

DRAINAGE ANALYSIS

for

Definitive Subdivision

ZP Battery Devco, LLC

1355 Main Street

Leicester, Massachusetts

November 30, 2022



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1.0
DRAINAGE NARRATIVE

1.0 NARRATIVE

1.1 INTRODUCTION

On behalf of our client, ZP Battery Devco, LLC, Hannigan Engineering, Inc. has prepared this Drainage Analysis and Report as part of the submittal package for a Definitive Subdivision Plan for the construction of a new roadway off Main Street in Leicester, Massachusetts. The Project includes a portion of land depicted on the Assessor's Map #26 as Parcels A1 (1355 Main Street), owned by WR Enterprises, LLC. The remaining portion of this parcel has been conveyed and annexed to the property at 1323 Main Street. It is the intent of the applicant to create a subdivision with a single roadway to provide access to two new building lots.

The purpose of this analysis is to compare the pre-development and post-development peak flow rates to certain design points from the project. In particular, changes in peak rates of runoff generally associated with alterations of land use were studied. These alterations include land being transformed from areas of landscape (grass), woods, and brush to areas of grass, landscape, and impervious areas (rooftops, sidewalks and pavement). The effects of stormwater being re-directed to new areas as a result of the proposed construction and the associated drainage system were reviewed as well. For the purposes of this report, any developed areas which are not impervious will be considered to consist of lawn and landscape areas.

The U.S. Soil Conservation Service (SCS) methods were utilized for this analysis in order to establish land use and run-off characteristics in the determination of pre- and post-development peak run-off rates. All proposed development areas and subsequent impacts on stormwater runoff relative to this development have been incorporated within this analysis and report.

The drainage from the site currently flows to several low points throughout the property. In the area of the proposed development, an increase in impervious areas due the construction of the proposed roadway within the subdivision along with the general clearing of the land will occur, requiring additional provisions be made to provide compliance with the Massachusetts Stormwater Regulations and the Local Stormwater Bylaw. These measures include the implementation of a underground storage system to capture and detain the majority of the anticipated runoff from the roadway.

1.2 METHOD OF ANALYSIS

The enclosed hydrologic calculations utilize the runoff estimating techniques developed by the USDA Soil Conservation Service (SCS). The following publications were used in the preparation of this report:

1. "Urban Hydrology for Small Watersheds"¹
2. "National Engineering Handbook, Hydrology, Section 4" (NEH-4)²
3. "Handbook of Hydraulics" 6th ed. - E.F. Brater & H. Williams³
4. "Soil Survey Report for Northeastern Worcester County" 1985 ed. - USDA NRCS⁴

Using SCS publications and other texts on surface water hydrology, in conjunction with drainage software *HydroCAD* developed by Applied Microcomputer Systems⁵, Hannigan Engineering, Inc. has calculated peak rates of runoff relative to the subject site for conditions prior to development as well as conditions upon the completion of construction. The drainage software program *HydroCAD* calculates peak rates of runoff similarly to the computer program known as *Computer Programs for Project Formulations-Hydrology, Technical Release Number 20 (TR-20)*, developed by SCS. This program and series of programs are the technical standard utilized by engineers, Planning Boards, Conservation Commission, and Municipal Agencies throughout the region and across the country for the evaluation of storm water conditions.

The analysis reviews certain parameters of sub-watersheds surrounding the subject site and how these parameters are affected by various rainfall conditions. These parameters include land cover and use, soil strata and permeability, and variations in slope. These parameters are used to develop rainfall runoff characteristics, which are used to analyze both pre and post development conditions within and surrounding the proposed construction activity. Some of these characteristics include times of concentration (Tc), peak rates of runoff, runoff volume, and the time the peak rate of runoff occurs within the particular storm event.

Times of concentration were computed by using the SCS "Upland Method" as described in the aforementioned National Engineering Handbook and were utilized for the analysis of the individual watersheds. The Upland Method computes the time of travel of storm waters over segments of the watershed depending upon land conditions, such as surface roughness, channel configuration, slope of land, and flow patterns. The addition of these travel times determines the individual watershed Time of Concentration. This method translates to more accurate Tc's than other more general methods.

1.3 SITE DESCRIPTION

The Project will be situated on a portion of the #1355 Main Street property along the southerly side of Main Street (Route 9) in Leicester. The property is currently undeveloped and is comprised mostly of woodland and brush. It is noted that some areas of an existing gravel access way exist within the area of development that is associated with the previous use of the property. Areas subject to protection under the Wetlands Protection Act and the Leicester Wetland Bylaws were reviewed and delineated by Caron Environmental. These areas are isolated to a Bordering Vegetated Wetland (BVW) along the southerly property line, near the center of the property with an secondary BVW located along the westerly property limits.

As part of the proposed development, a single roadway will be constructed to provide access to the individual lots. The paved roadway will access Main Street and extend in a southerly direction for a total paved roadway length of approximately 149 feet. The roadway will terminat with a T-Turnaround configuration which will allow for vehicles to enter and turnaround within the roadway. Due to the elevation relief of the site, a stabilized stone rip-rap slope will be provided to return the roadway grade to the existing topography.

For the purpose of the analysis, certain design points were reviewed. The design points are where the pre-development drainage for the subcatchment areas of the watershed over the property are directed. The same design points have been utilized and reviewed for both pre- and post-development runoff conditions. The drainage from the site currently overland flows to several low points located around the property. These Design Points are as follows. It is noted that Design Point #1 (DP#1) recieves the majority of the runoff from the proposed development.

Design Point #1 – Located at a low point within the onsite BVW along the southerly property line.

Design Point #2 – Located at a existing municipal catchbasin within Main Street to the east of the project.

Design Point #3 – Located at a low point located to the south east of the property on the abutting (#1323) property.

1.4 SOIL CHARACTERISTICS

Soil types for this analysis were based upon review of soils information contained in the SCS publication *Interim Soil Report for Worcester County, Massachusetts – Southern Part*. The original mapping has been reestablished via the Web Soil Survey as part of the National Cooperative Soil Survey under the Natural Resource Conservation Service and its website (<http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>). This mapping is the basis for the soil type determinations for this analysis.

The soils are classified by number and name by SCS and, subsequently, the Hydrological Soil Group has been designated within the Urban Hydrology for Small Watersheds manual. Soils within the subject watersheds are also hydrologically classified into different soil groups as defined by the Soil Conservation Service. The following table provides the SCS Hydrological Soil Group classification for each soil type.

<u>Soil Designation</u>	<u>Name</u>	<u>Hydrological Group</u>
305D	Paxton fine Sandy Loam	C
310B	Woodbridge Fine Sandy Loam	C/D

1.5 RUNOFF CURVE NUMBERS

The SCS runoff curve numbers used in all watershed modeling contained in this report are based on the Hydrologic Soil Groups and land uses below:

<u>Land Use</u>	<u>Hydrologic Soil Group</u>	<u>Curve #</u>
Grass Cover (good)	C	74
Woods (Good)	C	70
Gravel Surface	C	89
Impervious Area	NA	98

1.6 DESIGN CRITERIA

This drainage analysis was developed utilizing a Type III, 24-hour tropical storm as developed by SCS and required for this region. The storm frequencies and the corresponding 24-hour rainfall amounts are as follows:

<u>Storm Frequency (years)</u>	<u>Rainfall (inches)</u>
2	3.0
10	4.5
25	5.3
100	6.5

1.7 THE PROPOSED DRAINAGE SYSTEM

As with any development, changes in land use such as the transformation of woodland areas to lawn, landscape and impervious areas cause increased peak rates of runoff to the design points. These areas on this site consist of access drives and pad areas for ESS, as well as alterations in land use from woodland areas to open lawn and landscaped areas. In order to mitigate increases in peak rate of runoff, the site grading has been carefully designed to direct the majority of these land alterations to the storm drainage system. The majority of the runoff will be captured by a proposed dry detention basin located along the southerly limits of the project. This basin will provide the primary means of mitigating the peak rates of runoff from the development.

Stormwater generated from the project will be collected via deep-sump catchbasins and directed towards a water quately unit for TSS Removal. Upon treatment, the stormater will be directed towards an underground storage system located along the southerly limits of the roadway. The system will be comprised of a series of pre-cast concrete galley structures set within a bed of crushed stone. The system will be equipped with a PVC sub-drain system and an outlet orifice to control the discharge rate of the flow.

During smaller storm events, the stormwater will back up in the system controlled by the discharge flow allowed by the various outlet control features. Upon the completion of the storm event, these discharge control features will control the flow at or below pre-development rates until the stormwater has drained from the basin. It is noted that this subdrain system has a dual purpose of draining the underground system between storm events and preventing groundwater from entering from below.

1.8 CONCLUSIONS

As stated above, three Design Points have been established throughout the project area. Changes in land use are the predominant cause of increases in peak rate of runoff to these design points. Under proposed conditions, the majority of stormwater runoff will be captured by a proposed underground storage system before being directed towards DP#1. The results of the Drainage Analysis and resulting decreases in peak rates of runoff are shown below in *Table 1*.

Table #1: Peak Rates of Runoff

Design Point		2-yr Storm	10-yr Storm	25-yr Storm	100-yr Storm
#1	Pre-	3.47	8.29	11.18	15.76
	Post-	3.37	7.94	10.73	15.34
#2	Pre-	0.90	1.41	1.67	2.07
	Post-	0.90	1.41	1.67	2.07
#3	Pre-	2.30	4.89	6.38	8.67
	Post-	2.30	4.89	6.38	8.67

All flows are in cubic feet per second.

For all design points, mitigation of post development peak rates of runoff have been mitigated. This assures that no adverse impacts to abutting properties relative to increases in peak rates of runoff will occur due to the proposed development upon the completion of construction. The stormwater management as outlined herein and as shown on the accompanying plans has the following positive values relative to storm water management:

- A) Attenuation of the 2-, 10-, 25- and 100-year storm events has mitigated increases in peak rates of runoff, or has been justified herein.
- B) The development adheres to the provisions of the Massachusetts Stormwater Management program with greater than 80% TSS removal.
- C) The Stormwater Operation and Maintenance Plan (OMP) attached, has been prepared to ensure long-term function of the system, as designed.

¹Urban Hydrology for Small Watersheds (Technical Release Number 55); Engineering Division, United States Dept. of Agriculture ,Soil Conservation Service (Jan. 1975)

²National Engineering Handbook Section 4- Hydrology" ; United States Dept. of Agriculture, Soil Conservation Service (March 1985)

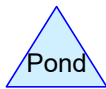
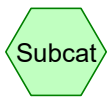
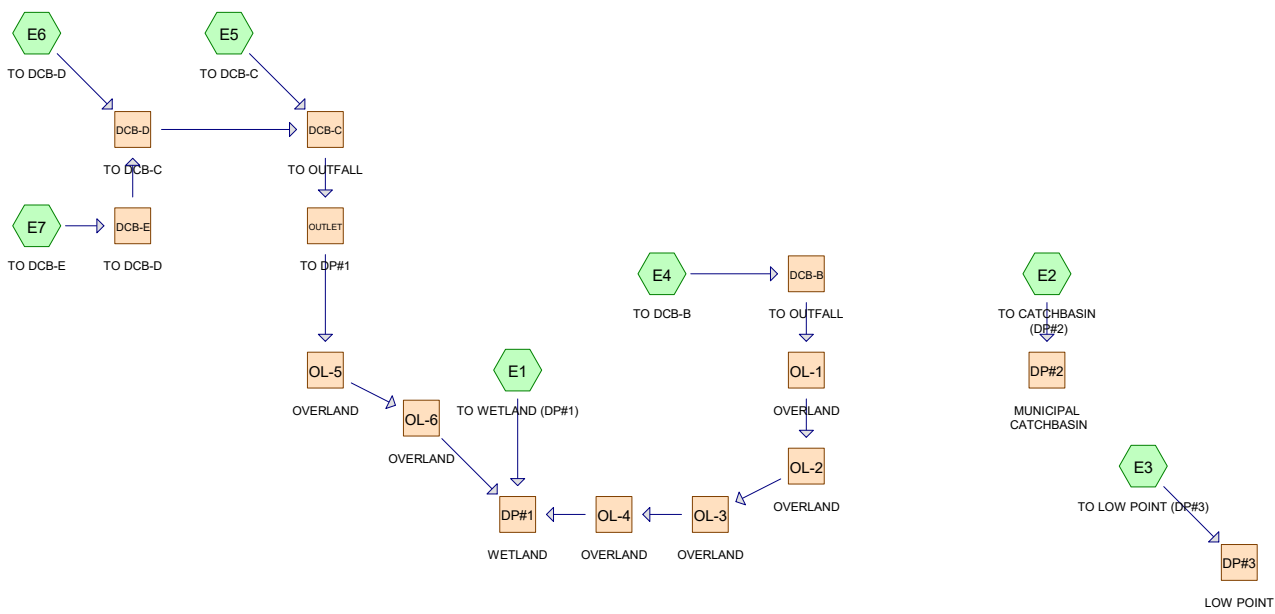
³Handbook of Hydraulics" - 6th ed., E.F. Brater & H. Williams (1976)

⁴Interim Soil Report for Southern Worcester County" 1995 ed., Published by the Southern Worcester County Conservation District, in cooperation with the United States Department of Agriculture, Natural Resources Conservation Service (1995)

⁵HydroCAD" Drainage software developed by Applied Microcomputer, Page Hill Road, Chocorua, NH

2.0
HYDROLOGICAL CALCULATIONS

2.1
PRE-DEVELOPMENT CALCULATIONS



Routing Diagram for 3010-Pre-SUBDIVISION
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Project Notes

Rainfall events imported from "TP-40-Rain.txt" for 449 MA Worcester

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.00	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.30	2
4	100-Year	Type III 24-hr		Default	24.00	1	6.50	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.284	74	>75% Grass cover, Good, HSG C (E1, E2, E3, E4)
0.446	89	Gravel roads, HSG C (E1, E3)
1.070	98	Paved parking, HSG C (E1, E2, E3, E4, E5, E6, E7)
6.183	70	Woods, Good, HSG C (E1, E2, E3, E7)
7.983	75	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
7.983	HSG C	E1, E2, E3, E4, E5, E6, E7
0.000	HSG D	
0.000	Other	
7.983		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.284	0.000	0.000	0.284	>75% Grass cover, Good	E1, E2, E3, E4
0.000	0.000	0.446	0.000	0.000	0.446	Gravel roads	E1, E3
0.000	0.000	1.070	0.000	0.000	1.070	Paved parking	E1, E2, E3, E4, E5, E6, E7
0.000	0.000	6.183	0.000	0.000	6.183	Woods, Good	E1, E2, E3, E7
0.000	0.000	7.983	0.000	0.000	7.983	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	DCB-C	131.25	113.50	70.0	0.2536	0.013	0.0	18.0	0.0
2	DCB-D	140.10	132.45	111.0	0.0689	0.013	0.0	18.0	0.0
3	DCB-E	140.85	140.20	36.0	0.0181	0.013	0.0	12.0	0.0

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Type III 24-hr 2-Year Rainfall=3.00"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: TO WETLAND (DP#1)	Runoff Area=230,616 sf 1.82% Impervious Runoff Depth=0.76" Flow Length=770' Tc=19.9 min CN=71 Runoff=2.81 cfs 0.335 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=2.45" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=0.90 cfs 0.067 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=1.07" Flow Length=356' Tc=5.0 min CN=77 Runoff=2.30 cfs 0.169 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=2.35" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.51 cfs 0.037 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=2.77" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.15 cfs 0.012 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=2.77" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.37 cfs 0.029 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=1.74" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.20 cfs 0.015 af
Reach DCB-B: TO OUTFALL	Inflow=0.51 cfs 0.037 af Outflow=0.51 cfs 0.037 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.12' Max Vel=10.50 fps Inflow=0.72 cfs 0.056 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=0.71 cfs 0.056 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.15' Max Vel=6.21 fps Inflow=0.57 cfs 0.044 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=0.56 cfs 0.044 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.14' Max Vel=3.02 fps Inflow=0.20 cfs 0.015 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.20 cfs 0.015 af
Reach DP#1: WETLAND	Inflow=3.47 cfs 0.429 af Outflow=3.47 cfs 0.429 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=0.90 cfs 0.067 af Outflow=0.90 cfs 0.067 af
Reach DP#3: LOW POINT	Inflow=2.30 cfs 0.169 af Outflow=2.30 cfs 0.169 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.04' Max Vel=0.75 fps Inflow=0.51 cfs 0.037 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=0.49 cfs 0.037 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.04' Max Vel=0.65 fps Inflow=0.49 cfs 0.037 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=0.42 cfs 0.037 af

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Type III 24-hr 2-Year Rainfall=3.00"

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.06' Max Vel=0.47 fps Inflow=0.42 cfs 0.037 af
n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.41 cfs 0.037 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.06' Max Vel=0.19 fps Inflow=0.41 cfs 0.037 af
n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.33 cfs 0.037 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.05' Max Vel=0.79 fps Inflow=0.71 cfs 0.056 af
n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=0.61 cfs 0.056 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.12' Max Vel=0.30 fps Inflow=0.61 cfs 0.056 af
n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=0.55 cfs 0.056 af

Reach OUTLET: TO DP#1

Inflow=0.71 cfs 0.056 af
Outflow=0.71 cfs 0.056 af

Total Runoff Area = 7.983 ac Runoff Volume = 0.664 af Average Runoff Depth = 1.00"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

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Type III 24-hr 2-Year Rainfall=3.00"

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Summary for Subcatchment E1: TO WETLAND (DP#1)

Runoff = 2.81 cfs @ 12.32 hrs, Volume= 0.335 af, Depth= 0.76"
 Routed to Reach DP#1 : WETLAND

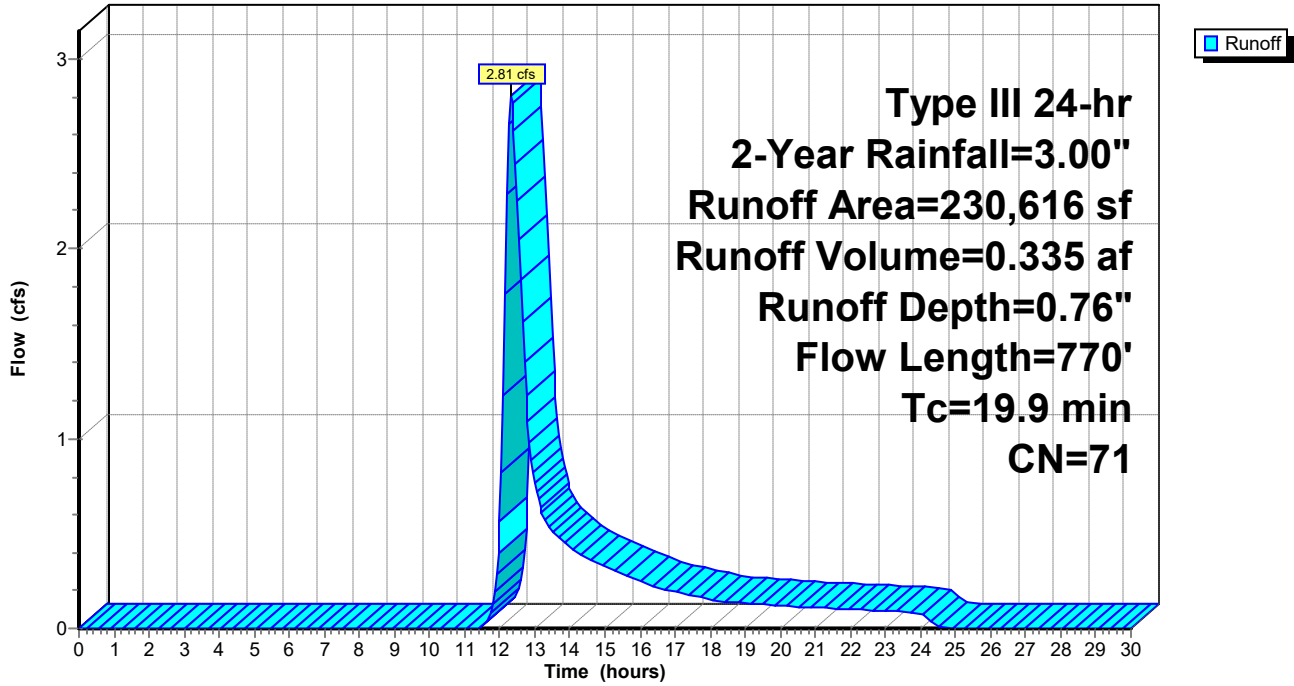
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,750	74	>75% Grass cover, Good, HSG C
217,729	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,943	89	Gravel roads, HSG C
230,616	71	Weighted Average
226,422		98.18% Pervious Area
4,194		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment E1: TO WETLAND (DP#1)

Hydrograph



Summary for Subcatchment E2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

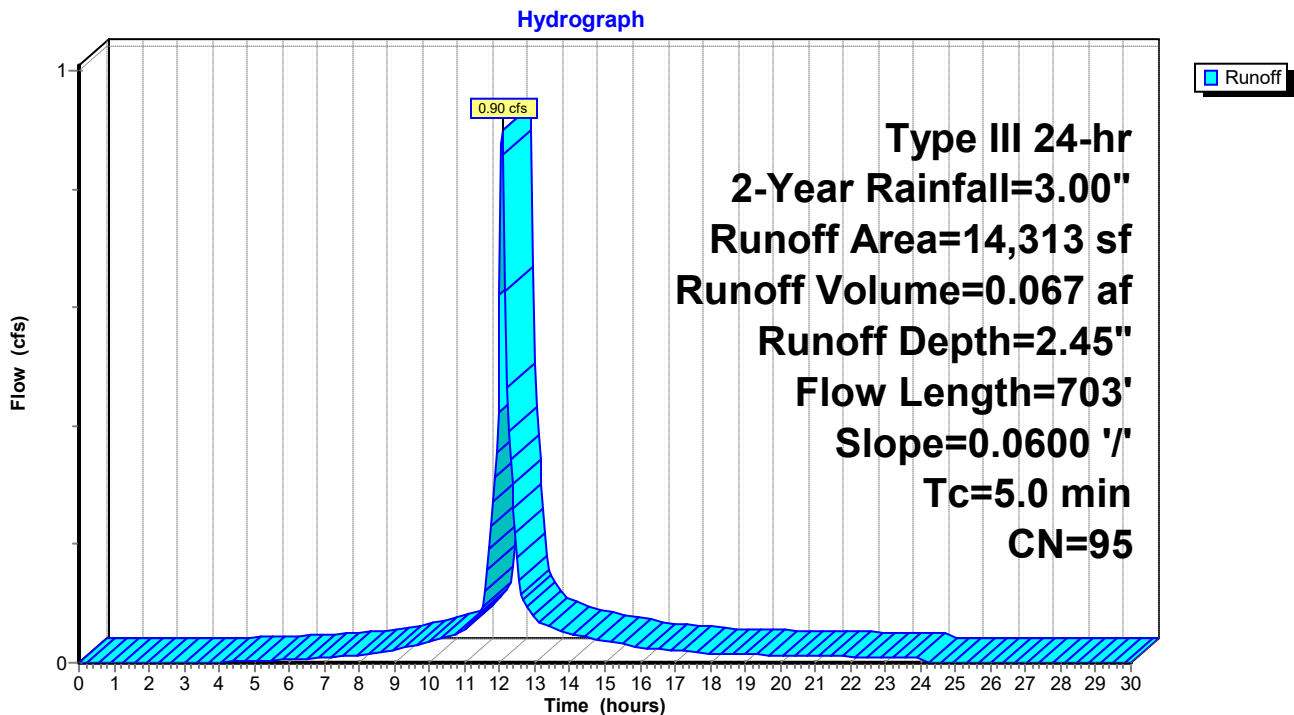
Runoff = 0.90 cfs @ 12.07 hrs, Volume= 0.067 af, Depth= 2.45"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,263	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,506	98	Paved parking, HSG C
14,313	95	Weighted Average
1,807		12.62% Pervious Area
12,506		87.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E2: TO CATCHBASIN (DP#2)



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Type III 24-hr 2-Year Rainfall=3.00"

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Summary for Subcatchment E3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

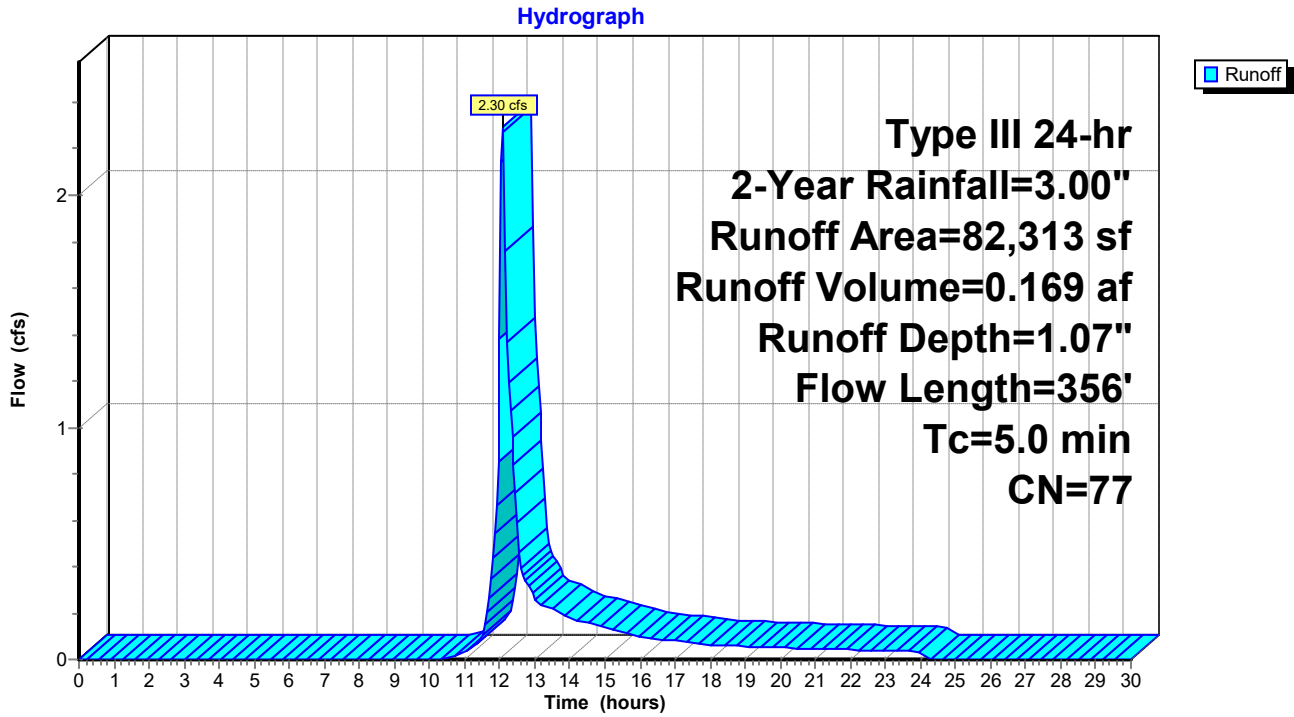
Runoff = 2.30 cfs @ 12.09 hrs, Volume= 0.169 af, Depth= 1.07"
 Routed to Reach DP#3 : LOW POINT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E3: TO LOW POINT (DP#3)



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Summary for Subcatchment E4: TO DCB-B

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af, Depth= 2.35"
 Routed to Reach DCB-B : TO OUTFALL

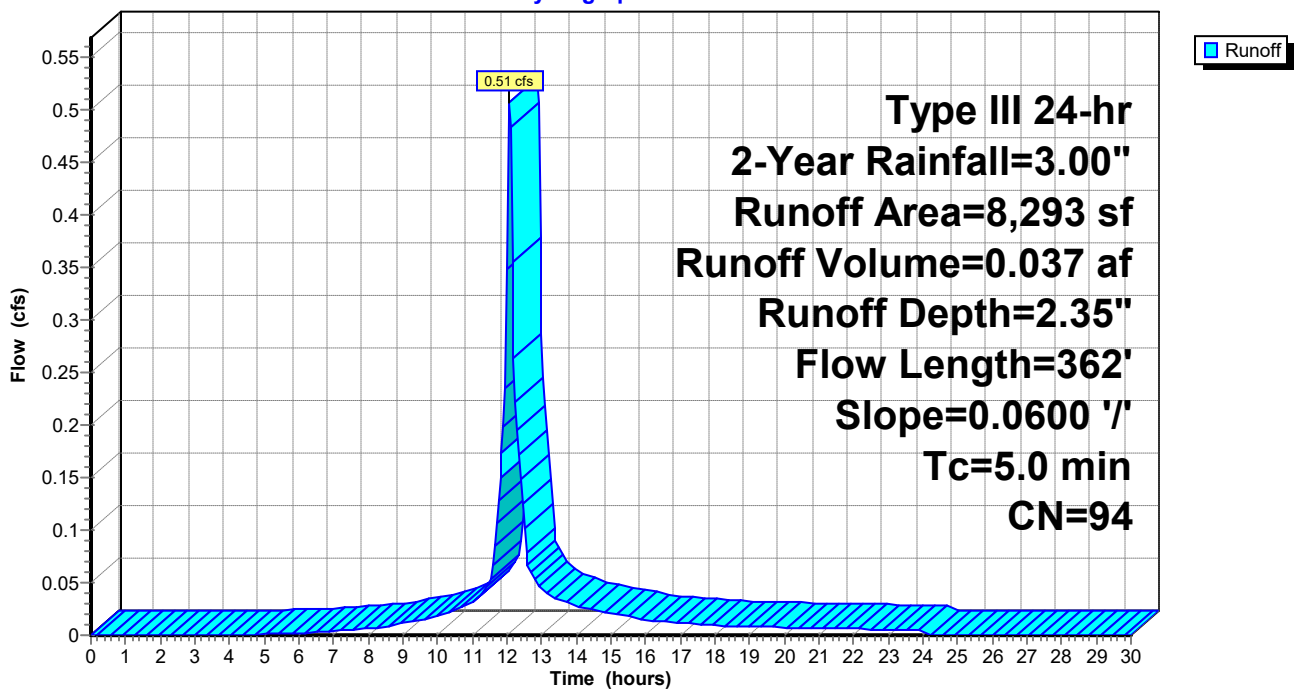
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	362	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E4: TO DCB-B

Hydrograph



Summary for Subcatchment E5: TO DCB-C

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.012 af, Depth= 2.77"
 Routed to Reach DCB-C : TO OUTFALL

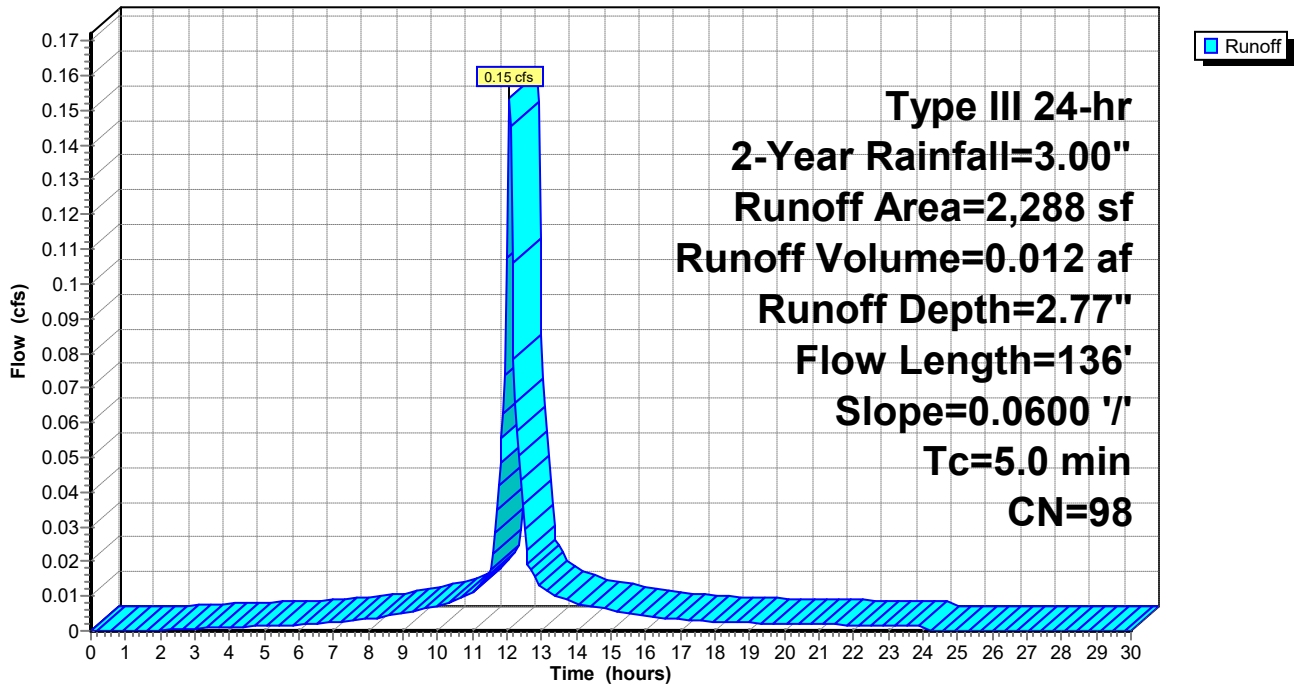
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E5: TO DCB-C

Hydrograph



Summary for Subcatchment E6: TO DCB-D

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af, Depth= 2.77"
 Routed to Reach DCB-D : TO DCB-C

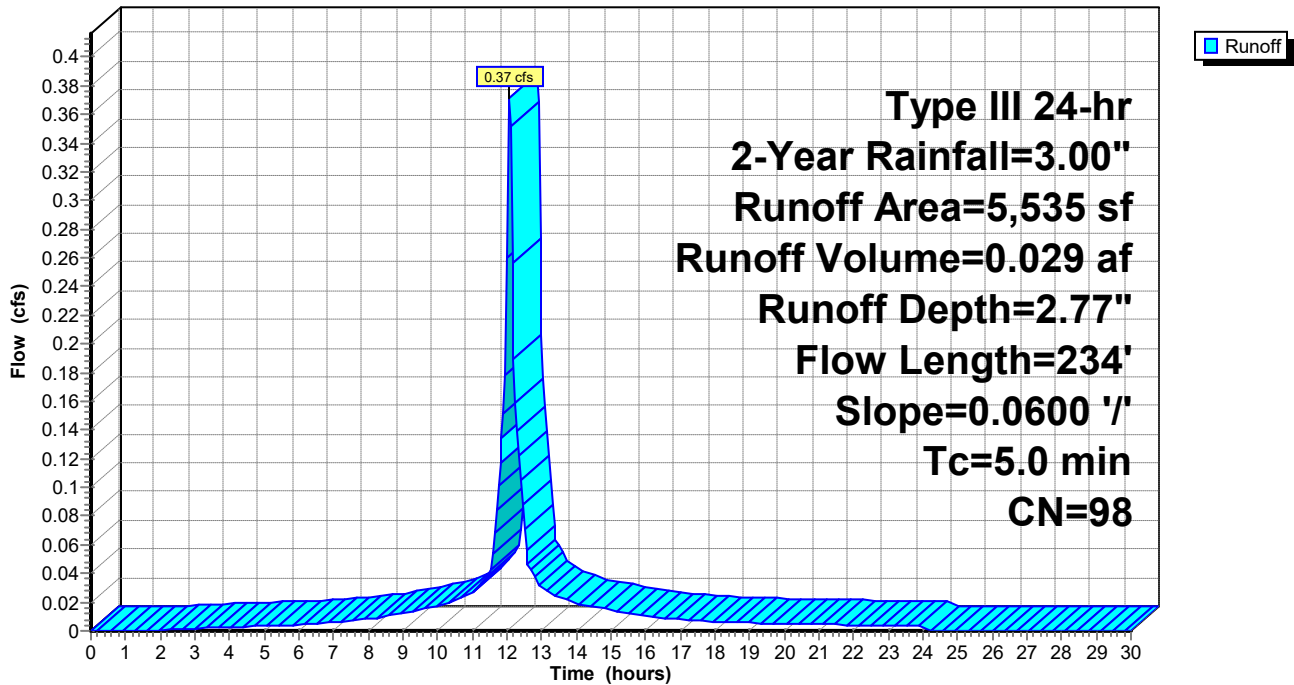
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E6: TO DCB-D

Hydrograph



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Summary for Subcatchment E7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.20 cfs @ 12.08 hrs, Volume= 0.015 af, Depth= 1.74"
 Routed to Reach DCB-E : TO DCB-D

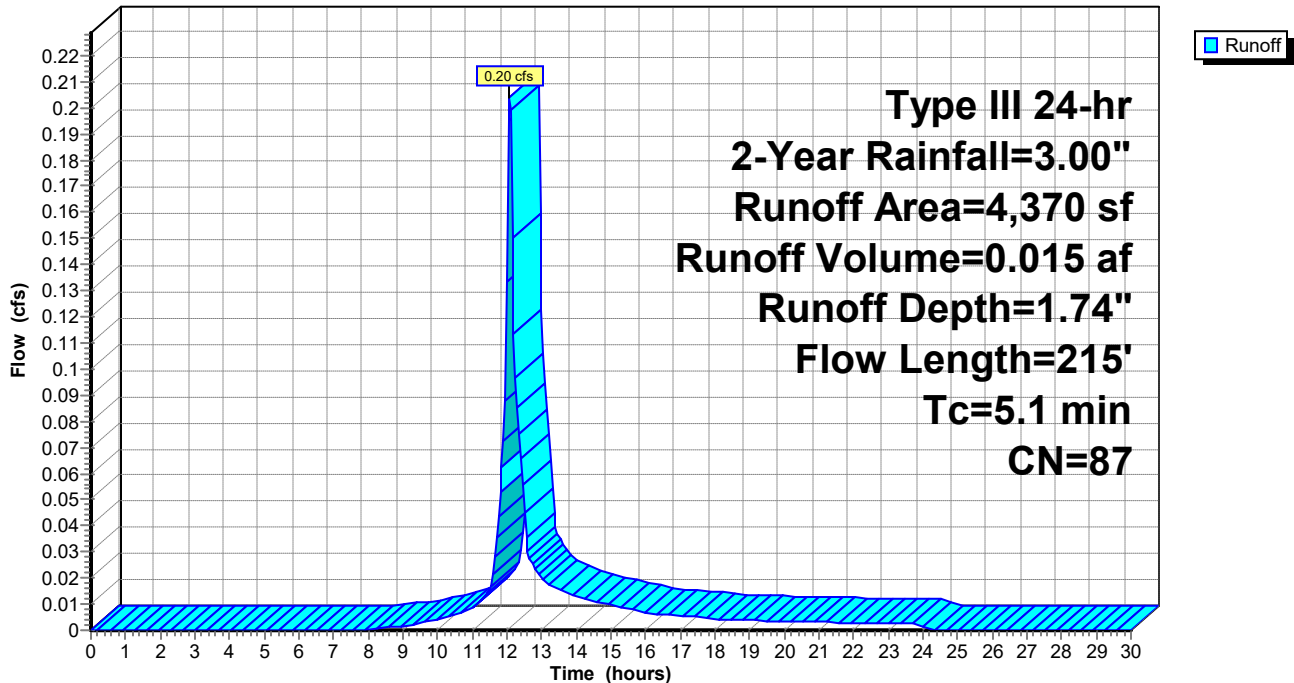
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,661	70	Woods, Good, HSG C
2,709	98	Paved parking, HSG C
4,370	87	Weighted Average
1,661		38.01% Pervious Area
2,709		61.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment E7: TO DCB-E

Hydrograph



Summary for Reach DCB-B: TO OUTFALL

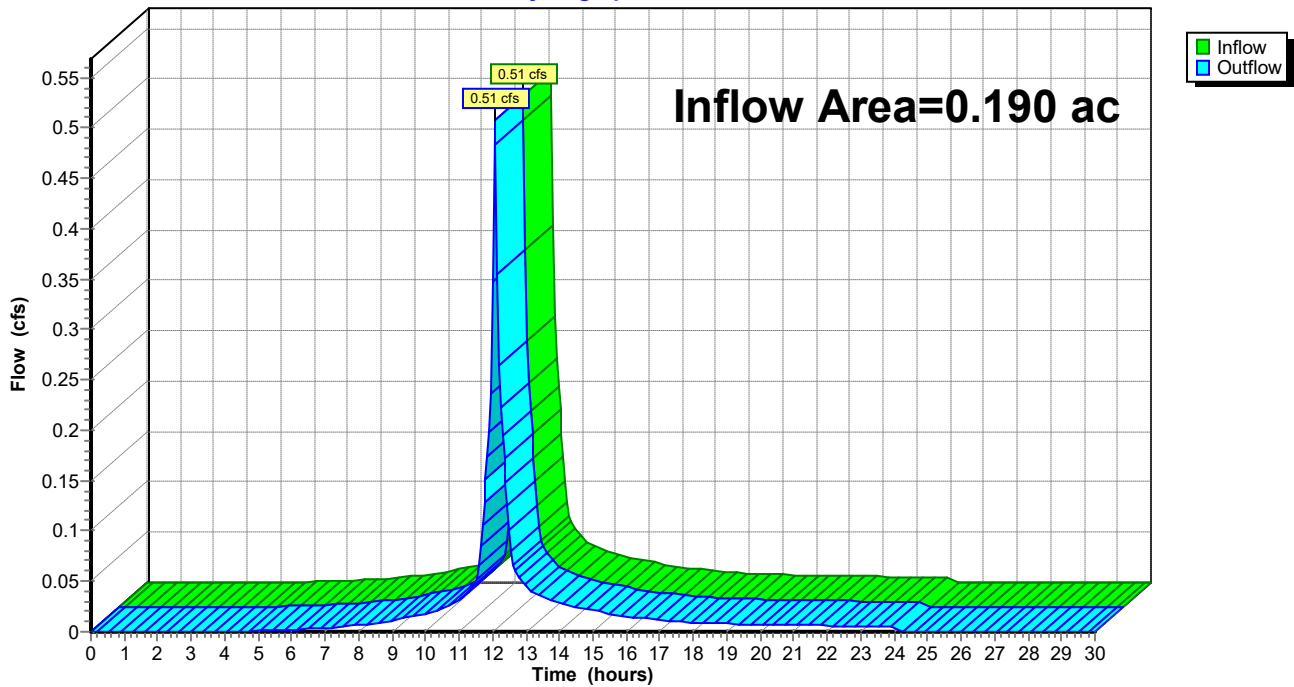
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af
Outflow = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



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Summary for Reach DCB-C: TO OUTFALL

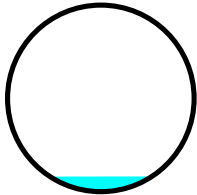
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 2.40" for 2-Year event
Inflow = 0.72 cfs @ 12.08 hrs, Volume= 0.056 af
Outflow = 0.71 cfs @ 12.09 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.50 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.54 fps, Avg. Travel Time= 0.3 min

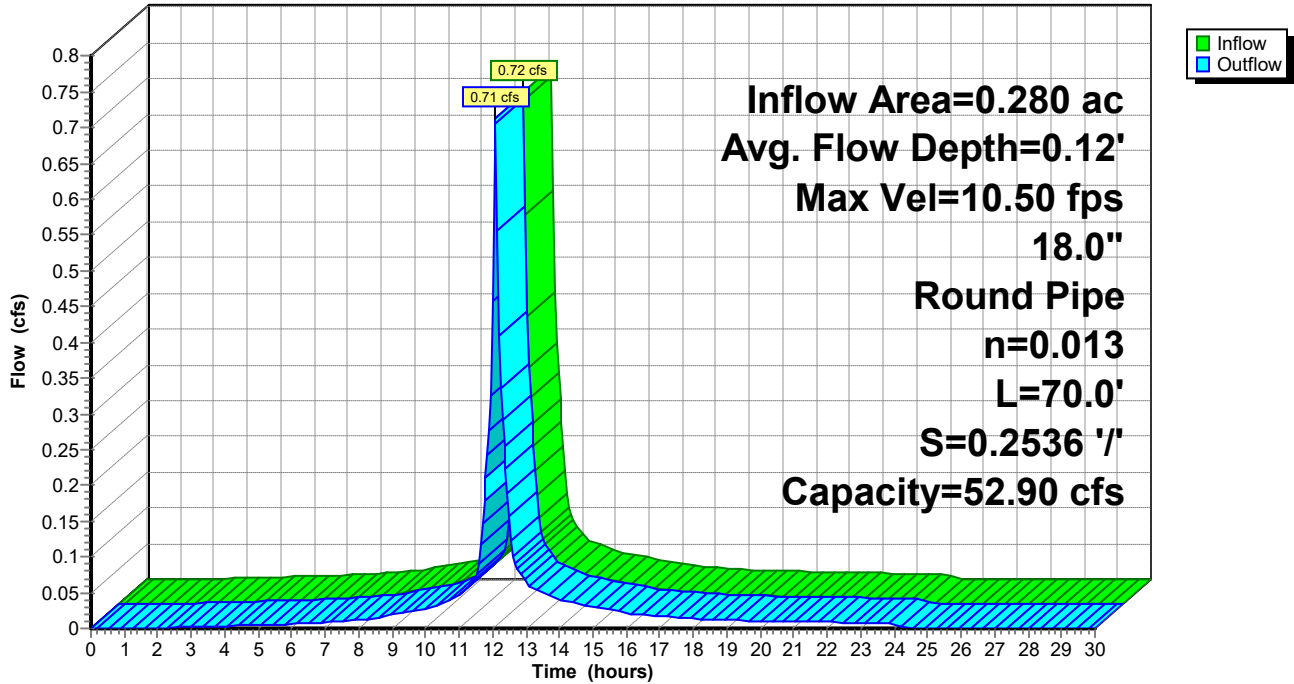
Peak Storage= 5 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 0.82'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



Reach DCB-C: TO OUTFALL

Hydrograph



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Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

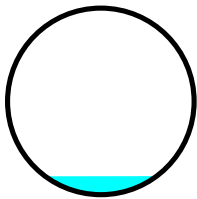
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.05' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 2.31" for 2-Year event
Inflow = 0.57 cfs @ 12.08 hrs, Volume= 0.044 af
Outflow = 0.56 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 1%, Lag= 0.6 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.21 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.05 fps, Avg. Travel Time= 0.9 min

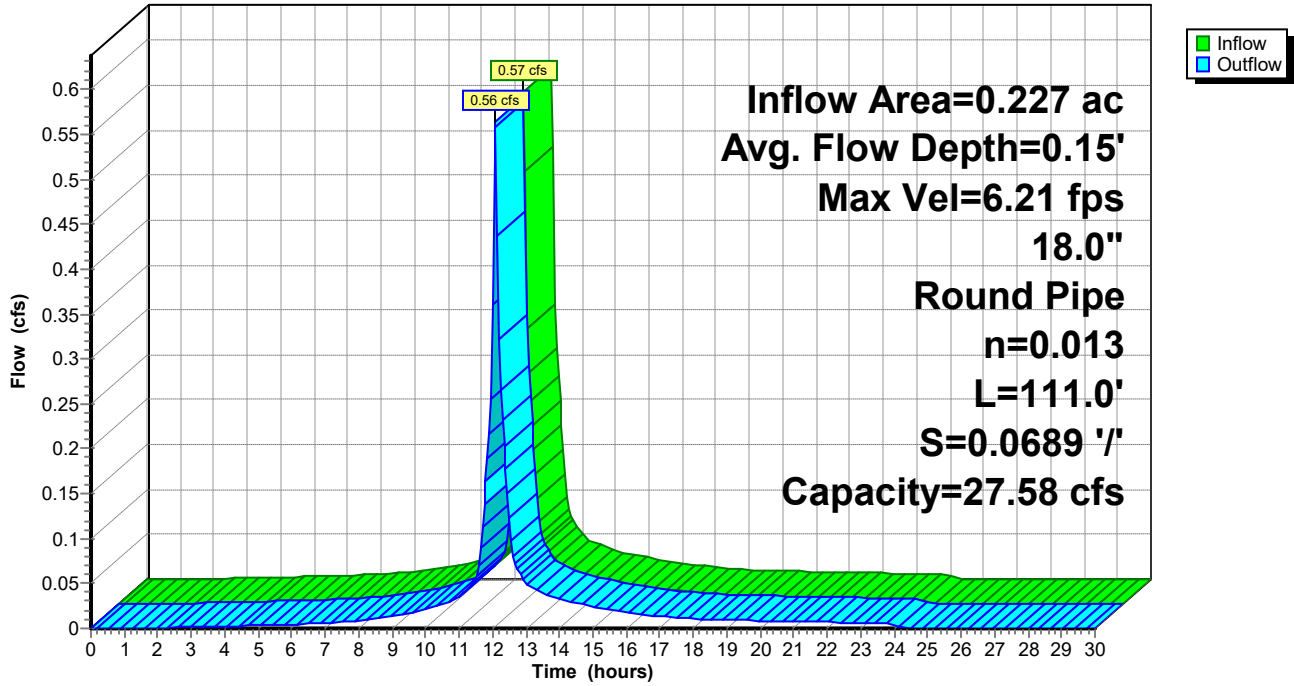
Peak Storage= 10 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.90'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



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Summary for Reach DCB-E: TO DCB-D

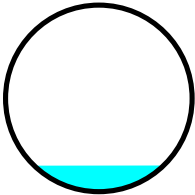
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 1.74" for 2-Year event
Inflow = 0.20 cfs @ 12.08 hrs, Volume= 0.015 af
Outflow = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.02 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 0.6 min

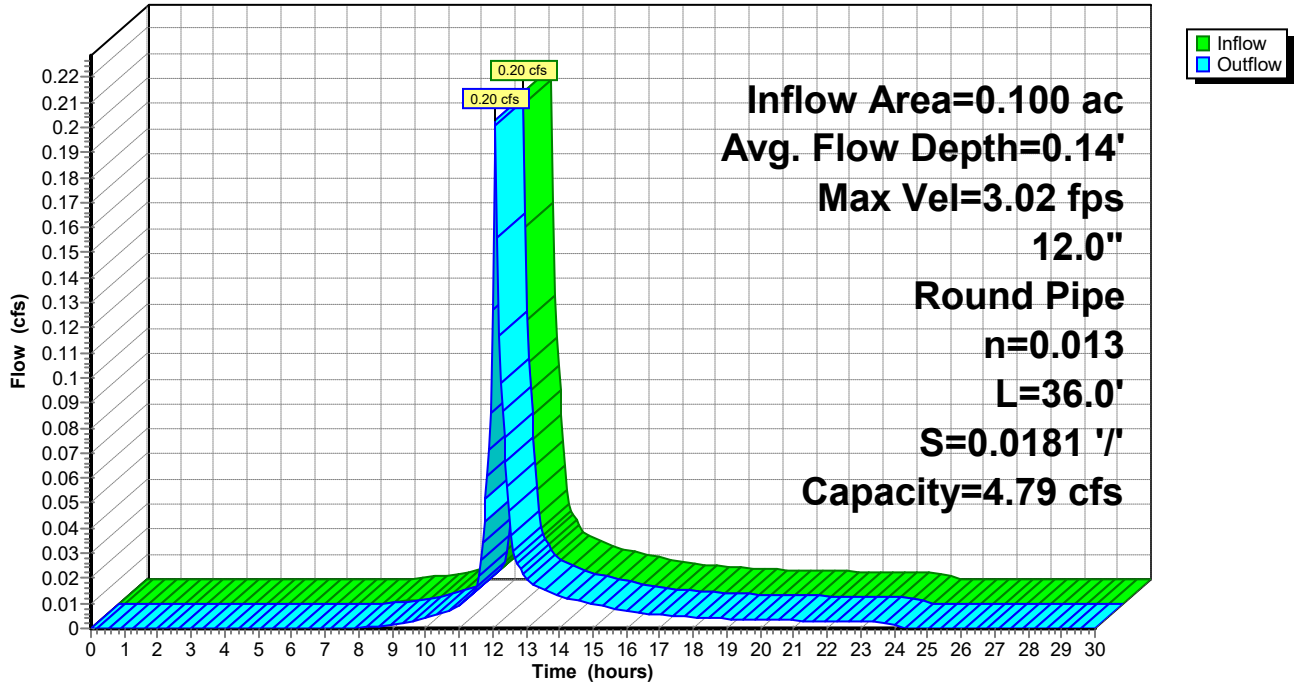
Peak Storage= 2 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 0.70'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/'
Inlet Invert= 140.85', Outlet Invert= 140.20'



Reach DCB-E: TO DCB-D

Hydrograph



Summary for Reach DP#1: WETLAND

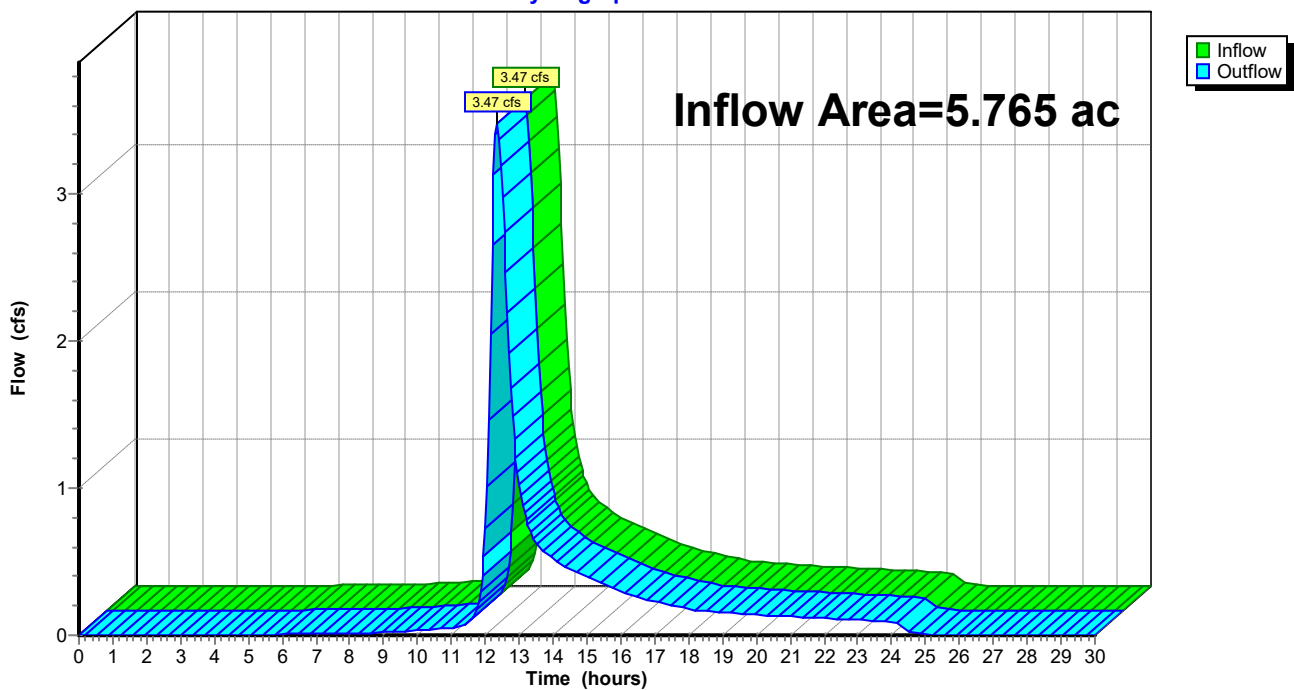
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 0.89" for 2-Year event
Inflow = 3.47 cfs @ 12.34 hrs, Volume= 0.429 af
Outflow = 3.47 cfs @ 12.34 hrs, Volume= 0.429 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#1: WETLAND

Hydrograph



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

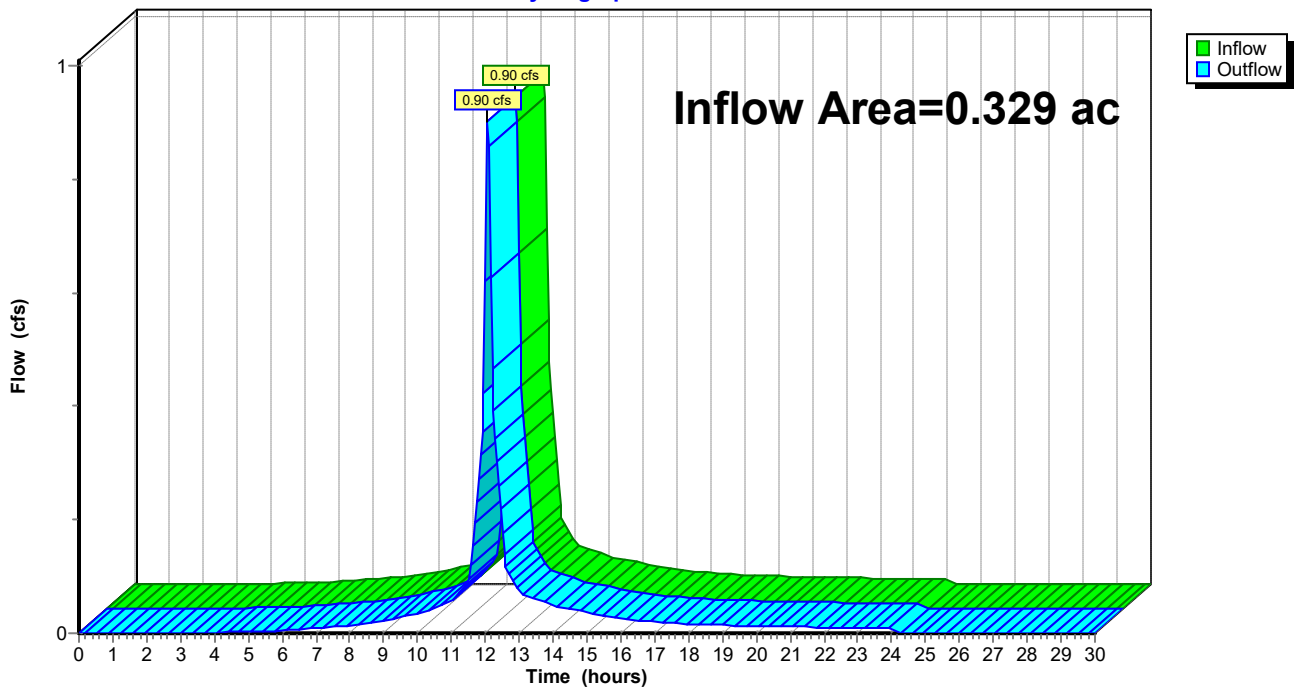
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 2.45" for 2-Year event
Inflow = 0.90 cfs @ 12.07 hrs, Volume= 0.067 af
Outflow = 0.90 cfs @ 12.07 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

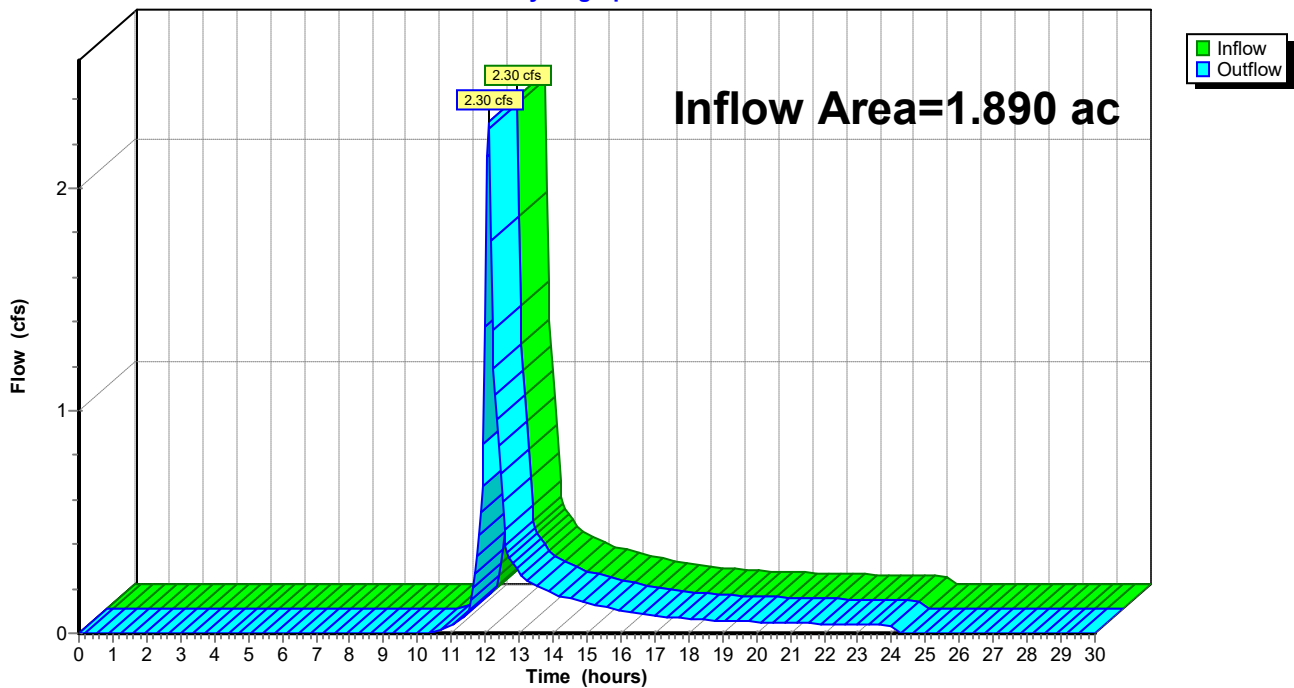
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 1.07" for 2-Year event
Inflow = 2.30 cfs @ 12.09 hrs, Volume= 0.169 af
Outflow = 2.30 cfs @ 12.09 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
 Inflow = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af
 Outflow = 0.49 cfs @ 12.10 hrs, Volume= 0.037 af, Atten= 4%, Lag= 1.9 min
 Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.75 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 0.30 fps, Avg. Travel Time= 2.6 min

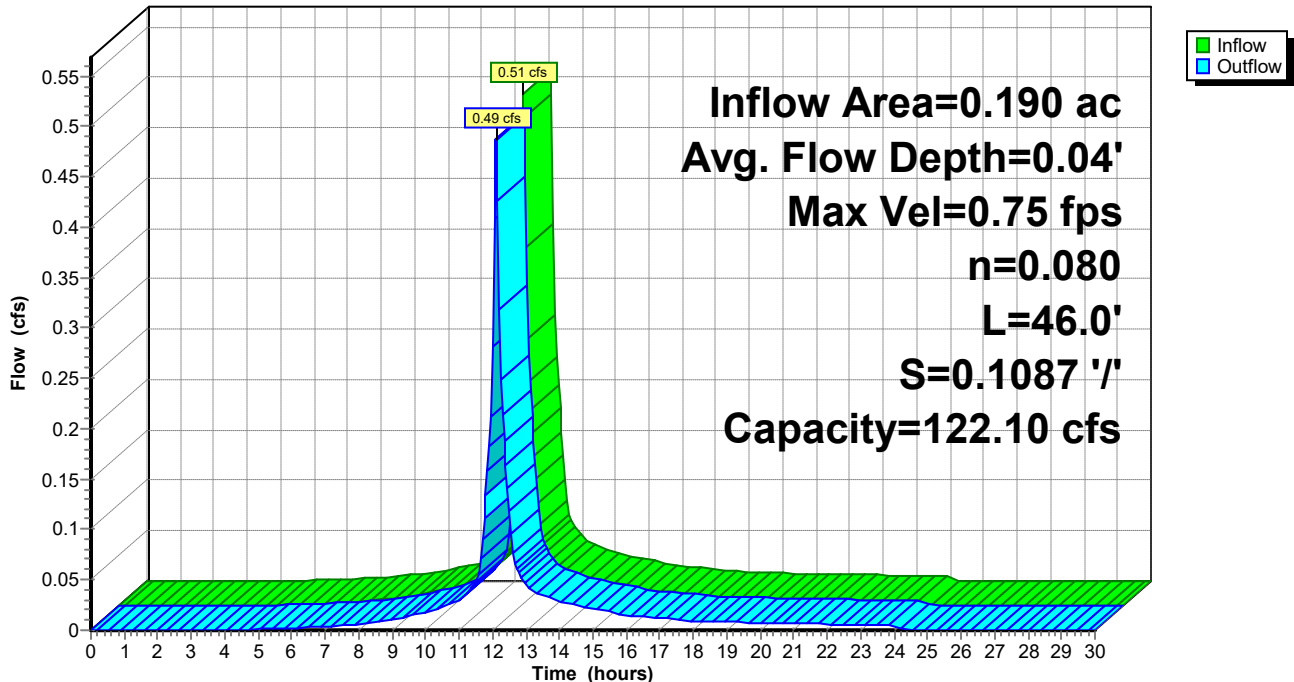
Peak Storage= 31 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.04' , Surface Width= 15.87'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 46.0' Slope= 0.1087 ' / '
 Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



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Summary for Reach OL-2: OVERLAND

[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.49 cfs @ 12.10 hrs, Volume= 0.037 af
Outflow = 0.42 cfs @ 12.25 hrs, Volume= 0.037 af, Atten= 14%, Lag= 8.6 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.65 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 13.3 min

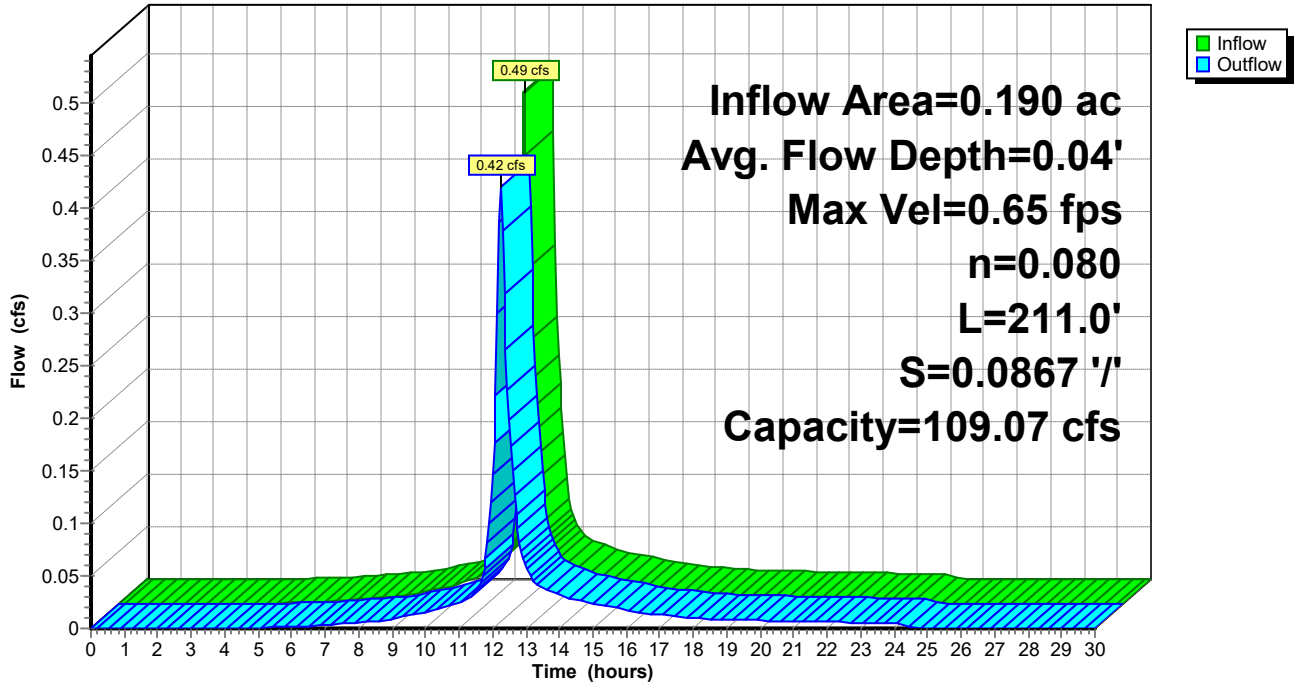
Peak Storage= 138 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 15.84'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' / '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.02' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.42 cfs @ 12.25 hrs, Volume= 0.037 af
Outflow = 0.41 cfs @ 12.27 hrs, Volume= 0.037 af, Atten= 2%, Lag= 1.3 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.47 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 2.3 min

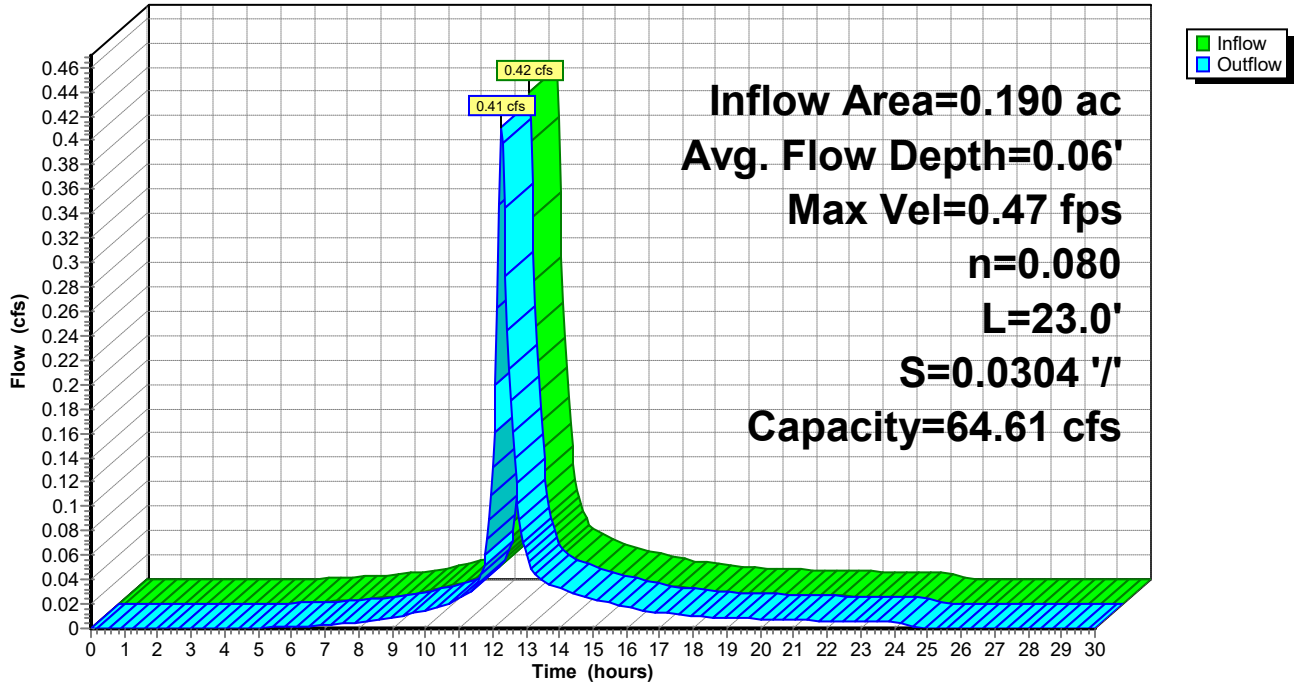
Peak Storage= 20 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.14'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



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Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.01' @ 12.55 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.41 cfs @ 12.27 hrs, Volume= 0.037 af
Outflow = 0.33 cfs @ 12.56 hrs, Volume= 0.037 af, Atten= 21%, Lag= 17.4 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 31.5 min

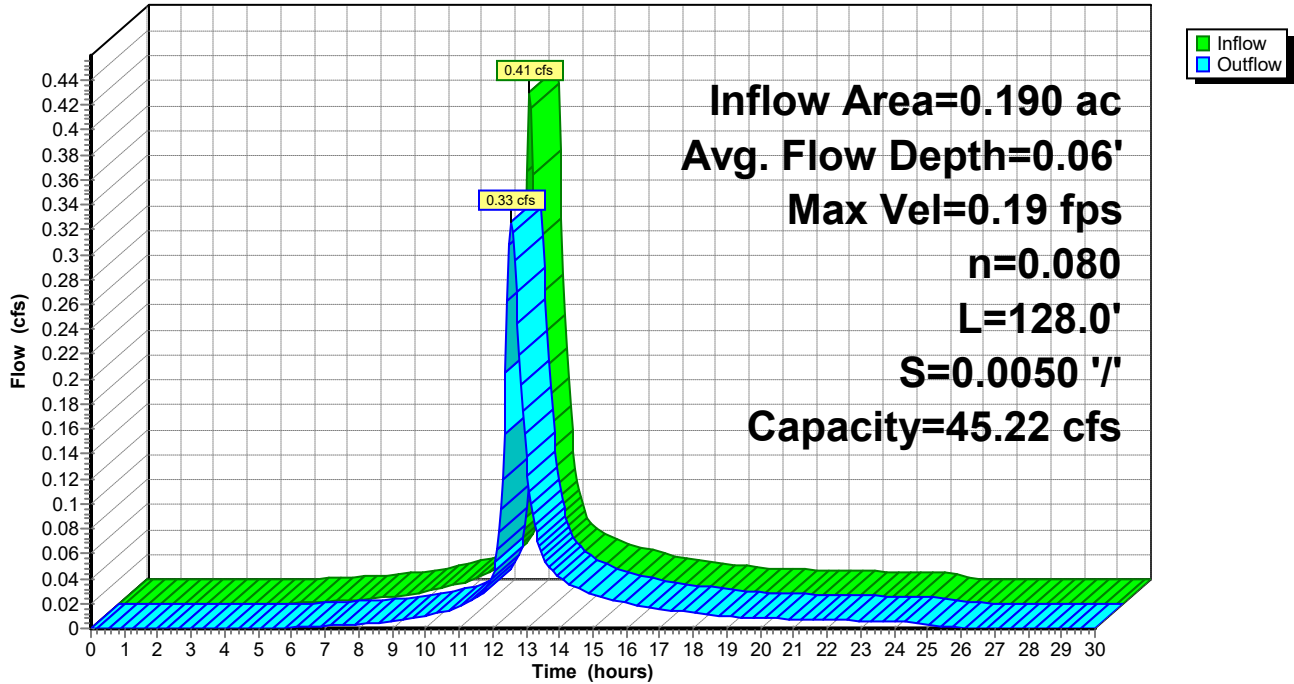
Peak Storage= 220 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 31.12'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 ' '
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



Summary for Reach OL-5: OVERLAND

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 2.40" for 2-Year event
 Inflow = 0.71 cfs @ 12.09 hrs, Volume= 0.056 af
 Outflow = 0.61 cfs @ 12.24 hrs, Volume= 0.056 af, Atten= 15%, Lag= 9.3 min
 Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.79 fps, Min. Travel Time= 6.0 min
 Avg. Velocity = 0.29 fps, Avg. Travel Time= 16.2 min

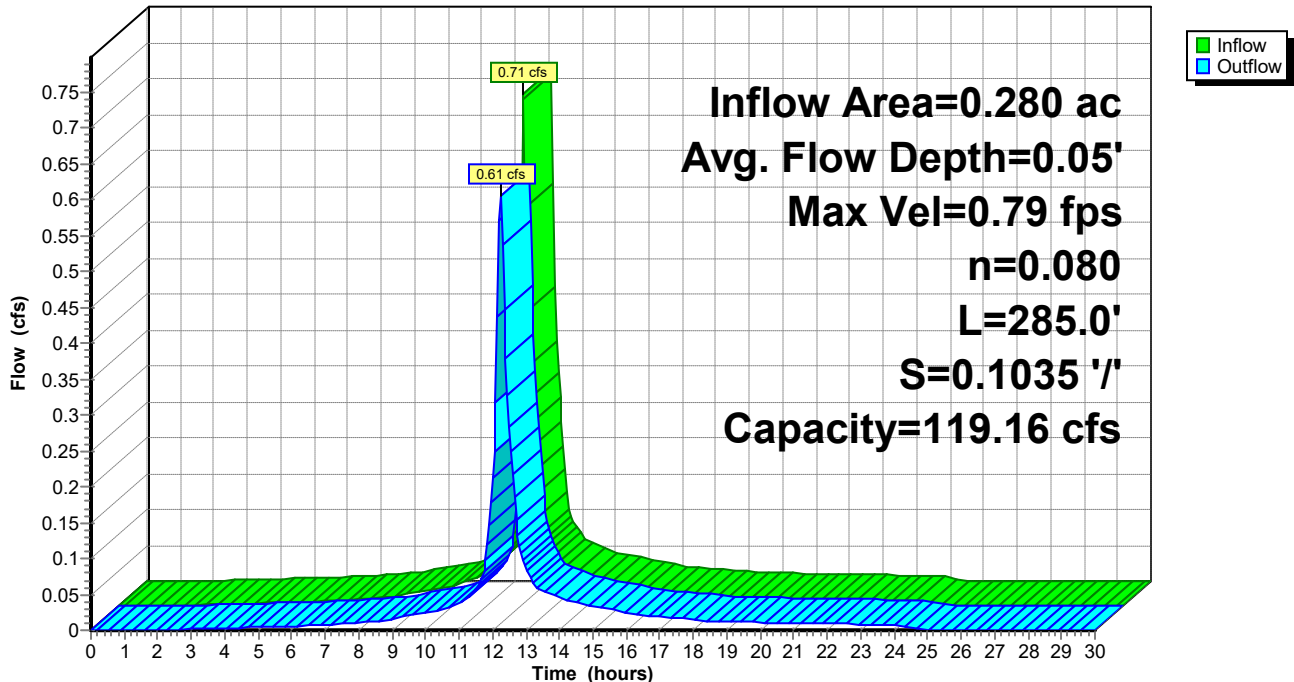
Peak Storage= 219 cf @ 12.14 hrs
 Average Depth at Peak Storage= 0.05', Surface Width= 15.99'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 285.0' Slope= 0.1035 ' / '
 Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



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Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.08' @ 12.30 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 2.40" for 2-Year event
Inflow = 0.61 cfs @ 12.24 hrs, Volume= 0.056 af
Outflow = 0.55 cfs @ 12.37 hrs, Volume= 0.056 af, Atten= 9%, Lag= 7.5 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.30 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 16.5 min

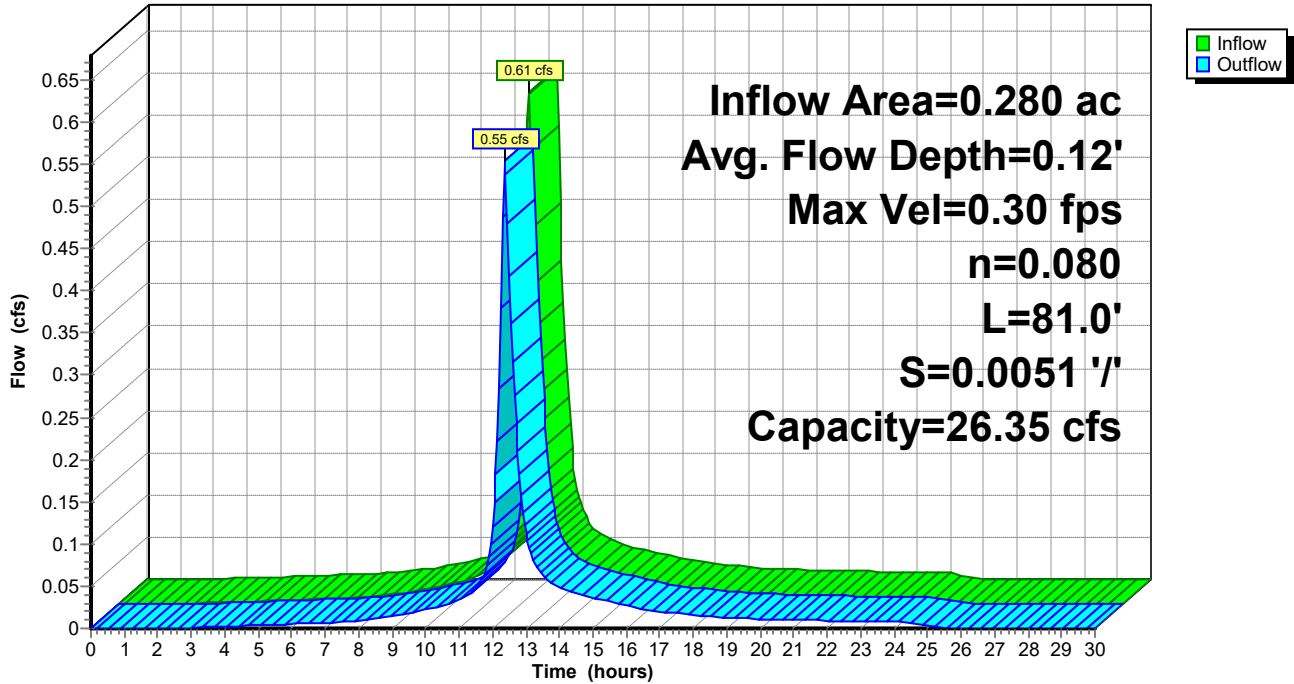
Peak Storage= 152 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 17.32'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 ' '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

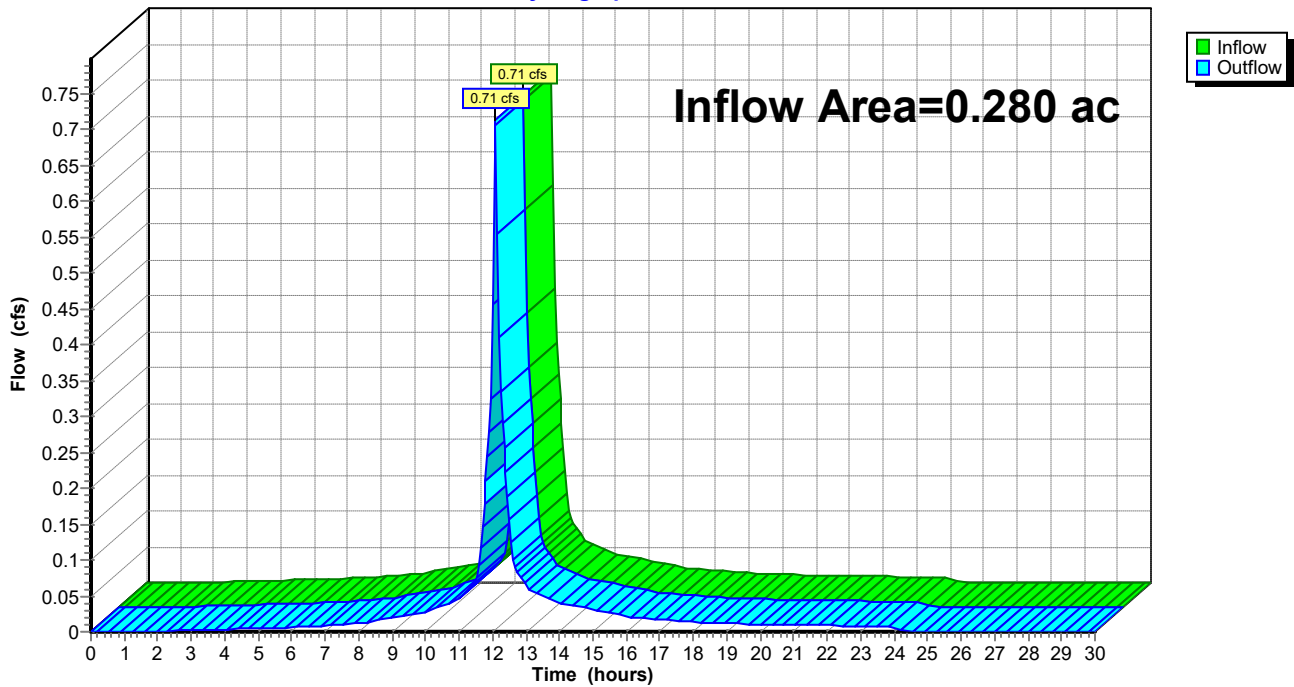
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 2.40" for 2-Year event
Inflow = 0.71 cfs @ 12.09 hrs, Volume= 0.056 af
Outflow = 0.71 cfs @ 12.09 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



3010-Pre-SUBDIVISION

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Type III 24-hr 10-Year Rainfall=4.50"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: TO WETLAND (DP#1)	Runoff Area=230,616 sf 1.82% Impervious Runoff Depth=1.75" Flow Length=770' Tc=19.9 min CN=71 Runoff=7.09 cfs 0.770 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=3.92" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=1.41 cfs 0.107 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=2.21" Flow Length=356' Tc=5.0 min CN=77 Runoff=4.89 cfs 0.348 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=3.82" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.80 cfs 0.061 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=4.26" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.23 cfs 0.019 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=4.26" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.56 cfs 0.045 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=3.10" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.36 cfs 0.026 af
Reach DCB-B: TO OUTFALL	Inflow=0.80 cfs 0.061 af Outflow=0.80 cfs 0.061 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.15' Max Vel=12.05 fps Inflow=1.13 cfs 0.090 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.13 cfs 0.090 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.19' Max Vel=7.15 fps Inflow=0.92 cfs 0.071 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=0.90 cfs 0.071 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.19' Max Vel=3.56 fps Inflow=0.36 cfs 0.026 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.36 cfs 0.026 af
Reach DP#1: WETLAND	Inflow=8.29 cfs 0.921 af Outflow=8.29 cfs 0.921 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.41 cfs 0.107 af Outflow=1.41 cfs 0.107 af
Reach DP#3: LOW POINT	Inflow=4.89 cfs 0.348 af Outflow=4.89 cfs 0.348 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.89 fps Inflow=0.80 cfs 0.061 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=0.77 cfs 0.061 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.79 fps Inflow=0.77 cfs 0.061 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=0.68 cfs 0.061 af

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Type III 24-hr 10-Year Rainfall=4.50"

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.08' Max Vel=0.56 fps Inflow=0.68 cfs 0.061 af
n=0.080 L=23.0' S=0.0304 '/' Capacity=64.61 cfs Outflow=0.66 cfs 0.061 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.08' Max Vel=0.23 fps Inflow=0.66 cfs 0.061 af
n=0.080 L=128.0' S=0.0050 '/' Capacity=45.22 cfs Outflow=0.56 cfs 0.061 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.07' Max Vel=0.95 fps Inflow=1.13 cfs 0.090 af
n=0.080 L=285.0' S=0.1035 '/' Capacity=119.16 cfs Outflow=0.98 cfs 0.090 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.15' Max Vel=0.36 fps Inflow=0.98 cfs 0.090 af
n=0.080 L=81.0' S=0.0051 '/' Capacity=26.35 cfs Outflow=0.91 cfs 0.090 af

Reach OUTLET: TO DP#1

Inflow=1.13 cfs 0.090 af
Outflow=1.13 cfs 0.090 af

Total Runoff Area = 7.983 ac Runoff Volume = 1.376 af Average Runoff Depth = 2.07"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment E1: TO WETLAND (DP#1)

Runoff = 7.09 cfs @ 12.29 hrs, Volume= 0.770 af, Depth= 1.75"
 Routed to Reach DP#1 : WETLAND

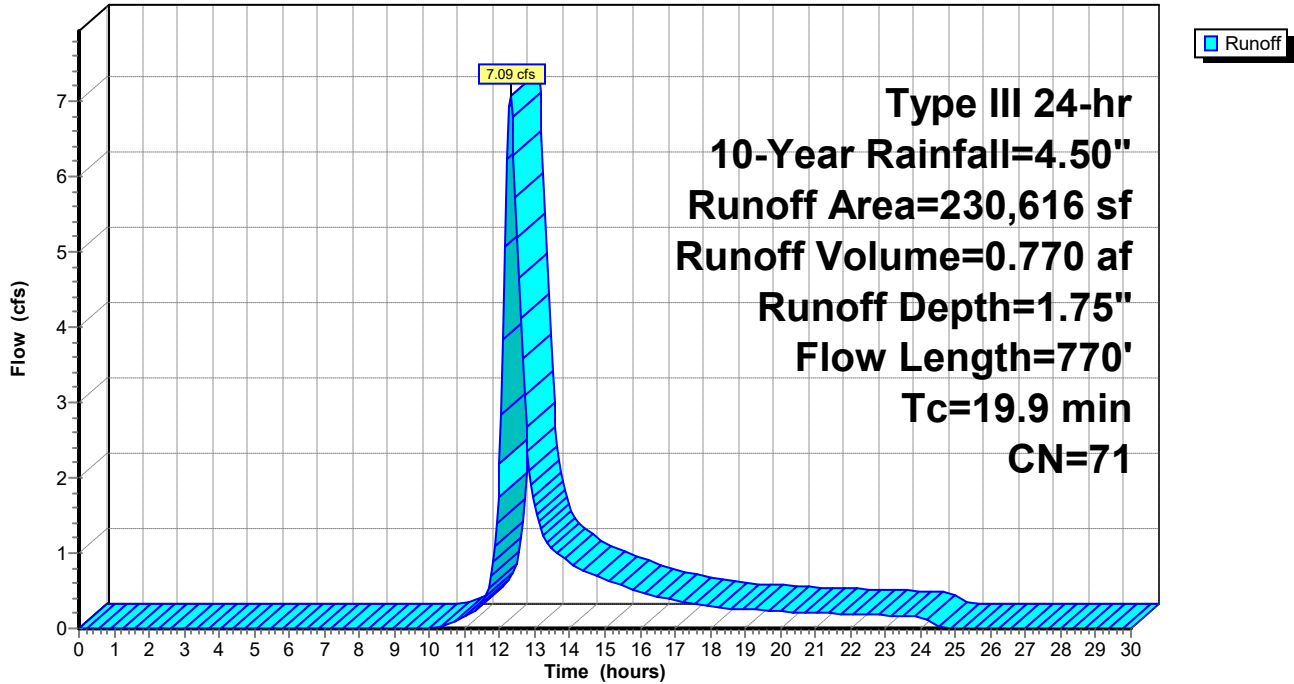
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,750	74	>75% Grass cover, Good, HSG C
217,729	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,943	89	Gravel roads, HSG C
230,616	71	Weighted Average
226,422		98.18% Pervious Area
4,194		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment E1: TO WETLAND (DP#1)

Hydrograph



Summary for Subcatchment E2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.41 cfs @ 12.07 hrs, Volume= 0.107 af, Depth= 3.92"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

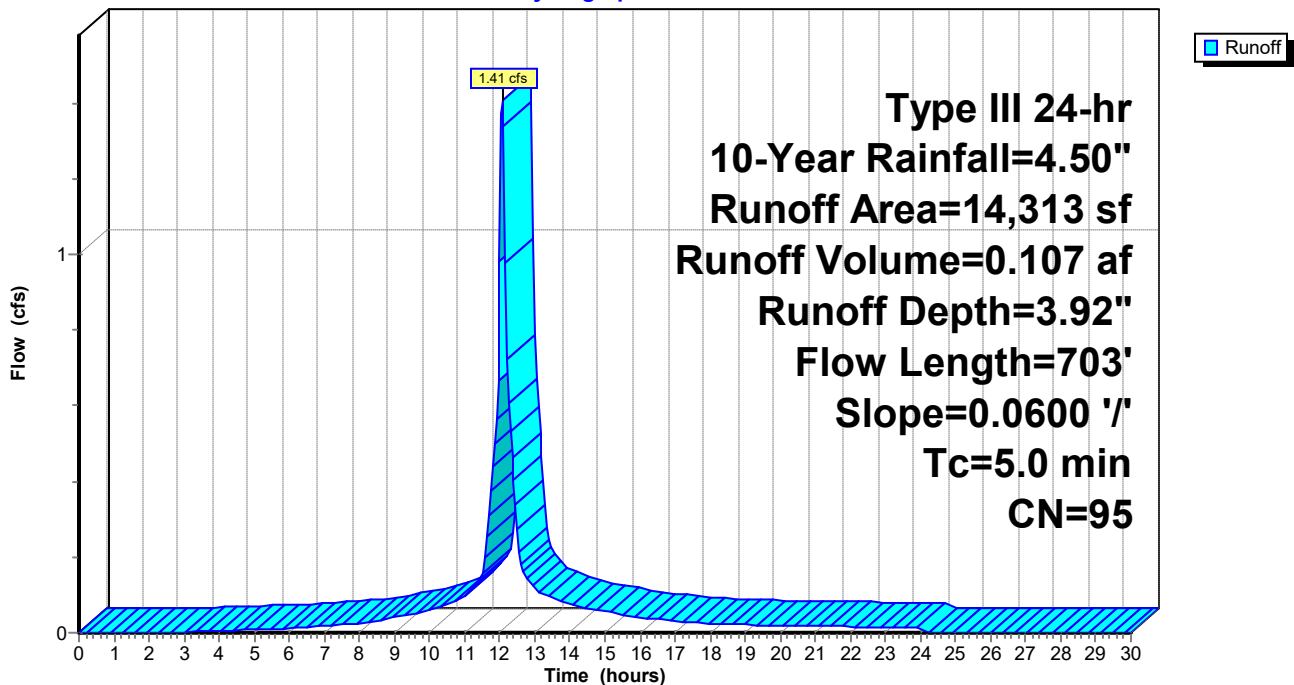
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,263	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,506	98	Paved parking, HSG C
14,313	95	Weighted Average
1,807		12.62% Pervious Area
12,506		87.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E2: TO CATCHBASIN (DP#2)

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment E3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 4.89 cfs @ 12.08 hrs, Volume= 0.348 af, Depth= 2.21"
 Routed to Reach DP#3 : LOW POINT

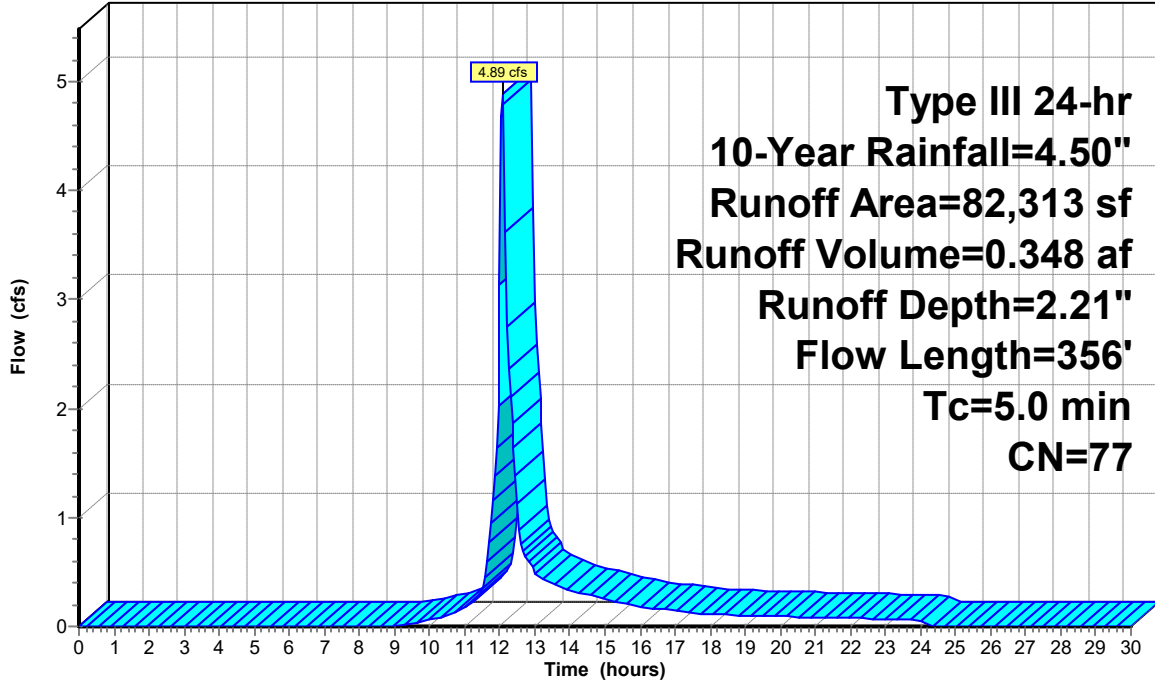
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E3: TO LOW POINT (DP#3)

Hydrograph



Summary for Subcatchment E4: TO DCB-B

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af, Depth= 3.82"
 Routed to Reach DCB-B : TO OUTFALL

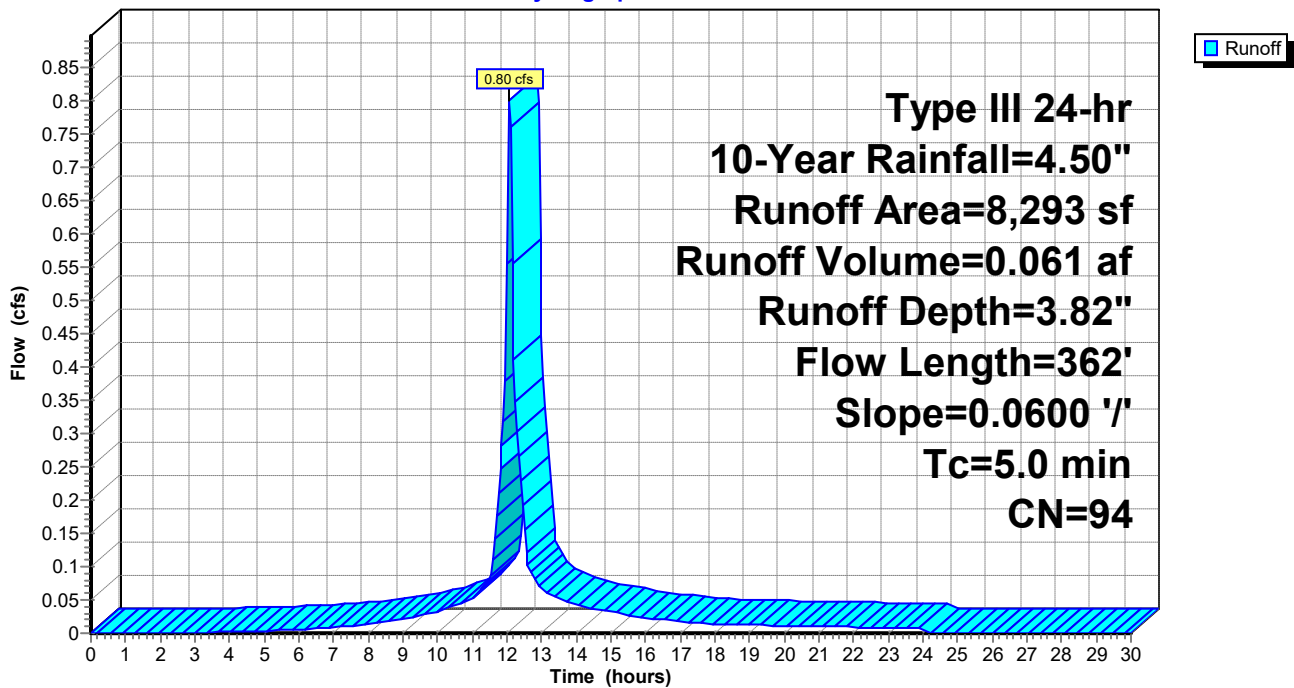
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	362	Total, Increased to minimum $T_c = 5.0$ min			

Subcatchment E4: TO DCB-B

Hydrograph



Summary for Subcatchment E5: TO DCB-C

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 4.26"
 Routed to Reach DCB-C : TO OUTFALL

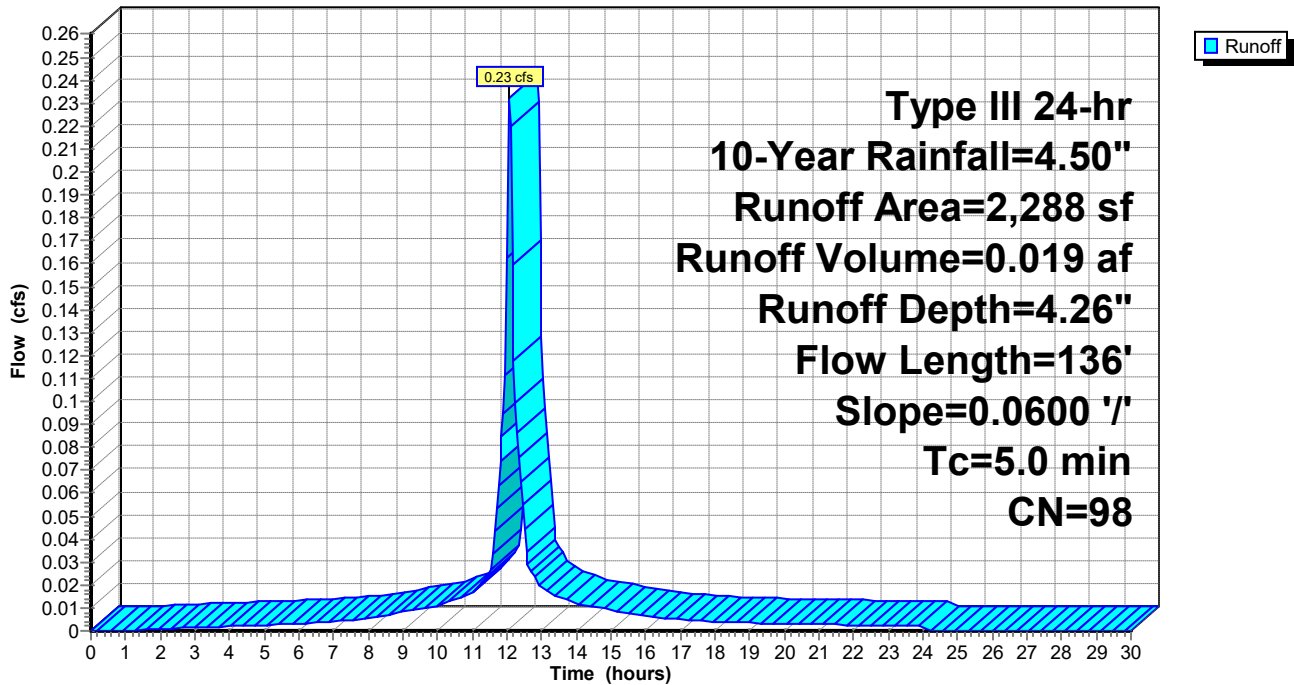
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum $T_c = 5.0$ min			

Subcatchment E5: TO DCB-C

Hydrograph



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Summary for Subcatchment E6: TO DCB-D

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.56 cfs @ 12.07 hrs, Volume= 0.045 af, Depth= 4.26"
 Routed to Reach DCB-D : TO DCB-C

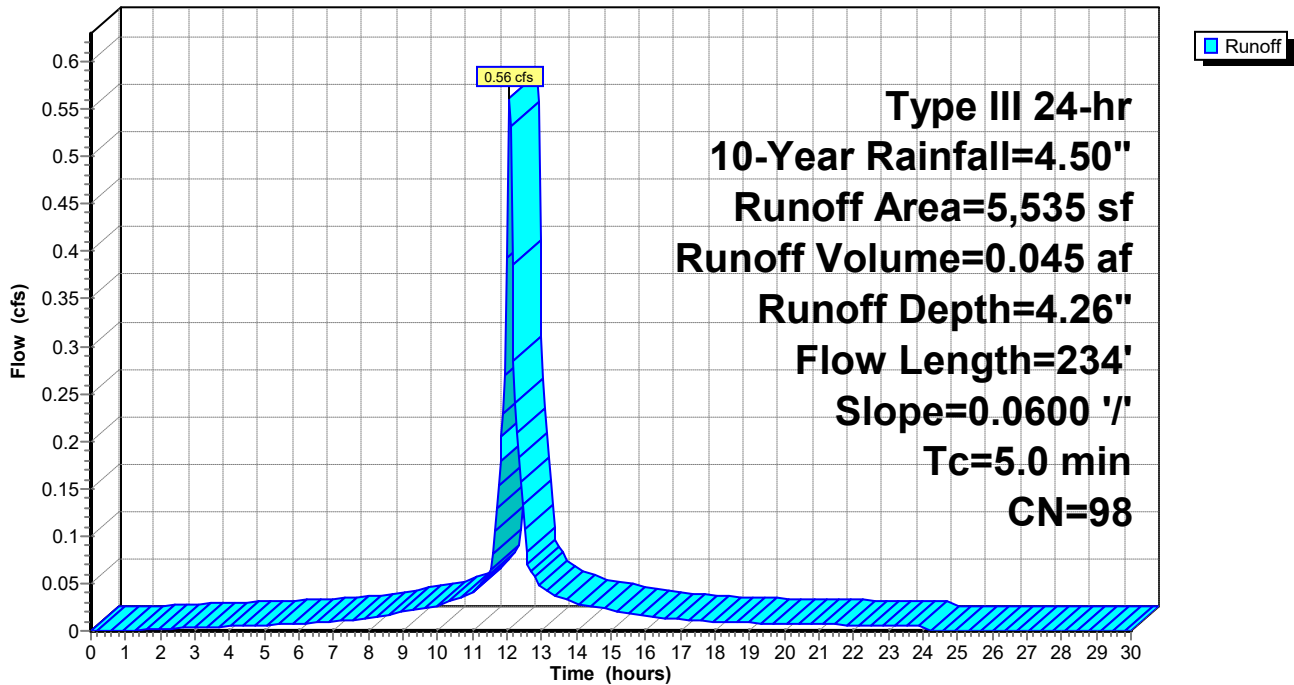
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E6: TO DCB-D

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment E7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.36 cfs @ 12.08 hrs, Volume= 0.026 af, Depth= 3.10"
 Routed to Reach DCB-E : TO DCB-D

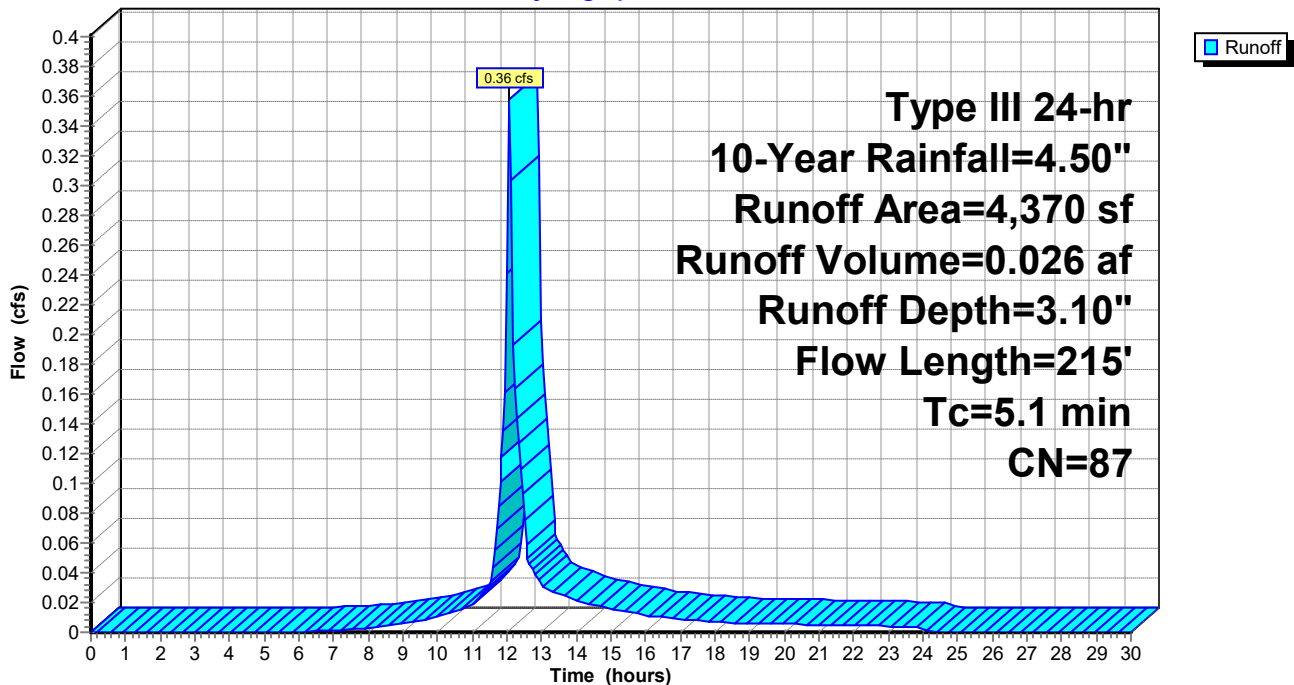
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,661	70	Woods, Good, HSG C
2,709	98	Paved parking, HSG C
4,370	87	Weighted Average
1,661		38.01% Pervious Area
2,709		61.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment E7: TO DCB-E

Hydrograph



Summary for Reach DCB-B: TO OUTFALL

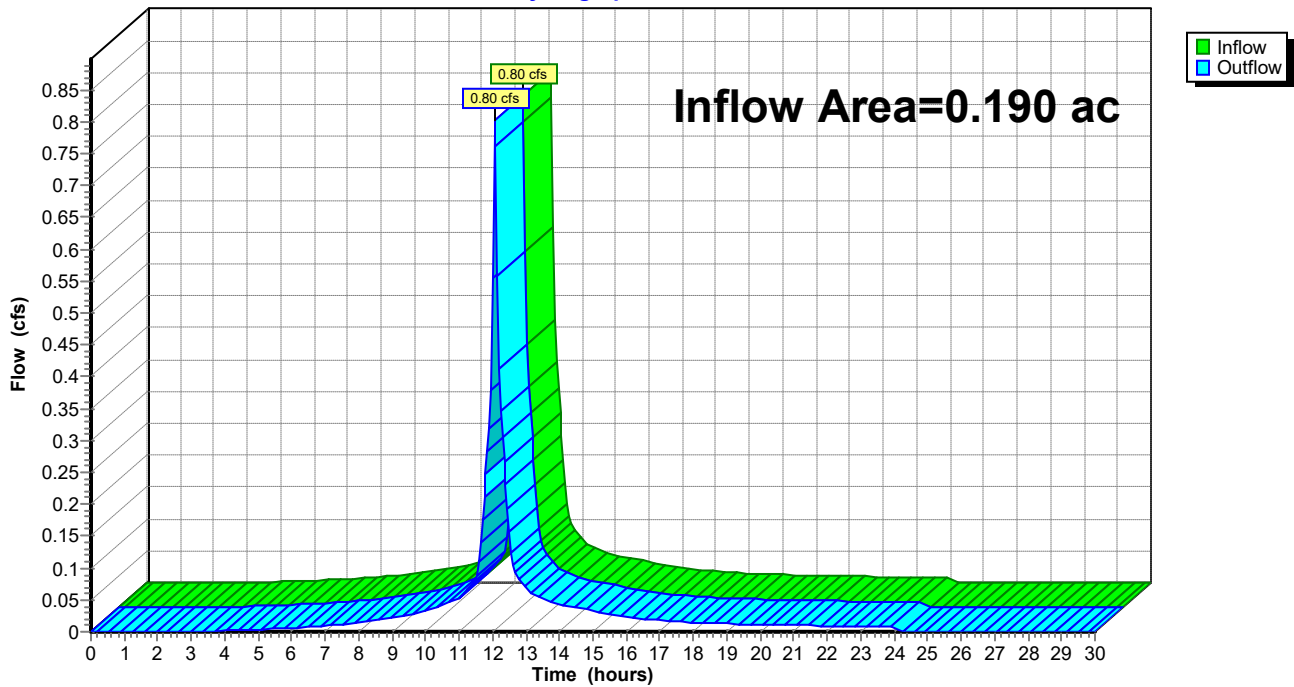
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af
Outflow = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



Summary for Reach DCB-C: TO OUTFALL

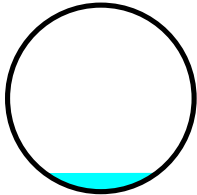
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 3.85" for 10-Year event
Inflow = 1.13 cfs @ 12.08 hrs, Volume= 0.090 af
Outflow = 1.13 cfs @ 12.08 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.05 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.99 fps, Avg. Travel Time= 0.3 min

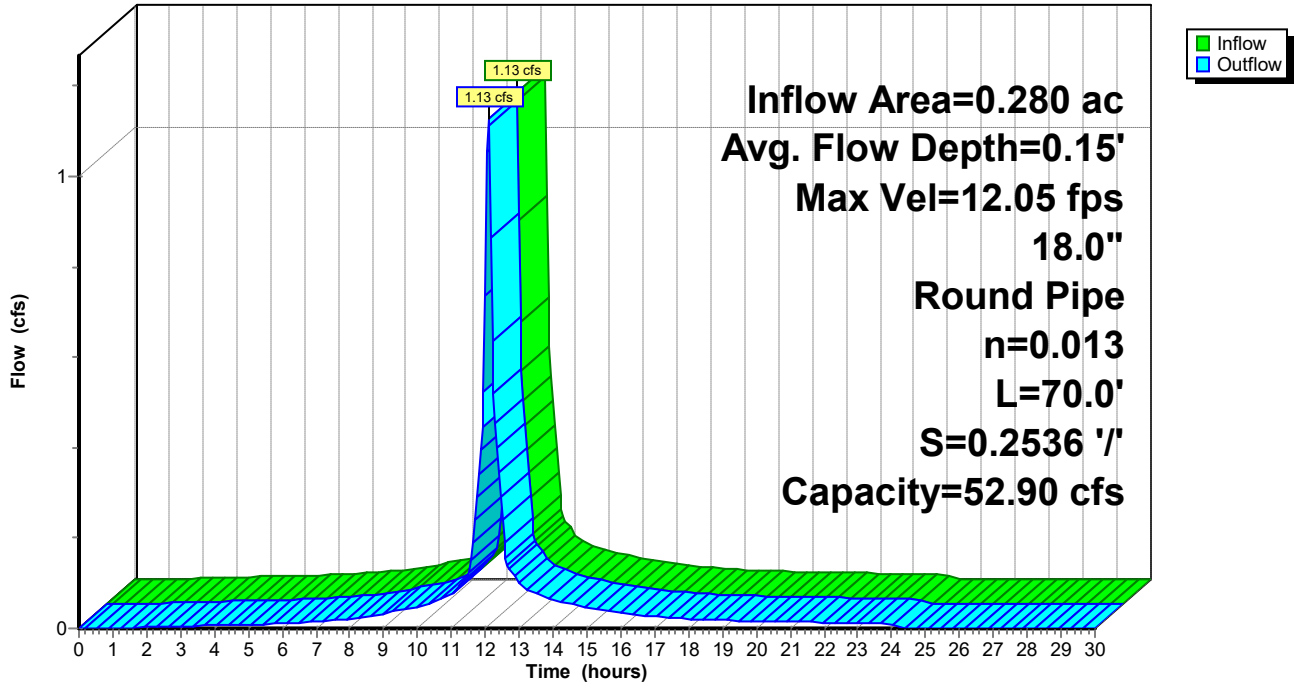
Peak Storage= 7 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.91'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



Reach DCB-C: TO OUTFALL

Hydrograph



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Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

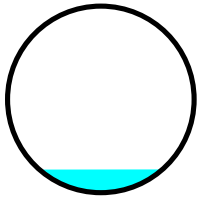
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.08' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 3.75" for 10-Year event
Inflow = 0.92 cfs @ 12.07 hrs, Volume= 0.071 af
Outflow = 0.90 cfs @ 12.08 hrs, Volume= 0.071 af, Atten= 1%, Lag= 0.6 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.15 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.32 fps, Avg. Travel Time= 0.8 min

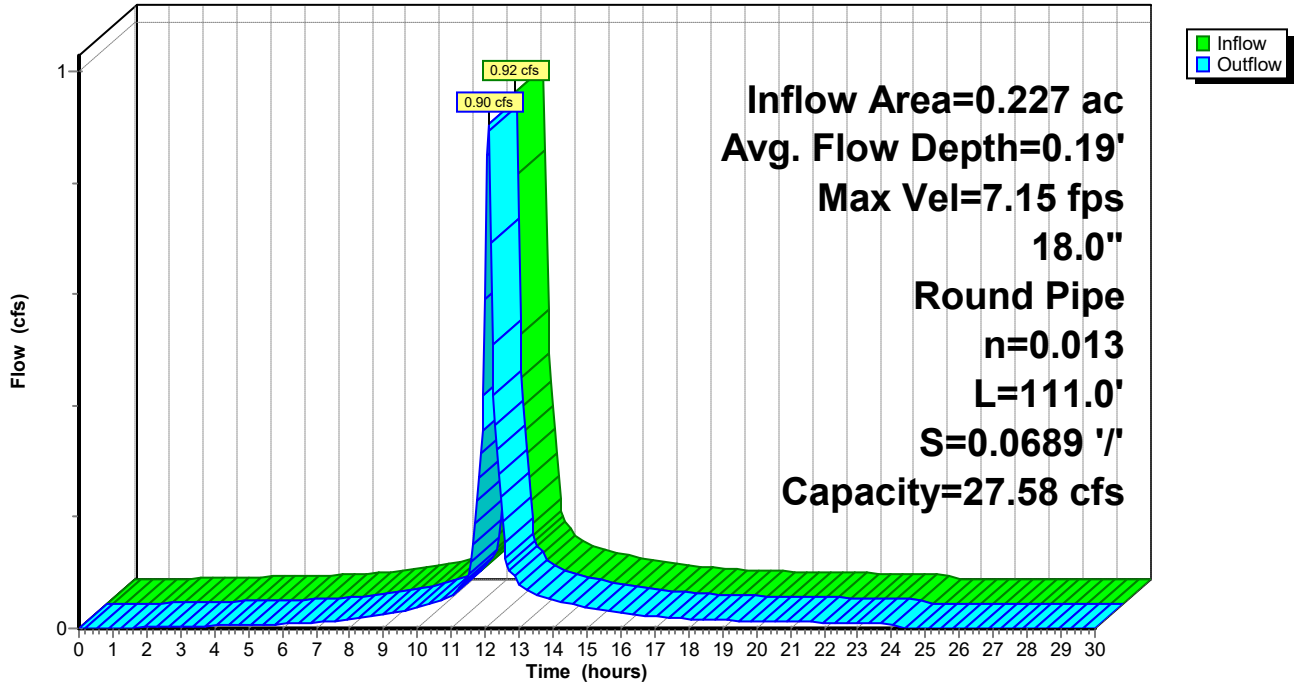
Peak Storage= 14 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 0.99'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



Summary for Reach DCB-E: TO DCB-D

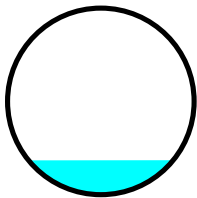
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 3.10" for 10-Year event
Inflow = 0.36 cfs @ 12.08 hrs, Volume= 0.026 af
Outflow = 0.36 cfs @ 12.08 hrs, Volume= 0.026 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.56 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 0.5 min

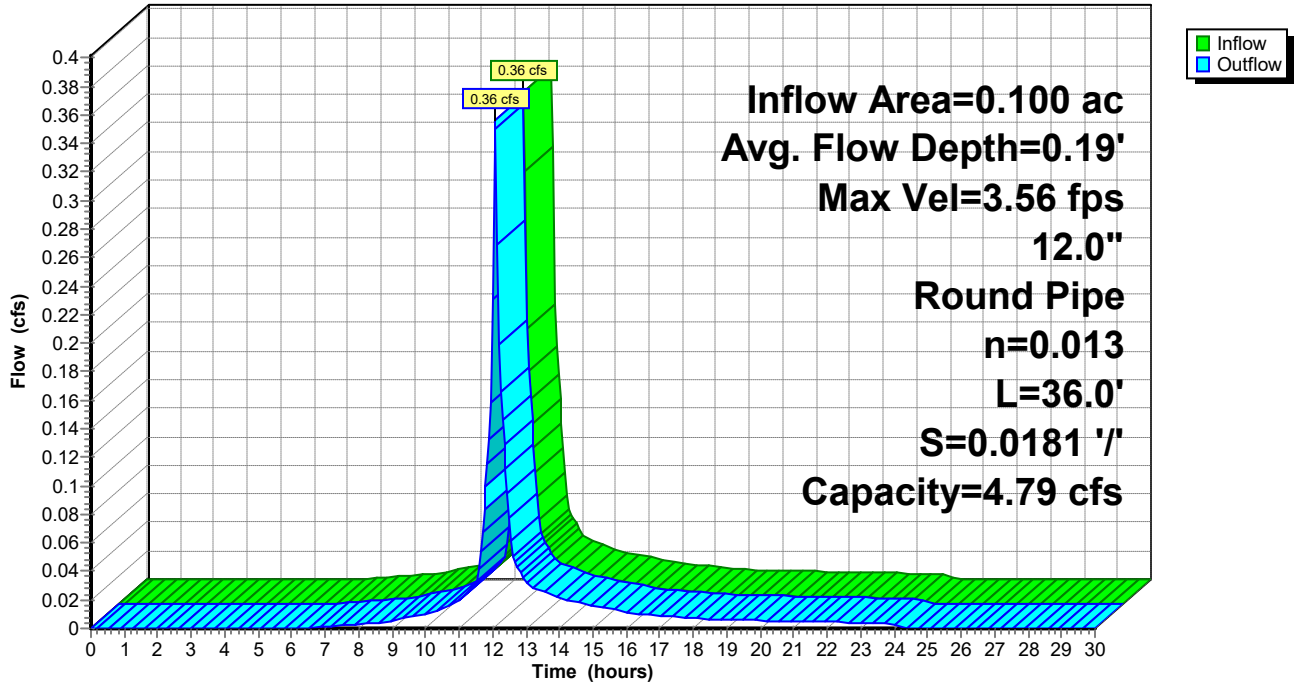
Peak Storage= 4 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 0.78'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/
Inlet Invert= 140.85', Outlet Invert= 140.20'



Reach DCB-E: TO DCB-D

Hydrograph

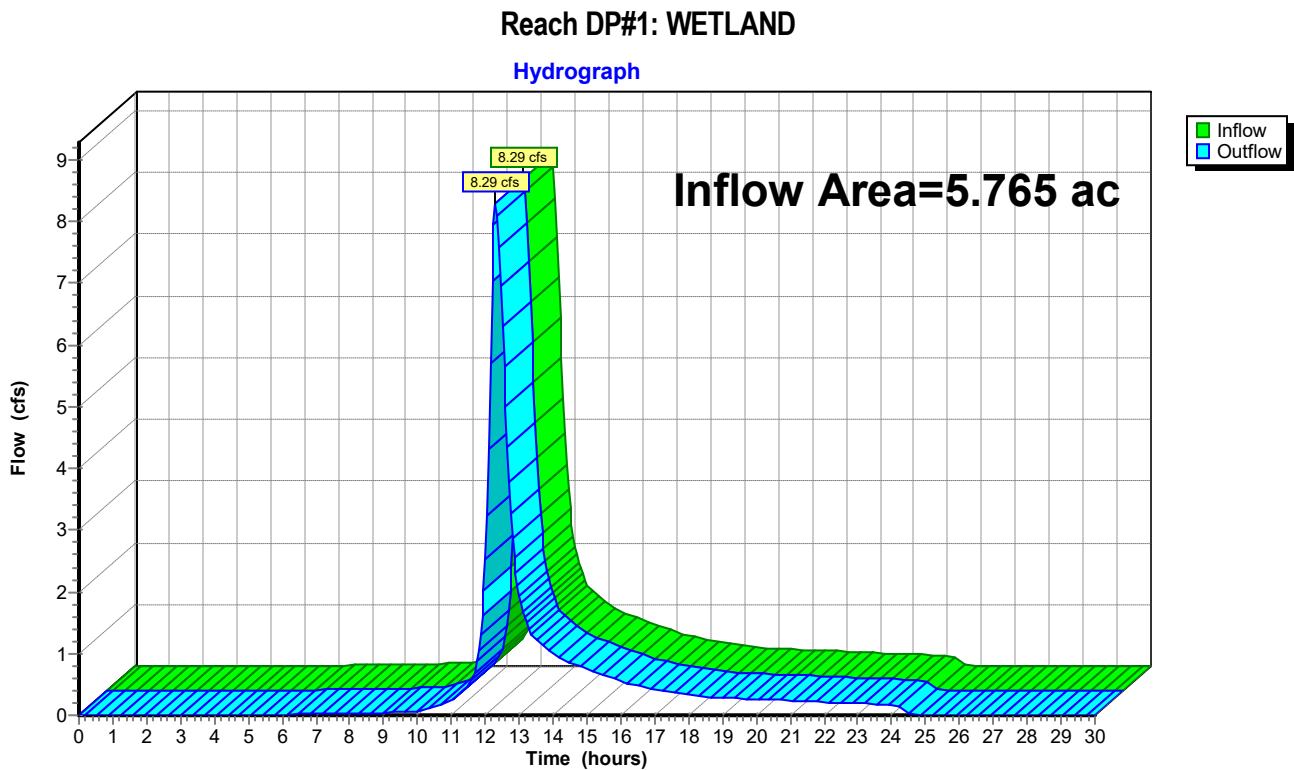


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 1.92" for 10-Year event
Inflow = 8.29 cfs @ 12.31 hrs, Volume= 0.921 af
Outflow = 8.29 cfs @ 12.31 hrs, Volume= 0.921 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

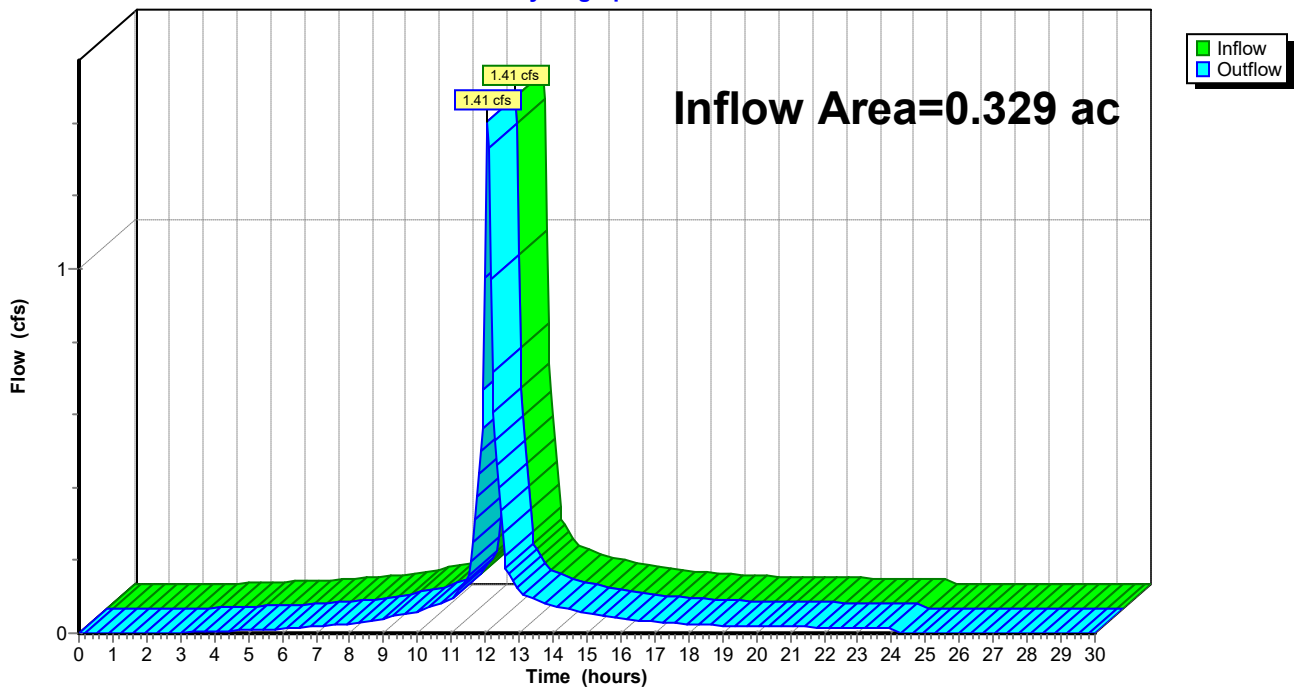
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 3.92" for 10-Year event
Inflow = 1.41 cfs @ 12.07 hrs, Volume= 0.107 af
Outflow = 1.41 cfs @ 12.07 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

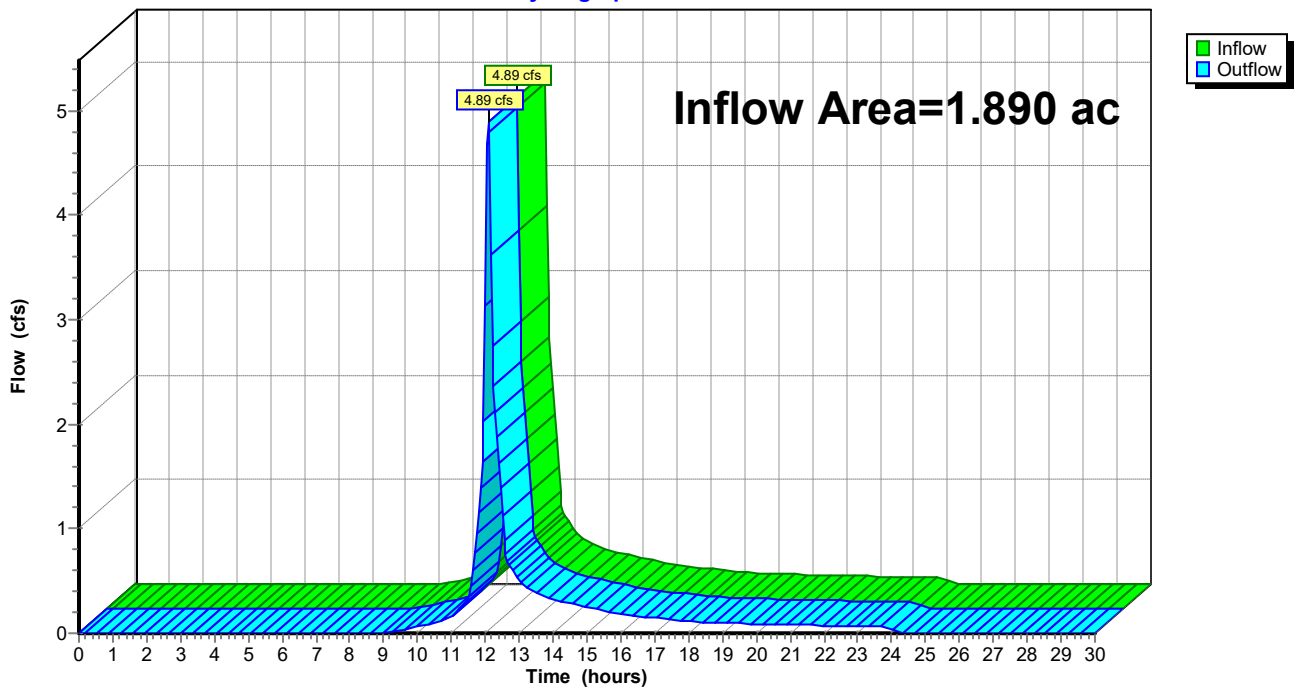
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 2.21" for 10-Year event
Inflow = 4.89 cfs @ 12.08 hrs, Volume= 0.348 af
Outflow = 4.89 cfs @ 12.08 hrs, Volume= 0.348 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
 Inflow = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af
 Outflow = 0.77 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 4%, Lag= 1.6 min
 Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.89 fps, Min. Travel Time= 0.9 min
 Avg. Velocity = 0.30 fps, Avg. Travel Time= 2.5 min

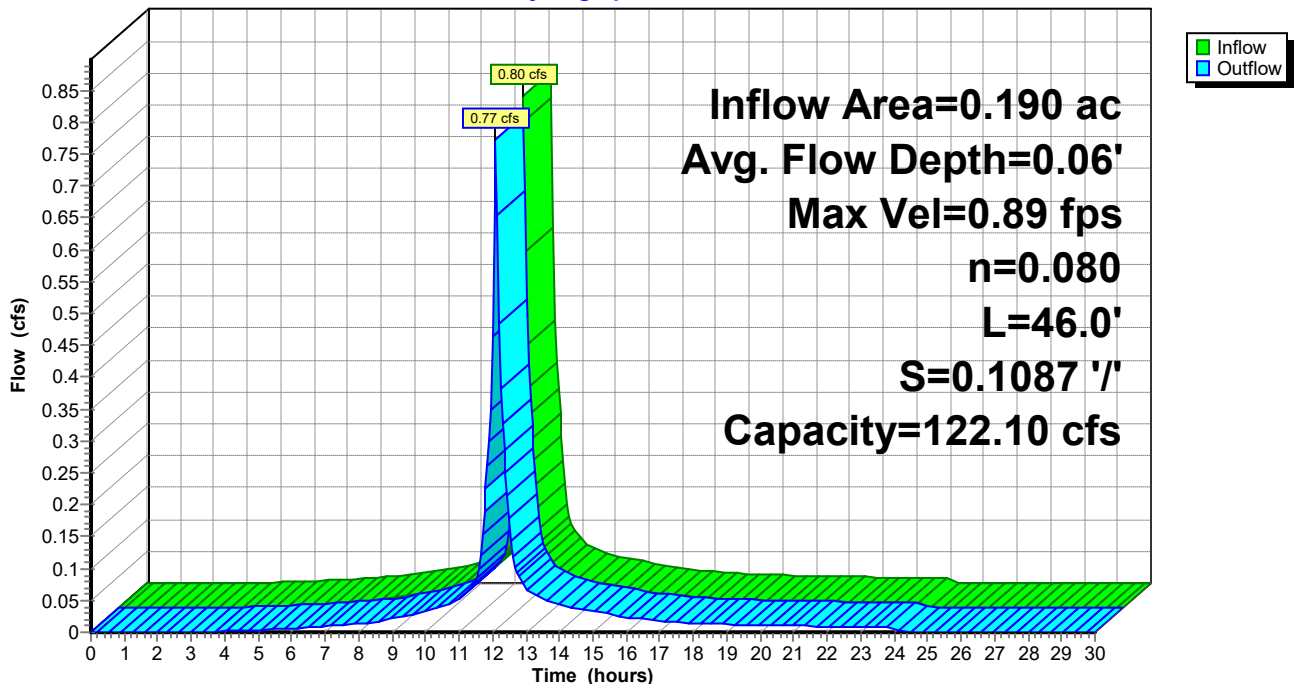
Peak Storage= 41 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.15'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 46.0' Slope= 0.1087 ' / '
 Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



Summary for Reach OL-2: OVERLAND

[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.77 cfs @ 12.10 hrs, Volume= 0.061 af
Outflow = 0.68 cfs @ 12.22 hrs, Volume= 0.061 af, Atten= 13%, Lag= 7.1 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 12.8 min

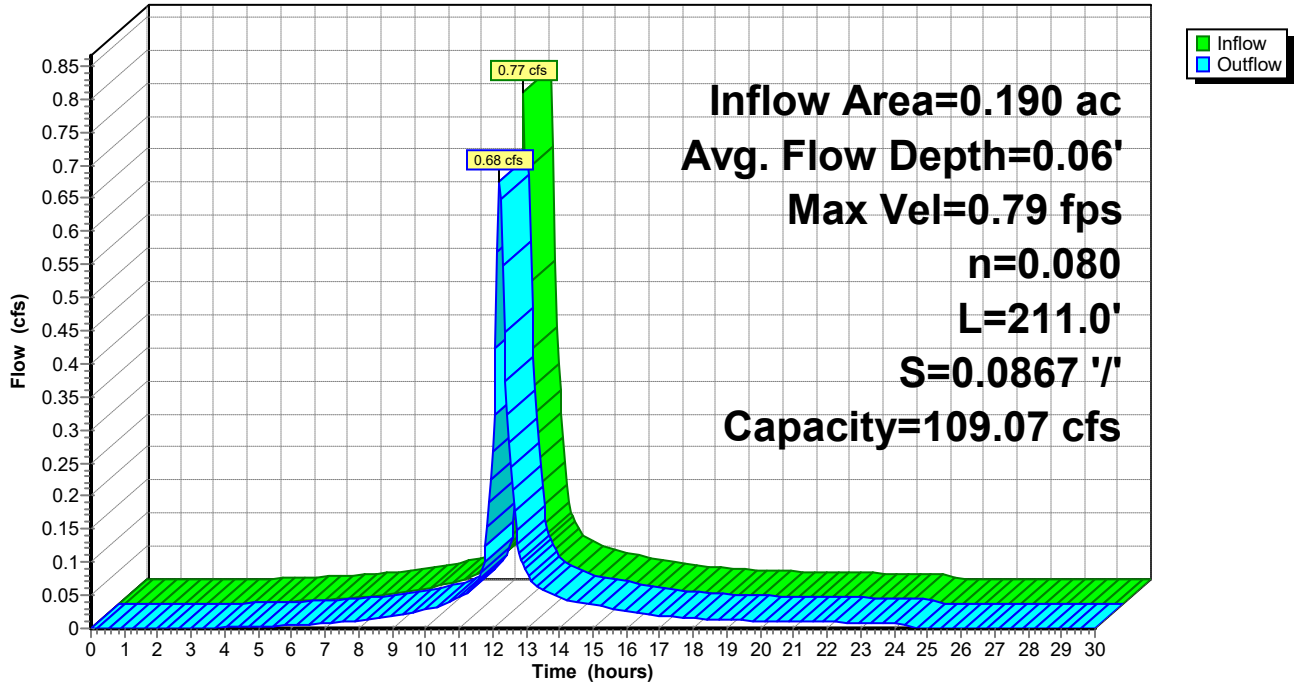
Peak Storage= 186 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.13'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.03' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.68 cfs @ 12.22 hrs, Volume= 0.061 af
Outflow = 0.66 cfs @ 12.24 hrs, Volume= 0.061 af, Atten= 2%, Lag= 1.3 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.56 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 2.2 min

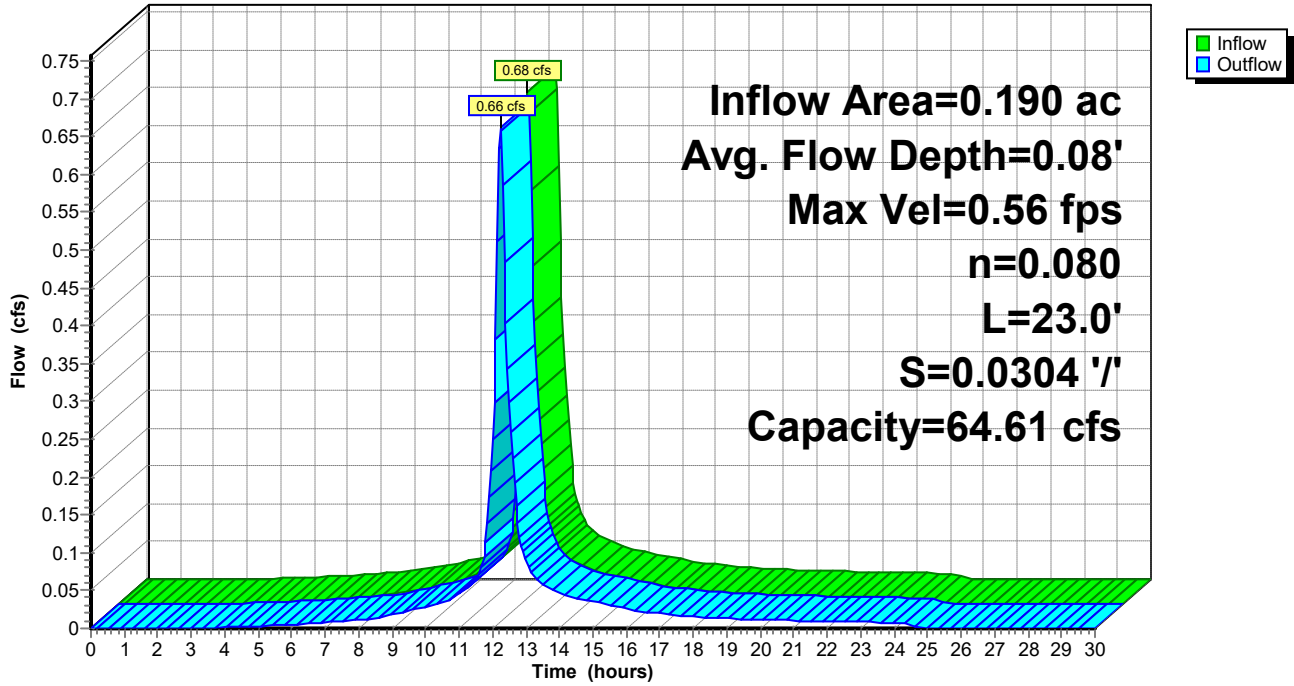
Peak Storage= 28 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.52'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.02' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.66 cfs @ 12.24 hrs, Volume= 0.061 af
Outflow = 0.56 cfs @ 12.47 hrs, Volume= 0.061 af, Atten= 16%, Lag= 14.0 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 9.1 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 29.6 min

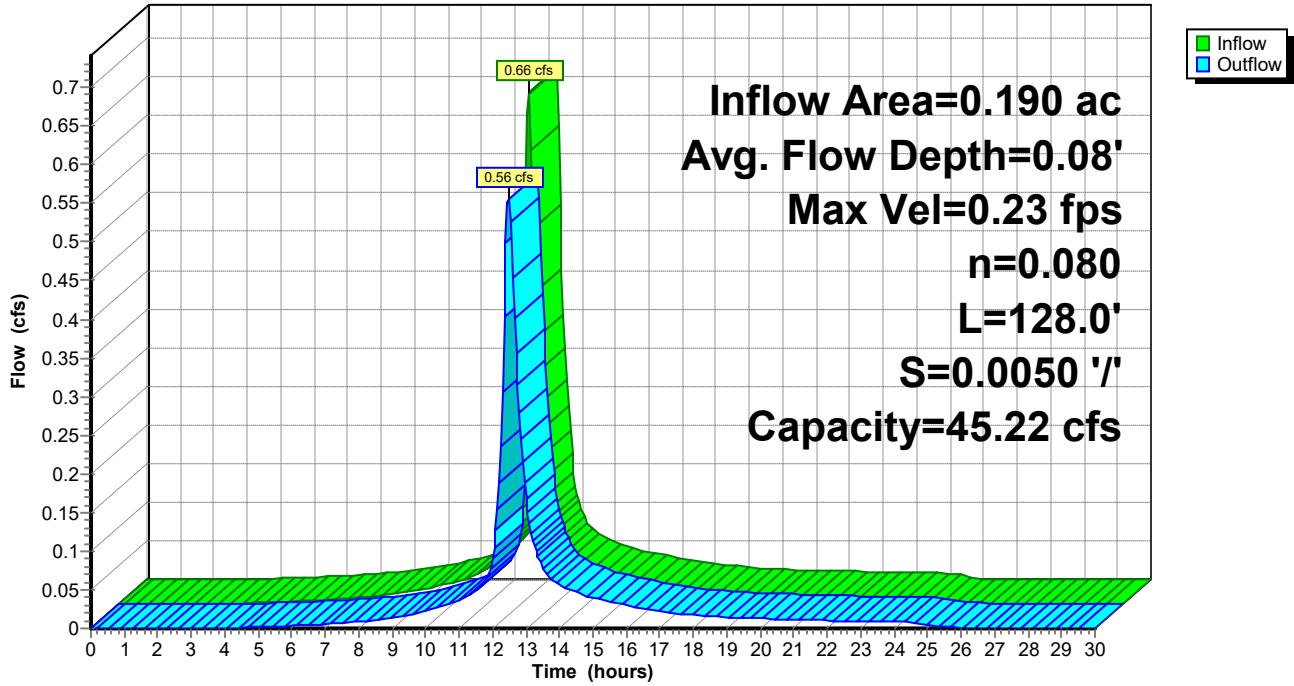
Peak Storage= 304 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 31.54'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 '/'
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



Summary for Reach OL-5: OVERLAND

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 3.85" for 10-Year event
 Inflow = 1.13 cfs @ 12.08 hrs, Volume= 0.090 af
 Outflow = 0.98 cfs @ 12.22 hrs, Volume= 0.090 af, Atten= 14%, Lag= 7.8 min
 Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.95 fps, Min. Travel Time= 5.0 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 15.5 min

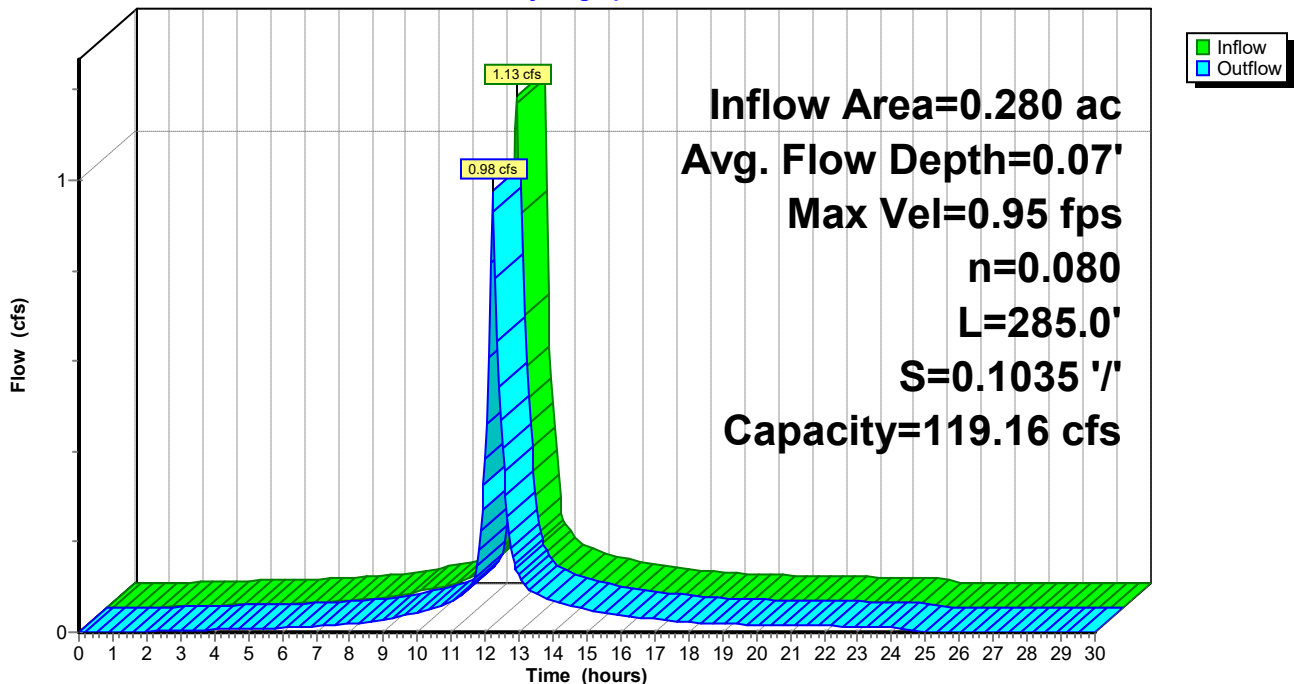
Peak Storage= 296 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.07' , Surface Width= 16.33'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 285.0' Slope= 0.1035 ' / '
 Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.10' @ 12.30 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 3.85" for 10-Year event
Inflow = 0.98 cfs @ 12.22 hrs, Volume= 0.090 af
Outflow = 0.91 cfs @ 12.32 hrs, Volume= 0.090 af, Atten= 7%, Lag= 6.3 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.36 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 14.5 min

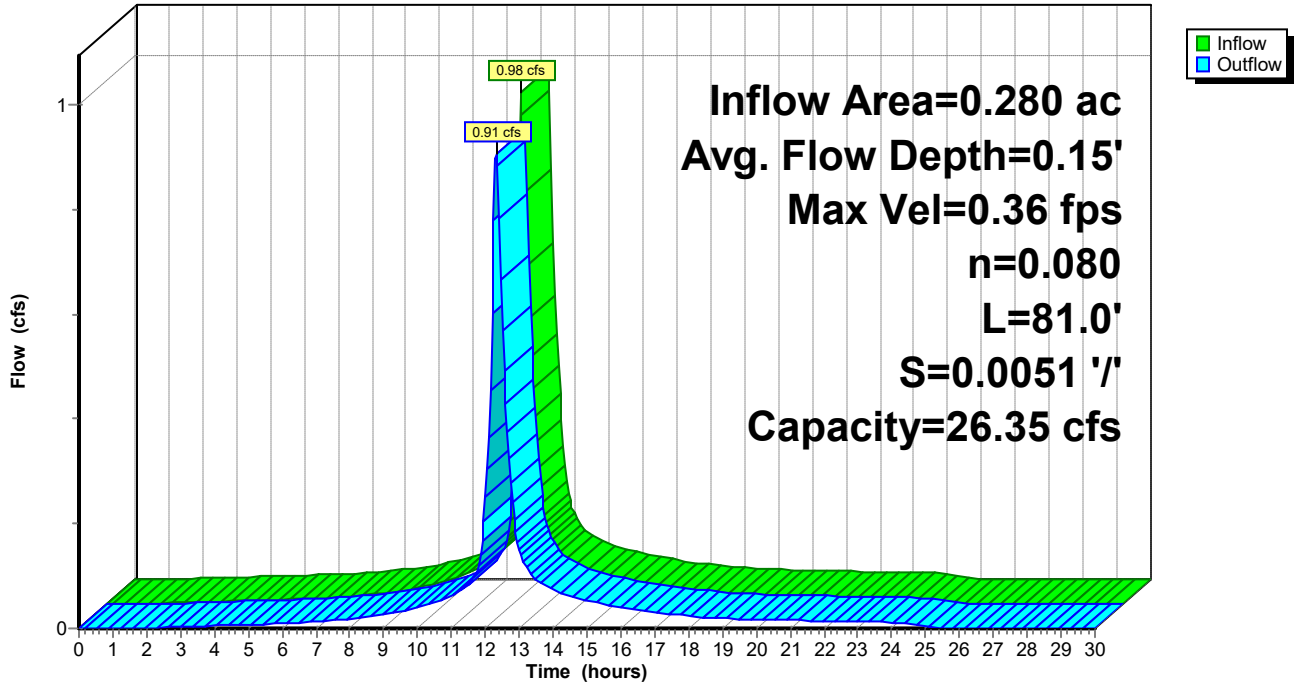
Peak Storage= 208 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.15', Surface Width= 18.10'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

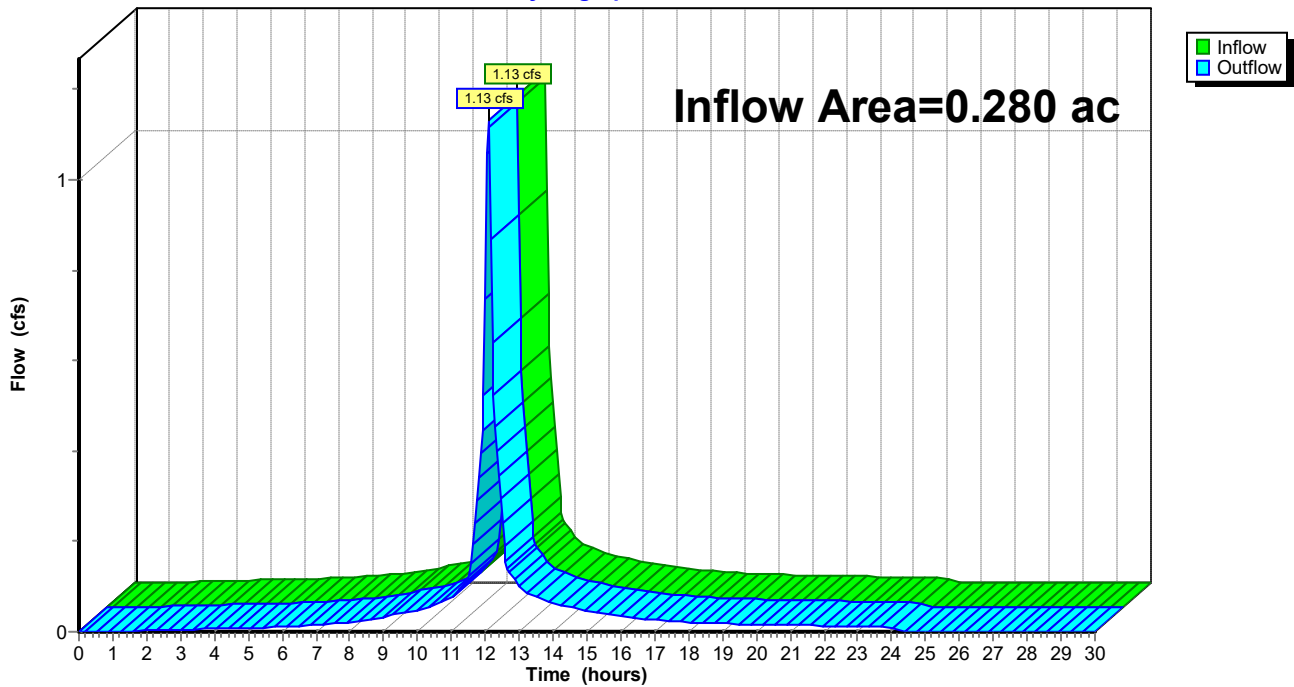
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 3.85" for 10-Year event
Inflow = 1.13 cfs @ 12.08 hrs, Volume= 0.090 af
Outflow = 1.13 cfs @ 12.08 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: TO WETLAND (DP#1)	Runoff Area=230,616 sf 1.82% Impervious Runoff Depth=2.35" Flow Length=770' Tc=19.9 min CN=71 Runoff=9.67 cfs 1.035 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=4.72" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=1.67 cfs 0.129 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=2.88" Flow Length=356' Tc=5.0 min CN=77 Runoff=6.38 cfs 0.453 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=4.60" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.96 cfs 0.073 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=5.06" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.27 cfs 0.022 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=5.06" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.66 cfs 0.054 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=3.85" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.44 cfs 0.032 af
Reach DCB-B: TO OUTFALL	Inflow=0.96 cfs 0.073 af Outflow=0.96 cfs 0.073 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.17' Max Vel=12.72 fps Inflow=1.36 cfs 0.108 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.35 cfs 0.108 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.20' Max Vel=7.55 fps Inflow=1.10 cfs 0.086 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.09 cfs 0.086 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.21' Max Vel=3.78 fps Inflow=0.44 cfs 0.032 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.44 cfs 0.032 af
Reach DP#1: WETLAND	Inflow=11.18 cfs 1.216 af Outflow=11.18 cfs 1.216 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.67 cfs 0.129 af Outflow=1.67 cfs 0.129 af
Reach DP#3: LOW POINT	Inflow=6.38 cfs 0.453 af Outflow=6.38 cfs 0.453 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.95 fps Inflow=0.96 cfs 0.073 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=0.92 cfs 0.073 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.85 fps Inflow=0.92 cfs 0.073 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=0.82 cfs 0.073 af

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Type III 24-hr 25-Year Rainfall=5.30"

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.09' Max Vel=0.60 fps Inflow=0.82 cfs 0.073 af
n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.80 cfs 0.073 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.09' Max Vel=0.25 fps Inflow=0.80 cfs 0.073 af
n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.67 cfs 0.073 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.07' Max Vel=1.02 fps Inflow=1.35 cfs 0.108 af
n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.18 cfs 0.108 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.17' Max Vel=0.38 fps Inflow=1.18 cfs 0.108 af
n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=1.10 cfs 0.108 af

Reach OUTLET: TO DP#1

Inflow=1.35 cfs 0.108 af
Outflow=1.35 cfs 0.108 af

Total Runoff Area = 7.983 ac Runoff Volume = 1.798 af Average Runoff Depth = 2.70"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Subcatchment E1: TO WETLAND (DP#1)

Runoff = 9.67 cfs @ 12.29 hrs, Volume= 1.035 af, Depth= 2.35"
 Routed to Reach DP#1 : WETLAND

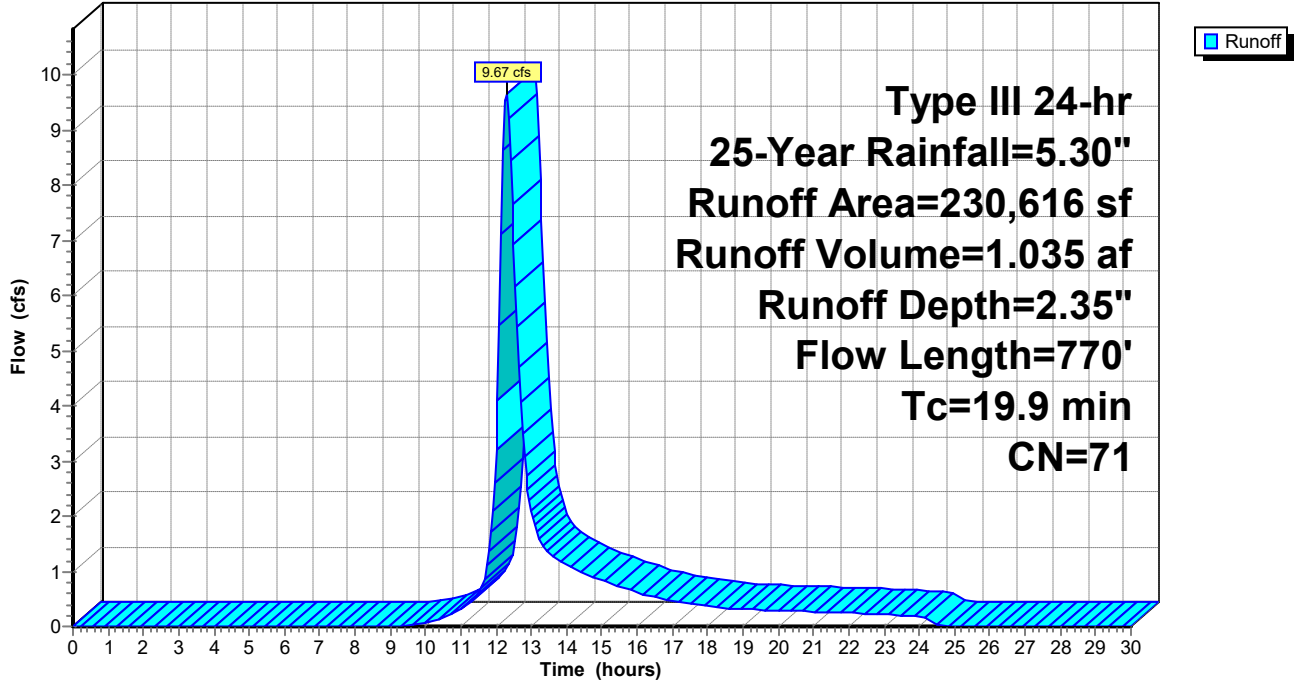
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,750	74	>75% Grass cover, Good, HSG C
217,729	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,943	89	Gravel roads, HSG C
230,616	71	Weighted Average
226,422		98.18% Pervious Area
4,194		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment E1: TO WETLAND (DP#1)

Hydrograph



Summary for Subcatchment E2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.67 cfs @ 12.07 hrs, Volume= 0.129 af, Depth= 4.72"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

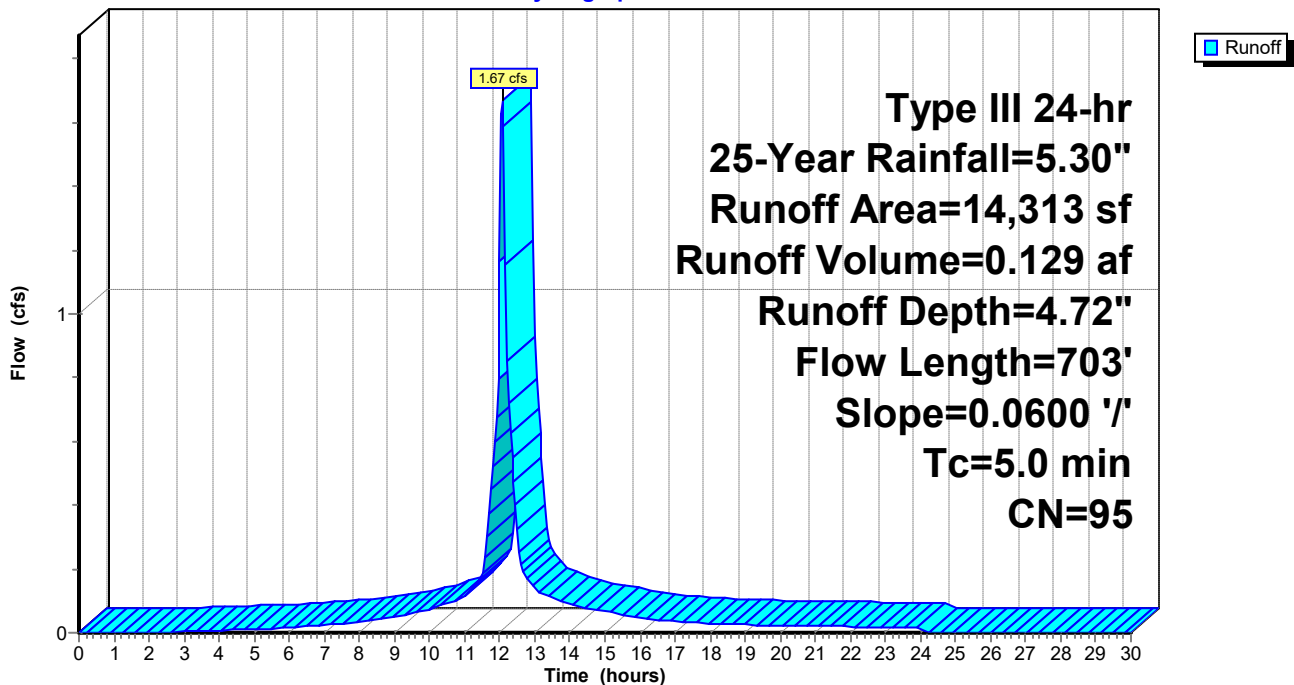
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,263	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,506	98	Paved parking, HSG C
14,313	95	Weighted Average
1,807		12.62% Pervious Area
12,506		87.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E2: TO CATCHBASIN (DP#2)

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Subcatchment E3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

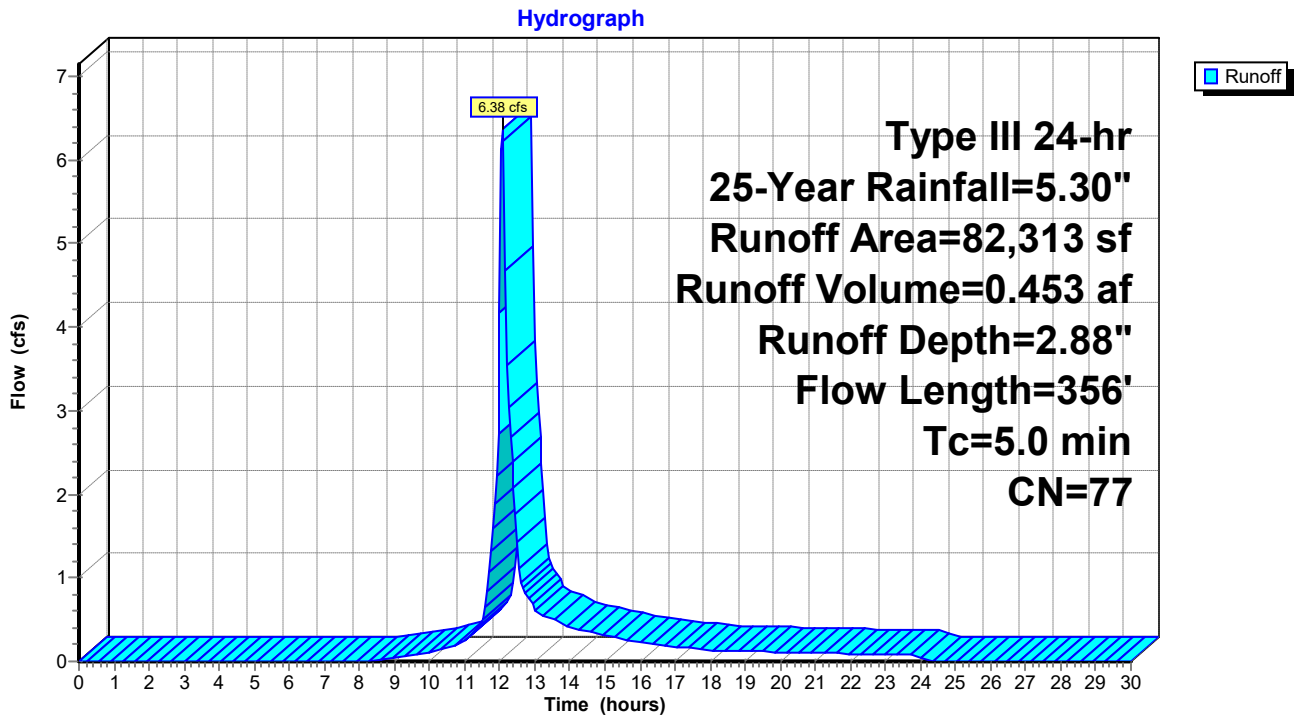
Runoff = 6.38 cfs @ 12.08 hrs, Volume= 0.453 af, Depth= 2.88"
 Routed to Reach DP#3 : LOW POINT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E3: TO LOW POINT (DP#3)



Summary for Subcatchment E4: TO DCB-B

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af, Depth= 4.60"
 Routed to Reach DCB-B : TO OUTFALL

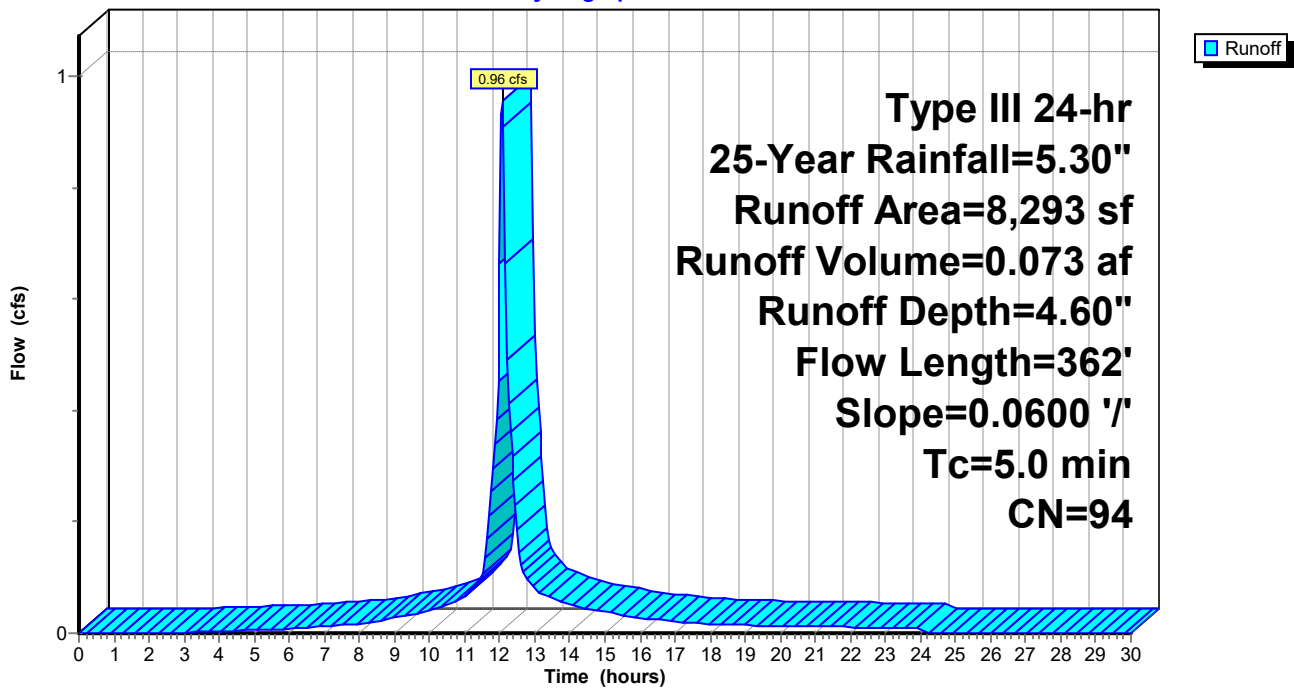
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	362	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E4: TO DCB-B

Hydrograph



Summary for Subcatchment E5: TO DCB-C

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.27 cfs @ 12.07 hrs, Volume= 0.022 af, Depth= 5.06"
 Routed to Reach DCB-C : TO OUTFALL

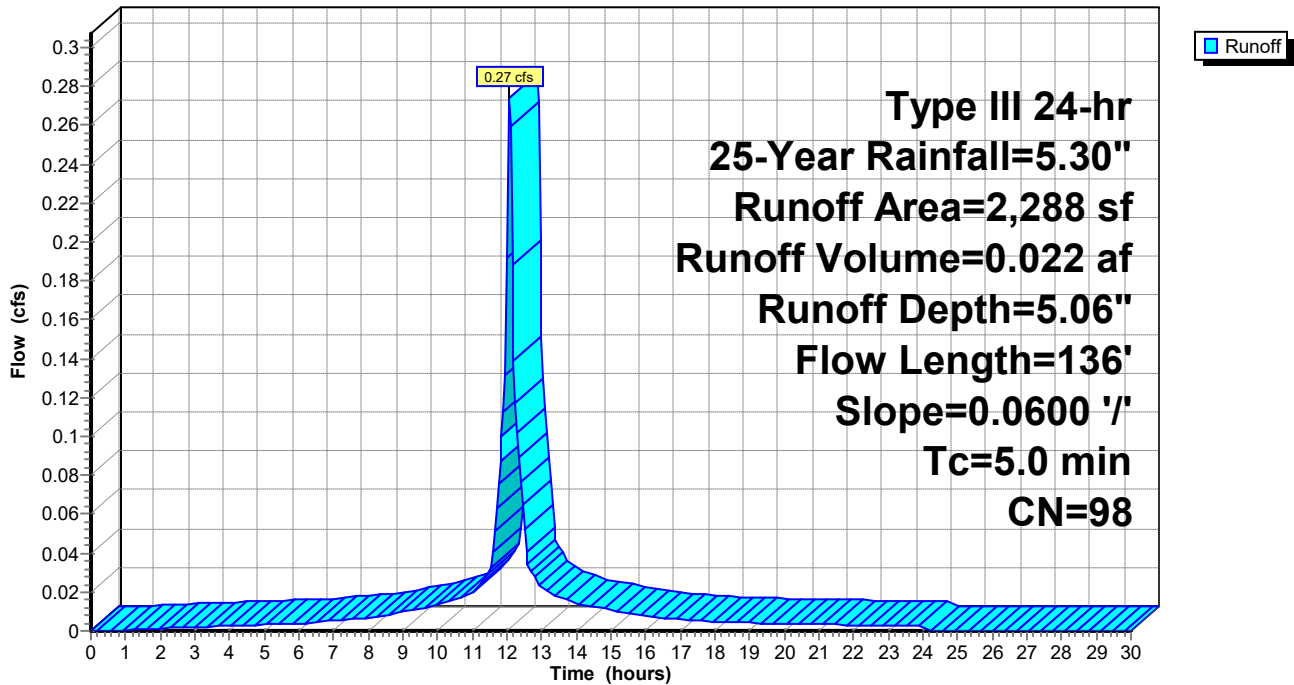
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E5: TO DCB-C

Hydrograph



Summary for Subcatchment E6: TO DCB-D

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.66 cfs @ 12.07 hrs, Volume= 0.054 af, Depth= 5.06"
 Routed to Reach DCB-D : TO DCB-C

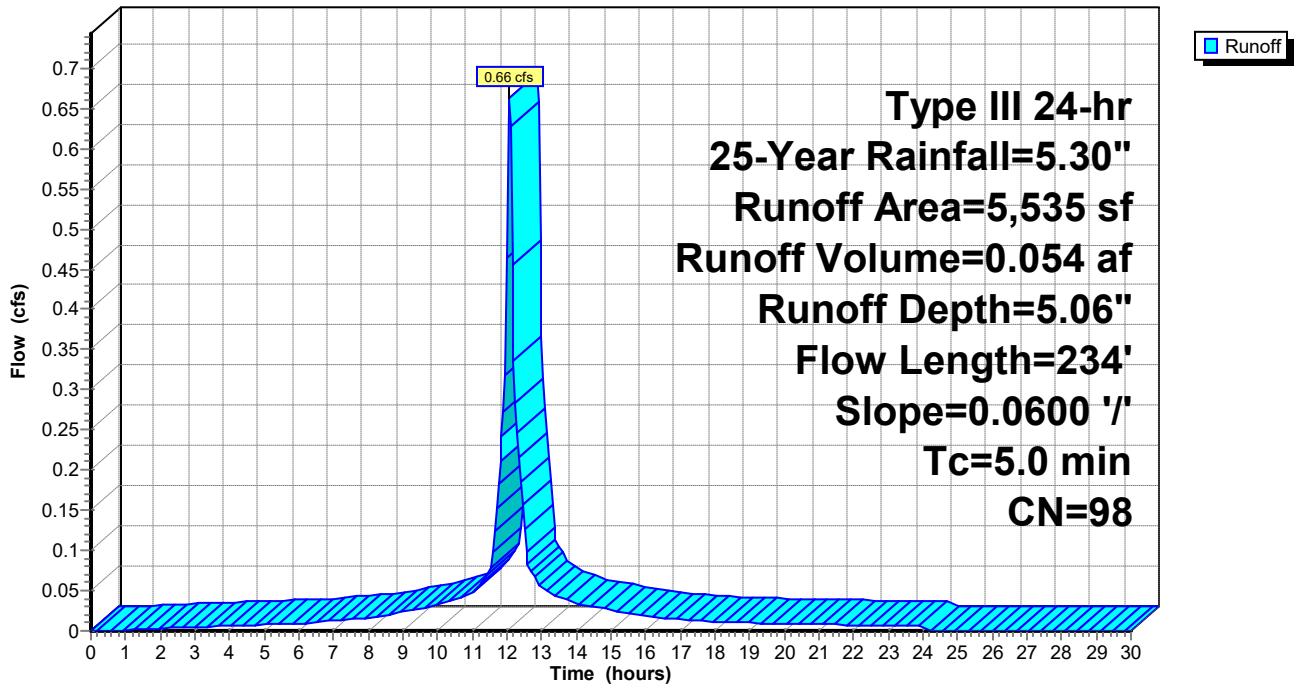
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E6: TO DCB-D

Hydrograph



Summary for Subcatchment E7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.44 cfs @ 12.07 hrs, Volume= 0.032 af, Depth= 3.85"
 Routed to Reach DCB-E : TO DCB-D

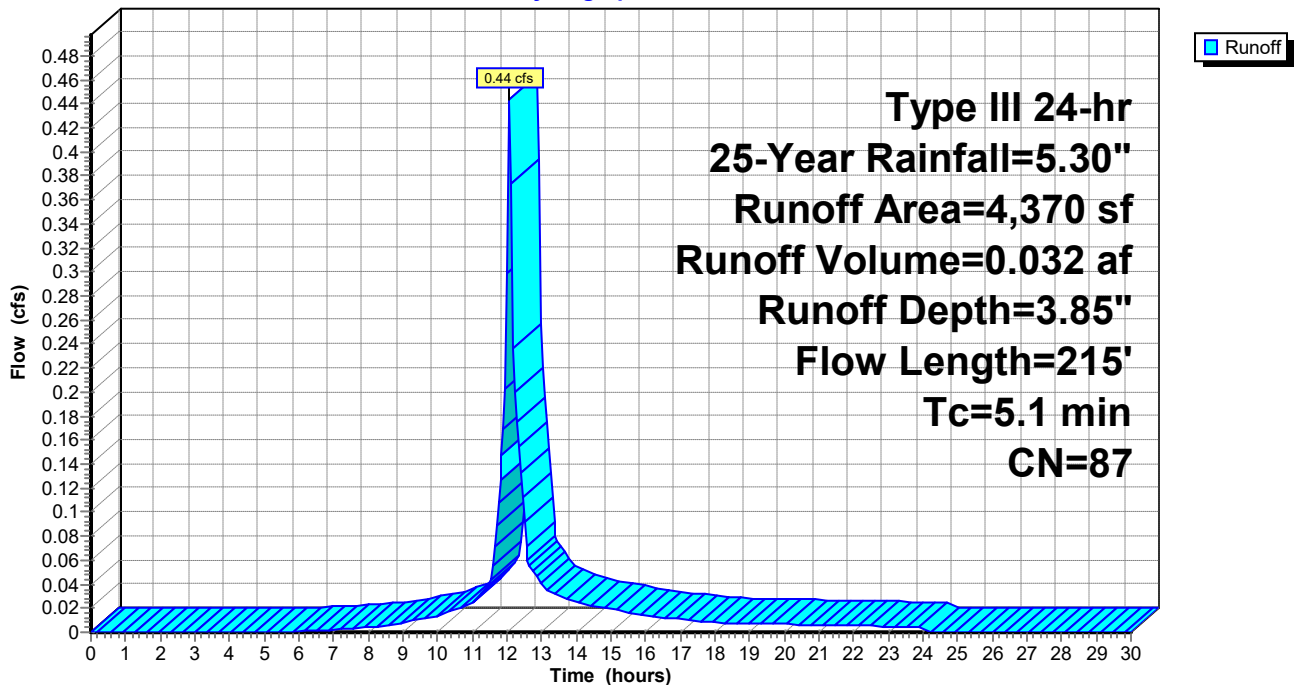
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,661	70	Woods, Good, HSG C
2,709	98	Paved parking, HSG C
4,370	87	Weighted Average
1,661		38.01% Pervious Area
2,709		61.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment E7: TO DCB-E

Hydrograph



Summary for Reach DCB-B: TO OUTFALL

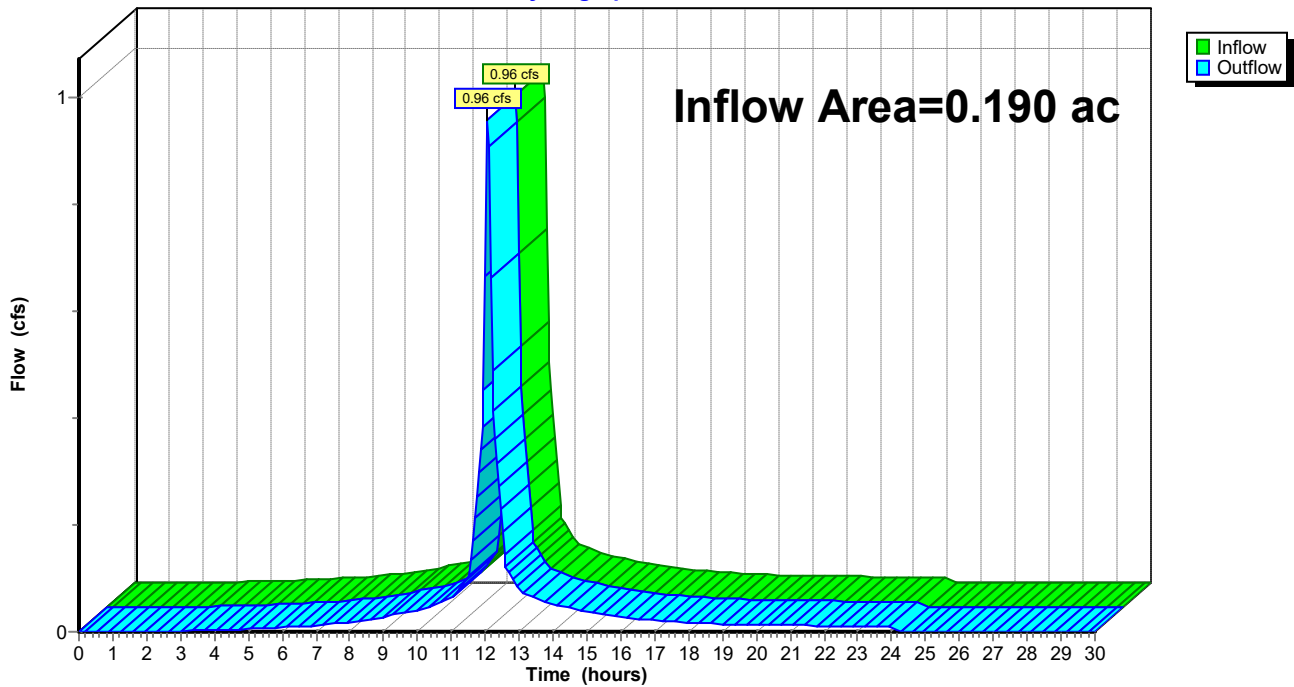
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af
Outflow = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



Summary for Reach DCB-C: TO OUTFALL

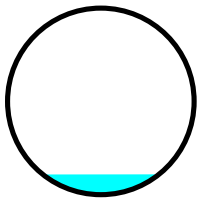
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 4.63" for 25-Year event
Inflow = 1.36 cfs @ 12.08 hrs, Volume= 0.108 af
Outflow = 1.35 cfs @ 12.08 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.72 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.19 fps, Avg. Travel Time= 0.3 min

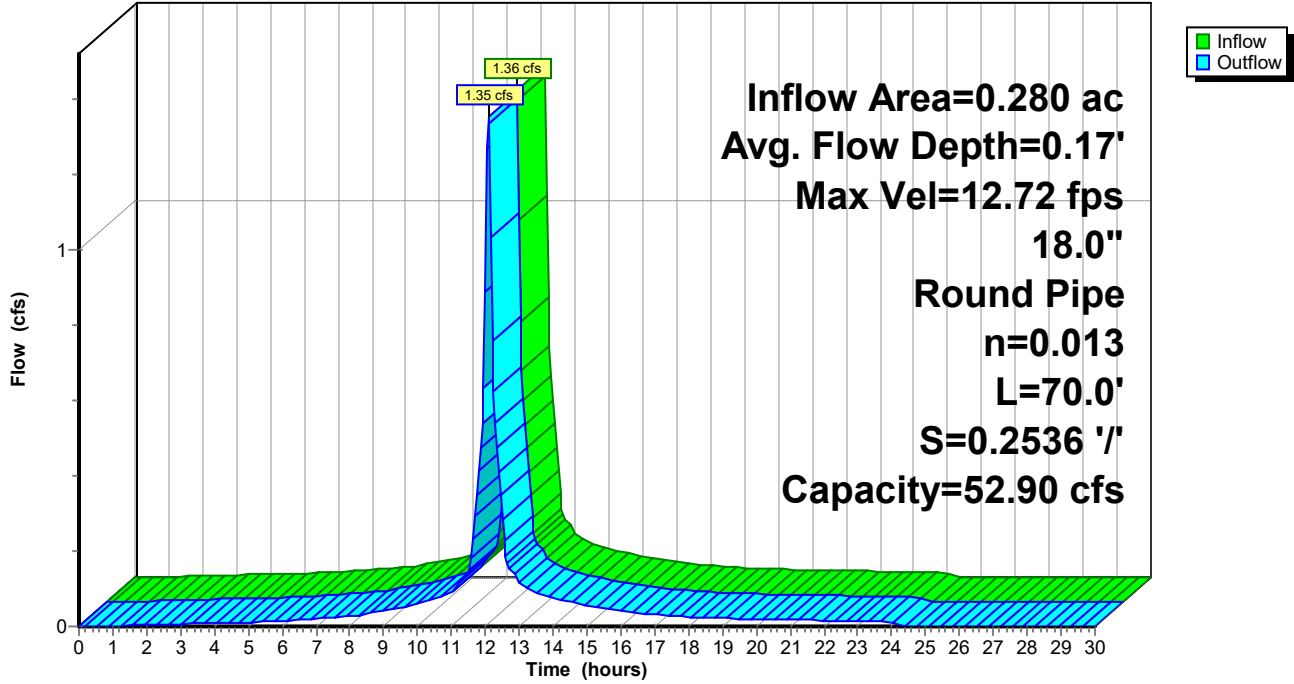
Peak Storage= 7 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 0.94'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



Reach DCB-C: TO OUTFALL

Hydrograph



Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

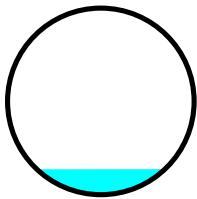
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.10' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 4.53" for 25-Year event
Inflow = 1.10 cfs @ 12.07 hrs, Volume= 0.086 af
Outflow = 1.09 cfs @ 12.08 hrs, Volume= 0.086 af, Atten= 1%, Lag= 0.5 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.55 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.44 fps, Avg. Travel Time= 0.8 min

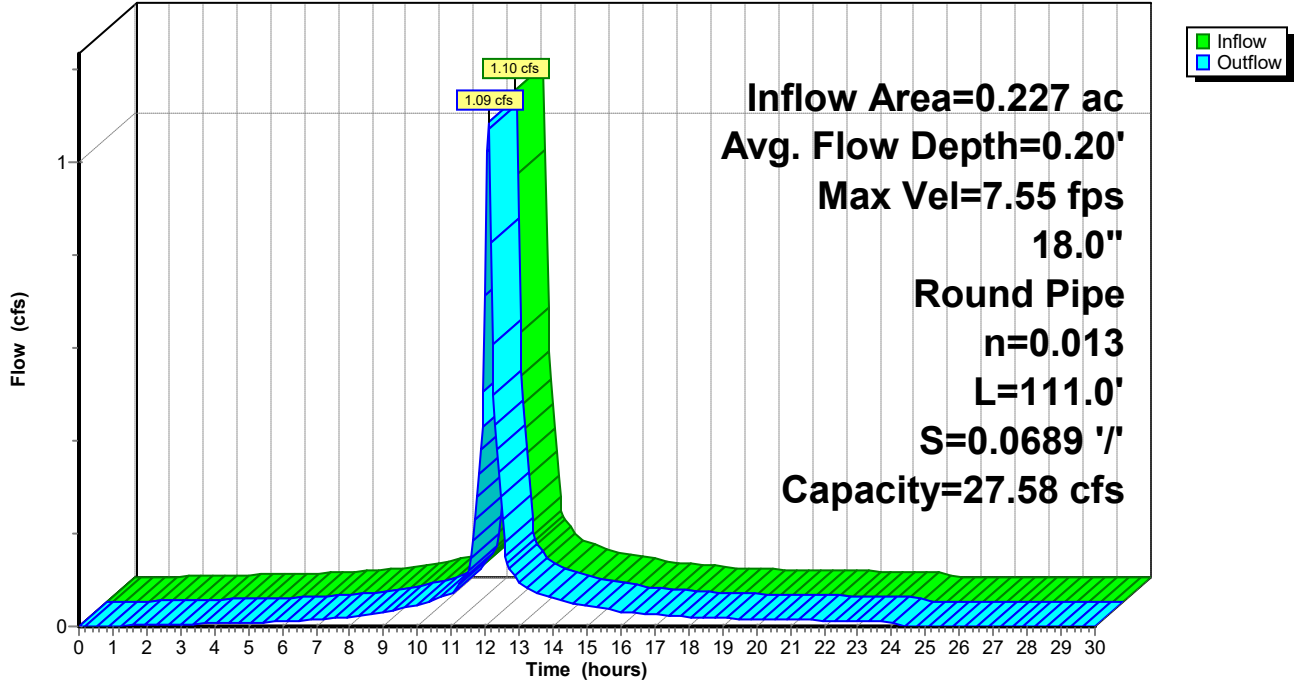
Peak Storage= 16 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 1.03'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



Summary for Reach DCB-E: TO DCB-D

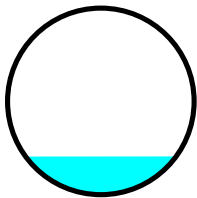
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 3.85" for 25-Year event
Inflow = 0.44 cfs @ 12.07 hrs, Volume= 0.032 af
Outflow = 0.44 cfs @ 12.08 hrs, Volume= 0.032 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.78 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 0.5 min

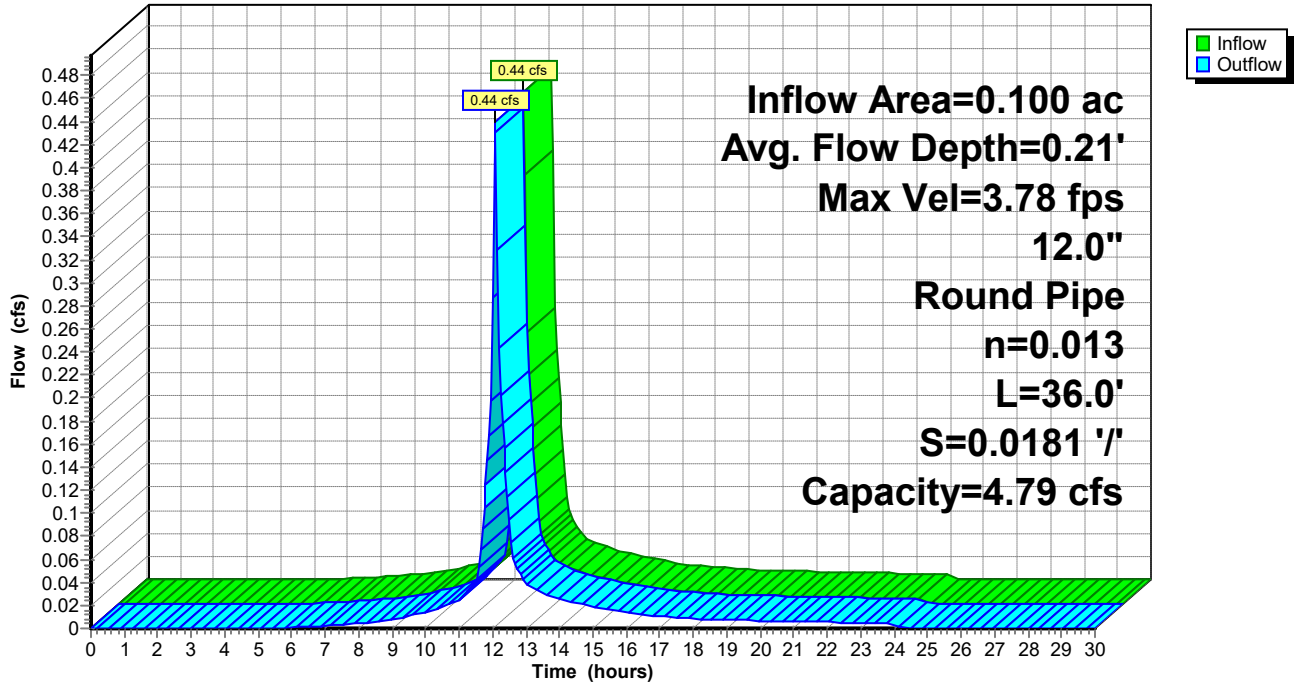
Peak Storage= 4 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 0.81'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/
Inlet Invert= 140.85', Outlet Invert= 140.20'



Reach DCB-E: TO DCB-D

Hydrograph

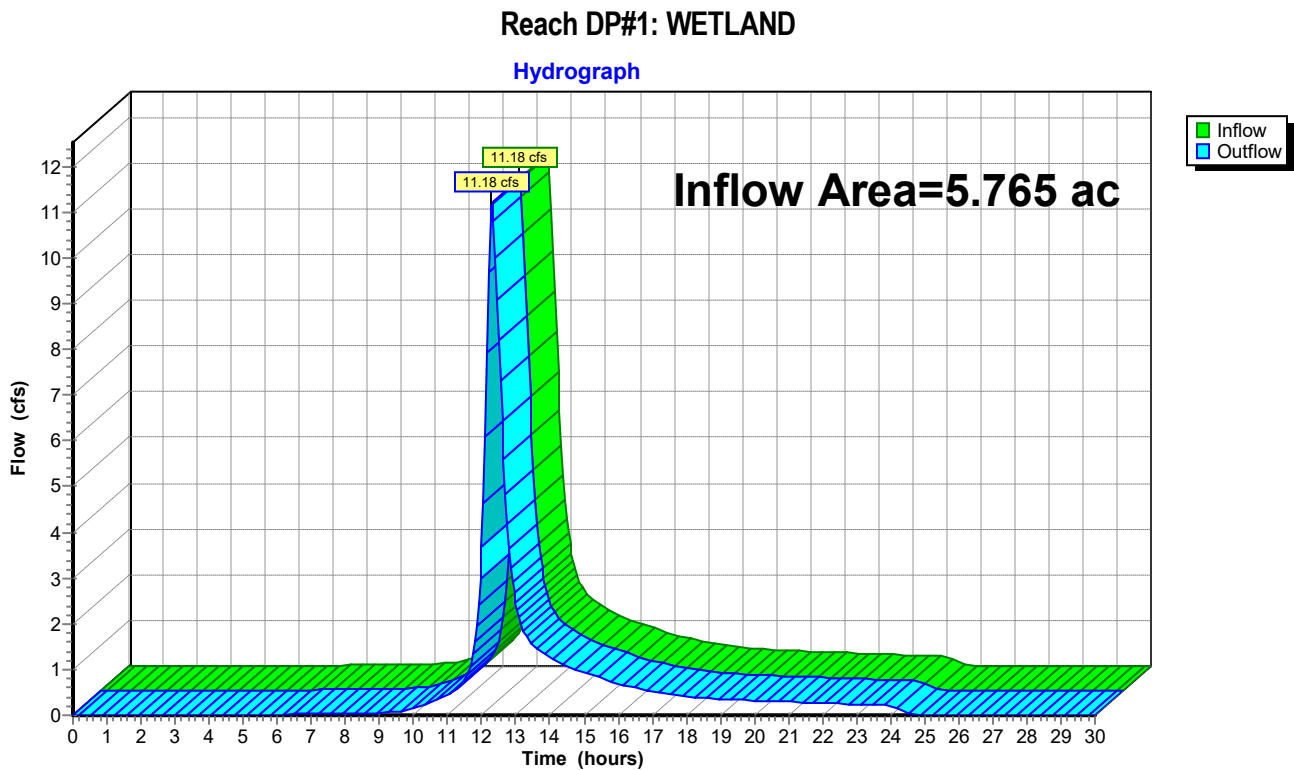


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 2.53" for 25-Year event
Inflow = 11.18 cfs @ 12.30 hrs, Volume= 1.216 af
Outflow = 11.18 cfs @ 12.30 hrs, Volume= 1.216 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

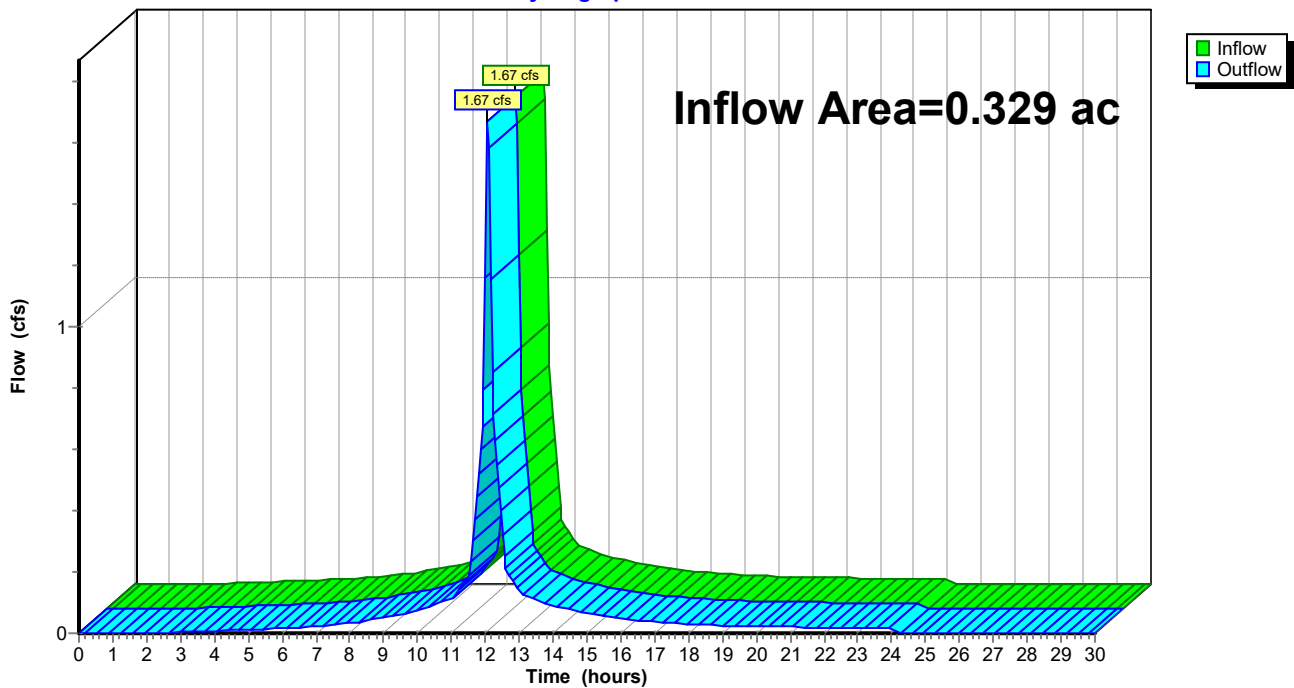
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 4.72" for 25-Year event
Inflow = 1.67 cfs @ 12.07 hrs, Volume= 0.129 af
Outflow = 1.67 cfs @ 12.07 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

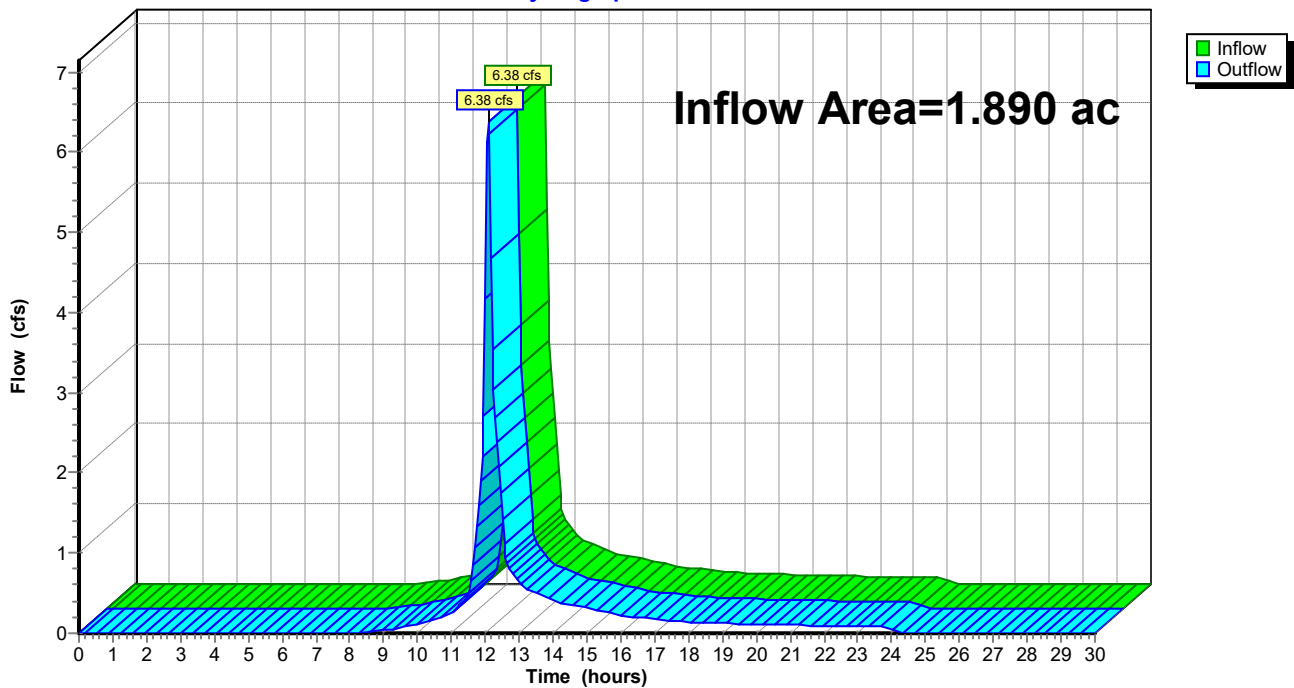
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 2.88" for 25-Year event
Inflow = 6.38 cfs @ 12.08 hrs, Volume= 0.453 af
Outflow = 6.38 cfs @ 12.08 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
 Inflow = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af
 Outflow = 0.92 cfs @ 12.10 hrs, Volume= 0.073 af, Atten= 3%, Lag= 1.5 min
 Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.95 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 2.5 min

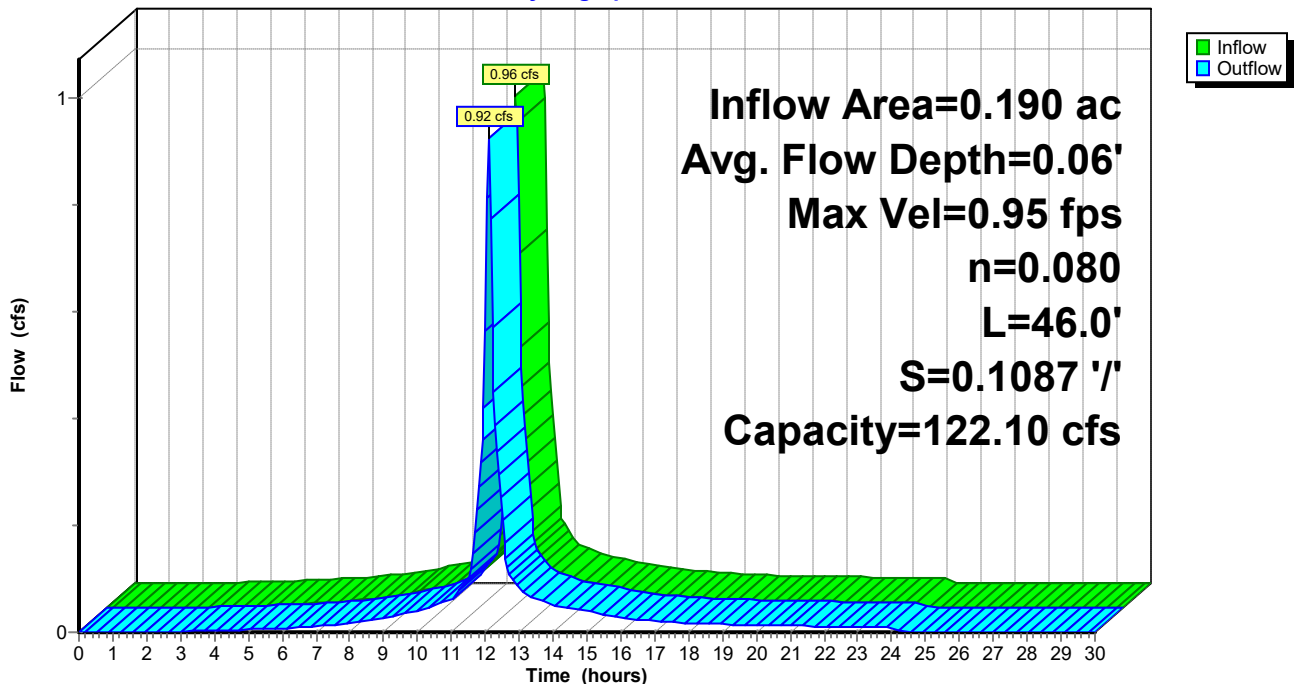
Peak Storage= 46 cf @ 12.08 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.28'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 46.0' Slope= 0.1087 ' / '
 Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



Summary for Reach OL-2: OVERLAND

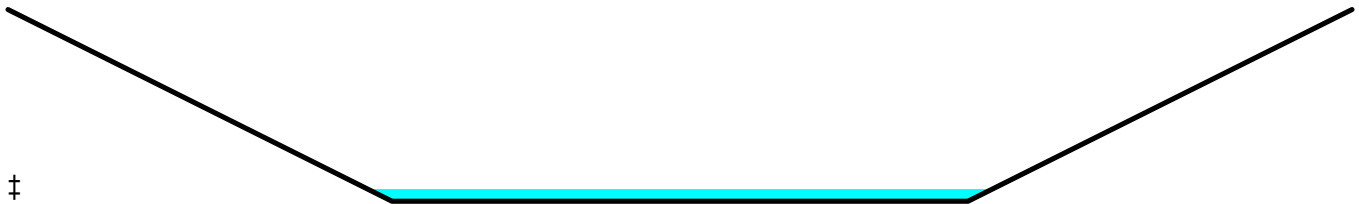
[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.92 cfs @ 12.10 hrs, Volume= 0.073 af
Outflow = 0.82 cfs @ 12.21 hrs, Volume= 0.073 af, Atten= 12%, Lag= 6.7 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 12.6 min

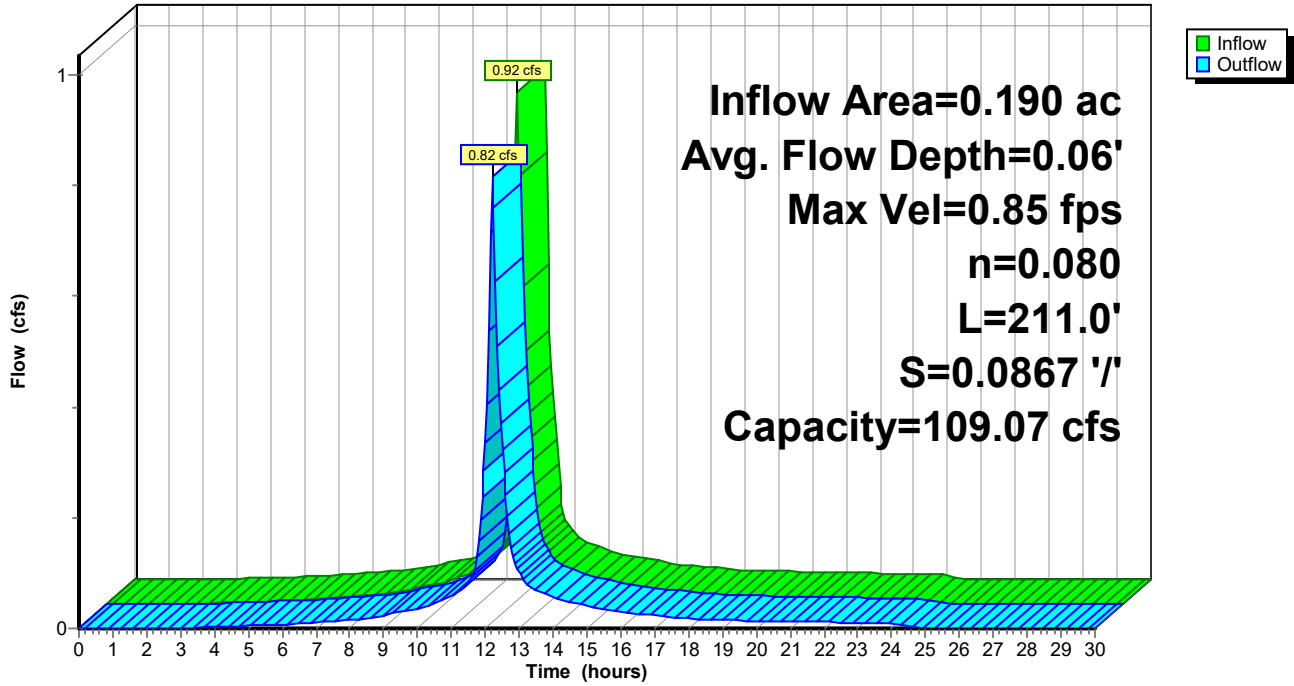
Peak Storage= 209 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.26'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.03' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.82 cfs @ 12.21 hrs, Volume= 0.073 af
Outflow = 0.80 cfs @ 12.22 hrs, Volume= 0.073 af, Atten= 2%, Lag= 1.0 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.60 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 2.1 min

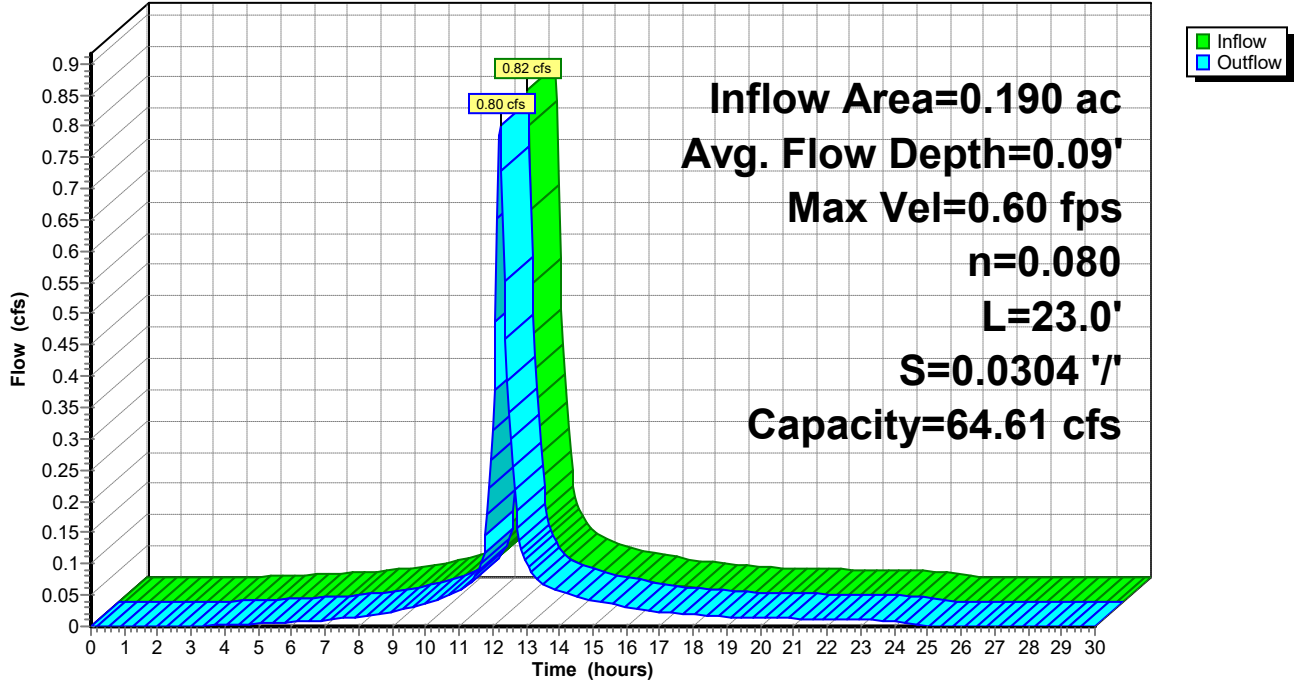
Peak Storage= 31 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 16.70'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.02' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.80 cfs @ 12.22 hrs, Volume= 0.073 af
Outflow = 0.67 cfs @ 12.45 hrs, Volume= 0.073 af, Atten= 16%, Lag= 13.3 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.25 fps, Min. Travel Time= 8.4 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 28.7 min

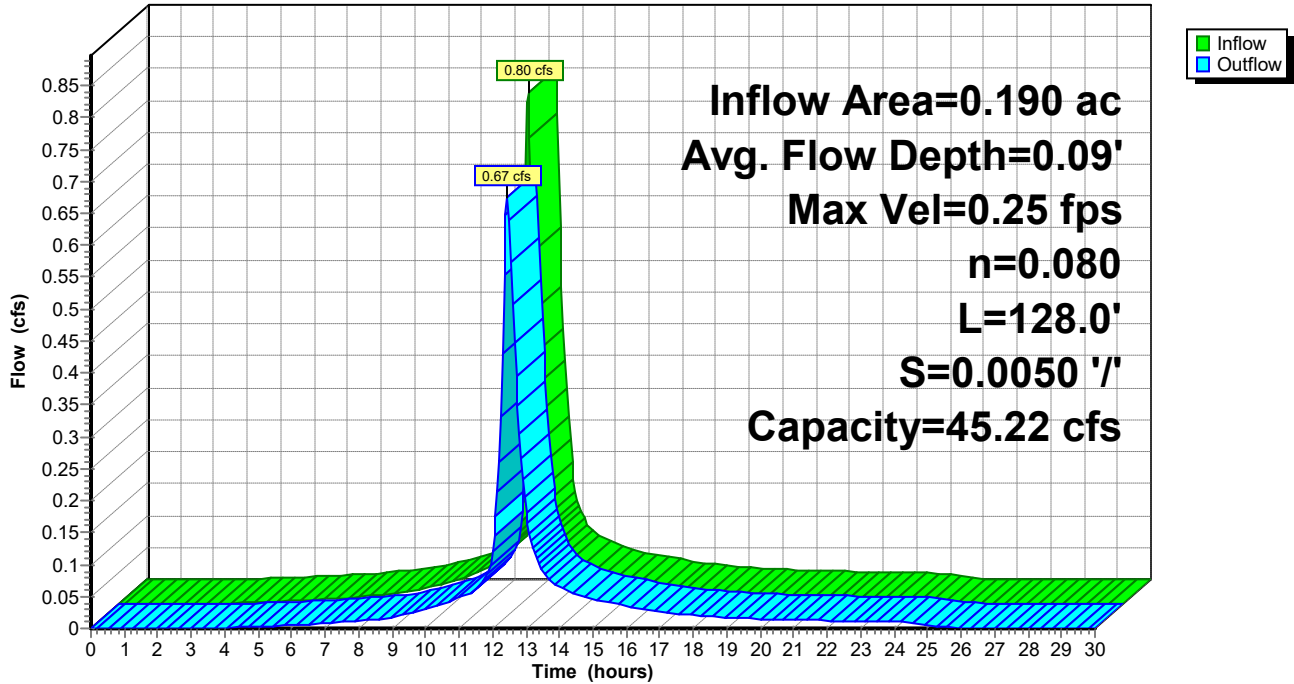
Peak Storage= 344 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.09', Surface Width= 31.74'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 '
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



Summary for Reach OL-5: OVERLAND

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 4.63" for 25-Year event
 Inflow = 1.35 cfs @ 12.08 hrs, Volume= 0.108 af
 Outflow = 1.18 cfs @ 12.21 hrs, Volume= 0.108 af, Atten= 13%, Lag= 7.4 min
 Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 1.02 fps, Min. Travel Time= 4.7 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 15.1 min

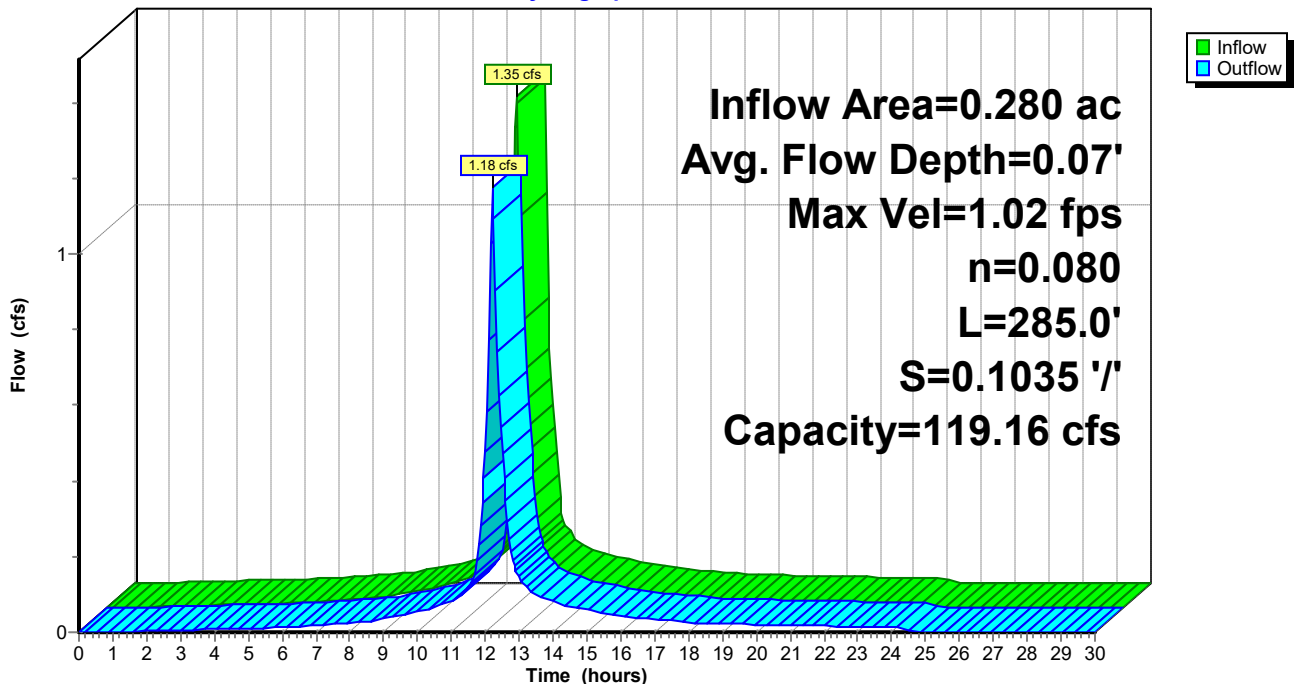
Peak Storage= 333 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.07' , Surface Width= 16.49'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 285.0' Slope= 0.1035 ' / '
 Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.11' @ 12.25 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 4.63" for 25-Year event
Inflow = 1.18 cfs @ 12.21 hrs, Volume= 0.108 af
Outflow = 1.10 cfs @ 12.31 hrs, Volume= 0.108 af, Atten= 6%, Lag= 5.9 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.38 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 13.7 min

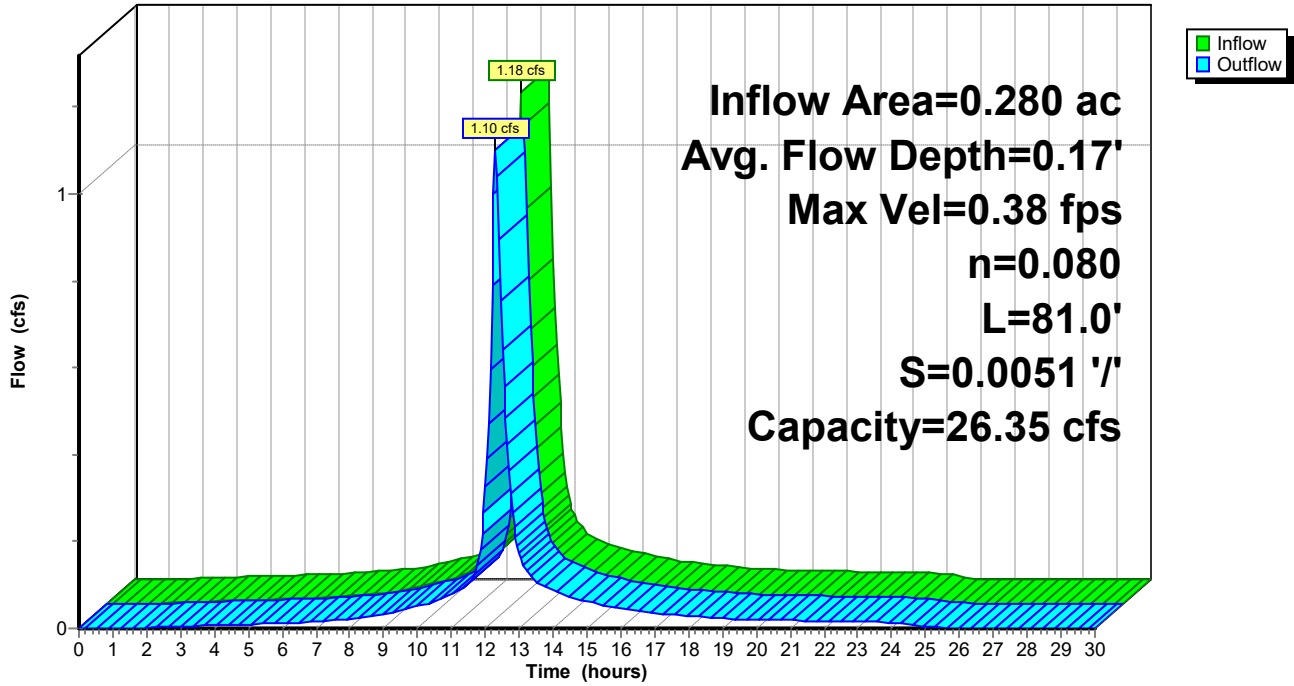
Peak Storage= 235 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 18.46'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 ' '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

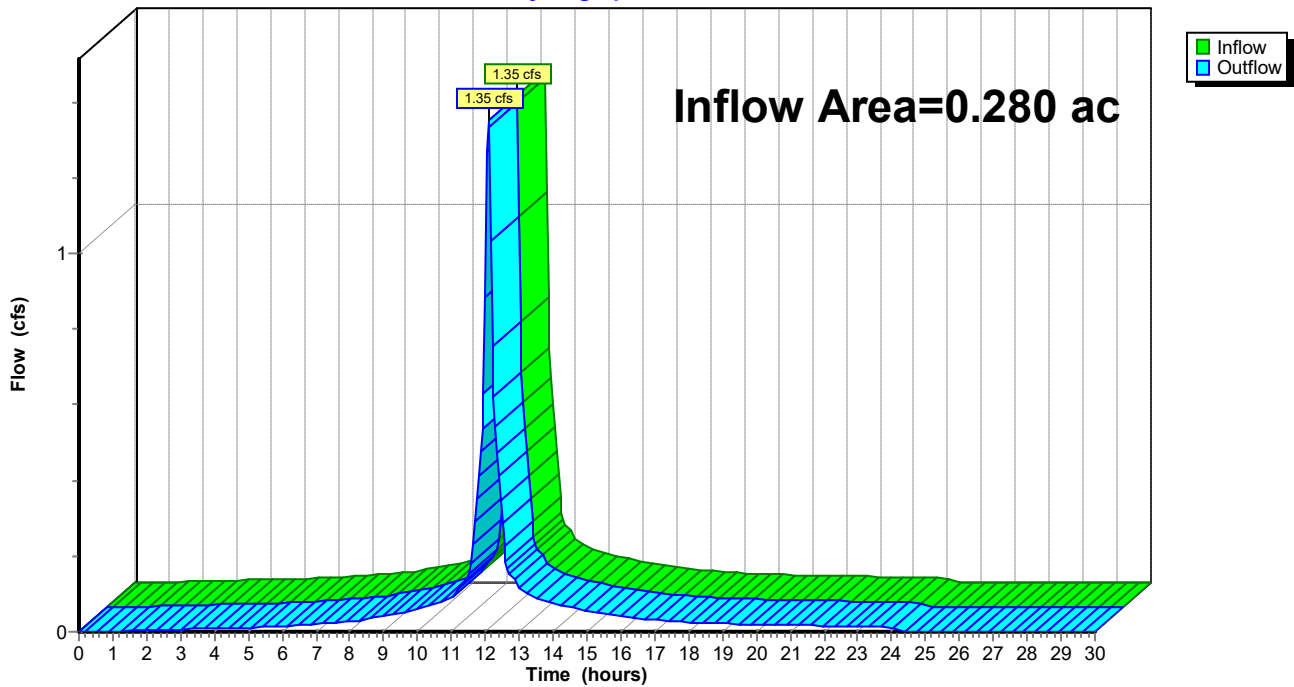
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 4.63" for 25-Year event
Inflow = 1.35 cfs @ 12.08 hrs, Volume= 0.108 af
Outflow = 1.35 cfs @ 12.08 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



3010-Pre-SUBDIVISION

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Type III 24-hr 100-Year Rainfall=6.50"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: TO WETLAND (DP#1)	Runoff Area=230,616 sf 1.82% Impervious Runoff Depth=3.31" Flow Length=770' Tc=19.9 min CN=71 Runoff=13.77 cfs 1.459 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=5.91" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=2.07 cfs 0.162 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=3.92" Flow Length=356' Tc=5.0 min CN=77 Runoff=8.67 cfs 0.617 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=5.79" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=1.19 cfs 0.092 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=6.26" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.34 cfs 0.027 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=6.26" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.82 cfs 0.066 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=5.00" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.57 cfs 0.042 af
Reach DCB-B: TO OUTFALL	Inflow=1.19 cfs 0.092 af Outflow=1.19 cfs 0.092 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.18' Max Vel=13.58 fps Inflow=1.69 cfs 0.135 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.69 cfs 0.135 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.23' Max Vel=8.06 fps Inflow=1.38 cfs 0.108 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.36 cfs 0.108 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.23' Max Vel=4.06 fps Inflow=0.57 cfs 0.042 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.56 cfs 0.042 af
Reach DP#1: WETLAND	Inflow=15.76 cfs 1.686 af Outflow=15.76 cfs 1.686 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=2.07 cfs 0.162 af Outflow=2.07 cfs 0.162 af
Reach DP#3: LOW POINT	Inflow=8.67 cfs 0.617 af Outflow=8.67 cfs 0.617 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.07' Max Vel=1.03 fps Inflow=1.19 cfs 0.092 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=1.15 cfs 0.092 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.07' Max Vel=0.92 fps Inflow=1.15 cfs 0.092 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=1.03 cfs 0.092 af

3010-Pre-SUBDIVISION

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Type III 24-hr 100-Year Rainfall=6.50"

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.10' Max Vel=0.66 fps Inflow=1.03 cfs 0.092 af
n=0.080 L=23.0' S=0.0304 '/' Capacity=64.61 cfs Outflow=1.01 cfs 0.092 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.10' Max Vel=0.28 fps Inflow=1.01 cfs 0.092 af
n=0.080 L=128.0' S=0.0050 '/' Capacity=45.22 cfs Outflow=0.86 cfs 0.092 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.09' Max Vel=1.11 fps Inflow=1.69 cfs 0.135 af
n=0.080 L=285.0' S=0.1035 '/' Capacity=119.16 cfs Outflow=1.48 cfs 0.135 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.20' Max Vel=0.42 fps Inflow=1.48 cfs 0.135 af
n=0.080 L=81.0' S=0.0051 '/' Capacity=26.35 cfs Outflow=1.40 cfs 0.135 af

Reach OUTLET: TO DP#1

Inflow=1.69 cfs 0.135 af
Outflow=1.69 cfs 0.135 af

Total Runoff Area = 7.983 ac Runoff Volume = 2.465 af Average Runoff Depth = 3.71"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

3010-Pre-SUBDIVISION

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Type III 24-hr 100-Year Rainfall=6.50"

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Summary for Subcatchment E1: TO WETLAND (DP#1)

Runoff = 13.77 cfs @ 12.28 hrs, Volume= 1.459 af, Depth= 3.31"
 Routed to Reach DP#1 : WETLAND

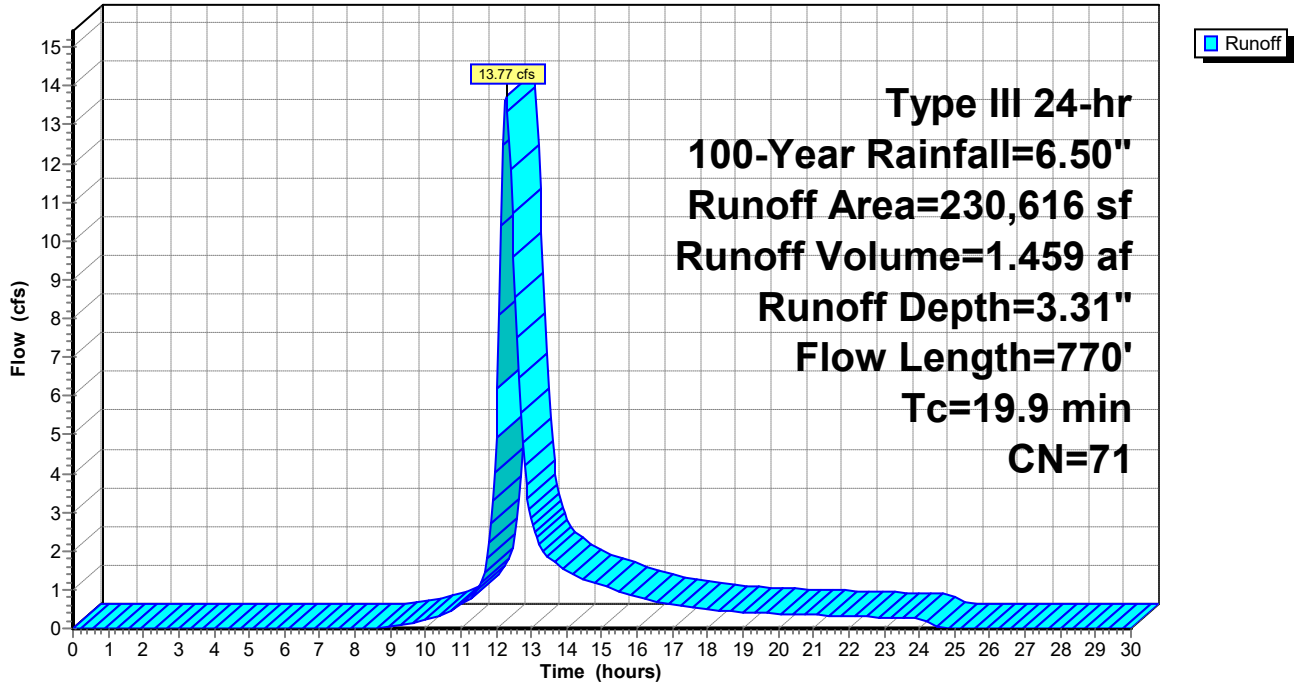
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,750	74	>75% Grass cover, Good, HSG C
217,729	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,943	89	Gravel roads, HSG C
230,616	71	Weighted Average
226,422		98.18% Pervious Area
4,194		1.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment E1: TO WETLAND (DP#1)

Hydrograph



Summary for Subcatchment E2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 2.07 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 5.91"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

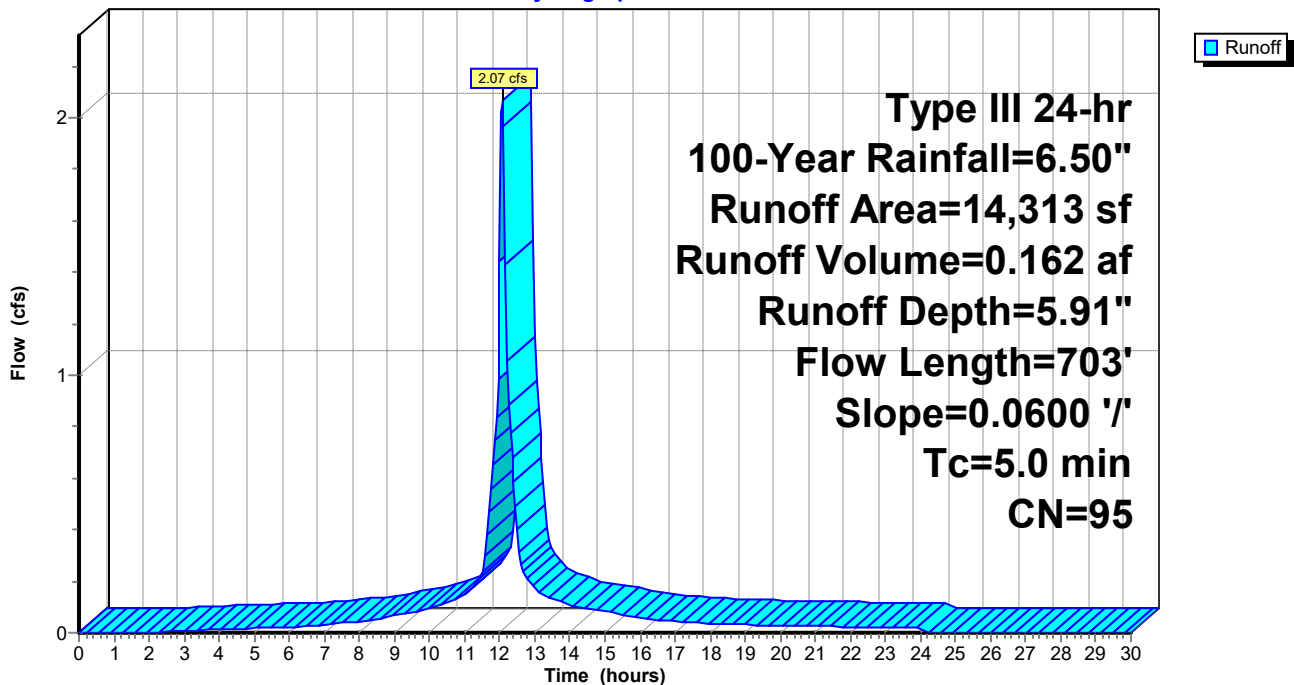
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,263	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,506	98	Paved parking, HSG C
14,313	95	Weighted Average
1,807		12.62% Pervious Area
12,506		87.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E2: TO CATCHBASIN (DP#2)

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.50"

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Summary for Subcatchment E3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 8.67 cfs @ 12.08 hrs, Volume= 0.617 af, Depth= 3.92"
 Routed to Reach DP#3 : LOW POINT

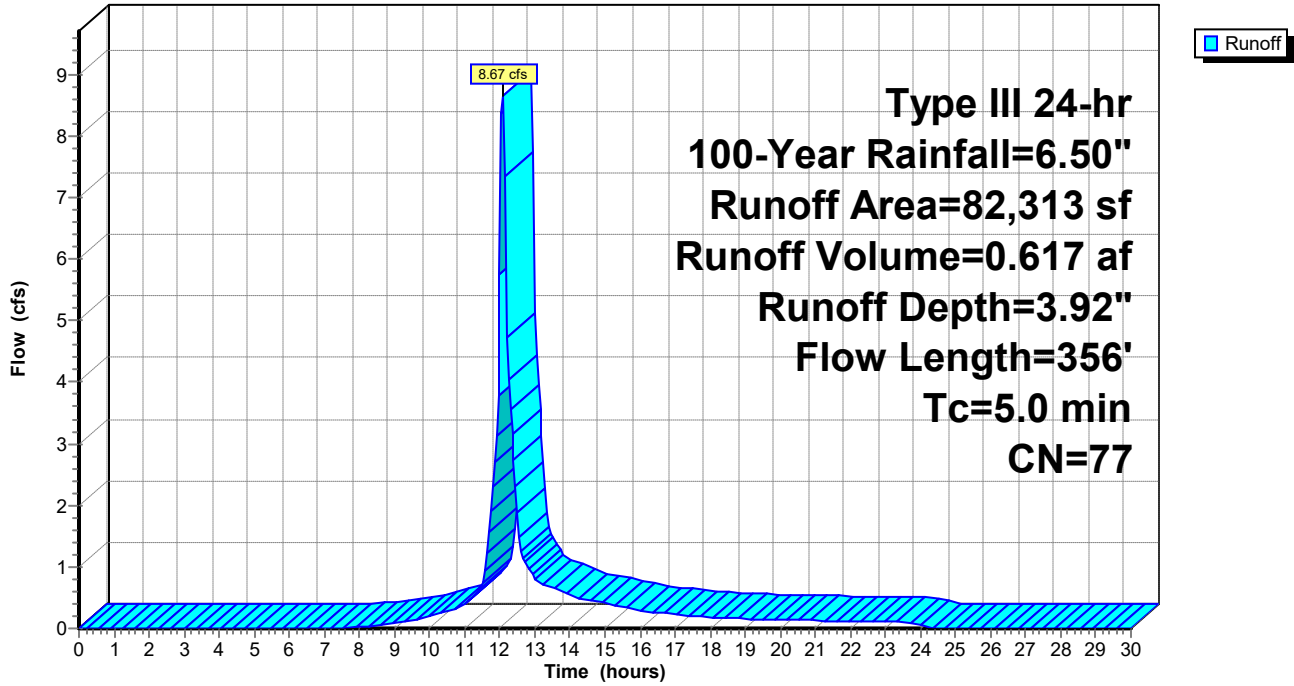
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E3: TO LOW POINT (DP#3)

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.50"

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Summary for Subcatchment E4: TO DCB-B

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af, Depth= 5.79"
 Routed to Reach DCB-B : TO OUTFALL

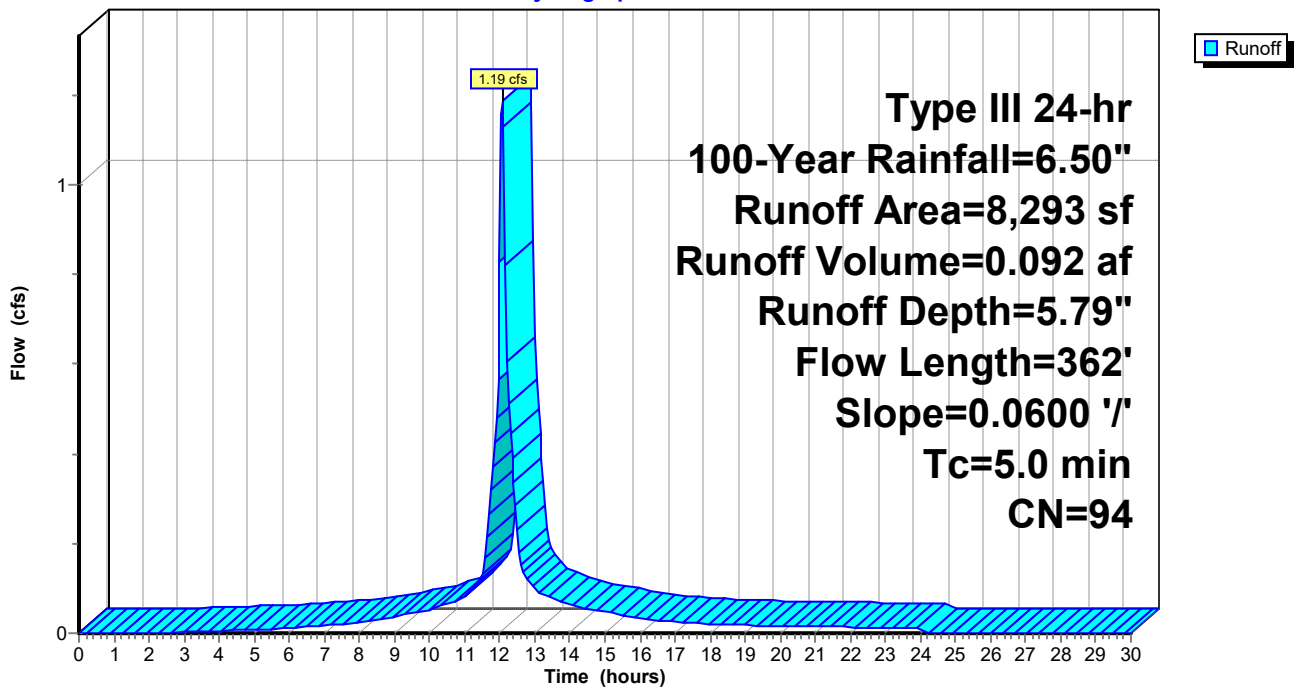
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	362	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E4: TO DCB-B

Hydrograph



Summary for Subcatchment E5: TO DCB-C

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 0.027 af, Depth= 6.26"
 Routed to Reach DCB-C : TO OUTFALL

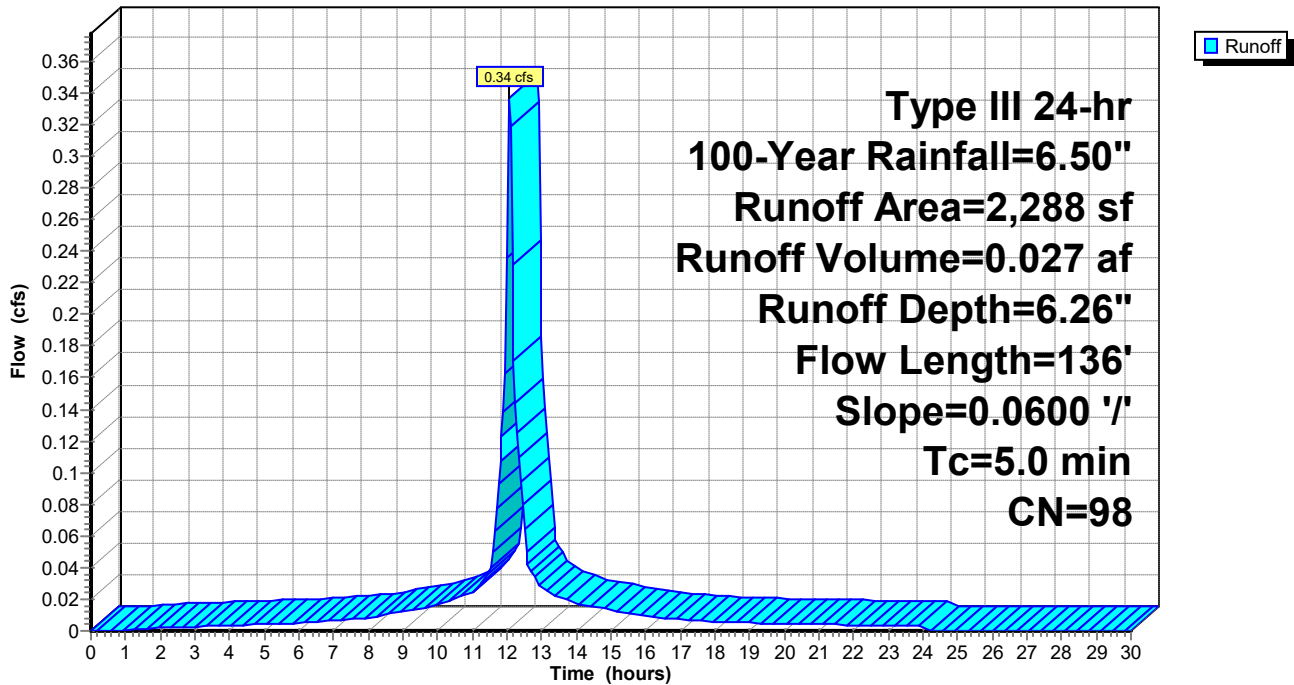
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E5: TO DCB-C

Hydrograph



Summary for Subcatchment E6: TO DCB-D

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.82 cfs @ 12.07 hrs, Volume= 0.066 af, Depth= 6.26"
 Routed to Reach DCB-D : TO DCB-C

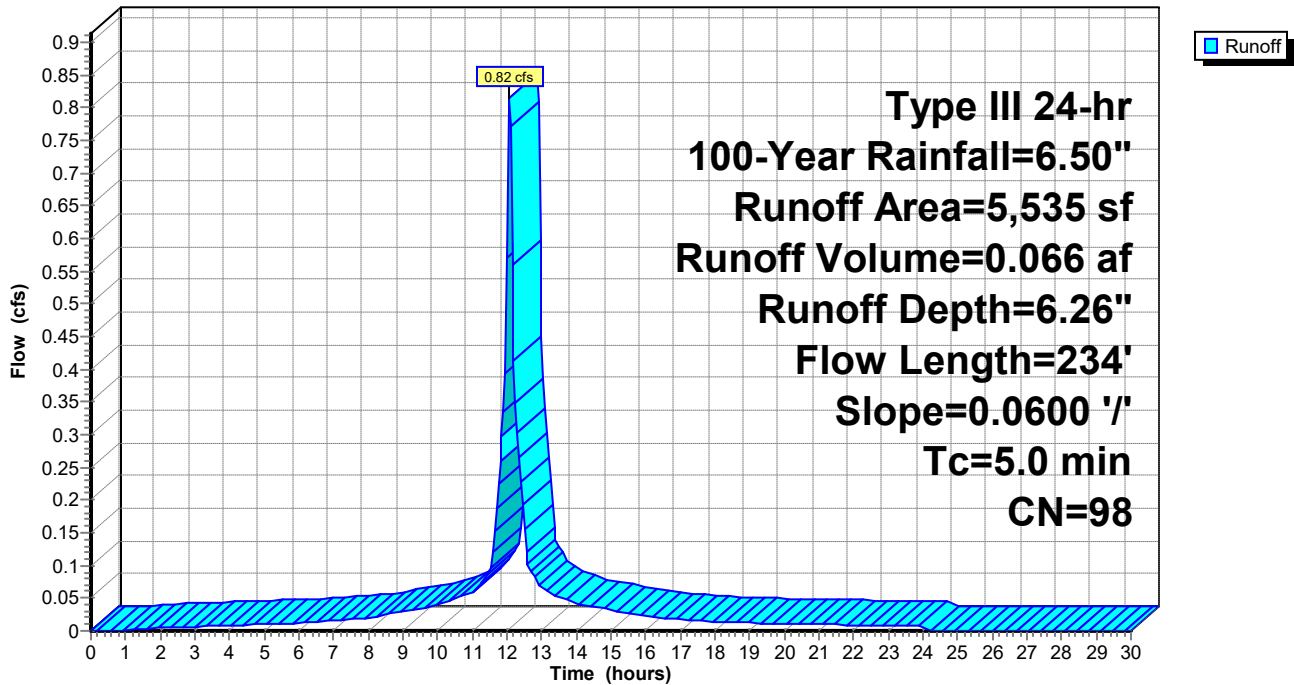
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment E6: TO DCB-D

Hydrograph



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Summary for Subcatchment E7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.57 cfs @ 12.07 hrs, Volume= 0.042 af, Depth= 5.00"
 Routed to Reach DCB-E : TO DCB-D

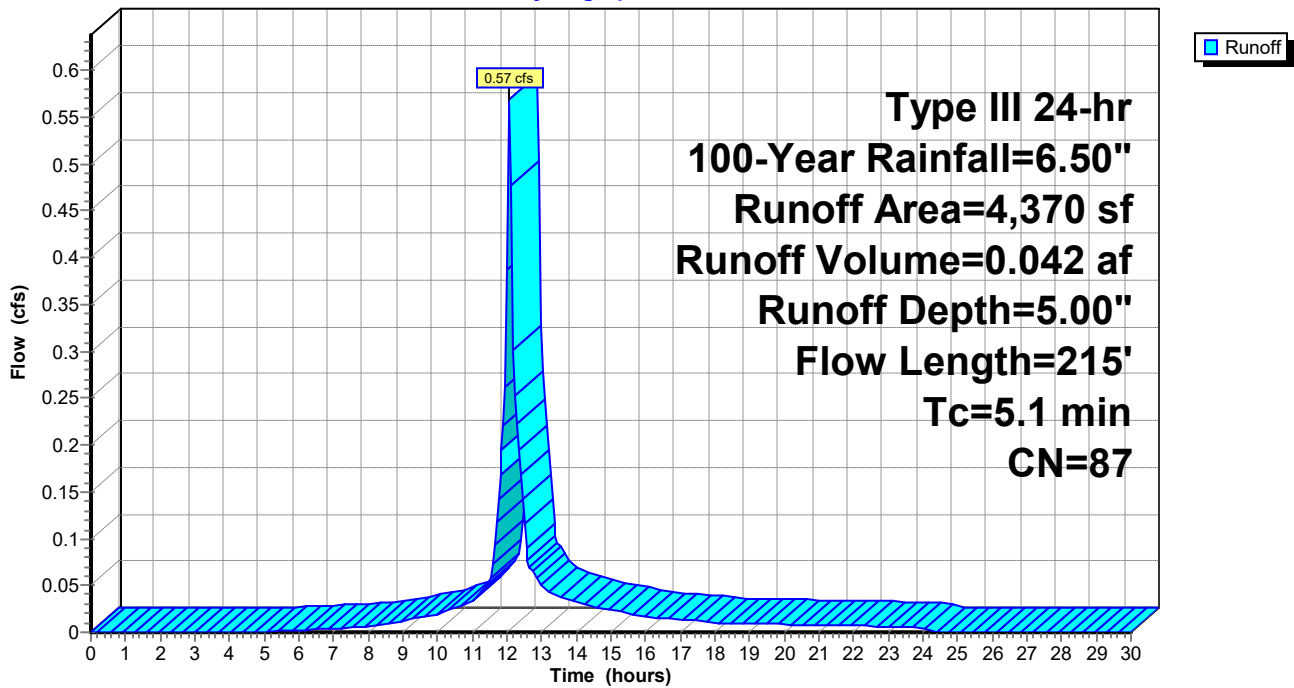
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,661	70	Woods, Good, HSG C
2,709	98	Paved parking, HSG C
4,370	87	Weighted Average
1,661		38.01% Pervious Area
2,709		61.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment E7: TO DCB-E

Hydrograph



Summary for Reach DCB-B: TO OUTFALL

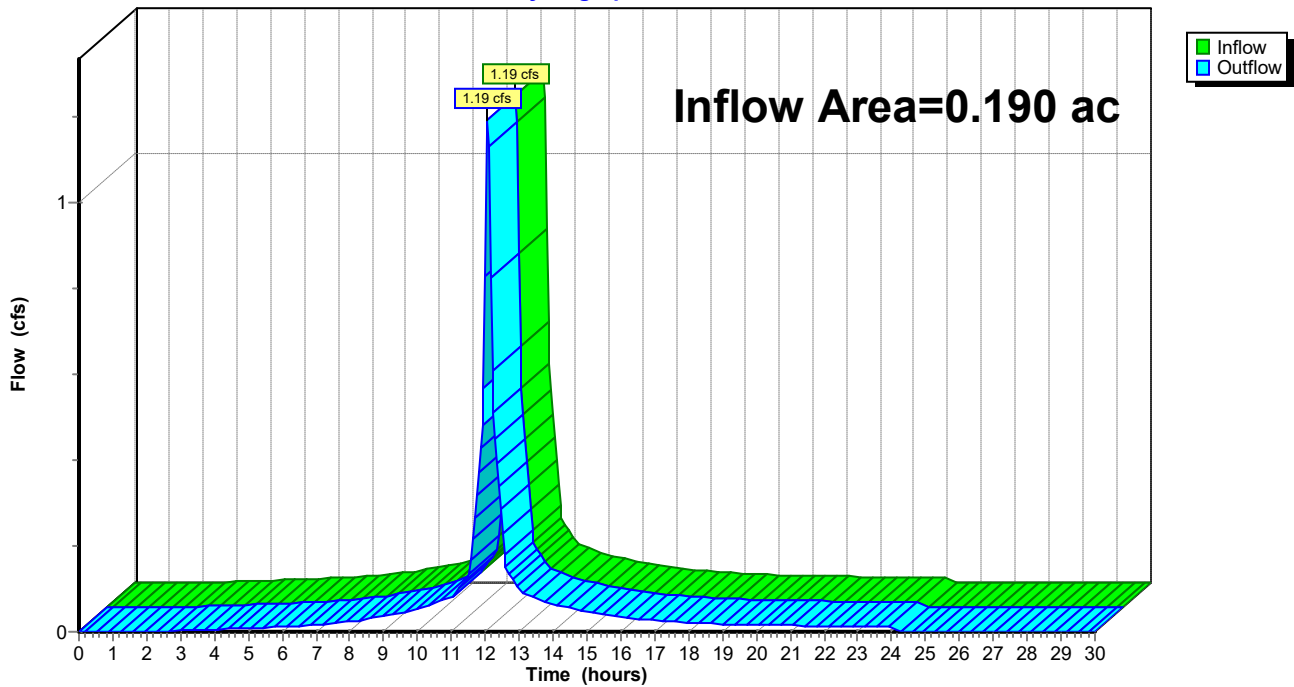
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af
Outflow = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



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Summary for Reach DCB-C: TO OUTFALL

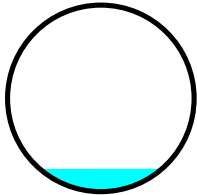
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 5.81" for 100-Year event
Inflow = 1.69 cfs @ 12.08 hrs, Volume= 0.135 af
Outflow = 1.69 cfs @ 12.08 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 13.58 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.46 fps, Avg. Travel Time= 0.3 min

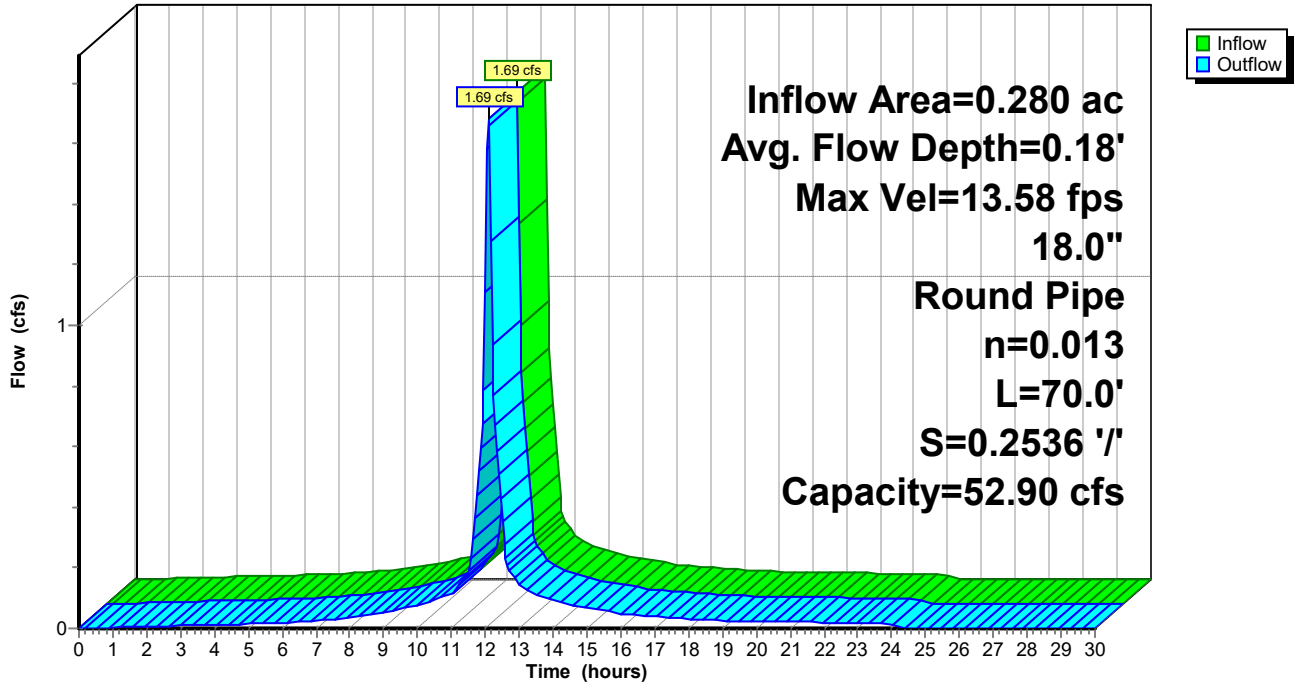
Peak Storage= 9 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 0.98'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



Reach DCB-C: TO OUTFALL

Hydrograph



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Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

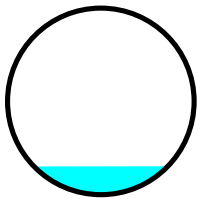
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.12' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 5.70" for 100-Year event
Inflow = 1.38 cfs @ 12.07 hrs, Volume= 0.108 af
Outflow = 1.36 cfs @ 12.08 hrs, Volume= 0.108 af, Atten= 1%, Lag= 0.5 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.06 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.60 fps, Avg. Travel Time= 0.7 min

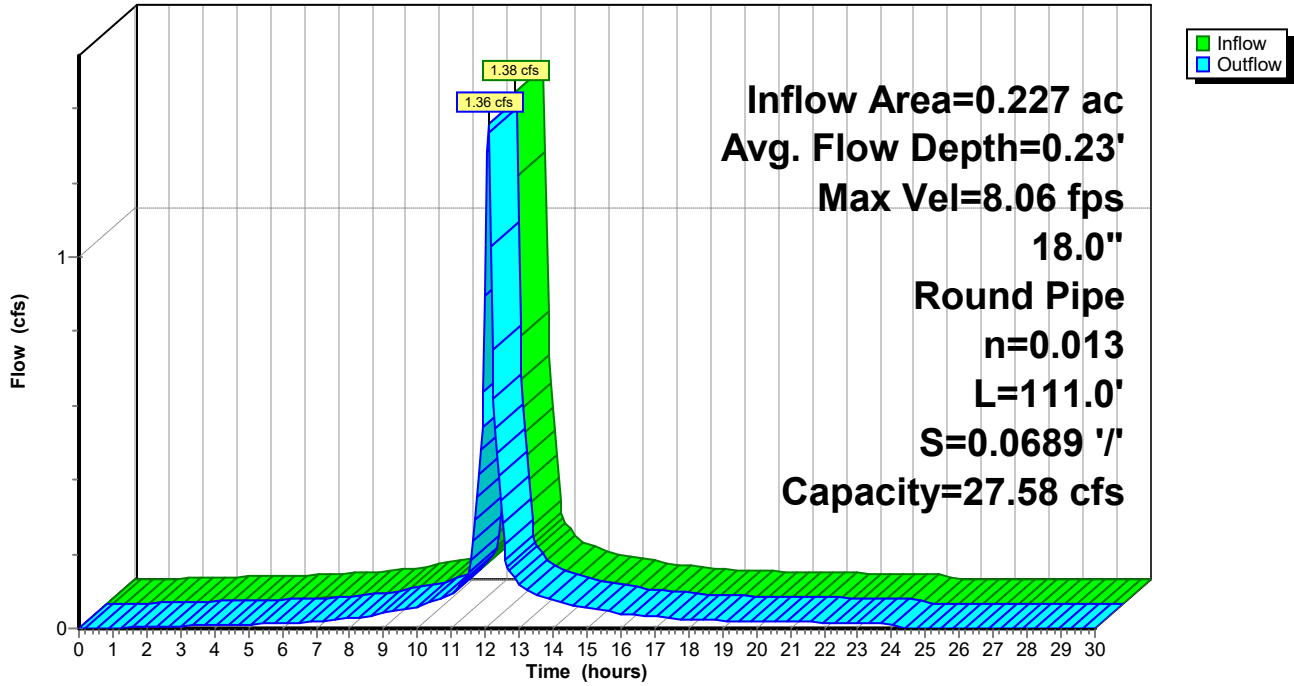
Peak Storage= 19 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 1.08'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



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Summary for Reach DCB-E: TO DCB-D

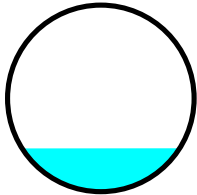
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 5.00" for 100-Year event
Inflow = 0.57 cfs @ 12.07 hrs, Volume= 0.042 af
Outflow = 0.56 cfs @ 12.08 hrs, Volume= 0.042 af, Atten= 1%, Lag= 0.3 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.06 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 0.4 min

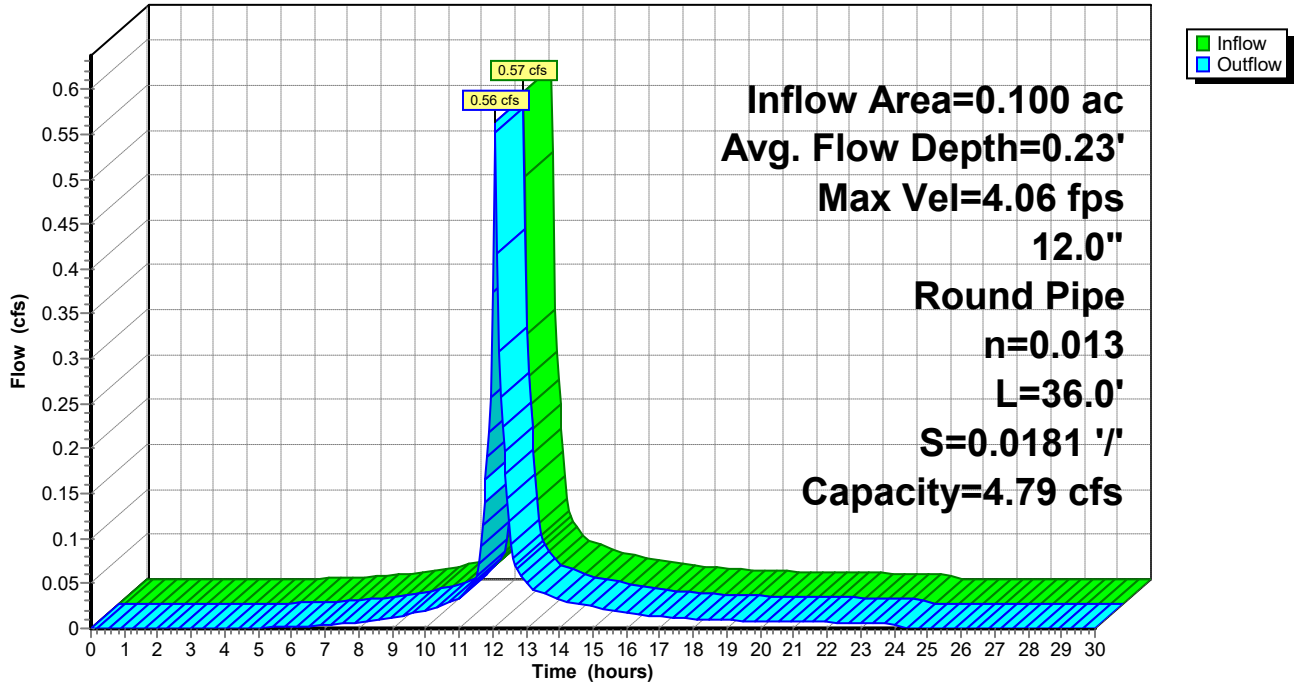
Peak Storage= 5 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 0.84'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/'
Inlet Invert= 140.85', Outlet Invert= 140.20'



Reach DCB-E: TO DCB-D

Hydrograph

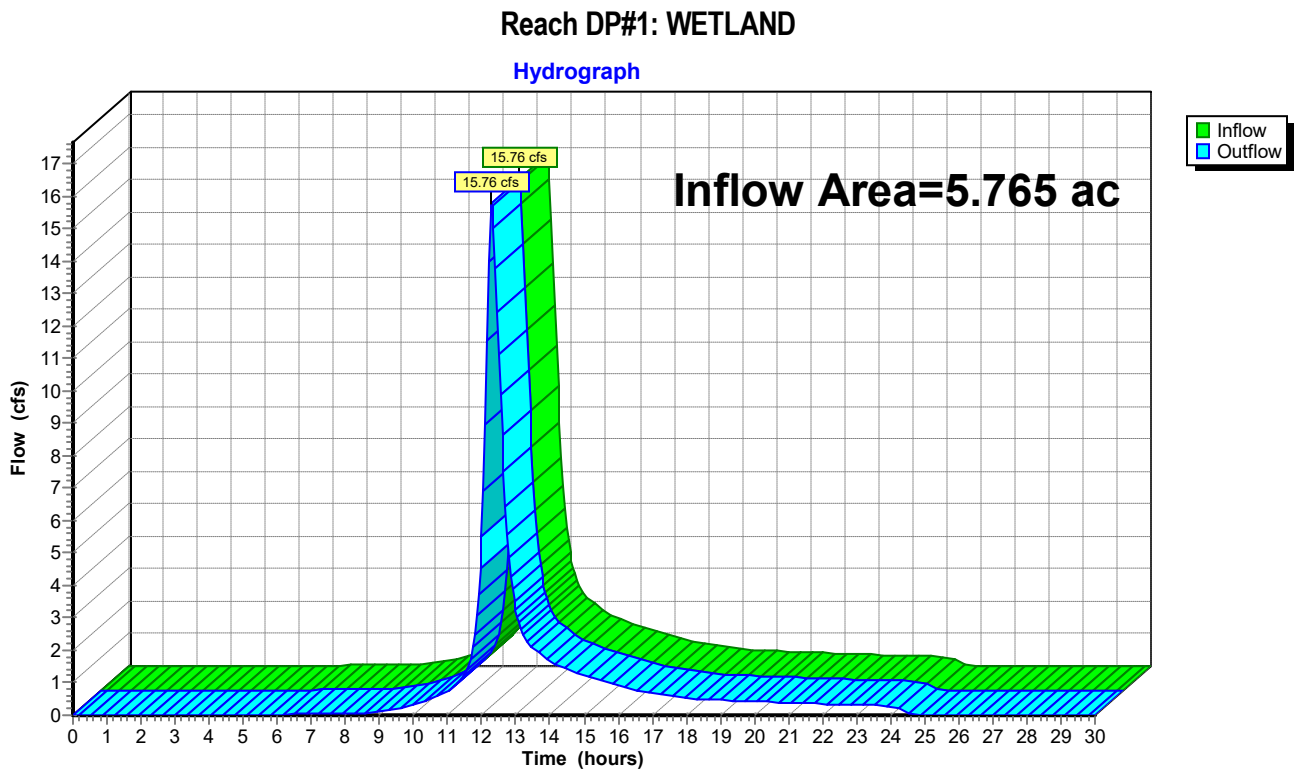


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 3.51" for 100-Year event
Inflow = 15.76 cfs @ 12.29 hrs, Volume= 1.686 af
Outflow = 15.76 cfs @ 12.29 hrs, Volume= 1.686 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

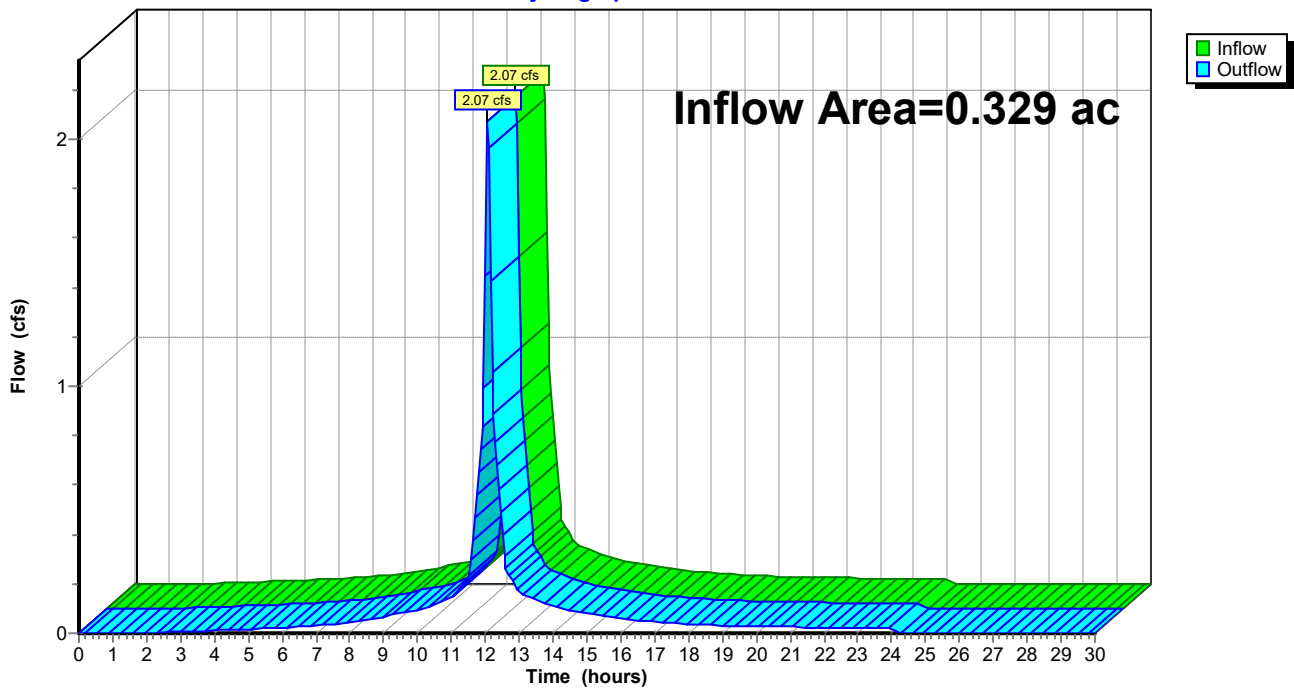
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 5.91" for 100-Year event
Inflow = 2.07 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 2.07 cfs @ 12.07 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

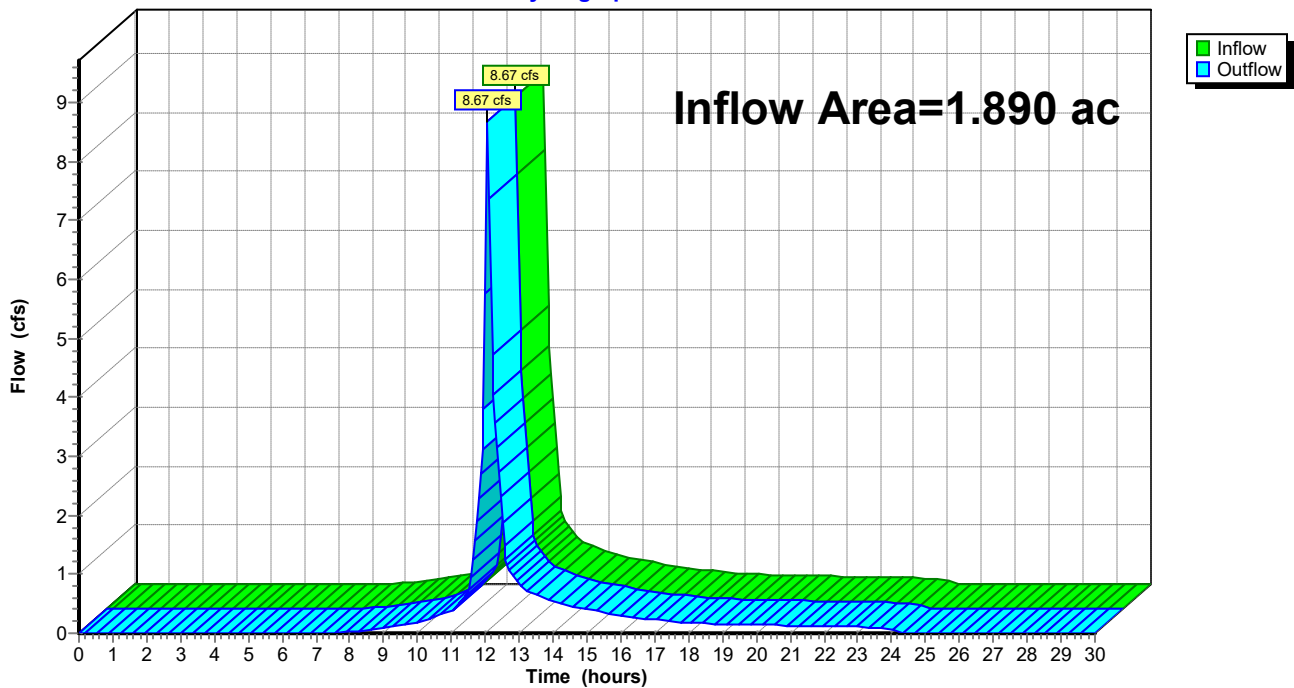
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 3.92" for 100-Year event
Inflow = 8.67 cfs @ 12.08 hrs, Volume= 0.617 af
Outflow = 8.67 cfs @ 12.08 hrs, Volume= 0.617 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 0.092 af, Atten= 3%, Lag= 1.4 min
Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.03 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 2.4 min

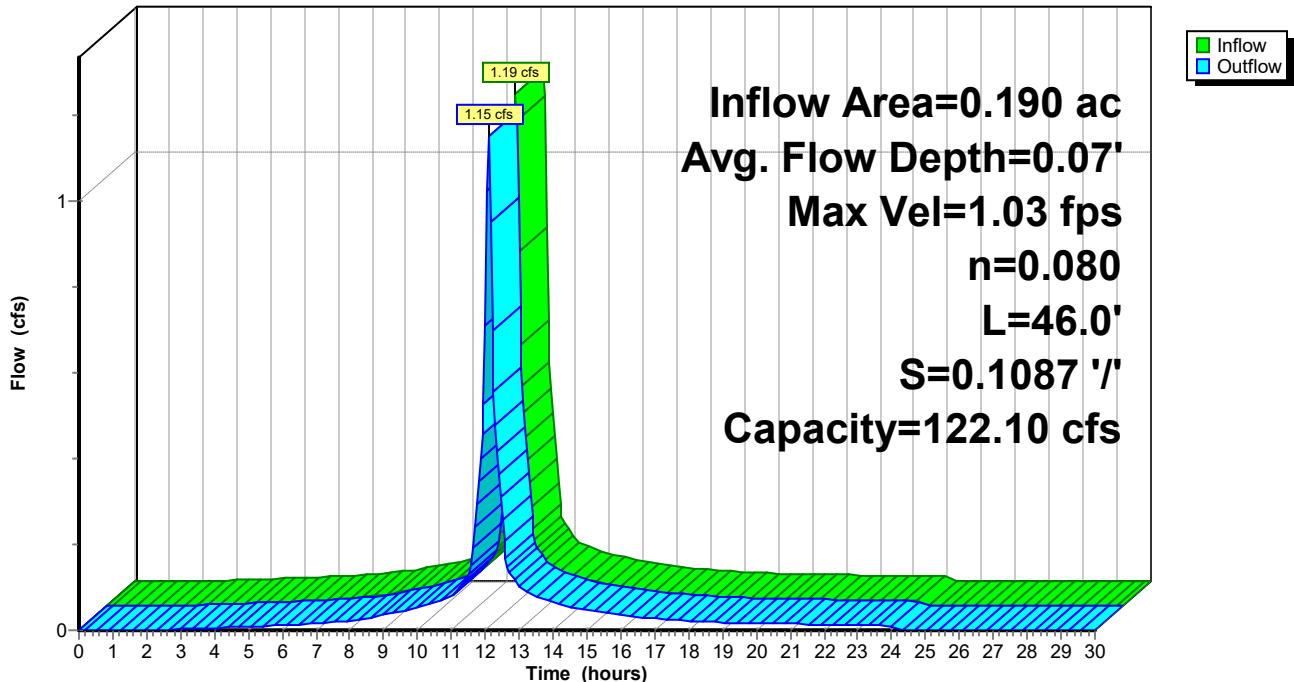
Peak Storage= 53 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.45'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
Length= 46.0' Slope= 0.1087 ' / '
Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.50"

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Summary for Reach OL-2: OVERLAND

[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 0.092 af
Outflow = 1.03 cfs @ 12.20 hrs, Volume= 0.092 af, Atten= 10%, Lag= 6.2 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.92 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 12.3 min

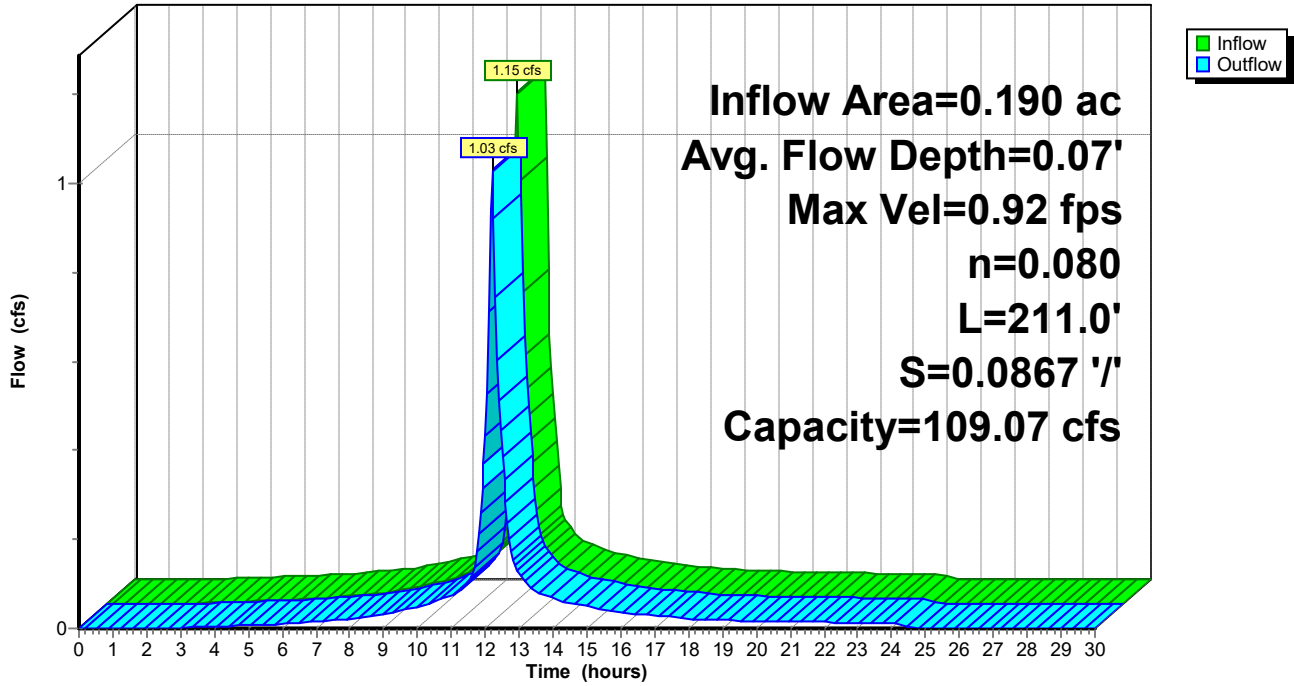
Peak Storage= 240 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.45'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.50"

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Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.04' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.03 cfs @ 12.20 hrs, Volume= 0.092 af
Outflow = 1.01 cfs @ 12.21 hrs, Volume= 0.092 af, Atten= 2%, Lag= 0.9 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.66 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 2.1 min

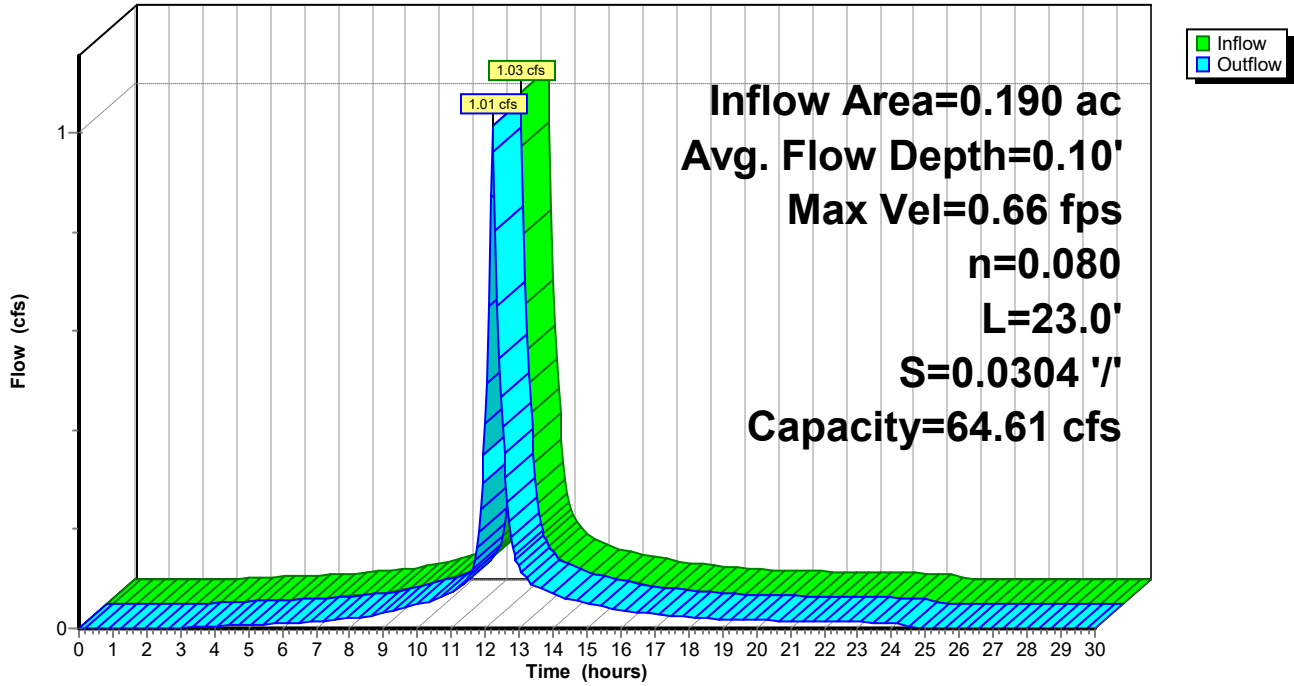
Peak Storage= 36 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 16.95'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.02' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.01 cfs @ 12.21 hrs, Volume= 0.092 af
Outflow = 0.86 cfs @ 12.41 hrs, Volume= 0.092 af, Atten= 15%, Lag= 12.1 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.28 fps, Min. Travel Time= 7.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 27.5 min

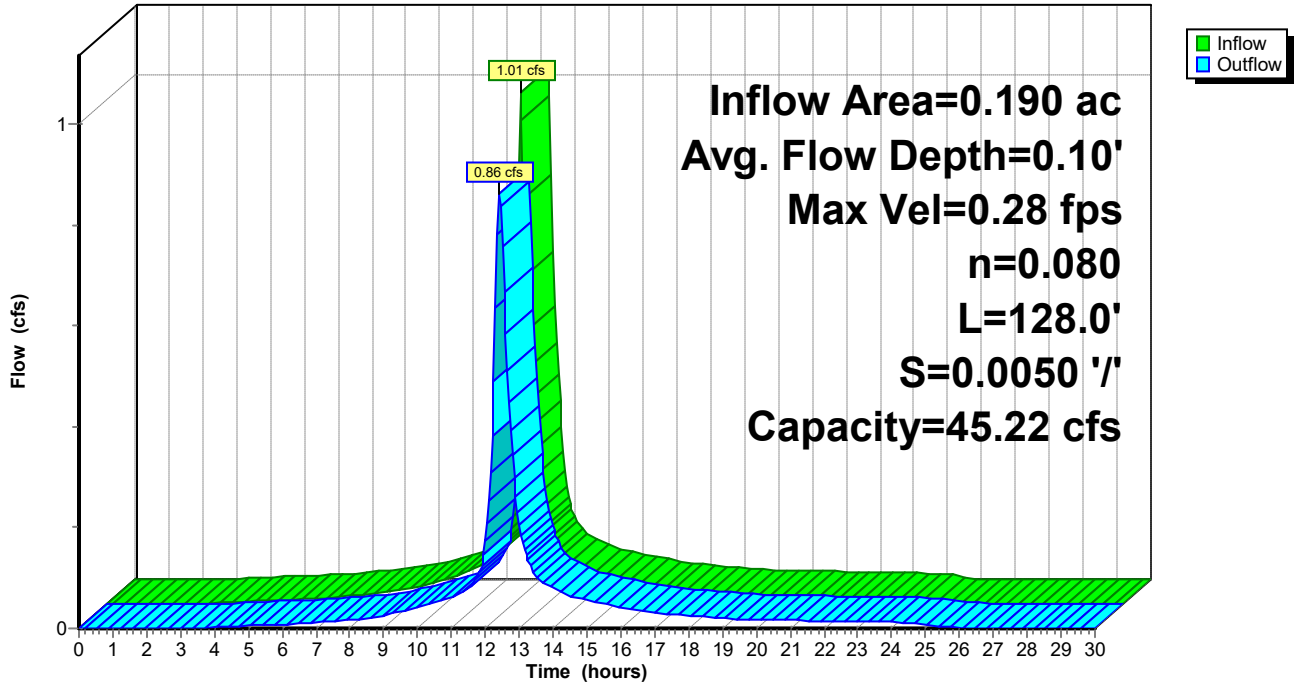
Peak Storage= 399 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.10', Surface Width= 32.01'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 '
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



Summary for Reach OL-5: OVERLAND

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 5.81" for 100-Year event
 Inflow = 1.69 cfs @ 12.08 hrs, Volume= 0.135 af
 Outflow = 1.48 cfs @ 12.20 hrs, Volume= 0.135 af, Atten= 12%, Lag= 6.9 min
 Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 1.11 fps, Min. Travel Time= 4.3 min
 Avg. Velocity = 0.32 fps, Avg. Travel Time= 14.6 min

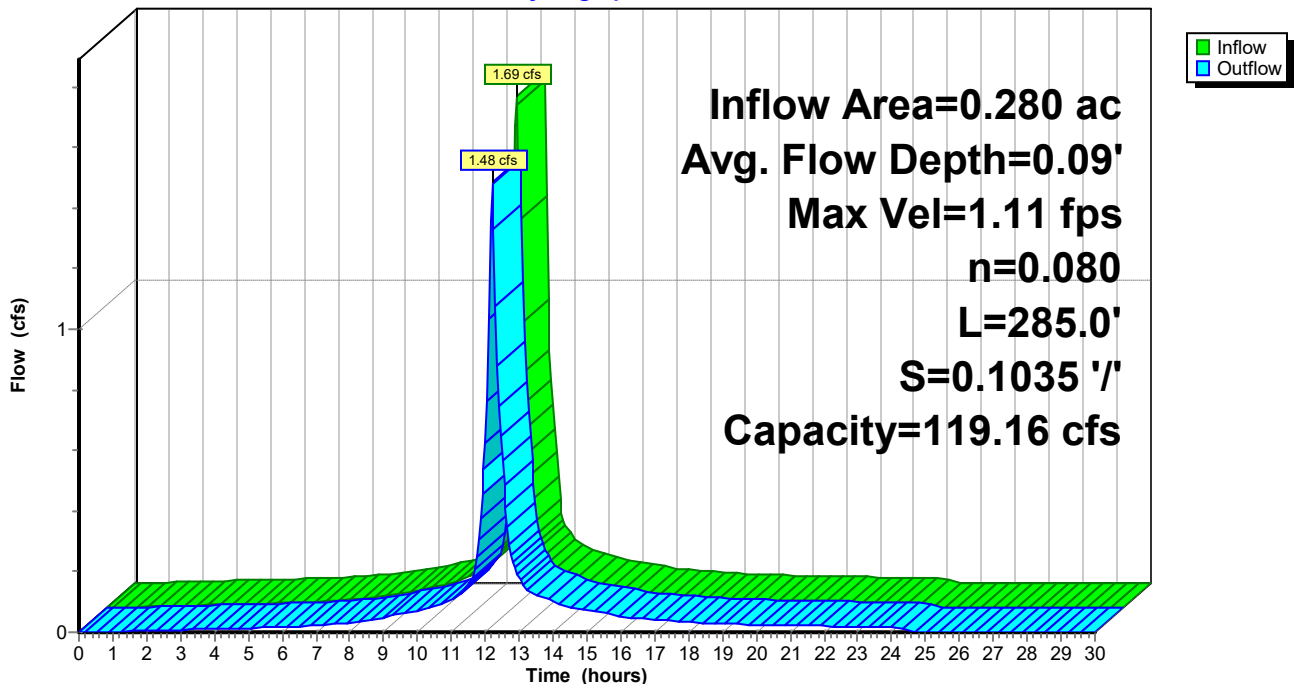
Peak Storage= 387 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.09' , Surface Width= 16.71'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 285.0' Slope= 0.1035 ' / '
 Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.13' @ 12.25 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 5.81" for 100-Year event
Inflow = 1.48 cfs @ 12.20 hrs, Volume= 0.135 af
Outflow = 1.40 cfs @ 12.29 hrs, Volume= 0.135 af, Atten= 6%, Lag= 5.5 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.42 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 12.7 min

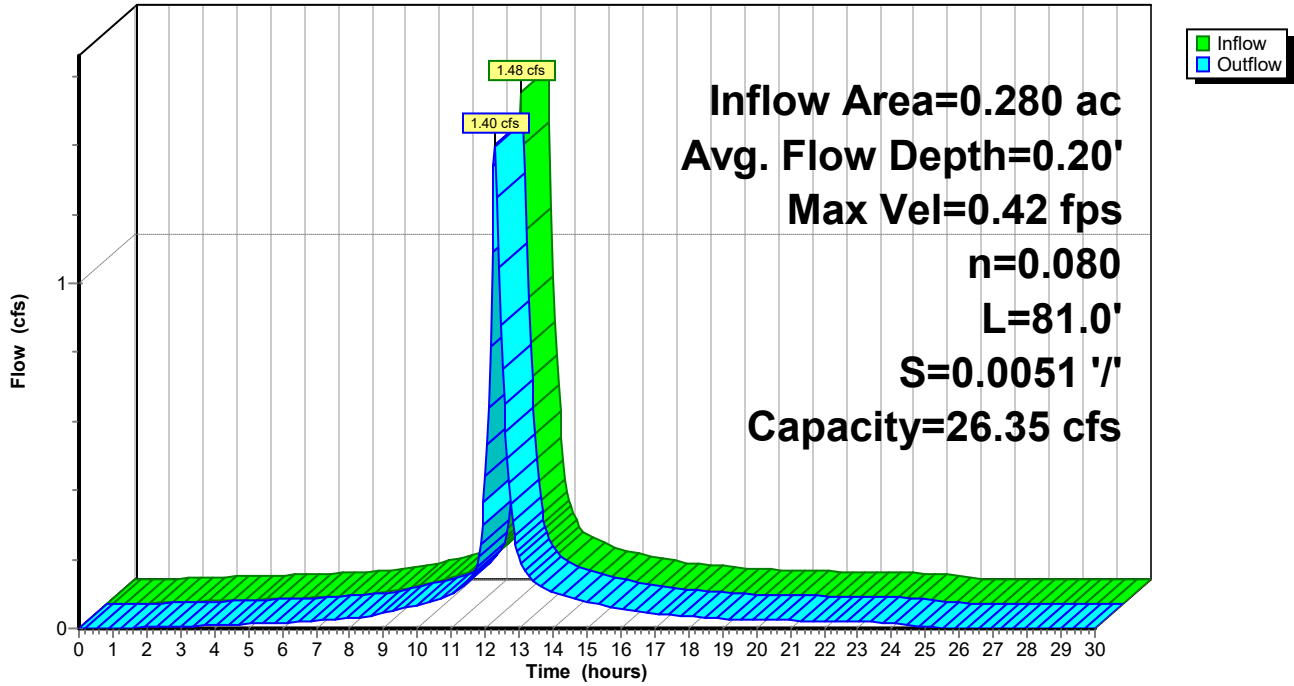
Peak Storage= 273 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 18.97'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 ' '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

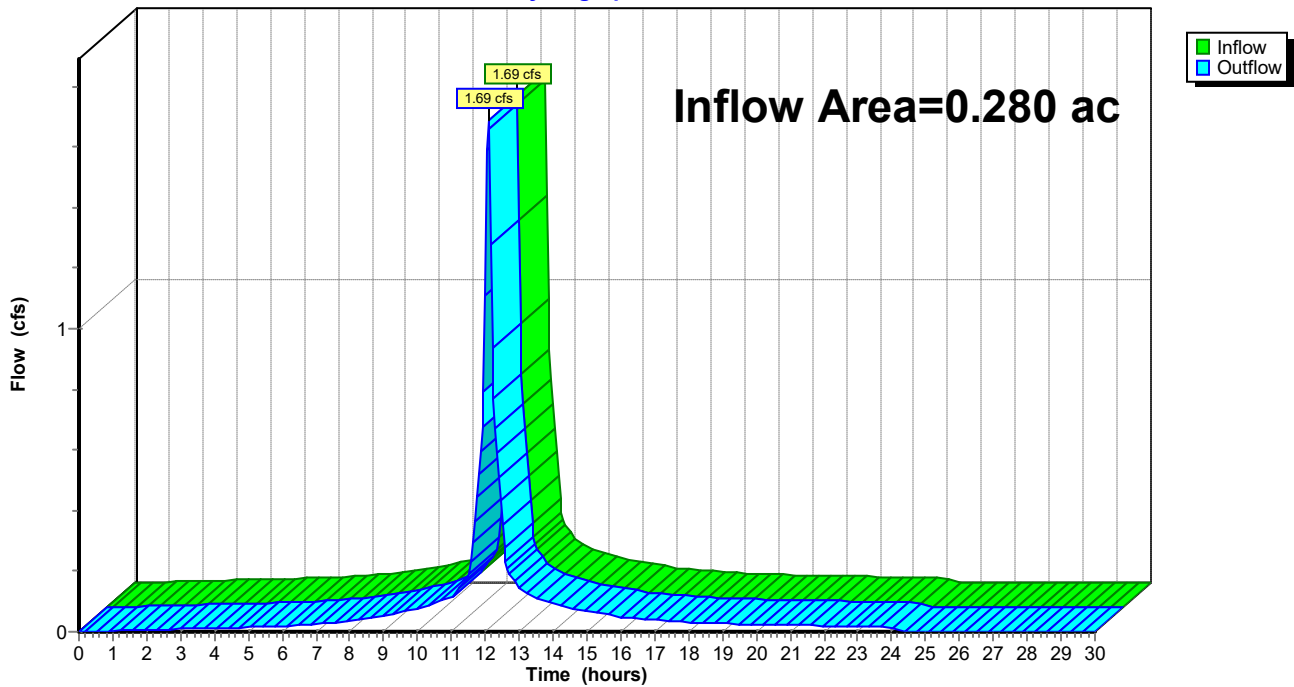
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 5.81" for 100-Year event
Inflow = 1.69 cfs @ 12.08 hrs, Volume= 0.135 af
Outflow = 1.69 cfs @ 12.08 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

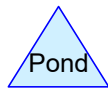
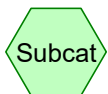
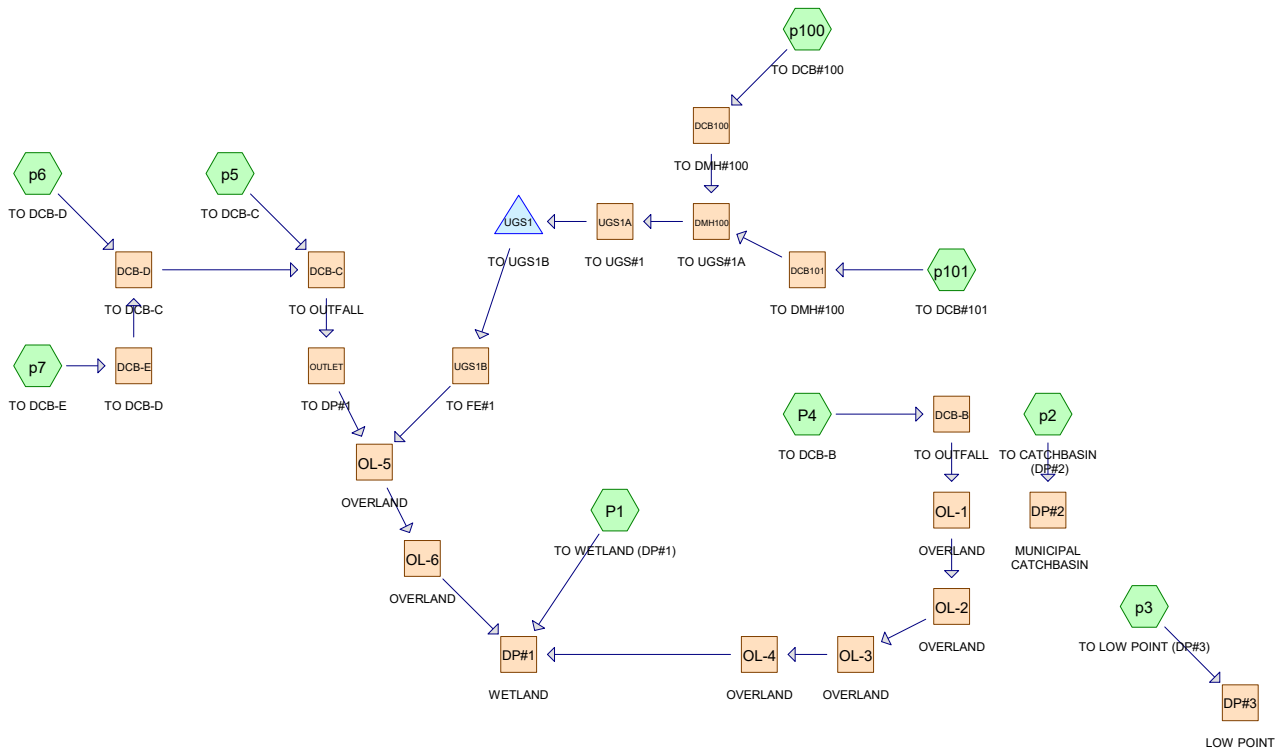
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



2.2
POST DEVELOPMENT CALCULATIONS



Routing Diagram for 3010-POST-SUBDIVISION
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Project Notes

Rainfall events imported from "TP-40-Rain.txt" for 449 MA Worcester

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.00	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.50	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.30	2
4	100-Year	Type III 24-hr		Default	24.00	1	6.50	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.374	74	>75% Grass cover, Good, HSG C (P1, p100, p101, p2, p3, P4, p7)
0.723	65	Brush, Good, HSG C (P1)
0.440	89	Gravel roads, HSG C (P1, p3)
0.002	96	Gravel surface, HSG C (p100)
1.188	98	Paved parking, HSG C (P1, p100, p101, p2, p3, P4, p5, p6, p7)
5.252	70	Woods, Good, HSG C (P1, p2, p3, p7)
7.980	75	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
7.980	HSG C	P1, p100, p101, p2, p3, P4, p5, p6, p7
0.000	HSG D	
0.000	Other	
7.980		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.374	0.000	0.000	0.374	>75% Grass cover, Good	P1, p100, p101, p2, p3, P4, p7
0.000	0.000	0.723	0.000	0.000	0.723	Brush, Good	P1
0.000	0.000	0.440	0.000	0.000	0.440	Gravel roads	P1, p3
0.000	0.000	0.002	0.000	0.000	0.002	Gravel surface	p100
0.000	0.000	1.188	0.000	0.000	1.188	Paved parking	P1, p100, p101, p2, p3, P4, p5, p6, p7
0.000	0.000	5.252	0.000	0.000	5.252	Woods, Good	P1, p2, p3, p7
0.000	0.000	7.980	0.000	0.000	7.980	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	DCB-C	131.25	113.50	70.0	0.2536	0.013	0.0	18.0	0.0
2	DCB-D	140.10	132.45	111.0	0.0689	0.013	0.0	18.0	0.0
3	DCB-E	140.85	140.20	36.0	0.0181	0.013	0.0	12.0	0.0
4	DCB100	140.50	136.00	127.0	0.0354	0.013	0.0	12.0	0.0
5	DCB101	136.40	136.00	36.0	0.0111	0.013	0.0	12.0	0.0
6	DMH100	135.80	135.50	8.0	0.0375	0.013	0.0	12.0	0.0
7	UGS1B	131.50	130.00	34.0	0.0441	0.013	0.0	12.0	0.0

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1: TO WETLAND (DP#1)	Runoff Area=223,130 sf 1.88% Impervious Runoff Depth=0.71" Flow Length=770' Tc=19.9 min CN=70 Runoff=2.50 cfs 0.305 af
Subcatchment p100: TO DCB#100	Runoff Area=988 sf 68.93% Impervious Runoff Depth=2.25" Flow Length=45' Slope=0.0200 '/' Tc=5.0 min CN=93 Runoff=0.06 cfs 0.004 af
Subcatchment p101: TO DCB#101	Runoff Area=6,297 sf 67.94% Impervious Runoff Depth=1.98" Flow Length=151' Tc=5.0 min CN=90 Runoff=0.34 cfs 0.024 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,320 sf 87.67% Impervious Runoff Depth=2.45" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=0.90 cfs 0.067 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=1.07" Flow Length=356' Tc=5.0 min CN=77 Runoff=2.30 cfs 0.169 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=2.35" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.51 cfs 0.037 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=2.77" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.15 cfs 0.012 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=2.77" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.37 cfs 0.029 af
Subcatchment p7: TO DCB-E	Runoff Area=4,439 sf 64.11% Impervious Runoff Depth=1.82" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.22 cfs 0.015 af
Reach DCB-B: TO OUTFALL	Inflow=0.51 cfs 0.037 af Outflow=0.51 cfs 0.037 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.12' Max Vel=10.56 fps Inflow=0.73 cfs 0.057 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=0.73 cfs 0.057 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.15' Max Vel=6.25 fps Inflow=0.58 cfs 0.045 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=0.58 cfs 0.045 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.15' Max Vel=3.07 fps Inflow=0.22 cfs 0.015 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.22 cfs 0.015 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.07' Max Vel=2.63 fps Inflow=0.06 cfs 0.004 af 12.0" Round Pipe n=0.013 L=127.0' S=0.0354 '/' Capacity=6.71 cfs Outflow=0.06 cfs 0.004 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.20' Max Vel=2.93 fps Inflow=0.34 cfs 0.024 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/' Capacity=3.76 cfs Outflow=0.33 cfs 0.024 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.16' Max Vel=4.72 fps Inflow=0.39 cfs 0.028 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/' Capacity=6.90 cfs Outflow=0.39 cfs 0.028 af

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Reach DP#1: WETLAND	Inflow=3.37 cfs 0.427 af Outflow=3.37 cfs 0.427 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=0.90 cfs 0.067 af Outflow=0.90 cfs 0.067 af
Reach DP#3: LOW POINT	Inflow=2.30 cfs 0.169 af Outflow=2.30 cfs 0.169 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.04' Max Vel=0.75 fps Inflow=0.51 cfs 0.037 af n=0.080 L=46.0' S=0.1087 '/ Capacity=122.10 cfs Outflow=0.49 cfs 0.037 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.04' Max Vel=0.65 fps Inflow=0.49 cfs 0.037 af n=0.080 L=211.0' S=0.0867 '/ Capacity=109.07 cfs Outflow=0.42 cfs 0.037 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.47 fps Inflow=0.42 cfs 0.037 af n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.41 cfs 0.037 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.19 fps Inflow=0.41 cfs 0.037 af n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.33 cfs 0.037 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.88 fps Inflow=0.90 cfs 0.085 af n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=0.79 cfs 0.085 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.14' Max Vel=0.33 fps Inflow=0.79 cfs 0.085 af n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=0.74 cfs 0.085 af
Reach OUTLET: TO DP#1	Inflow=0.73 cfs 0.057 af Outflow=0.73 cfs 0.057 af
Reach UGS1A: TO UGS#1	Inflow=0.39 cfs 0.028 af Outflow=0.39 cfs 0.028 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.10' Max Vel=3.92 fps Inflow=0.17 cfs 0.028 af 12.0" Round Pipe n=0.013 L=34.0' S=0.0441 '/ Capacity=7.48 cfs Outflow=0.17 cfs 0.028 af
Pond UGS1: TO UGS1B	Peak Elev=134.09' Storage=0.003 af Inflow=0.39 cfs 0.028 af Outflow=0.17 cfs 0.028 af

Total Runoff Area = 7.980 ac Runoff Volume = 0.663 af Average Runoff Depth = 1.00"
85.11% Pervious = 6.792 ac 14.89% Impervious = 1.188 ac

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Summary for Subcatchment P1: TO WETLAND (DP#1)

Runoff = 2.50 cfs @ 12.32 hrs, Volume= 0.305 af, Depth= 0.71"
 Routed to Reach DP#1 : WETLAND

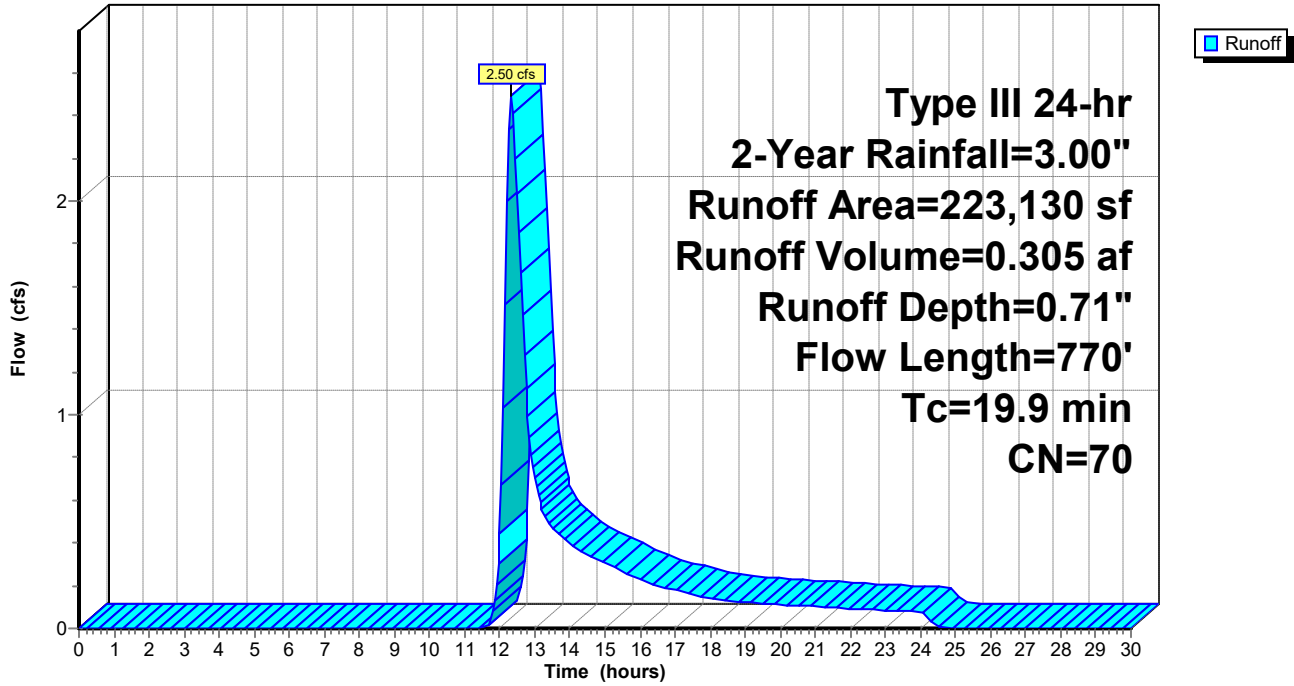
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
3,458	74	>75% Grass cover, Good, HSG C
177,279	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,702	89	Gravel roads, HSG C
31,497	65	Brush, Good, HSG C
223,130	70	Weighted Average
218,936		98.12% Pervious Area
4,194		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment P1: TO WETLAND (DP#1)

Hydrograph



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Summary for Subcatchment p100: TO DCB#100

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 2.25"
 Routed to Reach DCB100 : TO DMH#100

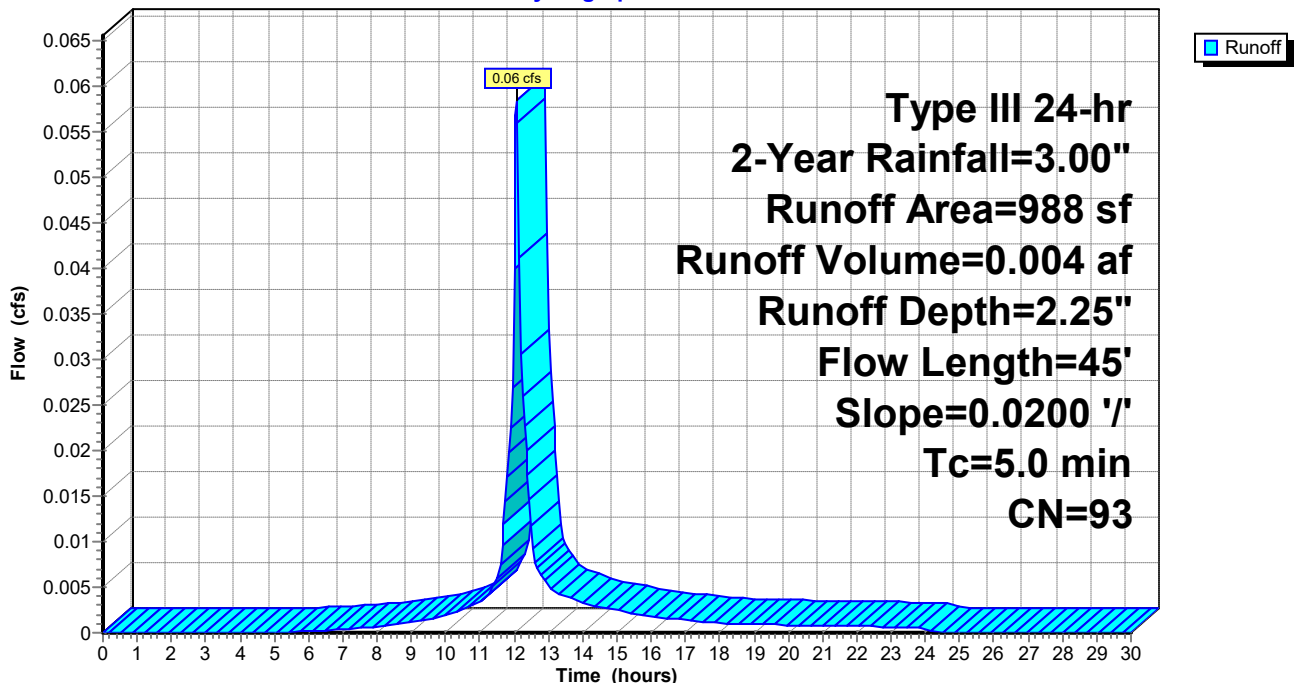
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
210	74	>75% Grass cover, Good, HSG C
681	98	Paved parking, HSG C
97	96	Gravel surface, HSG C
988	93	Weighted Average
307		31.07% Pervious Area
681		68.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.6	40	0.0200	1.11		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.5	45	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p100: TO DCB#100

Hydrograph



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Summary for Subcatchment p101: TO DCB#101

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 0.024 af, Depth= 1.98"
 Routed to Reach DCB101 : TO DMH#100

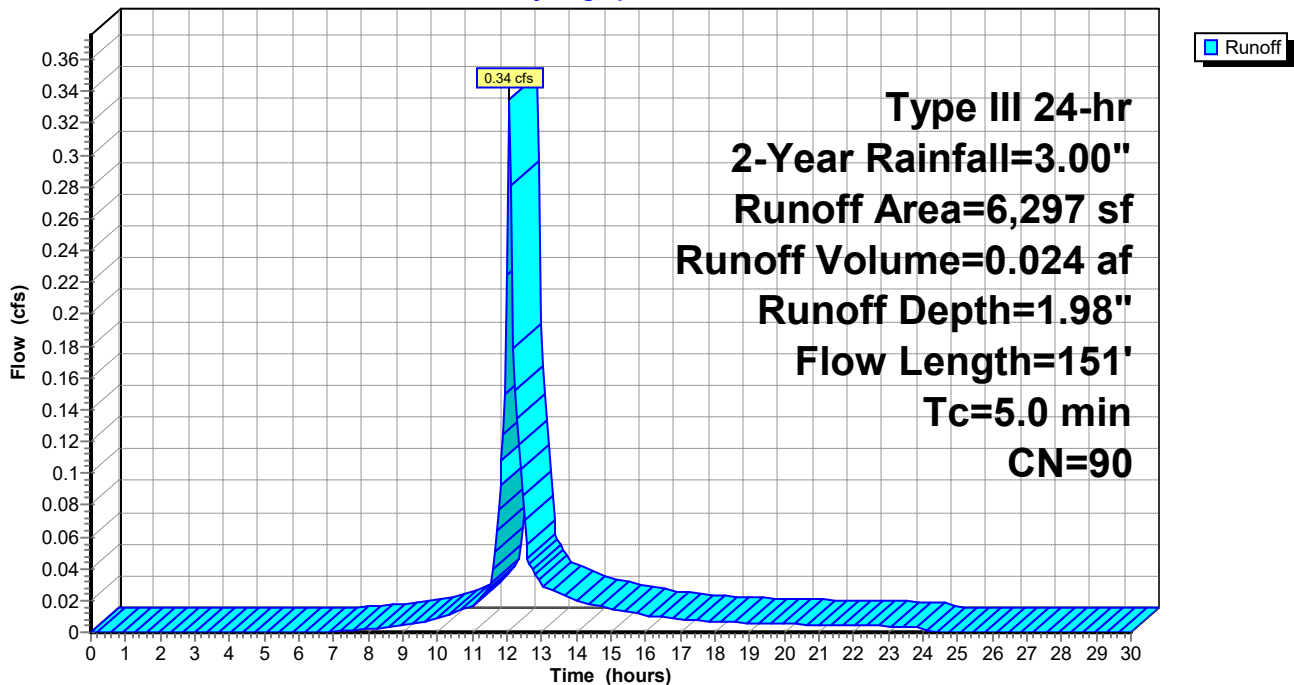
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
2,019	74	>75% Grass cover, Good, HSG C
4,278	98	Paved parking, HSG C
6,297	90	Weighted Average
2,019		32.06% Pervious Area
4,278		67.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.5	45	0.0400	1.50		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.4	101	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.8	151	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p101: TO DCB#101

Hydrograph



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Summary for Subcatchment p2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.90 cfs @ 12.07 hrs, Volume= 0.067 af, Depth= 2.45"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

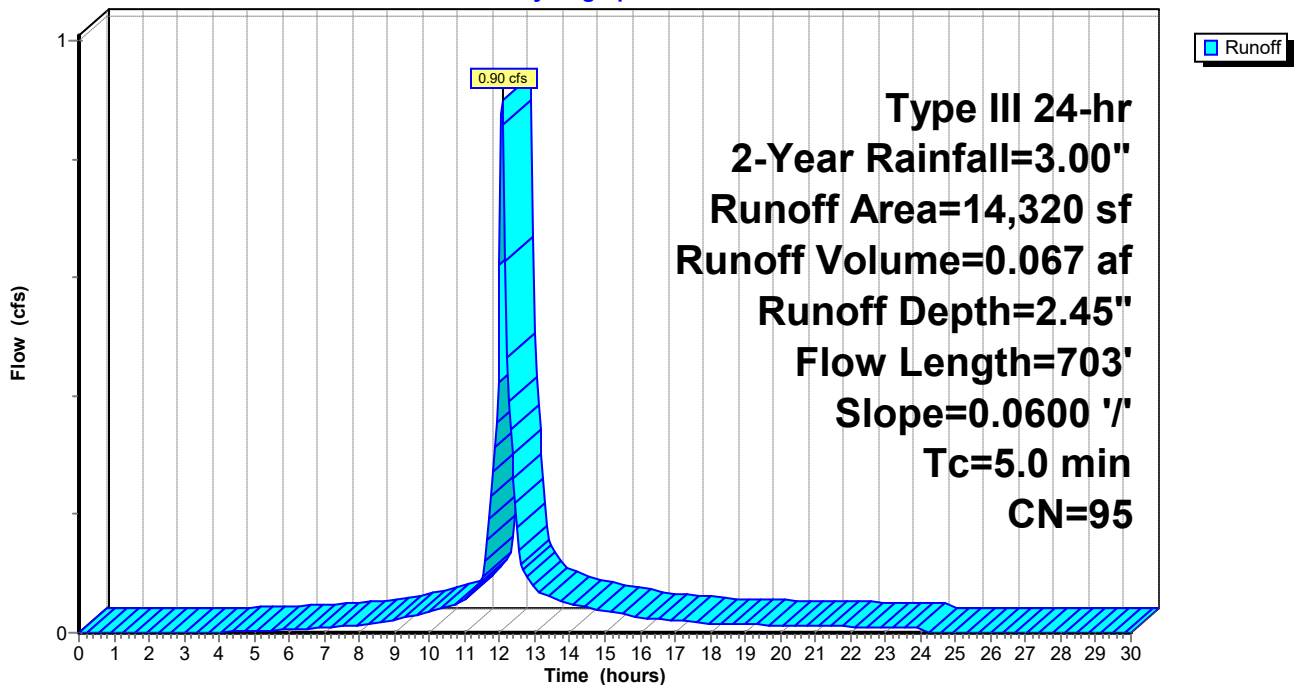
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,221	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,555	98	Paved parking, HSG C
14,320	95	Weighted Average
1,765		12.33% Pervious Area
12,555		87.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p2: TO CATCHBASIN (DP#2)

Hydrograph



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Summary for Subcatchment p3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

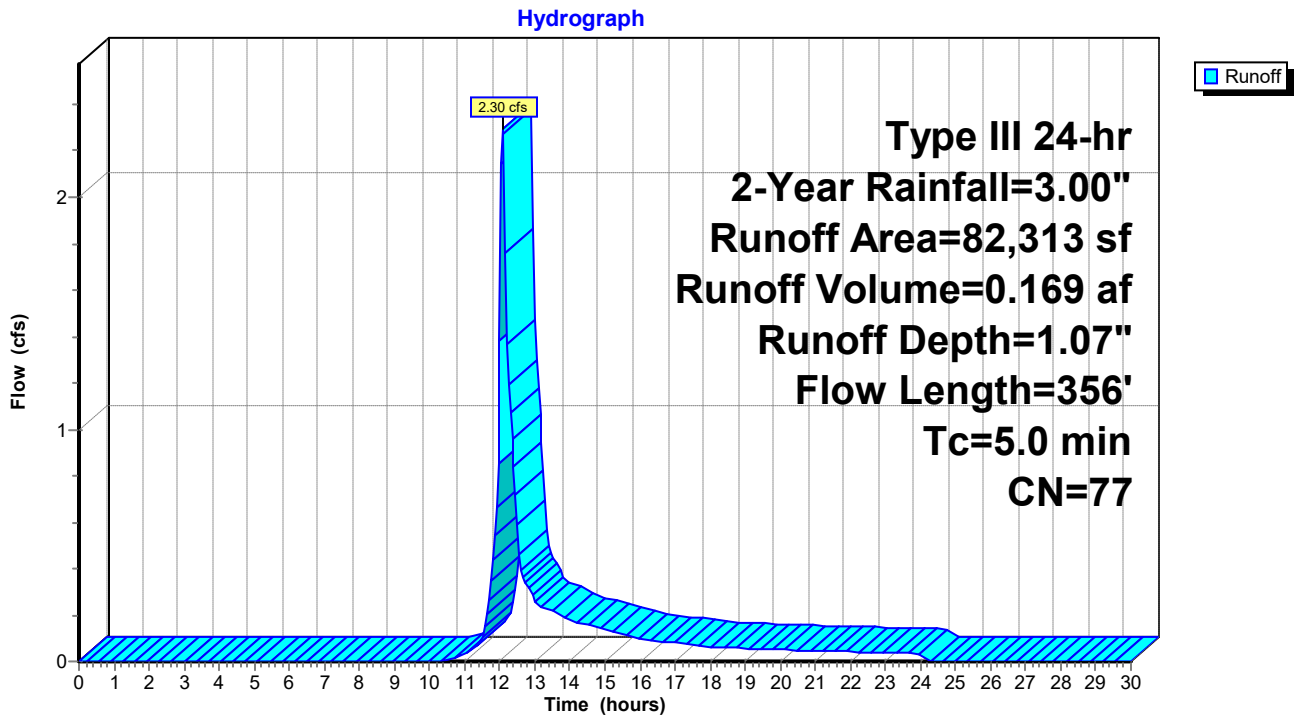
Runoff = 2.30 cfs @ 12.09 hrs, Volume= 0.169 af, Depth= 1.07"
 Routed to Reach DP#3 : LOW POINT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p3: TO LOW POINT (DP#3)



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Type III 24-hr 2-Year Rainfall=3.00"

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Summary for Subcatchment P4: TO DCB-B

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af, Depth= 2.35"
 Routed to Reach DCB-B : TO OUTFALL

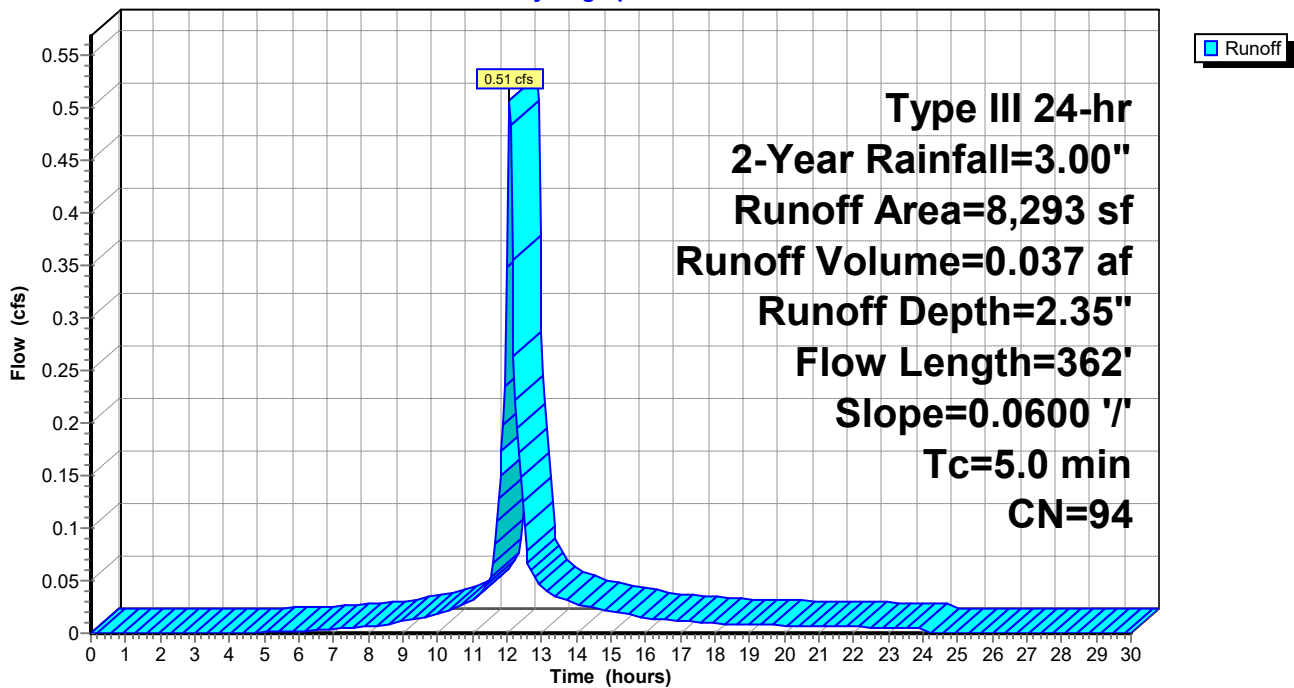
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces $n= 0.011$ $P2= 3.00"$
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved $K_v= 20.3$ fps
1.5	362	Total, Increased to minimum $T_c = 5.0$ min			

Subcatchment P4: TO DCB-B

Hydrograph



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Summary for Subcatchment p5: TO DCB-C

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.012 af, Depth= 2.77"
 Routed to Reach DCB-C : TO OUTFALL

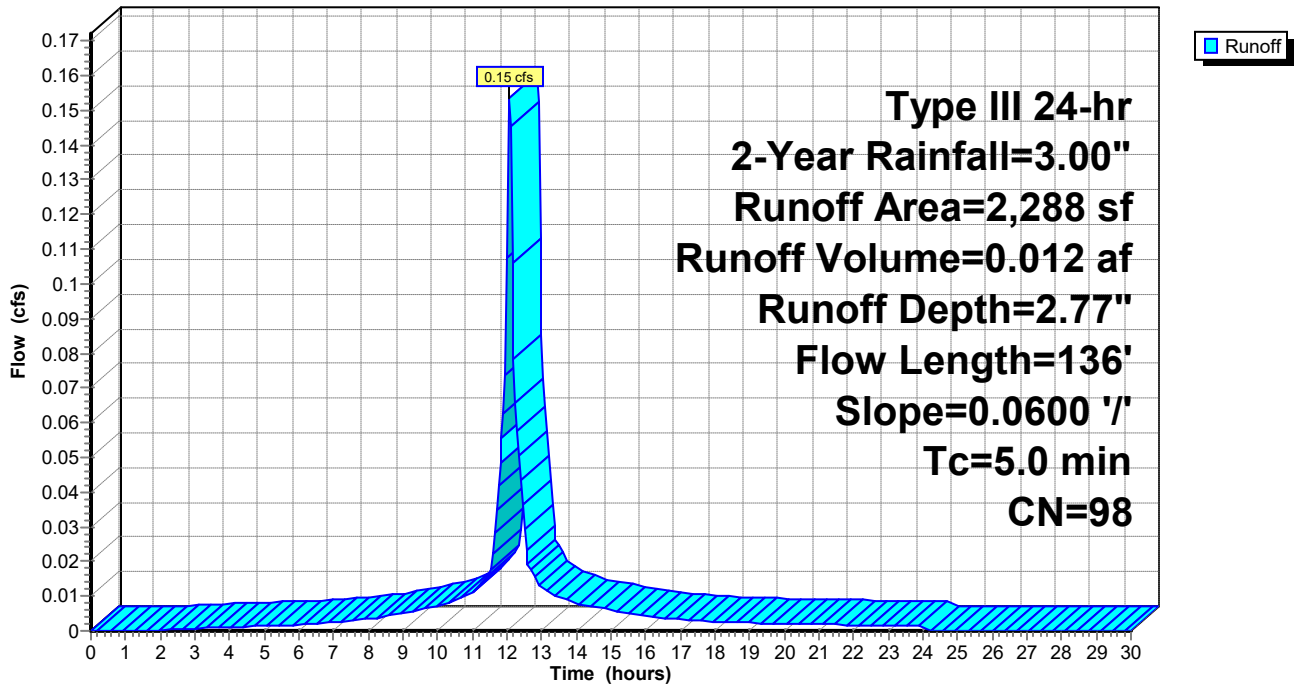
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p5: TO DCB-C

Hydrograph



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Summary for Subcatchment p6: TO DCB-D

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af, Depth= 2.77"
 Routed to Reach DCB-D : TO DCB-C

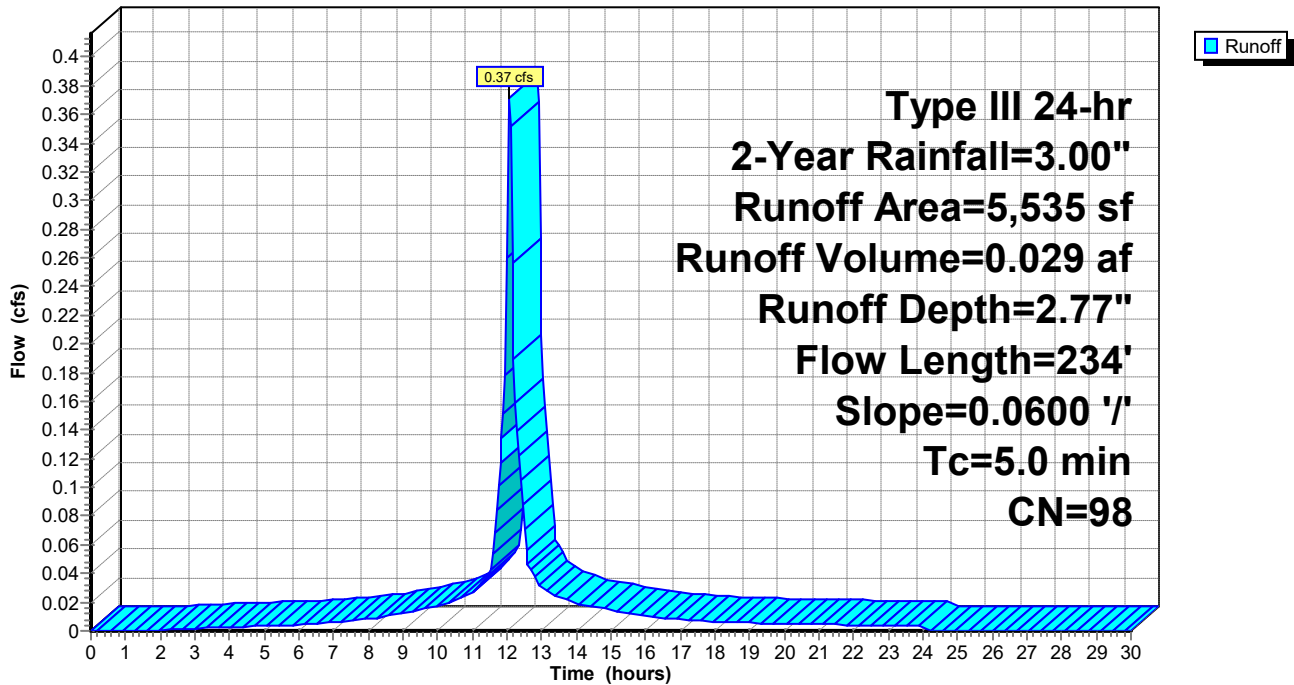
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p6: TO DCB-D

Hydrograph



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Type III 24-hr 2-Year Rainfall=3.00"

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Summary for Subcatchment p7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.22 cfs @ 12.08 hrs, Volume= 0.015 af, Depth= 1.82"
 Routed to Reach DCB-E : TO DCB-D

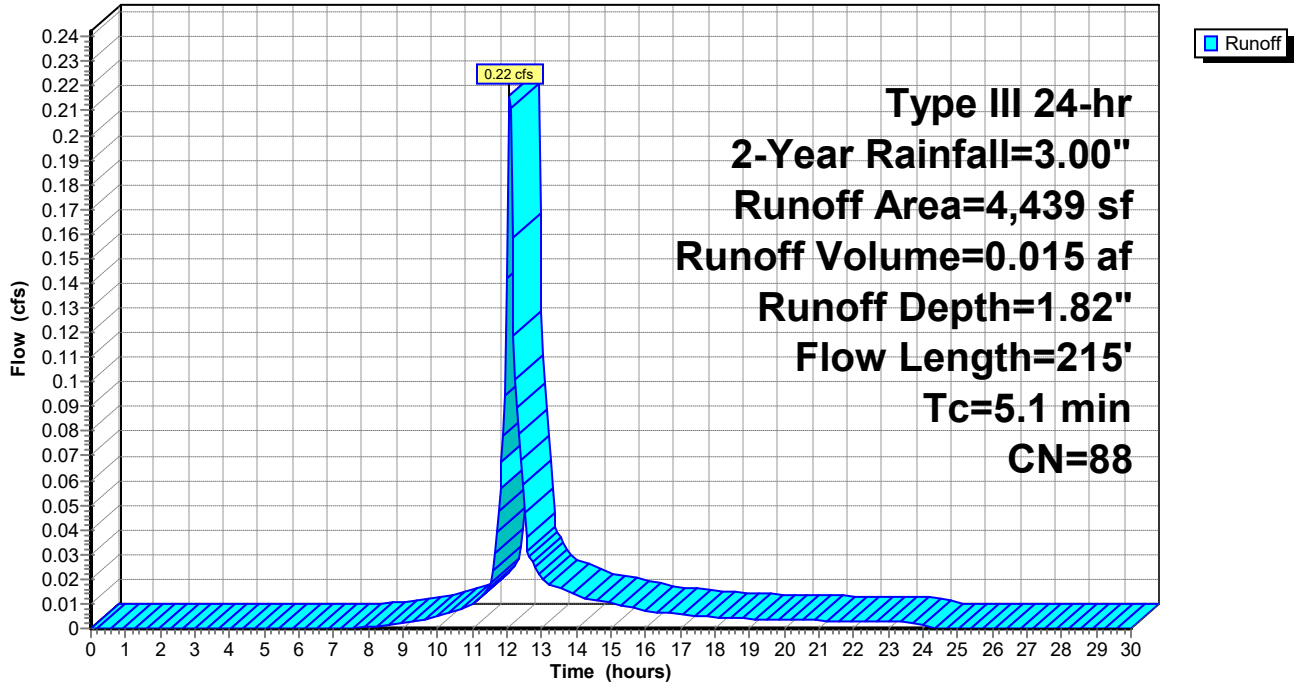
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,576	70	Woods, Good, HSG C
2,846	98	Paved parking, HSG C
17	74	>75% Grass cover, Good, HSG C
4,439	88	Weighted Average
1,593		35.89% Pervious Area
2,846		64.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment p7: TO DCB-E

Hydrograph



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Summary for Reach DCB-B: TO OUTFALL

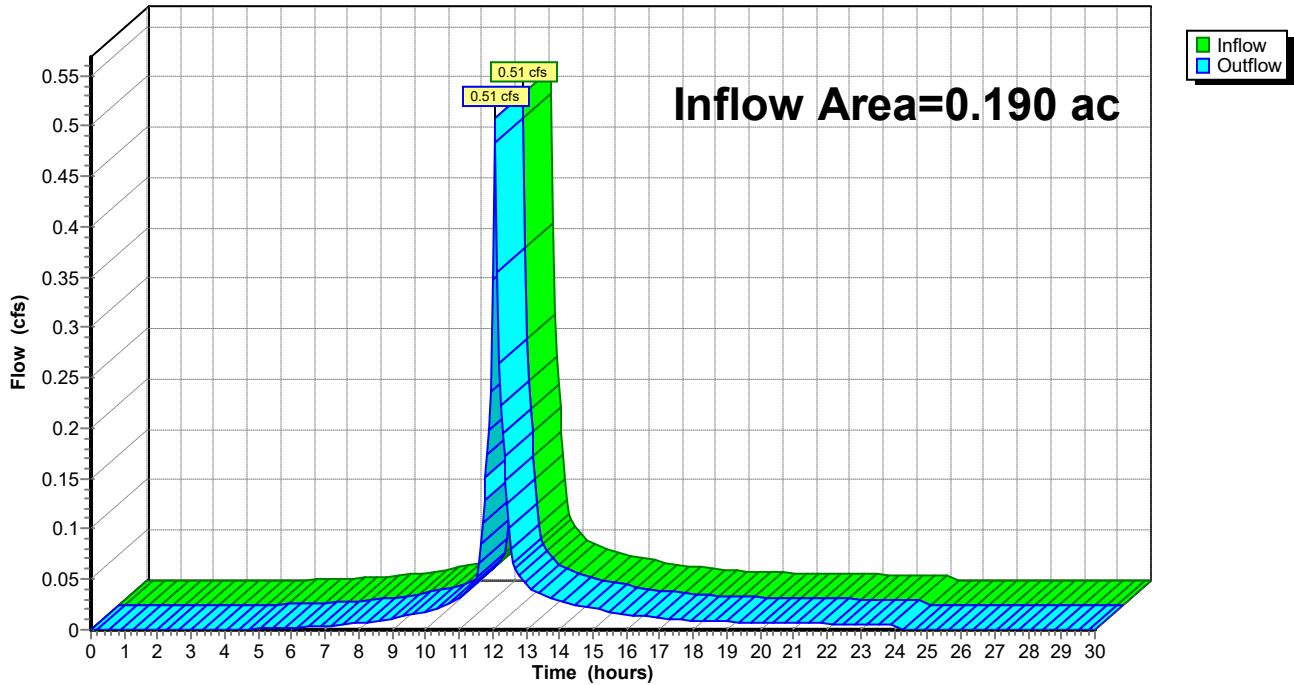
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af
Outflow = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



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Type III 24-hr 2-Year Rainfall=3.00"

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Summary for Reach DCB-C: TO OUTFALL

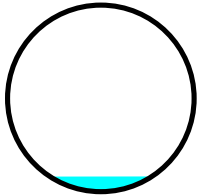
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 2.42" for 2-Year event
Inflow = 0.73 cfs @ 12.08 hrs, Volume= 0.057 af
Outflow = 0.73 cfs @ 12.09 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.56 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.55 fps, Avg. Travel Time= 0.3 min

Peak Storage= 5 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 0.82'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



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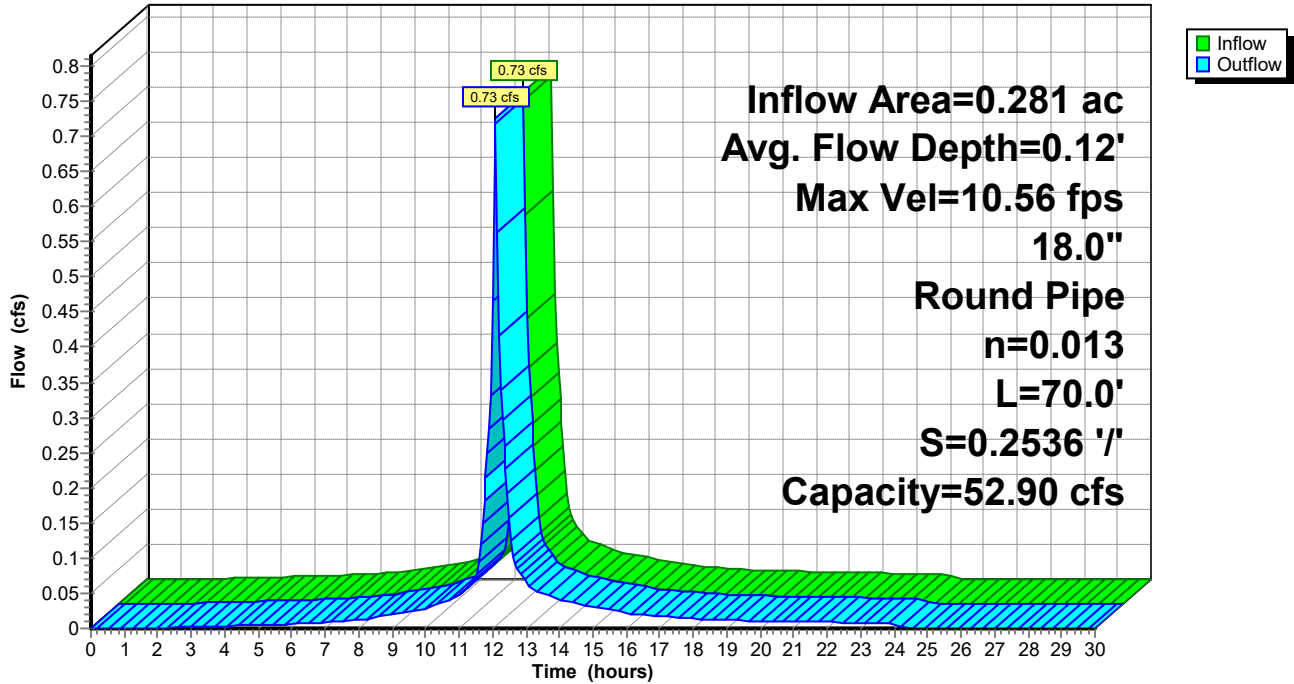
Type III 24-hr 2-Year Rainfall=3.00"

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Reach DCB-C: TO OUTFALL

Hydrograph



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Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

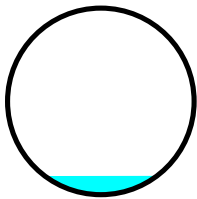
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.05' @ 12.10 hrs

Inflow Area = 0.229 ac, 84.03% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.58 cfs @ 12.08 hrs, Volume= 0.045 af
Outflow = 0.58 cfs @ 12.09 hrs, Volume= 0.045 af, Atten= 1%, Lag= 0.6 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.25 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.06 fps, Avg. Travel Time= 0.9 min

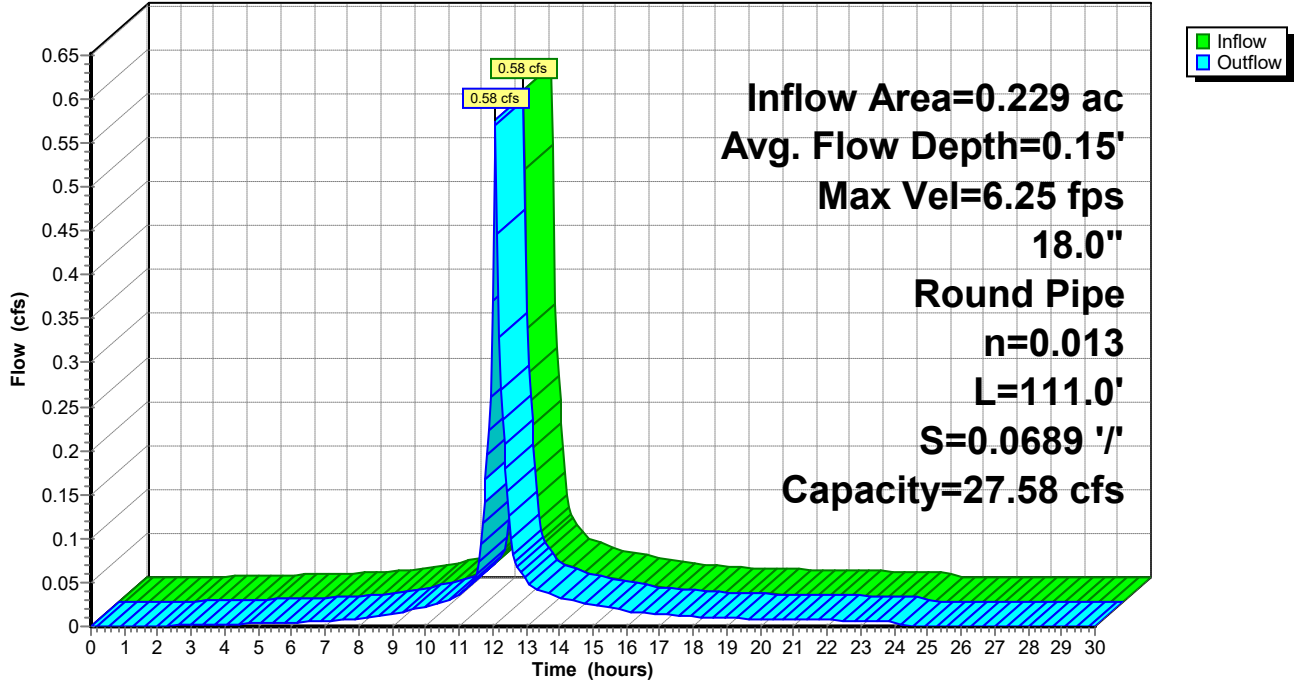
Peak Storage= 10 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.90'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



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Summary for Reach DCB-E: TO DCB-D

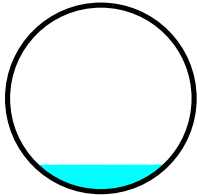
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.102 ac, 64.11% Impervious, Inflow Depth = 1.82" for 2-Year event
Inflow = 0.22 cfs @ 12.08 hrs, Volume= 0.015 af
Outflow = 0.22 cfs @ 12.08 hrs, Volume= 0.015 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.07 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.07 fps, Avg. Travel Time= 0.6 min

Peak Storage= 3 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.70'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/'
Inlet Invert= 140.85', Outlet Invert= 140.20'



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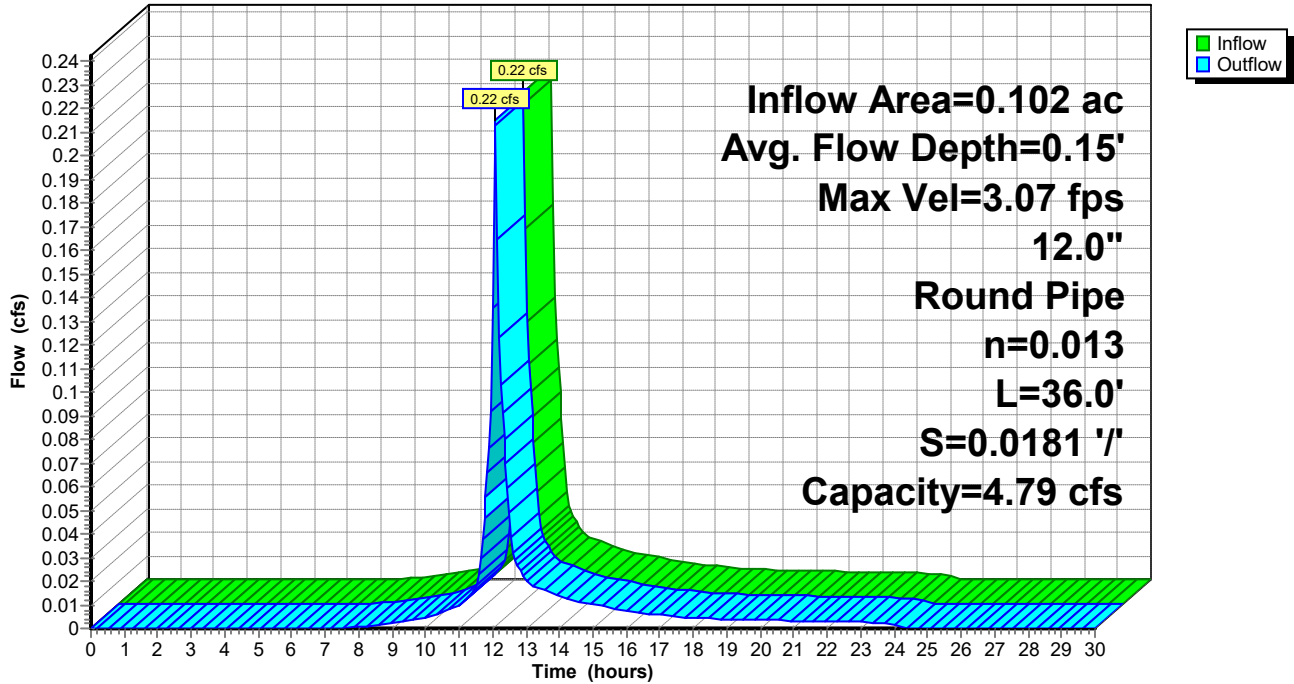
Type III 24-hr 2-Year Rainfall=3.00"

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Reach DCB-E: TO DCB-D

Hydrograph



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Summary for Reach DCB100: TO DMH#100

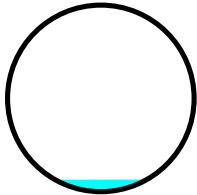
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.023 ac, 68.93% Impervious, Inflow Depth = 2.25" for 2-Year event
Inflow = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af
Outflow = 0.06 cfs @ 12.10 hrs, Volume= 0.004 af, Atten= 3%, Lag= 1.6 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.63 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 2.3 min

Peak Storage= 3 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 0.50'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.71 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 127.0' Slope= 0.0354 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'



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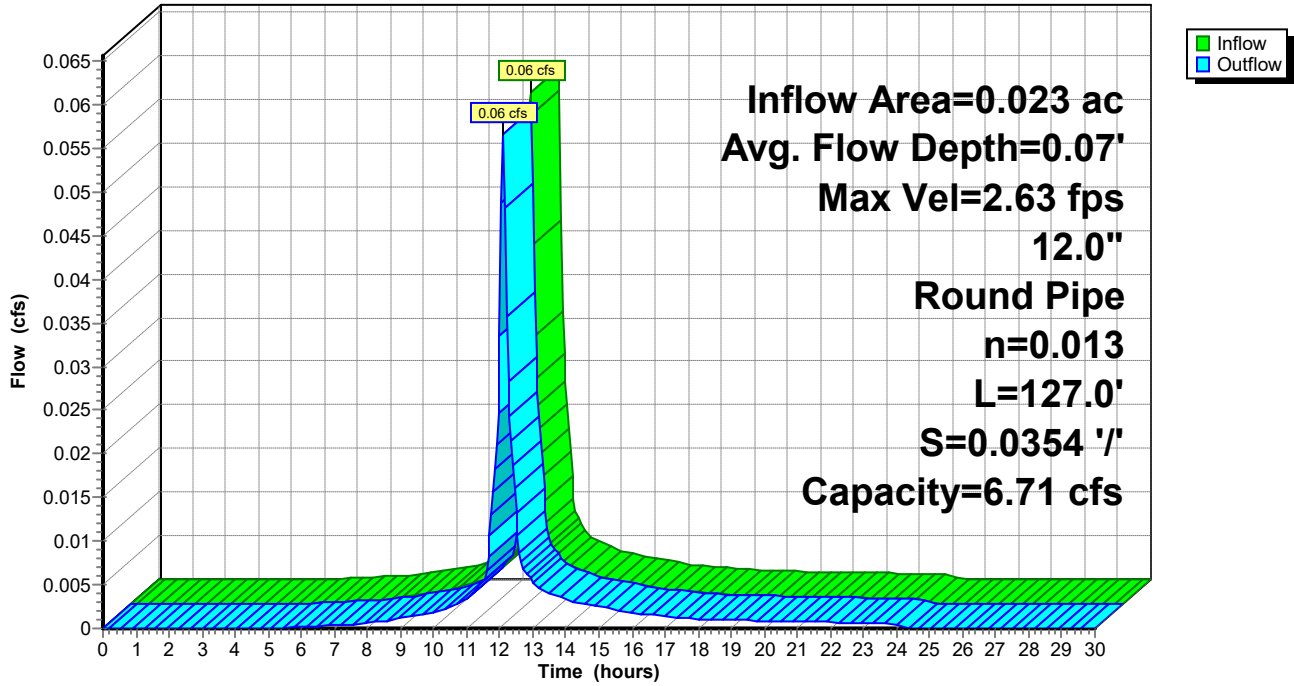
Type III 24-hr 2-Year Rainfall=3.00"

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Reach DCB100: TO DMH#100

Hydrograph



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Summary for Reach DCB101: TO DMH#100

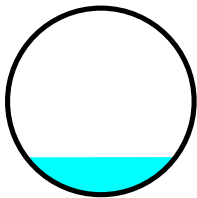
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.145 ac, 67.94% Impervious, Inflow Depth = 1.98" for 2-Year event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 0.024 af
Outflow = 0.33 cfs @ 12.08 hrs, Volume= 0.024 af, Atten= 1%, Lag= 0.5 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.93 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 0.6 min

Peak Storage= 4 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 0.80'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0111 '/'
Inlet Invert= 136.40', Outlet Invert= 136.00'



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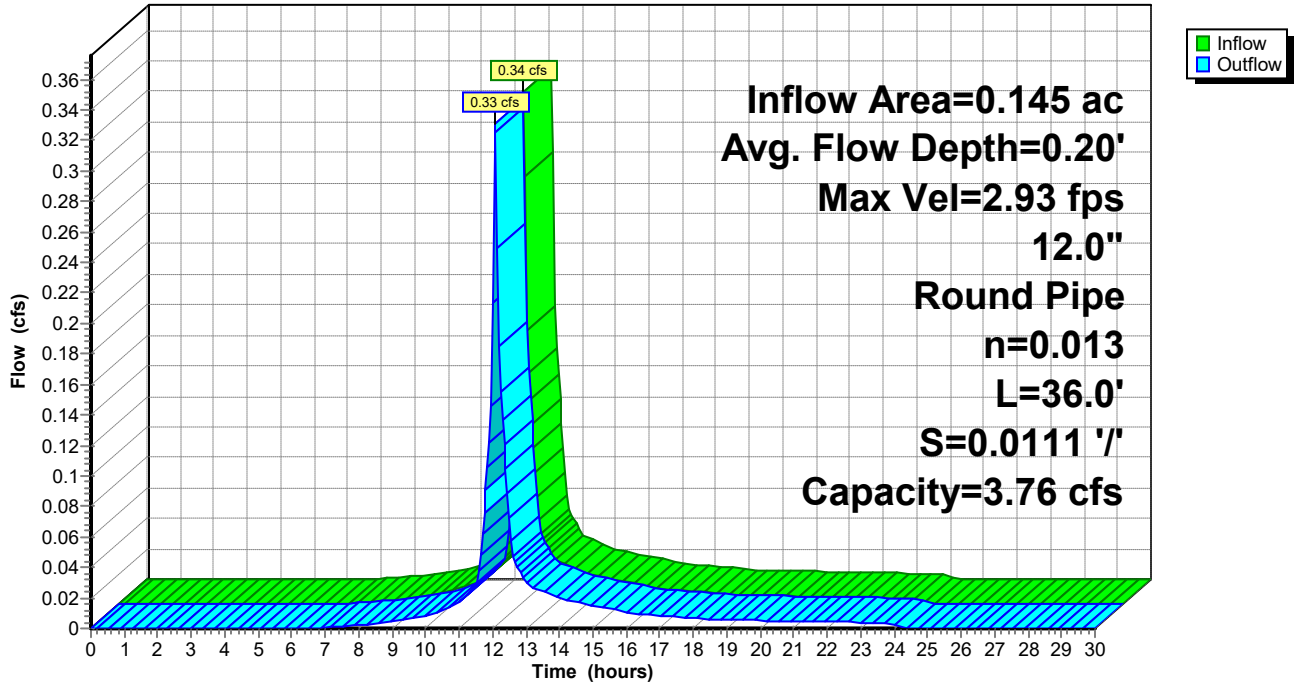
Type III 24-hr 2-Year Rainfall=3.00"

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Reach DCB101: TO DMH#100

Hydrograph



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Summary for Reach DMH100: TO UGS#1A

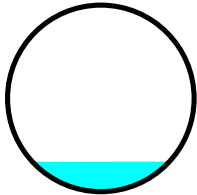
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 2.02" for 2-Year event
Inflow = 0.39 cfs @ 12.08 hrs, Volume= 0.028 af
Outflow = 0.39 cfs @ 12.09 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.1 min
Routed to Reach UGS1A : TO UGS#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.72 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.57 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 0.73'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.0' Slope= 0.0375 '/'
Inlet Invert= 135.80', Outlet Invert= 135.50'



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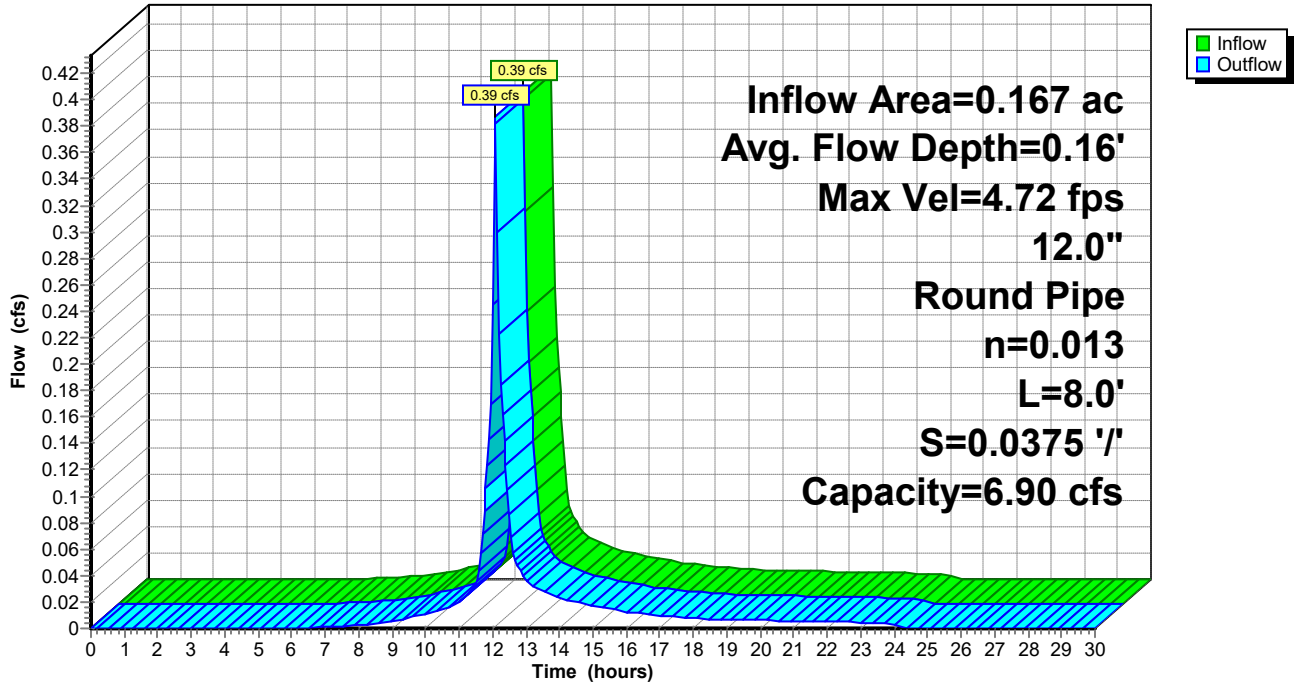
Type III 24-hr 2-Year Rainfall=3.00"

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Reach DMH100: TO UGS#1A

Hydrograph



Summary for Reach DP#1: WETLAND

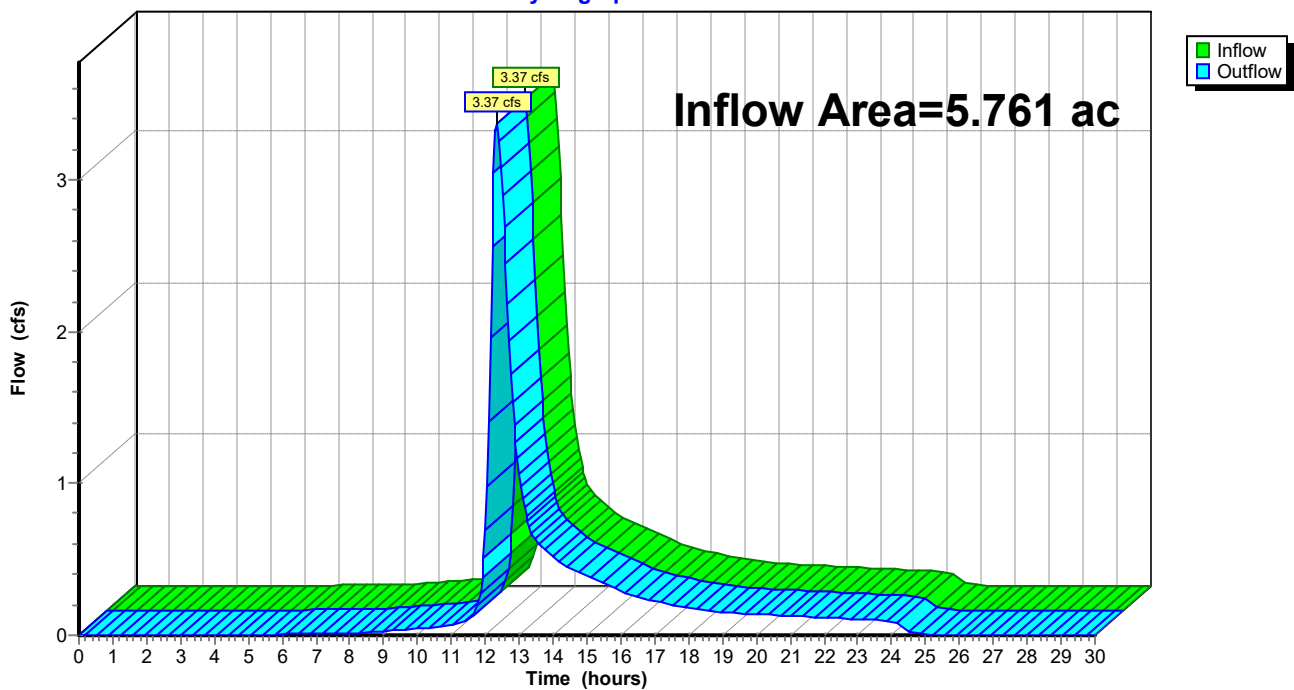
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.761 ac, 10.66% Impervious, Inflow Depth = 0.89" for 2-Year event
Inflow = 3.37 cfs @ 12.34 hrs, Volume= 0.427 af
Outflow = 3.37 cfs @ 12.34 hrs, Volume= 0.427 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#1: WETLAND

Hydrograph



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

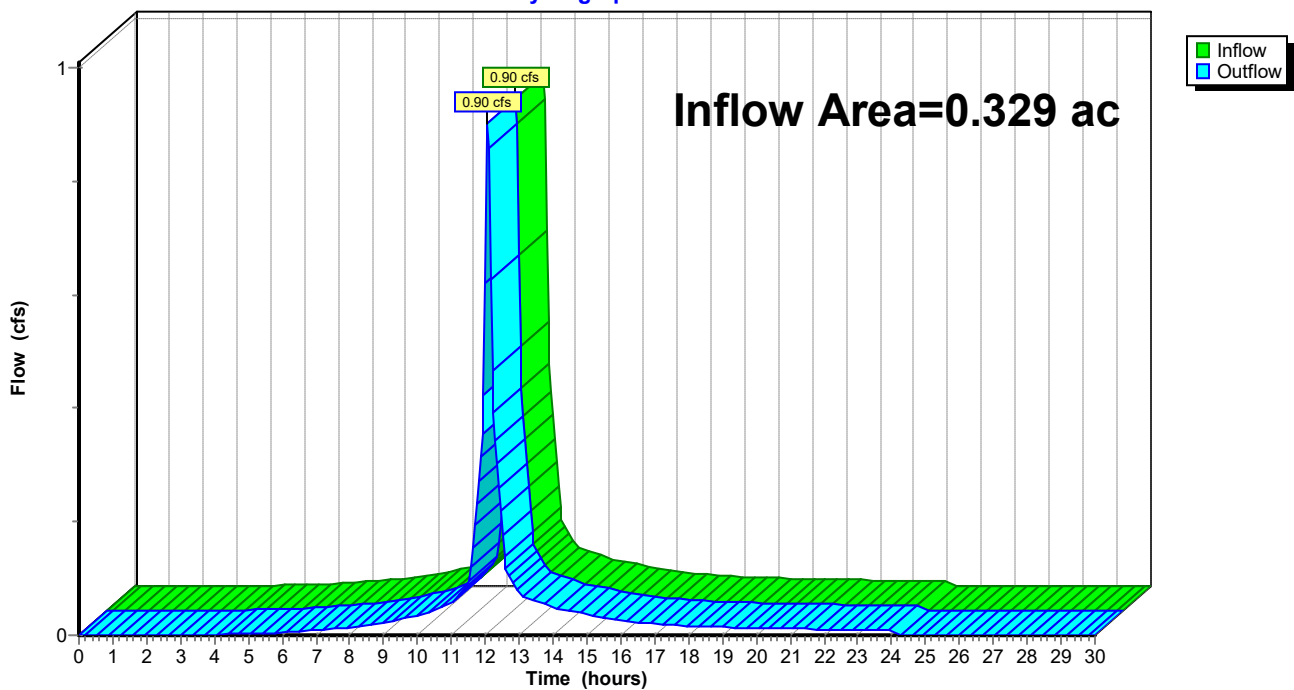
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.67% Impervious, Inflow Depth = 2.45" for 2-Year event
Inflow = 0.90 cfs @ 12.07 hrs, Volume= 0.067 af
Outflow = 0.90 cfs @ 12.07 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

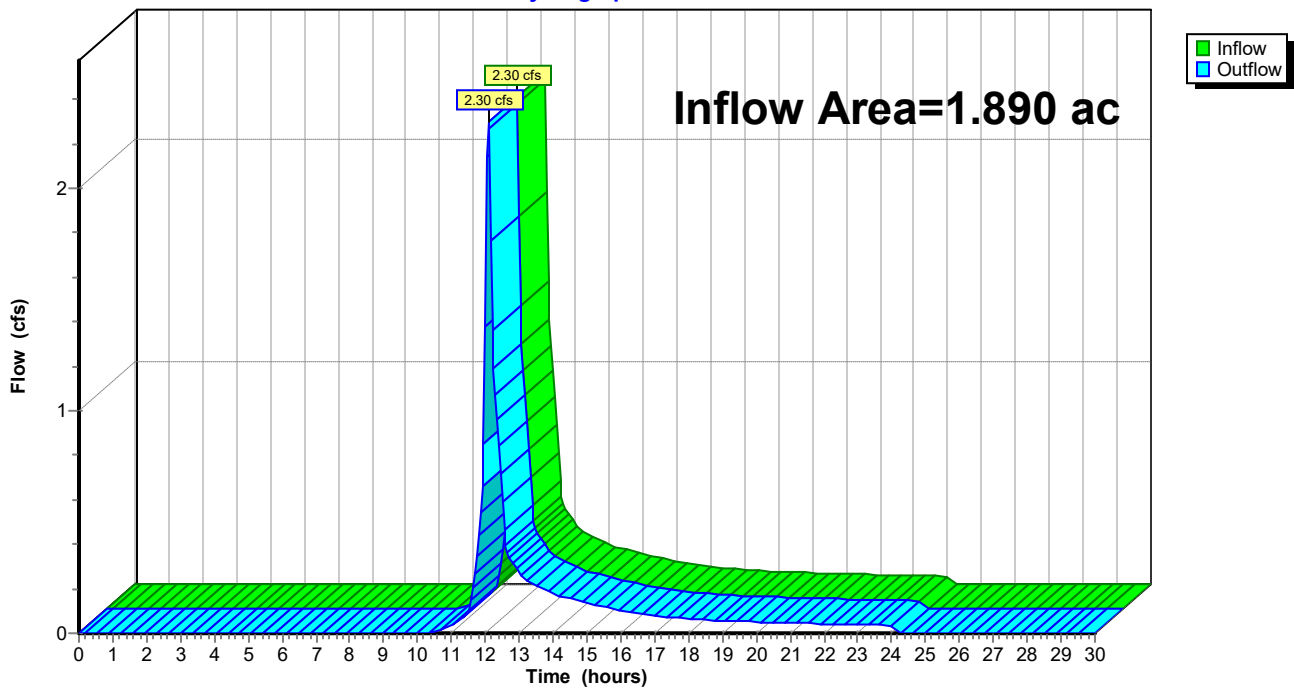
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 1.07" for 2-Year event
Inflow = 2.30 cfs @ 12.09 hrs, Volume= 0.169 af
Outflow = 2.30 cfs @ 12.09 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



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Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.51 cfs @ 12.07 hrs, Volume= 0.037 af
Outflow = 0.49 cfs @ 12.10 hrs, Volume= 0.037 af, Atten= 4%, Lag= 1.9 min
Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.75 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.30 fps, Avg. Travel Time= 2.6 min

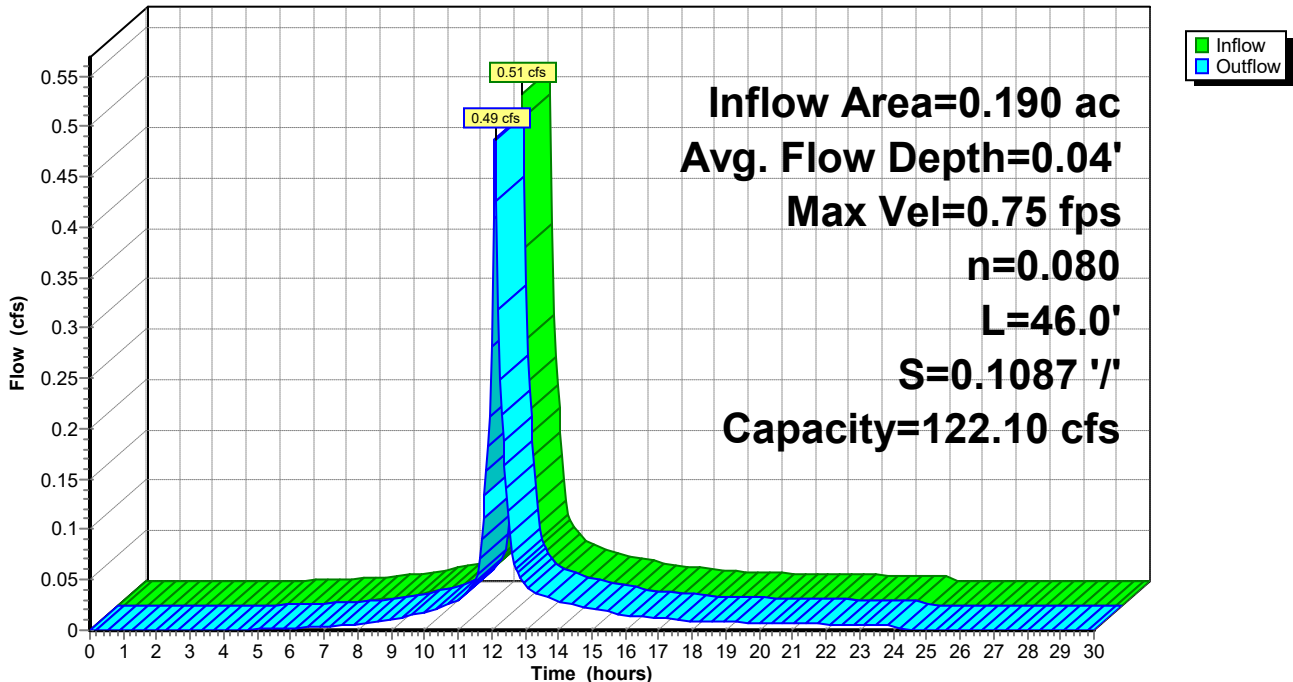
Peak Storage= 31 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 15.87'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 '/' Top Width= 35.00'
Length= 46.0' Slope= 0.1087 '/'
Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



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Summary for Reach OL-2: OVERLAND

[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.49 cfs @ 12.10 hrs, Volume= 0.037 af
Outflow = 0.42 cfs @ 12.25 hrs, Volume= 0.037 af, Atten= 14%, Lag= 8.6 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.65 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 13.3 min

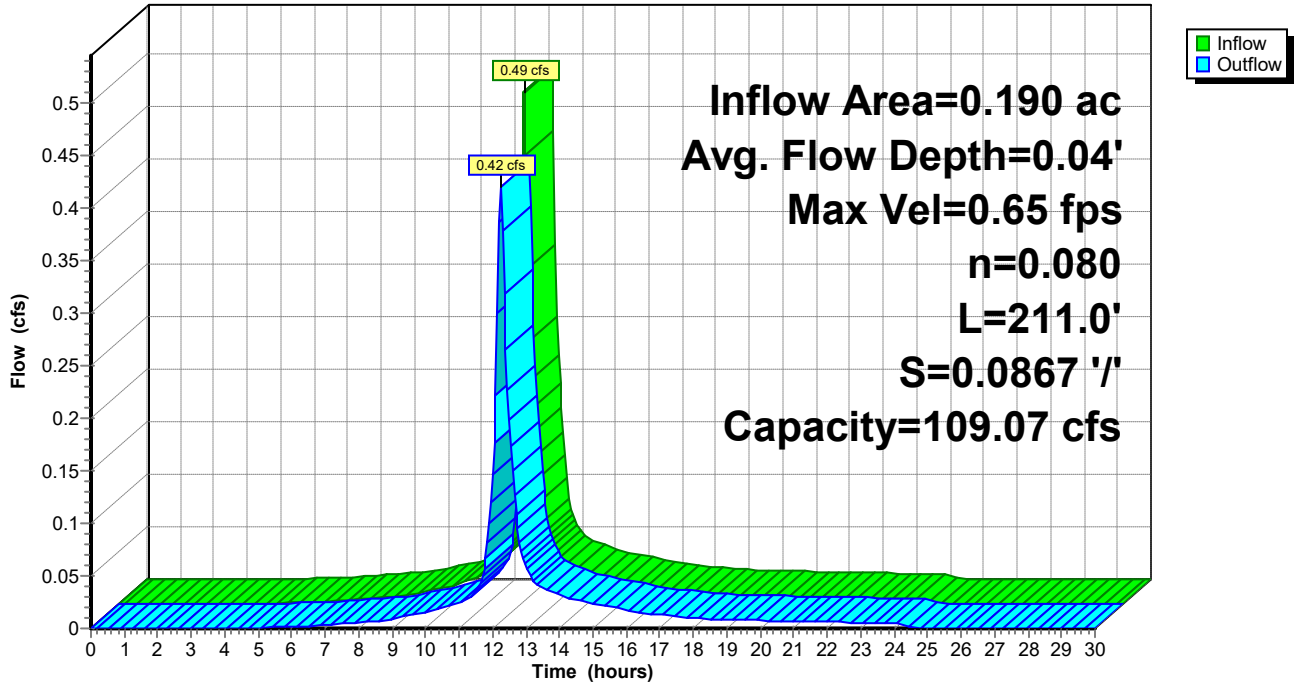
Peak Storage= 138 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 15.84'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



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Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.02' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.42 cfs @ 12.25 hrs, Volume= 0.037 af
Outflow = 0.41 cfs @ 12.27 hrs, Volume= 0.037 af, Atten= 2%, Lag= 1.3 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.47 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 2.3 min

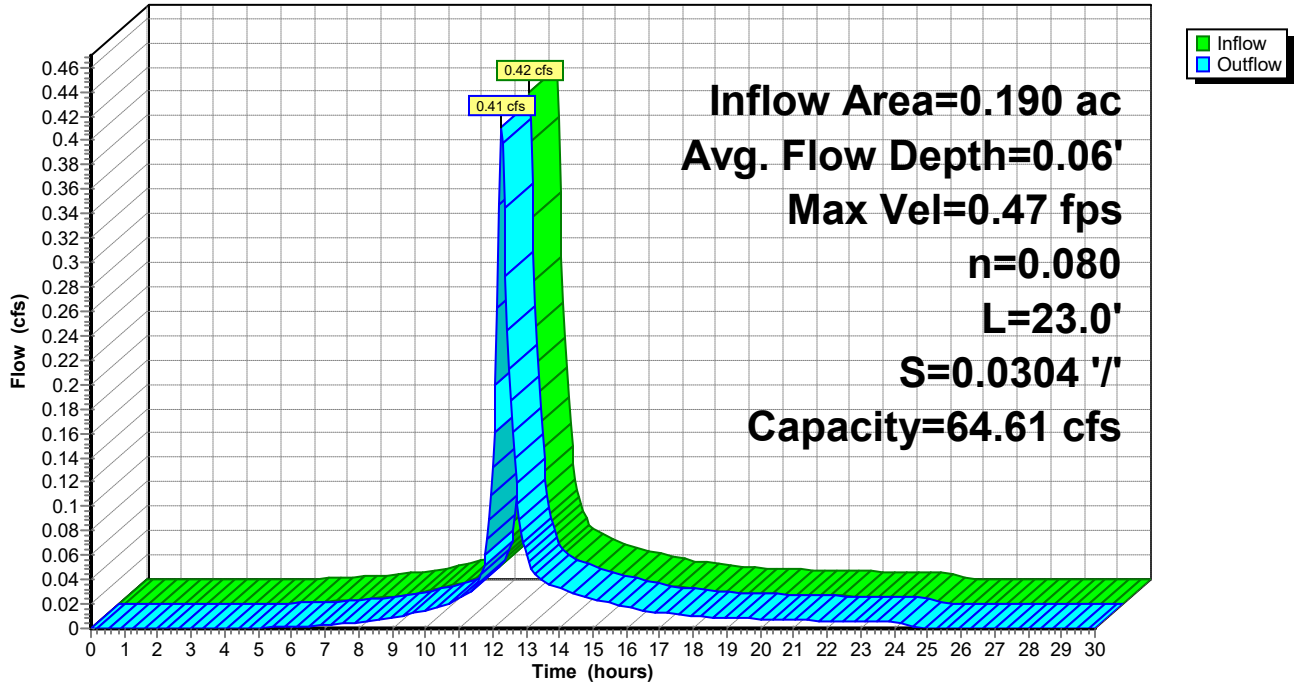
Peak Storage= 20 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.14'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



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Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.01' @ 12.55 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 0.41 cfs @ 12.27 hrs, Volume= 0.037 af
Outflow = 0.33 cfs @ 12.56 hrs, Volume= 0.037 af, Atten= 21%, Lag= 17.4 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 31.5 min

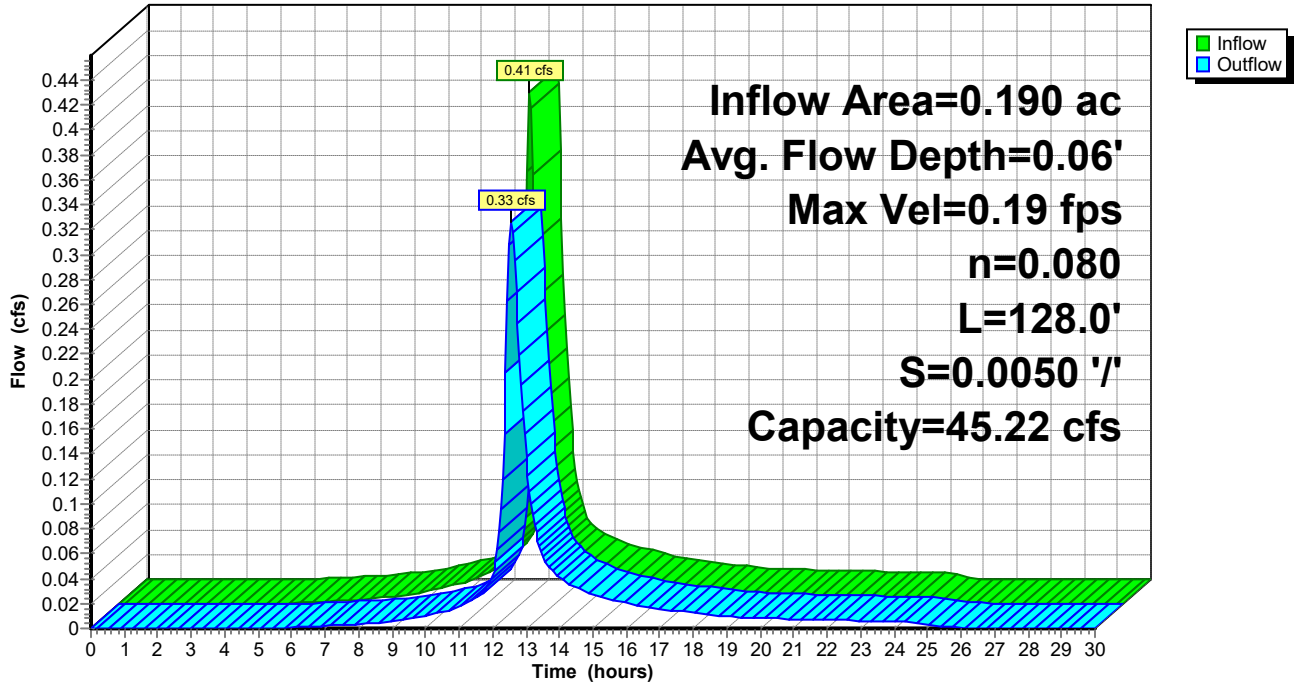
Peak Storage= 220 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 31.12'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 ' '
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



Summary for Reach OL-5: OVERLAND

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 2.27" for 2-Year event
 Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.085 af
 Outflow = 0.79 cfs @ 12.23 hrs, Volume= 0.085 af, Atten= 12%, Lag= 8.5 min
 Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.88 fps, Min. Travel Time= 5.4 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 15.5 min

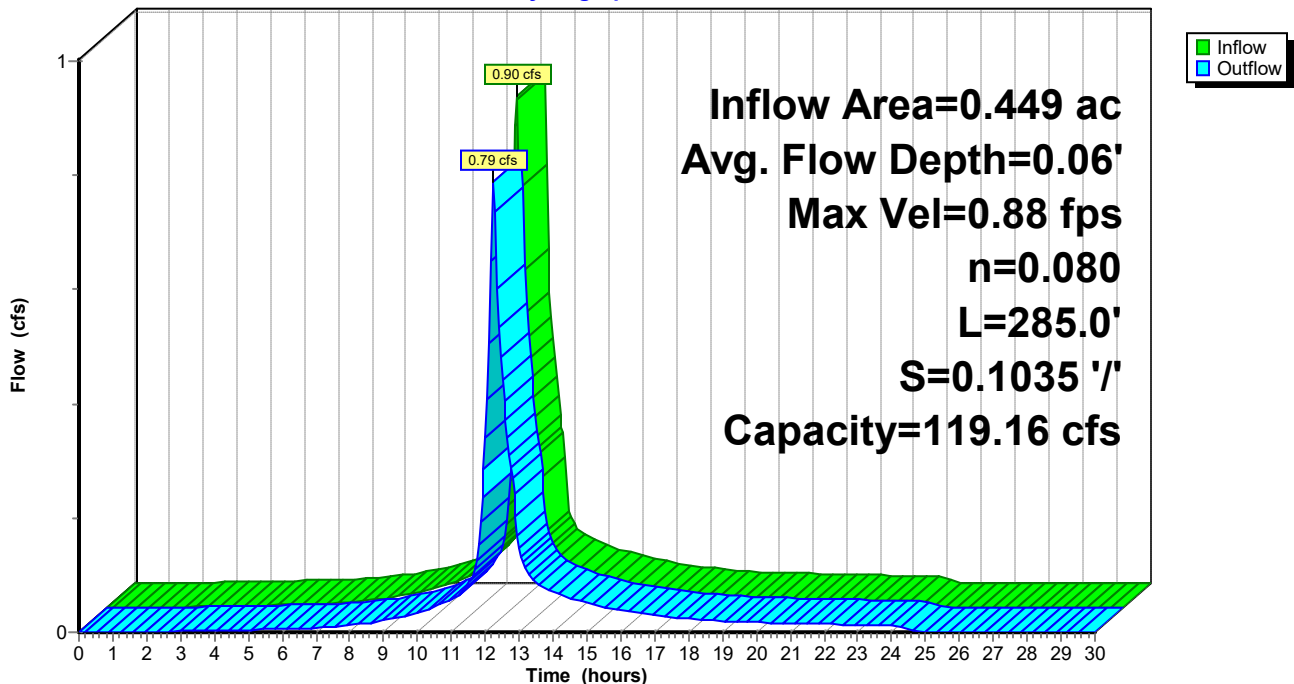
Peak Storage= 259 cf @ 12.14 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.17'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 285.0' Slope= 0.1035 ' / '
 Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



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Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.09' @ 12.30 hrs

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 2.27" for 2-Year event
Inflow = 0.79 cfs @ 12.23 hrs, Volume= 0.085 af
Outflow = 0.74 cfs @ 12.34 hrs, Volume= 0.085 af, Atten= 6%, Lag= 7.0 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.33 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 14.6 min

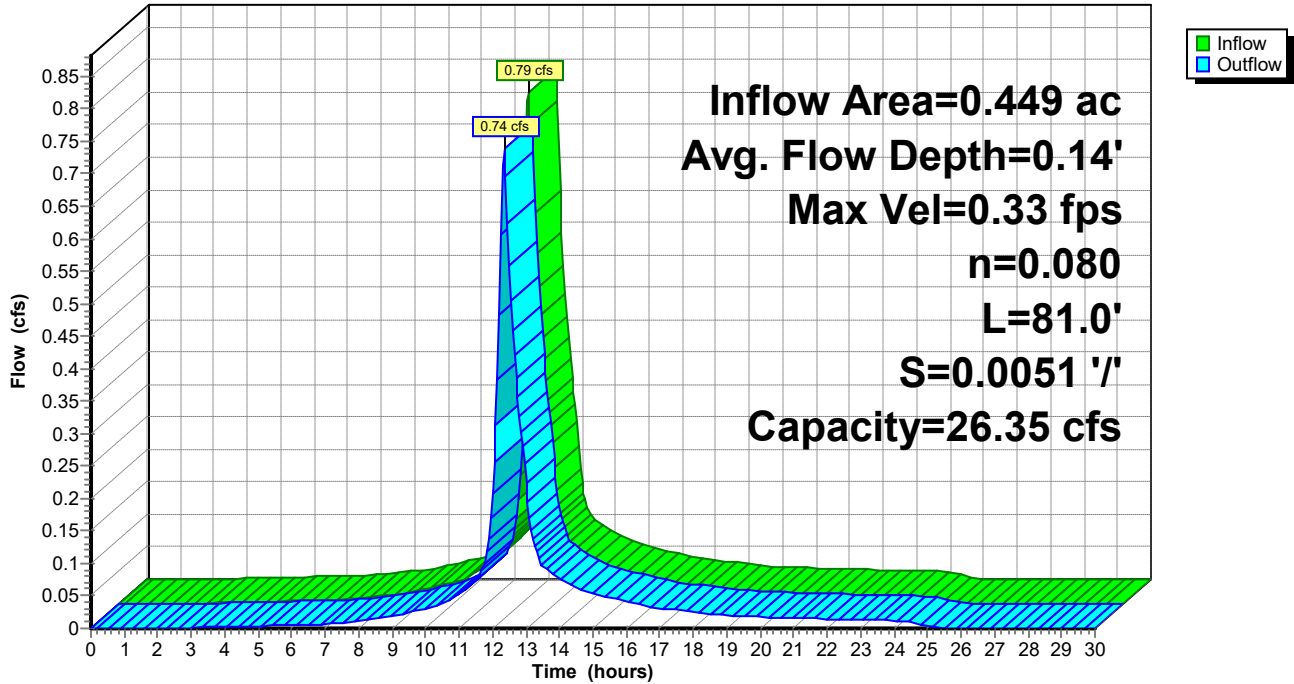
Peak Storage= 183 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 17.75'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 ' '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



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Summary for Reach OUTLET: TO DP#1

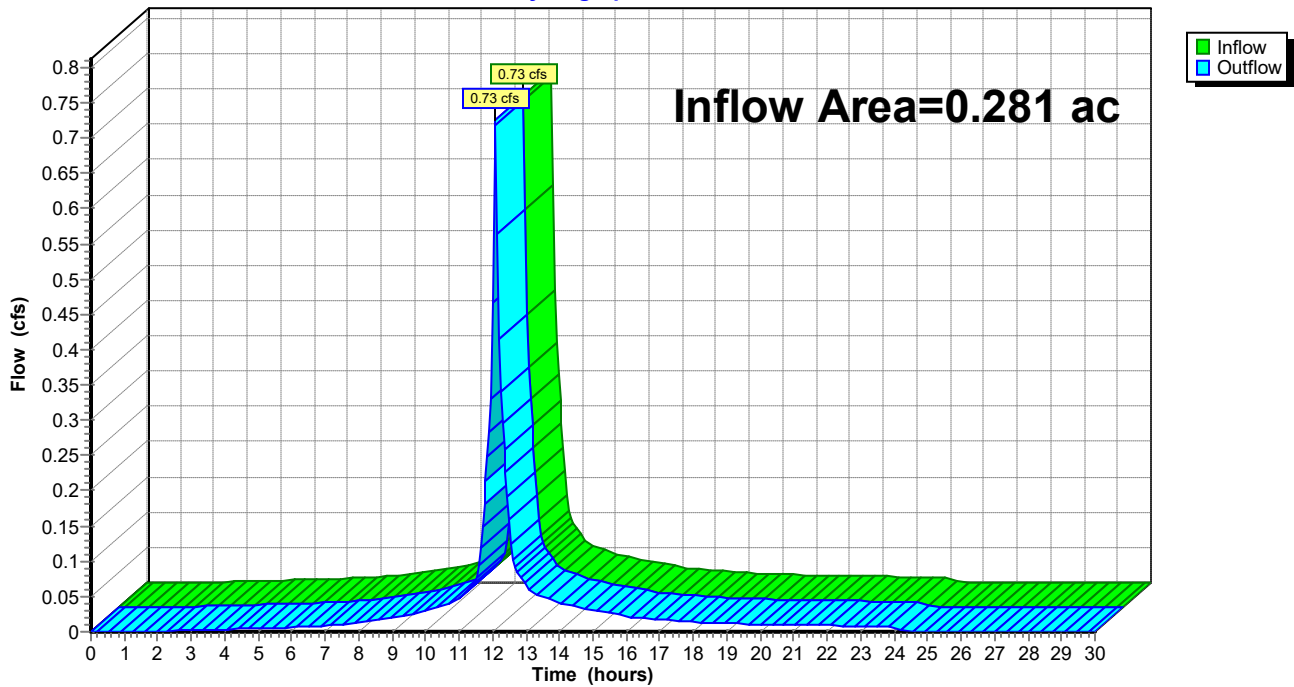
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 2.42" for 2-Year event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 0.057 af
Outflow = 0.73 cfs @ 12.09 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



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Summary for Reach UGS1A: TO UGS#1

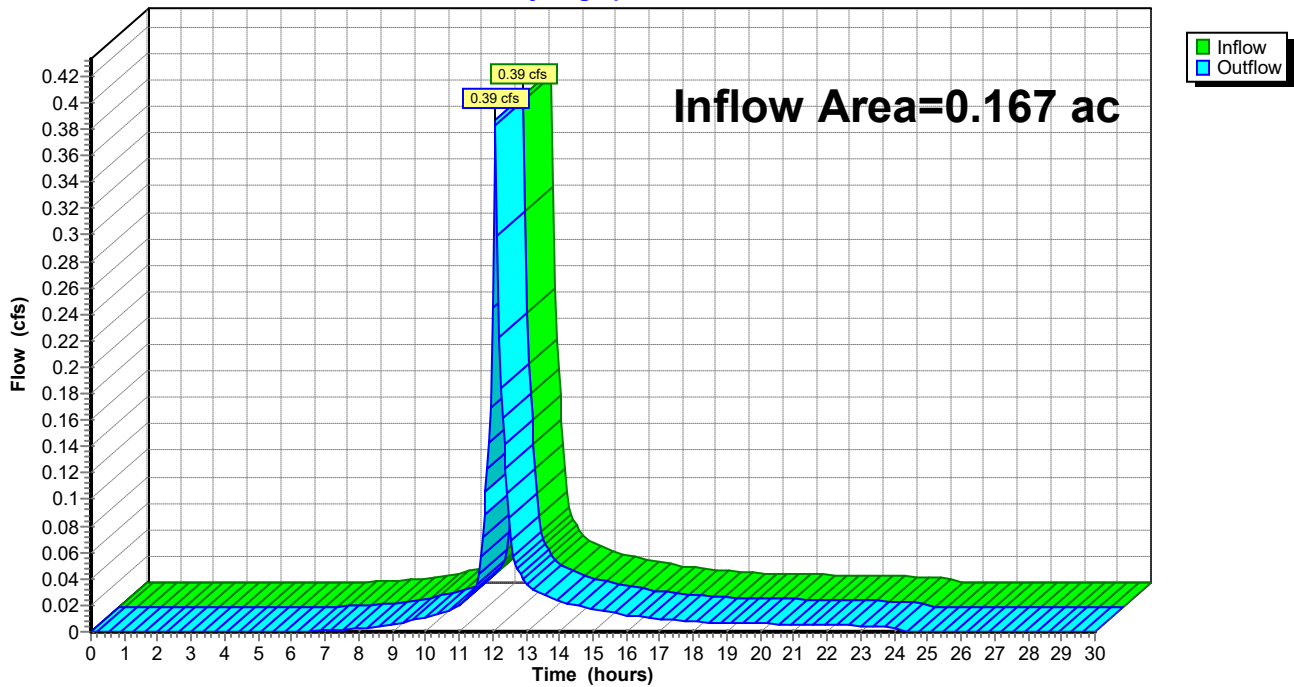
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 2.02" for 2-Year event
Inflow = 0.39 cfs @ 12.09 hrs, Volume= 0.028 af
Outflow = 0.39 cfs @ 12.09 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Routed to Pond UGS1 : TO UGS1B

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach UGS1A: TO UGS#1

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Summary for Reach UGS1B: TO FE#1

[52] Hint: Inlet/Outlet conditions not evaluated

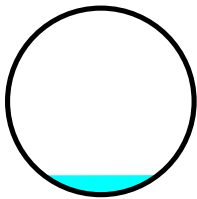
[78] Warning: Submerged Pond UGS1 Primary device # 1 by 0.10'

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 2.02" for 2-Year event
Inflow = 0.17 cfs @ 12.00 hrs, Volume= 0.028 af
Outflow = 0.17 cfs @ 12.05 hrs, Volume= 0.028 af, Atten= 0%, Lag= 3.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.92 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.68 fps, Avg. Travel Time= 0.3 min

Peak Storage= 1 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 0.61'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.48 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 34.0' Slope= 0.0441 '/'
Inlet Invert= 131.50', Outlet Invert= 130.00'



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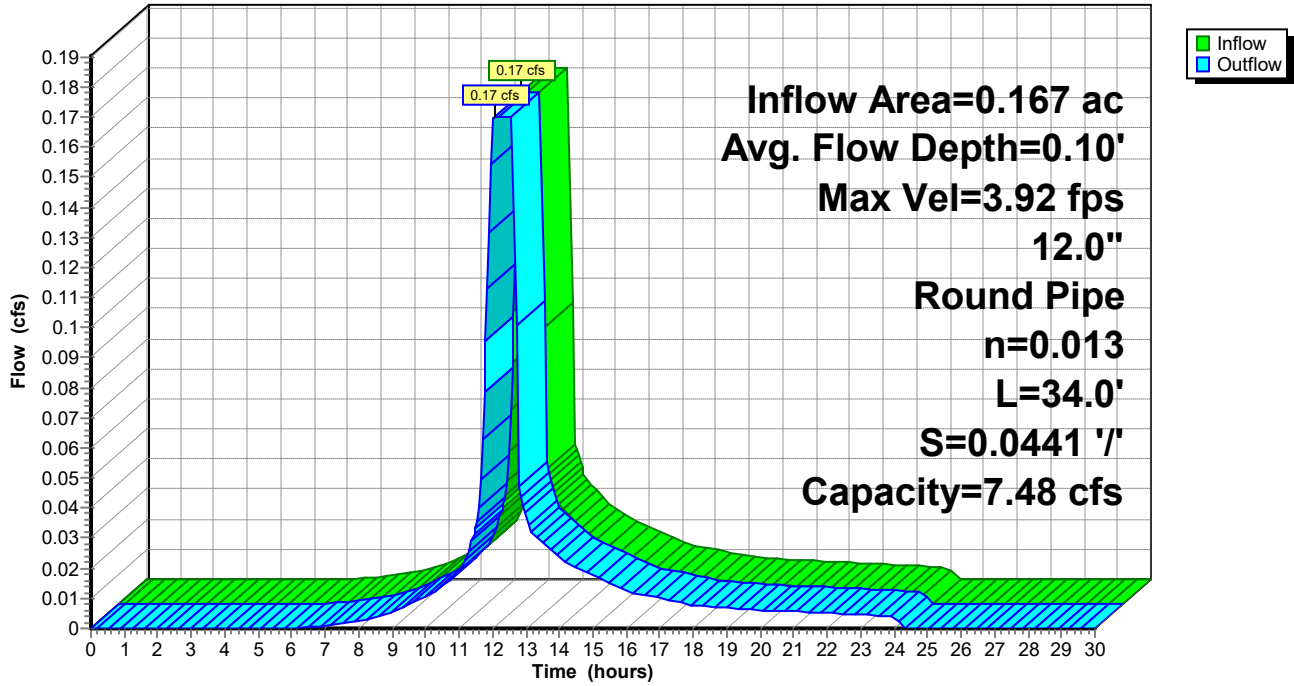
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Reach UGS1B: TO FE#1

Hydrograph



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Summary for Pond UGS1: TO UGS1B

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 2.02" for 2-Year event
 Inflow = 0.39 cfs @ 12.09 hrs, Volume= 0.028 af
 Outflow = 0.17 cfs @ 12.00 hrs, Volume= 0.028 af, Atten= 56%, Lag= 0.0 min
 Primary = 0.17 cfs @ 12.00 hrs, Volume= 0.028 af
 Routed to Reach UGS1B : TO FE#1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 134.09' @ 12.28 hrs Surf.Area= 0.010 ac Storage= 0.003 af

Plug-Flow detention time= 4.2 min calculated for 0.028 af (100% of inflow)
 Center-of-Mass det. time= 4.2 min (811.5 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.015 af	20.00'W x 14.00'L x 6.00'H Prismatic 0.039 af Overall x 40.0% Voids
#2	134.00'	0.013 af	Shea Leaching Chamber 4x4x4 x 12 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		0.028 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	131.50'	Special & User-Defined Head (feet) 0.00 1.00 15.00 Disch. (cfs) 0.000 0.170 0.170
#2	Primary	135.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

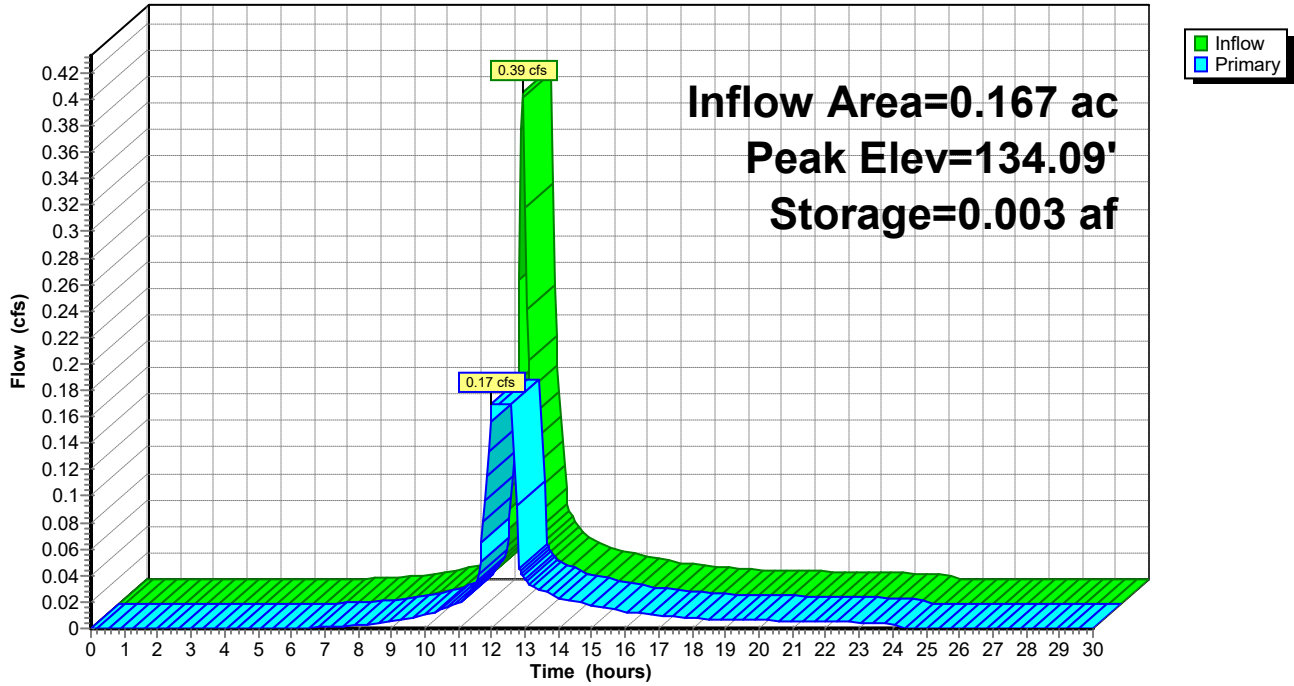
Primary OutFlow Max=0.17 cfs @ 12.00 hrs HW=133.20' (Free Discharge)

└─1=Special & User-Defined (Custom Controls 0.17 cfs)

└─2=Orifice/Grate (Controls 0.00 cfs)

Pond UGS1: TO UGS1B

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1: TO WETLAND (DP#1)	Runoff Area=223,130 sf 1.88% Impervious Runoff Depth=1.67" Flow Length=770' Tc=19.9 min CN=70 Runoff=6.53 cfs 0.714 af
Subcatchment p100: TO DCB#100	Runoff Area=988 sf 68.93% Impervious Runoff Depth=3.71" Flow Length=45' Slope=0.0200 '/' Tc=5.0 min CN=93 Runoff=0.09 cfs 0.007 af
Subcatchment p101: TO DCB#101	Runoff Area=6,297 sf 67.94% Impervious Runoff Depth=3.40" Flow Length=151' Tc=5.0 min CN=90 Runoff=0.56 cfs 0.041 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,320 sf 87.67% Impervious Runoff Depth=3.92" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=1.41 cfs 0.108 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=2.21" Flow Length=356' Tc=5.0 min CN=77 Runoff=4.89 cfs 0.348 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=3.82" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.80 cfs 0.061 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=4.26" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.23 cfs 0.019 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=4.26" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.56 cfs 0.045 af
Subcatchment p7: TO DCB-E	Runoff Area=4,439 sf 64.11% Impervious Runoff Depth=3.20" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.37 cfs 0.027 af
Reach DCB-B: TO OUTFALL	Inflow=0.80 cfs 0.061 af Outflow=0.80 cfs 0.061 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.15' Max Vel=12.10 fps Inflow=1.15 cfs 0.091 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.15 cfs 0.091 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.19' Max Vel=7.19 fps Inflow=0.93 cfs 0.072 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=0.92 cfs 0.072 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.19' Max Vel=3.60 fps Inflow=0.37 cfs 0.027 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.37 cfs 0.027 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.08' Max Vel=3.02 fps Inflow=0.09 cfs 0.007 af 12.0" Round Pipe n=0.013 L=127.0' S=0.0354 '/' Capacity=6.71 cfs Outflow=0.09 cfs 0.007 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.26' Max Vel=3.40 fps Inflow=0.56 cfs 0.041 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/' Capacity=3.76 cfs Outflow=0.55 cfs 0.041 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.21' Max Vel=5.48 fps Inflow=0.64 cfs 0.048 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/' Capacity=6.90 cfs Outflow=0.64 cfs 0.048 af

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Reach DP#1: WETLAND	Inflow=7.94 cfs 0.914 af Outflow=7.94 cfs 0.914 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.41 cfs 0.108 af Outflow=1.41 cfs 0.108 af
Reach DP#3: LOW POINT	Inflow=4.89 cfs 0.348 af Outflow=4.89 cfs 0.348 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.89 fps Inflow=0.80 cfs 0.061 af n=0.080 L=46.0' S=0.1087 '/ Capacity=122.10 cfs Outflow=0.77 cfs 0.061 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.79 fps Inflow=0.77 cfs 0.061 af n=0.080 L=211.0' S=0.0867 '/ Capacity=109.07 cfs Outflow=0.68 cfs 0.061 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.08' Max Vel=0.56 fps Inflow=0.68 cfs 0.061 af n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.66 cfs 0.061 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.08' Max Vel=0.23 fps Inflow=0.66 cfs 0.061 af n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.56 cfs 0.061 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.07' Max Vel=1.02 fps Inflow=1.32 cfs 0.139 af n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.17 cfs 0.139 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.17' Max Vel=0.38 fps Inflow=1.17 cfs 0.139 af n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=1.11 cfs 0.139 af
Reach OUTLET: TO DP#1	Inflow=1.15 cfs 0.091 af Outflow=1.15 cfs 0.091 af
Reach UGS1A: TO UGS#1	Inflow=0.64 cfs 0.048 af Outflow=0.64 cfs 0.048 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.11' Max Vel=4.16 fps Inflow=0.21 cfs 0.048 af 12.0" Round Pipe n=0.013 L=34.0' S=0.0441 '/ Capacity=7.48 cfs Outflow=0.21 cfs 0.048 af
Pond UGS1: TO UGS1B	Peak Elev=135.09' Storage=0.009 af Inflow=0.64 cfs 0.048 af Outflow=0.21 cfs 0.048 af

Total Runoff Area = 7.980 ac Runoff Volume = 1.369 af Average Runoff Depth = 2.06"
85.11% Pervious = 6.792 ac 14.89% Impervious = 1.188 ac

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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment P1: TO WETLAND (DP#1)

Runoff = 6.53 cfs @ 12.29 hrs, Volume= 0.714 af, Depth= 1.67"
 Routed to Reach DP#1 : WETLAND

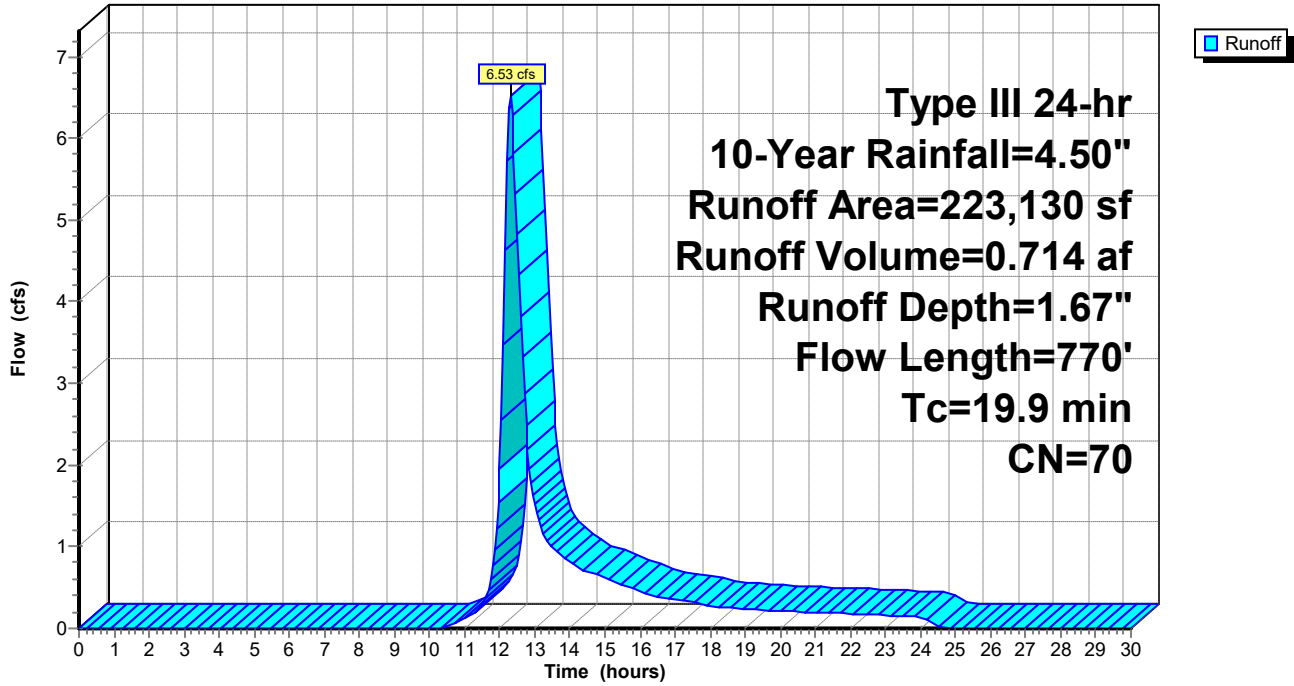
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
3,458	74	>75% Grass cover, Good, HSG C
177,279	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,702	89	Gravel roads, HSG C
31,497	65	Brush, Good, HSG C
223,130	70	Weighted Average
218,936		98.12% Pervious Area
4,194		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment P1: TO WETLAND (DP#1)

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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment p100: TO DCB#100

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af, Depth= 3.71"
 Routed to Reach DCB100 : TO DMH#100

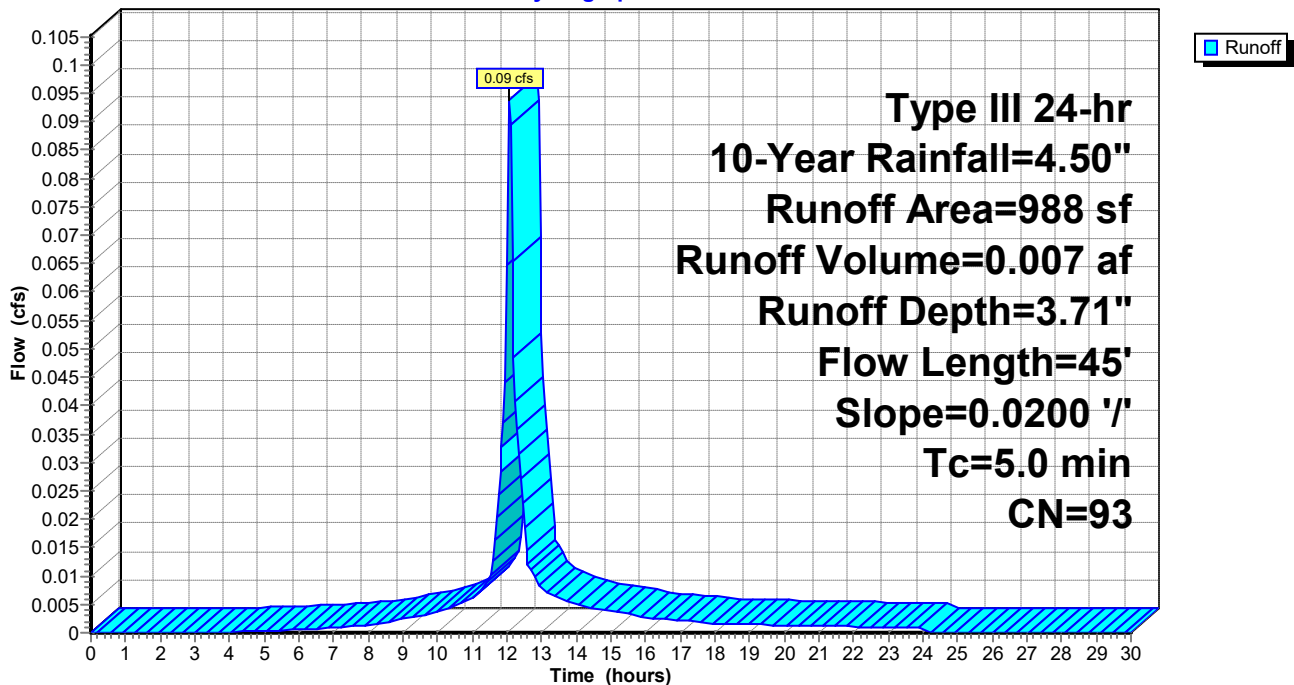
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
210	74	>75% Grass cover, Good, HSG C
681	98	Paved parking, HSG C
97	96	Gravel surface, HSG C
988	93	Weighted Average
307		31.07% Pervious Area
681		68.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.6	40	0.0200	1.11		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.5	45	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p100: TO DCB#100

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment p101: TO DCB#101

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.56 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 3.40"
 Routed to Reach DCB101 : TO DMH#100

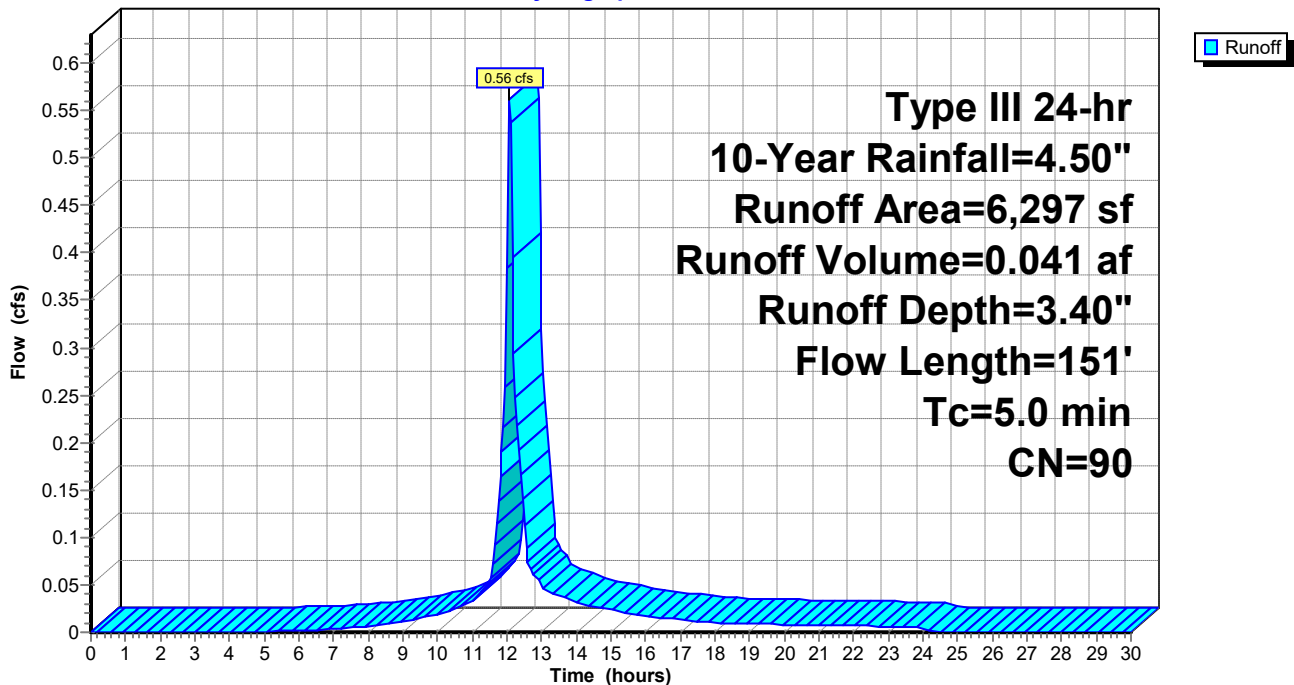
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
2,019	74	>75% Grass cover, Good, HSG C
4,278	98	Paved parking, HSG C
6,297	90	Weighted Average
2,019		32.06% Pervious Area
4,278		67.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.5	45	0.0400	1.50		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.4	101	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.8	151	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p101: TO DCB#101

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment p2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.41 cfs @ 12.07 hrs, Volume= 0.108 af, Depth= 3.92"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

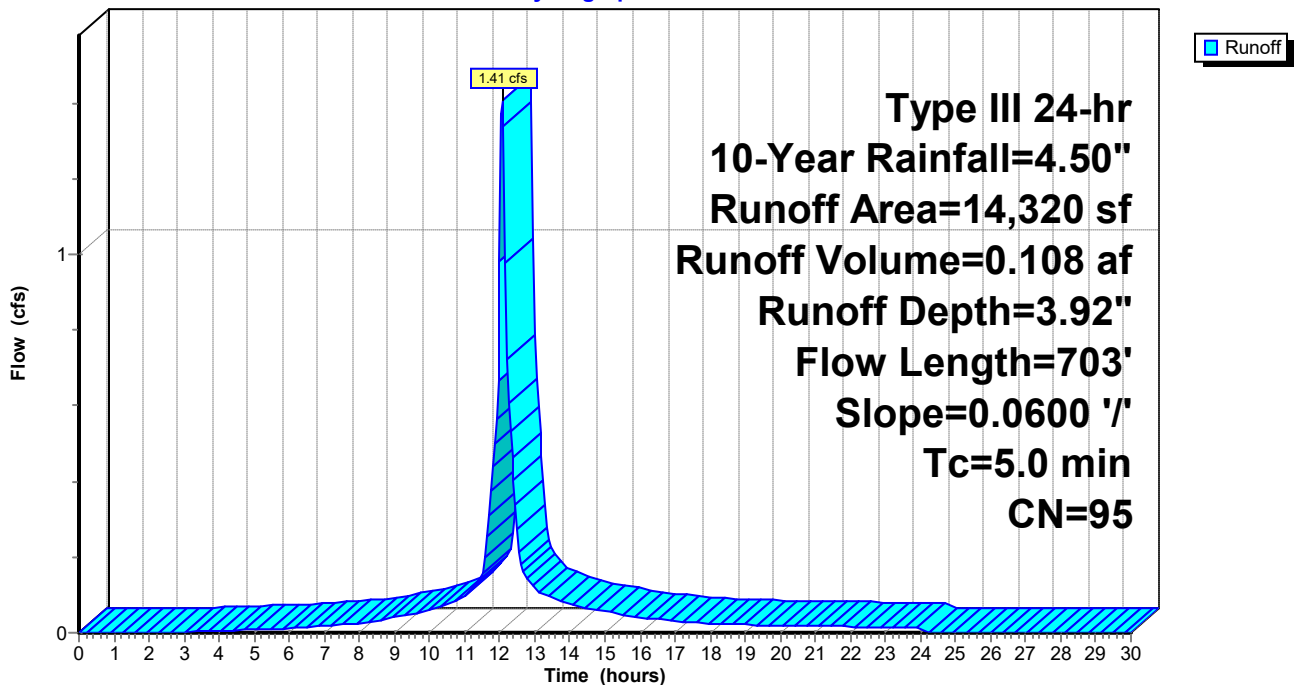
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,221	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,555	98	Paved parking, HSG C
14,320	95	Weighted Average
1,765		12.33% Pervious Area
12,555		87.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p2: TO CATCHBASIN (DP#2)

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment p3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

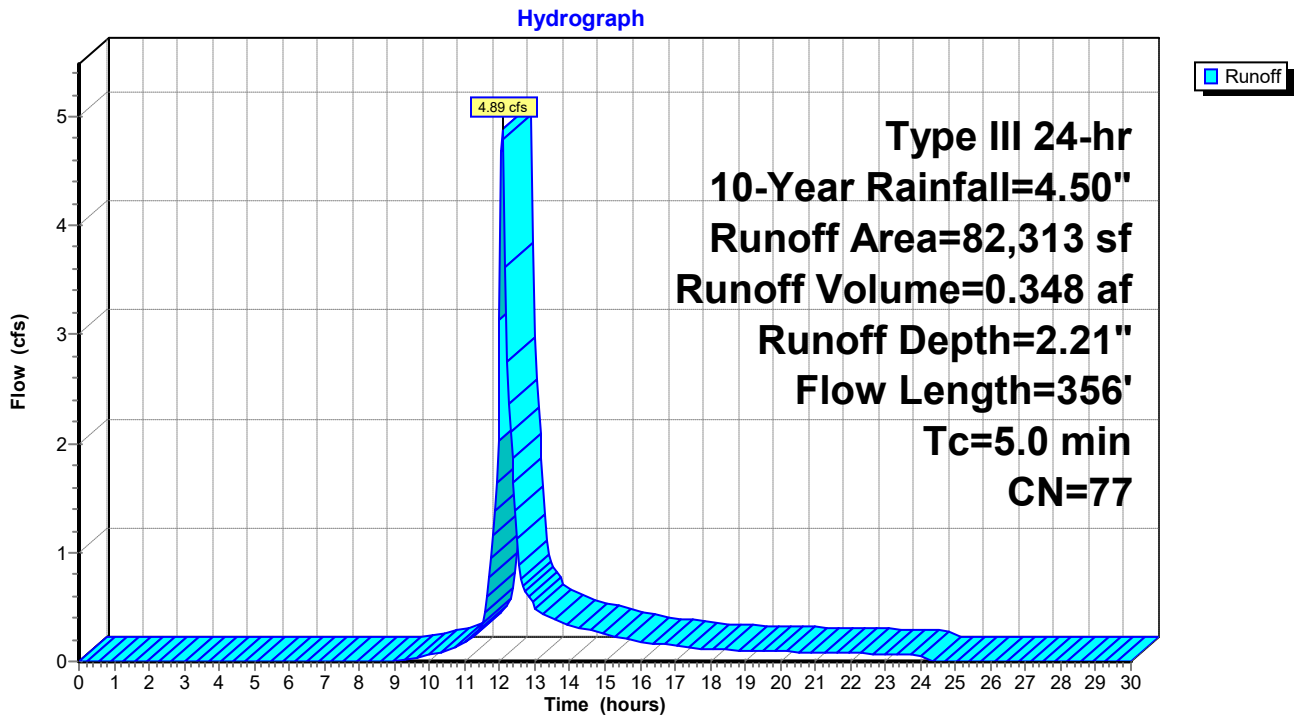
Runoff = 4.89 cfs @ 12.08 hrs, Volume= 0.348 af, Depth= 2.21"
 Routed to Reach DP#3 : LOW POINT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p3: TO LOW POINT (DP#3)



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment P4: TO DCB-B

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af, Depth= 3.82"
 Routed to Reach DCB-B : TO OUTFALL

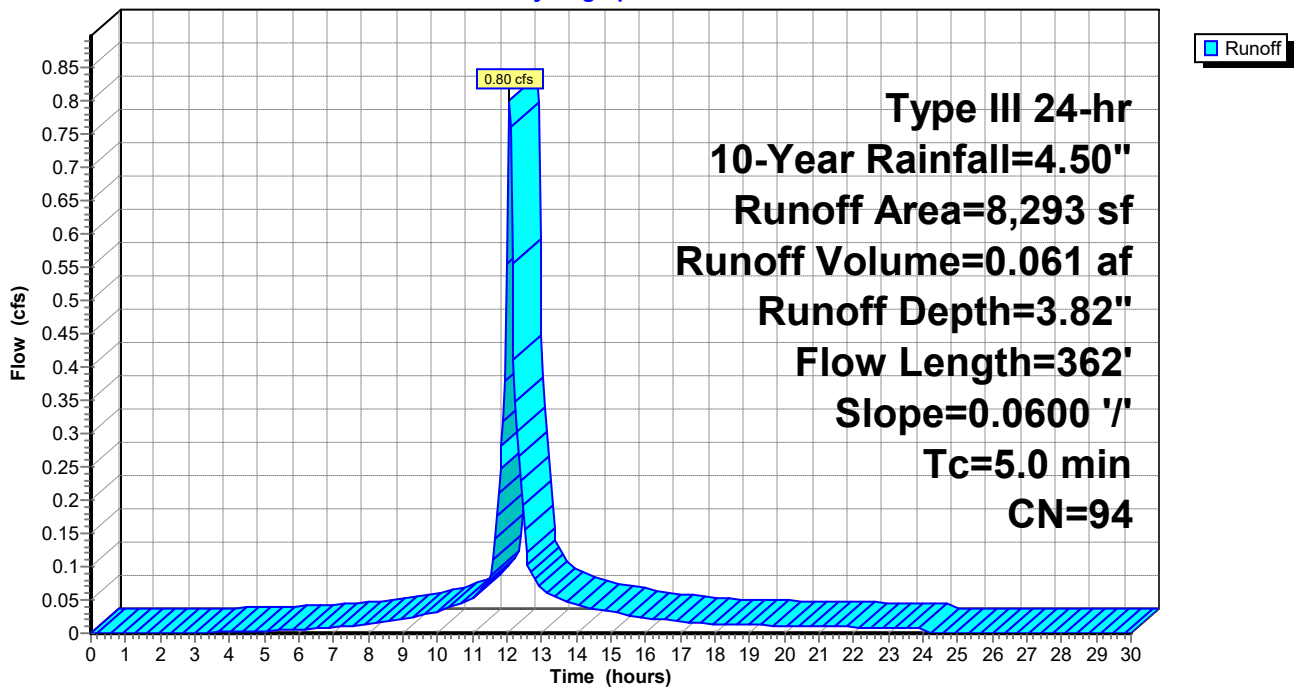
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces $n= 0.011$ $P_2= 3.00"$
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved $K_v= 20.3$ fps
1.5	362	Total, Increased to minimum $T_c = 5.0$ min			

Subcatchment P4: TO DCB-B

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment p5: TO DCB-C

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 4.26"
 Routed to Reach DCB-C : TO OUTFALL

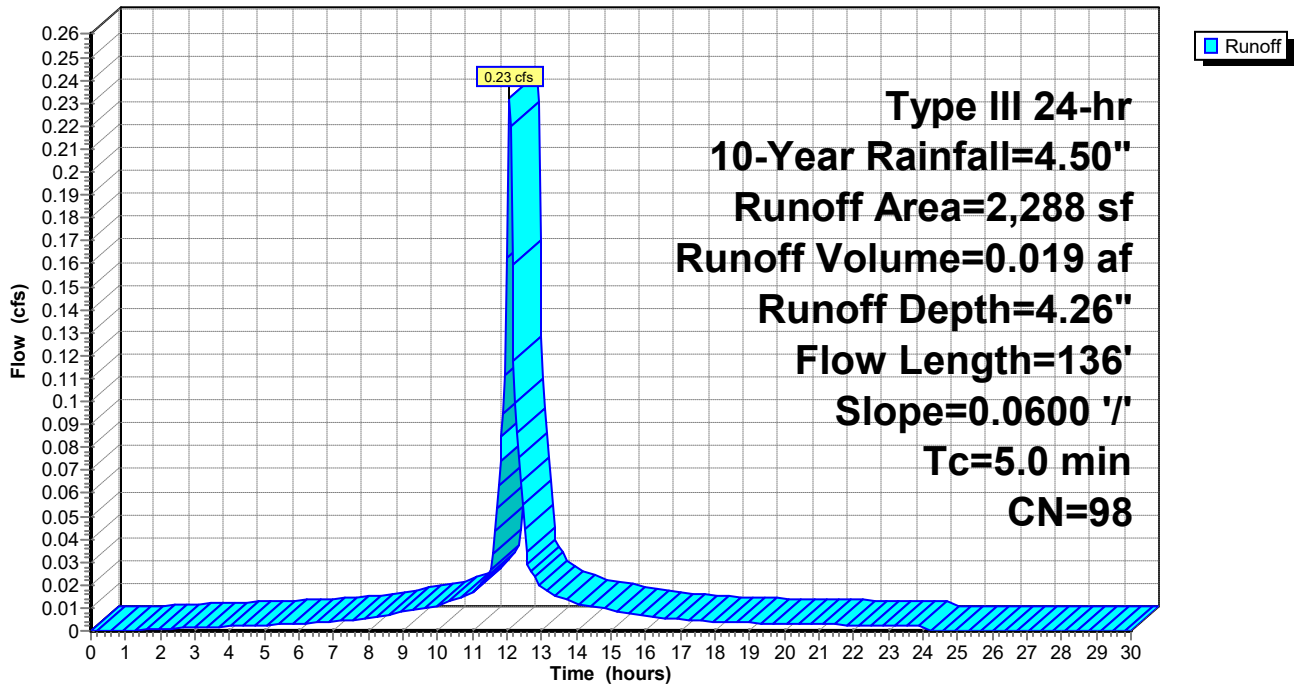
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p5: TO DCB-C

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment p6: TO DCB-D

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.56 cfs @ 12.07 hrs, Volume= 0.045 af, Depth= 4.26"
 Routed to Reach DCB-D : TO DCB-C

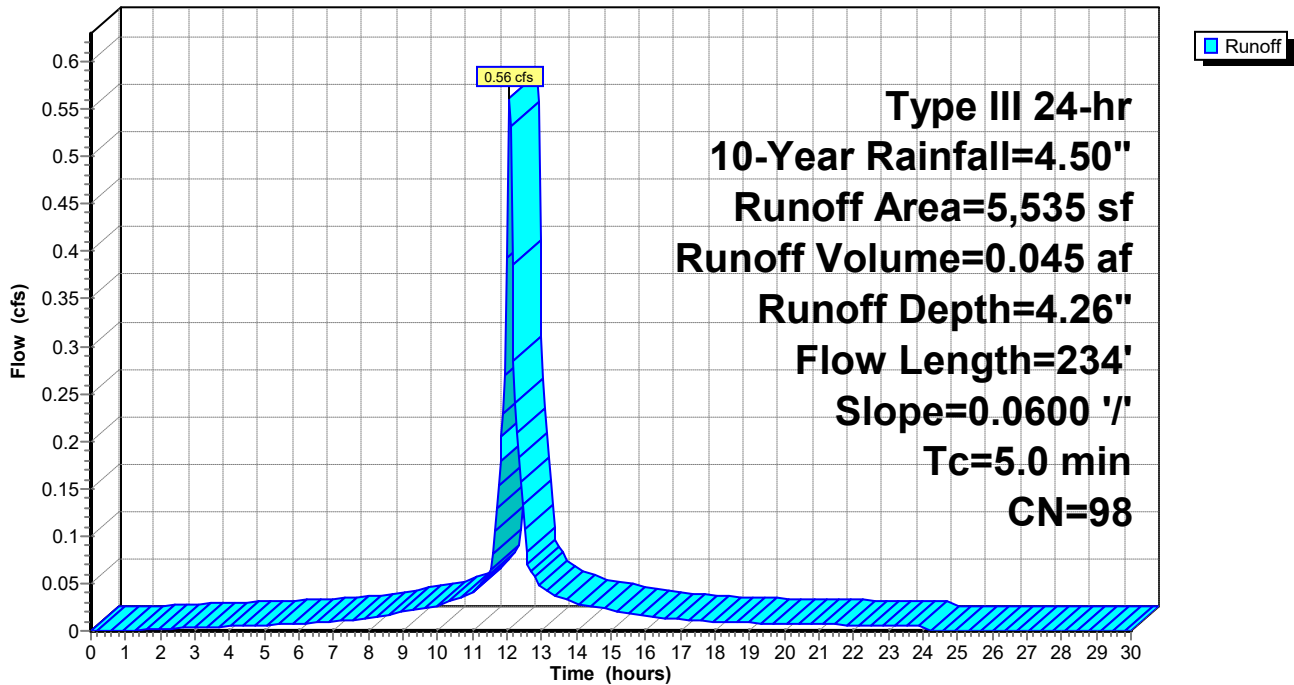
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p6: TO DCB-D

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.50"

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Summary for Subcatchment p7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.027 af, Depth= 3.20"
 Routed to Reach DCB-E : TO DCB-D

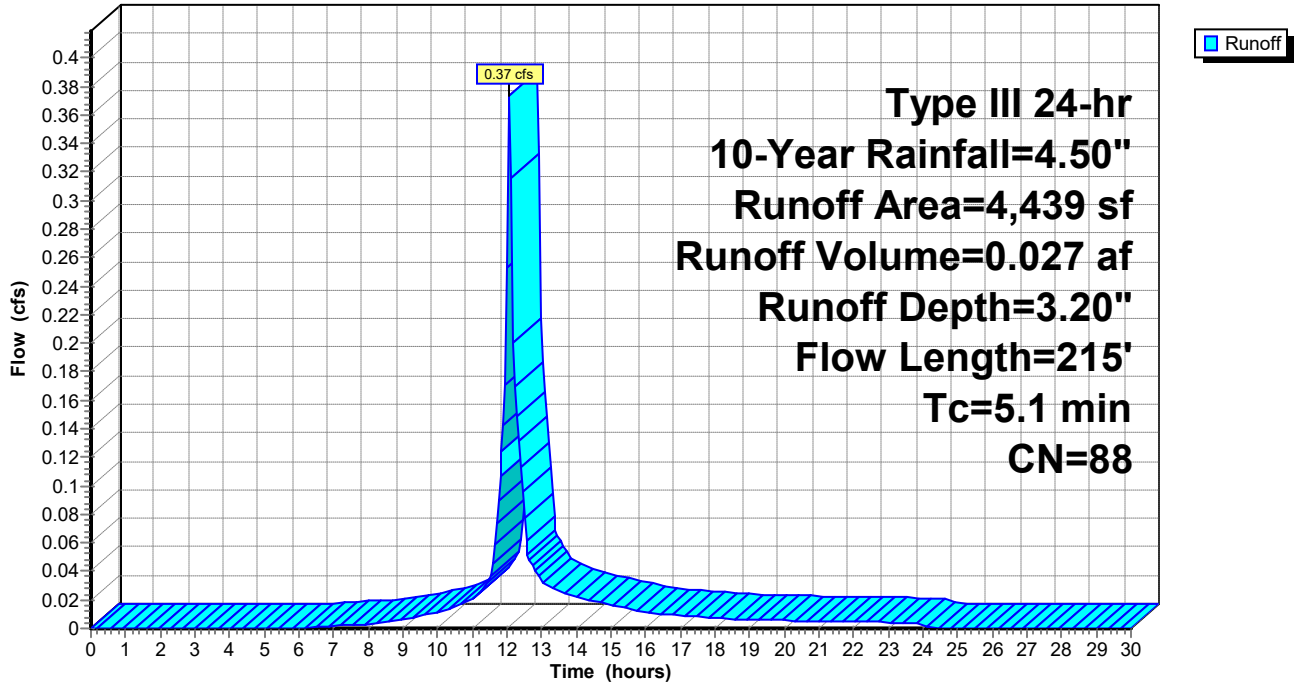
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,576	70	Woods, Good, HSG C
2,846	98	Paved parking, HSG C
17	74	>75% Grass cover, Good, HSG C
4,439	88	Weighted Average
1,593		35.89% Pervious Area
2,846		64.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment p7: TO DCB-E

Hydrograph



Summary for Reach DCB-B: TO OUTFALL

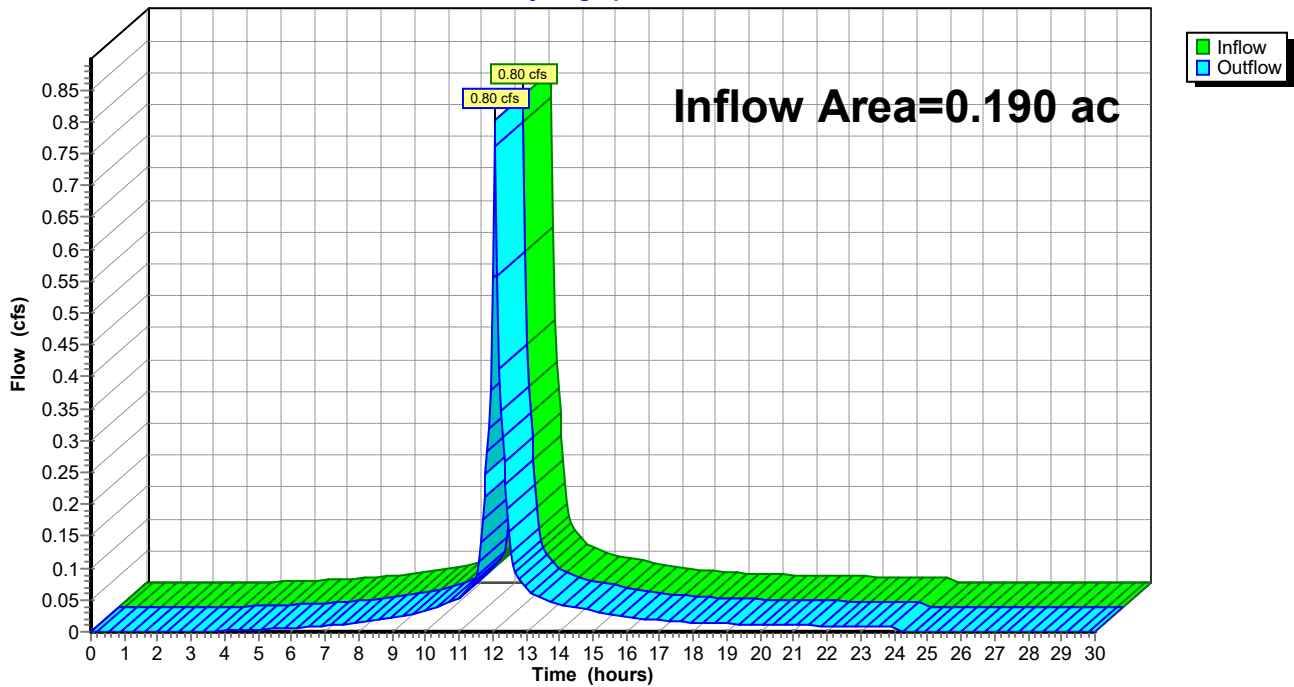
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af
Outflow = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



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Summary for Reach DCB-C: TO OUTFALL

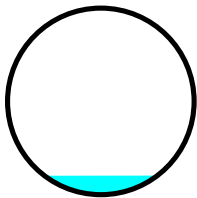
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 1.15 cfs @ 12.08 hrs, Volume= 0.091 af
Outflow = 1.15 cfs @ 12.08 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.10 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.00 fps, Avg. Travel Time= 0.3 min

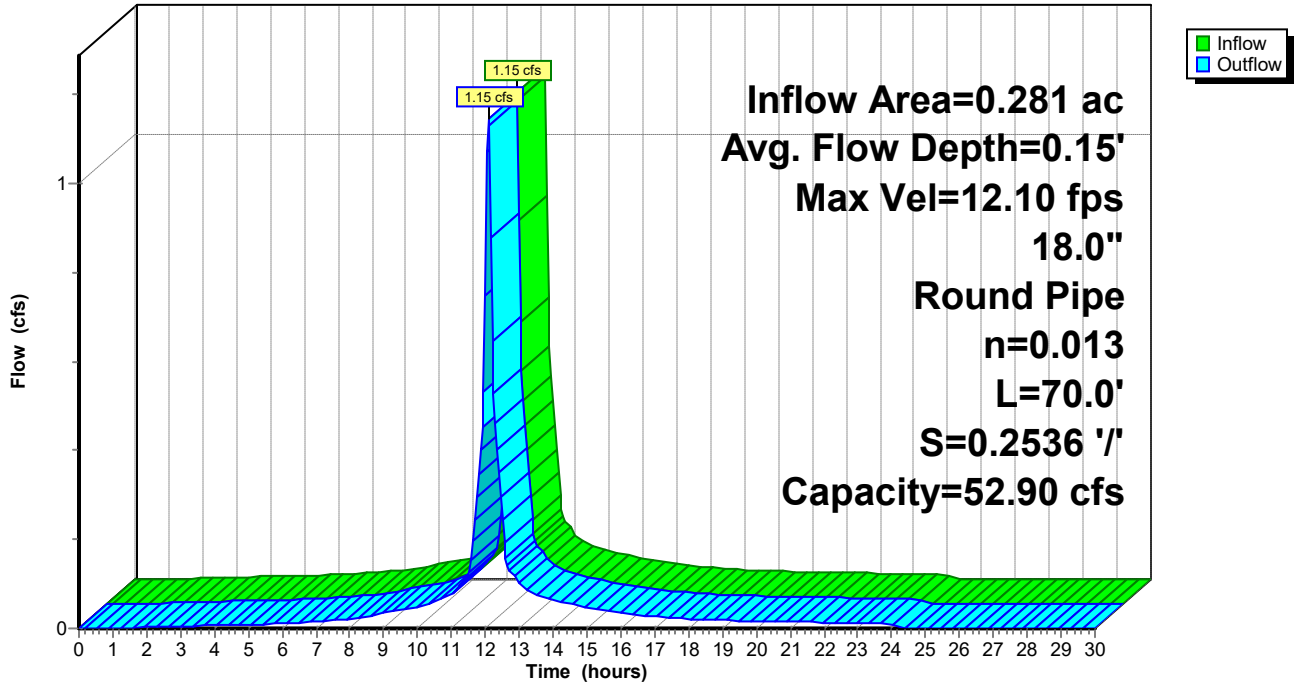
Peak Storage= 7 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.91'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



Reach DCB-C: TO OUTFALL

Hydrograph



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Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

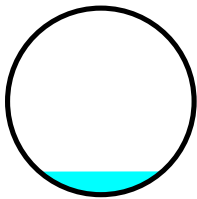
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.09' @ 12.10 hrs

Inflow Area = 0.229 ac, 84.03% Impervious, Inflow Depth = 3.79" for 10-Year event
Inflow = 0.93 cfs @ 12.07 hrs, Volume= 0.072 af
Outflow = 0.92 cfs @ 12.08 hrs, Volume= 0.072 af, Atten= 1%, Lag= 0.6 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.19 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.33 fps, Avg. Travel Time= 0.8 min

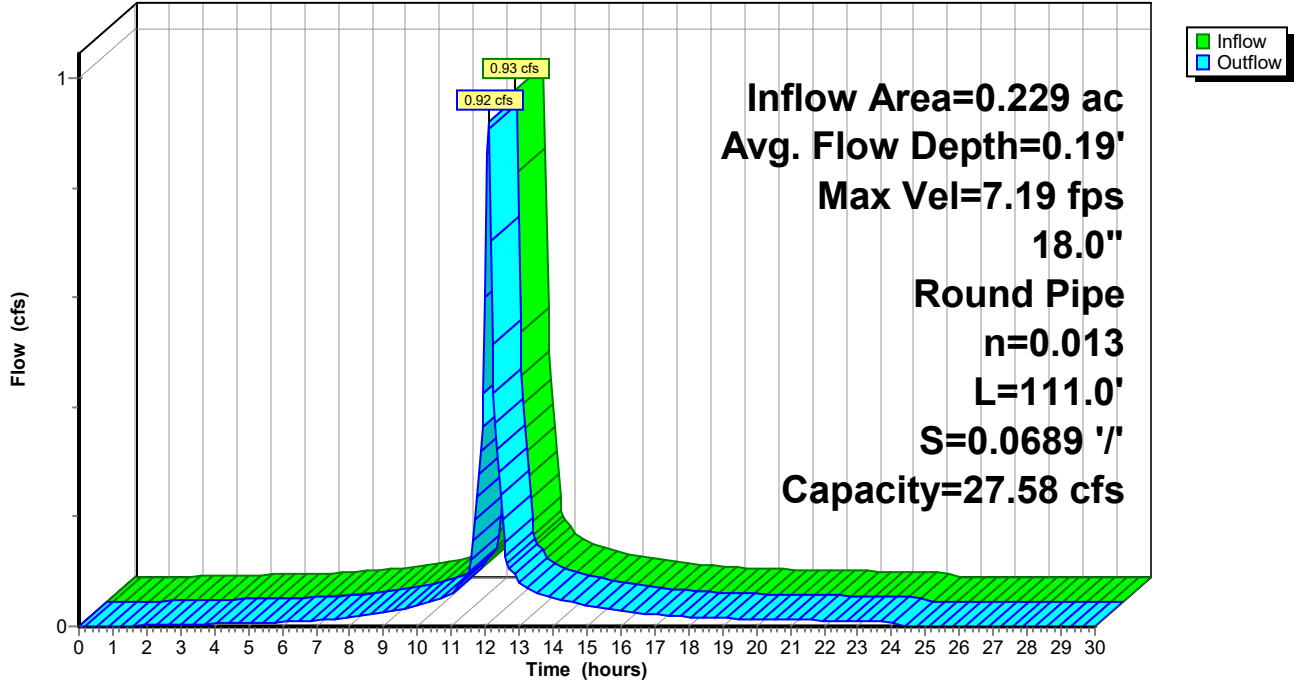
Peak Storage= 14 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 0.99'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



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Summary for Reach DCB-E: TO DCB-D

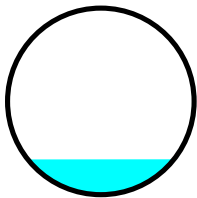
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.102 ac, 64.11% Impervious, Inflow Depth = 3.20" for 10-Year event
Inflow = 0.37 cfs @ 12.08 hrs, Volume= 0.027 af
Outflow = 0.37 cfs @ 12.08 hrs, Volume= 0.027 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.60 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 0.5 min

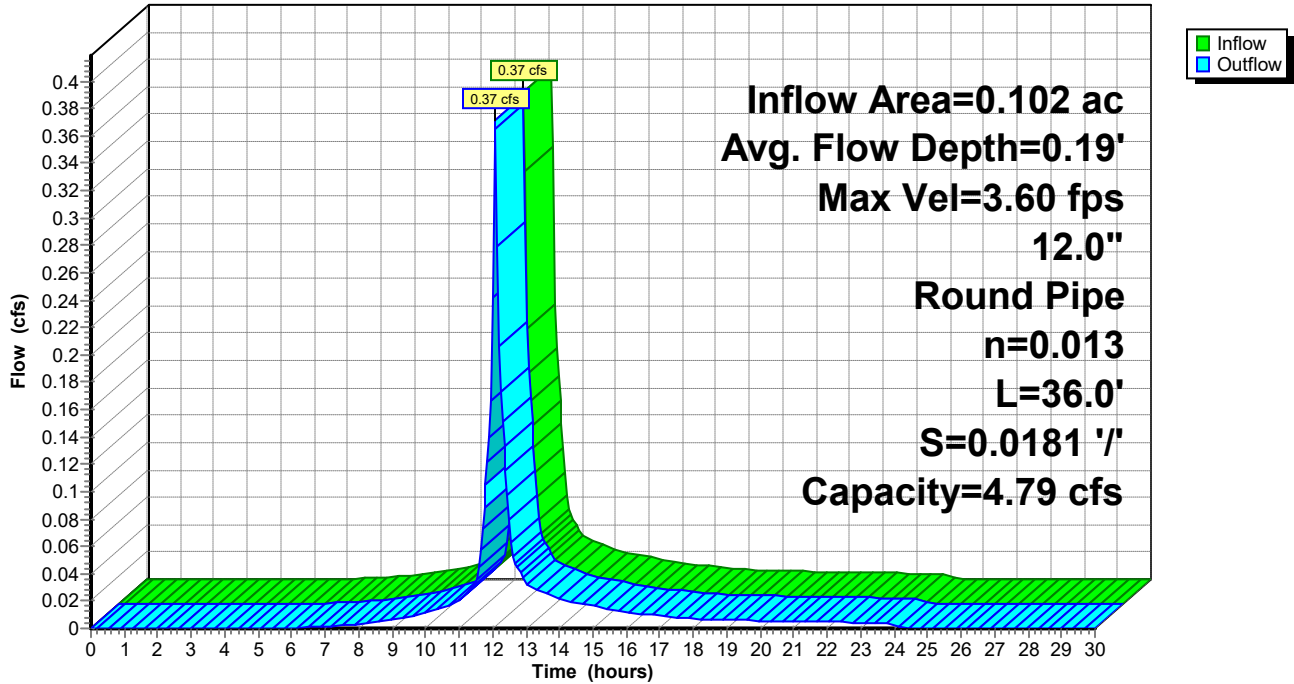
Peak Storage= 4 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 0.78'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/'
Inlet Invert= 140.85', Outlet Invert= 140.20'



Reach DCB-E: TO DCB-D

Hydrograph



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Summary for Reach DCB100: TO DMH#100

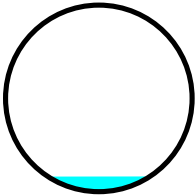
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.023 ac, 68.93% Impervious, Inflow Depth = 3.71" for 10-Year event
Inflow = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Atten= 3%, Lag= 1.4 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.02 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 2.0 min

Peak Storage= 4 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 0.55'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.71 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 127.0' Slope= 0.0354 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'



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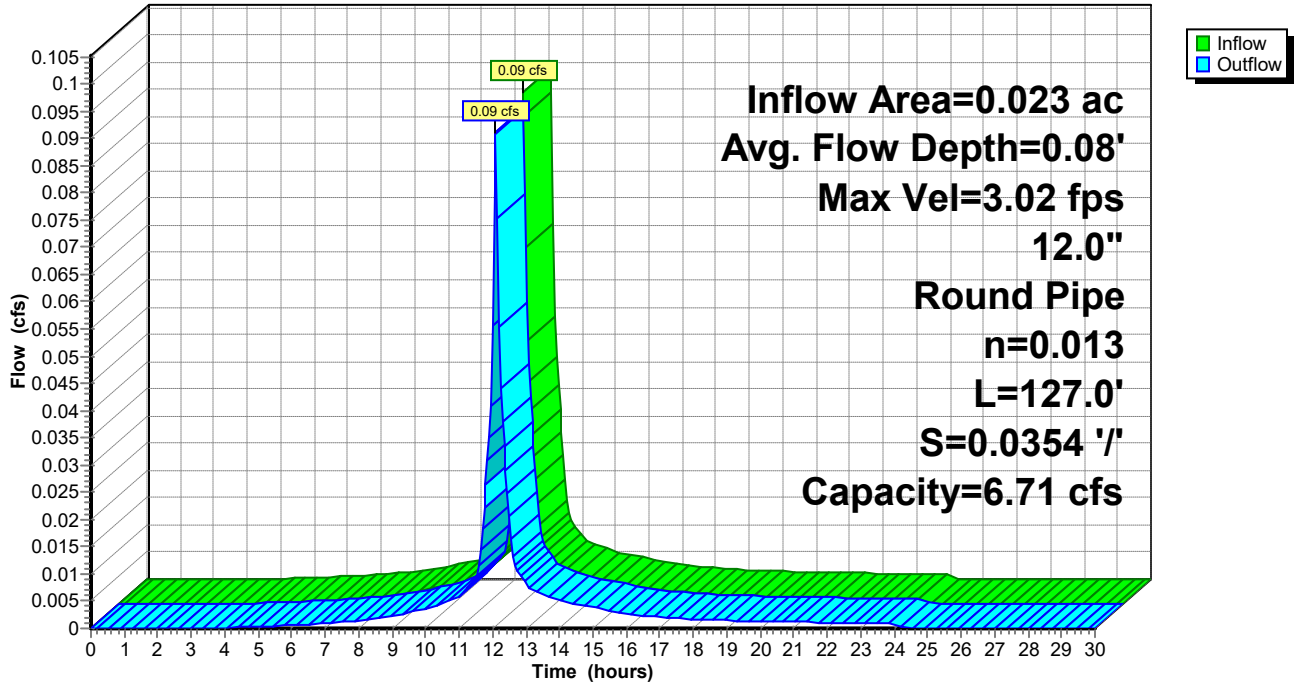
Type III 24-hr 10-Year Rainfall=4.50"

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Reach DCB100: TO DMH#100

Hydrograph



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Summary for Reach DCB101: TO DMH#100

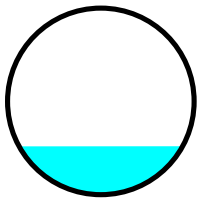
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.145 ac, 67.94% Impervious, Inflow Depth = 3.40" for 10-Year event
Inflow = 0.56 cfs @ 12.07 hrs, Volume= 0.041 af
Outflow = 0.55 cfs @ 12.08 hrs, Volume= 0.041 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.40 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 0.5 min

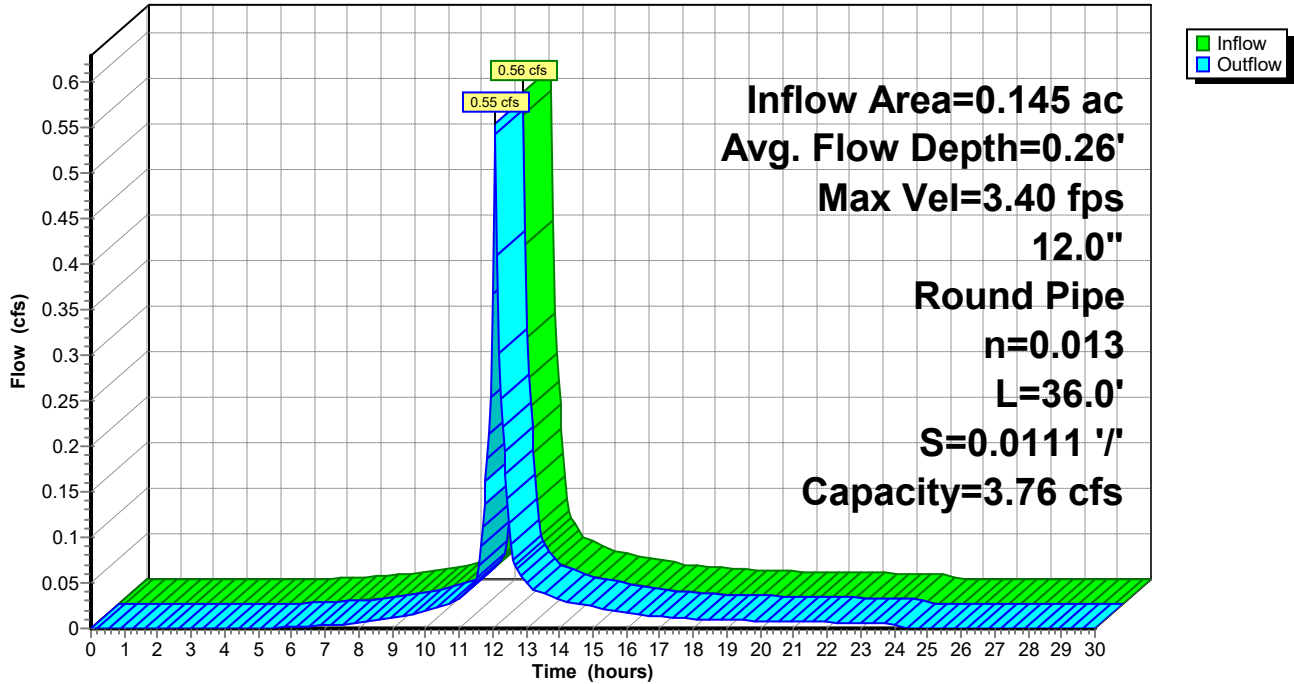
Peak Storage= 6 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 0.88'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0111 '/'
Inlet Invert= 136.40', Outlet Invert= 136.00'



Reach DCB101: TO DMH#100

Hydrograph



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Summary for Reach DMH100: TO UGS#1A

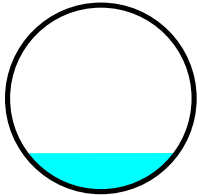
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 3.44" for 10-Year event
Inflow = 0.64 cfs @ 12.08 hrs, Volume= 0.048 af
Outflow = 0.64 cfs @ 12.08 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Routed to Reach UGS1A : TO UGS#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.48 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.79 fps, Avg. Travel Time= 0.1 min

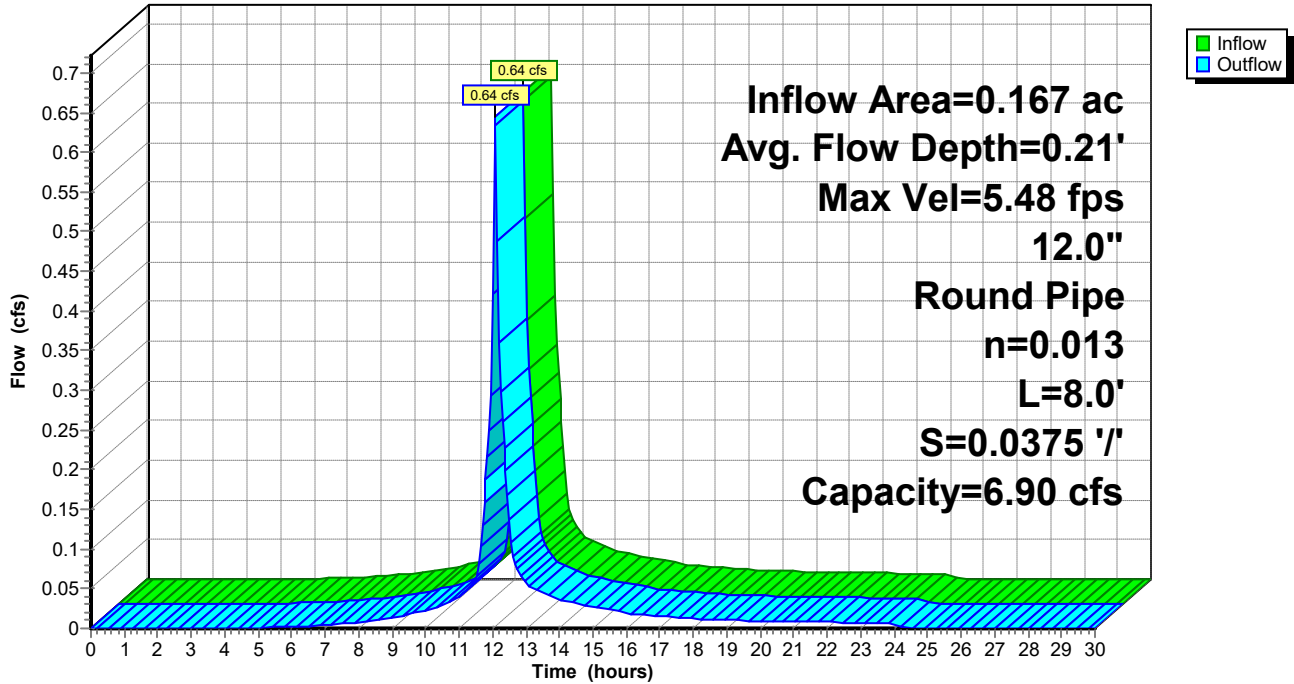
Peak Storage= 1 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 0.81'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.0' Slope= 0.0375 '/'
Inlet Invert= 135.80', Outlet Invert= 135.50'



Reach DMH100: TO UGS#1A

Hydrograph



Summary for Reach DP#1: WETLAND

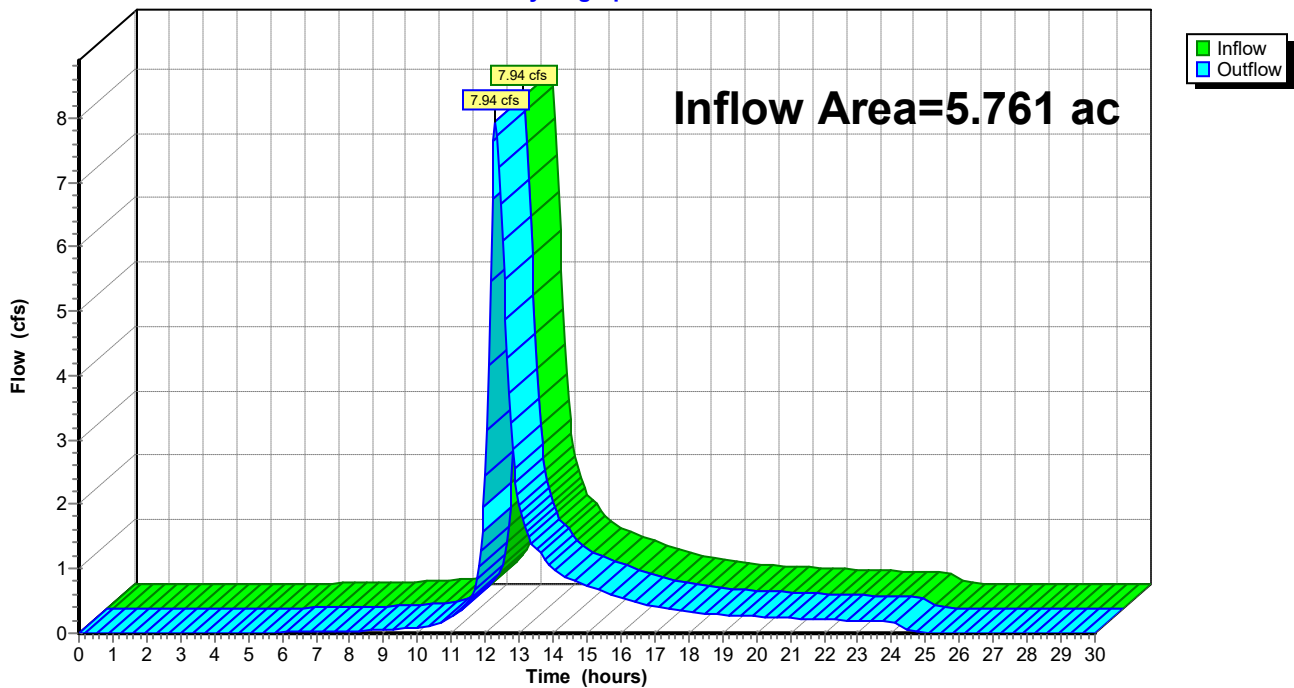
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.761 ac, 10.66% Impervious, Inflow Depth = 1.90" for 10-Year event
Inflow = 7.94 cfs @ 12.30 hrs, Volume= 0.914 af
Outflow = 7.94 cfs @ 12.30 hrs, Volume= 0.914 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#1: WETLAND

Hydrograph



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

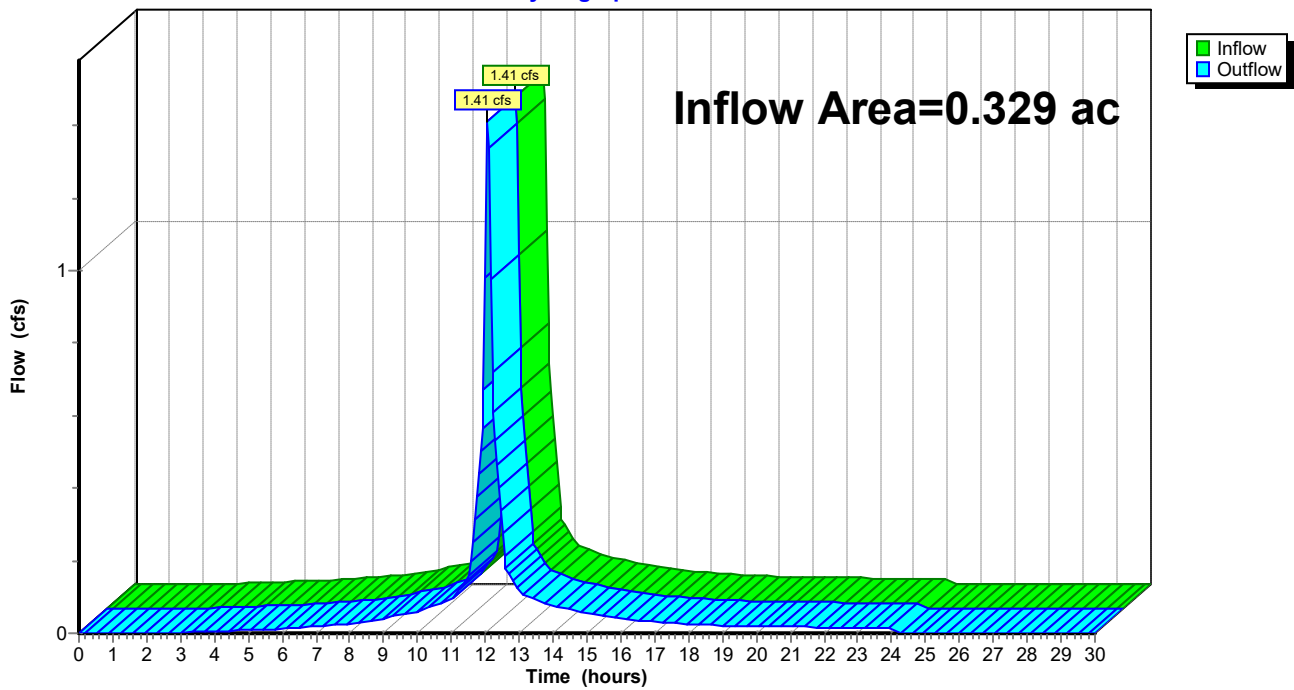
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.67% Impervious, Inflow Depth = 3.92" for 10-Year event
Inflow = 1.41 cfs @ 12.07 hrs, Volume= 0.108 af
Outflow = 1.41 cfs @ 12.07 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

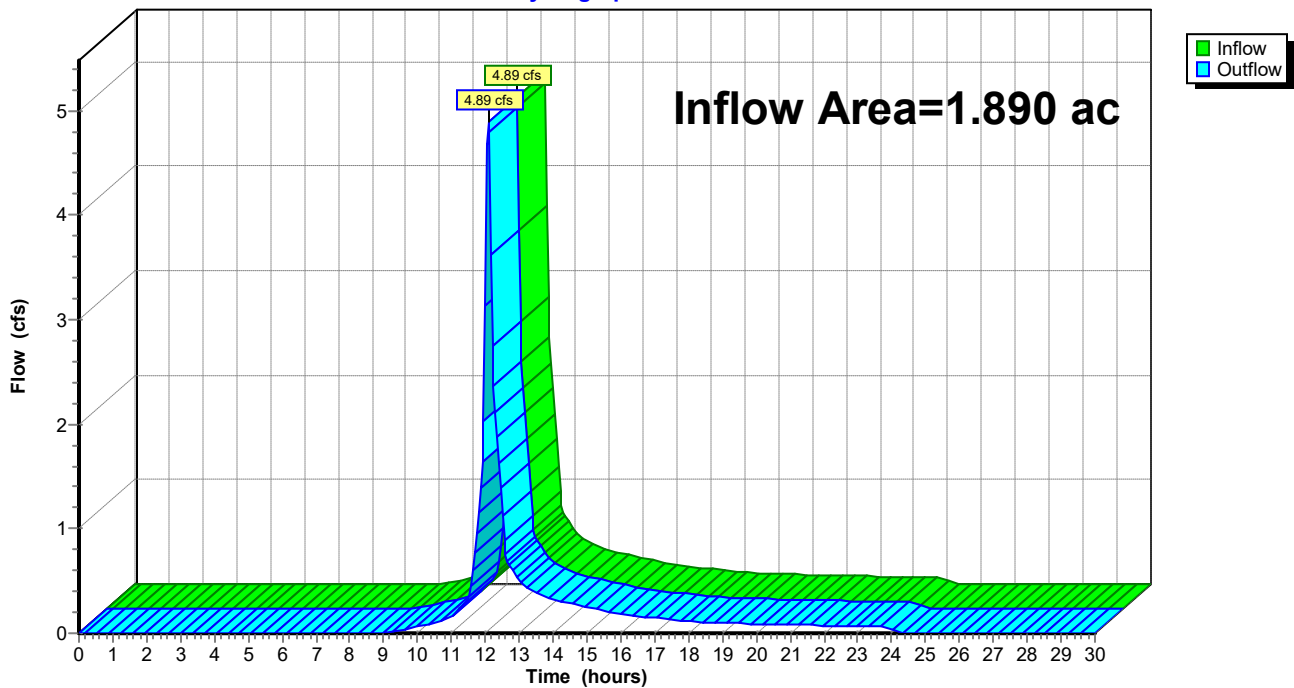
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 2.21" for 10-Year event
Inflow = 4.89 cfs @ 12.08 hrs, Volume= 0.348 af
Outflow = 4.89 cfs @ 12.08 hrs, Volume= 0.348 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
 Inflow = 0.80 cfs @ 12.07 hrs, Volume= 0.061 af
 Outflow = 0.77 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 4%, Lag= 1.6 min
 Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.89 fps, Min. Travel Time= 0.9 min
 Avg. Velocity = 0.30 fps, Avg. Travel Time= 2.5 min

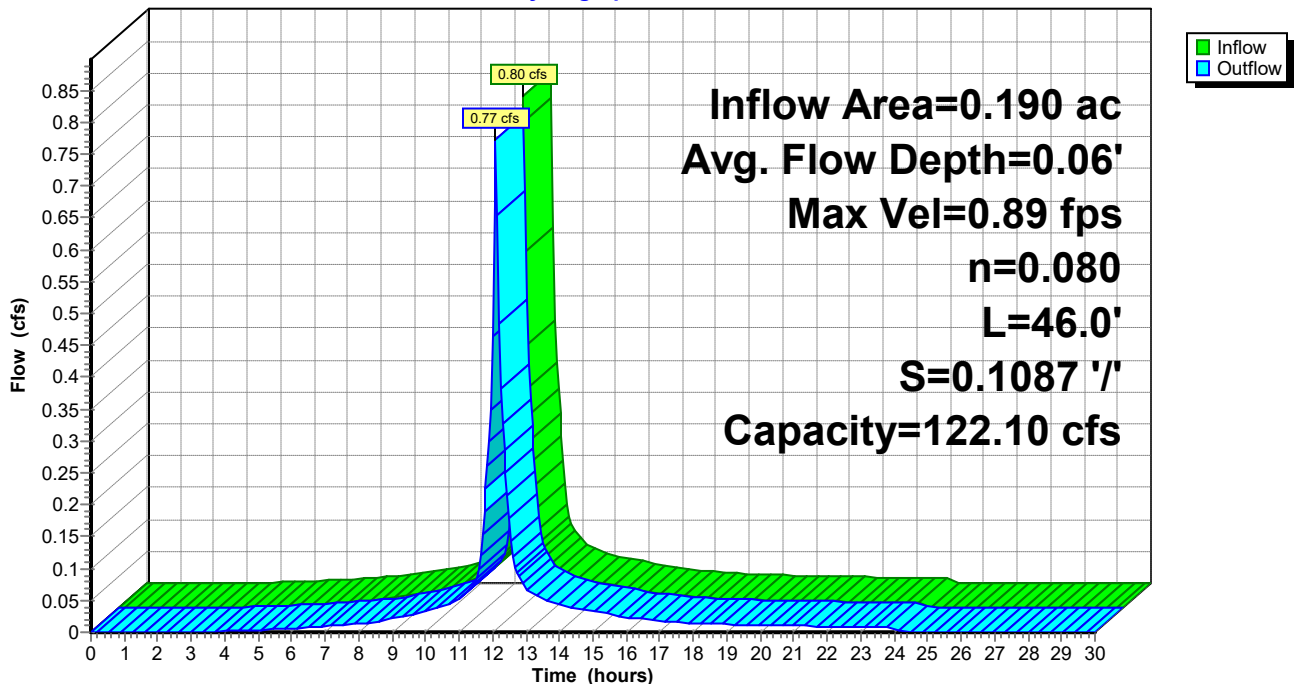
Peak Storage= 41 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.15'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 46.0' Slope= 0.1087 ' / '
 Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



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Summary for Reach OL-2: OVERLAND

[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.77 cfs @ 12.10 hrs, Volume= 0.061 af
Outflow = 0.68 cfs @ 12.22 hrs, Volume= 0.061 af, Atten= 13%, Lag= 7.1 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 12.8 min

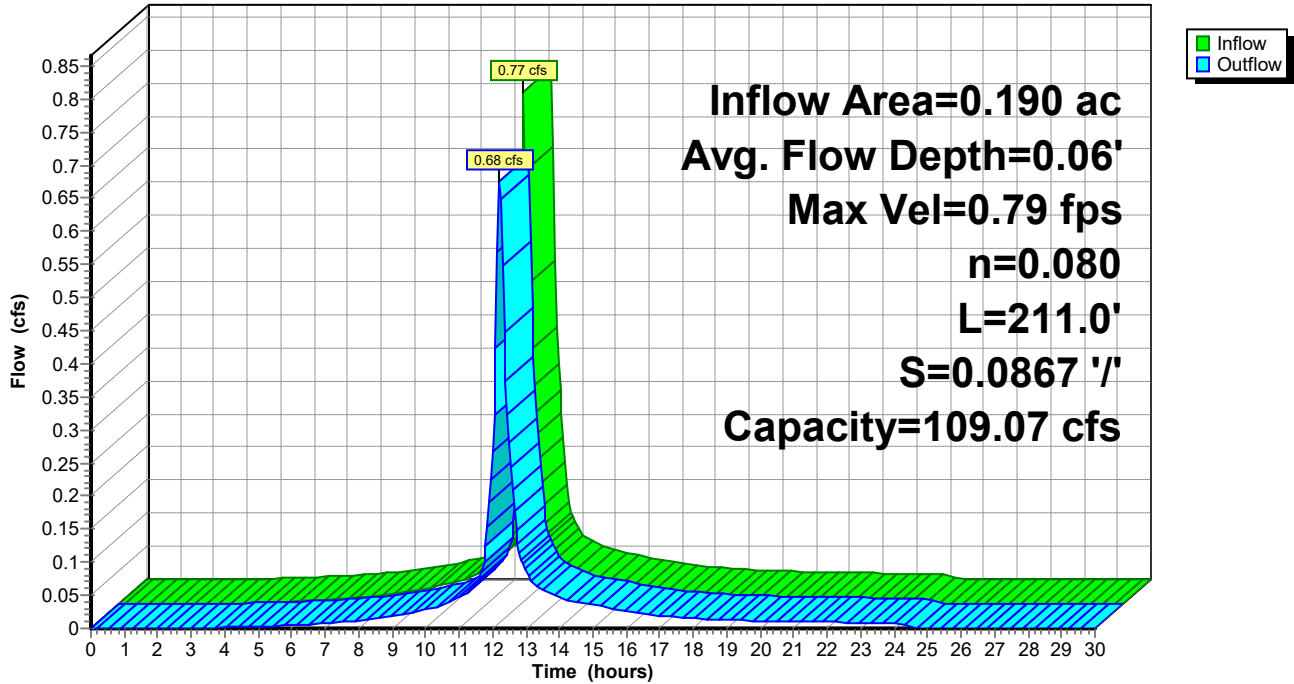
Peak Storage= 186 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.13'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



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Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.03' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.68 cfs @ 12.22 hrs, Volume= 0.061 af
Outflow = 0.66 cfs @ 12.24 hrs, Volume= 0.061 af, Atten= 2%, Lag= 1.3 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.56 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 2.2 min

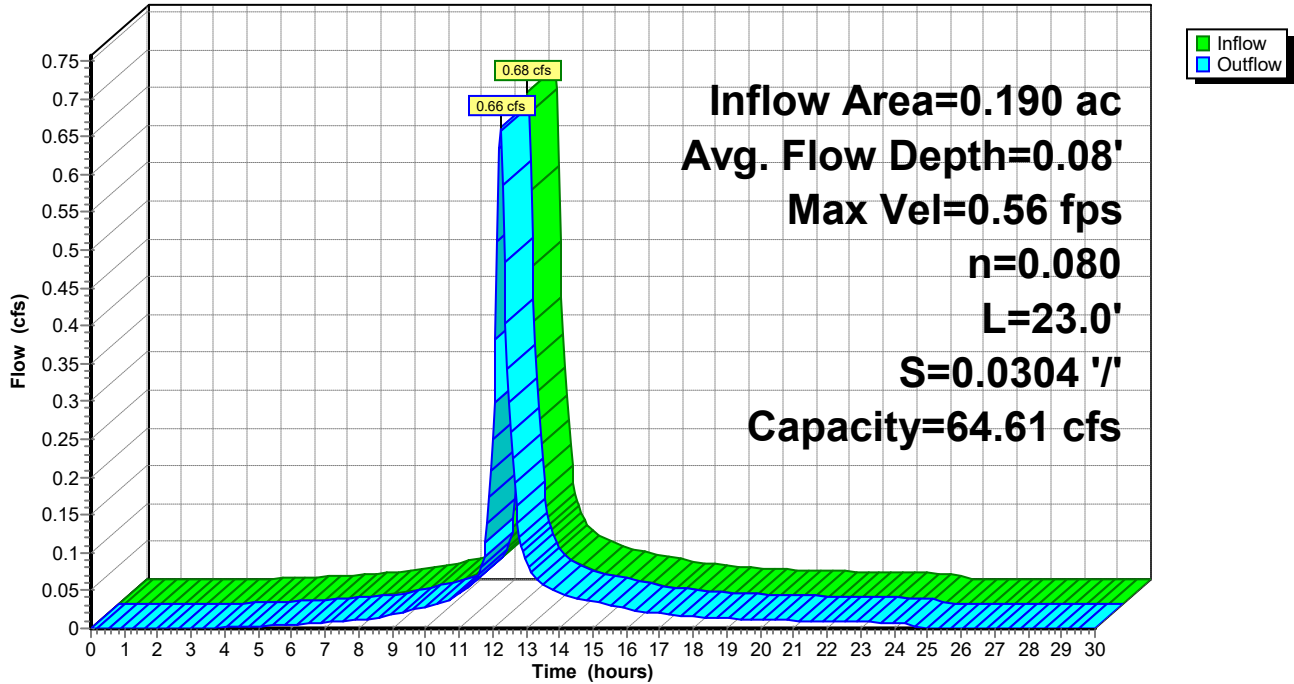
Peak Storage= 28 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.52'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



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Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.02' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 3.82" for 10-Year event
Inflow = 0.66 cfs @ 12.24 hrs, Volume= 0.061 af
Outflow = 0.56 cfs @ 12.47 hrs, Volume= 0.061 af, Atten= 16%, Lag= 14.0 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 9.1 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 29.6 min

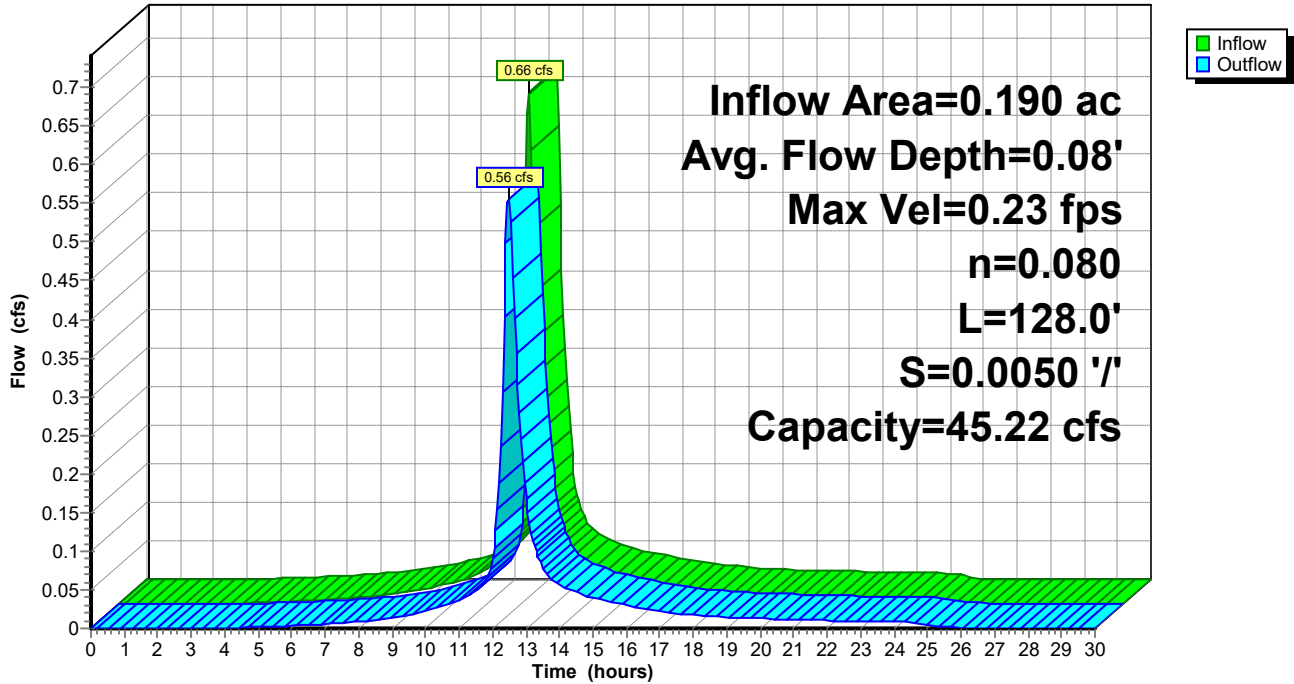
Peak Storage= 304 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 31.54'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 ' '
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



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Summary for Reach OL-5: OVERLAND

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 3.71" for 10-Year event
Inflow = 1.32 cfs @ 12.08 hrs, Volume= 0.139 af
Outflow = 1.17 cfs @ 12.21 hrs, Volume= 0.139 af, Atten= 11%, Lag= 7.4 min
Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.02 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 14.4 min

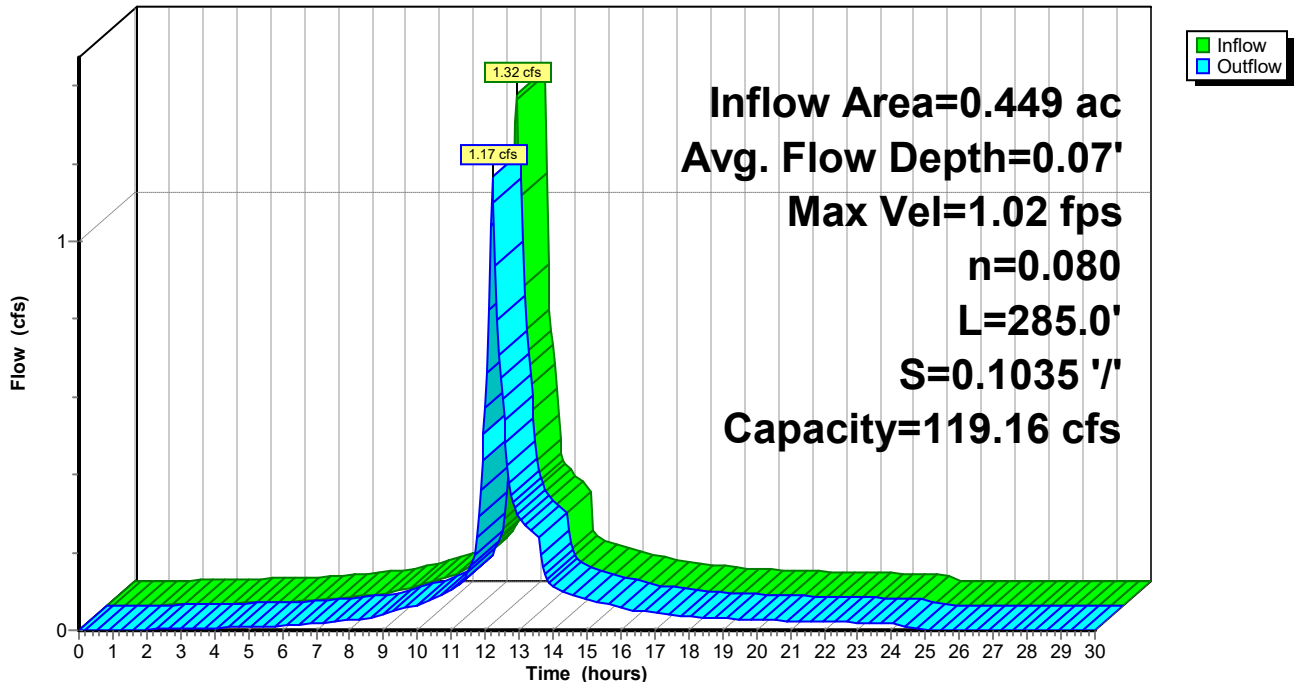
Peak Storage= 331 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.48'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
Length= 285.0' Slope= 0.1035 ' / '
Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



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Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.11' @ 12.25 hrs

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 3.71" for 10-Year event
Inflow = 1.17 cfs @ 12.21 hrs, Volume= 0.139 af
Outflow = 1.11 cfs @ 12.31 hrs, Volume= 0.139 af, Atten= 5%, Lag= 5.9 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.38 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 12.6 min

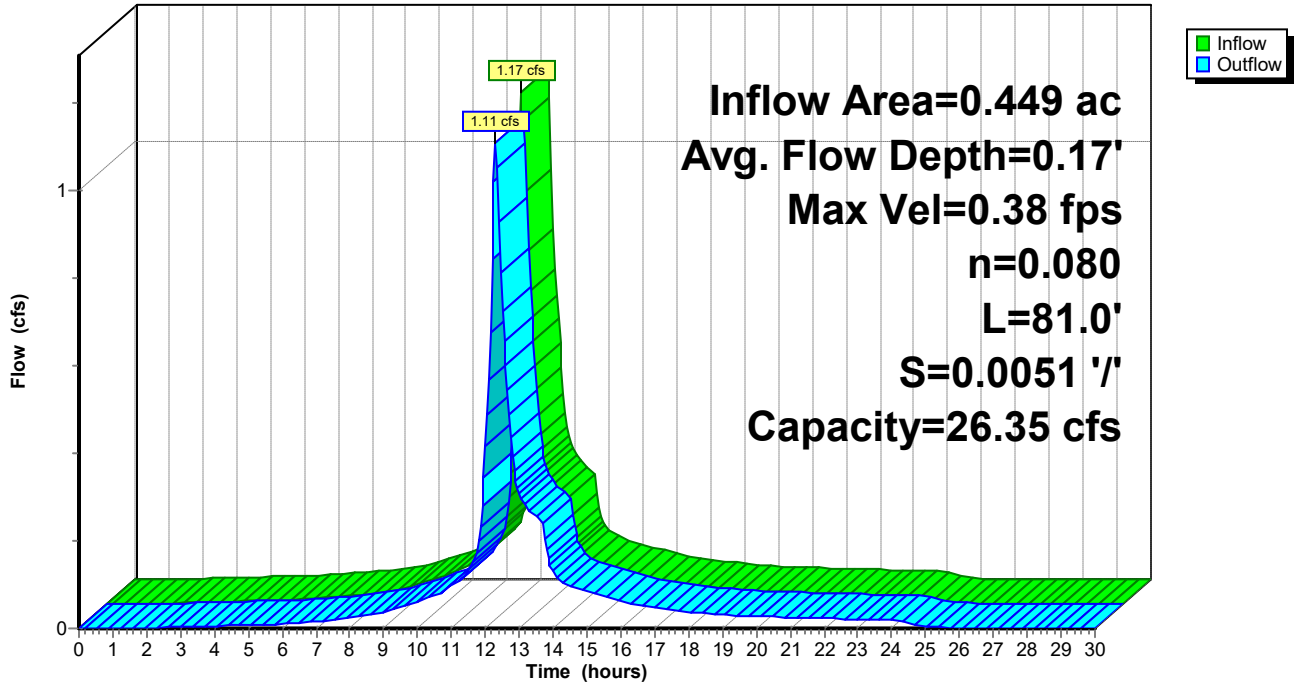
Peak Storage= 235 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 18.47'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 ' '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

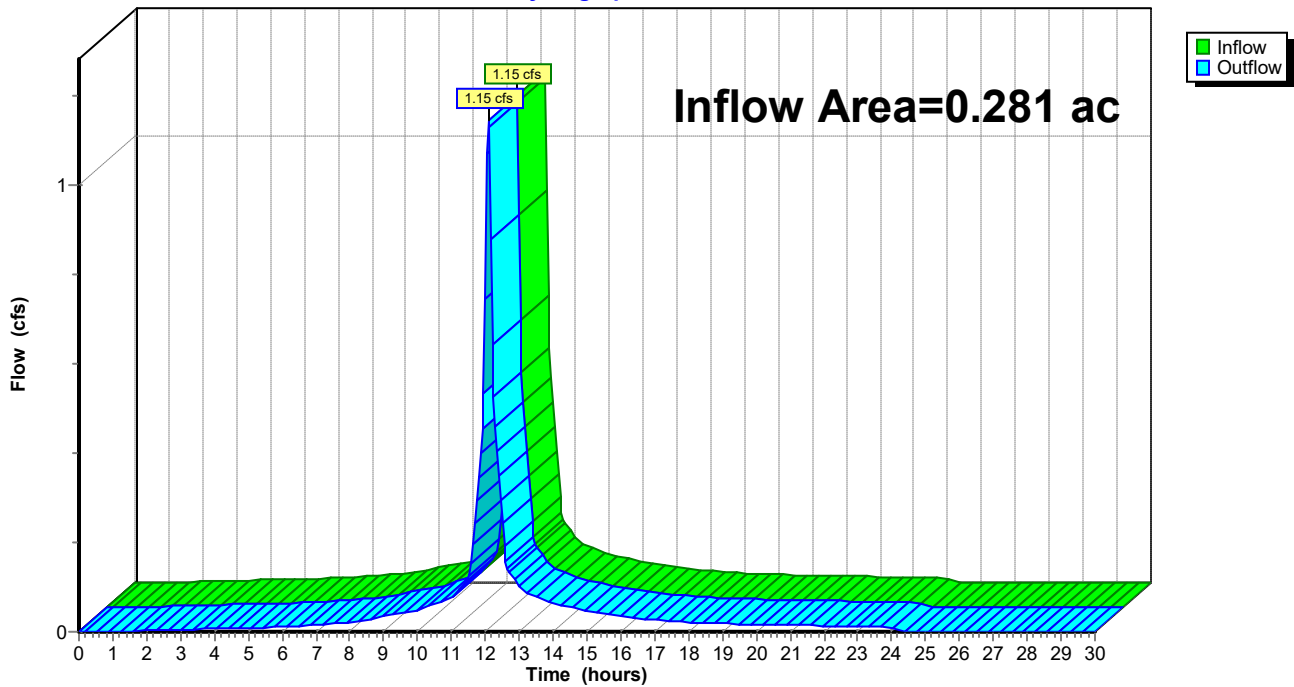
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 1.15 cfs @ 12.08 hrs, Volume= 0.091 af
Outflow = 1.15 cfs @ 12.08 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



Summary for Reach UGS1A: TO UGS#1

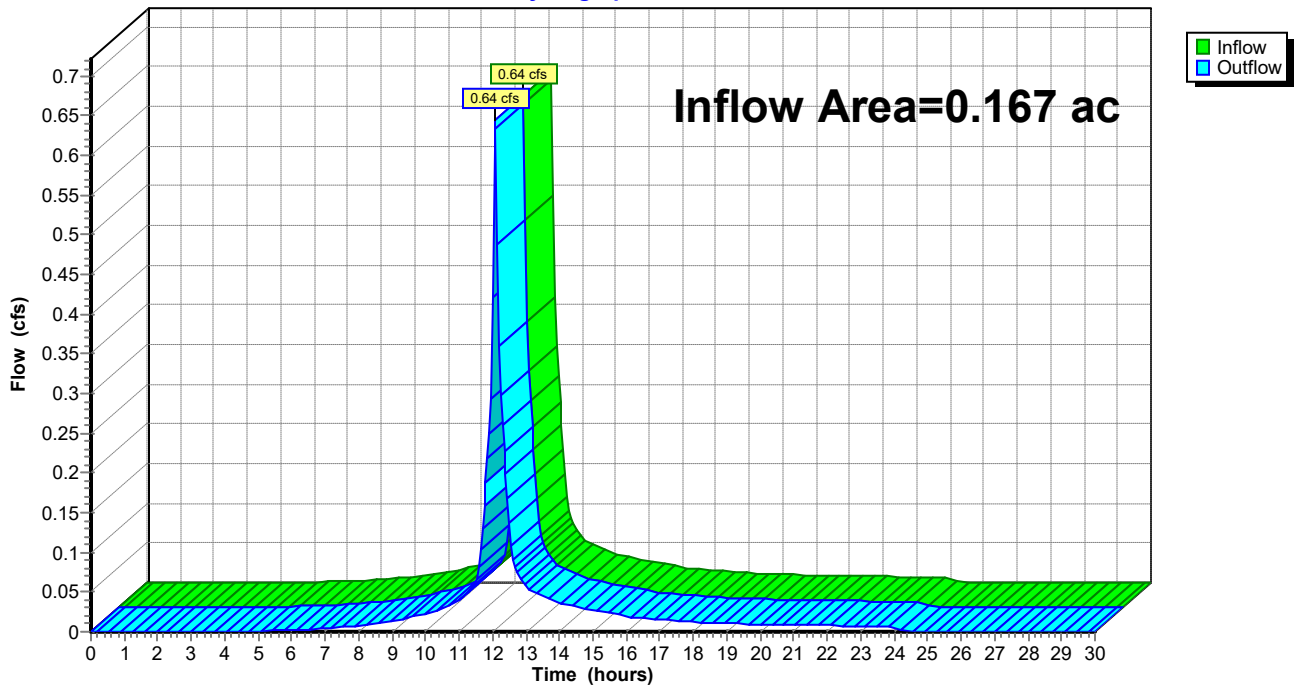
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 3.44" for 10-Year event
Inflow = 0.64 cfs @ 12.08 hrs, Volume= 0.048 af
Outflow = 0.64 cfs @ 12.08 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min
Routed to Pond UGS1 : TO UGS1B

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach UGS1A: TO UGS#1

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Summary for Reach UGS1B: TO FE#1

[52] Hint: Inlet/Outlet conditions not evaluated

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

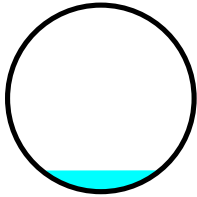
[78] Warning: Submerged Pond UGS1 Primary device # 1 by 0.11'

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 3.44" for 10-Year event
Inflow = 0.21 cfs @ 12.39 hrs, Volume= 0.048 af
Outflow = 0.21 cfs @ 12.39 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.16 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 0.3 min

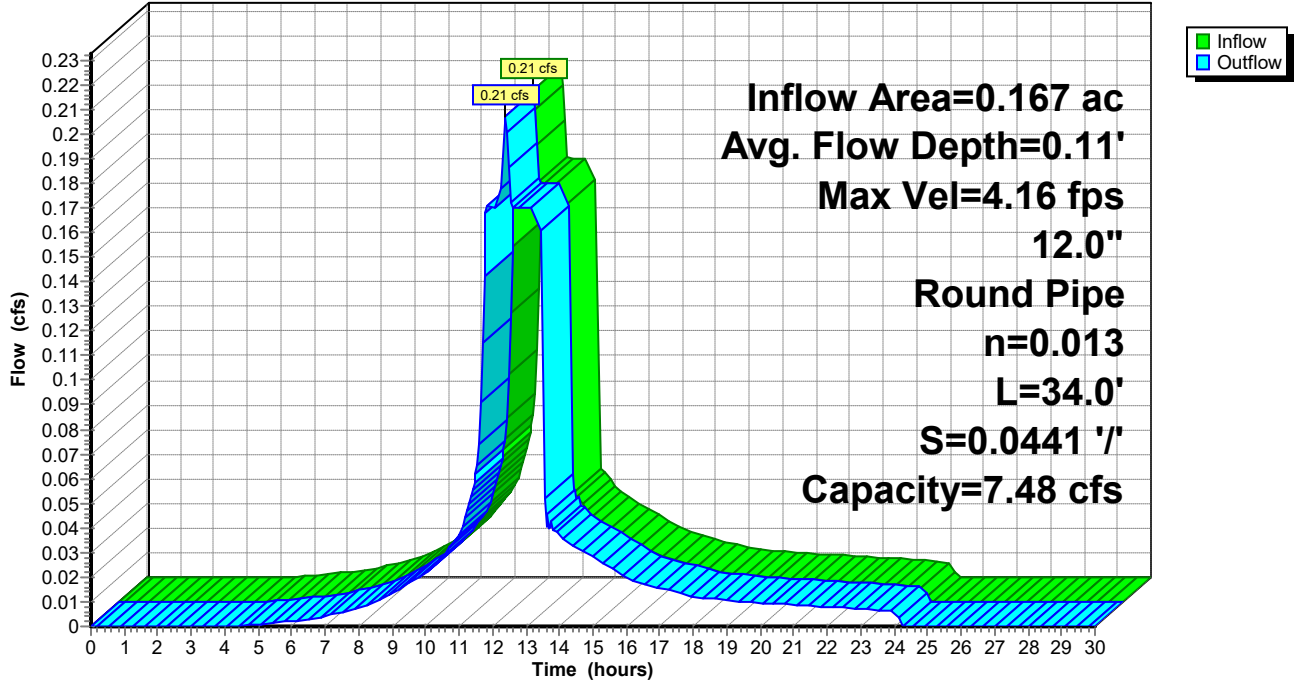
Peak Storage= 2 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 0.64'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.48 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 34.0' Slope= 0.0441 '/'
Inlet Invert= 131.50', Outlet Invert= 130.00'



Reach UGS1B: TO FE#1

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Summary for Pond UGS1: TO UGS1B

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 3.44" for 10-Year event
 Inflow = 0.64 cfs @ 12.08 hrs, Volume= 0.048 af
 Outflow = 0.21 cfs @ 12.39 hrs, Volume= 0.048 af, Atten= 68%, Lag= 18.3 min
 Primary = 0.21 cfs @ 12.39 hrs, Volume= 0.048 af
 Routed to Reach UGS1B : TO FE#1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.09' @ 12.39 hrs Surf.Area= 0.010 ac Storage= 0.009 af

Plug-Flow detention time= 11.8 min calculated for 0.048 af (100% of inflow)
 Center-of-Mass det. time= 11.8 min (804.2 - 792.4)

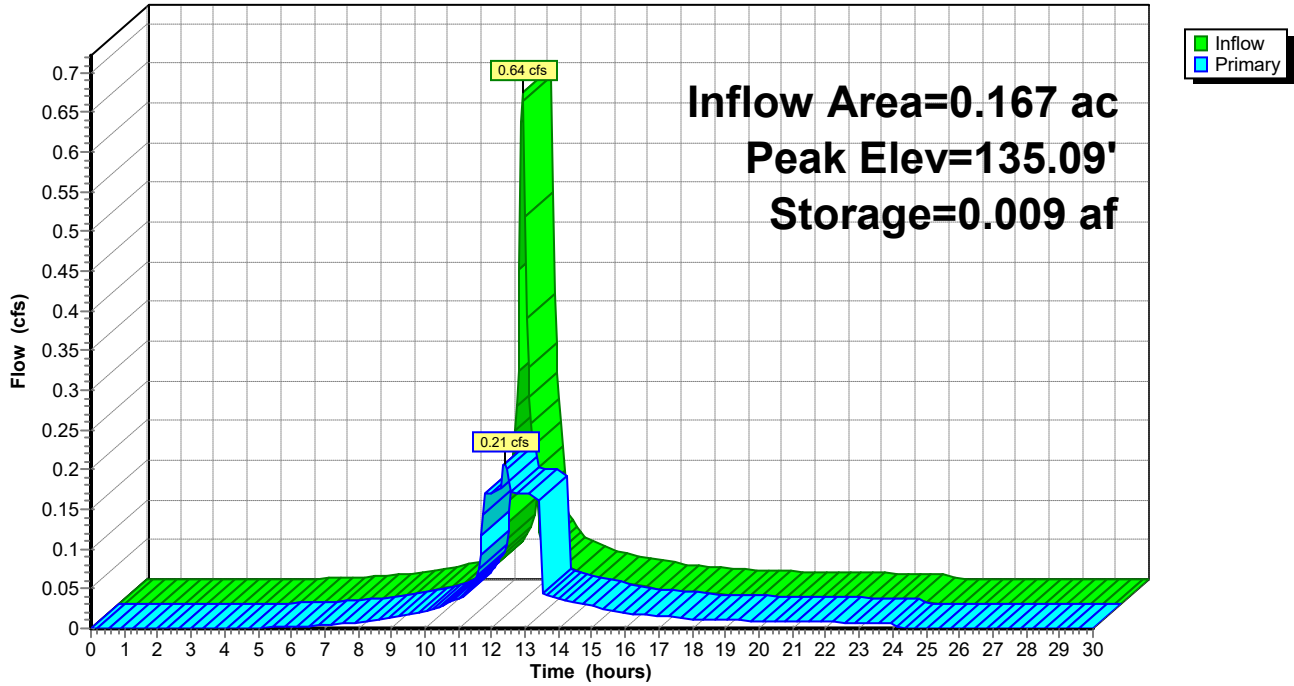
Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.015 af	20.00'W x 14.00'L x 6.00'H Prismaoid 0.039 af Overall x 40.0% Voids
#2	134.00'	0.013 af	Shea Leaching Chamber 4x4x4 x 12 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		0.028 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	131.50'	Special & User-Defined Head (feet) 0.00 1.00 15.00 Disch. (cfs) 0.000 0.170 0.170
#2	Primary	135.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.19 cfs @ 12.39 hrs HW=135.09' (Free Discharge)
 1=Special & User-Defined (Custom Controls 0.17 cfs)
 2=Orifice/Grate (Orifice Controls 0.02 cfs @ 1.02 fps)

Pond UGS1: TO UGS1B

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1: TO WETLAND (DP#1)	Runoff Area=223,130 sf 1.88% Impervious Runoff Depth=2.26" Flow Length=770' Tc=19.9 min CN=70 Runoff=8.98 cfs 0.965 af
Subcatchment p100: TO DCB#100	Runoff Area=988 sf 68.93% Impervious Runoff Depth=4.49" Flow Length=45' Slope=0.0200 '/' Tc=5.0 min CN=93 Runoff=0.11 cfs 0.008 af
Subcatchment p101: TO DCB#101	Runoff Area=6,297 sf 67.94% Impervious Runoff Depth=4.17" Flow Length=151' Tc=5.0 min CN=90 Runoff=0.68 cfs 0.050 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,320 sf 87.67% Impervious Runoff Depth=4.72" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=1.67 cfs 0.129 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=2.88" Flow Length=356' Tc=5.0 min CN=77 Runoff=6.38 cfs 0.453 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=4.60" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.96 cfs 0.073 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=5.06" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.27 cfs 0.022 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=5.06" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.66 cfs 0.054 af
Subcatchment p7: TO DCB-E	Runoff Area=4,439 sf 64.11% Impervious Runoff Depth=3.95" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.46 cfs 0.034 af
Reach DCB-B: TO OUTFALL	Inflow=0.96 cfs 0.073 af Outflow=0.96 cfs 0.073 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.17' Max Vel=12.76 fps Inflow=1.37 cfs 0.109 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.37 cfs 0.109 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.21' Max Vel=7.58 fps Inflow=1.12 cfs 0.087 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.10 cfs 0.087 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.21' Max Vel=3.82 fps Inflow=0.46 cfs 0.034 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.46 cfs 0.034 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.09' Max Vel=3.19 fps Inflow=0.11 cfs 0.008 af 12.0" Round Pipe n=0.013 L=127.0' S=0.0354 '/' Capacity=6.71 cfs Outflow=0.11 cfs 0.008 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.29' Max Vel=3.59 fps Inflow=0.68 cfs 0.050 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/' Capacity=3.76 cfs Outflow=0.67 cfs 0.050 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.23' Max Vel=5.79 fps Inflow=0.78 cfs 0.059 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/' Capacity=6.90 cfs Outflow=0.78 cfs 0.059 af

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Reach DP#1: WETLAND	Inflow=10.73 cfs 1.206 af Outflow=10.73 cfs 1.206 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.67 cfs 0.129 af Outflow=1.67 cfs 0.129 af
Reach DP#3: LOW POINT	Inflow=6.38 cfs 0.453 af Outflow=6.38 cfs 0.453 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.95 fps Inflow=0.96 cfs 0.073 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=0.92 cfs 0.073 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.85 fps Inflow=0.92 cfs 0.073 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=0.82 cfs 0.073 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.09' Max Vel=0.60 fps Inflow=0.82 cfs 0.073 af n=0.080 L=23.0' S=0.0304 '/' Capacity=64.61 cfs Outflow=0.80 cfs 0.073 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.09' Max Vel=0.25 fps Inflow=0.80 cfs 0.073 af n=0.080 L=128.0' S=0.0050 '/' Capacity=45.22 cfs Outflow=0.67 cfs 0.073 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.08' Max Vel=1.08 fps Inflow=1.53 cfs 0.168 af n=0.080 L=285.0' S=0.1035 '/' Capacity=119.16 cfs Outflow=1.38 cfs 0.168 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.19' Max Vel=0.41 fps Inflow=1.38 cfs 0.168 af n=0.080 L=81.0' S=0.0051 '/' Capacity=26.35 cfs Outflow=1.33 cfs 0.168 af
Reach OUTLET: TO DP#1	Inflow=1.37 cfs 0.109 af Outflow=1.37 cfs 0.109 af
Reach UGS1A: TO UGS#1	Inflow=0.78 cfs 0.059 af Outflow=0.78 cfs 0.059 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.15' Max Vel=5.02 fps Inflow=0.38 cfs 0.059 af 12.0" Round Pipe n=0.013 L=34.0' S=0.0441 '/' Capacity=7.48 cfs Outflow=0.39 cfs 0.059 af
Pond UGS1: TO UGS1B	Peak Elev=135.29' Storage=0.010 af Inflow=0.78 cfs 0.059 af Outflow=0.38 cfs 0.059 af

Total Runoff Area = 7.980 ac Runoff Volume = 1.788 af Average Runoff Depth = 2.69"
85.11% Pervious = 6.792 ac 14.89% Impervious = 1.188 ac

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Summary for Subcatchment P1: TO WETLAND (DP#1)

Runoff = 8.98 cfs @ 12.29 hrs, Volume= 0.965 af, Depth= 2.26"
 Routed to Reach DP#1 : WETLAND

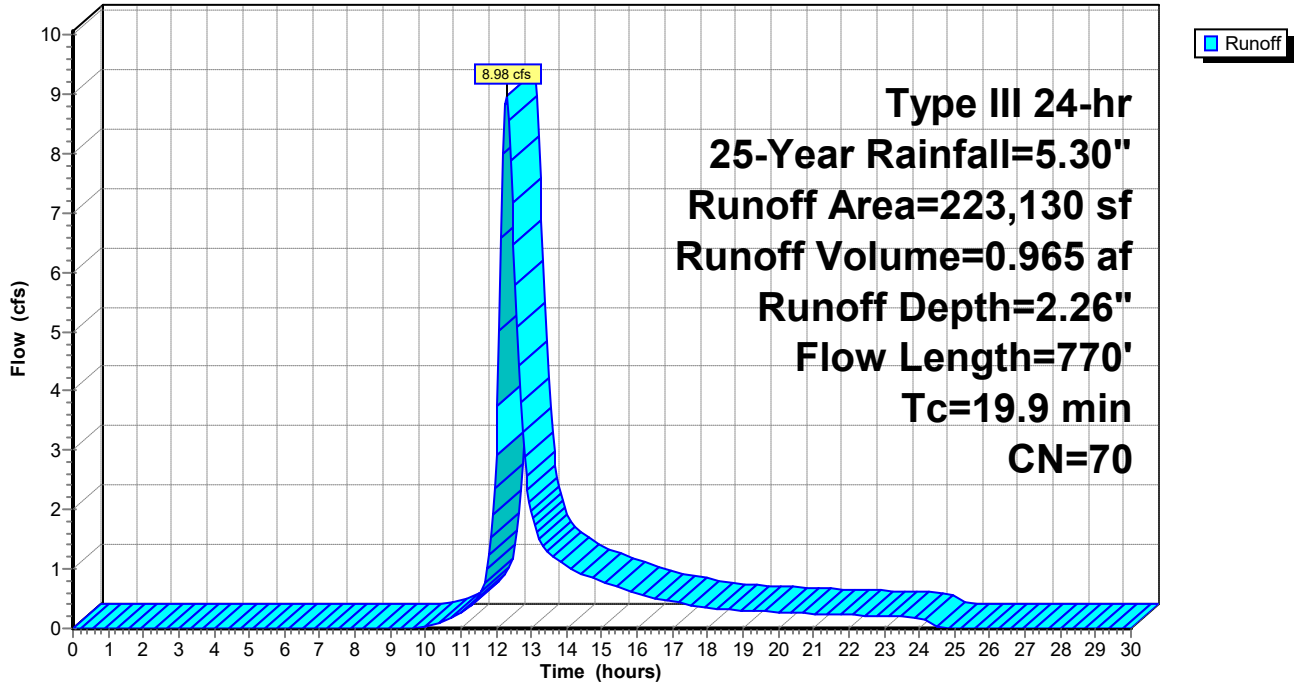
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
3,458	74	>75% Grass cover, Good, HSG C
177,279	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,702	89	Gravel roads, HSG C
31,497	65	Brush, Good, HSG C
223,130	70	Weighted Average
218,936		98.12% Pervious Area
4,194		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment P1: TO WETLAND (DP#1)

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Subcatchment p100: TO DCB#100

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af, Depth= 4.49"
 Routed to Reach DCB100 : TO DMH#100

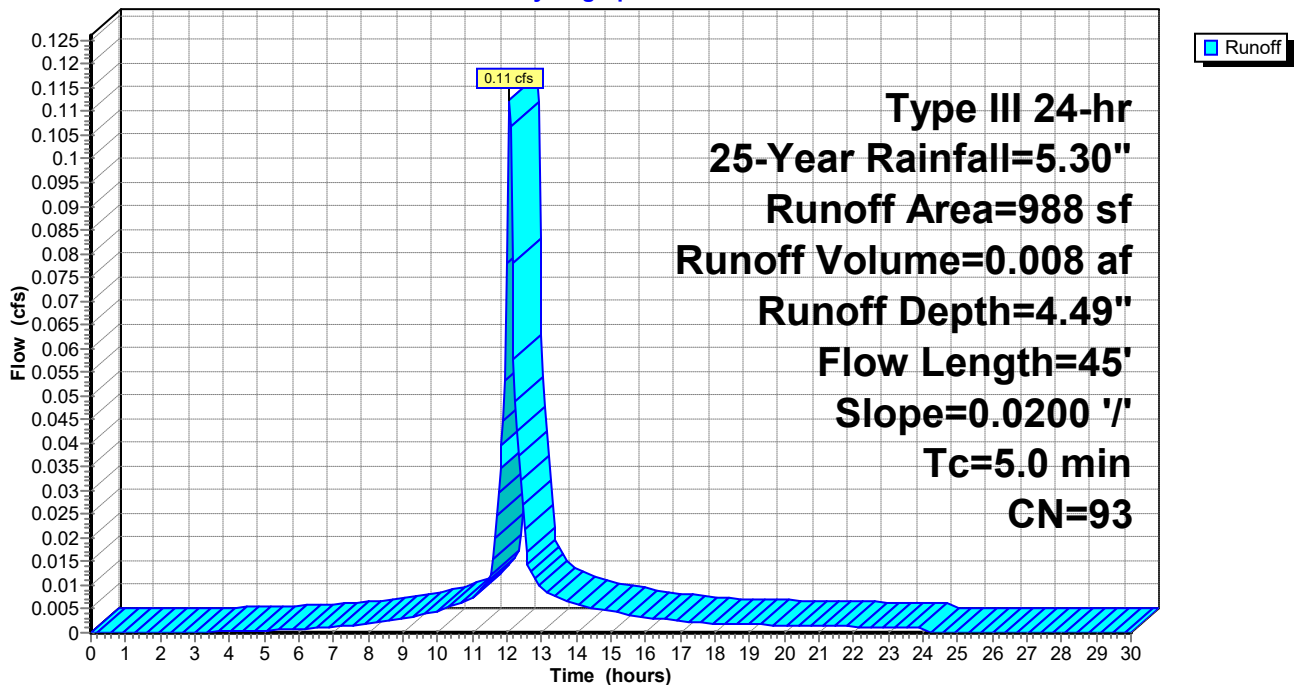
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
210	74	>75% Grass cover, Good, HSG C
681	98	Paved parking, HSG C
97	96	Gravel surface, HSG C
988	93	Weighted Average
307		31.07% Pervious Area
681		68.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.6	40	0.0200	1.11		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.5	45	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p100: TO DCB#100

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Subcatchment p101: TO DCB#101

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.68 cfs @ 12.07 hrs, Volume= 0.050 af, Depth= 4.17"
 Routed to Reach DCB101 : TO DMH#100

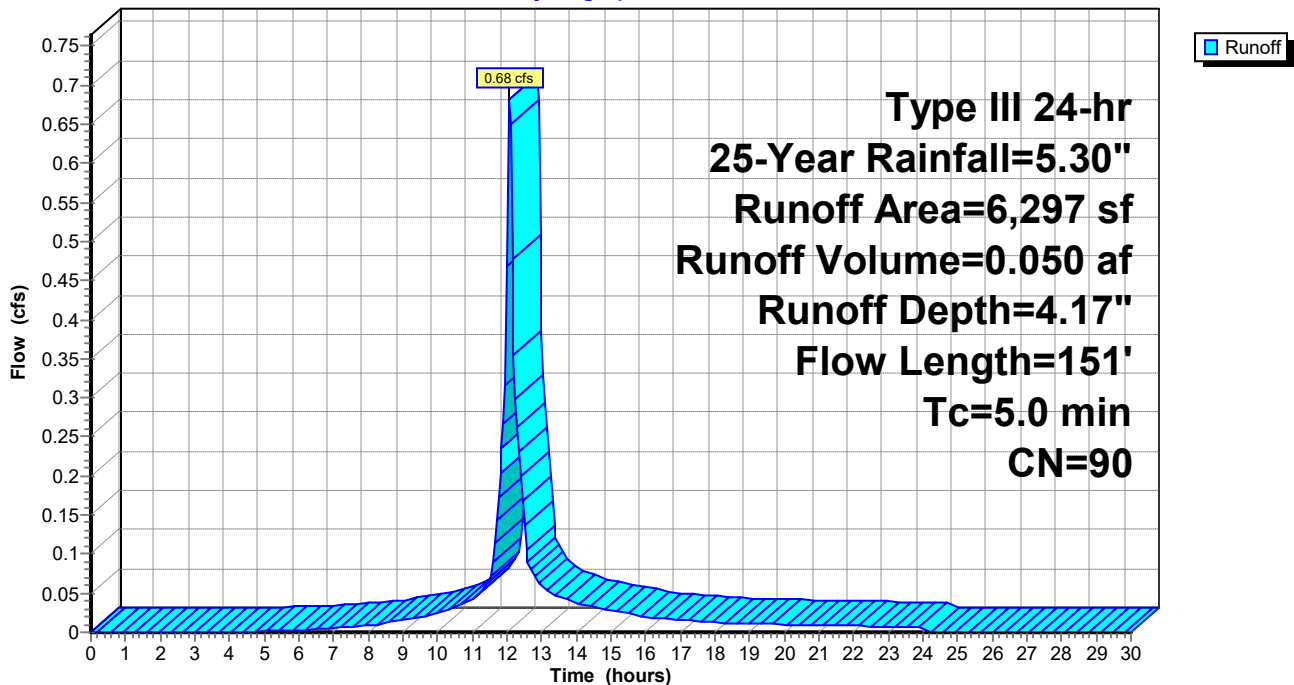
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
2,019	74	>75% Grass cover, Good, HSG C
4,278	98	Paved parking, HSG C
6,297	90	Weighted Average
2,019		32.06% Pervious Area
4,278		67.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.5	45	0.0400	1.50		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.4	101	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.8	151	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p101: TO DCB#101

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Subcatchment p2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.67 cfs @ 12.07 hrs, Volume= 0.129 af, Depth= 4.72"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

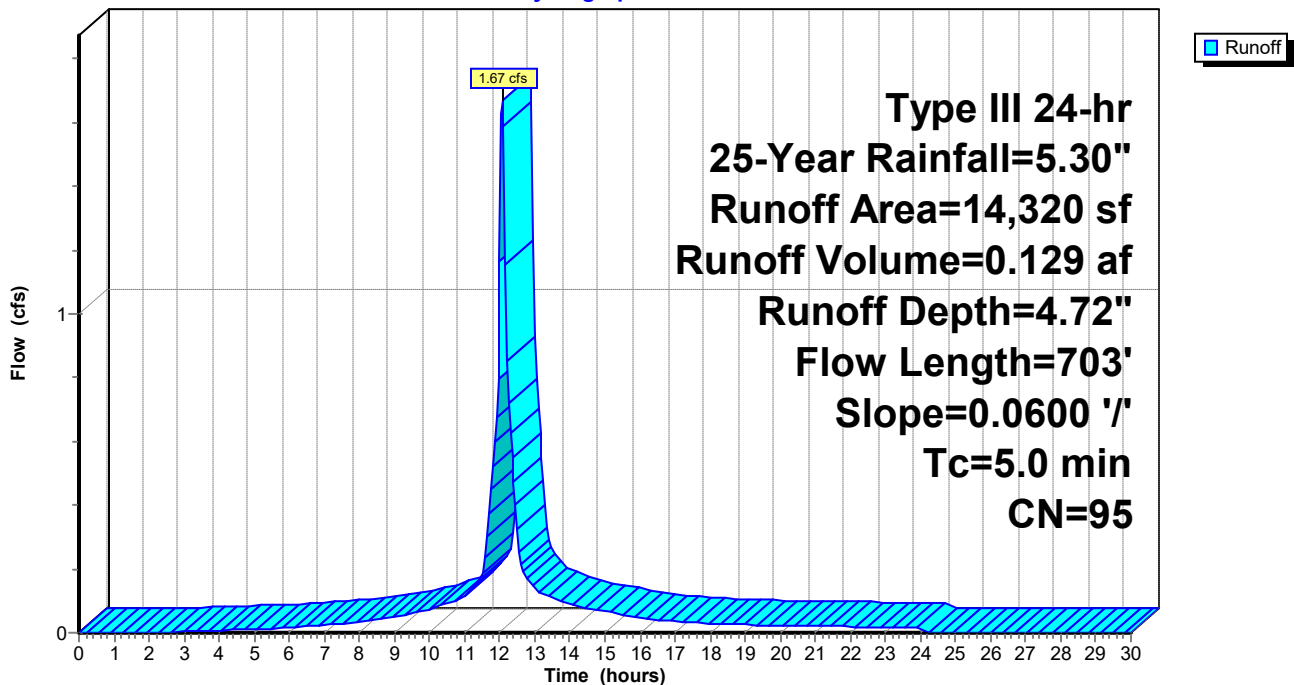
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,221	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,555	98	Paved parking, HSG C
14,320	95	Weighted Average
1,765		12.33% Pervious Area
12,555		87.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p2: TO CATCHBASIN (DP#2)

Hydrograph



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Summary for Subcatchment p3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

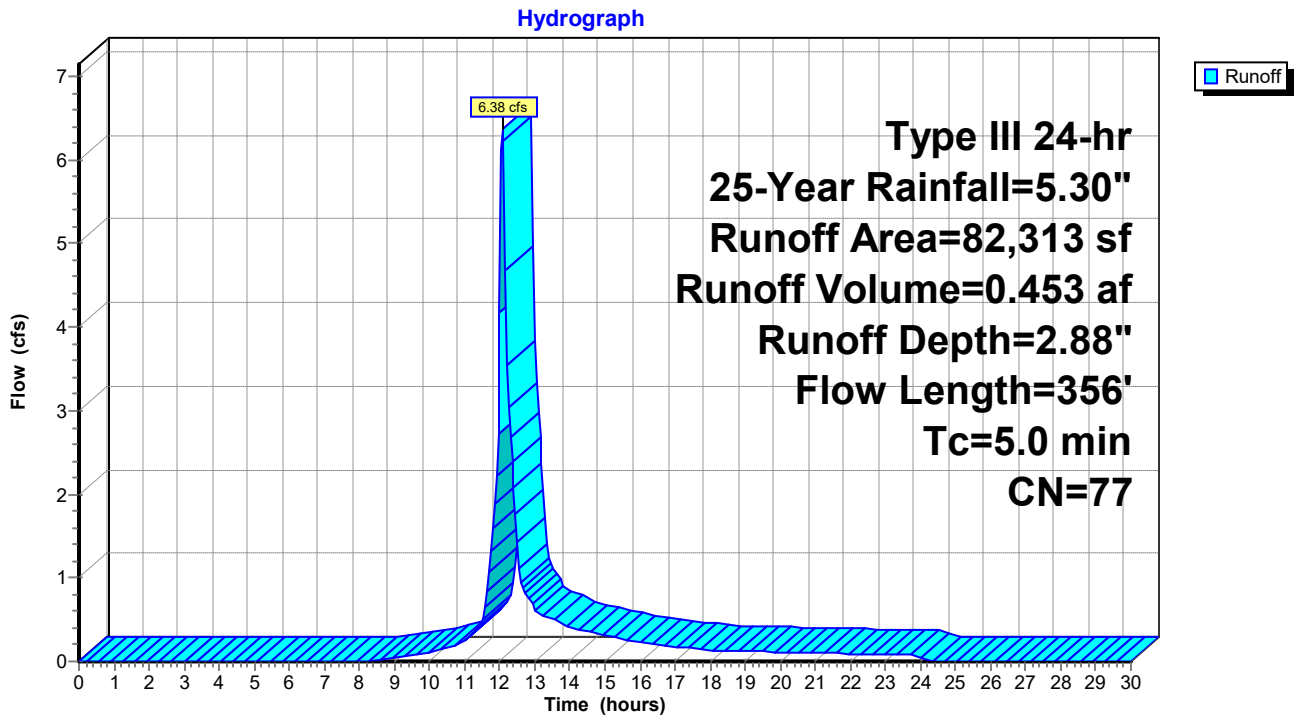
Runoff = 6.38 cfs @ 12.08 hrs, Volume= 0.453 af, Depth= 2.88"
 Routed to Reach DP#3 : LOW POINT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p3: TO LOW POINT (DP#3)



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Summary for Subcatchment P4: TO DCB-B

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af, Depth= 4.60"
 Routed to Reach DCB-B : TO OUTFALL

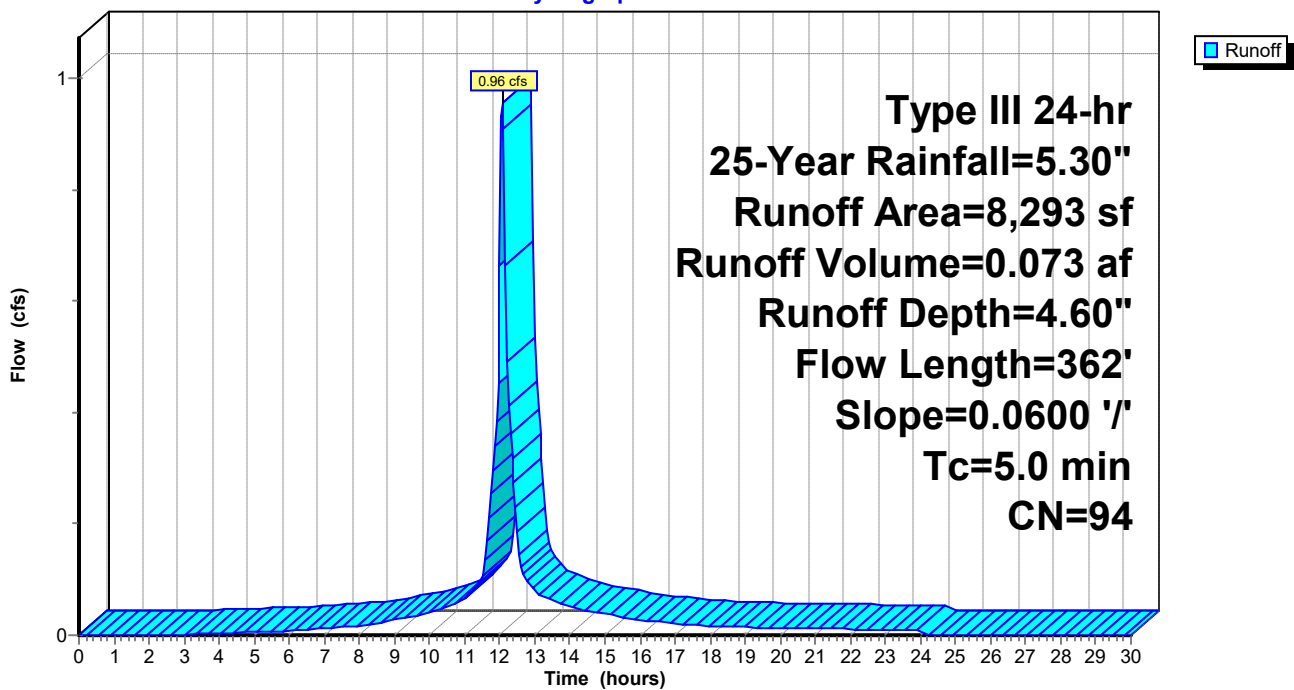
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	362	Total, Increased to minimum Tc = 5.0 min			

Subcatchment P4: TO DCB-B

Hydrograph



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Summary for Subcatchment p5: TO DCB-C

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.27 cfs @ 12.07 hrs, Volume= 0.022 af, Depth= 5.06"
 Routed to Reach DCB-C : TO OUTFALL

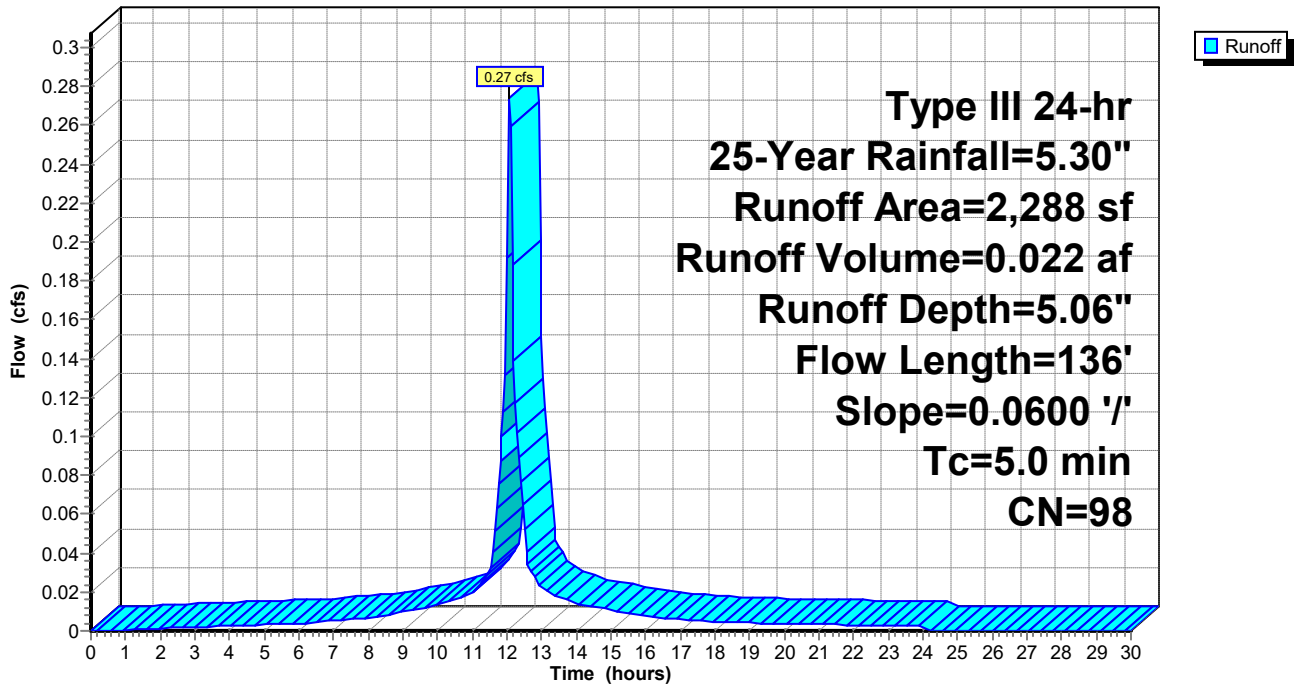
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p5: TO DCB-C

Hydrograph



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Summary for Subcatchment p6: TO DCB-D

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.66 cfs @ 12.07 hrs, Volume= 0.054 af, Depth= 5.06"
 Routed to Reach DCB-D : TO DCB-C

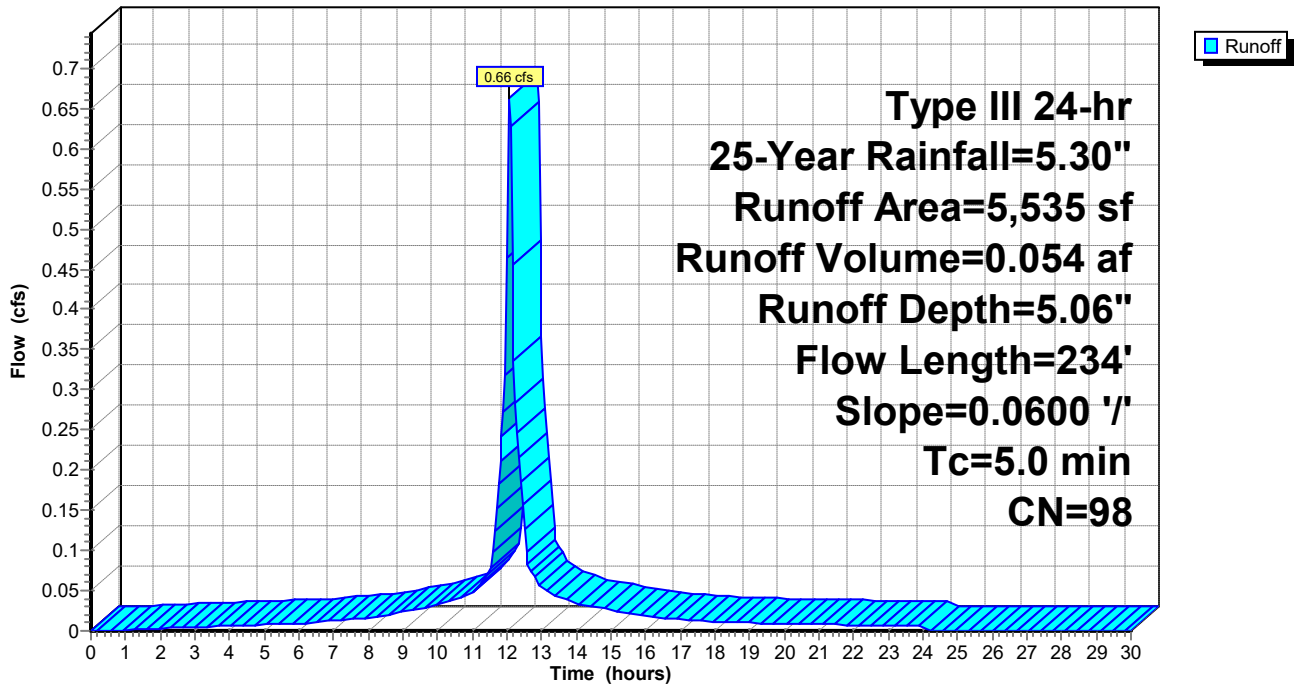
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p6: TO DCB-D

Hydrograph



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Summary for Subcatchment p7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.46 cfs @ 12.07 hrs, Volume= 0.034 af, Depth= 3.95"
 Routed to Reach DCB-E : TO DCB-D

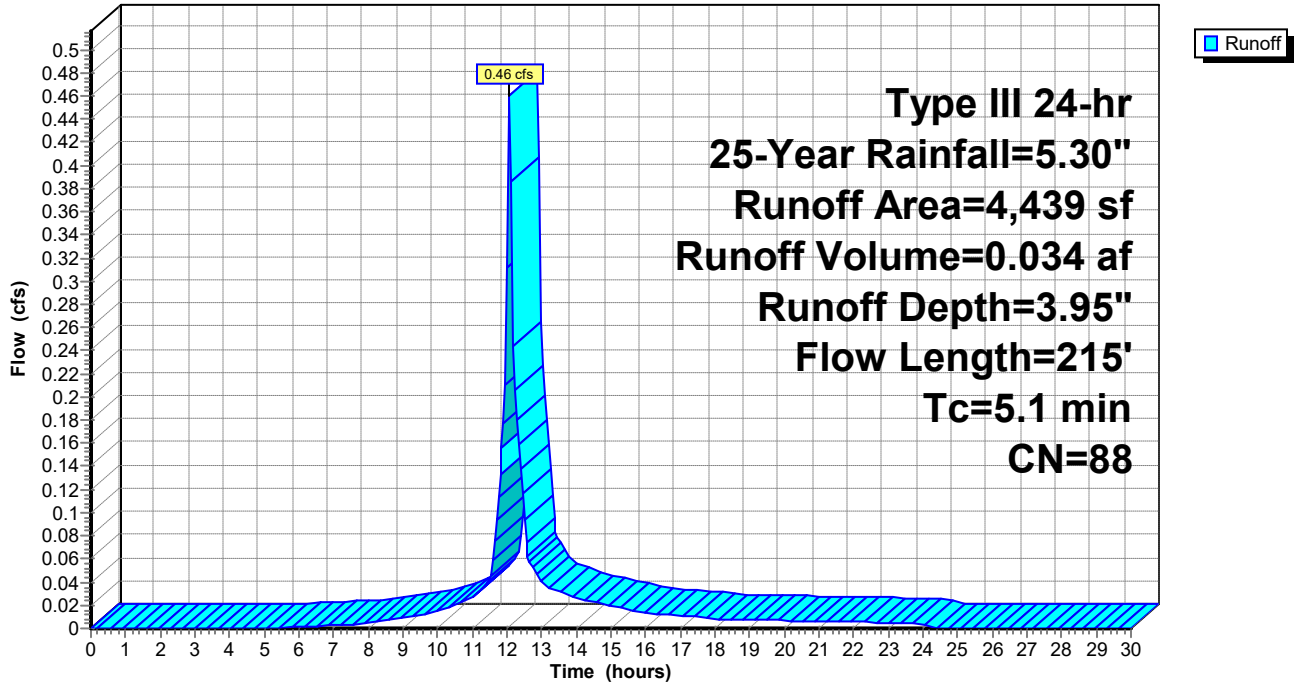
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,576	70	Woods, Good, HSG C
2,846	98	Paved parking, HSG C
17	74	>75% Grass cover, Good, HSG C
4,439	88	Weighted Average
1,593		35.89% Pervious Area
2,846		64.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment p7: TO DCB-E

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Reach DCB-B: TO OUTFALL

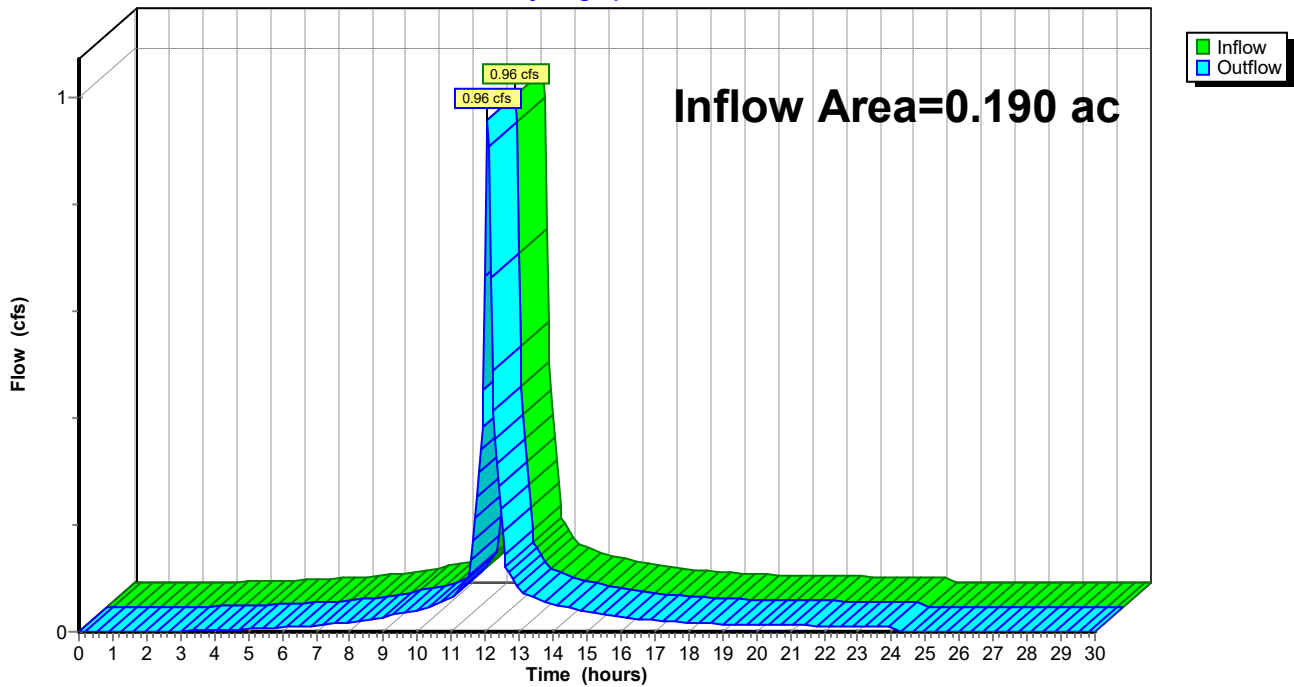
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af
Outflow = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



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Summary for Reach DCB-C: TO OUTFALL

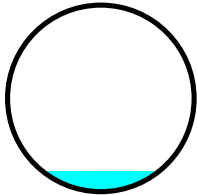
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 4.66" for 25-Year event
Inflow = 1.37 cfs @ 12.08 hrs, Volume= 0.109 af
Outflow = 1.37 cfs @ 12.08 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.76 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.21 fps, Avg. Travel Time= 0.3 min

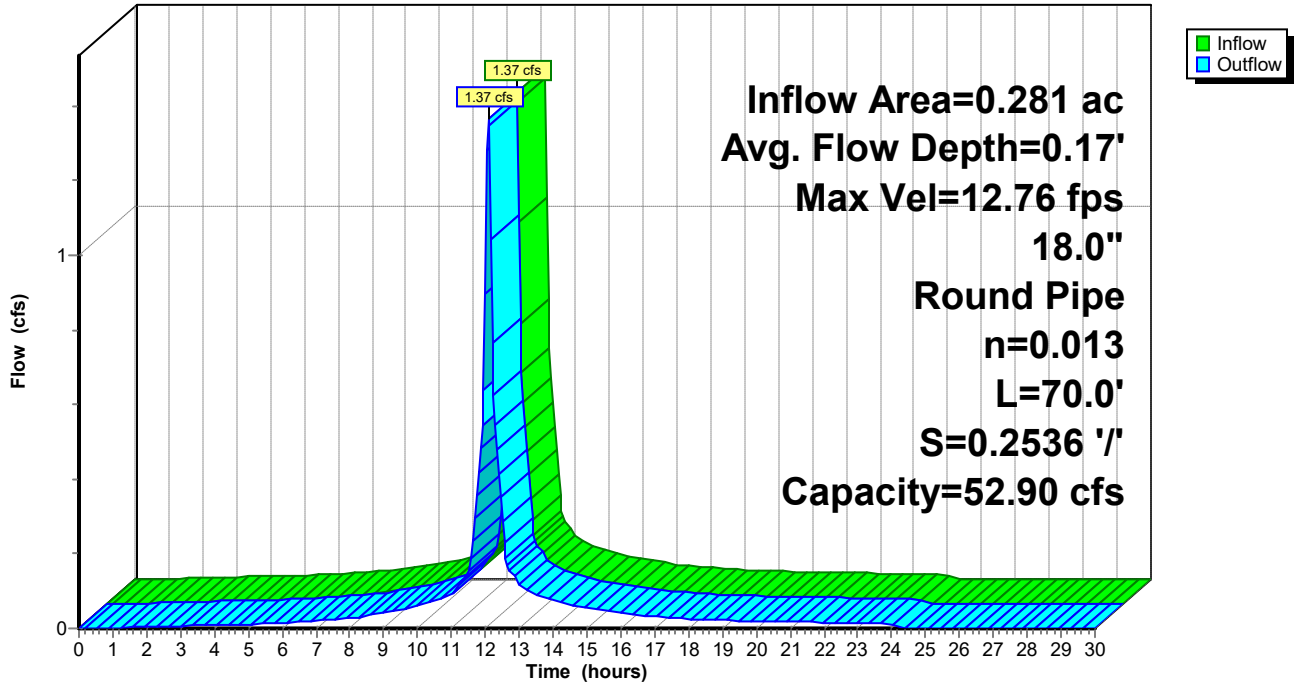
Peak Storage= 8 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 0.94'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



Reach DCB-C: TO OUTFALL

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

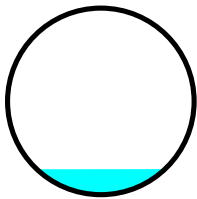
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.10' @ 12.10 hrs

Inflow Area = 0.229 ac, 84.03% Impervious, Inflow Depth = 4.57" for 25-Year event
Inflow = 1.12 cfs @ 12.07 hrs, Volume= 0.087 af
Outflow = 1.10 cfs @ 12.08 hrs, Volume= 0.087 af, Atten= 1%, Lag= 0.5 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.58 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.45 fps, Avg. Travel Time= 0.8 min

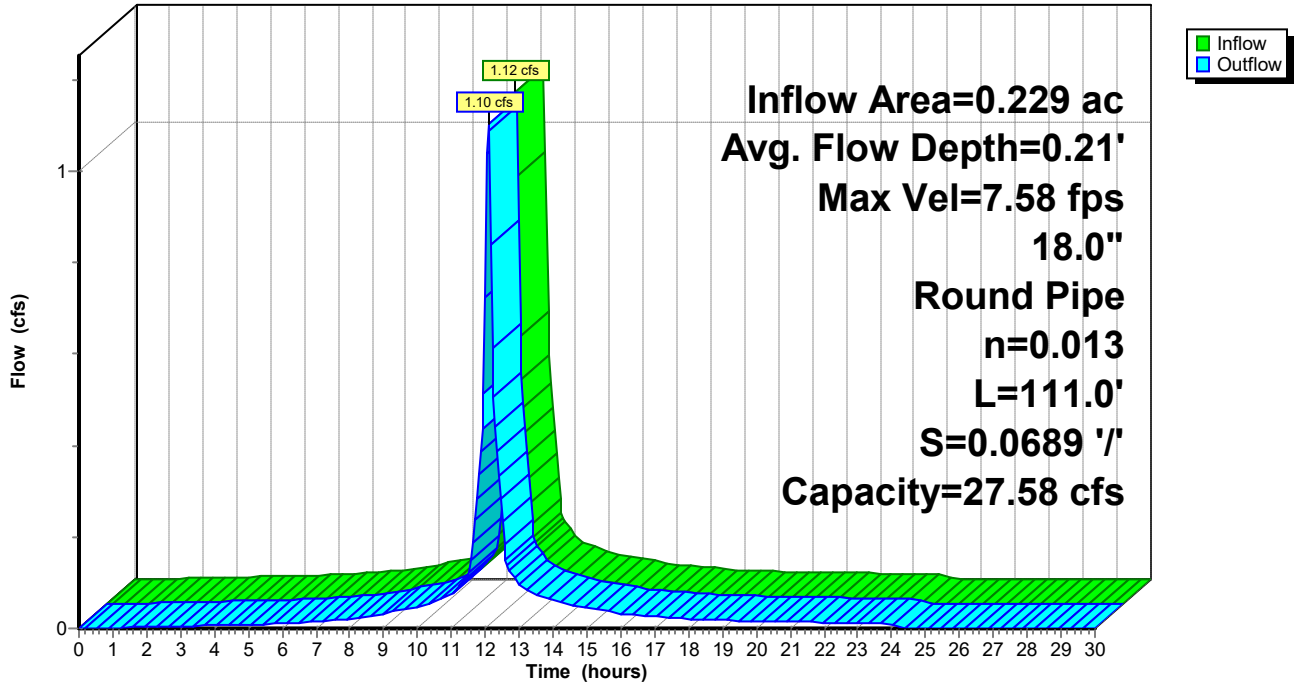
Peak Storage= 16 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 1.03'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



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Summary for Reach DCB-E: TO DCB-D

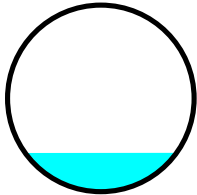
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.102 ac, 64.11% Impervious, Inflow Depth = 3.95" for 25-Year event
Inflow = 0.46 cfs @ 12.07 hrs, Volume= 0.034 af
Outflow = 0.46 cfs @ 12.08 hrs, Volume= 0.034 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.82 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 0.5 min

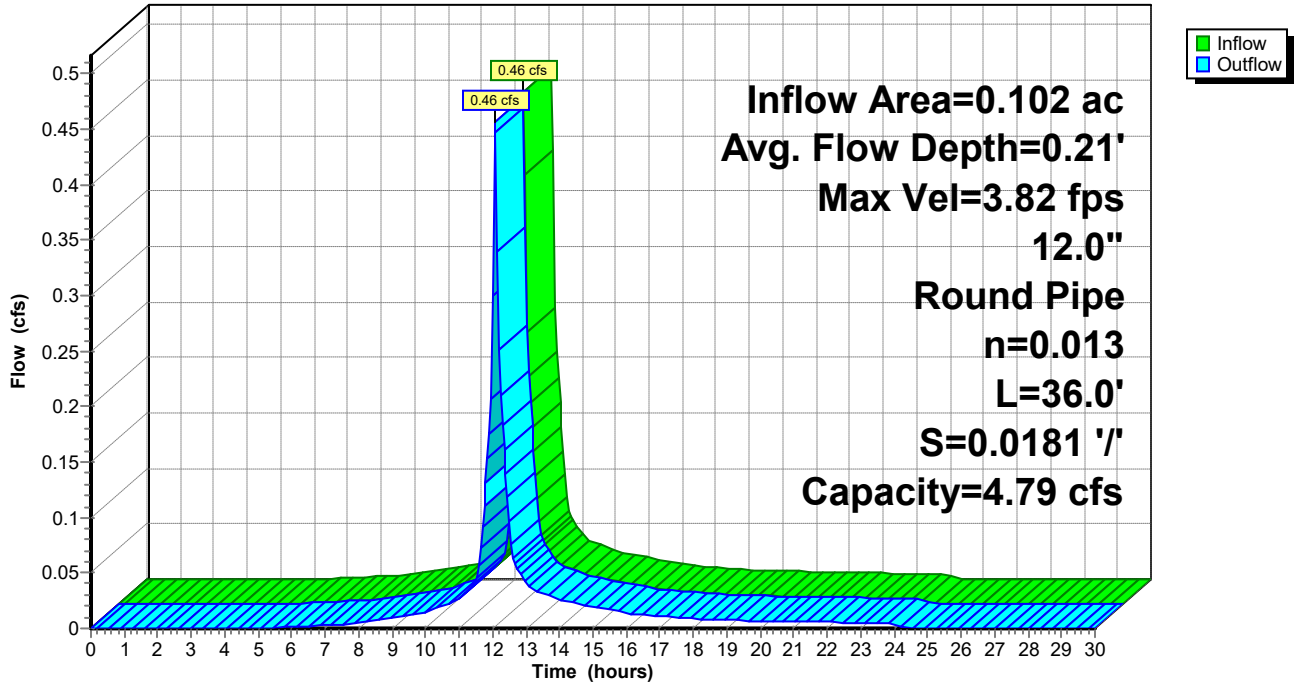
Peak Storage= 4 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 0.81'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/'
Inlet Invert= 140.85', Outlet Invert= 140.20'



Reach DCB-E: TO DCB-D

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.30"

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Summary for Reach DCB100: TO DMH#100

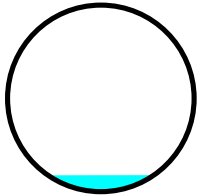
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.023 ac, 68.93% Impervious, Inflow Depth = 4.49" for 25-Year event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af
Outflow = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Atten= 3%, Lag= 1.3 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.19 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.08 fps, Avg. Travel Time= 2.0 min

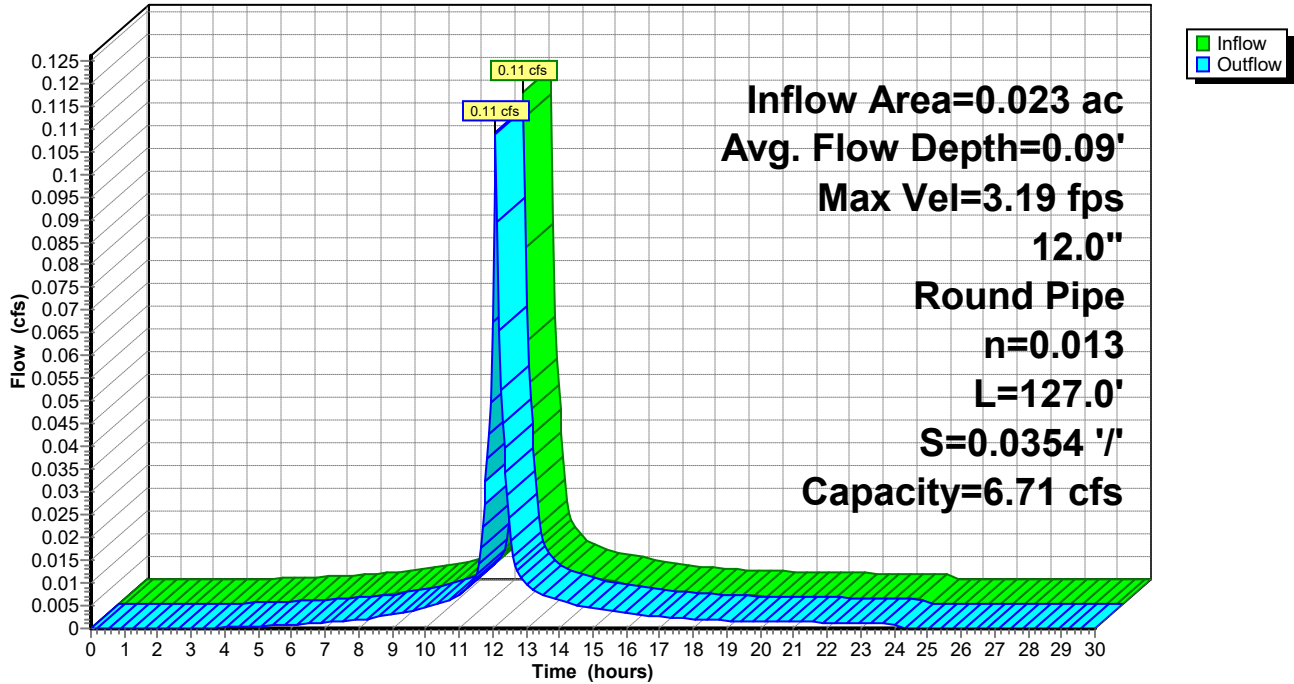
Peak Storage= 4 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 0.57'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.71 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 127.0' Slope= 0.0354 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'



Reach DCB100: TO DMH#100

Hydrograph



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Summary for Reach DCB101: TO DMH#100

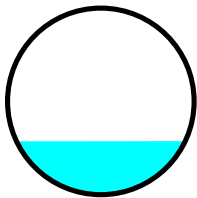
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.145 ac, 67.94% Impervious, Inflow Depth = 4.17" for 25-Year event
Inflow = 0.68 cfs @ 12.07 hrs, Volume= 0.050 af
Outflow = 0.67 cfs @ 12.08 hrs, Volume= 0.050 af, Atten= 1%, Lag= 0.4 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.59 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.19 fps, Avg. Travel Time= 0.5 min

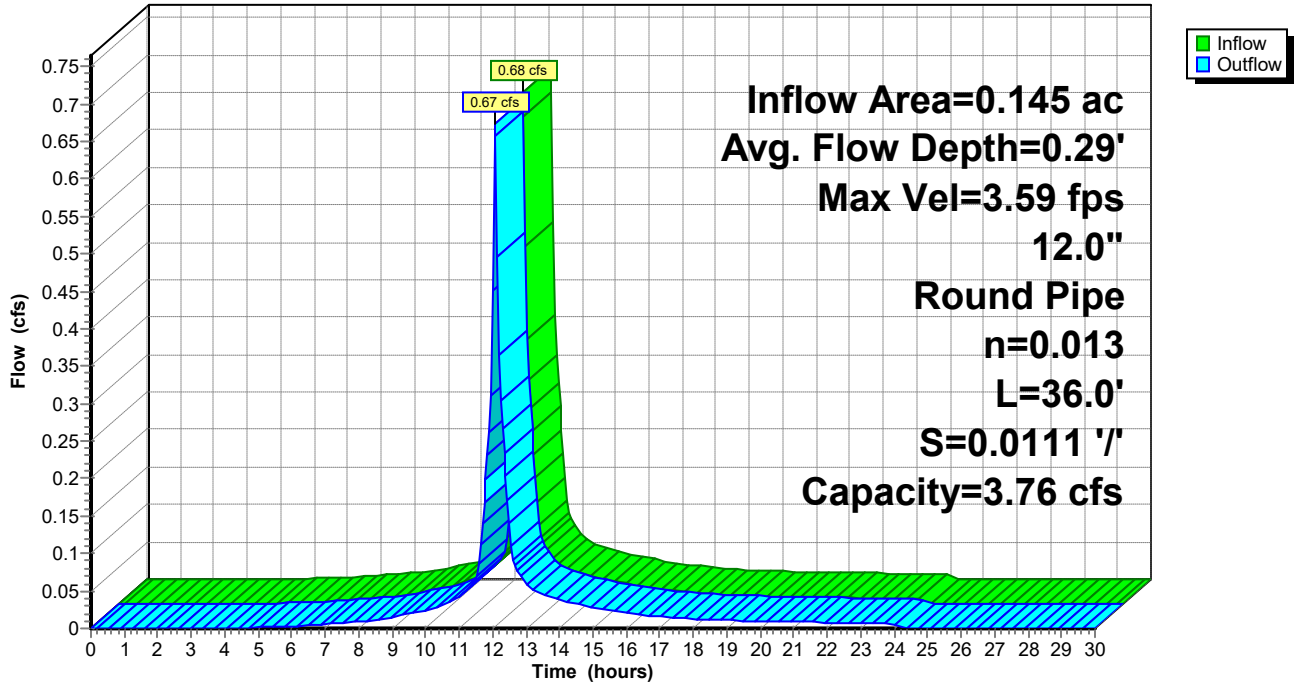
Peak Storage= 7 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 0.91'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0111 '/'
Inlet Invert= 136.40', Outlet Invert= 136.00'



Reach DCB101: TO DMH#100

Hydrograph



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Summary for Reach DMH100: TO UGS#1A

[52] Hint: Inlet/Outlet conditions not evaluated

[61] Hint: Exceeded Reach DCB100 outlet invert by 0.03' @ 12.10 hrs

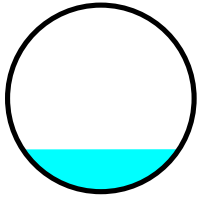
[61] Hint: Exceeded Reach DCB101 outlet invert by 0.03' @ 12.10 hrs

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 4.21" for 25-Year event
Inflow = 0.78 cfs @ 12.08 hrs, Volume= 0.059 af
Outflow = 0.78 cfs @ 12.08 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min
Routed to Reach UGS1A : TO UGS#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.79 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.88 fps, Avg. Travel Time= 0.1 min

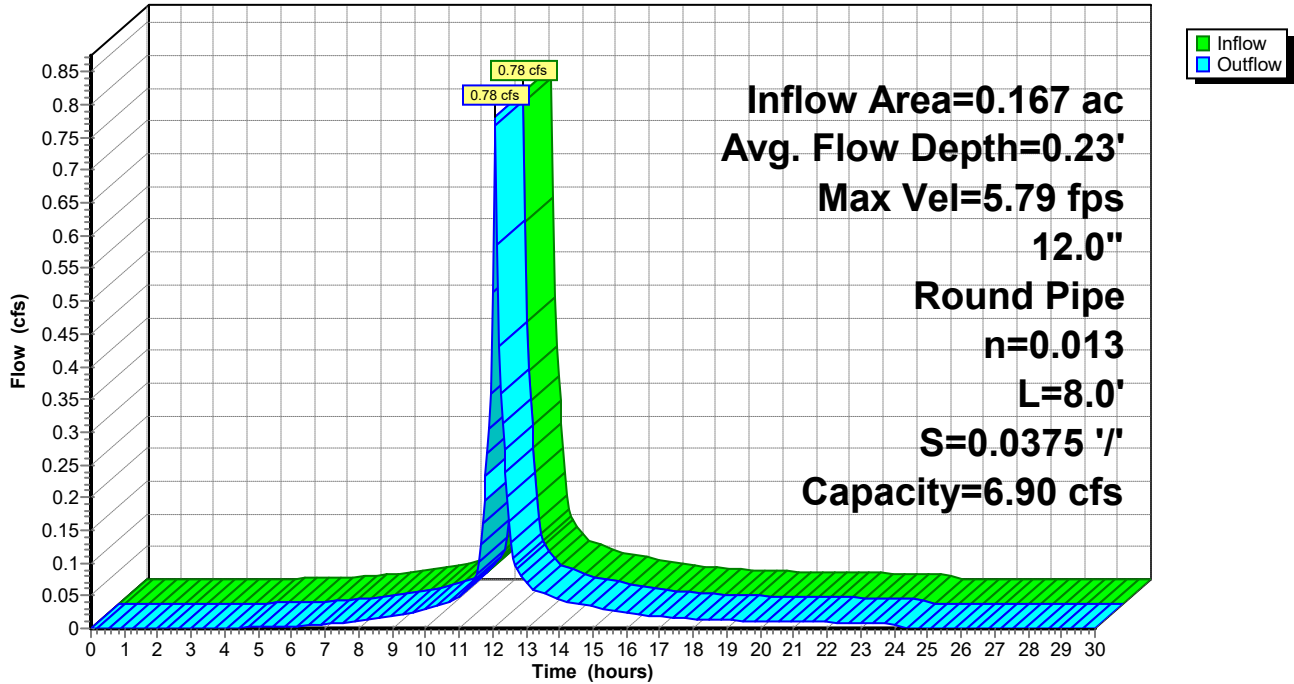
Peak Storage= 1 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 0.84'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.0' Slope= 0.0375 '/
Inlet Invert= 135.80', Outlet Invert= 135.50'



Reach DMH100: TO UGS#1A

Hydrograph

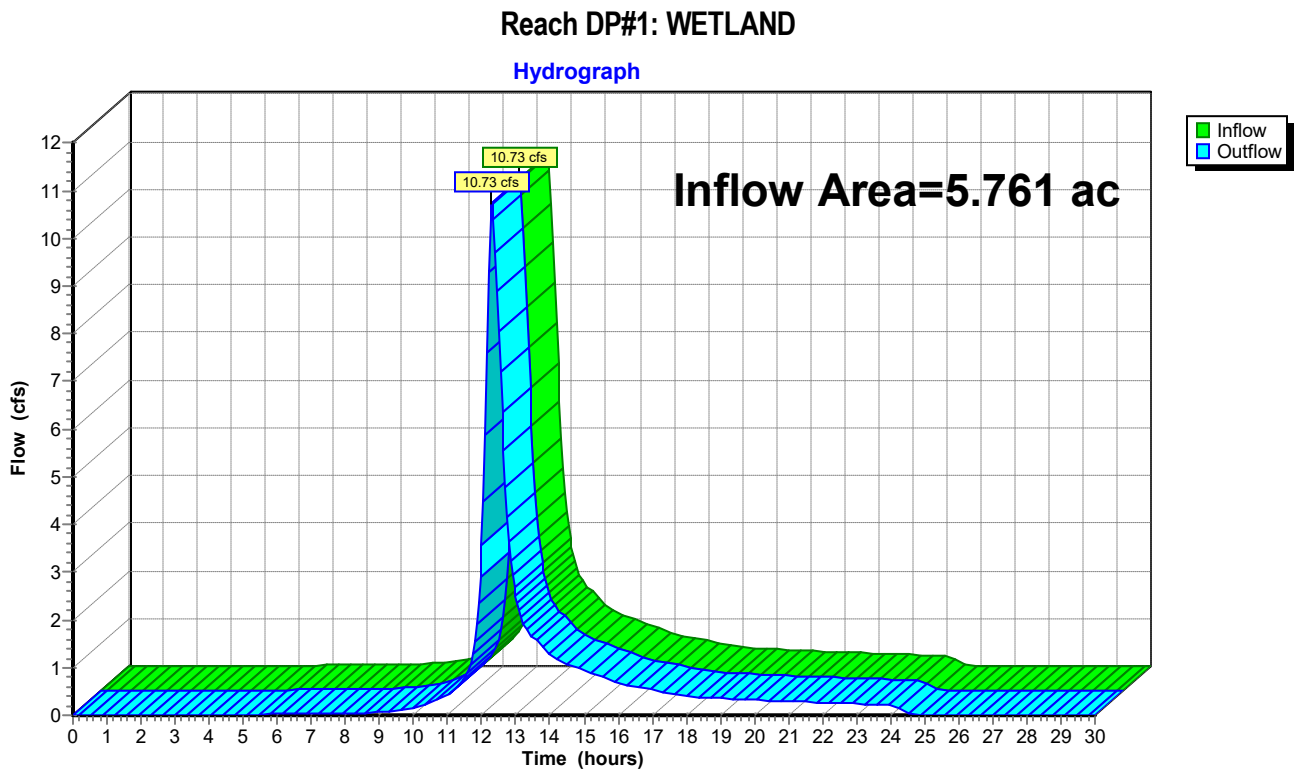


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.761 ac, 10.66% Impervious, Inflow Depth = 2.51" for 25-Year event
Inflow = 10.73 cfs @ 12.30 hrs, Volume= 1.206 af
Outflow = 10.73 cfs @ 12.30 hrs, Volume= 1.206 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

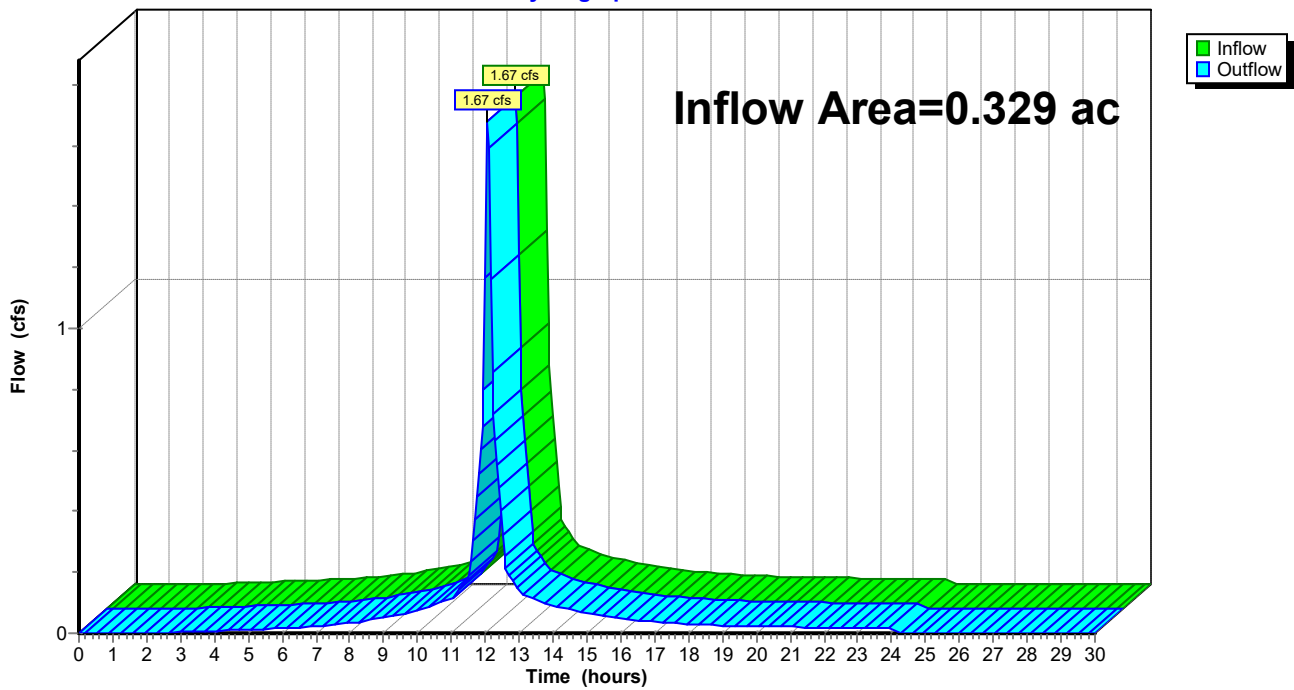
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.67% Impervious, Inflow Depth = 4.72" for 25-Year event
Inflow = 1.67 cfs @ 12.07 hrs, Volume= 0.129 af
Outflow = 1.67 cfs @ 12.07 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

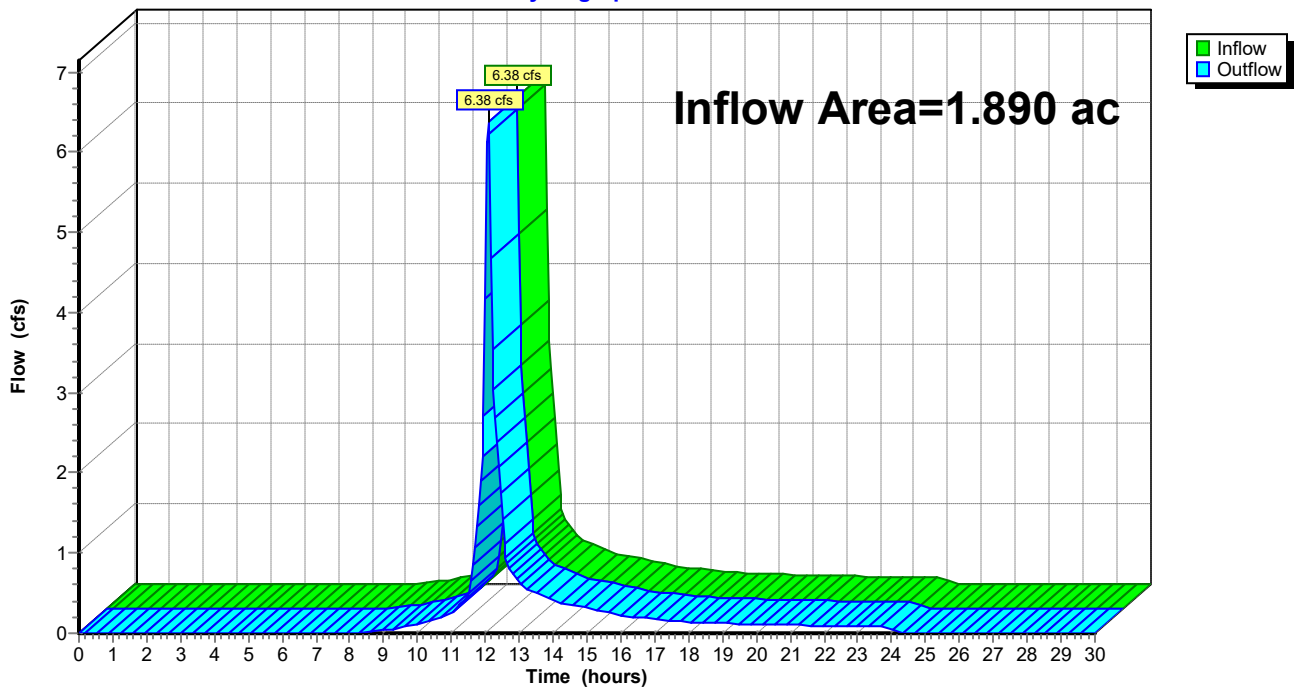
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 2.88" for 25-Year event
Inflow = 6.38 cfs @ 12.08 hrs, Volume= 0.453 af
Outflow = 6.38 cfs @ 12.08 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
 Inflow = 0.96 cfs @ 12.07 hrs, Volume= 0.073 af
 Outflow = 0.92 cfs @ 12.10 hrs, Volume= 0.073 af, Atten= 3%, Lag= 1.5 min
 Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.95 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 2.5 min

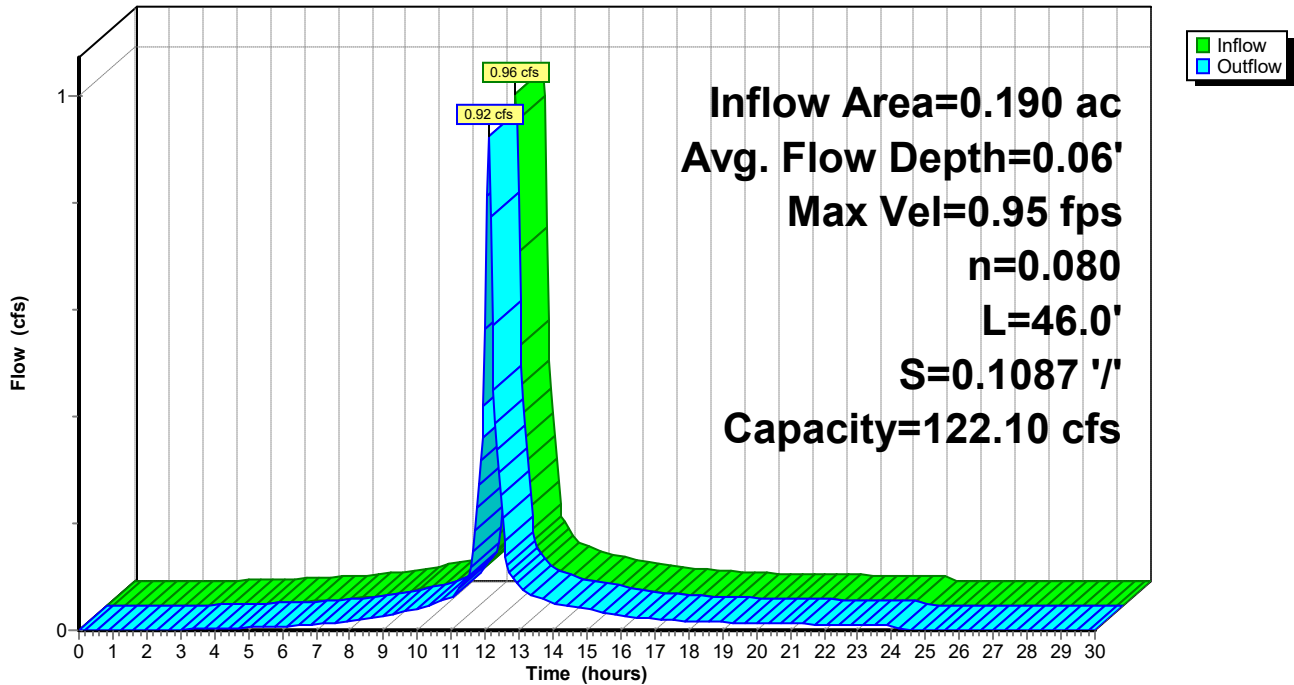
Peak Storage= 46 cf @ 12.08 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.28'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
 Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
 Length= 46.0' Slope= 0.1087 ' / '
 Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



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Summary for Reach OL-2: OVERLAND

[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.92 cfs @ 12.10 hrs, Volume= 0.073 af
Outflow = 0.82 cfs @ 12.21 hrs, Volume= 0.073 af, Atten= 12%, Lag= 6.7 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 12.6 min

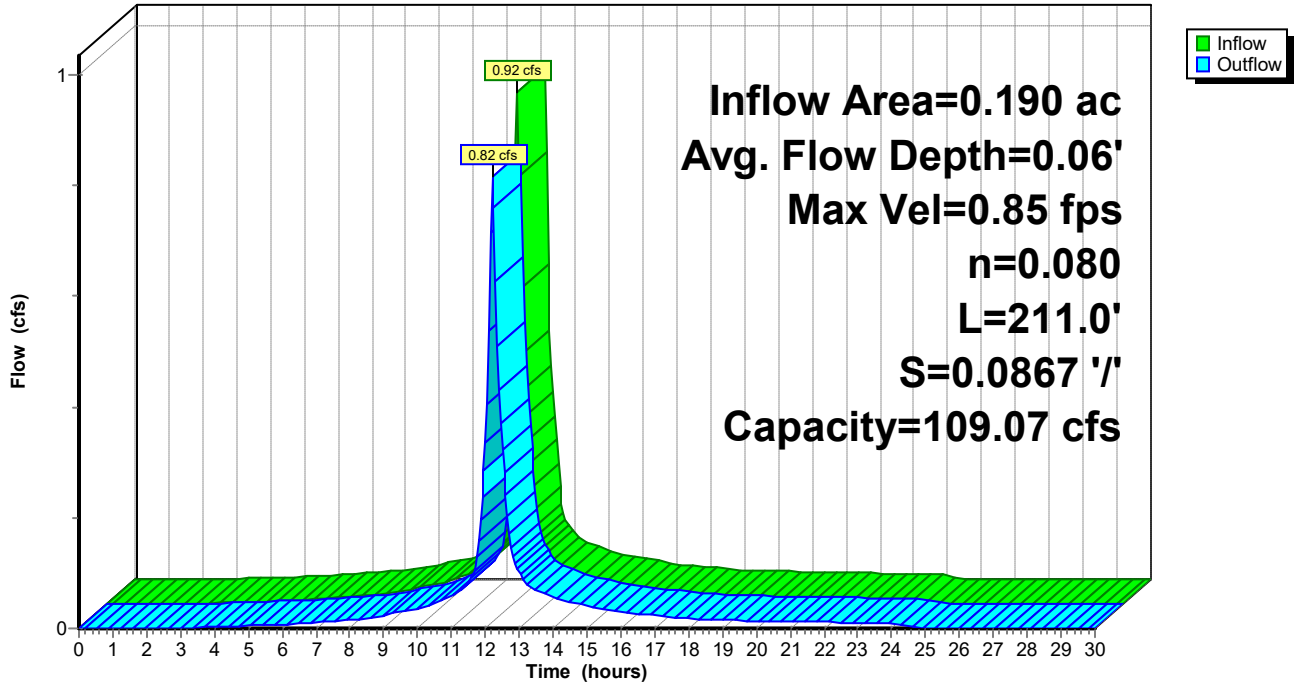
Peak Storage= 209 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.26'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



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Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.03' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.82 cfs @ 12.21 hrs, Volume= 0.073 af
Outflow = 0.80 cfs @ 12.22 hrs, Volume= 0.073 af, Atten= 2%, Lag= 1.0 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.60 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 2.1 min

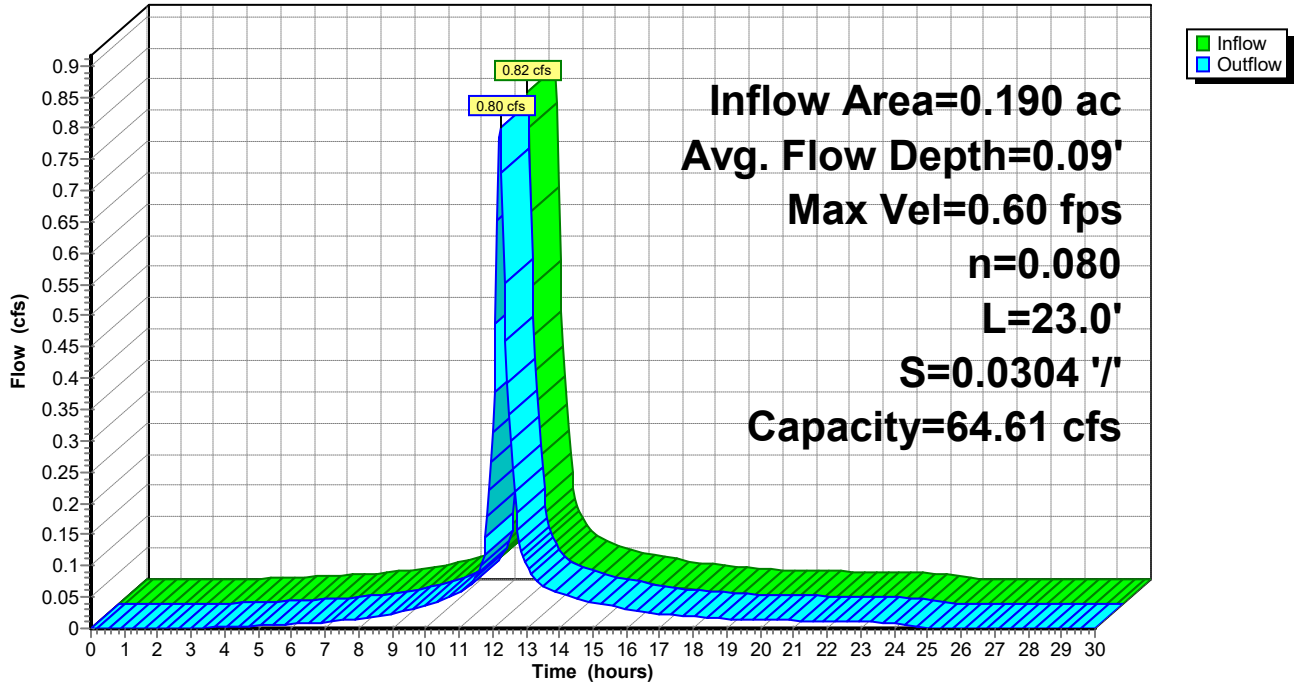
Peak Storage= 31 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 16.70'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' / '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



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Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.02' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.60" for 25-Year event
Inflow = 0.80 cfs @ 12.22 hrs, Volume= 0.073 af
Outflow = 0.67 cfs @ 12.45 hrs, Volume= 0.073 af, Atten= 16%, Lag= 13.3 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.25 fps, Min. Travel Time= 8.4 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 28.7 min

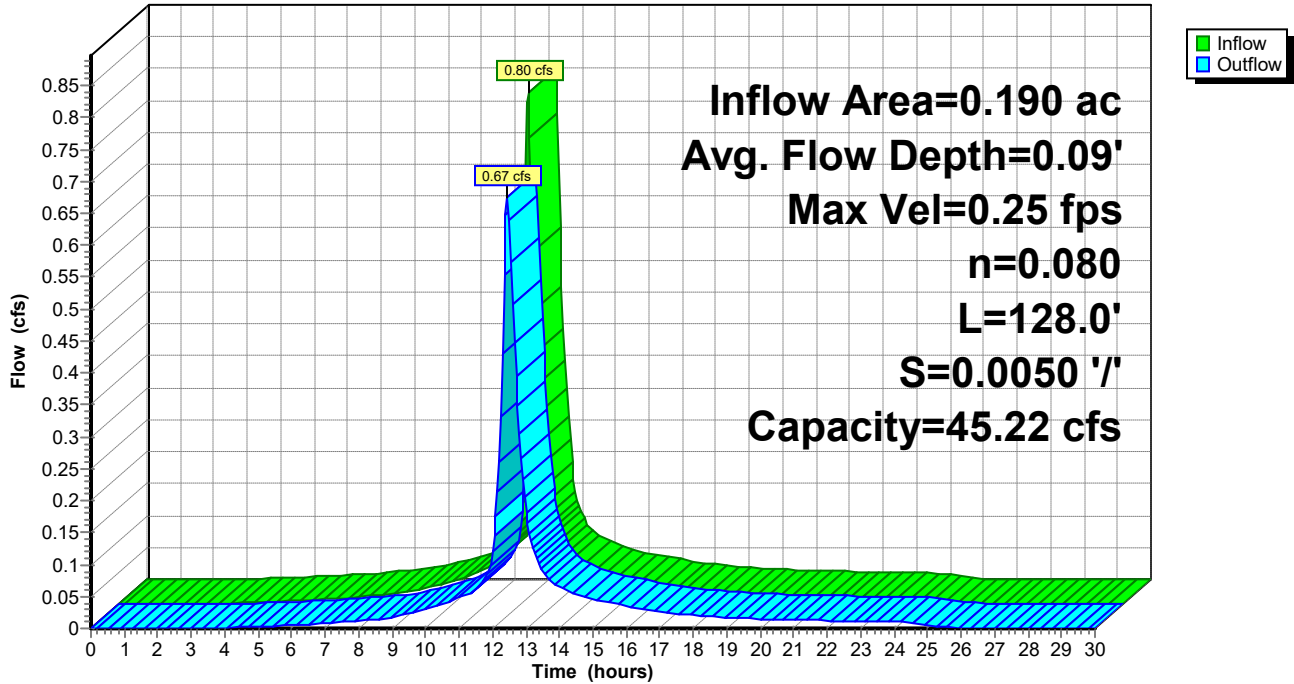
Peak Storage= 344 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 31.74'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 ' '
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



Summary for Reach OL-5: OVERLAND

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 4.49" for 25-Year event
Inflow = 1.53 cfs @ 12.09 hrs, Volume= 0.168 af
Outflow = 1.38 cfs @ 12.21 hrs, Volume= 0.168 af, Atten= 10%, Lag= 7.4 min
Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.08 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 13.9 min

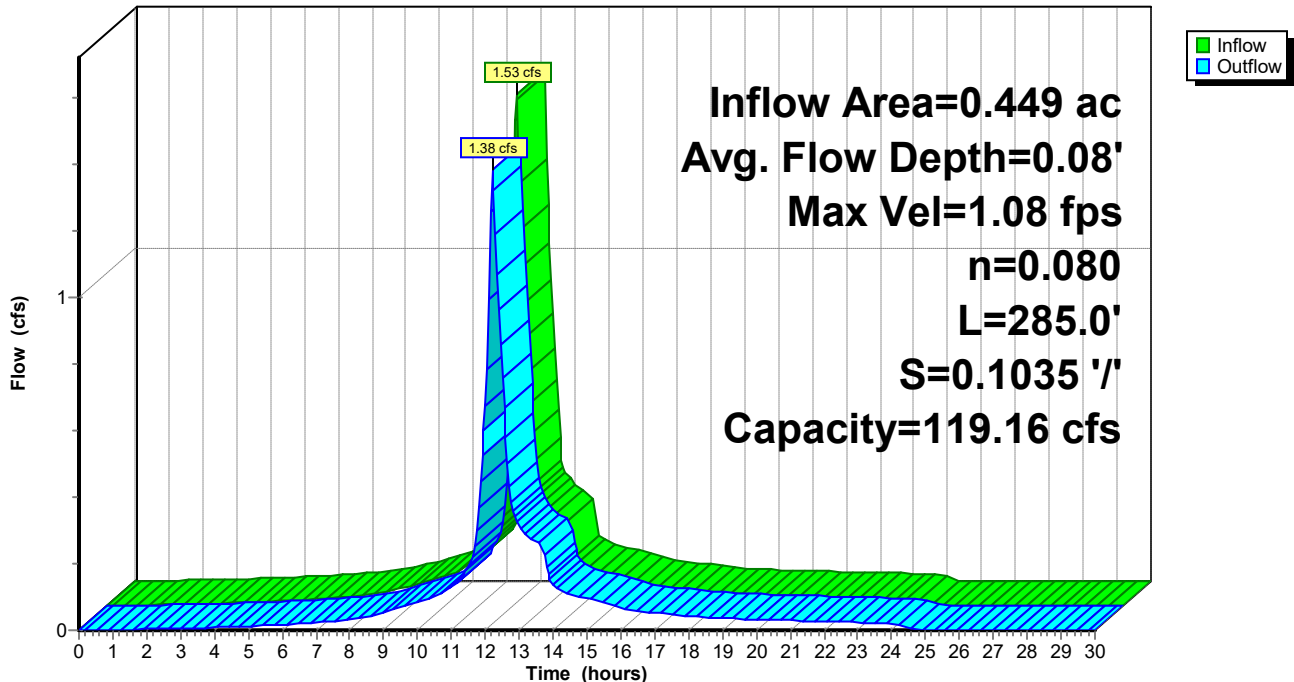
Peak Storage= 367 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.63'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' Top Width= 35.00'
Length= 285.0' Slope= 0.1035 ' / '
Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



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Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.12' @ 12.25 hrs

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 4.49" for 25-Year event
Inflow = 1.38 cfs @ 12.21 hrs, Volume= 0.168 af
Outflow = 1.33 cfs @ 12.30 hrs, Volume= 0.168 af, Atten= 4%, Lag= 5.8 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.41 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 11.9 min

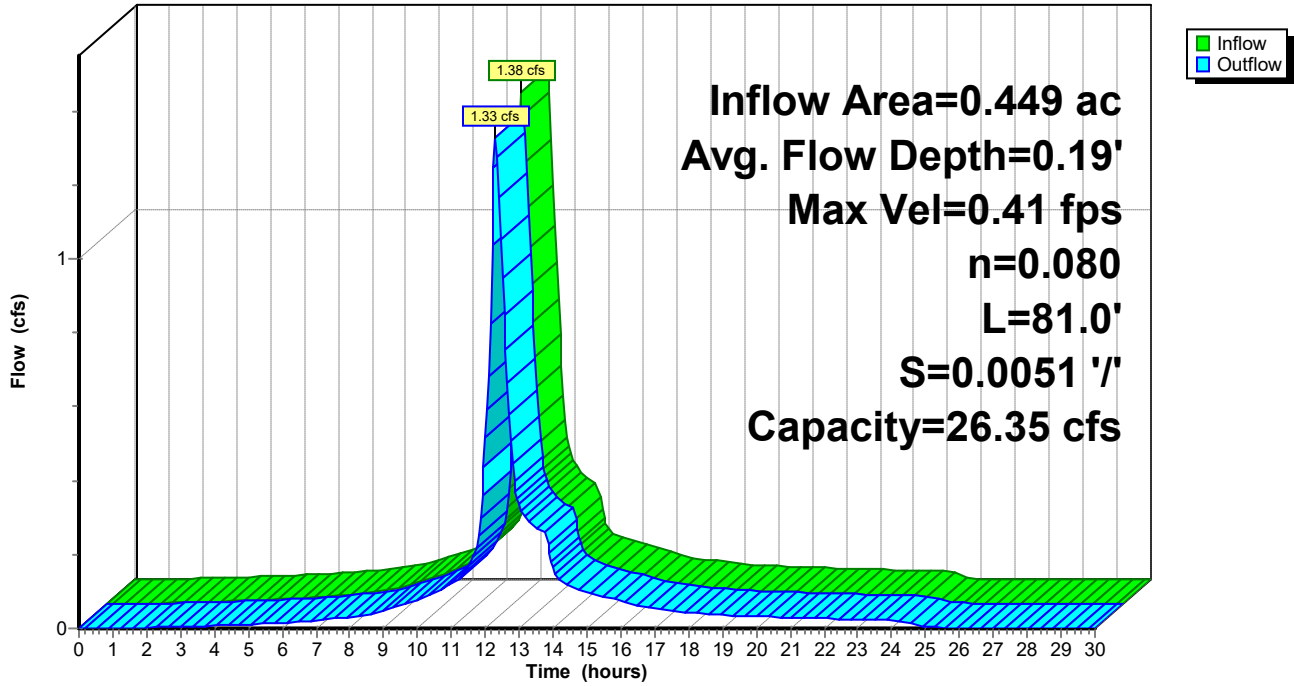
Peak Storage= 264 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 18.85'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 ' '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

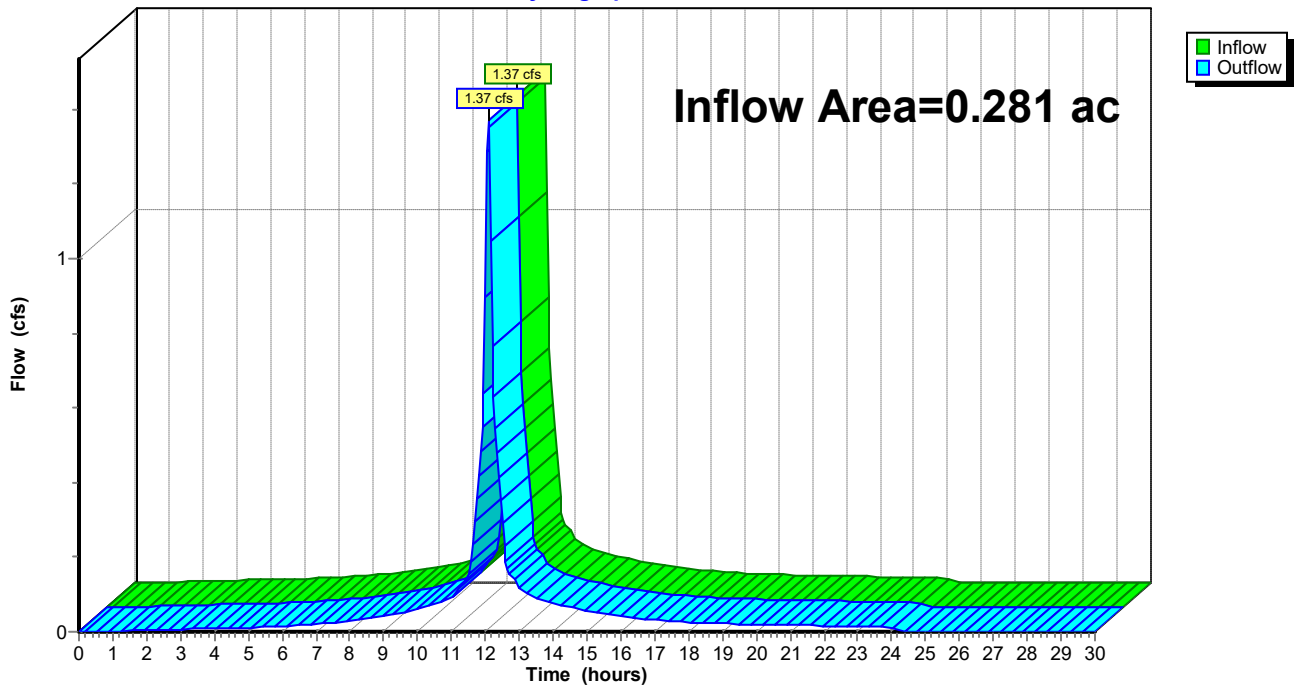
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 4.66" for 25-Year event
Inflow = 1.37 cfs @ 12.08 hrs, Volume= 0.109 af
Outflow = 1.37 cfs @ 12.08 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



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Summary for Reach UGS1A: TO UGS#1

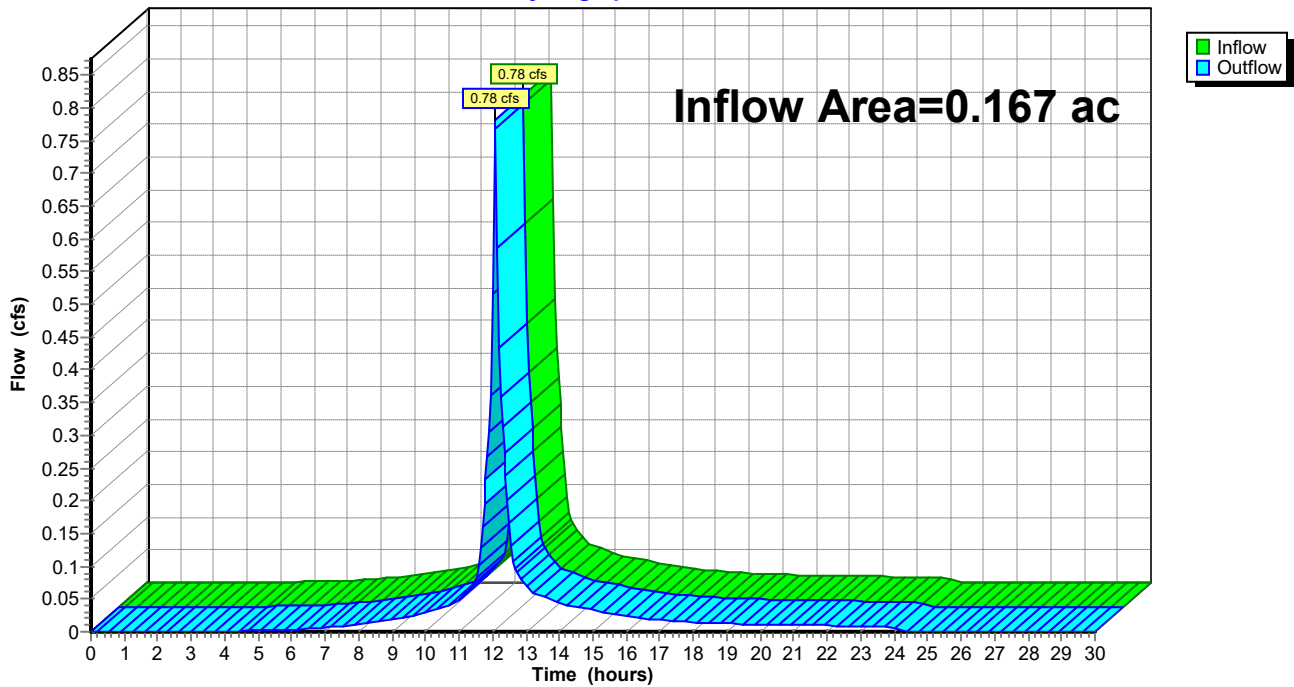
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 4.21" for 25-Year event
Inflow = 0.78 cfs @ 12.08 hrs, Volume= 0.059 af
Outflow = 0.78 cfs @ 12.08 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min
Routed to Pond UGS1 : TO UGS1B

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach UGS1A: TO UGS#1

Hydrograph



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Summary for Reach UGS1B: TO FE#1

[52] Hint: Inlet/Outlet conditions not evaluated

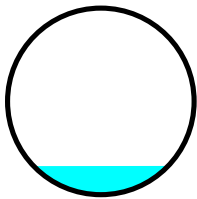
[78] Warning: Submerged Pond UGS1 Primary device # 1 by 0.15'

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 4.21" for 25-Year event
Inflow = 0.38 cfs @ 12.24 hrs, Volume= 0.059 af
Outflow = 0.39 cfs @ 12.25 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.4 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.02 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.02 fps, Avg. Travel Time= 0.3 min

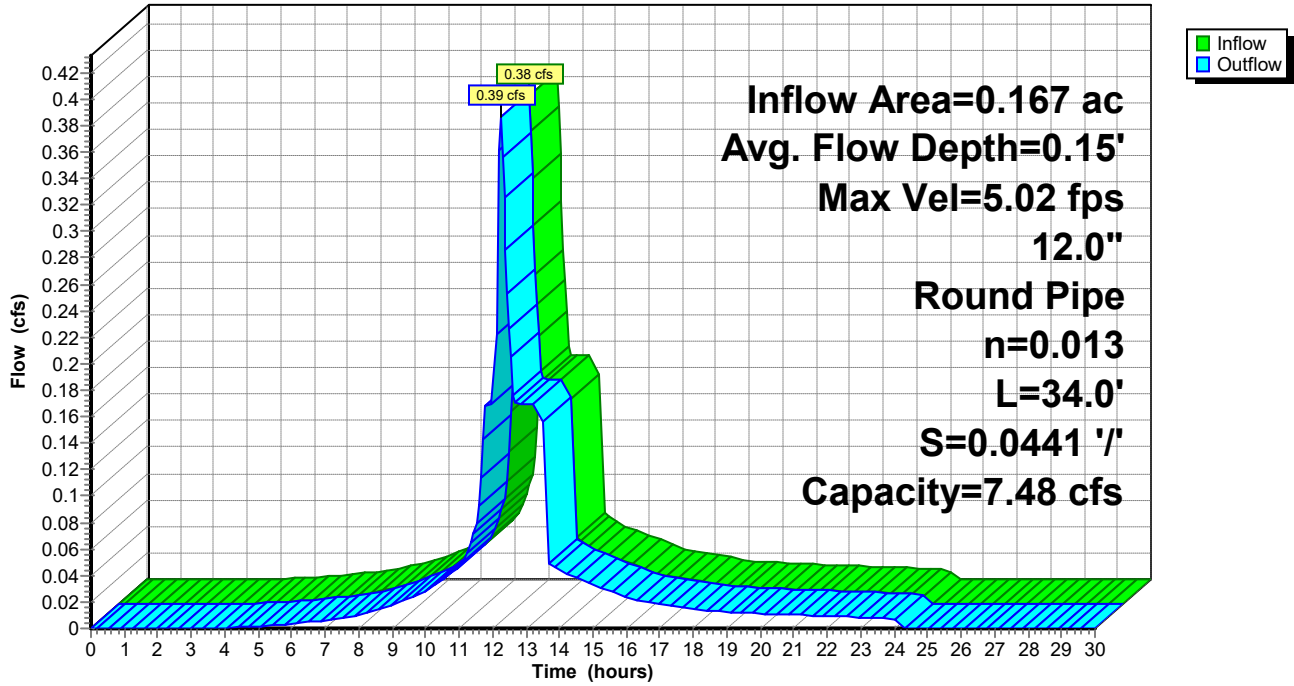
Peak Storage= 3 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.72'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.48 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 34.0' Slope= 0.0441 '/'
Inlet Invert= 131.50', Outlet Invert= 130.00'



Reach UGS1B: TO FE#1

Hydrograph



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Summary for Pond UGS1: TO UGS1B

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 4.21" for 25-Year event
 Inflow = 0.78 cfs @ 12.08 hrs, Volume= 0.059 af
 Outflow = 0.38 cfs @ 12.24 hrs, Volume= 0.059 af, Atten= 51%, Lag= 9.6 min
 Primary = 0.38 cfs @ 12.24 hrs, Volume= 0.059 af
 Routed to Reach UGS1B : TO FE#1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.29' @ 12.24 hrs Surf.Area= 0.010 ac Storage= 0.010 af

Plug-Flow detention time= 11.6 min calculated for 0.059 af (100% of inflow)
 Center-of-Mass det. time= 11.6 min (798.5 - 786.9)

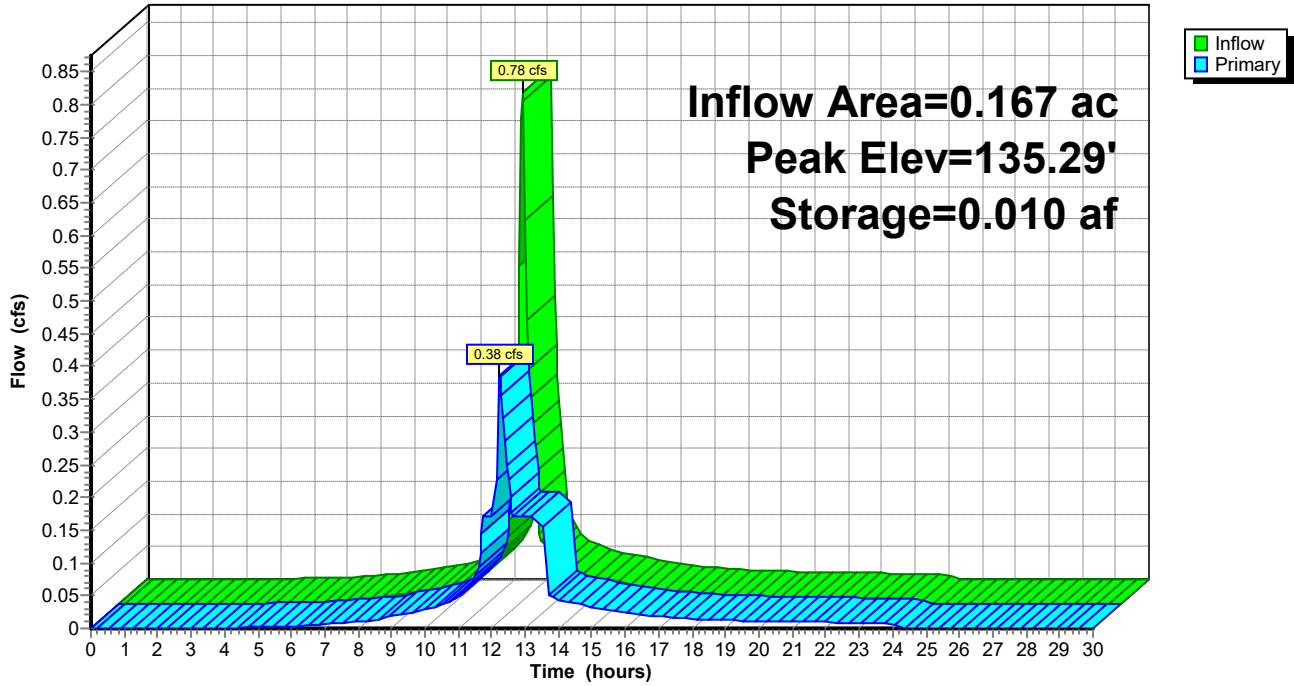
Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.015 af	20.00'W x 14.00'L x 6.00'H Prismaticoid 0.039 af Overall x 40.0% Voids
#2	134.00'	0.013 af	Shea Leaching Chamber 4x4x4 x 12 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		0.028 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	131.50'	Special & User-Defined Head (feet) 0.00 1.00 15.00 Disch. (cfs) 0.000 0.170 0.170
#2	Primary	135.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.38 cfs @ 12.24 hrs HW=135.28' (Free Discharge)
 1=Special & User-Defined (Custom Controls 0.17 cfs)
 2=Orifice/Grate (Orifice Controls 0.21 cfs @ 1.82 fps)

Pond UGS1: TO UGS1B

Hydrograph



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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1: TO WETLAND (DP#1)	Runoff Area=223,130 sf 1.88% Impervious Runoff Depth=3.21" Flow Length=770' Tc=19.9 min CN=70 Runoff=12.90 cfs 1.369 af
Subcatchment p100: TO DCB#100	Runoff Area=988 sf 68.93% Impervious Runoff Depth=5.68" Flow Length=45' Slope=0.0200 '/' Tc=5.0 min CN=93 Runoff=0.14 cfs 0.011 af
Subcatchment p101: TO DCB#101	Runoff Area=6,297 sf 67.94% Impervious Runoff Depth=5.33" Flow Length=151' Tc=5.0 min CN=90 Runoff=0.86 cfs 0.064 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,320 sf 87.67% Impervious Runoff Depth=5.91" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=2.07 cfs 0.162 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=3.92" Flow Length=356' Tc=5.0 min CN=77 Runoff=8.67 cfs 0.617 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=5.79" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=1.19 cfs 0.092 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=6.26" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.34 cfs 0.027 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=6.26" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.82 cfs 0.066 af
Subcatchment p7: TO DCB-E	Runoff Area=4,439 sf 64.11% Impervious Runoff Depth=5.11" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.59 cfs 0.043 af
Reach DCB-B: TO OUTFALL	Inflow=1.19 cfs 0.092 af Outflow=1.19 cfs 0.092 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.18' Max Vel=13.63 fps Inflow=1.71 cfs 0.137 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.70 cfs 0.137 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.23' Max Vel=8.09 fps Inflow=1.40 cfs 0.110 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.38 cfs 0.110 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.24' Max Vel=4.10 fps Inflow=0.59 cfs 0.043 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.58 cfs 0.043 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.10' Max Vel=3.40 fps Inflow=0.14 cfs 0.011 af 12.0" Round Pipe n=0.013 L=127.0' S=0.0354 '/' Capacity=6.71 cfs Outflow=0.14 cfs 0.011 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.33' Max Vel=3.84 fps Inflow=0.86 cfs 0.064 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/' Capacity=3.76 cfs Outflow=0.85 cfs 0.064 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.26' Max Vel=6.19 fps Inflow=0.99 cfs 0.075 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/' Capacity=6.90 cfs Outflow=0.98 cfs 0.075 af

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Reach DP#1: WETLAND	Inflow=15.34 cfs 1.673 af Outflow=15.34 cfs 1.673 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=2.07 cfs 0.162 af Outflow=2.07 cfs 0.162 af
Reach DP#3: LOW POINT	Inflow=8.67 cfs 0.617 af Outflow=8.67 cfs 0.617 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.07' Max Vel=1.03 fps Inflow=1.19 cfs 0.092 af n=0.080 L=46.0' S=0.1087 '/ Capacity=122.10 cfs Outflow=1.15 cfs 0.092 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.07' Max Vel=0.92 fps Inflow=1.15 cfs 0.092 af n=0.080 L=211.0' S=0.0867 '/ Capacity=109.07 cfs Outflow=1.03 cfs 0.092 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.10' Max Vel=0.66 fps Inflow=1.03 cfs 0.092 af n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=1.01 cfs 0.092 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.10' Max Vel=0.28 fps Inflow=1.01 cfs 0.092 af n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.86 cfs 0.092 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.10' Max Vel=1.23 fps Inflow=2.08 cfs 0.212 af n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.92 cfs 0.212 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.23' Max Vel=0.46 fps Inflow=1.92 cfs 0.212 af n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=1.86 cfs 0.212 af
Reach OUTLET: TO DP#1	Inflow=1.70 cfs 0.137 af Outflow=1.70 cfs 0.137 af
Reach UGS1A: TO UGS#1	Inflow=0.98 cfs 0.075 af Outflow=0.98 cfs 0.075 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.21' Max Vel=5.88 fps Inflow=0.69 cfs 0.075 af 12.0" Round Pipe n=0.013 L=34.0' S=0.0441 '/ Capacity=7.48 cfs Outflow=0.69 cfs 0.075 af
Pond UGS1: TO UGS1B	Peak Elev=135.55' Storage=0.012 af Inflow=0.98 cfs 0.075 af Outflow=0.69 cfs 0.075 af

Total Runoff Area = 7.980 ac Runoff Volume = 2.452 af Average Runoff Depth = 3.69"
85.11% Pervious = 6.792 ac 14.89% Impervious = 1.188 ac

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Type III 24-hr 100-Year Rainfall=6.50"

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Summary for Subcatchment P1: TO WETLAND (DP#1)

Runoff = 12.90 cfs @ 12.28 hrs, Volume= 1.369 af, Depth= 3.21"
 Routed to Reach DP#1 : WETLAND

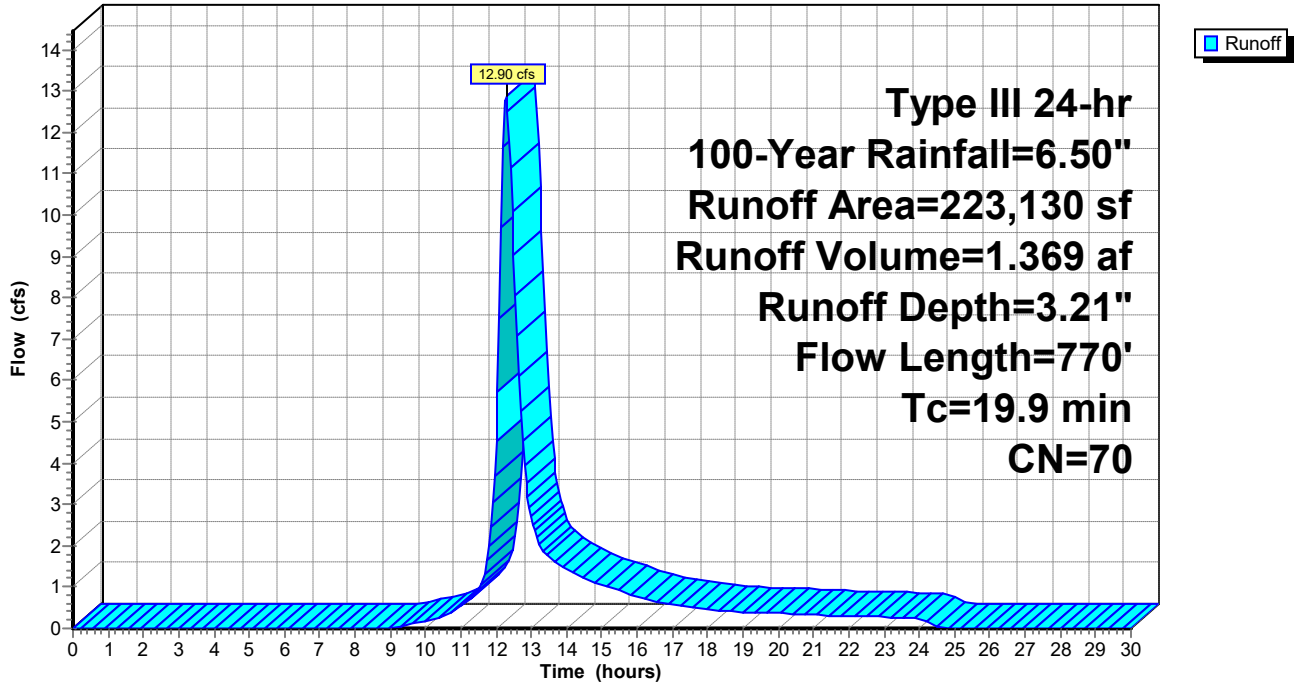
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
3,458	74	>75% Grass cover, Good, HSG C
177,279	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,702	89	Gravel roads, HSG C
31,497	65	Brush, Good, HSG C
223,130	70	Weighted Average
218,936		98.12% Pervious Area
4,194		1.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	75	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.9	75	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	104	0.1850	2.15		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.2	439	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.6	77	0.0050	0.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.9	770	Total			

Subcatchment P1: TO WETLAND (DP#1)

Hydrograph



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Summary for Subcatchment p100: TO DCB#100

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 5.68"
 Routed to Reach DCB100 : TO DMH#100

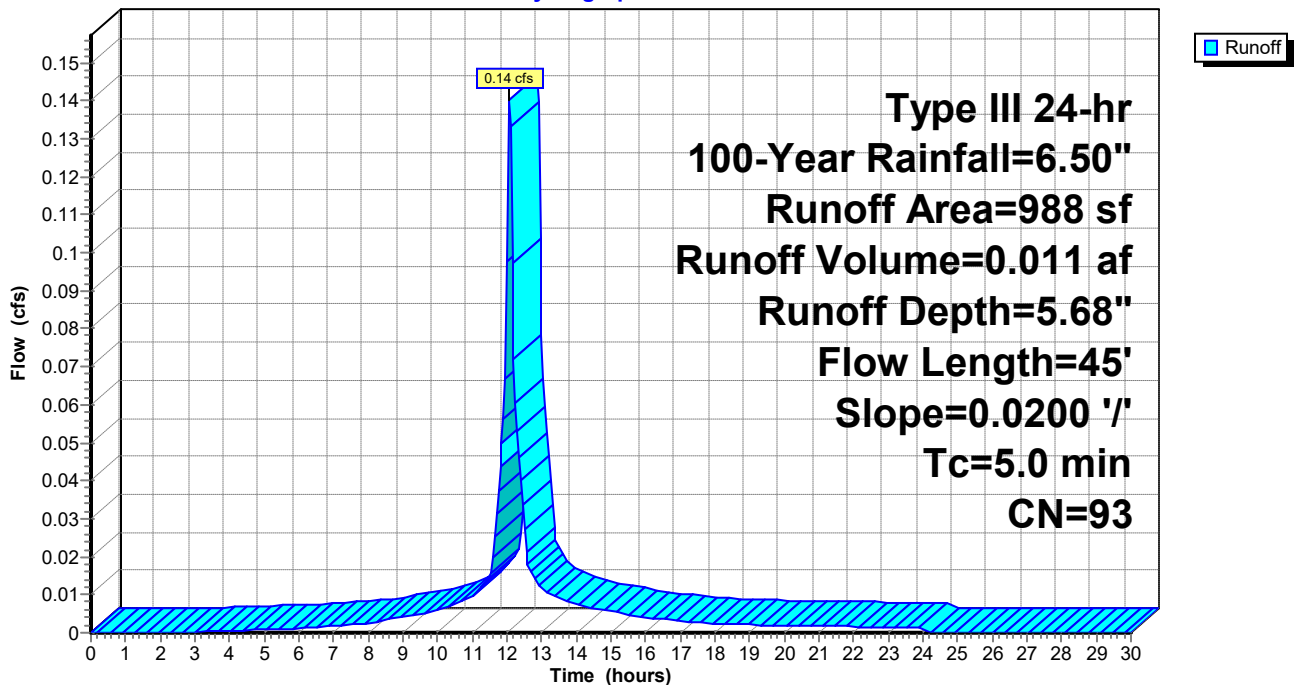
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
210	74	>75% Grass cover, Good, HSG C
681	98	Paved parking, HSG C
97	96	Gravel surface, HSG C
988	93	Weighted Average
307		31.07% Pervious Area
681		68.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.6	40	0.0200	1.11		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.5	45	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p100: TO DCB#100

Hydrograph



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Summary for Subcatchment p101: TO DCB#101

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.86 cfs @ 12.07 hrs, Volume= 0.064 af, Depth= 5.33"
 Routed to Reach DCB101 : TO DMH#100

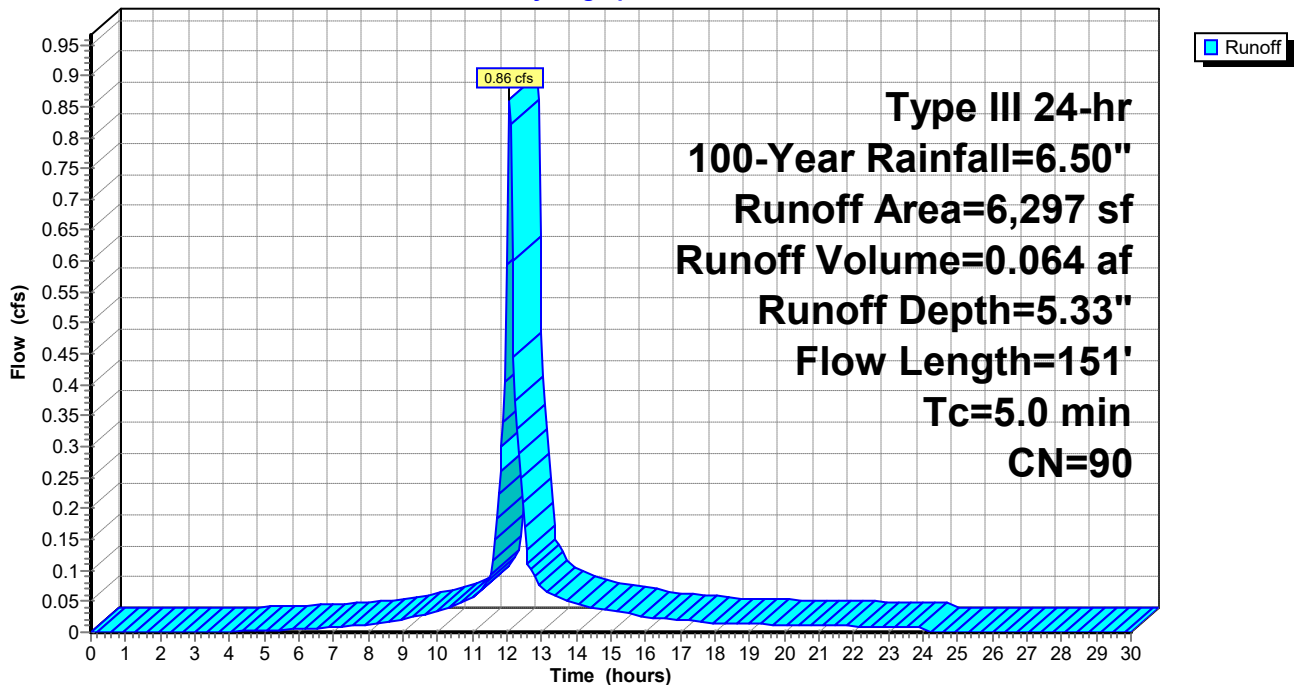
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
2,019	74	>75% Grass cover, Good, HSG C
4,278	98	Paved parking, HSG C
6,297	90	Weighted Average
2,019		32.06% Pervious Area
4,278		67.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.5	45	0.0400	1.50		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.4	101	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.8	151	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p101: TO DCB#101

Hydrograph



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Summary for Subcatchment p2: TO CATCHBASIN (DP#2)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 2.07 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 5.91"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

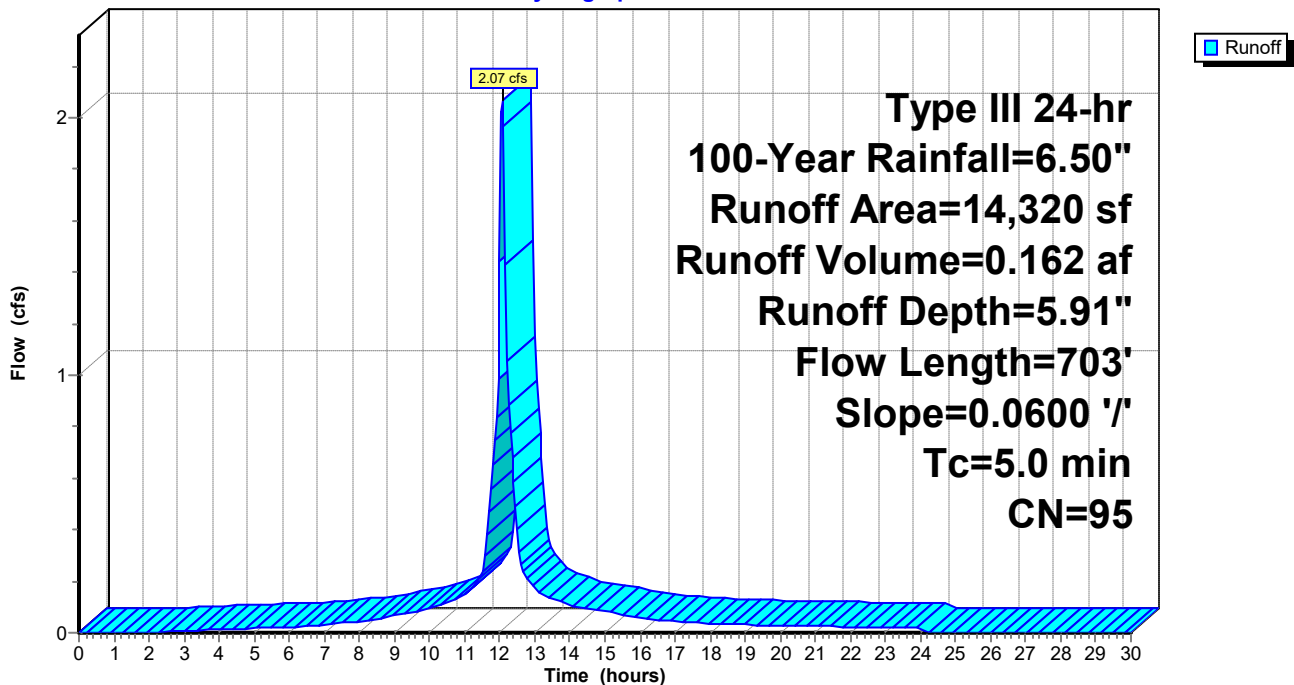
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,221	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,555	98	Paved parking, HSG C
14,320	95	Weighted Average
1,765		12.33% Pervious Area
12,555		87.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
2.2	653	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	703	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p2: TO CATCHBASIN (DP#2)

Hydrograph



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Summary for Subcatchment p3: TO LOW POINT (DP#3)

[49] Hint: Tc<2dt may require smaller dt

Runoff = 8.67 cfs @ 12.08 hrs, Volume= 0.617 af, Depth= 3.92"
 Routed to Reach DP#3 : LOW POINT

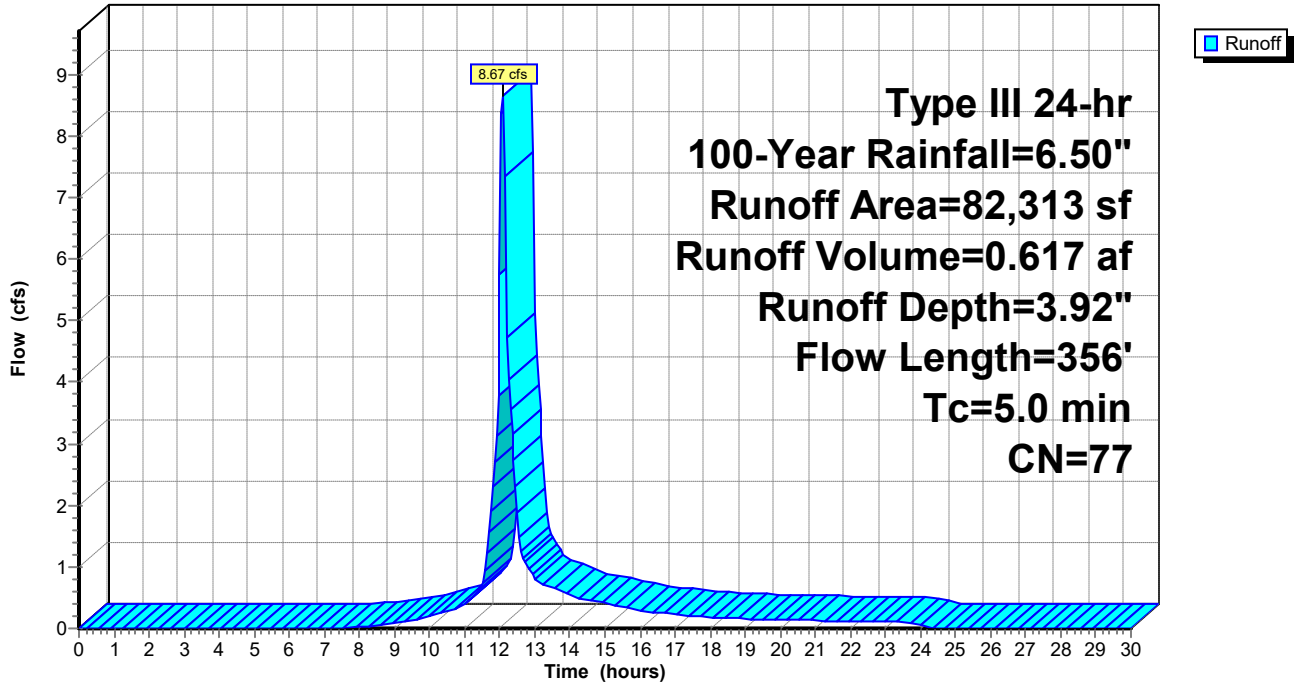
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
8,024	74	>75% Grass cover, Good, HSG C
49,390	70	Woods, Good, HSG C
12,433	98	Paved parking, HSG C
12,466	89	Gravel roads, HSG C
82,313	77	Weighted Average
69,880		84.90% Pervious Area
12,433		15.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	35	0.1400	2.35		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	15	0.0320	1.10		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.2	53	0.0320	3.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	54	0.0320	2.88		Shallow Concentrated Flow, GRAVEL Unpaved Kv= 16.1 fps
0.0	28	0.4200	10.43		Shallow Concentrated Flow, GRASS/BRUSH Unpaved Kv= 16.1 fps
1.4	171	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.3	356	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p3: TO LOW POINT (DP#3)

Hydrograph



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Summary for Subcatchment P4: TO DCB-B

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af, Depth= 5.79"
 Routed to Reach DCB-B : TO OUTFALL

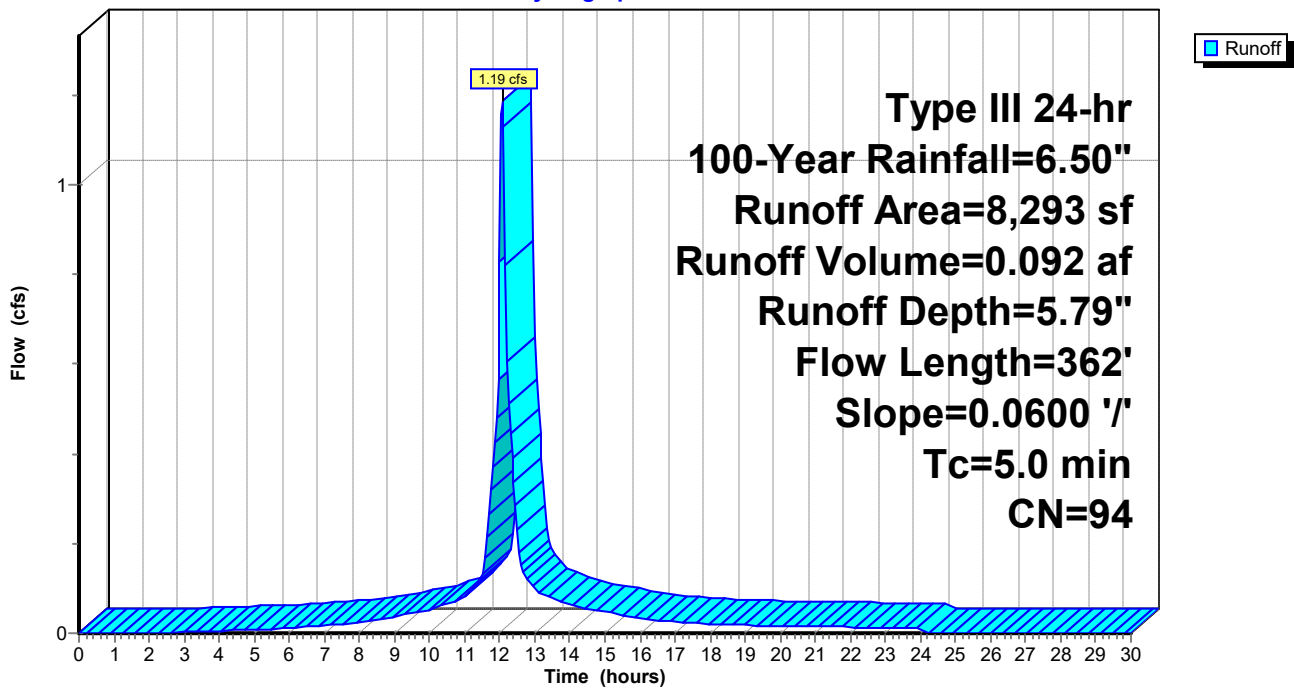
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,350	74	>75% Grass cover, Good, HSG C
6,943	98	Paved parking, HSG C
8,293	94	Weighted Average
1,350		16.28% Pervious Area
6,943		83.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.0	312	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	362	Total, Increased to minimum Tc = 5.0 min			

Subcatchment P4: TO DCB-B

Hydrograph



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Summary for Subcatchment p5: TO DCB-C

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 0.027 af, Depth= 6.26"
 Routed to Reach DCB-C : TO OUTFALL

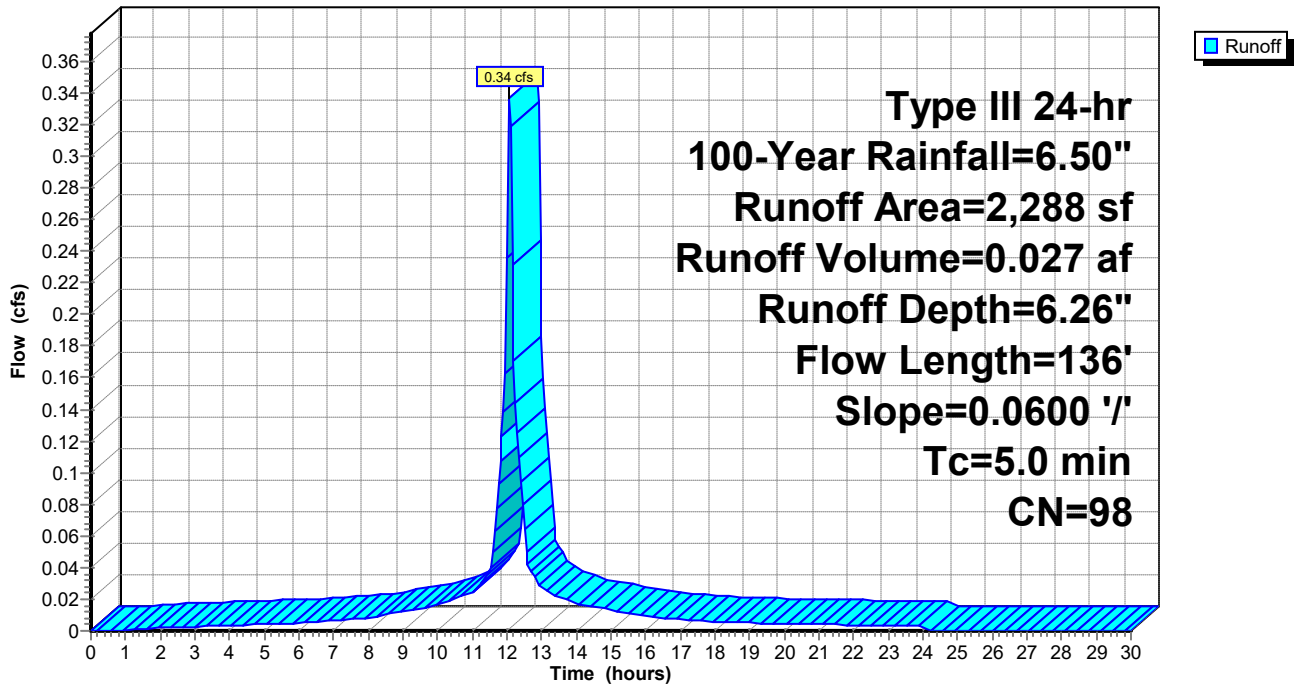
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
2,288	98	Paved parking, HSG C
2,288		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.3	86	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.8	136	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p5: TO DCB-C

Hydrograph



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Summary for Subcatchment p6: TO DCB-D

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.82 cfs @ 12.07 hrs, Volume= 0.066 af, Depth= 6.26"
 Routed to Reach DCB-D : TO DCB-C

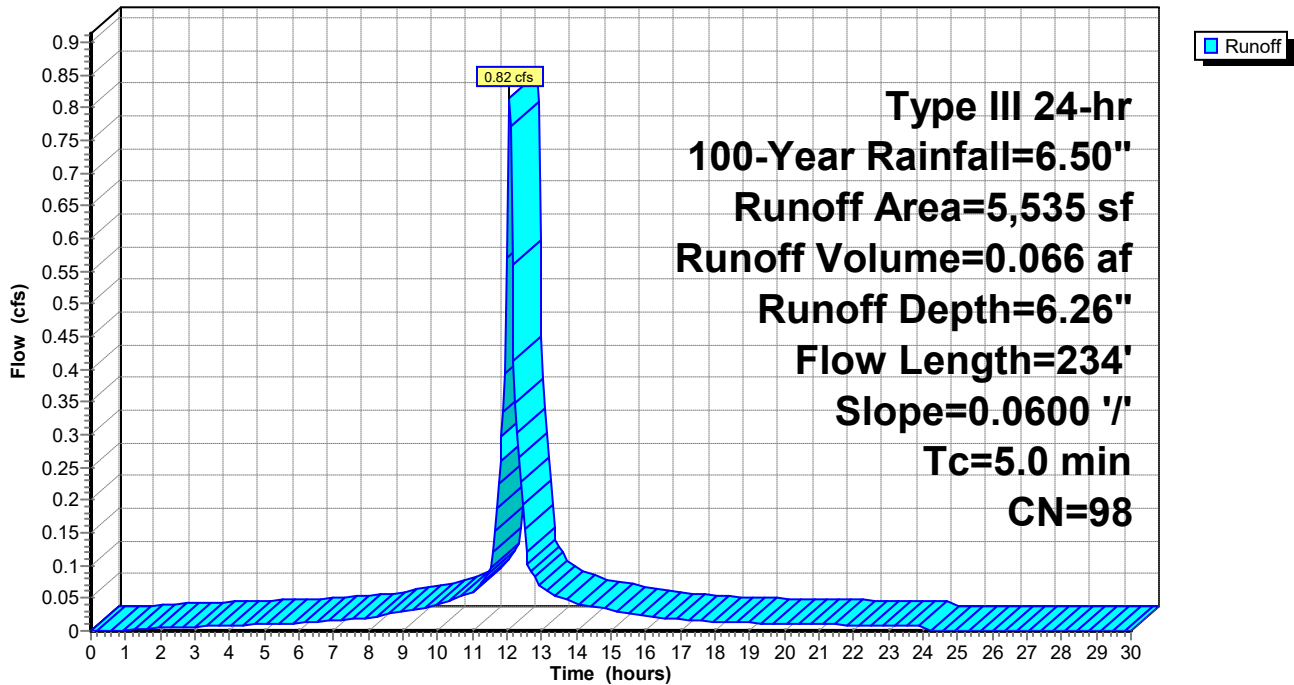
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
5,535	98	Paved parking, HSG C
5,535		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0600	1.80		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	184	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	234	Total, Increased to minimum Tc = 5.0 min			

Subcatchment p6: TO DCB-D

Hydrograph



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Summary for Subcatchment p7: TO DCB-E

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.59 cfs @ 12.07 hrs, Volume= 0.043 af, Depth= 5.11"
 Routed to Reach DCB-E : TO DCB-D

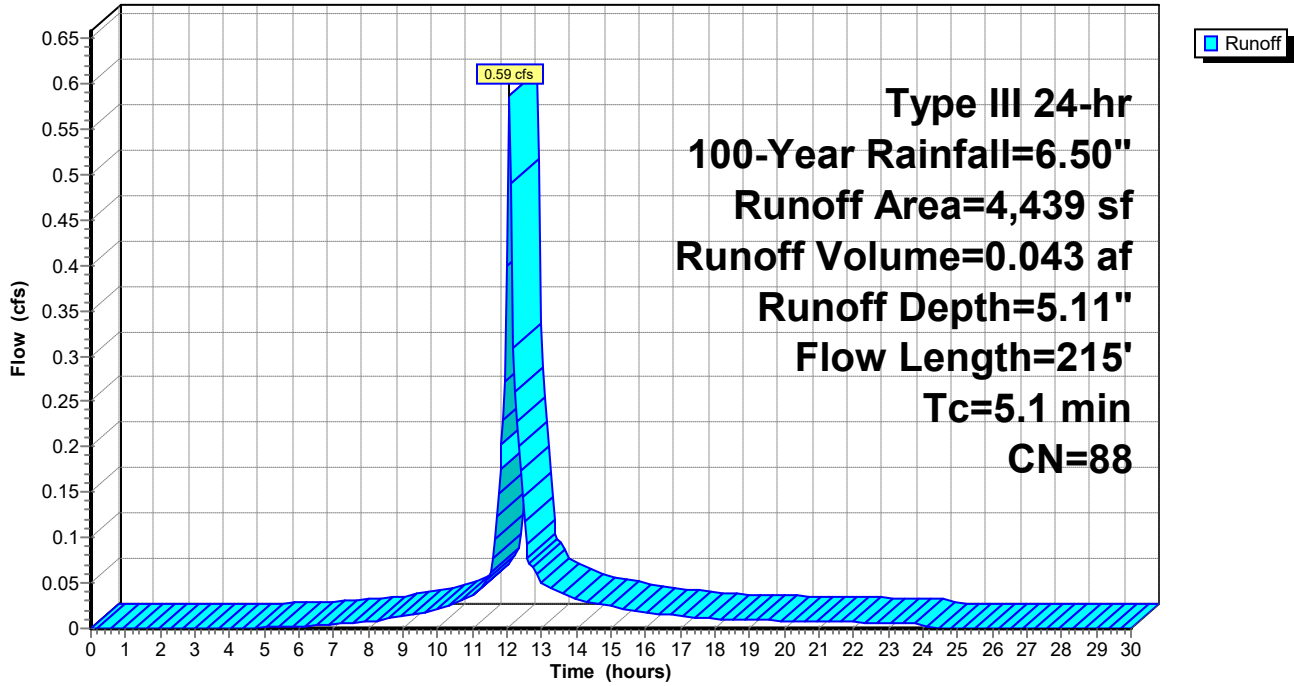
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,576	70	Woods, Good, HSG C
2,846	98	Paved parking, HSG C
17	74	>75% Grass cover, Good, HSG C
4,439	88	Weighted Average
1,593		35.89% Pervious Area
2,846		64.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	20	0.0500	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	30	0.0600	1.62		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.6	165	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	215	Total			

Subcatchment p7: TO DCB-E

Hydrograph



Summary for Reach DCB-B: TO OUTFALL

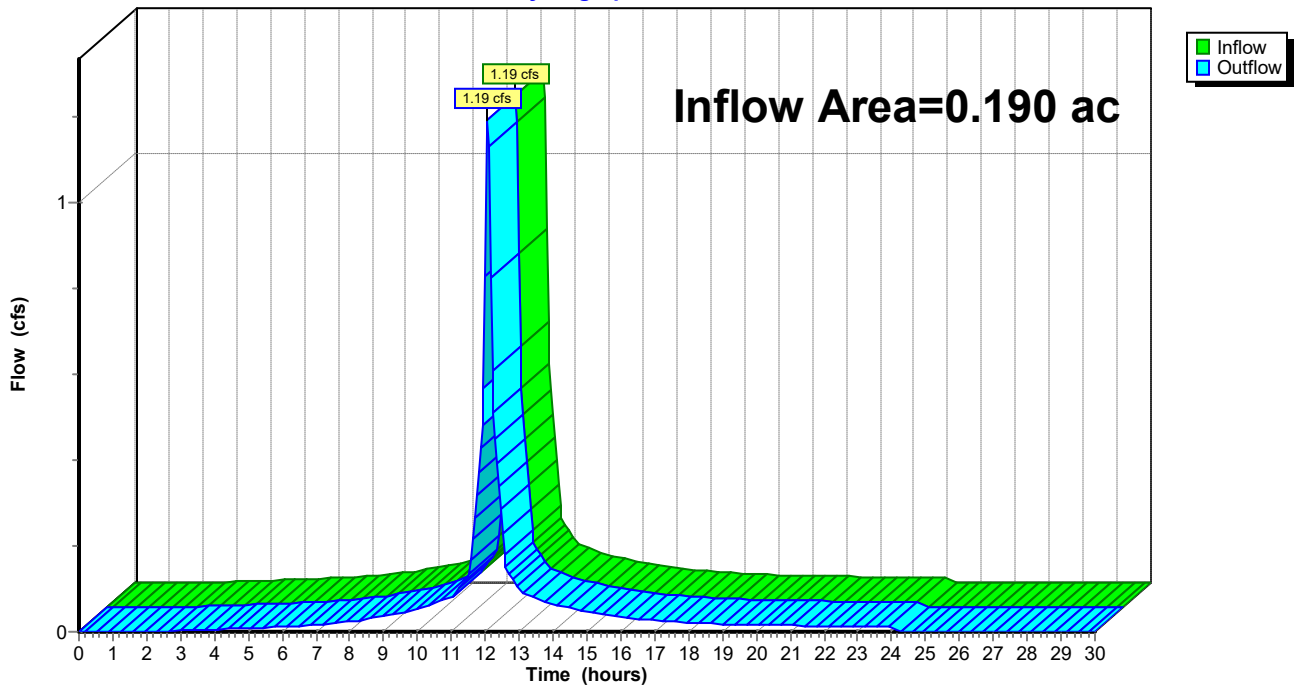
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af
Outflow = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-1 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DCB-B: TO OUTFALL

Hydrograph



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Summary for Reach DCB-C: TO OUTFALL

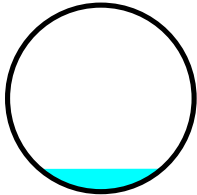
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 5.84" for 100-Year event
Inflow = 1.71 cfs @ 12.08 hrs, Volume= 0.137 af
Outflow = 1.70 cfs @ 12.08 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 13.63 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.48 fps, Avg. Travel Time= 0.3 min

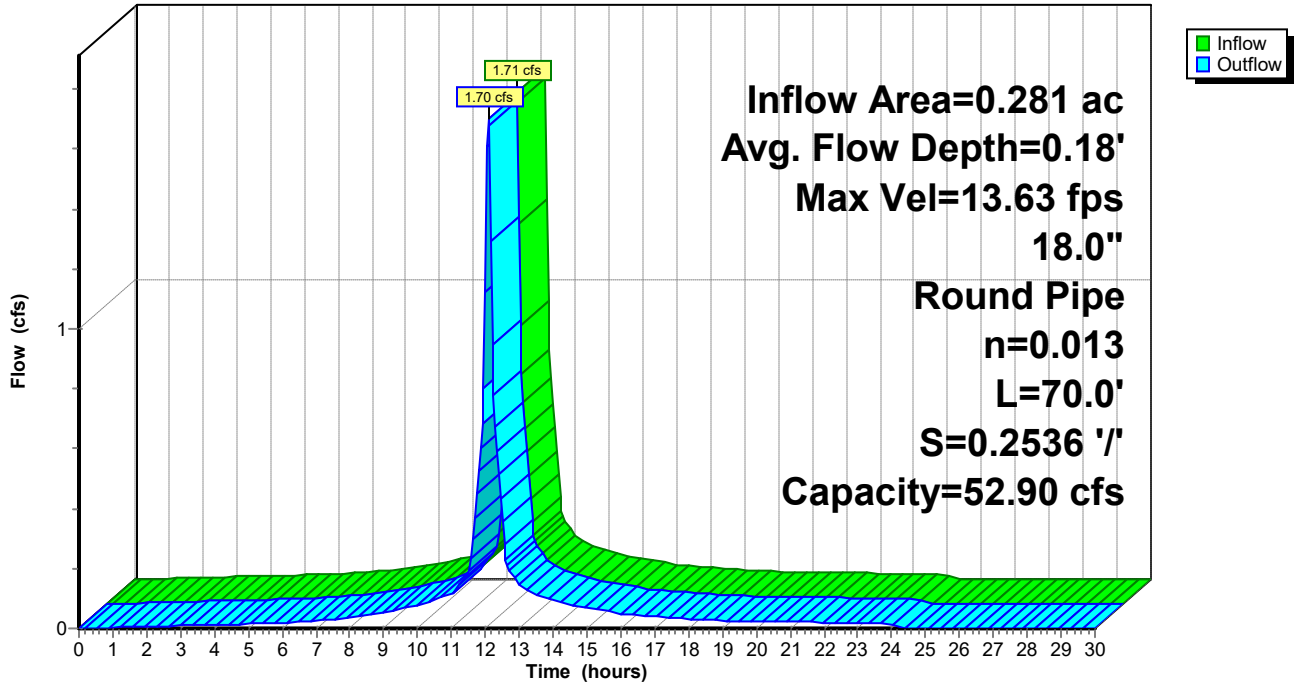
Peak Storage= 9 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 0.99'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.2536 '/'
Inlet Invert= 131.25', Outlet Invert= 113.50'



Reach DCB-C: TO OUTFALL

Hydrograph



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Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

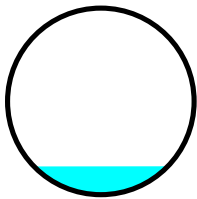
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.13' @ 12.10 hrs

Inflow Area = 0.229 ac, 84.03% Impervious, Inflow Depth = 5.75" for 100-Year event
Inflow = 1.40 cfs @ 12.07 hrs, Volume= 0.110 af
Outflow = 1.38 cfs @ 12.08 hrs, Volume= 0.110 af, Atten= 1%, Lag= 0.5 min
Routed to Reach DCB-C : TO OUTFALL

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.09 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.61 fps, Avg. Travel Time= 0.7 min

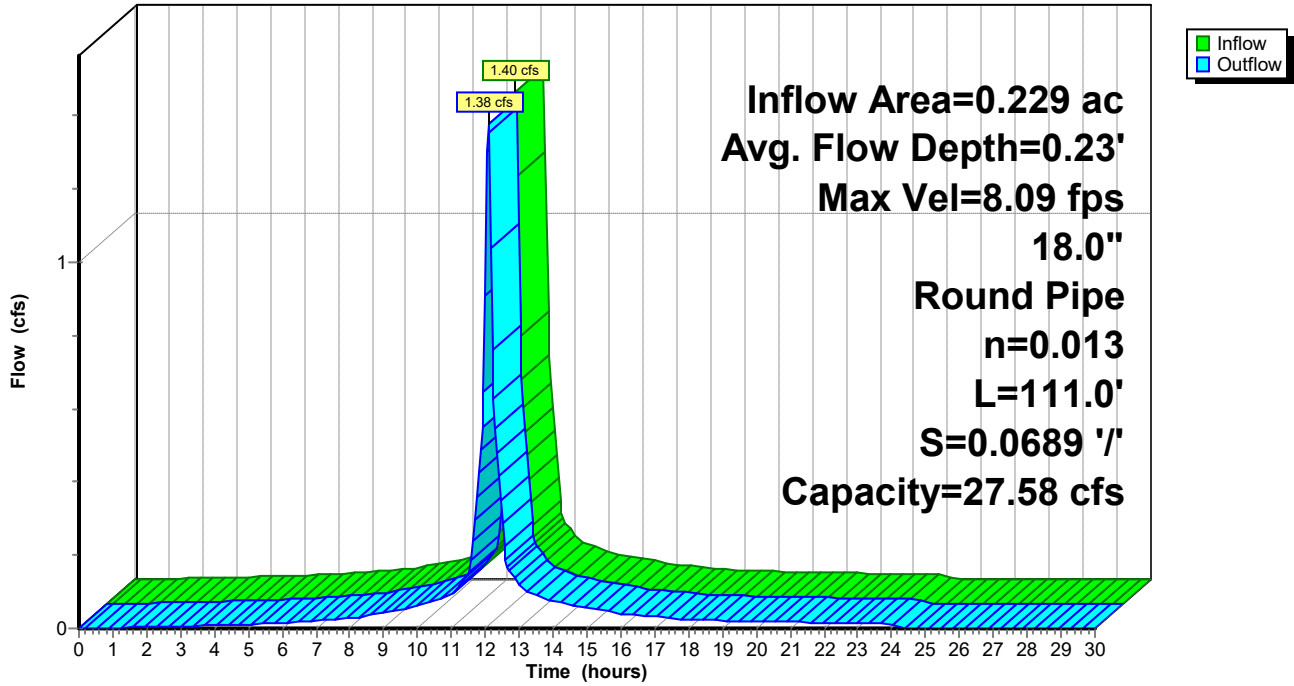
Peak Storage= 19 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 1.08'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 111.0' Slope= 0.0689 '/'
Inlet Invert= 140.10', Outlet Invert= 132.45'



Reach DCB-D: TO DCB-C

Hydrograph



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Summary for Reach DCB-E: TO DCB-D

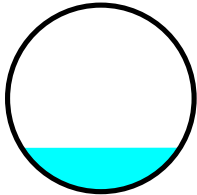
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.102 ac, 64.11% Impervious, Inflow Depth = 5.11" for 100-Year event
Inflow = 0.59 cfs @ 12.07 hrs, Volume= 0.043 af
Outflow = 0.58 cfs @ 12.08 hrs, Volume= 0.043 af, Atten= 1%, Lag= 0.3 min
Routed to Reach DCB-D : TO DCB-C

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.10 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.36 fps, Avg. Travel Time= 0.4 min

Peak Storage= 5 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 0.85'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0181 '/'
Inlet Invert= 140.85', Outlet Invert= 140.20'



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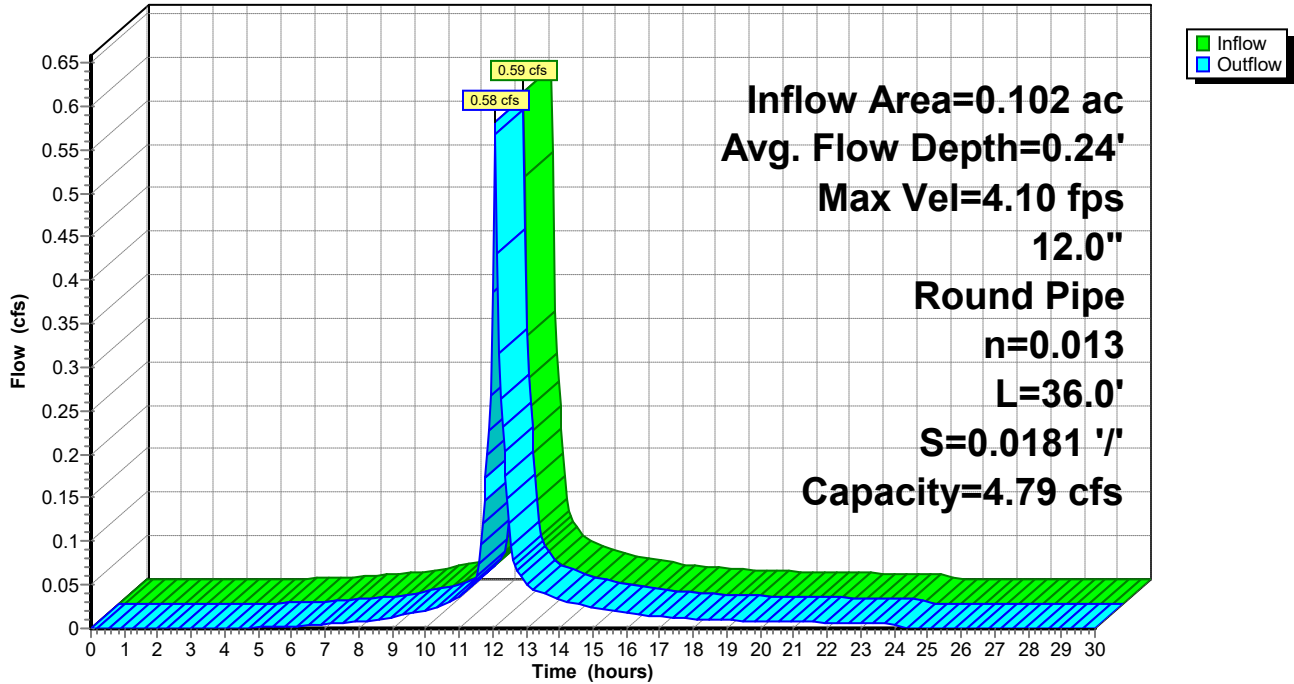
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Reach DCB-E: TO DCB-D

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Summary for Reach DCB100: TO DMH#100

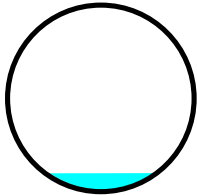
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.023 ac, 68.93% Impervious, Inflow Depth = 5.68" for 100-Year event
Inflow = 0.14 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af, Atten= 3%, Lag= 1.3 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.40 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.15 fps, Avg. Travel Time= 1.8 min

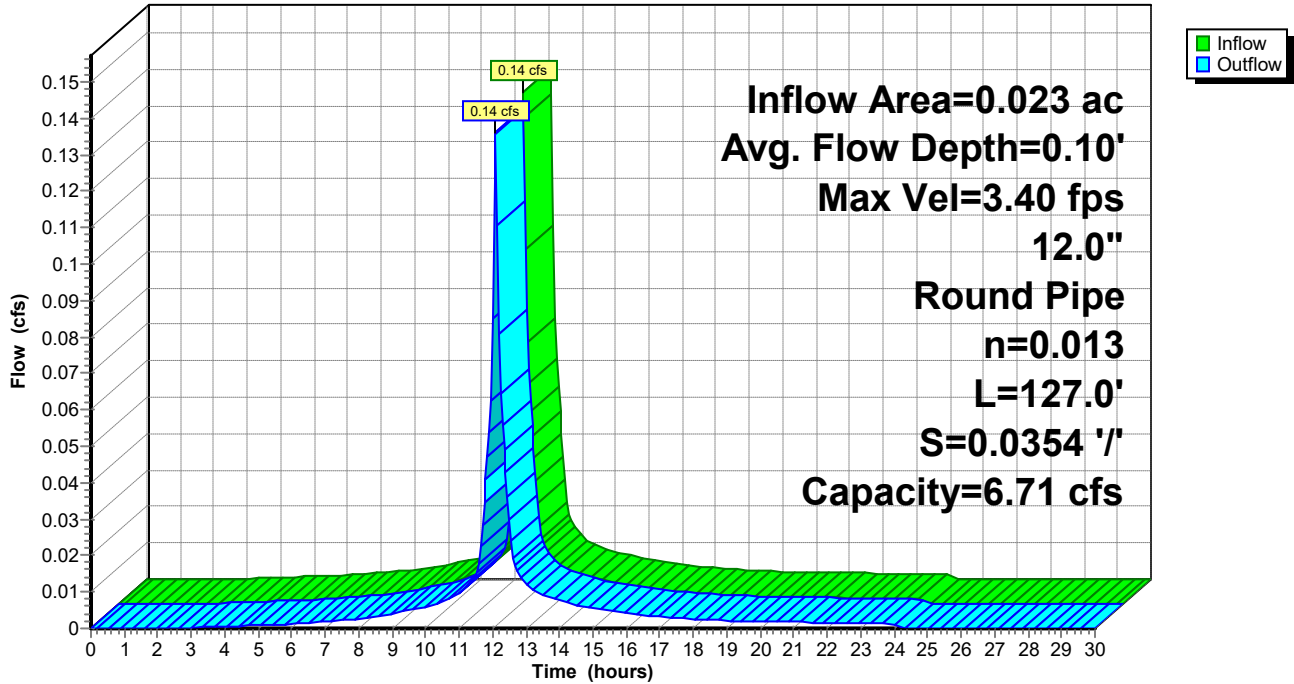
Peak Storage= 5 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 0.60'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.71 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 127.0' Slope= 0.0354 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'



Reach DCB100: TO DMH#100

Hydrograph



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Summary for Reach DCB101: TO DMH#100

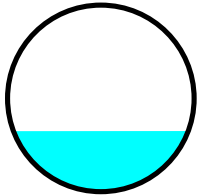
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.145 ac, 67.94% Impervious, Inflow Depth = 5.33" for 100-Year event
Inflow = 0.86 cfs @ 12.07 hrs, Volume= 0.064 af
Outflow = 0.85 cfs @ 12.08 hrs, Volume= 0.064 af, Atten= 1%, Lag= 0.3 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.84 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 0.5 min

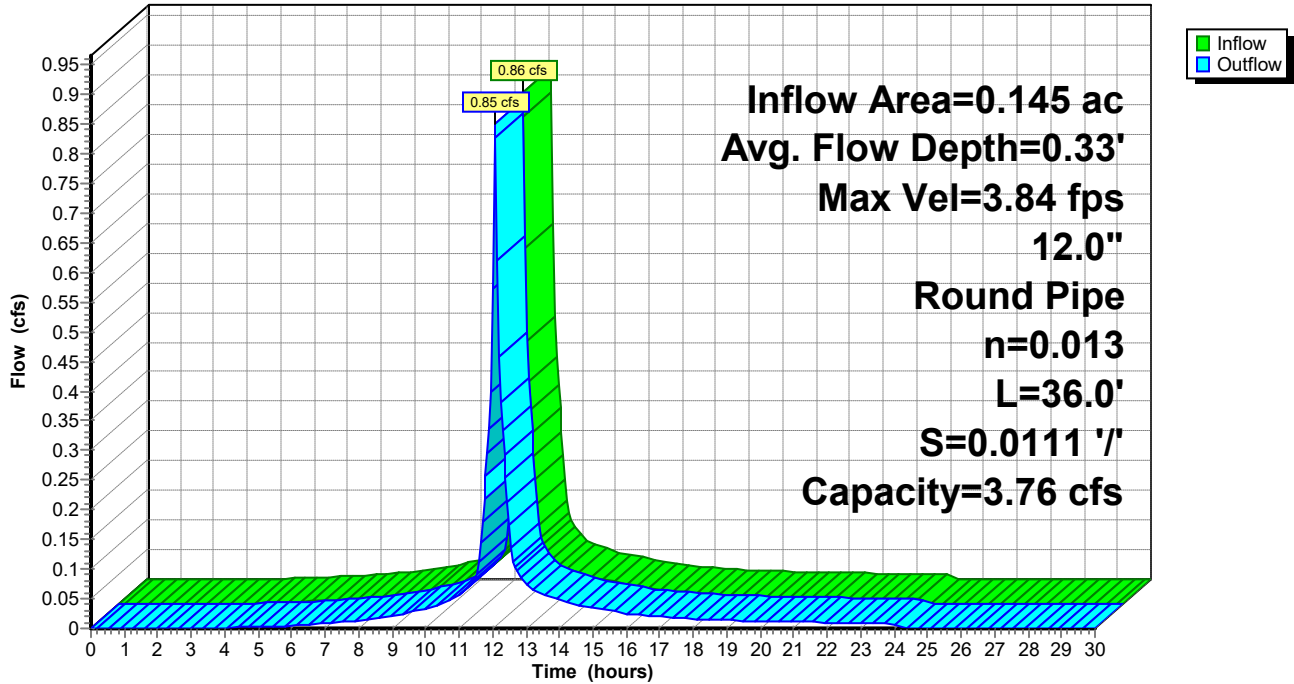
Peak Storage= 8 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 0.94'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0111 '/'
Inlet Invert= 136.40', Outlet Invert= 136.00'



Reach DCB101: TO DMH#100

Hydrograph



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Summary for Reach DMH100: TO UGS#1A

[52] Hint: Inlet/Outlet conditions not evaluated

[61] Hint: Exceeded Reach DCB100 outlet invert by 0.05' @ 12.10 hrs

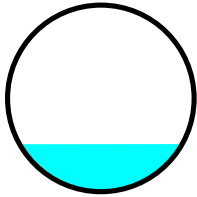
[61] Hint: Exceeded Reach DCB101 outlet invert by 0.05' @ 12.10 hrs

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 5.38" for 100-Year event
Inflow = 0.99 cfs @ 12.08 hrs, Volume= 0.075 af
Outflow = 0.98 cfs @ 12.08 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Routed to Reach UGS1A : TO UGS#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.19 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.00 fps, Avg. Travel Time= 0.1 min

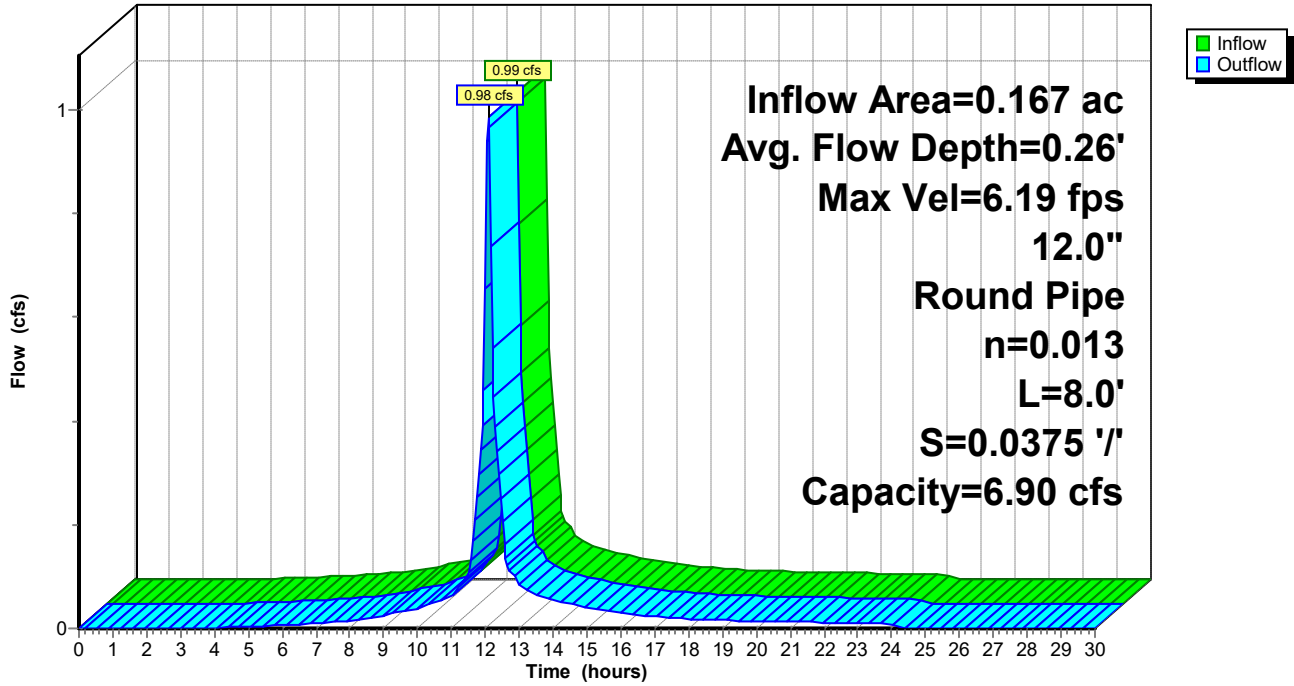
Peak Storage= 1 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 0.87'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.0' Slope= 0.0375 '/
Inlet Invert= 135.80', Outlet Invert= 135.50'



Reach DMH100: TO UGS#1A

Hydrograph

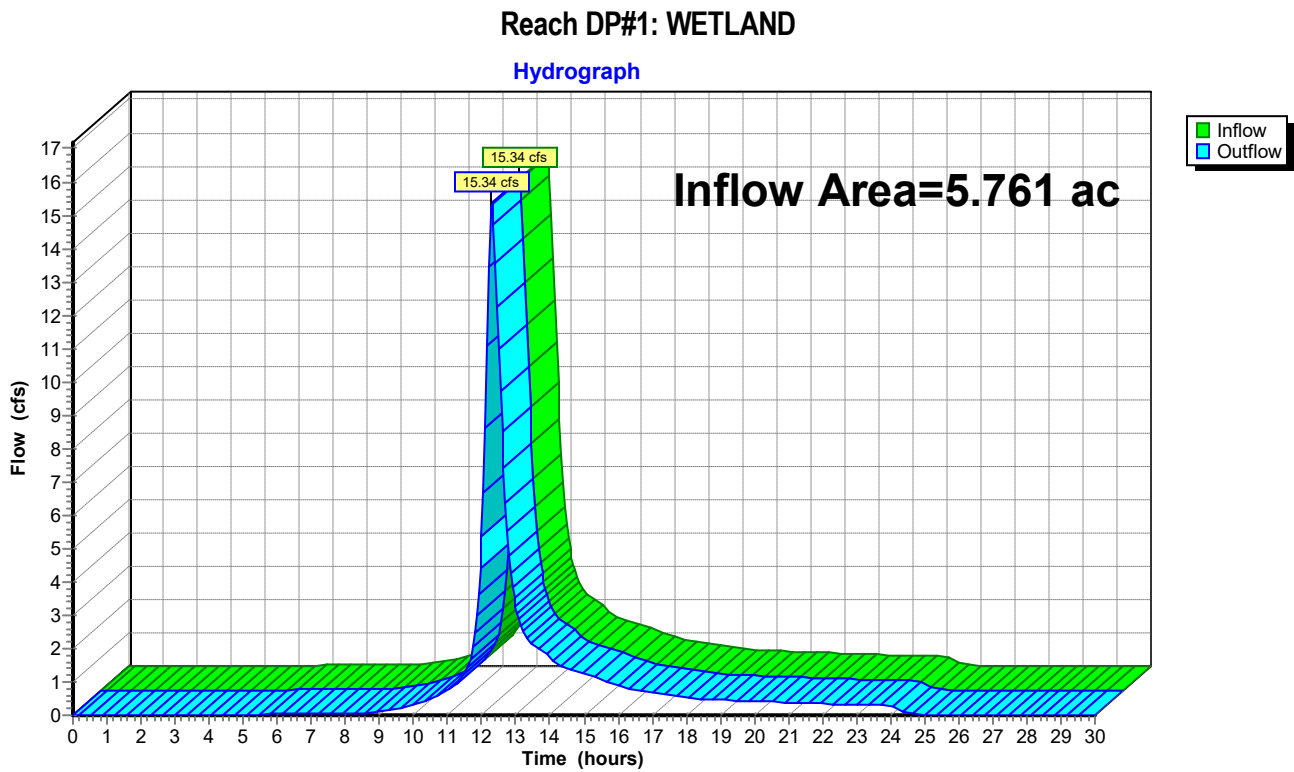


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.761 ac, 10.66% Impervious, Inflow Depth = 3.48" for 100-Year event
Inflow = 15.34 cfs @ 12.29 hrs, Volume= 1.673 af
Outflow = 15.34 cfs @ 12.29 hrs, Volume= 1.673 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Summary for Reach DP#2: MUNICIPAL CATCHBASIN

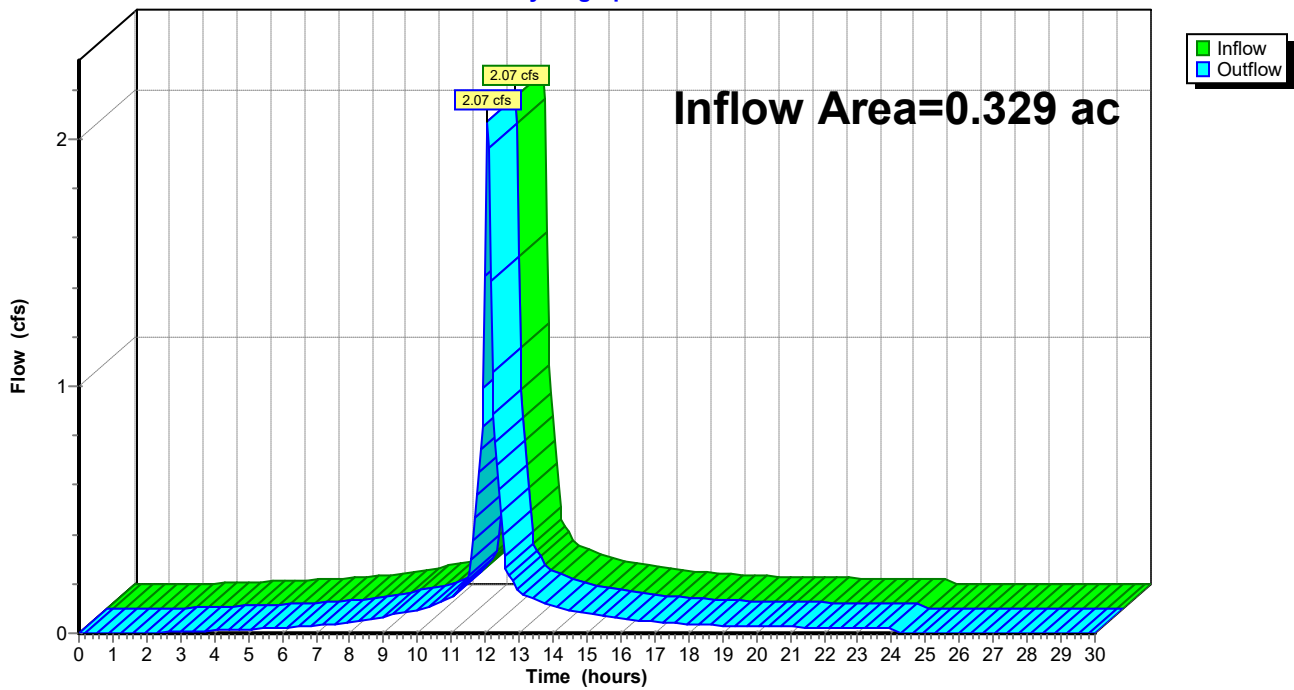
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.67% Impervious, Inflow Depth = 5.91" for 100-Year event
Inflow = 2.07 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 2.07 cfs @ 12.07 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#2: MUNICIPAL CATCHBASIN

Hydrograph



Summary for Reach DP#3: LOW POINT

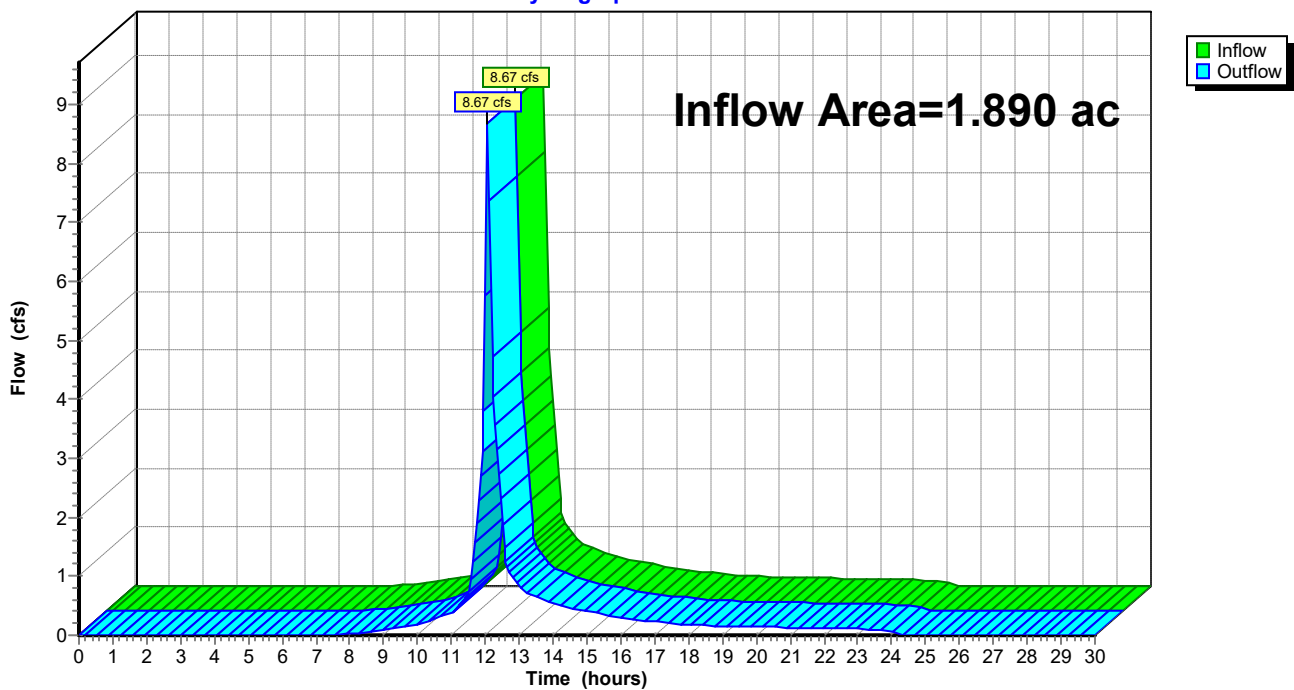
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 3.92" for 100-Year event
Inflow = 8.67 cfs @ 12.08 hrs, Volume= 0.617 af
Outflow = 8.67 cfs @ 12.08 hrs, Volume= 0.617 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach DP#3: LOW POINT

Hydrograph



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Summary for Reach OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.19 cfs @ 12.07 hrs, Volume= 0.092 af
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 0.092 af, Atten= 3%, Lag= 1.4 min
Routed to Reach OL-2 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.03 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 2.4 min

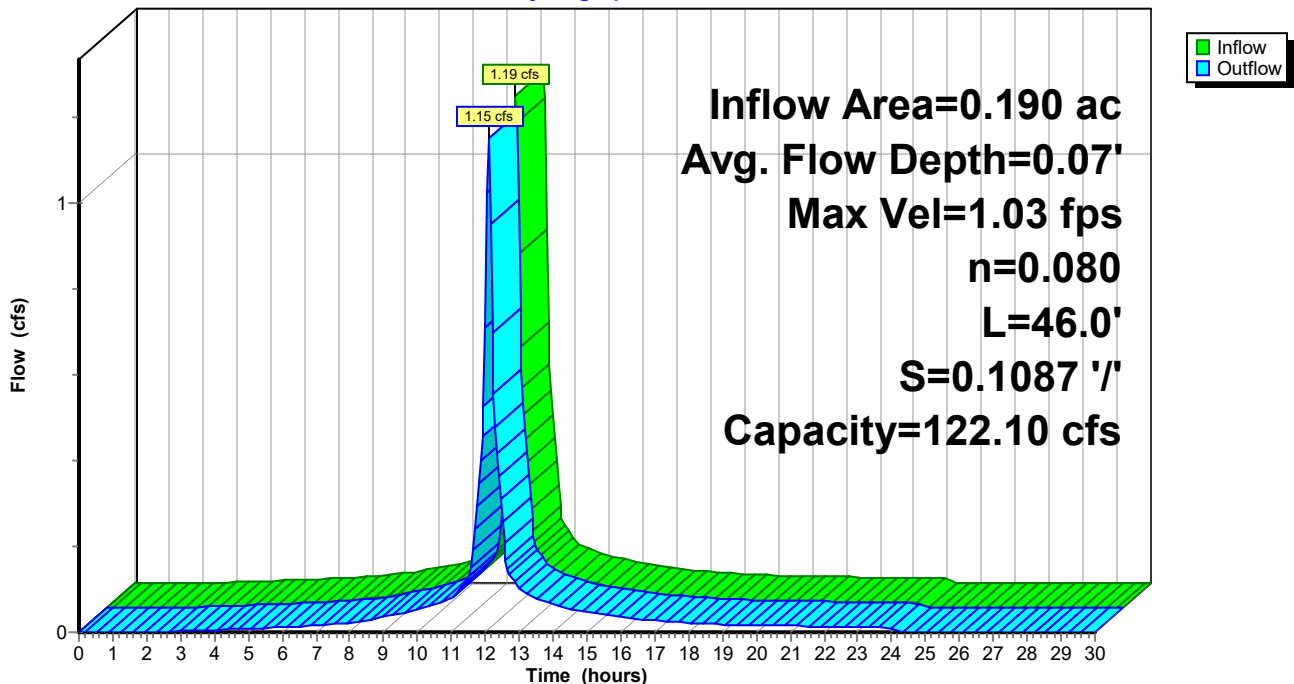
Peak Storage= 53 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.45'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
Length= 46.0' Slope= 0.1087 ' / '
Inlet Invert= 109.00', Outlet Invert= 104.00'



Reach OL-1: OVERLAND

Hydrograph



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Summary for Reach OL-2: OVERLAND

[62] Hint: Exceeded Reach OL-1 OUTLET depth by 0.01' @ 12.20 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 0.092 af
Outflow = 1.03 cfs @ 12.20 hrs, Volume= 0.092 af, Atten= 10%, Lag= 6.2 min
Routed to Reach OL-3 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.92 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 12.3 min

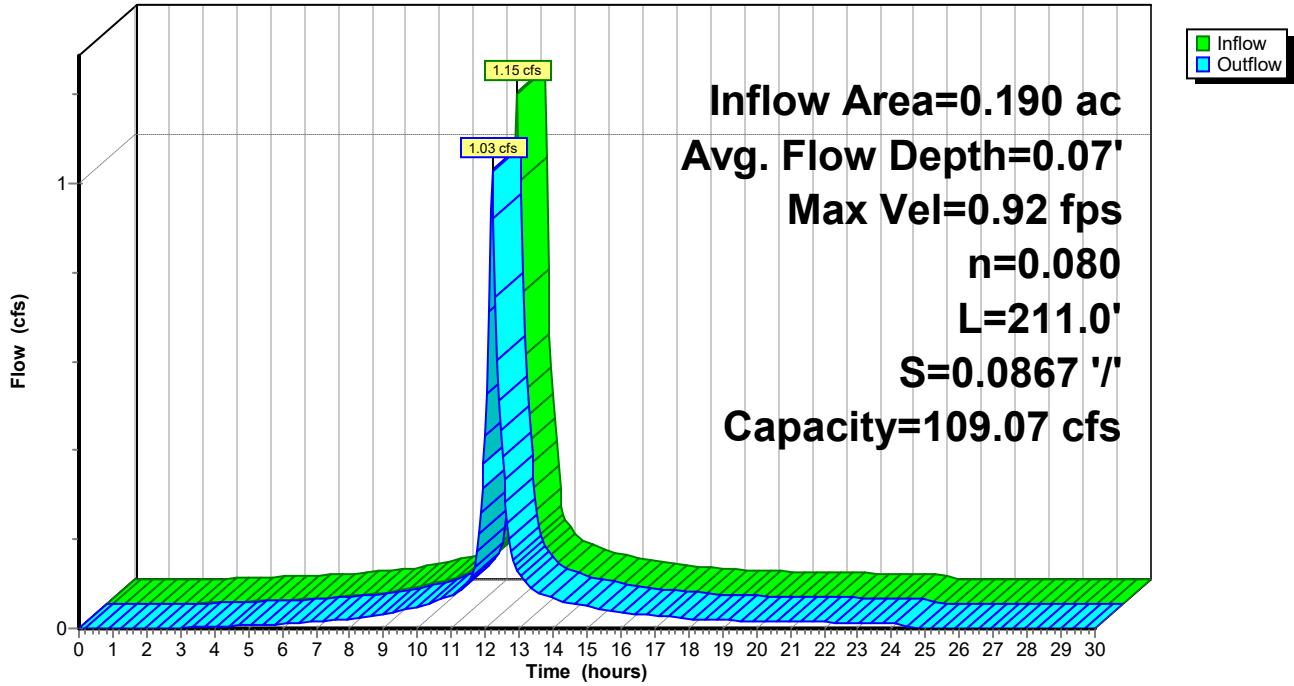
Peak Storage= 240 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.45'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
Length= 211.0' Slope= 0.0867 ' / '
Inlet Invert= 104.00', Outlet Invert= 85.70'



Reach OL-2: OVERLAND

Hydrograph



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Summary for Reach OL-3: OVERLAND

[62] Hint: Exceeded Reach OL-2 OUTLET depth by 0.04' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.03 cfs @ 12.20 hrs, Volume= 0.092 af
Outflow = 1.01 cfs @ 12.21 hrs, Volume= 0.092 af, Atten= 2%, Lag= 0.9 min
Routed to Reach OL-4 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.66 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 2.1 min

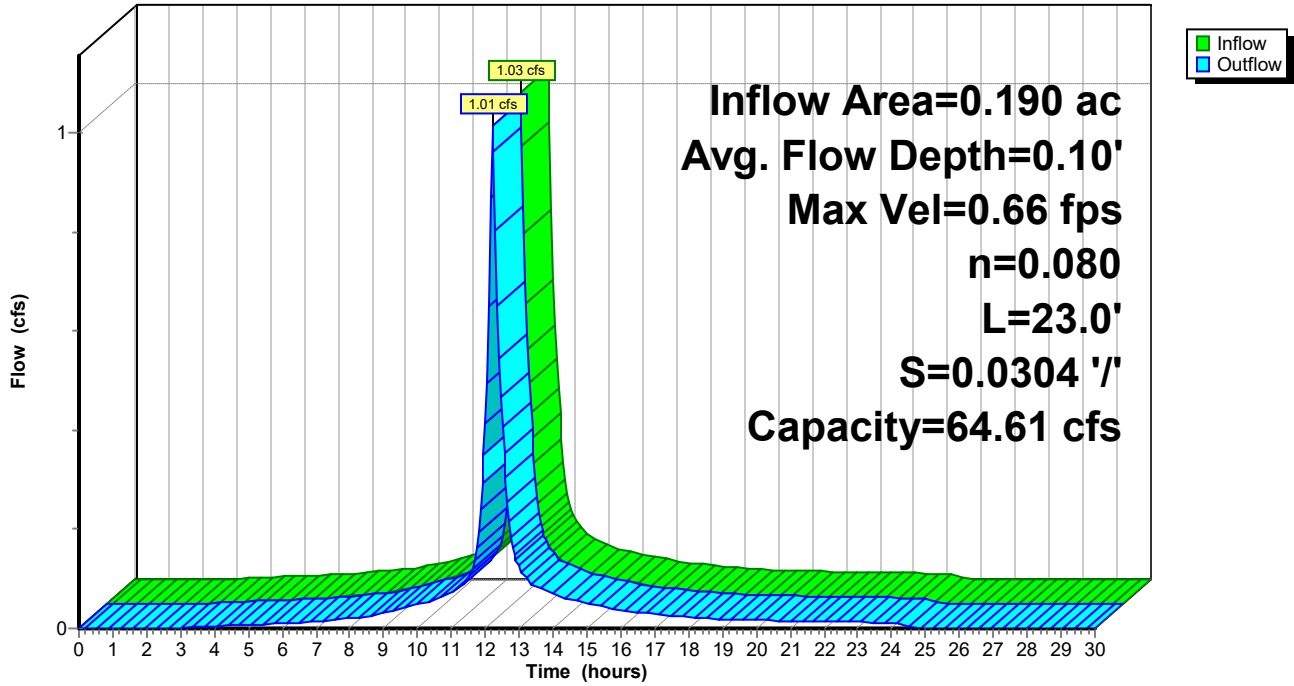
Peak Storage= 36 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 16.95'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 23.0' Slope= 0.0304 ' '
Inlet Invert= 85.70', Outlet Invert= 85.00'



Reach OL-3: OVERLAND

Hydrograph



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Summary for Reach OL-4: OVERLAND

[62] Hint: Exceeded Reach OL-3 OUTLET depth by 0.02' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 1.01 cfs @ 12.21 hrs, Volume= 0.092 af
Outflow = 0.86 cfs @ 12.41 hrs, Volume= 0.092 af, Atten= 15%, Lag= 12.1 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.28 fps, Min. Travel Time= 7.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 27.5 min

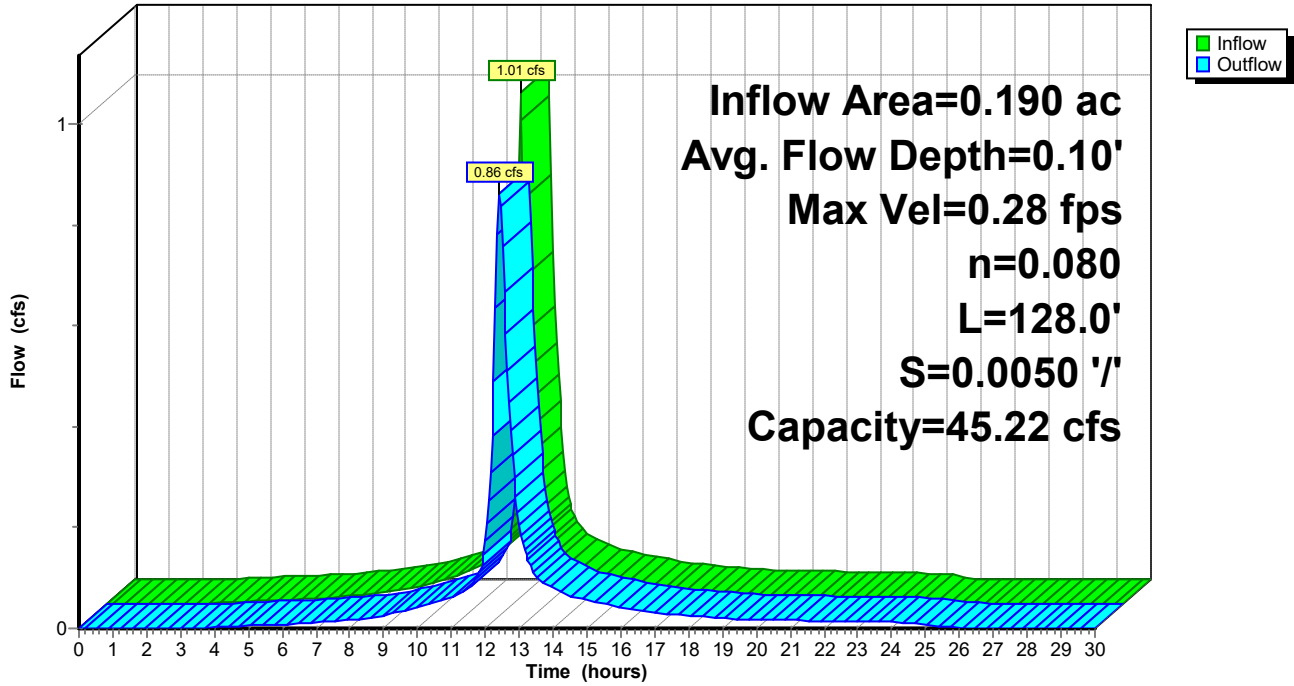
Peak Storage= 399 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 32.01'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

30.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 50.00'
Length= 128.0' Slope= 0.0050 ' '
Inlet Invert= 85.00', Outlet Invert= 84.36'



Reach OL-4: OVERLAND

Hydrograph



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Summary for Reach OL-5: OVERLAND

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 5.67" for 100-Year event
Inflow = 2.08 cfs @ 12.11 hrs, Volume= 0.212 af
Outflow = 1.92 cfs @ 12.22 hrs, Volume= 0.212 af, Atten= 8%, Lag= 6.4 min
Routed to Reach OL-6 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.23 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 13.3 min

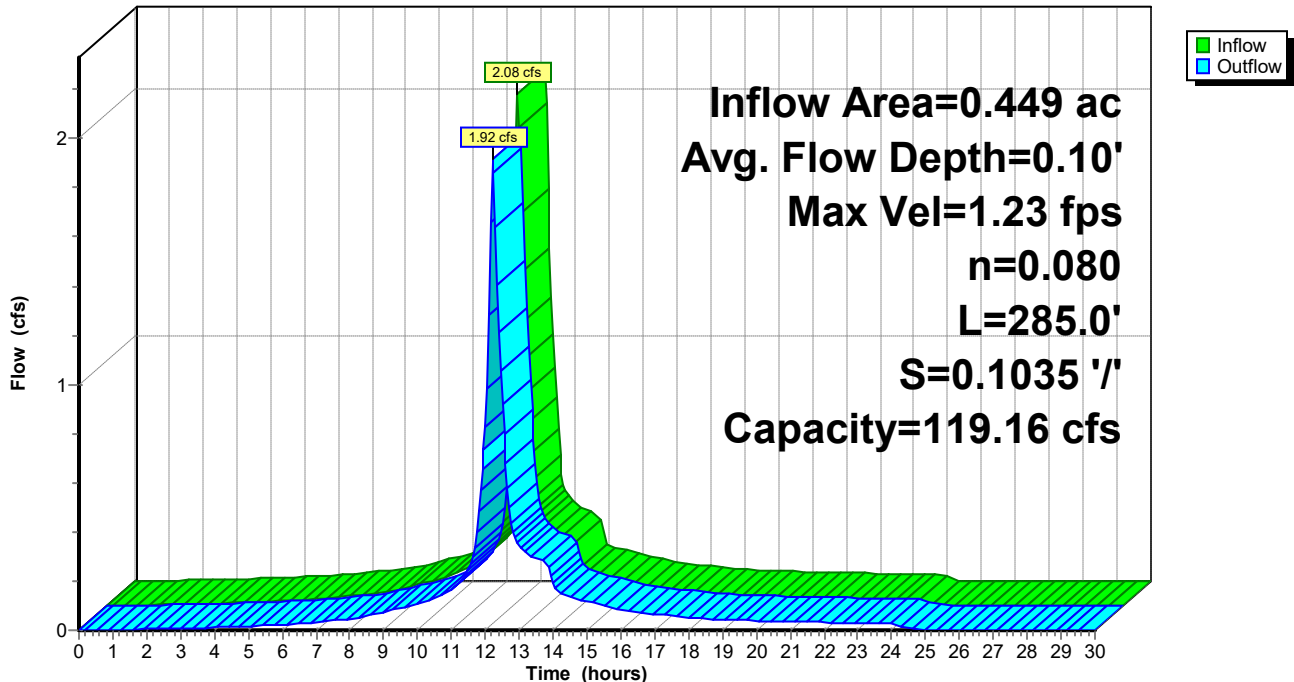
Peak Storage= 452 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 16.98'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' / ' Top Width= 35.00'
Length= 285.0' Slope= 0.1035 ' / '
Inlet Invert= 113.50', Outlet Invert= 84.00'



Reach OL-5: OVERLAND

Hydrograph



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Summary for Reach OL-6: OVERLAND

[62] Hint: Exceeded Reach OL-5 OUTLET depth by 0.15' @ 12.30 hrs

Inflow Area = 0.449 ac, 79.95% Impervious, Inflow Depth = 5.67" for 100-Year event
Inflow = 1.92 cfs @ 12.22 hrs, Volume= 0.212 af
Outflow = 1.86 cfs @ 12.30 hrs, Volume= 0.212 af, Atten= 3%, Lag= 5.2 min
Routed to Reach DP#1 : WETLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.46 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 11.0 min

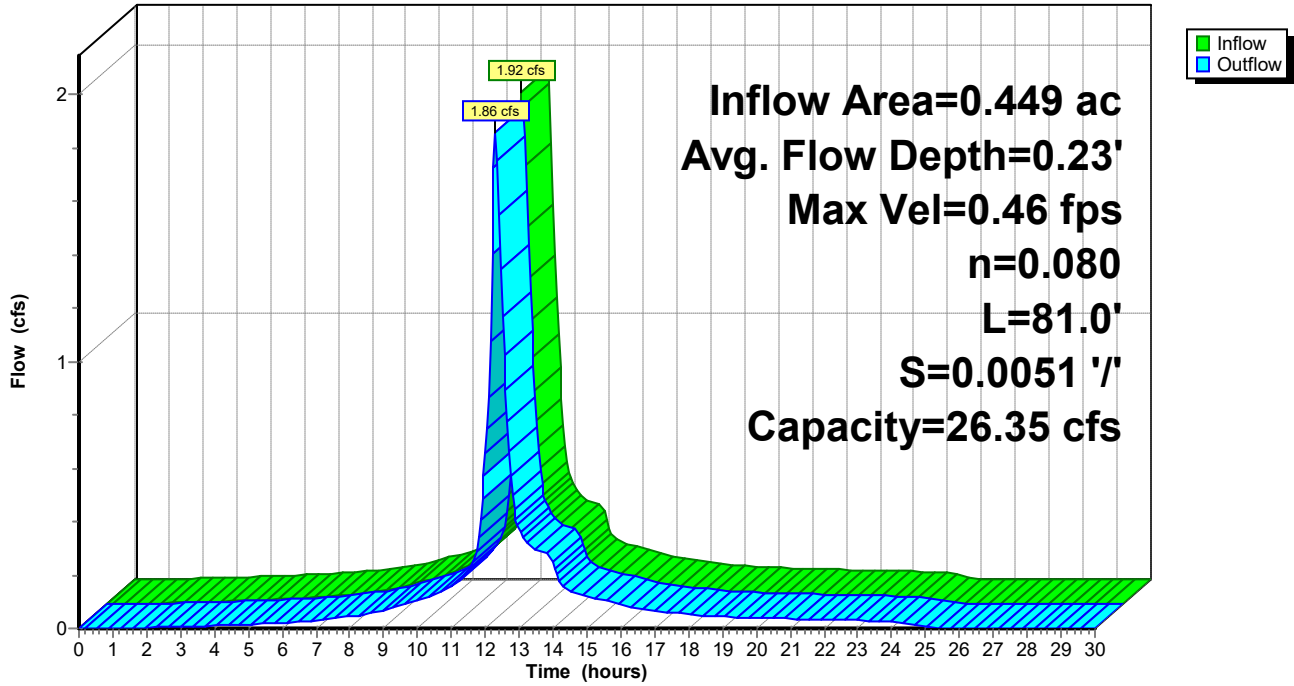
Peak Storage= 327 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 19.66'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

15.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 81.0' Slope= 0.0051 ' '
Inlet Invert= 84.00', Outlet Invert= 83.59'



Reach OL-6: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

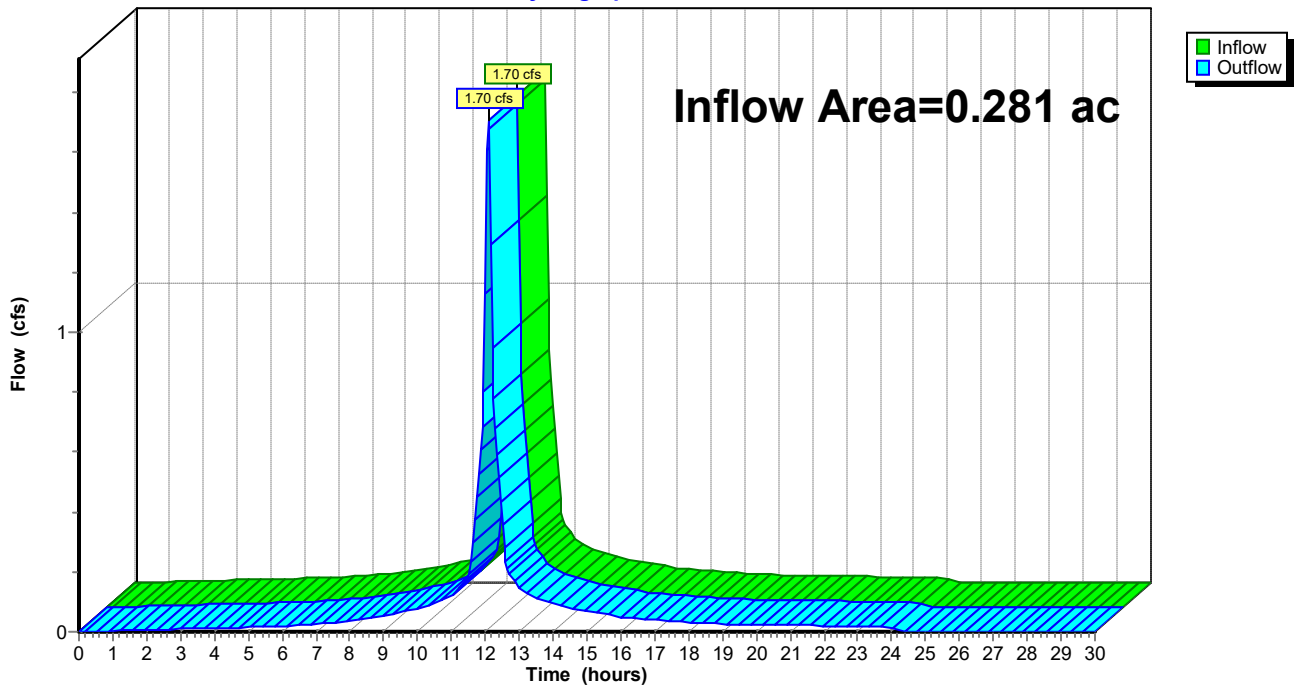
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.281 ac, 87.01% Impervious, Inflow Depth = 5.84" for 100-Year event
Inflow = 1.70 cfs @ 12.08 hrs, Volume= 0.137 af
Outflow = 1.70 cfs @ 12.08 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



Summary for Reach UGS1A: TO UGS#1

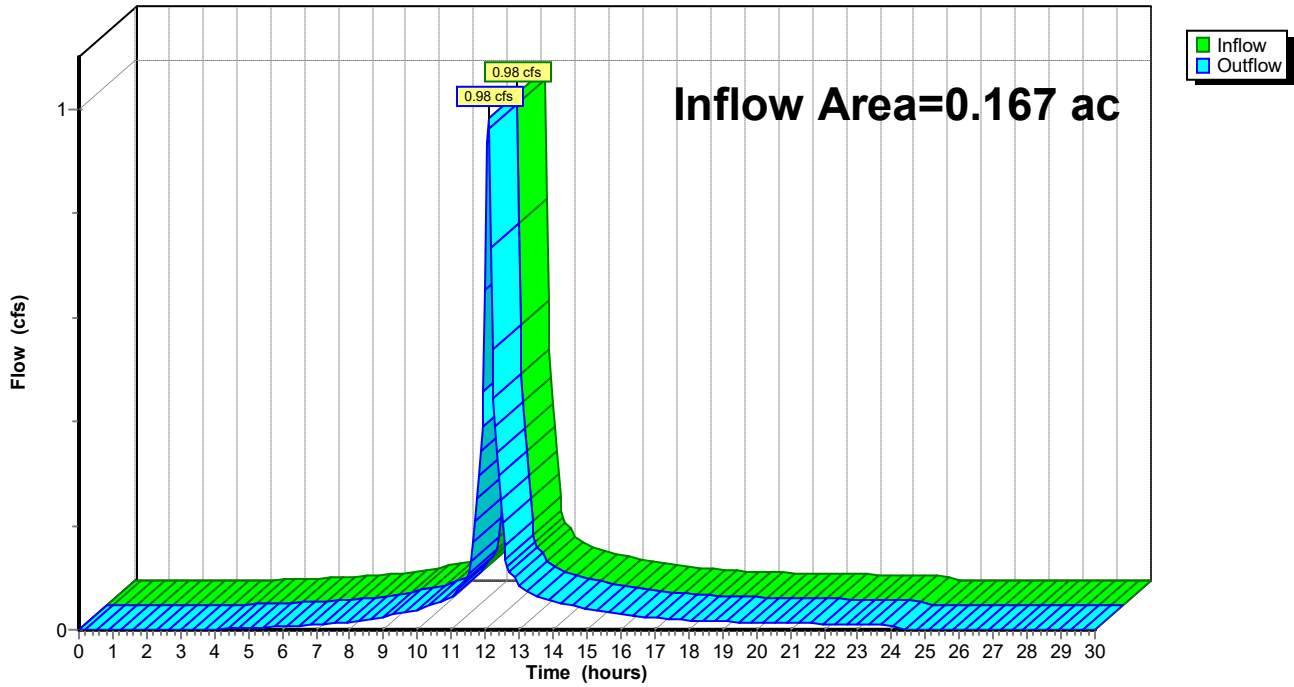
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 5.38" for 100-Year event
Inflow = 0.98 cfs @ 12.08 hrs, Volume= 0.075 af
Outflow = 0.98 cfs @ 12.08 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Routed to Pond UGS1 : TO UGS1B

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach UGS1A: TO UGS#1

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Summary for Reach UGS1B: TO FE#1

[52] Hint: Inlet/Outlet conditions not evaluated

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

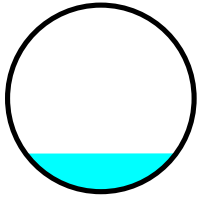
[78] Warning: Submerged Pond UGS1 Primary device # 1 by 0.20'

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 5.38" for 100-Year event
Inflow = 0.69 cfs @ 12.17 hrs, Volume= 0.075 af
Outflow = 0.69 cfs @ 12.17 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.1 min
Routed to Reach OL-5 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.88 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.15 fps, Avg. Travel Time= 0.3 min

Peak Storage= 4 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 0.81'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.48 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 34.0' Slope= 0.0441 '/'
Inlet Invert= 131.50', Outlet Invert= 130.00'



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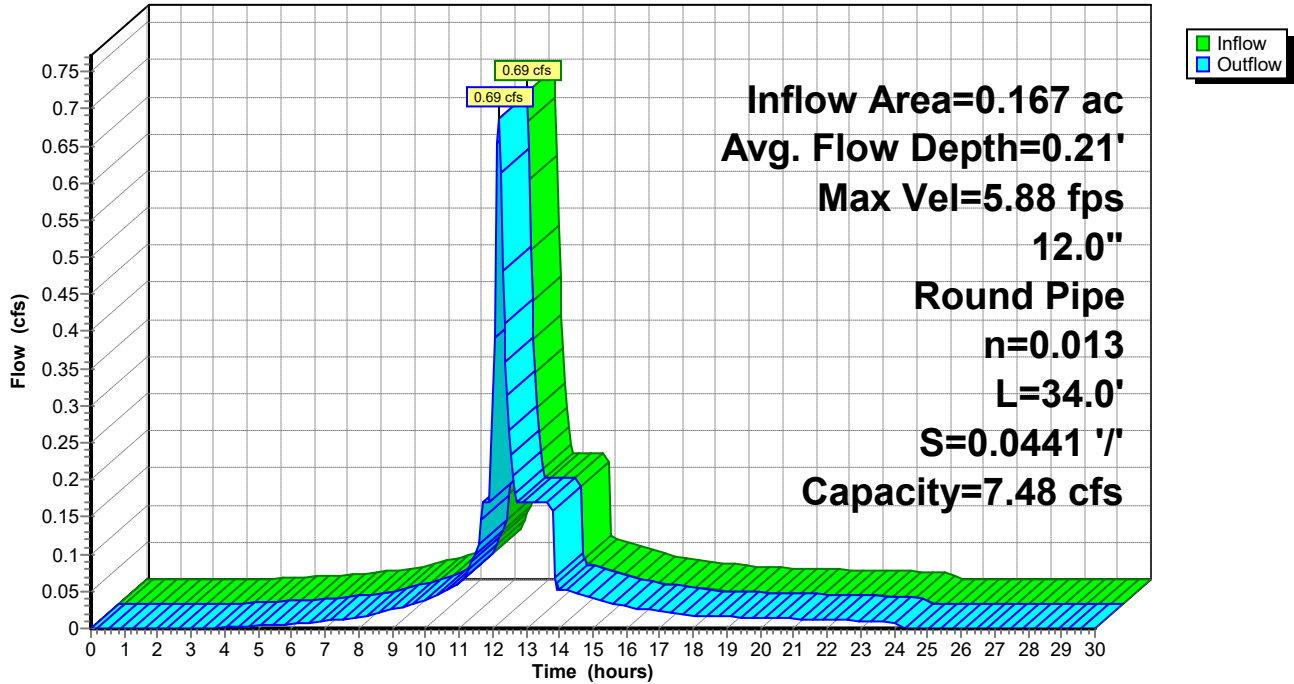
Type III 24-hr 100-Year Rainfall=6.50"

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Reach UGS1B: TO FE#1

Hydrograph



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Summary for Pond UGS1: TO UGS1B

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 5.38" for 100-Year event
 Inflow = 0.98 cfs @ 12.08 hrs, Volume= 0.075 af
 Outflow = 0.69 cfs @ 12.17 hrs, Volume= 0.075 af, Atten= 30%, Lag= 5.5 min
 Primary = 0.69 cfs @ 12.17 hrs, Volume= 0.075 af
 Routed to Reach UGS1B : TO FE#1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 135.55' @ 12.17 hrs Surf.Area= 0.010 ac Storage= 0.012 af

Plug-Flow detention time= 11.0 min calculated for 0.075 af (100% of inflow)
 Center-of-Mass det. time= 11.0 min (791.4 - 780.4)

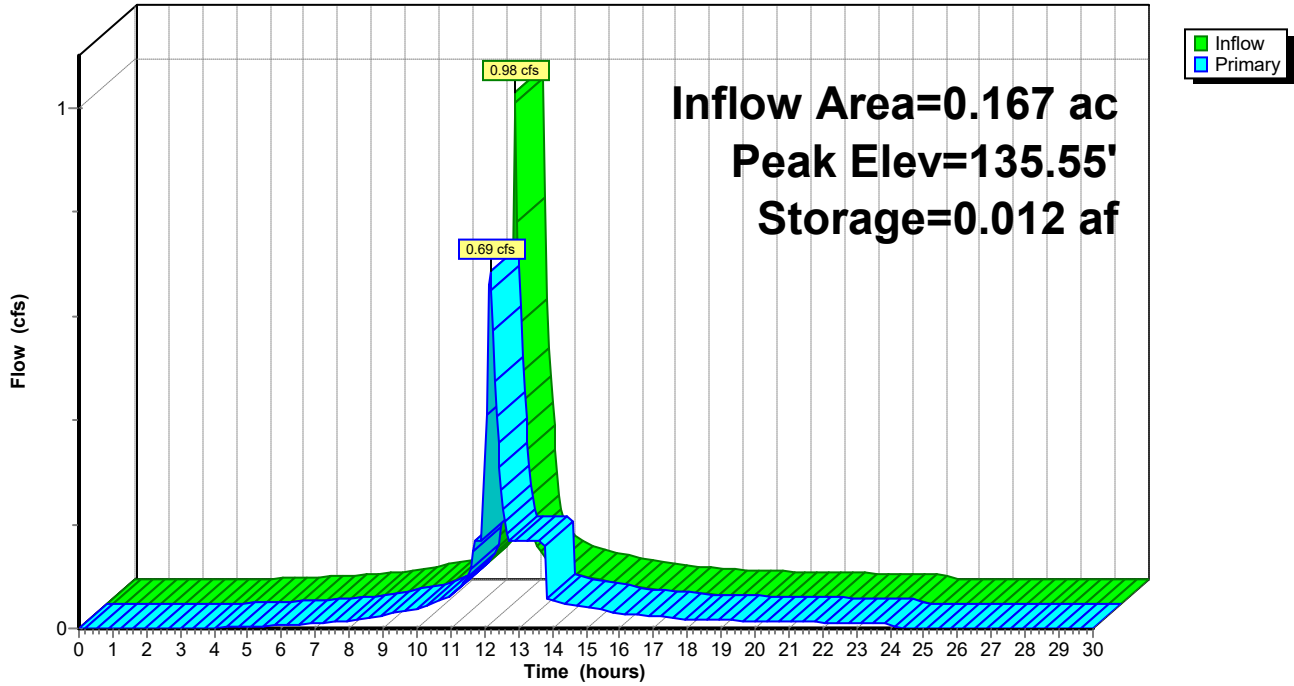
Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.015 af	20.00'W x 14.00'L x 6.00'H Prismaoid 0.039 af Overall x 40.0% Voids
#2	134.00'	0.013 af	Shea Leaching Chamber 4x4x4 x 12 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		0.028 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	131.50'	Special & User-Defined Head (feet) 0.00 1.00 15.00 Disch. (cfs) 0.000 0.170 0.170
#2	Primary	135.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.66 cfs @ 12.17 hrs HW=135.52' (Free Discharge)
 1=Special & User-Defined (Custom Controls 0.17 cfs)
 2=Orifice/Grate (Orifice Controls 0.49 cfs @ 2.50 fps)

Pond UGS1: TO UGS1B

Hydrograph



3.0
STORMWATER MANAGEMENT FORMS



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

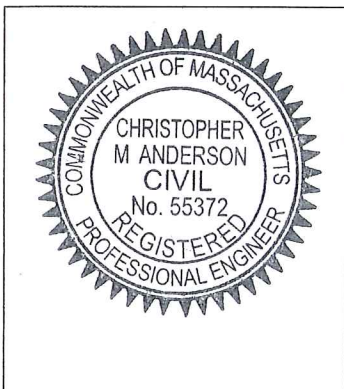
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



11-30-2022

Signature and Date

Checklist

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

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist (continued)



Checklist for Stormwater Report

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist (continued)



Checklist for Stormwater Report

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.

Checklist (continued)



Checklist for Stormwater Report

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

- Portions of the project are subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist (continued)

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



Checklist for Stormwater Report

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

Stormwater Compliance Documentation

Definitive Subdivision - 1355 Main Street, Leicester

November 30, 2022

Standard 1: No Untreated Discharges or Erosion to Wetlands

The drainage from the site currently overland flows towards one of two points within the project area. The majority of the project area overland flows to a wetland area located along the southerly property line. It is noted that a portion of the existing roadway drainage infrastructure flows onto the locus property and sheet flows to this wetland area as well. The remaining runoff either is directed towards the municipal drainage system further to the east along Main Street or a low point located further to the southeasterly corner of the abutting property.

As part of the project the majority of the runoff will be directed towards a small dry-detention basin located along the southerly portion of the project. This will then discharge towards the aforementioned wetland. Provided are the computations showing the calculations per the Connecticut DOT Drainage Manual, Section 11.13 that the proposed rip-rap aprons will provide adequate protection from scouring.

Equation-11.31
 $L=1.80(Q-5)/Sp^{(1.5)} + 10$

Equation-11.33
 $W2=3Sp + 0.7La$

For 12-inch HDPE pipe (FE#1)

$Q_{max}=0.69$ cfs (100-Year)	$Sp=12/12 \rightarrow 1.0$ ft	
$L=1.8(0.69-5)/(1^{1.5}) + 10 \rightarrow -7.8 + 10 = 2.2$	$\rightarrow 10$ feet (min)	
$W2=3(1.0) + 0.7(10) \rightarrow 3.0 + 7.0 = 10$	$\rightarrow 10.0$ feet	

Provide an apron 10-feet long with a terminus width of 10 feet wide.

Standard 2: Peak Rate Attenuation

Table #1: Peak Rate of Runoff

Design Point		2-yr Storm	10-yr Storm	25-yr Storm	100-yr Storm
#1	Pre-	3.47	8.29	11.18	15.76
	Post-	3.37	7.94	10.73	15.34
#2	Pre-	0.90	1.41	1.67	2.07
	Post-	0.90	1.41	1.67	2.07
#3	Pre-	2.30	4.89	6.38	8.67
	Post-	2.30	4.89	6.38	8.67

All flows are in cubic feet per second.

As outline above, the post-development peak rates of runoff have been mitigated for all Storm Events.

Standard 3: Stormwater Recharge

Project is located exclusively within an area of hydrological C (HSG-C) soils, as such compliance is provided to the maximum extent practicable.

Impervious Area Proposed: (This area includes all proposed buildings, driveways, etc.)

The soils within the reviewed project area classified as HSG C:

Existing Impervious HSG-C: 0.00 s.f.
Proposed Impervious HSG-C: 5,118 s.f.
Net New Impervious HSG-C: +5,118 s.f.

Total New Impervious area = +5,118 s.f.
Total Project Impervious = 5,118 s.f.

Required Recharge Volume:

Net Increase HSG Soil C

Net New Impervious HSG C= 5,118 s.f.
HSG C: 5,118 s.f. x (0.25 in/12) = 107 c.f.

Required Recharge Volume = 107 c.f.

Capture Rate:

Total Impervious to DB#1	4,952 sf
Net Captured Impervious	4,952 sf

Capture Rate = 4,952 s.f. / 5,118 s.f. = 97%

Compliance is provided, Capture rate in excess of 65%

Storage Volume Provided:

Volume below lowest outlet within detention facility.

UGS-1: 392 c.f. of storage volume provided

Recharge Provided:

Total Volume Required: 107 c.f.

Volume below lowest outlet within detention facility.

UGS-1: 392 c.f. of storage volume provided

Required Recharge Volume = 107 c.f.
Provided Recharge Volume = 392 c.f.

Compliance is provided to the maximum extent practicable

Drawdown Time: (72 Hours Max.)

Time = Storage Volume / (K x Bottom Area)

Where K = Saturated Hydraulic Conductivity (inches/hour) (From table 2.3.3 1982 Rawls Rates – Mass Stormwater Handbook)

UGS #1: 392 c.f. of storage volume provided.

Time = 392c.f. / (0.27 in/hr x (1 ft/ 12 in) x 280 s.f.) = **62.2 hrs**

Compliance is provided

Standard 4: Water Quality

Water Quality Volume (WQV) = Water Quality Depth x Impervious Area

Water Quality Depth = 1 inch

WQV = [(1 inch) / 12 inches/foot] x (5,118 s.f.) = 426 cf

The project has been designed to incorporate a Hydroworks Hydroguard HG4 unit within DMH#100. The units have been sized to provide in excess of 80% TSS removal as required under the Local Stormwater Ordinance. The treated runoff will then be directed towards the Underground storage system. The treatment trains have been designed to provide in excess of the locally required 80% TSS removal with a total treatment volume of approximately 958 c.f during the 1-year storm event. Reference is made to the provided TSS Removal Forms for each specific discharge point.

Standard 5: Land Uses with Higher Potential Pollutant Loads

Not Applicable

Standard 6: Critical Areas

Not Applicable

Standard 7: Redevelopment

Not Applicable

Standard 8: Construction Period Controls

Proper erosion controls have been incorporated into the submitted plans and details to ensure compliance with the standard.

Standard 9: Operation and Maintenance Plan

Operation and Maintenance plans for the project have been incorporated into the submitted plans and details to ensure compliance with the standard.

Standard 10: Illicit Discharges to Drainage System

No Illicit discharges to the drainage system will occur as a result of this proposed project. A No Illicit discharge statement shall be provided prior to construction.

3010-POST-SUBDIVISION

Type III 24-hr Custom Rainfall=4.30"

Prepared by Hannigan Engineering Inc

Printed 11/29/2022

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Summary for Pond UGS1: TO UGS1B

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 3.25" for Custom event
 Inflow = 0.61 cfs @ 12.08 hrs, Volume= 0.045 af
 Outflow = 0.17 cfs @ 11.85 hrs, Volume= 0.045 af, Atten= 72%, Lag= 0.0 min
 Primary = 0.17 cfs @ 11.85 hrs, Volume= 0.045 af
 Routed to Reach UGS1B : TO FE#1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 Peak Elev= 134.99' @ 12.43 hrs Surf.Area= 0.010 ac Storage= 0.009 af <=Storage/Drawdown Volume

Plug-Flow detention time= 11.2 min calculated for 0.045 af (100% of inflow)
 Center-of-Mass det. time= 11.2 min (805.2 - 794.0)

Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.015 af	20.00'W x 14.00'L x 6.00'H Prismaoid 0.039 af Overall x 40.0% Voids
#2	134.00'	0.013 af	Shea Leaching Chamber 4x4x4 x 12 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		0.028 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	131.50'	Special & User-Defined Head (feet) 0.00 1.00 15.00 Disch. (cfs) 0.000 0.170 0.170
#2	Primary	135.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.17 cfs @ 11.85 hrs HW=133.17' (Free Discharge)
 1=Special & User-Defined (Custom Controls 0.17 cfs)
 2=Orifice/Grate (Controls 0.00 cfs)

MASS DEP “Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices”

DMH#100-Water Quality Unit

For First 1.0-Inch Runoff WQV

Step 1: Area of Impervious Surface to Structure

0.167 acres @ 68.07% Impervious = 0.114 Acres Impervious
0.114 Acres x .0015625 sq mi = **1.18x(10⁻⁴) square miles.**

Step 2: Tc of Train

P100 to DCB#100:	5.0 min
DCB#100 to DMH#100:	2.3 min
Total Tc to DMH#2	7.3 min or 0.121 hours

Step 3: Determine qu

From Figure 4:

Tc @ 0.116, qu=755 csm/in

Step 4: Determine Q(1/2)

$$Q(1) = (qu) \times (A) \times (WQV)$$

$$Q(1) = (755 \text{ csm/in}) \times (1.18 \times 10^{-4}) \times (0.5 \text{ in})$$

$$Q(1) = 0.07 \text{ CFS}$$

Determination

Determination of Water Quality Flow rates for units by Connecticut DOT (CONNDOT)

From Technology Verification

HG 4 Treatment Flow rate

1.10 c.f.s > 0.07 c.f.s. “Pass”

HydroGuard HG5 to be utilized in Design.

INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C value within Row
5. Total TSS Removal = Sum All Values in Column D

Location:

A BMP ¹	B TSS Removal Rate ¹	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catchbasin	0.25	1.00	0.25	0.75
Hydroworks HG4	0.93	0.75	0.70	0.05

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

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

**TSS Removal
Calculation Worksheet**

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Type III 24-hr 1-Year Rainfall=2.50"

Printed 11/29/2022

Summary for Reach DMH100: TO UGS#1A

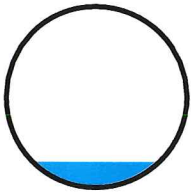
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.167 ac, 68.07% Impervious, Inflow Depth = 1.56" for 1-Year event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.022 af <=WQV
Outflow = 0.30 cfs @ 12.09 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.1 min
Routed to Reach UGS1A : TO UGS#1

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.39 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.49 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 0.70'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.0' Slope= 0.0375 1'
Inlet Invert= 135.80', Outlet Invert= 135.50'



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Type III 24-hr 1-Year Rainfall=2.50"

Printed 11/29/2022

Summary for Subcatchment p100: TO DCB#100

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af, Depth= 1.78"
 Routed to Reach DCB100 : TO DMH#100

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 Type III 24-hr 1-Year Rainfall=2.50"

Area (sf)	CN	Description
210	74	>75% Grass cover, Good, HSG C
681	98	Paved parking, HSG C
97	96	Gravel surface, HSG C
988	93	Weighted Average
307		31.07% Pervious Area
681		68.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	5	0.0200	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
0.6	40	0.0200	1.11		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.5	45	Total, Increased to minimum Tc = 5.0 min $\leq t_c$			

3010-POST-SUBDIVISION

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Type III 24-hr 1-Year Rainfall=2.50"

Printed 11/29/2022

Summary for Reach DCB100: TO DMH#100

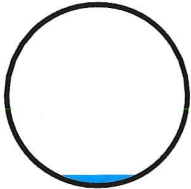
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.023 ac, 68.93% Impervious, Inflow Depth = 1.78" for 1-Year event
Inflow = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af
Outflow = 0.04 cfs @ 12.10 hrs, Volume= 0.003 af, Atten= 4%, Lag= 1.7 min
Routed to Reach DMH100 : TO UGS#1A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.45 fps, Min. Travel Time= 0.9 min
Avg. Velocity= 0.91 fps, Avg. Travel Time= 2.3 min $\leq t_c$

Peak Storage= 2 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.06', Surface Width= 0.47'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.71 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 127.0' Slope= 0.0354 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'



* Storm Water Management Sizing Model *
* Hydroworks, LLC *
* Version 4.4 *
* *
* Continuous Simulation Program *
* Based on SWMM 4.4H *
* Hydroworks, LLC *
* Graham Bryant *
* 2003 - 2021 *

Developed by

* Hydroworks, LLC *
* Metcalf & Eddy, Inc. *
* University of Florida *
* Water Resources Engineers, Inc. *
* (Now Camp Dresser & McKee, Inc.) *
* Modified SWMM 4.4 *

Distributed and Maintained by

* Hydroworks, LLC *
* 888-290-7900 *
* www.hydroworks.com *

* If any problems occur executing this *
* model, contact Mr. Graham Bryant at *
* Hydroworks, LLC by phone at 888-290-7900 *
* or by e-mail: support@hydroworks.com *

* This model is based on EPA SWMM 4.4 *
* "Nature is full of infinite causes which *
* have never occurred in experience" da Vinci *

* Entry made to the Rain Block *
* Created by the University of Florida - 1988 *
* Updated by Oregon State University, March 2000 *

ZP Battery DevCo, LLC
DMH#100

HydroStorm Simulation

```
#####  
# Precipitation Block Input Commands #  
#####  
Station Name..... Worcester Wso Ap  
Station Location..... Massachusetts  
Station, IATA..... 9923  
Beginning date, YRBEG (Yr/Mo/Dy)..... 1957/ 1/ 1  
Ending date, IYEND (Yr/Mo/Dy)..... 2001/12/31  
Minimum interevent time, MIT..... 1  
Number of ranked storms, NPTS..... 10  
NWS format, IFORM (See text)..... 1  
Print storm summary, ISUM (O-No 1-Yes) 0  
Print all rainfall, IYEAR (O-No 1-Yes) 0  
Save storm event data on NSCRAT(1).... 0  
(IFILE =0 -Do not save, =1 -Save data)  
IDECID 0 - Create interface file  
1 - Create file and analyze  
2 - Synoptic analysis..... 2  
Plotting position parameter, A..... 0.40  
Storm event statistics, NOSTAT..... 1100  
  
KODEA (from optional group B0)..... 2  
= 0, Do not include NCDC cumulative values.  
= 1, Average NCDC cumulative values.  
= 2, Use NCDC cumulative value as inst. rain.  
  
KODEPR (from optional group B0)..... 0  
Print NCDC special codes in event summary:  
= 0, only on days with events.  
= 1, on all days with codes present.  
Codes: A = accumulated value, I = incomplete value,  
M = missing value, O = other code present
```

* Precipitation output created using the Rain block *
* Number of precipitation stations... 1 *

Location Station Number

1. 9923

STATION ID ON PRECIP. DATA INPUT FILE = 2302
REQUESTED STATION ID = 9923 CHECK TO BE SURE THEY MATCH.

\$
Note, 15-min. data are being processed, but hourly
print-out, summaries, and statistics are based on
hourly totals only. Data placed on interface file
are at correct 15-min. intervals.
\$

Entry made to the Runoff Block, last updated by #
Oregon State University, and Camp, Dresser and #
McKee, Inc., March 2002.

"And wherever water goes, amoebae go along for #
the ride" Tom Robbins #
#####

ZP Battery DevCo, LLC
DMH#100

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Horton infiltration equation used - INFILM..... 2
Maximum infiltration volume is limited to RMAXINF input on subcatchment lines.
Infiltration volume regenerates during non rainfall periods.
Quality is simulated - KQUALTY..... 1
IVAP is negative. Evaporation will be set to zero
during time steps with rainfall.

```

Read evaporation data on line(s) F1 (F2) - IVAP..      1
Hour of day at start of storm - NHR.....           1
Minute of hour at start of storm - NMN.....         1
Time TZERO at start of storm (hours).....          1.017
Use U.S. Customary units for most I/O - METRIC...   0
Runoff input print control...                       0
Runoff graph plot control....                       1
Runoff output print control..                      0
Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0
Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Limit number of groundwater convergence messages to 10000 (if simulated)
Month, day, year of start of storm is:             1/ 1/1957
Wet time step length (seconds).....                300.
Dry time step length (seconds).....                900.
Wet/Dry time step length (seconds)...              450.
Simulation length is.....                          20011231.0 Yr/Mo/Dy
Percent of impervious area with zero detention depth 25.0
Horton infiltration model being used
Rate for regeneration of infiltration = REGEN * DECAY
DECAY is read in for each subcatchment
REGEN = ..... 0.01000

```

```

*****
* Processed Precipitation will be read from file *
*****

```

```

#####
# Data Group F1 #
# Evaporation Rate (in/day) #
#####

```

JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
0.00	0.00	0.00	0.10	0.10	0.15	0.15	0.15	0.10	0.10	0.00	0.00

 * CHANNEL AND PIPE DATA *

Input Channel Number	Drains to NGTO	Channel Type	Width (ft)	Length (ft)	Invert Slope (ft/ft)	L Side Slope (ft/ft)	R Side Slope (ft/ft)	Initial Depth (ft)	Max Depth (ft)	Mannings "N"	Full Flow (cfs)
1	201	200 Dummy	0.0	0.0	0.0000	0.0000	0.0000	0.0	0.0	0.0000	0.00E+00

 * SUBCATCHMENT DATA *

NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS

SUBCATCHMENT NO.	CHANNEL OR INLET	WIDTH (FT)	AREA (AC)	PERCENT IMPERV.	SLOPE (FT/FT)	RESISTANCE IMPERV.	FACTOR PERV.	DEPRES. IMPERV.	STORAGE PERV.	INFILTRATION RATE (IN/HR)	DECAY RATE (1/SEC)	MAXIMUM VOLUME (INCHES)		
1	300	200	85.29	0.17	68.10	0.0200	0.015	0.250	0.200	2.50	0.40	0.00055	1	4.00000

TOTAL NUMBER OF SUBCATCHMENTS... 1
 TOTAL TRIBUTARY AREA (ACRES)... 0.17
 IMPERVIOUS AREA (ACRES)... 0.11
 PERVIOUS AREA (ACRES)... 0.05
 TOTAL WIDTH (FEET)... 85.29
 PERCENT IMPERVIOUSNESS... 68.10

 * GROUNDWATER INPUT DATA *

SUB-CATCH NUMBER	CHANNEL OR INLET	ELEVATIONS			FLOW CONSTITANTS							
		GROUND (FT)	BOTTOM (FT)	STAGE (FT)	TW (FT)	A1 (IN/HR-FT^B1)	A2 (IN/HR-FT^B2)	A3 (IN/HR-FT^2)				
0	602	10.00	0.00	0.00	2.00	4.500E-05	2.600	0.000E+00	1.000	0.00E+00		

 * GROUNDWATER INPUT DATA (CONTINUED) *

SUBCAT. NO.	S O I L P R O P E R T I E S			P E R C O L A T I O N P A R A M E T E R S		
	HYDRAULIC CONDUCTIVITY (in/hr)	WILTING POINT (in/hr)	FIELD CAPACITY (in/hr)	MAX. DEEP PERCOLATION (in/hr)	HCO PCO	DEPTH OF ET TO UPPER ZONE (ft)

 * REMOVAL FRACTIONS FOR SELECTED CHANNEL/PIPES *
 * FROM J7 LINES *

CHANNEL/ CONSTITUENT
 PIPE Total Susp

 201 0.000

 * Subcatchment surface quality on data group L1 *

	No. Usage	Land Use No.	Land Use 10**2ft	Total Gutter Length	Number of Catch-Basins	Input Loading load/ac	Total Su
1	300	Urban De	1	1.70	1.00	0.0E+00	
Totals	(Loads in lb or other)			1.70	1.00	0.0E+00	

 * DATA GROUP M1 *

TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT.. 1
 NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV.. 0
 STARTING AND STOPPING PRINTOUT DATES..... 0

 * DATA GROUP M3 *

CHANNEL/ INLET PRINT DATA GROUPS..... -200

 * Rainfall from Nat. Weather Serv. file *
 * in units of hundredths of an inch *

0 .4000 5.000 .1500 .3000 .3000 2.000E-03 10.00 15.00 14.00 0.350

 * Arrangement of Subcatchments and Channel/Pipes *
 * See second subcatchment output table for connectivity *
 * of subcatchment to subcatchment flows. *

Channel
 or Pipe
 201 No Tributary Channel/Pipes
 No Tributary Subareas....

INLET
 200 Tributary Channel/Pipes... 201
 Tributary Subareas..... 300

 * Hydrographs will be stored for the following 1 INLETS *

 200

Quality Simulation #
 General Quality Control Data Groups #

Description	Variable	Value
Number of quality constituents.....	NQS.....	1
Number of land uses.....	JLAND.....	1
Standard catchbasin volume.....	CBVOL.....	4.00 cubic feet
Erosion is not simulated.....	IROS.....	0
DRY DAYS PRIOR TO START OF STORM...	DRYDAY.....	3.00 DAYS
DRY DAYS REQUIRED TO RECHARGE CATCHBASIN CONCENTRATION TO INITIAL VALUES.....	DRYBSN.....	5.00 DAYS
DUST AND DIRT STREET SWEEPING EFFICIENCY.....	REFEFD.....	0.000
DAY OF YEAR ON WHICH STREET SWEEPING BEGINS.....	KLNBGN.....	120

 # Land use data on data group J2 #
 #####

AND USE LNAME)	BUILDUP EQUATION TYPE (METHOD)	FUNCTIONAL DEPENDENCE OF BUILDUP PARAMETER (JACGUT)	LIMITING BUILDUP QUANTITY (DDLIM)	BUILDUP POWER (DPOW)	BUILDUP COEFF. (DDEFACT)	CLEANING INTERVAL IN DAYS (CLFREQ)	AVAIL. FRACTION (AVSWP)	DAYS SINCE LAST SWEEPING (DSLCL)
Urban De	EXPONENTIAL(1)	AREA(1)	2.500E+01	0.500	60.000	30.000	0.300	30.000

↑
 #####
 # Constituent data on data group J3 #
 #####

Constituent units	Total Su mg/l
Type of units	0
KALC	2
Type of buildup calc.	EXPONENTIAL (2)
KWASH	0
Type of washoff calc.	POWER EXPONEN. (0)
KACGUT	1
Dependence of buildup	AREA (1)
LINKUP	0
Linkage to snowmelt	NO SNOW LINKAGE
Buildup param 1 (QFACT1)	25.000
Buildup param 2 (QFACT2)	0.500
Buildup param 3 (QFACT3)	60.000
Buildup param 4 (QFACT4)	0.000
Buildup param 5 (QFACT5)	0.000
Washoff power (WASHPO)	1.100
Washoff coef. (RCOEF)	3.000
Init catchb conc (CBFACT)	100.000
Precip. conc. (CONCRN)	0.000
Street sweep effc (REFF)	0.000
Remove fraction (REMOVE)	0.000
1st order QDECAY, 1/day	0.000
Land use number	1

 * Constant Groundwater Quality Concentration(s) *

Total Susp has a concentration of.. 0.0000 mg/l

ZP Battery DevCo, LLC
DMH#100

Rainfall Station Worcester Wso Ap
State/Province Massachusetts

Rainfall Depth Summary (in)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1957.	0.4	1.4	2.8	3.6	3.4	3.0	1.1	2.8	1.1	3.8	5.7	7.3	36.5
1958.	9.0	2.9	4.9	7.2	4.3	2.8	6.1	4.4	8.1	2.8	5.0	3.2	60.8
1959.	5.1	2.8	8.2	4.2	2.4	4.7	8.4	4.5	3.1	8.3	6.1	5.1	62.9
1960.	2.4	6.3	4.2	5.4	5.9	3.1	7.2	3.9	7.0	3.0	4.0	5.0	57.4
1961.	3.7	2.5	5.8	5.2	4.2	3.5	4.3	5.3	6.1	3.5	3.3	5.1	51.5
1962.	2.4	5.4	2.6	3.9	4.4	3.5	4.1	4.6	5.7	9.2	4.9	5.8	54.4
1963.	4.2	3.4	4.7	1.9	3.6	2.6	2.0	3.0	4.9	1.7	8.8	3.3	44.0
1964.	5.9	3.6	4.2	4.5	1.5	1.8	3.6	2.9	2.1	2.5	3.5	6.2	42.4
1965.	3.1	4.9	2.7	3.9	3.1	2.0	2.0	3.2	3.8	2.3	3.2	2.9	37.1
1966.	4.4	4.4	3.2	1.7	3.8	2.6	3.5	2.0	7.5	3.5	4.9	4.2	45.6
1967.	2.8	3.7	4.9	5.2	7.4	3.9	6.5	3.5	5.2	2.4	5.1	5.0	55.7
1968.	3.7	1.4	7.9	2.3	7.1	8.4	1.9	0.7	2.2	2.4	6.2	6.5	50.7
1969.	1.8	4.2	2.7	5.6	3.4	1.7	4.3	4.7	5.4	1.8	7.1	8.5	51.1
1970.	2.2	5.5	4.1	3.9	6.1	2.9	0.9	5.8	3.6	3.0	4.0	3.9	45.7
1971.	3.2	5.9	1.9	2.0	5.6	2.6	4.9	8.0	1.6	3.6	5.5	3.7	48.3
1972.	3.1	8.2	6.1	4.8	8.4	9.7	6.6	5.1	3.3	6.0	10.2	6.4	77.7
1973.	4.4	4.1	4.9	5.7	4.8	7.3	4.1	4.4	4.1	4.8	3.9	8.8	61.1
1974.	4.2	3.4	5.6	3.6	6.3	3.8	3.4	3.7	13.4	3.6	5.7	4.1	61.0
1975.	6.9	3.3	5.9	1.3	2.0	3.8	4.3	5.1	7.6	6.6	6.0	5.2	57.9
1976.	6.9	2.9	4.5	2.5	3.2	2.8	3.6	6.6	2.3	5.3	1.0	3.4	45.0
1977.	2.4	3.2	6.4	4.2	2.7	4.2	4.8	2.4	8.2	5.6	4.2	6.8	55.0
1978.	11.9	1.8	3.4	2.5	3.8	1.8	3.8	5.4	1.3	4.1	2.5	4.3	46.5
1979.	12.2	3.1	4.0	5.5	4.7	0.6	6.1	7.7	4.1	4.9	4.1	1.8	58.8
1980.	0.8	1.2	7.4	5.2	2.4	4.8	3.9	2.1	3.3	5.4	4.8	2.2	43.4
1981.	1.9	9.4	1.4	4.9	4.1	2.7	8.2	1.2	5.5	5.7	3.9	6.1	55.0
1982.	4.4	4.0	4.2	4.8	3.4	13.1	6.0	2.0	2.1	3.2	4.6	3.9	55.7
1983.	5.3	5.3	9.0	8.4	7.3	2.7	0.9	6.4	1.5	6.3	9.3	7.1	69.5
1984.	3.3	6.7	6.3	5.1	10.3	3.3	6.4	1.2	2.8	3.3	3.0	3.4	55.1
1985.	1.9	3.6	3.5	3.0	5.1	5.2	6.6	4.1	4.7	3.0	7.3	2.7	50.7
1986.	5.5	3.5	3.6	1.9	3.4	9.6	3.5	3.6	0.9	3.0	6.7	7.8	52.9
1987.	6.2	1.9	5.8	9.9	1.5	5.0	1.0	5.4	6.7	4.5	3.1	2.6	53.6
1988.	3.7	3.5	3.3	3.8	5.1	1.4	6.7	4.5	1.2	5.9	5.9	1.8	46.8
1989.	1.6	3.4	3.0	4.8	6.6	7.3	4.6	5.9	5.1	0.0	0.0	0.0	42.3
1991.	0.0	0.0	0.0	0.0	0.0	0.0	3.2	8.1	6.9	3.8	6.0	3.5	31.5
1992.	3.1	3.3	4.7	3.2	2.7	5.0	5.7	7.2	2.3	2.4	6.3	5.1	50.9
1993.	3.2	2.9	7.1	4.0	1.9	2.9	3.4	2.1	9.4	4.0	5.2	5.8	51.8
1994.	6.0	2.9	6.6	2.9	6.8	2.5	3.2	8.0	5.3	1.3	6.0	4.2	55.7
1995.	5.9	2.3	2.2	2.5	0.0	0.0	4.7	2.1	3.7	8.8	5.2	1.4	38.8
1996.	7.1	3.3	2.5	7.3	4.1	3.1	6.3	4.5	4.9	4.9	3.0	5.0	55.8
1997.	3.3	1.7	4.6	3.4	2.6	1.6	3.2	2.8	1.6	1.8	5.5	2.3	34.4
1998.	3.9	2.8	6.3	2.8	5.7	9.7	1.8	2.3	1.2	5.0	2.4	1.4	45.4
1999.	7.0	2.4	4.6	1.1	3.3	1.8	2.4	2.4	8.6	4.6	3.1	4.3	45.7

2000. 3.5 3.3 4.2 7.6 4.2 5.4 4.5 2.5 3.4 2.4 4.0 4.2 49.3
 2001. 2.2 3.2 7.4 1.0 3.9 5.0 3.7 1.1 3.5 0.9 1.7 3.2 36.7

Total Rainfall Depth for Simulation Period 2227.9 (in)

Rainfall Intensity Analysis (in/hr)

(in/hr)	(#)	(%)	(in)	(%)
0.10	55294	69.5	679.	30.5
0.20	15423	19.4	571.	25.6
0.30	3295	4.1	211.	9.5
0.40	2538	3.2	224.	10.1
0.50	868	1.1	100.	4.5
0.60	597	0.8	80.	3.6
0.70	577	0.7	92.	4.1
0.80	337	0.4	64.	2.9
0.90	120	0.2	26.	1.2
1.00	123	0.2	29.	1.3
1.10	70	0.1	18.	0.8
1.20	64	0.1	18.	0.8
1.30	56	0.1	17.	0.8
1.40	38	0.0	13.	0.6
1.50	18	0.0	7.	0.3
1.60	38	0.0	15.	0.7
1.70	16	0.0	7.	0.3
1.80	28	0.0	12.	0.6
1.90	14	0.0	7.	0.3
2.00	16	0.0	8.	0.4
> 2.00	48	0.1	30.	1.3

Total # of Intensities 79578

Daily Rainfall Depth Analysis (in)

(in)	(#)	(%)	(in)	(%)
0.10	1790	31.7	85.	3.8
0.20	996	17.7	143.	6.4
0.30	575	10.2	138.	6.2
0.40	489	8.7	166.	7.4
0.50	302	5.4	134.	6.0
0.60	279	4.9	152.	6.8
0.70	209	3.7	134.	6.0
0.80	152	2.7	113.	5.1
0.90	128	2.3	108.	4.8
1.00	126	2.2	119.	5.3
1.10	89	1.6	93.	4.2
1.20	79	1.4	90.	4.1
1.30	69	1.2	86.	3.9
1.40	49	0.9	66.	3.0
1.50	56	1.0	81.	3.6
1.60	44	0.8	68.	3.0

Final Subsurface Storage 21824. 36.
 Upper Zone ET over Pervious Area 0. 0.
 Lower Zone ET over Pervious Area 0. 0.

 * Infiltration + Initial Storage - Final *
 * Storage - Upper and Lower Zone ET - *
 * Groundwater Flow - Deep Percolation *
 * ----- *
 * Infiltration + Initial Storage *

 Error 0.000 Percent

SUMMARY STATISTICS FOR SUBCATCHMENTS

SUBCATCH- MENT NO.	GUTTER OR INLET NO.	FULL VELOCITY (FPS)	FULL FLOW (CFS)	FULL DEPTH (FT)	PERVIOUS AREA			IMPERVIOUS AREA			TOTAL SUBCATCHMENT AREA		
					TOTAL SIMULATED RAINFALL (IN)	PERCENT IMPER. (IN)	AREA (AC)	TOTAL RUNOFF DEPTH (IN)	LOSSES RATE (CFS)	PERCENT IMPER. (IN)	AREA (AC)	TOTAL RUNOFF DEPTH (IN)	LOSSES RATE (CFS)
300	200	0.17	68.1	2224.52	26.8252198	493	0.132	2151.506	0.413	1473.733	0.545	3.264	

*** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE

SUMMARY STATISTICS FOR CHANNEL/PIPES

CHANNEL NUMBER	FULL FLOW (CFS)	FULL VELOCITY (FPS)	FULL DEPTH (FT)	MAXIMUM COMPUTED INFLOW (CFS)	MAXIMUM COMPUTED OUTFLOW (CFS)	MAXIMUM COMPUTED DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY HR.	LENGTH OF SURCHARGE (HR)	MAXIMUM SURCHARGE VOLUME (AC-FT)	RATIO OF	
											MAX. FULL FLOW	DEPTH TO FULL FLOW
201	0.00			1/	0/1900	0.00						
200	0.54			7/19	1972	17.50						

TOTAL NUMBER OF CHANNELS/PIPES = 2

*** NOTE *** THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL

 # Runoff Quality Summary Page #
 # If NDIM = 0 Units for: loads mass rates #
 # METRIC = 1 lb lb/sec #
 # METRIC = 2 kg kg/sec #
 # If NDIM = 1 Loads are in units of quantity #

1.70	39	0.7	64.	2.9
1.80	28	0.5	49.	2.2
1.90	20	0.4	37.	1.6
2.00	16	0.3	31.	1.4
> 2.00	104	1.8	270.	12.1

Total # Days with Rain 5639

 * End of time step DO-loop in Runoff *

Final Date (Mo/Day/Year) = 12/31/2001
 Total number of time steps = 3055844
 Final Julian Date = 2001365
 Final time of day = 86397. seconds.
 Final time of day = 24.00 hours.
 Final running time = 394464.0000 hours.
 Final running time = 16436.0000 days.

 * Extrapolation Summary for Watersheds *
 * # Steps ==> Total Number of Extrapolated Steps *
 * # Calls ==> Total Number of OVERLND Calls *

Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls	Subcatch	# Steps	# Calls
-----	-----	-----	-----	-----	-----	-----	-----	-----
300	13540570	3323262						

 * Extrapolation Summary for Channel/Pipes *
 * # Steps ==> Total Number of Extrapolated Steps *
 * # Calls ==> Total Number of GUTNR Calls *

Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls	Chan/Pipe	# Steps	# Calls
-----	-----	-----	-----	-----	-----	-----	-----	-----
201	0	0						

 * Continuity Check for Surface Water *

Total Precipitation (Rain plus Snow)		cubic feet	Inches over
Total Infiltration	1348526.	Total Basin	2225.
Total Evaporation	424591.		700.
Surface Runoff from Watersheds	41867.		69.
Total Water remaining in Surface Storage	893842.		1474.
Infiltration over the Pervious Area...	6.		0.
	424591.		2196.

 * Infiltration + Evaporation +
 * Surface Runoff + Snow removal +
 * Water remaining in Surface Storage +

Water remaining in Snow Cover..... 2244.
 Total Precipitation + Initial Storage. 2225.

1360307.
 1348526.

The error in continuity is calculated as

```

*****
* Precipitation + Initial Snow Cover *
* - Infiltration - *
*Evaporation - Snow removal - *
*Surface Runoff from Watersheds - *
*Water in Surface Storage - *
*Water remaining in Snow Cover *
*-----*
* Precipitation + Initial Snow Cover *
*****
Error..... -0.874 Percent
  
```

```

*****
* Continuity Check for Channel/Pipes *
*****
  
```

	cubic feet	Inches over Total Basin
Initial Channel/Pipe Storage.....	0.	0.
Final Channel/Pipe Storage.....	0.	0.
Surface Runoff from Watersheds.....	893842.	1474.
Baseflow.....	0.	0.
Groundwater Subsurface Inflow.....	0.	0.
Evaporation loss from Channels.....	0.	0.
Channel/Pipe/Inlet Outflow.....	893842.	1474.
Initial Storage + Inflow.....	893842.	1474.
Final Storage + Outflow.....	893842.	1474.

* Final Storage + Outflow + Evaporation - *		
* Watershed Runoff - Groundwater Inflow - *		
* Initial Channel/Pipe Storage *		
* ----- *		
* Final Storage + Outflow + Evaporation *		

Error.....	0.000 Percent	

```

*****
* Continuity Check for Subsurface Water *
*****
  
```

	cubic feet	Inches over Subsurface Basin
Total Infiltration	0.	0.
Total Upper Zone ET	0.	0.
Total Lower Zone ET	0.	0.
Total Groundwater flow	0.	0.
Total Deep percolation	0.	0.
Initial Subsurface Storage	21824.	36.

and mass rates are quantity/sec #
 # If NDIM = 2 loads are in units of concentration #
 # times volume and mass rates have units #
 # of concentration times volume/second #
 #####

Total Su NDIM = 0
 METRIC = 1

Total Su

Inputs

 1. INITIAL SURFACE LOAD..... 3.
 2. TOTAL SURFACE BUILDUP..... 5872.
 3. INITIAL CATCHBASIN LOAD..... 0.
 4. TOTAL CATCHBASIN LOAD..... 0.
 5. TOTAL CATCHBASIN AND SURFACE BUILDUP (2+4)..... 5872.

Remaining Loads

6. LOAD REMAINING ON SURFACE... 1.
 7. REMAINING IN CATCHBASINS... 0.
 8. REMAINING IN CHANNEL/PIPES.. 0.

Removals

9. STREET SWEEPING REMOVAL..... 0.
 10. NET SURFACE BUILDUP (2-9)... 5872.
 11. SURFACE WASHOFF..... 5867.
 12. CATCHBASIN WASHOFF..... 0.
 13. TOTAL WASHOFF (11+12)..... 5867.
 14. LOAD FROM OTHER CONSTITUENTS 0.
 15. PRECIPITATION LOAD..... 0.
 15a. SUM SURFACE LOAD (13+14+15) 5867.
 16. TOTAL GROUNDWATER LOAD..... 0.
 16a. TOTAL I/I LOAD..... 0.
 17. NET SUBCATCHMENT LOAD (15a-15b-15c-15d+16+16a).... 5867.
 >>Removal in channel/pipes (17a, 17b):
 17a. REMOVE BY EMP FRACTION..... 0.
 17b. REMOVE BY 1st ORDER DECAY... 0.
 18. TOTAL LOAD TO INLETS..... 5867.
 19. FLOW WT'D AVE. CONCENTRATION mg/l (INLET LOAD/TOTAL FLOW)..... 105.

Percentages

20. STREET SWEEPING (9/2)..... 0.
 21. SURFACE WASHOFF (11/2)..... 100.
 22. NET SURFACE WASHOFF (11/10).. 100.
 23. WASHOFF/SUBCAT LOAD (11/17).. 100.

24. SURFACE WASHOFF/INLET LOAD (11/18) 100.
 25. CATCHBASIN WASHOFF/ SUBCATCHMENT LOAD (12/17) ... 0.
 26. CATCHBASIN WASHOFF/ INLET LOAD (12/18) 0.
 27. OTHER CONSTITUENT LOAD/ SUBCATCHMENT LOAD (14/17) ... 0.
 28. INSOLUBLE FRACTION/ INLET LOAD (14/18) 0.
 29. PRECIPITATION/ SUBCATCHMENT LOAD (15/17) ... 0.
 30. PRECIPITATION/ INLET LOAD (15/18) 0.
 31. GROUNDWATER LOAD/ SUBCATCHMENT LOAD (16/17) ... 0.
 32. GROUNDWATER LOAD/ INLET LOAD (16/18) 0.
 32a. INFILTRATION/INFLOW LOAD/ SUBCATCHMENT LOAD (16a/17) .. 0.
 32b. INFILTRATION/INFLOW LOAD/ INLET LOAD (16a/18) 0.
 32c. CH/PIPE BMP FRACTION REMOVAL/ SUBCATCHMENT LOAD (17a/17) .. 0.
 32d. CH/PIPE 1st ORDER DECAY REMOVAL/ SUBCATCHMENT LOAD (17b/17) .. 0.
 33. INLET LOAD SUMMATION ERROR (18+8+6a+17a+17b-17)/17 0.

CAUTION. Due to method of quality routing (Users Manual, Appendix IX) quality routing through channel/pipes is sensitive to the time step. Large "Inlet Load Summation Errors" may result. These can be reduced by adjusting the time step(s). Note: surface accumulation during dry time steps at end of simulation is not included in totals. Buildup is only performed at beginning of wet steps or for street cleaning.

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*****
* TSS Particle Size Distribution
*****
Diameter % Specific Gravity Settling Velocity Critical Peclet
(um) (ft/s) Number
1. 5.0 2.65 0.000002 0.022000
4. 5.0 2.65 0.000035 0.049420
7. 10.0 2.65 0.000108 0.068516
18. 15.0 2.65 0.000710 0.118919
45. 10.0 2.65 0.004352 0.203034
70. 5.0 2.65 0.010215 0.262779
90. 10.0 2.65 0.016354 0.304305
125. 15.0 2.65 0.029465 0.368637
200. 15.0 2.65 0.063279 0.485025
400. 5.0 2.65 0.156843 0.726951

```

* Summary of TSS Removal *
 * * * * *

TSS Removal based on NJCAT Lab Performance Curve

Model #	Low Q Treated (cfs)	High Q Treated (cfs)	Runoff Treated (%)	TSS Removed (%)
HS 3	0.691	3.563	100.0	87.9
HS 4	1.184	3.563	100.0	92.6 <= tss removal
HS 5	1.462	3.563	100.0	95.8
HS 6	1.773	3.563	100.0	97.6
HS 7	2.456	3.563	100.0	98.4
HS 8	3.188	3.563	100.0	98.9
HS 10	3.563	3.563	100.0	99.5
HS 12	3.563	3.563	100.0	99.8

* Summary of Annual Flow Treatment & TSS Removal *
 * * * * *

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1957.	159304.	159304.	106.	92.	15.	0.	100.0	86.2
1958.	265710.	265710.	150.	128.	22.	0.	100.0	85.5
1959.	279410.	279410.	149.	130.	19.	0.	100.0	87.4
1960.	255777.	255777.	143.	127.	16.	0.	100.0	88.6
1961.	225920.	225920.	141.	126.	15.	0.	100.0	89.5
1962.	241993.	241993.	134.	119.	15.	0.	100.0	88.7
1963.	192971.	192971.	130.	116.	14.	0.	100.0	89.3
1964.	185128.	185128.	124.	111.	13.	0.	100.0	89.4
1965.	161451.	161451.	120.	107.	13.	0.	100.0	89.0
1966.	200948.	200948.	132.	116.	15.	0.	100.0	88.4
1967.	244979.	244979.	150.	132.	18.	0.	100.0	87.7
1968.	227376.	227376.	129.	114.	14.	0.	100.0	89.1
1969.	224894.	224894.	131.	116.	15.	0.	100.0	88.8
1970.	202724.	202724.	125.	111.	14.	0.	100.0	88.6
1971.	215032.	215032.	138.	119.	20.	0.	100.0	85.9
1972.	349655.	349655.	184.	154.	30.	0.	100.0	83.9
1973.	271801.	271801.	153.	131.	23.	0.	100.0	85.3
1974.	274284.	274284.	148.	126.	22.	0.	100.0	84.8
1975.	254228.	254228.	137.	122.	15.	0.	100.0	89.2
1976.	196466.	196466.	134.	118.	16.	0.	100.0	88.3

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1977.	241297.	241297.	148.	132.	16.	0.	100.0	88.9
1978.	202671.	202671.	120.	108.	12.	0.	100.0	90.2
1979.	261403.	261403.	141.	122.	19.	0.	100.0	86.6
1980.	188922.	188922.	125.	107.	18.	0.	100.0	85.8
1981.	241164.	241164.	142.	123.	20.	0.	100.0	86.1
1982.	245858.	245858.	140.	121.	19.	0.	100.0	86.6
1983.	310034.	310034.	165.	144.	21.	0.	100.0	87.1
1984.	244944.	244944.	138.	123.	15.	0.	100.0	89.2
1985.	223703.	223703.	137.	122.	15.	0.	100.0	89.0
1986.	231738.	231738.	129.	114.	15.	0.	100.0	88.6
1987.	241103.	241103.	128.	114.	13.	0.	100.0	89.5
1988.	204383.	204383.	127.	111.	16.	0.	100.0	87.5
1989.	182879.	182879.	111.	98.	13.	0.	100.0	88.4
1991.	143153.	143153.	66.	58.	8.	0.	100.0	87.9
1992.	222155.	222155.	143.	127.	15.	0.	100.0	89.2
1993.	229064.	229064.	143.	126.	17.	0.	100.0	88.0
1994.	244338.	244338.	149.	130.	19.	0.	100.0	87.4
1995.	172174.	172174.	107.	99.	14.	0.	100.0	87.3
1996.	245876.	245876.	150.	130.	20.	0.	100.0	86.7
1997.	150456.	150456.	112.	101.	11.	0.	100.0	90.4
1998.	200424.	200424.	122.	105.	17.	0.	100.0	86.0
1999.	201294.	201294.	125.	109.	16.	0.	100.0	87.4
2000.	212708.	212708.	134.	118.	16.	0.	100.0	88.0
2001.	159030.	159030.	111.	100.	12.	0.	100.0	89.4

HS 4

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1957.	159304.	159304.	106.	97.	9.	0.	100.0	91.2
1958.	265710.	265710.	150.	136.	14.	0.	100.0	90.6
1959.	279410.	279410.	149.	137.	11.	0.	100.0	92.3
1960.	255777.	255777.	143.	133.	10.	0.	100.0	92.9
1961.	225920.	225920.	141.	132.	9.	0.	100.0	93.7
1962.	241993.	241993.	134.	125.	9.	0.	100.0	93.1
1963.	192971.	192971.	130.	122.	8.	0.	100.0	93.9
1964.	185128.	185128.	124.	116.	8.	0.	100.0	93.3
1965.	161451.	161451.	120.	112.	7.	0.	100.0	93.8
1966.	200948.	200948.	132.	123.	9.	0.	100.0	93.2
1967.	244979.	244979.	150.	139.	11.	0.	100.0	92.7
1968.	227376.	227376.	129.	120.	8.	0.	100.0	93.7
1969.	224894.	224894.	131.	122.	9.	0.	100.0	93.5
1970.	202724.	202724.	125.	116.	9.	0.	100.0	92.9
1971.	215032.	215032.	138.	126.	13.	0.	100.0	90.7
1972.	349655.	349655.	184.	164.	20.	0.	100.0	89.0
1973.	271801.	271801.	153.	138.	15.	0.	100.0	90.2
1974.	274284.	274284.	148.	134.	14.	0.	100.0	90.3
1975.	254228.	254228.	137.	129.	8.	0.	100.0	94.5
1976.	196466.	196466.	134.	125.	9.	0.	100.0	93.3
1977.	241297.	241297.	148.	139.	9.	0.	100.0	93.6
1978.	202671.	202671.	120.	113.	7.	0.	100.0	94.3
1979.	261403.	261403.	141.	129.	12.	0.	100.0	91.3

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1980.	188922.	188922.	125.	113.	11.	0.	100.0	90.9
1981.	241164.	241164.	142.	129.	13.	0.	100.0	90.8
1982.	245858.	245858.	140.	128.	12.	0.	100.0	91.6
1983.	310034.	310034.	165.	153.	13.	0.	100.0	92.4
1984.	244944.	244944.	138.	129.	9.	0.	100.0	93.6
1985.	223703.	223703.	137.	128.	9.	0.	100.0	93.1
1986.	231738.	231738.	129.	120.	9.	0.	100.0	93.2
1987.	241103.	241103.	128.	120.	7.	0.	100.0	94.3
1988.	204383.	204383.	127.	117.	9.	0.	100.0	92.6
1989.	182879.	182879.	111.	103.	8.	0.	100.0	93.2
1991.	143153.	143153.	66.	61.	5.	0.	100.0	92.5
1992.	222155.	222155.	143.	134.	8.	0.	100.0	94.1
1993.	229064.	229064.	143.	132.	11.	0.	100.0	92.4
1994.	244338.	244338.	149.	137.	12.	0.	100.0	92.2
1995.	172174.	172174.	107.	98.	8.	0.	100.0	92.2
1996.	245876.	245876.	150.	137.	13.	0.	100.0	91.6
1997.	150456.	150456.	112.	106.	6.	0.	100.0	94.7
1998.	200424.	200424.	122.	111.	11.	0.	100.0	91.2
1999.	201294.	201294.	125.	115.	9.	0.	100.0	92.5
2000.	212708.	212708.	134.	124.	10.	0.	100.0	92.5
2001.	159030.	159030.	111.	104.	8.	0.	100.0	93.1
1957.	159304.	159304.	106.	101.	5.	0.	100.0	94.9
1958.	265710.	265710.	150.	142.	8.	0.	100.0	94.7
1959.	279410.	279410.	149.	142.	7.	0.	100.0	95.2
1960.	255777.	255777.	143.	138.	5.	0.	100.0	96.7
1961.	225920.	225920.	141.	136.	5.	0.	100.0	96.4
1962.	241993.	241993.	134.	129.	5.	0.	100.0	96.3
1963.	192971.	192971.	130.	126.	4.	0.	100.0	97.0
1964.	185128.	185128.	124.	120.	4.	0.	100.0	96.5
1965.	161451.	161451.	120.	116.	4.	0.	100.0	96.9
1966.	200948.	200948.	132.	127.	5.	0.	100.0	96.0
1967.	244979.	244979.	150.	144.	6.	0.	100.0	95.7
1968.	227376.	227376.	129.	124.	4.	0.	100.0	96.6
1969.	224894.	224894.	131.	126.	5.	0.	100.0	96.3
1970.	202724.	202724.	125.	120.	5.	0.	100.0	96.1
1971.	215032.	215032.	138.	132.	7.	0.	100.0	95.0
1972.	349655.	349655.	184.	172.	12.	0.	100.0	93.4
1973.	271801.	271801.	153.	145.	8.	0.	100.0	94.8
1974.	274284.	274284.	148.	139.	9.	0.	100.0	93.6
1975.	254228.	254228.	137.	133.	4.	0.	100.0	97.2
1976.	196466.	196466.	134.	128.	6.	0.	100.0	95.8
1977.	241297.	241297.	148.	143.	5.	0.	100.0	96.4
1978.	202671.	202671.	120.	117.	3.	0.	100.0	97.2
1979.	261403.	261403.	141.	133.	8.	0.	100.0	94.3
1980.	188922.	188922.	125.	118.	7.	0.	100.0	94.3
1981.	241164.	241164.	142.	134.	8.	0.	100.0	94.4
1982.	245858.	245858.	140.	134.	6.	0.	100.0	95.4

HS 5
Year

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1983.	310034.	310034.	165.	159.	6.	0.	100.0	96.1
1984.	244944.	244944.	138.	133.	5.	0.	100.0	96.3
1985.	223703.	223703.	137.	132.	5.	0.	100.0	96.2
1986.	231738.	231738.	129.	124.	5.	0.	100.0	96.4
1987.	241103.	241103.	128.	124.	4.	0.	100.0	96.9
1988.	204383.	204383.	127.	121.	5.	0.	100.0	95.7
1989.	182879.	182879.	111.	106.	5.	0.	100.0	95.9
1991.	143153.	143153.	66.	64.	3.	0.	100.0	96.0
1992.	222155.	222155.	143.	138.	5.	0.	100.0	96.8
1993.	229064.	229064.	143.	137.	6.	0.	100.0	95.9
1994.	244338.	244338.	149.	142.	7.	0.	100.0	95.5
1995.	172174.	172174.	107.	102.	4.	0.	100.0	96.0
1996.	245876.	245876.	150.	142.	8.	0.	100.0	94.9
1997.	150456.	150456.	112.	109.	3.	0.	100.0	97.3
1998.	200424.	200424.	122.	116.	6.	0.	100.0	95.0
1999.	201294.	201294.	125.	119.	5.	0.	100.0	95.9
2000.	212708.	212708.	134.	129.	5.	0.	100.0	96.0
2001.	159030.	159030.	111.	106.	5.	0.	100.0	95.5
HS 6								
Year								
1957.	159304.	159304.	106.	103.	3.	0.	100.0	97.2
1958.	265710.	265710.	150.	145.	5.	0.	100.0	96.9
1959.	279410.	279410.	149.	144.	4.	0.	100.0	97.2
1960.	255777.	255777.	143.	140.	3.	0.	100.0	98.1
1961.	225920.	225920.	141.	138.	3.	0.	100.0	98.0
1962.	241993.	241993.	134.	132.	3.	0.	100.0	98.0
1963.	192971.	192971.	130.	128.	2.	0.	100.0	98.5
1964.	185128.	185128.	124.	122.	2.	0.	100.0	98.1
1965.	161451.	161451.	120.	118.	2.	0.	100.0	98.3
1966.	200948.	200948.	132.	129.	3.	0.	100.0	97.7
1967.	244979.	244979.	150.	147.	3.	0.	100.0	97.8
1968.	227376.	227376.	129.	126.	3.	0.	100.0	98.0
1969.	224894.	224894.	131.	128.	3.	0.	100.0	97.8
1970.	202724.	202724.	125.	122.	3.	0.	100.0	97.8
1971.	215032.	215032.	138.	134.	4.	0.	100.0	97.1
1972.	349655.	349655.	184.	176.	8.	0.	100.0	95.6
1973.	271801.	271801.	153.	149.	4.	0.	100.0	97.1
1974.	274284.	274284.	148.	142.	6.	0.	100.0	96.1
1975.	254228.	254228.	137.	135.	2.	0.	100.0	98.5
1976.	196466.	196466.	134.	131.	3.	0.	100.0	97.5
1977.	241297.	241297.	148.	145.	3.	0.	100.0	97.8
1978.	202671.	202671.	120.	118.	2.	0.	100.0	98.5
1979.	261403.	261403.	141.	136.	5.	0.	100.0	96.6
1980.	188922.	188922.	125.	121.	4.	0.	100.0	96.9
1981.	241164.	241164.	142.	137.	5.	0.	100.0	96.6
1982.	245858.	245858.	140.	136.	4.	0.	100.0	97.2
1983.	310034.	310034.	165.	162.	4.	0.	100.0	97.8
1984.	244944.	244944.	138.	136.	2.	0.	100.0	98.2
1985.	223703.	223703.	137.	134.	3.	0.	100.0	97.7

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1986.	231738.	231738.	129.	126.	2.	0.	100.0	98.1
1987.	241103.	241103.	128.	126.	2.	0.	100.0	98.3
1988.	204383.	204383.	127.	123.	3.	0.	100.0	97.3
1989.	182879.	182879.	111.	109.	2.	0.	100.0	97.8
1991.	143153.	143153.	66.	65.	2.	0.	100.0	97.7
1992.	222155.	222155.	143.	140.	2.	0.	100.0	98.3
1993.	229064.	229064.	143.	140.	4.	0.	100.0	97.5
1994.	244338.	244338.	149.	145.	4.	0.	100.0	97.5
1995.	172174.	172174.	107.	104.	3.	0.	100.0	97.5
1996.	245876.	245876.	150.	146.	4.	0.	100.0	97.2
1997.	150456.	150456.	112.	111.	1.	0.	100.0	98.7
1998.	200424.	200424.	119.	119.	3.	0.	100.0	97.4
1999.	201294.	201294.	125.	122.	3.	0.	100.0	97.7
2000.	212708.	212708.	134.	132.	3.	0.	100.0	97.8
2001.	159030.	159030.	111.	108.	3.	0.	100.0	97.1
HS 7								
Year								
1957.	159304.	159304.	106.	104.	2.	0.	100.0	98.1
1958.	265710.	265710.	150.	147.	3.	0.	100.0	97.8
1959.	279410.	279410.	149.	145.	3.	0.	100.0	97.9
1960.	255777.	255777.	143.	141.	2.	0.	100.0	98.8
1961.	225920.	225920.	141.	139.	2.	0.	100.0	98.7
1962.	241993.	241993.	134.	132.	2.	0.	100.0	98.7
1963.	192971.	192971.	130.	129.	1.	0.	100.0	99.1
1964.	185128.	185128.	124.	123.	2.	0.	100.0	98.7
1965.	161451.	161451.	120.	118.	1.	0.	100.0	98.9
1966.	200948.	200948.	132.	130.	2.	0.	100.0	98.6
1967.	244979.	244979.	150.	148.	2.	0.	100.0	98.5
1968.	227376.	227376.	129.	127.	2.	0.	100.0	98.5
1969.	224894.	224894.	131.	129.	2.	0.	100.0	98.8
1970.	202724.	202724.	125.	123.	2.	0.	100.0	98.5
1971.	215032.	215032.	138.	136.	3.	0.	100.0	98.1
1972.	349655.	349655.	184.	178.	6.	0.	100.0	96.7
1973.	271801.	271801.	153.	150.	3.	0.	100.0	98.0
1974.	274284.	274284.	148.	144.	4.	0.	100.0	97.4
1975.	254228.	254228.	137.	136.	1.	0.	100.0	99.1
1976.	196466.	196466.	134.	132.	2.	0.	100.0	98.5
1977.	241297.	241297.	148.	147.	2.	0.	100.0	98.7
1978.	202671.	202671.	120.	119.	1.	0.	100.0	99.0
1979.	261403.	261403.	141.	138.	3.	0.	100.0	97.8
1980.	188922.	188922.	125.	122.	3.	0.	100.0	97.9
1981.	241164.	241164.	142.	139.	3.	0.	100.0	97.8
1982.	245858.	245858.	140.	138.	3.	0.	100.0	98.1
1983.	310034.	310034.	165.	163.	2.	0.	100.0	98.6
1984.	244944.	244944.	138.	137.	2.	0.	100.0	98.8
1985.	223703.	223703.	137.	135.	2.	0.	100.0	98.4
1986.	231738.	231738.	129.	127.	2.	0.	100.0	98.8
1987.	241103.	241103.	128.	126.	1.	0.	100.0	99.0
1988.	204383.	204383.	127.	124.	2.	0.	100.0	98.2

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1989.	182879.	182879.	111.	109.	2.	0.	100.0	98.6
1991.	143153.	143153.	66.	65.	1.	0.	100.0	98.5
1992.	222155.	222155.	143.	141.	2.	0.	100.0	99.1
1993.	229064.	229064.	143.	141.	2.	0.	100.0	98.3
1994.	244338.	244338.	149.	147.	2.	0.	100.0	98.3
1995.	172174.	172174.	107.	105.	2.	0.	100.0	98.5
1996.	245876.	245876.	150.	147.	3.	0.	100.0	98.2
1997.	150456.	150456.	112.	111.	1.	0.	100.0	99.2
1998.	200424.	200424.	122.	120.	2.	0.	100.0	98.2
1999.	201294.	201294.	125.	123.	2.	0.	100.0	98.5
2000.	212708.	212708.	134.	133.	2.	0.	100.0	98.6
2001.	159030.	159030.	111.	109.	2.	0.	100.0	98.1
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Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1957.	159304.	159304.	106.	105.	1.	0.	100.0	98.7
1958.	265710.	265710.	150.	148.	2.	0.	100.0	98.5
1959.	279410.	279410.	149.	146.	2.	0.	100.0	98.4
1960.	255777.	255777.	143.	142.	1.	0.	100.0	99.2
1961.	225920.	225920.	141.	140.	1.	0.	100.0	99.0
1962.	241993.	241993.	134.	133.	1.	0.	100.0	99.1
1963.	192971.	192971.	130.	130.	1.	0.	100.0	99.4
1964.	185128.	185128.	124.	123.	1.	0.	100.0	99.1
1965.	161451.	161451.	120.	119.	1.	0.	100.0	99.4
1966.	200948.	200948.	130.	130.	1.	0.	100.0	99.0
1967.	244979.	244979.	150.	149.	1.	0.	100.0	99.0
1968.	227376.	227376.	129.	127.	1.	0.	100.0	99.1
1969.	224894.	224894.	131.	130.	1.	0.	100.0	99.1
1970.	202724.	202724.	125.	124.	1.	0.	100.0	99.0
1971.	215032.	215032.	138.	137.	2.	0.	100.0	98.7
1972.	349655.	349655.	184.	179.	5.	0.	100.0	97.4
1973.	271801.	271801.	153.	151.	2.	0.	100.0	98.6
1974.	274284.	274284.	148.	145.	3.	0.	100.0	98.3
1975.	254228.	254228.	137.	136.	1.	0.	100.0	99.5
1976.	196466.	196466.	134.	133.	1.	0.	100.0	99.0
1977.	241297.	241297.	148.	147.	1.	0.	100.0	99.1
1978.	202671.	202671.	120.	119.	1.	0.	100.0	99.3
1979.	261403.	261403.	141.	139.	2.	0.	100.0	98.4
1980.	188922.	188922.	125.	123.	2.	0.	100.0	98.6
1981.	241164.	241164.	142.	140.	2.	0.	100.0	98.4
1982.	245858.	245858.	140.	138.	2.	0.	100.0	98.8
1983.	310034.	310034.	165.	164.	2.	0.	100.0	99.1
1984.	244944.	244944.	138.	137.	1.	0.	100.0	99.2
1985.	223703.	223703.	137.	136.	1.	0.	100.0	98.9
1986.	231738.	231738.	129.	128.	1.	0.	100.0	99.2
1987.	241103.	241103.	128.	127.	1.	0.	100.0	99.4
1988.	204383.	204383.	127.	125.	1.	0.	100.0	98.9
1989.	182879.	182879.	111.	110.	1.	0.	100.0	99.0
1991.	143153.	143153.	66.	66.	1.	0.	100.0	99.0
1992.	222155.	222155.	143.	142.	1.	0.	100.0	99.4

HS 10 Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1993.	229064.	229064.	143.	142.	2.	0.	100.0	98.8
1994.	244338.	244338.	149.	147.	2.	0.	100.0	98.9
1995.	172174.	172174.	107.	106.	1.	0.	100.0	99.0
1996.	245876.	245876.	150.	148.	2.	0.	100.0	98.8
1997.	150456.	150456.	112.	112.	1.	0.	100.0	99.4
1998.	200424.	200424.	122.	121.	1.	0.	100.0	98.8
1999.	201294.	201294.	125.	123.	1.	0.	100.0	99.0
2000.	212708.	212708.	134.	133.	1.	0.	100.0	99.1
2001.	159030.	159030.	111.	110.	1.	0.	100.0	98.7
1957.	159304.	159304.	106.	106.	1.	0.	100.0	99.5
1958.	265710.	265710.	150.	149.	1.	0.	100.0	99.4
1959.	279410.	279410.	149.	148.	1.	0.	100.0	99.3
1960.	255777.	255777.	143.	143.	0.	0.	100.0	99.7
1961.	225920.	225920.	141.	141.	1.	0.	100.0	99.6
1962.	241993.	241993.	134.	134.	1.	0.	100.0	99.6
1963.	192971.	192971.	130.	130.	0.	0.	100.0	99.8
1964.	185128.	185128.	124.	124.	0.	0.	100.0	99.6
1965.	161451.	161451.	120.	119.	0.	0.	100.0	99.8
1966.	200948.	200948.	132.	131.	1.	0.	100.0	99.6
1967.	244979.	244979.	150.	149.	1.	0.	100.0	99.6
1968.	227376.	227376.	129.	128.	0.	0.	100.0	99.6
1969.	224894.	224894.	131.	130.	1.	0.	100.0	99.6
1970.	202724.	202724.	125.	124.	1.	0.	100.0	99.6
1971.	215032.	215032.	138.	138.	1.	0.	100.0	99.5
1972.	349655.	349655.	184.	182.	2.	0.	100.0	98.9
1973.	271801.	271801.	153.	152.	1.	0.	100.0	99.5
1974.	274284.	274284.	148.	147.	1.	0.	100.0	99.1
1975.	254228.	254228.	137.	137.	0.	0.	100.0	99.8
1976.	196466.	196466.	134.	133.	1.	0.	100.0	99.5
1977.	241297.	241297.	148.	148.	1.	0.	100.0	99.6
1978.	202671.	202671.	120.	120.	0.	0.	100.0	99.8
1979.	261403.	261403.	141.	140.	1.	0.	100.0	99.2
1980.	188922.	188922.	125.	124.	1.	0.	100.0	99.4
1981.	241164.	241164.	142.	141.	1.	0.	100.0	99.3
1982.	245858.	245858.	140.	140.	1.	0.	100.0	99.5
1983.	310034.	310034.	165.	165.	1.	0.	100.0	99.7
1984.	244944.	244944.	138.	138.	1.	0.	100.0	99.6
1985.	223703.	223703.	137.	137.	1.	0.	100.0	99.6
1986.	231738.	231738.	129.	128.	0.	0.	100.0	99.7
1987.	241103.	241103.	128.	127.	0.	0.	100.0	99.8
1988.	204383.	204383.	127.	126.	1.	0.	100.0	99.5
1989.	182879.	182879.	111.	111.	1.	0.	100.0	99.5
1991.	143153.	143153.	66.	66.	0.	0.	100.0	99.6
1992.	222155.	222155.	143.	142.	0.	0.	100.0	99.8
1993.	229064.	229064.	143.	143.	1.	0.	100.0	99.5
1994.	244338.	244338.	149.	148.	1.	0.	100.0	99.6
1995.	172174.	172174.	107.	106.	0.	0.	100.0	99.6

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1996.	245876.	245876.	150.	149.	1.	0.	100.0	99.5
1997.	150456.	150456.	112.	112.	0.	0.	100.0	99.8
1998.	200424.	200424.	122.	122.	1.	0.	100.0	99.5
1999.	201294.	201294.	125.	124.	0.	0.	100.0	99.6
2000.	212708.	212708.	134.	134.	0.	0.	100.0	99.6
2001.	159030.	159030.	111.	111.	1.	0.	100.0	99.3
1957.	159304.	159304.	106.	106.	0.	0.	100.0	99.8
1958.	265710.	265710.	150.	149.	0.	0.	100.0	99.7
1959.	279410.	279410.	149.	148.	0.	0.	100.0	99.7
1960.	255777.	255777.	143.	143.	0.	0.	100.0	99.8
1961.	225920.	225920.	141.	141.	0.	0.	100.0	99.8
1962.	241993.	241993.	134.	134.	0.	0.	100.0	99.8
1963.	192971.	192971.	130.	130.	0.	0.	100.0	99.9
1964.	185128.	185128.	124.	124.	0.	0.	100.0	99.8
1965.	161451.	161451.	120.	120.	0.	0.	100.0	99.9
1966.	200948.	200948.	132.	131.	0.	0.	100.0	99.8
1967.	244979.	244979.	150.	150.	0.	0.	100.0	99.8
1968.	227376.	227376.	129.	128.	0.	0.	100.0	99.8
1969.	224894.	224894.	131.	131.	0.	0.	100.0	99.8
1970.	202724.	202724.	125.	125.	0.	0.	100.0	99.8
1971.	215032.	215032.	138.	138.	0.	0.	100.0	99.8
1972.	349655.	349655.	184.	183.	1.	0.	100.0	99.4
1973.	271801.	271801.	153.	153.	0.	0.	100.0	99.8
1974.	274284.	274284.	148.	147.	1.	0.	100.0	99.6
1975.	254228.	254228.	137.	137.	0.	0.	100.0	99.9
1976.	196466.	196466.	134.	134.	0.	0.	100.0	99.8
1977.	241297.	241297.	148.	148.	0.	0.	100.0	99.8
1978.	202671.	202671.	120.	120.	0.	0.	100.0	99.9
1979.	261403.	261403.	141.	141.	1.	0.	100.0	99.6
1980.	188922.	188922.	125.	124.	0.	0.	100.0	99.8
1981.	241164.	241164.	142.	142.	0.	0.	100.0	99.7
1982.	245858.	245858.	140.	140.	0.	0.	100.0	99.8
1983.	310034.	310034.	165.	165.	0.	0.	100.0	99.8
1984.	244944.	244944.	138.	138.	0.	0.	100.0	99.9
1985.	223703.	223703.	137.	137.	0.	0.	100.0	99.8
1986.	231738.	231738.	129.	129.	0.	0.	100.0	99.9
1987.	241103.	241103.	128.	128.	0.	0.	100.0	99.9
1988.	204383.	204383.	127.	126.	0.	0.	100.0	99.7
1989.	182879.	182879.	111.	111.	0.	0.	100.0	99.8
1991.	143153.	143153.	66.	66.	0.	0.	100.0	99.8
1992.	222155.	222155.	143.	142.	0.	0.	100.0	99.9
1993.	229064.	229064.	143.	143.	0.	0.	100.0	99.8
1994.	244338.	244338.	149.	149.	0.	0.	100.0	99.8
1995.	172174.	172174.	107.	107.	0.	0.	100.0	99.8
1996.	245876.	245876.	150.	150.	0.	0.	100.0	99.8
1997.	150456.	150456.	112.	112.	0.	0.	100.0	99.9
1998.	200424.	200424.	122.	122.	0.	0.	100.0	99.8

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1999.	201294.	201294.	125.	124.	0.	0.	100.0	99.8
2000.	212708.	212708.	134.	134.	0.	0.	100.0	99.8
2001.	159030.	159030.	111.	111.	0.	0.	100.0	99.6

* Summary of Quantity and Quality Results at *
 * Location 200 INFlow in cfs. *
 * Values are instantaneous at indicated time step *
 * Values are instantaneous at indicated time step *

ZP Battery DevCo, LLC
DMH#100

Date	Time	Flow	Total	Su
Mo/Da/Year	Hr:Min	cfs	mg/l	
Flow wtd means.....		0.001	105.	
Flow wtd std devs..		0.007	69.	
Maximum value.....		0.535	294.	
Minimum value.....		0.000	0.	
Total loads.....		893454.	5871.	
		Cub-Ft	POUNDS	

==> Runoff simulation ended normally.

==> SWMM 4.4 simulation ended normally.
 Always check output file for possible warning messages.

* SWMM 4.4 Simulation Date and Time Summary *
 * Starting Date... November 29, 2022 *
 * Time... 14:26:35.384 *
 * Ending Date... November 29, 2022 *
 * Time... 14:26:41.112 *
 * Elapsed Time... 0.095 minutes. *
 * Elapsed Time... 5.728 seconds. *
 *

3.1
OPERATION AND MAINTENANCE

STORMWATER OPERATION, MAINTENANCE AND POLLUTION PREVENTION PLAN

**ZP Battery DevCo, LLC – Definitive Subdivision
1355 Main Street
Leicester, Massachusetts**

RESPONSIBLE PARTY DURING CONSTRUCTION:

To Be Determined

RESPONSIBLE PARTY POST CONSTRUCTION:

**ZP Battery DevCo, LLC
10 E. Worcester, Suite 3A
Worcester, MA 01604**

BEST MANAGEMENT PRACTICES

To prevent the migration of soils, Best Management Practices (BMP's) shall be employed. During construction, hay bales and silt fence will be installed as shown on the plans and also at additional locations on an as needed basis to provide sufficient erosion controls on the site. These components shall be installed to catch and trap the migrating soil materials and pollutants.

All applicable BMP's listed below and in the Department of Environmental Protection's Stormwater Management Handbooks (Volume 1: Overview of Massachusetts Stormwater Management Standards and Volume 2: Technical Guide for Compliance with Massachusetts Stormwater Management Standards) dated January 2008 (as amended), shall be incorporated in this project. This Plan shall be followed by the Homeowners Association and residents as required and amended by the Massachusetts Department of Environmental Protection's Stormwater Management Regulations

INSPECTION AND MAINTENANCE (DURING CONSTRUCTION)

1. At all times, hay bales, siltation fabric fencing and wooden stakes sufficient to construct sedimentation control barrier a minimum of 50 feet long will be stockpiled on the site in order to repair established barriers which may have been damaged or breached.
2. Necessary erosion controls shall be in place prior to any clearing or construction on the site. Construction sequence shall be phased in such a manner that the on-site detention basins are stabilized and functioning prior to the establishment of any new impervious areas on the site. The Contractor shall provide temporary stilling or settling basins as needed to catch and trap any migrating soil materials and pollutants from the construction areas.
3. An inspection of all erosion control and stormwater management systems shall be conducted at least once every fourteen (14) calendar days and following significant storm events. Where sites have been finally or temporarily stabilized, or runoff is unlikely due to winter conditions, such inspections shall be conducted at least once every month. (EPA SWPPP IS REQUIRED FOR THIS PROJECT)

In case of any noted breach or failure, the General Contractor shall immediately make appropriate repairs to any erosion control system and notify the engineer of any problems involving storm water management systems.

A significant storm event shall be defined as all or one of the following thresholds.

- a. Any storm in which rain is predicted to last for twelve consecutive hours or more.
 - b. Any storm for which a flash flood watch or warning is issued.
 - c. Any single storm predicted to have a cumulative rainfall of greater than one inch.
 - d. Any storm not meeting the previous three thresholds but which would mark a third consecutive day of measurable rainfall.
4. If site inspections identify BMPs not operating effectively, maintenance must be performed as soon as possible and before the next storm event.
 5. If BMPs need modification or additional BMPs need to be added, implementation must be completed before the next storm if practicable. If implementation before the next storm event is impracticable, the situation must be documented in the construction log and alternative BMPs must be implemented as soon as possible
 6. The General Contractor shall also inspect the erosion control and stormwater management systems at times of significant increase in surface water runoff due to rapid thawing when the risk of failure of erosion control measures is significant.
 7. In such instances as remedial action is necessary, the General Contractor shall repair any and all significant deficiencies in erosion control systems within two days.
 8. The Department of Public Works and/or Conservation Commission shall be notified of any significant failure of storm water management systems and erosion and sediment control measures and shall be notified of any release of pollutants to a water body (stream, brook, pond, etc.).
 9. The General Contractor shall remove the sediment from behind the fence of the sedimentation control barrier when the accumulated sediment has reached one-half of the original installed height of the barrier.

INSPECTION AND MAINTENANCE (POST-CONSTRUCTION)

It is the agreement of the responsible parties to finance, inspect, and perform (respectfully) the long-term maintenance of the erosion control devices and the stormwater management systems within the limits stated below.

1. A visual inspection of all erosion control and stormwater management systems shall be conducted by the above identified person(s) a minimum of once per month and after every major storm during the first six months of operation (a portion of that time must be in the growing season). Thorough investigations shall be conducted twice a year. Monthly maintenance requirements may be adjusted based upon the results obtained from the first year of operation.
2. Roads and parking lots shall be swept at least twice per year and on a more frequent basis depending on sanding operations. All resulting sweepings shall be collected and properly disposed of off-site in accordance with MADEP and other applicable requirements.
3. Accumulated sediment shall be removed a minimum of one time per year by means of a clamshell bucket or equivalent from the bottom of the deep sump catch basins and manhole. Disposal of accumulated sediment and pollutants must be in accordance with local, state, and federal guidelines and requirements.
4. Hydroworks Units shall be inspected and maintained per the manufactures recommendations or as needed.
5. All resulting sweepings or sediment removed from catch basins, Hydroworks Units, and manhole connections shall be collected and properly disposed of off-site in accordance with MADEP and other applicable requirements.
6. Reference to this Operation and Maintenance Plan will be made within the chain of title by reference or recorded within the initial deed transfer if this is to occur prior to construction. This Plan shall be followed by subsequent landowners as required and amended by the Massachusetts Department of Environmental Protection's Stormwater Management Regulations.
7. It shall be the responsibility of the land owner to ensure that the Operation and Maintenance of all stormwater structures is performed as outlined in the provided Maintenance Schedule and to provide full funding of the required tasks.

8. **Maintenance Schedule**

<u>Structure Type</u>	<u>Inspection</u>	<u>Maintenance</u>	<u>Task</u>	<u>Cost Estimate</u>	<u>Owner</u>
Deep Sump Catchbasin	Quarterly and at the end of the foliage and snow removal seasons	Quarterly, or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe	Clean/Remove Debris and Sediment	\$750* (\$750/Year)	Land Owner
Hydroworks Unit	Annually in the spring	Annually in the spring	Clean/Remove Debris and sediment	\$750* (\$750/Year)	Land Owner
Rip/Rap Aprons	Every 2 Years	Every 10 Years	Clean/Add Stone	\$1,000* (\$100/Year)	Land Owner
Underground Storage System	Twice a Year	Twice a Year	Remove sediment if present with vac truck	\$1000* (\$1000/Year)	Land Owner
Total Annual Estimated Cost				\$2,600/Year	Land Owner

NOTES:

*Cost estimate per RS Means: Site work & Landscape Cost Data, Includes Mobilization, Material and Installation costs for work

LONG TERM POLLUTION PREVENTION PLAN

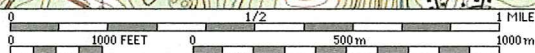
1. Access drives to the site shall be swept on an annual basis with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
2. Trash and other debris shall be removed from the drives periodically as needed. Full inspection of the site shall be made on a semi-annual basis to ensure clean and neat appearance to the site. This measure will help in the overall performance of the onsite systems.
3. Trash and other debris shall be removed from landscaped and planted areas periodically as needed. Full inspection of the site shall be made on a semi-annual basis to ensure clean and neat appearance to the site. This measure will help in the overall performance of the onsite systems.
4. Reseed any bare areas as soon as they occur. Erosion control measures shall be installed in these areas to prevent deposits of sediment from entering the drainage system
5. Grass shall be maintained at a minimum blade height of two to three inches and only 1/3 of the plant height shall be removed at a time.

6. The use of pesticides will be kept at a level consistent with typical residential use. Where possible mechanical methods (i.e. pest traps) or biological methods (i.e. beneficial insects) of pest control shall be implemented.
7. Pet waste shall be disposed of in accordance with local regulations. Pet waste shall not be disposed of in a storm drain or catch basin.

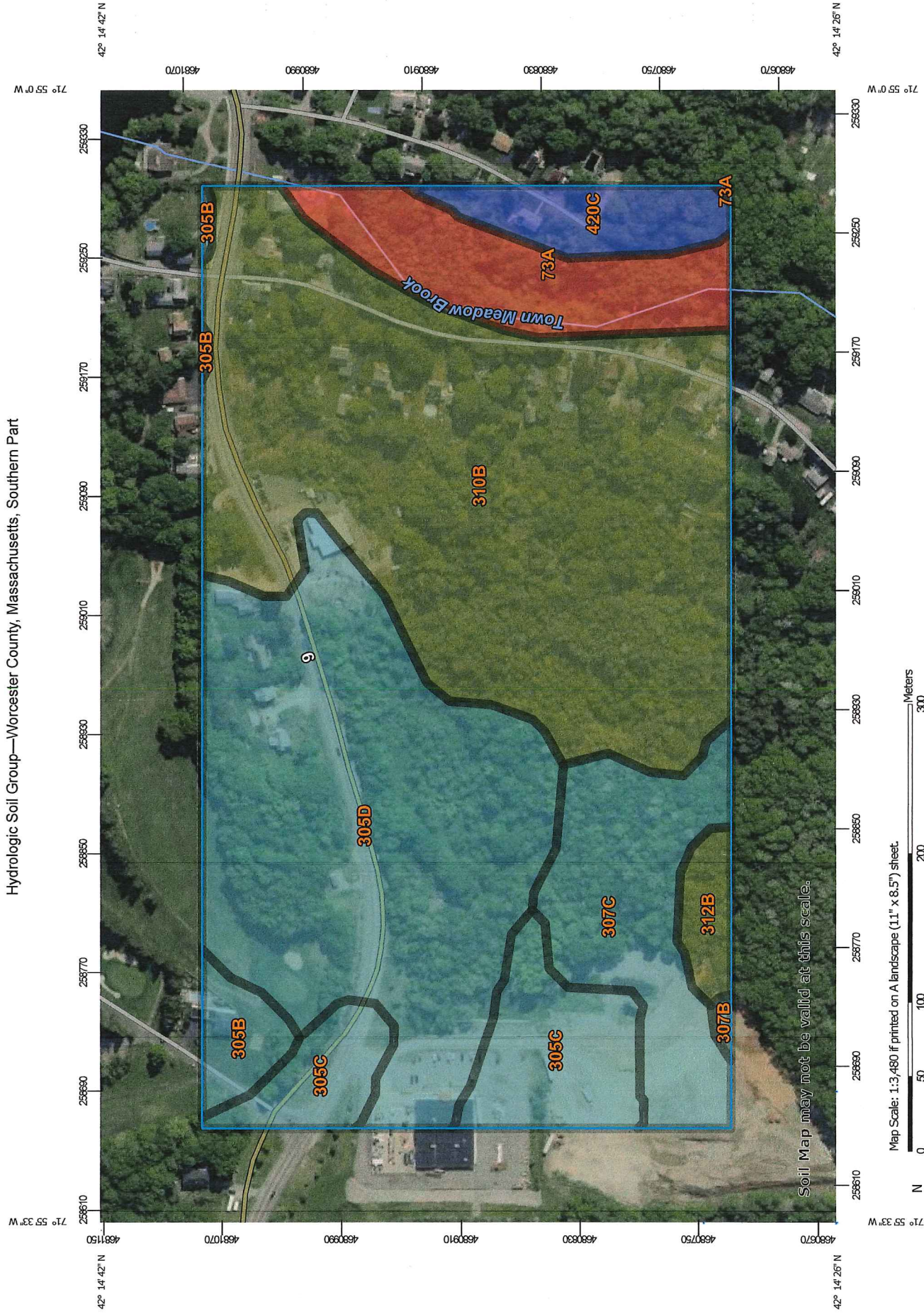
FIGURE 1
LOCUS MAP AND SOILS MAP



MN
16°



Hydrologic Soil Group—Worcester County, Massachusetts, Southern Part



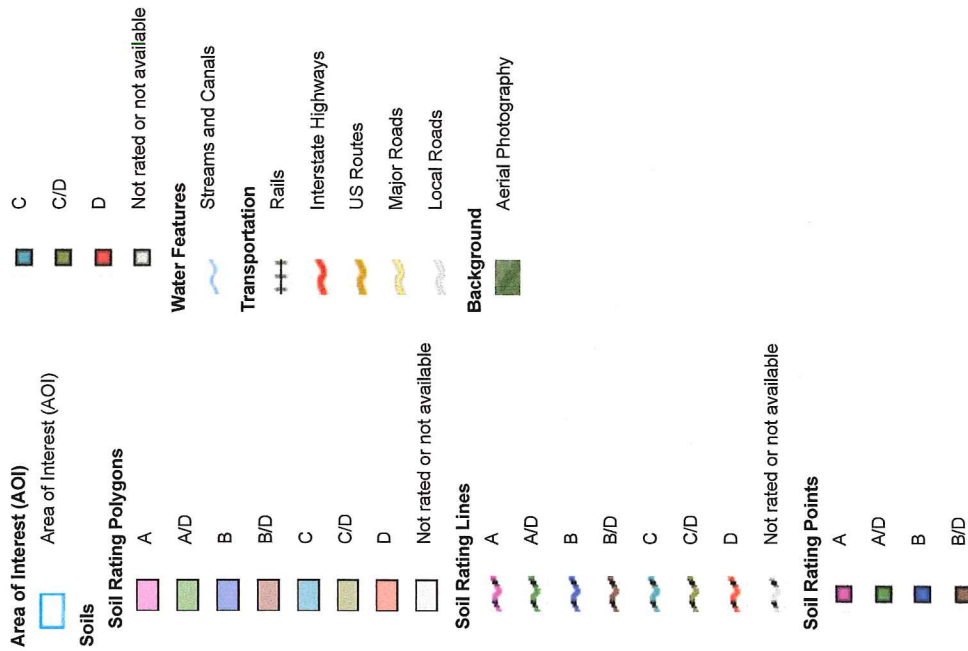
Soil Map may not be valid at this scale.

Map Scale: 1:3,480 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND



MAP INFORMATION

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
 Survey Area Data: Version 15, Sep 9, 2022

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	4.1	7.3%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	1.2	2.1%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	4.4	7.9%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	C	15.5	27.8%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	0.1	0.2%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	C	5.1	9.1%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	22.7	40.6%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	C/D	0.9	1.6%
420C	Canton fine sandy loam, 8 to 15 percent slopes	B	1.9	3.5%
Totals for Area of Interest			55.8	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

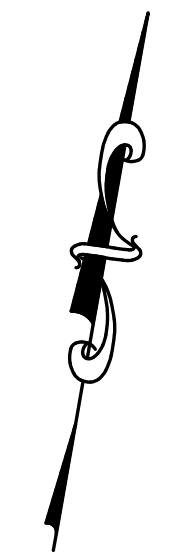
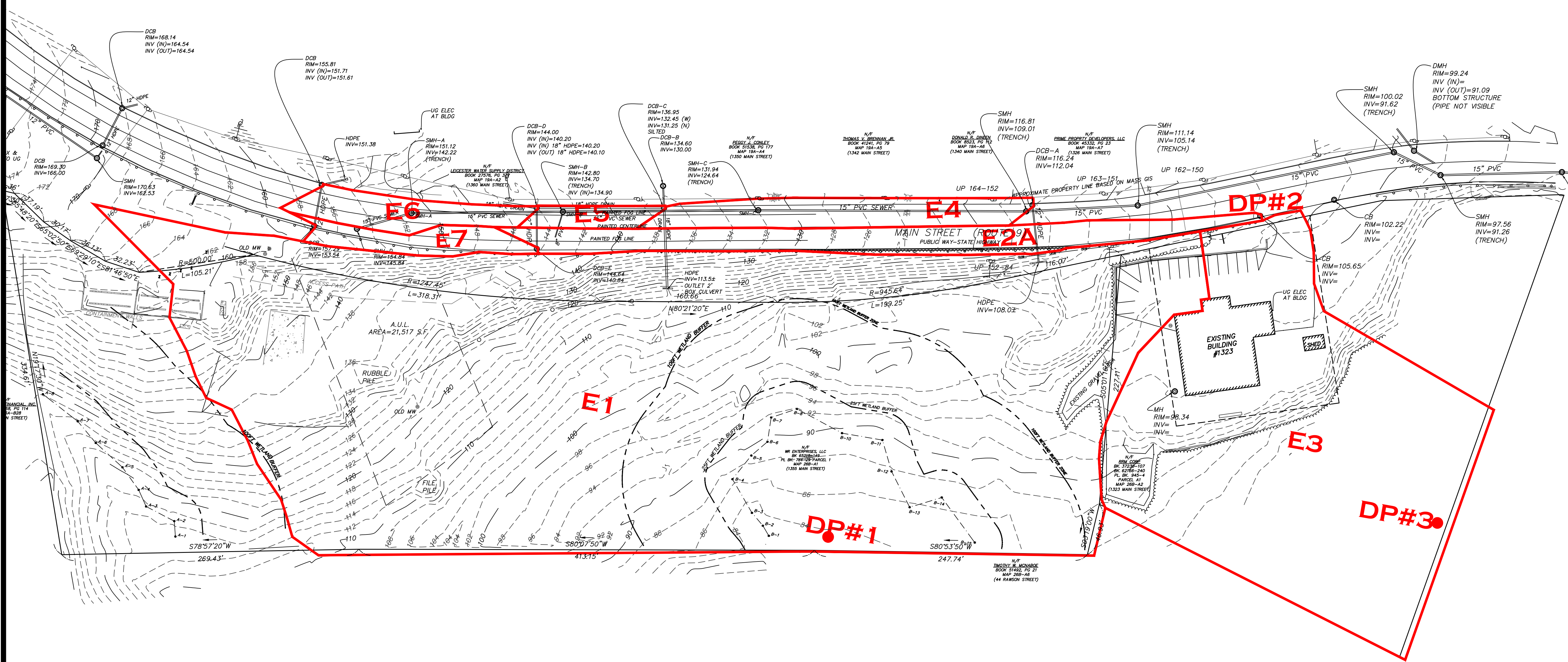
FIGURE 2
PRE-DEVELOPMENT WATERSHED MAP

PROJECT INFORMATION

LAND INFORMATION
 MAP PARCEL: 269/A1
 DEED BOOK-PAGE: 65218/149
 EXISTING FRONTAGE: 794.29'
 EXISTING AREA: 5.44 ACRES

ZONING INFORMATION
 ZONING DISTRICT: HIGHWAY BUSINESS-INDUSTRIAL 1 (HB-1)
 DIMENSIONAL REQUIREMENTS:
 MINIMUM AREA: 60,000 S.F.
 MINIMUM FRONTAGE: 200'
 MAXIMUM HEIGHT: 55'
 MINIMUM SETBACKS:
 FRONT YARD: 50'
 SIDE YARD: 50'
 REAR YARD: 50'

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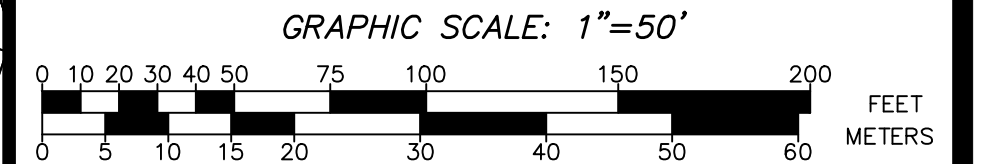


HANNIGAN ENGINEERING, INC.
 CIVIL ENGINEERS & LAND SURVEYORS

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 LEOMINSTER, MASSACHUSETTS 01453 (978) 534-6060 (F)
 WWW.HANNIGANENGINEERING.COM

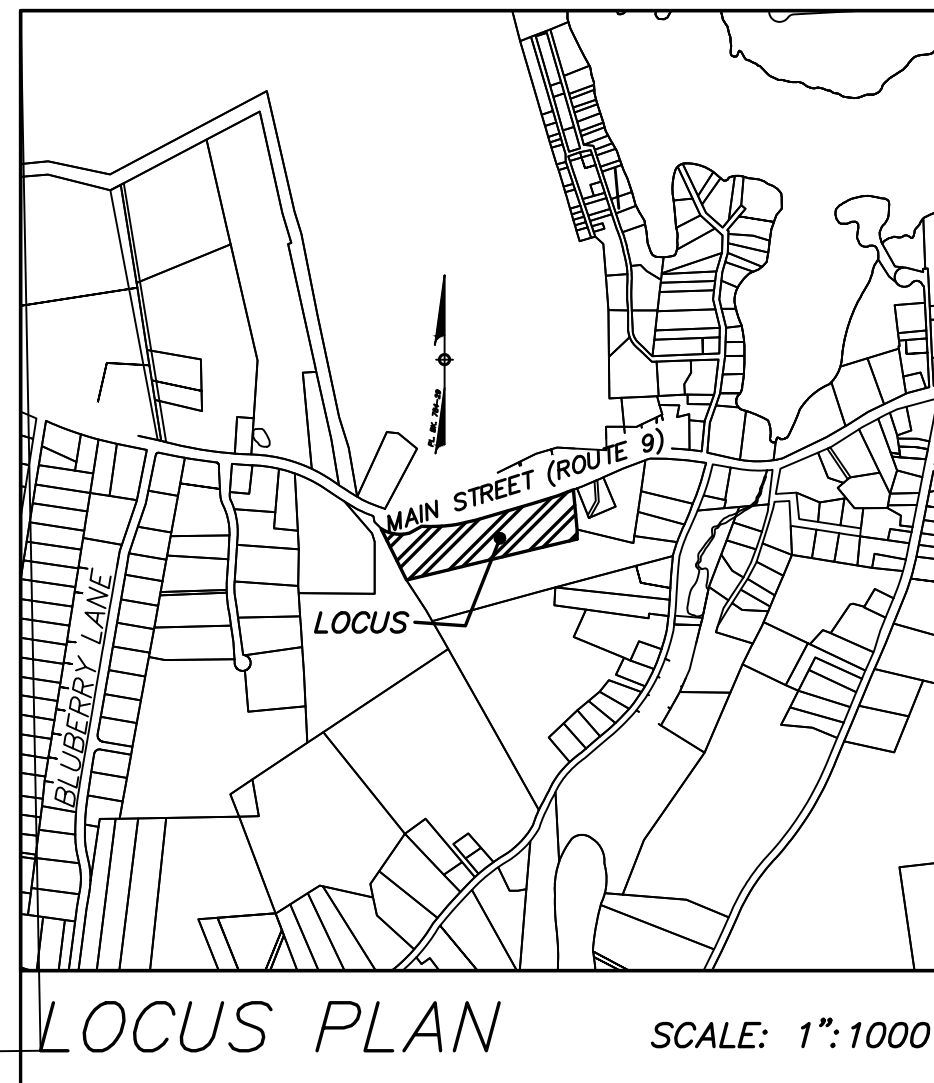
EXISTING WATERSHED IN LEICESTER, MASSACHUSETTS

PREPARED FOR:
 ZP BATTERY DEVCO, LLC
 BRENDAN GOVE
 10 E WORCESTER STREET SUITE 3A
 WORCESTER, MASSACHUSETTS 01604
 TEL:



CALC: CMA	DRWN: CMA	SCALE: 1"=50'
CHKD: WDH	APPD: WDH	DATE: NOV30,2022
SRV: JEF	FB: 71-22	JOB NO: 3010
TAB: WS	SHEET 1 OF 2	PLAN NO: C-17-38

APPLICANT:
 ZP BATTERY DEVCO, LLC
 BRENDAN GOVE
 10 E. WORCESTER STREET, SUIT 3A
 WORCESTER, MASSACHUSETTS 01604
OWNER:
 WR ENTERPRISES, LLC
 1323 MAIN STREET
 LEICESTER, MASSACHUSETTS 01524



LOCUS PLAN SCALE: 1"=1000'

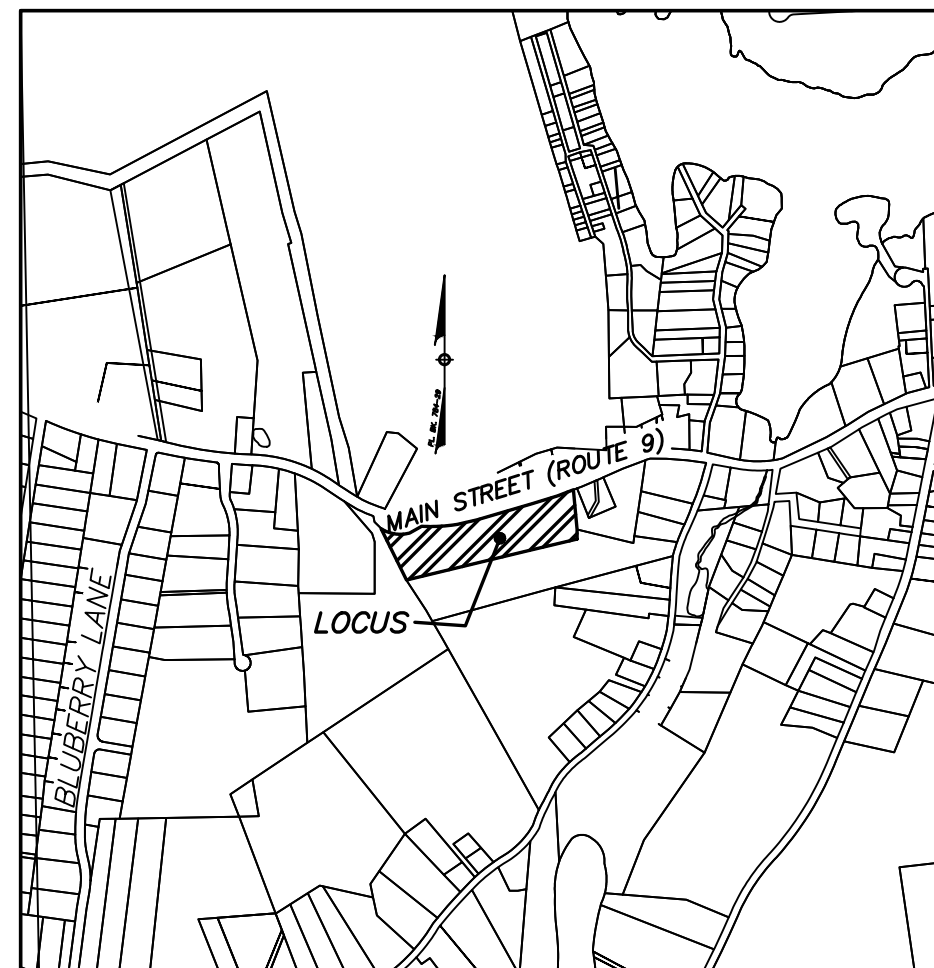
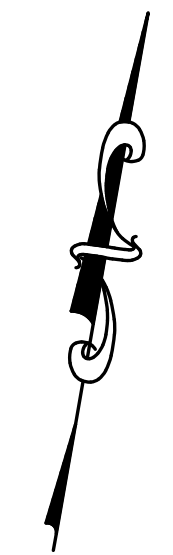
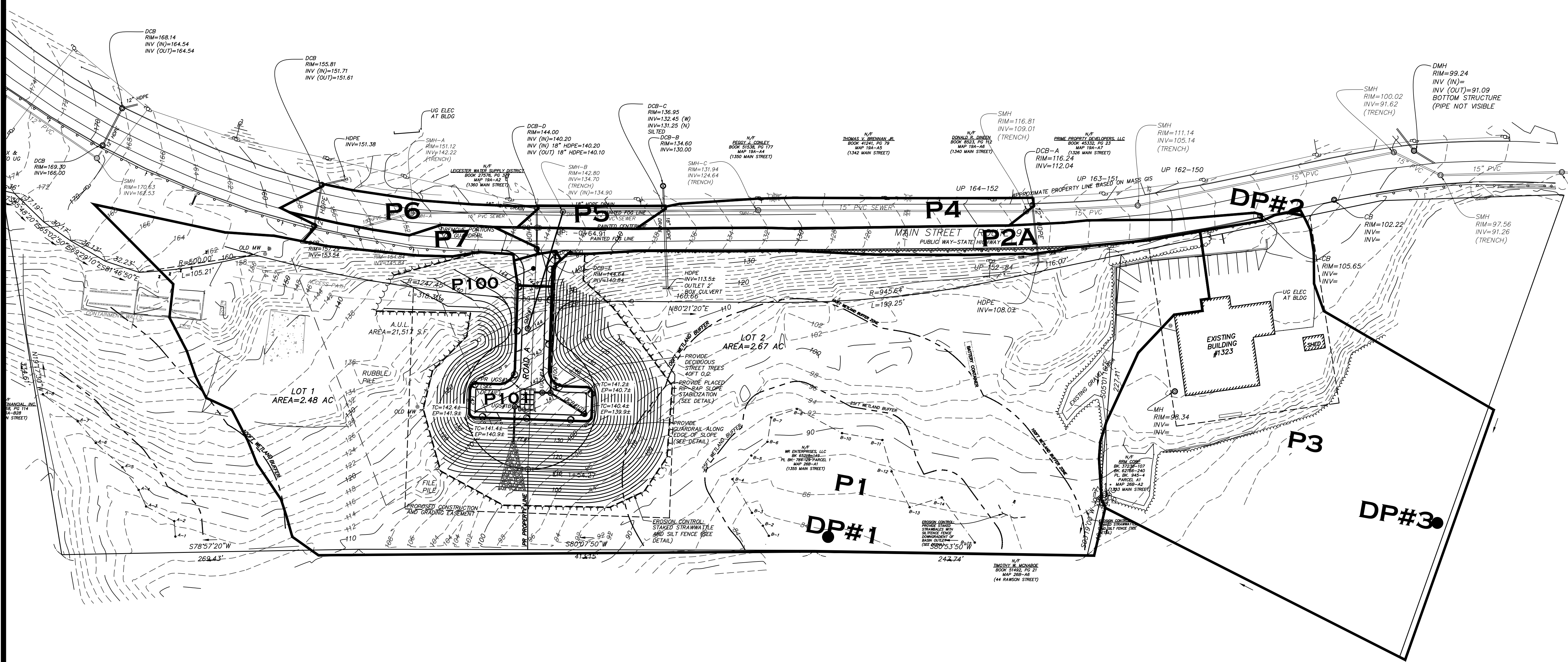
FIGURE 3
POST-DEVELOPMENT WATERSHED MAP

PROJECT INFORMATION

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 MAP PARCEL: 269/A1
 DEED BOOK-PAGE: 65218/149
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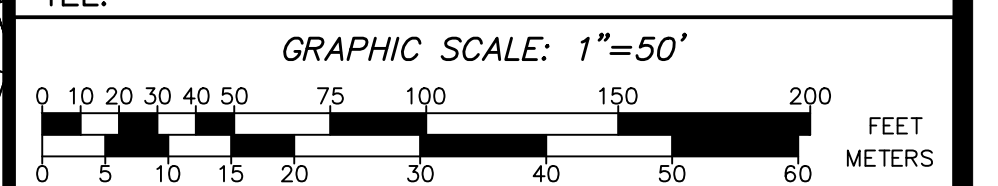
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PROPOSED WATERSHED IN LEICESTER, MASSACHUSETTS

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CHKD: WDH	APPD: WDH	DATE: NOV30,2022
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LOCUS PLAN SCALE: 1":1000'