

November 6, 2025

Town of Reading
Conservation Commission

**Re: Small Lane Extension, Reading
Drainage Design**

This drainage study was conducted for the proposed roadway extension of Small Lane to access one house lot. This report is intended to accompany a Definitive Subdivision Plan Set prepared by Sullivan Engineering Group, LLC dated September 21, 2025, revised Nov. 6, 2025

Soil testing was conducted on-site on 11/5/2019 by John D. Sullivan III, P.E. Soil testing was conducted in four locations (testhole locations shown on the Site Plan). All testholes show highly suitable soils for groundwater recharge (coarse sand).

The proposed drainage system consists of a pair of deep sump/hooded catchbasins, stormceptor, and Retain-It precast concrete units. The proposed house/porch will have its own onsite drainage system consisting of Retain-It Units. The soils are highly suitable for groundwater recharge (sand with a Rawl's Rate of 8.27 in/hr). The site was designed as "new construction" with only a small portion of the site being redevelopment (to be discussed later in this letter). The precipitation data for each storm event were taken from the National Oceanic & Atmospheric Administration's Atlas 14, Volume 10. The detention basin is situated 2 feet above the seasonal high groundwater. The proposed site development of Lot A is shown and is included in the drainage design analysis.

The HydroCAD report models the Predevelopment Condition vs. Postdevelopment Condition for the entire site area. The stormwater design reduces the peak rate of runoff and volume for the 2, 10, 25, & 100 year storm event. The following is summary of the peak rate of runoff for various storm events at each Design Point.

Design Point 1 (HydroCAD symbol – Link "1L")

<u>Storm Event</u>	Predevelopment		Postdevelopment	
	Peak Rate (cfs)	Volume (AF)	Peak Rate (cfs)	Volume (AF)
2 Year	0.00	0.00	0.00	0.00
10 Year	0.01	0.004	0.00	0.00
25 Year	0.05	0.016	0.01	0.005
100 Year	0.31	0.048	0.20	0.02

Design Point 2 (HydroCAD symbol – Link “2L)

<u>Storm Event</u>	Predevelopment		Postdevelopment	
	Peak Rate (cfs)	Volume (AF)	Peak Rate (cfs)	Volume (AF)
2 Year	0.00	0.00	0.00	0.00
10 Year	0.00	0.00	0.00	0.00
25 Year	0.01	0.006	0.01	0.004
100 Year	0.12	0.028	0.08	0.019

In the post development scenario, there is a small subcatchment that will drain back to the existing catchbasins in Small Lane. This area is predominately paved (therefore this portion of the project could be considered “redevelopment”). This subcatchment was modeled and the HydroCAD symbol – Link “3L” was used. It is my opinion that the flow back to the Small Lane catchbasins is “de minimis” (i.e. the 2 year storm contributes 0.12 cfs of peak flow to the existing catchbasins). Additionally, this area is extremely small in comparison of the full watershed.

HydroCAD calculations are attached which show that the infiltration fields are sized properly for the various storm events. The soil logs for this project are provided on the Existing Conditions Plan in the Civil set.

The following are part of this report:

- 1) NRCS soil map & descriptions
- 2) TSS removal worksheet
- 3) Mounding Analysis
- 4) Average Annual Load of Total Phosphorus worksheet
- 5) Operation & Maintenance Plan

The following will be provided prior to construction:

- 1) Construction Period Pollution Prevention/Erosion & Sedimentation Control plan (Stormwater Standard #8)
- 2) Illicit Discharge Statement (Stormwater Standard #10)

Very Truly Yours,

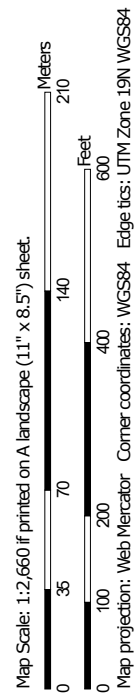


John (Jack) D. Sullivan III, PE

Soil Map—Middlesex County, Massachusetts



Soil Map may not be valid at this scale.



MAP LEGEND

- Area of Interest (AOI)
- Area of Interest (AOI)
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points
- Special Point Features**
 - Blowout
 - Borrow Pit
 - Clay Spot
 - Closed Depression
 - Gravel Pit
 - Gravelly Spot
 - Landfill
 - Lava Flow
 - Marsh or swamp
 - Mine or Quarry
 - Miscellaneous Water
 - Perennial Water
 - Rock Outcrop
 - Saline Spot
 - Sandy Spot
 - Severely Eroded Spot
 - Sinkhole
 - Slide or Slip
 - Sodic Spot
- Water Features**
 - Streams and Canals
- Transportation**
 - Rails
 - Interstate Highways
 - US Routes
 - Major Roads
 - Local Roads
- Background**
 - Aerial Photography
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
 Survey Area Data: Version 22, Sep 9, 2022

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	0.1	0.2%
51A	Swansea muck, 0 to 1 percent slopes	23.9	64.8%
52A	Freetown muck, 0 to 1 percent slopes	0.2	0.5%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	0.2	0.7%
255B	Windsor loamy sand, 3 to 8 percent slopes	0.5	1.3%
256B	Deerfield loamy fine sand, 3 to 8 percent slopes	1.3	3.4%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	2.6	7.1%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	8.0	21.7%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	0.1	0.2%
Totals for Area of Interest		36.9	100.0%

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: Small Lane Ext, Reading

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Subsurface Infiltration Structure	0.80	0.56	0.45	0.11
	0.00	0.11	0.00	0.11
	0.00	0.11	0.00	0.11

Separate Form Needs to be Completed for Each Outlet or BMP Train

Total TSS Removal = 89%

Project:
 Prepared By: JDS
 Date: 11/6/2025

*Equals remaining load from previous BMP (E) which enters the BMP

TSS Removal Calculation Worksheet

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

GKOUNDWAI EK MOUNDU UNDEK A KE CI ANGULAK KECHARGE AKEA Using the Hantush (1967) Derivation**Inputs** **w (Percolation Rate):** **[L/T]K (Hydraulic Conductivity):** **[L/T]S****(Specific Yield):** **[-]t(Time):** **[T]h_i****(Initial Saturated Thickness):** **[L]a (Length of Recharge Area):** **[L]b****(Width of Recharge Area):** **[L]******KEEP UNITS CONSISTENT******Calculate****Results******Note that because of estimations of an integral function, this is an estimate******Maximum hydraulic head:** **[L]Increase in hydraulic head:** **[L]**

Therefore a mound of 0.39 ft will not encroach the storage capacity of the infiltration system.

Total Phosphorus Removal - MS4 worksheet

Planning Level Analysis

The purpose of this tool is to provide decision-makers a comprehensive overview of stormwater management opportunities in a given watershed. The tool will characterize the watershed characteristics and opportunities for applying a variety of BMP technologies to various source areas based on land use, soils, and impervious cover. There are two approaches of the planning-level analysis tool:

- 1: BMP Storage Capacity** – to evaluate the changes in hydrologic and water quality benefits as the BMP/LID sizes are increased in fixed increments; and
- 2: BMP Drainage Area** – to determine how much impervious area would require treatment if specified BMP design capacities are selected for each HRU type to be treated.

1. Management Objective		
Select Pollutant Type ->	TP	Total BMP Cost (\$)
Enter Target Load Reduction (%) ->	60.0%	Total Pollutant Load Reduction (%)
		\$22,300
		82.6%

2. Optimization Target	
Select an option ->	Total BMP Storage Capacity (gal)
	48,406

3. Watershed Information	
Enter Land Use Area ->	Total Impervious Area (ac)
Click Here	0.3

4. BMP Information	
Enter Drainage Area ->	Total Treated Impervious Area (ac)
Click Here	0.3

5. Optimal Solution						
BMP Type	Design Storage Capacity (ft ³)	BMP Cost (\$)	Treated Impervious Area (ac)	O&M (hr/yr)	Load Reduction (lbs)	Treated Runoff Depth (in)
Biofiltration with ISR	-	\$	-	-	-	-
Bioretention	-	\$	-	-	-	-
Dry Pond	-	\$	-	-	-	-
Grass Swale*	-	\$	-	-	-	-
Gravel Wetland	-	\$	-	-	-	-
Infiltration Basin	6,471	22,300	0.30	-	0.25	0.50
Infiltration Chambers*	-	\$	-	-	-	-
Infiltration Trench	-	\$	-	-	-	-
Porous Pavement*	-	\$	-	-	-	-
Sand Filter	-	\$	-	-	-	-
Wet Pond	-	\$	-	-	-	-

Note: Only fill in the yellow highlighted cells.

* Place holder for future option (not implemented)

[Run Single Scenario](#)

[Run Optimize Scenario](#)

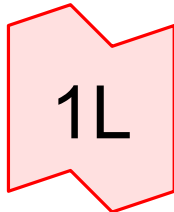
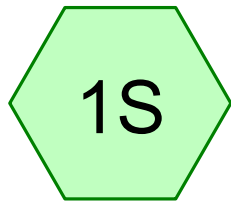
[Return to Home Page](#)

**Post-Construction
Small Lane Extension, Reading
Stormwater Maintenance Plan**

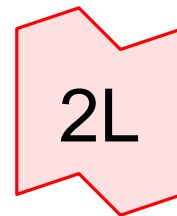
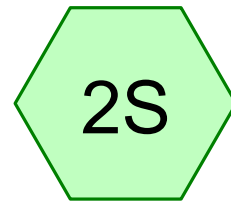
Beginning with the construction of the drainage system, and continuing in perpetuity thereafter, the owner(s) of the site shall maintain in accordance with the following schedule:

Joe Marino is the party responsible for the operation and maintenance of the site and drainage system within the development.. Since this development and drainage system will remain privately owned.

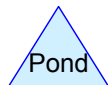
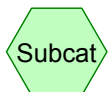
- a. Roadway sweeping – Pavement shall be swept in the early spring immediately after snow melt and at least twice other times annually.
- b. Paving and curbing – Paving and curbing shall be maintained in good condition to channel surface runoff into the onsite catchbasins.
- c. Roof drain inlets, downspouts, and roof drain pipes - All components of the roof drain collection system shall be inspected at least 3 times per year. Sediments and debris shall be removed and disposed of in accordance with all applicable federal, state, and local laws. Any components that become damaged shall be repaired or replaced immediately upon discovery to assure proper conveyance of stormwater runoff into the drywell systems.
- d. Retain-It precast concrete modules – The level of water in the Retain-it modules shall be monitored during and after heavy rain storms at least 3 times per year during the first year of operation and at least twice annually thereafter for evidence of clogging or other problems. If water does not leave the modules within 72 hours after the storm, or if water breaks out on the surface above the system, or if the roof collection system begins to overflow frequently (for the 10 year storm intensity or less intense storms), the infiltration bed is likely clogged. The infiltration bed shall be cleaned and repaired or replaced as needed to maintain proper functioning.
- e. The stormceptor catchbasin unit shall be inspected at least 3 times per year. Maintenance to the stormceptor unit shall be in accordance with the manufacturer’s guidance.
- f. Vegetation shall be maintained in healthy condition to prevent erosion and sedimentation in the drainage system and wetland resource areas.



Total Offsite - Northerly
Wetland @ Crossing



Total Offsite- Easterly
Wetland



Predevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

Prepared by Sullivan Engineering Group, LLC

Page 2

HydroCAD® 7.00 s/n 001433 © 1986-2003 Applied Microcomputer Systems

11/6/2025

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S:

Runoff Area=36,743 sf Runoff Depth=0.00"

Flow Length=279' Tc=12.1 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment 2S:

Runoff Area=37,180 sf Runoff Depth=0.00"

Flow Length=212' Tc=10.0 min CN=30 Runoff=0.00 cfs 0.000 af

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow=0.00 cfs 0.000 af

Primary=0.00 cfs 0.000 af

Link 2L: Total Offsite- Easterly Wetland

Inflow=0.00 cfs 0.000 af

Primary=0.00 cfs 0.000 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"

Predevelopment

Subcatchment 1S:

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

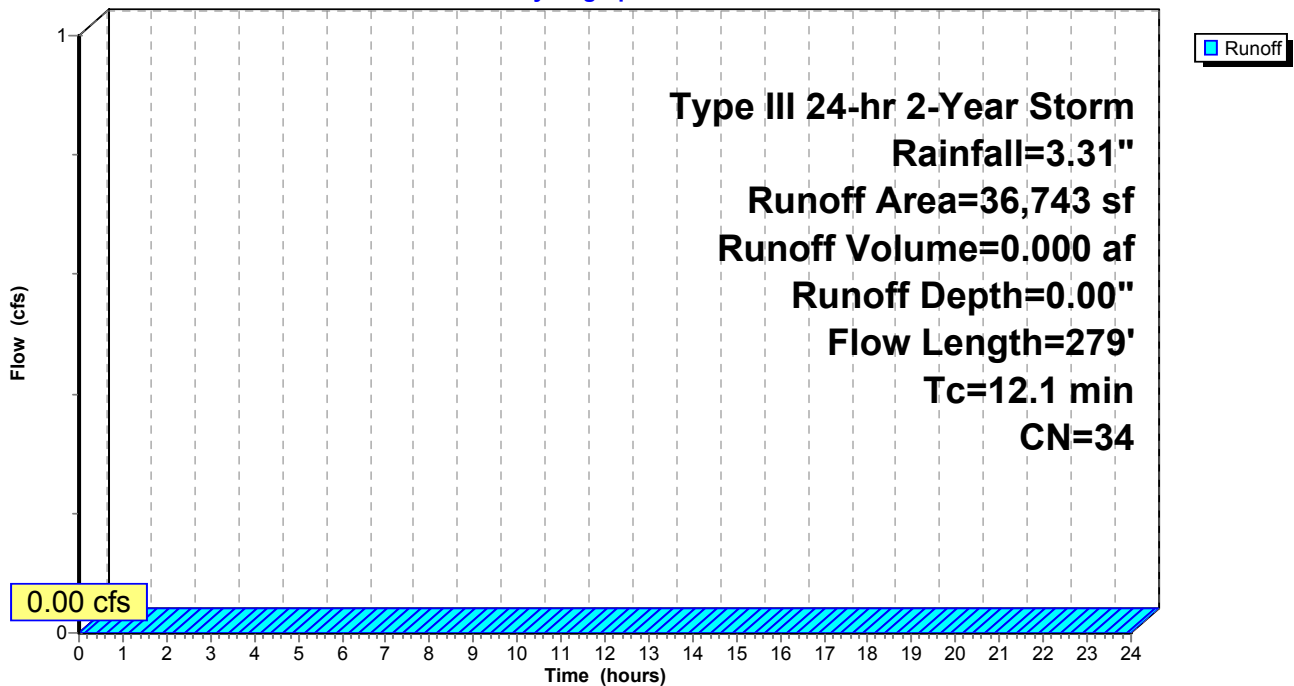
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Storm Rainfall=3.31"

Area (sf)	CN	Description
34,749	30	Woods, Good, HSG A
1,994	98	Pavement
36,743	34	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.31"
0.6	61	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.7	168	0.0230	0.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	279	Total			

Subcatchment 1S:

Hydrograph



Predevelopment

Prepared by Sullivan Engineering Group, LLC
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Type III 24-hr 2-Year Storm Rainfall=3.31"

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Subcatchment 2S:

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

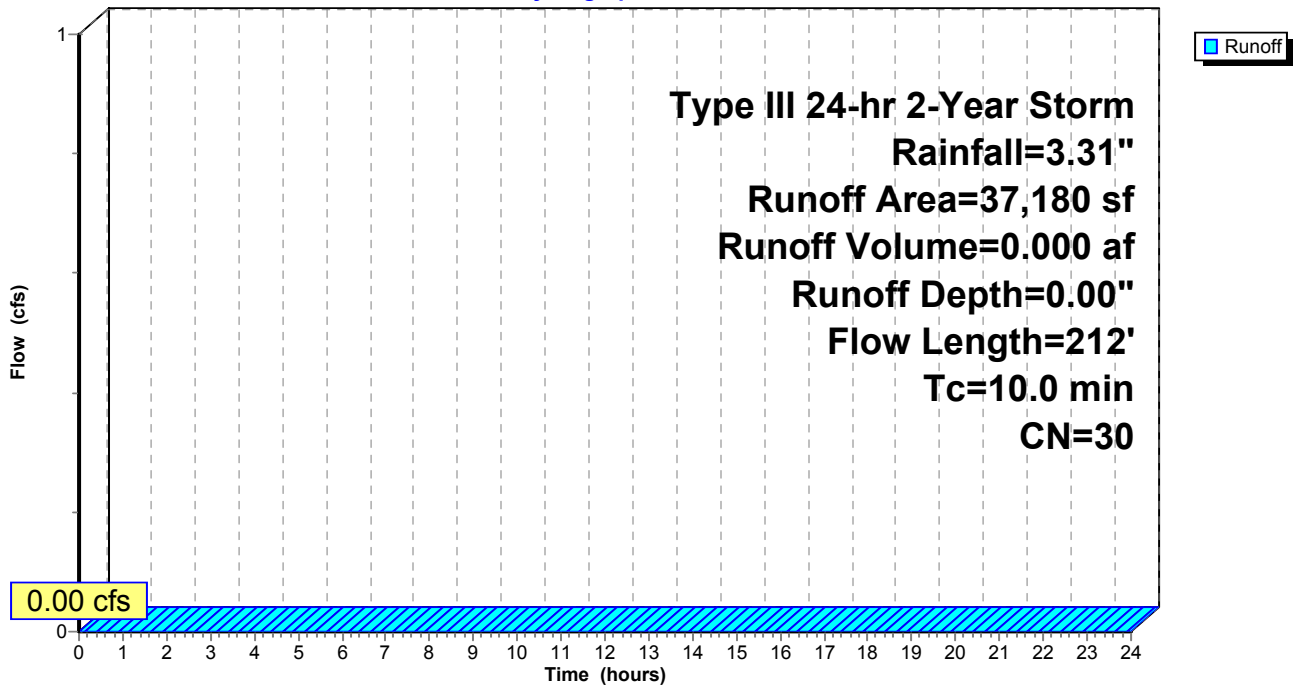
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Storm Rainfall=3.31"

Area (sf)	CN	Description
37,180	30	Woods, Good, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1380	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.31"
0.8	47	0.0400	1.0		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.0	6	0.5000	3.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	109	0.0100	0.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.0	212	Total			

Subcatchment 2S:

Hydrograph



Predevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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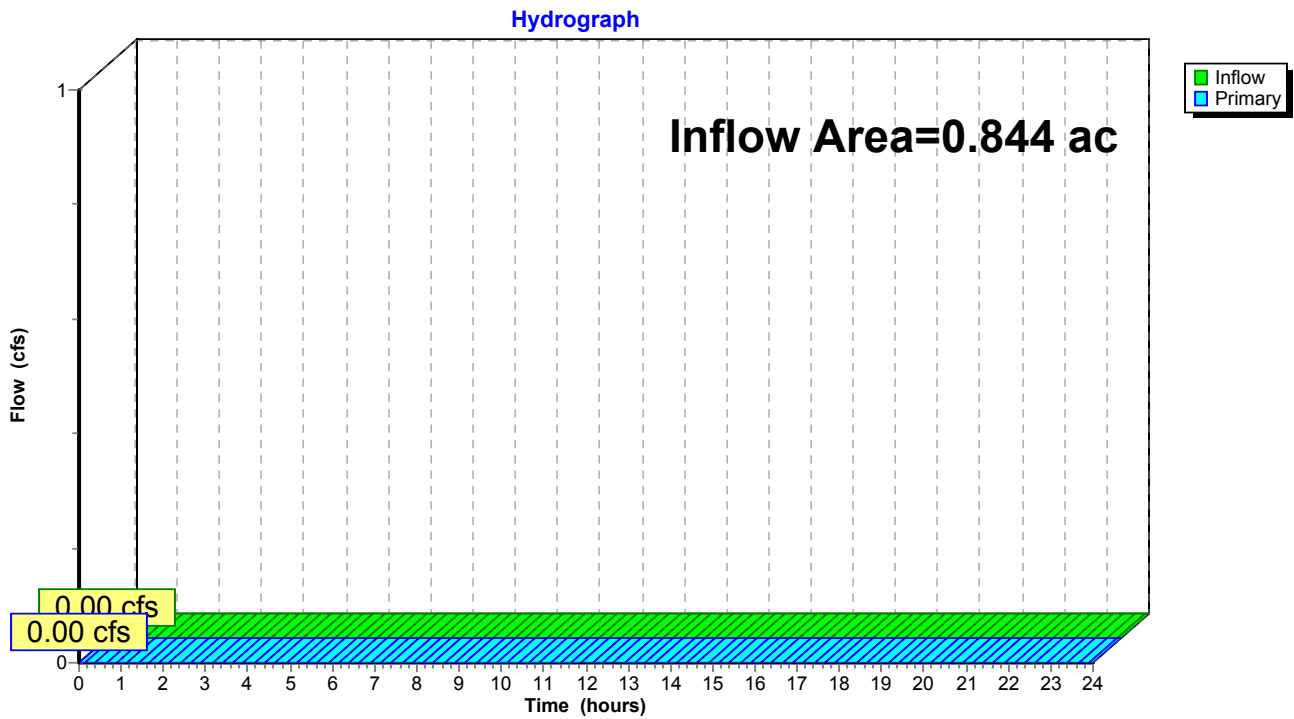
11/6/2025

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow Area = 0.844 ac, Inflow Depth = 0.00" for 2-Year Storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite - Northerly Wetland @ Crossing



Predevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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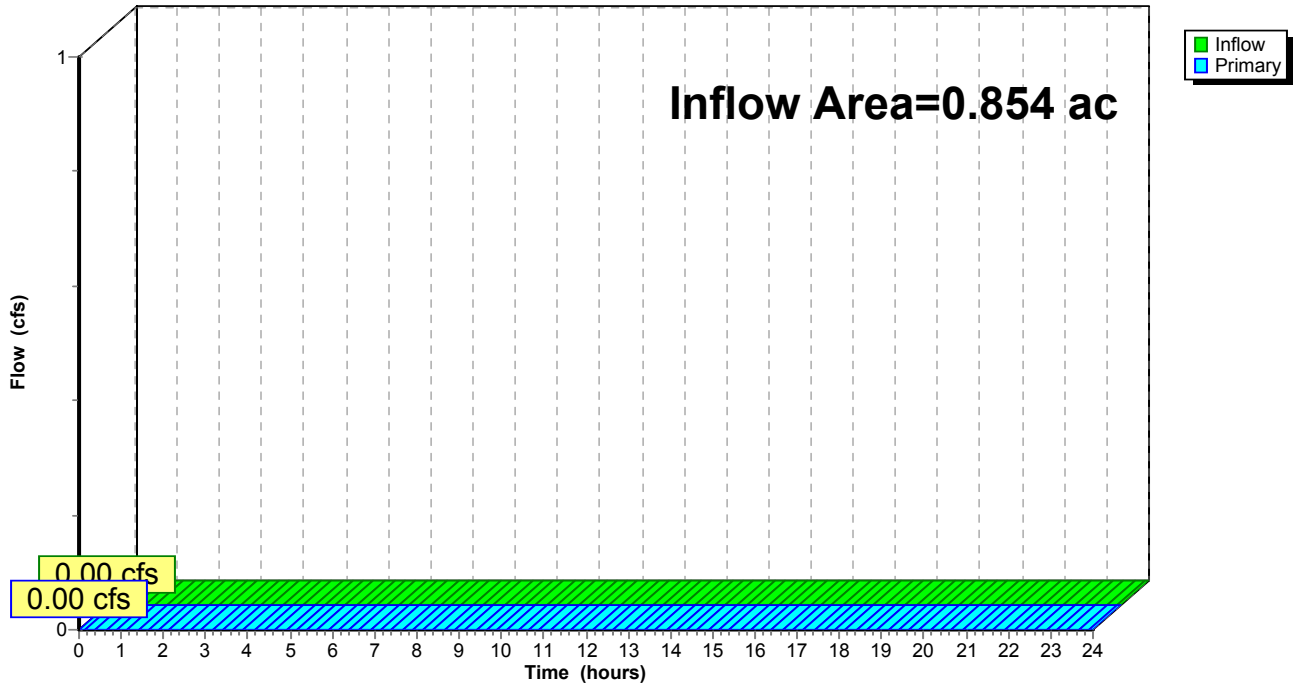
Link 2L: Total Offsite- Easterly Wetland

Inflow Area = 0.854 ac, Inflow Depth = 0.00" for 2-Year Storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite- Easterly Wetland

Hydrograph



Predevelopment

Type III 24-hr 10-Year Storm Rainfall=5.22"

Prepared by Sullivan Engineering Group, LLC

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S:

Runoff Area=36,743 sf Runoff Depth=0.09"

Flow Length=279' Tc=12.1 min CN=34 Runoff=0.01 cfs 0.006 af

Subcatchment 2S:

Runoff Area=37,180 sf Runoff Depth=0.01"

Flow Length=212' Tc=10.0 min CN=30 Runoff=0.00 cfs 0.001 af

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow=0.01 cfs 0.006 af

Primary=0.01 cfs 0.006 af

Link 2L: Total Offsite- Easterly Wetland

Inflow=0.00 cfs 0.001 af

Primary=0.00 cfs 0.001 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.007 af Average Runoff Depth = 0.05"

Predevelopment

Subcatchment 1S:

Runoff = 0.01 cfs @ 15.25 hrs, Volume= 0.006 af, Depth= 0.09"

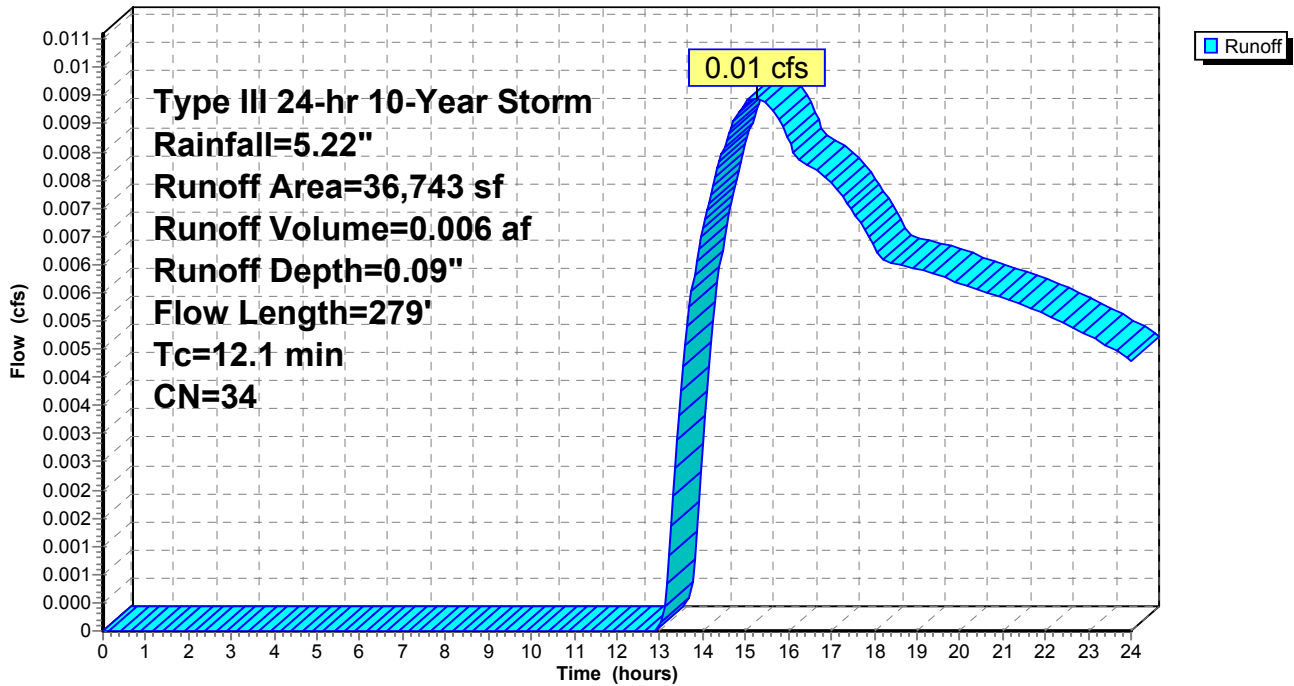
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Storm Rainfall=5.22"

Area (sf)	CN	Description
34,749	30	Woods, Good, HSG A
1,994	98	Pavement
36,743	34	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.31"
0.6	61	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.7	168	0.0230	0.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	279	Total			

Subcatchment 1S:

Hydrograph



Predevelopment

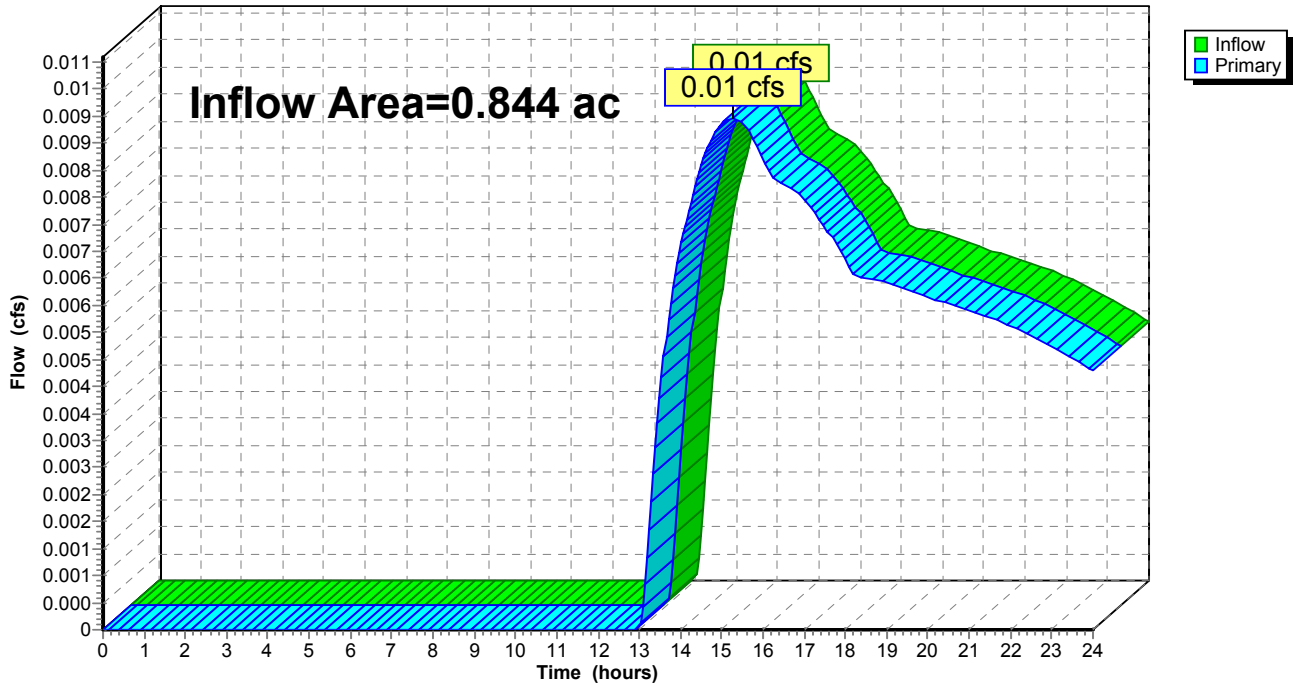
Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow Area = 0.844 ac, Inflow Depth = 0.09" for 10-Year Storm event
Inflow = 0.01 cfs @ 15.25 hrs, Volume= 0.006 af
Primary = 0.01 cfs @ 15.25 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Hydrograph



Predevelopment

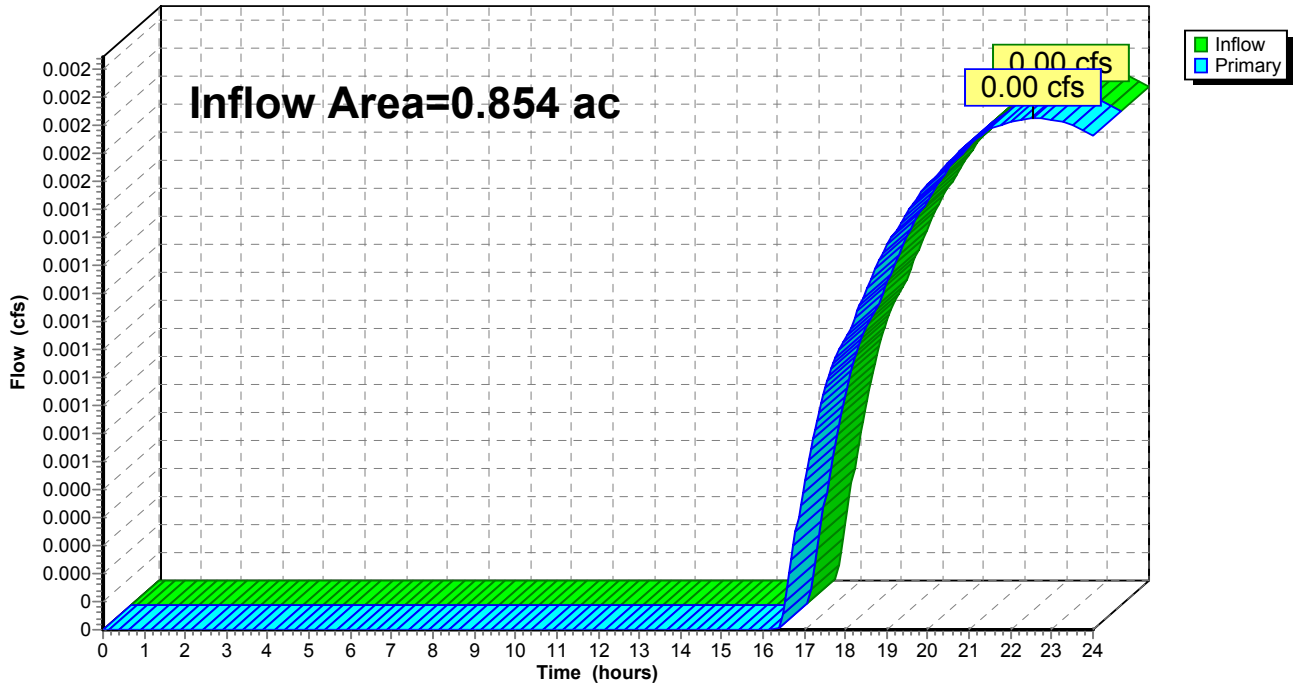
Link 2L: Total Offsite- Easterly Wetland

Inflow Area = 0.854 ac, Inflow Depth = 0.01" for 10-Year Storm event
Inflow = 0.00 cfs @ 22.53 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 22.53 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite- Easterly Wetland

Hydrograph



Predevelopment

Type III 24-hr 25-Year Storm Rainfall=6.41"

Prepared by Sullivan Engineering Group, LLC

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S:

Runoff Area=36,743 sf Runoff Depth=0.29"

Flow Length=279' Tc=12.1 min CN=34 Runoff=0.05 cfs 0.020 af

Subcatchment 2S:

Runoff Area=37,180 sf Runoff Depth=0.12"

Flow Length=212' Tc=10.0 min CN=30 Runoff=0.01 cfs 0.009 af

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow=0.05 cfs 0.020 af

Primary=0.05 cfs 0.020 af

Link 2L: Total Offsite- Easterly Wetland

Inflow=0.01 cfs 0.009 af

Primary=0.01 cfs 0.009 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.029 af Average Runoff Depth = 0.20"

Predevelopment

Prepared by Sullivan Engineering Group, LLC
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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Subcatchment 1S:

Runoff = 0.05 cfs @ 12.54 hrs, Volume= 0.020 af, Depth= 0.29"

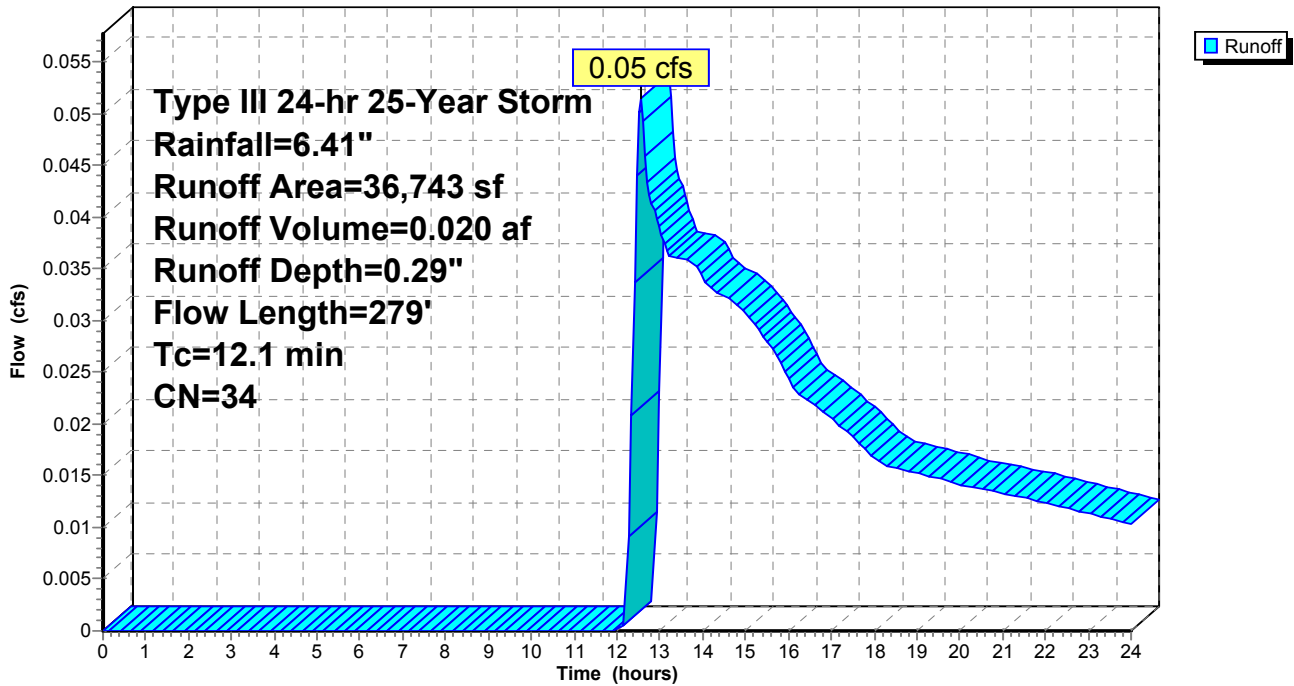
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
34,749	30	Woods, Good, HSG A
1,994	98	Pavement
36,743	34	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.31"
0.6	61	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.7	168	0.0230	0.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	279	Total			

Subcatchment 1S:

Hydrograph



Predevelopment

Prepared by Sullivan Engineering Group, LLC
 HydroCAD® 7.00 s/n 001433 © 1986-2003 Applied Microcomputer Systems

Type III 24-hr 25-Year Storm Rainfall=6.41"

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Subcatchment 2S:

Runoff = 0.01 cfs @ 15.07 hrs, Volume= 0.009 af, Depth= 0.12"

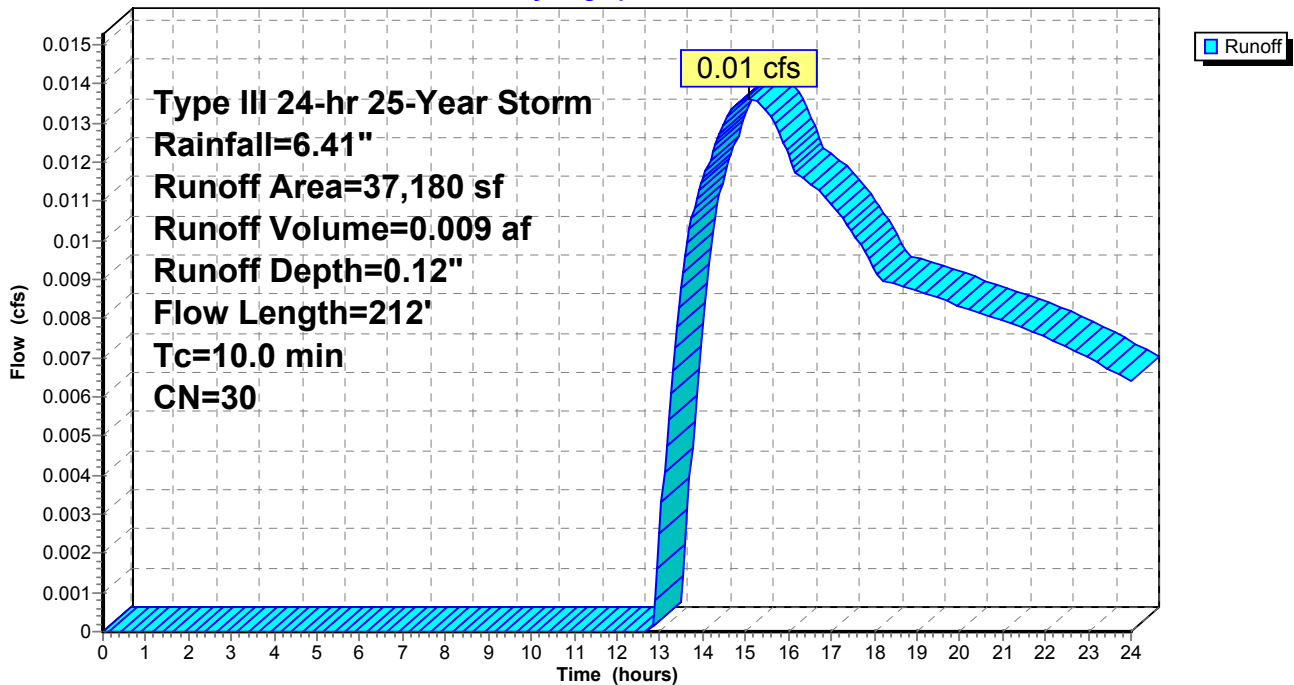
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
37,180	30	Woods, Good, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1380	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.31"
0.8	47	0.0400	1.0		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.0	6	0.5000	3.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	109	0.0100	0.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.0	212	Total			

Subcatchment 2S:

Hydrograph



Predevelopment

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Type III 24-hr 25-Year Storm Rainfall=6.41"

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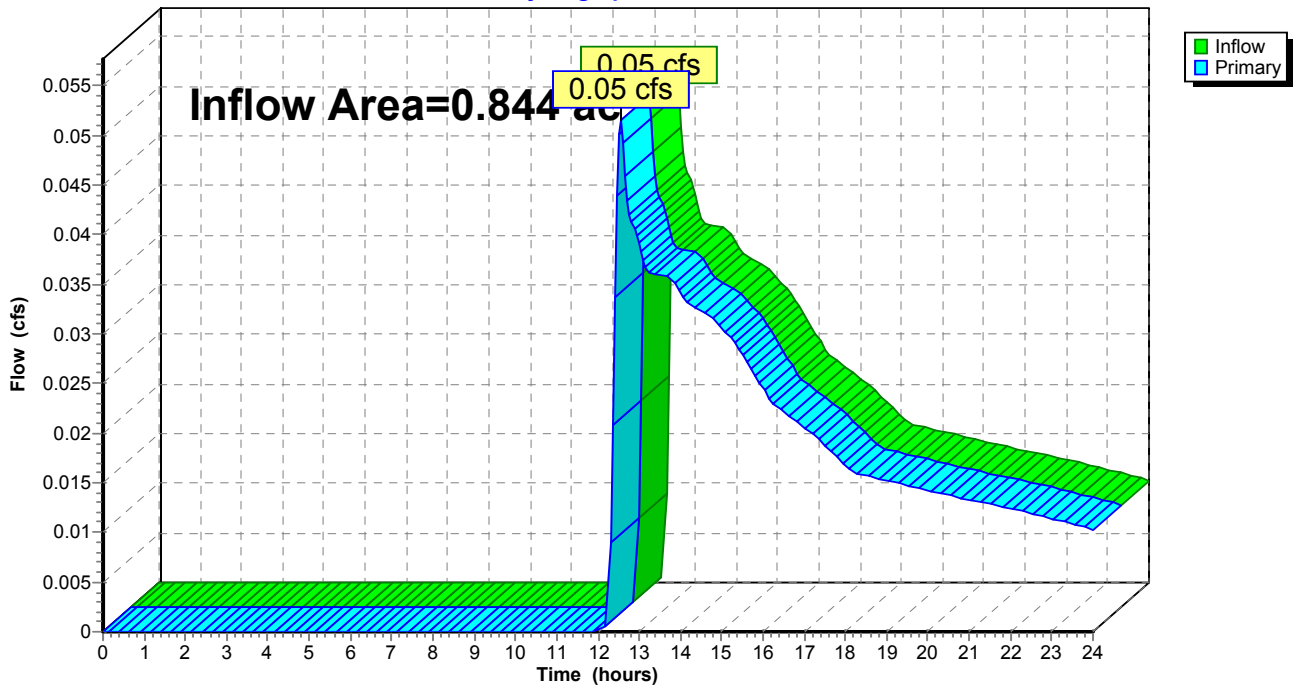
Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow Area = 0.844 ac, Inflow Depth = 0.29" for 25-Year Storm event
Inflow = 0.05 cfs @ 12.54 hrs, Volume= 0.020 af
Primary = 0.05 cfs @ 12.54 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Hydrograph



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Type III 24-hr 25-Year Storm Rainfall=6.41"

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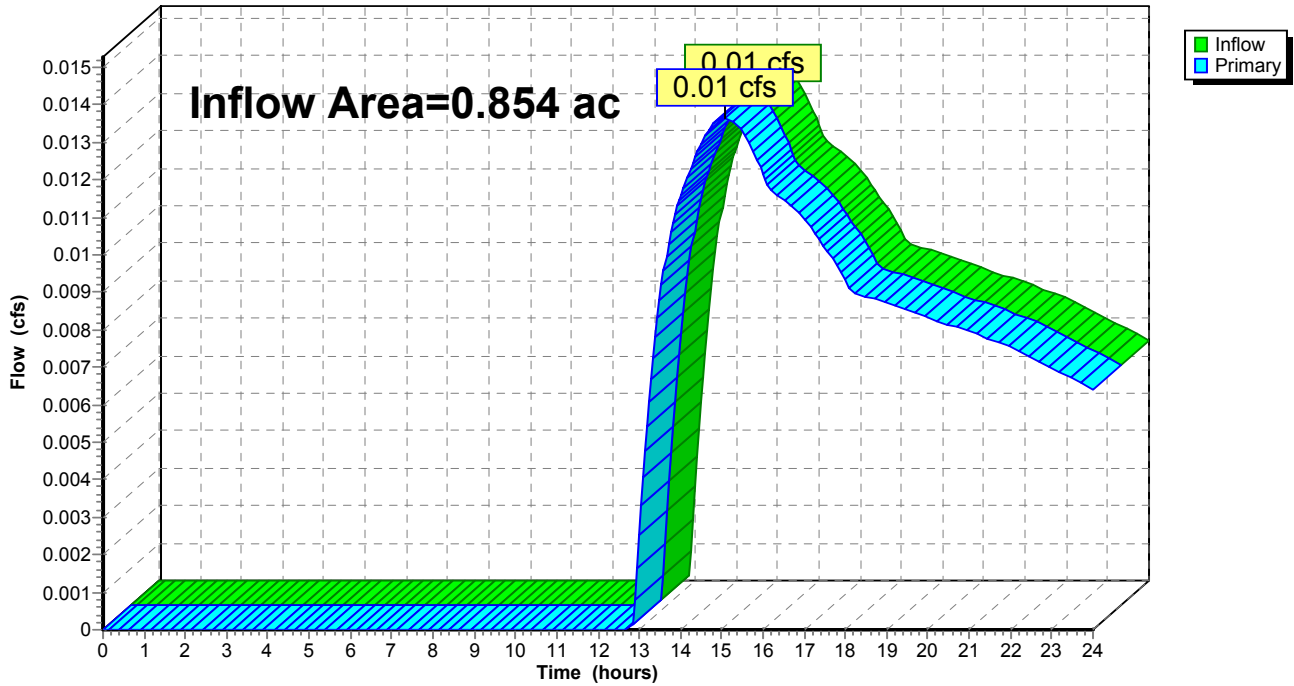
Link 2L: Total Offsite- Easterly Wetland

Inflow Area = 0.854 ac, Inflow Depth = 0.12" for 25-Year Storm event
Inflow = 0.01 cfs @ 15.07 hrs, Volume= 0.009 af
Primary = 0.01 cfs @ 15.07 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite- Easterly Wetland

Hydrograph



Predevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S:

Runoff Area=36,743 sf Runoff Depth=0.80"

Flow Length=279' Tc=12.1 min CN=34 Runoff=0.31 cfs 0.056 af

Subcatchment 2S:

Runoff Area=37,180 sf Runoff Depth=0.47"

Flow Length=212' Tc=10.0 min CN=30 Runoff=0.12 cfs 0.034 af

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow=0.31 cfs 0.056 af

Primary=0.31 cfs 0.056 af

Link 2L: Total Offsite- Easterly Wetland

Inflow=0.12 cfs 0.034 af

Primary=0.12 cfs 0.034 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.090 af Average Runoff Depth = 0.64"

Predevelopment

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Type III 24-hr 100-Year Storm Rainfall=8.25"

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Subcatchment 1S:

Runoff = 0.31 cfs @ 12.38 hrs, Volume= 0.056 af, Depth= 0.80"

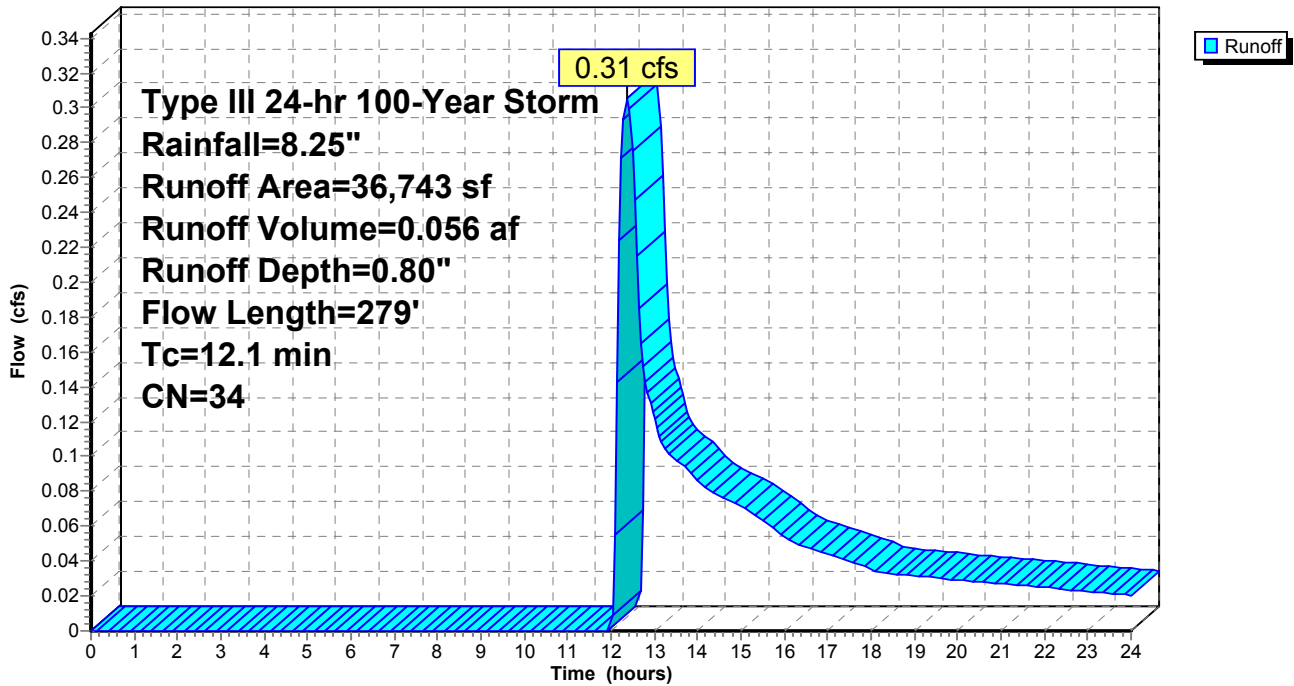
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Storm Rainfall=8.25"

Area (sf)	CN	Description
34,749	30	Woods, Good, HSG A
1,994	98	Pavement
36,743	34	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.31"
0.6	61	0.1300	1.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.7	168	0.0230	0.8		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	279	Total			

Subcatchment 1S:

Hydrograph



Predevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Subcatchment 2S:

Runoff = 0.12 cfs @ 12.46 hrs, Volume= 0.034 af, Depth= 0.47"

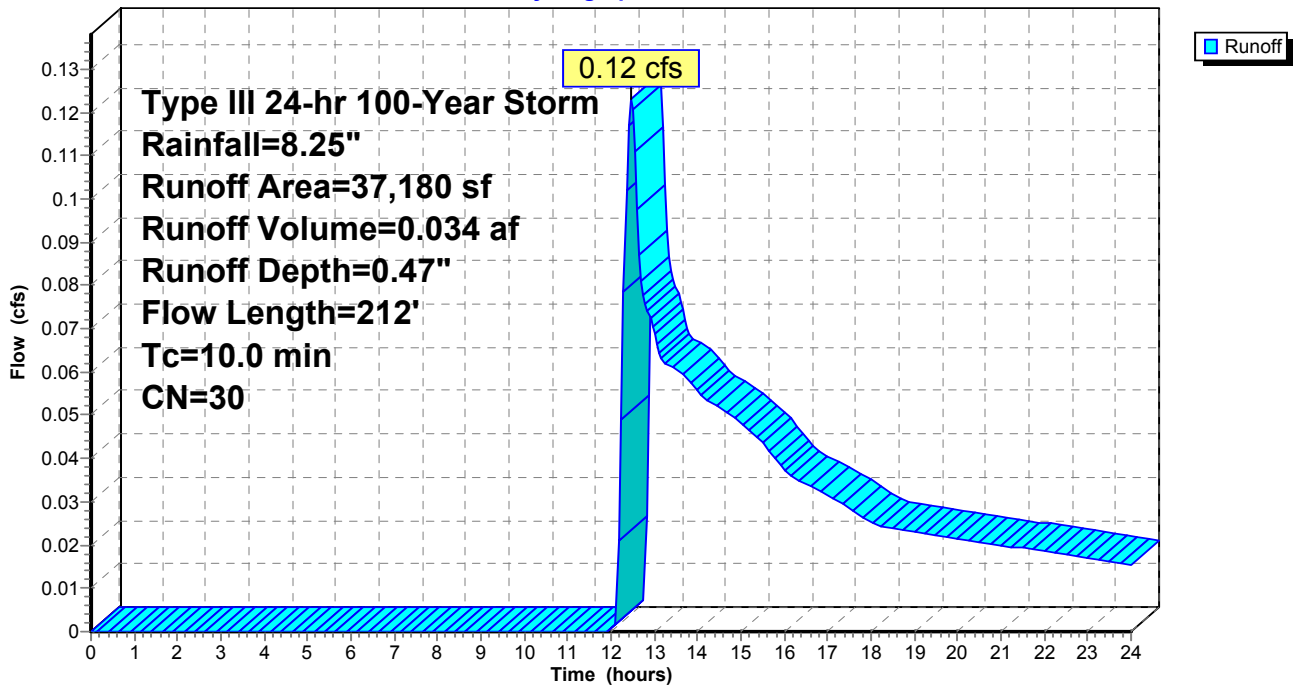
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Storm Rainfall=8.25"

Area (sf)	CN	Description
37,180	30	Woods, Good, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1380	0.1		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.31"
0.8	47	0.0400	1.0		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.0	6	0.5000	3.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	109	0.0100	0.5		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.0	212	Total			

Subcatchment 2S:

Hydrograph



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Type III 24-hr 100-Year Storm Rainfall=8.25"

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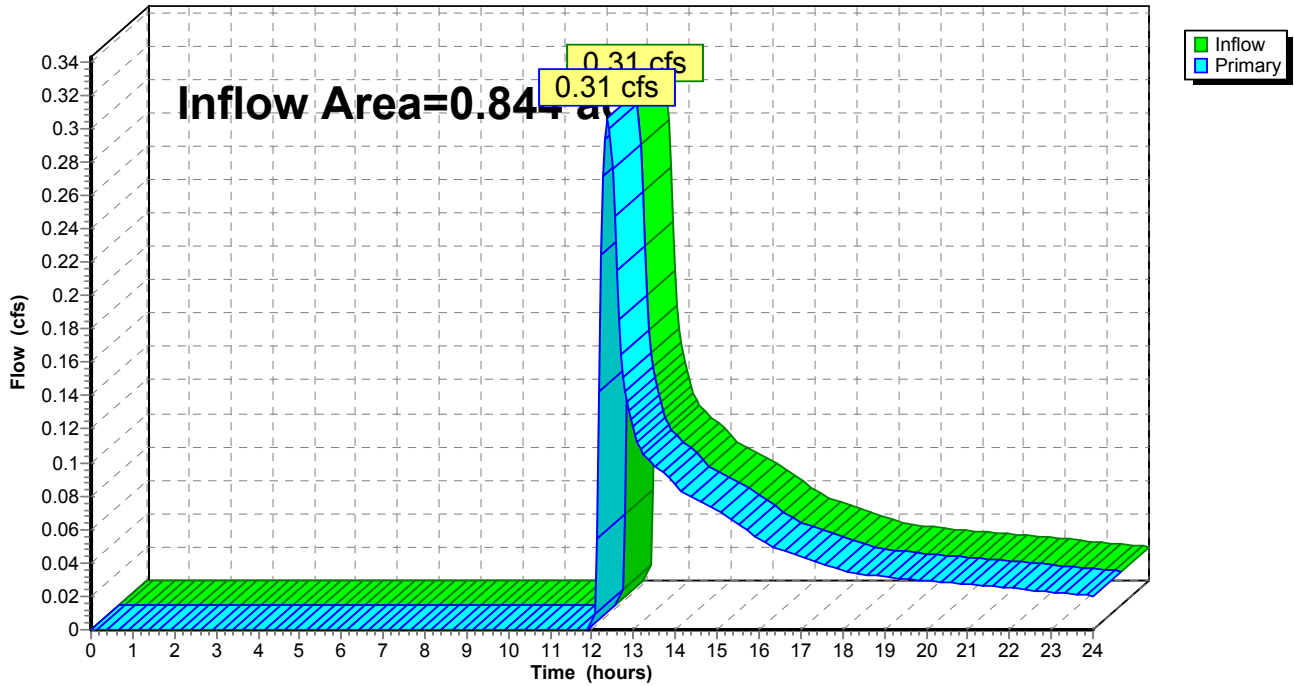
Link 1L: Total Offsite - Northerly Wetland @ Crossing

Inflow Area = 0.844 ac, Inflow Depth = 0.80" for 100-Year Storm event
Inflow = 0.31 cfs @ 12.38 hrs, Volume= 0.056 af
Primary = 0.31 cfs @ 12.38 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite - Northerly Wetland @ Crossing

Hydrograph



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Type III 24-hr 100-Year Storm Rainfall=8.25"

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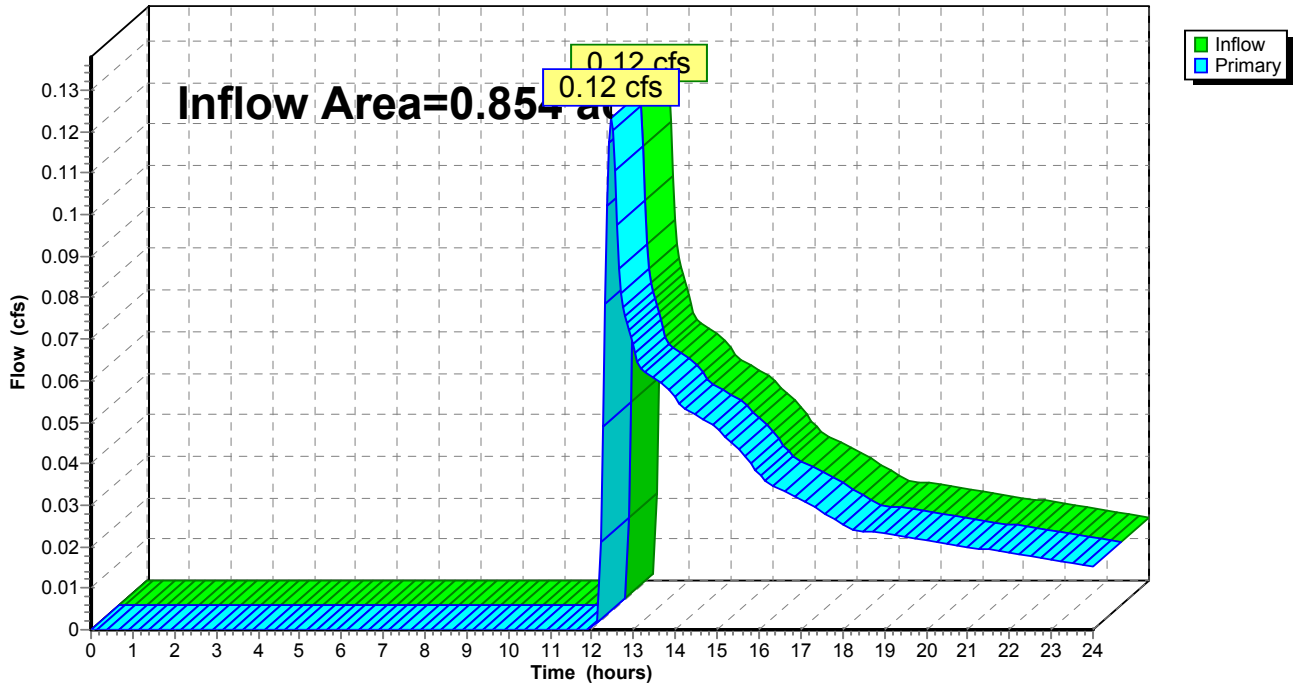
Link 2L: Total Offsite- Easterly Wetland

Inflow Area = 0.854 ac, Inflow Depth = 0.47" for 100-Year Storm event
Inflow = 0.12 cfs @ 12.46 hrs, Volume= 0.034 af
Primary = 0.12 cfs @ 12.46 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite- Easterly Wetland

Hydrograph



PREVIOUS VARIANCES AND/OR SPECIAL PERMITS:
 THERE ARE NO KNOWN VARIANCES OR SPECIAL PERMITS ISSUED FROM ANY REGULATORY BOARD OR COMMISSION WITHIN THE TOWN OF READING FOR THE SUBJECT SITE.

TEMPORARY BENCHMARK CHART:

TBM #	DESCRIPTION	ELEV.
△	SMH RIM	83.38'



NOTES:

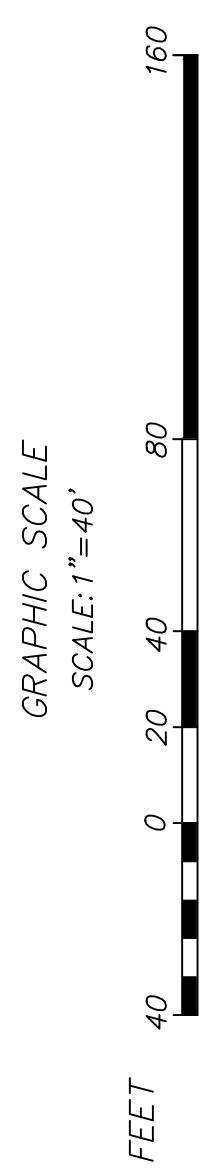
- 1) THE SEWER CONNECTION 1/1 FEE IS REQUIRED FOR THE NEW HOUSE PRIOR TO OCCUPANCY.
- 2) ENGINEERING DIVISION SHALL BE NOTIFIED 72 HOURS IN ADVANCE TO MARK OUT TOWN UTILITIES.
- 3) ALL WATER, SEWER, CURBOUT, STREET OPENING, & JACKIE'S LAW EXCAVATION PERMITS SHALL BE OBTAINED AT THE ENGINEERING DIVISION PRIOR TO ANY EXCAVATION.
- 4) ALL UTILITY WORK, INCLUDING DRAINAGE INSTALLATION SHALL BE INSPECTED BY THE ENGINEERING DIVISION.
- 5) THE DEVELOPER OR OWNER SHALL SUBMIT A CONSTRUCTION SCHEDULE OF PROPOSED WORK.
- 6) ALL INSPECTIONS SHALL BE SCHEDULED 24 HOURS IN ADVANCE.
- 7) AN APPROVED SITE AS-BUILT PLAN SHALL BE SUBMITTED TO THE ENGINEERING DIVISION WITHIN 60 DAYS OF CERTIFICATE OF OCCUPANCY. THE AS-BUILT SHALL BE PROVIDED ON PAPER COPY AND ELECTRONIC AUTOCAD FORMAT.

FOR REGISTRY OF DEEDS USE ONLY
 I DECLARE TO THE BEST OF MY PROFESSIONAL KNOWLEDGE AND BELIEF THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

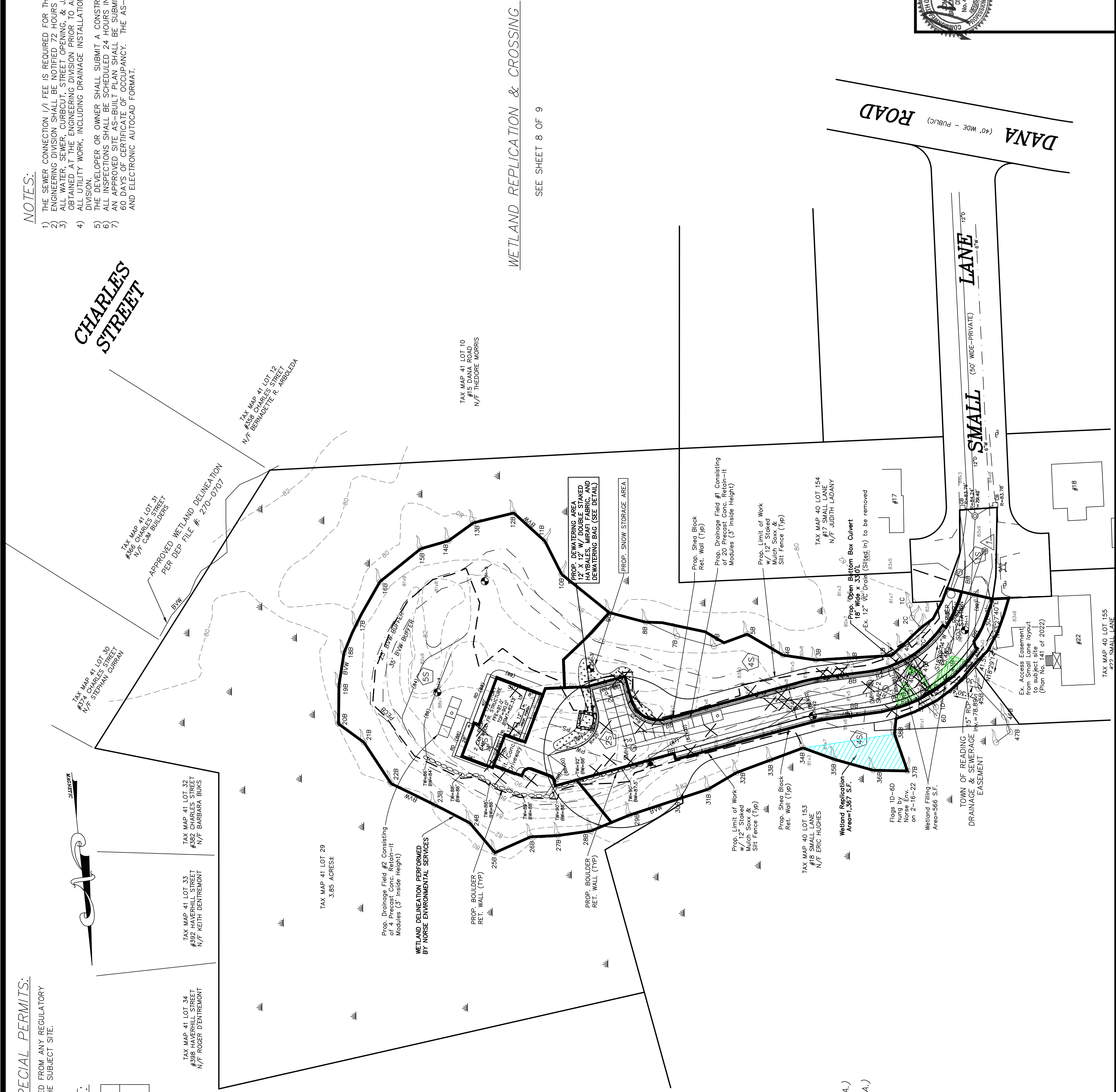
JOHN D. SULLIVAN III, PE DATE _____

READING COMMUNITY PLANNING & DEVELOPMENT COMMISSION

APPROVED _____, 20__

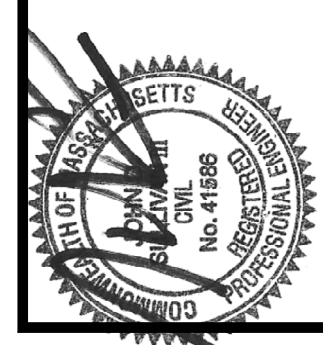


- LEGEND:**
- 248— TWO FOOT CONTOUR
 - DECIDUOUS TREE (> 6" DIA.)
 - ☼ EVERGREEN TREE (> 6" DIA.)
 - ☐ UTILITY POLE
 - SEWER MANHOLE
 - SEWER MAIN
 - COMPILED WATER MAIN
 - CB □ CATCHBASIN
 - DRAIN LINE
 - BIT. BITUMINOUS
 - CONC. CONCRETE
 - EOP EDGE OF PAVEMENT
 - TH TEST PIT
 - (100)— PROP. CONTOUR



WETLAND REPLICATION & CROSSING
 SEE SHEET 8 OF 9

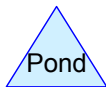
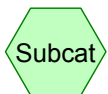
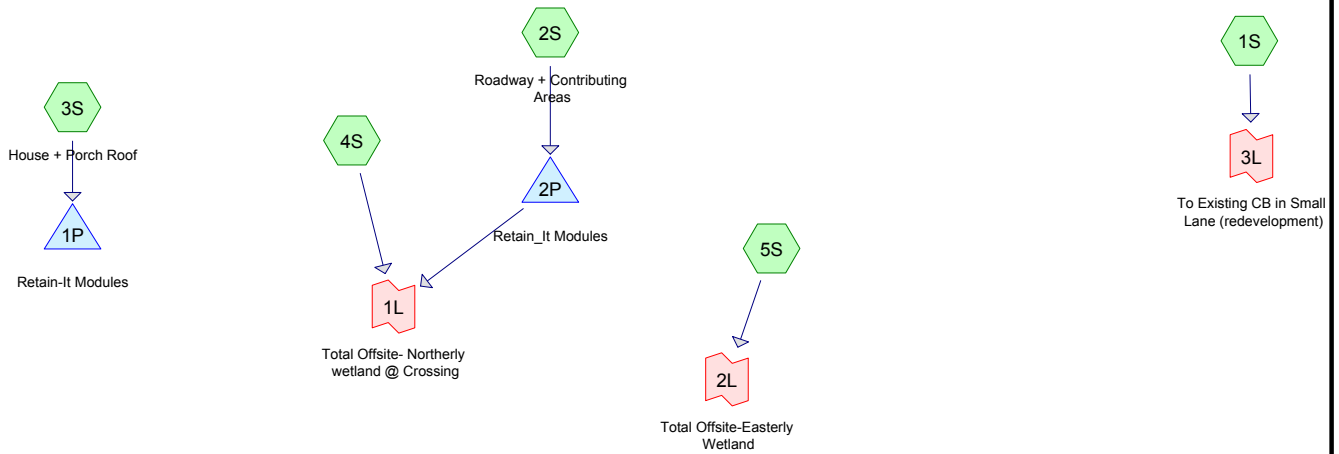
**SMALL LANE EXTENSION
 POSTDEVELOPMENT DRAINAGE PLAN**
 LOCATED IN
 READING, MASSACHUSETTS
 (MIDDLESEX COUNTY)



PREPARED FOR
 JOSEPH MARINO
 SCALE: 1" = 40' DATE: NOV. 6, 2025

PREPARED BY
SULLIVAN ENGINEERING GROUP, LLC
 P.O. BOX 2004
 WOBURN, MA 01888
 (781) 854-8644

SHEET No. 1 OF 1



Postdevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S:

Runoff Area=2,120 sf Runoff Depth=2.18"
Tc=6.0 min CN=89 Runoff=0.12 cfs 0.009 af

Subcatchment 2S: Roadway + Contributing Areas

Runoff Area=16,279 sf Runoff Depth=1.77"
Tc=6.0 min CN=84 Runoff=0.76 cfs 0.055 af

Subcatchment 3S: House + Porch Roof

Runoff Area=2,288 sf Runoff Depth=3.08"
Tc=6.0 min CN=98 Runoff=0.16 cfs 0.013 af

Subcatchment 4S:

Runoff Area=20,349 sf Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 5S:

Runoff Area=32,887 sf Runoff Depth=0.00"
Tc=6.0 min CN=34 Runoff=0.00 cfs 0.000 af

Pond 1P: Retain-It Modules

Peak Elev=82.40' Storage=124 cf Inflow=0.16 cfs 0.013 af
Outflow=0.04 cfs 0.013 af

Pond 2P: Retain_It Modules

Peak Elev=82.30' Storage=528 cf Inflow=0.76 cfs 0.055 af
Discarded=0.19 cfs 0.055 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.055 af

Link 1L: Total Offsite- Northerly wetland @ Crossing

Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 2L: Total Offsite-Easterly Wetland

Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 3L: To Existing CB in Small Lane (redevelopment)

Inflow=0.12 cfs 0.009 af
Primary=0.12 cfs 0.009 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.078 af Average Runoff Depth = 0.55"

Postdevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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Subcatchment 1S:

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 2.18"

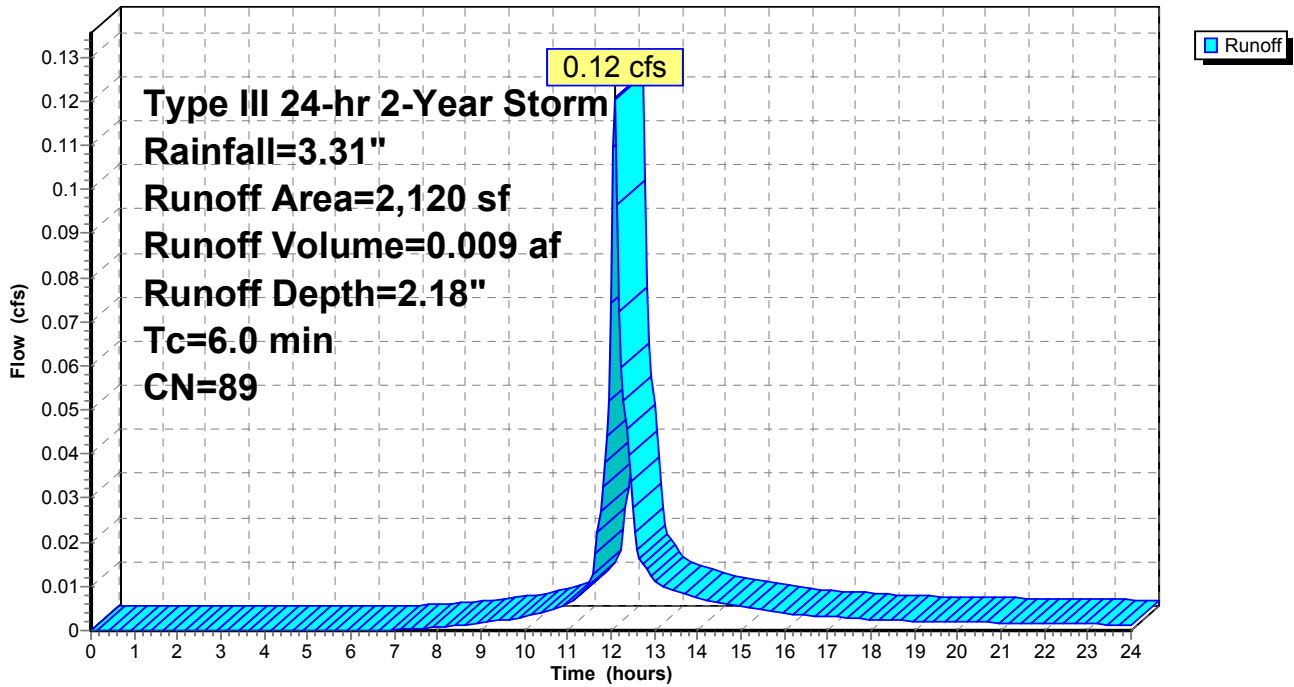
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.31"

Area (sf)	CN	Description
1,796	98	Pavement/Curb
324	39	>75% Grass cover, Good, HSG A
2,120	89	Weighted Average

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

Subcatchment 1S:

Hydrograph



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Type III 24-hr 2-Year Storm Rainfall=3.31"

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Subcatchment 2S: Roadway + Contributing Areas

Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.055 af, Depth= 1.77"

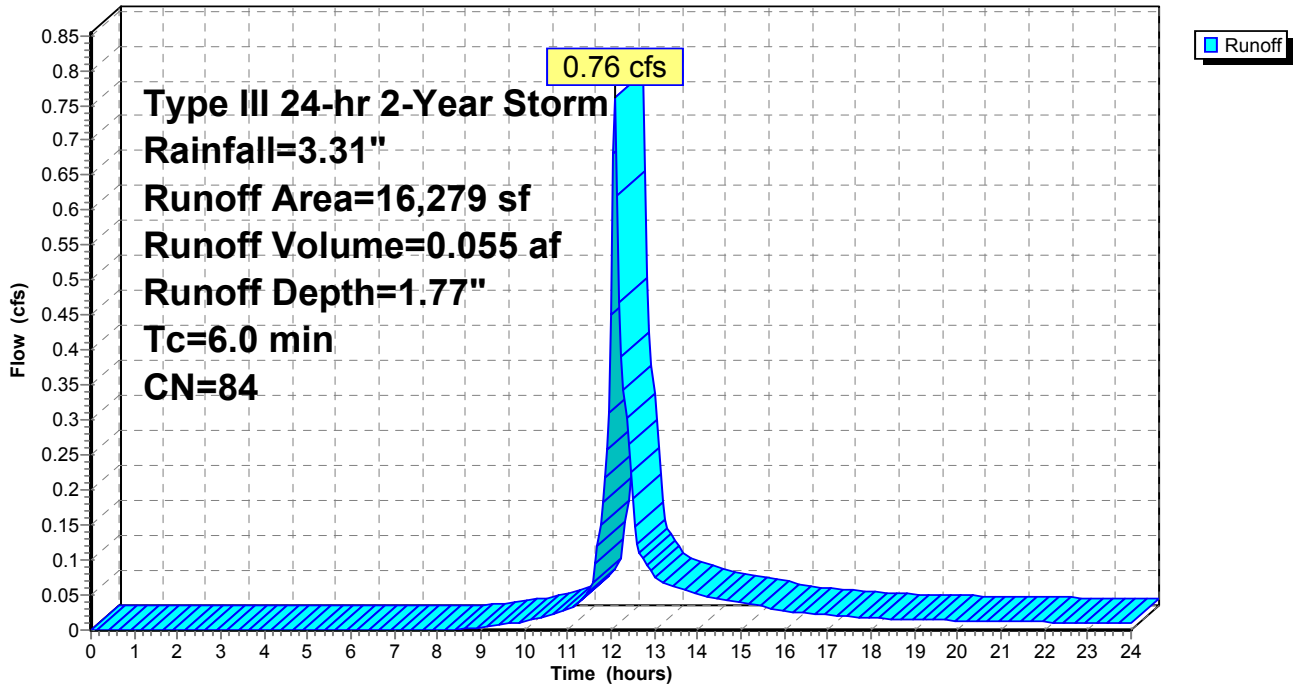
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.31"

Area (sf)	CN	Description
10,396	98	Roadway
410	98	curbing
1,168	98	ret wall
980	98	driveway
3,325	30	Woods, Good, HSG A
16,279	84	Weighted Average

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

Subcatchment 2S: Roadway + Contributing Areas

Hydrograph



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Type III 24-hr 2-Year Storm Rainfall=3.31"

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Subcatchment 3S: House + Porch Roof

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Depth= 3.08"

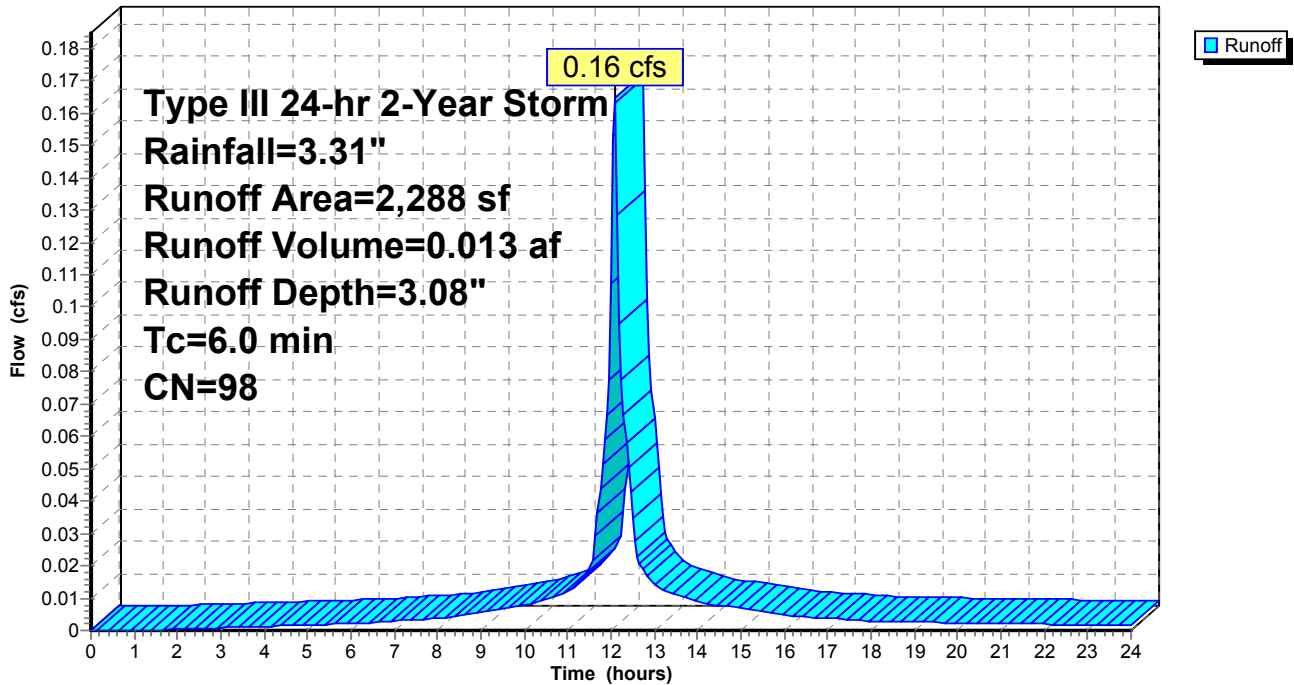
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.31"

Area (sf)	CN	Description
2,288	98	House Roof + Porch

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

Subcatchment 3S: House + Porch Roof

Hydrograph



Postdevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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Subcatchment 4S:

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

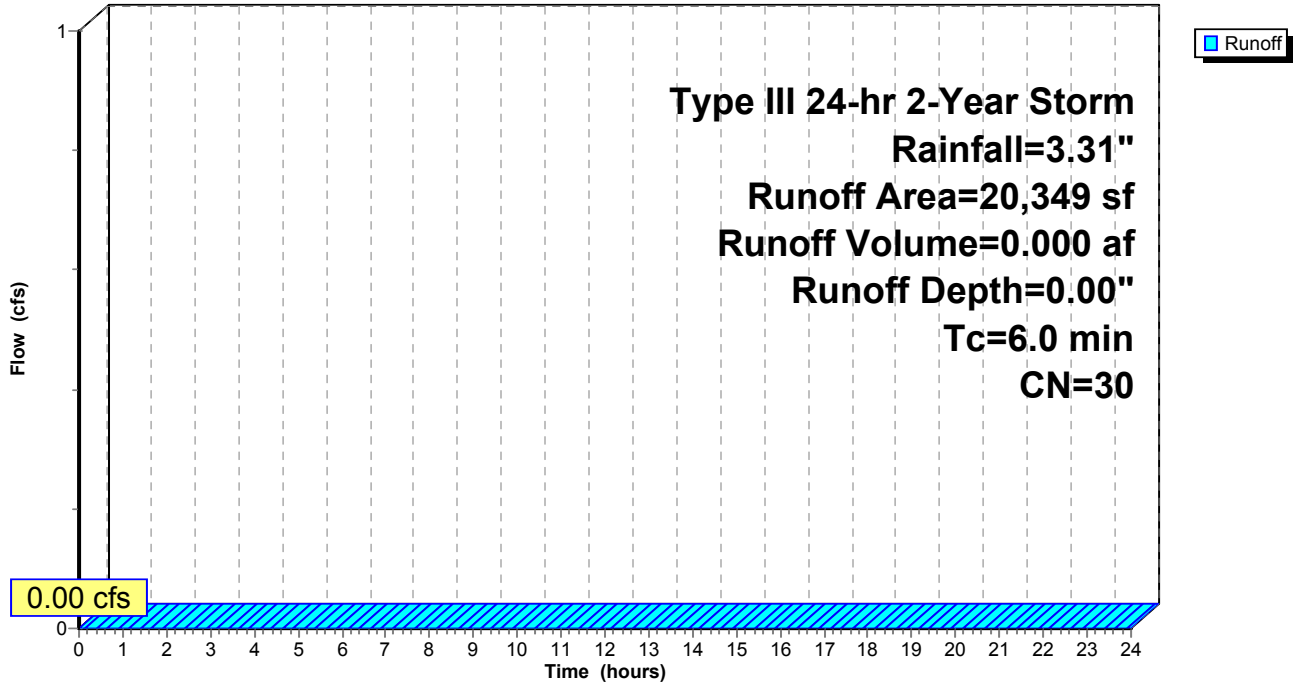
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.31"

Area (sf)	CN	Description
20,349	30	Woods, Good, HSG A

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

Subcatchment 4S:

Hydrograph



Postdevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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Subcatchment 5S:

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

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

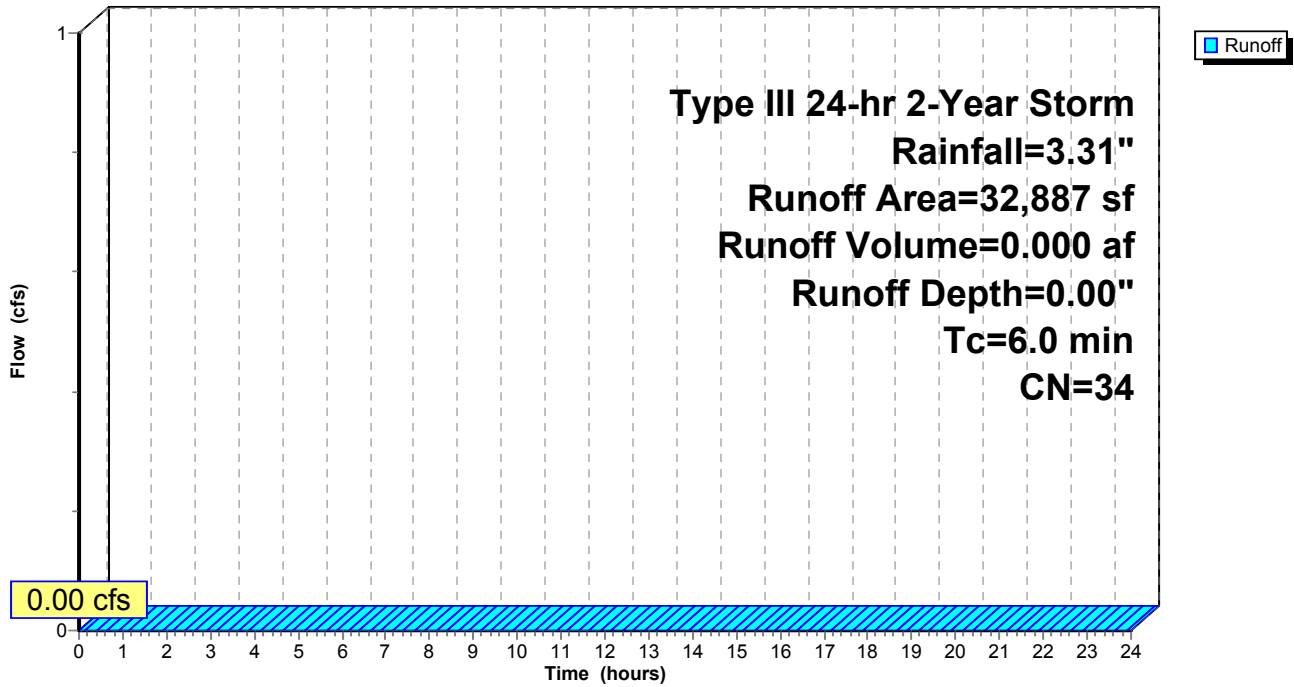
Type III 24-hr 2-Year Storm Rainfall=3.31"

Area (sf)	CN	Description
12,887	39	>75% Grass cover, Good, HSG A
20,000	30	Woods, Good, HSG A
32,887	34	Weighted Average

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

Subcatchment 5S:

Hydrograph



Postdevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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Pond 1P: Retain-It Modules

Inflow Area = 0.053 ac, Inflow Depth = 3.08" for 2-Year Storm event
 Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af
 Outflow = 0.04 cfs @ 11.75 hrs, Volume= 0.013 af, Atten= 77%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 11.75 hrs, Volume= 0.013 af

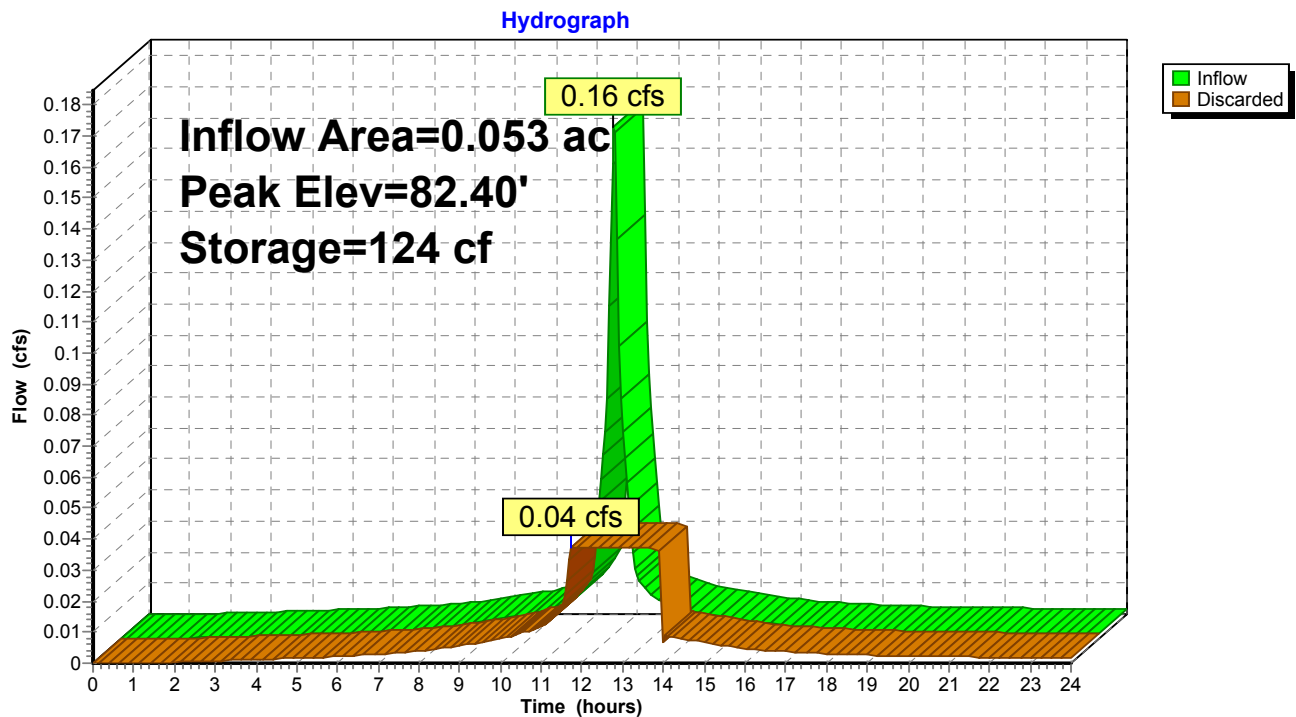
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 82.40' @ 12.48 hrs Surf.Area= 196 sf Storage= 124 cf
 Plug-Flow detention time= 16.2 min calculated for 0.013 af (100% of inflow)
 Center-of-Mass det. time= 16.1 min (771.4 - 755.3)

#	Invert	Avail.Storage	Storage Description
1	81.50'	39 cf	7.00'W x 7.00'L x 0.50'H Prisma toid x 4 98 cf Overall x 40.0% Voids
2	82.00'	588 cf	7.00'W x 7.00'L x 3.00'H Retain_it - 3 ft Inside Heightx 4 -Impervious
3	82.00'	43 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Opening) x 3 -Impervious
		670 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area

Discarded OutFlow Max=0.04 cfs @ 11.75 hrs HW=81.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Pond 1P: Retain-It Modules



Postdevelopment

Type III 24-hr 2-Year Storm Rainfall=3.31"

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Pond 2P: Retain_It Modules

Inflow Area = 0.374 ac, Inflow Depth = 1.77" for 2-Year Storm event
 Inflow = 0.76 cfs @ 12.09 hrs, Volume= 0.055 af
 Outflow = 0.19 cfs @ 11.85 hrs, Volume= 0.055 af, Atten= 75%, Lag= 0.0 min
 Discarded = 0.19 cfs @ 11.85 hrs, Volume= 0.055 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 82.30' @ 12.50 hrs Surf.Area= 980 sf Storage= 528 cf
 Plug-Flow detention time= 15.6 min calculated for 0.055 af (100% of inflow)
 Center-of-Mass det. time= 15.4 min (842.8 - 827.4)

#	Invert	Avail.Storage	Storage Description
1	81.50'	196 cf	7.00'W x 7.00'L x 0.50'H Prisma toid x 20 490 cf Overall x 40.0% Voids
2	82.00'	2,940 cf	7.00'W x 7.00'L x 3.00'H Retain-It Module x 20 -Impervious
3	82.00'	326 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Open) x 23 -Impervious
		3,462 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area
2	Primary	85.17'	2.00' x 2.00' Horiz. Orifice/Grate X 2.00 Limited to weir flow C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.85 hrs HW=81.54' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.50' (Free Discharge)
 ↳2=Orifice/Grate (Controls 0.00 cfs)

Postdevelopment

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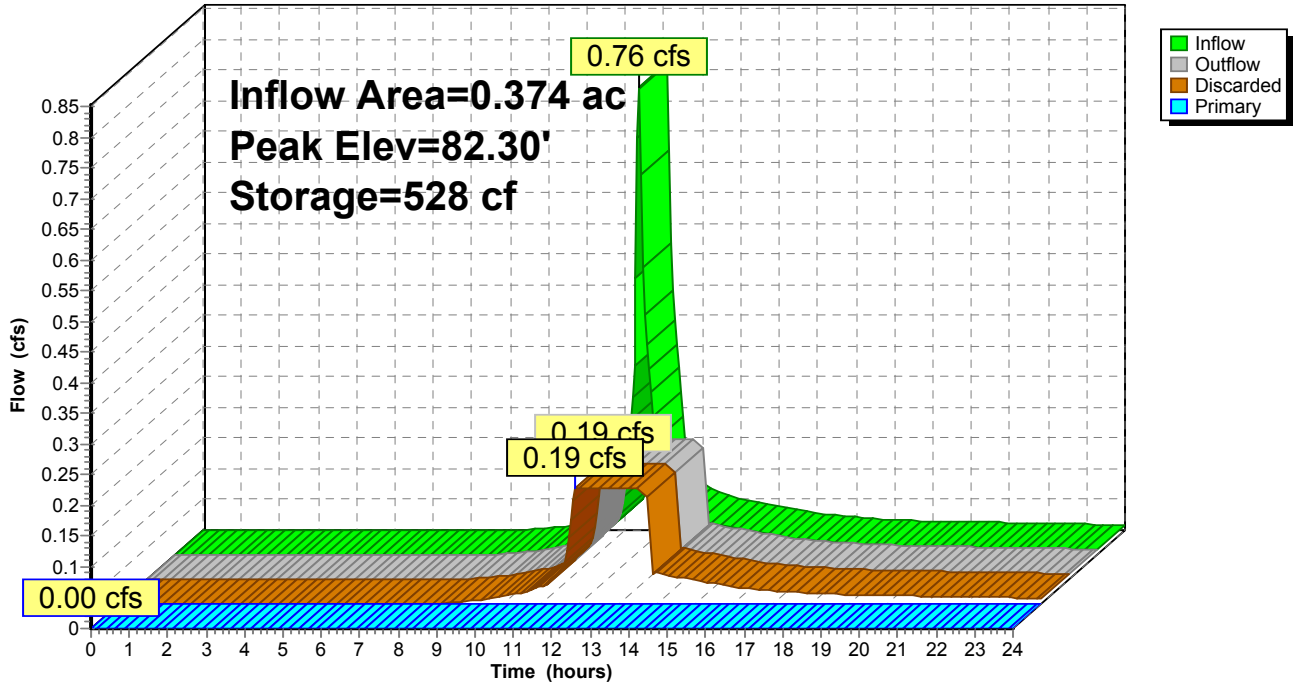
Type III 24-hr 2-Year Storm Rainfall=3.31"

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Pond 2P: Retain_It Modules

Hydrograph



Postdevelopment

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Type III 24-hr 2-Year Storm Rainfall=3.31"

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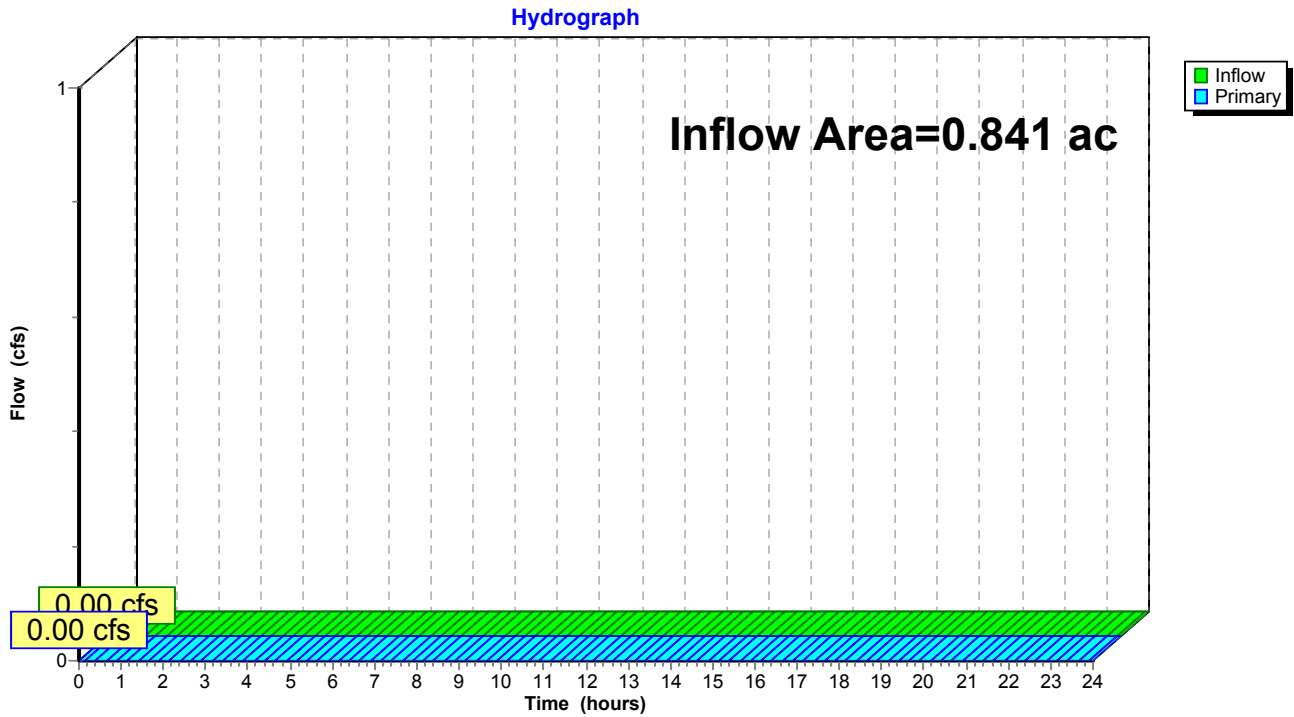
11/6/2025

Link 1L: Total Offsite- Northerly wetland @ Crossing

Inflow Area = 0.841 ac, Inflow Depth = 0.00" for 2-Year Storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite- Northerly wetland @ Crossing



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Type III 24-hr 2-Year Storm Rainfall=3.31"

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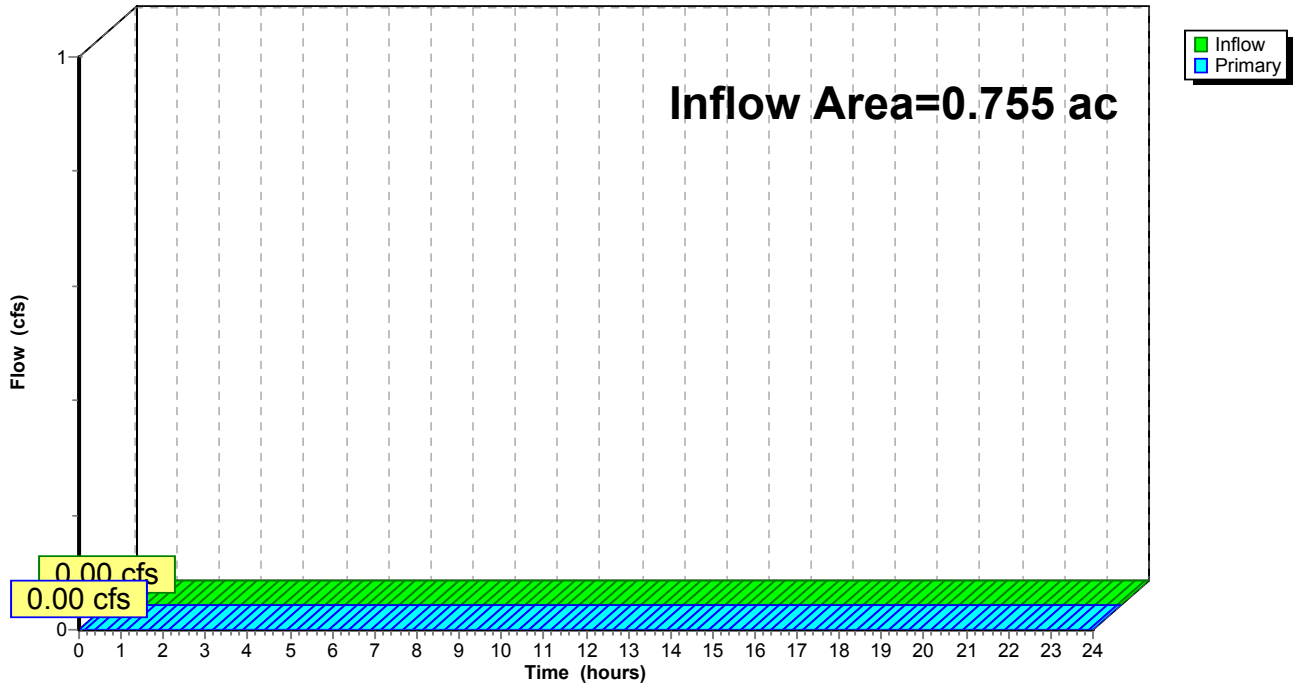
Link 2L: Total Offsite-Easterly Wetland

Inflow Area = 0.755 ac, Inflow Depth = 0.00" for 2-Year Storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite-Easterly Wetland

Hydrograph



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Type III 24-hr 2-Year Storm Rainfall=3.31"

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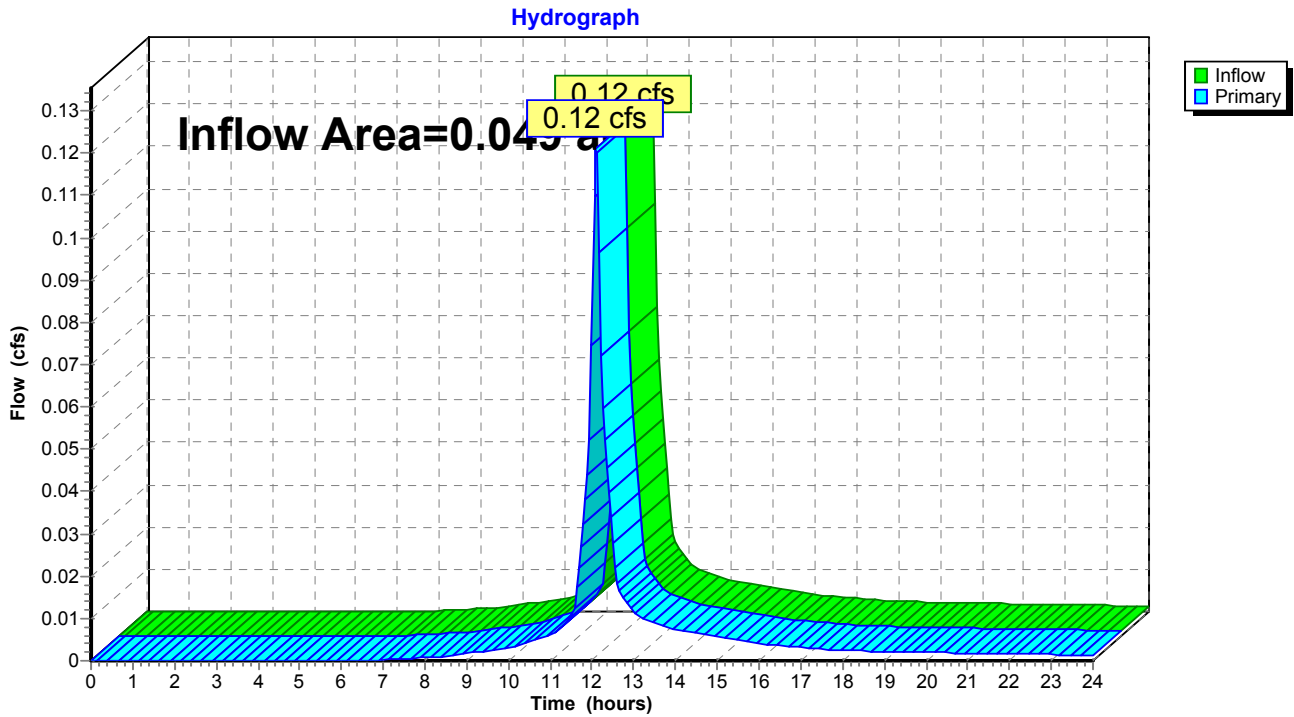
11/6/2025

Link 3L: To Existing CB in Small Lane (redevelopment)

Inflow Area = 0.049 ac, Inflow Depth = 2.18" for 2-Year Storm event
Inflow = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af
Primary = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: To Existing CB in Small Lane (redevelopment)



Postdevelopment

Type III 24-hr 10-Year Storm Rainfall=5.22"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: Runoff Area=2,120 sf Runoff Depth=3.98"
Tc=6.0 min CN=89 Runoff=0.22 cfs 0.016 af

Subcatchment 2S: Roadway + Contributing Areas Runoff Area=16,279 sf Runoff Depth=3.47"
Tc=6.0 min CN=84 Runoff=1.48 cfs 0.108 af

Subcatchment 3S: House + Porch Roof Runoff Area=2,288 sf Runoff Depth=4.98"
Tc=6.0 min CN=98 Runoff=0.26 cfs 0.022 af

Subcatchment 4S: Runoff Area=20,349 sf Runoff Depth=0.01"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 5S: Runoff Area=32,887 sf Runoff Depth=0.09"
Tc=6.0 min CN=34 Runoff=0.01 cfs 0.005 af

Pond 1P: Retain-It Modules Peak Elev=83.06' Storage=266 cf Inflow=0.26 cfs 0.022 af
Outflow=0.04 cfs 0.022 af

Pond 2P: Retain_It Modules Peak Elev=83.22' Storage=1,550 cf Inflow=1.48 cfs 0.108 af
Discarded=0.19 cfs 0.108 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.108 af

Link 1L: Total Offsite- Northerly wetland @ Crossing Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 2L: Total Offsite-Easterly Wetland Inflow=0.01 cfs 0.005 af
Primary=0.01 cfs 0.005 af

Link 3L: To Existing CB in Small Lane (redevelopment) Inflow=0.22 cfs 0.016 af
Primary=0.22 cfs 0.016 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.152 af Average Runoff Depth = 1.07"

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Type III 24-hr 10-Year Storm Rainfall=5.22"

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Subcatchment 1S:

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=5.22"

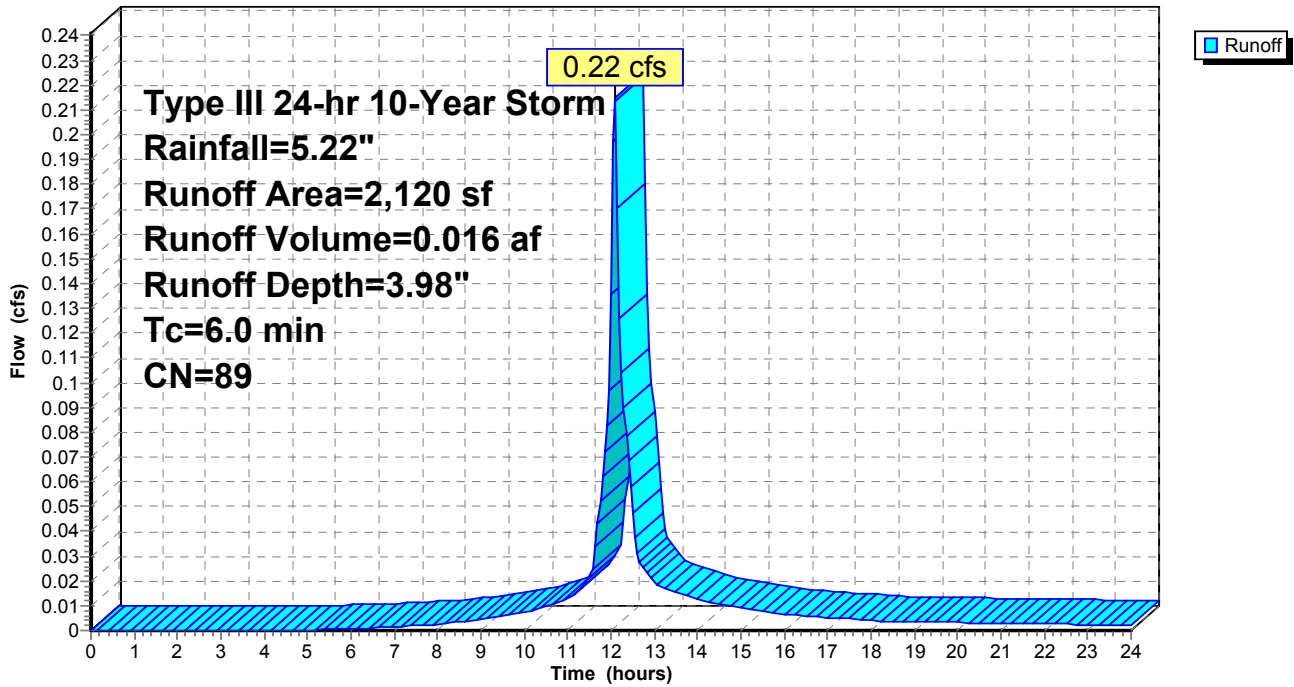
Area (sf)	CN	Description
1,796	98	Pavement/Curb
324	39	>75% Grass cover, Good, HSG A
2,120	89	Weighted Average

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

Subcatchment 1S:

Hydrograph



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Type III 24-hr 10-Year Storm Rainfall=5.22"

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Subcatchment 2S: Roadway + Contributing Areas

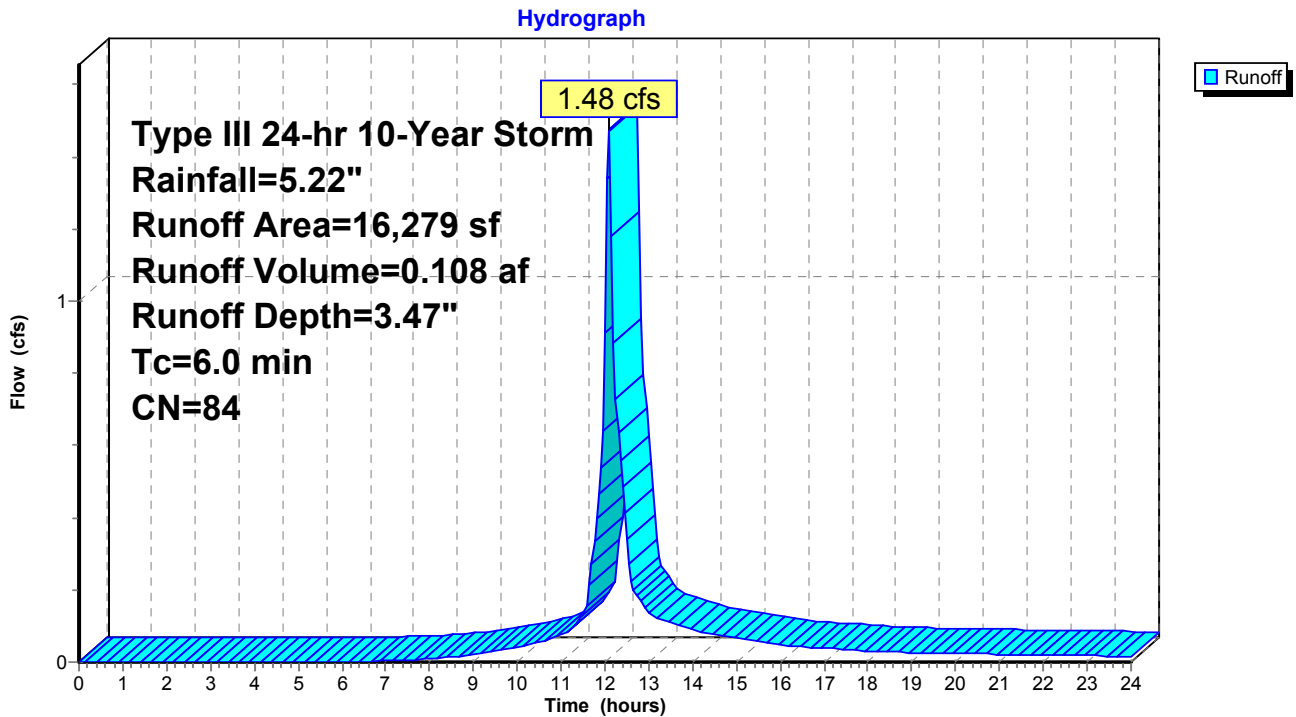
Runoff = 1.48 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Storm Rainfall=5.22"

Area (sf)	CN	Description
10,396	98	Roadway
410	98	curbing
1,168	98	ret wall
980	98	driveway
3,325	30	Woods, Good, HSG A
16,279	84	Weighted Average

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

Subcatchment 2S: Roadway + Contributing Areas



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Type III 24-hr 10-Year Storm Rainfall=5.22"

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Subcatchment 3S: House + Porch Roof

Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.022 af, Depth= 4.98"

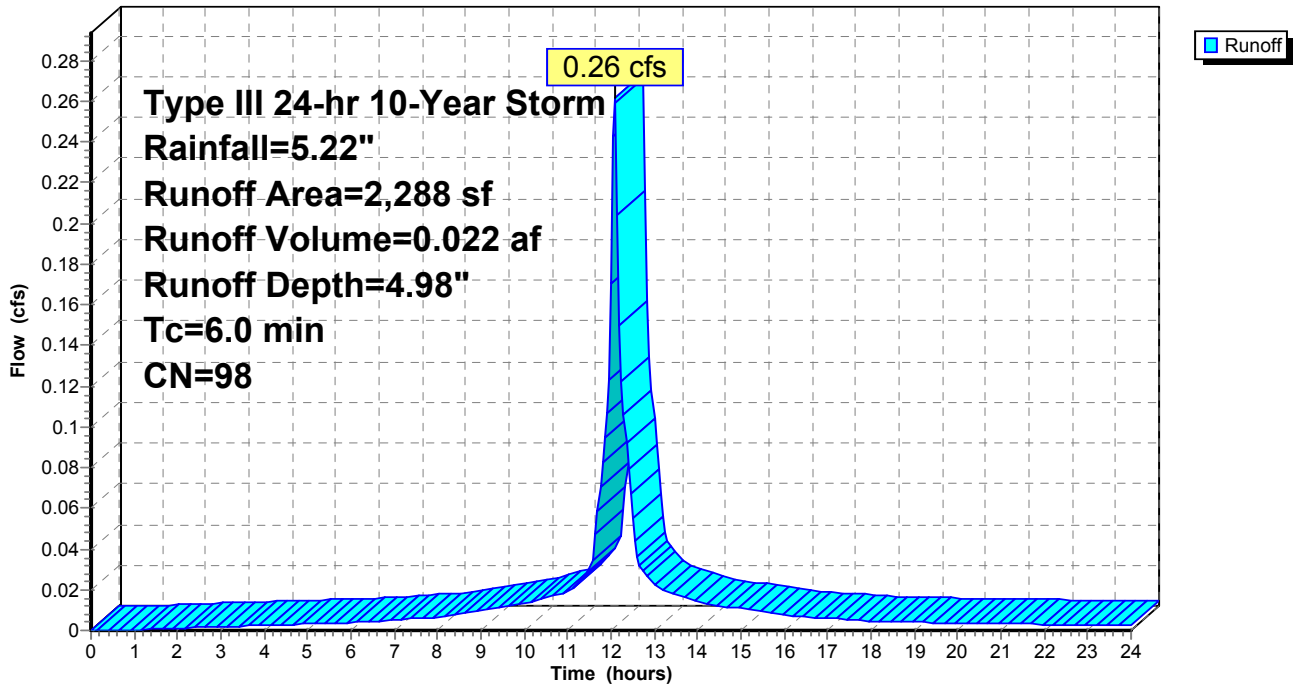
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=5.22"

Area (sf)	CN	Description
2,288	98	House Roof + Porch

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

Subcatchment 3S: House + Porch Roof

Hydrograph



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Type III 24-hr 10-Year Storm Rainfall=5.22"

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Subcatchment 5S:

Runoff = 0.01 cfs @ 15.16 hrs, Volume= 0.005 af, Depth= 0.09"

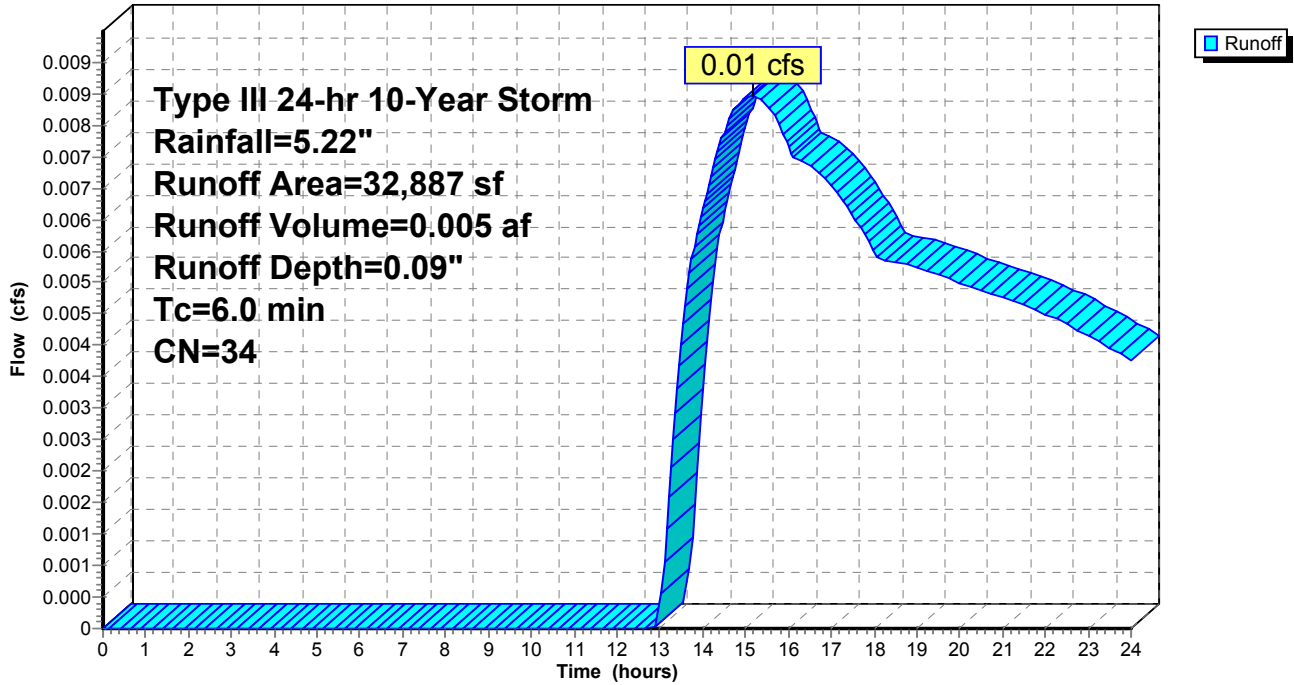
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Storm Rainfall=5.22"

Area (sf)	CN	Description
12,887	39	>75% Grass cover, Good, HSG A
20,000	30	Woods, Good, HSG A
32,887	34	Weighted Average

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

Subcatchment 5S:

Hydrograph



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Type III 24-hr 10-Year Storm Rainfall=5.22"

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Pond 1P: Retain-It Modules

Inflow Area = 0.053 ac, Inflow Depth = 4.98" for 10-Year Storm event
 Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.022 af
 Outflow = 0.04 cfs @ 11.65 hrs, Volume= 0.022 af, Atten= 86%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 11.65 hrs, Volume= 0.022 af

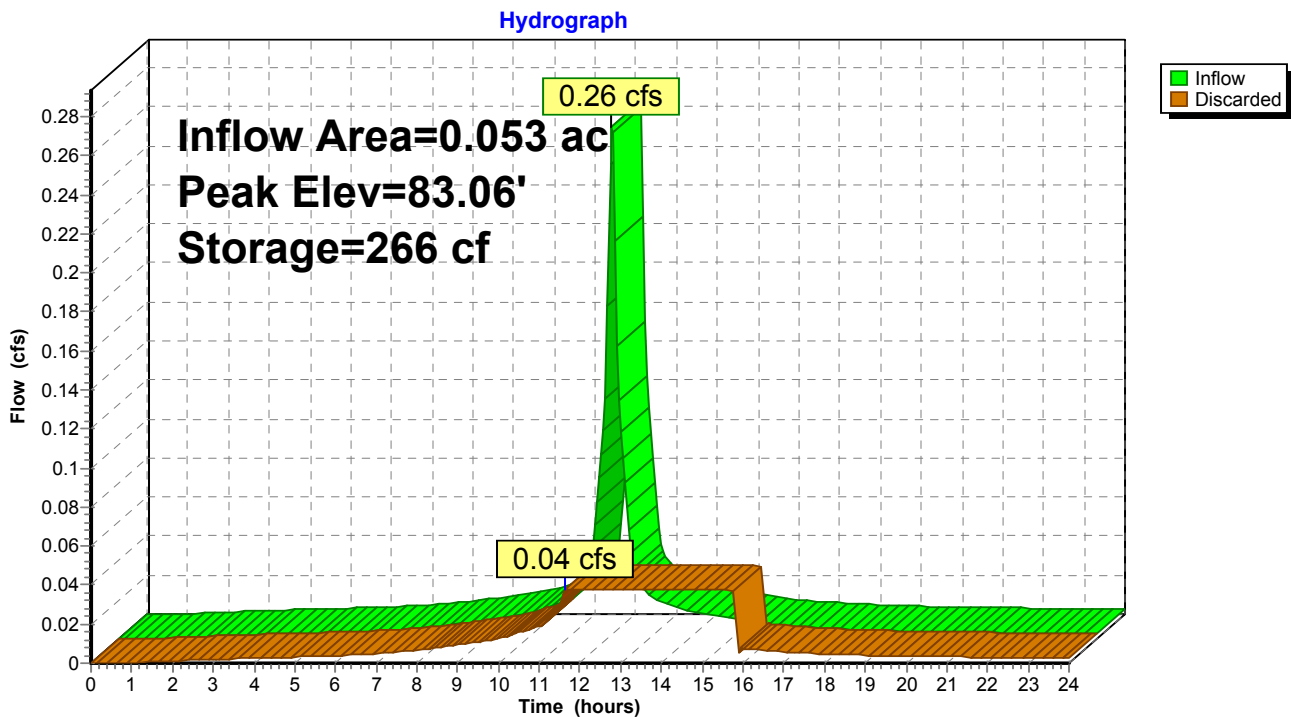
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 83.06' @ 12.59 hrs Surf.Area= 196 sf Storage= 266 cf
 Plug-Flow detention time= 40.5 min calculated for 0.022 af (100% of inflow)
 Center-of-Mass det. time= 40.3 min (787.2 - 746.9)

#	Invert	Avail.Storage	Storage Description
1	81.50'	39 cf	7.00'W x 7.00'L x 0.50'H Prisma toid x 4 98 cf Overall x 40.0% Voids
2	82.00'	588 cf	7.00'W x 7.00'L x 3.00'H Retain_it - 3 ft Inside Heightx 4 -Impervious
3	82.00'	43 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Opening) x 3 -Impervious
		670 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area

Discarded OutFlow Max=0.04 cfs @ 11.65 hrs HW=81.55' (Free Discharge)
 ←1=Exfiltration (Exfiltration Controls 0.04 cfs)

Pond 1P: Retain-It Modules



Postdevelopment

Type III 24-hr 10-Year Storm Rainfall=5.22"

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Pond 2P: Retain_It Modules

Inflow Area = 0.374 ac, Inflow Depth = 3.47" for 10-Year Storm event
 Inflow = 1.48 cfs @ 12.09 hrs, Volume= 0.108 af
 Outflow = 0.19 cfs @ 11.65 hrs, Volume= 0.108 af, Atten= 87%, Lag= 0.0 min
 Discarded = 0.19 cfs @ 11.65 hrs, Volume= 0.108 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 83.22' @ 12.70 hrs Surf.Area= 980 sf Storage= 1,550 cf
 Plug-Flow detention time= 58.8 min calculated for 0.108 af (100% of inflow)
 Center-of-Mass det. time= 58.6 min (866.9 - 808.3)

#	Invert	Avail.Storage	Storage Description
1	81.50'	196 cf	7.00'W x 7.00'L x 0.50'H Prismatoid x 20 490 cf Overall x 40.0% Voids
2	82.00'	2,940 cf	7.00'W x 7.00'L x 3.00'H Retain-It Module x 20 -Impervious
3	82.00'	326 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Open) x 23 -Impervious
		3,462 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area
2	Primary	85.17'	2.00' x 2.00' Horiz. Orifice/Grate X 2.00 Limited to weir flow C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.65 hrs HW=81.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.50' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

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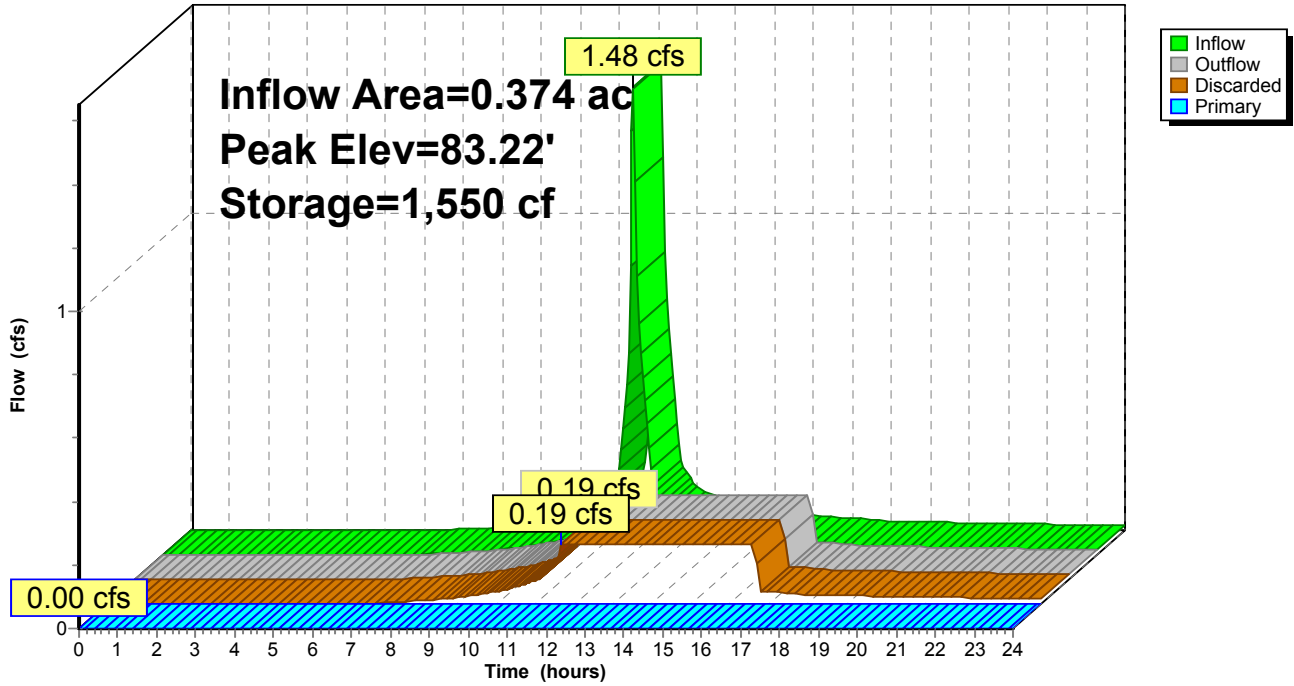
Type III 24-hr 10-Year Storm Rainfall=5.22"

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Pond 2P: Retain_It Modules

Hydrograph



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Type III 24-hr 10-Year Storm Rainfall=5.22"

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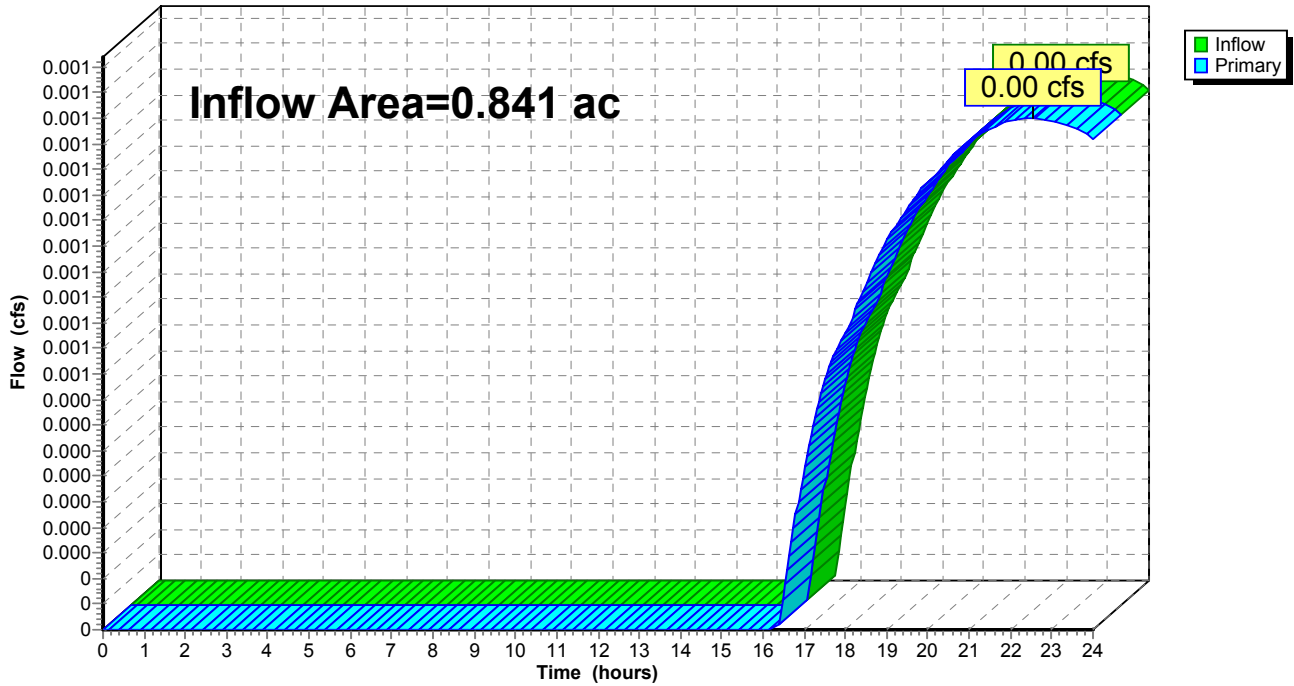
Link 1L: Total Offsite- Northerly wetland @ Crossing

Inflow Area = 0.841 ac, Inflow Depth = 0.01" for 10-Year Storm event
Inflow = 0.00 cfs @ 22.53 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 22.53 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite- Northerly wetland @ Crossing

Hydrograph



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Type III 24-hr 10-Year Storm Rainfall=5.22"

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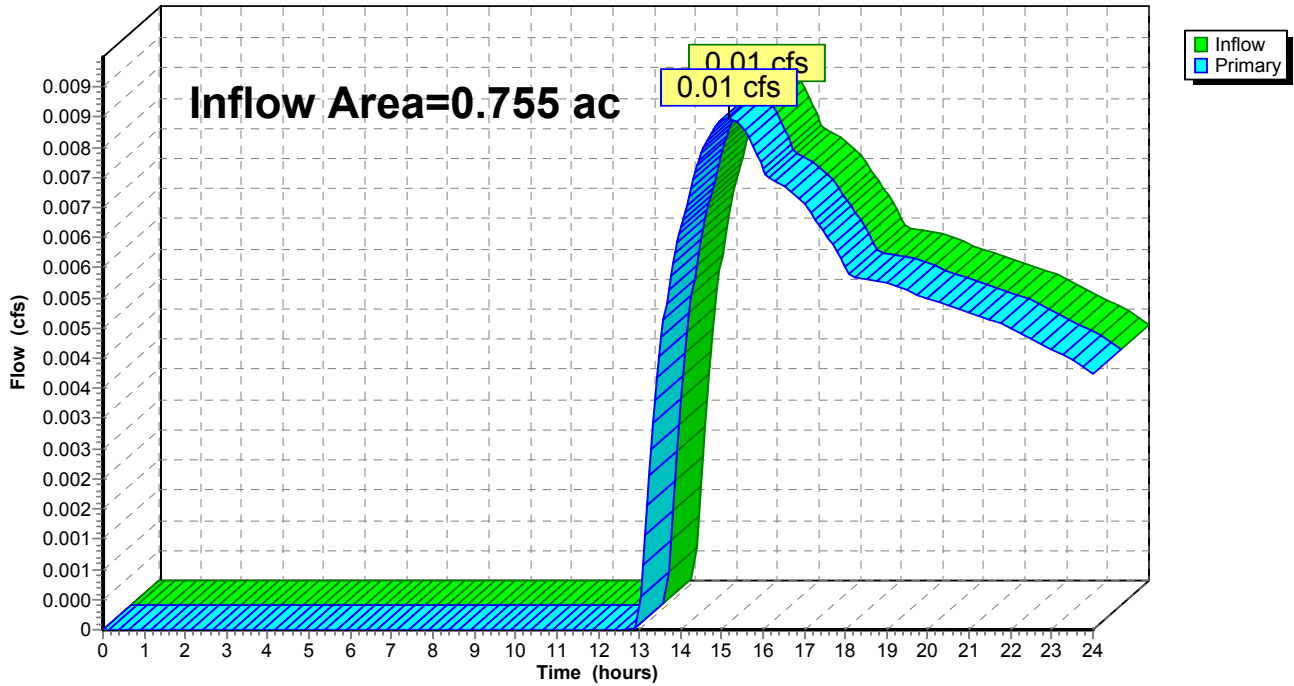
Link 2L: Total Offsite-Easterly Wetland

Inflow Area = 0.755 ac, Inflow Depth = 0.09" for 10-Year Storm event
Inflow = 0.01 cfs @ 15.16 hrs, Volume= 0.005 af
Primary = 0.01 cfs @ 15.16 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite-Easterly Wetland

Hydrograph



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Type III 24-hr 10-Year Storm Rainfall=5.22"

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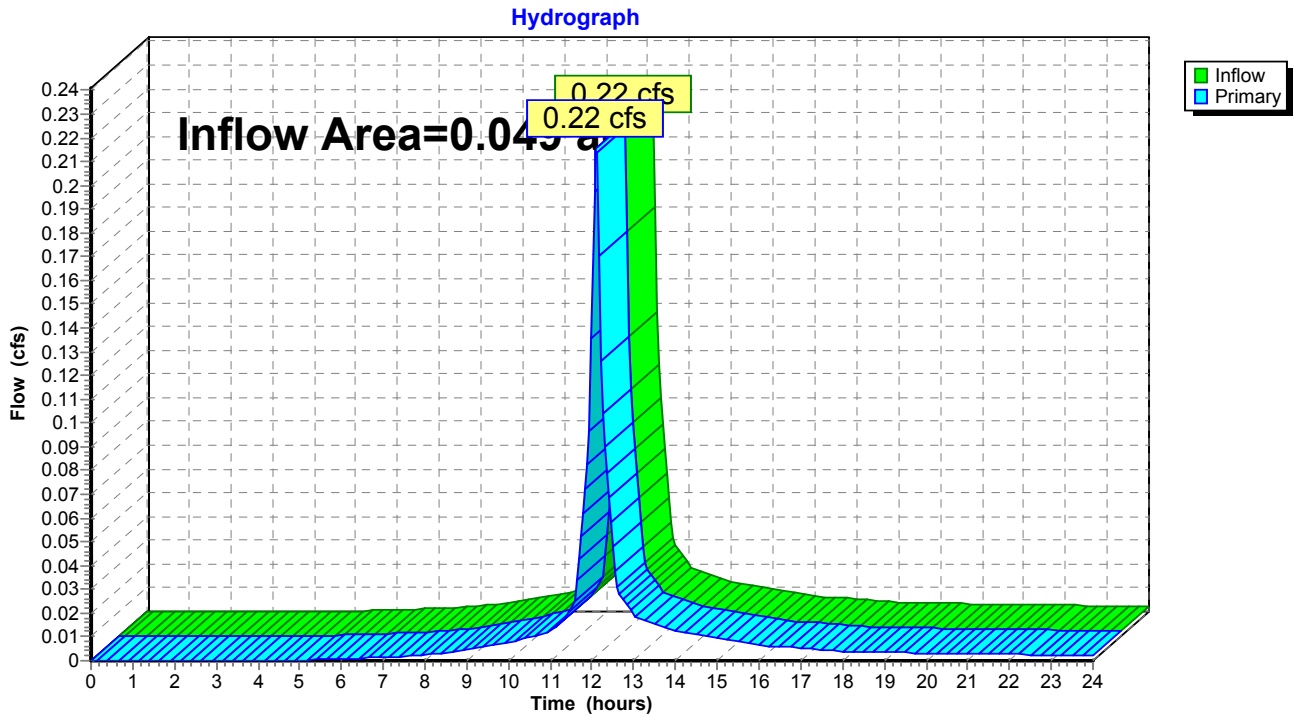
11/6/2025

Link 3L: To Existing CB in Small Lane (redevelopment)

Inflow Area = 0.049 ac, Inflow Depth = 3.98" for 10-Year Storm event
Inflow = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af
Primary = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: To Existing CB in Small Lane (redevelopment)



Postdevelopment

Type III 24-hr 25-Year Storm Rainfall=6.41"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: Runoff Area=2,120 sf Runoff Depth=5.13"
Tc=6.0 min CN=89 Runoff=0.27 cfs 0.021 af

Subcatchment 2S: Roadway + Contributing Areas Runoff Area=16,279 sf Runoff Depth=4.58"
Tc=6.0 min CN=84 Runoff=1.93 cfs 0.143 af

Subcatchment 3S: House + Porch Roof Runoff Area=2,288 sf Runoff Depth=6.17"
Tc=6.0 min CN=98 Runoff=0.32 cfs 0.027 af

Subcatchment 4S: Runoff Area=20,349 sf Runoff Depth=0.12"
Tc=6.0 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment 5S: Runoff Area=32,887 sf Runoff Depth=0.29"
Tc=6.0 min CN=34 Runoff=0.05 cfs 0.018 af

Pond 1P: Retain-It Modules Peak Elev=83.50' Storage=360 cf Inflow=0.32 cfs 0.027 af
Outflow=0.04 cfs 0.027 af

Pond 2P: Retain_It Modules Peak Elev=83.88' Storage=2,281 cf Inflow=1.93 cfs 0.143 af
Discarded=0.19 cfs 0.143 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.143 af

Link 1L: Total Offsite- Northerly wetland @ Crossing Inflow=0.01 cfs 0.005 af
Primary=0.01 cfs 0.005 af

Link 2L: Total Offsite-Easterly Wetland Inflow=0.05 cfs 0.018 af
Primary=0.05 cfs 0.018 af

Link 3L: To Existing CB in Small Lane (redevelopment) Inflow=0.27 cfs 0.021 af
Primary=0.27 cfs 0.021 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.213 af Average Runoff Depth = 1.51"

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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Subcatchment 1S:

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.021 af, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=6.41"

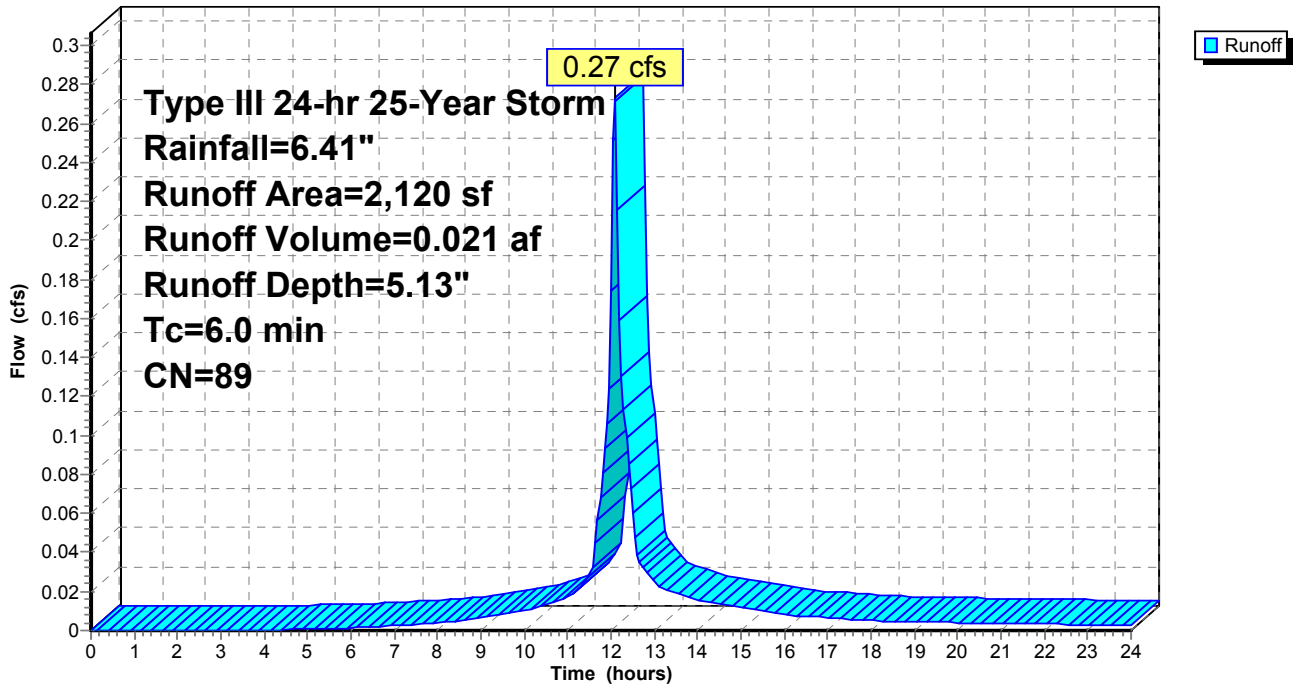
Area (sf)	CN	Description
1,796	98	Pavement/Curb
324	39	>75% Grass cover, Good, HSG A
2,120	89	Weighted Average

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

Subcatchment 1S:

Hydrograph



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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Subcatchment 2S: Roadway + Contributing Areas

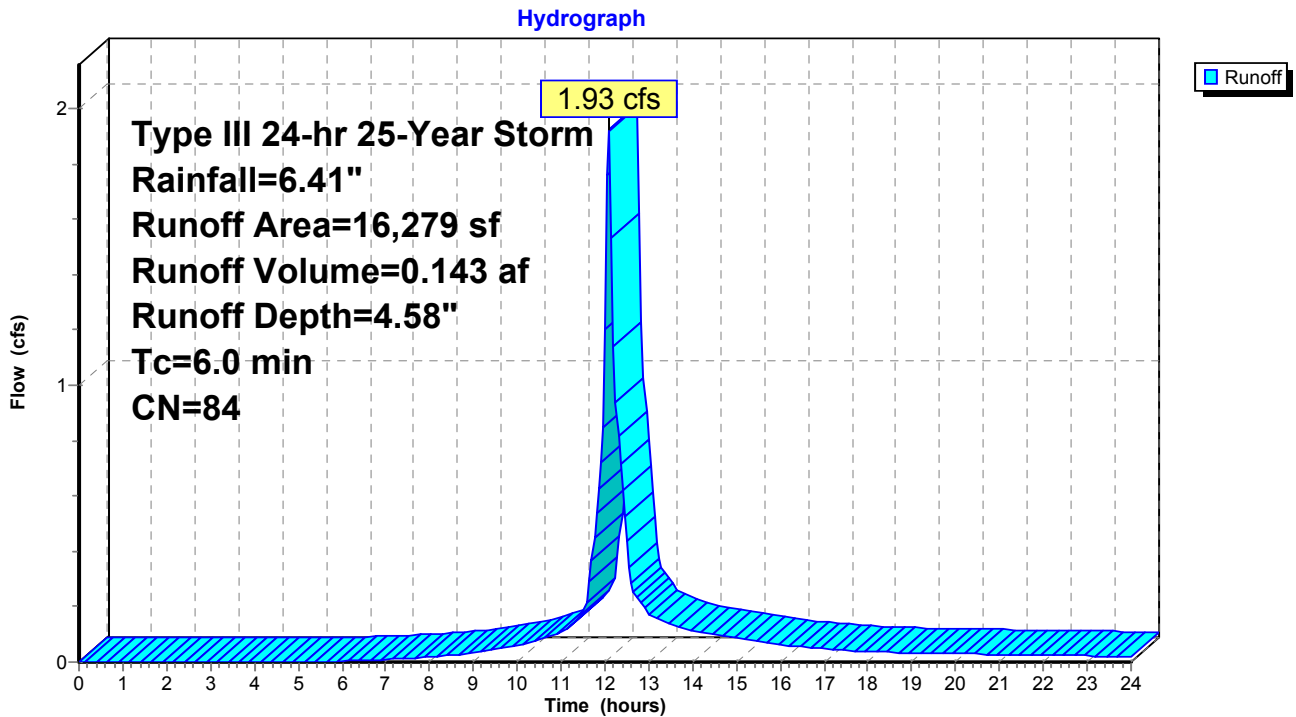
Runoff = 1.93 cfs @ 12.09 hrs, Volume= 0.143 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
10,396	98	Roadway
410	98	curbing
1,168	98	ret wall
980	98	driveway
3,325	30	Woods, Good, HSG A
16,279	84	Weighted Average

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

Subcatchment 2S: Roadway + Contributing Areas



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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Subcatchment 3S: House + Porch Roof

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.027 af, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

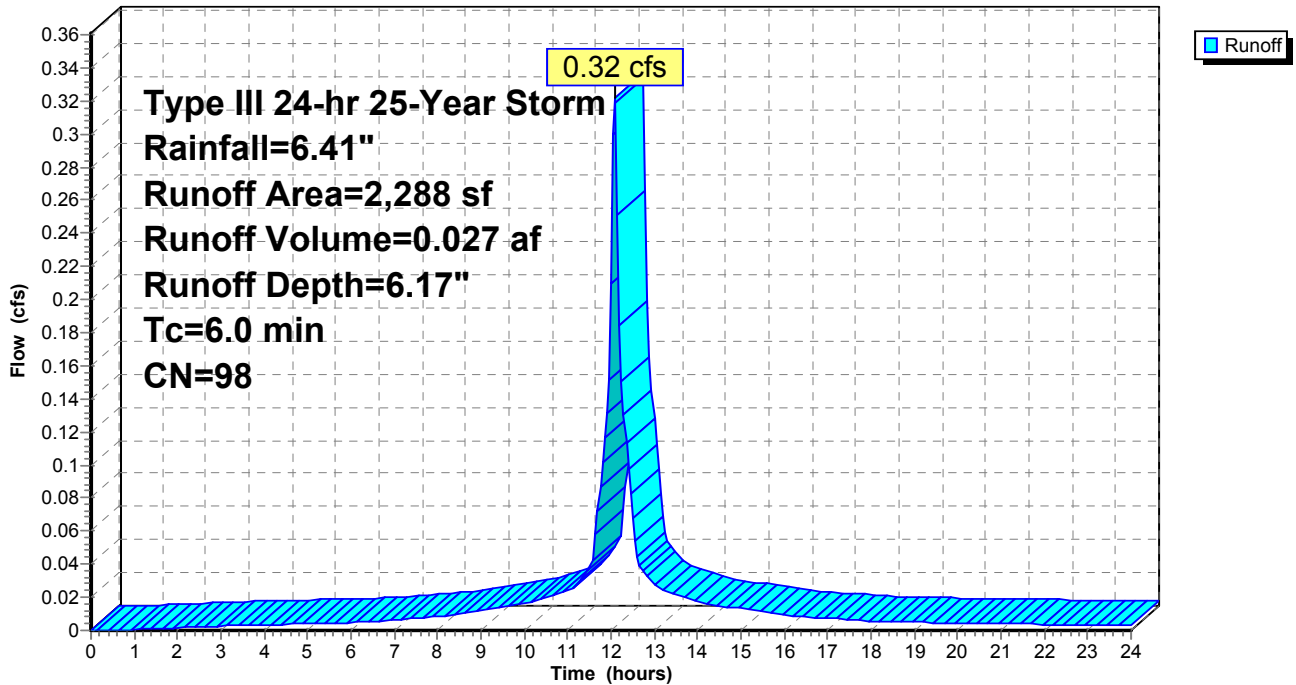
Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
2,288	98	House Roof + Porch

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

Subcatchment 3S: House + Porch Roof

Hydrograph



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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Subcatchment 4S:

Runoff = 0.01 cfs @ 15.00 hrs, Volume= 0.005 af, Depth= 0.12"

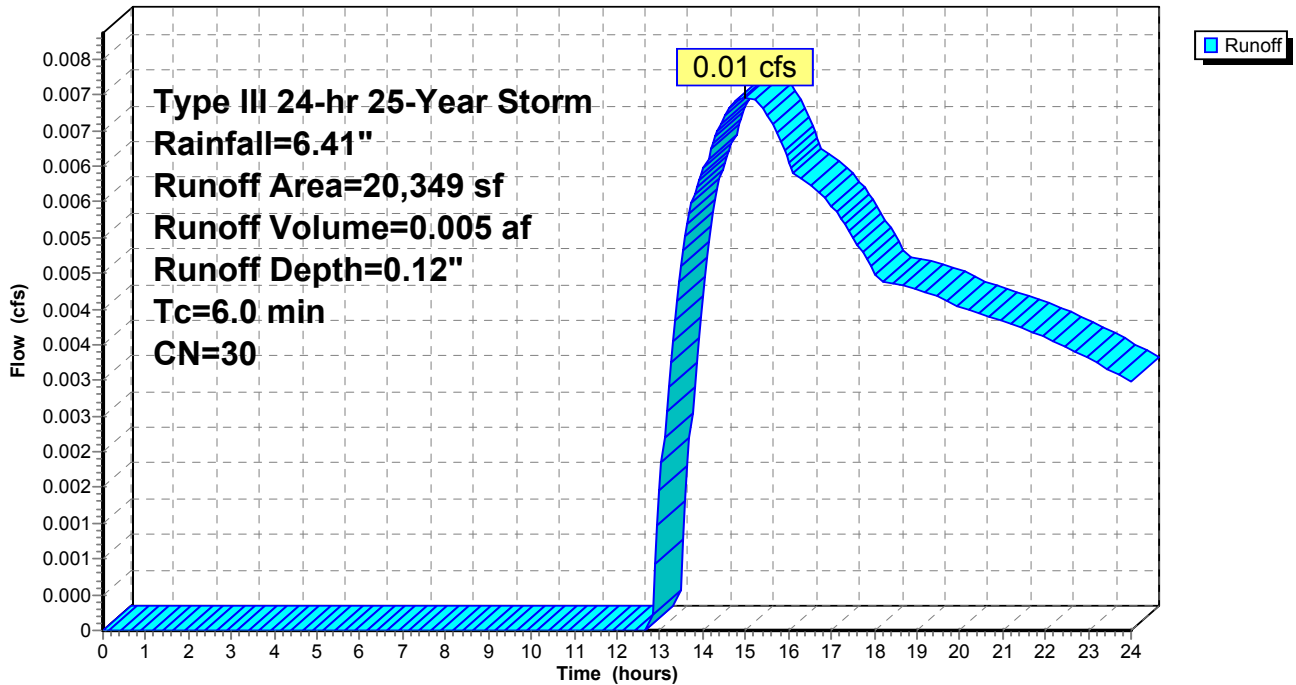
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
20,349	30	Woods, Good, HSG A

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

Subcatchment 4S:

Hydrograph



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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Subcatchment 5S:

Runoff = 0.05 cfs @ 12.45 hrs, Volume= 0.018 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

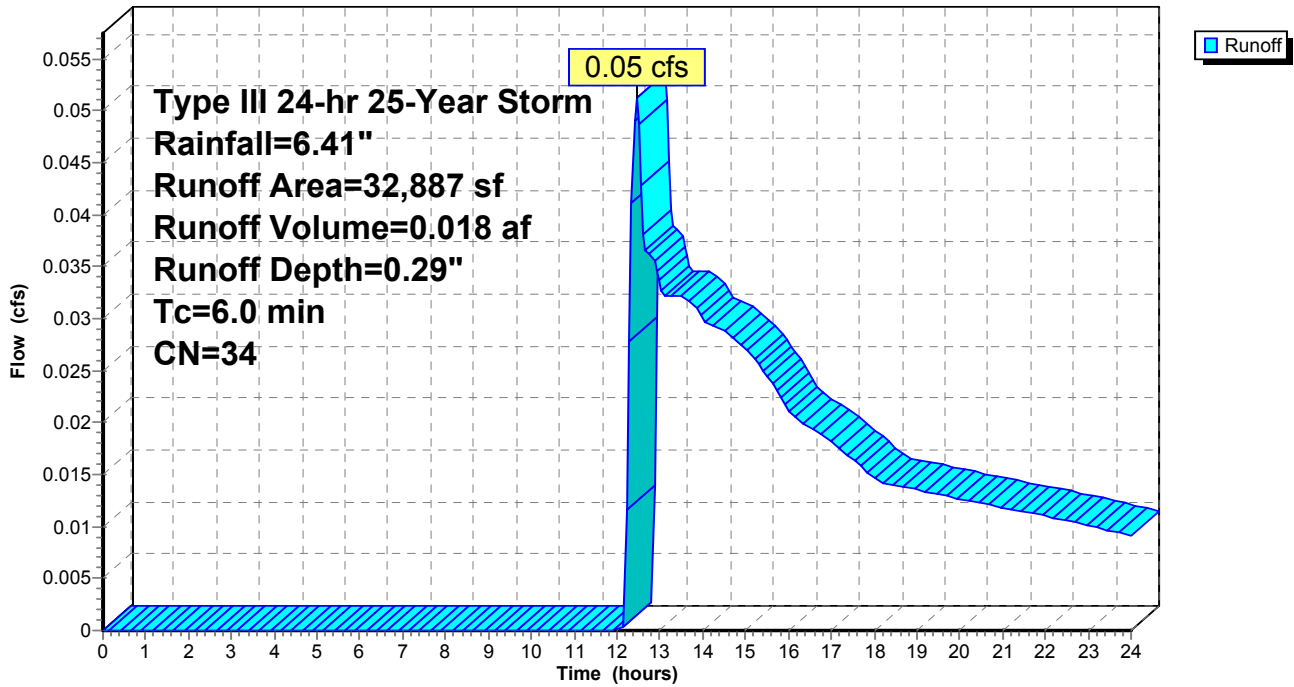
Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
12,887	39	>75% Grass cover, Good, HSG A
20,000	30	Woods, Good, HSG A
32,887	34	Weighted Average

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

Subcatchment 5S:

Hydrograph



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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Pond 1P: Retain-It Modules

Inflow Area = 0.053 ac, Inflow Depth = 6.17" for 25-Year Storm event
 Inflow = 0.32 cfs @ 12.09 hrs, Volume= 0.027 af
 Outflow = 0.04 cfs @ 11.55 hrs, Volume= 0.027 af, Atten= 88%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 11.55 hrs, Volume= 0.027 af

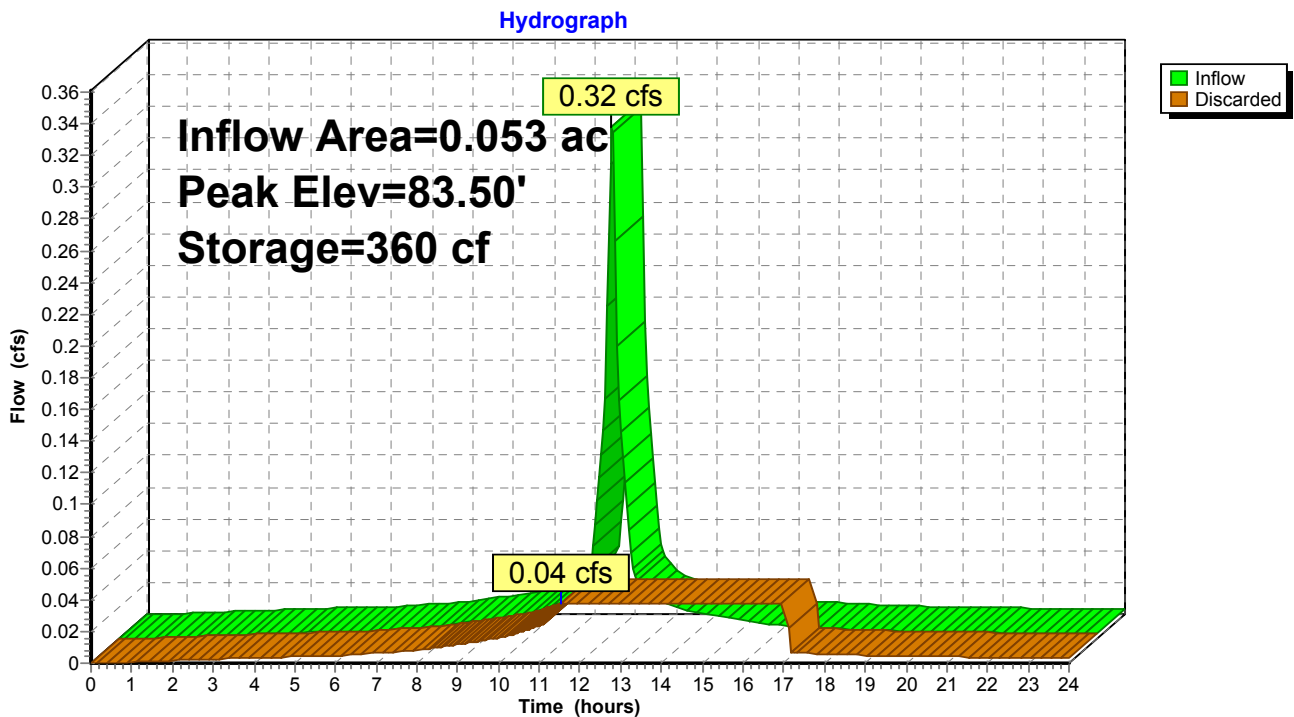
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 83.50' @ 12.70 hrs Surf.Area= 196 sf Storage= 360 cf
 Plug-Flow detention time= 59.1 min calculated for 0.027 af (100% of inflow)
 Center-of-Mass det. time= 58.9 min (802.7 - 743.8)

#	Invert	Avail.Storage	Storage Description
1	81.50'	39 cf	7.00'W x 7.00'L x 0.50'H Prisma toid x 4 98 cf Overall x 40.0% Voids
2	82.00'	588 cf	7.00'W x 7.00'L x 3.00'H Retain_it - 3 ft Inside Heightx 4 -Impervious
3	82.00'	43 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Opening) x 3 -Impervious
		670 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area

Discarded OutFlow Max=0.04 cfs @ 11.55 hrs HW=81.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Pond 1P: Retain-It Modules



Postdevelopment

Type III 24-hr 25-Year Storm Rainfall=6.41"

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Pond 2P: Retain_It Modules

Inflow Area = 0.374 ac, Inflow Depth = 4.58" for 25-Year Storm event
 Inflow = 1.93 cfs @ 12.09 hrs, Volume= 0.143 af
 Outflow = 0.19 cfs @ 11.55 hrs, Volume= 0.143 af, Atten= 90%, Lag= 0.0 min
 Discarded = 0.19 cfs @ 11.55 hrs, Volume= 0.143 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 83.88' @ 12.95 hrs Surf.Area= 980 sf Storage= 2,281 cf
 Plug-Flow detention time= 93.7 min calculated for 0.143 af (100% of inflow)
 Center-of-Mass det. time= 93.6 min (894.1 - 800.5)

#	Invert	Avail.Storage	Storage Description
1	81.50'	196 cf	7.00'W x 7.00'L x 0.50'H Prisma toid x 20 490 cf Overall x 40.0% Voids
2	82.00'	2,940 cf	7.00'W x 7.00'L x 3.00'H Retain-It Module x 20 -Impervious
3	82.00'	326 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Open) x 23 -Impervious
		3,462 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area
2	Primary	85.17'	2.00' x 2.00' Horiz. Orifice/Grate X 2.00 Limited to weir flow C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.55 hrs HW=81.54' (Free Discharge)
 ↑1=**Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.50' (Free Discharge)
 ↑2=**Orifice/Grate** (Controls 0.00 cfs)

Postdevelopment

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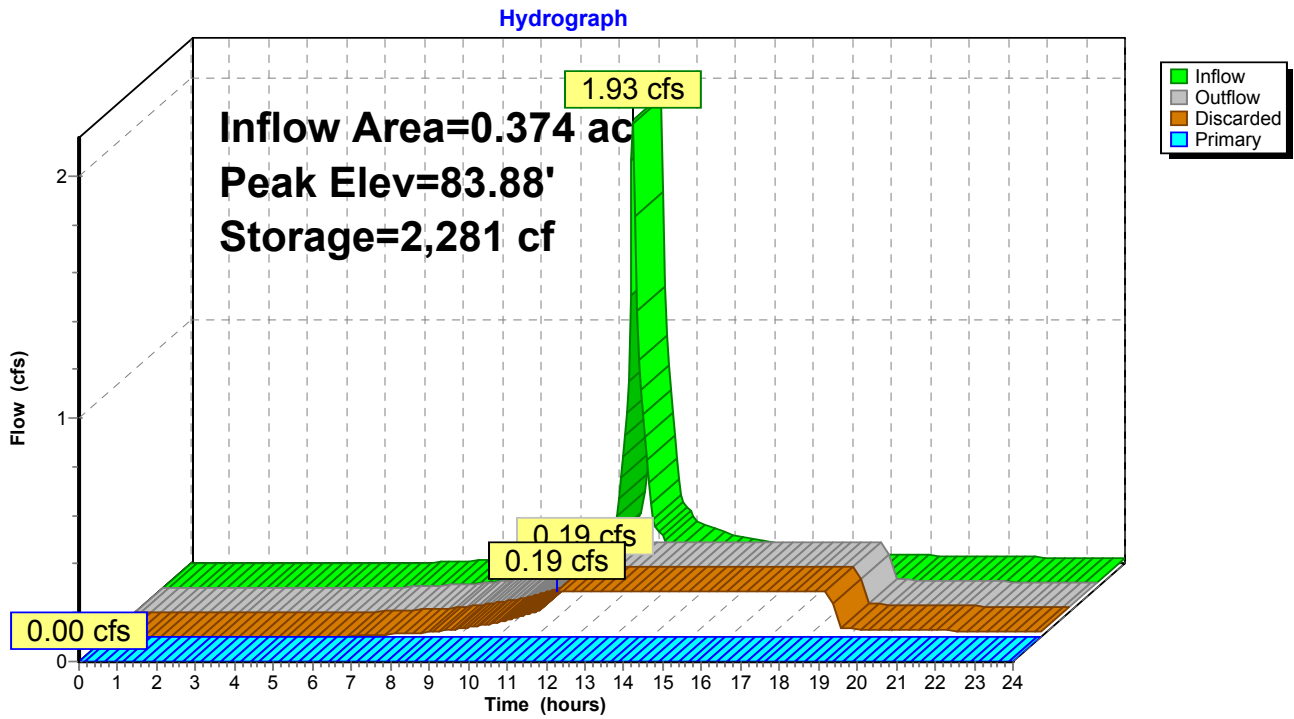
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Type III 24-hr 25-Year Storm Rainfall=6.41"

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Pond 2P: Retain_It Modules



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Type III 24-hr 25-Year Storm Rainfall=6.41"

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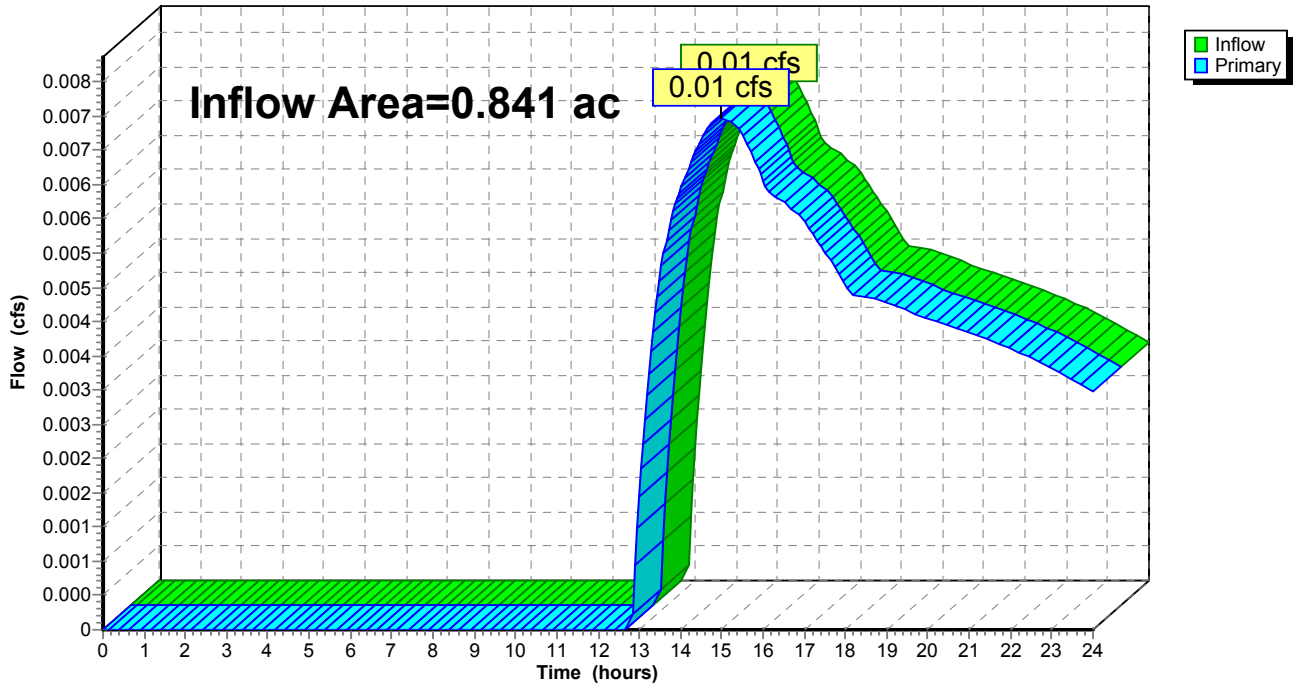
Link 1L: Total Offsite- Northerly wetland @ Crossing

Inflow Area = 0.841 ac, Inflow Depth = 0.07" for 25-Year Storm event
Inflow = 0.01 cfs @ 15.00 hrs, Volume= 0.005 af
Primary = 0.01 cfs @ 15.00 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite- Northerly wetland @ Crossing

Hydrograph



Postdevelopment

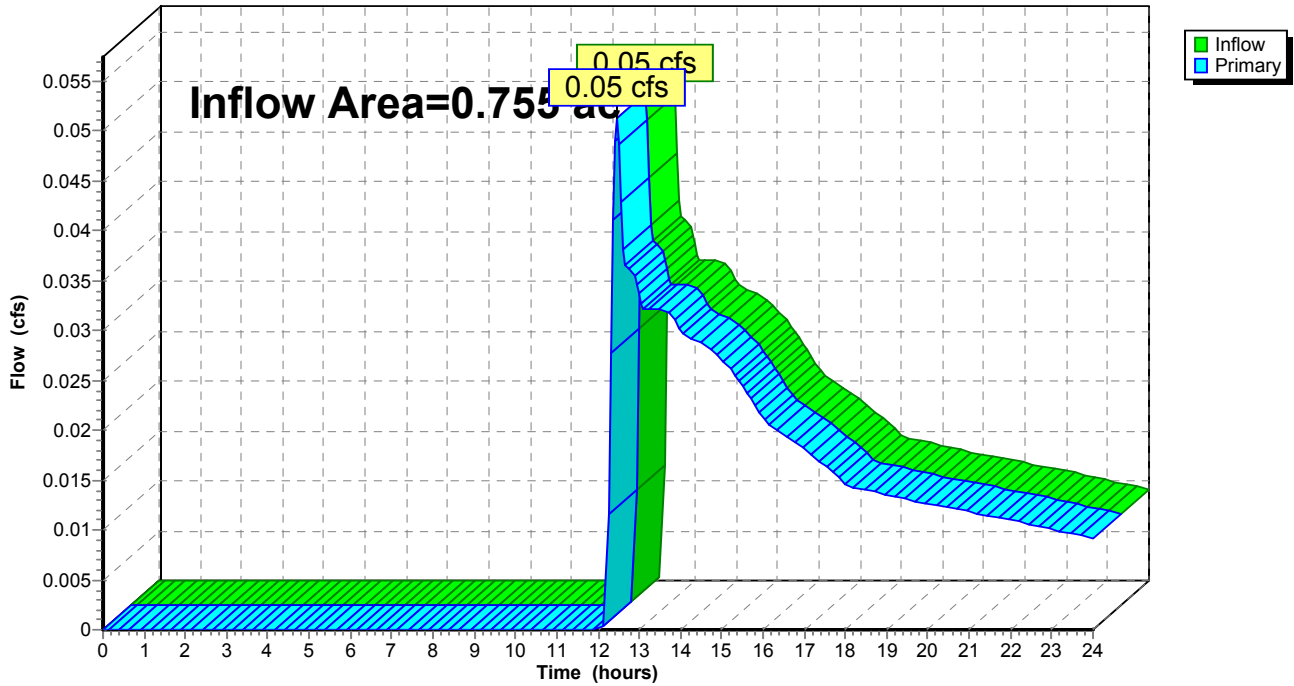
Link 2L: Total Offsite-Easterly Wetland

Inflow Area = 0.755 ac, Inflow Depth = 0.29" for 25-Year Storm event
Inflow = 0.05 cfs @ 12.45 hrs, Volume= 0.018 af
Primary = 0.05 cfs @ 12.45 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite-Easterly Wetland

Hydrograph



Postdevelopment

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Type III 24-hr 25-Year Storm Rainfall=6.41"

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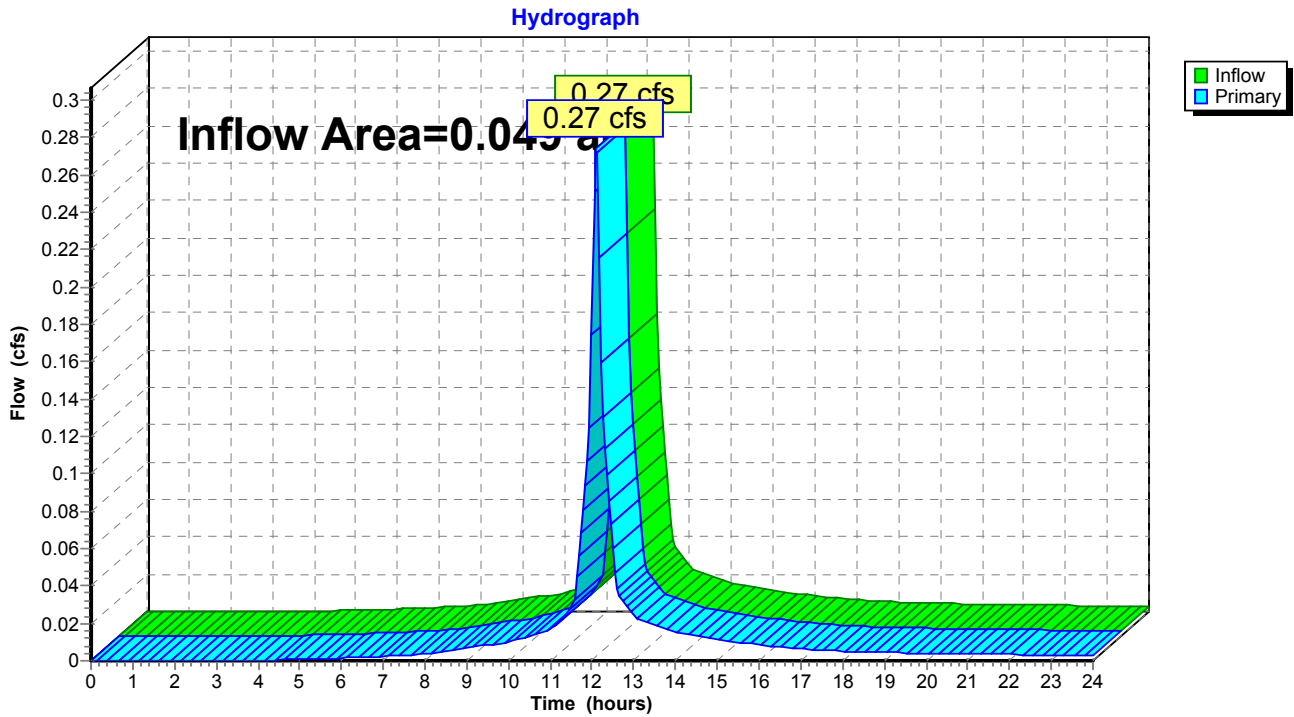
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Link 3L: To Existing CB in Small Lane (redevelopment)

Inflow Area = 0.049 ac, Inflow Depth = 5.13" for 25-Year Storm event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 0.021 af
Primary = 0.27 cfs @ 12.09 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: To Existing CB in Small Lane (redevelopment)



Postdevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S:

Runoff Area=2,120 sf Runoff Depth=6.93"
Tc=6.0 min CN=89 Runoff=0.36 cfs 0.028 af

Subcatchment 2S: Roadway + Contributing Areas

Runoff Area=16,279 sf Runoff Depth=6.33"
Tc=6.0 min CN=84 Runoff=2.62 cfs 0.197 af

Subcatchment 3S: House + Porch Roof

Runoff Area=2,288 sf Runoff Depth=8.01"
Tc=6.0 min CN=98 Runoff=0.42 cfs 0.035 af

Subcatchment 4S:

Runoff Area=20,349 sf Runoff Depth=0.48"
Tc=6.0 min CN=30 Runoff=0.07 cfs 0.019 af

Subcatchment 5S:

Runoff Area=32,887 sf Runoff Depth=0.80"
Tc=6.0 min CN=34 Runoff=0.29 cfs 0.050 af

Pond 1P: Retain-It Modules

Peak Elev=84.25' Storage=519 cf Inflow=0.42 cfs 0.035 af
Outflow=0.04 cfs 0.035 af

Pond 2P: Retain_It Modules

Peak Elev=85.19' Storage=3,462 cf Inflow=2.62 cfs 0.197 af
Discarded=0.19 cfs 0.195 af Primary=0.16 cfs 0.002 af Outflow=0.34 cfs 0.197 af

Link 1L: Total Offsite- Northerly wetland @ Crossing

Inflow=0.20 cfs 0.020 af
Primary=0.20 cfs 0.020 af

Link 2L: Total Offsite-Easterly Wetland

Inflow=0.29 cfs 0.050 af
Primary=0.29 cfs 0.050 af

Link 3L: To Existing CB in Small Lane (redevelopment)

Inflow=0.36 cfs 0.028 af
Primary=0.36 cfs 0.028 af

Total Runoff Area = 1.697 ac Runoff Volume = 0.329 af Average Runoff Depth = 2.33"

Postdevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Subcatchment 1S:

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.028 af, Depth= 6.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Storm Rainfall=8.25"

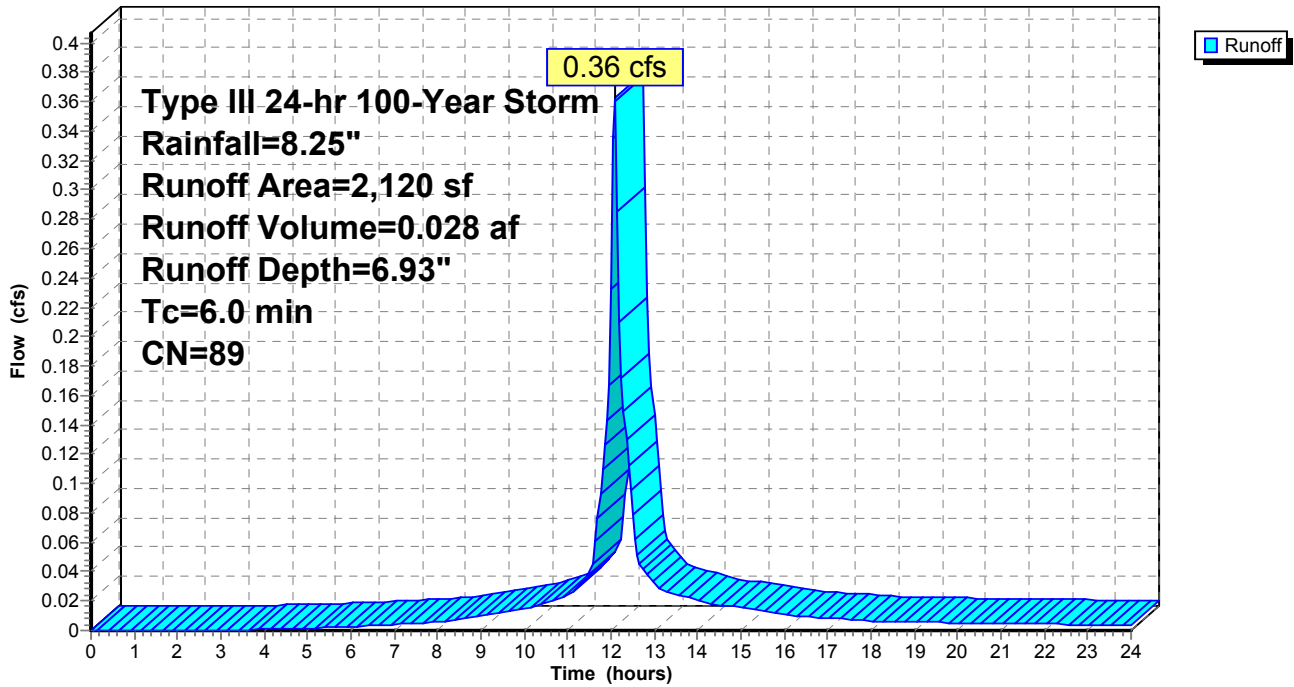
Area (sf)	CN	Description
1,796	98	Pavement/Curb
324	39	>75% Grass cover, Good, HSG A
2,120	89	Weighted Average

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

Subcatchment 1S:

Hydrograph



Postdevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Subcatchment 2S: Roadway + Contributing Areas

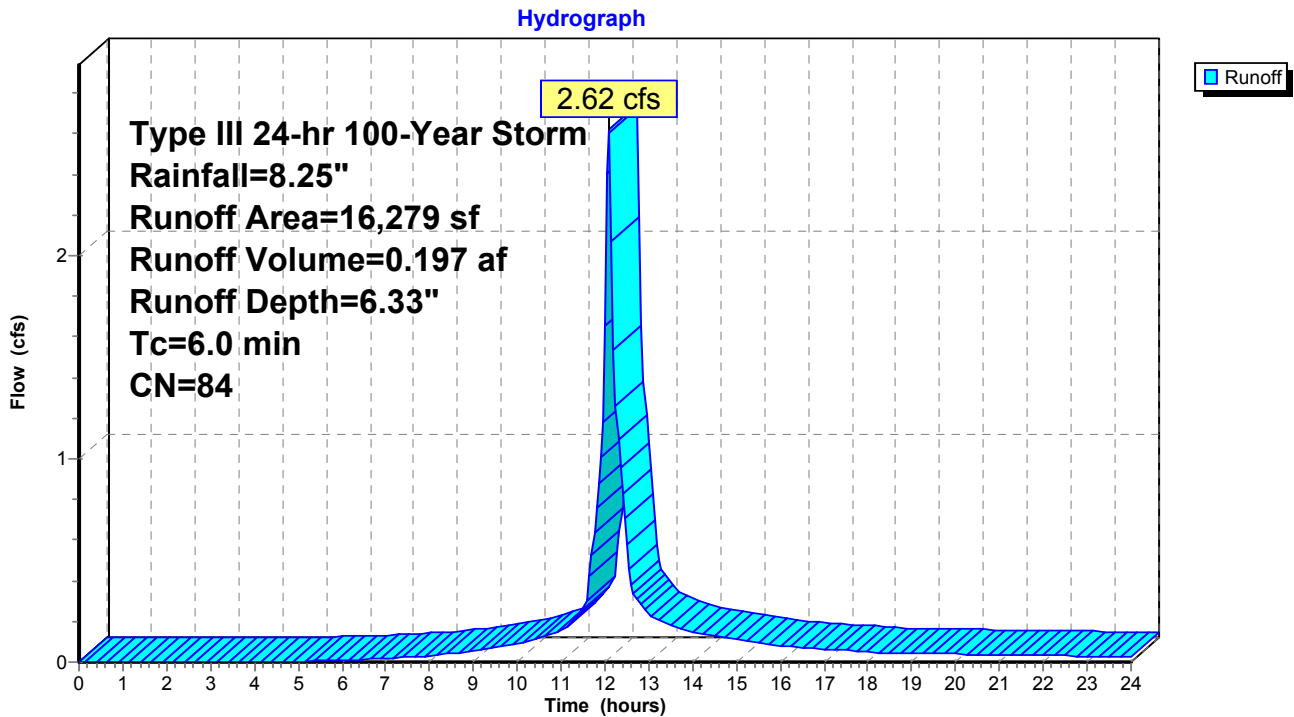
Runoff = 2.62 cfs @ 12.09 hrs, Volume= 0.197 af, Depth= 6.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Storm Rainfall=8.25"

Area (sf)	CN	Description
10,396	98	Roadway
410	98	curbing
1,168	98	ret wall
980	98	driveway
3,325	30	Woods, Good, HSG A
16,279	84	Weighted Average

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

Subcatchment 2S: Roadway + Contributing Areas



Postdevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Subcatchment 3S: House + Porch Roof

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 8.01"

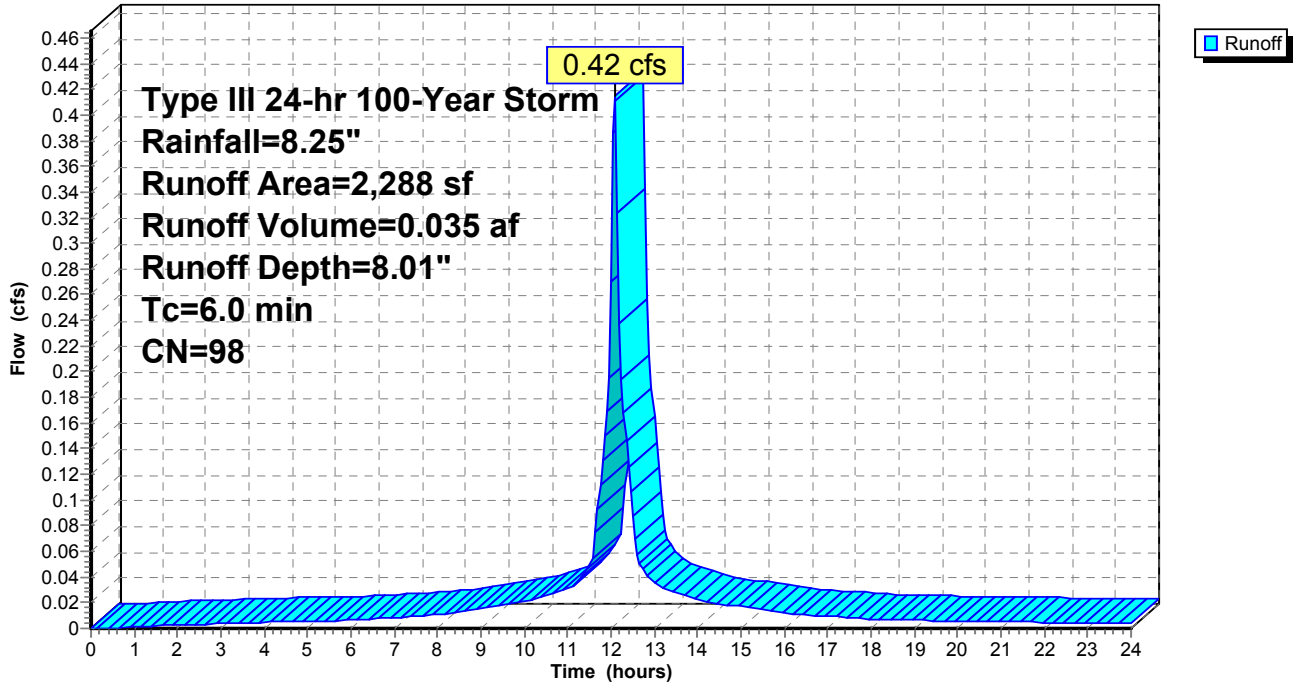
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Storm Rainfall=8.25"

Area (sf)	CN	Description
2,288	98	House Roof + Porch

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

Subcatchment 3S: House + Porch Roof

Hydrograph



Postdevelopment

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Type III 24-hr 100-Year Storm Rainfall=8.25"

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Subcatchment 4S:

Runoff = 0.07 cfs @ 12.40 hrs, Volume= 0.019 af, Depth= 0.48"

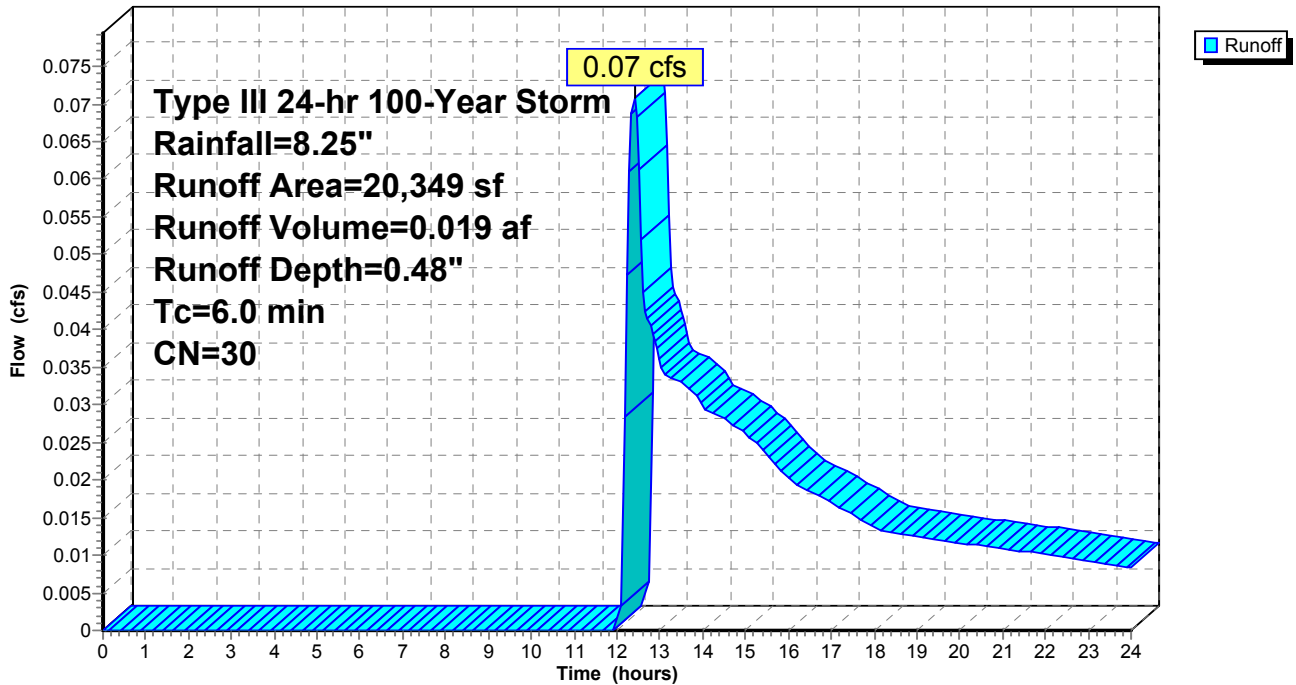
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Storm Rainfall=8.25"

Area (sf)	CN	Description
20,349	30	Woods, Good, HSG A

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

Subcatchment 4S:

Hydrograph



Postdevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Subcatchment 5S:

Runoff = 0.29 cfs @ 12.28 hrs, Volume= 0.050 af, Depth= 0.80"

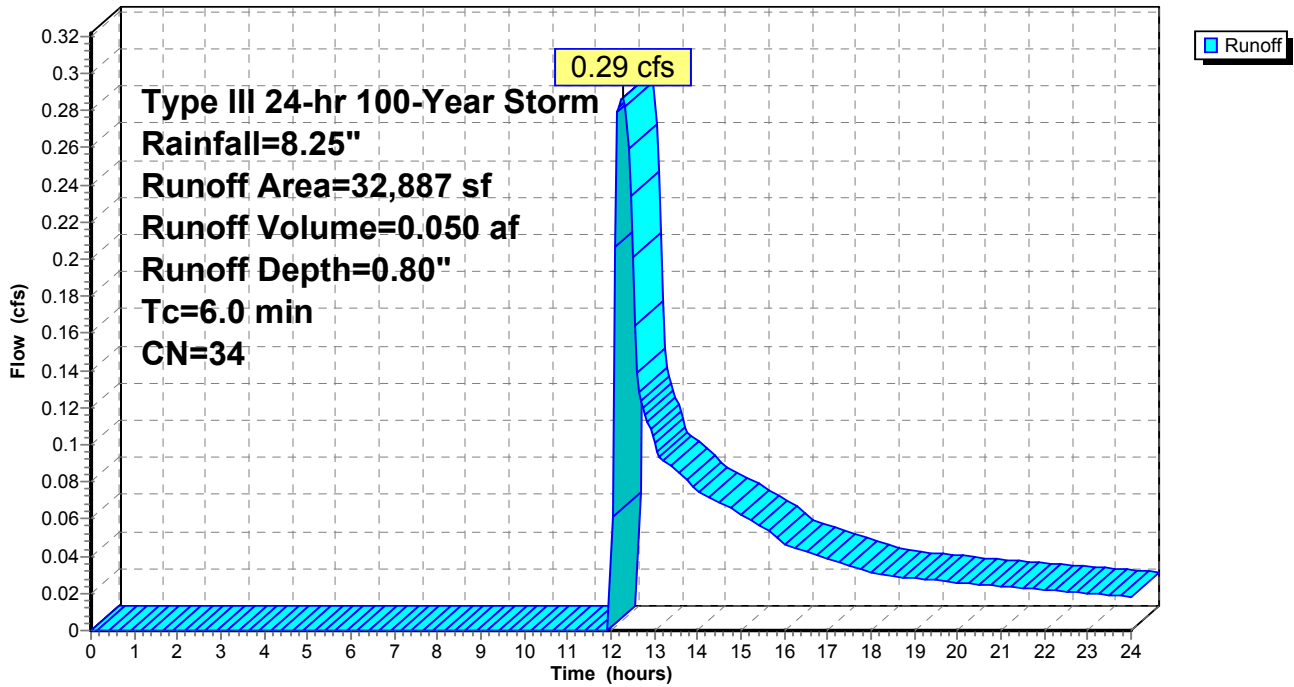
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Storm Rainfall=8.25"

Area (sf)	CN	Description
12,887	39	>75% Grass cover, Good, HSG A
20,000	30	Woods, Good, HSG A
32,887	34	Weighted Average

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

Subcatchment 5S:

Hydrograph



Postdevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Pond 1P: Retain-It Modules

Inflow Area = 0.053 ac, Inflow Depth = 8.01" for 100-Year Storm event
 Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.035 af
 Outflow = 0.04 cfs @ 11.30 hrs, Volume= 0.035 af, Atten= 91%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 11.30 hrs, Volume= 0.035 af

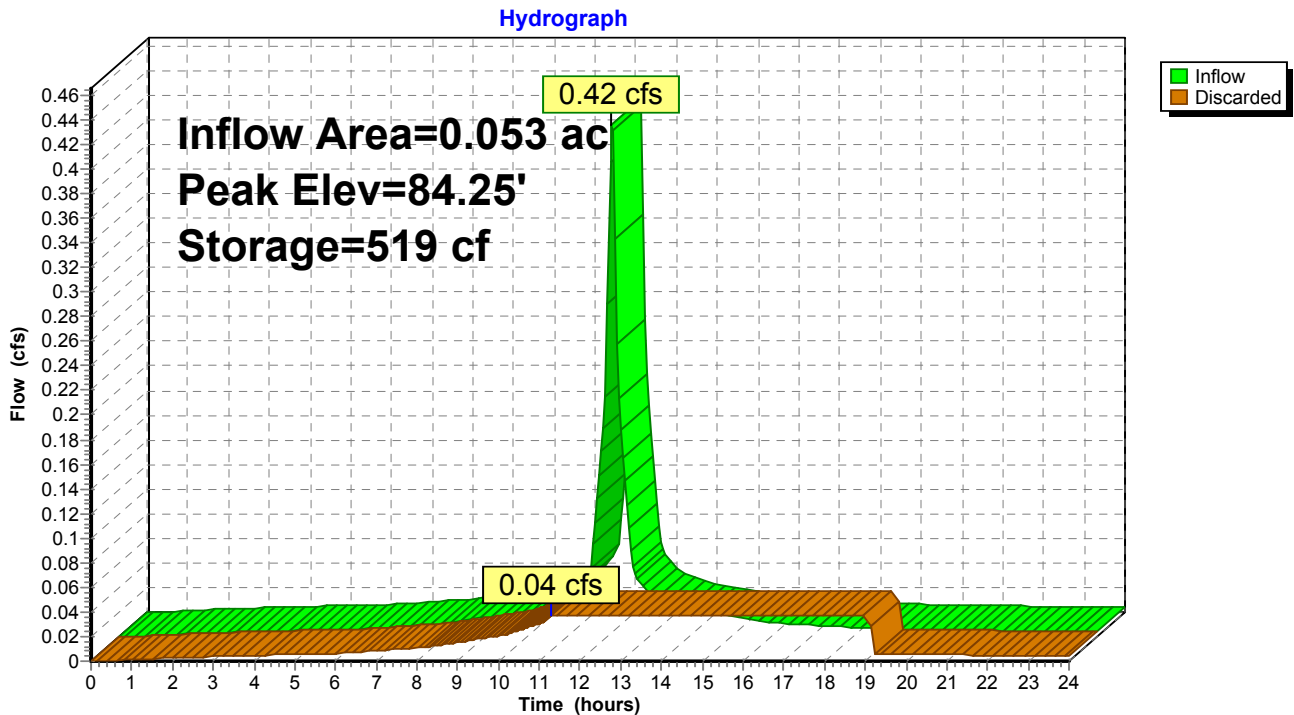
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 84.25' @ 12.95 hrs Surf.Area= 196 sf Storage= 519 cf
 Plug-Flow detention time= 93.0 min calculated for 0.035 af (100% of inflow)
 Center-of-Mass det. time= 92.9 min (833.3 - 740.4)

#	Invert	Avail.Storage	Storage Description
1	81.50'	39 cf	7.00'W x 7.00'L x 0.50'H Prisma toid x 4 98 cf Overall x 40.0% Voids
2	82.00'	588 cf	7.00'W x 7.00'L x 3.00'H Retain_it - 3 ft Inside Heightx 4 -Impervious
3	82.00'	43 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Opening) x 3 -Impervious
		670 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area

Discarded OutFlow Max=0.04 cfs @ 11.30 hrs HW=81.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

Pond 1P: Retain-It Modules



Postdevelopment

Type III 24-hr 100-Year Storm Rainfall=8.25"

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Pond 2P: Retain_It Modules

Inflow Area = 0.374 ac, Inflow Depth = 6.33" for 100-Year Storm event
 Inflow = 2.62 cfs @ 12.09 hrs, Volume= 0.197 af
 Outflow = 0.34 cfs @ 12.85 hrs, Volume= 0.197 af, Atten= 87%, Lag= 45.7 min
 Discarded = 0.19 cfs @ 11.25 hrs, Volume= 0.195 af
 Primary = 0.16 cfs @ 12.85 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 85.19' @ 12.85 hrs Surf.Area= 980 sf Storage= 3,462 cf
 Plug-Flow detention time= 151.9 min calculated for 0.197 af (100% of inflow)
 Center-of-Mass det. time= 151.8 min (943.3 - 791.6)

#	Invert	Avail.Storage	Storage Description
1	81.50'	196 cf	7.00'W x 7.00'L x 0.50'H Prismatoid x 20 490 cf Overall x 40.0% Voids
2	82.00'	2,940 cf	7.00'W x 7.00'L x 3.00'H Retain-It Module x 20 -Impervious
3	82.00'	326 cf	1.00'W x 5.67'L x 2.50'H Retain-It (Open) x 23 -Impervious
		3,462 cf	Total Available Storage

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.011500 fpm Exfiltration over entire Surface area
2	Primary	85.17'	2.00' x 2.00' Horiz. Orifice/Grate X 2.00 Limited to weir flow C= 0.600

Discarded OutFlow Max=0.19 cfs @ 11.25 hrs HW=81.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.10 cfs @ 12.85 hrs HW=85.19' (Free Discharge)
 ↑2=Orifice/Grate (Weir Controls 0.10 cfs @ 0.4 fps)

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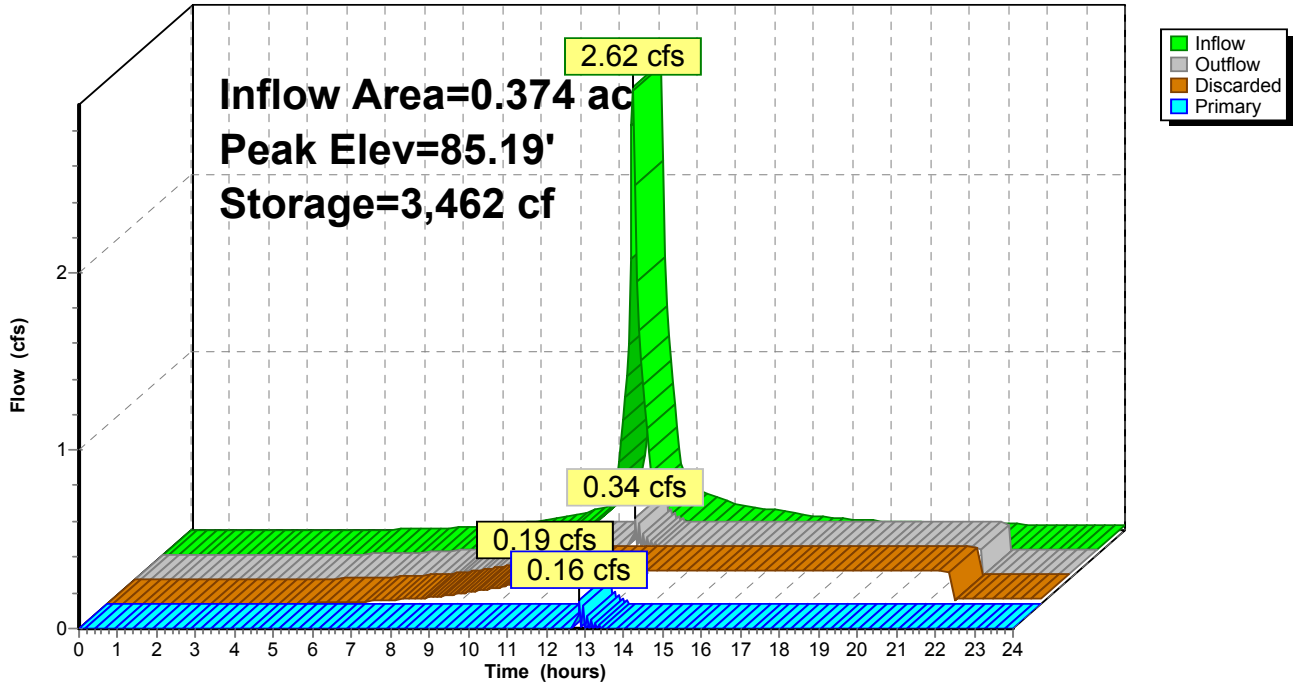
Type III 24-hr 100-Year Storm Rainfall=8.25"

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Pond 2P: Retain_It Modules

Hydrograph



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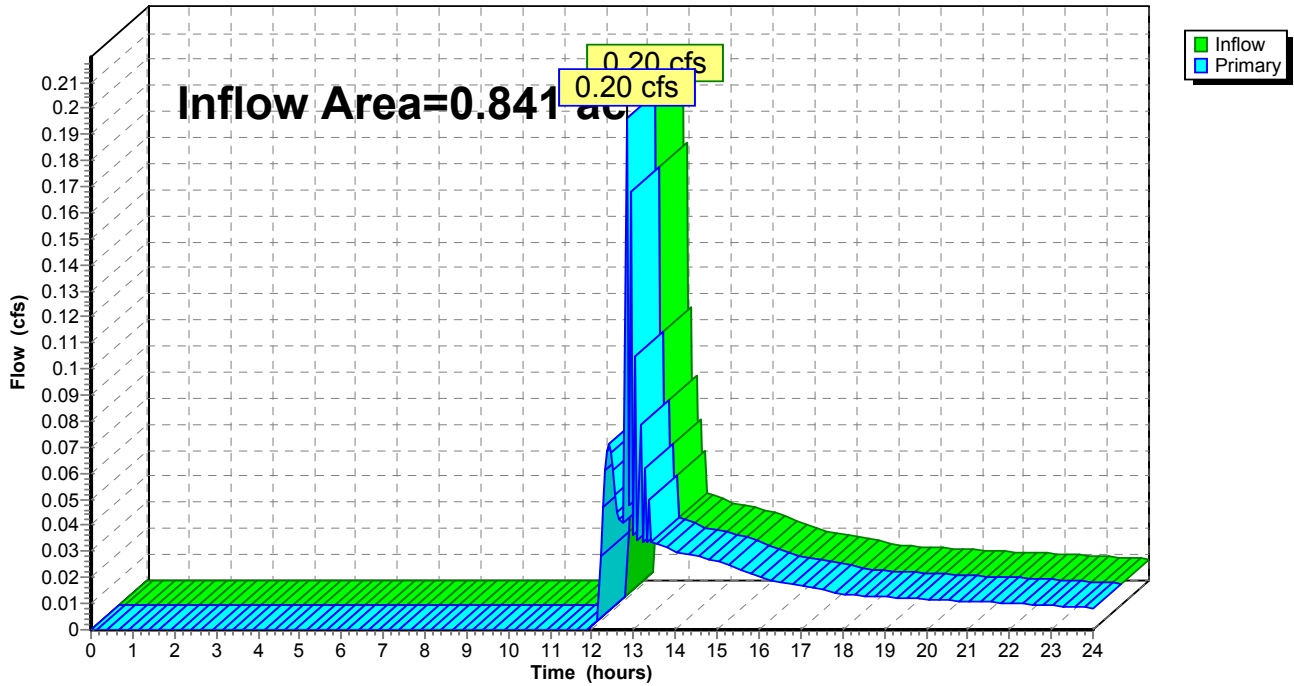
Link 1L: Total Offsite- Northerly wetland @ Crossing

Inflow Area = 0.841 ac, Inflow Depth = 0.29" for 100-Year Storm event
Inflow = 0.20 cfs @ 12.85 hrs, Volume= 0.020 af
Primary = 0.20 cfs @ 12.85 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Total Offsite- Northerly wetland @ Crossing

Hydrograph



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Type III 24-hr 100-Year Storm Rainfall=8.25"

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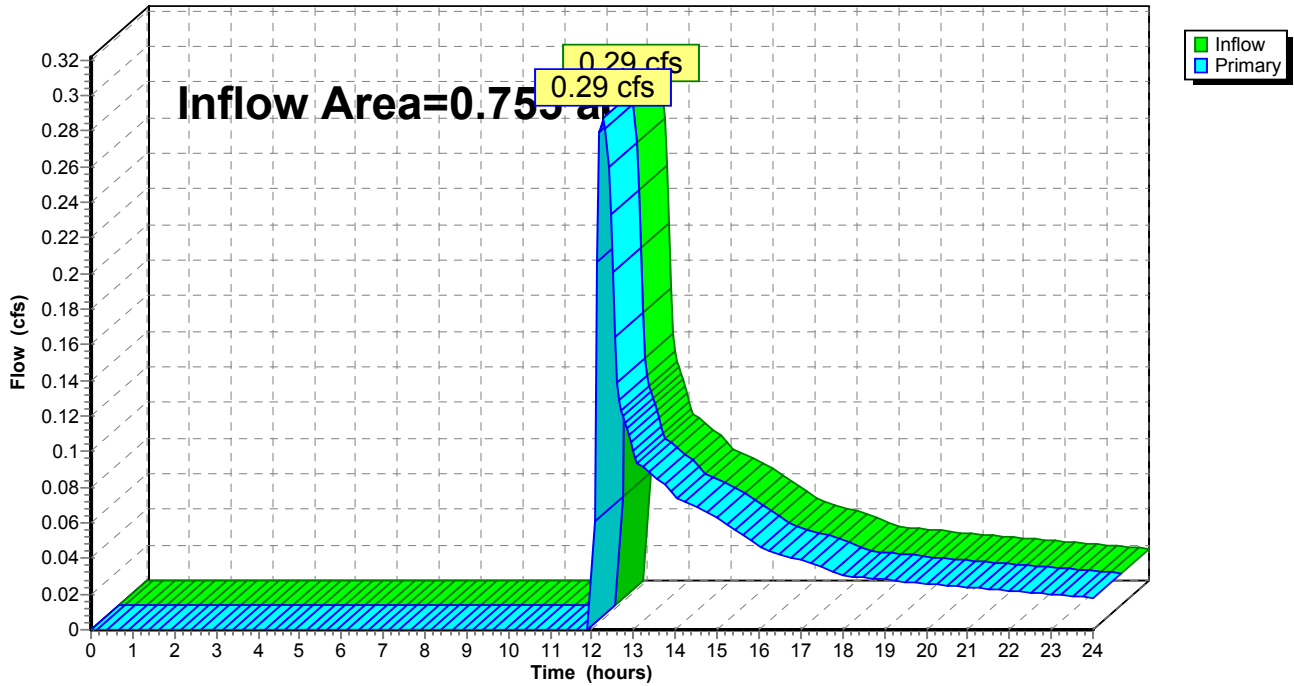
Link 2L: Total Offsite-Easterly Wetland

Inflow Area = 0.755 ac, Inflow Depth = 0.80" for 100-Year Storm event
Inflow = 0.29 cfs @ 12.28 hrs, Volume= 0.050 af
Primary = 0.29 cfs @ 12.28 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 2L: Total Offsite-Easterly Wetland

Hydrograph



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Type III 24-hr 100-Year Storm Rainfall=8.25"

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Link 3L: To Existing CB in Small Lane (redevelopment)

Inflow Area = 0.049 ac, Inflow Depth = 6.93" for 100-Year Storm event
Inflow = 0.36 cfs @ 12.09 hrs, Volume= 0.028 af
Primary = 0.36 cfs @ 12.09 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 3L: To Existing CB in Small Lane (redevelopment)

