

DRAINAGE REPORT

Prepared for

**PATRIOT HOMES
KILLINGLY, CT**

April 2020

Prepared for

Proposed 30-Lot Subdivision
With access from Route 101
Killingly, CT

Prepared by

Killingly Engineering Associates

Civil Engineering & Surveying



Normand Thibeault Jr., P.E.
CT License #22834

Introduction

Patriot Homes has submitted an application to the Town of Killingly to construct a 30-lot subdivision with access from Route 101. The development will require construction of a 1,300 linear foot paved roadway with a 50ø radius cul-de-sac turnaround. The existing property is a moderately sloped with wooded and emergent vegetation from a previous clearing. The project proposes to install a stormwater collection system for the roadway consisting of catch basins and piping that will discharge substantially to a stormwater basin. Development of subject property was previously approved in 2004 for a 40+ lot subdivision. The plans for that project were never filed on the land records by the owner and the project was not constructed.

Summary

The topography on the property is such that stormwater from the development lots will shed substantially away from the road and sheet flow overland. The calculations utilized HydroCAD® Stormwater Modeling System, a computer model, to analyze pre-and post-development drainage conditions, and to aid in the design of the stormwater detention/infiltration system. The model used the Soil Conservation Service TR-20 method with a Type III 24-hour rainfall to calculate the runoff in 4 directions. The 2 through 25-year extreme precipitation frequency storms were analyzed to evaluate peak runoff flow to and from the proposed stormwater pond as well as rates to the site perimeter in all directions.

Table 1. Existing & Proposed Peak Flows Drainage Area 1 (Southeast)

Design Storm	Depth (in)	Existing peak	Proposed peak	Change
2-Year	3.37	0.55 CFS	1.08 CFS	+0.53 CFS
5-Year	4.27	1.55 CFS	2.24 CFS	+0.69 CFS
10-Year	5.02	2.46 CFS	3.23 CFS	+0.77 CFS
25-Year	6.05	3.86 CFS	4.71 CFS	+0.85 CFS

It should be noted that these increases in runoff rates are not point discharges; runoff will sheet flow through wooded terrain and the nearest residences are more than 1,000 feet from the property line. Table 2 summarizes drainage to the west-southwest property line.

Table 2. Existing & Proposed Peak Flows Drainage Area 2

Design Storm	Depth (in)	Existing peak	Proposed peak	Change
2-Year	3.37	1.69 CFS	3.34 CFS	+1.65 CFS
5-Year	4.27	4.80 CFS	7.19 CFS	+2.39 CFS
10-Year	5.02	7.62 CFS	10.62 CFS	+3.00 CFS
25-Year	6.05	11.98 CFS	15.67 CFS	+3.69 CFS

As with drainage area 1, these increases in runoff rates are not point discharges except for drainage that comes off the road; Increases over the 950 length of the property line are approximately 0.004 CFS per linear foot.

Drainage Area 3 flows substantially toward Route 101 and is intercepted by a swale along the edge of the roadway that flows east. This runoff ultimately continues to flow east to a headwall that discharges back onto the subject property and to the proposed stormwater basin.

Table 3. Existing & Proposed Peak Flows Drainage Area 3 (Northwest)

Design Storm	Depth (in)	Existing peak	Proposed peak	Change
2-Year	3.37	1.09 CFS	0.91 CFS	-0.18 CFS
5-Year	4.27	2.36 CFS	1.82 CFS	-0.54 CFS
10-Year	5.02	3.46 CFS	2.60 CFS	-0.86 CFS
25-Year	6.05	5.10 CFS	3.75 CFS	-1.35 CFS

The decreases in peak runoff rates are the result of a smaller drainage area. Portions of the drainage area for the undeveloped site will be intercepted and re-directed to the stormwater collection system and to the stormwater basin.

Stormwater from 4.15 acres shown as drainage area 4A that includes the proposed roadway will be collected and directed to a stormwater basin. Another 6.4 acres that includes 9 lots and a substantially undisturbed wooded area will sheet flow to the eastern property line. The analysis for flows in this direction includes both the sheet flow and discharge from the basin and are as follows:

Table 4. Existing & Proposed Peak Flows Drainage Area 4 & 4a (East)

Design Storm	Depth (in)	Existing peak	Proposed peak	Change
2-Year	3.37	5.12 CFS	2.64 CFS	-2.48 CFS
5-Year	4.27	11.00 CFS	6.20 CFS	-4.80 CFS
10-Year	5.02	16.06 CFS	9.32 CFS	-6.74 CFS
25-Year	6.05	23.64 CFS	14.03 CFS	-9.61 CFS

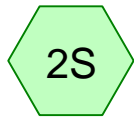
The substantial decreases in peak runoff rates can be attributed to the stormwater basin. Although the computations do not account for infiltration, a test hole excavated in the area of the first bay of the basin indicates that the soils consist of well drained sands and gravels. This finding is consistent with the NRCS Web Soil survey. The second bay of the basin was found to be more restrictive with indications of a seasonally high-water table that will result in approximately 10" of pooled water seasonally. This will not reduce the effectiveness of the basin.

HYDROCAD CALCULATIONS

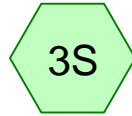
EXISTING CONDITIONS



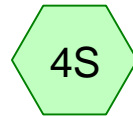
Drainage Area 1 -
Southeast



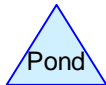
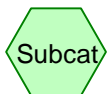
Drainage Area 2 -
Southwest



Drainage Area 3 -
Northwest



Drainage Area 4 -
Northeast



Existing Conditions

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.600	60	Woods, Fair, HSG B (1S, 2S)
12.150	65	Woods/grass comb., Fair, HSG B (3S, 4S)
20.750	63	TOTAL AREA

Existing Conditions

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Patriot Homes
Type III 24-hr 2-year Rainfall=3.27"
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=2.210 ac 0.00% Impervious Runoff Depth>0.38"
Flow Length=448' Slope=0.0580 '/' Tc=12.0 min CN=60 Runoff=0.55 cfs 0.070 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.390 ac 0.00% Impervious Runoff Depth>0.38"
Flow Length=495' Slope=0.1000 '/' Tc=9.9 min CN=60 Runoff=1.69 cfs 0.202 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=2.440 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=713' Slope=0.0670 '/' Tc=14.3 min CN=65 Runoff=1.09 cfs 0.114 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=9.710 ac 0.00% Impervious Runoff Depth>0.56"
Flow Length=557' Slope=0.1180 '/' Tc=8.8 min CN=65 Runoff=5.12 cfs 0.457 af

Total Runoff Area = 20.750 ac Runoff Volume = 0.842 af Average Runoff Depth = 0.49"
100.00% Pervious = 20.750 ac 0.00% Impervious = 0.000 ac

Existing Conditions

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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

Runoff = 0.55 cfs @ 12.25 hrs, Volume= 0.070 af, Depth> 0.38"

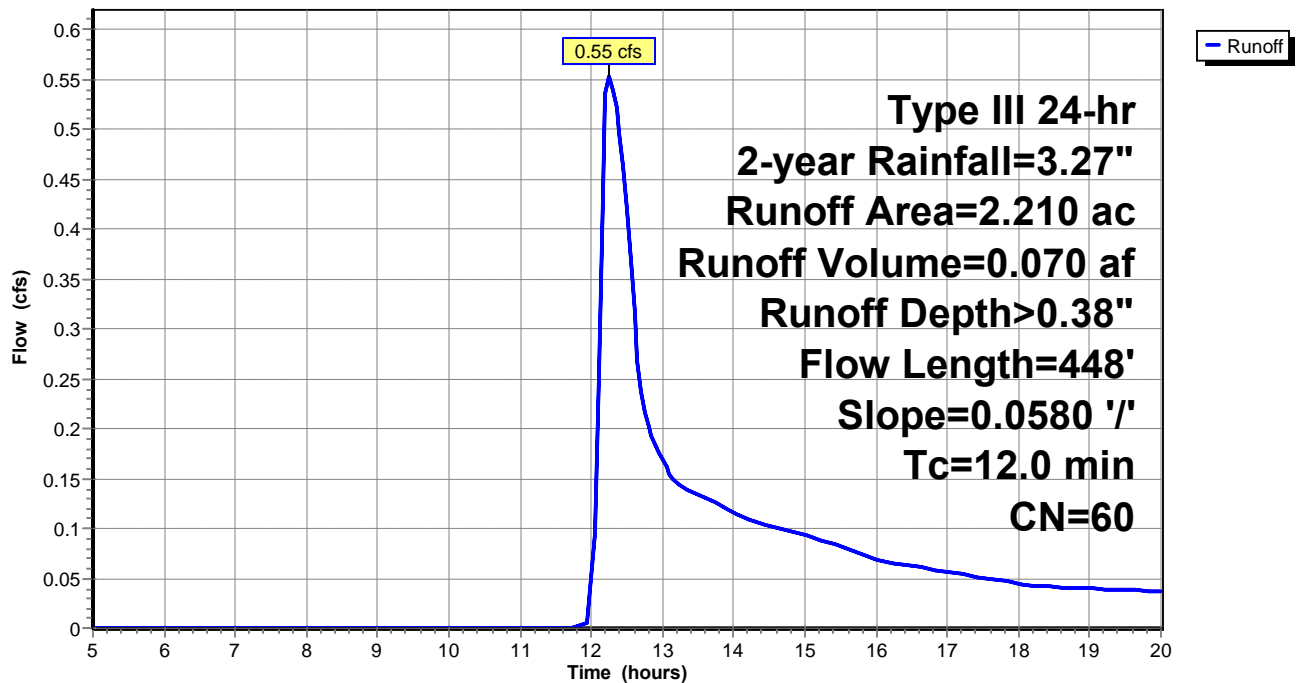
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
2.210	60	Woods, Fair, HSG B
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	448	0.0580	0.62		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast

Hydrograph



Existing Conditions

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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

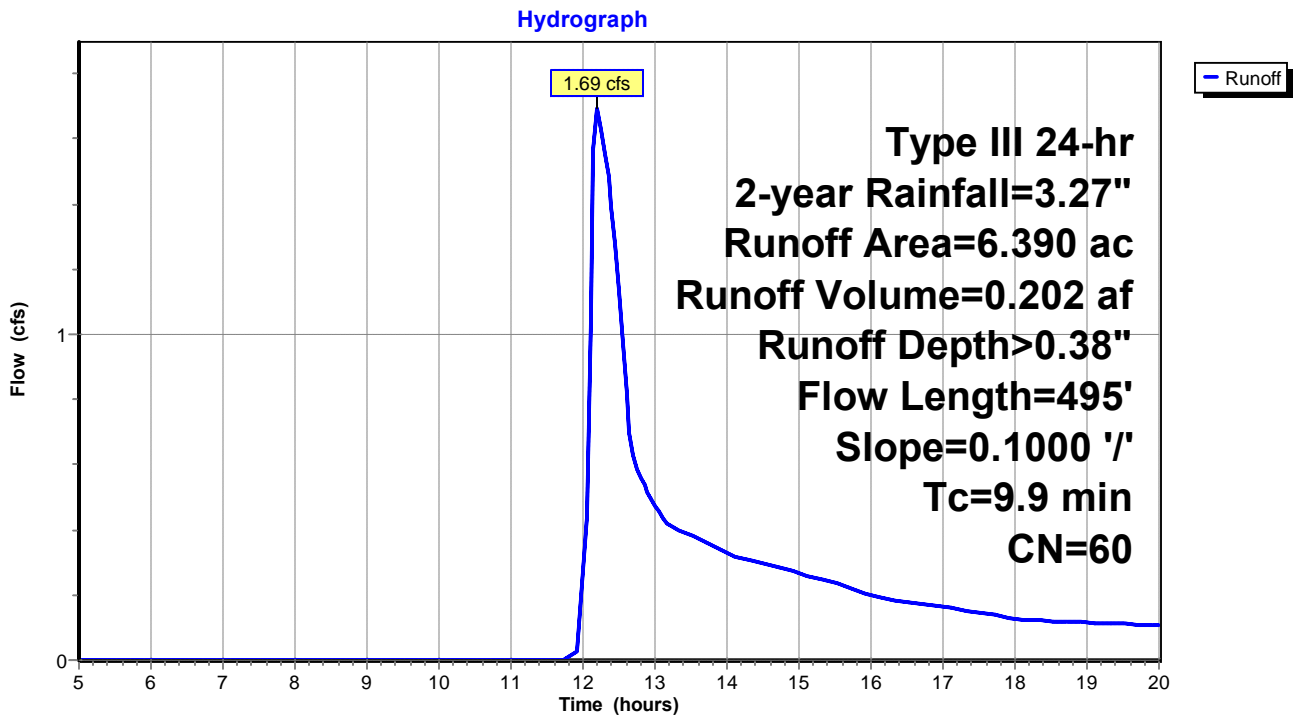
Runoff = 1.69 cfs @ 12.21 hrs, Volume= 0.202 af, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
6.390	60	Woods, Fair, HSG B
6.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	495	0.1000	0.83		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest



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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

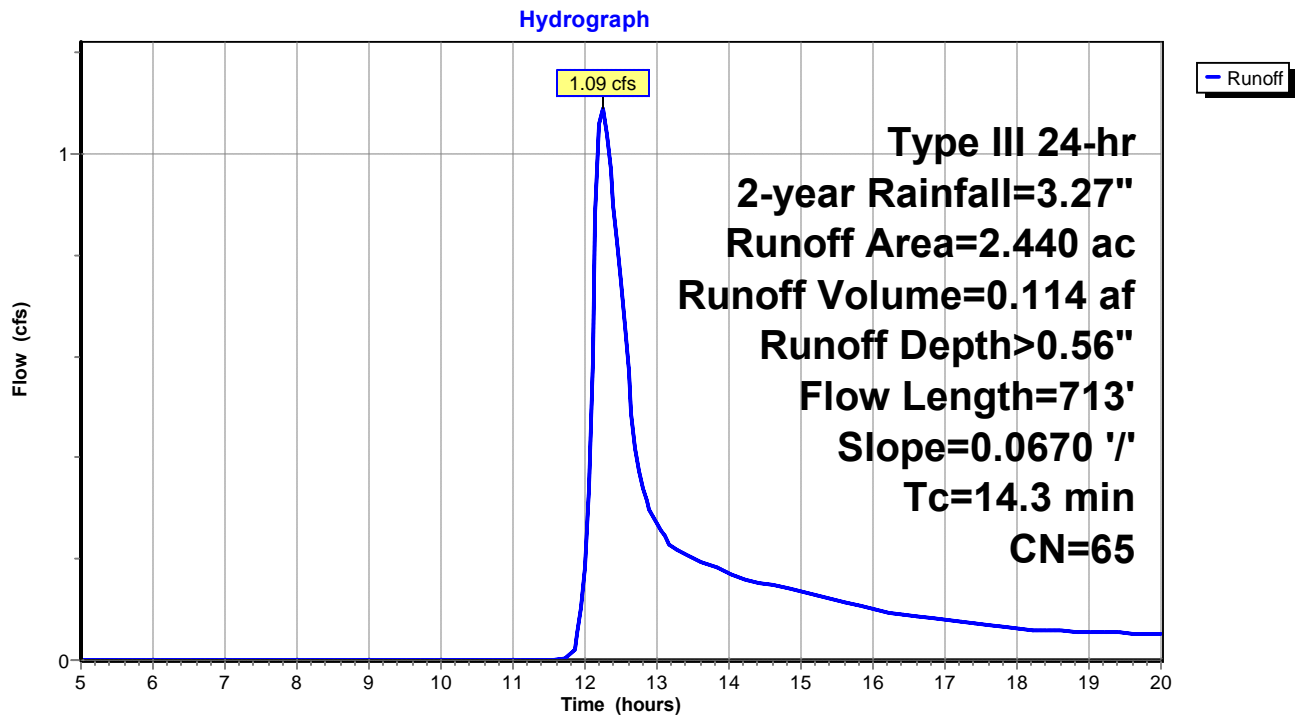
Runoff = 1.09 cfs @ 12.24 hrs, Volume= 0.114 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
2.440	65	Woods/grass comb., Fair, HSG B
2.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	713	0.0670	0.83		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest



Existing Conditions

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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 5.12 cfs @ 12.16 hrs, Volume= 0.457 af, Depth> 0.56"

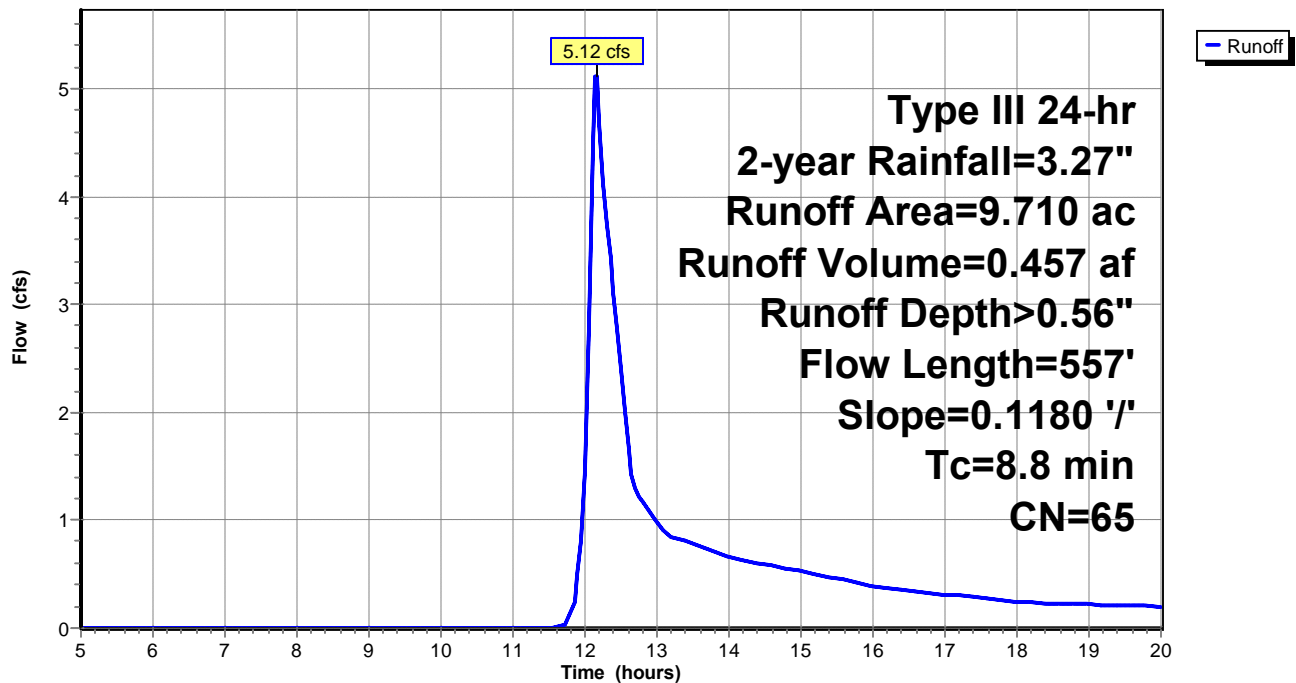
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
9.710	65	Woods/grass comb., Fair, HSG B
9.710		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	557	0.1180	1.05		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

Hydrograph



Existing Conditions

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Type III 24-hr 5-year Rainfall=4.27"
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=2.210 ac 0.00% Impervious Runoff Depth>0.80"
Flow Length=448' Slope=0.0580 '/' Tc=12.0 min CN=60 Runoff=1.55 cfs 0.147 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.390 ac 0.00% Impervious Runoff Depth>0.80"
Flow Length=495' Slope=0.1000 '/' Tc=9.9 min CN=60 Runoff=4.80 cfs 0.427 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=2.440 ac 0.00% Impervious Runoff Depth>1.07"
Flow Length=713' Slope=0.0670 '/' Tc=14.3 min CN=65 Runoff=2.36 cfs 0.218 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=9.710 ac 0.00% Impervious Runoff Depth>1.08"
Flow Length=557' Slope=0.1180 '/' Tc=8.8 min CN=65 Runoff=11.00 cfs 0.870 af

Total Runoff Area = 20.750 ac Runoff Volume = 1.662 af Average Runoff Depth = 0.96"
100.00% Pervious = 20.750 ac 0.00% Impervious = 0.000 ac

Existing Conditions

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Type III 24-hr 5-year Rainfall=4.27"
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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

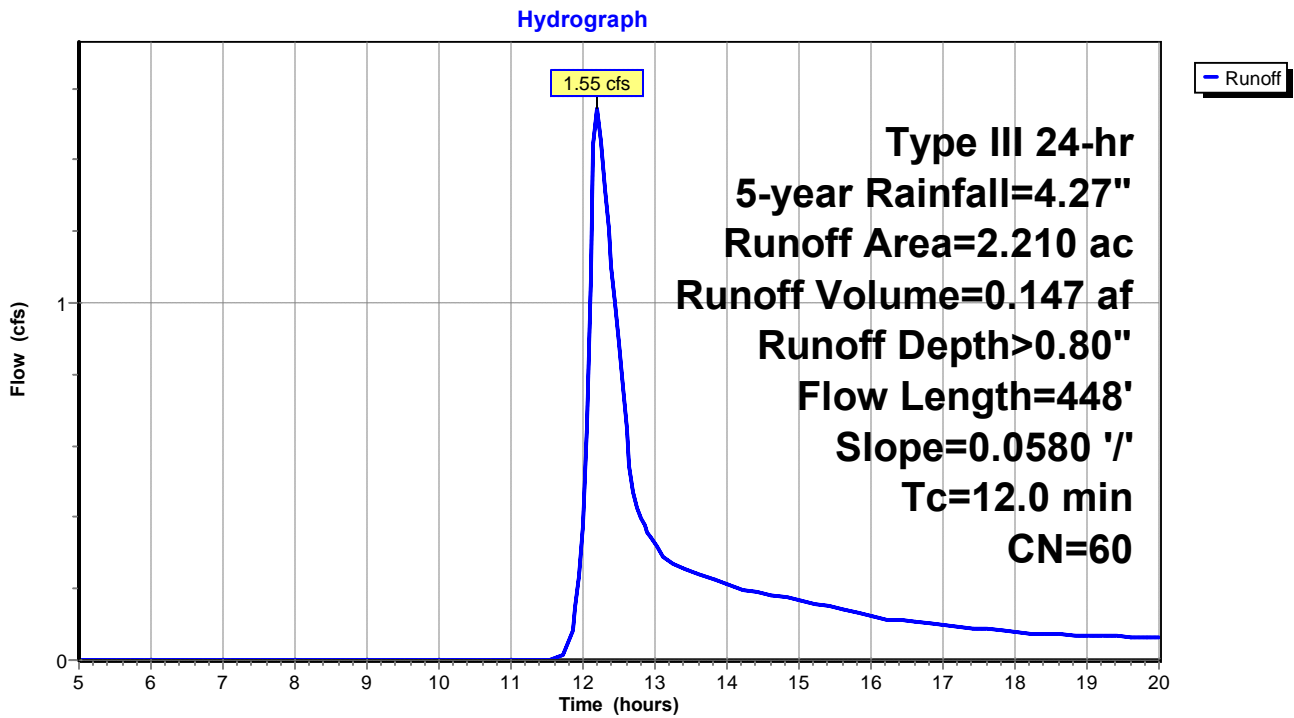
Runoff = 1.55 cfs @ 12.20 hrs, Volume= 0.147 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
2.210	60	Woods, Fair, HSG B
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	448	0.0580	0.62		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast



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Type III 24-hr 5-year Rainfall=4.27"
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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

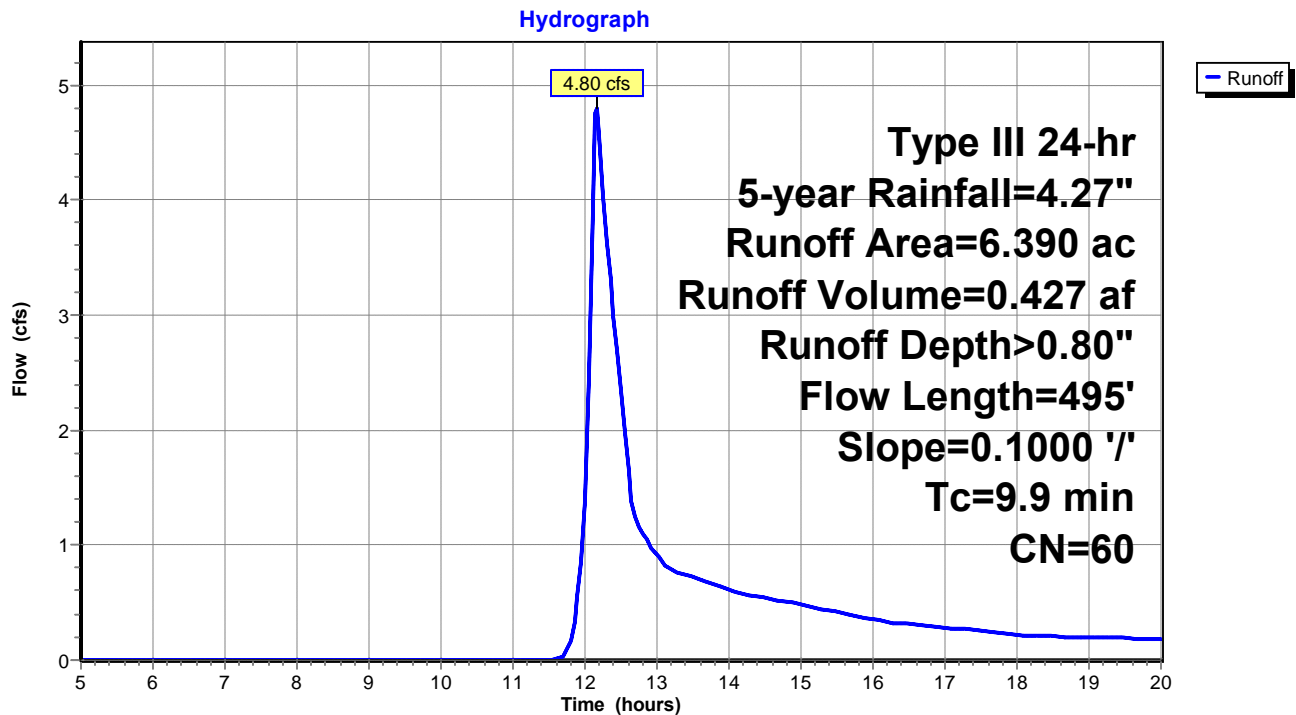
Runoff = 4.80 cfs @ 12.17 hrs, Volume= 0.427 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
6.390	60	Woods, Fair, HSG B
6.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	495	0.1000	0.83		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest



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Type III 24-hr 5-year Rainfall=4.27"
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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

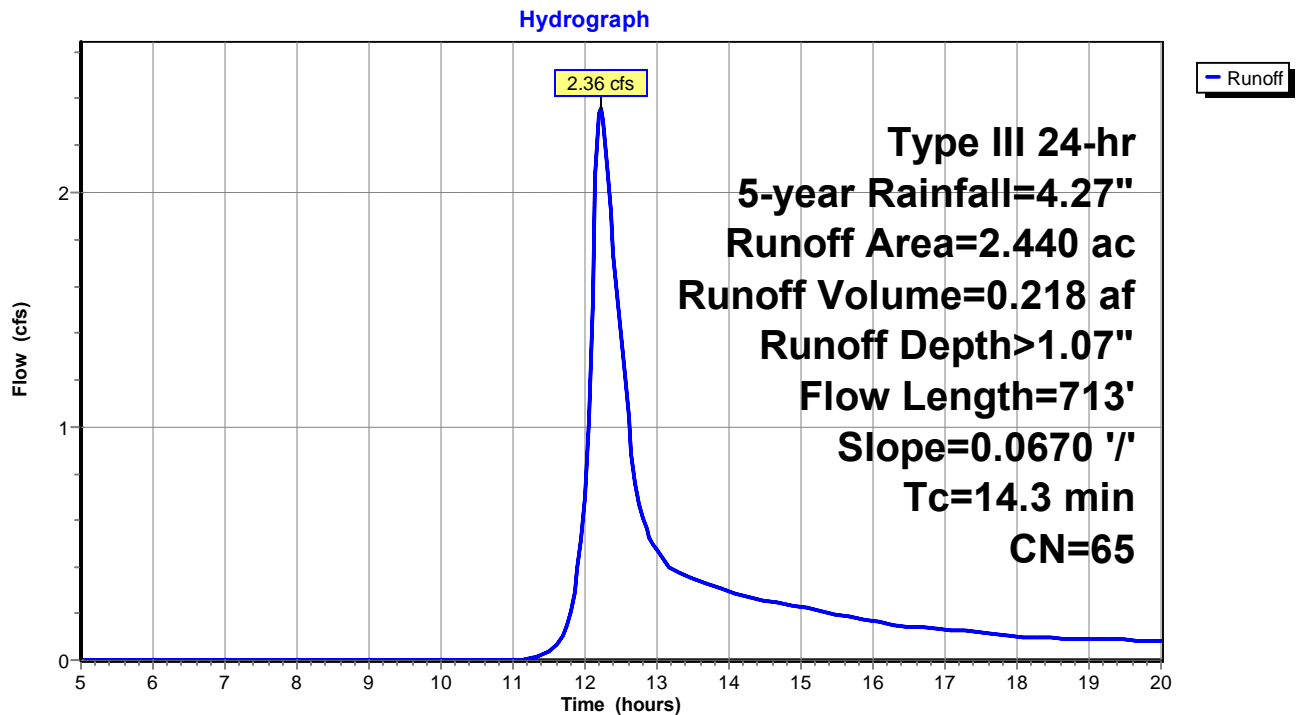
Runoff = 2.36 cfs @ 12.22 hrs, Volume= 0.218 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
2.440	65	Woods/grass comb., Fair, HSG B
2.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	713	0.0670	0.83		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest



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Type III 24-hr 5-year Rainfall=4.27"
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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 11.00 cfs @ 12.14 hrs, Volume= 0.870 af, Depth> 1.08"

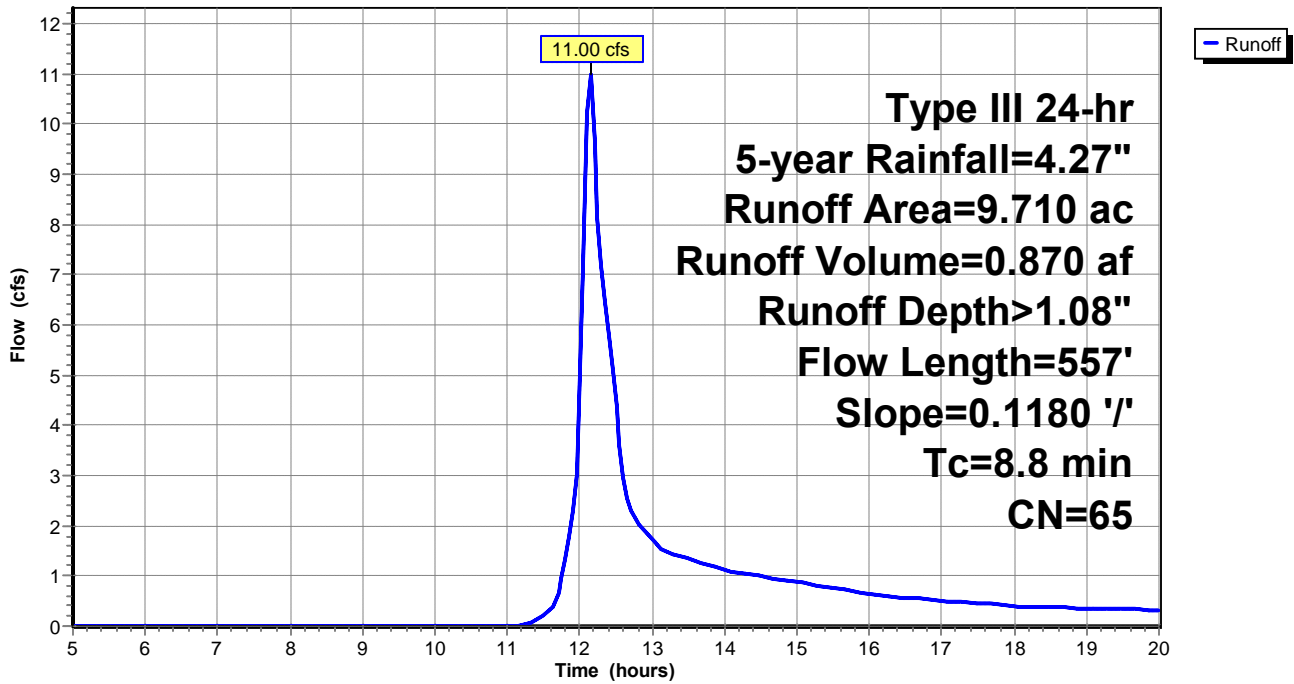
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
9.710	65	Woods/grass comb., Fair, HSG B
9.710		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	557	0.1180	1.05		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

Hydrograph



Existing Conditions

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Type III 24-hr 10-year Rainfall=5.02"
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=2.210 ac 0.00% Impervious Runoff Depth>1.18"
Flow Length=448' Slope=0.0580 '/' Tc=12.0 min CN=60 Runoff=2.46 cfs 0.218 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.390 ac 0.00% Impervious Runoff Depth>1.18"
Flow Length=495' Slope=0.1000 '/' Tc=9.9 min CN=60 Runoff=7.62 cfs 0.630 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=2.440 ac 0.00% Impervious Runoff Depth>1.52"
Flow Length=713' Slope=0.0670 '/' Tc=14.3 min CN=65 Runoff=3.46 cfs 0.308 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=9.710 ac 0.00% Impervious Runoff Depth>1.52"
Flow Length=557' Slope=0.1180 '/' Tc=8.8 min CN=65 Runoff=16.06 cfs 1.230 af

Total Runoff Area = 20.750 ac Runoff Volume = 2.386 af Average Runoff Depth = 1.38"
100.00% Pervious = 20.750 ac 0.00% Impervious = 0.000 ac

Existing Conditions

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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

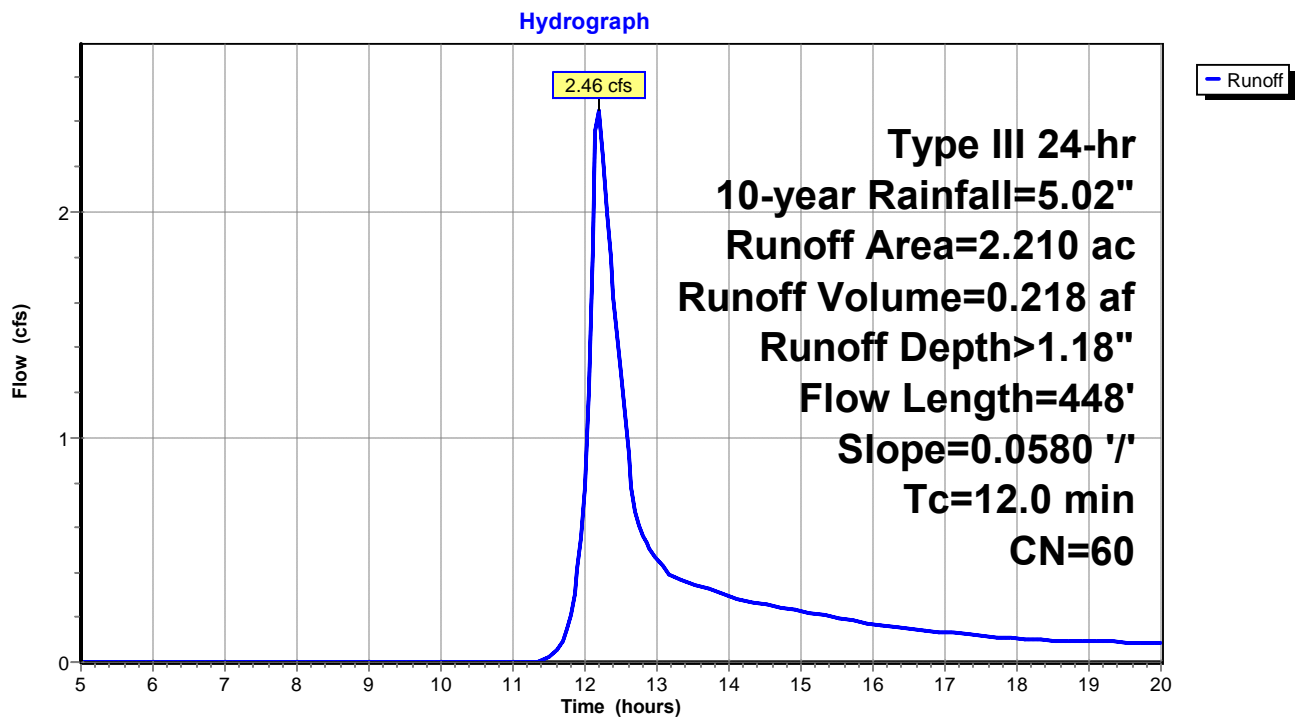
Runoff = 2.46 cfs @ 12.19 hrs, Volume= 0.218 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
2.210	60	Woods, Fair, HSG B
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	448	0.0580	0.62		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast



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Type III 24-hr 10-year Rainfall=5.02"
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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

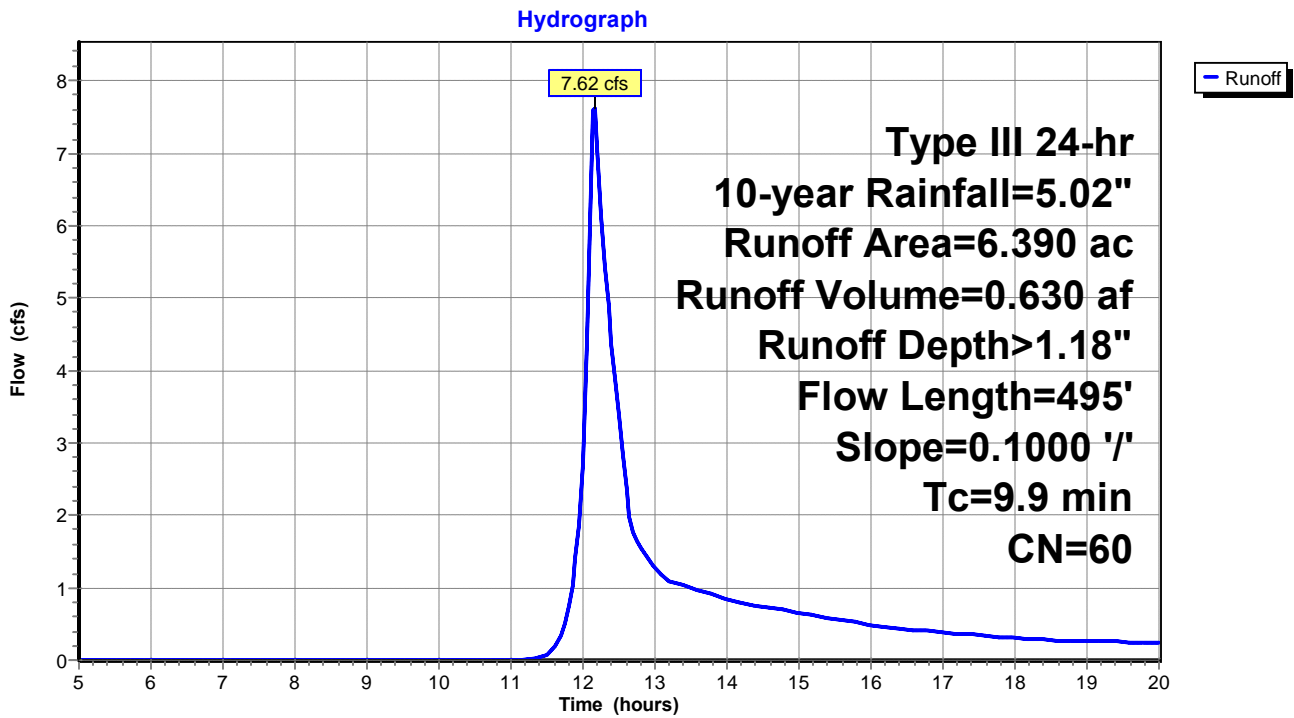
Runoff = 7.62 cfs @ 12.16 hrs, Volume= 0.630 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
6.390	60	Woods, Fair, HSG B
6.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	495	0.1000	0.83		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest



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Type III 24-hr 10-year Rainfall=5.02"
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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

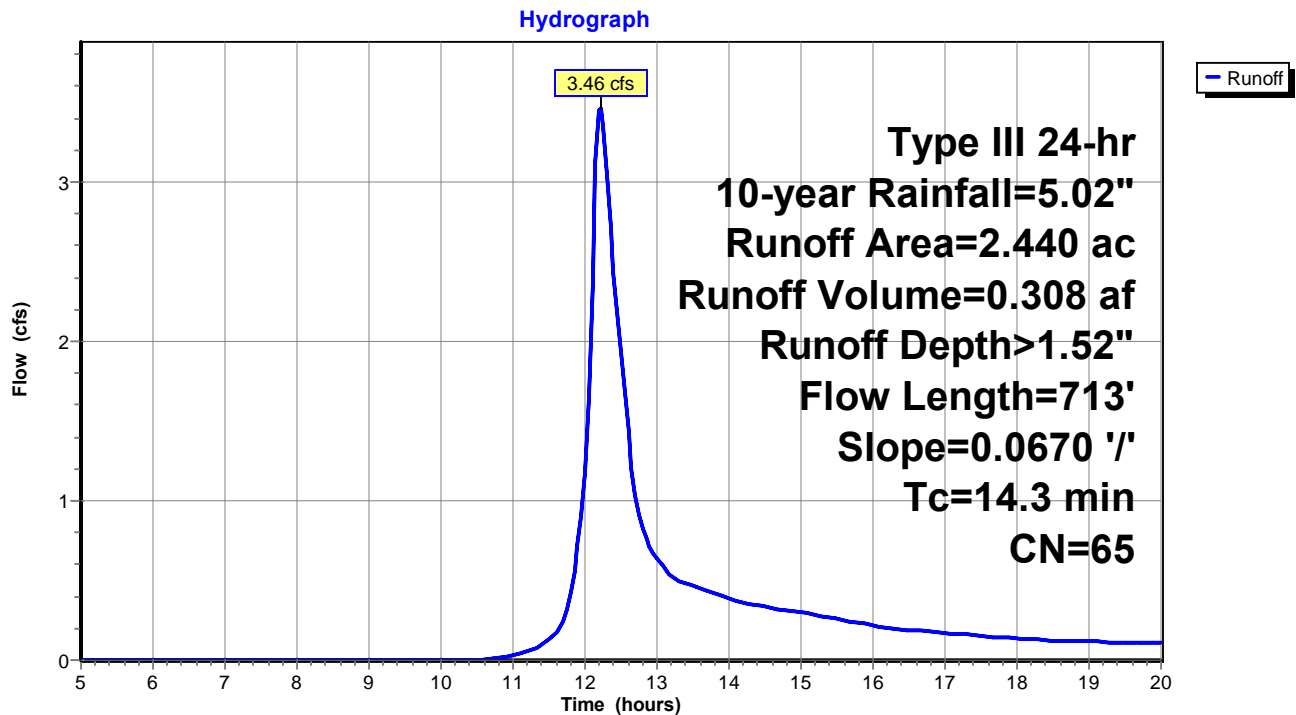
Runoff = 3.46 cfs @ 12.21 hrs, Volume= 0.308 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
2.440	65	Woods/grass comb., Fair, HSG B
2.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	713	0.0670	0.83		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest



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Type III 24-hr 10-year Rainfall=5.02"
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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 16.06 cfs @ 12.14 hrs, Volume= 1.230 af, Depth> 1.52"

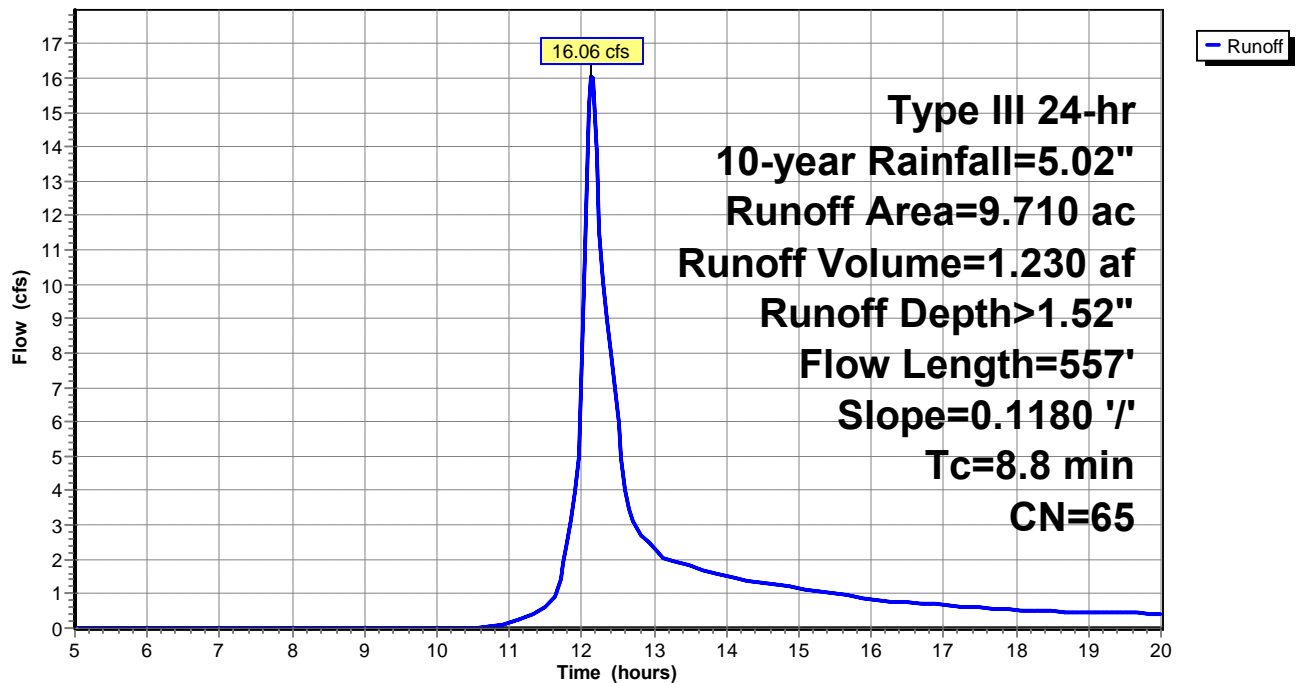
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
9.710	65	Woods/grass comb., Fair, HSG B
9.710		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	557	0.1180	1.05		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

Hydrograph



Existing Conditions

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Type III 24-hr 25-year Rainfall=6.05"
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=2.210 ac 0.00% Impervious Runoff Depth>1.78"
Flow Length=448' Slope=0.0580 '/' Tc=12.0 min CN=60 Runoff=3.86 cfs 0.327 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.390 ac 0.00% Impervious Runoff Depth>1.78"
Flow Length=495' Slope=0.1000 '/' Tc=9.9 min CN=60 Runoff=11.98 cfs 0.947 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=2.440 ac 0.00% Impervious Runoff Depth>2.19"
Flow Length=713' Slope=0.0670 '/' Tc=14.3 min CN=65 Runoff=5.10 cfs 0.445 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=9.710 ac 0.00% Impervious Runoff Depth>2.19"
Flow Length=557' Slope=0.1180 '/' Tc=8.8 min CN=65 Runoff=23.64 cfs 1.775 af

Total Runoff Area = 20.750 ac Runoff Volume = 3.494 af Average Runoff Depth = 2.02"
100.00% Pervious = 20.750 ac 0.00% Impervious = 0.000 ac

Existing Conditions

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Type III 24-hr 25-year Rainfall=6.05"
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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

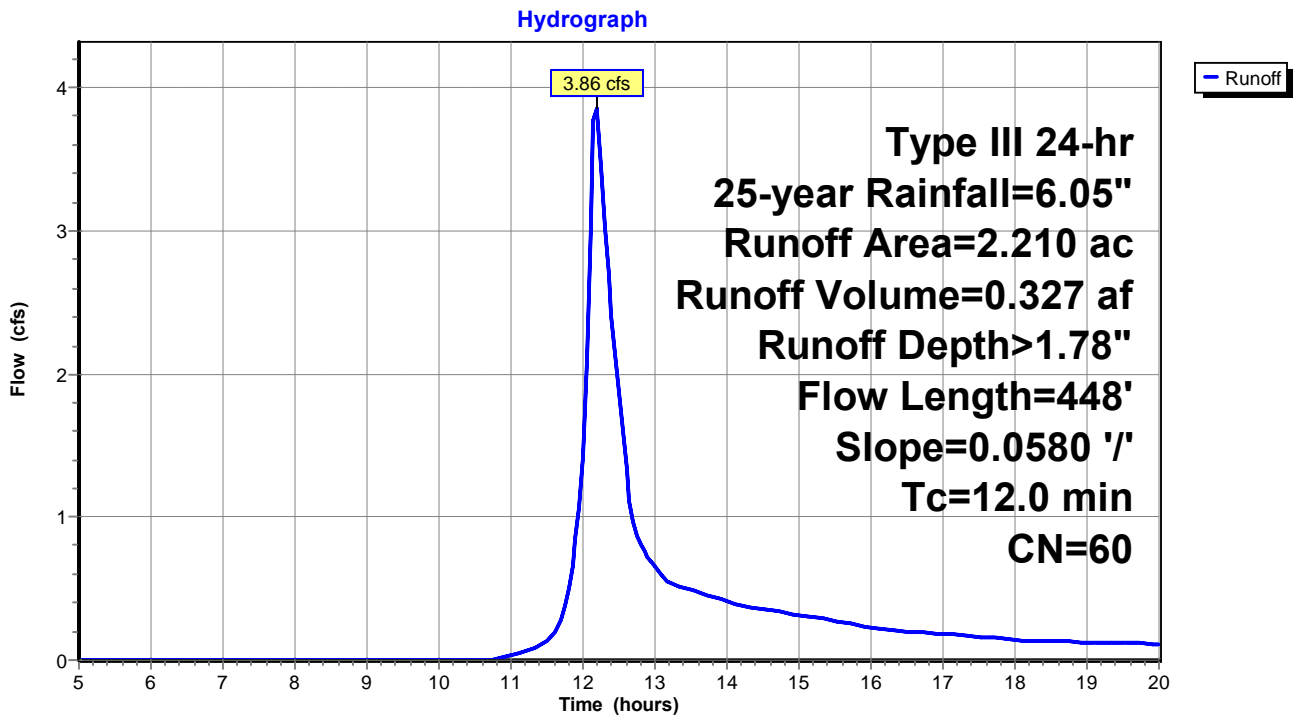
Runoff = 3.86 cfs @ 12.18 hrs, Volume= 0.327 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
2.210	60	Woods, Fair, HSG B
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	448	0.0580	0.62		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast



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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

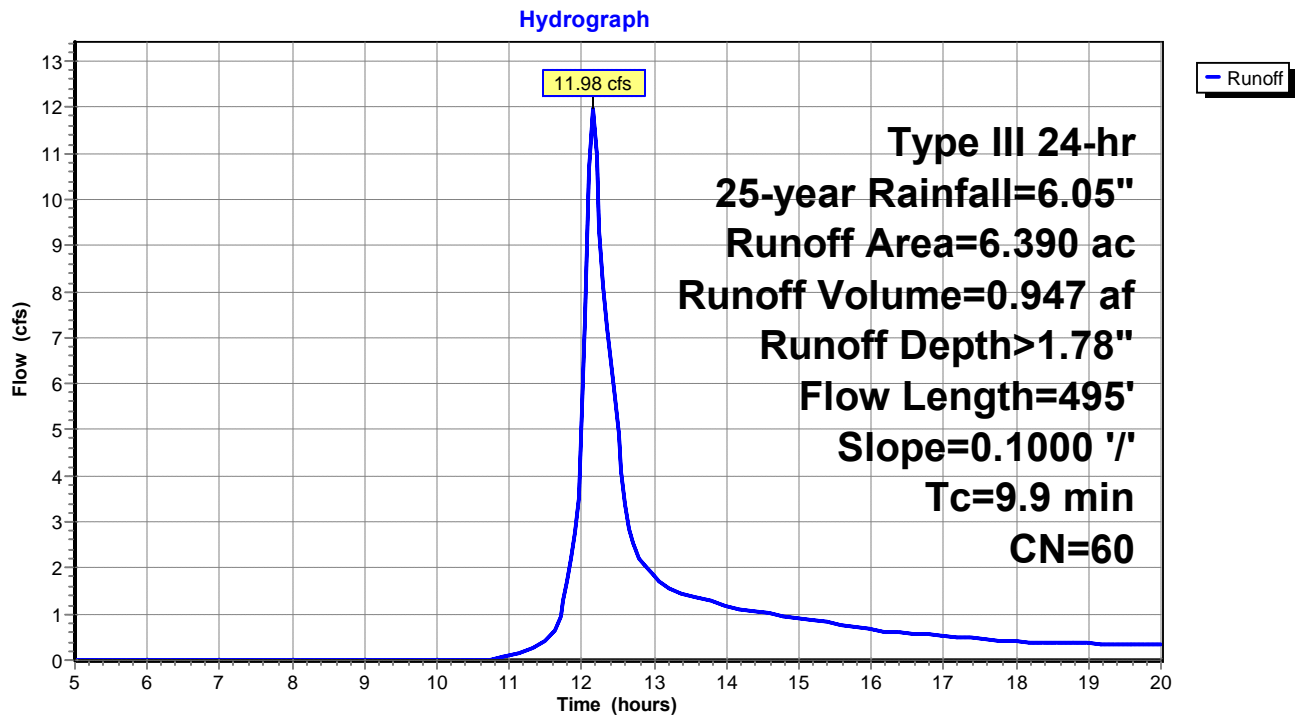
Runoff = 11.98 cfs @ 12.15 hrs, Volume= 0.947 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
6.390	60	Woods, Fair, HSG B
6.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	495	0.1000	0.83		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest



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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

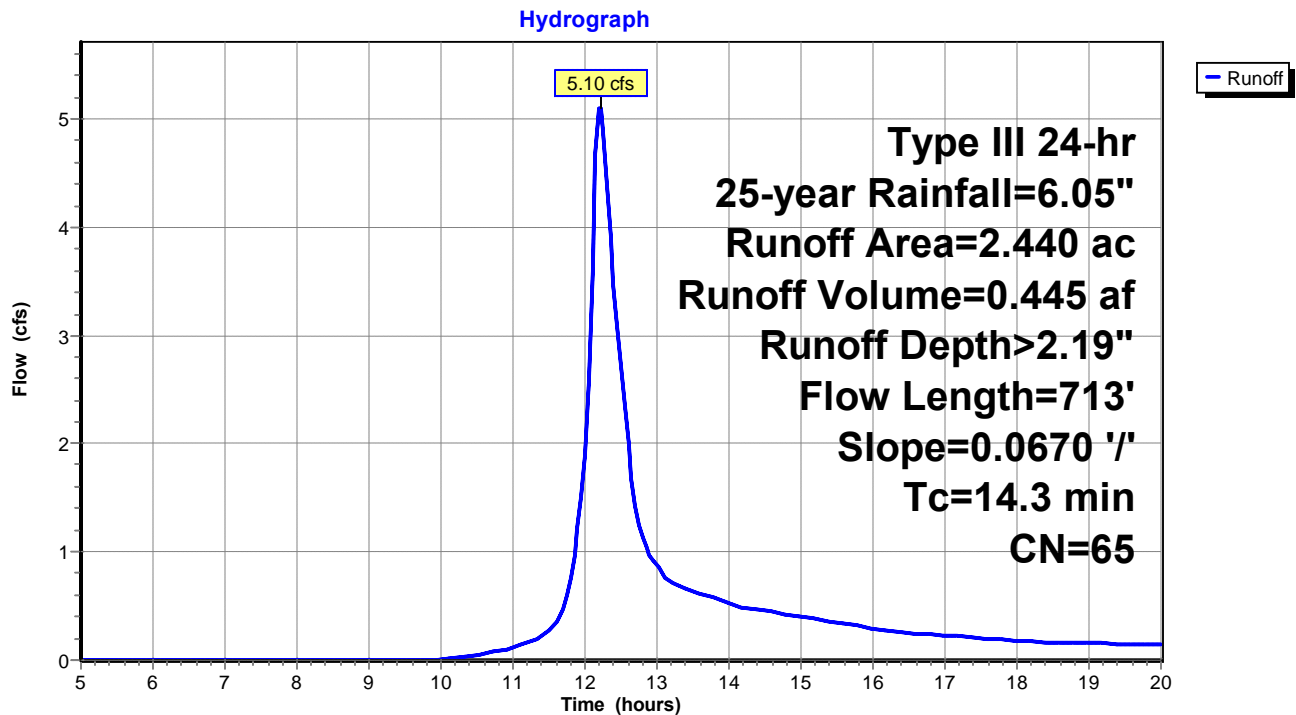
Runoff = 5.10 cfs @ 12.21 hrs, Volume= 0.445 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
2.440	65	Woods/grass comb., Fair, HSG B
2.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	713	0.0670	0.83		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest



Existing Conditions

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Type III 24-hr 25-year Rainfall=6.05"
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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 23.64 cfs @ 12.13 hrs, Volume= 1.775 af, Depth> 2.19"

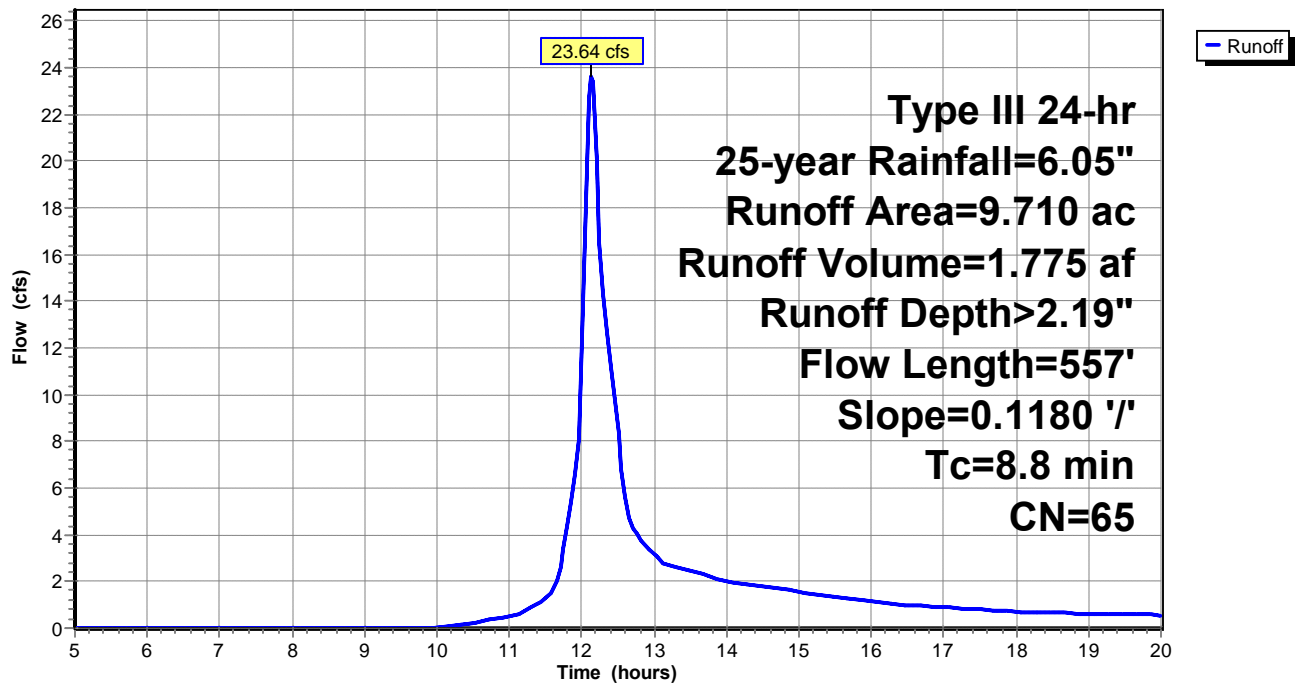
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
9.710	65	Woods/grass comb., Fair, HSG B
9.710		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	557	0.1180	1.05		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

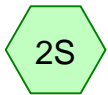
Hydrograph



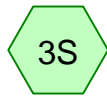
PROPOSED CONDITIONS



Drainage Area 1 - Southeast



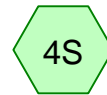
Drainage Area 2 - Southwest



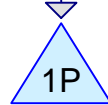
Drainage Area 3 - Northwest



Drainage to Basin



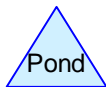
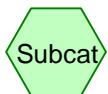
Drainage Area 4 - Northeast



Stormwater Basin



Peak East



Routing Diagram for Proposed Conditions
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.490	60	Woods, Fair, HSG B (1S, 2S, 3S, 4A, 4S)
2.080	61	>75% Grass cover, Good, HSG B (2S)
0.240	61	>75% Grass cover, Good, HSG B (basin) (4A)
6.440	68	3/4 acre lots, 20% imp, HSG B (3S, 4A, 4S)
1.060	70	1/2 acre lots, 25% imp, HSG B (1S)
0.960	98	Paved roads w/curbs & sewers, HSG B (2S, 4A)
0.540	98	Roof & driveways (2S)
20.810	66	TOTAL AREA

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Type III 24-hr 2-year Rainfall=3.27"
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=1.880 ac 14.10% Impervious Runoff Depth>0.61"
Flow Length=395' Slope=0.0580 '/' Tc=9.3 min CN=66 Runoff=1.08 cfs 0.095 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.930 ac 12.70% Impervious Runoff Depth>0.56"
Flow Length=498' Slope=0.0580 '/' Tc=11.5 min CN=65 Runoff=3.34 cfs 0.325 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=1.450 ac 16.41% Impervious Runoff Depth>0.65"
Flow Length=500' Slope=0.0760 '/' Tc=9.6 min CN=67 Runoff=0.91 cfs 0.078 af

Subcatchment 4A: Drainage to Basin Runoff Area=4.150 ac 28.82% Impervious Runoff Depth>0.83"
Flow Length=995' Tc=4.6 min CN=71 Runoff=4.17 cfs 0.289 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=6.400 ac 7.41% Impervious Runoff Depth>0.49"
Flow Length=561' Slope=0.1150 '/' Tc=9.5 min CN=63 Runoff=2.64 cfs 0.259 af

Reach 1R: Peak East Inflow=2.64 cfs 0.259 af
Outflow=2.64 cfs 0.259 af

Pond 1P: Stormwater Basin Peak Elev=274.35' Storage=12,566 cf Inflow=4.17 cfs 0.289 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 20.810 ac Runoff Volume = 1.046 af Average Runoff Depth = 0.60"
85.33% Pervious = 17.757 ac 14.67% Impervious = 3.053 ac

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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

Runoff = 1.08 cfs @ 12.16 hrs, Volume= 0.095 af, Depth> 0.61"

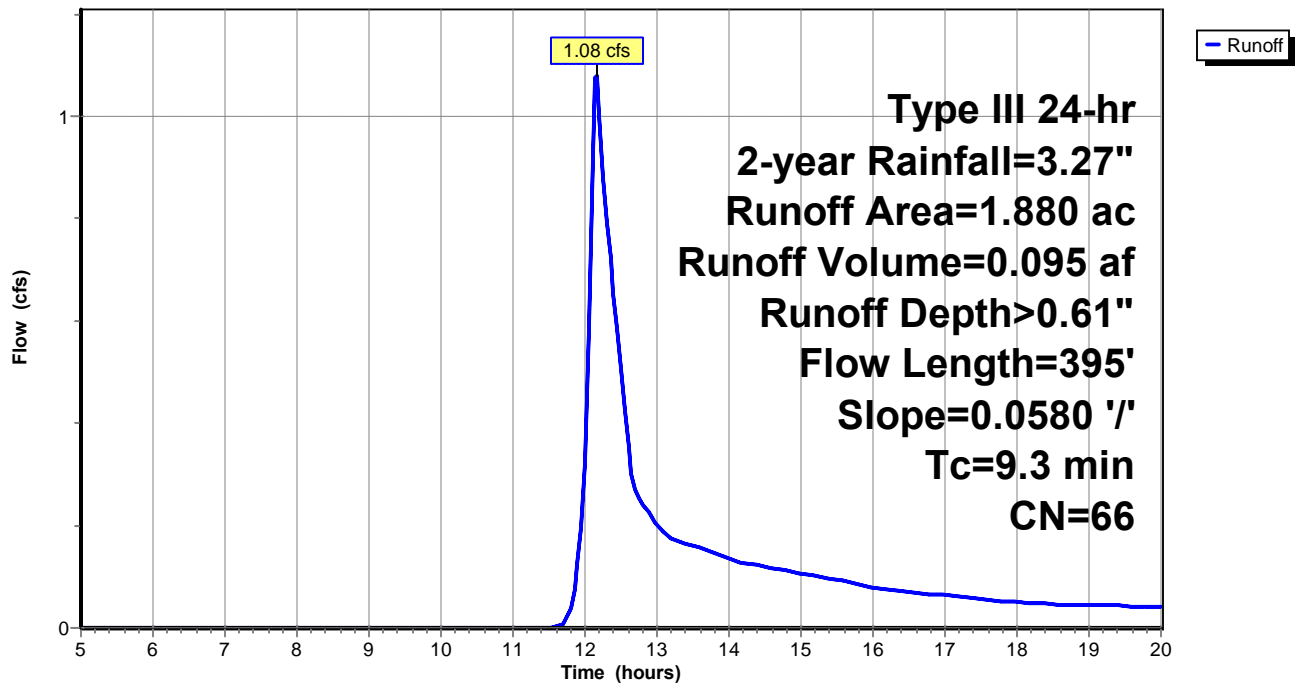
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
0.820	60	Woods, Fair, HSG B
1.060	70	1/2 acre lots, 25% imp, HSG B
1.880	66	Weighted Average
1.615		85.90% Pervious Area
0.265		14.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	395	0.0580	0.71		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast

Hydrograph



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 Type III 24-hr 2-year Rainfall=3.27"
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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

Runoff = 3.34 cfs @ 12.20 hrs, Volume= 0.325 af, Depth> 0.56"

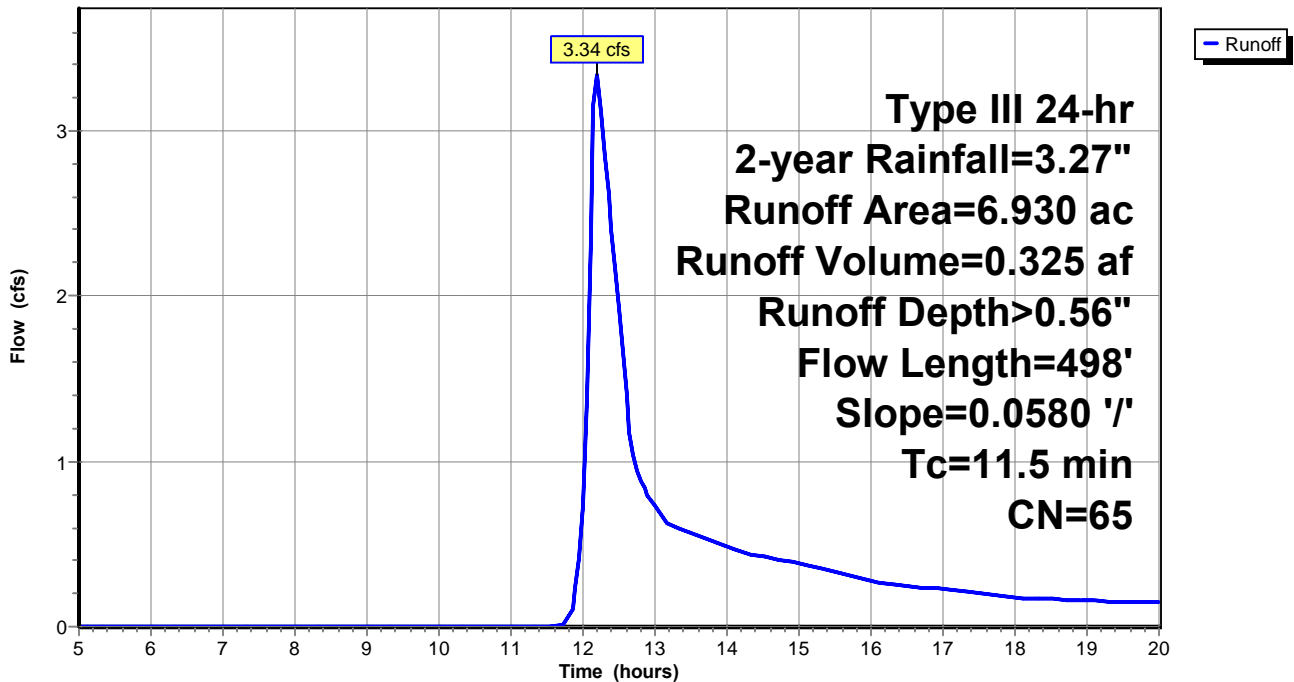
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
0.340	98	Paved roads w/curbs & sewers, HSG B
* 0.540	98	Roof & driveways
3.970	60	Woods, Fair, HSG B
2.080	61	>75% Grass cover, Good, HSG B
6.930	65	Weighted Average
6.050		87.30% Pervious Area
0.880		12.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	498	0.0580	0.72		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest

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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

Runoff = 0.91 cfs @ 12.16 hrs, Volume= 0.078 af, Depth> 0.65"

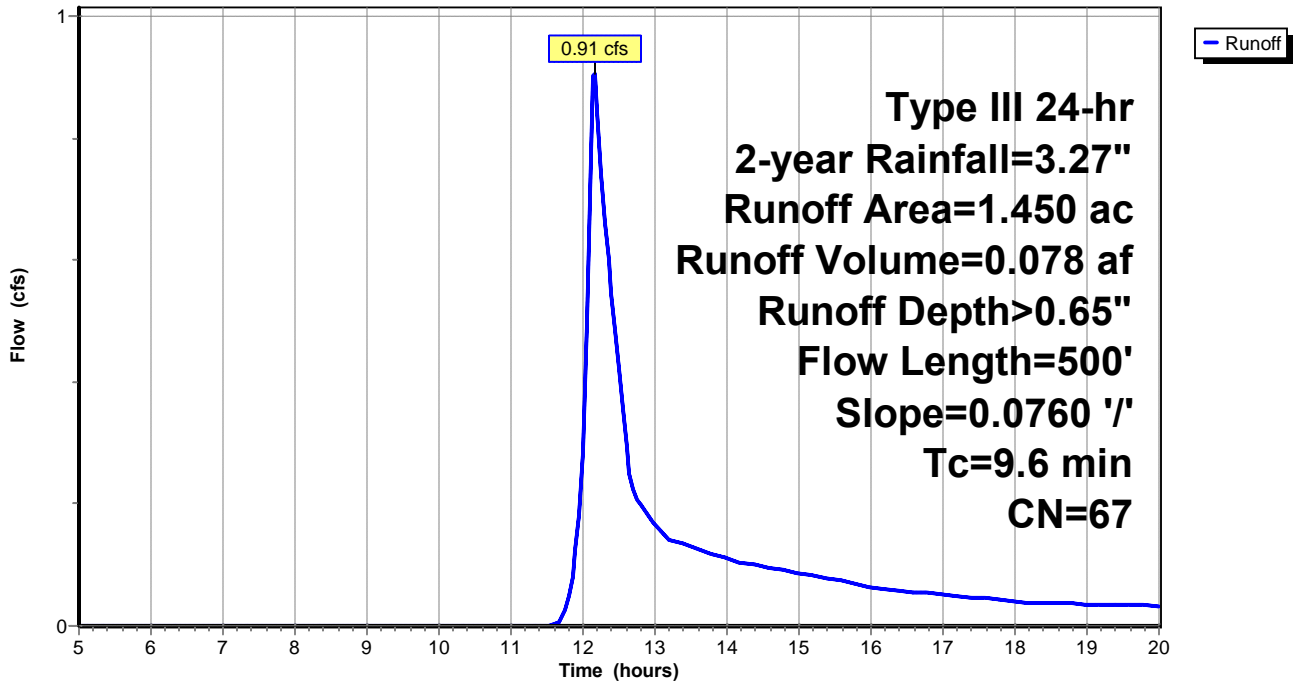
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
0.260	60	Woods, Fair, HSG B
* 1.190	68	3/4 acre lots, 20% imp, HSG B
1.450	67	Weighted Average
1.212		83.59% Pervious Area
0.238		16.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	500	0.0760	0.87		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest

Hydrograph



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 Type III 24-hr 2-year Rainfall=3.27"
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Summary for Subcatchment 4A: Drainage to Basin

Runoff = 4.17 cfs @ 12.08 hrs, Volume= 0.289 af, Depth> 0.83"

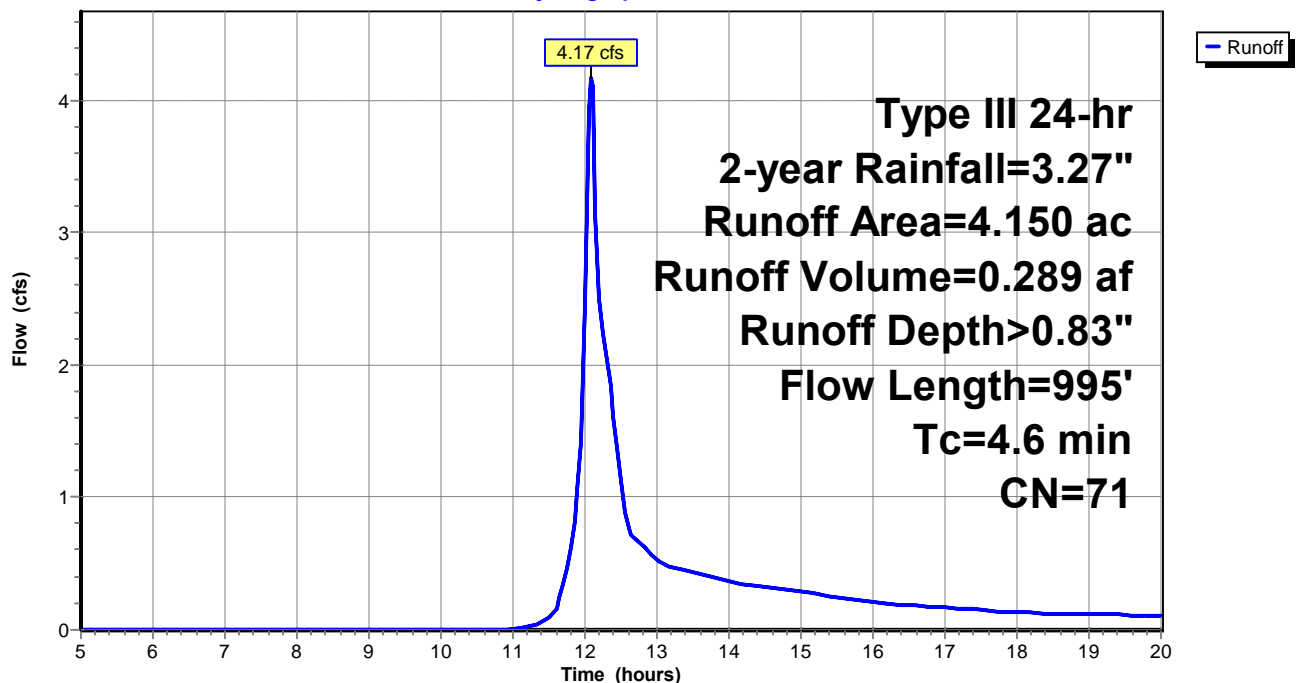
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
0.620	98	Paved roads w/curbs & sewers, HSG B
0.410	60	Woods, Fair, HSG B
* 0.240	61	>75% Grass cover, Good, HSG B (basin)
* 2.880	68	3/4 acre lots, 20% imp, HSG B
4.150	71	Weighted Average
2.954		71.18% Pervious Area
1.196		28.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	200	0.0150	1.42		Sheet Flow, Tc-3A1
					Smooth surfaces n= 0.011 P2= 3.27"
2.3	795	0.0790	5.71		Shallow Concentrated Flow, Tc-3A2
					Paved Kv= 20.3 fps
4.6	995	Total			

Subcatchment 4A: Drainage to Basin

Hydrograph



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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 2.64 cfs @ 12.17 hrs, Volume= 0.259 af, Depth> 0.49"

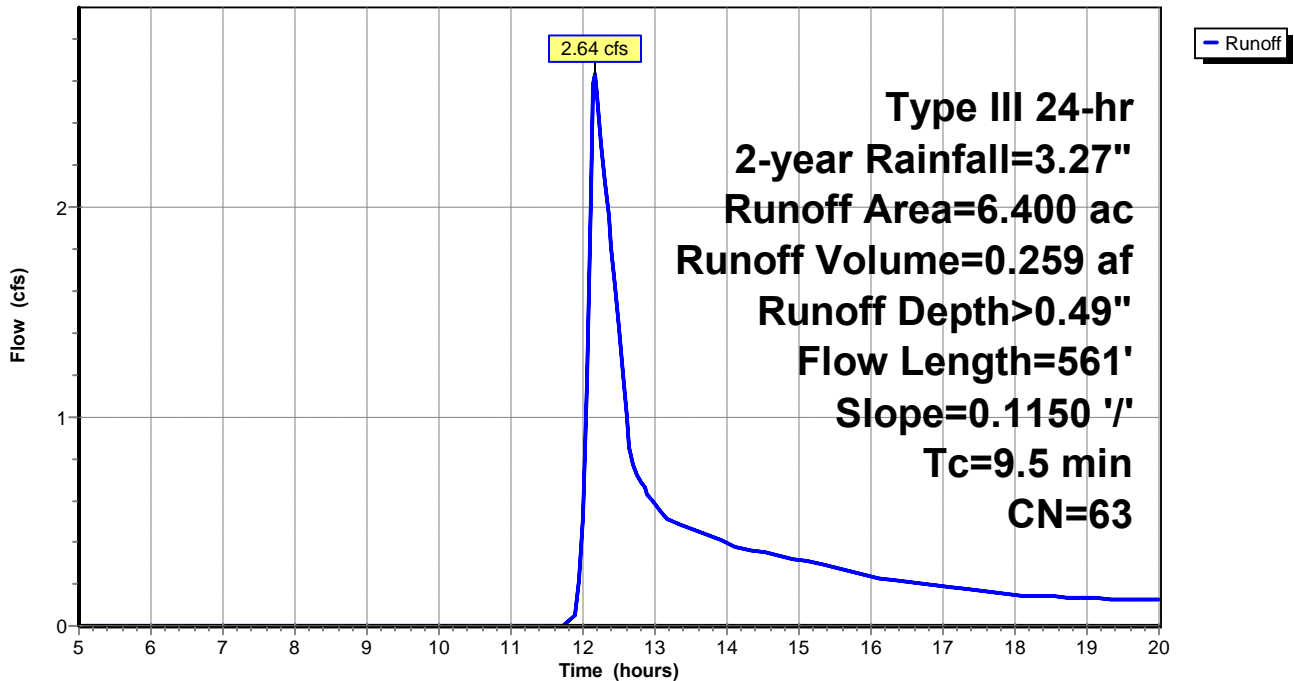
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-year Rainfall=3.27"

Area (ac)	CN	Description
* 2.370	68	3/4 acre lots, 20% imp, HSG B
4.030	60	Woods, Fair, HSG B
6.400	63	Weighted Average
5.926		92.59% Pervious Area
0.474		7.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	561	0.1150	0.99		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

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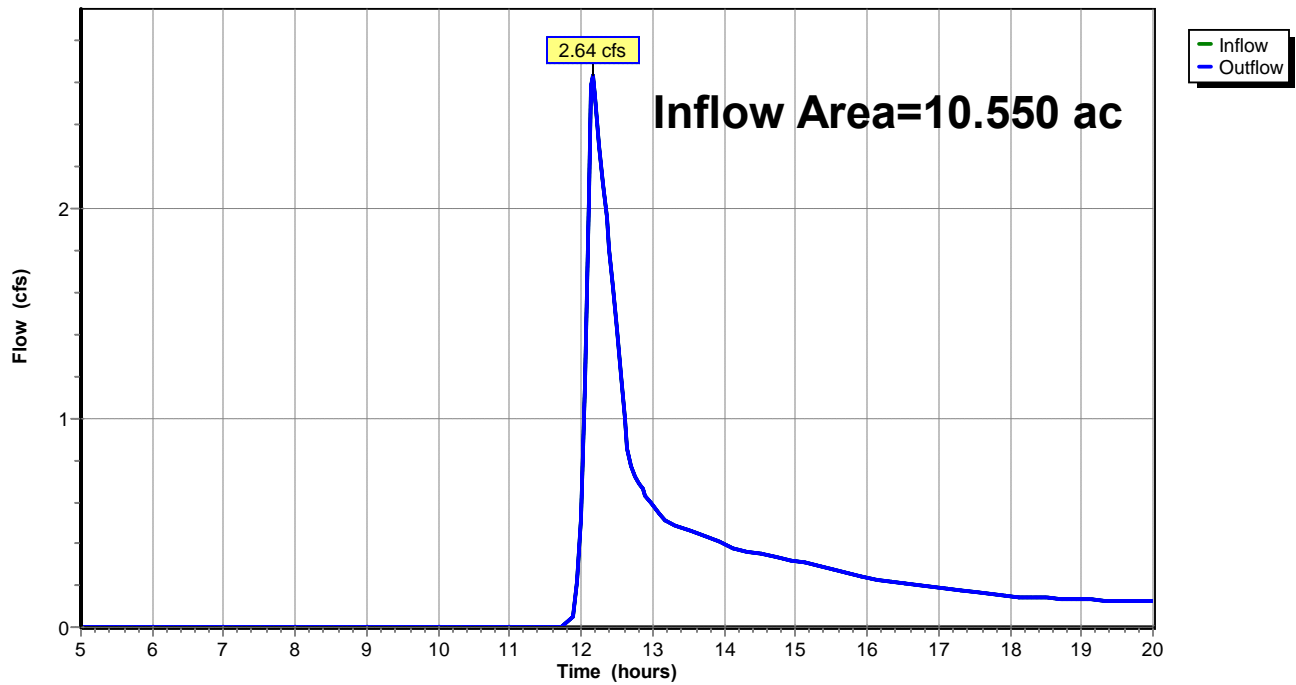
Summary for Reach 1R: Peak East

Inflow Area = 10.550 ac, 15.83% Impervious, Inflow Depth > 0.29" for 2-year event
Inflow = 2.64 cfs @ 12.17 hrs, Volume= 0.259 af
Outflow = 2.64 cfs @ 12.17 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: Peak East

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Summary for Pond 1P: Stormwater Basin

Inflow Area = 4.150 ac, 28.82% Impervious, Inflow Depth > 0.83" for 2-year event
Inflow = 4.17 cfs @ 12.08 hrs, Volume= 0.289 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 274.35' @ 20.00 hrs Surf.Area= 6,091 sf Storage= 12,566 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	271.50'	24,150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
271.50	0	0	0
272.00	3,840	960	960
274.00	5,685	9,525	10,485
276.00	7,980	13,665	24,150

Device	Routing	Invert	Outlet Devices
#1	Primary	275.00'	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

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=271.50' (Free Discharge)
↑1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

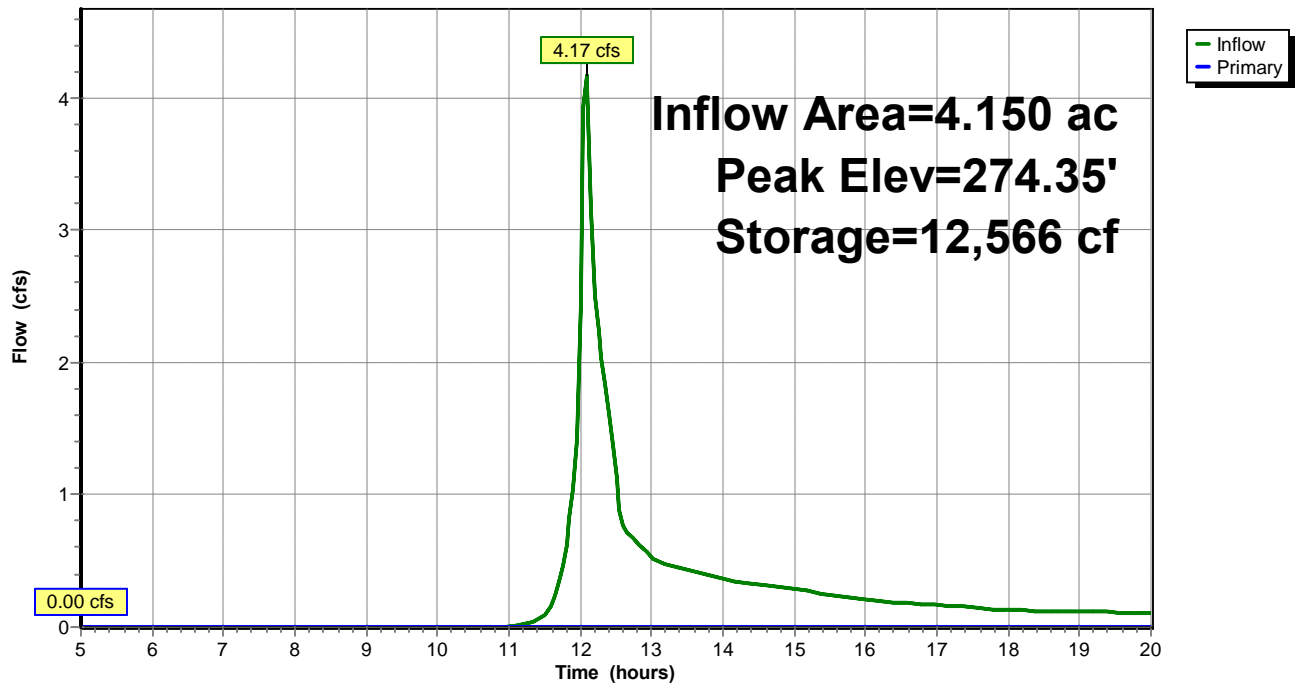
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Pond 1P: Stormwater Basin

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Type III 24-hr 5-year Rainfall=4.27"
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=1.880 ac 14.10% Impervious Runoff Depth>1.13"
Flow Length=395' Slope=0.0580 '/' Tc=9.3 min CN=66 Runoff=2.24 cfs 0.178 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.930 ac 12.70% Impervious Runoff Depth>1.07"
Flow Length=498' Slope=0.0580 '/' Tc=11.5 min CN=65 Runoff=7.19 cfs 0.620 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=1.450 ac 16.41% Impervious Runoff Depth>1.19"
Flow Length=500' Slope=0.0760 '/' Tc=9.6 min CN=67 Runoff=1.82 cfs 0.144 af

Subcatchment 4A: Drainage to Basin Runoff Area=4.150 ac 28.82% Impervious Runoff Depth>1.45"
Flow Length=995' Tc=4.6 min CN=71 Runoff=7.56 cfs 0.502 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=6.400 ac 7.41% Impervious Runoff Depth>0.96"
Flow Length=561' Slope=0.1150 '/' Tc=9.5 min CN=63 Runoff=6.20 cfs 0.513 af

Reach 1R: Peak East Inflow=6.20 cfs 0.625 af
Outflow=6.20 cfs 0.625 af

Pond 1P: Stormwater Basin Peak Elev=275.06' Storage=17,174 cf Inflow=7.56 cfs 0.502 af
Outflow=0.40 cfs 0.113 af

Total Runoff Area = 20.810 ac Runoff Volume = 1.957 af Average Runoff Depth = 1.13"
85.33% Pervious = 17.757 ac 14.67% Impervious = 3.053 ac

Proposed Conditions

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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

Runoff = 2.24 cfs @ 12.15 hrs, Volume= 0.178 af, Depth> 1.13"

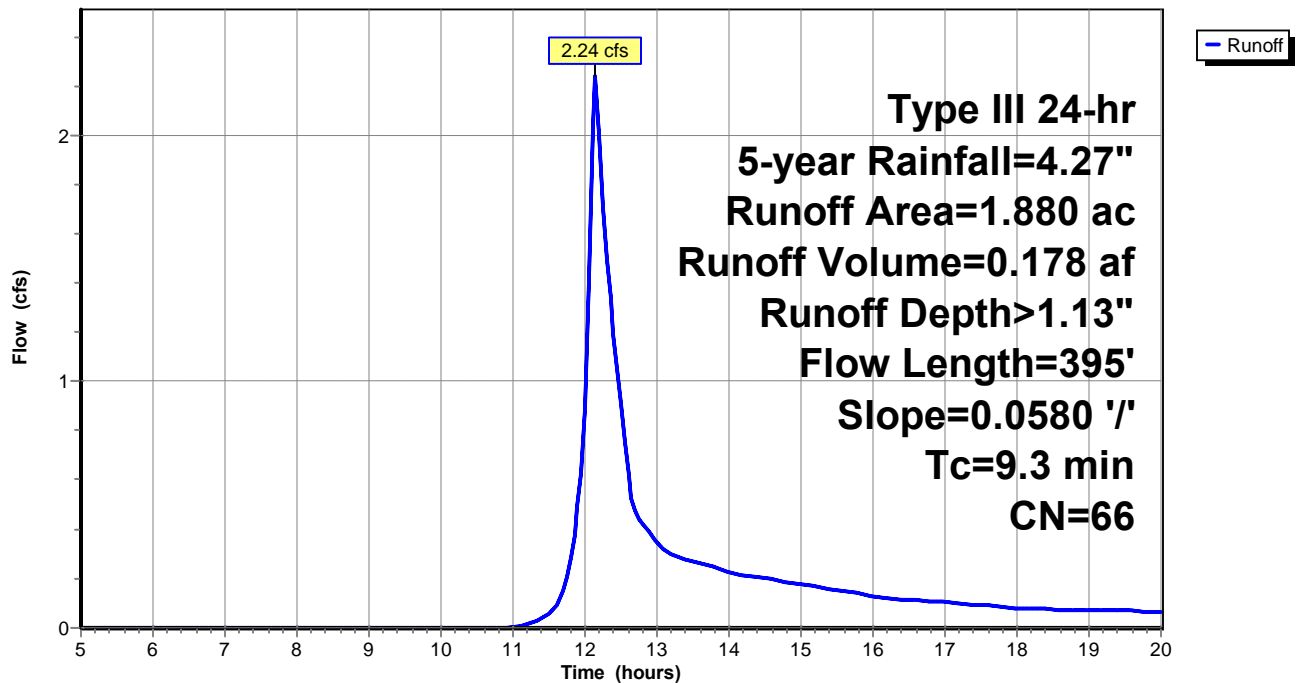
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
0.820	60	Woods, Fair, HSG B
1.060	70	1/2 acre lots, 25% imp, HSG B
1.880	66	Weighted Average
1.615		85.90% Pervious Area
0.265		14.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	395	0.0580	0.71		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast

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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

Runoff = 7.19 cfs @ 12.18 hrs, Volume= 0.620 af, Depth> 1.07"

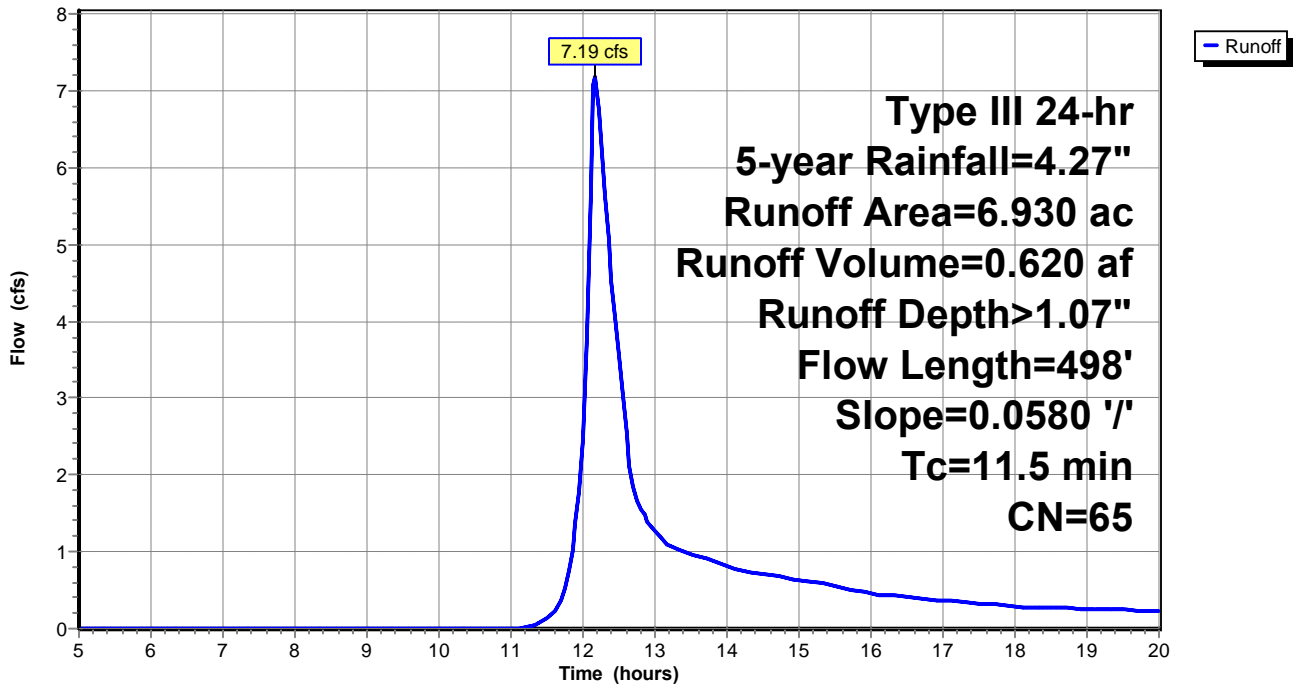
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
0.340	98	Paved roads w/curbs & sewers, HSG B
* 0.540	98	Roof & driveways
3.970	60	Woods, Fair, HSG B
2.080	61	>75% Grass cover, Good, HSG B
6.930	65	Weighted Average
6.050		87.30% Pervious Area
0.880		12.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	498	0.0580	0.72		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest

Hydrograph



Proposed Conditions

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Patriot Homes
 Type III 24-hr 5-year Rainfall=4.27"
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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

Runoff = 1.82 cfs @ 12.15 hrs, Volume= 0.144 af, Depth> 1.19"

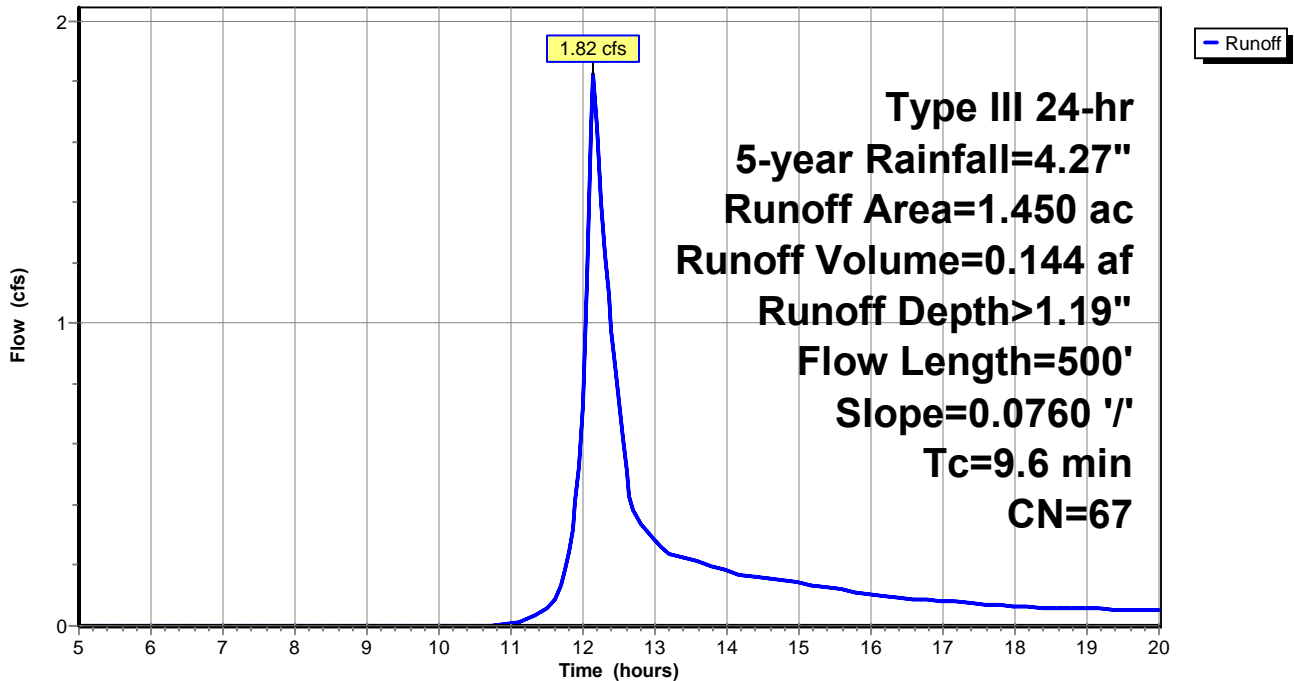
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
0.260	60	Woods, Fair, HSG B
* 1.190	68	3/4 acre lots, 20% imp, HSG B
1.450	67	Weighted Average
1.212		83.59% Pervious Area
0.238		16.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	500	0.0760	0.87		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest

Hydrograph



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 Type III 24-hr 5-year Rainfall=4.27"
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Summary for Subcatchment 4A: Drainage to Basin

Runoff = 7.56 cfs @ 12.08 hrs, Volume= 0.502 af, Depth> 1.45"

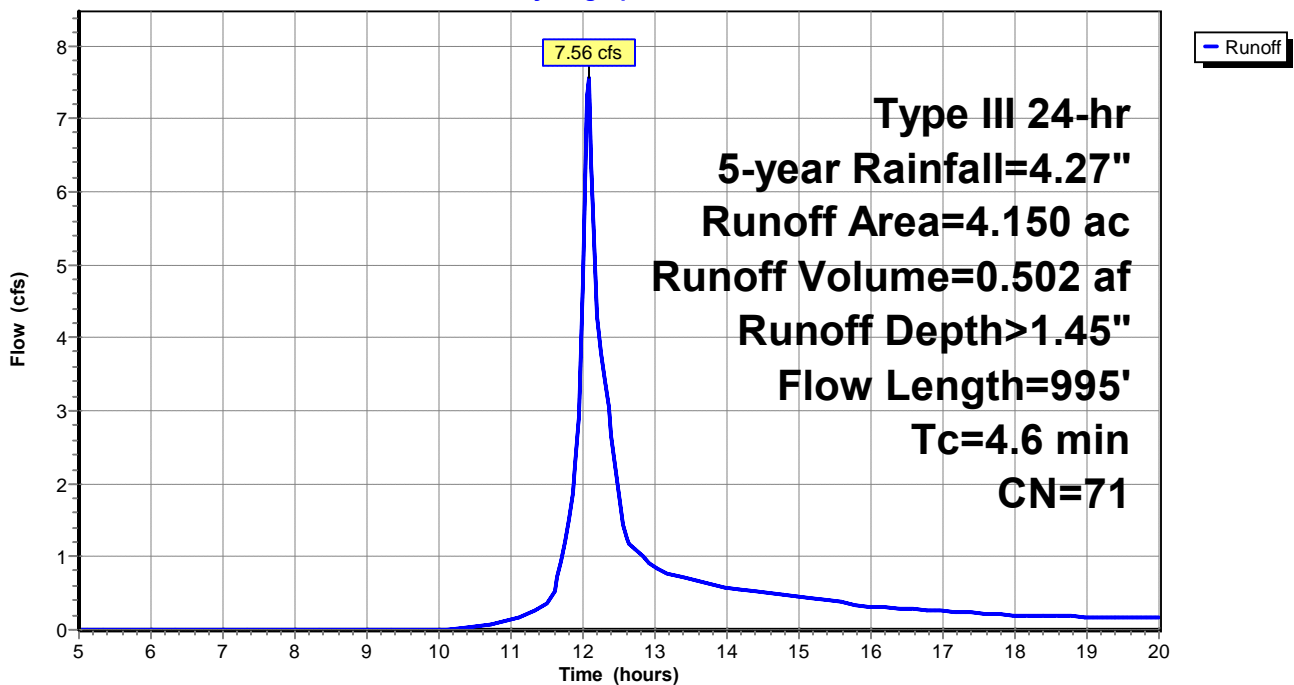
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
0.620	98	Paved roads w/curbs & sewers, HSG B
0.410	60	Woods, Fair, HSG B
* 0.240	61	>75% Grass cover, Good, HSG B (basin)
* 2.880	68	3/4 acre lots, 20% imp, HSG B
4.150	71	Weighted Average
2.954		71.18% Pervious Area
1.196		28.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	200	0.0150	1.42		Sheet Flow, Tc-3A1
					Smooth surfaces n= 0.011 P2= 3.27"
2.3	795	0.0790	5.71		Shallow Concentrated Flow, Tc-3A2
					Paved Kv= 20.3 fps
4.6	995	Total			

Subcatchment 4A: Drainage to Basin

Hydrograph



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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 6.20 cfs @ 12.16 hrs, Volume= 0.513 af, Depth> 0.96"

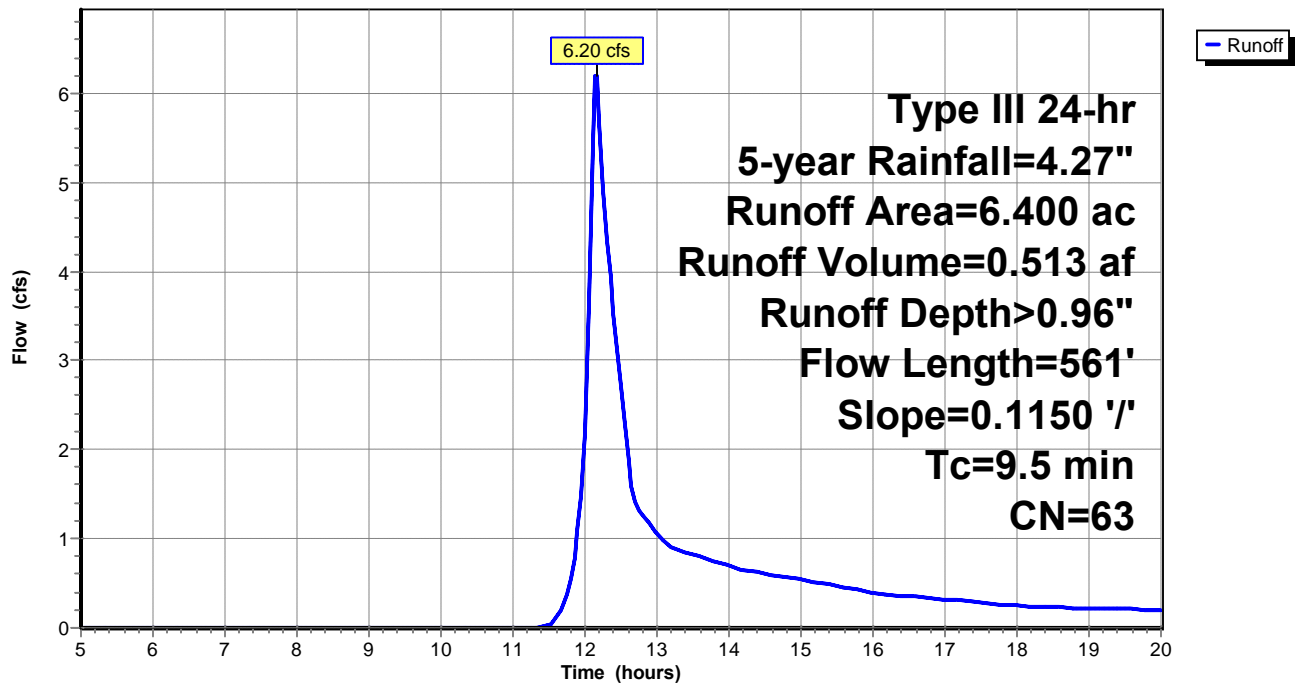
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.27"

Area (ac)	CN	Description
* 2.370	68	3/4 acre lots, 20% imp, HSG B
4.030	60	Woods, Fair, HSG B
6.400	63	Weighted Average
5.926		92.59% Pervious Area
0.474		7.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	561	0.1150	0.99		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

Hydrograph



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Type III 24-hr 5-year Rainfall=4.27"

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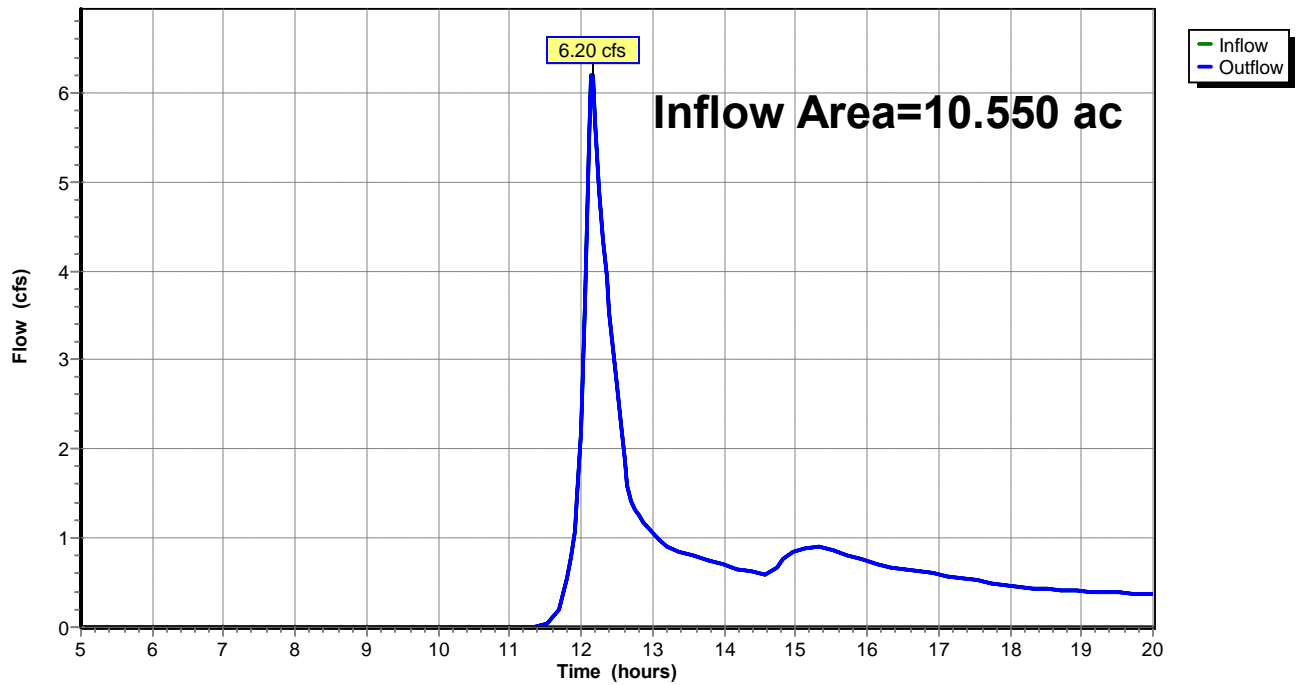
Summary for Reach 1R: Peak East

Inflow Area = 10.550 ac, 15.83% Impervious, Inflow Depth > 0.71" for 5-year event
Inflow = 6.20 cfs @ 12.16 hrs, Volume= 0.625 af
Outflow = 6.20 cfs @ 12.16 hrs, Volume= 0.625 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: Peak East

Hydrograph



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Type III 24-hr 5-year Rainfall=4.27"
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Summary for Pond 1P: Stormwater Basin

Inflow Area = 4.150 ac, 28.82% Impervious, Inflow Depth > 1.45" for 5-year event
Inflow = 7.56 cfs @ 12.08 hrs, Volume= 0.502 af
Outflow = 0.40 cfs @ 15.36 hrs, Volume= 0.113 af, Atten= 95%, Lag= 196.8 min
Primary = 0.40 cfs @ 15.36 hrs, Volume= 0.113 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 275.06' @ 15.36 hrs Surf.Area= 6,904 sf Storage= 17,174 cf

Plug-Flow detention time= 310.4 min calculated for 0.113 af (22% of inflow)
Center-of-Mass det. time= 209.1 min (1,020.1 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1	271.50'	24,150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
271.50	0	0	0
272.00	3,840	960	960
274.00	5,685	9,525	10,485
276.00	7,980	13,665	24,150

Device	Routing	Invert	Outlet Devices
#1	Primary	275.00'	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

Primary OutFlow Max=0.39 cfs @ 15.36 hrs HW=275.06' (Free Discharge)
↑1=Broad-Crested Rectangular Weir (Weir Controls 0.39 cfs @ 0.62 fps)

Proposed Conditions

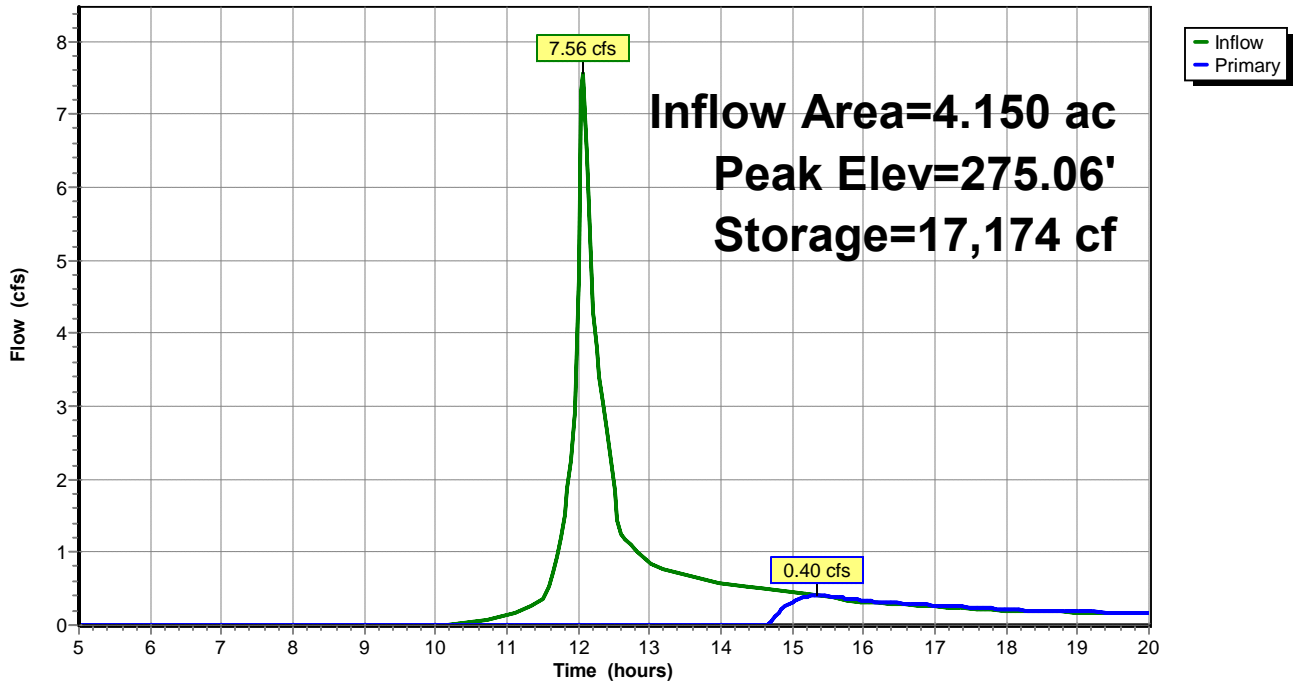
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Type III 24-hr 5-year Rainfall=4.27"

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Pond 1P: Stormwater Basin

Hydrograph



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Type III 24-hr 10-year Rainfall=5.02"
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=1.880 ac 14.10% Impervious Runoff Depth>1.59"
Flow Length=395' Slope=0.0580 '/' Tc=9.3 min CN=66 Runoff=3.23 cfs 0.249 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.930 ac 12.70% Impervious Runoff Depth>1.52"
Flow Length=498' Slope=0.0580 '/' Tc=11.5 min CN=65 Runoff=10.62 cfs 0.877 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=1.450 ac 16.41% Impervious Runoff Depth>1.66"
Flow Length=500' Slope=0.0760 '/' Tc=9.6 min CN=67 Runoff=2.60 cfs 0.201 af

Subcatchment 4A: Drainage to Basin Runoff Area=4.150 ac 28.82% Impervious Runoff Depth>1.97"
Flow Length=995' Tc=4.6 min CN=71 Runoff=10.45 cfs 0.680 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=6.400 ac 7.41% Impervious Runoff Depth>1.38"
Flow Length=561' Slope=0.1150 '/' Tc=9.5 min CN=63 Runoff=9.32 cfs 0.737 af

Reach 1R: Peak East Inflow=9.32 cfs 1.027 af
Outflow=9.32 cfs 1.027 af

Pond 1P: Stormwater Basin Peak Elev=275.12' Storage=17,570 cf Inflow=10.45 cfs 0.680 af
Outflow=1.05 cfs 0.290 af

Total Runoff Area = 20.810 ac Runoff Volume = 2.744 af Average Runoff Depth = 1.58"
85.33% Pervious = 17.757 ac 14.67% Impervious = 3.053 ac

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Type III 24-hr 10-year Rainfall=5.02"
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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

Runoff = 3.23 cfs @ 12.14 hrs, Volume= 0.249 af, Depth> 1.59"

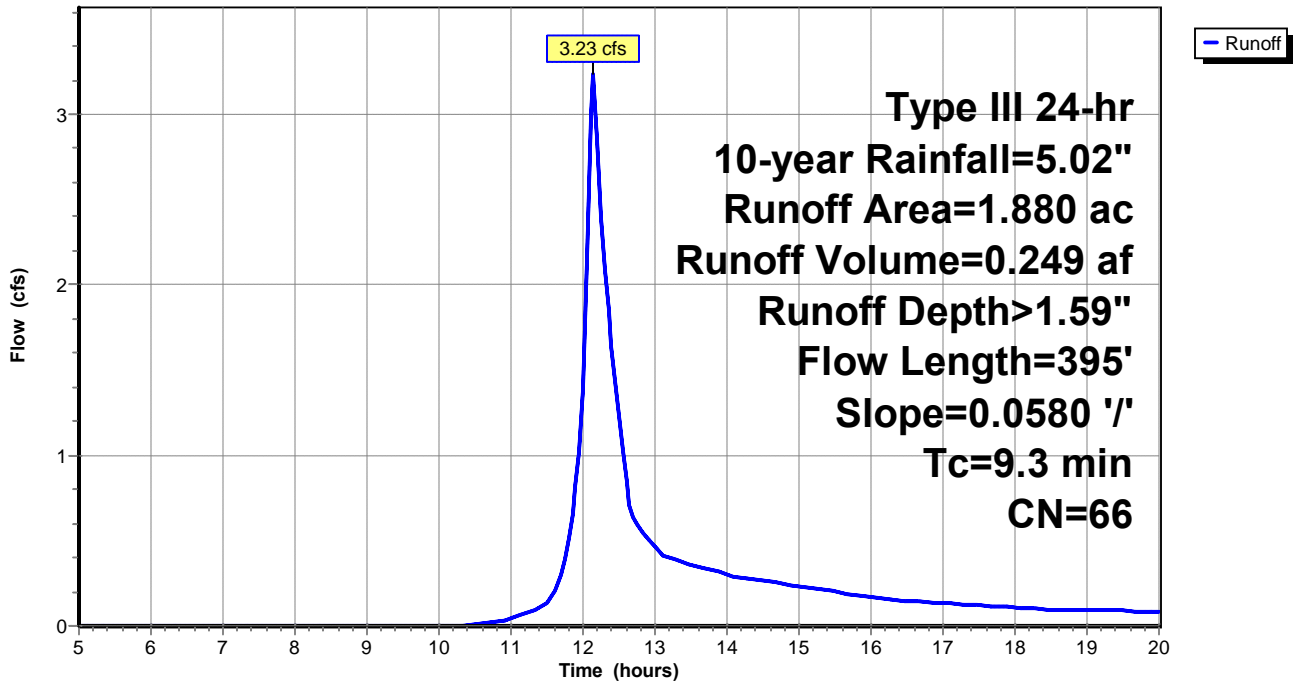
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
0.820	60	Woods, Fair, HSG B
1.060	70	1/2 acre lots, 25% imp, HSG B
1.880	66	Weighted Average
1.615		85.90% Pervious Area
0.265		14.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	395	0.0580	0.71		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast

Hydrograph



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 Type III 24-hr 10-year Rainfall=5.02"
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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

Runoff = 10.62 cfs @ 12.17 hrs, Volume= 0.877 af, Depth> 1.52"

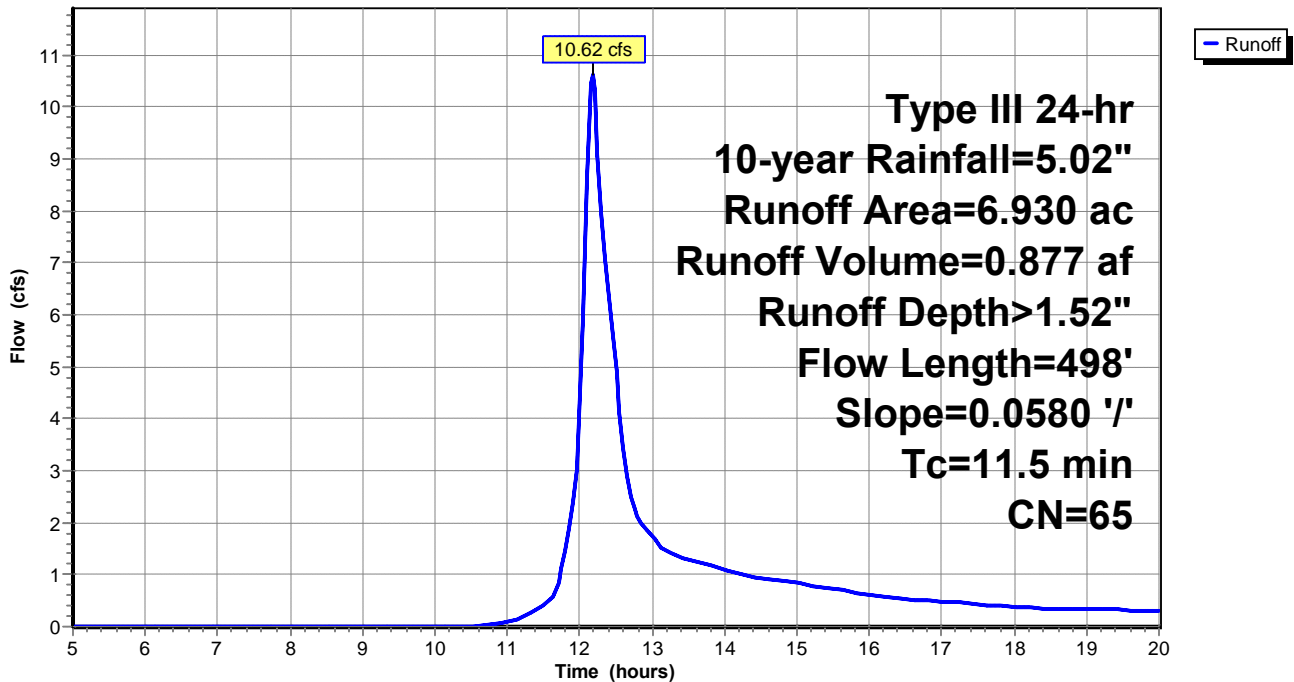
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
0.340	98	Paved roads w/curbs & sewers, HSG B
* 0.540	98	Roof & driveways
3.970	60	Woods, Fair, HSG B
2.080	61	>75% Grass cover, Good, HSG B
6.930	65	Weighted Average
6.050		87.30% Pervious Area
0.880		12.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	498	0.0580	0.72		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest

Hydrograph



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 Type III 24-hr 10-year Rainfall=5.02"
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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

Runoff = 2.60 cfs @ 12.15 hrs, Volume= 0.201 af, Depth> 1.66"

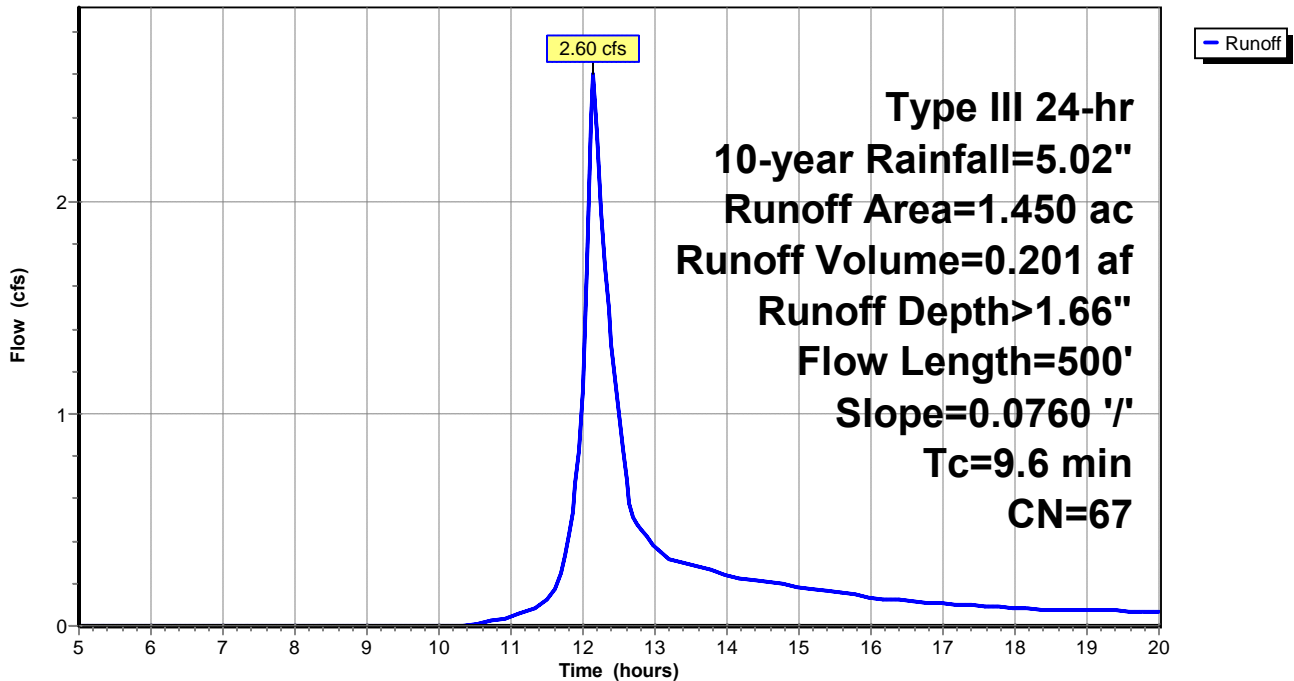
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
0.260	60	Woods, Fair, HSG B
* 1.190	68	3/4 acre lots, 20% imp, HSG B
1.450	67	Weighted Average
1.212		83.59% Pervious Area
0.238		16.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	500	0.0760	0.87		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest

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 Type III 24-hr 10-year Rainfall=5.02"
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Summary for Subcatchment 4A: Drainage to Basin

Runoff = 10.45 cfs @ 12.07 hrs, Volume= 0.680 af, Depth> 1.97"

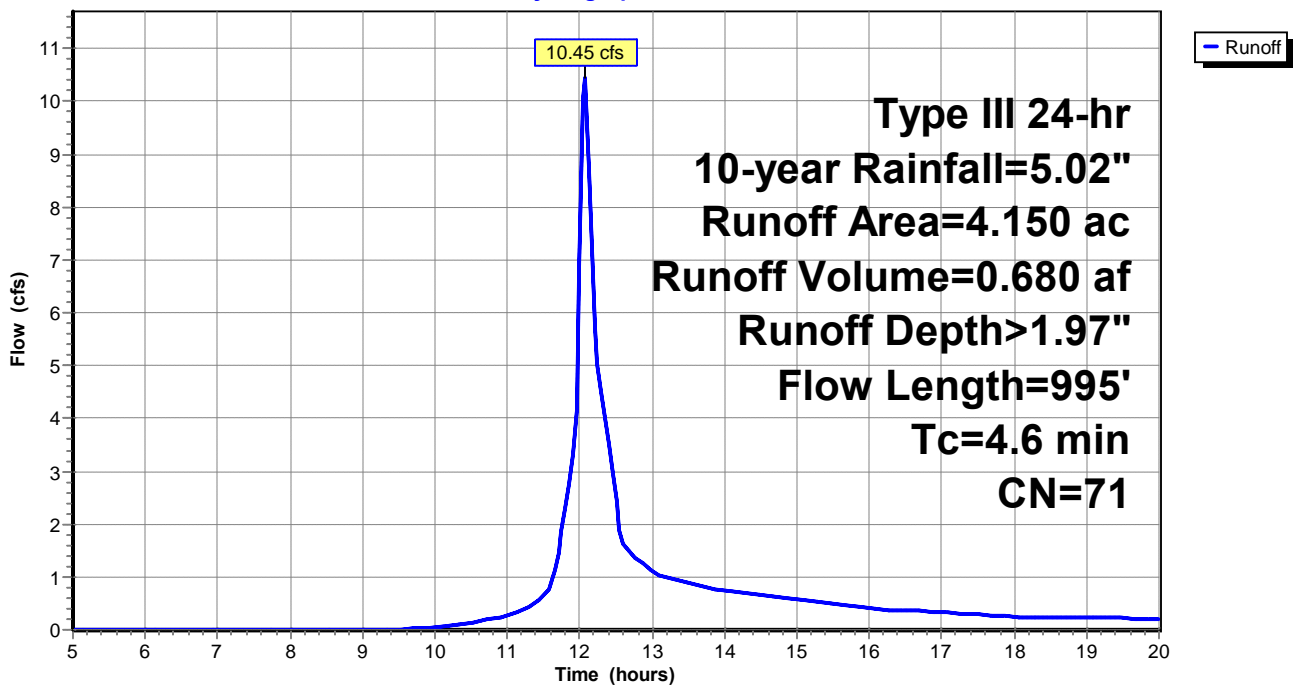
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
0.620	98	Paved roads w/curbs & sewers, HSG B
0.410	60	Woods, Fair, HSG B
* 0.240	61	>75% Grass cover, Good, HSG B (basin)
* 2.880	68	3/4 acre lots, 20% imp, HSG B
4.150	71	Weighted Average
2.954		71.18% Pervious Area
1.196		28.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	200	0.0150	1.42		Sheet Flow, Tc-3A1
					Smooth surfaces n= 0.011 P2= 3.27"
2.3	795	0.0790	5.71		Shallow Concentrated Flow, Tc-3A2
					Paved Kv= 20.3 fps
4.6	995	Total			

Subcatchment 4A: Drainage to Basin

Hydrograph



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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 9.32 cfs @ 12.15 hrs, Volume= 0.737 af, Depth> 1.38"

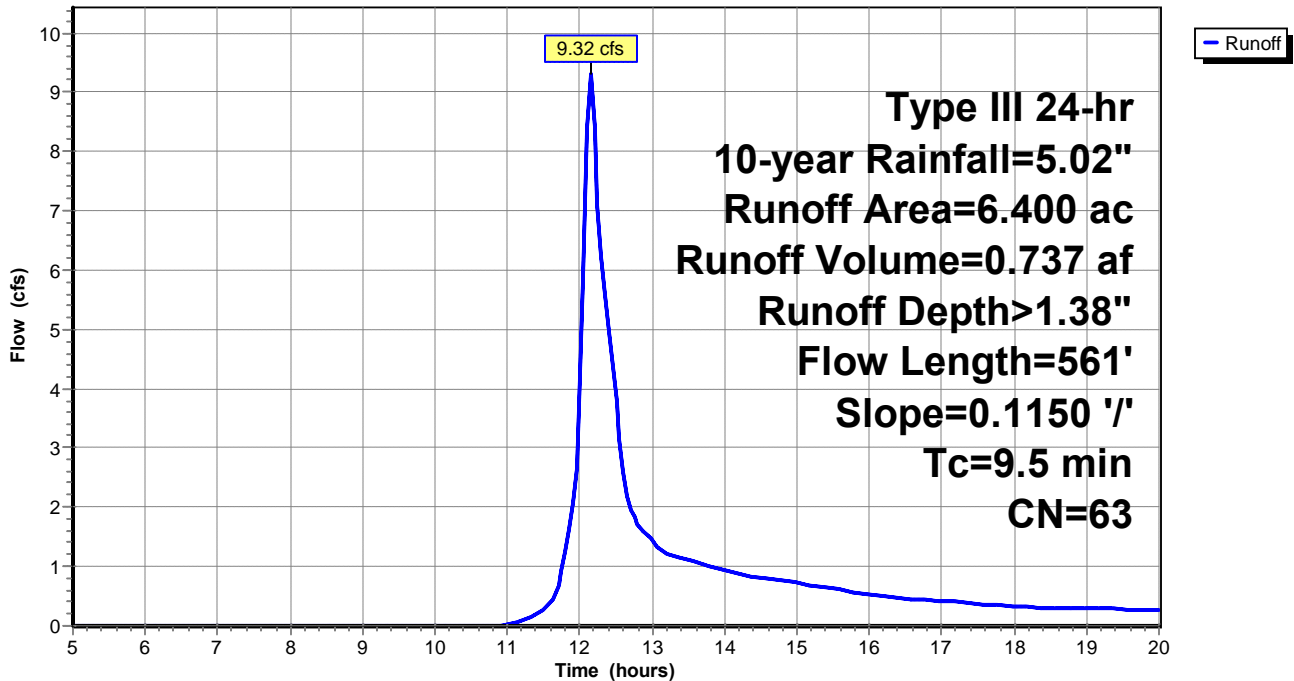
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-year Rainfall=5.02"

Area (ac)	CN	Description
* 2.370	68	3/4 acre lots, 20% imp, HSG B
4.030	60	Woods, Fair, HSG B
6.400	63	Weighted Average
5.926		92.59% Pervious Area
0.474		7.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	561	0.1150	0.99		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

Hydrograph



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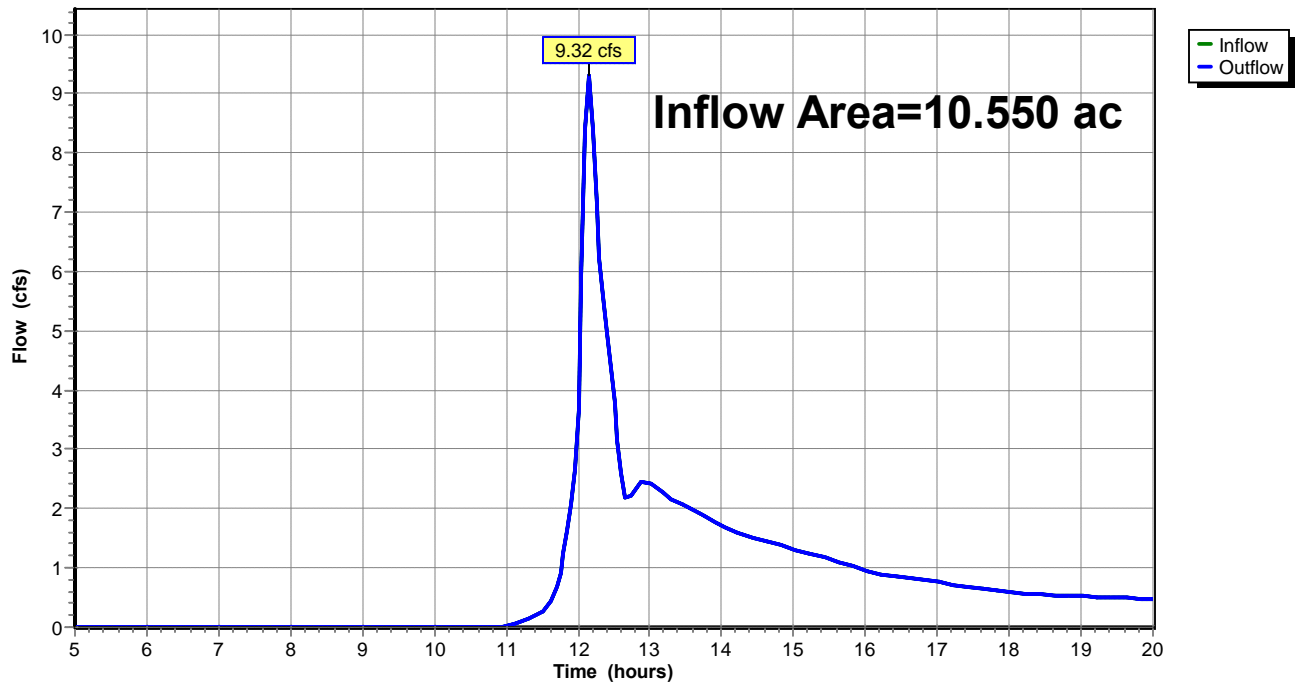
Summary for Reach 1R: Peak East

Inflow Area = 10.550 ac, 15.83% Impervious, Inflow Depth > 1.17" for 10-year event
Inflow = 9.32 cfs @ 12.15 hrs, Volume= 1.027 af
Outflow = 9.32 cfs @ 12.15 hrs, Volume= 1.027 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: Peak East

Hydrograph



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Type III 24-hr 10-year Rainfall=5.02"
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Summary for Pond 1P: Stormwater Basin

Inflow Area = 4.150 ac, 28.82% Impervious, Inflow Depth > 1.97" for 10-year event
Inflow = 10.45 cfs @ 12.07 hrs, Volume= 0.680 af
Outflow = 1.05 cfs @ 13.06 hrs, Volume= 0.290 af, Atten= 90%, Lag= 59.3 min
Primary = 1.05 cfs @ 13.06 hrs, Volume= 0.290 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 275.12' @ 13.06 hrs Surf.Area= 6,970 sf Storage= 17,570 cf

Plug-Flow detention time= 206.1 min calculated for 0.290 af (43% of inflow)
Center-of-Mass det. time= 116.9 min (921.1 - 804.2)

Volume	Invert	Avail.Storage	Storage Description
#1	271.50'	24,150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
271.50	0	0	0
272.00	3,840	960	960
274.00	5,685	9,525	10,485
276.00	7,980	13,665	24,150

Device	Routing	Invert	Outlet Devices
#1	Primary	275.00'	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

Primary OutFlow Max=1.03 cfs @ 13.06 hrs HW=275.12' (Free Discharge)
↑1=Broad-Crested Rectangular Weir (Weir Controls 1.03 cfs @ 0.86 fps)

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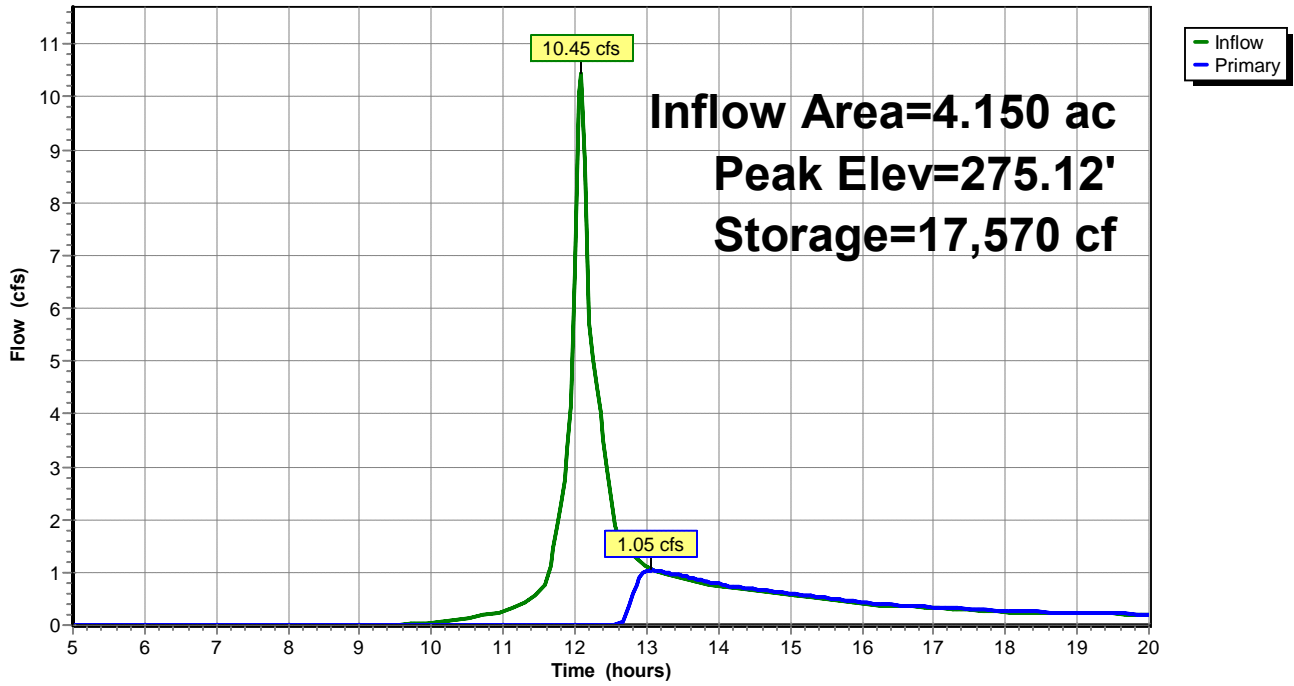
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Pond 1P: Stormwater Basin

Hydrograph



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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Drainage Area 1 - Southeast Runoff Area=1.880 ac 14.10% Impervious Runoff Depth>2.28"
Flow Length=395' Slope=0.0580 '/' Tc=9.3 min CN=66 Runoff=4.71 cfs 0.357 af

Subcatchment 2S: Drainage Area 2 - Southwest Runoff Area=6.930 ac 12.70% Impervious Runoff Depth>2.19"
Flow Length=498' Slope=0.0580 '/' Tc=11.5 min CN=65 Runoff=15.67 cfs 1.265 af

Subcatchment 3S: Drainage Area 3 - Northwest Runoff Area=1.450 ac 16.41% Impervious Runoff Depth>2.37"
Flow Length=500' Slope=0.0760 '/' Tc=9.6 min CN=67 Runoff=3.75 cfs 0.286 af

Subcatchment 4A: Drainage to Basin Runoff Area=4.150 ac 28.82% Impervious Runoff Depth>2.73"
Flow Length=995' Tc=4.6 min CN=71 Runoff=14.57 cfs 0.943 af

Subcatchment 4S: Drainage Area 4 - Northeast Runoff Area=6.400 ac 7.41% Impervious Runoff Depth>2.02"
Flow Length=561' Slope=0.1150 '/' Tc=9.5 min CN=63 Runoff=14.04 cfs 1.080 af

Reach 1R: Peak East Inflow=14.03 cfs 1.631 af
Outflow=14.03 cfs 1.631 af

Pond 1P: Stormwater Basin Peak Elev=275.33' Storage=19,059 cf Inflow=14.57 cfs 0.943 af
Outflow=4.80 cfs 0.551 af

Total Runoff Area = 20.810 ac Runoff Volume = 3.931 af Average Runoff Depth = 2.27"
85.33% Pervious = 17.757 ac 14.67% Impervious = 3.053 ac

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Summary for Subcatchment 1S: Drainage Area 1 - Southeast

Runoff = 4.71 cfs @ 12.14 hrs, Volume= 0.357 af, Depth> 2.28"

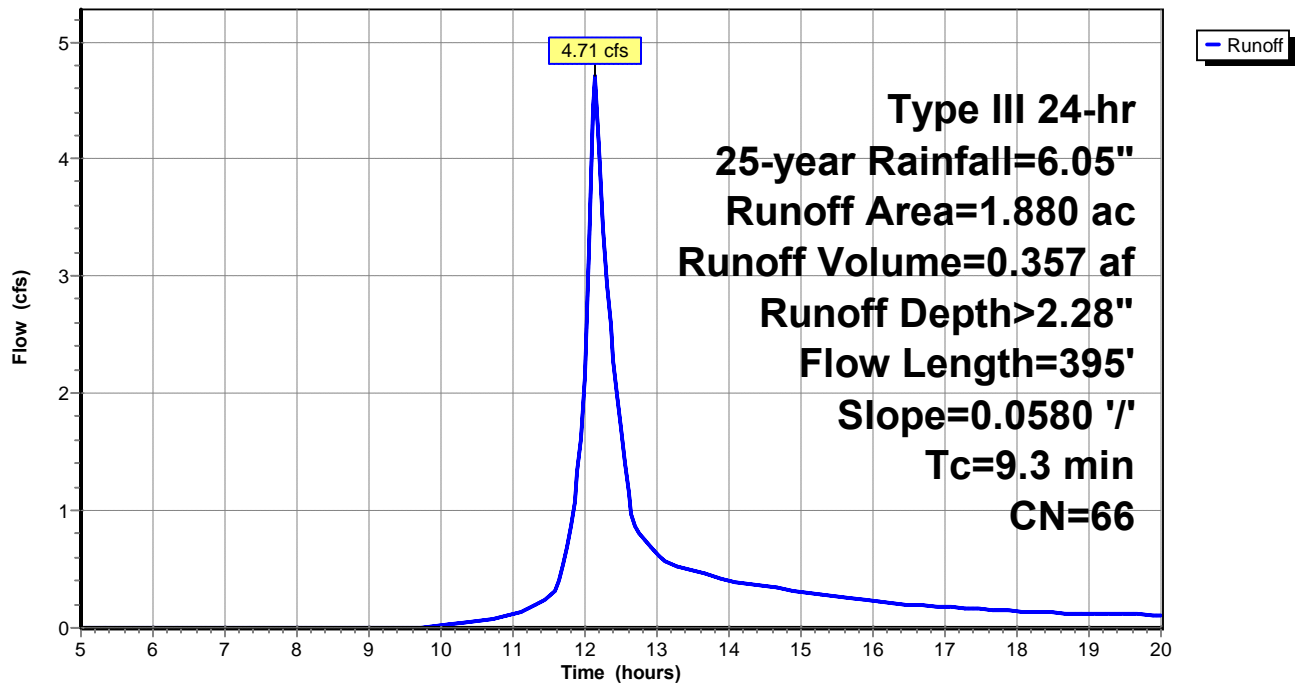
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
0.820	60	Woods, Fair, HSG B
1.060	70	1/2 acre lots, 25% imp, HSG B
1.880	66	Weighted Average
1.615		85.90% Pervious Area
0.265		14.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	395	0.0580	0.71		Lag/CN Method, Tc 1

Subcatchment 1S: Drainage Area 1 - Southeast

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Summary for Subcatchment 2S: Drainage Area 2 - Southwest

Runoff = 15.67 cfs @ 12.17 hrs, Volume= 1.265 af, Depth> 2.19"

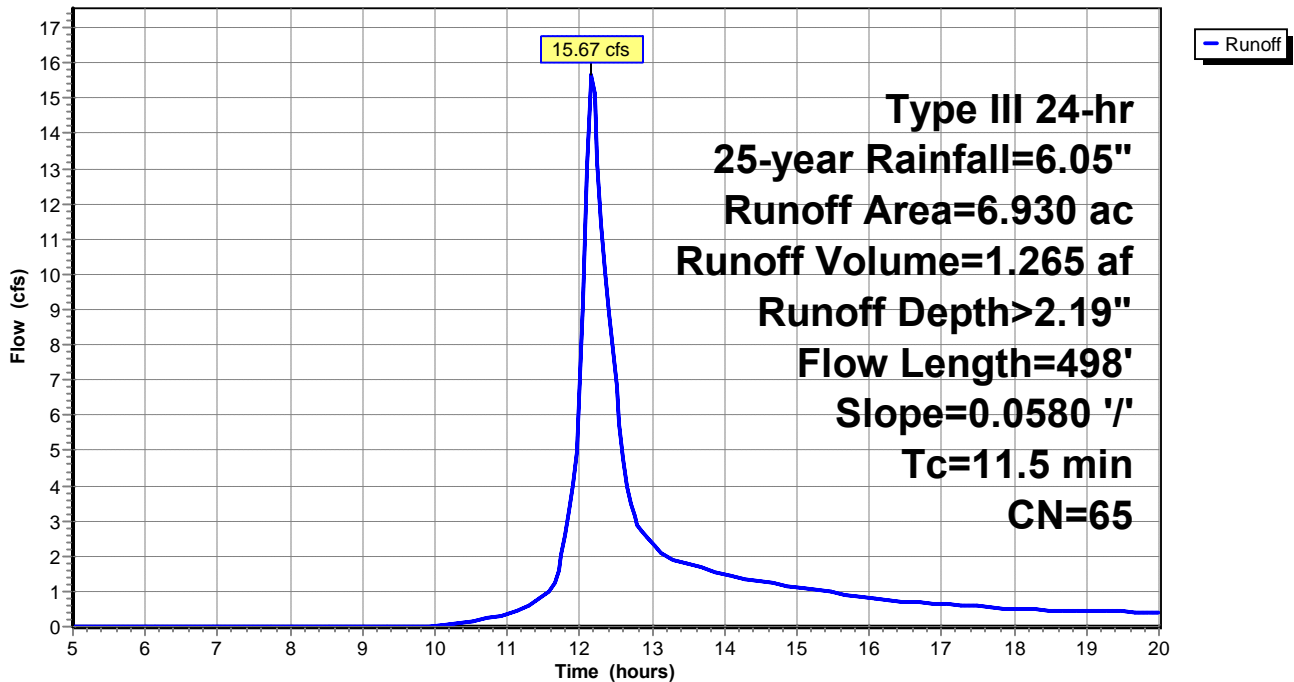
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
0.340	98	Paved roads w/curbs & sewers, HSG B
* 0.540	98	Roof & driveways
3.970	60	Woods, Fair, HSG B
2.080	61	>75% Grass cover, Good, HSG B
6.930	65	Weighted Average
6.050		87.30% Pervious Area
0.880		12.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	498	0.0580	0.72		Lag/CN Method, Tc-2

Subcatchment 2S: Drainage Area 2 - Southwest

Hydrograph



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Summary for Subcatchment 3S: Drainage Area 3 - Northwest

Runoff = 3.75 cfs @ 12.14 hrs, Volume= 0.286 af, Depth> 2.37"

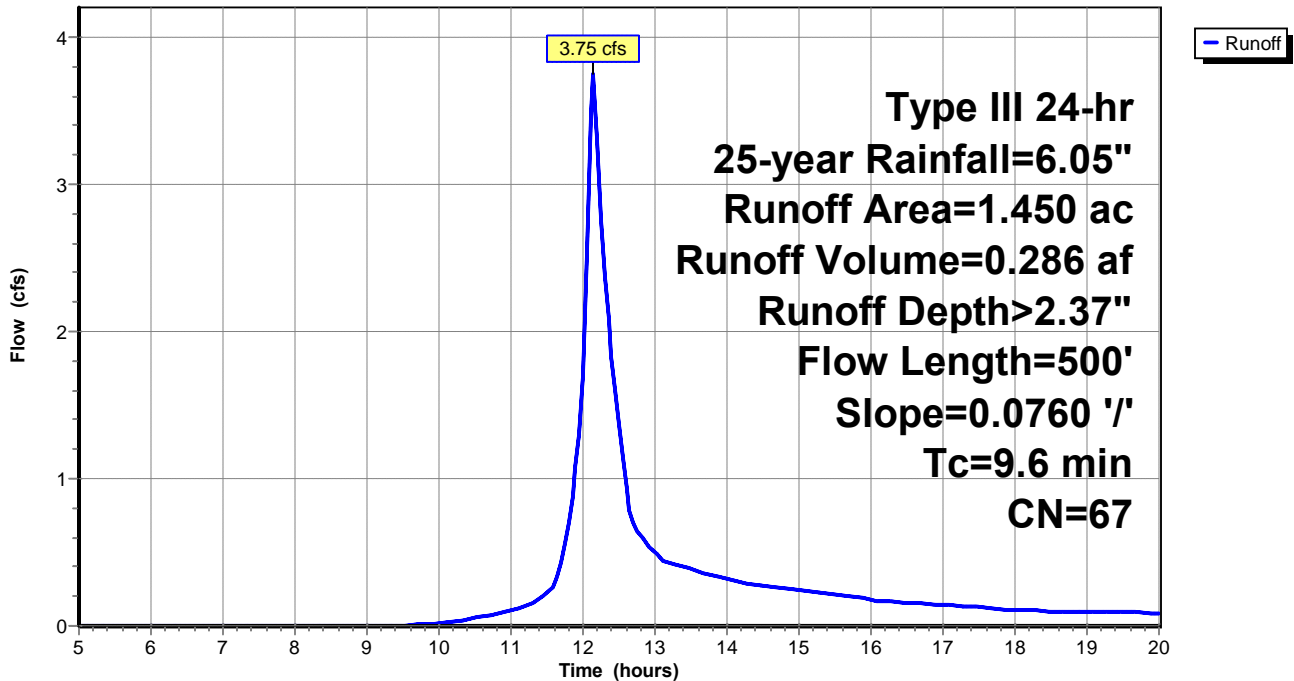
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
0.260	60	Woods, Fair, HSG B
* 1.190	68	3/4 acre lots, 20% imp, HSG B
1.450	67	Weighted Average
1.212		83.59% Pervious Area
0.238		16.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	500	0.0760	0.87		Lag/CN Method, Tc-3

Subcatchment 3S: Drainage Area 3 - Northwest

Hydrograph



Proposed Conditions

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 Type III 24-hr 25-year Rainfall=6.05"
 Printed 7/1/2020
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Summary for Subcatchment 4A: Drainage to Basin

Runoff = 14.57 cfs @ 12.07 hrs, Volume= 0.943 af, Depth> 2.73"

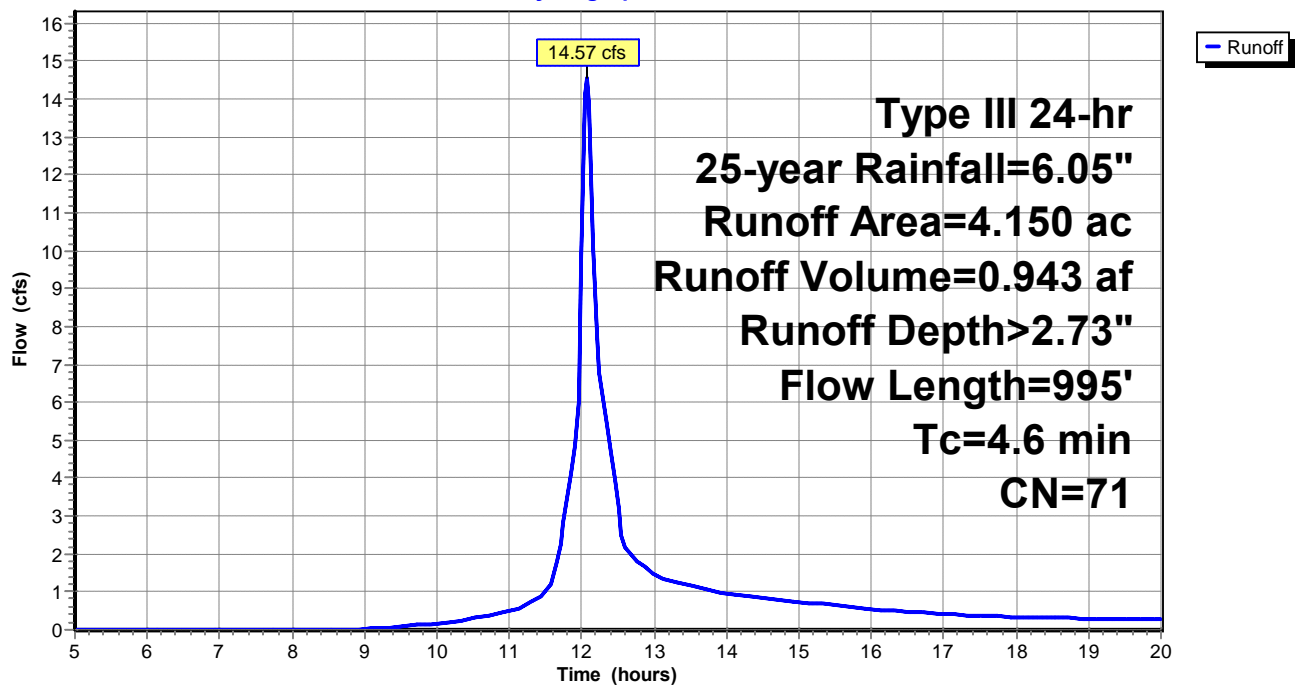
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
0.620	98	Paved roads w/curbs & sewers, HSG B
0.410	60	Woods, Fair, HSG B
* 0.240	61	>75% Grass cover, Good, HSG B (basin)
* 2.880	68	3/4 acre lots, 20% imp, HSG B
4.150	71	Weighted Average
2.954		71.18% Pervious Area
1.196		28.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	200	0.0150	1.42		Sheet Flow, Tc-3A1
					Smooth surfaces n= 0.011 P2= 3.27"
2.3	795	0.0790	5.71		Shallow Concentrated Flow, Tc-3A2
					Paved Kv= 20.3 fps
4.6	995	Total			

Subcatchment 4A: Drainage to Basin

Hydrograph



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 Type III 24-hr 25-year Rainfall=6.05"
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Summary for Subcatchment 4S: Drainage Area 4 - Northeast

Runoff = 14.04 cfs @ 12.15 hrs, Volume= 1.080 af, Depth> 2.02"

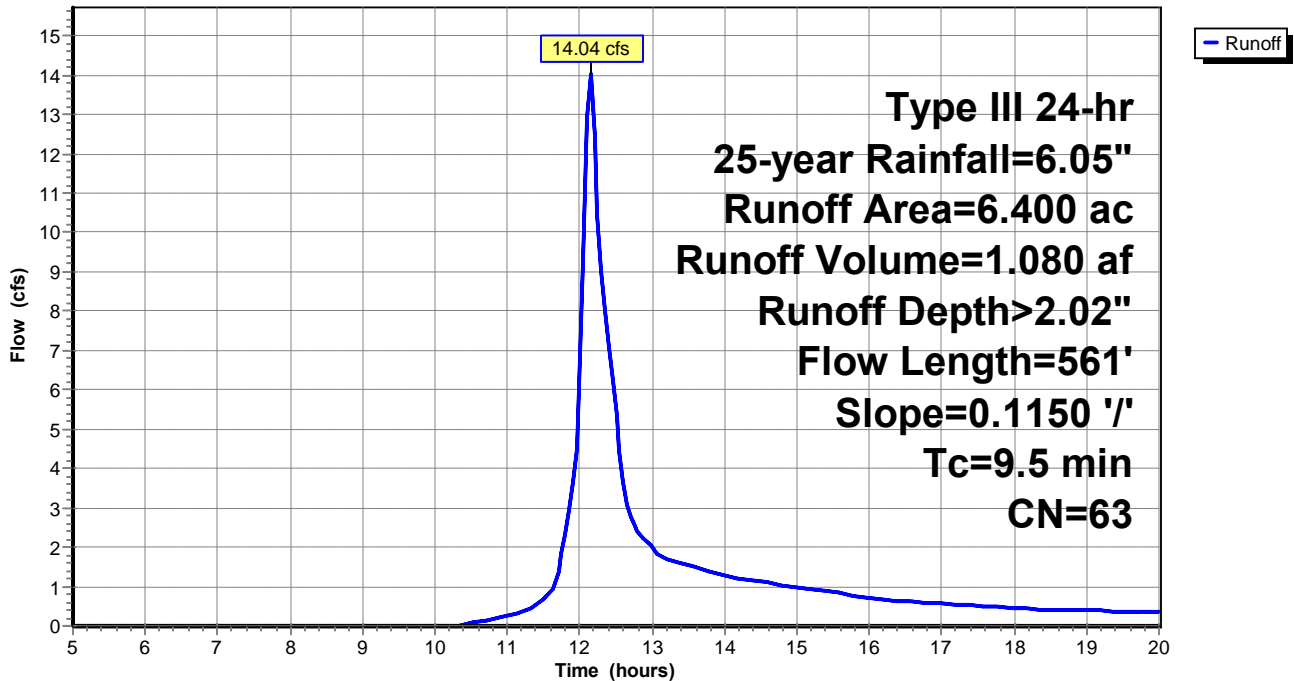
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
* 2.370	68	3/4 acre lots, 20% imp, HSG B
4.030	60	Woods, Fair, HSG B
6.400	63	Weighted Average
5.926		92.59% Pervious Area
0.474		7.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	561	0.1150	0.99		Lag/CN Method, Tc-4

Subcatchment 4S: Drainage Area 4 - Northeast

Hydrograph



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Type III 24-hr 25-year Rainfall=6.05"

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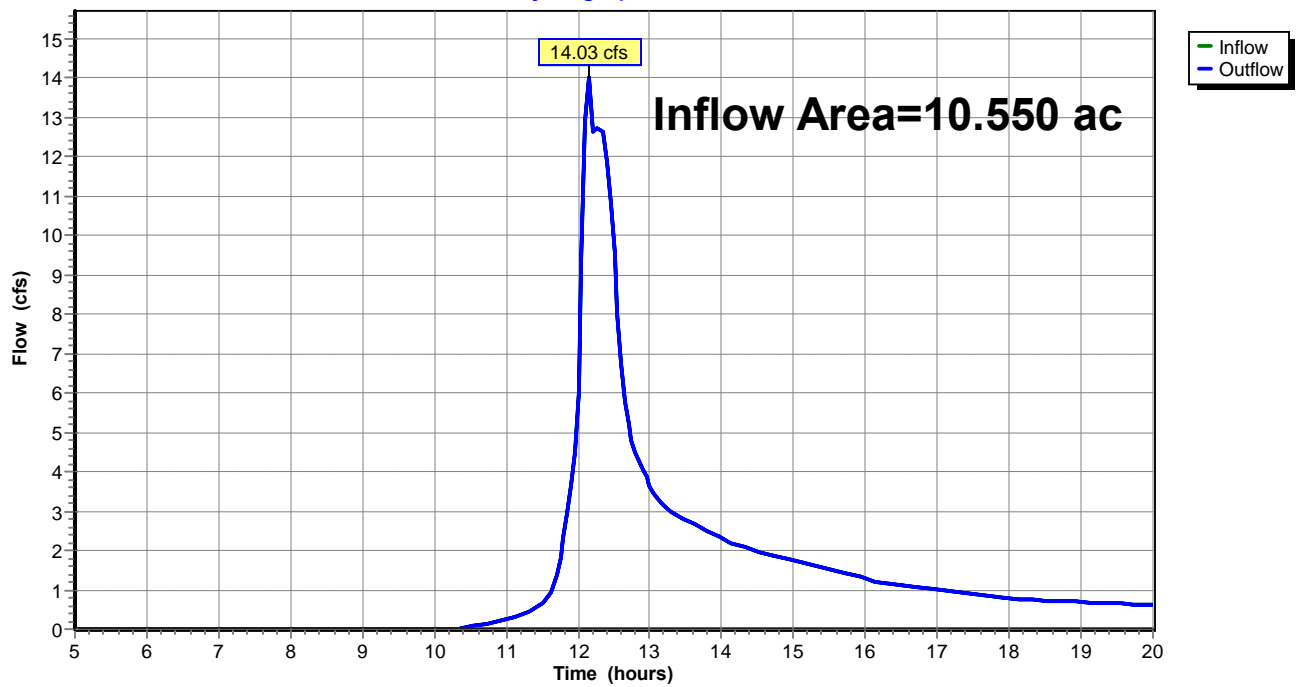
Summary for Reach 1R: Peak East

Inflow Area = 10.550 ac, 15.83% Impervious, Inflow Depth > 1.86" for 25-year event
Inflow = 14.03 cfs @ 12.15 hrs, Volume= 1.631 af
Outflow = 14.03 cfs @ 12.15 hrs, Volume= 1.631 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: Peak East

Hydrograph



Proposed Conditions

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Type III 24-hr 25-year Rainfall=6.05"
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Summary for Pond 1P: Stormwater Basin

Inflow Area = 4.150 ac, 28.82% Impervious, Inflow Depth > 2.73" for 25-year event
Inflow = 14.57 cfs @ 12.07 hrs, Volume= 0.943 af
Outflow = 4.80 cfs @ 12.40 hrs, Volume= 0.551 af, Atten= 67%, Lag= 19.6 min
Primary = 4.80 cfs @ 12.40 hrs, Volume= 0.551 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 275.33' @ 12.40 hrs Surf.Area= 7,211 sf Storage= 19,059 cf

Plug-Flow detention time= 147.4 min calculated for 0.550 af (58% of inflow)
Center-of-Mass det. time= 69.8 min (866.7 - 796.9)

Volume	Invert	Avail.Storage	Storage Description
#1	271.50'	24,150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
271.50	0	0	0
272.00	3,840	960	960
274.00	5,685	9,525	10,485
276.00	7,980	13,665	24,150

Device	Routing	Invert	Outlet Devices
#1	Primary	275.00'	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

Primary OutFlow Max=4.79 cfs @ 12.40 hrs HW=275.33' (Free Discharge)
↑1=Broad-Crested Rectangular Weir (Weir Controls 4.79 cfs @ 1.46 fps)

Proposed Conditions

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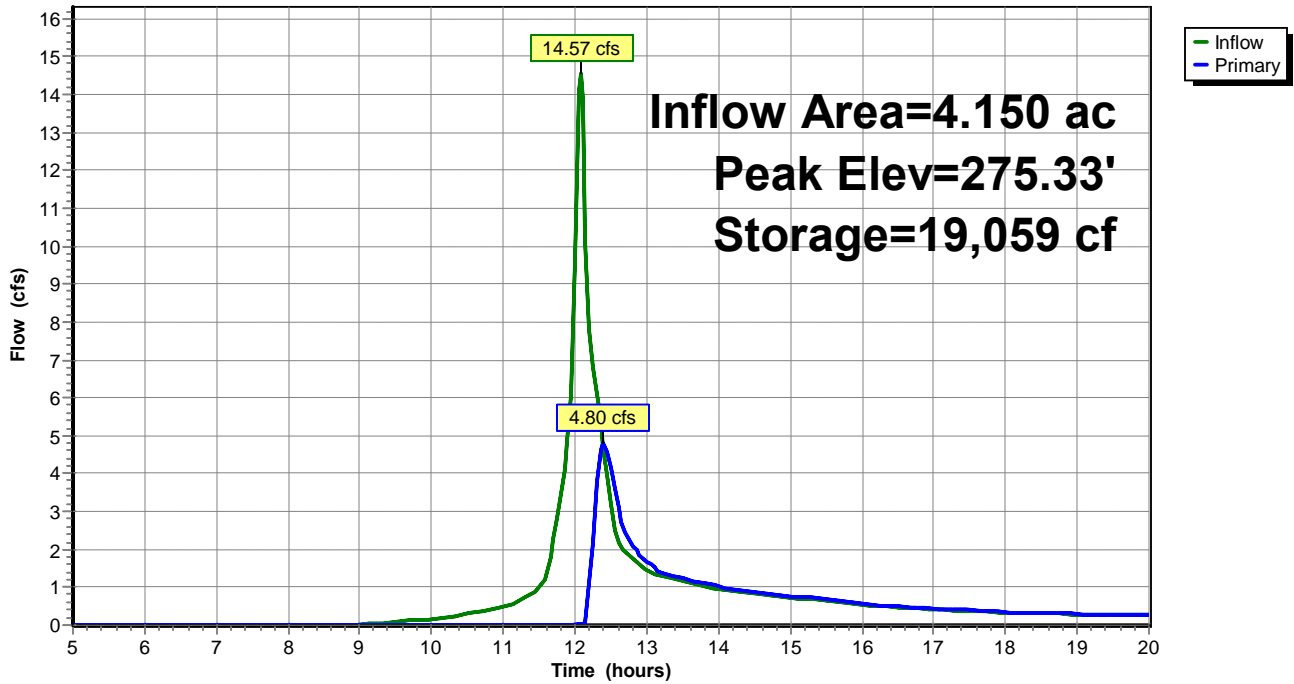
Type III 24-hr 25-year Rainfall=6.05"

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Pond 1P: Stormwater Basin

Hydrograph



SUPPORTING DOCUMENTATION

**WQV Calculation
Web Soil Survey**

Basin Water Quality Volume (WQV)

$$WQV = (1.0) (R)(A)/12$$

$$R = 0.05 + 0.009(I) \quad I = \% \text{ Impervious} = 15.8\% \text{ (Drainage Areas 4 \& 4A)}$$

$$R = 0.05 + 0.009(15.8) = 0.1922$$

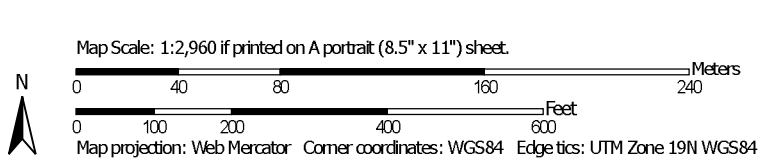
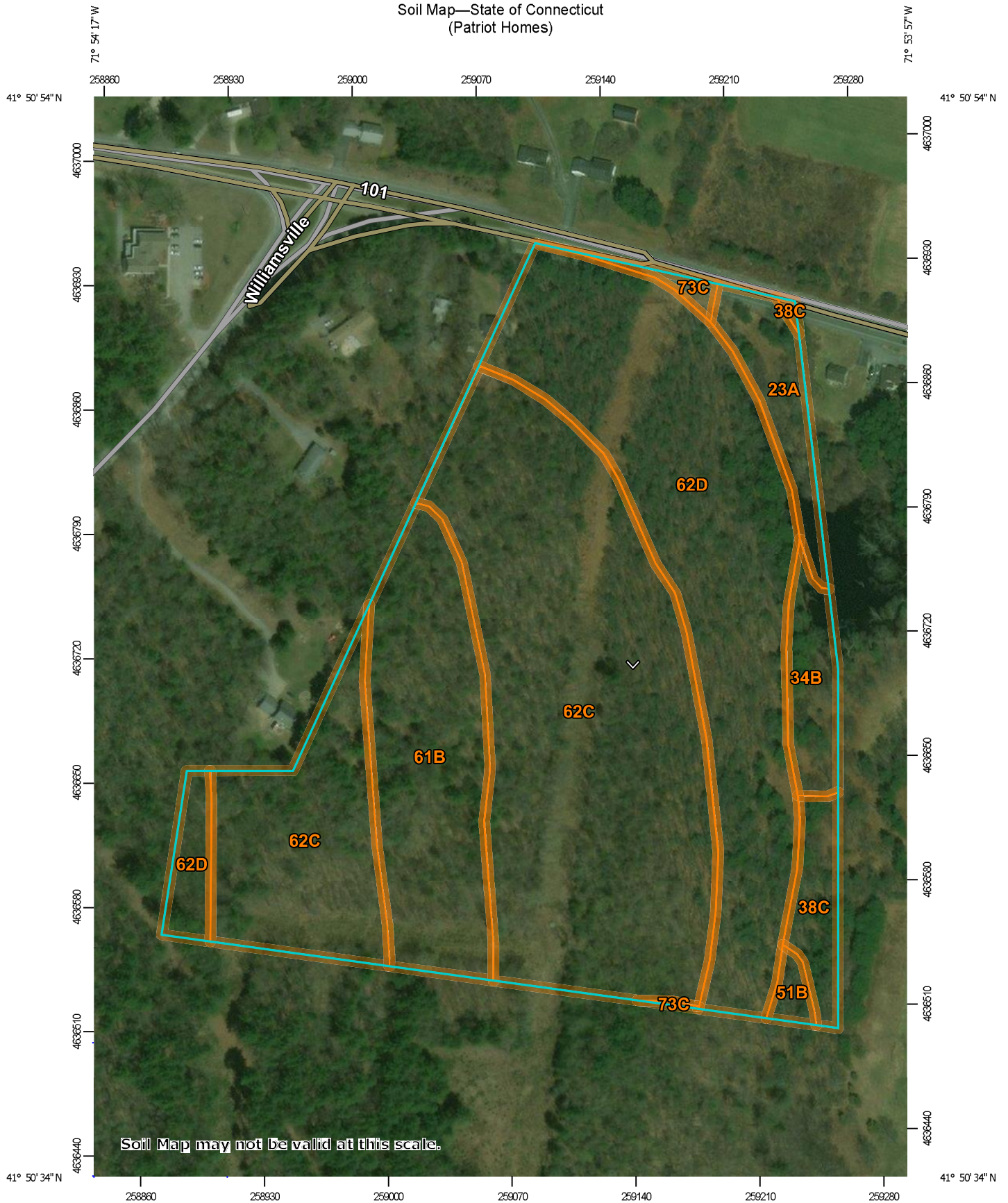
$$\text{Total Area} = 10.55 \text{ acres}$$

$$WQV = (1.0) (0.1922) (10.55)/12 = 0.169 \text{ ac-ft}$$

$$7,360 \text{ c.f.}$$


Basin provides 17,315 c.f. to overflow (Elevation 275)

Soil Map—State of Connecticut
(Patriot Homes)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: State of Connecticut
Survey Area Data: Version 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Apr 14, 2011—Aug 27, 2016

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
23A	Sudbury sandy loam, 0 to 5 percent slopes	1.0	3.6%
34B	Merrimac fine sandy loam, 3 to 8 percent slopes	0.8	3.0%
38C	Hinckley loamy sand, 3 to 15 percent slopes	0.7	2.7%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	0.2	0.7%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	3.7	13.7%
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	12.6	46.2%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	8.0	29.5%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	0.1	0.5%
Totals for Area of Interest		27.3	100.0%

TEST PIT DATA – STORMWATER BASIN

TP-101 ó Forebay

0 to 13ö	Topsoil
13ö-28ö	Orange-brown sandy loam
28ö-47ö	Medium sand, some fines
47ö-90ö	Coarse sands & gravel

No mottling, ledge or groundwater

TP-102

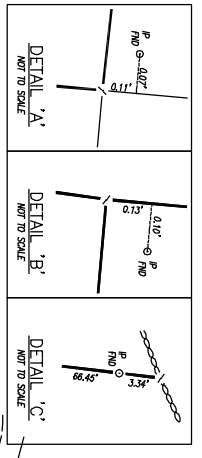
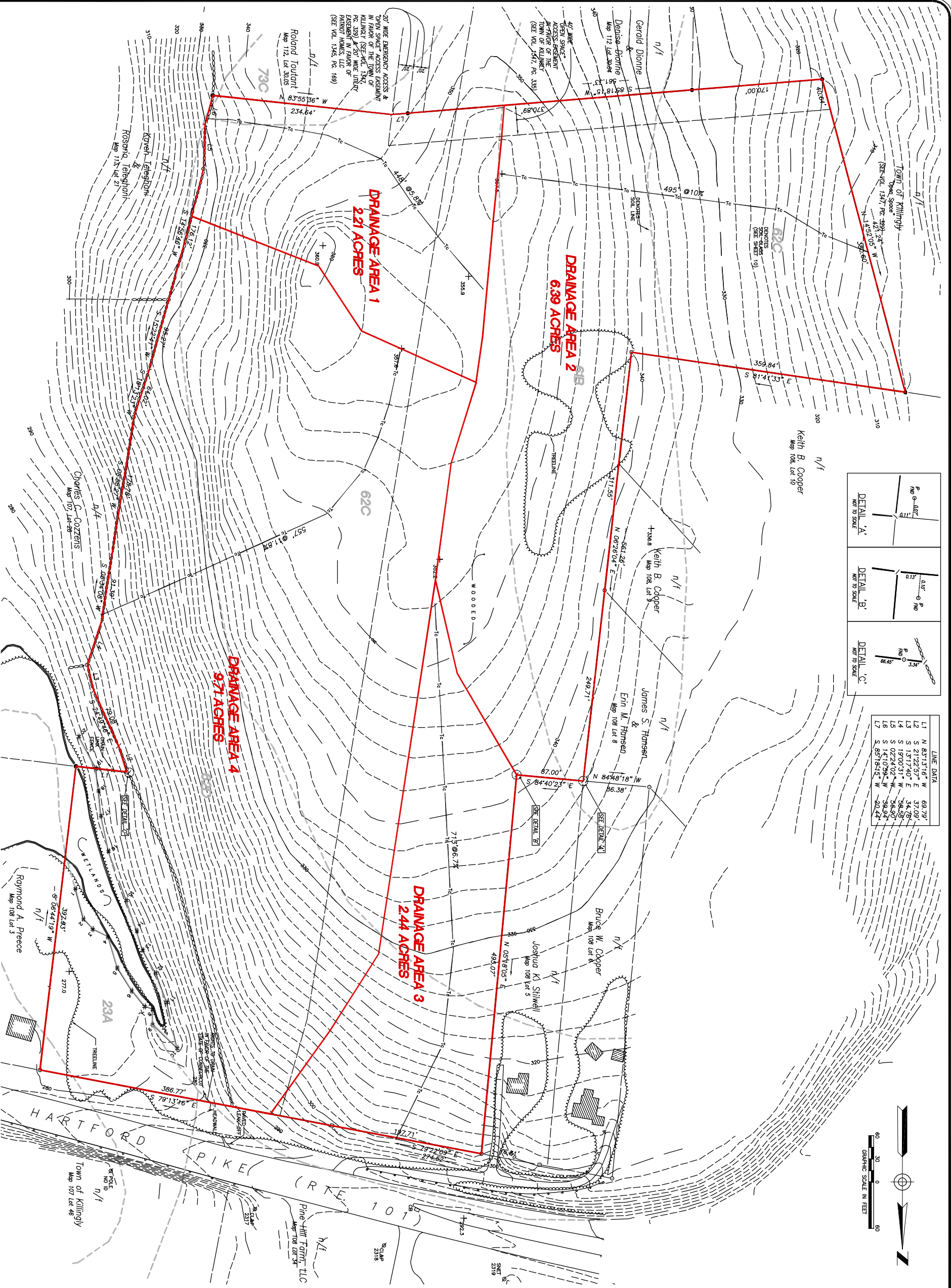
0 to 12ö	Topsoil
12ö-26ö	Orange-brown sandy loam
26ö-41ö	Loamy very fine sand
41ö-88ö	Compact fine silty sand

Mottling @41ö

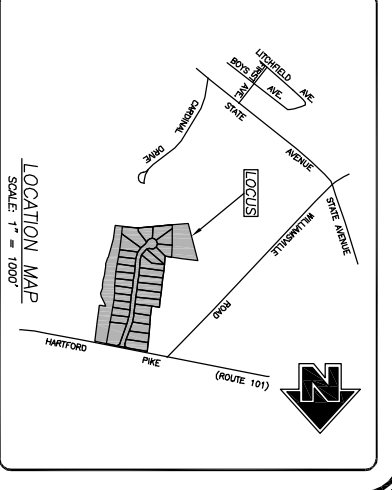
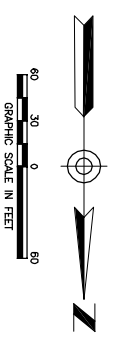
Groundwater @67ö

No ledge

DRAINAGE AREA PLANS



LINE DATA	
L1	N 83°13'16" W 69.70'
L2	S 73°12'00" E 91.07'
L3	S 12°17'00" E 31.78'
L4	S 19°00'31" W 38.58'
L5	S 02°04'02" W 36.90'
L6	S 14°10'36" W 36.94'
L7	S 85°18'15" W 30.24'



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Patriot Homes, LLC

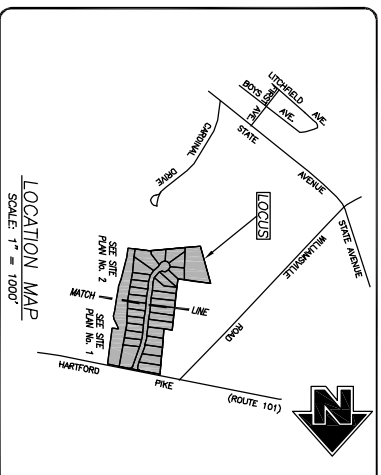
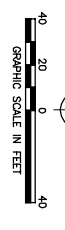
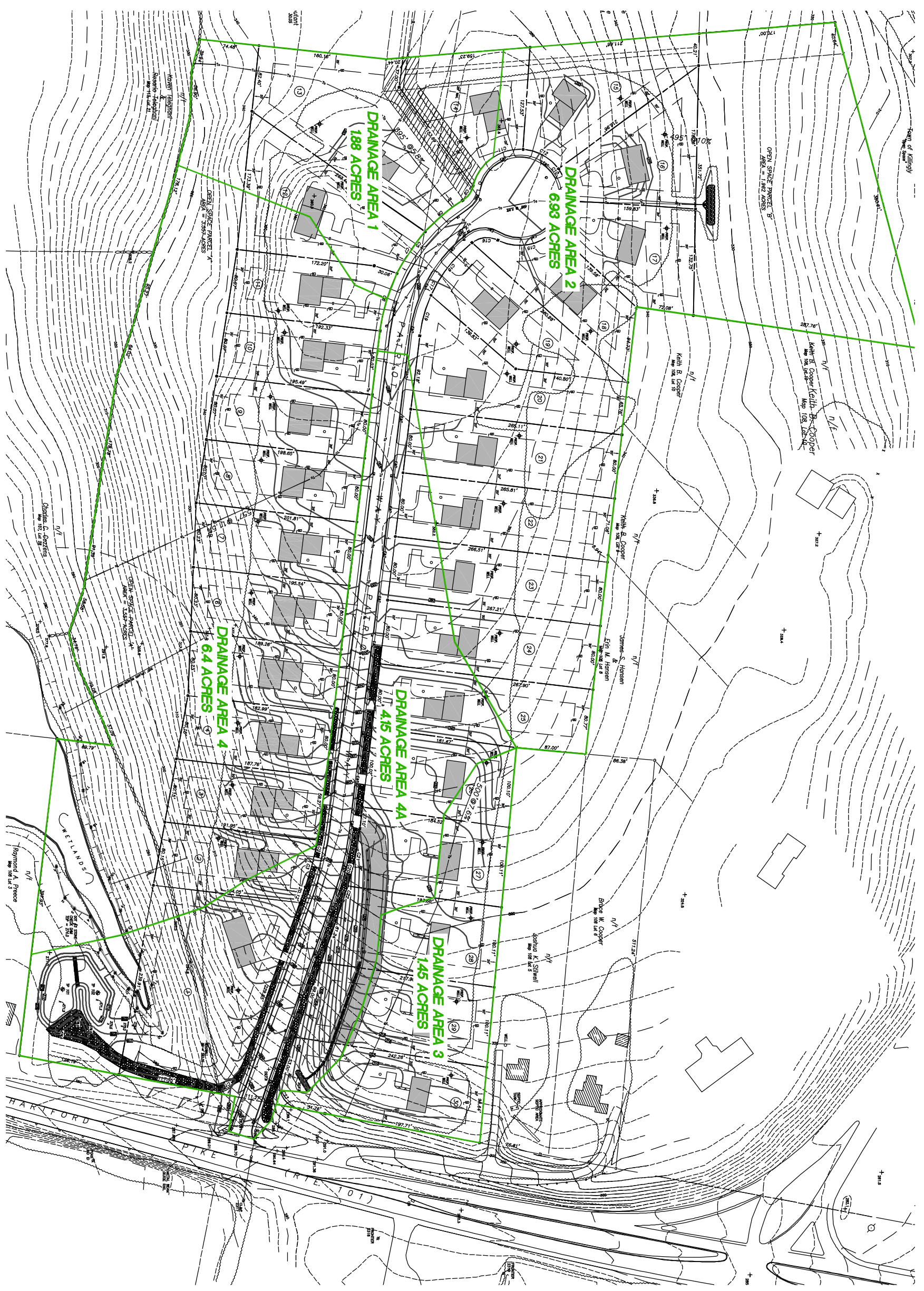
HARTFORD PIKE (ROUTE 101)
KILLINGLY, CONNECTICUT

DRAINAGE AREA PLAN
SHOWING EXISTING CONDITIONS
PREPARED FOR

DATE	REVISIONS

DATE: 4/15/2020	DRAWN: AMR
SCALE: 1" = 60'	DESIGN: NET
SHEET: 2 OF 2	CHK BY:
DWG. NO: CLIENT FILE	JOB NO: 16130

DATE: 4/15/2020
SCALE: 1" = 60'
SHEET: 2 OF 2
DWC: No. CLIENT FILE



DATE	DESCRIPTION

PROPOSED DRAINAGE AREAS
PREPARED FOR

PATRIOT HOMES, LLC

HARTFORD PIKE (ROUTE 101)
KILLINGLY, CONNECTICUT

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SCALE: 1" = 40'	DESIGN: NET
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NORMAN E. THIBOUT, JR., P.E.
DATE