STORMWATER MANAGEMENT REPORT

For

490 ELIZABETH AVE

BLOCK 514, LOT 34

Located in

TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NEW JERSEY

Prepared by

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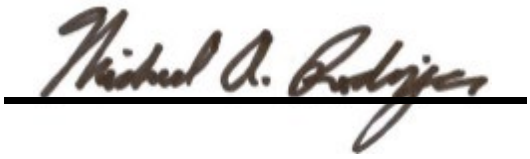

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HLE #19201
JULY 23, 2020

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A. Introduction

1. Purpose of Report

The purpose of this report is to present the hydrologic criteria and methods used for the stormwater management design for this project. The criteria and methods used in this report are in accordance with the most current Township of Franklin ordinance, New Jersey Department of Environmental Protection (NJDEP) Rules and Regulations, Delaware and Raritan Canal Commission (DRCC) Rules and Regulations, and Standards for Soil Erosion and Sediment Control (SESC) in New Jersey.

2. Project Location

The subject property is approximately 5.50 acres and is known as Block 514, Lot 34 as shown on the tax maps of the Township of Franklin. This project site is bounded by Elizabeth Avenue to the east, Franklin High School property to the south, a residential property to the north and vacant wooded property to the east. A tributary to the Raritan River is located at the northwesterly corner of the site. A USGS map delineating the site location can be found in section 3 of this report.

3. Hydrologic Methodologies

Technical Release No. 55 (TR55) was used to calculate the present and developed runoff from the project site. Hydrographs have been generated for the 2-, 10-, and 100-year storm events. The hydrographs were developed using the New Jersey Region C rainfall distribution and regional rainfall data for Somerset County.

The following parameters were utilized for stormwater management:

1. Reduce the developed peak rate of runoff to 50% of the present peak rate of runoff for the 2-year storm for the area of disturbance

2. Reduce the developed peak rate of runoff to 75% of the present peak rate of runoff for the 10-year storm for the area of disturbance

3. Reduce the developed peak rate of runoff to 80% of the present peak rate of runoff for the 100-year storm for the area of disturbance

4. Provide 80% TSS removal for the proposed development per the BMP Manual

B. Present Land Use and Drainage Patterns

1. Land Use

Presently, the site contains a residential house with an associated parking area near Elizabeth Avenue but is mostly wooded and undeveloped on the remainder of the property

2. Drainage Patterns / Topography and Soils

The site generally drains from south to north contributing runoff toward the tributary to the Raritan River. Portions of the off-site properties located to the south of the site also contribute runoff to this tributary. Additionally, existing inlets along the property frontage (along Elizabeth Avenue) collect runoff from a portion of the site contributing to same tributary to the north. The Soil Survey report, which is found in Section 3 of this report, shows that the existing soils are of hydrologic soil group C on the entire site and contributing off-site drainage area.

A subsurface investigation was performed by Whitestone Associates, Inc. (Whitestone) to evaluate the Seasonal High Groundwater levels and infiltration rates of the site soils. Please refer to the report entitled "Limited Geotechnical Investigation & Stormwater Management Area Evaluation" prepared by Whitestone Associates, Inc. dated March 16, 2020. This report concludes that from test pit data performed within the proposed detention basin area, the elevation of the seasonal high water table ranges between elevations 70.5 and 71.0. Additionally, the infiltration rates were determined to be less than 0.2 inches per hour. This information has been prepared in accordance with Appendix "E" of the NJ BMP Manual.

3. Present Drainage Areas

The present drainage areas are shown on a map entitled "Present Drainage Area Map" found in Section 3 of this report. The contributing drainage area to the tributary (Analysis Point) consists of both on-site and off-site mostly wooded land. These drainage areas are limited to the area of proposed disturbance on-site and all contributing off-site drainage to this area. Hydrographs have been calculated for these areas. Please see the calculations found in Section 2A of this report.

Using the data generated by the hydrologic calculations and applying the runoff reductions mentioned above, the following table has been prepared to summarize the Target Peak Flow for the proposed stormwater management design. The following table reduces the peak runoff from the on-site contributing drainage area and adds the contributing off-site peak flow rate to obtain the Target Peak Flow.

TABLE 1. TARGET FLOW CALCULATION					
STORM	EX. PEAK FLOW FROM ON-SITE AREA (CFS)	REDUCTION	REDUCED EX. PEAK FLOW FROM ON-SITE AREA (CFS)	EX PEAK FLOW FROM OFF-SITE AREA (CFS)	AP#1 TARGET PEAK FLOW (CFS)
	A	B	C=A*B	D	E=C+D
2-YR	2.84	50%	1.42	2.81	4.23
10-YR	6.47	75%	4.85	6.19	11.04
100-YR	14.41	80%	11.53	13.45	24.98

Please see Section 2A of this report for the Present Runoff calculations used in the Table above

C. Developed Land Use and Drainage Patterns

1. Land Use

The project proposes to construct a warehouse facility with associated loading docks, car parking, driveways, stormwater management facilities, utilities, landscaping and lighting.

2. Developed Drainage Areas

Once developed, the project will convey the runoff to a combination underground and above-ground detention basin with a single outfall which discharges directly to the tributary. The proposed detention system has been designed to attenuate the required peak flows from the 2-, 10-, and 100-year storm events. The hydrologic calculations can be found in Section 2A of this report.

The following table summarizes the calculations for the developed peak runoff flow rates and compares them to the target peak flow rates from Table 1 above:

Summary of Calculations for Present Runoff and Developed Runoff at the Analysis Point

TABLE 2. TARGET FLOW VS. DEVELOPED FLOW RATES		
STORM	TARGET FLOW (CFS) FROM TABLE 1	DEVELOPED FLOW (CFS)
2-YR	3.43	3.09
10-YR	9.24	8.49
100-YR	21.16	21.14

3. Water Quality

For the proposed development, the Water Quality requirement (minimum runoff treatment to 80% TSS removal from a storm consisting of 1.25-in. of rainfall over 2 hours, or WQ storm event). This requirement is satisfied through the combination of a manufactured treatment devices (ADS BaySaver Barracuda providing 50% TSS Removal) and an extended detention basin (providing 60% TSS Removal).

The runoff from the WQ storm event, especially from the proposed on-site pavements which require treatment, will be conveyed through the extended detention basin (24hours extended detention for 60% TSS removal) and then to the manufactured treatment device (50% TSS removal). For water quality calculations (including routing of the water quality storm through the extended detention basin) please see Section 2B of this report.

4. Storm Sewer

The storm system was designed to accept the 25-year peak runoff. Runoff coefficients of 0.51 for hydrologic soil group 'C' open space and 0.99 for impervious areas were used in the Rational Method calculations. A minimum time of concentration of 10 minutes was used. Local rainfall data provided by the National Oceanic and Atmospheric Administration (NOAA) was utilized to determine the average rainfall intensity. A Manning's "n" value of 0.013 was used for reinforced concrete pipe (RCP) and 0.012 was used for HDPE pipe.

Stormwater pipe conveyance calculations have been provided in Section 2 of this report.

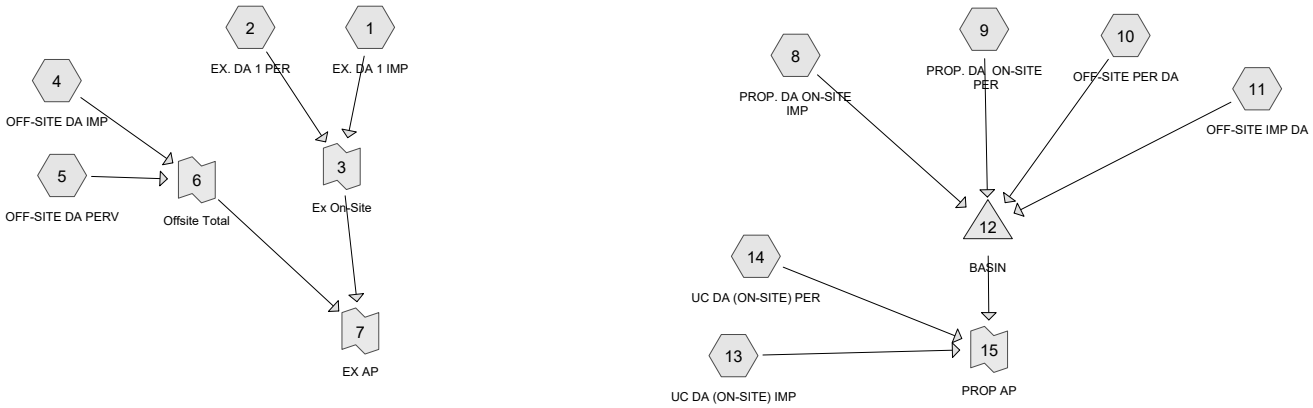
5. Groundwater Recharge

As demonstrated in the above referenced Whitestone report, all test results of permeability rates are below 1 inch per hour throughout the site. However, the recharge BMP options require a design permeability rate of 0.5 inches per hour with a factor of safety of 2 which would require the tested rate to be at least 1 inch per hour or greater. The guidelines for Groundwater Recharge in Chapter 6 of the BMP Manual state "a groundwater recharge waiver may be sought from the applicable reviewing agencies if suitable permeability rates cannot be found at any recharge BMP locations on the development site". Therefore, a waiver is requested from the Groundwater Recharge requirement.

D. Conclusion

The stormwater management design provided will adhere to the most current Township of Franklin development standards, NJDEP Best Management Practices, Delaware and Raritan Canal Commission (DRCC) Rules and Regulations, and the Standards for Soil Erosion and Sediment Control (SESC) in New Jersey. The proposed stormwater management system will provide adequate water quality treatment and runoff flow attenuation. The proposed stormwater management facilities will safely convey all developed runoff from the site and will not have an adverse impact on downstream areas.

SECTION 2A



Subcat Reach Pond Link

Routing Diagram for Drainage Analysis

Prepared by {enter your company name here}, Printed 7/23/2020

Summary for Subcatchment 1: EX. DA 1 IMP

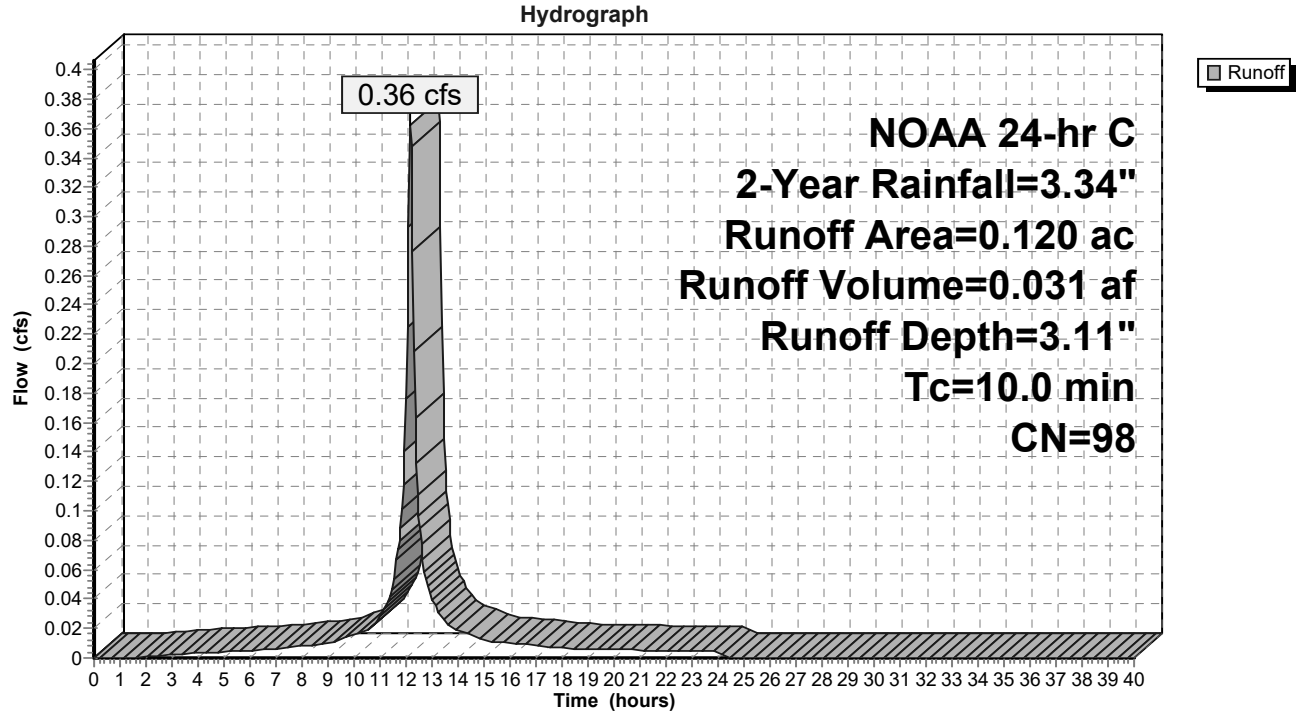
Runoff = 0.36 cfs @ 12.17 hrs, Volume= 0.031 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG C
0.120		100.00% Impervious Area

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

Subcatchment 1: EX. DA 1 IMP



Summary for Subcatchment 2: EX. DA 1 PER

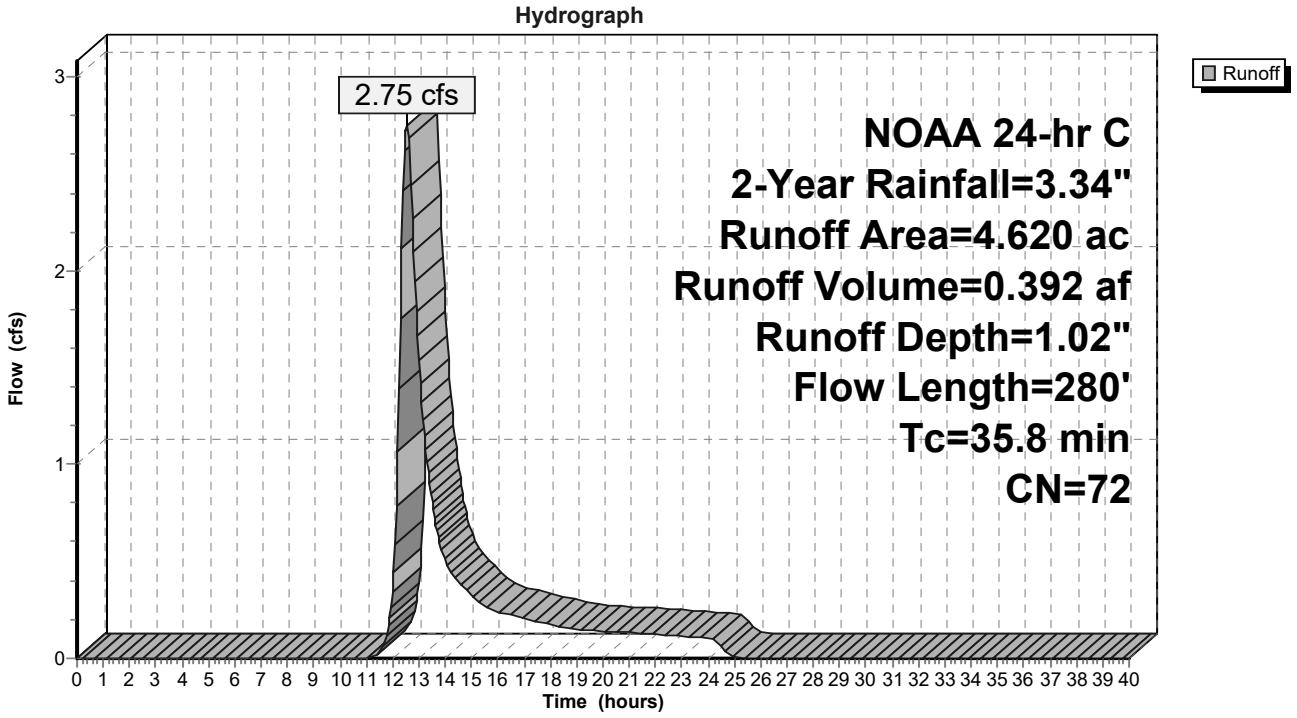
Runoff = 2.75 cfs @ 12.54 hrs, Volume= 0.392 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

Area (ac)	CN	Description
4.620	72	Woods/grass comb., Good, HSG C
4.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.3	150	0.0142	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.34"
2.5	130	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.8	280	Total			

Subcatchment 2: EX. DA 1 PER

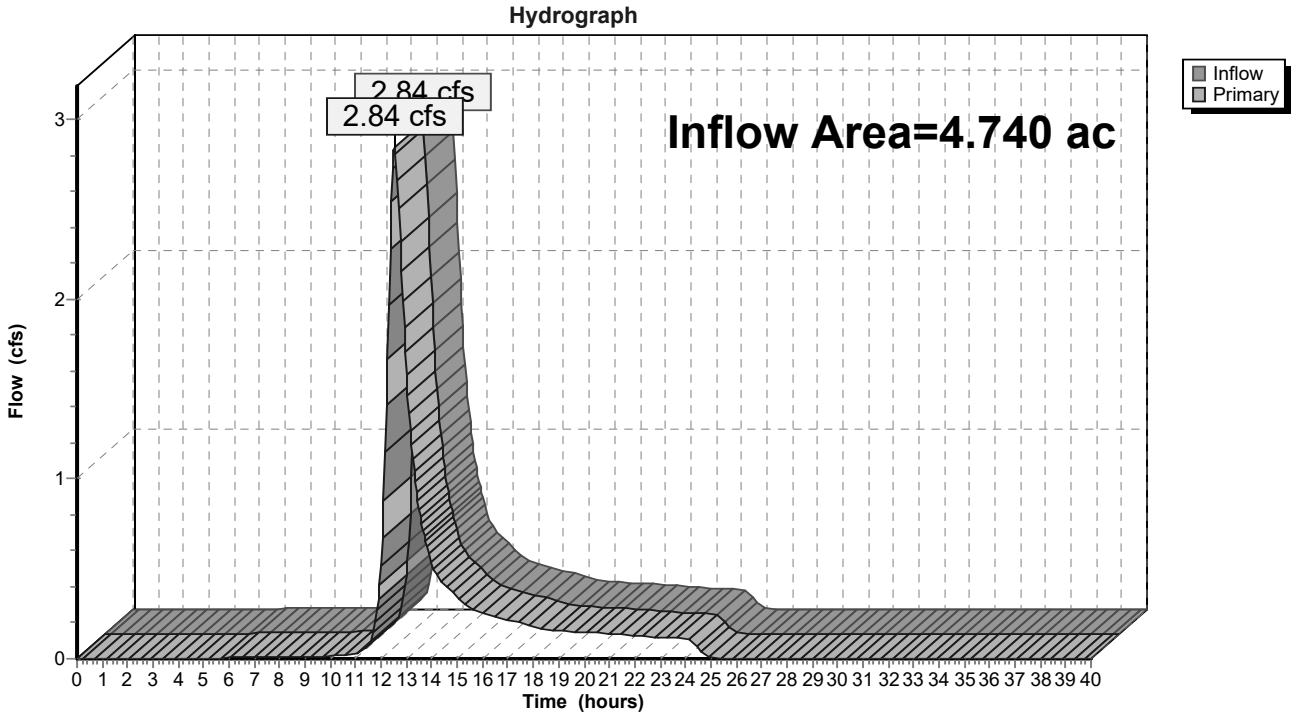


Summary for Link 3: Ex On-Site

Inflow Area = 4.740 ac, 2.53% Impervious, Inflow Depth = 1.07" for 2-Year event
Inflow = 2.84 cfs @ 12.54 hrs, Volume= 0.423 af
Primary = 2.84 cfs @ 12.54 hrs, Volume= 0.423 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3: Ex On-Site



Summary for Subcatchment 4: OFF-SITE DA IMP

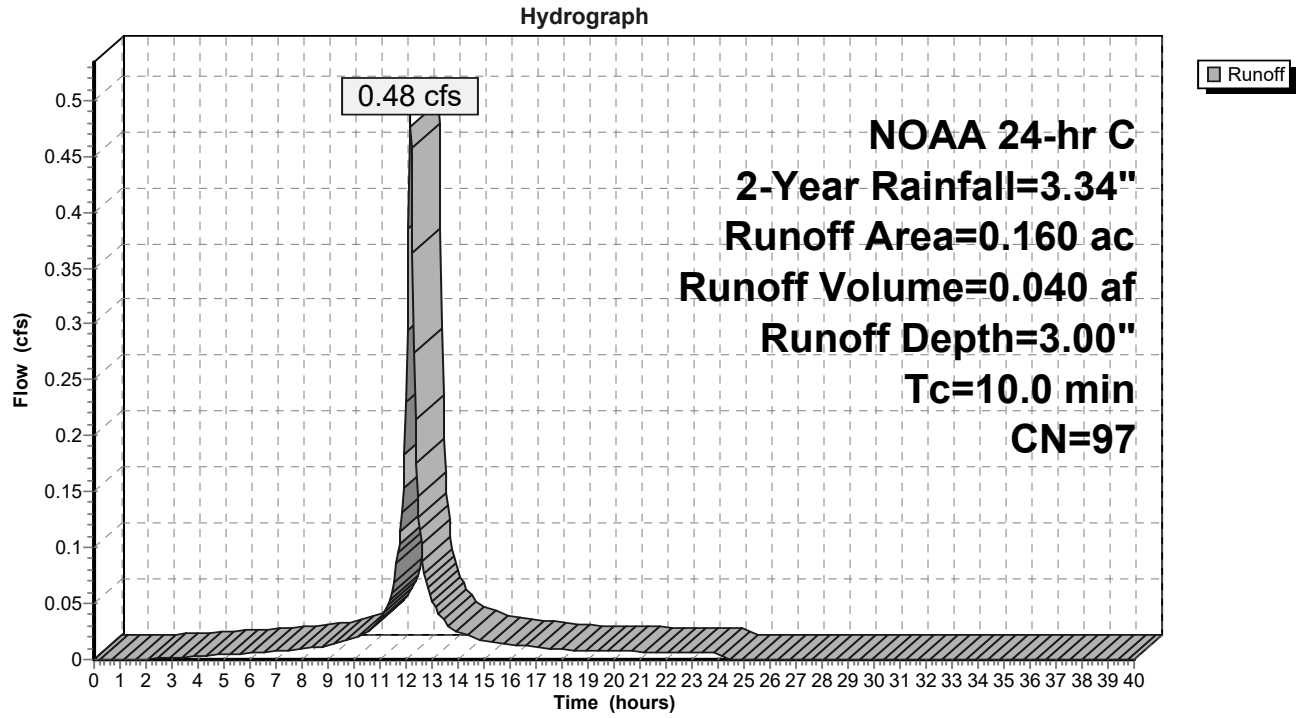
Runoff = 0.48 cfs @ 12.17 hrs, Volume= 0.040 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
*	0.040	98	Impervious
*	0.120	96	Gravel
	0.160	97	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 4: OFF-SITE DA IMP



Summary for Subcatchment 5: OFF-SITE DA PERV

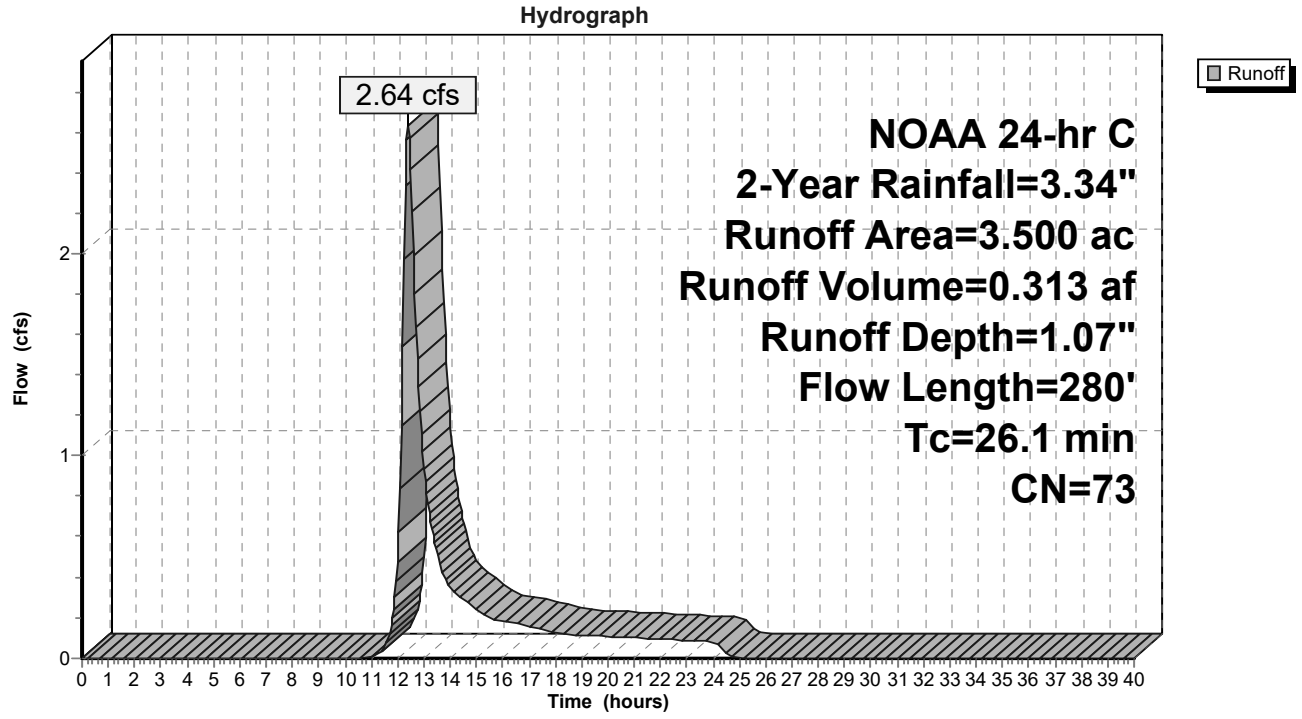
Runoff = 2.64 cfs @ 12.40 hrs, Volume= 0.313 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	150	0.0130	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
3.1	130	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.1	280	Total			

Subcatchment 5: OFF-SITE DA PERV

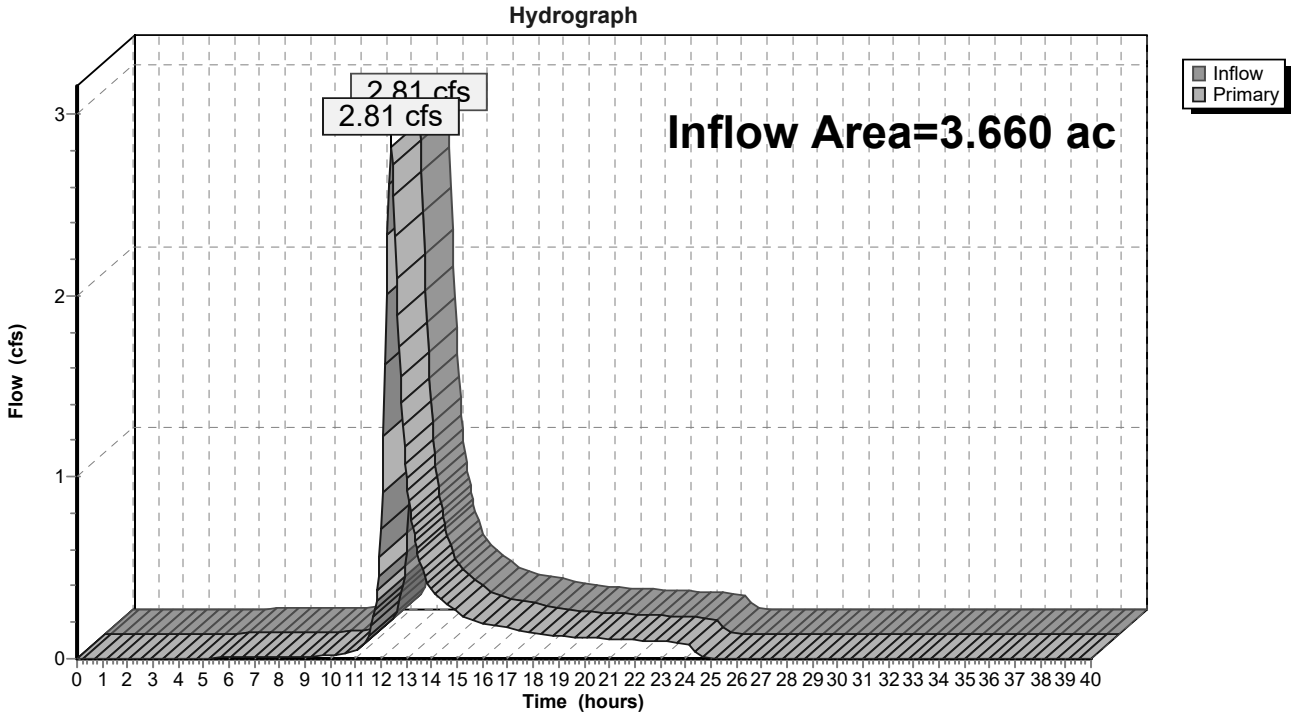


Summary for Link 6: Offsite Total

Inflow Area = 3.660 ac, 1.09% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 2.81 cfs @ 12.39 hrs, Volume= 0.353 af
Primary = 2.81 cfs @ 12.39 hrs, Volume= 0.353 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 6: Offsite Total

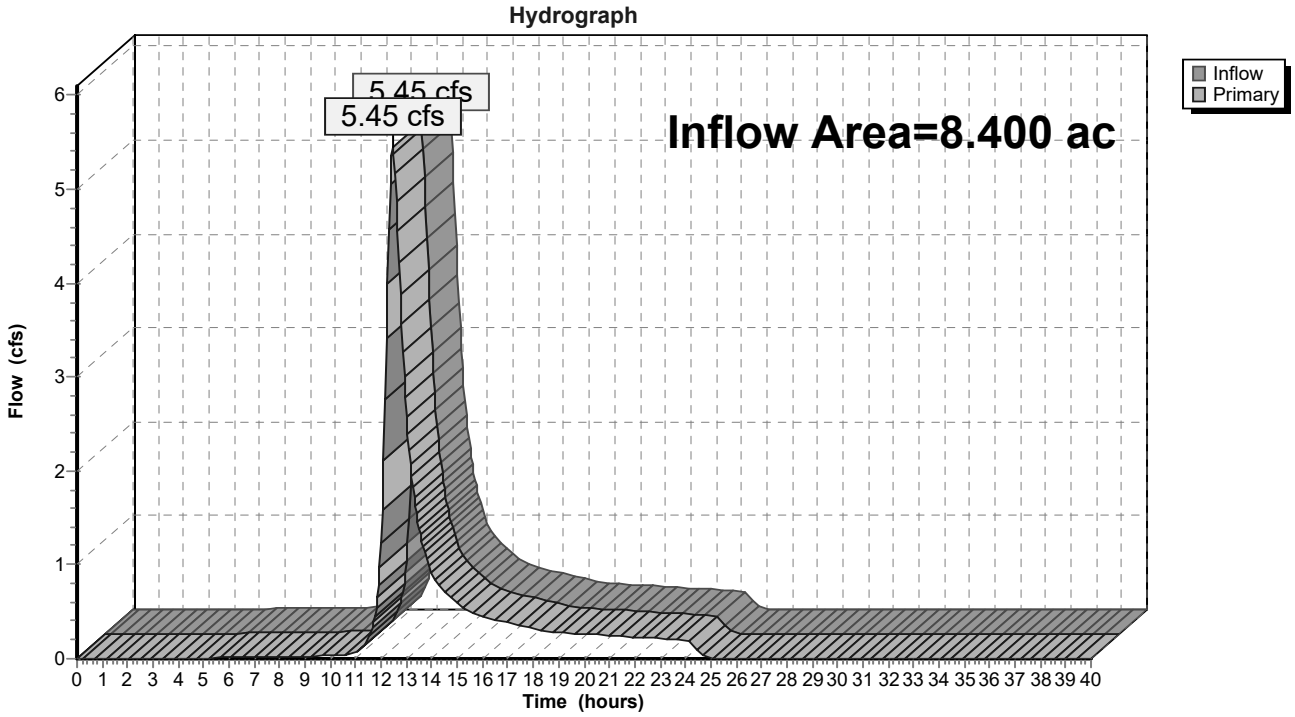


Summary for Link 7: EX AP

Inflow Area = 8.400 ac, 1.90% Impervious, Inflow Depth = 1.11" for 2-Year event
Inflow = 5.45 cfs @ 12.45 hrs, Volume= 0.776 af
Primary = 5.45 cfs @ 12.45 hrs, Volume= 0.776 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 7: EX AP



Summary for Subcatchment 8: PROP. DA ON-SITE IMP

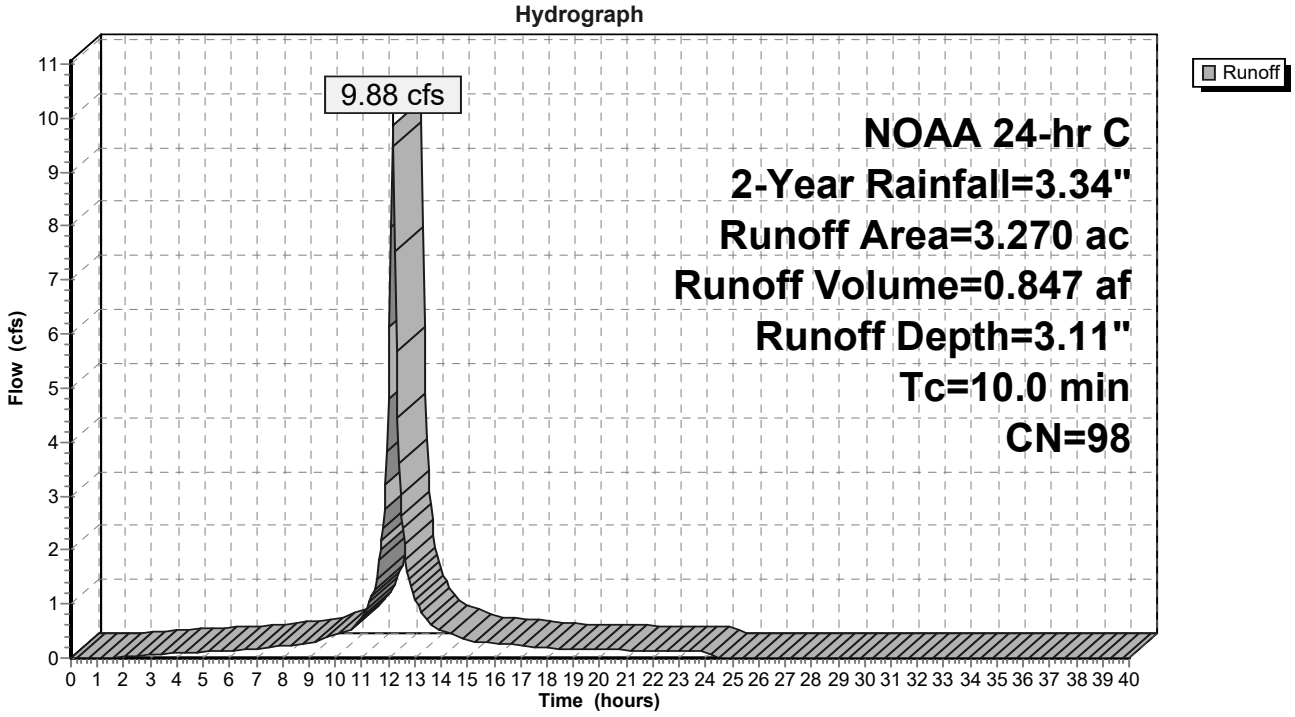
Runoff = 9.88 cfs @ 12.17 hrs, Volume= 0.847 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
*	3.130	98	Impervious
*	0.140	98	1/2 Basin Impervious
	3.270	98	Weighted Average
	3.270		100.00% Impervious Area

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

Subcatchment 8: PROP. DA ON-SITE IMP



Summary for Subcatchment 9: PROP. DA ON-SITE PER

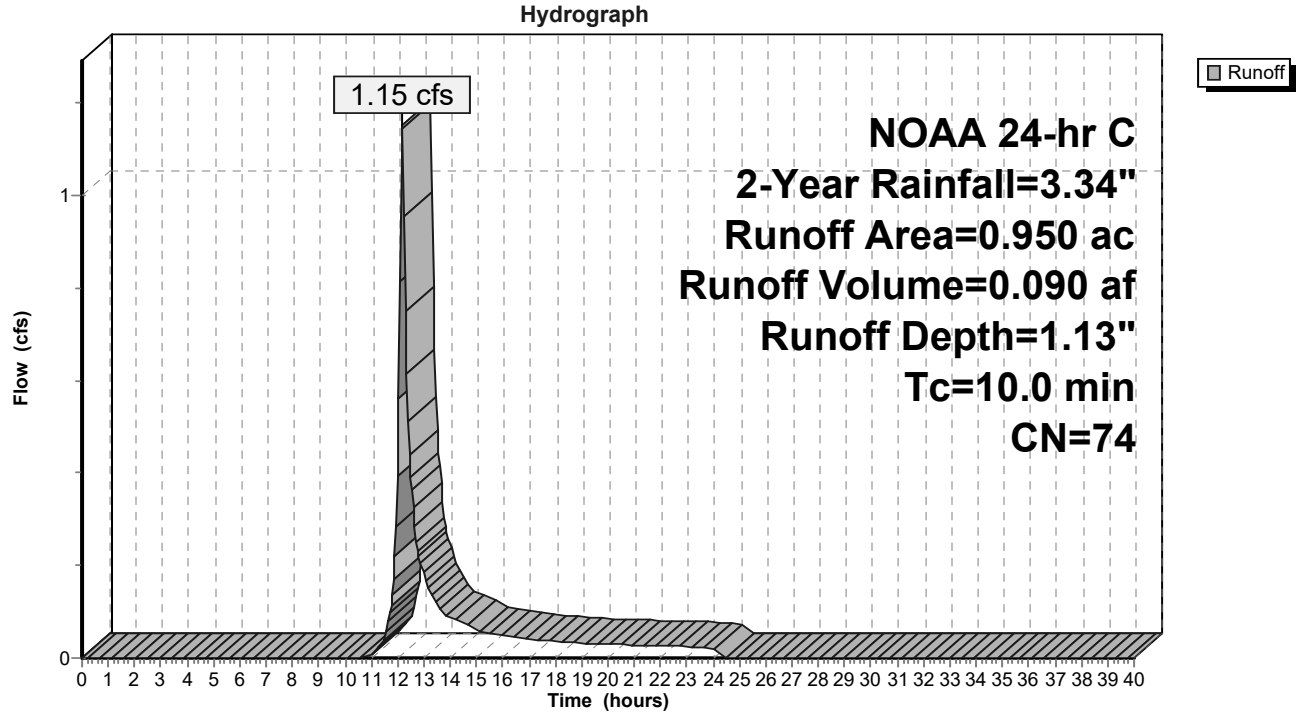
Runoff = 1.15 cfs @ 12.18 hrs, Volume= 0.090 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
	0.810	74	>75% Grass cover, Good, HSG C
*	0.140	74	1/2 Basin Pervious
	0.950	74	Weighted Average
	0.950		100.00% Pervious Area

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

Subcatchment 9: PROP. DA ON-SITE PER



Summary for Subcatchment 10: OFF-SITE PER DA

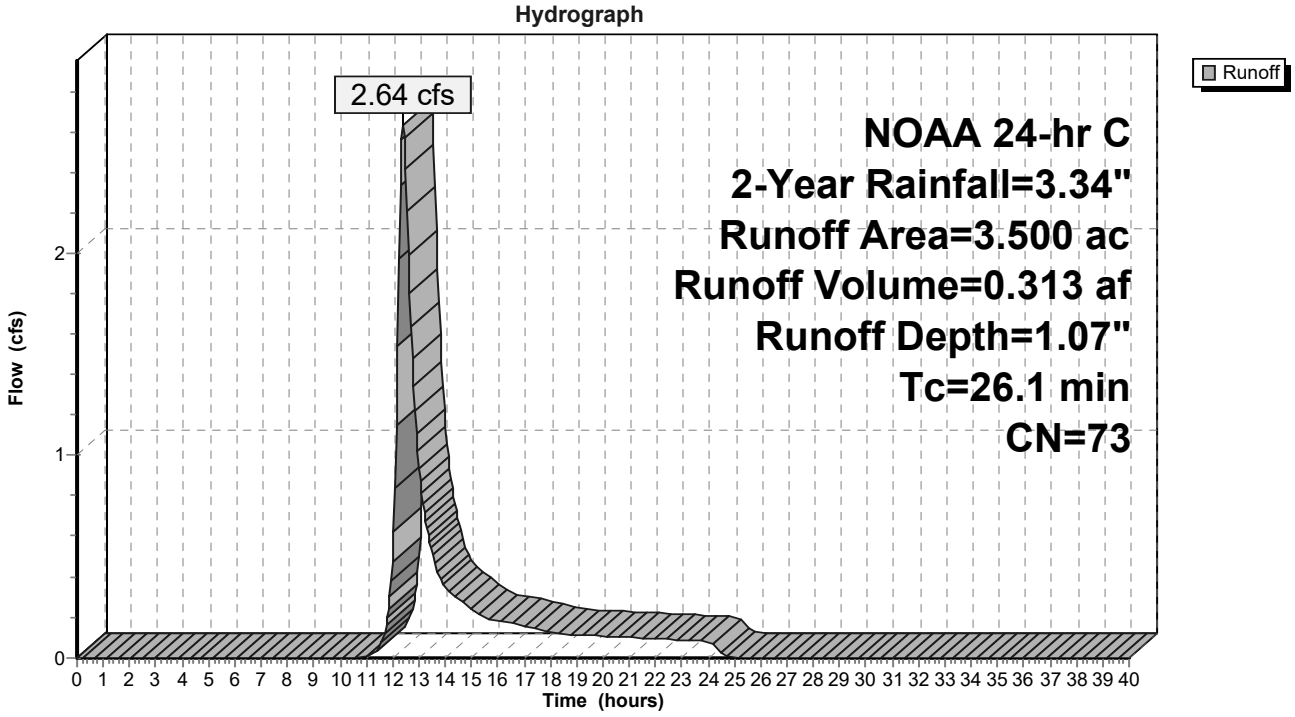
Runoff = 2.64 cfs @ 12.40 hrs, Volume= 0.313 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

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

Subcatchment 10: OFF-SITE PER DA



Summary for Subcatchment 11: OFF-SITE IMP DA

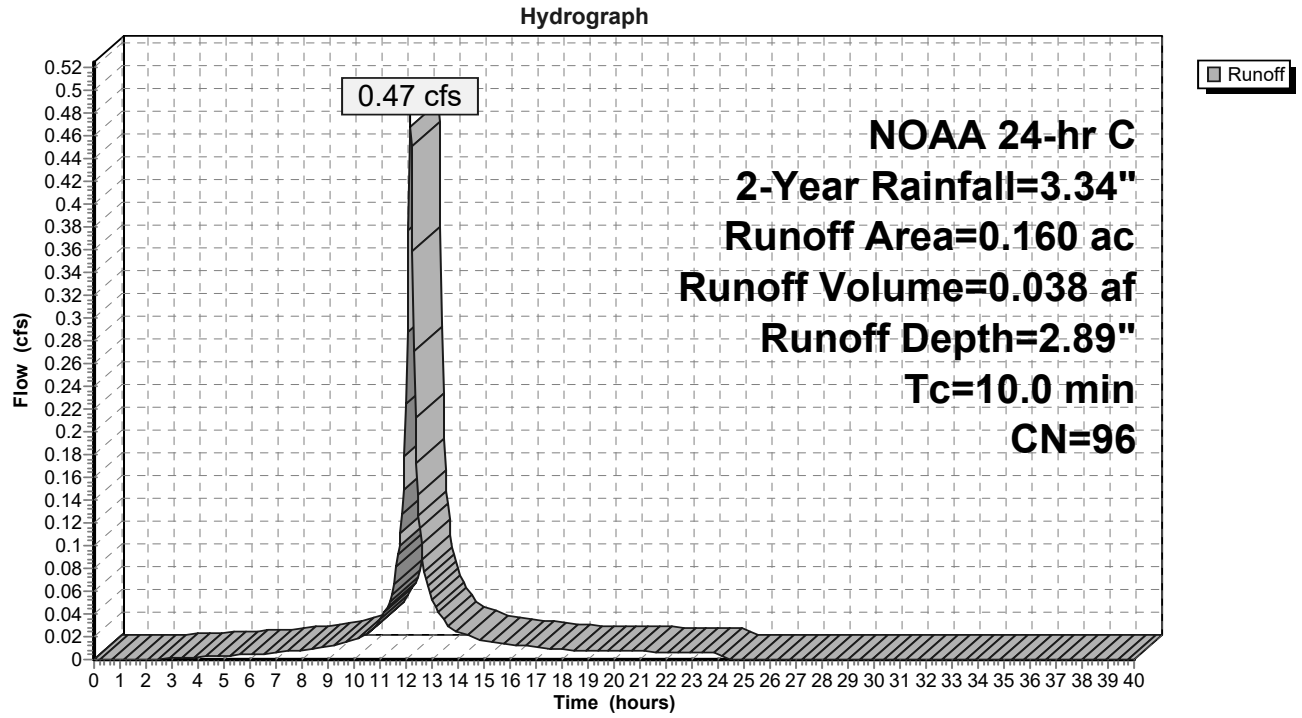
Runoff = 0.47 cfs @ 12.17 hrs, Volume= 0.038 af, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
*	0.120	96	Gravel
*	0.040	98	Impervious
	0.160	96	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 11: OFF-SITE IMP DA



Summary for Pond 12: BASIN

Inflow Area = 7.880 ac, 42.01% Impervious, Inflow Depth = 1.96" for 2-Year event
Inflow = 12.79 cfs @ 12.18 hrs, Volume= 1.288 af
Outflow = 2.96 cfs @ 12.81 hrs, Volume= 1.173 af, Atten= 77%, Lag= 37.9 min
Primary = 2.96 cfs @ 12.81 hrs, Volume= 1.173 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Starting Elev= 71.50' Surf.Area= 16,148 sf Storage= 3,106 cf
Peak Elev= 73.11' @ 12.81 hrs Surf.Area= 25,958 sf Storage= 30,353 cf (27,246 cf above start)

Plug-Flow detention time= 411.0 min calculated for 1.100 af (85% of inflow)
Center-of-Mass det. time= 311.1 min (1,109.6 - 798.6)

Volume	Invert	Avail.Storage	Storage Description
#1	71.50'	58,069 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2A	71.25'	5,593 cf	**14.83'W x 530.08'L x 2.33'H Field A** 18,347 cf Overall - 4,364 cf Embedded = 13,983 cf x 40.0% Voids
#3A	71.75'	4,364 cf	**ADS_StormTech SC-310 +Cap** x 296 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 296 Chambers in 4 Rows
#4B	70.80'	11,595 cf	**22.75'W x 364.20'L x 5.50'H Field B** 45,571 cf Overall - 16,582 cf Embedded = 28,988 cf x 40.0% Voids
#5B	71.55'	16,582 cf	**ADS_StormTech MC-3500 d +Cap** x 150 Inside #4 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 150 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		96,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

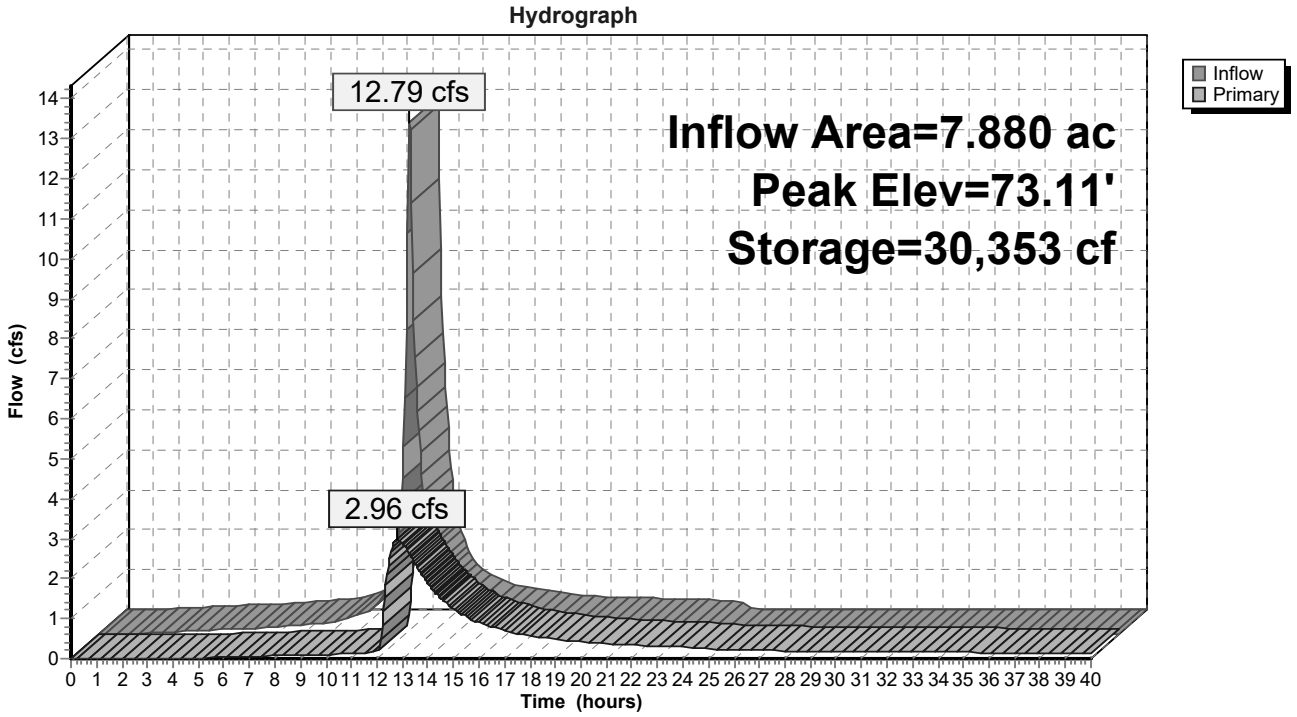
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	0	0	0
72.00	3,730	933	933
73.00	9,663	6,697	7,629
74.00	11,006	10,335	17,964
75.00	12,411	11,709	29,672
76.00	14,395	13,403	43,075
77.00	15,593	14,994	58,069

Device	Routing	Invert	Outlet Devices
#1	Primary	70.36'	**30.0" Round RCP_Round 30"** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 70.36' / 70.20' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	71.50'	**3.0" Vert. Orifice** C= 0.600
#3	Device 1	72.40'	**1.4' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.96 cfs @ 12.81 hrs HW=73.11' TW=0.00' (Dynamic Tailwater)
↑**1=RCP_Round 30"** (Passes 2.96 cfs of 22.70 cfs potential flow)
↑**2=Orifice** (Orifice Controls 0.29 cfs @ 5.87 fps)
3=Broad-Crested Rectangular Weir (Weir Controls 2.67 cfs @ 2.69 fps)

Pond 12: BASIN



Summary for Subcatchment 13: UC DA (ON-SITE) IMP

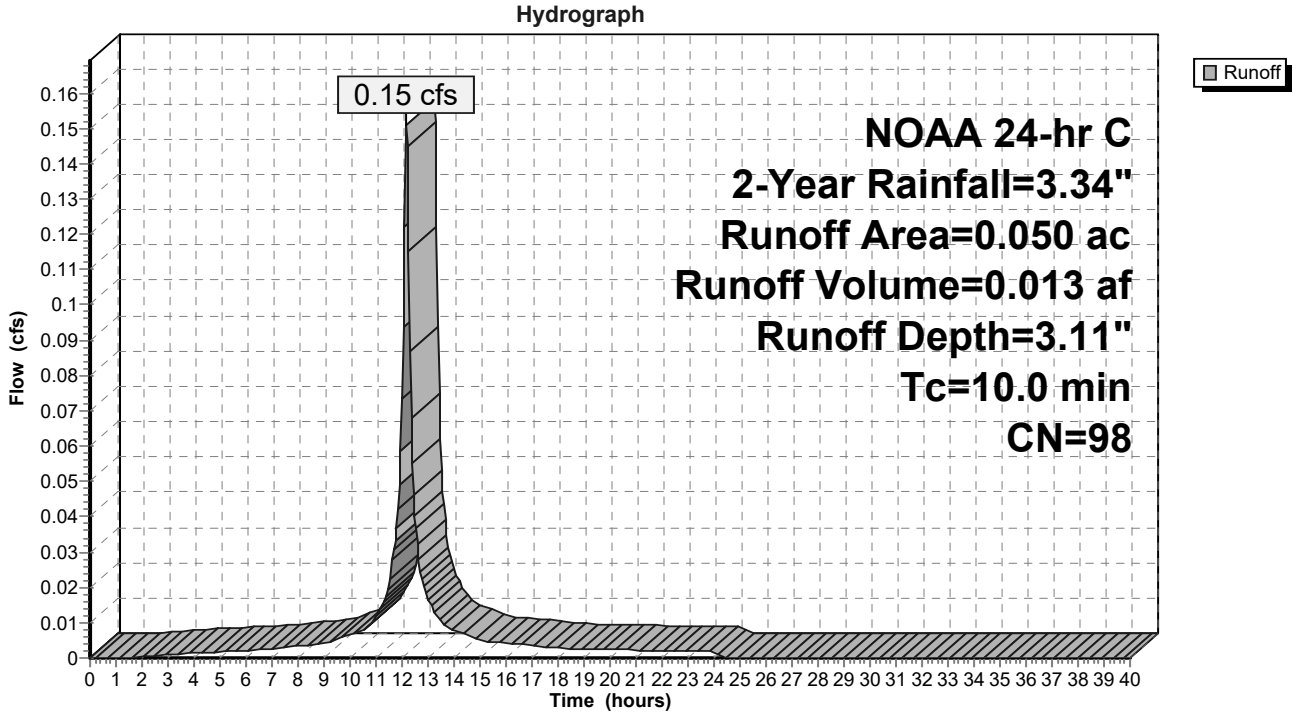
Runoff = 0.15 cfs @ 12.17 hrs, Volume= 0.013 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

	Area (ac)	CN	Description
*	0.050	98	Impervious
	0.050		100.00% Impervious Area

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

Subcatchment 13: UC DA (ON-SITE) IMP



Summary for Subcatchment 14: UC DA (ON-SITE) PER

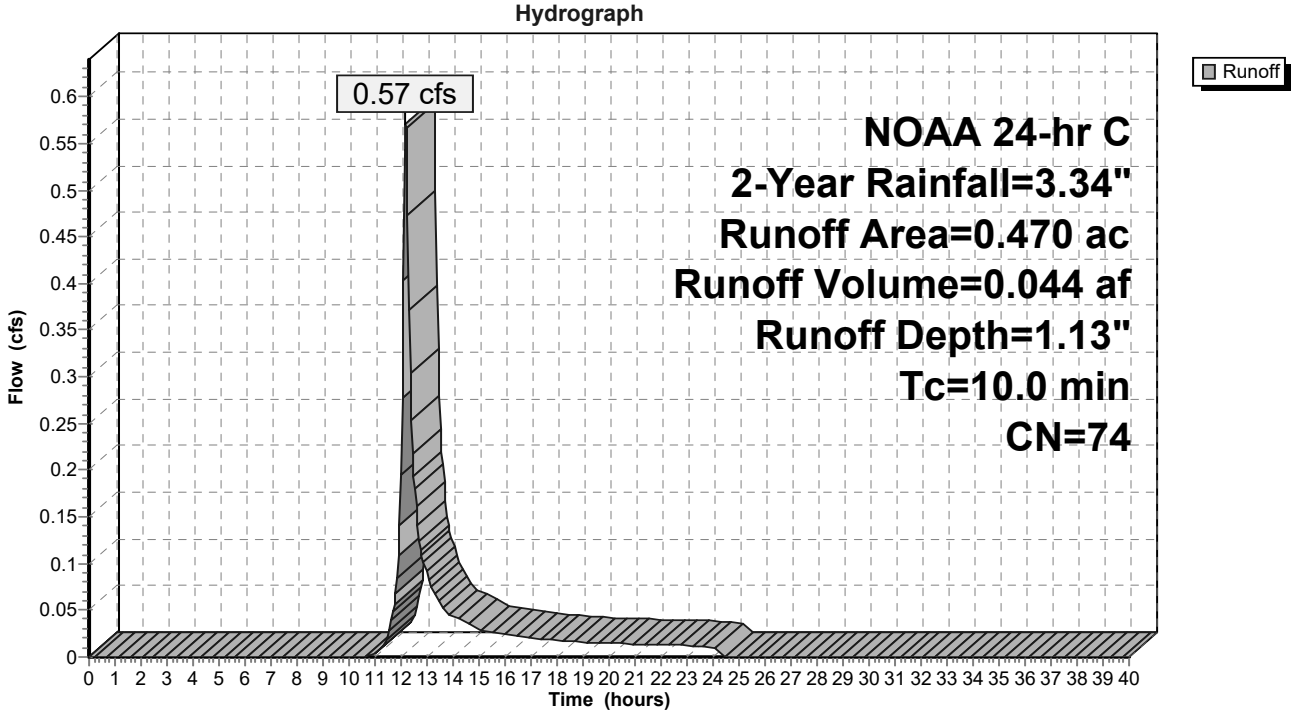
Runoff = 0.57 cfs @ 12.18 hrs, Volume= 0.044 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.34"

Area (ac)	CN	Description
0.470	74	>75% Grass cover, Good, HSG C
0.470		100.00% Pervious Area

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

Subcatchment 14: UC DA (ON-SITE) PER

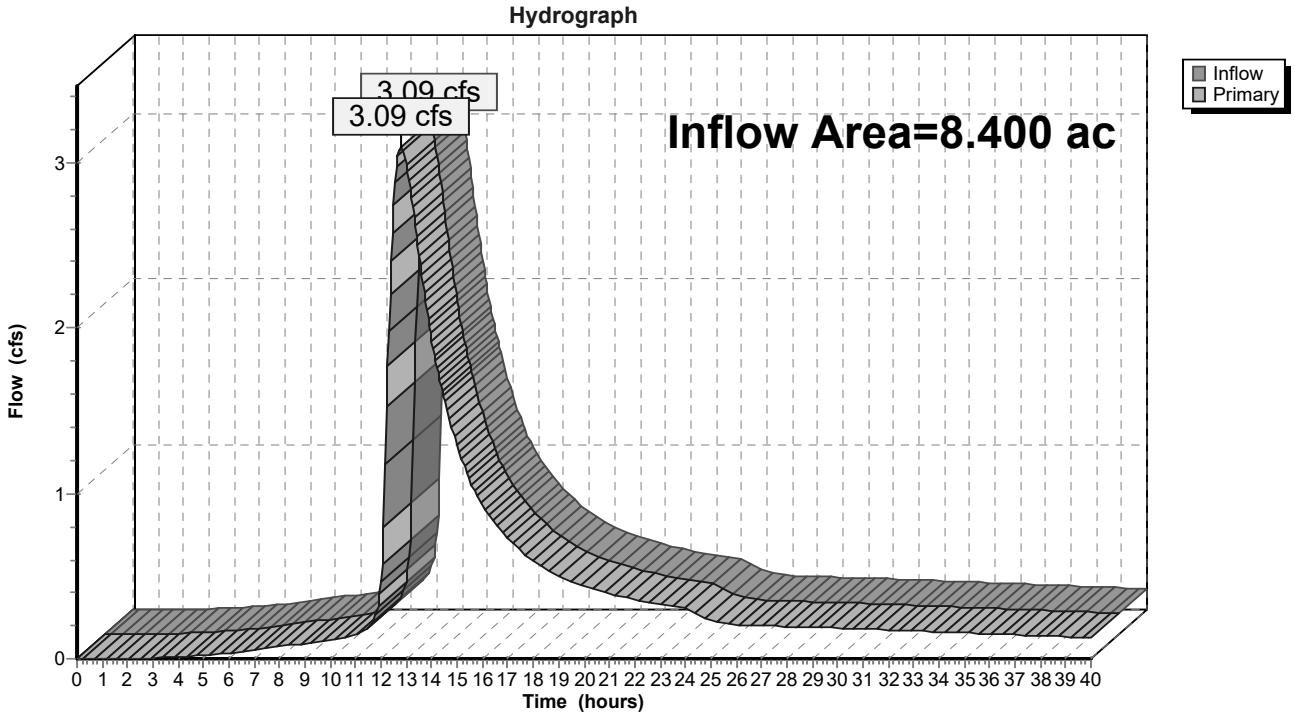


Summary for Link 15: PROP AP

Inflow Area = 8.400 ac, 40.00% Impervious, Inflow Depth > 1.76" for 2-Year event
Inflow = 3.09 cfs @ 12.78 hrs, Volume= 1.230 af
Primary = 3.09 cfs @ 12.78 hrs, Volume= 1.230 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 15: PROP AP



Summary for Subcatchment 1: EX. DA 1 IMP

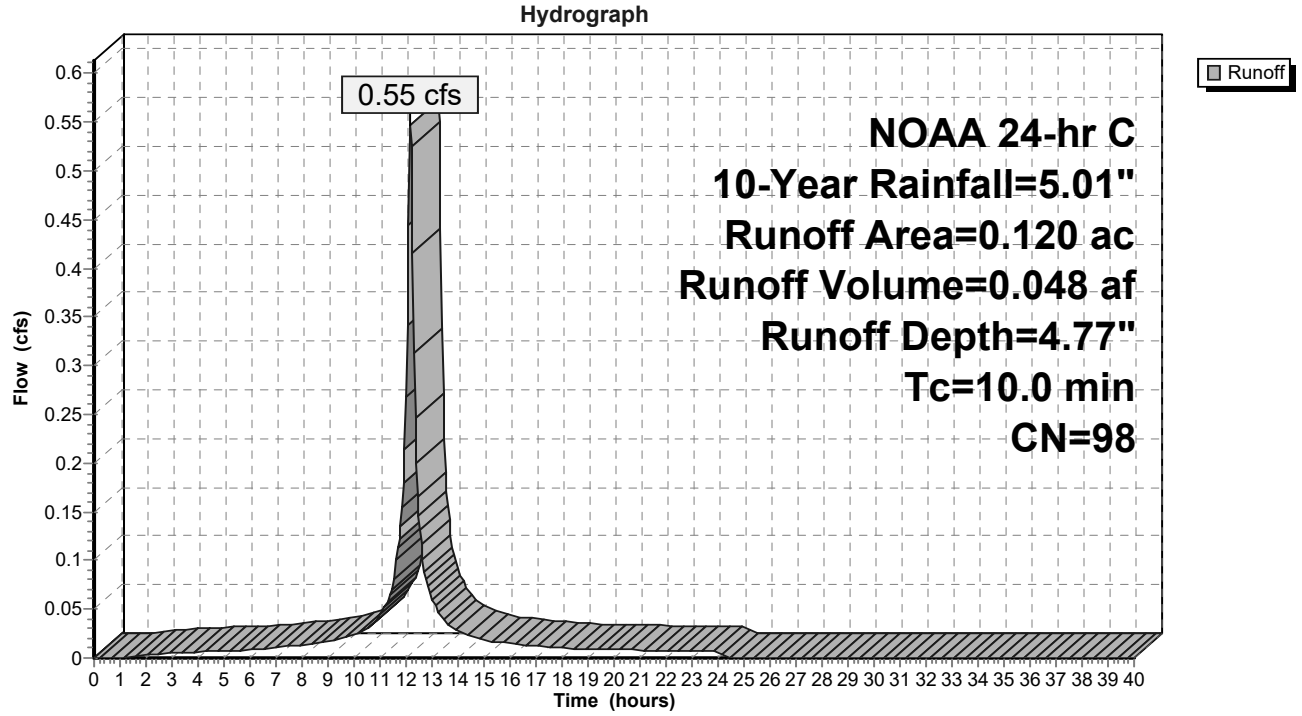
Runoff = 0.55 cfs @ 12.17 hrs, Volume= 0.048 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG C
0.120		100.00% Impervious Area

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

Subcatchment 1: EX. DA 1 IMP



Summary for Subcatchment 2: EX. DA 1 PER

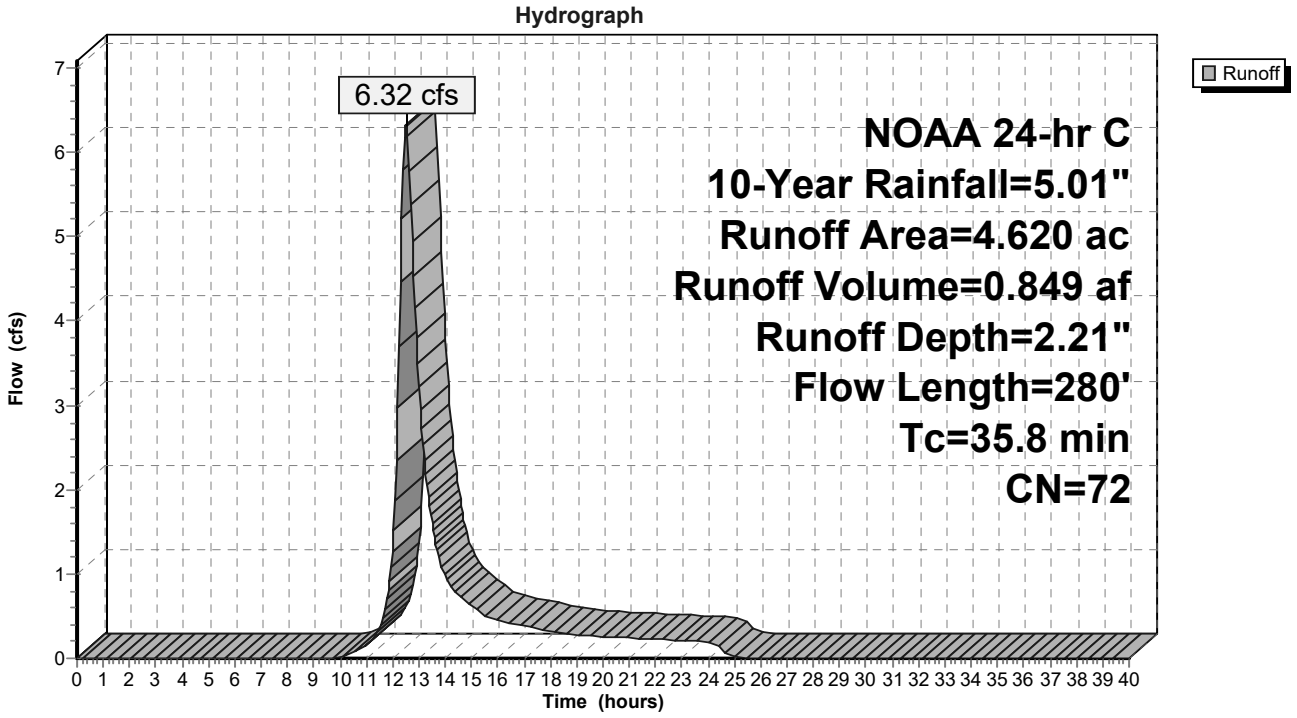
Runoff = 6.32 cfs @ 12.52 hrs, Volume= 0.849 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
4.620	72	Woods/grass comb., Good, HSG C
4.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.3	150	0.0142	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.34"
2.5	130	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.8	280	Total			

Subcatchment 2: EX. DA 1 PER

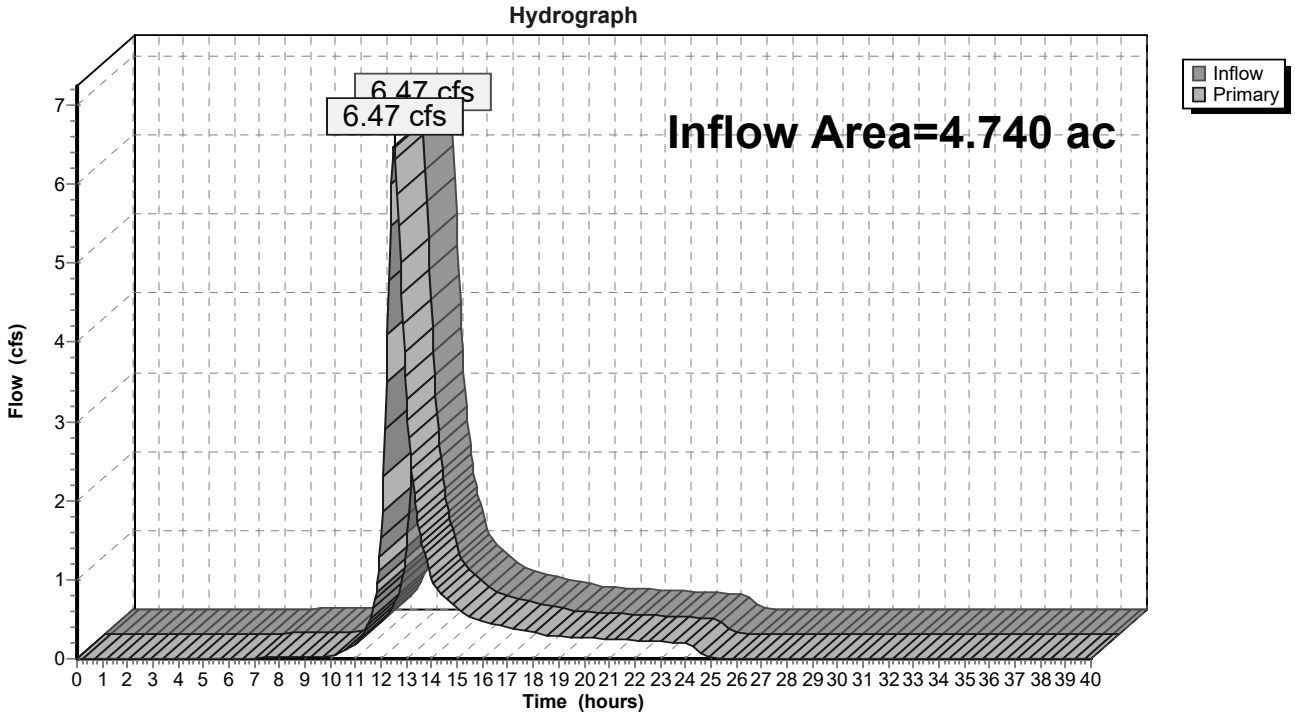


Summary for Link 3: Ex On-Site

Inflow Area = 4.740 ac, 2.53% Impervious, Inflow Depth = 2.27" for 10-Year event
Inflow = 6.47 cfs @ 12.51 hrs, Volume= 0.897 af
Primary = 6.47 cfs @ 12.51 hrs, Volume= 0.897 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3: Ex On-Site



Summary for Subcatchment 4: OFF-SITE DA IMP

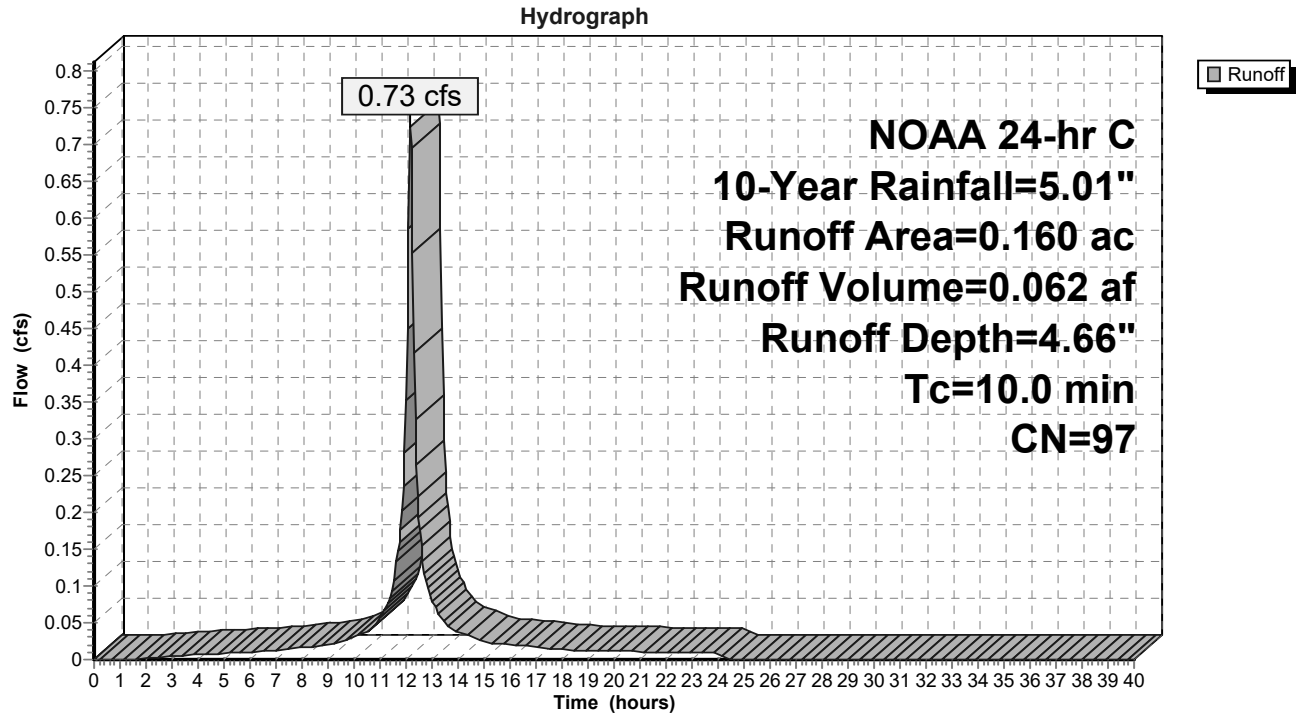
Runoff = 0.73 cfs @ 12.17 hrs, Volume= 0.062 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

	Area (ac)	CN	Description
*	0.040	98	Impervious
*	0.120	96	Gravel
	0.160	97	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 4: OFF-SITE DA IMP



Summary for Subcatchment 5: OFF-SITE DA PERV

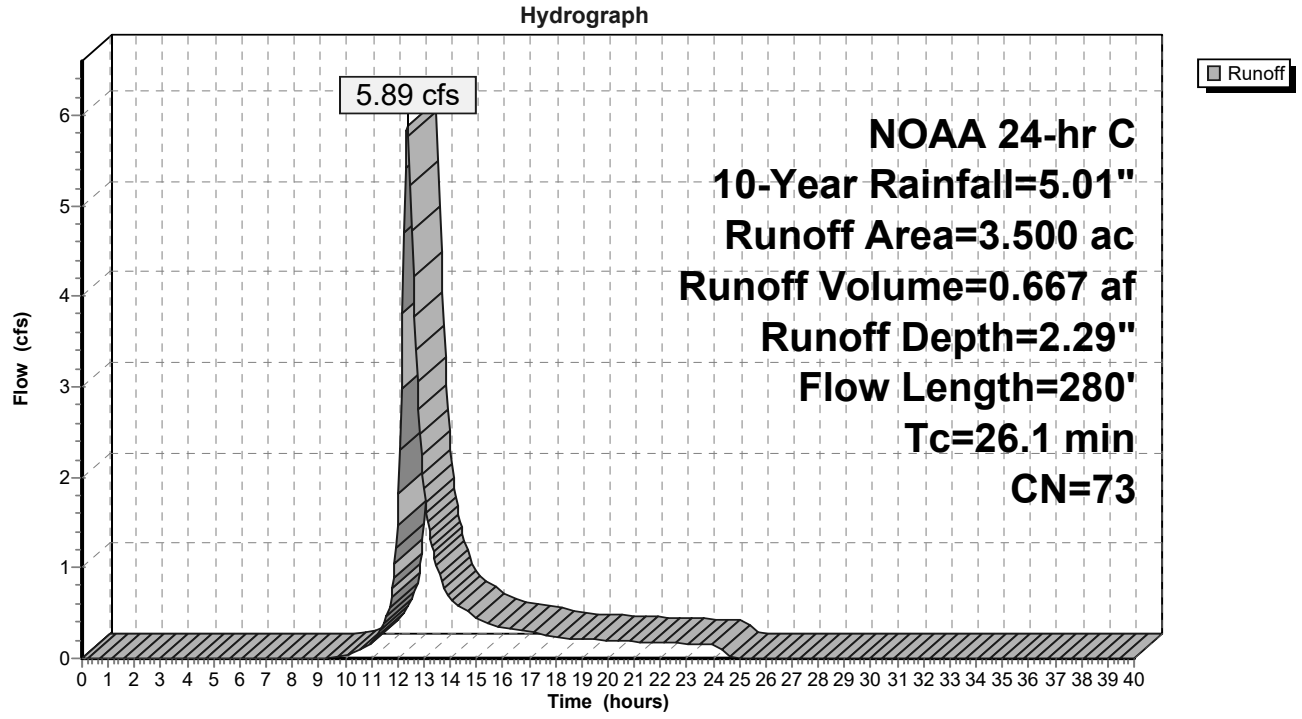
Runoff = 5.89 cfs @ 12.38 hrs, Volume= 0.667 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	150	0.0130	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
3.1	130	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.1	280	Total			

Subcatchment 5: OFF-SITE DA PERV

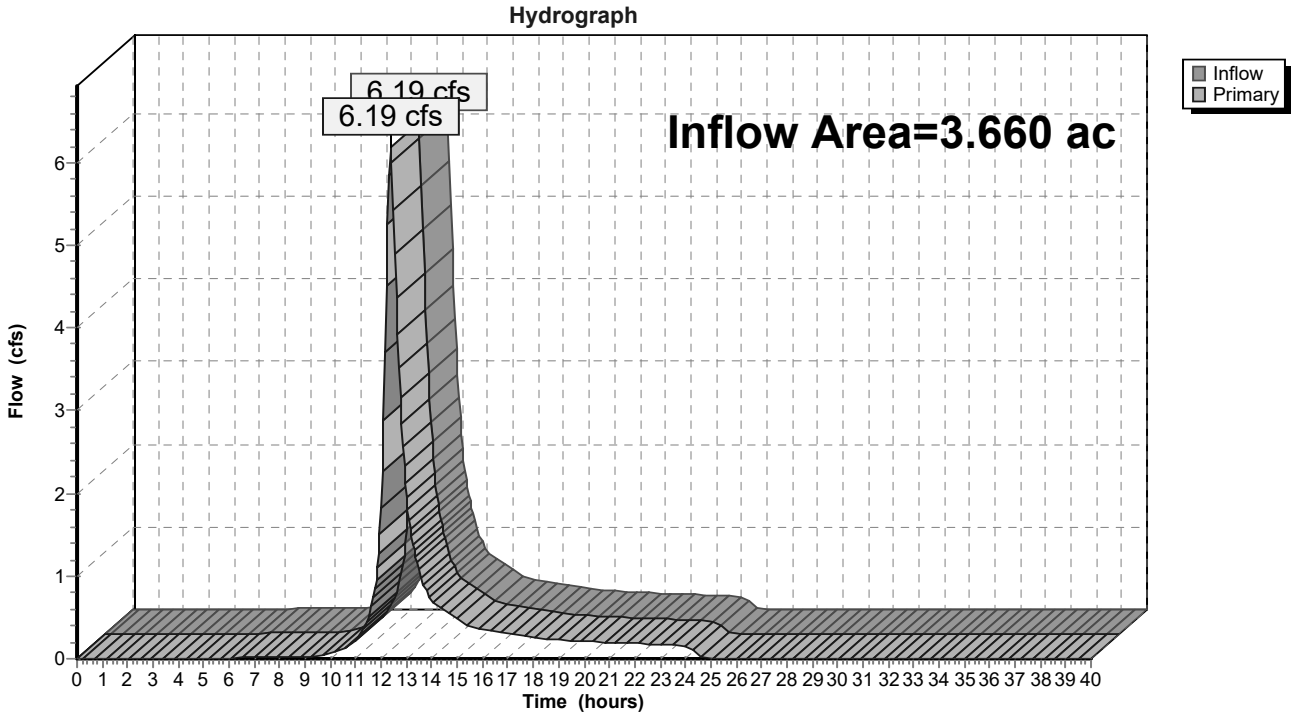


Summary for Link 6: Offsite Total

Inflow Area = 3.660 ac, 1.09% Impervious, Inflow Depth = 2.39" for 10-Year event
Inflow = 6.19 cfs @ 12.37 hrs, Volume= 0.730 af
Primary = 6.19 cfs @ 12.37 hrs, Volume= 0.730 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 6: Offsite Total

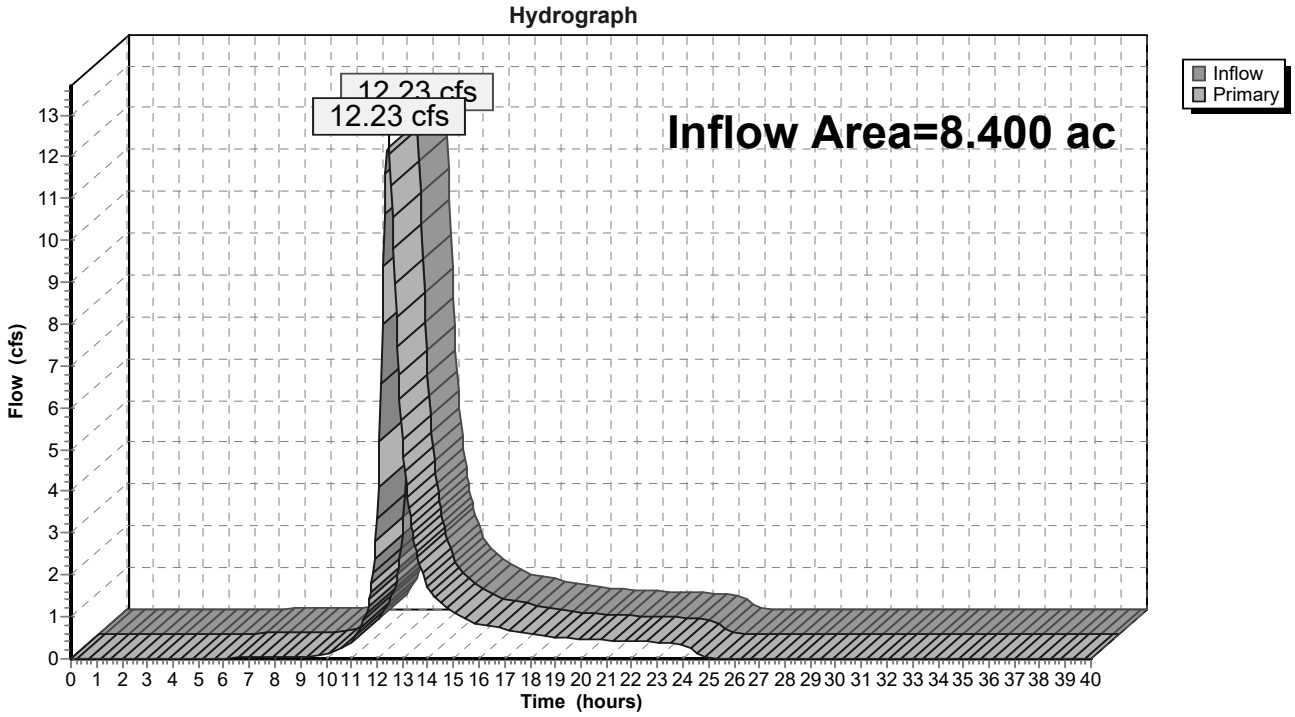


Summary for Link 7: EX AP

Inflow Area = 8.400 ac, 1.90% Impervious, Inflow Depth = 2.32" for 10-Year event
Inflow = 12.23 cfs @ 12.43 hrs, Volume= 1.626 af
Primary = 12.23 cfs @ 12.43 hrs, Volume= 1.626 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 7: EX AP



Summary for Subcatchment 8: PROP. DA ON-SITE IMP

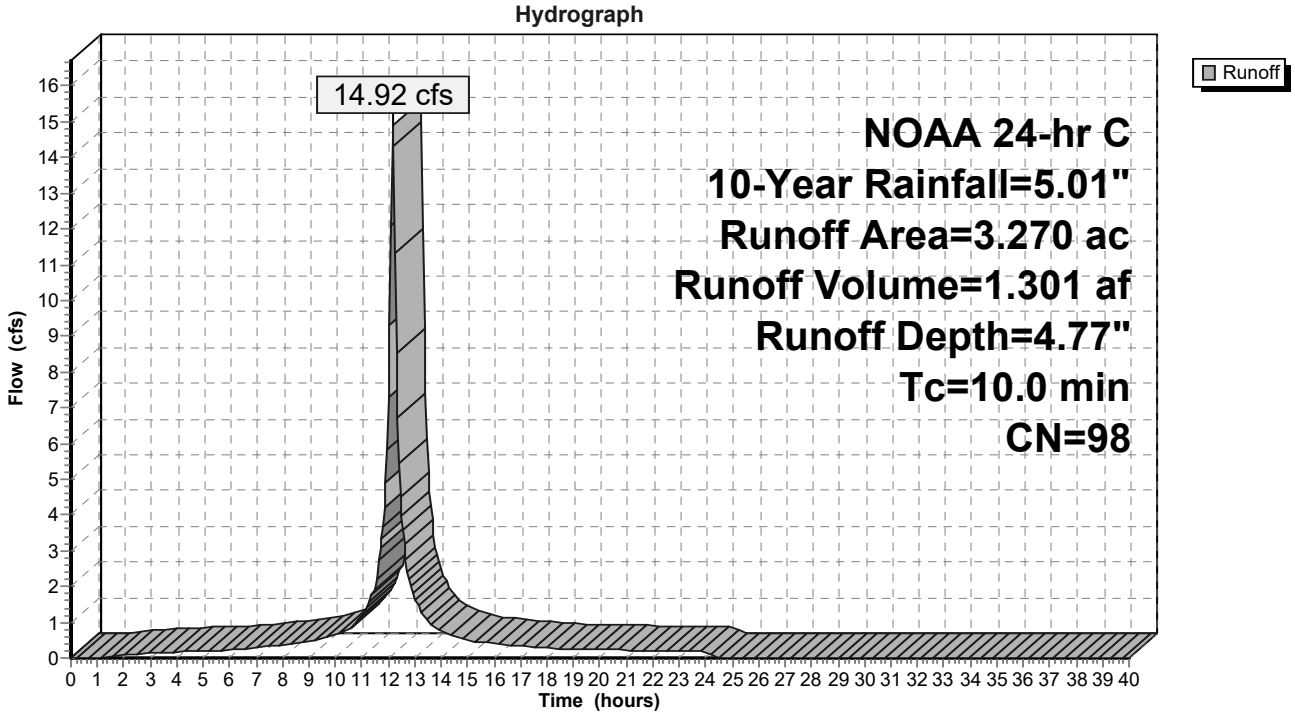
Runoff = 14.92 cfs @ 12.17 hrs, Volume= 1.301 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

	Area (ac)	CN	Description
*	3.130	98	Impervious
*	0.140	98	1/2 Basin Impervious
	3.270	98	Weighted Average
	3.270		100.00% Impervious Area

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

Subcatchment 8: PROP. DA ON-SITE IMP



Summary for Subcatchment 9: PROP. DA ON-SITE PER

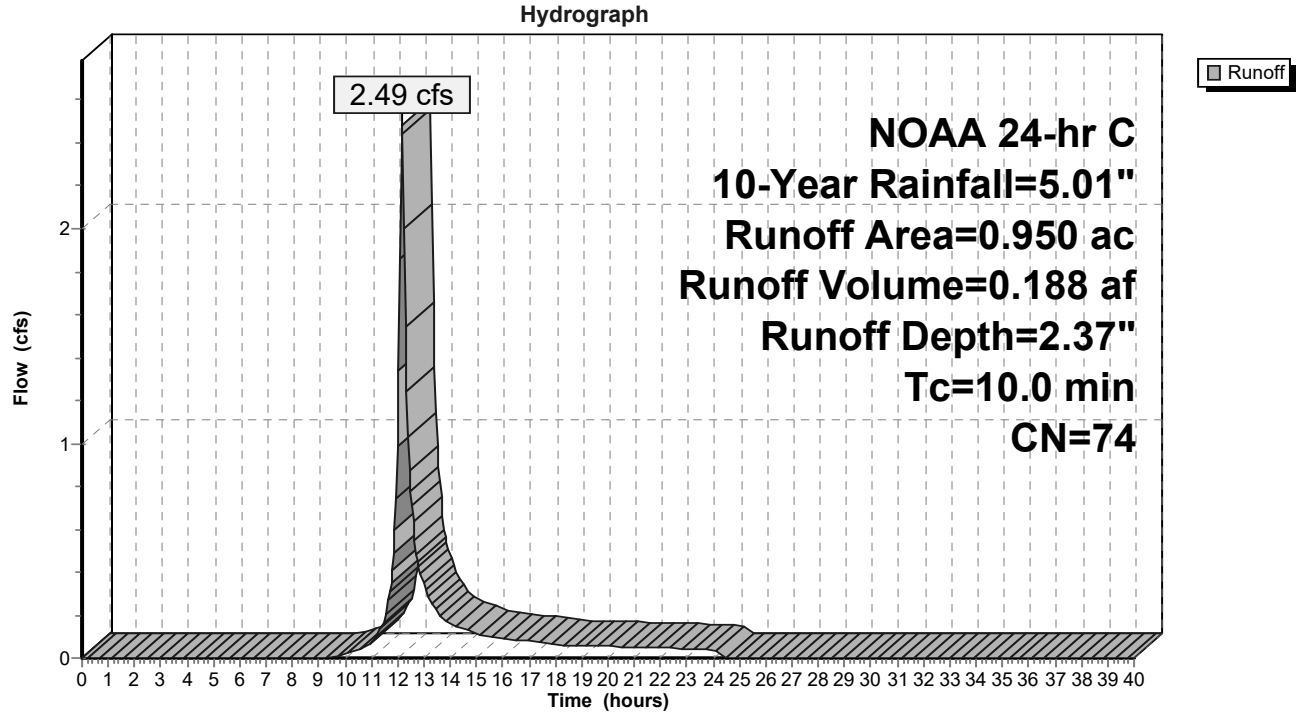
Runoff = 2.49 cfs @ 12.18 hrs, Volume= 0.188 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

	Area (ac)	CN	Description
	0.810	74	>75% Grass cover, Good, HSG C
*	0.140	74	1/2 Basin Pervious
	0.950	74	Weighted Average
	0.950		100.00% Pervious Area

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

Subcatchment 9: PROP. DA ON-SITE PER



Summary for Subcatchment 10: OFF-SITE PER DA

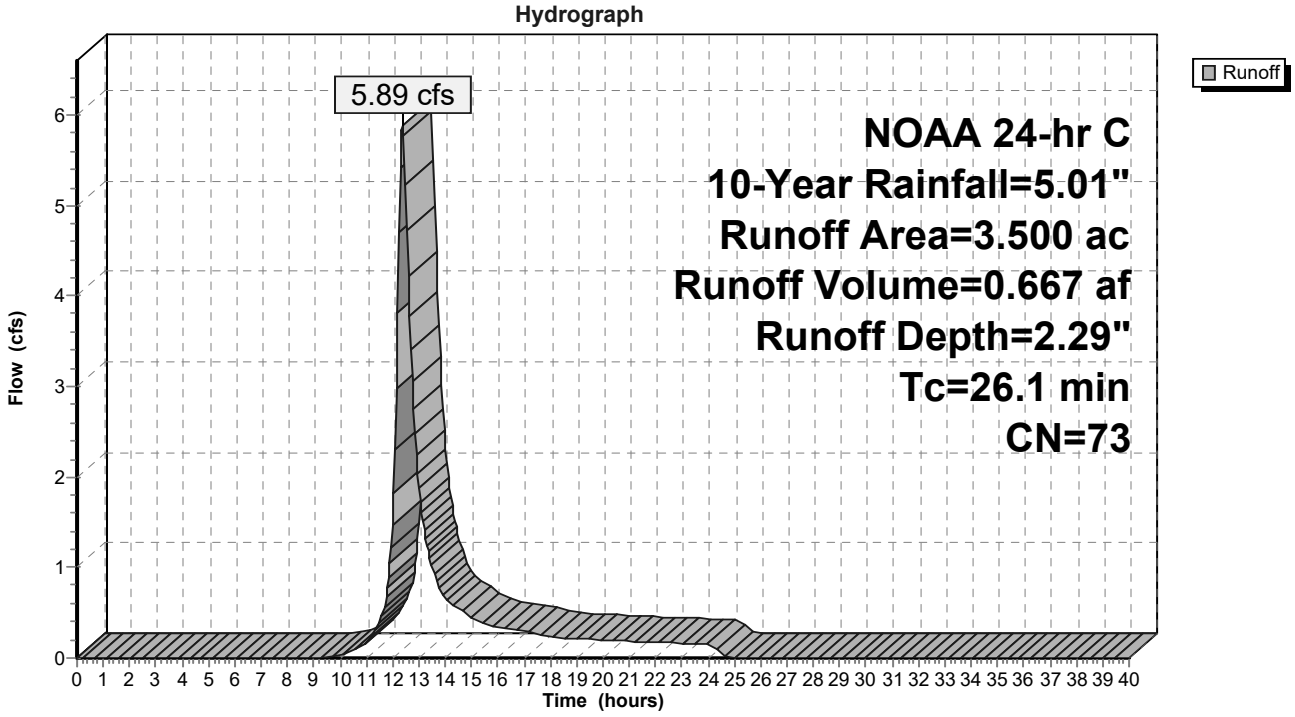
Runoff = 5.89 cfs @ 12.38 hrs, Volume= 0.667 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

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

Subcatchment 10: OFF-SITE PER DA



Summary for Subcatchment 11: OFF-SITE IMP DA

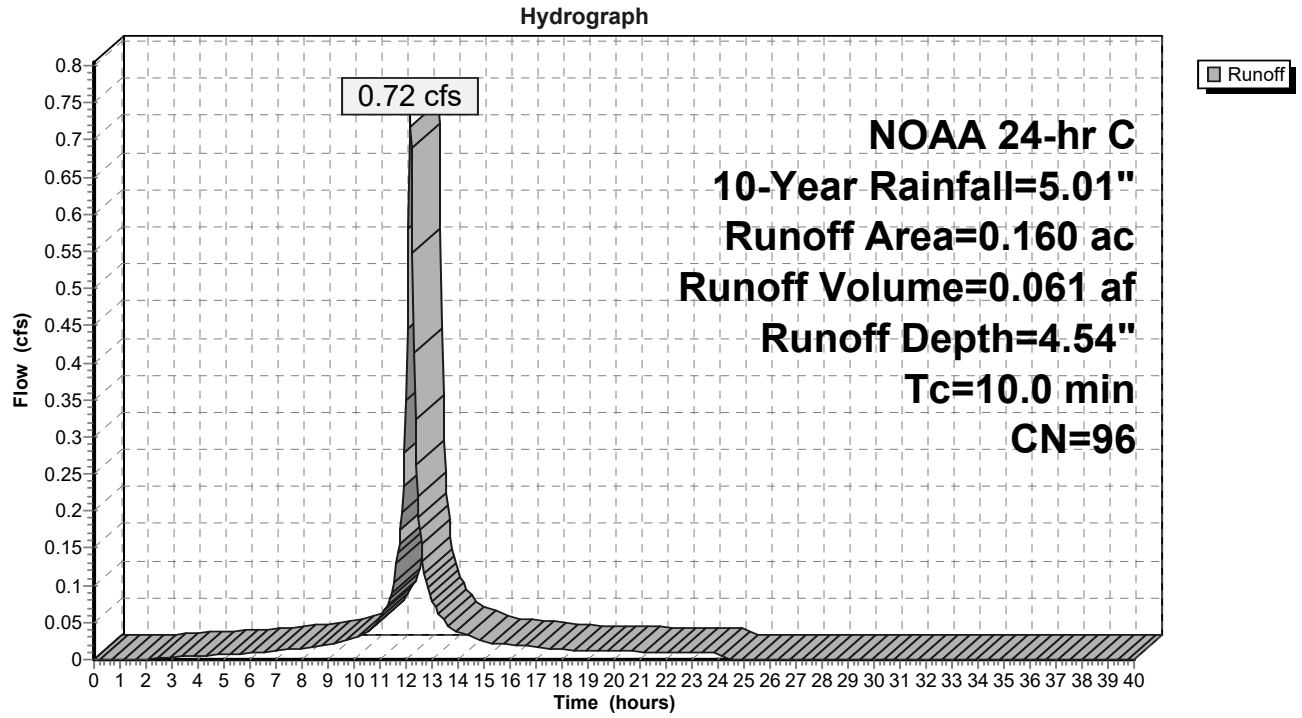
Runoff = 0.72 cfs @ 12.17 hrs, Volume= 0.061 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

	Area (ac)	CN	Description
*	0.120	96	Gravel
*	0.040	98	Impervious
	0.160	96	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 11: OFF-SITE IMP DA



Summary for Pond 12: BASIN

Inflow Area = 7.880 ac, 42.01% Impervious, Inflow Depth = 3.38" for 10-Year event
Inflow = 21.46 cfs @ 12.18 hrs, Volume= 2.216 af
Outflow = 8.12 cfs @ 12.60 hrs, Volume= 2.090 af, Atten= 62%, Lag= 25.4 min
Primary = 8.12 cfs @ 12.60 hrs, Volume= 2.090 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Starting Elev= 71.50' Surf.Area= 16,148 sf Storage= 3,106 cf
Peak Elev= 73.81' @ 12.60 hrs Surf.Area= 26,898 sf Storage= 43,442 cf (40,336 cf above start)

Plug-Flow detention time= 276.1 min calculated for 2.018 af (91% of inflow)
Center-of-Mass det. time= 210.9 min (1,004.6 - 793.7)

Volume	Invert	Avail.Storage	Storage Description
#1	71.50'	58,069 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2A	71.25'	5,593 cf	**14.83'W x 530.08'L x 2.33'H Field A** 18,347 cf Overall - 4,364 cf Embedded = 13,983 cf x 40.0% Voids
#3A	71.75'	4,364 cf	**ADS_StormTech SC-310 +Cap** x 296 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 296 Chambers in 4 Rows
#4B	70.80'	11,595 cf	**22.75'W x 364.20'L x 5.50'H Field B** 45,571 cf Overall - 16,582 cf Embedded = 28,988 cf x 40.0% Voids
#5B	71.55'	16,582 cf	**ADS_StormTech MC-3500 d +Cap** x 150 Inside #4 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 150 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		96,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

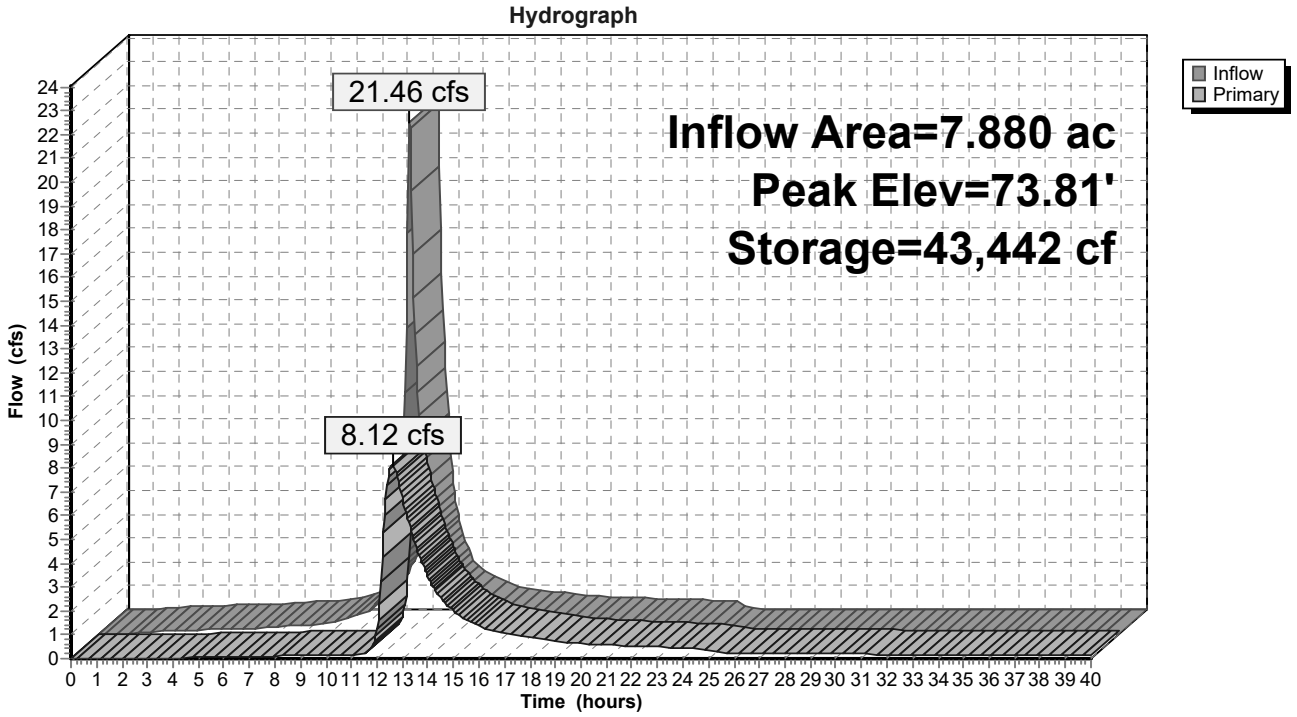
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	0	0	0
72.00	3,730	933	933
73.00	9,663	6,697	7,629
74.00	11,006	10,335	17,964
75.00	12,411	11,709	29,672
76.00	14,395	13,403	43,075
77.00	15,593	14,994	58,069

Device	Routing	Invert	Outlet Devices
#1	Primary	70.36'	**30.0" Round RCP_Round 30"** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 70.36' / 70.20' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	71.50'	**3.0" Vert. Orifice** C= 0.600
#3	Device 1	72.40'	**1.4' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=8.12 cfs @ 12.60 hrs HW=73.81' TW=0.00' (Dynamic Tailwater)
↑**1=RCP_Round 30"** (Passes 8.12 cfs of 28.41 cfs potential flow)
↑**2=Orifice** (Orifice Controls 0.35 cfs @ 7.11 fps)
3=Broad-Crested Rectangular Weir (Weir Controls 7.77 cfs @ 3.94 fps)

Pond 12: BASIN



Summary for Subcatchment 13: UC DA (ON-SITE) IMP

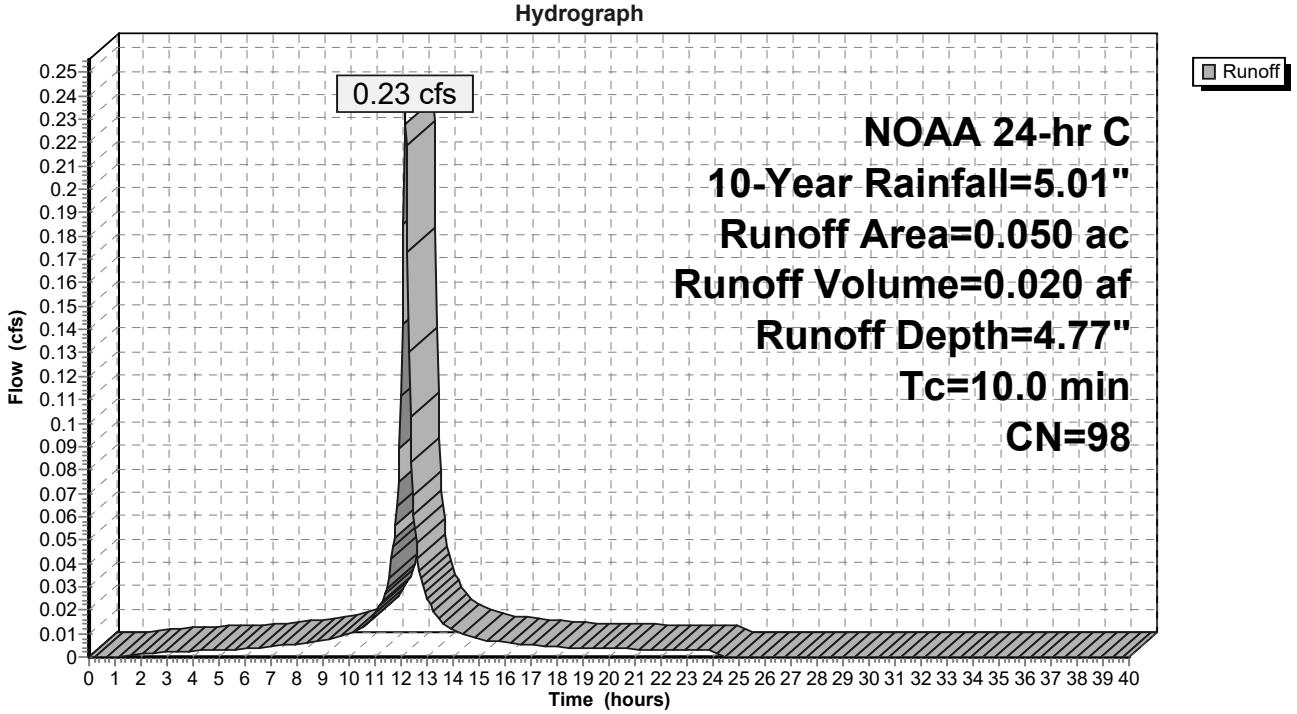
Runoff = 0.23 cfs @ 12.17 hrs, Volume= 0.020 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

	Area (ac)	CN	Description
*	0.050	98	Impervious
	0.050		100.00% Impervious Area

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

Subcatchment 13: UC DA (ON-SITE) IMP



Summary for Subcatchment 14: UC DA (ON-SITE) PER

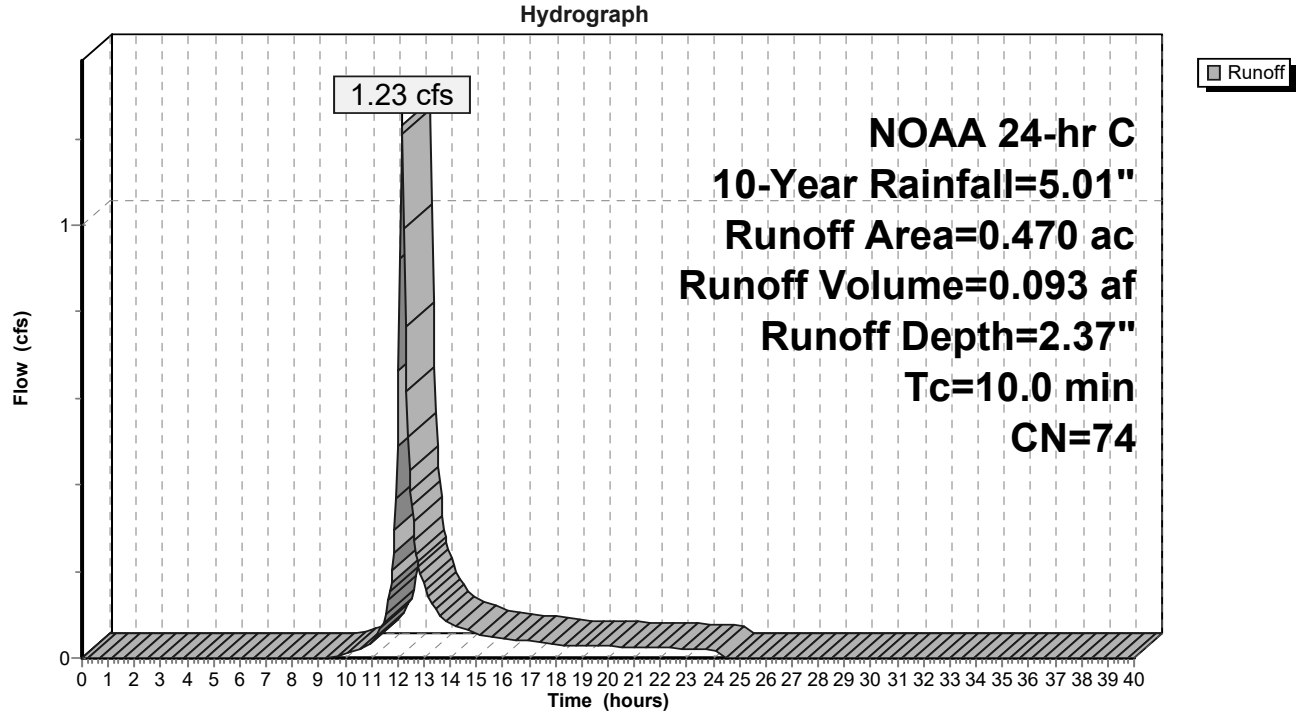
Runoff = 1.23 cfs @ 12.18 hrs, Volume= 0.093 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.470	74	>75% Grass cover, Good, HSG C
0.470		100.00% Pervious Area

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

Subcatchment 14: UC DA (ON-SITE) PER

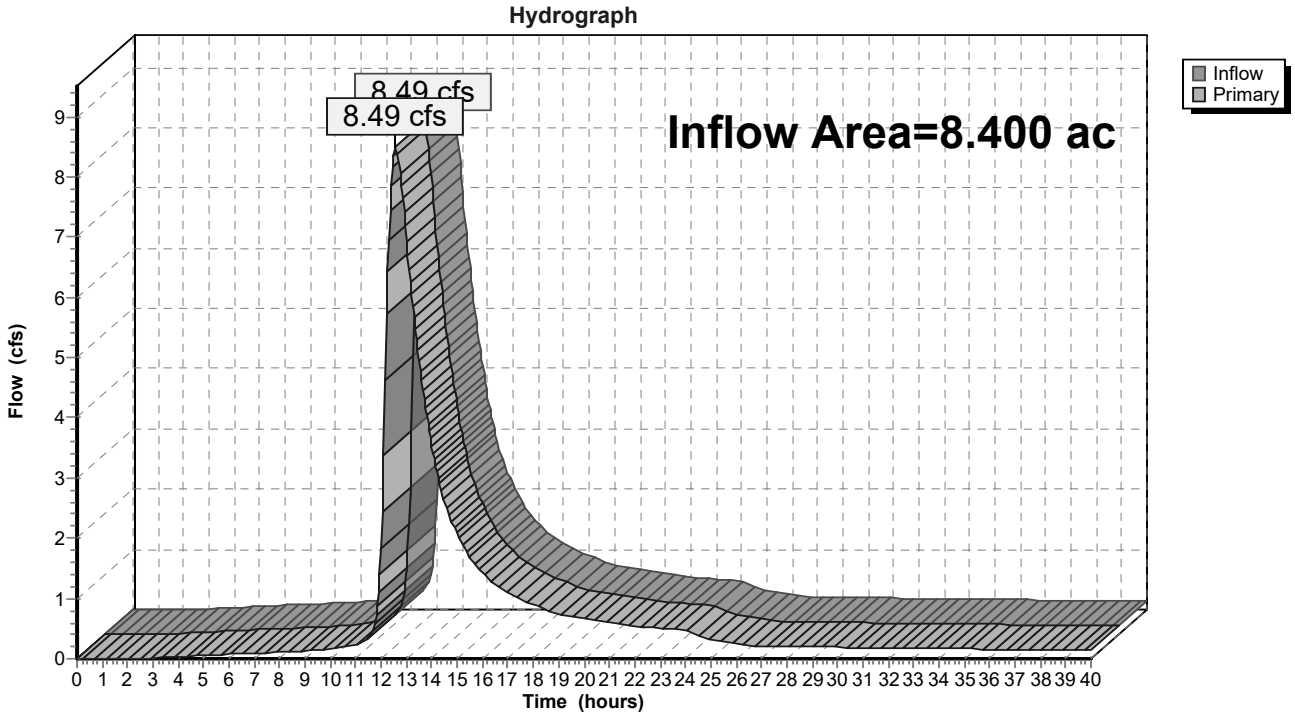


Summary for Link 15: PROP AP

Inflow Area = 8.400 ac, 40.00% Impervious, Inflow Depth > 3.15" for 10-Year event
Inflow = 8.49 cfs @ 12.58 hrs, Volume= 2.202 af
Primary = 8.49 cfs @ 12.58 hrs, Volume= 2.202 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 15: PROP AP



Summary for Subcatchment 1: EX. DA 1 IMP

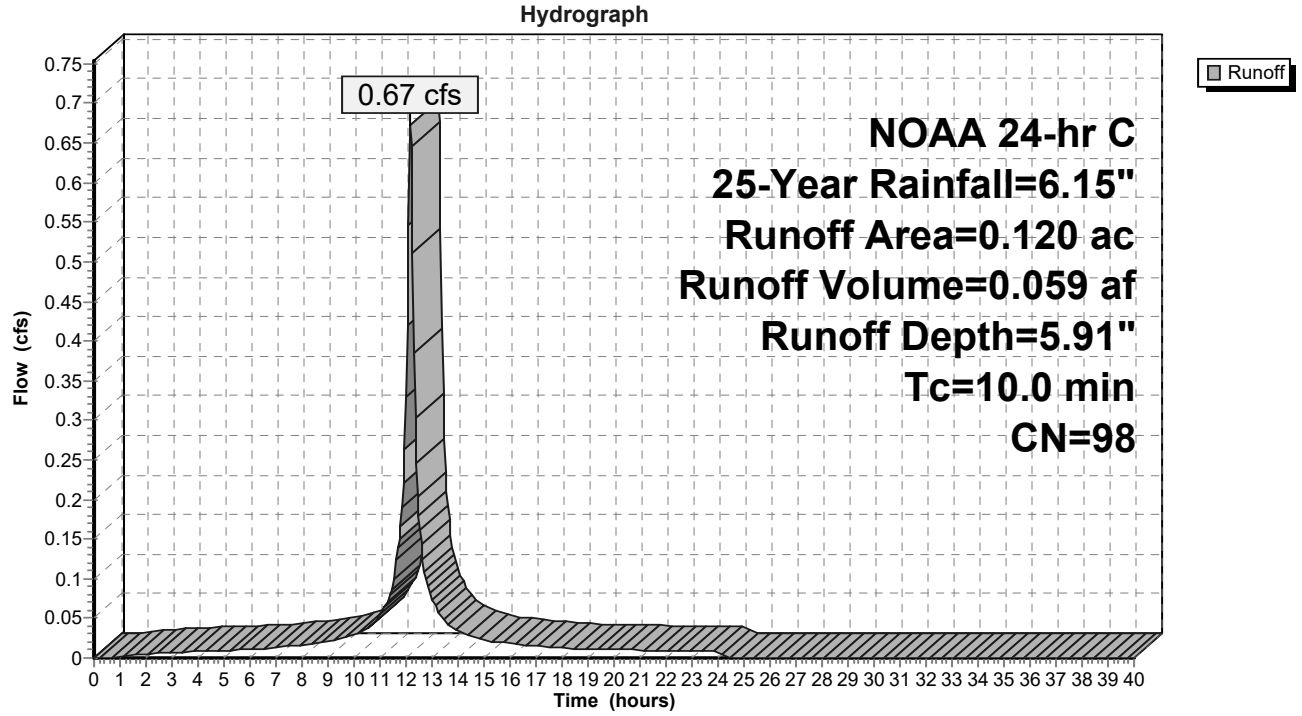
Runoff = 0.67 cfs @ 12.17 hrs, Volume= 0.059 af, Depth= 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG C
0.120		100.00% Impervious Area

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

Subcatchment 1: EX. DA 1 IMP



Summary for Subcatchment 2: EX. DA 1 PER

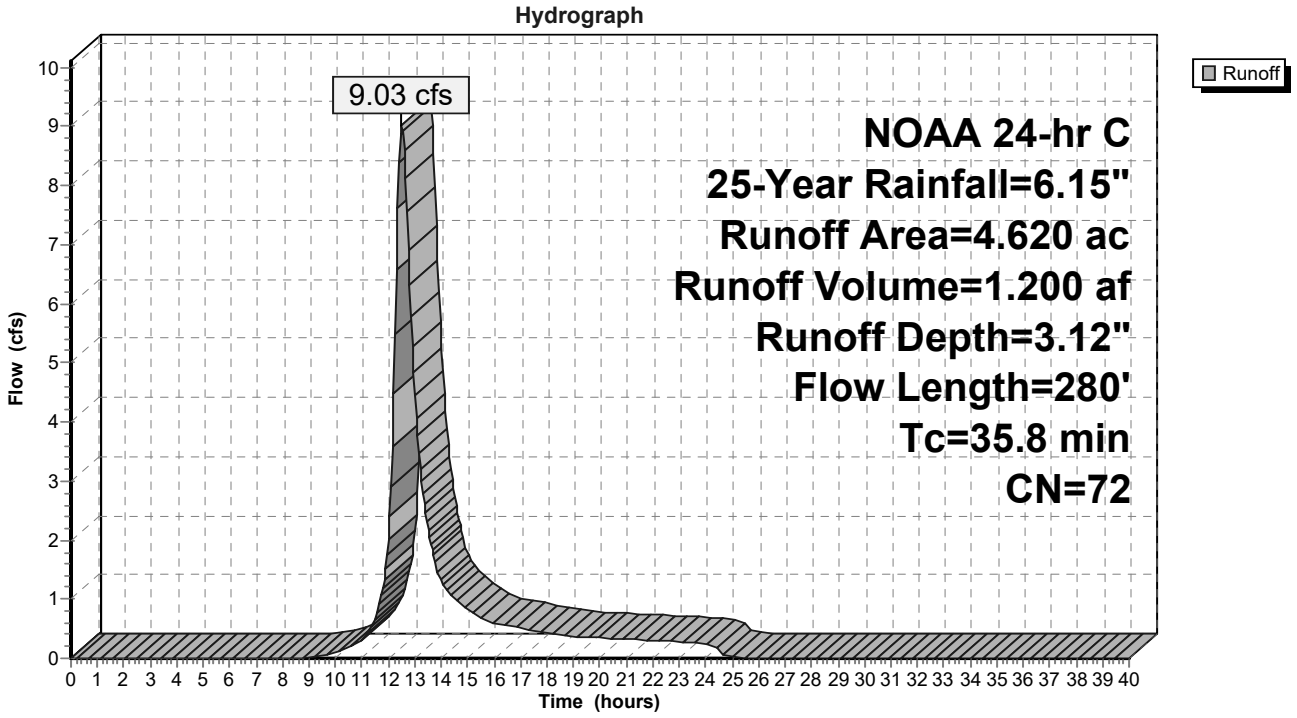
Runoff = 9.03 cfs @ 12.51 hrs, Volume= 1.200 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

Area (ac)	CN	Description
4.620	72	Woods/grass comb., Good, HSG C
4.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.3	150	0.0142	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.34"
2.5	130	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.8	280	Total			

Subcatchment 2: EX. DA 1 PER

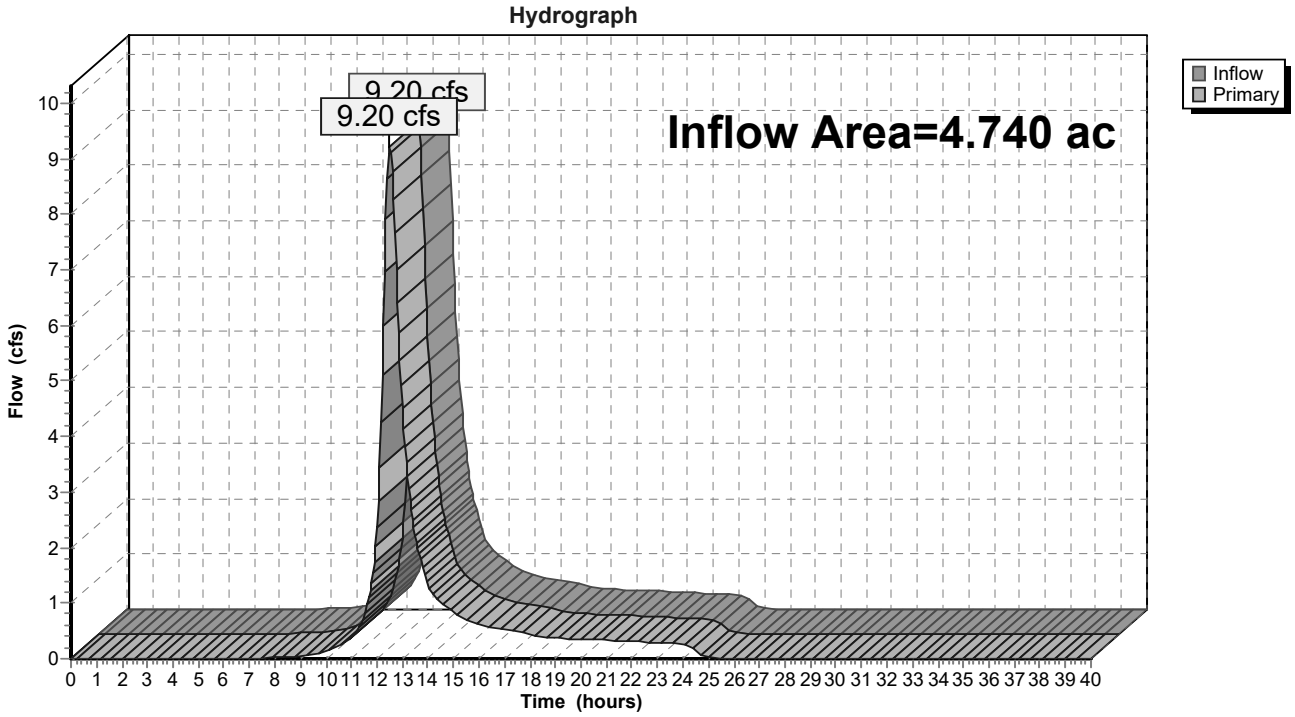


Summary for Link 3: Ex On-Site

Inflow Area = 4.740 ac, 2.53% Impervious, Inflow Depth = 3.19" for 25-Year event
Inflow = 9.20 cfs @ 12.50 hrs, Volume= 1.259 af
Primary = 9.20 cfs @ 12.50 hrs, Volume= 1.259 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3: Ex On-Site



Summary for Subcatchment 4: OFF-SITE DA IMP

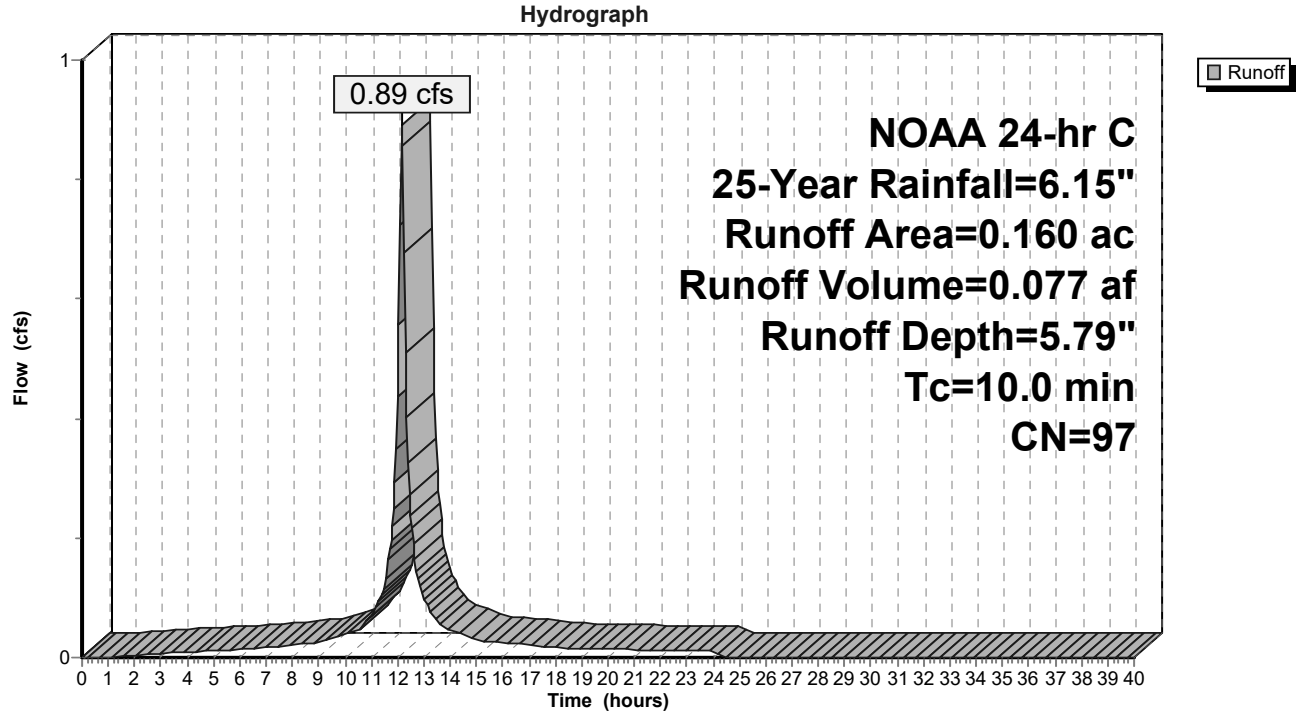
Runoff = 0.89 cfs @ 12.17 hrs, Volume= 0.077 af, Depth= 5.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

	Area (ac)	CN	Description
*	0.040	98	Impervious
*	0.120	96	Gravel
	0.160	97	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 4: OFF-SITE DA IMP



Summary for Subcatchment 5: OFF-SITE DA PERV

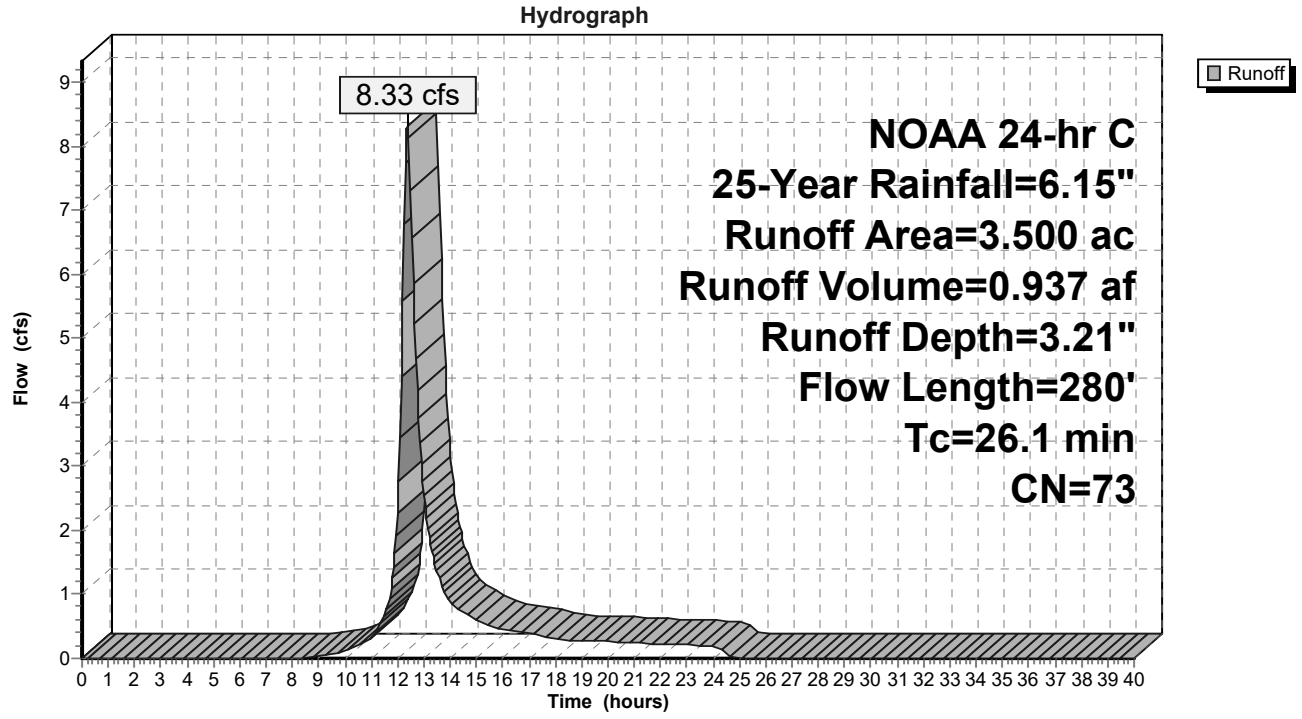
Runoff = 8.33 cfs @ 12.38 hrs, Volume= 0.937 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	150	0.0130	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
3.1	130	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.1	280	Total			

Subcatchment 5: OFF-SITE DA PERV

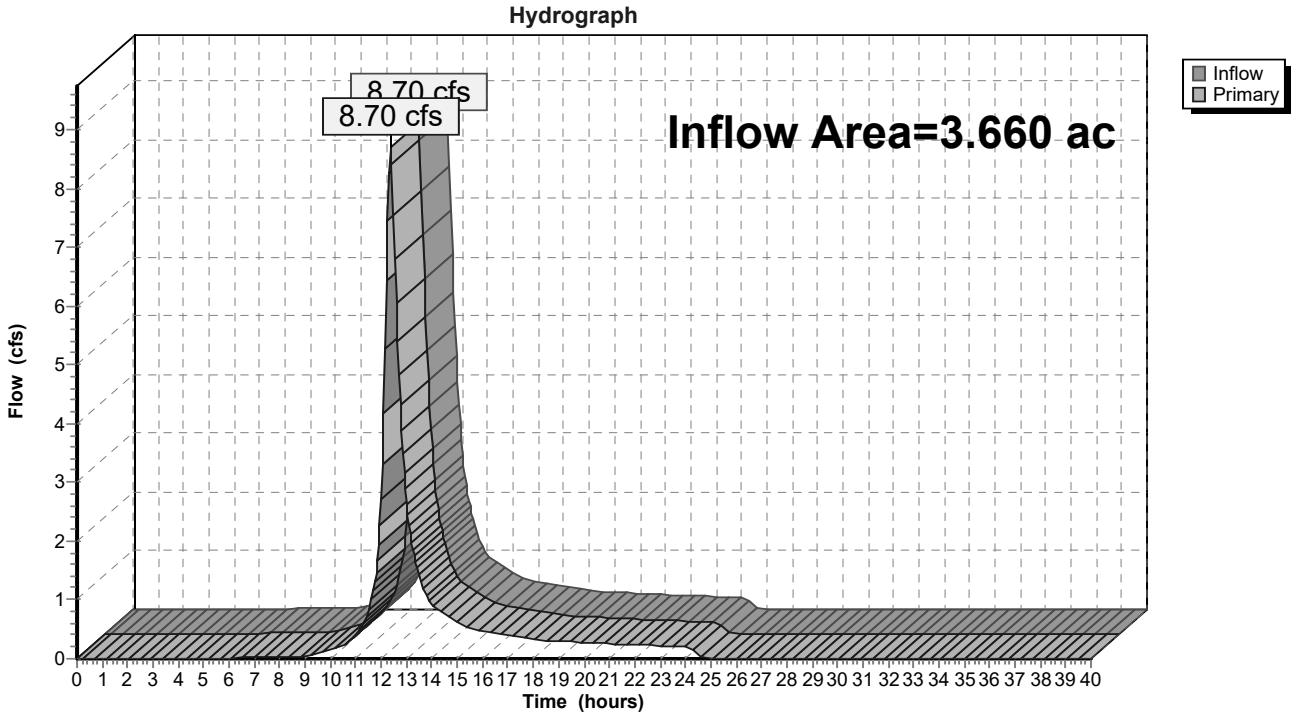


Summary for Link 6: Offsite Total

Inflow Area = 3.660 ac, 1.09% Impervious, Inflow Depth = 3.33" for 25-Year event
Inflow = 8.70 cfs @ 12.37 hrs, Volume= 1.015 af
Primary = 8.70 cfs @ 12.37 hrs, Volume= 1.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 6: Offsite Total

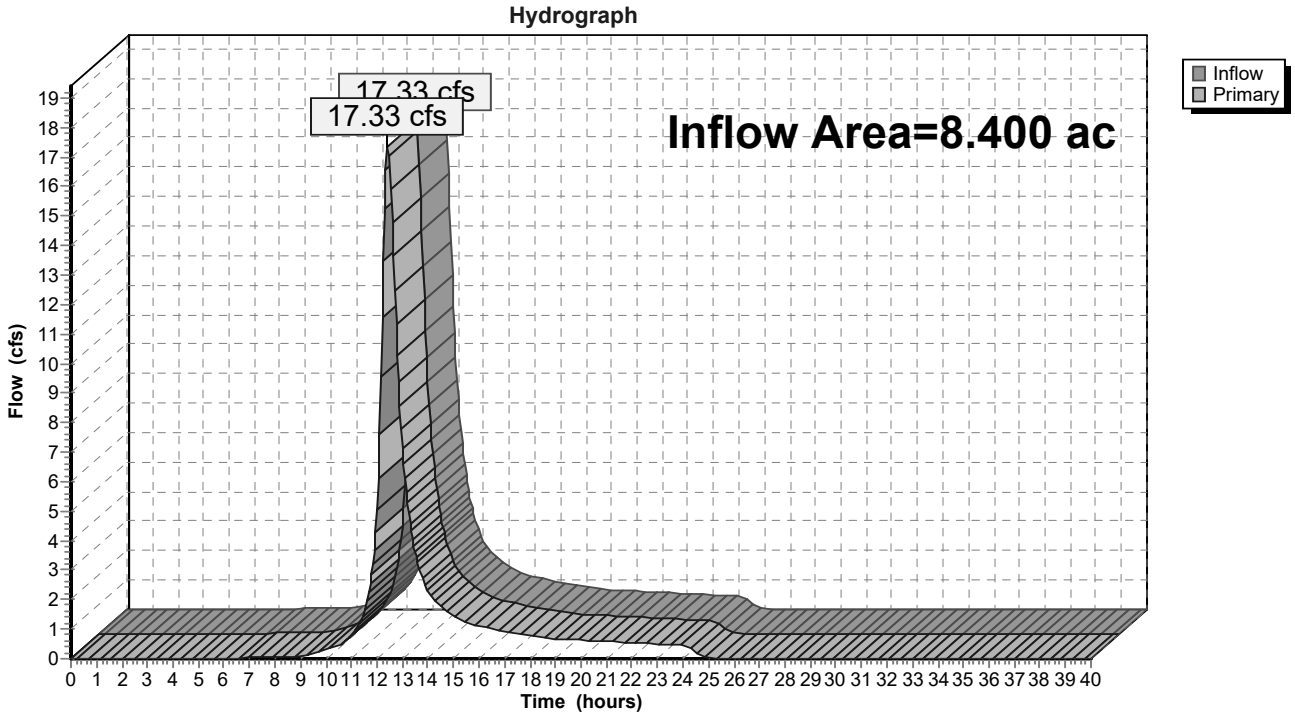


Summary for Link 7: EX AP

Inflow Area = 8.400 ac, 1.90% Impervious, Inflow Depth = 3.25" for 25-Year event
Inflow = 17.33 cfs @ 12.43 hrs, Volume= 2.273 af
Primary = 17.33 cfs @ 12.43 hrs, Volume= 2.273 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 7: EX AP



Summary for Subcatchment 8: PROP. DA ON-SITE IMP

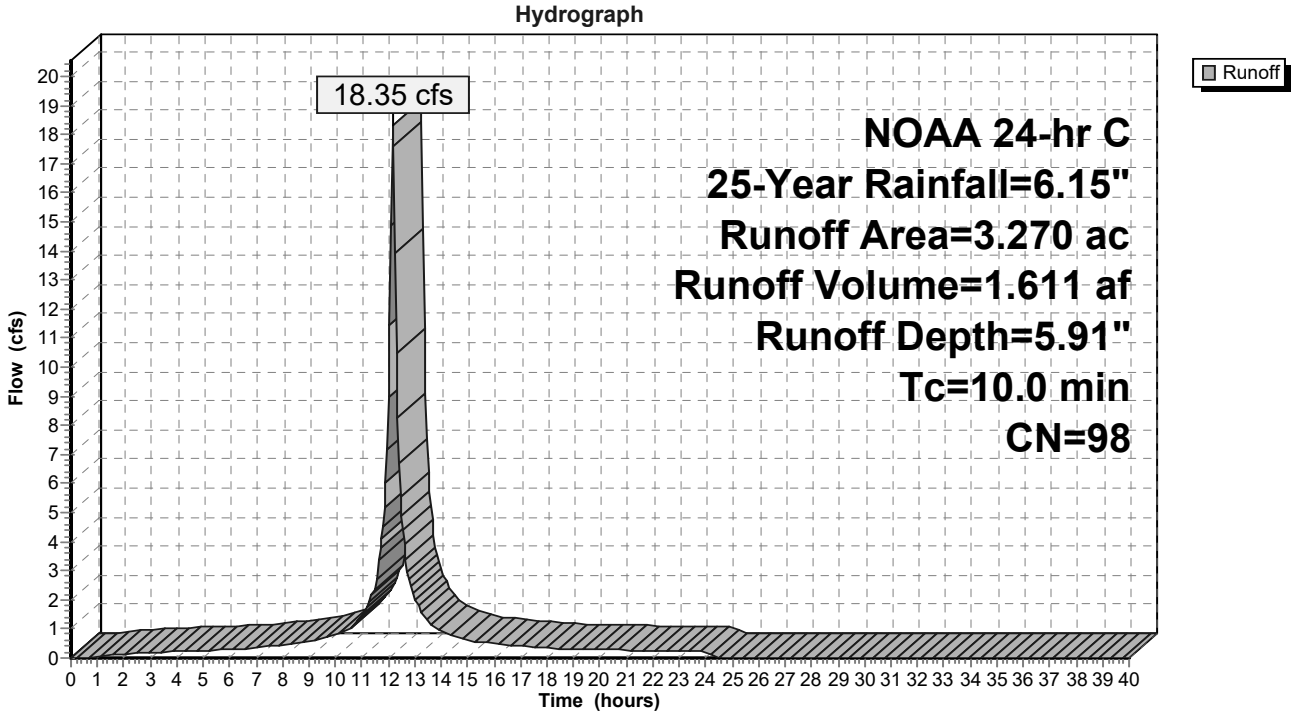
Runoff = 18.35 cfs @ 12.17 hrs, Volume= 1.611 af, Depth= 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

	Area (ac)	CN	Description
*	3.130	98	Impervious
*	0.140	98	1/2 Basin Impervious
	3.270	98	Weighted Average
	3.270		100.00% Impervious Area

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

Subcatchment 8: PROP. DA ON-SITE IMP



Summary for Subcatchment 9: PROP. DA ON-SITE PER

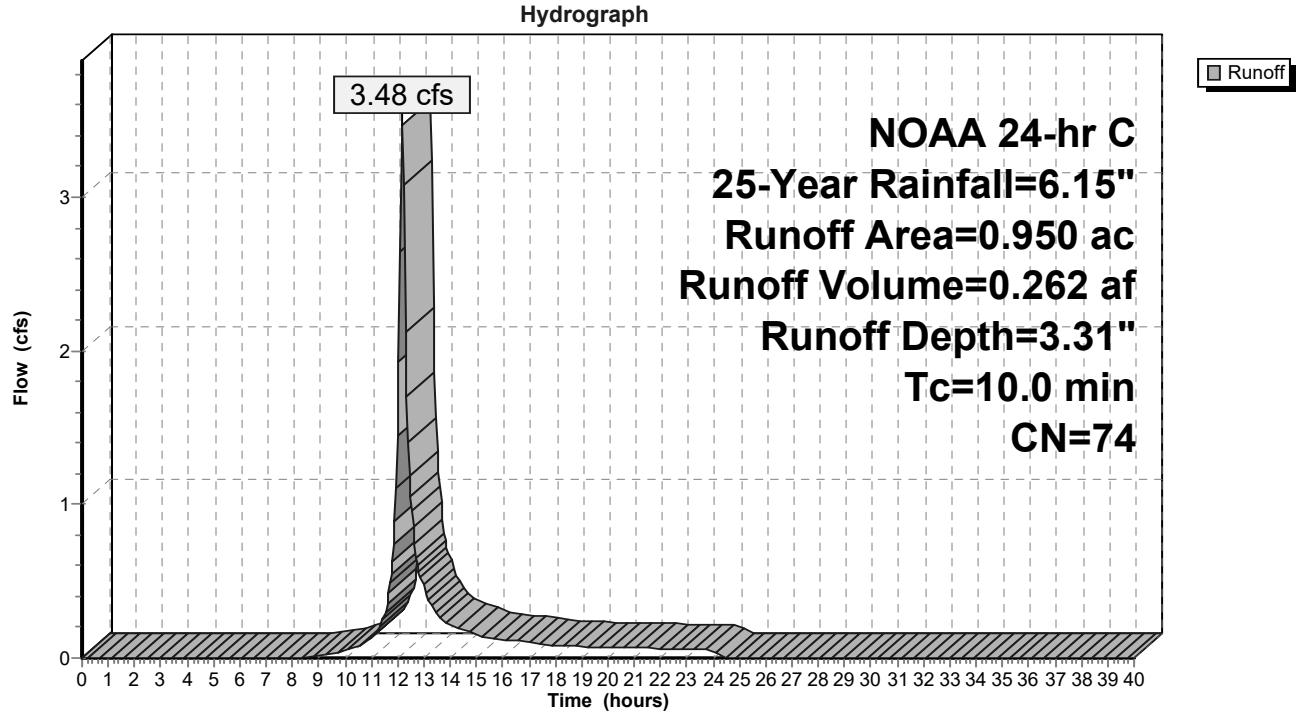
Runoff = 3.48 cfs @ 12.18 hrs, Volume= 0.262 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

	Area (ac)	CN	Description
	0.810	74	>75% Grass cover, Good, HSG C
*	0.140	74	1/2 Basin Pervious
	0.950	74	Weighted Average
	0.950		100.00% Pervious Area

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

Subcatchment 9: PROP. DA ON-SITE PER



Summary for Subcatchment 10: OFF-SITE PER DA

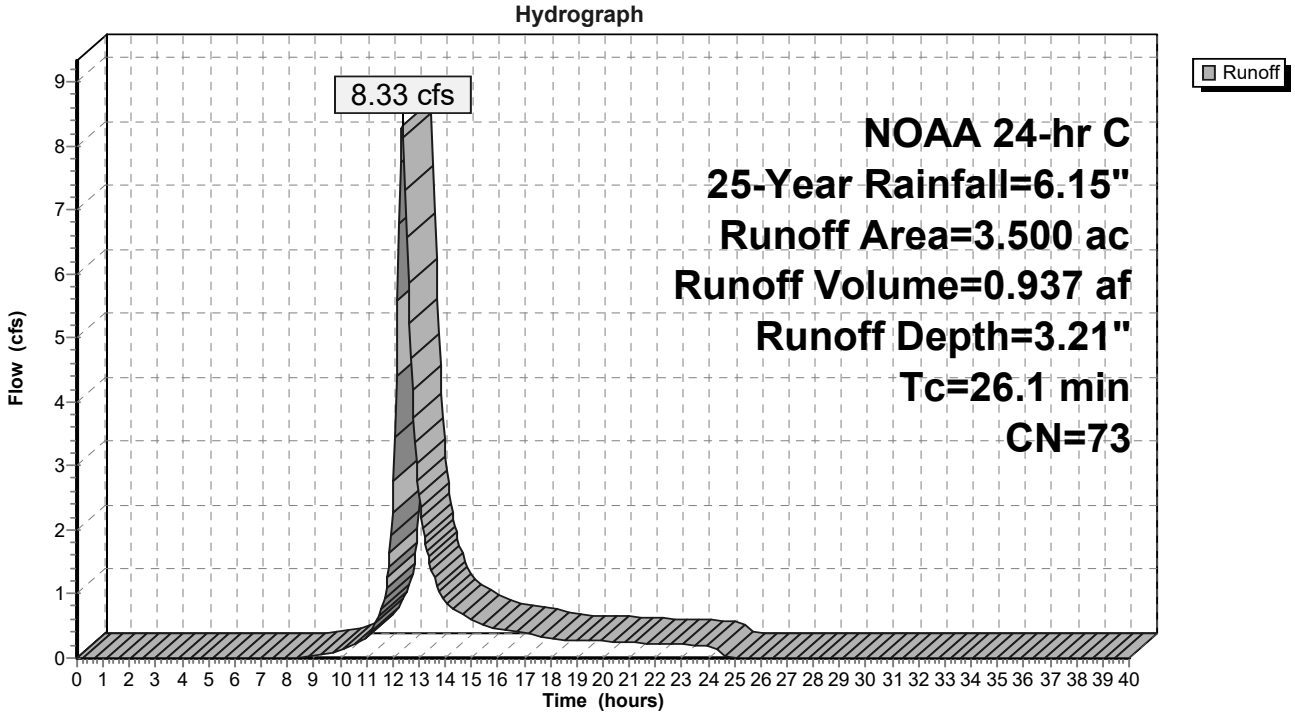
Runoff = 8.33 cfs @ 12.38 hrs, Volume= 0.937 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

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

Subcatchment 10: OFF-SITE PER DA



Summary for Subcatchment 11: OFF-SITE IMP DA

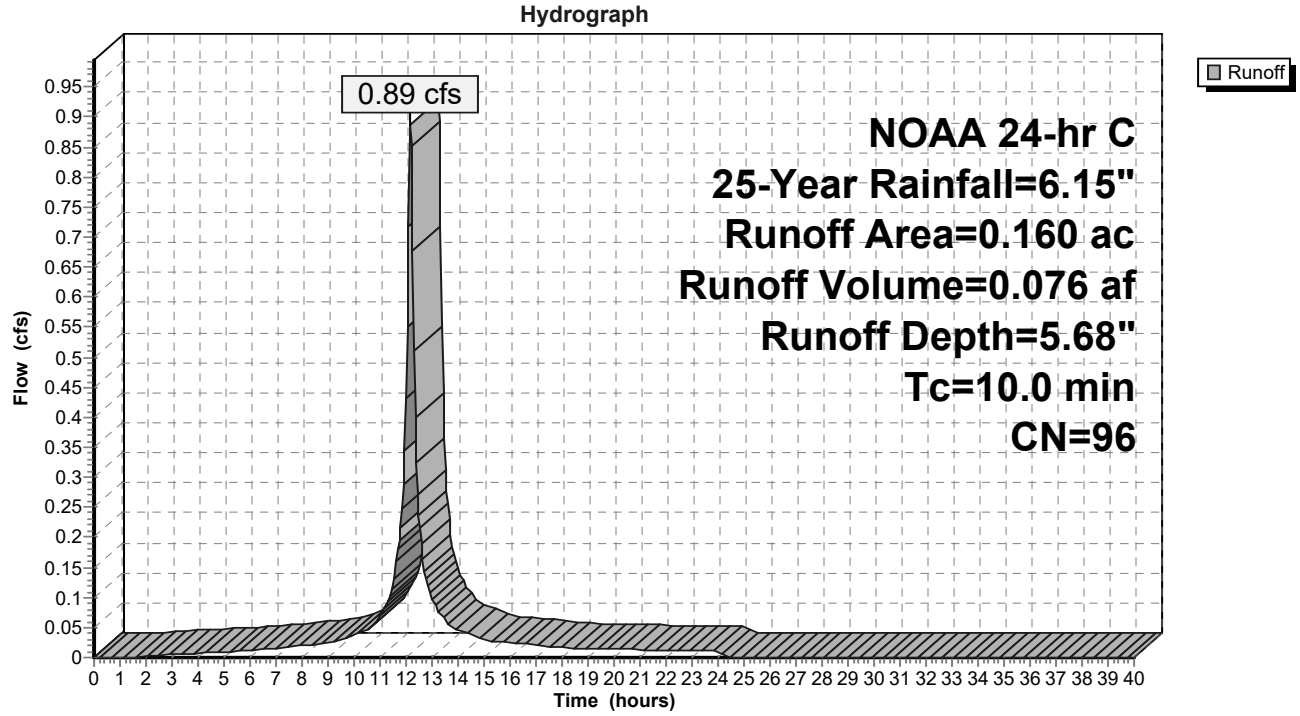
Runoff = 0.89 cfs @ 12.17 hrs, Volume= 0.076 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

	Area (ac)	CN	Description
*	0.120	96	Gravel
*	0.040	98	Impervious
	0.160	96	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 11: OFF-SITE IMP DA



Summary for Pond 12: BASIN

Inflow Area = 7.880 ac, 42.01% Impervious, Inflow Depth = 4.39" for 25-Year event
Inflow = 27.63 cfs @ 12.18 hrs, Volume= 2.886 af
Outflow = 12.32 cfs @ 12.54 hrs, Volume= 2.754 af, Atten= 55%, Lag= 21.7 min
Primary = 12.32 cfs @ 12.54 hrs, Volume= 2.754 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Starting Elev= 71.50' Surf.Area= 16,148 sf Storage= 3,106 cf
Peak Elev= 74.28' @ 12.54 hrs Surf.Area= 27,541 sf Storage= 51,299 cf (48,193 cf above start)

Plug-Flow detention time= 230.2 min calculated for 2.683 af (93% of inflow)
Center-of-Mass det. time= 177.4 min (968.1 - 790.7)

Volume	Invert	Avail.Storage	Storage Description
#1	71.50'	58,069 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2A	71.25'	5,593 cf	**14.83'W x 530.08'L x 2.33'H Field A** 18,347 cf Overall - 4,364 cf Embedded = 13,983 cf x 40.0% Voids
#3A	71.75'	4,364 cf	**ADS_StormTech SC-310 +Cap** x 296 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 296 Chambers in 4 Rows
#4B	70.80'	11,595 cf	**22.75'W x 364.20'L x 5.50'H Field B** 45,571 cf Overall - 16,582 cf Embedded = 28,988 cf x 40.0% Voids
#5B	71.55'	16,582 cf	**ADS_StormTech MC-3500 d +Cap** x 150 Inside #4 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 150 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		96,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

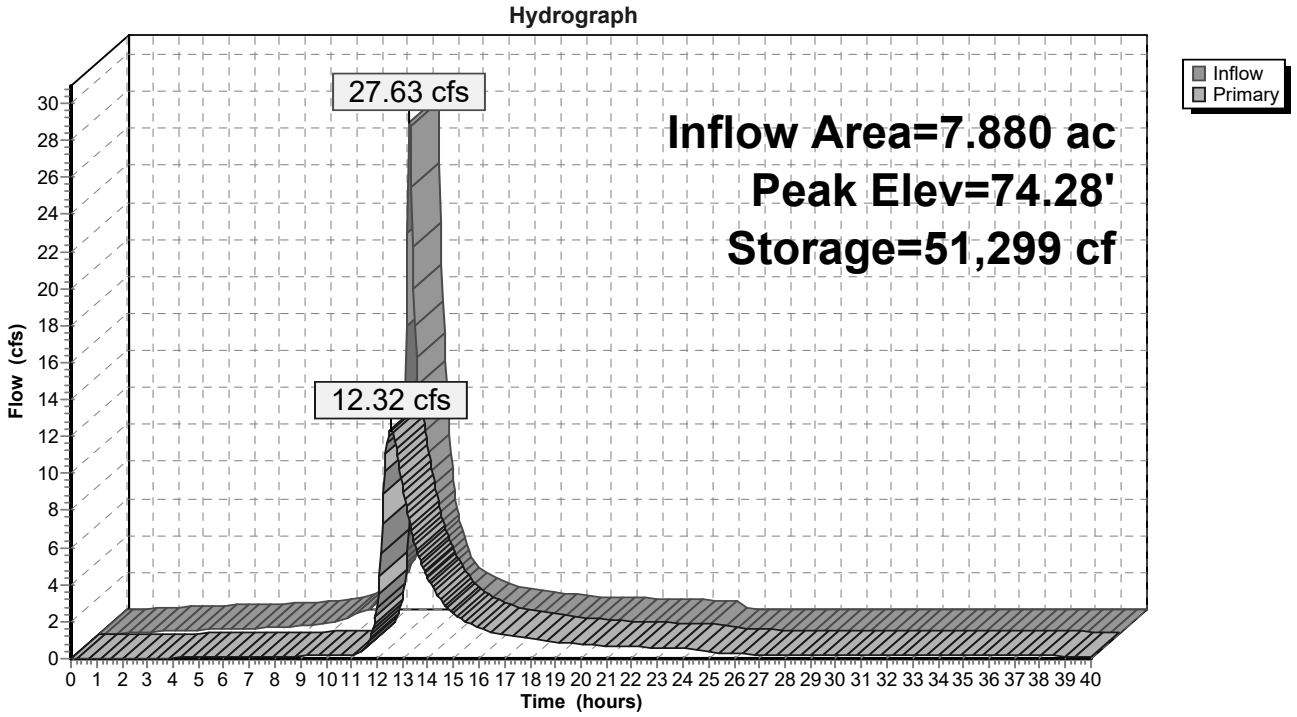
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	0	0	0
72.00	3,730	933	933
73.00	9,663	6,697	7,629
74.00	11,006	10,335	17,964
75.00	12,411	11,709	29,672
76.00	14,395	13,403	43,075
77.00	15,593	14,994	58,069

Device	Routing	Invert	Outlet Devices
#1	Primary	70.36'	**30.0" Round RCP_Round 30"** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 70.36' / 70.20' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	71.50'	**3.0" Vert. Orifice** C= 0.600
#3	Device 1	72.40'	**1.4' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=12.32 cfs @ 12.54 hrs HW=74.27' TW=0.00' (Dynamic Tailwater)
└─**1=RCP_Round 30"** (Passes 12.32 cfs of 33.86 cfs potential flow)
└─**2=Orifice** (Orifice Controls 0.38 cfs @ 7.84 fps)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 11.93 cfs @ 4.55 fps)

Pond 12: BASIN



Summary for Subcatchment 13: UC DA (ON-SITE) IMP

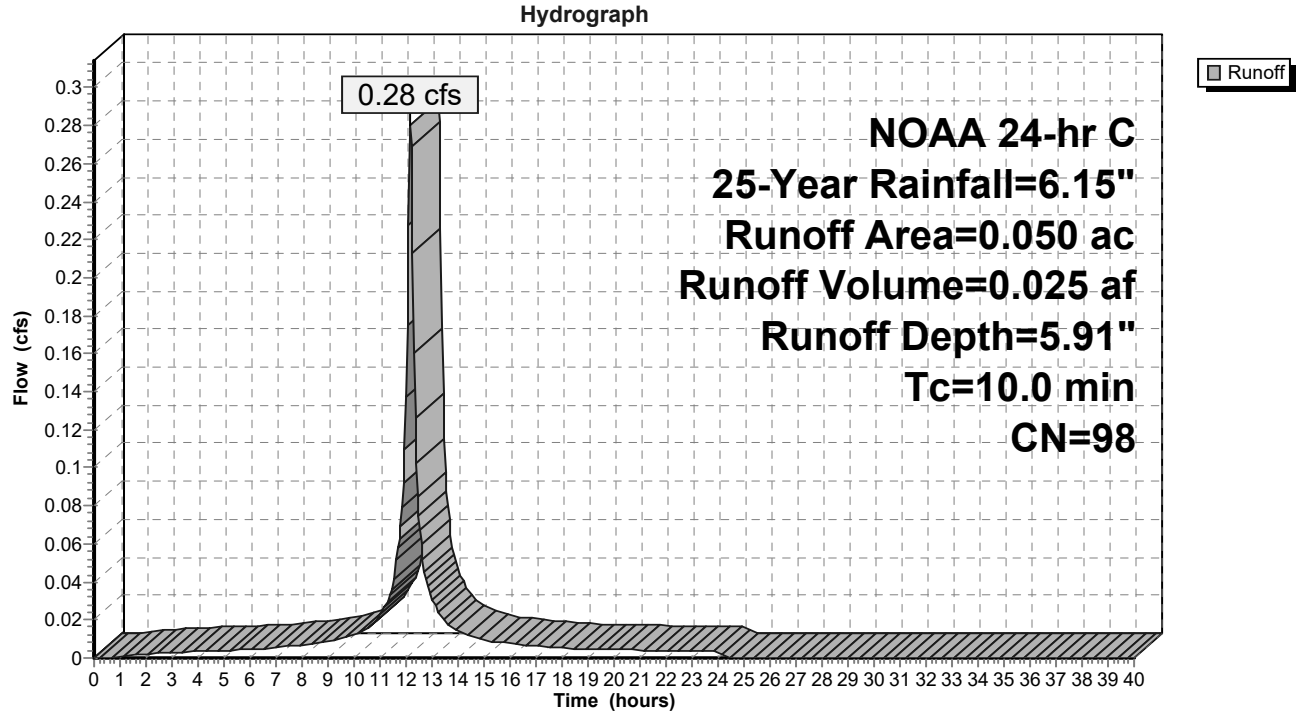
Runoff = 0.28 cfs @ 12.17 hrs, Volume= 0.025 af, Depth= 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

	Area (ac)	CN	Description
*	0.050	98	Impervious
	0.050		100.00% Impervious Area

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

Subcatchment 13: UC DA (ON-SITE) IMP



Summary for Subcatchment 14: UC DA (ON-SITE) PER

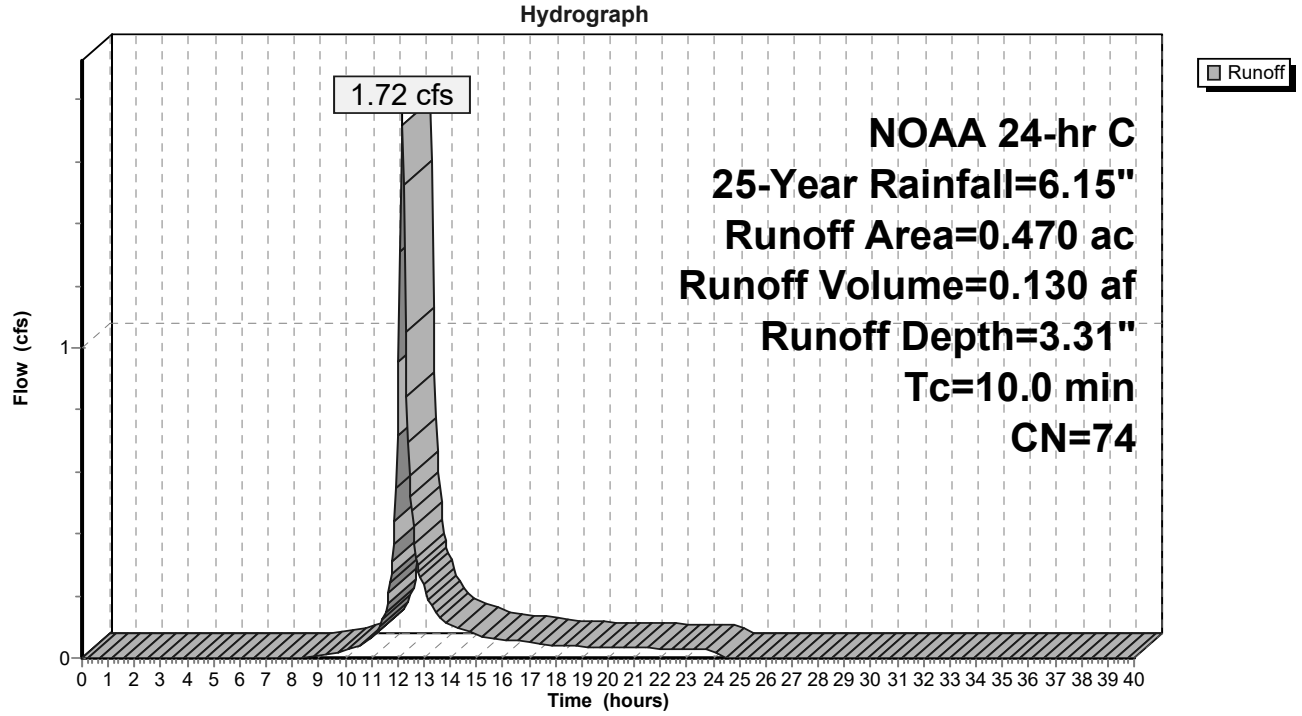
Runoff = 1.72 cfs @ 12.18 hrs, Volume= 0.130 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 25-Year Rainfall=6.15"

Area (ac)	CN	Description
0.470	74	>75% Grass cover, Good, HSG C
0.470		100.00% Pervious Area

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

Subcatchment 14: UC DA (ON-SITE) PER

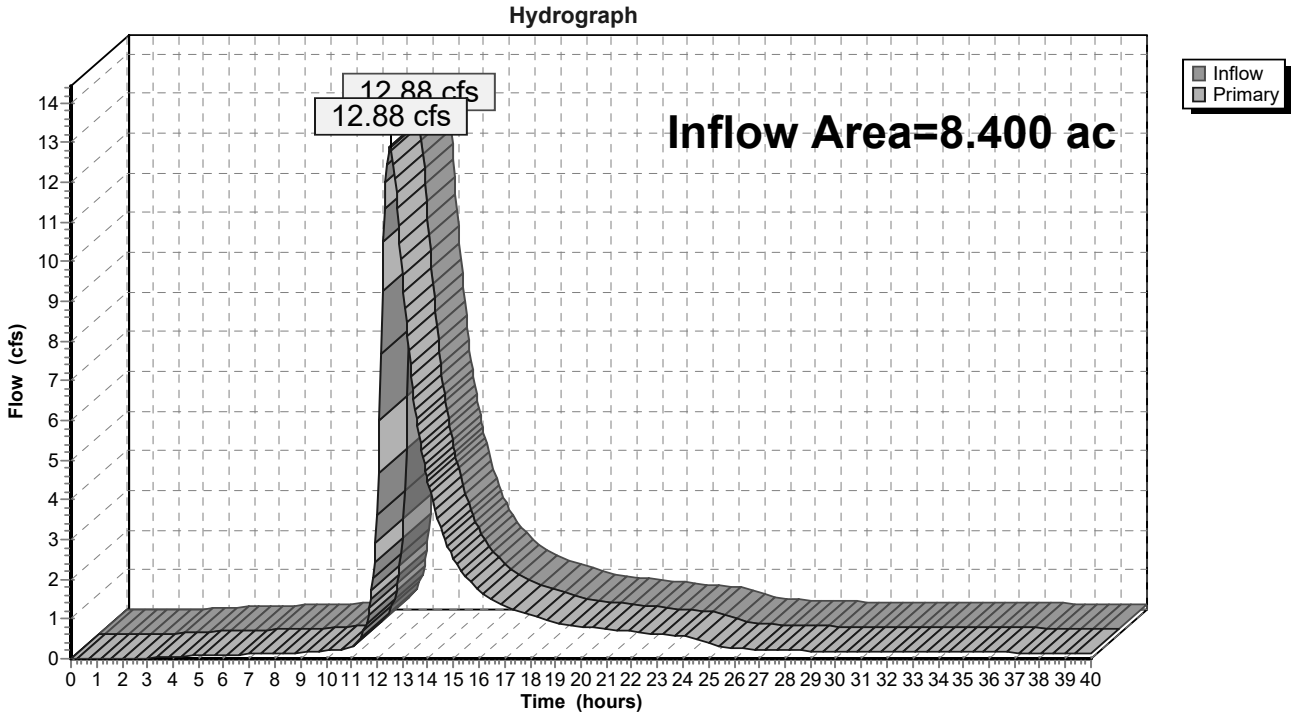


Summary for Link 15: PROP AP

Inflow Area = 8.400 ac, 40.00% Impervious, Inflow Depth > 4.15" for 25-Year event
Inflow = 12.88 cfs @ 12.53 hrs, Volume= 2.908 af
Primary = 12.88 cfs @ 12.53 hrs, Volume= 2.908 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 15: PROP AP



Summary for Subcatchment 1: EX. DA 1 IMP

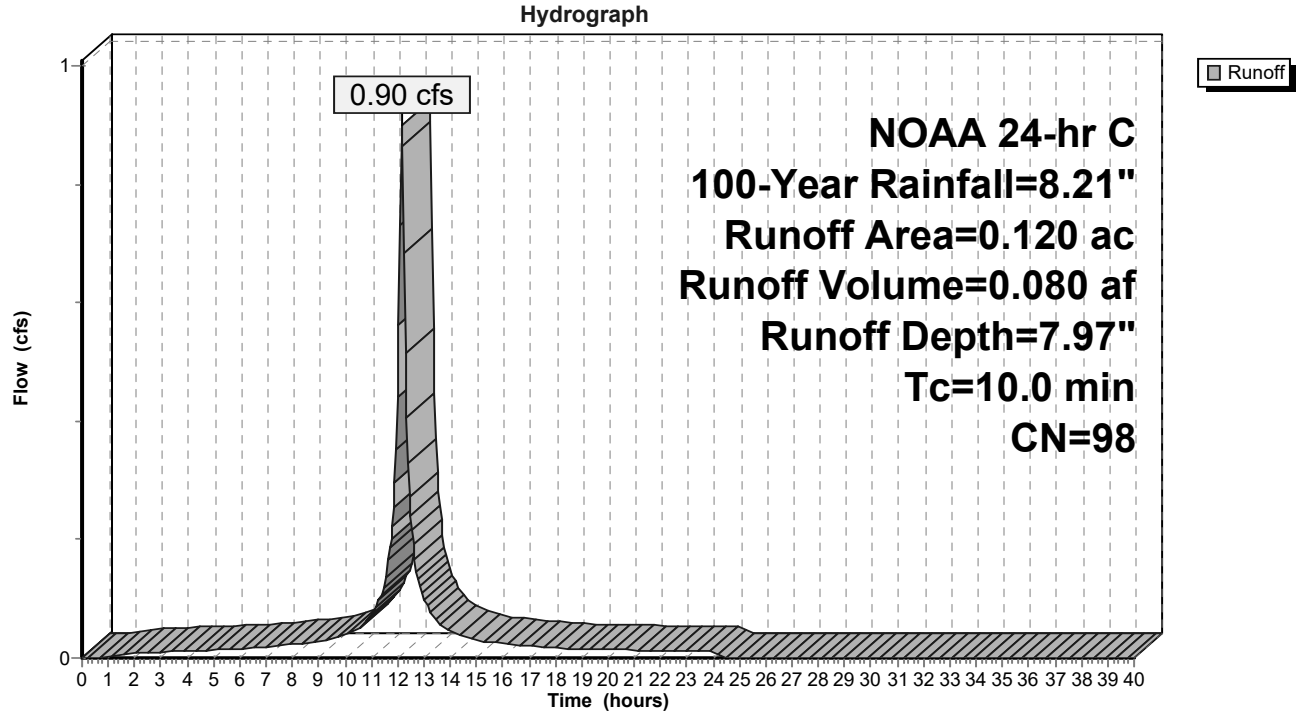
Runoff = 0.90 cfs @ 12.17 hrs, Volume= 0.080 af, Depth= 7.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG C
0.120		100.00% Impervious Area

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

Subcatchment 1: EX. DA 1 IMP



Summary for Subcatchment 2: EX. DA 1 PER

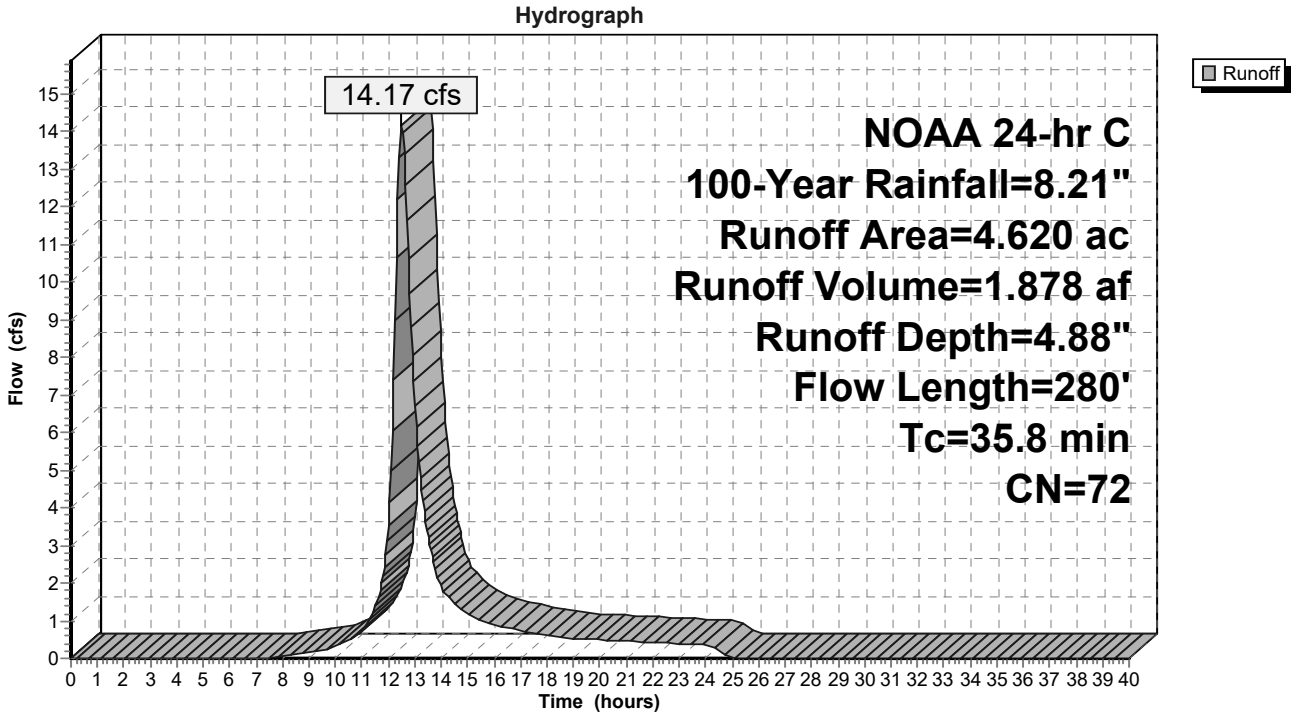
Runoff = 14.17 cfs @ 12.50 hrs, Volume= 1.878 af, Depth= 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (ac)	CN	Description
4.620	72	Woods/grass comb., Good, HSG C
4.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.3	150	0.0142	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.34"
2.5	130	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
35.8	280	Total			

Subcatchment 2: EX. DA 1 PER

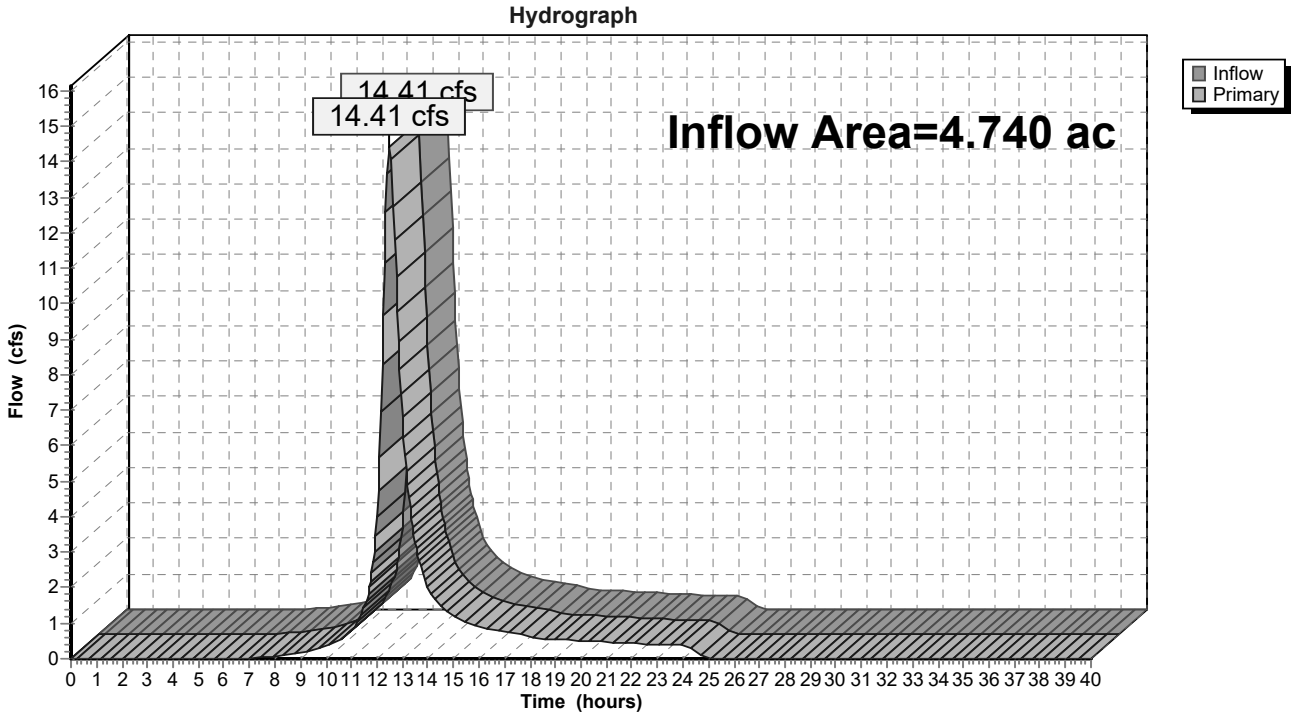


Summary for Link 3: Ex On-Site

Inflow Area = 4.740 ac, 2.53% Impervious, Inflow Depth = 4.96" for 100-Year event
Inflow = 14.41 cfs @ 12.49 hrs, Volume= 1.958 af
Primary = 14.41 cfs @ 12.49 hrs, Volume= 1.958 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3: Ex On-Site



Summary for Subcatchment 4: OFF-SITE DA IMP

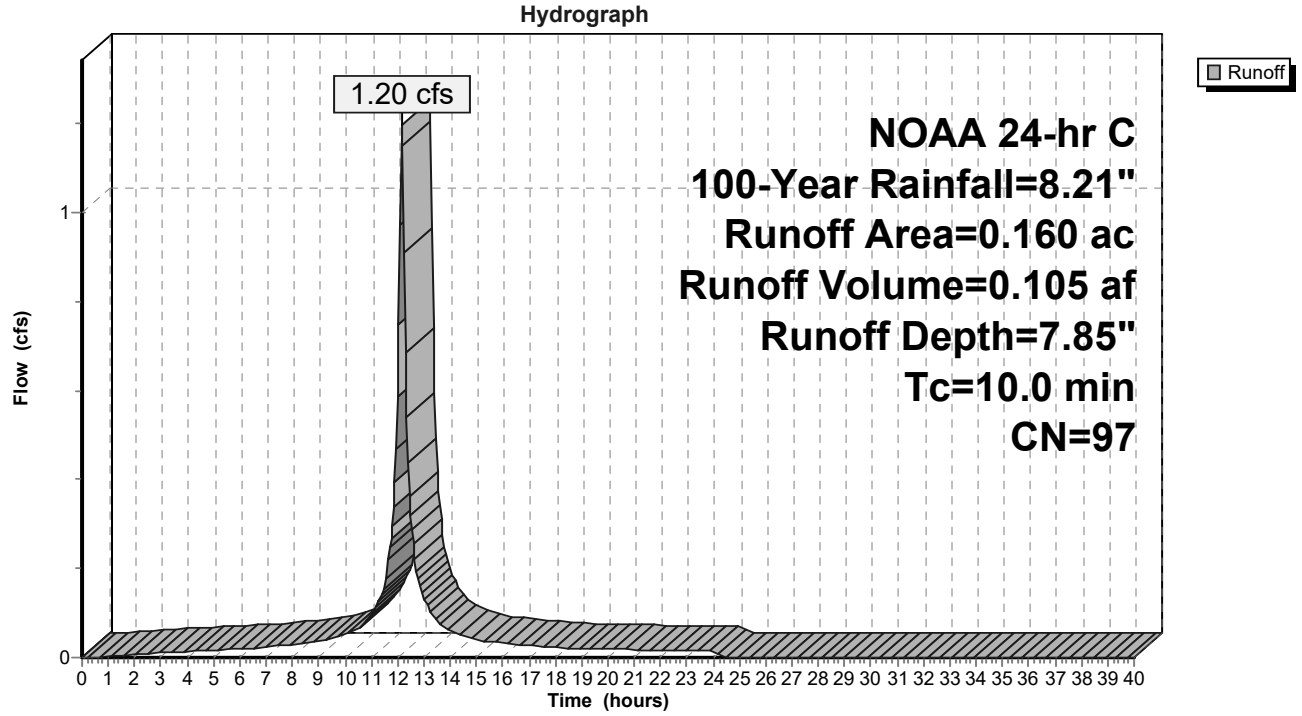
Runoff = 1.20 cfs @ 12.17 hrs, Volume= 0.105 af, Depth= 7.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

	Area (ac)	CN	Description
*	0.040	98	Impervious
*	0.120	96	Gravel
	0.160	97	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 4: OFF-SITE DA IMP



Summary for Subcatchment 5: OFF-SITE DA PERV

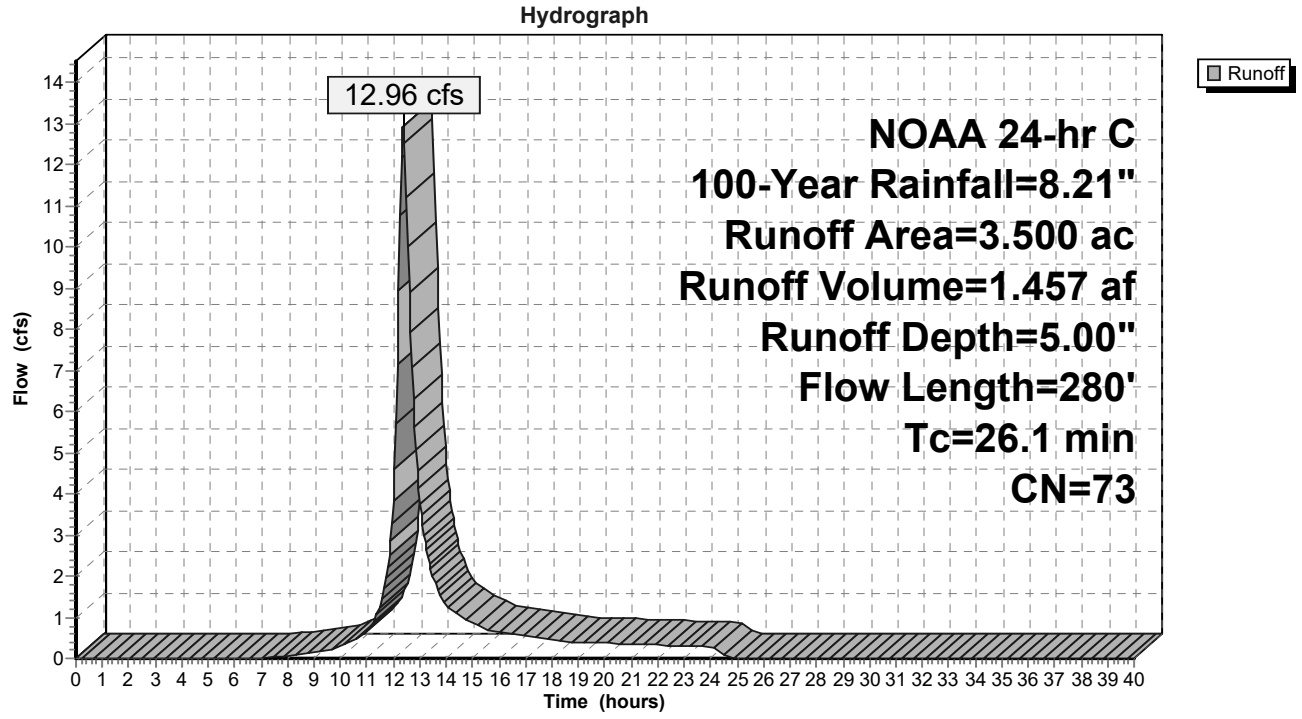
Runoff = 12.96 cfs @ 12.37 hrs, Volume= 1.457 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	150	0.0130	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.34"
3.1	130	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
26.1	280	Total			

Subcatchment 5: OFF-SITE DA PERV

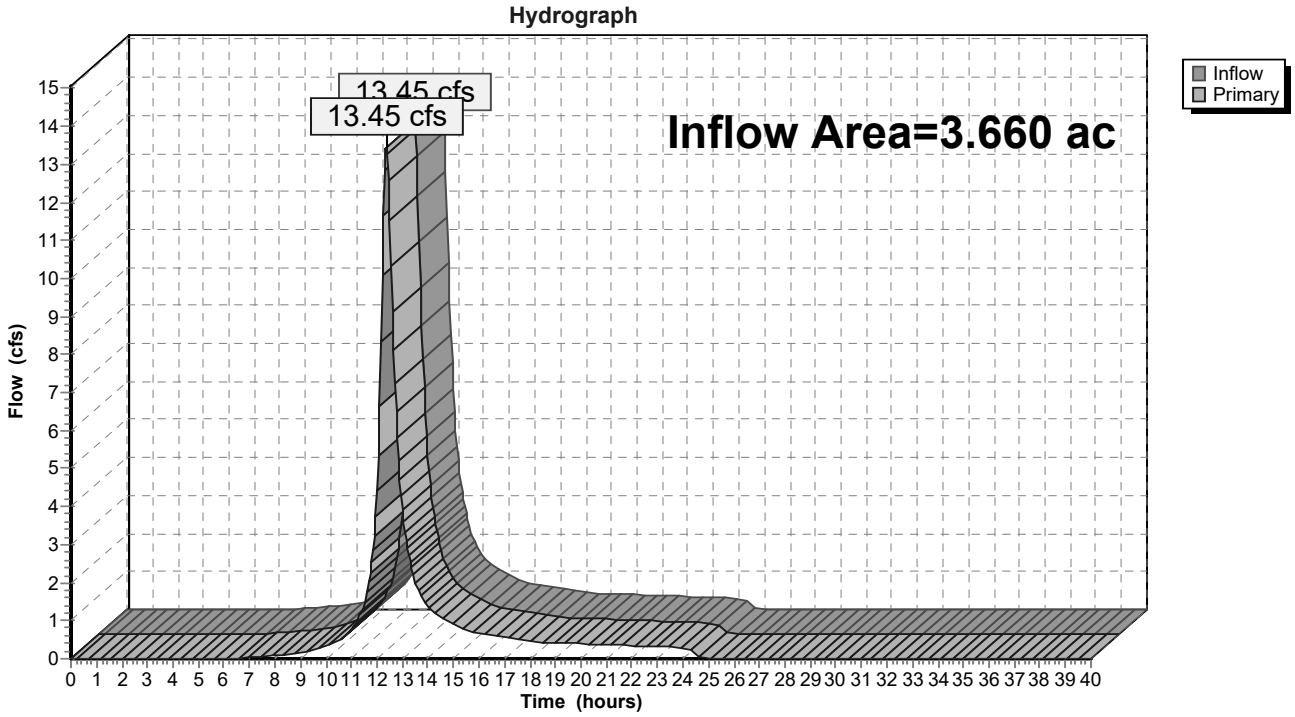


Summary for Link 6: Offsite Total

Inflow Area = 3.660 ac, 1.09% Impervious, Inflow Depth = 5.12" for 100-Year event
Inflow = 13.45 cfs @ 12.37 hrs, Volume= 1.562 af
Primary = 13.45 cfs @ 12.37 hrs, Volume= 1.562 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 6: Offsite Total

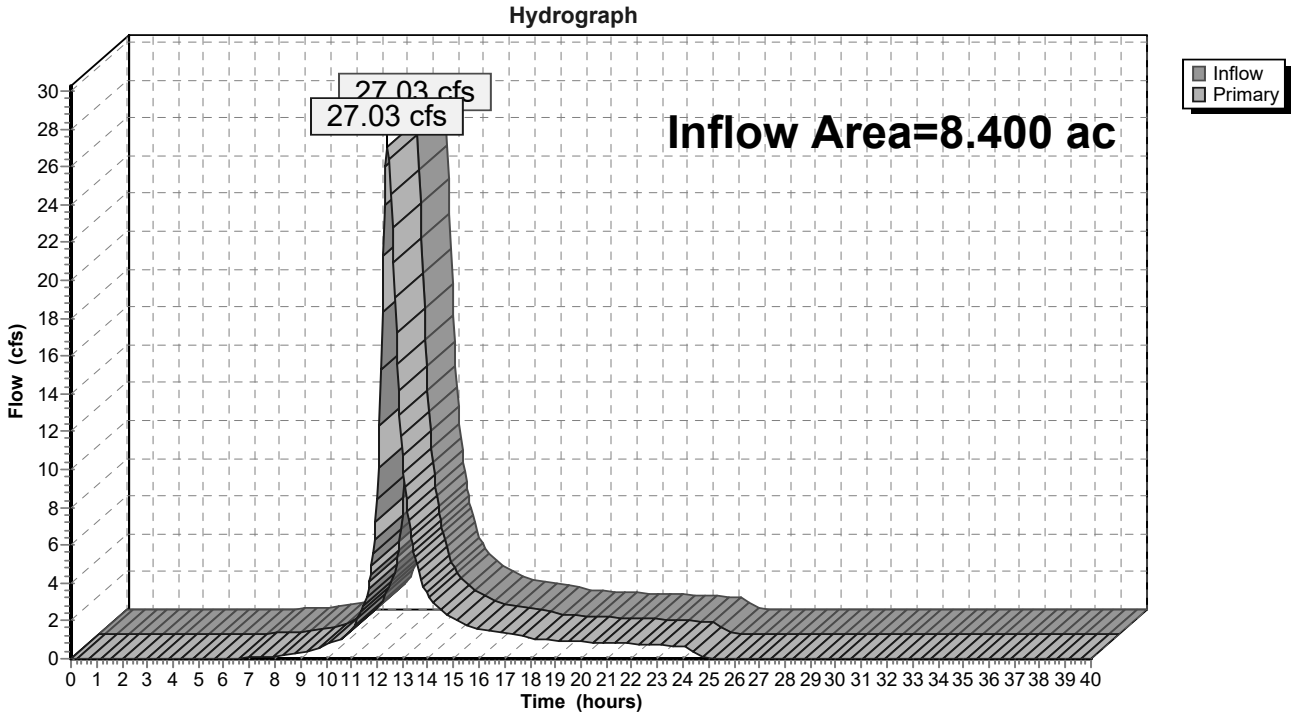


Summary for Link 7: EX AP

Inflow Area = 8.400 ac, 1.90% Impervious, Inflow Depth = 5.03" for 100-Year event
Inflow = 27.03 cfs @ 12.42 hrs, Volume= 3.520 af
Primary = 27.03 cfs @ 12.42 hrs, Volume= 3.520 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 7: EX AP



Summary for Subcatchment 8: PROP. DA ON-SITE IMP

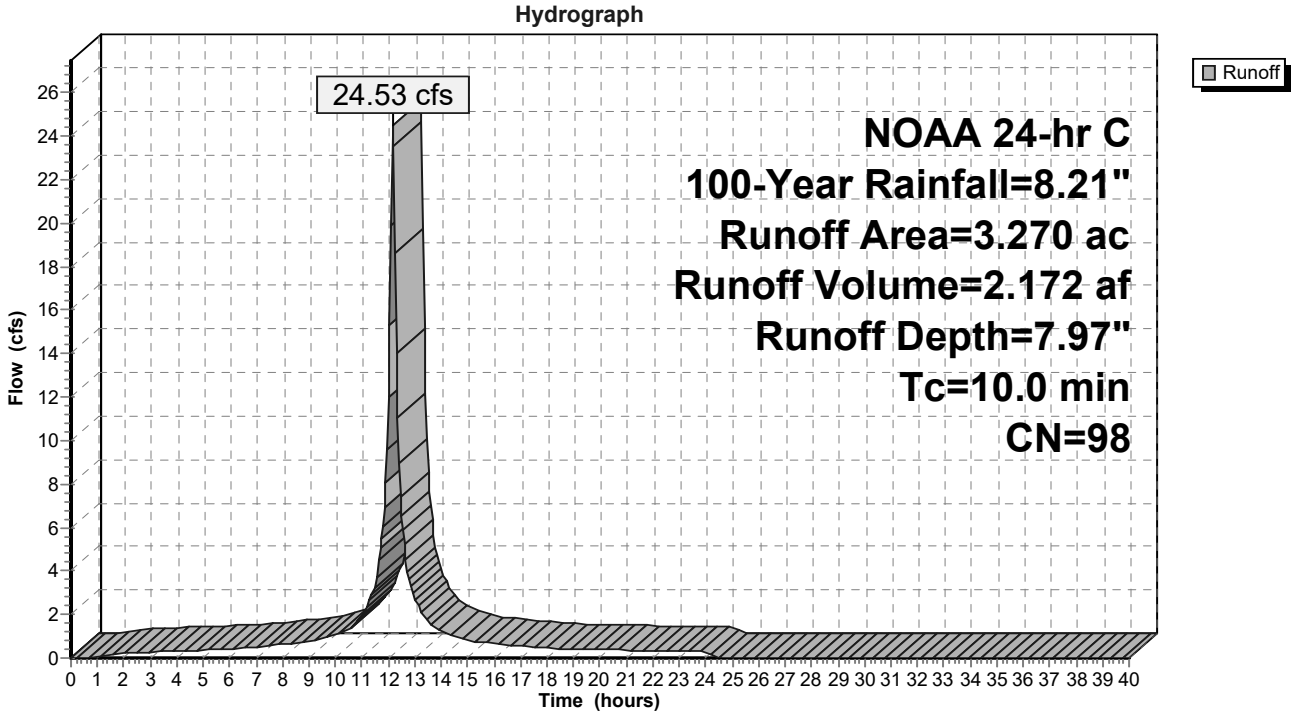
Runoff = 24.53 cfs @ 12.17 hrs, Volume= 2.172 af, Depth= 7.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

	Area (ac)	CN	Description
*	3.130	98	Impervious
*	0.140	98	1/2 Basin Impervious
	3.270	98	Weighted Average
	3.270		100.00% Impervious Area

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

Subcatchment 8: PROP. DA ON-SITE IMP



Summary for Subcatchment 9: PROP. DA ON-SITE PER

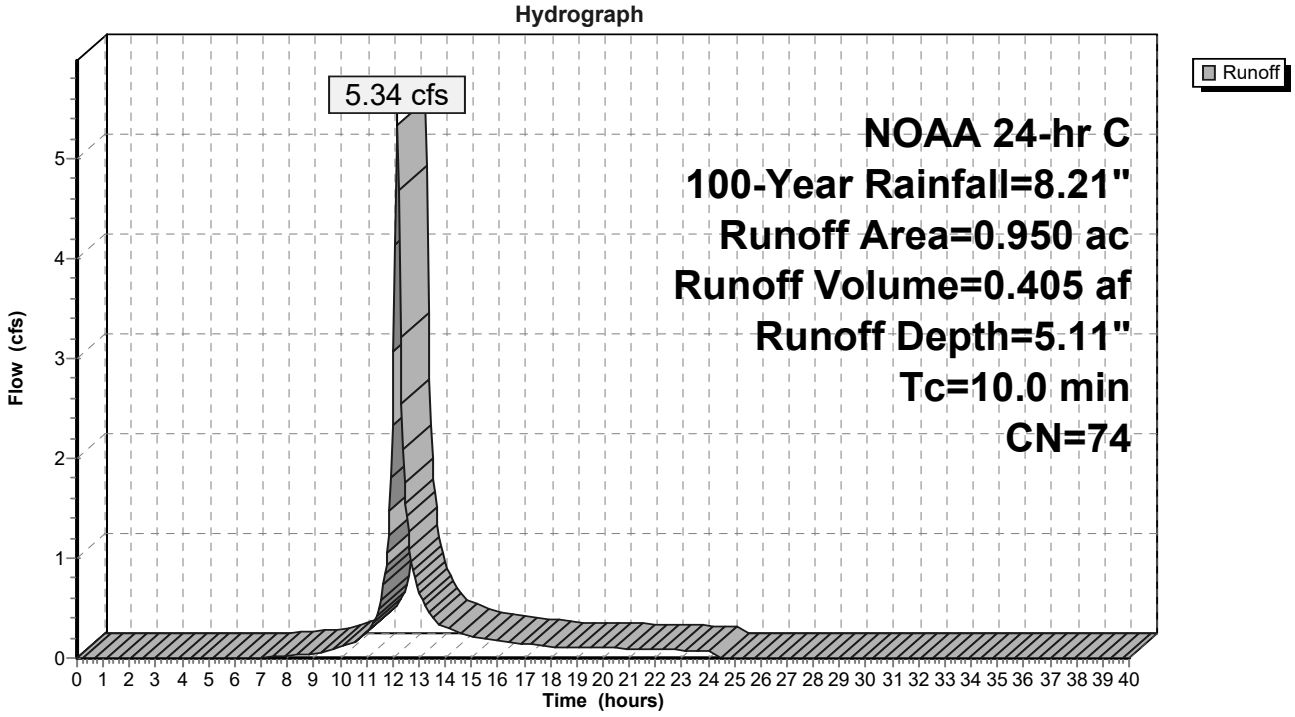
Runoff = 5.34 cfs @ 12.17 hrs, Volume= 0.405 af, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

	Area (ac)	CN	Description
	0.810	74	>75% Grass cover, Good, HSG C
*	0.140	74	1/2 Basin Pervious
	0.950	74	Weighted Average
	0.950		100.00% Pervious Area

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

Subcatchment 9: PROP. DA ON-SITE PER



Summary for Subcatchment 10: OFF-SITE PER DA

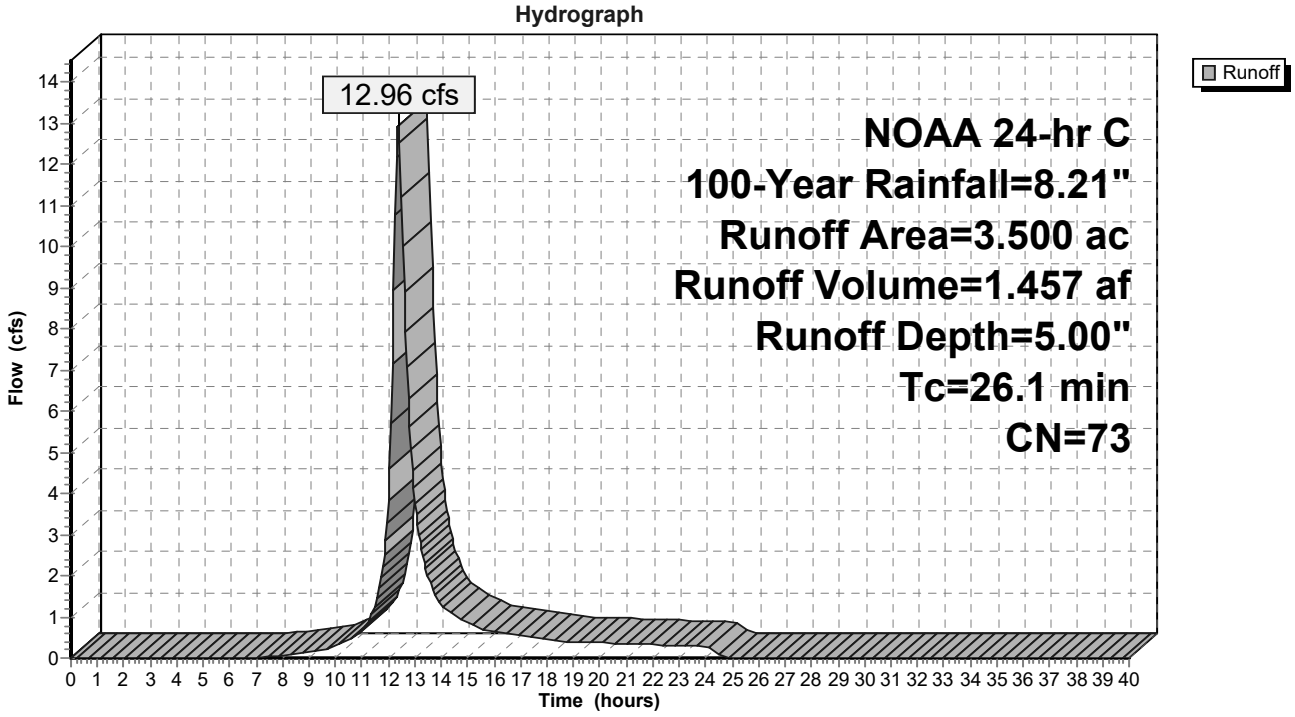
Runoff = 12.96 cfs @ 12.37 hrs, Volume= 1.457 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

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

Subcatchment 10: OFF-SITE PER DA



Summary for Subcatchment 11: OFF-SITE IMP DA

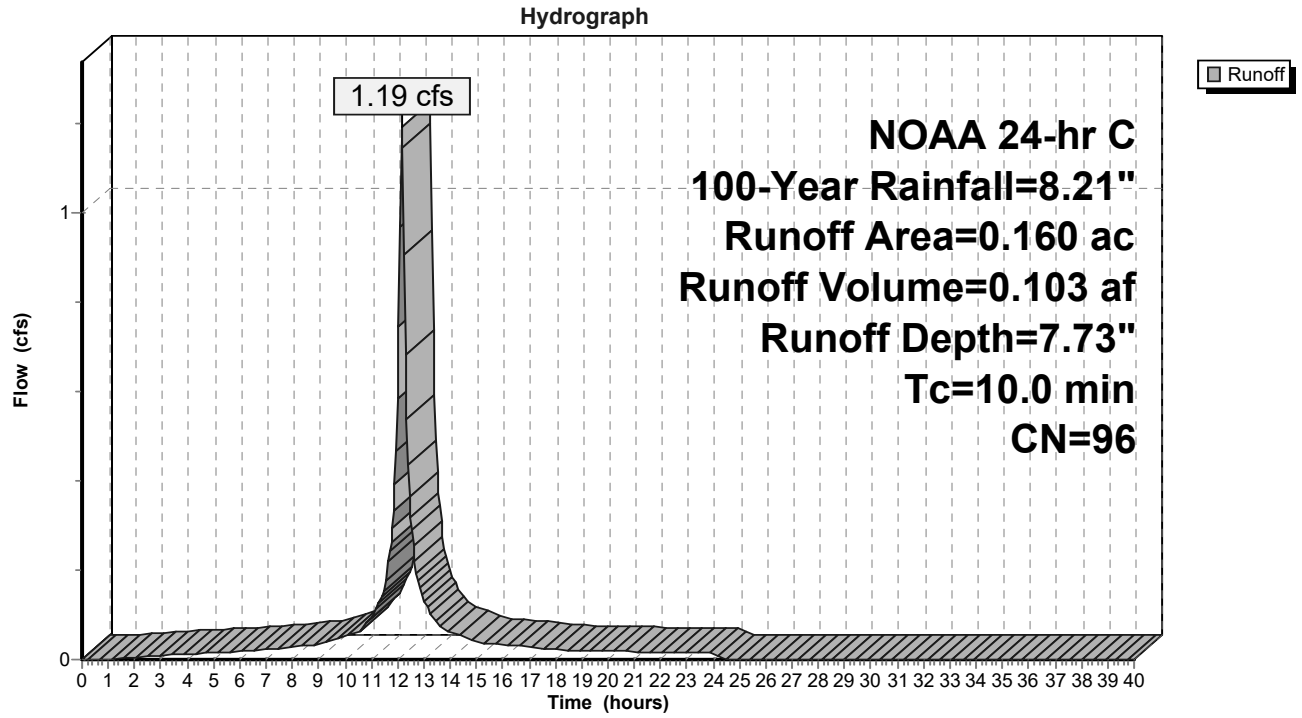
Runoff = 1.19 cfs @ 12.17 hrs, Volume= 0.103 af, Depth= 7.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

	Area (ac)	CN	Description
*	0.120	96	Gravel
*	0.040	98	Impervious
	0.160	96	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 11: OFF-SITE IMP DA



Summary for Pond 12: BASIN

Inflow Area = 7.880 ac, 42.01% Impervious, Inflow Depth = 6.30" for 100-Year event
Inflow = 39.04 cfs @ 12.18 hrs, Volume= 4.137 af
Outflow = 20.22 cfs @ 12.49 hrs, Volume= 3.999 af, Atten= 48%, Lag= 18.2 min
Primary = 20.22 cfs @ 12.49 hrs, Volume= 3.999 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Starting Elev= 71.50' Surf.Area= 16,148 sf Storage= 3,106 cf
Peak Elev= 75.03' @ 12.49 hrs Surf.Area= 28,611 sf Storage= 63,852 cf (60,745 cf above start)

Plug-Flow detention time= 181.8 min calculated for 3.928 af (95% of inflow)
Center-of-Mass det. time= 142.4 min (928.5 - 786.1)

Volume	Invert	Avail.Storage	Storage Description
#1	71.50'	58,069 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2A	71.25'	5,593 cf	**14.83'W x 530.08'L x 2.33'H Field A** 18,347 cf Overall - 4,364 cf Embedded = 13,983 cf x 40.0% Voids
#3A	71.75'	4,364 cf	**ADS_StormTech SC-310 +Cap** x 296 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 296 Chambers in 4 Rows
#4B	70.80'	11,595 cf	**22.75'W x 364.20'L x 5.50'H Field B** 45,571 cf Overall - 16,582 cf Embedded = 28,988 cf x 40.0% Voids
#5B	71.55'	16,582 cf	**ADS_StormTech MC-3500 d +Cap** x 150 Inside #4 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 150 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		96,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

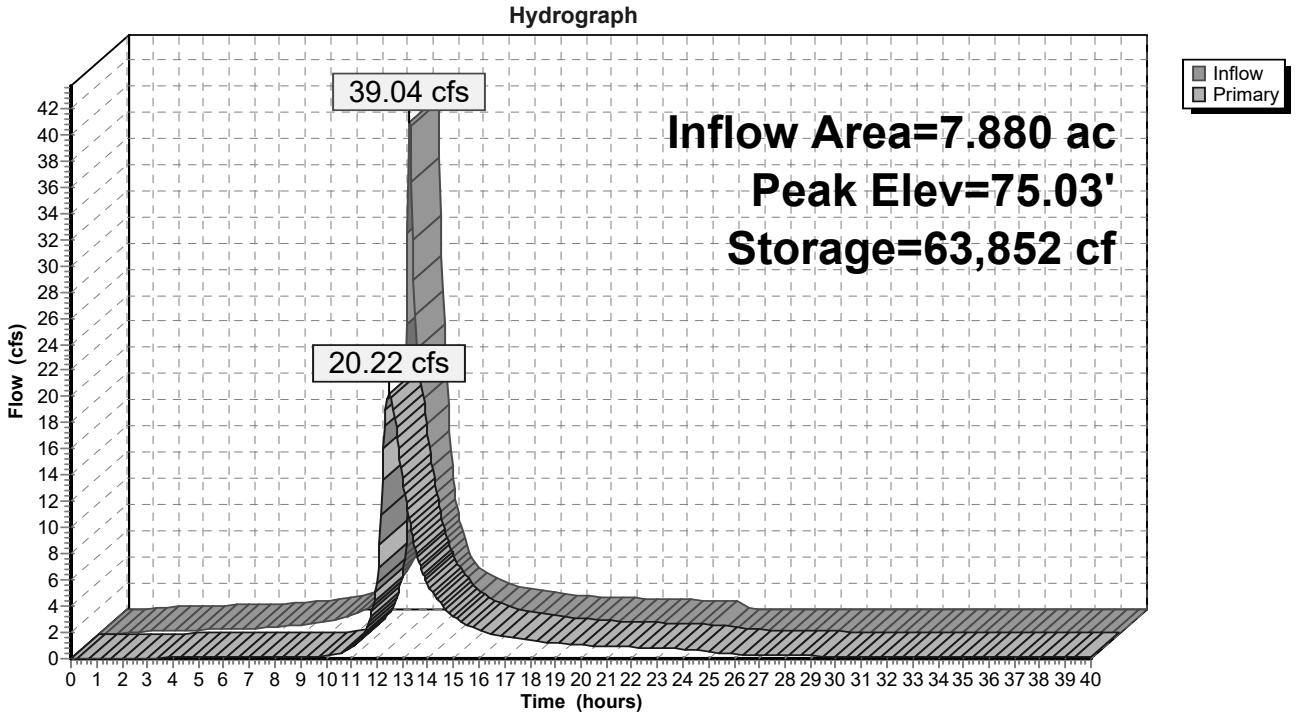
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	0	0	0
72.00	3,730	933	933
73.00	9,663	6,697	7,629
74.00	11,006	10,335	17,964
75.00	12,411	11,709	29,672
76.00	14,395	13,403	43,075
77.00	15,593	14,994	58,069

Device	Routing	Invert	Outlet Devices
#1	Primary	70.36'	**30.0" Round RCP_Round 30"** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 70.36' / 70.20' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	71.50'	**3.0" Vert. Orifice** C= 0.600
#3	Device 1	72.40'	**1.4' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=20.19 cfs @ 12.49 hrs HW=75.02' TW=0.00' (Dynamic Tailwater)
└─**1=RCP_Round 30"** (Passes 20.19 cfs of 41.14 cfs potential flow)
└─**2=Orifice** (Orifice Controls 0.44 cfs @ 8.88 fps)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 19.76 cfs @ 5.38 fps)

Pond 12: BASIN



Summary for Subcatchment 13: UC DA (ON-SITE) IMP

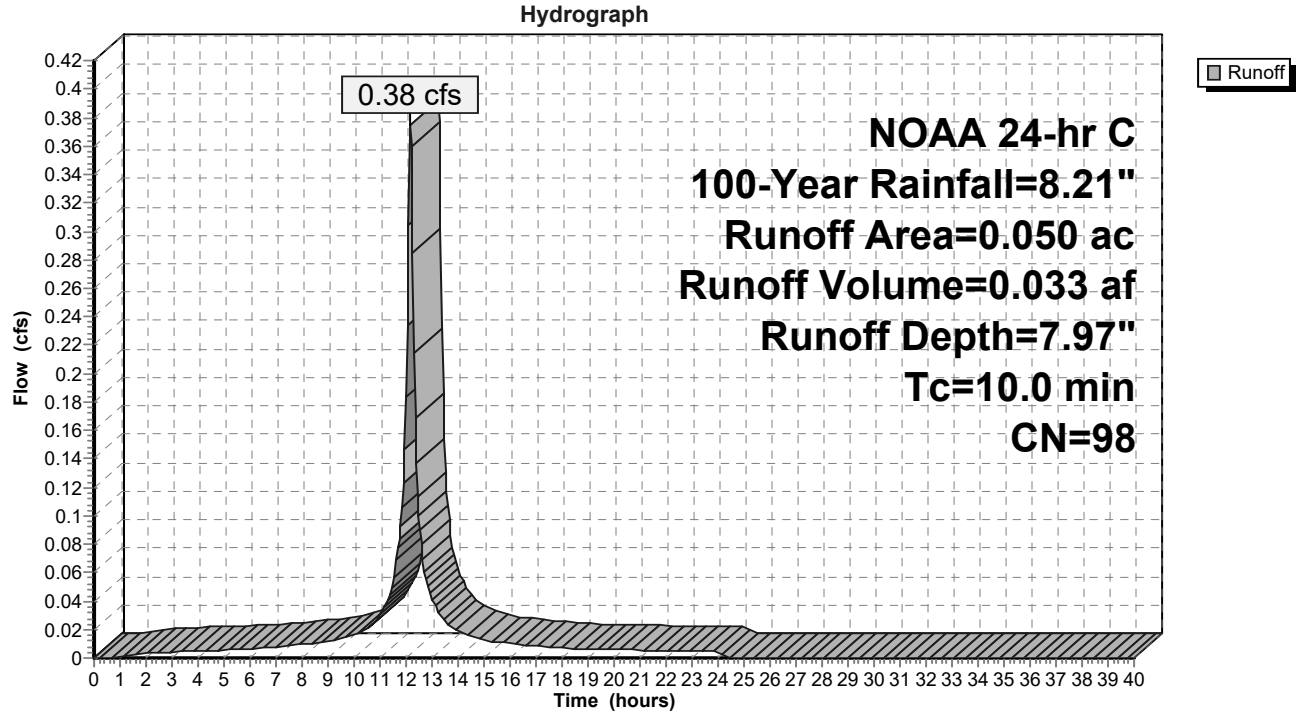
Runoff = 0.38 cfs @ 12.17 hrs, Volume= 0.033 af, Depth= 7.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

	Area (ac)	CN	Description
*	0.050	98	Impervious
	0.050		100.00% Impervious Area

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

Subcatchment 13: UC DA (ON-SITE) IMP



Summary for Subcatchment 14: UC DA (ON-SITE) PER

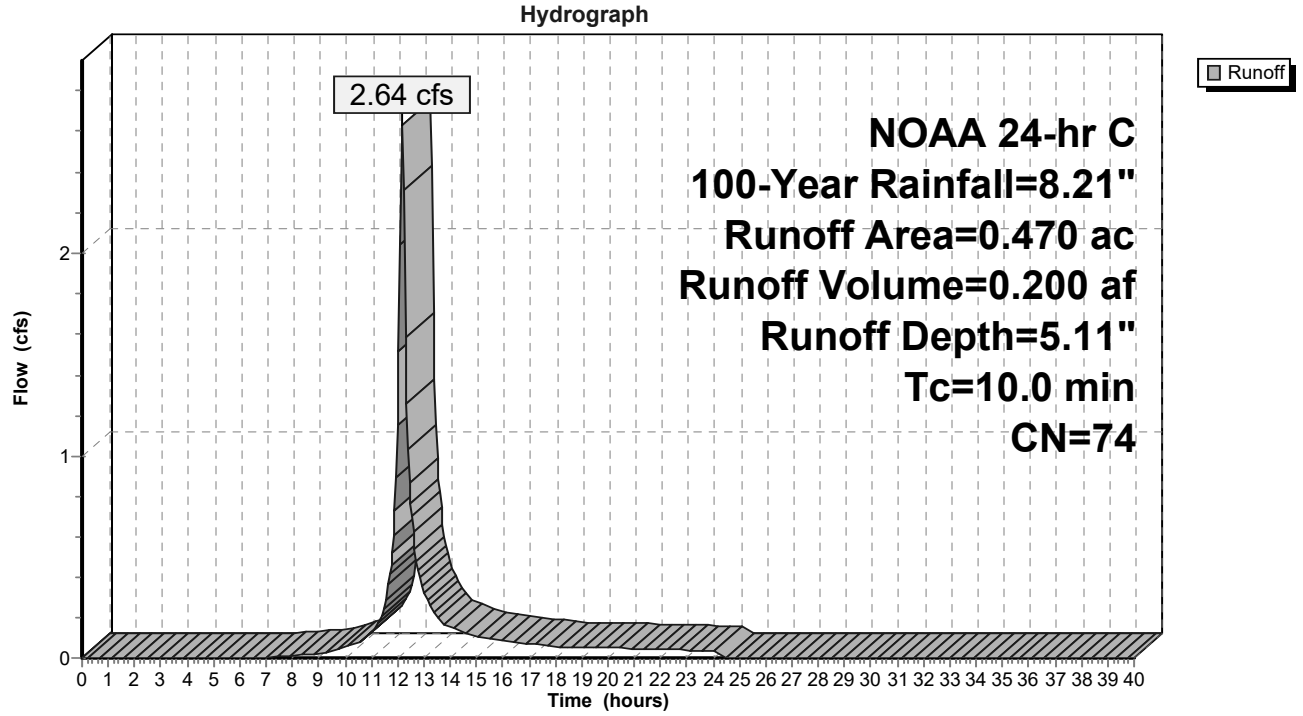
Runoff = 2.64 cfs @ 12.17 hrs, Volume= 0.200 af, Depth= 5.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (ac)	CN	Description
0.470	74	>75% Grass cover, Good, HSG C
0.470		100.00% Pervious Area

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

Subcatchment 14: UC DA (ON-SITE) PER

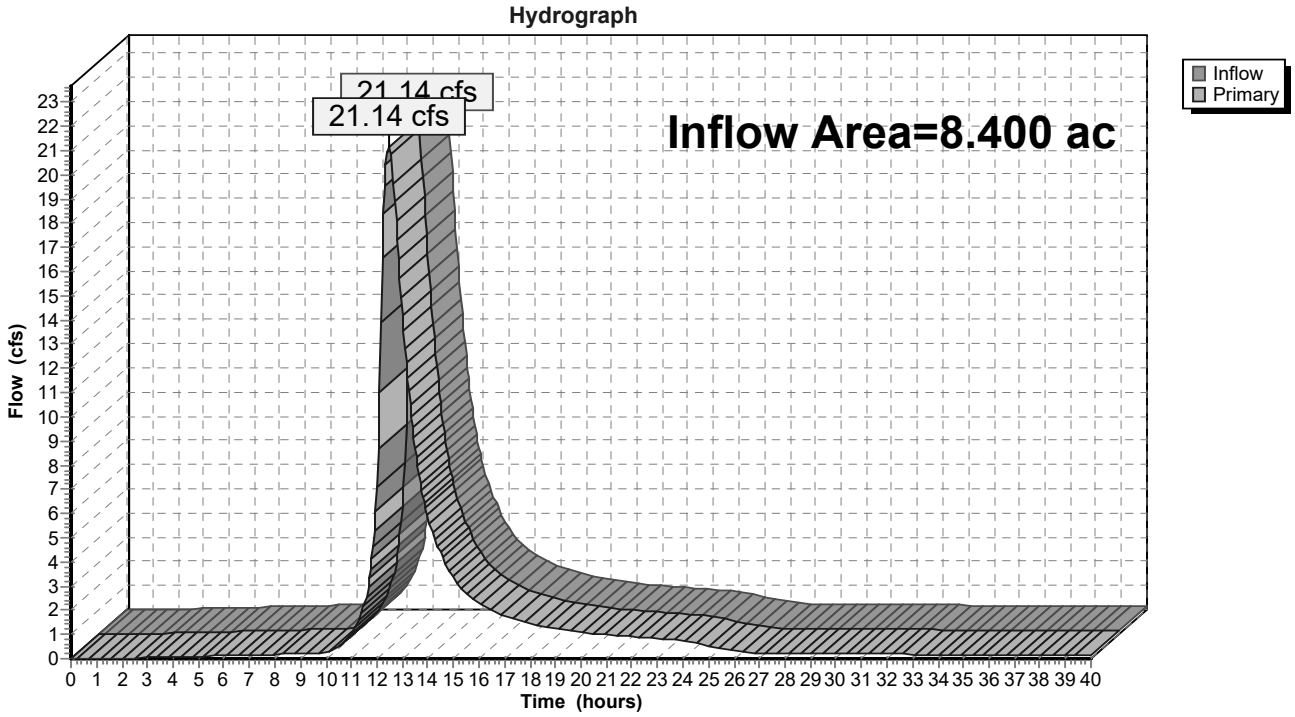


Summary for Link 15: PROP AP

Inflow Area = 8.400 ac, 40.00% Impervious, Inflow Depth > 6.05" for 100-Year event
Inflow = 21.14 cfs @ 12.46 hrs, Volume= 4.232 af
Primary = 21.14 cfs @ 12.46 hrs, Volume= 4.232 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 15: PROP AP



SECTION 2B

Proposed TSS Removal Rate

Design Criteria:

Treat all proposed pavement to 80% TSS removal (roof runoff is mixed with runoff from pavement and will need to be treated as well).

Proposed BMPs:

Proposed runoff from the site including proposed pavement will contribute to the extended detention basin which provides 24-hours extended detention and provides 60% TSS Removal per the BMP Manual. The BaySaver Barracuda manufactured treatment device will be located downstream of the extended detention basin and will treat the basin discharge rates to 50% TSS Removal.

Proposed Weighted TSS Removal Rate

R = A + B – [(A X B) / 100] (Equation 4-1)

Where: R = Total TSS Removal Rate ; A = TSS Removal Rate of the First or Upstream BMP; B = TSS Removal Rate of the Second or Downstream BMP

TSS Removal Rate = 60% + 50% - [(60% X 50%) / 100]

TSS Removal Rate = 80%

KIM GUADAGNO

CHRIS CHRISTIE
Governor

Lt. Governor

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

BOB MARTIN
Commissioner

September 18, 2017

Daniel J. Figola, P.E.
General Manager
BaySaver Technologies, LLC
1030 Deer Hollow Drive
Mt. Airy, MD 21771

Re: MTD Lab Certification
BaySaver Barracuda™ Hydrodynamic Separator by BaySaver Technologies, LLC
Online Installation

TSS Removal Rate 50%

Dear Mr. Figola:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). BaySaver Technologies, LLC has requested an MTD Laboratory Certification for the BaySaver Barracuda™ Hydrodynamic Separator (BaySaver Barracuda).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated September 2017) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the BaySaver Barracuda by BaySaver Technologies, LLC at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The BaySaver Barracuda shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This BaySaver Barracuda cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the BaySaver Barracuda. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at http://www.ads-pipe.com/pdf/en/Barracuda_Maintenance_07_17.pdf for any changes to the maintenance requirements.

6. Sizing Requirement:

   The example below demonstrates the sizing procedure for the BaySaver Barracuda:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a BaySaver Barracuda. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c = 0.99 (curve number for impervious)
   Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the Barracuda Model S4 with a MTFR of 1.25 cfs could be used for this site to remove 50% of the TSS from the impervious area without exceeding the MTFR.

   The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1.

DETENTION BASIN WQ FLOW=0.20 CFS
S3 MODEL REQUIRED FOR 50% TSS REMOVAL

Table 1 BaySaver Barracuda Sizing Information

Barracuda Model	NJDEP 50% TSS Maximum Treatment Flow Rate (cfs)	Treatment Area (ft^2)	Hydraulic Loading Rate (gpm/ft^2)	50% Maximum Sediment Storage (ft^3)
S3	0.70	7.07	44.6	5.89
S4	1.25	12.57	44.6	10.47
S5	1.95	19.63	44.6	16.36
S6	2.80	28.27	44.6	23.56
S8	5.00	50.27	44.6	41.89
S10	7.80	78.54	44.6	65.45

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

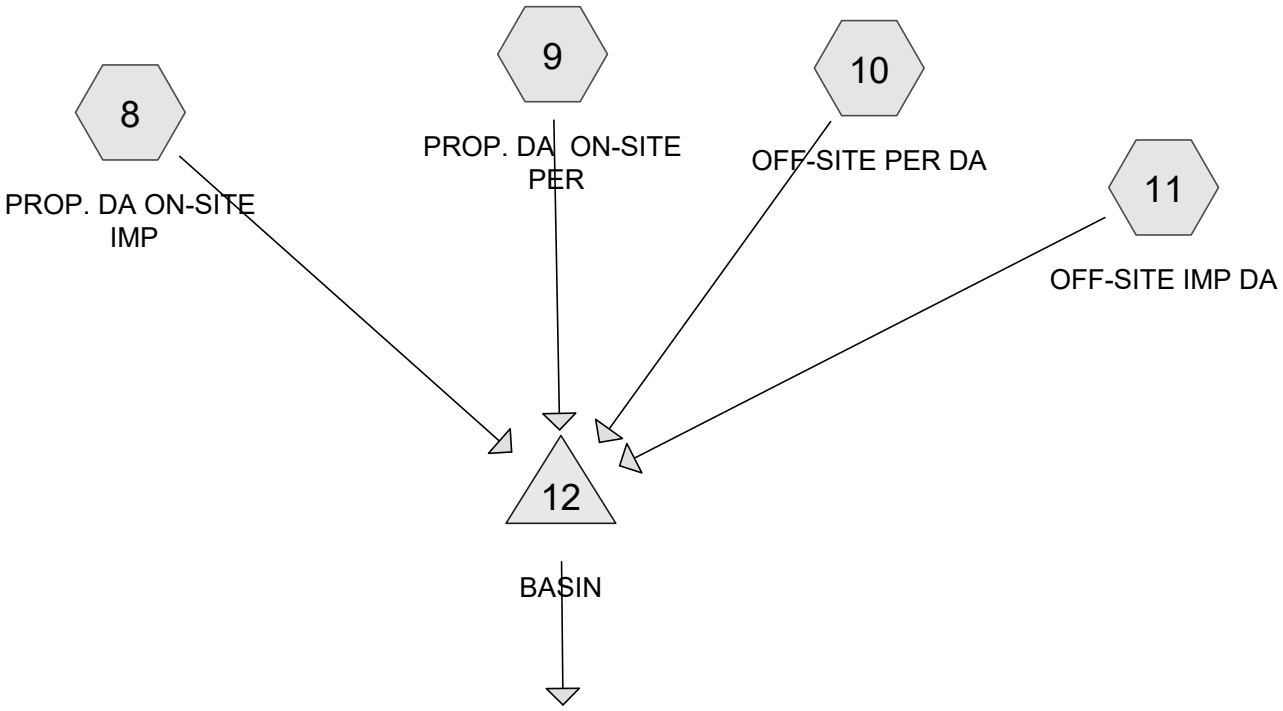
If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC



Subcat Reach Pond Link

Routing Diagram for Drainage Analysis

Prepared by {enter your company name here}, Printed 7/23/2020

Summary for Subcatchment 8: PROP. DA ON-SITE IMP

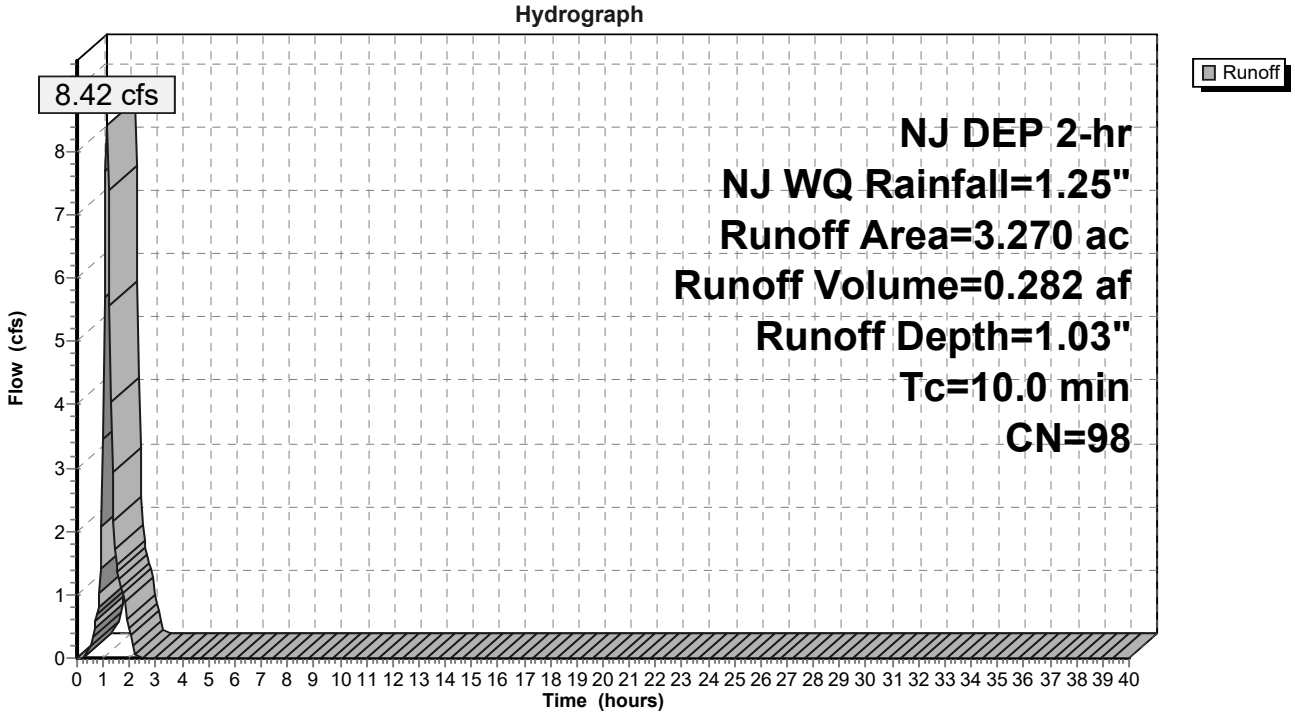
Runoff = 8.42 cfs @ 1.15 hrs, Volume= 0.282 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr NJ WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	3.130	98	Impervious
*	0.140	98	1/2 Basin Impervious
	3.270	98	Weighted Average
	3.270		100.00% Impervious Area

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

Subcatchment 8: PROP. DA ON-SITE IMP



Summary for Subcatchment 9: PROP. DA ON-SITE PER

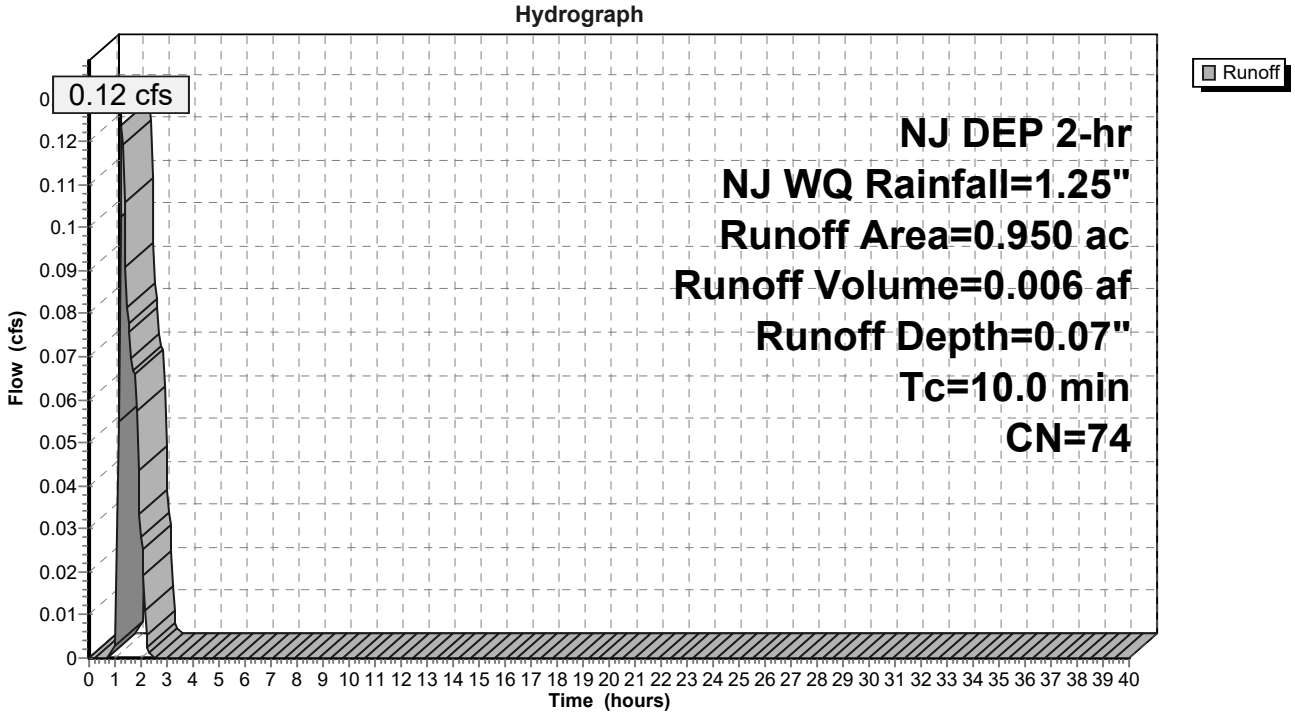
Runoff = 0.12 cfs @ 1.27 hrs, Volume= 0.006 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr NJ WQ Rainfall=1.25"

	Area (ac)	CN	Description
	0.810	74	>75% Grass cover, Good, HSG C
*	0.140	74	1/2 Basin Pervious
	0.950	74	Weighted Average
	0.950		100.00% Pervious Area

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

Subcatchment 9: PROP. DA ON-SITE PER



Summary for Subcatchment 10: OFF-SITE PER DA

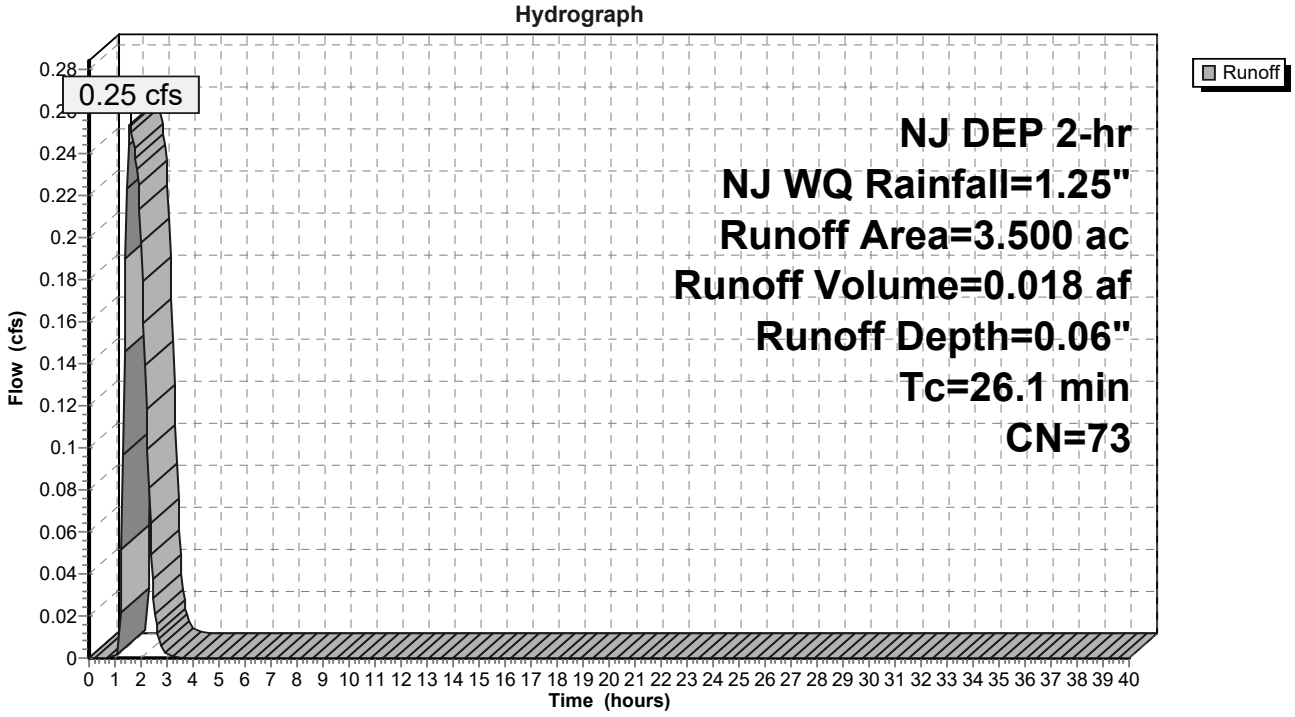
Runoff = 0.25 cfs @ 1.58 hrs, Volume= 0.018 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr NJ WQ Rainfall=1.25"

Area (ac)	CN	Description
1.360	72	Woods/grass comb., Good, HSG C
2.140	74	>75% Grass cover, Good, HSG C
3.500	73	Weighted Average
3.500		100.00% Pervious Area

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

Subcatchment 10: OFF-SITE PER DA



Summary for Subcatchment 11: OFF-SITE IMP DA

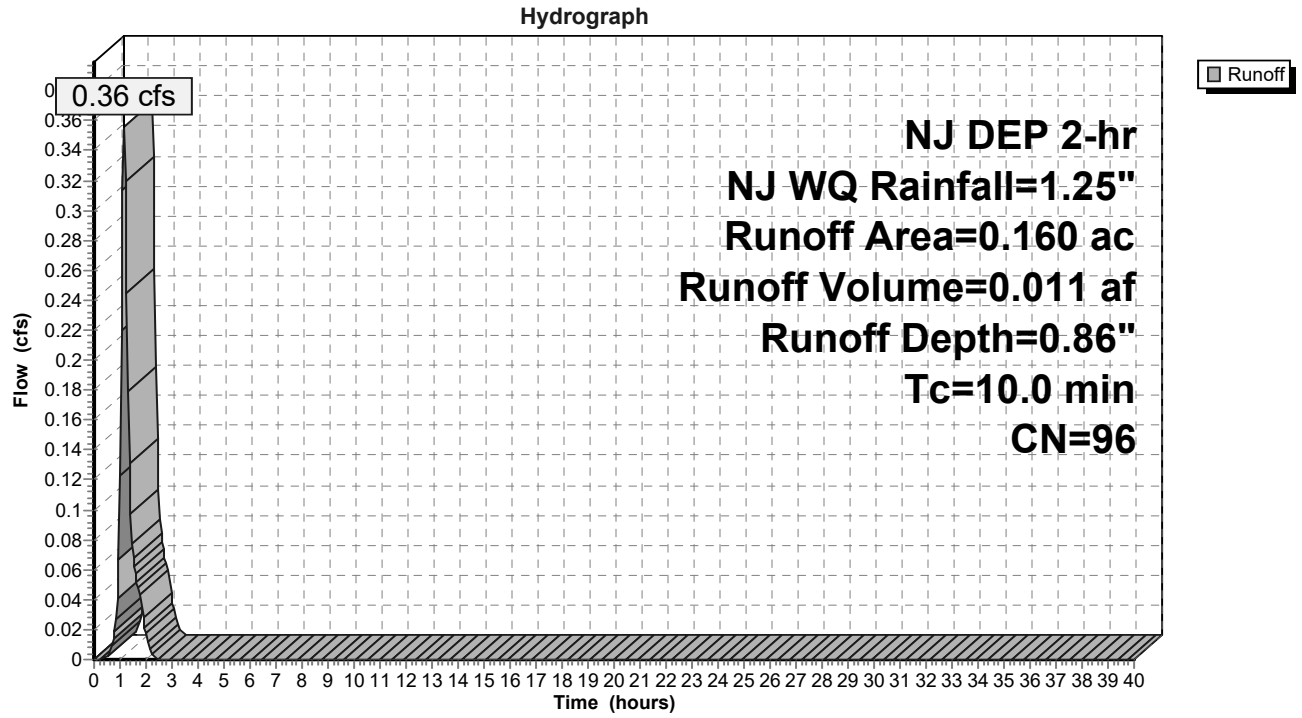
Runoff = 0.36 cfs @ 1.15 hrs, Volume= 0.011 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr NJ WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.120	96	Gravel
*	0.040	98	Impervious
	0.160	96	Weighted Average
	0.120		75.00% Pervious Area
	0.040		25.00% Impervious Area

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

Subcatchment 11: OFF-SITE IMP DA



Summary for Pond 12: BASIN

Inflow Area = 7.880 ac, 42.01% Impervious, Inflow Depth = 0.48" for NJ WQ event
Inflow = 8.84 cfs @ 1.15 hrs, Volume= 0.317 af
Outflow = 0.20 cfs @ 2.20 hrs, Volume= 0.305 af, Atten= 98%, Lag= 63.4 min
Primary = 0.20 cfs @ 2.20 hrs, Volume= 0.305 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Starting Elev= 71.50' Surf.Area= 16,148 sf Storage= 3,106 cf
Peak Elev= 72.36' @ 2.20 hrs Surf.Area= 22,025 sf Storage= 16,037 cf (12,931 cf above start)

Plug-Flow detention time= 883.2 min calculated for 0.234 af (74% of inflow)
Center-of-Mass det. time= 699.5 min (775.8 - 76.3)

Volume	Invert	Avail.Storage	Storage Description
#1	71.50'	58,069 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
#2A	71.25'	5,593 cf	**14.83'W x 530.08'L x 2.33'H Field A** 18,347 cf Overall - 4,364 cf Embedded = 13,983 cf x 40.0% Voids
#3A	71.75'	4,364 cf	**ADS_StormTech SC-310 +Cap** x 296 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 296 Chambers in 4 Rows
#4B	70.80'	11,595 cf	**22.75'W x 364.20'L x 5.50'H Field B** 45,571 cf Overall - 16,582 cf Embedded = 28,988 cf x 40.0% Voids
#5B	71.55'	16,582 cf	**ADS_StormTech MC-3500 d +Cap** x 150 Inside #4 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 150 Chambers in 3 Rows Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		96,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	0	0	0
72.00	3,730	933	933
73.00	9,663	6,697	7,629
74.00	11,006	10,335	17,964
75.00	12,411	11,709	29,672
76.00	14,395	13,403	43,075
77.00	15,593	14,994	58,069

Device	Routing	Invert	Outlet Devices
#1	Primary	70.36'	**30.0" Round RCP_Round 30"** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 70.36' / 70.20' S= 0.0020 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	71.50'	**3.0" Vert. Orifice** C= 0.600
#3	Device 1	72.40'	**1.4' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00

Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.20 cfs @ 2.20 hrs HW=72.36' TW=0.00' (Dynamic Tailwater)
↑└─**1=RCP_Round 30"** (Passes 0.20 cfs of 14.03 cfs potential flow)
↑ ├─**2=Orifice** (Orifice Controls 0.20 cfs @ 4.13 fps)
↑ └─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Hydrograph for Pond 12: BASIN

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	3,106	71.50	0.00
0.10	0.00	3,106	71.50	0.00
0.20	0.00	3,106	71.50	0.00
0.30	0.00	3,106	71.50	0.00
0.40	0.02	3,108	71.50	0.00
0.50	0.14	3,133	71.50	0.00
0.60	0.34	3,217	71.52	0.00
0.70	0.60	3,386	71.54	0.00
0.80	0.81	3,636	71.57	0.01
0.90	1.45	4,021	71.60	0.02
1.00	3.58	4,847	71.68	0.05
1.10	**8.02**	6,929	71.83	0.11
1.20	**7.82**	9,899	72.01	0.15
1.30	4.42	12,021	72.14	0.17
1.40	2.53	13,179	72.20	0.18
1.50	1.87	13,886	72.24	0.19
1.60	1.62	14,447	72.27	0.19
1.70	1.40	14,918	72.30	0.19
1.80	1.31	15,335	72.32	0.20
1.90	0.91	15,671	72.34	0.20
2.00	0.63	15,870	72.35	0.20
2.10	0.45	15,996	72.36	0.20
2.20	0.20	**16,037**	**72.36**	**0.20**
2.30	0.10	16,015	72.36	0.20
2.40	0.05	15,969	72.36	0.20
2.50	0.03	15,911	72.35	0.20
2.60	0.02	15,846	72.35	0.20
2.70	0.01	15,778	72.35	0.20
2.80	0.00	15,708	72.34	0.20
2.90	0.00	15,637	72.34	0.20
3.00	0.00	15,566	72.34	0.20
3.10	0.00	15,495	72.33	0.20
3.20	0.00	15,424	72.33	0.20
3.30	0.00	15,353	72.32	0.20
3.40	0.00	15,281	72.32	0.20
3.50	0.00	15,211	72.32	0.20
3.60	0.00	15,140	72.31	0.20
3.70	0.00	15,070	72.31	0.20
3.80	0.00	14,999	72.30	0.19
3.90	0.00	14,929	72.30	0.19
4.00	0.00	14,859	72.30	0.19
4.10	0.00	14,790	72.29	0.19
4.20	0.00	14,720	72.29	0.19
4.30	0.00	14,651	72.29	0.19
4.40	0.00	14,582	72.28	0.19
4.50	0.00	14,513	72.28	0.19
4.60	0.00	14,445	72.27	0.19
4.70	0.00	14,376	72.27	0.19
4.80	0.00	14,308	72.27	0.19
4.90	0.00	14,240	72.26	0.19
5.00	0.00	14,172	72.26	0.19
5.10	0.00	14,104	72.25	0.19
5.20	0.00	14,037	72.25	0.19

PEAK STORAGE
(16,037-3,106= 12,931CF)

Hydrograph for Pond 12: BASIN (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
5.30	0.00	13,970	72.25	0.19
5.40	0.00	13,903	72.24	0.19
5.50	0.00	13,836	72.24	0.19
5.60	0.00	13,769	72.24	0.18
5.70	0.00	13,703	72.23	0.18
5.80	0.00	13,637	72.23	0.18
5.90	0.00	13,571	72.22	0.18
6.00	0.00	13,505	72.22	0.18
6.10	0.00	13,440	72.22	0.18
6.20	0.00	13,374	72.21	0.18
6.30	0.00	13,309	72.21	0.18
6.40	0.00	13,244	72.21	0.18
6.50	0.00	13,179	72.20	0.18
6.60	0.00	13,115	72.20	0.18
6.70	0.00	13,050	72.20	0.18
6.80	0.00	12,986	72.19	0.18
6.90	0.00	12,922	72.19	0.18
7.00	0.00	12,859	72.18	0.18
7.10	0.00	12,795	72.18	0.18
7.20	0.00	12,732	72.18	0.18
7.30	0.00	12,669	72.17	0.18
7.40	0.00	12,606	72.17	0.17
7.50	0.00	12,543	72.17	0.17
7.60	0.00	12,480	72.16	0.17
7.70	0.00	12,418	72.16	0.17
7.80	0.00	12,356	72.16	0.17
7.90	0.00	12,294	72.15	0.17
8.00	0.00	12,233	72.15	0.17
8.10	0.00	12,171	72.14	0.17
8.20	0.00	12,110	72.14	0.17
8.30	0.00	12,049	72.14	0.17
8.40	0.00	11,988	72.13	0.17
8.50	0.00	11,927	72.13	0.17
8.60	0.00	11,867	72.13	0.17
8.70	0.00	11,807	72.12	0.17
8.80	0.00	11,747	72.12	0.17
8.90	0.00	11,687	72.12	0.17
9.00	0.00	11,627	72.11	0.17
9.10	0.00	11,568	72.11	0.16
9.20	0.00	11,509	72.11	0.16
9.30	0.00	11,450	72.10	0.16
9.40	0.00	11,391	72.10	0.16
9.50	0.00	11,333	72.10	0.16
9.60	0.00	11,274	72.09	0.16
9.70	0.00	11,216	72.09	0.16
9.80	0.00	11,158	72.09	0.16
9.90	0.00	11,101	72.08	0.16
10.00	0.00	11,043	72.08	0.16
10.10	0.00	10,986	72.08	0.16
10.20	0.00	10,929	72.07	0.16
10.30	0.00	10,872	72.07	0.16
10.40	0.00	10,816	72.07	0.16
10.50	0.00	10,759	72.06	0.16

Hydrograph for Pond 12: BASIN (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
10.60	0.00	10,703	72.06	0.16
10.70	0.00	10,647	72.06	0.16
10.80	0.00	10,591	72.05	0.15
10.90	0.00	10,536	72.05	0.15
11.00	0.00	10,480	72.05	0.15
11.10	0.00	10,425	72.04	0.15
11.20	0.00	10,370	72.04	0.15
11.30	0.00	10,316	72.04	0.15
11.40	0.00	10,261	72.03	0.15
11.50	0.00	10,207	72.03	0.15
11.60	0.00	10,153	72.03	0.15
11.70	0.00	10,099	72.02	0.15
11.80	0.00	10,045	72.02	0.15
11.90	0.00	9,992	72.02	0.15
12.00	0.00	9,939	72.01	0.15
12.10	0.00	9,886	72.01	0.15
12.20	0.00	9,833	72.01	0.15
12.30	0.00	9,781	72.00	0.15
12.40	0.00	9,728	72.00	0.15
12.50	0.00	9,676	72.00	0.14
12.60	0.00	9,624	72.00	0.14
12.70	0.00	9,573	71.99	0.14
12.80	0.00	9,521	71.99	0.14
12.90	0.00	9,470	71.99	0.14
13.00	0.00	9,419	71.98	0.14
13.10	0.00	9,368	71.98	0.14
13.20	0.00	9,317	71.98	0.14
13.30	0.00	9,267	71.97	0.14
13.40	0.00	9,217	71.97	0.14
13.50	0.00	9,167	71.97	0.14
13.60	0.00	9,117	71.96	0.14
13.70	0.00	9,068	71.96	0.14
13.80	0.00	9,018	71.96	0.14
13.90	0.00	8,969	71.96	0.14
14.00	0.00	8,920	71.95	0.14
14.10	0.00	8,872	71.95	0.13
14.20	0.00	8,823	71.95	0.13
14.30	0.00	8,775	71.94	0.13
14.40	0.00	8,727	71.94	0.13
14.50	0.00	8,680	71.94	0.13
14.60	0.00	8,632	71.94	0.13
14.70	0.00	8,585	71.93	0.13
14.80	0.00	8,538	71.93	0.13
14.90	0.00	8,491	71.93	0.13
15.00	0.00	8,444	71.92	0.13
15.10	0.00	8,398	71.92	0.13
15.20	0.00	8,352	71.92	0.13
15.30	0.00	8,306	71.92	0.13
15.40	0.00	8,260	71.91	0.13
15.50	0.00	8,214	71.91	0.13
15.60	0.00	8,169	71.91	0.13
15.70	0.00	8,124	71.90	0.12
15.80	0.00	8,079	71.90	0.12

Hydrograph for Pond 12: BASIN (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
15.90	0.00	8,035	71.90	0.12
16.00	0.00	7,990	71.90	0.12
16.10	0.00	7,946	71.89	0.12
16.20	0.00	7,902	71.89	0.12
16.30	0.00	7,858	71.89	0.12
16.40	0.00	7,815	71.88	0.12
16.50	0.00	7,772	71.88	0.12
16.60	0.00	7,728	71.88	0.12
16.70	0.00	7,686	71.88	0.12
16.80	0.00	7,643	71.87	0.12
16.90	0.00	7,601	71.87	0.12
17.00	0.00	7,559	71.87	0.12
17.10	0.00	7,517	71.87	0.12
17.20	0.00	7,475	71.86	0.12
17.30	0.00	7,434	71.86	0.11
17.40	0.00	7,392	71.86	0.11
17.50	0.00	7,351	71.86	0.11
17.60	0.00	7,311	71.85	0.11
17.70	0.00	7,270	71.85	0.11
17.80	0.00	7,230	71.85	0.11
17.90	0.00	7,190	71.85	0.11
18.00	0.00	7,150	71.84	0.11
18.10	0.00	7,110	71.84	0.11
18.20	0.00	7,071	71.84	0.11
18.30	0.00	7,032	71.84	0.11
18.40	0.00	6,993	71.83	0.11
18.50	0.00	6,954	71.83	0.11
18.60	0.00	6,915	71.83	0.11
18.70	0.00	6,877	71.83	0.11
18.80	0.00	6,839	71.82	0.11
18.90	0.00	6,801	71.82	0.10
19.00	0.00	6,764	71.82	0.10
19.10	0.00	6,727	71.82	0.10
19.20	0.00	6,689	71.81	0.10
19.30	0.00	6,653	71.81	0.10
19.40	0.00	6,616	71.81	0.10
19.50	0.00	6,580	71.81	0.10
19.60	0.00	6,543	71.80	0.10
19.70	0.00	6,508	71.80	0.10
19.80	0.00	6,472	71.80	0.10
19.90	0.00	6,436	71.80	0.10
20.00	0.00	6,401	71.80	0.10
20.10	0.00	6,366	71.79	0.10
20.20	0.00	6,331	71.79	0.10
20.30	0.00	6,297	71.79	0.10
20.40	0.00	6,263	71.79	0.09
20.50	0.00	6,229	71.78	0.09
20.60	0.00	6,195	71.78	0.09
20.70	0.00	6,161	71.78	0.09
20.80	0.00	6,128	71.78	0.09
20.90	0.00	6,095	71.78	0.09
21.00	0.00	6,062	71.77	0.09
21.10	0.00	6,029	71.77	0.09

Hydrograph for Pond 12: BASIN (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
21.20	0.00	5,997	71.77	0.09
21.30	0.00	5,965	71.77	0.09
21.40	0.00	5,933	71.76	0.09
21.50	0.00	5,901	71.76	0.09
21.60	0.00	5,870	71.76	0.09
21.70	0.00	5,839	71.76	0.09
21.80	0.00	5,808	71.76	0.09
21.90	0.00	5,777	71.75	0.09
22.00	0.00	5,746	71.75	0.08
22.10	0.00	5,716	71.75	0.08
22.20	0.00	5,686	71.75	0.08
22.30	0.00	5,656	71.75	0.08
22.40	0.00	5,627	71.74	0.08
22.50	0.00	5,598	71.74	0.08
22.60	0.00	5,569	71.74	0.08
22.70	0.00	5,540	71.74	0.08
22.80	0.00	5,511	71.73	0.08
22.90	0.00	5,483	71.73	0.08
23.00	0.00	5,456	71.73	0.08
23.10	0.00	5,428	71.73	0.08
23.20	0.00	5,401	71.72	0.07
23.30	0.00	5,374	71.72	0.07
23.40	0.00	5,348	71.72	0.07
23.50	0.00	5,322	71.72	0.07
23.60	0.00	5,296	71.72	0.07
23.70	0.00	5,271	71.71	0.07
23.80	0.00	5,246	71.71	0.07
23.90	0.00	5,221	71.71	0.07
24.00	0.00	5,196	71.71	0.07
24.10	0.00	5,172	71.70	0.07
24.20	0.00	5,149	71.70	0.07
24.30	0.00	5,125	71.70	0.06
24.40	0.00	5,102	71.70	0.06
24.50	0.00	5,080	71.70	0.06
24.60	0.00	5,057	71.69	0.06
24.70	0.00	5,035	71.69	0.06
24.80	0.00	5,013	71.69	0.06
24.90	0.00	4,992	71.69	0.06
25.00	0.00	4,971	71.69	0.06
25.10	0.00	4,950	71.69	0.06
25.20	0.00	4,929	71.68	0.06
25.30	0.00	4,909	71.68	0.06
25.40	0.00	4,889	71.68	0.05
25.50	0.00	4,870	71.68	0.05
25.60	0.00	4,850	71.68	0.05
25.70	0.00	4,831	71.68	0.05
25.80	0.00	4,813	71.67	0.05
25.90	0.00	4,794	71.67	0.05
26.00	0.00	4,776	71.67	0.05
26.10	0.00	4,758	71.67	0.05
26.20	0.00	4,740	71.67	0.05
26.30	0.00	4,723	71.67	0.05
26.40	0.00	4,706	71.66	0.05

Hydrograph for Pond 12: BASIN (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
26.50	0.00	4,689	71.66	0.05
26.60	0.00	4,672	71.66	0.05
26.70	0.00	4,656	71.66	0.05
26.80	0.00	4,639	71.66	0.04
26.90	0.00	4,623	71.66	0.04
27.00	0.00	4,608	71.66	0.04
27.10	0.00	4,592	71.65	0.04
27.20	0.00	4,577	71.65	0.04
27.30	0.00	4,562	71.65	0.04
27.40	0.00	4,547	71.65	0.04
27.50	0.00	4,532	71.65	0.04
27.60	0.00	4,518	71.65	0.04
27.70	0.00	4,504	71.65	0.04
27.80	0.00	4,490	71.65	0.04
27.90	0.00	4,476	71.64	0.04
28.00	0.00	4,463	71.64	0.04
28.10	0.00	4,449	71.64	0.04
28.20	0.00	4,436	71.64	0.04
28.30	0.00	4,423	71.64	0.04
28.40	0.00	4,410	71.64	0.04
28.50	0.00	4,397	71.64	0.03
28.60	0.00	4,385	71.64	0.03
28.70	0.00	4,373	71.64	0.03
28.80	0.00	4,360	71.63	0.03
28.90	0.00	4,348	71.63	0.03
29.00	0.00	4,337	71.63	0.03
29.10	0.00	4,325	71.63	0.03
29.20	0.00	4,314	71.63	0.03
29.30	0.00	4,302	71.63	0.03
29.40	0.00	4,291	71.63	0.03
29.50	0.00	4,280	71.63	0.03
29.60	0.00	4,269	71.63	0.03
29.70	0.00	4,258	71.63	0.03
29.80	0.00	4,248	71.62	0.03
29.90	0.00	4,237	71.62	0.03
30.00	0.00	4,227	71.62	0.03
30.10	0.00	4,217	71.62	0.03
30.20	0.00	4,207	71.62	0.03
30.30	0.00	4,197	71.62	0.03
30.40	0.00	4,187	71.62	0.03
30.50	0.00	4,178	71.62	0.03
30.60	0.00	4,168	71.62	0.03
30.70	0.00	4,159	71.62	0.03
30.80	0.00	4,149	71.62	0.03
30.90	0.00	4,140	71.61	0.03
31.00	0.00	4,131	71.61	0.02
31.10	0.00	4,122	71.61	0.02
31.20	0.00	4,113	71.61	0.02
31.30	0.00	4,105	71.61	0.02
31.40	0.00	4,096	71.61	0.02
31.50	0.00	4,088	71.61	0.02
31.60	0.00	4,079	71.61	0.02
31.70	0.00	4,071	71.61	0.02

10% PEAK STORAGE TARGET
(0.10*12,931 + 3,106 = 4,339 CF)
@28.90 HRS. OR 26.70 HRS AFTER PEAK
THEREFORE, GREATER THAN 24 HRS.
OF EXTENDED DETENTION IS
ACHIEVED

Hydrograph for Pond 12: BASIN (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
31.80	0.00	4,063	71.61	0.02
31.90	0.00	4,055	71.61	0.02
32.00	0.00	4,047	71.61	0.02
32.10	0.00	4,039	71.61	0.02
32.20	0.00	4,031	71.60	0.02
32.30	0.00	4,023	71.60	0.02
32.40	0.00	4,016	71.60	0.02
32.50	0.00	4,008	71.60	0.02
32.60	0.00	4,001	71.60	0.02
32.70	0.00	3,994	71.60	0.02
32.80	0.00	3,986	71.60	0.02
32.90	0.00	3,979	71.60	0.02
33.00	0.00	3,972	71.60	0.02
33.10	0.00	3,965	71.60	0.02
33.20	0.00	3,958	71.60	0.02
33.30	0.00	3,952	71.60	0.02
33.40	0.00	3,945	71.60	0.02
33.50	0.00	3,938	71.60	0.02
33.60	0.00	3,932	71.60	0.02
33.70	0.00	3,925	71.60	0.02
33.80	0.00	3,919	71.59	0.02
33.90	0.00	3,912	71.59	0.02
34.00	0.00	3,906	71.59	0.02
34.10	0.00	3,900	71.59	0.02
34.20	0.00	3,894	71.59	0.02
34.30	0.00	3,888	71.59	0.02
34.40	0.00	3,882	71.59	0.02
34.50	0.00	3,876	71.59	0.02
34.60	0.00	3,870	71.59	0.02
34.70	0.00	3,864	71.59	0.02
34.80	0.00	3,858	71.59	0.02
34.90	0.00	3,852	71.59	0.02
35.00	0.00	3,847	71.59	0.02
35.10	0.00	3,841	71.59	0.02
35.20	0.00	3,836	71.59	0.02
35.30	0.00	3,830	71.59	0.02
35.40	0.00	3,825	71.59	0.01
35.50	0.00	3,820	71.59	0.01
35.60	0.00	3,814	71.58	0.01
35.70	0.00	3,809	71.58	0.01
35.80	0.00	3,804	71.58	0.01
35.90	0.00	3,799	71.58	0.01
36.00	0.00	3,794	71.58	0.01
36.10	0.00	3,789	71.58	0.01
36.20	0.00	3,784	71.58	0.01
36.30	0.00	3,779	71.58	0.01
36.40	0.00	3,774	71.58	0.01
36.50	0.00	3,769	71.58	0.01
36.60	0.00	3,764	71.58	0.01
36.70	0.00	3,760	71.58	0.01
36.80	0.00	3,755	71.58	0.01
36.90	0.00	3,750	71.58	0.01
37.00	0.00	3,746	71.58	0.01

Hydrograph for Pond 12: BASIN (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
37.10	0.00	3,741	71.58	0.01
37.20	0.00	3,737	71.58	0.01
37.30	0.00	3,733	71.58	0.01
37.40	0.00	3,728	71.58	0.01
37.50	0.00	3,724	71.58	0.01
37.60	0.00	3,719	71.58	0.01
37.70	0.00	3,715	71.58	0.01
37.80	0.00	3,711	71.58	0.01
37.90	0.00	3,707	71.58	0.01
38.00	0.00	3,703	71.57	0.01
38.10	0.00	3,699	71.57	0.01
38.20	0.00	3,695	71.57	0.01
38.30	0.00	3,690	71.57	0.01
38.40	0.00	3,687	71.57	0.01
38.50	0.00	3,683	71.57	0.01
38.60	0.00	3,679	71.57	0.01
38.70	0.00	3,675	71.57	0.01
38.80	0.00	3,671	71.57	0.01
38.90	0.00	3,667	71.57	0.01
39.00	0.00	3,663	71.57	0.01
39.10	0.00	3,660	71.57	0.01
39.20	0.00	3,656	71.57	0.01
39.30	0.00	3,652	71.57	0.01
39.40	0.00	3,649	71.57	0.01
39.50	0.00	3,645	71.57	0.01
39.60	0.00	3,642	71.57	0.01
39.70	0.00	3,638	71.57	0.01
39.80	0.00	3,634	71.57	0.01
39.90	0.00	3,631	71.57	0.01
40.00	0.00	3,628	71.57	0.01

SECTION 2C

NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project:	490 Elizabeth Ave
Date:	July 23, 2020
User:	Hammer Land Engineering
Notes:	

Step 1 - Provide Basic Major Development Site Information

A. Specify Total Area in Acres of Development Site Described in Steps 2 and 3 = 5.5 **Acres**

B. Specify by Percent the Various Planning Areas Located within the Development Site:

State Plan Planning Area:	PA-1	PA-2	PA-3	PA-4	PA-4B	PA-5	Total % Area
Percent of Each Planning Area within Site:		61.0%			39.0%		100.0%

Note: See User's Guide for Equivalent Zones within Designated Centers and the NJ Meadowlands, Pinelands, and Highlands Districts

Step 2 - Describe Existing or Pre-Developed Site Conditions

A. Specify Existing Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals		Points
		HSG A	HSG B	HSG C	HSG D			
1	Wetlands and Undisturbed Stream Buffers			0.2		0.2		13
2	Lawn and Open Space					0.0		0
3	Brush and Shrub					0.0		0
4	Meadow, Pasture, Grassland, or Range					0.0		0
5	Row Crop					0.0		0
6	Small Grain and Legumes					0.0		0
7	Woods - Indigenous					0.0		0
8	Woods - Planted					0.0		0
9	Woods and Grass Combination			5.2		5.2		261
10	Ponds, Lakes, and Other Open Water					0.0		0
11	Gravel and Dirt					0.0		0
12	Porous and Permeable Paving					0.0		0
13	Directly Connected Impervious			0.1		0.1		0
14	Unconnected Impervious with Small D/S Pervious					0.0		0
15	Unconnected Impervious with Large D/S Pervious					0.0		0
	HSG Subtotals (Acres):	0.0	0.0	5.5	0.0		**Total Area:**	5.5
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%		**Total % Area:**	100.0%

Points Subtotal: **275**

Total Existing Site Points: **275**

Step 3 - Describe Proposed or Post-Developed Site Conditions

A. Specify Proposed Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals		Points
		HSG A	HSG B	HSG C	HSG D			
1	Wetlands and Undisturbed Stream Buffers			0.2		0.2		13
2	Lawn and Open Space			1.6		1.6		67
3	Brush and Shrub					0.0		0
4	Meadow, Pasture, Grassland, or Range					0.0		0
5	Row Crop					0.0		0
6	Small Grain and Legumes					0.0		0
7	Woods - Indigenous					0.0		0
8	Woods - Planted					0.0		0
9	Woods and Grass Combination			0.5		0.5		27
10	Ponds, Lakes, and Other Open Water					0.0		0
11	Gravel and Dirt					0.0		0
12	Porous and Permeable Paving					0.0		0
13	Directly Connected Impervious			0.2		0.2		0
14	Unconnected Impervious with Small D/S Pervious			3.0		3.0		38
15	Unconnected Impervious with Large D/S Pervious					0.0		0
	HSG Subtotals (Acres):	0.0	0.0	5.5	0.0		**Total Area:**	5.5
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%		**Total % Area:**	100.0%
							Points Subtotal:	**146**

B. Compare Proposed Impervious Coverage with Maximum Allowable Impervious Coverage:

Total Directly Connected Impervious Coverage =	3%	% of Site
Total Unconnected Impervious Coverage with Small D/S Pervious =	55%	% of Site
Total Unconnected Impervious Coverage with Large D/S Pervious =	0%	% of Site
Total Site Impervious Coverage =	58%	% of Site
Effective Site Impervious Coverage =	50%	% of Site
Specify Source of Maximum Allowable Impervious Coverage:	Table	(None or Table)
Allowable Site Impervious Cover from Maximum Impervious Cover Table:	49%	

Note: See Maximum Impervious Cover Table Worksheet for Details

Points Subtotal: 0

C. Compare Proposed Site Disturbance with Maximum Allowable Site Disturbance:

Total Proposed Site Disturbance =	85%	% of Site
Maximum Allowable Site Disturbance by Municipal Ordinance =	100%	% of Site

Points Subtotal: 7

D. Describe Proposed Runoff Conveyance System:

Total Length of Runoff Conveyance System =	2024	Feet
Length of Vegetated Runoff Conveyance System =	1285	Feet
% of Total Runoff Conveyance System That is Vegetated =	63%	

Points Subtotal: 59

E. Residential Lot Clustering:

Percent of Total Site Area that will be Clustered =		% of Site
Minimum Standard Lot Size as Per Zoning (Note: 1/2 Acre or Greater) =		Acres
Maximum Proposed Cluster Lot Size (Note:1/4 Acre or Less) =		Acres
Percent of Clustered Portion of Site to be Preserved as Vegetated Open Space =		% of Clustered Site Portion

Points Subtotal: 0

F. Will the Following be Utilized to Minimize Soil Compaction?

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:	Yes	(Yes or No)
Percent of Proposed Lawn Areas to be Graded with Such Equipment:	100%	% of Lawn Areas

Points Subtotal: 23

G. Are Any of the Following Stormwater Management Standards Met Using Only Nonstructural Strategies and Measures?

Groundwater Recharge Standards (NJAC 7:8-5.4-a-2):	No	(Yes or No)
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):	No	(Yes or No)
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):	No	(Yes or No)

Points Subtotal: 0

Note: If the Answers to All Three Questions at G Above are "Yes", Adequate Nonstructural Measures have been Utilized.

Total Proposed Site Points: 234

Ratio of Proposed to Existing Site Points: 85%

Required Site Points Ratio: 91%

Nonstructural Point System Results: Further Review of Proposed Nonstructural Measures is Necessary

SECTION 2D

New Jersey Stormwater Best Management Practices Manual

February 2004

A P P E N D I X A

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: Township of Franklin

County: Somerset Date: 08/22/18

Review board or agency: Township of Franklin/DRCC

Proposed land development name: 490 Elizabeth Ave

Lot(s): 34 Block(s): 514

Project or application number: _____

Applicant's name: ALPHA Finance Corp.

Applicant's address: 53 Knightsbridge Rd, Suite 200

Piscataway, NJ 08854

Telephone: (908) 429-4334 Fax: N/A

Email address: patelh@hotmail.com

Designer's name: Michael A. Rodrigues, Hammer Land Engineering

Designer's address: 663 Raritan Rd, Suite E

Cranford, NJ 07016

Telephone: 732-899-0898 Fax: 888-712-4519

Email address: mike@hammerengineering.com

Part 1: Description of Nonstructural Approach to Site Design

In narrative form, provide an overall description of the nonstructural stormwater management approach and strategies incorporated into the proposed site's design. Attach additional pages as necessary. Details of each nonstructural strategy are provided in Part 3 below.

The existing land cover for the site within the limit of disturbance is predominantly woods and open space. A geotechnical investigation was performed and it was determined that the existing soils have an infiltration rate less than 0.2 inches per hour, therefore the development does not provide any groundwater recharge. The site will utilize an aboveground stormwater basin in conjunction with a below ground detention basin to provide storage of the 2, 10, and 100-year storm events. Stormwater conveyance is provided mostly through curb cuts and vegetated swales on all sides of the property where practicable. The site has been designed to limit the increase in impervious coverage (approximately 57%) and land disturbance (approximately 85%). Wooded areas and areas with native vegetation will be preserved to the furthest extents possible. Regular inspection and maintenance of the proposed stormwater system will be required as indicated in the Operations and Maintenance Manual. Fertilizers if required, will be applied in accordance with the Standards of the Soil Erosion and Sediment Control Act.

Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

2004 BMP Manual, revised through 2020

Do regulations include nonstructural requirements? Yes: X No: _____

If yes, briefly describe: Local ordinance references NJAC 7:8.

List LID-BMPs prohibited by local regulations: N/A

Pre-design meeting held? Yes: _____ Date: _____ No: X

Meeting held with: _____

Pre-design site walk held? Yes: _____ Date: _____ No: X

Site walk held with: _____

Other agencies with stormwater review jurisdiction:

Name: Township of Franklin

Required approval: Site Plan Approval

Name: Somerset-Union County Soil Conservation District

Required approval: Soil Erosion and Sediment Contraol Plan Certification

Name: Somerset County Planning Board

Required approval: Site Plan Approval

Part 3: Nonstructural Strategies and LID-BMPs in Design

3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

A. Has an inventory of existing site vegetation been performed? Yes: X No: _____

If yes, was this inventory a factor in the site's layout and design? Yes: X No: _____

B. Does the site design utilize any of the following nonstructural LID-BMPs?

Preservation of natural areas? Yes: X No: _____ If yes, specify % of site: 15%

Native ground cover? Yes: X No: _____ If yes, specify % of site: 15%

Vegetated buffers? Yes: _____ No: X If yes, specify % of site: N/A

C. Do the land development regulations require these nonstructural LID-BMPs?

Preservation of natural areas? Yes: _____ No: X If yes, specify % of site: _____

Native ground cover? Yes: _____ No: X If yes, specify % of site: _____

Vegetated buffers? Yes: _____ No: X If yes, specify % of site: _____

D. If vegetated filter strips or buffers are utilized, specify their functions:

Reduce runoff volume increases through lower runoff coefficient: Yes: X No: _____

Reduce runoff pollutant loads through runoff treatment: Yes: _____ No: X

Maintain groundwater recharge by preserving natural areas: Yes: _____ No: X

3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed? Yes: X No: _____

If yes, were these inventories factors in the site's layout and design? Yes: X No: _____

B. Does the development's design utilize any of the following nonstructural LID-BMPs?

Restrict permanent site disturbance by land owners? Yes: _____ No: X

If yes, how: _____

_____

Restrict temporary site disturbance during construction? Yes: X No: _____

If yes, how: Tree protection, silt fencing and limiting land disturbance around perimeter of site.

_____

Consider soils and slopes in selecting disturbance limits? Yes: X No: _____

If yes, how: _____

_____

C. Specify percentage of site to be cleared: 85% Regraded: 85%

D. Specify percentage of cleared areas done so for buildings: 26%

For driveways and parking: 52% For roadways: N/A

E. What design criteria and/or site changes would be required to reduce the percentages in C and D above?

A reduction of parking and loading would be required

F. Specify site's hydrologic soil group (HSG) percentages:

HSG A: 0% HSG B: 0% HSG C: 100% HSG D: 0%

G. Specify percentage of each HSG that will be permanently disturbed:

HSG A: N/A HSG B: N/A HSG C: 85% HSG D: N/A

H. Locating site disturbance within areas with less permeable soils (HSG C and D) and minimizing disturbance within areas with greater permeable soils (HSG A and B) can help maintain groundwater recharge rates and reduce runoff volume increases. In light of the HSG percentages in F and G above, what other practical measures if any can be taken to achieve this?

All of site is located within HSG 'C' soil types.

I. Does the site include Karst topography? Yes: _____ No: X

If yes, discuss measures taken to limit Karst impacts:

3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: 0.12 Ac. Proposed: 3.13 Ac.

B. Specify maximum site impervious coverage allowed by regulations: 60%

C. Compare proposed street cartway widths with those required by regulations:

Type of Street	Proposed Cartway Width (feet)	Required Cartway Width (feet)
Residential access – low intensity	N/A	N/A
Residential access – medium intensity	N/A	N/A
Residential access – high intensity with parking	N/A	N/A
Residential access – high intensity without parking	N/A	N/A
Neighborhood	N/A	N/A
Minor collector – low intensity without parking	N/A	N/A
Minor collector – with one parking lane	N/A	N/A
Minor collector – with two parking lanes	N/A	N/A
Minor collector – without parking	N/A	N/A
Major collector	N/A	N/A

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: 9'X 18' Regulations: 9'X 18'

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: 57 Regulations: 56

F. Specify percentage of total site impervious cover created by buildings: 26%

By driveways and parking: 21% By roadways: N/A

G. What design criteria and/or site changes would be required to reduce the percentages in F above?

Reducing the number of parking spaces however note that parking provided meets what is required by the ordinance.

H. Specify percentage of total impervious area that will be unconnected:

Total site: 0% Buildings: 0% Driveways and parking: 0% Roads: N/A

I. Specify percentage of total impervious area that will be porous:

Total site: 0% Buildings: 0% Driveways and parking: 0% Roads: N/A

J. Specify percentage of total building roof area that will be vegetated: 0%

K. Specify percentage of total parking area located beneath buildings: 0%

L. Specify percentage of total parking located within multi-level parking deck: 0%

3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: 37% Vegetated swale: 63% Natural channel: 0%

Stormwater management facility: 0% Other: N/A

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

Additional swales, however due to the narrow nature of the site, it is not possible.Also based on infiltration testing, the site does not have suitable infiltration rates. Water quality will be addressed through the use of manufactured treatment devices and extended detention.

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: _____

Increase overland flow roughness: Grass areas are already at a minimum slope.

3.5 Preventative Source Controls

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

Specify the number of trash receptacles provided: Trash Enclosure

Specify the spacing between the trash receptacles: N/A

Compare trash receptacles proposed with those required by regulations:

Proposed: N/A Regulations: N/A

B. Pet Waste Stations

Specify the number of pet waste stations provided: 0

Specify the spacing between the pet waste stations: N/A

Compare pet waste stations proposed with those required by regulations:

Proposed: _____ Regulations: N/A

C. Inlets, Trash Racks, and Other Devices that Prevent Discharge of Large Trash and Debris

Specify percentage of total inlets that comply with the NJPDES storm drain inlet criteria: 100%

D. Maintenance

Specify the frequency of the following maintenance activities:

Street sweeping: Proposed: TBD Regulations: N/A

Litter collection: Proposed: TBD Regulations: N/A

Identify other stormwater management measures on the site that prevent discharge of large trash and debris:

Operations and maintenance manual

E. Prevention and Containment of Spills

Identify locations where pollutants are located on the site, and the features that prevent these pollutants from being exposed to stormwater runoff:

Pollutant: N/A Location: N/A

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: N/A Location: N/A

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: N/A Location: N/A

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: N/A Location: N/A

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: N/A Location: N/A

Part 4: Compliance with Nonstructural Requirements of NJDEP Stormwater Management Rules

1. Based upon the checklist responses above, indicate which nonstructural strategies have been incorporated into the proposed development's design in accordance with N.J.A.C. 7:8-5.3(b):

No.	Nonstructural Strategy	Yes	No
1.	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.	X	
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.	X	
3.	Maximize the protection of natural drainage features and vegetation.	X	
4.	Minimize the decrease in the pre-construction time of concentration.	X	
5.	Minimize land disturbance including clearing and grading.	X	
6.	Minimize soil compaction.	X	
7.	Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.	X	
8.	Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas.	X	
9.	Provide preventative source controls.	X	

2. For those strategies that have not been incorporated into the proposed development's design, provide engineering, environmental, and/or safety reasons. Attached additional pages as necessary.

The site layout design makes a concerted effort to disconnect runoff from impervious surfaces along with preserving existing natural areas. Stormwater runoff quality and attenuation will be provided. Groundwater recharge is not required since the site soils have an infiltration rate of less than 1 inch per hour.

SECTION 2E

Job #:	**19201**
Job Description:	**Alpha 490 Elizabeth Ave**
Designed By:	**MDS**
Checked By:	**MAR**
Date:	**July 23, 2020**
Location:	**Franklin, NJ**
Design Storm:	**25**

Surface	"C"
Impervious	0.99
Grassed Area 'C'	0.51
Grassed Area 'D'	0.65
Woods 'C'	0.45
Woods 'D'	0.59
Runoff Coefficient Adjustment Factor =	**1.00**

INLET AREA #	TOTAL AREA (AC)	Impervious Area (Ac) C = 0.99	Grassed Area 'C Area (Ac) ADJ. C = 0.51	Grassed Area 'D Area (Ac) ADJ. C = 0.65	Woods 'C' Area (Ac) ADJ. C = 0.45	Woods 'D' Area (Ac) ADJ. C = 0.59	ADJUSTED WEIGHTED C (*)	A X C	TC
104A	0.08	0.07	0.01				0.93	0.07	10.0
104B	0.37	0.31	0.06				0.91	0.34	10.0
105A	0.07	0.05	0.02				0.85	0.06	10.0
105B	0.30	0.28	0.02				0.96	0.29	10.0
105C	0.30	0.28	0.02				0.96	0.29	10.0
106A	0.30	0.28	0.02				0.96	0.29	10.0
106B	0.07	0.05	0.02				0.85	0.06	10.0
106C	0.07	0.05	0.02				0.85	0.06	10.0
107A	0.07	0.05	0.02				0.85	0.06	10.0
107B	0.30	0.28	0.02				0.96	0.29	10.0
107C	0.32	0.30	0.02				0.96	0.31	10.0
108A	0.08	0.06	0.02				0.87	0.07	10.0
108B	0.15	0.13	0.02				0.93	0.14	10.0
108C	0.10	0.06	0.04				0.80	0.08	10.0
203A	0.30		0.23		0.07		0.50	0.15	10.0
204A	0.90	0.05	0.68		0.17		0.53	0.47	10.0
205A	0.68	0.05	0.57		0.06		0.54	0.37	10.0
206A	0.24	0.05	0.16		0.03		0.60	0.14	10.0
207A	0.11	0.08	0.03				0.86	0.09	10.0
209	0.09	0.08	0.01				0.94	0.08	10.0
209A	0.02		0.02				0.51	0.01	10.0
209B	1.21	0.16	0.83		0.22		0.56	0.68	10.0
210	0.16	0.10	0.06				0.81	0.13	10.0
									10.0
BASIN 1	0.15	0.13	0.02				0.93	0.14	10.0
BASIN 2	0.10	0.08	0.02				0.89	0.09	10.0
BASIN 3	0.03	0.03	0.00				0.99	0.03	10.0
Totals	6.57	3.06	**2.96**	**0.00**		0.00	0.69	**4.54**	
	Percent Impervious		**46.6%**			**Total Composite 'C'**			

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	9.708	0.24	0.24	0.60	0.14	0.14	10.0	10.0	5.8	0.83	3.92	3.02	12	1.03	75.00	75.10	75.38	75.48	78.40	0.00	206A
2	End	9.708	0.11	0.11	0.86	0.09	0.09	10.0	10.0	5.8	0.54	3.92	2.67	12	1.03	75.00	75.10	75.31	75.41	78.40	0.00	207A
3	End	9.708	0.30	0.30	0.50	0.15	0.15	10.0	10.0	5.8	0.86	3.92	3.06	12	1.03	75.00	75.10	75.39	75.49	0.00	78.40	203A
4	End	9.708	0.90	0.90	0.53	0.48	0.48	10.0	10.0	5.8	2.74	3.92	4.60	12	1.03	75.00	75.10	75.71	75.81	0.00	78.40	204A
5	End	9.708	0.68	0.68	0.54	0.37	0.37	10.0	10.0	5.8	2.11	3.92	4.13	12	1.03	75.00	75.10	75.62	75.72	0.00	78.40	205A
6	End	131.506	0.09	1.48	0.94	0.08	0.91	10.0	10.8	5.6	5.11	11.70	3.82	24	0.23	71.55	71.85	72.35	72.85	0.00	77.00	209
7	6	28.043	0.16	0.16	0.81	0.13	0.13	10.0	10.0	5.8	0.75	7.24	3.29	15	1.07	73.50	73.80	73.77	74.14	77.00	77.50	210
8	6	12.095	0.02	1.23	0.99	0.02	0.70	10.0	10.5	5.6	3.94	12.67	3.36	18	1.24	71.85	72.00	73.22	72.76	77.00	75.50	209A
9	8	71.451	1.21	1.21	0.56	0.68	0.68	10.0	10.0	5.8	3.90	9.03	4.36	18	0.63	72.00	72.45	72.76	73.20	75.50	75.50	209B
10	End	8.208	0.08	0.45	0.93	0.07	0.41	10.0	10.3	5.7	2.34	6.73	4.30	12	3.05	72.50	72.75	73.15	73.40	0.00	75.50	104A
11	10	45.689	0.37	0.37	0.91	0.34	0.34	10.0	10.0	5.8	1.94	4.04	3.78	12	1.09	72.75	73.25	73.40	73.84	75.50	75.50	104B
12	End	8.213	0.07	0.67	0.85	0.06	0.64	10.0	10.4	5.7	3.61	6.73	5.30	12	3.04	72.50	72.75	73.31	73.56	0.00	75.50	105A
13	12	44.311	0.30	0.30	0.96	0.29	0.29	10.0	10.0	5.8	1.66	4.10	3.10	12	1.13	72.75	73.25	73.56	73.80	75.50	75.50	105B
14	12	44.311	0.30	0.30	0.96	0.29	0.29	10.0	10.0	5.8	1.66	4.10	3.10	12	1.13	72.75	73.25	73.56	73.80	75.50	75.50	105C
15	End	8.495	0.30	0.44	0.96	0.29	0.41	10.0	11.7	5.4	2.21	6.62	4.20	12	2.94	72.50	72.75	73.13	73.38	0.00	75.50	106A
16	15	44.311	0.07	0.07	0.85	0.06	0.06	10.0	10.0	5.8	0.34	4.10	1.50	12	1.13	72.75	73.25	73.38	73.49	75.50	75.50	106B
17	15	45.689	0.07	0.07	0.85	0.06	0.06	10.0	10.0	5.8	0.34	4.04	1.50	12	1.09	72.75	73.25	73.38	73.49	75.50	75.50	106C
18	End	8.761	0.07	0.69	0.85	0.06	0.65	10.0	10.4	5.7	3.72	6.52	5.39	12	2.85	72.50	72.75	73.32	73.57	0.00	75.50	107A
19	18	44.311	0.30	0.30	0.96	0.29	0.29	10.0	10.0	5.8	1.66	4.10	3.09	12	1.13	72.75	73.25	73.57	73.80	75.50	75.50	107B
20	18	45.689	0.32	0.32	0.96	0.31	0.31	10.0	10.0	5.8	1.77	4.04	3.21	12	1.09	72.75	73.25	73.57	73.82	75.50	75.50	107C
21	End	8.208	0.08	0.33	0.87	0.07	0.29	10.0	11.3	5.5	1.59	6.73	3.72	12	3.05	72.50	72.75	73.04	73.29	0.00	75.50	108A
22	21	44.311	0.15	0.15	0.93	0.14	0.14	10.0	10.0	5.8	0.80	4.10	2.43	12	1.13	72.75	73.25	73.29	73.62	75.50	75.50	108B

Project File: 490 Alpha Storm Pipes.stm

Number of lines: 23

Run Date: 7/23/2020

NOTES:Intensity = 54.48 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	21	45.689	0.10	0.10	0.80	0.08	0.08	10.0	10.0	5.8	0.46	4.04	1.81	12	1.09	72.75	73.25	73.29	73.53	75.50	75.50	108C

Project File: 490 Alpha Storm Pipes.stm

Number of lines: 23

Run Date: 7/23/2020

NOTES:Intensity = 54.48 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

SECTION 2F

7/23/2020

SCOUR HOLE CALCULATIONS

NJ Standards for SESC, Ch. 12, July 1999

Structure: SCOUR HOLE 1

Job # 19201
Job Name: Alpha 490 Elizabeth
Designed by: MDS
Checked by: MAR

HAMMER LAND ENGINEERING

Q =	20.22 c.f.s.	W_o=	2.50 Ft.
D_o=	2.50 Ft.	q=Q/W_o=	8.09 c.f.s.
TW=	0.50 Ft.		

(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — **When Y = 1/2 D_o**

$d_{50} = \frac{0.0125 * q^{1.33}}{TW}$ = 0.40 Ft. = 5 " Stone Calculated

5 " Stone Used for Construction

1.25 ' = Y

d_{50} Stone size formula — **When Y = D_o**

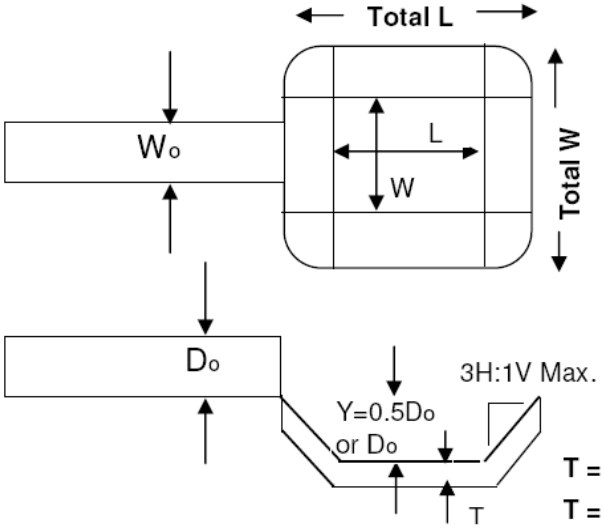
$d_{50} = \frac{0.0082 * q^{1.33}}{TW}$ = 0.26 Ft. = 4 " Stone Calculated

4 " Stone Used for Construction

2.50 ' = Y

NJ Standards require d_{50}=3" min, NJDOT requires d_{50}=6" min

Y = Depth of scour hole below culvert invert



L = 3 D_o = 7.50 '
W = 2 W_o = 5.00 '

If Y = 1/2D_o
Total L = 15.00 , Total W = 12.50

If Y = D_o
Total L = 22.50 , Total W = 20.00

T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if *no* filter fabric is used

Structure SCOUR HOLE 1 Design Summary

Select Scour Hole Design	Total L =	15 '	L = 7.5 '
	Total W =	12.5 '	W = 5 '
	Depth of scour hole (Y) =		1.25 '
Y = 1/2 Do Use Filter Fabric	d_{50} stone size =		5 "
	Thickness of riprap (T) =		10 "
	Volume of riprap (V) =		5.79 CY

Notes:

7/23/2020

SCOUR HOLE CALCULATIONS

NJ Standards for SESC, Ch. 12, July 1999

Structure: SCOUR HOLE 2

Job # 19201
Job Name: Alpha 490 Elizabeth
Designed by: MDS
Checked by: MAR

HAMMER LAND ENGINEERING

Q =	39.04 c.f.s.	W_o=	3.00 Ft.
D_o=	3.00 Ft.	q=Q/W_o=	13.01 c.f.s.
TW=	1.56 Ft.		

(For areas where Tw cannot be computed, use Tw = 0.2D_o)

d_{50} Stone size formula — **When Y = 1/2 D_o**

$$d_{50} = \frac{0.0125 * q^{1.33}}{TW}$$ = 0.24 Ft. = 3 " Stone Calculated

3 " Stone Used for Construction

1.50 ' = Y

d_{50} Stone size formula — **When Y = D_o**

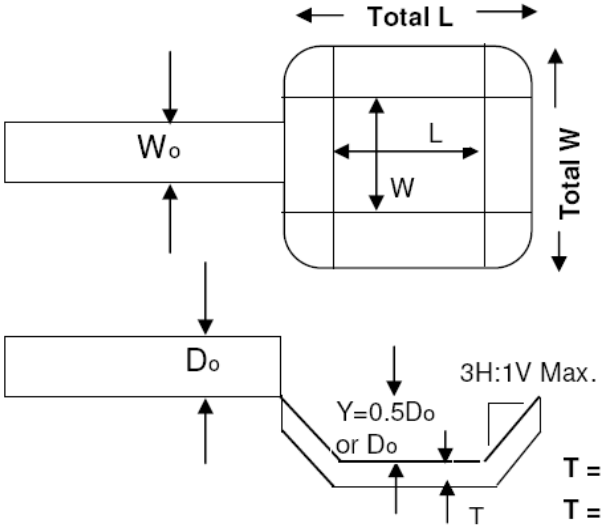
$$d_{50} = \frac{0.0082 * q^{1.33}}{TW}$$ = 0.16 Ft. = 2 " Stone Calculated

3 " Stone Used for Construction

3.00 ' = Y

NJ Standards require d_{50}=3" min, NJDOT requires d_{50}=6" min

Y = Depth of scour hole below culvert invert



L = 3 D_o = 9.00 '
W = 2 W_o = 6.00 '

If Y = 1/2D_o
Total L = 18.00 , Total W = 15.00

If Y = D_o
Total L = 27.00 , Total W = 24.00

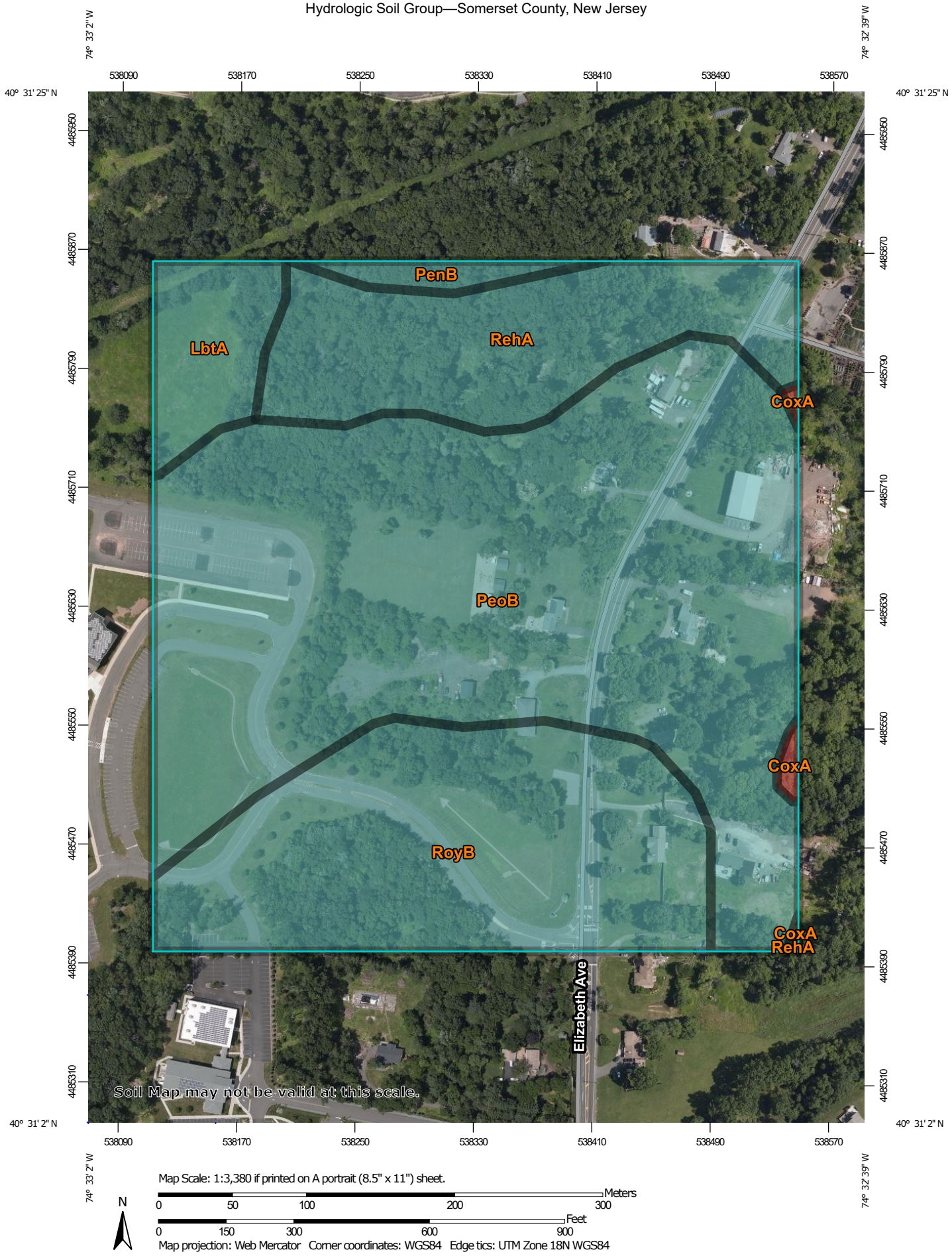
T = d_{50} Stone size x 2 if filter fabric is used
T = d_{50} Stone size x 3 if *no* filter fabric is used

Structure SCOUR HOLE 2 Design Summary

Select Scour Hole Design	Total L = 18 '	L =	9 '
	Total W = 15 '	W =	6 '
	Depth of scour hole (Y) =		1.5 '
Y = 1/2 Do Use Filter Fabric	d_{50} stone size =		3 "
	Thickness of riprap (T) =		6 "
	Volume of riprap (V) =		5 CY

Notes:

SECTION 3



Map Scale: 1:3,380 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Somerset County, New Jersey
Survey Area Data: Version 17, Sep 16, 2019

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

Date(s) aerial images were photographed: Jun 22, 2019—Jul 13, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CoxA	Croton silt loam, 0 to 2 percent slopes	D	0.2	0.4%
LbtA	Lansdowne silt loam, 0 to 2 percent slopes	C	2.4	4.8%
PenB	Penn silt loam, 2 to 6 percent slopes	C	0.7	1.4%
PeoB	Penn channery silt loam, 2 to 6 percent slopes	C	27.6	54.9%
RehA	Reaville silt loam, 0 to 2 percent slopes	C	7.3	14.6%
RoyB	Royce silt loam, 2 to 6 percent slopes	C	12.1	24.0%
Totals for Area of Interest			**50.2**	**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

NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA

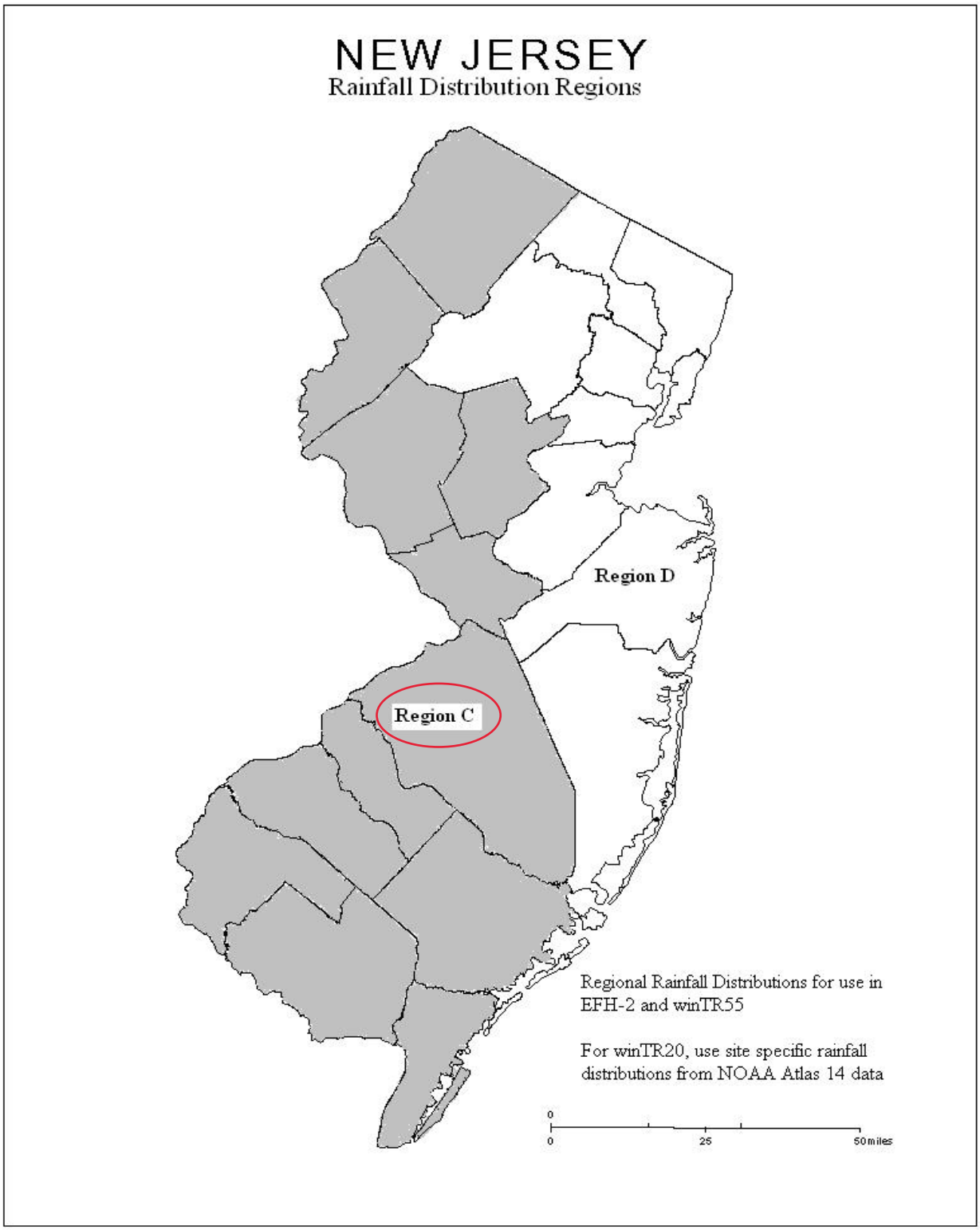
Rainfall amounts in Inches

County	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Atlantic	2.72	3.31	4.30	5.16	6.46	7.61	8.90
Bergen	2.75	3.34	4.27	5.07	6.28	7.32	8.47
Burlington	2.77	3.36	4.34	5.18	6.45	7.56	8.81
Camden	2.73	3.31	4.25	5.06	6.28	7.34	8.52
Cape May	2.67	3.25	4.22	5.07	6.34	7.47	8.73
Cumberland	2.69	3.27	4.25	5.09	6.37	7.49	8.76
Essex	2.85	3.44	4.40	5.22	6.44	7.49	8.66
Gloucester	2.71	3.29	4.24	5.05	6.29	7.36	8.55
Hudson	2.73	3.31	4.23	5.02	6.19	7.20	8.31
Hunterdon	2.80	3.38	4.26	5.00	6.09	7.02	8.03
Mercer	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Middlesex	2.76	3.35	4.30	5.12	6.36	7.43	8.63
Monmouth	2.79	3.38	4.38	5.23	6.53	7.66	8.94
Morris	2.94	3.54	4.47	5.24	6.37	7.32	8.35
Ocean	2.81	3.42	4.45	5.33	6.68	7.87	9.20
Passaic	2.87	3.47	4.42	5.23	6.43	7.47	8.62
Salem	2.69	3.26	4.20	5.00	6.22	7.28	8.45
Somerset	2.76	3.34	4.25	5.01	6.15	7.13	8.21
Sussex	2.68	3.22	4.02	4.70	5.72	6.60	7.58
Union	2.80	3.39	4.35	5.17	6.42	7.49	8.69
Warren	2.78	3.34	4.18	4.89	5.93	6.83	7.82

Notes: The average point rainfall amounts listed above were developed from data contained in NOAA Atlas 14 Volume 2.

Point rainfall estimates for specific locations may be obtained from the Precipitation Frequency Data Server located at http://www.nws.noaa.gov/ohd/hdsc/

For most hydrologic design procedures, the rainfall amounts listed above may be rounded to the nearest tenth of an inch.


NEW JERSEY
Rainfall Distribution Regions
Region D
Region C
Regional Rainfall Distributions for use in EFH-2 and winTR55
For winTR20, use site specific rainfall distributions from NOAA Atlas 14 data
0
0
25
50 miles

NOAA Atlas 14, Volume 2, Version 3
Location name: Somerset, New Jersey, USA*
Latitude: 40.5213°, Longitude: -74.5465°
Elevation: 75.95 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**3.98** (3.61-4.40)	**4.75** (4.30-5.24)	**5.63** (5.08-6.22)	**6.26** (5.65-6.92)	**7.04** (6.32-7.76)	**7.60** (6.78-8.36)	**8.14** (7.24-8.98)	**8.63** (7.63-9.52)	**9.24** (8.10-10.2)	**9.68** (8.44-10.7)
10-min	**3.19** (2.88-3.52)	**3.80** (3.43-4.19)	**4.51** (4.07-4.97)	**5.01** (4.52-5.53)	**5.62** (5.04-6.19)	**6.05** (5.40-6.66)	**6.47** (5.75-7.13)	**6.84** (6.05-7.55)	**7.30** (6.40-8.08)	**7.63** (6.64-8.46)
15-min	**2.65** (2.40-2.94)	**3.18** (2.88-3.52)	**3.80** (3.43-4.20)	**4.22** (3.81-4.67)	**4.74** (4.26-5.23)	**5.10** (4.56-5.62)	**5.45** (4.84-6.01)	**5.75** (5.09-6.35)	**6.13** (5.37-6.78)	**6.38** (5.56-7.08)
30-min	**1.82** (1.65-2.01)	**2.20** (1.99-2.43)	**2.70** (2.44-2.98)	**3.06** (2.76-3.38)	**3.51** (3.15-3.87)	**3.84** (3.43-4.23)	**4.17** (3.71-4.60)	**4.48** (3.96-4.94)	**4.88** (4.28-5.40)	**5.17** (4.50-5.73)
60-min	**1.13** (1.03-1.25)	**1.38** (1.25-1.52)	**1.73** (1.56-1.91)	**1.99** (1.80-2.20)	**2.34** (2.10-2.58)	**2.60** (2.33-2.87)	**2.87** (2.56-3.17)	**3.14** (2.78-3.47)	**3.50** (3.07-3.87)	**3.77** (3.29-4.18)
2-hr	**0.692** (0.622-0.770)	**0.844** (0.759-0.937)	**1.07** (0.962-1.19)	**1.25** (1.12-1.38)	**1.49** (1.33-1.65)	**1.69** (1.50-1.87)	**1.89** (1.67-2.10)	**2.11** (1.85-2.33)	**2.40** (2.08-2.67)	**2.64** (2.26-2.94)
3-hr	**0.513** (0.462-0.572)	**0.624** (0.563-0.697)	**0.793** (0.714-0.885)	**0.925** (0.830-1.03)	**1.11** (0.988-1.23)	**1.26** (1.12-1.40)	**1.41** (1.24-1.57)	**1.57** (1.38-1.75)	**1.80** (1.55-2.00)	**1.98** (1.69-2.20)
6-hr	**0.329** (0.296-0.368)	**0.399** (0.359-0.445)	**0.506** (0.454-0.563)	**0.594** (0.531-0.659)	**0.719** (0.637-0.796)	**0.824** (0.725-0.910)	**0.936** (0.816-1.03)	**1.06** (0.913-1.17)	**1.23** (1.05-1.36)	**1.38** (1.16-1.52)
12-hr	**0.198** (0.178-0.223)	**0.240** (0.215-0.270)	**0.307** (0.274-0.343)	**0.363** (0.323-0.405)	**0.446** (0.393-0.496)	**0.517** (0.453-0.575)	**0.595** (0.516-0.660)	**0.682** (0.583-0.757)	**0.811** (0.681-0.901)	**0.921** (0.761-1.02)
24-hr	**0.113** (0.105-0.123)	**0.137** (0.127-0.149)	**0.175** (0.162-0.191)	**0.208** (0.192-0.226)	**0.257** (0.236-0.279)	**0.300** (0.272-0.325)	**0.347** (0.312-0.376)	**0.400** (0.356-0.434)	**0.478** (0.419-0.521)	**0.545** (0.471-0.596)
2-day	**0.066** (0.060-0.072)	**0.079** (0.073-0.087)	**0.101** (0.092-0.111)	**0.120** (0.109-0.131)	**0.146** (0.132-0.161)	**0.169** (0.152-0.185)	**0.194** (0.173-0.213)	**0.221** (0.195-0.243)	**0.260** (0.226-0.288)	**0.293** (0.252-0.326)
3-day	**0.046** (0.043-0.051)	**0.056** (0.051-0.062)	**0.071** (0.065-0.078)	**0.084** (0.076-0.092)	**0.102** (0.093-0.112)	**0.118** (0.106-0.129)	**0.134** (0.120-0.147)	**0.152** (0.135-0.167)	**0.178** (0.156-0.197)	**0.200** (0.172-0.221)
4-day	**0.037** (0.034-0.040)	**0.045** (0.041-0.049)	**0.056** (0.052-0.062)	**0.066** (0.060-0.072)	**0.080** (0.073-0.088)	**0.092** (0.083-0.100)	**0.104** (0.093-0.114)	**0.118** (0.105-0.129)	**0.137** (0.120-0.151)	**0.153** (0.133-0.169)
7-day	**0.025** (0.023-0.027)	**0.030** (0.027-0.032)	**0.037** (0.034-0.040)	**0.043** (0.039-0.046)	**0.051** (0.047-0.056)	**0.058** (0.053-0.063)	**0.066** (0.059-0.071)	**0.074** (0.066-0.080)	**0.085** (0.075-0.093)	**0.094** (0.082-0.104)
10-day	**0.020** (0.018-0.021)	**0.023** (0.022-0.025)	**0.029** (0.027-0.031)	**0.033** (0.031-0.036)	**0.039** (0.036-0.042)	**0.044** (0.040-0.047)	**0.049** (0.045-0.053)	**0.055** (0.049-0.059)	**0.062** (0.056-0.068)	**0.068** (0.060-0.075)
20-day	**0.013** (0.012-0.014)	**0.016** (0.015-0.017)	**0.019** (0.018-0.020)	**0.021** (0.020-0.022)	**0.024** (0.023-0.026)	**0.027** (0.025-0.029)	**0.029** (0.027-0.031)	**0.032** (0.030-0.034)	**0.035** (0.032-0.038)	**0.038** (0.035-0.041)
30-day	**0.011** (0.010-0.012)	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.019** (0.018-0.020)	**0.021** (0.019-0.022)	**0.022** (0.021-0.024)	**0.024** (0.022-0.025)	**0.026** (0.024-0.028)	**0.027** (0.025-0.029)
45-day	**0.009** (0.009-0.010)	**0.011** (0.010-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.015)	**0.016** (0.015-0.016)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.018-0.020)	**0.020** (0.019-0.022)	**0.021** (0.020-0.023)
60-day	**0.008** (0.008-0.009)	**0.010** (0.009-0.010)	**0.011** (0.011-0.012)	**0.012** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.015)	**0.015** (0.015-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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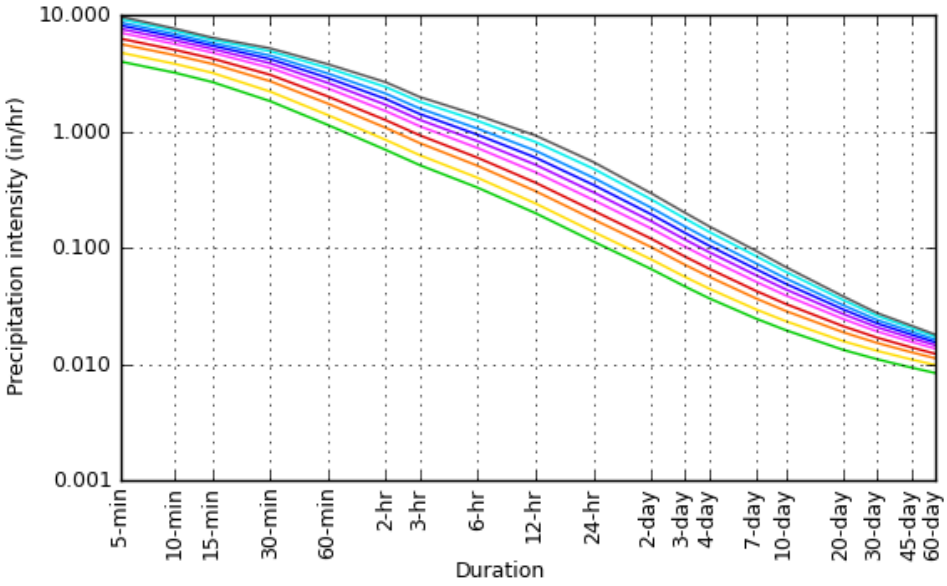
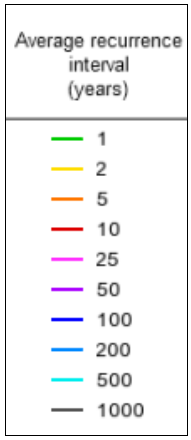
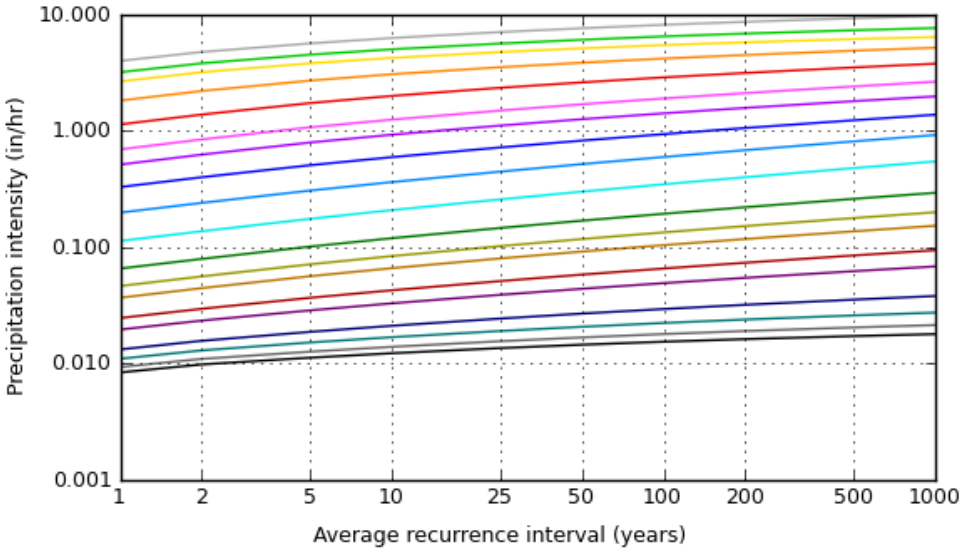
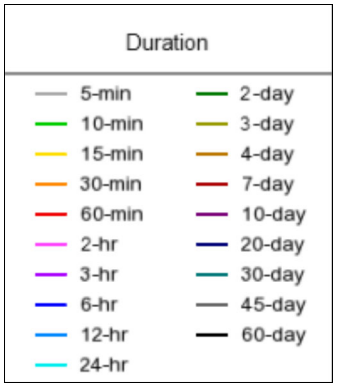
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 40.5213°, Longitude: -74.5465°









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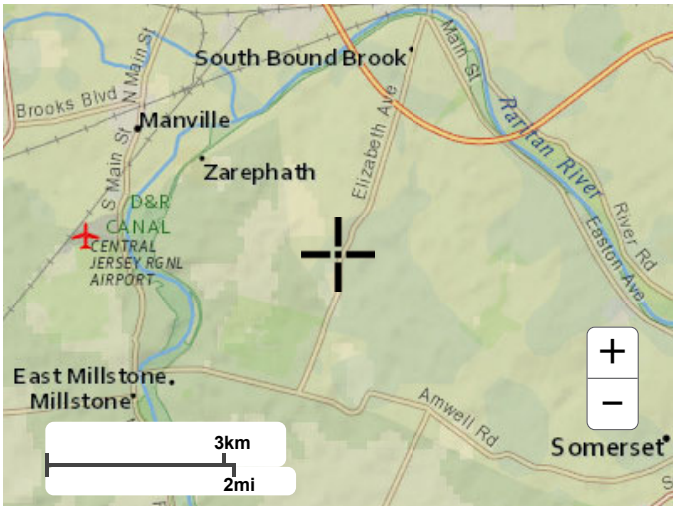
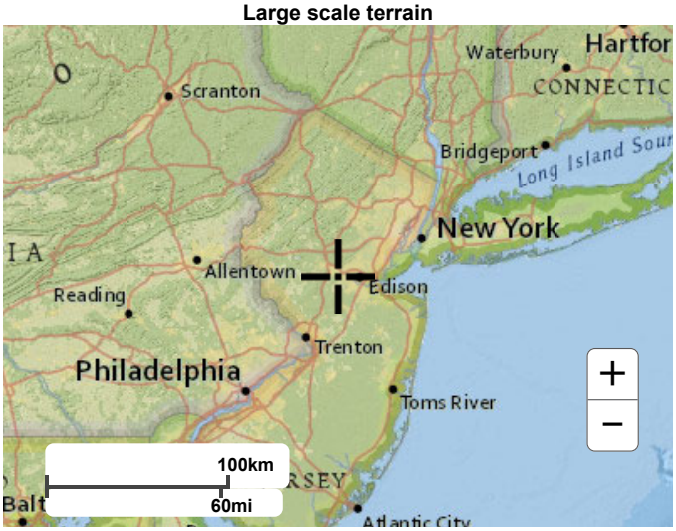
Maps & aerials

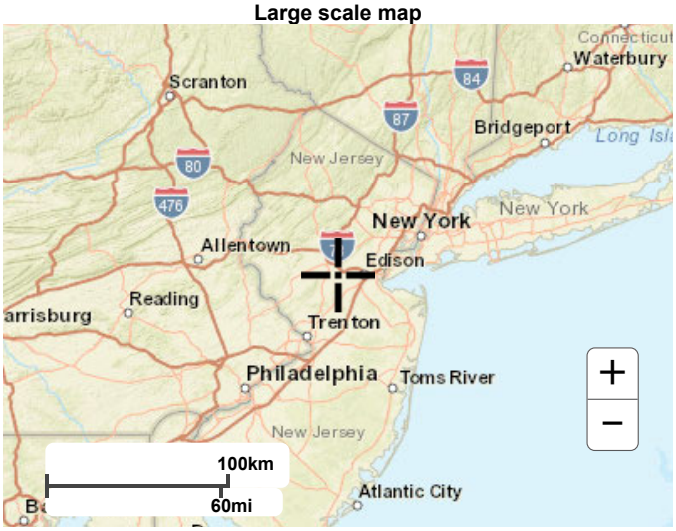
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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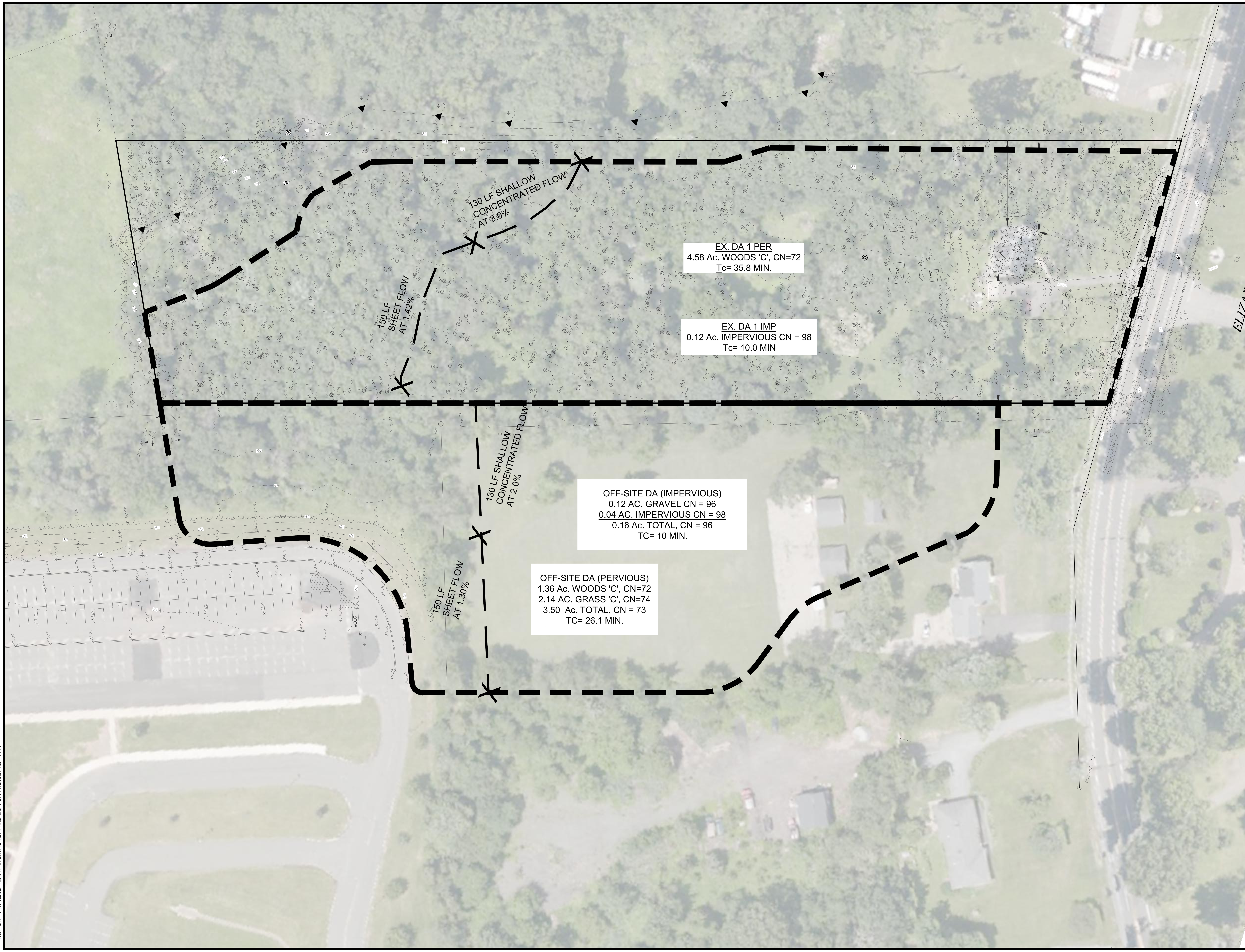

DUE TO INHERENT ERRORS IN REPRODUCTION METHODS, ERRORS MAY OCCUR WHEN SCALING THIS DRAWING

HAMMER LAND ENGINEERING

"THE WAY TO ENTITLEMENT" GROUNDBREAKING RESULTS

APPLICANT:

ALPHA FINANCE CORP
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SUITE 200
PISCATAWAY, NJ 08854
T: 908.429.4334

40 20 0 40 80
HORIZONTAL SCALE: 1"=40'-0"

NORTH ARROW

PROTECT YOURSELF
A PHONE CALL CAN BE YOUR INSURANCE POLICY

GARDEN STATE UNDERGROUND LOCATION 1-800-272-1000 STOP - CALL BEFORE YOU DIG!

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REVISIONS

PROJECT:

490 ELIZABETH AVENUE

LOCATION:

BLOCK 514, LOT 34
TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NJ

DRAWING TITLE:

EXISTING DRAINAGE AREA MAP

HAMMER LAND ENGINEERING
663 RARITAN ROAD, SUITE E
CRANFORD, NJ 07016
(TEL) 732.899.0898 (FAX) 888.712.4519
CERTIFICATE OF AUTHORIZATION #24GA28176300
HAMMERENGINEERING.COM

MICHAEL A. RODRIGUES
PROFESSIONAL ENGINEER
NJ LICENSE NUMBER 48141

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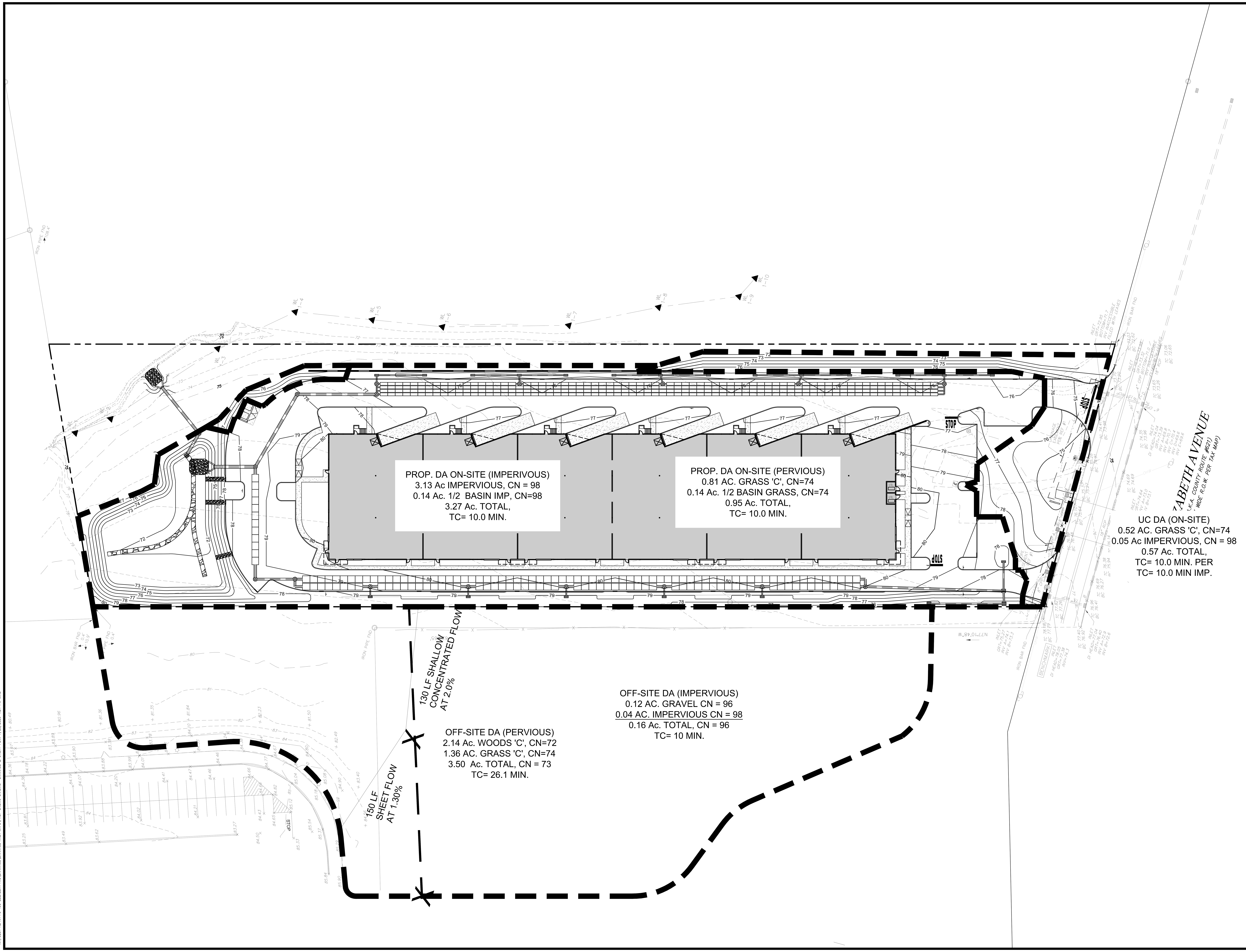
MDS	MAR	DA-01
SCALE: 1" = 40'		
JOB NUMBER: 19201	DATE: 07.23.20	SHEET 1 OF 1



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REVISIONS

PROJECT:

490 ELIZABETH AVENUE

LOCATION:

BLOCK 514, LOT 34
TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NJ

DRAWING TITLE:

PROPOSED DRAINAGE AREA MAP

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(TEL) 732.899.0898 (FAX) 888.712.4519
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NJ LICENSE NUMBER 48141

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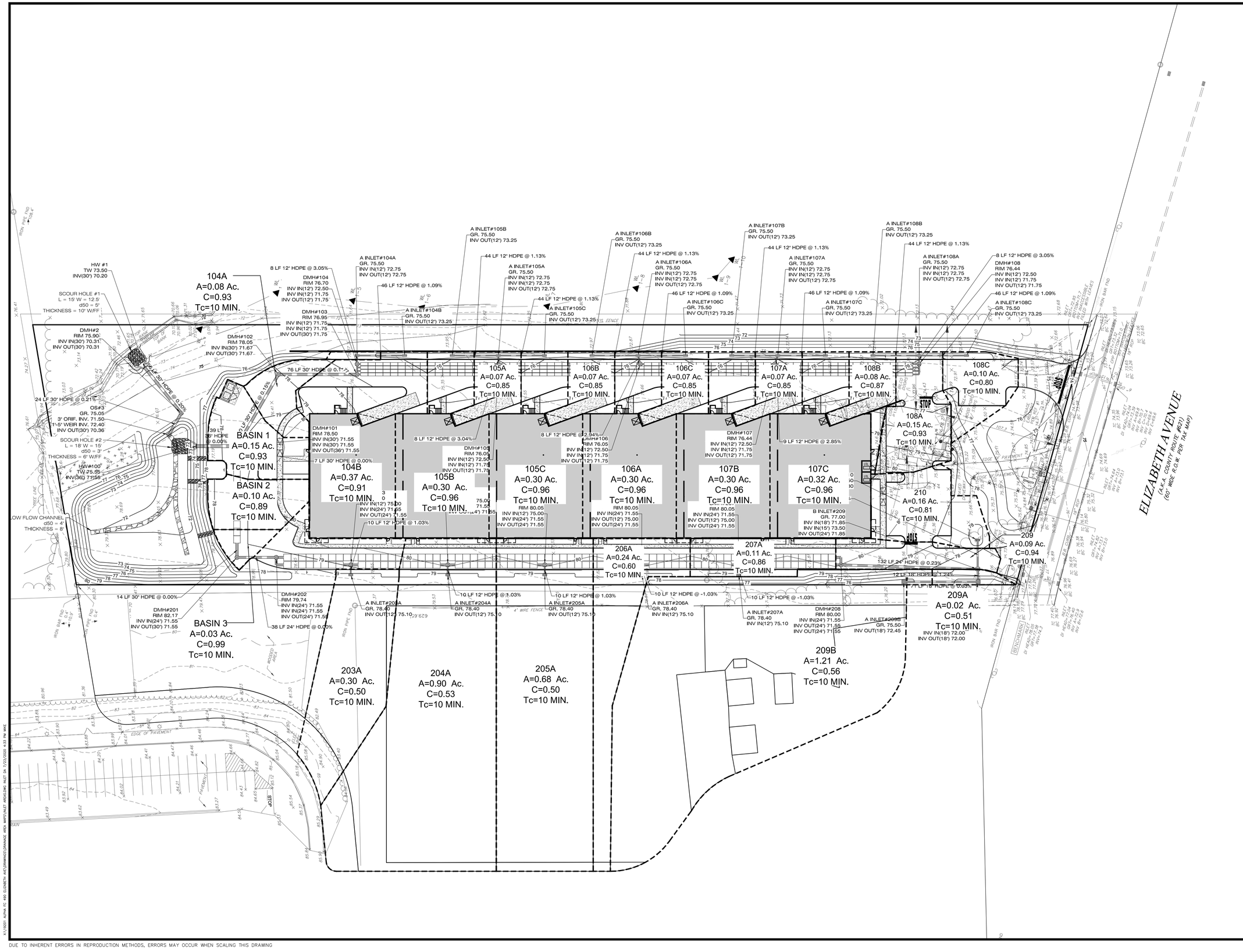
SCALE: 1" = 40'		
JOB NUMBER: 19201	DATE: 07.23.20	SHEET 1 OF 1



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NO.	DATE	ISSUE OR REVISION	BY

REVISIONS

PROJECT:

490 ELIZABETH AVENUE

LOCATION:

BLOCK 514, LOT 34
TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NJ

DRAWING TITLE:

INLET DRAINAGE AREA MAP

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MICHAEL A. RODRIGUES
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MDS	MAR	DA-03
SCALE: 1" = 40'		
JOB NUMBER: 19201	DATE: 07.23.20	SHEET 1 OF 1

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