

DRAINAGE ANALYSIS

for

Definitive Subdivision

ZP Battery Devco, LLC

1355 Main Street

Leicester, Massachusetts

November 30, 2022

Revised Through January 23, 2023



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1.0
DRAINAGE NARRATIVE

1.0 NARRATIVE

Revised Through January 23, 2023

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 to 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 an 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 along with a reinforced block retaining wall 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 NOAA Type III, 24-hour storm typical 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	3.13
10	4.85
25	5.95
100	7.59

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 quality unit for TSS Removal. Upon treatment, the stormwater 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-	4.13	10.23	14.62	21.50
	Post-	3.85	9.68	13.91	20.52
#2	Pre-	1.03	1.65	2.05	2.63
	Post-	1.03	1.65	2.05	2.63
#3	Pre-	2.85	6.19	8.47	11.94
	Post-	2.85	6.19	8.47	11.94

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.

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

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

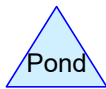
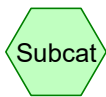
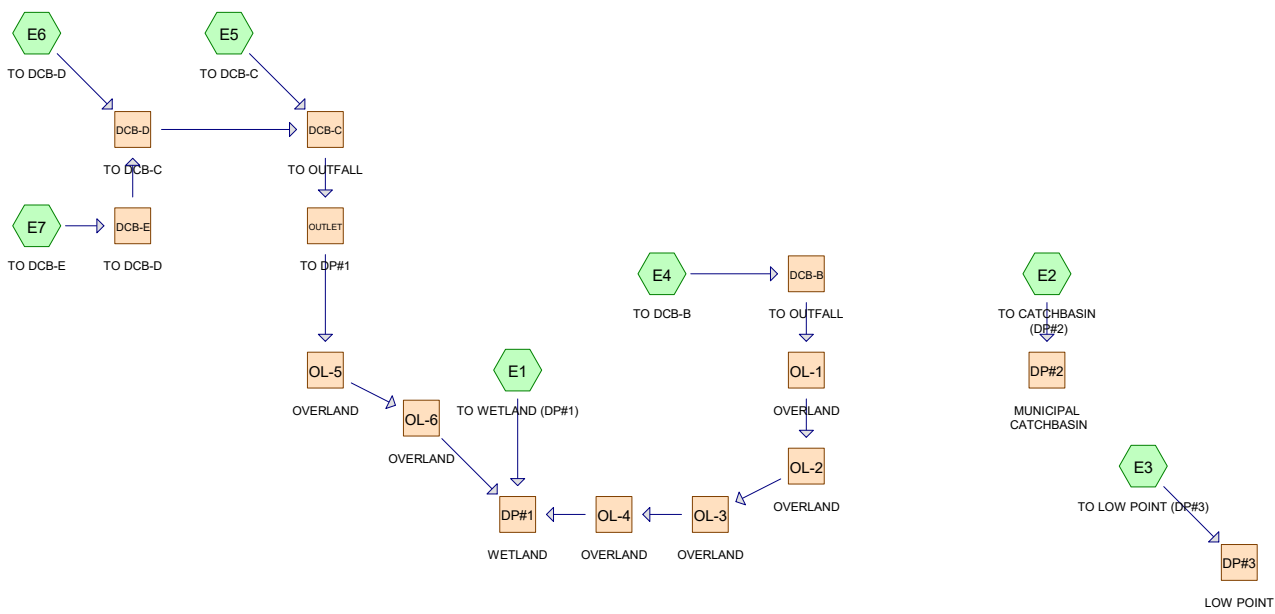
³"Handbook of Hydraulics" - 6th ed., E.F. Brater & H. Williams (1976)

⁴"Interim 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)

⁵ "HydroCAD" 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

Rainfall events imported from "3010-POST-SUBDIVISION-R1.hcp"

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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	NOAA 24-hr	C	Default	24.00	1	3.13	2
2	10-Year	NOAA 24-hr	C	Default	24.00	1	4.85	2
3	25-Year	NOAA 24-hr	C	Default	24.00	1	5.95	2
4	100-Year	NOAA 24-hr	C	Default	24.00	1	7.59	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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NOAA 24-hr C 2-Year Rainfall=3.13"

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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=0.84" Flow Length=770' Tc=19.9 min CN=71 Runoff=3.40 cfs 0.369 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=2.58" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=1.03 cfs 0.071 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=1.16" Flow Length=356' Tc=5.0 min CN=77 Runoff=2.85 cfs 0.183 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=2.48" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.58 cfs 0.039 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=2.90" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.17 cfs 0.013 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=2.90" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.42 cfs 0.031 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=1.85" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.24 cfs 0.015 af
Reach DCB-B: TO OUTFALL	Inflow=0.58 cfs 0.039 af Outflow=0.58 cfs 0.039 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.13' Max Vel=10.85 fps Inflow=0.81 cfs 0.059 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=0.81 cfs 0.059 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.16' Max Vel=6.44 fps Inflow=0.65 cfs 0.046 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=0.65 cfs 0.046 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.15' Max Vel=3.15 fps Inflow=0.24 cfs 0.015 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.24 cfs 0.015 af
Reach DP#1: WETLAND	Inflow=4.13 cfs 0.467 af Outflow=4.13 cfs 0.467 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.03 cfs 0.071 af Outflow=1.03 cfs 0.071 af
Reach DP#3: LOW POINT	Inflow=2.85 cfs 0.183 af Outflow=2.85 cfs 0.183 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.05' Max Vel=0.78 fps Inflow=0.58 cfs 0.039 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=0.55 cfs 0.039 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.05' Max Vel=0.69 fps Inflow=0.55 cfs 0.039 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=0.47 cfs 0.039 af

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NOAA 24-hr C 2-Year Rainfall=3.13"

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.06' Max Vel=0.49 fps Inflow=0.47 cfs 0.039 af
n=0.080 L=23.0' S=0.0304 '/' Capacity=64.61 cfs Outflow=0.47 cfs 0.039 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.06' Max Vel=0.20 fps Inflow=0.47 cfs 0.039 af
n=0.080 L=128.0' S=0.0050 '/' Capacity=45.22 cfs Outflow=0.37 cfs 0.039 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.05' Max Vel=0.83 fps Inflow=0.81 cfs 0.059 af
n=0.080 L=285.0' S=0.1035 '/' Capacity=119.16 cfs Outflow=0.69 cfs 0.059 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.13' Max Vel=0.31 fps Inflow=0.69 cfs 0.059 af
n=0.080 L=81.0' S=0.0051 '/' Capacity=26.35 cfs Outflow=0.63 cfs 0.059 af

Reach OUTLET: TO DP#1

Inflow=0.81 cfs 0.059 af
Outflow=0.81 cfs 0.059 af

Total Runoff Area = 7.983 ac Runoff Volume = 0.721 af Average Runoff Depth = 1.08"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

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NOAA 24-hr C 2-Year Rainfall=3.13"

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

Runoff = 3.40 cfs @ 12.32 hrs, Volume= 0.369 af, Depth= 0.84"
 Routed to Reach DP#1 : WETLAND

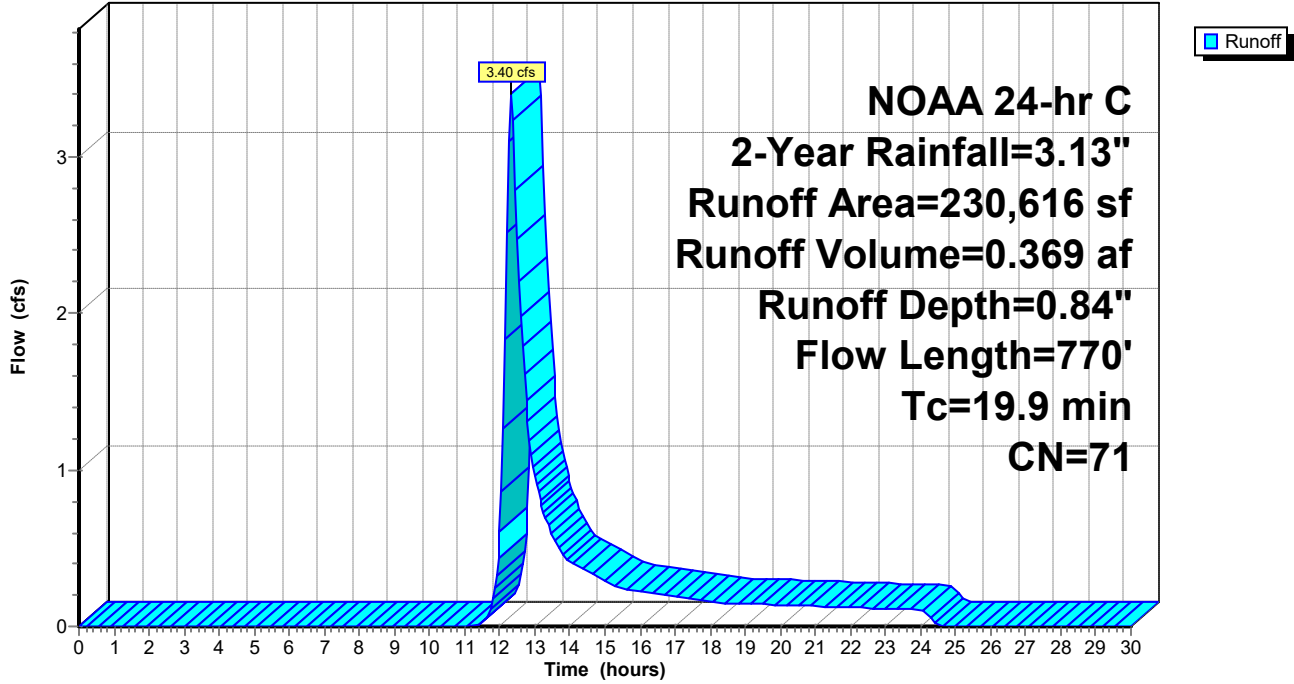
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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: $T_c < 2dt$ may require smaller dt

Runoff = 1.03 cfs @ 12.11 hrs, Volume= 0.071 af, Depth= 2.58"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

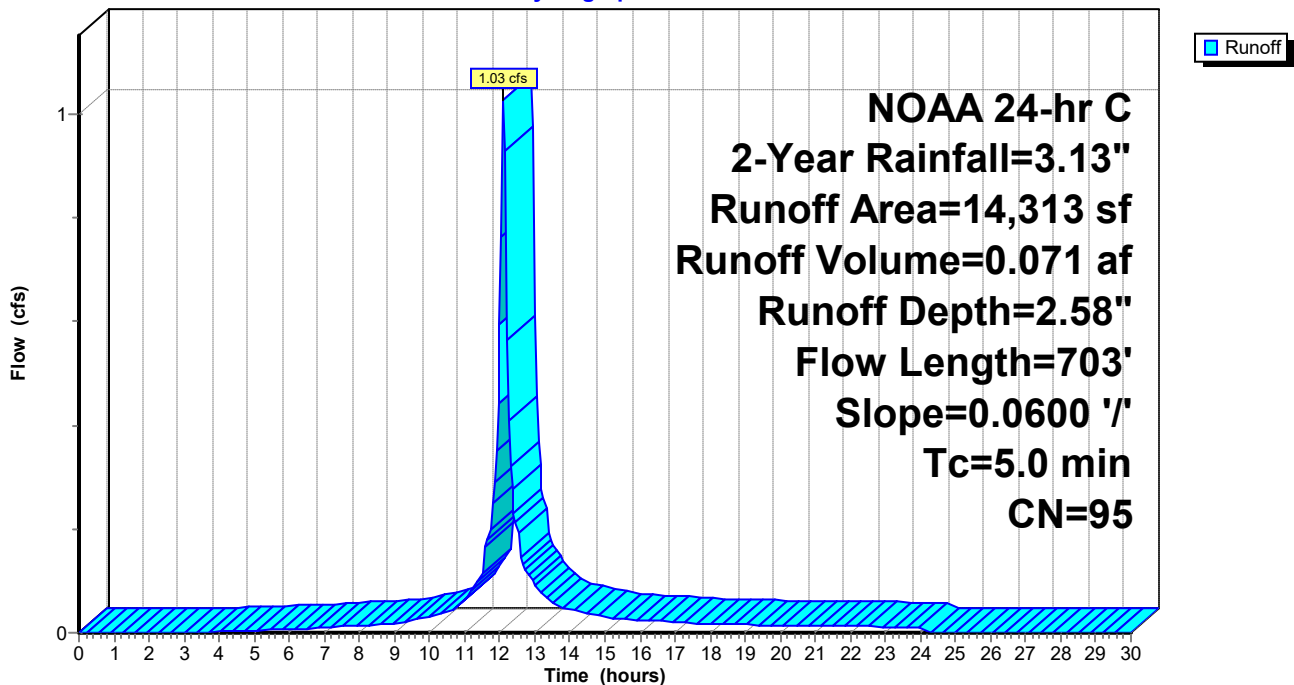
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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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NOAA 24-hr C 2-Year Rainfall=3.13"

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

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

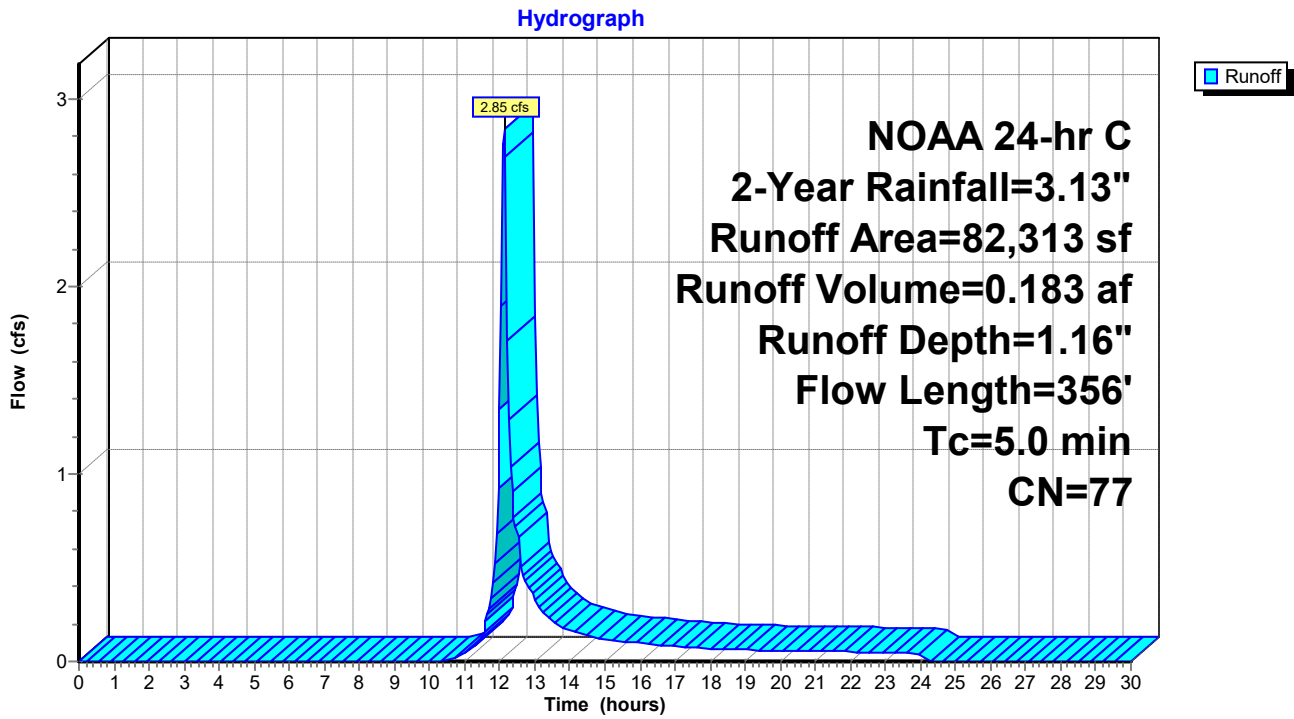
Runoff = 2.85 cfs @ 12.12 hrs, Volume= 0.183 af, Depth= 1.16"
 Routed to Reach DP#3 : LOW POINT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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 = 0.58 cfs @ 12.11 hrs, Volume= 0.039 af, Depth= 2.48"
 Routed to Reach DCB-B : TO OUTFALL

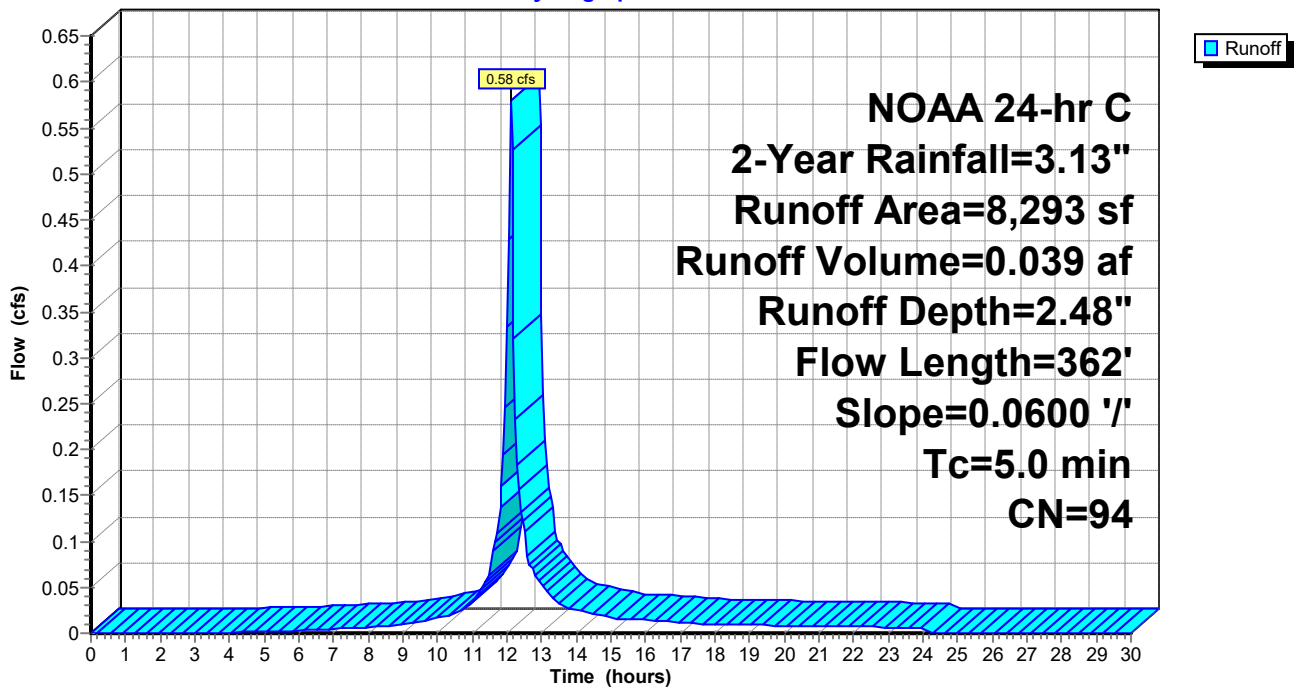
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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 = 0.17 cfs @ 12.11 hrs, Volume= 0.013 af, Depth= 2.90"
 Routed to Reach DCB-C : TO OUTFALL

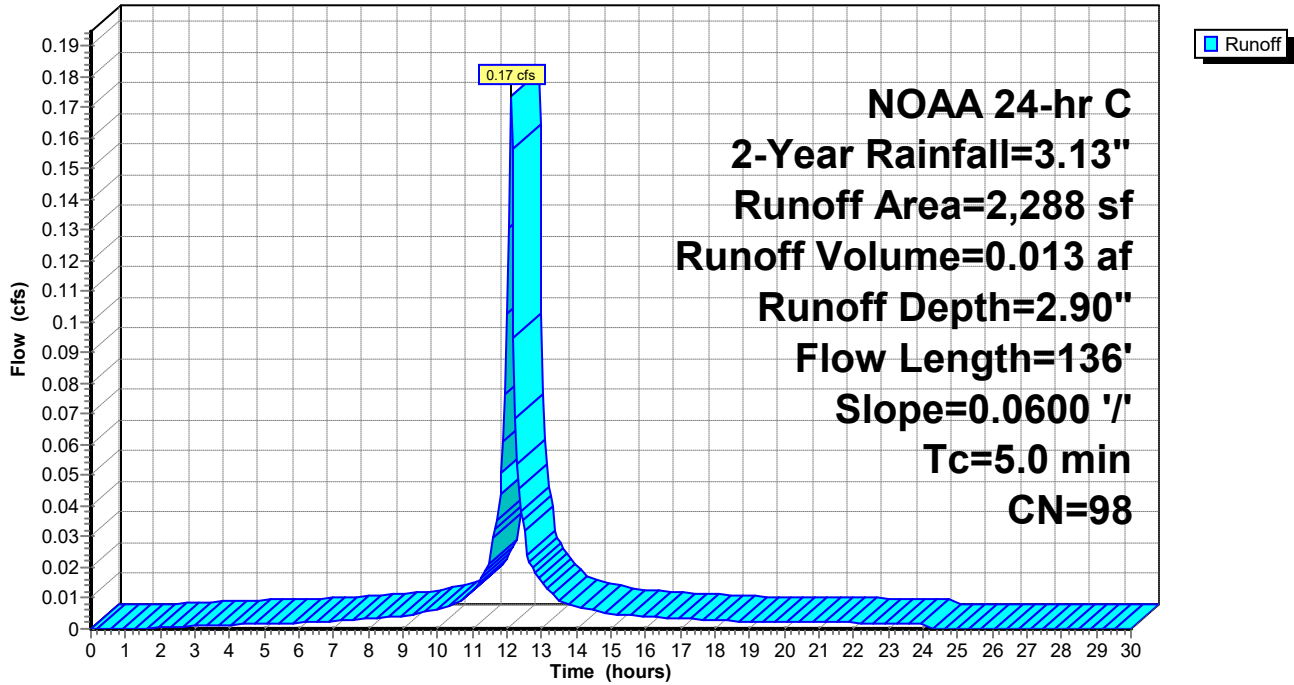
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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 = 0.42 cfs @ 12.11 hrs, Volume= 0.031 af, Depth= 2.90"
 Routed to Reach DCB-D : TO DCB-C

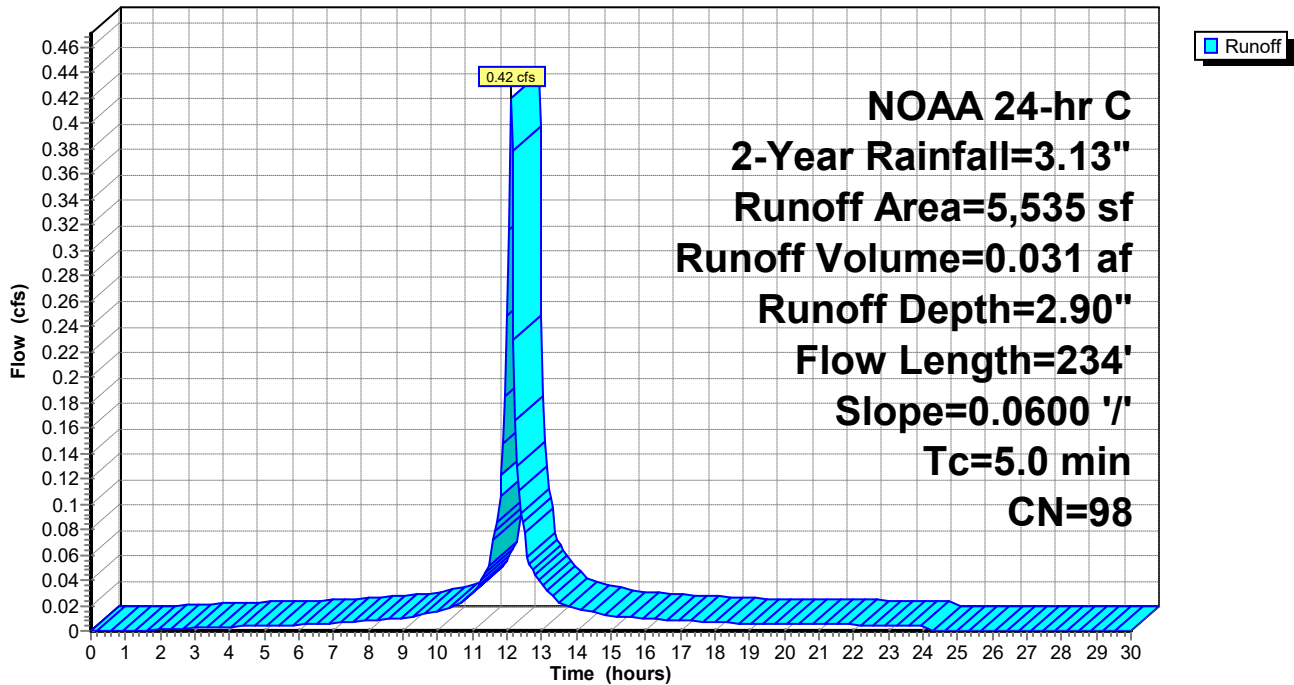
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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 = 0.24 cfs @ 12.12 hrs, Volume= 0.015 af, Depth= 1.85"
 Routed to Reach DCB-E : TO DCB-D

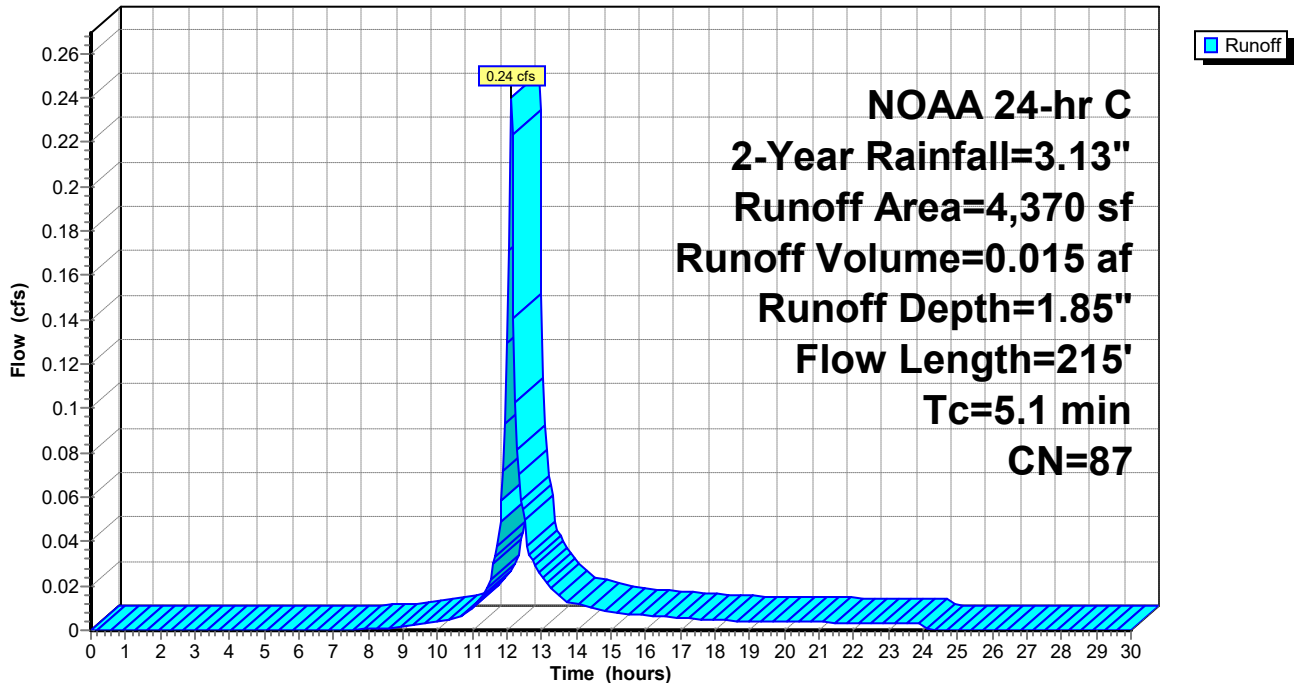
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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

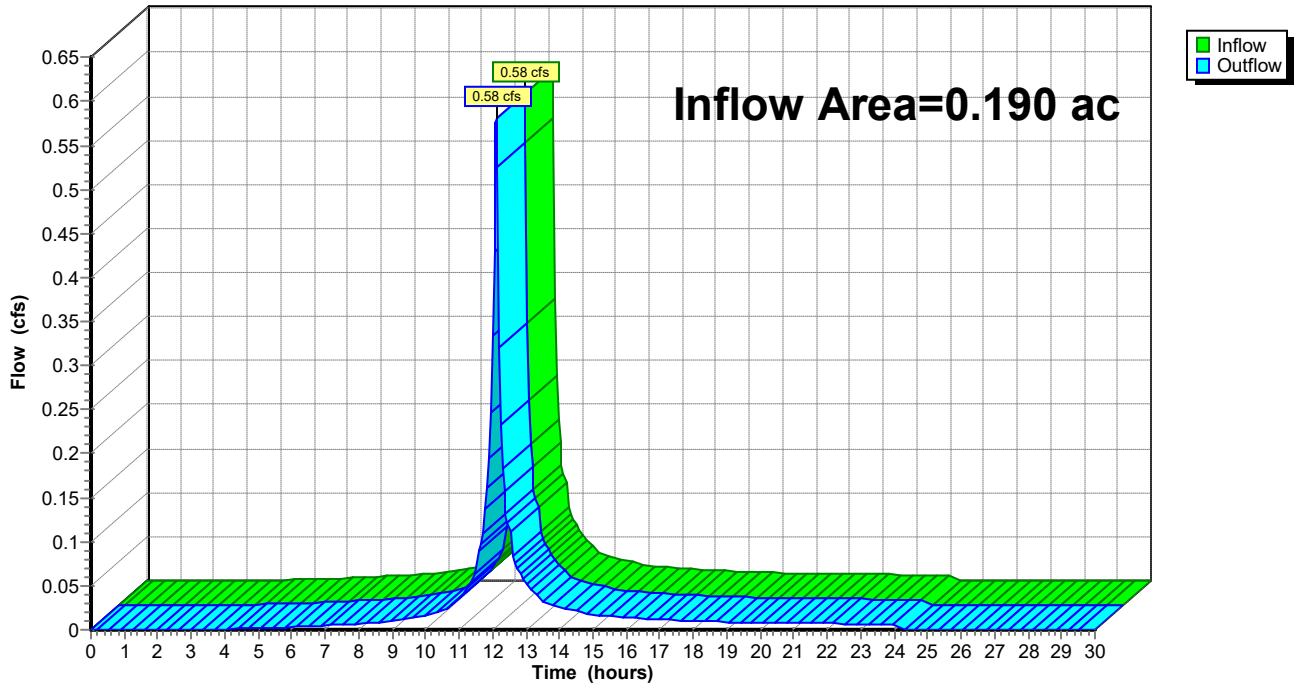
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.58 cfs @ 12.11 hrs, Volume= 0.039 af
Outflow = 0.58 cfs @ 12.11 hrs, Volume= 0.039 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

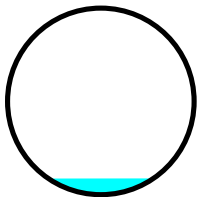
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 2.52" for 2-Year event
Inflow = 0.81 cfs @ 12.12 hrs, Volume= 0.059 af
Outflow = 0.81 cfs @ 12.13 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.3 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= 10.85 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.58 fps, Avg. Travel Time= 0.3 min

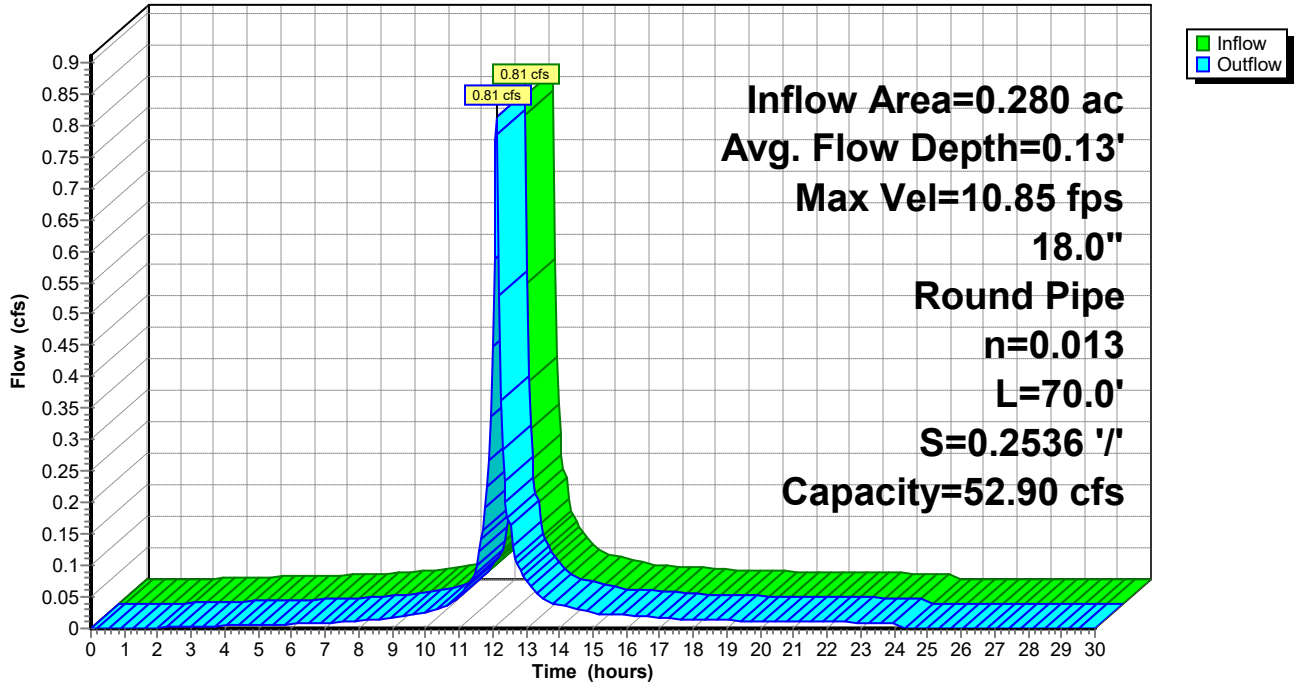
Peak Storage= 5 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 0.84'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

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

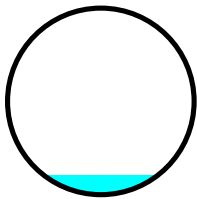
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.06' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 2.44" for 2-Year event
Inflow = 0.65 cfs @ 12.12 hrs, Volume= 0.046 af
Outflow = 0.65 cfs @ 12.13 hrs, Volume= 0.046 af, Atten= 1%, Lag= 0.7 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= 6.44 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.07 fps, Avg. Travel Time= 0.9 min

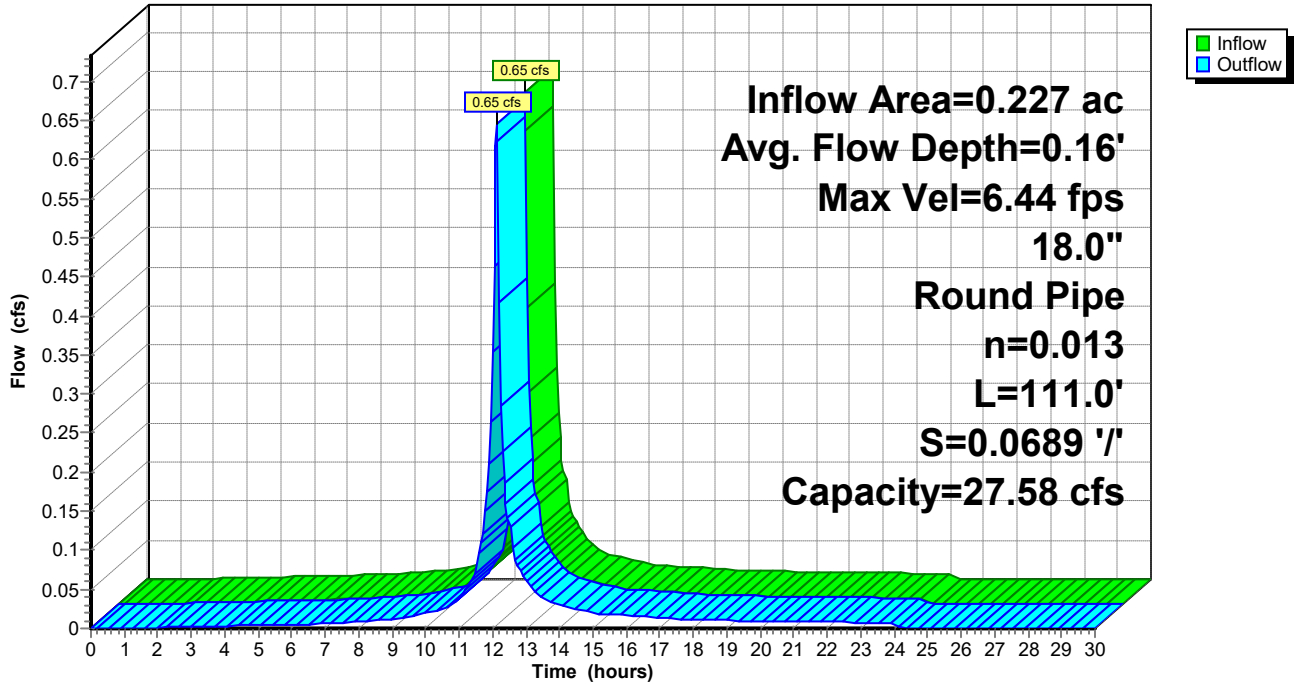
Peak Storage= 11 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 0.92'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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



3010-Pre-SUBDIVISION

Prepared by Hannigan Engineering Inc
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NOAA 24-hr C 2-Year Rainfall=3.13"

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Summary for Reach DCB-E: TO DCB-D

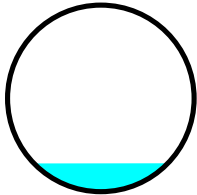
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 1.85" for 2-Year event
Inflow = 0.24 cfs @ 12.12 hrs, Volume= 0.015 af
Outflow = 0.24 cfs @ 12.13 hrs, Volume= 0.015 af, Atten= 1%, Lag= 0.5 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= 3.15 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 0.6 min

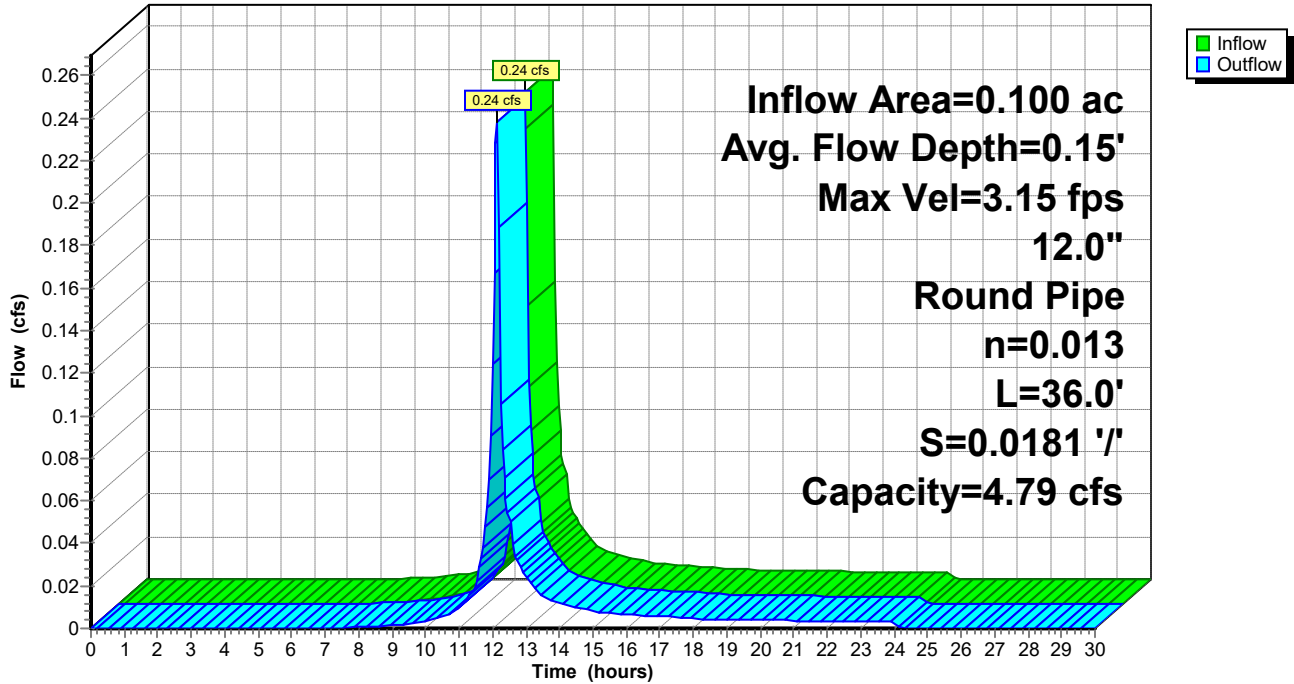
Peak Storage= 3 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.72'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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

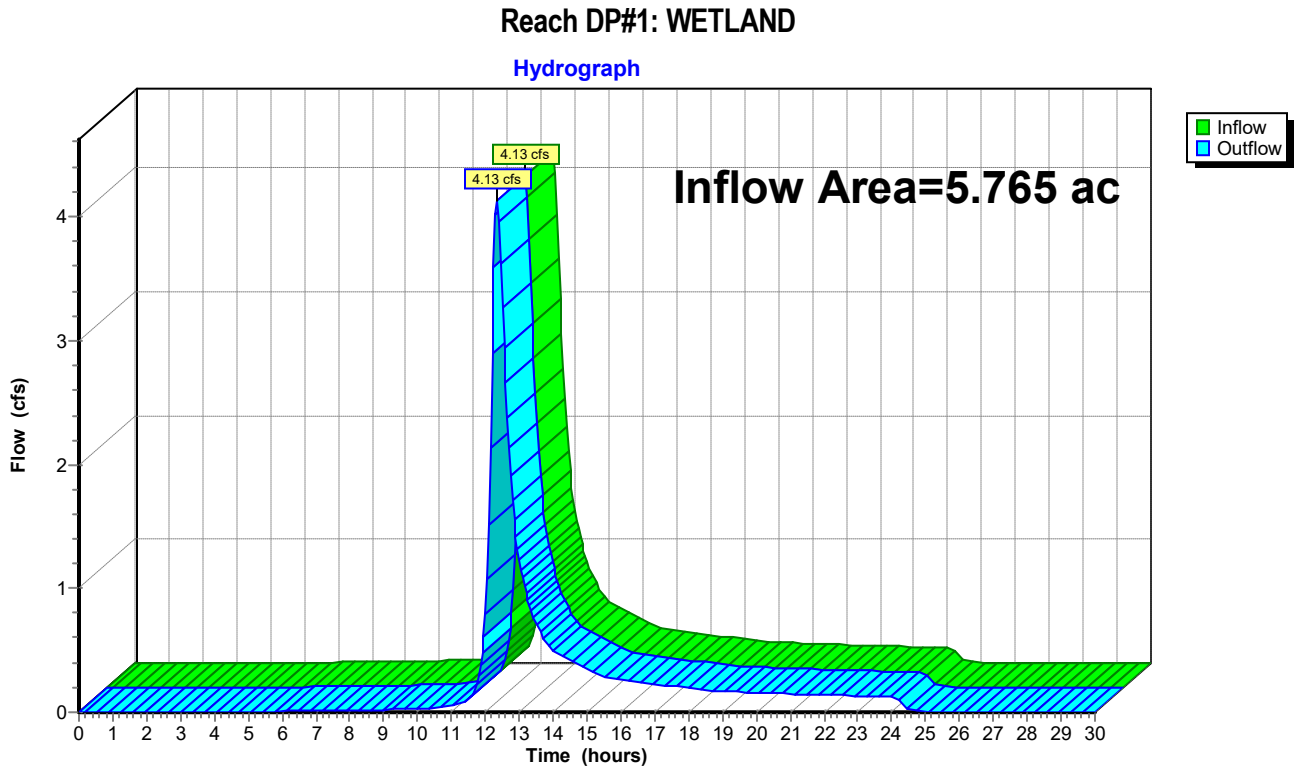


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 0.97" for 2-Year event
Inflow = 4.13 cfs @ 12.35 hrs, Volume= 0.467 af
Outflow = 4.13 cfs @ 12.35 hrs, Volume= 0.467 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

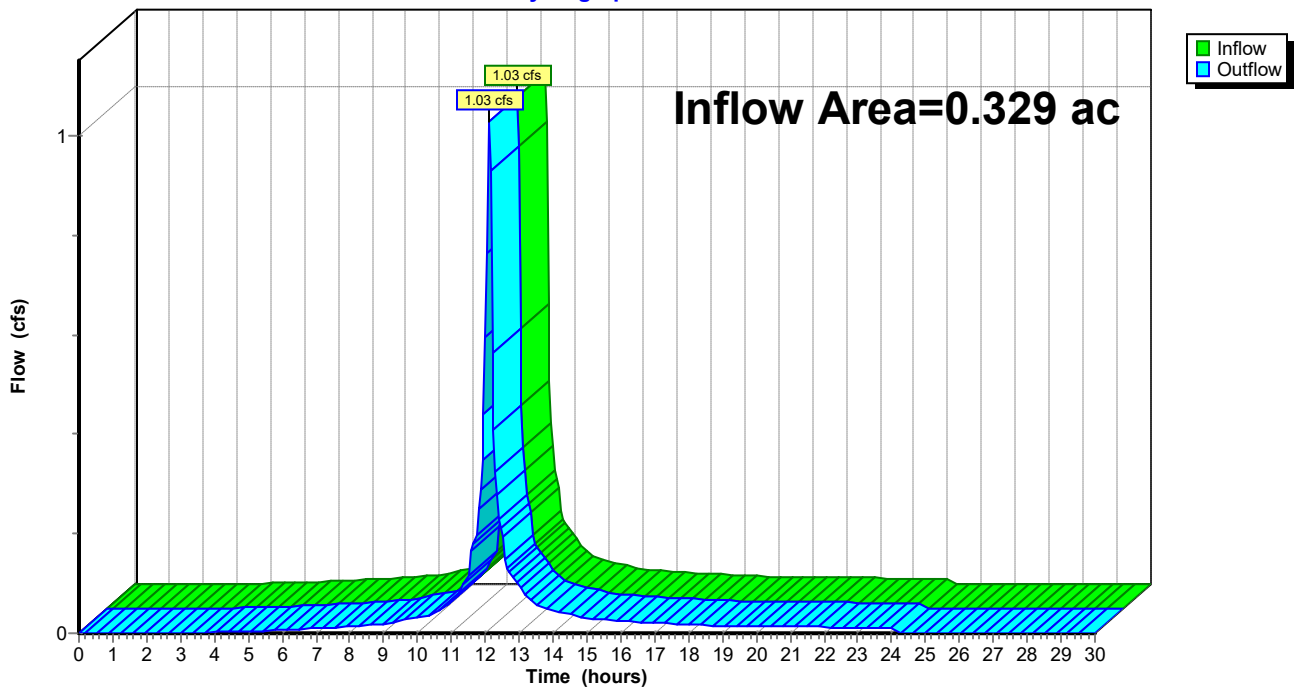
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 2.58" for 2-Year event
Inflow = 1.03 cfs @ 12.11 hrs, Volume= 0.071 af
Outflow = 1.03 cfs @ 12.11 hrs, Volume= 0.071 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

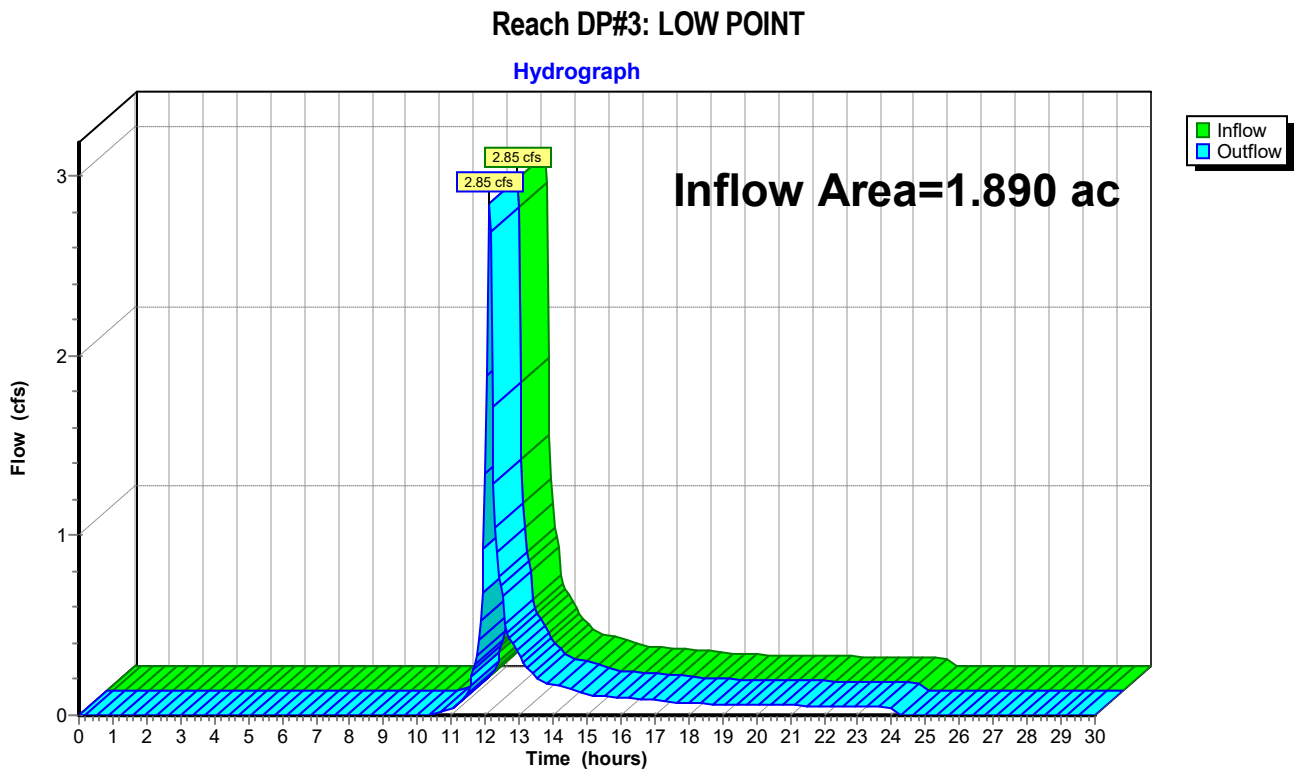


Summary for Reach DP#3: LOW POINT

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

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 2.85 cfs @ 12.12 hrs, Volume= 0.183 af
Outflow = 2.85 cfs @ 12.12 hrs, Volume= 0.183 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 OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.58 cfs @ 12.11 hrs, Volume= 0.039 af
Outflow = 0.55 cfs @ 12.14 hrs, Volume= 0.039 af, Atten= 5%, Lag= 1.7 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= 0.78 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.30 fps, Avg. Travel Time= 2.6 min

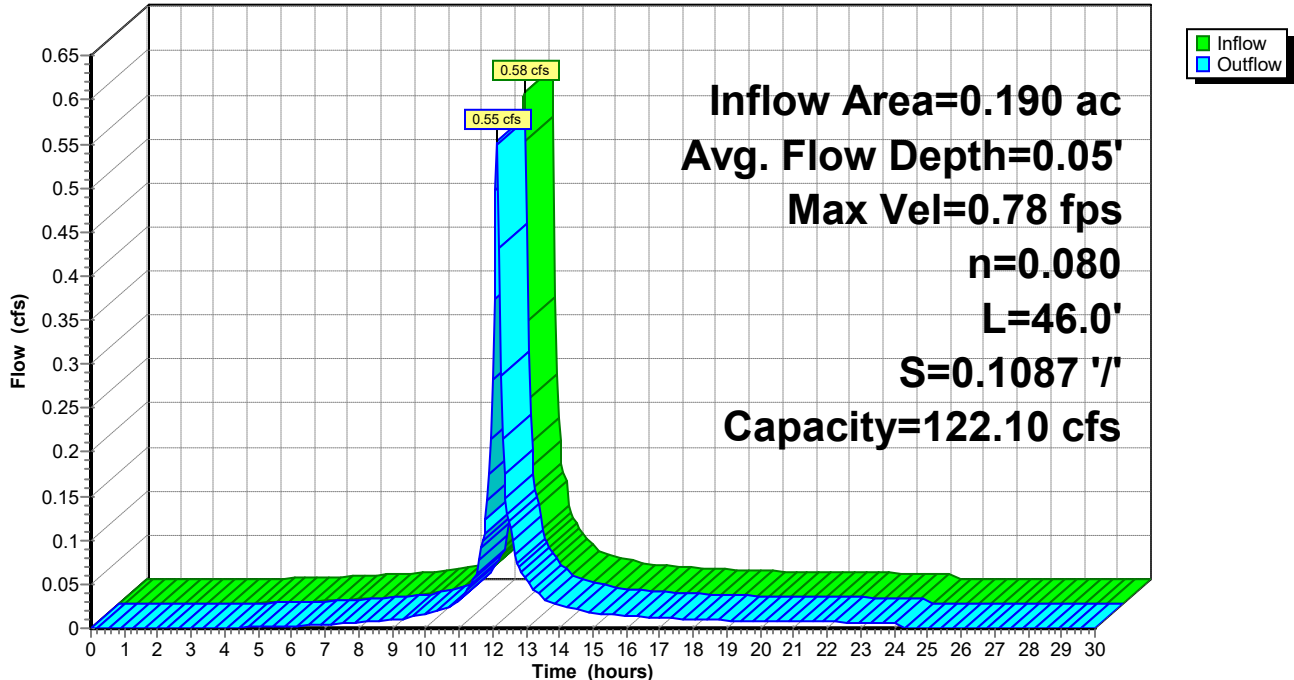
Peak Storage= 34 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.05', Surface Width= 15.94'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.55 cfs @ 12.14 hrs, Volume= 0.039 af
Outflow = 0.47 cfs @ 12.27 hrs, Volume= 0.039 af, Atten= 14%, Lag= 7.7 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= 0.69 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 13.2 min

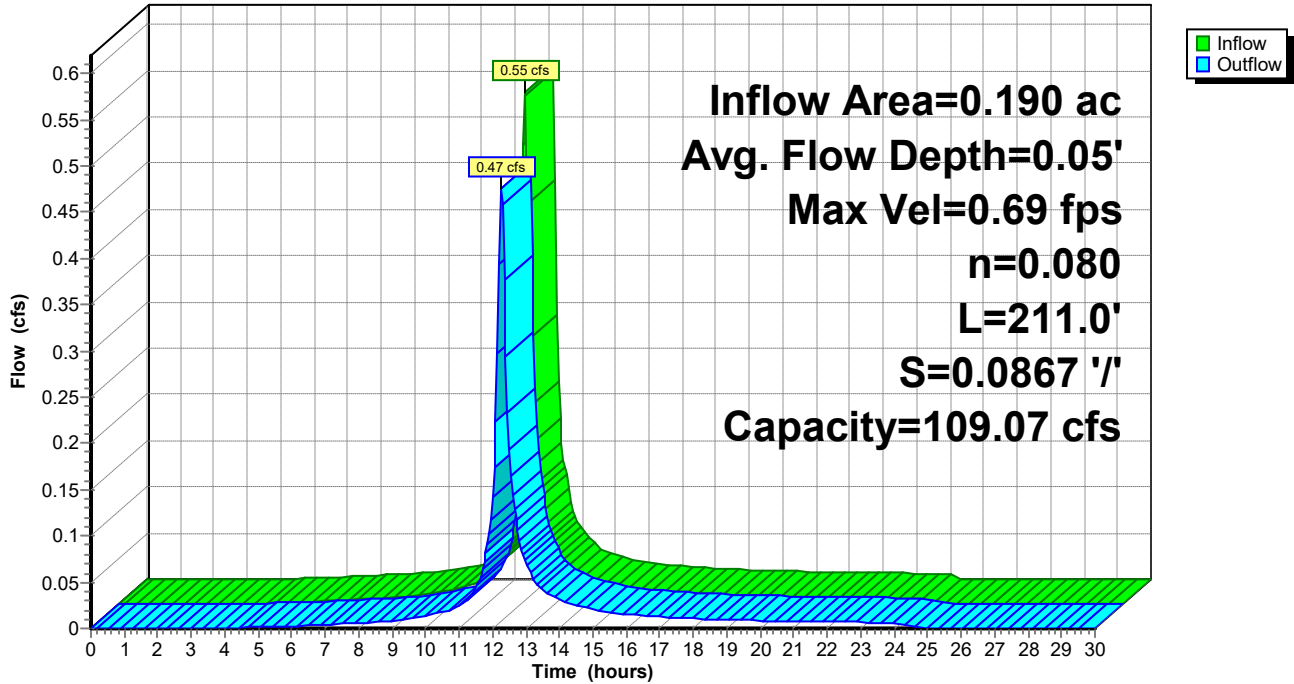
Peak Storage= 149 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.05', Surface Width= 15.91'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.47 cfs @ 12.27 hrs, Volume= 0.039 af
Outflow = 0.47 cfs @ 12.29 hrs, Volume= 0.039 af, Atten= 2%, Lag= 1.4 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= 0.49 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 2.3 min

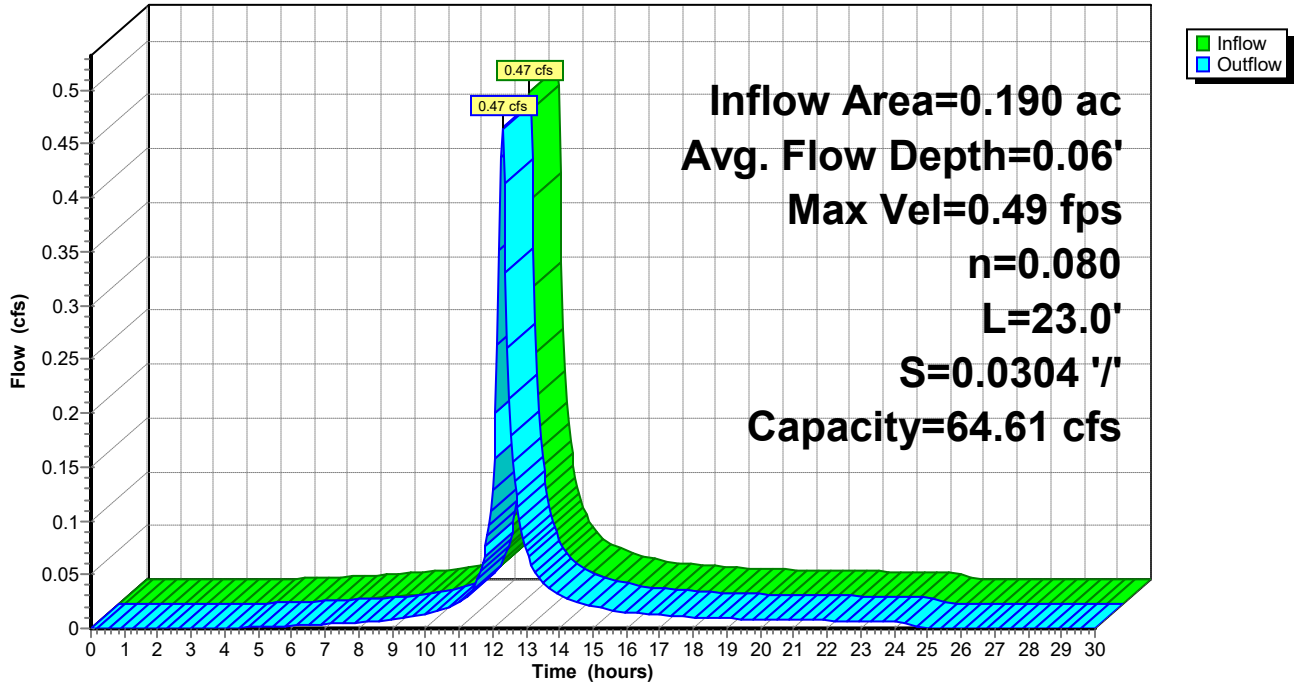
Peak Storage= 22 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.23'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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' @ 12.50 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.47 cfs @ 12.29 hrs, Volume= 0.039 af
Outflow = 0.37 cfs @ 12.56 hrs, Volume= 0.039 af, Atten= 21%, Lag= 16.1 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= 0.20 fps, Min. Travel Time= 10.7 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 31.5 min

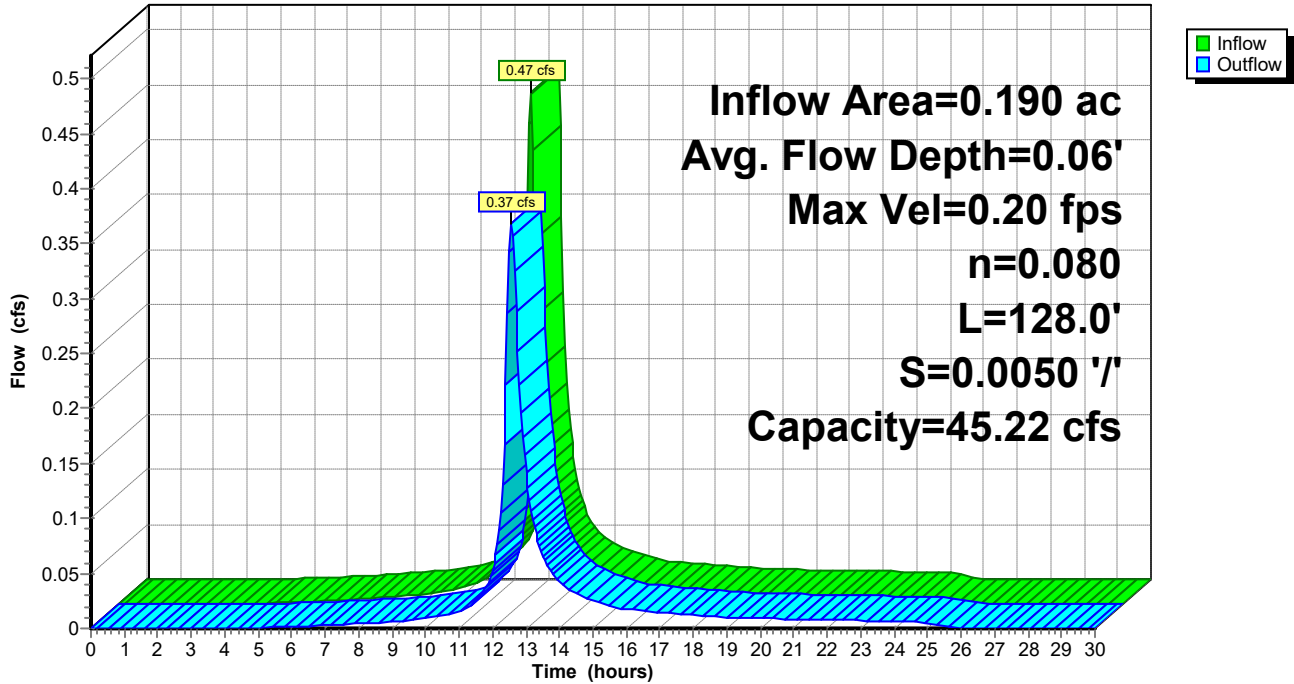
Peak Storage= 237 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 31.21'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 2.52" for 2-Year event
Inflow = 0.81 cfs @ 12.13 hrs, Volume= 0.059 af
Outflow = 0.69 cfs @ 12.26 hrs, Volume= 0.059 af, Atten= 15%, Lag= 8.3 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= 0.83 fps, Min. Travel Time= 5.7 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 16.1 min

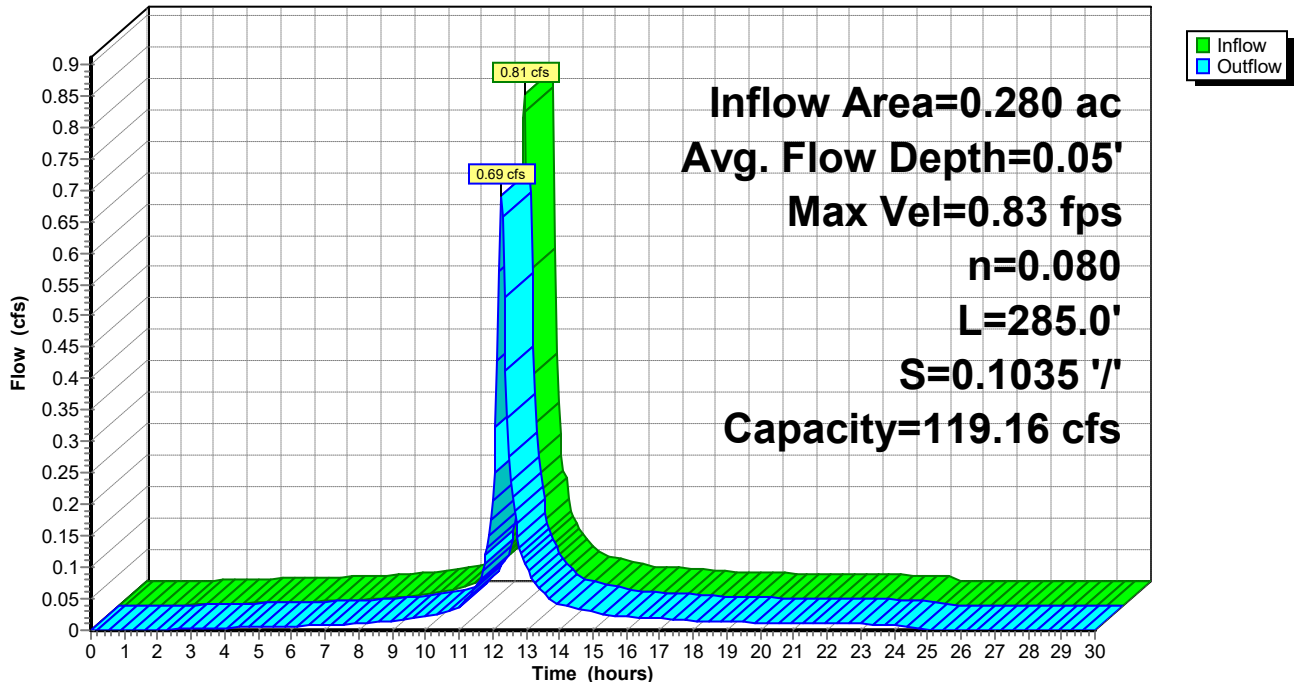
Peak Storage= 238 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.05', Surface Width= 16.08'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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 0.09' @ 12.35 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 2.52" for 2-Year event
Inflow = 0.69 cfs @ 12.26 hrs, Volume= 0.059 af
Outflow = 0.63 cfs @ 12.38 hrs, Volume= 0.059 af, Atten= 10%, Lag= 7.1 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= 0.31 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 16.4 min

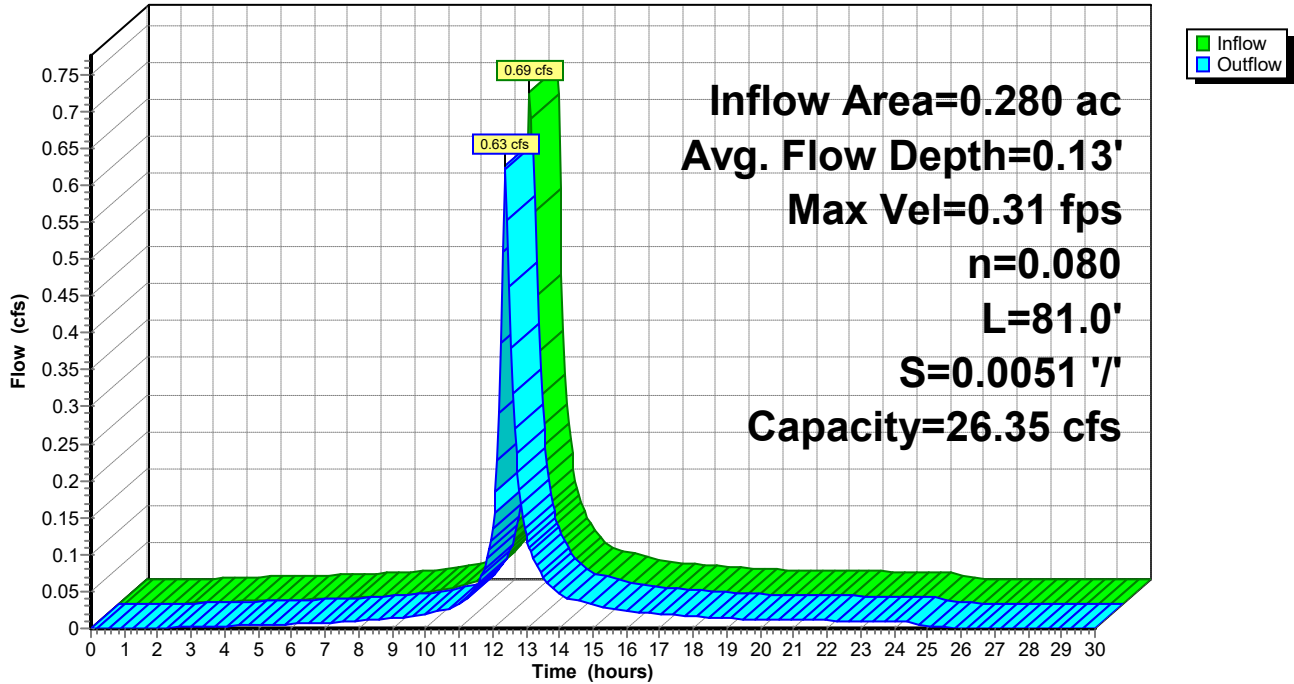
Peak Storage= 165 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 17.51'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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

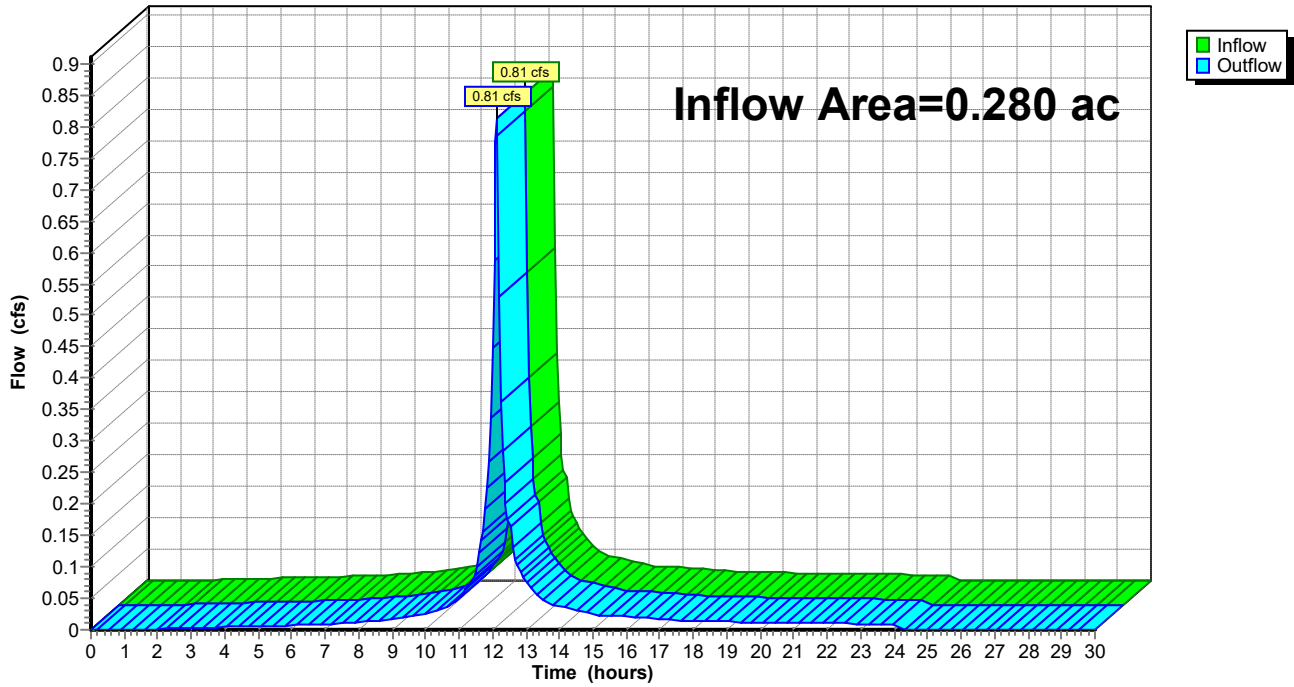
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 2.52" for 2-Year event
Inflow = 0.81 cfs @ 12.13 hrs, Volume= 0.059 af
Outflow = 0.81 cfs @ 12.13 hrs, Volume= 0.059 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

Prepared by Hannigan Engineering Inc
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NOAA 24-hr C 10-Year Rainfall=4.85"

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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=2.00" Flow Length=770' Tc=19.9 min CN=71 Runoff=8.82 cfs 0.884 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=4.27" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=1.65 cfs 0.117 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=2.50" Flow Length=356' Tc=5.0 min CN=77 Runoff=6.19 cfs 0.393 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=4.16" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.94 cfs 0.066 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=4.61" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.27 cfs 0.020 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=4.61" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.66 cfs 0.049 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=3.43" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.43 cfs 0.029 af
Reach DCB-B: TO OUTFALL	Inflow=0.94 cfs 0.066 af Outflow=0.94 cfs 0.066 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.16' Max Vel=12.58 fps Inflow=1.32 cfs 0.098 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.31 cfs 0.098 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.20' Max Vel=7.49 fps Inflow=1.08 cfs 0.077 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.05 cfs 0.077 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.20' Max Vel=3.76 fps Inflow=0.43 cfs 0.029 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.43 cfs 0.029 af
Reach DP#1: WETLAND	Inflow=10.23 cfs 1.048 af Outflow=10.23 cfs 1.048 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.65 cfs 0.117 af Outflow=1.65 cfs 0.117 af
Reach DP#3: LOW POINT	Inflow=6.19 cfs 0.393 af Outflow=6.19 cfs 0.393 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.93 fps Inflow=0.94 cfs 0.066 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=0.91 cfs 0.066 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.83 fps Inflow=0.91 cfs 0.066 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=0.79 cfs 0.066 af

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NOAA 24-hr C 10-Year Rainfall=4.85"

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.08' Max Vel=0.60 fps Inflow=0.79 cfs 0.066 af
n=0.080 L=23.0' S=0.0304 '/' Capacity=64.61 cfs Outflow=0.78 cfs 0.066 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.08' Max Vel=0.25 fps Inflow=0.78 cfs 0.066 af
n=0.080 L=128.0' S=0.0050 '/' Capacity=45.22 cfs Outflow=0.65 cfs 0.066 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.07' Max Vel=1.02 fps Inflow=1.31 cfs 0.098 af
n=0.080 L=285.0' S=0.1035 '/' Capacity=119.16 cfs Outflow=1.14 cfs 0.098 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.17' Max Vel=0.38 fps Inflow=1.14 cfs 0.098 af
n=0.080 L=81.0' S=0.0051 '/' Capacity=26.35 cfs Outflow=1.06 cfs 0.098 af

Reach OUTLET: TO DP#1

Inflow=1.31 cfs 0.098 af
Outflow=1.31 cfs 0.098 af

Total Runoff Area = 7.983 ac Runoff Volume = 1.558 af Average Runoff Depth = 2.34"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

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

Runoff = 8.82 cfs @ 12.31 hrs, Volume= 0.884 af, Depth= 2.00"

Routed to Reach DP#1 : WETLAND

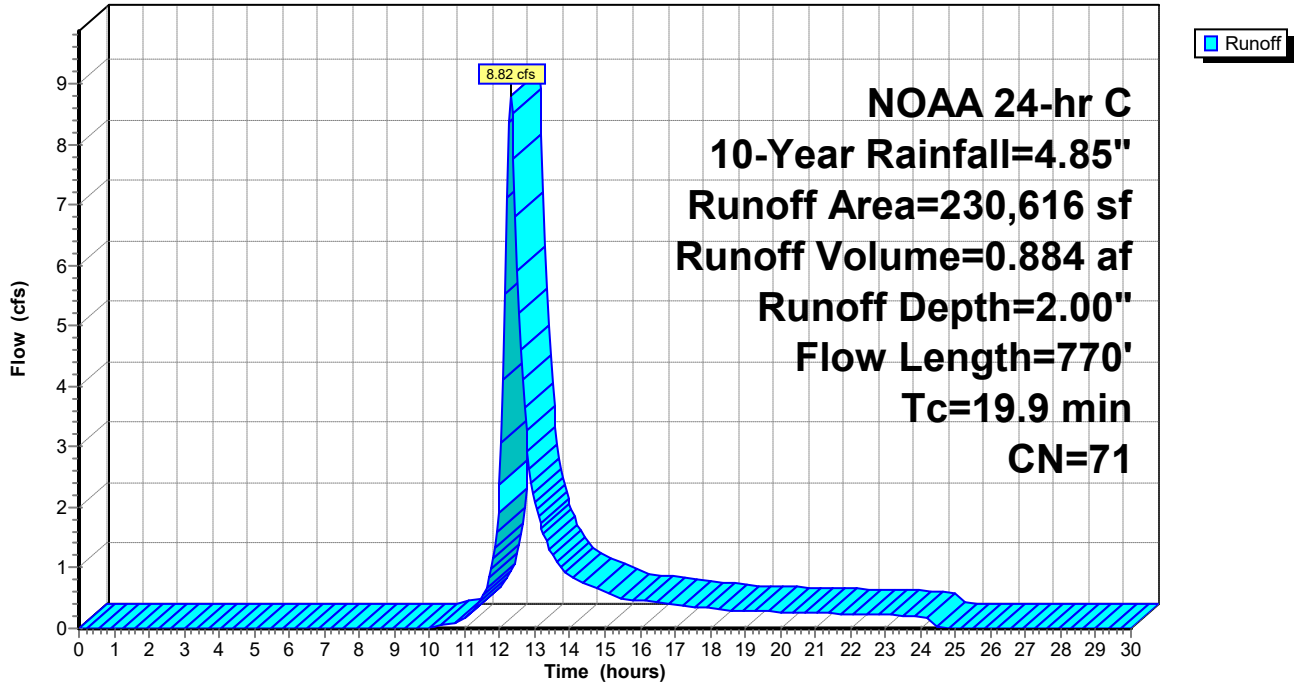
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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 = 1.65 cfs @ 12.11 hrs, Volume= 0.117 af, Depth= 4.27"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

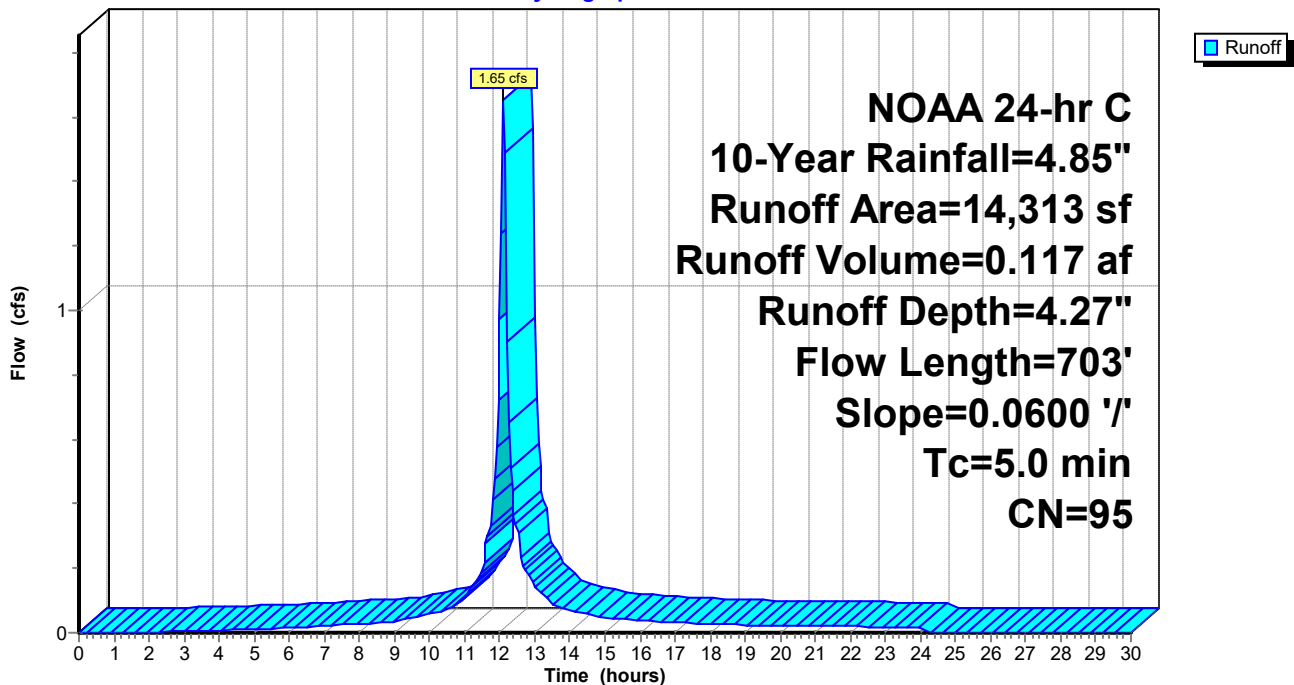
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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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NOAA 24-hr C 10-Year Rainfall=4.85"

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

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

Runoff = 6.19 cfs @ 12.12 hrs, Volume= 0.393 af, Depth= 2.50"
 Routed to Reach DP#3 : LOW POINT

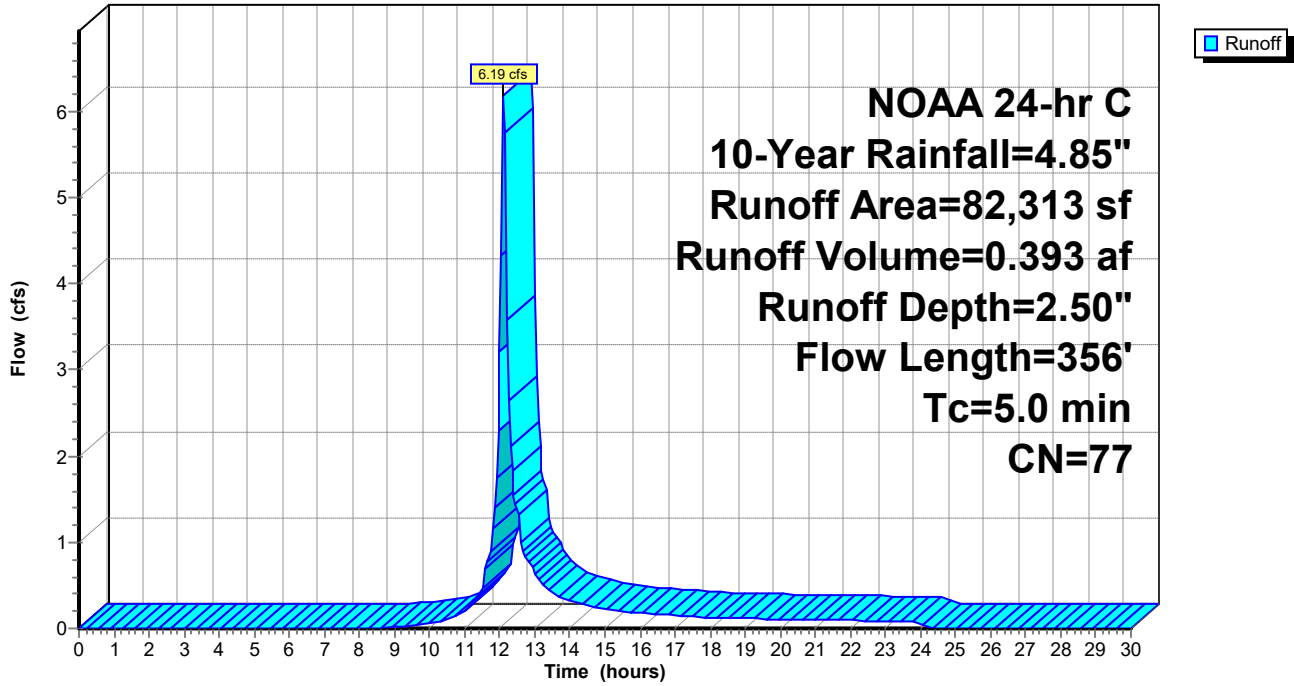
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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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Summary for Subcatchment E4: TO DCB-B

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

Runoff = 0.94 cfs @ 12.11 hrs, Volume= 0.066 af, Depth= 4.16"
 Routed to Reach DCB-B : TO OUTFALL

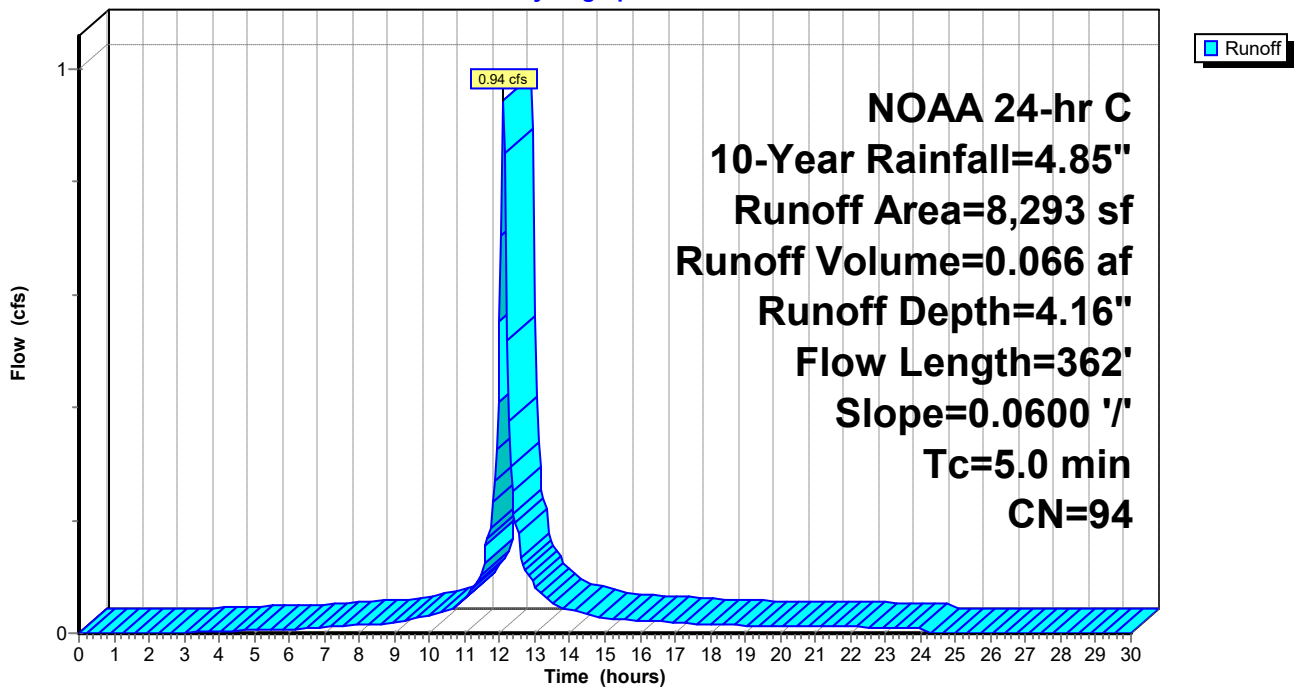
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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 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 @ 12.11 hrs, Volume= 0.020 af, Depth= 4.61"
 Routed to Reach DCB-C : TO OUTFALL

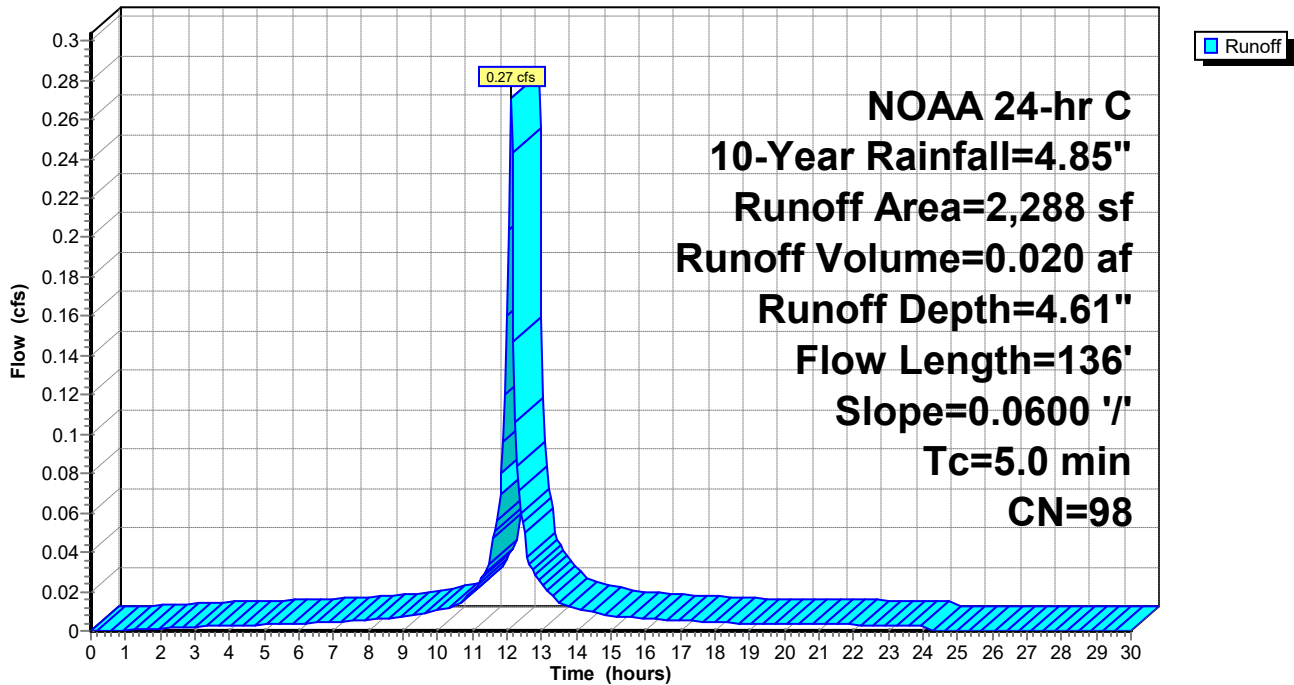
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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



Summary for Subcatchment E6: TO DCB-D

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

Runoff = 0.66 cfs @ 12.11 hrs, Volume= 0.049 af, Depth= 4.61"
 Routed to Reach DCB-D : TO DCB-C

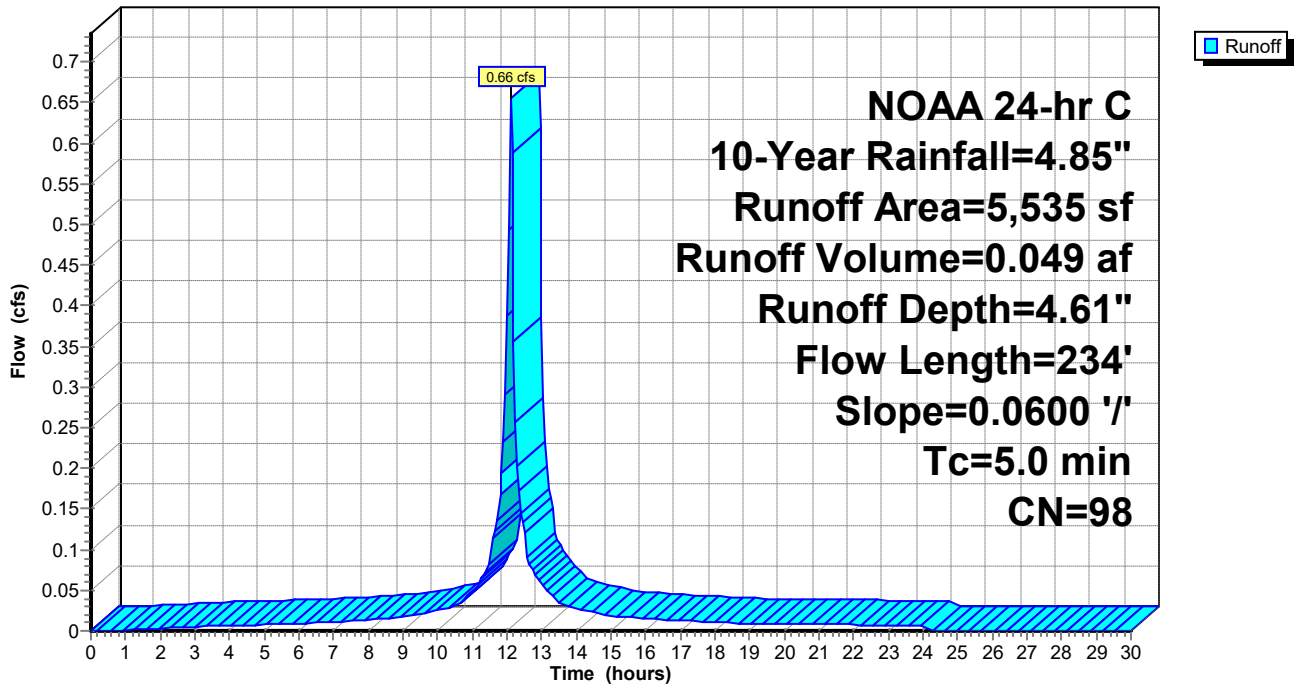
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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 $T_c = 5.0$ 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 = 0.43 cfs @ 12.11 hrs, Volume= 0.029 af, Depth= 3.43"
 Routed to Reach DCB-E : TO DCB-D

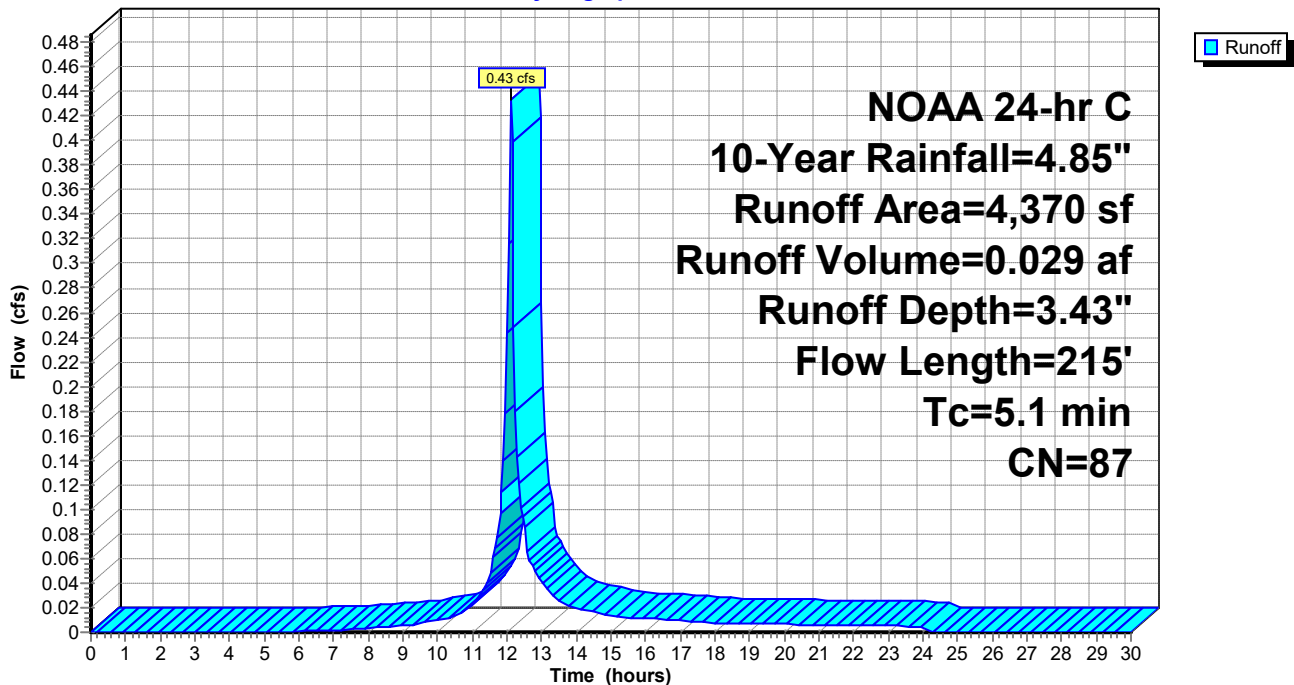
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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

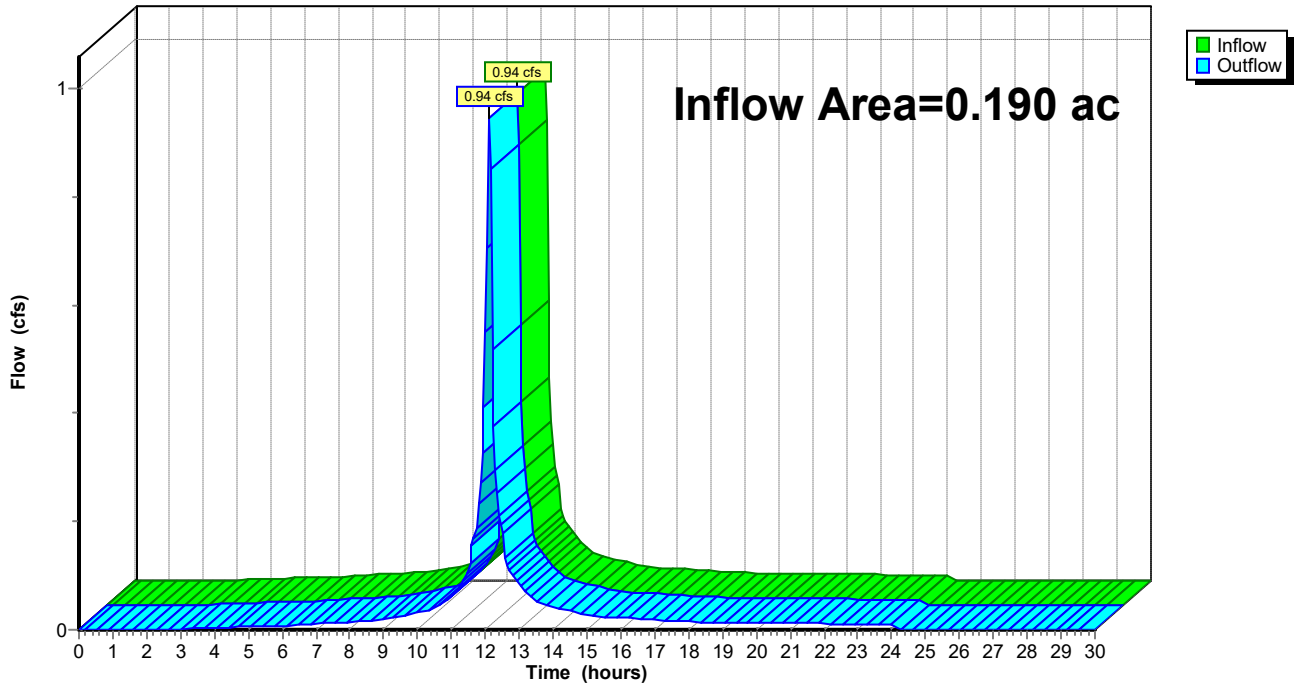
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.94 cfs @ 12.11 hrs, Volume= 0.066 af
Outflow = 0.94 cfs @ 12.11 hrs, Volume= 0.066 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

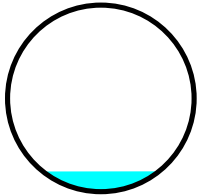
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 4.19" for 10-Year event
Inflow = 1.32 cfs @ 12.12 hrs, Volume= 0.098 af
Outflow = 1.31 cfs @ 12.12 hrs, Volume= 0.098 af, Atten= 1%, 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= 12.58 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.08 fps, Avg. Travel Time= 0.3 min

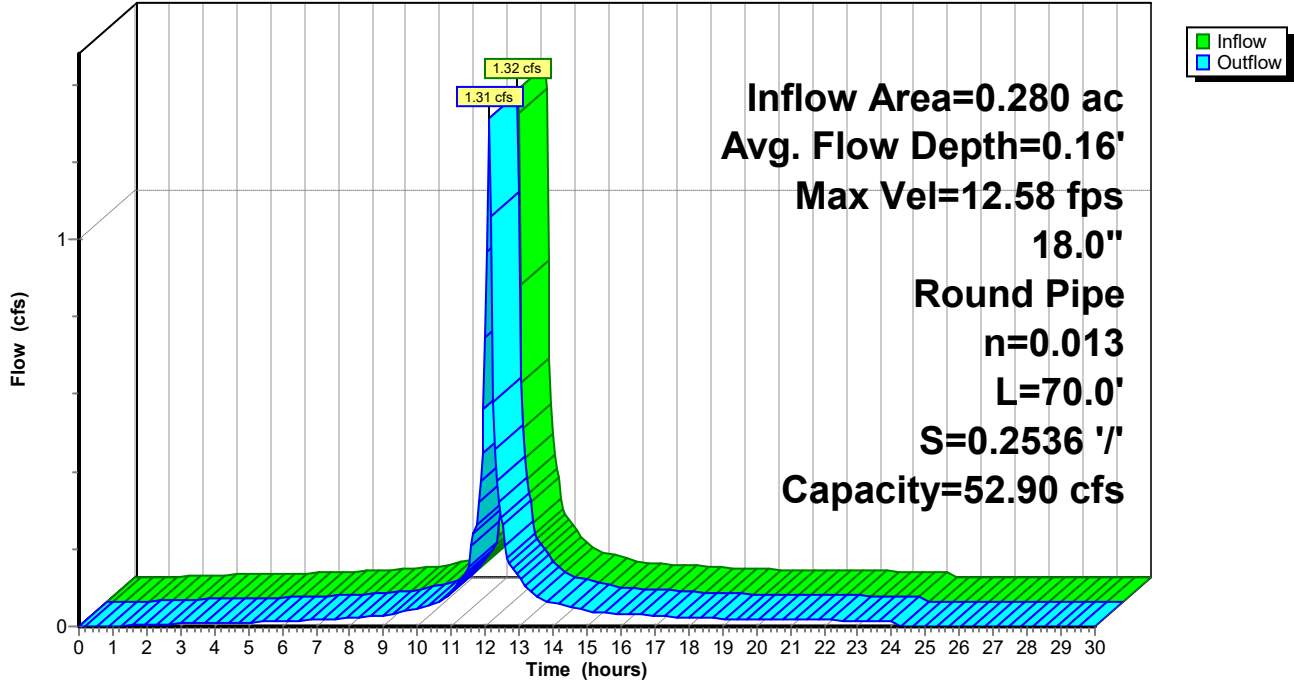
Peak Storage= 7 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 0.93'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

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

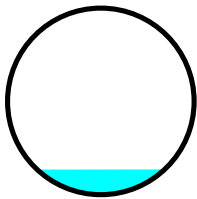
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.10' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 4.09" for 10-Year event
 Inflow = 1.08 cfs @ 12.11 hrs, Volume= 0.077 af
 Outflow = 1.05 cfs @ 12.12 hrs, Volume= 0.077 af, Atten= 2%, 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= 7.49 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 2.37 fps, Avg. Travel Time= 0.8 min

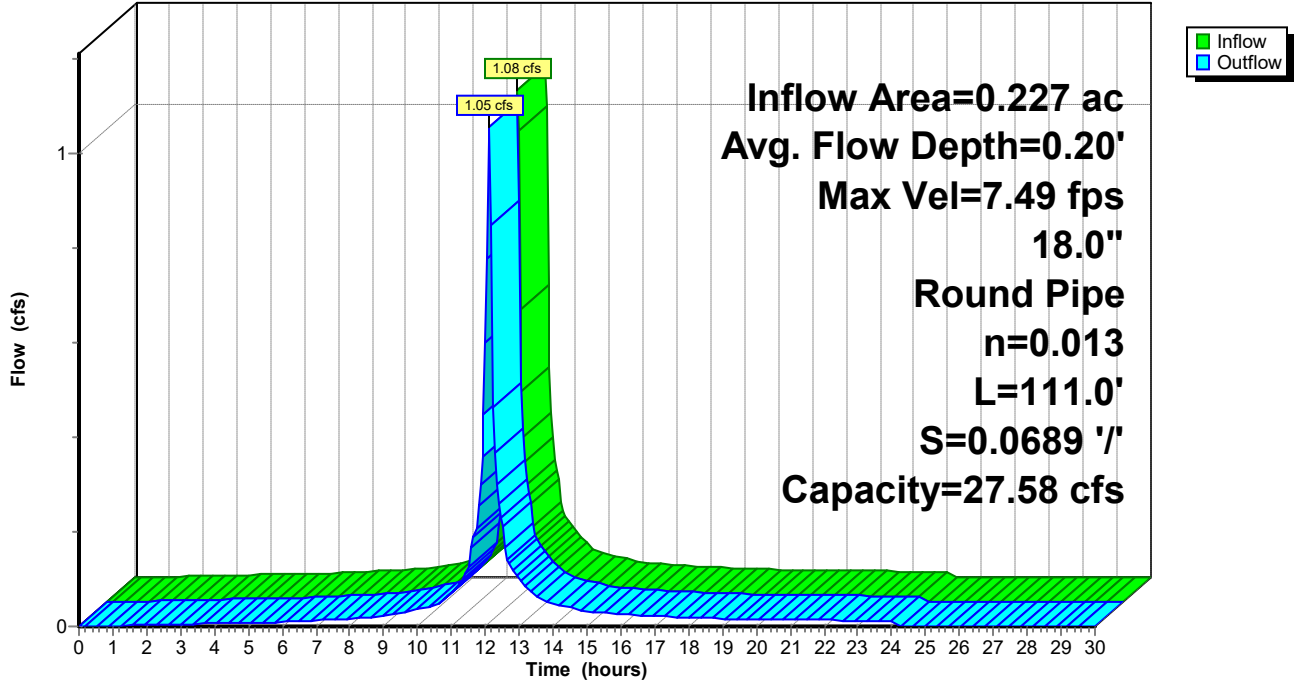
Peak Storage= 16 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.20' , Surface Width= 1.02'
 Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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

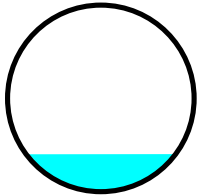
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 3.43" for 10-Year event
Inflow = 0.43 cfs @ 12.11 hrs, Volume= 0.029 af
Outflow = 0.43 cfs @ 12.12 hrs, Volume= 0.029 af, Atten= 2%, 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= 3.76 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 0.5 min

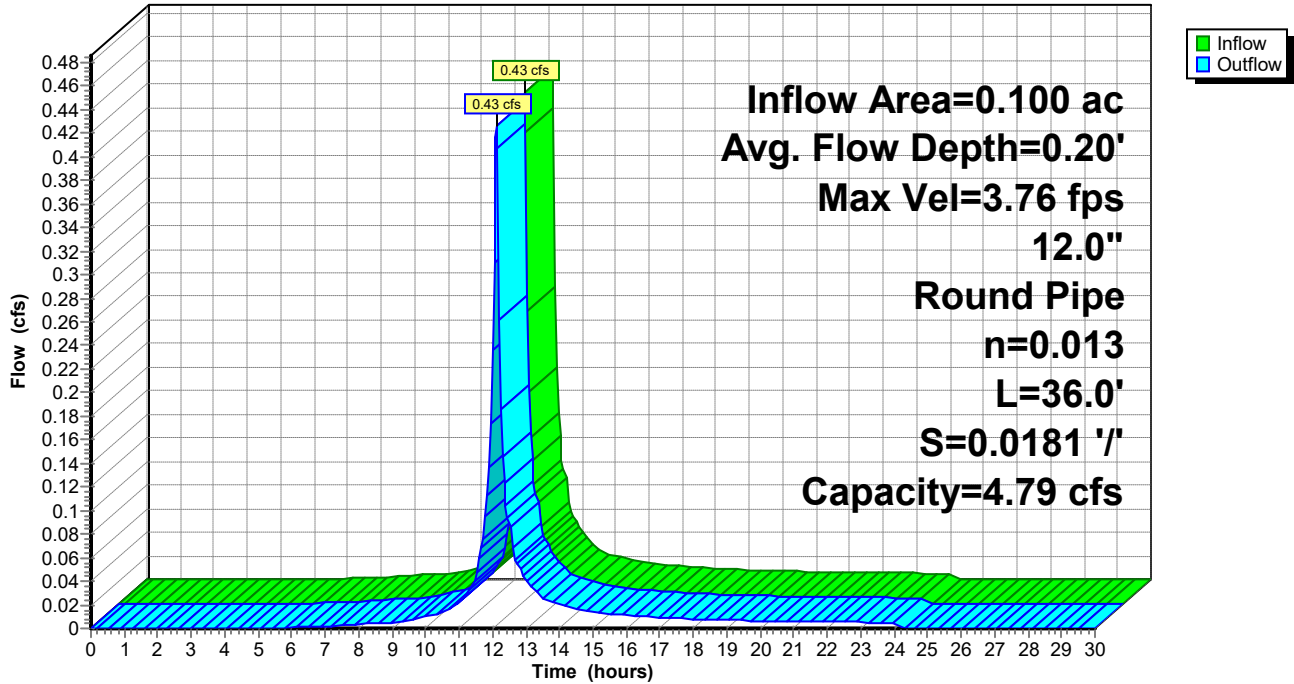
Peak Storage= 4 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 0.80'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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

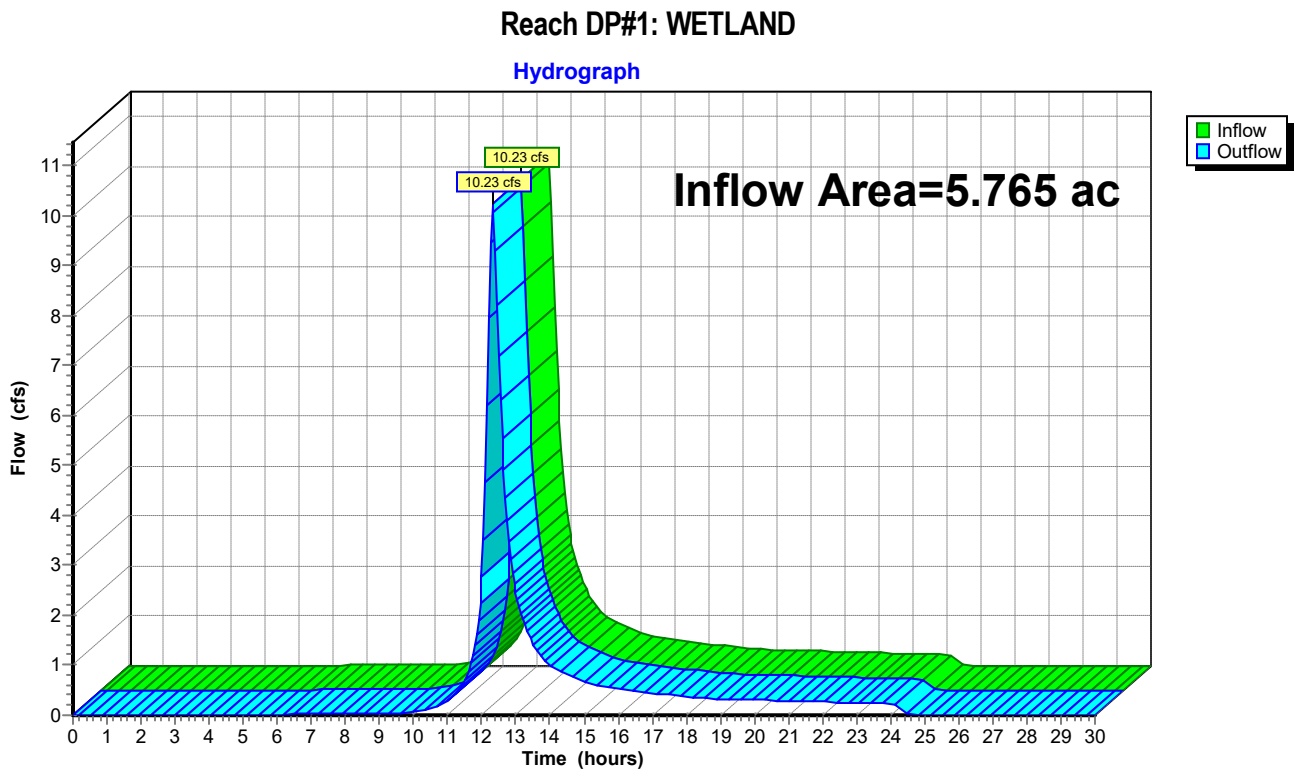


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 2.18" for 10-Year event
Inflow = 10.23 cfs @ 12.32 hrs, Volume= 1.048 af
Outflow = 10.23 cfs @ 12.32 hrs, Volume= 1.048 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

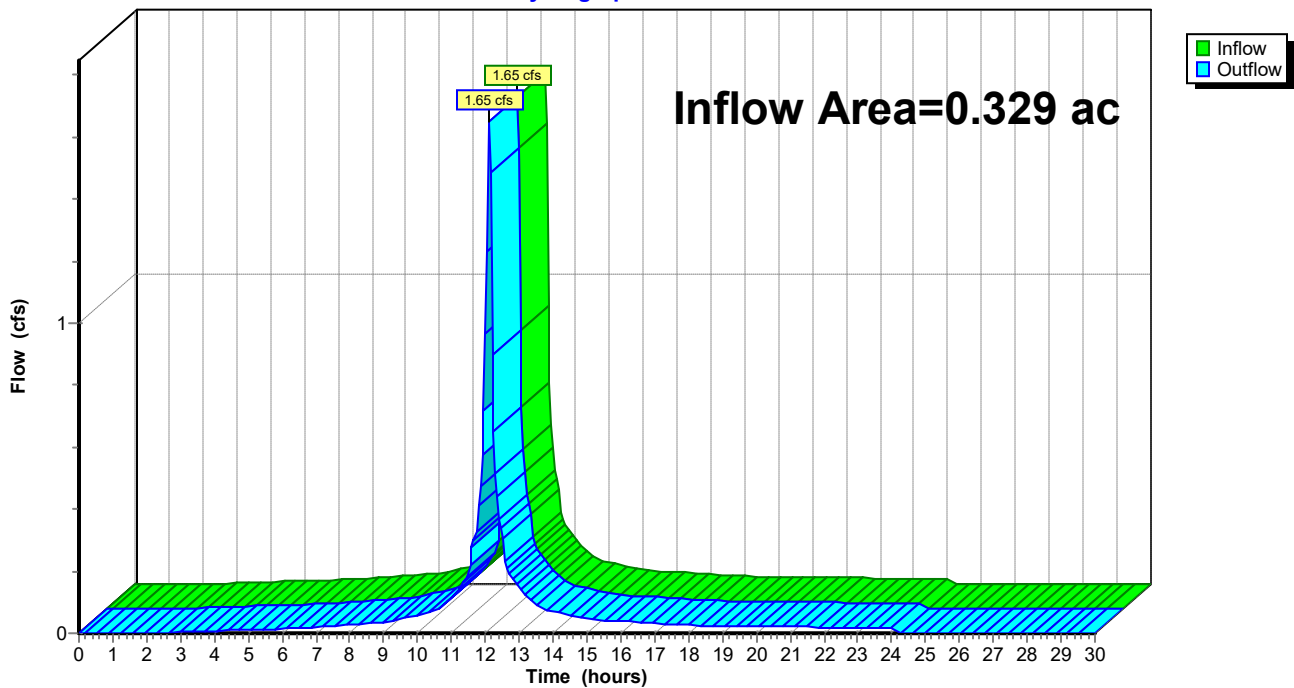
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 4.27" for 10-Year event
Inflow = 1.65 cfs @ 12.11 hrs, Volume= 0.117 af
Outflow = 1.65 cfs @ 12.11 hrs, Volume= 0.117 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

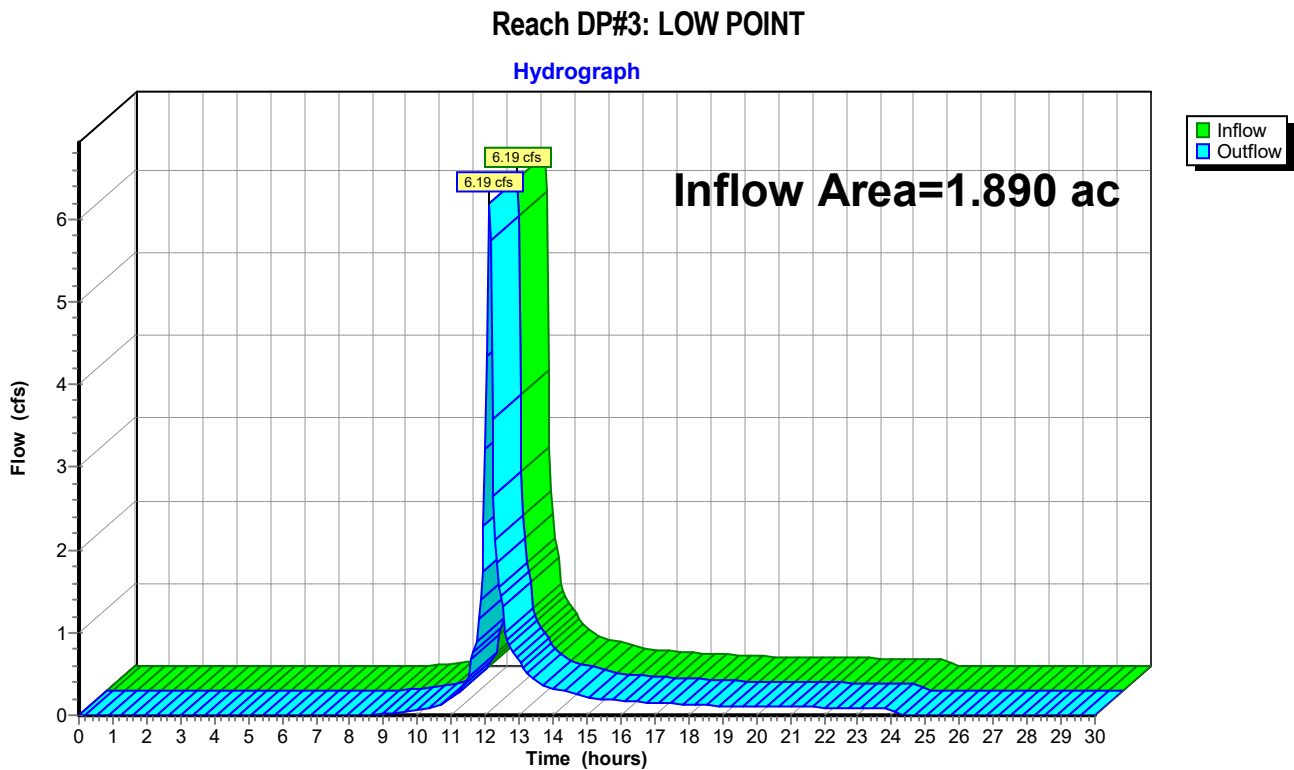


Summary for Reach DP#3: LOW POINT

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

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 2.50" for 10-Year event
Inflow = 6.19 cfs @ 12.12 hrs, Volume= 0.393 af
Outflow = 6.19 cfs @ 12.12 hrs, Volume= 0.393 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 OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
 Inflow = 0.94 cfs @ 12.11 hrs, Volume= 0.066 af
 Outflow = 0.91 cfs @ 12.14 hrs, Volume= 0.066 af, Atten= 4%, 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= 0.93 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 2.5 min

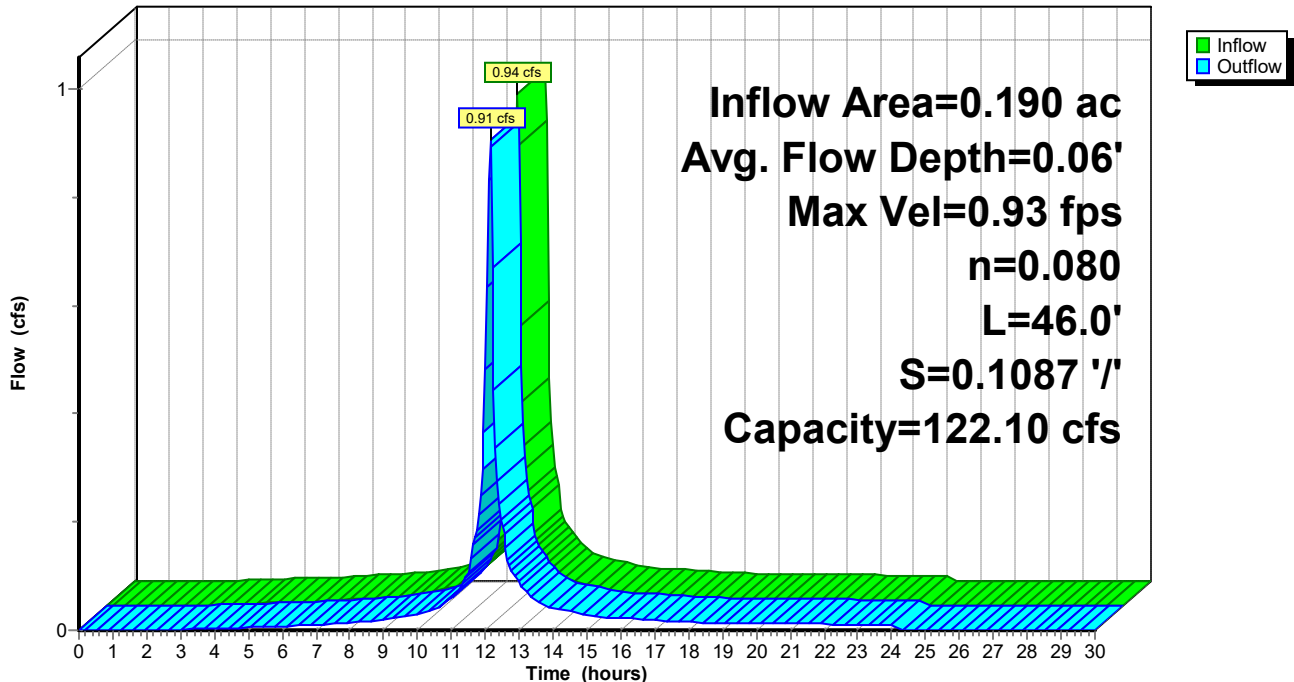
Peak Storage= 45 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.26'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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 0.02' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.91 cfs @ 12.14 hrs, Volume= 0.066 af
Outflow = 0.79 cfs @ 12.24 hrs, Volume= 0.066 af, Atten= 12%, Lag= 6.4 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= 0.83 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 12.8 min

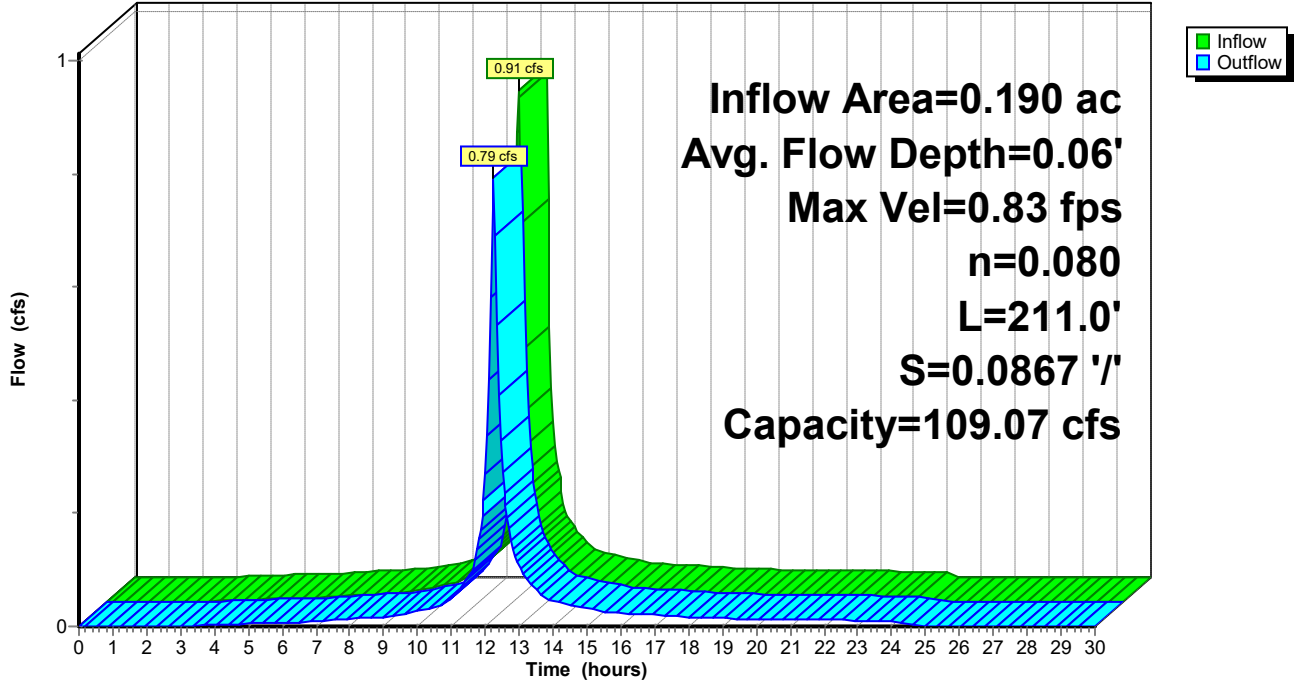
Peak Storage= 205 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.25'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.79 cfs @ 12.24 hrs, Volume= 0.066 af
Outflow = 0.78 cfs @ 12.26 hrs, Volume= 0.066 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= 0.60 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 2.2 min

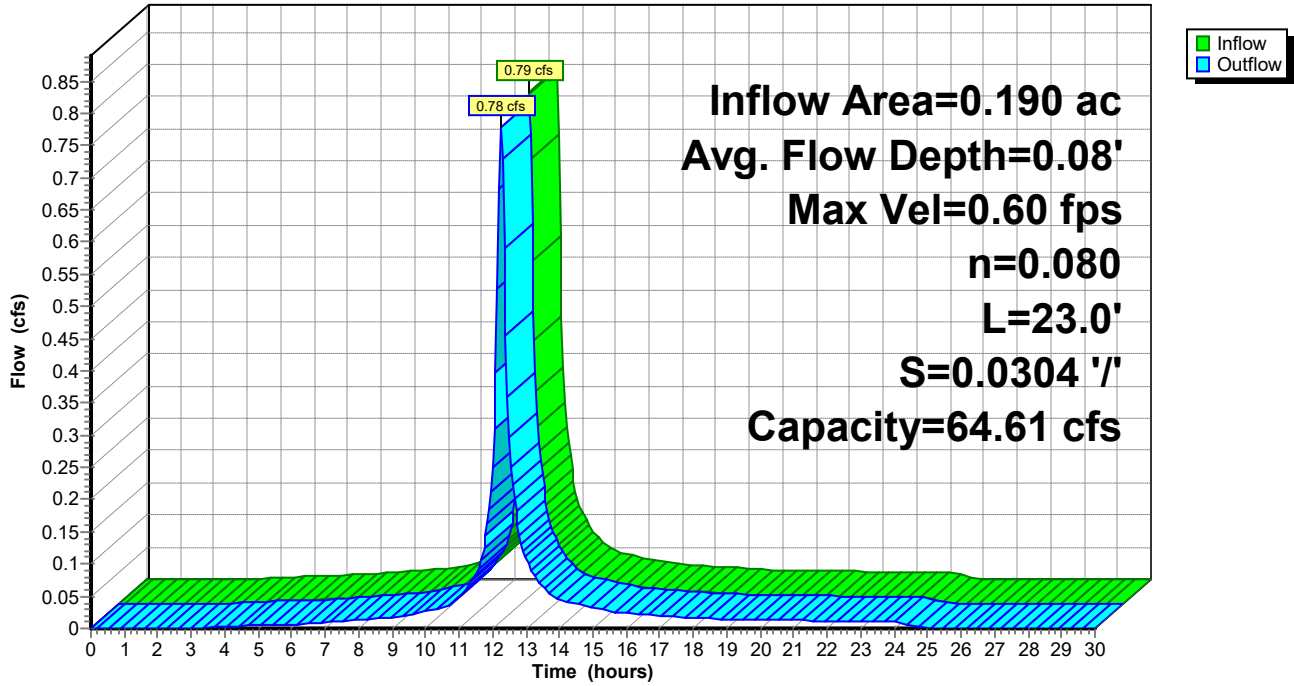
Peak Storage= 30 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.67'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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' @ 12.45 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.78 cfs @ 12.26 hrs, Volume= 0.066 af
Outflow = 0.65 cfs @ 12.47 hrs, Volume= 0.066 af, Atten= 17%, Lag= 13.0 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= 0.25 fps, Min. Travel Time= 8.6 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 29.6 min

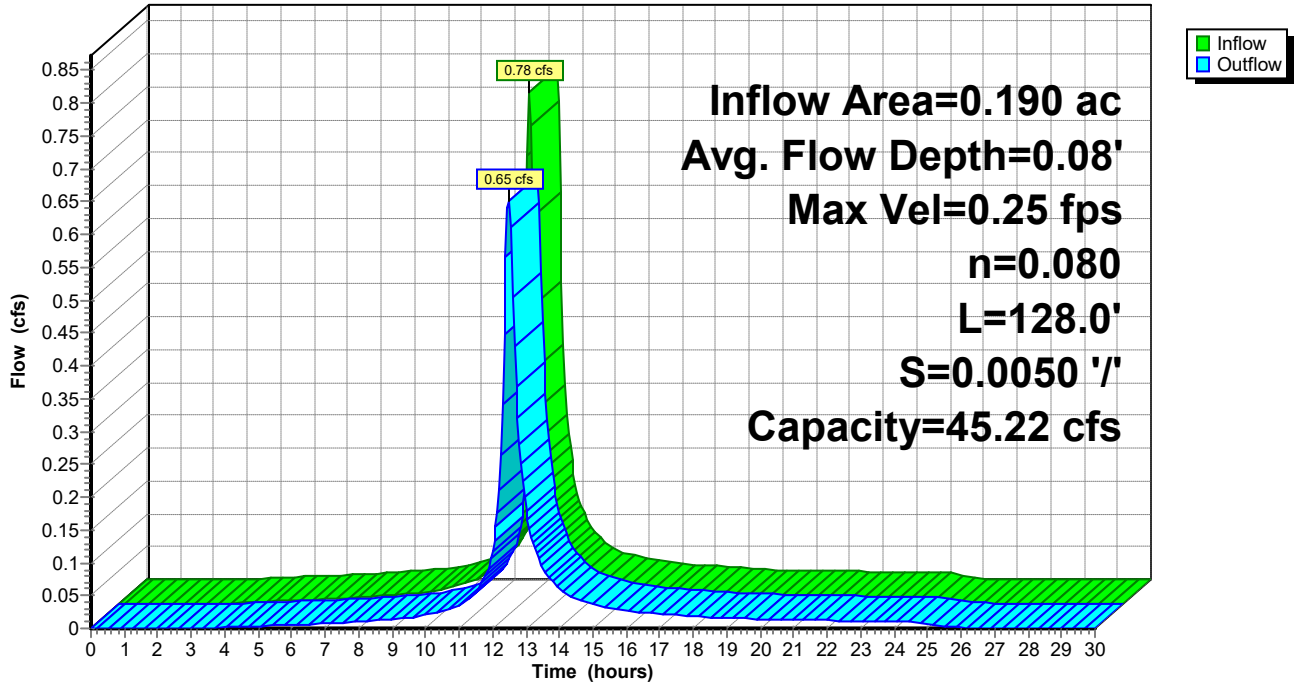
Peak Storage= 335 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 31.70'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 4.19" for 10-Year event
 Inflow = 1.31 cfs @ 12.12 hrs, Volume= 0.098 af
 Outflow = 1.14 cfs @ 12.24 hrs, Volume= 0.098 af, Atten= 13%, Lag= 7.0 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= 15.4 min

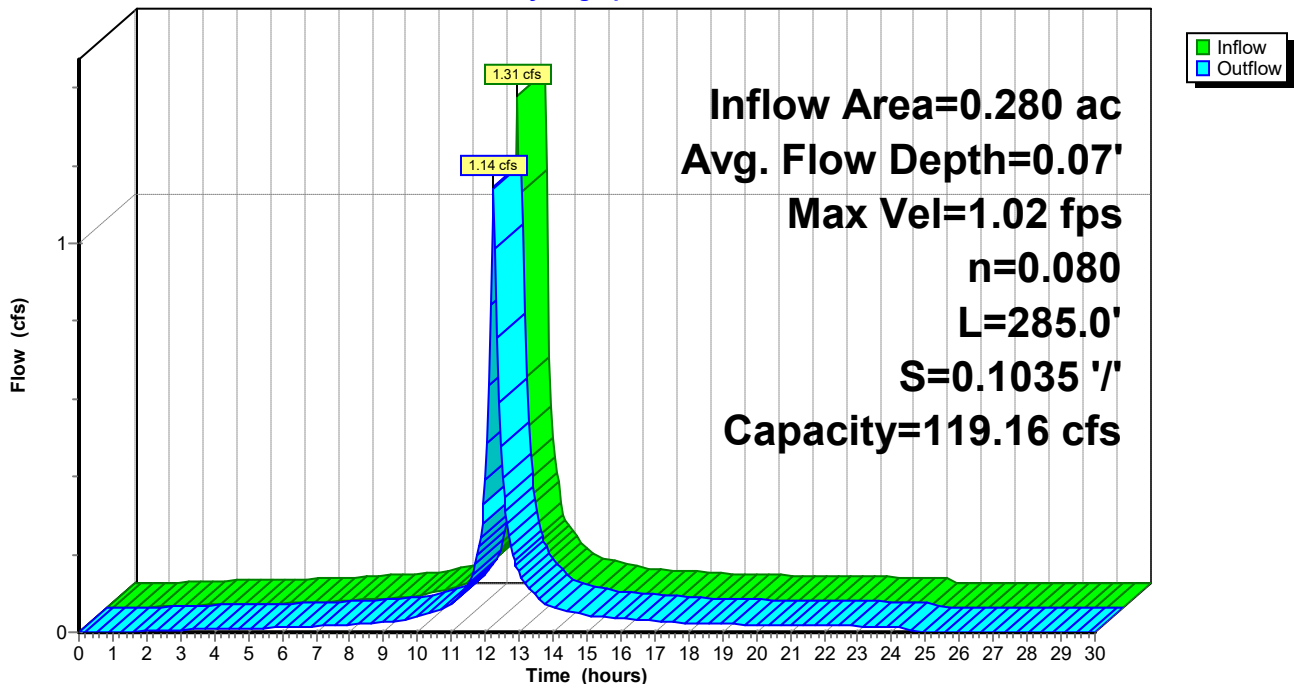
Peak Storage= 330 cf @ 12.16 hrs
 Average Depth at Peak Storage= 0.07' , Surface Width= 16.47'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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 0.12' @ 12.30 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 4.19" for 10-Year event
Inflow = 1.14 cfs @ 12.24 hrs, Volume= 0.098 af
Outflow = 1.06 cfs @ 12.34 hrs, Volume= 0.098 af, Atten= 7%, 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= 0.38 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 14.2 min

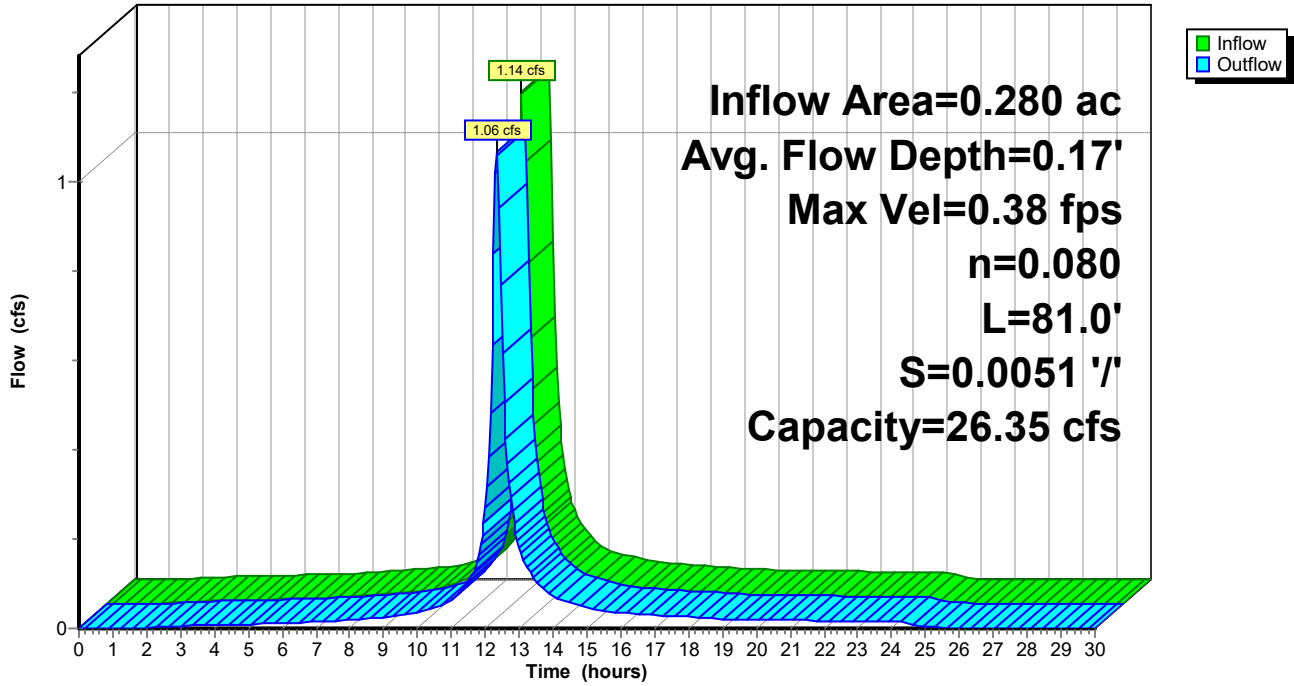
Peak Storage= 230 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 18.40'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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

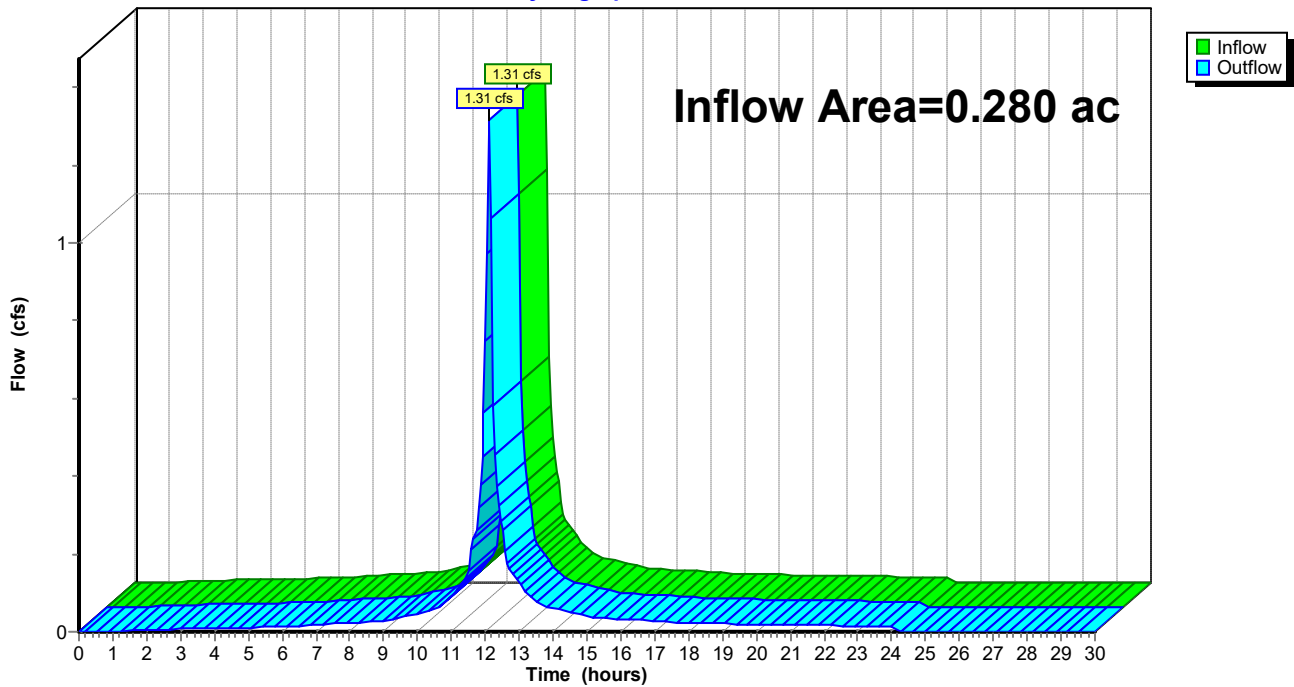
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 4.19" for 10-Year event
Inflow = 1.31 cfs @ 12.12 hrs, Volume= 0.098 af
Outflow = 1.31 cfs @ 12.12 hrs, Volume= 0.098 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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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=2.86" Flow Length=770' Tc=19.9 min CN=71 Runoff=12.73 cfs 1.261 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=5.36" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=2.05 cfs 0.147 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=3.44" Flow Length=356' Tc=5.0 min CN=77 Runoff=8.47 cfs 0.541 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=5.25" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=1.17 cfs 0.083 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=5.71" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.33 cfs 0.025 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=5.71" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.81 cfs 0.060 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=4.47" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.56 cfs 0.037 af
Reach DCB-B: TO OUTFALL	Inflow=1.17 cfs 0.083 af Outflow=1.17 cfs 0.083 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.18' Max Vel=13.45 fps Inflow=1.65 cfs 0.123 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.64 cfs 0.123 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.23' Max Vel=8.02 fps Inflow=1.35 cfs 0.098 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.32 cfs 0.098 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.23' Max Vel=4.04 fps Inflow=0.56 cfs 0.037 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.55 cfs 0.037 af
Reach DP#1: WETLAND	Inflow=14.62 cfs 1.467 af Outflow=14.62 cfs 1.467 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=2.05 cfs 0.147 af Outflow=2.05 cfs 0.147 af
Reach DP#3: LOW POINT	Inflow=8.47 cfs 0.541 af Outflow=8.47 cfs 0.541 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.07' Max Vel=1.01 fps Inflow=1.17 cfs 0.083 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=1.13 cfs 0.083 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.07' Max Vel=0.91 fps Inflow=1.13 cfs 0.083 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=1.00 cfs 0.083 af

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.10' Max Vel=0.65 fps Inflow=1.00 cfs 0.083 af
n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.99 cfs 0.083 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.10' Max Vel=0.27 fps Inflow=0.99 cfs 0.083 af
n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.83 cfs 0.083 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.08' Max Vel=1.11 fps Inflow=1.64 cfs 0.123 af
n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.44 cfs 0.123 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.20' Max Vel=0.41 fps Inflow=1.44 cfs 0.123 af
n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=1.36 cfs 0.123 af

Reach OUTLET: TO DP#1

Inflow=1.64 cfs 0.123 af
Outflow=1.64 cfs 0.123 af

Total Runoff Area = 7.983 ac Runoff Volume = 2.155 af Average Runoff Depth = 3.24"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

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

Runoff = 12.73 cfs @ 12.30 hrs, Volume= 1.261 af, Depth= 2.86"

Routed to Reach DP#1 : WETLAND

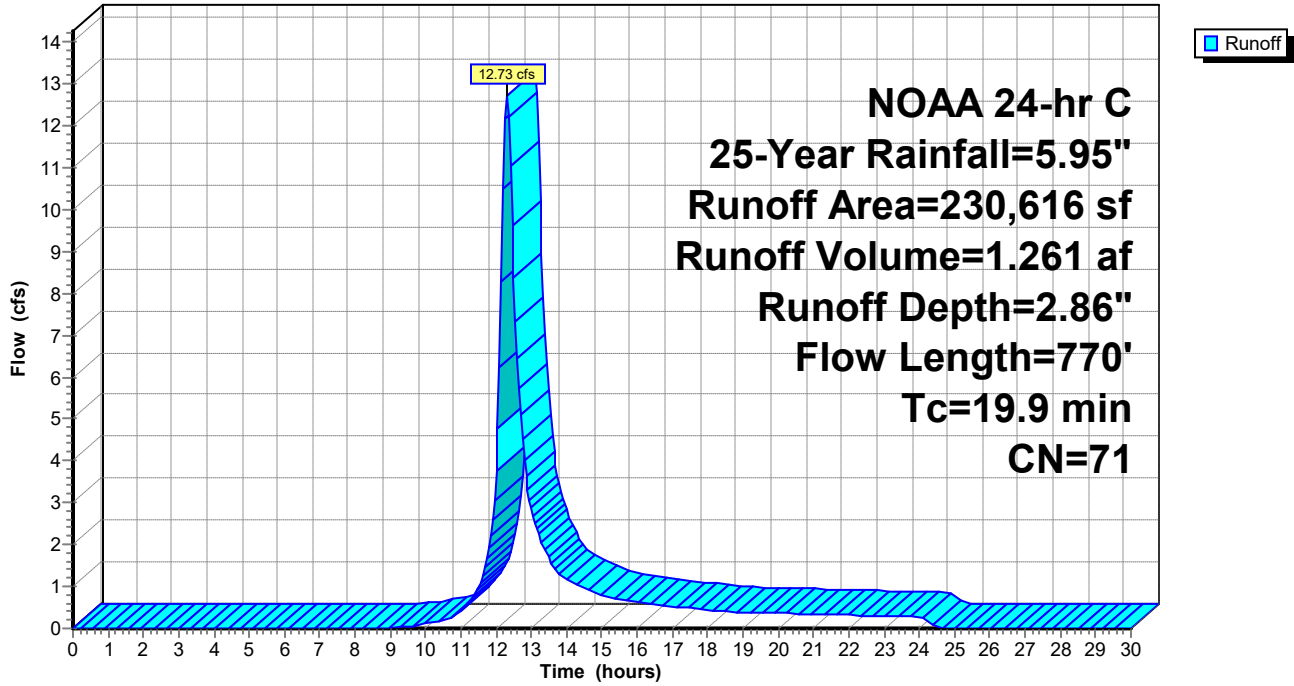
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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 = 2.05 cfs @ 12.11 hrs, Volume= 0.147 af, Depth= 5.36"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

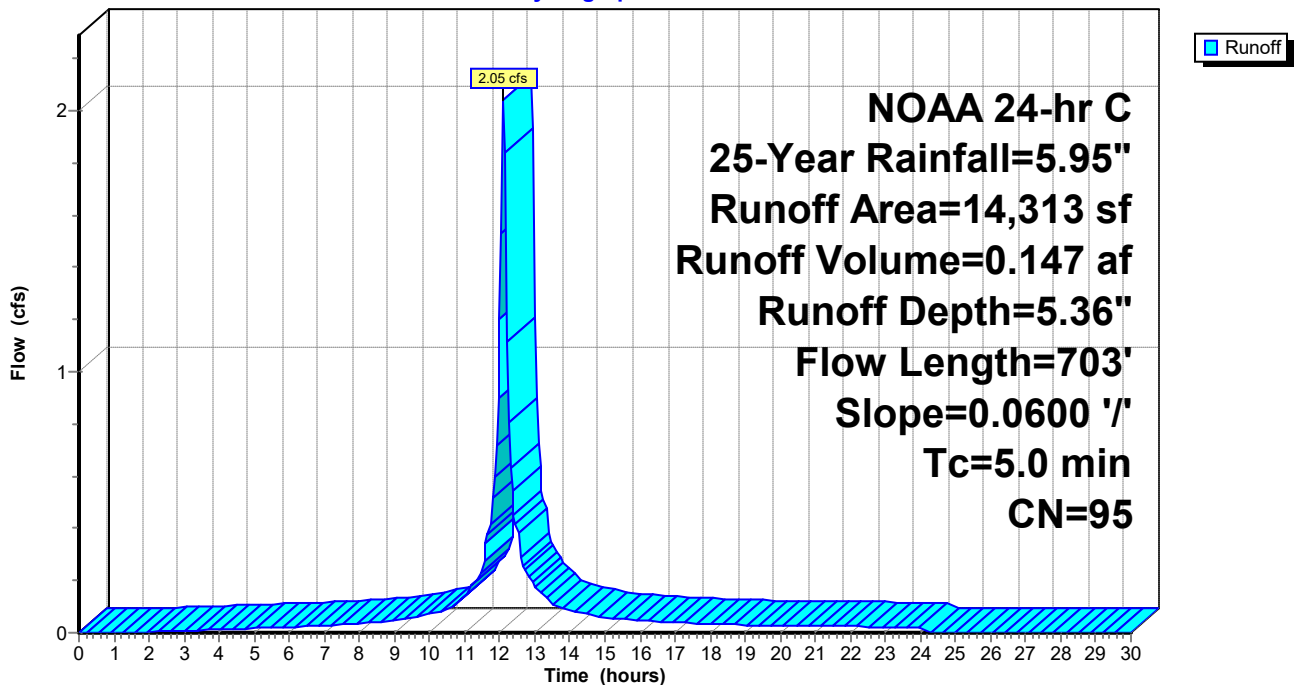
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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

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

Runoff = 8.47 cfs @ 12.12 hrs, Volume= 0.541 af, Depth= 3.44"
 Routed to Reach DP#3 : LOW POINT

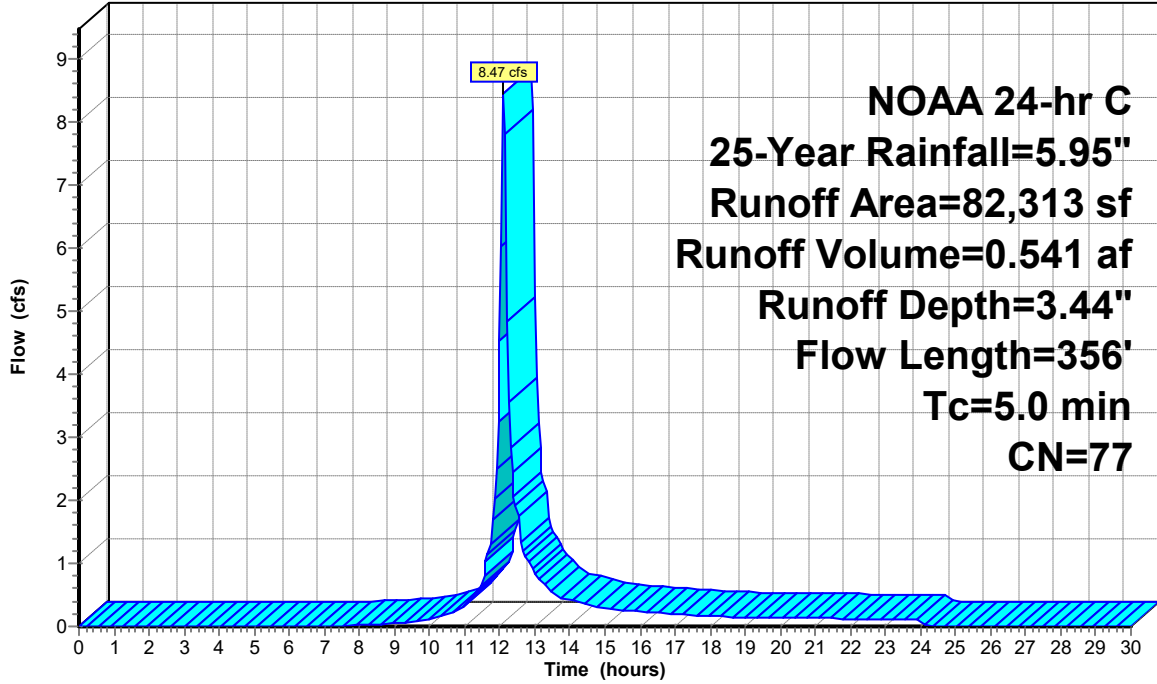
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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: Tc<2dt may require smaller dt

Runoff = 1.17 cfs @ 12.11 hrs, Volume= 0.083 af, Depth= 5.25"
 Routed to Reach DCB-B : TO OUTFALL

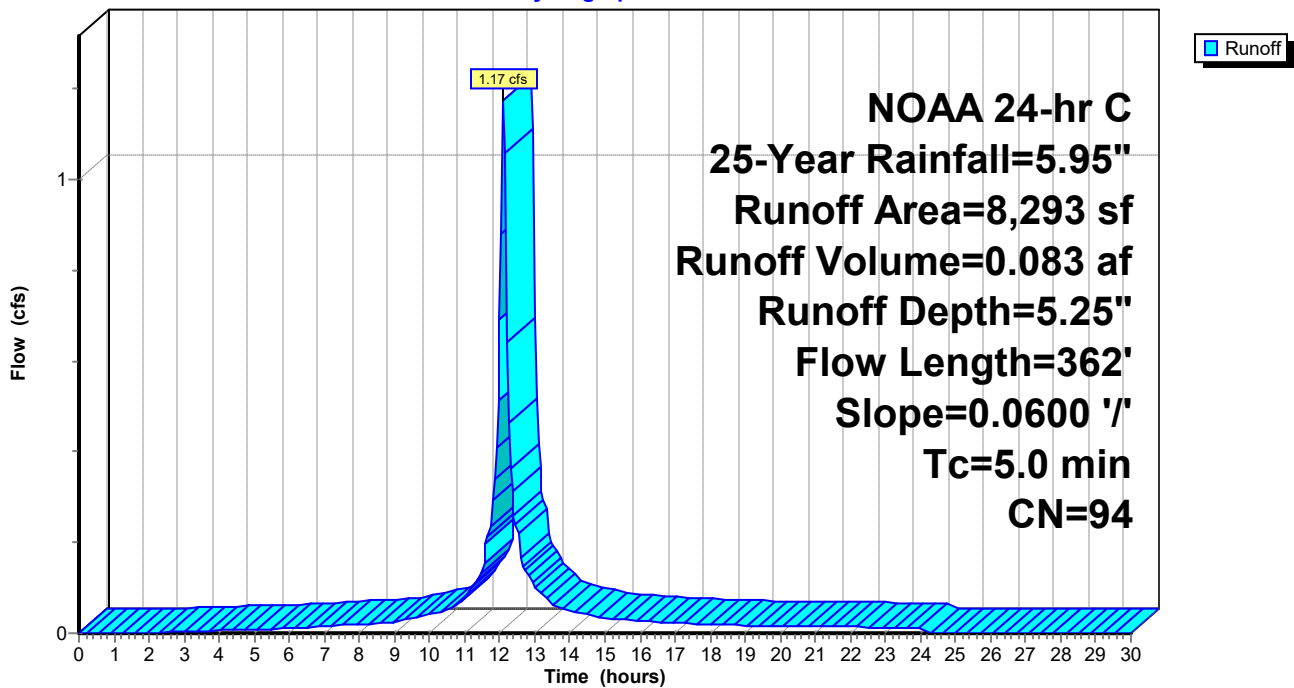
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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 = 0.33 cfs @ 12.11 hrs, Volume= 0.025 af, Depth= 5.71"
 Routed to Reach DCB-C : TO OUTFALL

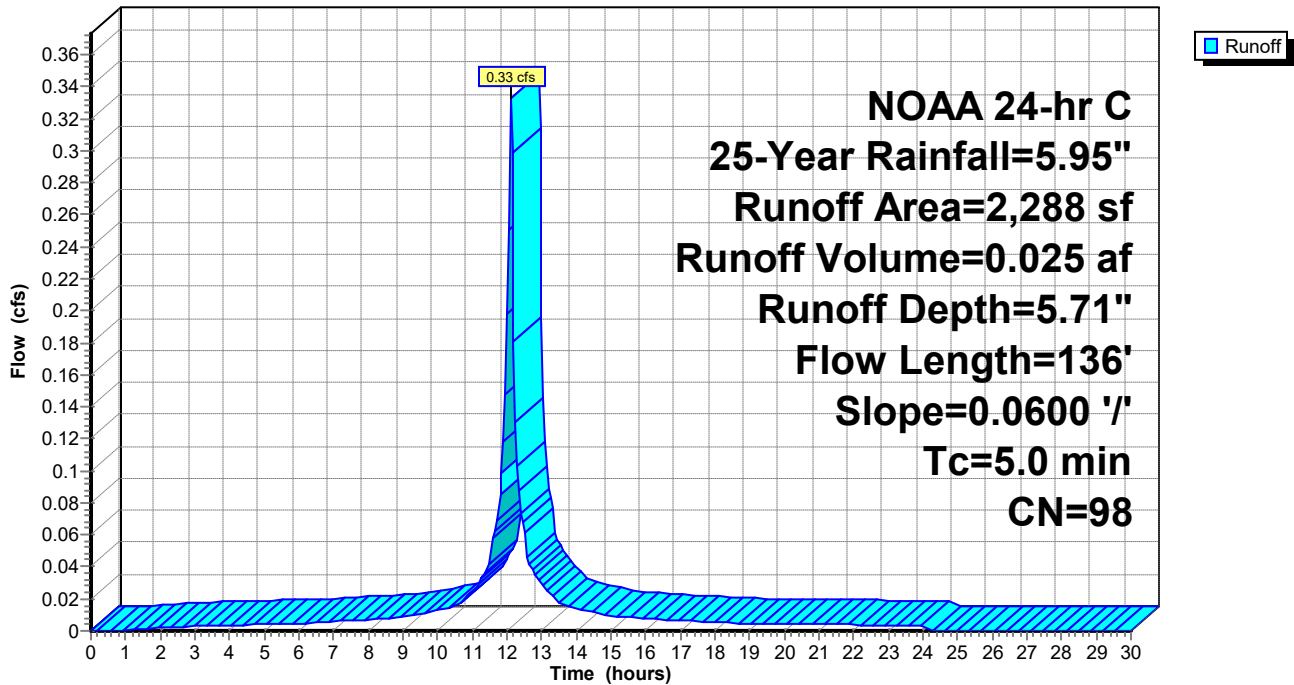
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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



Summary for Subcatchment E6: TO DCB-D

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

Runoff = 0.81 cfs @ 12.11 hrs, Volume= 0.060 af, Depth= 5.71"
 Routed to Reach DCB-D : TO DCB-C

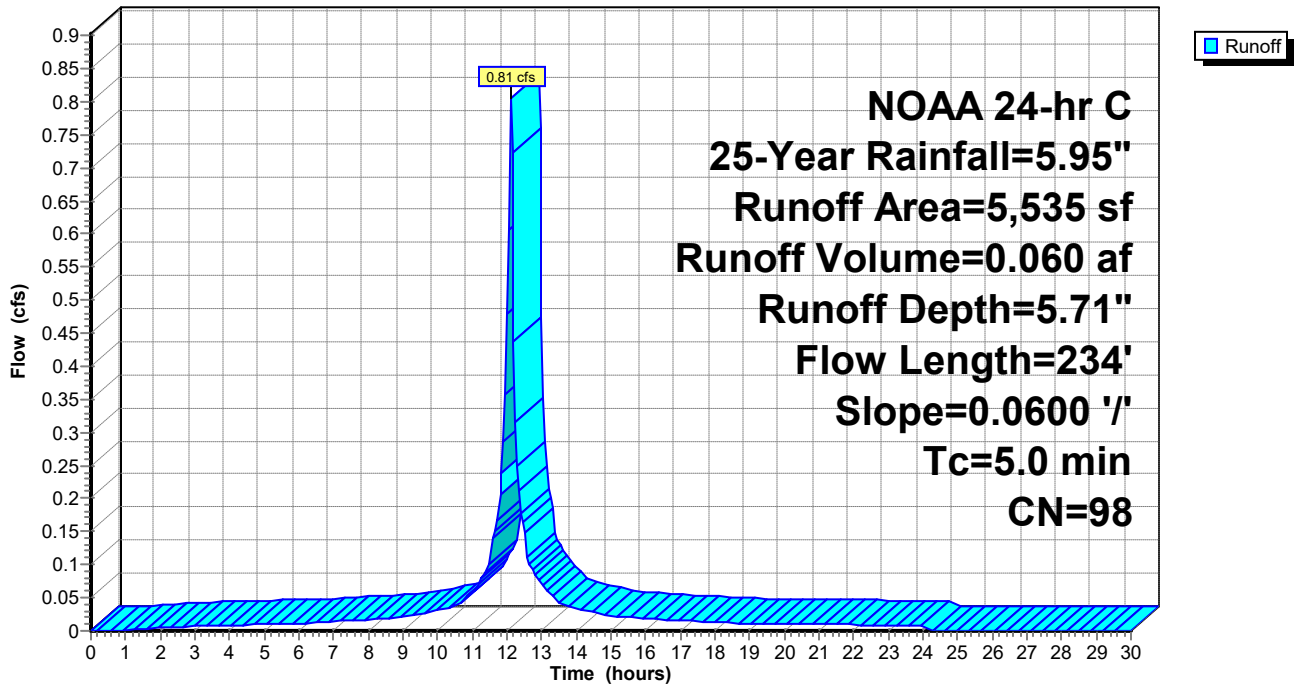
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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 = 0.56 cfs @ 12.11 hrs, Volume= 0.037 af, Depth= 4.47"
 Routed to Reach DCB-E : TO DCB-D

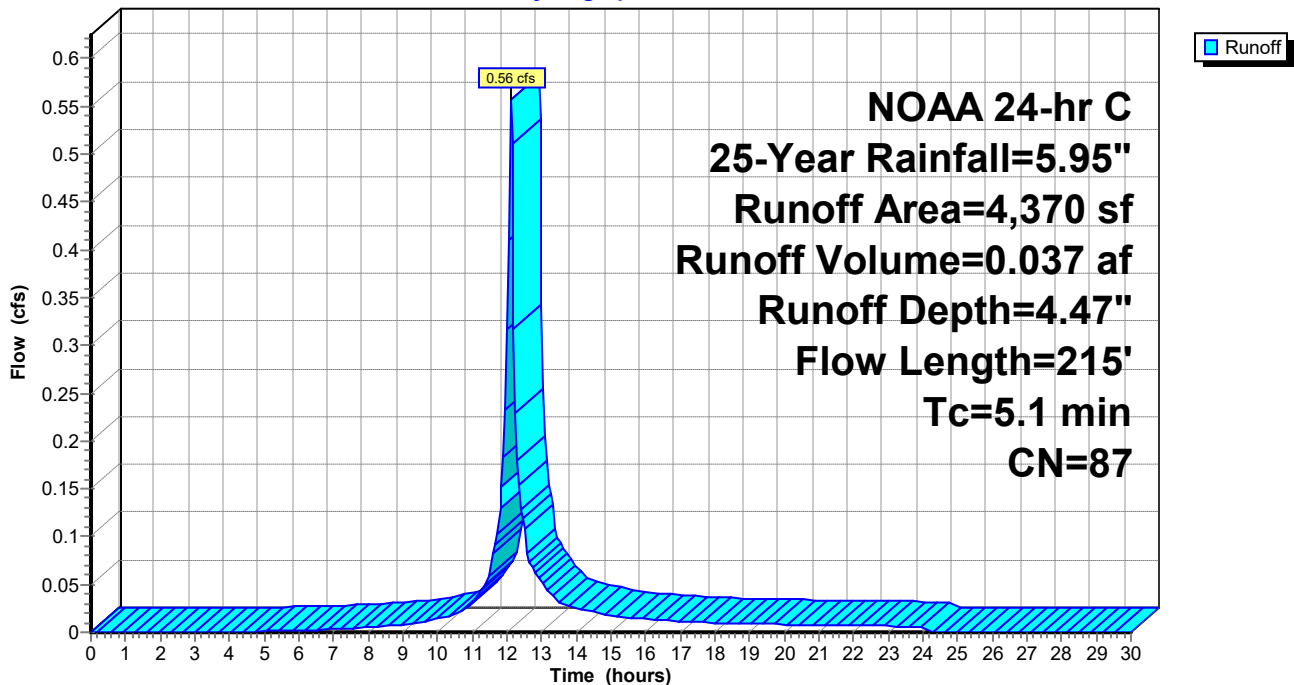
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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

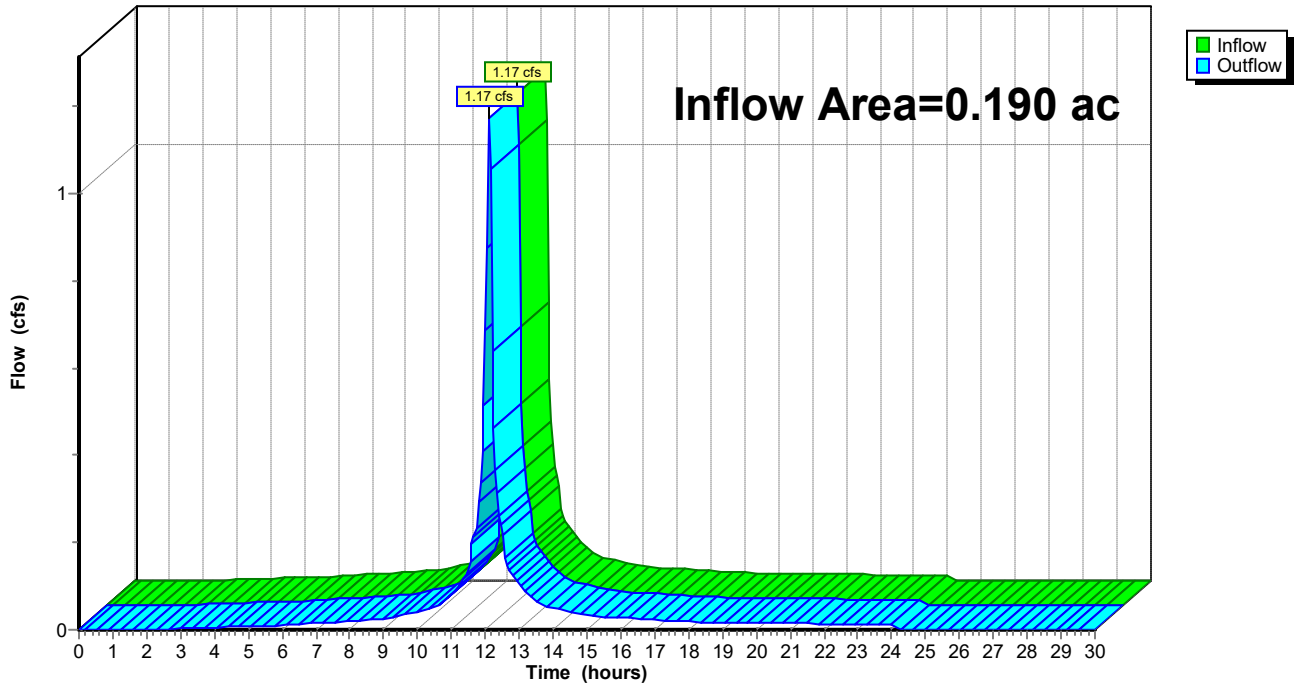
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 1.17 cfs @ 12.11 hrs, Volume= 0.083 af
Outflow = 1.17 cfs @ 12.11 hrs, Volume= 0.083 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

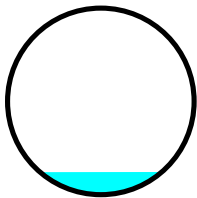
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 5.27" for 25-Year event
Inflow = 1.65 cfs @ 12.12 hrs, Volume= 0.123 af
Outflow = 1.64 cfs @ 12.12 hrs, Volume= 0.123 af, Atten= 1%, 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= 13.45 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.34 fps, Avg. Travel Time= 0.3 min

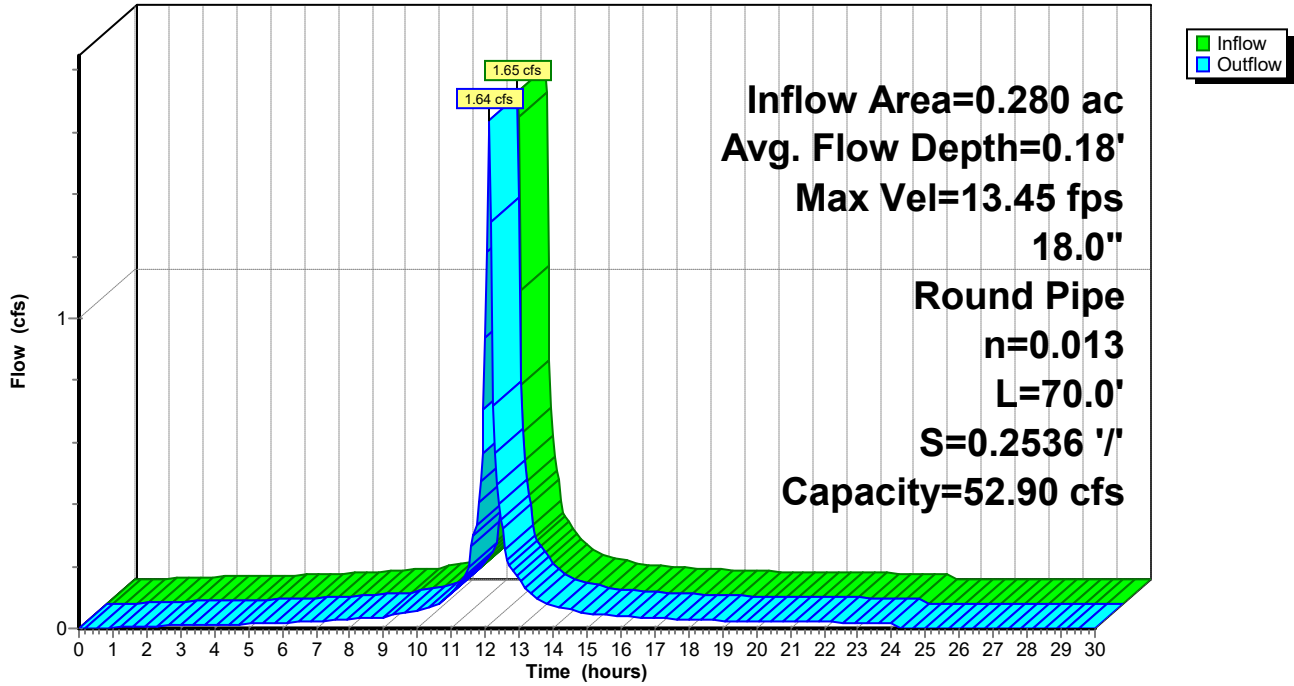
Peak Storage= 9 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 0.98'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

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



Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

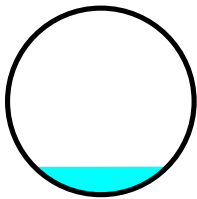
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.12' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 5.16" for 25-Year event
Inflow = 1.35 cfs @ 12.11 hrs, Volume= 0.098 af
Outflow = 1.32 cfs @ 12.12 hrs, Volume= 0.098 af, Atten= 2%, 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= 8.02 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.53 fps, Avg. Travel Time= 0.7 min

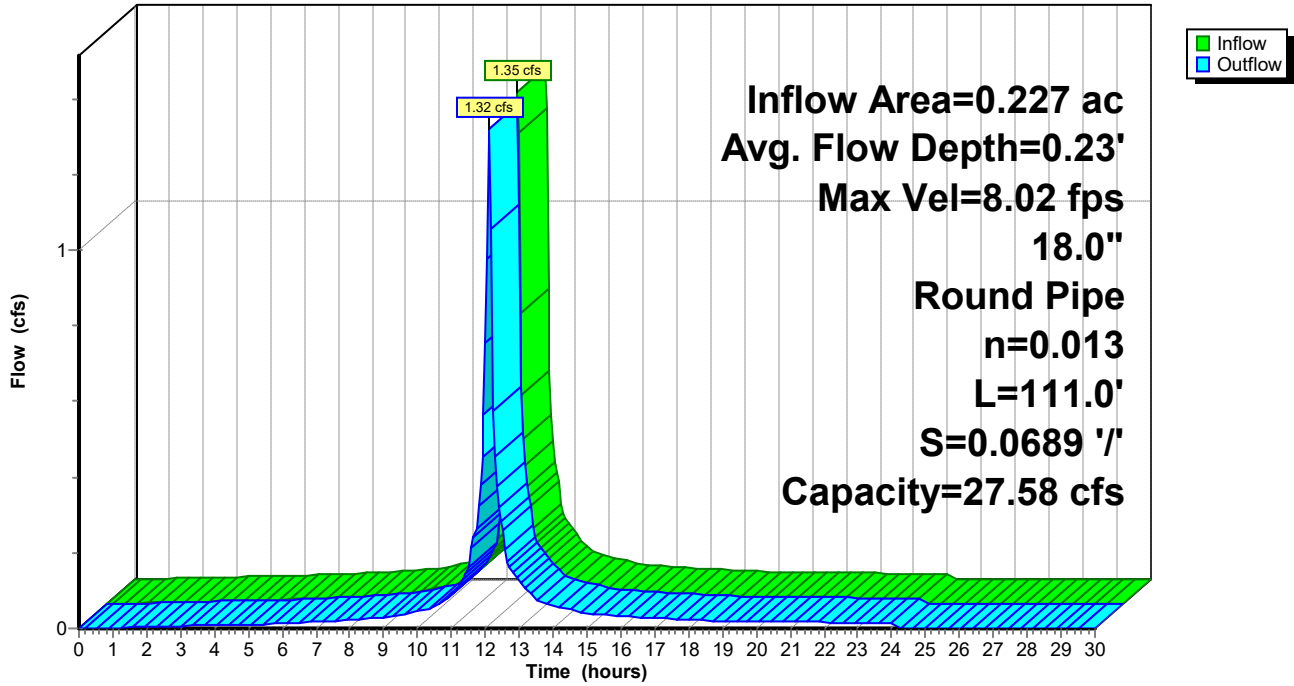
Peak Storage= 18 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 1.07'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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

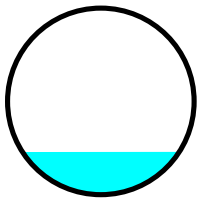
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 4.47" for 25-Year event
Inflow = 0.56 cfs @ 12.11 hrs, Volume= 0.037 af
Outflow = 0.55 cfs @ 12.12 hrs, Volume= 0.037 af, Atten= 2%, 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= 4.04 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 0.5 min

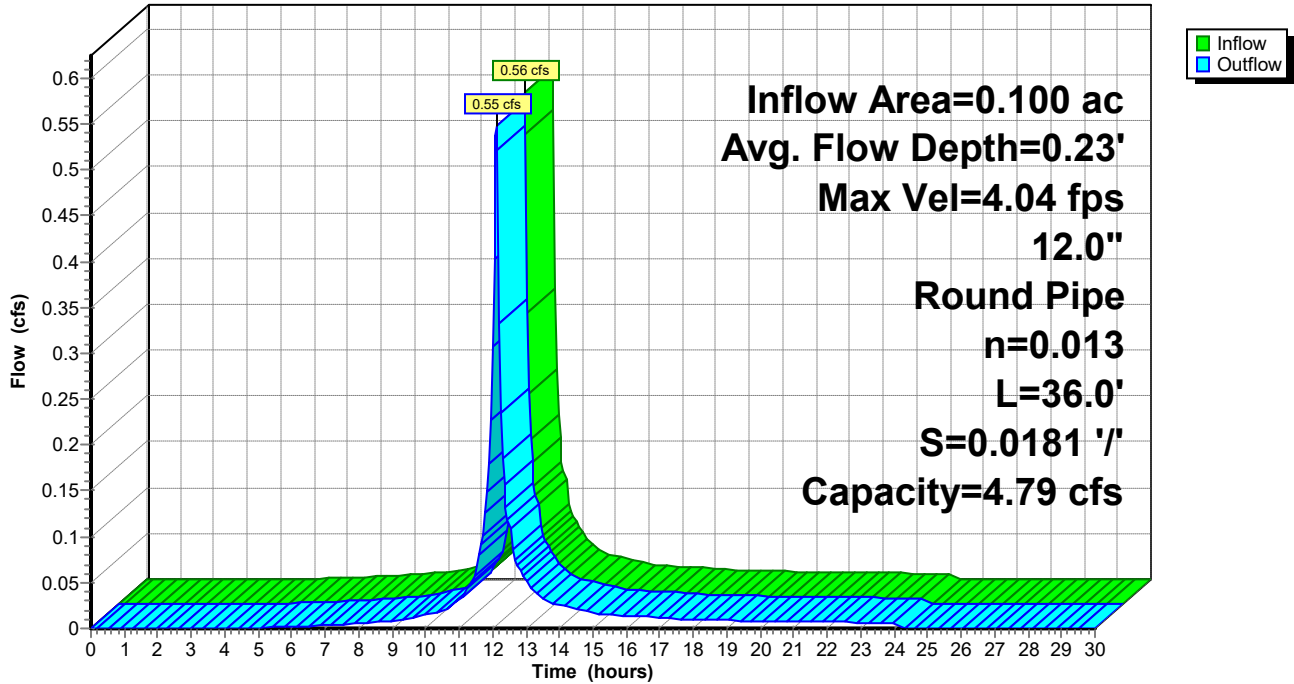
Peak Storage= 5 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 0.84'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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

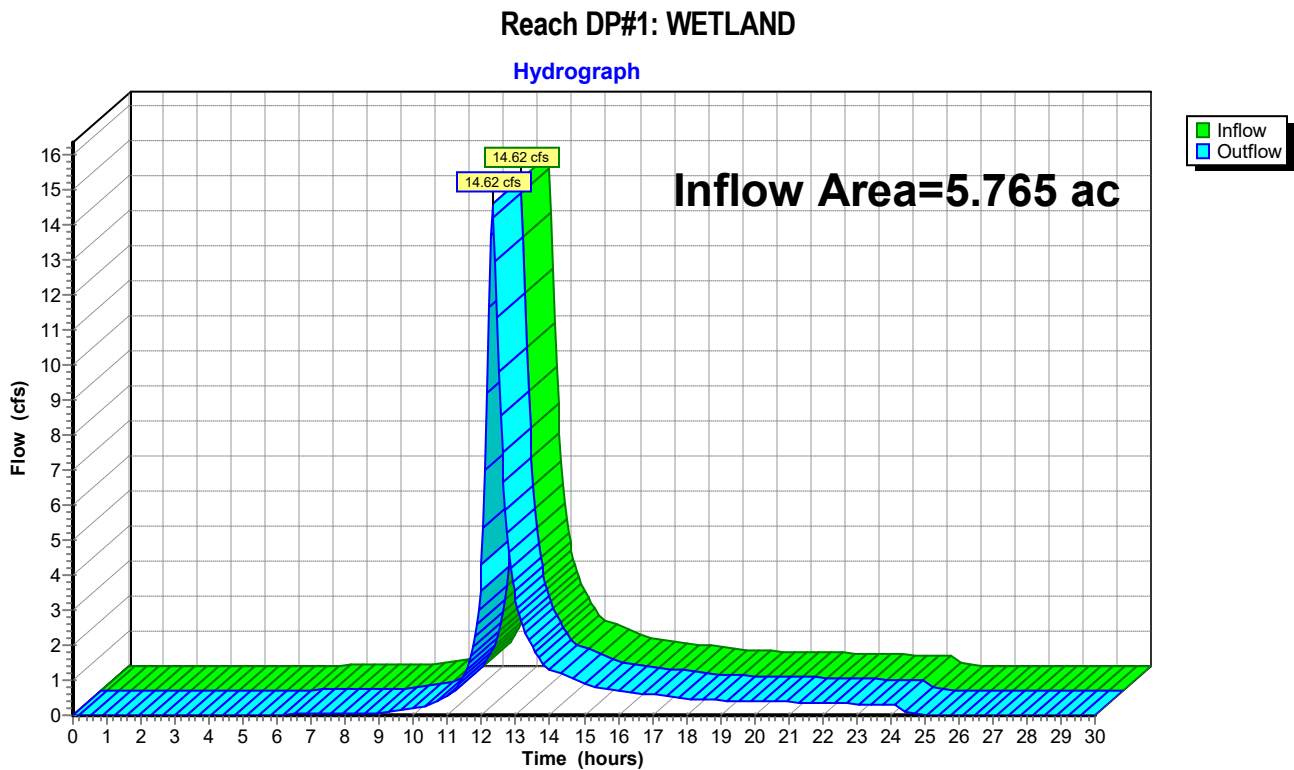


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 3.05" for 25-Year event
Inflow = 14.62 cfs @ 12.31 hrs, Volume= 1.467 af
Outflow = 14.62 cfs @ 12.31 hrs, Volume= 1.467 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

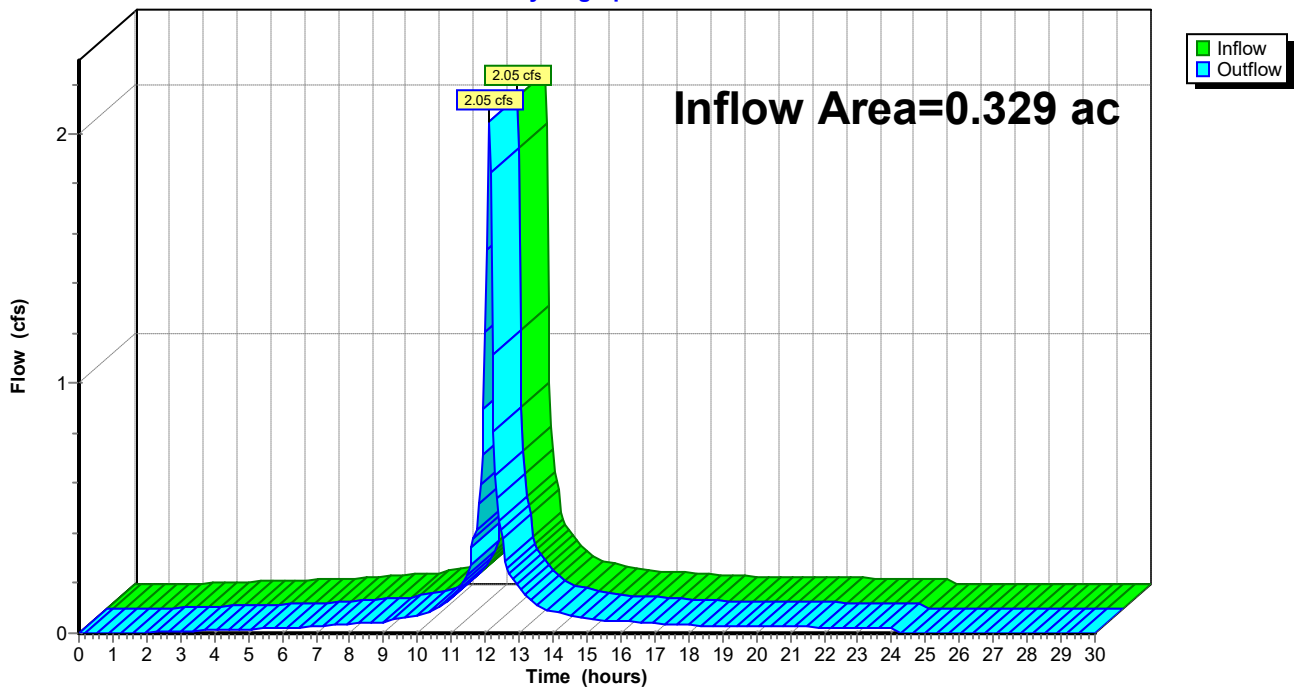
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 5.36" for 25-Year event
Inflow = 2.05 cfs @ 12.11 hrs, Volume= 0.147 af
Outflow = 2.05 cfs @ 12.11 hrs, Volume= 0.147 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

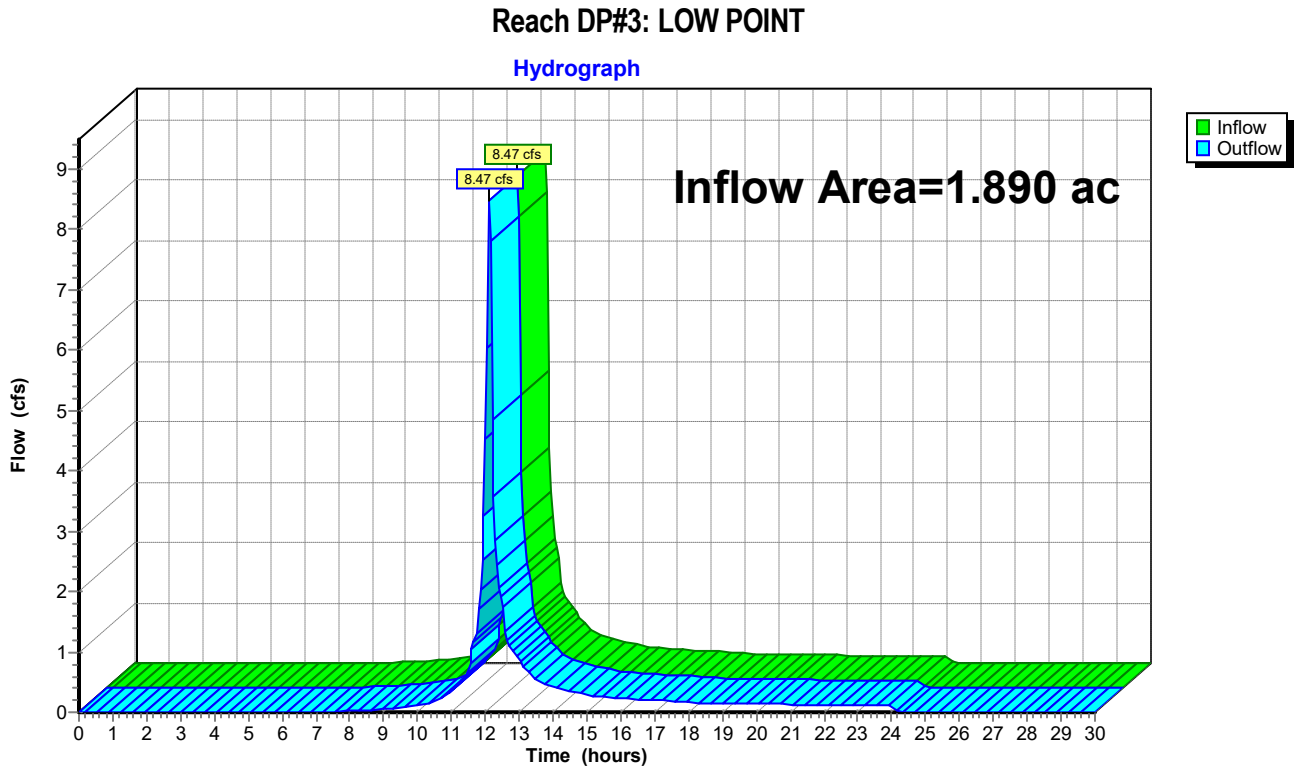


Summary for Reach DP#3: LOW POINT

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

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 3.44" for 25-Year event
Inflow = 8.47 cfs @ 12.12 hrs, Volume= 0.541 af
Outflow = 8.47 cfs @ 12.12 hrs, Volume= 0.541 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 OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
 Inflow = 1.17 cfs @ 12.11 hrs, Volume= 0.083 af
 Outflow = 1.13 cfs @ 12.13 hrs, Volume= 0.083 af, Atten= 4%, 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= 1.01 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 2.5 min

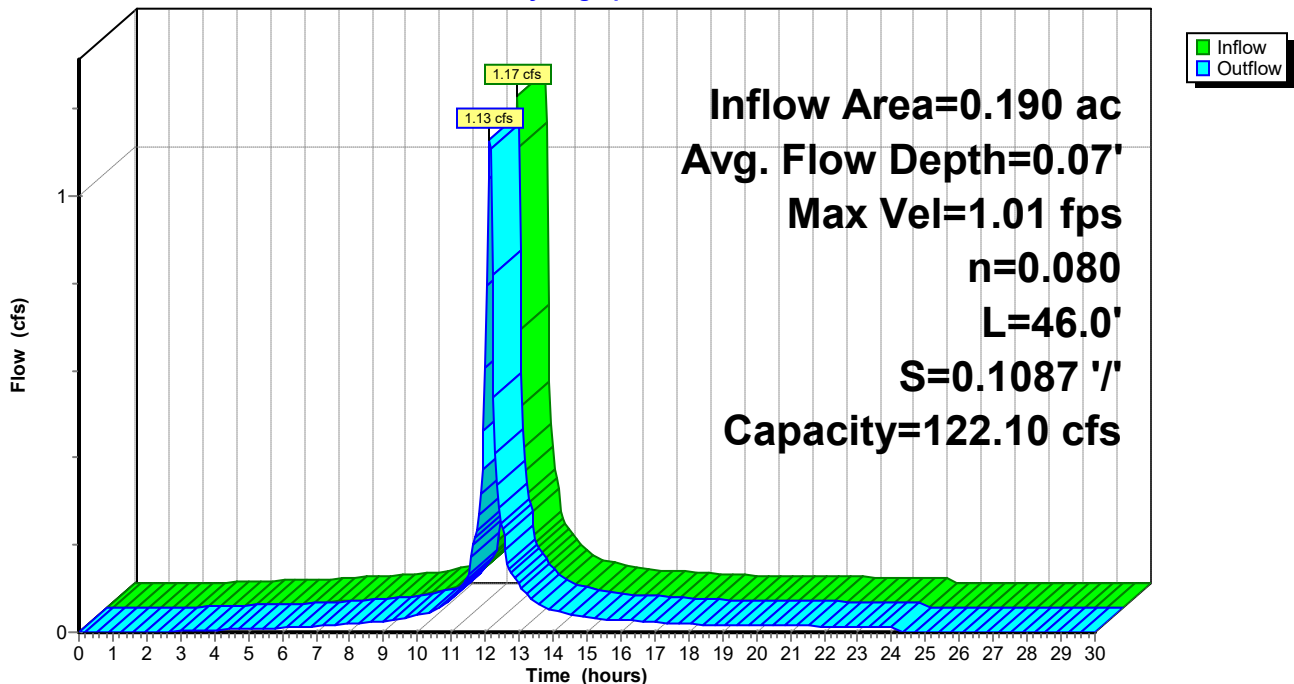
Peak Storage= 52 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.07' , Surface Width= 16.44'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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 0.02' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 1.13 cfs @ 12.13 hrs, Volume= 0.083 af
Outflow = 1.00 cfs @ 12.23 hrs, Volume= 0.083 af, Atten= 11%, Lag= 5.8 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= 0.91 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 12.5 min

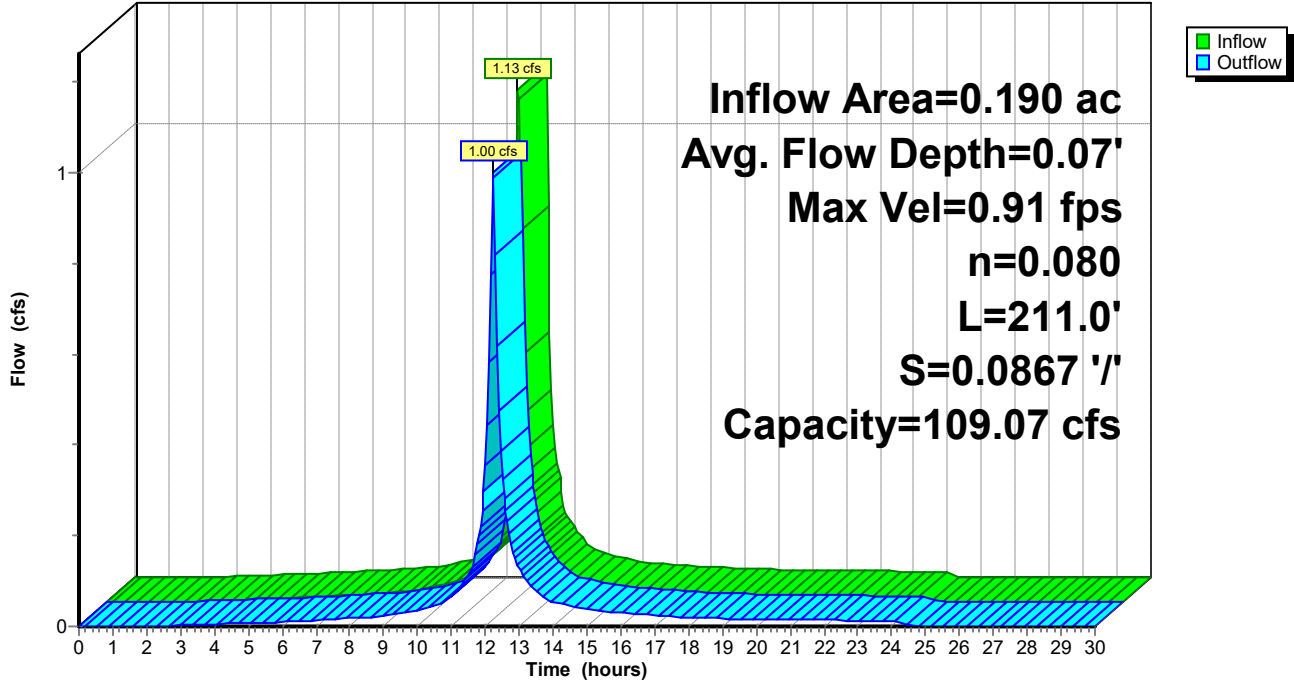
Peak Storage= 237 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.43'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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 0.04' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 1.00 cfs @ 12.23 hrs, Volume= 0.083 af
Outflow = 0.99 cfs @ 12.25 hrs, Volume= 0.083 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= 0.65 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 2.1 min

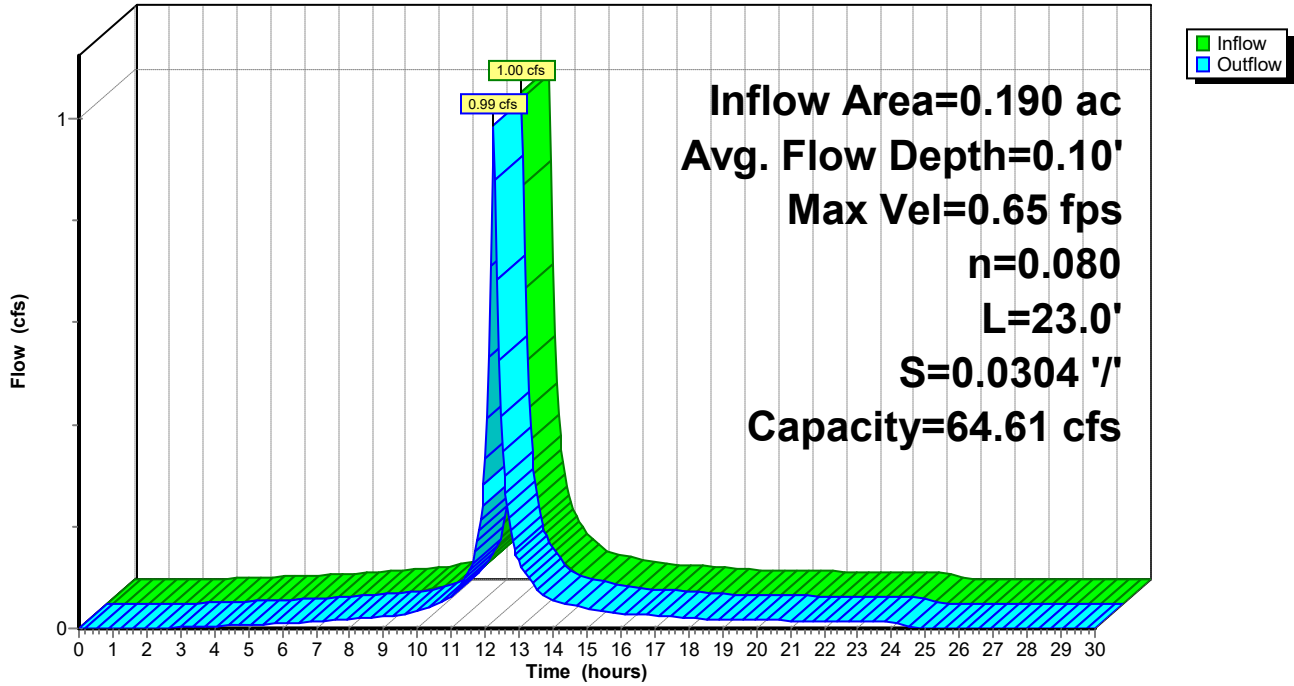
Peak Storage= 35 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 16.92'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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 0.03' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 0.99 cfs @ 12.25 hrs, Volume= 0.083 af
Outflow = 0.83 cfs @ 12.45 hrs, Volume= 0.083 af, Atten= 16%, Lag= 11.9 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= 0.27 fps, Min. Travel Time= 7.8 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 28.5 min

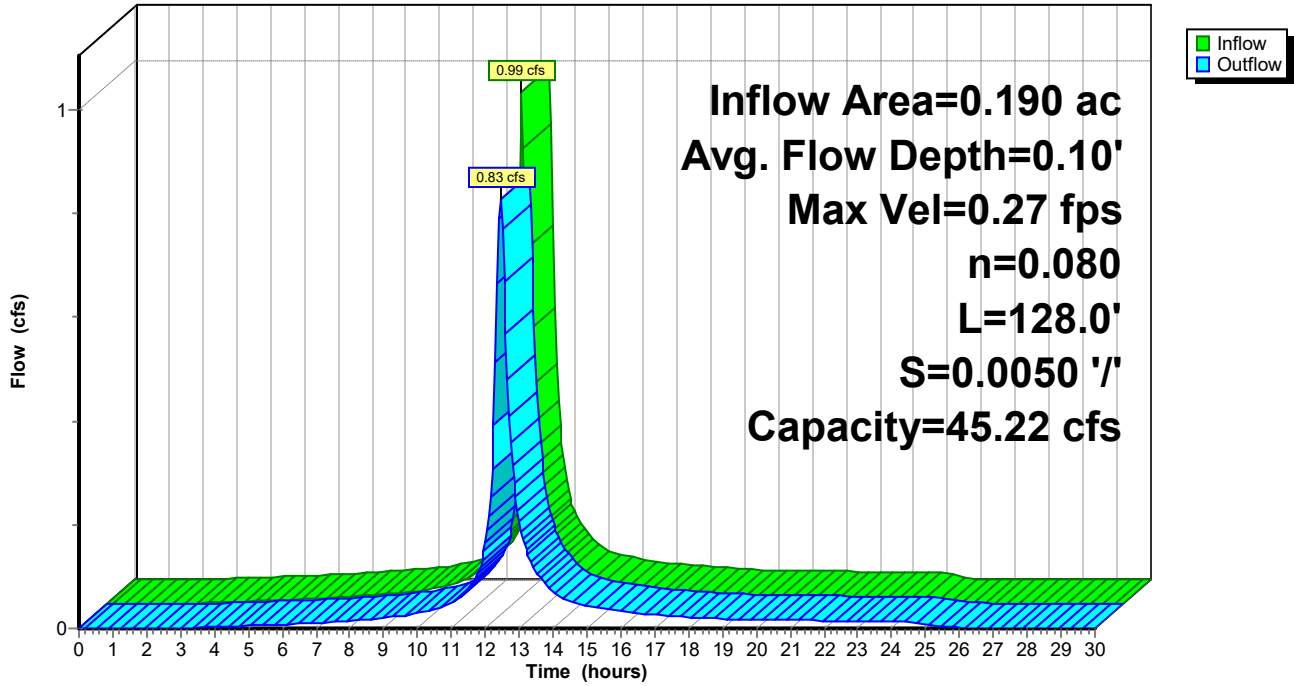
Peak Storage= 392 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 31.98'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 5.27" for 25-Year event
Inflow = 1.64 cfs @ 12.12 hrs, Volume= 0.123 af
Outflow = 1.44 cfs @ 12.23 hrs, Volume= 0.123 af, Atten= 12%, 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= 1.11 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 15.0 min

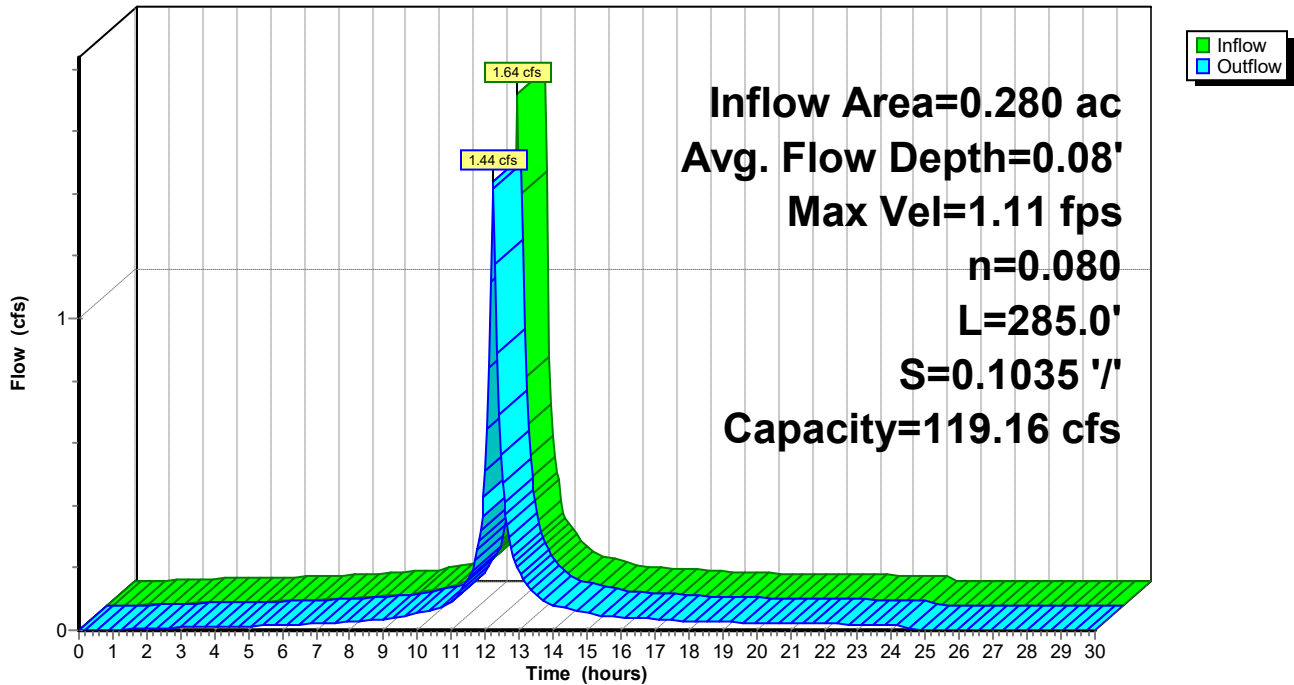
Peak Storage= 383 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.69'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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 0.13' @ 12.30 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 5.27" for 25-Year event
Inflow = 1.44 cfs @ 12.23 hrs, Volume= 0.123 af
Outflow = 1.36 cfs @ 12.32 hrs, Volume= 0.123 af, Atten= 5%, 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= 0.41 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 13.2 min

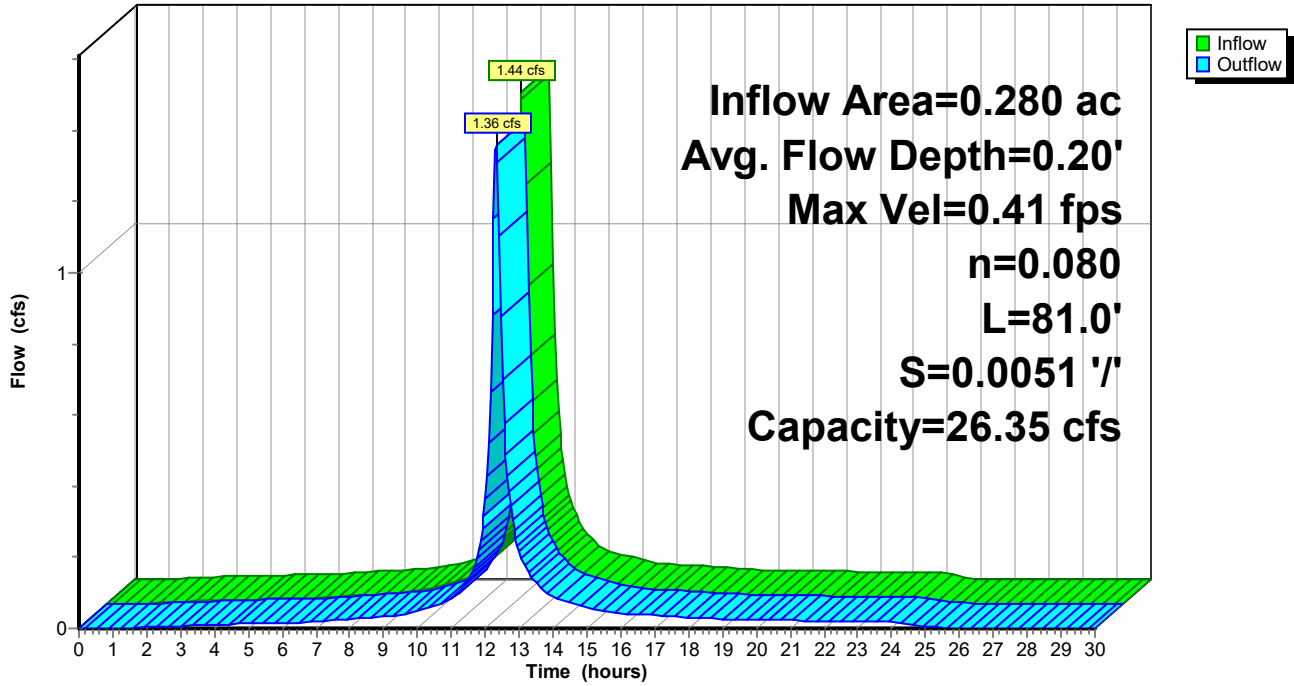
Peak Storage= 269 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 18.91'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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

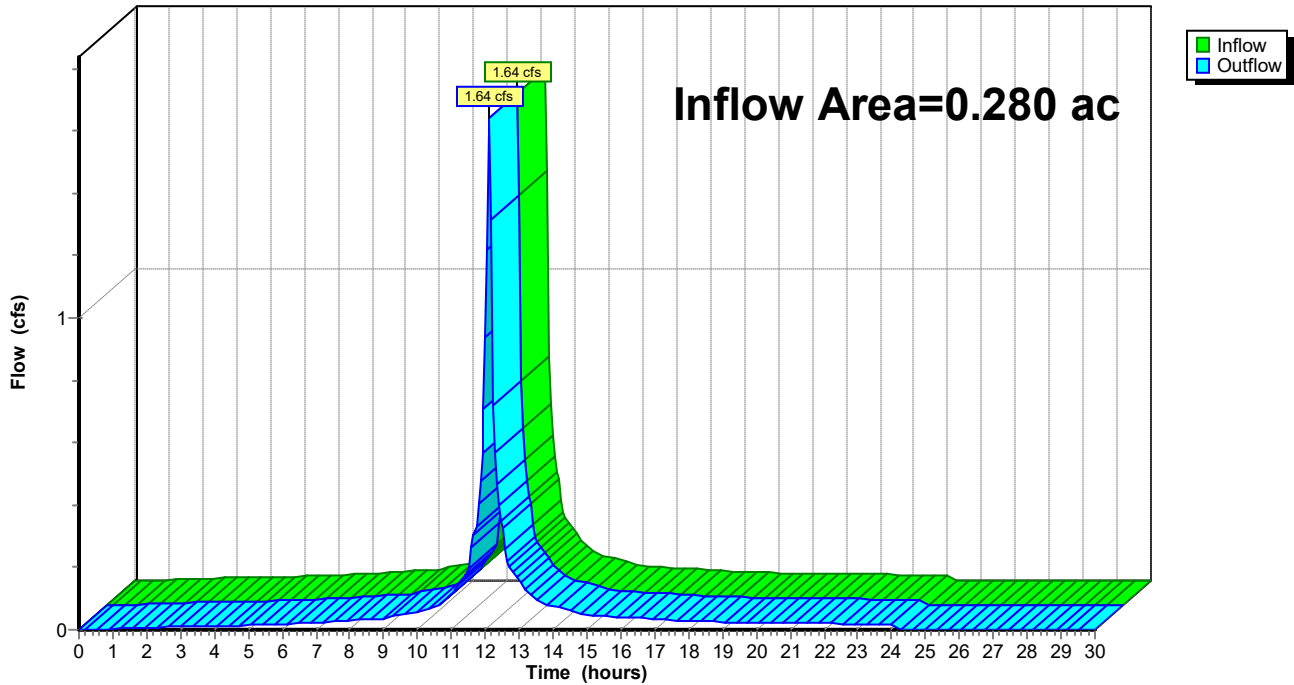
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 5.27" for 25-Year event
Inflow = 1.64 cfs @ 12.12 hrs, Volume= 0.123 af
Outflow = 1.64 cfs @ 12.12 hrs, Volume= 0.123 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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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=4.23" Flow Length=770' Tc=19.9 min CN=71 Runoff=18.88 cfs 1.864 af
Subcatchment E2: TO CATCHBASIN (DP#2)	Runoff Area=14,313 sf 87.38% Impervious Runoff Depth=6.99" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=2.63 cfs 0.191 af
Subcatchment E3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=4.90" Flow Length=356' Tc=5.0 min CN=77 Runoff=11.94 cfs 0.772 af
Subcatchment E4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=6.87" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=1.52 cfs 0.109 af
Subcatchment E5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=7.35" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.43 cfs 0.032 af
Subcatchment E6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=7.35" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=1.03 cfs 0.078 af
Subcatchment E7: TO DCB-E	Runoff Area=4,370 sf 61.99% Impervious Runoff Depth=6.05" Flow Length=215' Tc=5.1 min CN=87 Runoff=0.74 cfs 0.051 af
Reach DCB-B: TO OUTFALL	Inflow=1.52 cfs 0.109 af Outflow=1.52 cfs 0.109 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.21' Max Vel=14.55 fps Inflow=2.14 cfs 0.161 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=2.13 cfs 0.161 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.26' Max Vel=8.67 fps Inflow=1.76 cfs 0.128 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.72 cfs 0.128 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.27' Max Vel=4.39 fps Inflow=0.74 cfs 0.051 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.73 cfs 0.051 af
Reach DP#1: WETLAND	Inflow=21.50 cfs 2.134 af Outflow=21.50 cfs 2.134 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=2.63 cfs 0.191 af Outflow=2.63 cfs 0.191 af
Reach DP#3: LOW POINT	Inflow=11.94 cfs 0.772 af Outflow=11.94 cfs 0.772 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.08' Max Vel=1.11 fps Inflow=1.52 cfs 0.109 af n=0.080 L=46.0' S=0.1087 '/' Capacity=122.10 cfs Outflow=1.46 cfs 0.109 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.08' Max Vel=1.01 fps Inflow=1.46 cfs 0.109 af n=0.080 L=211.0' S=0.0867 '/' Capacity=109.07 cfs Outflow=1.32 cfs 0.109 af

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Reach OL-3: OVERLAND

Avg. Flow Depth=0.11' Max Vel=0.72 fps Inflow=1.32 cfs 0.109 af
n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=1.30 cfs 0.109 af

Reach OL-4: OVERLAND

Avg. Flow Depth=0.12' Max Vel=0.31 fps Inflow=1.30 cfs 0.109 af
n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=1.11 cfs 0.109 af

Reach OL-5: OVERLAND

Avg. Flow Depth=0.10' Max Vel=1.23 fps Inflow=2.13 cfs 0.161 af
n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.90 cfs 0.161 af

Reach OL-6: OVERLAND

Avg. Flow Depth=0.23' Max Vel=0.46 fps Inflow=1.90 cfs 0.161 af
n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=1.82 cfs 0.161 af

Reach OUTLET: TO DP#1

Inflow=2.13 cfs 0.161 af
Outflow=2.13 cfs 0.161 af

Total Runoff Area = 7.983 ac Runoff Volume = 3.097 af Average Runoff Depth = 4.66"
86.60% Pervious = 6.913 ac 13.40% Impervious = 1.070 ac

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

Runoff = 18.88 cfs @ 12.30 hrs, Volume= 1.864 af, Depth= 4.23"
 Routed to Reach DP#1 : WETLAND

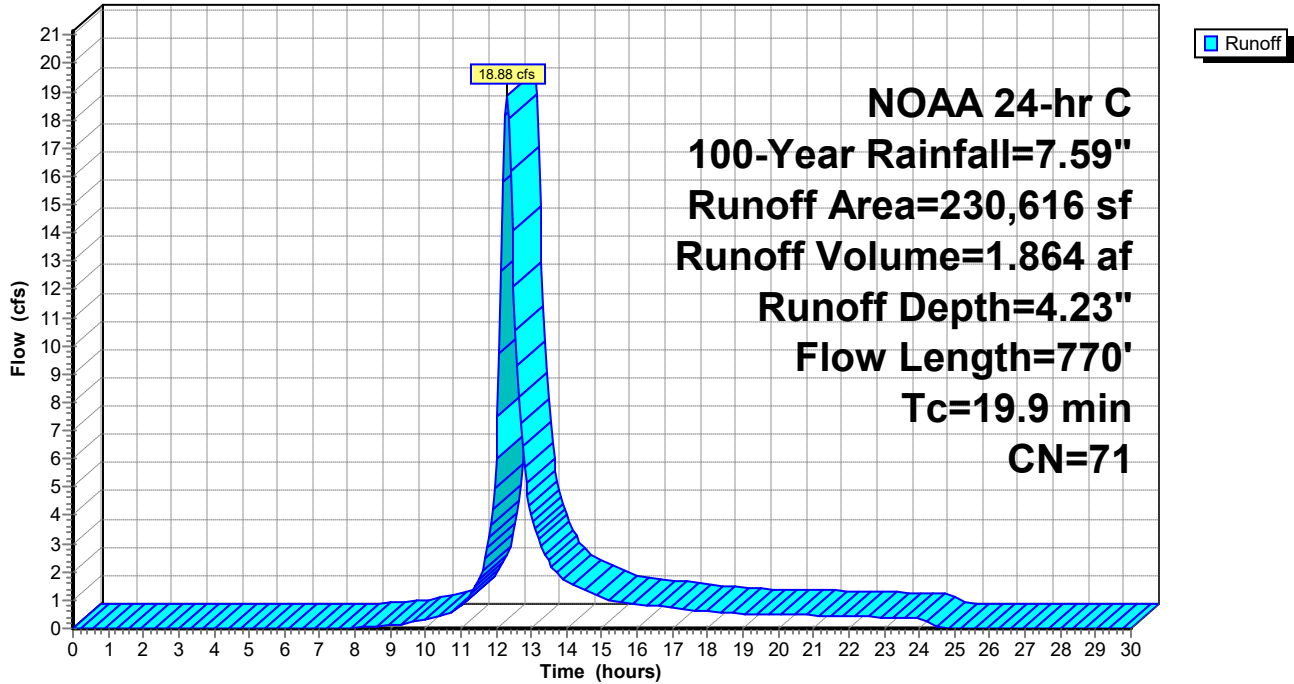
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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 = 2.63 cfs @ 12.11 hrs, Volume= 0.191 af, Depth= 6.99"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

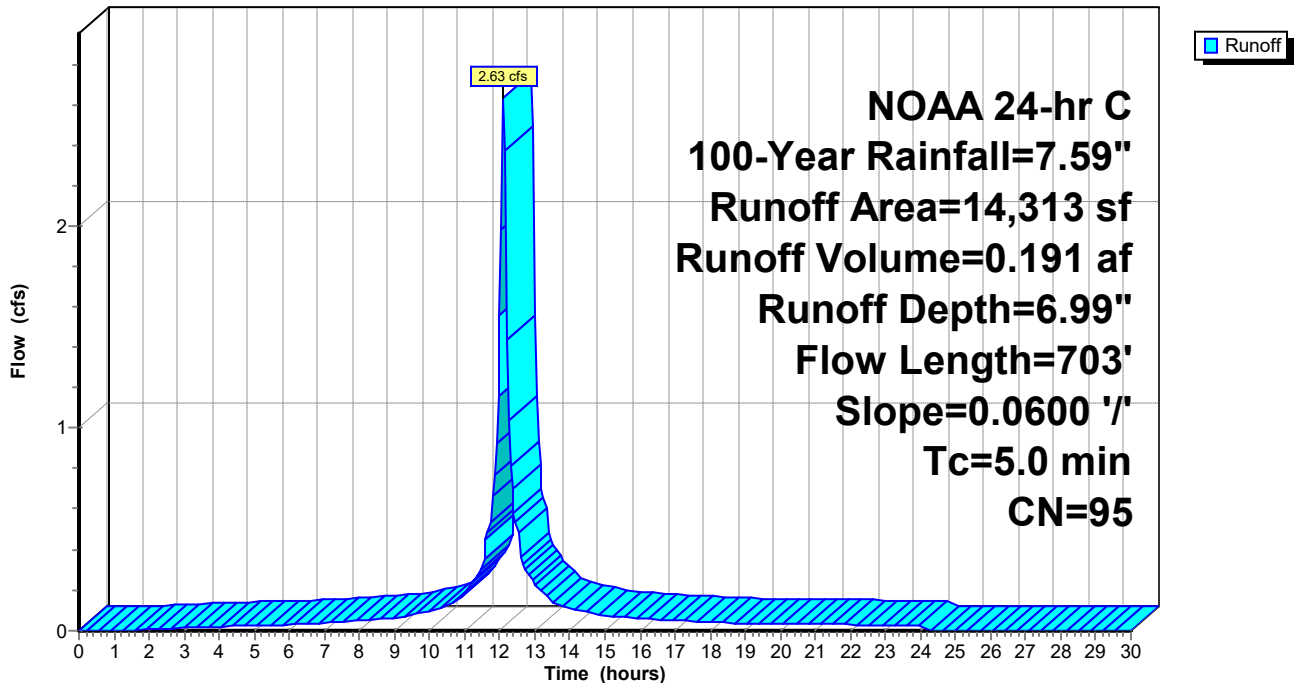
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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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NOAA 24-hr C 100-Year Rainfall=7.59"

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

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

Runoff = 11.94 cfs @ 12.11 hrs, Volume= 0.772 af, Depth= 4.90"
 Routed to Reach DP#3 : LOW POINT

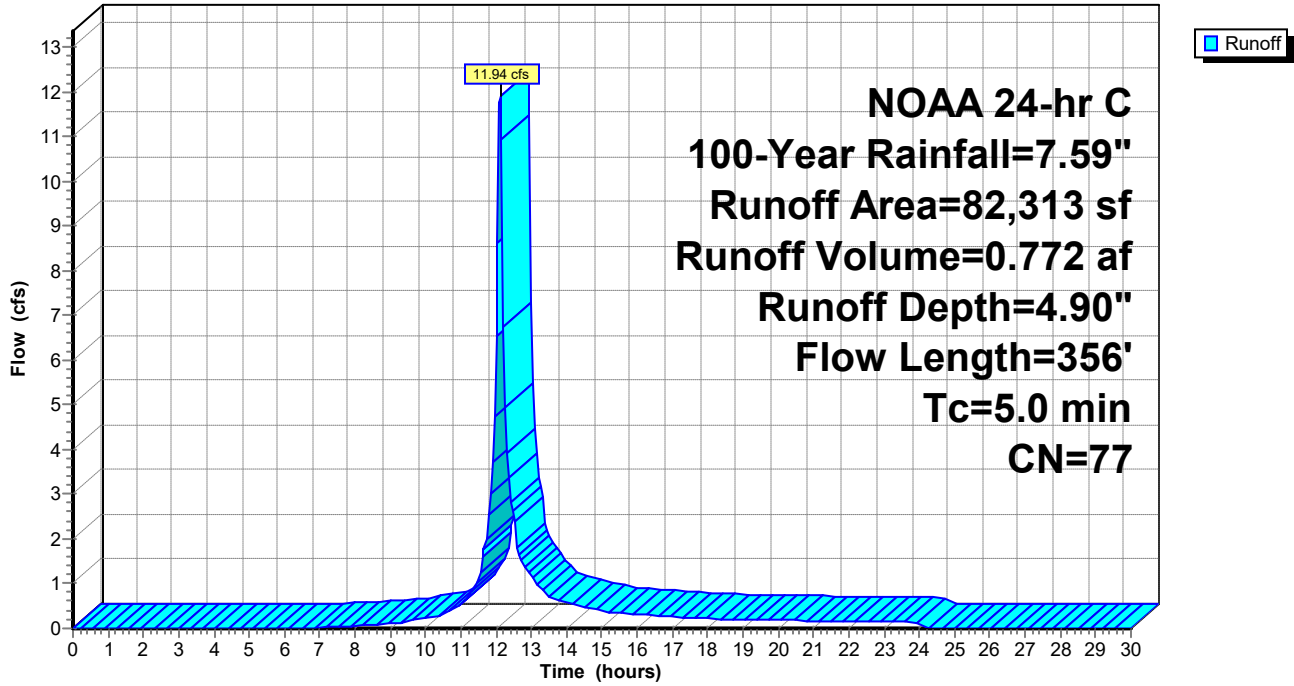
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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: Tc<2dt may require smaller dt

Runoff = 1.52 cfs @ 12.11 hrs, Volume= 0.109 af, Depth= 6.87"
 Routed to Reach DCB-B : TO OUTFALL

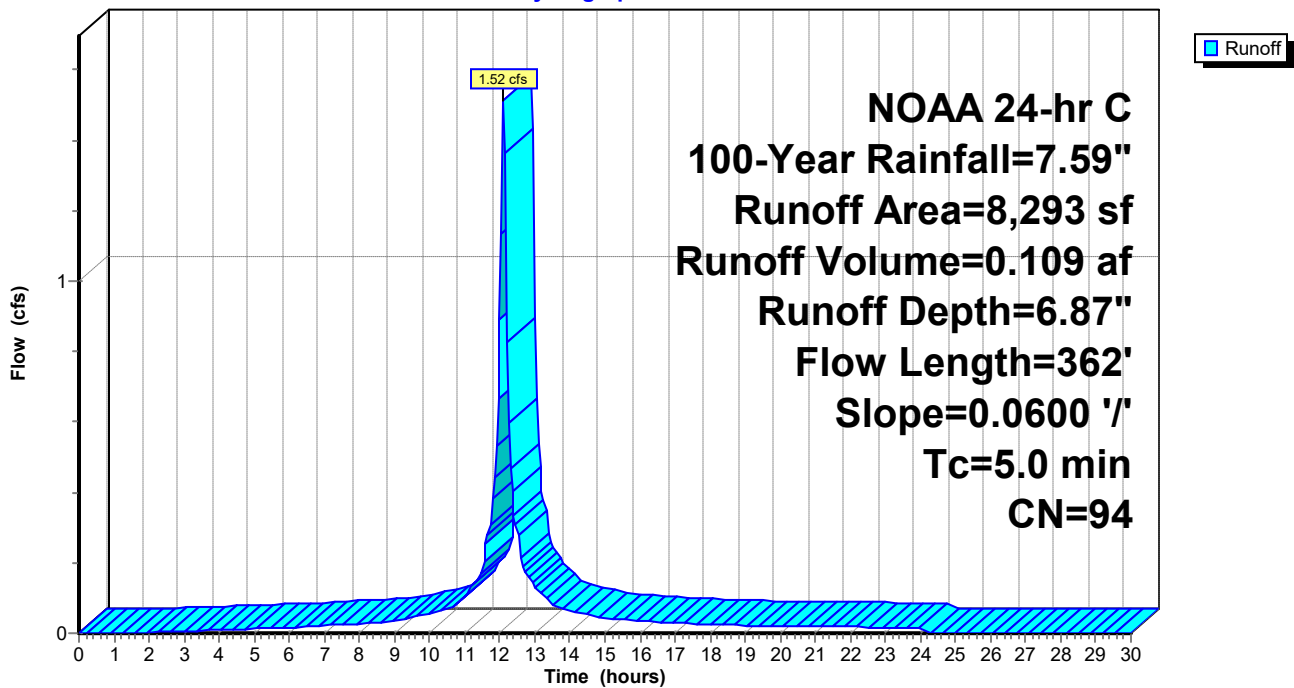
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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 = 0.43 cfs @ 12.11 hrs, Volume= 0.032 af, Depth= 7.35"
 Routed to Reach DCB-C : TO OUTFALL

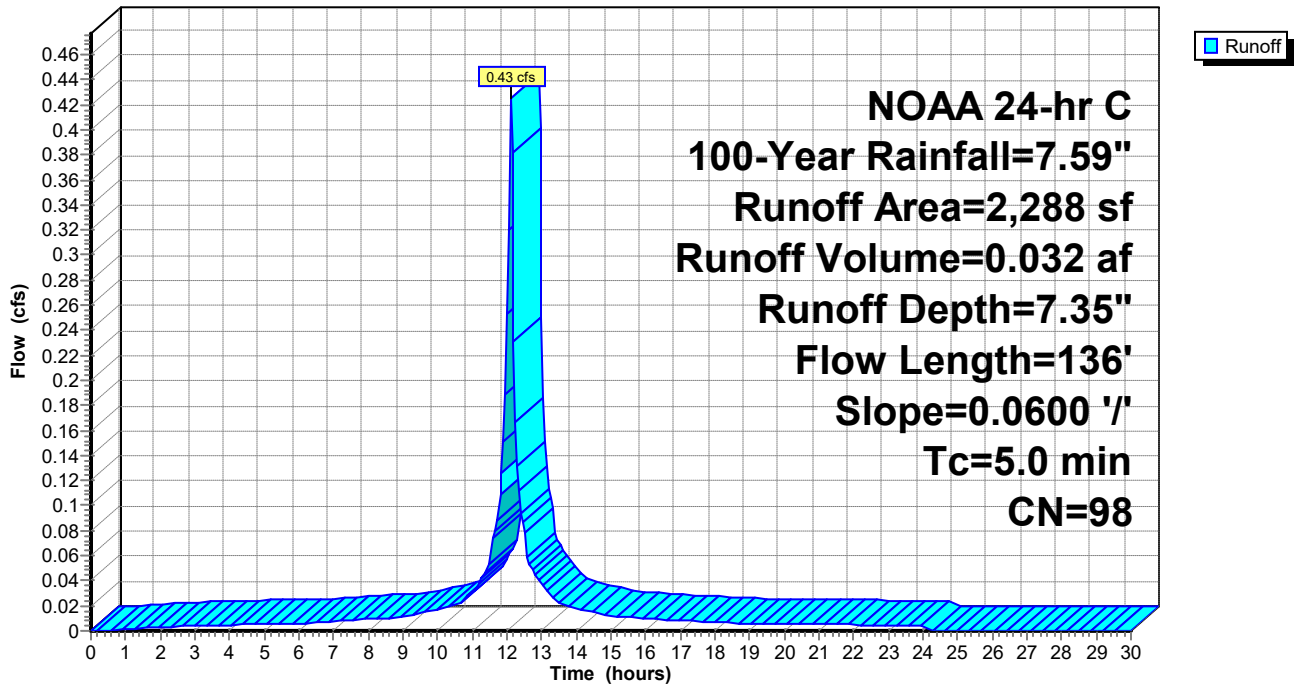
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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 = 1.03 cfs @ 12.11 hrs, Volume= 0.078 af, Depth= 7.35"
 Routed to Reach DCB-D : TO DCB-C

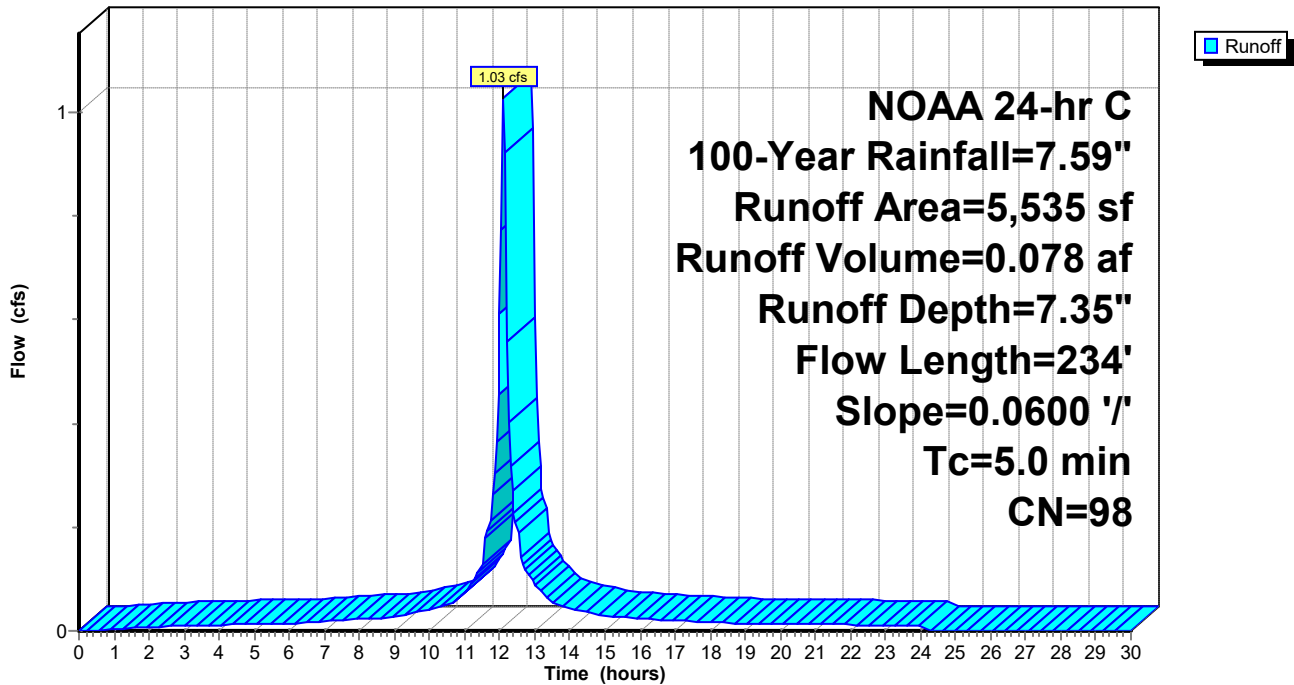
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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 = 0.74 cfs @ 12.11 hrs, Volume= 0.051 af, Depth= 6.05"
 Routed to Reach DCB-E : TO DCB-D

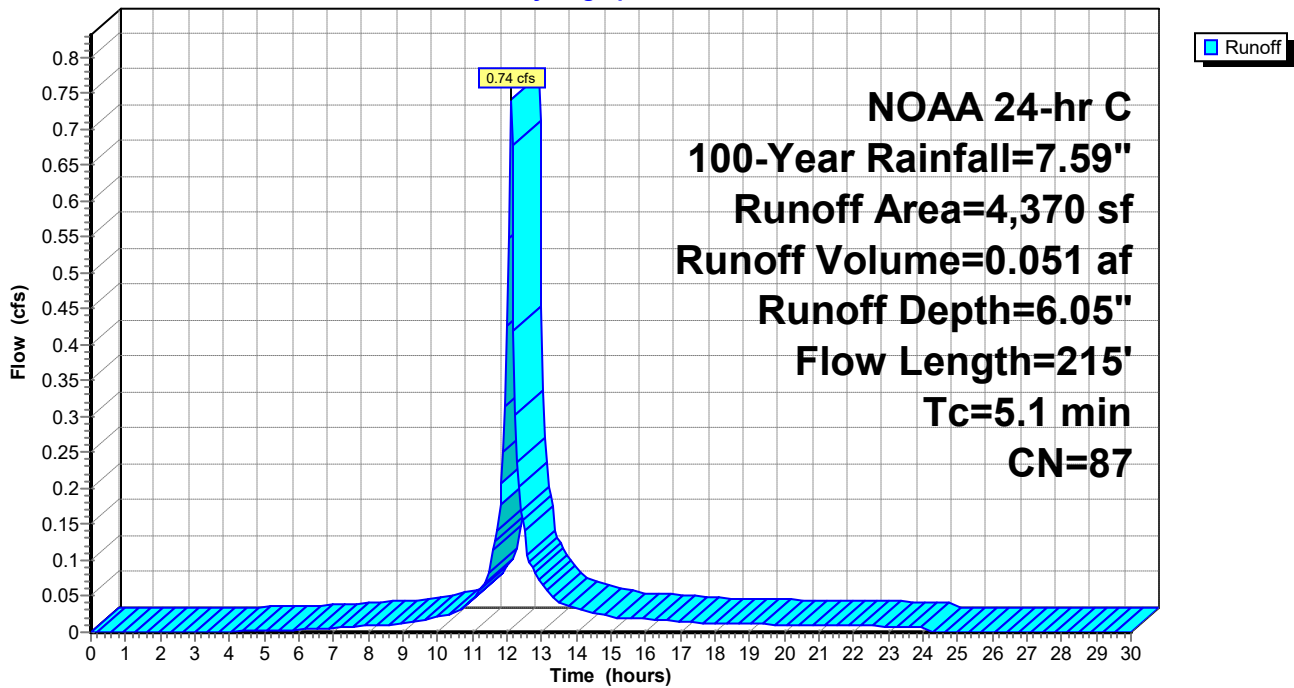
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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

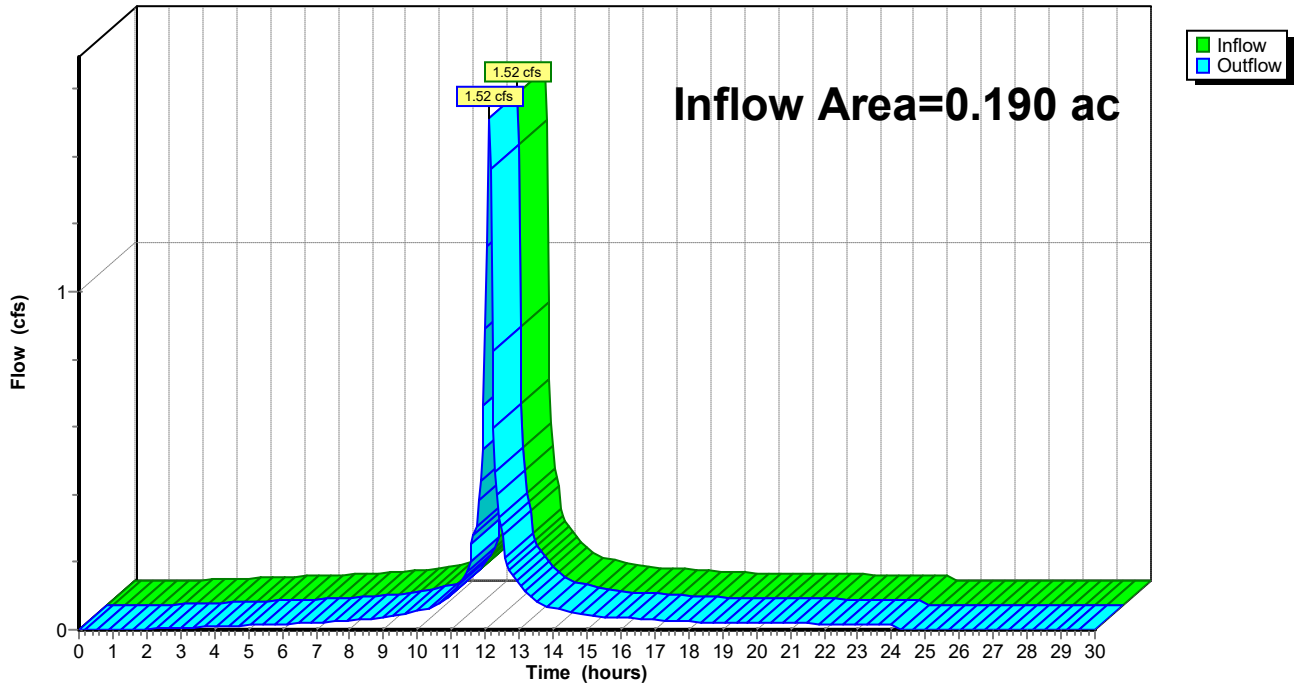
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.52 cfs @ 12.11 hrs, Volume= 0.109 af
Outflow = 1.52 cfs @ 12.11 hrs, Volume= 0.109 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

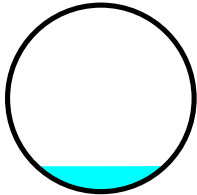
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 6.88" for 100-Year event
Inflow = 2.14 cfs @ 12.12 hrs, Volume= 0.161 af
Outflow = 2.13 cfs @ 12.12 hrs, Volume= 0.161 af, Atten= 1%, Lag= 0.2 min
Routed to Reach OUTFLET : TO DP#1

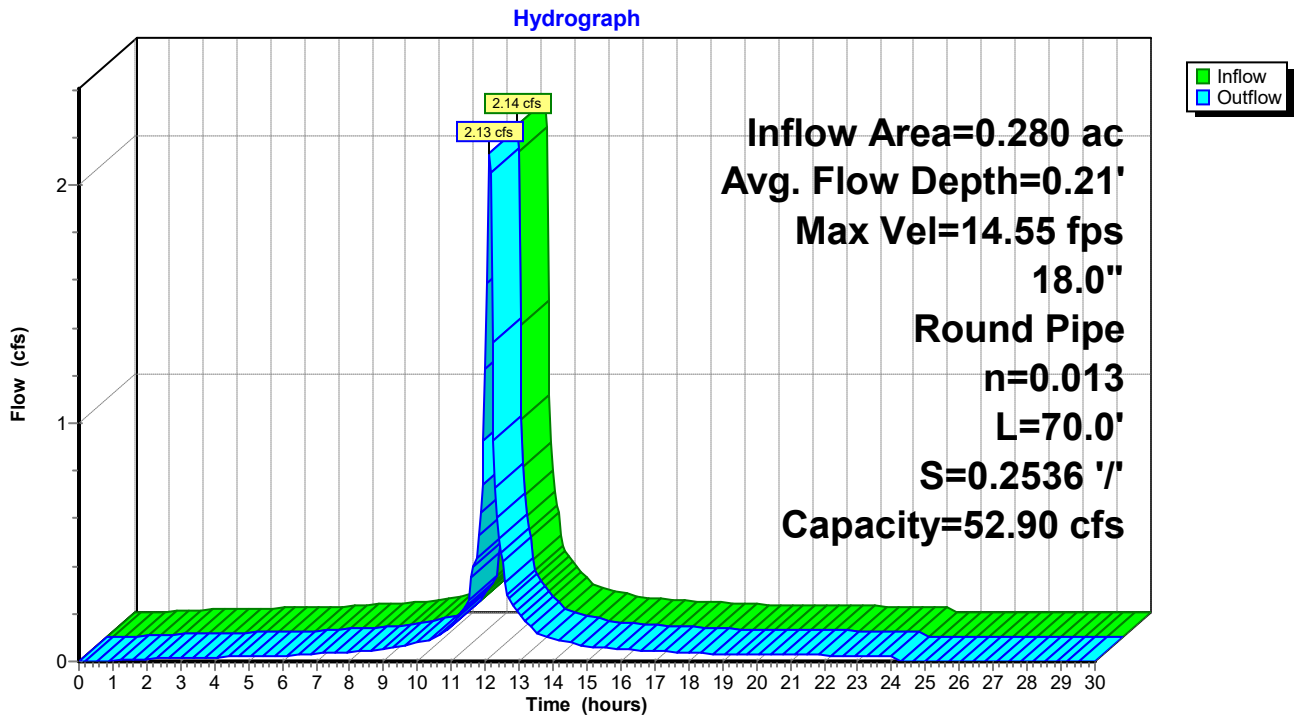
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.55 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.67 fps, Avg. Travel Time= 0.2 min

Peak Storage= 10 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 1.03'
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



Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

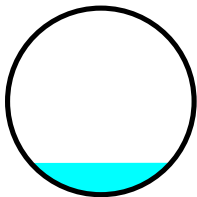
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.15' @ 12.10 hrs

Inflow Area = 0.227 ac, 83.23% Impervious, Inflow Depth = 6.78" for 100-Year event
Inflow = 1.76 cfs @ 12.11 hrs, Volume= 0.128 af
Outflow = 1.72 cfs @ 12.12 hrs, Volume= 0.128 af, Atten= 2%, 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= 8.67 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.74 fps, Avg. Travel Time= 0.7 min

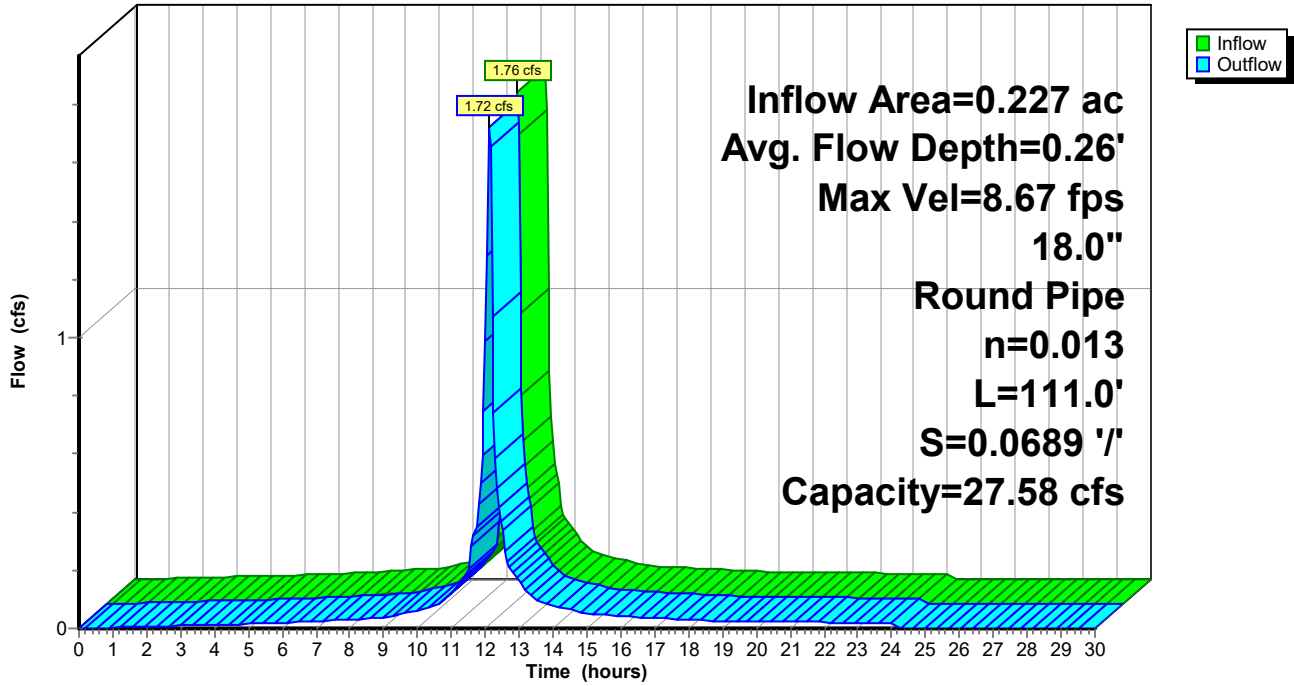
Peak Storage= 22 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 1.13'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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

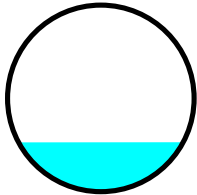
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.100 ac, 61.99% Impervious, Inflow Depth = 6.05" for 100-Year event
Inflow = 0.74 cfs @ 12.11 hrs, Volume= 0.051 af
Outflow = 0.73 cfs @ 12.12 hrs, Volume= 0.051 af, Atten= 2%, 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= 4.39 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 0.4 min

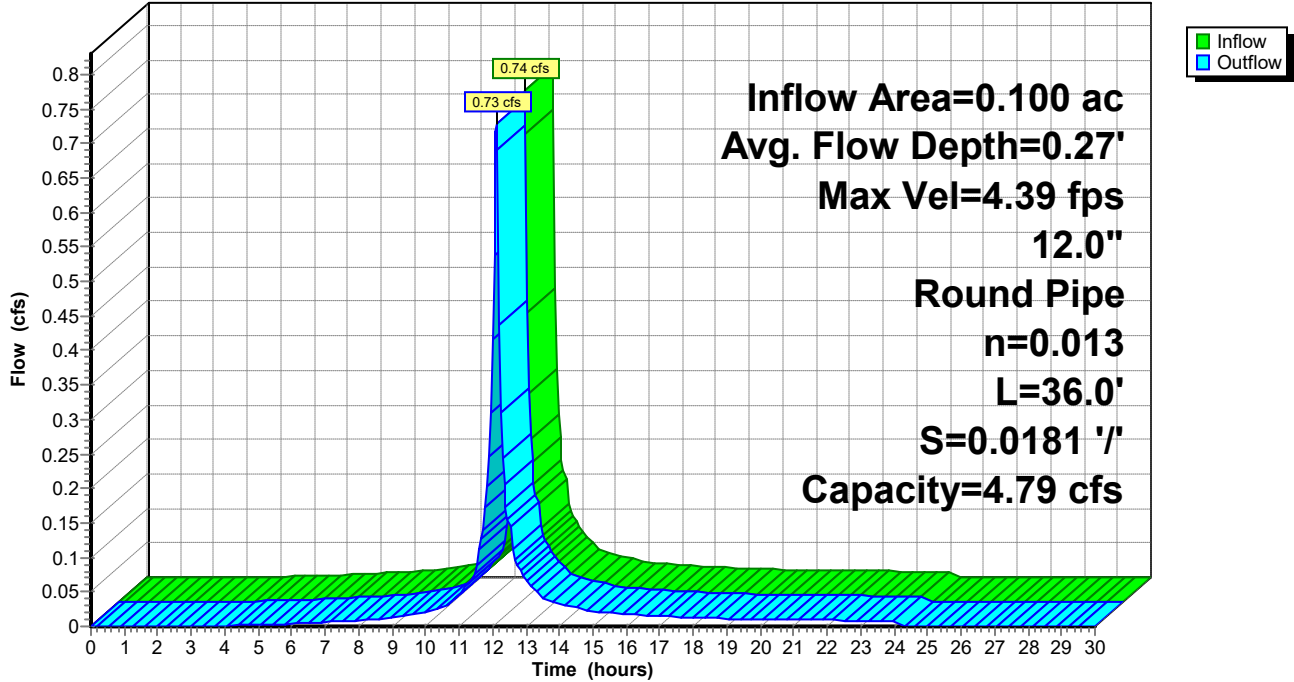
Peak Storage= 6 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 0.88'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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

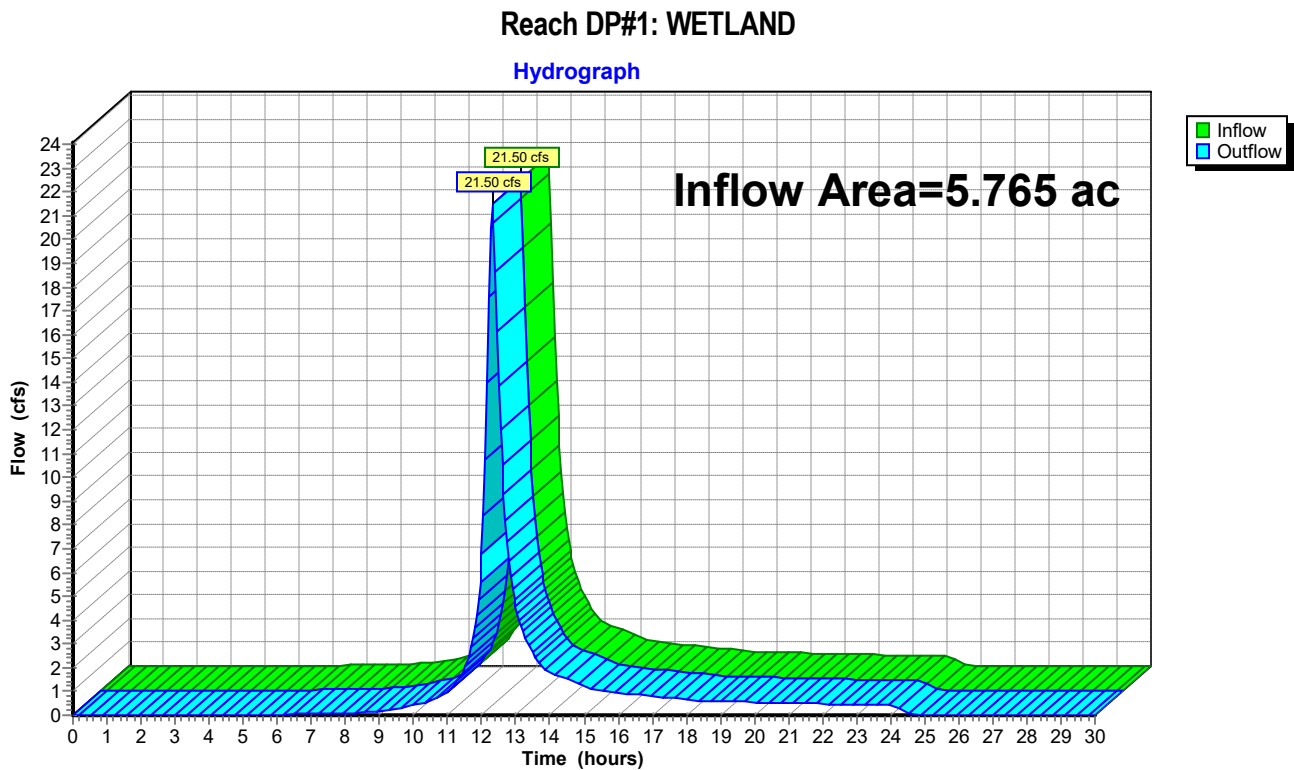


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.765 ac, 8.63% Impervious, Inflow Depth = 4.44" for 100-Year event
Inflow = 21.50 cfs @ 12.30 hrs, Volume= 2.134 af
Outflow = 21.50 cfs @ 12.30 hrs, Volume= 2.134 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

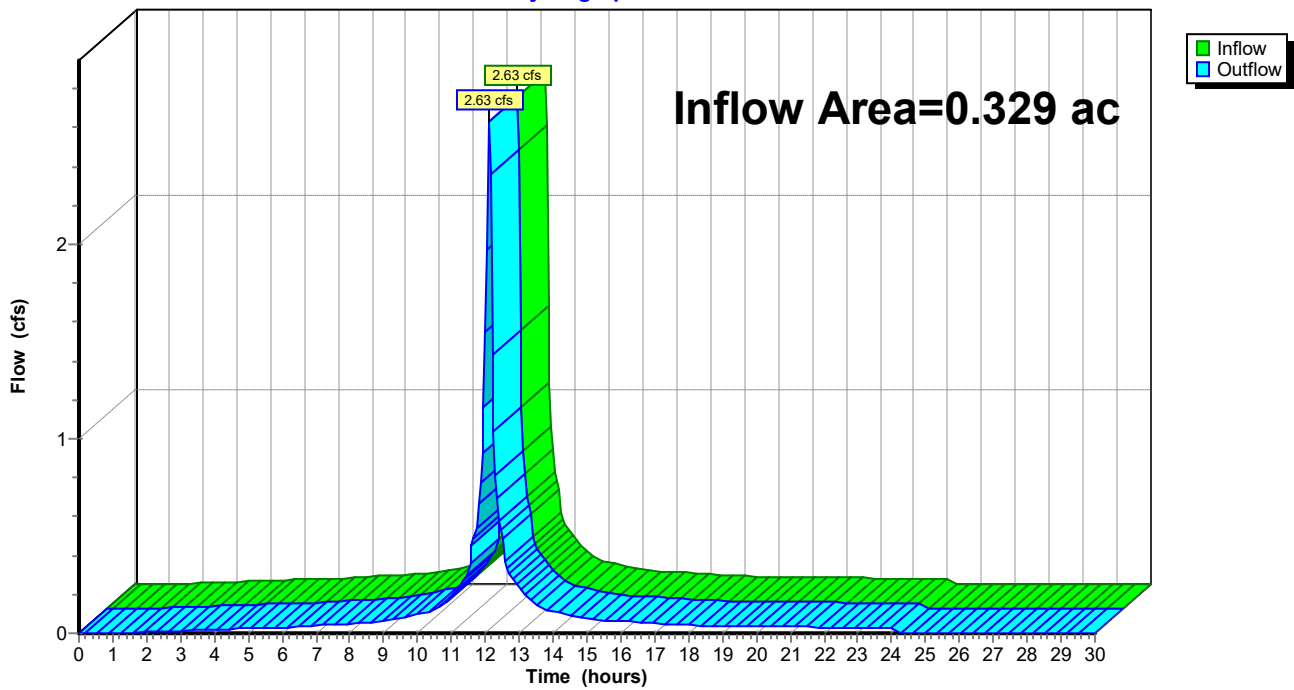
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 87.38% Impervious, Inflow Depth = 6.99" for 100-Year event
Inflow = 2.63 cfs @ 12.11 hrs, Volume= 0.191 af
Outflow = 2.63 cfs @ 12.11 hrs, Volume= 0.191 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

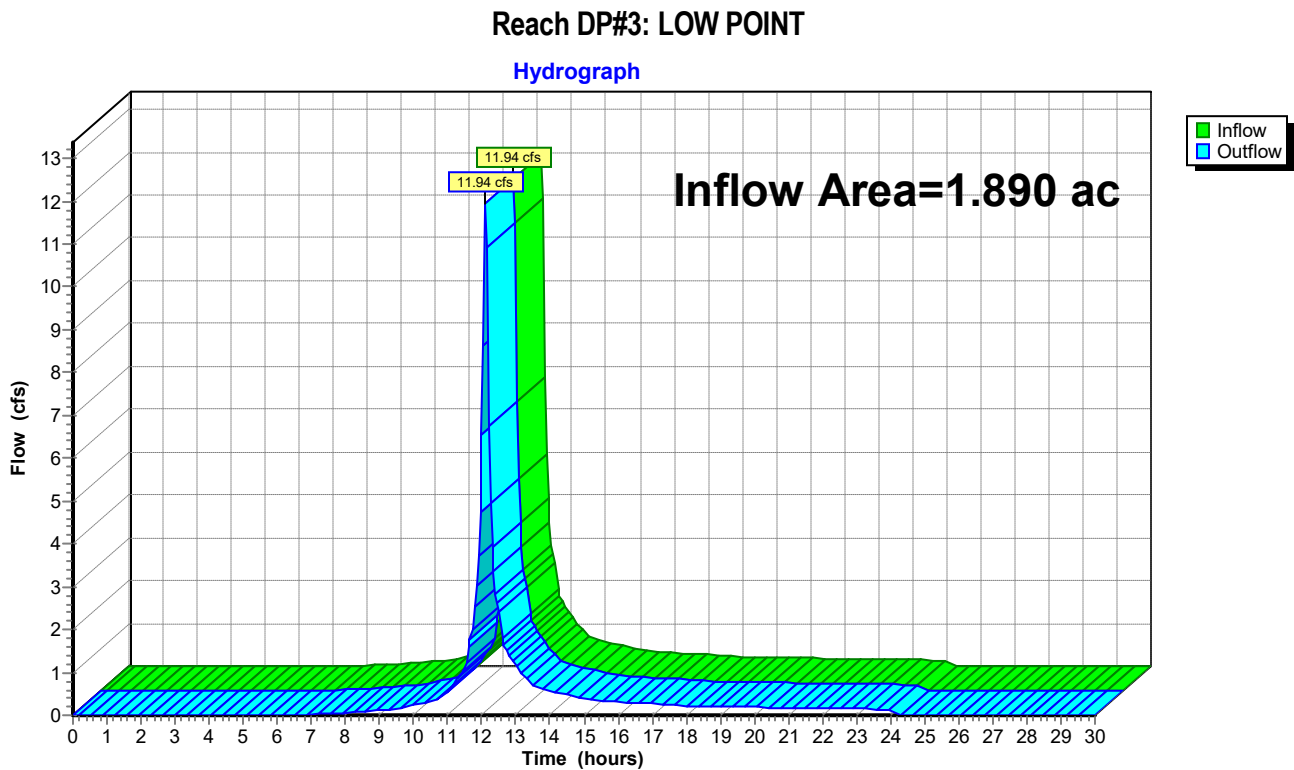


Summary for Reach DP#3: LOW POINT

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

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 4.90" for 100-Year event
Inflow = 11.94 cfs @ 12.11 hrs, Volume= 0.772 af
Outflow = 11.94 cfs @ 12.11 hrs, Volume= 0.772 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 OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
 Inflow = 1.52 cfs @ 12.11 hrs, Volume= 0.109 af
 Outflow = 1.46 cfs @ 12.13 hrs, Volume= 0.109 af, Atten= 4%, Lag= 1.3 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= 1.11 fps, Min. Travel Time= 0.7 min
 Avg. Velocity = 0.32 fps, Avg. Travel Time= 2.4 min

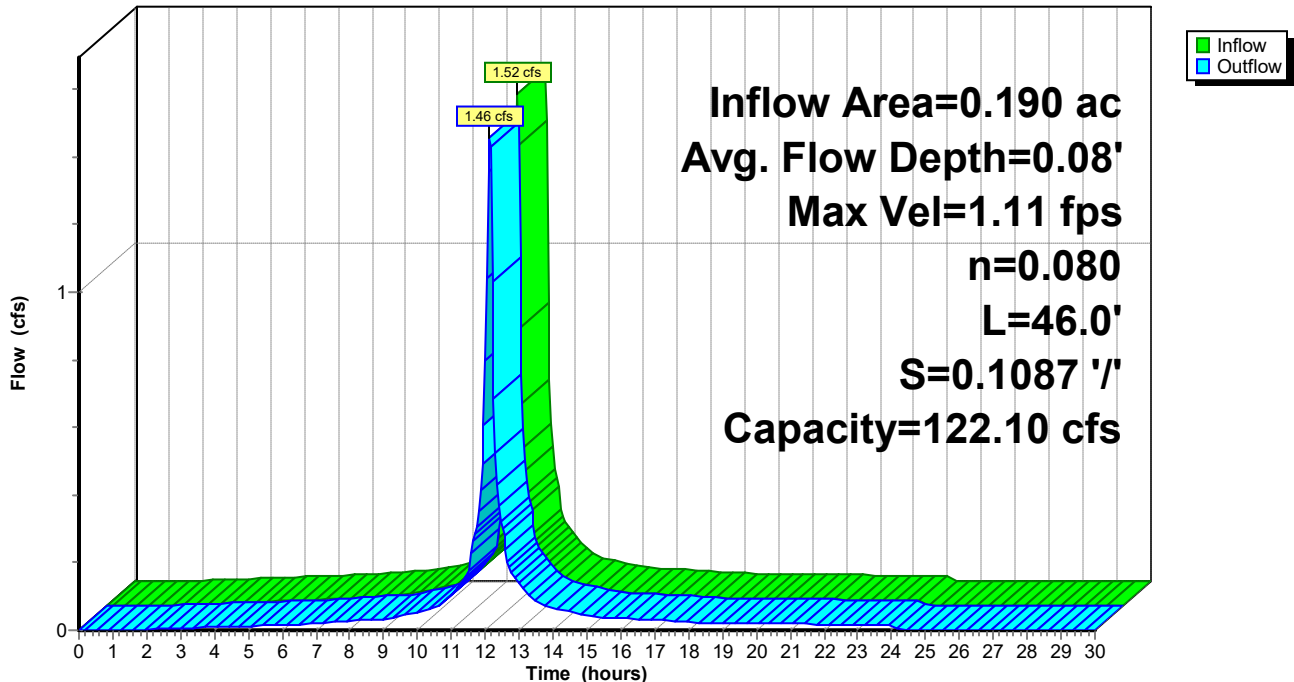
Peak Storage= 60 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.08' , Surface Width= 16.66'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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 0.02' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.46 cfs @ 12.13 hrs, Volume= 0.109 af
Outflow = 1.32 cfs @ 12.22 hrs, Volume= 0.109 af, Atten= 9%, Lag= 5.1 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= 1.01 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 12.1 min

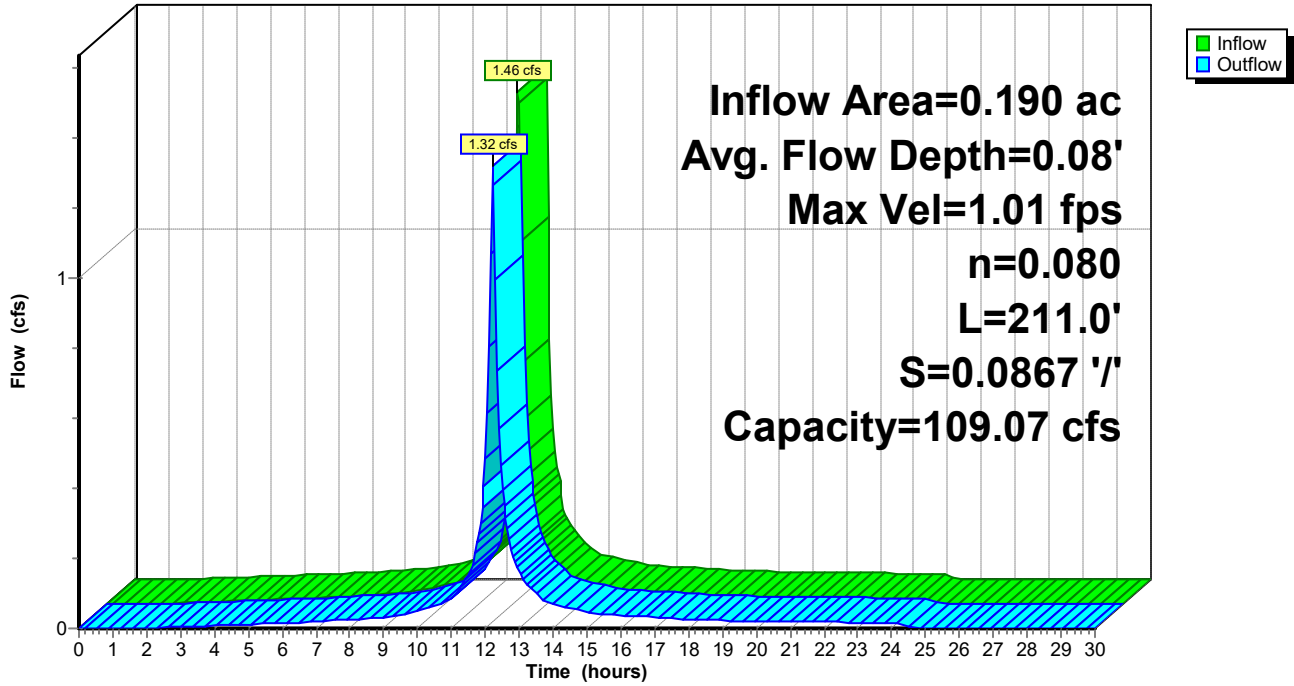
Peak Storage= 280 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.68'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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 0.04' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.32 cfs @ 12.22 hrs, Volume= 0.109 af
Outflow = 1.30 cfs @ 12.23 hrs, Volume= 0.109 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= 0.72 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 2.0 min

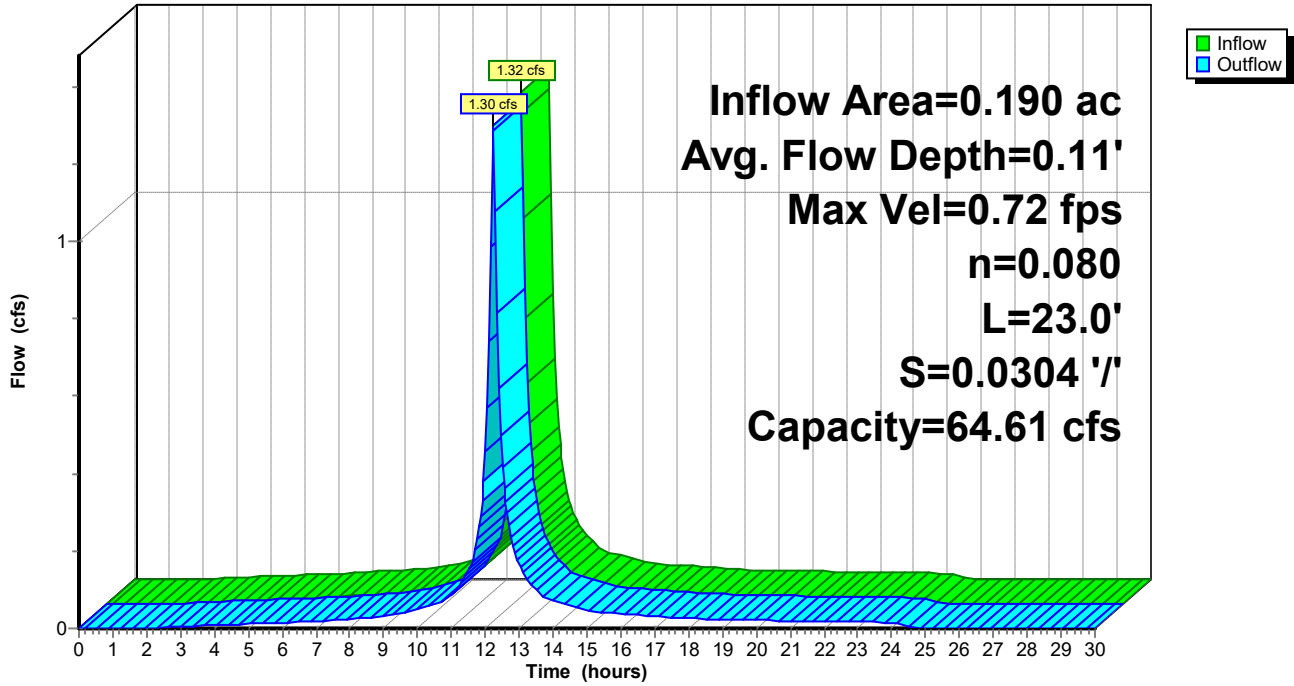
Peak Storage= 42 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 17.26'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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 0.03' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.30 cfs @ 12.23 hrs, Volume= 0.109 af
Outflow = 1.11 cfs @ 12.41 hrs, Volume= 0.109 af, Atten= 15%, Lag= 10.5 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= 0.31 fps, Min. Travel Time= 6.9 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 26.8 min

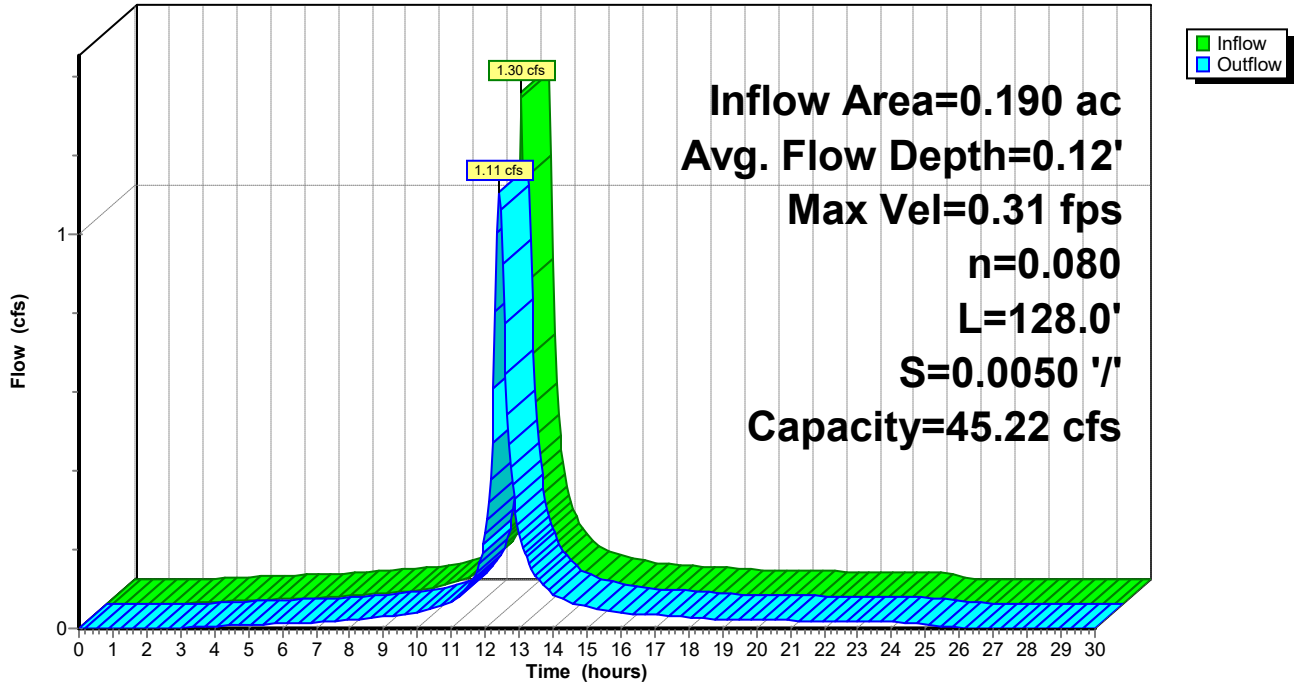
Peak Storage= 469 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.12', Surface Width= 32.35'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 6.88" for 100-Year event
 Inflow = 2.13 cfs @ 12.12 hrs, Volume= 0.161 af
 Outflow = 1.90 cfs @ 12.22 hrs, Volume= 0.161 af, Atten= 11%, Lag= 5.7 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 = 0.33 fps, Avg. Travel Time= 14.4 min

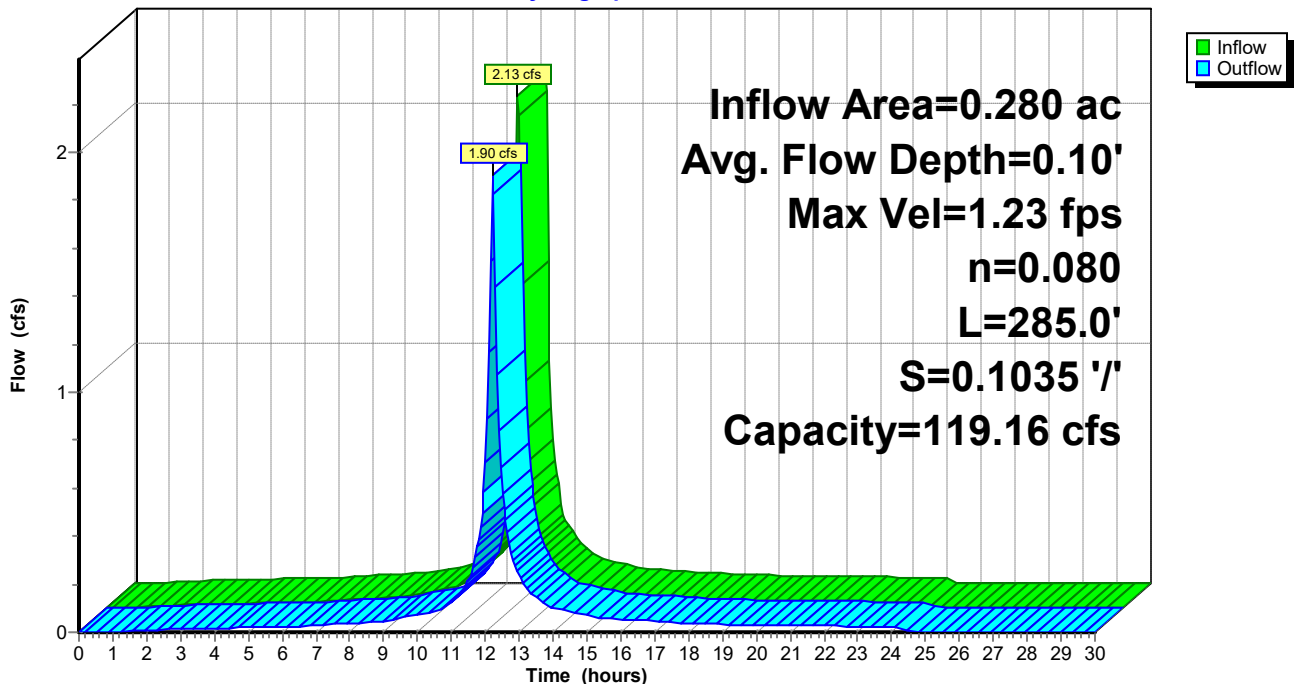
Peak Storage= 454 cf @ 12.15 hrs
 Average Depth at Peak Storage= 0.10' , Surface Width= 16.99'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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 0.15' @ 12.25 hrs

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 6.88" for 100-Year event
Inflow = 1.90 cfs @ 12.22 hrs, Volume= 0.161 af
Outflow = 1.82 cfs @ 12.30 hrs, Volume= 0.161 af, Atten= 4%, Lag= 5.0 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= 0.46 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 12.1 min

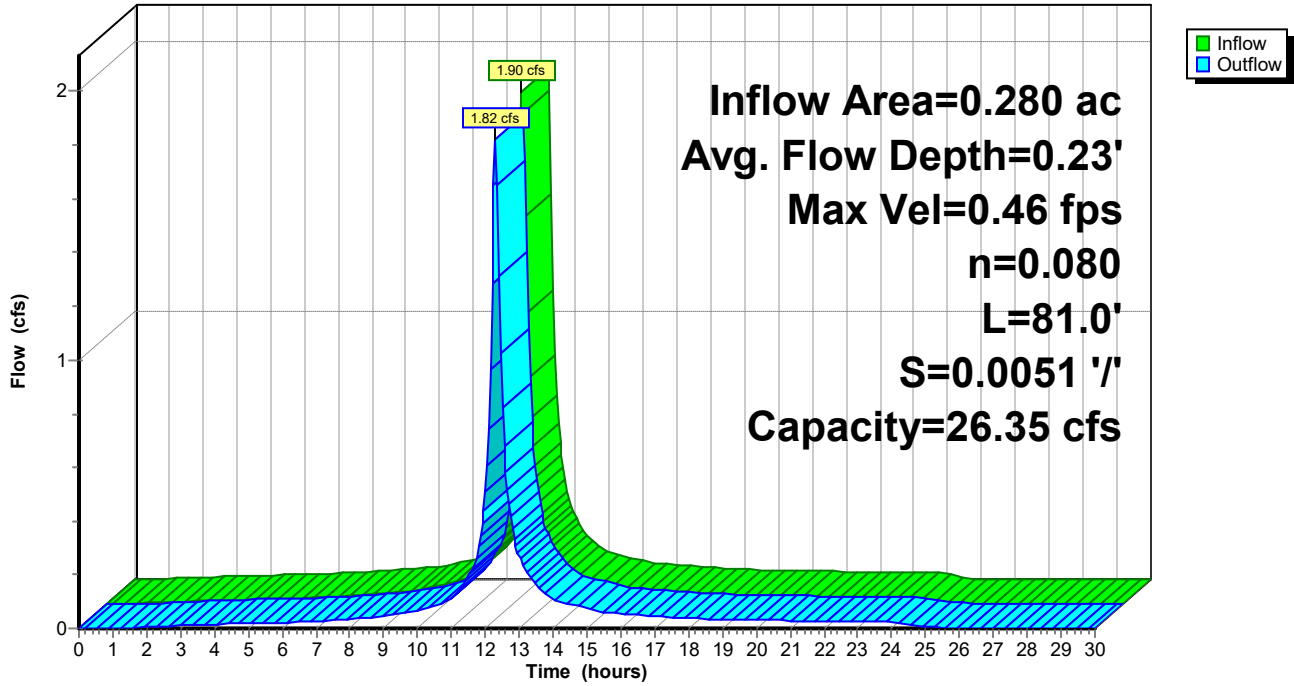
Peak Storage= 323 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 19.61'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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

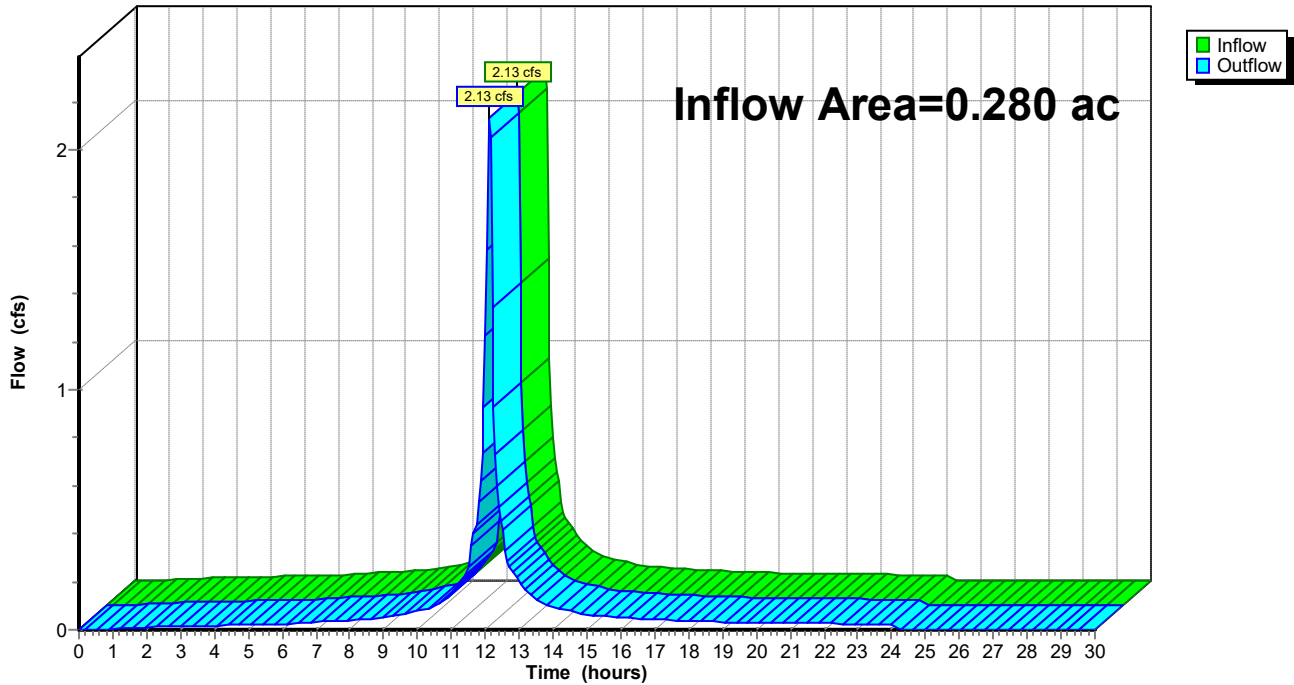
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.280 ac, 86.38% Impervious, Inflow Depth = 6.88" for 100-Year event
Inflow = 2.13 cfs @ 12.12 hrs, Volume= 0.161 af
Outflow = 2.13 cfs @ 12.12 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min
Routed to Reach OL-5 : OVERLAND

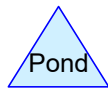
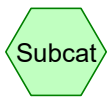
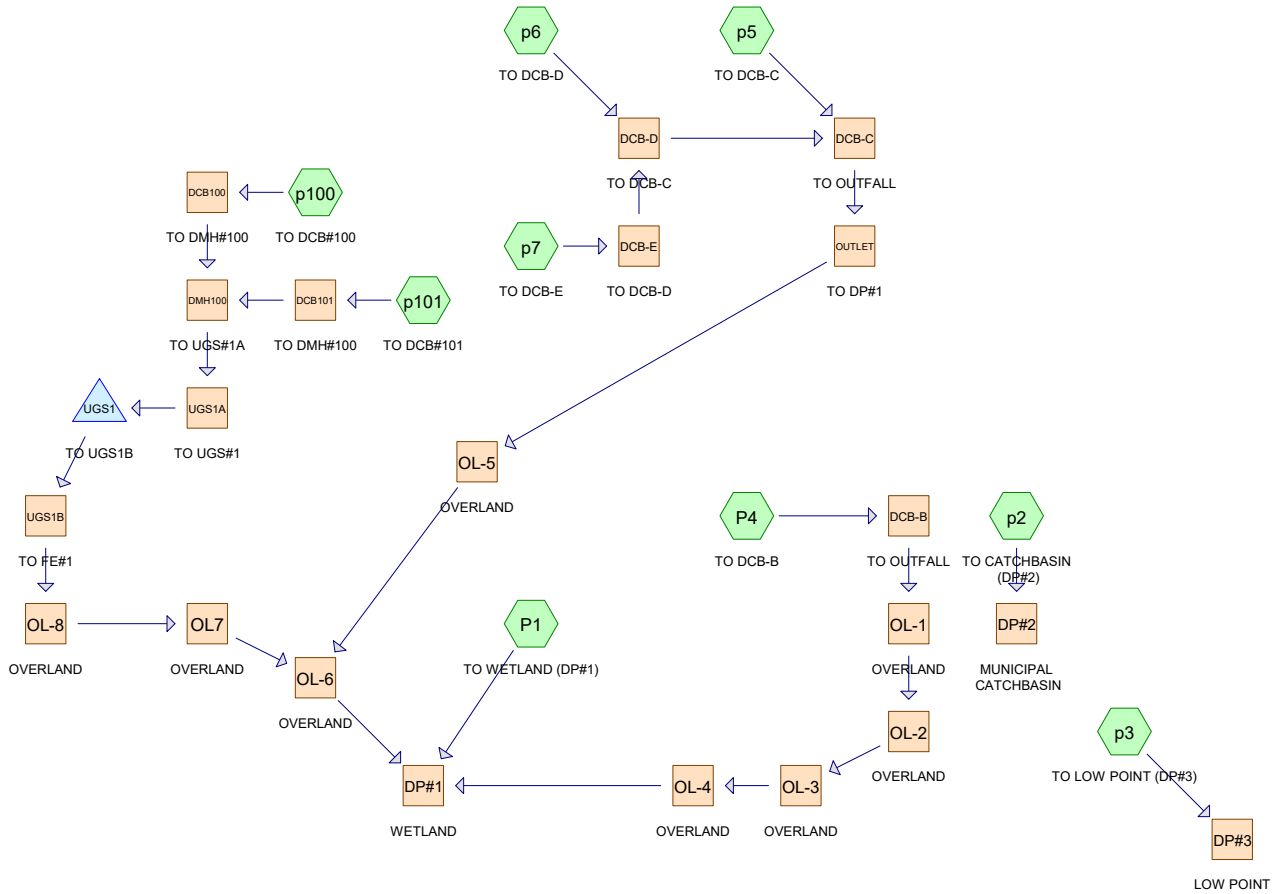
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach OUTLET: TO DP#1

Hydrograph



2.2
POST DEVELOPMENT CALCULATIONS



Routing Diagram for 3010-POST-SUBDIVISION-R1
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Project Notes

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

Rainfall events imported from "Atlas-14-Rain.txt" for 6691 MD Worcester South

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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	NOAA 24-hr	C	Default	24.00	1	3.13	2
2	10-Year	NOAA 24-hr	C	Default	24.00	1	4.85	2
3	25-Year	NOAA 24-hr	C	Default	24.00	1	5.95	2
4	100-Year	NOAA 24-hr	C	Default	24.00	1	7.59	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.375	74	>75% Grass cover, Good, HSG C (P1, p100, p101, p2, p3, P4, p7)
0.693	65	Brush, Good, HSG C (P1)
0.436	89	Gravel roads, HSG C (P1, p3)
1.223	98	Paved parking, HSG C (P1, p100, p101, p2, p3, P4, p5, p6, p7)
5.253	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	0.375	0.000	0.000	0.375	>75% Grass cover, Good	P1, p100, p101, p2, p3, P4, p7
0.000	0.000	0.693	0.000	0.000	0.693	Brush, Good	P1
0.000	0.000	0.436	0.000	0.000	0.436	Gravel roads	P1, p3
0.000	0.000	1.223	0.000	0.000	1.223	Paved parking	P1, p100, p101, p2, p3, P4, p5, p6, p7
0.000	0.000	5.253	0.000	0.000	5.253	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	138.50	136.00	128.0	0.0195	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	130.40	125.00	54.0	0.1000	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=221,713 sf 1.89% Impervious Runoff Depth=0.79" Flow Length=770' Tc=19.9 min CN=70 Runoff=3.03 cfs 0.334 af
Subcatchment p100: TO DCB#100	Runoff Area=1,528 sf 80.69% Impervious Runoff Depth=2.38" Flow Length=68' Slope=0.0200 '/' Tc=5.0 min CN=93 Runoff=0.10 cfs 0.007 af
Subcatchment p101: TO DCB#101	Runoff Area=6,877 sf 71.02% Impervious Runoff Depth=2.19" Flow Length=151' Tc=5.0 min CN=91 Runoff=0.44 cfs 0.029 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,330 sf 88.46% Impervious Runoff Depth=2.58" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=1.03 cfs 0.071 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=1.16" Flow Length=356' Tc=5.0 min CN=77 Runoff=2.85 cfs 0.183 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=2.48" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=0.58 cfs 0.039 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=2.90" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.17 cfs 0.013 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=2.90" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.42 cfs 0.031 af
Subcatchment p7: TO DCB-E	Runoff Area=4,728 sf 65.46% Impervious Runoff Depth=1.93" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.27 cfs 0.017 af
Reach DCB-B: TO OUTFALL	Inflow=0.58 cfs 0.039 af Outflow=0.58 cfs 0.039 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.13' Max Vel=10.96 fps Inflow=0.84 cfs 0.061 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=0.84 cfs 0.061 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.16' Max Vel=6.53 fps Inflow=0.68 cfs 0.048 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=0.68 cfs 0.048 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.16' Max Vel=3.26 fps Inflow=0.27 cfs 0.017 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.27 cfs 0.017 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.10' Max Vel=2.51 fps Inflow=0.10 cfs 0.007 af 12.0" Round Pipe n=0.013 L=128.0' S=0.0195 '/' Capacity=4.98 cfs Outflow=0.10 cfs 0.007 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.23' Max Vel=3.18 fps Inflow=0.44 cfs 0.029 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/' Capacity=3.76 cfs Outflow=0.43 cfs 0.029 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.19' Max Vel=5.14 fps Inflow=0.53 cfs 0.036 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/' Capacity=6.90 cfs Outflow=0.53 cfs 0.036 af

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Reach DP#1: WETLAND	Inflow=3.85 cfs 0.470 af Outflow=3.85 cfs 0.470 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.03 cfs 0.071 af Outflow=1.03 cfs 0.071 af
Reach DP#3: LOW POINT	Inflow=2.85 cfs 0.183 af Outflow=2.85 cfs 0.183 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.05' Max Vel=0.78 fps Inflow=0.58 cfs 0.039 af n=0.080 L=46.0' S=0.1087 '/ Capacity=122.10 cfs Outflow=0.55 cfs 0.039 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.05' Max Vel=0.69 fps Inflow=0.55 cfs 0.039 af n=0.080 L=211.0' S=0.0867 '/ Capacity=109.07 cfs Outflow=0.47 cfs 0.039 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.49 fps Inflow=0.47 cfs 0.039 af n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.47 cfs 0.039 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.20 fps Inflow=0.47 cfs 0.039 af n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.37 cfs 0.039 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.84 fps Inflow=0.84 cfs 0.061 af n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=0.72 cfs 0.061 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.13' Max Vel=0.33 fps Inflow=0.77 cfs 0.097 af n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=0.70 cfs 0.097 af
Reach OL-8: OVERLAND	Avg. Flow Depth=0.02' Max Vel=0.55 fps Inflow=0.17 cfs 0.036 af n=0.080 L=82.0' S=0.1585 '/ Capacity=147.47 cfs Outflow=0.17 cfs 0.036 af
Reach OL7: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.18 fps Inflow=0.17 cfs 0.036 af n=0.400 L=270.0' S=0.1037 '/ Capacity=23.85 cfs Outflow=0.17 cfs 0.036 af
Reach OUTLET: TO DP#1	Inflow=0.84 cfs 0.061 af Outflow=0.84 cfs 0.061 af
Reach UGS1A: TO UGS#1	Inflow=0.53 cfs 0.036 af Outflow=0.53 cfs 0.036 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.09' Max Vel=5.23 fps Inflow=0.17 cfs 0.036 af 12.0" Round Pipe n=0.013 L=54.0' S=0.1000 '/ Capacity=11.27 cfs Outflow=0.17 cfs 0.036 af
Pond UGS1: TO UGS1B	Peak Elev=134.19' Storage=0.006 af Inflow=0.53 cfs 0.036 af Outflow=0.17 cfs 0.036 af

Total Runoff Area = 7.980 ac Runoff Volume = 0.724 af Average Runoff Depth = 1.09"
84.67% Pervious = 6.757 ac 15.33% Impervious = 1.223 ac

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

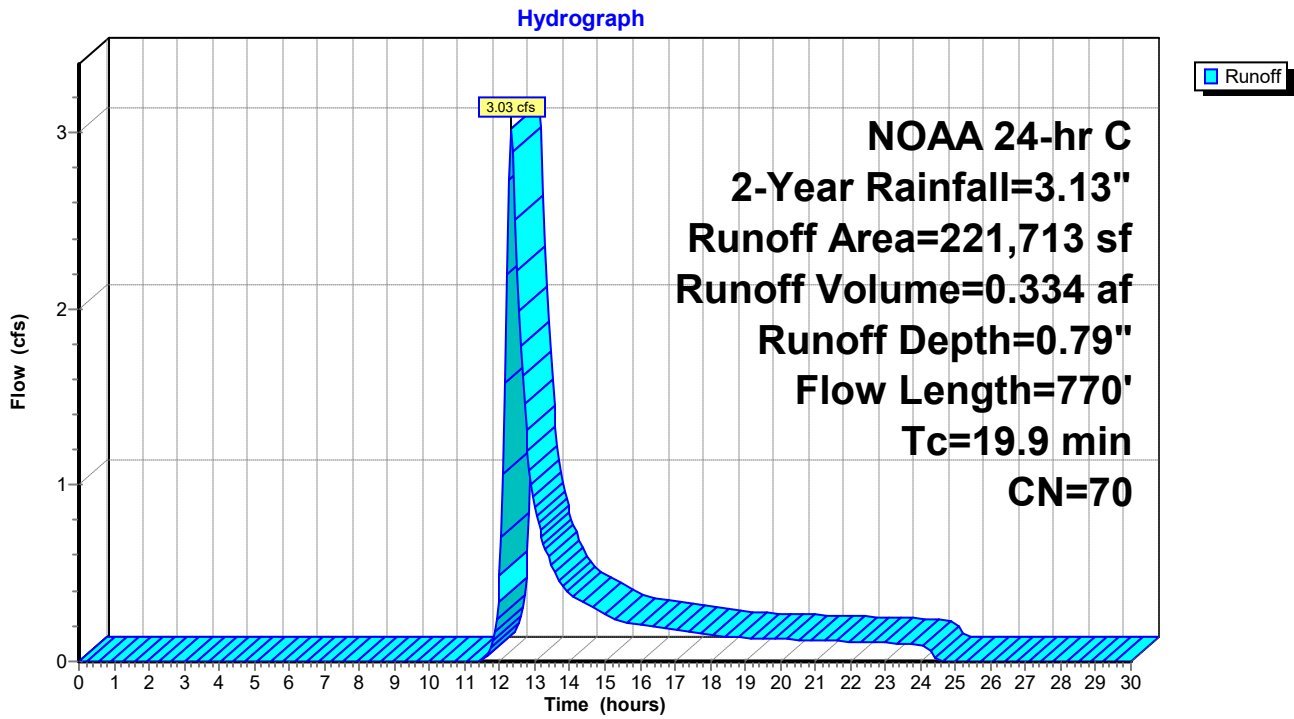
Runoff = 3.03 cfs @ 12.32 hrs, Volume= 0.334 af, Depth= 0.79"
 Routed to Reach DP#1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

Area (sf)	CN	Description
3,388	74	>75% Grass cover, Good, HSG C
177,438	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,514	89	Gravel roads, HSG C
30,179	65	Brush, Good, HSG C
221,713	70	Weighted Average
217,519		98.11% Pervious Area
4,194		1.89% 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)



Summary for Subcatchment p100: TO DCB#100

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

Runoff = 0.10 cfs @ 12.11 hrs, Volume= 0.007 af, Depth= 2.38"
 Routed to Reach DCB100 : TO DMH#100

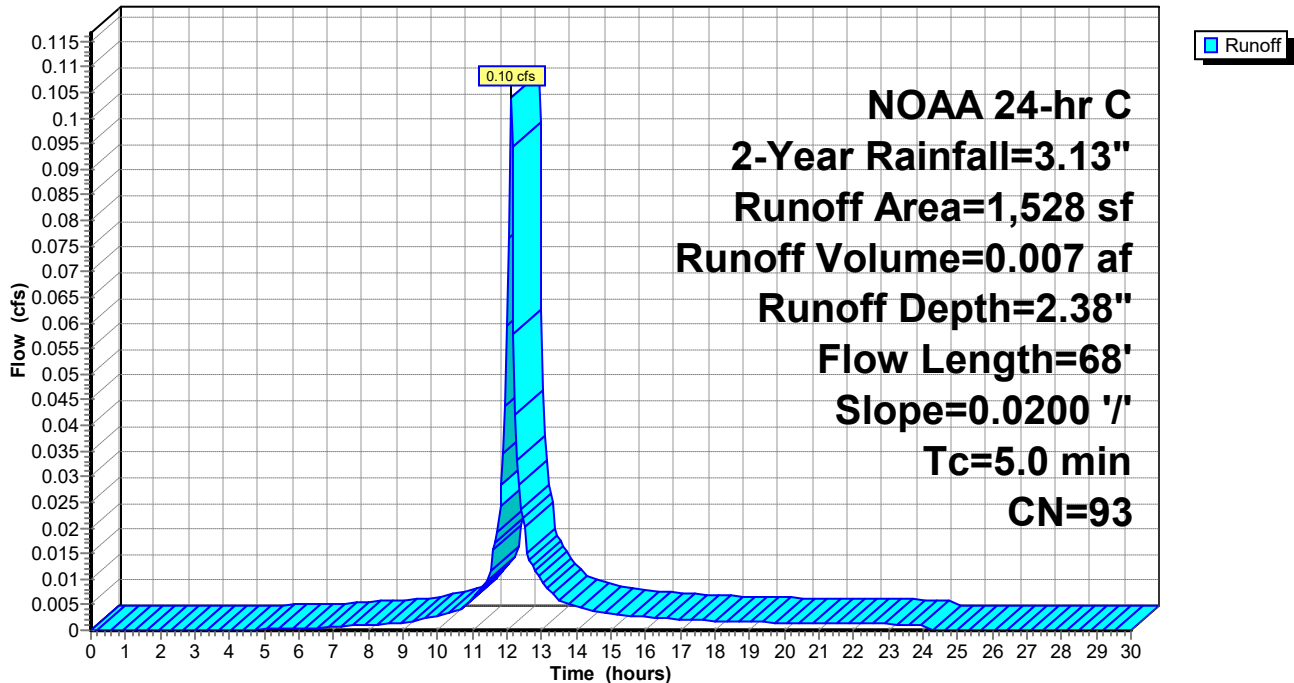
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

Area (sf)	CN	Description
295	74	>75% Grass cover, Good, HSG C
1,233	98	Paved parking, HSG C
1,528	93	Weighted Average
295		19.31% Pervious Area
1,233		80.69% 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"
0.7	45	0.0200	1.14		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.1	18	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	68	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 = 0.44 cfs @ 12.11 hrs, Volume= 0.029 af, Depth= 2.19"
 Routed to Reach DCB101 : TO DMH#100

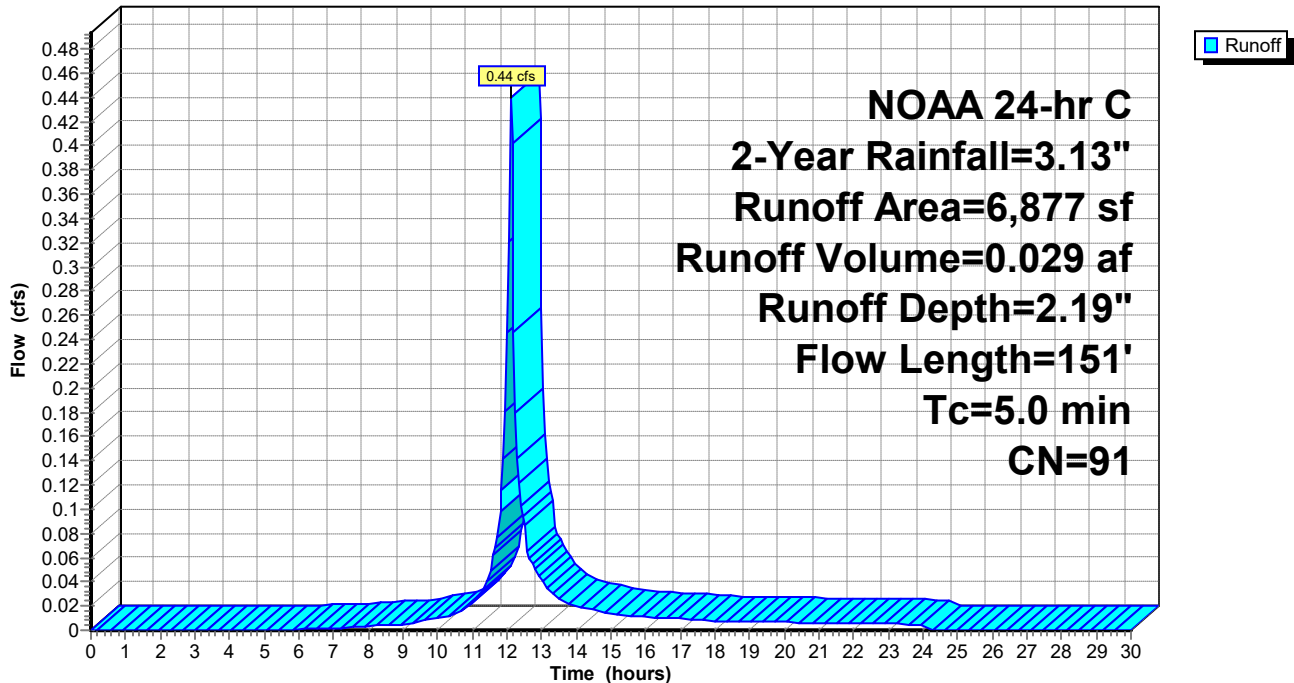
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

Area (sf)	CN	Description
1,993	74	>75% Grass cover, Good, HSG C
4,884	98	Paved parking, HSG C
6,877	91	Weighted Average
1,993		28.98% Pervious Area
4,884		71.02% 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



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

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

Runoff = 1.03 cfs @ 12.11 hrs, Volume= 0.071 af, Depth= 2.58"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

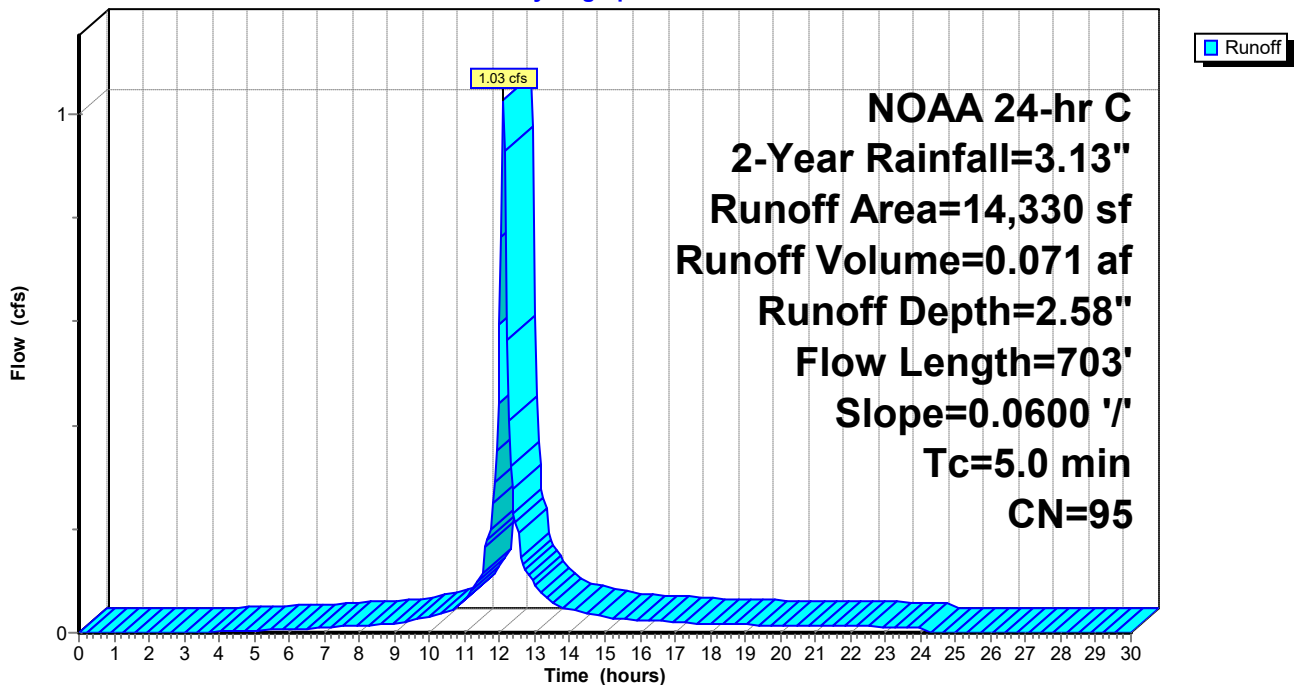
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

Area (sf)	CN	Description
* 1,110	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,676	98	Paved parking, HSG C
14,330	95	Weighted Average
1,654		11.54% Pervious Area
12,676		88.46% 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

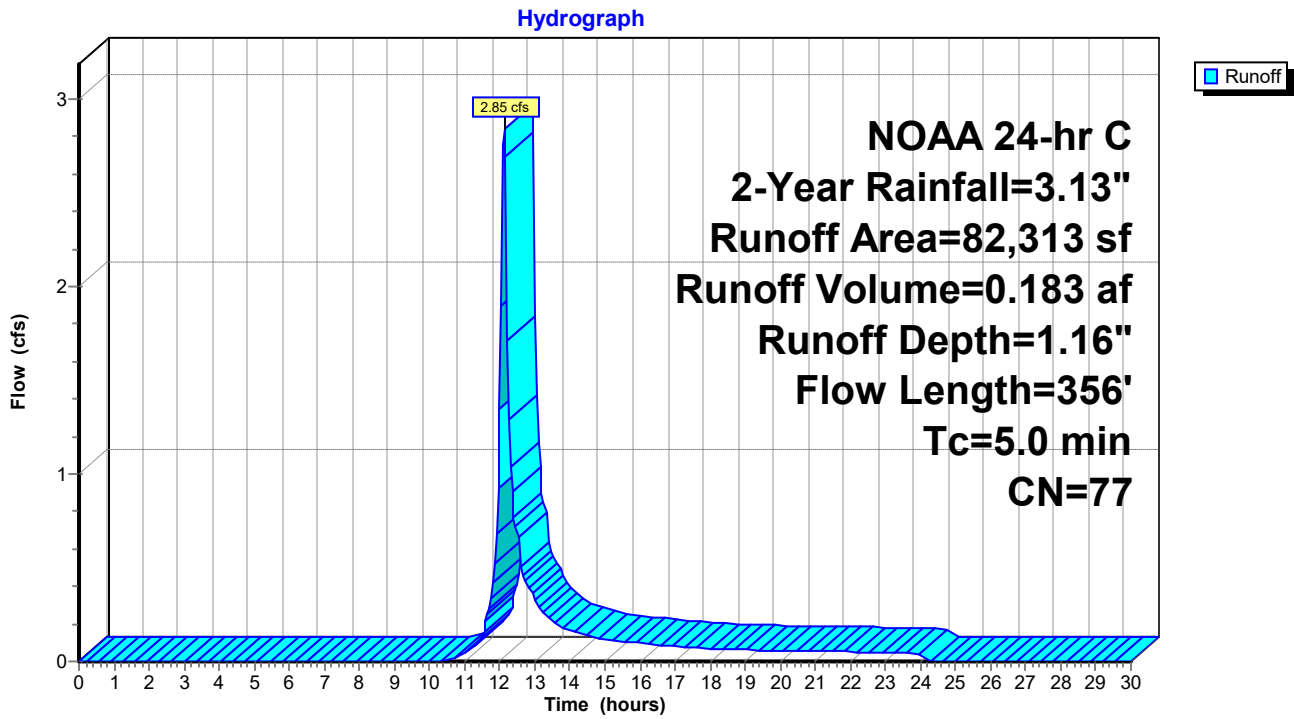
Runoff = 2.85 cfs @ 12.12 hrs, Volume= 0.183 af, Depth= 1.16"
 Routed to Reach DP#3 : LOW POINT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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)



Summary for Subcatchment P4: TO DCB-B

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

Runoff = 0.58 cfs @ 12.11 hrs, Volume= 0.039 af, Depth= 2.48"
 Routed to Reach DCB-B : TO OUTFALL

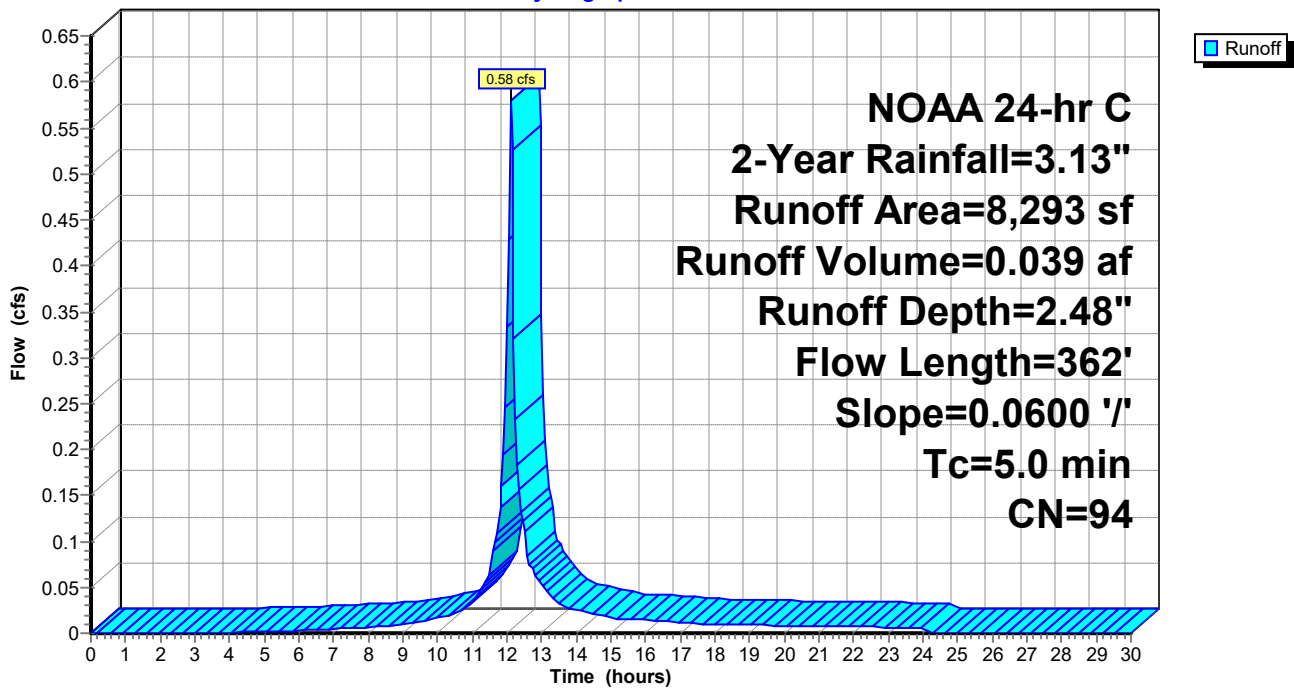
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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



Summary for Subcatchment p5: TO DCB-C

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

Runoff = 0.17 cfs @ 12.11 hrs, Volume= 0.013 af, Depth= 2.90"
 Routed to Reach DCB-C : TO OUTFALL

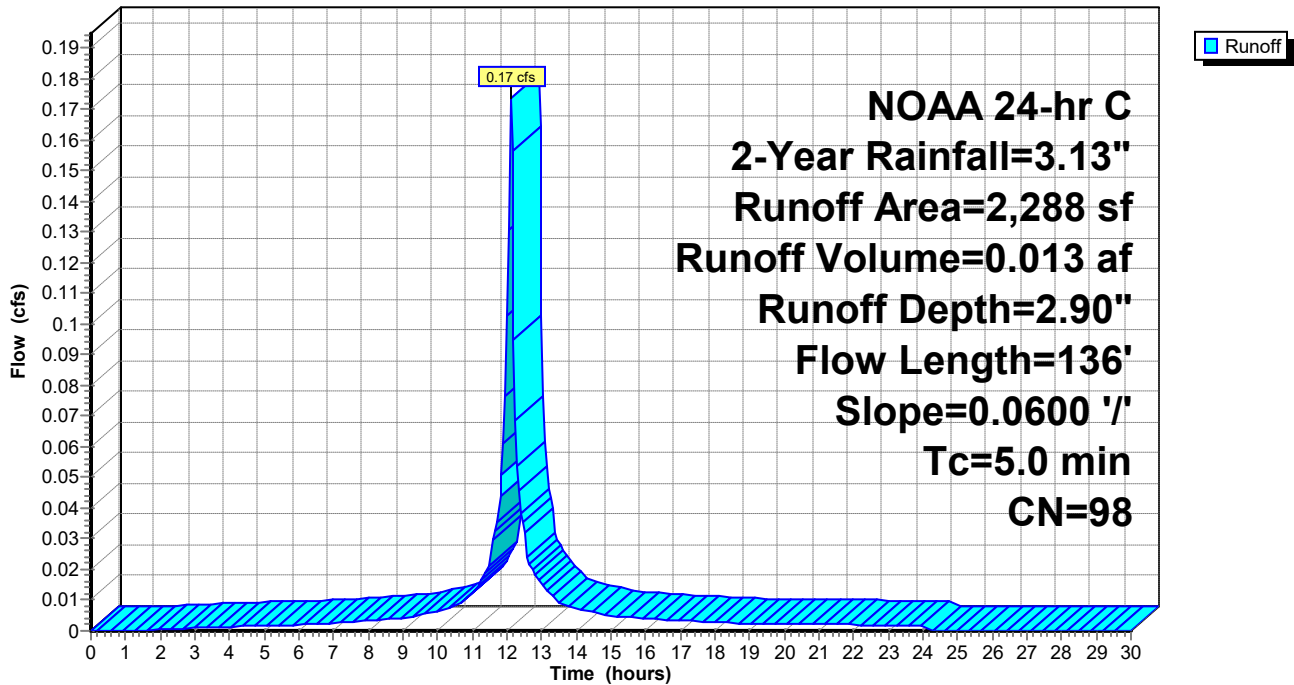
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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



Summary for Subcatchment p6: TO DCB-D

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

Runoff = 0.42 cfs @ 12.11 hrs, Volume= 0.031 af, Depth= 2.90"
 Routed to Reach DCB-D : TO DCB-C

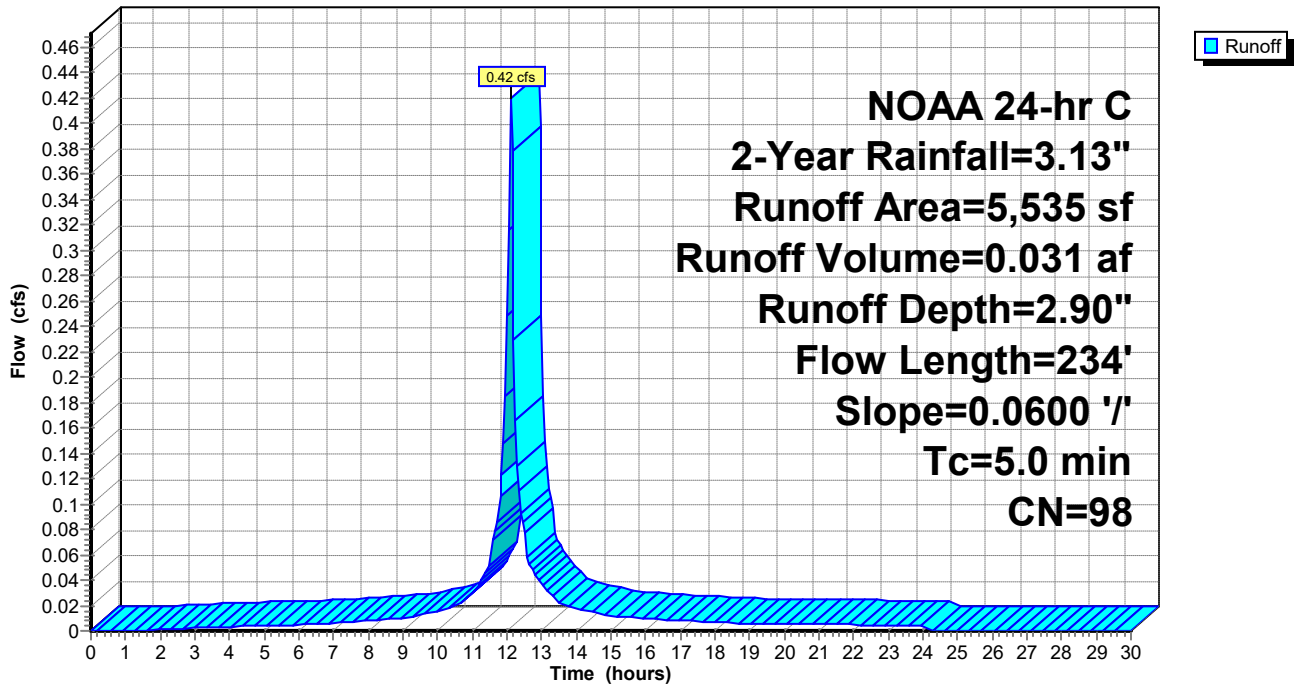
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.13"

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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NOAA 24-hr C 2-Year Rainfall=3.13"

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Summary for Subcatchment p7: TO DCB-E

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

Runoff = 0.27 cfs @ 12.12 hrs, Volume= 0.017 af, Depth= 1.93"
Routed to Reach DCB-E : TO DCB-D

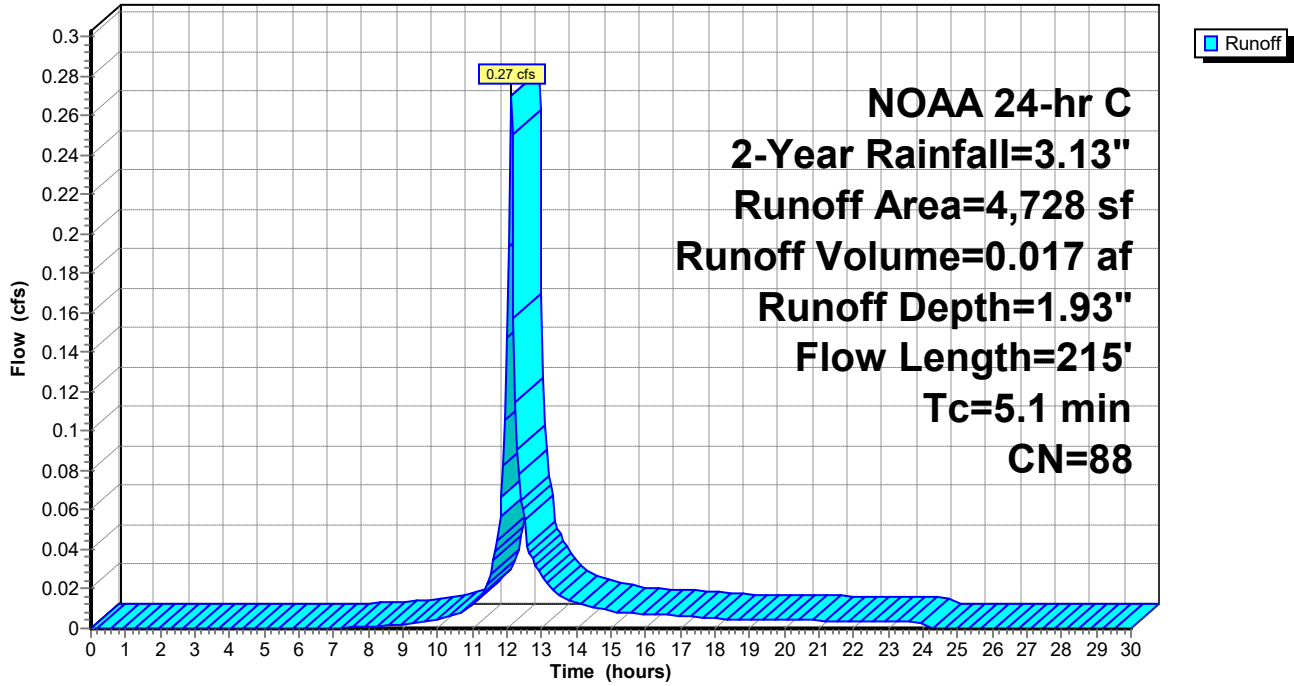
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.13"

Area (sf)	CN	Description
1,440	70	Woods, Good, HSG C
3,095	98	Paved parking, HSG C
193	74	>75% Grass cover, Good, HSG C
4,728	88	Weighted Average
1,633		34.54% Pervious Area
3,095		65.46% 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

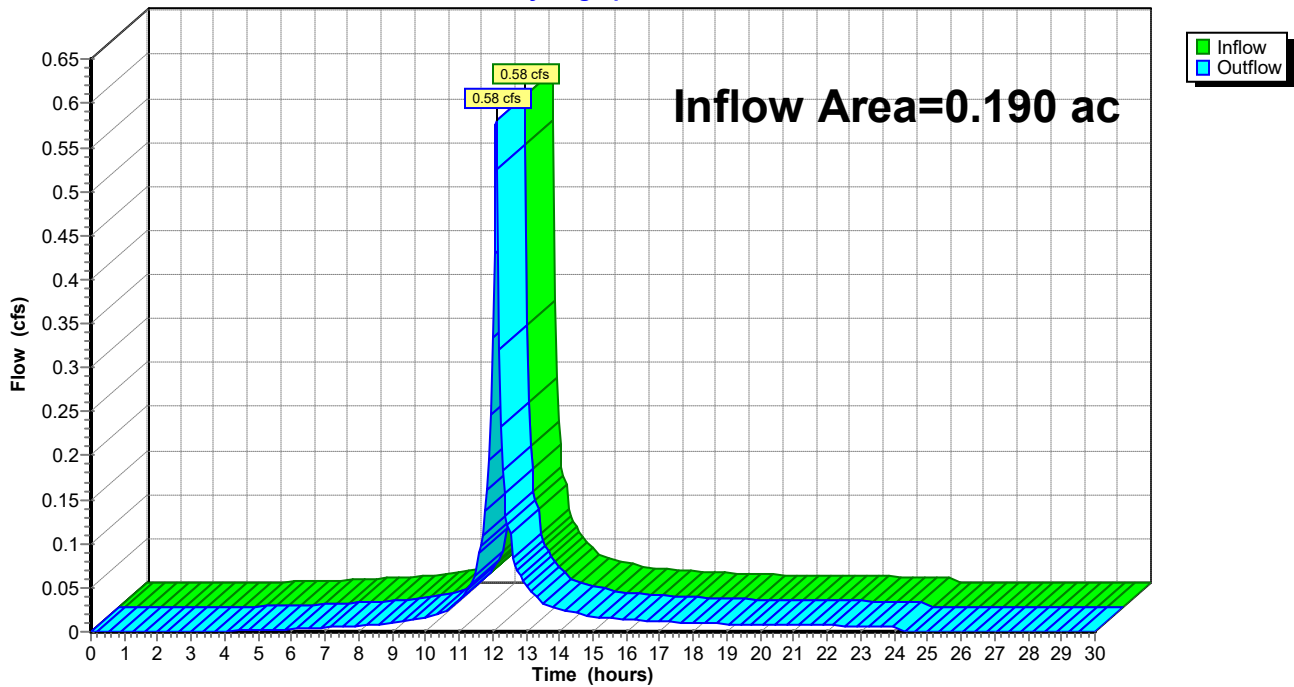
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.58 cfs @ 12.11 hrs, Volume= 0.039 af
Outflow = 0.58 cfs @ 12.11 hrs, Volume= 0.039 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

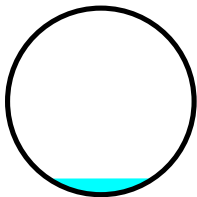
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 2.53" for 2-Year event
Inflow = 0.84 cfs @ 12.12 hrs, Volume= 0.061 af
Outflow = 0.84 cfs @ 12.13 hrs, Volume= 0.061 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= 10.96 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.61 fps, Avg. Travel Time= 0.3 min

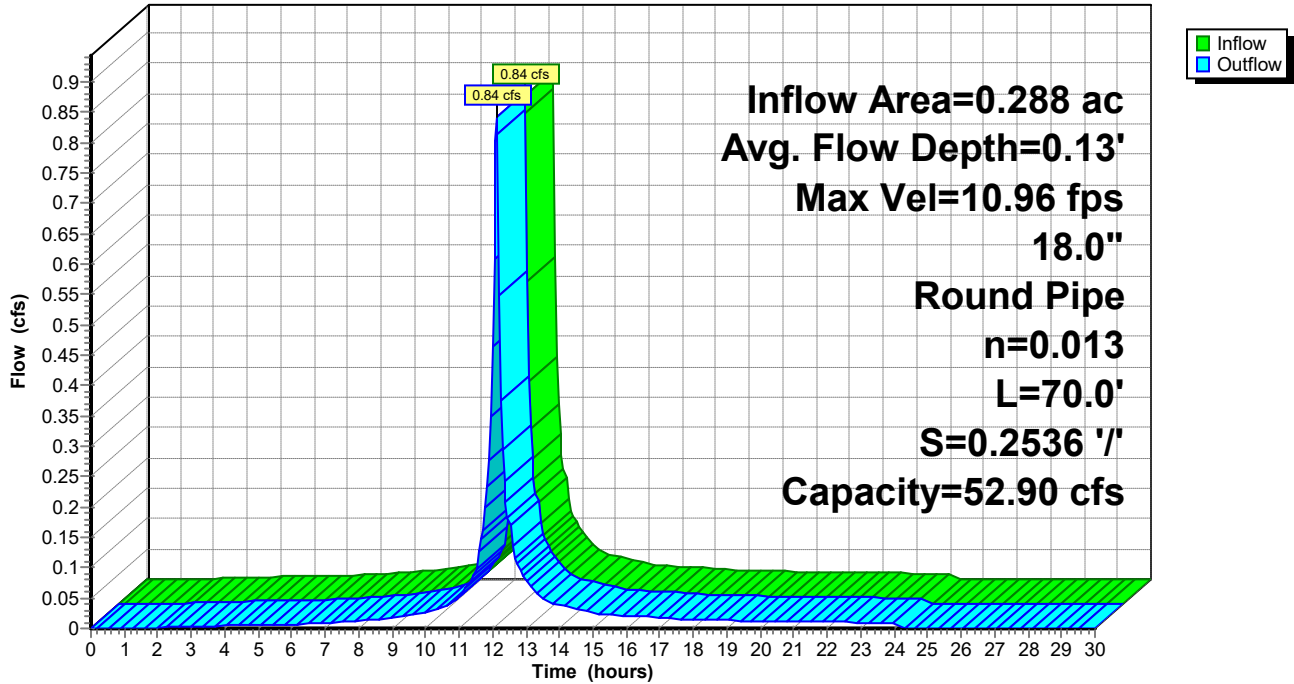
Peak Storage= 5 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 0.85'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

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

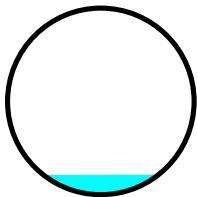
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.06' @ 12.10 hrs

Inflow Area = 0.236 ac, 84.09% Impervious, Inflow Depth = 2.45" for 2-Year event
Inflow = 0.68 cfs @ 12.12 hrs, Volume= 0.048 af
Outflow = 0.68 cfs @ 12.13 hrs, Volume= 0.048 af, Atten= 1%, Lag= 0.7 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= 6.53 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.09 fps, Avg. Travel Time= 0.9 min

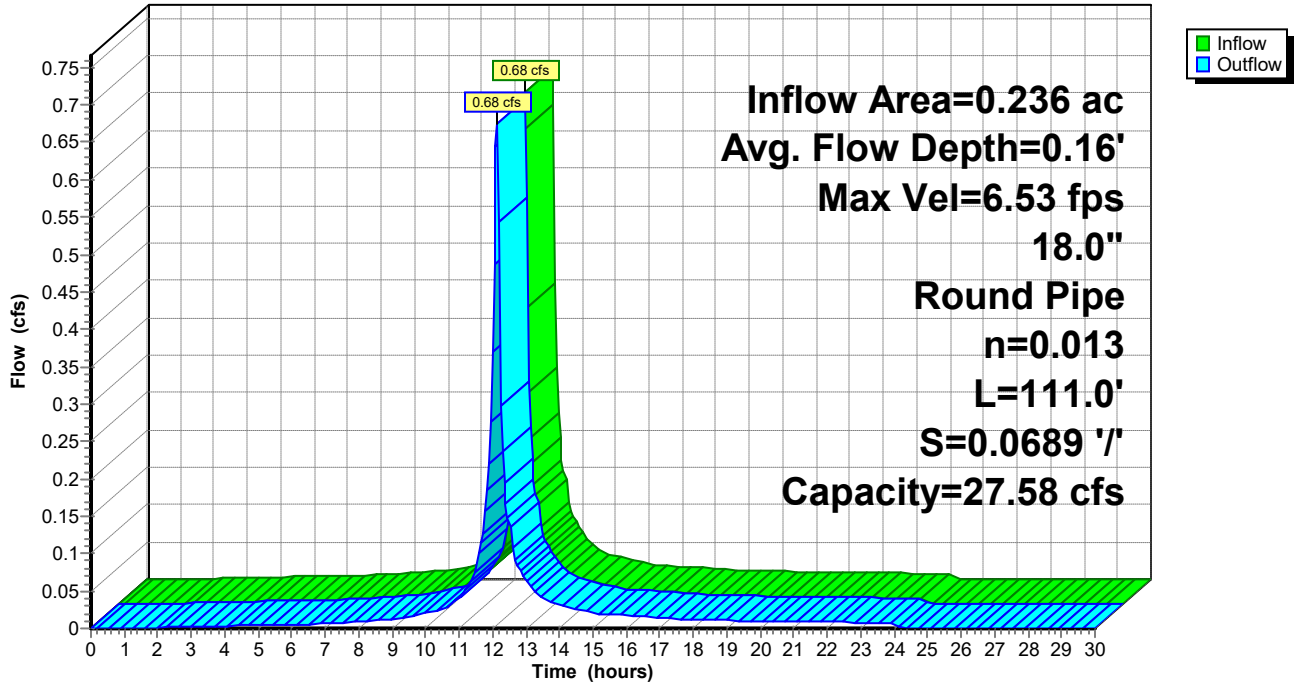
Peak Storage= 11 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 0.93'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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

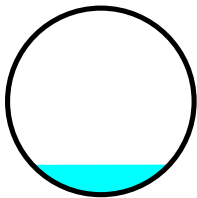
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.109 ac, 65.46% Impervious, Inflow Depth = 1.93" for 2-Year event
Inflow = 0.27 cfs @ 12.12 hrs, Volume= 0.017 af
Outflow = 0.27 cfs @ 12.12 hrs, Volume= 0.017 af, Atten= 2%, Lag= 0.5 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= 3.26 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.09 fps, Avg. Travel Time= 0.6 min

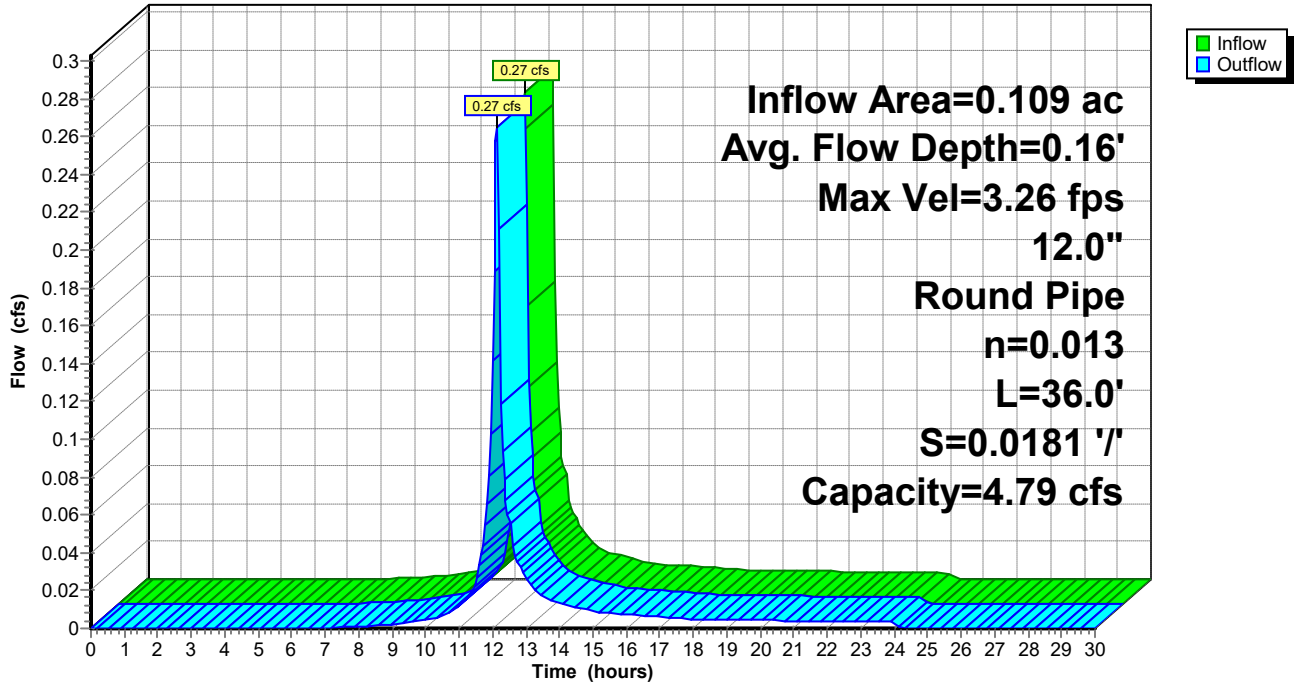
Peak Storage= 3 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 0.73'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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



3010-POST-SUBDIVISION-R1

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NOAA 24-hr C 2-Year Rainfall=3.13"

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Summary for Reach DCB100: TO DMH#100

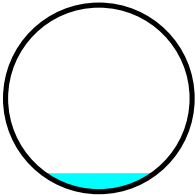
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.035 ac, 80.69% Impervious, Inflow Depth = 2.38" for 2-Year event
Inflow = 0.10 cfs @ 12.11 hrs, Volume= 0.007 af
Outflow = 0.10 cfs @ 12.14 hrs, Volume= 0.007 af, Atten= 4%, 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= 2.51 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 2.6 min

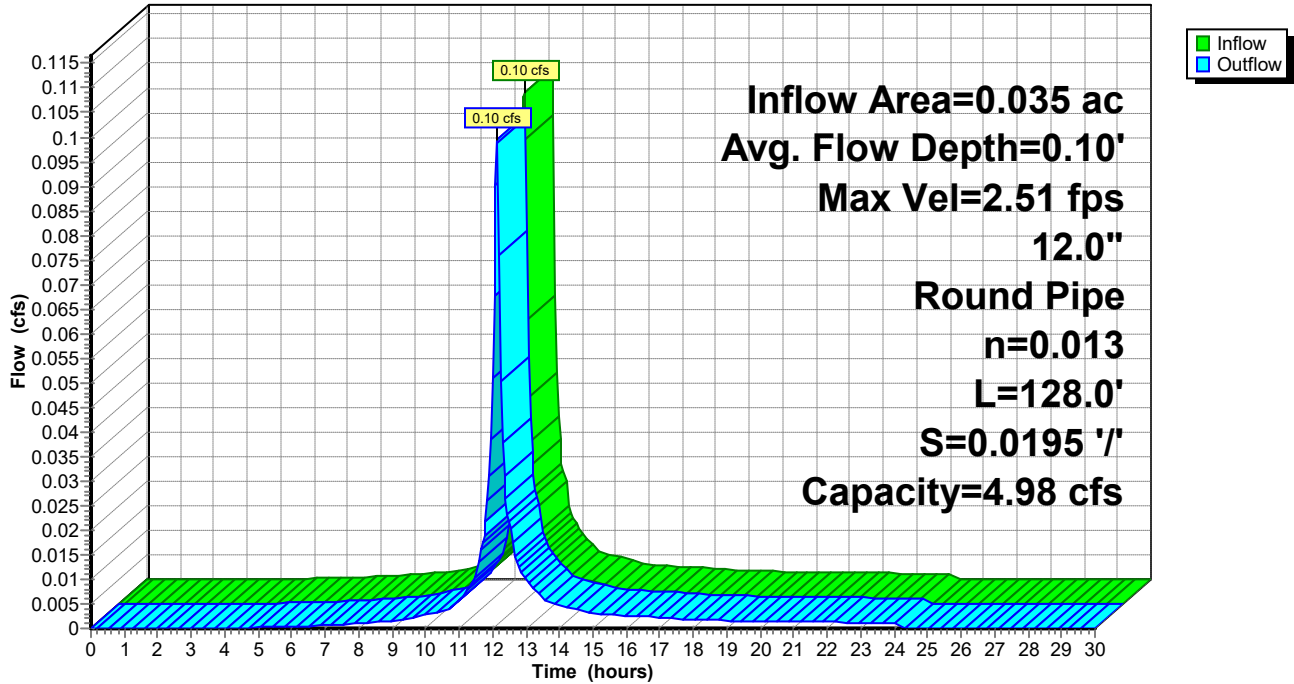
Peak Storage= 5 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 0.60'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.98 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 128.0' Slope= 0.0195 '/'
Inlet Invert= 138.50', Outlet Invert= 136.00'



Reach DCB100: TO DMH#100

Hydrograph



Summary for Reach DCB101: TO DMH#100

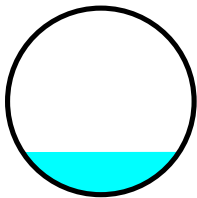
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.158 ac, 71.02% Impervious, Inflow Depth = 2.19" for 2-Year event
Inflow = 0.44 cfs @ 12.11 hrs, Volume= 0.029 af
Outflow = 0.43 cfs @ 12.12 hrs, Volume= 0.029 af, Atten= 2%, 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= 3.18 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.02 fps, Avg. Travel Time= 0.6 min

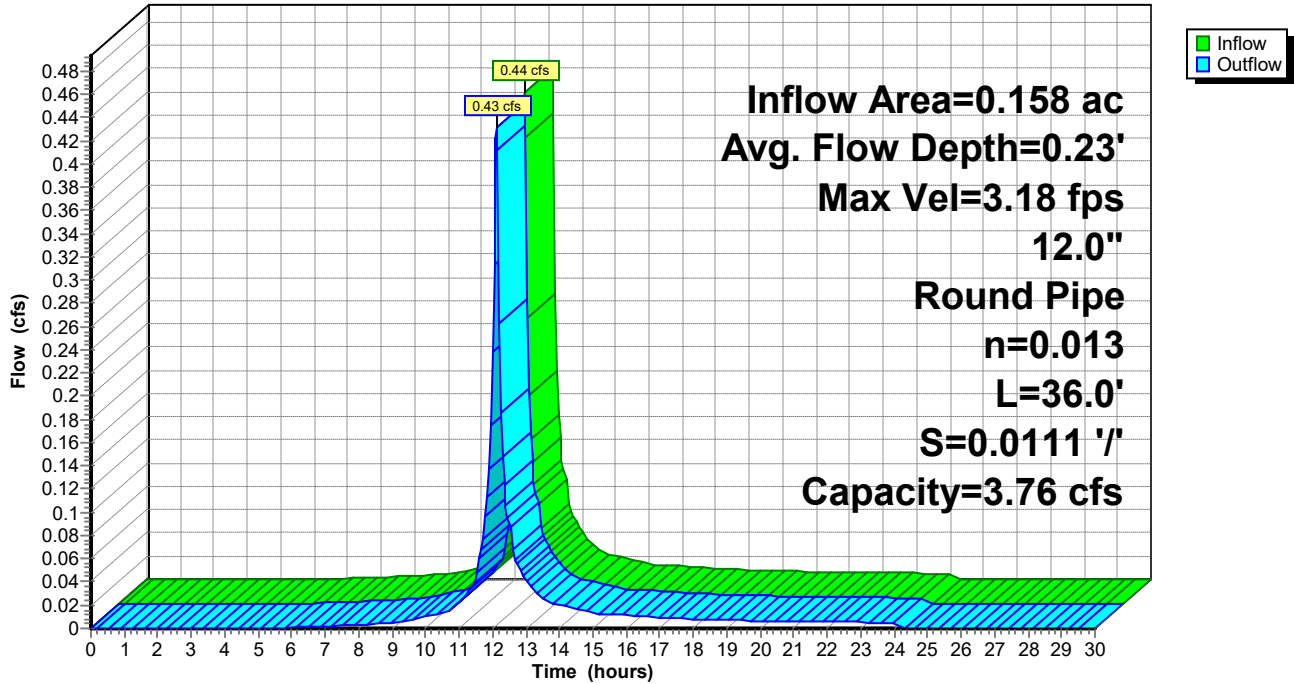
Peak Storage= 5 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 0.84'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 36.0' Slope= 0.0111 1'
Inlet Invert= 136.40', Outlet Invert= 136.00'



Reach DCB101: TO DMH#100

Hydrograph



Summary for Reach DMH100: TO UGS#1A

[52] Hint: Inlet/Outlet conditions not evaluated

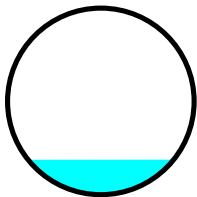
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 2.23" for 2-Year event
 Inflow = 0.53 cfs @ 12.12 hrs, Volume= 0.036 af
 Outflow = 0.53 cfs @ 12.13 hrs, Volume= 0.036 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= 5.14 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.1 min

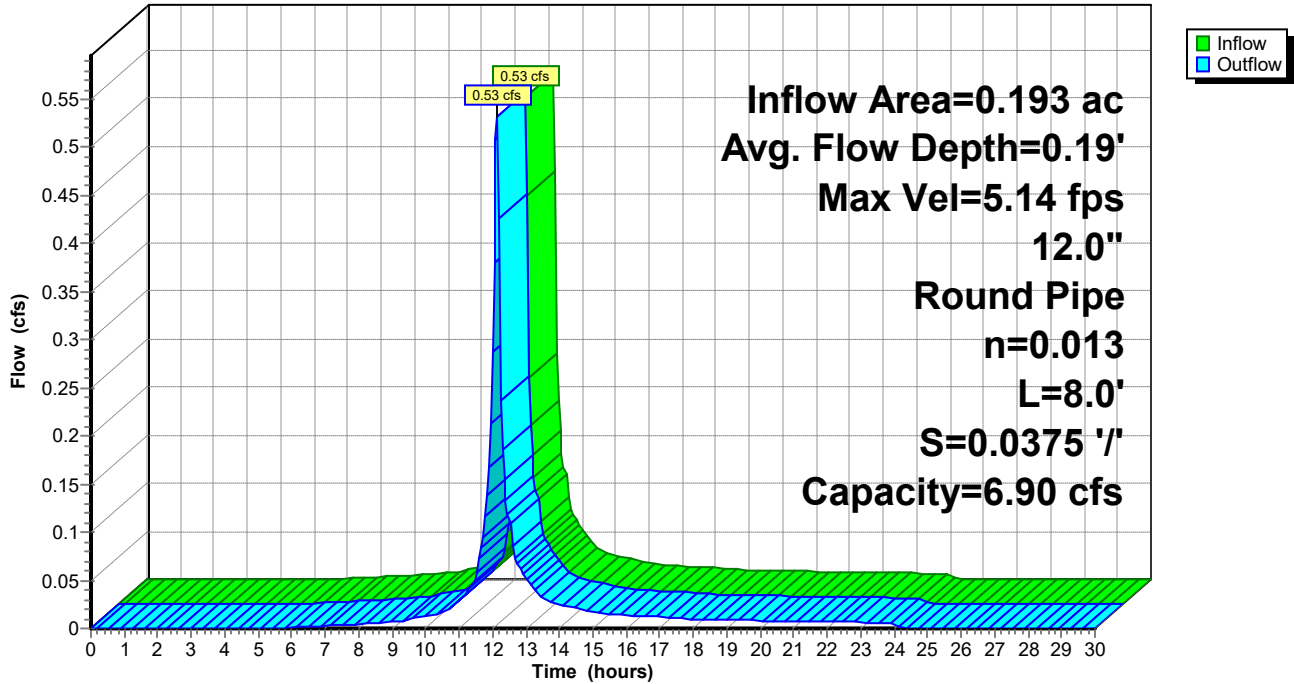
Peak Storage= 1 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.19' , Surface Width= 0.78'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

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

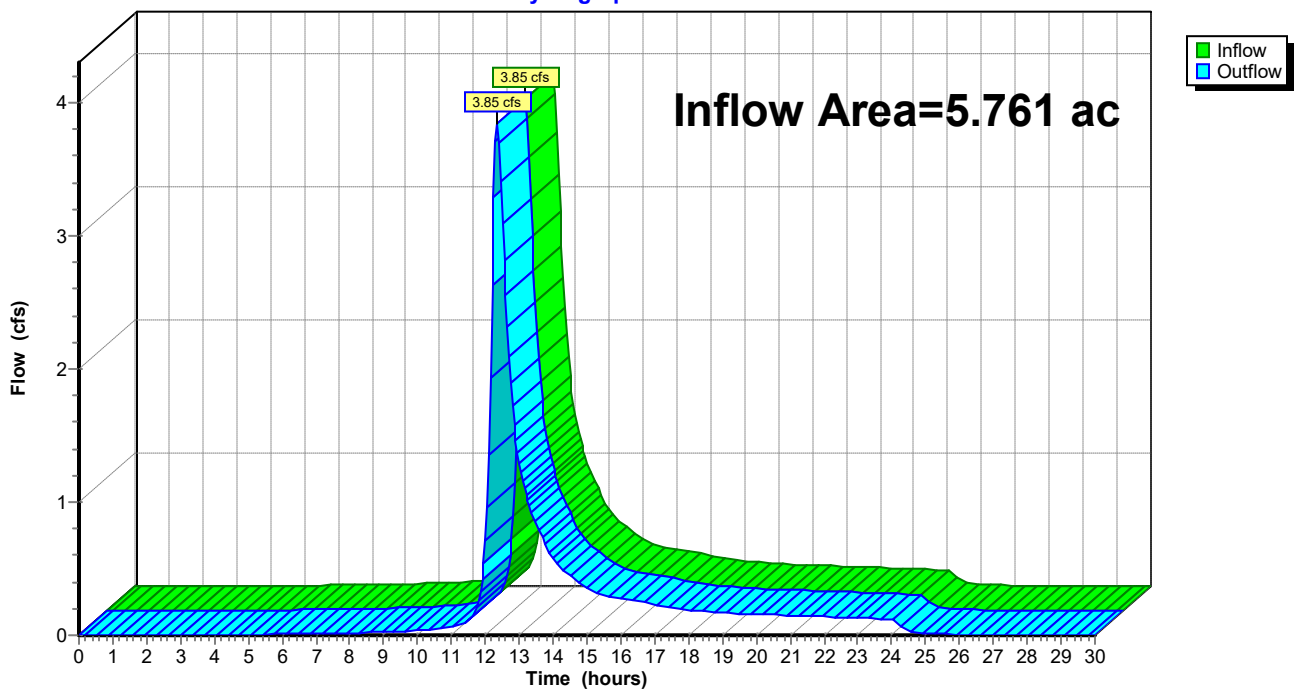
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 5.761 ac, 11.23% Impervious, Inflow Depth = 0.98" for 2-Year event
Inflow = 3.85 cfs @ 12.35 hrs, Volume= 0.470 af
Outflow = 3.85 cfs @ 12.35 hrs, Volume= 0.470 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

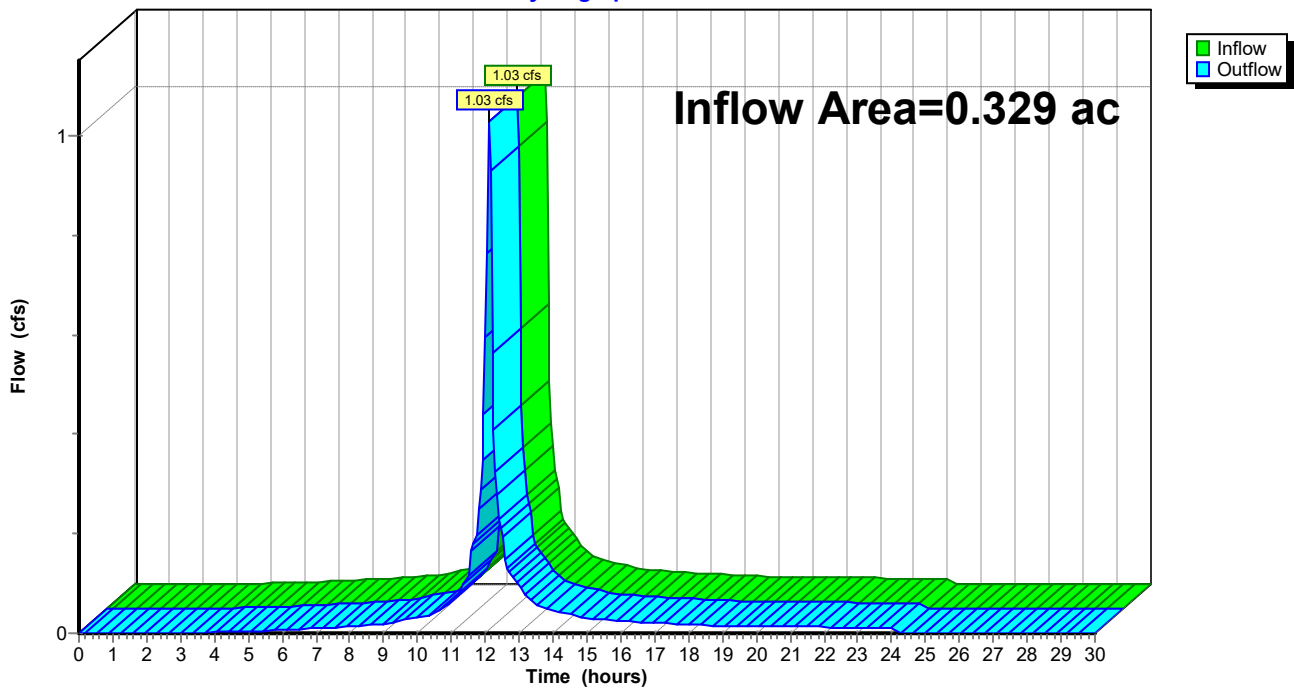
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 88.46% Impervious, Inflow Depth = 2.58" for 2-Year event
Inflow = 1.03 cfs @ 12.11 hrs, Volume= 0.071 af
Outflow = 1.03 cfs @ 12.11 hrs, Volume= 0.071 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

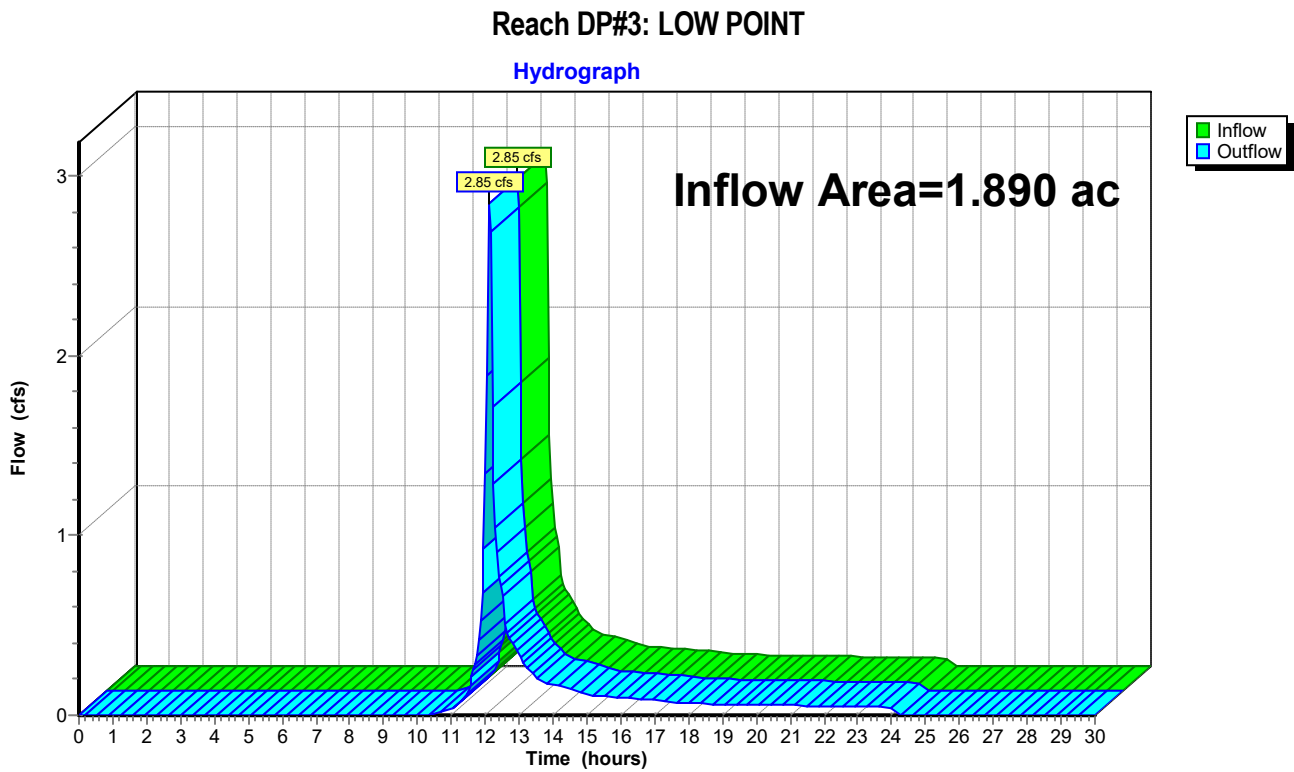


Summary for Reach DP#3: LOW POINT

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

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 2.85 cfs @ 12.12 hrs, Volume= 0.183 af
Outflow = 2.85 cfs @ 12.12 hrs, Volume= 0.183 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 OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
 Inflow = 0.58 cfs @ 12.11 hrs, Volume= 0.039 af
 Outflow = 0.55 cfs @ 12.14 hrs, Volume= 0.039 af, Atten= 5%, Lag= 1.7 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= 0.78 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 0.30 fps, Avg. Travel Time= 2.6 min

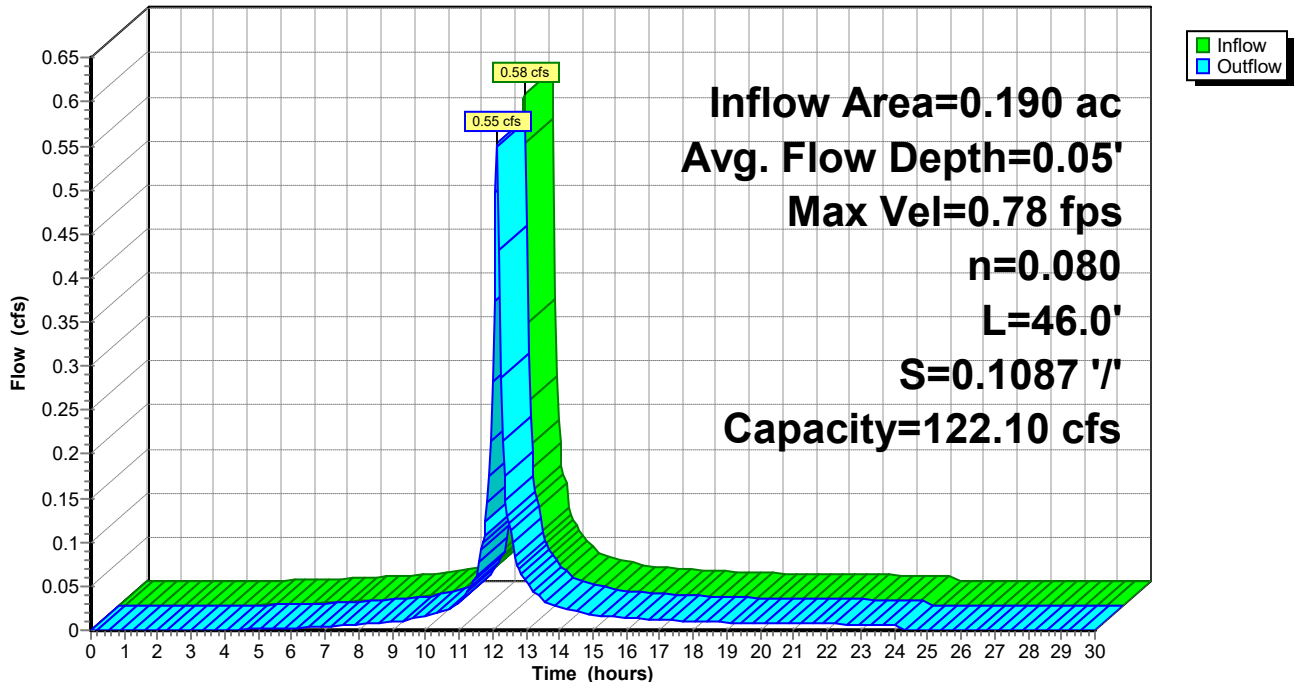
Peak Storage= 34 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.05', Surface Width= 15.94'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.55 cfs @ 12.14 hrs, Volume= 0.039 af
Outflow = 0.47 cfs @ 12.27 hrs, Volume= 0.039 af, Atten= 14%, Lag= 7.7 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= 0.69 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 13.2 min

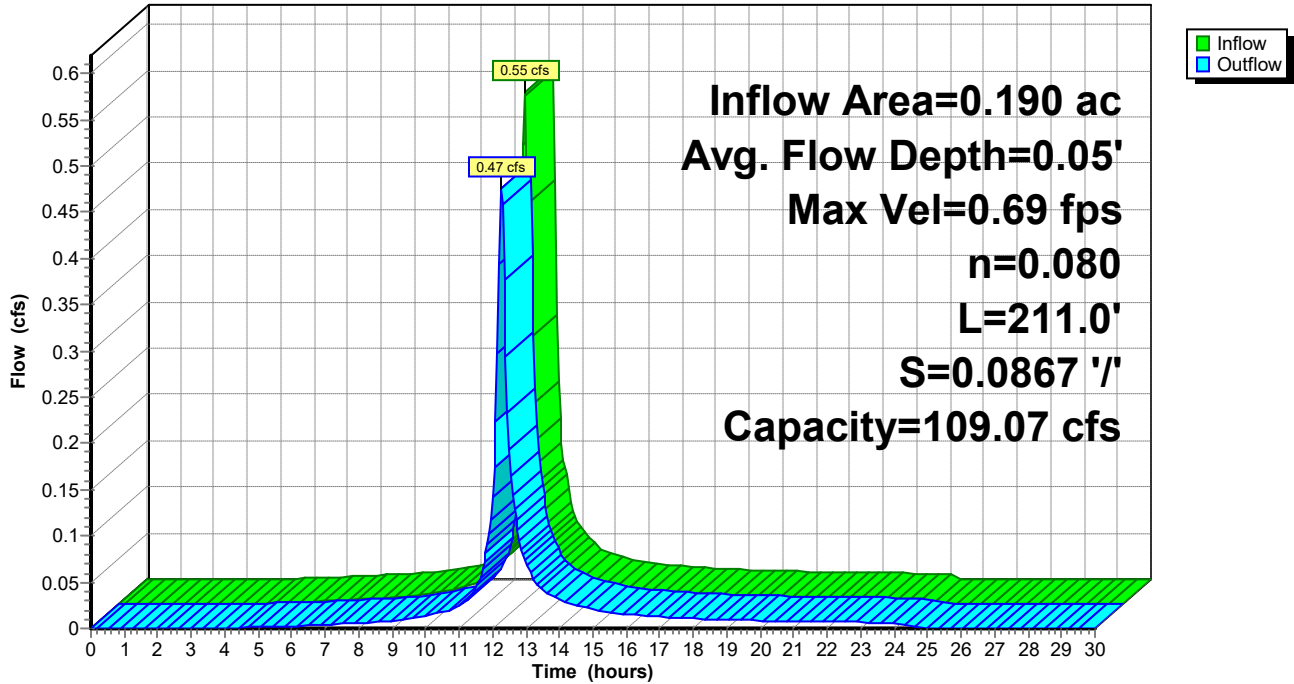
Peak Storage= 149 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.05', Surface Width= 15.91'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.47 cfs @ 12.27 hrs, Volume= 0.039 af
Outflow = 0.47 cfs @ 12.29 hrs, Volume= 0.039 af, Atten= 2%, Lag= 1.4 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= 0.49 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 2.3 min

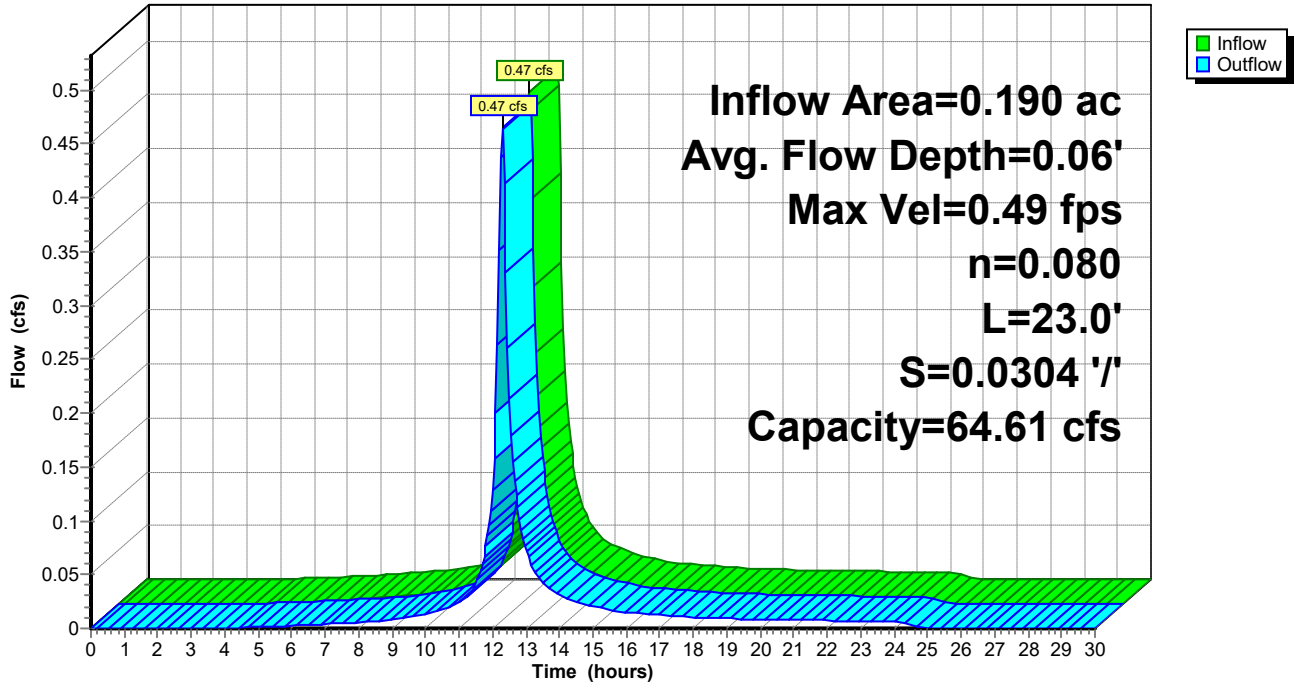
Peak Storage= 22 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.23'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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' @ 12.50 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 2.48" for 2-Year event
Inflow = 0.47 cfs @ 12.29 hrs, Volume= 0.039 af
Outflow = 0.37 cfs @ 12.56 hrs, Volume= 0.039 af, Atten= 21%, Lag= 16.1 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= 0.20 fps, Min. Travel Time= 10.7 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 31.5 min

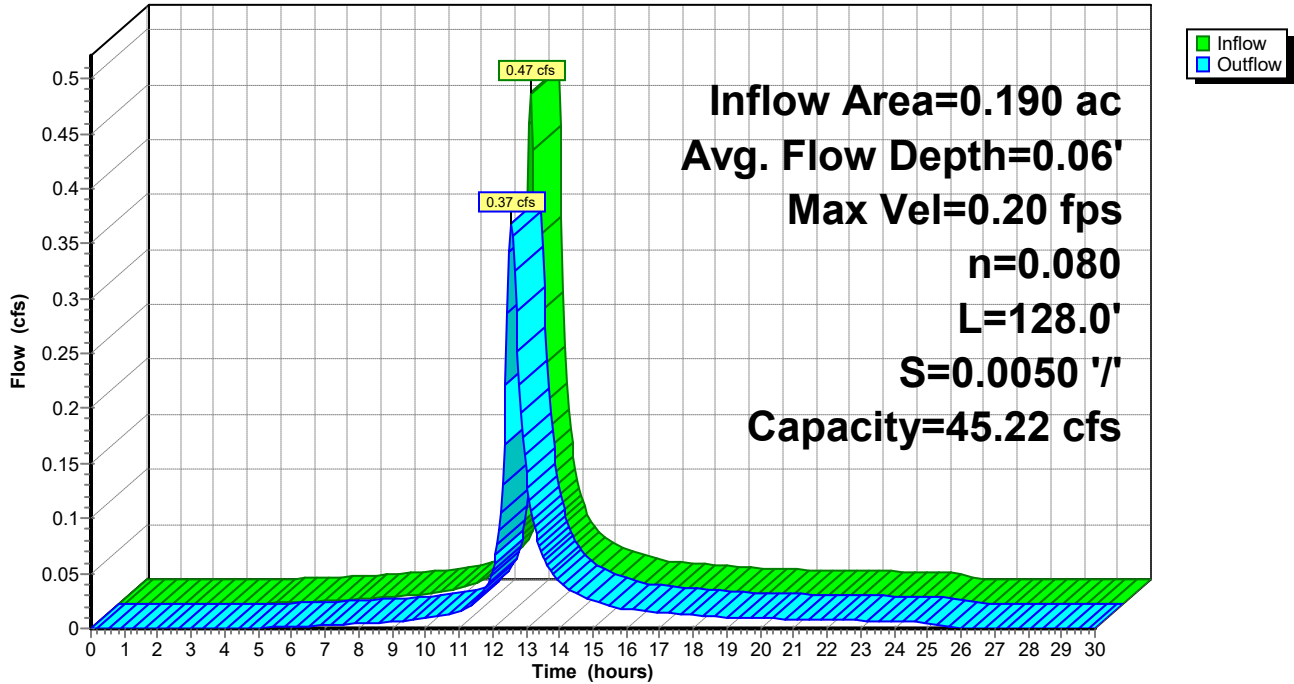
Peak Storage= 237 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.06', Surface Width= 31.21'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 0.288 ac, 86.99% Impervious, Inflow Depth = 2.53" for 2-Year event
 Inflow = 0.84 cfs @ 12.13 hrs, Volume= 0.061 af
 Outflow = 0.72 cfs @ 12.26 hrs, Volume= 0.061 af, Atten= 15%, Lag= 8.2 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= 0.84 fps, Min. Travel Time= 5.6 min
 Avg. Velocity = 0.30 fps, Avg. Travel Time= 16.1 min

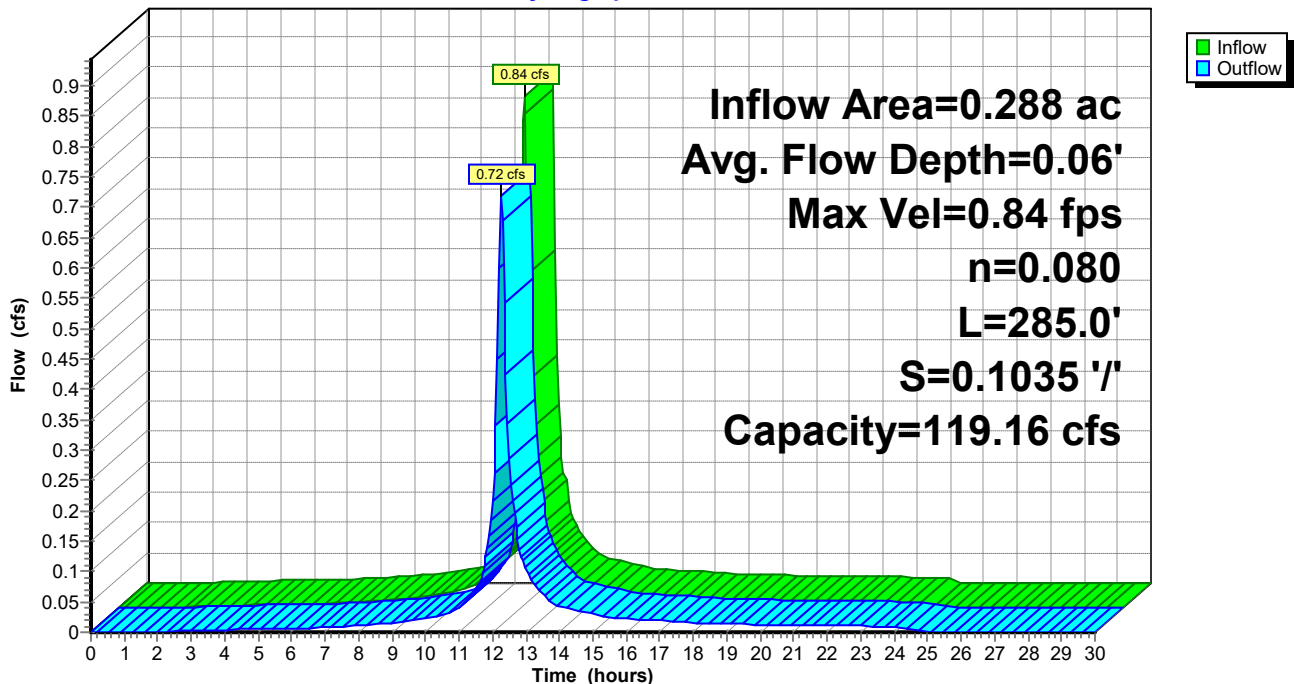
Peak Storage= 244 cf @ 12.17 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.10'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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 0.09' @ 12.35 hrs

[62] Hint: Exceeded Reach OL7 OUTLET depth by 0.08' @ 12.30 hrs

Inflow Area = 0.481 ac, 81.29% Impervious, Inflow Depth > 2.41" for 2-Year event
Inflow = 0.77 cfs @ 12.27 hrs, Volume= 0.097 af
Outflow = 0.70 cfs @ 12.38 hrs, Volume= 0.097 af, Atten= 9%, Lag= 6.9 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= 0.33 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 14.5 min

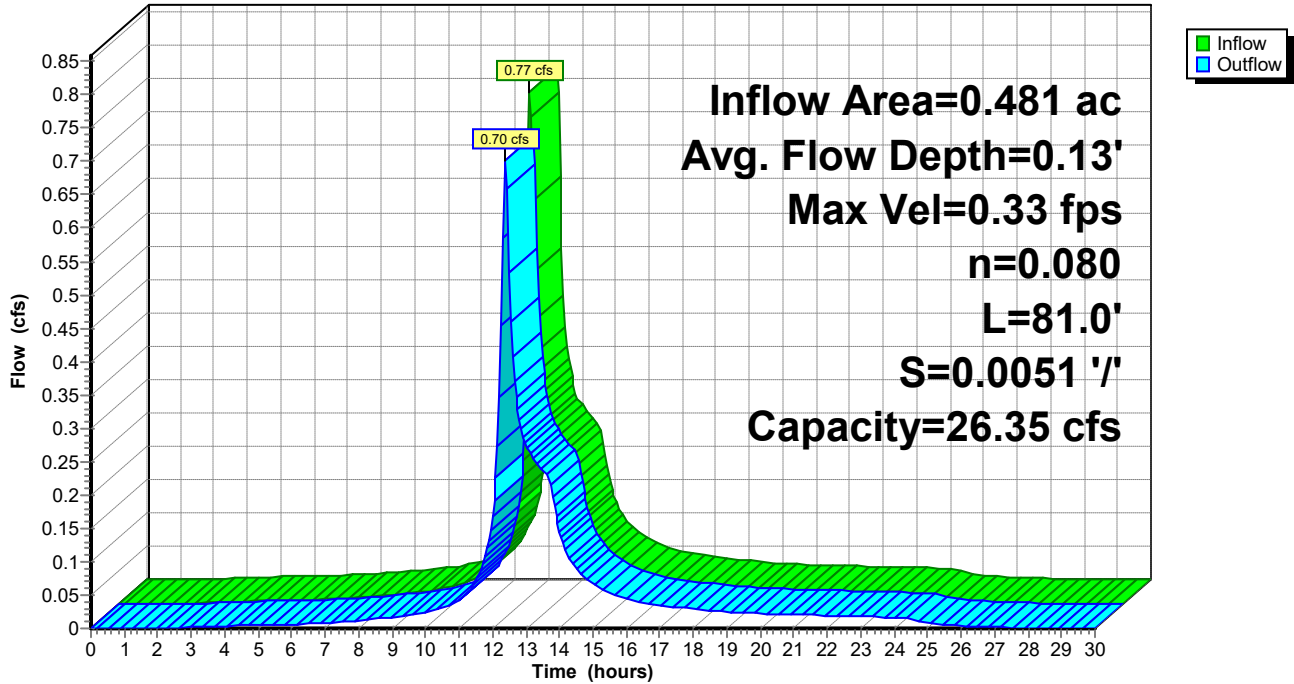
Peak Storage= 177 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 17.68'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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 OL-8: OVERLAND

[61] Hint: Exceeded Reach UGS1B outlet invert by 0.02' @ 12.05 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 2.23" for 2-Year event
Inflow = 0.17 cfs @ 12.00 hrs, Volume= 0.036 af
Outflow = 0.17 cfs @ 12.10 hrs, Volume= 0.036 af, Atten= 0%, Lag= 6.0 min
Routed to Reach OL7 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.55 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 3.8 min

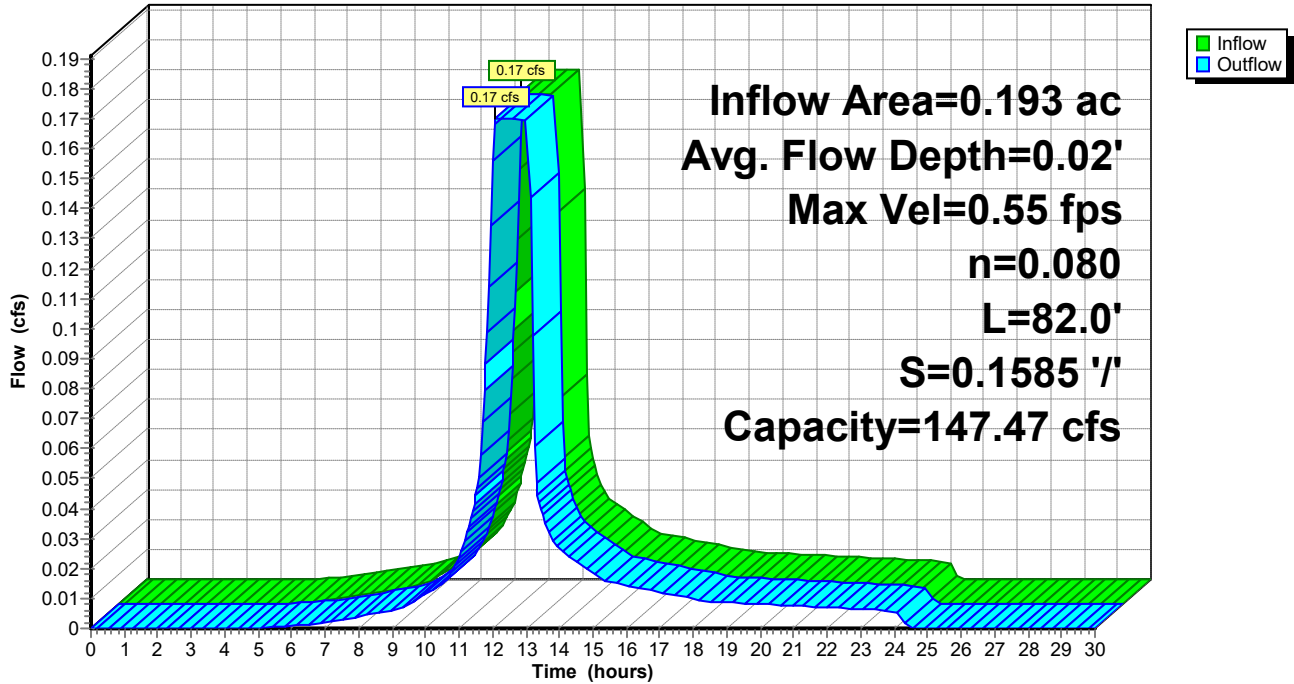
Peak Storage= 25 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 15.41'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 147.47 cfs

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= 82.0' Slope= 0.1585 ' '
Inlet Invert= 125.00', Outlet Invert= 112.00'



Reach OL-8: OVERLAND

Hydrograph



Summary for Reach OL7: OVERLAND

[62] Hint: Exceeded Reach OL-8 OUTLET depth by 0.05' @ 13.20 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 2.23" for 2-Year event
Inflow = 0.17 cfs @ 12.10 hrs, Volume= 0.036 af
Outflow = 0.17 cfs @ 13.48 hrs, Volume= 0.036 af, Atten= 1%, Lag= 83.0 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= 0.18 fps, Min. Travel Time= 25.1 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 65.4 min

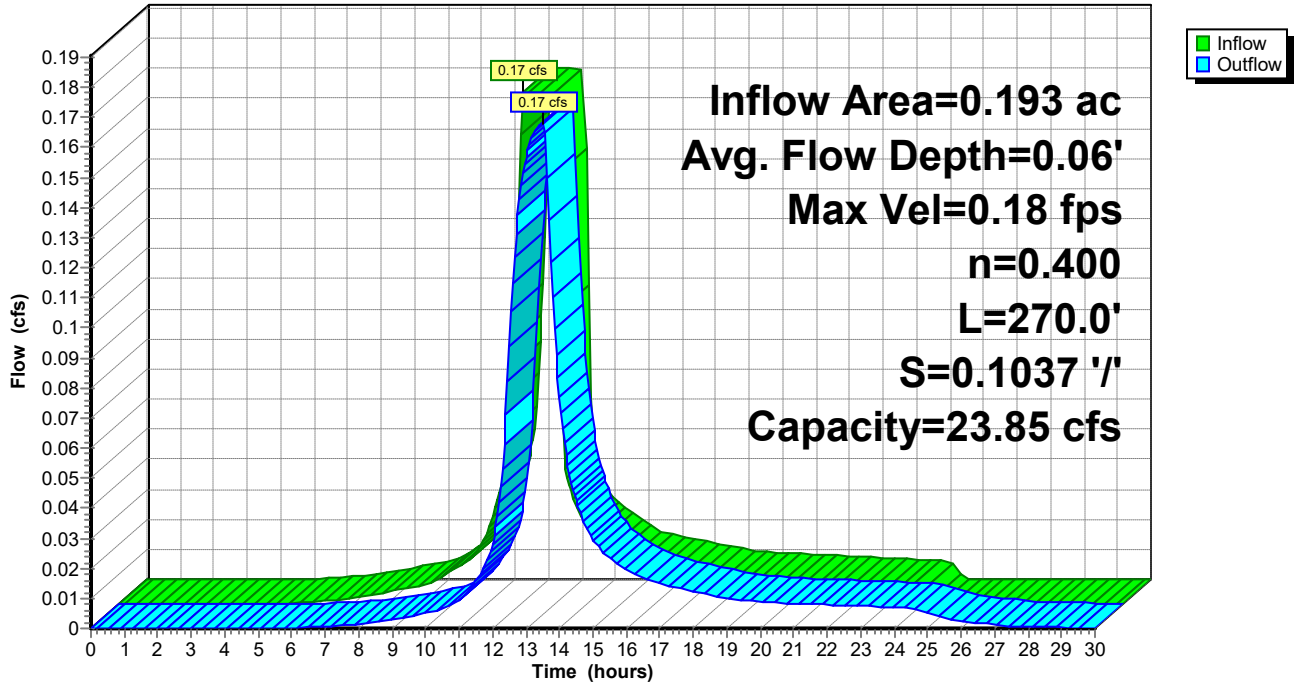
Peak Storage= 253 cf @ 13.08 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.20'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 23.85 cfs

15.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 ' Top Width= 35.00'
Length= 270.0' Slope= 0.1037 '
Inlet Invert= 112.00', Outlet Invert= 84.00'



Reach OL7: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

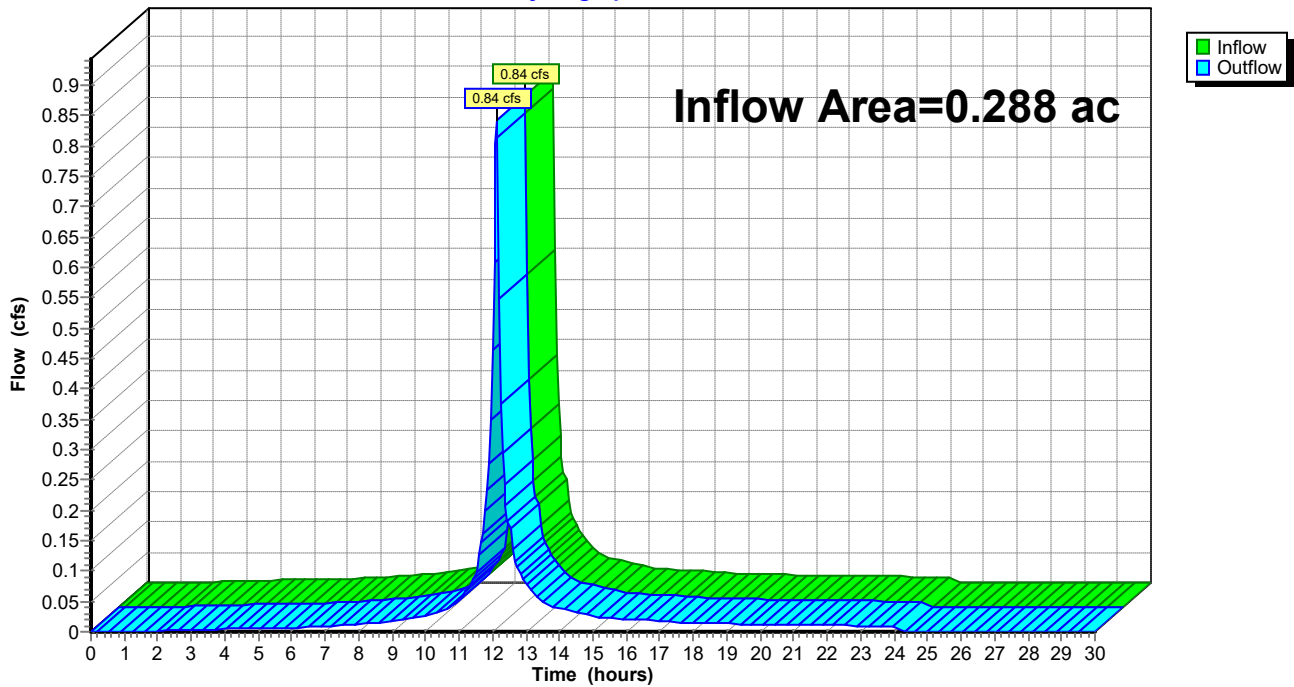
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 2.53" for 2-Year event
Inflow = 0.84 cfs @ 12.13 hrs, Volume= 0.061 af
Outflow = 0.84 cfs @ 12.13 hrs, Volume= 0.061 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

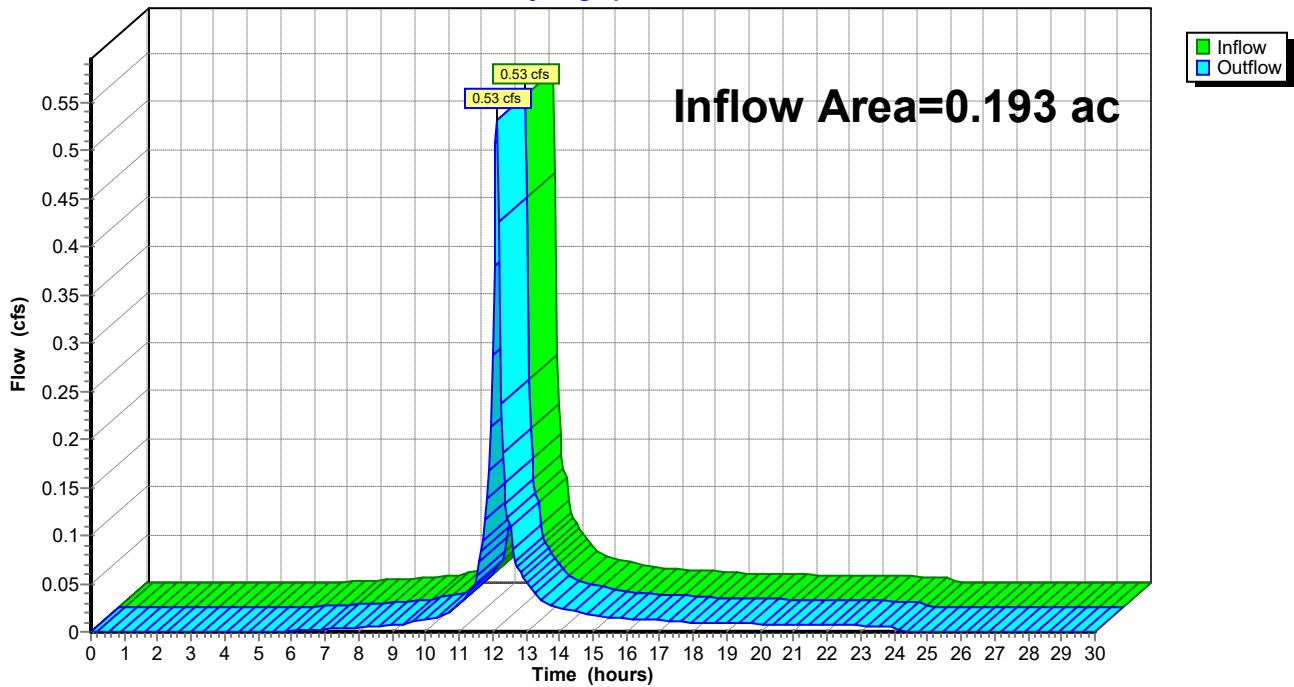
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 2.23" for 2-Year event
Inflow = 0.53 cfs @ 12.13 hrs, Volume= 0.036 af
Outflow = 0.53 cfs @ 12.13 hrs, Volume= 0.036 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



Summary for Reach UGS1B: TO FE#1

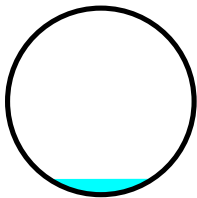
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 2.23" for 2-Year event
Inflow = 0.17 cfs @ 11.95 hrs, Volume= 0.036 af
Outflow = 0.17 cfs @ 12.00 hrs, Volume= 0.036 af, Atten= 0%, Lag= 3.0 min
Routed to Reach OL-8 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.23 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.38 fps, Avg. Travel Time= 0.4 min

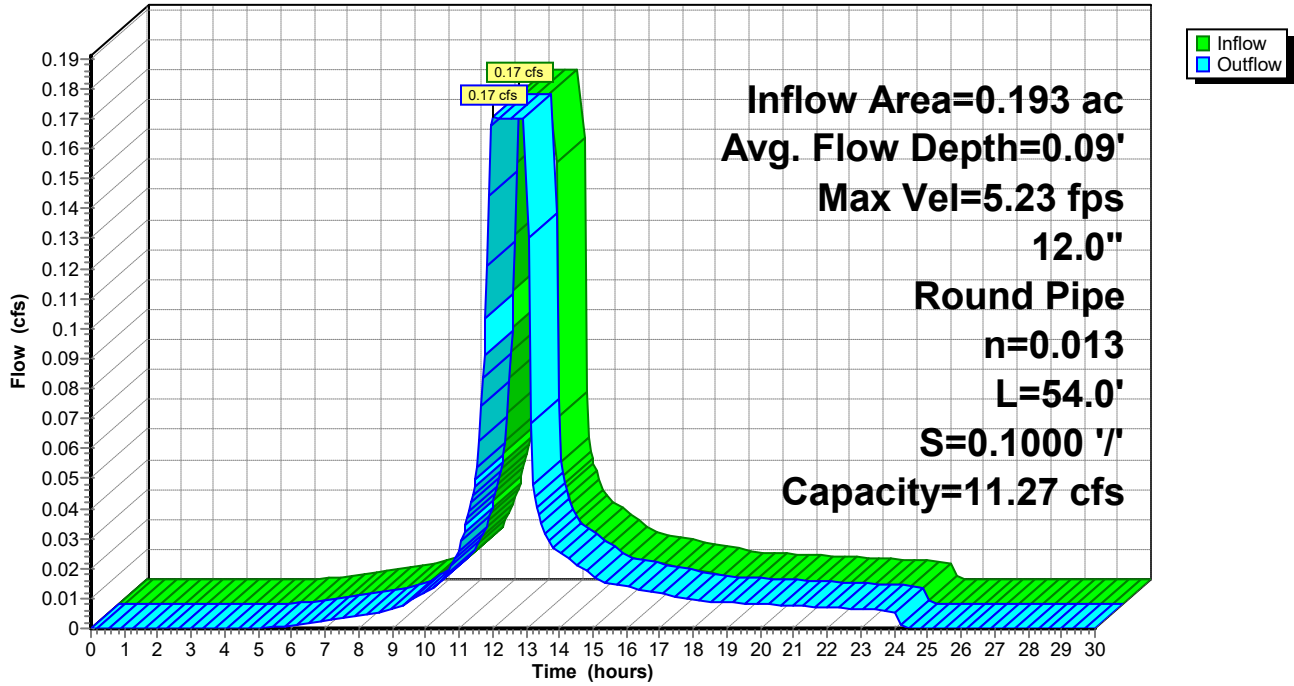
Peak Storage= 2 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 0.56'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 11.27 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 54.0' Slope= 0.1000 '/
Inlet Invert= 130.40', Outlet Invert= 125.00'



Reach UGS1B: TO FE#1

Hydrograph



Summary for Pond UGS1: TO UGS1B

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

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 2.23" for 2-Year event
 Inflow = 0.53 cfs @ 12.13 hrs, Volume= 0.036 af
 Outflow = 0.17 cfs @ 11.95 hrs, Volume= 0.036 af, Atten= 68%, Lag= 0.0 min
 Primary = 0.17 cfs @ 11.95 hrs, Volume= 0.036 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= 134.19' @ 12.33 hrs Surf.Area= 0.016 ac Storage= 0.006 af

Plug-Flow detention time= 8.3 min calculated for 0.036 af (100% of inflow)
 Center-of-Mass det. time= 8.3 min (812.6 - 804.3)

Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.024 af	20.00'W x 22.00'L x 6.00'H Prismatic 0.061 af Overall x 40.0% Voids
#2	134.00'	0.021 af	Shea Leaching Chamber 4x4x4 x 20 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 20 Chambers in 5 Rows
		0.046 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'	8.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads

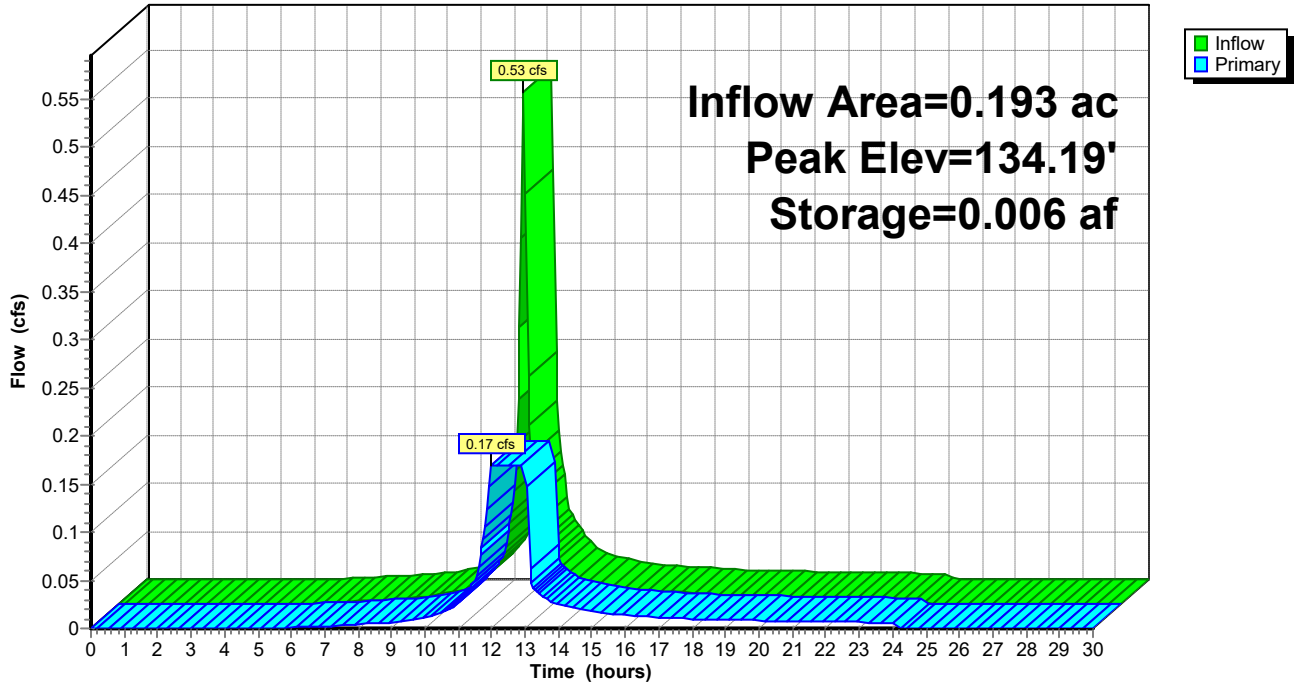
Primary OutFlow Max=0.17 cfs @ 11.95 hrs HW=133.15' (Free Discharge)

└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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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=221,713 sf 1.89% Impervious Runoff Depth=1.93" Flow Length=770' Tc=19.9 min CN=70 Runoff=8.12 cfs 0.817 af
Subcatchment p100: TO DCB#100	Runoff Area=1,528 sf 80.69% Impervious Runoff Depth=4.05" Flow Length=68' Slope=0.0200 '/ Tc=5.0 min CN=93 Runoff=0.17 cfs 0.012 af
Subcatchment p101: TO DCB#101	Runoff Area=6,877 sf 71.02% Impervious Runoff Depth=3.84" Flow Length=151' Tc=5.0 min CN=91 Runoff=0.75 cfs 0.050 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,330 sf 88.46% Impervious Runoff Depth=4.27" Flow Length=703' Slope=0.0600 '/ Tc=5.0 min CN=95 Runoff=1.65 cfs 0.117 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=2.50" Flow Length=356' Tc=5.0 min CN=77 Runoff=6.19 cfs 0.393 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=4.16" Flow Length=362' Slope=0.0600 '/ Tc=5.0 min CN=94 Runoff=0.94 cfs 0.066 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=4.61" Flow Length=136' Slope=0.0600 '/ Tc=5.0 min CN=98 Runoff=0.27 cfs 0.020 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=4.61" Flow Length=234' Slope=0.0600 '/ Tc=5.0 min CN=98 Runoff=0.66 cfs 0.049 af
Subcatchment p7: TO DCB-E	Runoff Area=4,728 sf 65.46% Impervious Runoff Depth=3.53" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.48 cfs 0.032 af
Reach DCB-B: TO OUTFALL	Inflow=0.94 cfs 0.066 af Outflow=0.94 cfs 0.066 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.17' Max Vel=12.70 fps Inflow=1.37 cfs 0.101 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/ Capacity=52.90 cfs Outflow=1.36 cfs 0.101 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.21' Max Vel=7.59 fps Inflow=1.13 cfs 0.081 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/ Capacity=27.58 cfs Outflow=1.10 cfs 0.081 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.21' Max Vel=3.87 fps Inflow=0.48 cfs 0.032 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/ Capacity=4.79 cfs Outflow=0.47 cfs 0.032 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.13' Max Vel=2.91 fps Inflow=0.17 cfs 0.012 af 12.0" Round Pipe n=0.013 L=128.0' S=0.0195 '/ Capacity=4.98 cfs Outflow=0.16 cfs 0.012 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.30' Max Vel=3.70 fps Inflow=0.75 cfs 0.050 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/ Capacity=3.76 cfs Outflow=0.73 cfs 0.050 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.24' Max Vel=6.01 fps Inflow=0.89 cfs 0.062 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/ Capacity=6.90 cfs Outflow=0.89 cfs 0.062 af

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Reach DP#1: WETLAND	Inflow=9.68 cfs 1.046 af Outflow=9.68 cfs 1.046 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=1.65 cfs 0.117 af Outflow=1.65 cfs 0.117 af
Reach DP#3: LOW POINT	Inflow=6.19 cfs 0.393 af Outflow=6.19 cfs 0.393 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.93 fps Inflow=0.94 cfs 0.066 af n=0.080 L=46.0' S=0.1087 '/ Capacity=122.10 cfs Outflow=0.91 cfs 0.066 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.06' Max Vel=0.83 fps Inflow=0.91 cfs 0.066 af n=0.080 L=211.0' S=0.0867 '/ Capacity=109.07 cfs Outflow=0.79 cfs 0.066 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.08' Max Vel=0.60 fps Inflow=0.79 cfs 0.066 af n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.78 cfs 0.066 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.08' Max Vel=0.25 fps Inflow=0.78 cfs 0.066 af n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.65 cfs 0.066 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.08' Max Vel=1.03 fps Inflow=1.36 cfs 0.101 af n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.19 cfs 0.101 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.18' Max Vel=0.40 fps Inflow=1.29 cfs 0.163 af n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=1.21 cfs 0.163 af
Reach OL-8: OVERLAND	Avg. Flow Depth=0.02' Max Vel=0.62 fps Inflow=0.23 cfs 0.062 af n=0.080 L=82.0' S=0.1585 '/ Capacity=147.47 cfs Outflow=0.23 cfs 0.062 af
Reach OL7: OVERLAND	Avg. Flow Depth=0.07' Max Vel=0.19 fps Inflow=0.23 cfs 0.062 af n=0.400 L=270.0' S=0.1037 '/ Capacity=23.85 cfs Outflow=0.19 cfs 0.062 af
Reach OUTLET: TO DP#1	Inflow=1.36 cfs 0.101 af Outflow=1.36 cfs 0.101 af
Reach UGS1A: TO UGS#1	Inflow=0.89 cfs 0.062 af Outflow=0.89 cfs 0.062 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.10' Max Vel=5.73 fps Inflow=0.23 cfs 0.062 af 12.0" Round Pipe n=0.013 L=54.0' S=0.1000 '/ Capacity=11.27 cfs Outflow=0.23 cfs 0.062 af
Pond UGS1: TO UGS1B	Peak Elev=135.07' Storage=0.015 af Inflow=0.89 cfs 0.062 af Outflow=0.23 cfs 0.062 af

Total Runoff Area = 7.980 ac Runoff Volume = 1.557 af Average Runoff Depth = 2.34"
84.67% Pervious = 6.757 ac 15.33% Impervious = 1.223 ac

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

Runoff = 8.12 cfs @ 12.31 hrs, Volume= 0.817 af, Depth= 1.93"

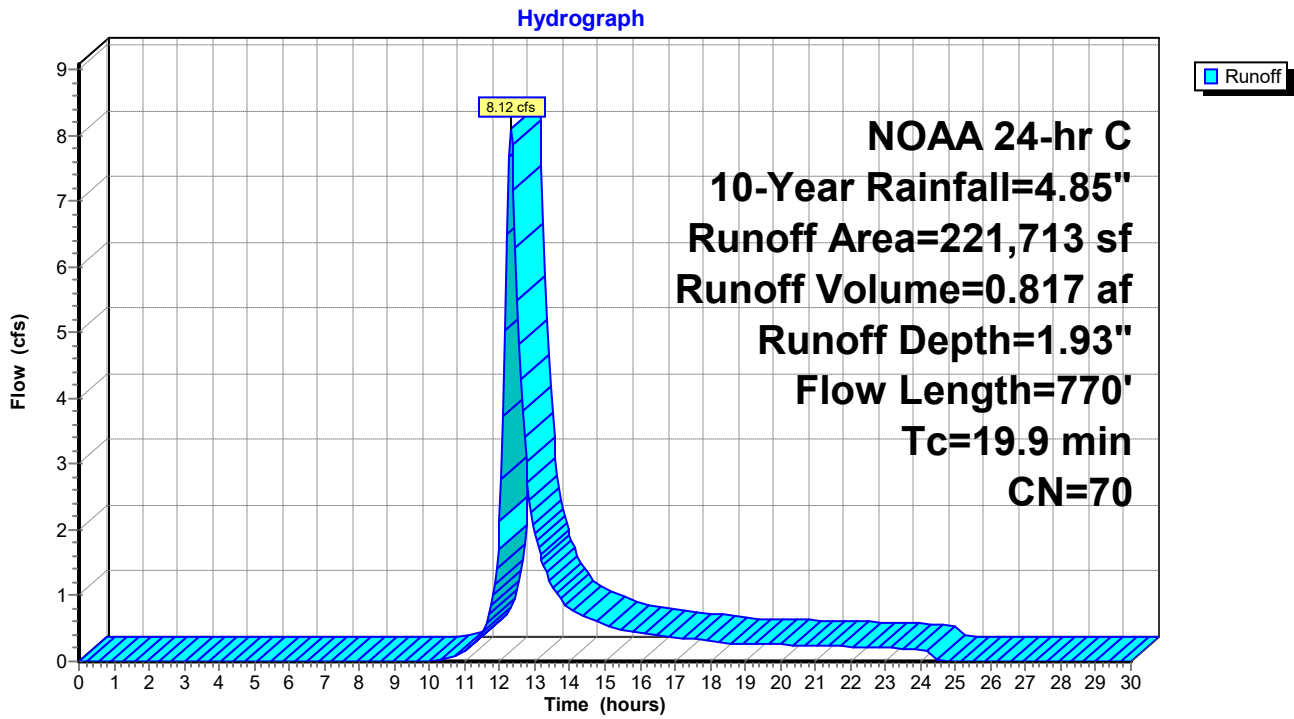
Routed to Reach DP#1 : WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

Area (sf)	CN	Description
3,388	74	>75% Grass cover, Good, HSG C
177,438	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,514	89	Gravel roads, HSG C
30,179	65	Brush, Good, HSG C
221,713	70	Weighted Average
217,519		98.11% Pervious Area
4,194		1.89% 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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Summary for Subcatchment p100: TO DCB#100

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

Runoff = 0.17 cfs @ 12.11 hrs, Volume= 0.012 af, Depth= 4.05"
 Routed to Reach DCB100 : TO DMH#100

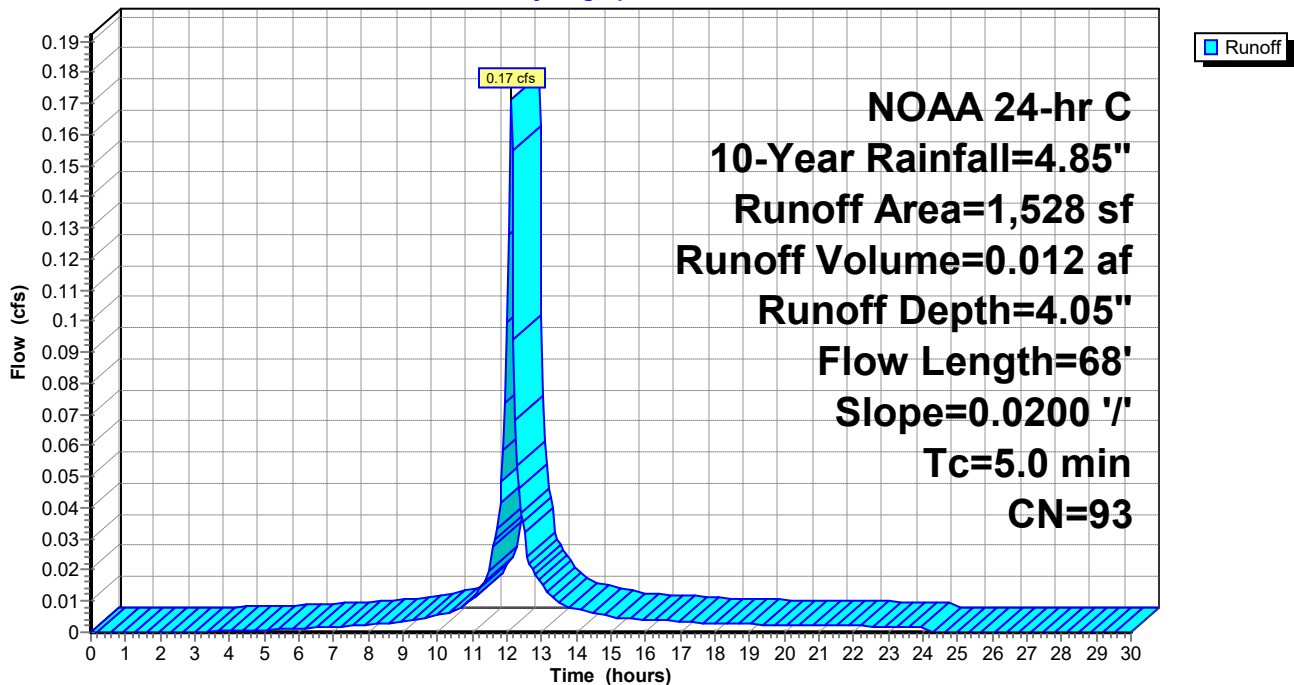
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

Area (sf)	CN	Description
295	74	>75% Grass cover, Good, HSG C
1,233	98	Paved parking, HSG C
1,528	93	Weighted Average
295		19.31% Pervious Area
1,233		80.69% 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"
0.7	45	0.0200	1.14		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.1	18	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	68	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 = 0.75 cfs @ 12.11 hrs, Volume= 0.050 af, Depth= 3.84"
 Routed to Reach DCB101 : TO DMH#100

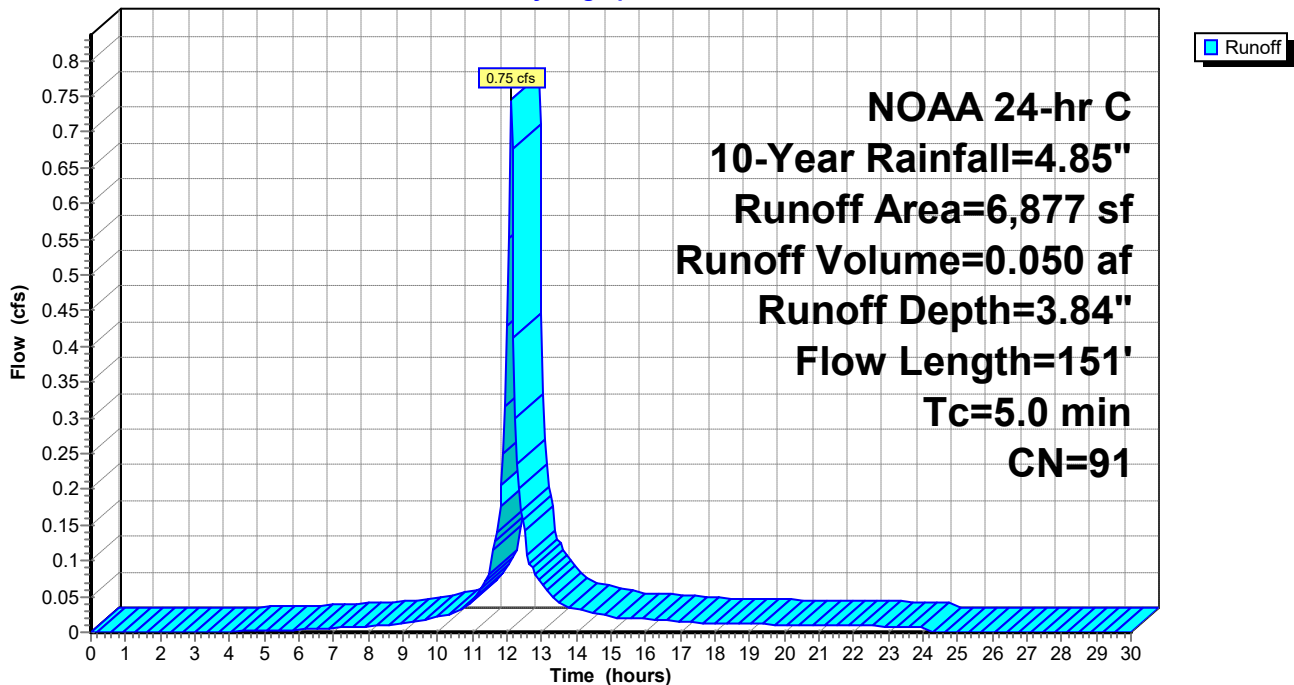
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

Area (sf)	CN	Description
1,993	74	>75% Grass cover, Good, HSG C
4,884	98	Paved parking, HSG C
6,877	91	Weighted Average
1,993		28.98% Pervious Area
4,884		71.02% 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



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

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

Runoff = 1.65 cfs @ 12.11 hrs, Volume= 0.117 af, Depth= 4.27"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

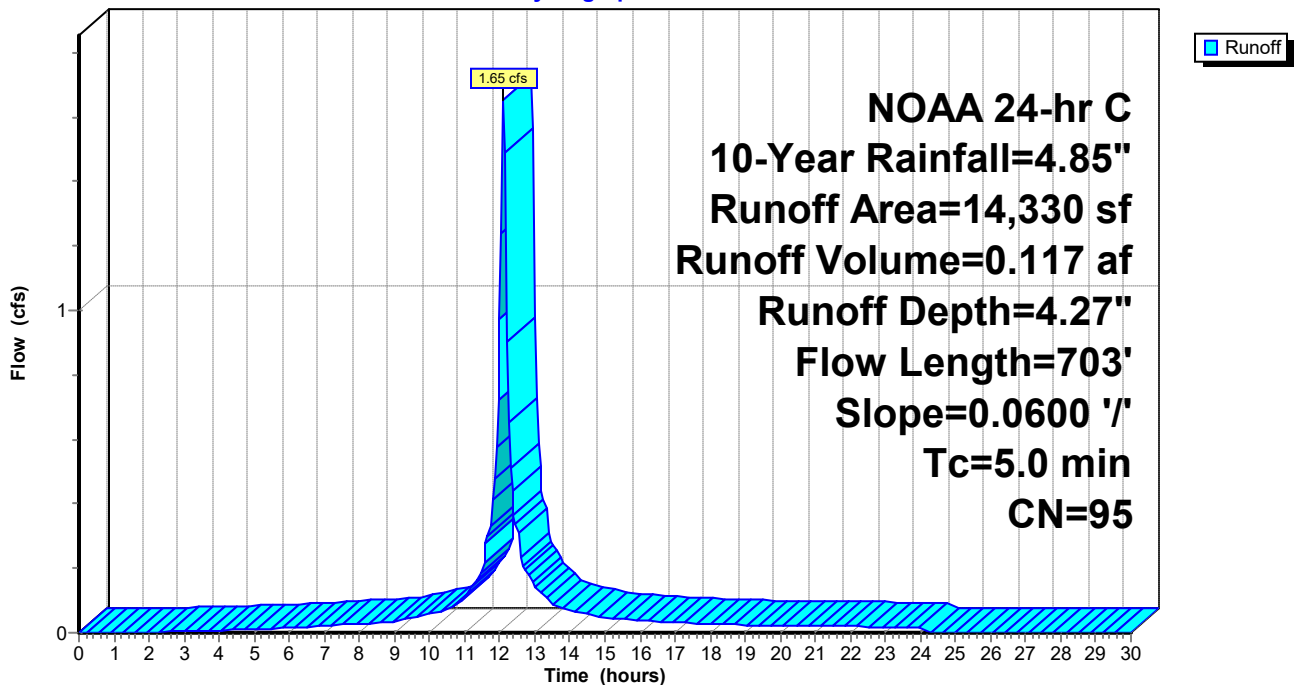
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

Area (sf)	CN	Description
* 1,110	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,676	98	Paved parking, HSG C
14,330	95	Weighted Average
1,654		11.54% Pervious Area
12,676		88.46% 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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NOAA 24-hr C 10-Year Rainfall=4.85"

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

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

Runoff = 6.19 cfs @ 12.12 hrs, Volume= 0.393 af, Depth= 2.50"
 Routed to Reach DP#3 : LOW POINT

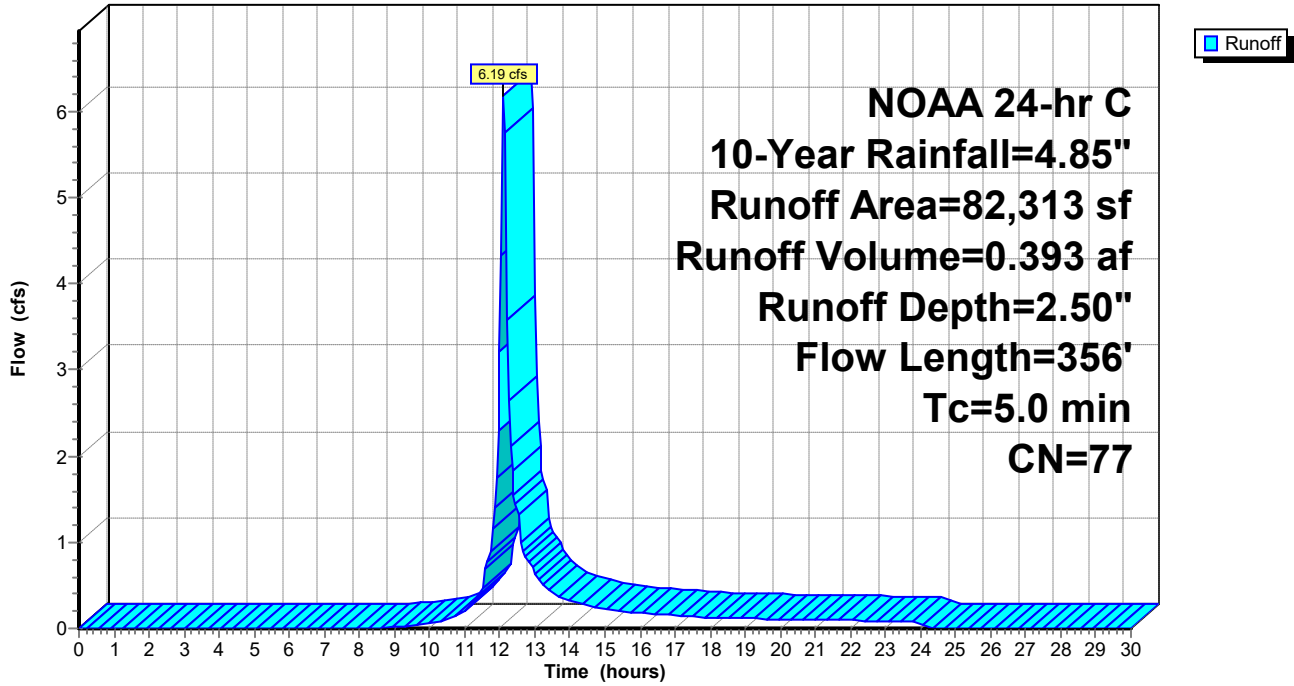
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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



Summary for Subcatchment P4: TO DCB-B

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

Runoff = 0.94 cfs @ 12.11 hrs, Volume= 0.066 af, Depth= 4.16"
 Routed to Reach DCB-B : TO OUTFALL

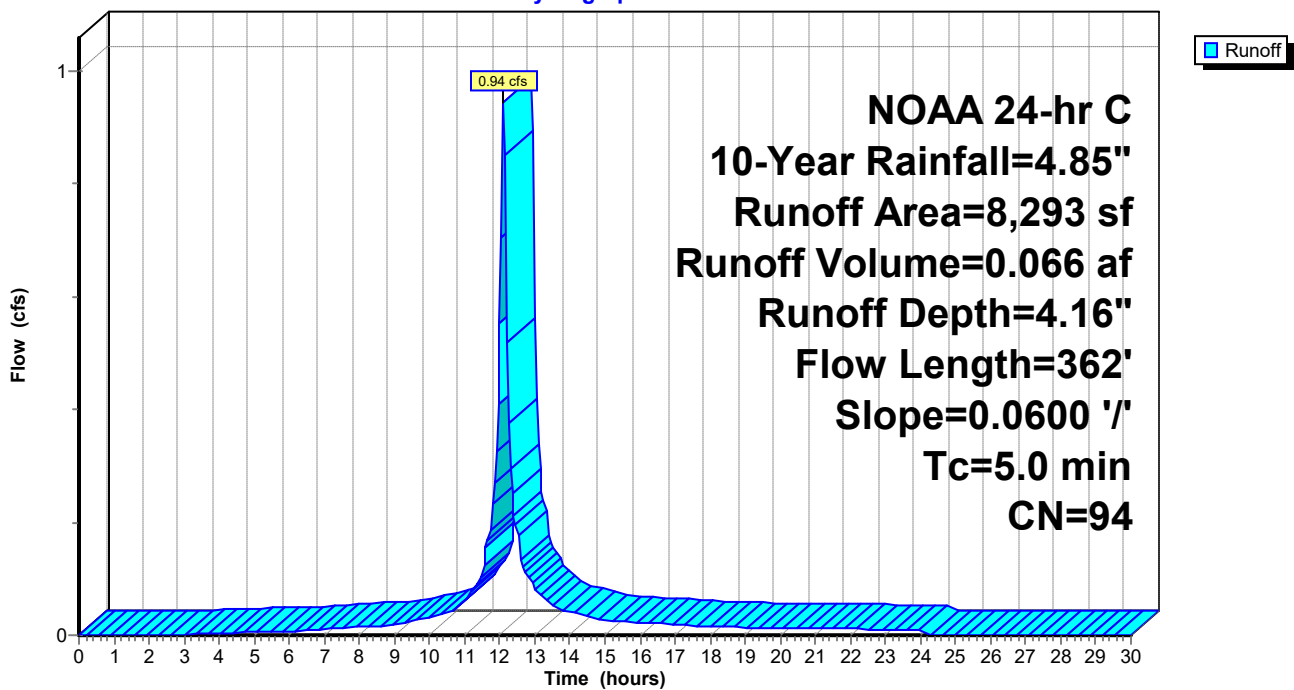
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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



Summary for Subcatchment p5: TO DCB-C

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

Runoff = 0.27 cfs @ 12.11 hrs, Volume= 0.020 af, Depth= 4.61"
 Routed to Reach DCB-C : TO OUTFALL

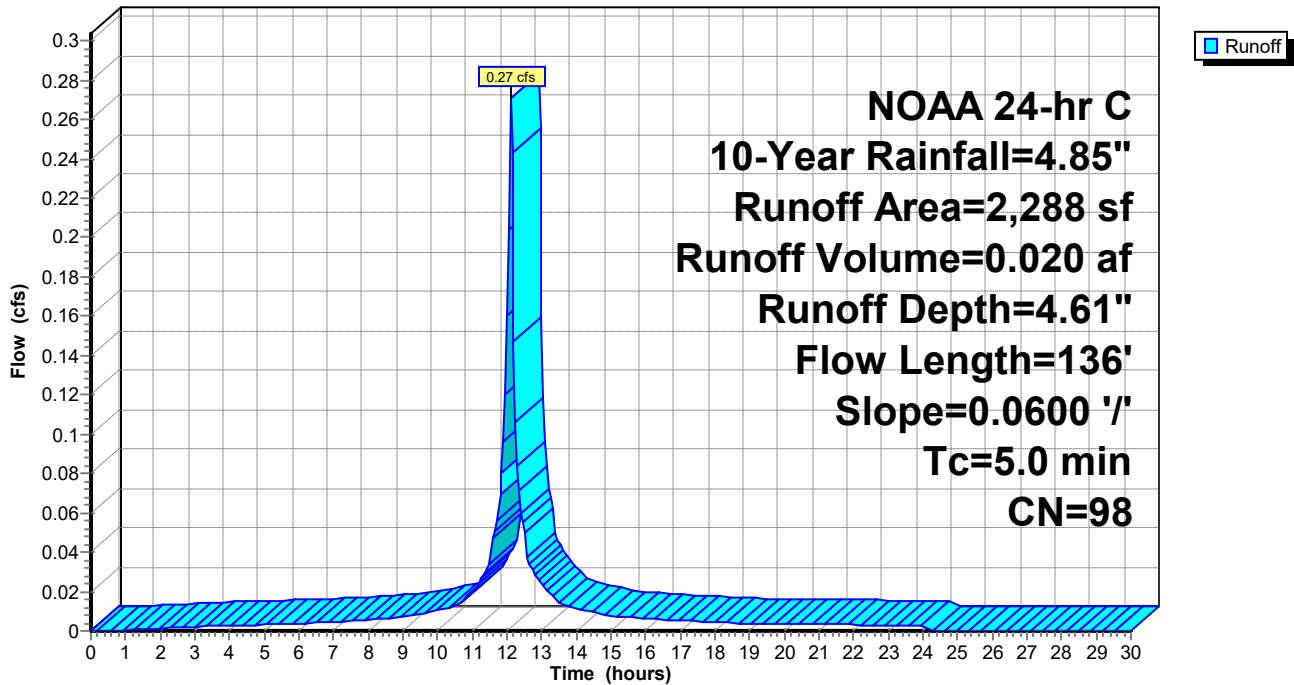
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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 p5: TO DCB-C

Hydrograph



Summary for Subcatchment p6: TO DCB-D

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

Runoff = 0.66 cfs @ 12.11 hrs, Volume= 0.049 af, Depth= 4.61"
 Routed to Reach DCB-D : TO DCB-C

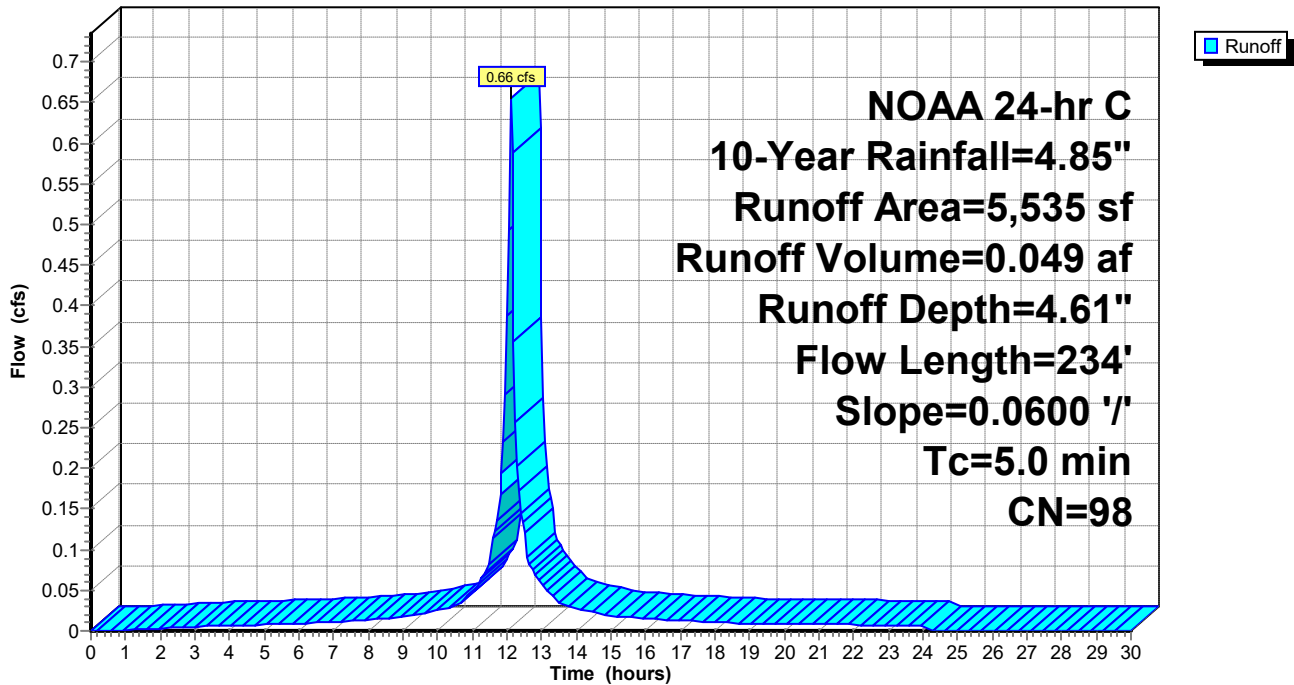
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 10-Year Rainfall=4.85"

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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NOAA 24-hr C 10-Year Rainfall=4.85"

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Summary for Subcatchment p7: TO DCB-E

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

Runoff = 0.48 cfs @ 12.11 hrs, Volume= 0.032 af, Depth= 3.53"
Routed to Reach DCB-E : TO DCB-D

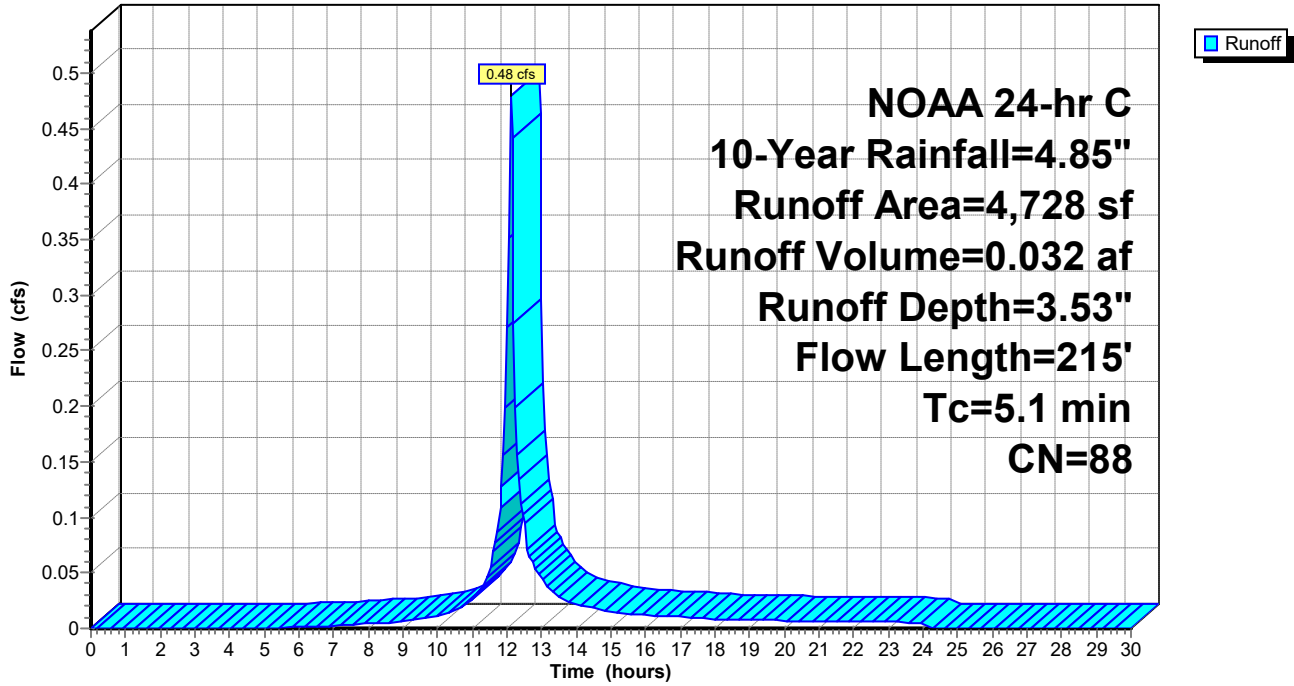
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=4.85"

Area (sf)	CN	Description
1,440	70	Woods, Good, HSG C
3,095	98	Paved parking, HSG C
193	74	>75% Grass cover, Good, HSG C
4,728	88	Weighted Average
1,633		34.54% Pervious Area
3,095		65.46% 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

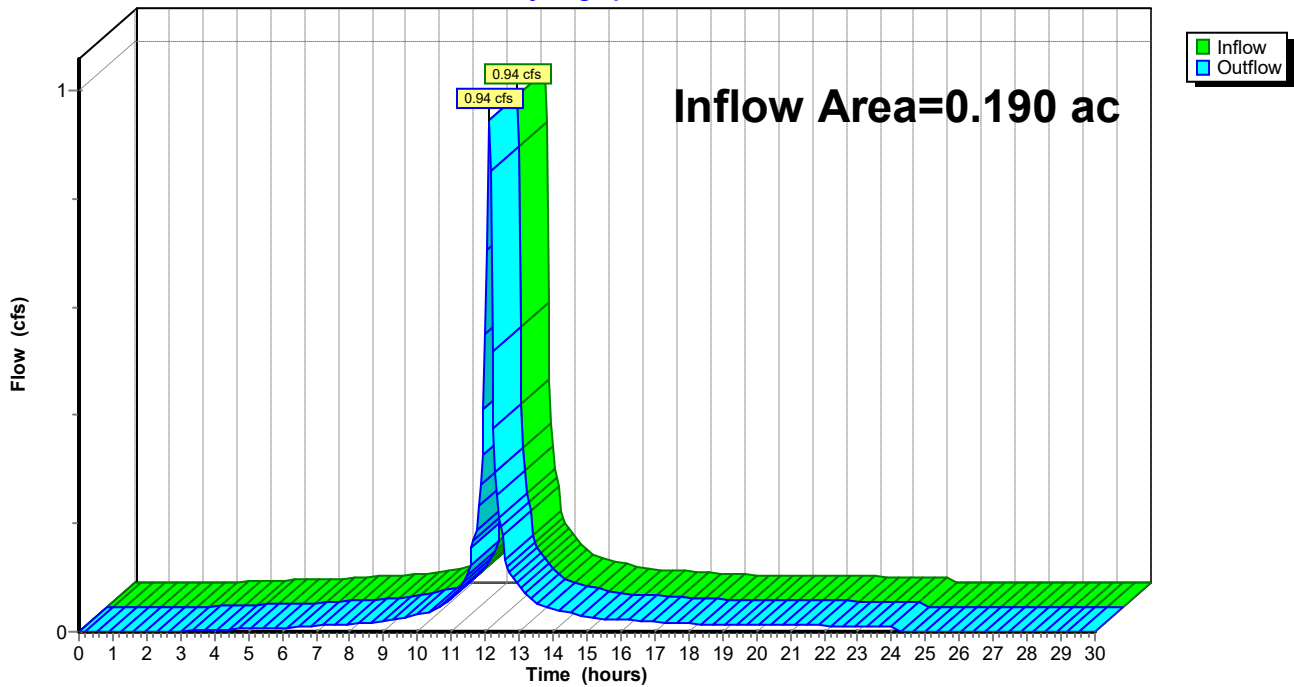
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.94 cfs @ 12.11 hrs, Volume= 0.066 af
Outflow = 0.94 cfs @ 12.11 hrs, Volume= 0.066 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

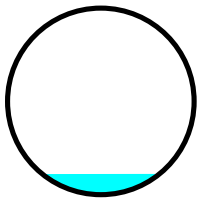
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 4.20" for 10-Year event
Inflow = 1.37 cfs @ 12.12 hrs, Volume= 0.101 af
Outflow = 1.36 cfs @ 12.12 hrs, Volume= 0.101 af, Atten= 1%, 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= 12.70 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.11 fps, Avg. Travel Time= 0.3 min

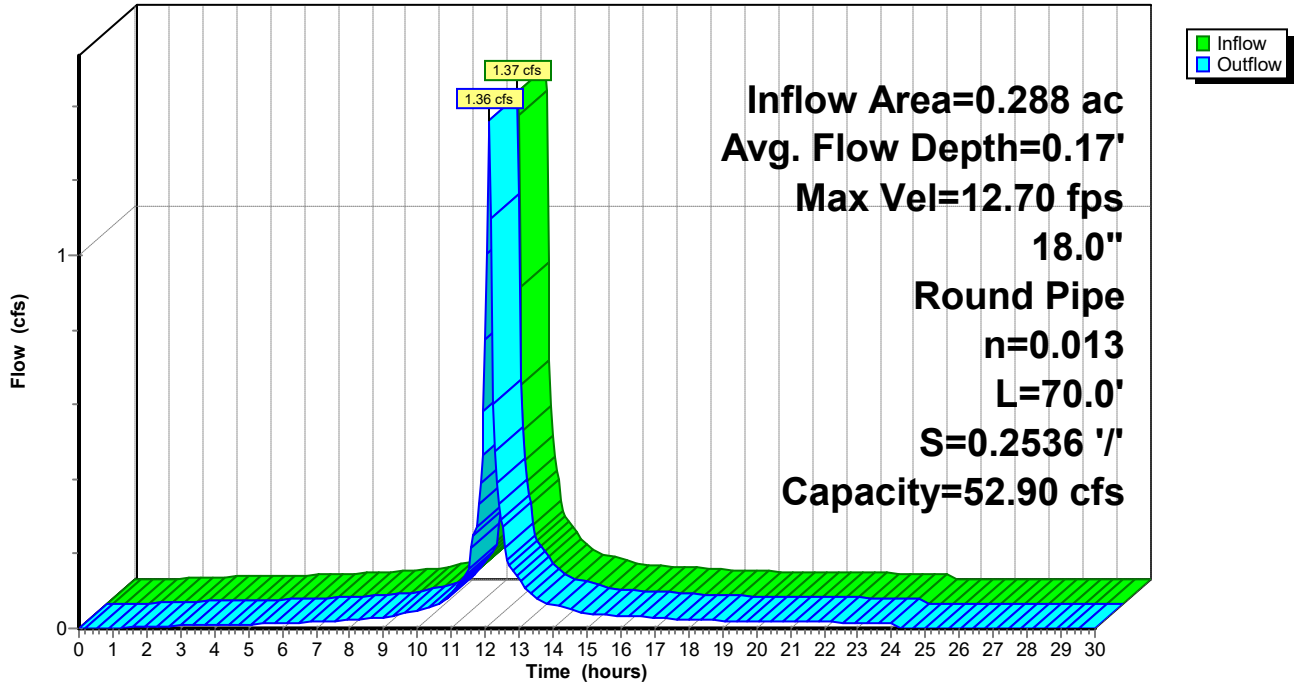
Peak Storage= 7 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 0.94'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

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

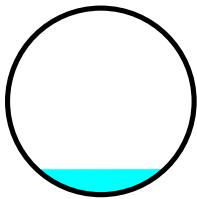
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.10' @ 12.10 hrs

Inflow Area = 0.236 ac, 84.09% Impervious, Inflow Depth = 4.11" for 10-Year event
Inflow = 1.13 cfs @ 12.11 hrs, Volume= 0.081 af
Outflow = 1.10 cfs @ 12.12 hrs, Volume= 0.081 af, Atten= 2%, 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= 7.59 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.40 fps, Avg. Travel Time= 0.8 min

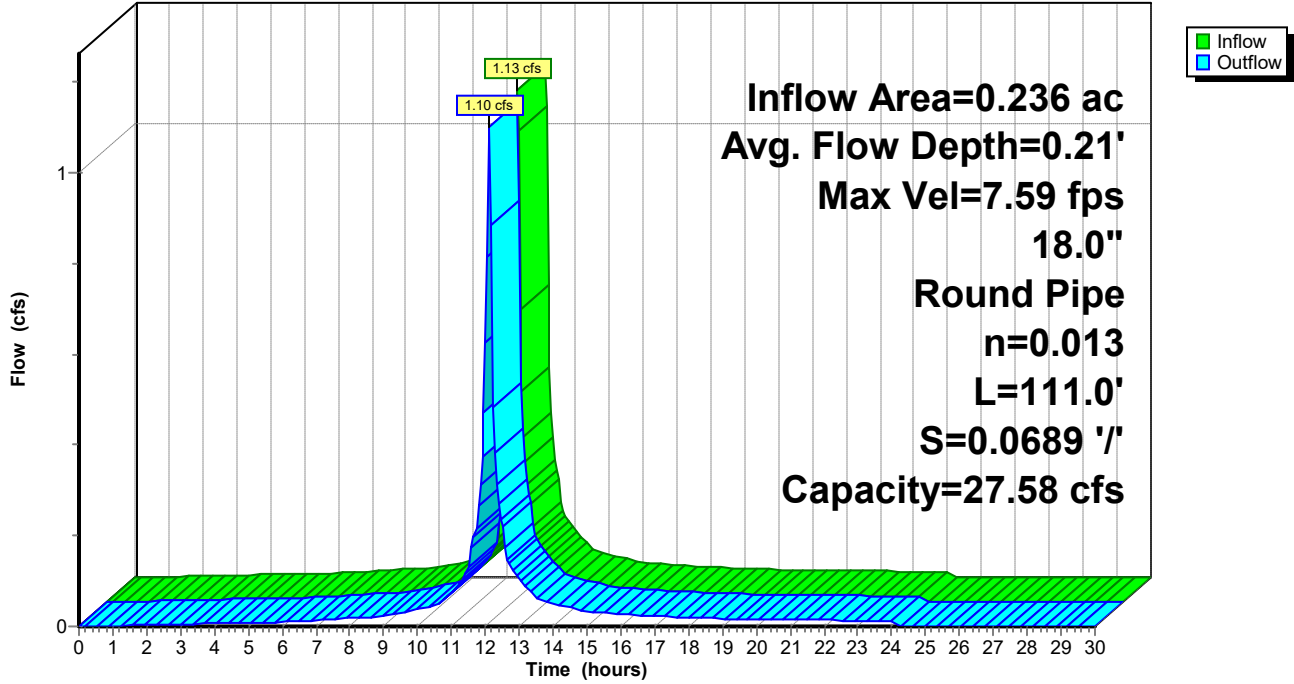
Peak Storage= 16 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 1.03'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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



Summary for Reach DCB-E: TO DCB-D

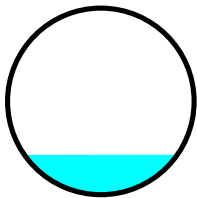
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.109 ac, 65.46% Impervious, Inflow Depth = 3.53" for 10-Year event
Inflow = 0.48 cfs @ 12.11 hrs, Volume= 0.032 af
Outflow = 0.47 cfs @ 12.12 hrs, Volume= 0.032 af, Atten= 2%, 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= 3.87 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.24 fps, Avg. Travel Time= 0.5 min

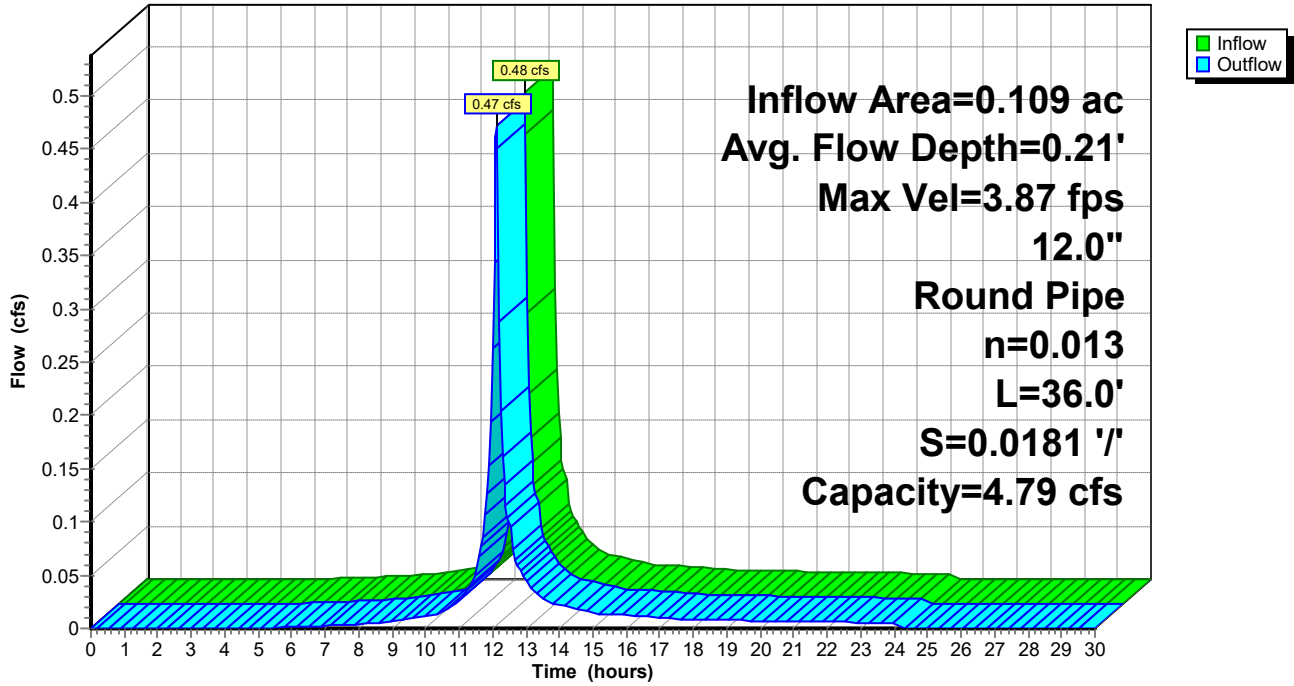
Peak Storage= 4 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 0.82'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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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NOAA 24-hr C 10-Year Rainfall=4.85"

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Summary for Reach DCB100: TO DMH#100

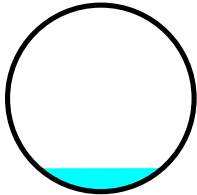
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.035 ac, 80.69% Impervious, Inflow Depth = 4.05" for 10-Year event
Inflow = 0.17 cfs @ 12.11 hrs, Volume= 0.012 af
Outflow = 0.16 cfs @ 12.14 hrs, Volume= 0.012 af, Atten= 4%, 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= 2.91 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.95 fps, Avg. Travel Time= 2.3 min

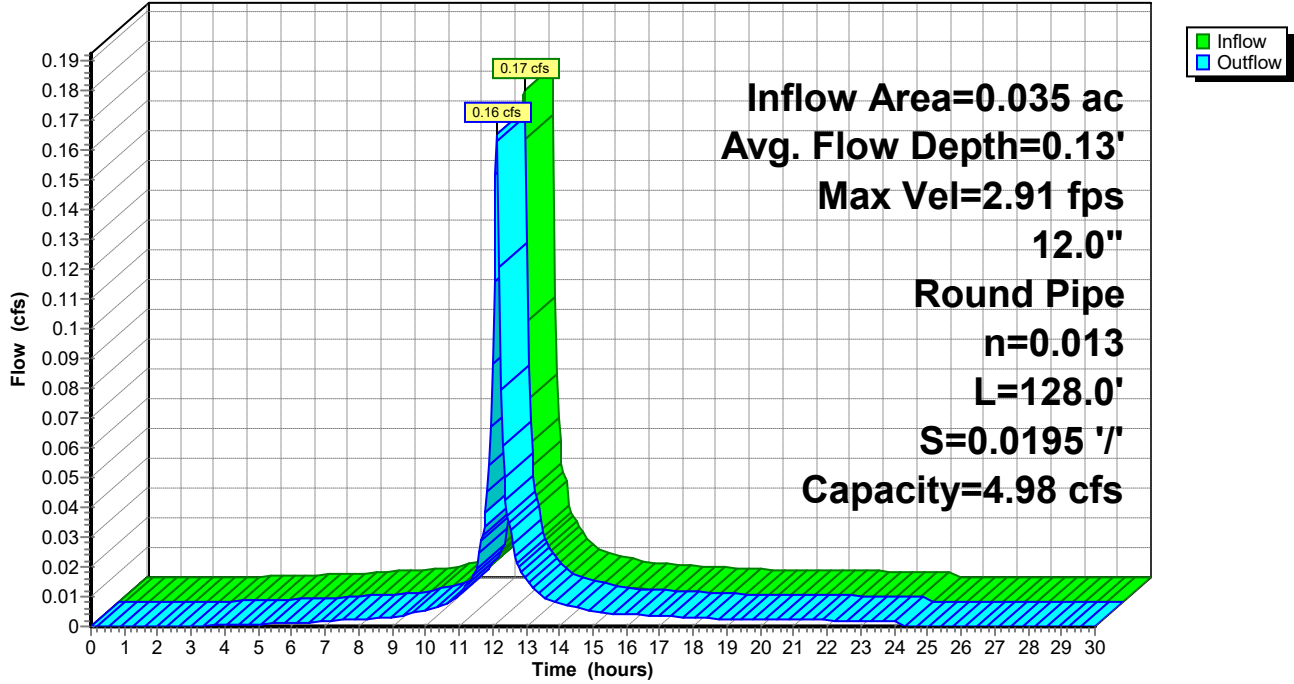
Peak Storage= 7 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 0.66'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.98 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 128.0' Slope= 0.0195 '/'
Inlet Invert= 138.50', Outlet Invert= 136.00'



Reach DCB100: TO DMH#100

Hydrograph



Summary for Reach DCB101: TO DMH#100

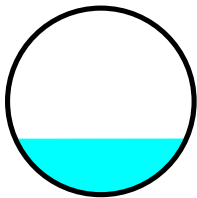
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.158 ac, 71.02% Impervious, Inflow Depth = 3.84" for 10-Year event
Inflow = 0.75 cfs @ 12.11 hrs, Volume= 0.050 af
Outflow = 0.73 cfs @ 12.12 hrs, Volume= 0.050 af, Atten= 2%, 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= 3.70 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.18 fps, Avg. Travel Time= 0.5 min

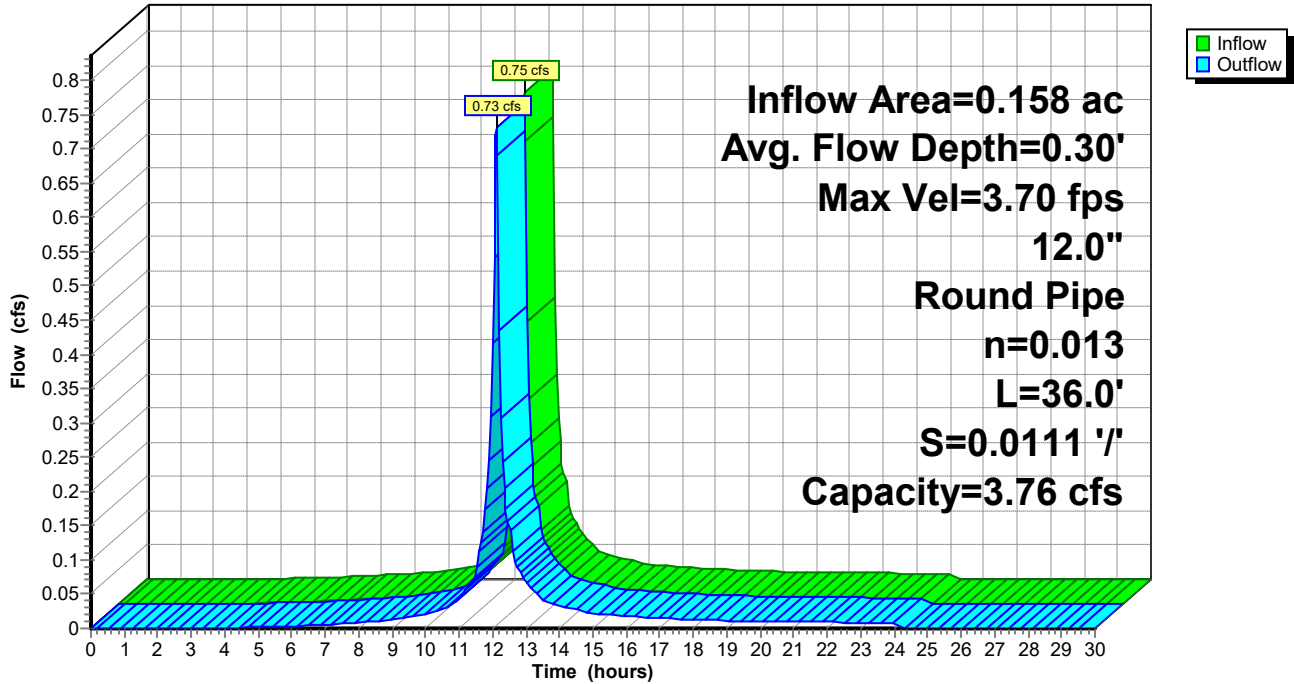
Peak Storage= 7 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 0.92'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

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



Summary for Reach DMH100: TO UGS#1A

[52] Hint: Inlet/Outlet conditions not evaluated

[61] Hint: Exceeded Reach DCB100 outlet invert by 0.04' @ 12.10 hrs

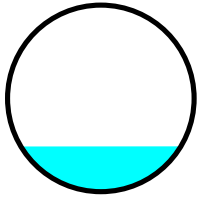
[61] Hint: Exceeded Reach DCB101 outlet invert by 0.04' @ 12.10 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 0.89 cfs @ 12.12 hrs, Volume= 0.062 af
Outflow = 0.89 cfs @ 12.12 hrs, Volume= 0.062 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= 6.01 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.90 fps, Avg. Travel Time= 0.1 min

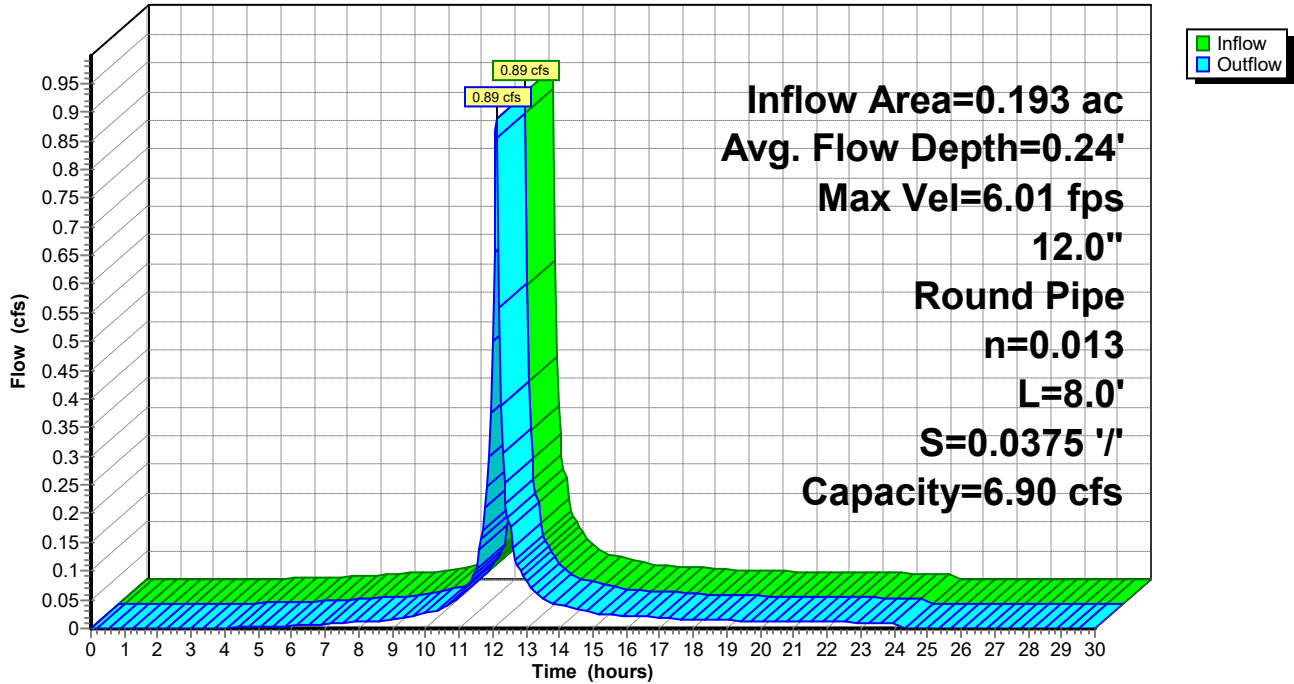
Peak Storage= 1 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 0.86'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

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

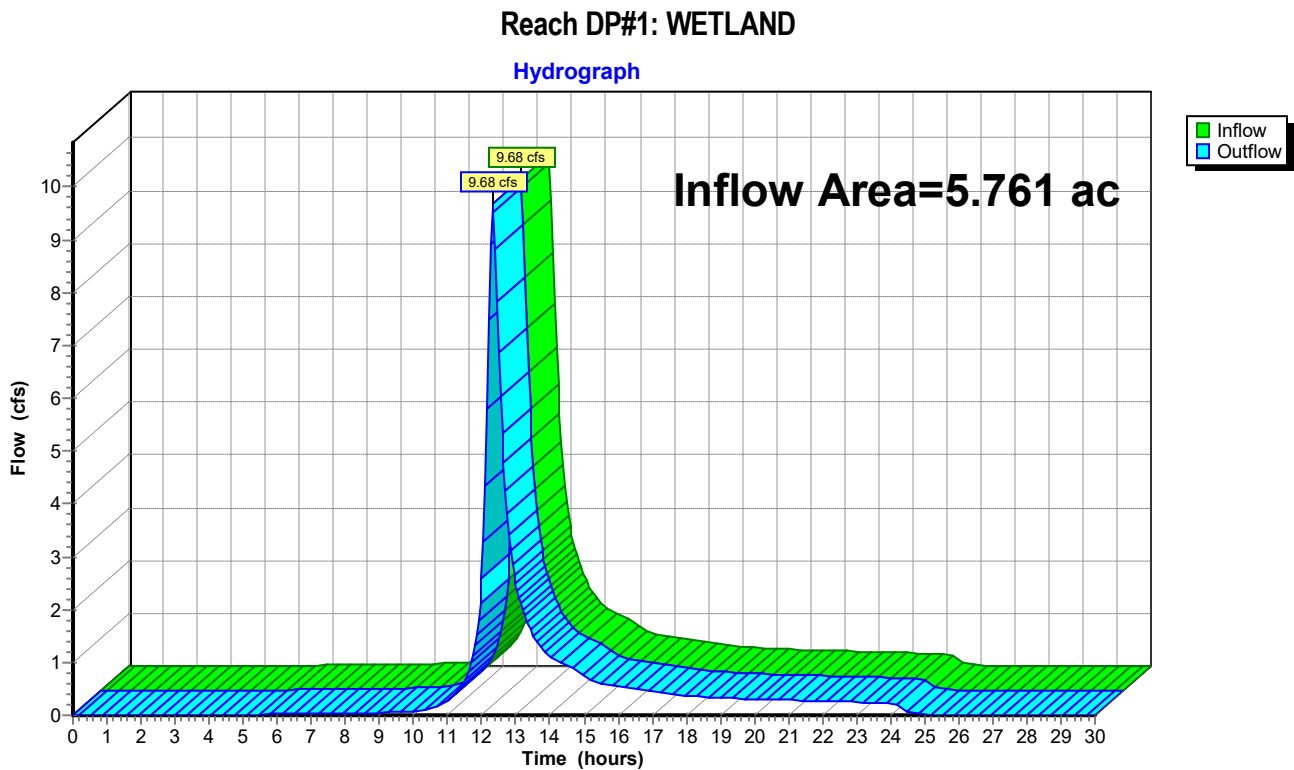


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.761 ac, 11.23% Impervious, Inflow Depth = 2.18" for 10-Year event
Inflow = 9.68 cfs @ 12.32 hrs, Volume= 1.046 af
Outflow = 9.68 cfs @ 12.32 hrs, Volume= 1.046 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

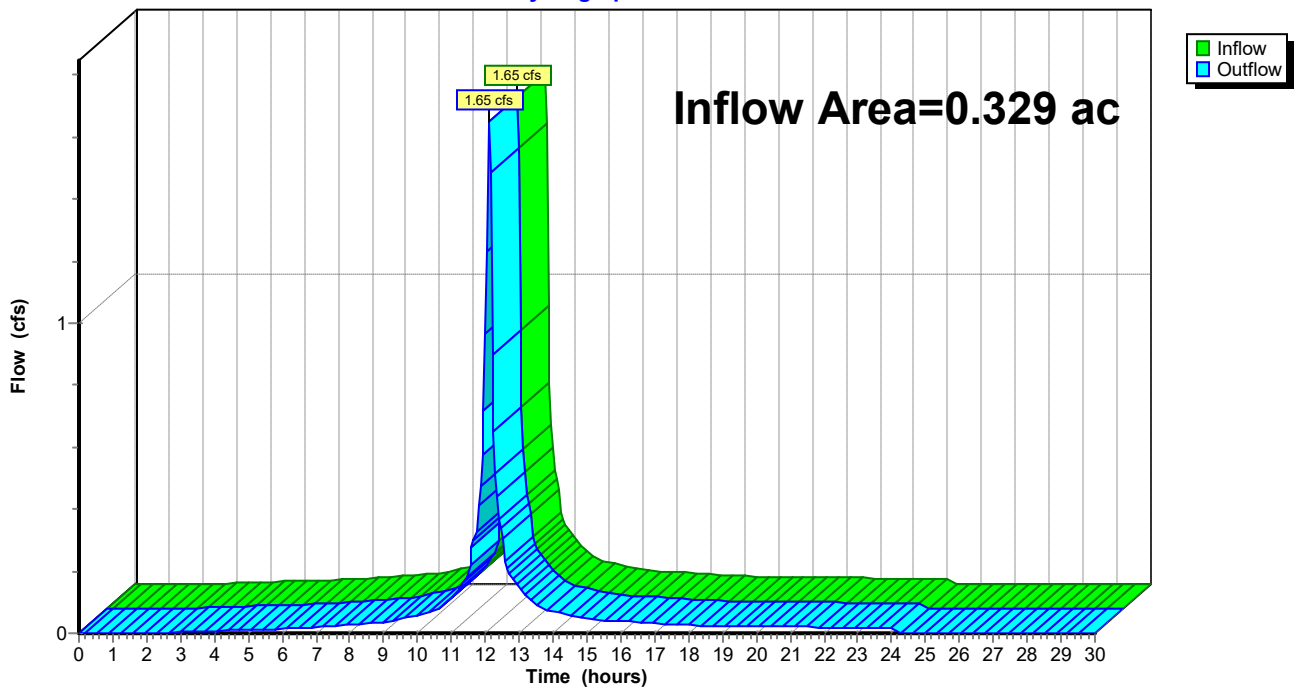
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 88.46% Impervious, Inflow Depth = 4.27" for 10-Year event
Inflow = 1.65 cfs @ 12.11 hrs, Volume= 0.117 af
Outflow = 1.65 cfs @ 12.11 hrs, Volume= 0.117 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

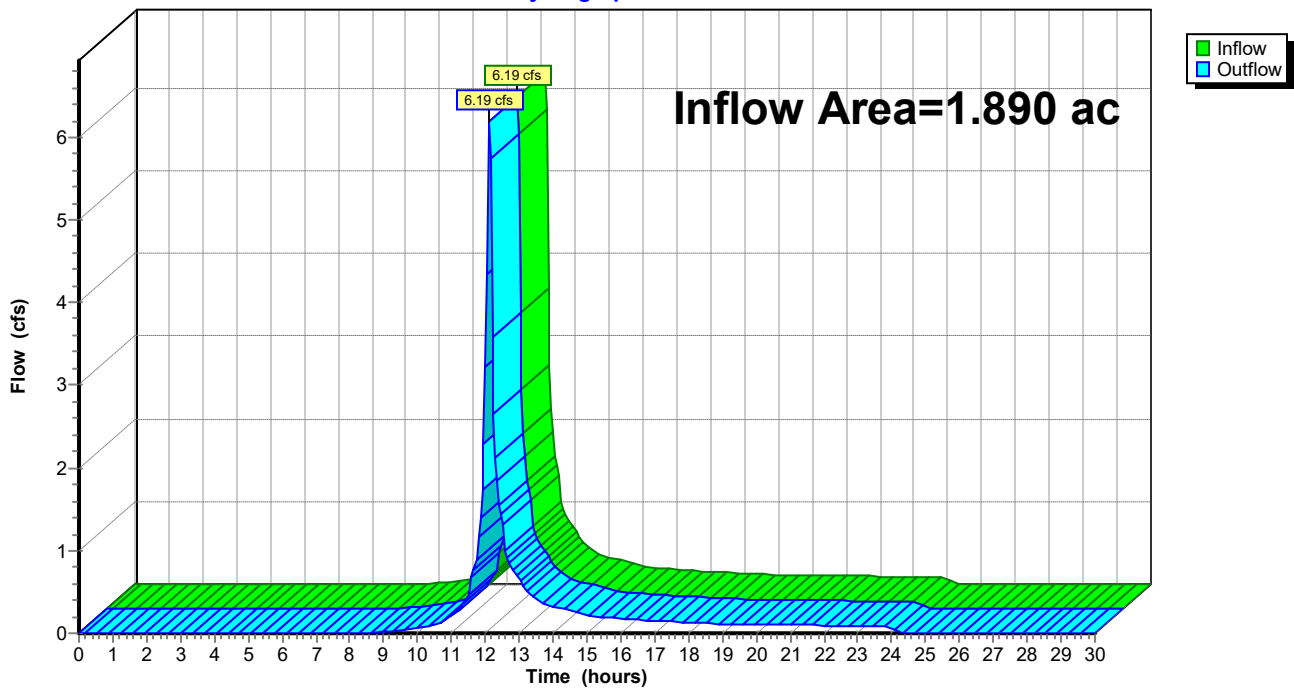
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 2.50" for 10-Year event
Inflow = 6.19 cfs @ 12.12 hrs, Volume= 0.393 af
Outflow = 6.19 cfs @ 12.12 hrs, Volume= 0.393 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 = 4.16" for 10-Year event
 Inflow = 0.94 cfs @ 12.11 hrs, Volume= 0.066 af
 Outflow = 0.91 cfs @ 12.14 hrs, Volume= 0.066 af, Atten= 4%, 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= 0.93 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 2.5 min

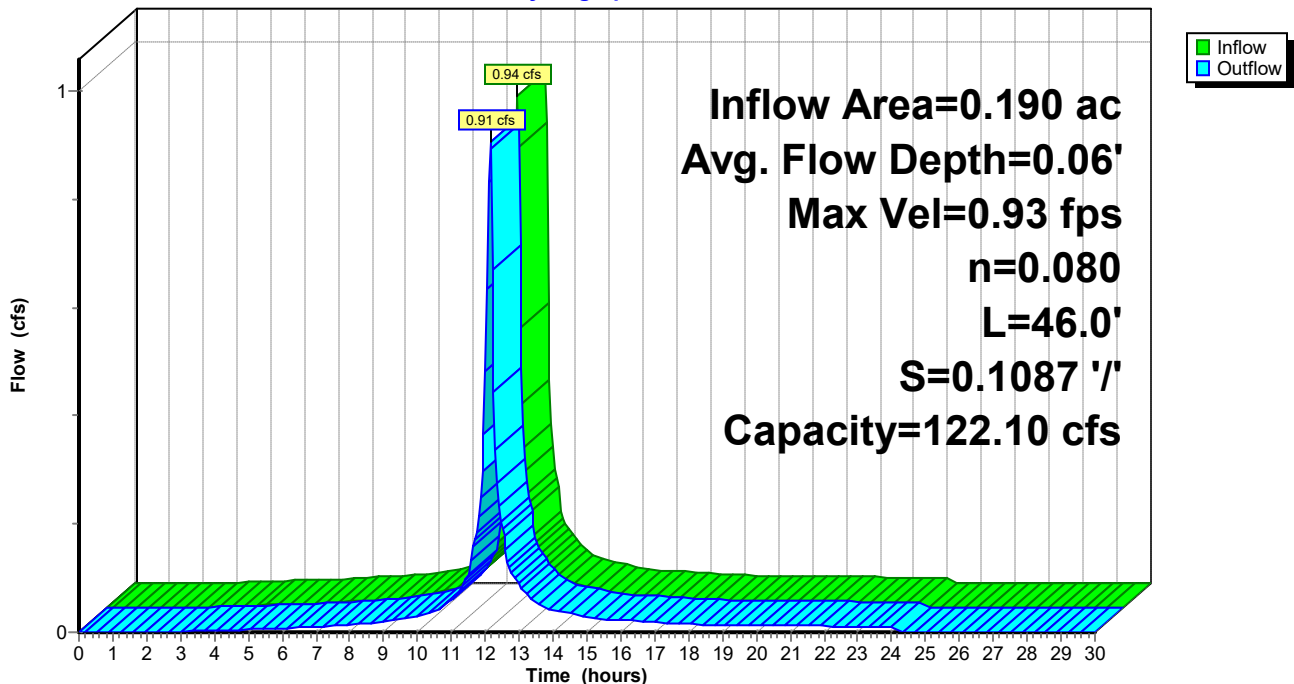
Peak Storage= 45 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.06' , Surface Width= 16.26'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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 0.02' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.91 cfs @ 12.14 hrs, Volume= 0.066 af
Outflow = 0.79 cfs @ 12.24 hrs, Volume= 0.066 af, Atten= 12%, Lag= 6.4 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= 0.83 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 12.8 min

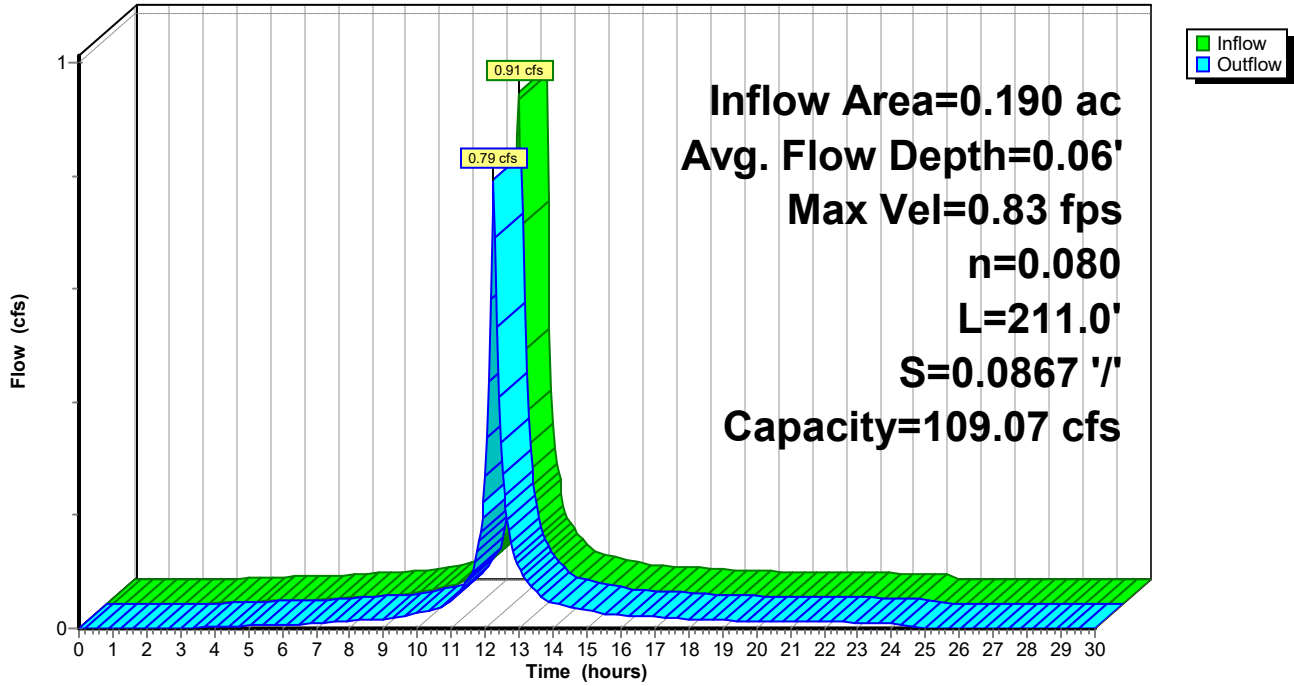
Peak Storage= 205 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 16.25'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.79 cfs @ 12.24 hrs, Volume= 0.066 af
Outflow = 0.78 cfs @ 12.26 hrs, Volume= 0.066 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= 0.60 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 2.2 min

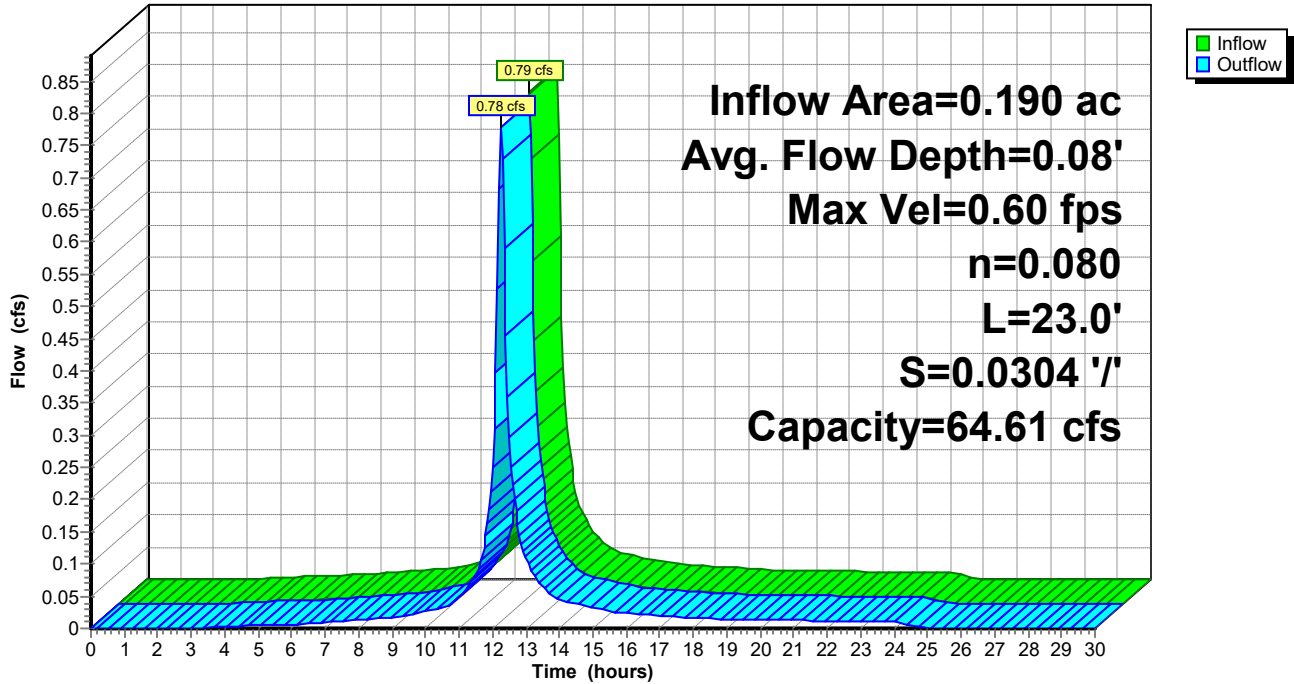
Peak Storage= 30 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.67'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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' @ 12.45 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 4.16" for 10-Year event
Inflow = 0.78 cfs @ 12.26 hrs, Volume= 0.066 af
Outflow = 0.65 cfs @ 12.47 hrs, Volume= 0.066 af, Atten= 17%, Lag= 13.0 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= 0.25 fps, Min. Travel Time= 8.6 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 29.6 min

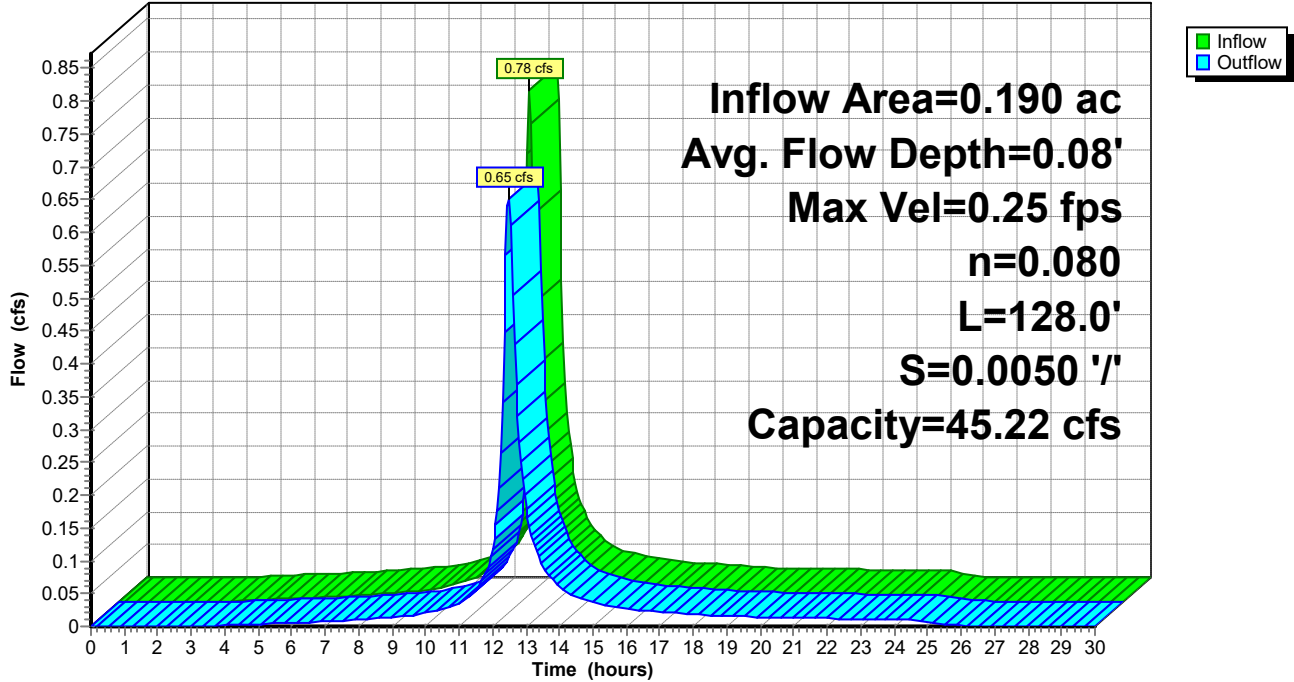
Peak Storage= 335 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 31.70'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 0.288 ac, 86.99% Impervious, Inflow Depth = 4.20" for 10-Year event
 Inflow = 1.36 cfs @ 12.12 hrs, Volume= 0.101 af
 Outflow = 1.19 cfs @ 12.24 hrs, Volume= 0.101 af, Atten= 13%, 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= 1.03 fps, Min. Travel Time= 4.6 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 15.4 min

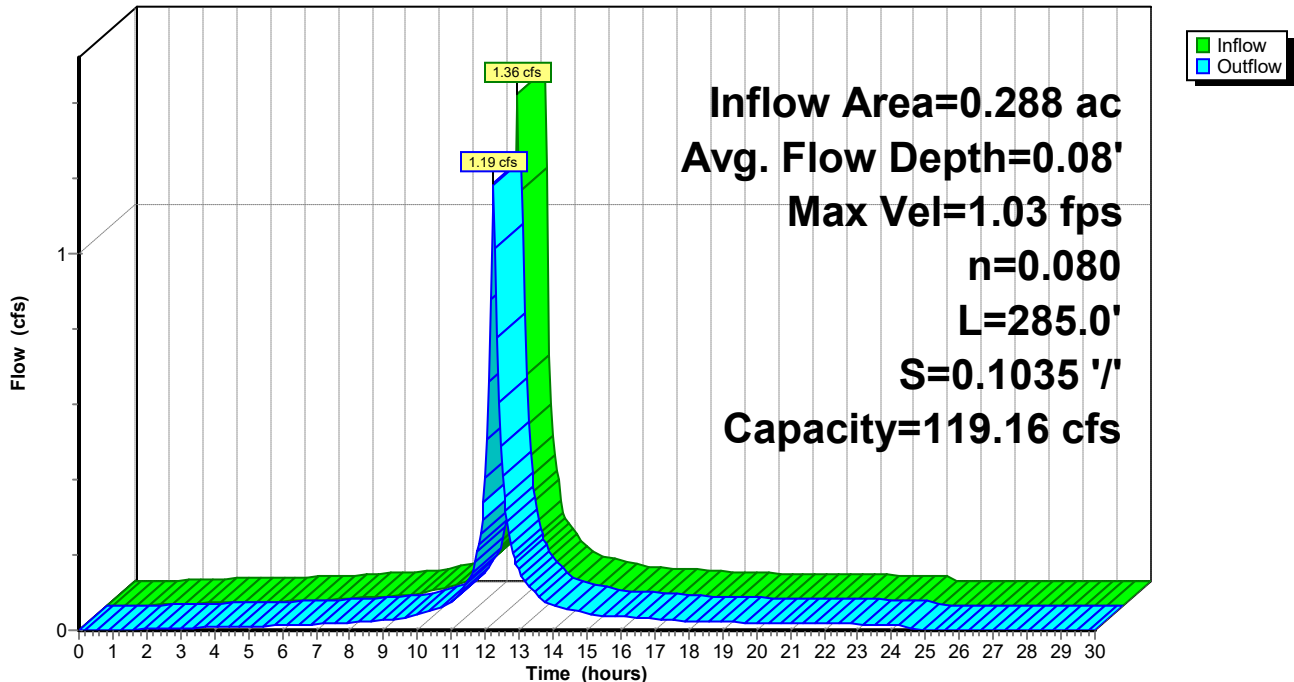
Peak Storage= 338 cf @ 12.16 hrs
 Average Depth at Peak Storage= 0.08' , Surface Width= 16.50'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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' @ 12.30 hrs

[62] Hint: Exceeded Reach OL7 OUTLET depth by 0.12' @ 12.25 hrs

Inflow Area = 0.481 ac, 81.29% Impervious, Inflow Depth > 4.07" for 10-Year event
Inflow = 1.29 cfs @ 12.24 hrs, Volume= 0.163 af
Outflow = 1.21 cfs @ 12.33 hrs, Volume= 0.163 af, Atten= 6%, Lag= 5.6 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= 0.40 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 12.3 min

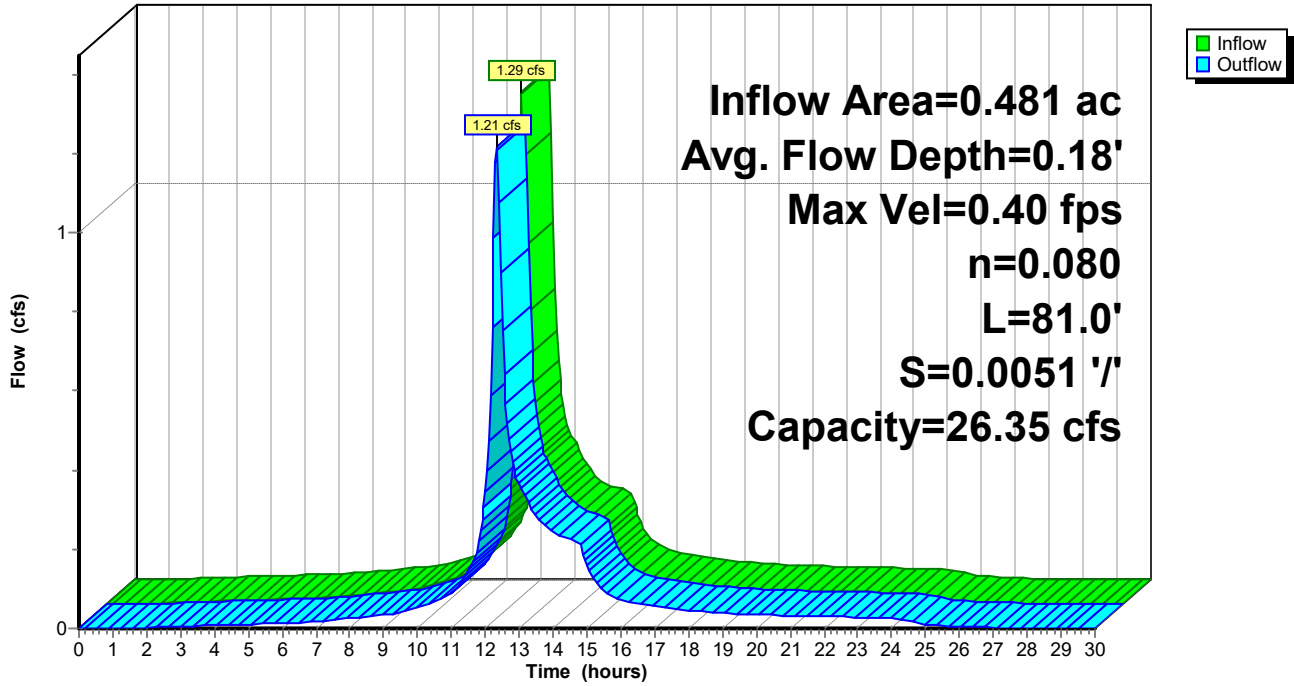
Peak Storage= 249 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 18.66'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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 OL-8: OVERLAND

[61] Hint: Exceeded Reach UGS1B outlet invert by 0.02' @ 12.40 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 0.23 cfs @ 12.39 hrs, Volume= 0.062 af
Outflow = 0.23 cfs @ 12.46 hrs, Volume= 0.062 af, Atten= 1%, Lag= 4.0 min
Routed to Reach OL7 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.62 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 3.7 min

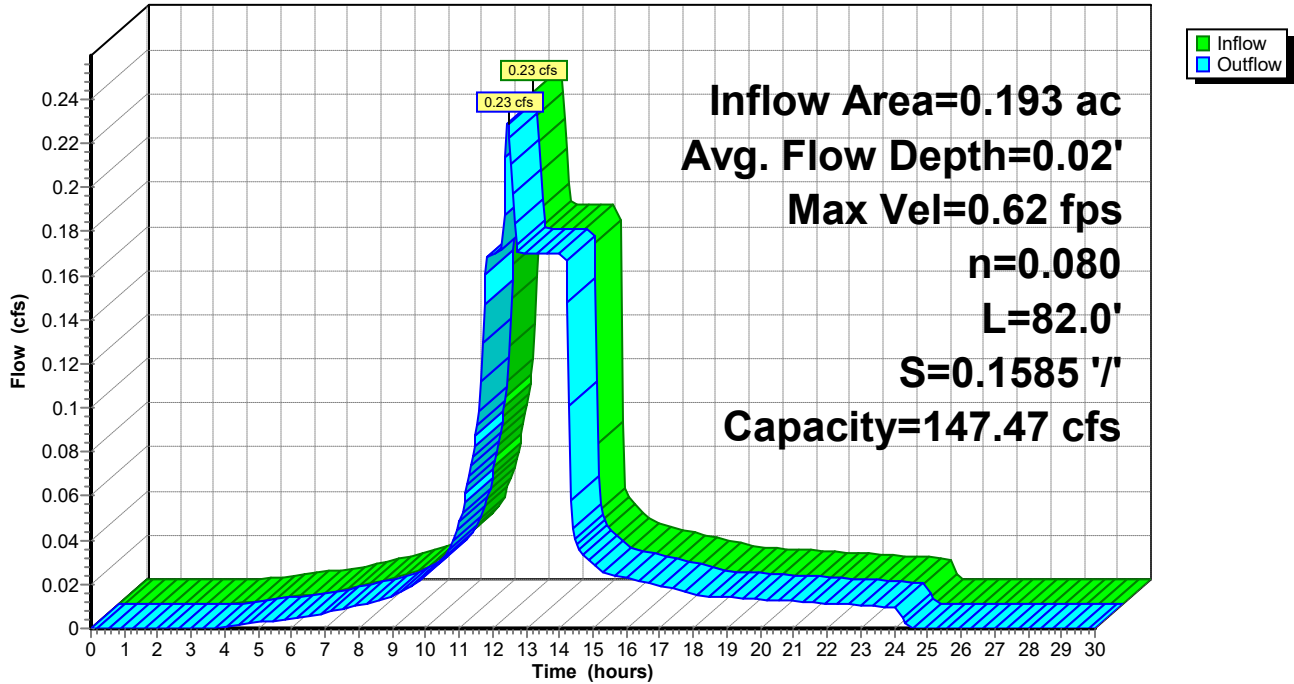
Peak Storage= 30 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.02', Surface Width= 15.48'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 147.47 cfs

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= 82.0' Slope= 0.1585 ' / '
Inlet Invert= 125.00', Outlet Invert= 112.00'



Reach OL-8: OVERLAND

Hydrograph



Summary for Reach OL7: OVERLAND

[62] Hint: Exceeded Reach OL-8 OUTLET depth by 0.05' @ 14.30 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 0.23 cfs @ 12.46 hrs, Volume= 0.062 af
Outflow = 0.19 cfs @ 13.01 hrs, Volume= 0.062 af, Atten= 15%, Lag= 32.9 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= 0.19 fps, Min. Travel Time= 23.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 56.9 min

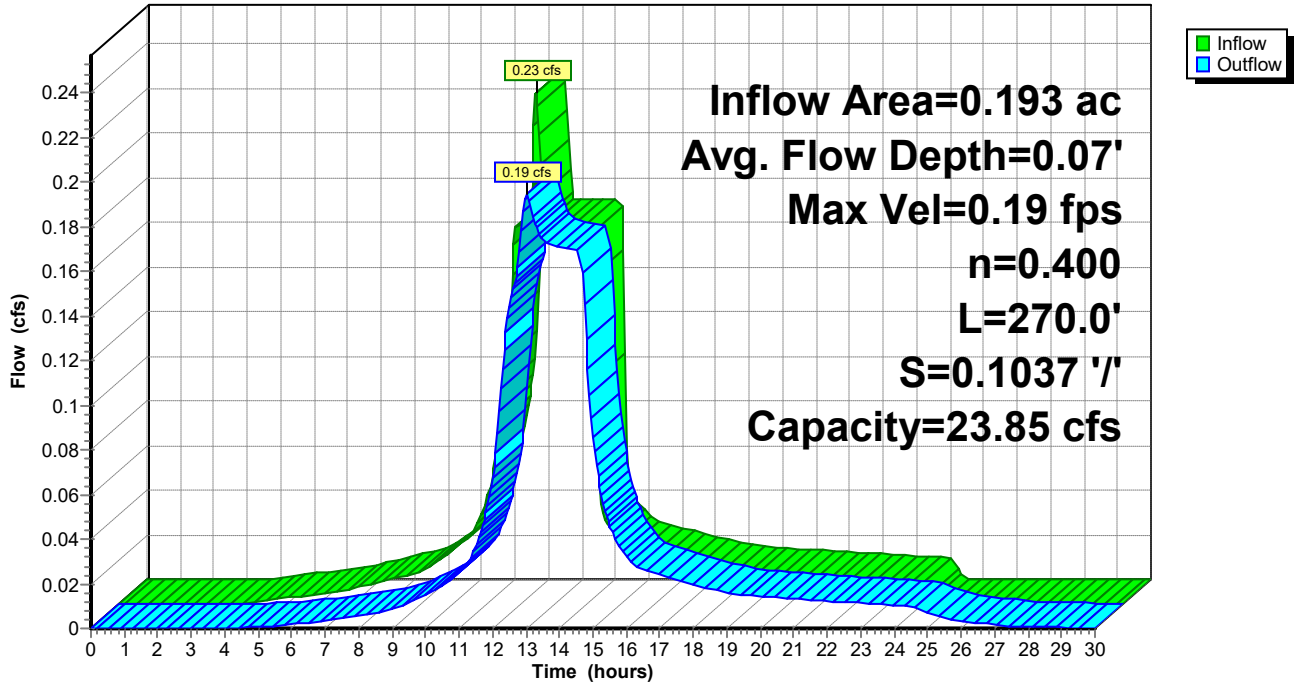
Peak Storage= 277 cf @ 12.61 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.31'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 23.85 cfs

15.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 ' Top Width= 35.00'
Length= 270.0' Slope= 0.1037 '
Inlet Invert= 112.00', Outlet Invert= 84.00'



Reach OL7: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

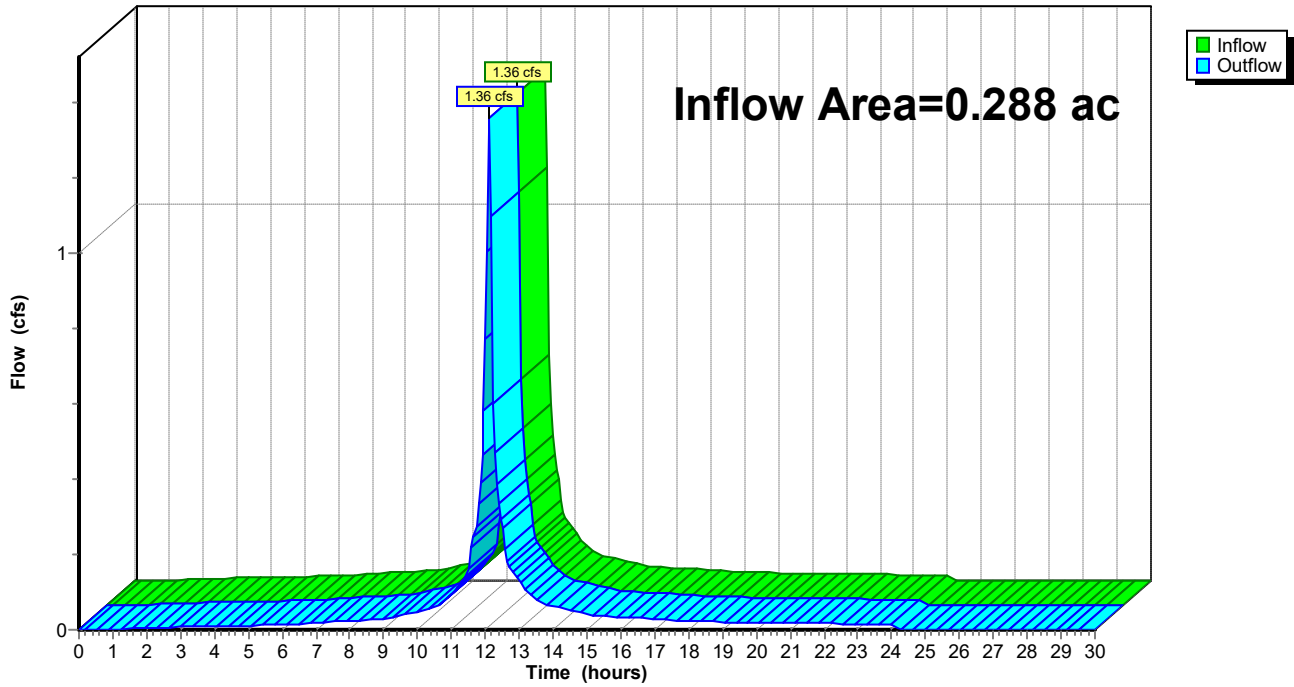
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 4.20" for 10-Year event
Inflow = 1.36 cfs @ 12.12 hrs, Volume= 0.101 af
Outflow = 1.36 cfs @ 12.12 hrs, Volume= 0.101 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

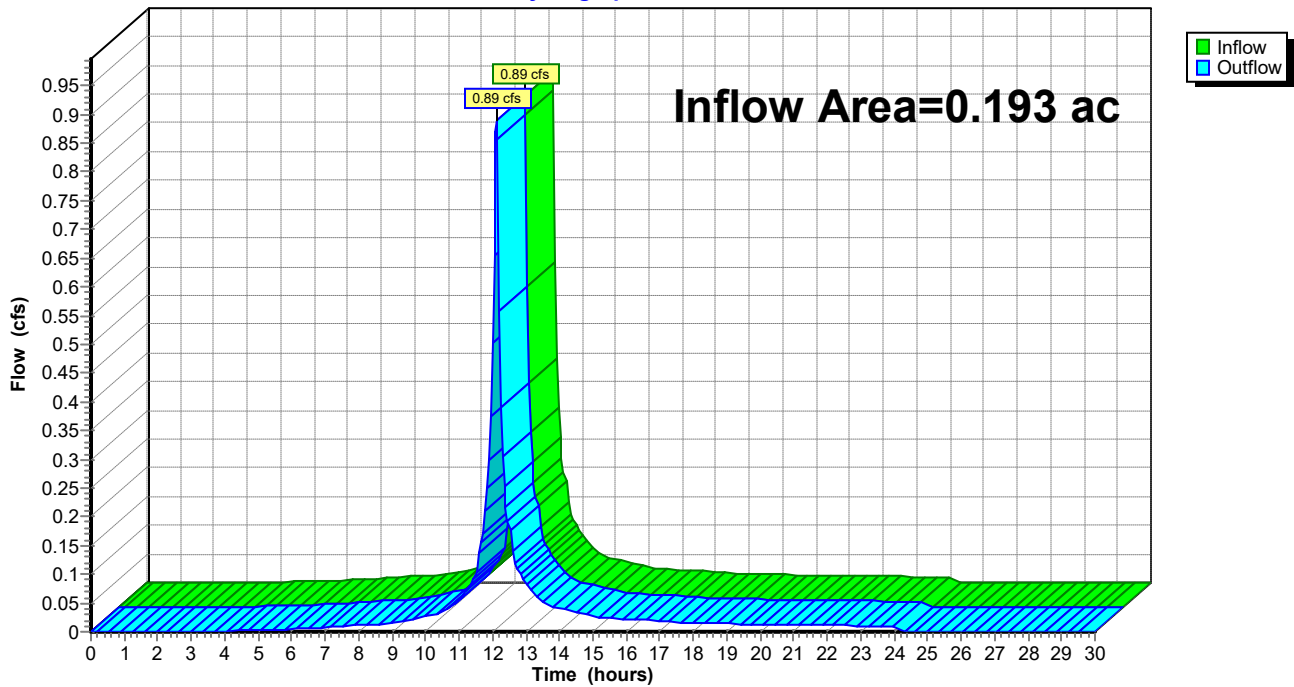
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 0.89 cfs @ 12.12 hrs, Volume= 0.062 af
Outflow = 0.89 cfs @ 12.12 hrs, Volume= 0.062 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

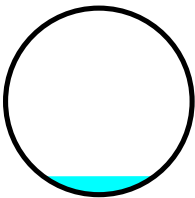
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 0.23 cfs @ 12.39 hrs, Volume= 0.062 af
Outflow = 0.23 cfs @ 12.39 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.5 min
Routed to Reach OL-8 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.73 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.76 fps, Avg. Travel Time= 0.3 min

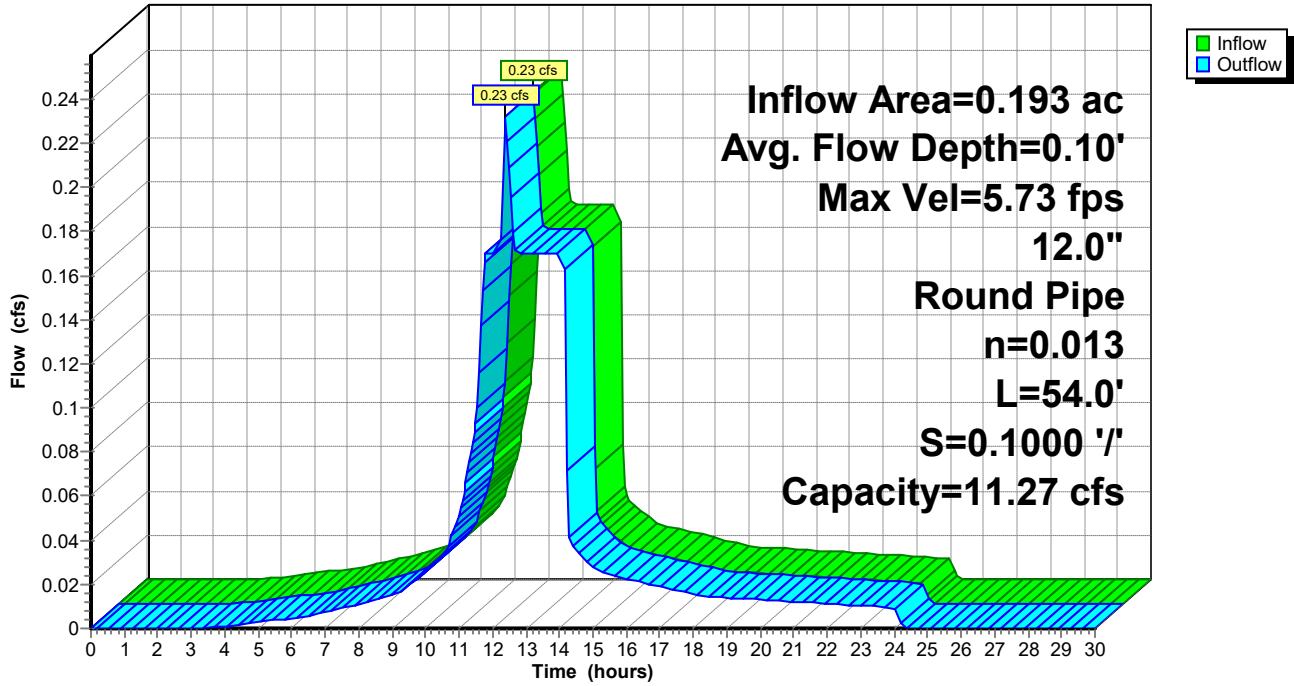
Peak Storage= 2 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 0.60'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 11.27 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 54.0' Slope= 0.1000 '/'
Inlet Invert= 130.40', Outlet Invert= 125.00'



Reach UGS1B: TO FE#1

Hydrograph



Summary for Pond UGS1: TO UGS1B

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

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 3.88" for 10-Year event
 Inflow = 0.89 cfs @ 12.12 hrs, Volume= 0.062 af
 Outflow = 0.23 cfs @ 12.39 hrs, Volume= 0.062 af, Atten= 74%, Lag= 15.8 min
 Primary = 0.23 cfs @ 12.39 hrs, Volume= 0.062 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= 135.07' @ 12.39 hrs Surf.Area= 0.016 ac Storage= 0.015 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 20.9 min (809.4 - 788.5)

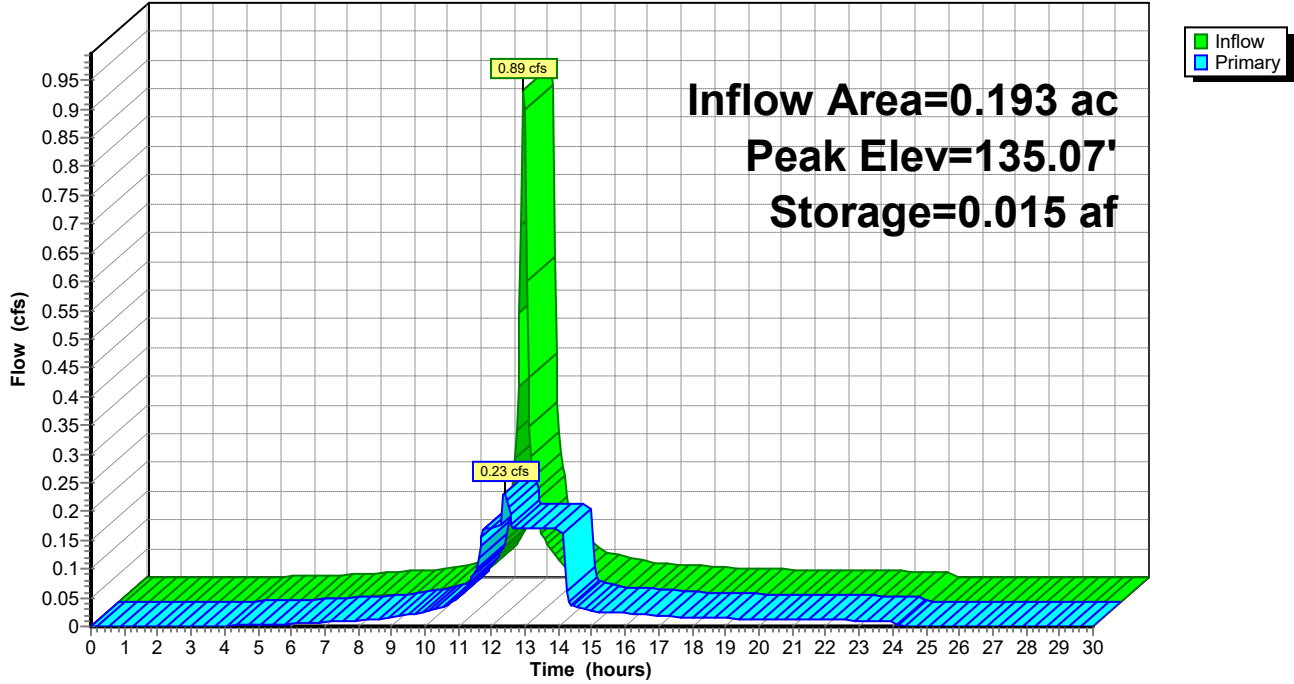
Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.024 af	20.00'W x 22.00'L x 6.00'H Prismaoid 0.061 af Overall x 40.0% Voids
#2	134.00'	0.021 af	Shea Leaching Chamber 4x4x4 x 20 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 20 Chambers in 5 Rows
		0.046 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'	8.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.20 cfs @ 12.39 hrs HW=135.07' (Free Discharge)
 1=Special & User-Defined (Custom Controls 0.17 cfs)
 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 0.89 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=221,713 sf 1.89% Impervious Runoff Depth=2.77" Flow Length=770' Tc=19.9 min CN=70 Runoff=11.82 cfs 1.173 af
Subcatchment p100: TO DCB#100	Runoff Area=1,528 sf 80.69% Impervious Runoff Depth=5.13" Flow Length=68' Slope=0.0200 '/' Tc=5.0 min CN=93 Runoff=0.21 cfs 0.015 af
Subcatchment p101: TO DCB#101	Runoff Area=6,877 sf 71.02% Impervious Runoff Depth=4.91" Flow Length=151' Tc=5.0 min CN=91 Runoff=0.94 cfs 0.065 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,330 sf 88.46% Impervious Runoff Depth=5.36" Flow Length=703' Slope=0.0600 '/' Tc=5.0 min CN=95 Runoff=2.05 cfs 0.147 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=3.44" Flow Length=356' Tc=5.0 min CN=77 Runoff=8.47 cfs 0.541 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=5.25" Flow Length=362' Slope=0.0600 '/' Tc=5.0 min CN=94 Runoff=1.17 cfs 0.083 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=5.71" Flow Length=136' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.33 cfs 0.025 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=5.71" Flow Length=234' Slope=0.0600 '/' Tc=5.0 min CN=98 Runoff=0.81 cfs 0.060 af
Subcatchment p7: TO DCB-E	Runoff Area=4,728 sf 65.46% Impervious Runoff Depth=4.58" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.61 cfs 0.041 af
Reach DCB-B: TO OUTFALL	Inflow=1.17 cfs 0.083 af Outflow=1.17 cfs 0.083 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.18' Max Vel=13.58 fps Inflow=1.71 cfs 0.127 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/' Capacity=52.90 cfs Outflow=1.70 cfs 0.127 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.23' Max Vel=8.11 fps Inflow=1.41 cfs 0.102 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/' Capacity=27.58 cfs Outflow=1.38 cfs 0.102 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.24' Max Vel=4.16 fps Inflow=0.61 cfs 0.041 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/' Capacity=4.79 cfs Outflow=0.60 cfs 0.041 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.14' Max Vel=3.11 fps Inflow=0.21 cfs 0.015 af 12.0" Round Pipe n=0.013 L=128.0' S=0.0195 '/' Capacity=4.98 cfs Outflow=0.21 cfs 0.015 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.34' Max Vel=3.95 fps Inflow=0.94 cfs 0.065 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/' Capacity=3.76 cfs Outflow=0.92 cfs 0.065 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.27' Max Vel=6.42 fps Inflow=1.12 cfs 0.080 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/' Capacity=6.90 cfs Outflow=1.12 cfs 0.080 af

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Reach DP#1: WETLAND	Inflow=13.91 cfs 1.463 af Outflow=13.91 cfs 1.463 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=2.05 cfs 0.147 af Outflow=2.05 cfs 0.147 af
Reach DP#3: LOW POINT	Inflow=8.47 cfs 0.541 af Outflow=8.47 cfs 0.541 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.07' Max Vel=1.01 fps Inflow=1.17 cfs 0.083 af n=0.080 L=46.0' S=0.1087 '/ Capacity=122.10 cfs Outflow=1.13 cfs 0.083 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.07' Max Vel=0.91 fps Inflow=1.13 cfs 0.083 af n=0.080 L=211.0' S=0.0867 '/ Capacity=109.07 cfs Outflow=1.00 cfs 0.083 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.10' Max Vel=0.65 fps Inflow=1.00 cfs 0.083 af n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=0.99 cfs 0.083 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.10' Max Vel=0.27 fps Inflow=0.99 cfs 0.083 af n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=0.83 cfs 0.083 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.09' Max Vel=1.13 fps Inflow=1.70 cfs 0.127 af n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.49 cfs 0.127 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.21' Max Vel=0.43 fps Inflow=1.63 cfs 0.206 af n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=1.56 cfs 0.206 af
Reach OL-8: OVERLAND	Avg. Flow Depth=0.04' Max Vel=0.92 fps Inflow=0.62 cfs 0.080 af n=0.080 L=82.0' S=0.1585 '/ Capacity=147.47 cfs Outflow=0.58 cfs 0.080 af
Reach OL7: OVERLAND	Avg. Flow Depth=0.09' Max Vel=0.24 fps Inflow=0.58 cfs 0.080 af n=0.400 L=270.0' S=0.1037 '/ Capacity=23.85 cfs Outflow=0.36 cfs 0.080 af
Reach OUTLET: TO DP#1	Inflow=1.70 cfs 0.127 af Outflow=1.70 cfs 0.127 af
Reach UGS1A: TO UGS#1	Inflow=1.12 cfs 0.080 af Outflow=1.12 cfs 0.080 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.16' Max Vel=7.68 fps Inflow=0.66 cfs 0.080 af 12.0" Round Pipe n=0.013 L=54.0' S=0.1000 '/ Capacity=11.27 cfs Outflow=0.62 cfs 0.080 af
Pond UGS1: TO UGS1B	Peak Elev=135.28' Storage=0.017 af Inflow=1.12 cfs 0.080 af Outflow=0.66 cfs 0.080 af

Total Runoff Area = 7.980 ac Runoff Volume = 2.151 af Average Runoff Depth = 3.23"
84.67% Pervious = 6.757 ac 15.33% Impervious = 1.223 ac

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

Runoff = 11.82 cfs @ 12.30 hrs, Volume= 1.173 af, Depth= 2.77"

Routed to Reach DP#1 : WETLAND

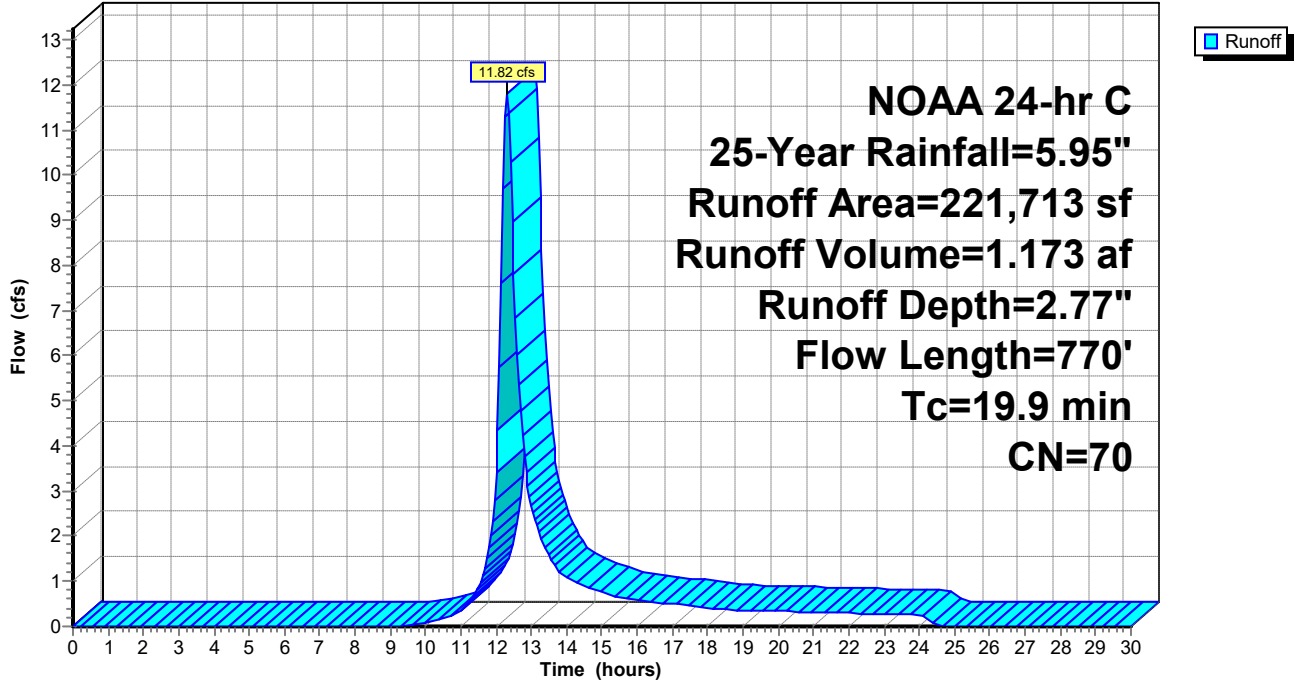
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

Area (sf)	CN	Description
3,388	74	>75% Grass cover, Good, HSG C
177,438	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,514	89	Gravel roads, HSG C
30,179	65	Brush, Good, HSG C
221,713	70	Weighted Average
217,519		98.11% Pervious Area
4,194		1.89% 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 = 0.21 cfs @ 12.11 hrs, Volume= 0.015 af, Depth= 5.13"
 Routed to Reach DCB100 : TO DMH#100

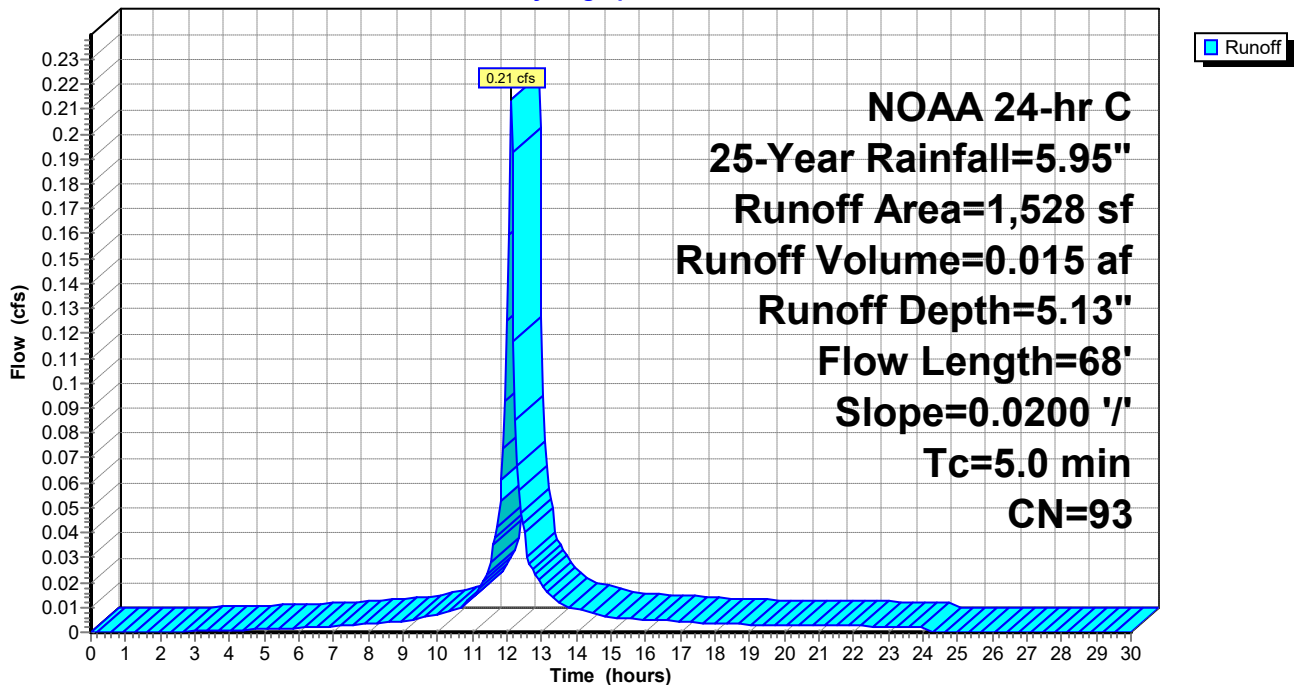
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

Area (sf)	CN	Description
295	74	>75% Grass cover, Good, HSG C
1,233	98	Paved parking, HSG C
1,528	93	Weighted Average
295		19.31% Pervious Area
1,233		80.69% 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"
0.7	45	0.0200	1.14		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.1	18	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	68	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 = 0.94 cfs @ 12.11 hrs, Volume= 0.065 af, Depth= 4.91"
 Routed to Reach DCB101 : TO DMH#100

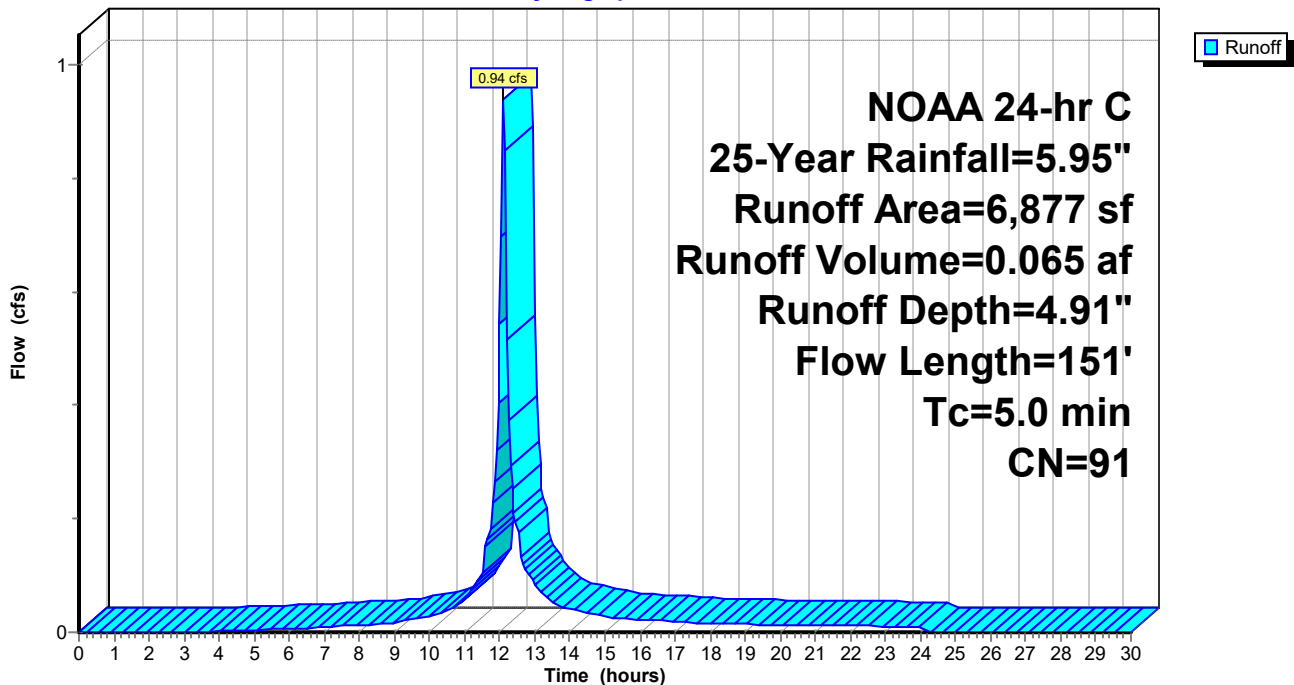
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

Area (sf)	CN	Description
1,993	74	>75% Grass cover, Good, HSG C
4,884	98	Paved parking, HSG C
6,877	91	Weighted Average
1,993		28.98% Pervious Area
4,884		71.02% 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



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

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

Runoff = 2.05 cfs @ 12.11 hrs, Volume= 0.147 af, Depth= 5.36"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

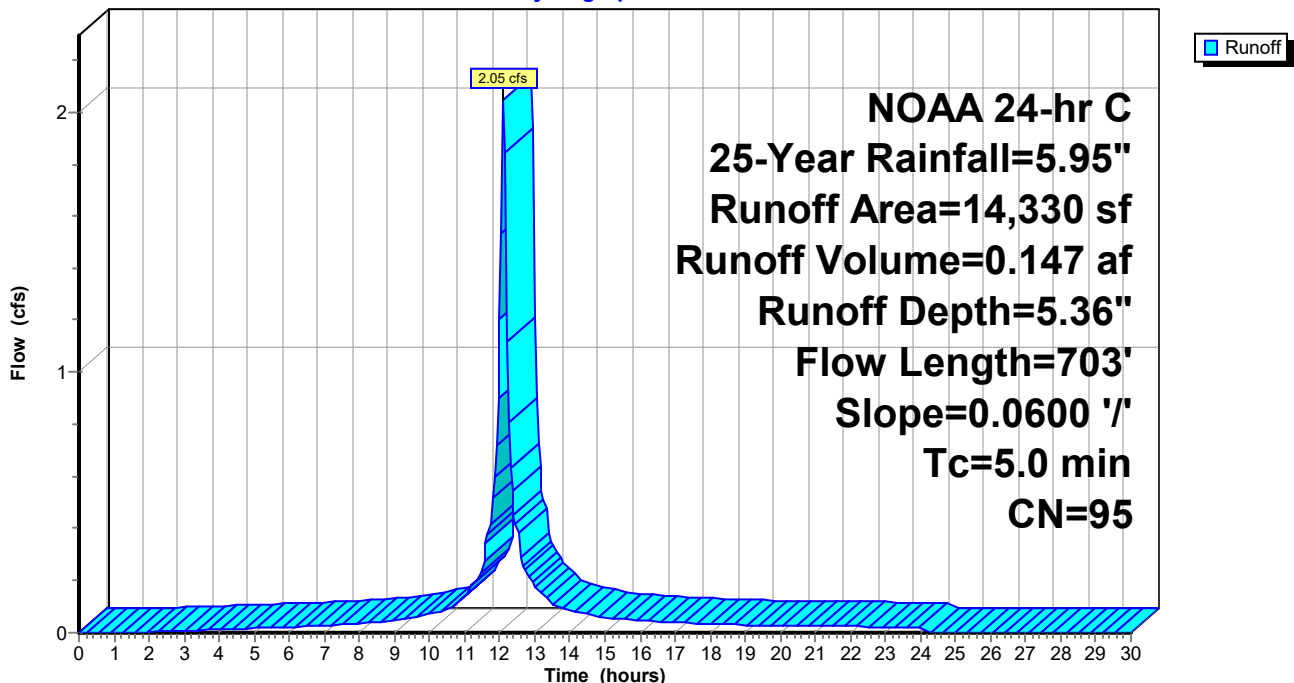
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

Area (sf)	CN	Description
* 1,110	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,676	98	Paved parking, HSG C
14,330	95	Weighted Average
1,654		11.54% Pervious Area
12,676		88.46% 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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NOAA 24-hr C 25-Year Rainfall=5.95"

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

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

Runoff = 8.47 cfs @ 12.12 hrs, Volume= 0.541 af, Depth= 3.44"
 Routed to Reach DP#3 : LOW POINT

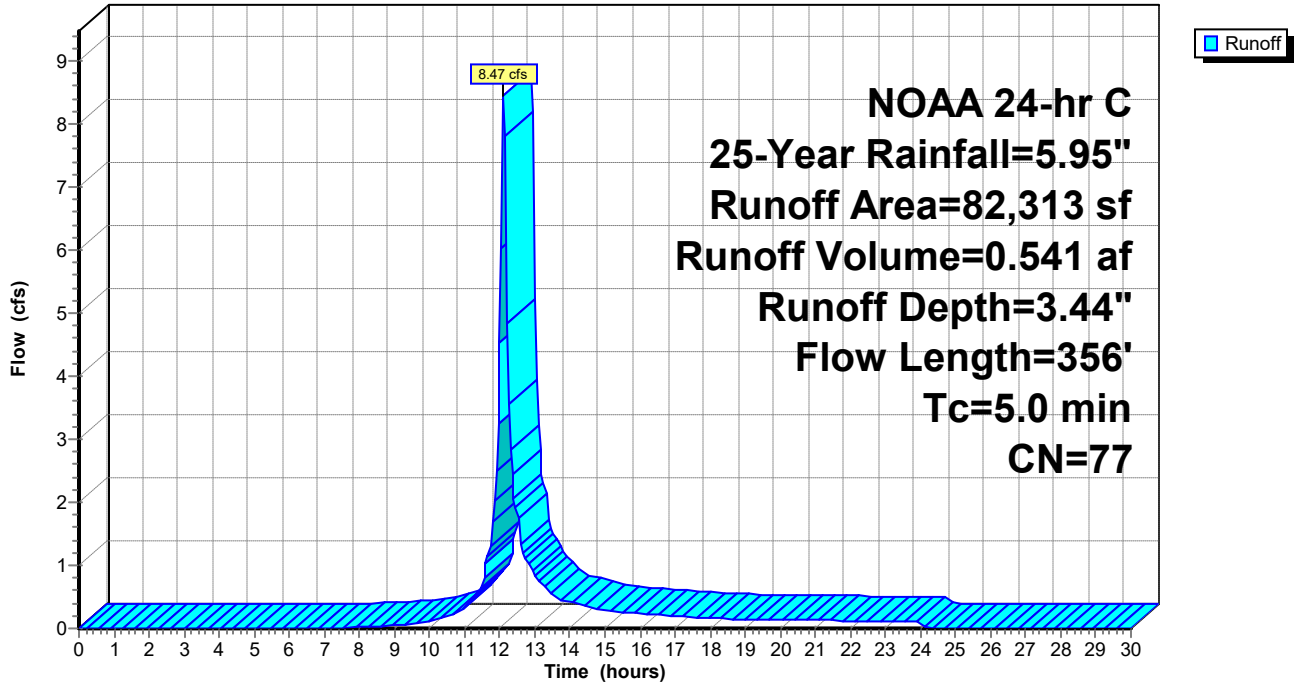
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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



Summary for Subcatchment P4: TO DCB-B

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

Runoff = 1.17 cfs @ 12.11 hrs, Volume= 0.083 af, Depth= 5.25"
 Routed to Reach DCB-B : TO OUTFALL

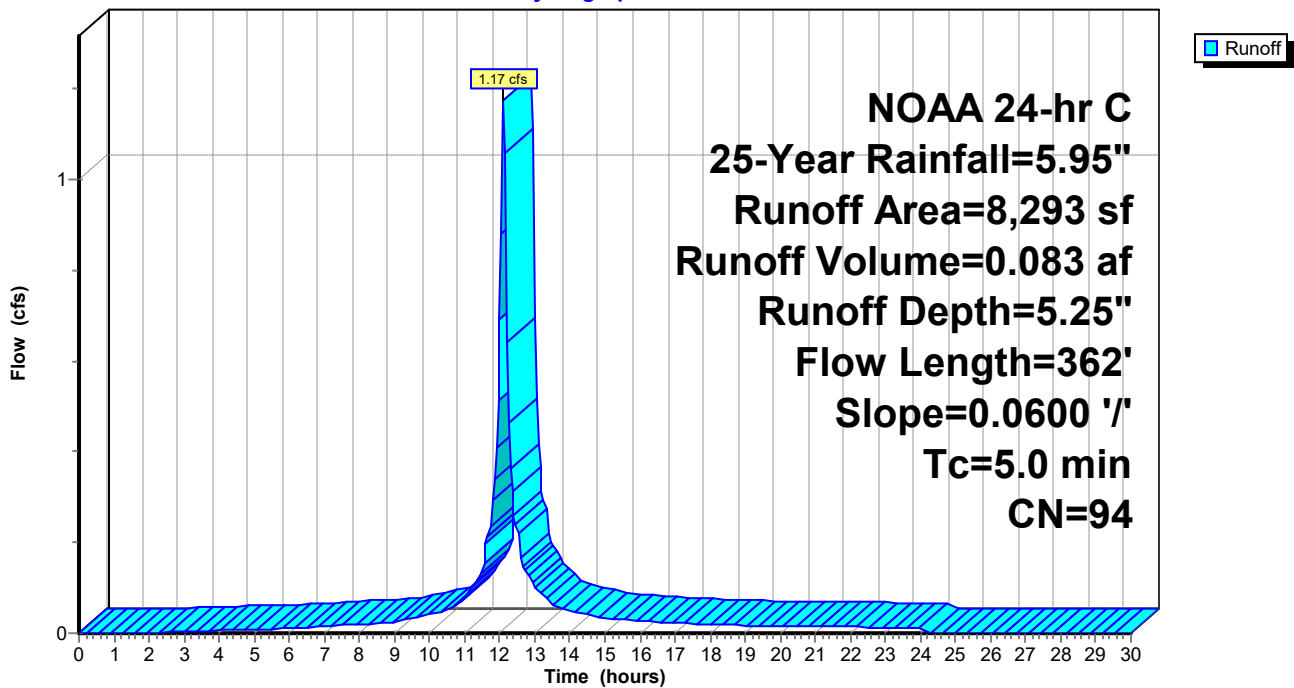
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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



Summary for Subcatchment p5: TO DCB-C

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

Runoff = 0.33 cfs @ 12.11 hrs, Volume= 0.025 af, Depth= 5.71"
 Routed to Reach DCB-C : TO OUTFALL

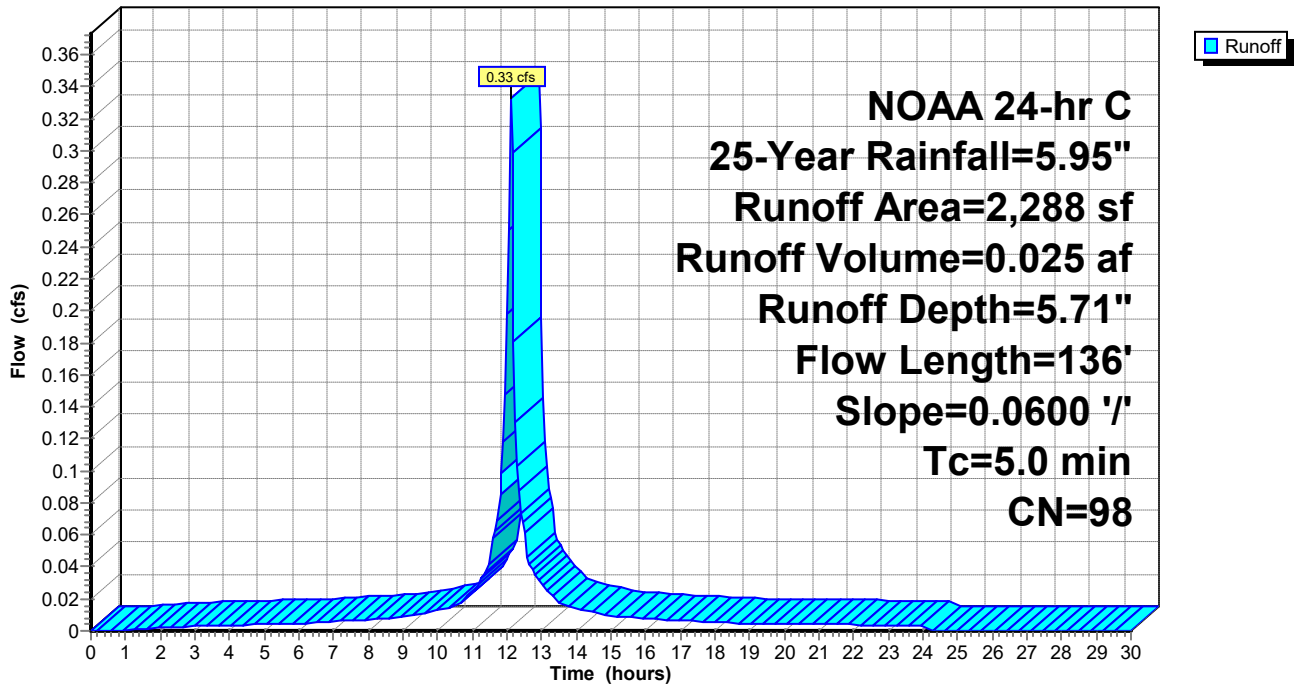
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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 = 0.81 cfs @ 12.11 hrs, Volume= 0.060 af, Depth= 5.71"
 Routed to Reach DCB-D : TO DCB-C

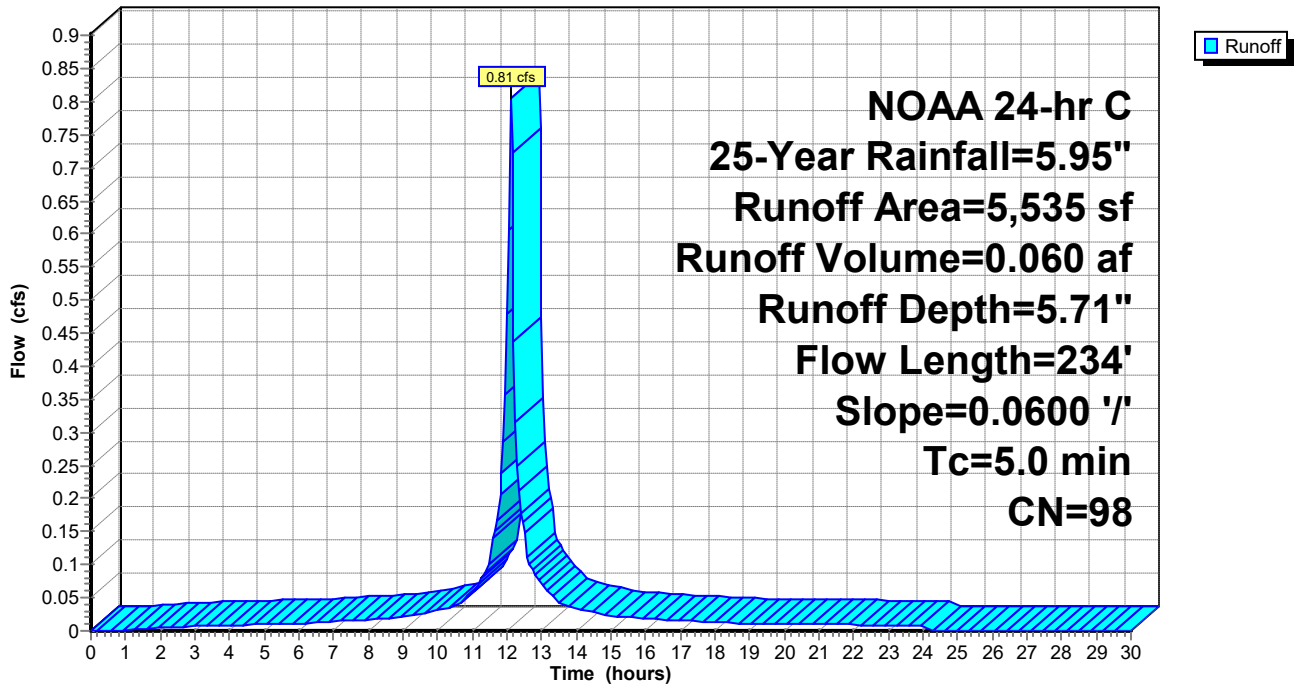
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

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 = 0.61 cfs @ 12.11 hrs, Volume= 0.041 af, Depth= 4.58"
 Routed to Reach DCB-E : TO DCB-D

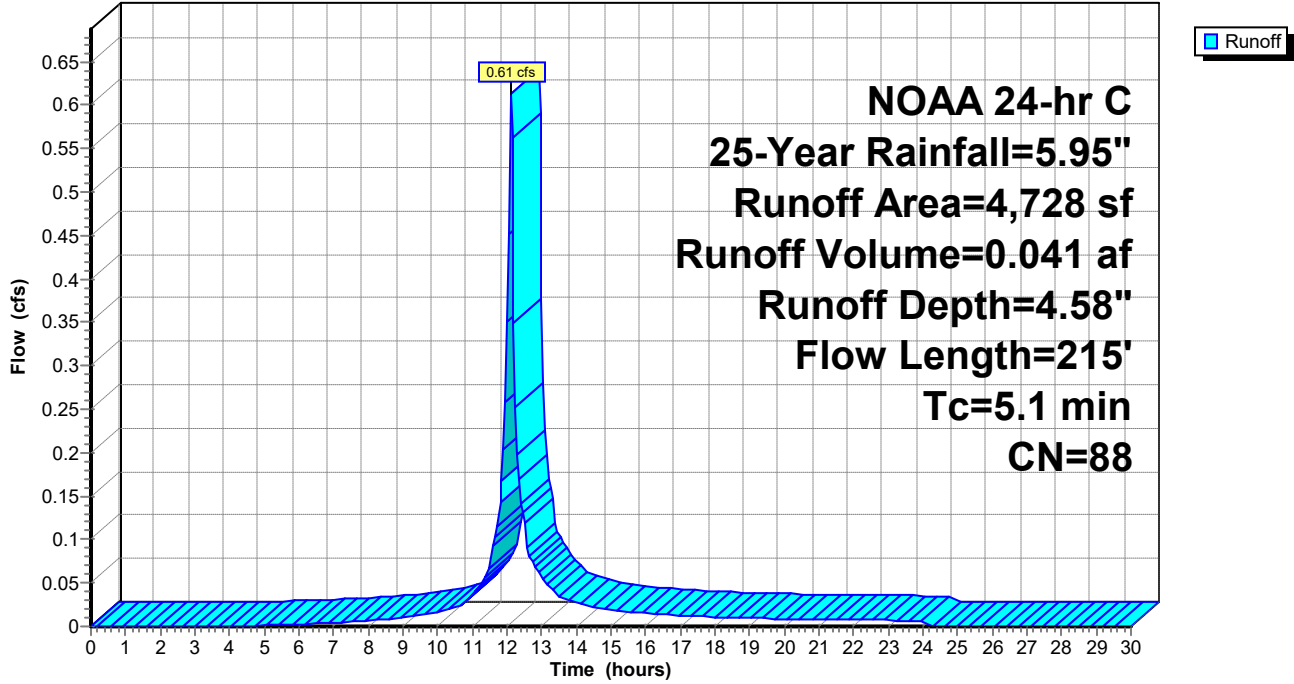
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=5.95"

Area (sf)	CN	Description
1,440	70	Woods, Good, HSG C
3,095	98	Paved parking, HSG C
193	74	>75% Grass cover, Good, HSG C
4,728	88	Weighted Average
1,633		34.54% Pervious Area
3,095		65.46% 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

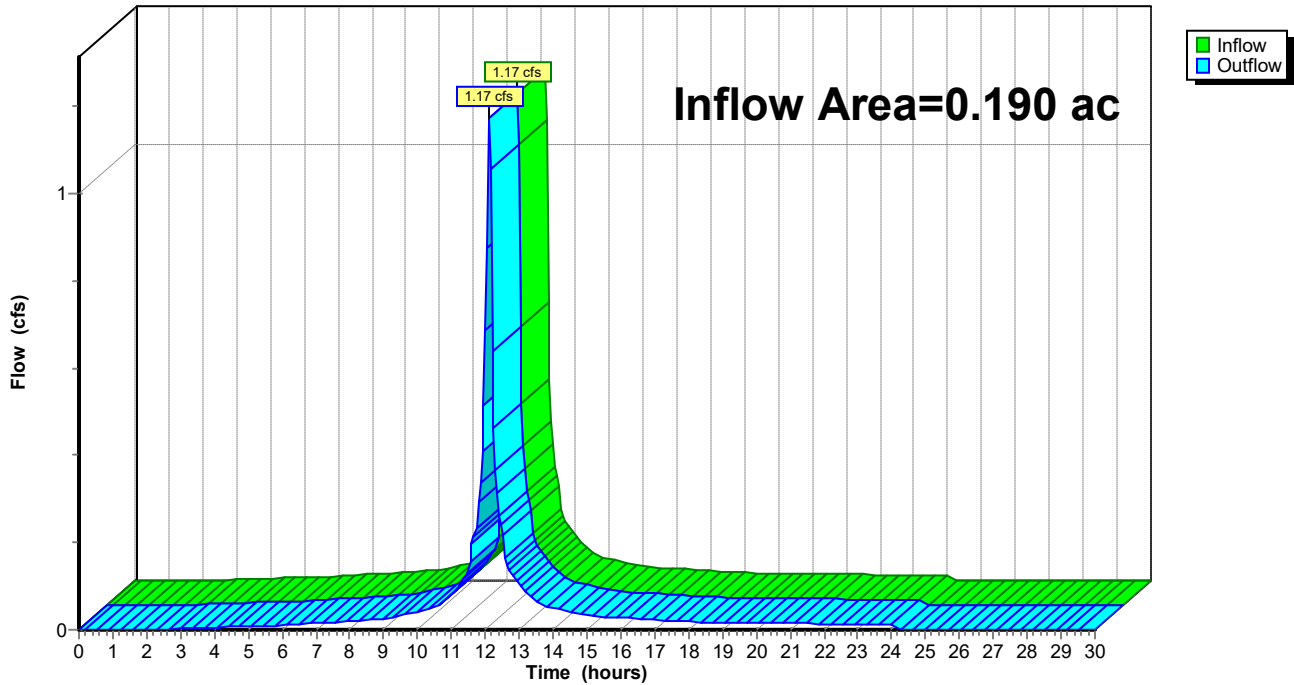
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 1.17 cfs @ 12.11 hrs, Volume= 0.083 af
Outflow = 1.17 cfs @ 12.11 hrs, Volume= 0.083 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

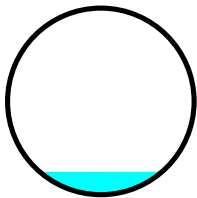
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 5.28" for 25-Year event
Inflow = 1.71 cfs @ 12.12 hrs, Volume= 0.127 af
Outflow = 1.70 cfs @ 12.12 hrs, Volume= 0.127 af, Atten= 1%, 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 = 4.37 fps, Avg. Travel Time= 0.3 min

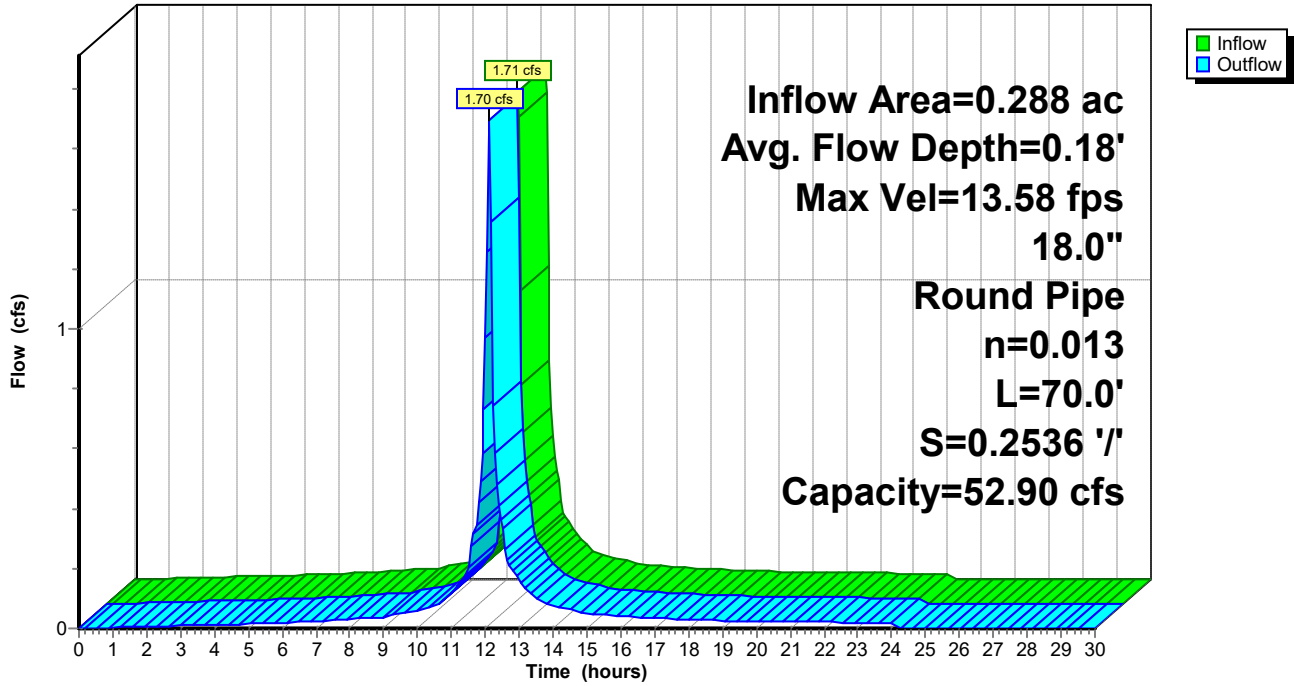
Peak Storage= 9 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 0.99'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

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



Summary for Reach DCB-D: TO DCB-C

[52] Hint: Inlet/Outlet conditions not evaluated

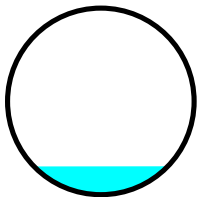
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.13' @ 12.10 hrs

Inflow Area = 0.236 ac, 84.09% Impervious, Inflow Depth = 5.19" for 25-Year event
Inflow = 1.41 cfs @ 12.11 hrs, Volume= 0.102 af
Outflow = 1.38 cfs @ 12.12 hrs, Volume= 0.102 af, Atten= 2%, 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= 8.11 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.56 fps, Avg. Travel Time= 0.7 min

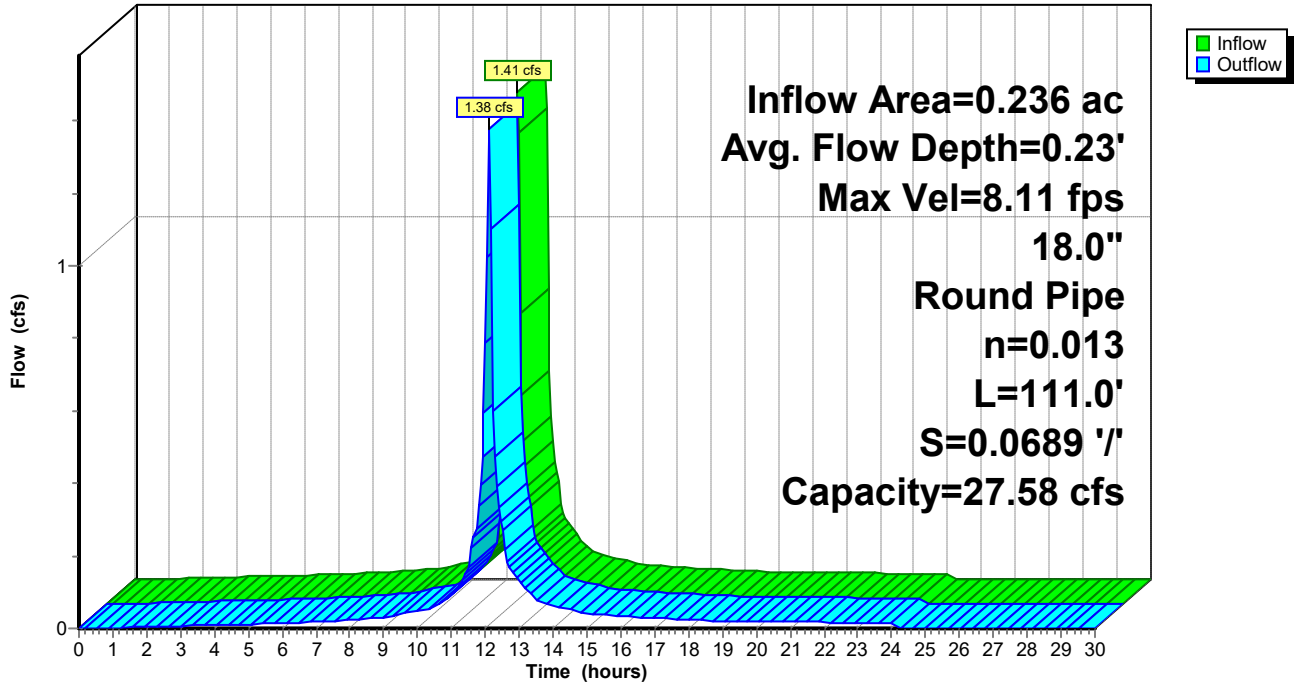
Peak Storage= 19 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 1.08'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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



Summary for Reach DCB-E: TO DCB-D

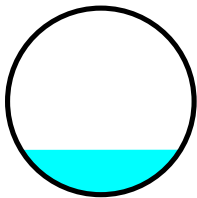
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.109 ac, 65.46% Impervious, Inflow Depth = 4.58" for 25-Year event
Inflow = 0.61 cfs @ 12.11 hrs, Volume= 0.041 af
Outflow = 0.60 cfs @ 12.12 hrs, Volume= 0.041 af, Atten= 2%, 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= 4.16 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 0.5 min

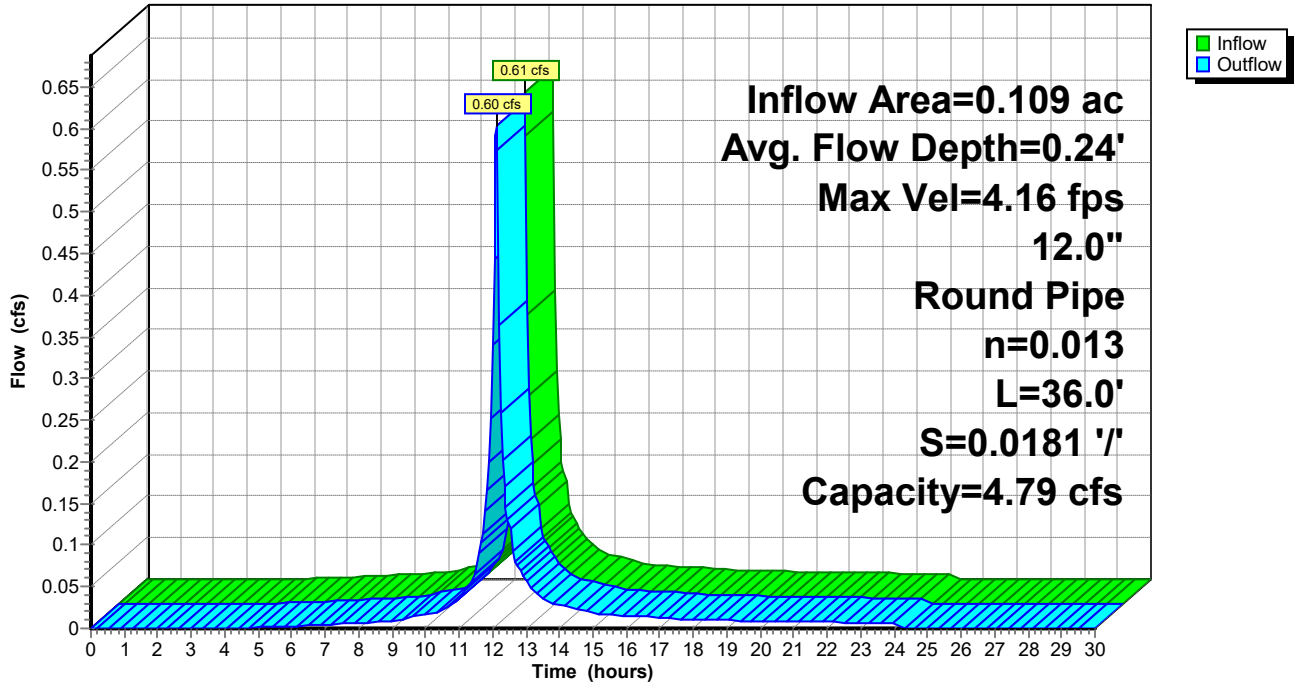
Peak Storage= 5 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 0.86'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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

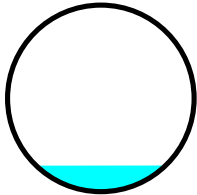
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.035 ac, 80.69% Impervious, Inflow Depth = 5.13" for 25-Year event
Inflow = 0.21 cfs @ 12.11 hrs, Volume= 0.015 af
Outflow = 0.21 cfs @ 12.13 hrs, Volume= 0.015 af, Atten= 4%, 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= 3.11 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 2.1 min

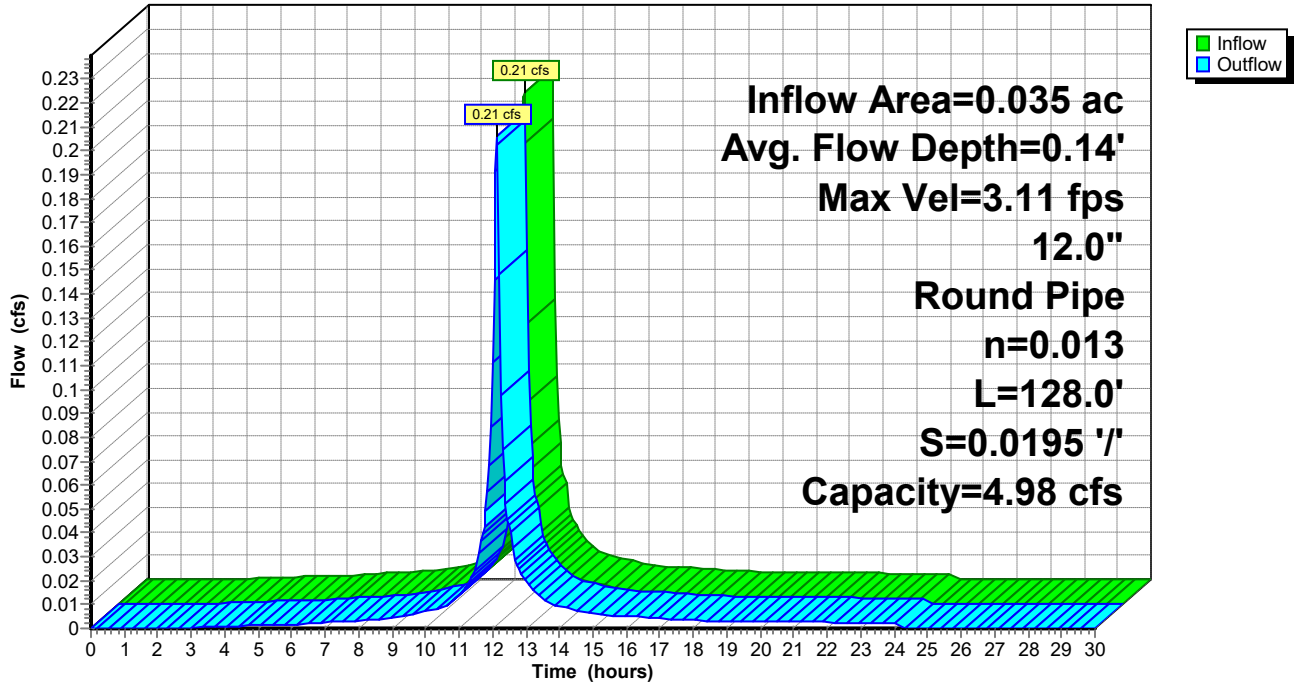
Peak Storage= 9 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 0.70'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.98 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 128.0' Slope= 0.0195 '/'
Inlet Invert= 138.50', Outlet Invert= 136.00'



Reach DCB100: TO DMH#100

Hydrograph



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NOAA 24-hr C 25-Year Rainfall=5.95"

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Summary for Reach DCB101: TO DMH#100

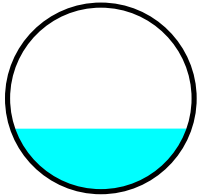
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.158 ac, 71.02% Impervious, Inflow Depth = 4.91" for 25-Year event
Inflow = 0.94 cfs @ 12.11 hrs, Volume= 0.065 af
Outflow = 0.92 cfs @ 12.12 hrs, Volume= 0.065 af, Atten= 2%, 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= 3.95 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 0.5 min

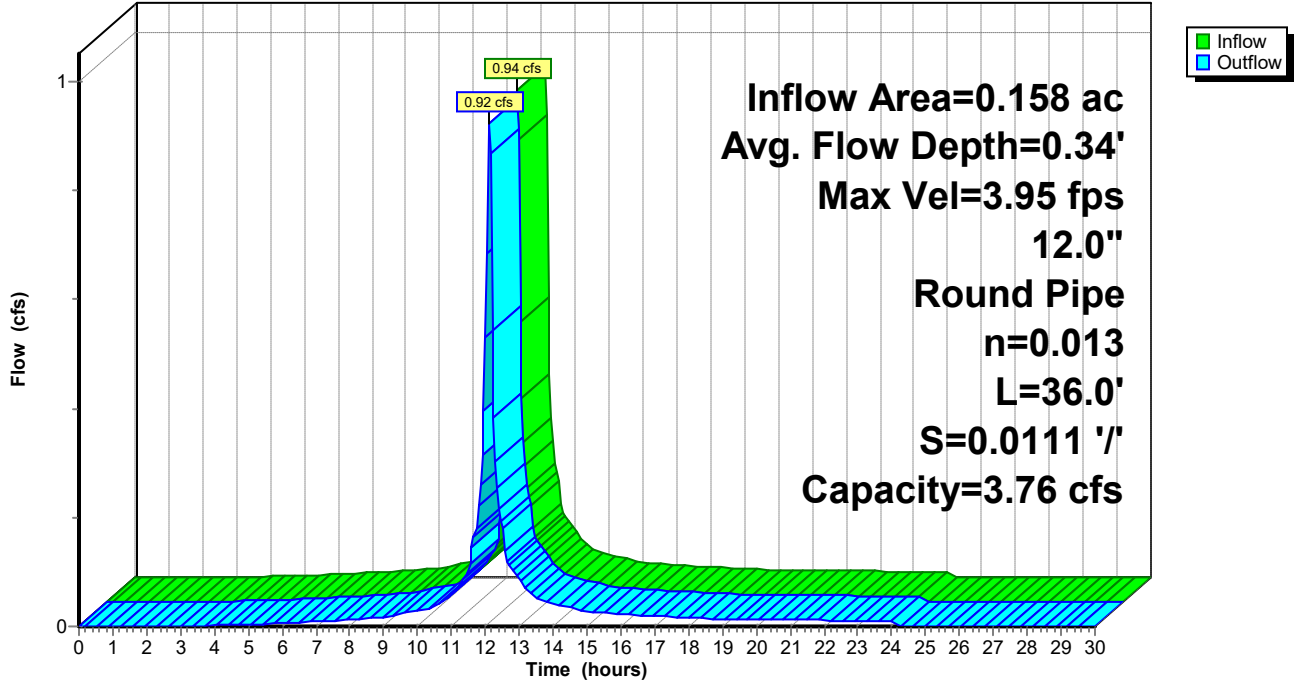
Peak Storage= 8 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 0.95'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

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 0.07' @ 12.10 hrs

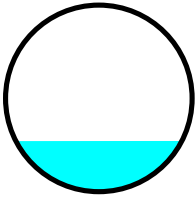
[61] Hint: Exceeded Reach DCB101 outlet invert by 0.07' @ 12.10 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 4.95" for 25-Year event
Inflow = 1.12 cfs @ 12.12 hrs, Volume= 0.080 af
Outflow = 1.12 cfs @ 12.12 hrs, Volume= 0.080 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= 6.42 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 0.1 min

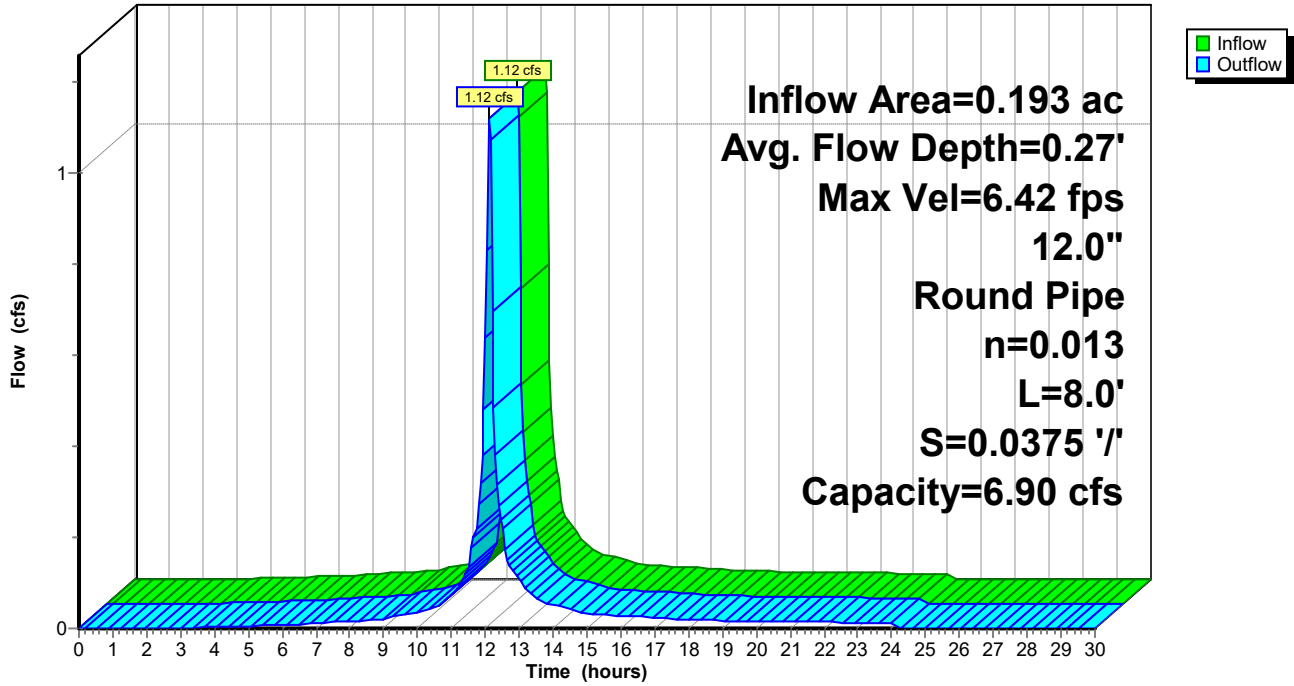
Peak Storage= 1 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 0.89'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

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

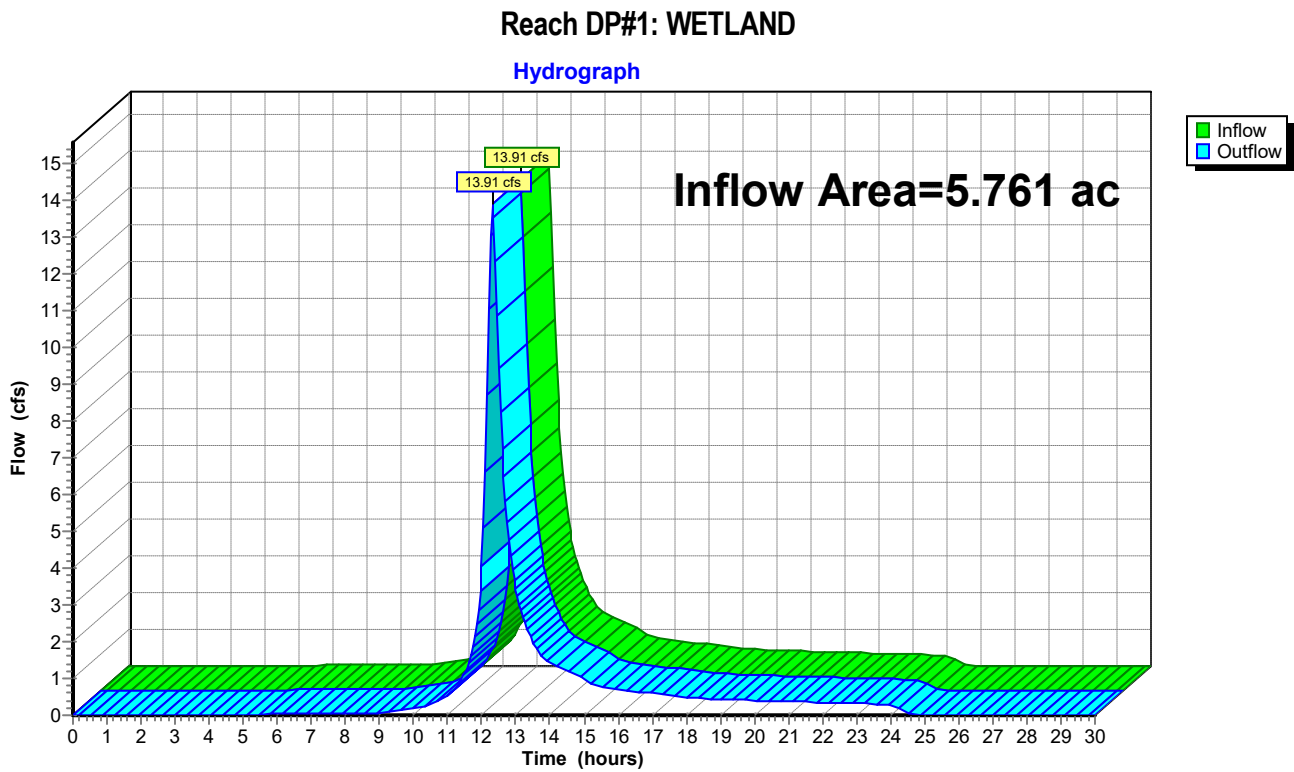


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.761 ac, 11.23% Impervious, Inflow Depth = 3.05" for 25-Year event
Inflow = 13.91 cfs @ 12.31 hrs, Volume= 1.463 af
Outflow = 13.91 cfs @ 12.31 hrs, Volume= 1.463 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

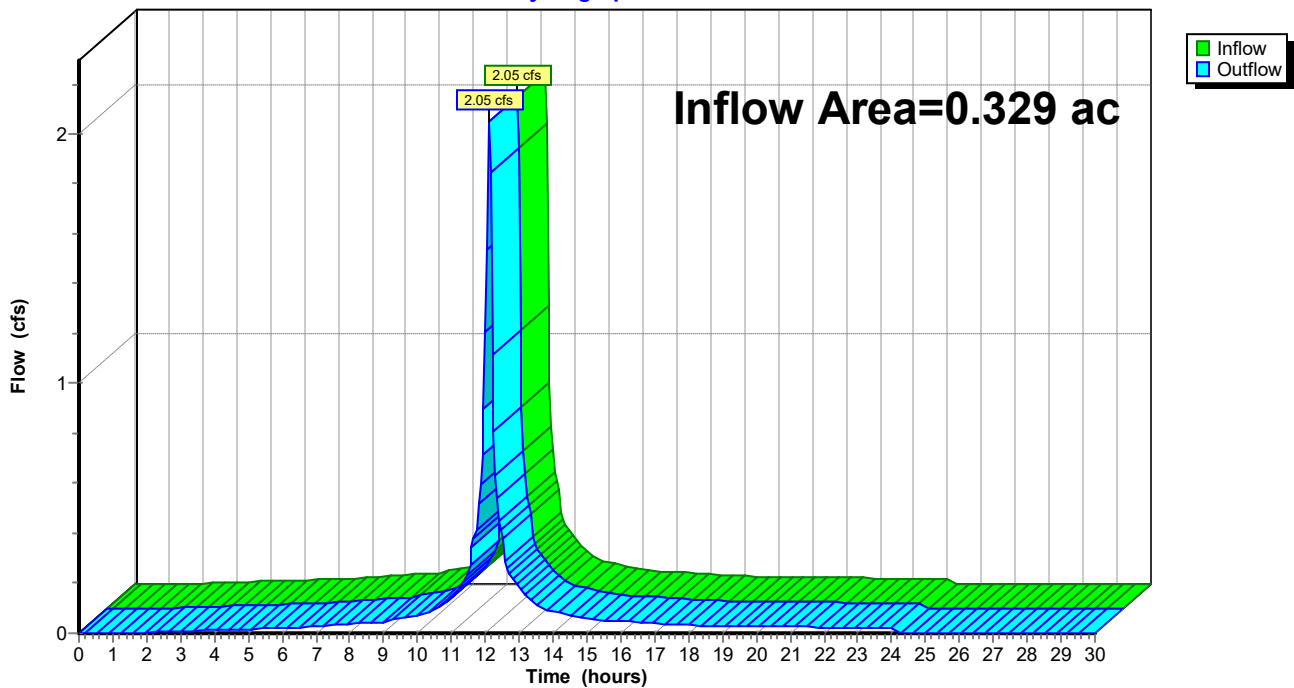
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 88.46% Impervious, Inflow Depth = 5.36" for 25-Year event
Inflow = 2.05 cfs @ 12.11 hrs, Volume= 0.147 af
Outflow = 2.05 cfs @ 12.11 hrs, Volume= 0.147 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

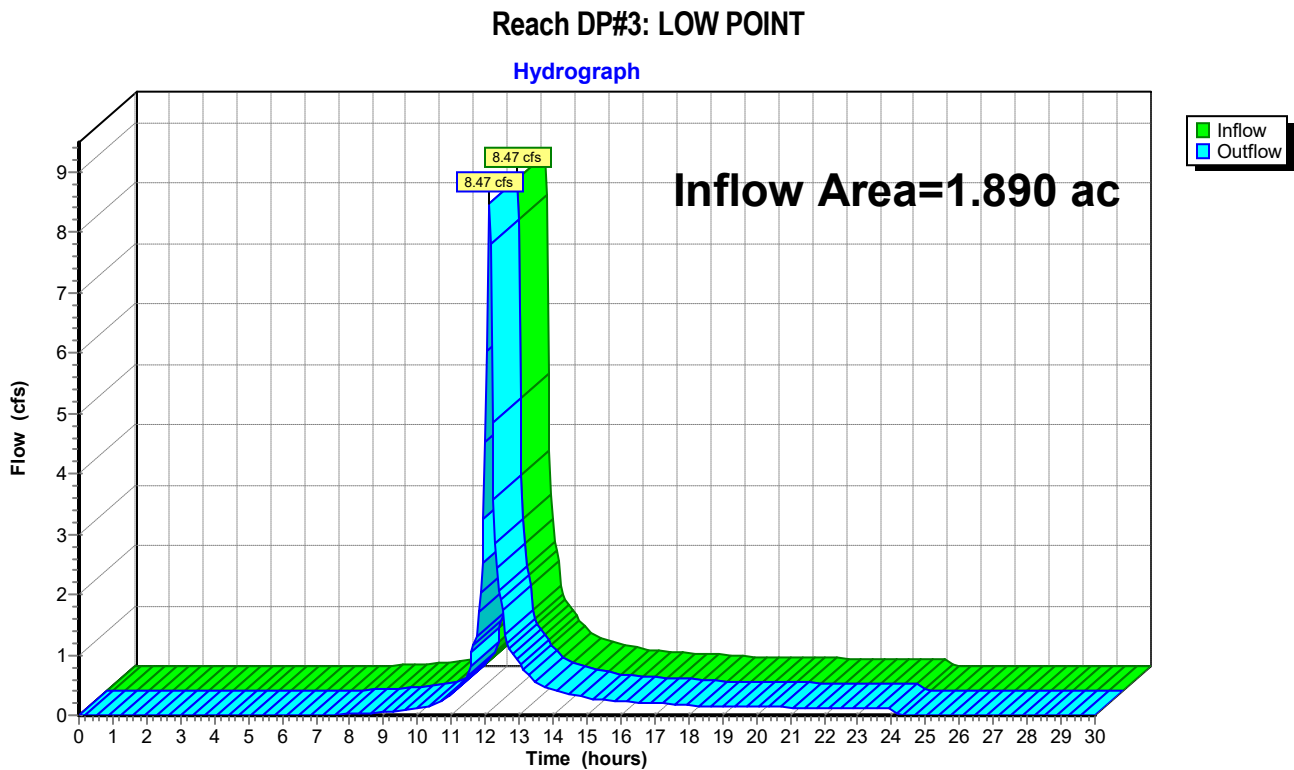


Summary for Reach DP#3: LOW POINT

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

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 3.44" for 25-Year event
Inflow = 8.47 cfs @ 12.12 hrs, Volume= 0.541 af
Outflow = 8.47 cfs @ 12.12 hrs, Volume= 0.541 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 OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
 Inflow = 1.17 cfs @ 12.11 hrs, Volume= 0.083 af
 Outflow = 1.13 cfs @ 12.13 hrs, Volume= 0.083 af, Atten= 4%, 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= 1.01 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.31 fps, Avg. Travel Time= 2.5 min

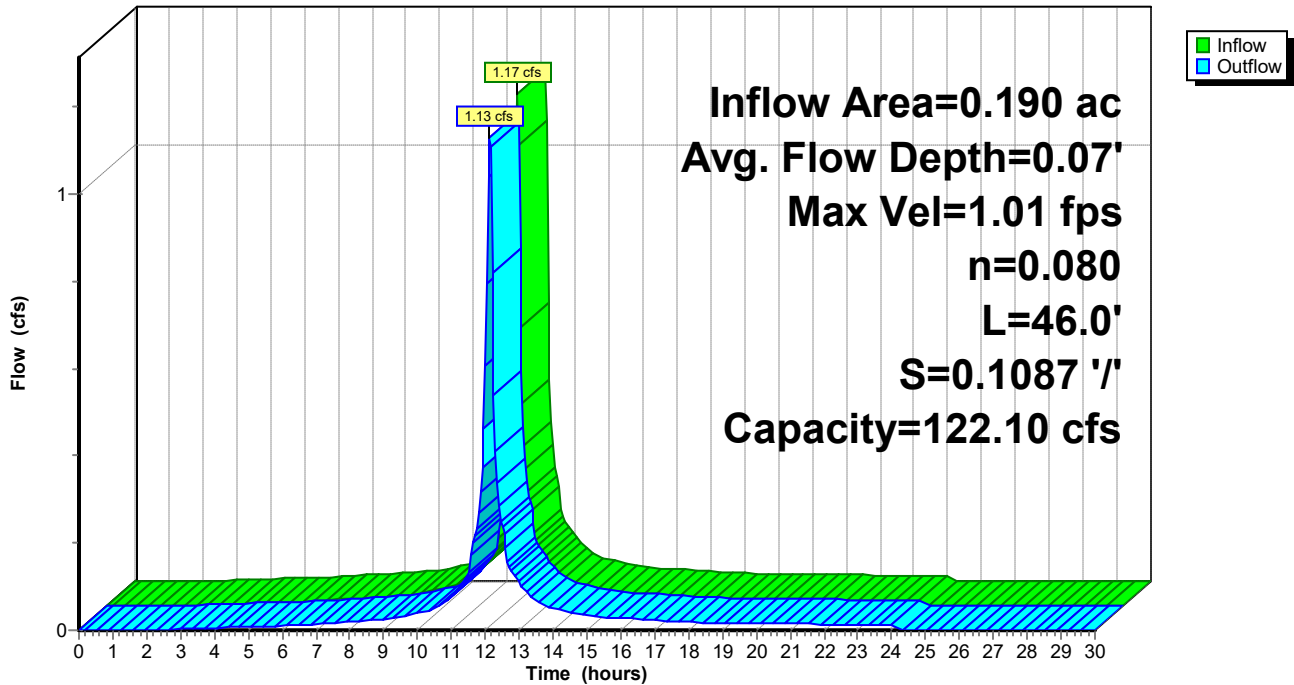
Peak Storage= 52 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.07' , Surface Width= 16.44'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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 0.02' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 1.13 cfs @ 12.13 hrs, Volume= 0.083 af
Outflow = 1.00 cfs @ 12.23 hrs, Volume= 0.083 af, Atten= 11%, Lag= 5.8 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= 0.91 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 12.5 min

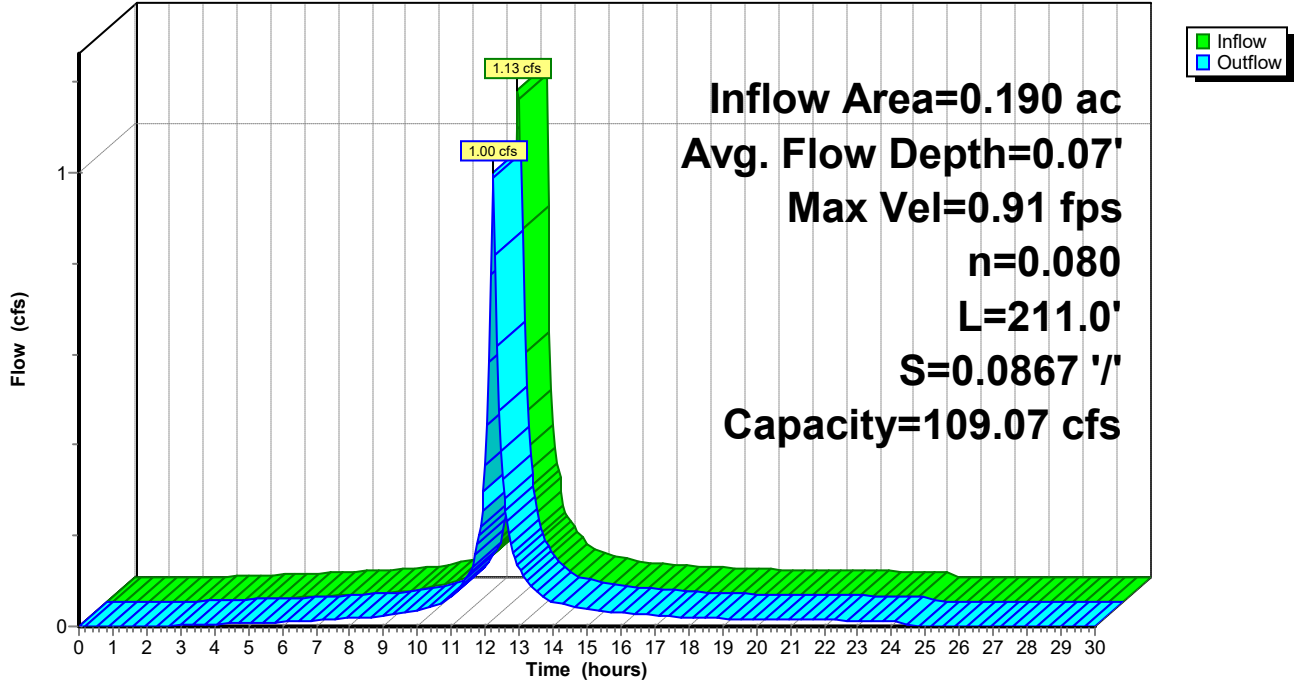
Peak Storage= 237 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.43'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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 0.04' @ 12.30 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 1.00 cfs @ 12.23 hrs, Volume= 0.083 af
Outflow = 0.99 cfs @ 12.25 hrs, Volume= 0.083 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= 0.65 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 2.1 min

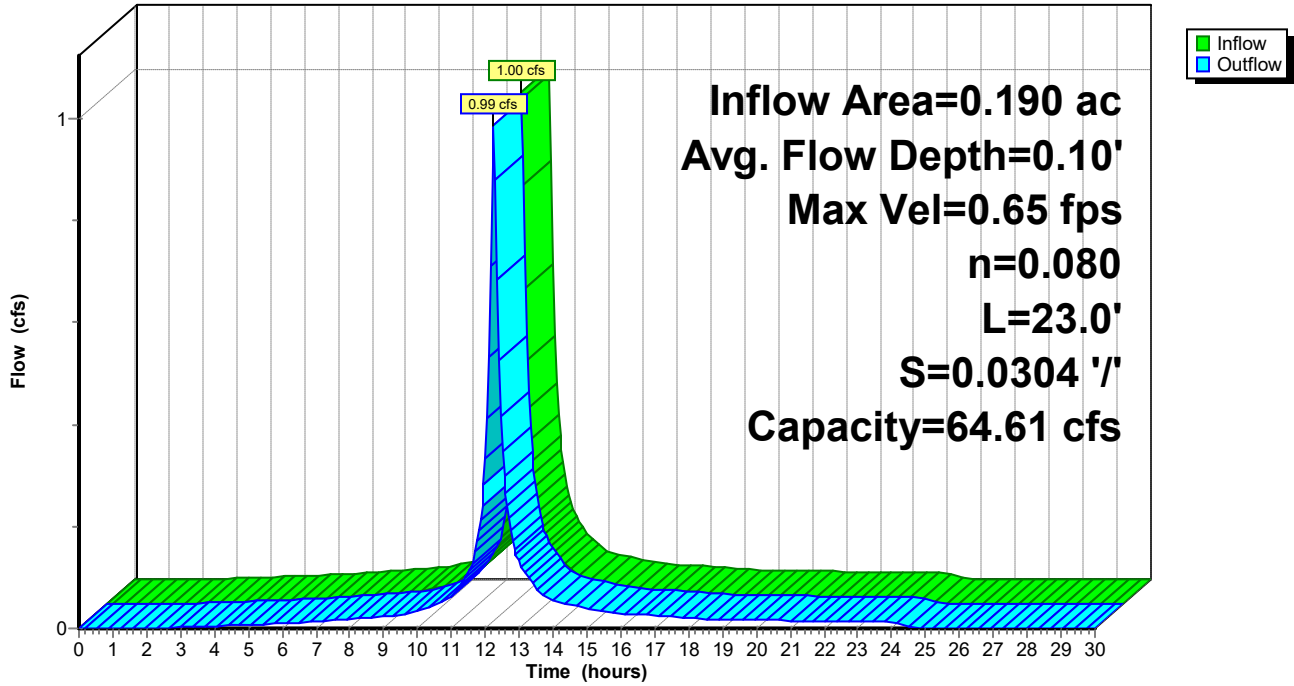
Peak Storage= 35 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.10', Surface Width= 16.92'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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 0.03' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 5.25" for 25-Year event
Inflow = 0.99 cfs @ 12.25 hrs, Volume= 0.083 af
Outflow = 0.83 cfs @ 12.45 hrs, Volume= 0.083 af, Atten= 16%, Lag= 11.9 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= 0.27 fps, Min. Travel Time= 7.8 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 28.5 min

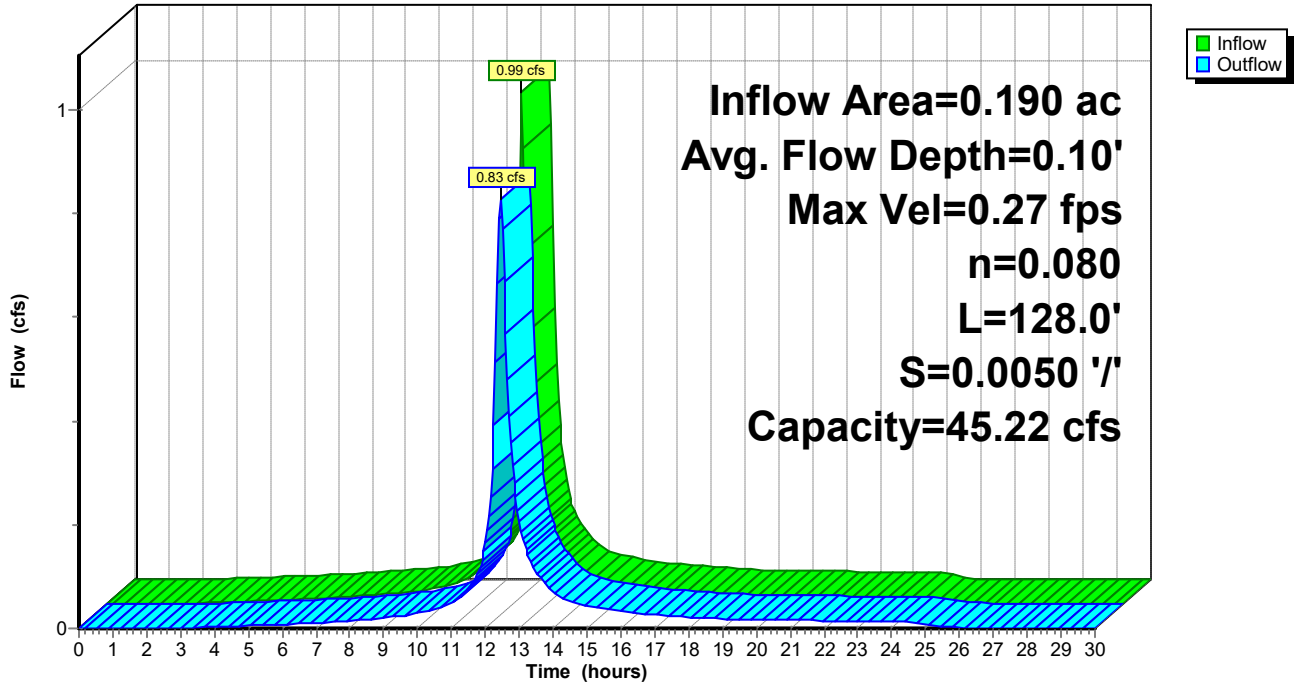
Peak Storage= 392 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 31.98'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 0.288 ac, 86.99% Impervious, Inflow Depth = 5.28" for 25-Year event
 Inflow = 1.70 cfs @ 12.12 hrs, Volume= 0.127 af
 Outflow = 1.49 cfs @ 12.23 hrs, Volume= 0.127 af, Atten= 12%, Lag= 6.3 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= 1.13 fps, Min. Travel Time= 4.2 min
 Avg. Velocity = 0.32 fps, Avg. Travel Time= 14.9 min

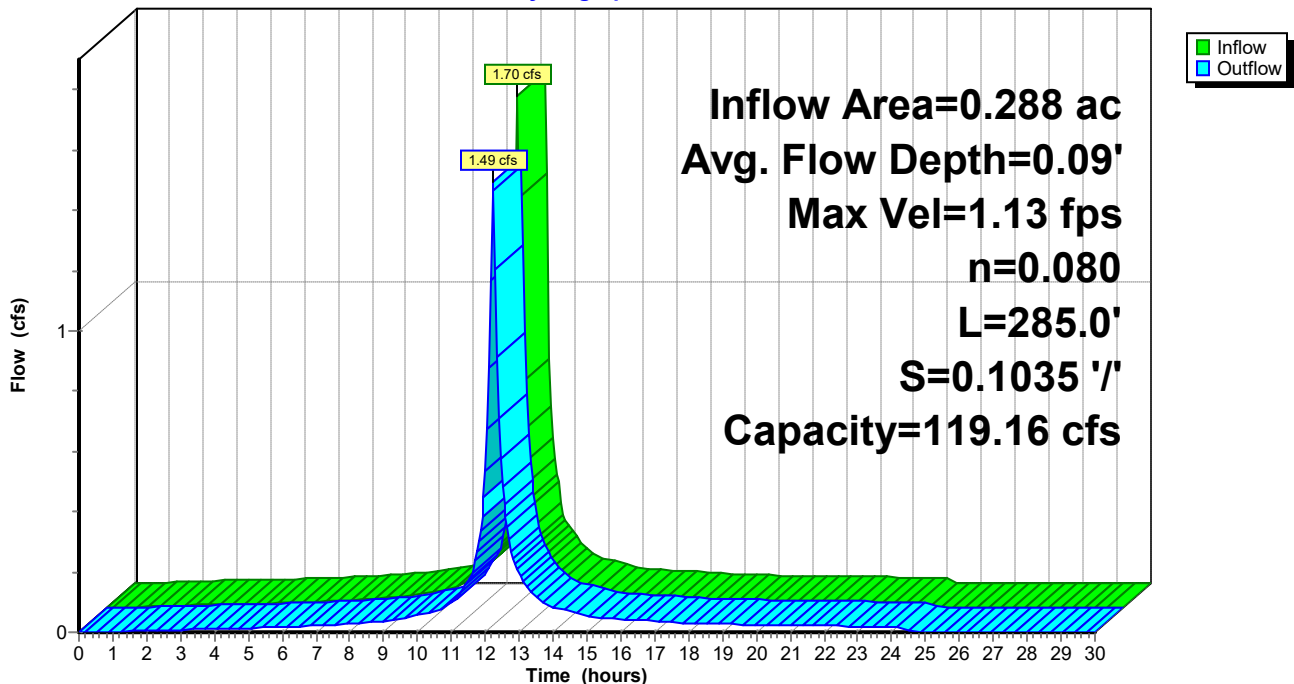
Peak Storage= 391 cf @ 12.16 hrs
 Average Depth at Peak Storage= 0.09' , Surface Width= 16.73'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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 0.15' @ 12.30 hrs

[62] Hint: Exceeded Reach OL7 OUTLET depth by 0.14' @ 12.25 hrs

Inflow Area = 0.481 ac, 81.29% Impervious, Inflow Depth > 5.15" for 25-Year event
Inflow = 1.63 cfs @ 12.23 hrs, Volume= 0.206 af
Outflow = 1.56 cfs @ 12.31 hrs, Volume= 0.206 af, Atten= 4%, Lag= 5.0 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= 0.43 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 11.4 min

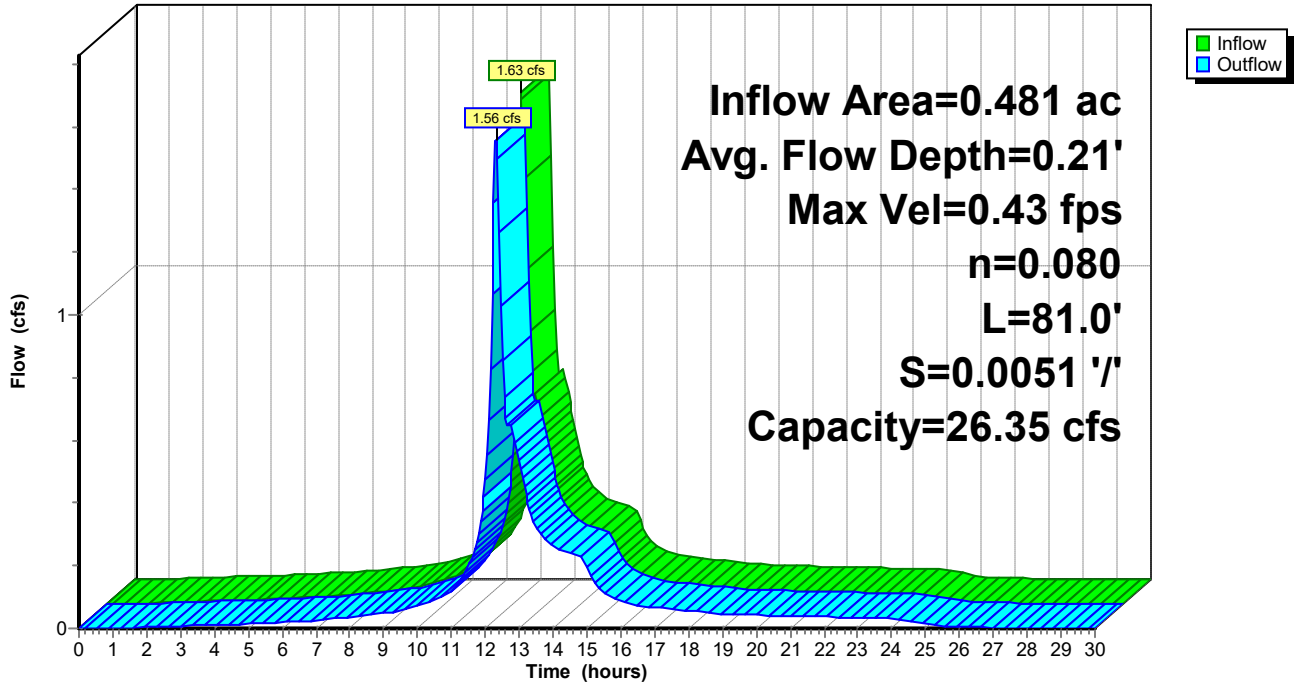
Peak Storage= 293 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.21', Surface Width= 19.22'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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 OL-8: OVERLAND

[61] Hint: Exceeded Reach UGS1B outlet invert by 0.04' @ 12.25 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 4.95" for 25-Year event
Inflow = 0.62 cfs @ 12.23 hrs, Volume= 0.080 af
Outflow = 0.58 cfs @ 12.29 hrs, Volume= 0.080 af, Atten= 7%, Lag= 3.4 min
Routed to Reach OL7 : 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= 1.5 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 3.6 min

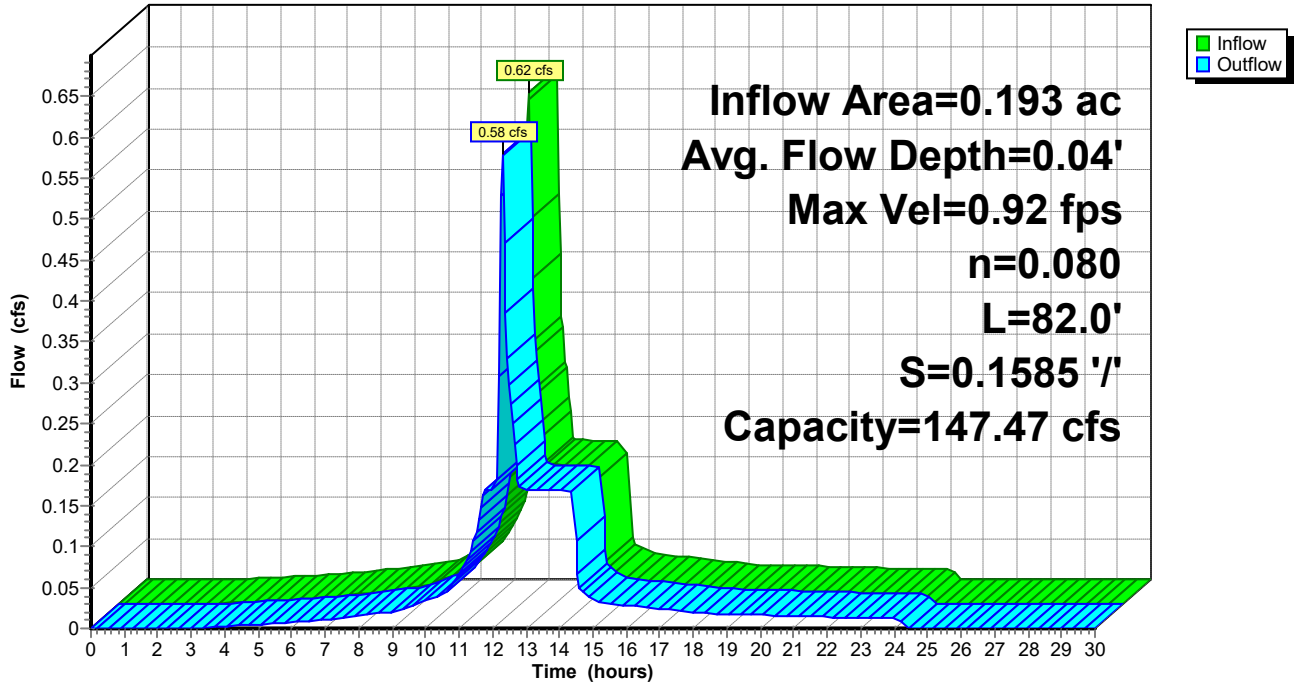
Peak Storage= 57 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 15.90'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 147.47 cfs

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= 82.0' Slope= 0.1585 ' '
Inlet Invert= 125.00', Outlet Invert= 112.00'



Reach OL-8: OVERLAND

Hydrograph



Summary for Reach OL7: OVERLAND

[62] Hint: Exceeded Reach OL-8 OUTLET depth by 0.06' @ 12.50 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 4.95" for 25-Year event
Inflow = 0.58 cfs @ 12.29 hrs, Volume= 0.080 af
Outflow = 0.36 cfs @ 12.75 hrs, Volume= 0.080 af, Atten= 38%, Lag= 27.4 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= 0.24 fps, Min. Travel Time= 18.9 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 53.3 min

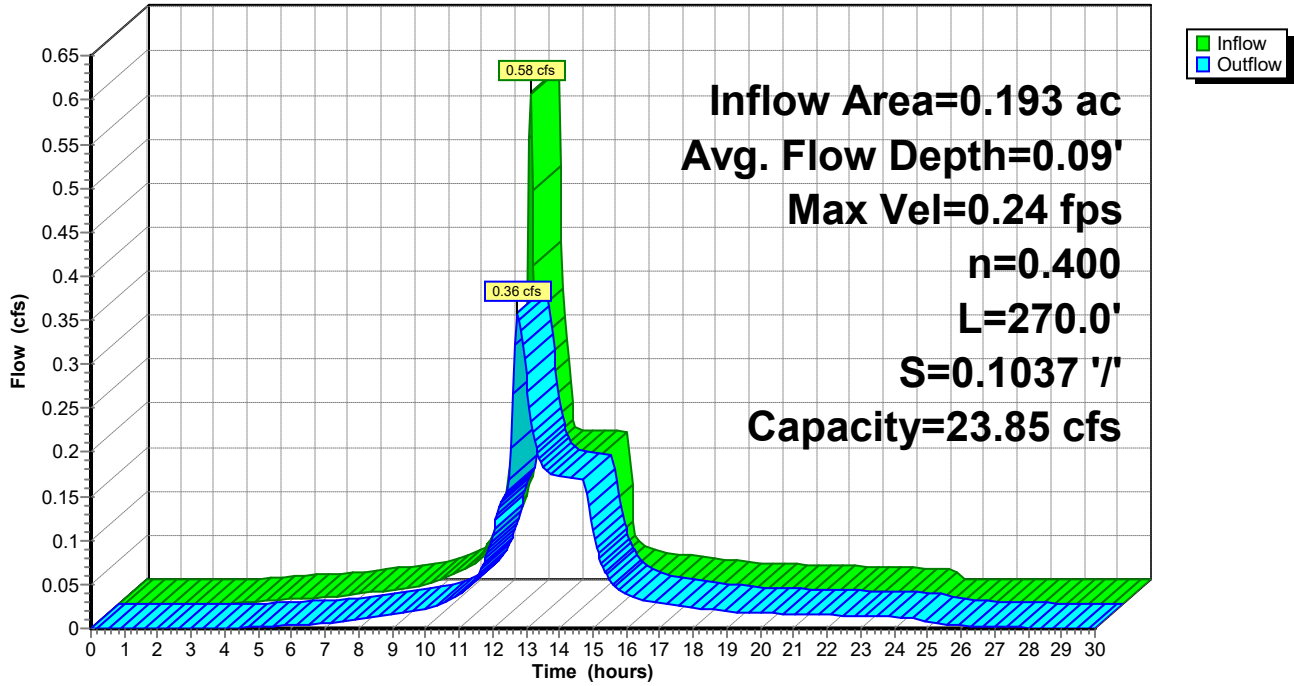
Peak Storage= 407 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.09', Surface Width= 16.89'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 23.85 cfs

15.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 ' Top Width= 35.00'
Length= 270.0' Slope= 0.1037 '/'
Inlet Invert= 112.00', Outlet Invert= 84.00'



Reach OL7: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

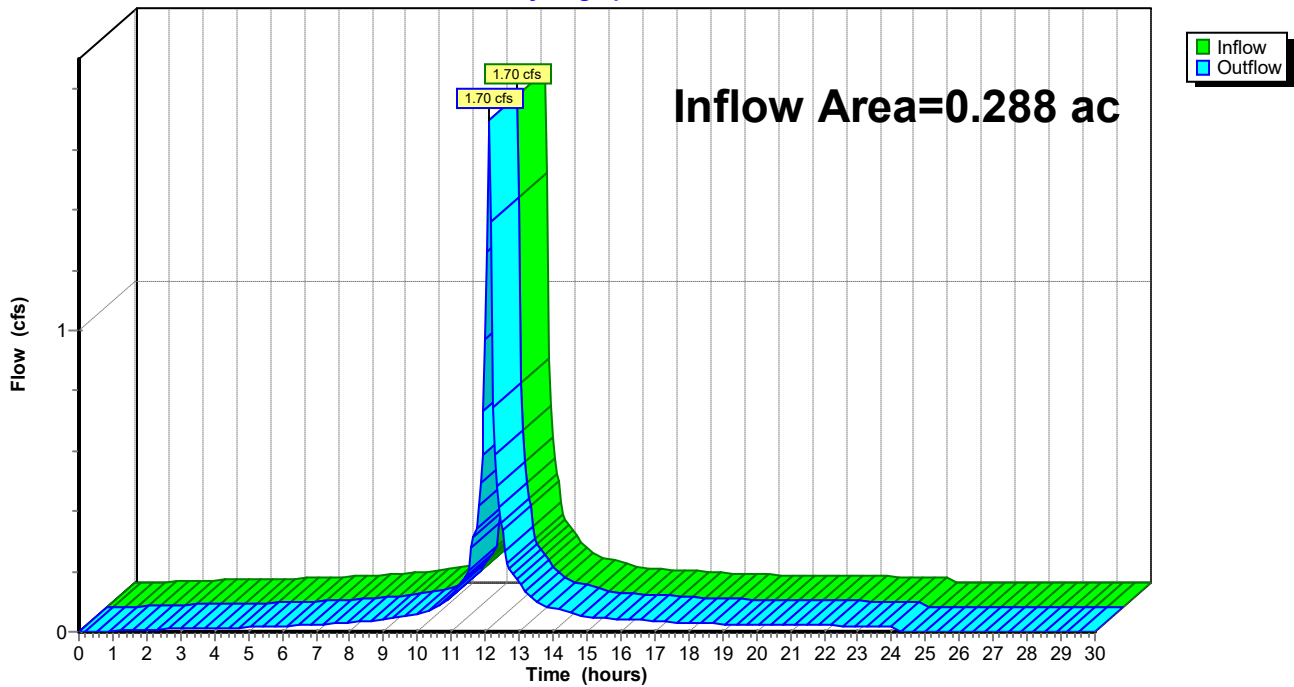
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 5.28" for 25-Year event
Inflow = 1.70 cfs @ 12.12 hrs, Volume= 0.127 af
Outflow = 1.70 cfs @ 12.12 hrs, Volume= 0.127 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

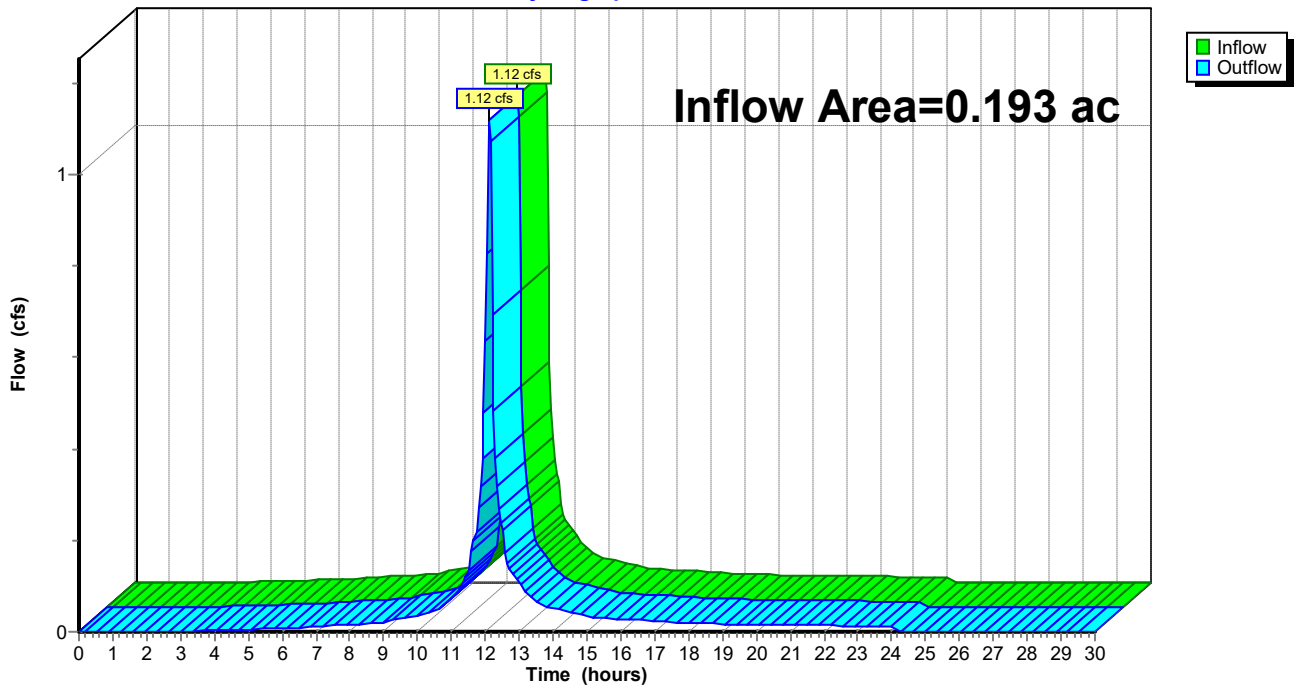
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 4.95" for 25-Year event
Inflow = 1.12 cfs @ 12.12 hrs, Volume= 0.080 af
Outflow = 1.12 cfs @ 12.12 hrs, Volume= 0.080 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

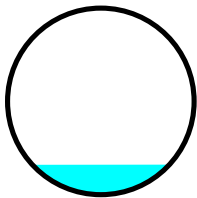
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 4.95" for 25-Year event
Inflow = 0.66 cfs @ 12.22 hrs, Volume= 0.080 af
Outflow = 0.62 cfs @ 12.23 hrs, Volume= 0.080 af, Atten= 5%, Lag= 0.7 min
Routed to Reach OL-8 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.68 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.95 fps, Avg. Travel Time= 0.3 min

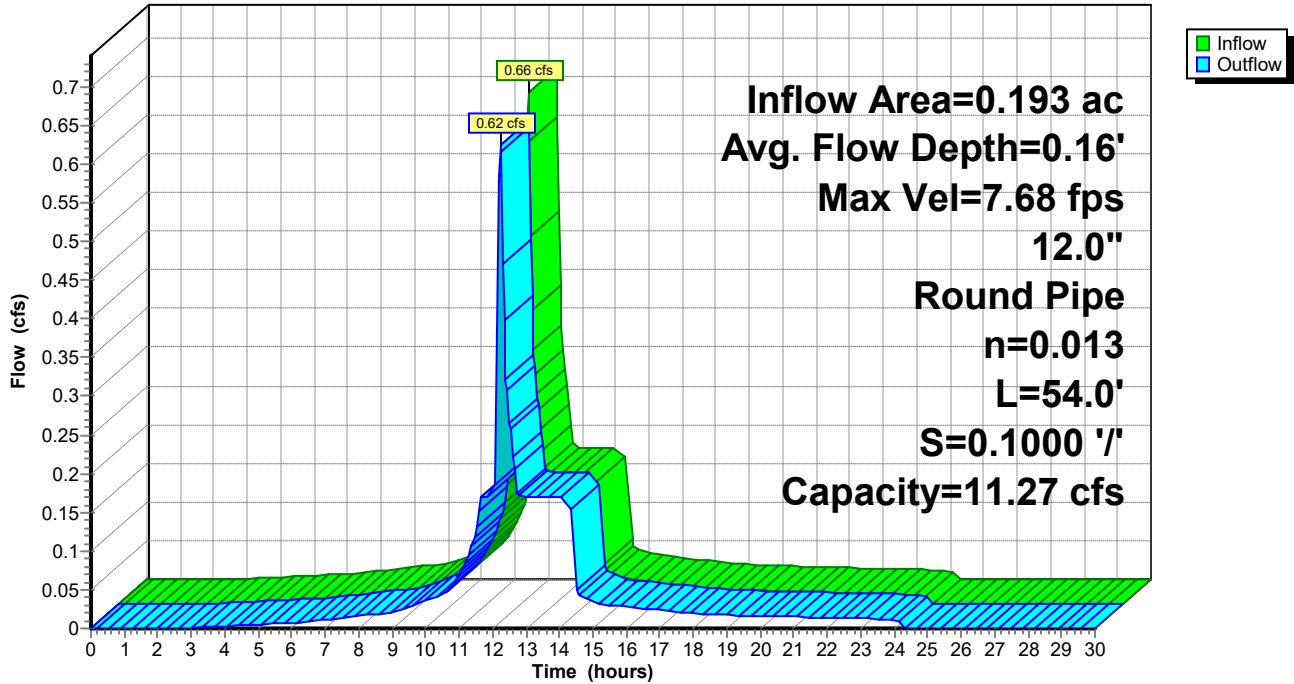
Peak Storage= 4 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 0.73'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 11.27 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 54.0' Slope= 0.1000 '/'
Inlet Invert= 130.40', Outlet Invert= 125.00'



Reach UGS1B: TO FE#1

Hydrograph



Summary for Pond UGS1: TO UGS1B

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

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 4.95" for 25-Year event
 Inflow = 1.12 cfs @ 12.12 hrs, Volume= 0.080 af
 Outflow = 0.66 cfs @ 12.22 hrs, Volume= 0.080 af, Atten= 41%, Lag= 6.1 min
 Primary = 0.66 cfs @ 12.22 hrs, Volume= 0.080 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= 135.28' @ 12.22 hrs Surf.Area= 0.016 ac Storage= 0.017 af

Plug-Flow detention time= 19.7 min calculated for 0.079 af (100% of inflow)
 Center-of-Mass det. time= 19.7 min (801.5 - 781.8)

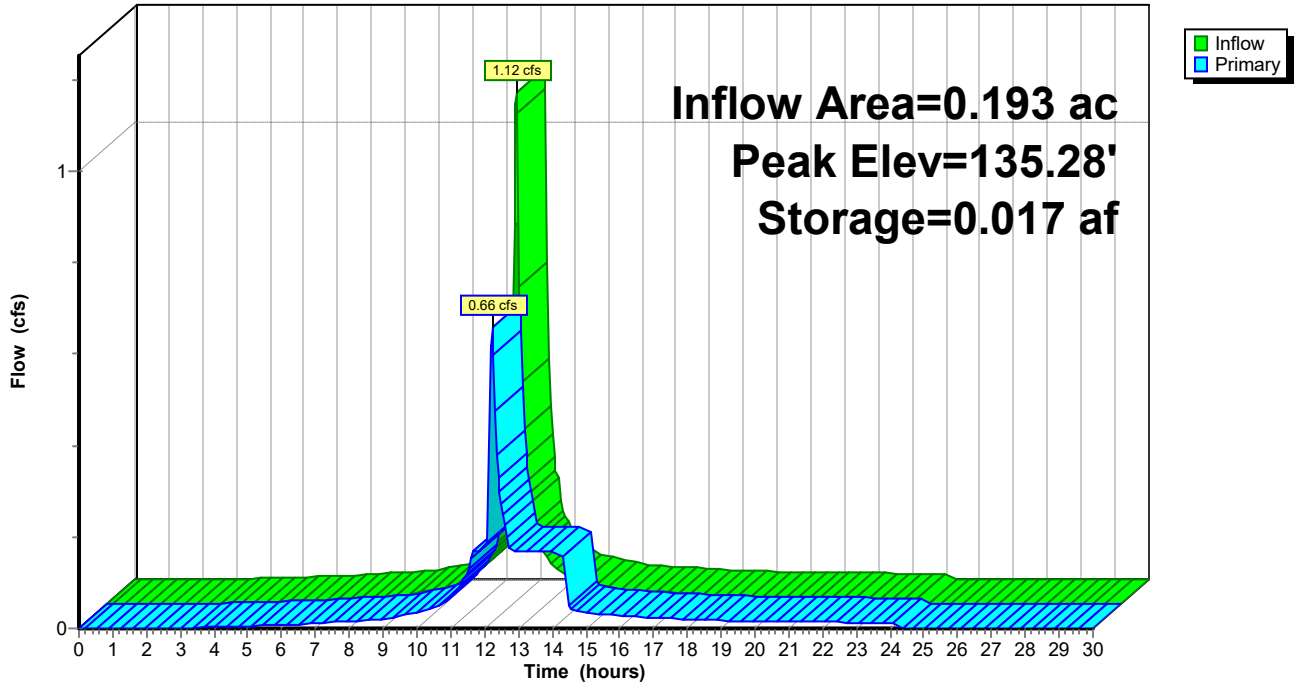
Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.024 af	20.00'W x 22.00'L x 6.00'H Prismaoid 0.061 af Overall x 40.0% Voids
#2	134.00'	0.021 af	Shea Leaching Chamber 4x4x4 x 20 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 20 Chambers in 5 Rows
		0.046 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'	8.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.59 cfs @ 12.22 hrs HW=135.25' (Free Discharge)
 1=Special & User-Defined (Custom Controls 0.17 cfs)
 2=Orifice/Grate (Orifice Controls 0.42 cfs @ 1.72 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=221,713 sf 1.89% Impervious Runoff Depth=4.11" Flow Length=770' Tc=19.9 min CN=70 Runoff=17.67 cfs 1.745 af
Subcatchment p100: TO DCB#100	Runoff Area=1,528 sf 80.69% Impervious Runoff Depth=6.76" Flow Length=68' Slope=0.0200 '/ Tc=5.0 min CN=93 Runoff=0.28 cfs 0.020 af
Subcatchment p101: TO DCB#101	Runoff Area=6,877 sf 71.02% Impervious Runoff Depth=6.52" Flow Length=151' Tc=5.0 min CN=91 Runoff=1.23 cfs 0.086 af
Subcatchment p2: TO CATCHBASIN (DP#2)	Runoff Area=14,330 sf 88.46% Impervious Runoff Depth=6.99" Flow Length=703' Slope=0.0600 '/ Tc=5.0 min CN=95 Runoff=2.63 cfs 0.192 af
Subcatchment p3: TO LOW POINT (DP#3)	Runoff Area=82,313 sf 15.10% Impervious Runoff Depth=4.90" Flow Length=356' Tc=5.0 min CN=77 Runoff=11.94 cfs 0.772 af
Subcatchment P4: TO DCB-B	Runoff Area=8,293 sf 83.72% Impervious Runoff Depth=6.87" Flow Length=362' Slope=0.0600 '/ Tc=5.0 min CN=94 Runoff=1.52 cfs 0.109 af
Subcatchment p5: TO DCB-C	Runoff Area=2,288 sf 100.00% Impervious Runoff Depth=7.35" Flow Length=136' Slope=0.0600 '/ Tc=5.0 min CN=98 Runoff=0.43 cfs 0.032 af
Subcatchment p6: TO DCB-D	Runoff Area=5,535 sf 100.00% Impervious Runoff Depth=7.35" Flow Length=234' Slope=0.0600 '/ Tc=5.0 min CN=98 Runoff=1.03 cfs 0.078 af
Subcatchment p7: TO DCB-E	Runoff Area=4,728 sf 65.46% Impervious Runoff Depth=6.17" Flow Length=215' Tc=5.1 min CN=88 Runoff=0.81 cfs 0.056 af
Reach DCB-B: TO OUTFALL	Inflow=1.52 cfs 0.109 af Outflow=1.52 cfs 0.109 af
Reach DCB-C: TO OUTFALL	Avg. Flow Depth=0.21' Max Vel=14.68 fps Inflow=2.21 cfs 0.166 af 18.0" Round Pipe n=0.013 L=70.0' S=0.2536 '/ Capacity=52.90 cfs Outflow=2.20 cfs 0.166 af
Reach DCB-D: TO DCB-C	Avg. Flow Depth=0.26' Max Vel=8.77 fps Inflow=1.83 cfs 0.134 af 18.0" Round Pipe n=0.013 L=111.0' S=0.0689 '/ Capacity=27.58 cfs Outflow=1.79 cfs 0.134 af
Reach DCB-E: TO DCB-D	Avg. Flow Depth=0.28' Max Vel=4.51 fps Inflow=0.81 cfs 0.056 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0181 '/ Capacity=4.79 cfs Outflow=0.80 cfs 0.056 af
Reach DCB100: TO DMH#100	Avg. Flow Depth=0.16' Max Vel=3.36 fps Inflow=0.28 cfs 0.020 af 12.0" Round Pipe n=0.013 L=128.0' S=0.0195 '/ Capacity=4.98 cfs Outflow=0.27 cfs 0.020 af
Reach DCB101: TO DMH#100	Avg. Flow Depth=0.39' Max Vel=4.25 fps Inflow=1.23 cfs 0.086 af 12.0" Round Pipe n=0.013 L=36.0' S=0.0111 '/ Capacity=3.76 cfs Outflow=1.21 cfs 0.086 af
Reach DMH100: TO UGS#1A	Avg. Flow Depth=0.31' Max Vel=6.93 fps Inflow=1.47 cfs 0.106 af 12.0" Round Pipe n=0.013 L=8.0' S=0.0375 '/ Capacity=6.90 cfs Outflow=1.46 cfs 0.106 af

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Reach DP#1: WETLAND	Inflow=20.52 cfs 2.125 af Outflow=20.52 cfs 2.125 af
Reach DP#2: MUNICIPAL CATCHBASIN	Inflow=2.63 cfs 0.192 af Outflow=2.63 cfs 0.192 af
Reach DP#3: LOW POINT	Inflow=11.94 cfs 0.772 af Outflow=11.94 cfs 0.772 af
Reach OL-1: OVERLAND	Avg. Flow Depth=0.08' Max Vel=1.11 fps Inflow=1.52 cfs 0.109 af n=0.080 L=46.0' S=0.1087 '/ Capacity=122.10 cfs Outflow=1.46 cfs 0.109 af
Reach OL-2: OVERLAND	Avg. Flow Depth=0.08' Max Vel=1.01 fps Inflow=1.46 cfs 0.109 af n=0.080 L=211.0' S=0.0867 '/ Capacity=109.07 cfs Outflow=1.32 cfs 0.109 af
Reach OL-3: OVERLAND	Avg. Flow Depth=0.11' Max Vel=0.72 fps Inflow=1.32 cfs 0.109 af n=0.080 L=23.0' S=0.0304 '/ Capacity=64.61 cfs Outflow=1.30 cfs 0.109 af
Reach OL-4: OVERLAND	Avg. Flow Depth=0.12' Max Vel=0.31 fps Inflow=1.30 cfs 0.109 af n=0.080 L=128.0' S=0.0050 '/ Capacity=45.22 cfs Outflow=1.11 cfs 0.109 af
Reach OL-5: OVERLAND	Avg. Flow Depth=0.10' Max Vel=1.25 fps Inflow=2.20 cfs 0.166 af n=0.080 L=285.0' S=0.1035 '/ Capacity=119.16 cfs Outflow=1.97 cfs 0.166 af
Reach OL-6: OVERLAND	Avg. Flow Depth=0.25' Max Vel=0.48 fps Inflow=2.13 cfs 0.271 af n=0.080 L=81.0' S=0.0051 '/ Capacity=26.35 cfs Outflow=2.04 cfs 0.271 af
Reach OL-8: OVERLAND	Avg. Flow Depth=0.07' Max Vel=1.20 fps Inflow=1.30 cfs 0.106 af n=0.080 L=82.0' S=0.1585 '/ Capacity=147.47 cfs Outflow=1.18 cfs 0.106 af
Reach OL7: OVERLAND	Avg. Flow Depth=0.13' Max Vel=0.30 fps Inflow=1.18 cfs 0.106 af n=0.400 L=270.0' S=0.1037 '/ Capacity=23.85 cfs Outflow=0.66 cfs 0.106 af
Reach OUTLET: TO DP#1	Inflow=2.20 cfs 0.166 af Outflow=2.20 cfs 0.166 af
Reach UGS1A: TO UGS#1	Inflow=1.46 cfs 0.106 af Outflow=1.46 cfs 0.106 af
Reach UGS1B: TO FE#1	Avg. Flow Depth=0.23' Max Vel=9.45 fps Inflow=1.33 cfs 0.106 af 12.0" Round Pipe n=0.013 L=54.0' S=0.1000 '/ Capacity=11.27 cfs Outflow=1.30 cfs 0.106 af
Pond UGS1: TO UGS1B	Peak Elev=135.46' Storage=0.018 af Inflow=1.46 cfs 0.106 af Outflow=1.33 cfs 0.106 af

Total Runoff Area = 7.980 ac Runoff Volume = 3.089 af Average Runoff Depth = 4.64"
84.67% Pervious = 6.757 ac 15.33% Impervious = 1.223 ac

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

Runoff = 17.67 cfs @ 12.30 hrs, Volume= 1.745 af, Depth= 4.11"
 Routed to Reach DP#1 : WETLAND

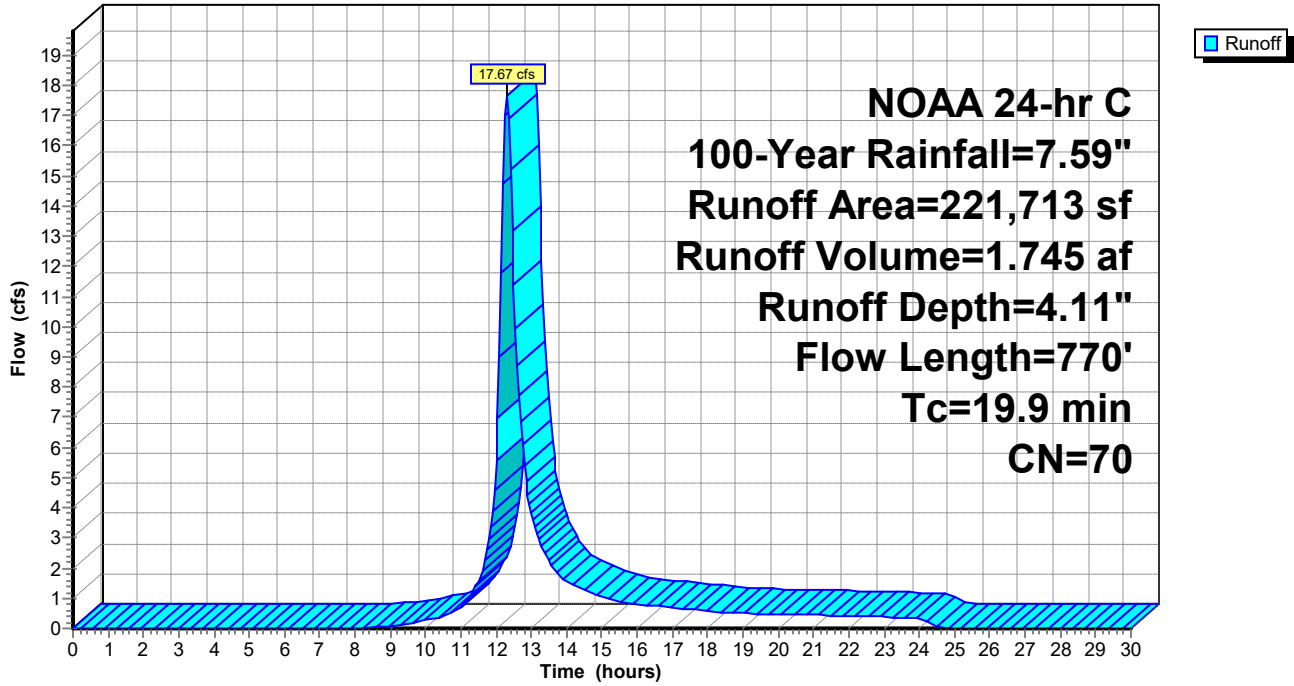
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

Area (sf)	CN	Description
3,388	74	>75% Grass cover, Good, HSG C
177,438	70	Woods, Good, HSG C
4,194	98	Paved parking, HSG C
6,514	89	Gravel roads, HSG C
30,179	65	Brush, Good, HSG C
221,713	70	Weighted Average
217,519		98.11% Pervious Area
4,194		1.89% 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 = 0.28 cfs @ 12.11 hrs, Volume= 0.020 af, Depth= 6.76"
 Routed to Reach DCB100 : TO DMH#100

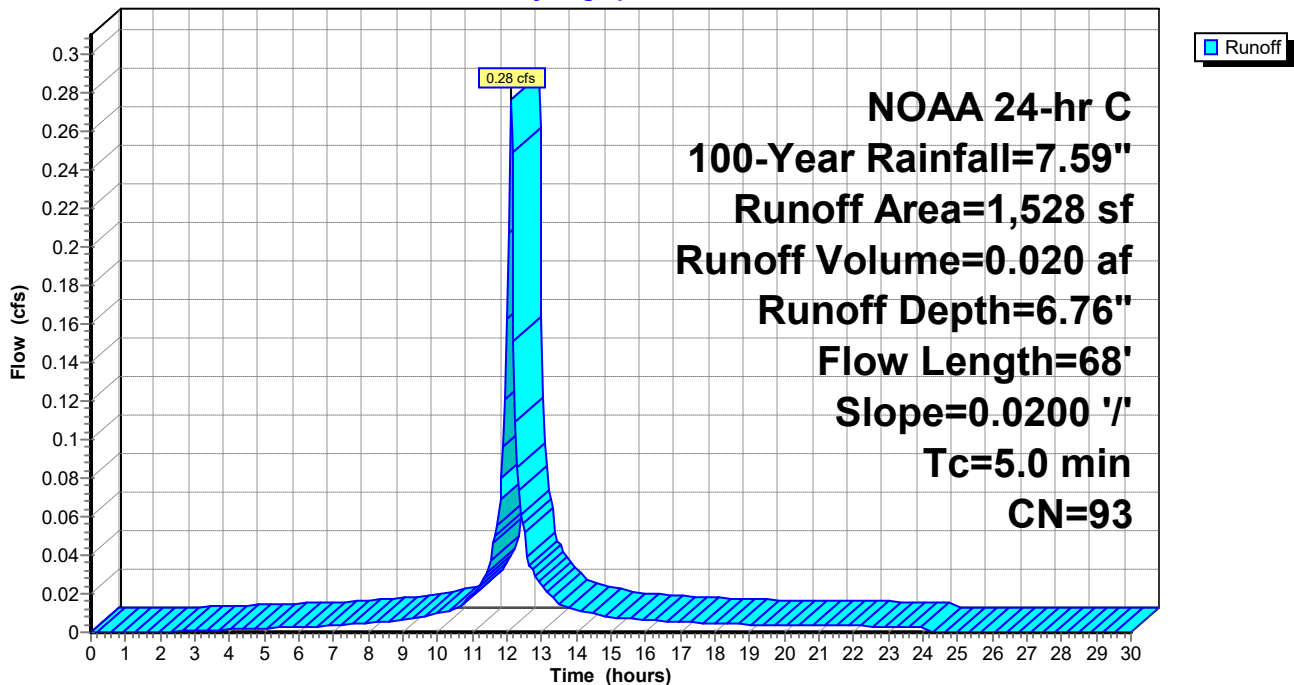
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

Area (sf)	CN	Description
295	74	>75% Grass cover, Good, HSG C
1,233	98	Paved parking, HSG C
1,528	93	Weighted Average
295		19.31% Pervious Area
1,233		80.69% 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"
0.7	45	0.0200	1.14		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.1	18	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	68	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 = 1.23 cfs @ 12.11 hrs, Volume= 0.086 af, Depth= 6.52"
 Routed to Reach DCB101 : TO DMH#100

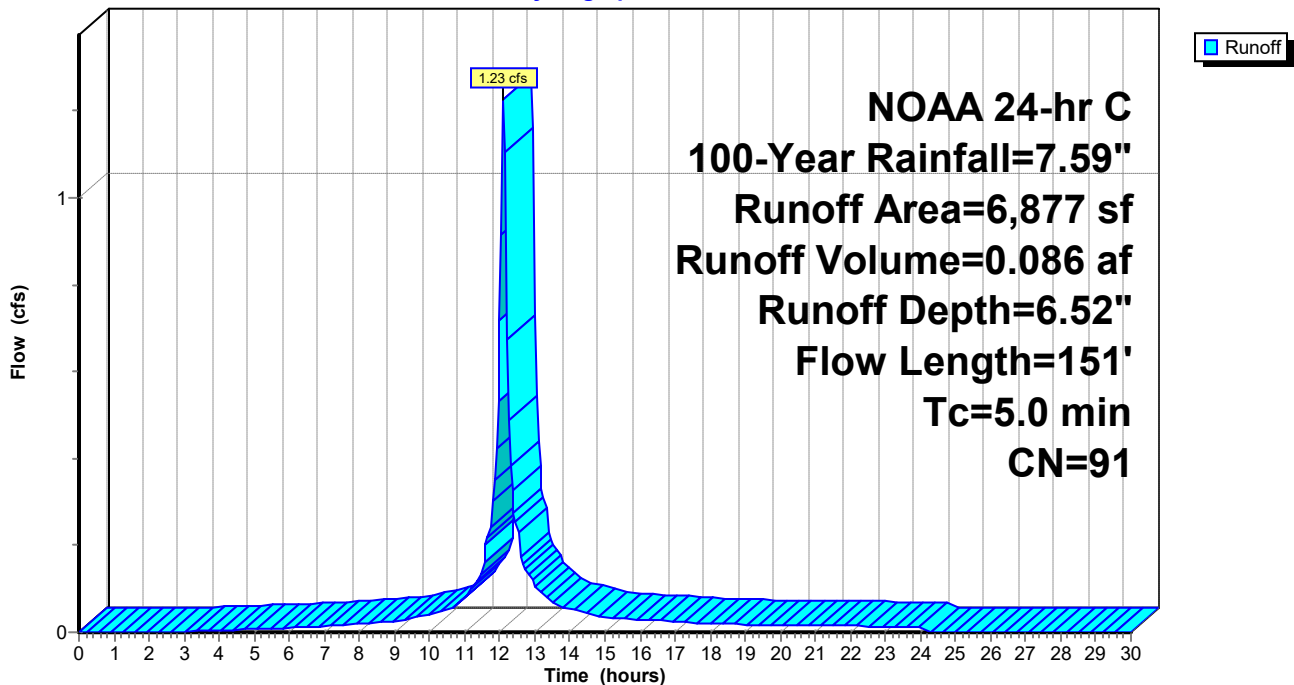
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

Area (sf)	CN	Description
1,993	74	>75% Grass cover, Good, HSG C
4,884	98	Paved parking, HSG C
6,877	91	Weighted Average
1,993		28.98% Pervious Area
4,884		71.02% 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



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

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

Runoff = 2.63 cfs @ 12.11 hrs, Volume= 0.192 af, Depth= 6.99"
 Routed to Reach DP#2 : MUNICIPAL CATCHBASIN

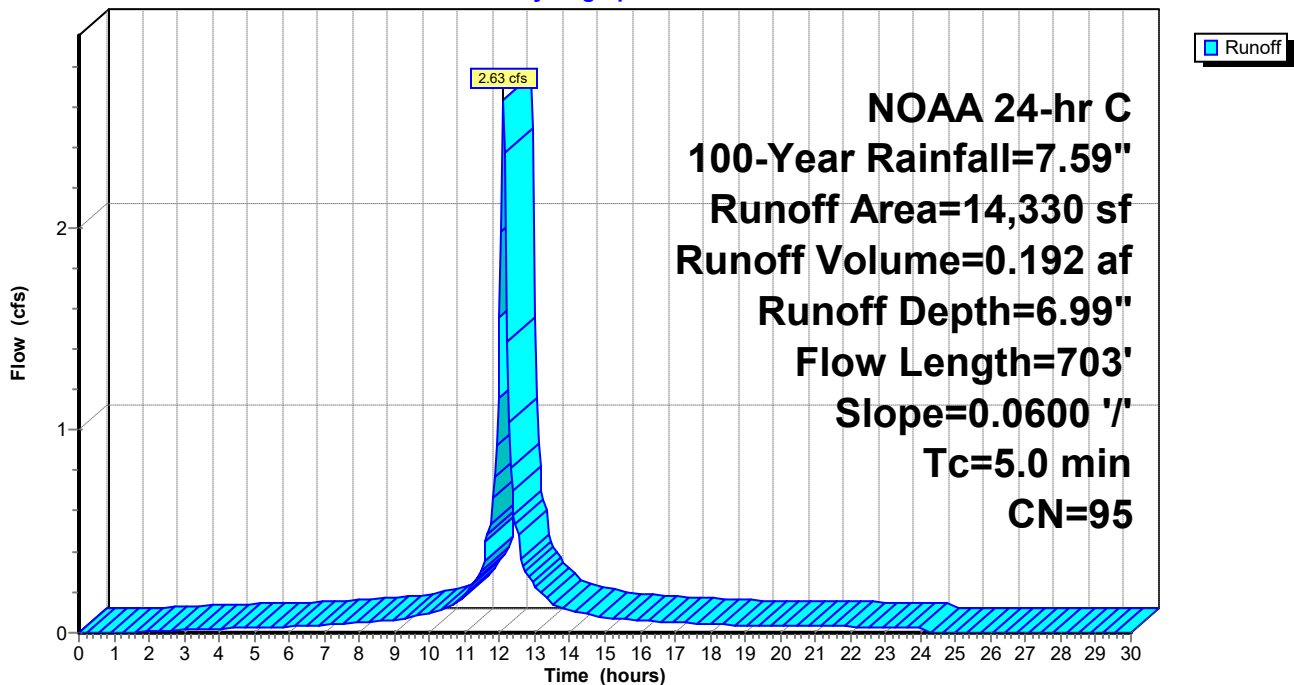
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

Area (sf)	CN	Description
* 1,110	74	>75% Grass cover, Good, HSG C
544	70	Woods, Good, HSG C
12,676	98	Paved parking, HSG C
14,330	95	Weighted Average
1,654		11.54% Pervious Area
12,676		88.46% 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 = 11.94 cfs @ 12.11 hrs, Volume= 0.772 af, Depth= 4.90"
 Routed to Reach DP#3 : LOW POINT

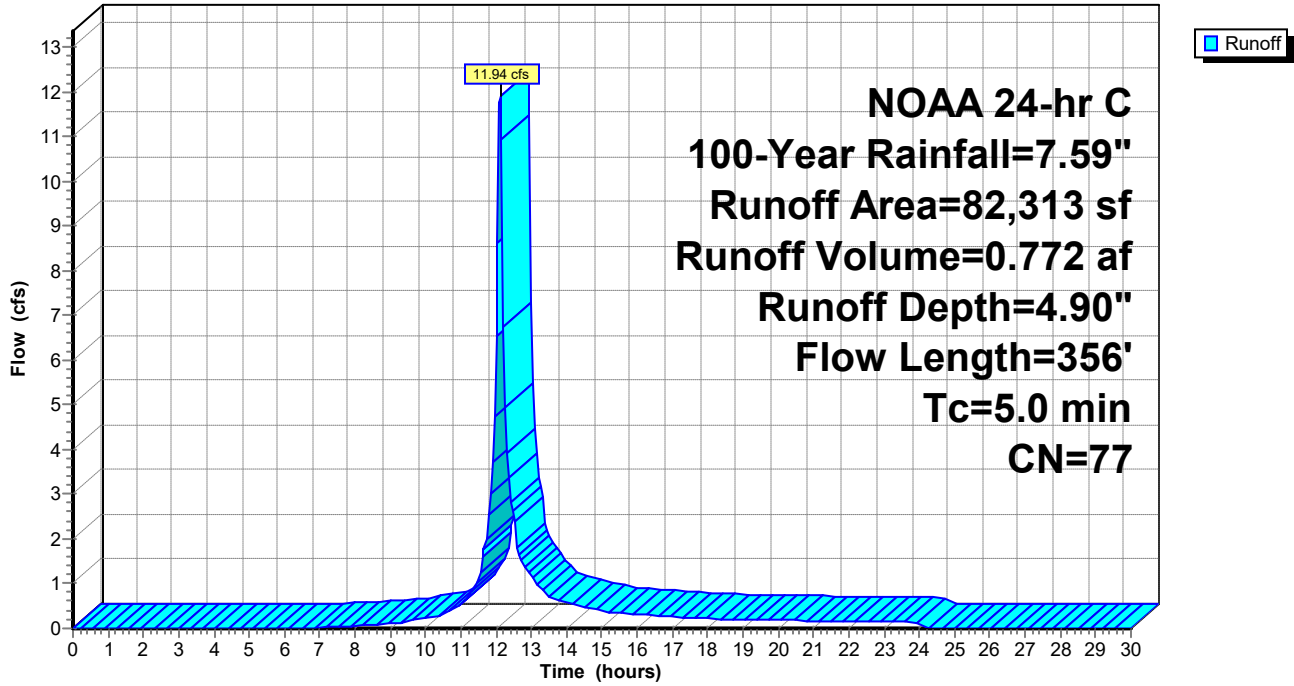
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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 = 1.52 cfs @ 12.11 hrs, Volume= 0.109 af, Depth= 6.87"
 Routed to Reach DCB-B : TO OUTFALL

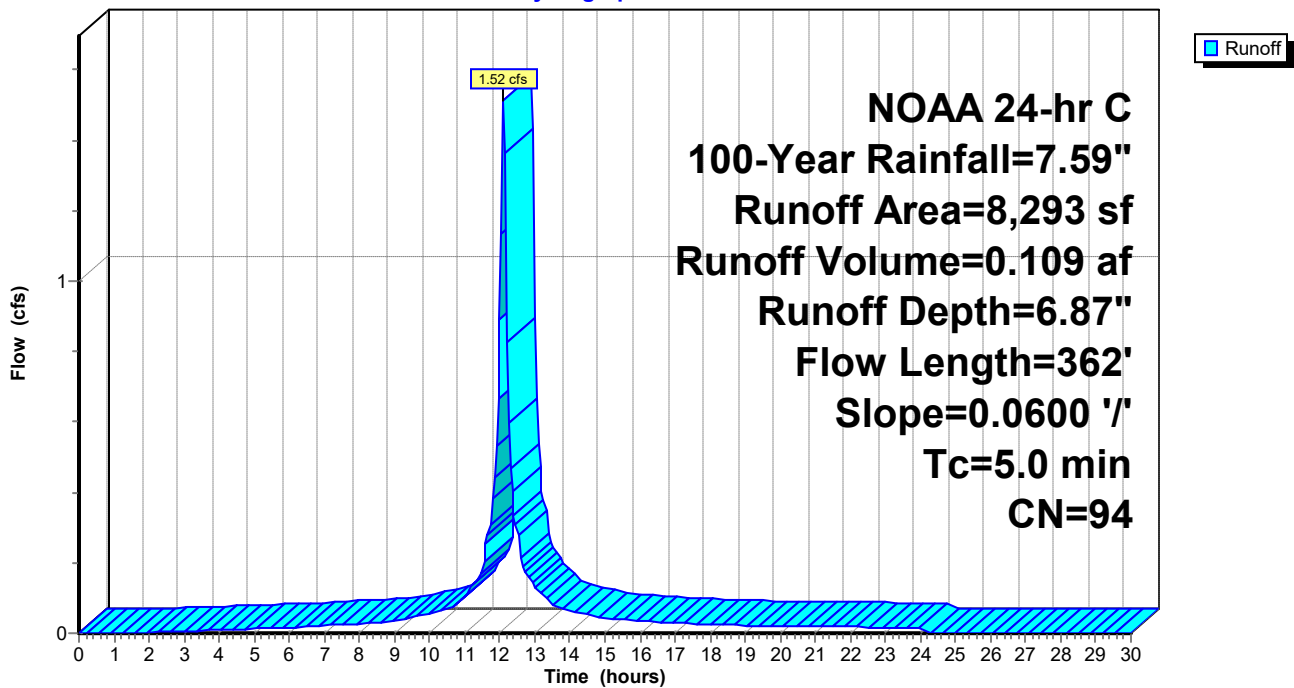
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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



Summary for Subcatchment p5: TO DCB-C

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

Runoff = 0.43 cfs @ 12.11 hrs, Volume= 0.032 af, Depth= 7.35"
 Routed to Reach DCB-C : TO OUTFALL

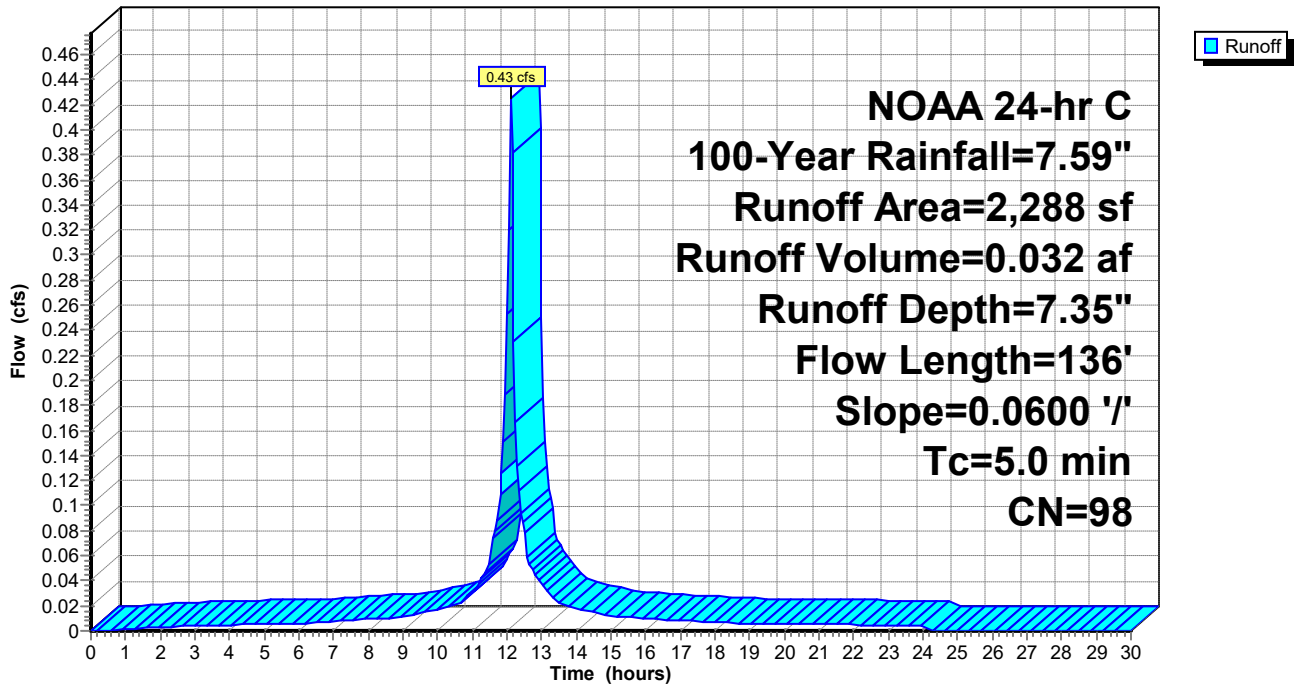
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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



Summary for Subcatchment p6: TO DCB-D

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

Runoff = 1.03 cfs @ 12.11 hrs, Volume= 0.078 af, Depth= 7.35"
 Routed to Reach DCB-D : TO DCB-C

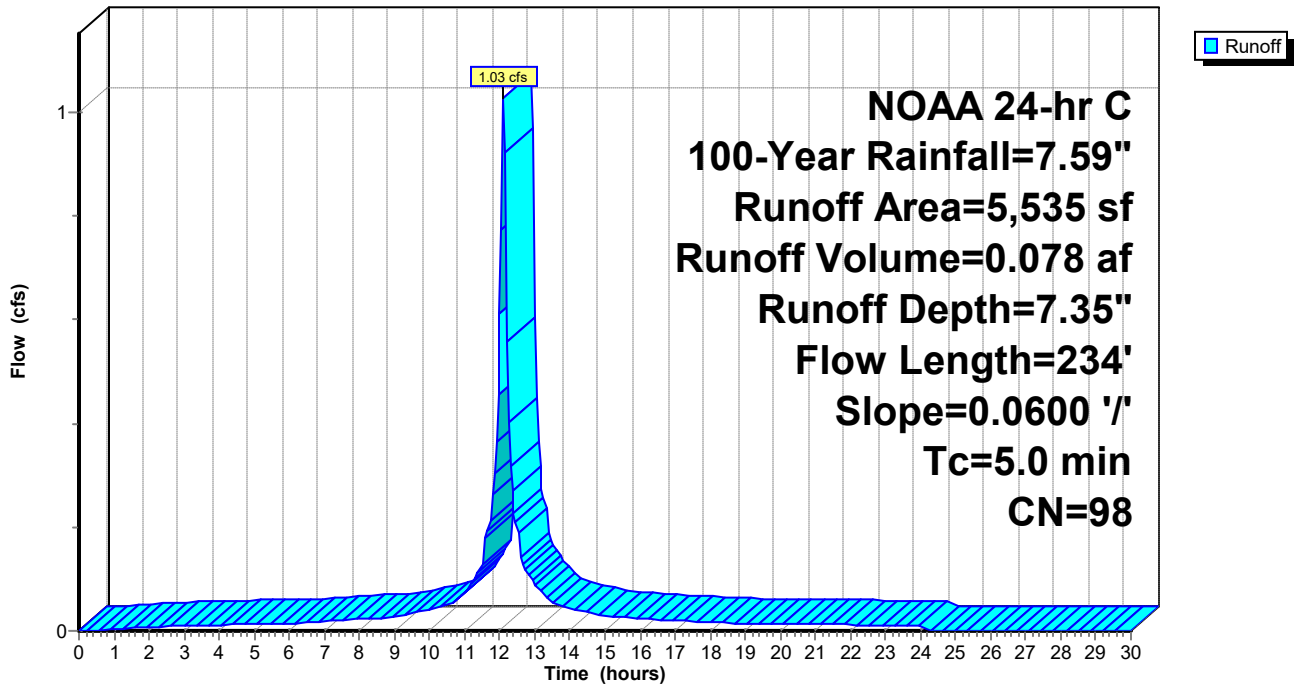
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, $dt= 0.05$ hrs
 NOAA 24-hr C 100-Year Rainfall=7.59"

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 = 0.81 cfs @ 12.11 hrs, Volume= 0.056 af, Depth= 6.17"
Routed to Reach DCB-E : TO DCB-D

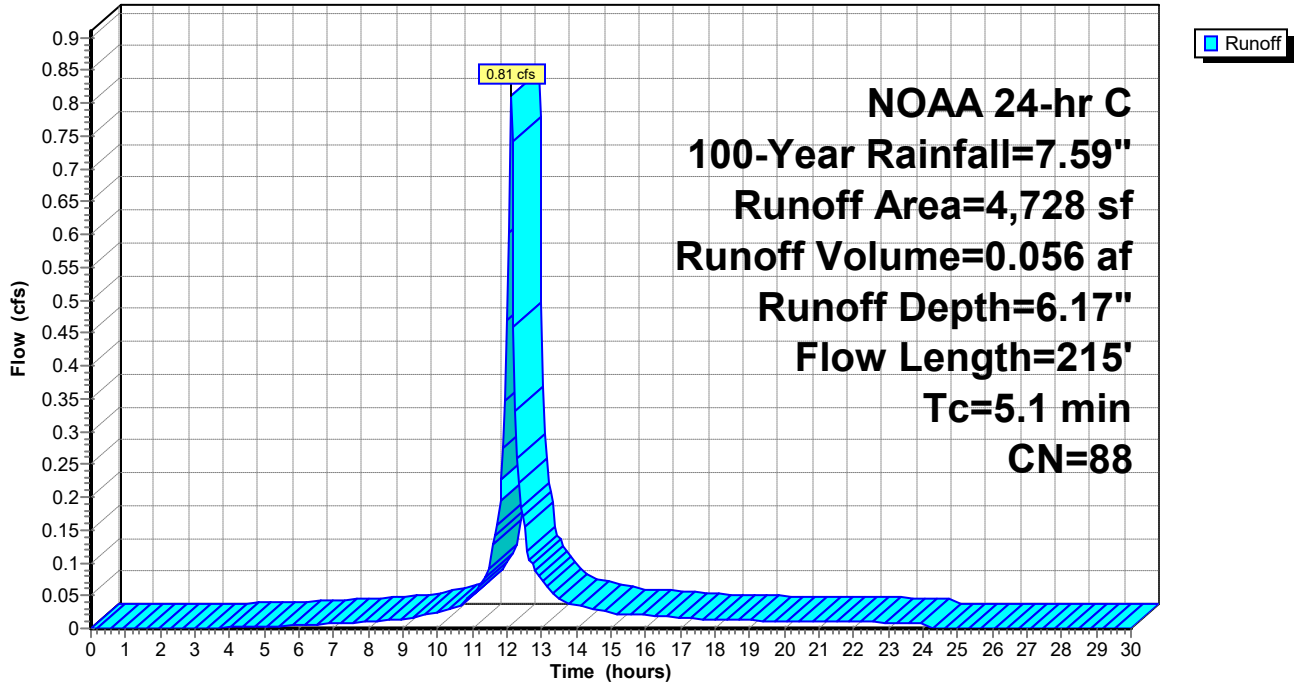
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=7.59"

Area (sf)	CN	Description
1,440	70	Woods, Good, HSG C
3,095	98	Paved parking, HSG C
193	74	>75% Grass cover, Good, HSG C
4,728	88	Weighted Average
1,633		34.54% Pervious Area
3,095		65.46% 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

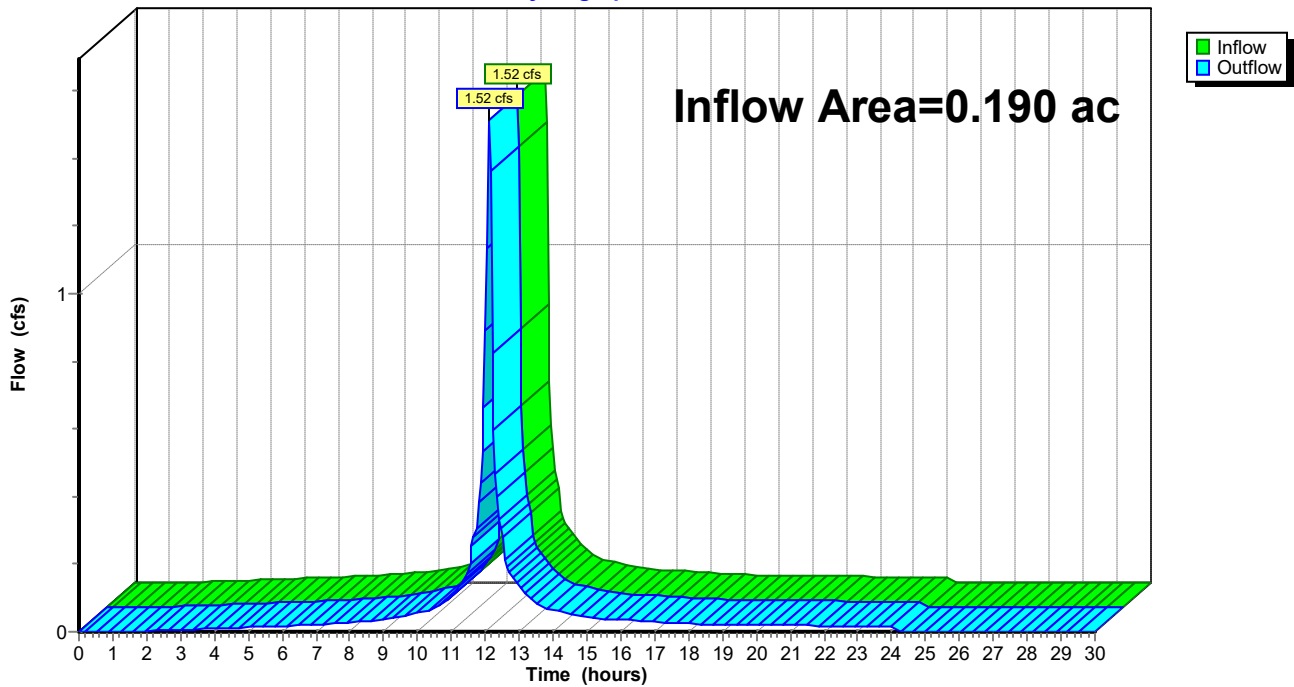
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.52 cfs @ 12.11 hrs, Volume= 0.109 af
Outflow = 1.52 cfs @ 12.11 hrs, Volume= 0.109 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

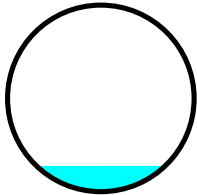
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 6.90" for 100-Year event
Inflow = 2.21 cfs @ 12.12 hrs, Volume= 0.166 af
Outflow = 2.20 cfs @ 12.12 hrs, Volume= 0.166 af, Atten= 1%, 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= 14.68 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.71 fps, Avg. Travel Time= 0.2 min

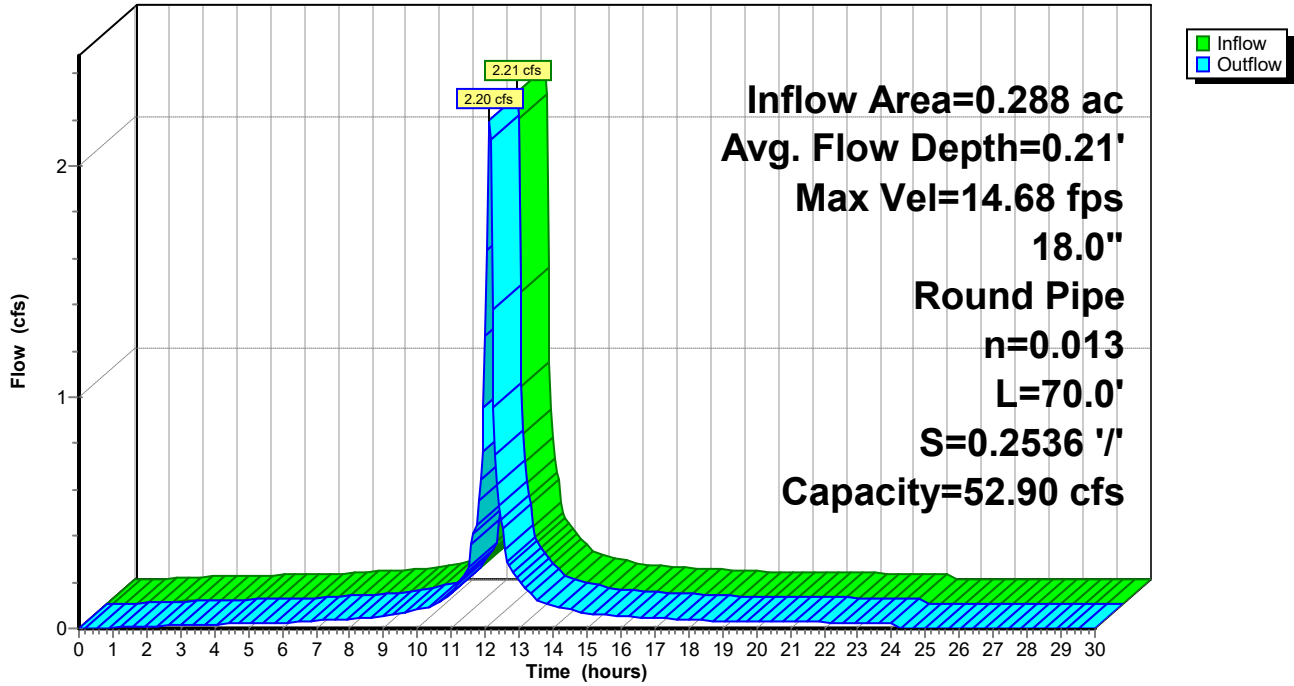
Peak Storage= 10 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 1.04'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 52.90 cfs

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

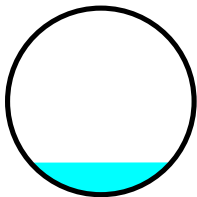
[61] Hint: Exceeded Reach DCB-E outlet invert by 0.16' @ 12.10 hrs

Inflow Area = 0.236 ac, 84.09% Impervious, Inflow Depth = 6.81" for 100-Year event
Inflow = 1.83 cfs @ 12.11 hrs, Volume= 0.134 af
Outflow = 1.79 cfs @ 12.12 hrs, Volume= 0.134 af, Atten= 2%, 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= 8.77 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.77 fps, Avg. Travel Time= 0.7 min

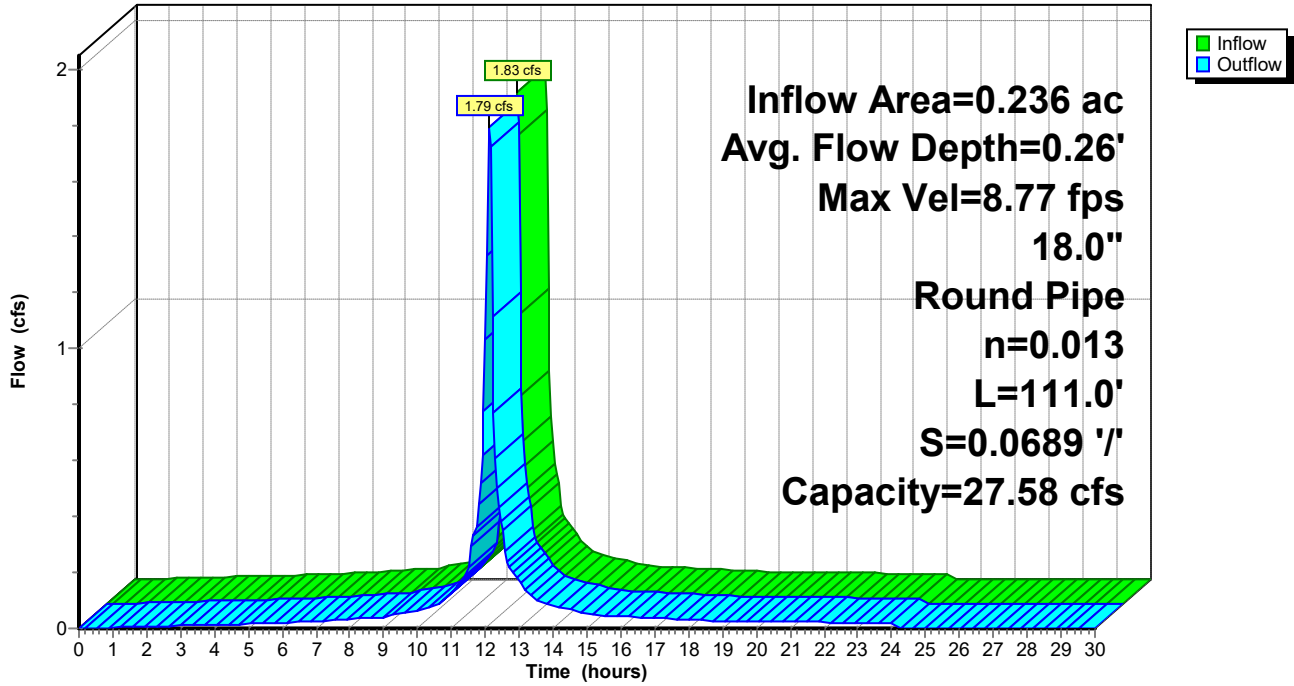
Peak Storage= 23 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 1.14'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 27.58 cfs

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

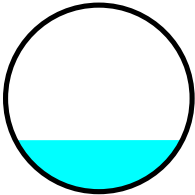
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.109 ac, 65.46% Impervious, Inflow Depth = 6.17" for 100-Year event
Inflow = 0.81 cfs @ 12.11 hrs, Volume= 0.056 af
Outflow = 0.80 cfs @ 12.12 hrs, Volume= 0.056 af, Atten= 2%, 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= 4.51 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.44 fps, Avg. Travel Time= 0.4 min

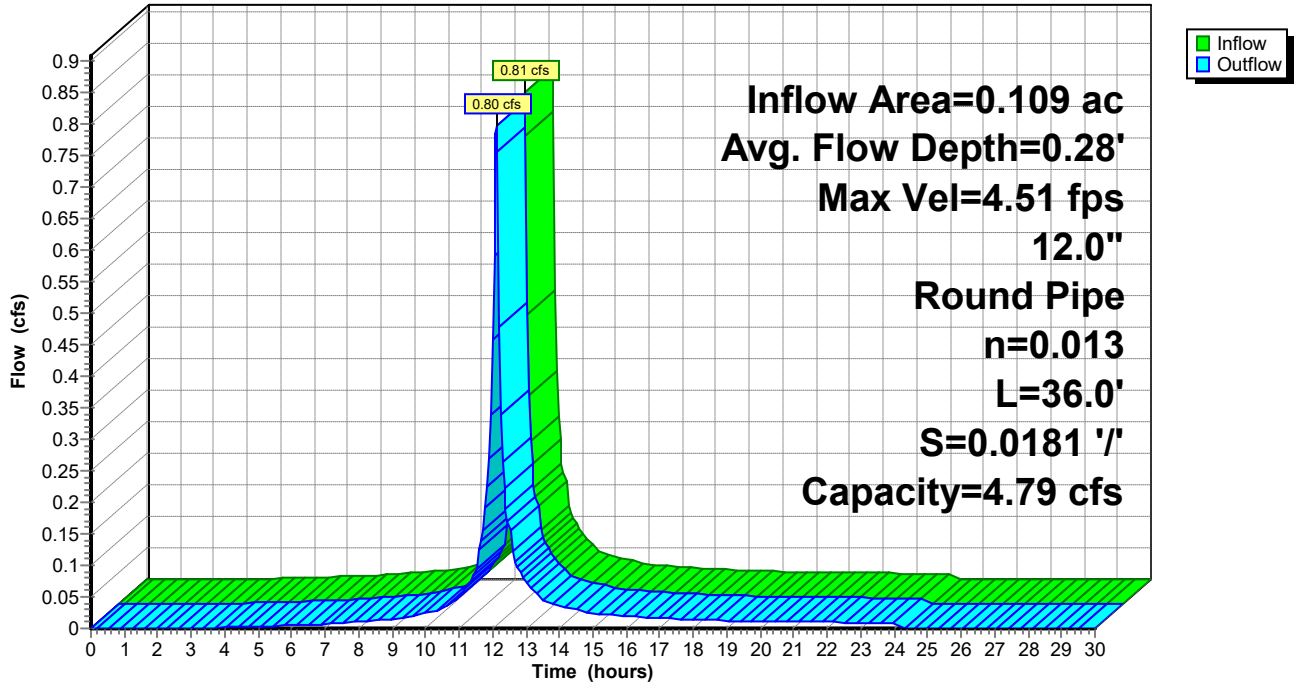
Peak Storage= 6 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 0.90'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.79 cfs

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

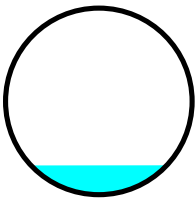
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.035 ac, 80.69% Impervious, Inflow Depth = 6.76" for 100-Year event
Inflow = 0.28 cfs @ 12.11 hrs, Volume= 0.020 af
Outflow = 0.27 cfs @ 12.13 hrs, Volume= 0.020 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= 3.36 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.08 fps, Avg. Travel Time= 2.0 min

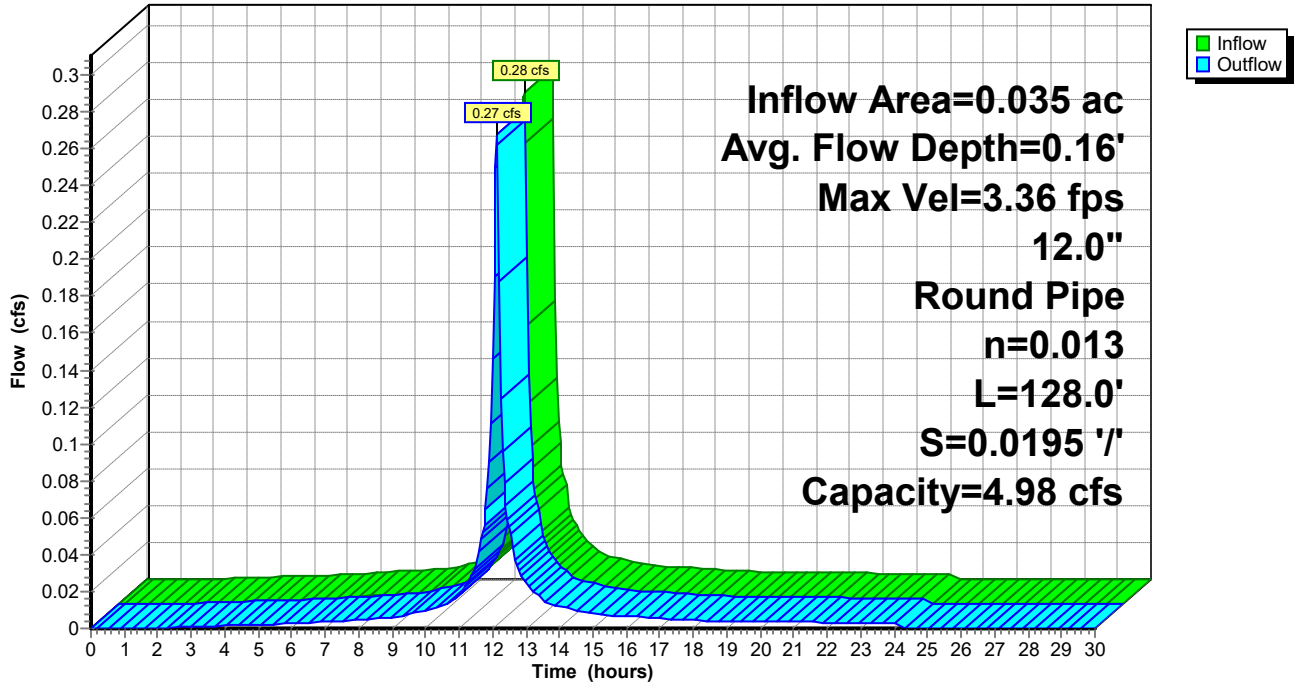
Peak Storage= 10 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 0.73'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.98 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 128.0' Slope= 0.0195 '/'
Inlet Invert= 138.50', Outlet Invert= 136.00'



Reach DCB100: TO DMH#100

Hydrograph



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Summary for Reach DCB101: TO DMH#100

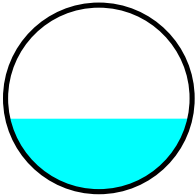
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.158 ac, 71.02% Impervious, Inflow Depth = 6.52" for 100-Year event
Inflow = 1.23 cfs @ 12.11 hrs, Volume= 0.086 af
Outflow = 1.21 cfs @ 12.12 hrs, Volume= 0.086 af, Atten= 2%, 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= 4.25 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.37 fps, Avg. Travel Time= 0.4 min

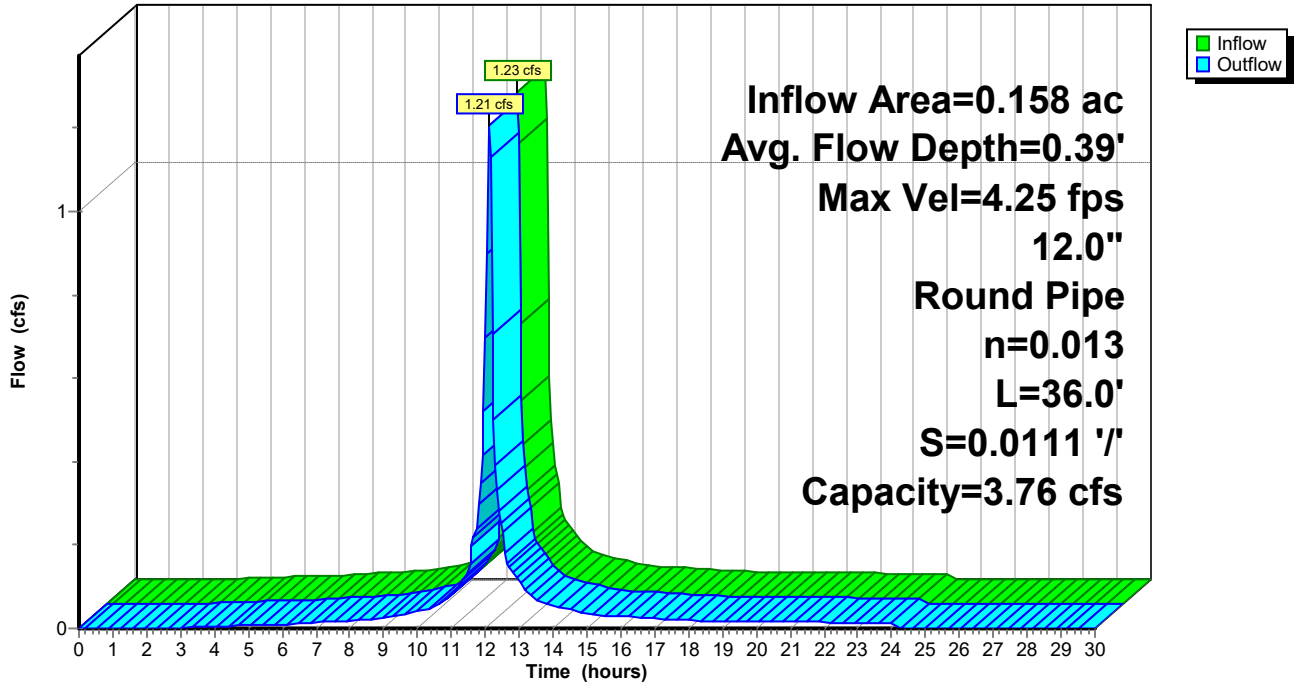
Peak Storage= 10 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.39' , Surface Width= 0.98'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.76 cfs

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 0.11' @ 12.10 hrs

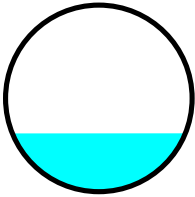
[61] Hint: Exceeded Reach DCB101 outlet invert by 0.11' @ 12.10 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 6.56" for 100-Year event
Inflow = 1.47 cfs @ 12.12 hrs, Volume= 0.106 af
Outflow = 1.46 cfs @ 12.12 hrs, Volume= 0.106 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= 6.93 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.21 fps, Avg. Travel Time= 0.1 min

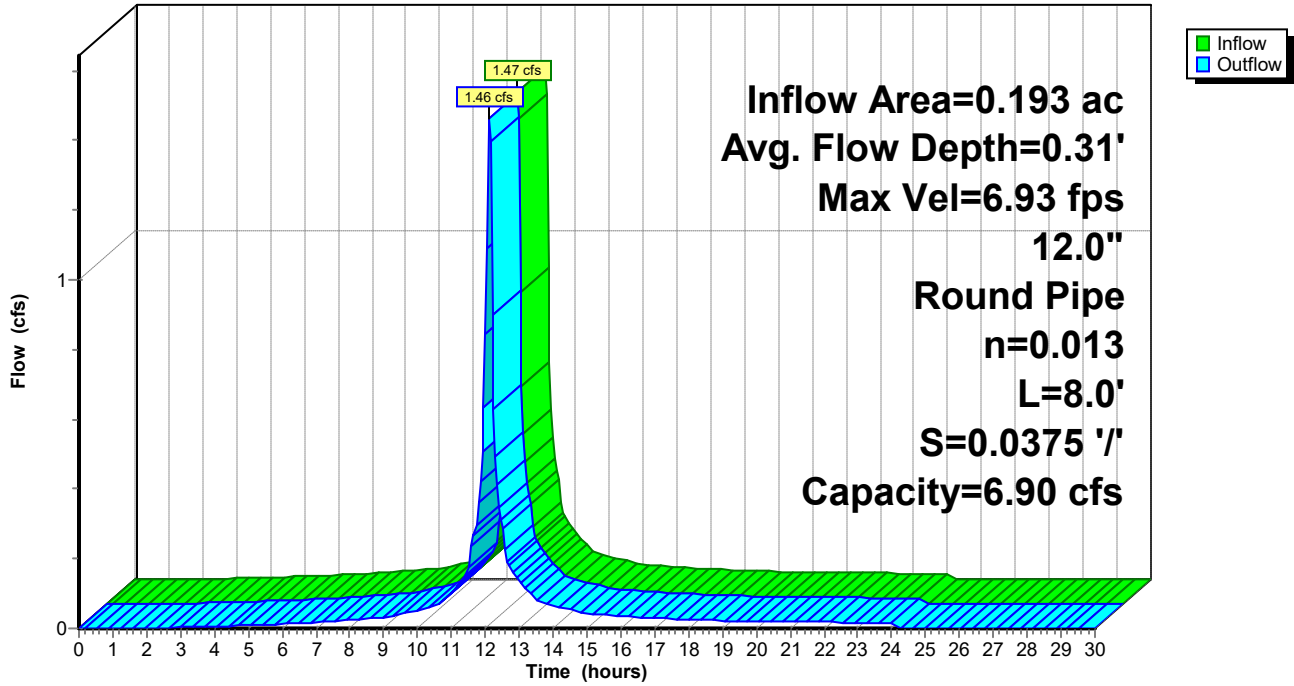
Peak Storage= 2 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.31' , Surface Width= 0.93'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

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

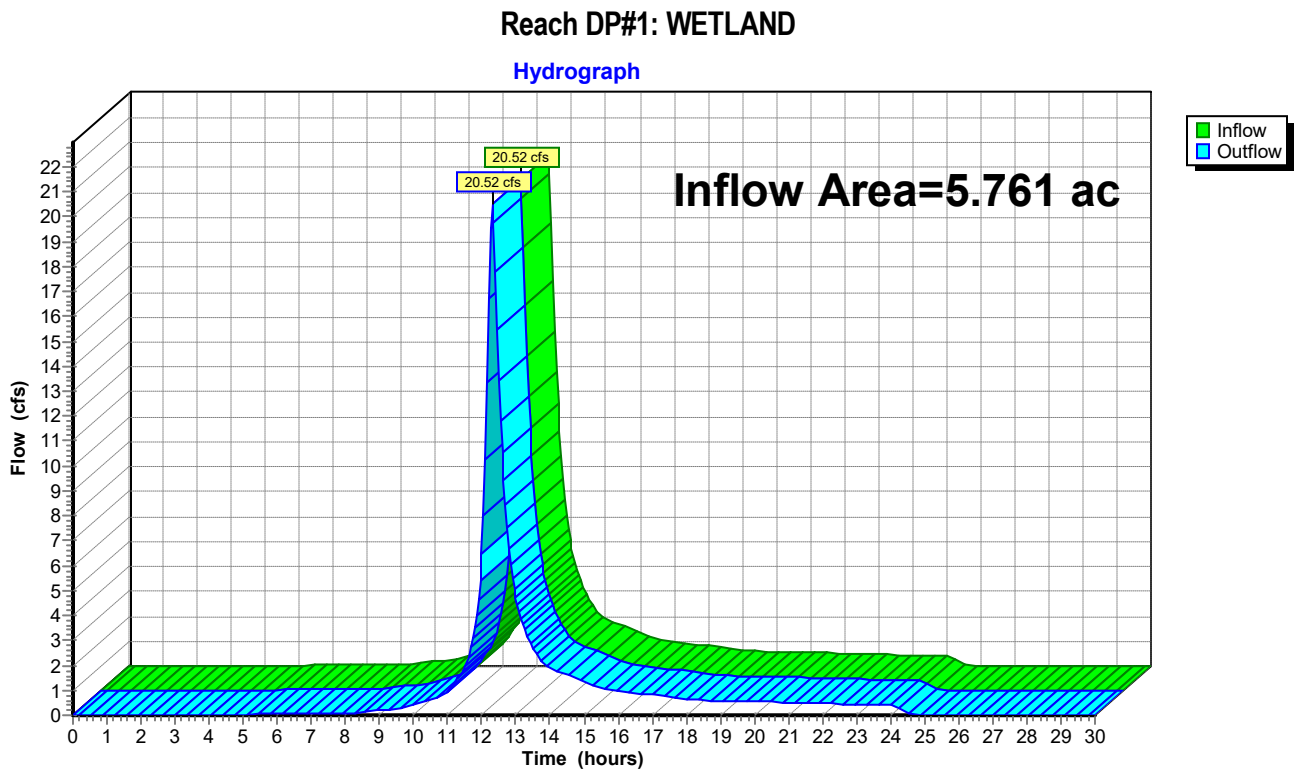


Summary for Reach DP#1: WETLAND

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

Inflow Area = 5.761 ac, 11.23% Impervious, Inflow Depth = 4.43" for 100-Year event
Inflow = 20.52 cfs @ 12.30 hrs, Volume= 2.125 af
Outflow = 20.52 cfs @ 12.30 hrs, Volume= 2.125 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

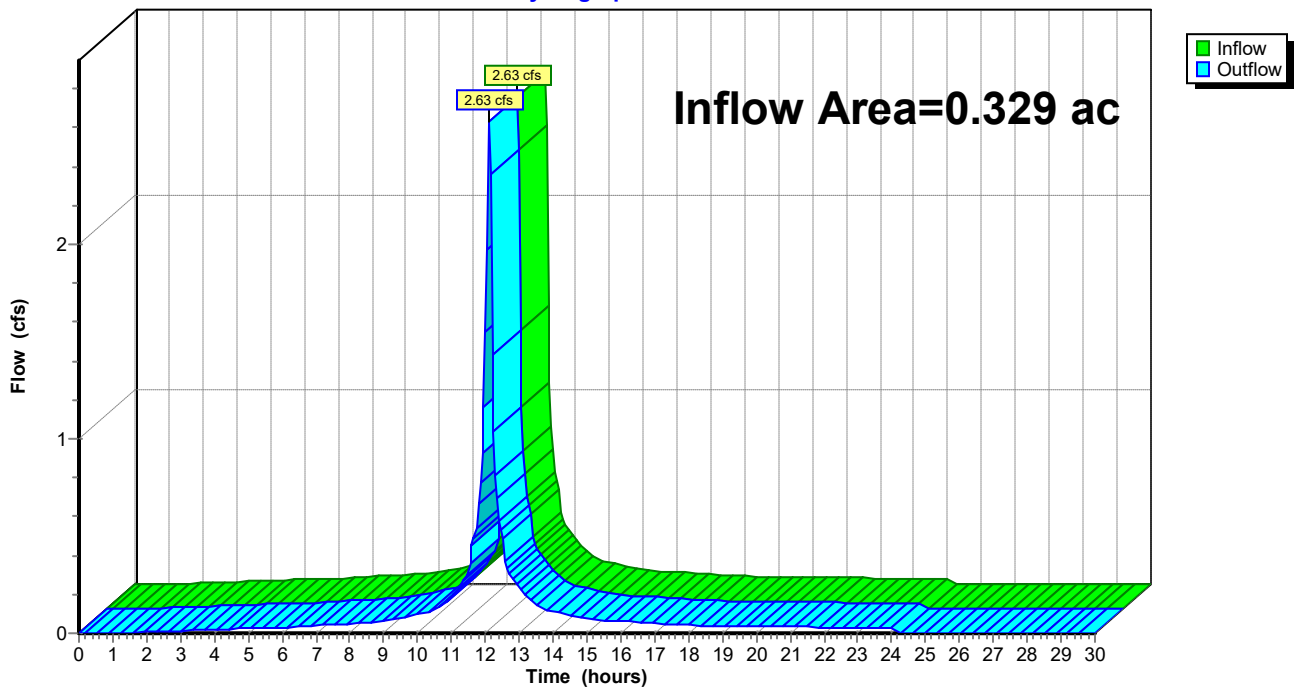
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.329 ac, 88.46% Impervious, Inflow Depth = 6.99" for 100-Year event
Inflow = 2.63 cfs @ 12.11 hrs, Volume= 0.192 af
Outflow = 2.63 cfs @ 12.11 hrs, Volume= 0.192 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

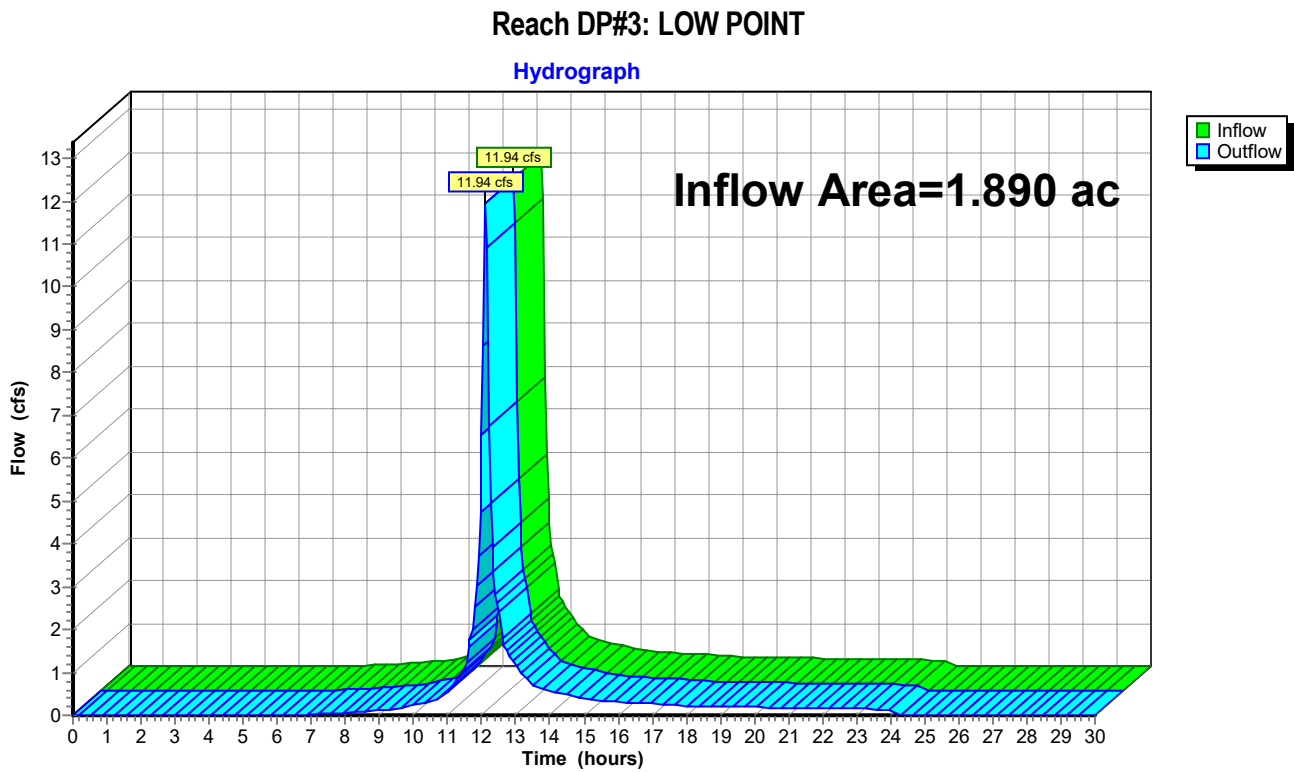


Summary for Reach DP#3: LOW POINT

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

Inflow Area = 1.890 ac, 15.10% Impervious, Inflow Depth = 4.90" for 100-Year event
Inflow = 11.94 cfs @ 12.11 hrs, Volume= 0.772 af
Outflow = 11.94 cfs @ 12.11 hrs, Volume= 0.772 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 OL-1: OVERLAND

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
 Inflow = 1.52 cfs @ 12.11 hrs, Volume= 0.109 af
 Outflow = 1.46 cfs @ 12.13 hrs, Volume= 0.109 af, Atten= 4%, Lag= 1.3 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= 1.11 fps, Min. Travel Time= 0.7 min
 Avg. Velocity = 0.32 fps, Avg. Travel Time= 2.4 min

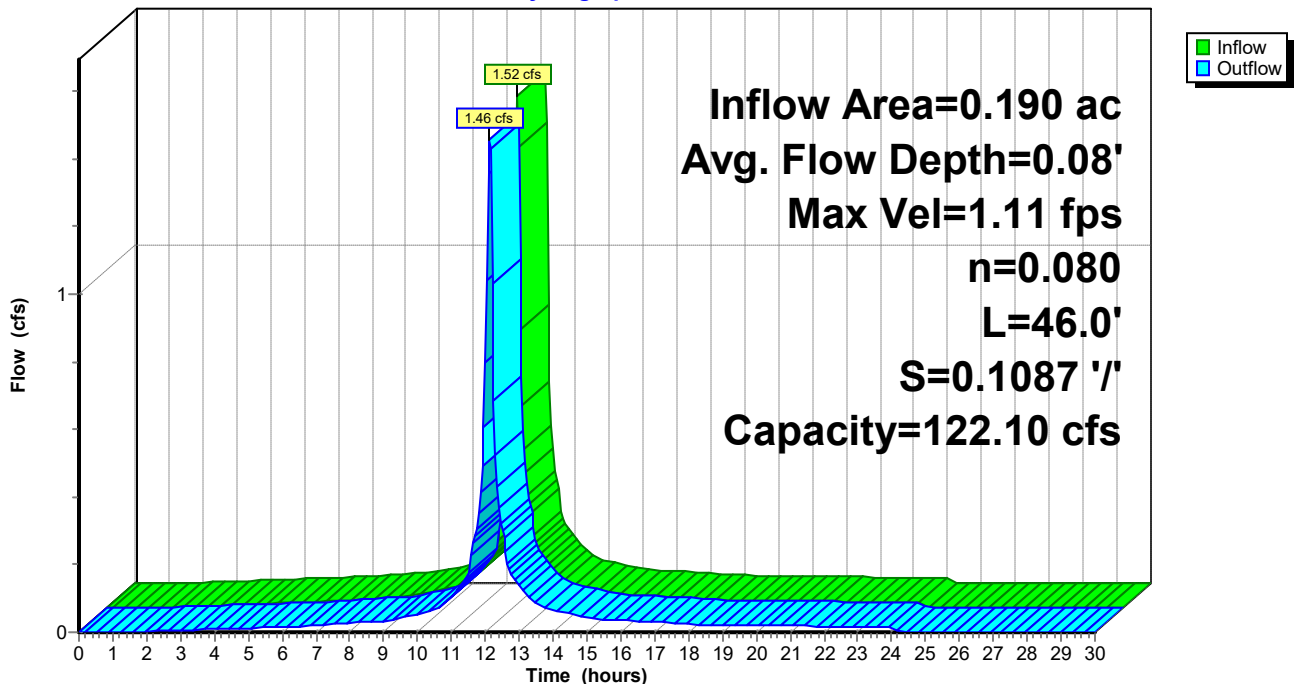
Peak Storage= 60 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.08' , Surface Width= 16.66'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 122.10 cfs

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 0.02' @ 12.25 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.46 cfs @ 12.13 hrs, Volume= 0.109 af
Outflow = 1.32 cfs @ 12.22 hrs, Volume= 0.109 af, Atten= 9%, Lag= 5.1 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= 1.01 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 12.1 min

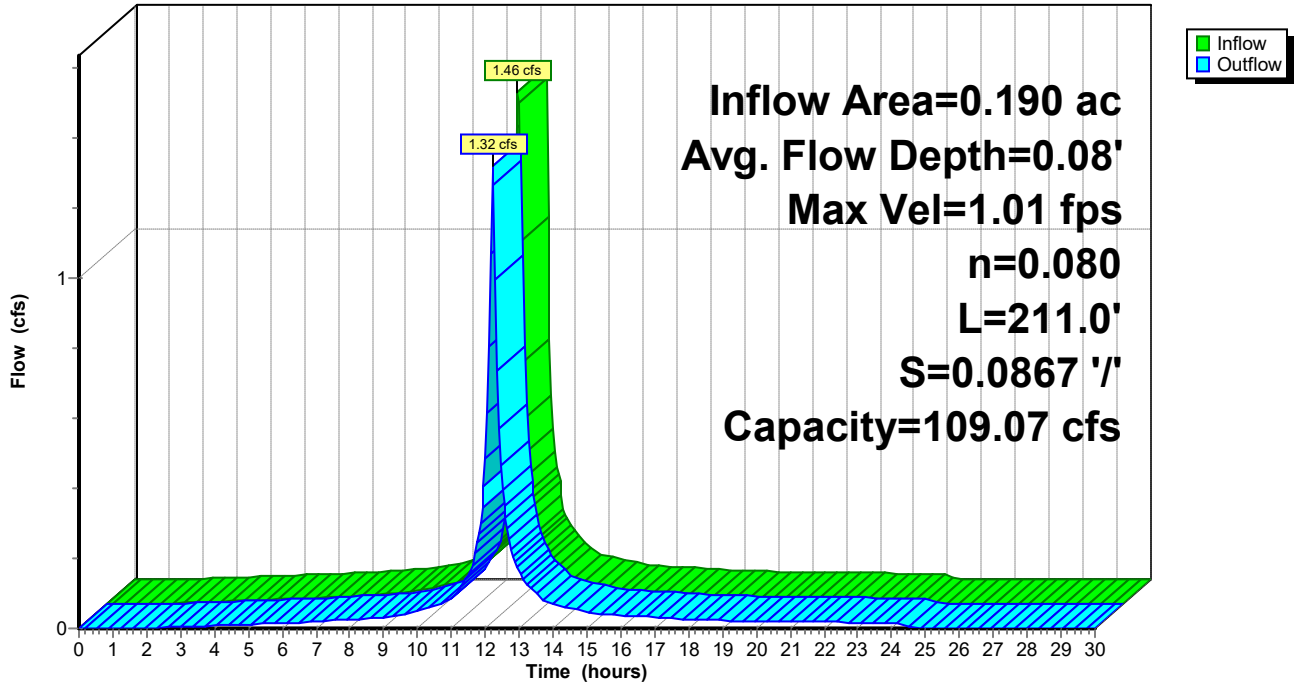
Peak Storage= 280 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 16.68'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 109.07 cfs

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 = 6.87" for 100-Year event
Inflow = 1.32 cfs @ 12.22 hrs, Volume= 0.109 af
Outflow = 1.30 cfs @ 12.23 hrs, Volume= 0.109 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= 0.72 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 2.0 min

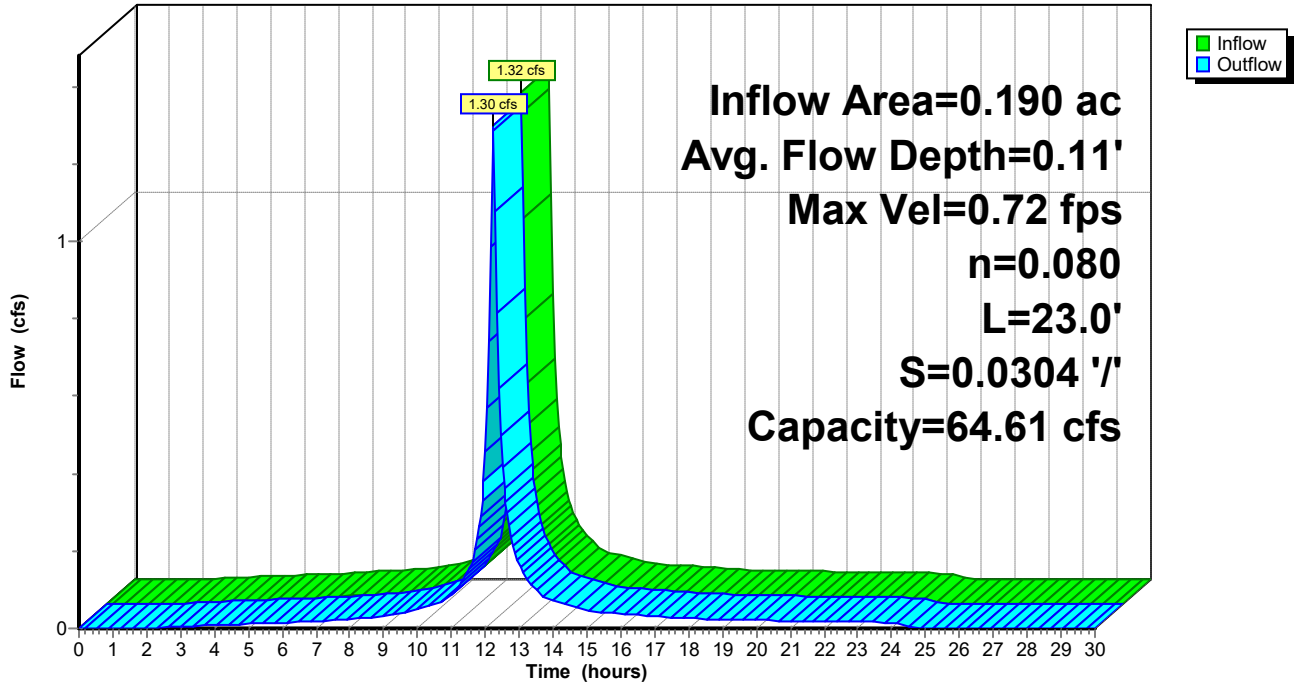
Peak Storage= 42 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 17.26'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 64.61 cfs

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 0.03' @ 12.40 hrs

Inflow Area = 0.190 ac, 83.72% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.30 cfs @ 12.23 hrs, Volume= 0.109 af
Outflow = 1.11 cfs @ 12.41 hrs, Volume= 0.109 af, Atten= 15%, Lag= 10.5 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= 0.31 fps, Min. Travel Time= 6.9 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 26.8 min

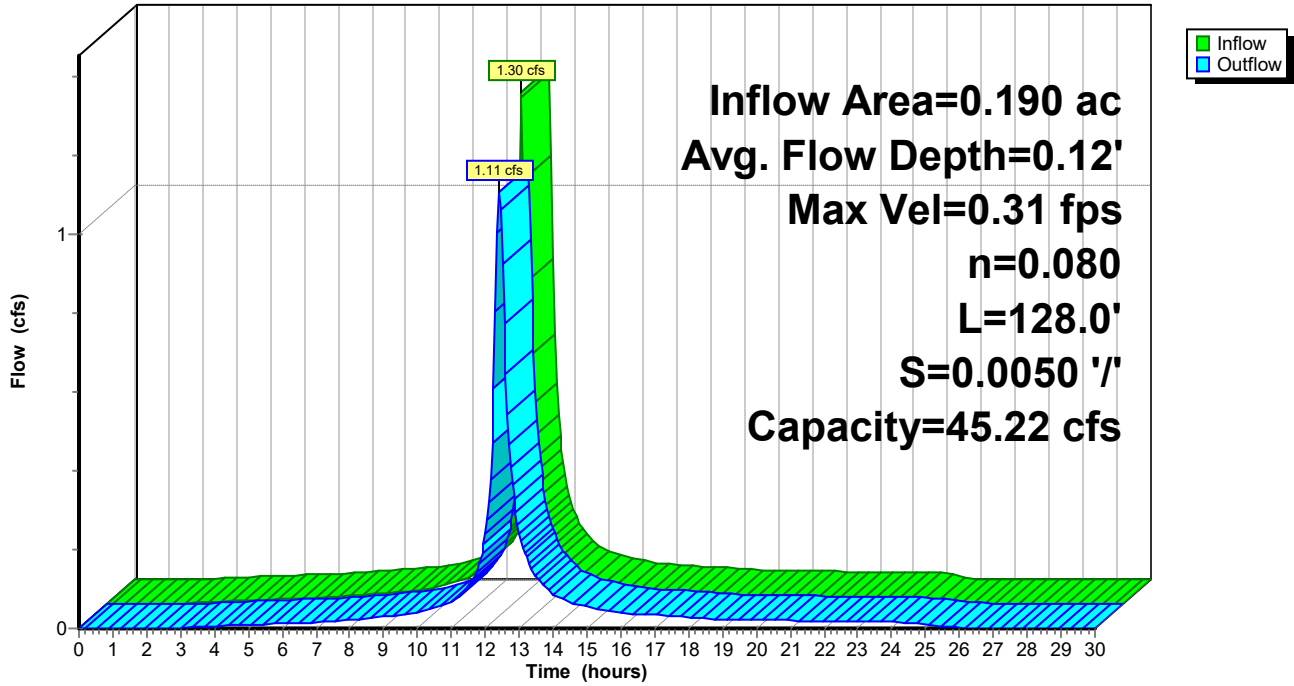
Peak Storage= 469 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 32.35'
Bank-Full Depth= 1.00' Flow Area= 40.0 sf, Capacity= 45.22 cfs

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 = 0.288 ac, 86.99% Impervious, Inflow Depth = 6.90" for 100-Year event
 Inflow = 2.20 cfs @ 12.12 hrs, Volume= 0.166 af
 Outflow = 1.97 cfs @ 12.22 hrs, Volume= 0.166 af, Atten= 10%, Lag= 5.6 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= 1.25 fps, Min. Travel Time= 3.8 min
 Avg. Velocity = 0.33 fps, Avg. Travel Time= 14.3 min

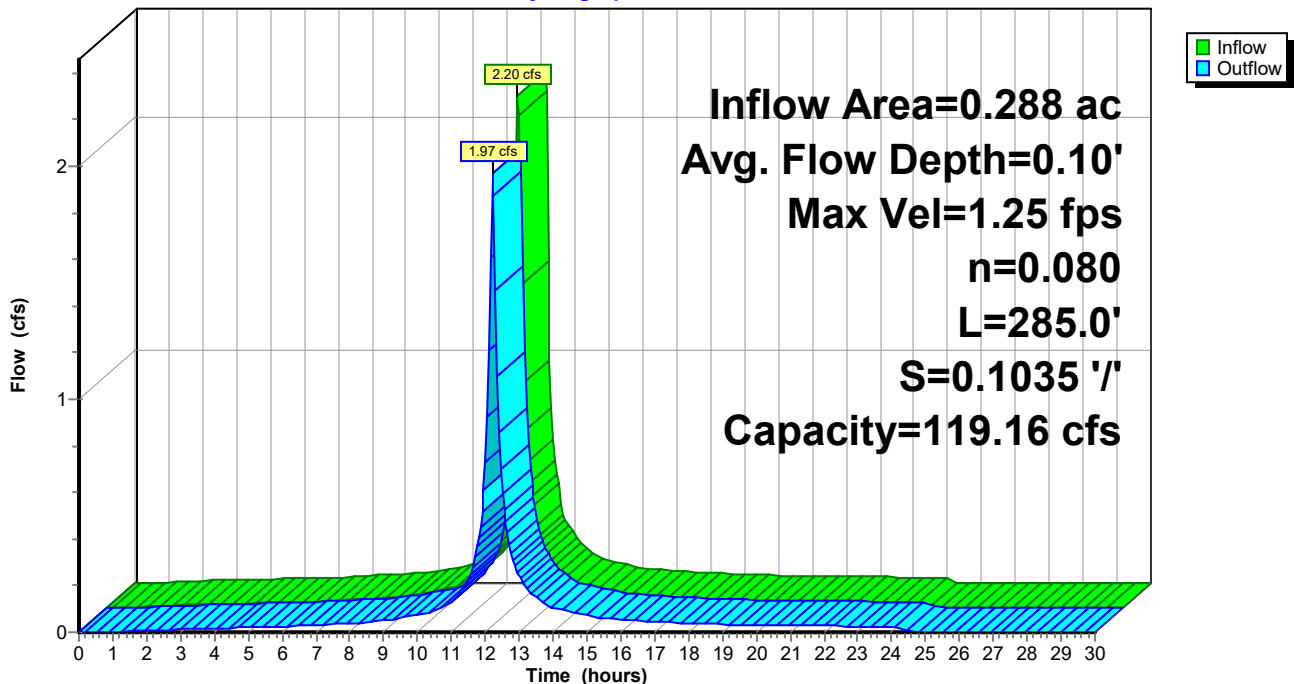
Peak Storage= 464 cf @ 12.15 hrs
 Average Depth at Peak Storage= 0.10' , Surface Width= 17.03'
 Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 119.16 cfs

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 0.17' @ 12.25 hrs

[62] Hint: Exceeded Reach OL7 OUTLET depth by 0.14' @ 12.20 hrs

Inflow Area = 0.481 ac, 81.29% Impervious, Inflow Depth > 6.77" for 100-Year event
Inflow = 2.13 cfs @ 12.22 hrs, Volume= 0.271 af
Outflow = 2.04 cfs @ 12.30 hrs, Volume= 0.271 af, Atten= 4%, Lag= 4.8 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= 0.48 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 10.4 min

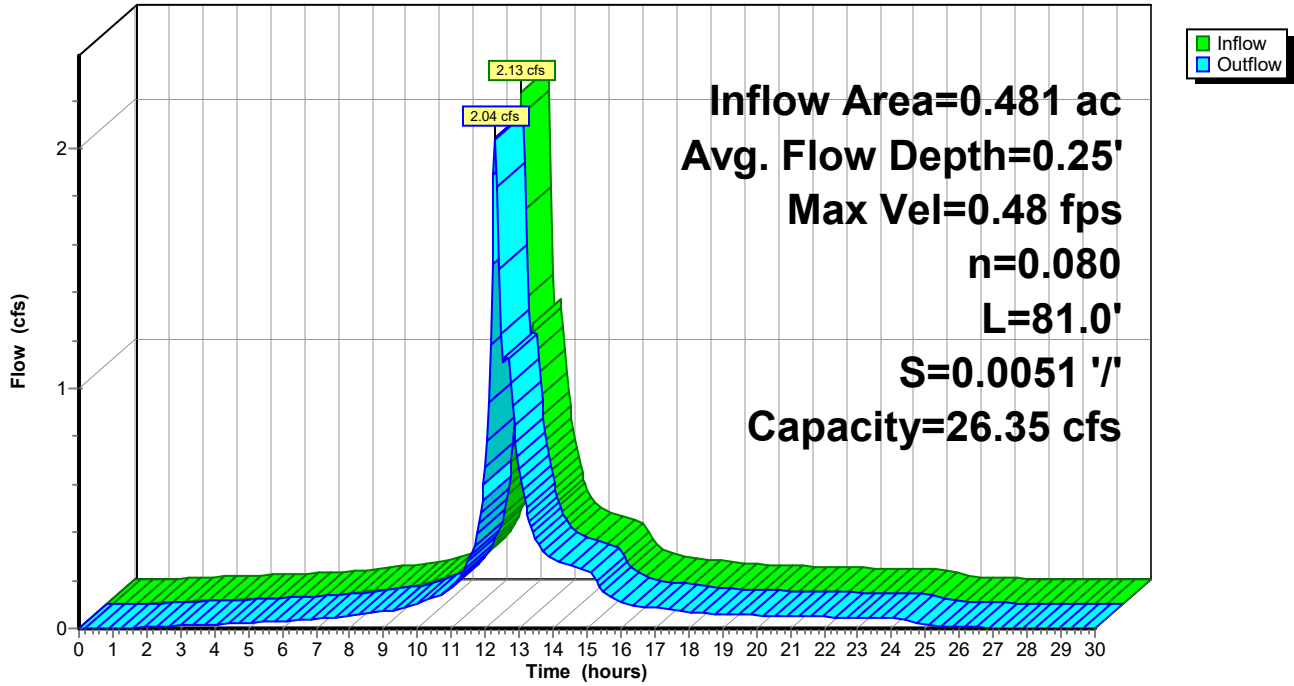
Peak Storage= 349 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.25', Surface Width= 19.93'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 26.35 cfs

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 OL-8: OVERLAND

[61] Hint: Exceeded Reach UGS1B outlet invert by 0.07' @ 12.20 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 6.56" for 100-Year event
Inflow = 1.30 cfs @ 12.17 hrs, Volume= 0.106 af
Outflow = 1.18 cfs @ 12.21 hrs, Volume= 0.106 af, Atten= 9%, Lag= 2.5 min
Routed to Reach OL7 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 3.5 min

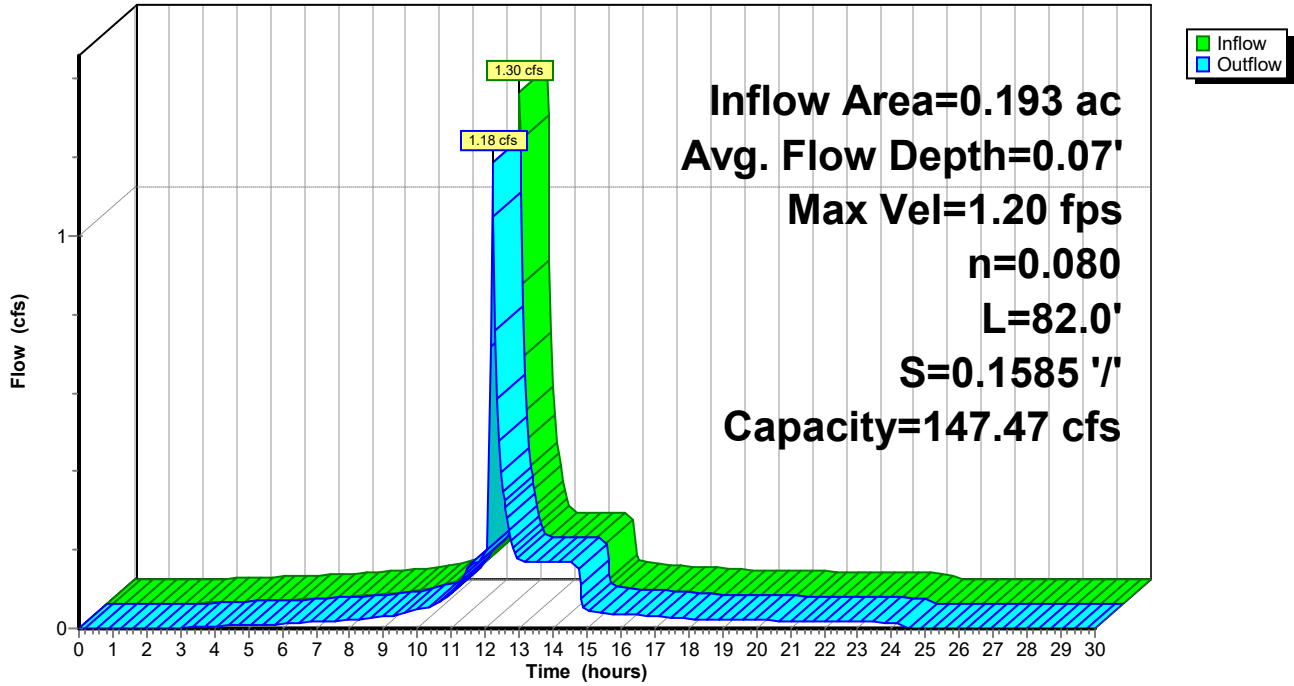
Peak Storage= 88 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 16.36'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 147.47 cfs

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= 82.0' Slope= 0.1585 ' '
Inlet Invert= 125.00', Outlet Invert= 112.00'



Reach OL-8: OVERLAND

Hydrograph



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Summary for Reach OL7: OVERLAND

[62] Hint: Exceeded Reach OL-8 OUTLET depth by 0.09' @ 12.40 hrs

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 6.56" for 100-Year event
Inflow = 1.18 cfs @ 12.21 hrs, Volume= 0.106 af
Outflow = 0.66 cfs @ 12.59 hrs, Volume= 0.106 af, Atten= 45%, Lag= 22.2 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= 0.30 fps, Min. Travel Time= 15.1 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 49.3 min

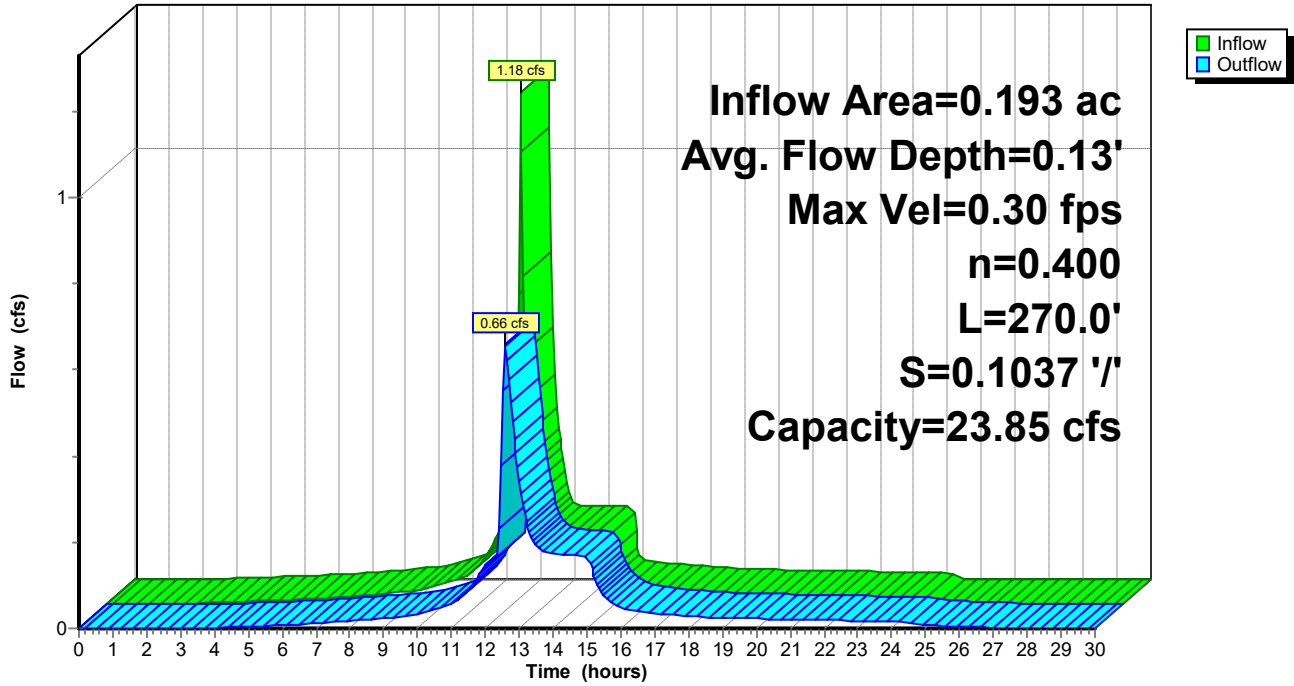
Peak Storage= 595 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 17.70'
Bank-Full Depth= 1.00' Flow Area= 25.0 sf, Capacity= 23.85 cfs

15.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 ' ' Top Width= 35.00'
Length= 270.0' Slope= 0.1037 ' '
Inlet Invert= 112.00', Outlet Invert= 84.00'



Reach OL7: OVERLAND

Hydrograph



Summary for Reach OUTLET: TO DP#1

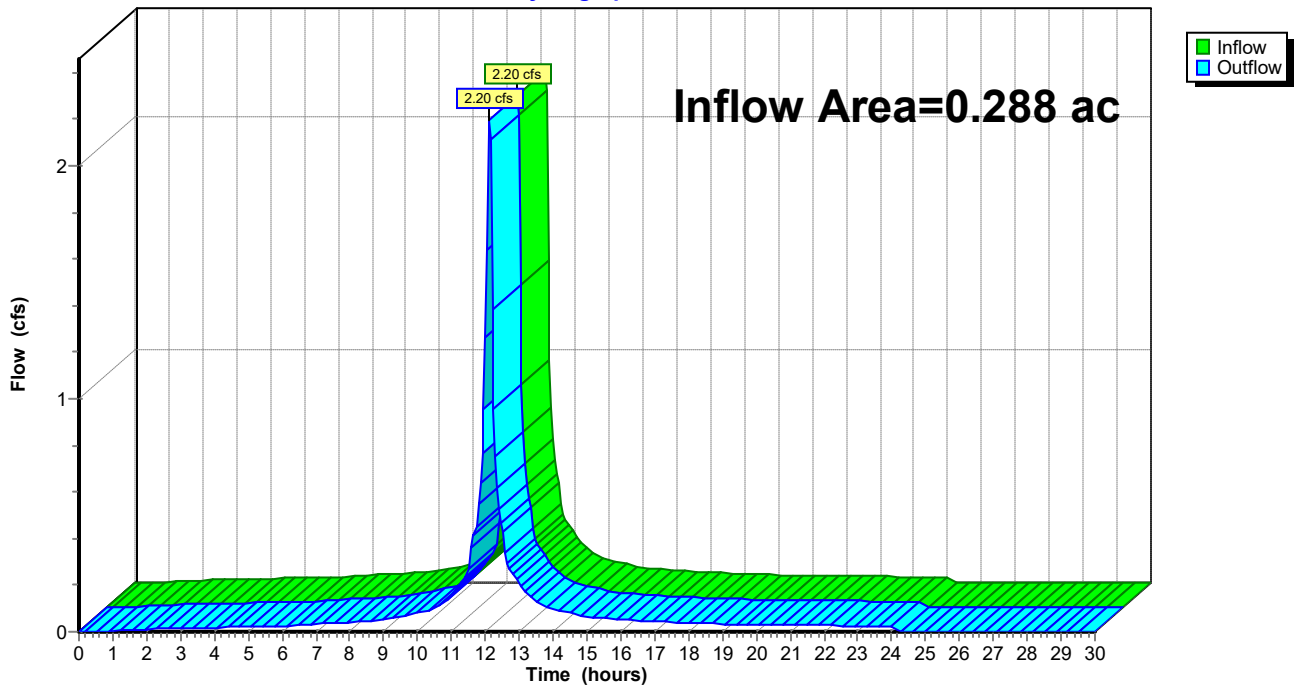
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.288 ac, 86.99% Impervious, Inflow Depth = 6.90" for 100-Year event
Inflow = 2.20 cfs @ 12.12 hrs, Volume= 0.166 af
Outflow = 2.20 cfs @ 12.12 hrs, Volume= 0.166 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

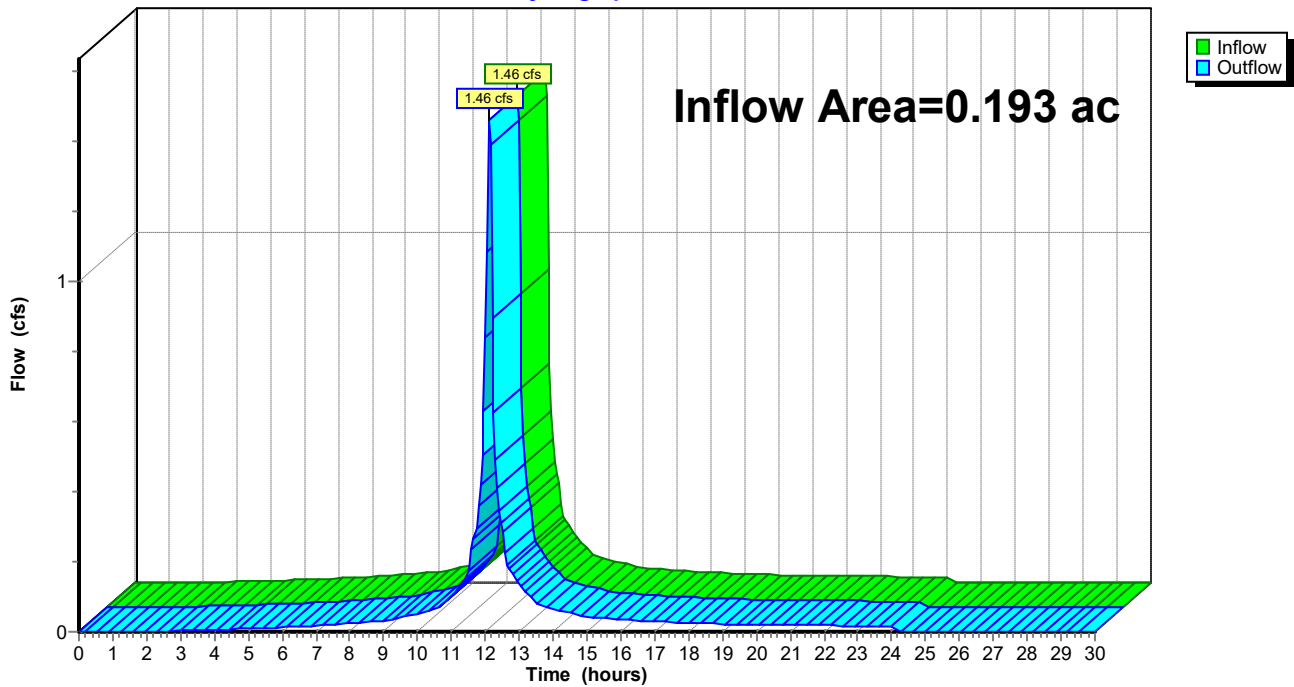
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 6.56" for 100-Year event
Inflow = 1.46 cfs @ 12.12 hrs, Volume= 0.106 af
Outflow = 1.46 cfs @ 12.12 hrs, Volume= 0.106 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

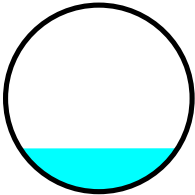
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 6.56" for 100-Year event
Inflow = 1.33 cfs @ 12.17 hrs, Volume= 0.106 af
Outflow = 1.30 cfs @ 12.17 hrs, Volume= 0.106 af, Atten= 2%, Lag= 0.2 min
Routed to Reach OL-8 : OVERLAND

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.45 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.18 fps, Avg. Travel Time= 0.3 min

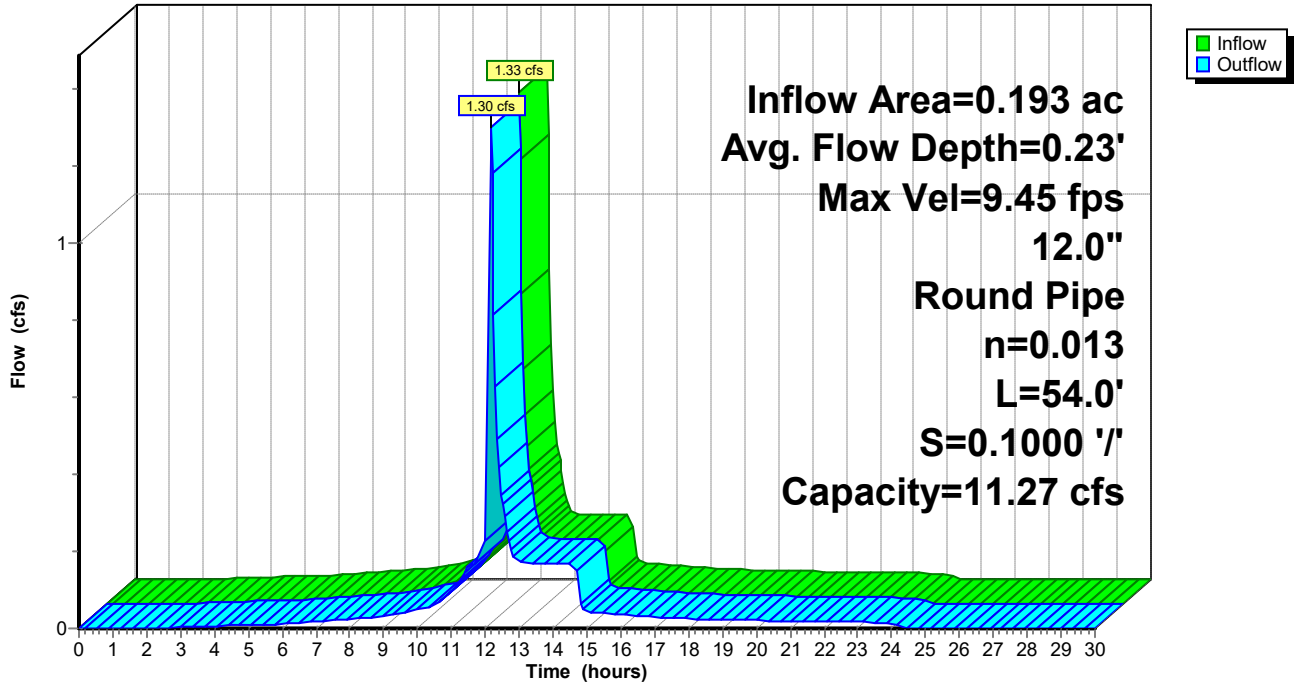
Peak Storage= 7 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 0.85'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 11.27 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 54.0' Slope= 0.1000 '/'
Inlet Invert= 130.40', Outlet Invert= 125.00'



Reach UGS1B: TO FE#1

Hydrograph



Summary for Pond UGS1: TO UGS1B

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

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 6.56" for 100-Year event
 Inflow = 1.46 cfs @ 12.12 hrs, Volume= 0.106 af
 Outflow = 1.33 cfs @ 12.17 hrs, Volume= 0.106 af, Atten= 9%, Lag= 2.9 min
 Primary = 1.33 cfs @ 12.17 hrs, Volume= 0.106 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= 135.46' @ 12.17 hrs Surf.Area= 0.016 ac Storage= 0.018 af

Plug-Flow detention time= 18.2 min calculated for 0.105 af (100% of inflow)
 Center-of-Mass det. time= 18.1 min (792.5 - 774.4)

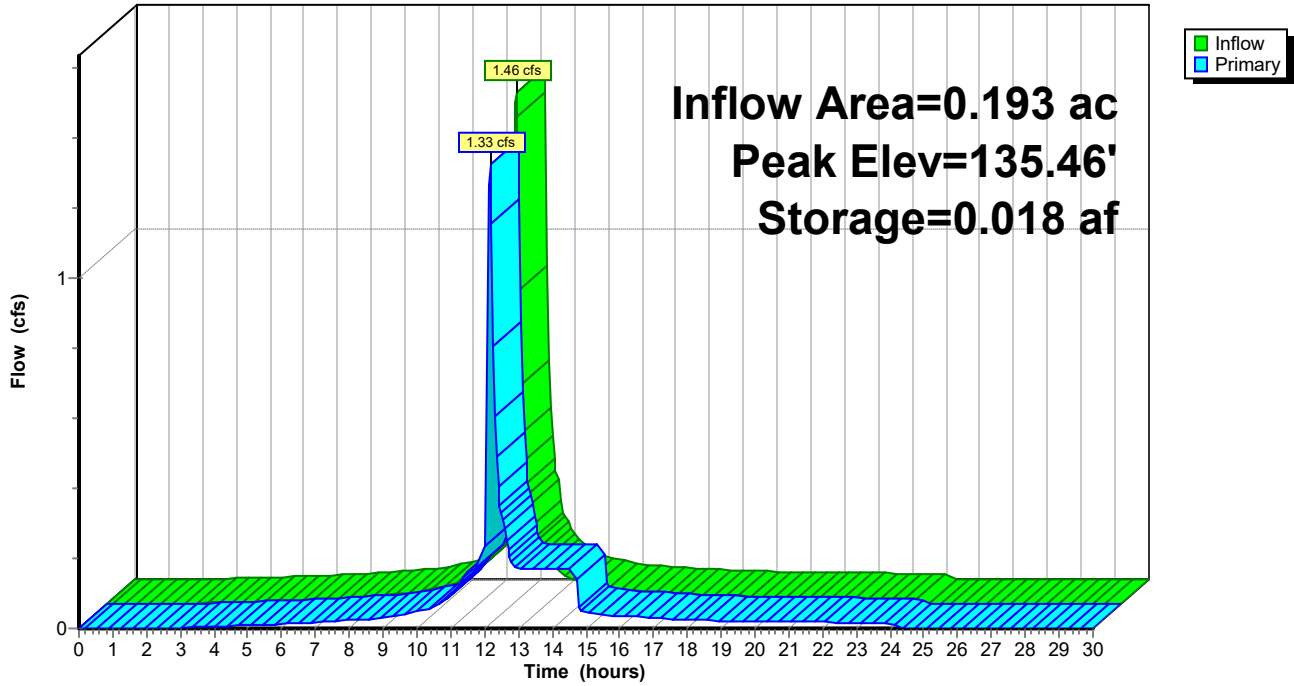
Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.024 af	20.00'W x 22.00'L x 6.00'H Prismaoid 0.061 af Overall x 40.0% Voids
#2	134.00'	0.021 af	Shea Leaching Chamber 4x4x4 x 20 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 20 Chambers in 5 Rows
		0.046 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'	8.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.22 cfs @ 12.17 hrs HW=135.43' (Free Discharge)
 1=Special & User-Defined (Custom Controls 0.17 cfs)
 2=Orifice/Grate (Orifice Controls 1.05 cfs @ 2.23 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.

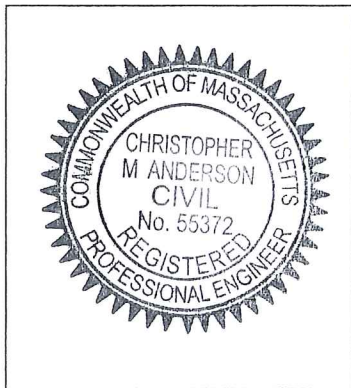
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the 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



1-23-23

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

Revised through January 23, 2023

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)

$Q_{max}=1.33 \text{ cfs (100-Year)}$	$Sp=12/12 \rightarrow 1.0 \text{ ft}$	
$L=1.8(1.33-5)/(1^{1.5}) + 10 \rightarrow -6.6 + 10 = 3.4$	$\rightarrow 10 \text{ feet (min)}$	
$W2=3(1.0) + 0.7(10) \rightarrow 3.0 + 7.0 = 10$	$\rightarrow 10.0 \text{ feet}$	

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-	4.13	10.23	14.62	21.50
	Post-	3.85	9.68	13.91	20.52
#2	Pre-	1.03	1.65	2.05	2.63
	Post-	1.03	1.65	2.05	2.63
#3	Pre-	2.85	6.19	8.47	11.94
	Post-	2.85	6.19	8.47	11.94

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: 6,584 s.f.
Net New Impervious HSG-C: +6,584 s.f.

Total New Impervious area = +6,584 s.f.
Total Project Impervious = 6,584 s.f.

Required Recharge Volume:

Net Increase HSG Soil C

Net New Impervious HSG C= 6,584 s.f.
HSG C: 6,584 s.f. x (0.25 in/12) = 137 c.f.

Required Recharge Volume = 137 c.f.

Capture Rate:

Total Impervious to DB#1	6,117 sf
Net Captured Impervious	6,117 sf

Capture Rate = 6,117 s.f. / 6,584 s.f. = 92.9%

Compliance is provided, Capture rate in excess of 65%

Storage Volume Provided:

Volume below lowest outlet within detention facility.

UGS-1: 609 c.f. of storage volume provided

Recharge Provided:

Total Volume Required: 137 c.f.

Volume below lowest outlet within detention facility.

UGS-1: 609 c.f. of storage volume provided

Required Recharge Volume = 107 c.f.
Provided Recharge Volume = 0 c.f.

*Minimal recharge is provided due to generally restrictive hydraulic capacity of underlying soil
Compliance is provided to the maximum extent practicable as underlying soil is considered HSG-C*

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: 609 c.f. of storage volume provided.
Time = 609 c.f. / (0.27 in/hr x (1 ft/ 12 in) x 440 s.f.) = **61.5 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 (6,584 s.f.) = 548 cf

The project has been designed to incorporate a Hydroworks Hydrostorm HS4 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 1,350 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-R1

NOAA 24-hr C Custom Rainfall=4.63"

Prepared by Hannigan Engineering Inc

Printed 1/19/2023

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Summary for Pond UGS1: TO UGS1B

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

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 3.66" for Custom event
 Inflow = 0.84 cfs @ 12.12 hrs, Volume= 0.059 af
 Outflow = 0.17 cfs @ 12.51 hrs, Volume= 0.059 af, Atten= 80%, Lag= 23.5 min
 Primary = 0.17 cfs @ 12.51 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= 135.00' @ 12.52 hrs Surf.Area= 0.016 ac **Storage= 0.014 af <= Storage/Drawdown Volume**

Plug-Flow detention time= 20.7 min calculated for 0.059 af (100% of inflow)
 Center-of-Mass det. time= 20.6 min (810.7 - 790.1)

Volume	Invert	Avail.Storage	Storage Description
#1	133.00'	0.024 af	20.00'W x 22.00'L x 6.00'H Prismatic 0.061 af Overall x 40.0% Voids
#2	134.00'	0.021 af	Shea Leaching Chamber 4x4x4 x 20 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 20 Chambers in 5 Rows
		0.046 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'	8.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.17 cfs @ 12.51 hrs HW=135.00' (Free Discharge)

- 1=Special & User-Defined (Custom Controls 0.17 cfs)
- 2=Orifice/Grate (Orifice Controls 0.00 cfs @ 0.16 fps)

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

0.193 acres @ 72.78% Impervious = 0.140 Acres Impervious

0.140 Acres x .0015625 sq mi = **2.20x(10⁻⁴) square miles.**

Step 2: Tc of Train

P100 to DCB#100: 5.0 min

DCB#100 to DMH#100: 2.6 min

Total Tc to DMH#2 7.6 min or 0.127 hours

Step 3: Determine qu

From Figure 4:

Tc @ 0.116, qu=755 csm/in

Step 4: Determine Q(1/2)

$$Q(1) = (qu) \times (A) \times (WQV)$$

$$Q(1) = (755 \text{ csm/in}) \times (2.20 \times 10^{-4}) \times (0.5 \text{ in})$$

$$Q(1) = 0.17 \text{ CFS}$$

Determination

Determination of Water Quality Flow rates for units by Connecticut DOT (CONNDOT)

From Technology Verification

HS 4 Treatment Flow rate

1.10 cfs > 0.17 c.f.s. "Pass"

HydroGuard HS4 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 within Row
 5. Total TSS Removal = Sum All Values in Column D

Location:

A	B	C	D	E
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Deep Sump Catchbasin	0.25	1.00	0.25	0.75
Hydroworks HG4	0.91	0.75	0.68	0.07

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

3010-POST-SUBDIVISION-R1

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NOAA 24-hr C 1-Year Rainfall=2.81"

Printed 1/19/2023

Summary for Reach DMH100: TO UGS#1A

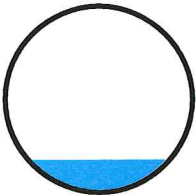
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.193 ac, 72.78% Impervious, Inflow Depth = 1.93" for 1-Year event
Inflow = 0.46 cfs @ 12.13 hrs, Volume= 0.031 af <=WQV
Outflow = 0.46 cfs @ 12.13 hrs, Volume= 0.031 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= 4.94 fps, Min. Travel Time= 0.0 min
Avg. Velocity= 1.60 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 0.76'
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'



3010-POST-SUBDIVISION-R1

NOAA 24-hr C 1-Year Rainfall=2.81"

Prepared by Hannigan Engineering Inc

Printed 1/19/2023

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Summary for Subcatchment p100: TO DCB#100

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

Runoff = 0.09 cfs @ 12.11 hrs, Volume= 0.006 af, Depth= 2.07"
 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
 NOAA 24-hr C 1-Year Rainfall=2.81"

Area (sf)	CN	Description
295	74	>75% Grass cover, Good, HSG C
1,233	98	Paved parking, HSG C
1,528	93	Weighted Average
295		19.31% Pervious Area
1,233		80.69% 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"
0.7	45	0.0200	1.14		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.1	18	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7	68	Total, Increased to minimum Tc = 5.0 min			<= Tc

3010-POST-SUBDIVISION-R1

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NOAA 24-hr C 1-Year Rainfall=2.81"

Printed 1/19/2023

Summary for Reach DCB100: TO DMH#100

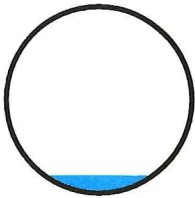
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.035 ac, 80.69% Impervious, Inflow Depth = 2.07" for 1-Year event
Inflow = 0.09 cfs @ 12.11 hrs, Volume= 0.006 af
Outflow = 0.09 cfs @ 12.14 hrs, Volume= 0.006 af, Atten= 4%, 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= 2.42 fps, Min. Travel Time= 0.9 min
Avg. Velocity= 0.81 fps, Avg. Travel Time= 2.6 min $\leq T_C$

Peak Storage= 5 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 0.58'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.98 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 128.0' Slope= 0.0195 '/'
Inlet Invert= 138.50', 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
Leicester - DMH#100

HydroStorm Simulation

```
#####  
# Precipitation Block Input Commands #  
#####  
Station Name..... Worcester Wso Ap  
Station Location..... Massachusetts  
Station, ISTA..... 9923  
Beginning date, IYBEG (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
```



```

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

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 *

 # 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.....	CEVOL.....	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.....	REFFDD.....	0.000
DAY OF YEAR ON WHICH STREET SWEEPING BEGINS.....	KLNBGN.....	120

 # Land use data on data group J2 #
 #####

AND USE	BUILDUP EQUATION TYPE	FUNCTIONAL DEPENDENCE OF BUILDUP PARAMETER (JACGUT)	LIMITING BUILDUP QUANTITY (DDLIM)	BUILDUP POWER (DDPOW)	BUILDUP COEFF. (DDFACT)	CLEANING INTERVAL IN DAYS (CLFREQ)	AVAIL. FACTOR 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	Type of units	KALC	Type of buildup calc	KWASH	Type of washoff calc	KACGUT	Dependence of buildup	LINKUP	Linkage to snowmelt	Buildup param 1 (QFACT1)	Buildup param 2 (QFACT2)	Buildup param 3 (QFACT3)	Buildup param 4 (QFACT4)	Buildup param 5 (QFACT5)	Washoff power (WASHPO)	Washoff coef. (RCOEF)	Init catchb conc (CBFACT)	Precip. conc. (CONCRN)	Street sweep efflc (REFF)	Remove fraction (REMOVE)	1st order QDECAY, 1/day	Land use number
Total Su	mg/l	0	2	0	1	0	AREA(1)	0	NO SNOW LINKAGE	25.000	0.500	60.000	0.000	0.000	1.100	3.000	100.000	0.000	0.000	0.000	0.000	1

 * Constant Groundwater Quality Concentration(s) *
 #####

Total Susp has a concentration of.. 0.0000 mg/l

 * REMOVAL FRACTIONS FOR SELECTED CHANNEL/PIES *
 * FROM J7 LINES *

CHANNEL/ CONSTITUENT

PIPE Total Susp

 201 0.000

 * Subcatchment surface quality on data group I1 *

	No. Usage	Land Use No.	Total Gutter Length 10**2ft	Number of Catch-Basins	Input Loading load/ac
1	300 Urban De	1	1.80	1.00	0.0E+00
Totals (Loads in lb or other)			1.80	1.00	0.0E+00

 * DATA GROUP M1 *

TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRINT.. 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 *

ZP Battery DevCo, LLC
 Leicester - 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	2.5	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	2.1	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

1.70	39	0.7	64.	0.7	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 = 3055881
 Final Julian Date = 2001365
 Final time of day = 86395. 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	13506308	3332524						

 * 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 *

	cubic feet	Inches over
Total Precipitation (Rain plus Snow)	1558476.	Total Basin
Total Infiltration	418665.	2225.
Total Evaporation	51997.	598.
Surface Runoff from Watersheds	1101558.	74.
Total Water remaining in Surface Storage	8.	1572.
Infiltration over the Pervious Area...	418665.	0.
		2195.

 Infiltration + Evaporation +
 Surface Runoff + Snow removal +
 Water remaining in Surface Storage +

Water remaining in Snow Cover..... 2244.
 Total Precipitation + Initial Storage. 2225.

1572228.
 1558476.

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.....

```

-0.882 Percent

```

*****
* Continuity Check for Channel/Pipes *
*****

```

Initial Channel/Pipe Storage.....	cubic feet	Inches over
Final Channel/Pipe Storage.....	0.	Total Basin
Surface Runoff from Watersheds.....	0.	0.
Baseflow.....	1101558.	1572.
Groundwater Subsurface Inflow.....	0.	0.
Evaporation Loss from Channels.....	0.	0.
Channel/Pipe/Inlet Outflow.....	1101558.	1572.
Initial Storage + Inflow.....	1101558.	1572.
Final Storage + Outflow.....	1101558.	1572.

```

*****
* 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 *
*****

```

Total Infiltration	cubic feet	Inches over
Total Upper Zone ET	0.	Subsurface Basin
Total Lower Zone ET	0.	0.
Total Groundwater flow	0.	0.
Total Deep percolation	0.	0.
Initial Subsurface Storage	25221.	36.

Final Subsurface Storage 25221. 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.	PERVIOUS AREA		IMPERVIOUS AREA		TOTAL SUBCATCHMENT AREA					
		AC	IMPER.	AC	IMPER.	AC	IMPER.				
300	200	0.19	72.8	2224.52	27.0812198.272	0.131	2148.950	0.510	1571.377	0.640	3.318

*** 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 DEPTH (FT)	MAXIMUM COMPUTED VELOCITY (FPS)	TIME OF OCCURRENCE DAY HR.	LENGTH OF SURCHARGE (HOUR)	MAXIMUM SURCHARGE VOLUME (AC-FT)	RATIO OF MAX. TO FULL FLOW DEPTH
200	0.63			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 #

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.....	4.
2. TOTAL SURFACE BUILDUP.....	6961.
3. INITIAL CATCHBASIN LOAD.....	0.
4. TOTAL CATCHBASIN LOAD.....	0.
5. TOTAL CATCHBASIN AND	
SURFACE BUILDUP (2+4).....	6961.

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)....	6961.
11. SURFACE WASHOFF.....	6957.
12. CATCHBASIN WASHOFF.....	0.
13. TOTAL WASHOFF (11+12).....	6957.
14. LOAD FROM OTHER CONSTITUENTS	0.
15. PRECIPITATION LOAD.....	0.
15a. SUM SURFACE LOAD (13+14+15).	6957.
16. TOTAL GROUNDWATER LOAD.....	0.
16a. TOTAL I/I LOAD.....	0.
17. NET SUBCATCHMENT LOAD	
(15a-15b-15c-15d+16+16a)....	6957.
>>Removal in channel/pipes (17a, 17b):	
17a. REMOVE BY EMP FRACTION.....	0.
17b. REMOVE BY 1st ORDER DECAY...	0.
18. TOTAL LOAD TO INLETS.....	6956.
19. FLOW WT'D AVE. CONCENTRATION	
(INLET LOAD/TOTAL FLOW).....	101.

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.

```

*****
* 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

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850. 5.0 2.65 0.321303 1.128801

 * Summary of TSS Removal *
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TSS Removal based on NJCAT Lab Performance Curve

Model #	Low Q Treated (cfs)	High Q Treated (cfs)	Runoff Treated (%)	TSS Removed (%)
HS 3	0.355	6.899	99.8	85.7
HS 4	0.585	6.899	100.0	90.9
HS 5	0.731	6.899	100.0	94.8
HS 6	0.868	6.899	100.0	96.9
HS 7	1.226	6.899	100.0	97.9
HS 8	1.605	6.899	100.0	98.6
HS 10	2.328	6.899	100.0	99.4
HS 12	3.129	6.899	100.0	99.7

<=TSS Removal

 * Summary of Annual Flow Treatmetnet & TSS Removal *
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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.	196546.	196546.	126.	106.	20.	0.	100.0	83.8
1958.	327835.	327835.	177.	148.	29.	0.	100.0	83.6
1959.	343933.	338697.	176.	149.	27.	0.	98.5	84.7
1960.	314713.	313779.	169.	147.	23.	0.	99.7	86.7
1961.	278551.	278394.	167.	146.	21.	0.	99.9	87.3
1962.	297778.	297778.	159.	138.	21.	0.	100.0	86.6
1963.	238066.	238066.	155.	135.	20.	0.	100.0	86.8
1964.	228413.	228413.	148.	129.	18.	0.	100.0	87.5
1965.	199170.	199170.	143.	124.	19.	0.	100.0	87.0
1966.	247933.	247933.	157.	136.	21.	0.	100.0	86.6
1967.	302201.	302201.	178.	152.	26.	0.	100.0	85.5
1968.	279533.	278472.	152.	132.	20.	0.	99.6	86.9
1969.	277454.	277454.	155.	134.	21.	0.	100.0	86.7
1970.	249789.	249789.	149.	129.	20.	0.	100.0	86.6
1971.	265163.	265140.	164.	137.	27.	0.	100.0	83.4
1972.	430620.	421877.	217.	177.	39.	0.	98.0	81.8
1973.	335149.	335149.	181.	150.	31.	0.	100.0	83.0
1974.	337678.	336685.	175.	145.	30.	0.	99.7	83.0
1975.	313600.	313600.	162.	141.	21.	0.	100.0	87.3
1976.	242260.	242260.	160.	137.	22.	0.	100.0	86.2

1977.	297470.	297460.	176.	153.	23.	0.	100.0	87.1
1978.	250045.	250045.	142.	126.	17.	0.	100.0	88.2
1979.	321978.	318761.	167.	141.	26.	0.	99.0	84.3
1980.	233084.	233084.	148.	124.	24.	0.	100.0	83.7
1981.	297545.	297545.	169.	141.	27.	0.	100.0	83.8
1982.	302926.	302926.	166.	141.	25.	0.	100.0	84.7
1983.	382317.	382289.	195.	165.	30.	0.	100.0	84.8
1984.	301369.	301369.	164.	142.	22.	0.	100.0	86.7
1985.	275137.	273381.	163.	141.	21.	0.	99.4	86.9
1986.	285586.	285586.	153.	132.	21.	0.	100.0	86.5
1987.	295702.	295702.	151.	132.	19.	0.	100.0	87.1
1988.	252102.	252015.	151.	129.	22.	0.	100.0	85.6
1989.	225551.	225551.	132.	113.	18.	0.	100.0	86.1
1991.	175732.	175732.	79.	68.	11.	0.	100.0	86.1
1992.	274032.	274032.	169.	147.	22.	0.	100.0	87.0
1993.	282172.	281801.	170.	146.	23.	0.	99.9	86.2
1994.	301467.	301467.	177.	151.	26.	0.	100.0	85.3
1995.	212318.	212298.	126.	108.	18.	0.	100.0	85.5
1996.	303292.	303278.	178.	150.	28.	0.	100.0	84.4
1997.	185596.	185596.	134.	118.	16.	0.	100.0	88.1
1998.	247190.	247190.	145.	122.	23.	0.	100.0	83.9
1999.	248078.	248078.	148.	126.	22.	0.	100.0	85.1
2000.	262399.	262399.	160.	137.	22.	0.	100.0	86.1
2001.	196146.	195669.	133.	115.	18.	0.	99.8	86.7

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.	196546.	196546.	126.	113.	13.	0.	100.0	89.5
1958.	327835.	327835.	177.	157.	20.	0.	100.0	88.8
1959.	343933.	343933.	176.	159.	17.	0.	100.0	90.4
1960.	314713.	314713.	169.	155.	14.	0.	100.0	91.5
1961.	278551.	278551.	167.	155.	13.	0.	100.0	92.3
1962.	297778.	297778.	159.	146.	13.	0.	100.0	91.7
1963.	238066.	238066.	155.	143.	12.	0.	100.0	92.1
1964.	228413.	228413.	148.	136.	12.	0.	100.0	92.0
1965.	199170.	199170.	143.	131.	11.	0.	100.0	92.1
1966.	247933.	247933.	157.	143.	13.	0.	100.0	91.6
1967.	302201.	302201.	178.	162.	16.	0.	100.0	90.7
1968.	279533.	279533.	152.	140.	12.	0.	100.0	91.9
1969.	277454.	277454.	155.	143.	12.	0.	100.0	92.1
1970.	249789.	249789.	149.	136.	12.	0.	100.0	91.6
1971.	265163.	265163.	164.	146.	18.	0.	100.0	89.1
1972.	430620.	430308.	217.	189.	27.	0.	99.9	87.4
1973.	335149.	335149.	181.	160.	21.	0.	100.0	88.6
1974.	337678.	337678.	175.	155.	20.	0.	100.0	88.4
1975.	313600.	313600.	162.	150.	12.	0.	100.0	92.7
1976.	242260.	242260.	160.	146.	13.	0.	100.0	91.7
1977.	297470.	297470.	176.	162.	14.	0.	100.0	92.0
1978.	250045.	250045.	142.	133.	10.	0.	100.0	93.1
1979.	321978.	321978.	167.	150.	17.	0.	100.0	90.0

Year	Flow Vol (ft ³)	Flow Treated (ft ³)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1980.	233084.	233084.	148.	132.	16.	0.	100.0	89.0
1981.	297545.	297545.	169.	150.	18.	0.	100.0	89.2
1982.	302926.	302926.	166.	149.	17.	0.	100.0	89.6
1983.	382317.	382317.	195.	176.	19.	0.	100.0	90.2
1984.	301369.	301369.	164.	151.	13.	0.	100.0	92.3
1985.	275137.	275137.	163.	149.	14.	0.	100.0	91.7
1986.	285586.	285586.	153.	139.	13.	0.	100.0	91.4
1987.	295702.	295702.	151.	140.	12.	0.	100.0	92.3
1988.	252102.	252102.	151.	137.	14.	0.	100.0	90.8
1989.	225551.	225551.	132.	121.	11.	0.	100.0	91.7
1991.	175732.	175732.	79.	71.	7.	0.	100.0	90.9
1992.	274032.	274032.	169.	157.	12.	0.	100.0	92.6
1993.	282172.	282172.	170.	154.	16.	0.	100.0	90.7
1994.	301467.	301467.	177.	159.	17.	0.	100.0	90.3
1995.	212318.	212318.	126.	115.	12.	0.	100.0	90.6
1996.	303292.	303292.	178.	160.	18.	0.	100.0	89.9
1997.	185596.	185596.	134.	125.	9.	0.	100.0	93.1
1998.	247190.	247190.	145.	130.	15.	0.	100.0	89.4
1999.	248078.	248078.	148.	134.	14.	0.	100.0	90.7
2000.	262399.	262399.	160.	145.	14.	0.	100.0	91.1
2001.	196146.	196146.	133.	122.	11.	0.	100.0	91.8
1957.	196546.	196546.	126.	119.	8.	0.	100.0	93.8
1958.	327835.	327835.	177.	165.	12.	0.	100.0	93.3
1959.	343933.	343933.	176.	166.	10.	0.	100.0	94.5
1960.	314713.	314713.	169.	161.	8.	0.	100.0	95.4
1961.	278551.	278551.	167.	160.	7.	0.	100.0	95.7
1962.	297778.	297778.	159.	151.	8.	0.	100.0	95.2
1963.	238066.	238066.	155.	149.	6.	0.	100.0	96.1
1964.	228413.	228413.	148.	141.	7.	0.	100.0	95.4
1965.	199170.	199170.	143.	137.	6.	0.	100.0	96.0
1966.	247933.	247933.	157.	149.	7.	0.	100.0	95.4
1967.	302201.	302201.	178.	169.	9.	0.	100.0	94.7
1968.	279533.	279533.	152.	146.	6.	0.	100.0	95.9
1969.	277454.	277454.	155.	148.	7.	0.	100.0	95.4
1970.	249789.	249789.	149.	141.	7.	0.	100.0	95.1
1971.	265163.	265163.	164.	153.	11.	0.	100.0	93.3
1972.	430620.	430620.	217.	200.	17.	0.	100.0	92.2
1973.	335149.	335149.	181.	169.	12.	0.	100.0	93.4
1974.	337678.	337678.	175.	162.	13.	0.	100.0	92.6
1975.	313600.	313600.	162.	156.	6.	0.	100.0	96.5
1976.	242260.	242260.	160.	151.	8.	0.	100.0	95.0
1977.	297470.	297470.	176.	168.	8.	0.	100.0	95.6
1978.	250045.	250045.	142.	137.	5.	0.	100.0	96.5
1979.	321978.	321978.	167.	155.	11.	0.	100.0	93.3
1980.	233084.	233084.	148.	138.	10.	0.	100.0	93.3
1981.	297545.	297545.	169.	157.	11.	0.	100.0	93.2
1982.	302926.	302926.	166.	156.	10.	0.	100.0	93.9

HS 5

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1983.	382317.	382317.	195.	185.	9.	0.	100.0	95.1
1984.	301369.	301369.	164.	156.	7.	0.	100.0	95.5
1985.	275137.	275137.	163.	155.	7.	0.	100.0	95.5
1986.	285586.	285586.	153.	145.	7.	0.	100.0	95.4
1987.	295702.	295702.	151.	146.	6.	0.	100.0	96.2
1988.	252102.	252102.	151.	143.	8.	0.	100.0	94.7
1989.	225551.	225551.	132.	125.	6.	0.	100.0	95.2
1991.	175732.	175732.	79.	75.	4.	0.	100.0	95.0
1992.	274032.	274032.	169.	163.	6.	0.	100.0	96.2
1993.	282172.	282172.	170.	161.	9.	0.	100.0	94.8
1994.	301467.	301467.	177.	167.	10.	0.	100.0	94.5
1995.	212318.	212318.	126.	120.	7.	0.	100.0	94.7
1996.	303292.	303292.	178.	179.	11.	0.	100.0	93.7
1997.	185596.	185596.	134.	129.	4.	0.	100.0	96.7
1998.	247190.	247190.	145.	137.	9.	0.	100.0	94.0
1999.	248078.	248078.	148.	140.	8.	0.	100.0	94.8
2000.	262399.	262399.	160.	152.	8.	0.	100.0	94.9
2001.	196146.	196146.	133.	126.	7.	0.	100.0	94.8
HS 6								
Year								
1957.	196546.	196546.	126.	122.	5.	0.	100.0	96.1
1958.	327835.	327835.	177.	170.	7.	0.	100.0	96.1
1959.	343933.	343933.	176.	169.	6.	0.	100.0	96.3
1960.	314713.	314713.	169.	165.	4.	0.	100.0	97.7
1961.	278551.	278551.	167.	163.	5.	0.	100.0	97.3
1962.	297778.	297778.	159.	155.	4.	0.	100.0	97.4
1963.	238066.	238066.	155.	152.	3.	0.	100.0	97.9
1964.	228413.	228413.	148.	144.	4.	0.	100.0	97.5
1965.	199170.	199170.	143.	140.	3.	0.	100.0	97.8
1966.	247933.	247933.	157.	152.	4.	0.	100.0	97.2
1967.	302201.	302201.	178.	173.	5.	0.	100.0	97.0
1968.	279533.	279533.	152.	148.	4.	0.	100.0	97.5
1969.	277454.	277454.	155.	151.	4.	0.	100.0	97.3
1970.	249789.	249789.	149.	144.	4.	0.	100.0	97.1
1971.	265163.	265163.	164.	158.	6.	0.	100.0	96.3
1972.	430620.	430620.	217.	206.	11.	0.	100.0	94.9
1973.	335149.	335149.	181.	174.	7.	0.	100.0	96.2
1974.	337678.	337678.	175.	166.	9.	0.	100.0	95.1
1975.	313600.	313600.	162.	159.	3.	0.	100.0	98.1
1976.	242260.	242260.	160.	154.	5.	0.	100.0	96.9
1977.	297470.	297470.	176.	171.	5.	0.	100.0	97.3
1978.	250045.	250045.	142.	140.	3.	0.	100.0	98.1
1979.	321978.	321978.	167.	159.	8.	0.	100.0	95.5
1980.	233084.	233084.	148.	142.	6.	0.	100.0	95.9
1981.	297545.	297545.	169.	161.	7.	0.	100.0	95.7
1982.	302926.	302926.	166.	161.	6.	0.	100.0	96.7
1983.	382317.	382317.	195.	190.	5.	0.	100.0	97.2
1984.	301369.	301369.	164.	160.	4.	0.	100.0	97.5
1985.	275137.	275137.	163.	158.	5.	0.	100.0	97.2

1986.	285586.	285586.	153.	149.	4.	0.	100.0	97.6
1987.	295702.	295702.	151.	148.	3.	0.	100.0	97.8
1988.	252102.	252102.	151.	146.	5.	0.	100.0	96.7
1989.	225551.	225551.	132.	128.	4.	0.	100.0	97.0
1991.	175732.	175732.	79.	76.	2.	0.	100.0	97.1
1992.	274032.	274032.	169.	165.	4.	0.	100.0	97.8
1993.	282172.	282172.	170.	165.	5.	0.	100.0	97.0
1994.	301467.	301467.	177.	171.	6.	0.	100.0	96.9
1995.	212318.	212318.	126.	123.	4.	0.	100.0	97.0
1996.	303292.	303292.	178.	172.	6.	0.	100.0	96.4
1997.	185596.	185596.	134.	131.	2.	0.	100.0	98.3
1998.	247190.	247190.	145.	140.	5.	0.	100.0	96.5
1999.	248078.	248078.	148.	143.	5.	0.	100.0	96.9
2000.	262399.	262399.	160.	155.	5.	0.	100.0	97.1
2001.	196146.	196146.	133.	128.	5.	0.	100.0	96.4

HS 7 Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1957.	196546.	196546.	126.	123.	3.	0.	100.0	97.6
1958.	327835.	327835.	177.	172.	5.	0.	100.0	97.3
1959.	343933.	343933.	176.	171.	4.	0.	100.0	97.5
1960.	314713.	314713.	169.	167.	3.	0.	100.0	98.4
1961.	278551.	278551.	167.	165.	3.	0.	100.0	98.3
1962.	297778.	297778.	159.	156.	3.	0.	100.0	98.3
1963.	238066.	238066.	155.	153.	2.	0.	100.0	98.8
1964.	228413.	228413.	148.	145.	2.	0.	100.0	98.4
1965.	199170.	199170.	143.	141.	2.	0.	100.0	98.6
1966.	247933.	247933.	157.	154.	3.	0.	100.0	98.2
1967.	302201.	302201.	178.	175.	3.	0.	100.0	98.1
1968.	279533.	279533.	152.	150.	3.	0.	100.0	98.2
1969.	277454.	277454.	155.	152.	3.	0.	100.0	98.1
1970.	249789.	249789.	149.	146.	3.	0.	100.0	98.1
1971.	265163.	265163.	164.	160.	4.	0.	100.0	97.5
1972.	430620.	430620.	217.	208.	8.	0.	100.0	96.1
1973.	335149.	335149.	181.	176.	4.	0.	100.0	97.5
1974.	337678.	337678.	175.	169.	6.	0.	100.0	96.7
1975.	313600.	313600.	162.	160.	2.	0.	100.0	98.8
1976.	242260.	242260.	160.	156.	3.	0.	100.0	98.0
1977.	297470.	297470.	176.	173.	3.	0.	100.0	98.2
1978.	250045.	250045.	142.	141.	2.	0.	100.0	98.8
1979.	321978.	321978.	167.	162.	5.	0.	100.0	97.0
1980.	233084.	233084.	148.	144.	4.	0.	100.0	97.4
1981.	297545.	297545.	169.	163.	5.	0.	100.0	97.0
1982.	302926.	302926.	166.	162.	4.	0.	100.0	97.6
1983.	382317.	382317.	195.	191.	4.	0.	100.0	98.2
1984.	301369.	301369.	164.	161.	2.	0.	100.0	98.5
1985.	275137.	275137.	163.	160.	3.	0.	100.0	98.0
1986.	285586.	285586.	153.	150.	2.	0.	100.0	98.4
1987.	295702.	295702.	151.	149.	2.	0.	100.0	98.6
1988.	252102.	252102.	151.	147.	4.	0.	100.0	97.6

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1989.	225551.	225551.	132.	129.	2.	0.	100.0	98.2
1991.	175732.	175732.	79.	77.	1.	0.	100.0	98.1
1992.	274032.	274032.	169.	167.	2.	0.	100.0	98.6
1993.	282172.	282172.	170.	166.	4.	0.	100.0	97.9
1994.	301467.	301467.	177.	173.	4.	0.	100.0	97.9
1995.	212318.	212318.	126.	124.	3.	0.	100.0	97.9
1996.	303292.	303292.	178.	174.	4.	0.	100.0	97.6
1997.	185596.	185596.	134.	132.	1.	0.	100.0	99.0
1998.	247190.	247190.	145.	142.	3.	0.	100.0	97.7
1999.	248078.	248078.	148.	145.	3.	0.	100.0	98.1
2000.	262399.	262399.	160.	157.	3.	0.	100.0	98.2
2001.	196146.	196146.	133.	130.	3.	0.	100.0	97.6
HS 8								
Year								
1957.	196546.	196546.	126.	124.	2.	0.	100.0	98.3
1958.	327835.	327835.	177.	174.	3.	0.	100.0	98.1
1959.	343933.	343933.	176.	172.	3.	0.	100.0	98.1
1960.	314713.	314713.	169.	167.	2.	0.	100.0	98.9
1961.	278551.	278551.	167.	165.	2.	0.	100.0	98.8
1962.	297778.	297778.	159.	157.	2.	0.	100.0	98.8
1963.	238066.	238066.	155.	154.	1.	0.	100.0	99.2
1964.	228413.	228413.	148.	146.	2.	0.	100.0	98.8
1965.	199170.	199170.	143.	141.	1.	0.	100.0	99.1
1966.	247933.	247933.	157.	155.	2.	0.	100.0	98.8
1967.	302201.	302201.	178.	176.	2.	0.	100.0	98.7
1968.	279533.	279533.	152.	150.	2.	0.	100.0	98.7
1969.	277454.	277454.	155.	153.	2.	0.	100.0	98.9
1970.	249789.	249789.	149.	147.	2.	0.	100.0	98.7
1971.	265163.	265163.	164.	162.	3.	0.	100.0	98.3
1972.	430620.	430620.	217.	210.	7.	0.	100.0	97.0
1973.	335149.	335149.	181.	178.	3.	0.	100.0	98.3
1974.	337678.	337678.	175.	171.	4.	0.	100.0	97.7
1975.	313600.	313600.	162.	161.	1.	0.	100.0	99.2
1976.	242260.	242260.	160.	157.	2.	0.	100.0	98.7
1977.	297470.	297470.	176.	174.	2.	0.	100.0	98.9
1978.	250045.	250045.	142.	141.	1.	0.	100.0	99.2
1979.	321978.	321978.	167.	163.	3.	0.	100.0	98.0
1980.	233084.	233084.	148.	146.	3.	0.	100.0	98.2
1981.	297545.	297545.	169.	165.	3.	0.	100.0	98.1
1982.	302926.	302926.	166.	163.	3.	0.	100.0	98.4
1983.	382317.	382317.	195.	193.	2.	0.	100.0	98.8
1984.	301369.	301369.	164.	162.	2.	0.	100.0	98.9
1985.	275137.	275137.	163.	161.	2.	0.	100.0	98.6
1986.	285586.	285586.	153.	151.	2.	0.	100.0	98.9
1987.	295702.	295702.	151.	150.	1.	0.	100.0	99.1
1988.	252102.	252102.	151.	148.	2.	0.	100.0	98.4
1989.	225551.	225551.	132.	130.	2.	0.	100.0	98.7
1991.	175732.	175732.	79.	78.	1.	0.	100.0	98.7
1992.	274032.	274032.	169.	168.	1.	0.	100.0	99.2

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.	282172.	282172.	170.	167.	3.	0.	100.0	98.5
1994.	301467.	301467.	177.	174.	3.	0.	100.0	98.5
1995.	212318.	212318.	126.	125.	2.	0.	100.0	98.7
1996.	303292.	303292.	178.	175.	3.	0.	100.0	98.4
1997.	185596.	185596.	134.	133.	1.	0.	100.0	99.3
1998.	247190.	247190.	145.	143.	2.	0.	100.0	98.4
1999.	248078.	248078.	148.	146.	2.	0.	100.0	98.7
2000.	262399.	262399.	160.	158.	2.	0.	100.0	98.8
2001.	196146.	196146.	133.	130.	2.	0.	100.0	98.3
1957.	196546.	196546.	126.	126.	1.	0.	100.0	99.3
1958.	327835.	327835.	177.	175.	2.	0.	100.0	99.1
1959.	343933.	343933.	176.	174.	1.	0.	100.0	99.2
1960.	314713.	314713.	169.	168.	1.	0.	100.0	99.6
1961.	278551.	278551.	167.	167.	1.	0.	100.0	99.5
1962.	297778.	297778.	159.	158.	1.	0.	100.0	99.5
1963.	238066.	238066.	155.	155.	0.	0.	100.0	99.7
1964.	228413.	228413.	148.	147.	1.	0.	100.0	99.5
1965.	199170.	199170.	143.	142.	0.	0.	100.0	99.7
1966.	247933.	247933.	157.	156.	1.	0.	100.0	99.5
1967.	302201.	302201.	178.	177.	1.	0.	100.0	99.4
1968.	279533.	279533.	152.	151.	1.	0.	100.0	99.5
1969.	277454.	277454.	155.	154.	1.	0.	100.0	99.5
1970.	249789.	249789.	149.	148.	1.	0.	100.0	99.4
1971.	265163.	265163.	164.	163.	1.	0.	100.0	99.3
1972.	430620.	430620.	217.	214.	3.	0.	100.0	98.7
1973.	335149.	335149.	181.	180.	1.	0.	100.0	99.3
1974.	337678.	337678.	175.	173.	2.	0.	100.0	98.9
1975.	313600.	313600.	162.	161.	0.	0.	100.0	99.7
1976.	242260.	242260.	160.	158.	1.	0.	100.0	99.4
1977.	297470.	297470.	176.	175.	1.	0.	100.0	99.5
1978.	250045.	250045.	142.	142.	0.	0.	100.0	99.7
1979.	321978.	321978.	167.	165.	2.	0.	100.0	99.0
1980.	233084.	233084.	148.	147.	1.	0.	100.0	99.2
1981.	297545.	297545.	169.	167.	2.	0.	100.0	99.1
1982.	302926.	302926.	166.	165.	1.	0.	100.0	99.3
1983.	382317.	382317.	195.	194.	1.	0.	100.0	99.5
1984.	301369.	301369.	164.	163.	1.	0.	100.0	99.5
1985.	275137.	275137.	163.	162.	1.	0.	100.0	99.4
1986.	285586.	285586.	153.	152.	1.	0.	100.0	99.6
1987.	295702.	295702.	151.	151.	0.	0.	100.0	99.7
1988.	252102.	252102.	151.	150.	1.	0.	100.0	99.4
1989.	225551.	225551.	132.	131.	1.	0.	100.0	99.4
1991.	175732.	175732.	79.	78.	0.	0.	100.0	99.5
1992.	274032.	274032.	169.	169.	1.	0.	100.0	99.7
1993.	282172.	282172.	170.	170.	1.	0.	100.0	99.4
1994.	301467.	301467.	177.	175.	1.	0.	100.0	99.4
1995.	212318.	212318.	126.	126.	1.	0.	100.0	99.5

Year	Flow Vol (ft3)	Flow Treated (ft3)	TSS In (lb)	TSS Rem (lb)	TSS Out (lb)	TSS Byp (lb)	Flow Treated (%)	TSS Removal (%)
1996.	303292.	303292.	178.	177.	1.	0.	100.0	99.3
1997.	185596.	185596.	134.	133.	0.	0.	100.0	99.7
1998.	247190.	247190.	145.	144.	1.	0.	100.0	99.3
1999.	248078.	248078.	148.	147.	1.	0.	100.0	99.5
2000.	262399.	262399.	160.	159.	1.	0.	100.0	99.5
2001.	196146.	196146.	133.	132.	1.	0.	100.0	99.2
HS 12								
Year								
1957.	196546.	196546.	126.	126.	0.	0.	100.0	99.7
1958.	327835.	327835.	177.	176.	1.	0.	100.0	99.6
1959.	343933.	343933.	176.	175.	1.	0.	100.0	99.5
1960.	314713.	314713.	169.	169.	0.	0.	100.0	99.8
1961.	278551.	278551.	167.	167.	0.	0.	100.0	99.7
1962.	297778.	297778.	159.	159.	0.	0.	100.0	99.8
1963.	238066.	238066.	155.	155.	0.	0.	100.0	99.9
1964.	228413.	228413.	148.	147.	0.	0.	100.0	99.8
1965.	199170.	199170.	143.	143.	0.	0.	100.0	99.9
1966.	247933.	247933.	157.	156.	0.	0.	100.0	99.7
1967.	302201.	302201.	178.	178.	0.	0.	100.0	99.7
1968.	279533.	279533.	152.	152.	0.	0.	100.0	99.7
1969.	277454.	277454.	155.	155.	0.	0.	100.0	99.7
1970.	249789.	249789.	149.	148.	0.	0.	100.0	99.7
1971.	265163.	265163.	164.	164.	0.	0.	100.0	99.7
1972.	430620.	430620.	217.	215.	2.	0.	100.0	99.3
1973.	335149.	335149.	181.	180.	1.	0.	100.0	99.7
1974.	337678.	337678.	175.	174.	1.	0.	100.0	99.4
1975.	313600.	313600.	162.	162.	0.	0.	100.0	99.9
1976.	242260.	242260.	160.	159.	0.	0.	100.0	99.7
1977.	297470.	297470.	176.	175.	0.	0.	100.0	99.7
1978.	250045.	250045.	142.	142.	0.	0.	100.0	99.9
1979.	321978.	321978.	167.	166.	1.	0.	100.0	99.5
1980.	233084.	233084.	148.	148.	1.	0.	100.0	99.6
1981.	297545.	297545.	169.	168.	1.	0.	100.0	99.5
1982.	302926.	302926.	166.	166.	0.	0.	100.0	99.7
1983.	382317.	382317.	195.	195.	0.	0.	100.0	99.8
1984.	301369.	301369.	164.	164.	0.	0.	100.0	99.8
1985.	275137.	275137.	163.	162.	0.	0.	100.0	99.7
1986.	285586.	285586.	153.	152.	0.	0.	100.0	99.8
1987.	295702.	295702.	151.	151.	0.	0.	100.0	99.9
1988.	252102.	252102.	151.	150.	0.	0.	100.0	99.7
1989.	225551.	225551.	132.	131.	0.	0.	100.0	99.7
1991.	175732.	175732.	79.	78.	0.	0.	100.0	99.8
1992.	274032.	274032.	169.	169.	0.	0.	100.0	99.9
1993.	282172.	282172.	170.	169.	0.	0.	100.0	99.7
1994.	301467.	301467.	177.	176.	0.	0.	100.0	99.7
1995.	212318.	212318.	126.	126.	0.	0.	100.0	99.7
1996.	303292.	303292.	178.	177.	1.	0.	100.0	99.7
1997.	185596.	185596.	134.	134.	0.	0.	100.0	99.9
1998.	247190.	247190.	145.	145.	0.	0.	100.0	99.7

1999.	248078.	248078.	148.	147.	0.	0.	100.0	99.8
2000.	262399.	262399.	160.	159.	0.	0.	100.0	99.8
2001.	196146.	196146.	133.	132.	1.	0.	100.0	99.5

* Summary of Quantity and Quality Results at *
 * Location 200 INFlow in cfs. *
 * Values are instantaneous at indicated time step *

ZP Battery DevCo, LLC
 Leicester - DMH#100

Mo/Da/Year	Date	Time	Flow	Total	Su
-----	-----	-----	cfs	mg/l	-----
			0.002	101.	
			0.009	69.	
			0.631	294.	
			0.000	0.	
			1101030.	6960.	
			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... January 19, 2023 *
 * Time... 9:32:14.527 *
 * Ending Date... January 19, 2023 *
 * Time... 9:32:20.236 *
 * Elapsed Time... 0.095 minutes. *
 * Elapsed Time... 5.709 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

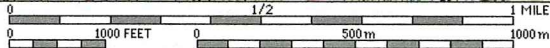
1. Access drives to the site shall be swept on an annual basis with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
2. Trash and other debris shall be removed from the drives periodically as needed. Full inspection of the 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.

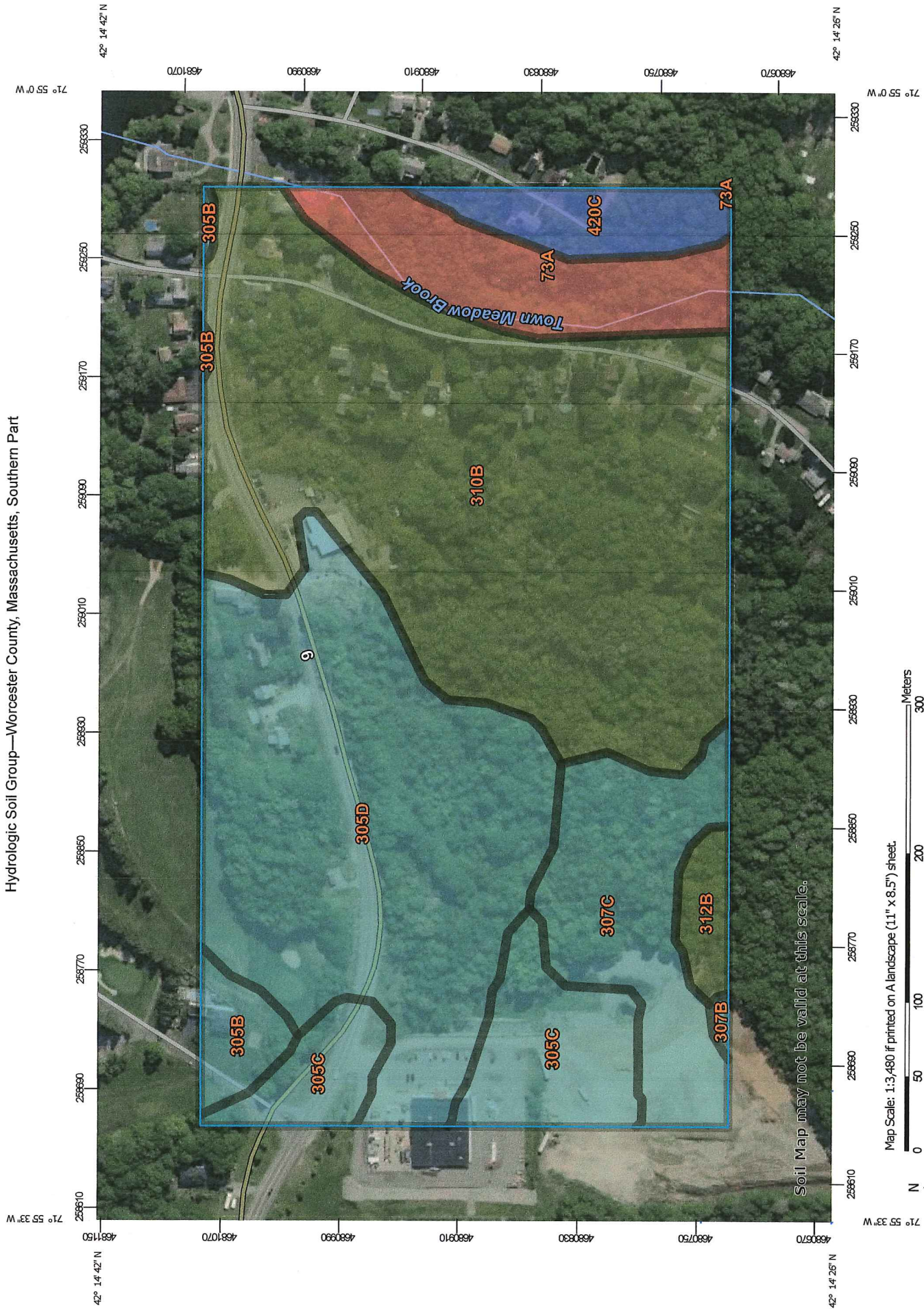
FIGURE 1
LOCUS MAP AND SOILS MAP



MN
16° TN



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.



Natural Resources Conservation Service

Web Soil Survey National Cooperative Soil Survey

MAP LEGEND

 Area of Interest (AOI)	 C
Soils	 C/D
Soil Rating Polygons	 D
 A	 Not rated or not available
 A/D	Water Features
 B	 Streams and Canals
 B/D	Transportation
 C	 Rails
 C/D	 Interstate Highways
 D	 US Routes
 Not rated or not available	 Major Roads
Soil Rating Lines	 Local Roads
 A	Background
 A/D	 Aerial Photography
 B	
 B/D	
 C	
 C/D	
 D	
 Not rated or not available	
Soil Rating Points	
 A	
 A/D	
 B	
 B/D	

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

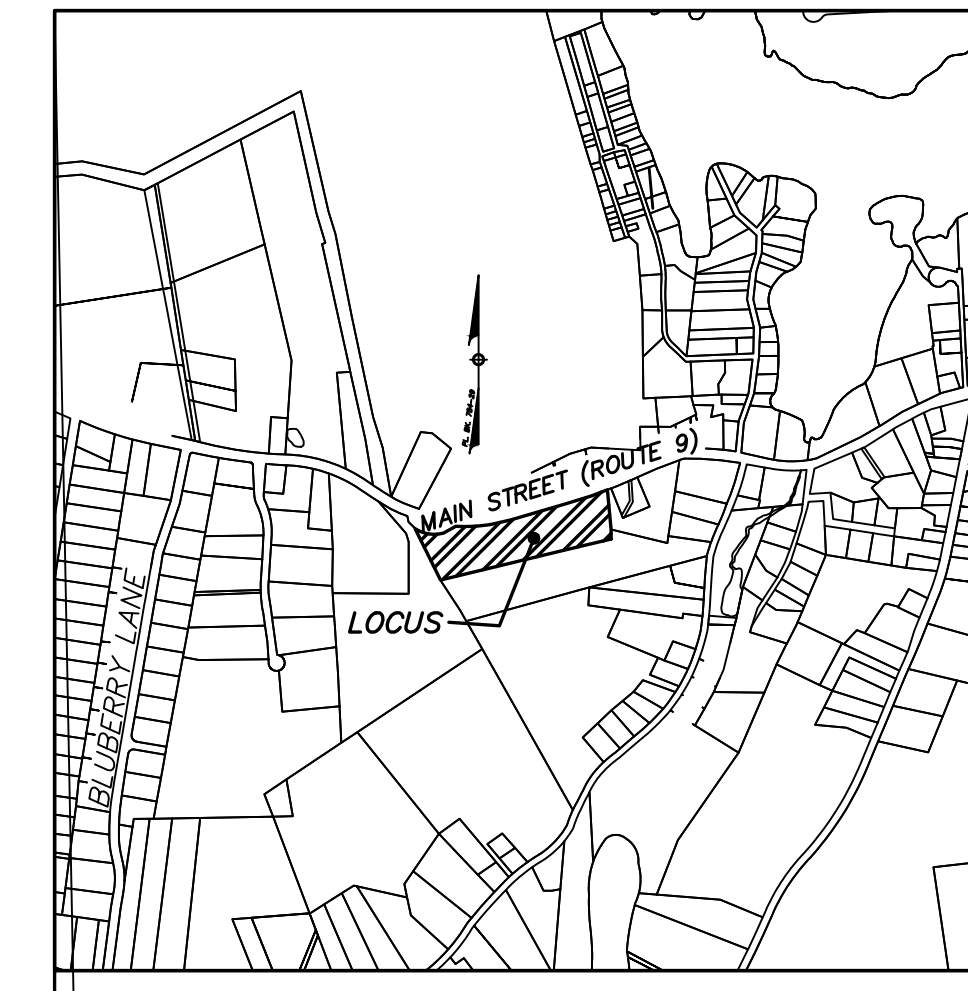
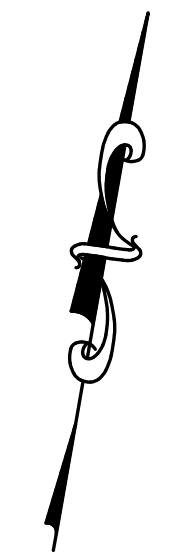
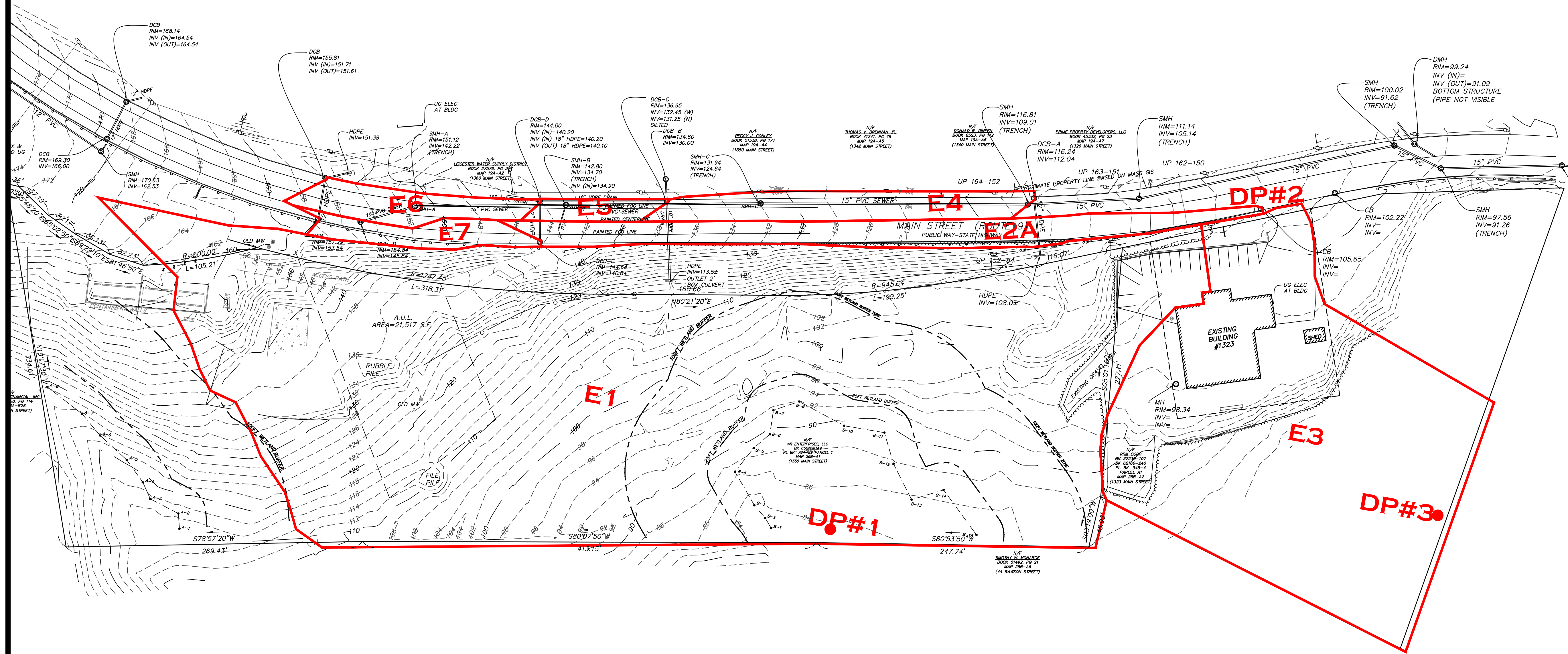
FIGURE 2
PRE-DEVELOPMENT WATERSHED MAP

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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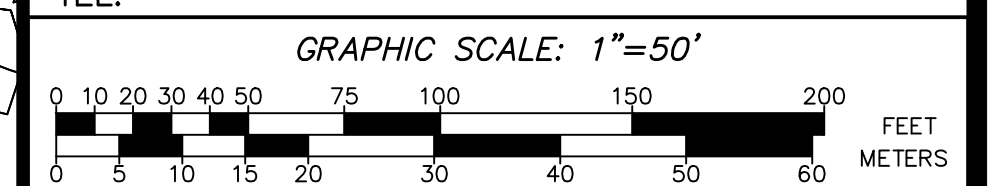
APPLICANT:
 ZP BATTERY DEVCO, LLC
 BRENDAN GOVE
 10 E. WORCESTER STREET, SUIT 3A
 WORCESTER, MASSACHUSETTS 01604
OWNER:
 WR ENTERPRISES, LLC
 1323 MAIN STREET
 LEICESTER, MASSACHUSETTS 01524

HANNIGAN ENGINEERING, INC.
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 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

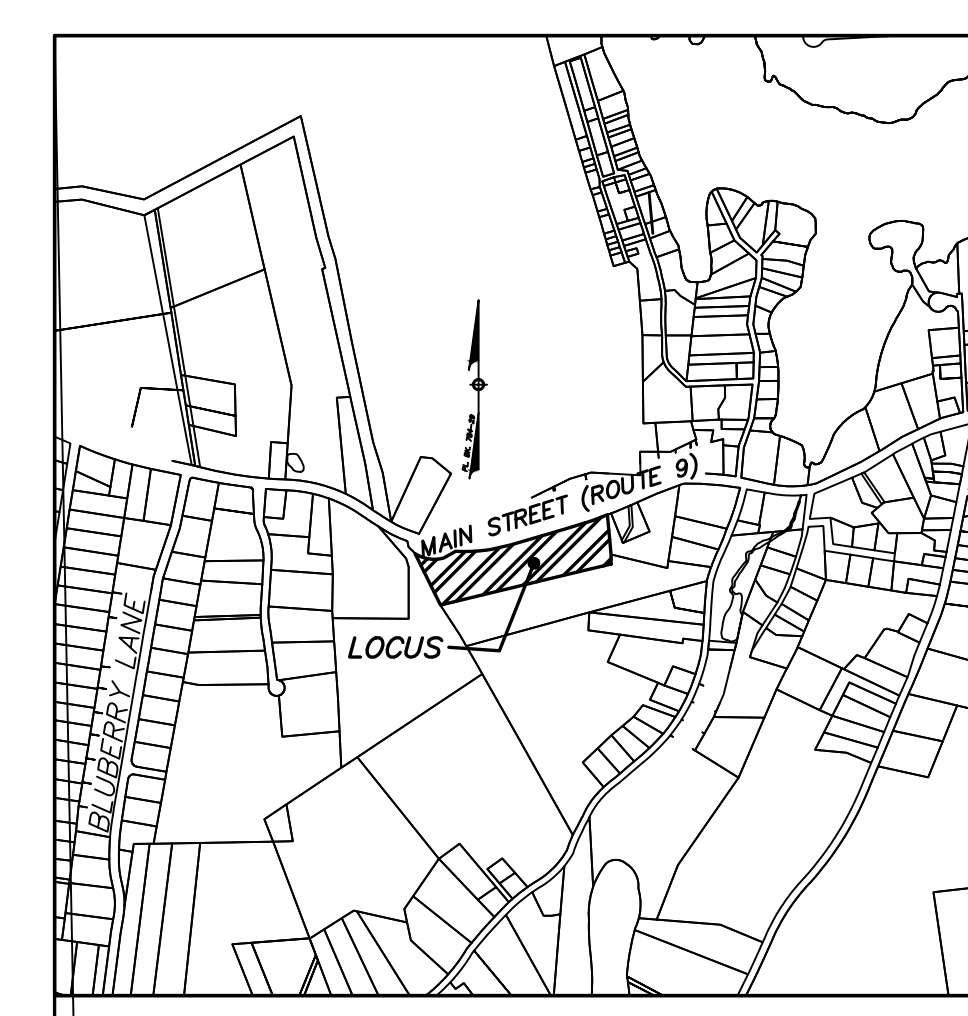
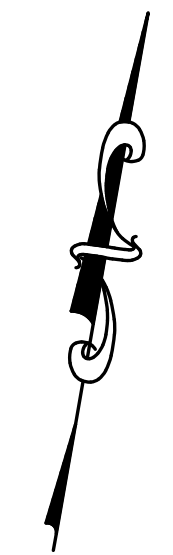
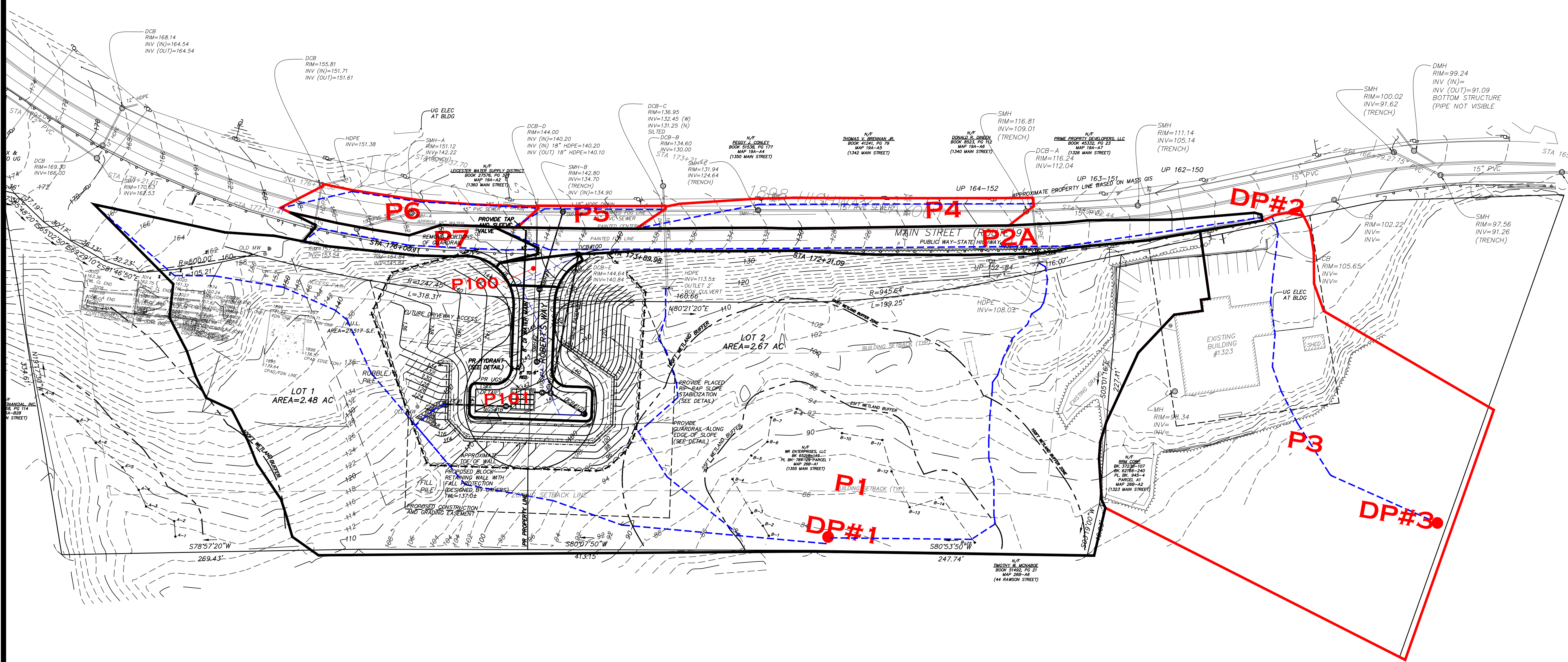
FIGURE 3
POST-DEVELOPMENT WATERSHED MAP

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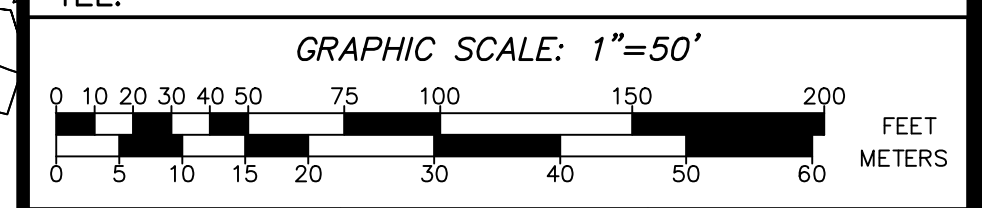
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PROPOSED WATERSHED IN LEICESTER, MASSACHUSETTS

PREPARED FOR:
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CALC: CMA	DRWN: CMA	SCALE: 1"=50'
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TAB: WS	SHEET 1 OF 2	PLAN NO: C-17-38

LOCUS PLAN SCALE: 1"=1000'