

APPENDIX G – STORMWATER MANAGEMENT REPORT

STORMWATER MANAGEMENT REPORT

APRIL 2021

SALES DISTRIBUTION CENTER

**SCHODACK, NEW YORK
RENSSELAER COUNTY**

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I. General Information

A. Project Description

This Stormwater Management Report is for the proposed Sales Distribution Center located in the Town of Schodack, Rensselaer County, New York, which is an MS4 community. The proposed project consists of a new 278,670 +/- S.F. sales distribution center.

This report addresses Water Quality Volume (WQv), Runoff Reduction Volume (RRv) and stormwater quantity mitigation for the proposed Sales Distribution Center. The proposed design will comply with both the New York State Department of Environmental Conservation (NYSDEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002) with a waiver to disturb more than 5 acres at once, and Town of Schodack Requirements.

B. Soil Classification

According to the Natural Resources Conservation Service website (NRCS), there are seven (6) mapped soil units identified within the project boundary (see Appendix D). Most of the soils have a hydrologic soil group A, meaning they have a high infiltration rate when thoroughly wet. Two of the soil units, CbA and FIA, have a hydrologic soil group D when thoroughly wet, which means they do not infiltrate well if they are inundated with water.

The complete list of soils found on the project site is identified in the table below (See Appendix D for NRCS Soils Report).

Table I – Soils Summary

Symbol	Soil Name	Hydrologic Soil Group
CbA	Castile gravelly silt loam, 0 to 5 percent slopes	A/D
FIA	Fluvaquents-Udifluvents complex, 0-3 percent slopes	A/D
HoB	Hoosic gravelly sandy loam, 3 to 8 percent slopes	A
HoC	Hoosic gravelly sandy loam, rolling	A
HoE	Hoosic gravelly sandy loam, steep	A
Pg	Pits, gravel	

II. Hydrology

A. Methodology

Stormwater runoff rates discharged from the site under the existing conditions provide the basis on which to compare the impacts of the proposed site improvements. Analysis points are established where runoff exits the site to provide a fixed location at which existing and proposed stormwater discharge rates and quantities can be compared. The areas draining to each analysis point are delineated using topographic survey maps and grading plans. HydroCAD 10.00 by HydroCAD Software Solutions LLC was used to model the existing and proposed conditions. This program simulates the USDA Soil Conservation Services's TR-20 hydrologic model to analyze discharges from drainage areas and retention basins.

The parameters required to calculate stormwater runoff are area, curve number, and time of concentration. Each drainage area is evaluated using the guidelines described in USDA Soil Conservation Services's TR-55 to determine the curve number and time of concentration.

The runoff curve number (CN) is based on a weighted average of ground cover and soil type. The underlying soil types are described in county soil maps provided in Appendix D. Site and grading plans and survey maps outline existing and proposed ground cover. CN values for specific locations are determined from the tables presented in TR-55.

Time of concentration (T_c) represents the amount of time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of analysis. Surface roughness, slope, channel shape and flow patterns are the factors that affect the time of concentration. Stormwater runoff flows through the drainage area as sheet flow, shallow concentrated flow, open channel flow, or concentrated flow (such as in storm sewers). For this report, sheet flow will become shallow concentrated flow after a maximum of 100 feet for the existing and proposed conditions. The sum of the travel times over the various surfaces within the assumed flow path for a specific drainage area determines that area's time of concentration. The figures and formulas in TR-55 are employed to compute travel times for sheet flow and shallow concentrated flow.

B. Existing Conditions

The existing drainage area is comprised of a total of 125.24 +/- acres. This includes portions of off-site drainage from adjacent properties along the perimeter of the site. The parcel to be developed consists of undeveloped land with off-site areas consisting of roadways, buildings and open land.

Drainage Area DR-A, consisting of 100.40 +/- acres, includes most of the project site. Most of this drainage area is pervious. Drainage Area DR-B consists of 24.55 +/- acres, and Drainage Area DR-C consists of 0.29 +/- acres. Most of these drainage areas are pervious. DR-C is a self-contained depression capable of storing the 100-year storm runoff and is not included in the runoff calculations.

Drainage Area DR-A ultimately discharges to a stream along the western edge of the project site. A portion of this area is collected in a roadside swale along New York State Route 150 in the northeast corner of the project site.

Table II summarizes the hydrologic characteristics of the drainage areas described above. See Appendix A for computations for the existing drainage conditions.

Table II
Existing Conditions Summary

Drainage Area	Description	Size (Ac)	Composite CN	Tc (Min)	Q10 (CFS)	Q100 (CFS)
Area DR-A	Majority of this area is pervious. Remainder is from off-site roadways and buildings. The entire drainage area is collected on-site via overland flow and ultimately discharges to a stream along the western edge of the project site.	100.4	45	91.9	0.74	8.50
Area DR-B	Majority of this area is pervious and discharges to a roadside swale along N.Y.S. Route 150 in the northeast corner of the project site. The impervious portion of this area is runoff from N.Y.S. Route 150.	24.55	63	36.0	5.52	20.05
Area DR-C	Self-contained depression capable of storing the 100-year storm runoff	0.29	39	6.0	0.00	0.07

C. Proposed Conditions

The Proposed drainage area is comprised of a total of 125.24 +/- acres. This includes portions of offsite drainage from adjacent roadways and open land along the perimeter of the site. The parcel to be developed and off-site areas consist of pavement, buildings, and open land. There is no change in the analysis points from the existing to proposed conditions. All stormwater management practices discussed below have been designed in accordance with the New York State Stormwater Management Design Manual.

Analysis Point #1 receives runoff from Drainage Areas DR-1, DR-2, DR-3, DR-4, and DR-5 consisting of a total of 108.93 acres. This drainage area is a mix of impervious and pervious cover. Drainage area DR-1 discharges to Analysis Point #1 via overland flow. A culvert is proposed within this drainage area at the southern end of the project to allow the continuation of an overland flow path towards Analysis point #1. Drainage area DR-5 collects stormwater runoff through a roadside swale along the truck outbound and employee driveways and discharges to the roadside swale along New York State Route 150, which discharges to a stream along the western edge of the project site slightly upstream of Analysis Point #1. The roadside swales along the truck outbound and employee driveways will have check dams at regular intervals and provide the required WQv for this drainage area. Drainage Area DR-4 will be collected on-site via the storm sewer system and will drain into Sedimentation Basin #1. Sedimentation Basin #1 also receives runoff from Drainage Area DR-3. Infiltration Basin #1 receives runoff the Drainage Area DR-2 through overland flow and ultimately discharges to Analysis Point #1 via a broad crested weir during storms greater than the 100-year event. Infiltration Basin #1 is designed to attenuate the entire 100-year storm runoff volumes from DR-2, DR-3 and DR-4. A design infiltration rate of 20 in/hr was conservatively used for infiltration basin design calculations. This was based off a previous geotechnical report for the project site prepared by Gifford Engineering. 100% of the WQv must be provided in Sedimentation Basin #1 as pretreatment due to on-site infiltration rates greater than 5.0 in/hr. Sedimentation Basin #1 provides a total water quality volume of 2.00 acre-feet, which is greater than the required 100% WQv of 1.86 acre-feet.

Analysis Point #2 receives runoff from Drainage Areas DR-6, DR-7, DR-8, DR-9, DR-10, and DR-11 consisting of 16.31 acres. Drainage Area DR-6 discharges to Analysis Point #2 via overland flow. Drainage Areas DR-10 and DR-11 will collect stormwater runoff via the storm sewer system and drain into Sedimentation Basin #2. Sedimentation Basin #2 also receives runoff from Drainage Area DR-9. Infiltration Basin #2 receives runoff from Drainage Area DR-8 via overland flow and discharges to Drainage Area DR-7 via a broad crested weir during storms greater than the 100-year event. Drainage Area DR-7 collects stormwater runoff through roadside swales along New York State Route 150 and the employee and truck entrance driveways. The roadside swales along

the employee and truck entrance driveways will have check dams at regular intervals and provide the required WQv for this drainage area. This area ultimately discharges to Analysis Point #2. Infiltration Basin #2 is designed to attenuate the entire 100-year storm runoff volumes from DR-8, DR-9, DR-10, and DR-11. A design infiltration rate of 20 in/hr was conservatively used for infiltration basin design calculations. This was based off a previous geotechnical report for the project site prepared by Gifford Engineering. 100% of the WQv must be provided in Sedimentation Basin #2 as pretreatment due to on-site infiltration rates greater than 5.0 in/hr. Sedimentation Basin #2 provides a total water quality volume of 0.57 acre-feet, which is greater than the required 100% WQv of 0.43 acre-feet.

Erosion & Sediment Control

It is planned to complete the earthwork for this project in five separate phases to minimize the amount of soil disturbance at any one time. The total site disturbance will be approximately 41 +/- acres and it is anticipated that the maximum disturbance at any one time will be approximately 10 acres. The construction phasing and erosion and sediment control measures will be addressed in greater detail in the SWPPP prepared for this project and will comply with the New York State Standards and Specifications for Erosion and Sediment Control as well as General Permit GP-0-10-002.

**Table III
Proposed Conditions Summary**

Drainage Area	Description	Size (Ac)	Composite CN	Tc (Min)	Q10 (CFS)	Q100 (CFS)
Area DR-1	Majority of drainage area is pervious. The remainder is from off-site roadways, buildings, and open land. A portion of the drainage area receives runoff from overland flow and a portion of it receives runoff from a roadside swale along N.Y.S. Route 150. The entire drainage area ultimately discharges to a stream along the western edge of the project site.	77.40	38	91.9	0.57	6.55
Area DR-2	Majority of this area is pervious and discharges to Infiltration Basin #1	3.89	32	6.0	0.00	0.09
Area DR-3	This area is pervious and discharges to Sedimentation Basin #1	1.27	32	6.0	0.00	0.03
Area DR-4	Majority of this area is impervious. It includes stormwater runoff collected on site via the storm sewer system. This area discharges to Sedimentation Basin #1	25.82	92	9.7	86.14	132.23

Area DR-5	Majority of this area is pervious and is collected onsite through swales along the truck outbound and employee driveways. This area discharges to a roadside swale along N.Y.S. Route 150 and ultimately into a stream along the western edge of the project site.	0.54	58	6.0	0.40	1.15
Area DR-6	Majority of drainage area is pervious. Runoff is collected on site via overland flow and discharges to a roadside swale along N.Y.S. Route 150.	6.80	47	36.0	0.56	3.36
Area DR-7	Majority of drainage area is pervious. Runoff is collected on site via swales along the truck inbound and employee driveways and discharges to a culvert under the truck inbound driveway.	1.90	55	6.0	0.98	3.36
Area DR-8	This area is pervious and discharges to Infiltration Basin #2.	0.74	43	6.0	0.03	0.37
Area DR-9	This area is pervious and discharges to Sedimentation Basin #2.	0.67	47	6.0	0.08	0.60
Area DR-10	Majority of this area is impervious. It includes stormwater runoff collected on site via the storm sewer system. This area discharges to Sedimentation Basin #2.	6.21	89	6.0	21.68	34.24

III. Stormwater Management & SPDES Phase II Requirements

State Pollutant Discharge Elimination System (SPDES)

Since the subject site will have land disturbance of more than 1-acre, a State Pollutant Discharge Elimination System (SPDES) permit will be required as part of the project. A Stormwater Pollution Prevention Plan (SWPPP) will be developed in accordance with the permit regulations. The SWPPP will be prepared in compliance with the New York State DEC Design Manual and meet the following criteria as the principle objectives contained in an approved SWPPP.

- 1) Reduction or elimination of erosion and sediment loading to water-bodies during construction activities. Controls will be designed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control.
- 2) Control the impact of stormwater runoff on the water quality of the receiving waters.
- 3) Control the increase volume and peak runoff rate of runoff during and after construction.
- 4) Maintenance of stormwater controls during and after completion of construction.

The aforementioned objectives will be accomplished by incorporating several of the design criteria outlined within the Technical Guidelines provided by New York State Department of Environmental Conservation Stormwater Management Design Manual and summarized below.

A. Water Quality Volume (WQv) / Runoff Reduction Volume (RRv)

The Water Quality Volume (WQv) requirement is designed to improve the quality of stormwater leaving the site. The WQv is based on the site areas that drain to their respective stormwater treatment practices. The infiltration rate used for design is 20 in/hr. When the infiltration rate is greater than 5 in/hr, 100% of the WQv must be provided as pre-treatment. The design incorporates the use of forebays as pre-treatment. As shown in the attached HydroCAD and WQv calculations, each forebay provides enough storage for 100% of the WQv.

The Runoff Reduction Volume (RRv) has been achieved by use of infiltration basins and meet pre-development hydrology requirements by reducing pre-construction peak runoff rate and discharge volume as well as minimizing concentrated flow by using runoff control techniques to provide treatment in a distributed manner before runoff reaches the analysis points. Refer to Tables VI and VII in Section IV for existing and proposed condition runoff volumes for each design storm.

B. Channel Protection Volume

The Channel Protection Volume will be met by providing detention and infiltration. The Channel Protection Volume requires that 24-hour detention of the 1-year 24-hour storm event is provided. The HydroCAD report contained in Appendix B of this report shows that 100% of the 1-year storm event is infiltrated such that there is no discharge from the basins, therefore this requirement is met.

C. Overbank Flood

Overbank Flood protection is met by providing detention and infiltration. A comparison of the calculated discharge for the pre-development versus post-development flow results in a reduction in peak flow rates for the 10-year storm. The HydroCAD report contained in Appendices A and B of this report as well as Table IV below summarize this decrease for the 10-year storm.

D. Extreme Storm

Extreme Storm protection is met by providing detention and infiltration. A comparison of the calculated discharge for the pre-development versus post-development flow results in a reduction in peak flow rates for the 100-year storm. The HydroCAD report contained in Appendices A and B of this report, as well as Table V below, summarize this decrease for the 100-year storm.

IV. INFILTRATION TESTING

A. Summary of Test Results

A design infiltration rate of 20 in/hr was conservatively used for infiltration basin design calculations. This was based off a previous geotechnical report for the project site prepared by Gifford Engineering. Terracon is doing geotech work at the site while this report is being drafted. Updated infiltration rates will be provided once those tests are completed.

Summary of Findings

A. Summary of Results

Tables IV and Table V depict the peak discharges from the site for each of the design storms for the proposed conditions.

Table IV
Existing and Proposed Peak Discharge for the 10-Year Storm (cfs)

Drainage Area	10-Year Design Storm Discharge (cfs)	
	Existing	Proposed
Analysis Point #1	0.74	0.59
Analysis Point #2	5.52	0.98

Table V
Existing and Proposed Peak Discharge for the 100-Year Storm (cfs)

Drainage Area	100-Year Design Storm Discharge (cfs)	
	Existing	Proposed
Analysis Point #1	8.50	6.66
Analysis Point #2	20.05	4.13

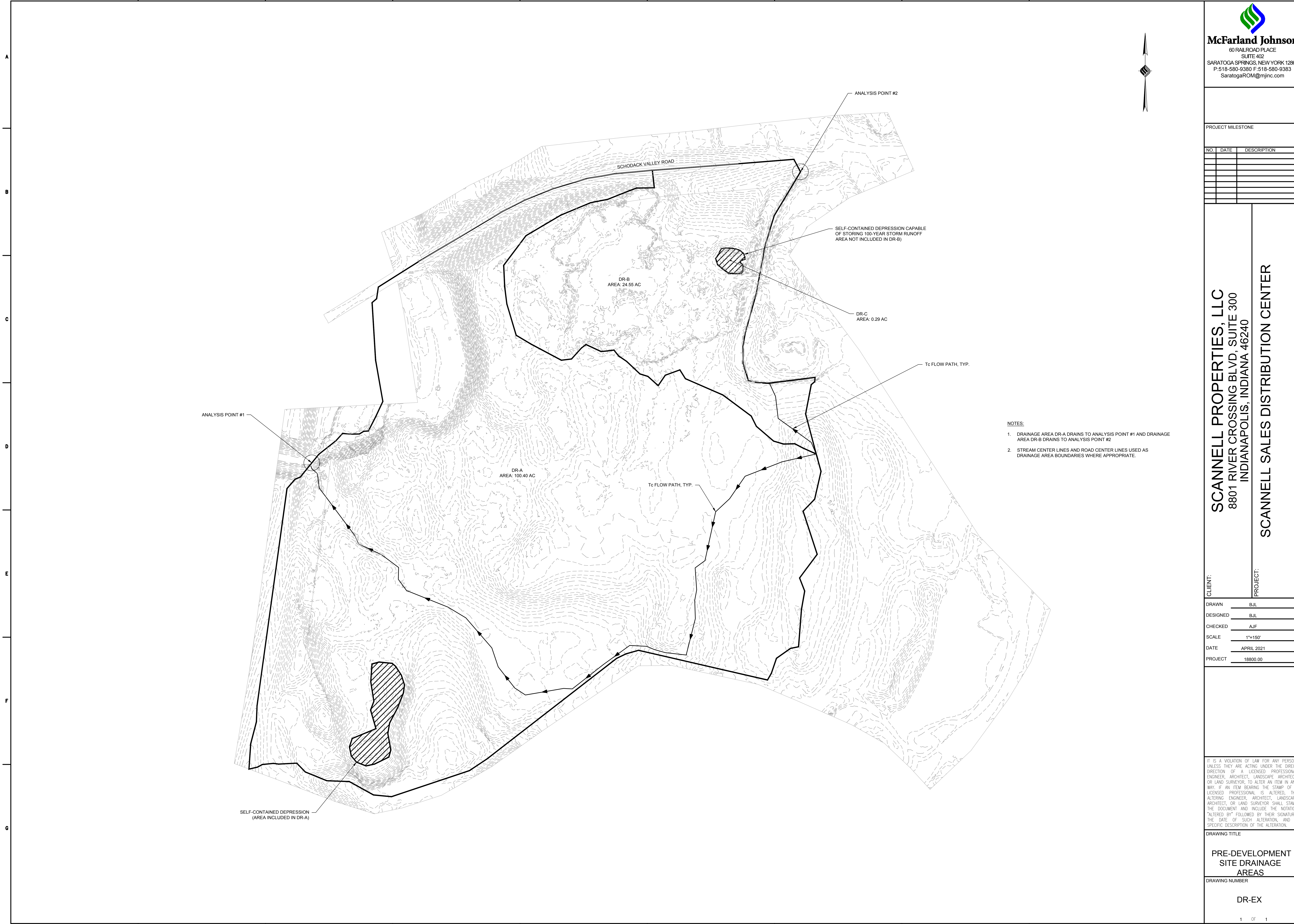
As depicted in the above tables, the peak runoff rates generated from the site for each of the design storms will be decreased after this project is constructed and the stormwater management plan is implemented.

B. Conclusion

Based on the analysis provided in this report, the proposed stormwater management practices will mitigate peak discharge rates of runoff from the site for all the design storms under proposed conditions. The proposed stormwater management practices includes two forebay/infiltration basins designed in accordance with the New York State Stormwater Management Design Manual for water quantity and water quality treatment. Therefore, this project will meet the NYSDEC and Town of Schodack requirements for stormwater runoff from the developed site.

Appendix A

Existing Conditions Drainage Map and HydroCAD Report



PROJECT MILESTONE		
NO.	DATE	DESCRIPTION

SCANNELL PROPERTIES, LLC
8801 RIVER CROSSING BLVD, SUITE 300
INDIANAPOLIS, INDIANA 46240

SCANNELL SALES DISTRIBUTION CENTER

CLIENT:	
PROJECT:	
DRAWN	B.J.L.
DESIGNED	B.J.L.
CHECKED	A.J.F.
SCALE	1"=150'
DATE	APRIL 2021
PROJECT	18800.00

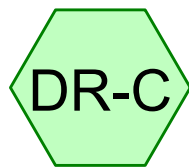
IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECT DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

DRAWING TITLE

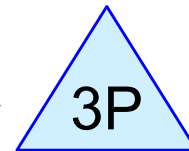
**PRE-DEVELOPMENT
SITE DRAINAGE
AREAS**

DRAWING NUMBER

DR-EX



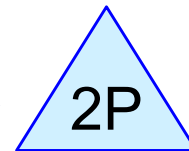
Depression



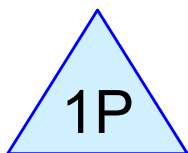
Infiltration



Overland



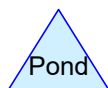
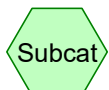
Analysis Point #2



Analysis Point #1



Overland



Routing Diagram for Pre Conditions

Prepared by {enter your company name here}, Printed 3/25/2021
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Pre Conditions

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Project Notes

Rainfall events imported from "TP-40-Rain.txt" for 1424 NY Rensselaer

Pre Conditions

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.290	39	>75% Grass cover, Good, HSG A (DR-C)
7.190	76	Gravel roads, HSG A (DR-A, DR-B)
0.810	98	Paved parking, HSG A (DR-A)
1.870	83	Paved roads w/open ditches, 50% imp, HSG A (DR-A, DR-B)
0.660	98	Roofs, HSG A (DR-A)
96.950	36	Woods, Fair, HSG A (DR-A)
17.470	43	Woods/grass comb., Fair, HSG A (DR-B)
125.240	41	TOTAL AREA

Pre Conditions

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
125.240	HSG A	DR-A, DR-B, DR-C
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
125.240		TOTAL AREA

Pre Conditions

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.290	0.000	0.000	0.000	0.000	0.290	>75% Grass cover, Good	
7.190	0.000	0.000	0.000	0.000	7.190	Gravel roads	
0.810	0.000	0.000	0.000	0.000	0.810	Paved parking	
1.870	0.000	0.000	0.000	0.000	1.870	Paved roads w/open ditches, 50% imp	
0.660	0.000	0.000	0.000	0.000	0.660	Roofs	
96.950	0.000	0.000	0.000	0.000	96.950	Woods, Fair	
17.470	0.000	0.000	0.000	0.000	17.470	Woods/grass comb., Fair	
125.240	0.000	0.000	0.000	0.000	125.240	TOTAL AREA	

Pre Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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

SubcatchmentDR-A: Overland

Runoff Area=100.400 ac 2.21% Impervious Runoff Depth=0.00"
Flow Length=3,707' Tc=91.9 min CN=38 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-B: Overland

Runoff Area=24.550 ac 0.77% Impervious Runoff Depth>0.03"
Flow Length=1,521' Tc=36.0 min CN=53 Runoff=0.13 cfs 0.056 af

SubcatchmentDR-C: Depression

Runoff Area=0.290 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Pond 1P: Analysis Point #1

Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 2P: Analysis Point #2

Inflow=0.13 cfs 0.056 af
Primary=0.13 cfs 0.056 af

Pond 3P: Infiltration

Peak Elev=318.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 125.240 ac Runoff Volume = 0.056 af Average Runoff Depth = 0.01"
98.08% Pervious = 122.835 ac 1.92% Impervious = 2.405 ac

Pre Conditions

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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-A: Overland

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
1.490	83	Paved roads w/open ditches, 50% imp, HSG A
0.660	98	Roofs, HSG A
0.810	98	Paved parking, HSG A
0.490	76	Gravel roads, HSG A
96.950	36	Woods, Fair, HSG A
100.400	38	Weighted Average
98.185		97.79% Pervious Area
2.215		2.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	87	0.0920	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
22.3	1,099	0.0270	0.82		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	110	0.0180	1.34		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
3.4	613	0.0390	2.96		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.4	237	0.0080	0.89		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
5.9	185	0.0110	0.52		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.7	171	0.0060	0.19		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.4	1,205	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
91.9	3,707	Total			

Pre Conditions

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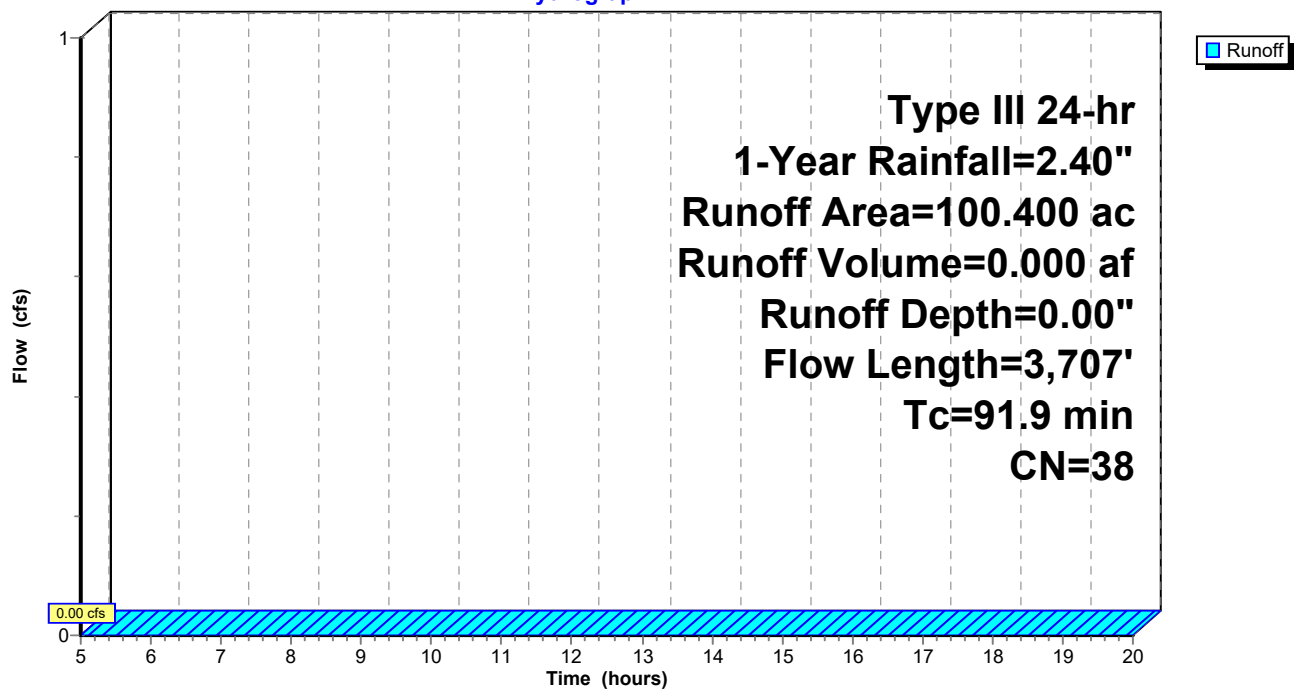
Type III 24-hr 1-Year Rainfall=2.40"

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Subcatchment DR-A: Overland

Hydrograph



Pre Conditions

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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-B: Overland

Runoff = 0.13 cfs @ 15.56 hrs, Volume= 0.056 af, Depth> 0.03"

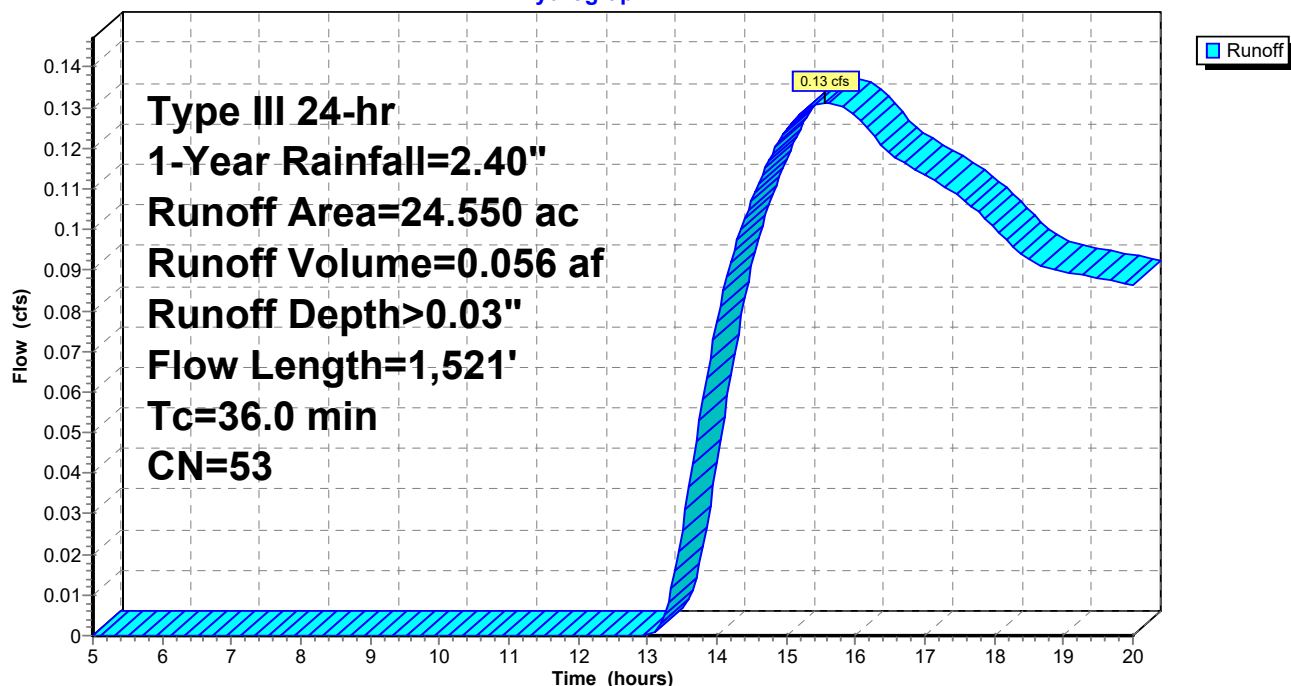
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
6.700	76	Gravel roads, HSG A
17.470	43	Woods/grass comb., Fair, HSG A
0.380	83	Paved roads w/open ditches, 50% imp, HSG A
24.550	53	Weighted Average
24.360		99.23% Pervious Area
0.190		0.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	148	0.0540	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
2.7	257	0.1010	1.59		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	1,116	0.0070	1.58	31.54	Channel Flow, Area= 20.0 sf Perim= 14.0' r= 1.43' n= 0.100 Very weedy reaches w/pools
36.0	1,521	Total			

Subcatchment DR-B: Overland

Hydrograph



Pre Conditions

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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-C: Depression

[45] Hint: Runoff=Zero

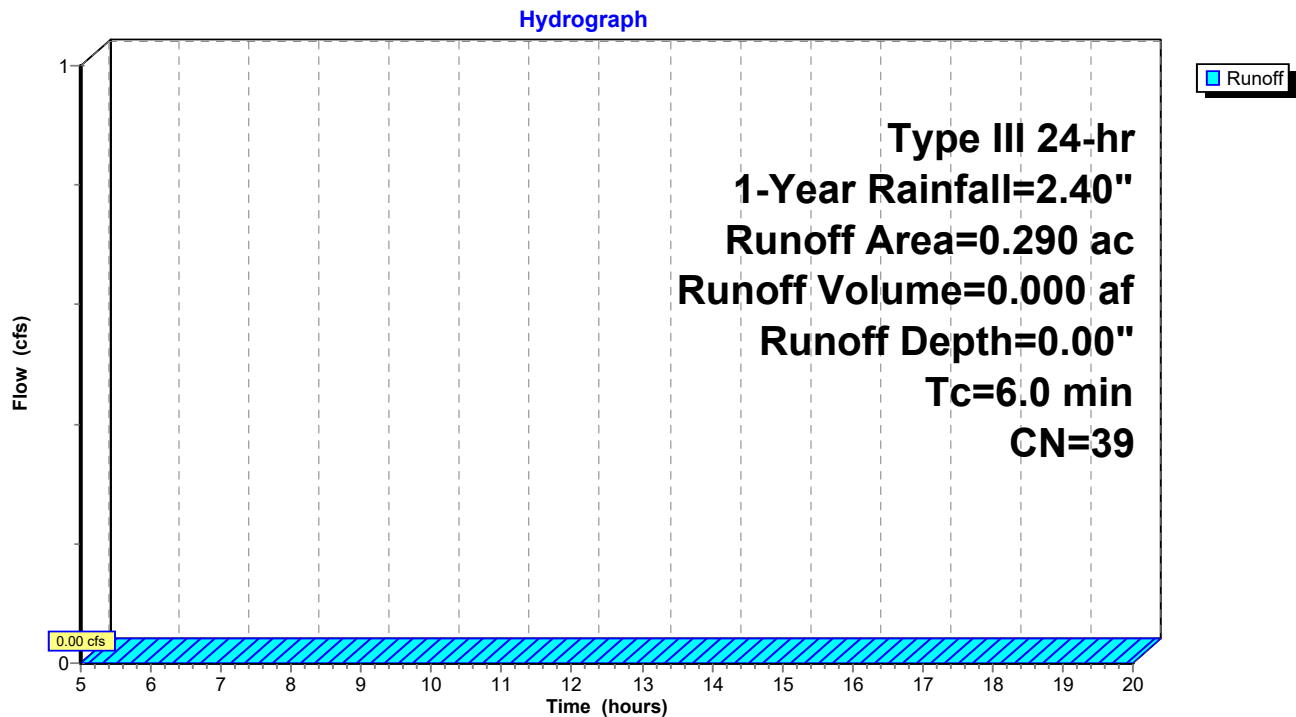
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.290	39	>75% Grass cover, Good, HSG A
0.290		100.00% Pervious Area

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

Subcatchment DR-C: Depression



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 1P: Analysis Point #1

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

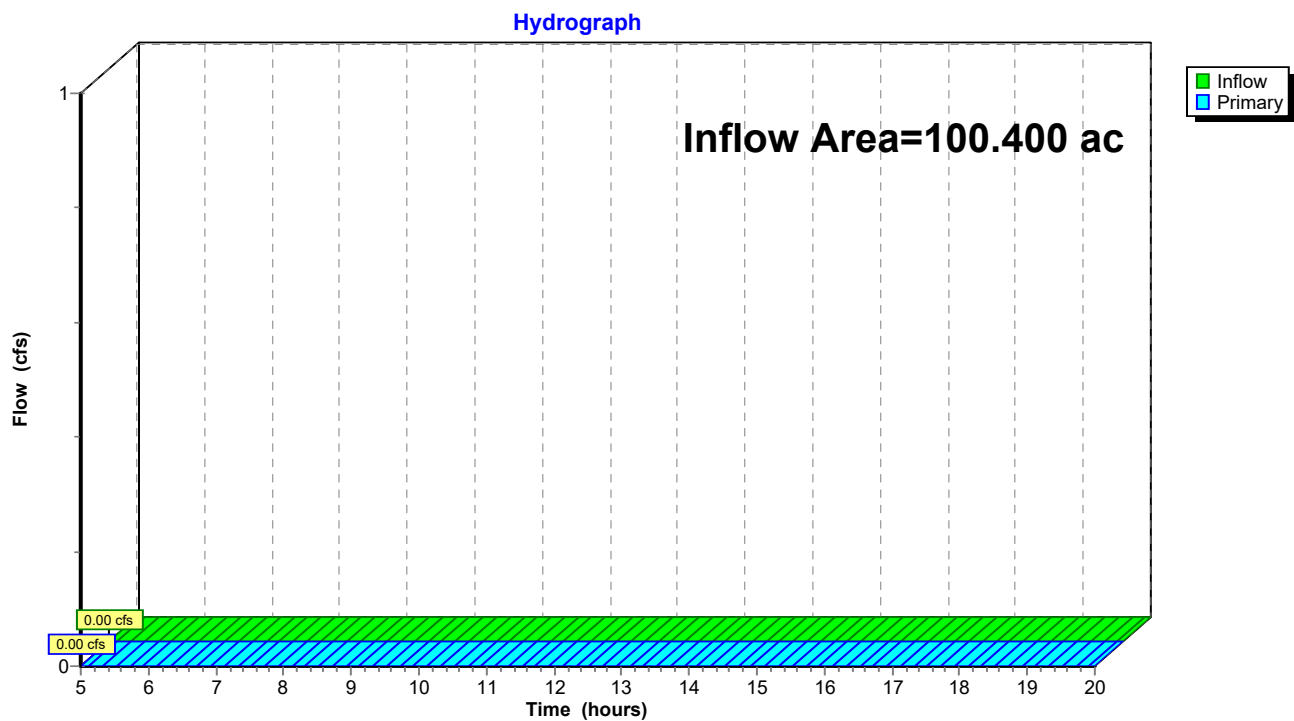
Inflow Area = 100.400 ac, 2.21% Impervious, Inflow Depth = 0.00" for 1-Year event

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 2P: Analysis Point #2

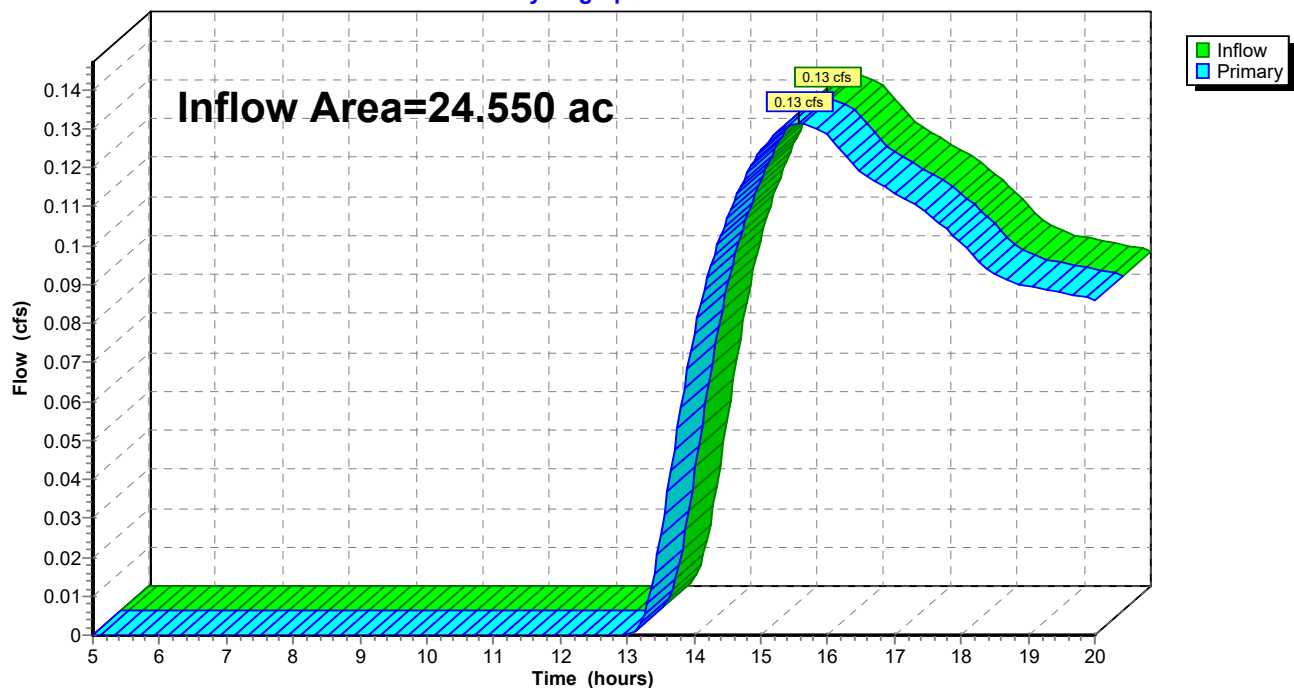
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 24.550 ac, 0.77% Impervious, Inflow Depth > 0.03" for 1-Year event
Inflow = 0.13 cfs @ 15.56 hrs, Volume= 0.056 af
Primary = 0.13 cfs @ 15.56 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Analysis Point #2

Hydrograph



Pre Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 3P: Infiltration

Inflow Area = 0.290 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-Year event
 Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 318.00' @ 5.00 hrs Surf.Area= 274 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	318.00'	51,210 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
318.00	274	63.5	0	0	274
320.00	1,003	156.9	1,201	1,201	1,927
322.00	2,050	213.5	2,991	4,192	3,636
324.00	6,950	373.3	8,516	12,708	11,121
326.00	9,538	394.1	16,420	29,128	12,605
328.00	12,615	439.9	22,081	51,210	15,757

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	20.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=318.00' (Free Discharge)

↑ **1=Exfiltration** (Passes 0.00 cfs of 0.13 cfs potential flow)

Pre Conditions

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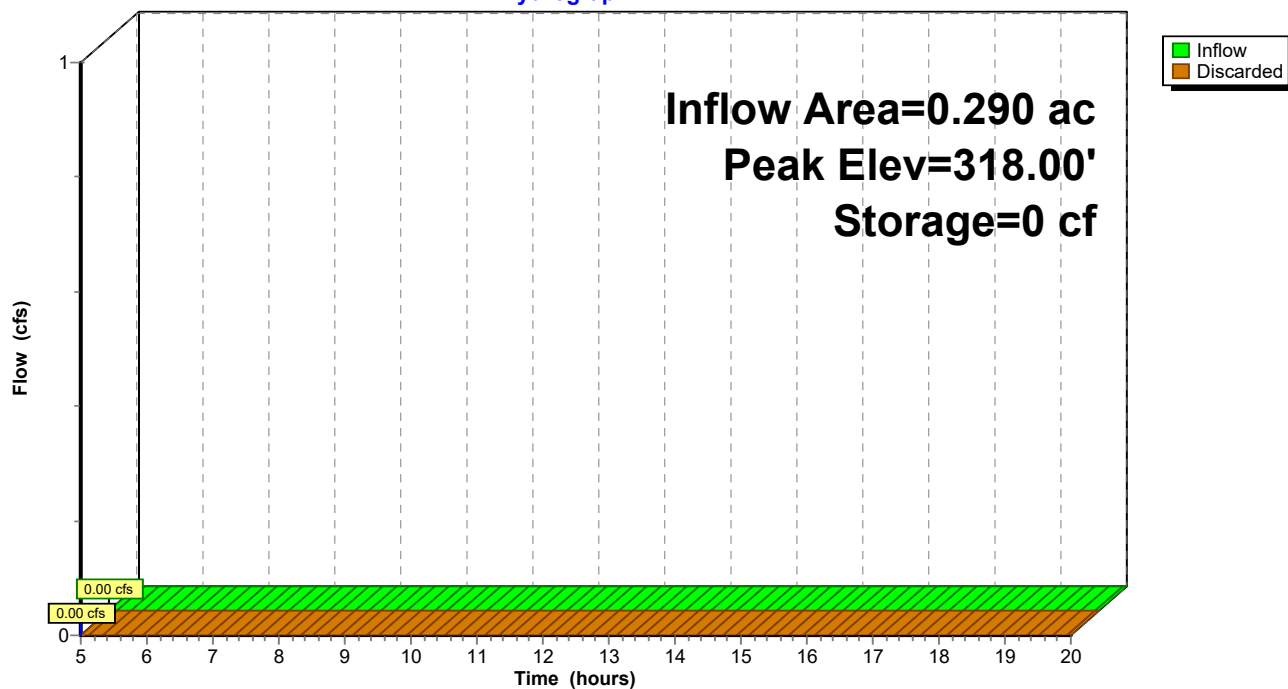
Type III 24-hr 1-Year Rainfall=2.40"

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Pond 3P: Infiltration

Hydrograph



Pre Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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

SubcatchmentDR-A: Overland

Runoff Area=100.400 ac 2.21% Impervious Runoff Depth>0.03"
Flow Length=3,707' Tc=91.9 min CN=38 Runoff=0.74 cfs 0.288 af

SubcatchmentDR-B: Overland

Runoff Area=24.550 ac 0.77% Impervious Runoff Depth>0.48"
Flow Length=1,521' Tc=36.0 min CN=53 Runoff=5.52 cfs 0.977 af

SubcatchmentDR-C: Depression

Runoff Area=0.290 ac 0.00% Impervious Runoff Depth>0.06"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.001 af

Pond 1P: Analysis Point #1

Inflow=0.74 cfs 0.288 af
Primary=0.74 cfs 0.288 af

Pond 2P: Analysis Point #2

Inflow=5.52 cfs 0.977 af
Primary=5.52 cfs 0.977 af

Pond 3P: Infiltration

Peak Elev=318.00' Storage=0 cf Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Total Runoff Area = 125.240 ac Runoff Volume = 1.267 af Average Runoff Depth = 0.12"
98.08% Pervious = 122.835 ac 1.92% Impervious = 2.405 ac

Pre Conditions

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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-A: Overland

Runoff = 0.74 cfs @ 16.84 hrs, Volume= 0.288 af, Depth> 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
1.490	83	Paved roads w/open ditches, 50% imp, HSG A
0.660	98	Roofs, HSG A
0.810	98	Paved parking, HSG A
0.490	76	Gravel roads, HSG A
96.950	36	Woods, Fair, HSG A
100.400	38	Weighted Average
98.185		97.79% Pervious Area
2.215		2.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	87	0.0920	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
22.3	1,099	0.0270	0.82		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	110	0.0180	1.34		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
3.4	613	0.0390	2.96		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.4	237	0.0080	0.89		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
5.9	185	0.0110	0.52		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.7	171	0.0060	0.19		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.4	1,205	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
91.9	3,707	Total			

Pre Conditions

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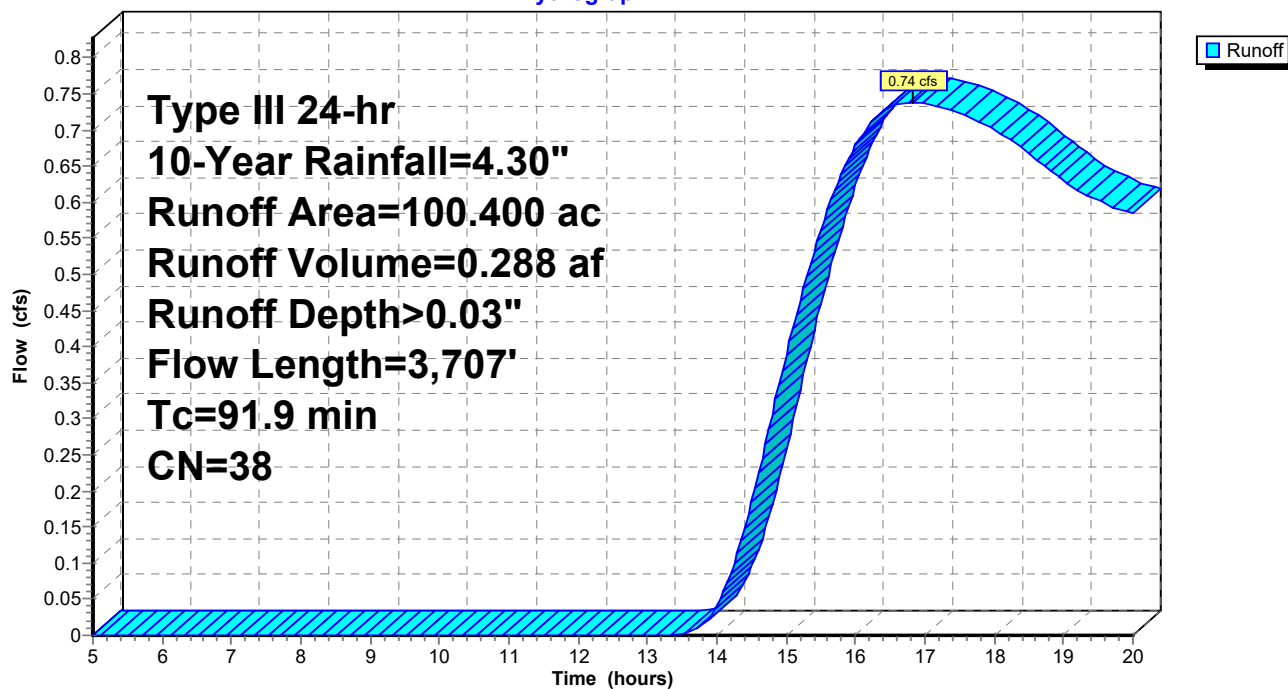
Type III 24-hr 10-Year Rainfall=4.30"

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Subcatchment DR-A: Overland

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-B: Overland

Runoff = 5.52 cfs @ 12.66 hrs, Volume= 0.977 af, Depth> 0.48"

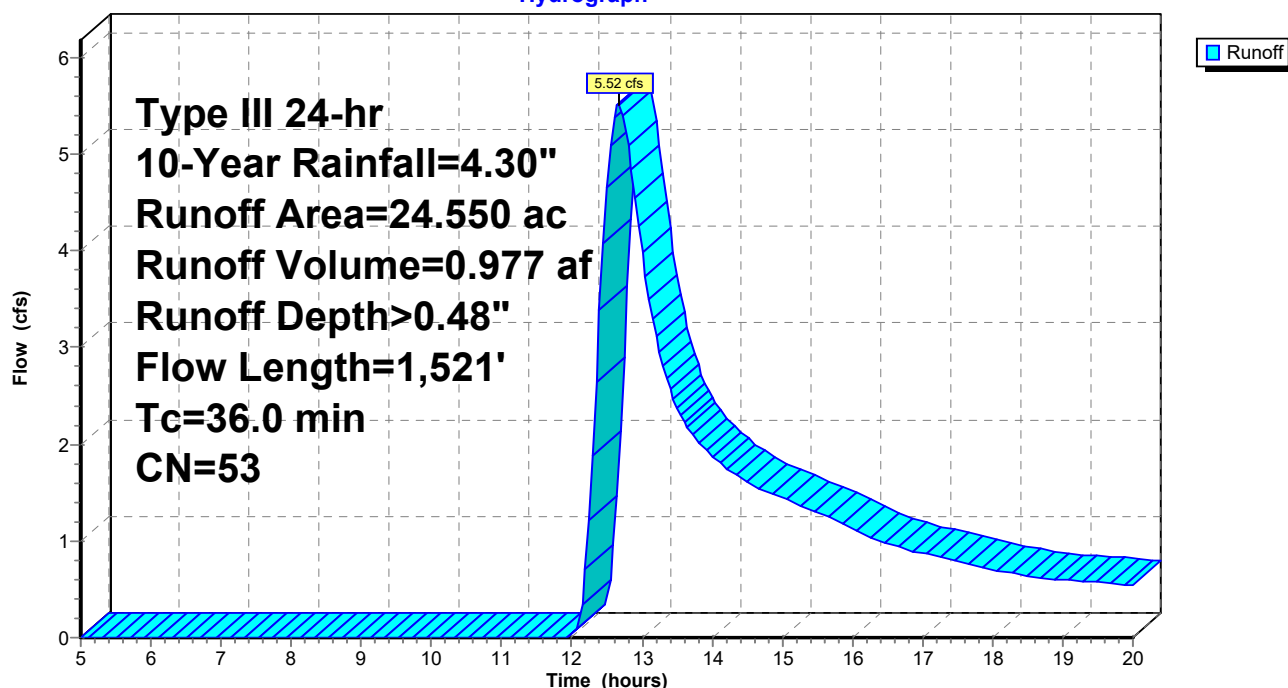
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
6.700	76	Gravel roads, HSG A
17.470	43	Woods/grass comb., Fair, HSG A
0.380	83	Paved roads w/open ditches, 50% imp, HSG A
24.550	53	Weighted Average
24.360		99.23% Pervious Area
0.190		0.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	148	0.0540	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
2.7	257	0.1010	1.59		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	1,116	0.0070	1.58	31.54	Channel Flow, Area= 20.0 sf Perim= 14.0' r= 1.43' n= 0.100 Very weedy reaches w/pools
36.0	1,521	Total			

Subcatchment DR-B: Overland

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-C: Depression

Runoff = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af, Depth> 0.06"

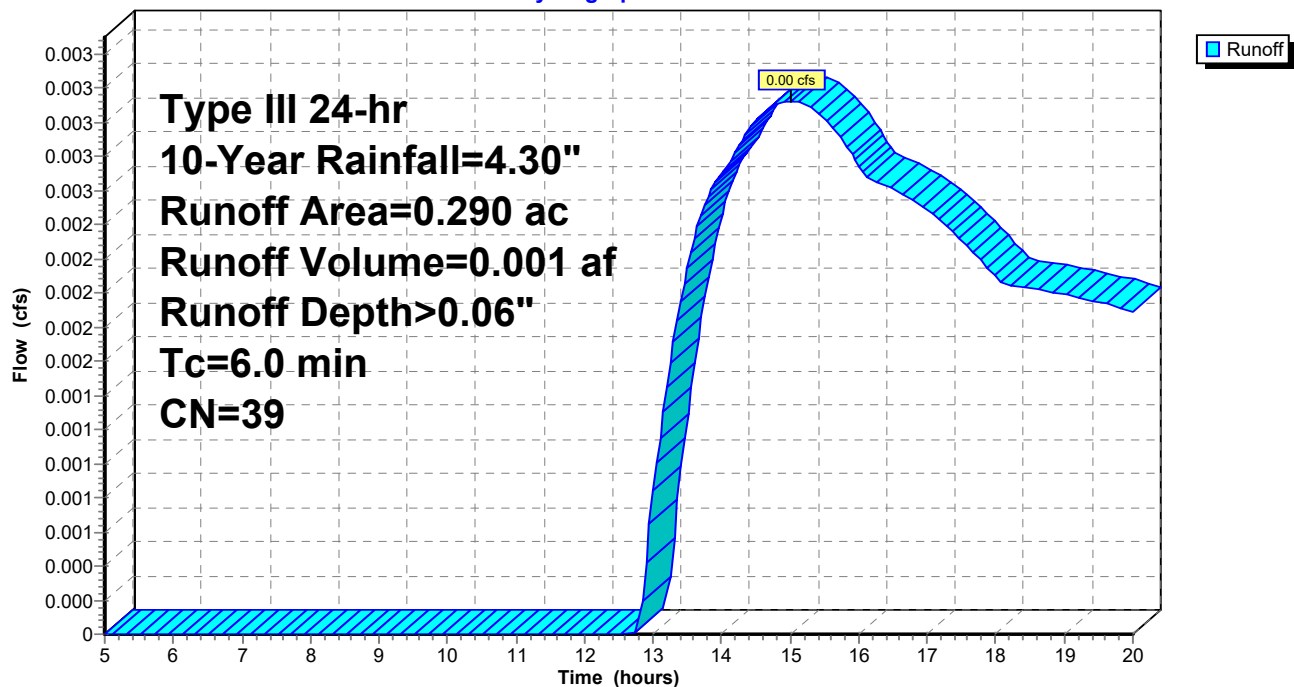
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
0.290	39	>75% Grass cover, Good, HSG A
0.290		100.00% Pervious Area

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

Subcatchment DR-C: Depression

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.30"

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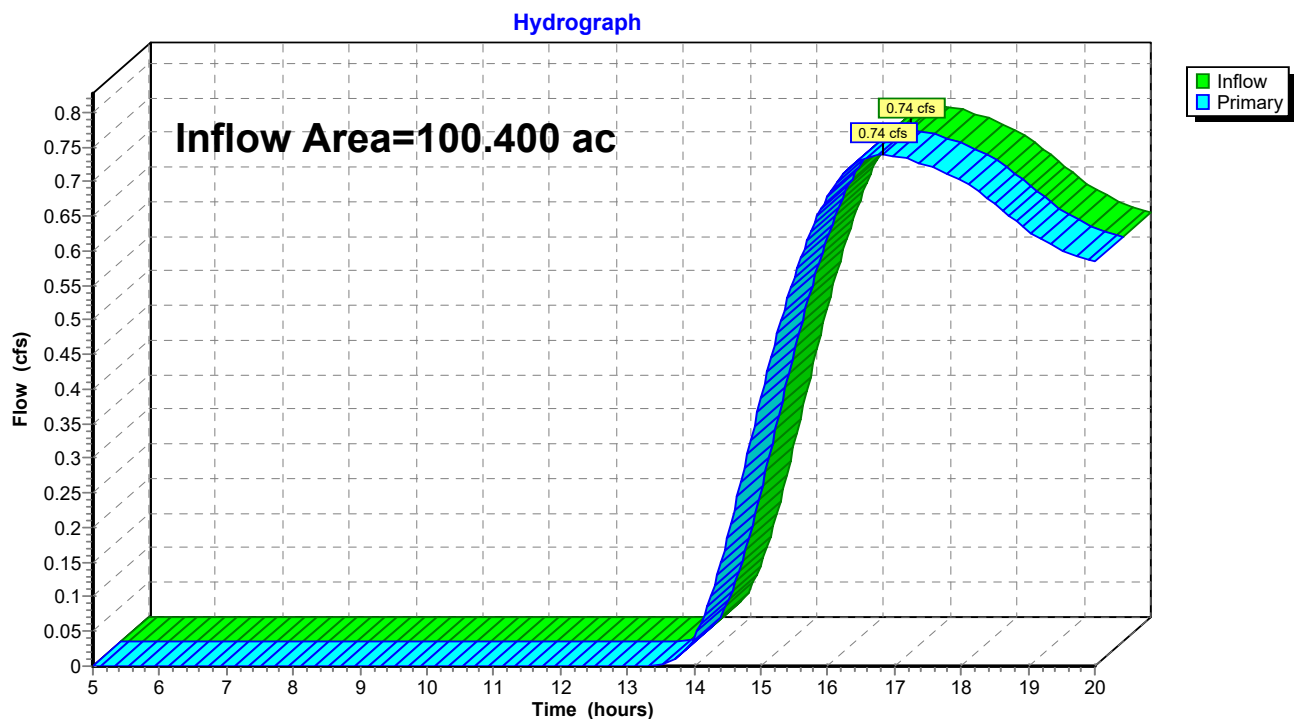
Summary for Pond 1P: Analysis Point #1

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

Inflow Area = 100.400 ac, 2.21% Impervious, Inflow Depth > 0.03" for 10-Year event
Inflow = 0.74 cfs @ 16.84 hrs, Volume= 0.288 af
Primary = 0.74 cfs @ 16.84 hrs, Volume= 0.288 af, Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1



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Type III 24-hr 10-Year Rainfall=4.30"

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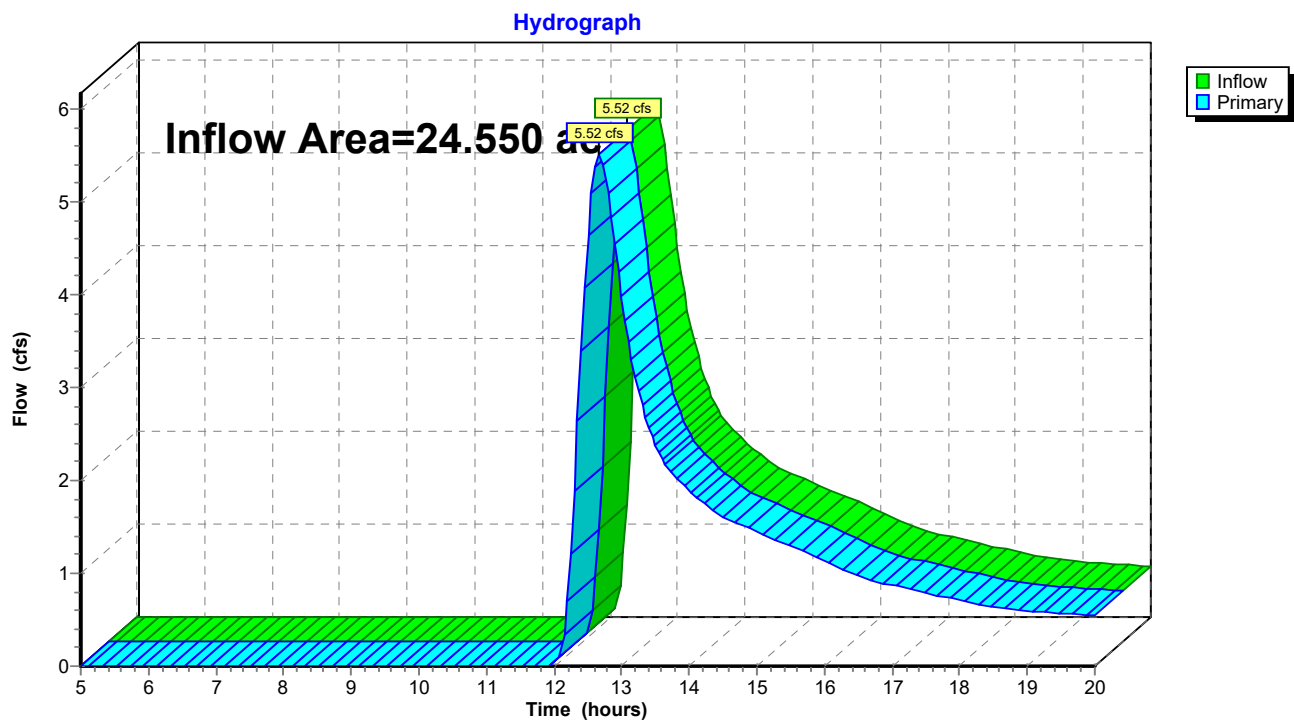
Summary for Pond 2P: Analysis Point #2

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

Inflow Area = 24.550 ac, 0.77% Impervious, Inflow Depth > 0.48" for 10-Year event
Inflow = 5.52 cfs @ 12.66 hrs, Volume= 0.977 af
Primary = 5.52 cfs @ 12.66 hrs, Volume= 0.977 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Analysis Point #2



Pre Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Pond 3P: Infiltration

Inflow Area = 0.290 ac, 0.00% Impervious, Inflow Depth > 0.06" for 10-Year event
 Inflow = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af
 Outflow = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 318.00' @ 5.00 hrs Surf.Area= 274 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	318.00'	51,210 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
318.00	274	63.5	0	0	274
320.00	1,003	156.9	1,201	1,201	1,927
322.00	2,050	213.5	2,991	4,192	3,636
324.00	6,950	373.3	8,516	12,708	11,121
326.00	9,538	394.1	16,420	29,128	12,605
328.00	12,615	439.9	22,081	51,210	15,757

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	20.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 15.00 hrs HW=318.00' (Free Discharge)↑ **1=Exfiltration** (Passes 0.00 cfs of 0.13 cfs potential flow)

Pre Conditions

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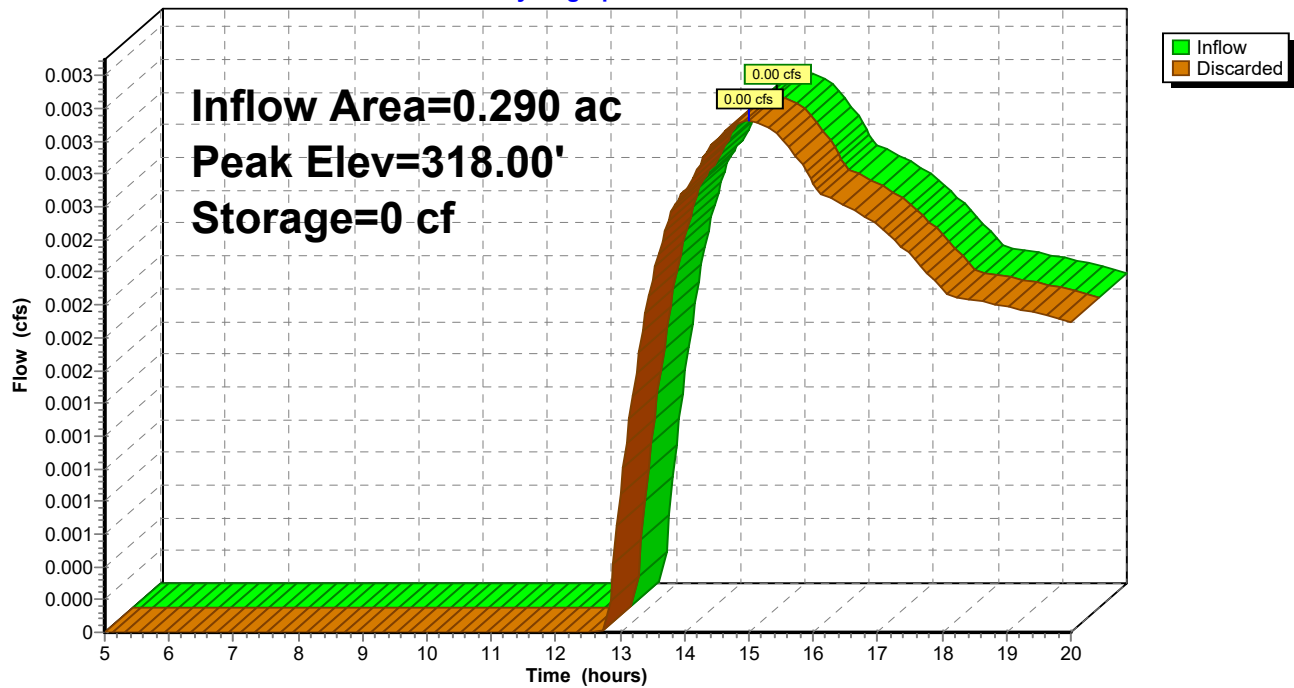
Type III 24-hr 10-Year Rainfall=4.30"

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Pond 3P: Infiltration

Hydrograph



Pre Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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

SubcatchmentDR-A: Overland

Runoff Area=100.400 ac 2.21% Impervious Runoff Depth>0.37"
Flow Length=3,707' Tc=91.9 min CN=38 Runoff=8.50 cfs 3.076 af

SubcatchmentDR-B: Overland

Runoff Area=24.550 ac 0.77% Impervious Runoff Depth>1.36"
Flow Length=1,521' Tc=36.0 min CN=53 Runoff=20.05 cfs 2.773 af

SubcatchmentDR-C: Depression

Runoff Area=0.290 ac 0.00% Impervious Runoff Depth>0.45"
Tc=6.0 min CN=39 Runoff=0.07 cfs 0.011 af

Pond 1P: Analysis Point #1

Inflow=8.50 cfs 3.076 af
Primary=8.50 cfs 3.076 af

Pond 2P: Analysis Point #2

Inflow=20.05 cfs 2.773 af
Primary=20.05 cfs 2.773 af

Pond 3P: Infiltration

Peak Elev=318.00' Storage=0 cf Inflow=0.07 cfs 0.011 af
Outflow=0.07 cfs 0.011 af

Total Runoff Area = 125.240 ac Runoff Volume = 5.860 af Average Runoff Depth = 0.56"
98.08% Pervious = 122.835 ac 1.92% Impervious = 2.405 ac

Pre Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-A: Overland

Runoff = 8.50 cfs @ 13.79 hrs, Volume= 3.076 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
1.490	83	Paved roads w/open ditches, 50% imp, HSG A
0.660	98	Roofs, HSG A
0.810	98	Paved parking, HSG A
0.490	76	Gravel roads, HSG A
96.950	36	Woods, Fair, HSG A
100.400	38	Weighted Average
98.185		97.79% Pervious Area
2.215		2.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	87	0.0920	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
22.3	1,099	0.0270	0.82		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	110	0.0180	1.34		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
3.4	613	0.0390	2.96		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.4	237	0.0080	0.89		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
5.9	185	0.0110	0.52		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.7	171	0.0060	0.19		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.4	1,205	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
91.9	3,707	Total			

Pre Conditions

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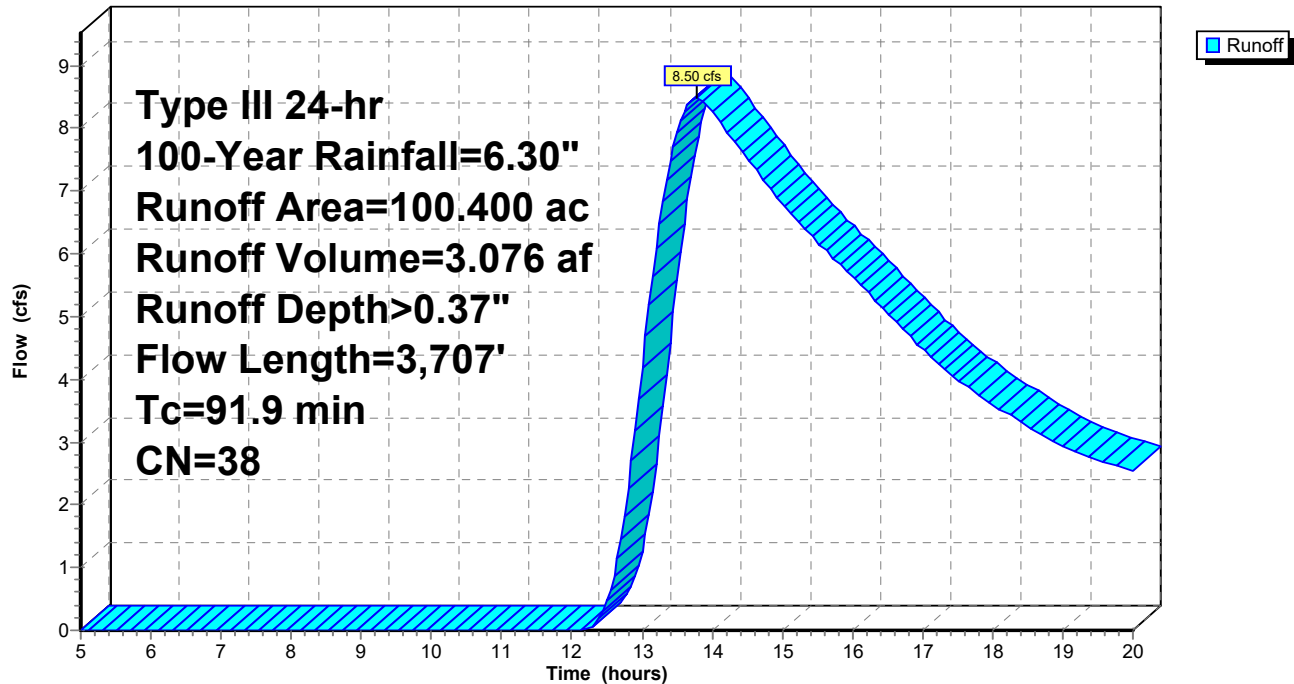
Type III 24-hr 100-Year Rainfall=6.30"

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Subcatchment DR-A: Overland

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-B: Overland

Runoff = 20.05 cfs @ 12.57 hrs, Volume= 2.773 af, Depth> 1.36"

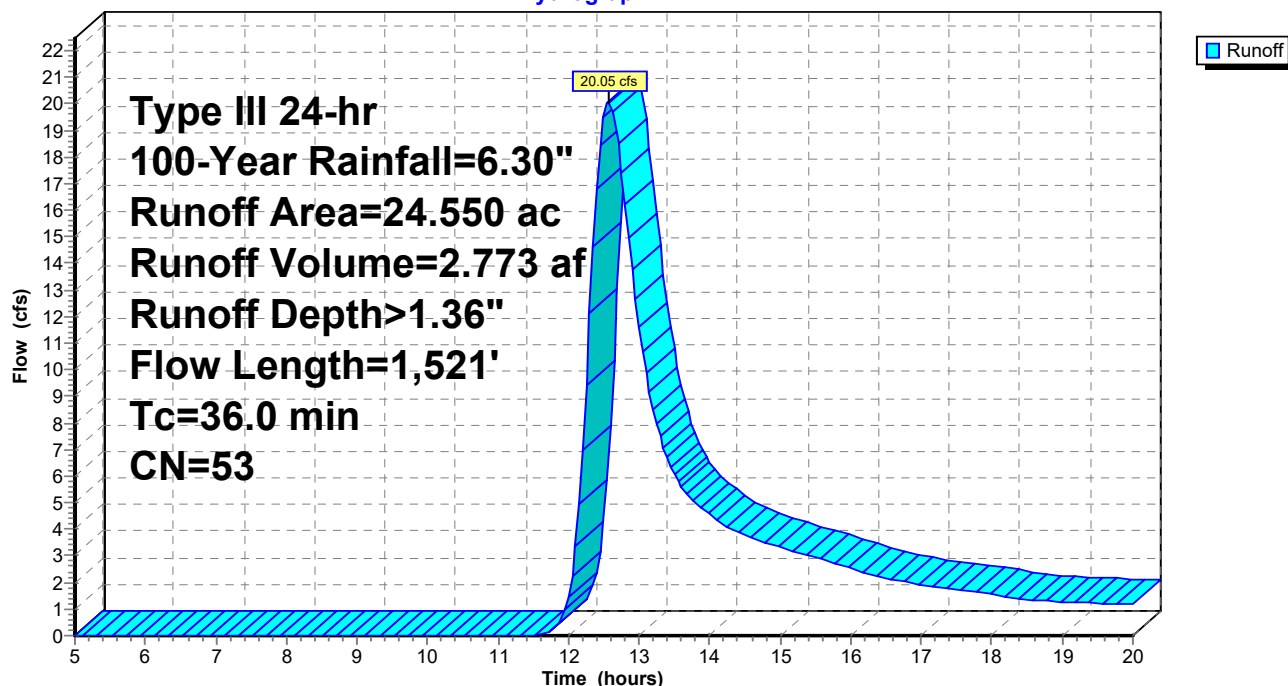
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
6.700	76	Gravel roads, HSG A
17.470	43	Woods/grass comb., Fair, HSG A
0.380	83	Paved roads w/open ditches, 50% imp, HSG A
24.550	53	Weighted Average
24.360		99.23% Pervious Area
0.190		0.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	148	0.0540	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
2.7	257	0.1010	1.59		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	1,116	0.0070	1.58	31.54	Channel Flow, Area= 20.0 sf Perim= 14.0' r= 1.43' n= 0.100 Very weedy reaches w/pools
36.0	1,521	Total			

Subcatchment DR-B: Overland

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-C: Depression

Runoff = 0.07 cfs @ 12.31 hrs, Volume= 0.011 af, Depth> 0.45"

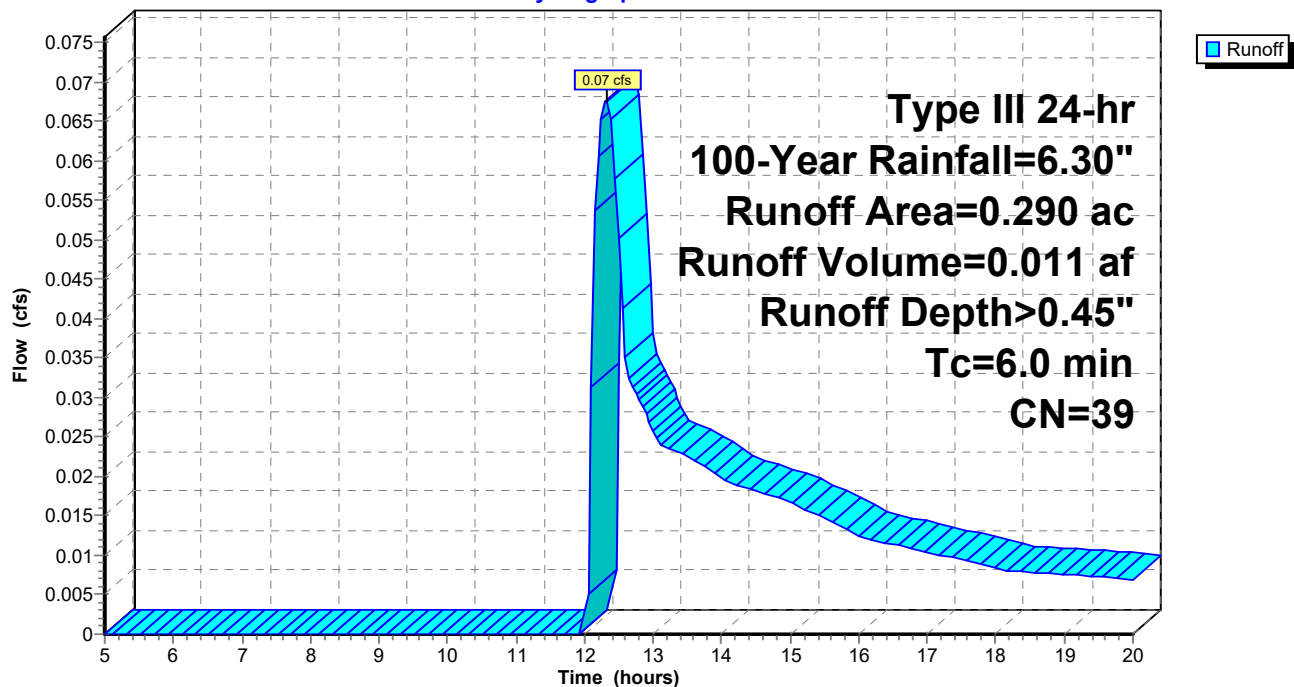
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
0.290	39	>75% Grass cover, Good, HSG A
0.290		100.00% Pervious Area

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

Subcatchment DR-C: Depression

Hydrograph



Pre Conditions

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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 1P: Analysis Point #1

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

Inflow Area = 100.400 ac, 2.21% Impervious, Inflow Depth > 0.37" for 100-Year event

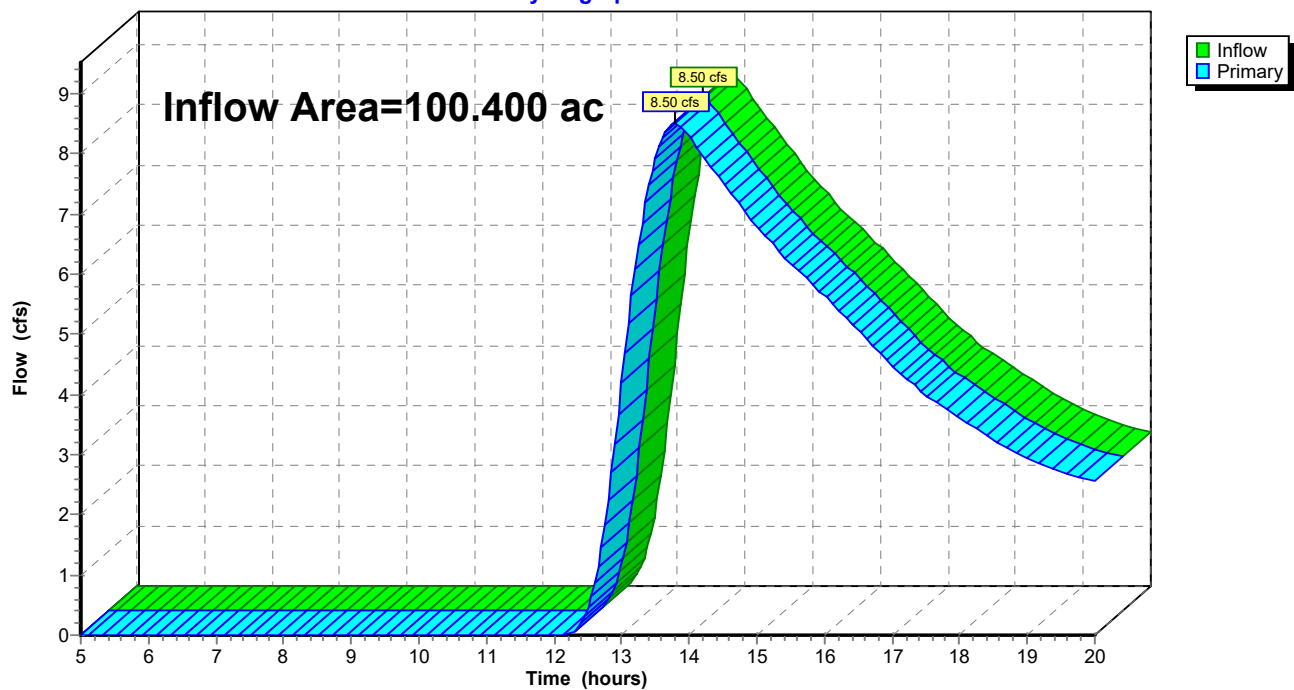
Inflow = 8.50 cfs @ 13.79 hrs, Volume= 3.076 af

Primary = 8.50 cfs @ 13.79 hrs, Volume= 3.076 af, Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1

Hydrograph



Pre Conditions

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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 2P: Analysis Point #2

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

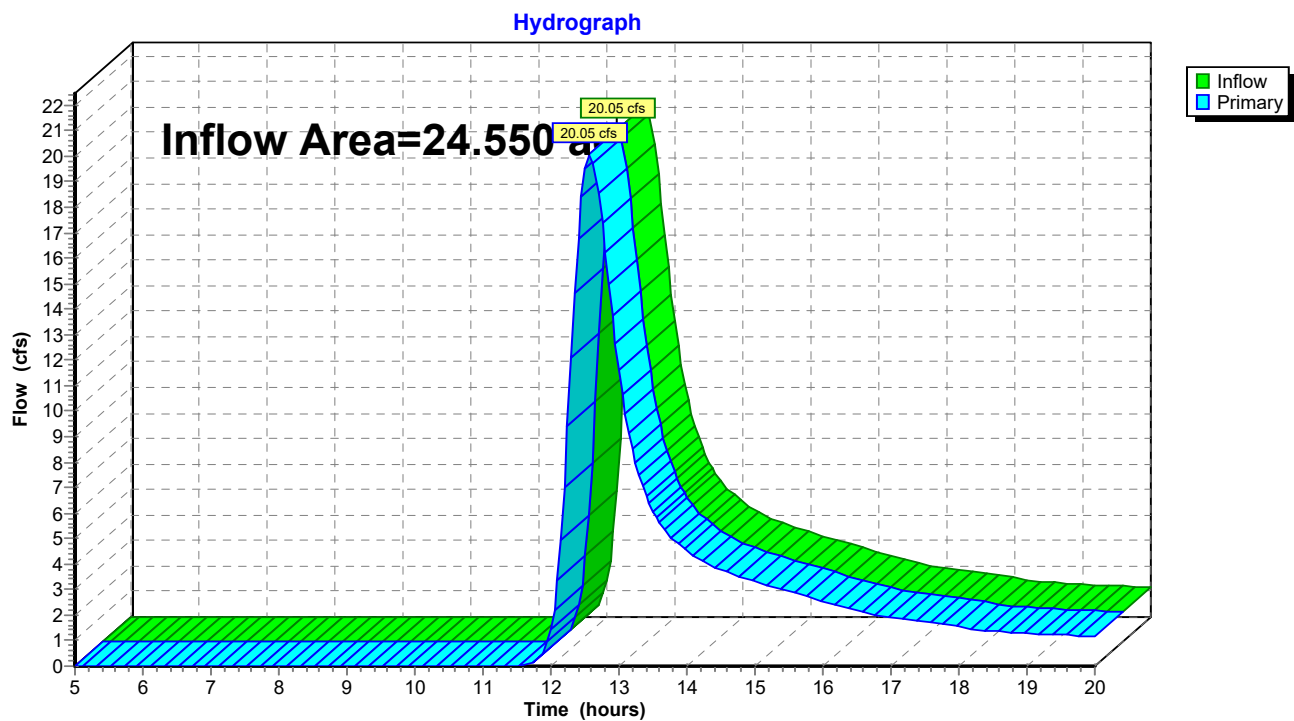
Inflow Area = 24.550 ac, 0.77% Impervious, Inflow Depth > 1.36" for 100-Year event

Inflow = 20.05 cfs @ 12.57 hrs, Volume= 2.773 af

Primary = 20.05 cfs @ 12.57 hrs, Volume= 2.773 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Analysis Point #2



Pre Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 3P: Infiltration

Inflow Area = 0.290 ac, 0.00% Impervious, Inflow Depth > 0.45" for 100-Year event
 Inflow = 0.07 cfs @ 12.31 hrs, Volume= 0.011 af
 Outflow = 0.07 cfs @ 12.31 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.07 cfs @ 12.31 hrs, Volume= 0.011 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 318.00' @ 12.31 hrs Surf.Area= 274 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.011 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (882.4 - 882.4)

Volume	Invert	Avail.Storage	Storage Description
#1	318.00'	51,210 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
318.00	274	63.5	0	0	274
320.00	1,003	156.9	1,201	1,201	1,927
322.00	2,050	213.5	2,991	4,192	3,636
324.00	6,950	373.3	8,516	12,708	11,121
326.00	9,538	394.1	16,420	29,128	12,605
328.00	12,615	439.9	22,081	51,210	15,757

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	20.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.13 cfs @ 12.31 hrs HW=318.00' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Pre Conditions

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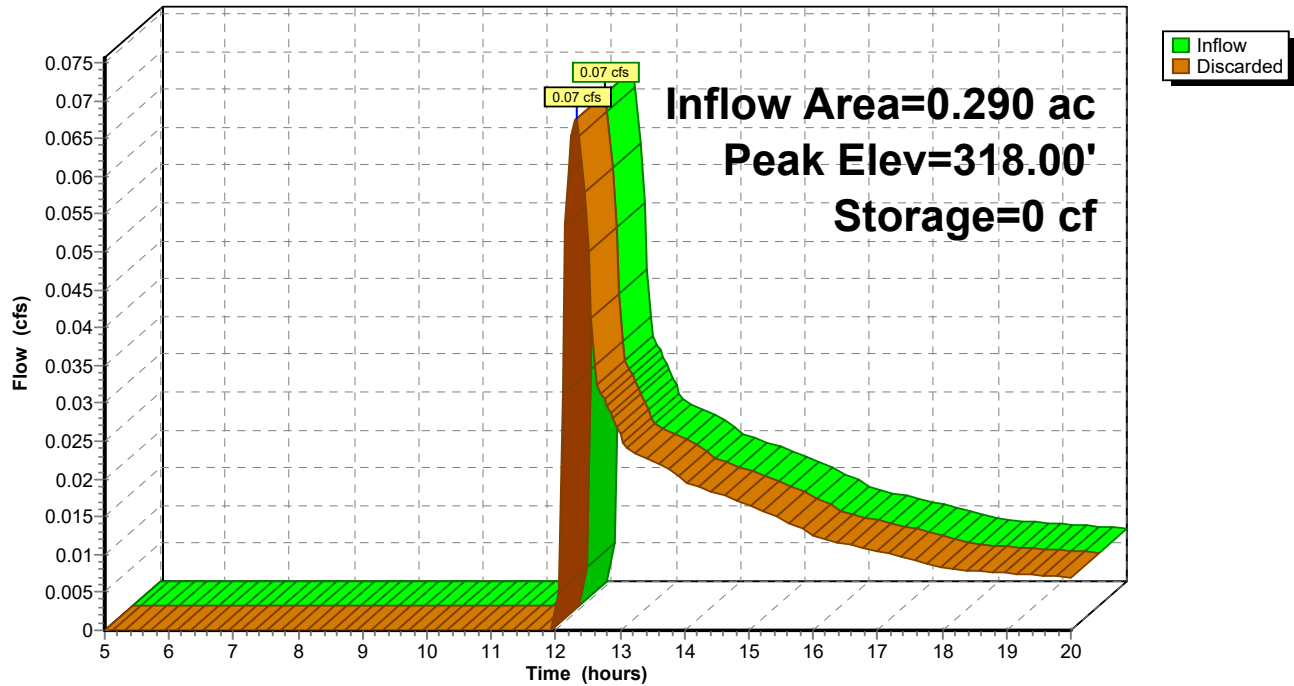
Type III 24-hr 100-Year Rainfall=6.30"

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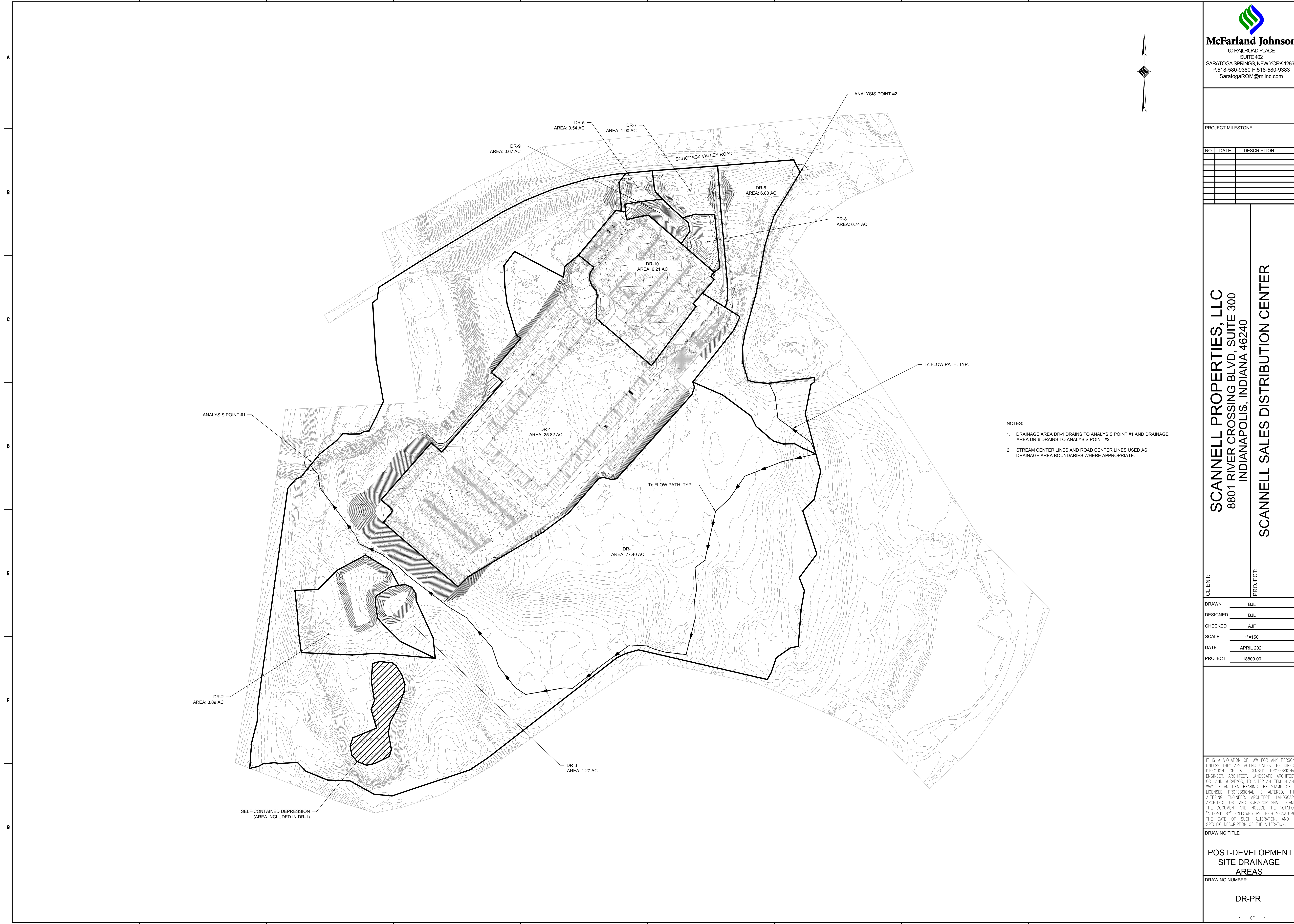
Pond 3P: Infiltration

Hydrograph



Appendix B

Proposed Conditions Drainage Map and HydroCAD Report



ANALYSIS POINT #1

ANALYSIS POINT #2

SCHODACK VALLEY ROAD

To FLOW PATH, TYP.

To FLOW PATH, TYP.

DR-2
AREA: 3.89 AC

DR-3
AREA: 1.27 AC

SELF-CONTAINED DEPRESSION
(AREA INCLUDED IN DR-1)

DR-4
AREA: 25.82 AC

DR-1
AREA: 77.40 AC

DR-10
AREA: 6.21 AC

DR-6
AREA: 6.80 AC

DR-8
AREA: 0.74 AC

DR-5
AREA: 0.54 AC

DR-7
AREA: 1.90 AC

DR-9
AREA: 0.67 AC

- NOTES:
1. DRAINAGE AREA DR-1 DRAINS TO ANALYSIS POINT #1 AND DRAINAGE AREA DR-6 DRAINS TO ANALYSIS POINT #2
 2. STREAM CENTER LINES AND ROAD CENTER LINES USED AS DRAINAGE AREA BOUNDARIES WHERE APPROPRIATE.



McFarland Johnson
60 RAILROAD PLACE
SUITE 402
SARATOGA SPRINGS, NEW YORK 12866
P:518-580-9380 F:518-580-9383
SaratogaROM@mjinco.com

PROJECT MILESTONE		
NO.	DATE	DESCRIPTION

CLIENT:
SCANNELL PROPERTIES, LLC
8801 RIVER CROSSING BLVD, SUITE 300
INDIANAPOLIS, INDIANA 46240

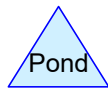
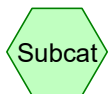
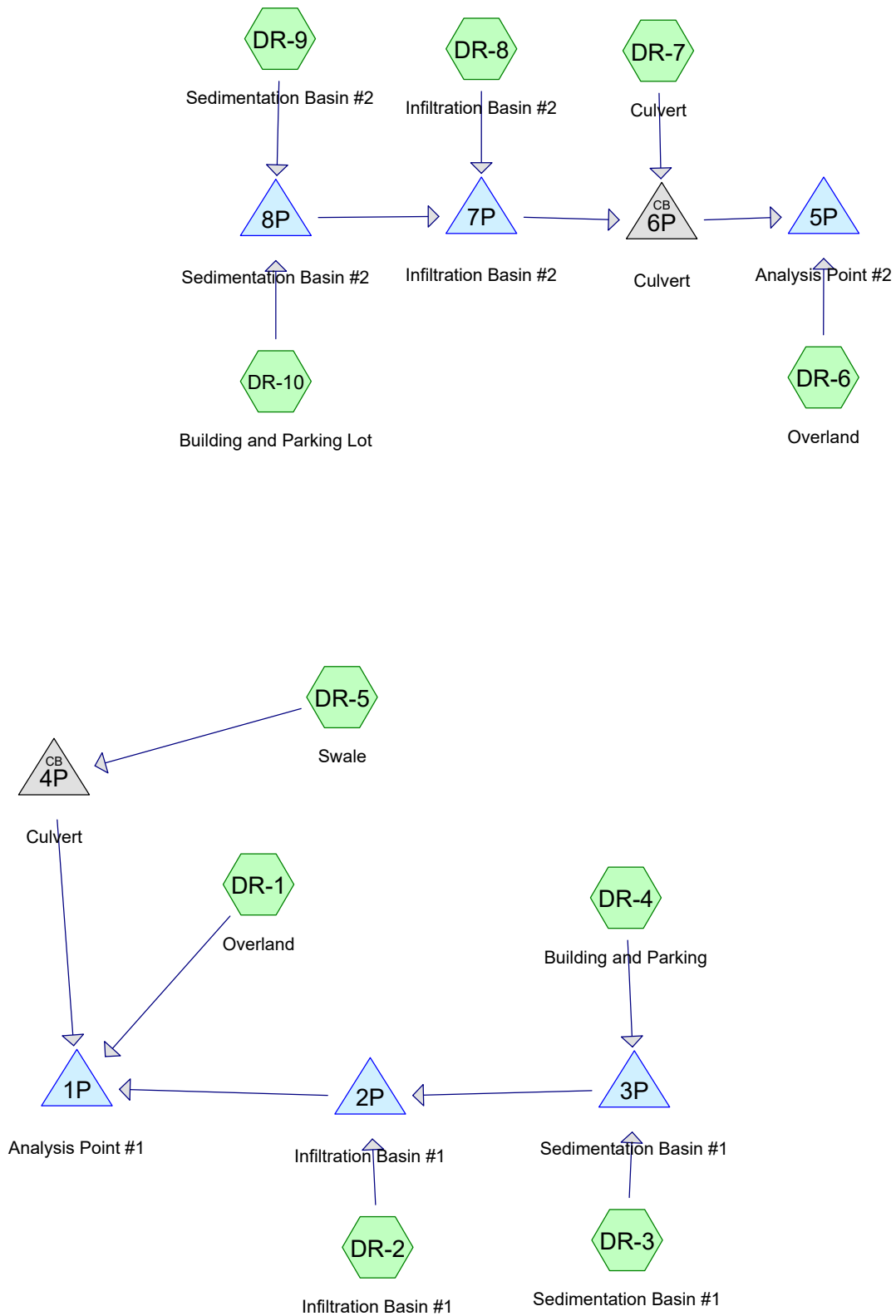
PROJECT:
SCANNELL SALES DISTRIBUTION CENTER

DRAWN	B.J.L.
DESIGNED	B.J.L.
CHECKED	A.J.F.
SCALE	1"=150'
DATE	APRIL 2021
PROJECT	18800.00

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECT DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR, TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

DRAWING TITLE
**POST-DEVELOPMENT
SITE DRAINAGE
AREAS**

DRAWING NUMBER
DR-PR



Routing Diagram for Post Conditions

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Post Conditions

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Project Notes

Rainfall events imported from "TP-40-Rain.txt" for 1424 NY Rensselaer

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.808	39	>75% Grass cover, Good, HSG A (DR-10, DR-4, DR-5, DR-7, DR-8, DR-9)
0.490	76	Gravel roads, HSG A (DR-1)
30.375	98	Paved parking, HSG A (DR-1, DR-10, DR-4, DR-5, DR-6, DR-7, DR-8, DR-9)
1.490	83	Paved roads w/open ditches, 50% imp, HSG A (DR-1)
0.660	98	Roofs, HSG A (DR-1)
73.950	36	Woods, Fair, HSG A (DR-1)
6.311	43	Woods/grass comb., Fair, HSG A (DR-6)
5.160	32	Woods/grass comb., Good, HSG A (DR-2, DR-3)
125.244	52	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
125.244	HSG A	DR-1, DR-10, DR-2, DR-3, DR-4, DR-5, DR-6, DR-7, DR-8, DR-9
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
125.244		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
6.808	0.000	0.000	0.000	0.000	6.808	>75% Grass cover, Good	
0.490	0.000	0.000	0.000	0.000	0.490	Gravel roads	
30.375	0.000	0.000	0.000	0.000	30.375	Paved parking	
1.490	0.000	0.000	0.000	0.000	1.490	Paved roads w/open ditches, 50% imp	
0.660	0.000	0.000	0.000	0.000	0.660	Roofs	
73.950	0.000	0.000	0.000	0.000	73.950	Woods, Fair	
6.311	0.000	0.000	0.000	0.000	6.311	Woods/grass comb., Fair	
5.160	0.000	0.000	0.000	0.000	5.160	Woods/grass comb., Good	
125.244	0.000	0.000	0.000	0.000	125.244	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4P	327.00	325.50	100.0	0.0150	0.013	24.0	0.0	0.0
2	6P	324.00	323.00	50.0	0.0200	0.013	24.0	0.0	0.0

Post Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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

SubcatchmentDR-1: Overland

Runoff Area=77.400 ac 2.86% Impervious Runoff Depth=0.00"
Flow Length=3,707' Tc=91.9 min CN=38 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-10: Building and

Runoff Area=6.214 ac 83.91% Impervious Runoff Depth>1.28"
Tc=6.0 min CN=89 Runoff=9.76 cfs 0.661 af

SubcatchmentDR-2: Infiltration Basin #1

Runoff Area=3.886 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=32 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-3: Sedimentation Basin #1

Runoff Area=1.274 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=32 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-4: Building and Parking

Runoff Area=25.823 ac 89.19% Impervious Runoff Depth>1.50"
Flow Length=1,750' Tc=9.7 min CN=92 Runoff=41.79 cfs 3.233 af

SubcatchmentDR-5: Swale

Runoff Area=0.544 ac 31.99% Impervious Runoff Depth>0.09"
Tc=6.0 min CN=58 Runoff=0.01 cfs 0.004 af

SubcatchmentDR-6: Overland

Runoff Area=6.803 ac 7.23% Impervious Runoff Depth>0.00"
Flow Length=1,521' Tc=36.0 min CN=47 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-7: Culvert

Runoff Area=1.897 ac 27.20% Impervious Runoff Depth>0.05"
Tc=6.0 min CN=55 Runoff=0.02 cfs 0.008 af

SubcatchmentDR-8: Infiltration Basin #2

Runoff Area=0.738 ac 6.91% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=43 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-9: Sedimentation Basin

Runoff Area=0.665 ac 12.93% Impervious Runoff Depth>0.00"
Tc=6.0 min CN=47 Runoff=0.00 cfs 0.000 af

Pond 1P: Analysis Point #1

Inflow=0.01 cfs 0.004 af
Primary=0.01 cfs 0.004 af

Pond 2P: Infiltration Basin #1

Peak Elev=288.90' Storage=26,981 cf Inflow=37.94 cfs 3.218 af
Discarded=14.40 cfs 3.215 af Primary=0.00 cfs 0.000 af Outflow=14.40 cfs 3.215 af

Pond 3P: Sedimentation Basin #1

Peak Elev=295.60' Storage=96,809 cf Inflow=41.79 cfs 3.233 af
Outflow=37.94 cfs 3.218 af

Pond 4P: Culvert

Peak Elev=327.05' Inflow=0.01 cfs 0.004 af
24.0" Round Culvert n=0.013 L=100.0' S=0.0150 ' /' Outflow=0.01 cfs 0.004 af

Pond 5P: Analysis Point #2

Inflow=0.02 cfs 0.008 af
Primary=0.02 cfs 0.008 af

Pond 6P: Culvert

Peak Elev=324.06' Inflow=0.02 cfs 0.008 af
24.0" Round Culvert n=0.013 L=50.0' S=0.0200 ' /' Outflow=0.02 cfs 0.008 af

Post Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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Pond 7P: Infiltration Basin #2

Peak Elev=323.41' Storage=3,598 cf Inflow=9.63 cfs 0.603 af
Discarded=4.36 cfs 0.602 af Primary=0.00 cfs 0.000 af Outflow=4.36 cfs 0.602 af

Pond 8P: Sedimentation Basin #2

Peak Elev=327.24' Storage=3,267 cf Inflow=9.76 cfs 0.661 af
Outflow=9.63 cfs 0.603 af

Total Runoff Area = 125.244 ac Runoff Volume = 3.906 af Average Runoff Depth = 0.37"
74.63% Pervious = 93.464 ac 25.37% Impervious = 31.780 ac

Post Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-1: Overland

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
1.490	83	Paved roads w/open ditches, 50% imp, HSG A
0.660	98	Roofs, HSG A
0.810	98	Paved parking, HSG A
73.950	36	Woods, Fair, HSG A
0.490	76	Gravel roads, HSG A
77.400	38	Weighted Average
75.185		97.14% Pervious Area
2.215		2.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	87	0.0920	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
22.3	1,099	0.0270	0.82		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	110	0.0180	1.34		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
3.4	613	0.0390	2.96		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.4	237	0.0080	0.89		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
5.9	185	0.0110	0.52		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.7	171	0.0060	0.19		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.4	1,205	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
91.9	3,707	Total			

Post Conditions

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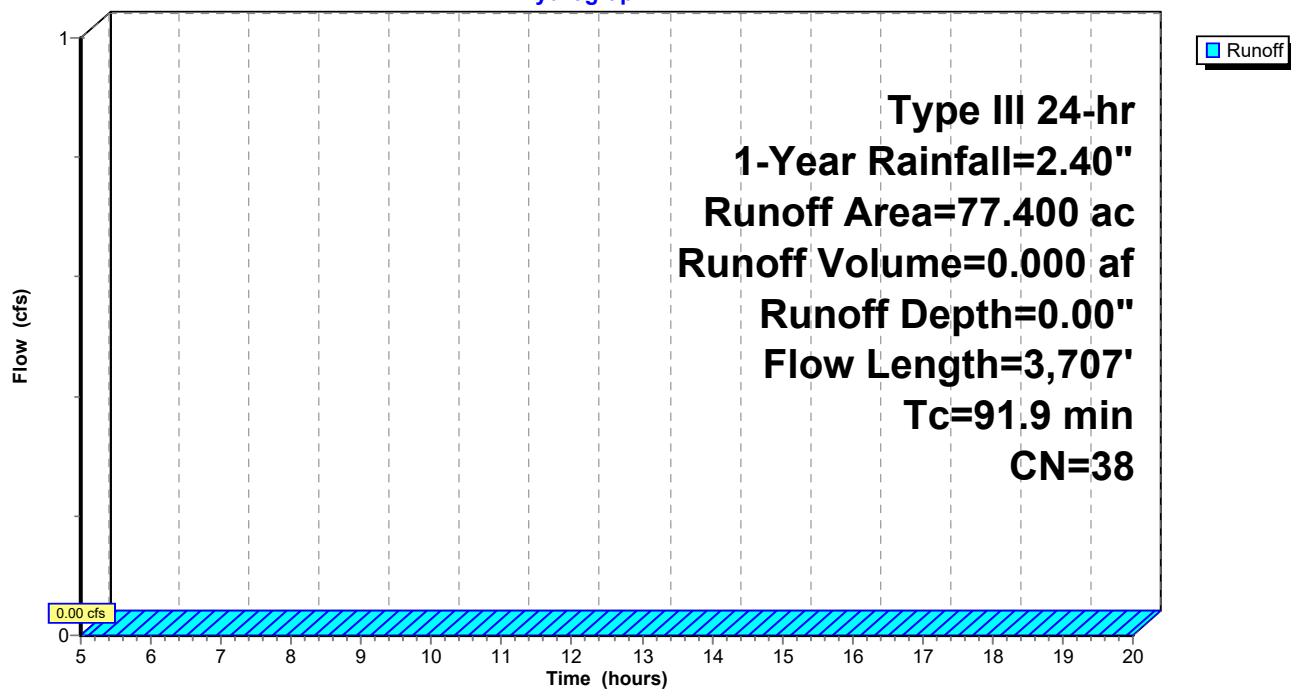
Type III 24-hr 1-Year Rainfall=2.40"

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Subcatchment DR-1: Overland

Hydrograph



Post Conditions

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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-10: Building and Parking Lot

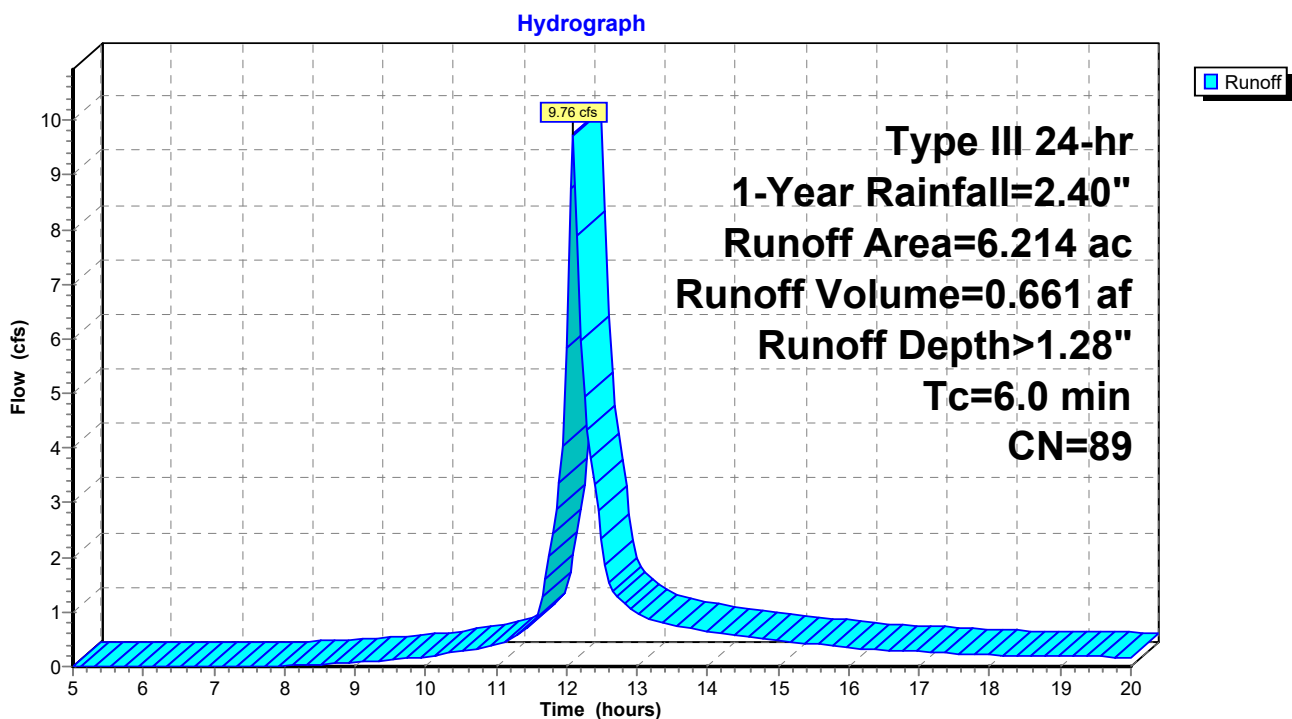
Runoff = 9.76 cfs @ 12.09 hrs, Volume= 0.661 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
5.214	98	Paved parking, HSG A
1.000	39	>75% Grass cover, Good, HSG A
6.214	89	Weighted Average
1.000		16.09% Pervious Area
5.214		83.91% Impervious Area

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

Subcatchment DR-10: Building and Parking Lot



Post Conditions

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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-2: Infiltration Basin #1

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

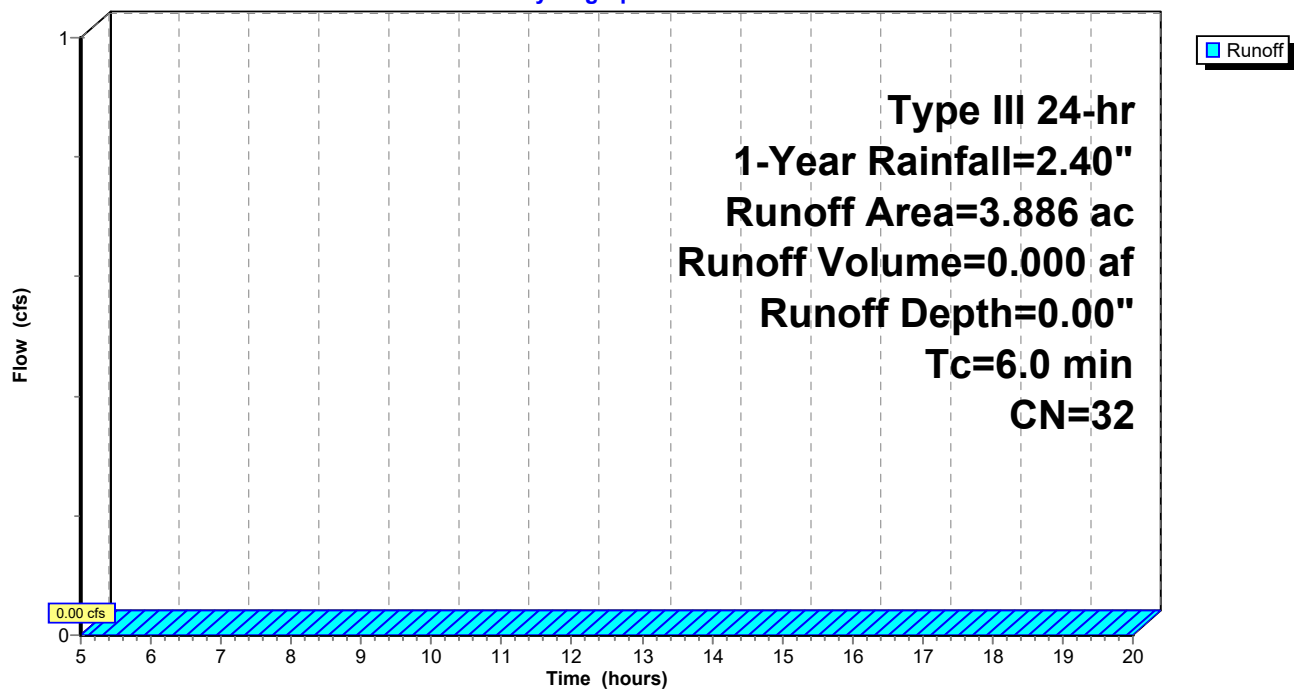
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
3.886	32	Woods/grass comb., Good, HSG A
3.886		100.00% Pervious Area

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

Subcatchment DR-2: Infiltration Basin #1

Hydrograph



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-3: Sedimentation Basin #1

[45] Hint: Runoff=Zero

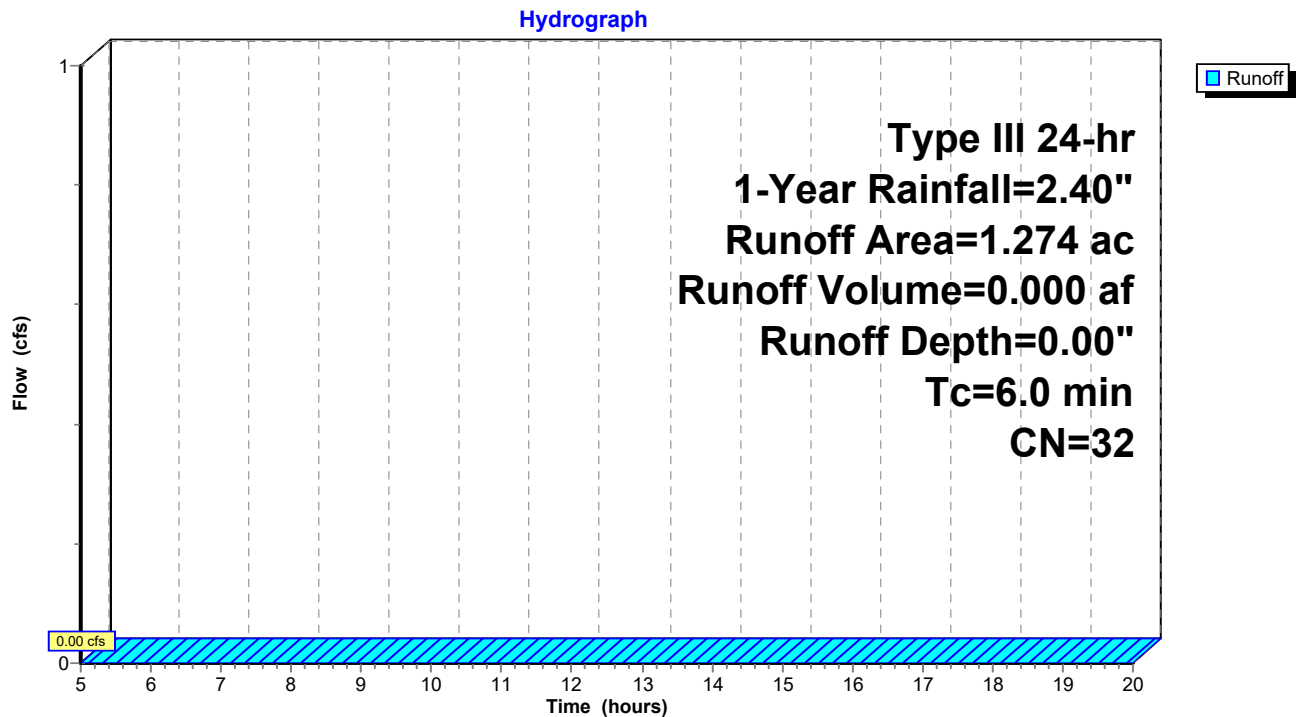
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
1.274	32	Woods/grass comb., Good, HSG A
1.274		100.00% Pervious Area

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

Subcatchment DR-3: Sedimentation Basin #1



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-4: Building and Parking

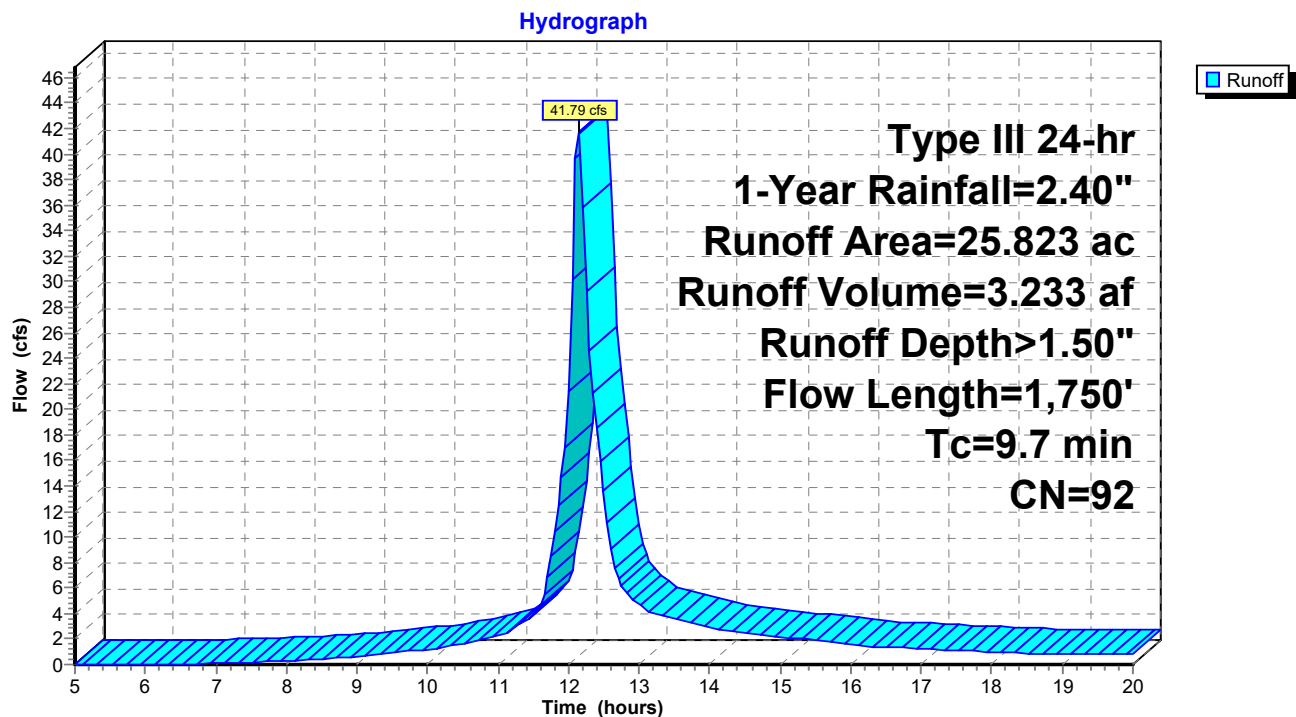
Runoff = 41.79 cfs @ 12.14 hrs, Volume= 3.233 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
2.791	39	>75% Grass cover, Good, HSG A
23.032	98	Paved parking, HSG A
25.823	92	Weighted Average
2.791		10.81% Pervious Area
23.032		89.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	1,750		3.00		Direct Entry,

Subcatchment DR-4: Building and Parking



Post Conditions

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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-5: Swale

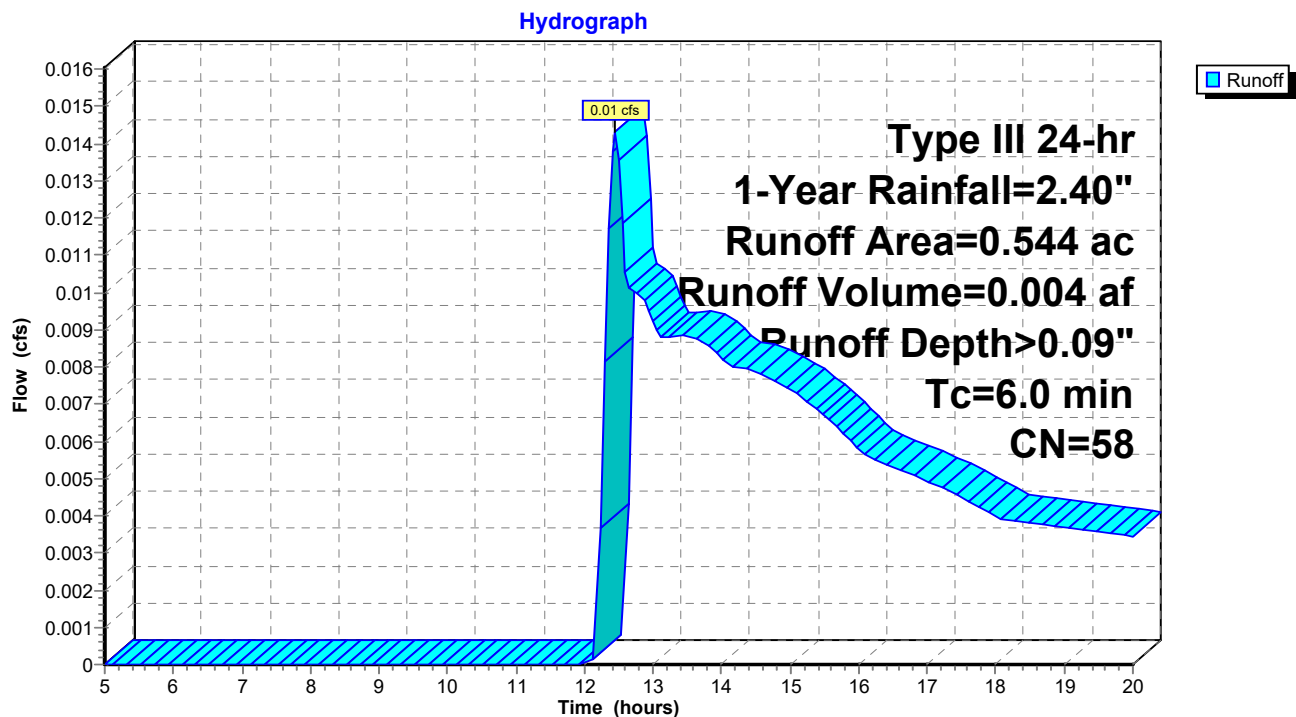
Runoff = 0.01 cfs @ 12.45 hrs, Volume= 0.004 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.370	39	>75% Grass cover, Good, HSG A
0.174	98	Paved parking, HSG A
0.544	58	Weighted Average
0.370		68.01% Pervious Area
0.174		31.99% Impervious Area

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

Subcatchment DR-5: Swale



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-6: Overland

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Depth> 0.00"

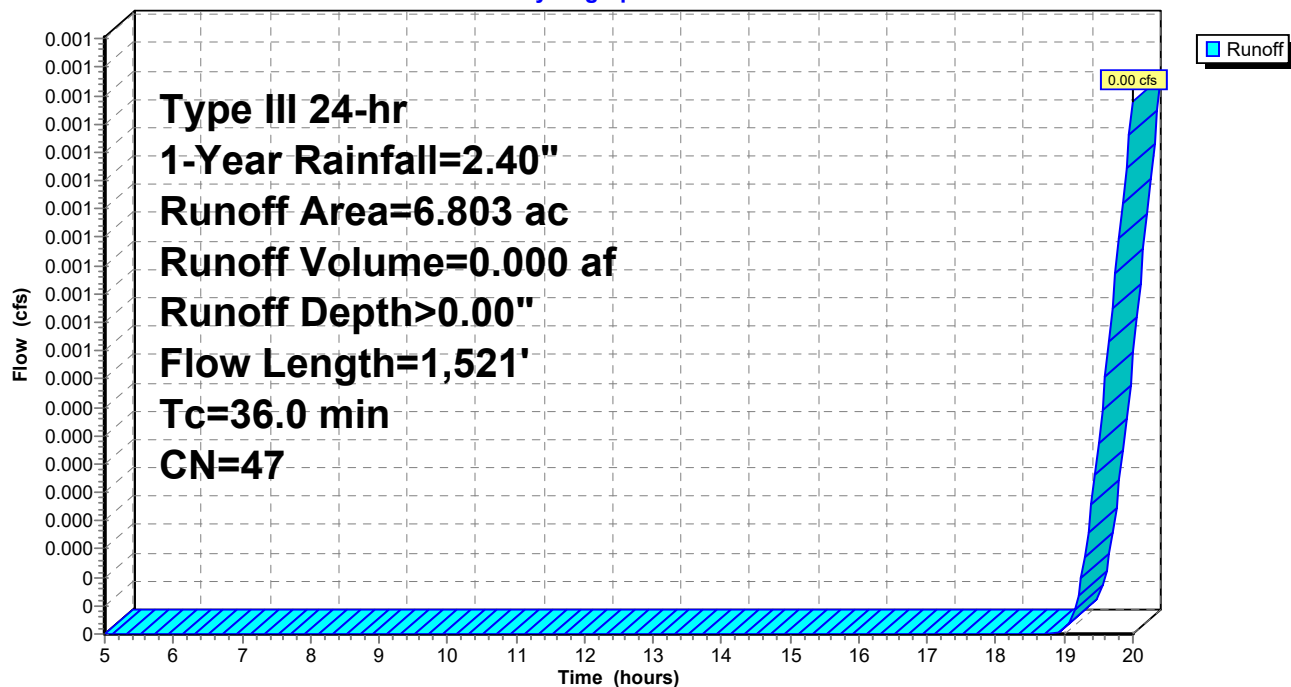
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG A
6.311	43	Woods/grass comb., Fair, HSG A
6.803	47	Weighted Average
6.311		92.77% Pervious Area
0.492		7.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	148	0.0540	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
2.7	257	0.1010	1.59		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	1,116	0.0070	1.58	31.54	Channel Flow, Area= 20.0 sf Perim= 14.0' r= 1.43' n= 0.100 Very weedy reaches w/pools
36.0	1,521	Total			

Subcatchment DR-6: Overland

Hydrograph



Post Conditions

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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-7: Culvert

Runoff = 0.02 cfs @ 14.59 hrs, Volume= 0.008 af, Depth> 0.05"

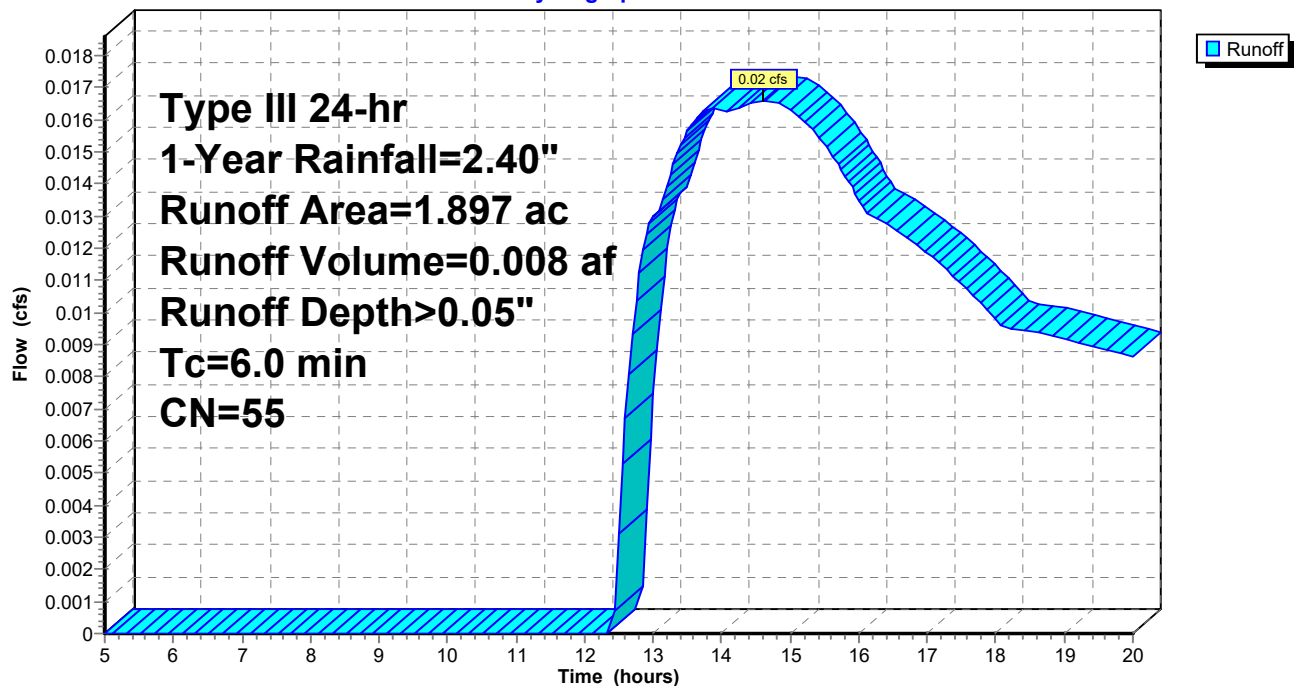
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
1.381	39	>75% Grass cover, Good, HSG A
1.897	55	Weighted Average
1.381		72.80% Pervious Area
0.516		27.20% Impervious Area

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

Subcatchment DR-7: Culvert

Hydrograph



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-8: Infiltration Basin #2

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

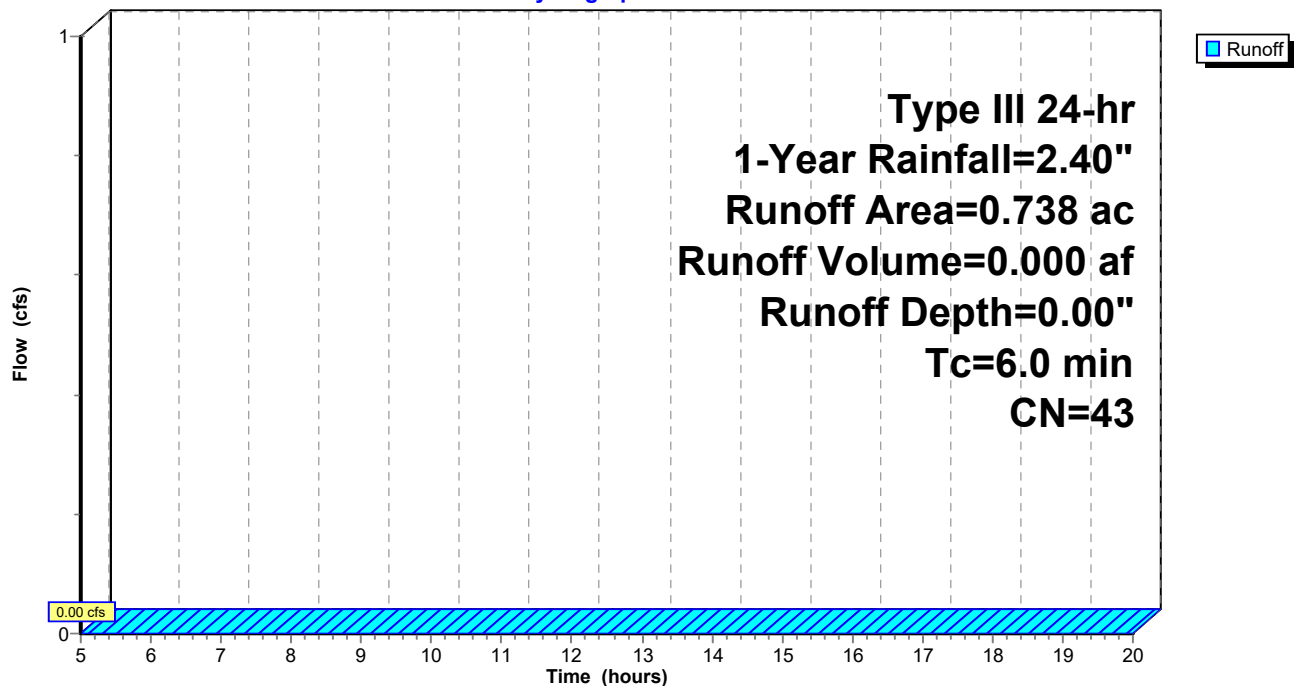
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.051	98	Paved parking, HSG A
0.687	39	>75% Grass cover, Good, HSG A
0.738	43	Weighted Average
0.687		93.09% Pervious Area
0.051		6.91% Impervious Area

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

Subcatchment DR-8: Infiltration Basin #2

Hydrograph



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Subcatchment DR-9: Sedimentation Basin #2

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 20.00 hrs, Volume= 0.000 af, Depth> 0.00"

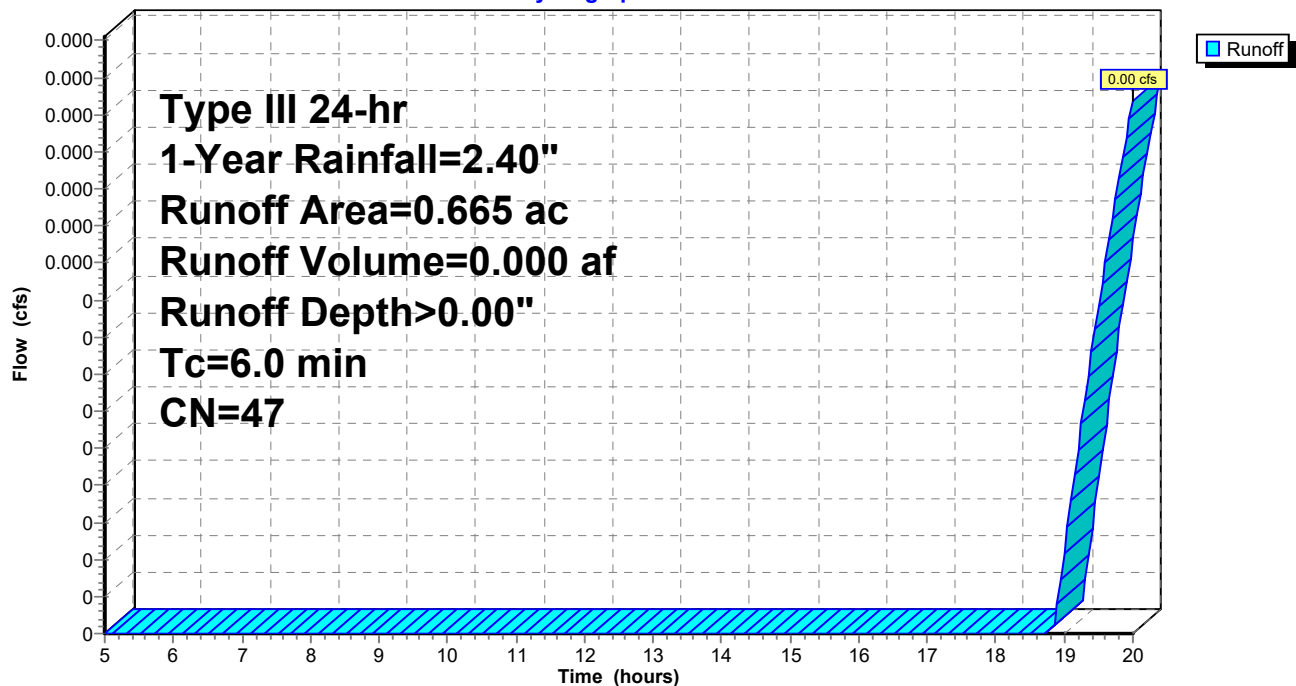
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.40"

Area (ac)	CN	Description
0.579	39	>75% Grass cover, Good, HSG A
0.086	98	Paved parking, HSG A
0.665	47	Weighted Average
0.579		87.07% Pervious Area
0.086		12.93% Impervious Area

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

Subcatchment DR-9: Sedimentation Basin #2

Hydrograph



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 1P: Analysis Point #1

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

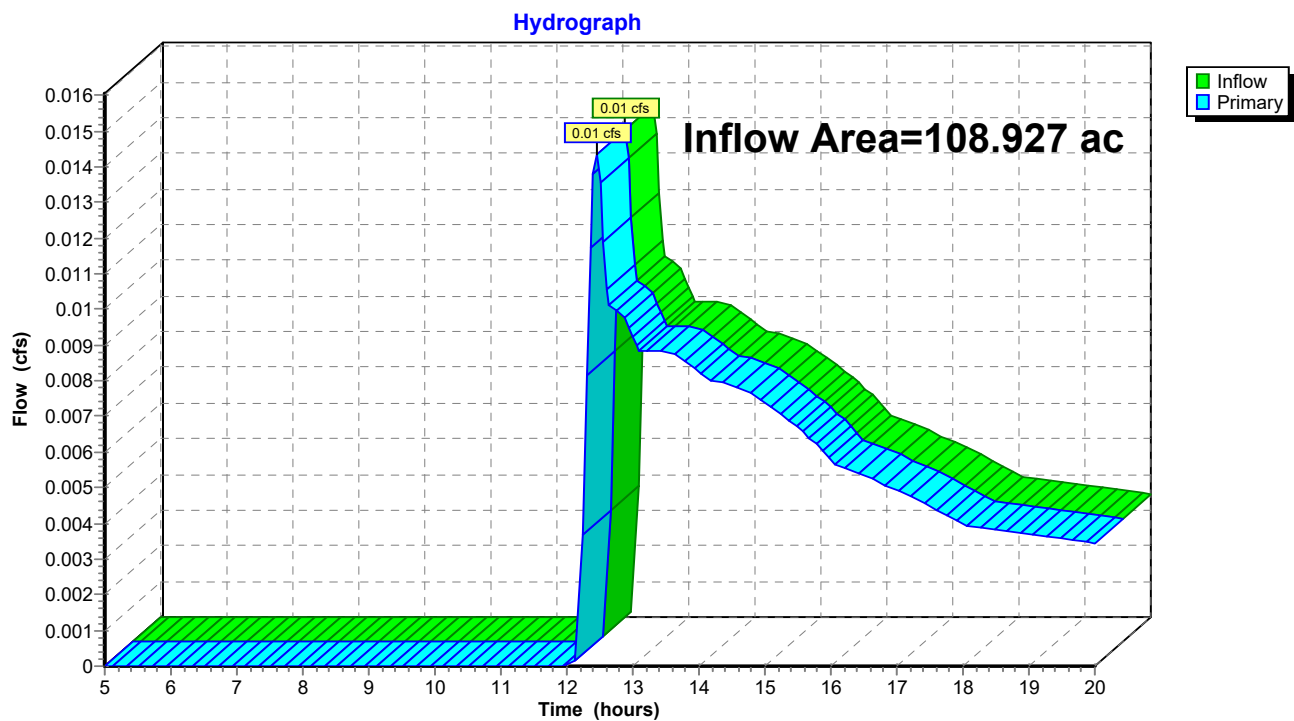
Inflow Area = 108.927 ac, 23.34% Impervious, Inflow Depth > 0.00" for 1-Year event

Inflow = 0.01 cfs @ 12.45 hrs, Volume= 0.004 af

Primary = 0.01 cfs @ 12.45 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1



Post Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 2P: Infiltration Basin #1

Inflow Area = 30.983 ac, 74.34% Impervious, Inflow Depth > 1.25" for 1-Year event
 Inflow = 37.94 cfs @ 12.19 hrs, Volume= 3.218 af
 Outflow = 14.40 cfs @ 12.55 hrs, Volume= 3.215 af, Atten= 62%, Lag= 21.7 min
 Discarded = 14.40 cfs @ 12.55 hrs, Volume= 3.215 af
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 288.90' @ 12.55 hrs Surf.Area= 31,103 sf Storage= 26,981 cf

Plug-Flow detention time= 11.9 min calculated for 3.204 af (100% of inflow)
 Center-of-Mass det. time= 11.4 min (796.8 - 785.4)

Volume	Invert	Avail.Storage	Storage Description
#1	288.00'	363,783 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
288.00	29,029	807.7	0	0	29,029
295.00	47,099	936.0	263,910	263,910	47,849
297.00	52,829	974.4	99,873	363,783	53,991

Device	Routing	Invert	Outlet Devices
#1	Discarded	288.00'	20.000 in/hr Exfiltration over Surface area
#2	Primary	295.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=14.40 cfs @ 12.55 hrs HW=288.90' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 14.40 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=288.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post Conditions

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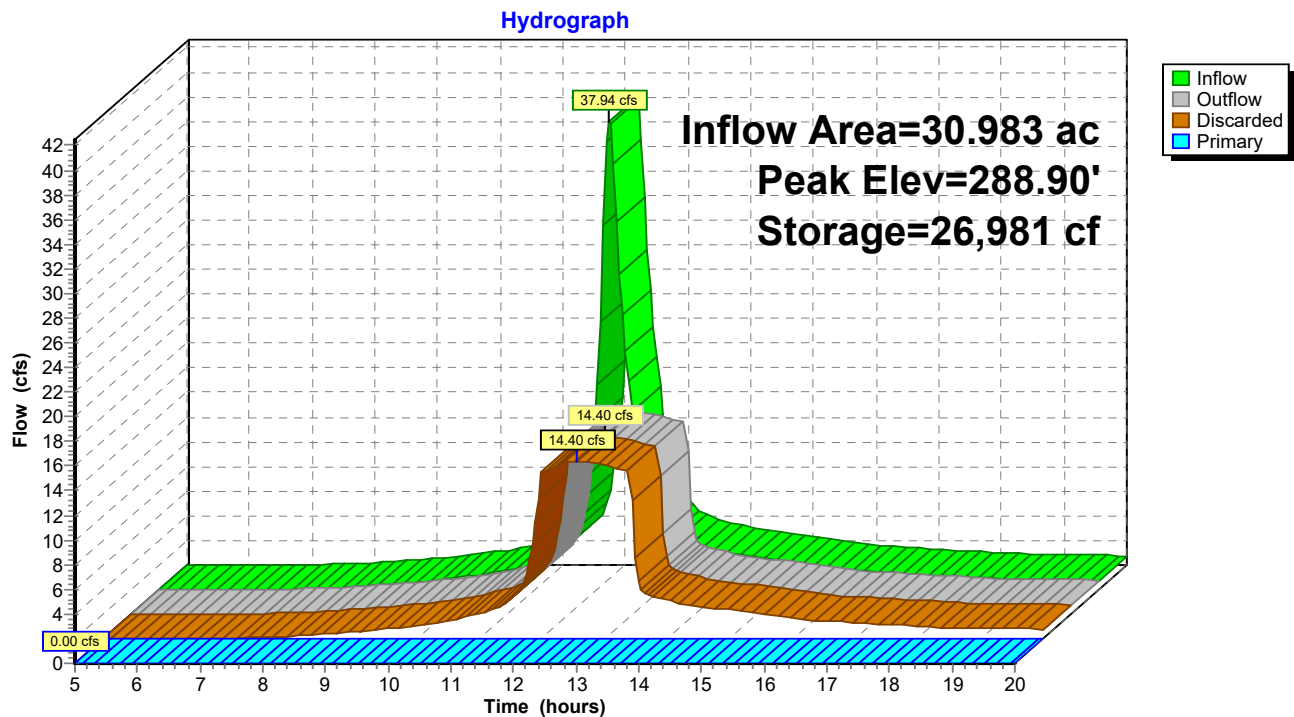
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Type III 24-hr 1-Year Rainfall=2.40"

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Pond 2P: Infiltration Basin #1



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 3P: Sedimentation Basin #1

Inflow Area = 27.097 ac, 85.00% Impervious, Inflow Depth > 1.43" for 1-Year event
 Inflow = 41.79 cfs @ 12.14 hrs, Volume= 3.233 af
 Outflow = 37.94 cfs @ 12.19 hrs, Volume= 3.218 af, Atten= 9%, Lag= 3.2 min
 Primary = 37.94 cfs @ 12.19 hrs, Volume= 3.218 af

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

Starting Elev= 295.00' Surf.Area= 17,007 sf Storage= 86,271 cf

Peak Elev= 295.60' @ 12.19 hrs Surf.Area= 17,921 sf Storage= 96,809 cf (10,538 cf above start)

Flood Elev= 297.00' Surf.Area= 20,127 sf Storage= 123,361 cf (37,090 cf above start)

Plug-Flow detention time= 218.1 min calculated for 1.238 af (38% of inflow)

Center-of-Mass det. time= 6.5 min (785.4 - 778.9)

Volume	Invert	Avail.Storage	Storage Description
#1	288.00'	123,361 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
288.00	8,175	359.2	0	0	8,175
295.00	17,007	494.6	86,271	86,271	17,848
297.00	20,127	533.9	37,090	123,361	21,225

Device	Routing	Invert	Outlet Devices
#1	Primary	295.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=37.58 cfs @ 12.19 hrs HW=295.60' (Free Discharge)↑1=**Broad-Crested Rectangular Weir** (Weir Controls 37.58 cfs @ 2.09 fps)

Post Conditions

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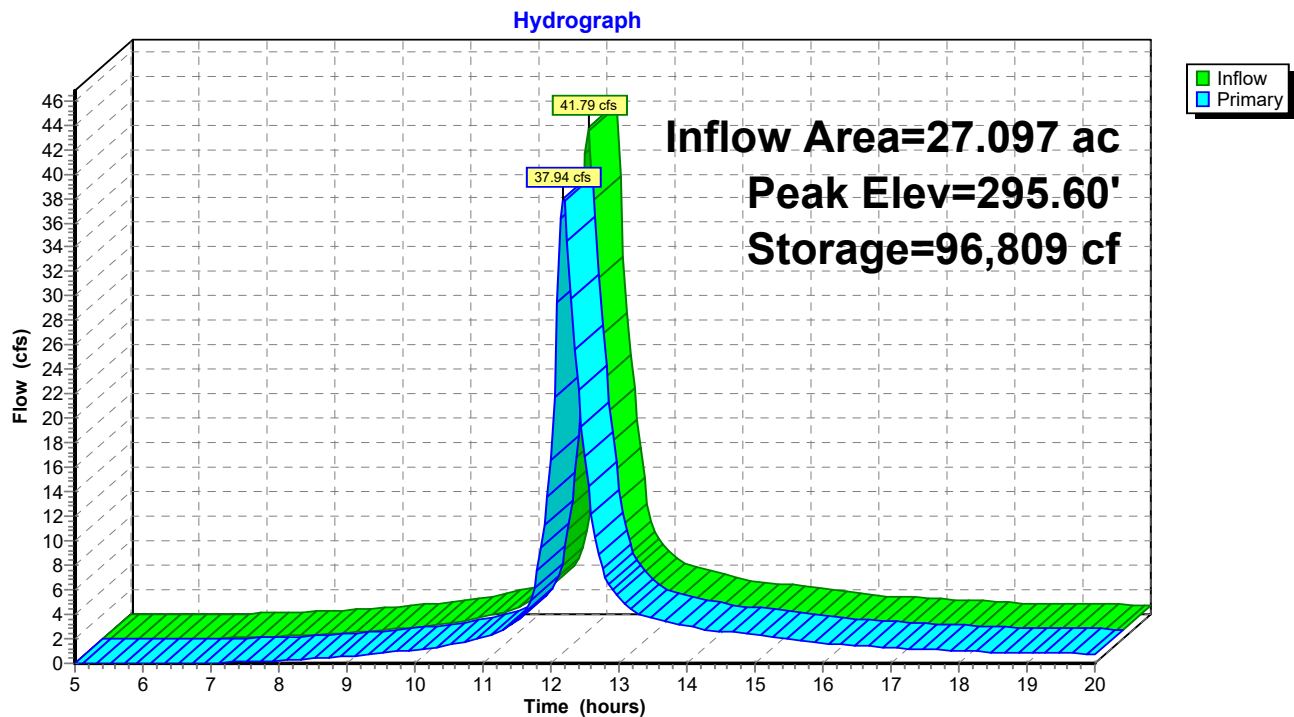
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Type III 24-hr 1-Year Rainfall=2.40"

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Pond 3P: Sedimentation Basin #1



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Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 4P: Culvert

[57] Hint: Peaked at 327.05' (Flood elevation advised)

Inflow Area = 0.544 ac, 31.99% Impervious, Inflow Depth > 0.09" for 1-Year event
Inflow = 0.01 cfs @ 12.45 hrs, Volume= 0.004 af
Outflow = 0.01 cfs @ 12.45 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.01 cfs @ 12.45 hrs, Volume= 0.004 af

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

Peak Elev= 327.05' @ 12.45 hrs

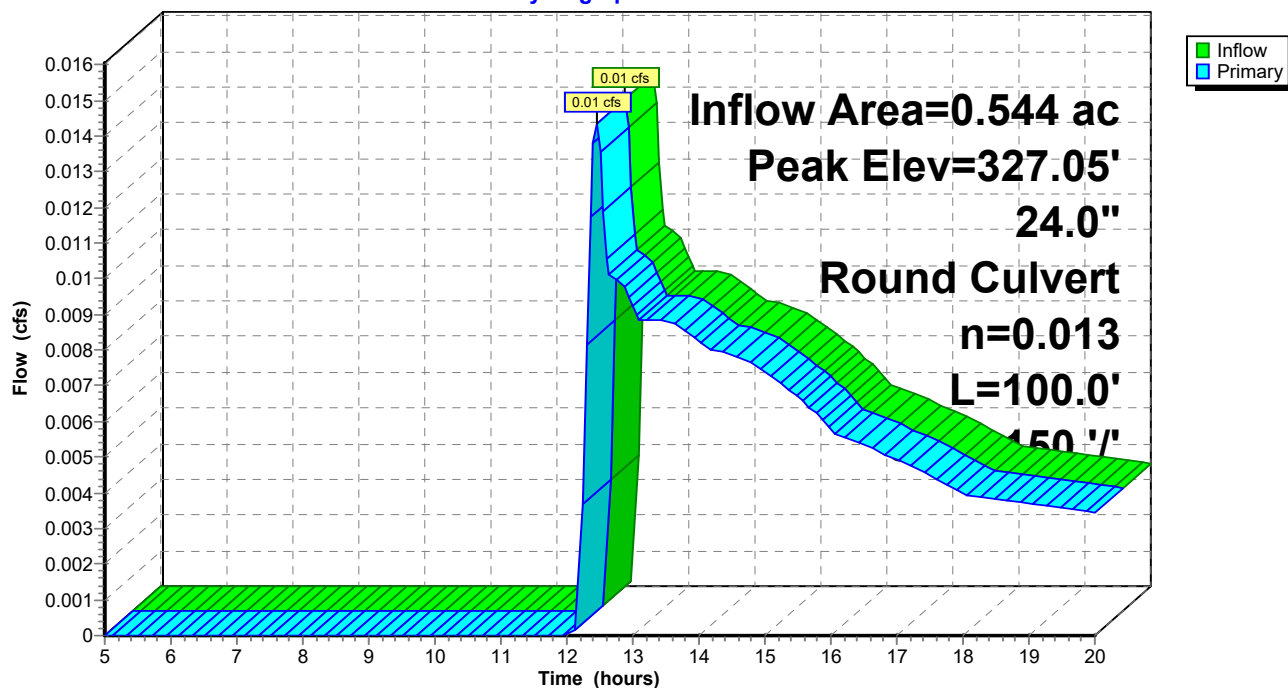
Device	Routing	Invert	Outlet Devices
#1	Primary	327.00'	24.0" Round Culvert L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 327.00' / 325.50' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.01 cfs @ 12.45 hrs HW=327.05' (Free Discharge)

↑1=Culvert (Barrel Controls 0.01 cfs @ 1.13 fps)

Pond 4P: Culvert

Hydrograph



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Summary for Pond 5P: Analysis Point #2

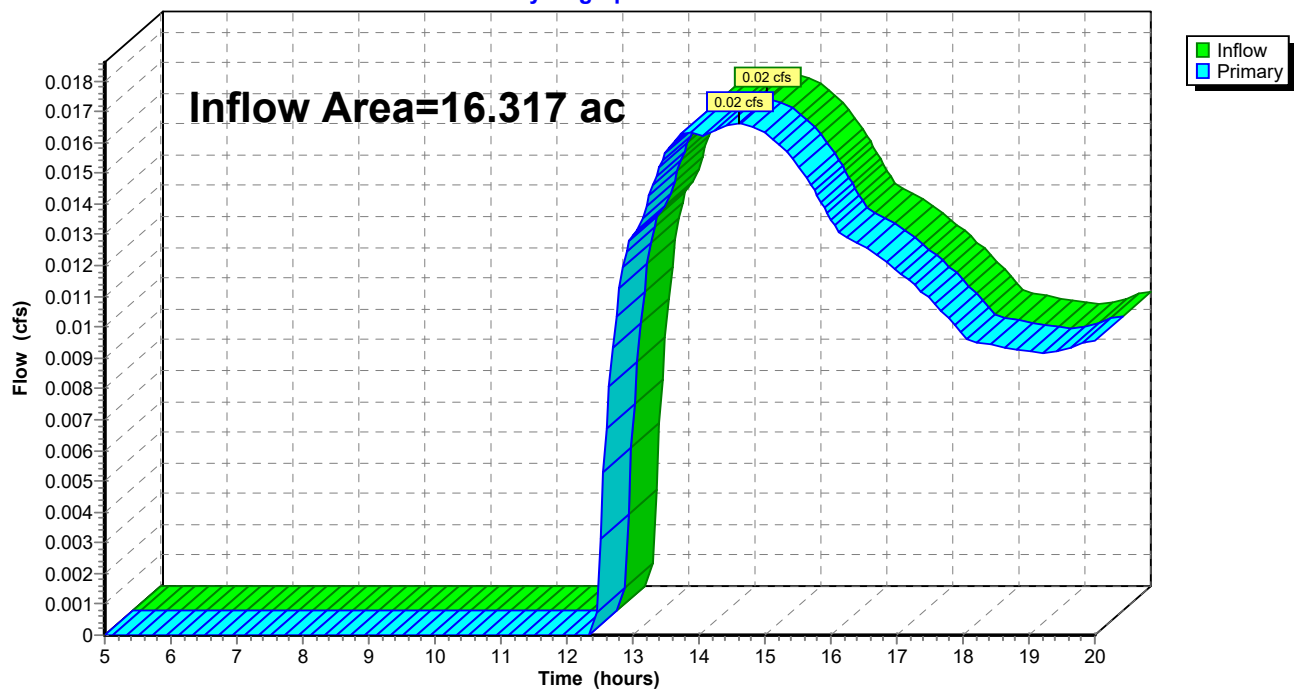
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 16.317 ac, 38.97% Impervious, Inflow Depth > 0.01" for 1-Year event
Inflow = 0.02 cfs @ 14.59 hrs, Volume= 0.008 af
Primary = 0.02 cfs @ 14.59 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

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

Pond 5P: Analysis Point #2

Hydrograph



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Summary for Pond 6P: Culvert

[57] Hint: Peaked at 324.06' (Flood elevation advised)

Inflow Area = 9.514 ac, 61.67% Impervious, Inflow Depth > 0.01" for 1-Year event
Inflow = 0.02 cfs @ 14.59 hrs, Volume= 0.008 af
Outflow = 0.02 cfs @ 14.59 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 14.59 hrs, Volume= 0.008 af

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

Peak Elev= 324.06' @ 14.59 hrs

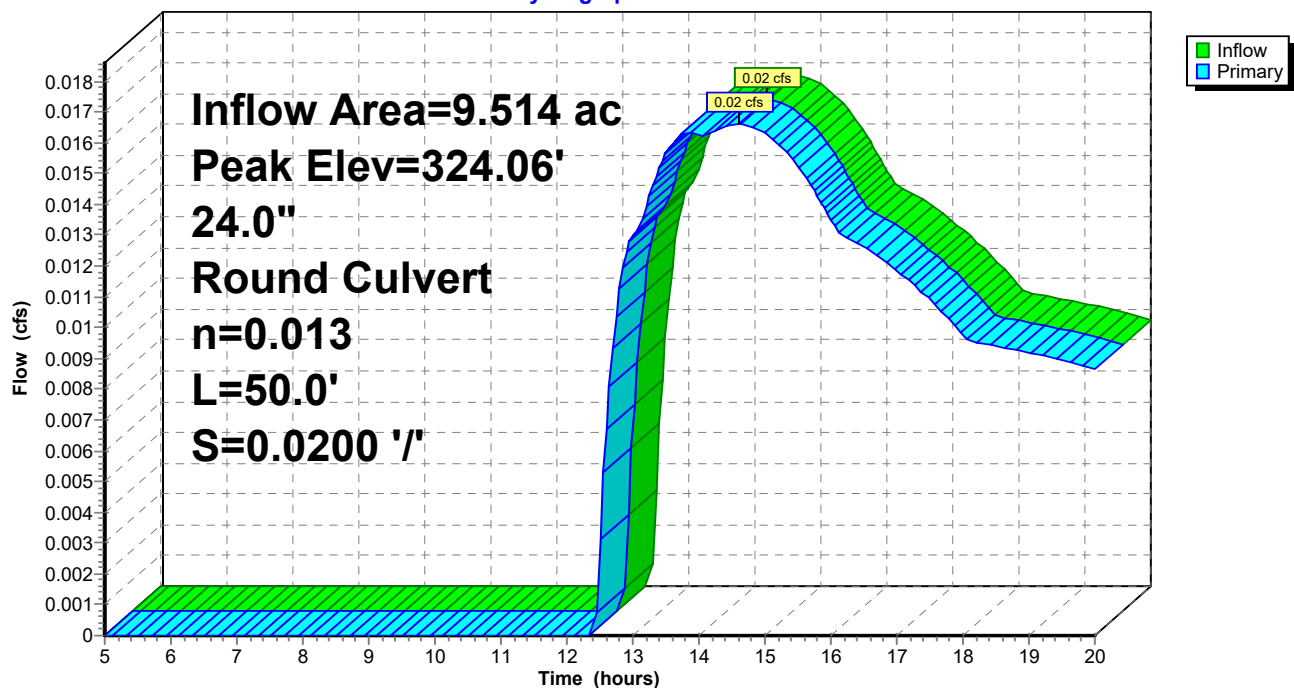
Device	Routing	Invert	Outlet Devices
#1	Primary	324.00'	24.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 324.00' / 323.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.02 cfs @ 14.59 hrs HW=324.06' (Free Discharge)

↑1=Culvert (Inlet Controls 0.02 cfs @ 0.64 fps)

Pond 6P: Culvert

Hydrograph



Post Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 7P: Infiltration Basin #2

Inflow Area = 7.617 ac, 70.25% Impervious, Inflow Depth > 0.95" for 1-Year event
Inflow = 9.63 cfs @ 12.11 hrs, Volume= 0.603 af
Outflow = 4.36 cfs @ 12.32 hrs, Volume= 0.602 af, Atten= 55%, Lag= 12.7 min
Discarded = 4.36 cfs @ 12.32 hrs, Volume= 0.602 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 323.41' @ 12.32 hrs Surf.Area= 9,419 sf Storage= 3,598 cf

Plug-Flow detention time= 5.2 min calculated for 0.600 af (100% of inflow)
Center-of-Mass det. time= 4.9 min (809.8 - 804.9)

Volume	Invert	Avail.Storage	Storage Description
#1	323.00'	59,502 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.00	8,281	742.9	0	0	8,281
327.00	22,650	963.7	59,502	59,502	38,461

Device	Routing	Invert	Outlet Devices
#1	Discarded	323.00'	20.000 in/hr Exfiltration over Surface area
#2	Primary	326.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=4.36 cfs @ 12.32 hrs HW=323.41' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 4.36 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=323.00' (Free Discharge)

↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post Conditions

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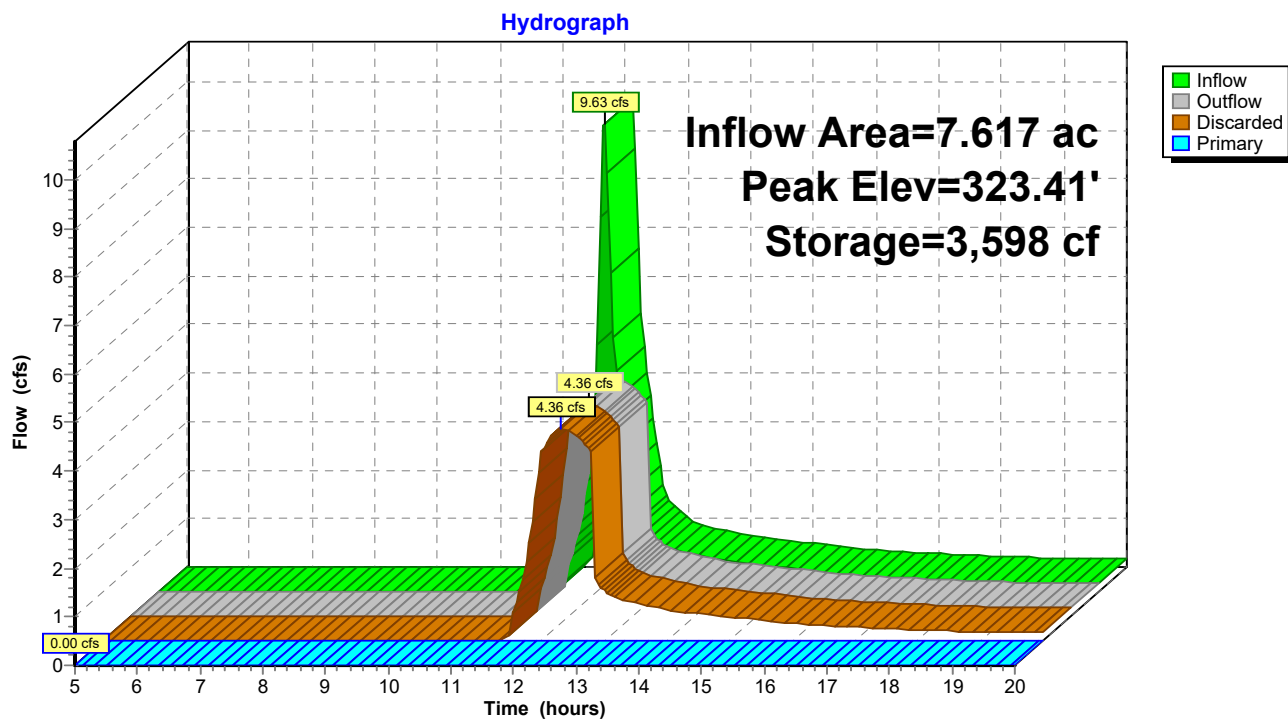
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Pond 7P: Infiltration Basin #2



Post Conditions

Type III 24-hr 1-Year Rainfall=2.40"

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Summary for Pond 8P: Sedimentation Basin #2

Inflow Area = 6.879 ac, 77.05% Impervious, Inflow Depth > 1.15" for 1-Year event
Inflow = 9.76 cfs @ 12.09 hrs, Volume= 0.661 af
Outflow = 9.63 cfs @ 12.11 hrs, Volume= 0.603 af, Atten= 1%, Lag= 0.9 min
Primary = 9.63 cfs @ 12.11 hrs, Volume= 0.603 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 327.24' @ 12.11 hrs Surf.Area= 3,206 sf Storage= 3,267 cf

Plug-Flow detention time= 46.0 min calculated for 0.603 af (91% of inflow)
Center-of-Mass det. time= 16.8 min (804.9 - 788.1)

Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	15,146 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.00	2,020	244.7	0	0	2,020
327.00	3,033	277.8	2,509	2,509	3,421
330.00	5,514	348.3	12,636	15,146	7,057

Device	Routing	Invert	Outlet Devices
#1	Primary	327.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	329.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=9.43 cfs @ 12.11 hrs HW=327.24' (Free Discharge)

1=Broad-Crested Rectangular Weir (Weir Controls 9.43 cfs @ 1.31 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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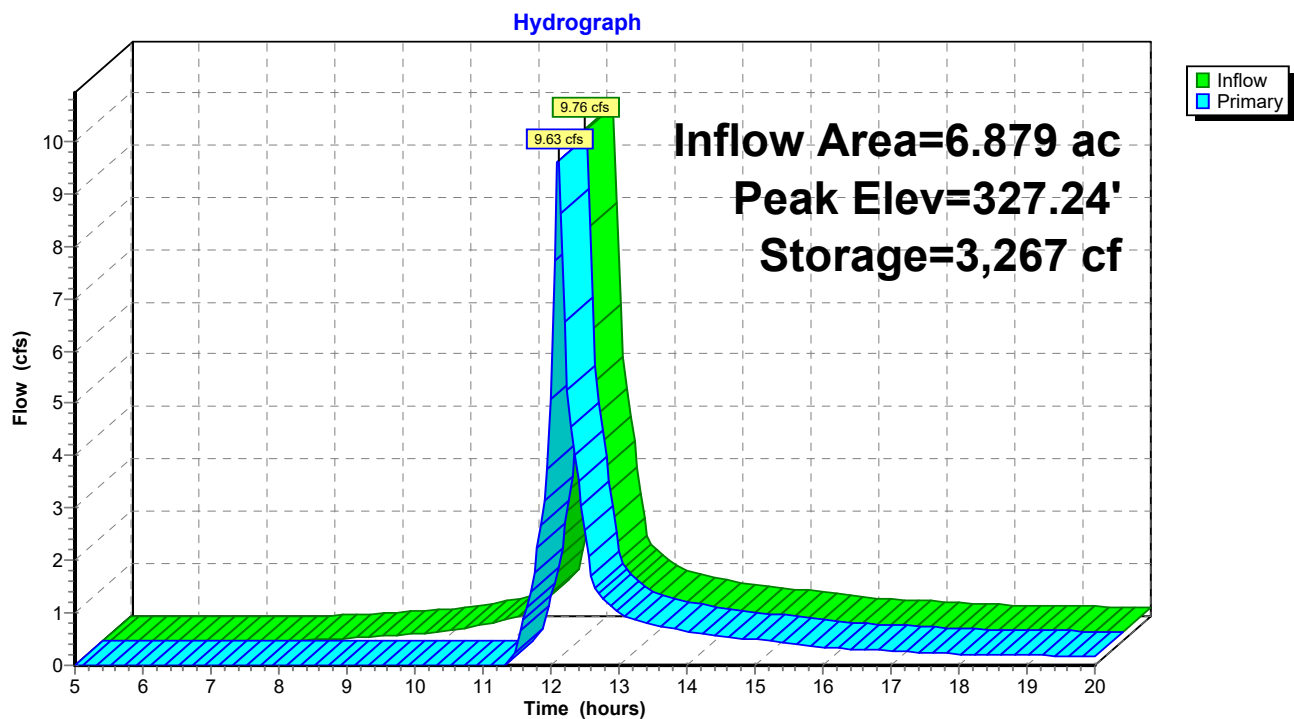
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Pond 8P: Sedimentation Basin #2



Post Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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

SubcatchmentDR-1: Overland

Runoff Area=77.400 ac 2.86% Impervious Runoff Depth>0.03"
Flow Length=3,707' Tc=91.9 min CN=38 Runoff=0.57 cfs 0.222 af

SubcatchmentDR-10: Building and

Runoff Area=6.214 ac 83.91% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=89 Runoff=21.68 cfs 1.516 af

SubcatchmentDR-2: Infiltration Basin #1

Runoff Area=3.886 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=32 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-3: Sedimentation Basin #1

Runoff Area=1.274 ac 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=32 Runoff=0.00 cfs 0.000 af

SubcatchmentDR-4: Building and Parking

Runoff Area=25.823 ac 89.19% Impervious Runoff Depth>3.22"
Flow Length=1,750' Tc=9.7 min CN=92 Runoff=86.14 cfs 6.925 af

SubcatchmentDR-5: Swale

Runoff Area=0.544 ac 31.99% Impervious Runoff Depth>0.72"
Tc=6.0 min CN=58 Runoff=0.40 cfs 0.032 af

SubcatchmentDR-6: Overland

Runoff Area=6.803 ac 7.23% Impervious Runoff Depth>0.26"
Flow Length=1,521' Tc=36.0 min CN=47 Runoff=0.56 cfs 0.145 af

SubcatchmentDR-7: Culvert

Runoff Area=1.897 ac 27.20% Impervious Runoff Depth>0.57"
Tc=6.0 min CN=55 Runoff=0.98 cfs 0.091 af

SubcatchmentDR-8: Infiltration Basin #2

Runoff Area=0.738 ac 6.91% Impervious Runoff Depth>0.14"
Tc=6.0 min CN=43 Runoff=0.03 cfs 0.009 af

SubcatchmentDR-9: Sedimentation Basin

Runoff Area=0.665 ac 12.93% Impervious Runoff Depth>0.26"
Tc=6.0 min CN=47 Runoff=0.08 cfs 0.015 af

Pond 1P: Analysis Point #1

Inflow=0.59 cfs 0.254 af
Primary=0.59 cfs 0.254 af

Pond 2P: Infiltration Basin #1

Peak Elev=290.85' Storage=92,257 cf Inflow=80.02 cfs 6.901 af
Discarded=16.60 cfs 6.895 af Primary=0.00 cfs 0.000 af Outflow=16.60 cfs 6.895 af

Pond 3P: Sedimentation Basin #1

Peak Elev=296.01' Storage=104,209 cf Inflow=86.14 cfs 6.925 af
Outflow=80.02 cfs 6.901 af

Pond 4P: Culvert

Peak Elev=327.25' Inflow=0.40 cfs 0.032 af
24.0" Round Culvert n=0.013 L=100.0' S=0.0150 ' /' Outflow=0.40 cfs 0.032 af

Pond 5P: Analysis Point #2

Inflow=0.98 cfs 0.236 af
Primary=0.98 cfs 0.236 af

Pond 6P: Culvert

Peak Elev=324.46' Inflow=0.98 cfs 0.091 af
24.0" Round Culvert n=0.013 L=50.0' S=0.0200 ' /' Outflow=0.98 cfs 0.091 af

Post Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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Pond 7P: Infiltration Basin #2

Peak Elev=324.52' Storage=15,995 cf Inflow=21.59 cfs 1.480 af
Discarded=5.98 cfs 1.480 af Primary=0.00 cfs 0.000 af Outflow=5.98 cfs 1.480 af

Pond 8P: Sedimentation Basin #2

Peak Elev=327.41' Storage=3,826 cf Inflow=21.69 cfs 1.531 af
Outflow=21.59 cfs 1.471 af

Total Runoff Area = 125.244 ac Runoff Volume = 8.955 af Average Runoff Depth = 0.86"
74.63% Pervious = 93.464 ac 25.37% Impervious = 31.780 ac

Post Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-1: Overland

Runoff = 0.57 cfs @ 16.84 hrs, Volume= 0.222 af, Depth> 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
1.490	83	Paved roads w/open ditches, 50% imp, HSG A
0.660	98	Roofs, HSG A
0.810	98	Paved parking, HSG A
73.950	36	Woods, Fair, HSG A
0.490	76	Gravel roads, HSG A
77.400	38	Weighted Average
75.185		97.14% Pervious Area
2.215		2.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	87	0.0920	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
22.3	1,099	0.0270	0.82		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	110	0.0180	1.34		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
3.4	613	0.0390	2.96		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.4	237	0.0080	0.89		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
5.9	185	0.0110	0.52		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.7	171	0.0060	0.19		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.4	1,205	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
91.9	3,707	Total			

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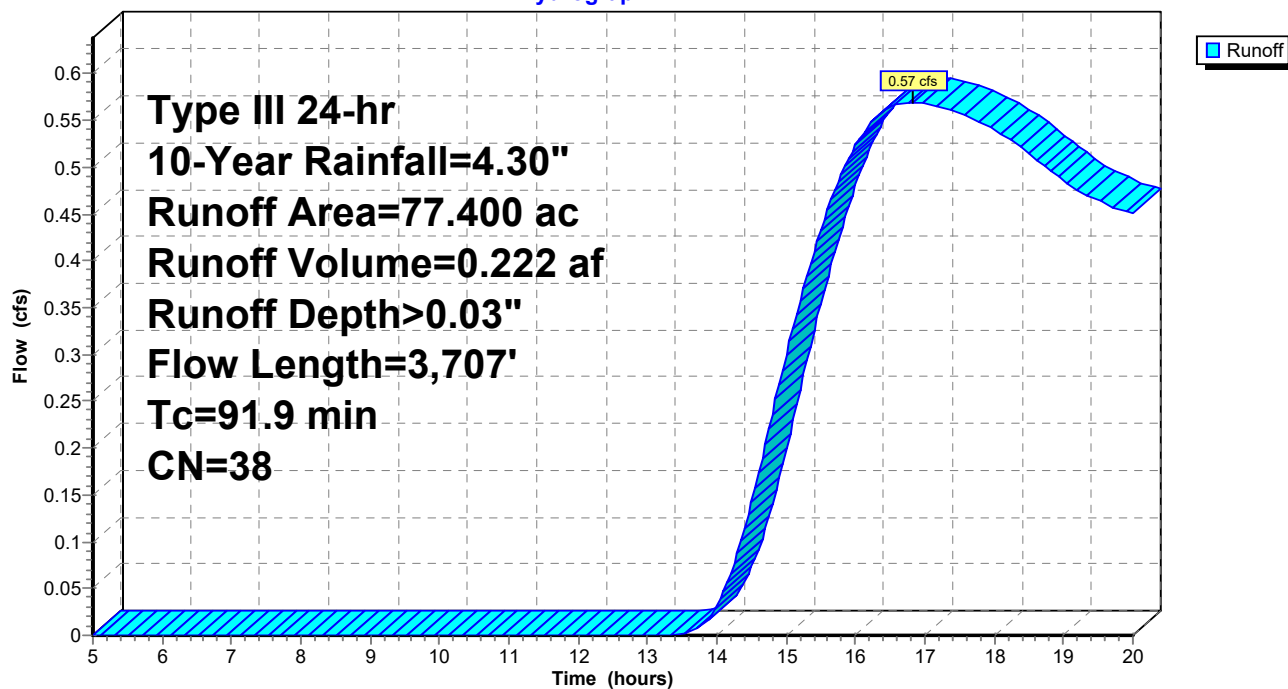
Type III 24-hr 10-Year Rainfall=4.30"

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Subcatchment DR-1: Overland

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-10: Building and Parking Lot

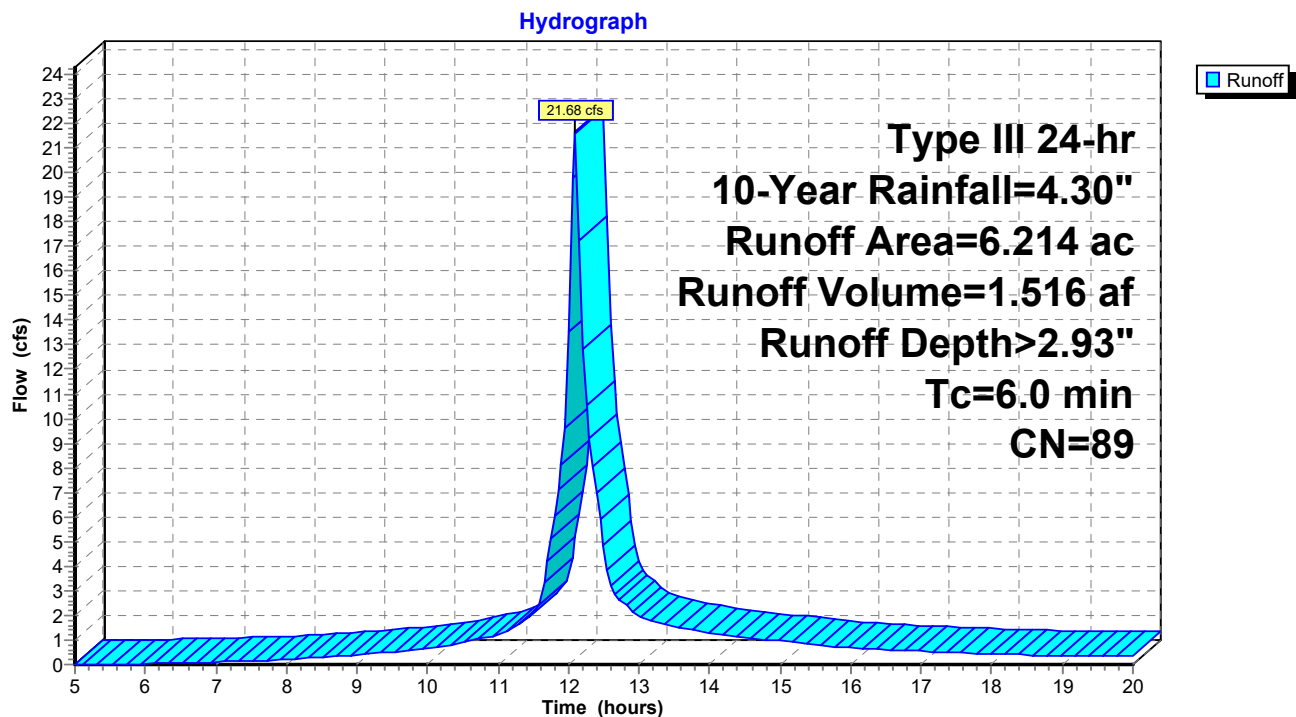
Runoff = 21.68 cfs @ 12.09 hrs, Volume= 1.516 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
5.214	98	Paved parking, HSG A
1.000	39	>75% Grass cover, Good, HSG A
6.214	89	Weighted Average
1.000		16.09% Pervious Area
5.214		83.91% Impervious Area

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

Subcatchment DR-10: Building and Parking Lot



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-2: Infiltration Basin #1

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

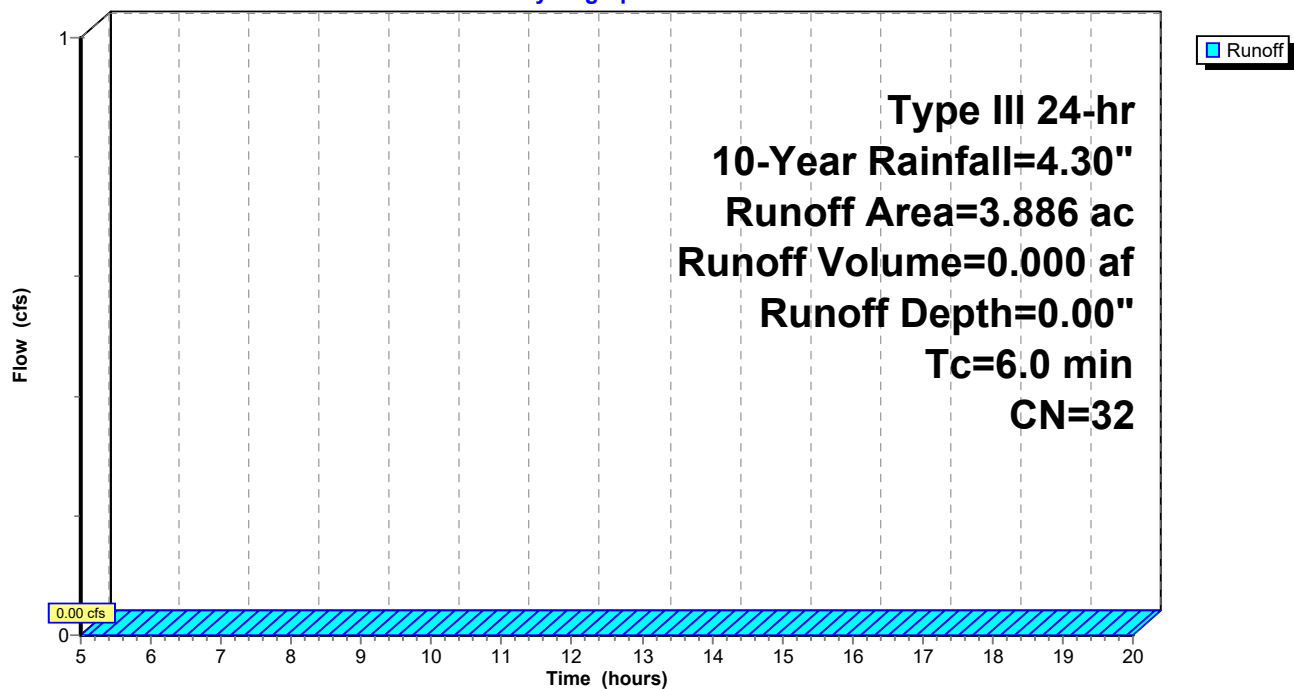
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
3.886	32	Woods/grass comb., Good, HSG A
3.886		100.00% Pervious Area

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

Subcatchment DR-2: Infiltration Basin #1

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-3: Sedimentation Basin #1

[45] Hint: Runoff=Zero

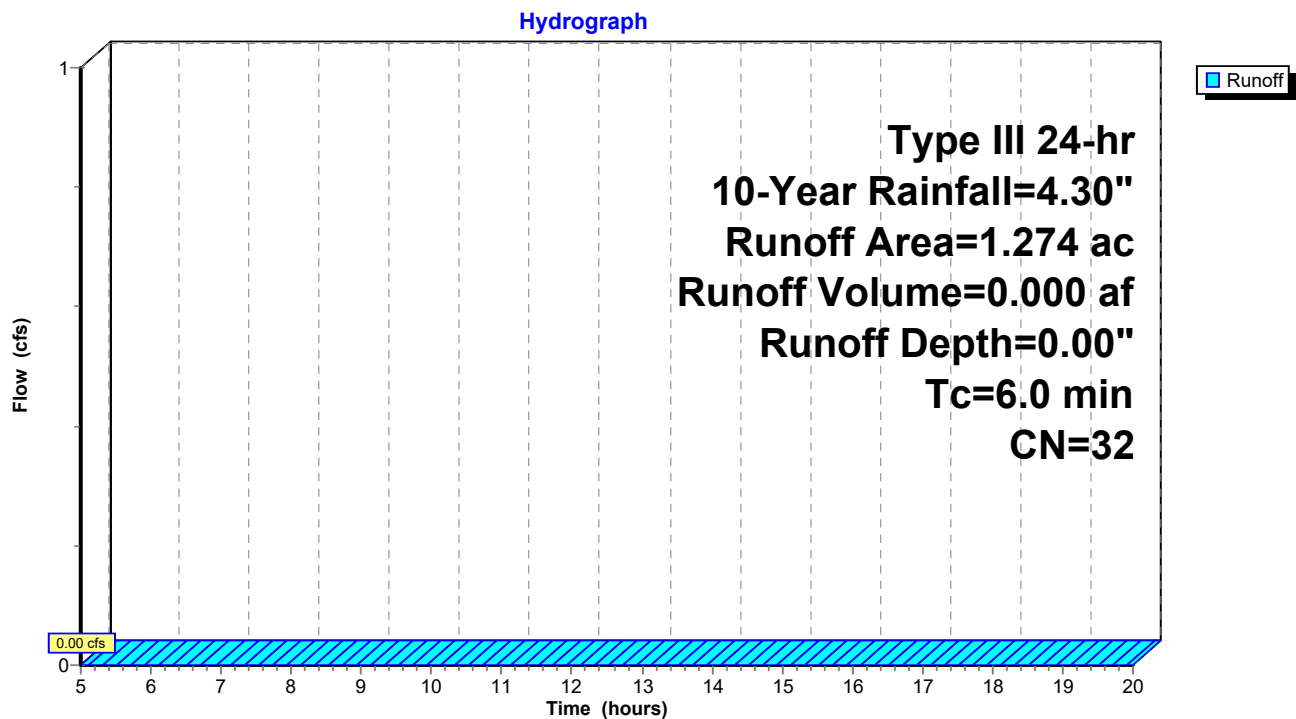
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
1.274	32	Woods/grass comb., Good, HSG A
1.274		100.00% Pervious Area

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

Subcatchment DR-3: Sedimentation Basin #1



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-4: Building and Parking

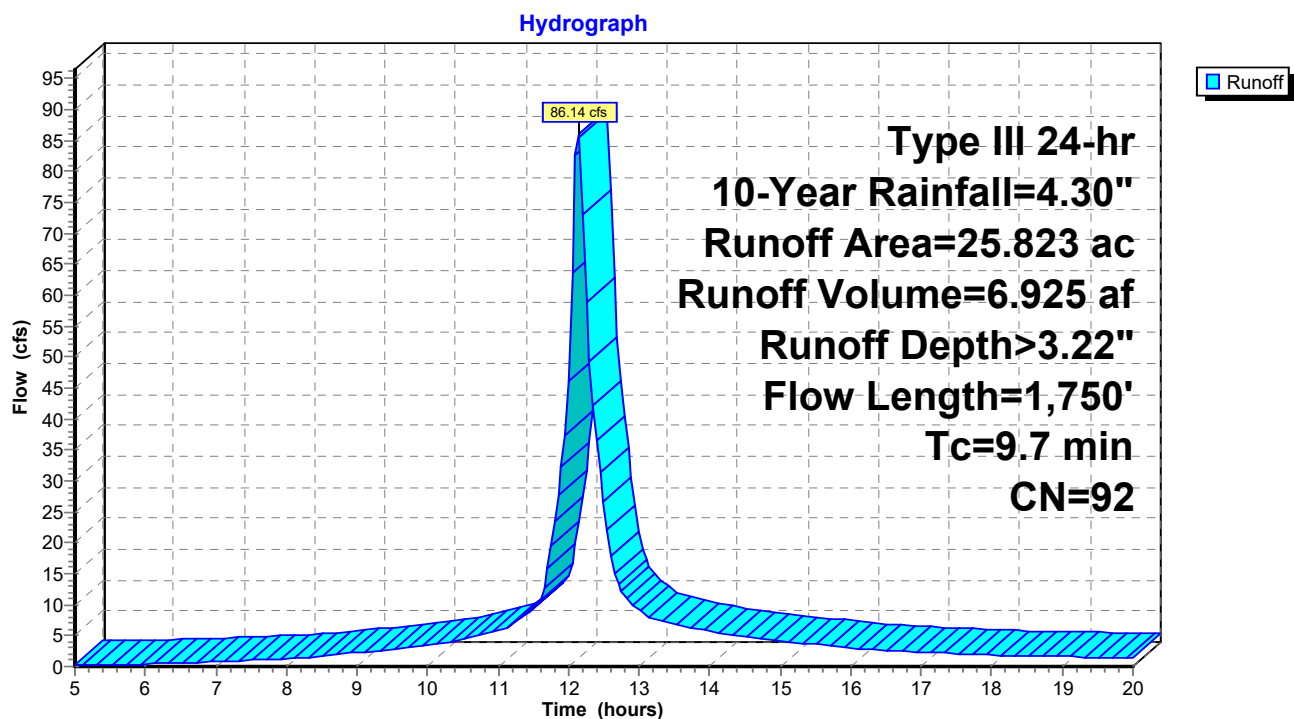
Runoff = 86.14 cfs @ 12.13 hrs, Volume= 6.925 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
2.791	39	>75% Grass cover, Good, HSG A
23.032	98	Paved parking, HSG A
25.823	92	Weighted Average
2.791		10.81% Pervious Area
23.032		89.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	1,750		3.00		Direct Entry,

Subcatchment DR-4: Building and Parking



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-5: Swale

Runoff = 0.40 cfs @ 12.11 hrs, Volume= 0.032 af, Depth> 0.72"

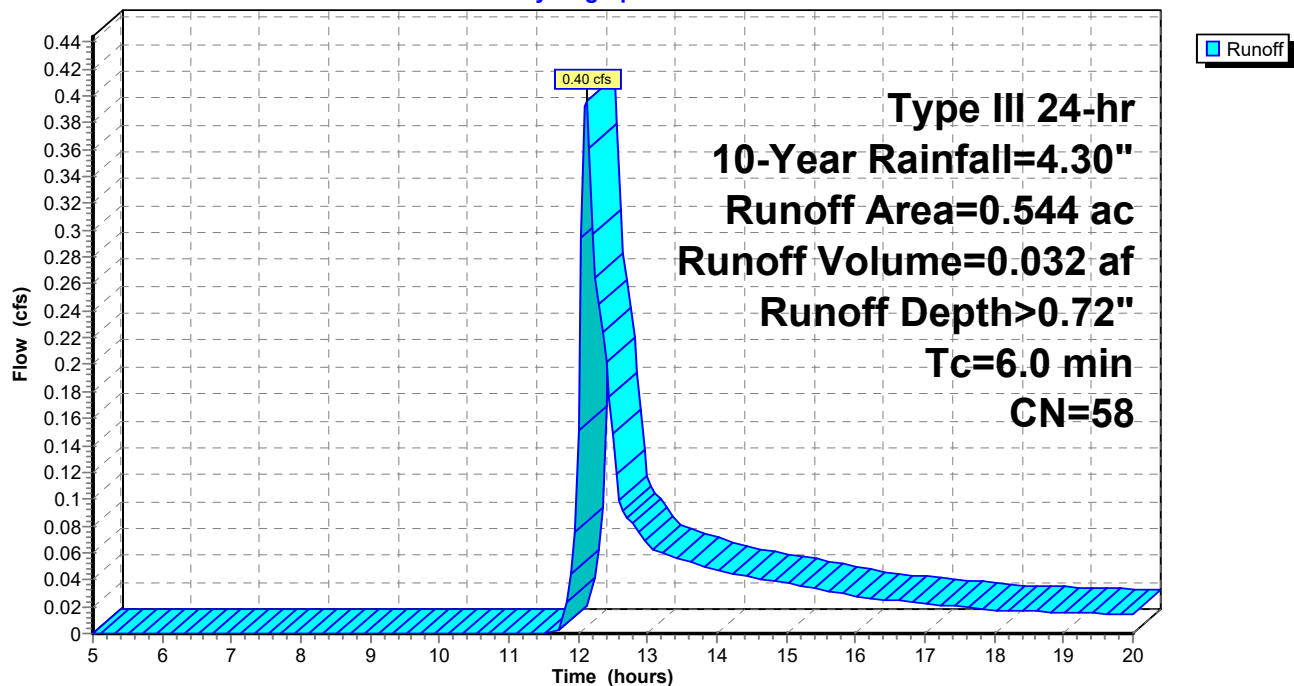
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
0.370	39	>75% Grass cover, Good, HSG A
0.174	98	Paved parking, HSG A
0.544	58	Weighted Average
0.370		68.01% Pervious Area
0.174		31.99% Impervious Area

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

Subcatchment DR-5: Swale

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-6: Overland

Runoff = 0.56 cfs @ 12.80 hrs, Volume= 0.145 af, Depth> 0.26"

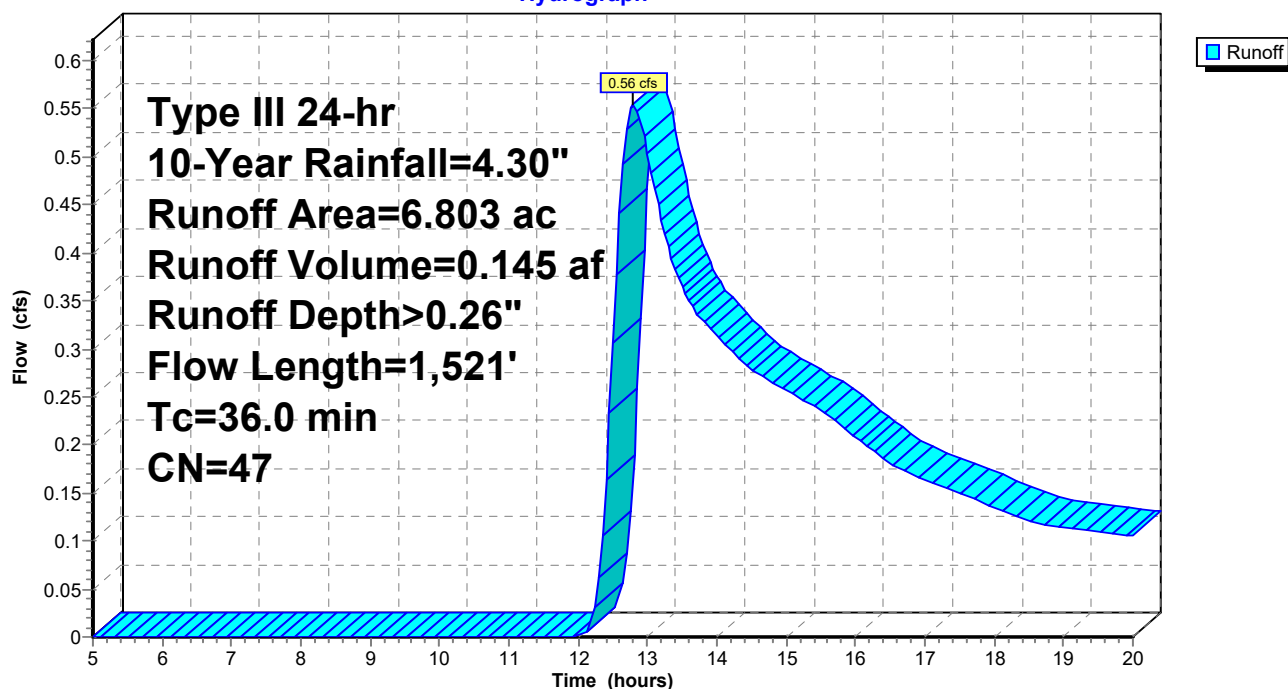
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG A
6.311	43	Woods/grass comb., Fair, HSG A
6.803	47	Weighted Average
6.311		92.77% Pervious Area
0.492		7.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	148	0.0540	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
2.7	257	0.1010	1.59		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	1,116	0.0070	1.58	31.54	Channel Flow, Area= 20.0 sf Perim= 14.0' r= 1.43' n= 0.100 Very weedy reaches w/pools
36.0	1,521	Total			

Subcatchment DR-6: Overland

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-7: Culvert

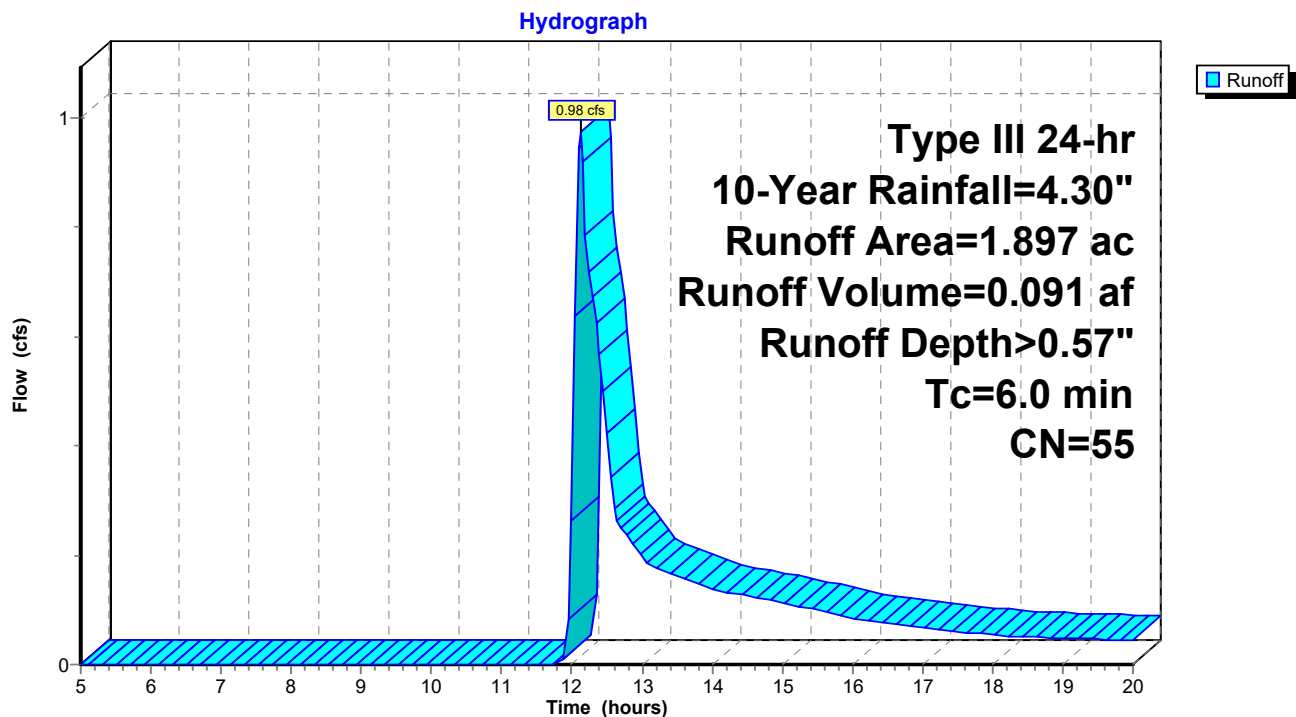
Runoff = 0.98 cfs @ 12.12 hrs, Volume= 0.091 af, Depth> 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
1.381	39	>75% Grass cover, Good, HSG A
1.897	55	Weighted Average
1.381		72.80% Pervious Area
0.516		27.20% Impervious Area

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

Subcatchment DR-7: Culvert



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-8: Infiltration Basin #2

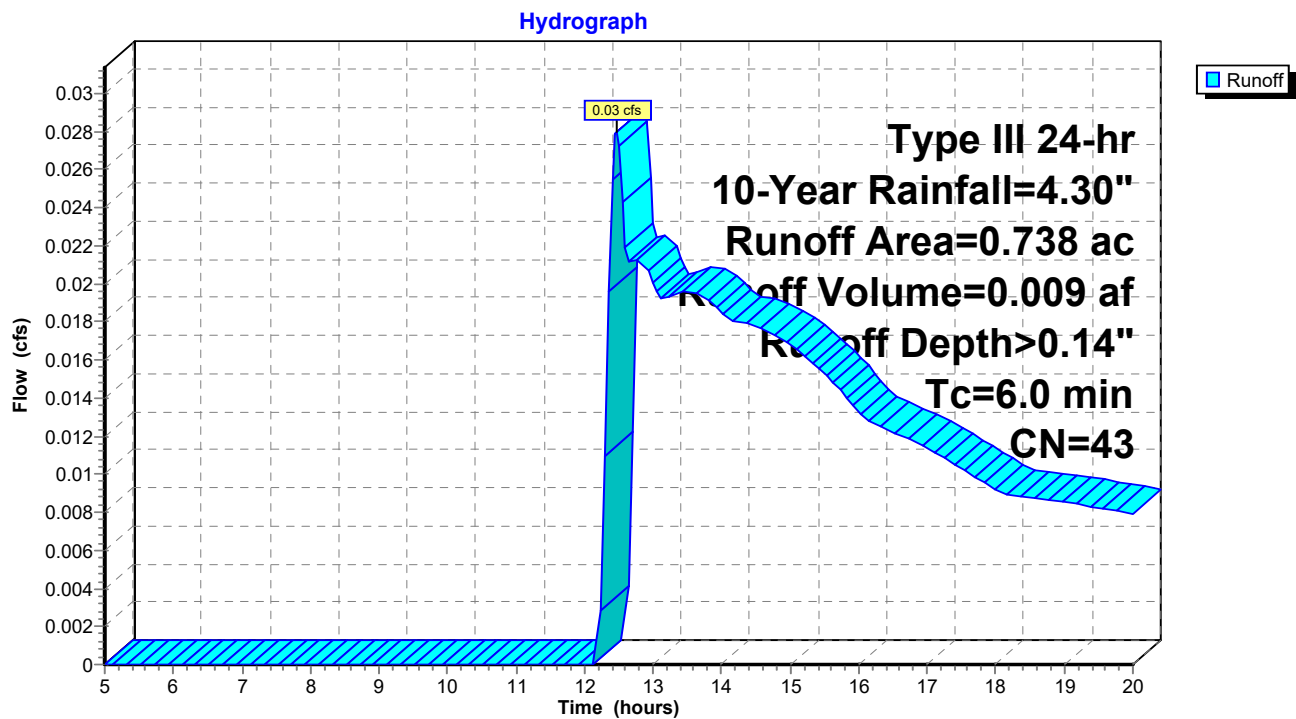
Runoff = 0.03 cfs @ 12.46 hrs, Volume= 0.009 af, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
0.051	98	Paved parking, HSG A
0.687	39	>75% Grass cover, Good, HSG A
0.738	43	Weighted Average
0.687		93.09% Pervious Area
0.051		6.91% Impervious Area

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

Subcatchment DR-8: Infiltration Basin #2



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Subcatchment DR-9: Sedimentation Basin #2

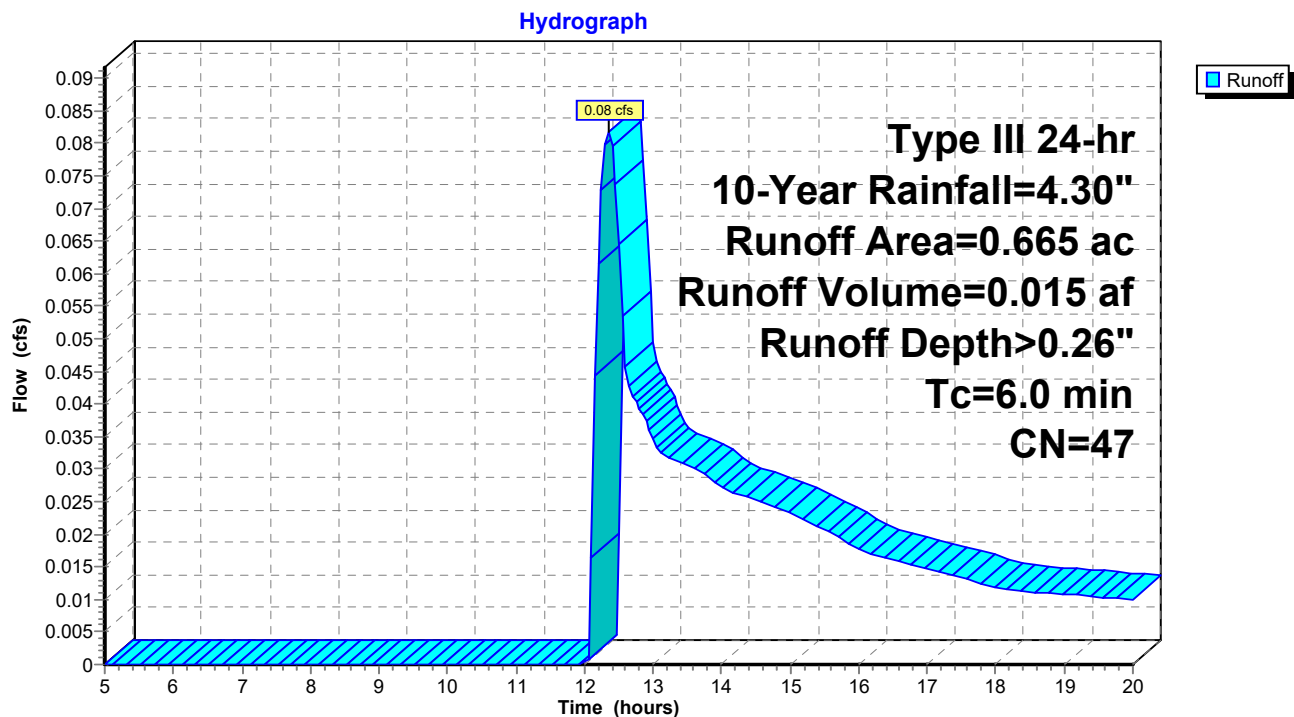
Runoff = 0.08 cfs @ 12.35 hrs, Volume= 0.015 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.30"

Area (ac)	CN	Description
0.579	39	>75% Grass cover, Good, HSG A
0.086	98	Paved parking, HSG A
0.665	47	Weighted Average
0.579		87.07% Pervious Area
0.086		12.93% Impervious Area

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

Subcatchment DR-9: Sedimentation Basin #2



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Pond 1P: Analysis Point #1

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

Inflow Area = 108.927 ac, 23.34% Impervious, Inflow Depth > 0.03" for 10-Year event

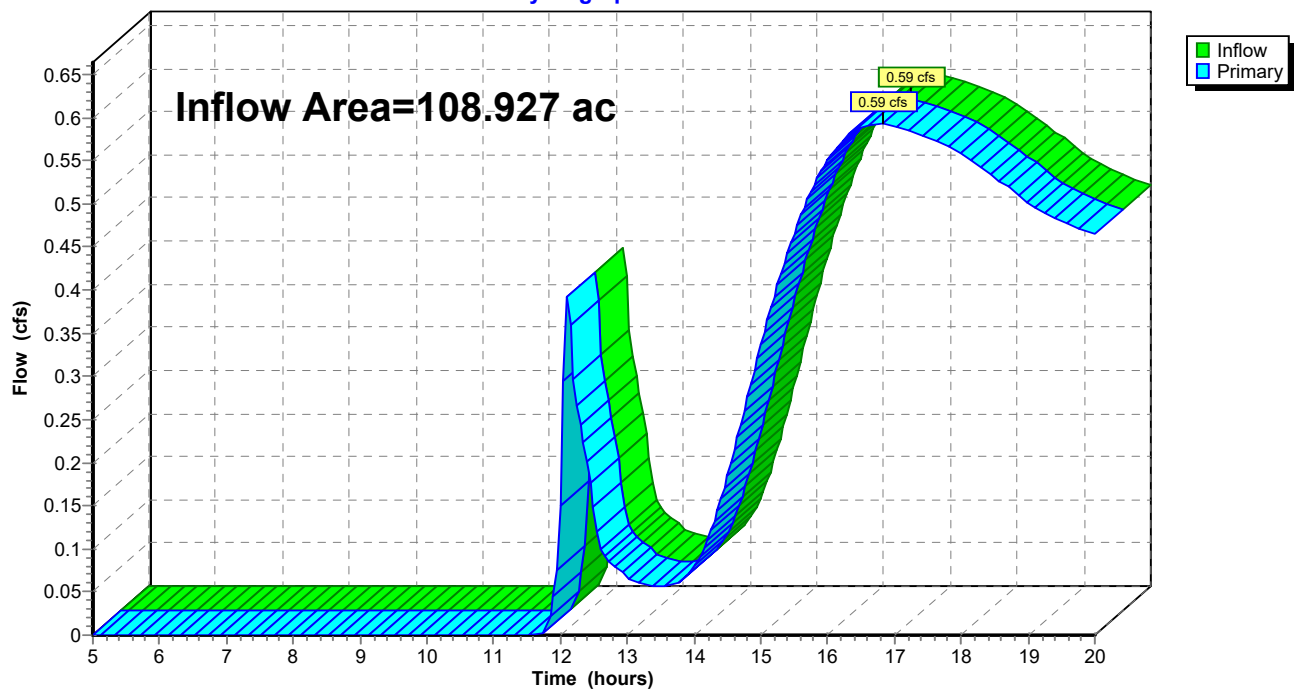
Inflow = 0.59 cfs @ 16.83 hrs, Volume= 0.254 af

Primary = 0.59 cfs @ 16.83 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1

Hydrograph



Post Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Pond 2P: Infiltration Basin #1

Inflow Area = 30.983 ac, 74.34% Impervious, Inflow Depth > 2.67" for 10-Year event
 Inflow = 80.02 cfs @ 12.18 hrs, Volume= 6.901 af
 Outflow = 16.60 cfs @ 12.70 hrs, Volume= 6.895 af, Atten= 79%, Lag= 31.4 min
 Discarded = 16.60 cfs @ 12.70 hrs, Volume= 6.895 af
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 290.85' @ 12.70 hrs Surf.Area= 35,858 sf Storage= 92,257 cf

Plug-Flow detention time= 39.6 min calculated for 6.872 af (100% of inflow)
 Center-of-Mass det. time= 39.1 min (805.8 - 766.7)

Volume	Invert	Avail.Storage	Storage Description
#1	288.00'	363,783 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
288.00	29,029	807.7	0	0	29,029
295.00	47,099	936.0	263,910	263,910	47,849
297.00	52,829	974.4	99,873	363,783	53,991

Device	Routing	Invert	Outlet Devices
#1	Discarded	288.00'	20.000 in/hr Exfiltration over Surface area
#2	Primary	295.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=16.60 cfs @ 12.70 hrs HW=290.85' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 16.60 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=288.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post Conditions

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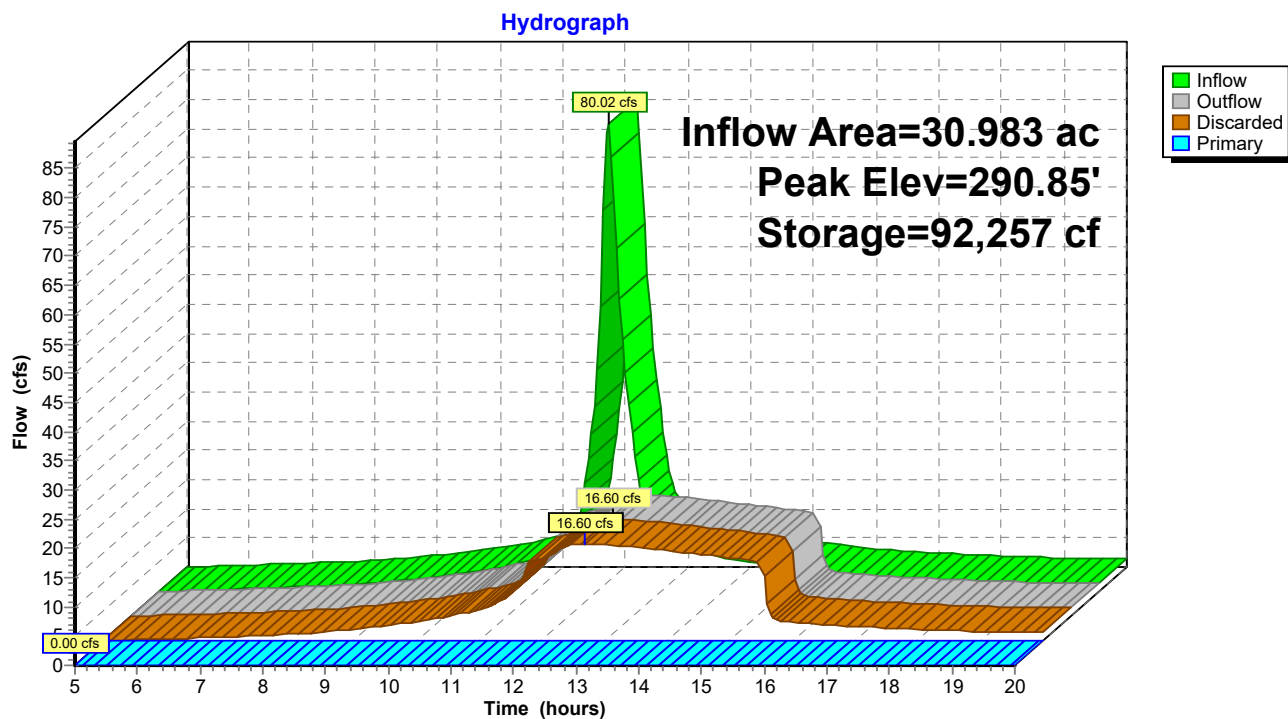
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Type III 24-hr 10-Year Rainfall=4.30"

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Pond 2P: Infiltration Basin #1



Post Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Pond 3P: Sedimentation Basin #1

[82] Warning: Early inflow requires earlier time span

Inflow Area = 27.097 ac, 85.00% Impervious, Inflow Depth > 3.07" for 10-Year event
 Inflow = 86.14 cfs @ 12.13 hrs, Volume= 6.925 af
 Outflow = 80.02 cfs @ 12.18 hrs, Volume= 6.901 af, Atten= 7%, Lag= 2.6 min
 Primary = 80.02 cfs @ 12.18 hrs, Volume= 6.901 af

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

Starting Elev= 295.00' Surf.Area= 17,007 sf Storage= 86,271 cf

Peak Elev= 296.01' @ 12.18 hrs Surf.Area= 18,549 sf Storage= 104,209 cf (17,938 cf above start)

Flood Elev= 297.00' Surf.Area= 20,127 sf Storage= 123,361 cf (37,090 cf above start)

Plug-Flow detention time= 120.1 min calculated for 4.921 af (71% of inflow)

Center-of-Mass det. time= 5.5 min (766.7 - 761.2)

Volume	Invert	Avail.Storage	Storage Description
#1	288.00'	123,361 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
288.00	8,175	359.2	0	0	8,175
295.00	17,007	494.6	86,271	86,271	17,848
297.00	20,127	533.9	37,090	123,361	21,225

Device	Routing	Invert	Outlet Devices
#1	Primary	295.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=78.76 cfs @ 12.18 hrs HW=296.00' (Free Discharge)↑1=**Broad-Crested Rectangular Weir** (Weir Controls 78.76 cfs @ 2.63 fps)

Post Conditions

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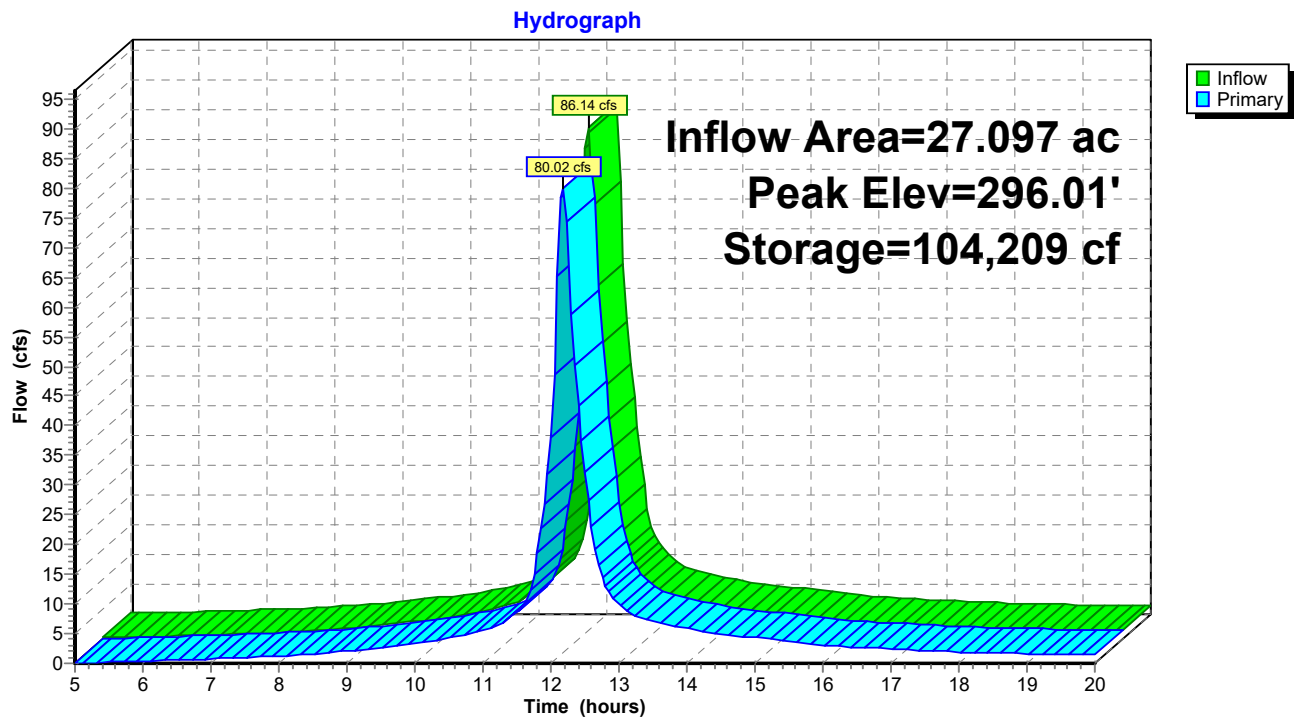
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Type III 24-hr 10-Year Rainfall=4.30"

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Pond 3P: Sedimentation Basin #1



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Summary for Pond 4P: Culvert

[57] Hint: Peaked at 327.25' (Flood elevation advised)

Inflow Area = 0.544 ac, 31.99% Impervious, Inflow Depth > 0.72" for 10-Year event
Inflow = 0.40 cfs @ 12.11 hrs, Volume= 0.032 af
Outflow = 0.40 cfs @ 12.11 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 12.11 hrs, Volume= 0.032 af

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

Peak Elev= 327.25' @ 12.11 hrs

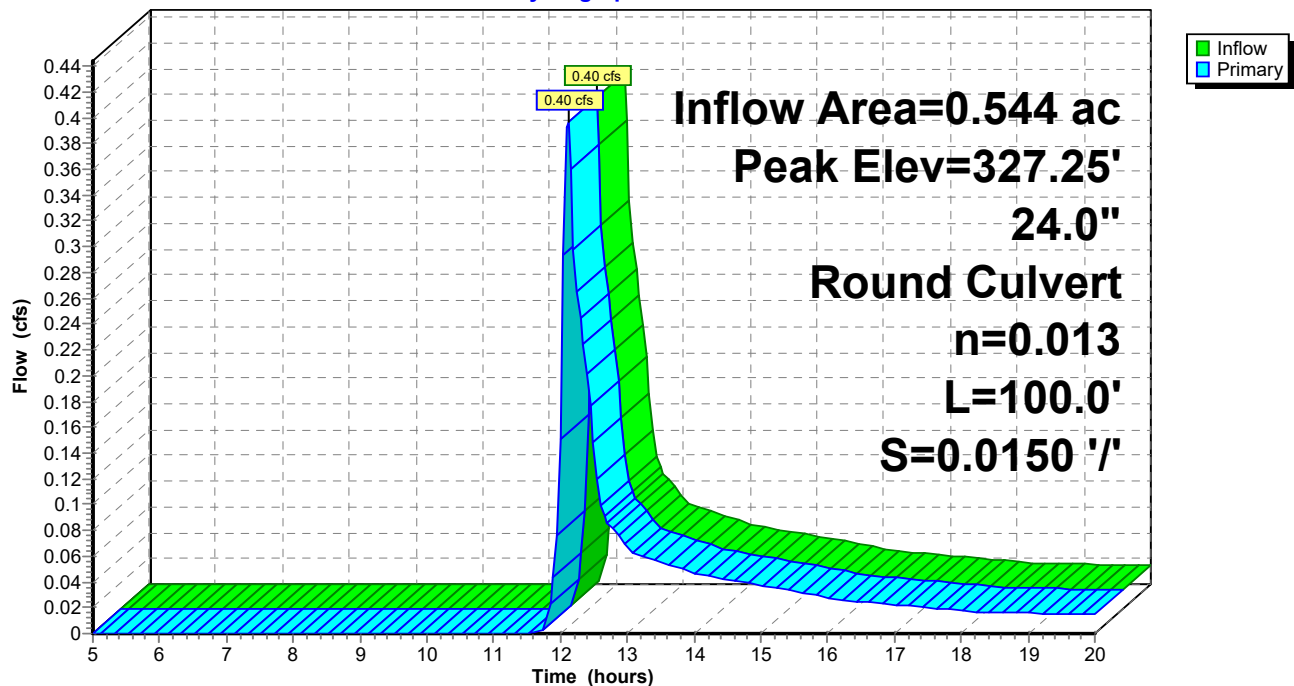
Device	Routing	Invert	Outlet Devices
#1	Primary	327.00'	24.0" Round Culvert L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 327.00' / 325.50' S= 0.0150 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.38 cfs @ 12.11 hrs HW=327.25' (Free Discharge)

↑1=Culvert (Inlet Controls 0.38 cfs @ 1.70 fps)

Pond 4P: Culvert

Hydrograph



Post Conditions

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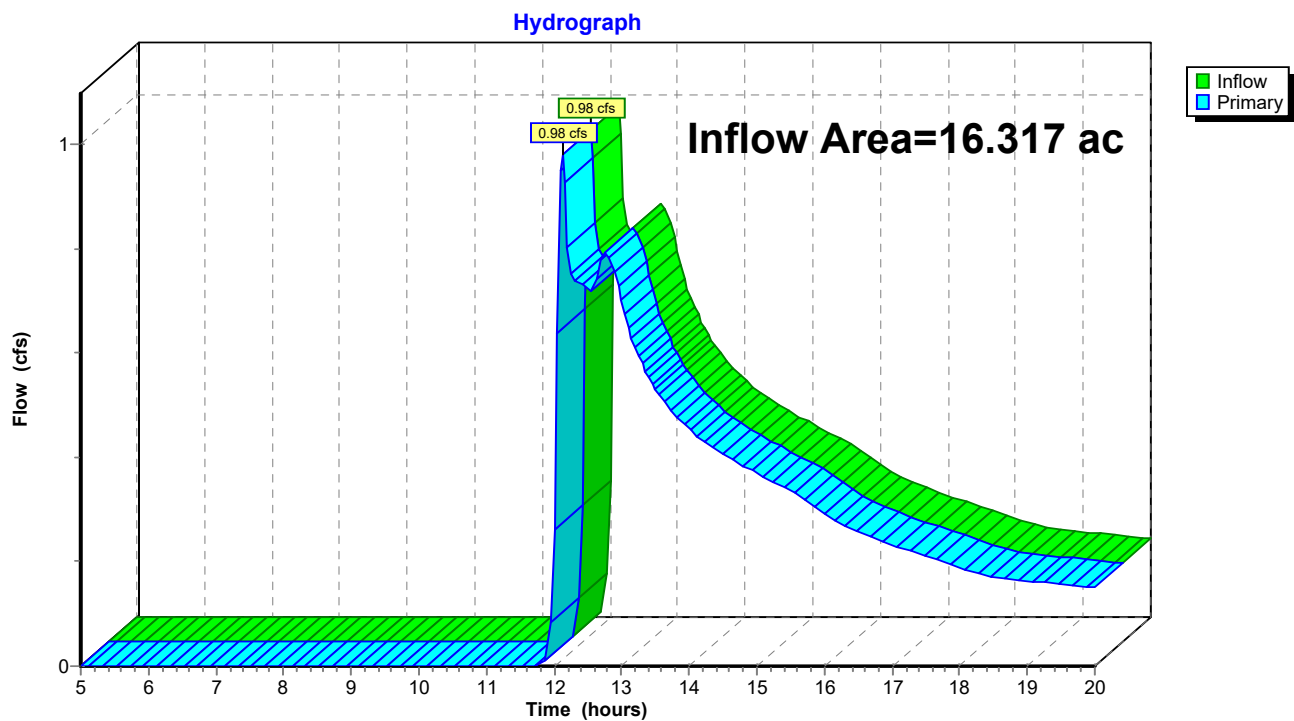
Summary for Pond 5P: Analysis Point #2

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

Inflow Area = 16.317 ac, 38.97% Impervious, Inflow Depth > 0.17" for 10-Year event
Inflow = 0.98 cfs @ 12.12 hrs, Volume= 0.236 af
Primary = 0.98 cfs @ 12.12 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min

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

Pond 5P: Analysis Point #2



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Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Pond 6P: Culvert

[57] Hint: Peaked at 324.46' (Flood elevation advised)

Inflow Area = 9.514 ac, 61.67% Impervious, Inflow Depth > 0.11" for 10-Year event
Inflow = 0.98 cfs @ 12.12 hrs, Volume= 0.091 af
Outflow = 0.98 cfs @ 12.12 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Primary = 0.98 cfs @ 12.12 hrs, Volume= 0.091 af

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

Peak Elev= 324.46' @ 12.12 hrs

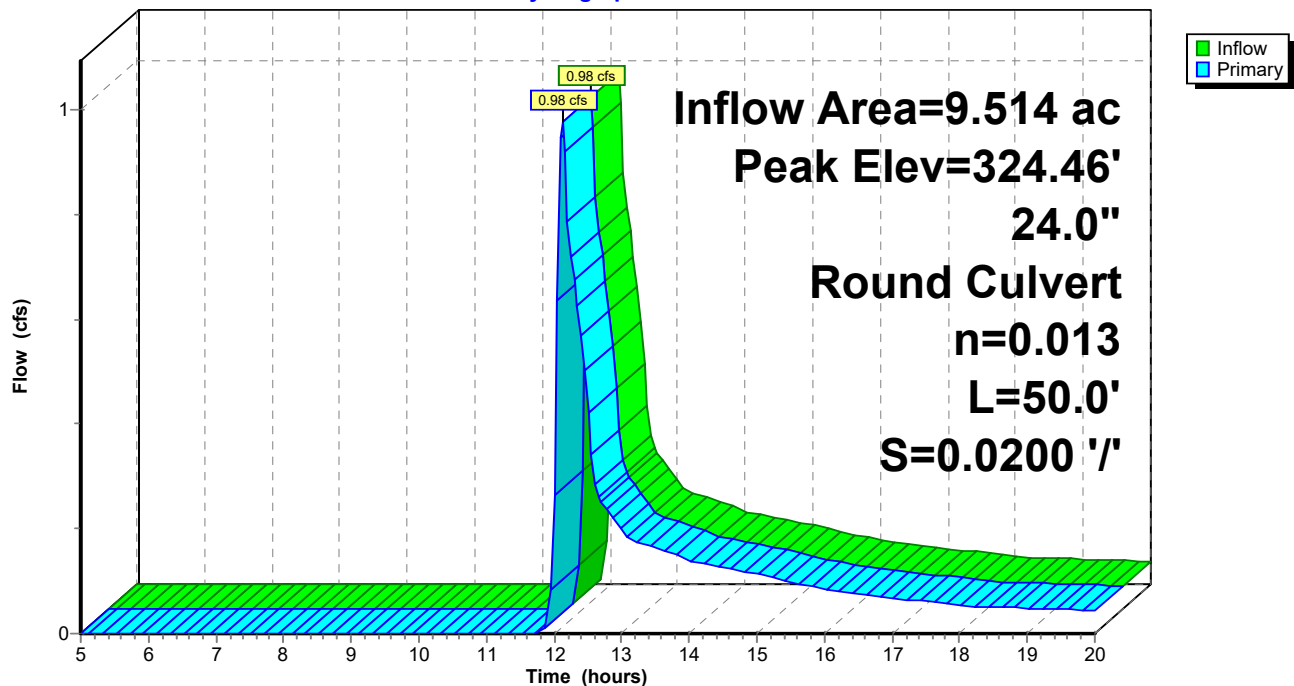
Device	Routing	Invert	Outlet Devices
#1	Primary	324.00'	24.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 324.00' / 323.00' S= 0.0200 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.94 cfs @ 12.12 hrs HW=324.45' (Free Discharge)

↑1=Culvert (Inlet Controls 0.94 cfs @ 1.79 fps)

Pond 6P: Culvert

Hydrograph



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Summary for Pond 7P: Infiltration Basin #2

Inflow Area = 7.617 ac, 70.25% Impervious, Inflow Depth > 2.33" for 10-Year event
Inflow = 21.59 cfs @ 12.10 hrs, Volume= 1.480 af
Outflow = 5.98 cfs @ 12.47 hrs, Volume= 1.480 af, Atten= 72%, Lag= 22.0 min
Discarded = 5.98 cfs @ 12.47 hrs, Volume= 1.480 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 324.52' @ 12.47 hrs Surf.Area= 12,913 sf Storage= 15,995 cf

Plug-Flow detention time= 18.1 min calculated for 1.480 af (100% of inflow)
Center-of-Mass det. time= 17.9 min (800.6 - 782.7)

Volume	Invert	Avail.Storage	Storage Description		
#1	323.00'	59,502 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.00	8,281	742.9	0	0	8,281
327.00	22,650	963.7	59,502	59,502	38,461

Device	Routing	Invert	Outlet Devices									
#1	Discarded	323.00'	20.000 in/hr Exfiltration over Surface area									
#2	Primary	326.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir									
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60									
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64									

Discarded OutFlow Max=5.98 cfs @ 12.47 hrs HW=324.52' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 5.98 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=323.00' (Free Discharge)

↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post Conditions

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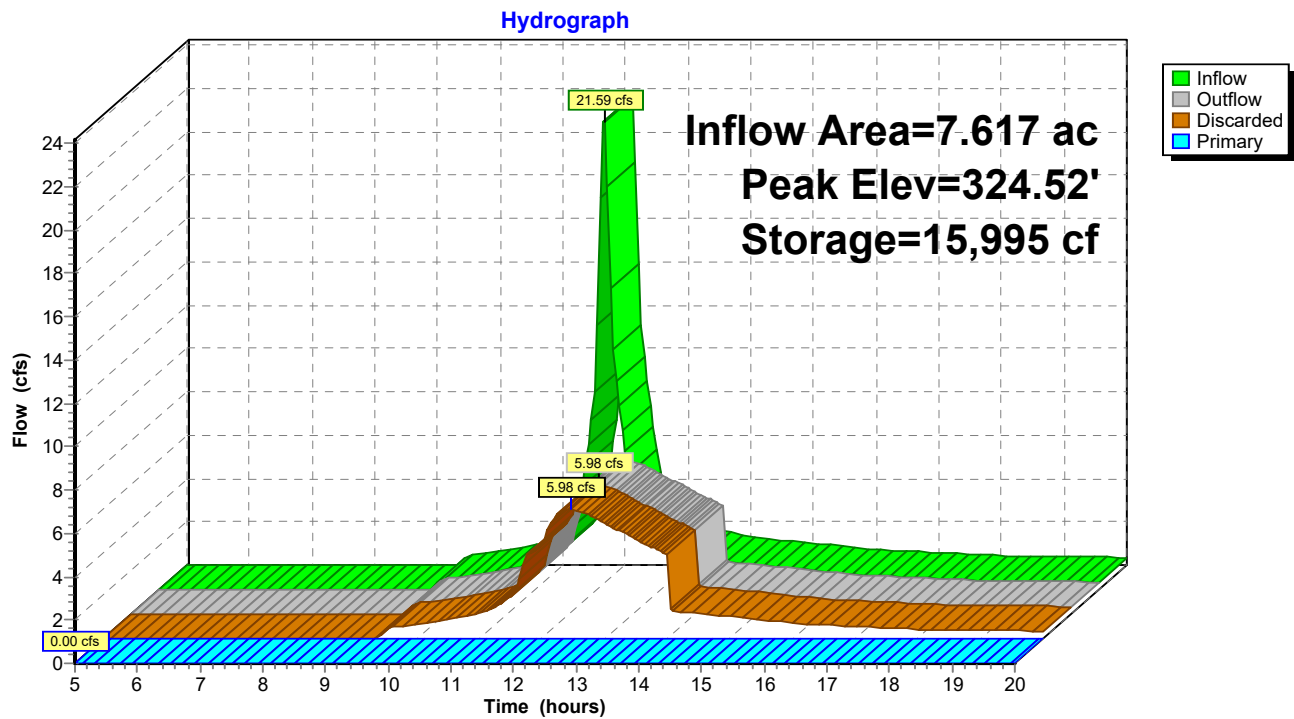
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Type III 24-hr 10-Year Rainfall=4.30"

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Pond 7P: Infiltration Basin #2



Post Conditions

Type III 24-hr 10-Year Rainfall=4.30"

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Summary for Pond 8P: Sedimentation Basin #2

Inflow Area = 6.879 ac, 77.05% Impervious, Inflow Depth > 2.67" for 10-Year event
 Inflow = 21.69 cfs @ 12.09 hrs, Volume= 1.531 af
 Outflow = 21.59 cfs @ 12.10 hrs, Volume= 1.471 af, Atten= 0%, Lag= 0.8 min
 Primary = 21.59 cfs @ 12.10 hrs, Volume= 1.471 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 327.41' @ 12.10 hrs Surf.Area= 3,332 sf Storage= 3,826 cf

Plug-Flow detention time= 26.6 min calculated for 1.467 af (96% of inflow)
 Center-of-Mass det. time= 12.2 min (781.9 - 769.6)

Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	15,146 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.00	2,020	244.7	0	0	2,020
327.00	3,033	277.8	2,509	2,509	3,421
330.00	5,514	348.3	12,636	15,146	7,057

Device	Routing	Invert	Outlet Devices
#1	Primary	327.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	329.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=21.44 cfs @ 12.10 hrs HW=327.41' (Free Discharge)

1=Broad-Crested Rectangular Weir (Weir Controls 21.44 cfs @ 1.73 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Post Conditions

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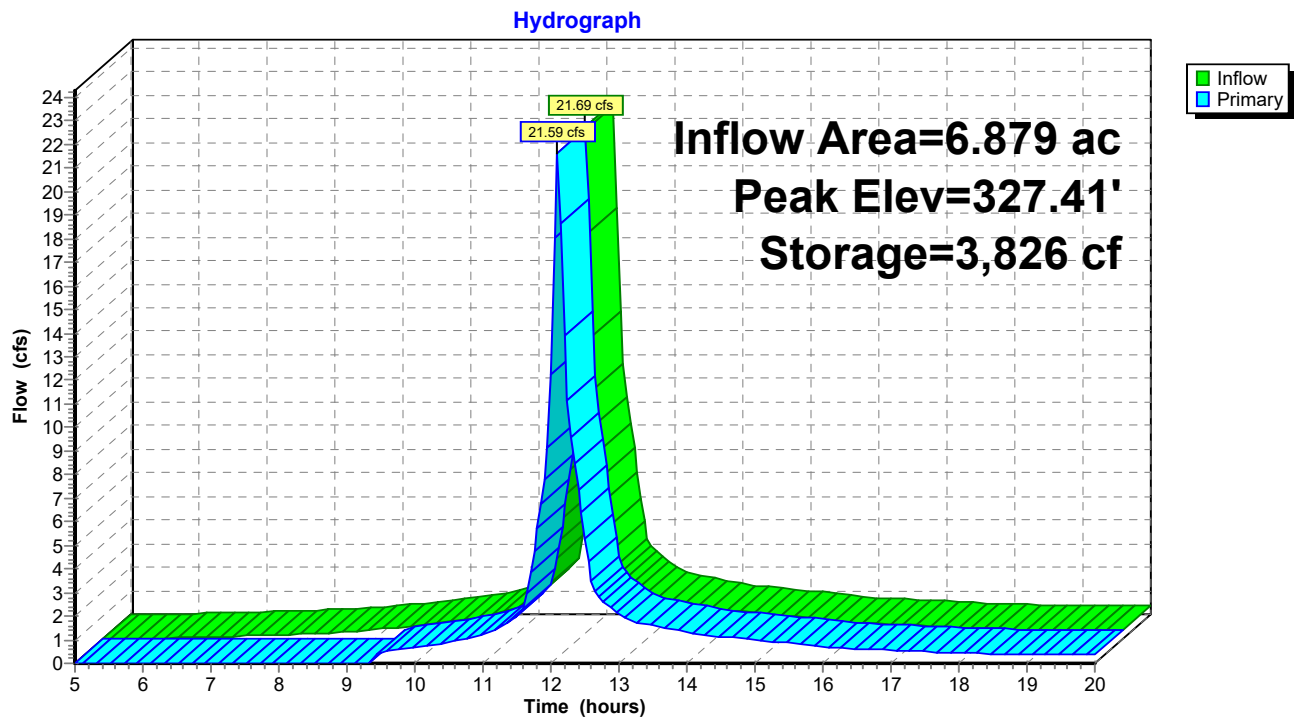
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Type III 24-hr 10-Year Rainfall=4.30"

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Pond 8P: Sedimentation Basin #2



Post Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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

SubcatchmentDR-1: Overland

Runoff Area=77.400 ac 2.86% Impervious Runoff Depth>0.37"
Flow Length=3,707' Tc=91.9 min CN=38 Runoff=6.55 cfs 2.371 af

SubcatchmentDR-10: Building and

Runoff Area=6.214 ac 83.91% Impervious Runoff Depth>4.75"
Tc=6.0 min CN=89 Runoff=34.24 cfs 2.460 af

SubcatchmentDR-2: Infiltration Basin #1

Runoff Area=3.886 ac 0.00% Impervious Runoff Depth>0.14"
Tc=6.0 min CN=32 Runoff=0.09 cfs 0.044 af

SubcatchmentDR-3: SedimentationBasin #1

Runoff Area=1.274 ac 0.00% Impervious Runoff Depth>0.14"
Tc=6.0 min CN=32 Runoff=0.03 cfs 0.015 af

SubcatchmentDR-4: Building and Parking

Runoff Area=25.823 ac 89.19% Impervious Runoff Depth>5.06"
Flow Length=1,750' Tc=9.7 min CN=92 Runoff=132.23 cfs 10.890 af

SubcatchmentDR-5: Swale

Runoff Area=0.544 ac 31.99% Impervious Runoff Depth>1.77"
Tc=6.0 min CN=58 Runoff=1.15 cfs 0.080 af

SubcatchmentDR-6: Overland

Runoff Area=6.803 ac 7.23% Impervious Runoff Depth>0.93"
Flow Length=1,521' Tc=36.0 min CN=47 Runoff=3.36 cfs 0.525 af

SubcatchmentDR-7: Culvert

Runoff Area=1.897 ac 27.20% Impervious Runoff Depth>1.53"
Tc=6.0 min CN=55 Runoff=3.36 cfs 0.242 af

SubcatchmentDR-8: Infiltration Basin #2

Runoff Area=0.738 ac 6.91% Impervious Runoff Depth>0.68"
Tc=6.0 min CN=43 Runoff=0.37 cfs 0.042 af

SubcatchmentDR-9: SedimentationBasin

Runoff Area=0.665 ac 12.93% Impervious Runoff Depth>0.94"
Tc=6.0 min CN=47 Runoff=0.60 cfs 0.052 af

Pond 1P: AnalysisPoint #1

Inflow=6.66 cfs 2.452 af
Primary=6.66 cfs 2.452 af

Pond 2P: Infiltration Basin #1

Peak Elev=292.84' Storage=168,797 cf Inflow=125.33 cfs 10.916 af
Discarded=19.01 cfs 10.906 af Primary=0.00 cfs 0.000 af Outflow=19.01 cfs 10.906 af

Pond 3P: SedimentationBasin #1

Peak Elev=296.36' Storage=110,773 cf Inflow=132.23 cfs 10.905 af
Outflow=125.33 cfs 10.871 af

Pond 4P: Culvert

Peak Elev=327.44' Inflow=1.15 cfs 0.080 af
24.0" Round Culvert n=0.013 L=100.0' S=0.0150 '/' Outflow=1.15 cfs 0.080 af

Pond 5P: AnalysisPoint #2

Inflow=4.13 cfs 0.767 af
Primary=4.13 cfs 0.767 af

Pond 6P: Culvert

Peak Elev=324.88' Inflow=3.36 cfs 0.242 af
24.0" Round Culvert n=0.013 L=50.0' S=0.0200 '/' Outflow=3.36 cfs 0.242 af

Post Conditions*Type III 24-hr 100-Year Rainfall=6.30"*

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Pond 7P: Infiltration Basin #2

Peak Elev=325.61' Storage=32,138 cf Inflow=35.09 cfs 2.495 af
Discarded=7.80 cfs 2.493 af Primary=0.00 cfs 0.000 af Outflow=7.80 cfs 2.493 af

Pond 8P: Sedimentation Basin #2

Peak Elev=327.57' Storage=4,350 cf Inflow=34.82 cfs 2.512 af
Outflow=34.74 cfs 2.453 af

Total Runoff Area = 125.244 ac Runoff Volume = 16.722 af Average Runoff Depth = 1.60"
74.63% Pervious = 93.464 ac 25.37% Impervious = 31.780 ac

Post Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-1: Overland

Runoff = 6.55 cfs @ 13.79 hrs, Volume= 2.371 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
1.490	83	Paved roads w/open ditches, 50% imp, HSG A
0.660	98	Roofs, HSG A
0.810	98	Paved parking, HSG A
73.950	36	Woods, Fair, HSG A
0.490	76	Gravel roads, HSG A
77.400	38	Weighted Average
75.185		97.14% Pervious Area
2.215		2.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	87	0.0920	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
22.3	1,099	0.0270	0.82		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.4	110	0.0180	1.34		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
3.4	613	0.0390	2.96		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.4	237	0.0080	0.89		Shallow Concentrated Flow, Nearly Bare & Untilled Kv= 10.0 fps
5.9	185	0.0110	0.52		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.7	171	0.0060	0.19		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.4	1,205	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
91.9	3,707	Total			

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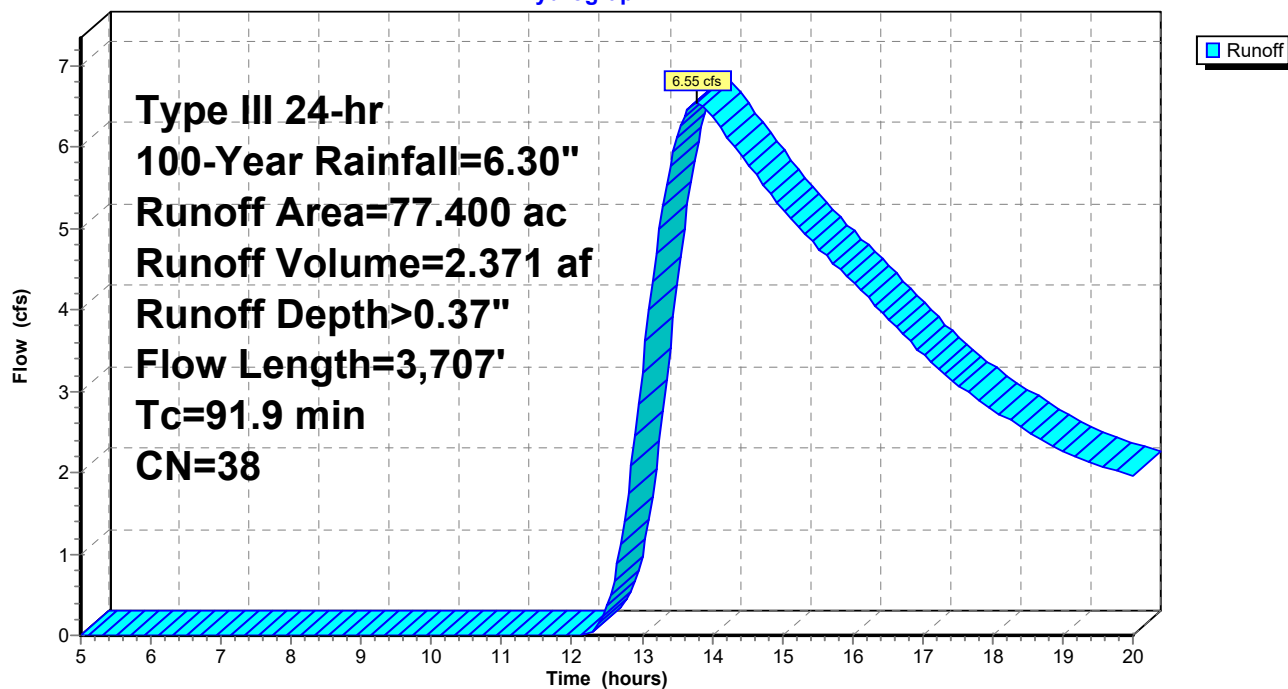
Type III 24-hr 100-Year Rainfall=6.30"

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Subcatchment DR-1: Overland

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-10: Building and Parking Lot

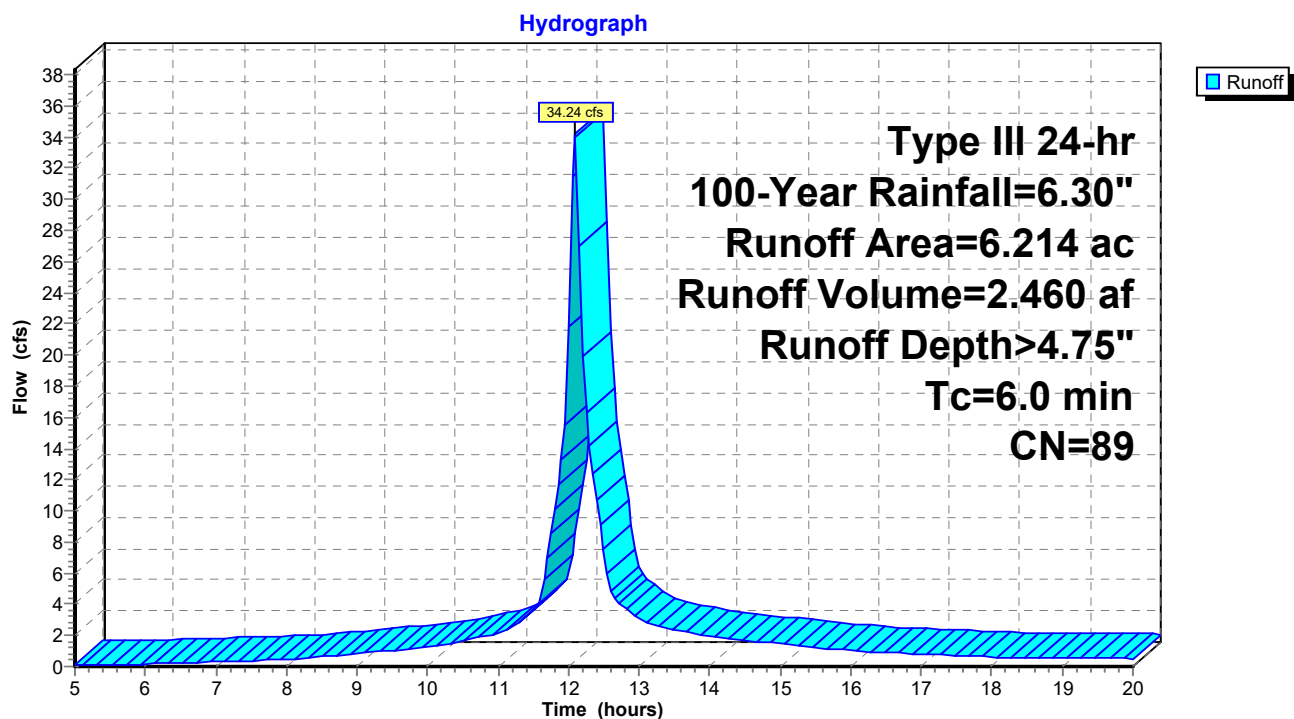
Runoff = 34.24 cfs @ 12.09 hrs, Volume= 2.460 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
5.214	98	Paved parking, HSG A
1.000	39	>75% Grass cover, Good, HSG A
6.214	89	Weighted Average
1.000		16.09% Pervious Area
5.214		83.91% Impervious Area

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

Subcatchment DR-10: Building and Parking Lot



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-2: Infiltration Basin #1

Runoff = 0.09 cfs @ 14.54 hrs, Volume= 0.044 af, Depth> 0.14"

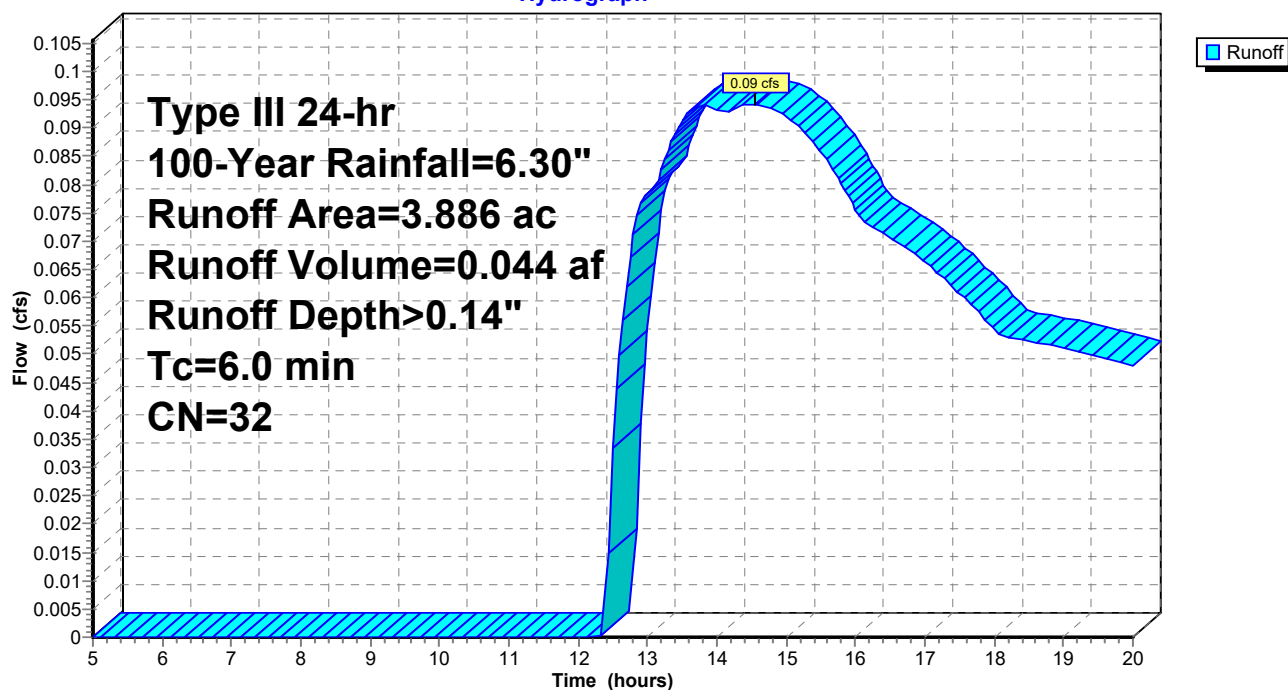
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
3.886	32	Woods/grass comb., Good, HSG A
3.886		100.00% Pervious Area

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

Subcatchment DR-2: Infiltration Basin #1

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-3: Sedimentation Basin #1

Runoff = 0.03 cfs @ 14.54 hrs, Volume= 0.015 af, Depth> 0.14"

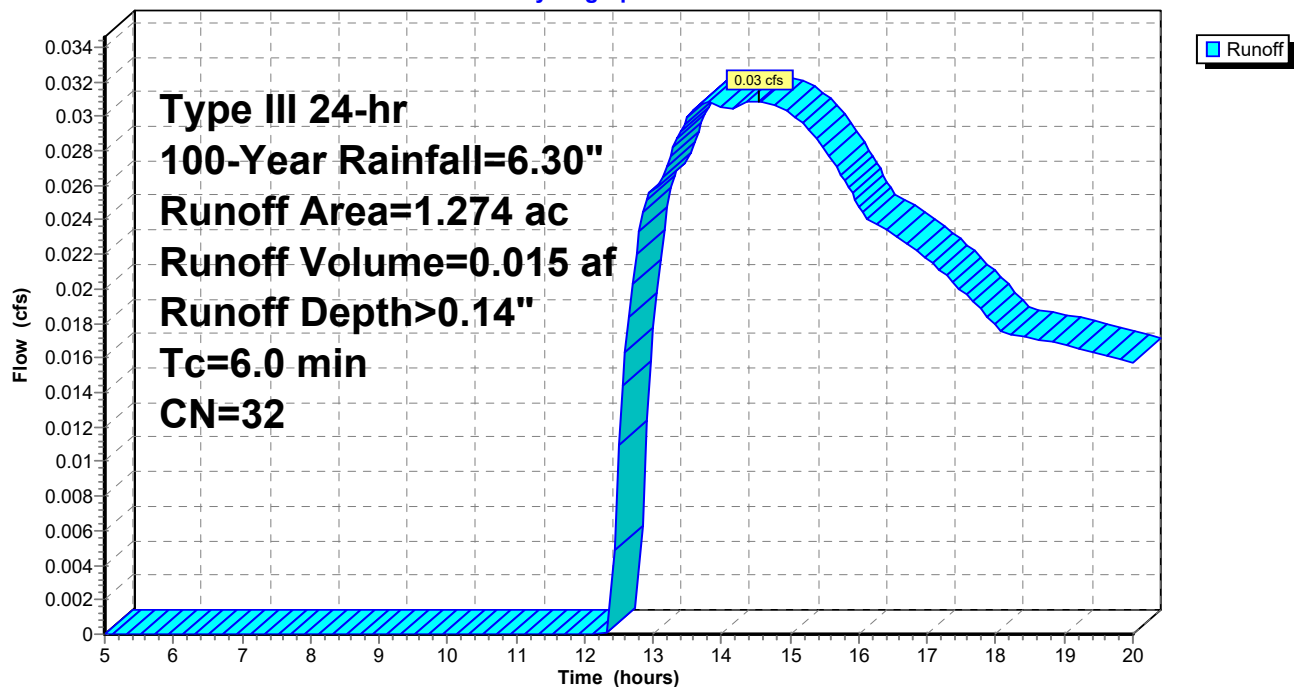
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
1.274	32	Woods/grass comb., Good, HSG A
1.274		100.00% Pervious Area

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

Subcatchment DR-3: Sedimentation Basin #1

Hydrograph



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-4: Building and Parking

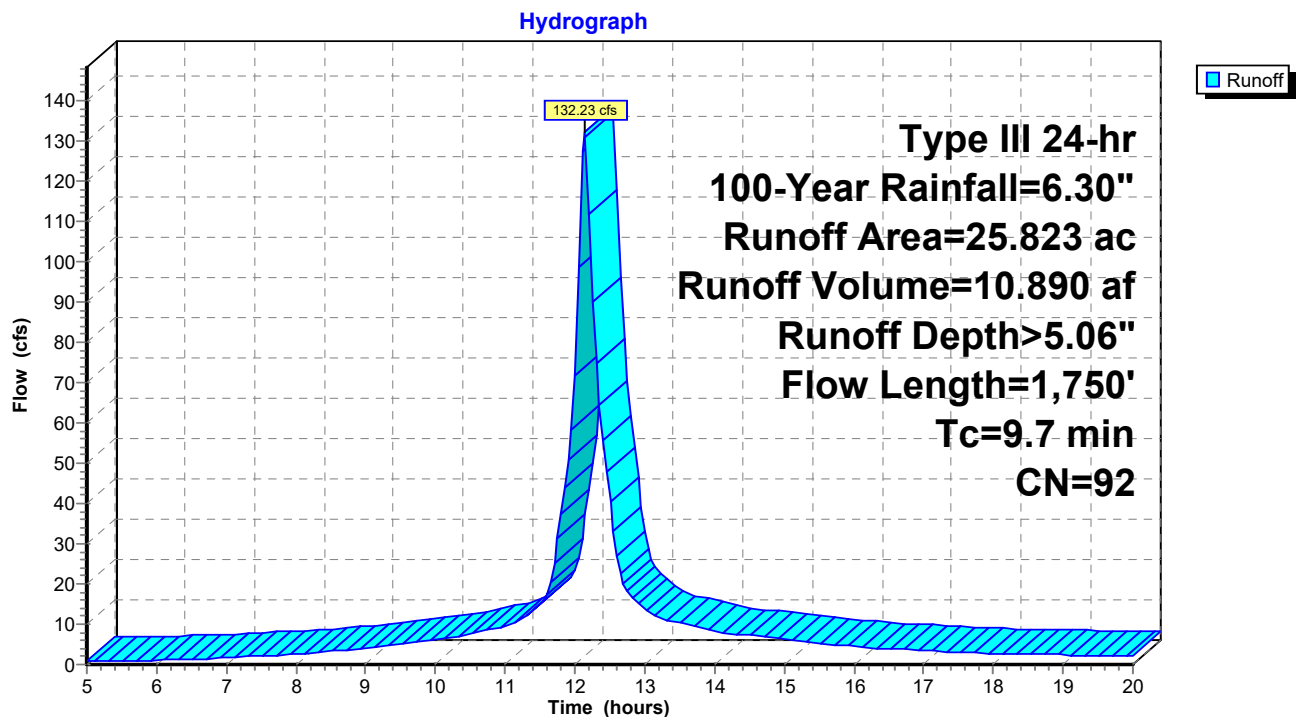
Runoff = 132.23 cfs @ 12.13 hrs, Volume= 10.890 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
2.791	39	>75% Grass cover, Good, HSG A
23.032	98	Paved parking, HSG A
25.823	92	Weighted Average
2.791		10.81% Pervious Area
23.032		89.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	1,750		3.00		Direct Entry,

Subcatchment DR-4: Building and Parking



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-5: Swale

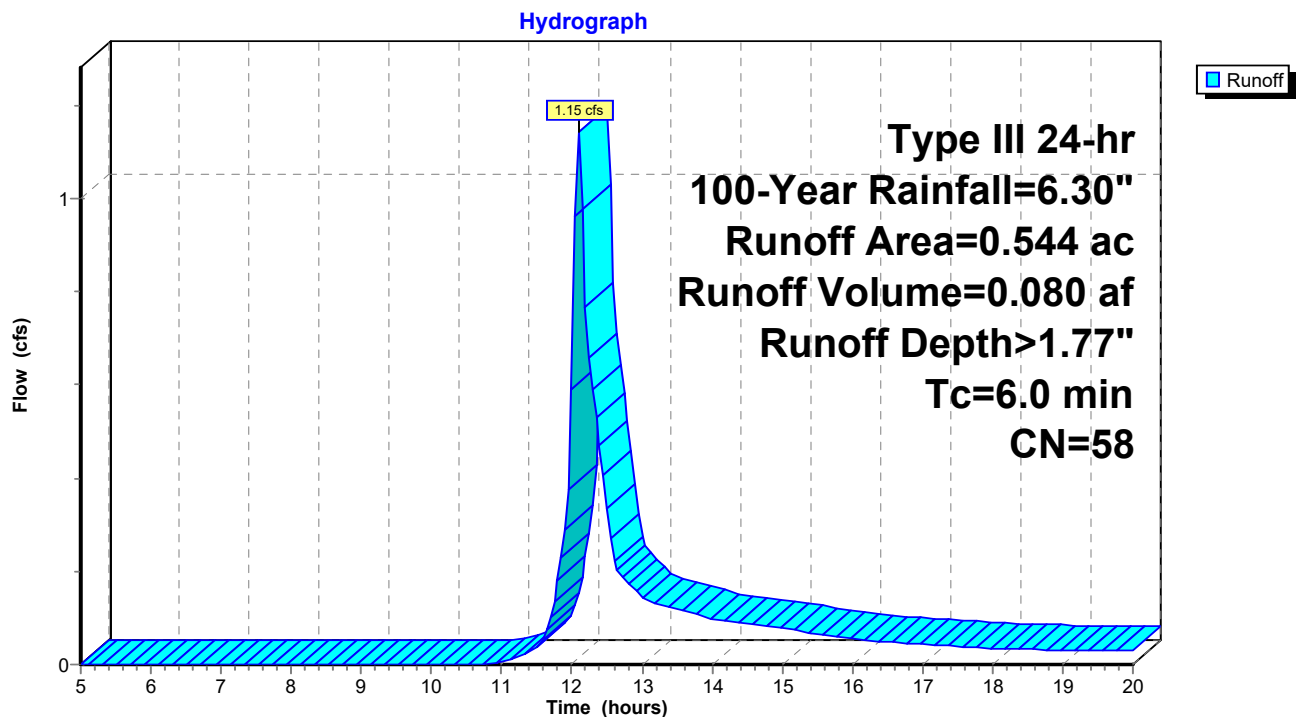
Runoff = 1.15 cfs @ 12.10 hrs, Volume= 0.080 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
0.370	39	>75% Grass cover, Good, HSG A
0.174	98	Paved parking, HSG A
0.544	58	Weighted Average
0.370		68.01% Pervious Area
0.174		31.99% Impervious Area

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

Subcatchment DR-5: Swale



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-6: Overland

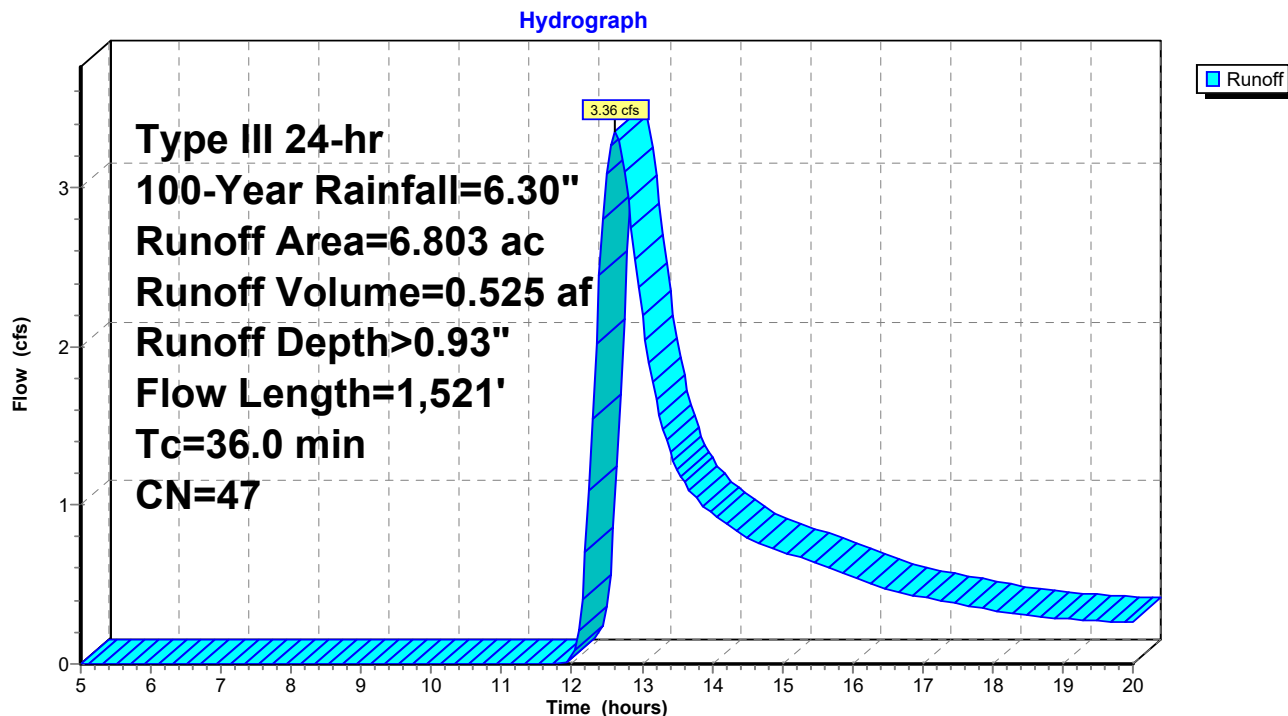
Runoff = 3.36 cfs @ 12.62 hrs, Volume= 0.525 af, Depth> 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG A
6.311	43	Woods/grass comb., Fair, HSG A
6.803	47	Weighted Average
6.311		92.77% Pervious Area
0.492		7.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	148	0.0540	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.70"
2.7	257	0.1010	1.59		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.8	1,116	0.0070	1.58	31.54	Channel Flow, Area= 20.0 sf Perim= 14.0' r= 1.43' n= 0.100 Very weedy reaches w/pools
36.0	1,521	Total			

Subcatchment DR-6: Overland



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-7: Culvert

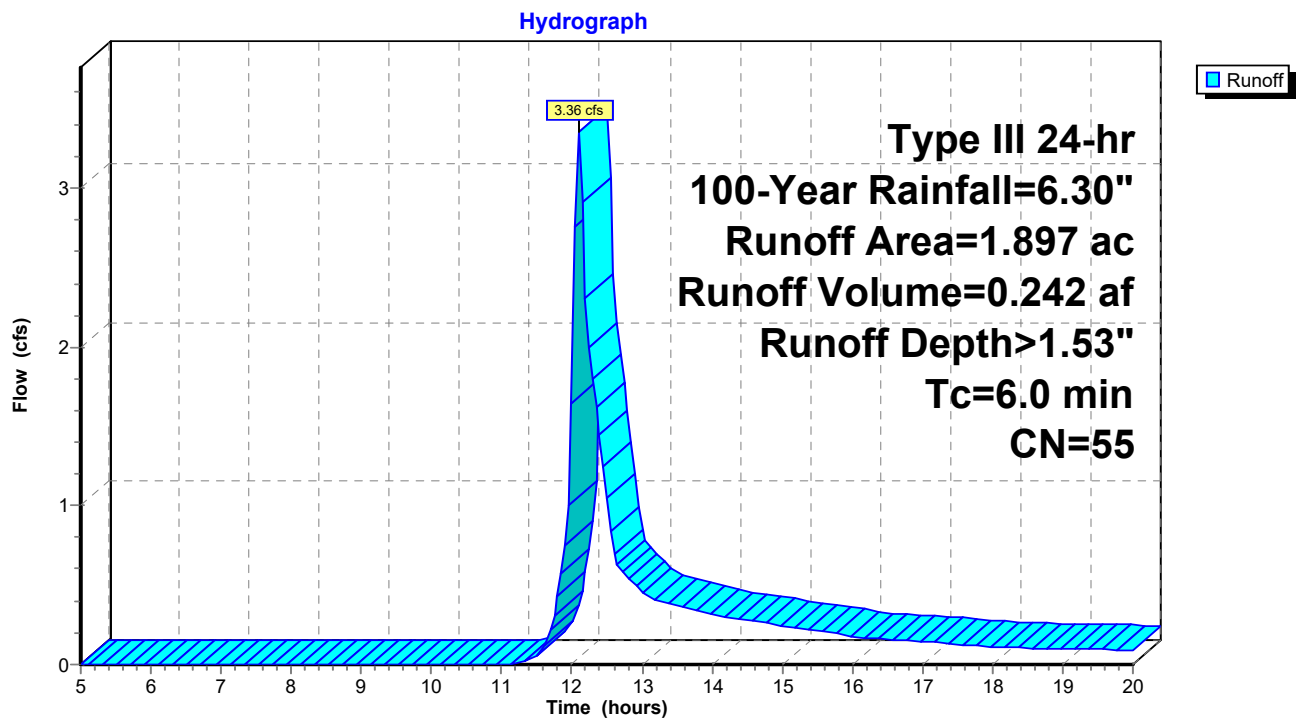
Runoff = 3.36 cfs @ 12.10 hrs, Volume= 0.242 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
1.381	39	>75% Grass cover, Good, HSG A
1.897	55	Weighted Average
1.381		72.80% Pervious Area
0.516		27.20% Impervious Area

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

Subcatchment DR-7: Culvert



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-8: Infiltration Basin #2

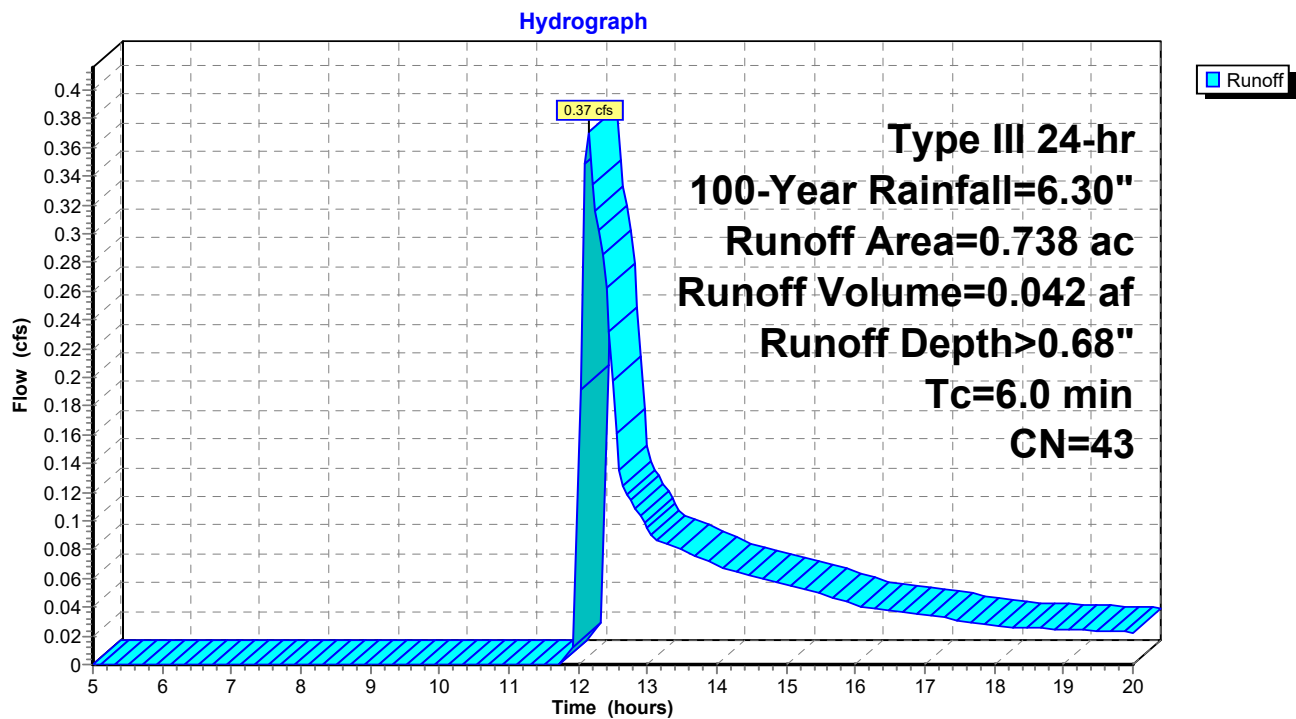
Runoff = 0.37 cfs @ 12.14 hrs, Volume= 0.042 af, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
0.051	98	Paved parking, HSG A
0.687	39	>75% Grass cover, Good, HSG A
0.738	43	Weighted Average
0.687		93.09% Pervious Area
0.051		6.91% Impervious Area

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

Subcatchment DR-8: Infiltration Basin #2



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Subcatchment DR-9: Sedimentation Basin #2

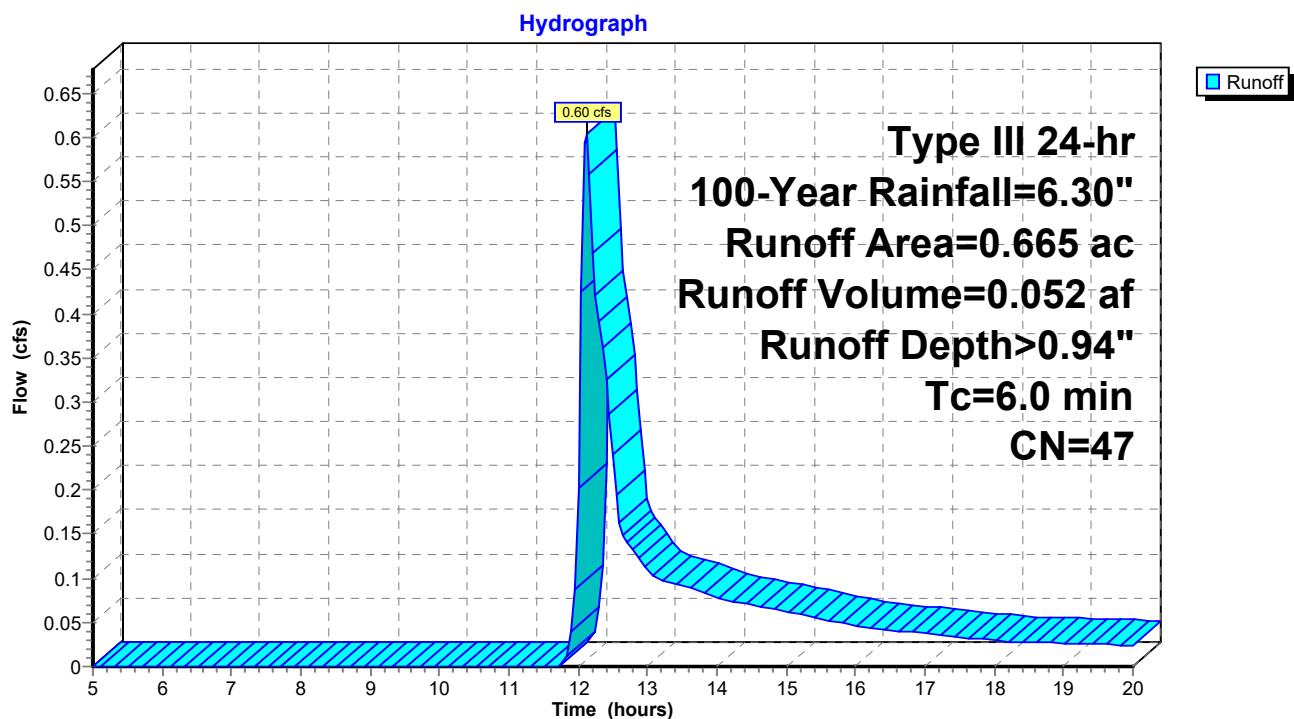
Runoff = 0.60 cfs @ 12.12 hrs, Volume= 0.052 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.30"

Area (ac)	CN	Description
0.579	39	>75% Grass cover, Good, HSG A
0.086	98	Paved parking, HSG A
0.665	47	Weighted Average
0.579		87.07% Pervious Area
0.086		12.93% Impervious Area

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

Subcatchment DR-9: Sedimentation Basin #2



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 1P: Analysis Point #1

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

Inflow Area = 108.927 ac, 23.34% Impervious, Inflow Depth > 0.27" for 100-Year event

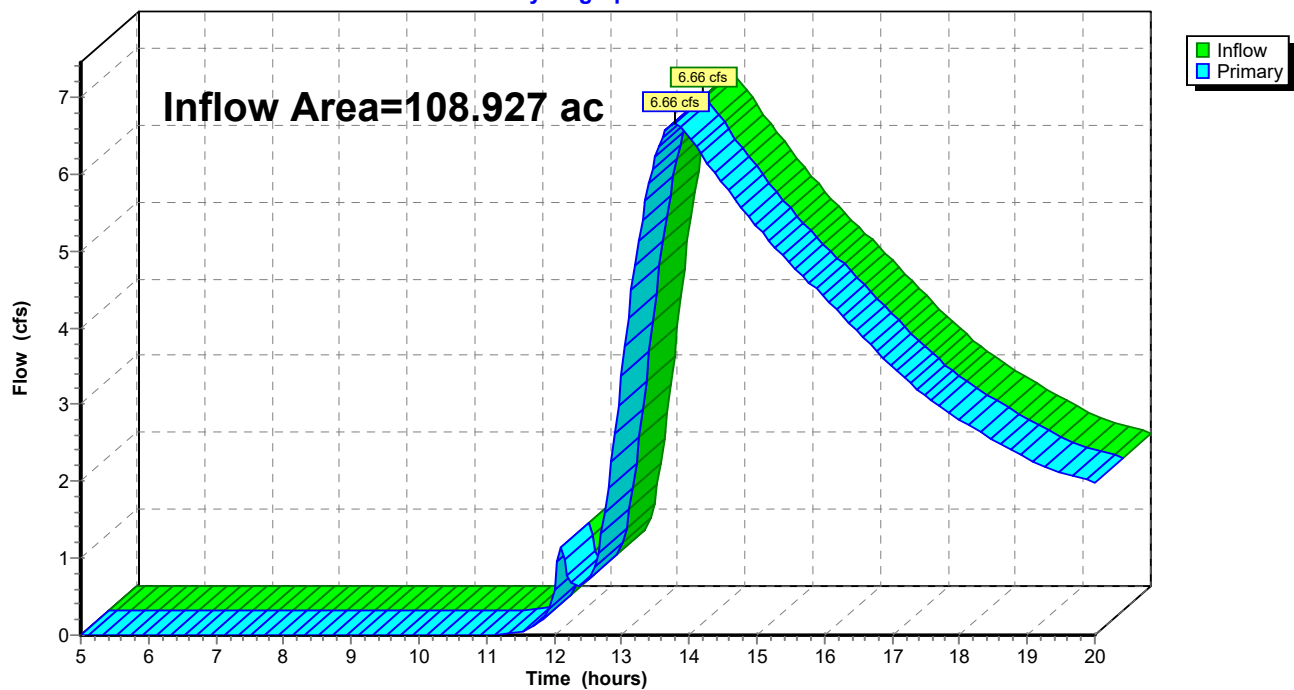
Inflow = 6.66 cfs @ 13.79 hrs, Volume= 2.452 af

Primary = 6.66 cfs @ 13.79 hrs, Volume= 2.452 af, Atten= 0%, Lag= 0.0 min

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

Pond 1P: Analysis Point #1

Hydrograph



Post Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 2P: Infiltration Basin #1

Inflow Area = 30.983 ac, 74.34% Impervious, Inflow Depth > 4.23" for 100-Year event
Inflow = 125.33 cfs @ 12.17 hrs, Volume= 10.916 af
Outflow = 19.01 cfs @ 12.81 hrs, Volume= 10.906 af, Atten= 85%, Lag= 38.5 min
Discarded = 19.01 cfs @ 12.81 hrs, Volume= 10.906 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 292.84' @ 12.81 hrs Surf.Area= 41,060 sf Storage= 168,797 cf

Plug-Flow detention time= 71.3 min calculated for 10.869 af (100% of inflow)
Center-of-Mass det. time= 70.6 min (829.1 - 758.5)

Volume	Invert	Avail.Storage	Storage Description
#1	288.00'	363,783 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
288.00	29,029	807.7	0	0	29,029
295.00	47,099	936.0	263,910	263,910	47,849
297.00	52,829	974.4	99,873	363,783	53,991

Device	Routing	Invert	Outlet Devices
#1	Discarded	288.00'	20.000 in/hr Exfiltration over Surface area
#2	Primary	295.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=19.01 cfs @ 12.81 hrs HW=292.84' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 19.01 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=288.00' (Free Discharge)

↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post Conditions

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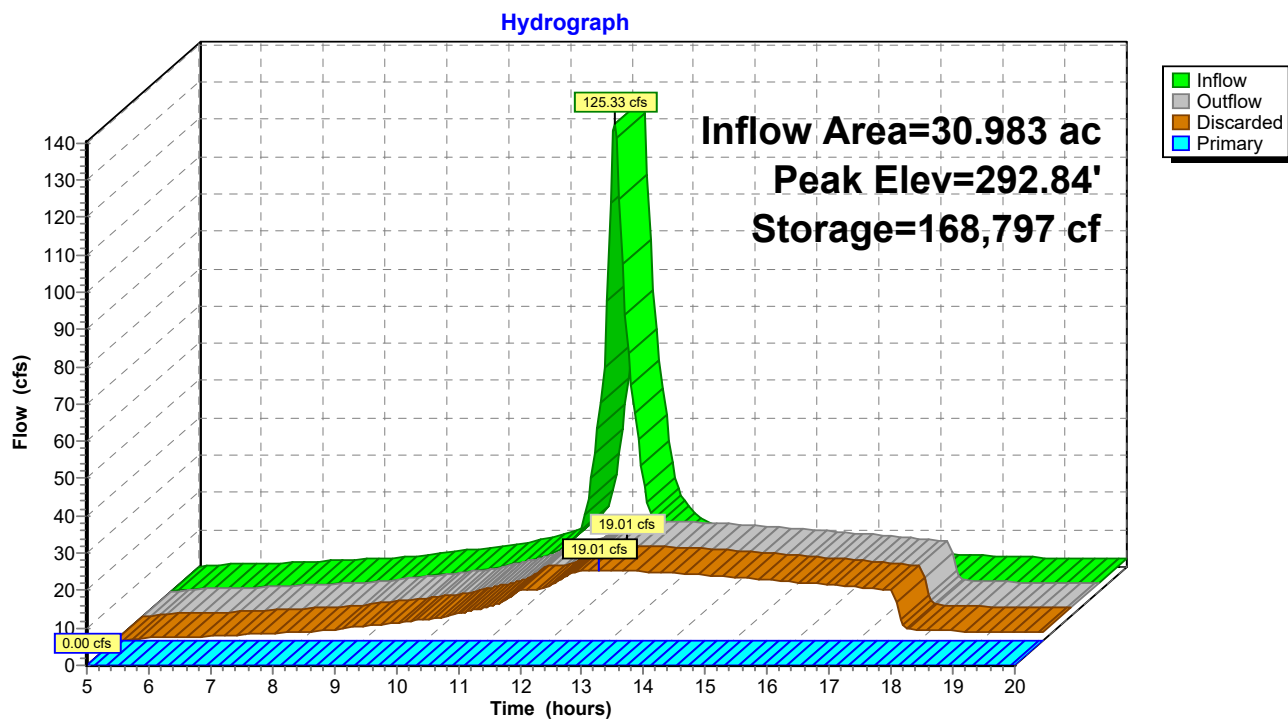
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Type III 24-hr 100-Year Rainfall=6.30"

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Pond 2P: Infiltration Basin #1



Post Conditions

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Summary for Pond 3P: Sedimentation Basin #1

[82] Warning: Early inflow requires earlier time span

Inflow Area = 27.097 ac, 85.00% Impervious, Inflow Depth > 4.83" for 100-Year event
 Inflow = 132.23 cfs @ 12.13 hrs, Volume= 10.905 af
 Outflow = 125.33 cfs @ 12.17 hrs, Volume= 10.871 af, Atten= 5%, Lag= 2.2 min
 Primary = 125.33 cfs @ 12.17 hrs, Volume= 10.871 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Starting Elev= 295.00' Surf.Area= 17,007 sf Storage= 86,271 cf
 Peak Elev= 296.36' @ 12.17 hrs Surf.Area= 19,097 sf Storage= 110,773 cf (24,502 cf above start)
 Flood Elev= 297.00' Surf.Area= 20,127 sf Storage= 123,361 cf (37,090 cf above start)

Plug-Flow detention time= 96.2 min calculated for 8.890 af (82% of inflow)
 Center-of-Mass det. time= 4.8 min (757.7 - 752.8)

Volume	Invert	Avail.Storage	Storage Description
#1	288.00'	123,361 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
288.00	8,175	359.2	0	0	8,175
295.00	17,007	494.6	86,271	86,271	17,848
297.00	20,127	533.9	37,090	123,361	21,225

Device	Routing	Invert	Outlet Devices
#1	Primary	295.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=122.73 cfs @ 12.17 hrs HW=296.34' (Free Discharge)
 ↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 122.73 cfs @ 3.06 fps)

Post Conditions

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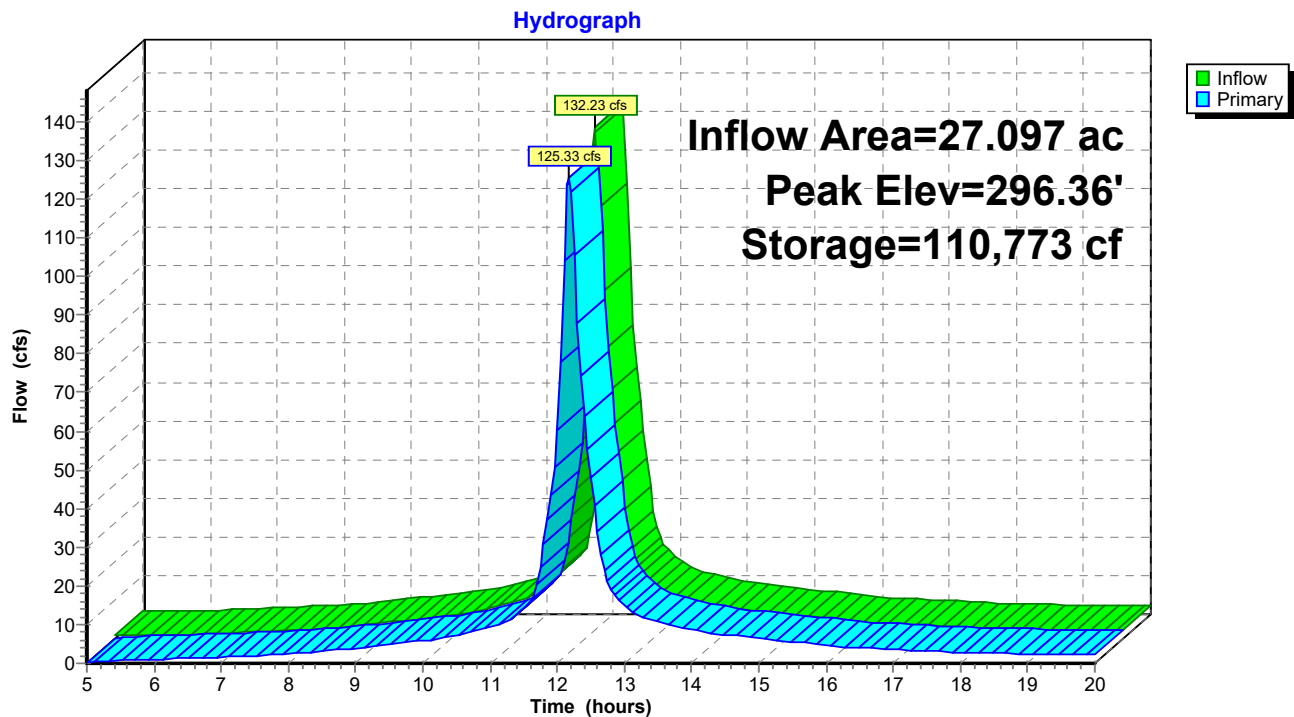
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Pond 3P: Sedimentation Basin #1



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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 4P: Culvert

[57] Hint: Peaked at 327.44' (Flood elevation advised)

Inflow Area = 0.544 ac, 31.99% Impervious, Inflow Depth > 1.77" for 100-Year event
Inflow = 1.15 cfs @ 12.10 hrs, Volume= 0.080 af
Outflow = 1.15 cfs @ 12.10 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.10 hrs, Volume= 0.080 af

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

Peak Elev= 327.44' @ 12.10 hrs

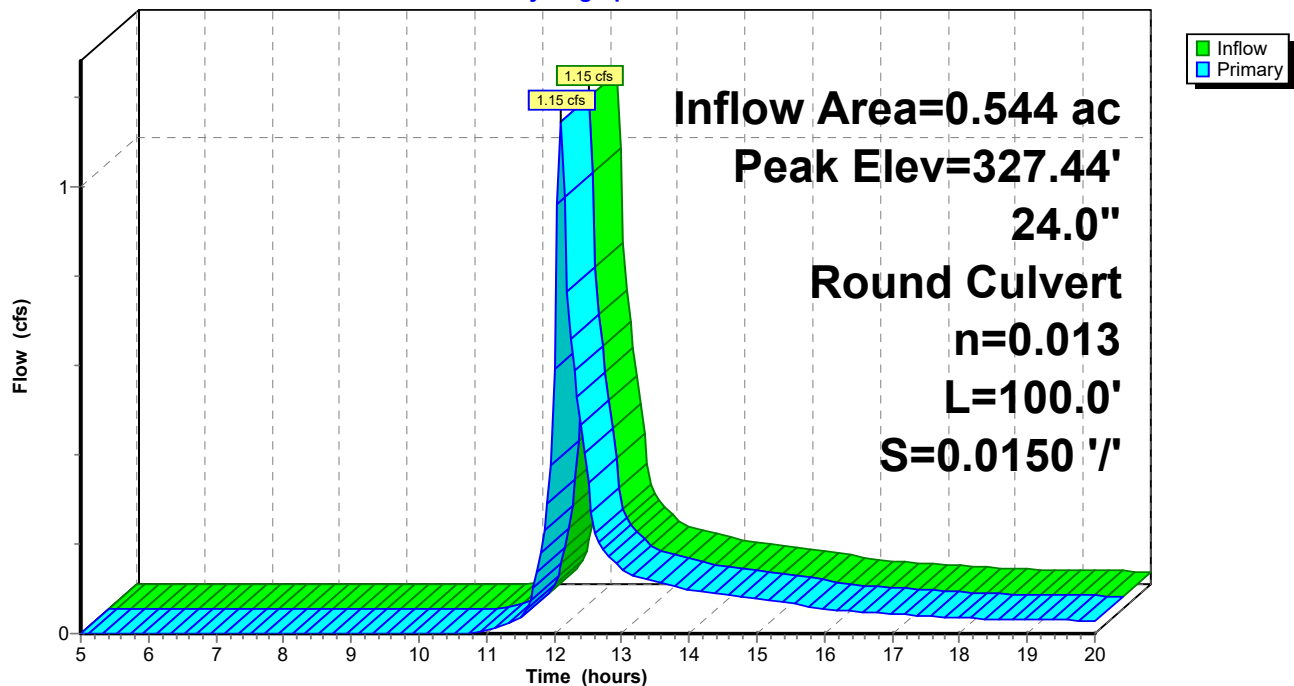
Device	Routing	Invert	Outlet Devices
#1	Primary	327.00'	24.0" Round Culvert L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 327.00' / 325.50' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.14 cfs @ 12.10 hrs HW=327.44' (Free Discharge)

↑1=Culvert (Inlet Controls 1.14 cfs @ 2.25 fps)

Pond 4P: Culvert

Hydrograph



Post Conditions

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Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 5P: Analysis Point #2

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

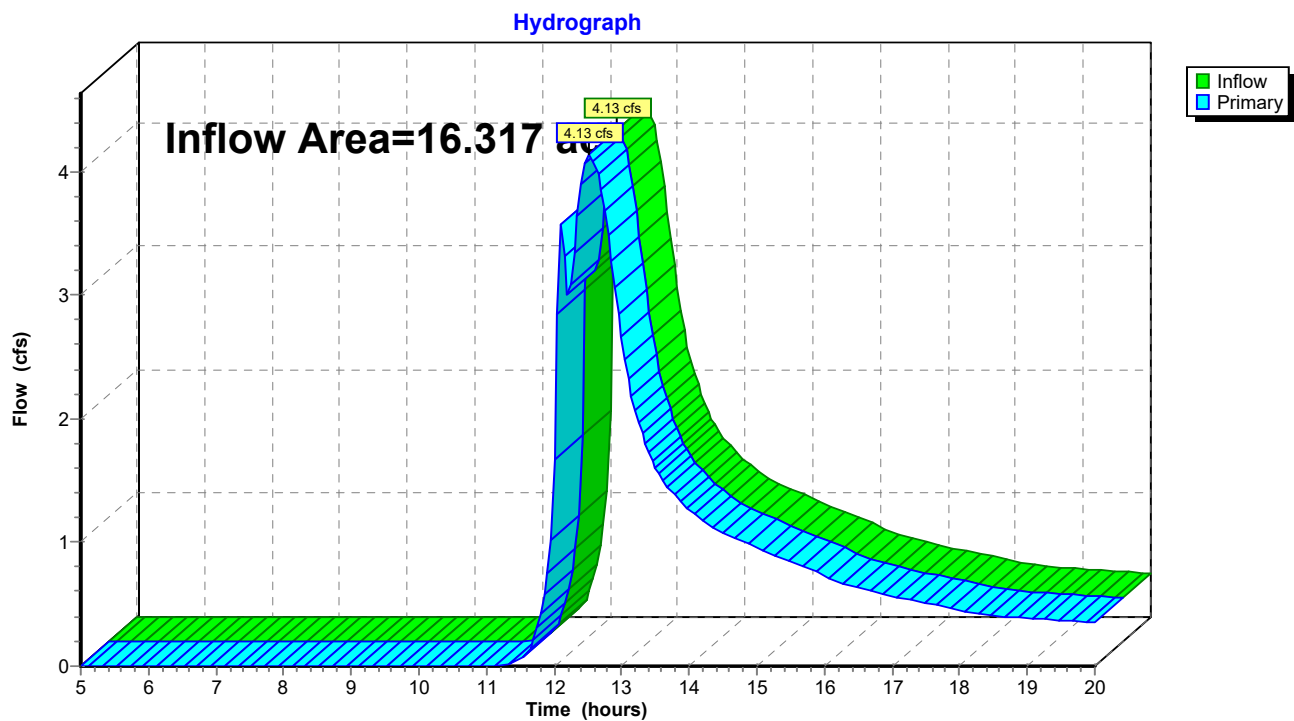
Inflow Area = 16.317 ac, 38.97% Impervious, Inflow Depth > 0.56" for 100-Year event

Inflow = 4.13 cfs @ 12.51 hrs, Volume= 0.767 af

Primary = 4.13 cfs @ 12.51 hrs, Volume= 0.767 af, Atten= 0%, Lag= 0.0 min

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

Pond 5P: Analysis Point #2



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Summary for Pond 6P: Culvert

[57] Hint: Peaked at 324.88' (Flood elevation advised)

Inflow Area = 9.514 ac, 61.67% Impervious, Inflow Depth > 0.31" for 100-Year event
Inflow = 3.36 cfs @ 12.10 hrs, Volume= 0.242 af
Outflow = 3.36 cfs @ 12.10 hrs, Volume= 0.242 af, Atten= 0%, Lag= 0.0 min
Primary = 3.36 cfs @ 12.10 hrs, Volume= 0.242 af

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

Peak Elev= 324.88' @ 12.10 hrs

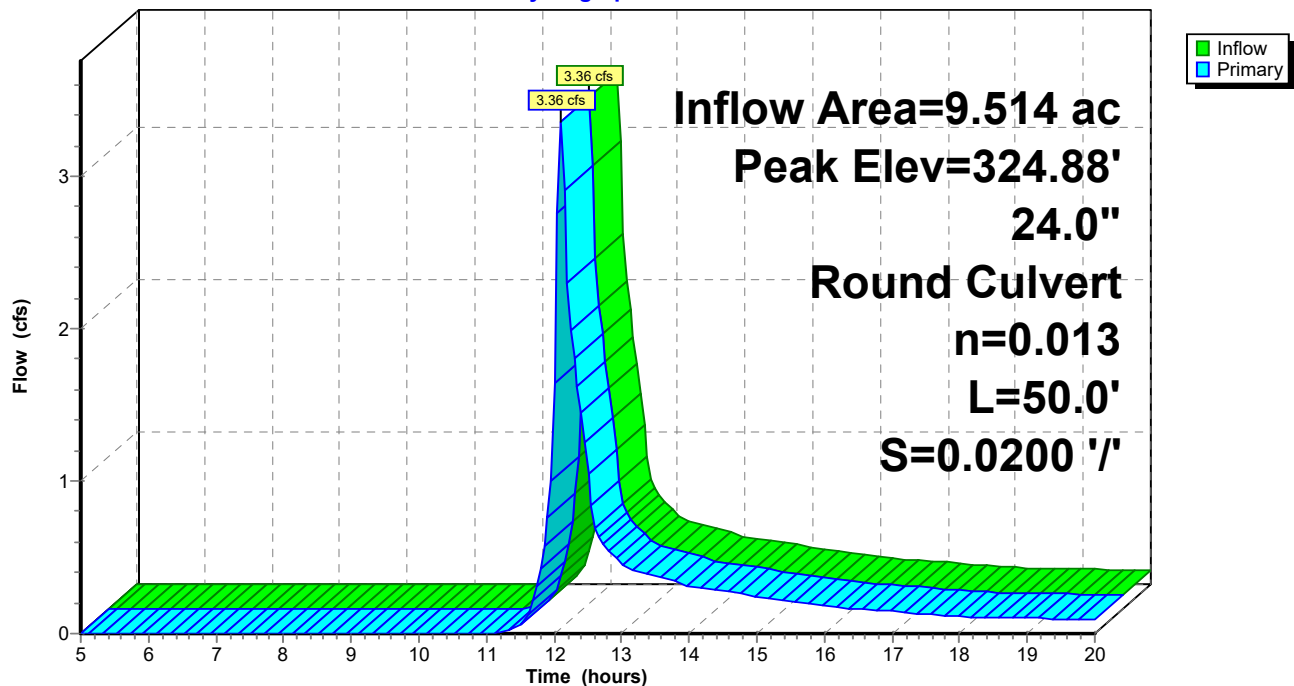
Device	Routing	Invert	Outlet Devices
#1	Primary	324.00'	24.0" Round Culvert L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 324.00' / 323.00' S= 0.0200 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.32 cfs @ 12.10 hrs HW=324.88' (Free Discharge)

↑1=Culvert (Inlet Controls 3.32 cfs @ 2.51 fps)

Pond 6P: Culvert

Hydrograph



Post Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 7P: Infiltration Basin #2

Inflow Area = 7.617 ac, 70.25% Impervious, Inflow Depth > 3.93" for 100-Year event
Inflow = 35.09 cfs @ 12.10 hrs, Volume= 2.495 af
Outflow = 7.80 cfs @ 12.52 hrs, Volume= 2.493 af, Atten= 78%, Lag= 25.1 min
Discarded = 7.80 cfs @ 12.52 hrs, Volume= 2.493 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 325.61' @ 12.52 hrs Surf.Area= 16,852 sf Storage= 32,138 cf

Plug-Flow detention time= 31.4 min calculated for 2.493 af (100% of inflow)
Center-of-Mass det. time= 31.2 min (801.7 - 770.5)

Volume	Invert	Avail.Storage	Storage Description
#1	323.00'	59,502 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.00	8,281	742.9	0	0	8,281
327.00	22,650	963.7	59,502	59,502	38,461

Device	Routing	Invert	Outlet Devices
#1	Discarded	323.00'	20.000 in/hr Exfiltration over Surface area
#2	Primary	326.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=7.80 cfs @ 12.52 hrs HW=325.61' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 7.80 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=323.00' (Free Discharge)

↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post Conditions

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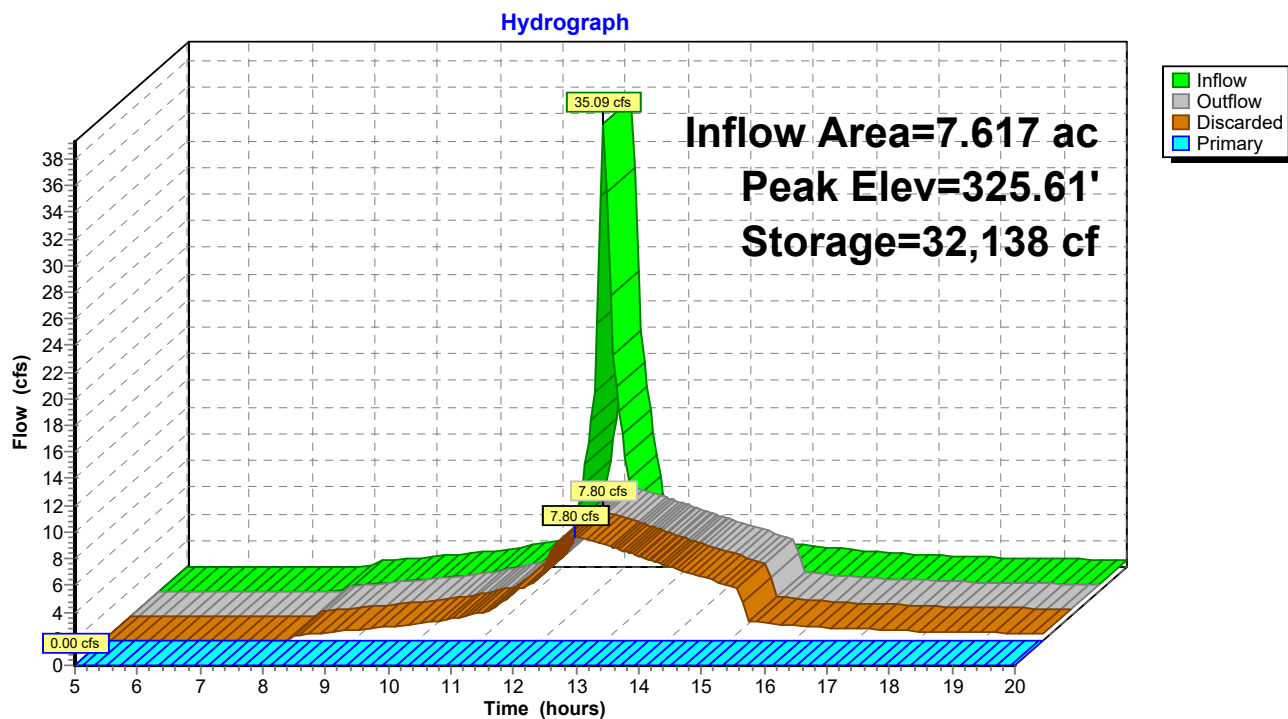
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Type III 24-hr 100-Year Rainfall=6.30"

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Pond 7P: Infiltration Basin #2



Post Conditions

Type III 24-hr 100-Year Rainfall=6.30"

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Summary for Pond 8P: Sedimentation Basin #2

[82] Warning: Early inflow requires earlier time span

Inflow Area = 6.879 ac, 77.05% Impervious, Inflow Depth > 4.38" for 100-Year event
 Inflow = 34.82 cfs @ 12.09 hrs, Volume= 2.512 af
 Outflow = 34.74 cfs @ 12.10 hrs, Volume= 2.453 af, Atten= 0%, Lag= 0.7 min
 Primary = 34.74 cfs @ 12.10 hrs, Volume= 2.453 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 327.57' @ 12.10 hrs Surf.Area= 3,447 sf Storage= 4,350 cf

Plug-Flow detention time= 19.2 min calculated for 2.444 af (97% of inflow)
 Center-of-Mass det. time= 9.5 min (768.9 - 759.4)

Volume	Invert	Avail.Storage	Storage Description			
#1	326.00'	15,146 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
326.00	2,020	244.7	0	0	2,020	
327.00	3,033	277.8	2,509	2,509	3,421	
330.00	5,514	348.3	12,636	15,146	7,057	

Device	Routing	Invert	Outlet Devices									
#1	Primary	327.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir									
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60									
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63									
#2	Primary	329.00'	30.0' long x 30.0' breadth Broad-Crested Rectangular Weir									
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60									
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63									

Primary OutFlow Max=34.71 cfs @ 12.10 hrs HW=327.57' (Free Discharge)


 1=Broad-Crested Rectangular Weir (Weir Controls 34.71 cfs @ 2.04 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Post Conditions

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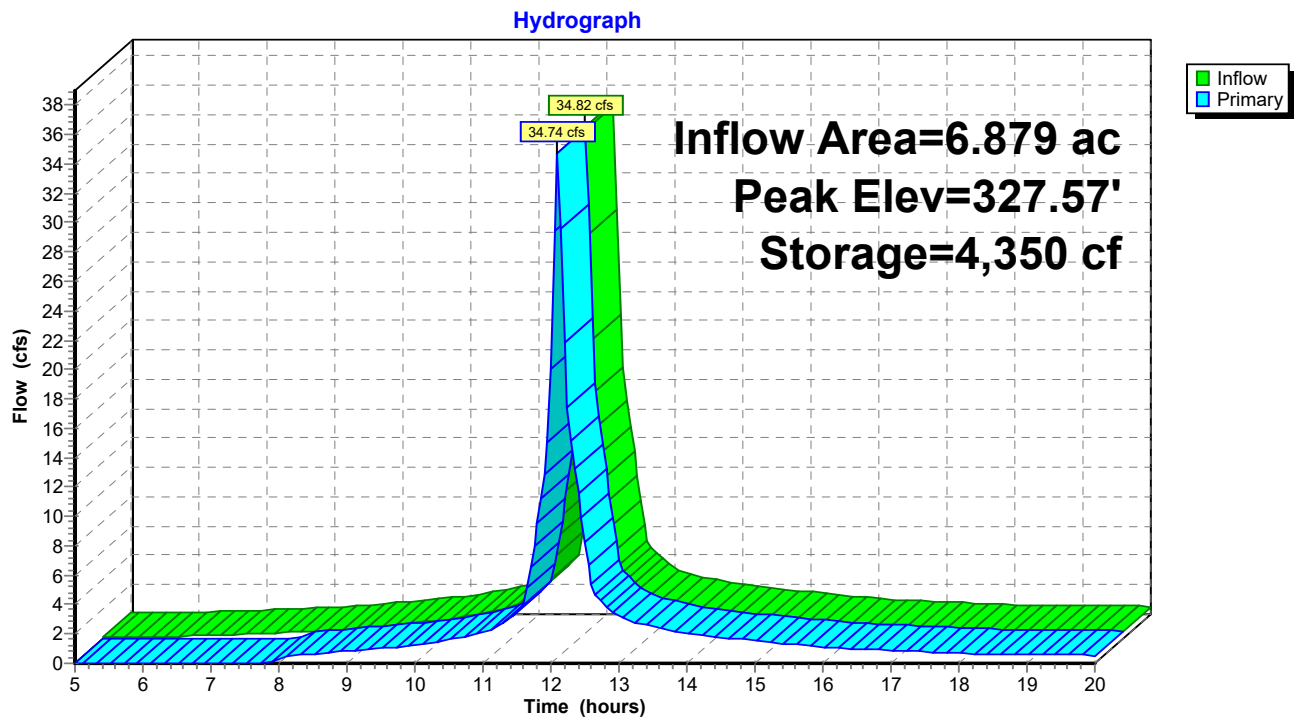
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Type III 24-hr 100-Year Rainfall=6.30"

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Pond 8P: Sedimentation Basin #2



Appendix C

Water Quality and Runoff Reduction Volume Calculations

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.....

No

Design Point:

P=

1.00

inch

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft ³)	Description
1	30.98	23.03	74%	0.72	80,862	
2	7.62	5.35	70%	0.68	18,861	
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	38.60	28.38	74%	0.71	99,724	Subtotal 1
Total	38.60	28.38	74%	0.71	99,724	Initial WQv

DRAINAGE AREA TO SEDIMENTATION/INFILTRATION BASIN #1

DRAINAGE AREA TO SEDIMENTATION/INFILTRATION BASIN #2

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area	Contributing Impervious Area	Notes
	(Acre)	(Acre)	
Conservation of Natural Areas	0.00	0.00	minimum 10,000 sf
Riparian Buffers	0.00	0.00	maximum contributing length 75 feet to 150 feet
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	Up to 100 sf directly connected impervious area may be subtracted per tree
Total	0.00	0.00	

Recalculate WQv after application of Area Reduction Techniques

	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Runoff Coefficient Rv	WQv (ft ³)
"<<Initial WQv"	38.60	28.38	74%	0.71	99,724
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	38.60	28.38	74%	0.71	99,724
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	38.60	28.38	74%	0.71	99,724
WQv reduced by Area Reduction techniques					0

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techniques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	38.60	28.38	99724	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4				
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4)	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2)	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction →			0.00	0.00	0	
Totals by Volume Reduction →			0.00	0.00	0	
Totals by Standard SMP w/RRV →			38.60	28.38	99724	0
Totals by Standard SMP →			0.00	0.00		0
Totals (Area + Volume + all SMPs) →			38.60	28.38	99,724	0
	Impervious Cover v	okay				

Minimum RRv

Enter the Soils Data for the site

Soil Group	Acres	S
A	38.60	55%
B		40%
C		30%
D		20%
Total Area	38.6	

Calculate the Minimum RRv

S =	0.55	
Impervious =	28.38	acre
Precipitation	1	in
Rv	0.95	
Minimum RRv	53,828	ft3
	1.24	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	99724	2.289
30	Total RRV Provided	99724	2.289
31	Is RRV Provided \geq WQv Required?	Yes	
32	Minimum RRV	53828	1.236
32a	Is RRV Provided \geq Minimum RRV Required?	Yes	
33a	Total WQv Treated	0	0.000
34	Sum of Volume Reduced & Treated	99724	2.289
34	Sum of Volume Reduced and Treated	99724	2.289
35	Is Sum RRV Provided and WQv Provided \geq WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	C_{pv}	
37	Overbank	Q_p	
37	Extreme Flood Control	Q_f	
	Are Quantity Control requirements met?		

Infiltration Basin Worksheet

Design Point:							
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft ³)	Precipitation (in)	Description
1	30.98	23.03	0.74	0.72	80862.42	1.00	
Enter Impervious Area Reduced by Disconnection of Roofs			74%	0.72	80,862	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft ³	
Drainage Area exceeds the maximum allowable unless soil infiltration rate exceeds 5 in/hr							
Pretreatment Techniques to Prevent Clogging							
Infiltration Rate			20.00	in/hour	Okay		
Pretreatment Sizing			100	% WQv	25% minimum; 50% if >2 in/hr 100% if >5in/hour		
Pretreatment Required Volume			80,862	ft ³			
Pretreatment Provided			87,120	ft ³			
Pretreatment Techniques utilized			Sedimentation Basin				
Size An Infiltration Basin							
Design Volume	80,862	ft ³	WQv				
Basal Area Required	11,552	ft ²	Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.				
Basal Area Provided	29,029	ft ²					
Design Depth	7.00	ft					
Volume Provided	203,203	ft ³	Storage Volume provided in infiltration basin area (not including pretreatment.				
Determine Runoff Reduction							
RRv	80,862	ft³	90% of the storage provided in the basin or WQv whichever is smaller				
Volume Treated	0	ft ³	This is the portion of the WQv that is not reduced/infiltrated				
Sizing v	OK		The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.				

Infiltration Basin Worksheet

Design Point:							
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft ³)	Precipitation (in)	Description
2	7.62	5.35	0.70	0.68	18861.48	1.00	
Enter Impervious Area Reduced by Disconnection of Roofs			70%	0.68	18,861	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft ³	
Drainage Area exceeds the maximum allowable unless soil infiltration rate exceeds 5 in/hr							
Pretreatment Techniques to Prevent Clogging							
Infiltration Rate			20.00	in/hour	Okay		
Pretreatment Sizing			100	% WQv	25% minimum; 50% if >2 in/hr 100% if >5in/hour		
Pretreatment Required Volume			18,861	ft ³			
Pretreatment Provided			24,830	ft ³			
Pretreatment Techniques utilized			Sedimentation Basin				
Size An Infiltration Basin							
Design Volume	18,861	ft ³	WQv				
Basal Area Required	6,287	ft ²	Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.				
Basal Area Provided	8,281	ft ²					
Design Depth	3.00	ft					
Volume Provided	24,843	ft ³	Storage Volume provided in infiltration basin area (not including pretreatment.				
Determine Runoff Reduction							
RRv	18,861	ft³	90% of the storage provided in the basin or WQv whichever is smaller				
Volume Treated	0	ft ³	This is the portion of the WQv that is not reduced/infiltrated				
Sizing v	OK		The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.				

Appendix D

NRCS Soil Map



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Rensselaer County, New York



March 16, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot


 Closed Depression

 Gravel Pit

 Gravelly Spot


 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry


 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip


 Sodic Spot

 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Rensselaer County, New York
Survey Area Data: Version 17, Jun 11, 2020

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

Date(s) aerial images were photographed: Mar 18, 2016—Oct 16, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CbA	Castile gravelly silt loam, 0 to 5 percent slopes	4.0	7.2%
FIA	Fluvaquents-Udifulvents complex, 0 to 3 percent slopes	0.4	0.7%
HoB	Hoosic gravelly sandy loam, 3 to 8 percent slopes	11.9	21.4%
HoC	Hoosic gravelly sandy loam, rolling	7.6	13.5%
HoE	Hoosic gravelly sandy loam, steep	4.6	8.2%
Pg	Pits, gravel	27.5	49.1%
Totals for Area of Interest		55.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rensselaer County, New York

CbA—Castile gravelly silt loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 9v1m
Elevation: 100 to 970 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 115 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Castile and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castile

Setting

Landform: Valley trains, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from sandstone, shale, and siltstone

Typical profile

H1 - 0 to 10 inches: gravelly silt loam
H2 - 10 to 32 inches: very gravelly sandy loam
H3 - 32 to 60 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 5.95 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A/D
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Fredon

Percent of map unit: 5 percent
Hydric soil rating: No

Chenango

Percent of map unit: 5 percent

Hydric soil rating: No

Hoosic

Percent of map unit: 5 percent

Hydric soil rating: No

FIA—Fluvaquents-Udifuvents complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9v1t

Elevation: 0 to 3,000 feet

Mean annual precipitation: 36 to 44 inches

Mean annual air temperature: 45 to 48 degrees F

Frost-free period: 115 to 195 days

Farmland classification: Not prime farmland

Map Unit Composition

Fluvaquents and similar soils: 45 percent

Udifuvents and similar soils: 35 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fluvaquents

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Alluvium with highly variable texture

Typical profile

H1 - 0 to 6 inches: silt loam

H2 - 6 to 60 inches: gravelly silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

*Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.06 to 5.95 in/hr)*

Depth to water table: About 0 inches

Frequency of flooding: FrequentNone

Frequency of ponding: Frequent

Calcium carbonate, maximum content: 5 percent

Available water capacity: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Description of Udifluvents

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium with a wide range of texture

Typical profile

H1 - 0 to 9 inches: gravelly fine sandy loam
H2 - 9 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 19.98 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Teel

Percent of map unit: 5 percent
Hydric soil rating: No

Saprists

Percent of map unit: 5 percent
Landform: Marshes, swamps
Hydric soil rating: Yes

Limerick

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Fredon

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed soils, moderately deep

Percent of map unit: 2 percent

Hydric soil rating: Unranked

HoB—Hoosic gravelly sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9v23

Elevation: 100 to 1,100 feet

Mean annual precipitation: 36 to 44 inches

Mean annual air temperature: 45 to 48 degrees F

Frost-free period: 115 to 195 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Hoosic and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Deltas, outwash plains, terraces

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: gravelly sandy loam

H2 - 9 to 23 inches: very gravelly sandy loam

H3 - 23 to 60 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3s

Hydrologic Soil Group: A

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Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Chenango

Percent of map unit: 5 percent

Hydric soil rating: No

Castile

Percent of map unit: 5 percent

Hydric soil rating: No

Fredon

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed soils, sandy surface

Percent of map unit: 2 percent

Hydric soil rating: No

HoC—Hoosic gravelly sandy loam, rolling

Map Unit Setting

National map unit symbol: 9v24

Elevation: 100 to 1,100 feet

Mean annual precipitation: 36 to 44 inches

Mean annual air temperature: 45 to 48 degrees F

Frost-free period: 115 to 195 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Hoosic and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Outwash plains, terraces, deltas

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: gravelly sandy loam

H2 - 9 to 23 inches: very gravelly sandy loam

H3 - 23 to 60 inches: very gravelly sand

Custom Soil Resource Report

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Riverhead

Percent of map unit: 5 percent

Hydric soil rating: No

Windsor

Percent of map unit: 5 percent

Hydric soil rating: No

Unnamed soils, silty surface

Percent of map unit: 5 percent

Hydric soil rating: No

HoE—Hoosic gravelly sandy loam, steep

Map Unit Setting

National map unit symbol: 9v26

Elevation: 100 to 1,100 feet

Mean annual precipitation: 36 to 44 inches

Mean annual air temperature: 45 to 48 degrees F

Frost-free period: 115 to 195 days

Farmland classification: Not prime farmland

Map Unit Composition

Hoosic and similar soils: 75 percent

Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hoosic

Setting

Landform: Outwash plains, terraces, deltas

Custom Soil Resource Report

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Riser

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Sandy and gravelly glaciofluvial deposits

Typical profile

H1 - 0 to 9 inches: gravelly sandy loam

H2 - 9 to 23 inches: very gravelly sandy loam

H3 - 23 to 60 inches: very gravelly sand

Properties and qualities

Slope: 25 to 35 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Riverhead

Percent of map unit: 5 percent

Hydric soil rating: No

Hoosic, very steep

Percent of map unit: 5 percent

Hydric soil rating: No

Unnamed soils, sandy surface

Percent of map unit: 5 percent

Hydric soil rating: No

Windsor

Percent of map unit: 5 percent

Hydric soil rating: No

Hoosic, severely eroded

Percent of map unit: 5 percent

Hydric soil rating: No

Pg—Pits, gravel

Map Unit Setting

National map unit symbol: 9v2r

Mean annual precipitation: 36 to 44 inches

Mean annual air temperature: 45 to 48 degrees F

Frost-free period: 115 to 195 days

Farmland classification: Not prime farmland

Map Unit Composition

Pits, gravel: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Gravel

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: No

Minor Components

Udorthents, loamy and clayey

Percent of map unit: 10 percent

Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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.

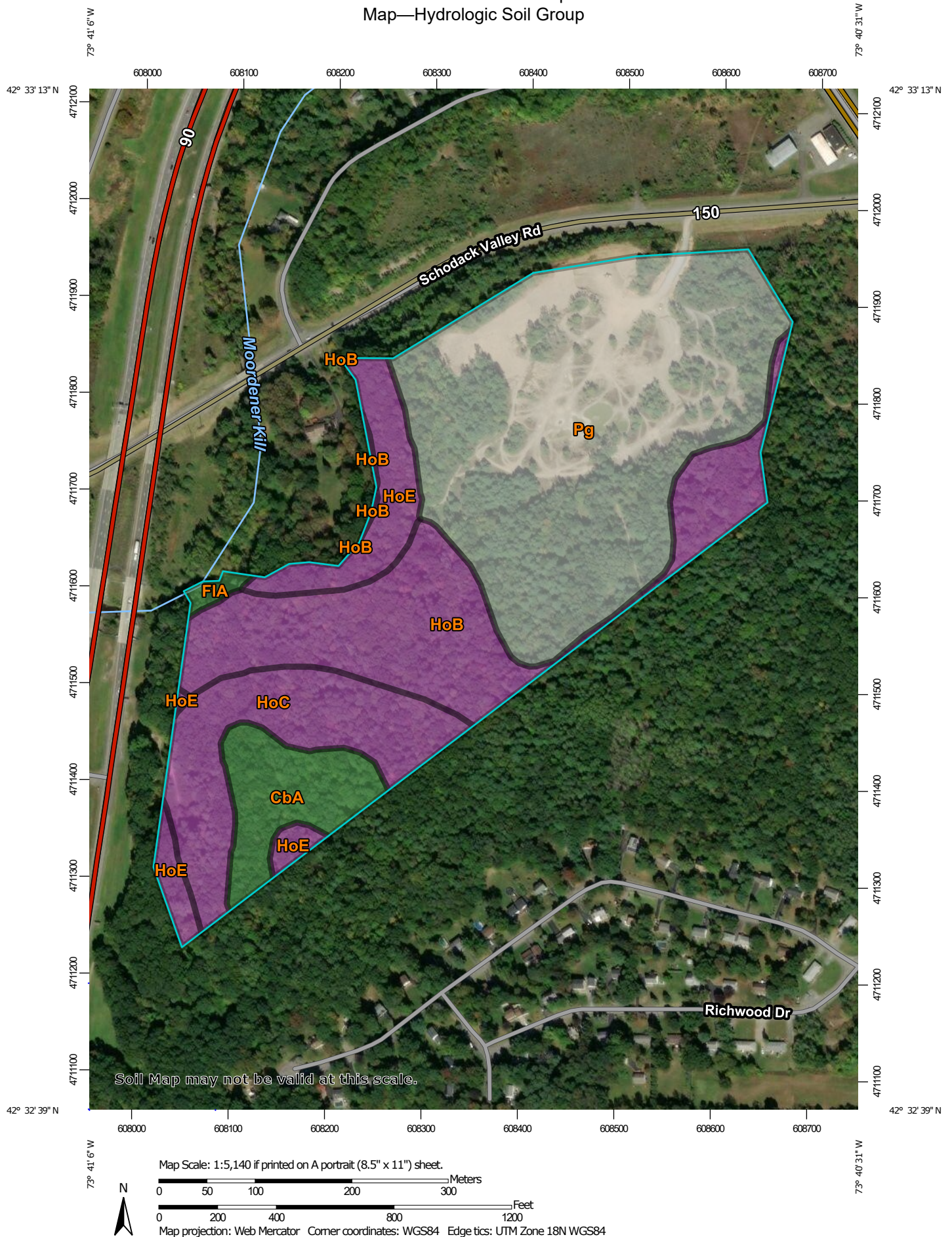
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Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water 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.


Custom Soil Resource Report Map—Hydrologic Soil Group



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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 1:15,800.

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Rensselaer County, New York
Survey Area Data: Version 17, Jun 11, 2020

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

Date(s) aerial images were photographed: Mar 18, 2016—Oct 16, 2017

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CbA	Castile gravelly silt loam, 0 to 5 percent slopes	A/D	4.0	7.2%
FIA	Fluvaquents-Udifulvents complex, 0 to 3 percent slopes	A/D	0.4	0.7%
HoB	Hoosic gravelly sandy loam, 3 to 8 percent slopes	A	11.9	21.4%
HoC	Hoosic gravelly sandy loam, rolling	A	7.6	13.5%
HoE	Hoosic gravelly sandy loam, steep	A	4.6	8.2%
Pg	Pits, gravel		27.5	49.1%
Totals for Area of Interest			55.9	100.0%

Rating Options—Hydrologic Soil Group*Aggregation Method: Dominant Condition**Component Percent Cutoff: None Specified**Tie-break Rule: Higher*