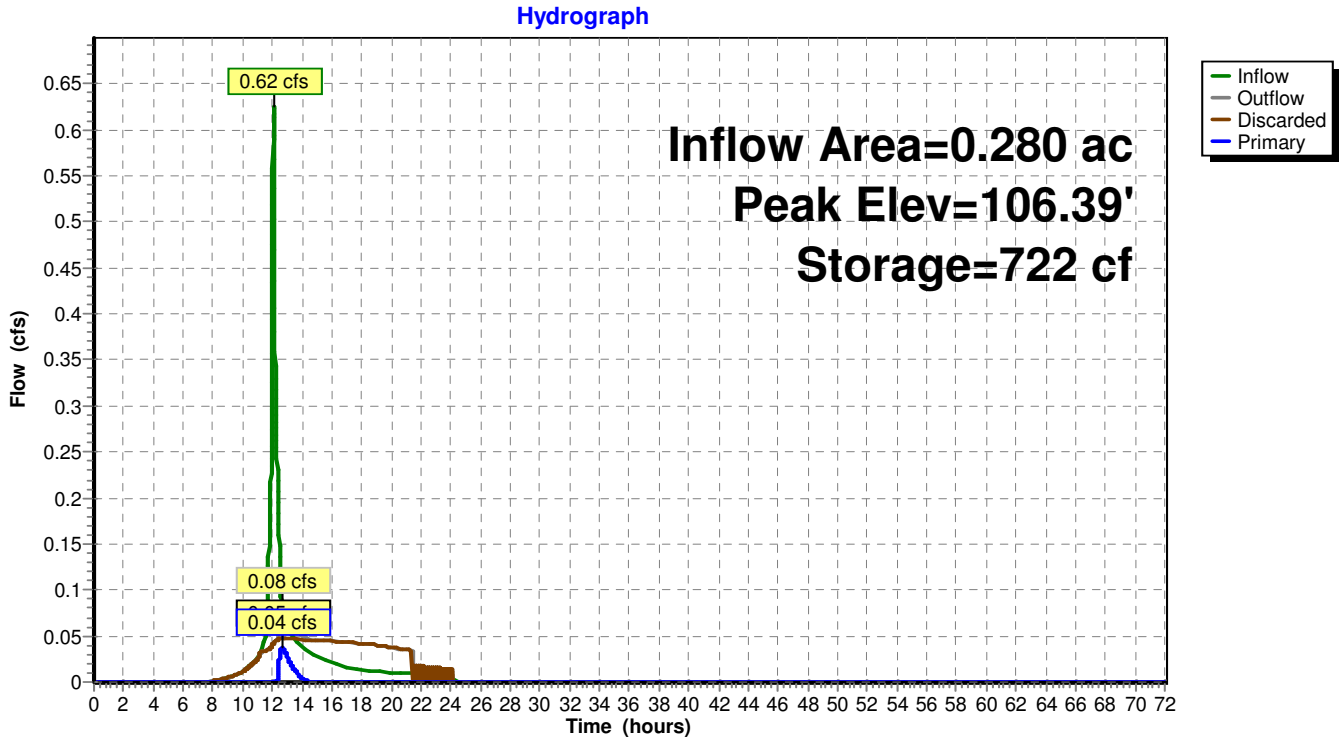
Volume	Invert	Avail.Storage	Storage Description
#1	105.50'	1,022 cf	**21.50'W x 67.00'L x 2.33'H Prismatoid** 3,356 cf Overall - 802 cf Embedded = 2,555 cf x 40.0% Voids
#2	106.00'	802 cf	**StormTech SC-310** x 54 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 6 rows
		1,823 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.30'	**12.0" Round Culvert** L= 34.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 106.30' / 105.28' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.05 cfs @ 12.63 hrs HW=106.39' (Free Discharge)
1=Exfiltration (Controls 0.05 cfs)

Primary OutFlow Max=0.04 cfs @ 12.63 hrs HW=106.39' TW=100.30' (Dynamic Tailwater)
2=Culvert (Inlet Controls 0.04 cfs @ 1.03 fps)

Pond 3B: 3b (Sub. Infil. Chambers)



Summary for Pond DP1: DP1 (Sub. Infil. Chambers)

Inflow Area = 9.167 ac, 35.31% Impervious, Inflow Depth = 0.32" for 2-yr event
Inflow = 3.08 cfs @ 12.12 hrs, Volume= 0.244 af
Outflow = 1.41 cfs @ 12.39 hrs, Volume= 0.244 af, Atten= 54%, Lag= 16.0 min
Discarded = 1.41 cfs @ 12.39 hrs, Volume= 0.244 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 100.43' @ 12.39 hrs Surf.Area= 6,672 sf Storage= 1,149 cf

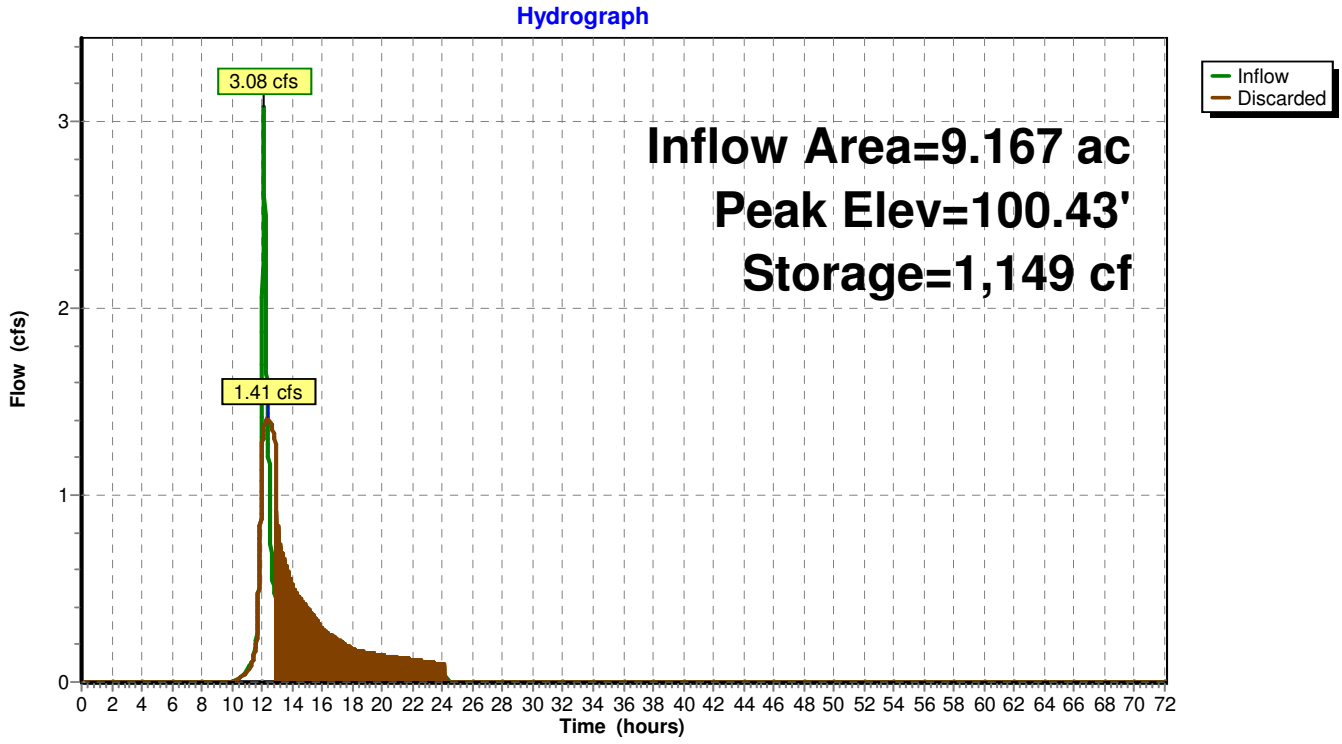
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.7 min (857.0 - 853.4)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	4,855 cf	**44.25'W x 123.92'L x 3.50'H Prismatoid** 19,192 cf Overall - 7,054 cf Embedded = 12,138 cf x 40.0% Voids
#2	100.50'	7,054 cf	**StormTech SC-740** x 153 Inside #1 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 Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
#3	100.00'	1,101 cf	**24.25'W x 49.00'L x 3.50'H Prismatoid** 4,159 cf Overall - 1,406 cf Embedded = 2,752 cf x 40.0% Voids
#4	100.50'	1,406 cf	**StormTech SC-740** x 30 Inside #3 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 Row Length Adjustment= +0.44' x 6.45 sf x 10 rows
		14,417 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=1.41 cfs @ 12.39 hrs HW=100.43' (Free Discharge)
1=Exfiltration (Controls 1.41 cfs)

Pond DP1: DP1 (Sub. Infil. Chambers)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.139 ac, 14.02% Impervious, Inflow Depth = 0.03" for 2-yr event
Inflow = 0.01 cfs @ 15.81 hrs, Volume= 0.006 af
Outflow = 0.01 cfs @ 17.85 hrs, Volume= 0.006 af, Atten= 9%, Lag= 122.6 min
Discarded = 0.01 cfs @ 17.85 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 100.66' @ 17.85 hrs Surf.Area= 130 sf Storage= 18 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 34.6 min (1,178.0 - 1,143.5)

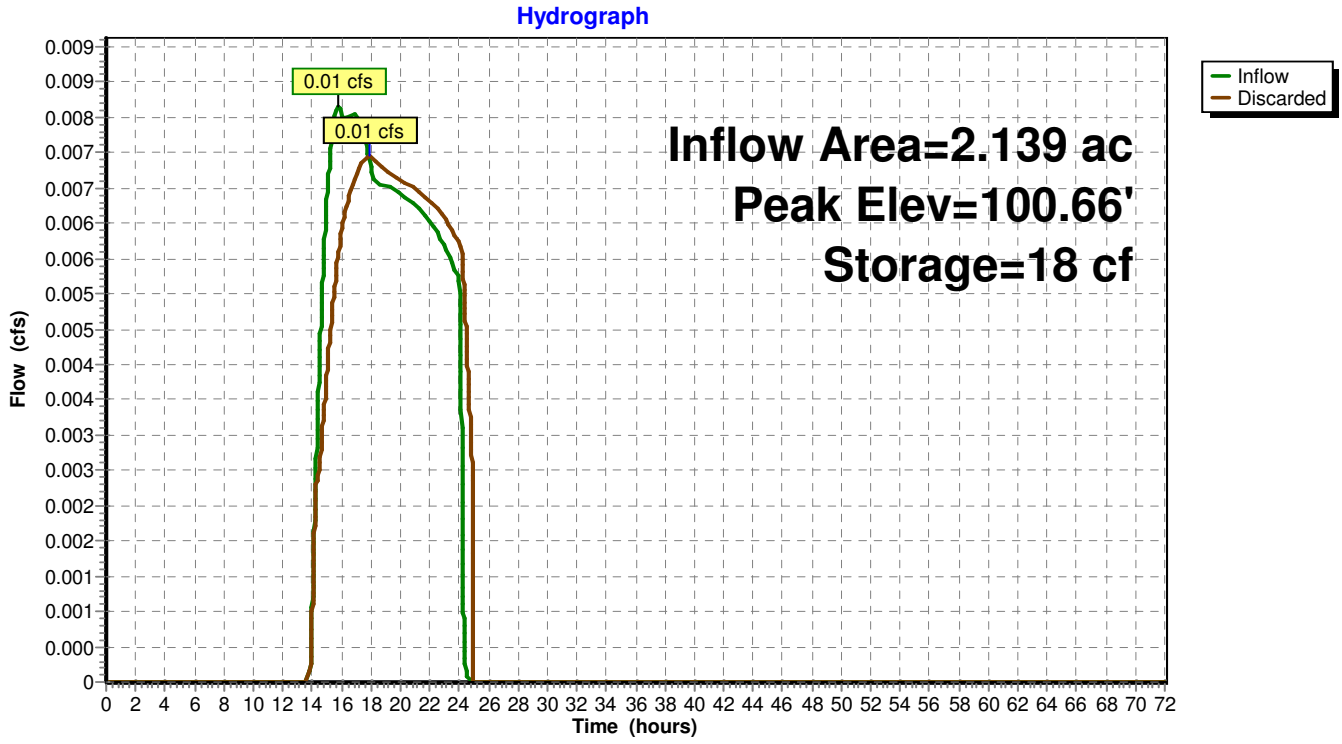
Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	5,700 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,630	946	1,029
103.00	3,637	2,634	3,663
103.50	4,512	2,037	5,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.01 cfs @ 17.85 hrs HW=100.66' (Free Discharge)
↑**1=Exfiltration** (Controls 0.01 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 2.271 ac, 12.03% Impervious, Inflow Depth = 0.01" for 2-yr event
Inflow = 0.00 cfs @ 21.59 hrs, Volume= 0.003 af
Outflow = 0.00 cfs @ 21.59 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 21.59 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.30' @ 0.00 hrs Surf.Area= 2,653 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,214.8 - 1,214.8)

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	6,303 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

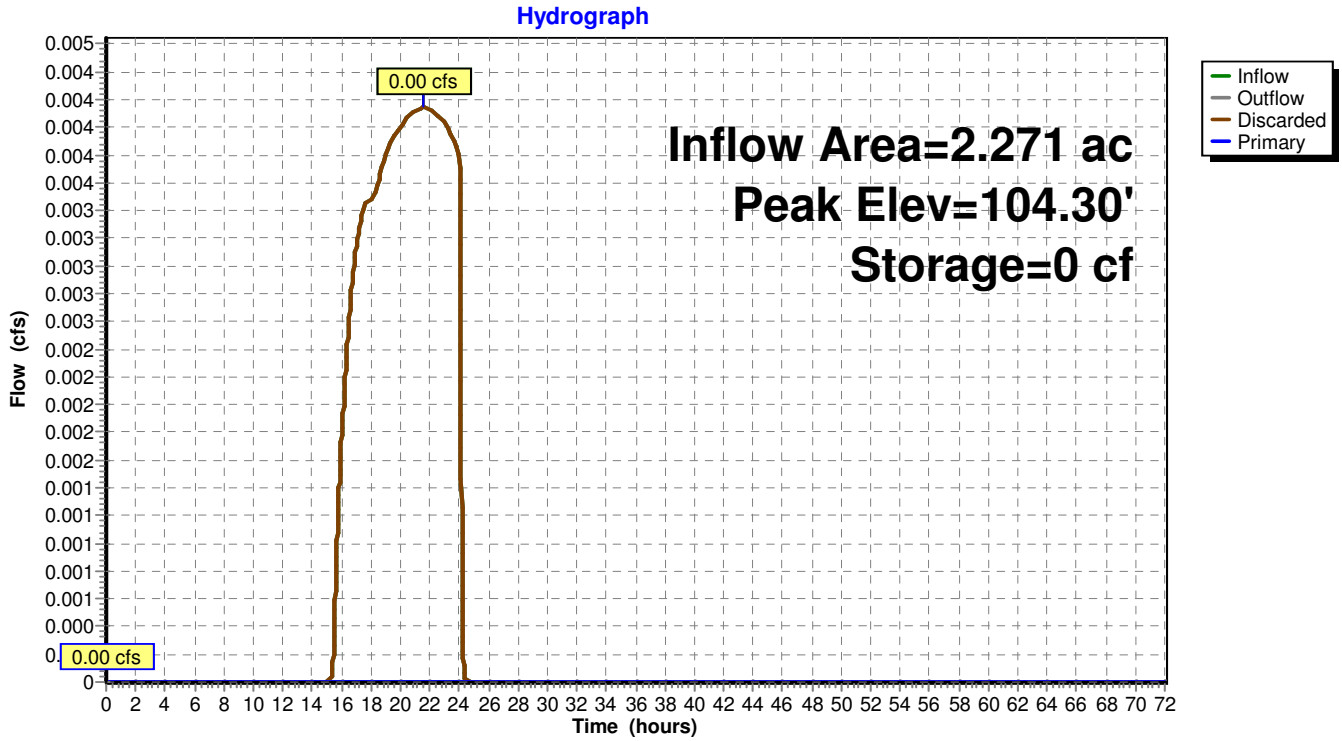
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,653	0	0
105.00	3,806	2,261	2,261
105.50	5,835	2,410	4,671
105.75	7,220	1,632	6,303

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	104.85'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 104.85' / 104.24' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.00 cfs @ 21.59 hrs HW=104.30' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 0.03 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' TW=100.00' (Dynamic Tailwater)
2=Culvert (Controls 0.00 cfs)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 2.207 ac, 11.71% Impervious, Inflow Depth = 0.03" for 2-yr event
Inflow = 0.01 cfs @ 15.80 hrs, Volume= 0.006 af
Outflow = 0.01 cfs @ 15.80 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 15.80 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 103.83' @ 0.00 hrs Surf.Area= 2,056 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,141.3 - 1,141.3)

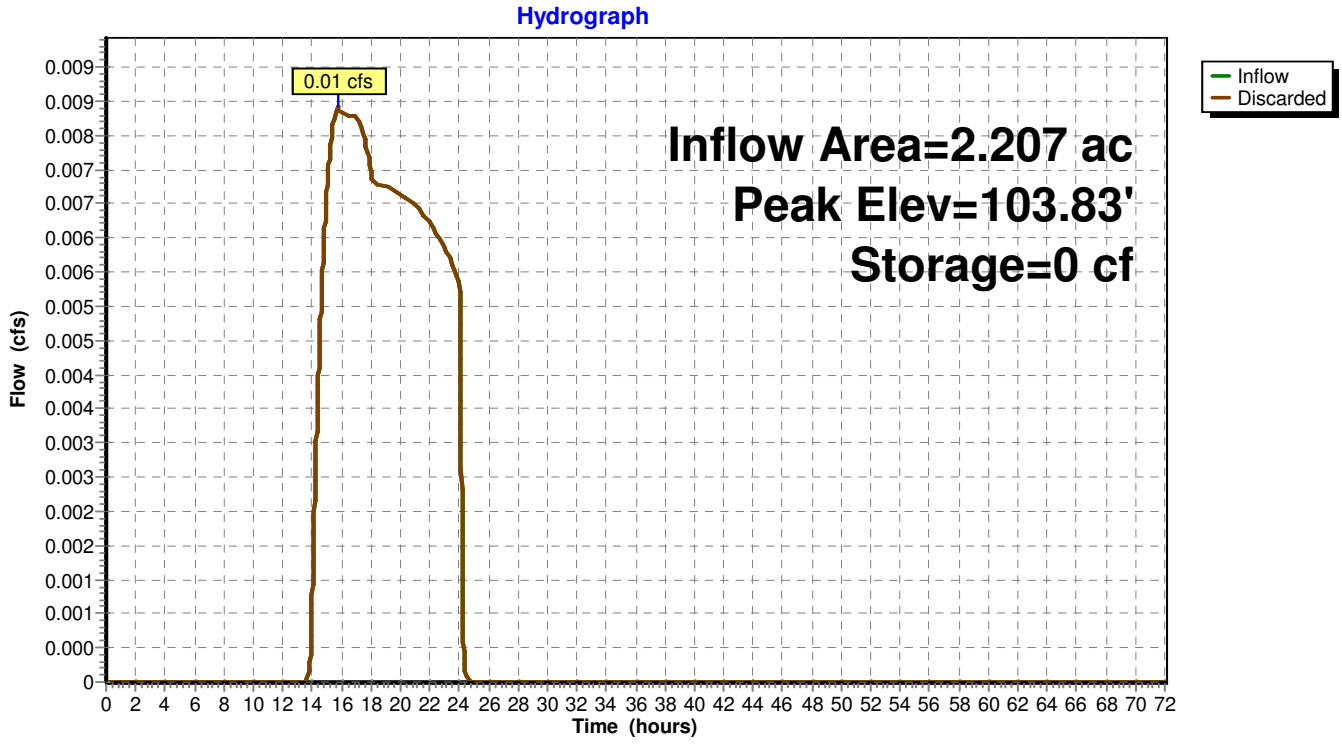
Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	15,451 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,056	0	0
104.00	3,071	436	436
105.00	13,033	8,052	8,488
105.50	14,818	6,963	15,451

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'

Discarded OutFlow Max=0.00 cfs @ 15.80 hrs HW=103.83' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 0.05 cfs potential flow)

Pond DP4: DP4 (North - Natural Depression)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.17"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.01 cfs 0.008 af

Subcatchment 1bS: 1bS Runoff Area=40,744 sf 19.15% Impervious Runoff Depth=0.57"
Tc=10.0 min CN=50 Runoff=0.30 cfs 0.045 af

Subcatchment 1cS: 1cS Runoff Area=23,675 sf 12.27% Impervious Runoff Depth=0.24"
Tc=5.0 min CN=42 Runoff=0.04 cfs 0.011 af

Subcatchment 1dS: 1dS Runoff Area=80,131 sf 16.36% Impervious Runoff Depth=0.44"
Flow Length=583' Tc=18.0 min CN=47 Runoff=0.33 cfs 0.067 af

Subcatchment 1eS: 1eS Runoff Area=38,668 sf 76.01% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=84 Runoff=3.22 cfs 0.222 af

Subcatchment 1S: 1S Runoff Area=104,111 sf 64.15% Impervious Runoff Depth=2.37"
Tc=8.0 min CN=77 Runoff=6.20 cfs 0.473 af

Subcatchment 2S: 2S Runoff Area=93,156 sf 14.02% Impervious Runoff Depth=0.31"
Flow Length=402' Tc=14.1 min CN=44 Runoff=0.22 cfs 0.056 af

Subcatchment 3aS: 3S off site Runoff Area=138,732 sf 11.36% Impervious Runoff Depth=0.17"
Flow Length=702' Tc=34.0 min CN=40 Runoff=0.08 cfs 0.046 af

Subcatchment 3bS: 3bS Runoff Area=12,198 sf 78.82% Impervious Runoff Depth=3.19"
Tc=5.0 min CN=86 Runoff=1.07 cfs 0.074 af

Subcatchment 3S: 3S Runoff Area=98,908 sf 12.03% Impervious Runoff Depth=0.24"
Tc=10.0 min CN=42 Runoff=0.14 cfs 0.045 af

Subcatchment 4S: 4S Runoff Area=96,150 sf 11.71% Impervious Runoff Depth=0.31"
Flow Length=170' Tc=11.8 min CN=44 Runoff=0.23 cfs 0.057 af

Pond 1A: 1a (Off Site Natural Depression) Peak Elev=105.00' Storage=0 cf Inflow=0.01 cfs 0.008 af
Discarded=0.01 cfs 0.008 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.008 af

Pond 1B: 1b (Central Nat. Depression & Peak Elev=102.26' Storage=5,225 cf Inflow=3.33 cfs 0.333 af
Discarded=0.40 cfs 0.333 af Primary=0.00 cfs 0.000 af Outflow=0.40 cfs 0.333 af

Pond 1C: 1cP (Natural Depression) Peak Elev=101.00' Storage=2 cf Inflow=0.04 cfs 0.011 af
Outflow=0.03 cfs 0.011 af

Pond 3A: 3a (Trench Drain) Peak Elev=105.63' Storage=414 cf Inflow=0.08 cfs 0.046 af
Discarded=0.05 cfs 0.046 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.046 af

Pond 3B: 3b (Sub. Infil. Chambers) Peak Elev=106.62' Storage=963 cf Inflow=1.07 cfs 0.074 af
Discarded=0.05 cfs 0.051 af Primary=0.42 cfs 0.024 af Outflow=0.48 cfs 0.074 af

Pond DP1: DP1 (Sub. Infil. Chambers) Peak Elev=101.21' Storage=5,227 cf Inflow=6.41 cfs 0.496 af
Outflow=1.66 cfs 0.496 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=101.66' Storage=557 cf Inflow=0.22 cfs 0.056 af
Outflow=0.07 cfs 0.056 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=104.49' Storage=544 cf Inflow=0.14 cfs 0.045 af
Discarded=0.04 cfs 0.045 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.045 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=103.99' Storage=414 cf Inflow=0.23 cfs 0.057 af
Outflow=0.08 cfs 0.057 af

Total Runoff Area = 17.241 ac Runoff Volume = 1.103 af Average Runoff Depth = 0.77"
75.50% Pervious = 13.018 ac 24.50% Impervious = 4.224 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

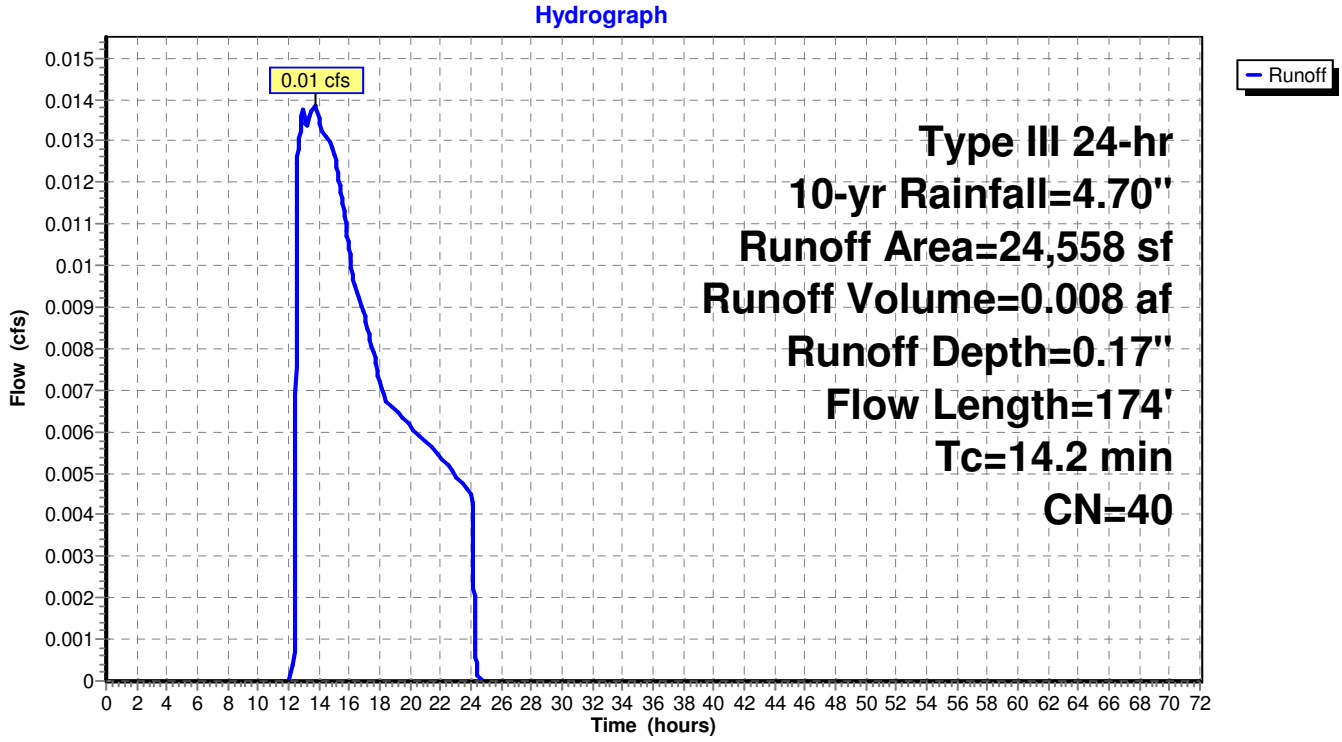
Runoff = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

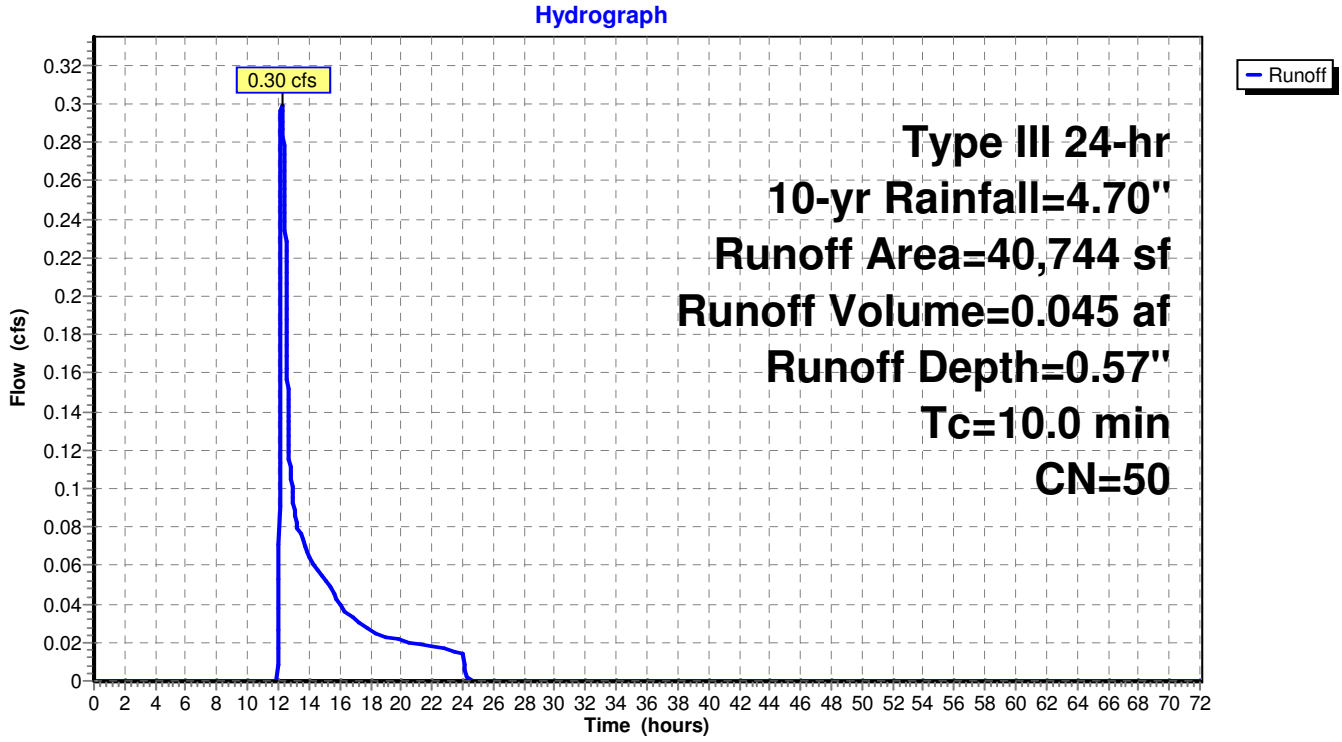
Runoff = 0.30 cfs @ 12.21 hrs, Volume= 0.045 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
833	76	Gravel roads, HSG A
7,801	98	Roofs, HSG A
28,513	39	>75% Grass cover, Good, HSG A
3,597	30	Woods, Good, HSG A
40,744	50	Weighted Average
32,943		80.85% Pervious Area
7,801		19.15% Impervious Area

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

Subcatchment 1bS: 1bS



Summary for Subcatchment 1cS: 1cS

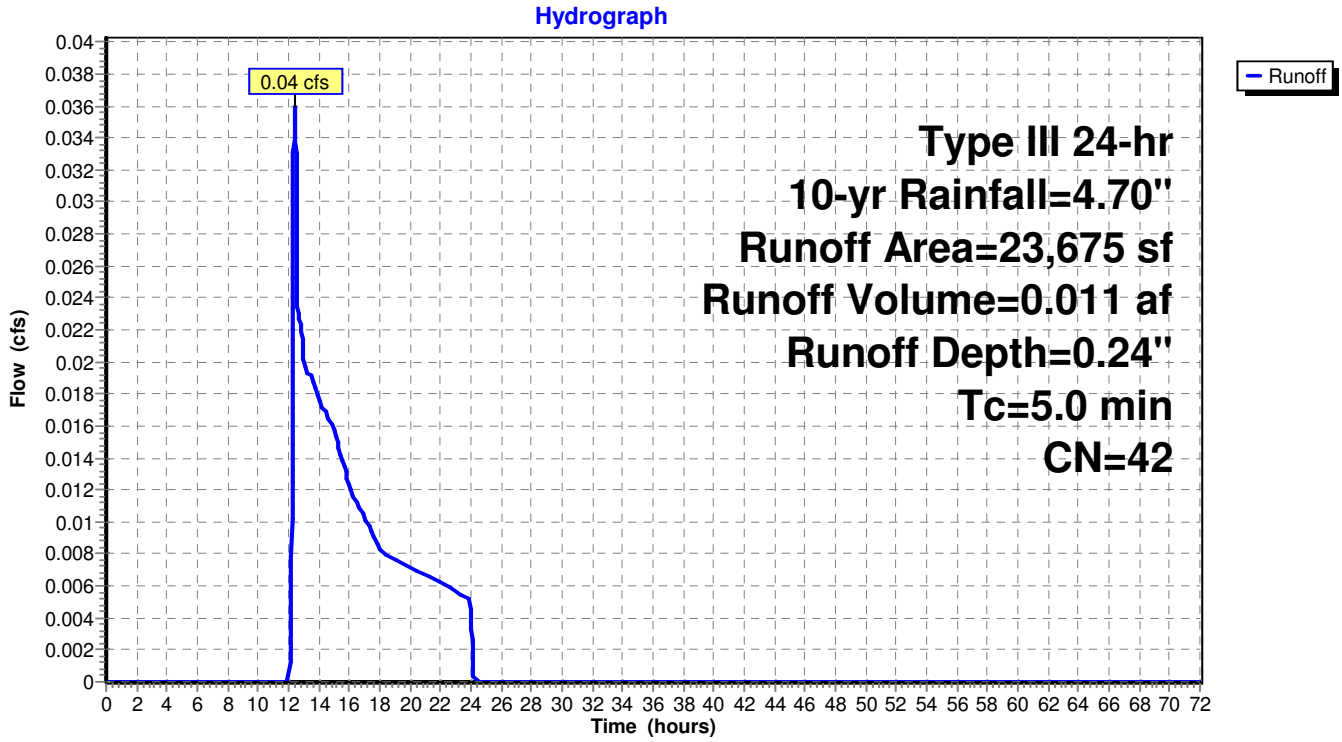
Runoff = 0.04 cfs @ 12.41 hrs, Volume= 0.011 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
11,369	30	Woods, Good, HSG A
2,905	98	Roofs, HSG A
9,401	39	>75% Grass cover, Good, HSG A
23,675	42	Weighted Average
20,770		87.73% Pervious Area
2,905		12.27% Impervious Area

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

Subcatchment 1cS: 1cS



Summary for Subcatchment 1dS: 1dS

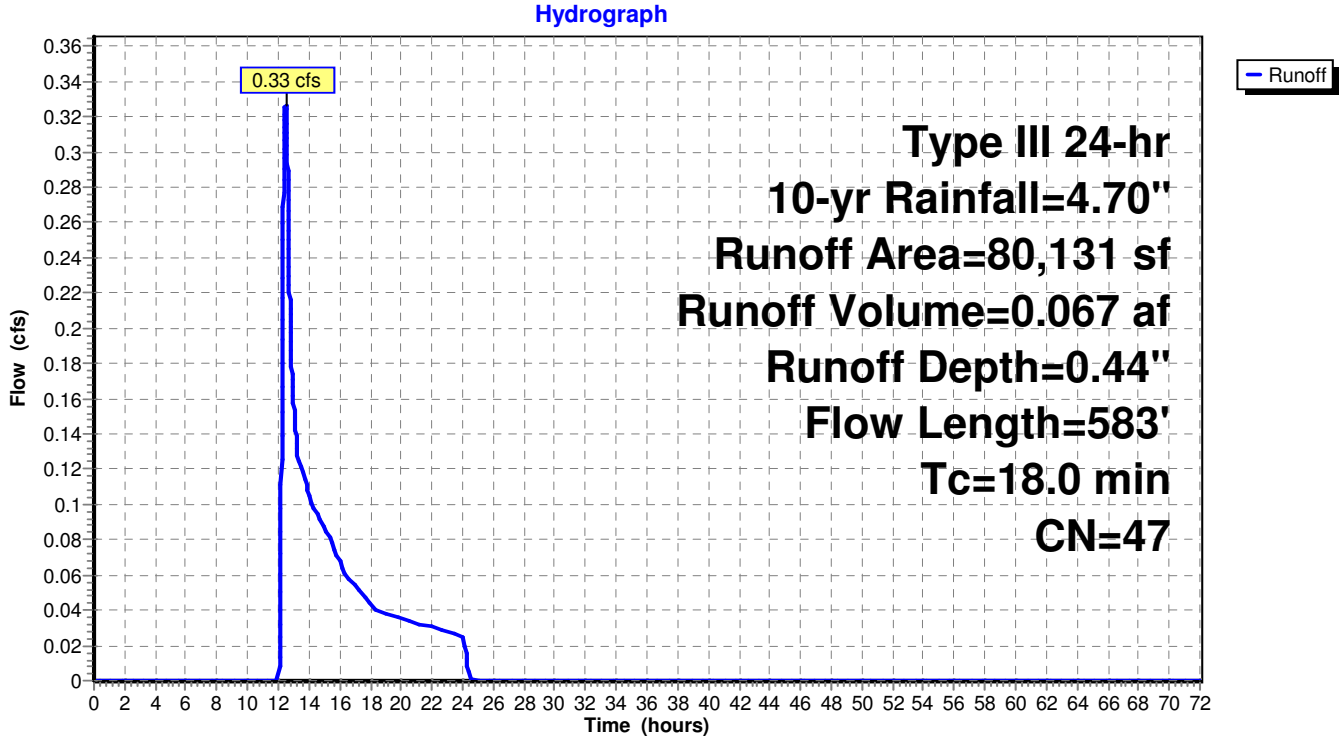
Runoff = 0.33 cfs @ 12.48 hrs, Volume= 0.067 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
5,354	98	Roofs, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
17,837	30	Woods, Good, HSG A
7,757	98	Roofs, HSG A
13,831	39	>75% Grass cover, Good, HSG A
10,861	30	Woods, Good, HSG A
80,131	47	Weighted Average
67,020		83.64% Pervious Area
13,111		16.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1dS: 1dS



Summary for Subcatchment 1eS: 1eS

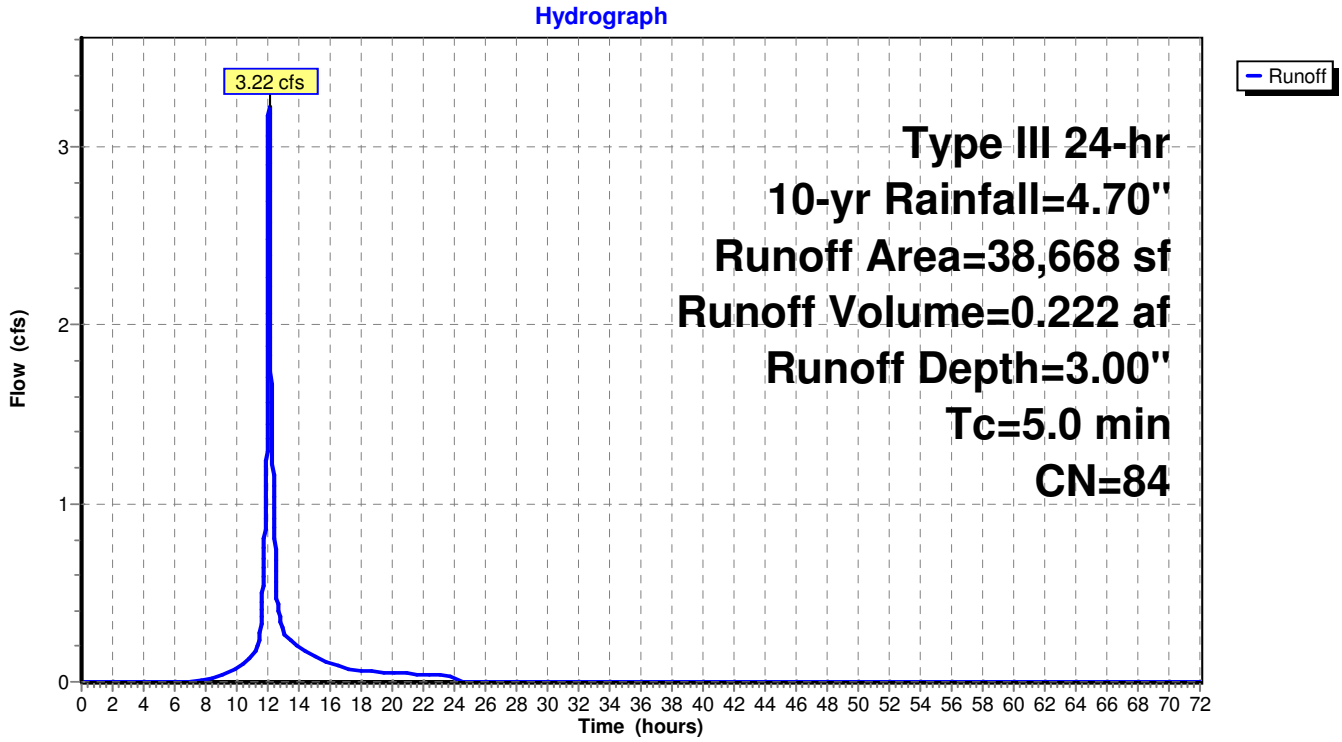
Runoff = 3.22 cfs @ 12.07 hrs, Volume= 0.222 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
15,724	98	Paved parking, HSG A
13,666	98	Roofs, HSG A
9,278	39	>75% Grass cover, Good, HSG A
38,668	84	Weighted Average
9,278		23.99% Pervious Area
29,390		76.01% Impervious Area

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

Subcatchment 1eS: 1eS



Summary for Subcatchment 1S: 1S

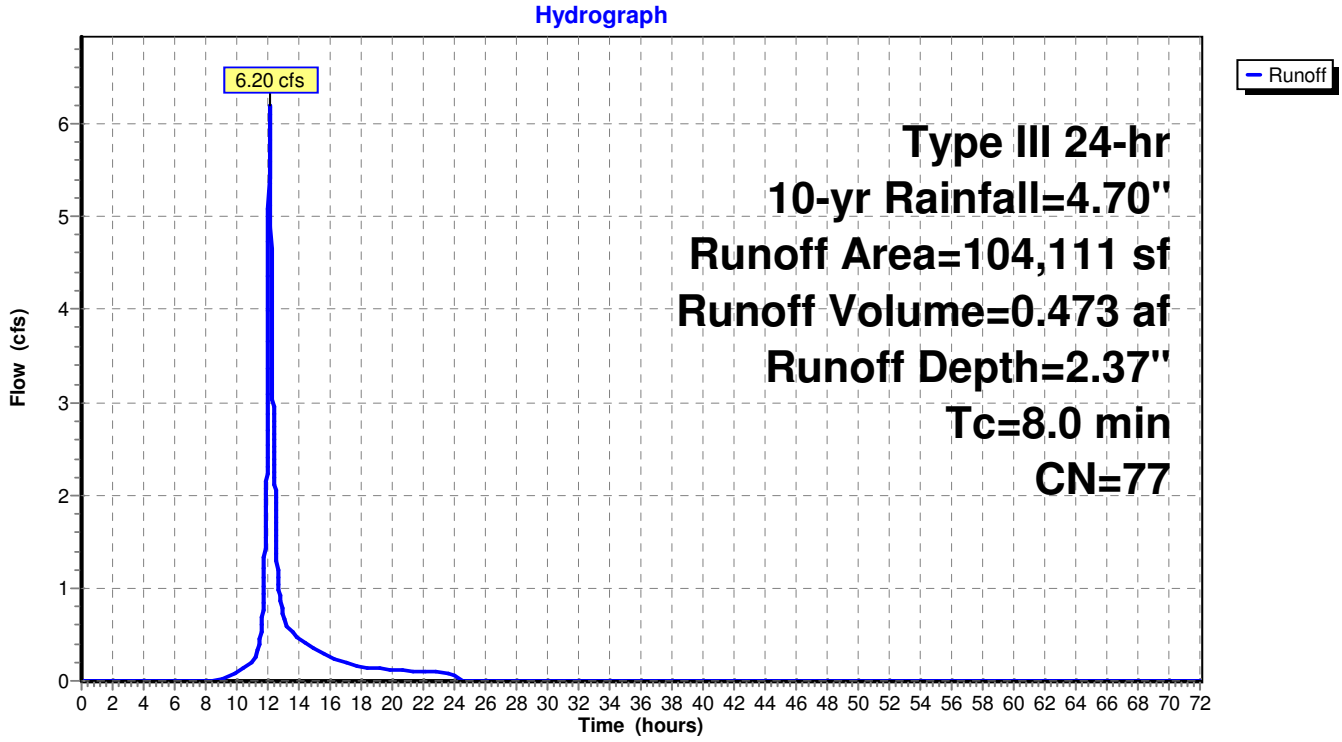
Runoff = 6.20 cfs @ 12.12 hrs, Volume= 0.473 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
39,719	98	Paved parking, HSG A
27,065	98	Roofs, HSG A
35,819	39	>75% Grass cover, Good, HSG A
1,508	30	Woods, Good, HSG A
104,111	77	Weighted Average
37,327		35.85% Pervious Area
66,784		64.15% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

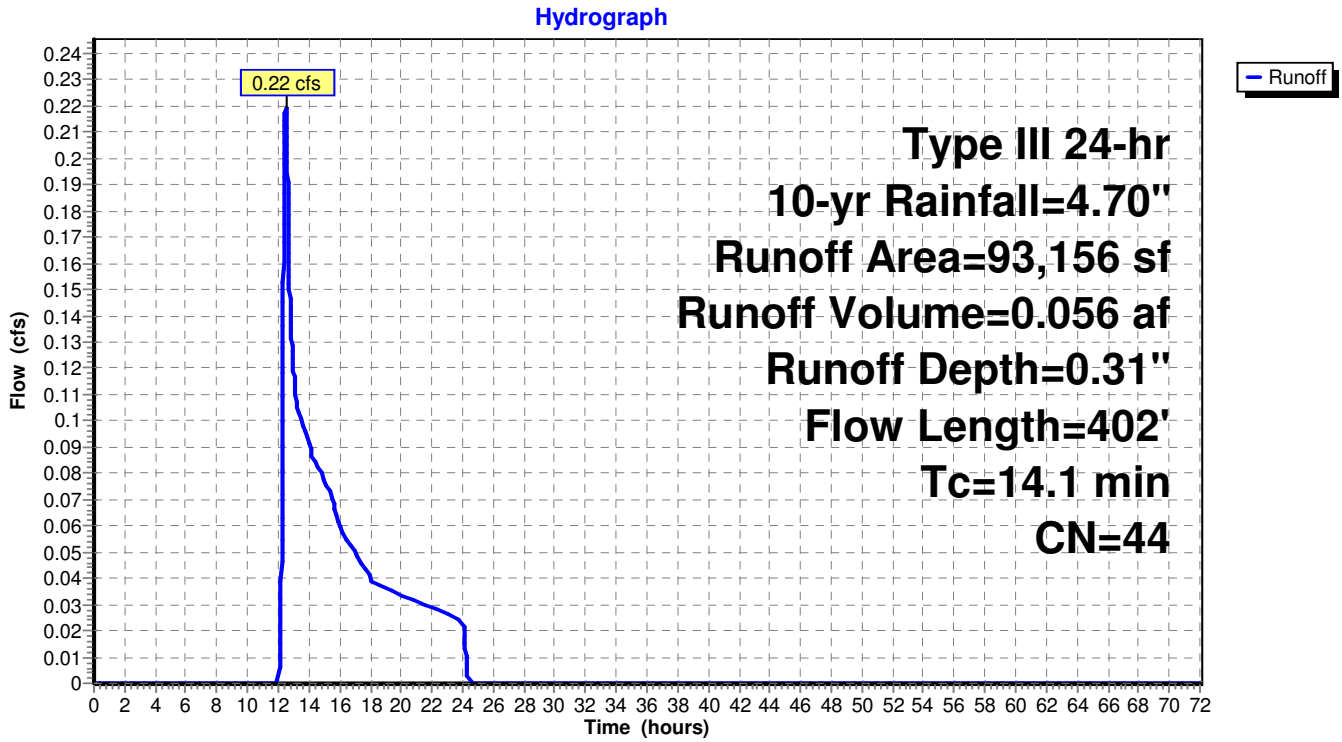
Runoff = 0.22 cfs @ 12.49 hrs, Volume= 0.056 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
37,337	30	Woods, Good, HSG A
12,390	39	>75% Grass cover, Good, HSG A
7,870	98	Roofs, HSG A
93,156	44	Weighted Average
80,098		85.98% Pervious Area
13,058		14.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3aS: 3S off site

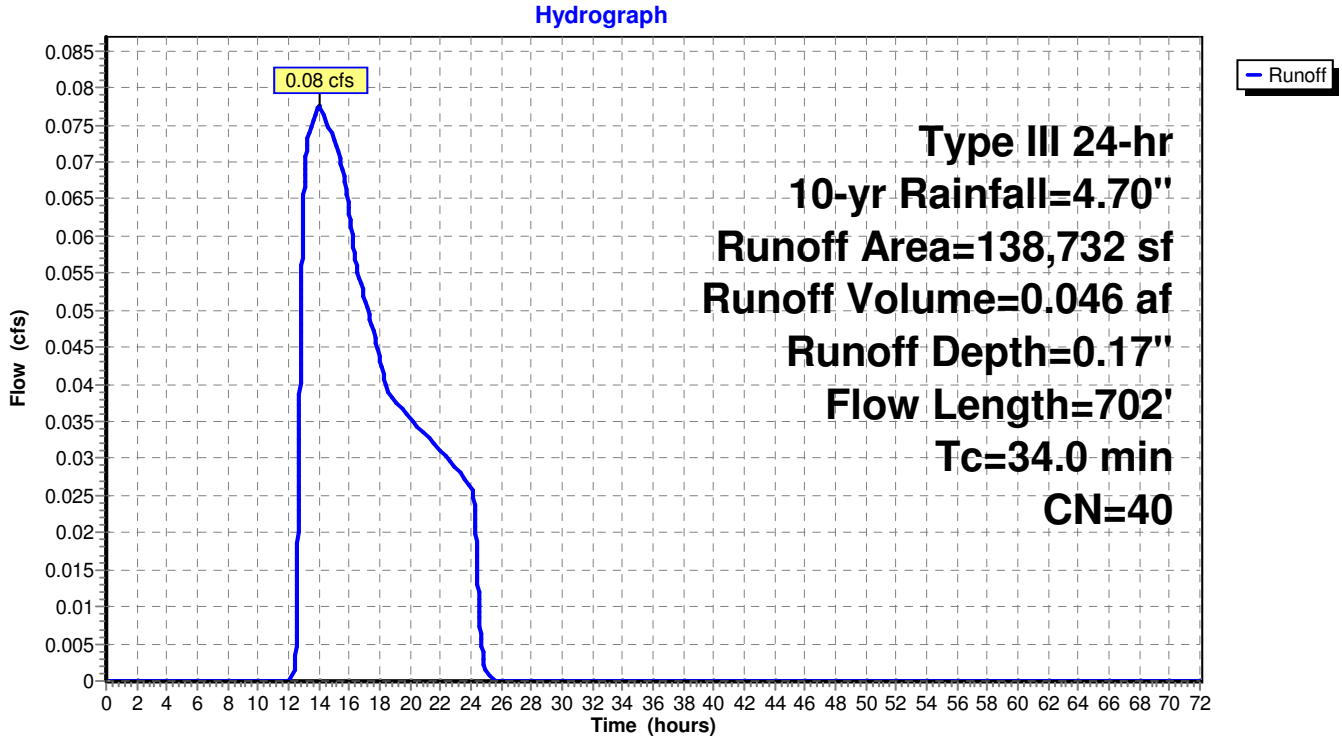
Runoff = 0.08 cfs @ 14.01 hrs, Volume= 0.046 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
7,998	98	Roofs, HSG A
20,884	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
80,826	30	Woods, Good, HSG A
138,732	40	Weighted Average
122,971		88.64% Pervious Area
15,761		11.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3aS: 3S off site



Summary for Subcatchment 3bS: 3bS

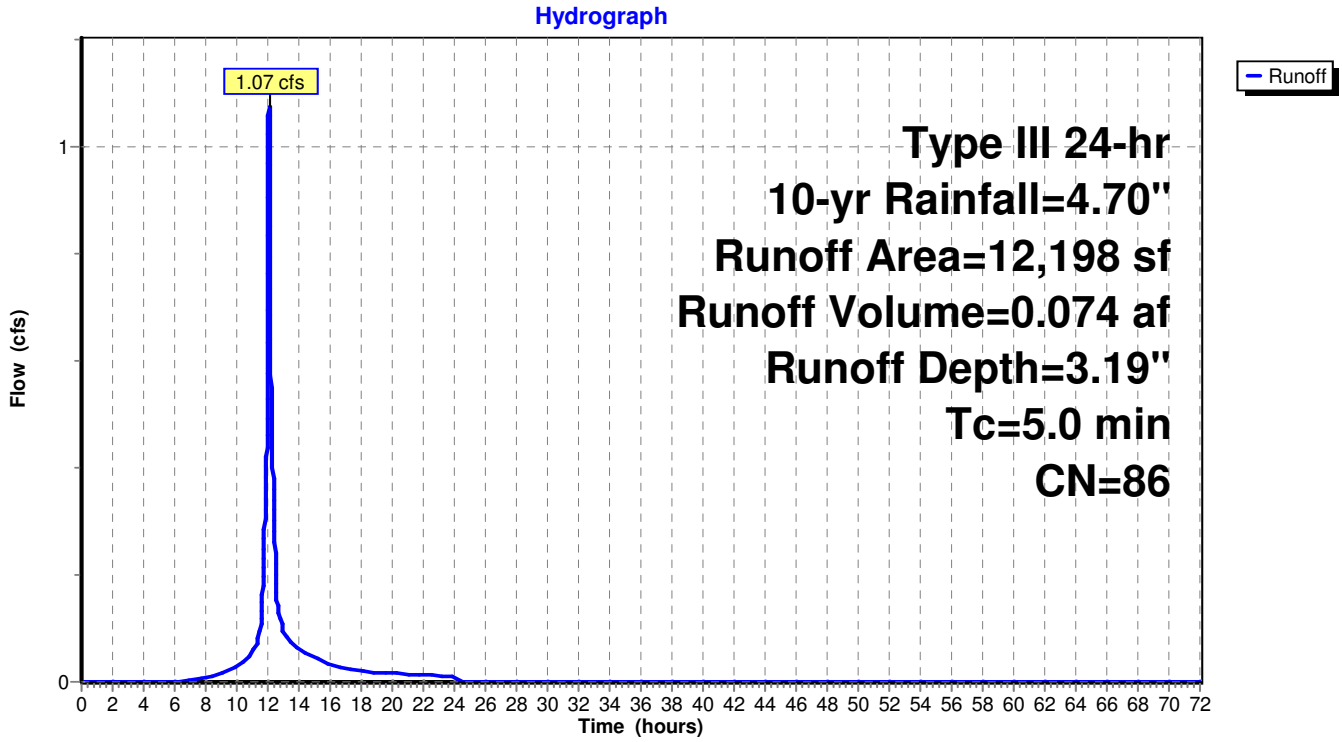
Runoff = 1.07 cfs @ 12.07 hrs, Volume= 0.074 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
4,827	98	Roofs, HSG A
4,787	98	Paved parking, HSG A
2,584	39	>75% Grass cover, Good, HSG A
12,198	86	Weighted Average
2,584		21.18% Pervious Area
9,614		78.82% Impervious Area

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

Subcatchment 3bS: 3bS



Summary for Subcatchment 3S: 3S

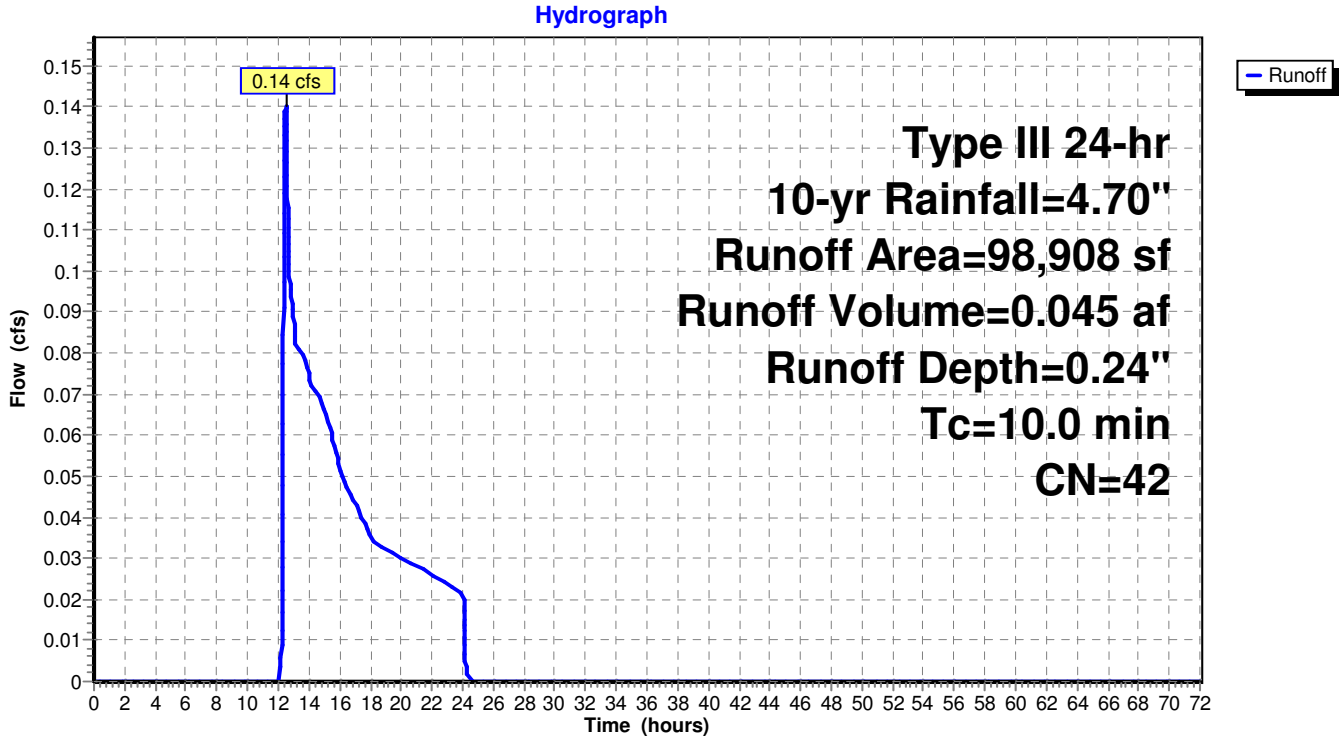
Runoff = 0.14 cfs @ 12.48 hrs, Volume= 0.045 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
4,948	98	Roofs, HSG A
23,819	39	>75% Grass cover, Good, HSG A
6,947	98	Roofs, HSG A
14,369	39	>75% Grass cover, Good, HSG A
48,825	30	Woods, Good, HSG A
98,908	42	Weighted Average
87,013		87.97% Pervious Area
11,895		12.03% Impervious Area

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

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

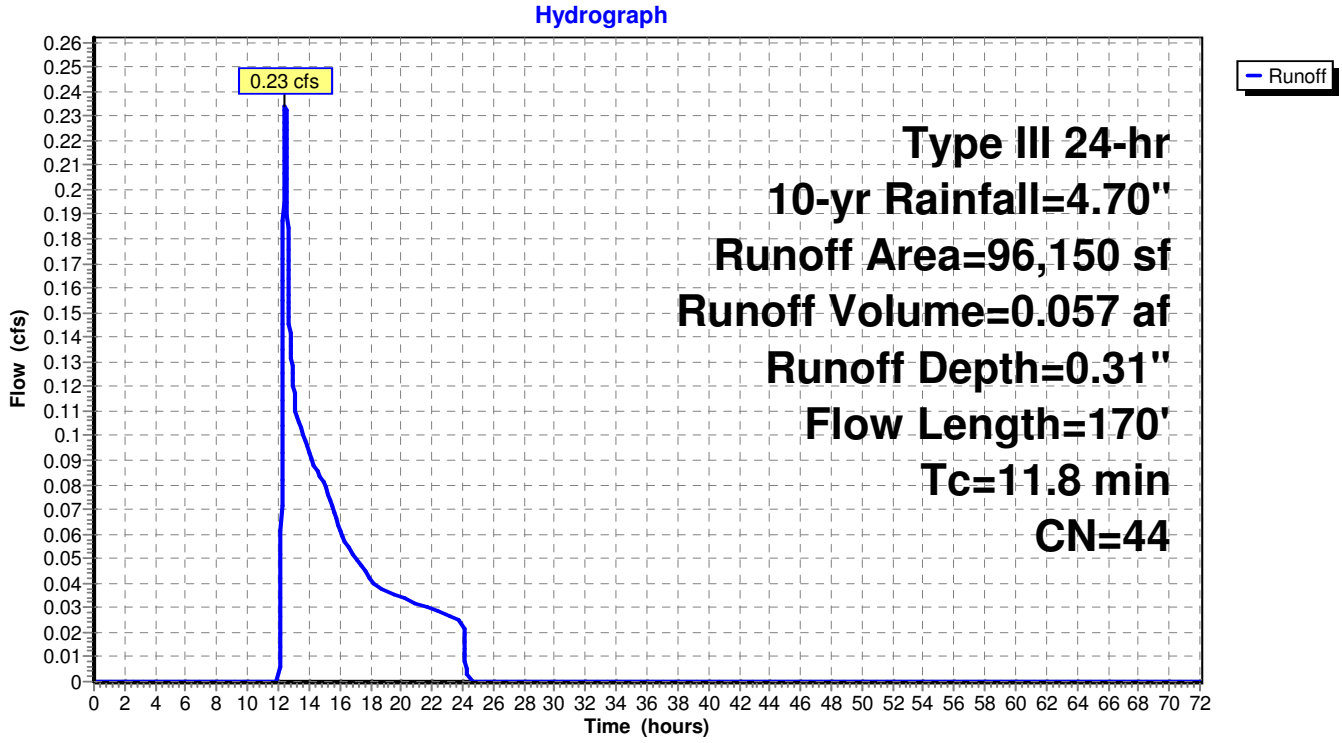
Runoff = 0.23 cfs @ 12.46 hrs, Volume= 0.057 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.70"

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
5,319	98	Roofs, HSG A
16,063	39	>75% Grass cover, Good, HSG A
10,112	30	Woods, Good, HSG A
96,150	44	Weighted Average
84,895		88.29% Pervious Area
11,255		11.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.17" for 10-yr event
Inflow = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af
Outflow = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 13.71 hrs, Volume= 0.008 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.00' @ 0.00 hrs Surf.Area= 1,231 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,025.2 - 1,025.2)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

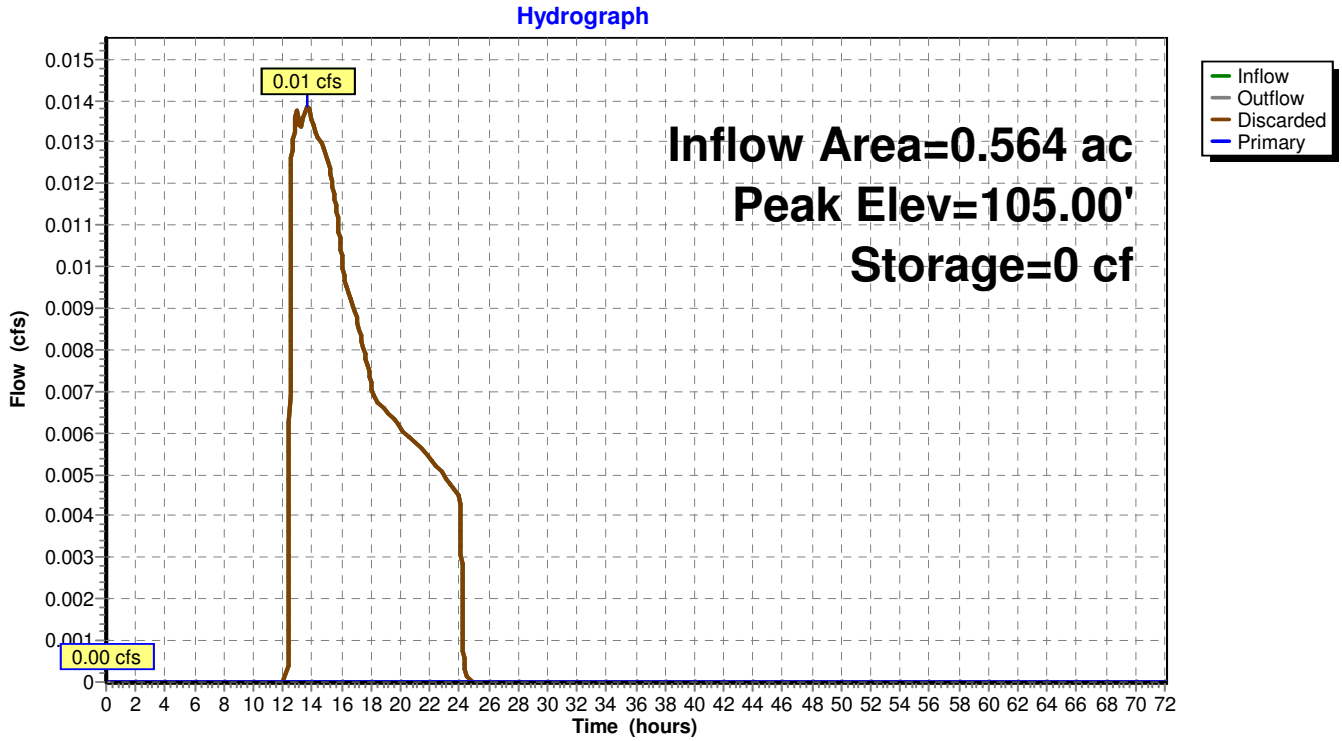
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 13.71 hrs HW=105.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.07 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=100.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off Site Natural Depression)



Summary for Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)

Inflow Area = 3.663 ac, 31.53% Impervious, Inflow Depth = 1.09" for 10-yr event
Inflow = 3.33 cfs @ 12.08 hrs, Volume= 0.333 af
Outflow = 0.40 cfs @ 13.71 hrs, Volume= 0.333 af, Atten= 88%, Lag= 98.1 min
Discarded = 0.40 cfs @ 13.71 hrs, Volume= 0.333 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.26' @ 13.71 hrs Surf.Area= 6,100 sf Storage= 5,225 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 157.4 min (1,013.3 - 856.0)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	33,502 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

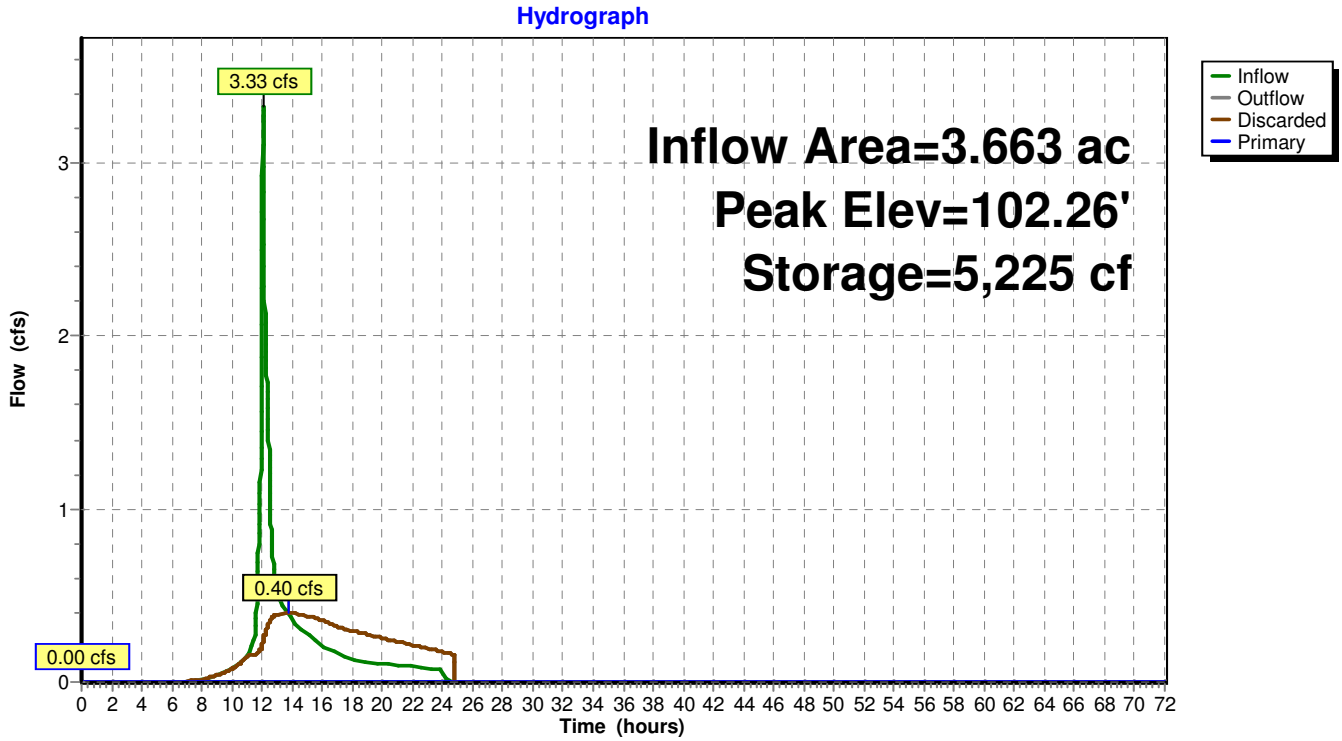
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	2,755	0	0
102.00	4,827	3,791	3,791
103.00	9,677	7,252	11,043
104.00	11,211	10,444	21,487
105.00	12,819	12,015	33,502

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	101.96'	**12.0" Round Culvert** L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 101.96' / 101.67' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	103.00'	**1.0' long x 0.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height

Discarded OutFlow Max=0.40 cfs @ 13.71 hrs HW=102.26' (Free Discharge)
↑**1=Exfiltration** (Controls 0.40 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.00' TW=100.00' (Dynamic Tailwater)
↑**2=Culvert** (Controls 0.00 cfs)
↑**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)



Summary for Pond 1C: 1cP (Natural Depression)

Inflow Area = 0.544 ac, 12.27% Impervious, Inflow Depth = 0.24" for 10-yr event
Inflow = 0.04 cfs @ 12.41 hrs, Volume= 0.011 af
Outflow = 0.03 cfs @ 12.50 hrs, Volume= 0.011 af, Atten= 14%, Lag= 5.8 min
Discarded = 0.03 cfs @ 12.50 hrs, Volume= 0.011 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.00' @ 12.50 hrs Surf.Area= 555 sf Storage= 2 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (989.3 - 989.2)

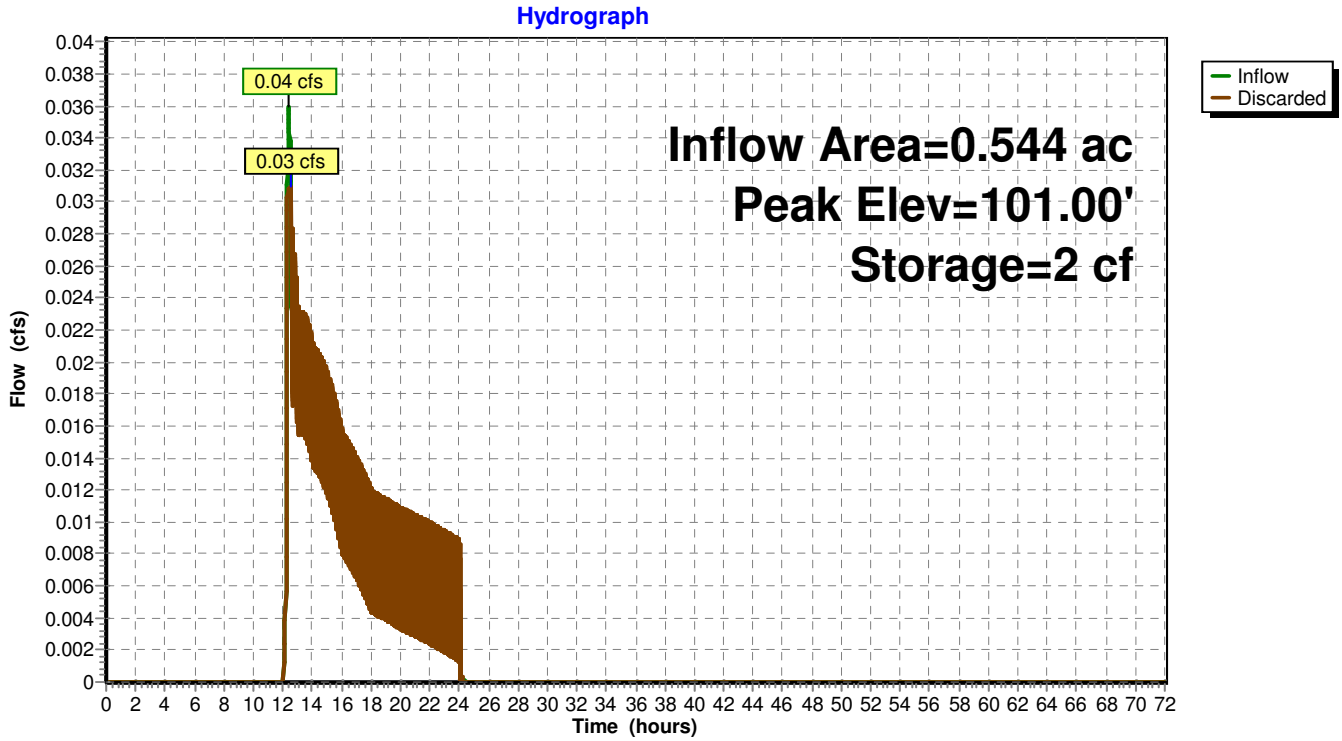
Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	13,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	550	0	0
102.00	1,807	1,179	1,179
103.00	3,213	2,510	3,689
104.00	4,741	3,977	7,666
105.00	6,304	5,523	13,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.03 cfs @ 12.50 hrs HW=101.00' (Free Discharge)
↑**1=Exfiltration** (Controls 0.03 cfs)

Pond 1C: 1cP (Natural Depression)



Summary for Pond 3A: 3a (Trench Drain)

Inflow Area = 3.185 ac, 11.36% Impervious, Inflow Depth = 0.17" for 10-yr event
Inflow = 0.08 cfs @ 14.01 hrs, Volume= 0.046 af
Outflow = 0.05 cfs @ 17.74 hrs, Volume= 0.046 af, Atten= 41%, Lag= 223.4 min
Discarded = 0.05 cfs @ 17.74 hrs, Volume= 0.046 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.63' @ 17.74 hrs Surf.Area= 1,440 sf Storage= 414 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 105.5 min (1,149.0 - 1,043.5)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,106 cf	**5.00'W x 288.00'L x 2.33'H Prismatoid** 3,355 cf Overall - 591 cf Embedded = 2,765 cf x 40.0% Voids
#2	105.50'	591 cf	**StormTech SC-310** x 40 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 1 rows
#3	107.33'	3,995 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,691 cf	Total Available Storage

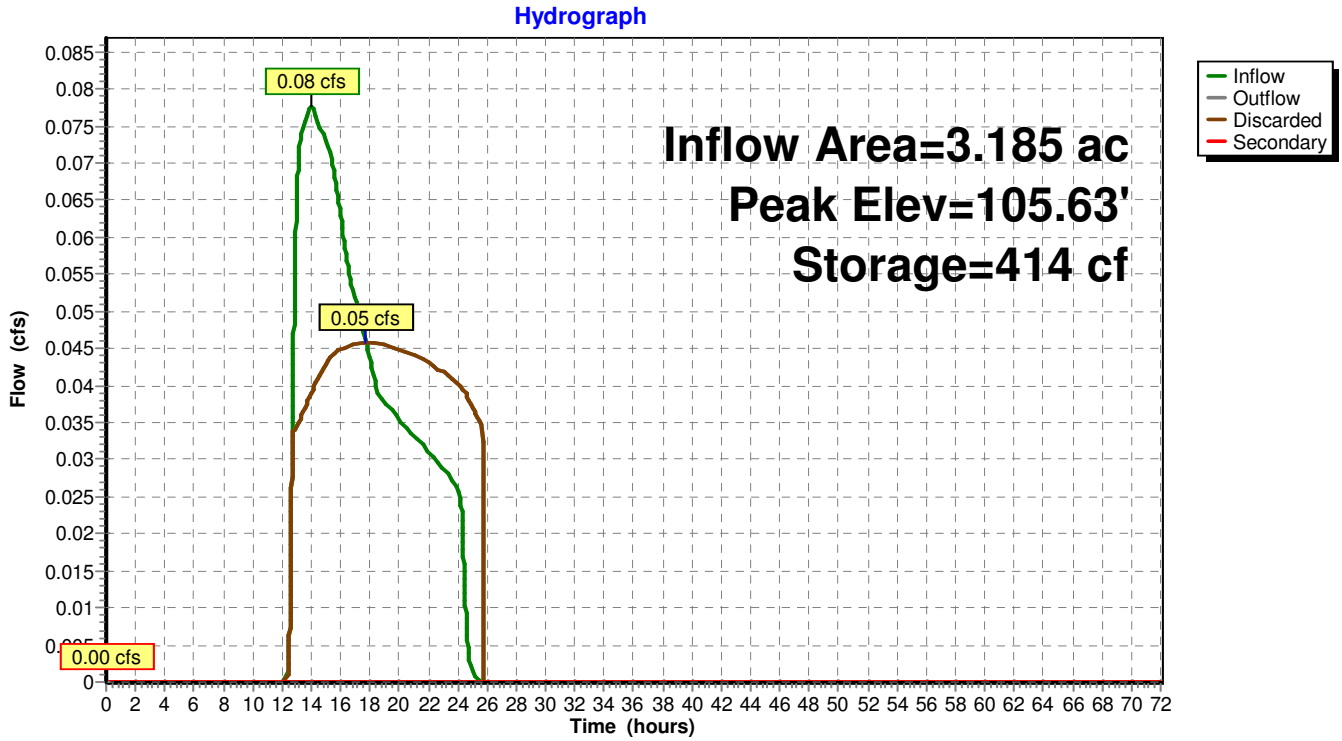
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
107.33	1,438	0	0
108.00	10,487	3,995	3,995

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Secondary	107.75'	**5.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.05 cfs @ 17.74 hrs HW=105.63' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.05 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=103.83' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3A: 3a (Trench Drain)



Summary for Pond 3B: 3b (Sub. Infil. Chambers)

Inflow Area = 0.280 ac, 78.82% Impervious, Inflow Depth = 3.19" for 10-yr event
Inflow = 1.07 cfs @ 12.07 hrs, Volume= 0.074 af
Outflow = 0.48 cfs @ 12.24 hrs, Volume= 0.074 af, Atten= 56%, Lag= 10.3 min
Discarded = 0.05 cfs @ 12.24 hrs, Volume= 0.051 af
Primary = 0.42 cfs @ 12.24 hrs, Volume= 0.024 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 106.62' @ 12.24 hrs Surf.Area= 1,441 sf Storage= 963 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 103.0 min (908.9 - 805.9)

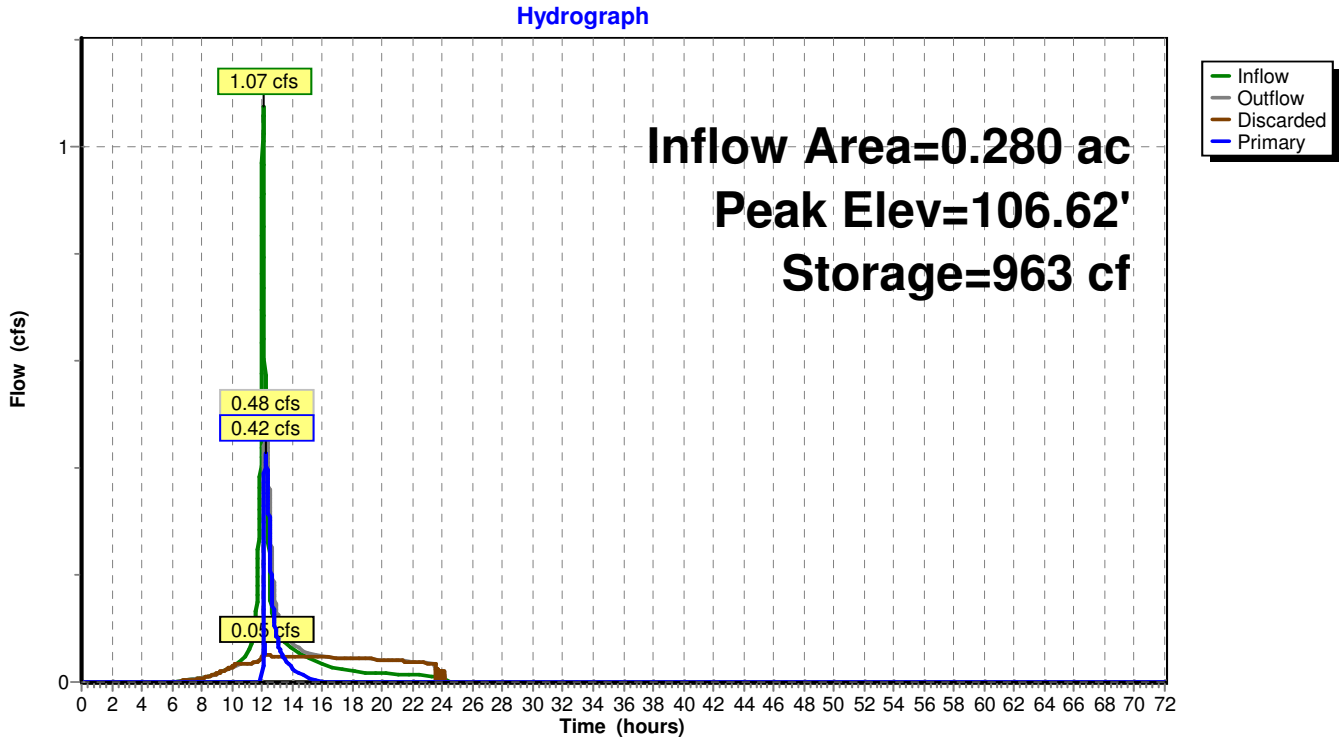
Volume	Invert	Avail.Storage	Storage Description
#1	105.50'	1,022 cf	**21.50'W x 67.00'L x 2.33'H Prismatoid** 3,356 cf Overall - 802 cf Embedded = 2,555 cf x 40.0% Voids
#2	106.00'	802 cf	**StormTech SC-310** x 54 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 6 rows
		1,823 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.30'	**12.0" Round Culvert** L= 34.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 106.30' / 105.28' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.05 cfs @ 12.24 hrs HW=106.62' (Free Discharge)
1=Exfiltration (Controls 0.05 cfs)

Primary OutFlow Max=0.42 cfs @ 12.24 hrs HW=106.62' TW=100.95' (Dynamic Tailwater)
2=Culvert (Inlet Controls 0.42 cfs @ 1.94 fps)

Pond 3B: 3b (Sub. Infil. Chambers)



Summary for Pond DP1: DP1 (Sub. Infil. Chambers)

Inflow Area = 9.167 ac, 35.31% Impervious, Inflow Depth = 0.65" for 10-yr event
Inflow = 6.41 cfs @ 12.12 hrs, Volume= 0.496 af
Outflow = 1.66 cfs @ 12.56 hrs, Volume= 0.496 af, Atten= 74%, Lag= 26.3 min
Discarded = 1.66 cfs @ 12.56 hrs, Volume= 0.496 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.21' @ 12.56 hrs Surf.Area= 6,672 sf Storage= 5,227 cf

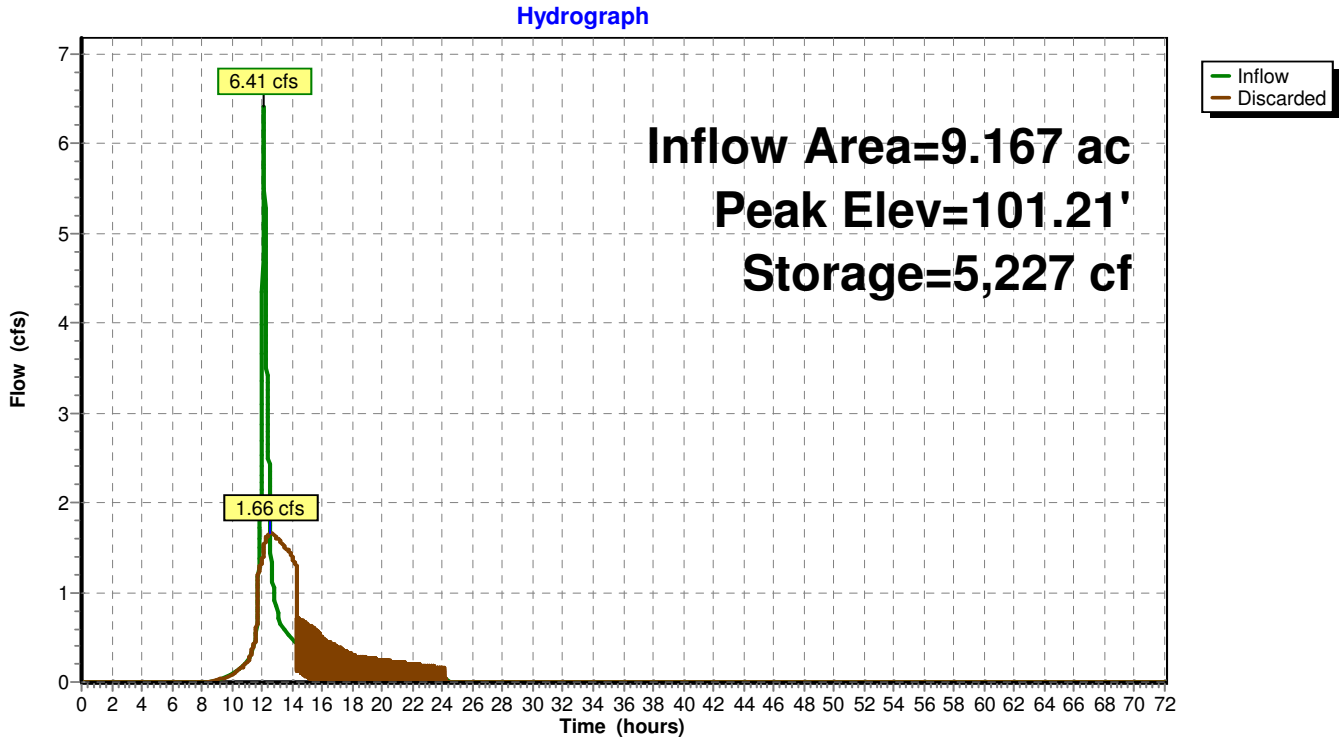
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 19.5 min (850.7 - 831.1)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	4,855 cf	**44.25'W x 123.92'L x 3.50'H Prismatoid** 19,192 cf Overall - 7,054 cf Embedded = 12,138 cf x 40.0% Voids
#2	100.50'	7,054 cf	**StormTech SC-740** x 153 Inside #1 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 Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
#3	100.00'	1,101 cf	**24.25'W x 49.00'L x 3.50'H Prismatoid** 4,159 cf Overall - 1,406 cf Embedded = 2,752 cf x 40.0% Voids
#4	100.50'	1,406 cf	**StormTech SC-740** x 30 Inside #3 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 Row Length Adjustment= +0.44' x 6.45 sf x 10 rows
		14,417 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=1.66 cfs @ 12.56 hrs HW=101.21' (Free Discharge)
↑**1=Exfiltration** (Controls 1.66 cfs)

Pond DP1: DP1 (Sub. Infil. Chambers)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.139 ac, 14.02% Impervious, Inflow Depth = 0.31" for 10-yr event
Inflow = 0.22 cfs @ 12.49 hrs, Volume= 0.056 af
Outflow = 0.07 cfs @ 15.43 hrs, Volume= 0.056 af, Atten= 67%, Lag= 176.1 min
Discarded = 0.07 cfs @ 15.43 hrs, Volume= 0.056 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.66' @ 15.43 hrs Surf.Area= 1,168 sf Storage= 557 cf

Plug-Flow detention time= 110.3 min calculated for 0.056 af (100% of inflow)
Center-of-Mass det. time= 110.3 min (1,086.1 - 975.8)

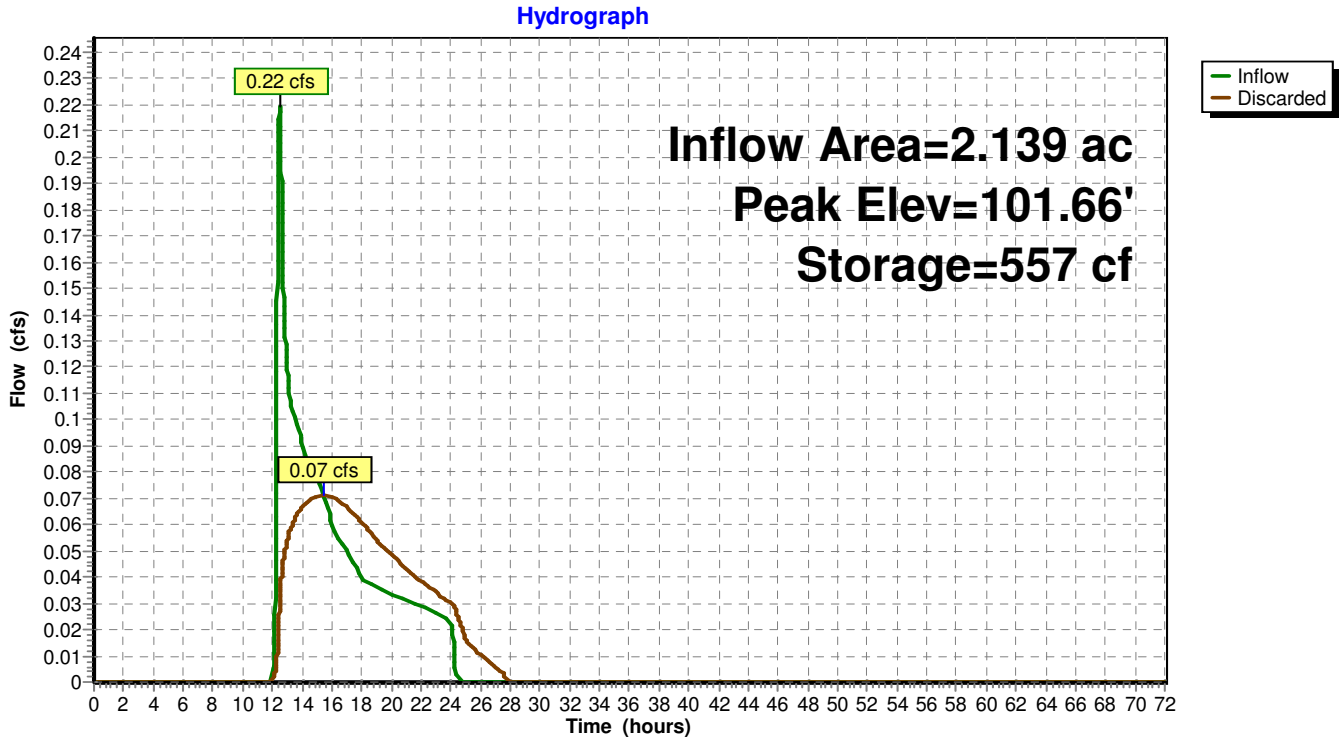
Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	5,700 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,630	946	1,029
103.00	3,637	2,634	3,663
103.50	4,512	2,037	5,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.07 cfs @ 15.43 hrs HW=101.66' (Free Discharge)
↑**1=Exfiltration** (Controls 0.07 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 2.271 ac, 12.03% Impervious, Inflow Depth = 0.24" for 10-yr event
Inflow = 0.14 cfs @ 12.48 hrs, Volume= 0.045 af
Outflow = 0.04 cfs @ 17.25 hrs, Volume= 0.045 af, Atten= 70%, Lag= 285.9 min
Discarded = 0.04 cfs @ 17.25 hrs, Volume= 0.045 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.49' @ 17.25 hrs Surf.Area= 2,972 sf Storage= 544 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 159.0 min (1,152.9 - 993.8)

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	6,303 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

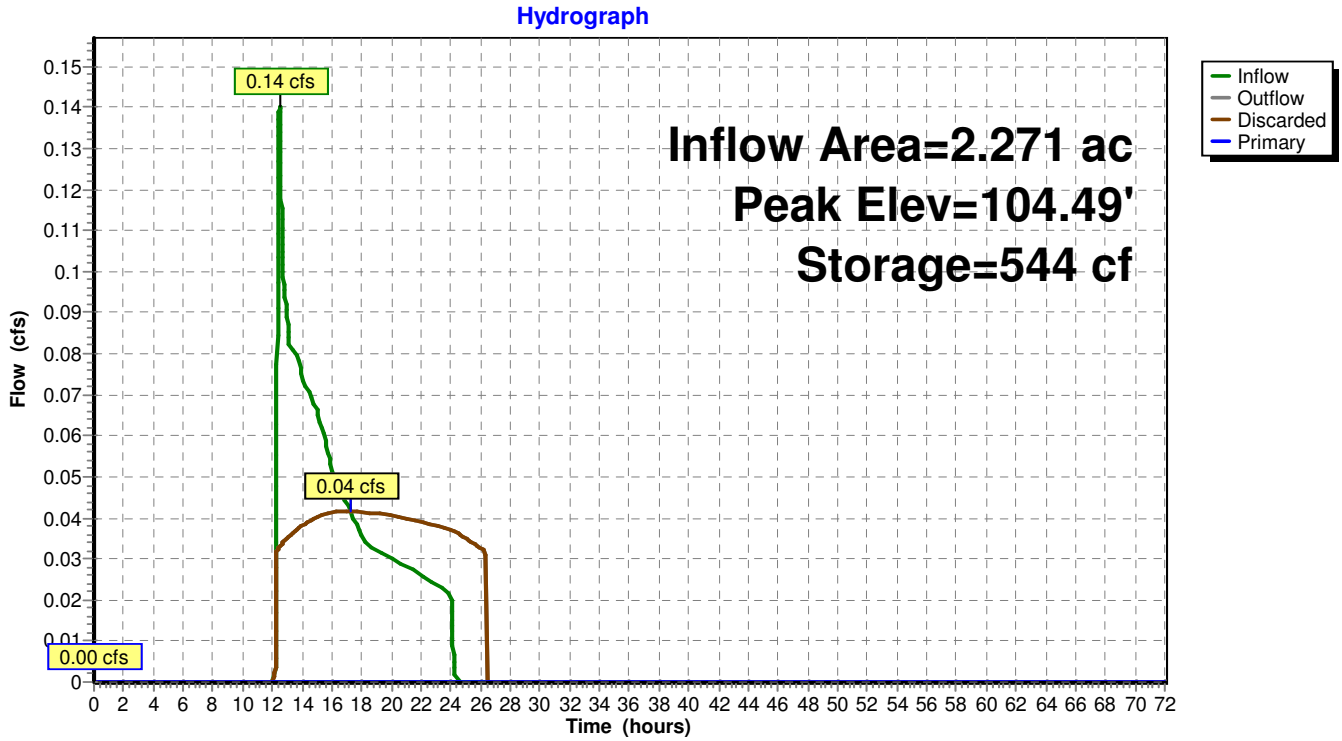
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,653	0	0
105.00	3,806	2,261	2,261
105.50	5,835	2,410	4,671
105.75	7,220	1,632	6,303

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	104.85'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 104.85' / 104.24' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 17.25 hrs HW=104.49' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' TW=100.00' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 2.207 ac, 11.71% Impervious, Inflow Depth = 0.31" for 10-yr event
Inflow = 0.23 cfs @ 12.46 hrs, Volume= 0.057 af
Outflow = 0.08 cfs @ 14.93 hrs, Volume= 0.057 af, Atten= 65%, Lag= 148.0 min
Discarded = 0.08 cfs @ 14.93 hrs, Volume= 0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 103.99' @ 14.93 hrs Surf.Area= 3,029 sf Storage= 414 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 53.1 min (1,026.8 - 973.7)

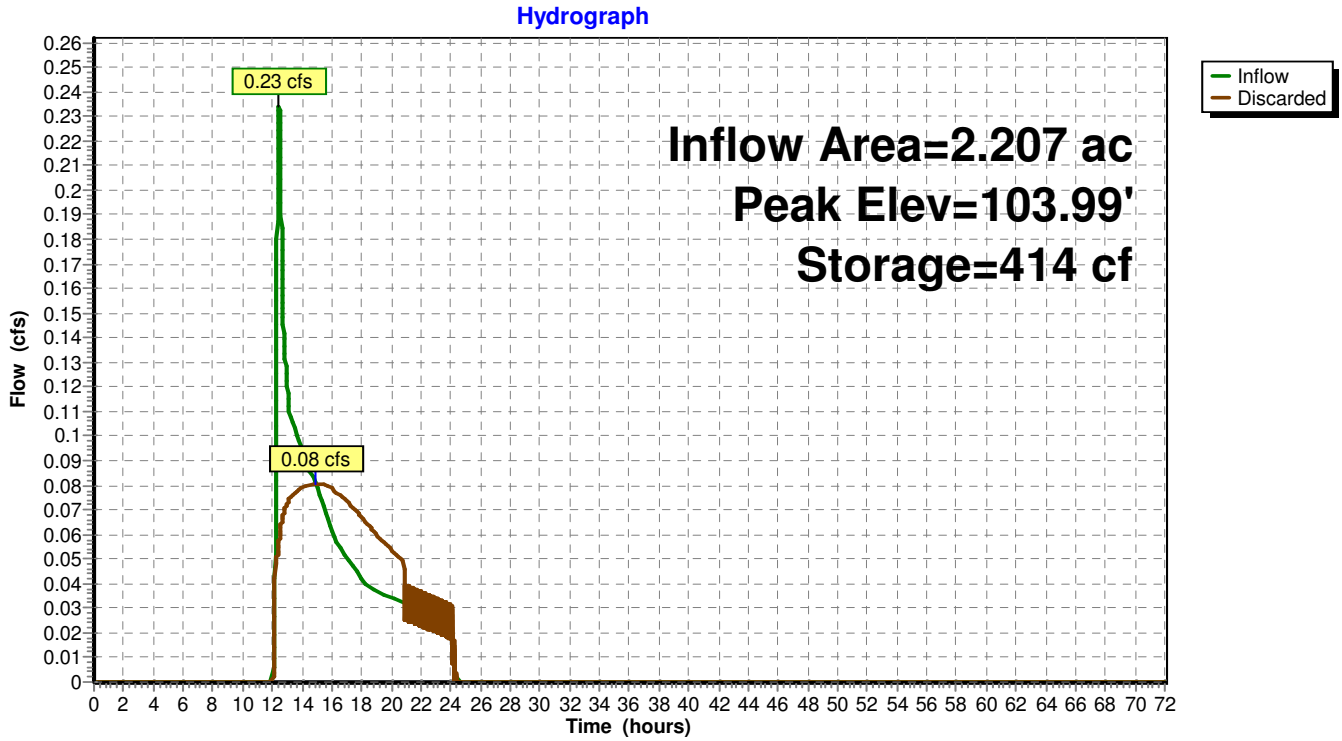
Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	15,451 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,056	0	0
104.00	3,071	436	436
105.00	13,033	8,052	8,488
105.50	14,818	6,963	15,451

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'

Discarded OutFlow Max=0.08 cfs @ 14.93 hrs HW=103.99' (Free Discharge)
1=Exfiltration (Controls 0.08 cfs)

Pond DP4: DP4 (North - Natural Depression)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.36"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.06 cfs 0.017 af

Subcatchment 1bS: 1bS Runoff Area=40,744 sf 19.15% Impervious Runoff Depth=0.91"
Tc=10.0 min CN=50 Runoff=0.62 cfs 0.071 af

Subcatchment 1cS: 1cS Runoff Area=23,675 sf 12.27% Impervious Runoff Depth=0.45"
Tc=5.0 min CN=42 Runoff=0.11 cfs 0.021 af

Subcatchment 1dS: 1dS Runoff Area=80,131 sf 16.36% Impervious Runoff Depth=0.73"
Flow Length=583' Tc=18.0 min CN=47 Runoff=0.69 cfs 0.111 af

Subcatchment 1eS: 1eS Runoff Area=38,668 sf 76.01% Impervious Runoff Depth=3.73"
Tc=5.0 min CN=84 Runoff=3.98 cfs 0.276 af

Subcatchment 1S: 1S Runoff Area=104,111 sf 64.15% Impervious Runoff Depth=3.05"
Tc=8.0 min CN=77 Runoff=7.97 cfs 0.607 af

Subcatchment 2S: 2S Runoff Area=93,156 sf 14.02% Impervious Runoff Depth=0.56"
Flow Length=402' Tc=14.1 min CN=44 Runoff=0.54 cfs 0.099 af

Subcatchment 3aS: 3S off site Runoff Area=138,732 sf 11.36% Impervious Runoff Depth=0.36"
Flow Length=702' Tc=34.0 min CN=40 Runoff=0.27 cfs 0.095 af

Subcatchment 3bS: 3bS Runoff Area=12,198 sf 78.82% Impervious Runoff Depth=3.94"
Tc=5.0 min CN=86 Runoff=1.31 cfs 0.092 af

Subcatchment 3S: 3S Runoff Area=98,908 sf 12.03% Impervious Runoff Depth=0.45"
Tc=10.0 min CN=42 Runoff=0.43 cfs 0.086 af

Subcatchment 4S: 4S Runoff Area=96,150 sf 11.71% Impervious Runoff Depth=0.56"
Flow Length=170' Tc=11.8 min CN=44 Runoff=0.57 cfs 0.102 af

Pond 1A: 1a (Off Site Natural Depression) Peak Elev=105.00' Storage=0 cf Inflow=0.06 cfs 0.017 af
Discarded=0.06 cfs 0.017 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.017 af

Pond 1B: 1b (Central Nat. Depression & Peak Elev=102.62' Storage=7,741 cf Inflow=4.41 cfs 0.458 af
Discarded=0.52 cfs 0.458 af Primary=0.00 cfs 0.000 af Outflow=0.52 cfs 0.458 af

Pond 1C: 1cP (Natural Depression) Peak Elev=101.15' Storage=98 cf Inflow=0.11 cfs 0.021 af
Outflow=0.04 cfs 0.021 af

Pond 3A: 3a (Trench Drain) Peak Elev=107.14' Storage=1,589 cf Inflow=0.27 cfs 0.095 af
Discarded=0.07 cfs 0.095 af Secondary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.095 af

Pond 3B: 3b (Sub. Infil. Chambers) Peak Elev=106.74' Storage=1,077 cf Inflow=1.31 cfs 0.092 af
Discarded=0.05 cfs 0.056 af Primary=0.75 cfs 0.036 af Outflow=0.80 cfs 0.092 af

Pond DP1: DP1 (Sub. Infil. Chambers) Peak Elev=101.73' Storage=7,933 cf Inflow=8.61 cfs 0.643 af
Outflow=1.83 cfs 0.643 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=102.14' Storage=1,286 cf Inflow=0.54 cfs 0.099 af
Outflow=0.12 cfs 0.099 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=104.83' Storage=1,631 cf Inflow=0.43 cfs 0.086 af
Discarded=0.06 cfs 0.086 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.086 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=104.18' Storage=1,129 cf Inflow=0.57 cfs 0.102 af
Outflow=0.14 cfs 0.102 af

Total Runoff Area = 17.241 ac Runoff Volume = 1.576 af Average Runoff Depth = 1.10"
75.50% Pervious = 13.018 ac 24.50% Impervious = 4.224 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

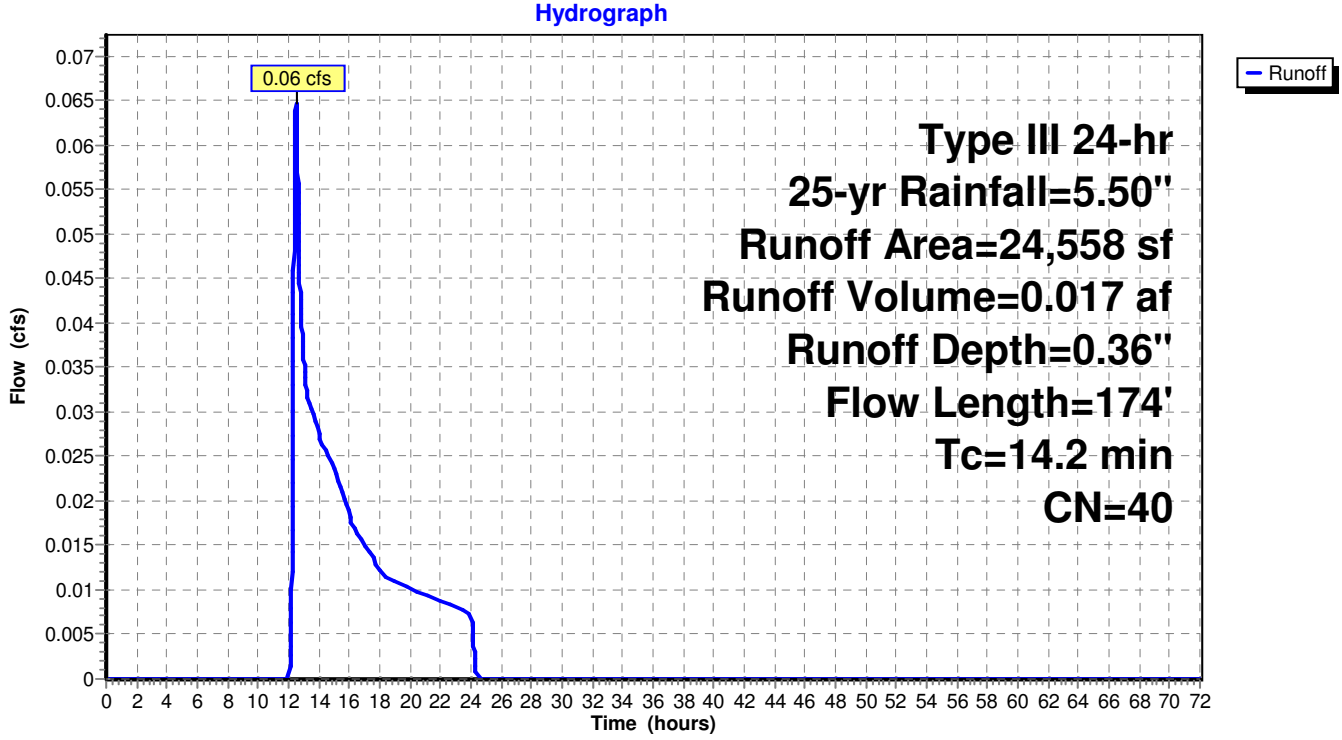
Runoff = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

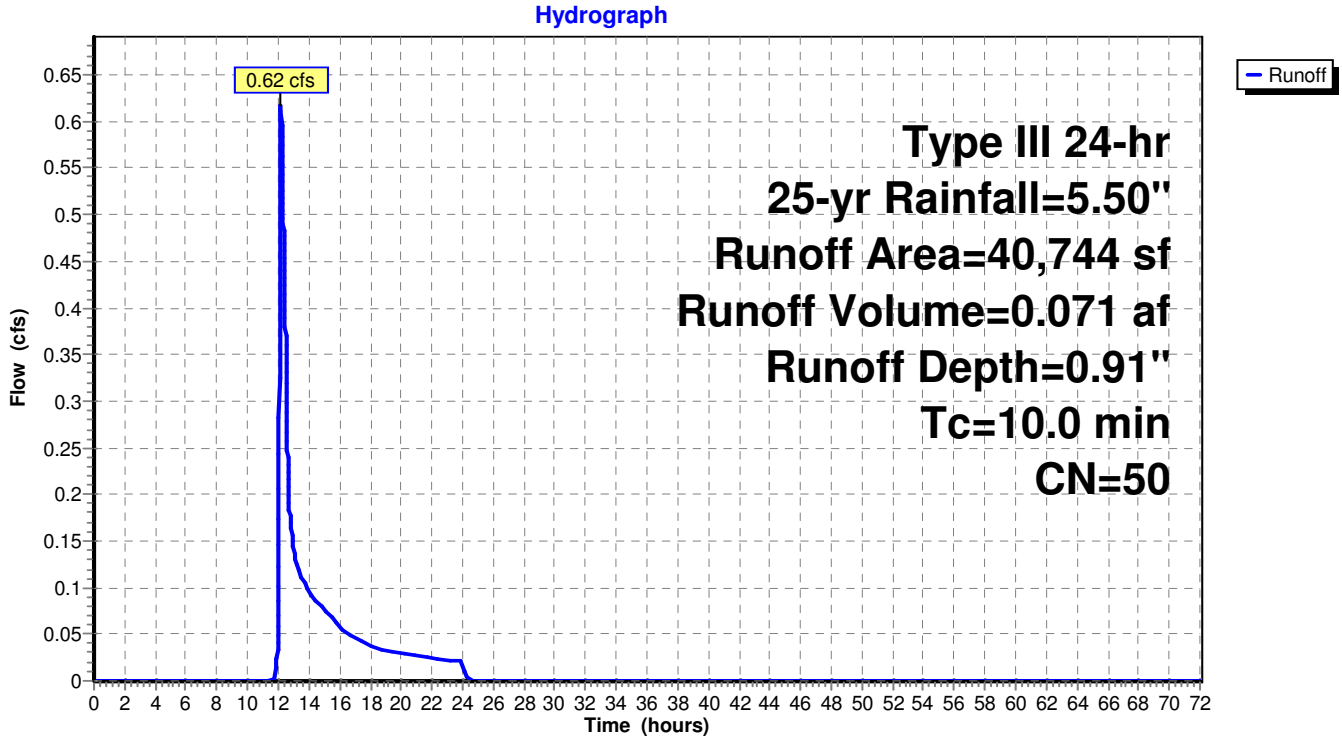
Runoff = 0.62 cfs @ 12.17 hrs, Volume= 0.071 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
833	76	Gravel roads, HSG A
7,801	98	Roofs, HSG A
28,513	39	>75% Grass cover, Good, HSG A
3,597	30	Woods, Good, HSG A
40,744	50	Weighted Average
32,943		80.85% Pervious Area
7,801		19.15% Impervious Area

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

Subcatchment 1bS: 1bS



Summary for Subcatchment 1cS: 1cS

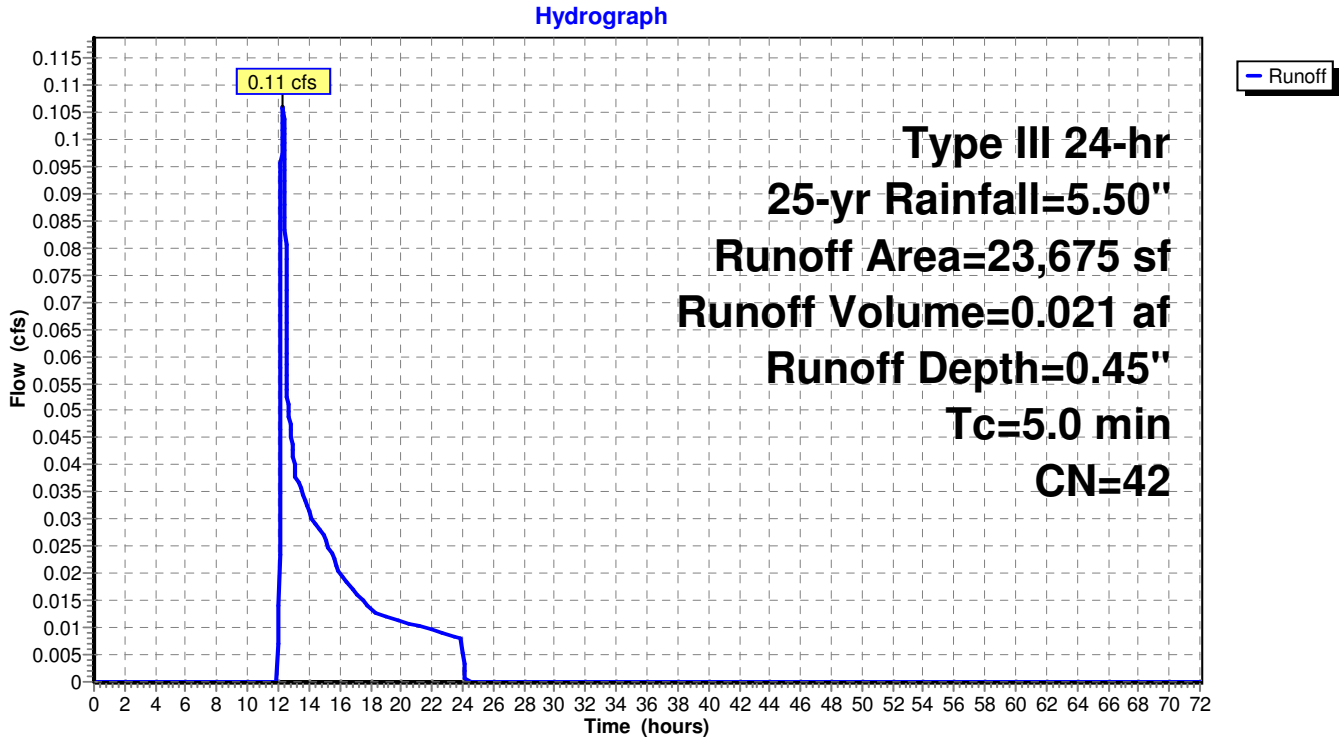
Runoff = 0.11 cfs @ 12.31 hrs, Volume= 0.021 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
11,369	30	Woods, Good, HSG A
2,905	98	Roofs, HSG A
9,401	39	>75% Grass cover, Good, HSG A
23,675	42	Weighted Average
20,770		87.73% Pervious Area
2,905		12.27% Impervious Area

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

Subcatchment 1cS: 1cS



Summary for Subcatchment 1dS: 1dS

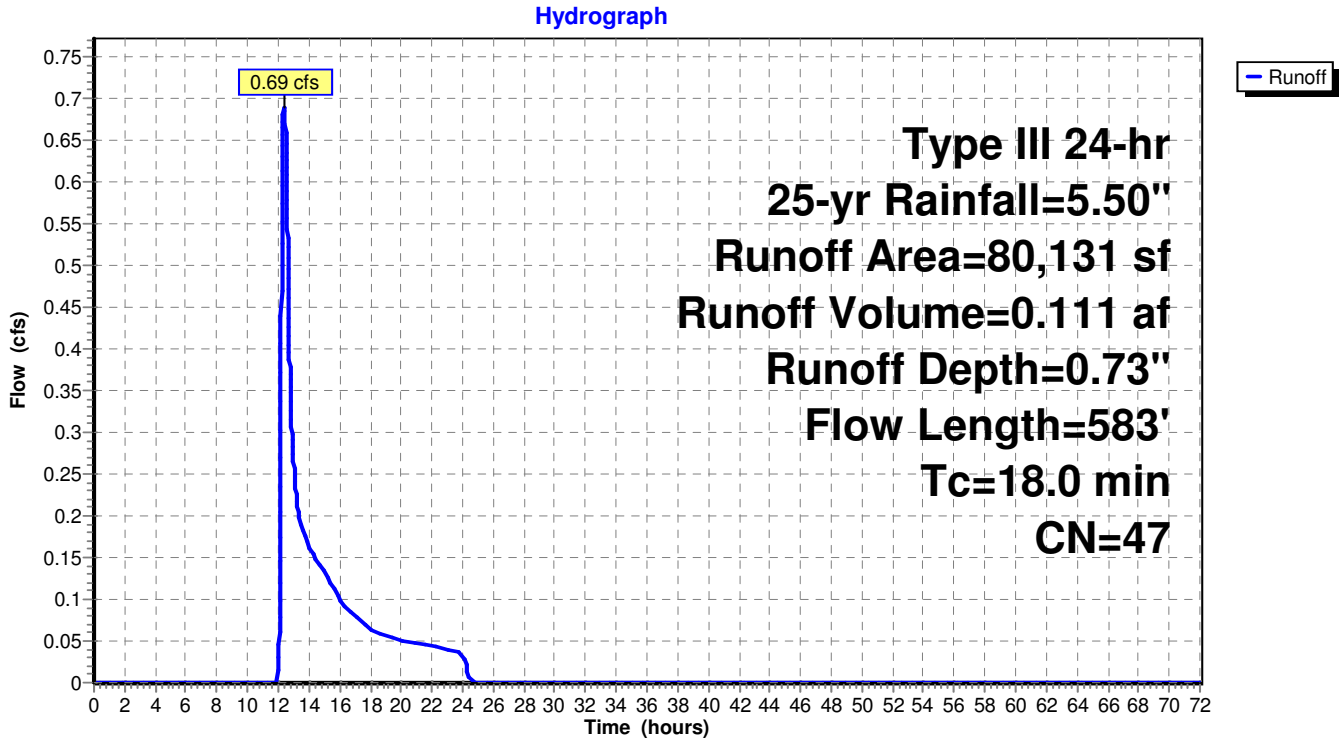
Runoff = 0.69 cfs @ 12.38 hrs, Volume= 0.111 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
5,354	98	Roofs, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
17,837	30	Woods, Good, HSG A
7,757	98	Roofs, HSG A
13,831	39	>75% Grass cover, Good, HSG A
10,861	30	Woods, Good, HSG A
80,131	47	Weighted Average
67,020		83.64% Pervious Area
13,111		16.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1dS: 1dS



Summary for Subcatchment 1eS: 1eS

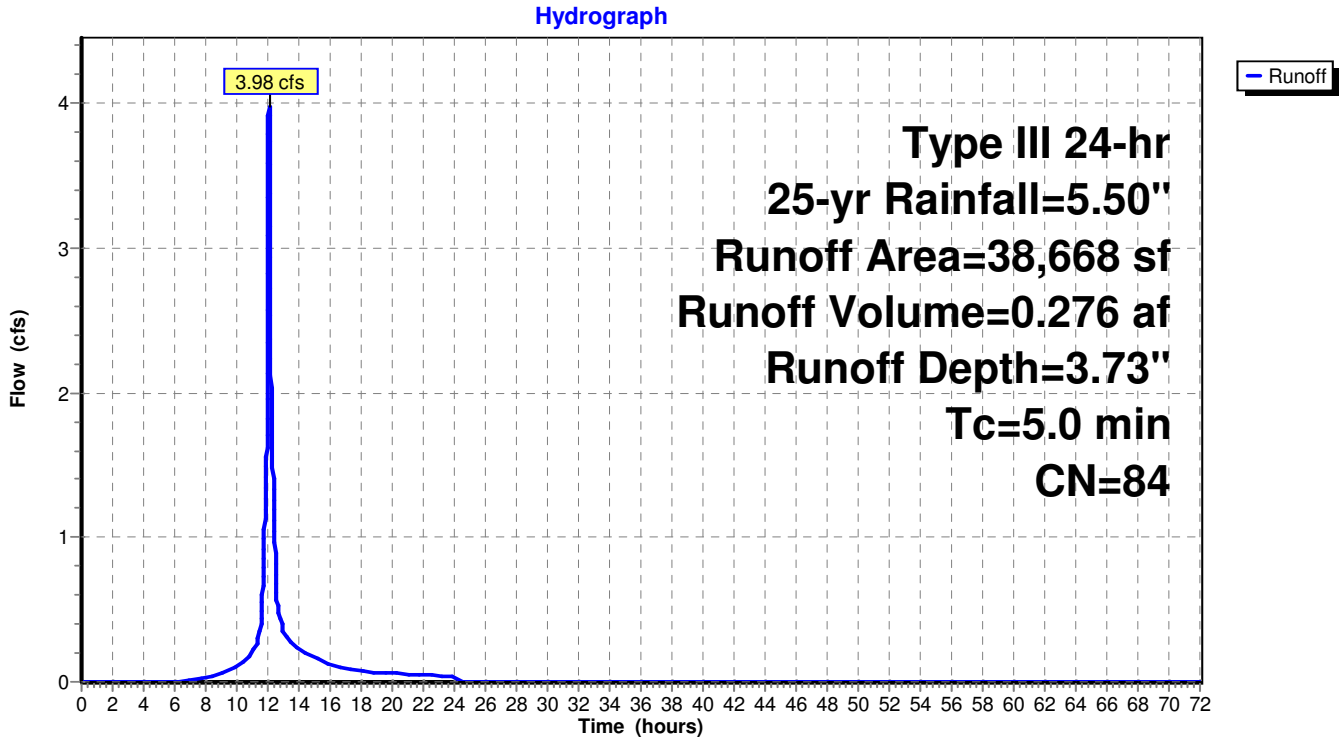
Runoff = 3.98 cfs @ 12.07 hrs, Volume= 0.276 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
15,724	98	Paved parking, HSG A
13,666	98	Roofs, HSG A
9,278	39	>75% Grass cover, Good, HSG A
38,668	84	Weighted Average
9,278		23.99% Pervious Area
29,390		76.01% Impervious Area

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

Subcatchment 1eS: 1eS



Summary for Subcatchment 1S: 1S

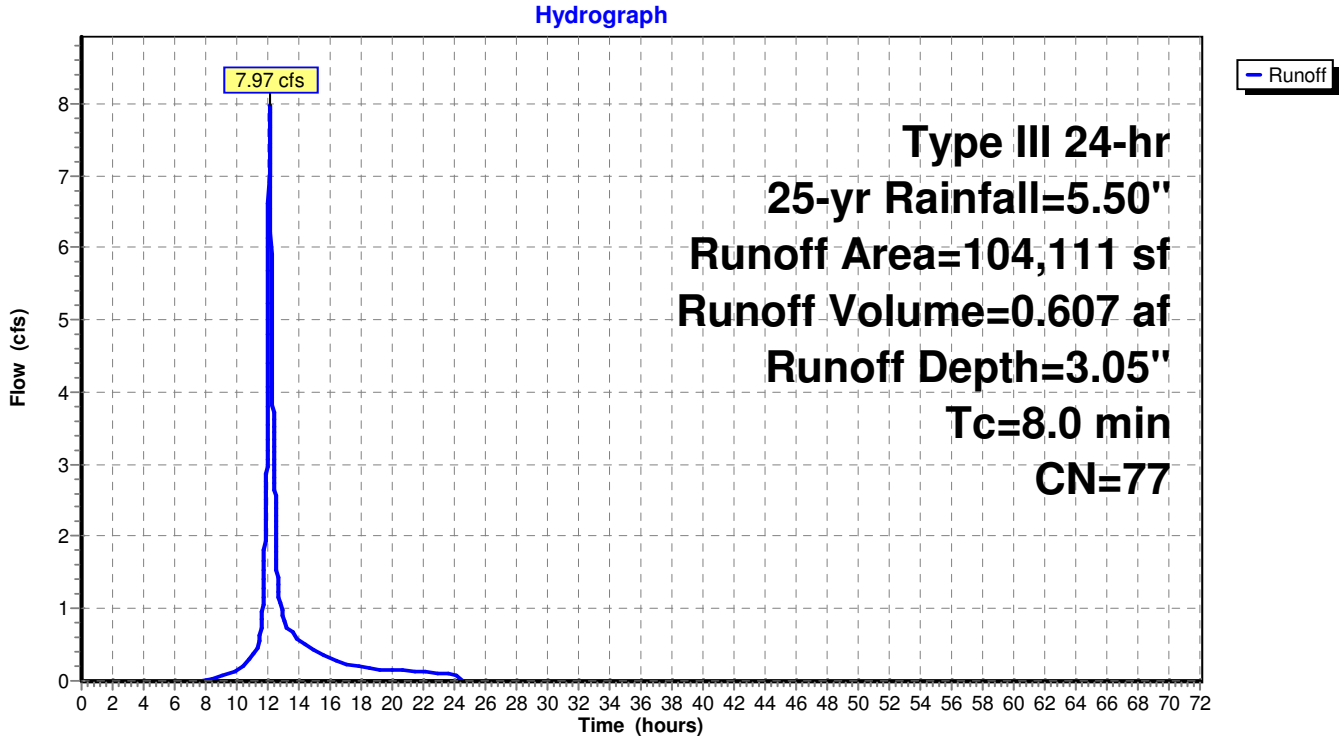
Runoff = 7.97 cfs @ 12.11 hrs, Volume= 0.607 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
39,719	98	Paved parking, HSG A
27,065	98	Roofs, HSG A
35,819	39	>75% Grass cover, Good, HSG A
1,508	30	Woods, Good, HSG A
104,111	77	Weighted Average
37,327		35.85% Pervious Area
66,784		64.15% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

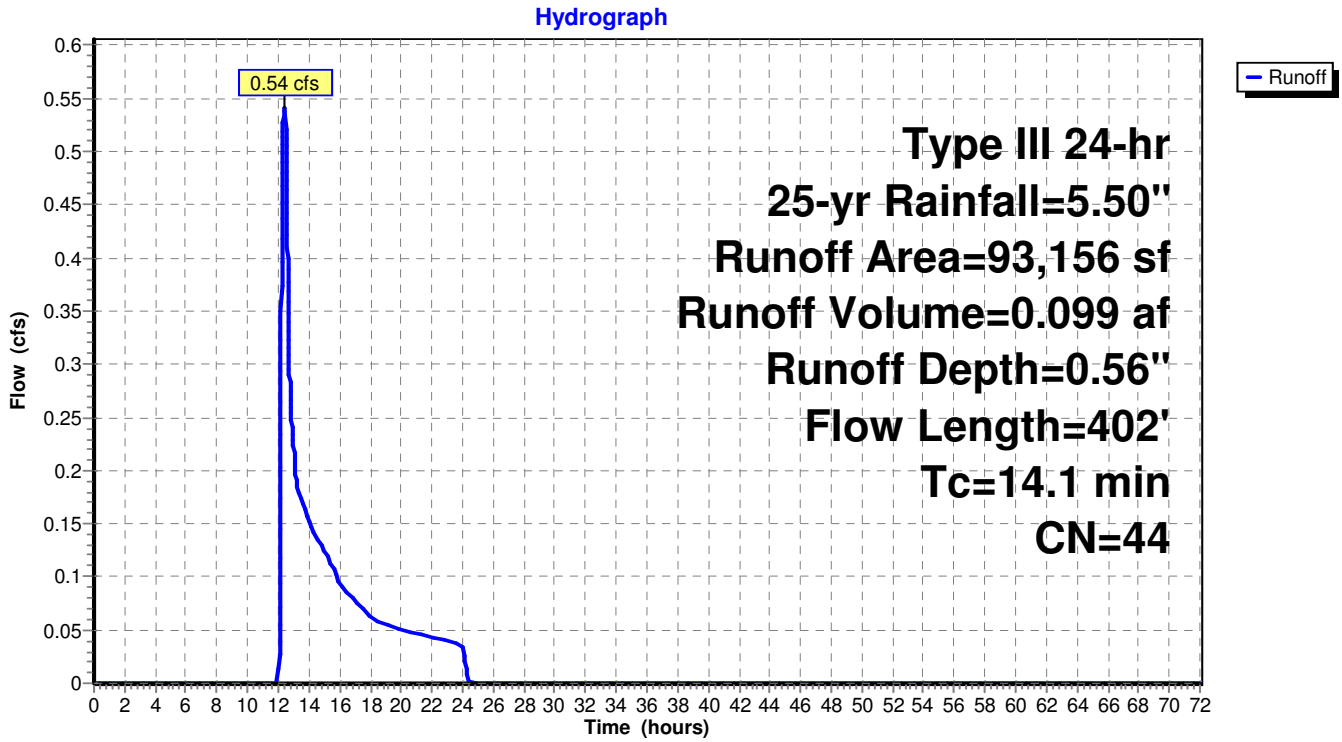
Runoff = 0.54 cfs @ 12.40 hrs, Volume= 0.099 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
37,337	30	Woods, Good, HSG A
12,390	39	>75% Grass cover, Good, HSG A
7,870	98	Roofs, HSG A
93,156	44	Weighted Average
80,098		85.98% Pervious Area
13,058		14.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3aS: 3S off site

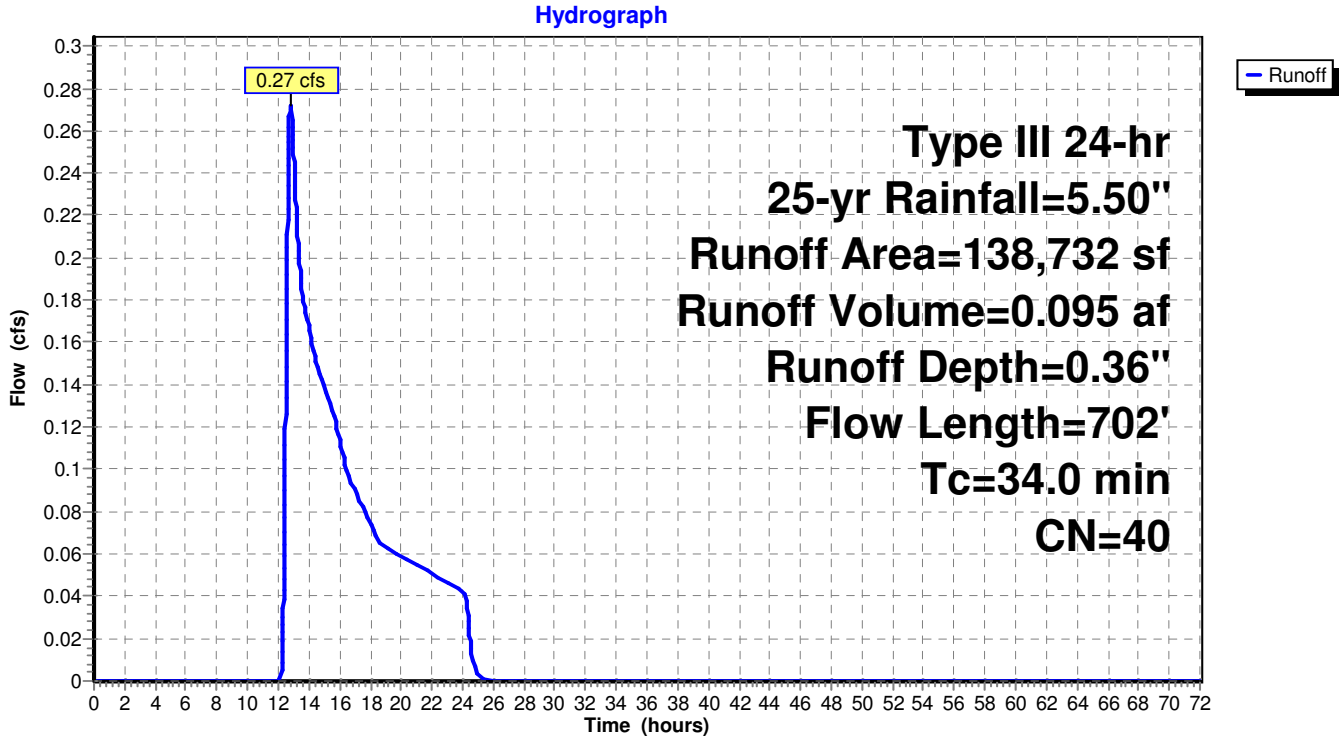
Runoff = 0.27 cfs @ 12.81 hrs, Volume= 0.095 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
7,998	98	Roofs, HSG A
20,884	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
80,826	30	Woods, Good, HSG A
138,732	40	Weighted Average
122,971		88.64% Pervious Area
15,761		11.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3aS: 3S off site



Summary for Subcatchment 3bS: 3bS

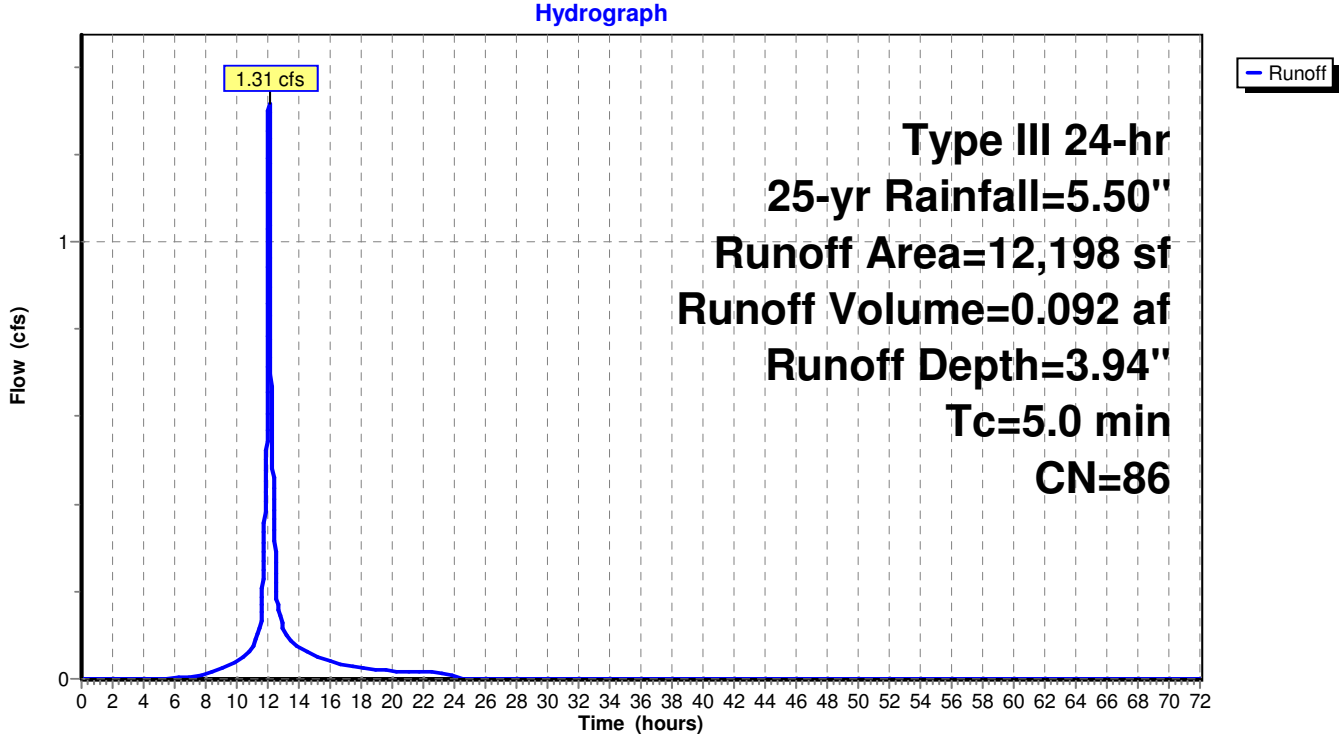
Runoff = 1.31 cfs @ 12.07 hrs, Volume= 0.092 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
4,827	98	Roofs, HSG A
4,787	98	Paved parking, HSG A
2,584	39	>75% Grass cover, Good, HSG A
12,198	86	Weighted Average
2,584		21.18% Pervious Area
9,614		78.82% Impervious Area

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

Subcatchment 3bS: 3bS



Summary for Subcatchment 3S: 3S

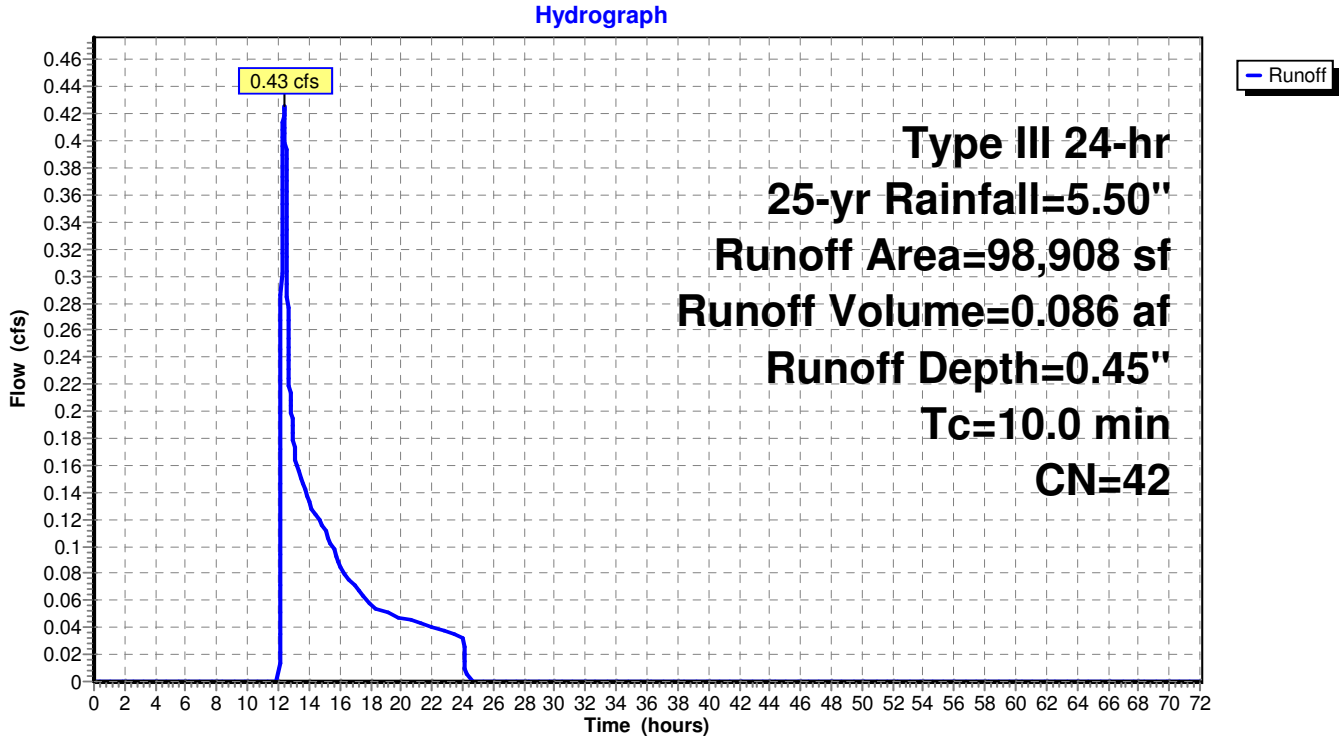
Runoff = 0.43 cfs @ 12.39 hrs, Volume= 0.086 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
4,948	98	Roofs, HSG A
23,819	39	>75% Grass cover, Good, HSG A
6,947	98	Roofs, HSG A
14,369	39	>75% Grass cover, Good, HSG A
48,825	30	Woods, Good, HSG A
98,908	42	Weighted Average
87,013		87.97% Pervious Area
11,895		12.03% Impervious Area

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

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

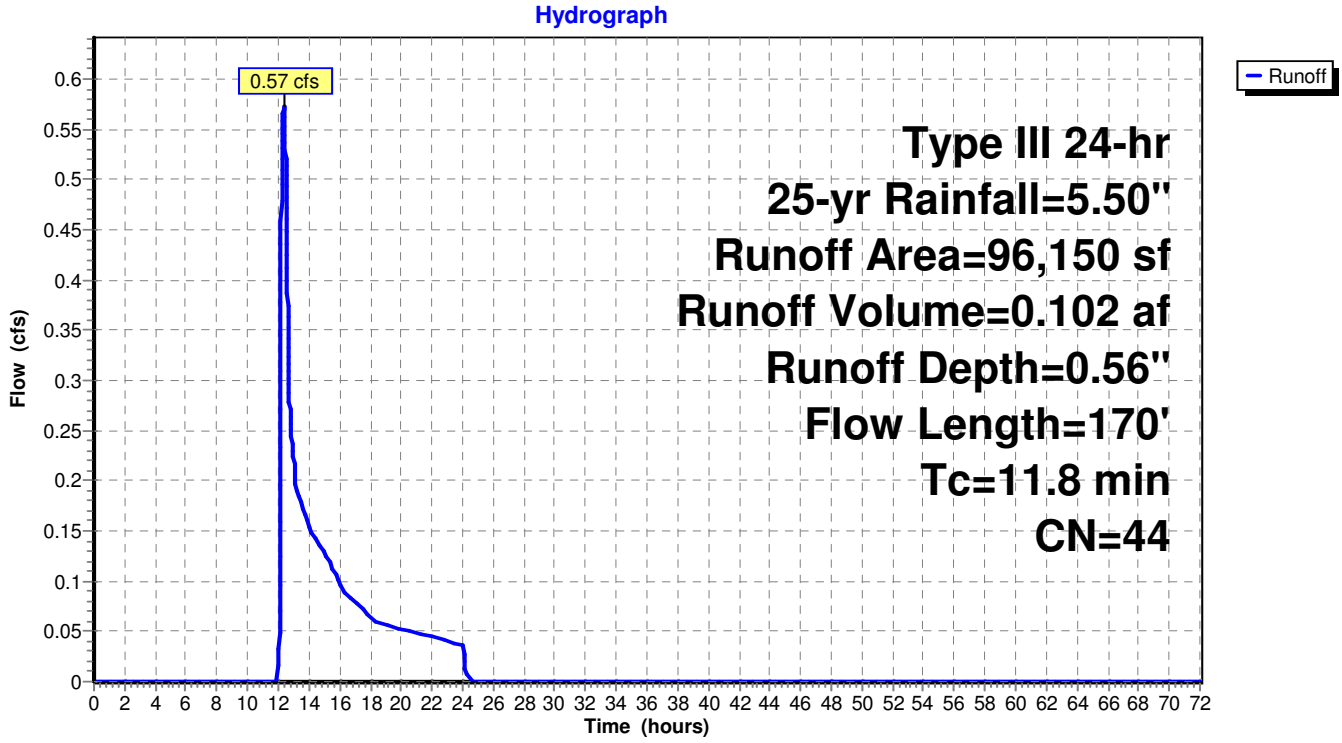
Runoff = 0.57 cfs @ 12.36 hrs, Volume= 0.102 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=5.50"

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
5,319	98	Roofs, HSG A
16,063	39	>75% Grass cover, Good, HSG A
10,112	30	Woods, Good, HSG A
96,150	44	Weighted Average
84,895		88.29% Pervious Area
11,255		11.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.36" for 25-yr event
Inflow = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af
Outflow = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.1 min
Discarded = 0.06 cfs @ 12.50 hrs, Volume= 0.017 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.00' @ 12.50 hrs Surf.Area= 1,231 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (977.6 - 977.6)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

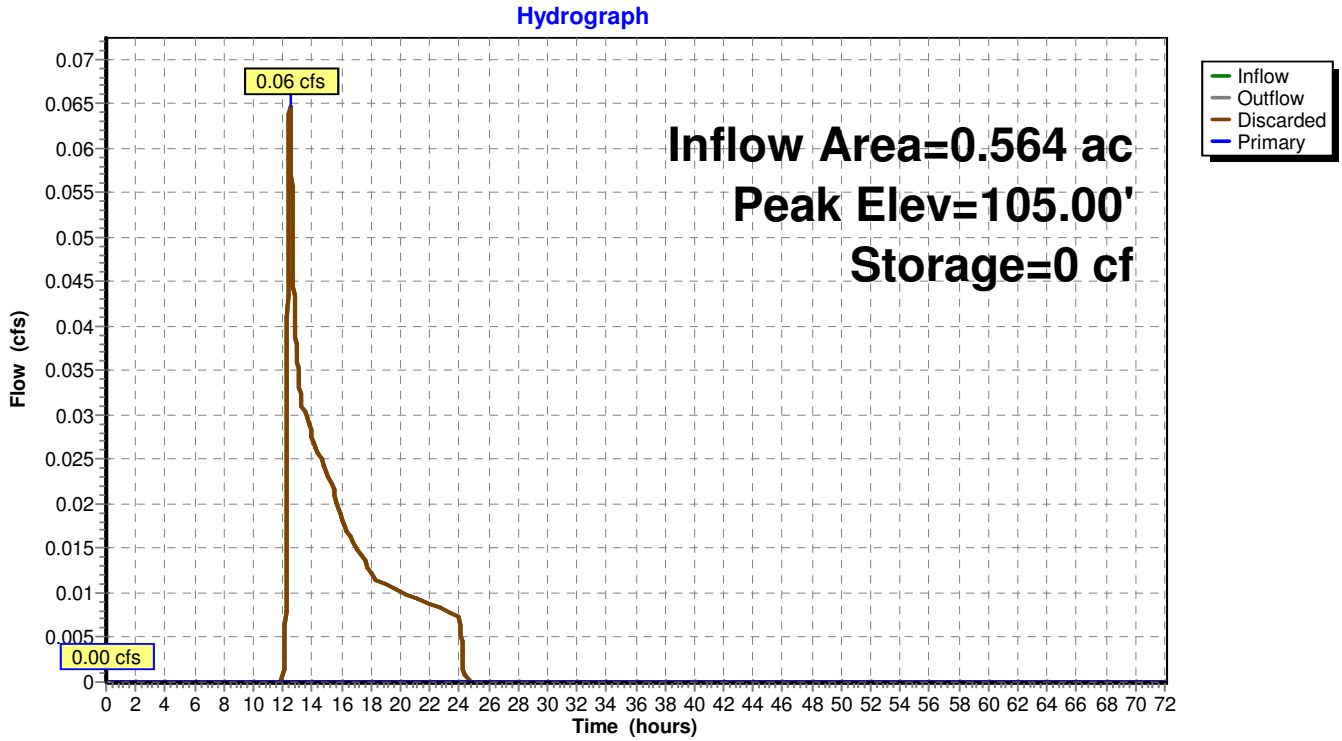
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 12.50 hrs HW=105.00' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=100.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off Site Natural Depression)



Summary for Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)

Inflow Area = 3.663 ac, 31.53% Impervious, Inflow Depth = 1.50" for 25-yr event
Inflow = 4.41 cfs @ 12.08 hrs, Volume= 0.458 af
Outflow = 0.52 cfs @ 13.83 hrs, Volume= 0.458 af, Atten= 88%, Lag= 104.7 min
Discarded = 0.52 cfs @ 13.83 hrs, Volume= 0.458 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.62' @ 13.83 hrs Surf.Area= 7,849 sf Storage= 7,741 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 187.8 min (1,039.3 - 851.5)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	33,502 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

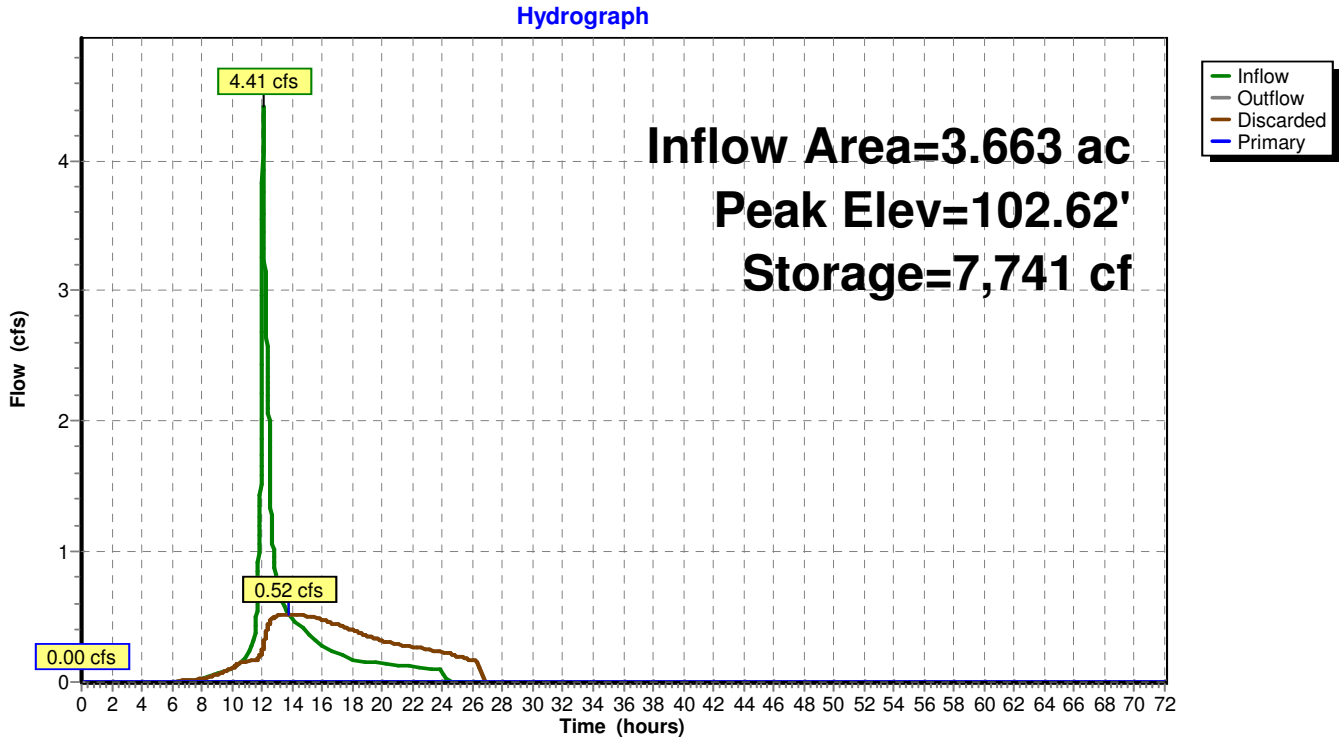
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	2,755	0	0
102.00	4,827	3,791	3,791
103.00	9,677	7,252	11,043
104.00	11,211	10,444	21,487
105.00	12,819	12,015	33,502

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	101.96'	**12.0" Round Culvert** L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 101.96' / 101.67' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	103.00'	**1.0' long x 0.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height

Discarded OutFlow Max=0.52 cfs @ 13.83 hrs HW=102.62' (Free Discharge)
└**1=Exfiltration** (Controls 0.52 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.00' TW=100.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)



Summary for Pond 1C: 1cP (Natural Depression)

Inflow Area = 0.544 ac, 12.27% Impervious, Inflow Depth = 0.45" for 25-yr event
Inflow = 0.11 cfs @ 12.31 hrs, Volume= 0.021 af
Outflow = 0.04 cfs @ 12.94 hrs, Volume= 0.021 af, Atten= 60%, Lag= 38.3 min
Discarded = 0.04 cfs @ 12.94 hrs, Volume= 0.021 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.15' @ 12.94 hrs Surf.Area= 742 sf Storage= 98 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.2 min (966.9 - 950.7)

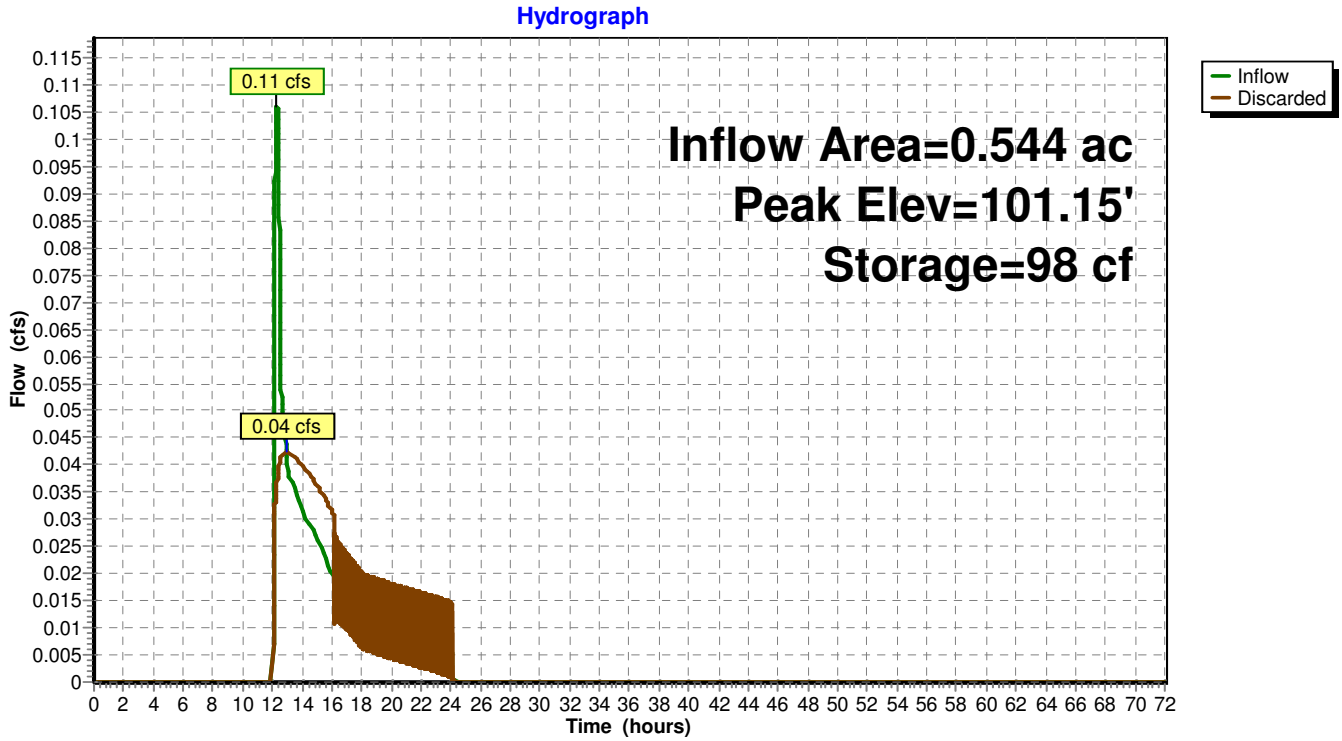
Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	13,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	550	0	0
102.00	1,807	1,179	1,179
103.00	3,213	2,510	3,689
104.00	4,741	3,977	7,666
105.00	6,304	5,523	13,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.04 cfs @ 12.94 hrs HW=101.15' (Free Discharge)
↑**1=Exfiltration** (Controls 0.04 cfs)

Pond 1C: 1cP (Natural Depression)



Summary for Pond 3A: 3a (Trench Drain)

Inflow Area = 3.185 ac, 11.36% Impervious, Inflow Depth = 0.36" for 25-yr event
Inflow = 0.27 cfs @ 12.81 hrs, Volume= 0.095 af
Outflow = 0.07 cfs @ 17.99 hrs, Volume= 0.095 af, Atten= 73%, Lag= 311.2 min
Discarded = 0.07 cfs @ 17.99 hrs, Volume= 0.095 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 107.14' @ 17.99 hrs Surf.Area= 1,440 sf Storage= 1,589 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 285.2 min (1,281.2 - 996.0)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,106 cf	**5.00'W x 288.00'L x 2.33'H Prismatoid** 3,355 cf Overall - 591 cf Embedded = 2,765 cf x 40.0% Voids
#2	105.50'	591 cf	**StormTech SC-310** x 40 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 1 rows
#3	107.33'	3,995 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,691 cf	Total Available Storage

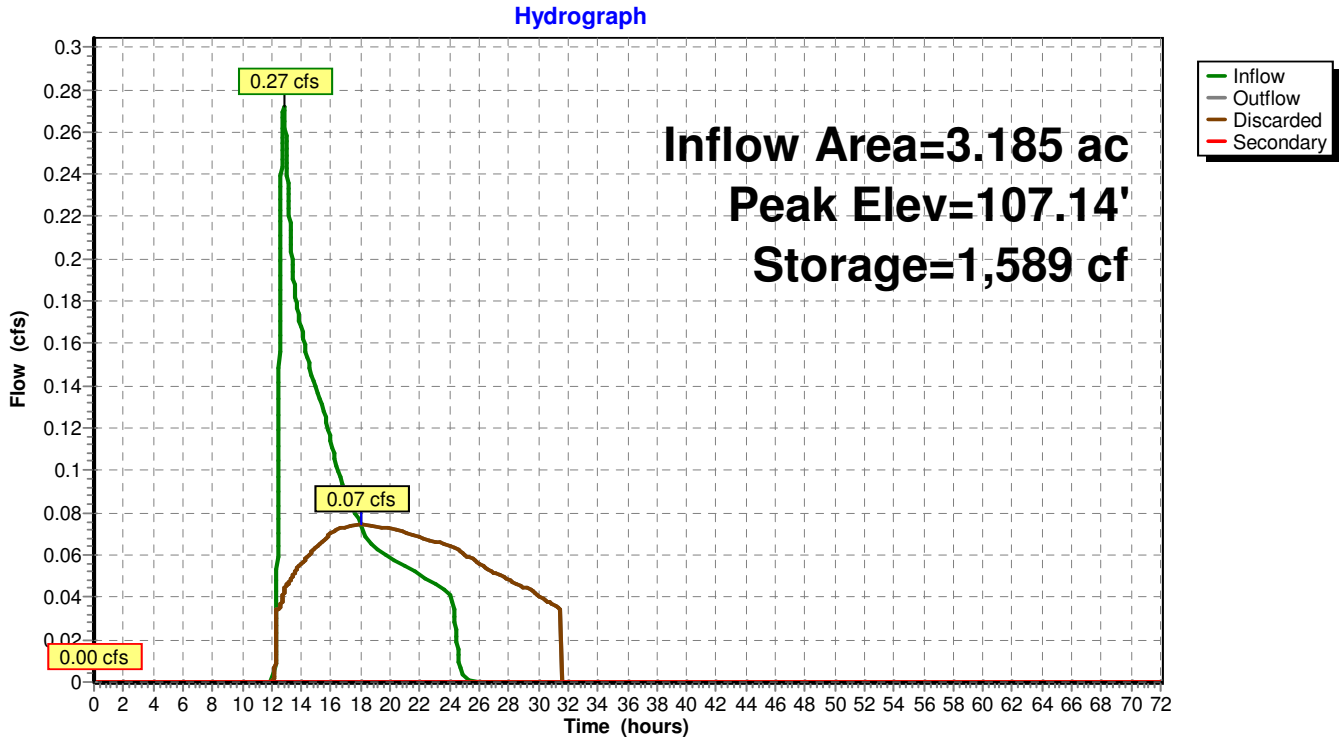
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
107.33	1,438	0	0
108.00	10,487	3,995	3,995

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Secondary	107.75'	**5.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.07 cfs @ 17.99 hrs HW=107.14' (Free Discharge)
1=Exfiltration (Controls 0.07 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=103.83' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3A: 3a (Trench Drain)



Summary for Pond 3B: 3b (Sub. Infil. Chambers)

Inflow Area = 0.280 ac, 78.82% Impervious, Inflow Depth = 3.94" for 25-yr event
Inflow = 1.31 cfs @ 12.07 hrs, Volume= 0.092 af
Outflow = 0.80 cfs @ 12.17 hrs, Volume= 0.092 af, Atten= 39%, Lag= 5.6 min
Discarded = 0.05 cfs @ 12.17 hrs, Volume= 0.056 af
Primary = 0.75 cfs @ 12.17 hrs, Volume= 0.036 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 106.74' @ 12.17 hrs Surf.Area= 1,441 sf Storage= 1,077 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 94.6 min (894.5 - 799.9)

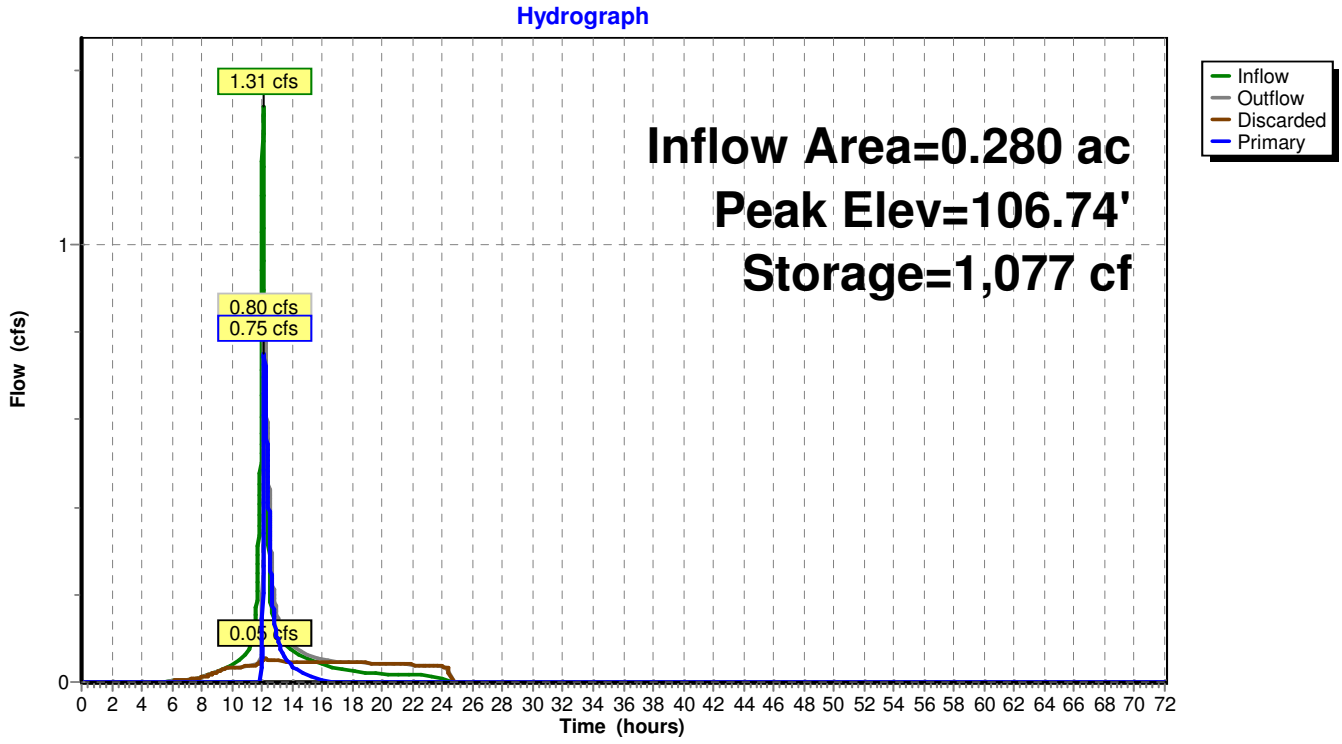
Volume	Invert	Avail.Storage	Storage Description
#1	105.50'	1,022 cf	**21.50'W x 67.00'L x 2.33'H Prismatoid** 3,356 cf Overall - 802 cf Embedded = 2,555 cf x 40.0% Voids
#2	106.00'	802 cf	**StormTech SC-310** x 54 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 6 rows
		1,823 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.30'	**12.0" Round Culvert** L= 34.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 106.30' / 105.28' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.05 cfs @ 12.17 hrs HW=106.74' (Free Discharge)
1=Exfiltration (Controls 0.05 cfs)

Primary OutFlow Max=0.75 cfs @ 12.17 hrs HW=106.74' TW=101.06' (Dynamic Tailwater)
2=Culvert (Inlet Controls 0.75 cfs @ 2.26 fps)

Pond 3B: 3b (Sub. Infil. Chambers)



Summary for Pond DP1: DP1 (Sub. Infil. Chambers)

Inflow Area = 9.167 ac, 35.31% Impervious, Inflow Depth = 0.84" for 25-yr event
Inflow = 8.61 cfs @ 12.12 hrs, Volume= 0.643 af
Outflow = 1.83 cfs @ 12.59 hrs, Volume= 0.643 af, Atten= 79%, Lag= 28.2 min
Discarded = 1.83 cfs @ 12.59 hrs, Volume= 0.643 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.73' @ 12.59 hrs Surf.Area= 6,672 sf Storage= 7,933 cf

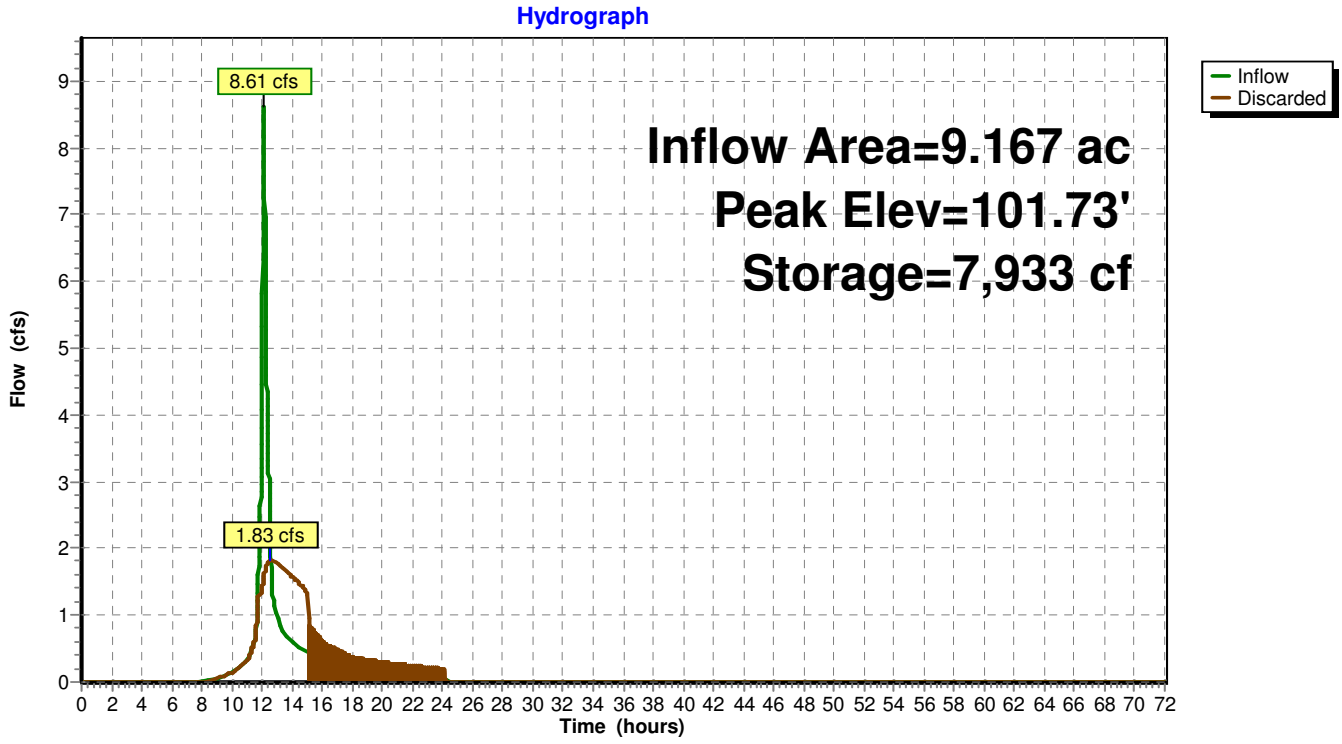
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 30.2 min (853.8 - 823.6)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	4,855 cf	**44.25'W x 123.92'L x 3.50'H Prismatoid** 19,192 cf Overall - 7,054 cf Embedded = 12,138 cf x 40.0% Voids
#2	100.50'	7,054 cf	**StormTech SC-740** x 153 Inside #1 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 Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
#3	100.00'	1,101 cf	**24.25'W x 49.00'L x 3.50'H Prismatoid** 4,159 cf Overall - 1,406 cf Embedded = 2,752 cf x 40.0% Voids
#4	100.50'	1,406 cf	**StormTech SC-740** x 30 Inside #3 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 Row Length Adjustment= +0.44' x 6.45 sf x 10 rows
		14,417 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=1.83 cfs @ 12.59 hrs HW=101.73' (Free Discharge)
↑**1=Exfiltration** (Controls 1.83 cfs)

Pond DP1: DP1 (Sub. Infil. Chambers)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.139 ac, 14.02% Impervious, Inflow Depth = 0.56" for 25-yr event
Inflow = 0.54 cfs @ 12.40 hrs, Volume= 0.099 af
Outflow = 0.12 cfs @ 15.16 hrs, Volume= 0.099 af, Atten= 78%, Lag= 166.1 min
Discarded = 0.12 cfs @ 15.16 hrs, Volume= 0.099 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.14' @ 15.16 hrs Surf.Area= 1,920 sf Storage= 1,286 cf

Plug-Flow detention time= 151.6 min calculated for 0.099 af (100% of inflow)
Center-of-Mass det. time= 151.6 min (1,095.6 - 944.0)

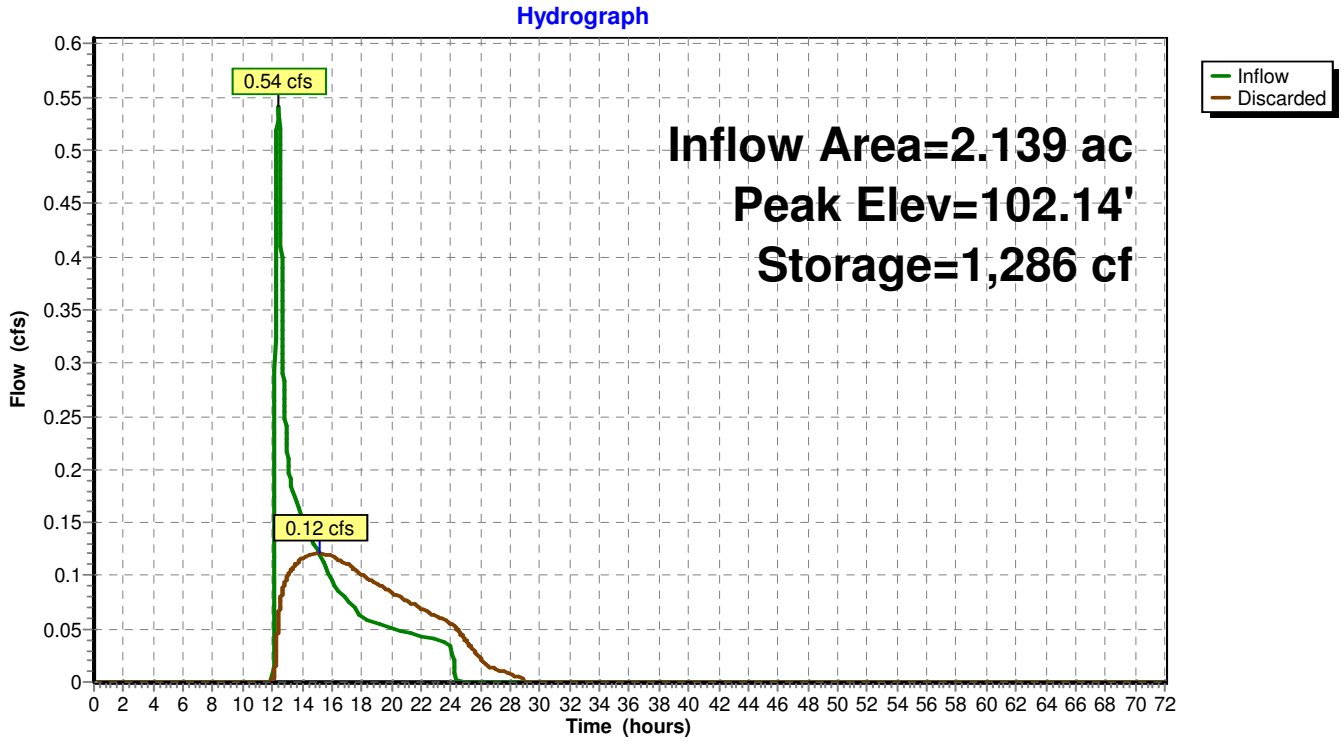
Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	5,700 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,630	946	1,029
103.00	3,637	2,634	3,663
103.50	4,512	2,037	5,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.12 cfs @ 15.16 hrs HW=102.14' (Free Discharge)
↑**1=Exfiltration** (Controls 0.12 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 2.271 ac, 12.03% Impervious, Inflow Depth = 0.45" for 25-yr event
Inflow = 0.43 cfs @ 12.39 hrs, Volume= 0.086 af
Outflow = 0.06 cfs @ 17.78 hrs, Volume= 0.086 af, Atten= 86%, Lag= 323.4 min
Discarded = 0.06 cfs @ 17.78 hrs, Volume= 0.086 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.83' @ 17.78 hrs Surf.Area= 3,523 sf Storage= 1,631 cf

Plug-Flow detention time= 349.3 min calculated for 0.086 af (100% of inflow)
Center-of-Mass det. time= 349.3 min (1,304.7 - 955.3)

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	6,303 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

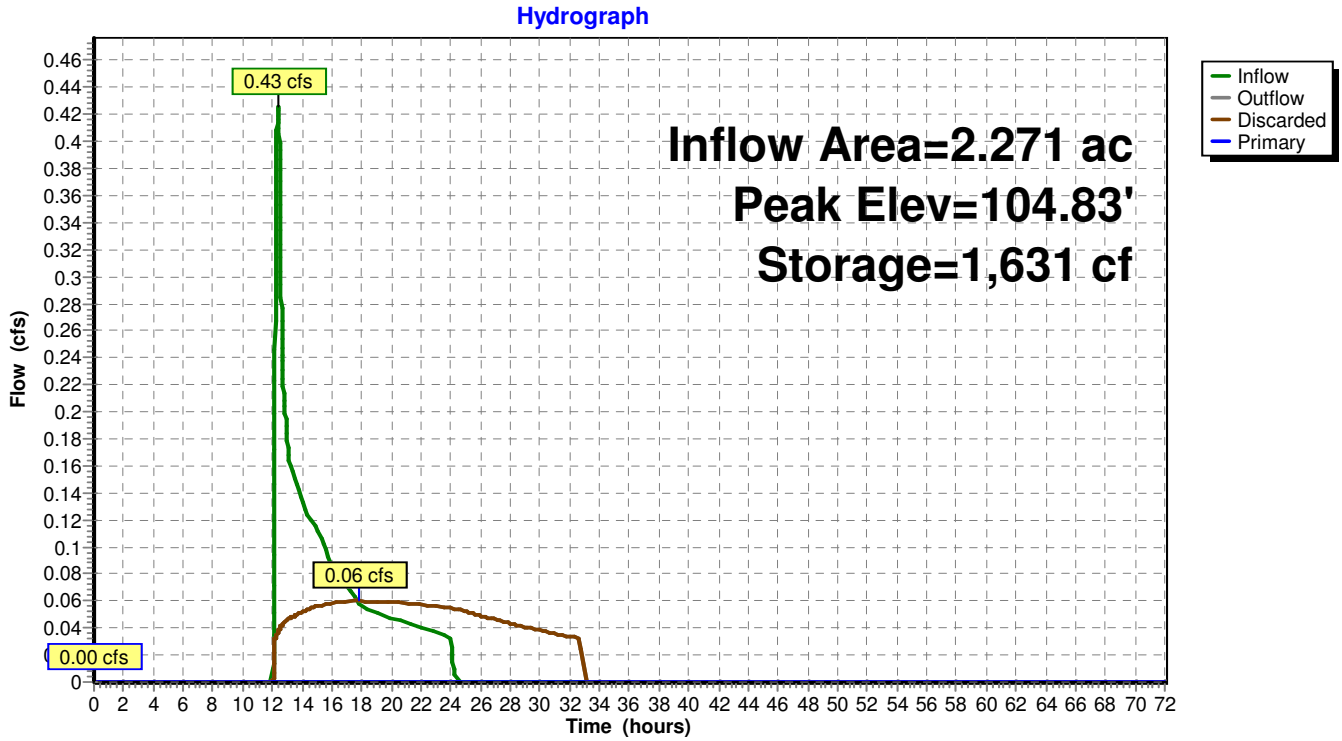
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,653	0	0
105.00	3,806	2,261	2,261
105.50	5,835	2,410	4,671
105.75	7,220	1,632	6,303

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	104.85'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 104.85' / 104.24' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.06 cfs @ 17.78 hrs HW=104.83' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=104.30' TW=100.00' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 2.207 ac, 11.71% Impervious, Inflow Depth = 0.56" for 25-yr event
Inflow = 0.57 cfs @ 12.36 hrs, Volume= 0.102 af
Outflow = 0.14 cfs @ 14.60 hrs, Volume= 0.102 af, Atten= 76%, Lag= 134.2 min
Discarded = 0.14 cfs @ 14.60 hrs, Volume= 0.102 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.18' @ 14.60 hrs Surf.Area= 4,822 sf Storage= 1,129 cf

Plug-Flow detention time= 105.2 min calculated for 0.102 af (100% of inflow)
Center-of-Mass det. time= 105.2 min (1,047.1 - 941.9)

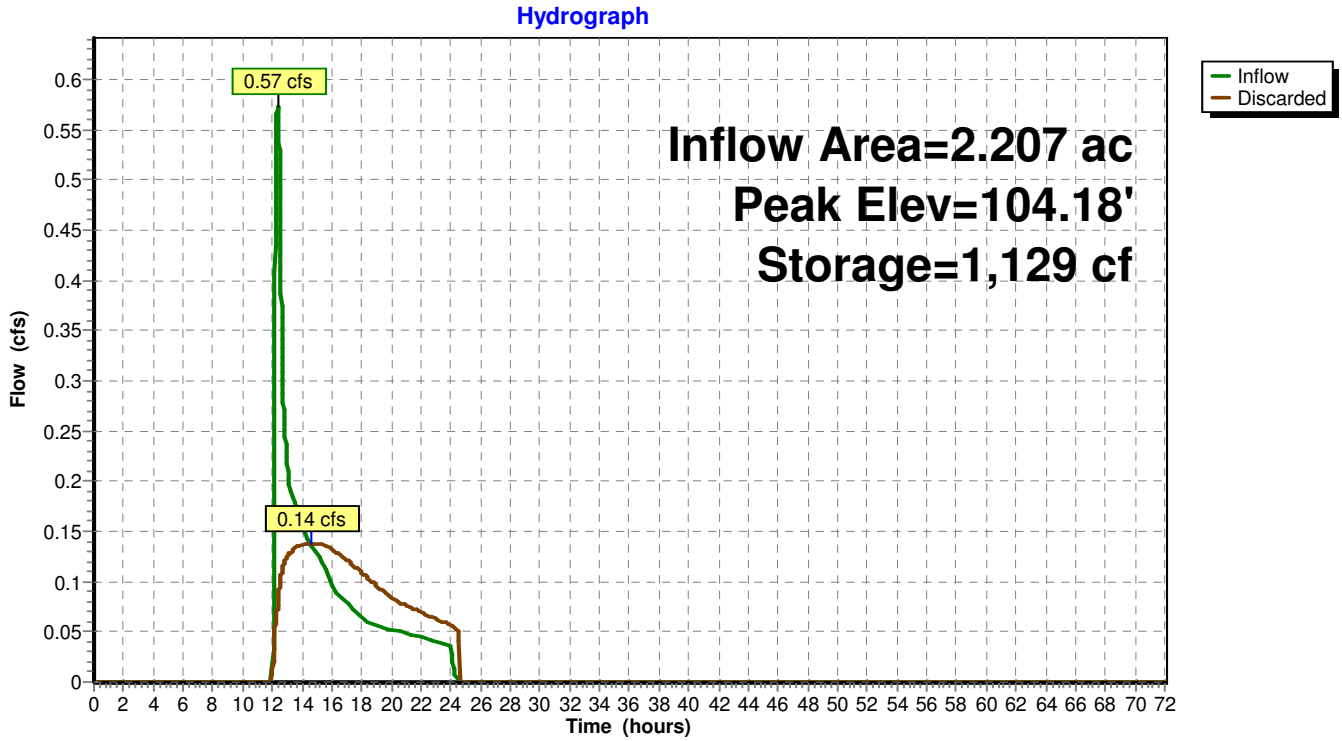
Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	15,451 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,056	0	0
104.00	3,071	436	436
105.00	13,033	8,052	8,488
105.50	14,818	6,963	15,451

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'

Discarded OutFlow Max=0.14 cfs @ 14.60 hrs HW=104.18' (Free Discharge)
1=Exfiltration (Controls 0.14 cfs)

Pond DP4: DP4 (North - Natural Depression)



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1aS: 1aS (Off Site) Runoff Area=24,558 sf 9.81% Impervious Runoff Depth=0.73"
Flow Length=174' Tc=14.2 min CN=40 Runoff=0.20 cfs 0.034 af

Subcatchment 1bS: 1bS Runoff Area=40,744 sf 19.15% Impervious Runoff Depth=1.50"
Tc=10.0 min CN=50 Runoff=1.21 cfs 0.117 af

Subcatchment 1cS: 1cS Runoff Area=23,675 sf 12.27% Impervious Runoff Depth=0.87"
Tc=5.0 min CN=42 Runoff=0.34 cfs 0.040 af

Subcatchment 1dS: 1dS Runoff Area=80,131 sf 16.36% Impervious Runoff Depth=1.26"
Flow Length=583' Tc=18.0 min CN=47 Runoff=1.48 cfs 0.193 af

Subcatchment 1eS: 1eS Runoff Area=38,668 sf 76.01% Impervious Runoff Depth=4.86"
Tc=5.0 min CN=84 Runoff=5.13 cfs 0.359 af

Subcatchment 1S: 1S Runoff Area=104,111 sf 64.15% Impervious Runoff Depth=4.10"
Tc=8.0 min CN=77 Runoff=10.69 cfs 0.816 af

Subcatchment 2S: 2S Runoff Area=93,156 sf 14.02% Impervious Runoff Depth=1.02"
Flow Length=402' Tc=14.1 min CN=44 Runoff=1.34 cfs 0.182 af

Subcatchment 3aS: 3S off site Runoff Area=138,732 sf 11.36% Impervious Runoff Depth=0.73"
Flow Length=702' Tc=34.0 min CN=40 Runoff=0.86 cfs 0.194 af

Subcatchment 3bS: 3bS Runoff Area=12,198 sf 78.82% Impervious Runoff Depth=5.08"
Tc=5.0 min CN=86 Runoff=1.68 cfs 0.118 af

Subcatchment 3S: 3S Runoff Area=98,908 sf 12.03% Impervious Runoff Depth=0.87"
Tc=10.0 min CN=42 Runoff=1.18 cfs 0.165 af

Subcatchment 4S: 4S Runoff Area=96,150 sf 11.71% Impervious Runoff Depth=1.02"
Flow Length=170' Tc=11.8 min CN=44 Runoff=1.46 cfs 0.188 af

Pond 1A: 1a (Off Site Natural Depression) Peak Elev=105.11' Storage=159 cf Inflow=0.20 cfs 0.034 af
Discarded=0.10 cfs 0.034 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.034 af

Pond 1B: 1b (Central Nat. Depression & Peak Elev=103.11' Storage=12,120 cf Inflow=6.42 cfs 0.669 af
Discarded=0.67 cfs 0.652 af Primary=0.12 cfs 0.017 af Outflow=0.79 cfs 0.669 af

Pond 1C: 1cP (Natural Depression) Peak Elev=101.47' Storage=397 cf Inflow=0.34 cfs 0.040 af
Outflow=0.07 cfs 0.040 af

Pond 3A: 3a (Trench Drain) Peak Elev=107.65' Storage=2,834 cf Inflow=0.86 cfs 0.194 af
Discarded=0.23 cfs 0.194 af Secondary=0.00 cfs 0.000 af Outflow=0.23 cfs 0.194 af

Pond 3B: 3b (Sub. Infil. Chambers) Peak Elev=106.88' Storage=1,211 cf Inflow=1.68 cfs 0.118 af
Discarded=0.05 cfs 0.062 af Primary=1.24 cfs 0.057 af Outflow=1.29 cfs 0.118 af

Pond DP1: DP1 (Sub. Infil. Chambers) Peak Elev=102.71' Storage=12,227 cf Inflow=11.90 cfs 0.945 af
Outflow=2.14 cfs 0.945 af

Pond DP2: DP2 (SW - Natural Depression) Peak Elev=102.77' Storage=2,887 cf Inflow=1.34 cfs 0.182 af
Outflow=0.21 cfs 0.182 af

Pond DP3: DP3 (NW - Natural Depression) Peak Elev=105.07' Storage=2,539 cf Inflow=1.18 cfs 0.165 af
Discarded=0.08 cfs 0.110 af Primary=0.15 cfs 0.055 af Outflow=0.22 cfs 0.165 af

Pond DP4: DP4 (North - Natural Depression) Peak Elev=104.44' Storage=2,751 cf Inflow=1.46 cfs 0.188 af
Outflow=0.23 cfs 0.188 af

Total Runoff Area = 17.241 ac Runoff Volume = 2.407 af Average Runoff Depth = 1.68"
75.50% Pervious = 13.018 ac 24.50% Impervious = 4.224 ac

Summary for Subcatchment 1aS: 1aS (Off Site)

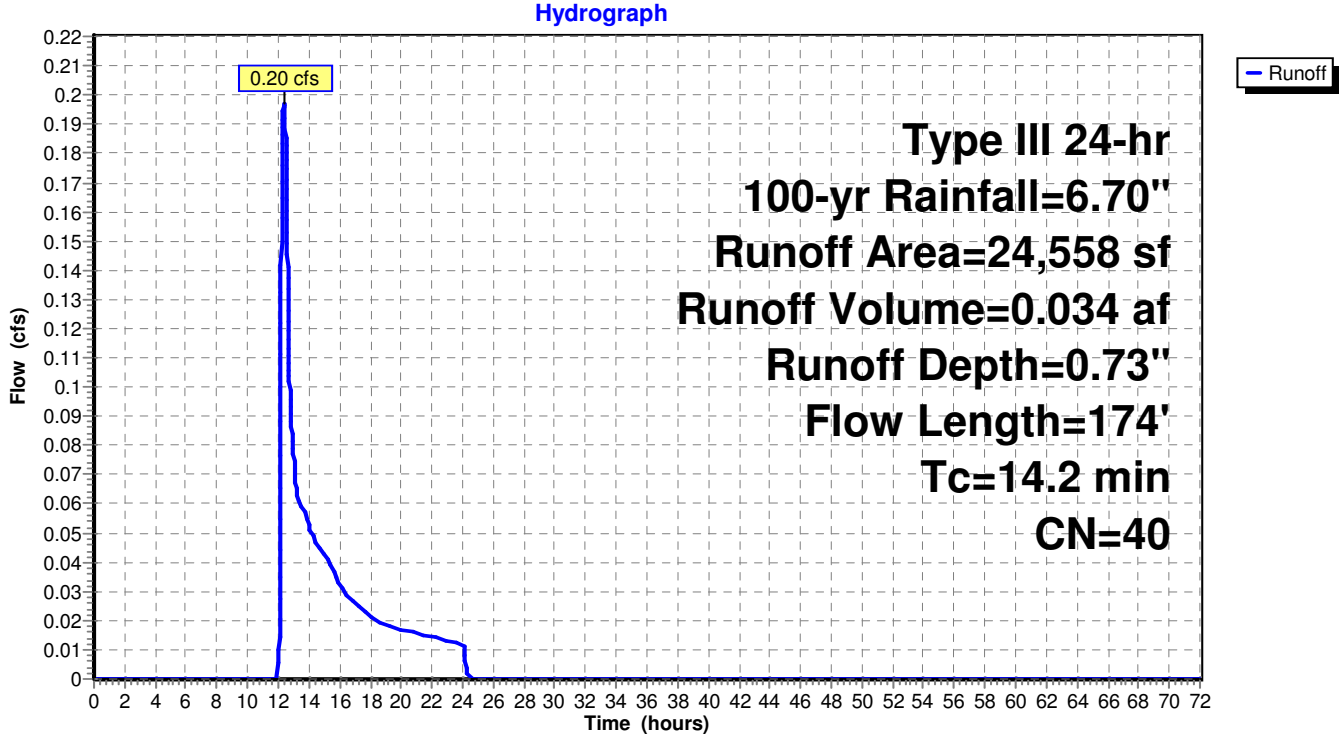
Runoff = 0.20 cfs @ 12.38 hrs, Volume= 0.034 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
2,408	98	Roofs, HSG A
8,090	39	>75% Grass cover, Good, HSG A
14,060	30	Woods, Good, HSG A
24,558	40	Weighted Average
22,150		90.19% Pervious Area
2,408		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.2	50	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	74	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	174	Total			

Subcatchment 1aS: 1aS (Off Site)



Summary for Subcatchment 1bS: 1bS

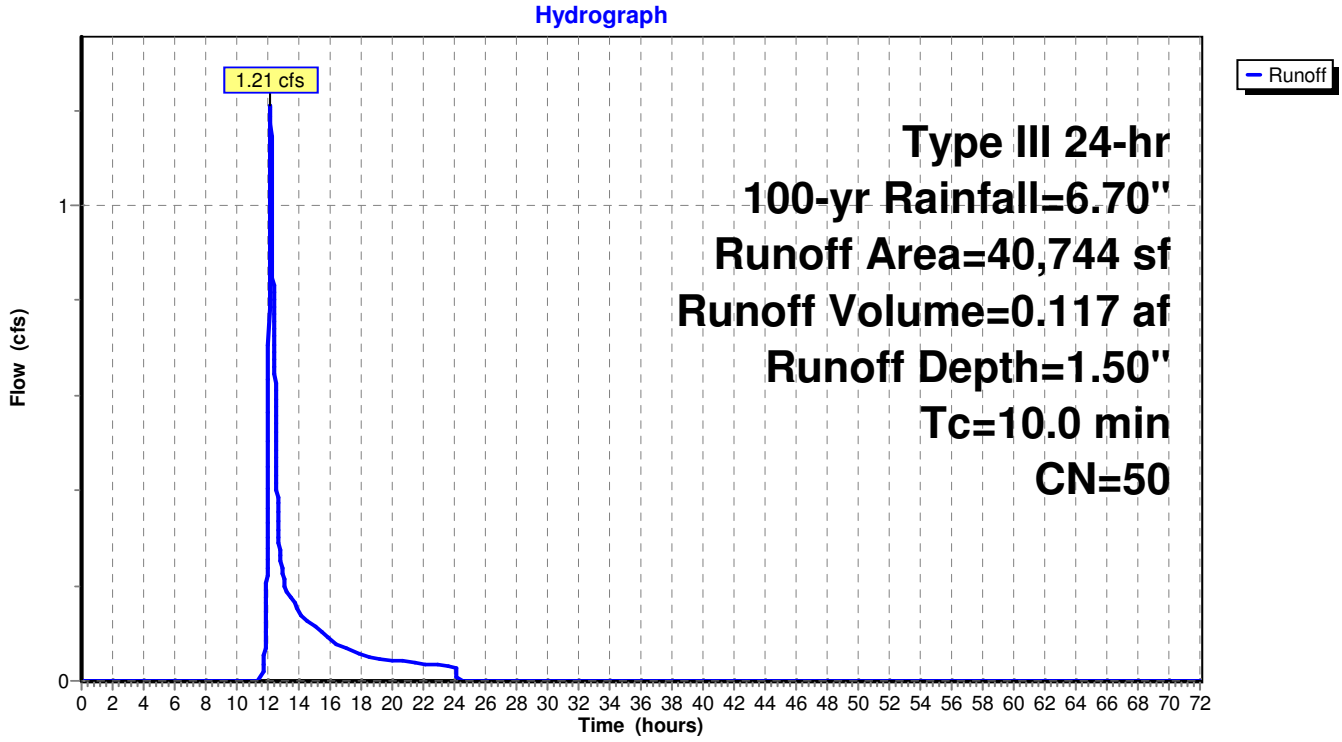
Runoff = 1.21 cfs @ 12.16 hrs, Volume= 0.117 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
833	76	Gravel roads, HSG A
7,801	98	Roofs, HSG A
28,513	39	>75% Grass cover, Good, HSG A
3,597	30	Woods, Good, HSG A
40,744	50	Weighted Average
32,943		80.85% Pervious Area
7,801		19.15% Impervious Area

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

Subcatchment 1bS: 1bS



Summary for Subcatchment 1cS: 1cS

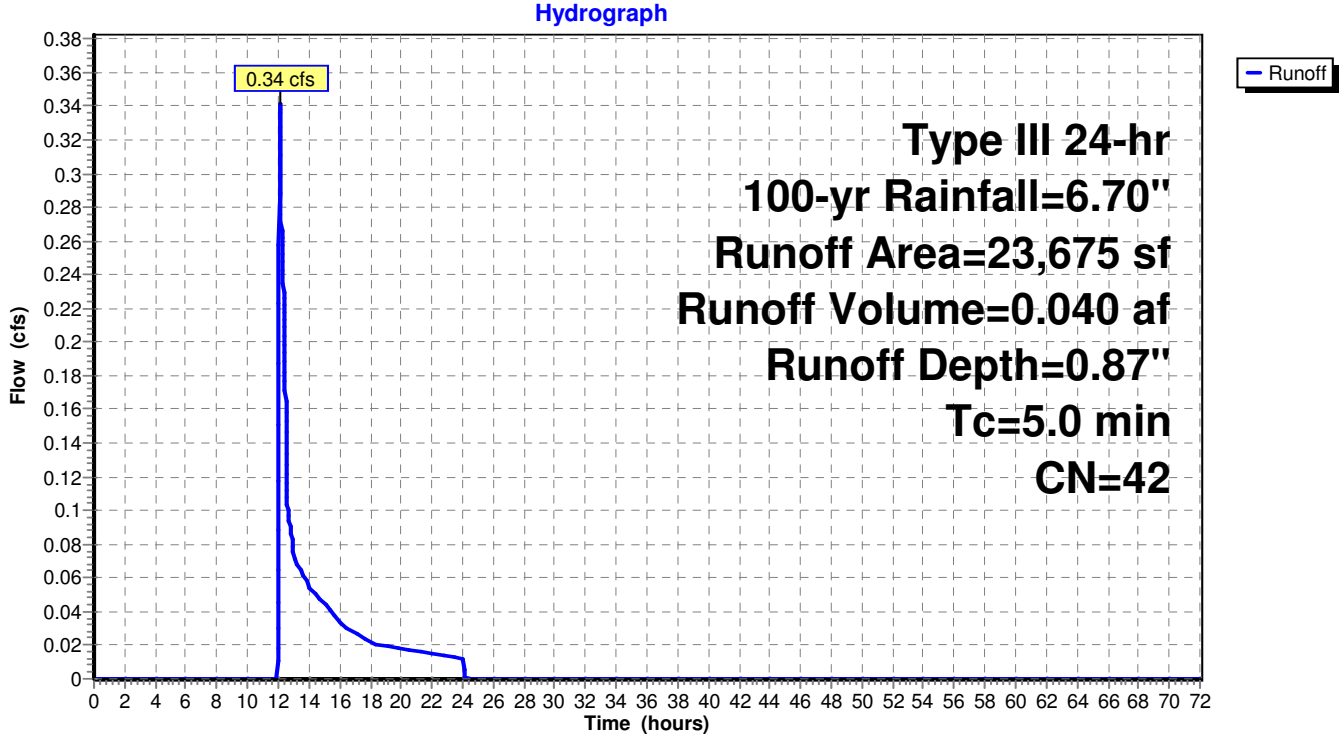
Runoff = 0.34 cfs @ 12.11 hrs, Volume= 0.040 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
11,369	30	Woods, Good, HSG A
2,905	98	Roofs, HSG A
9,401	39	>75% Grass cover, Good, HSG A
23,675	42	Weighted Average
20,770		87.73% Pervious Area
2,905		12.27% Impervious Area

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

Subcatchment 1cS: 1cS



Summary for Subcatchment 1dS: 1dS

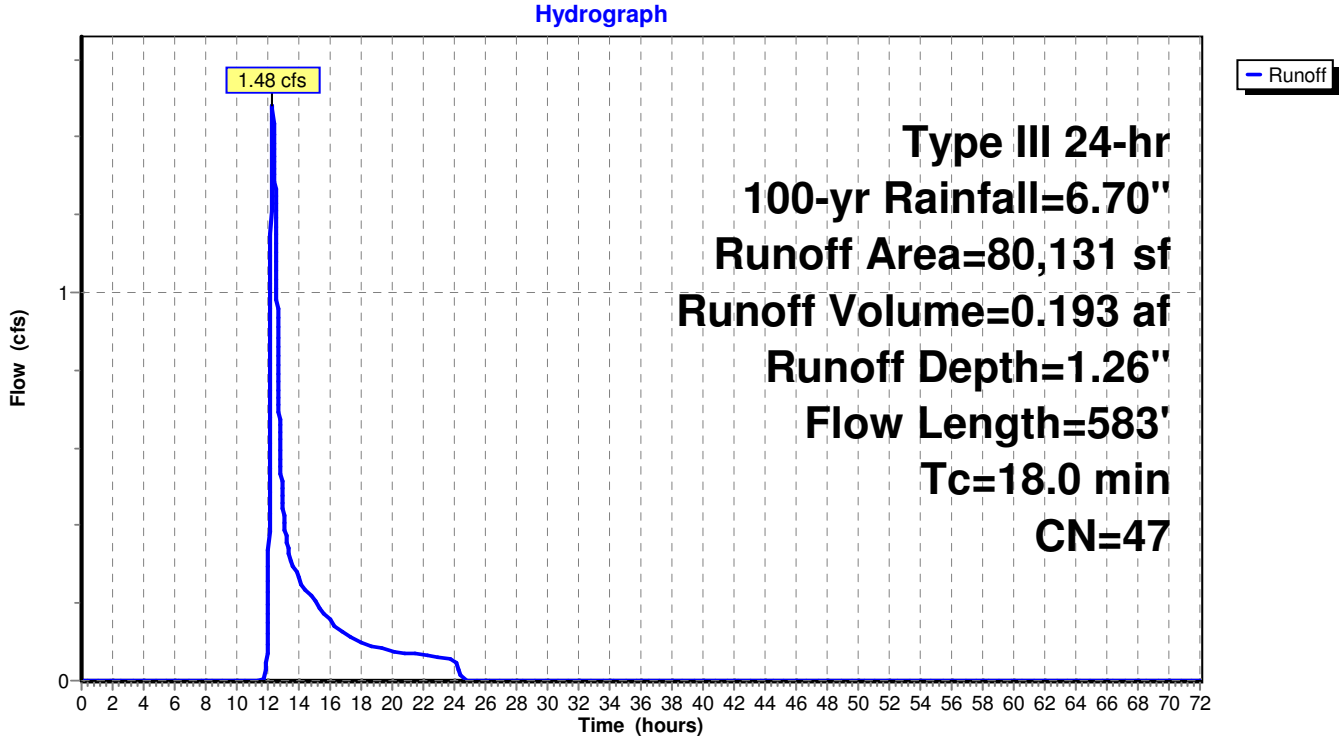
Runoff = 1.48 cfs @ 12.30 hrs, Volume= 0.193 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
5,354	98	Roofs, HSG A
20,800	39	>75% Grass cover, Good, HSG A
3,691	74	>75% Grass cover, Good, HSG C
17,837	30	Woods, Good, HSG A
7,757	98	Roofs, HSG A
13,831	39	>75% Grass cover, Good, HSG A
10,861	30	Woods, Good, HSG A
80,131	47	Weighted Average
67,020		83.64% Pervious Area
13,111		16.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.5	107	0.0280	1.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.2	426	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.0	583	Total			

Subcatchment 1dS: 1dS



Summary for Subcatchment 1eS: 1eS

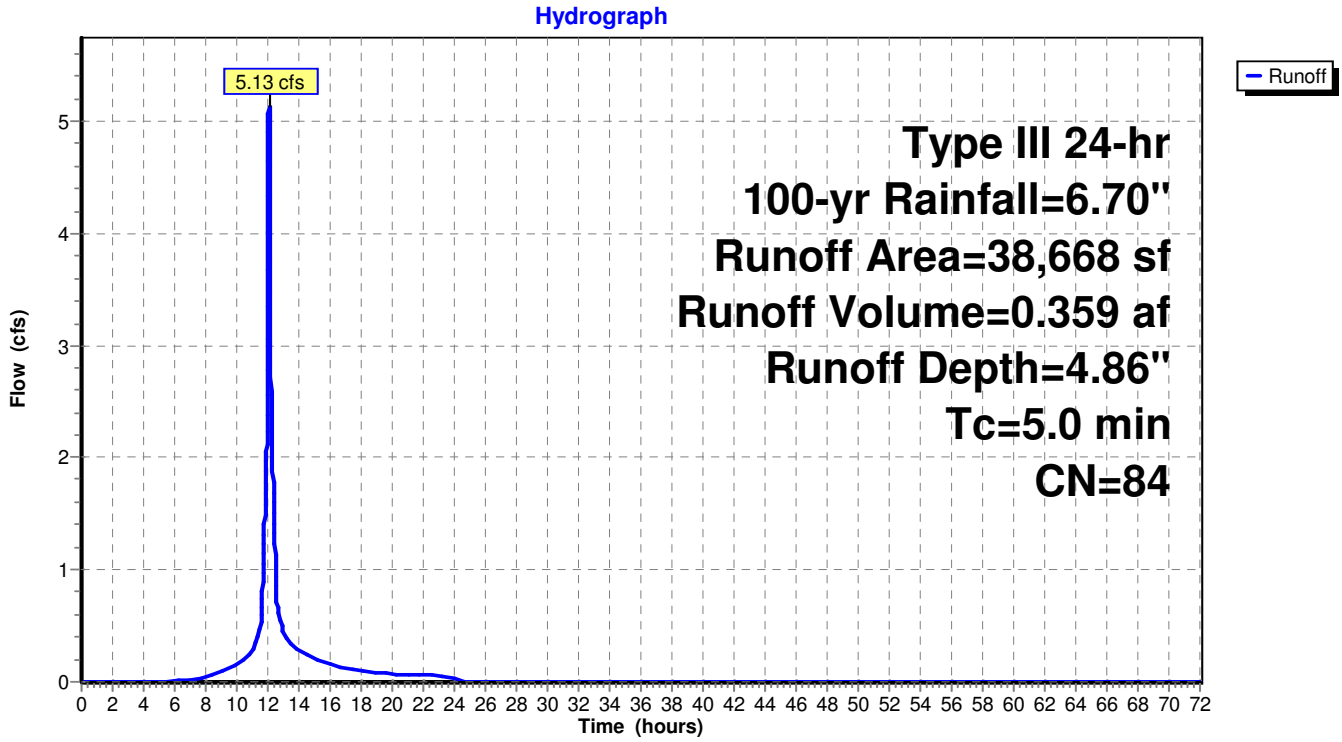
Runoff = 5.13 cfs @ 12.07 hrs, Volume= 0.359 af, Depth= 4.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
15,724	98	Paved parking, HSG A
13,666	98	Roofs, HSG A
9,278	39	>75% Grass cover, Good, HSG A
38,668	84	Weighted Average
9,278		23.99% Pervious Area
29,390		76.01% Impervious Area

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

Subcatchment 1eS: 1eS



Summary for Subcatchment 1S: 1S

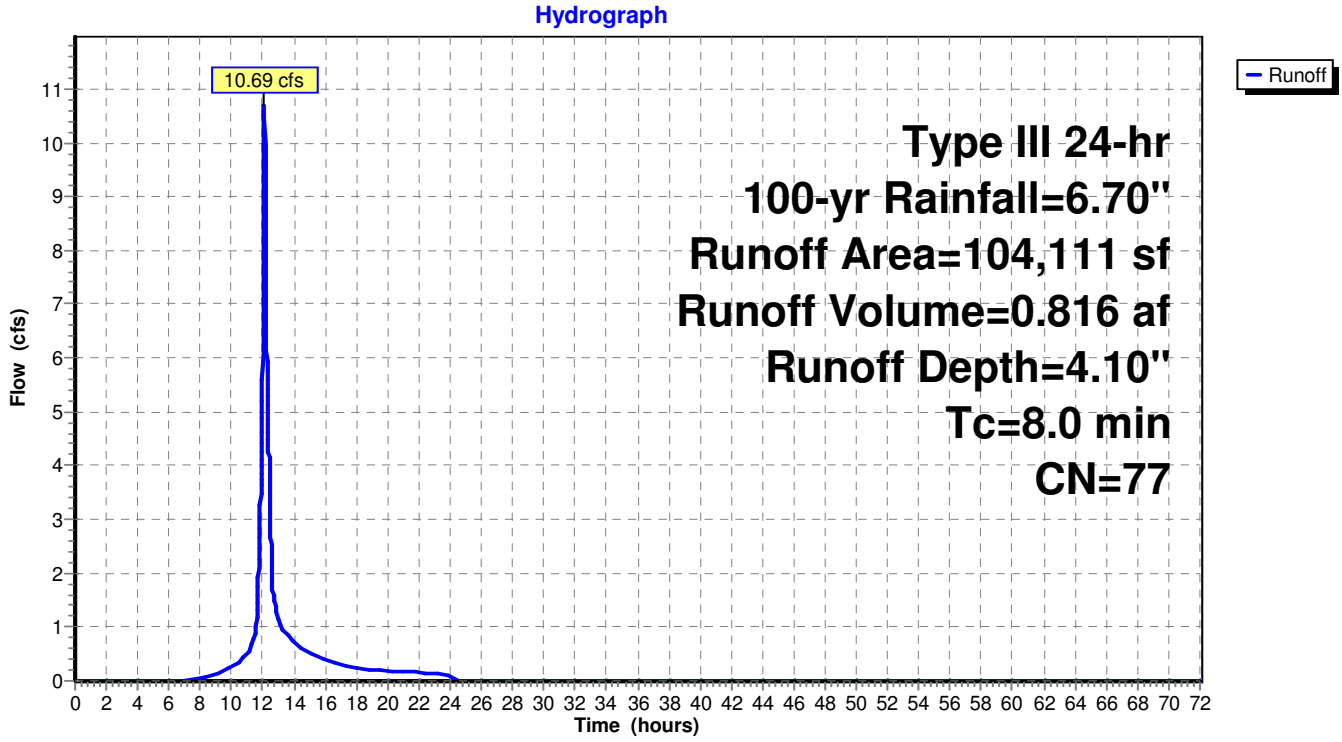
Runoff = 10.69 cfs @ 12.11 hrs, Volume= 0.816 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
39,719	98	Paved parking, HSG A
27,065	98	Roofs, HSG A
35,819	39	>75% Grass cover, Good, HSG A
1,508	30	Woods, Good, HSG A
104,111	77	Weighted Average
37,327		35.85% Pervious Area
66,784		64.15% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

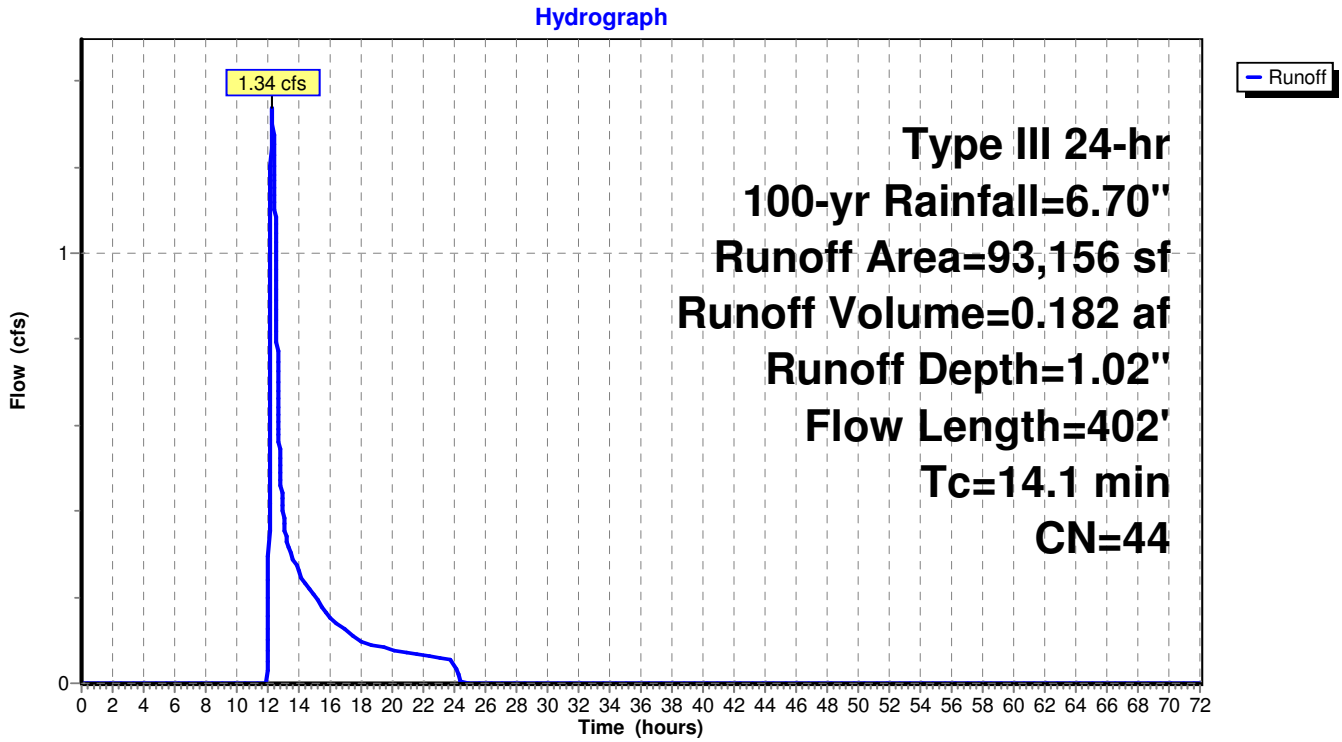
Runoff = 1.34 cfs @ 12.26 hrs, Volume= 0.182 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
5,188	98	Roofs, HSG A
30,371	39	>75% Grass cover, Good, HSG A
37,337	30	Woods, Good, HSG A
12,390	39	>75% Grass cover, Good, HSG A
7,870	98	Roofs, HSG A
93,156	44	Weighted Average
80,098		85.98% Pervious Area
13,058		14.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.3	194	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.3	158	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.1	402	Total			

Subcatchment 2S: 2S



Summary for Subcatchment 3aS: 3S off site

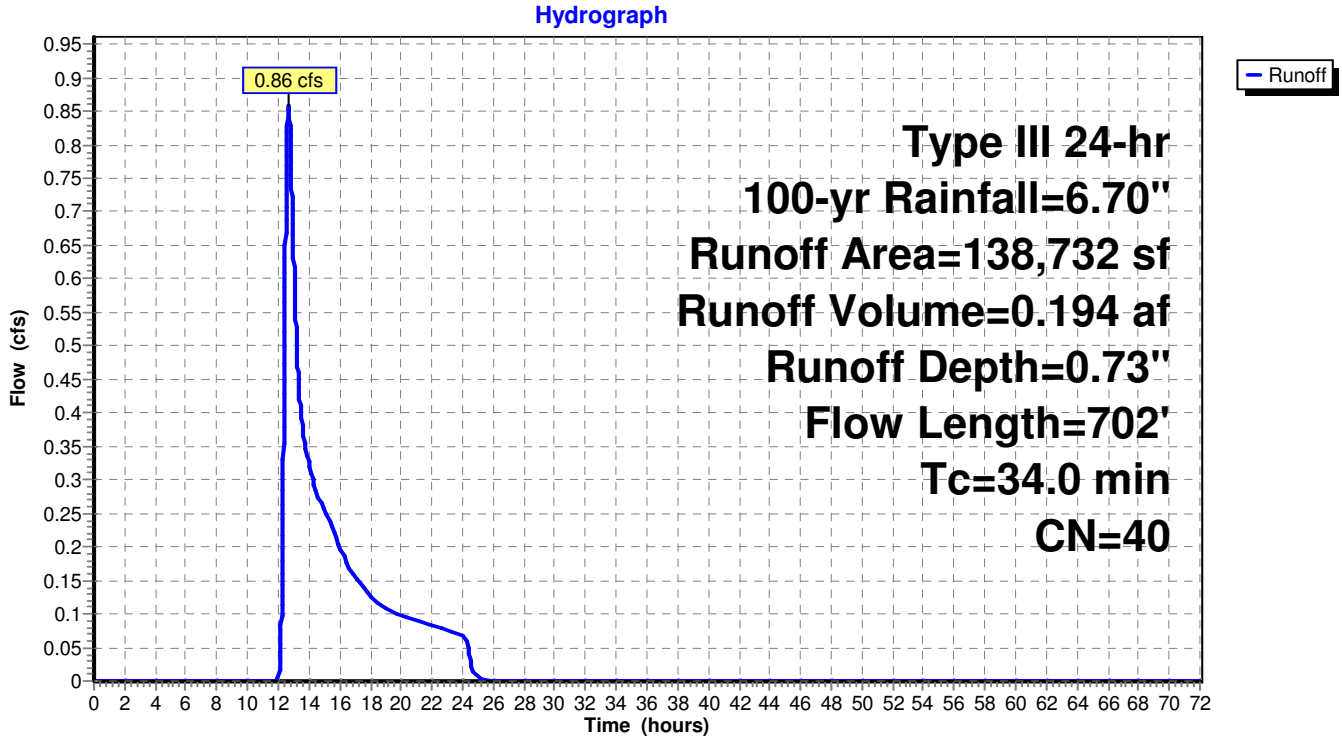
Runoff = 0.86 cfs @ 12.66 hrs, Volume= 0.194 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
7,998	98	Roofs, HSG A
20,884	39	>75% Grass cover, Good, HSG A
7,763	98	Roofs, HSG A
21,261	39	>75% Grass cover, Good, HSG A
80,826	30	Woods, Good, HSG A
138,732	40	Weighted Average
122,971		88.64% Pervious Area
15,761		11.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
21.7	652	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.0	702	Total			

Subcatchment 3aS: 3S off site



Summary for Subcatchment 3bS: 3bS

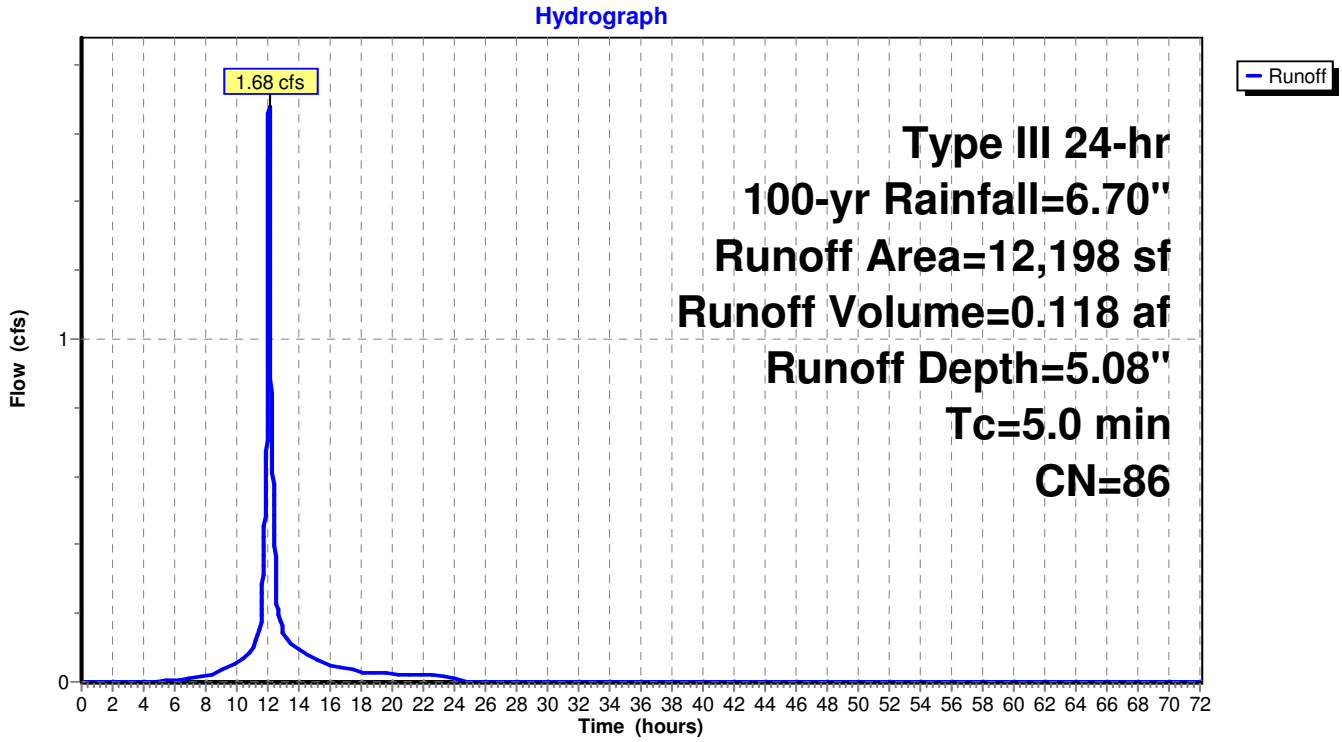
Runoff = 1.68 cfs @ 12.07 hrs, Volume= 0.118 af, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
4,827	98	Roofs, HSG A
4,787	98	Paved parking, HSG A
2,584	39	>75% Grass cover, Good, HSG A
12,198	86	Weighted Average
2,584		21.18% Pervious Area
9,614		78.82% Impervious Area

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

Subcatchment 3bS: 3bS



Summary for Subcatchment 3S: 3S

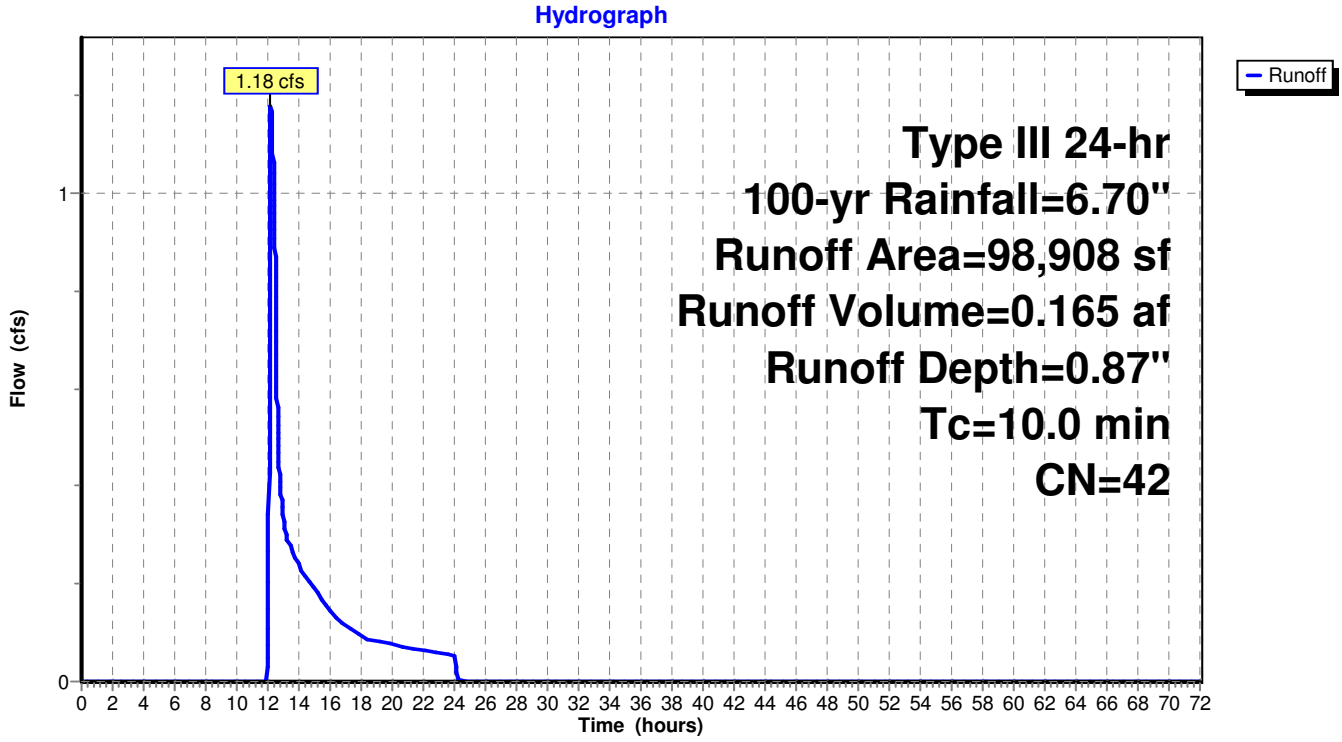
Runoff = 1.18 cfs @ 12.20 hrs, Volume= 0.165 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
4,948	98	Roofs, HSG A
23,819	39	>75% Grass cover, Good, HSG A
6,947	98	Roofs, HSG A
14,369	39	>75% Grass cover, Good, HSG A
48,825	30	Woods, Good, HSG A
98,908	42	Weighted Average
87,013		87.97% Pervious Area
11,895		12.03% Impervious Area

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

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

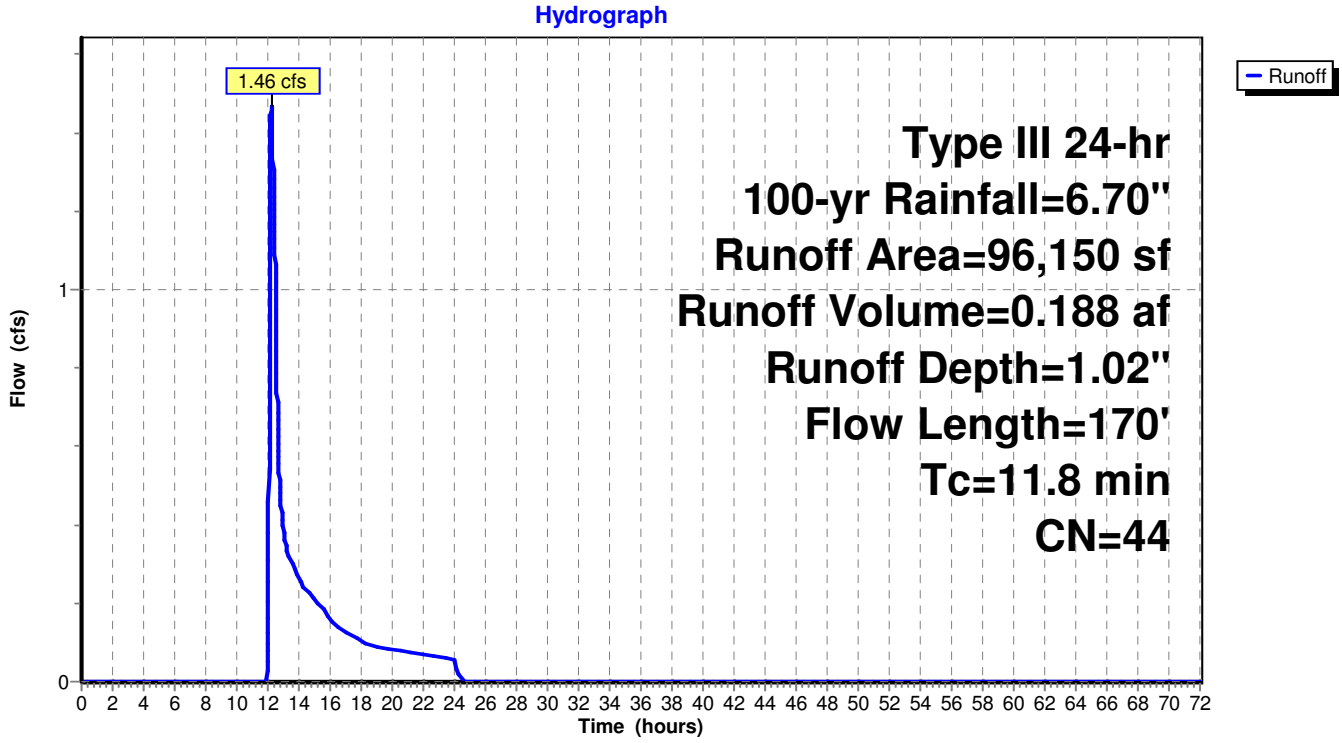
Runoff = 1.46 cfs @ 12.21 hrs, Volume= 0.188 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=6.70"

Area (sf)	CN	Description
5,936	98	Roofs, HSG A
46,782	39	>75% Grass cover, Good, HSG A
11,938	30	Woods, Good, HSG A
5,319	98	Roofs, HSG A
16,063	39	>75% Grass cover, Good, HSG A
10,112	30	Woods, Good, HSG A
96,150	44	Weighted Average
84,895		88.29% Pervious Area
11,255		11.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
3.6	120	0.0125	0.56		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.8	170	Total			

Subcatchment 4S: 4S



Summary for Pond 1A: 1a (Off Site Natural Depression)

Inflow Area = 0.564 ac, 9.81% Impervious, Inflow Depth = 0.73" for 100-yr event
Inflow = 0.20 cfs @ 12.38 hrs, Volume= 0.034 af
Outflow = 0.10 cfs @ 12.76 hrs, Volume= 0.034 af, Atten= 50%, Lag= 22.9 min
Discarded = 0.10 cfs @ 12.76 hrs, Volume= 0.034 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.11' @ 12.76 hrs Surf.Area= 1,736 sf Storage= 159 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.4 min (947.1 - 938.7)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

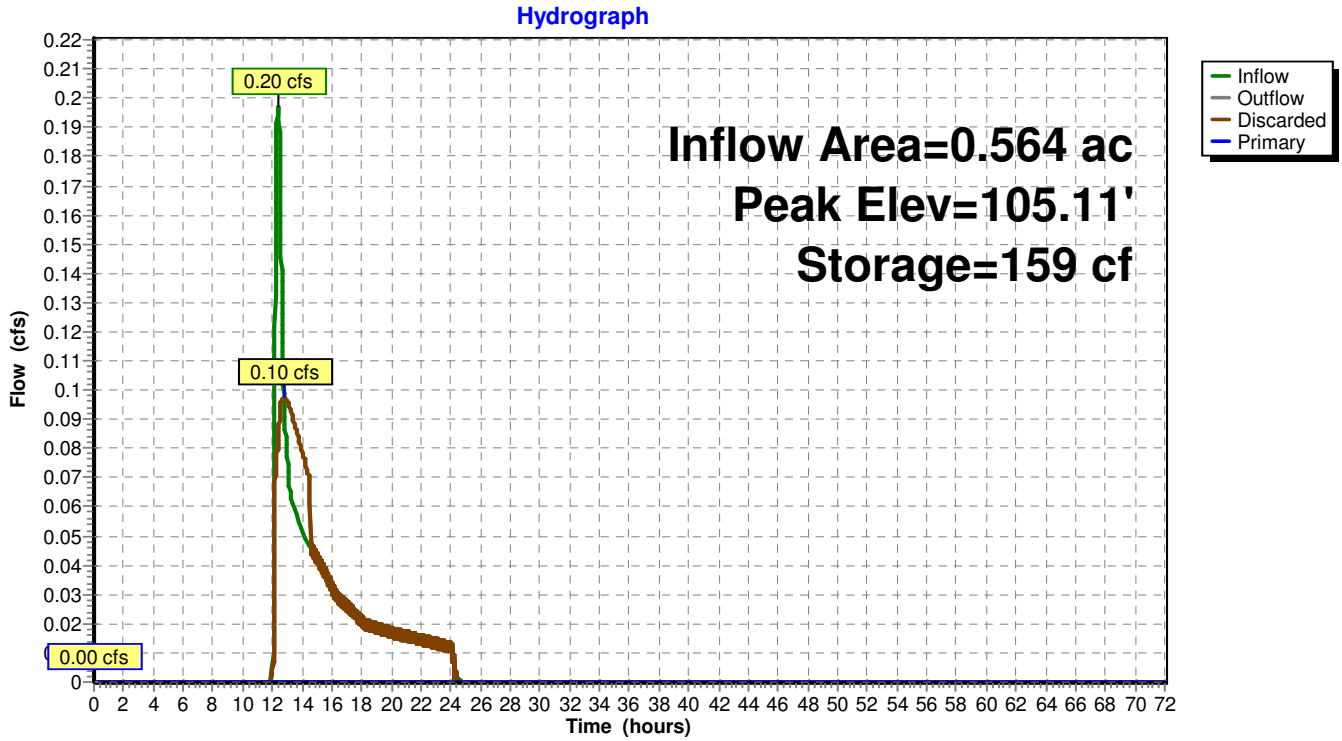
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,231	0	0
105.50	3,587	1,205	1,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	105.22'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.10 cfs @ 12.76 hrs HW=105.11' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=100.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1A: 1a (Off Site Natural Depression)



Summary for Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)

Inflow Area = 3.663 ac, 31.53% Impervious, Inflow Depth = 2.19" for 100-yr event
Inflow = 6.42 cfs @ 12.09 hrs, Volume= 0.669 af
Outflow = 0.79 cfs @ 13.64 hrs, Volume= 0.669 af, Atten= 88%, Lag= 93.3 min
Discarded = 0.67 cfs @ 13.64 hrs, Volume= 0.652 af
Primary = 0.12 cfs @ 13.64 hrs, Volume= 0.017 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 103.11' @ 13.64 hrs Surf.Area= 9,846 sf Storage= 12,120 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 219.4 min (1,064.6 - 845.3)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	33,502 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

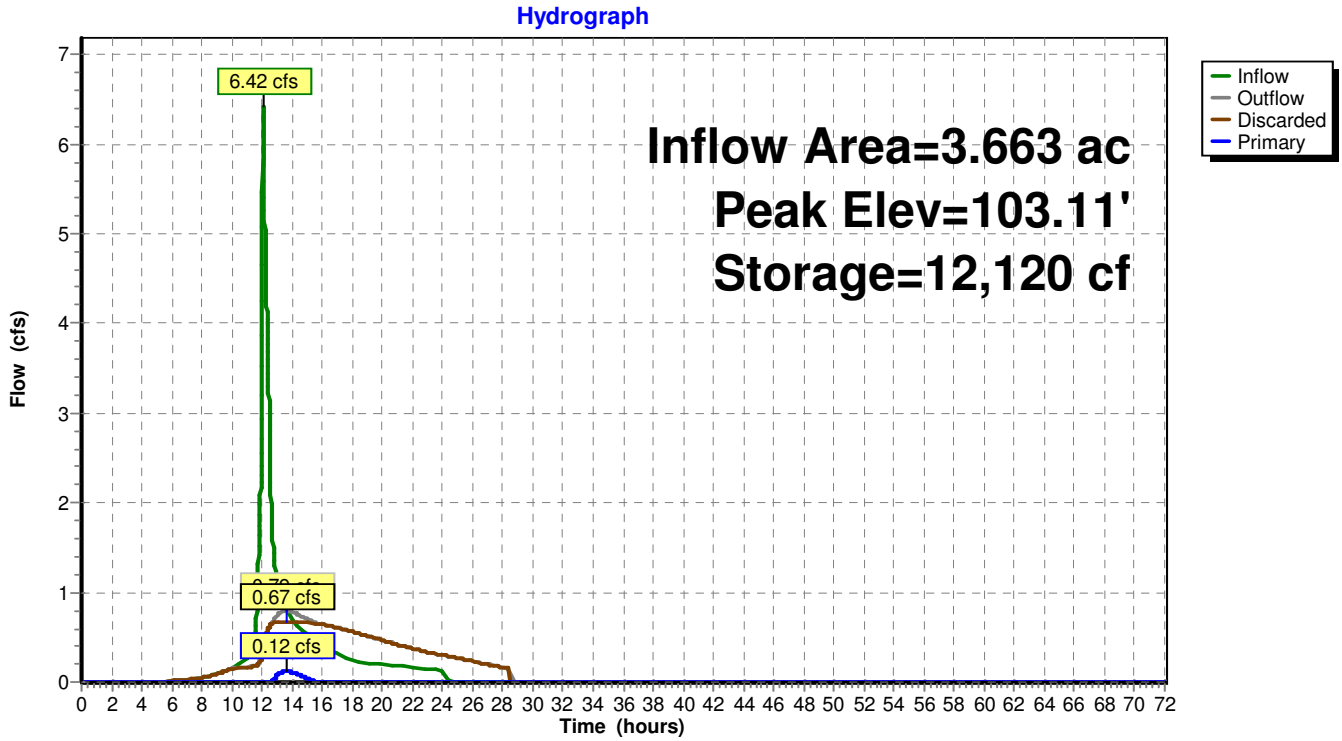
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	2,755	0	0
102.00	4,827	3,791	3,791
103.00	9,677	7,252	11,043
104.00	11,211	10,444	21,487
105.00	12,819	12,015	33,502

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'
#2	Primary	101.96'	**12.0" Round Culvert** L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 101.96' / 101.67' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	103.00'	**1.0' long x 0.50' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height

Discarded OutFlow Max=0.67 cfs @ 13.64 hrs HW=103.11' (Free Discharge)
└**1=Exfiltration** (Controls 0.67 cfs)

Primary OutFlow Max=0.12 cfs @ 13.64 hrs HW=103.11' TW=102.12' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.12 cfs of 2.96 cfs potential flow)
└**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.12 cfs @ 1.09 fps)

Pond 1B: 1b (Central Nat. Depression & Infiltration Basin)



Summary for Pond 1C: 1cP (Natural Depression)

Inflow Area = 0.544 ac, 12.27% Impervious, Inflow Depth = 0.87" for 100-yr event
Inflow = 0.34 cfs @ 12.11 hrs, Volume= 0.040 af
Outflow = 0.07 cfs @ 13.27 hrs, Volume= 0.040 af, Atten= 80%, Lag= 69.2 min
Discarded = 0.07 cfs @ 13.27 hrs, Volume= 0.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 101.47' @ 13.27 hrs Surf.Area= 1,140 sf Storage= 397 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 60.6 min (978.6 - 918.0)

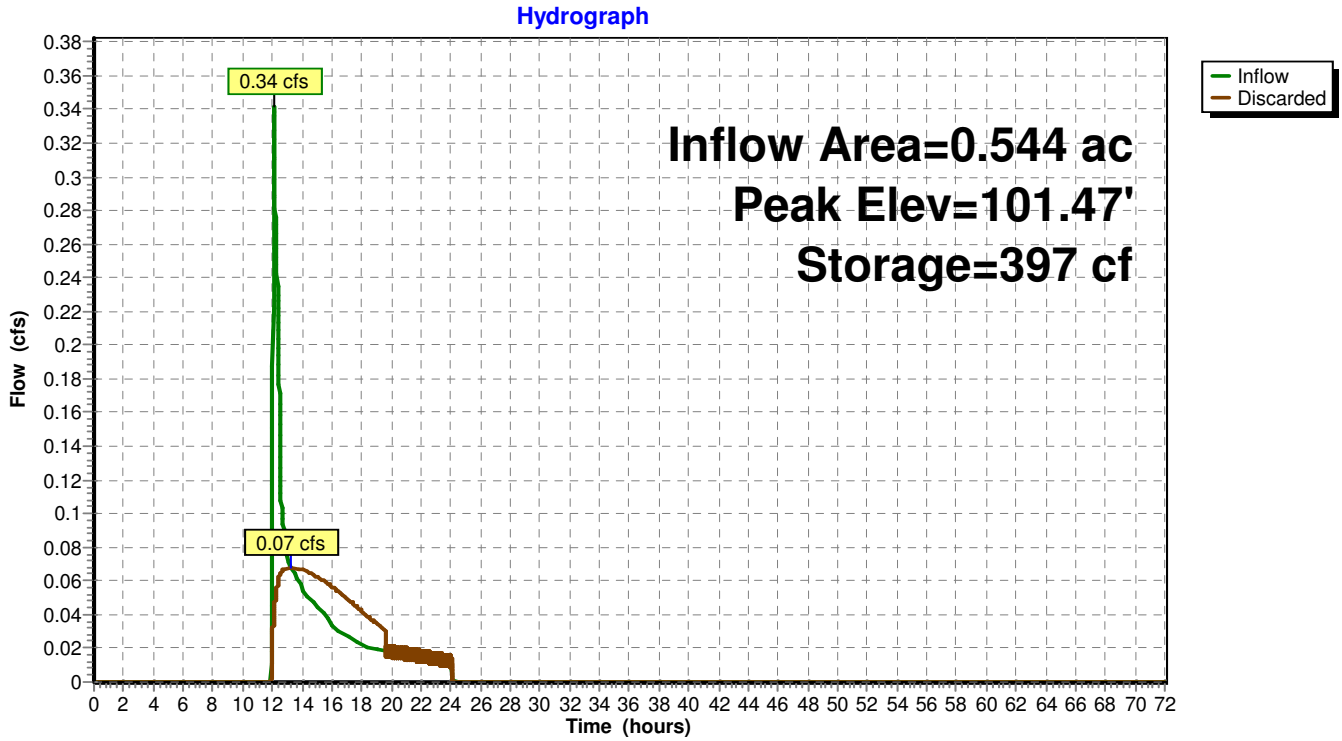
Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	13,188 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	550	0	0
102.00	1,807	1,179	1,179
103.00	3,213	2,510	3,689
104.00	4,741	3,977	7,666
105.00	6,304	5,523	13,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.07 cfs @ 13.27 hrs HW=101.47' (Free Discharge)
↑**1=Exfiltration** (Controls 0.07 cfs)

Pond 1C: 1cP (Natural Depression)



Summary for Pond 3A: 3a (Trench Drain)

Inflow Area = 3.185 ac, 11.36% Impervious, Inflow Depth = 0.73" for 100-yr event
Inflow = 0.86 cfs @ 12.66 hrs, Volume= 0.194 af
Outflow = 0.23 cfs @ 15.59 hrs, Volume= 0.194 af, Atten= 74%, Lag= 175.5 min
Discarded = 0.23 cfs @ 15.59 hrs, Volume= 0.194 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 107.65' @ 15.59 hrs Surf.Area= 7,166 sf Storage= 2,834 cf

Plug-Flow detention time= 228.5 min calculated for 0.194 af (100% of inflow)
Center-of-Mass det. time= 228.6 min (1,185.6 - 957.0)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,106 cf	**5.00'W x 288.00'L x 2.33'H Prismatoid** 3,355 cf Overall - 591 cf Embedded = 2,765 cf x 40.0% Voids
#2	105.50'	591 cf	**StormTech SC-310** x 40 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 1 rows
#3	107.33'	3,995 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,691 cf	Total Available Storage

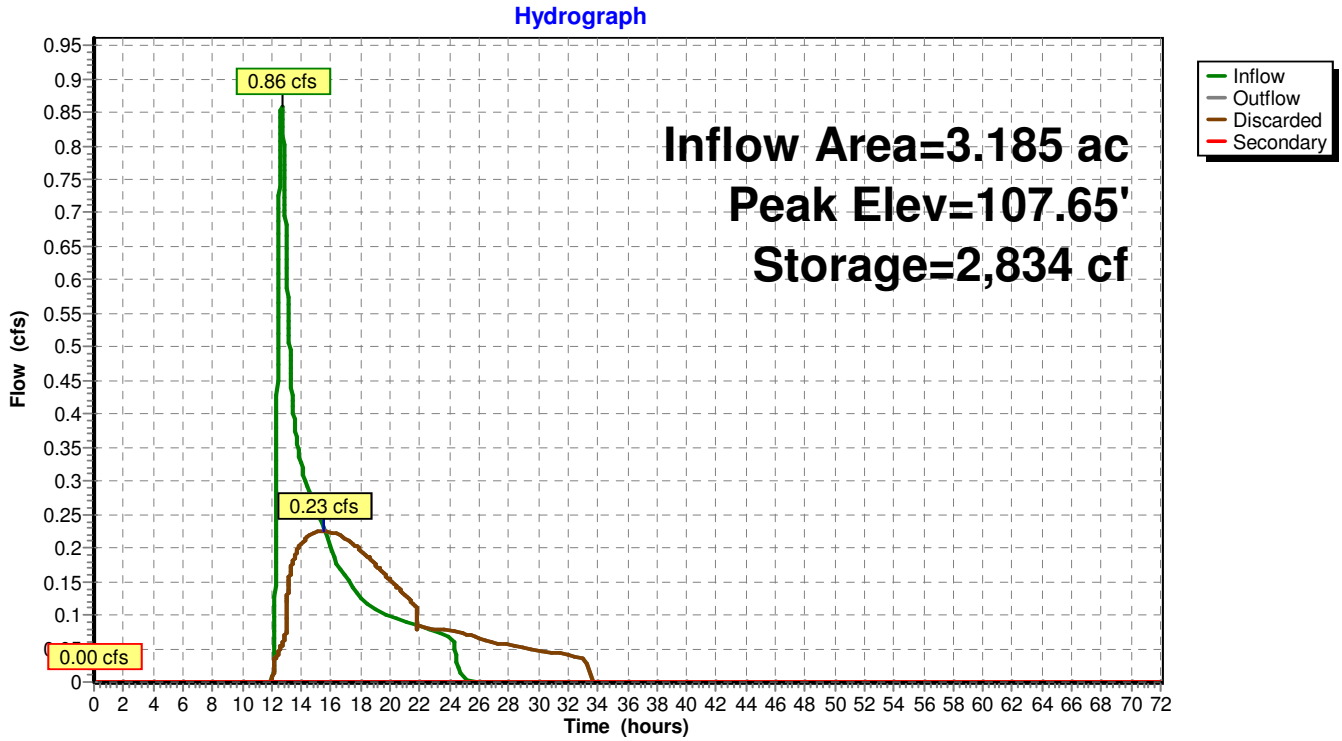
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
107.33	1,438	0	0
108.00	10,487	3,995	3,995

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Secondary	107.75'	**5.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.23 cfs @ 15.59 hrs HW=107.65' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.23 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' TW=103.83' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3A: 3a (Trench Drain)



Summary for Pond 3B: 3b (Sub. Infil. Chambers)

Inflow Area = 0.280 ac, 78.82% Impervious, Inflow Depth = 5.08" for 100-yr event
Inflow = 1.68 cfs @ 12.07 hrs, Volume= 0.118 af
Outflow = 1.29 cfs @ 12.13 hrs, Volume= 0.118 af, Atten= 23%, Lag= 3.7 min
Discarded = 0.05 cfs @ 12.13 hrs, Volume= 0.062 af
Primary = 1.24 cfs @ 12.13 hrs, Volume= 0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 106.88' @ 12.13 hrs Surf.Area= 1,441 sf Storage= 1,211 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 85.8 min (878.7 - 792.9)

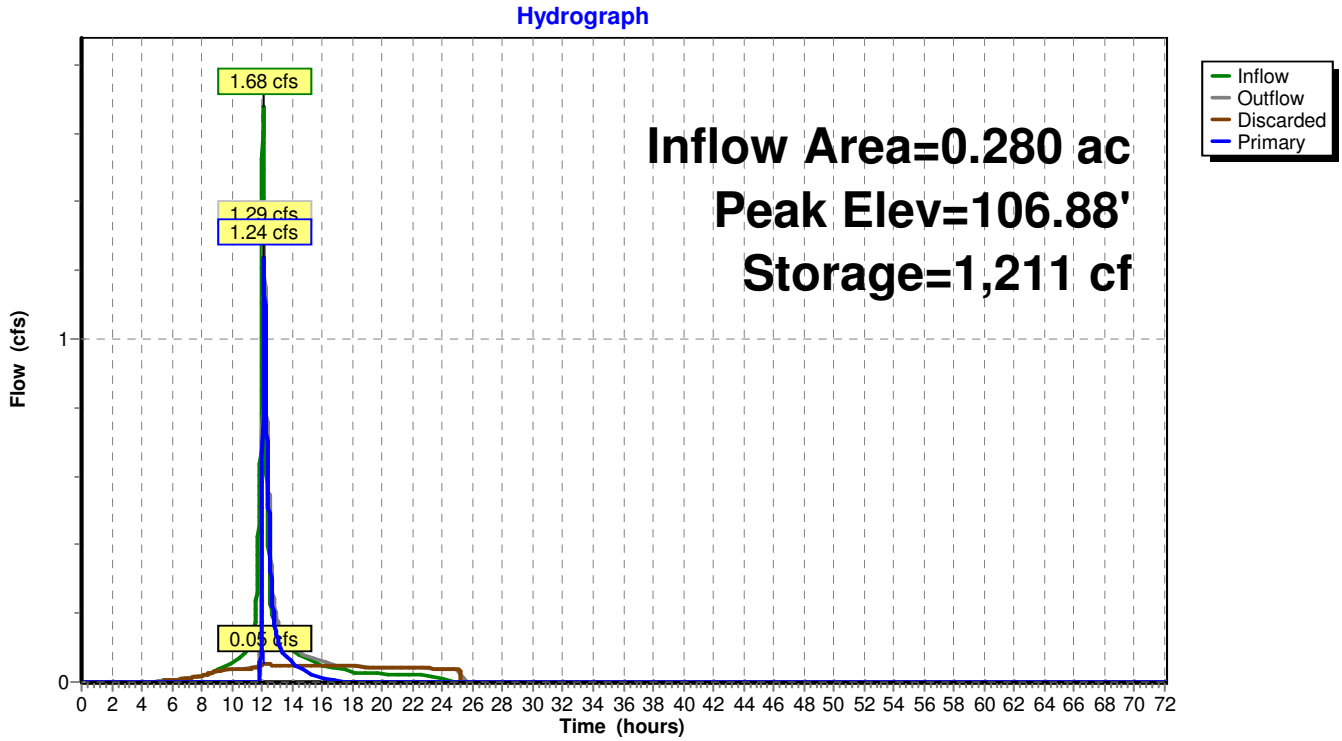
Volume	Invert	Avail.Storage	Storage Description
#1	105.50'	1,022 cf	**21.50'W x 67.00'L x 2.33'H Prismatoid** 3,356 cf Overall - 802 cf Embedded = 2,555 cf x 40.0% Voids
#2	106.00'	802 cf	**StormTech SC-310** x 54 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 6 rows
		1,823 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.50'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	106.30'	**12.0" Round Culvert** L= 34.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 106.30' / 105.28' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.05 cfs @ 12.13 hrs HW=106.88' (Free Discharge)
1=Exfiltration (Controls 0.05 cfs)

Primary OutFlow Max=1.24 cfs @ 12.13 hrs HW=106.88' TW=101.36' (Dynamic Tailwater)
2=Culvert (Inlet Controls 1.24 cfs @ 2.60 fps)

Pond 3B: 3b (Sub. Infil. Chambers)



Summary for Pond DP1: DP1 (Sub. Infil. Chambers)

Inflow Area = 9.167 ac, 35.31% Impervious, Inflow Depth = 1.24" for 100-yr event
Inflow = 11.90 cfs @ 12.12 hrs, Volume= 0.945 af
Outflow = 2.14 cfs @ 12.62 hrs, Volume= 0.945 af, Atten= 82%, Lag= 30.1 min
Discarded = 2.14 cfs @ 12.62 hrs, Volume= 0.945 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.71' @ 12.62 hrs Surf.Area= 6,672 sf Storage= 12,227 cf

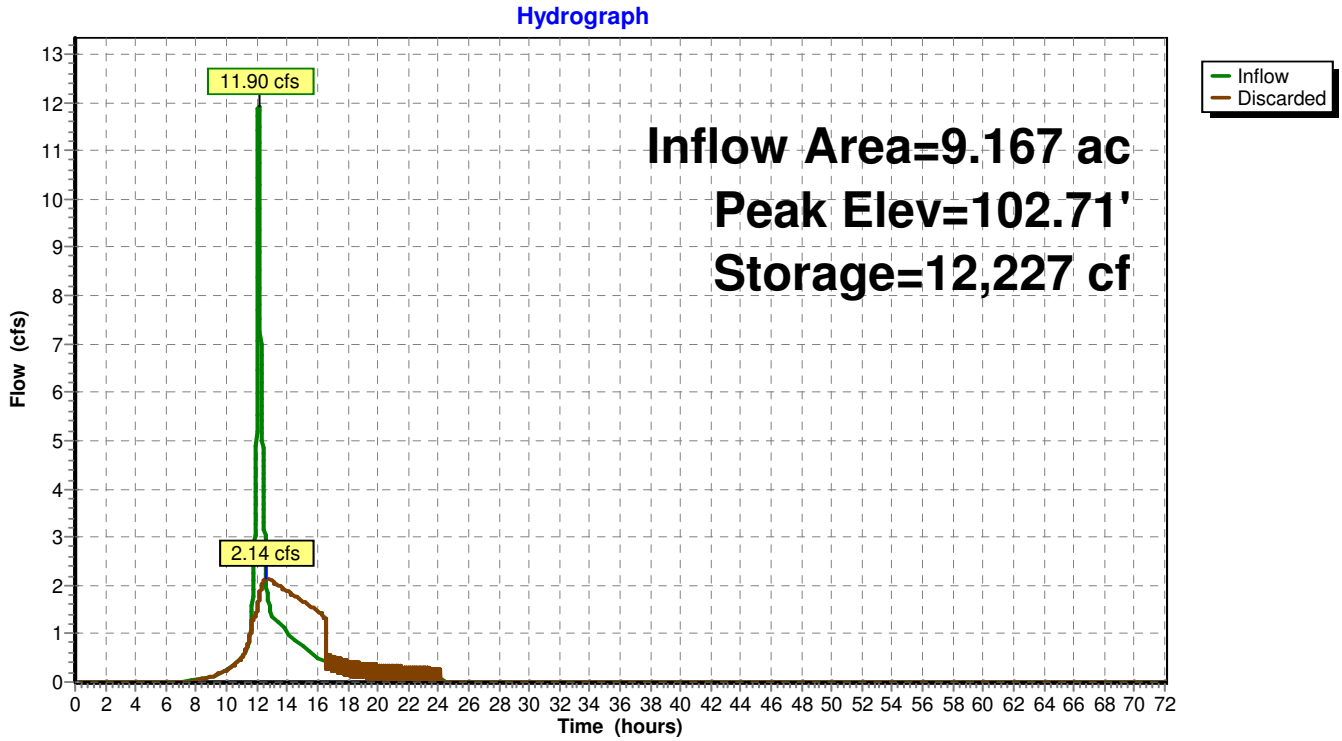
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 46.7 min (870.8 - 824.1)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	4,855 cf	**44.25'W x 123.92'L x 3.50'H Prismatoid** 19,192 cf Overall - 7,054 cf Embedded = 12,138 cf x 40.0% Voids
#2	100.50'	7,054 cf	**StormTech SC-740** x 153 Inside #1 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 Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
#3	100.00'	1,101 cf	**24.25'W x 49.00'L x 3.50'H Prismatoid** 4,159 cf Overall - 1,406 cf Embedded = 2,752 cf x 40.0% Voids
#4	100.50'	1,406 cf	**StormTech SC-740** x 30 Inside #3 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 Row Length Adjustment= +0.44' x 6.45 sf x 10 rows
		14,417 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=2.14 cfs @ 12.62 hrs HW=102.71' (Free Discharge)
↑**1=Exfiltration** (Controls 2.14 cfs)

Pond DP1: DP1 (Sub. Infil. Chambers)



Summary for Pond DP2: DP2 (SW - Natural Depression)

Inflow Area = 2.139 ac, 14.02% Impervious, Inflow Depth = 1.02" for 100-yr event
Inflow = 1.34 cfs @ 12.26 hrs, Volume= 0.182 af
Outflow = 0.21 cfs @ 14.97 hrs, Volume= 0.182 af, Atten= 85%, Lag= 162.4 min
Discarded = 0.21 cfs @ 14.97 hrs, Volume= 0.182 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 102.77' @ 14.97 hrs Surf.Area= 3,180 sf Storage= 2,887 cf

Plug-Flow detention time= 198.0 min calculated for 0.182 af (100% of inflow)
Center-of-Mass det. time= 198.0 min (1,114.0 - 916.0)

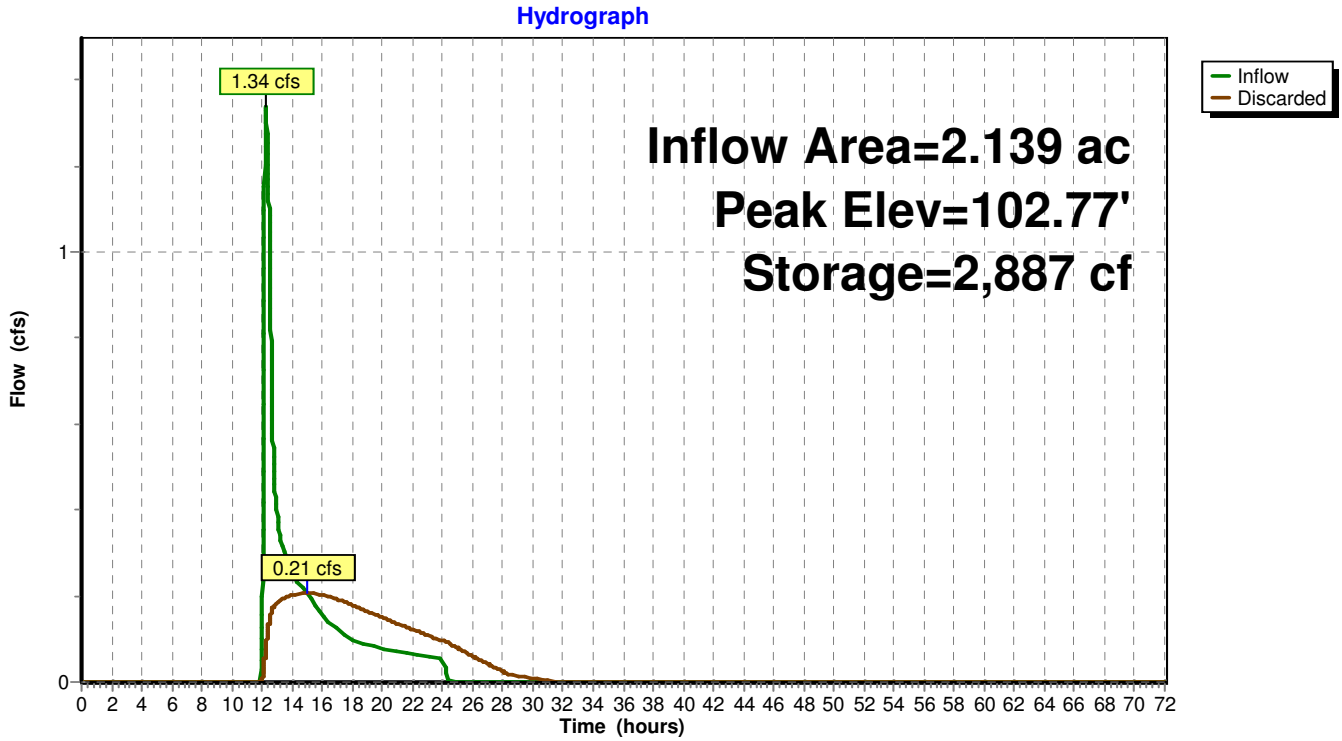
Volume	Invert	Avail.Storage	Storage Description
#1	100.46'	5,700 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.46	50	0	0
101.00	261	84	84
102.00	1,630	946	1,029
103.00	3,637	2,634	3,663
103.50	4,512	2,037	5,700

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.46'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 96.00'

Discarded OutFlow Max=0.21 cfs @ 14.97 hrs HW=102.77' (Free Discharge)
↑**1=Exfiltration** (Controls 0.21 cfs)

Pond DP2: DP2 (SW - Natural Depression)



Summary for Pond DP3: DP3 (NW - Natural Depression)

Inflow Area = 2.271 ac, 12.03% Impervious, Inflow Depth = 0.87" for 100-yr event
Inflow = 1.18 cfs @ 12.20 hrs, Volume= 0.165 af
Outflow = 0.22 cfs @ 14.19 hrs, Volume= 0.165 af, Atten= 81%, Lag= 119.8 min
Discarded = 0.08 cfs @ 14.19 hrs, Volume= 0.110 af
Primary = 0.15 cfs @ 14.19 hrs, Volume= 0.055 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.07' @ 14.19 hrs Surf.Area= 4,092 sf Storage= 2,539 cf

Plug-Flow detention time= 288.8 min calculated for 0.165 af (100% of inflow)
Center-of-Mass det. time= 288.9 min (1,211.5 - 922.6)

Volume	Invert	Avail.Storage	Storage Description
#1	104.30'	6,303 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

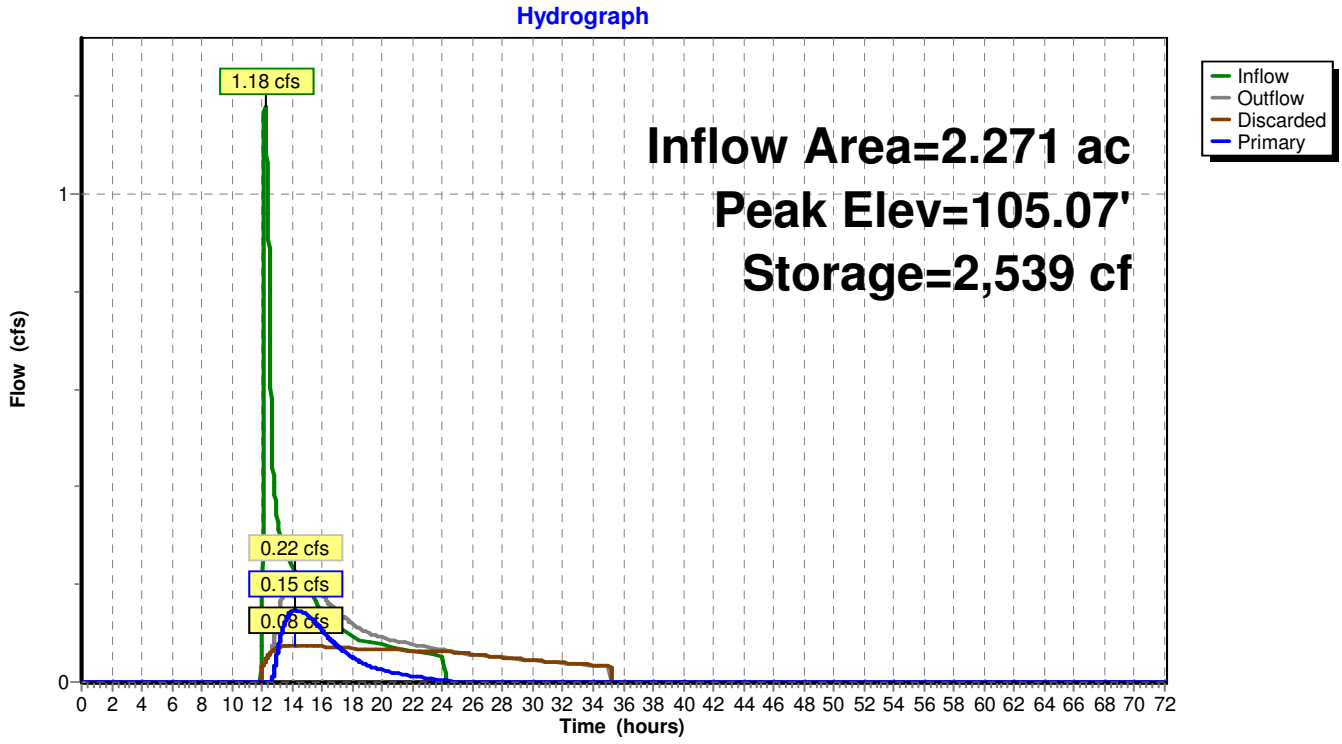
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
104.30	2,653	0	0
105.00	3,806	2,261	2,261
105.50	5,835	2,410	4,671
105.75	7,220	1,632	6,303

Device	Routing	Invert	Outlet Devices
#1	Discarded	104.30'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 103.20'
#2	Primary	104.85'	**12.0" Round Culvert** L= 122.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 104.85' / 104.24' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.08 cfs @ 14.19 hrs HW=105.07' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.15 cfs @ 14.19 hrs HW=105.07' TW=101.77' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 0.15 cfs @ 1.74 fps)

Pond DP3: DP3 (NW - Natural Depression)



Summary for Pond DP4: DP4 (North - Natural Depression)

Inflow Area = 2.207 ac, 11.71% Impervious, Inflow Depth = 1.02" for 100-yr event
Inflow = 1.46 cfs @ 12.21 hrs, Volume= 0.188 af
Outflow = 0.23 cfs @ 14.51 hrs, Volume= 0.188 af, Atten= 84%, Lag= 138.1 min
Discarded = 0.23 cfs @ 14.51 hrs, Volume= 0.188 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 104.44' @ 14.51 hrs Surf.Area= 7,454 sf Storage= 2,751 cf

Plug-Flow detention time= 160.3 min calculated for 0.188 af (100% of inflow)
Center-of-Mass det. time= 160.3 min (1,074.2 - 913.9)

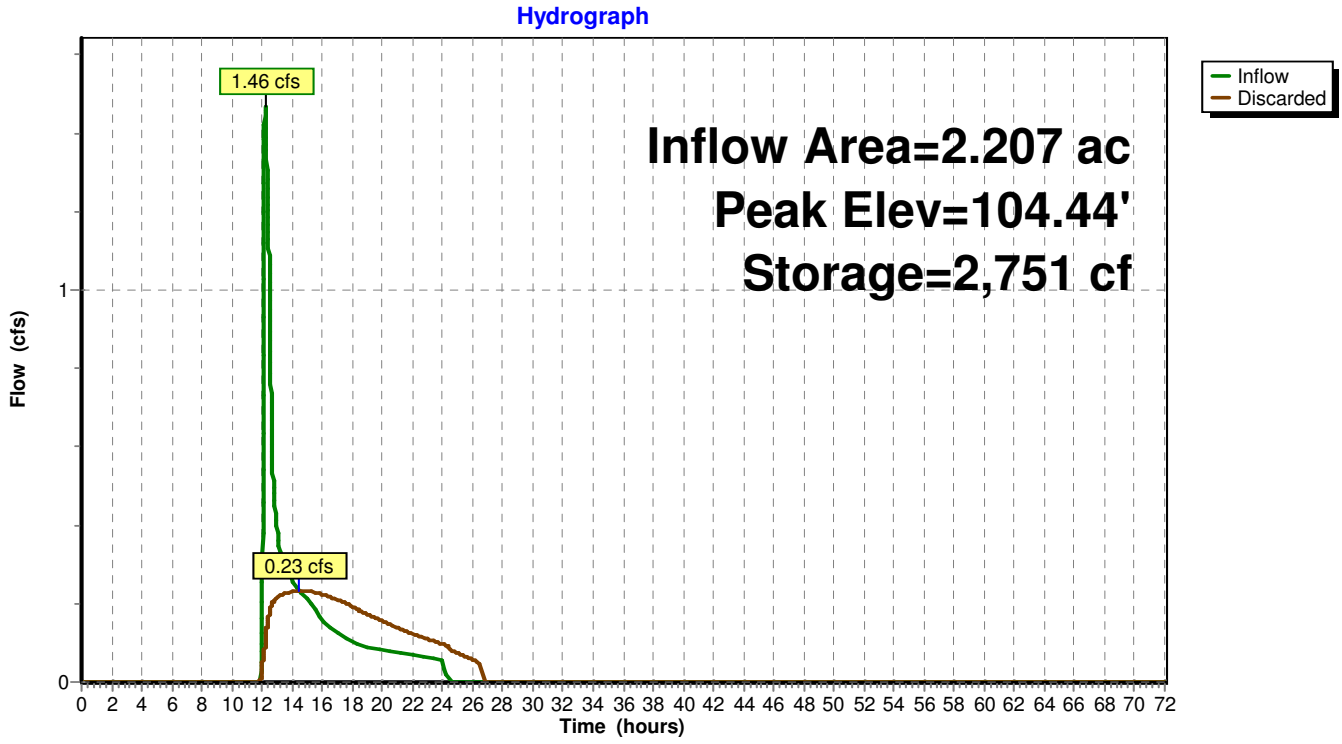
Volume	Invert	Avail.Storage	Storage Description
#1	103.83'	15,451 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.83	2,056	0	0
104.00	3,071	436	436
105.00	13,033	8,052	8,488
105.50	14,818	6,963	15,451

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.83'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.80'

Discarded OutFlow Max=0.23 cfs @ 14.51 hrs HW=104.44' (Free Discharge)
1=Exfiltration (Controls 0.23 cfs)

Pond DP4: DP4 (North - Natural Depression)



A P P E N D I X C

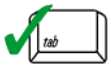
- **Stormwater Report Checklist**
- **Stormwater Management Facility & BMP Calculations**

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

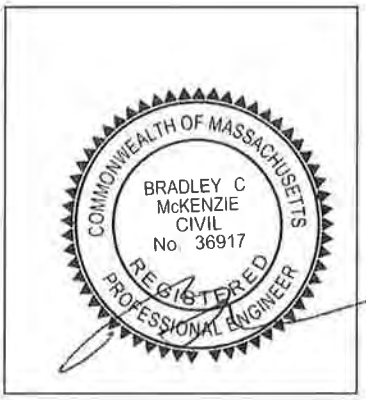
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date

May 13, 2015

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): Utilization of natural depression areas

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.

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SHEET NO. 1 OF
CALCULATED BY dwk DATE 2/17/15
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SCALE SMR Calculations

Standard 1 - Outlet Protection

- No new outlets are proposed.
- Trap Sizing for proposed pipe outlet (HW-3) to Natural Depression / Infiltration basin.

Ref: ASCE No 77 Design & Construction of Urban Stormwater Management Systems; Chap. 9 Section C - Scour Hole

HW-3 - outlet into Inf. basin = 15" (1.25)

$Q_{50} = 4.41$ cfs

TW = 102.62 (Basin EL.) Inv = 102.00 TW = 0.62'

Y = depth of trap = 1/2 pipe size (Min) = 6'

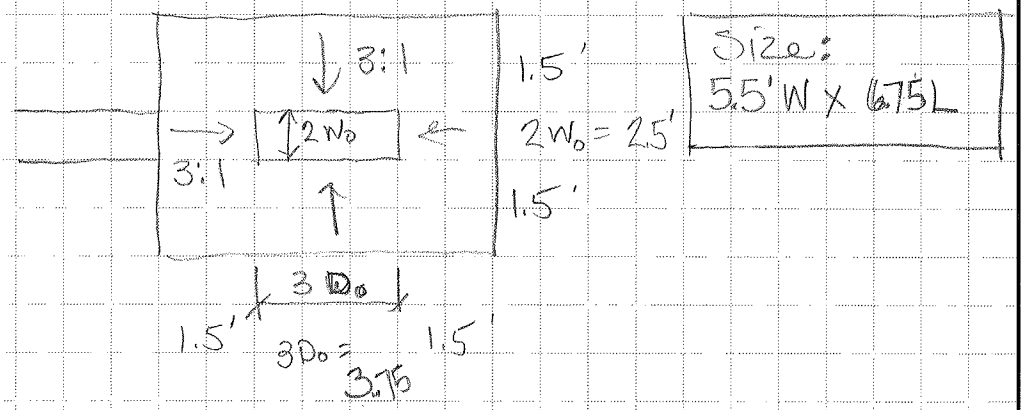
$$d_{50} = \frac{0.0125(Q)^{4/3}}{TW(D_o)}$$

(d50 = Stone size)

$$= \frac{0.0125(4.41)^{4/3}}{0.62(1.25)} = 0.116' = 1.4"$$

use 4" min dia Stone

Trap Size =



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SCALE SMR Calculations

Standard 2 - Peak Rate - see HydroCAD Analysis

Standard 3 - Groundwater Recharge

Review NRCS mapping (Figure 3) and On-site soil investigation (Appendix E)

Total Site proposed imp area = 3.329 AC
(includes roads, sidewalk, house, Prop Building)

HSG A = 3.329 AC x 0.6"/12 = 0.16644 AC/FT
= 7,251 CF
Req'd GW Recharge

Proposed Recharge On-site:

BMP		Storage Below outlet/inlet	
P1B (infil basin)		11,043 CF	outlet 103.0
DP1 (sub chambers)		14,417 CF	no outlet (Emrg Only)
P3B (sub chambers)		651 CF	outlet 106.83
		26,111 CF > 7,251 CF ✓	
Roof & offsite	DP2	Nat. Dep. = 3,057 CF	@ 102.77 no outlet
Roof & offsite	DP3	Nat. Dep. = 2055 CF	@ 104.87 outlet
Roof & offsite	DP4	Nat. Dep. = 3926 CF	@ 104.44 no outlet
offsite	P3A	Trench Drain Storage = 5691 CF	@ withchamber
Roof & lawn offsite	P1C	Nat Dep. = 518 CF	@ 101.47 no outlet

41,358 CF total site Recharge

Site is contained as in existing conditions

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Infiltration System Design:

Pretreatment Unit Sizing

Pretreatment = by proprietary unit

(P1b) PT1

Imp. Area = CB6 + CB7 = 15,724 imp area Rd + driveway

1" runoff WQV CN = 98 T_c = 5min

From Fig 4 = qu = 795 csm/in

$Q_{treatment} = (qu)(Area_{SQmi})(WQV)$

$Q = 795\ (0.3610\ AC)(0.0015625\ \frac{mi^2}{Ac})(1")$

Q = 0.45 cfs pretreatment WQV Q rate

$Q_{100\text{-}yr}$ = 5.13 cfs

Use First Defense 4' dia (FD-4)

TSS Flow Rate = 0.7 cfs > 0.45 cfs

Peak Flow Rate = 6 cfs > 5.13 cfs

(P3b) PT4 - Isolator Row w/in Chambers

Imp. Area = CB4 + CB5 = 4,787 imp area Rd + driveway

1" runoff WQV CN = 98 T_c = 5 min

From Fig 4 = qu = 795 csm/in

$Q = 795(0.1100)(0.0015625\ \frac{mi^2}{Ac})(1")$

Q = 0.14 cfs pretreatment WQV Q rate

Q_{100yr} = 1.68 cfs

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PT4

use Isolator Row w/in chamber system - 9 units

(DP1) PT1

Imp Area = 16,990 SF = 0.390 Ac Rd, drive, sidewalk
1" runoff WQV CN = 98 T_c = 8 min (0.13 hr)
From Fig 4 = qu = 736 csm/in

$Q = 736(0.390 Ac)(0.0015625)(1")$
Q = 0.45 cfs pretreatment WQV rate

Q_{100yr} = 6.3 cfs

Use Isolator Row w/in Chamber System
17 units

(DP1) PT2

Imp Area = 22,729 SF = 0.522 Ac Rd, drive, sidewalk
1" runoff WQV CN = 98 T_c = 5.3 min (0.083)
From Fig 4 = qu = 795 csm/in

$Q = 795(0.522)(0.0015625)(1")$
Q = 0.65 cfs pretreatment WQV rate

Q_{100yr} = 5.0 cfs

Use Isolator Row w/in Chamber system
17 units

Figure 4: for First 1-inch Runoff, Table of qu values for Ia/P Curve = 0.034, listed by tc, for Type III Storm Distribution

Tc (Hours)	qu (csm/in)
0.01	835
0.03	835
0.05	831
0.067	814
0.083	795
0.1	774
0.116	755
0.133	736
0.15	717
0.167	700
0.183	685
0.2	669
0.217	654
0.233	641
0.25	628
0.3	593
0.333	572
0.35	563
0.4	536
0.416	528
0.5	491
0.583	460
0.6	454
0.667	433
0.7	424
0.8	398
0.9	376
1	356
1.1	339
1.2	323
1.3	309
1.4	296
1.5	285
1.6	274
1.7	264
1.8	255
1.9	247
2	239
2.1	232
2.2	225
2.3	219
2.4	213
2.5	207
2.6	202

Tc (Hours)	qu (csm/in)
2.7	197
2.8	192
2.9	187
3	183
3.1	179
3.2	175
3.3	171
3.4	168
3.5	164
3.6	161
3.7	158
3.8	155
3.9	152
4	149
4.1	146
4.2	144
4.3	141
4.4	139
4.5	137
4.6	134
4.7	132
4.8	130
4.9	128
5	126
5.1	124
5.2	122
5.3	120
5.4	119
5.5	117
5.6	115
5.7	114
5.8	112
5.9	111
6	109
6.1	108
6.2	106
6.3	105
6.4	104
6.5	102
6.6	101
6.7	100
6.8	99
6.9	98
7	96

Tc (Hours)	qu (csm/in)
7.1	95
7.2	94
7.3	93
7.4	92
7.5	91
7.6	90
7.7	89
7.8	88
7.9	87
8	86
8.1	85
8.2	84
8.3	84
8.4	83
8.5	82
8.6	81
8.7	80
8.8	79
8.9	79
9	78
9.1	77
9.2	76
9.3	76
9.4	75
9.5	74
9.6	74
9.7	73
9.8	72
9.9	72
10	71

Hydro International

First Defense®

Cost-effective stormwater treatment with adaptability to meet demanding site requirements

Product Profile

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (Table 1, next page).

Components

1. Inlet Grate (optional)
2. Inlet Chute
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Precast Vortex Chamber
6. Internal Bypass
7. Outlet Chute
8. Outlet Pipe
9. Oil and Floatables Storage
10. Sediment Storage Sump

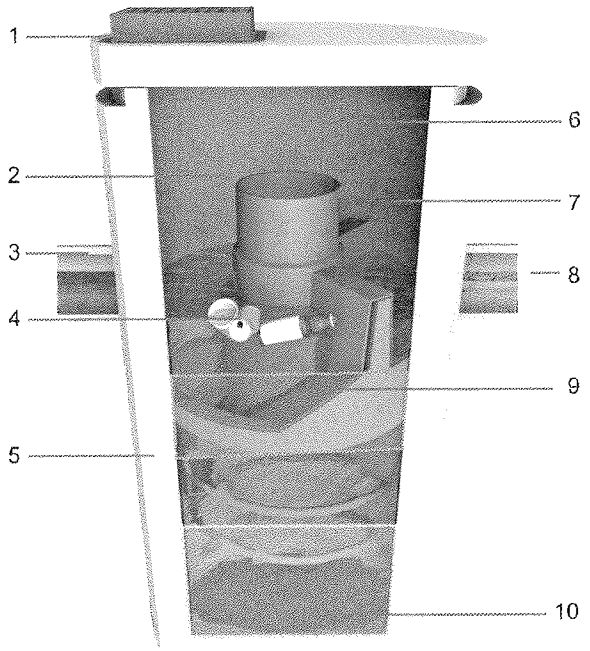


Fig.1 The First Defense® has internal components designed to efficiently capture pollutants and prevent washout at peak flows.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 500% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

How it Works

The First Defense® has internal components designed to remove and retain gross debris, total suspended solids (TSS) and hydrocarbons (Fig.1).

Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An integral bypass conveys infrequent peak flows directly to the outlet chute, eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

First Defense®

Maintenance

The First Defense® needs minimal maintenance, but like all structural best management practices maintenance is necessary for the long-term protection of the environment.

Sediments captured by the First Defense® are stored in the sump; floatable trash and hydrocarbons are stored on the surface of the standing water. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.2).

More information can be found in the First Defense® Operation and Maintenance Manual, available at http://www.hydro-int.com/us/products/first-defense.

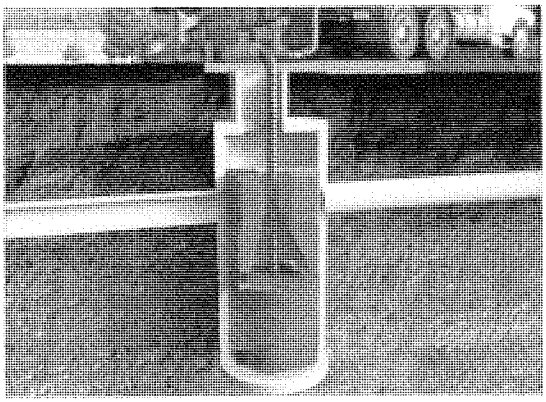


Fig.2 Maintenance is performed with a vactor truck.

First Defense® Sizing & Design

Design Options for Inlet and Internal Bypass Arrangements

For maximum flexibility the First Defense® inlet and internal bypass arrangements are available in two configurations (Fig.3a & 3b). Model parameters and design criteria are shown in Table 1.

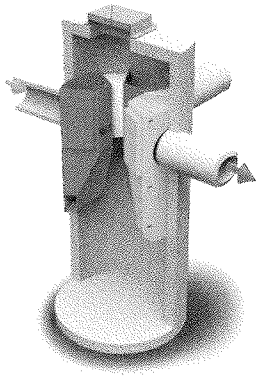


Fig.3a Inlet configurations for all models include options for inlet grates and multiple inlet pipes.

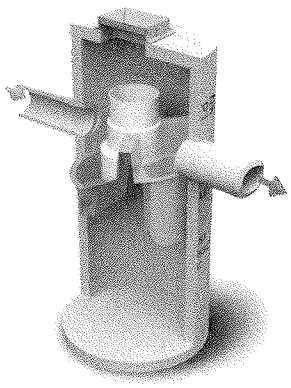


Fig.3b First Defense®-*HC* with higher capacity internal bypass and larger maximum pipe diameter.

Table 1. First Defense® Models and Design Criteria.

First Defense® Model Number	Diameter	Typical Flow Rates for TSS Treatment		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		106µm	230µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd³ / m³)	(ft / m)	(ft / m)
FD-4	4 / 1.2	0.7 / 20	1.2 / 34	6 / 170	18 / 450	180 / 681	1.3 / 1.0	3.1 / 1.1	5.47 / 1.7
FD-4HC				18 / 510	24 / 600	191 / 723		2.3 - 3.9 / 0.7 - 1.2	
FD-6	6 / 1.8	2.2 / 63	3.8 / 108	18 / 510	24 / 600	420 / 1,590	3.3 / 2.5	4.0 / 1.2	6.52 / 2.0
FD-6HC				32 / 906	30 / 750	496 / 1,878		3.0 - 5.1 / 0.9 - 1.6	

[1]Contact Hydro International when larger pipe sizes are required.

[2]Contact Hydro International when custom sediment storage capacity is required.

[3]The minimum distance for the 4HC and 6HC models depends on pipe diameter.

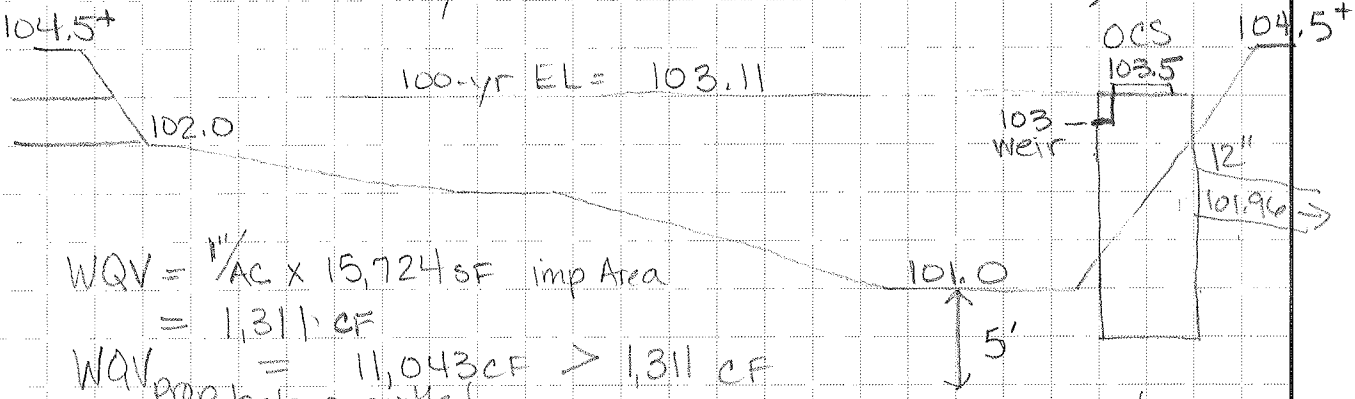
Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

McKENZIE ENGINEERING GROUP, INC.
150 Longwater Drive Suite 101
Norwell, Massachusetts 02061
Tel: 781.792-3900
Fax: 781.792-0333
Professional Civil Engineering • Land Planning • Project Management

JOB 214-122 Milton MA
SHEET NO. 10 OF
CALCULATED BY dwk DATE 2/18/15
CHECKED BY DATE
SCALE SMR Regulations

Prop Infiltration Basin: (DP1b)

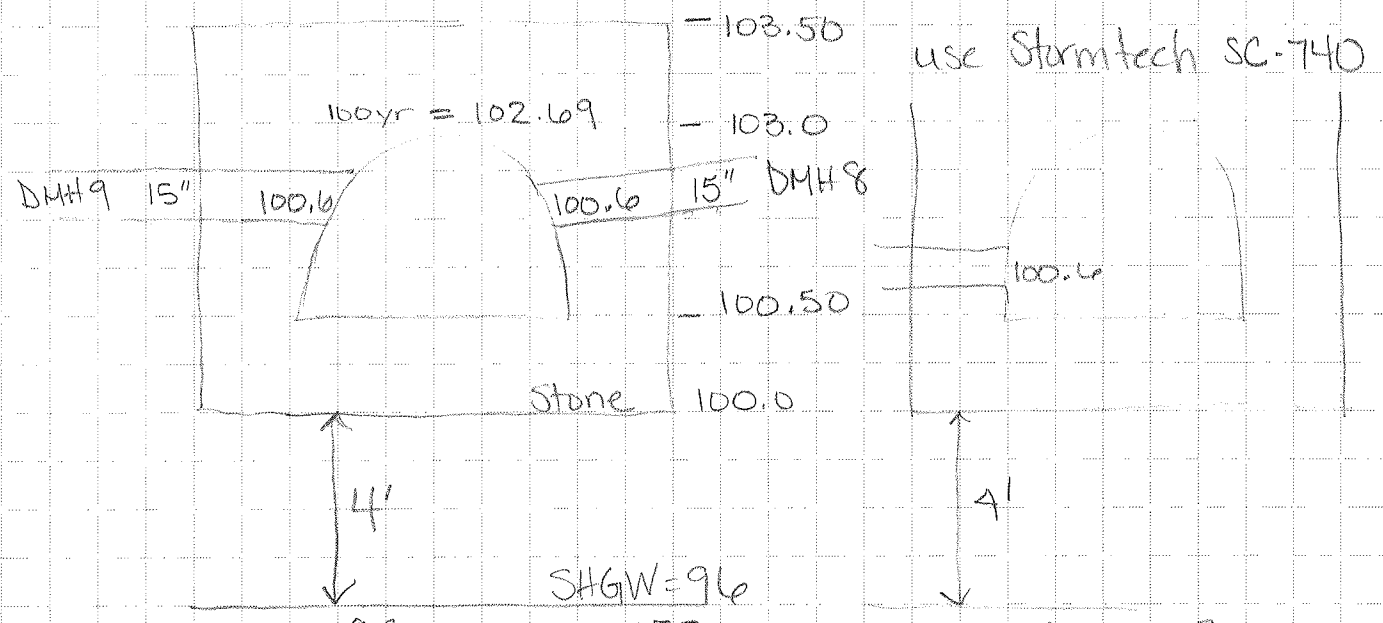
Pretreatment by PT3 (First Defense 4' dia FD-4)



WQV = 1"/Ac. x 15,724 sf imp Area
= 1,311 cf
$WQV_{prop\ below\ outlet}$ = 11,043cf > 1,311 cf
SHGW = 96.0 Sand
Use Loamy Sand for bottom basin = 2.41 in/hr.

Prop Subsurface Chamber Sys #1 (DP1)

Pretreatment by PT1 and PT2 – Isolator Rows



use Stormtech SC-740

SHGW = 96

9 Rows x 17 = 153 +
10 Rows x 3 = 30
= 186 total units

Sand = 8.27 in/hr.

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SHEET NO. 11 OF
CALCULATED BY dwk DATE 2/18/15
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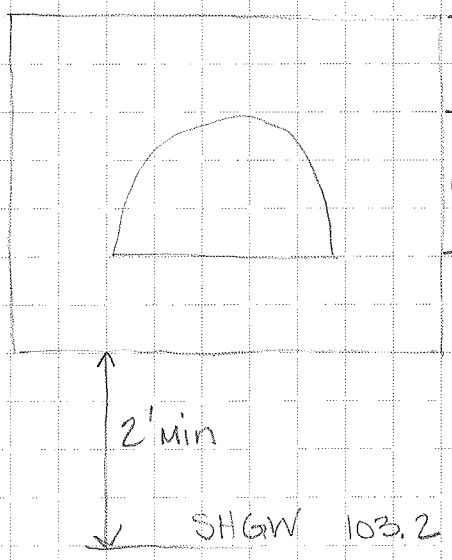
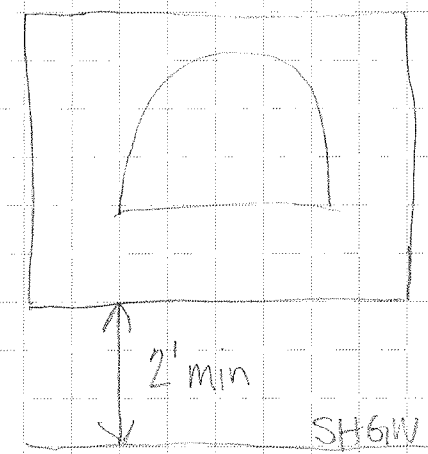
Prop. Subsurface Chamber Sys. #2 (P3b)
Pretreatment by PT4 (Isolator Row)



StormTech SC-310
6 rows x 9
= 54 units

Infiltration rate = 1.02 in/hr
Sandy Loam
Outlet = 106.30 inv.

Prop. Subsurface Chamber System #3 (P3a)
Along gravel walking path - no new impv. area.



5' x 288' stone
x 2.33' H

StormTech SC-310
1 Row x 40

107.33 = 1,438 sf
108.00 = 10,487 sf

Infiltration rate = 1.02 in/hr
Sandy Loam

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SCALE SMR Regulations

Drawdown Calculations (utilize complete 100-yr storm event since site is contained)

Infiltration basin:

$$Time_{dd} = \frac{R_V = \text{Full storm event}}{k\,(\text{bottom Area})}$$ greater than recharge vol.

P1B (infiltration basin)

$$Time_{dd} = \frac{11,043\,CF}{2.41\,in/hr\,(2,755\,SF)} = 20\,hrs < 72\,hrs. \checkmark$$
10 | 01

DP1 (subsurface Chambers)

$$Time_{dd} = \frac{14,417\,CF}{8.27\,in/hr\,(6,671\,SF)} = 3.1\,hrs < 72 \checkmark$$

P3B (subsurface Chambers)

$$Time_{dd} = \frac{651\,CF}{1.02\,in/hr\,(1,440\,SF)} = 5.4\,hrs. < 72 \checkmark$$

DP2 (Nat. Depression)

$$Time_{dd} = \frac{3057}{2.41\,(1630)} = 9.3\,hrs. < 72 \checkmark$$

DP3 (Nat. Dep.)

$$Time_{dd} = \frac{2055}{.52\,in/hr\,(2653)} = 17.9\,hr. < 72 \checkmark$$

DP4 (Nat. Dep.)

$$Time_{dd} = \frac{3926}{1.02\,in/hr\,(2056)} = 22.5\,hr. < 72 \checkmark$$

P3A (Nat. Dep.)

$$Time_{dd} = \frac{5691}{1.02\,in/hr.\,(1440)} = 46.5\,hr. < 72 \checkmark$$

Weighted Runoff Coefficients

Name:	865 Brush Hill Road Milton, MA	Proj. No.:	**214-122**
		Date:	**2/18/2015**
Client:	Northland Residential Corp.	Computed by:	**dwk**
		Checked by:	**awl**

CB 1

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.162	0.30	0.05
Impervious	0.198	0.90	0.18
Totals =	0.361		0.23

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.63**

CB 2

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.123	0.30	0.04
Impervious	0.338	0.90	0.30
Totals =	0.461		0.34

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.74**

CB 3

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.047	0.30	0.01
Impervious	0.145	0.90	0.13
Totals =	0.193		0.15

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.75**

CB 4

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.042	0.30	0.01
Impervious	0.060	0.90	0.05
Totals =	0.102		0.07

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.65**

CB 5

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.018	0.30	0.01
Impervious	0.161	0.90	0.14
Totals =	0.178		0.15

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.84**

CB 6

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.099	0.30	0.03
Impervious	0.211	0.90	0.19
Totals =	0.310		0.22

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.71**

CB 7

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.114	0.30	0.03
Impervious	0.464	0.90	0.42
Totals =	0.578		0.45

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.78**

CB 8

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.123	0.30	0.04
Impervious	0.298	0.90	0.27
Totals =	0.421		0.30

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.72**

CB 9

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.159	0.30	0.05
Impervious	0.300	0.90	0.27
Totals =	0.459		0.32

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.69**

CB 10

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.174	0.30	0.05
Impervious	0.223	0.90	0.20
Totals =	0.396		0.25

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.64**

CB 11

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.064	0.30	0.02
Impervious	0.018	0.90	0.02
Totals =	0.082		0.04

Weighted Runoff Coefficient = **Σ(AxC) / ΣA =** **0.43**

CB 12

Description of Area	Area (acres)	Runoff Coefficient	A x C
Pervious	0.004	0.30	0.00
Impervious	0.014	0.90	0.01
Totals =	0.017		0.01

Weighted Runoff Coefficient = **Σ(AxC)** / **ΣA =** **0.77**

Storm Drainage Computations

Name: 865 Brush Hill Road
Milton, MA

Client: Northland Residential Corp.

Proj. No.: **214-122**
Date: **13-May-15**
Computed by: **dwk**
Checked by: **awl**

Design Parameters:
7 **Year Storm** Boston, MA
100
k_b= **0.5**

DESCRIPTION	LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PROFILE						
	FROM	TO	(AC.)			C x A	PIPE	CONC TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER	W.S.E. ft	Freeboard ft
	CB4	DMH 11	0.102	0.65	0.07	0.07	0.04	5.0	7.3	0.5	3.0	0.013	12	0.0187	4.9	6.2	8	0.15	109.79	106.79	106.64	108.0	1.8
	CB5	DMH 11	0.178	0.84	0.15	0.15	0.07	5.0	7.3	1.1	3.4	0.013	12	0.0100	3.6	4.5	15	0.15	109.79	106.79	106.64	107.4	2.4
	DMH 11	SUB 2	---	---	---	0.22	0.01	5.1	7.3	1.6	4.8	0.013	12	0.0200	5.0	6.4	3	0.06	109.97	106.54	106.48	108.3	1.7
	SUB2	DMH3	---	---	---	0.22	0.10	5.1	7.3	1.6	5.5	0.013	12	0.0300	6.2	7.9	34	1.02	109.97	106.30	105.28	107.8	2.2
	HW1	DMH3	---	---	---	0.03	1.35	5.0	7.3	0.2	1.5	0.013	12	0.0050	2.5	3.2	122	0.61	106.00	104.85	104.24	105.8	0.2
	DMH3	DMH2	---	---	---	0.25	0.51	6.3	6.9	1.7	3.0	0.013	12	0.0050	2.5	3.2	91	0.46	110.65	104.24	103.78	105.1	5.6
	CB3	DMH2	0.193	0.75	0.15	0.15	0.13	5.0	7.3	1.1	4.2	0.013	12	0.0200	5.0	6.4	34	0.68	109.45	105.25	104.57	105.5	4.0
	CB1	DMH 1	0.361	0.63	0.23	0.23	0.04	5.0	7.3	1.7	4.9	0.013	12	0.0200	5.0	6.4	12	0.24	107.49	103.40	103.16	103.6	3.9
	CB2	DMH 1	0.461	0.74	0.34	0.34	0.01	5.0	7.3	2.5	5.4	0.013	12	0.0200	5.0	6.4	4	0.08	107.44	103.24	103.16	103.8	3.6
	DMH2	DMH1	---	---	---	0.39	0.78	6.9	6.8	2.7	3.7	0.013	12	0.0060	2.8	3.5	171	1.03	109.17	103.78	102.75	104.6	4.5
	DMH1	DMH10	---	---	---	0.96	0.36	7.6	6.6	6.3	5.5	0.013	15	0.0100	6.5	5.3	118	1.18	107.52	102.62	101.44	103.7	3.8
	DMH10	DMH 9	---	---	---	0.96	0.23	7.6	6.6	6.3	5.5	0.013	15	0.0100	6.5	5.3	76	0.76	106.25	101.44	100.68	102.5	3.7
	DMH 9	SUB1	---	---	---	0.96	0.00	8.0	6.5	6.2	5.5	0.013	15	0.0100	6.5	5.3	1	0.01	106.25	100.61	100.60	101.9	4.4
	CB6	PT 1	0.310	0.71	0.22	0.22	0.03	5.0	7.3	1.6	5.8	0.013	12	0.0355	6.7	8.5	10	0.36	107.48	103.78	103.42	103.8	3.7
	CB7	PT 1	0.578	0.78	0.45	0.45	0.05	5.0	7.3	3.3	5.8	0.013	12	0.0200	5.0	6.4	18	0.36	107.48	103.78	103.42	104.2	3.3
	PT 1	DMH4	---	---	---	0.67	0.09	5.0	7.3	4.9	6.7	0.013	12	0.0200	5.0	6.4	37	0.74	107.35	103.42	102.68	104.8	2.6
	HW2	DMH 4	---	---	---	0.20	0.71	5.0	7.3	1.5	3.1	0.013	12	0.0065	2.9	3.7	130	0.85	105.00	103.50	102.65	104.0	1.0
	DMH 4	HW3	---	---	---	0.87	0.06	5.1	7.3	6.3	5.5	0.013	15	0.0100	6.5	5.3	20	0.20	106.98	102.40	102.20	103.6	3.4
	CB8	DMH5	0.421	0.72	0.30	0.30	0.02	5.0	7.3	2.2	5.3	0.013	12	0.0200	5.0	6.4	5	0.10	104.63	101.77	101.67	101.9	2.7
	OCS	DMH 5	---	---	---	0.03	0.25	5.0	7.3	0.2	2.0	0.013	12	0.0100	3.6	4.5	29	0.29	103.50	101.96	101.67	102.8	0.7
	DMH 5	DMH 6	---	---	---	0.33	0.14	5.0	7.3	2.4	3.3	0.013	12	0.0050	2.5	3.2	29	0.15	104.82	101.67	101.52	103.0	1.9
	CB9	DMH 6	0.459	0.69	0.32	0.32	0.07	5.0	7.3	2.3	4.1	0.013	12	0.0100	3.6	4.5	17	0.17	104.64	101.69	101.52	102.9	1.7
	CB10	DMH 6	0.396	0.64	0.25	0.25	0.04	5.0	7.3	1.8	4.9	0.013	12	0.0200	5.0	6.4	12	0.24	104.57	101.76	101.52	102.3	2.3
	CB11	DMH7	0.082	0.43	0.04	0.04	0.11	5.0	7.3	0.3	1.6	0.013	12	0.0050	2.5	3.2	11	0.06	104.34	101.86	101.80	103.4	0.9
	CB12	DMH7	0.017	0.77	0.01	0.01	0.25	5.0	7.3	0.1	1.3	0.013	12	0.0100	3.6	4.5	20	0.20	104.52	102.00	101.80	102.9	1.6
	DMH7	DMH6	---	---	---	0.05	0.44	5.3	7.2	0.4	1.9	0.013	12	0.0060	2.8	3.5	50	0.30	104.66	101.80	101.50	103.7	0.9
	DMH 6	DMH 8	---	---	---	0.95	0.04	5.3	7.2	6.9	6.0	0.013	15	0.0120	7.1	5.8	16	0.19	104.97	101.50	101.30	103.7	1.2
	DMH 8	SUB1	---	---	---	0.95	0.00	5.3	7.2	6.9	6.0	0.013	15	0.0120	7.1	5.8	1	0.01	105.27	100.62	100.60	103.0	2.2

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 865 Brush Hill Road, Milton (Infiltration basin) (Sub 1, 2, & 3)

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
* Isolator Row or PTI **Oil Grit Separator**	0.25	0.75	0.19	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56

* First Defense Unit (PTI) or Isolator Row within Chamber Sys (Sub 1, 2, and 3)

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Pretreatment @ Least 44%

Project: 214-122
Prepared By: DWK
Date: 30-Jan-15

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 865 Brush Hill Road, Milton (Infiltration basin)

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 214-122
Prepared By: DWK
Date: 30-Jan-15

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 865 Brush Hill Road, Milton (Sub 1, 2 & 3)

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure *	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

* Pretreatment - Isolator Row

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 214-122
Prepared By: DWK
Date: 30-Jan-15

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

A P P E N D I X D

Soil Testing Data

Commonwealth of Massachusetts
City/Town of Milton

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

A. Facility Information

Milton NRC, LLC
Owner Name

865 Brush Hill Road
Street Address

Map B 12, Lots 8A & 8B
Map/Lot #

Milton
City

MA
State

02186
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (NRCS) (Source) 254B (Soil Map Unit)

Merrimac fine sandy loam
Soil Name

Few limitations for development
Soil Limitations

Gravelly glacial fluvial deposits
Geologic/Parent Material

Kame terrace
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1965 (Year Published/Source) USGS (Publication) Qkt (Map Unit)

4. Flood Rate Insurance Map

Above the 500-year flood boundary? ☒ Yes ☐ No
If Yes, continue to #5.

Within the 500-year flood boundary? ☐ Yes ☒ No

Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): Dec. 2014 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Milton

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

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

Deep Observation Hole Number: TP 1 | 12/2/14 (Date) | 8:45 AM (Time) | Cloudy 45° (Weather)

1. Location

Ground Elevation at Surface of Hole: 98.7+/- feet Latitude/Longitude: 42°14'33.4" / 71°06'59.3"

Description of Location: Woodland at front of residential lot

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5 (Slope (%))

Pine, oak, brush (Vegetation) | Kame terrace (Landform) | Bottom of slope (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	80'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit | 100" Depth Standing Water in Hole

Estimated Depth to High Groundwater: 52" inches 94.4 elevation

Commonwealth of Massachusetts
City/Town of Milton

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

C. On-Site Review (continued)

Deep Observation Hole Number: TP 1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-16"	O/A	10YR3/2				Sandy Loam	10%	15%	Crumb	Friable	
16"-24"	B	10YR5/3				Sandy Loam	10%	15%	Crumb	Friable	
24"-42"	C1	2.5Y5/4				Fine Sandy Loam	5%	5%	Blocky	Firm	
42"-110"	C2	2.5Y4/3	52"		Common	Sand	35-40%	30%	Single grain	Loose	Coarse Trace of silt

Additional Notes: Rounded coarse fragments throughout

Commonwealth of Massachusetts
City/Town of Milton

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

C. On-Site Review (continued)

Deep Observation Hole Number: TP 2 | 12/2/14 (Date) | 9:45 AM (Time) | Cloudy 45° (Weather)

1. Location

   Ground Elevation at Surface of Hole: 100.8+/- feet Latitude/Longitude: 42°14'34.1"/71°06'58.5"

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

   Pine, oak, brush (Vegetation) | Kame Terrace (Landform) | On slope (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	:>100' feet
Property Line	80'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit | 118" Depth Standing Water in Hole

   Estimated Depth to High Groundwater: 80" inches 94.1+/- elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-18"	A	10YR4/6				Sandy loam	5-10%	10%	Crumb	Friable	
18"-26"	B	10YR3/4				Sandy loam	5-10%	10%	Crumb	Friable	
26"-44"	C1	10YR5/3				Fine sandy loam	5%	<5%	Blocky	Firm	
44"-120"	C2	2.5Y3/3				Sand	35-40%	30%	Single grain	Loose	Semi-rounded coarse part.

Additional Notes: Depth to transitional mottling varies from 44" to 72" in deep observation test pit

Commonwealth of Massachusetts
City/Town of Milton

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

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #TP 1	Obs. Hole #TP 2
☐ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	inches	inches
☒ Depth to soil redoximorphic features (mottles)	52 inches	inches
☒ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	inches	80.3 inches

Weymouth 4 (Index Well Number) 11/25/14 (Reading Date)

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

Obs. Hole #		S_c	S_r	OW_c	OW_{max}	OW_r	S_h
Obs. Hole #	TP-2	S_c 9.83	S_r 9.2	OW_c 5.96	OW_{max} 4.39	OW_r 4.60	S_h 6.69

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

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

   ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 44 inches Lower boundary: 120 inches

   c. If no, at what depth was impervious material observed? Upper boundary: inches Lower boundary: inches

Commonwealth of Massachusetts
City/Town of Milton

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.

Signature of Soil Evaluator	Date: 12/2/14
Typed or Printed Name of Soil Evaluator / License #: Alan W. Loomis, #1405	Expiration Date of License: 6/30/16
Name of Board of Health Witness	Board of Health

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.

Commonwealth of Massachusetts
City/Town of Milton

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

A. Facility Information

Milton NRC, LLC
Owner Name

865 Brush Hill Road
Street Address

Map B 12, Lots 8A & 8B
Map/Lot #

Milton
City

MA
State

02186
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (NRCS) (Source) 254B (Soil Map Unit)

   Merrimac fine sandy loam (Soil Name) Few limitations for development (Soil Limitations)

   Gravelly glacial fluvial deposits (Geologic/Parent Material) Kame terrace (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1965 (Year Published/Source) USGS (Publication) Qkt (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.

   Within the 500-year flood boundary? ☐ Yes ☒ No

   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): Dec. 2014 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Milton

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

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

Deep Observation Hole Number: TP 3 | 12/2/14 (Date) | 10:20 AM (Time) | Cloudy 45° (Weather)

1. Location

   Ground Elevation at Surface of Hole: 100.5+/- feet Latitude/Longitude: 42°14'34.8" / 71°06'59.5"

   Description of Location: Woodland at front of residential lot

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

   Pine, oak, brush (Vegetation) | Kame terrace (Landform) | On slope (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	75'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit | 102" Depth Standing Water in Hole

   Estimated Depth to High Groundwater: 64" inches 95.2 elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-29"	O/A	10YR3/2				Sandy Loam	5-10%	10%	Crumb	Friable	
29"-37"	B	10YR3/4				Sandy Loam	5-10%	10%	Crumb	Friable	
37"-60"	C1	10YR5/3				Fine Sandy Loam	5%	<5%	Blocky	Firm	
60"-106"	C2	2.5Y4/3	64"		Common	Sand	35-40%	30%	Single grain	Loose	Semi-rounded stones

Additional Notes: Some transitional mottling at bottom of C1 horizon

Commonwealth of Massachusetts
City/Town of Milton

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

C. On-Site Review (continued)

Deep Observation Hole Number: TP 4 | 12/2/14 (Date) | 10:50 AM (Time) | Cloudy 45° (Weather)

1. Location

   Ground Elevation at Surface of Hole: 100.5+/- feet Latitude/Longitude: 42°14'34.1"/71°07'00.1"

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

   Pine, oak, brush (Vegetation) | Kame Terrace (Landform) | On slope (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	:>100' feet
Property Line	165'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit | 96" Depth Standing Water in Hole

   Estimated Depth to High Groundwater: 54" inches 96.0+/- elevation

Commonwealth of Massachusetts
City/Town of Milton

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

C. On-Site Review (continued)

Deep Observation Hole Number: TP 4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-24"	A	10YR3/2				Sandy loam	5-10%	10%	Crumb	Friable	
24"-34"	B	10YR3/4				Sandy loam	5-10%	10%	Crumb	Friable	
34"-78"	C1	10YR5/3	54"		Common	Fine sandy loam	5%	<5%	Blocky	Firm	
78"-114"	C2	2.5Y3/3				Sand	35-40%	30%	Single grain	Loose	Semi-rounded coarse part.

Additional Notes: Depth to transitional mottling varies from 58" to 68" in deep observation test pit

Commonwealth of Massachusetts
City/Town of Milton

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

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #TP 3	Obs. Hole #TP 4
☐ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	inches	inches
☒ Depth to soil redoximorphic features (mottles)	64 inches	54 inches
☒ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	inches	inches

Weymouth 4 (Index Well Number) 11/25/14 (Reading Date)

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

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

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

E. Depth of Pervious Material

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

      ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 60 inches Lower boundary: 106 inches

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Milton
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.

Signature of Soil Evaluator	12/2/14 Date
Alan W. Loomis, #1405 Typed or Printed Name of Soil Evaluator / License #	6/30/16 Expiration Date of License
Name of Board of Health Witness	Board of Health

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.

Commonwealth of Massachusetts
City/Town of Milton

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

A. Facility Information

Milton NRC, LLC
Owner Name

865 Brush Hill Road
Street Address

Map B 12, Lots 8A & 8B
Map/Lot #

Milton
City

MA
State

02186
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (NRCS) (Source) 254B (Soil Map Unit)

   Merrimac fine sandy loam (Soil Name)
   Few limitations for development (Soil Limitations)
   Gravelly glacial fluvial deposits (Geologic/Parent Material)
   Kame terrace (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1965 (Year Published/Source) USGS (Publication) Qkt (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.

   Within the 500-year flood boundary? ☐ Yes ☒ No

   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): Dec. 2014 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Milton

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

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

Deep Observation Hole Number: TP 5 | 12/2/14 (Date) | 11:25 AM (Time) | Cloudy 45° (Weather)

1. Location

Ground Elevation at Surface of Hole: 103.6+/- feet Latitude/Longitude: 42°14'32.5" / 71°07'00.5"

Description of Location: Woodland at front of residential lot

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Pine, oak, brush (Vegetation) | Kame terrace (Landform) | On slope (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	105'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

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

Estimated Depth to High Groundwater: See TP 1 – TP 4 inches elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-12"	A	10YR3/2				Sandy Loam	10-15%	15%	Crumb	Friable	
12"-26"	B	10YR3/4				Sandy Loam	15-20%	20%	Crumb	Friable	
26"-126"	C1	2.5Y4/3				Sand	35-40%	35%	Single grain	Loose	Rounded to sub-rounded

Additional Notes: Some transitional color at 78". Not consistent around entire test pit.

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 6 | 12/2/14 (Date) | 12:30 PM (Time) | Cloudy 45° (Weather)

1. Location

Ground Elevation at Surface of Hole: 105.0+/- feet Latitude/Longitude: 42°14'35.8"/71°06'58.1"

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Pine, oak, brush (Vegetation) | Kame Terrace (Landform) | On slope (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	:>100' feet
Property Line	110'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

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

Estimated Depth to High Groundwater: See TP 1 – TP 4 inches elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-11"	A	7.5YR2.5/2				Sandy loam	15-20%	20%	Crumb	Friable	
11"-17"	B	10YR3/4				Loam sand	25-30%	25%	Crumb	Friable	
17"-120"	C1	2.5Y4/3				Sand	35-40%	40%	Single grain	Loose	Rounded to sub-rounded

Additional Notes:

Commonwealth of Massachusetts
City/Town of Milton

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

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #TP 5	Obs. Hole #TP 6
☐ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	inches	inches
☐ Depth to soil redoximorphic features (mottles)	inches	inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	See TP 1 – TP 4 inches	See TP 1 – TP 4 inches

Index Well Number _____ Reading Date _____

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

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

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

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

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

   ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 17 inches Lower boundary: 106 Inche

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Milton
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.

Signature of Soil Evaluator

12/2/14
Date

Alan W. Loomis, #1405
Typed or Printed Name of Soil Evaluator / License #

6/30/16
Expiration Date of License

Name of Board of Health Witness

Board of Health

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.

Commonwealth of Massachusetts
City/Town of Milton

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

A. Facility Information

Milton NRC, LLC
Owner Name

865 Brush Hill Road
Street Address

Map B 12, Lots 8A & 8B
Map/Lot #

Milton
City

MA
State

02186
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (NRCS) (Source) 254B (Soil Map Unit)

   Merrimac fine sandy loam (Soil Name)
   Few limitations for development (Soil Limitations)
   Gravelly glacial fluvial deposits (Geologic/Parent Material)
   Kame terrace (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1965 (Year Published/Source) USGS (Publication) Qkt (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.

   Within the 500-year flood boundary? ☐ Yes ☒ No

   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): Dec. 2014 (Month/Year)
   Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Milton

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

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

Deep Observation Hole Number: TP 7 | 12/2/14 (Date) | 1:50 PM (Time) | Cloudy 45° (Weather)

1. Location

Ground Elevation at Surface of Hole: 103.6+/- feet Latitude/Longitude: 42°14'33.6" / 71°07'00.9"

Description of Location: Woodland at front of residential lot

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Pine, oak, brush (Vegetation) | Kame terrace (Landform) | On slope (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	175'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

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

Estimated Depth to High Groundwater: See TP 1 – TP 4 inches elevation

Commonwealth of Massachusetts
City/Town of Milton

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

C. On-Site Review (continued)

Deep Observation Hole Number: TP 7

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-13"	A	10YR2/2				Sandy Loam	15-20%	20%	Crumb	Friable	
13"-26"	B	10YR3/4				Sandy Loam	10-15%	15%	Crumb	Friable	
26"-53"	C1	10YR5/3				Fine sandy Loam	5%	<5%	Blocky	Firm	
53"-114"	C2	2.5Y3/4				Sand	35-40%	35%	Single grain	Loose	Rounded to sub-rounded

Additional Notes:

Commonwealth of Massachusetts
City/Town of Milton

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

C. On-Site Review (continued)

Deep Observation Hole Number: TP 8 | 12/2/14 (Date) | 2:20 PM (Time) | Cloudy 45° (Weather)

1. Location

   Ground Elevation at Surface of Hole: 105.3+/- feet Latitude/Longitude: 42°14'35.7"/71°07'05.2"

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

   Pine, oak, brush (Vegetation) | Kame Terrace (Landform) | On slope (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	:>100' feet
Property Line	35'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit | 68" Depth Standing Water in Hole

   Estimated Depth to High Groundwater: 30" inches 102.8+/- elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 8

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-13"	A	10YR2/2				Sandy loam	10-15%	15%	Crumb	Friable	
13"-28"	B	10YR3/2				Sandy loam	20-25%	25%	Crumb	Friable	
28"-72"	C1	10YR3/3	30"		Common	Loamy sand	35-40%	35%	Single grain	Cemented	Coarse

Additional Notes: Soil is cemented together, very gravelly & stony.

Commonwealth of Massachusetts
City/Town of Milton

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

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #TP 7	Obs. Hole #TP 8
☐ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	inches	inches
☒ Depth to soil redoximorphic features (mottles)	inches	30" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	See TP 1 – TP 4 inches	inches

Index Well Number _____ Reading Date _____

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

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

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

E. Depth of Pervious Material

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

      ☒ Yes ☐ No

   b. If yes, at what depth was it observed? Upper boundary: 53 inches Lower boundary: 114 Inche

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Milton
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.

Signature of Soil Evaluator	12/2/14 Date
Alan W. Loomis, #1405 Typed or Printed Name of Soil Evaluator / License #	6/30/16 Expiration Date of License
Name of Board of Health Witness	Board of Health

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.

Commonwealth of Massachusetts
City/Town of Milton

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

A. Facility Information

Milton NRC, LLC
Owner Name

865 Brush Hill Road
Street Address

Map B 12, Lots 8A & 8B
Map/Lot #

Milton
City

MA
State

02186
Zip Code

B. Site Information

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

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web Soil Survey (NRCS) (Source) 254B (Soil Map Unit)

   Merrimac fine sandy loam (Soil Name) Few limitations for development (Soil Limitations)

   Gravelly glacial fluvial deposits (Geologic/Parent Material) Kame terrace (Landform)

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1965 (Year Published/Source) USGS (Publication) Qkt (Map Unit)

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   If Yes, continue to #5.

   Within the 500-year flood boundary? ☐ Yes ☒ No

   Within the 100-year flood boundary? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

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

7. Current Water Resource Conditions (USGS): Dec. 2014 (Month/Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

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

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

Deep Observation Hole Number: TP 9 | 12/2/14 (Date) | 3:10 PM (Time) | Cloudy 45° (Weather)

1. Location

Ground Elevation at Surface of Hole: 104.7+/- feet Latitude/Longitude: 42°14'34.1" / 71°07'06.6"

Description of Location: Woodland at rear of residential lot

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

Pine, oak, brush (Vegetation) | Kame terrace (Landform) | On slope (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	120'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit | 72" Depth Standing Water in Hole

Estimated Depth to High Groundwater: 18" inches 103.2+/- elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 9

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-16"	A	10YR2/1				Loam	0-5%	0-5%	Crumb	Very friable	High % organic
16"-20"	B	10YR4/3	18"		Common	Sandy loam	5-10%	5%	Crumb	Friable	
20"-48"	C1	2.5Y6/2				Sandy loam	5-10%	5%	Blocky	Firm	Gleyed
48"-72"	C2	2.5Y4/3				Sandy loam	5-10%	10%	Single grain	Loose	
72"-84"	C3	2.5Y3/4				Sand	25-30%	25%	Single grain	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Milton

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

C. On-Site Review (continued)

Deep Observation Hole Number: TP 10 | 12/2/14 (Date) | 4:00 PM (Time) | Cloudy 45° (Weather)

1. Location

   Ground Elevation at Surface of Hole: 103.0+/- feet Latitude/Longitude: 42°14'34.7"/71°07'02.1"

2. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Common (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 1-3% (Slope (%))

   Pine, oak, brush (Vegetation) | Kame Terrace (Landform) | On slope (Position on Landscape (SU, SH, BS, FS,

3. Distances from:

Open Water Body	>100' feet	Drainage Way	>100' feet	Wetlands	:>100' feet
Property Line	210'+/- feet	Drinking Water Well	>100' feet	Other	feet

4. Parent Material: Gravelly glacial fluvial deposits Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

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

   Estimated Depth to High Groundwater: See TP 4 inches | elevation

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP 10

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
	A					Sandy loam					
	B					Sandy loam					
	C1					Fine sandy loam					
	C2					Sand					

Additional Notes: Too dark to properly assess soils. Similar to TP 7.

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

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #TP 9	Obs. Hole #TP 10
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	18 inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

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

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

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

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material
   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?
      ☐ Yes ☐ No
   b. If yes, at what depth was it observed? Upper boundary: _____ inches Lower boundary: _____ Inche
   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Milton
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

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Signature of Soil Evaluator	12/2/14 Date
Alan W. Loomis, #1405 Typed or Printed Name of Soil Evaluator / License #	6/30/16 Expiration Date of License
Name of Board of Health Witness	Board of Health

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