ENGINEERING SUMMARY REPORT

Proposed Site Plan for

PROPOSED ACCESS DRIVE

Located at

MAP 40 LOT 113 & 115
Arbutus Street
City of Middletown, Middlesex County, CT

Date

February 24, 2021

Prepared for

MWH ASSOCIATES, LLC

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Prepared by

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INTRODUCTION

Location

The proposed project area consists of a portion of property identified as lots 113 and 115 on Map 40 on Arbutus Street, located on the east side of Arbutus Street, located approximately 650 feet north of Thimble Rock Road and 425 feet south of Monarca Drive. The project area contains approximately 1.10 acres.

Existing Conditions Summary

The property is currently wooded with areas of exposed ledge visible. The property slopes from east to west towards Arbutus Street. An area of inland wetlands exists in the western portion of the property adjacent to Arbutus Street.

Property is located in Zone "X" as depicted on Flood Insurance Rate Map (FIRM) Panel 119 of 450, Middlesex County, Connecticut, City of Middletown, community number 090068, Panel number 119, Suffix G, Map Revised August 28, 2008.

The existing soil types that cover the proposed project area are described as Cheshire-Holyoke Complex 15 to 35 percent slopes – Hydrologic Soil Group B per the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey.

The stormwater runoff from the project area was analyzed at the existing catch basin in Arbutus Street.

Proposed Project Description

Site improvements associated with the project include the construction of a stone access drive, storm drainage conveyance system, underground stormwater management and site grading.

Site access is provided from Arbutus Street.

The project increases the total impervious surface over the project area. The increase in impervious area dur to the construction of the stone access drive will cause an increase in the peak rate of runoff leaving the site. Therefore, the construction of an on-site stormwater management area will be required.

STORMWATER DESIGN

Stormwater Design

The stormwater runoff from the proposed stone access drive will be collected in a drainage system consisting of catch basins with four-foot deep sumps, drainage piping and an underground stormwater management systems.

These underground stormwater management systems is designed to attenuate the increase in runoff due to the change in surface coverage. The stormwater flow is contained within the catch basins and stormwater management systems for the 2-year, 10-year, 25-year & 50-year storm events without overtopping the structures. The stormwater management systems are designed with an isolator row to capture sediment, oil, and debris.

The information contained within this engineering summary does not include an analysis of the off-site drainage system.

The stormwater management area and underground chamber systems have been designed assuming that there is no infiltration into the underlying soils. The underground chamber system is designed with an underdrain to allow the smaller storm event inflow to discharge and for the system to empty overtime.

The proposed stormwater management system has been designed in consideration for the need to 1) meet all applicable design criteria set forth within the City of Middletown; 2) meet any additional design requirement set forth by the City Engineer and or the CT DEEP.

Per the City of Middletown Regulations, detention systems shall be designed to not exceed the rate of runoff for the same site in its underdeveloped state for intensities and duration of rainfall. The proposed drainage system has been designed to provide a net decrease in runoff for the required storm events.

Method of Analysis

The HydroCAD Stormwater Modeling System computer program by Applied Microcomputer Systems was used to analyze and design the storm sewer system. HydroCAD uses the TR-55 curve number method to estimate the quantity and peak rates of runoff produced by each subcatchment; the resulting flows are routed through the different storm system elements to the system's Analysis Points, typically where the stormwater flows leave the subject property. Storm events were analyzed with Type III, 24-hour rainfall values and curve number/cover types as selected from the SCS TR-55 Manual. Also, the minimum of Time of Concentration used was 0.10 hour (6 Minutes) as selected from the SCS TR-55 Manual. Runoff rates chosen from the NOAA Atlas 14, Volume 10, Version 3 located in Middletown, CT are listed below:

Design Rainfall Amounts:

2 year	3.37 in.
10 year	5.20 in.
25 year	6.34 in.
50 Year	7.18 in.

Detailed Runoff Summary

Flow Rate Attenuation

Existing Catch Basin			
Storm:	Pre (cfs)	Post (cfs)	**Change (cfs)**
2 year	0.83	0.72	**-0.11**
10 year	3.27	1.97	**-1.30**
25 year	5.19	4.72	**-0.47**
50 year	6.73	6.69	**-0.04**

Conclusions

This summary report demonstrates that all design criteria set forth by the State of Connecticut and City of Middletown have been met or exceeded, and all design and mitigation measures have been derived from standard practices and procedures as directed by the Connecticut DEEP and DOT design manuals.

APPENDIX A – STORM SYSTEM DESIGN DETAILS

Map Scale: 1:908 if printed on D portrait (22" x 34") sheet.

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

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.

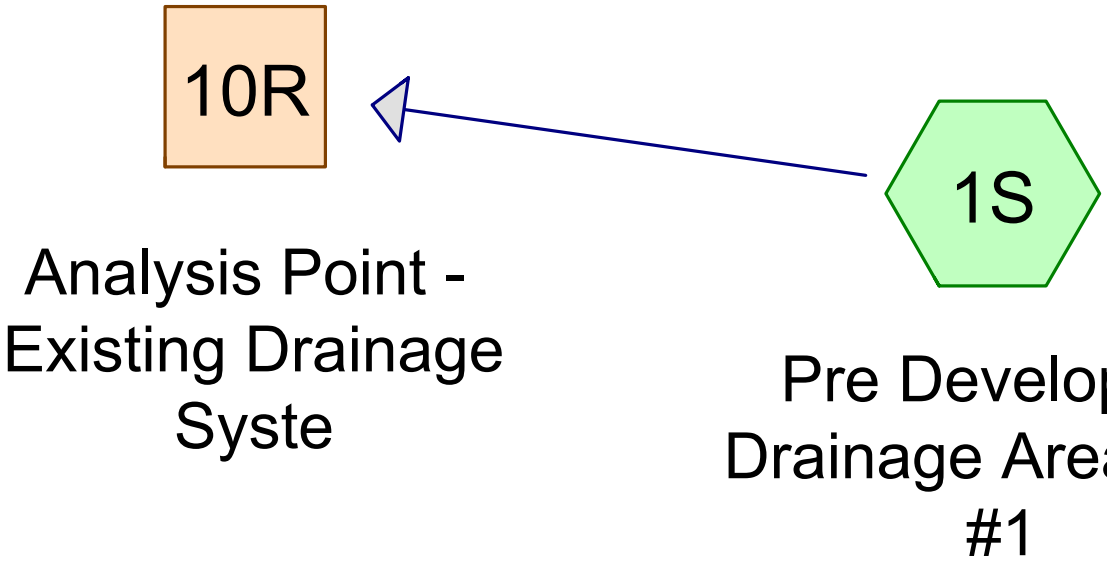
Date(s) aerial images were photographed: Aug 30, 2019—Oct 15, 2019

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
6	Wilbraham and Menlo soils, 0 to 8 percent slopes, extremely stony	0.6	1.1%
77C	Cheshire-Holyoke complex, 3 to 15 percent slopes, very rocky	10.4	19.1%
77D	Cheshire-Holyoke complex, 15 to 35 percent slopes, very rocky	33.1	61.1%
87B	Wethersfield loam, 3 to 8 percent slopes	2.7	5.0%
88C	Wethersfield loam, 8 to 15 percent slopes, very stony	7.4	13.7%
Totals for Area of Interest		**54.2**	**100.0%**

APPENDIX B – PRE & POST DEVELOPED HYDROLOGIC DATA



Subcat Reach Pond Link

Routing Diagram for 20-2630 PreDeveloped Site
Prepared by LRC Group, Printed 2/23/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
162,115	60	Woods, Fair, HSG B (1S)
162,115	**60**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
162,115	HSG B	1S
0	HSG C	
0	HSG D	
0	Other	
162,115		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	162,115	0	0	0	162,115	Woods, Fair	1S
0	**162,115**	**0**	**0**	**0**	**162,115**	**TOTAL AREA**	

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Developed Runoff Area=162,115 sf 0.00% Impervious Runoff Depth=0.48"
Flow Length=554' Tc=28.0 min CN=60 Runoff=0.83 cfs 6,439 cf

Reach 10R: Analysis Point - Existing Drainage Syste Inflow=0.83 cfs 6,439 cf
Outflow=0.83 cfs 6,439 cf

Total Runoff Area = 162,115 sf Runoff Volume = 6,439 cf Average Runoff Depth = 0.48"
100.00% Pervious = 162,115 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: Pre Developed Drainage Area - AP #1

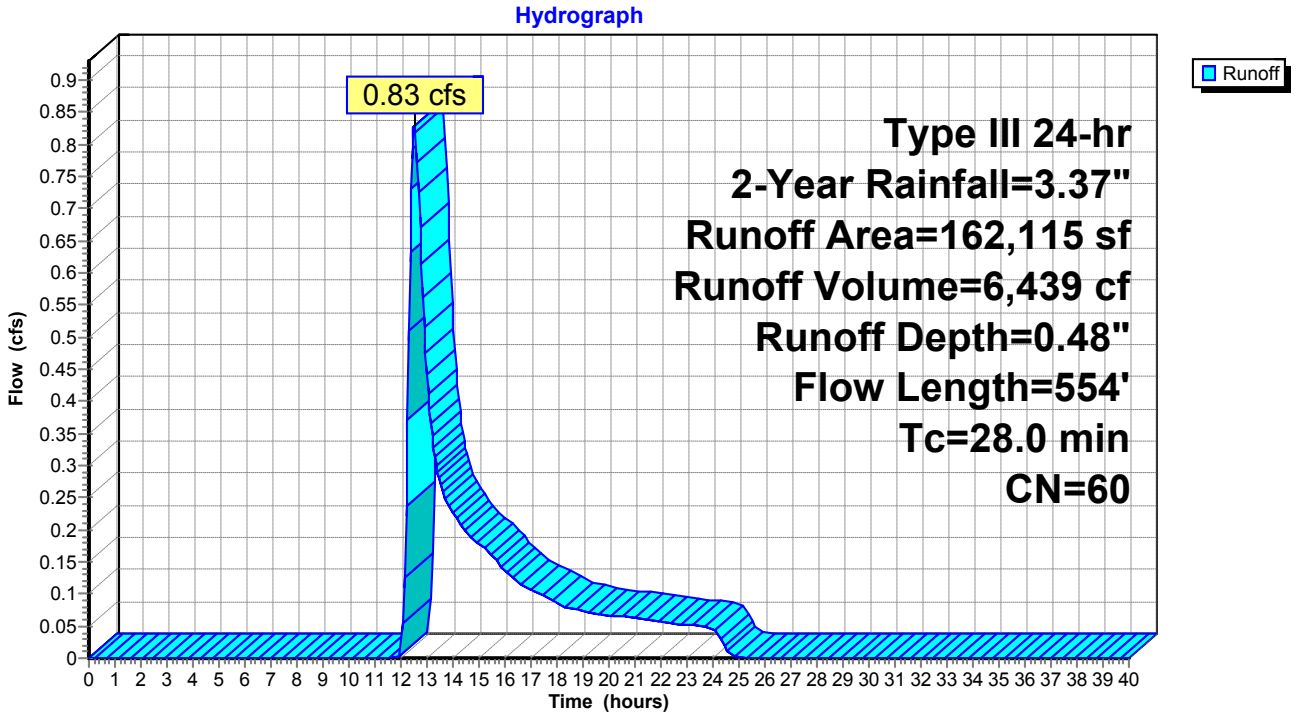
Runoff = 0.83 cfs @ 12.53 hrs, Volume= 6,439 cf, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
162,115	60	Woods, Fair, HSG B
162,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.5	404	0.2430	1.23		**Shallow Concentrated Flow, Elev. 448 -350** Forest w/Heavy Litter Kv= 2.5 fps
28.0	554	Total			

Subcatchment 1S: Pre Developed Drainage Area - AP #1



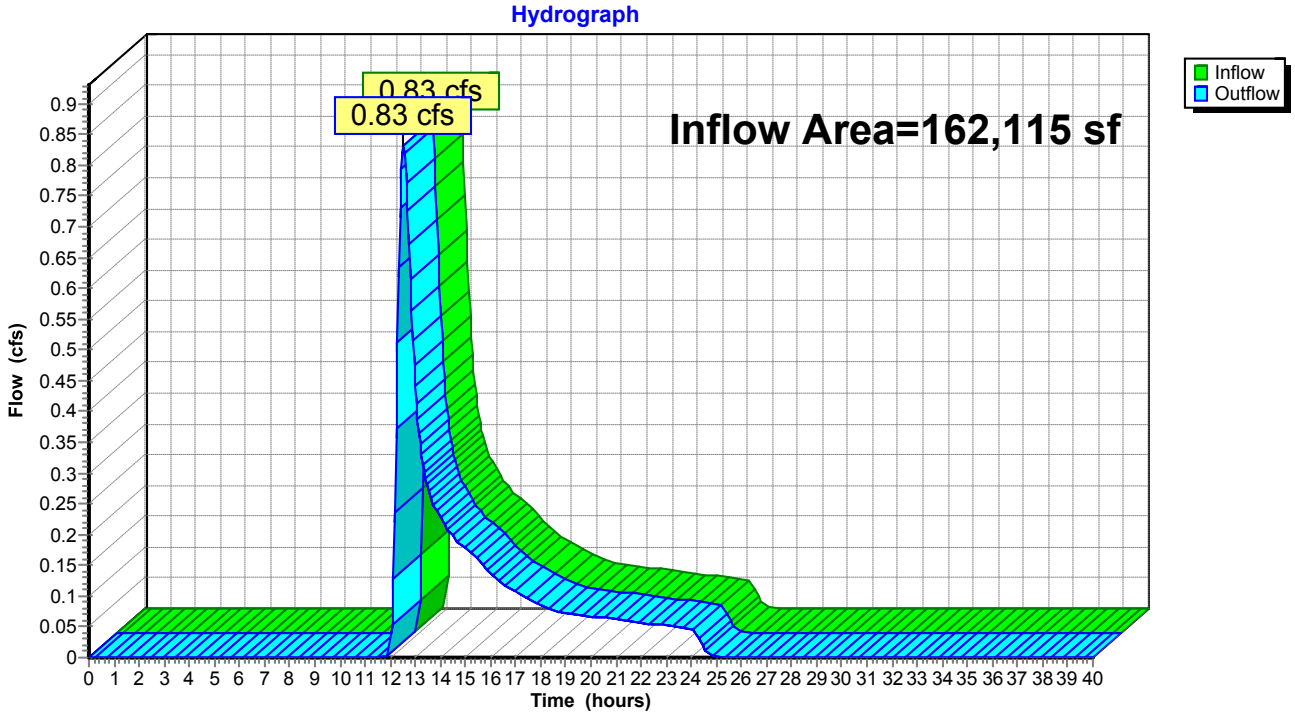
Summary for Reach 10R: Analysis Point - Existing Drainage Syste

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,115 sf, 0.00% Impervious, Inflow Depth = 0.48" for 2-Year event
Inflow = 0.83 cfs @ 12.53 hrs, Volume= 6,439 cf
Outflow = 0.83 cfs @ 12.53 hrs, Volume= 6,439 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 10R: Analysis Point - Existing Drainage Syste



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Developed Runoff Area=162,115 sf 0.00% Impervious Runoff Depth=1.42"
Flow Length=554' Tc=28.0 min CN=60 Runoff=3.27 cfs 19,176 cf

Reach 10R: Analysis Point - Existing Drainage Syste Inflow=3.27 cfs 19,176 cf
Outflow=3.27 cfs 19,176 cf

Total Runoff Area = 162,115 sf Runoff Volume = 19,176 cf Average Runoff Depth = 1.42"
100.00% Pervious = 162,115 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: Pre Developed Drainage Area - AP #1

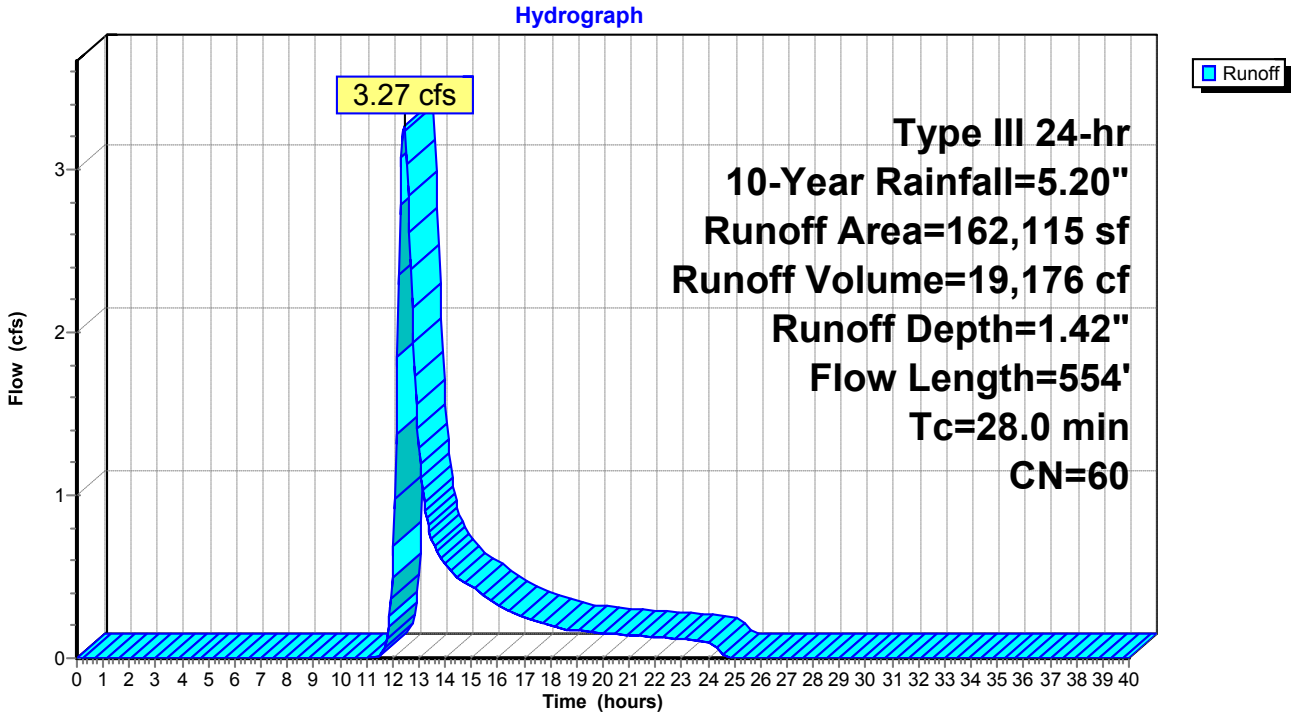
Runoff = 3.27 cfs @ 12.44 hrs, Volume= 19,176 cf, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
162,115	60	Woods, Fair, HSG B
162,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.5	404	0.2430	1.23		**Shallow Concentrated Flow, Elev. 448 -350** Forest w/Heavy Litter Kv= 2.5 fps
28.0	554	Total			

Subcatchment 1S: Pre Developed Drainage Area - AP #1



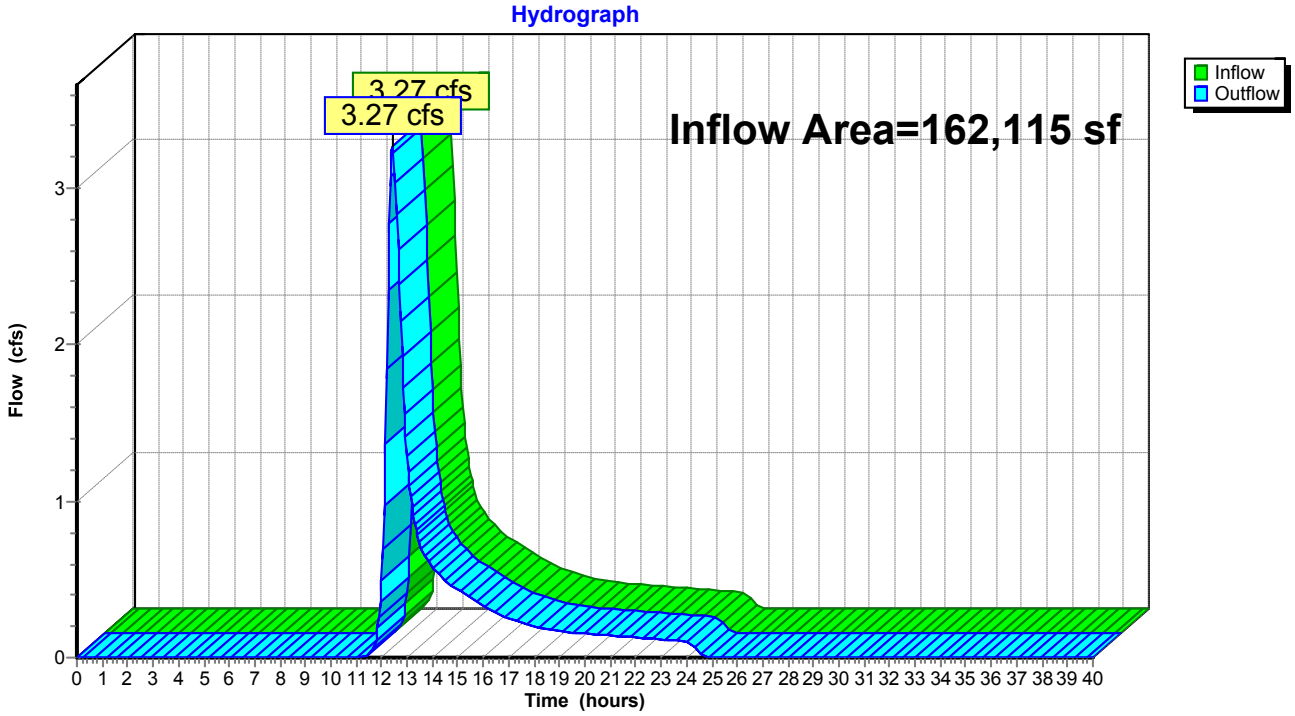
Summary for Reach 10R: Analysis Point - Existing Drainage Syste

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,115 sf, 0.00% Impervious, Inflow Depth = 1.42" for 10-Year event
Inflow = 3.27 cfs @ 12.44 hrs, Volume= 19,176 cf
Outflow = 3.27 cfs @ 12.44 hrs, Volume= 19,176 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 10R: Analysis Point - Existing Drainage Syste



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Developed Runoff Area=162,115 sf 0.00% Impervious Runoff Depth=2.15"
Flow Length=554' Tc=28.0 min CN=60 Runoff=5.19 cfs 29,010 cf

Reach 10R: Analysis Point - Existing Drainage Syste Inflow=5.19 cfs 29,010 cf
Outflow=5.19 cfs 29,010 cf

Total Runoff Area = 162,115 sf Runoff Volume = 29,010 cf Average Runoff Depth = 2.15"
100.00% Pervious = 162,115 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: Pre Developed Drainage Area - AP #1

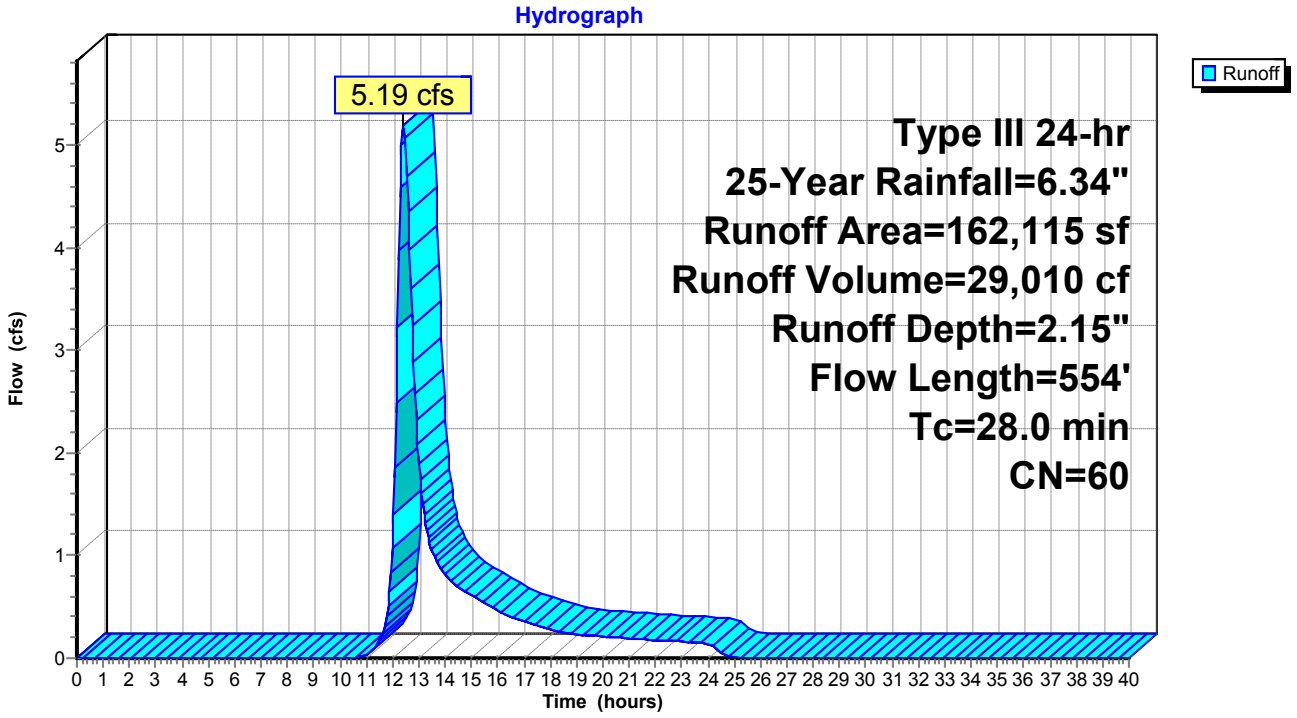
Runoff = 5.19 cfs @ 12.42 hrs, Volume= 29,010 cf, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
162,115	60	Woods, Fair, HSG B
162,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.5	404	0.2430	1.23		**Shallow Concentrated Flow, Elev. 448 -350** Forest w/Heavy Litter Kv= 2.5 fps
28.0	554	Total			

Subcatchment 1S: Pre Developed Drainage Area - AP #1



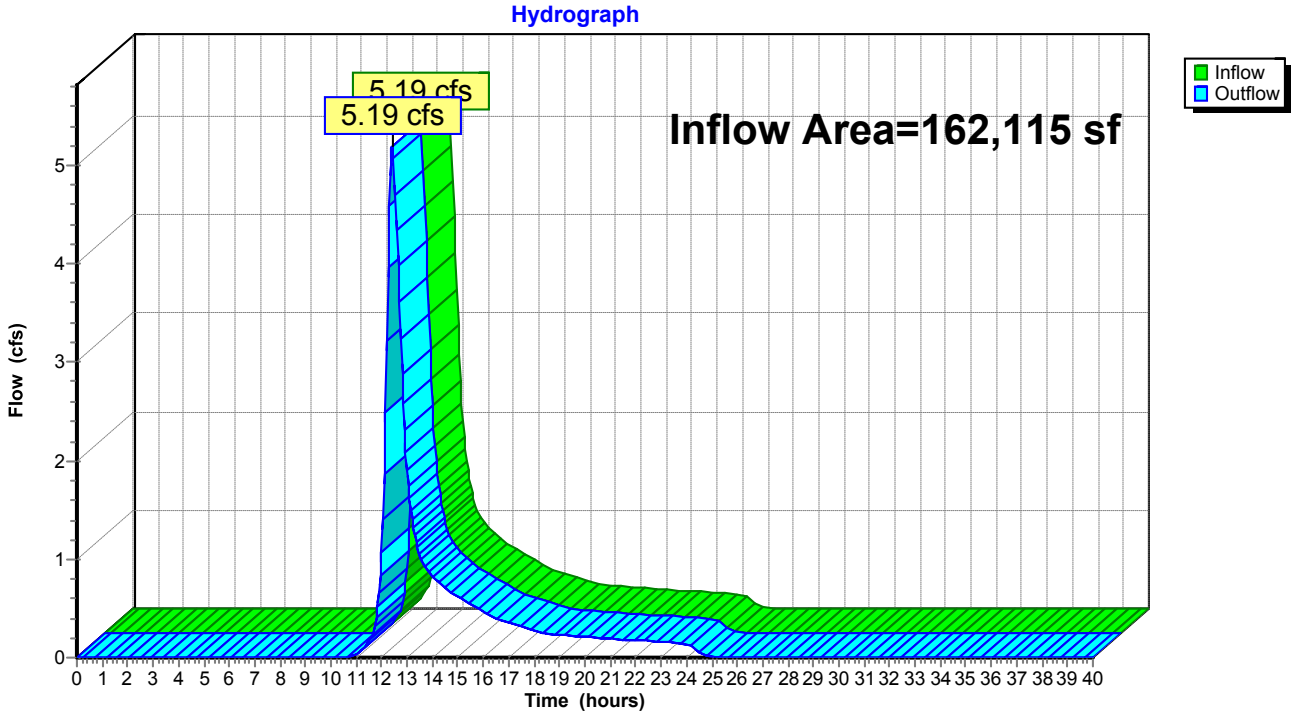
Summary for Reach 10R: Analysis Point - Existing Drainage Syste

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,115 sf, 0.00% Impervious, Inflow Depth = 2.15" for 25-Year event
Inflow = 5.19 cfs @ 12.42 hrs, Volume= 29,010 cf
Outflow = 5.19 cfs @ 12.42 hrs, Volume= 29,010 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 10R: Analysis Point - Existing Drainage Syste



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre Developed Runoff Area=162,115 sf 0.00% Impervious Runoff Depth=2.73"
Flow Length=554' Tc=28.0 min CN=60 Runoff=6.73 cfs 36,905 cf

Reach 10R: Analysis Point - Existing Drainage Syste Inflow=6.73 cfs 36,905 cf
Outflow=6.73 cfs 36,905 cf

Total Runoff Area = 162,115 sf Runoff Volume = 36,905 cf Average Runoff Depth = 2.73"
100.00% Pervious = 162,115 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: Pre Developed Drainage Area - AP #1

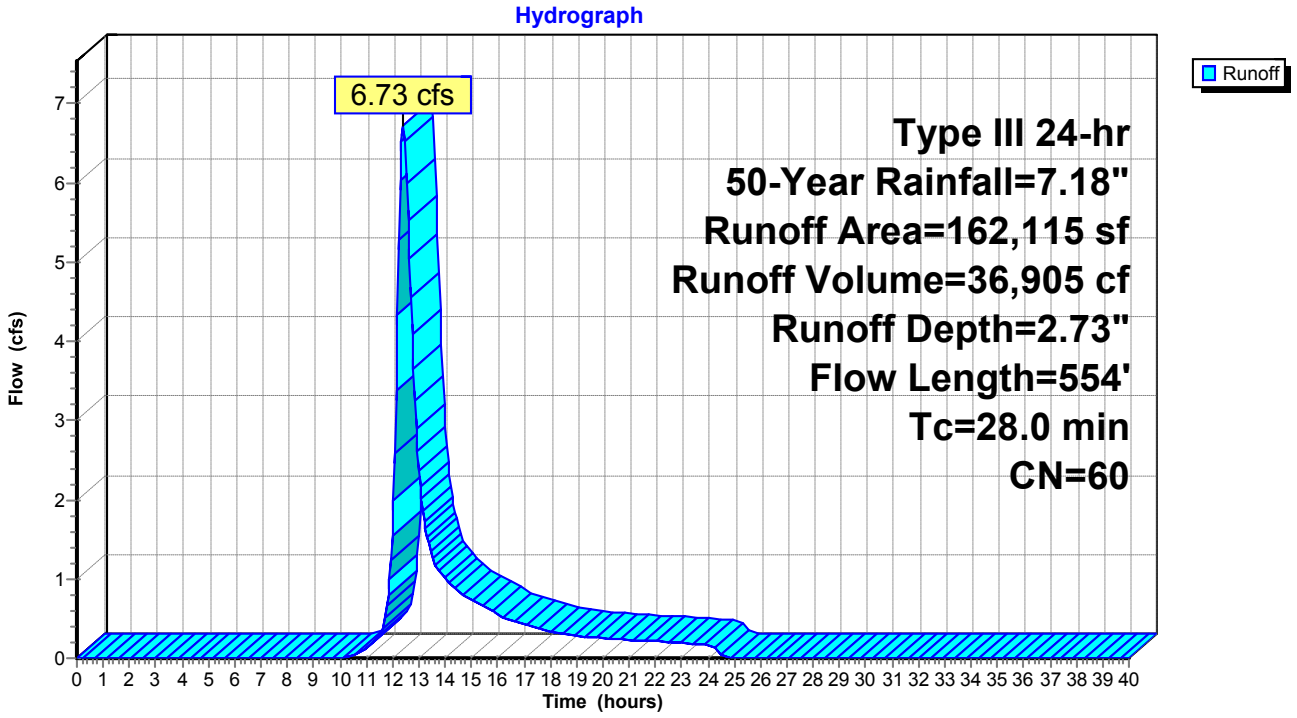
Runoff = 6.73 cfs @ 12.41 hrs, Volume= 36,905 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
162,115	60	Woods, Fair, HSG B
162,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
5.5	404	0.2430	1.23		**Shallow Concentrated Flow, Elev. 448 -350** Forest w/Heavy Litter Kv= 2.5 fps
28.0	554	Total			

Subcatchment 1S: Pre Developed Drainage Area - AP #1



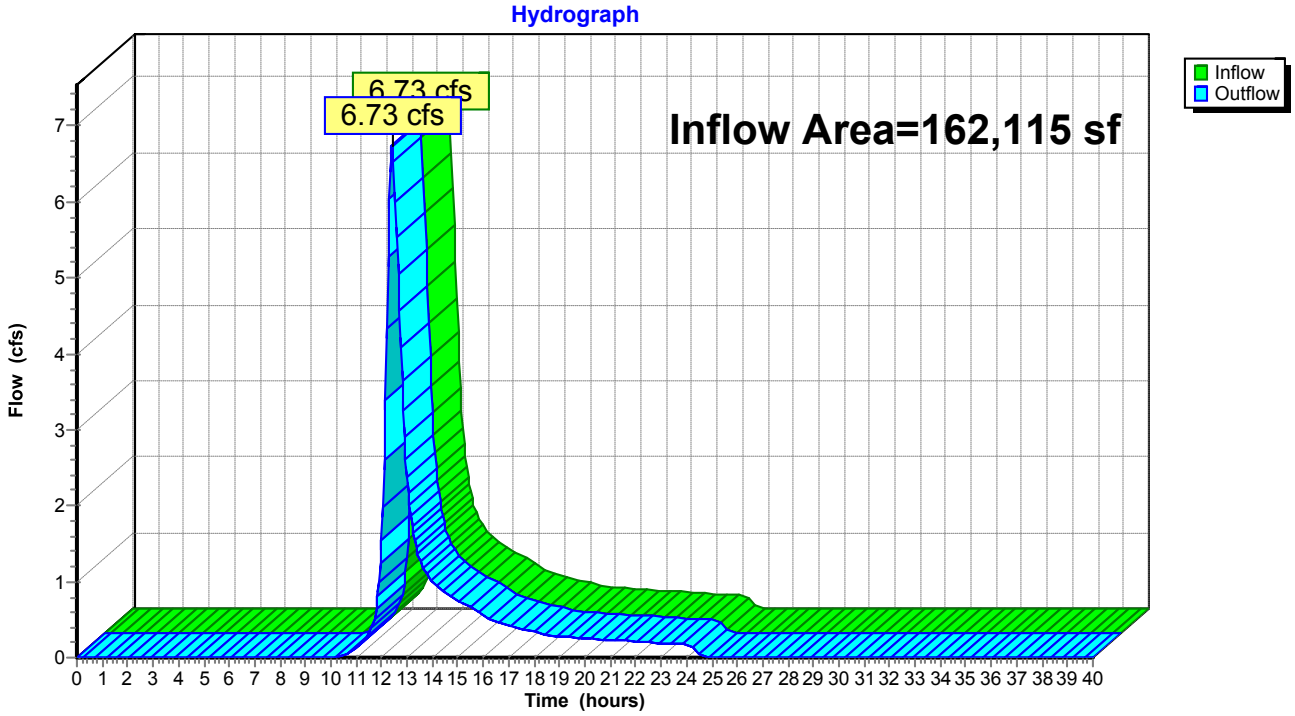
Summary for Reach 10R: Analysis Point - Existing Drainage Syste

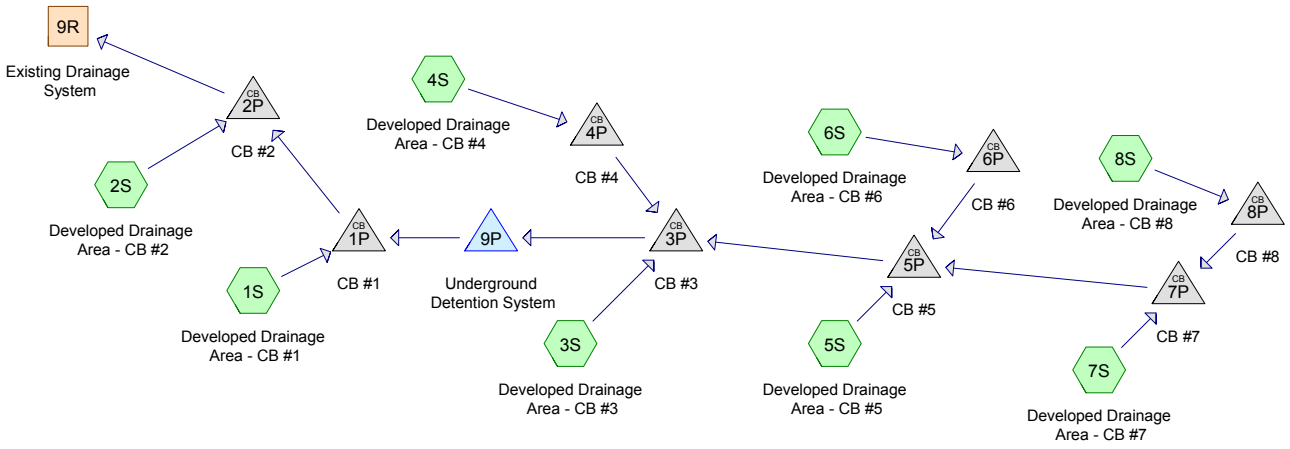
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,115 sf, 0.00% Impervious, Inflow Depth = 2.73" for 50-Year event
Inflow = 6.73 cfs @ 12.41 hrs, Volume= 36,905 cf
Outflow = 6.73 cfs @ 12.41 hrs, Volume= 36,905 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 10R: Analysis Point - Existing Drainage Syste





Subcat Reach Pond Link

Routing Diagram for 20-2630 Proposed Site
Prepared by LRC Group, Printed 2/23/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
42,189	98	Paved parking, HSG D (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
103,920	60	Woods, Fair, HSG B (1S, 2S, 3S, 4S, 5S, 6S, 7S)
16,010	73	Woods, Fair, HSG C (8S)
162,119	**71**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
103,920	HSG B	1S, 2S, 3S, 4S, 5S, 6S, 7S
16,010	HSG C	8S
42,189	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0	Other	
162,119		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	0	0	42,189	0	42,189	Paved parking	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0	103,920	16,010	0	0	119,930	Woods, Fair	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S

Ground Covers (all nodes) (continued)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	**103,920**	**16,010**	**42,189**	**0**	**162,119**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	338.25	338.11	14.0	0.0100	0.013	18.0	0.0	0.0
2	2P	336.96	336.20	76.0	0.0100	0.013	18.0	0.0	0.0
3	3P	349.38	348.00	11.0	0.1255	0.020	15.0	0.0	0.0
4	4P	345.20	345.03	17.0	0.0100	0.013	12.0	0.0	0.0
5	5P	367.23	343.23	192.0	0.1250	0.020	15.0	0.0	0.0
6	6P	367.40	367.23	17.0	0.0100	0.013	12.0	0.0	0.0
7	7P	388.23	367.23	168.0	0.1250	0.020	15.0	0.0	0.0
8	8P	388.40	388.23	17.0	0.0100	0.013	12.0	0.0	0.0
9	9P	337.25	337.00	25.0	0.0100	0.013	3.0	0.0	0.0
10	9P	340.97	340.77	20.0	0.0100	0.013	12.0	0.0	0.0

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Developed Drainage Runoff Area=32,065 sf 22.58% Impervious Runoff Depth=0.88"
Flow Length=537' Tc=26.6 min CN=69 Runoff=0.40 cfs 2,344 cf

Subcatchment 2S: Developed Drainage Runoff Area=6,831 sf 83.90% Impervious Runoff Depth=2.51"
Flow Length=173' Tc=6.2 min CN=92 Runoff=0.44 cfs 1,430 cf

Subcatchment 3S: Developed Drainage Runoff Area=52,541 sf 9.95% Impervious Runoff Depth=0.64"
Flow Length=461' Tc=26.1 min CN=64 Runoff=0.43 cfs 2,804 cf

Subcatchment 4S: Developed Drainage Runoff Area=7,292 sf 66.39% Impervious Runoff Depth=1.90"
Flow Length=191' Tc=8.2 min CN=85 Runoff=0.34 cfs 1,157 cf

Subcatchment 5S: Developed Drainage Runoff Area=20,008 sf 23.30% Impervious Runoff Depth=0.88"
Flow Length=319' Tc=22.4 min CN=69 Runoff=0.27 cfs 1,462 cf

Subcatchment 6S: Developed Drainage Runoff Area=16,237 sf 29.82% Impervious Runoff Depth=0.98"
Flow Length=262' Tc=24.3 min CN=71 Runoff=0.25 cfs 1,329 cf

Subcatchment 7S: Developed Drainage Runoff Area=6,304 sf 76.33% Impervious Runoff Depth=2.24"
Flow Length=330' Tc=27.5 min CN=89 Runoff=0.22 cfs 1,175 cf

Subcatchment 8S: Developed Drainage Runoff Area=20,841 sf 23.18% Impervious Runoff Depth=1.47"
Flow Length=323' Tc=29.3 min CN=79 Runoff=0.46 cfs 2,546 cf

Reach 9R: Existing Drainage System Inflow=0.72 cfs 14,247 cf
Outflow=0.72 cfs 14,247 cf

Pond 1P: CB #1 Peak Elev=338.62' Inflow=0.58 cfs 12,816 cf
18.0" Round Culvert n=0.013 L=14.0' S=0.0100 '/' Outflow=0.58 cfs 12,816 cf

Pond 2P: CB #2 Peak Elev=337.33' Inflow=0.72 cfs 14,247 cf
18.0" Round Culvert n=0.013 L=76.0' S=0.0100 '/' Outflow=0.72 cfs 14,247 cf

Pond 3P: CB #3 Peak Elev=350.03' Inflow=1.76 cfs 10,473 cf
15.0" Round Culvert n=0.020 L=11.0' S=0.1255 '/' Outflow=1.76 cfs 10,473 cf

Pond 4P: CB #4 Peak Elev=345.51' Inflow=0.34 cfs 1,157 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.34 cfs 1,157 cf

Pond 5P: CB #5 Peak Elev=367.75' Inflow=1.19 cfs 6,512 cf
15.0" Round Culvert n=0.020 L=192.0' S=0.1250 '/' Outflow=1.19 cfs 6,512 cf

Pond 6P: CB #6 Peak Elev=367.66' Inflow=0.25 cfs 1,329 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.25 cfs 1,329 cf

Pond 7P: CB #7 Peak Elev=388.62' Inflow=0.68 cfs 3,721 cf
15.0" Round Culvert n=0.020 L=168.0' S=0.1250 '/' Outflow=0.68 cfs 3,721 cf

Pond 8P: CB #8 Peak Elev=388.77' Inflow=0.46 cfs 2,546 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.46 cfs 2,546 cf

Pond 9P: Underground Detention System Peak Elev=339.50' Storage=4,589 cf Inflow=1.76 cfs 10,473 cf
Outflow=0.23 cfs 10,473 cf

Total Runoff Area = 162,119 sf Runoff Volume = 14,247 cf Average Runoff Depth = 1.05"
73.98% Pervious = 119,930 sf 26.02% Impervious = 42,189 sf

Summary for Subcatchment 1S: Developed Drainage Area - CB #1

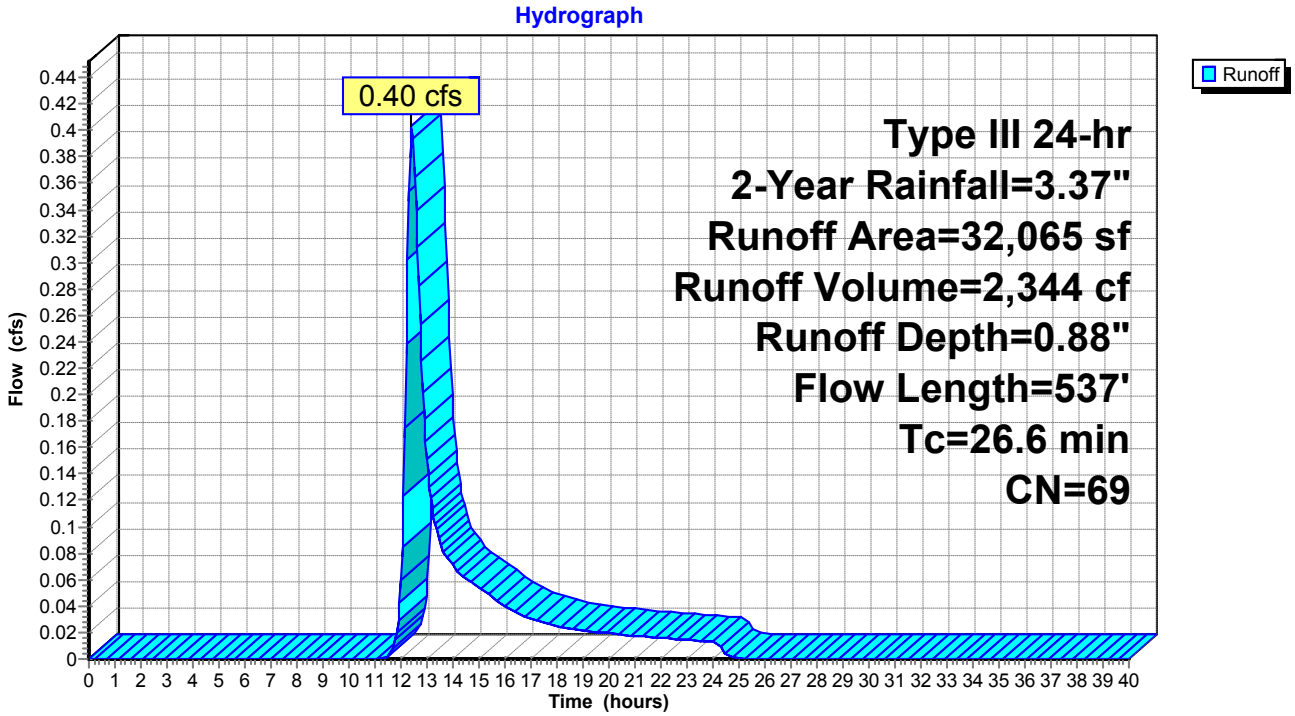
Runoff = 0.40 cfs @ 12.42 hrs, Volume= 2,344 cf, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
7,241	98	Paved parking, HSG D
24,824	60	Woods, Fair, HSG B
32,065	69	Weighted Average
24,824		77.42% Pervious Area
7,241		22.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
3.4	236	0.2200	1.17		**Shallow Concentrated Flow, Elev. 448 -396** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3700	9.79		**Shallow Concentrated Flow, Elev. 396 - 348** Unpaved Kv= 16.1 fps
0.7	134	0.0420	3.30		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
26.6	537	Total			

Subcatchment 1S: Developed Drainage Area - CB #1



Summary for Subcatchment 2S: Developed Drainage Area - CB #2

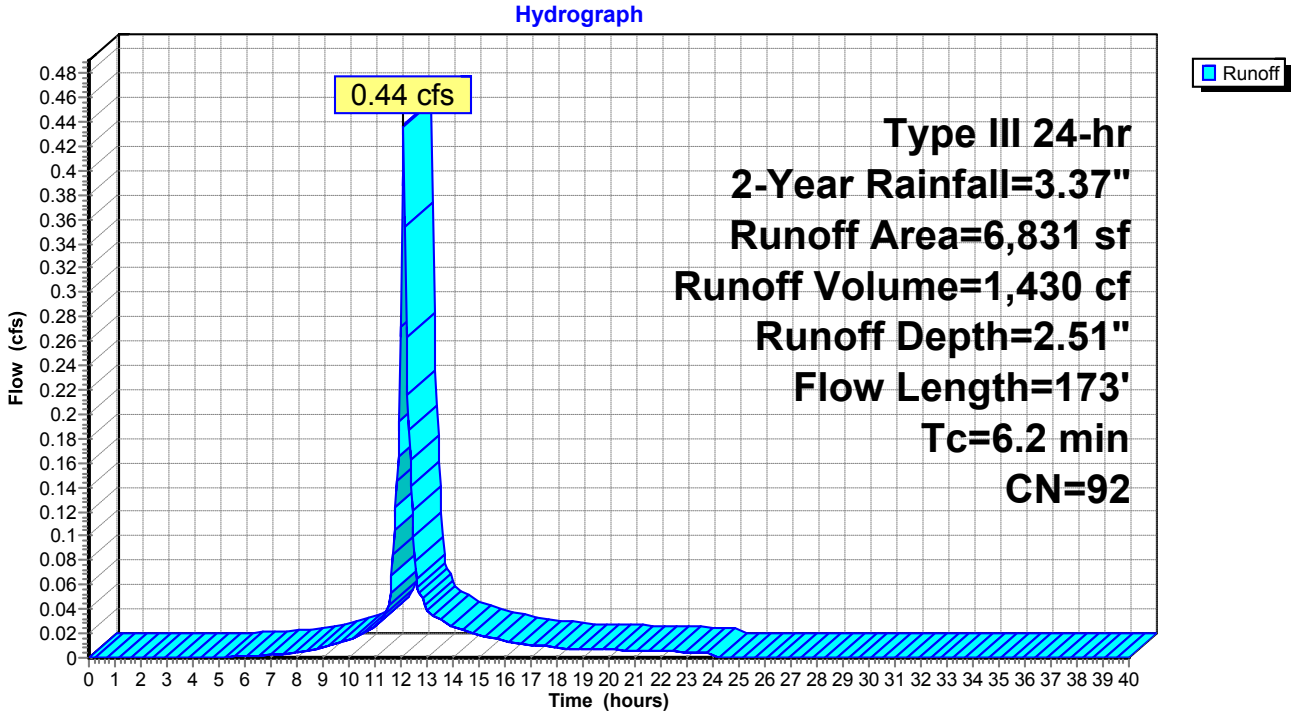
Runoff = 0.44 cfs @ 12.09 hrs, Volume= 1,430 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
5,731	98	Paved parking, HSG D
1,100	60	Woods, Fair, HSG B
6,831	92	Weighted Average
1,100		16.10% Pervious Area
5,731		83.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.2860	0.10		**Sheet Flow, Elev. 396 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	14	0.3700	9.79		**Shallow Concentrated Flow, Elev. 386 -348** Unpaved Kv= 16.1 fps
0.6	124	0.0450	3.42		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
6.2	173	Total			

Subcatchment 2S: Developed Drainage Area - CB #2



Summary for Subcatchment 3S: Developed Drainage Area - CB #3

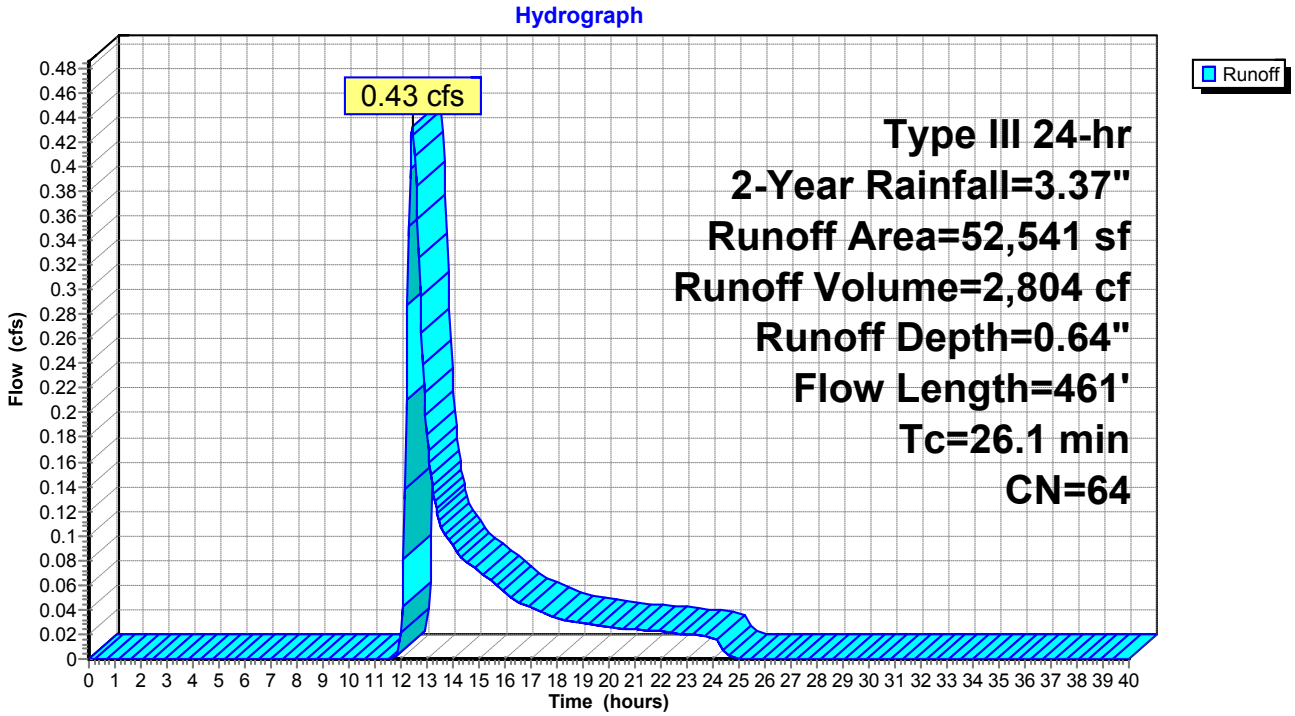
Runoff = 0.43 cfs @ 12.45 hrs, Volume= 2,804 cf, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
5,229	98	Paved parking, HSG D
47,312	60	Woods, Fair, HSG B
52,541	64	Weighted Average
47,312		90.05% Pervious Area
5,229		9.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	150	0.1700	0.11		**Sheet Flow, Elev. 472 - 446.5** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	247	0.1720	1.04		**Shallow Concentrated Flow, Elev. 446.5 - 404** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3400	9.39		**Shallow Concentrated Flow, Elev. 404 - 354** Unpaved Kv= 16.1 fps
0.1	47	0.1120	5.39		**Shallow Concentrated Flow, Elev. 354 - 348.72** Unpaved Kv= 16.1 fps
26.1	461	Total			

Subcatchment 3S: Developed Drainage Area - CB #3



Summary for Subcatchment 4S: Developed Drainage Area - CB #4

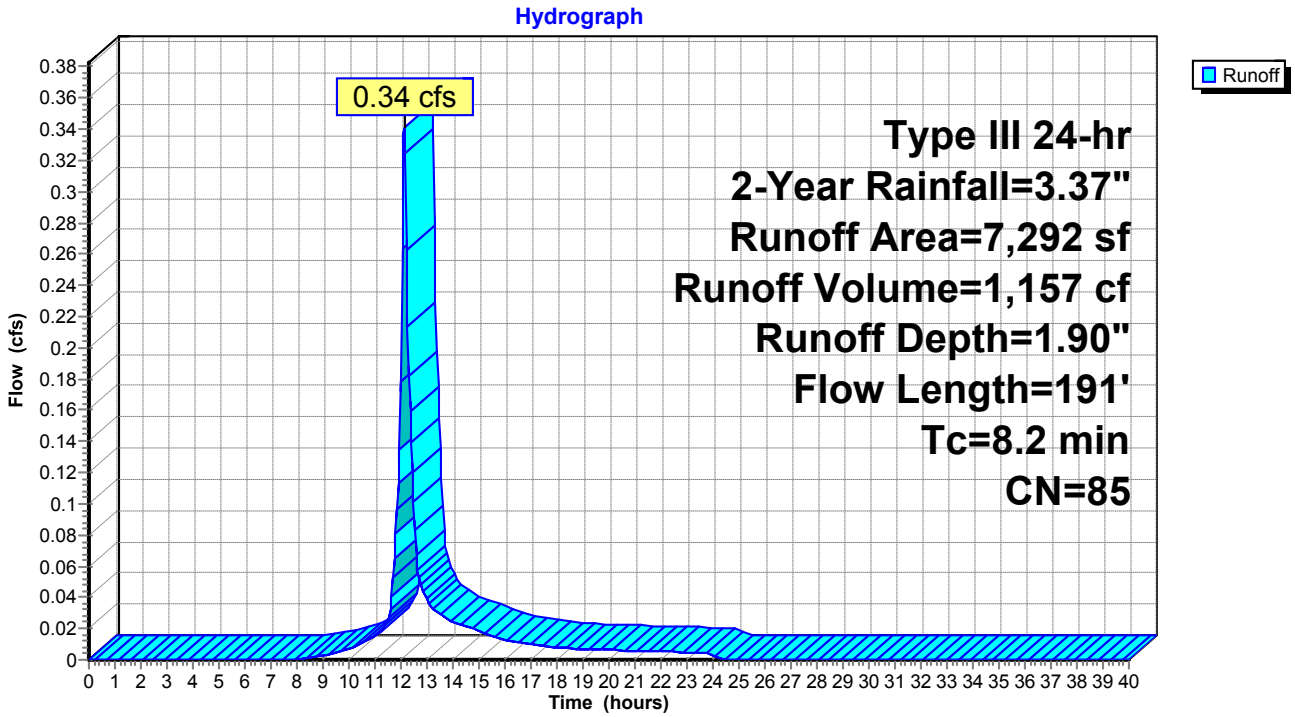
Runoff = 0.34 cfs @ 12.12 hrs, Volume= 1,157 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
4,841	98	Paved parking, HSG D
2,451	60	Woods, Fair, HSG B
7,292	85	Weighted Average
2,451		33.61% Pervious Area
4,841		66.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	39	0.1540	0.08		**Sheet Flow, Elev. 392 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	7	0.3500	9.52		**Shallow Concentrated Flow, Elev. 386 - 366** Unpaved Kv= 16.1 fps
0.4	145	0.1190	5.55		**Shallow Concentrated Flow, Elev. 366 - 348.72** Unpaved Kv= 16.1 fps
8.2	191	Total			

Subcatchment 4S: Developed Drainage Area - CB #4



Summary for Subcatchment 5S: Developed Drainage Area - CB #5

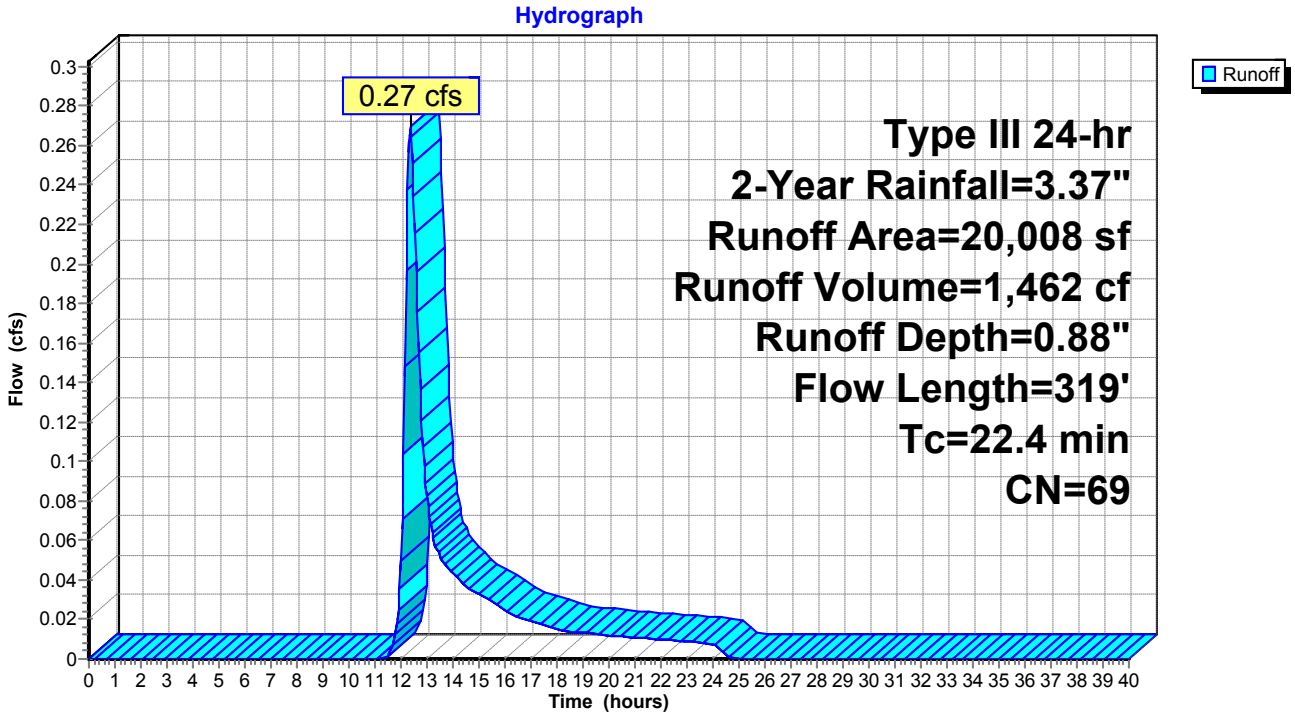
Runoff = 0.27 cfs @ 12.36 hrs, Volume= 1,462 cf, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
4,662	98	Paved parking, HSG D
15,346	60	Woods, Fair, HSG B
20,008	69	Weighted Average
15,346		76.70% Pervious Area
4,662		23.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	150	0.1970	0.12		**Sheet Flow, Elev. 450.5 - 421** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.6	121	0.2400	1.22		**Shallow Concentrated Flow, Elev. 421 - 392** Forest w/Heavy Litter Kv= 2.5 fps
0.0	6	0.4290	10.55		**Shallow Concentrated Flow, Elev. 392.0 - 378** Unpaved Kv= 16.1 fps
0.1	42	0.1690	6.62		**Shallow Concentrated Flow, Elev. 378 - 370.92** Unpaved Kv= 16.1 fps
22.4	319	Total			

Subcatchment 5S: Developed Drainage Area - CB #5



Summary for Subcatchment 6S: Developed Drainage Area - CB #6

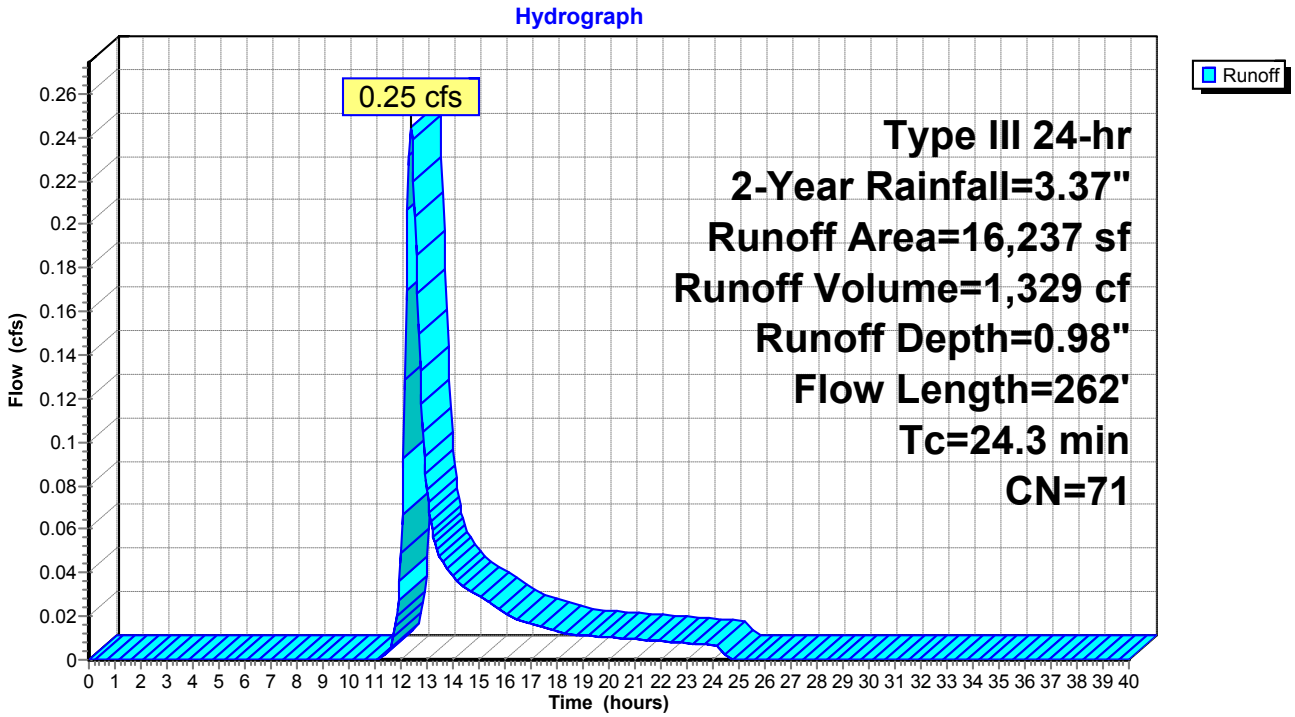
Runoff = 0.25 cfs @ 12.37 hrs, Volume= 1,329 cf, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
4,842	98	Paved parking, HSG D
11,395	60	Woods, Fair, HSG B
16,237	71	Weighted Average
11,395		70.18% Pervious Area
4,842		29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.0	150	0.1370	0.10		**Sheet Flow, Elev. 424.5 - 404** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	8	0.4000	10.18		**Shallow Concentrated Flow, Elev. 404 - 384** Unpaved Kv= 16.1 fps
0.3	104	0.1260	5.71		**Shallow Concentrated Flow, Elev. 384 - 370.92** Unpaved Kv= 16.1 fps
24.3	262	Total			

Subcatchment 6S: Developed Drainage Area - CB #6



Summary for Subcatchment 7S: Developed Drainage Area - CB #7

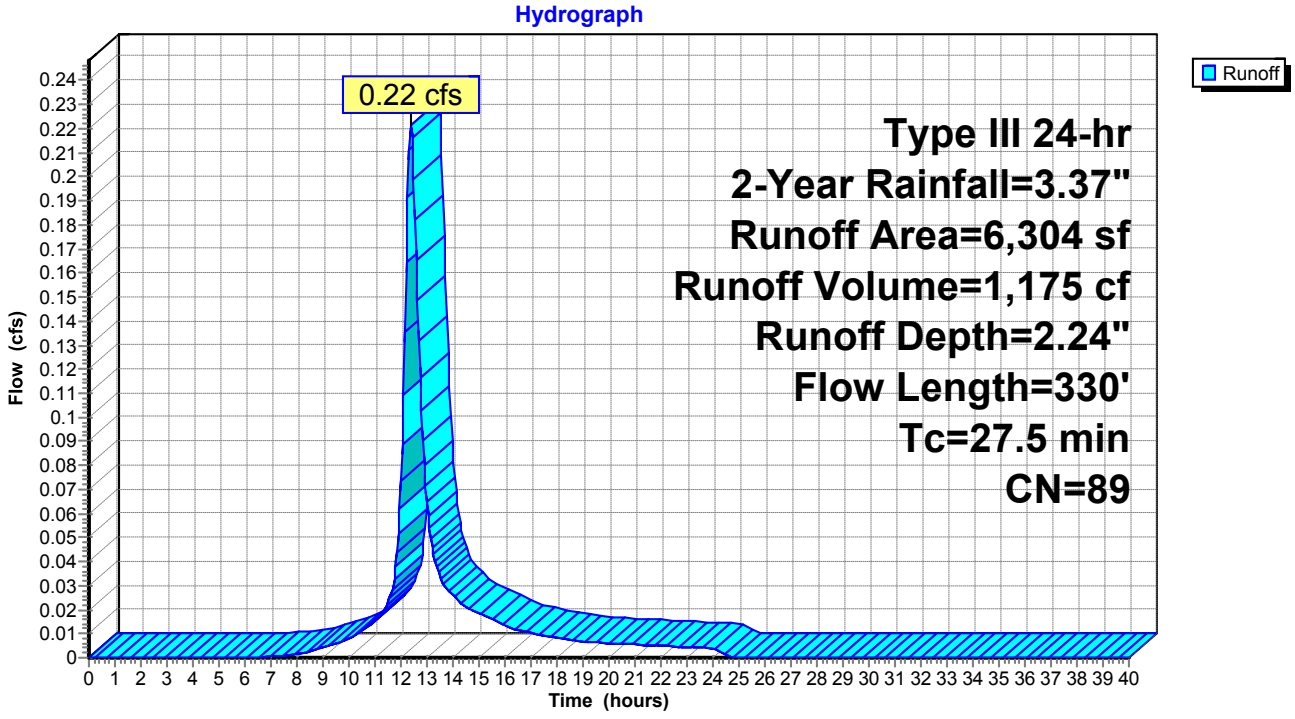
Runoff = 0.22 cfs @ 12.37 hrs, Volume= 1,175 cf, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
4,812	98	Paved parking, HSG D
1,492	60	Woods, Fair, HSG B
6,304	89	Weighted Average
1,492		23.67% Pervious Area
4,812		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	110	0.0550	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	220	0.1280	5.76		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
27.5	330	Total			

Subcatchment 7S: Developed Drainage Area - CB #7



Summary for Subcatchment 8S: Developed Drainage Area - CB #8

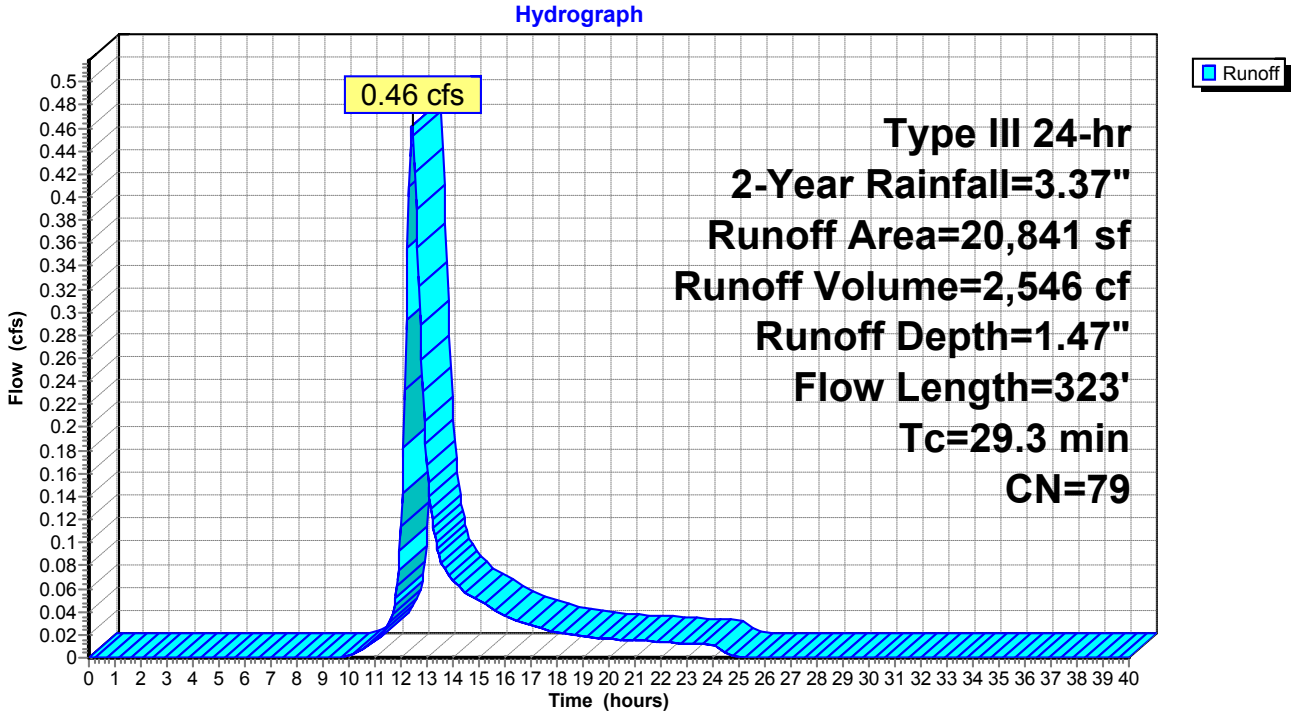
Runoff = 0.46 cfs @ 12.42 hrs, Volume= 2,546 cf, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.37"

Area (sf)	CN	Description
4,831	98	Paved parking, HSG D
16,010	73	Woods, Fair, HSG C
20,841	79	Weighted Average
16,010		76.82% Pervious Area
4,831		23.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.7	116	0.0520	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	207	0.1360	5.94		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
29.3	323	Total			

Subcatchment 8S: Developed Drainage Area - CB #8



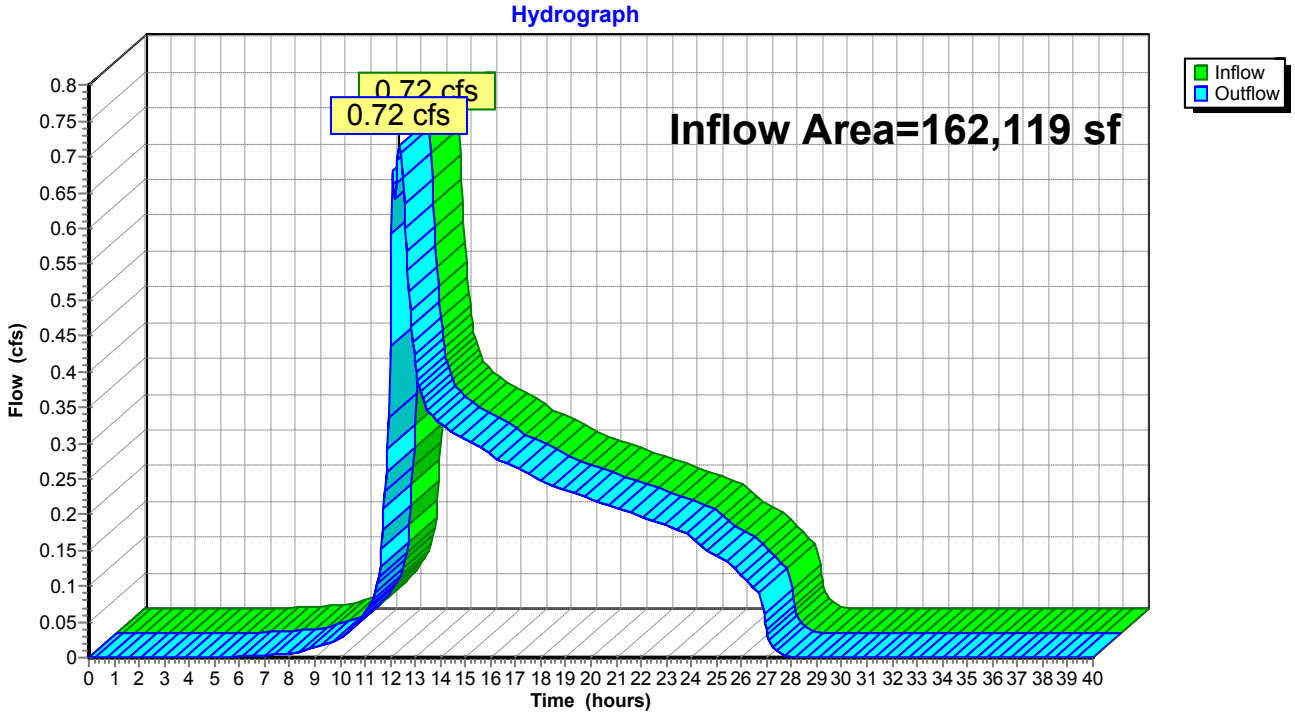
Summary for Reach 9R: Existing Drainage System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 1.05" for 2-Year event
Inflow = 0.72 cfs @ 12.38 hrs, Volume= 14,247 cf
Outflow = 0.72 cfs @ 12.38 hrs, Volume= 14,247 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 9R: Existing Drainage System



Summary for Pond 1P: CB #1

[81] Warning: Exceeded Pond 9P by 0.83' @ 11.70 hrs

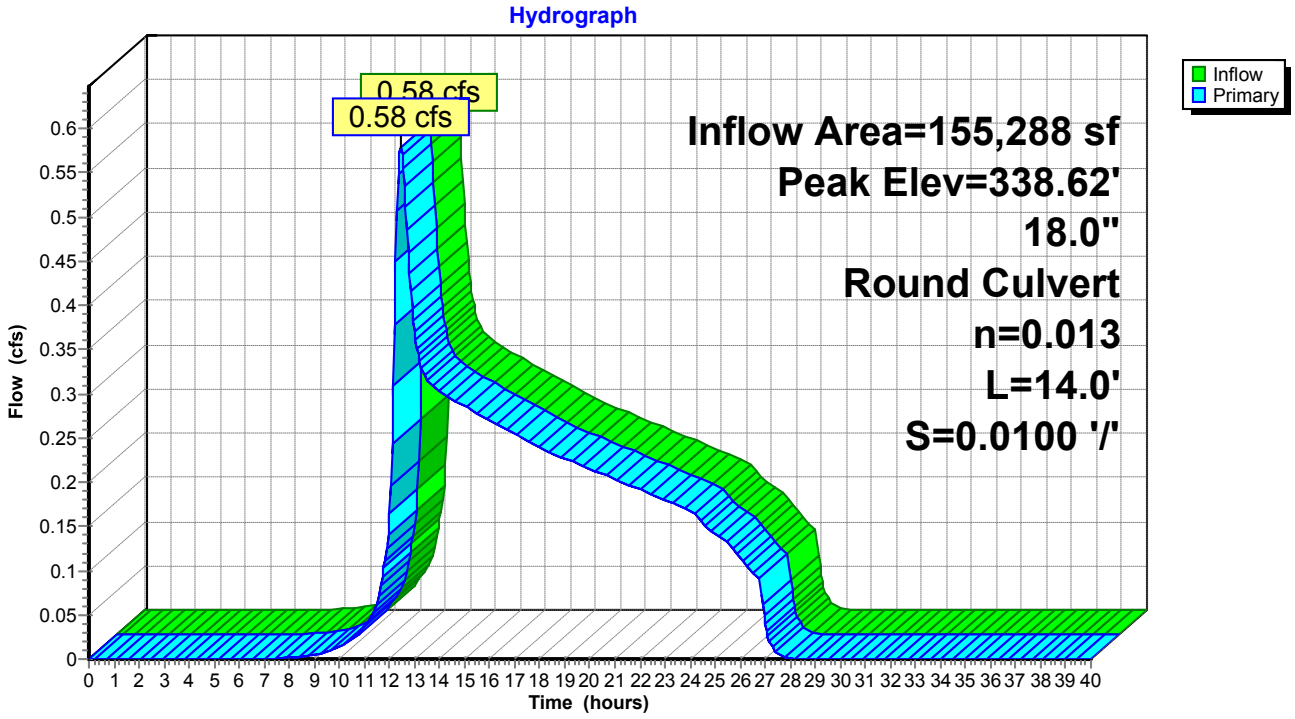
Inflow Area = 155,288 sf, 23.48% Impervious, Inflow Depth = 0.99" for 2-Year event
Inflow = 0.58 cfs @ 12.45 hrs, Volume= 12,816 cf
Outflow = 0.58 cfs @ 12.45 hrs, Volume= 12,816 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.58 cfs @ 12.45 hrs, Volume= 12,816 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 338.62' @ 12.45 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	338.25'	**18.0" Round Culvert** L= 14.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 338.25' / 338.11' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.58 cfs @ 12.45 hrs HW=338.62' (Free Discharge)
1=Culvert (Barrel Controls 0.58 cfs @ 2.58 fps)

Pond 1P: CB #1



Summary for Pond 2P: CB #2

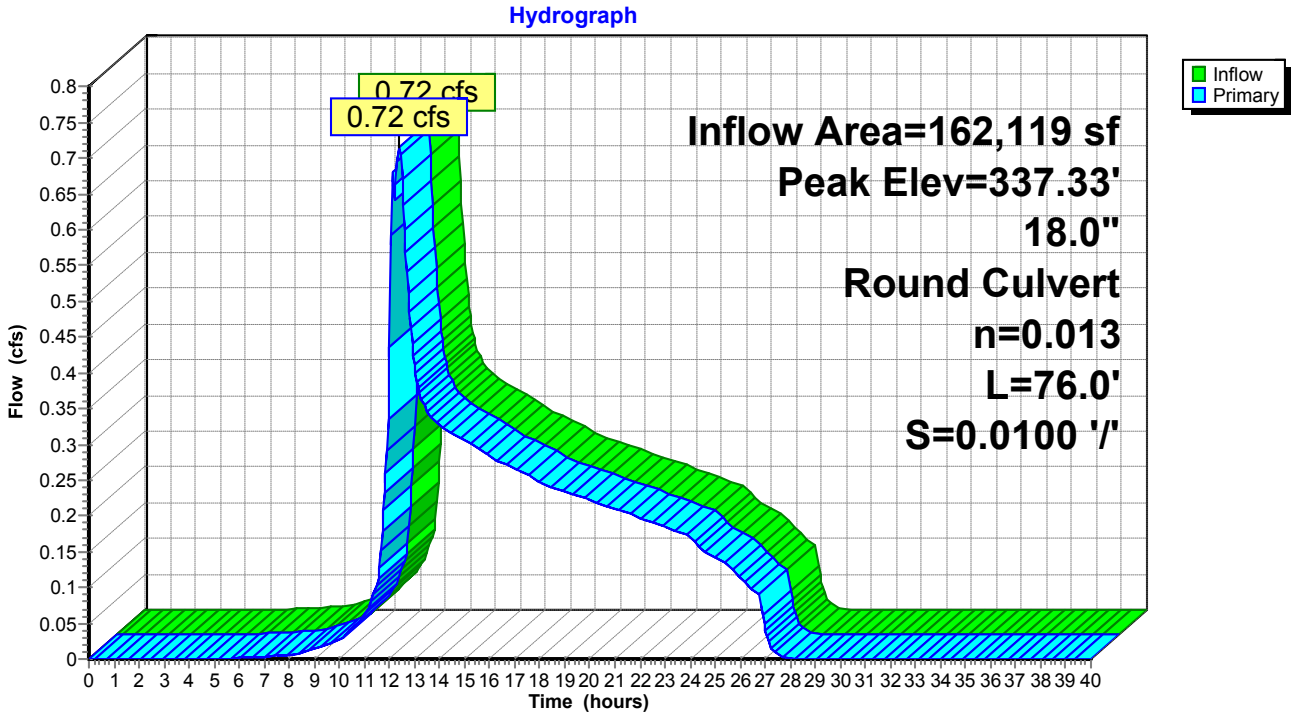
Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 1.05" for 2-Year event
Inflow = 0.72 cfs @ 12.38 hrs, Volume= 14,247 cf
Outflow = 0.72 cfs @ 12.38 hrs, Volume= 14,247 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.72 cfs @ 12.38 hrs, Volume= 14,247 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 337.33' @ 12.38 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	336.96'	**18.0" Round Culvert** L= 76.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 336.96' / 336.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.71 cfs @ 12.38 hrs HW=337.33' (Free Discharge)
1=Culvert (Inlet Controls 0.71 cfs @ 2.08 fps)

Pond 2P: CB #2



Summary for Pond 3P: CB #3

[58] Hint: Peaked 1.31' above defined flood level
[81] Warning: Exceeded Pond 4P by 4.64' @ 12.45 hrs
[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 6.80'

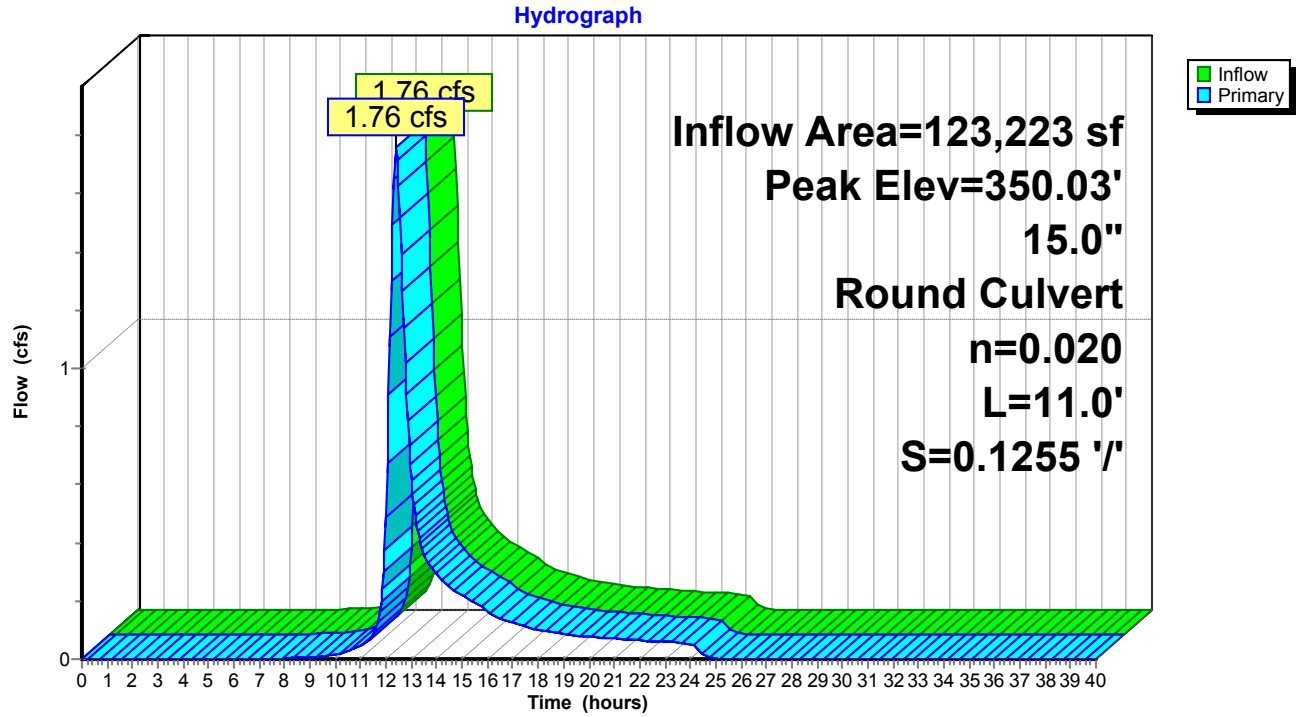
Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 1.02" for 2-Year event
Inflow = 1.76 cfs @ 12.39 hrs, Volume= 10,473 cf
Outflow = 1.76 cfs @ 12.39 hrs, Volume= 10,473 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.76 cfs @ 12.39 hrs, Volume= 10,473 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 350.03' @ 12.39 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.38'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.38' / 348.00' S= 0.1255 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.75 cfs @ 12.39 hrs HW=350.03' (Free Discharge)
1=Culvert (Inlet Controls 1.75 cfs @ 2.74 fps)

Pond 3P: CB #3



Summary for Pond 4P: CB #4

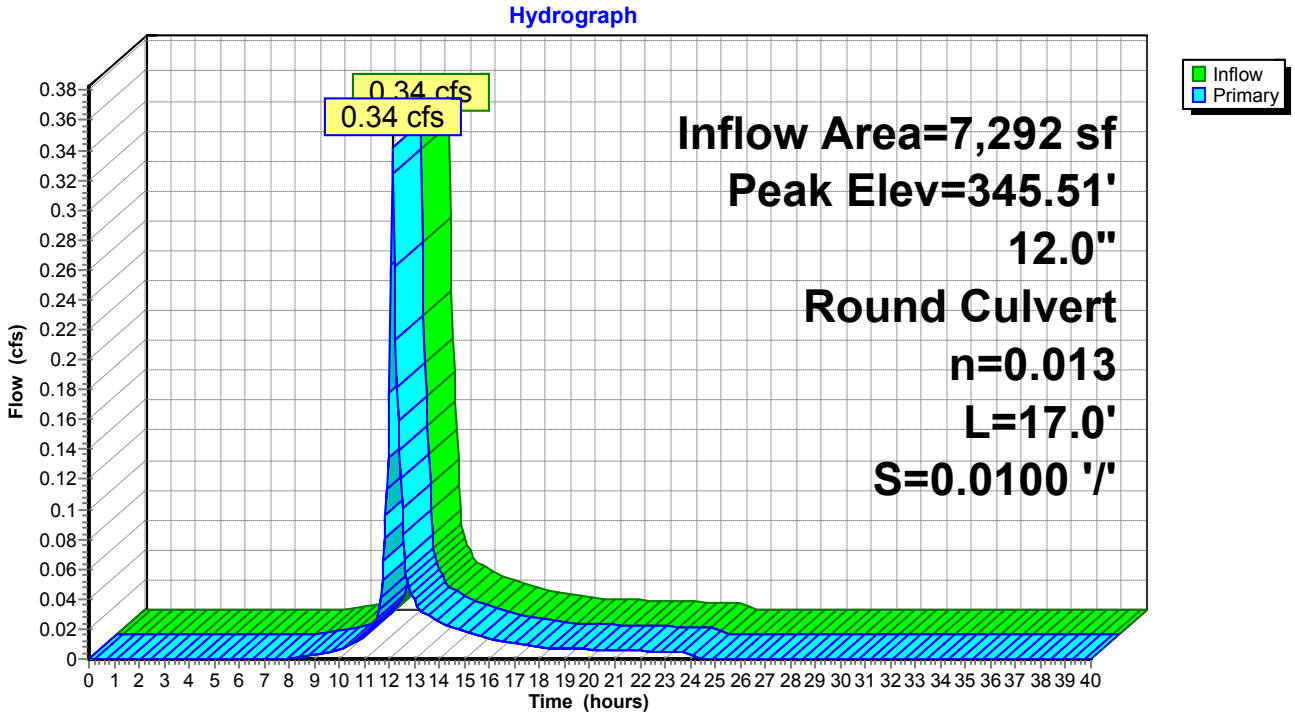
Inflow Area = 7,292 sf, 66.39% Impervious, Inflow Depth = 1.90" for 2-Year event
Inflow = 0.34 cfs @ 12.12 hrs, Volume= 1,157 cf
Outflow = 0.34 cfs @ 12.12 hrs, Volume= 1,157 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.12 hrs, Volume= 1,157 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 345.51' @ 12.12 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	345.20'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 345.20' / 345.03' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.33 cfs @ 12.12 hrs HW=345.51' (Free Discharge)
1=Culvert (Barrel Controls 0.33 cfs @ 2.43 fps)

Pond 4P: CB #4



Summary for Pond 5P: CB #5

[81] Warning: Exceeded Pond 6P by 0.09' @ 12.40 hrs
[79] Warning: Submerged Pond 7P Primary device # 1 OUTLET by 0.52'

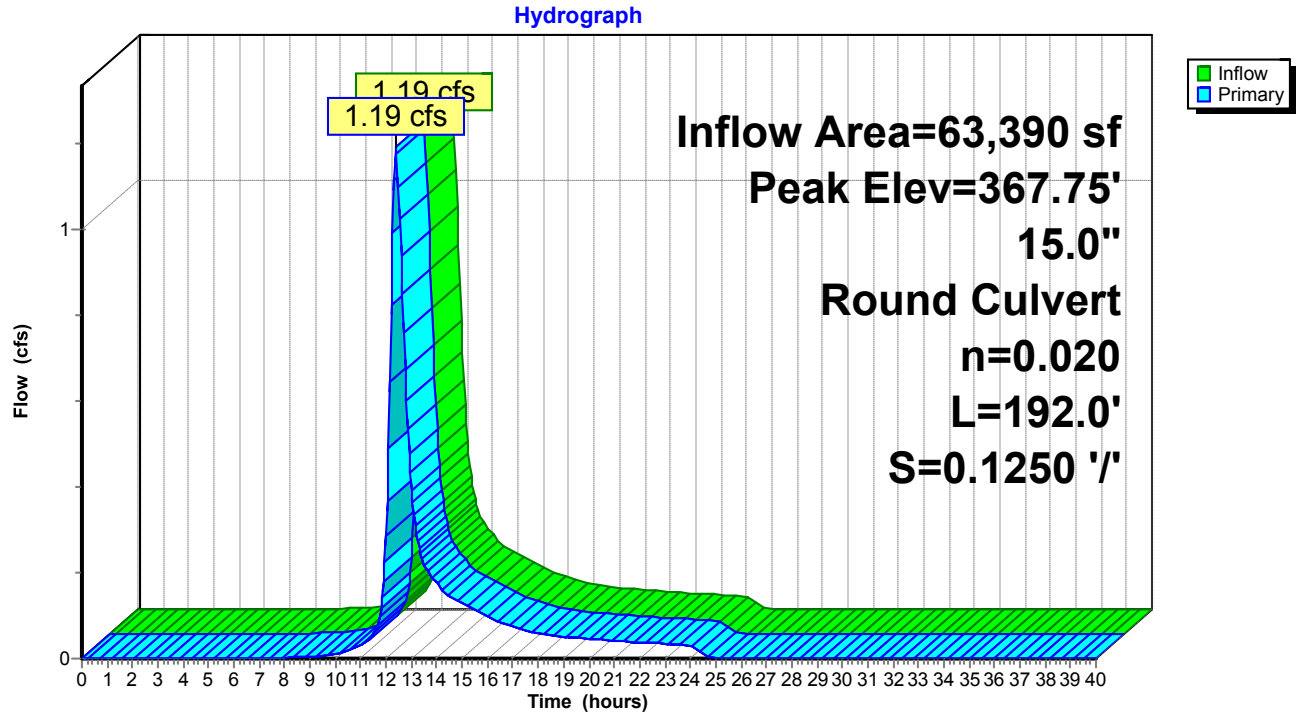
Inflow Area = 63,390 sf, 30.21% Impervious, Inflow Depth = 1.23" for 2-Year event
Inflow = 1.19 cfs @ 12.39 hrs, Volume= 6,512 cf
Outflow = 1.19 cfs @ 12.39 hrs, Volume= 6,512 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.19 cfs @ 12.39 hrs, Volume= 6,512 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 367.75' @ 12.39 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.23'	**15.0" Round Culvert** L= 192.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.23' / 343.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.19 cfs @ 12.39 hrs HW=367.75' (Free Discharge)
1=Culvert (Inlet Controls 1.19 cfs @ 2.46 fps)

Pond 5P: CB #5



Summary for Pond 6P: CB #6

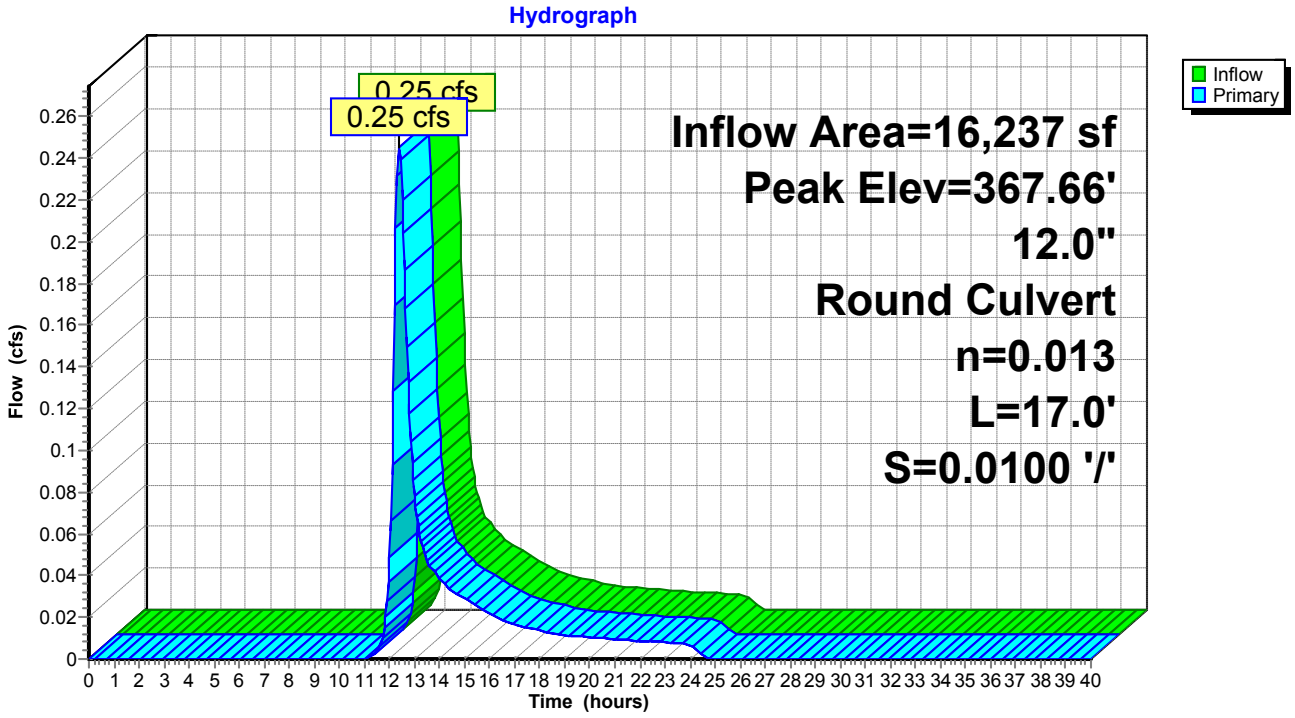
Inflow Area = 16,237 sf, 29.82% Impervious, Inflow Depth = 0.98" for 2-Year event
Inflow = 0.25 cfs @ 12.37 hrs, Volume= 1,329 cf
Outflow = 0.25 cfs @ 12.37 hrs, Volume= 1,329 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.37 hrs, Volume= 1,329 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 367.66' @ 12.37 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.40' / 367.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.37 hrs HW=367.66' (Free Discharge)
1=Culvert (Barrel Controls 0.24 cfs @ 2.26 fps)

Pond 6P: CB #6



Summary for Pond 7P: CB #7

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.22'

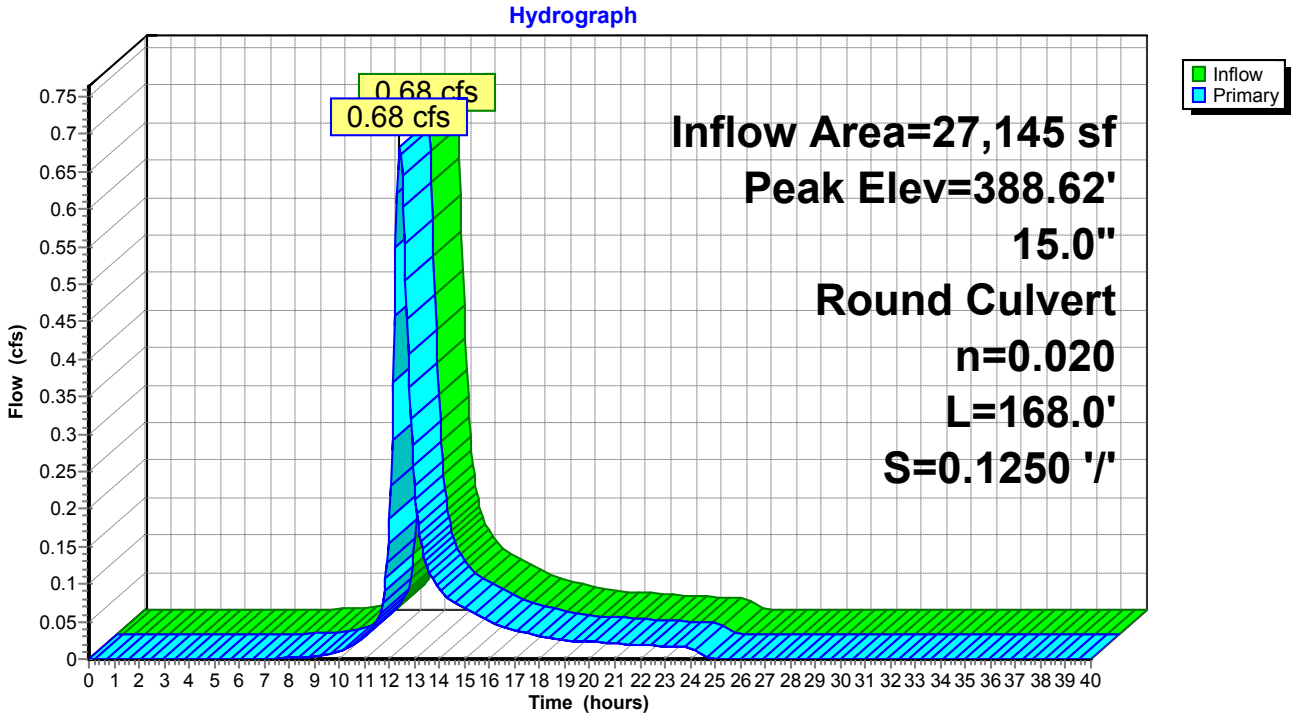
Inflow Area = 27,145 sf, 35.52% Impervious, Inflow Depth = 1.64" for 2-Year event
Inflow = 0.68 cfs @ 12.41 hrs, Volume= 3,721 cf
Outflow = 0.68 cfs @ 12.41 hrs, Volume= 3,721 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.68 cfs @ 12.41 hrs, Volume= 3,721 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 388.62' @ 12.41 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.23'	**15.0" Round Culvert** L= 168.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.23' / 367.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.68 cfs @ 12.41 hrs HW=388.62' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.68 cfs @ 2.11 fps)

Pond 7P: CB #7



Summary for Pond 8P: CB #8

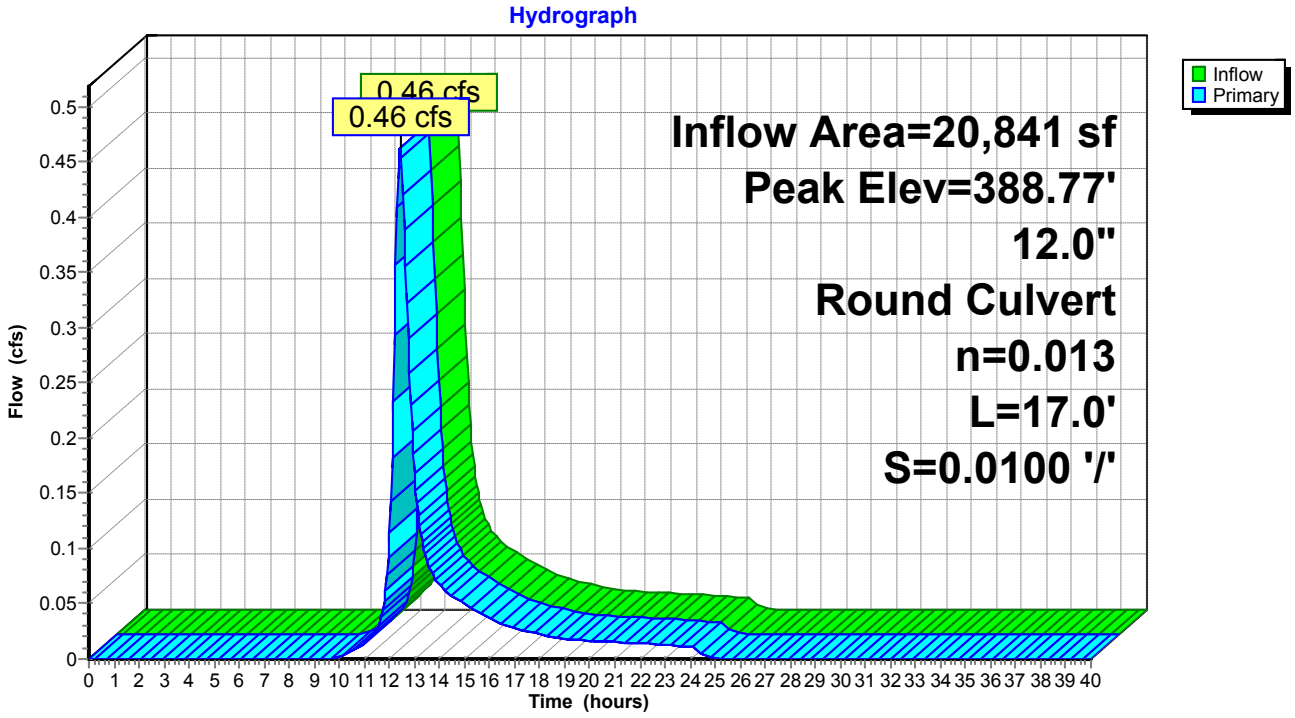
Inflow Area = 20,841 sf, 23.18% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 0.46 cfs @ 12.42 hrs, Volume= 2,546 cf
Outflow = 0.46 cfs @ 12.42 hrs, Volume= 2,546 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.46 cfs @ 12.42 hrs, Volume= 2,546 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 388.77' @ 12.42 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.40' / 388.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.46 cfs @ 12.42 hrs HW=388.77' (Free Discharge)
1=Culvert (Barrel Controls 0.46 cfs @ 2.61 fps)

Pond 8P: CB #8



Summary for Pond 9P: Underground Detention System

Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 1.02" for 2-Year event
Inflow = 1.76 cfs @ 12.39 hrs, Volume= 10,473 cf
Outflow = 0.23 cfs @ 14.76 hrs, Volume= 10,473 cf, Atten= 87%, Lag= 142.2 min
Primary = 0.23 cfs @ 14.76 hrs, Volume= 10,473 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 339.50' @ 14.76 hrs Surf.Area= 3,142 sf Storage= 4,589 cf

Plug-Flow detention time= 234.2 min calculated for 10,460 cf (100% of inflow)
Center-of-Mass det. time= 234.2 min (1,109.9 - 875.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	337.50'	4,817 cf	**37.58'W x 83.59'L x 6.50'H Field A** 20,421 cf Overall - 8,379 cf Embedded = 12,042 cf x 40.0% Voids
#2A	338.00'	8,379 cf	**ADS_StormTech MC-4500 +Cap** x 76 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 19 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		13,196 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	337.25'	**3.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 337.25' / 337.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.05 sf
#2	Primary	340.97'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 340.97' / 340.77' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.23 cfs @ 14.76 hrs HW=339.50' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.23 cfs @ 4.73 fps)
└**2=Culvert** (Controls 0.00 cfs)

Pond 9P: Underground Detention System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

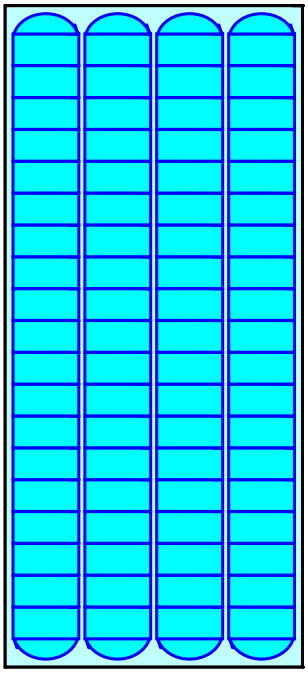
19 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 81.59' Row Length +12.0" End Stone x 2 = 83.59' Base Length
4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width
6.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.50' Field Height

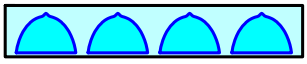
76 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 8,378.9 cf Chamber Storage

20,420.7 cf Field - 8,378.9 cf Chambers = 12,041.9 cf Stone x 40.0% Voids = 4,816.7 cf Stone Storage

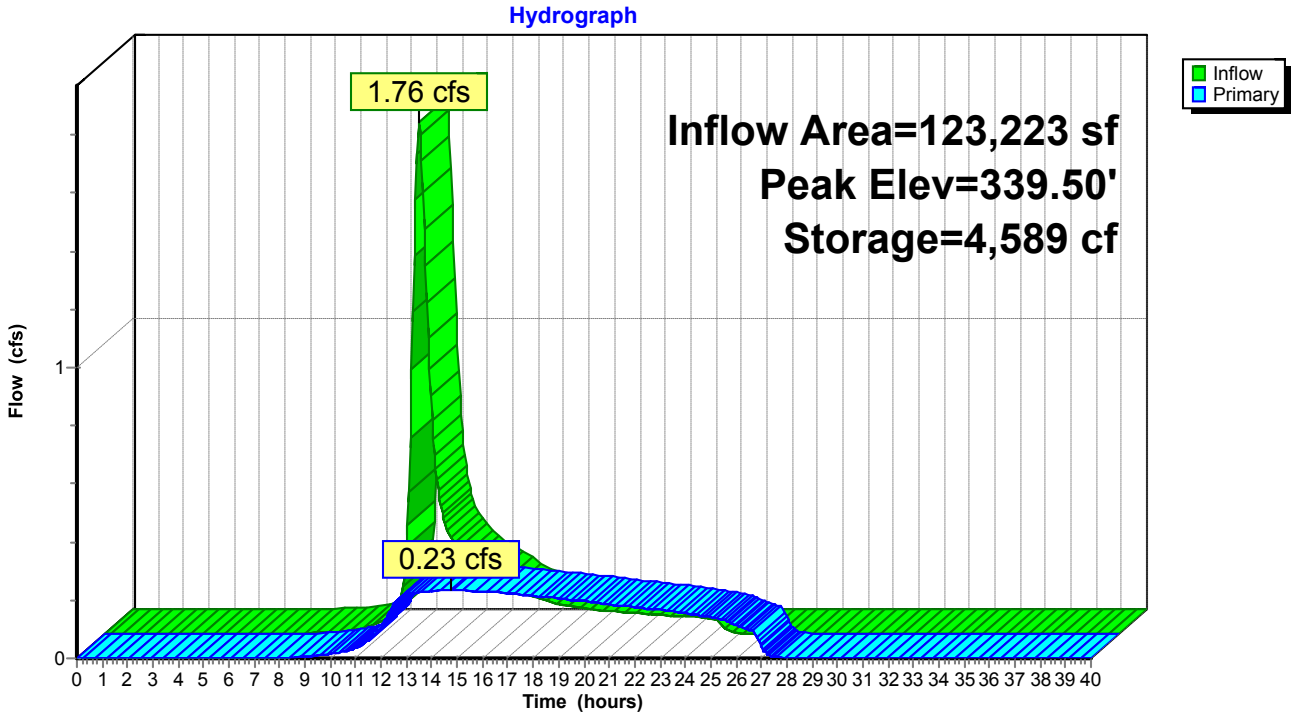
Chamber Storage + Stone Storage = 13,195.6 cf = 0.303 af
Overall Storage Efficiency = 64.6%
Overall System Size = 83.59' x 37.58' x 6.50'

76 Chambers
756.3 cy Field
446.0 cy Stone





Pond 9P: Underground Detention System



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Developed Drainage Runoff Area=32,065 sf 22.58% Impervious Runoff Depth=2.10"
Flow Length=537' Tc=26.6 min CN=69 Runoff=1.06 cfs 5,622 cf

Subcatchment 2S: Developed Drainage Runoff Area=6,831 sf 83.90% Impervious Runoff Depth=4.28"
Flow Length=173' Tc=6.2 min CN=92 Runoff=0.73 cfs 2,439 cf

Subcatchment 3S: Developed Drainage Runoff Area=52,541 sf 9.95% Impervious Runoff Depth=1.71"
Flow Length=461' Tc=26.1 min CN=64 Runoff=1.38 cfs 7,495 cf

Subcatchment 4S: Developed Drainage Runoff Area=7,292 sf 66.39% Impervious Runoff Depth=3.55"
Flow Length=191' Tc=8.2 min CN=85 Runoff=0.63 cfs 2,159 cf

Subcatchment 5S: Developed Drainage Runoff Area=20,008 sf 23.30% Impervious Runoff Depth=2.10"
Flow Length=319' Tc=22.4 min CN=69 Runoff=0.71 cfs 3,508 cf

Subcatchment 6S: Developed Drainage Runoff Area=16,237 sf 29.82% Impervious Runoff Depth=2.27"
Flow Length=262' Tc=24.3 min CN=71 Runoff=0.61 cfs 3,070 cf

Subcatchment 7S: Developed Drainage Runoff Area=6,304 sf 76.33% Impervious Runoff Depth=3.96"
Flow Length=330' Tc=27.5 min CN=89 Runoff=0.39 cfs 2,082 cf

Subcatchment 8S: Developed Drainage Runoff Area=20,841 sf 23.18% Impervious Runoff Depth=2.97"
Flow Length=323' Tc=29.3 min CN=79 Runoff=0.95 cfs 5,166 cf

Reach 9R: Existing Drainage System Inflow=1.97 cfs 31,542 cf
Outflow=1.97 cfs 31,542 cf

Pond 1P: CB #1 Peak Elev=338.97' Inflow=1.90 cfs 29,103 cf
18.0" Round Culvert n=0.013 L=14.0' S=0.0100 '/' Outflow=1.90 cfs 29,103 cf

Pond 2P: CB #2 Peak Elev=337.60' Inflow=1.97 cfs 31,542 cf
18.0" Round Culvert n=0.013 L=76.0' S=0.0100 '/' Outflow=1.97 cfs 31,542 cf

Pond 3P: CB #3 Peak Elev=350.52' Inflow=4.27 cfs 23,481 cf
15.0" Round Culvert n=0.020 L=11.0' S=0.1255 '/' Outflow=4.27 cfs 23,481 cf

Pond 4P: CB #4 Peak Elev=345.64' Inflow=0.63 cfs 2,159 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.63 cfs 2,159 cf

Pond 5P: CB #5 Peak Elev=368.05' Inflow=2.63 cfs 13,826 cf
15.0" Round Culvert n=0.020 L=192.0' S=0.1250 '/' Outflow=2.63 cfs 13,826 cf

Pond 6P: CB #6 Peak Elev=367.83' Inflow=0.61 cfs 3,070 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.61 cfs 3,070 cf

Pond 7P: CB #7 Peak Elev=388.78' Inflow=1.33 cfs 7,248 cf
15.0" Round Culvert n=0.020 L=168.0' S=0.1250 '/' Outflow=1.33 cfs 7,248 cf

Pond 8P: CB #8 Peak Elev=388.96' Inflow=0.95 cfs 5,166 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.95 cfs 5,166 cf

Pond 9P: Underground Detention System Peak Elev=341.59' Storage=9,530 cf Inflow=4.27 cfs 23,481 cf
Outflow=1.49 cfs 23,481 cf

Total Runoff Area = 162,119 sf Runoff Volume = 31,542 cf Average Runoff Depth = 2.33"
73.98% Pervious = 119,930 sf 26.02% Impervious = 42,189 sf

Summary for Subcatchment 1S: Developed Drainage Area - CB #1

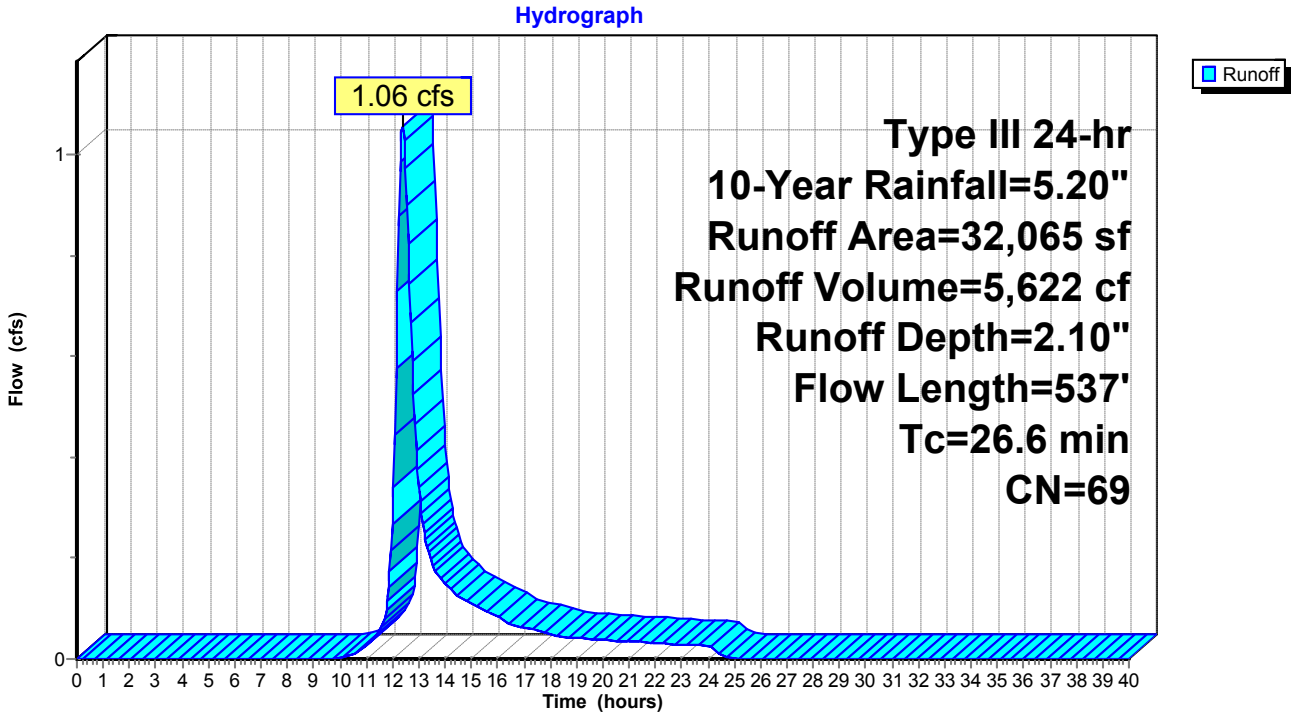
Runoff = 1.06 cfs @ 12.39 hrs, Volume= 5,622 cf, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
7,241	98	Paved parking, HSG D
24,824	60	Woods, Fair, HSG B
32,065	69	Weighted Average
24,824		77.42% Pervious Area
7,241		22.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
3.4	236	0.2200	1.17		**Shallow Concentrated Flow, Elev. 448 -396** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3700	9.79		**Shallow Concentrated Flow, Elev. 396 - 348** Unpaved Kv= 16.1 fps
0.7	134	0.0420	3.30		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
26.6	537	Total			

Subcatchment 1S: Developed Drainage Area - CB #1



Summary for Subcatchment 2S: Developed Drainage Area - CB #2

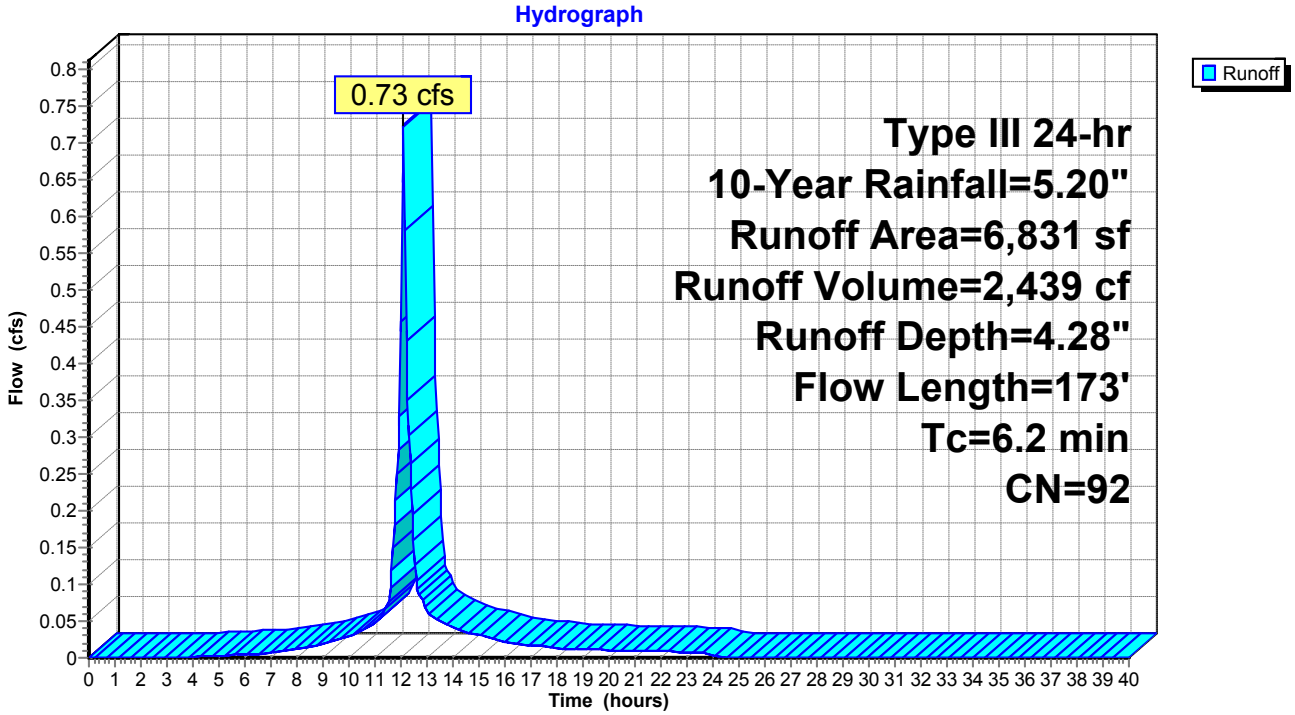
Runoff = 0.73 cfs @ 12.09 hrs, Volume= 2,439 cf, Depth= 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
5,731	98	Paved parking, HSG D
1,100	60	Woods, Fair, HSG B
6,831	92	Weighted Average
1,100		16.10% Pervious Area
5,731		83.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.2860	0.10		**Sheet Flow, Elev. 396 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	14	0.3700	9.79		**Shallow Concentrated Flow, Elev. 386 -348** Unpaved Kv= 16.1 fps
0.6	124	0.0450	3.42		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
6.2	173	Total			

Subcatchment 2S: Developed Drainage Area - CB #2



Summary for Subcatchment 3S: Developed Drainage Area - CB #3

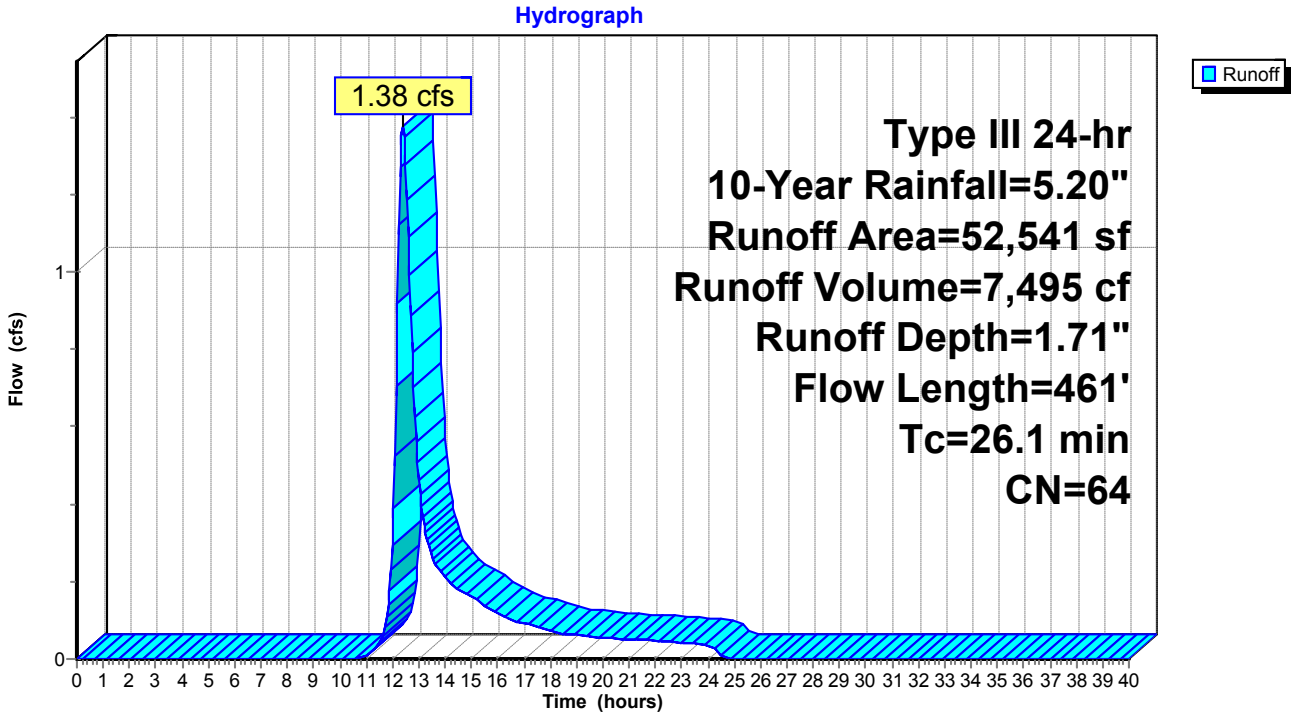
Runoff = 1.38 cfs @ 12.40 hrs, Volume= 7,495 cf, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
5,229	98	Paved parking, HSG D
47,312	60	Woods, Fair, HSG B
52,541	64	Weighted Average
47,312		90.05% Pervious Area
5,229		9.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	150	0.1700	0.11		**Sheet Flow, Elev. 472 - 446.5** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	247	0.1720	1.04		**Shallow Concentrated Flow, Elev. 446.5 - 404** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3400	9.39		**Shallow Concentrated Flow, Elev. 404 - 354** Unpaved Kv= 16.1 fps
0.1	47	0.1120	5.39		**Shallow Concentrated Flow, Elev. 354 - 348.72** Unpaved Kv= 16.1 fps
26.1	461	Total			

Subcatchment 3S: Developed Drainage Area - CB #3



Summary for Subcatchment 4S: Developed Drainage Area - CB #4

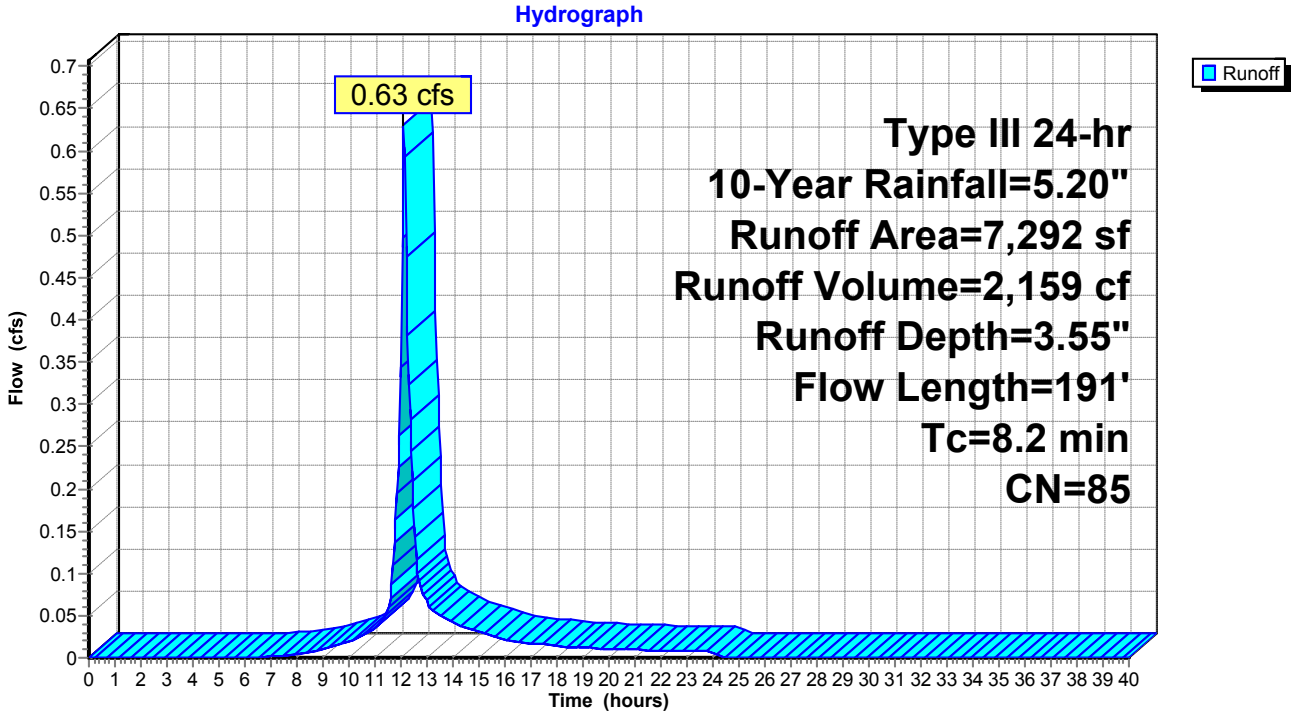
Runoff = 0.63 cfs @ 12.12 hrs, Volume= 2,159 cf, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
4,841	98	Paved parking, HSG D
2,451	60	Woods, Fair, HSG B
7,292	85	Weighted Average
2,451		33.61% Pervious Area
4,841		66.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	39	0.1540	0.08		**Sheet Flow, Elev. 392 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	7	0.3500	9.52		**Shallow Concentrated Flow, Elev. 386 - 366** Unpaved Kv= 16.1 fps
0.4	145	0.1190	5.55		**Shallow Concentrated Flow, Elev. 366 - 348.72** Unpaved Kv= 16.1 fps
8.2	191	Total			

Subcatchment 4S: Developed Drainage Area - CB #4



Summary for Subcatchment 5S: Developed Drainage Area - CB #5

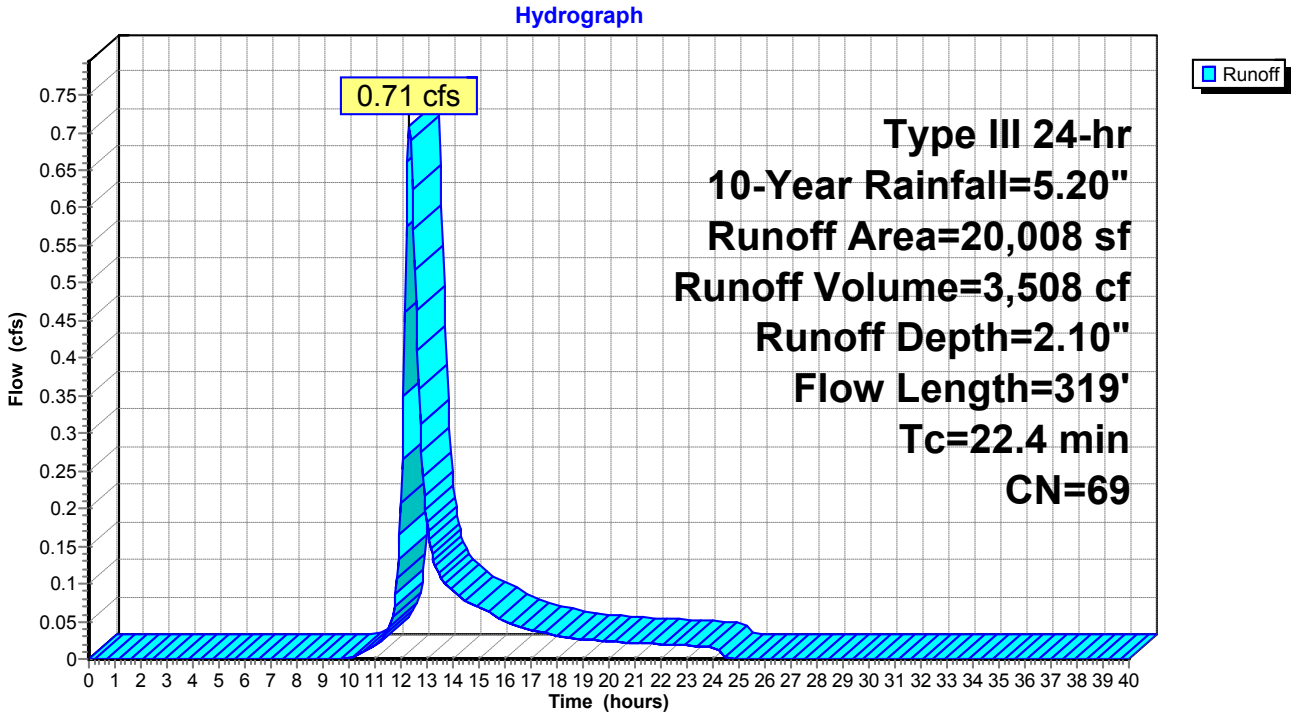
Runoff = 0.71 cfs @ 12.33 hrs, Volume= 3,508 cf, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
4,662	98	Paved parking, HSG D
15,346	60	Woods, Fair, HSG B
20,008	69	Weighted Average
15,346		76.70% Pervious Area
4,662		23.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	150	0.1970	0.12		**Sheet Flow, Elev. 450.5 - 421** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.6	121	0.2400	1.22		**Shallow Concentrated Flow, Elev. 421 - 392** Forest w/Heavy Litter Kv= 2.5 fps
0.0	6	0.4290	10.55		**Shallow Concentrated Flow, Elev. 392.0 - 378** Unpaved Kv= 16.1 fps
0.1	42	0.1690	6.62		**Shallow Concentrated Flow, Elev. 378 - 370.92** Unpaved Kv= 16.1 fps
22.4	319	Total			

Subcatchment 5S: Developed Drainage Area - CB #5



Summary for Subcatchment 6S: Developed Drainage Area - CB #6

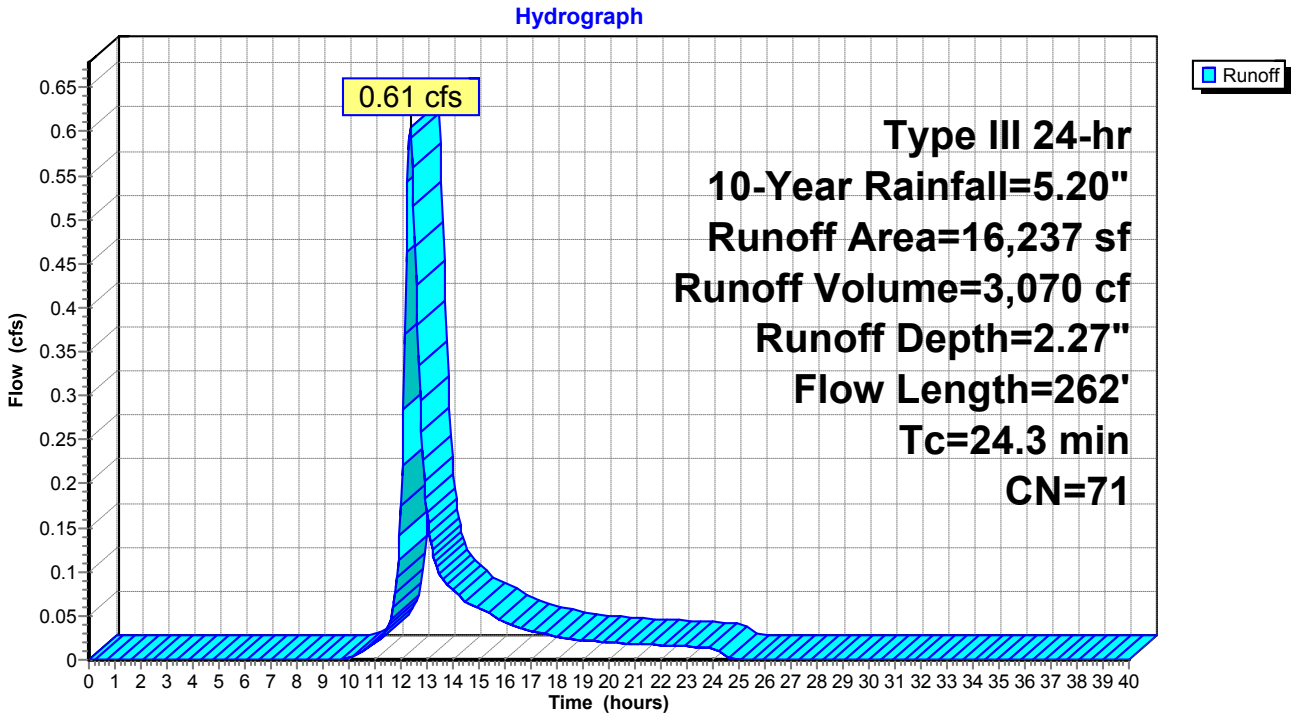
Runoff = 0.61 cfs @ 12.35 hrs, Volume= 3,070 cf, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
4,842	98	Paved parking, HSG D
11,395	60	Woods, Fair, HSG B
16,237	71	Weighted Average
11,395		70.18% Pervious Area
4,842		29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.0	150	0.1370	0.10		**Sheet Flow, Elev. 424.5 - 404** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	8	0.4000	10.18		**Shallow Concentrated Flow, Elev. 404 - 384** Unpaved Kv= 16.1 fps
0.3	104	0.1260	5.71		**Shallow Concentrated Flow, Elev. 384 - 370.92** Unpaved Kv= 16.1 fps
24.3	262	Total			

Subcatchment 6S: Developed Drainage Area - CB #6



Summary for Subcatchment 7S: Developed Drainage Area - CB #7

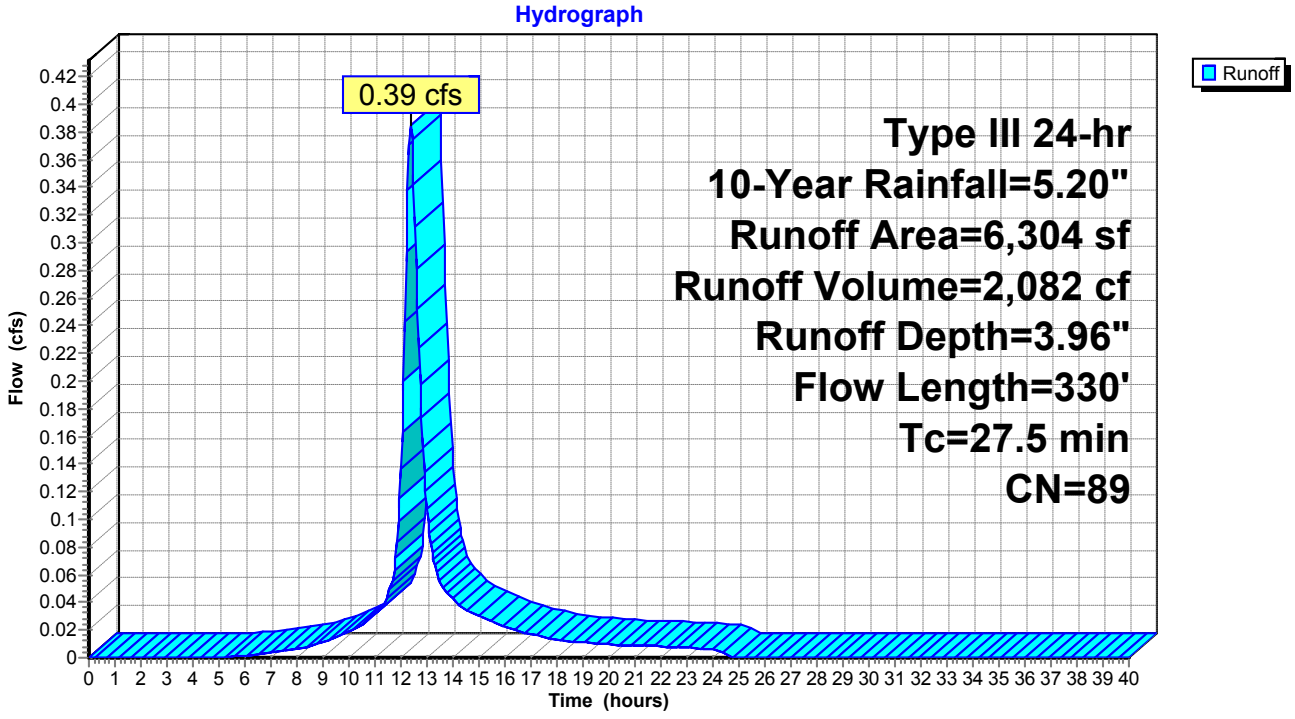
Runoff = 0.39 cfs @ 12.37 hrs, Volume= 2,082 cf, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
4,812	98	Paved parking, HSG D
1,492	60	Woods, Fair, HSG B
6,304	89	Weighted Average
1,492		23.67% Pervious Area
4,812		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	110	0.0550	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	220	0.1280	5.76		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
27.5	330	Total			

Subcatchment 7S: Developed Drainage Area - CB #7



Summary for Subcatchment 8S: Developed Drainage Area - CB #8

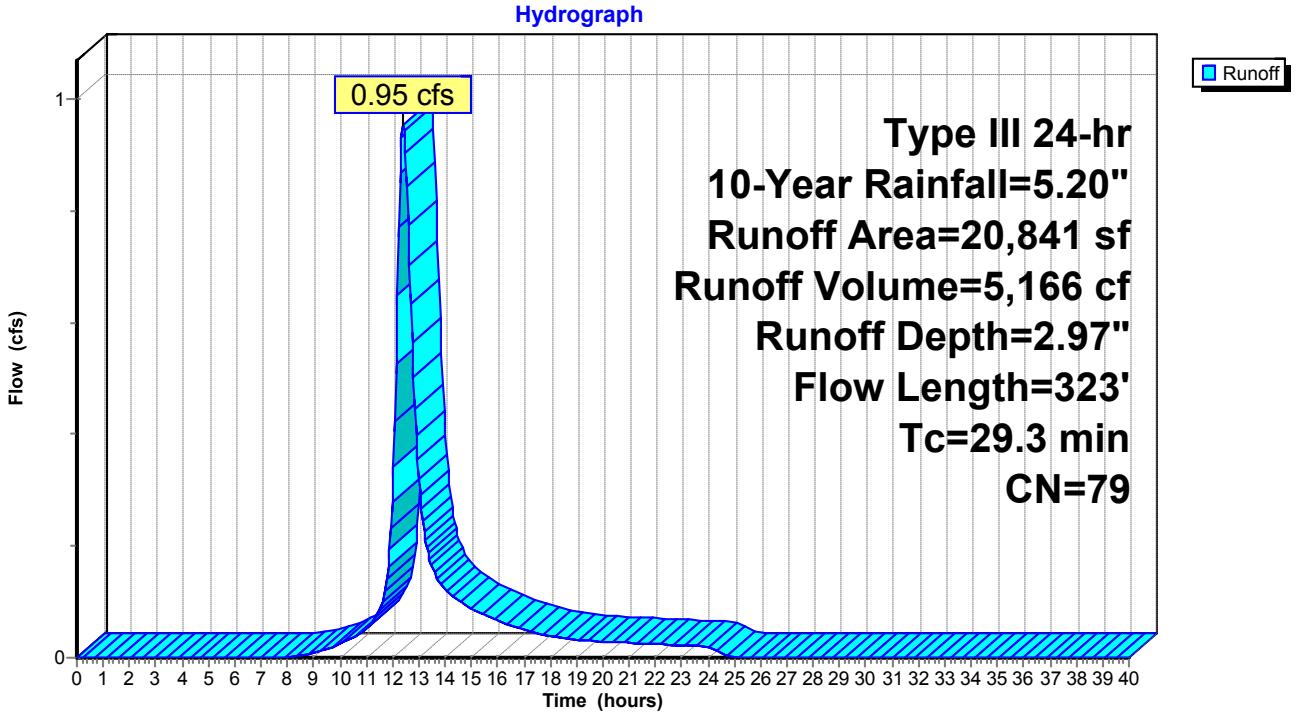
Runoff = 0.95 cfs @ 12.41 hrs, Volume= 5,166 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.20"

Area (sf)	CN	Description
4,831	98	Paved parking, HSG D
16,010	73	Woods, Fair, HSG C
20,841	79	Weighted Average
16,010		76.82% Pervious Area
4,831		23.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.7	116	0.0520	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	207	0.1360	5.94		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
29.3	323	Total			

Subcatchment 8S: Developed Drainage Area - CB #8



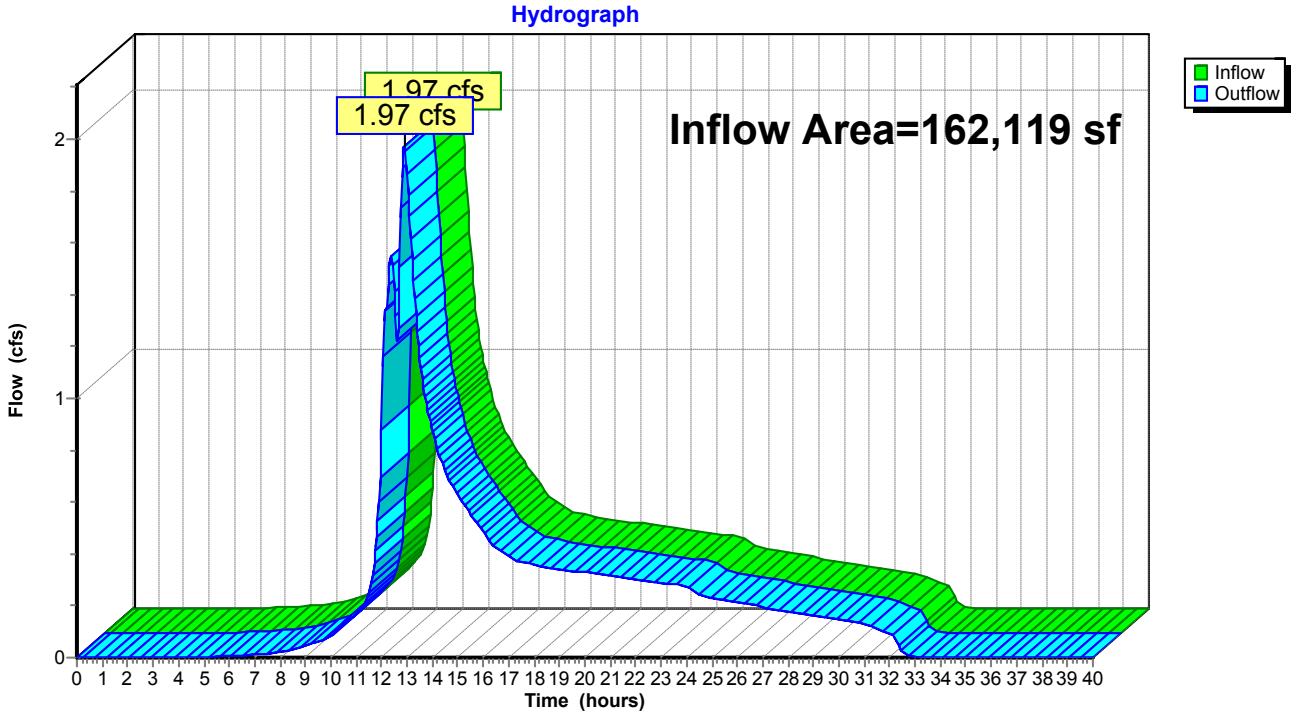
Summary for Reach 9R: Existing Drainage System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 2.33" for 10-Year event
Inflow = 1.97 cfs @ 12.88 hrs, Volume= 31,542 cf
Outflow = 1.97 cfs @ 12.88 hrs, Volume= 31,542 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 9R: Existing Drainage System



Summary for Pond 1P: CB #1

[81] Warning: Exceeded Pond 9P by 0.83' @ 10.60 hrs

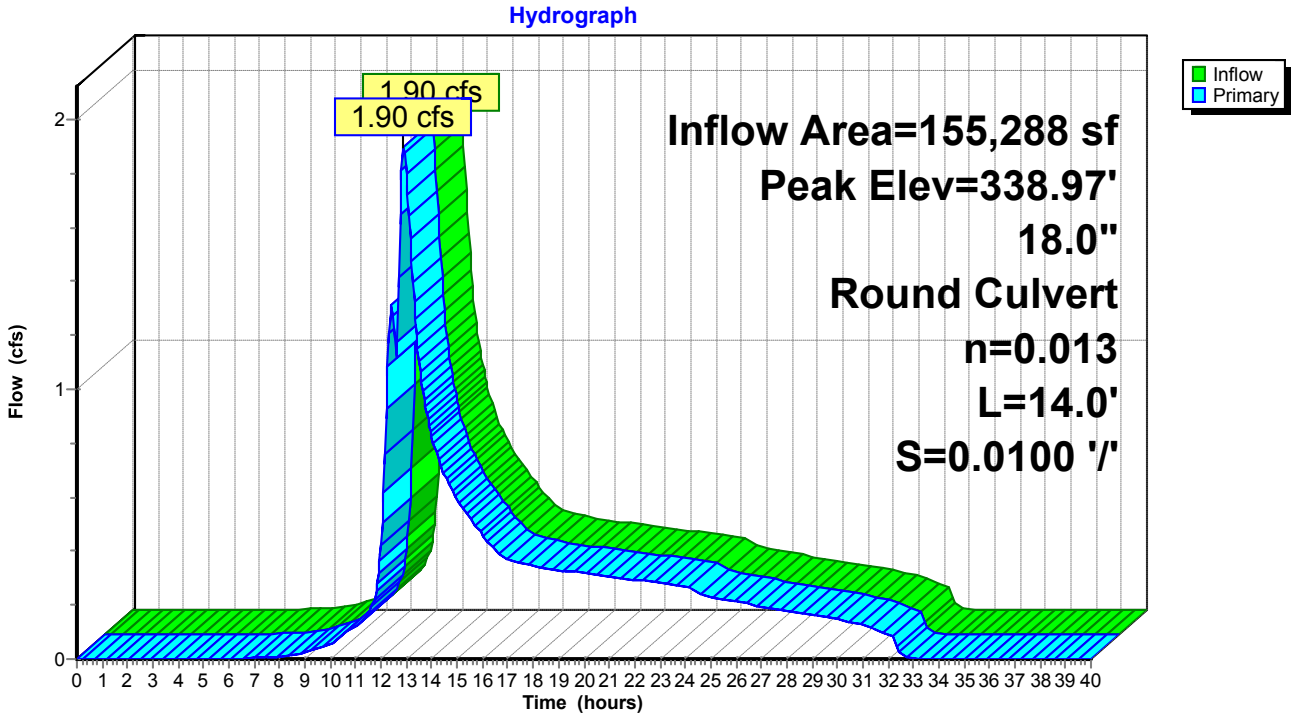
Inflow Area = 155,288 sf, 23.48% Impervious, Inflow Depth = 2.25" for 10-Year event
Inflow = 1.90 cfs @ 12.89 hrs, Volume= 29,103 cf
Outflow = 1.90 cfs @ 12.89 hrs, Volume= 29,103 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.90 cfs @ 12.89 hrs, Volume= 29,103 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 338.97' @ 12.89 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	338.25'	**18.0" Round Culvert** L= 14.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 338.25' / 338.11' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.89 cfs @ 12.89 hrs HW=338.97' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.89 cfs @ 3.33 fps)

Pond 1P: CB #1



Summary for Pond 2P: CB #2

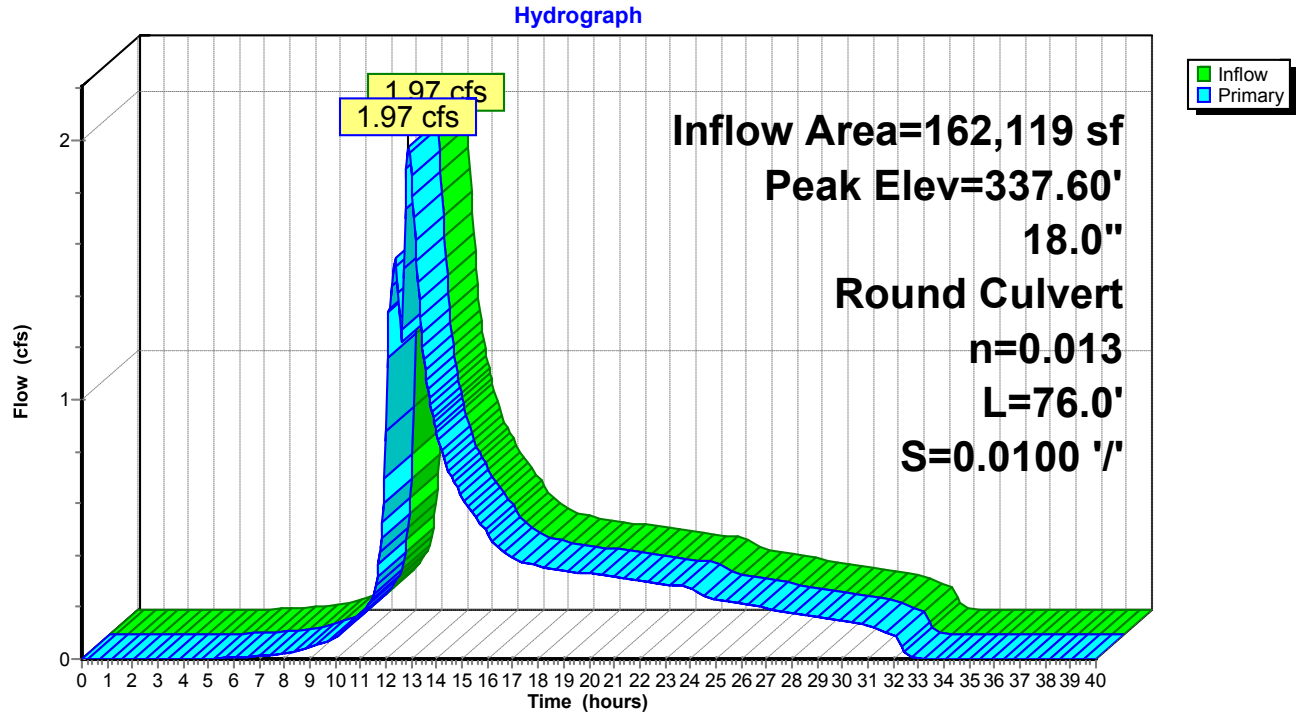
Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 2.33" for 10-Year event
Inflow = 1.97 cfs @ 12.88 hrs, Volume= 31,542 cf
Outflow = 1.97 cfs @ 12.88 hrs, Volume= 31,542 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.97 cfs @ 12.88 hrs, Volume= 31,542 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 337.60' @ 12.88 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	336.96'	**18.0" Round Culvert** L= 76.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 336.96' / 336.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.96 cfs @ 12.88 hrs HW=337.60' (Free Discharge)
1=Culvert (Inlet Controls 1.96 cfs @ 2.73 fps)

Pond 2P: CB #2



Summary for Pond 3P: CB #3

[58] Hint: Peaked 1.80' above defined flood level
[81] Warning: Exceeded Pond 4P by 5.05' @ 12.40 hrs
[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 7.29'

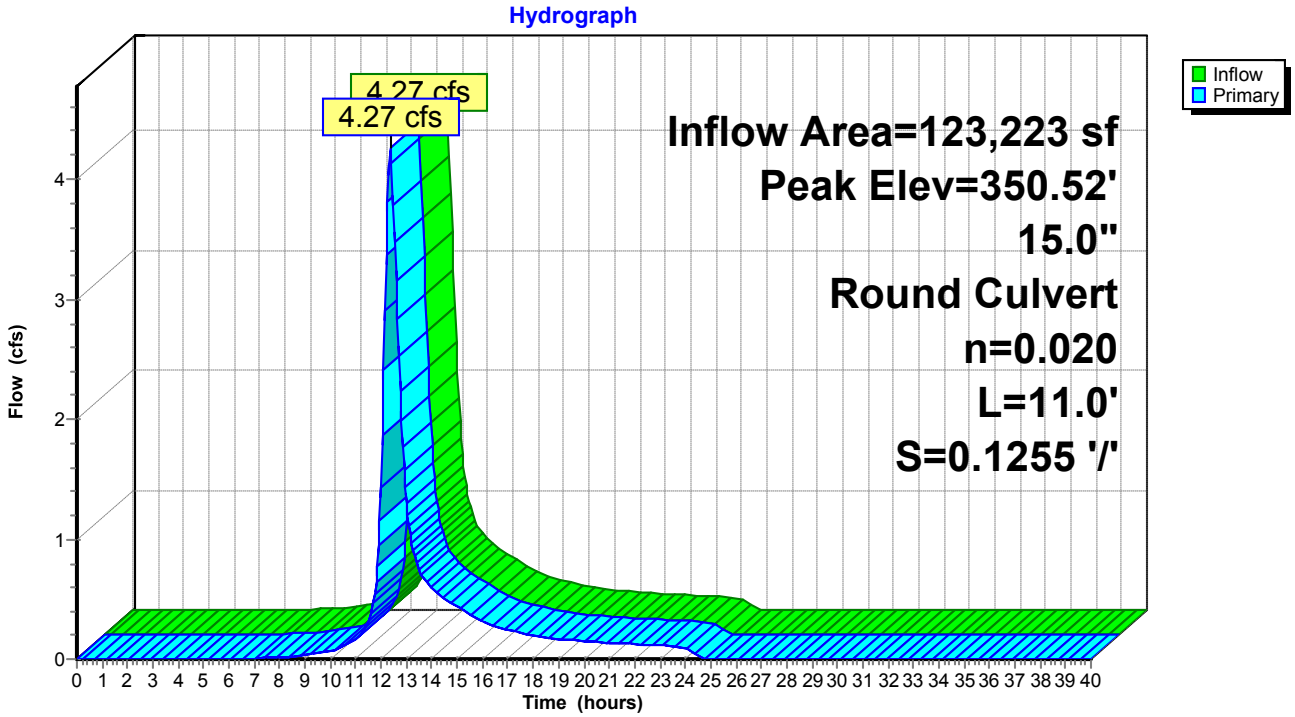
Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 4.27 cfs @ 12.36 hrs, Volume= 23,481 cf
Outflow = 4.27 cfs @ 12.36 hrs, Volume= 23,481 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.27 cfs @ 12.36 hrs, Volume= 23,481 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 350.52' @ 12.36 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.38'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.38' / 348.00' S= 0.1255 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=4.25 cfs @ 12.36 hrs HW=350.52' (Free Discharge)
1=Culvert (Inlet Controls 4.25 cfs @ 3.63 fps)

Pond 3P: CB #3



Summary for Pond 4P: CB #4

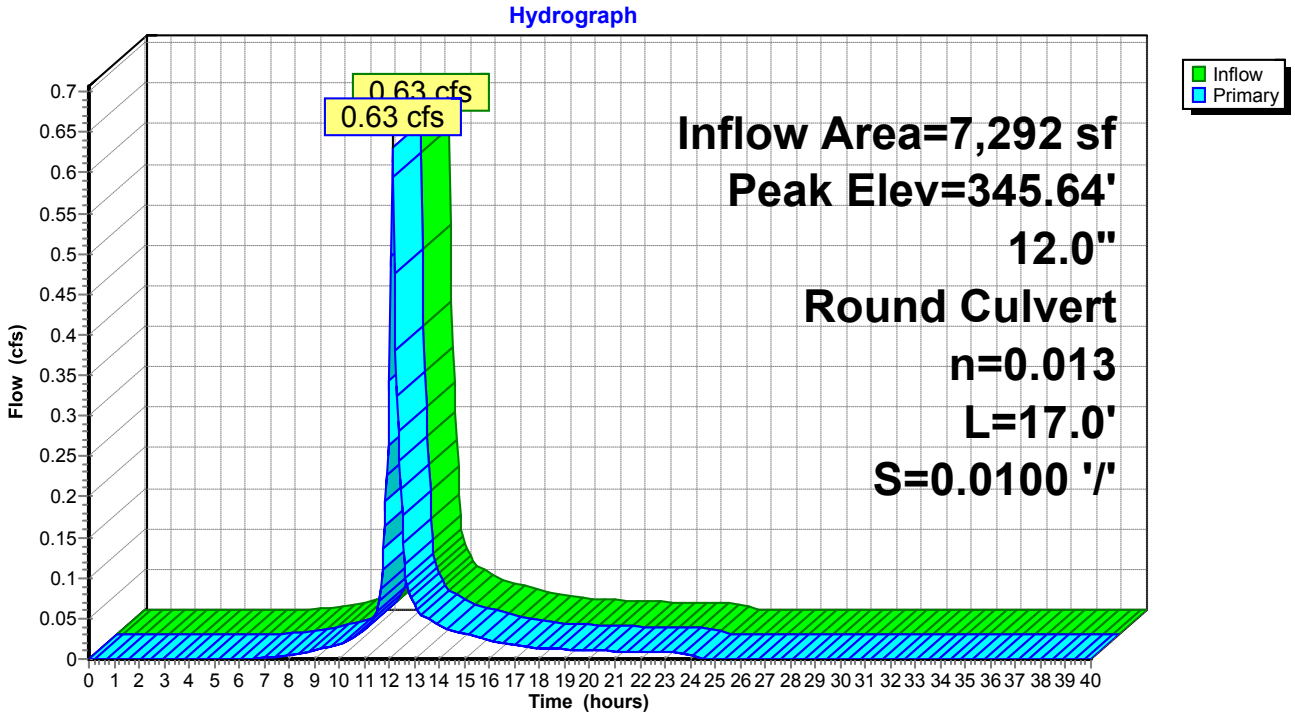
Inflow Area = 7,292 sf, 66.39% Impervious, Inflow Depth = 3.55" for 10-Year event
Inflow = 0.63 cfs @ 12.12 hrs, Volume= 2,159 cf
Outflow = 0.63 cfs @ 12.12 hrs, Volume= 2,159 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.12 hrs, Volume= 2,159 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 345.64' @ 12.12 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	345.20'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 345.20' / 345.03' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.61 cfs @ 12.12 hrs HW=345.63' (Free Discharge)
1=Culvert (Barrel Controls 0.61 cfs @ 2.78 fps)

Pond 4P: CB #4



Summary for Pond 5P: CB #5

[81] Warning: Exceeded Pond 6P by 0.22' @ 12.40 hrs
[79] Warning: Submerged Pond 7P Primary device # 1 OUTLET by 0.82'

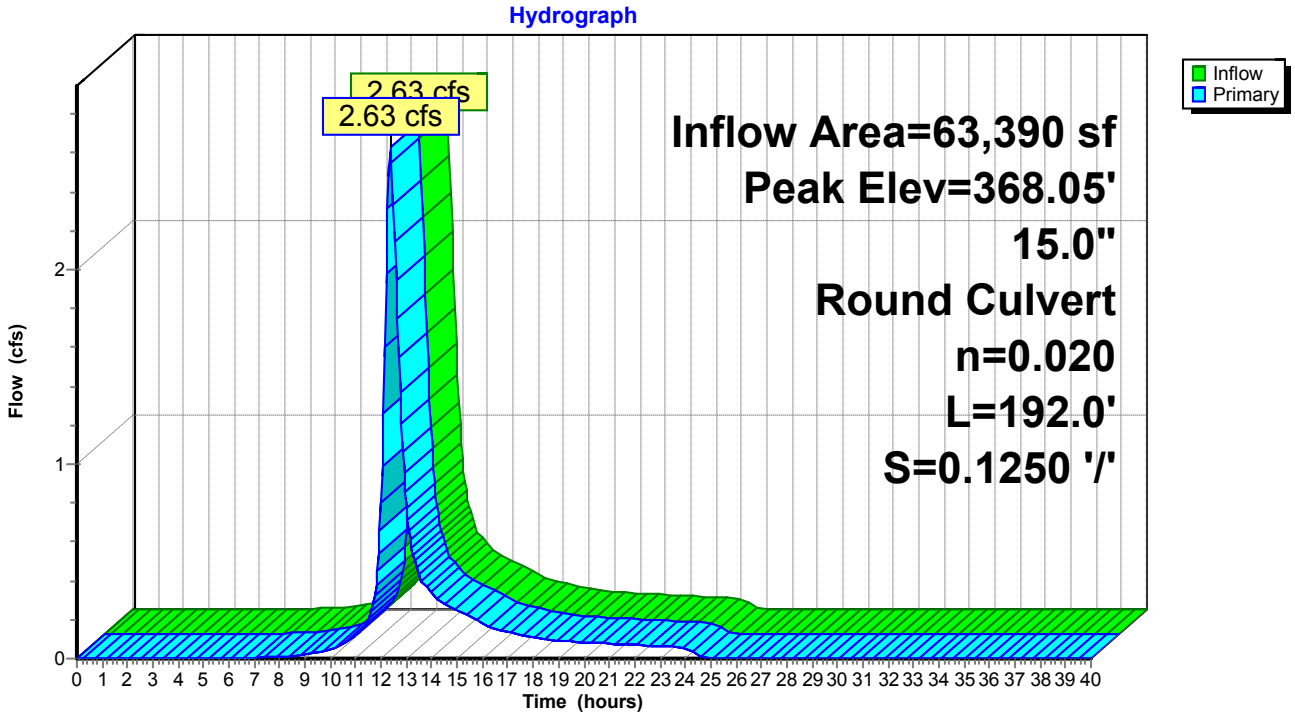
Inflow Area = 63,390 sf, 30.21% Impervious, Inflow Depth = 2.62" for 10-Year event
Inflow = 2.63 cfs @ 12.36 hrs, Volume= 13,826 cf
Outflow = 2.63 cfs @ 12.36 hrs, Volume= 13,826 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.63 cfs @ 12.36 hrs, Volume= 13,826 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 368.05' @ 12.36 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.23'	**15.0" Round Culvert** L= 192.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.23' / 343.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.62 cfs @ 12.36 hrs HW=368.05' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 2.62 cfs @ 3.08 fps)

Pond 5P: CB #5



Summary for Pond 6P: CB #6

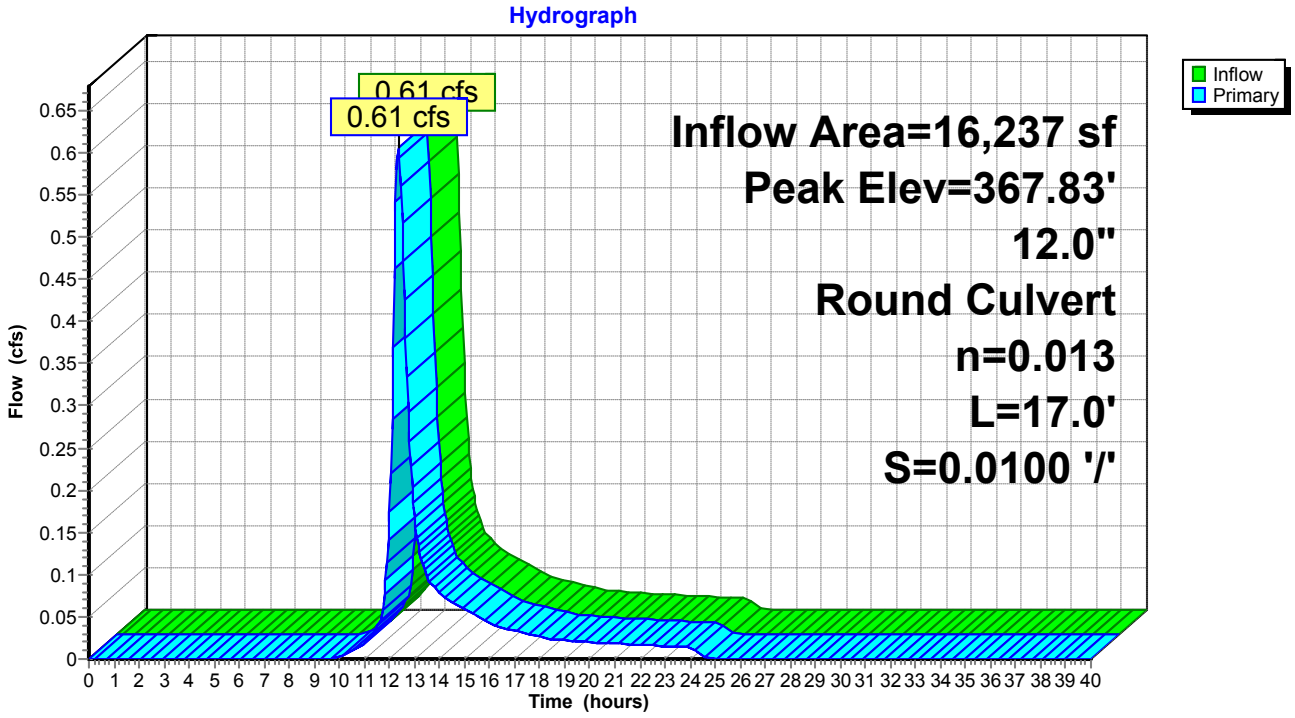
Inflow Area = 16,237 sf, 29.82% Impervious, Inflow Depth = 2.27" for 10-Year event
Inflow = 0.61 cfs @ 12.35 hrs, Volume= 3,070 cf
Outflow = 0.61 cfs @ 12.35 hrs, Volume= 3,070 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.61 cfs @ 12.35 hrs, Volume= 3,070 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 367.83' @ 12.35 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.40' / 367.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.61 cfs @ 12.35 hrs HW=367.83' (Free Discharge)
1=Culvert (Barrel Controls 0.61 cfs @ 2.77 fps)

Pond 6P: CB #6



Summary for Pond 7P: CB #7

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.38'

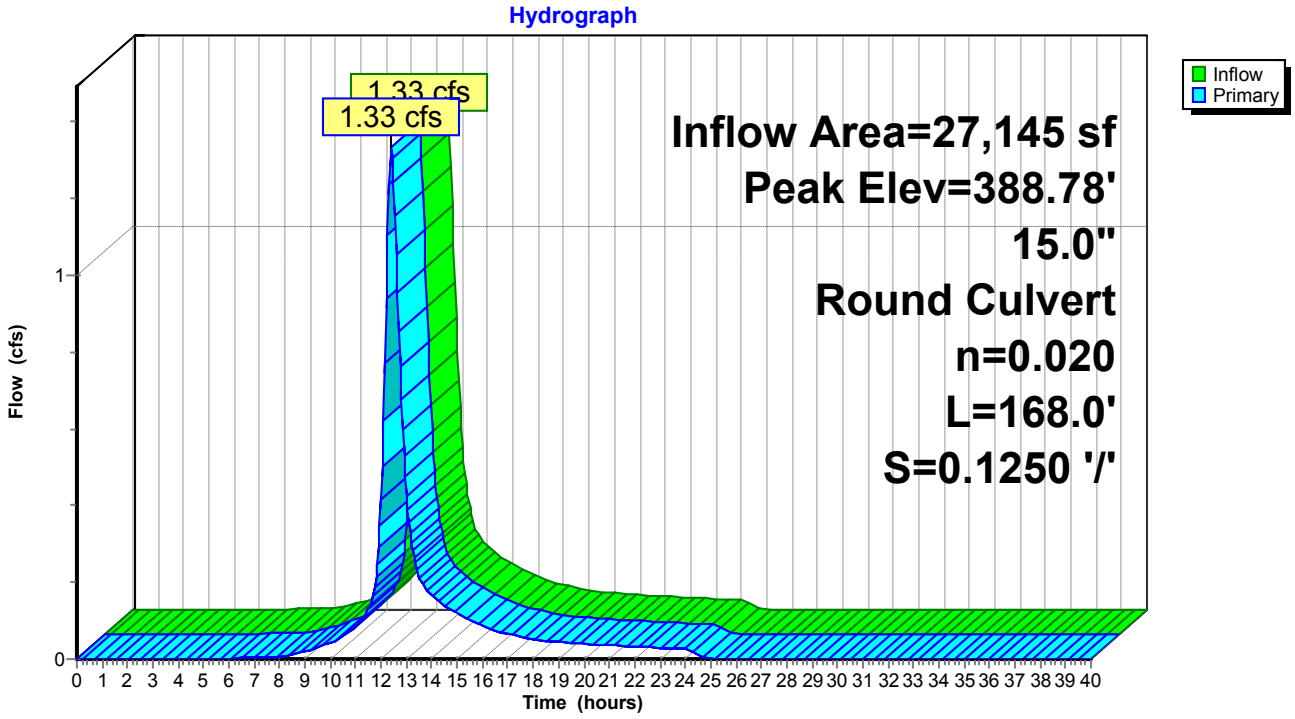
Inflow Area = 27,145 sf, 35.52% Impervious, Inflow Depth = 3.20" for 10-Year event
Inflow = 1.33 cfs @ 12.40 hrs, Volume= 7,248 cf
Outflow = 1.33 cfs @ 12.40 hrs, Volume= 7,248 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.33 cfs @ 12.40 hrs, Volume= 7,248 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 388.78' @ 12.40 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.23'	**15.0" Round Culvert** L= 168.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.23' / 367.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.33 cfs @ 12.40 hrs HW=388.78' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.33 cfs @ 2.54 fps)

Pond 7P: CB #7



Summary for Pond 8P: CB #8

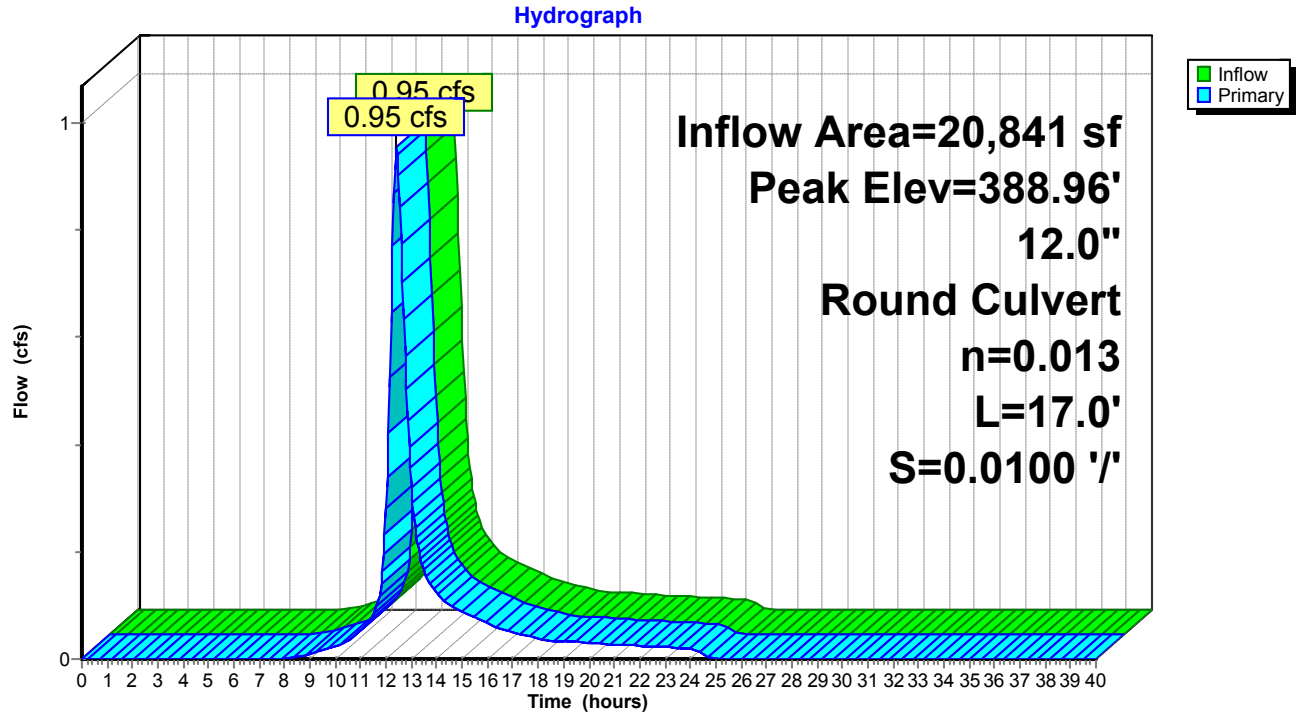
Inflow Area = 20,841 sf, 23.18% Impervious, Inflow Depth = 2.97" for 10-Year event
Inflow = 0.95 cfs @ 12.41 hrs, Volume= 5,166 cf
Outflow = 0.95 cfs @ 12.41 hrs, Volume= 5,166 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.95 cfs @ 12.41 hrs, Volume= 5,166 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 388.96' @ 12.41 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.40' / 388.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.95 cfs @ 12.41 hrs HW=388.96' (Free Discharge)
1=Culvert (Barrel Controls 0.95 cfs @ 3.06 fps)

Pond 8P: CB #8



Summary for Pond 9P: Underground Detention System

Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 4.27 cfs @ 12.36 hrs, Volume= 23,481 cf
Outflow = 1.49 cfs @ 12.93 hrs, Volume= 23,481 cf, Atten= 65%, Lag= 34.2 min
Primary = 1.49 cfs @ 12.93 hrs, Volume= 23,481 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 341.59' @ 12.93 hrs Surf.Area= 3,142 sf Storage= 9,530 cf

Plug-Flow detention time= 276.6 min calculated for 23,452 cf (100% of inflow)
Center-of-Mass det. time= 276.8 min (1,131.2 - 854.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	337.50'	4,817 cf	**37.58'W x 83.59'L x 6.50'H Field A** 20,421 cf Overall - 8,379 cf Embedded = 12,042 cf x 40.0% Voids
#2A	338.00'	8,379 cf	**ADS_StormTech MC-4500 +Cap** x 76 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 19 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		13,196 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	337.25'	**3.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 337.25' / 337.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.05 sf
#2	Primary	340.97'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 340.97' / 340.77' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.48 cfs @ 12.93 hrs HW=341.59' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.32 cfs @ 6.57 fps)
└**2=Culvert** (Barrel Controls 1.16 cfs @ 3.25 fps)

Pond 9P: Underground Detention System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

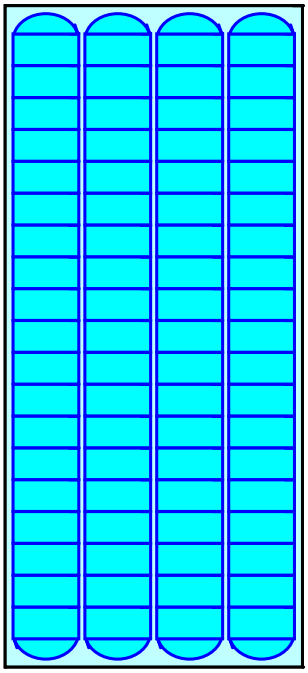
19 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 81.59' Row Length +12.0" End Stone x 2 = 83.59' Base Length
4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width
6.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.50' Field Height

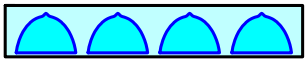
76 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 8,378.9 cf Chamber Storage

20,420.7 cf Field - 8,378.9 cf Chambers = 12,041.9 cf Stone x 40.0% Voids = 4,816.7 cf Stone Storage

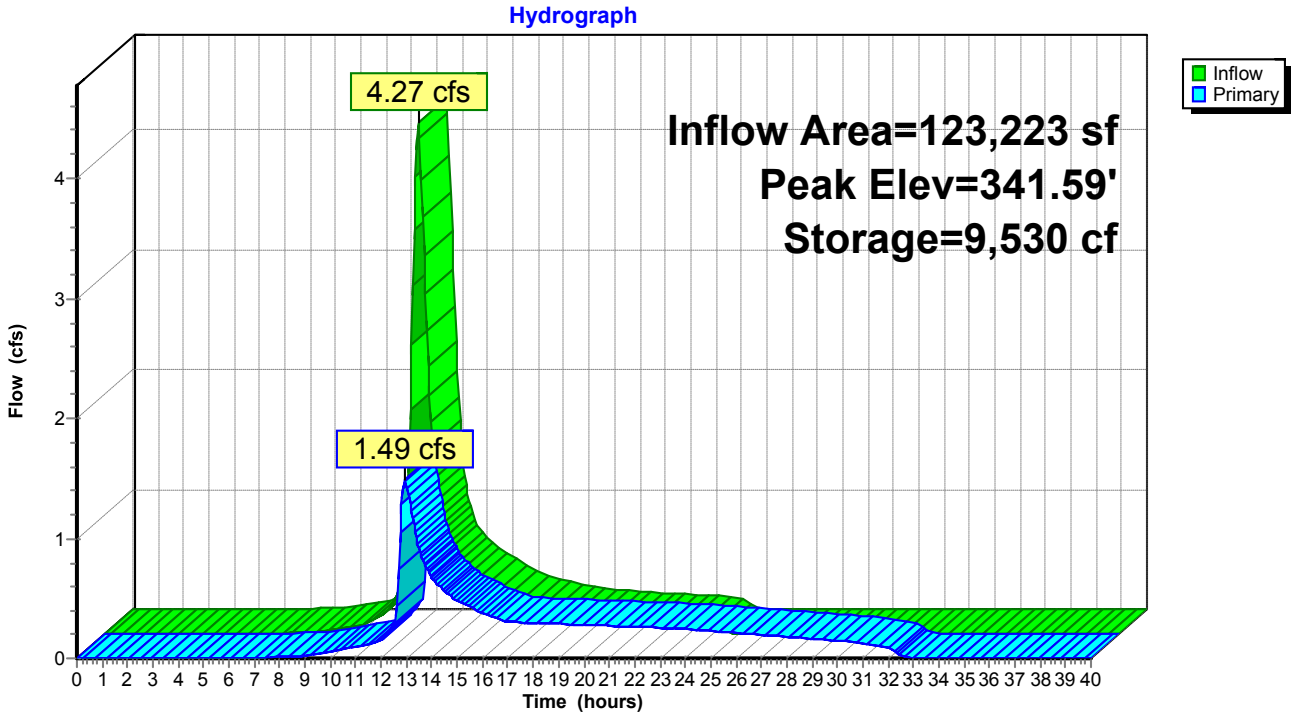
Chamber Storage + Stone Storage = 13,195.6 cf = 0.303 af
Overall Storage Efficiency = 64.6%
Overall System Size = 83.59' x 37.58' x 6.50'

76 Chambers
756.3 cy Field
446.0 cy Stone





Pond 9P: Underground Detention System



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Developed Drainage Runoff Area=32,065 sf 22.58% Impervious Runoff Depth=2.98"
Flow Length=537' Tc=26.6 min CN=69 Runoff=1.52 cfs 7,964 cf

Subcatchment 2S: Developed Drainage Runoff Area=6,831 sf 83.90% Impervious Runoff Depth=5.40"
Flow Length=173' Tc=6.2 min CN=92 Runoff=0.90 cfs 3,076 cf

Subcatchment 3S: Developed Drainage Runoff Area=52,541 sf 9.95% Impervious Runoff Depth=2.51"
Flow Length=461' Tc=26.1 min CN=64 Runoff=2.08 cfs 10,985 cf

Subcatchment 4S: Developed Drainage Runoff Area=7,292 sf 66.39% Impervious Runoff Depth=4.62"
Flow Length=191' Tc=8.2 min CN=85 Runoff=0.81 cfs 2,810 cf

Subcatchment 5S: Developed Drainage Runoff Area=20,008 sf 23.30% Impervious Runoff Depth=2.98"
Flow Length=319' Tc=22.4 min CN=69 Runoff=1.02 cfs 4,970 cf

Subcatchment 6S: Developed Drainage Runoff Area=16,237 sf 29.82% Impervious Runoff Depth=3.18"
Flow Length=262' Tc=24.3 min CN=71 Runoff=0.86 cfs 4,296 cf

Subcatchment 7S: Developed Drainage Runoff Area=6,304 sf 76.33% Impervious Runoff Depth=5.07"
Flow Length=330' Tc=27.5 min CN=89 Runoff=0.49 cfs 2,661 cf

Subcatchment 8S: Developed Drainage Runoff Area=20,841 sf 23.18% Impervious Runoff Depth=3.98"
Flow Length=323' Tc=29.3 min CN=79 Runoff=1.27 cfs 6,920 cf

Reach 9R: Existing Drainage System Inflow=4.72 cfs 43,682 cf
Outflow=4.72 cfs 43,682 cf

Pond 1P: CB #1 Peak Elev=339.47' Inflow=4.60 cfs 40,606 cf
18.0" Round Culvert n=0.013 L=14.0' S=0.0100 '/' Outflow=4.60 cfs 40,606 cf

Pond 2P: CB #2 Peak Elev=338.04' Inflow=4.72 cfs 43,682 cf
18.0" Round Culvert n=0.013 L=76.0' S=0.0100 '/' Outflow=4.72 cfs 43,682 cf

Pond 3P: CB #3 Peak Elev=351.04' Inflow=6.02 cfs 32,642 cf
15.0" Round Culvert n=0.020 L=11.0' S=0.1255 '/' Outflow=6.02 cfs 32,642 cf

Pond 4P: CB #4 Peak Elev=345.71' Inflow=0.81 cfs 2,810 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.81 cfs 2,810 cf

Pond 5P: CB #5 Peak Elev=368.23' Inflow=3.60 cfs 18,847 cf
15.0" Round Culvert n=0.020 L=192.0' S=0.1250 '/' Outflow=3.60 cfs 18,847 cf

Pond 6P: CB #6 Peak Elev=367.92' Inflow=0.86 cfs 4,296 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.86 cfs 4,296 cf

Pond 7P: CB #7 Peak Elev=388.88' Inflow=1.76 cfs 9,581 cf
15.0" Round Culvert n=0.020 L=168.0' S=0.1250 '/' Outflow=1.76 cfs 9,581 cf

Pond 8P: CB #8 Peak Elev=389.06' Inflow=1.27 cfs 6,920 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=1.27 cfs 6,920 cf

Pond 9P: Underground Detention System Peak Elev=342.30' Storage=10,916 cf Inflow=6.02 cfs 32,642 cf
Outflow=3.52 cfs 32,642 cf

Total Runoff Area = 162,119 sf Runoff Volume = 43,682 cf Average Runoff Depth = 3.23"
73.98% Pervious = 119,930 sf 26.02% Impervious = 42,189 sf

Summary for Subcatchment 1S: Developed Drainage Area - CB #1

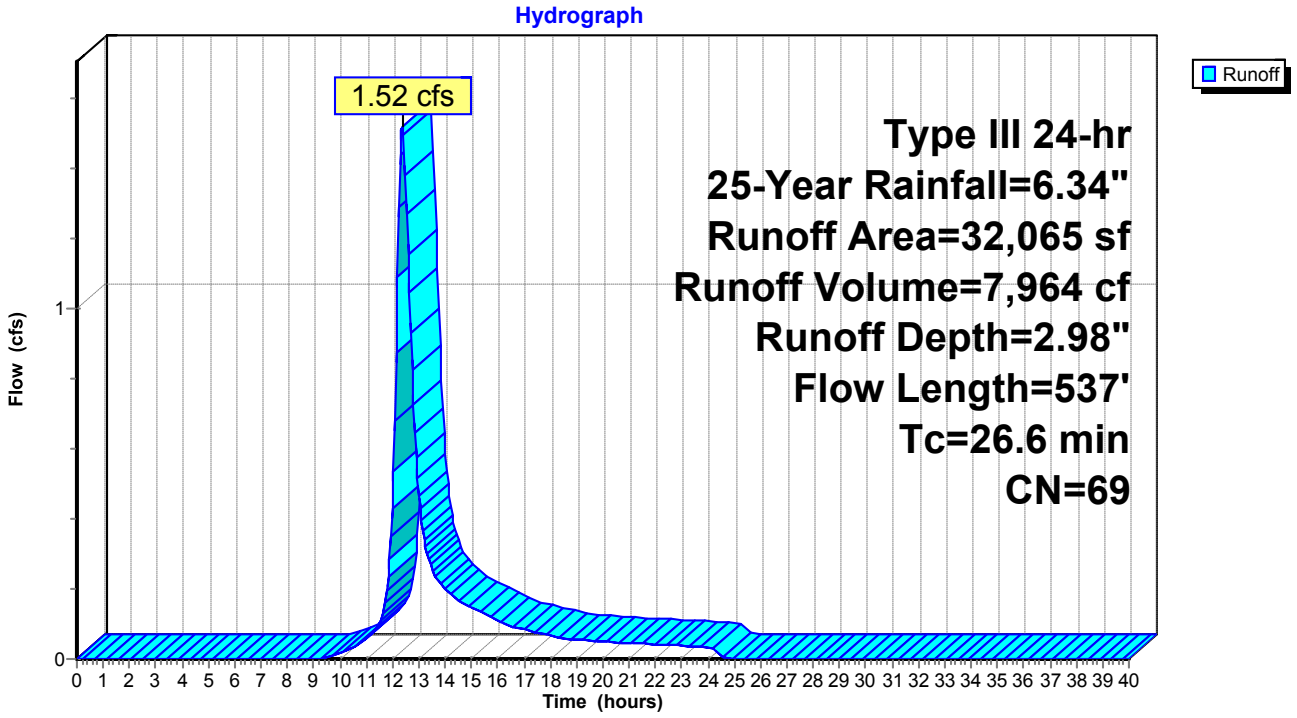
Runoff = 1.52 cfs @ 12.38 hrs, Volume= 7,964 cf, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
7,241	98	Paved parking, HSG D
24,824	60	Woods, Fair, HSG B
32,065	69	Weighted Average
24,824		77.42% Pervious Area
7,241		22.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
3.4	236	0.2200	1.17		**Shallow Concentrated Flow, Elev. 448 -396** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3700	9.79		**Shallow Concentrated Flow, Elev. 396 - 348** Unpaved Kv= 16.1 fps
0.7	134	0.0420	3.30		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
26.6	537	Total			

Subcatchment 1S: Developed Drainage Area - CB #1



Summary for Subcatchment 2S: Developed Drainage Area - CB #2

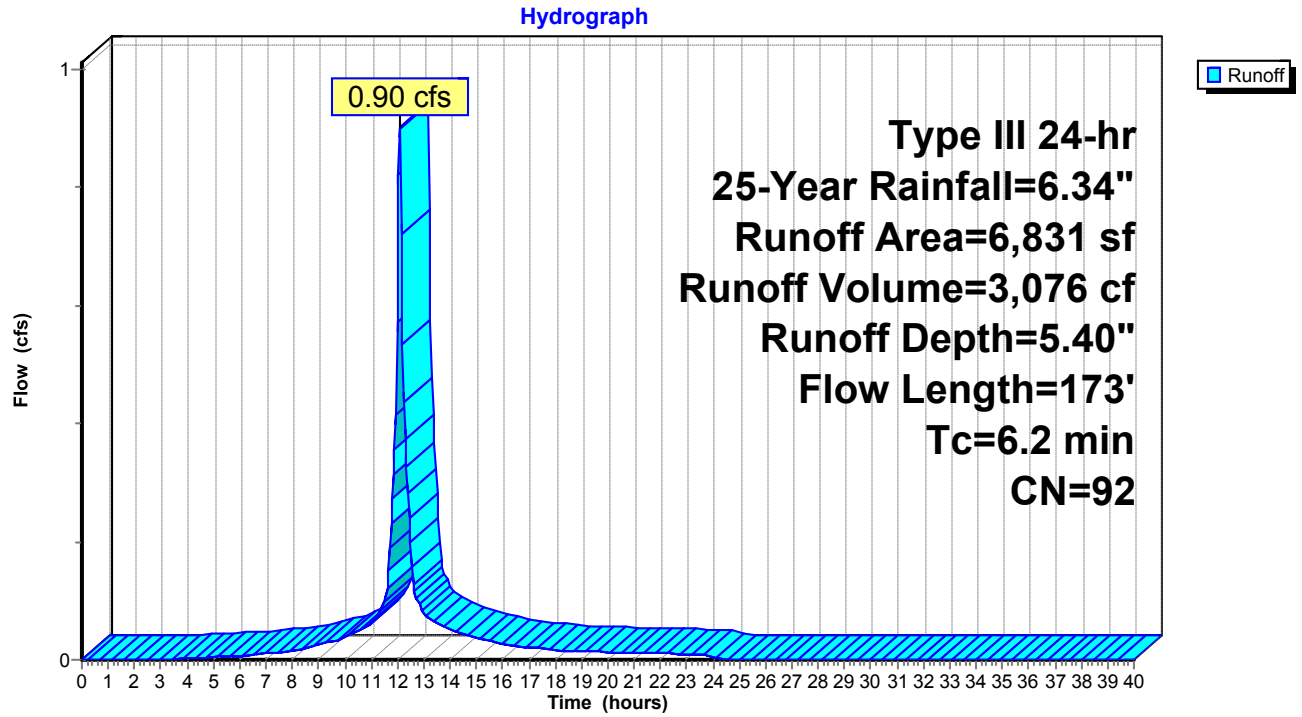
Runoff = 0.90 cfs @ 12.09 hrs, Volume= 3,076 cf, Depth= 5.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
5,731	98	Paved parking, HSG D
1,100	60	Woods, Fair, HSG B
6,831	92	Weighted Average
1,100		16.10% Pervious Area
5,731		83.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.2860	0.10		**Sheet Flow, Elev. 396 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	14	0.3700	9.79		**Shallow Concentrated Flow, Elev. 386 -348** Unpaved Kv= 16.1 fps
0.6	124	0.0450	3.42		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
6.2	173	Total			

Subcatchment 2S: Developed Drainage Area - CB #2



Summary for Subcatchment 3S: Developed Drainage Area - CB #3

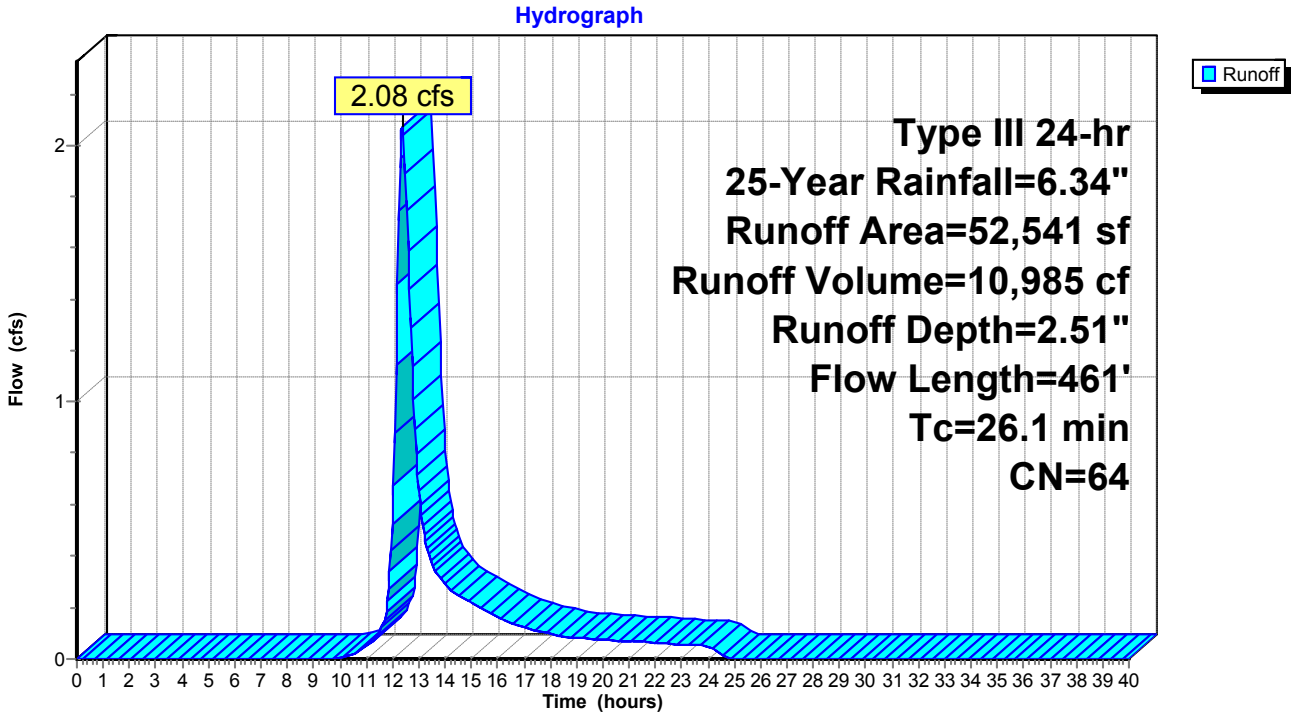
Runoff = 2.08 cfs @ 12.38 hrs, Volume= 10,985 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
5,229	98	Paved parking, HSG D
47,312	60	Woods, Fair, HSG B
52,541	64	Weighted Average
47,312		90.05% Pervious Area
5,229		9.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	150	0.1700	0.11		**Sheet Flow, Elev. 472 - 446.5** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	247	0.1720	1.04		**Shallow Concentrated Flow, Elev. 446.5 - 404** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3400	9.39		**Shallow Concentrated Flow, Elev. 404 - 354** Unpaved Kv= 16.1 fps
0.1	47	0.1120	5.39		**Shallow Concentrated Flow, Elev. 354 - 348.72** Unpaved Kv= 16.1 fps
26.1	461	Total			

Subcatchment 3S: Developed Drainage Area - CB #3



Summary for Subcatchment 4S: Developed Drainage Area - CB #4

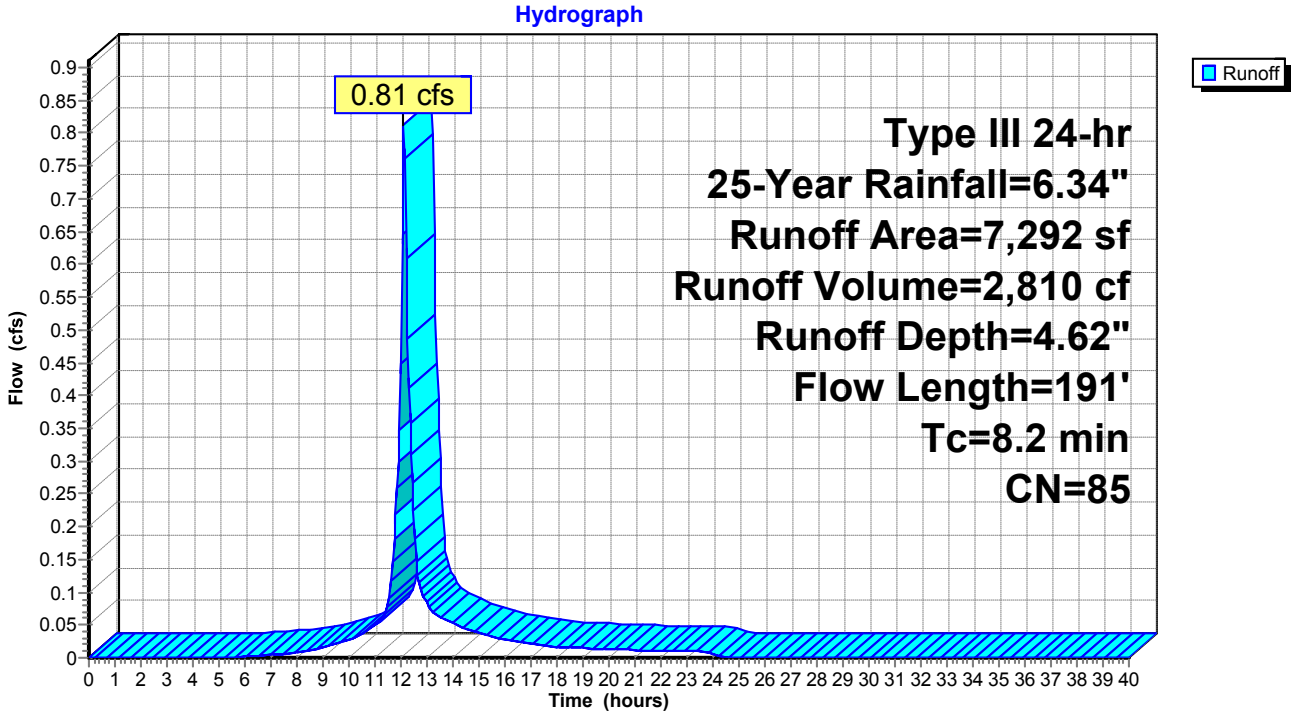
Runoff = 0.81 cfs @ 12.11 hrs, Volume= 2,810 cf, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
4,841	98	Paved parking, HSG D
2,451	60	Woods, Fair, HSG B
7,292	85	Weighted Average
2,451		33.61% Pervious Area
4,841		66.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	39	0.1540	0.08		**Sheet Flow, Elev. 392 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	7	0.3500	9.52		**Shallow Concentrated Flow, Elev. 386 - 366** Unpaved Kv= 16.1 fps
0.4	145	0.1190	5.55		**Shallow Concentrated Flow, Elev. 366 - 348.72** Unpaved Kv= 16.1 fps
8.2	191	Total			

Subcatchment 4S: Developed Drainage Area - CB #4



Summary for Subcatchment 5S: Developed Drainage Area - CB #5

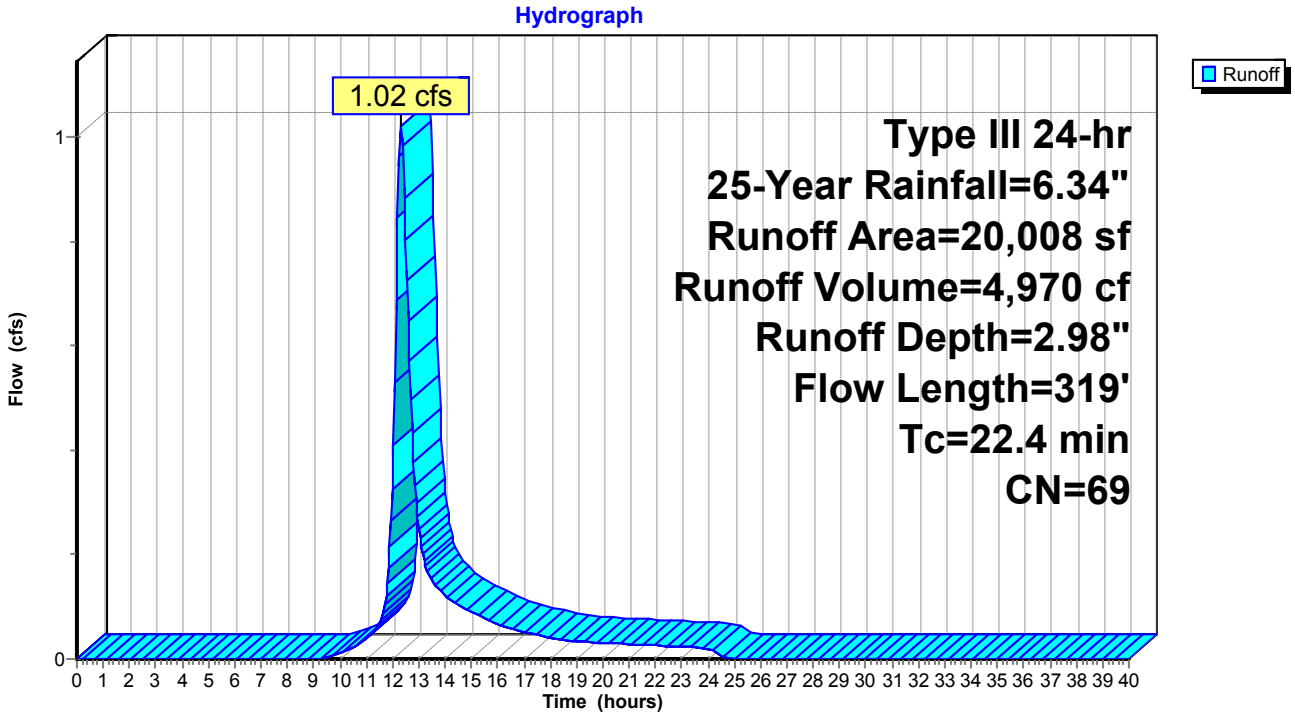
Runoff = 1.02 cfs @ 12.32 hrs, Volume= 4,970 cf, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
4,662	98	Paved parking, HSG D
15,346	60	Woods, Fair, HSG B
20,008	69	Weighted Average
15,346		76.70% Pervious Area
4,662		23.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	150	0.1970	0.12		**Sheet Flow, Elev. 450.5 - 421** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.6	121	0.2400	1.22		**Shallow Concentrated Flow, Elev. 421 - 392** Forest w/Heavy Litter Kv= 2.5 fps
0.0	6	0.4290	10.55		**Shallow Concentrated Flow, Elev. 392.0 - 378** Unpaved Kv= 16.1 fps
0.1	42	0.1690	6.62		**Shallow Concentrated Flow, Elev. 378 - 370.92** Unpaved Kv= 16.1 fps
22.4	319	Total			

Subcatchment 5S: Developed Drainage Area - CB #5



Summary for Subcatchment 6S: Developed Drainage Area - CB #6

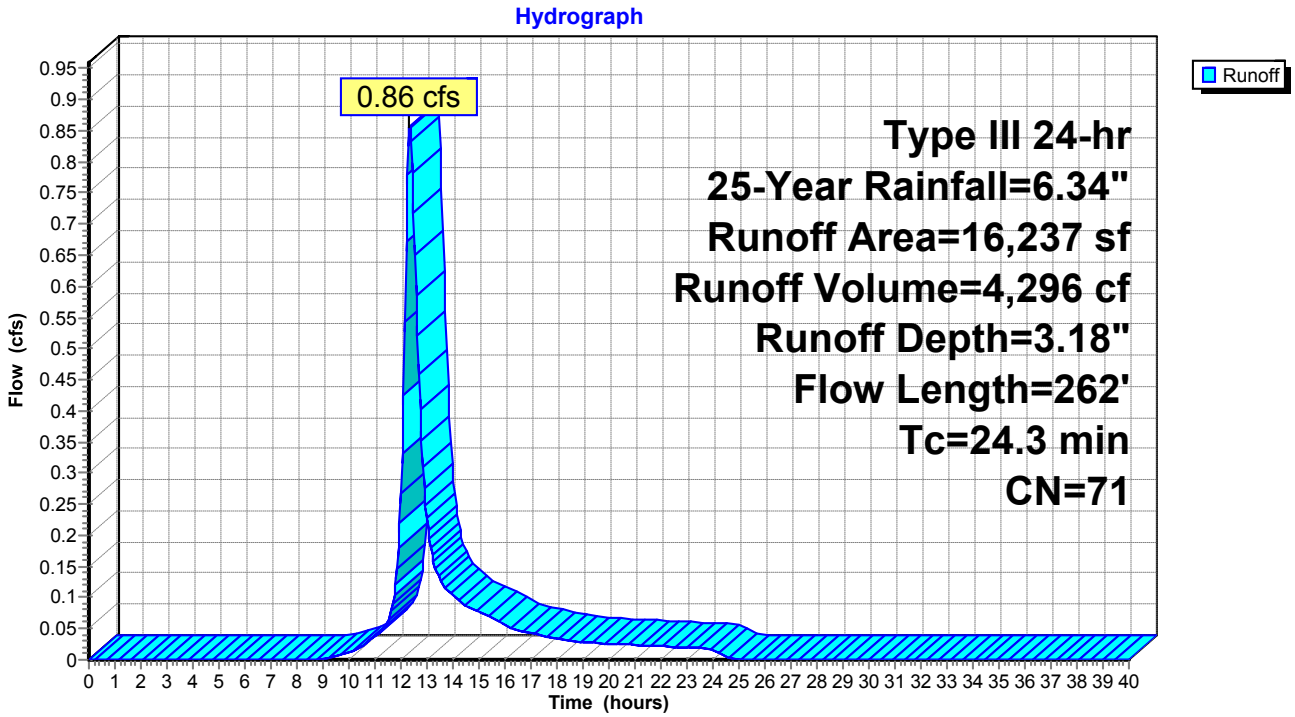
Runoff = 0.86 cfs @ 12.34 hrs, Volume= 4,296 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
4,842	98	Paved parking, HSG D
11,395	60	Woods, Fair, HSG B
16,237	71	Weighted Average
11,395		70.18% Pervious Area
4,842		29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.0	150	0.1370	0.10		**Sheet Flow, Elev. 424.5 - 404** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	8	0.4000	10.18		**Shallow Concentrated Flow, Elev. 404 - 384** Unpaved Kv= 16.1 fps
0.3	104	0.1260	5.71		**Shallow Concentrated Flow, Elev. 384 - 370.92** Unpaved Kv= 16.1 fps
24.3	262	Total			

Subcatchment 6S: Developed Drainage Area - CB #6



Summary for Subcatchment 7S: Developed Drainage Area - CB #7

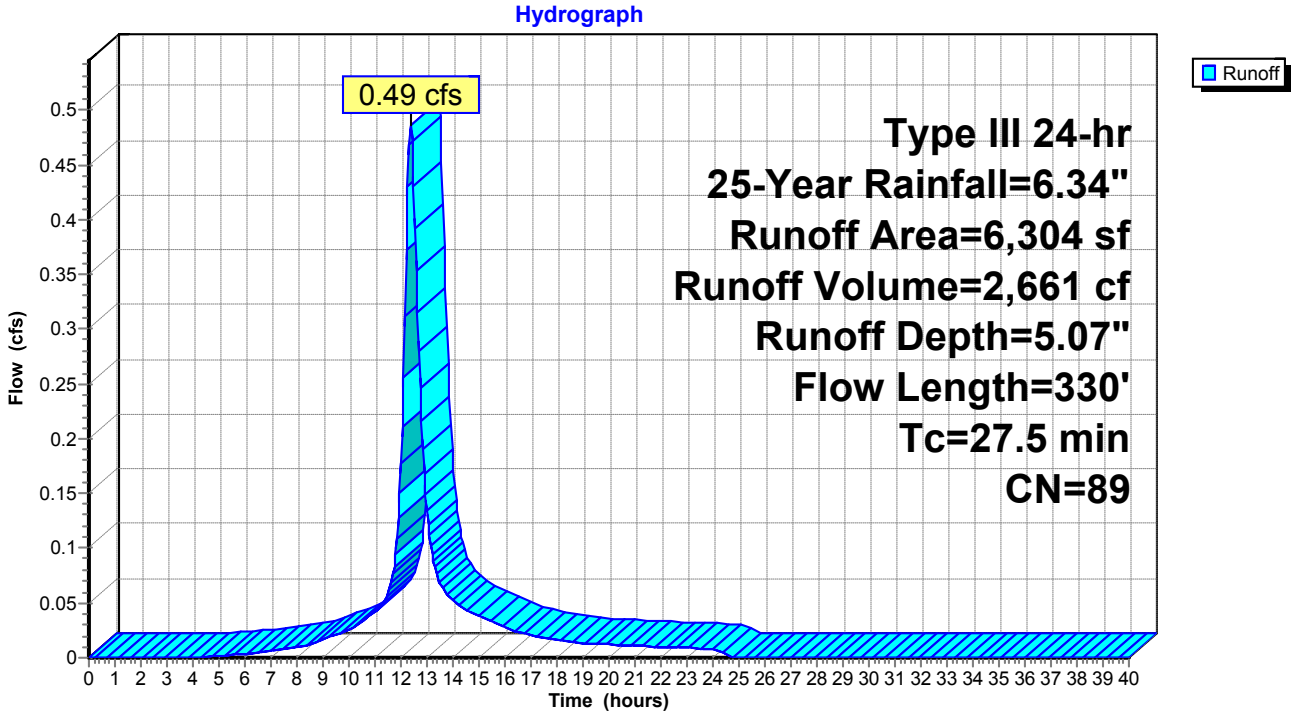
Runoff = 0.49 cfs @ 12.37 hrs, Volume= 2,661 cf, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
4,812	98	Paved parking, HSG D
1,492	60	Woods, Fair, HSG B
6,304	89	Weighted Average
1,492		23.67% Pervious Area
4,812		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	110	0.0550	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	220	0.1280	5.76		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
27.5	330	Total			

Subcatchment 7S: Developed Drainage Area - CB #7



Summary for Subcatchment 8S: Developed Drainage Area - CB #8

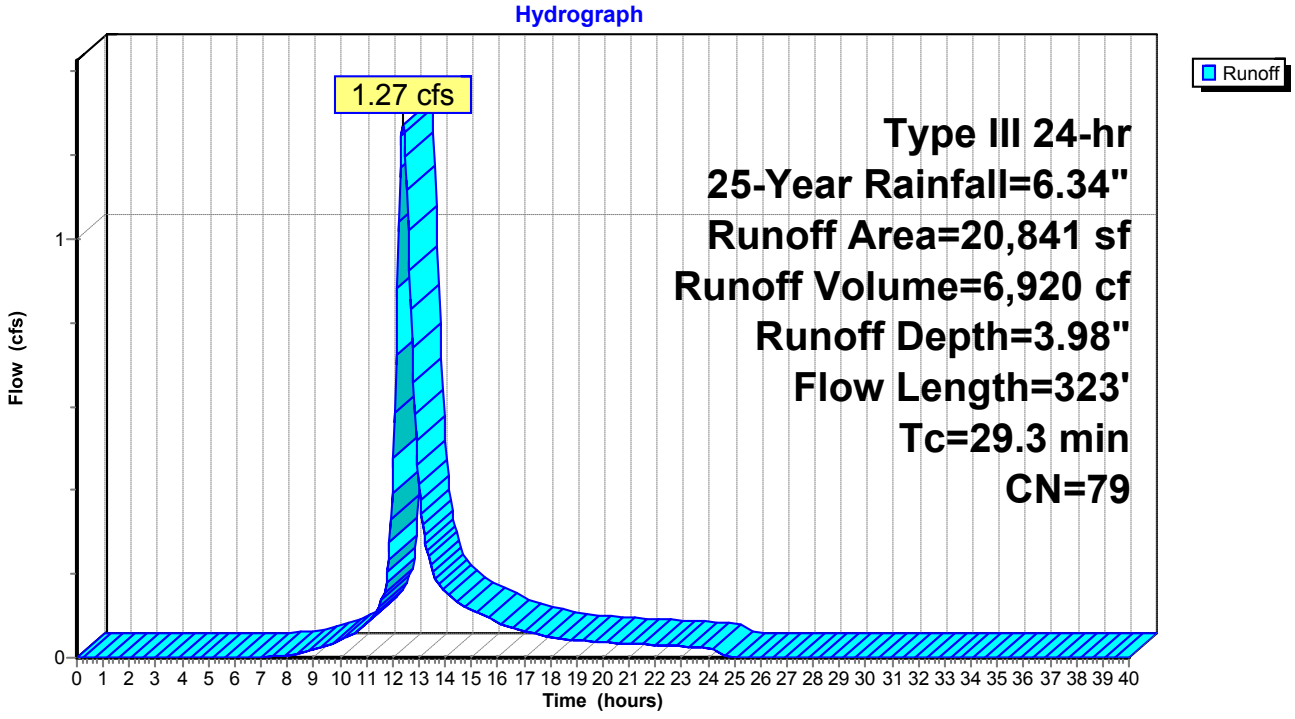
Runoff = 1.27 cfs @ 12.40 hrs, Volume= 6,920 cf, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
4,831	98	Paved parking, HSG D
16,010	73	Woods, Fair, HSG C
20,841	79	Weighted Average
16,010		76.82% Pervious Area
4,831		23.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.7	116	0.0520	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	207	0.1360	5.94		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
29.3	323	Total			

Subcatchment 8S: Developed Drainage Area - CB #8



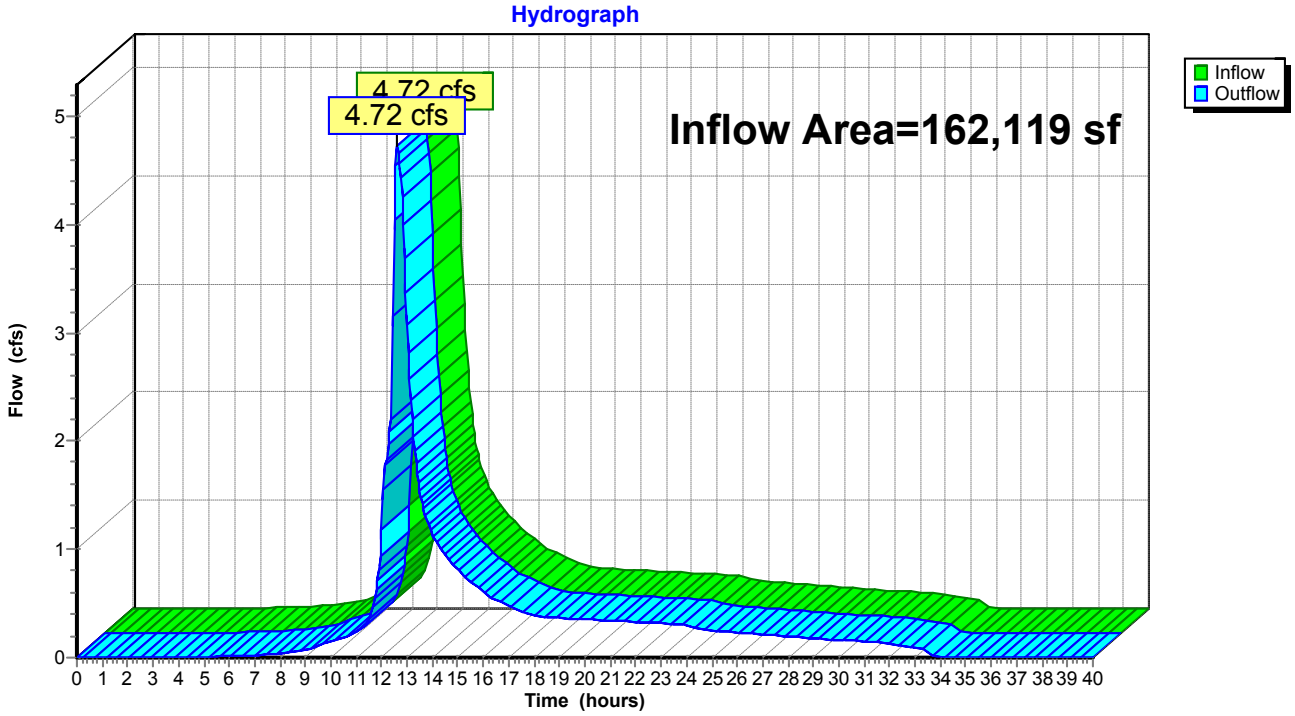
Summary for Reach 9R: Existing Drainage System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 3.23" for 25-Year event
Inflow = 4.72 cfs @ 12.61 hrs, Volume= 43,682 cf
Outflow = 4.72 cfs @ 12.61 hrs, Volume= 43,682 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 9R: Existing Drainage System



Summary for Pond 1P: CB #1

[81] Warning: Exceeded Pond 9P by 0.84' @ 9.90 hrs

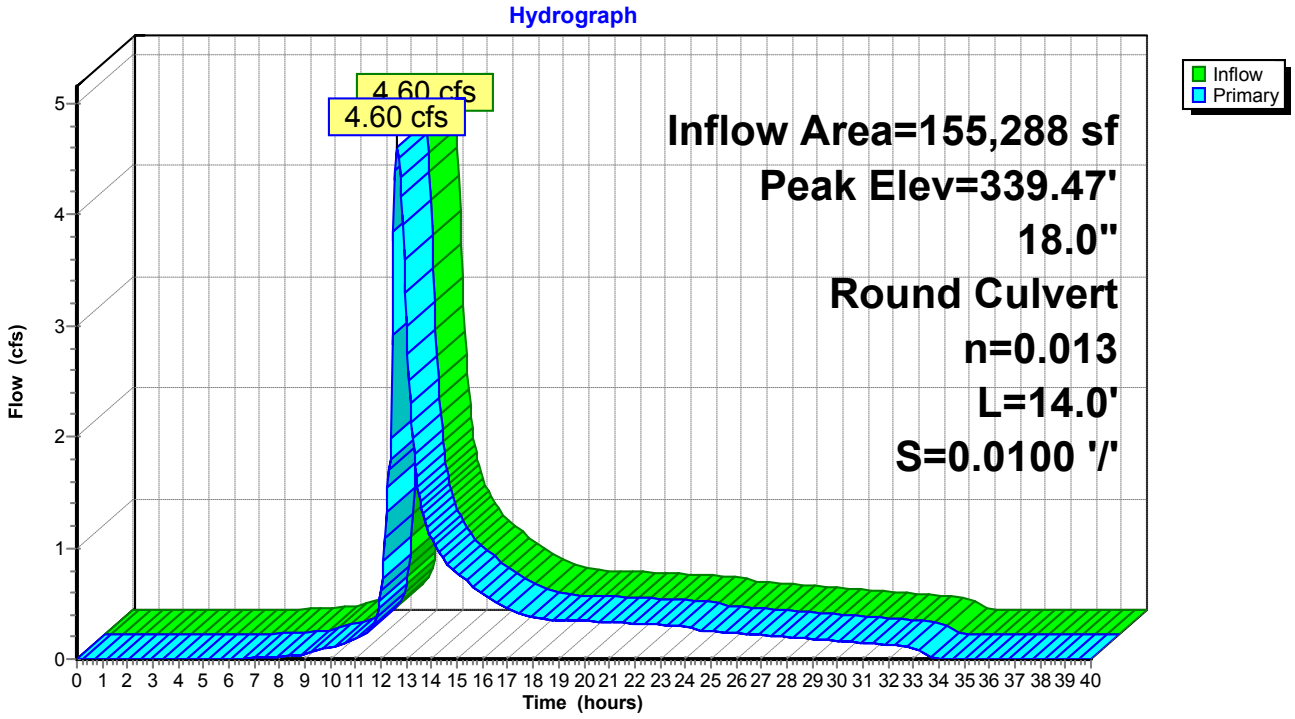
Inflow Area = 155,288 sf, 23.48% Impervious, Inflow Depth = 3.14" for 25-Year event
Inflow = 4.60 cfs @ 12.62 hrs, Volume= 40,606 cf
Outflow = 4.60 cfs @ 12.62 hrs, Volume= 40,606 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.60 cfs @ 12.62 hrs, Volume= 40,606 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 339.47' @ 12.62 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	338.25'	**18.0" Round Culvert** L= 14.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 338.25' / 338.11' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.57 cfs @ 12.62 hrs HW=339.46' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.57 cfs @ 4.07 fps)

Pond 1P: CB #1



Summary for Pond 2P: CB #2

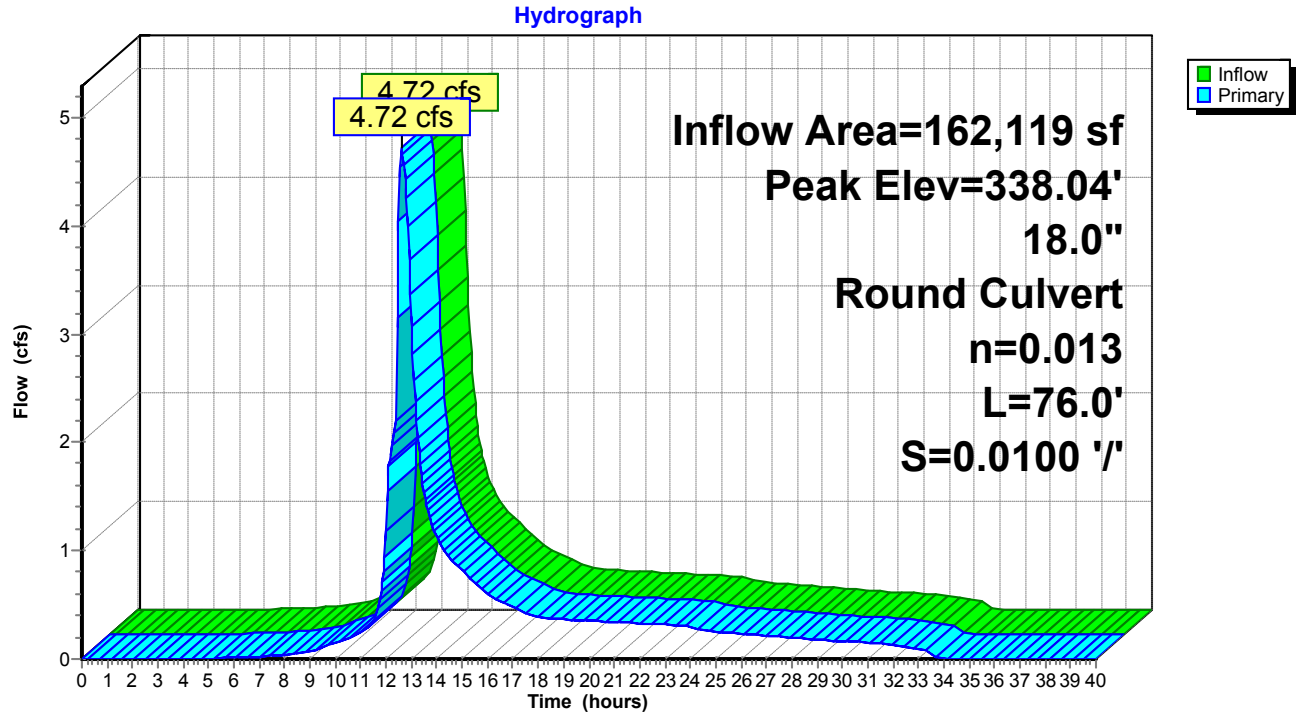
Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 3.23" for 25-Year event
Inflow = 4.72 cfs @ 12.61 hrs, Volume= 43,682 cf
Outflow = 4.72 cfs @ 12.61 hrs, Volume= 43,682 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.72 cfs @ 12.61 hrs, Volume= 43,682 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 338.04' @ 12.61 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	336.96'	**18.0" Round Culvert** L= 76.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 336.96' / 336.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.70 cfs @ 12.61 hrs HW=338.04' (Free Discharge)
1=Culvert (Barrel Controls 4.70 cfs @ 4.86 fps)

Pond 2P: CB #2



Summary for Pond 3P: CB #3

[58] Hint: Peaked 2.32' above defined flood level
[81] Warning: Exceeded Pond 4P by 5.52' @ 12.35 hrs
[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 7.81'

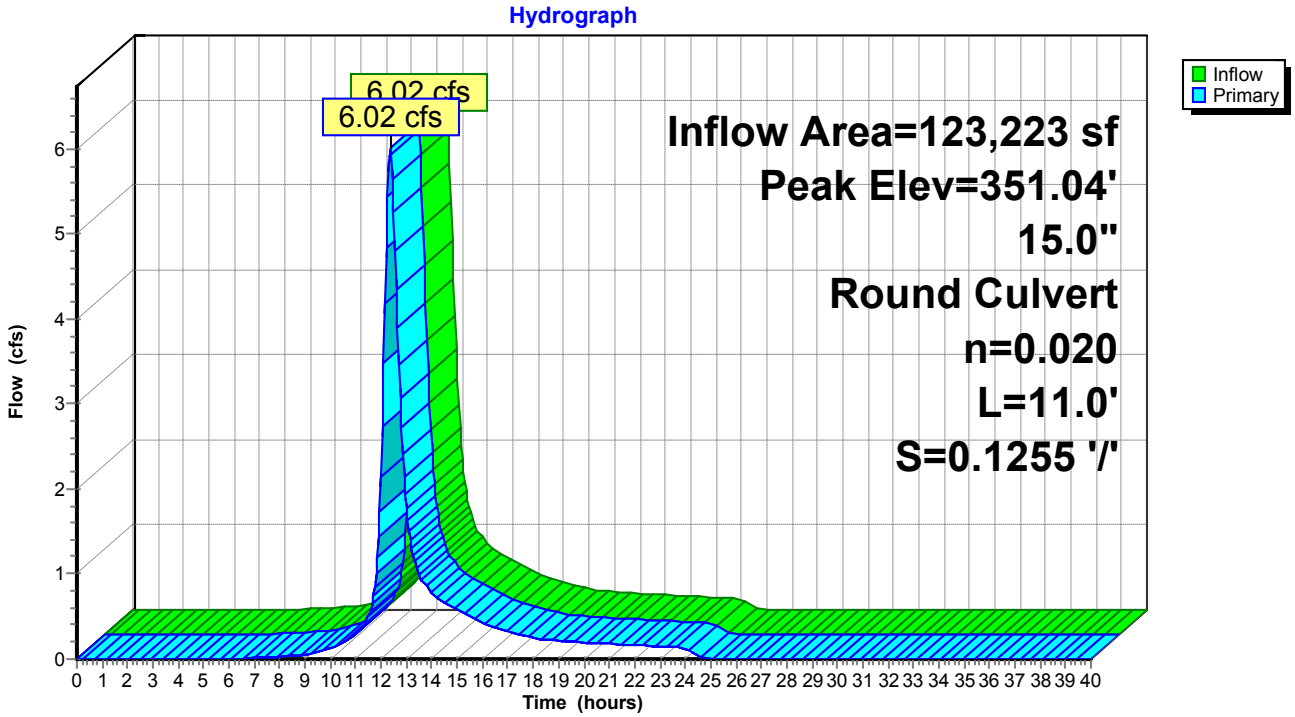
Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 3.18" for 25-Year event
Inflow = 6.02 cfs @ 12.36 hrs, Volume= 32,642 cf
Outflow = 6.02 cfs @ 12.36 hrs, Volume= 32,642 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.02 cfs @ 12.36 hrs, Volume= 32,642 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 351.04' @ 12.36 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.38'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.38' / 348.00' S= 0.1255 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=6.00 cfs @ 12.36 hrs HW=351.04' (Free Discharge)
1=Culvert (Inlet Controls 6.00 cfs @ 4.89 fps)

Pond 3P: CB #3



Summary for Pond 4P: CB #4

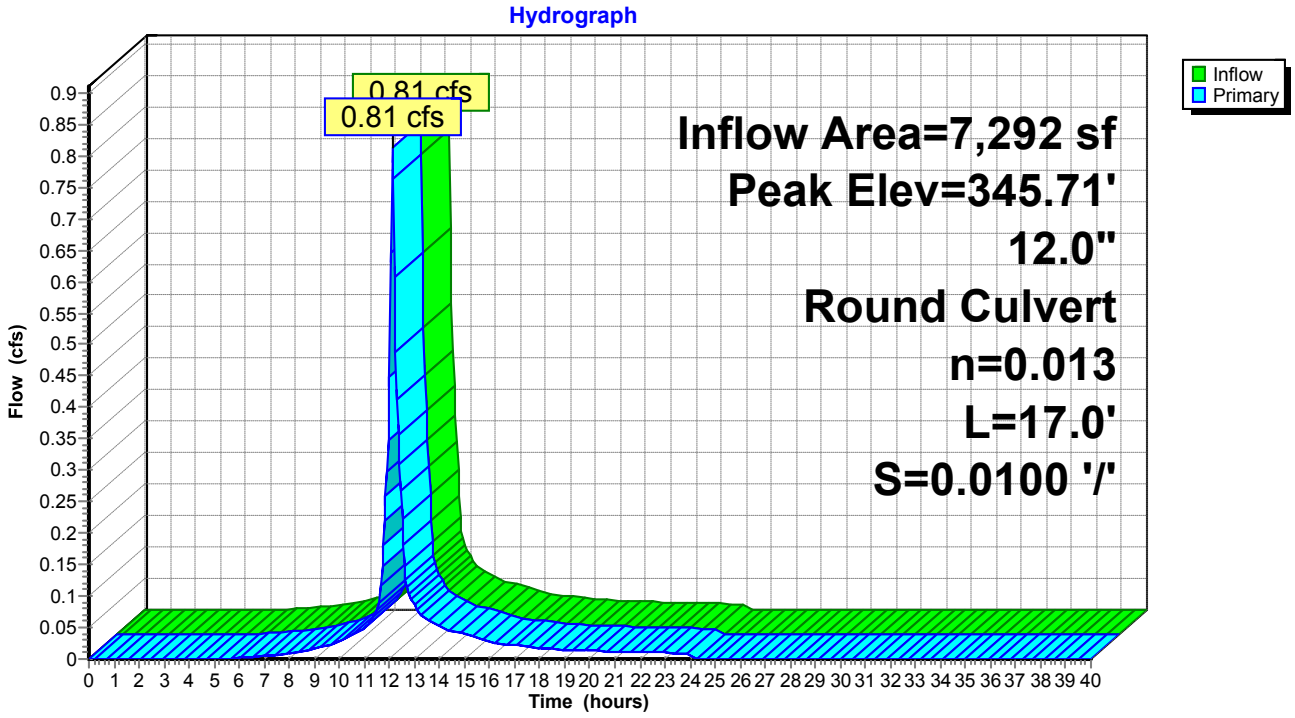
Inflow Area = 7,292 sf, 66.39% Impervious, Inflow Depth = 4.62" for 25-Year event
Inflow = 0.81 cfs @ 12.11 hrs, Volume= 2,810 cf
Outflow = 0.81 cfs @ 12.11 hrs, Volume= 2,810 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 12.11 hrs, Volume= 2,810 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 345.71' @ 12.11 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	345.20'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 345.20' / 345.03' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.79 cfs @ 12.11 hrs HW=345.70' (Free Discharge)
1=Culvert (Barrel Controls 0.79 cfs @ 2.94 fps)

Pond 4P: CB #4



Summary for Pond 5P: CB #5

[81] Warning: Exceeded Pond 6P by 0.31' @ 12.35 hrs
[79] Warning: Submerged Pond 7P Primary device # 1 OUTLET by 1.00'

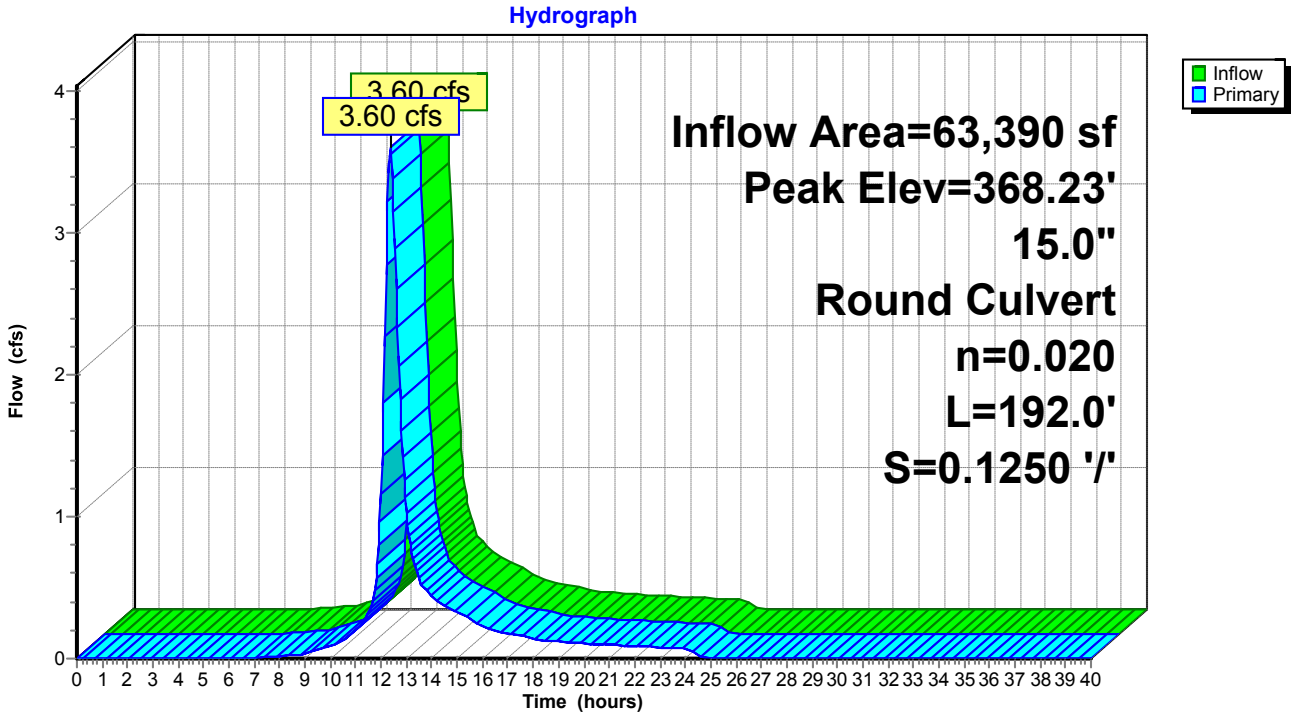
Inflow Area = 63,390 sf, 30.21% Impervious, Inflow Depth = 3.57" for 25-Year event
Inflow = 3.60 cfs @ 12.36 hrs, Volume= 18,847 cf
Outflow = 3.60 cfs @ 12.36 hrs, Volume= 18,847 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.60 cfs @ 12.36 hrs, Volume= 18,847 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 368.23' @ 12.36 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.23'	**15.0" Round Culvert** L= 192.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.23' / 343.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.59 cfs @ 12.36 hrs HW=368.23' (Free Discharge)
1=Culvert (Inlet Controls 3.59 cfs @ 3.41 fps)

Pond 5P: CB #5



Summary for Pond 6P: CB #6

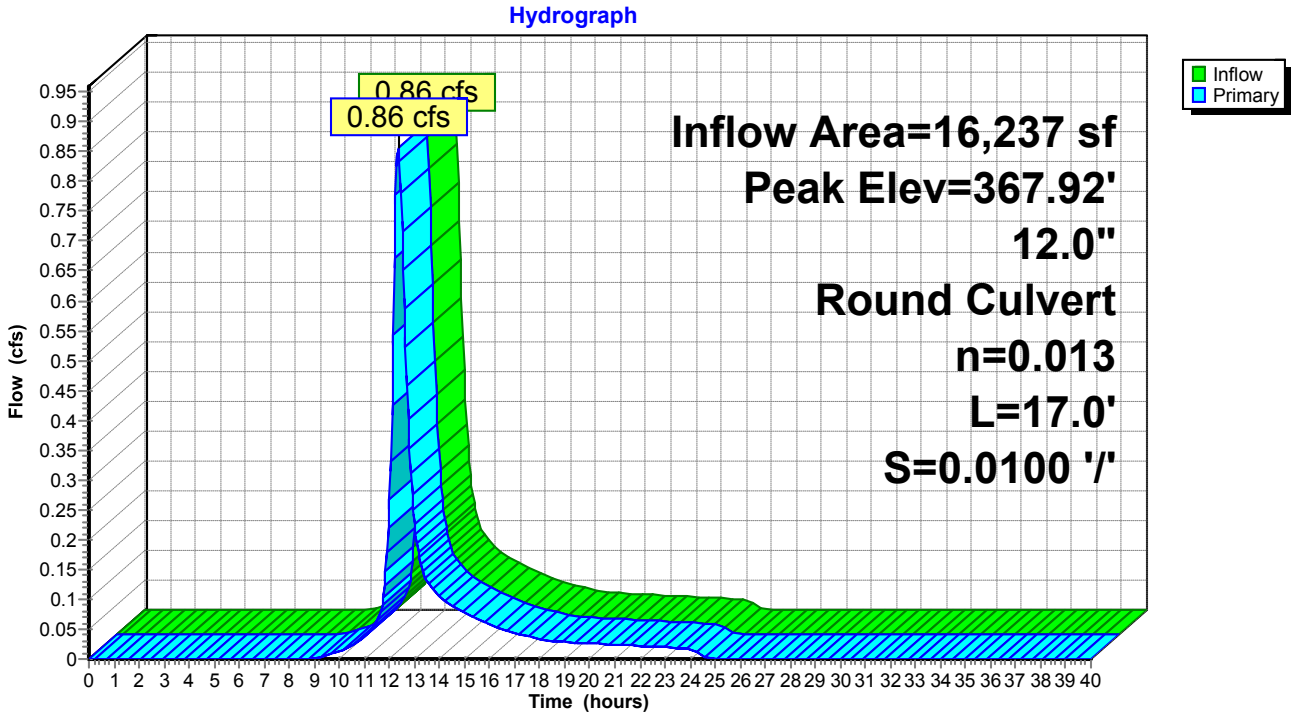
Inflow Area = 16,237 sf, 29.82% Impervious, Inflow Depth = 3.18" for 25-Year event
Inflow = 0.86 cfs @ 12.34 hrs, Volume= 4,296 cf
Outflow = 0.86 cfs @ 12.34 hrs, Volume= 4,296 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.86 cfs @ 12.34 hrs, Volume= 4,296 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 367.92' @ 12.34 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.40' / 367.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.34 hrs HW=367.92' (Free Discharge)
1=Culvert (Barrel Controls 0.85 cfs @ 2.99 fps)

Pond 6P: CB #6



Summary for Pond 7P: CB #7

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.48'

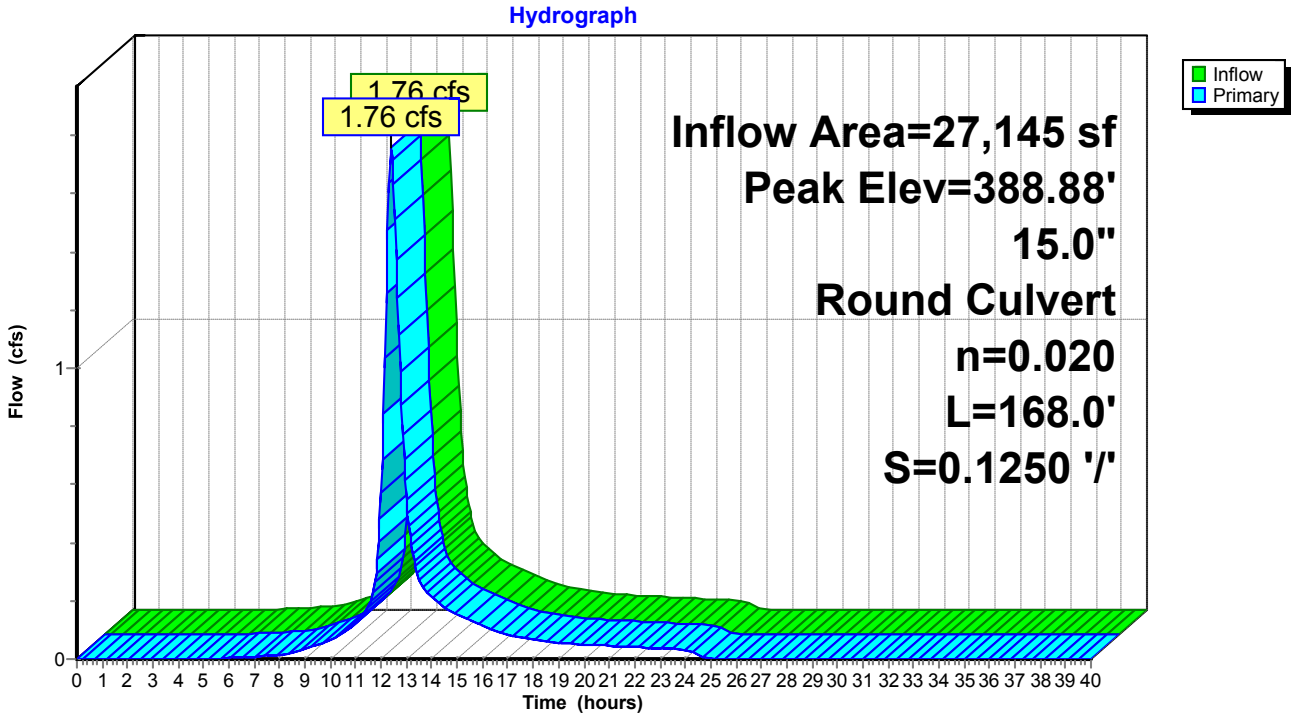
Inflow Area = 27,145 sf, 35.52% Impervious, Inflow Depth = 4.24" for 25-Year event
Inflow = 1.76 cfs @ 12.39 hrs, Volume= 9,581 cf
Outflow = 1.76 cfs @ 12.39 hrs, Volume= 9,581 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.76 cfs @ 12.39 hrs, Volume= 9,581 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 388.88' @ 12.39 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.23'	**15.0" Round Culvert** L= 168.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.23' / 367.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.75 cfs @ 12.39 hrs HW=388.88' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.75 cfs @ 2.74 fps)

Pond 7P: CB #7



Summary for Pond 8P: CB #8

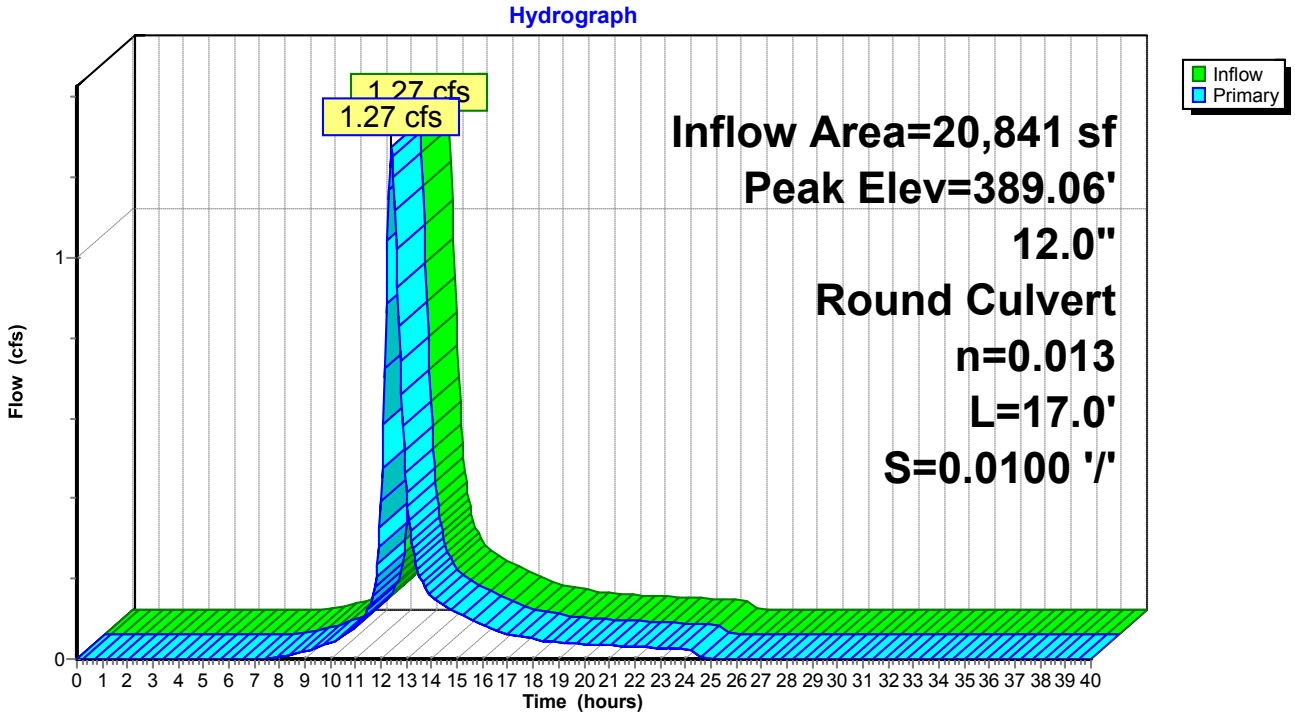
Inflow Area = 20,841 sf, 23.18% Impervious, Inflow Depth = 3.98" for 25-Year event
Inflow = 1.27 cfs @ 12.40 hrs, Volume= 6,920 cf
Outflow = 1.27 cfs @ 12.40 hrs, Volume= 6,920 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.40 hrs, Volume= 6,920 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 389.06' @ 12.40 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.40' / 388.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.27 cfs @ 12.40 hrs HW=389.06' (Free Discharge)
1=Culvert (Barrel Controls 1.27 cfs @ 3.26 fps)

Pond 8P: CB #8



Summary for Pond 9P: Underground Detention System

Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 3.18" for 25-Year event
Inflow = 6.02 cfs @ 12.36 hrs, Volume= 32,642 cf
Outflow = 3.52 cfs @ 12.70 hrs, Volume= 32,642 cf, Atten= 42%, Lag= 20.3 min
Primary = 3.52 cfs @ 12.70 hrs, Volume= 32,642 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 342.30' @ 12.70 hrs Surf.Area= 3,142 sf Storage= 10,916 cf

Plug-Flow detention time= 224.6 min calculated for 32,601 cf (100% of inflow)
Center-of-Mass det. time= 225.1 min (1,070.9 - 845.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	337.50'	4,817 cf	**37.58'W x 83.59'L x 6.50'H Field A** 20,421 cf Overall - 8,379 cf Embedded = 12,042 cf x 40.0% Voids
#2A	338.00'	8,379 cf	**ADS_StormTech MC-4500 +Cap** x 76 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 19 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		13,196 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	337.25'	**3.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 337.25' / 337.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.05 sf
#2	Primary	340.97'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 340.97' / 340.77' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.52 cfs @ 12.70 hrs HW=342.30' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.35 cfs @ 7.08 fps)
└**2=Culvert** (Barrel Controls 3.17 cfs @ 4.04 fps)

Pond 9P: Underground Detention System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

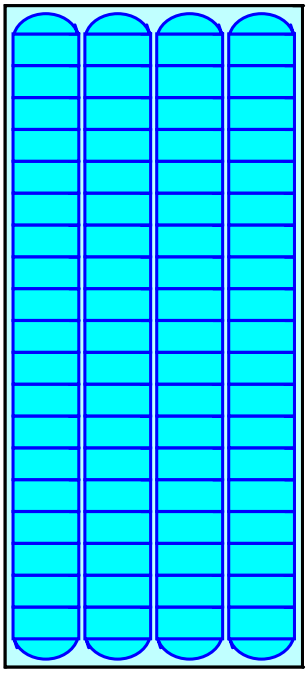
19 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 81.59' Row Length +12.0" End Stone x 2 = 83.59' Base Length
4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width
6.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.50' Field Height

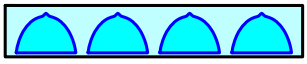
76 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 8,378.9 cf Chamber Storage

20,420.7 cf Field - 8,378.9 cf Chambers = 12,041.9 cf Stone x 40.0% Voids = 4,816.7 cf Stone Storage

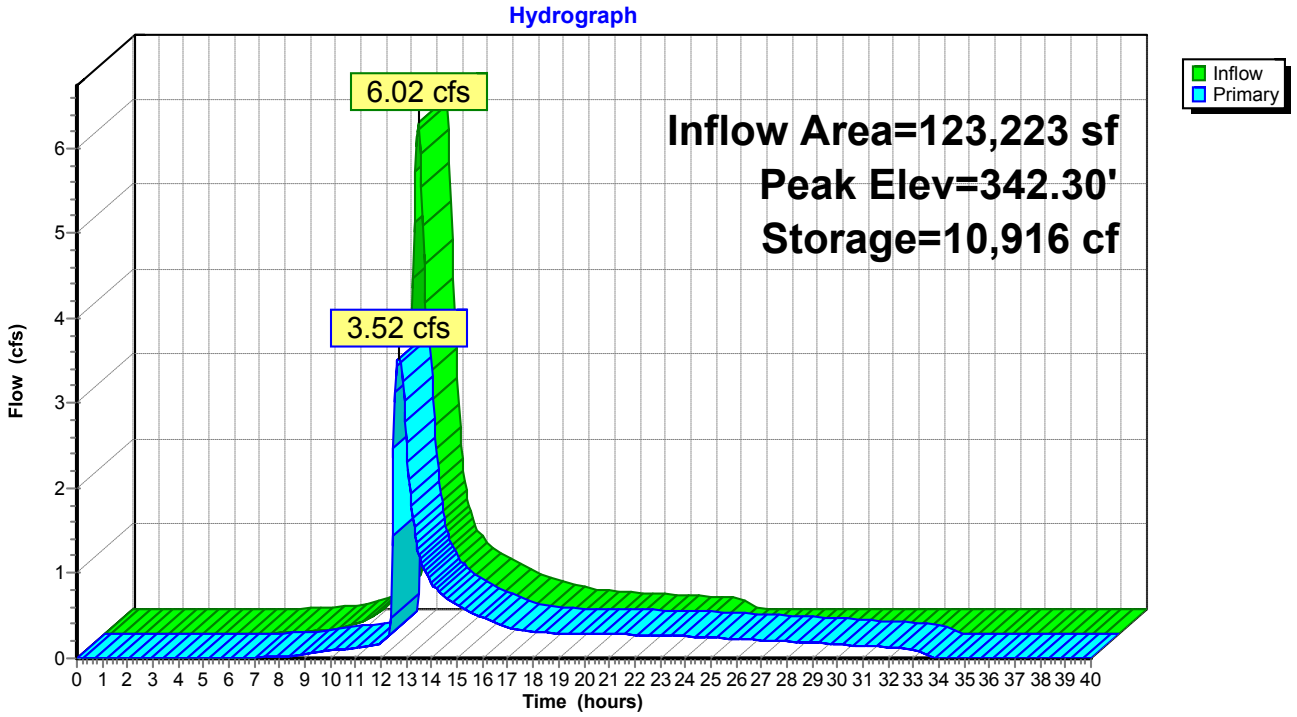
Chamber Storage + Stone Storage = 13,195.6 cf = 0.303 af
Overall Storage Efficiency = 64.6%
Overall System Size = 83.59' x 37.58' x 6.50'

76 Chambers
756.3 cy Field
446.0 cy Stone





Pond 9P: Underground Detention System



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Developed Drainage Runoff Area=32,065 sf 22.58% Impervious Runoff Depth=3.66"
Flow Length=537' Tc=26.6 min CN=69 Runoff=1.88 cfs 9,786 cf

Subcatchment 2S: Developed Drainage Runoff Area=6,831 sf 83.90% Impervious Runoff Depth=6.23"
Flow Length=173' Tc=6.2 min CN=92 Runoff=1.03 cfs 3,548 cf

Subcatchment 3S: Developed Drainage Runoff Area=52,541 sf 9.95% Impervious Runoff Depth=3.14"
Flow Length=461' Tc=26.1 min CN=64 Runoff=2.63 cfs 13,744 cf

Subcatchment 4S: Developed Drainage Runoff Area=7,292 sf 66.39% Impervious Runoff Depth=5.42"
Flow Length=191' Tc=8.2 min CN=85 Runoff=0.95 cfs 3,296 cf

Subcatchment 5S: Developed Drainage Runoff Area=20,008 sf 23.30% Impervious Runoff Depth=3.66"
Flow Length=319' Tc=22.4 min CN=69 Runoff=1.26 cfs 6,106 cf

Subcatchment 6S: Developed Drainage Runoff Area=16,237 sf 29.82% Impervious Runoff Depth=3.88"
Flow Length=262' Tc=24.3 min CN=71 Runoff=1.05 cfs 5,244 cf

Subcatchment 7S: Developed Drainage Runoff Area=6,304 sf 76.33% Impervious Runoff Depth=5.88"
Flow Length=330' Tc=27.5 min CN=89 Runoff=0.56 cfs 3,091 cf

Subcatchment 8S: Developed Drainage Runoff Area=20,841 sf 23.18% Impervious Runoff Depth=4.75"
Flow Length=323' Tc=29.3 min CN=79 Runoff=1.51 cfs 8,249 cf

Reach 9R: Existing Drainage System Inflow=6.69 cfs 53,063 cf
Outflow=6.69 cfs 53,063 cf

Pond 1P: CB #1 Peak Elev=339.79' Inflow=6.52 cfs 49,515 cf
18.0" Round Culvert n=0.013 L=14.0' S=0.0100 '/' Outflow=6.52 cfs 49,515 cf

Pond 2P: CB #2 Peak Elev=338.33' Inflow=6.69 cfs 53,063 cf
18.0" Round Culvert n=0.013 L=76.0' S=0.0100 '/' Outflow=6.69 cfs 53,063 cf

Pond 3P: CB #3 Peak Elev=351.56' Inflow=7.36 cfs 39,729 cf
15.0" Round Culvert n=0.020 L=11.0' S=0.1255 '/' Outflow=7.36 cfs 39,729 cf

Pond 4P: CB #4 Peak Elev=345.76' Inflow=0.95 cfs 3,296 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=0.95 cfs 3,296 cf

Pond 5P: CB #5 Peak Elev=368.39' Inflow=4.34 cfs 22,689 cf
15.0" Round Culvert n=0.020 L=192.0' S=0.1250 '/' Outflow=4.34 cfs 22,689 cf

Pond 6P: CB #6 Peak Elev=367.99' Inflow=1.05 cfs 5,244 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=1.05 cfs 5,244 cf

Pond 7P: CB #7 Peak Elev=388.94' Inflow=2.07 cfs 11,339 cf
15.0" Round Culvert n=0.020 L=168.0' S=0.1250 '/' Outflow=2.07 cfs 11,339 cf

Pond 8P: CB #8 Peak Elev=389.14' Inflow=1.51 cfs 8,249 cf
12.0" Round Culvert n=0.013 L=17.0' S=0.0100 '/' Outflow=1.51 cfs 8,249 cf

Pond 9P: Underground Detention System Peak Elev=343.02' Storage=11,966 cf Inflow=7.36 cfs 39,729 cf
Outflow=5.08 cfs 39,729 cf

Total Runoff Area = 162,119 sf Runoff Volume = 53,063 cf Average Runoff Depth = 3.93"
73.98% Pervious = 119,930 sf 26.02% Impervious = 42,189 sf

Summary for Subcatchment 1S: Developed Drainage Area - CB #1

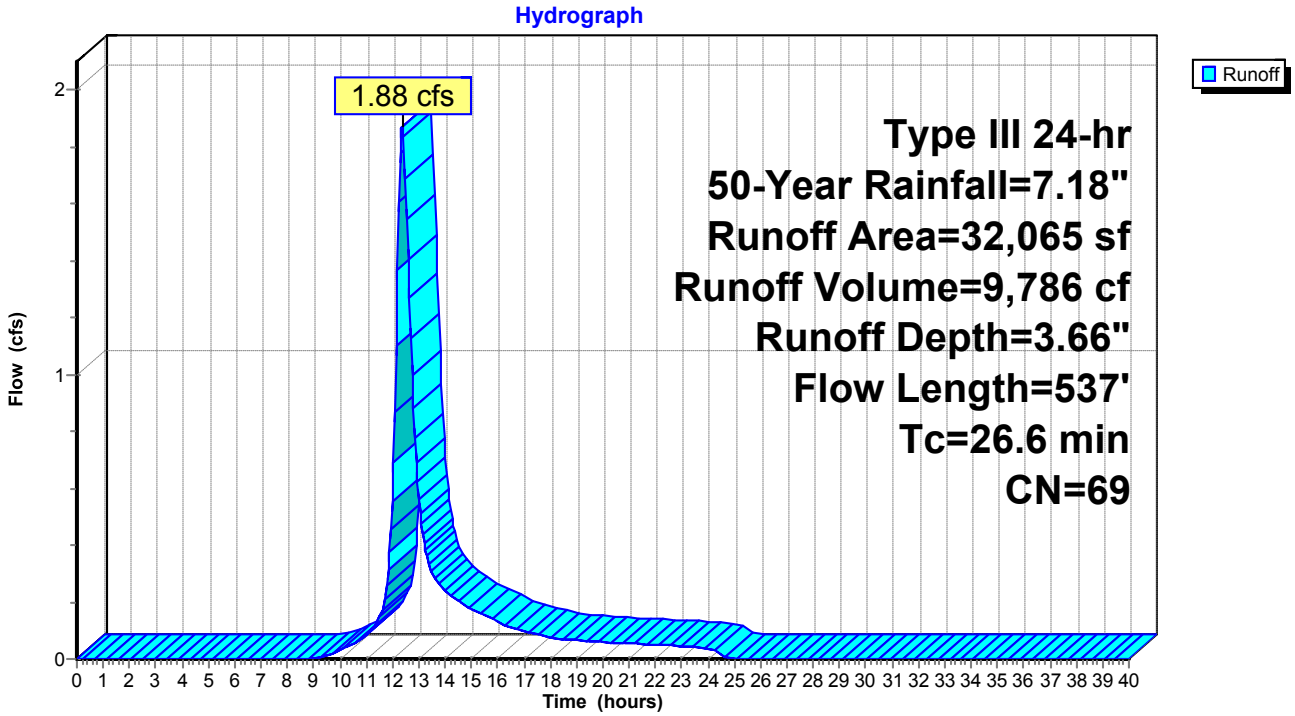
Runoff = 1.88 cfs @ 12.38 hrs, Volume= 9,786 cf, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
7,241	98	Paved parking, HSG D
24,824	60	Woods, Fair, HSG B
32,065	69	Weighted Average
24,824		77.42% Pervious Area
7,241		22.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.5	150	0.1600	0.11		**Sheet Flow, Elev. 472 - 448** Woods: Dense underbrush n= 0.800 P2= 3.20"
3.4	236	0.2200	1.17		**Shallow Concentrated Flow, Elev. 448 -396** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3700	9.79		**Shallow Concentrated Flow, Elev. 396 - 348** Unpaved Kv= 16.1 fps
0.7	134	0.0420	3.30		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
26.6	537	Total			

Subcatchment 1S: Developed Drainage Area - CB #1



Summary for Subcatchment 2S: Developed Drainage Area - CB #2

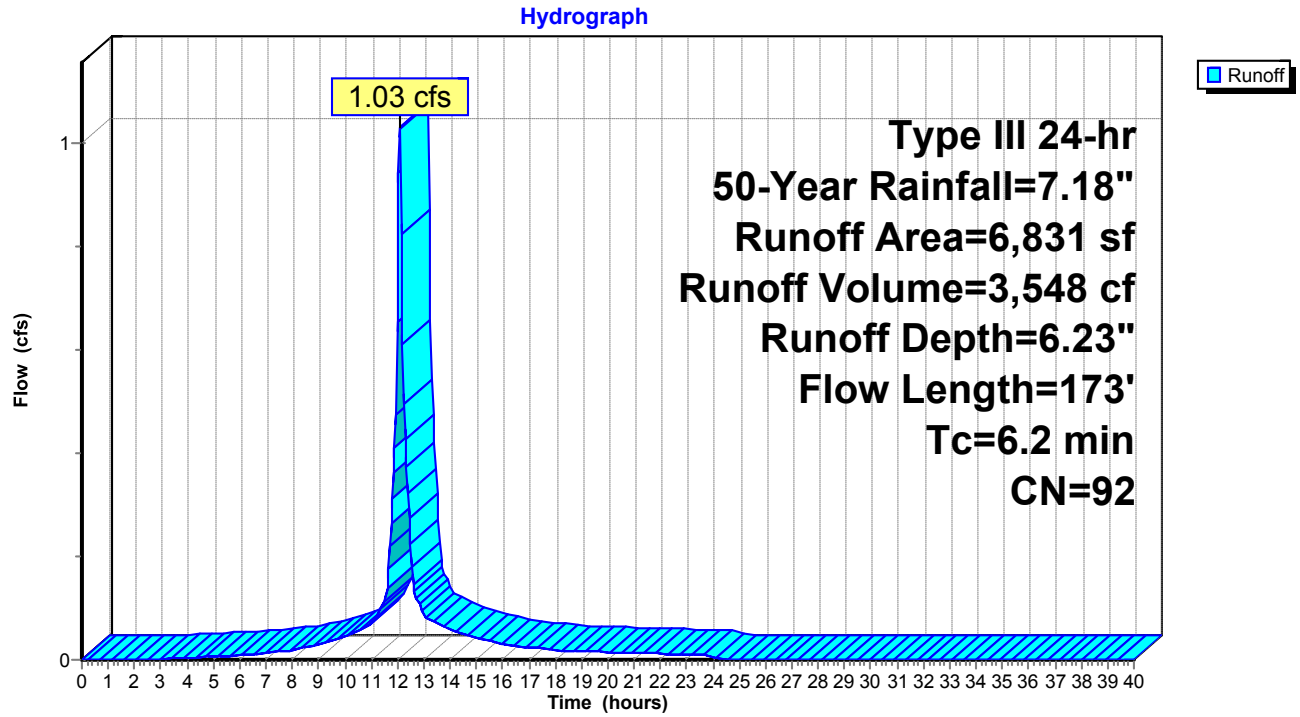
Runoff = 1.03 cfs @ 12.09 hrs, Volume= 3,548 cf, Depth= 6.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
5,731	98	Paved parking, HSG D
1,100	60	Woods, Fair, HSG B
6,831	92	Weighted Average
1,100		16.10% Pervious Area
5,731		83.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.2860	0.10		**Sheet Flow, Elev. 396 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	14	0.3700	9.79		**Shallow Concentrated Flow, Elev. 386 -348** Unpaved Kv= 16.1 fps
0.6	124	0.0450	3.42		**Shallow Concentrated Flow, Elev. 348 - 342.35** Unpaved Kv= 16.1 fps
6.2	173	Total			

Subcatchment 2S: Developed Drainage Area - CB #2



Summary for Subcatchment 3S: Developed Drainage Area - CB #3

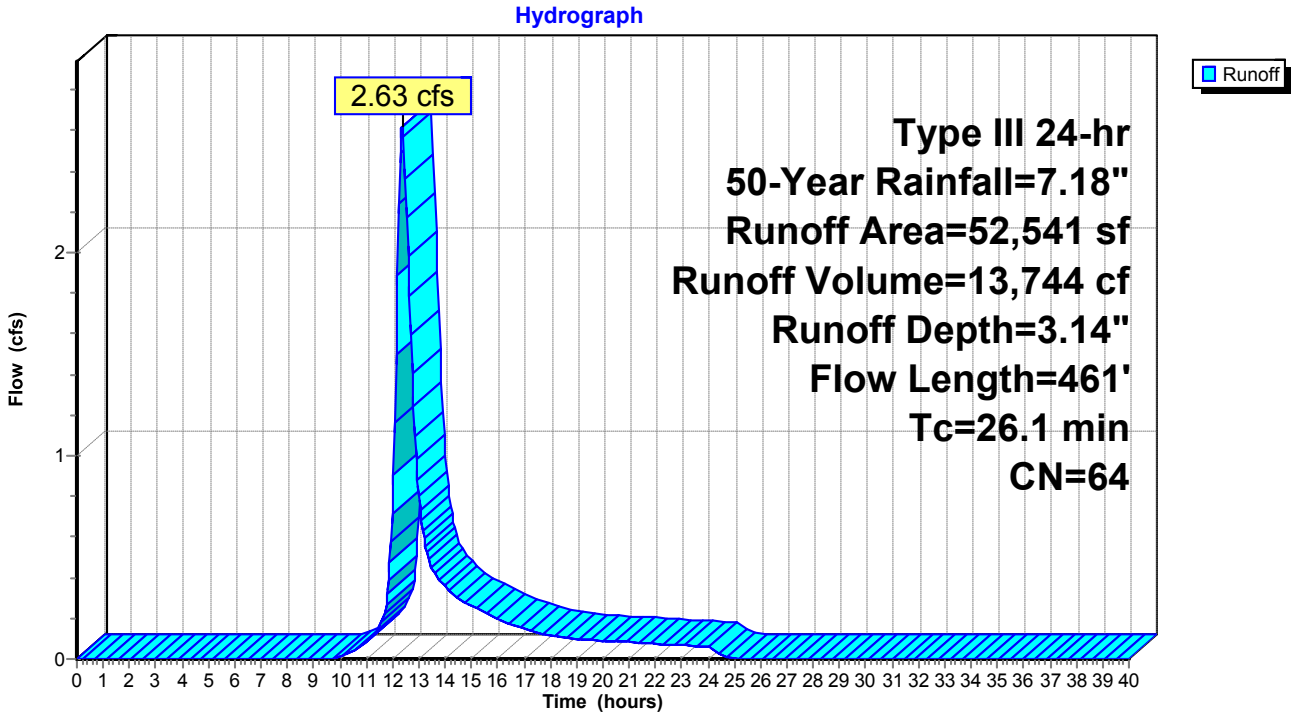
Runoff = 2.63 cfs @ 12.38 hrs, Volume= 13,744 cf, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
5,229	98	Paved parking, HSG D
47,312	60	Woods, Fair, HSG B
52,541	64	Weighted Average
47,312		90.05% Pervious Area
5,229		9.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	150	0.1700	0.11		**Sheet Flow, Elev. 472 - 446.5** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	247	0.1720	1.04		**Shallow Concentrated Flow, Elev. 446.5 - 404** Forest w/Heavy Litter Kv= 2.5 fps
0.0	17	0.3400	9.39		**Shallow Concentrated Flow, Elev. 404 - 354** Unpaved Kv= 16.1 fps
0.1	47	0.1120	5.39		**Shallow Concentrated Flow, Elev. 354 - 348.72** Unpaved Kv= 16.1 fps
26.1	461	Total			

Subcatchment 3S: Developed Drainage Area - CB #3



Summary for Subcatchment 4S: Developed Drainage Area - CB #4

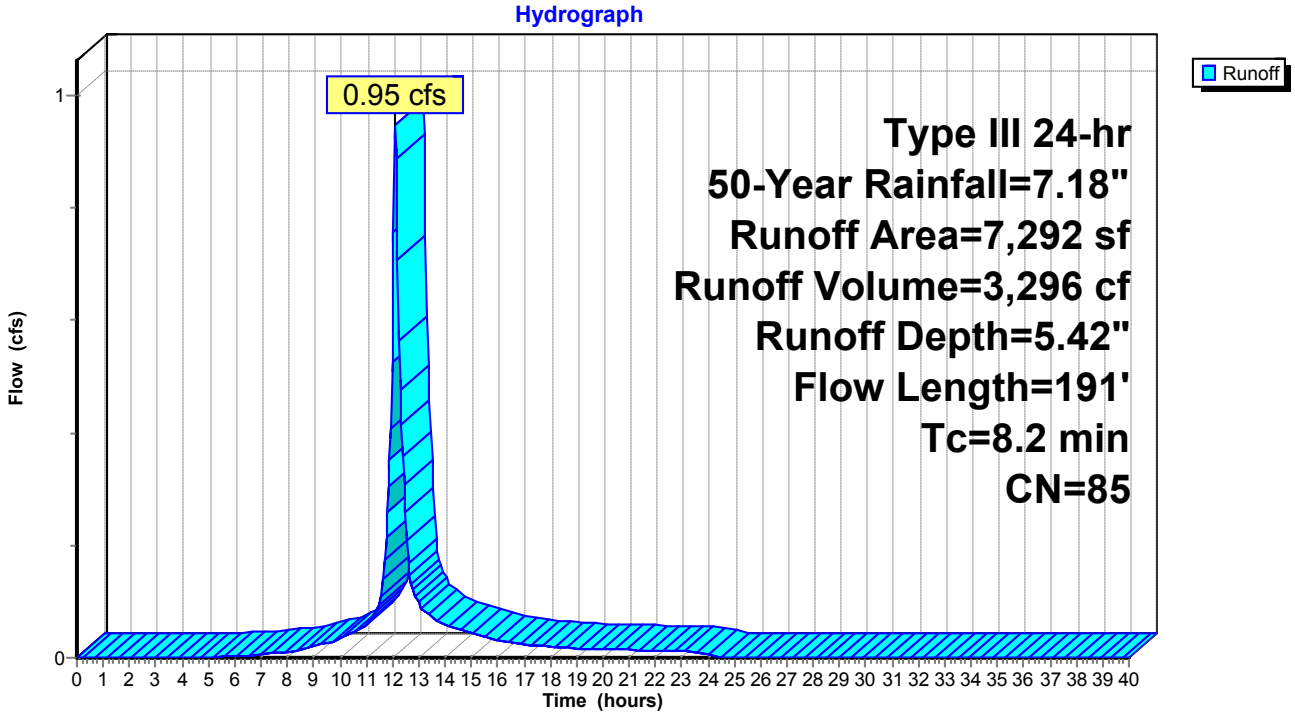
Runoff = 0.95 cfs @ 12.11 hrs, Volume= 3,296 cf, Depth= 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
4,841	98	Paved parking, HSG D
2,451	60	Woods, Fair, HSG B
7,292	85	Weighted Average
2,451		33.61% Pervious Area
4,841		66.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	39	0.1540	0.08		**Sheet Flow, Elev. 392 - 386** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	7	0.3500	9.52		**Shallow Concentrated Flow, Elev. 386 - 366** Unpaved Kv= 16.1 fps
0.4	145	0.1190	5.55		**Shallow Concentrated Flow, Elev. 366 - 348.72** Unpaved Kv= 16.1 fps
8.2	191	Total			

Subcatchment 4S: Developed Drainage Area - CB #4



Summary for Subcatchment 5S: Developed Drainage Area - CB #5

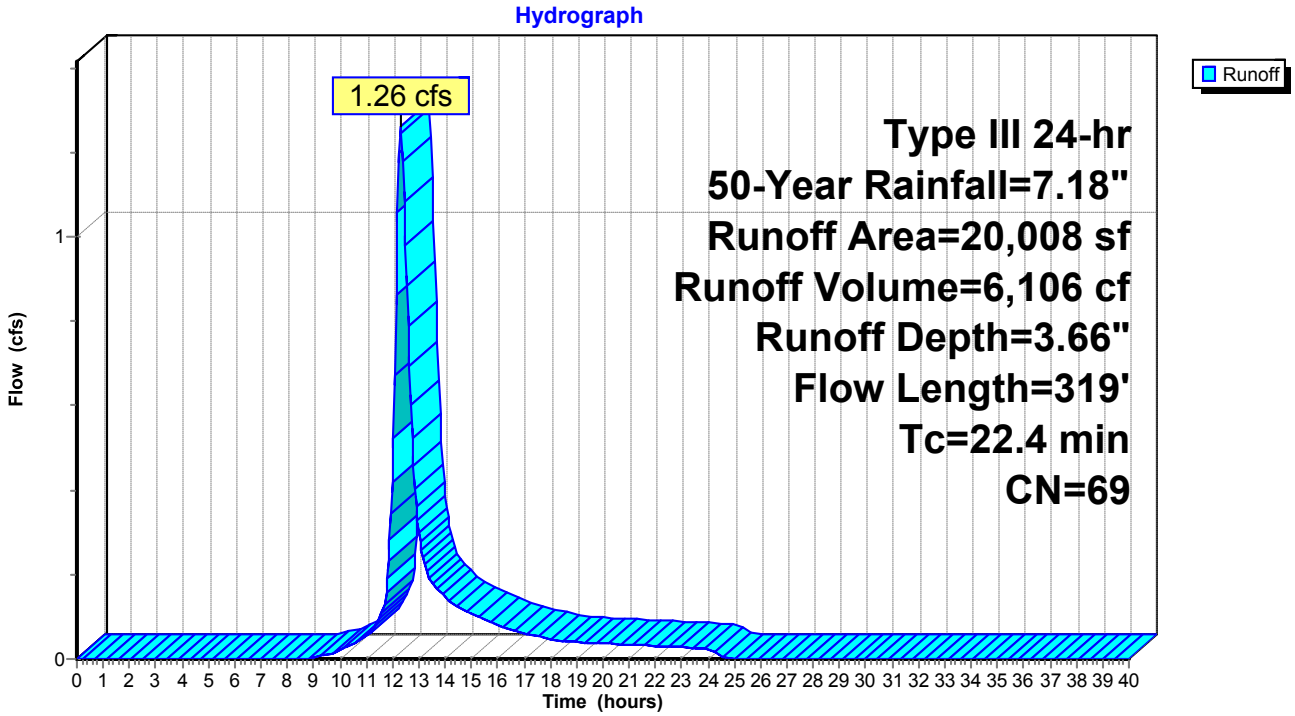
Runoff = 1.26 cfs @ 12.32 hrs, Volume= 6,106 cf, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
4,662	98	Paved parking, HSG D
15,346	60	Woods, Fair, HSG B
20,008	69	Weighted Average
15,346		76.70% Pervious Area
4,662		23.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	150	0.1970	0.12		**Sheet Flow, Elev. 450.5 - 421** Woods: Dense underbrush n= 0.800 P2= 3.20"
1.6	121	0.2400	1.22		**Shallow Concentrated Flow, Elev. 421 - 392** Forest w/Heavy Litter Kv= 2.5 fps
0.0	6	0.4290	10.55		**Shallow Concentrated Flow, Elev. 392.0 - 378** Unpaved Kv= 16.1 fps
0.1	42	0.1690	6.62		**Shallow Concentrated Flow, Elev. 378 - 370.92** Unpaved Kv= 16.1 fps
22.4	319	Total			

Subcatchment 5S: Developed Drainage Area - CB #5



Summary for Subcatchment 6S: Developed Drainage Area - CB #6

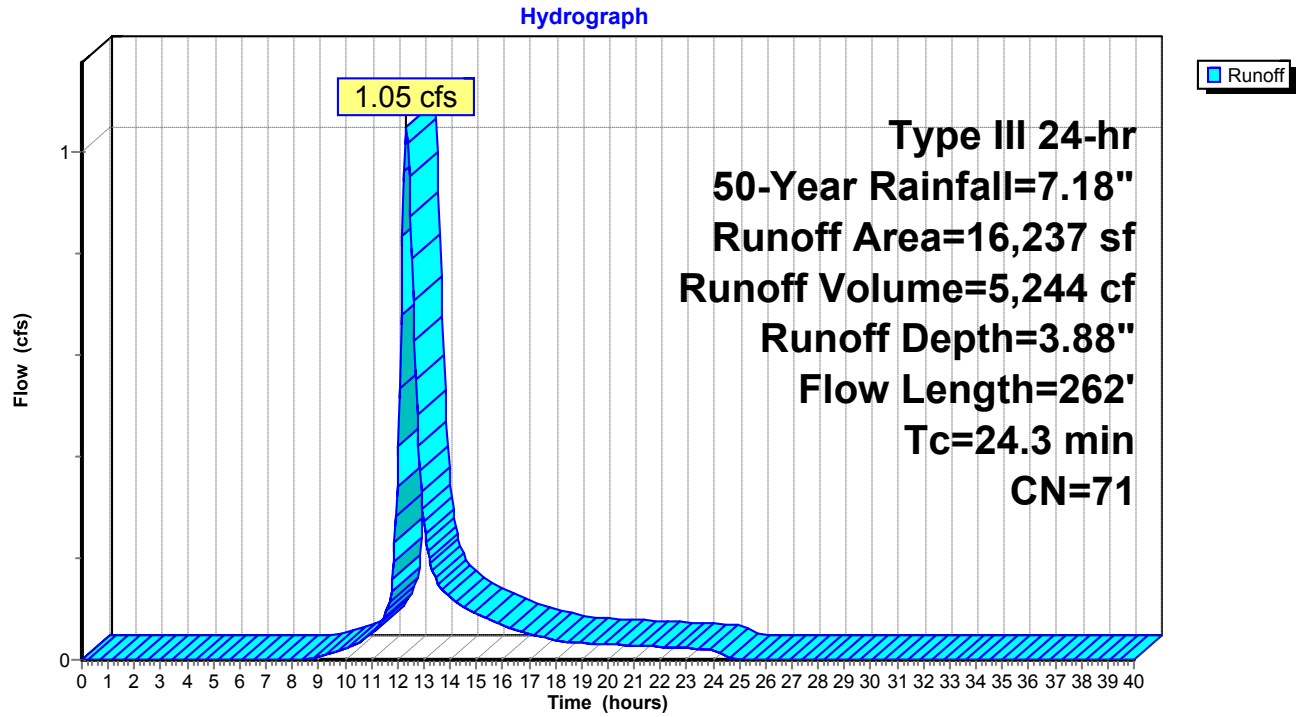
Runoff = 1.05 cfs @ 12.34 hrs, Volume= 5,244 cf, Depth= 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
4,842	98	Paved parking, HSG D
11,395	60	Woods, Fair, HSG B
16,237	71	Weighted Average
11,395		70.18% Pervious Area
4,842		29.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.0	150	0.1370	0.10		**Sheet Flow, Elev. 424.5 - 404** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.0	8	0.4000	10.18		**Shallow Concentrated Flow, Elev. 404 - 384** Unpaved Kv= 16.1 fps
0.3	104	0.1260	5.71		**Shallow Concentrated Flow, Elev. 384 - 370.92** Unpaved Kv= 16.1 fps
24.3	262	Total			

Subcatchment 6S: Developed Drainage Area - CB #6



Summary for Subcatchment 7S: Developed Drainage Area - CB #7

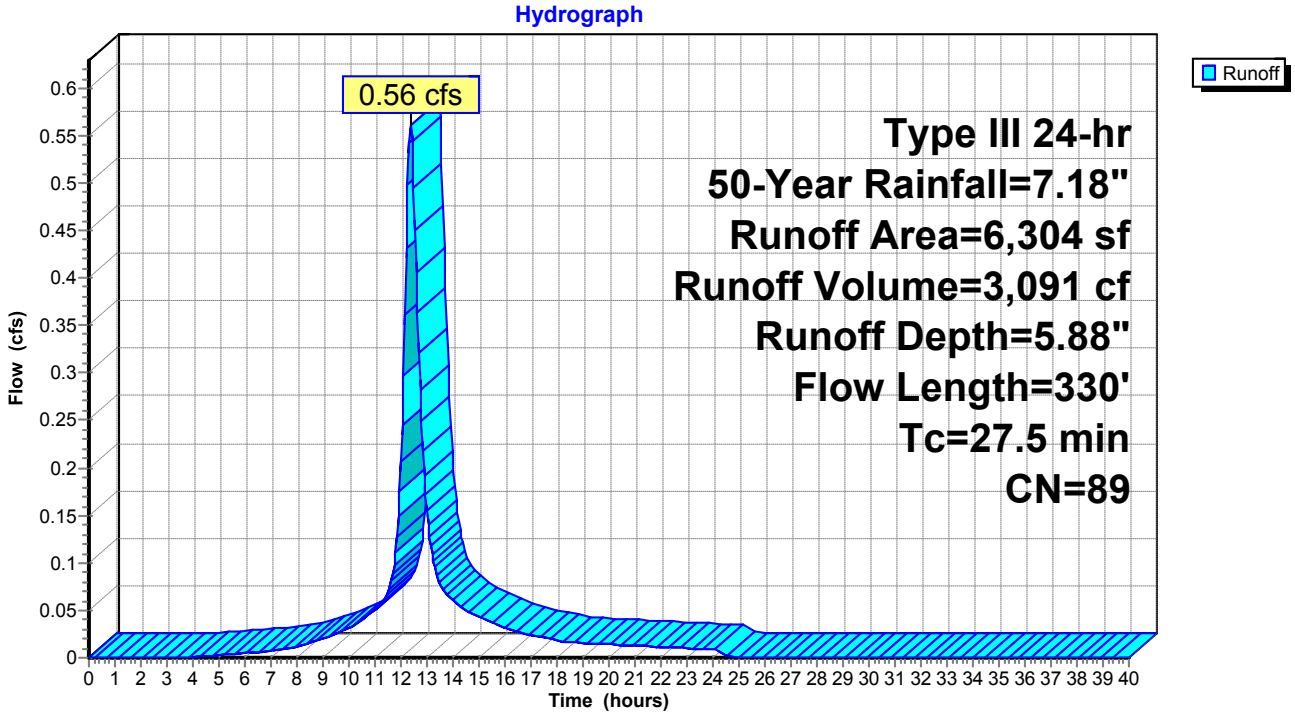
Runoff = 0.56 cfs @ 12.37 hrs, Volume= 3,091 cf, Depth= 5.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
4,812	98	Paved parking, HSG D
1,492	60	Woods, Fair, HSG B
6,304	89	Weighted Average
1,492		23.67% Pervious Area
4,812		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.9	110	0.0550	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	220	0.1280	5.76		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
27.5	330	Total			

Subcatchment 7S: Developed Drainage Area - CB #7



Summary for Subcatchment 8S: Developed Drainage Area - CB #8

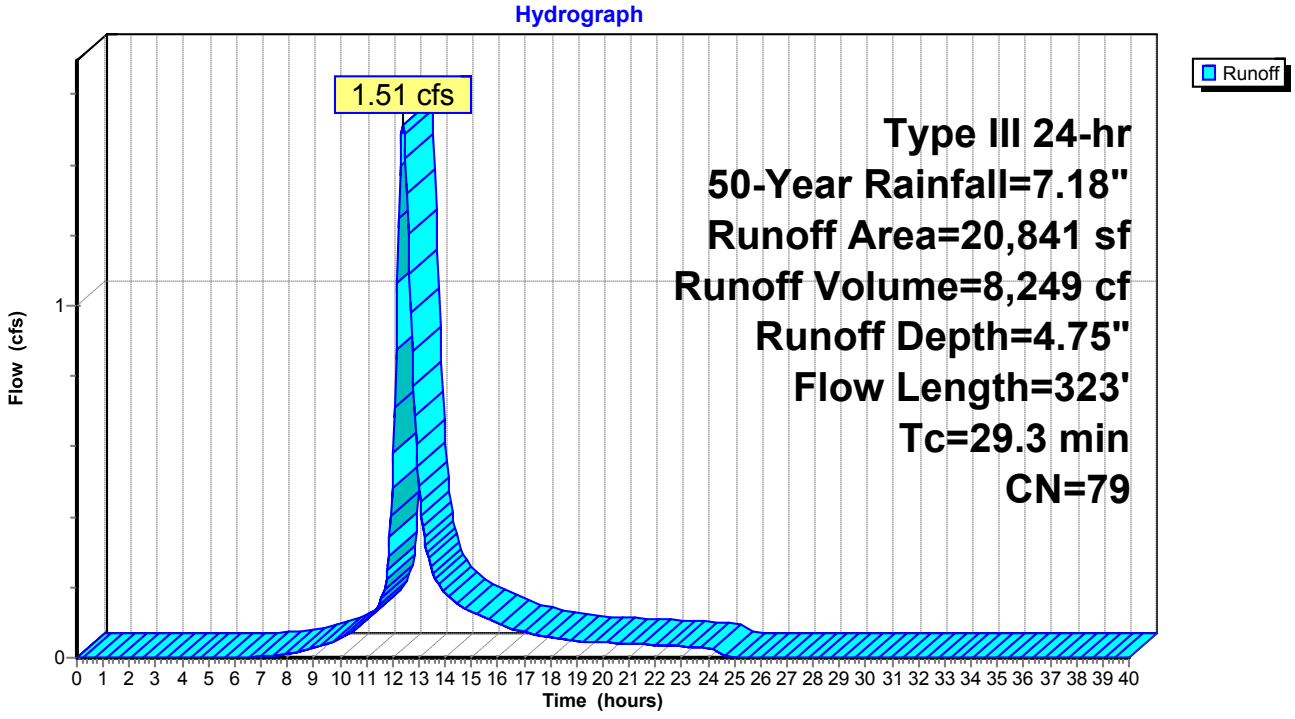
Runoff = 1.51 cfs @ 12.40 hrs, Volume= 8,249 cf, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.18"

Area (sf)	CN	Description
4,831	98	Paved parking, HSG D
16,010	73	Woods, Fair, HSG C
20,841	79	Weighted Average
16,010		76.82% Pervious Area
4,831		23.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.7	116	0.0520	0.07		**Sheet Flow, Elev. 426 - 420** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.6	207	0.1360	5.94		**Shallow Concentrated Flow, Elev. 420 - 391.91** Unpaved Kv= 16.1 fps
29.3	323	Total			

Subcatchment 8S: Developed Drainage Area - CB #8



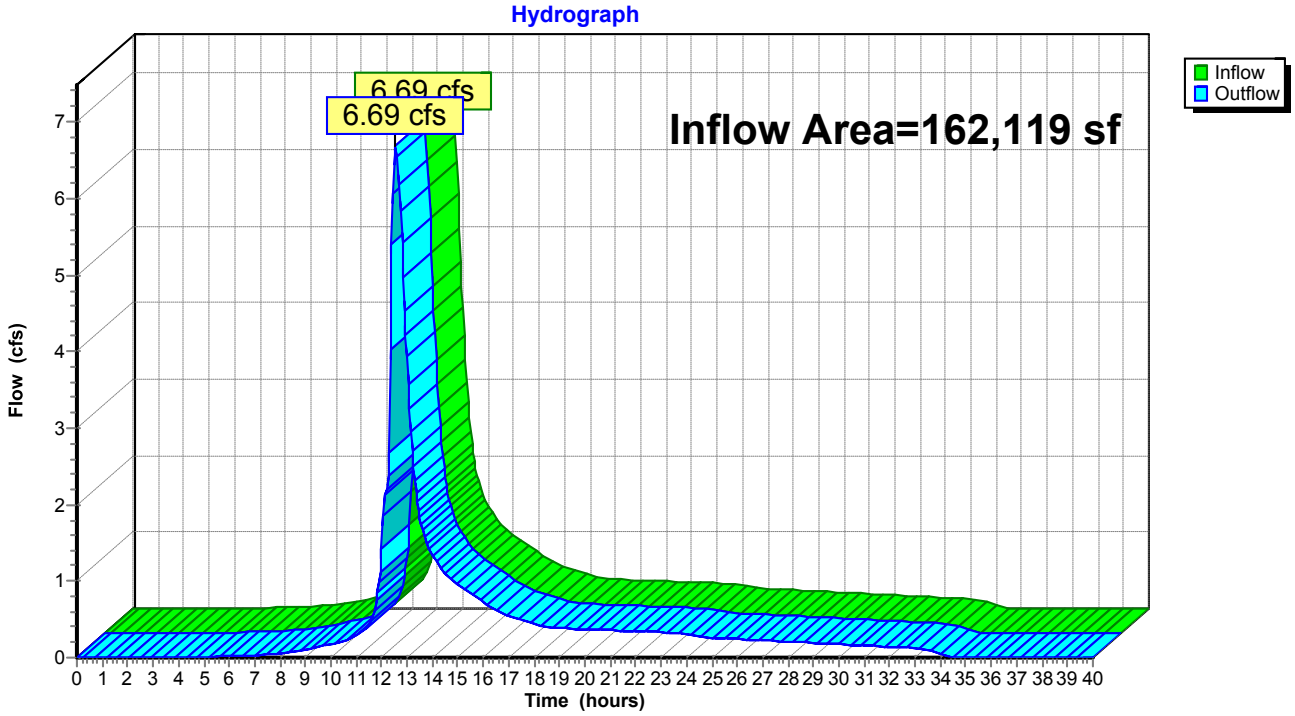
Summary for Reach 9R: Existing Drainage System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 3.93" for 50-Year event
Inflow = 6.69 cfs @ 12.56 hrs, Volume= 53,063 cf
Outflow = 6.69 cfs @ 12.56 hrs, Volume= 53,063 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Reach 9R: Existing Drainage System



Summary for Pond 1P: CB #1

[81] Warning: Exceeded Pond 9P by 0.84' @ 9.45 hrs

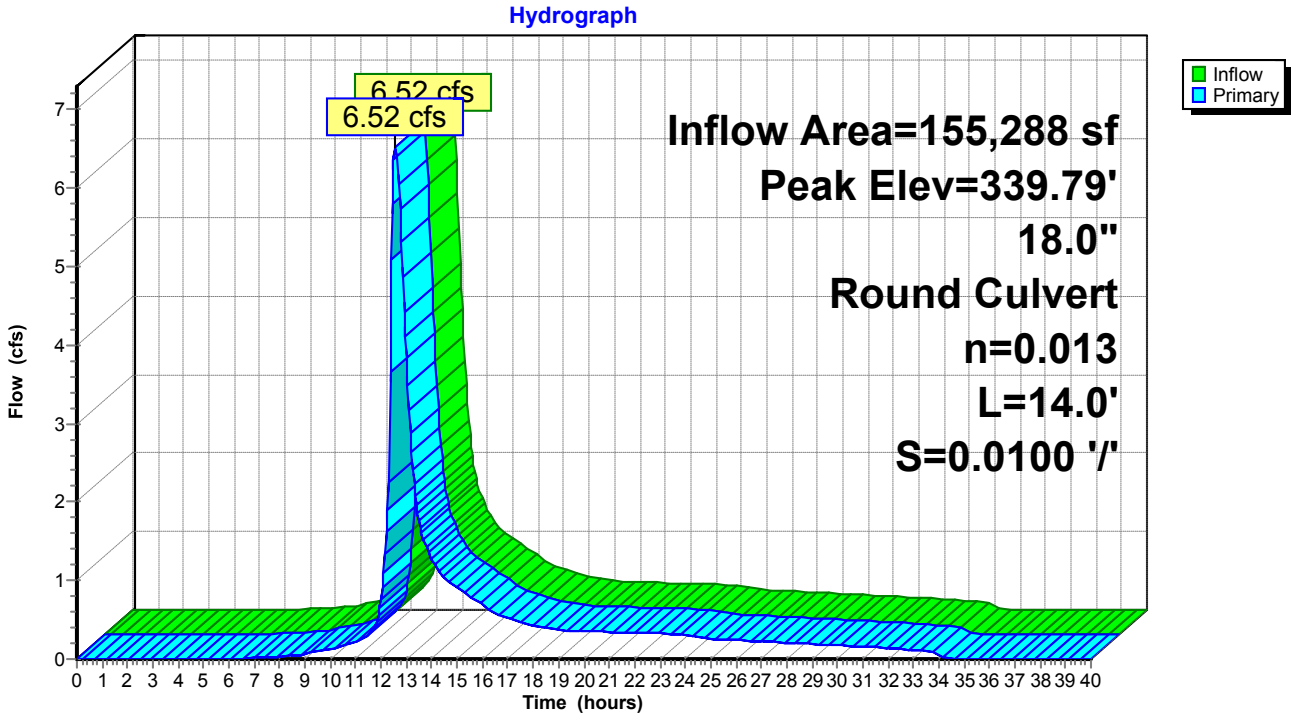
Inflow Area = 155,288 sf, 23.48% Impervious, Inflow Depth = 3.83" for 50-Year event
Inflow = 6.52 cfs @ 12.57 hrs, Volume= 49,515 cf
Outflow = 6.52 cfs @ 12.57 hrs, Volume= 49,515 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.52 cfs @ 12.57 hrs, Volume= 49,515 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 339.79' @ 12.57 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	338.25'	**18.0" Round Culvert** L= 14.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 338.25' / 338.11' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.50 cfs @ 12.57 hrs HW=339.79' (Free Discharge)
1=Culvert (Barrel Controls 6.50 cfs @ 4.46 fps)

Pond 1P: CB #1



Summary for Pond 2P: CB #2

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.08'

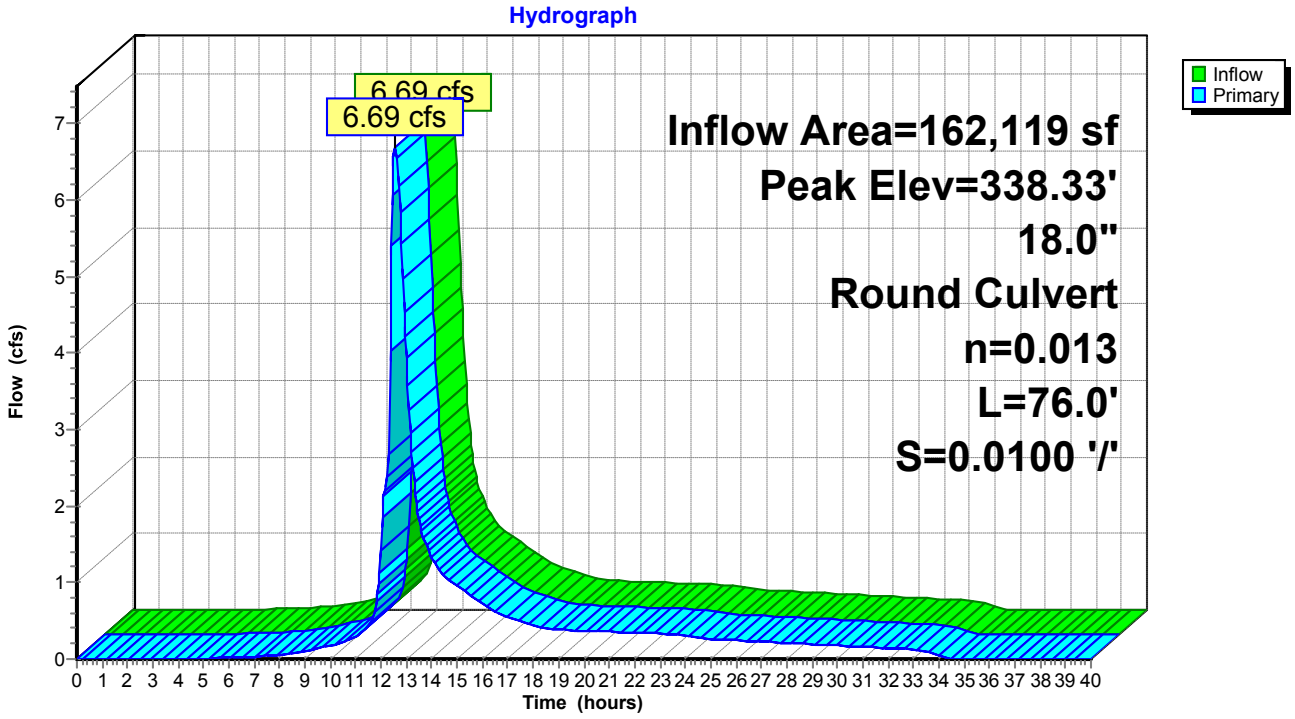
Inflow Area = 162,119 sf, 26.02% Impervious, Inflow Depth = 3.93" for 50-Year event
Inflow = 6.69 cfs @ 12.56 hrs, Volume= 53,063 cf
Outflow = 6.69 cfs @ 12.56 hrs, Volume= 53,063 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.69 cfs @ 12.56 hrs, Volume= 53,063 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 338.33' @ 12.56 hrs
Flood Elev= 342.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	336.96'	**18.0" Round Culvert** L= 76.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 336.96' / 336.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.68 cfs @ 12.56 hrs HW=338.32' (Free Discharge)
└**1=Culvert** (Barrel Controls 6.68 cfs @ 5.20 fps)

Pond 2P: CB #2



Summary for Pond 3P: CB #3

[58] Hint: Peaked 2.84' above defined flood level
[81] Warning: Exceeded Pond 4P by 6.01' @ 12.35 hrs
[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 8.33'

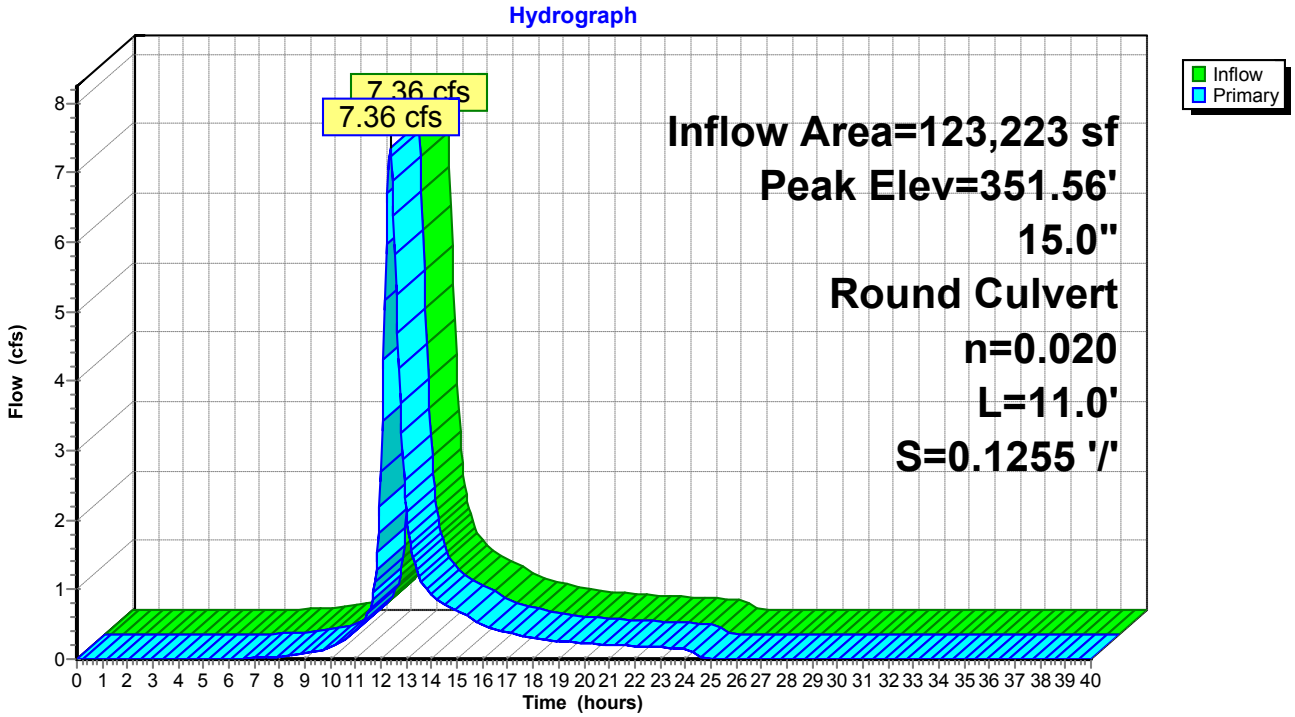
Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 3.87" for 50-Year event
Inflow = 7.36 cfs @ 12.35 hrs, Volume= 39,729 cf
Outflow = 7.36 cfs @ 12.35 hrs, Volume= 39,729 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.36 cfs @ 12.35 hrs, Volume= 39,729 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 351.56' @ 12.35 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	349.38'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 349.38' / 348.00' S= 0.1255 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=7.35 cfs @ 12.35 hrs HW=351.55' (Free Discharge)
1=Culvert (Inlet Controls 7.35 cfs @ 5.99 fps)

Pond 3P: CB #3



Summary for Pond 4P: CB #4

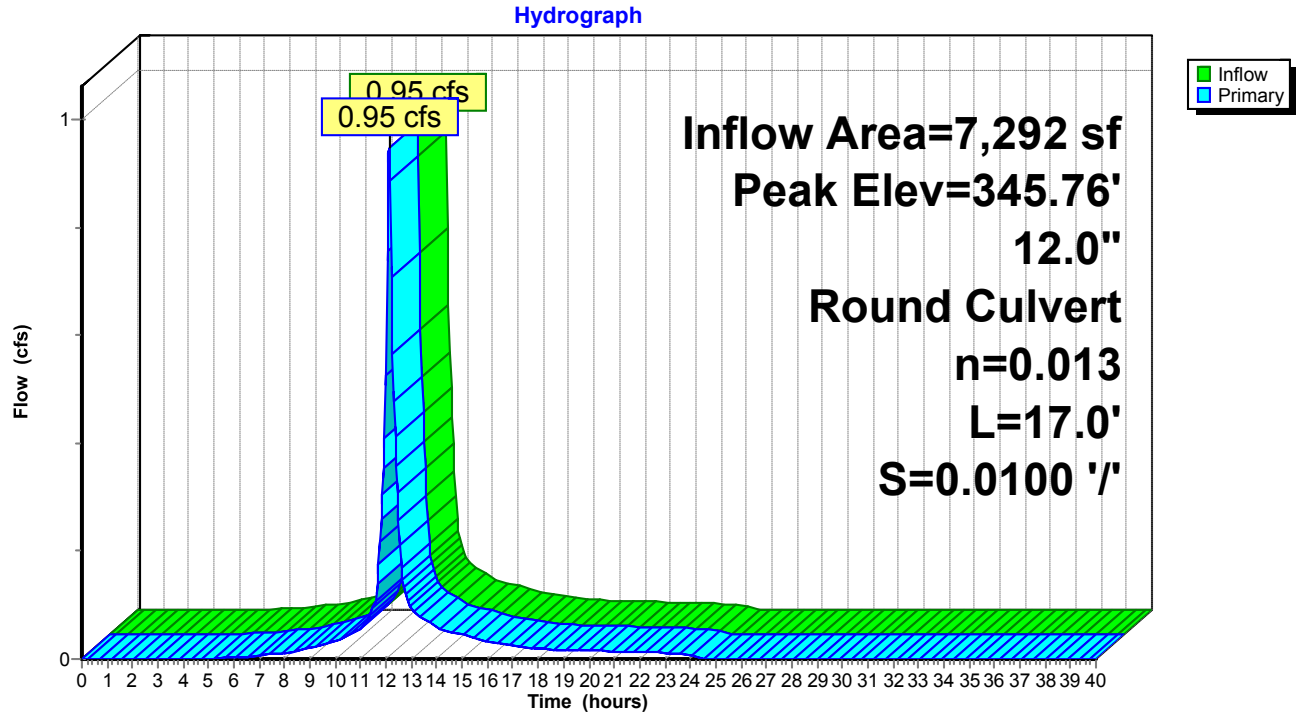
Inflow Area = 7,292 sf, 66.39% Impervious, Inflow Depth = 5.42" for 50-Year event
Inflow = 0.95 cfs @ 12.11 hrs, Volume= 3,296 cf
Outflow = 0.95 cfs @ 12.11 hrs, Volume= 3,296 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.95 cfs @ 12.11 hrs, Volume= 3,296 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 345.76' @ 12.11 hrs
Flood Elev= 348.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	345.20'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 345.20' / 345.03' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.11 hrs HW=345.75' (Free Discharge)
1=Culvert (Barrel Controls 0.92 cfs @ 3.04 fps)

Pond 4P: CB #4



Summary for Pond 5P: CB #5

[81] Warning: Exceeded Pond 6P by 0.40' @ 12.35 hrs
[79] Warning: Submerged Pond 7P Primary device # 1 OUTLET by 1.16'

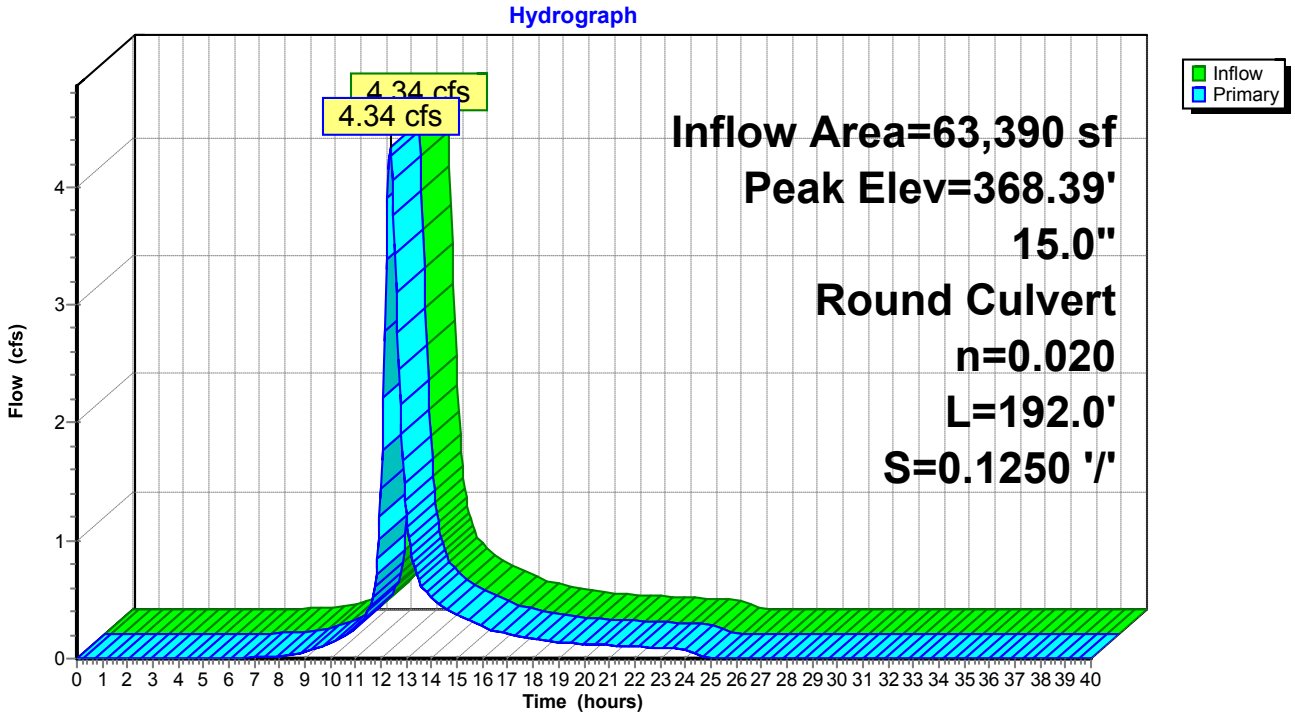
Inflow Area = 63,390 sf, 30.21% Impervious, Inflow Depth = 4.30" for 50-Year event
Inflow = 4.34 cfs @ 12.35 hrs, Volume= 22,689 cf
Outflow = 4.34 cfs @ 12.35 hrs, Volume= 22,689 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.34 cfs @ 12.35 hrs, Volume= 22,689 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 368.39' @ 12.35 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.23'	**15.0" Round Culvert** L= 192.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.23' / 343.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=4.33 cfs @ 12.35 hrs HW=368.38' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 4.33 cfs @ 3.66 fps)

Pond 5P: CB #5



Summary for Pond 6P: CB #6

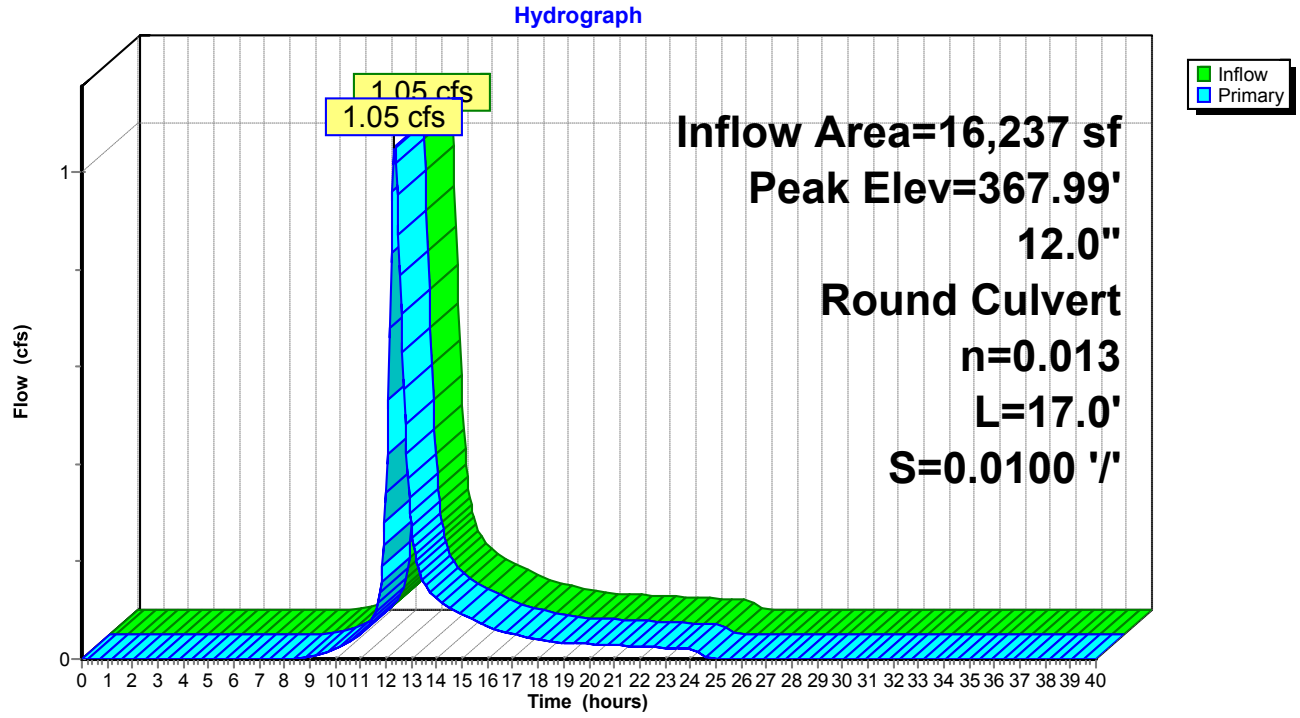
Inflow Area = 16,237 sf, 29.82% Impervious, Inflow Depth = 3.88" for 50-Year event
Inflow = 1.05 cfs @ 12.34 hrs, Volume= 5,244 cf
Outflow = 1.05 cfs @ 12.34 hrs, Volume= 5,244 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.05 cfs @ 12.34 hrs, Volume= 5,244 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 367.99' @ 12.34 hrs
Flood Elev= 370.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	367.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 367.40' / 367.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.04 cfs @ 12.34 hrs HW=367.99' (Free Discharge)
1=Culvert (Barrel Controls 1.04 cfs @ 3.12 fps)

Pond 6P: CB #6



Summary for Pond 7P: CB #7

[79] Warning: Submerged Pond 8P Primary device # 1 INLET by 0.54'

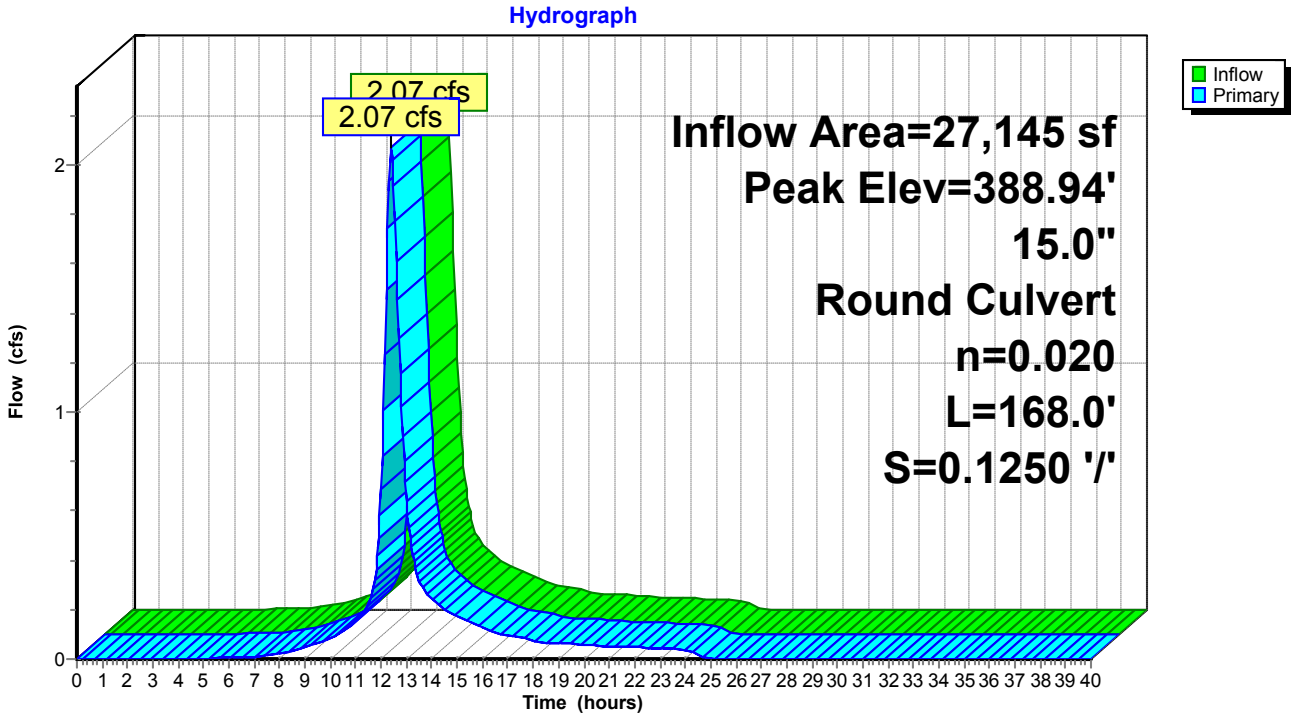
Inflow Area = 27,145 sf, 35.52% Impervious, Inflow Depth = 5.01" for 50-Year event
Inflow = 2.07 cfs @ 12.39 hrs, Volume= 11,339 cf
Outflow = 2.07 cfs @ 12.39 hrs, Volume= 11,339 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.07 cfs @ 12.39 hrs, Volume= 11,339 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 388.94' @ 12.39 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.23'	**15.0" Round Culvert** L= 168.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.23' / 367.23' S= 0.1250 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.06 cfs @ 12.39 hrs HW=388.94' (Free Discharge)
1=Culvert (Inlet Controls 2.06 cfs @ 2.87 fps)

Pond 7P: CB #7



Summary for Pond 8P: CB #8

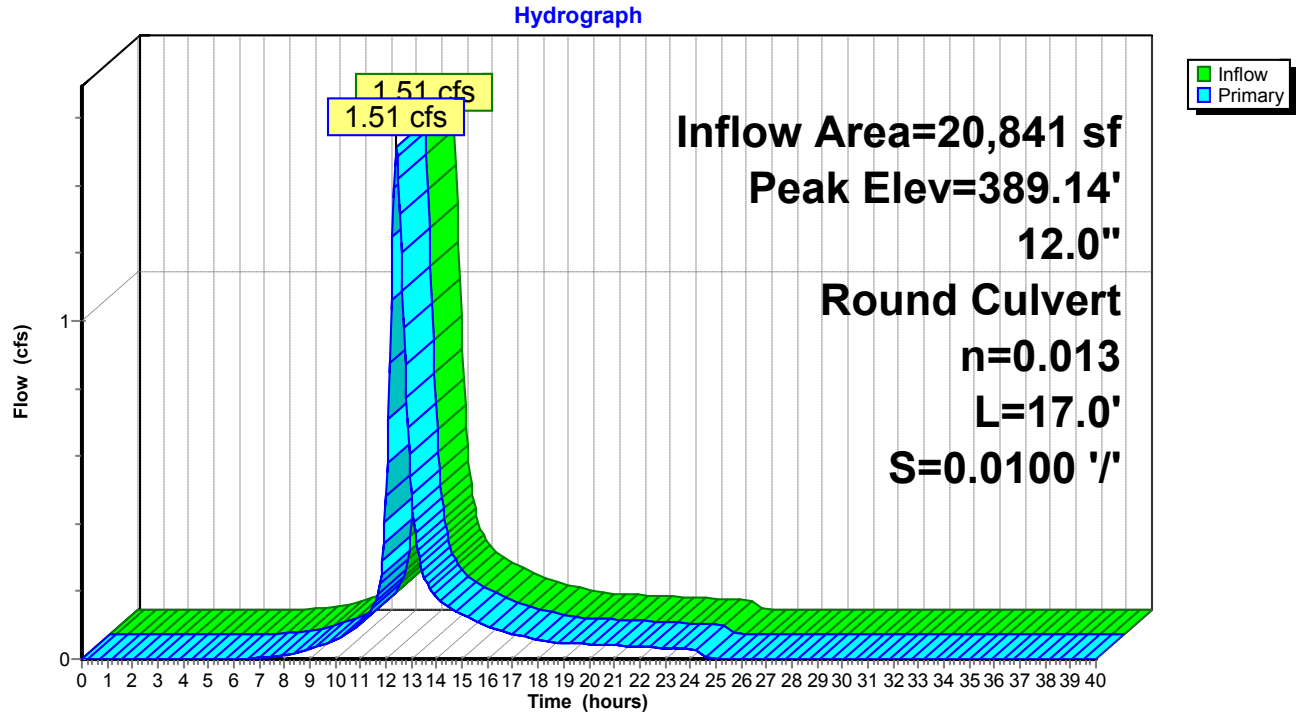
Inflow Area = 20,841 sf, 23.18% Impervious, Inflow Depth = 4.75" for 50-Year event
Inflow = 1.51 cfs @ 12.40 hrs, Volume= 8,249 cf
Outflow = 1.51 cfs @ 12.40 hrs, Volume= 8,249 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.51 cfs @ 12.40 hrs, Volume= 8,249 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 389.14' @ 12.40 hrs
Flood Elev= 391.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	388.40'	**12.0" Round Culvert** L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 388.40' / 388.23' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.51 cfs @ 12.40 hrs HW=389.14' (Free Discharge)
1=Culvert (Barrel Controls 1.51 cfs @ 3.39 fps)

Pond 8P: CB #8



Summary for Pond 9P: Underground Detention System

Inflow Area = 123,223 sf, 23.71% Impervious, Inflow Depth = 3.87" for 50-Year event
Inflow = 7.36 cfs @ 12.35 hrs, Volume= 39,729 cf
Outflow = 5.08 cfs @ 12.62 hrs, Volume= 39,729 cf, Atten= 31%, Lag= 15.9 min
Primary = 5.08 cfs @ 12.62 hrs, Volume= 39,729 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 343.02' @ 12.62 hrs Surf.Area= 3,142 sf Storage= 11,966 cf

Plug-Flow detention time= 198.3 min calculated for 39,680 cf (100% of inflow)
Center-of-Mass det. time= 198.8 min (1,039.5 - 840.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	337.50'	4,817 cf	**37.58'W x 83.59'L x 6.50'H Field A** 20,421 cf Overall - 8,379 cf Embedded = 12,042 cf x 40.0% Voids
#2A	338.00'	8,379 cf	**ADS_StormTech MC-4500 +Cap** x 76 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 19 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		13,196 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	337.25'	**3.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 337.25' / 337.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.05 sf
#2	Primary	340.97'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 340.97' / 340.77' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=5.07 cfs @ 12.62 hrs HW=343.01' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.37 cfs @ 7.57 fps)
└**2=Culvert** (Inlet Controls 4.69 cfs @ 5.98 fps)

Pond 9P: Underground Detention System - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

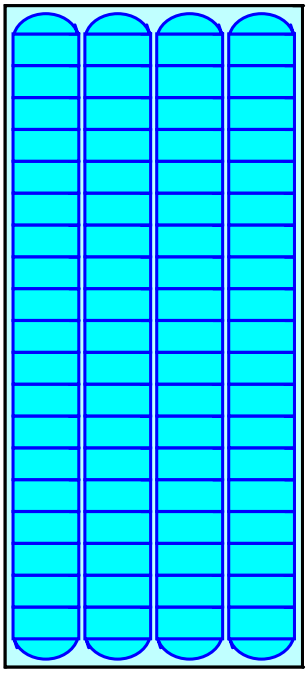
19 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 81.59' Row Length +12.0" End Stone x 2 = 83.59' Base Length
4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width
6.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.50' Field Height

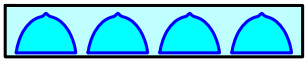
76 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 8,378.9 cf Chamber Storage

20,420.7 cf Field - 8,378.9 cf Chambers = 12,041.9 cf Stone x 40.0% Voids = 4,816.7 cf Stone Storage

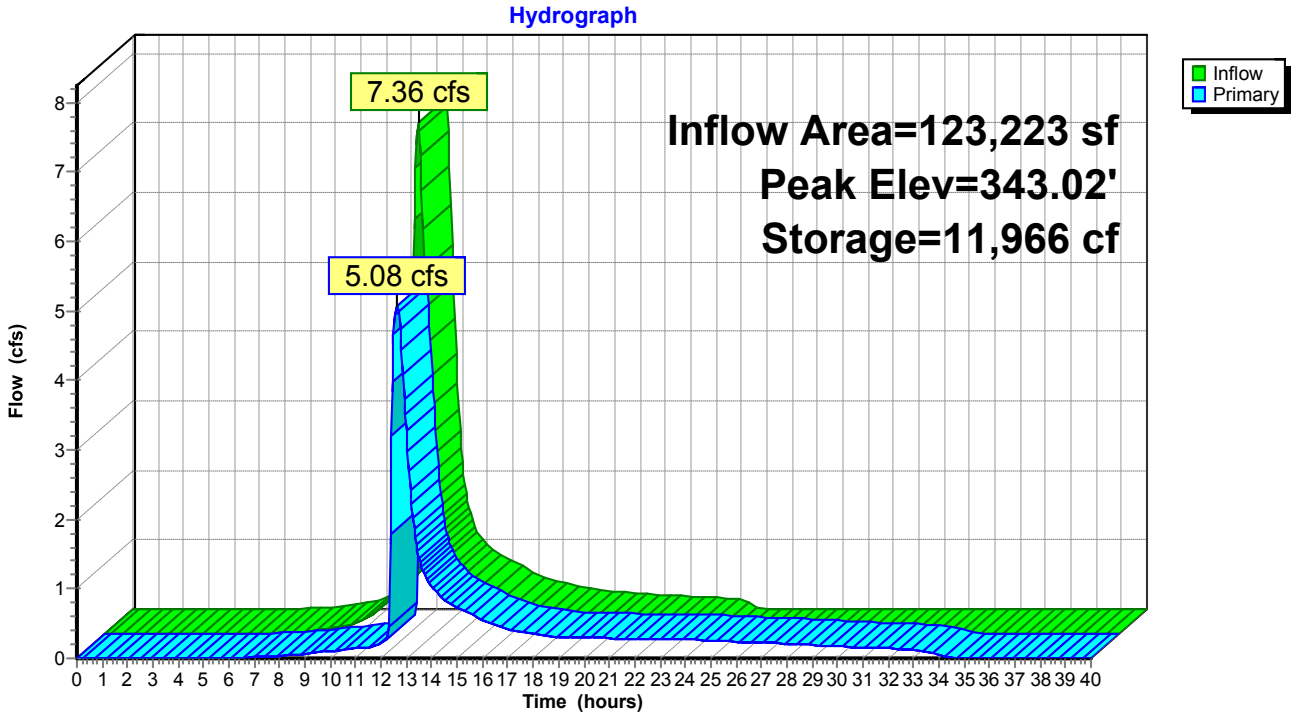
Chamber Storage + Stone Storage = 13,195.6 cf = 0.303 af
Overall Storage Efficiency = 64.6%
Overall System Size = 83.59' x 37.58' x 6.50'

76 Chambers
756.3 cy Field
446.0 cy Stone





Pond 9P: Underground Detention System



APPENDIX C – FLOOD INSURANCE RATE MAP

he Flood Insurance Study report for this jurisdiction.

ce is available in this community, contact your insurance
d Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

METERS
0 150 300

NATIONAL FLOOD INSURANCE PROGRAM FIP

PANEL 0119G

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

PANEL 119 OF 450

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HADDAM, TOWN OF	090066	0119	G
MIDDLETOWN, CITY OF	090068	0119	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
09007C0119G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency

APPENDIX D – POST CONSTRUCTION MAINTENANCE & INSPECTION

1.0 POST CONSTRUCTION INSPECTION & MAINTENANCE

Post-construction, regularly scheduled inspections and maintenance will be necessary to ensure the permanent structural features such as the underground stormwater management system and the conveyance system components remain optimally functional and continue to reduce the risk of sediment loading of the municipal drainage system.

When construction is complete, the Contractor will remain responsible for the site until the entire site has reached final stabilization. The site is considered stabilized when all soil disturbing activities have been completed and a full uniform, perennial vegetative cover has been established or equivalent stabilization measures such as the use of mulches or geotextiles have been employed on all unpaved areas and areas not covered by permanent structures. Weekly inspections should continue until the site has reached this point. Additionally, inspections should be performed after every rain event of 0.5 inches or more in 24-hours.

At the time of final stabilization, the Owner's Engineer shall perform a final inspection of the site and certify that the site has successfully undergone final stabilization using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls such as silt fence, not needed for long term use, have been removed. At this point, the Owner is responsible for the following:

1. Identify all the permanent stormwater management structures that have been constructed and provide the Land Owner with an Operations and Maintenance (O&M) manual that will be necessary in order for the structures to function properly after the site has been stabilized. ***Section 1.0 of this report satisfies the O&M requirements.***
2. Certify that the permanent structures have been constructed as described by this plan and the drawings.

The Land Owner shall overtake responsibility of inspecting and maintaining drainage and erosion control features over the lifetime of the structures. Maintenance personnel, employed by the Land Owner, must be aware of the stormwater management system and conveyance system should be trained to recognize signs that stabilization measures may not be performing optimally or are failing. The inspection of on-site stabilization measures will become part of routine preventative maintenance practiced by the Land Owner. Inspections should be performed after rain events of 0.5 inches or greater in a 24-hour period and at a minimum of once per year. Inspections and maintenance should be performed as described below within this section.

1.1 Inspection

Overall Site Inspection

The overall site, embankments, vegetation and stormwater conveyance system components including underground stormwater management systems and catch basin sumps should be inspected regularly after every major rain event of 0.5 inch or greater in a 24-hour period and on an annual basis. A rain gauge should be installed and permanently maintained at the site. The inspections should include but are not limited to:

1. Density and condition of vegetation and ground cover.
2. Erosion, differential settlement or cracking of embankment.
3. Bulging or sliding of toe of embankments.
4. Sedimentation of lawn areas, paved areas, water quality unit or catch basin sumps.
5. Damage or fatigue of storm sewer structures or associated components.

1.2 Maintenance

Overall Site Maintenance

Maintaining vegetative and structural measures for soil protection is necessary to keep the storm water system functioning properly. Maintenance should occur on a regular basis and should include but is not limited to:

Seasonal Maintenance

1. Vegetated areas should be maintained to promote vigorous and dense growth. Lawn areas should be mowed at least three times a year but may require more frequent mowings depending on the growth rate.

2. Accumulation of litter and debris should be removed during each mowing or sweep operation.

3. Structural components of the storm sewer system such as culverts, catch basin sumps which require repair or replacement should be addressed immediately following identification.

Winter Maintenance

1. Remove snow and ice from catch basin inlets.

2. Use of deicing materials should be limited to sand and environmentally friendly chemical products. Use of salt mixtures should be kept to a minimum.

3. Sand used for deicing should be clean, course material free of fines, silt, and clay.

4. Materials used for deicing should be removed during the early spring by sweeping and/or vacuuming.

Stormwater Management/Water Quality Maintenance

1. The stormtech chambers should be maintained per manufacturer's specifications. The chambers should also be inspected/maintained twice a year per manufacturer's specifications; which typically involves measurements of accumulated sediment followed by removal with a "vac-truck". These maintenance measures are to be performed at the Land Owners expense.

2.0 CONCLUSION

The Engineer has designed a Stormwater Management Plan for the proposed development site Improvements. Overall, the proposed stormwater management system reduces and/or eliminates the impacts of the proposed development by controlling and treating stormwater through the use of underground stormwater management systems. The stormwater management system will function adequately and will not adversely affect adjacent or downstream properties provided it is constructed and maintained as outlined in this plan and as shown on the site plans.