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Canandaigua, NY 14424

Engineer's Report

for

Diversified Equipment, LLC

1947 State Route 332

TOWN OF Canandaigua, NY 14424

Prepared for:

Diversified Equipment, LLC

Date:

October 26, 2022

Prepared by:

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Table of Contents

Appendices

1) Stormwater Management
Quantity Calcs
(a) Figure 01 – Existing Conditions Map
(b) Figure 02 – proposed Conditions Map
(c) Stormwater hydrographs

Quality Calcs

(a) Figure 03 – WQv/RRv Map
(b) Water Quality and Runoff Reduction Calculations
(c) Channel Protection Volume, Orifice and Spillway Calculations

2) Storm Sewers
(1) Figure 04 – Storm Sewer Drainage Areas Map
(2) Storm Sewer Sizing Calculations
(3) Rip-Rap Outlet Protection Calculations

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A. Introduction

Diversified Equipment, LLC are proposing site improvements located in the Town of Canandaigua, Ontario County at 1947 State Route 332. The project includes the development of a new equipment repair/rental facility and equipment storage building. The project site is approximately +/- 7.5 acres and is located on the east side of NYS Route 332. The property is currently zoned community commercial.

Access will be provided from a proposed private driveway on the east side (north bound lane) of NYS Route 332. The equipment rental/repair building will be served by proposed water and sanitary utilities. The water service will connect to the existing watermain located along property frontage on the east side of NYS Route 332.The sanitary wastewater treatment is proposed to be addressed by installation of private onsite wastewater treatment system (WWTS) designed per the current New York State Department of Health (NYSDOH) and New York State Department of Environmental Conservation (NYSDEC) requirements for a private intermediate sized WWTS. Stormwater drainage will be managed through installation of site swales and a stormwater management facility that will be constructed in the northwest corner of the site, near the existing stormwater facility located on-site.

The following report provides the technical data to support the proposed overall development. The report includes discussion on the water and sanitary sewer service, stormwater management, construction erosion control and other site design components.

B. Water Supply

The water supply will be provided via a proposed 1" HDPE private domestic water service that will extend from the existing watermain located on the east side of NYS Route 332. The domestic service will enter the building where it will be metered and protected against backflow with an RPZ unit. The estimated daily useage for the development is 75 gpd and was calculated using the New York State Design Standards for intermediate sized wastewater treatment systems (15gpd per employee, max of 5).

C. Sanitary Wastewater Treatment

The project includes the installation of a proposed private onsite WWTS located at the northeast corner of the site, which shall be installed by the developer and will treat domestic wastewater generated by daily useage operations. The design sanitary discharge loading rate of 75 gallons per day has been utilized upon Method 1 of the New York State Design Standards for Intermediate sized wastewater treatment system. The proposed WWTS includes the installation of a 4" SCH 40 PVC sanitary lateral pipe from the building to a proposed 1250 gallon septic tank, precast concrete distribution box to a raised bed absorption trench system. The proposed WWTS has been designed in basic compliance with the NYSDOH and NYSDEC requirements based upon existing soil characteristics observed by this office.

D. Stormwater Management Analysis

D.1 Overview

Stormwater runoff associated with the proposed project will be treated during and after construction to meet New York State Department of Environmental Conservation (NYSDEC) water quality and quantity requirements. One permanent stormwater management facility will be constructed to capture and detain runoff from the developed areas of the property, then release the runoff to a downstream area at a controlled rate. The proposed stormwater facility will be located adjacent to an existing stormwater facility that's located on-site. The existing facility will not receive any flows from the new impervious area, but rather continue to receive the existing runoff it's receiving today. The proposed SWMF will not infringe into the existing nor vis-a-versa. The proposed SWMF will create a berm to ensure the existing spillway and outfall flows of the SWMF will not flow into the proposed facility. The stormwater management plan for the project is designed in accordance with the current rules and regulations set in the NYSDEC stormwater Design Manual (January 2015).

D.2 Methodology

The NYSDEC Stormwater Management Design Manual provides specifications and sizing criteria for stormwater management practices for stormwater discharges. The proposed stormwater management for this project has been designed to meet five key criteria outline in the Design Manual:

- Water Quality volume (WQv) to meet pollutant removal goals;
- Runoff reduction volume (RRv) by application of runoff reduction practices to replicate pre-development flows;
- Channel Protection volume (Cpv) to reduce channel erosion;
- Overbank flood protection (Qp) to prevent overbank flooding;
- Extreme storm protection(Qf) to help control extreme floods.

The existing and propose drainage conditions at the project site were analyzed following the methods outlines in Soil Conservation Service Technical Release No. 20 & 55. Peak runoff rates for existing and post-development conditions were modeled for the 1, 2, 10, and 100-year design storm events using the HydroCAD software. Runoff rates were determined based on hydraulic characteristics of the site (soil conditions, existing and proposed land cover, time of concentration for the contributing drainage areas) and the hydraulic characteristics of the proposed stormwater management facility (type of storage, size of facility, and outlet structure features and sizing). Appendix 1 contains the stormwater hydrographs and subarea information.

D.3 Soils

The Natural Resources Conservation Service (NRCS) indicates that the project site and contributing drainage areas contains soils of hydrologic class “D” or “C/D”. Based upon test pits competed at the project site, the hydrologic analysis assumed all soils at the site to be Class D.

D.4 Existing Conditions

The analyzed watershed for the project totals approximately 24.2 acres and under existing conditions consist of 5 drainage areas (see Figure 1 in Appendix 1). Table 1 below provides a summary of the existing subareas which are described in further detail following the table.

Table 1: Existing Conditions

Sub area	Area	Curve Number	Time of Concentration
Existing area #1	11.08 AC	78	29.9 min
Existing area #2	0.25 AC	88	6 min (TR-55 MIN)

Existing Area #1 (11.08AC)

This drainage area contains the majority of the development site and off-site areas to the east of the development. Runoff from this subarea all eventually exit the site near the northeast corner and analysis point A.

Existing Area #2 (0.25 AC)

This drainage area contains portions of the northbound travel lane and small portion of on-site drainage which flows into the DOT right-of-way and to existing 12” culvert. This runoff is eventually conveyed to analysis Point B.

D.5 Proposed Conditions

The drainage areas for the post-development conditions (see Figure 2 in Appendix 1) have been delineated per the proposed grading of the site development. The analyzed drainage includes 24.2 acres, which matches the existing conditions and is composed of 6 sub areas.

Table 2: Proposed Conditions

Sub area	Area	Curve Number	Time of Concentration

Proposed Area #1	2.0 AC	87	12.1 min
Proposed Area #2	8.99 AC	79	29.9 min
Proposed Area #3	0.34 AC	89	6 min (TR-55 MIN)

Proposed Area #1 (2.0 AC)

This area includes portion of the project site, which will be collected and conveyed to the proposed stormwater management facility, where it will be detained and released at a controlled rate. This runoff is conveyed to analysis Point A.

Proposed Area #2 (8.99 AC)

This area contains portions of the project site and off-site areas to the east. This runoff will continue to follow existing drainage patterns and drain to the northeast corner of the site. This runoff is conveyed to analysis Point A.

Proposed Area #3 (0.34 AC)

This area contains portion of the project site that drains to the NYSDOT right-of-way. This runoff is conveyed to analysis point B.

D.6 Stormwater Management Facility

The Stormwater Management Facility is designed as a stormwater wet pond. The pond will receive runoff from the proposed drainage area #4 which includes approximately 2 acres. The proposed facility will detain and treat runoff from the development, the discharge stormwater through an engineered outlet structure toward analysis Point A.

The pond outlet structure is designed to control the rate at which runoff is discharges from the site, ensuring that runoff rates are at or below those for existing conditions. The outlet structure consists of a 2'X2' concrete structure, with a 12" outlet pipe. The facility also includes a spillway set approximately 0.3' above the 100-year ponding elevation and 1' below the top of berm elevation. Storage volume for detention purposes will be provide between the maintained water level of the pond and a the proposed top of outlet structure. Sufficient storage is provided in the facility to effectively detain the 1, 2, 10 & 100-year storms. The spillway should only be needed for storms having anintensity greater than a 100-year storm. Detailed Cpv calculations have been provides in Appendix 1. Details of the outlet structures have been provided on the design plans.

Table 3: SWMF Summary

Design Storm Event	Post-Development Inflow (cfs)	Post Development Outflow (cfs)	Ponding elevation (ft)	Storage Volume (cf)
1-year	2.32	0.17	720.13	2,923
2-year	3.00	0.20	720.33	3,942
10-year	5.30	0.28	720.98	7,630
100-year	10.64	1.05	722.09	15,581
12" outlet pipe elev.	719.50		Total Available storage Volume at elev. 723.5	30,752 cf
3" orifice	719.50			
2'X2' Grate elev.	722.0			

Spillway elev.	722.5
Top of Berm elev.	723.5

D.7 Stormwater Quality

The August 2015 NYSDEC Stormwater Management Design Manual outlines numerous practices that can be constructed to improve the water quality and reduce the runoff volume of stormwater runoff. Reduced Runoff Volume (RRv) is the reduction of the total Water Quality Volume (WQv) by application of green infrastructure techniques and standard management practices to replicate pre-development hydrology. To meet the WQv and minimum RRv requirements, the stormwater plan includes two dry swale areas.

The intent of the new green infrastructure measures is to replicate the pre-construction infiltration, peak runoff flow and discharge volume, as well as minimization of concentrated flow by using runoff control techniques to provide treatment in a disturbed manner before runoff reaches offsite discharge locations. Calculations were completed to show that the project site can effectively meet the overall WQv and minimum allowable RRv requirements, and these calculations have been provided in Appendix 1 and summarized below. Figure 3 in appendix 1 shows the approximate drainage area to each green infrastructure facility and the overall water quality limits utilized in the calculations.

Dry swale#1 – located near the stormwater facility, it will receive runoff from the impervious areas of drainage area #4. Runoff entering the dry swale will be treated and filtered before eventually discharging into the SWMF.

Dry swale #2- located along the rear of the site, near analysis point A, it will receive runoff from the impervious areas of Drainage area #5. The runoff will be treated and filtered before being discharged from the site.

Figure 3 in Appendix 1 shows the overall WQv limits utilized in the calculations. Detailed calculations of the site requirements and these practice shave been included in Appendix 1 and summarized below.

WQv Provided in Dry swale #1 = 1,928 cf

WQv Provided in Dry swale #2 = 1,863 cf

WQv Provided in excess CPv = 7,572 cf

RRv provided by dry swale #1 = 459 cf

RRv provided by dry swale #1 = 617 cf

Stormwater Quality Summary

The proposed stormwater management facility satisfies both the NYSDEC's Stormwater Design Manual key criteria relating to stormwater quality. The total provided WQv and RRv are summarized below;

WQv required = 5,541 cf — Total WQv provided = 11,363 cf

Minimum allowable RRv=884 cf — Total RRv provided = 1,076 cf

D.8 Channel Protection

The 2015 NYSDEC stormwater design manual defines the CPv requirement as extended detention of the post-developed 1-year, 24-hour storm event. This requirement is intended to protect stream channels from erosion. To show compliance with the current standards the required Channel protection volume was calculated based upon the contributing drainage area to the stormwater facility under proposed conditions. These calculations are provided in Appendix 1 and summarized below.

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CPv required for SWMF = 11,531 cf

Total CPv provided in SWMF = 14,861 cf

D.9 Stormwater Quantity and Quality Analysis and Results

The calculations provided within the appendices show that the proposed project results in a reduction of stormwater runoff rates for both the 10-year and 100-year events as required by the NSDEC stormwater Design Manual quantity criteria. A summary of the existing vs. proposed runoff rates has been summarized with Table 5 and 6 below. The previous sections showed that the project satisfies the other key criteria, including WQv, RRv and CPv. These values have been summarized in table 6 below.

Table 5: comparison of Existing and Proposed Peak Runoff Rates

Offsite discharge	Design storm	Existing peak runoff rate (cfs)	Proposed peak runoff rate (cfs)
Off-site discharge	1-year	3.37	3.24
	2-year	5.09	4.74
	10-year	11.58	10.25
	100-year	28.68	24.49

Table 6: Compliance with NYSDEC Sizing Requirements

New York State Sizing Criteria	Compliance
Water Quality Volume (WQv)	WQv Required = 5,541 cf WQv Provided = 11,363 cf > 5,541 cf **OK**
Runoff Reduction Volume (RRv)	RRv Required = 1,076 cf RRv Provided = 976 cf > 884 cf **OK**
Channel Protection Volume (Cpv)	CPv required = 3,294 cf Cpv Provided = 14,861 cf > 3,294 cf **OK**
Overbank Flood Protection *Control peak discharge from 10-year storm to 10-year pre-development rates*	Total flows from site; 10.25 proposed < 11.58 existing **OK**
Extreme Storm Protection (Qf) *Control peak discharge from the 100-year storm to 100-year pre-development rates*	Total flows from site; 24.49 proposed < 28.68 Existing **OK**

Based on the above information, the proposed stormwater management design for the project satisfies the key criteria of the Stormwater Management Design Manual guidelines.

E. Erosion and Sediment Control

The proposed stormwater management facility and a comprehensive erosion control plan have been designed to control sediment runoff and provide water quality treatment during and after the site construction. As required by the NYSDEC, the project will include a Stormwater Pollution Prevention Plan (SWPPP) that will combine the design presented in this report and on the plans with the requirements of NYSDEC GP -0-20-001 to outline how the owner will address the construction and post construction stormwater conditions. The construction erosion control plan has been designed per the New Yok State Standards and Specifications for Erosion Control and Sediment Control.

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Additional erosion control measures will be implemented during construction to control silt and minimize disturbance to the existing swales and drainage conditions. Typical practices include the installation and maintenance of silt fence, stone check dams and rip rap outlet protection. The disturbed areas will be seeded and mulched as soon as possible to control erosion. Pipe outlet control rip-rap measures are also proposed with the storm sewer system. A stabilized construction entrance will also be installed from NYS Route 332 to access the site during construction.

The final component of the erosion control plan will be maintenance. The contractor will be responsible for installing the erosion control features, as well as maintain and replacing them as necessary throughout construction. A SWPPP will be prepared for the project and is to be kept on-site throughout the soil disturbing activities until groundcover is established.

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Appendix 1;

Stormwater Management

Quantity Calculations

(a) Figure 01 – Existing Conditions Map
(b) Figure 02 – Proposed Conditions Map
(c) Stormwater hydrographs

Quality Calculations

(a) Figure 03 – WQv/RRv Map
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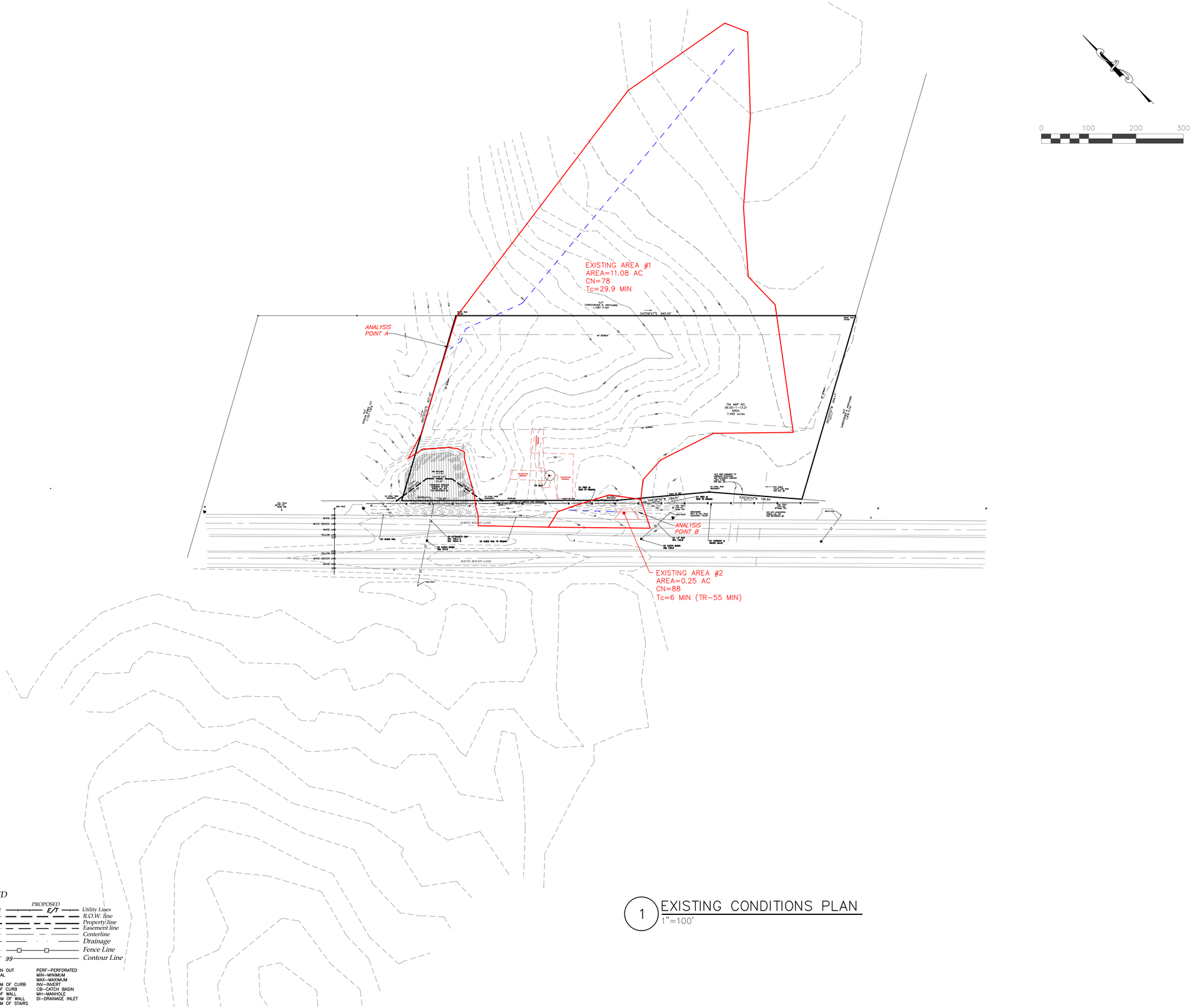

LEGEND

EXISTING	PROPOSED	
	OHE elec	E/T Utility Lines
Iron pin or pipe found		
Benchmark		R.O.W. line
Utility pole		Property line
		Easement line
Hydrant		Centerline
Light pole		Drainage
PERC TEST / DEEP HOLE		Fence Line
	99	Contour Line

ABBREVIATIONS:
EX–EXISTING
CPP–CORRUGATED POLYETHYLENE PIPE
O.C.–ON CENTER
SCPP–SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE
UG–UNDERGROUND
CONC–CONCRETE
CO –CLEAN OUT
TYP–TYPICAL
R–RADIUS
BC–BOTTOM OF CURB
TC–TOP OF CURB
TW–TOP OF WALL
BW–BOTTOM OF WALL
BS–BOTTOM OF STAIRS
PERF–PERFORATED
MIN–MINIMUM
MAX–MAXIMUM
INV–INVERT
CB–CATCH BASIN
MH–MANHOLE
DI–DRAINAGE INLET

1 EXISTING CONDITIONS PLAN
1"=100'

NOT FOR CONSTRUCTION

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STATE OF NEW YORK
BRENNAN A. MARKS
093182
PROFESSIONAL ENGINEER
STAMP

STAMP

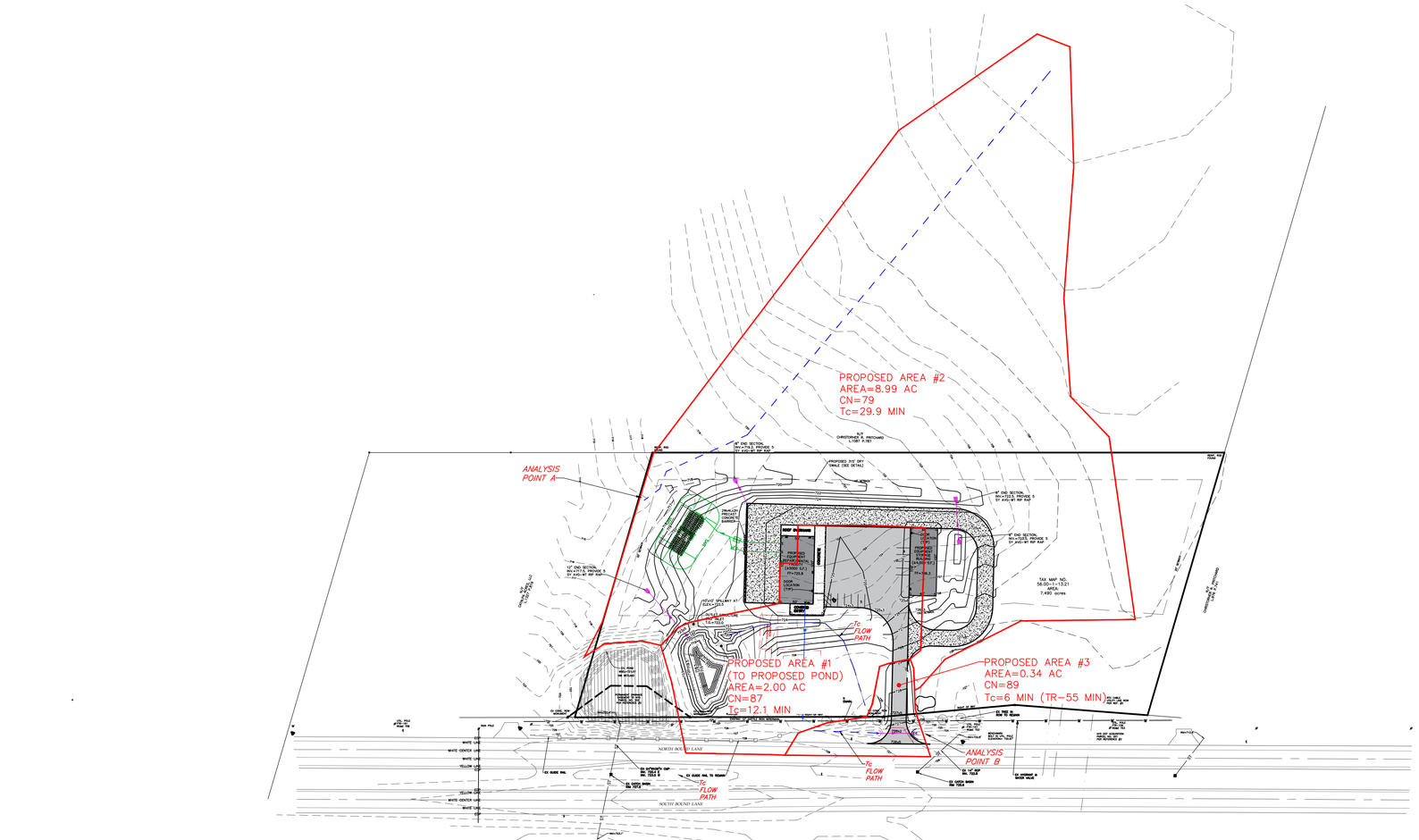
REVISIONS: NO.	DATE	DESCRIPTION OF REVISION	BY

NEW COMMERCIAL SITE PLANS PREPARED FOR:
DIVERSIFIED EQUIPMENT, LLC
NEW LAWN & GARDEN EQUIPMENT REPAIR/RENTAL FACILITY AND EQUIPMENT STORAGE BUILDING
SHOWING LAND IN:
1947 STATE ROUTE 332
TOWN OF CANANDAIGUA
COUNTY OF ONTARIO
STATE OF NEW YORK

DRAWING TITLE:
EXISTING CONDITIONS

DRAWN BY:	JWJ
DESIGNED BY:	JWJ
CHECKED BY:	BAM
SCALE:	1"=100'
JOB NO.:	22-210
DATE:	10/26/2022
TAX MAP#:	56.00-1-13.21

FIGURE 01



LEGEND

EXISTING	PROPOSED	
	OHE elec	E/T Utility Lines
		R.O.W. line
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		Centerline
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DEEP HOLE

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1 PROPOSED CONDITIONS PLAN
1"=100'

NOT FOR CONSTRUCTION

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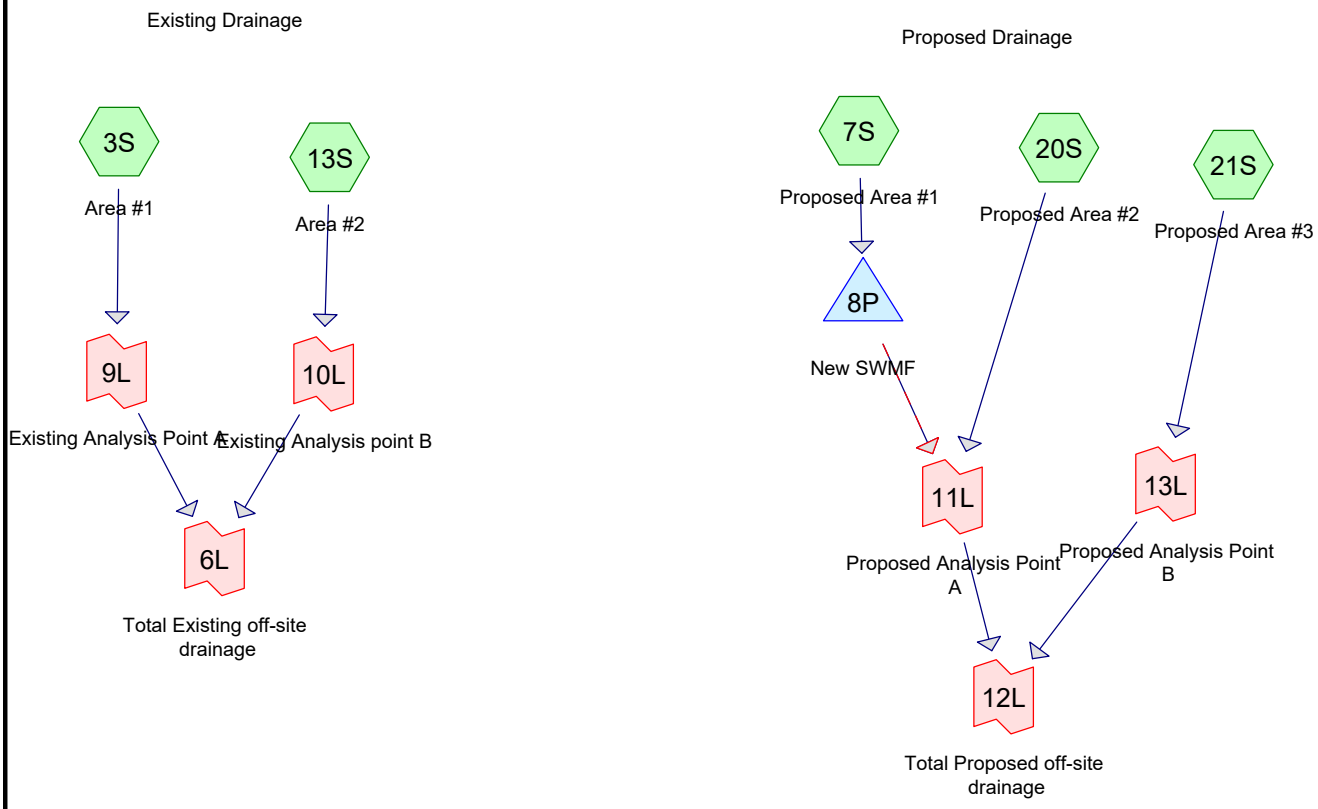
FIGURE 02



Subcat Reach Pond Link

Routing Diagram for hydrocad model

Prepared by {enter your company name here}, Printed 1/5/2023

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.150	80	>75% Grass cover, Good, HSG D (3S, 7S, 13S, 20S, 21S)
17.780	78	Meadow, non-grazed, HSG D (3S, 20S)
1.550	98	Paved parking, HSG D (3S, 7S, 13S, 20S, 21S)
0.180	98	Water Surface, HSG D (7S)
22.660	**80**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
22.660	HSG D	3S, 7S, 13S, 20S, 21S
0.000	Other	
22.660		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	3.150	0.000	3.150	>75% Grass cover, Good	3S, 7S, 13S, 20S, 21S
0.000	0.000	0.000	17.780	0.000	17.780	Meadow, non-grazed	3S, 20S
0.000	0.000	0.000	1.550	0.000	1.550	Paved parking	3S, 7S, 13S, 20S, 21S
0.000	0.000	0.000	0.180	0.000	0.180	Water Surface	7S
0.000	**0.000**	**0.000**	**22.660**	**0.000**	**22.660**	**TOTAL AREA**	

Pipe Listing (selected 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	8P	719.50	717.50	87.0	0.0230	0.013	12.0	0.0	0.0

Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment3S: Area #1 Runoff Area=11.080 ac 0.63% Impervious Runoff Depth=0.42"
Flow Length=887' Tc=29.9 min CN=78 Runoff=3.32 cfs 0.387 af

Subcatchment7S: Proposed Area #1 Runoff Area=2.000 ac 40.00% Impervious Runoff Depth=0.81"
Flow Length=277' Tc=10.8 min CN=87 Runoff=2.43 cfs 0.135 af

Subcatchment13S: Area #2 Runoff Area=0.250 ac 44.00% Impervious Runoff Depth=0.87"
Tc=6.0 min CN=88 Runoff=0.39 cfs 0.018 af

Subcatchment20S: Proposed Area #2 Runoff Area=8.990 ac 6.45% Impervious Runoff Depth=0.49"
Flow Length=887' Tc=29.9 min CN=80 Runoff=3.36 cfs 0.368 af

Subcatchment21S: Proposed Area #3 Runoff Area=0.340 ac 50.00% Impervious Runoff Depth=0.93"
Tc=6.0 min CN=89 Runoff=0.56 cfs 0.026 af

Pond 8P: New SWMF Peak Elev=720.13' Storage=2,924 cf Inflow=2.43 cfs 0.135 af
Primary=0.17 cfs 0.132 af Secondary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.132 af

Link 6L: Total Existing off-site drainage Inflow=3.37 cfs 0.405 af
Primary=3.37 cfs 0.405 af

Link 9L: Existing Analysis Point A Inflow=3.32 cfs 0.387 af
Primary=3.32 cfs 0.387 af

Link 10L: Existing Analysis point B Inflow=0.39 cfs 0.018 af
Primary=0.39 cfs 0.018 af

Link 11L: Proposed Analysis Point A Inflow=3.52 cfs 0.500 af
Primary=3.52 cfs 0.500 af

Link 12L: Total Proposed off-site drainage Inflow=3.59 cfs 0.526 af
Primary=3.59 cfs 0.526 af

Link 13L: Proposed Analysis Point B Inflow=0.56 cfs 0.026 af
Primary=0.56 cfs 0.026 af

Total Runoff Area = 22.660 ac Runoff Volume = 0.934 af Average Runoff Depth = 0.49"
92.37% Pervious = 20.930 ac 7.63% Impervious = 1.730 ac

Summary for Subcatchment 3S: Area #1

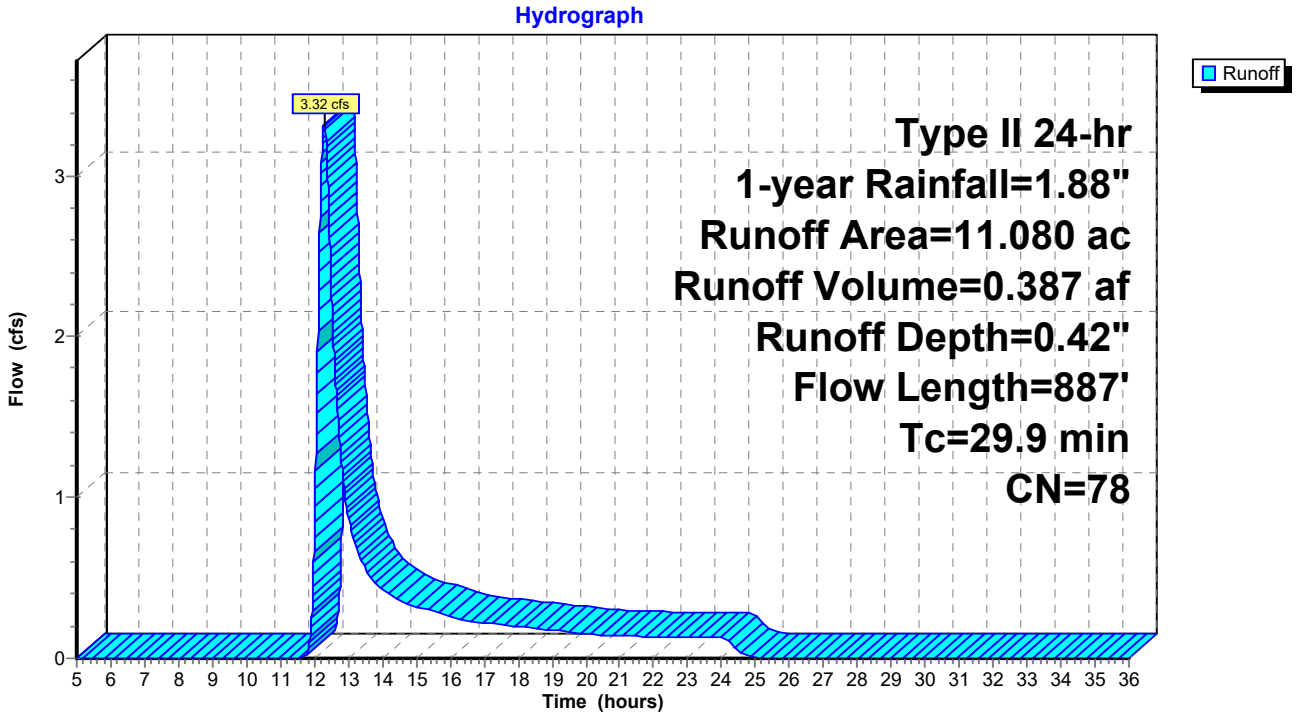
Runoff = 3.32 cfs @ 12.29 hrs, Volume= 0.387 af, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-year Rainfall=1.88"

Area (ac)	CN	Description
0.070	98	Paved parking, HSG D
0.160	80	>75% Grass cover, Good, HSG D
10.850	78	Meadow, non-grazed, HSG D
11.080	78	Weighted Average
11.010		99.37% Pervious Area
0.070		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 3S: Area #1



Summary for Subcatchment 7S: Proposed Area #1

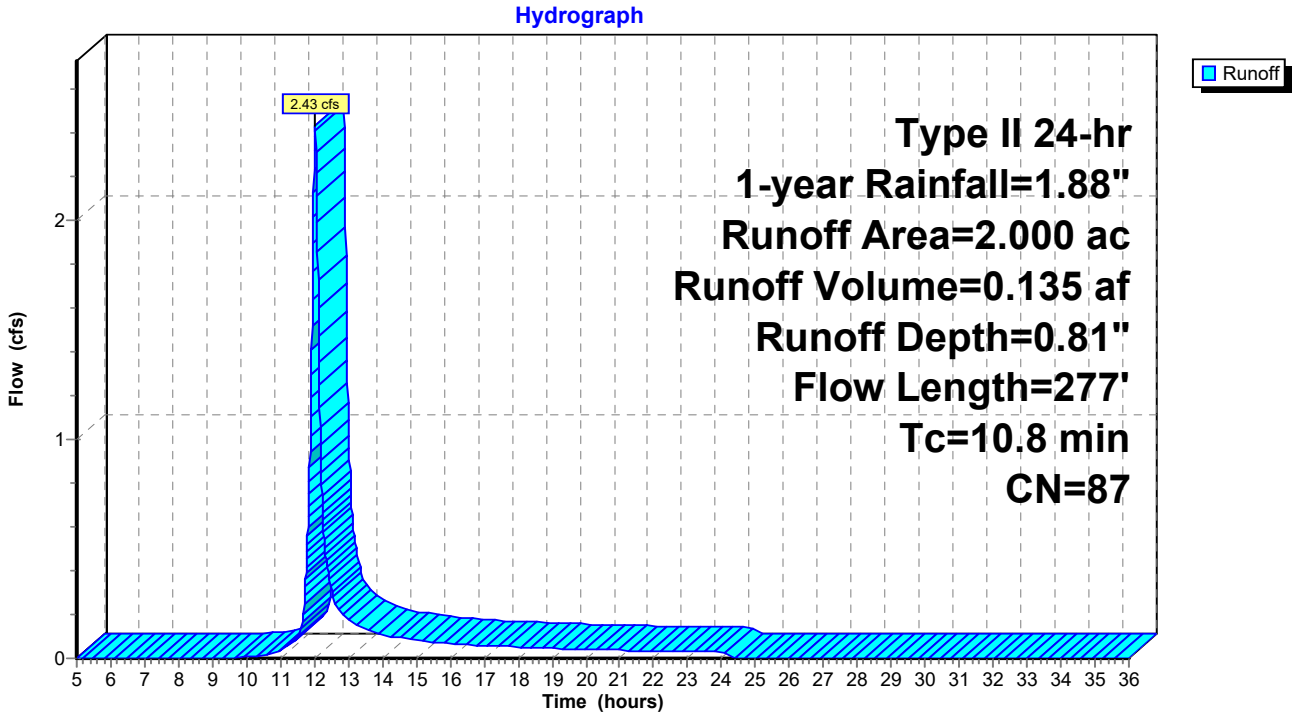
Runoff = 2.43 cfs @ 12.03 hrs, Volume= 0.135 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-year Rainfall=1.88"

Area (ac)	CN	Description
0.620	98	Paved parking, HSG D
0.180	98	Water Surface, HSG D
1.200	80	>75% Grass cover, Good, HSG D
2.000	87	Weighted Average
1.200		60.00% Pervious Area
0.800		40.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0300	0.17		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.18"
0.2	44	0.0700	4.26		**Shallow Concentrated Flow, Shallow cocentrated** Unpaved Kv= 16.1 fps
0.4	73	0.0130	3.31	14.88	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.1	50	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.0	10	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
10.8	277	Total			

Subcatchment 7S: Proposed Area #1



Summary for Subcatchment 13S: Area #2

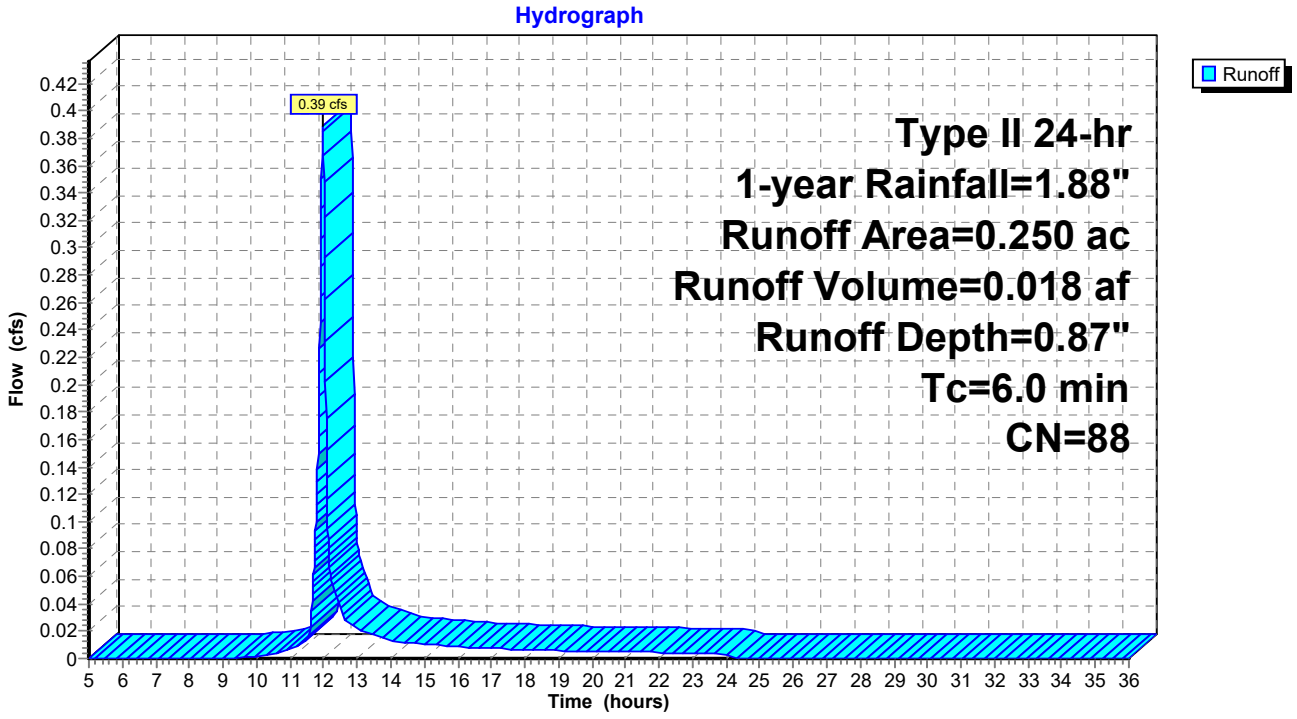
Runoff = 0.39 cfs @ 11.98 hrs, Volume= 0.018 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-year Rainfall=1.88"

Area (ac)	CN	Description
0.110	98	Paved parking, HSG D
0.140	80	>75% Grass cover, Good, HSG D
0.250	88	Weighted Average
0.140		56.00% Pervious Area
0.110		44.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 13S: Area #2



Summary for Subcatchment 20S: Proposed Area #2

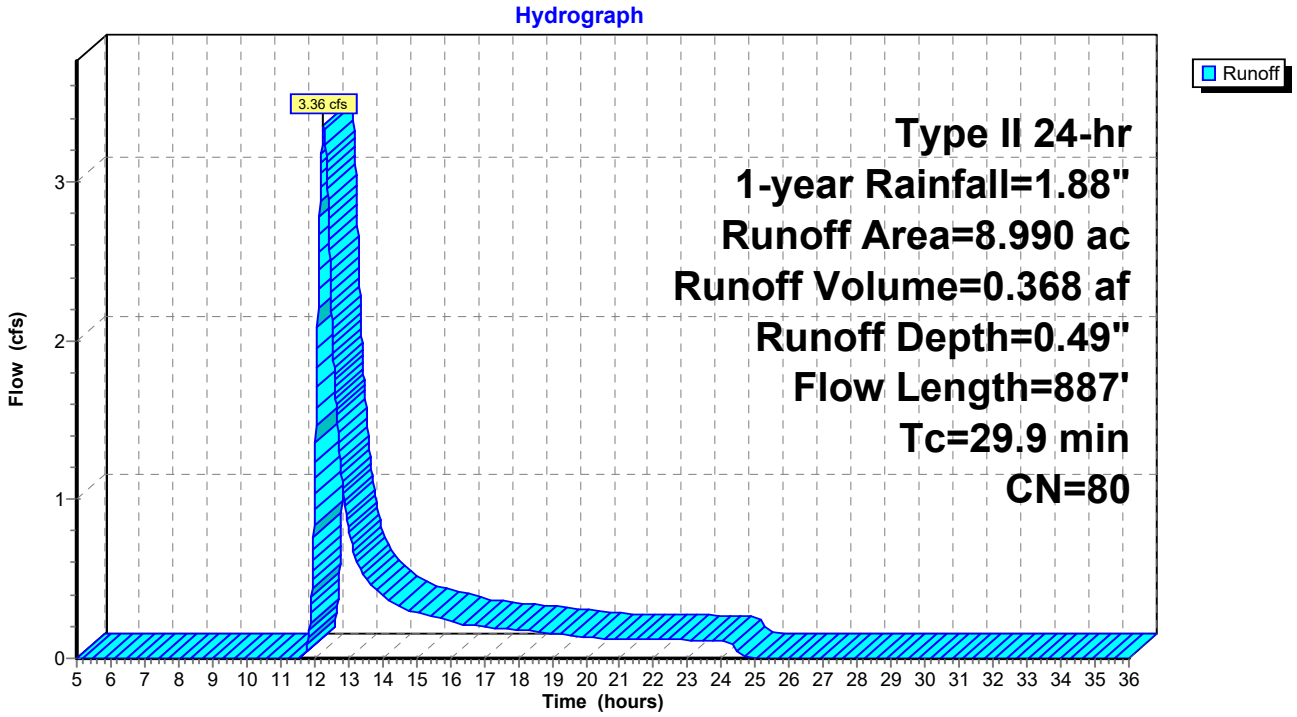
Runoff = 3.36 cfs @ 12.26 hrs, Volume= 0.368 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-year Rainfall=1.88"

Area (ac)	CN	Description
0.580	98	Paved parking, HSG D
1.480	80	>75% Grass cover, Good, HSG D
6.930	78	Meadow, non-grazed, HSG D
8.990	80	Weighted Average
8.410		93.55% Pervious Area
0.580		6.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 20S: Proposed Area #2



Summary for Subcatchment 21S: Proposed Area #3

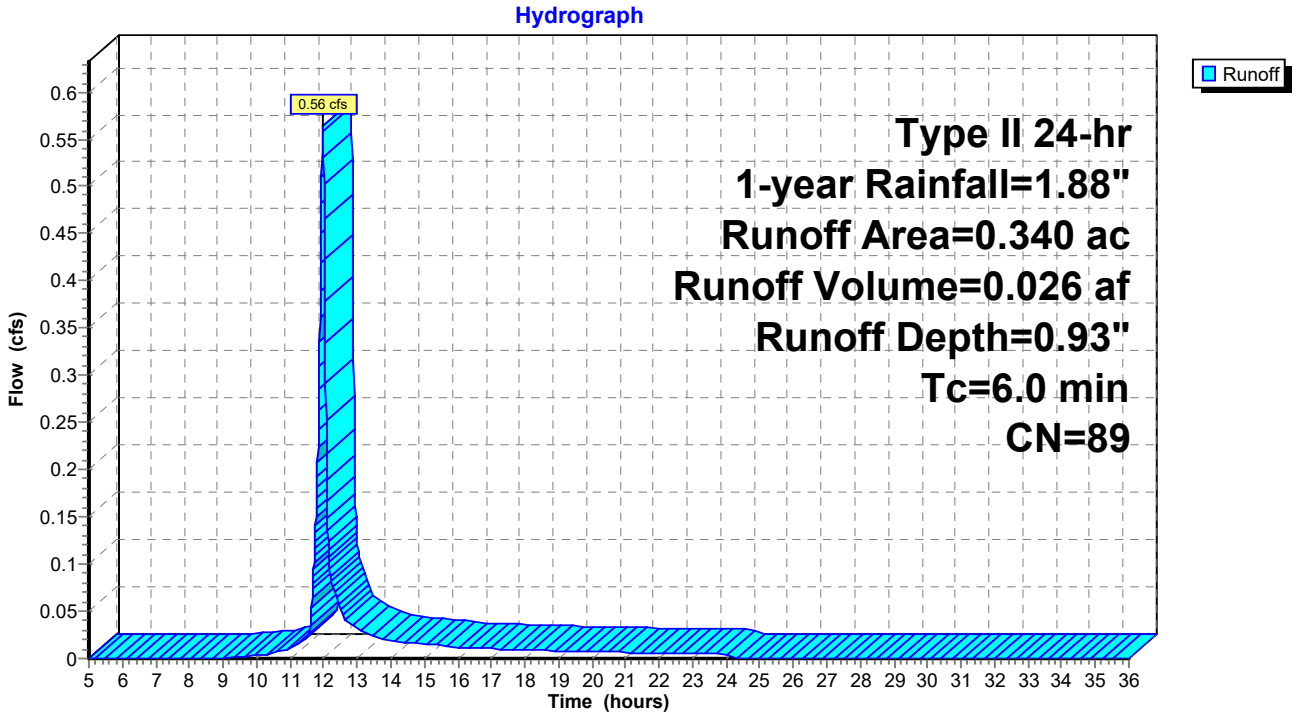
Runoff = 0.56 cfs @ 11.97 hrs, Volume= 0.026 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-year Rainfall=1.88"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG D
0.170	80	>75% Grass cover, Good, HSG D
0.340	89	Weighted Average
0.170		50.00% Pervious Area
0.170		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 21S: Proposed Area #3



Summary for Pond 8P: New SWMF

Inflow Area = 2.000 ac, 40.00% Impervious, Inflow Depth = 0.81" for 1-year event
Inflow = 2.43 cfs @ 12.03 hrs, Volume= 0.135 af
Outflow = 0.17 cfs @ 13.08 hrs, Volume= 0.132 af, Atten= 93%, Lag= 63.2 min
Primary = 0.17 cfs @ 13.08 hrs, Volume= 0.132 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 720.13' @ 13.08 hrs Surf.Area= 5,000 sf Storage= 2,924 cf

Plug-Flow detention time= 250.0 min calculated for 0.132 af (97% of inflow)
Center-of-Mass det. time= 234.3 min (1,079.1 - 844.8)

Volume	Invert	Avail.Storage	Storage Description
#1	719.50'	30,752 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

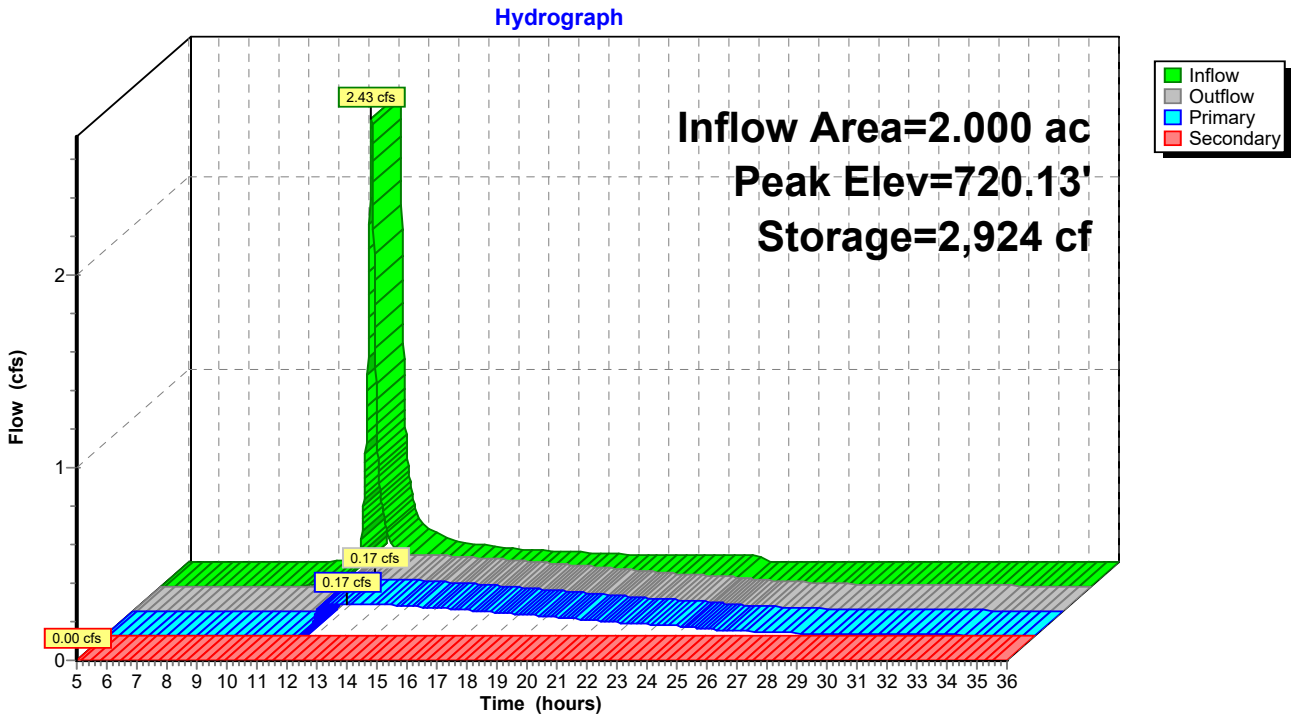
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
719.50	4,263	0	0
720.00	4,837	2,275	2,275
721.00	6,074	5,456	7,731
722.00	8,185	7,130	14,860
723.00	11,333	9,759	24,619
723.50	13,200	6,133	30,752

Device	Routing	Invert	Outlet Devices
#1	Primary	719.50'	**12.0" Round Culvert** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 719.50' / 717.50' S= 0.0230 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	722.00'	**24.0" x 24.0" Horiz. 2'x2' grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	722.50'	**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
#4	Device 1	719.50'	**3.0" Vert. 3" orifice** C= 0.600

Primary OutFlow Max=0.17 cfs @ 13.08 hrs HW=720.13' (Free Discharge)
└─**1=Culvert** (Passes 0.17 cfs of 1.42 cfs potential flow)
  ├─**2=2'x2' grate** (Controls 0.00 cfs)
  └─**4=3" orifice** (Orifice Controls 0.17 cfs @ 3.43 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=719.50' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: New SWMF

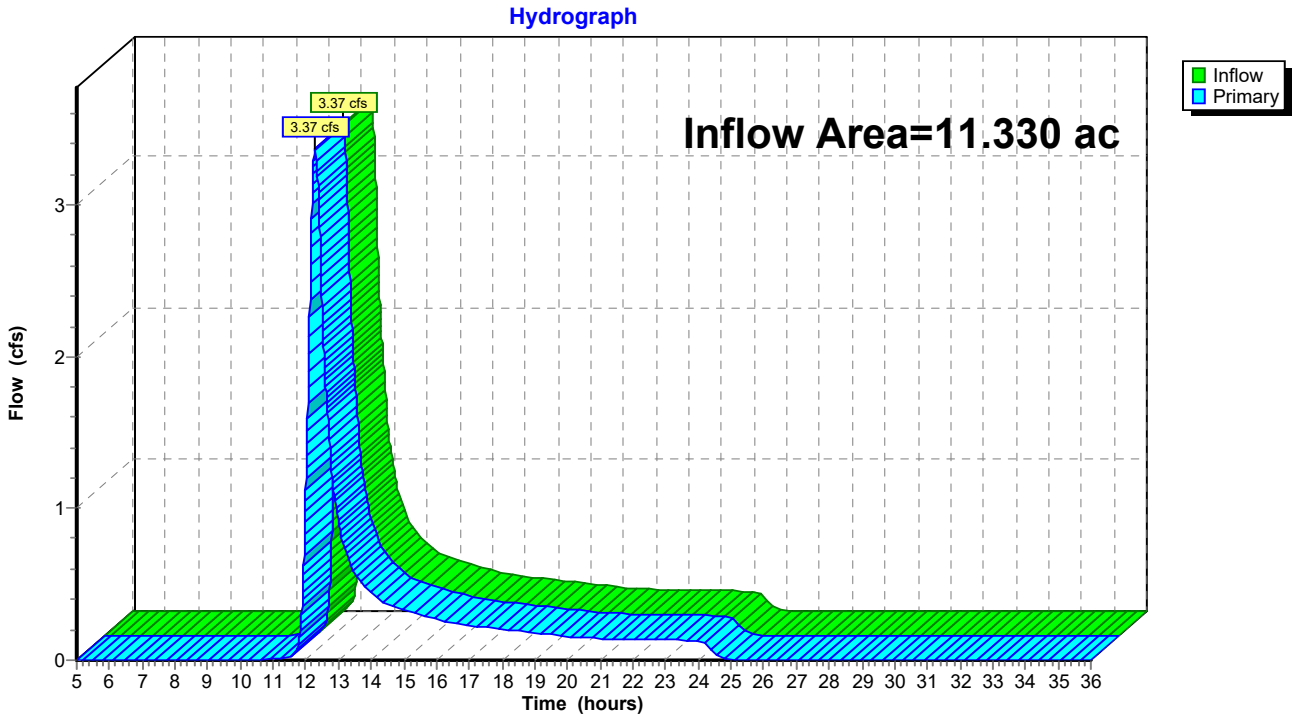


Summary for Link 6L: Total Existing off-site drainage

Inflow Area = 11.330 ac, 1.59% Impervious, Inflow Depth = 0.43" for 1-year event
Inflow = 3.37 cfs @ 12.29 hrs, Volume= 0.405 af
Primary = 3.37 cfs @ 12.29 hrs, Volume= 0.405 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 6L: Total Existing off-site drainage

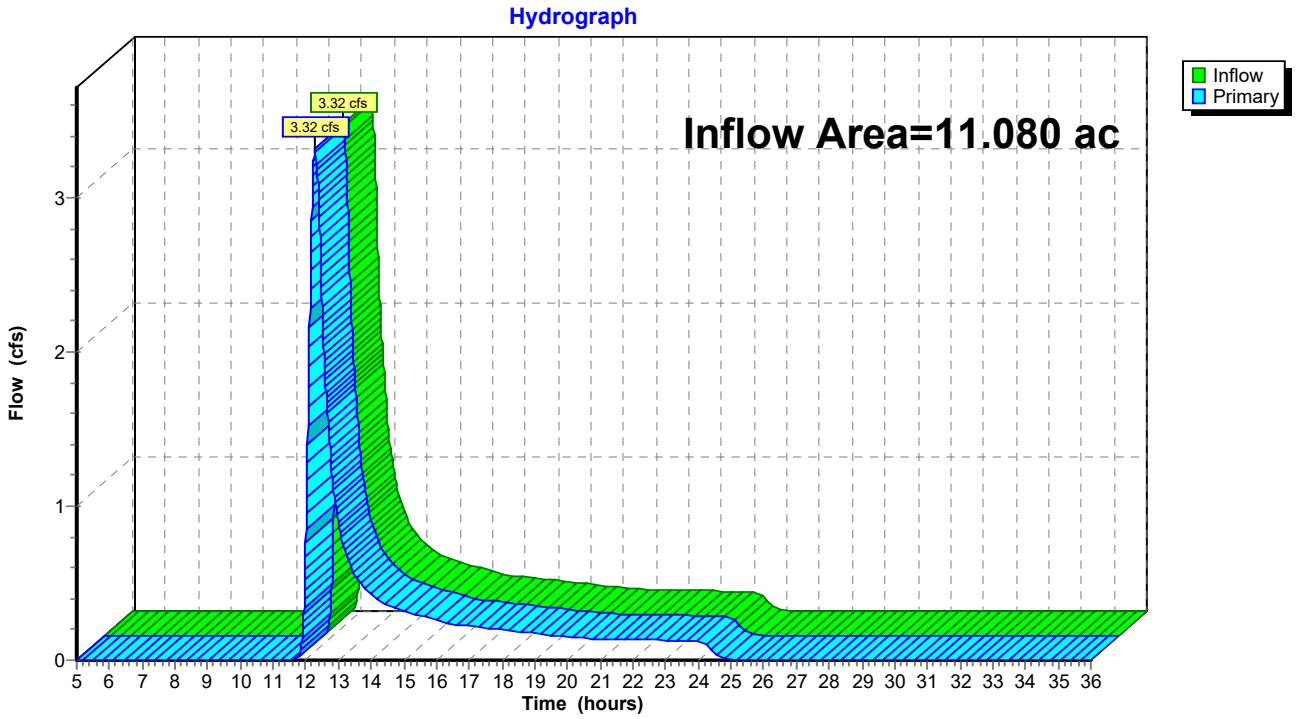


Summary for Link 9L: Existing Analysis Point A

Inflow Area = 11.080 ac, 0.63% Impervious, Inflow Depth = 0.42" for 1-year event
Inflow = 3.32 cfs @ 12.29 hrs, Volume= 0.387 af
Primary = 3.32 cfs @ 12.29 hrs, Volume= 0.387 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 9L: Existing Analysis Point A

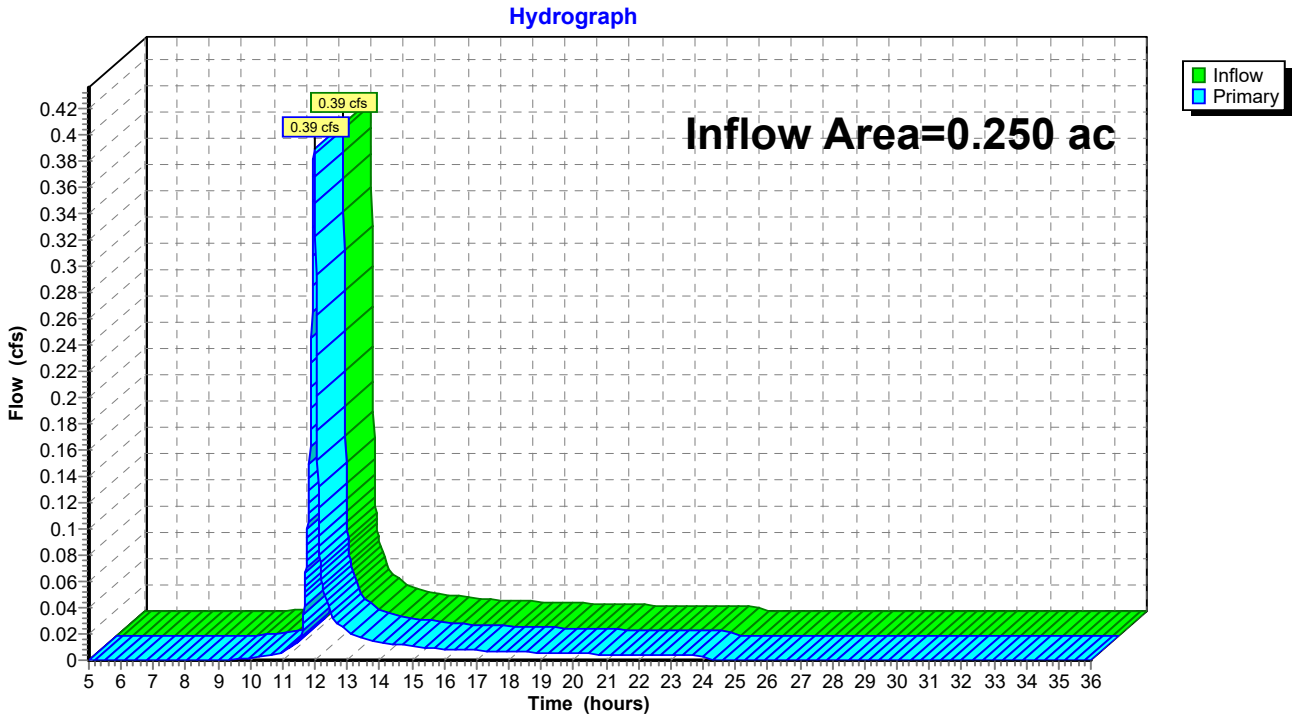


Summary for Link 10L: Existing Analysis point B

Inflow Area = 0.250 ac, 44.00% Impervious, Inflow Depth = 0.87" for 1-year event
Inflow = 0.39 cfs @ 11.98 hrs, Volume= 0.018 af
Primary = 0.39 cfs @ 11.98 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 10L: Existing Analysis point B

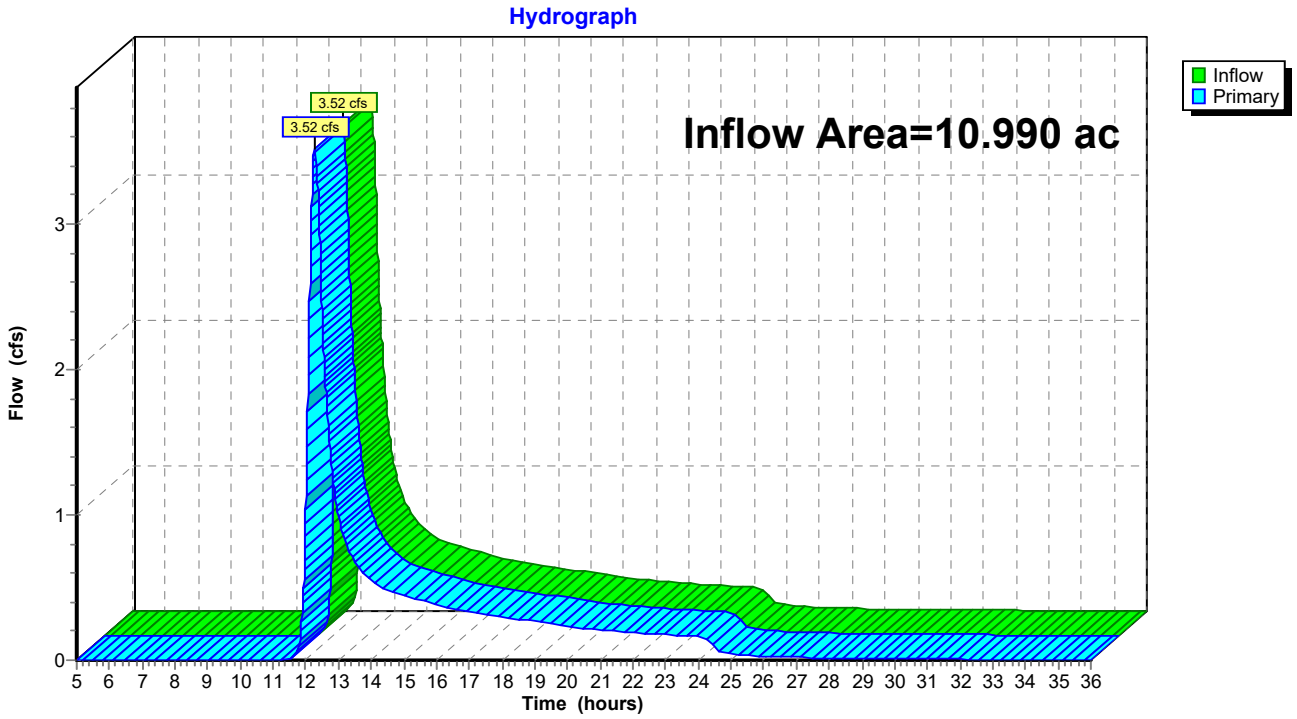


Summary for Link 11L: Proposed Analysis Point A

Inflow Area = 10.990 ac, 12.56% Impervious, Inflow Depth > 0.55" for 1-year event
Inflow = 3.52 cfs @ 12.26 hrs, Volume= 0.500 af
Primary = 3.52 cfs @ 12.26 hrs, Volume= 0.500 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 11L: Proposed Analysis Point A

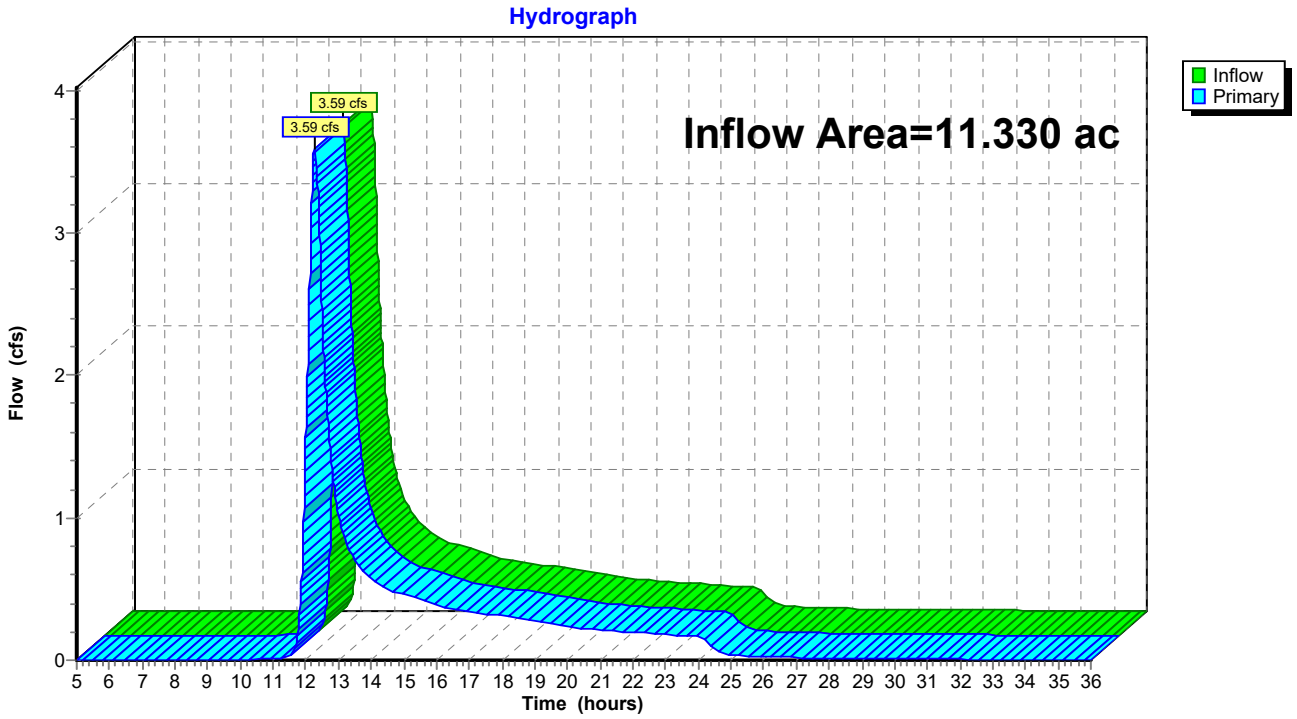


Summary for Link 12L: Total Proposed off-site drainage

Inflow Area = 11.330 ac, 13.68% Impervious, Inflow Depth > 0.56" for 1-year event
Inflow = 3.59 cfs @ 12.26 hrs, Volume= 0.526 af
Primary = 3.59 cfs @ 12.26 hrs, Volume= 0.526 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 12L: Total Proposed off-site drainage

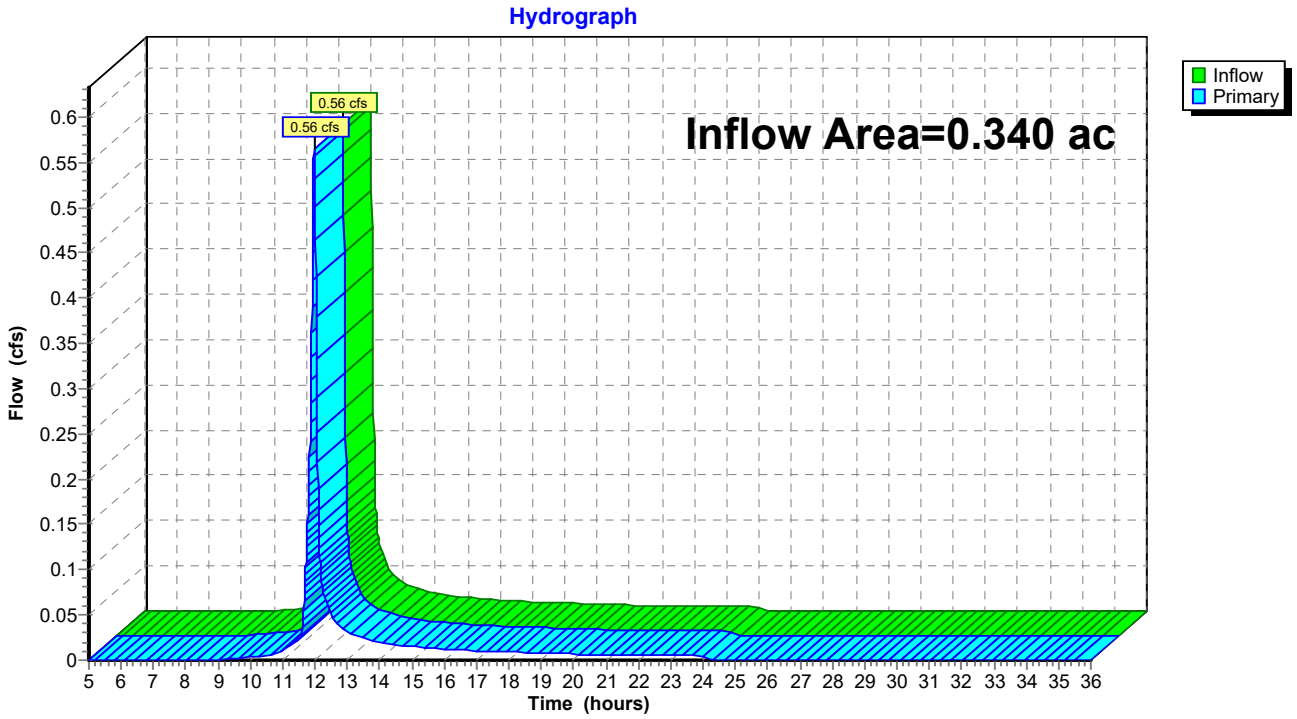


Summary for Link 13L: Proposed Analysis Point B

Inflow Area = 0.340 ac, 50.00% Impervious, Inflow Depth = 0.93" for 1-year event
Inflow = 0.56 cfs @ 11.97 hrs, Volume= 0.026 af
Primary = 0.56 cfs @ 11.97 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 13L: Proposed Analysis Point B



Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment3S: Area #1 Runoff Area=11.080 ac 0.63% Impervious Runoff Depth=0.59"
Flow Length=887' Tc=29.9 min CN=78 Runoff=5.02 cfs 0.543 af

Subcatchment7S: Proposed Area #1 Runoff Area=2.000 ac 40.00% Impervious Runoff Depth=1.05"
Flow Length=277' Tc=10.8 min CN=87 Runoff=3.14 cfs 0.175 af

Subcatchment13S: Area #2 Runoff Area=0.250 ac 44.00% Impervious Runoff Depth=1.11"
Tc=6.0 min CN=88 Runoff=0.50 cfs 0.023 af

Subcatchment20S: Proposed Area #2 Runoff Area=8.990 ac 6.45% Impervious Runoff Depth=0.68"
Flow Length=887' Tc=29.9 min CN=80 Runoff=4.87 cfs 0.506 af

Subcatchment21S: Proposed Area #3 Runoff Area=0.340 ac 50.00% Impervious Runoff Depth=1.18"
Tc=6.0 min CN=89 Runoff=0.71 cfs 0.033 af

Pond 8P: New SWMF Peak Elev=720.33' Storage=3,943 cf Inflow=3.14 cfs 0.175 af
Primary=0.20 cfs 0.171 af Secondary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.171 af

Link 6L: Total Existing off-site drainage Inflow=5.09 cfs 0.567 af
Primary=5.09 cfs 0.567 af

Link 9L: Existing Analysis Point A Inflow=5.02 cfs 0.543 af
Primary=5.02 cfs 0.543 af

Link 10L: Existing Analysis point B Inflow=0.50 cfs 0.023 af
Primary=0.50 cfs 0.023 af

Link 11L: Proposed Analysis Point A Inflow=5.06 cfs 0.677 af
Primary=5.06 cfs 0.677 af

Link 12L: Total Proposed off-site drainage Inflow=5.15 cfs 0.710 af
Primary=5.15 cfs 0.710 af

Link 13L: Proposed Analysis Point B Inflow=0.71 cfs 0.033 af
Primary=0.71 cfs 0.033 af

Total Runoff Area = 22.660 ac Runoff Volume = 1.281 af Average Runoff Depth = 0.68"
92.37% Pervious = 20.930 ac 7.63% Impervious = 1.730 ac

Summary for Subcatchment 3S: Area #1

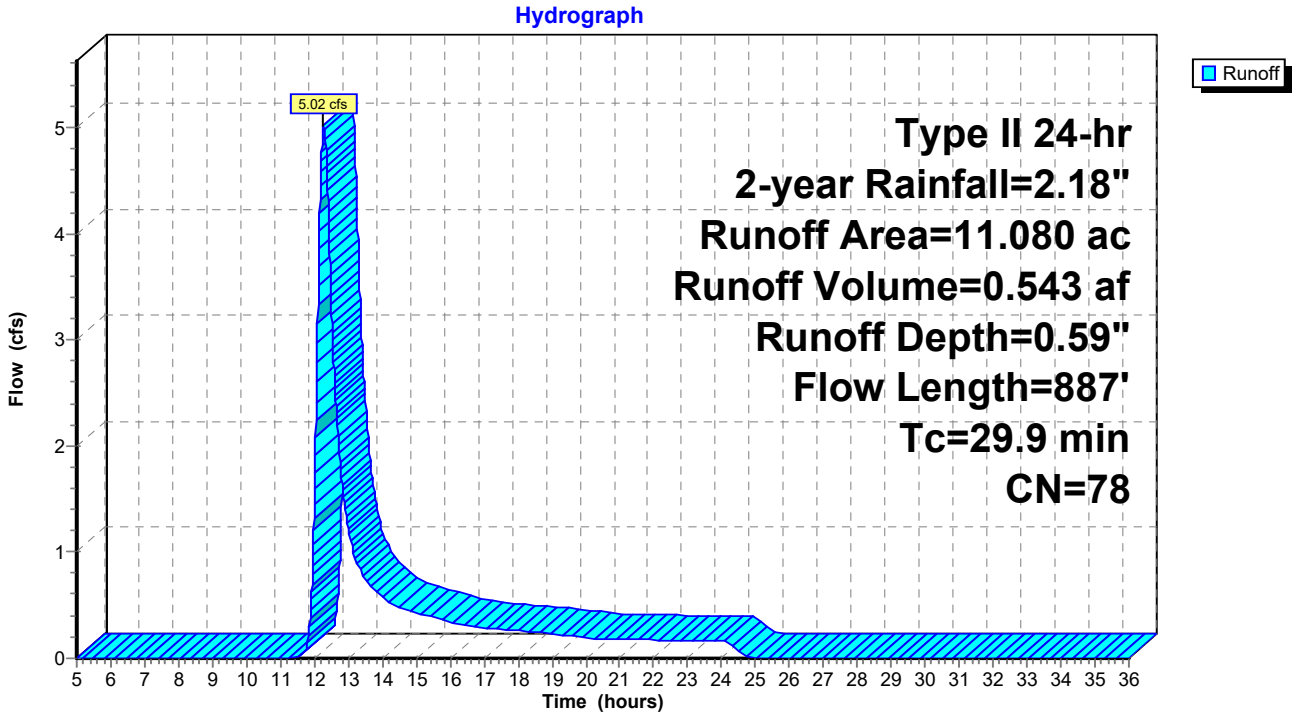
Runoff = 5.02 cfs @ 12.26 hrs, Volume= 0.543 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-year Rainfall=2.18"

Area (ac)	CN	Description
0.070	98	Paved parking, HSG D
0.160	80	>75% Grass cover, Good, HSG D
10.850	78	Meadow, non-grazed, HSG D
11.080	78	Weighted Average
11.010		99.37% Pervious Area
0.070		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 3S: Area #1



Summary for Subcatchment 7S: Proposed Area #1

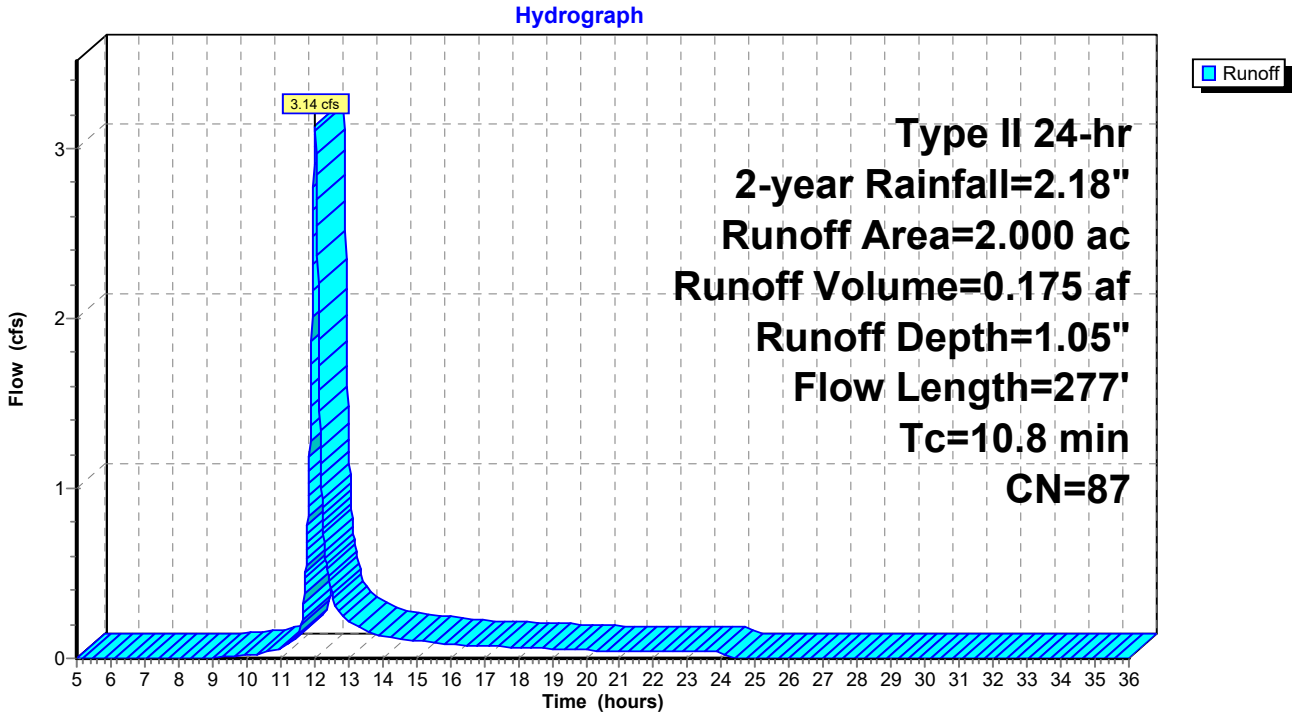
Runoff = 3.14 cfs @ 12.03 hrs, Volume= 0.175 af, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-year Rainfall=2.18"

Area (ac)	CN	Description
0.620	98	Paved parking, HSG D
0.180	98	Water Surface, HSG D
1.200	80	>75% Grass cover, Good, HSG D
2.000	87	Weighted Average
1.200		60.00% Pervious Area
0.800		40.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0300	0.17		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.18"
0.2	44	0.0700	4.26		**Shallow Concentrated Flow, Shallow cocentrated** Unpaved Kv= 16.1 fps
0.4	73	0.0130	3.31	14.88	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.1	50	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.0	10	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
10.8	277	Total			

Subcatchment 7S: Proposed Area #1



Summary for Subcatchment 13S: Area #2

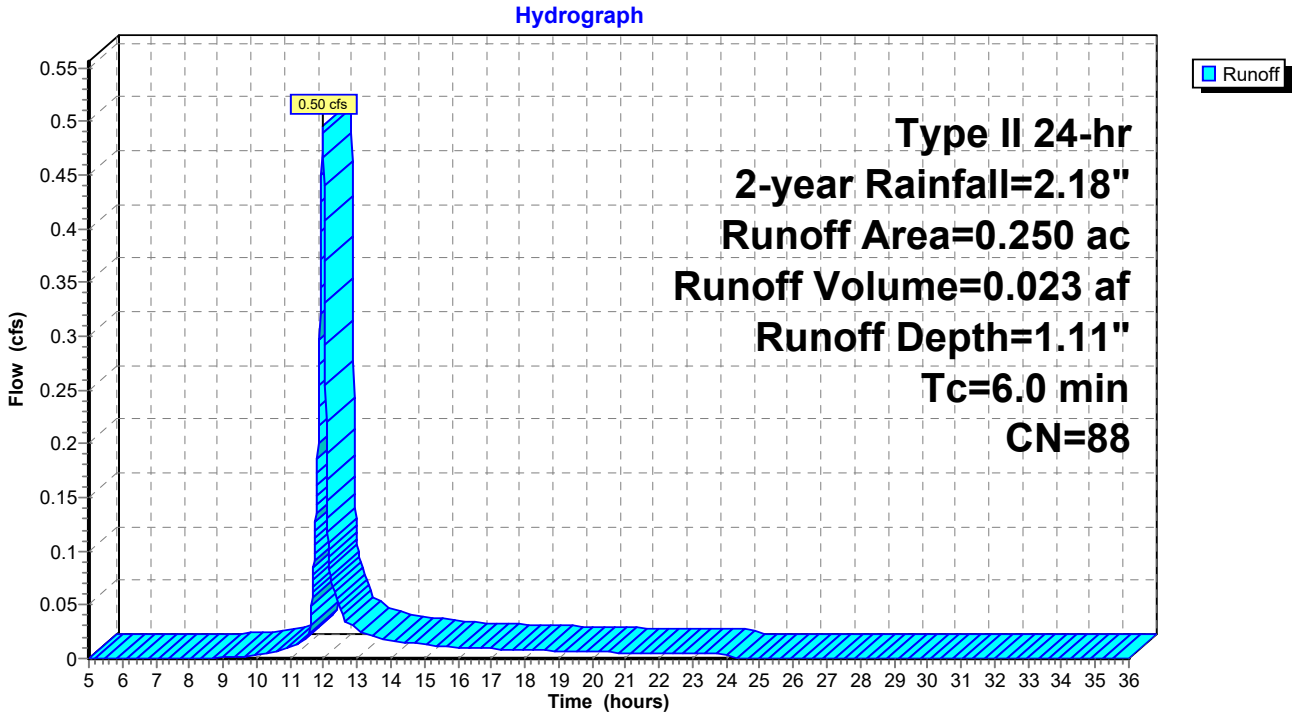
Runoff = 0.50 cfs @ 11.97 hrs, Volume= 0.023 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-year Rainfall=2.18"

Area (ac)	CN	Description
0.110	98	Paved parking, HSG D
0.140	80	>75% Grass cover, Good, HSG D
0.250	88	Weighted Average
0.140		56.00% Pervious Area
0.110		44.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 13S: Area #2



Summary for Subcatchment 20S: Proposed Area #2

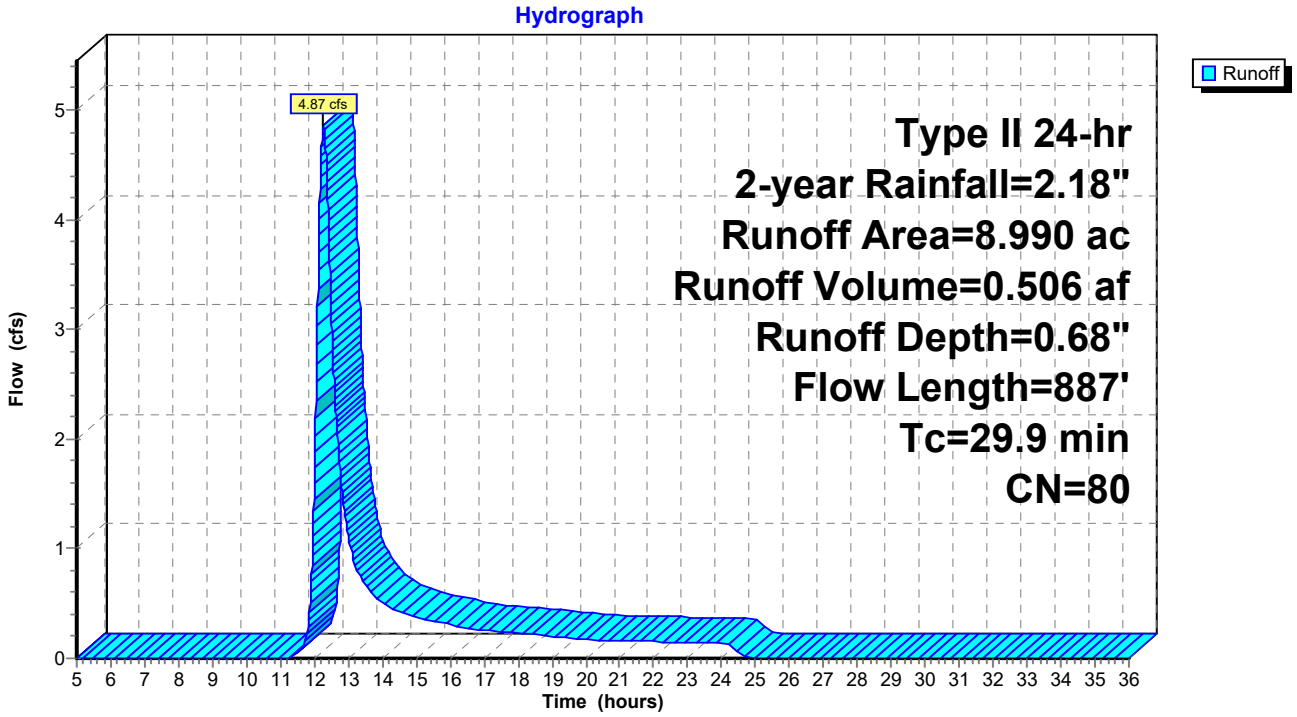
Runoff = 4.87 cfs @ 12.26 hrs, Volume= 0.506 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-year Rainfall=2.18"

Area (ac)	CN	Description
0.580	98	Paved parking, HSG D
1.480	80	>75% Grass cover, Good, HSG D
6.930	78	Meadow, non-grazed, HSG D
8.990	80	Weighted Average
8.410		93.55% Pervious Area
0.580		6.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 20S: Proposed Area #2



Summary for Subcatchment 21S: Proposed Area #3

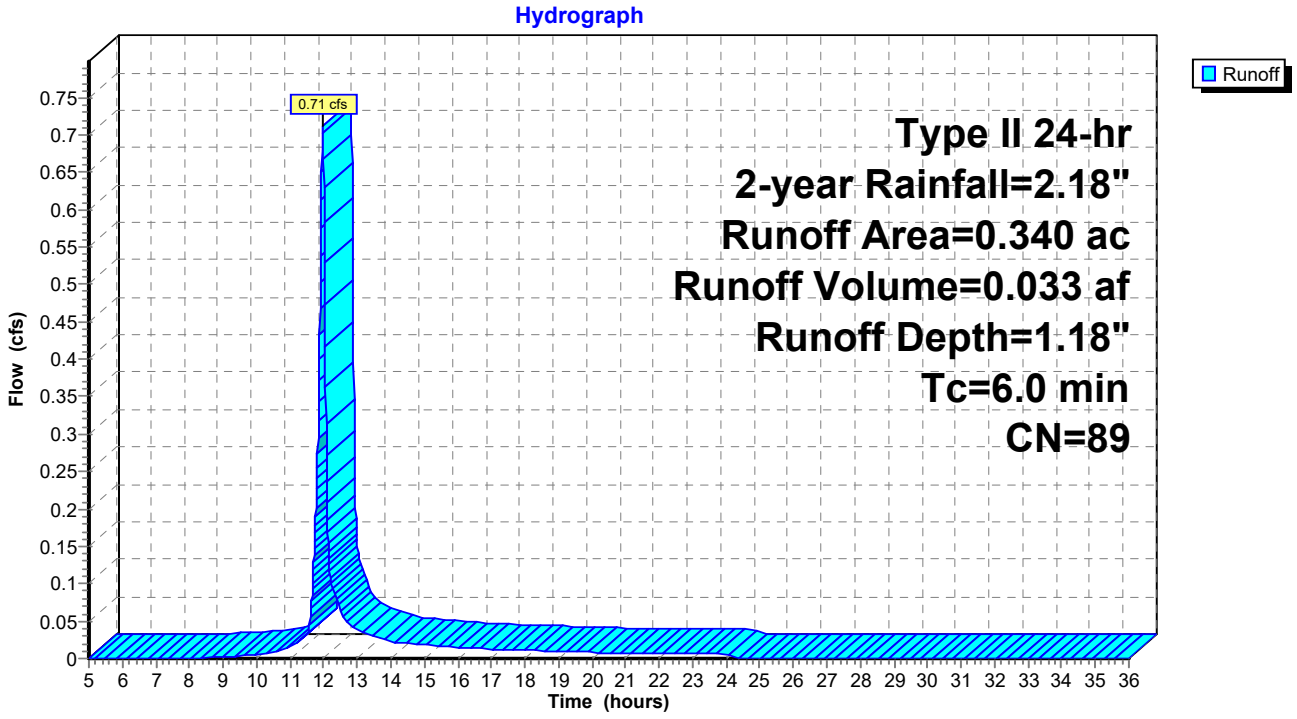
Runoff = 0.71 cfs @ 11.97 hrs, Volume= 0.033 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-year Rainfall=2.18"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG D
0.170	80	>75% Grass cover, Good, HSG D
0.340	89	Weighted Average
0.170		50.00% Pervious Area
0.170		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 21S: Proposed Area #3



Summary for Pond 8P: New SWMF

Inflow Area = 2.000 ac, 40.00% Impervious, Inflow Depth = 1.05" for 2-year event
Inflow = 3.14 cfs @ 12.03 hrs, Volume= 0.175 af
Outflow = 0.20 cfs @ 13.16 hrs, Volume= 0.171 af, Atten= 94%, Lag= 68.2 min
Primary = 0.20 cfs @ 13.16 hrs, Volume= 0.171 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 720.33' @ 13.16 hrs Surf.Area= 5,246 sf Storage= 3,943 cf

Plug-Flow detention time= 272.2 min calculated for 0.171 af (98% of inflow)
Center-of-Mass det. time= 258.9 min (1,096.4 - 837.5)

Volume	Invert	Avail.Storage	Storage Description
#1	719.50'	30,752 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

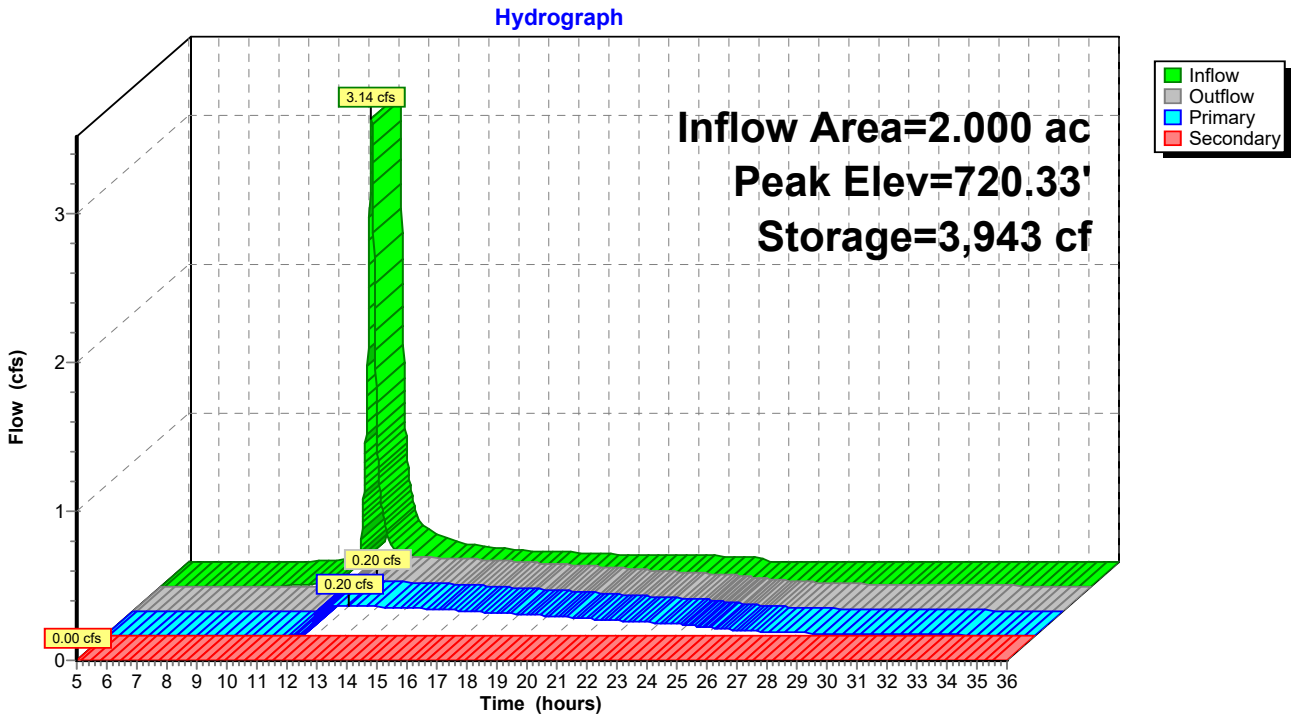
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
719.50	4,263	0	0
720.00	4,837	2,275	2,275
721.00	6,074	5,456	7,731
722.00	8,185	7,130	14,860
723.00	11,333	9,759	24,619
723.50	13,200	6,133	30,752

Device	Routing	Invert	Outlet Devices
#1	Primary	719.50'	**12.0" Round Culvert** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 719.50' / 717.50' S= 0.0230 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	722.00'	**24.0" x 24.0" Horiz. 2'x2' grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	722.50'	**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
#4	Device 1	719.50'	**3.0" Vert. 3" orifice** C= 0.600

Primary OutFlow Max=0.20 cfs @ 13.16 hrs HW=720.33' (Free Discharge)
└─**1=Culvert** (Passes 0.20 cfs of 2.16 cfs potential flow)
  ├─**2=2'x2' grate** (Controls 0.00 cfs)
  └─**4=3" orifice** (Orifice Controls 0.20 cfs @ 4.05 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=719.50' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: New SWMF

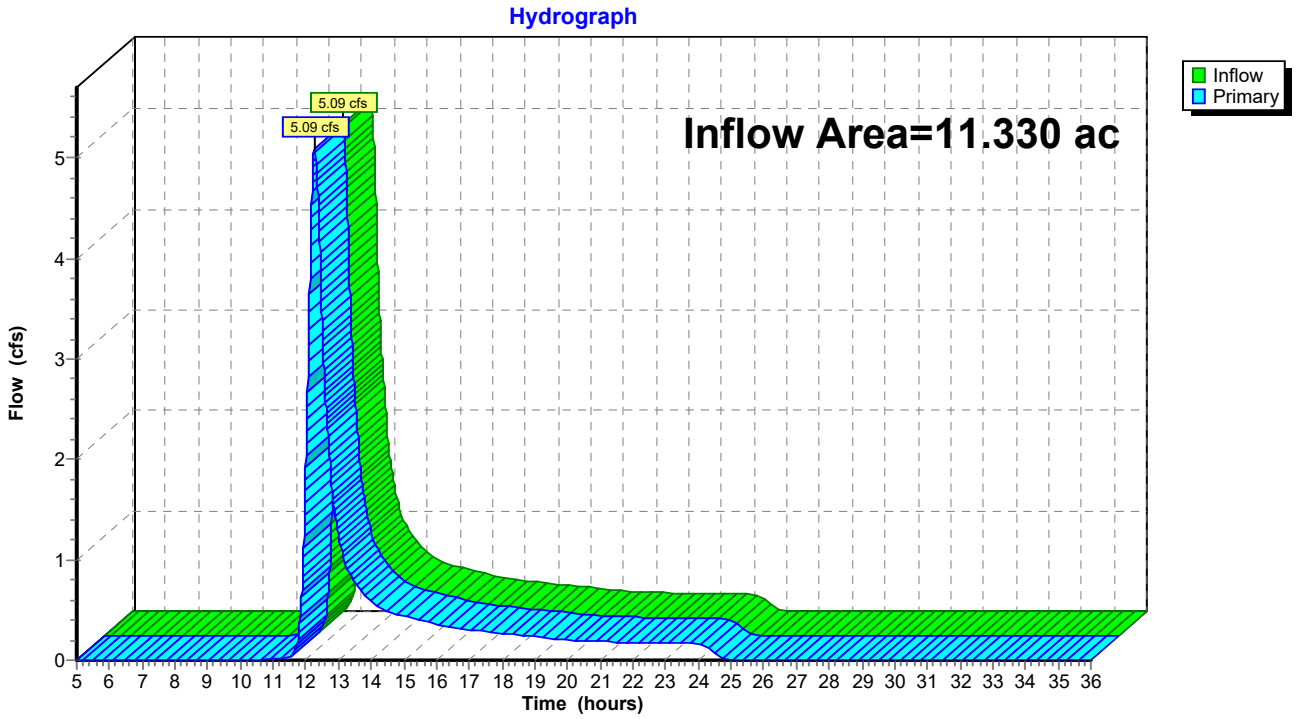


Summary for Link 6L: Total Existing off-site drainage

Inflow Area = 11.330 ac, 1.59% Impervious, Inflow Depth = 0.60" for 2-year event
Inflow = 5.09 cfs @ 12.26 hrs, Volume= 0.567 af
Primary = 5.09 cfs @ 12.26 hrs, Volume= 0.567 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 6L: Total Existing off-site drainage

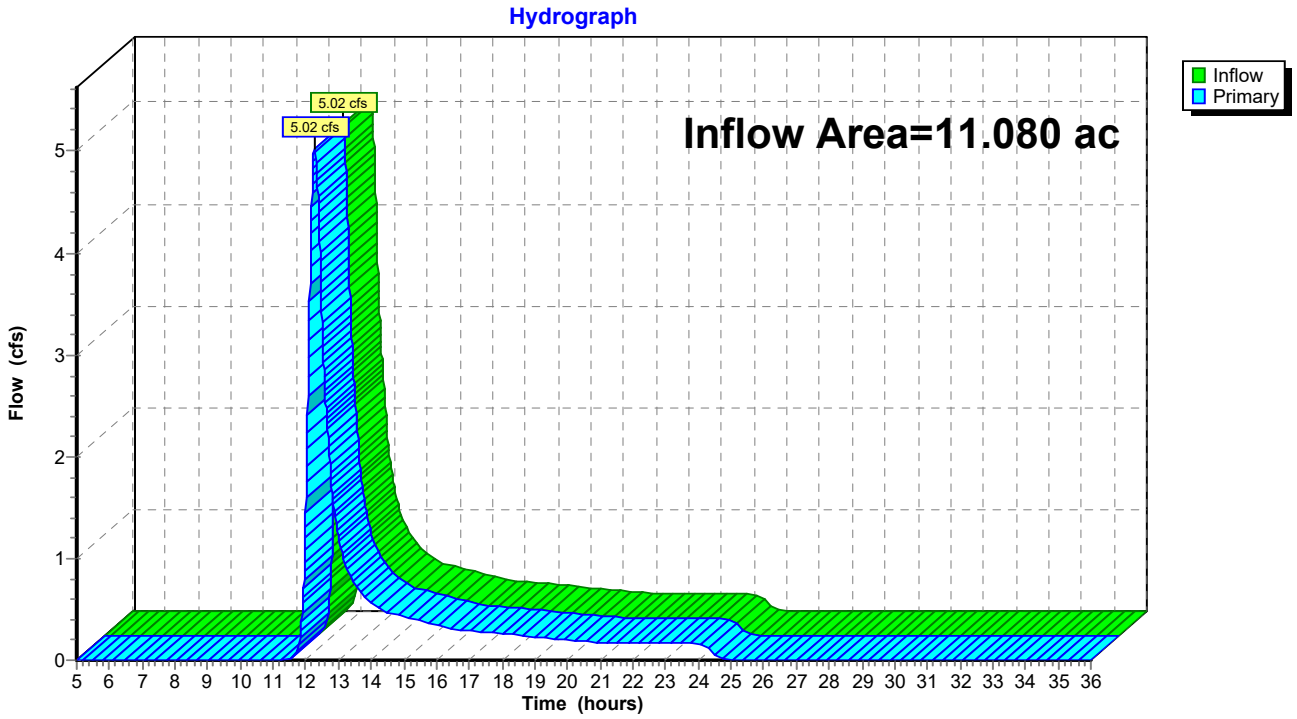


Summary for Link 9L: Existing Analysis Point A

Inflow Area = 11.080 ac, 0.63% Impervious, Inflow Depth = 0.59" for 2-year event
Inflow = 5.02 cfs @ 12.26 hrs, Volume= 0.543 af
Primary = 5.02 cfs @ 12.26 hrs, Volume= 0.543 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 9L: Existing Analysis Point A

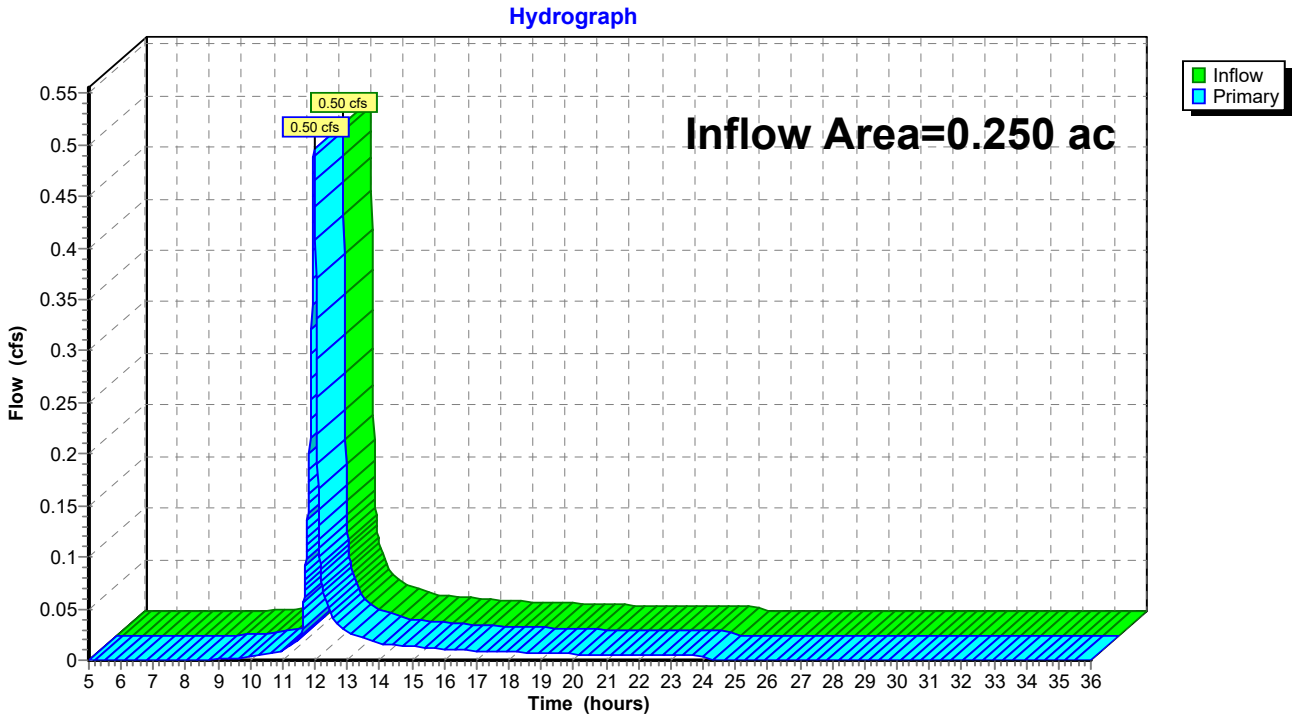


Summary for Link 10L: Existing Analysis point B

Inflow Area = 0.250 ac, 44.00% Impervious, Inflow Depth = 1.11" for 2-year event
Inflow = 0.50 cfs @ 11.97 hrs, Volume= 0.023 af
Primary = 0.50 cfs @ 11.97 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 10L: Existing Analysis point B

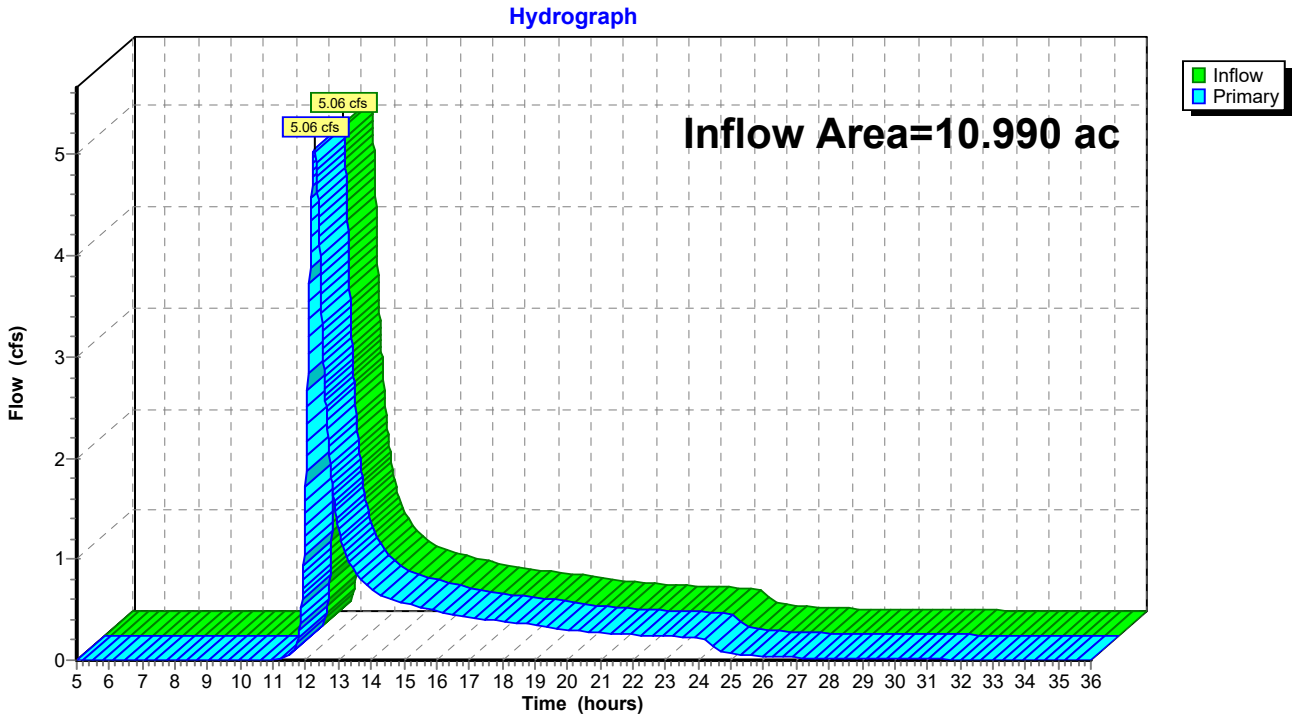


Summary for Link 11L: Proposed Analysis Point A

Inflow Area = 10.990 ac, 12.56% Impervious, Inflow Depth > 0.74" for 2-year event
Inflow = 5.06 cfs @ 12.26 hrs, Volume= 0.677 af
Primary = 5.06 cfs @ 12.26 hrs, Volume= 0.677 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 11L: Proposed Analysis Point A

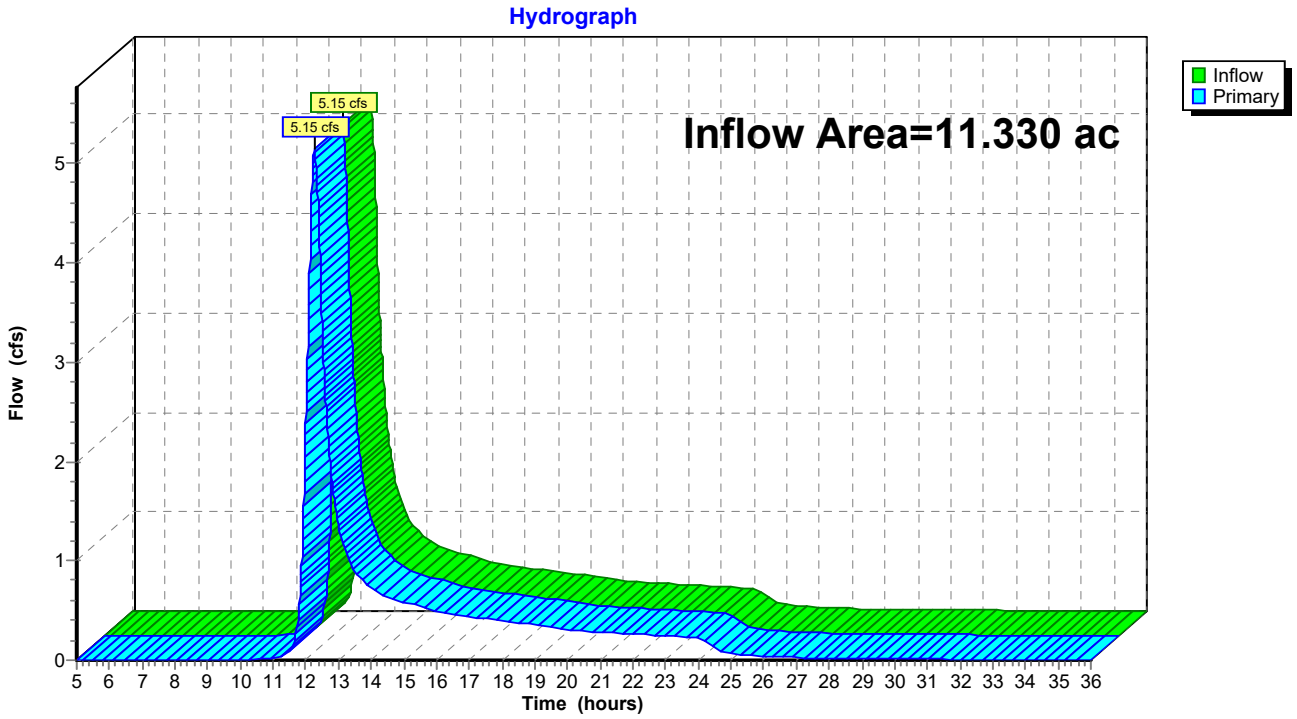


Summary for Link 12L: Total Proposed off-site drainage

Inflow Area = 11.330 ac, 13.68% Impervious, Inflow Depth > 0.75" for 2-year event
Inflow = 5.15 cfs @ 12.26 hrs, Volume= 0.710 af
Primary = 5.15 cfs @ 12.26 hrs, Volume= 0.710 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 12L: Total Proposed off-site drainage

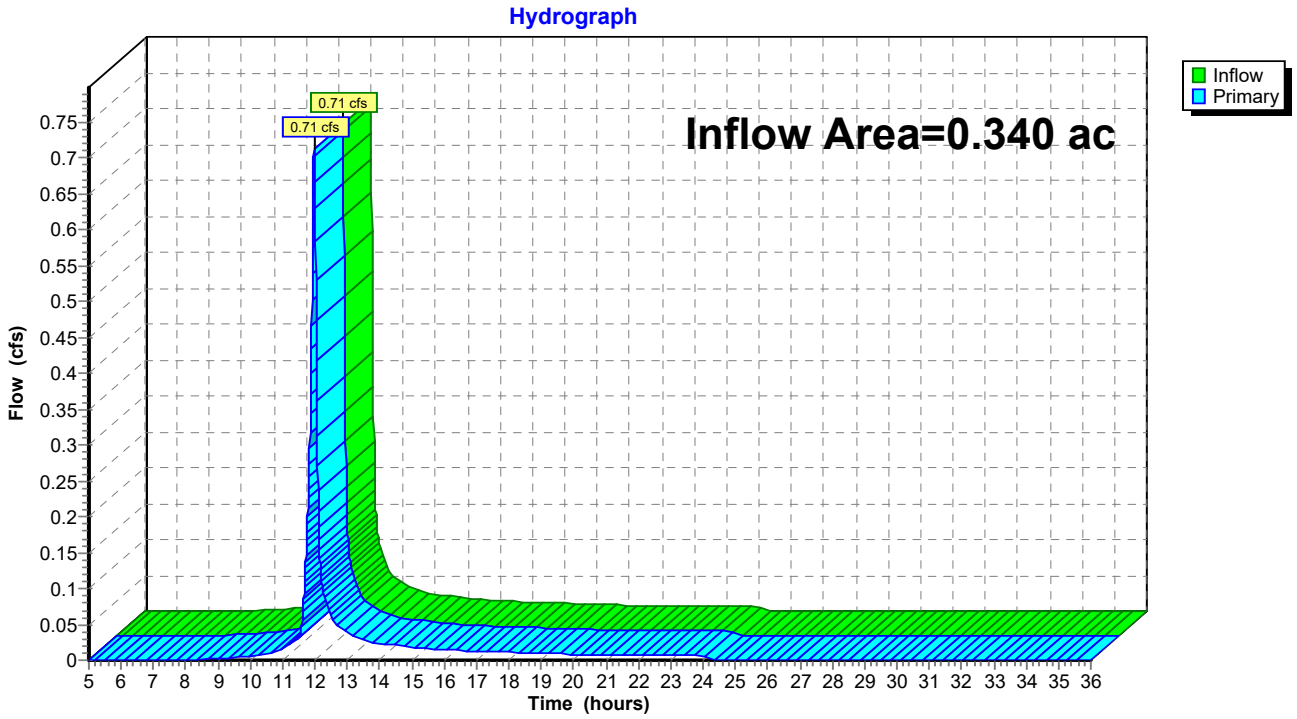


Summary for Link 13L: Proposed Analysis Point B

Inflow Area = 0.340 ac, 50.00% Impervious, Inflow Depth = 1.18" for 2-year event
Inflow = 0.71 cfs @ 11.97 hrs, Volume= 0.033 af
Primary = 0.71 cfs @ 11.97 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 13L: Proposed Analysis Point B



Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment3S: Area #1 Runoff Area=11.080 ac 0.63% Impervious Runoff Depth=1.23"
Flow Length=887' Tc=29.9 min CN=78 Runoff=11.47 cfs 1.135 af

Subcatchment7S: Proposed Area #1 Runoff Area=2.000 ac 40.00% Impervious Runoff Depth=1.86"
Flow Length=277' Tc=10.8 min CN=87 Runoff=5.54 cfs 0.310 af

Subcatchment13S: Area #2 Runoff Area=0.250 ac 44.00% Impervious Runoff Depth=1.94"
Tc=6.0 min CN=88 Runoff=0.85 cfs 0.040 af

Subcatchment20S: Proposed Area #2 Runoff Area=8.990 ac 6.45% Impervious Runoff Depth=1.36"
Flow Length=887' Tc=29.9 min CN=80 Runoff=10.40 cfs 1.016 af

Subcatchment21S: Proposed Area #3 Runoff Area=0.340 ac 50.00% Impervious Runoff Depth=2.03"
Tc=6.0 min CN=89 Runoff=1.20 cfs 0.057 af

Pond 8P: New SWMF Peak Elev=720.98' Storage=7,631 cf Inflow=5.54 cfs 0.310 af
Primary=0.28 cfs 0.304 af Secondary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.304 af

Link 6L: Total Existing off-site drainage Inflow=11.58 cfs 1.176 af
Primary=11.58 cfs 1.176 af

Link 9L: Existing Analysis Point A Inflow=11.47 cfs 1.135 af
Primary=11.47 cfs 1.135 af

Link 10L: Existing Analysis point B Inflow=0.85 cfs 0.040 af
Primary=0.85 cfs 0.040 af

Link 11L: Proposed Analysis Point A Inflow=10.66 cfs 1.320 af
Primary=10.66 cfs 1.320 af

Link 12L: Total Proposed off-site drainage Inflow=10.81 cfs 1.378 af
Primary=10.81 cfs 1.378 af

Link 13L: Proposed Analysis Point B Inflow=1.20 cfs 0.057 af
Primary=1.20 cfs 0.057 af

Total Runoff Area = 22.660 ac Runoff Volume = 2.559 af Average Runoff Depth = 1.36"
92.37% Pervious = 20.930 ac 7.63% Impervious = 1.730 ac

Summary for Subcatchment 3S: Area #1

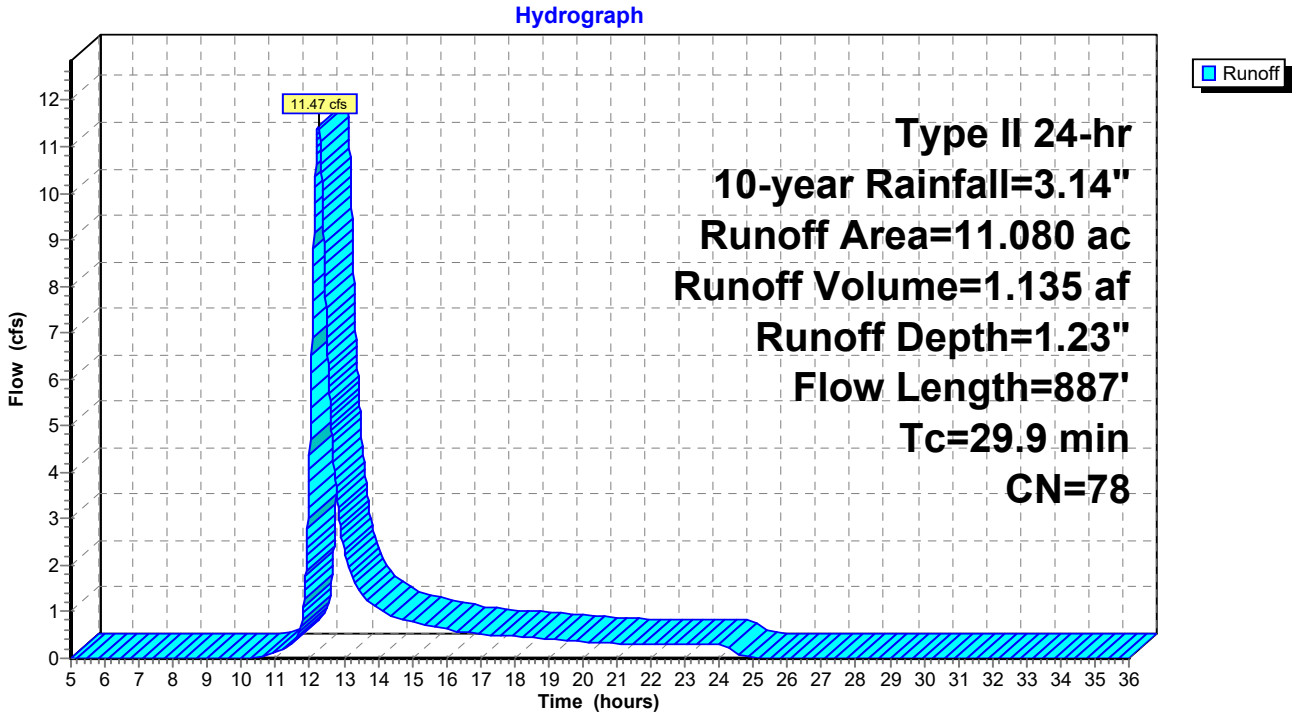
Runoff = 11.47 cfs @ 12.26 hrs, Volume= 1.135 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.14"

Area (ac)	CN	Description
0.070	98	Paved parking, HSG D
0.160	80	>75% Grass cover, Good, HSG D
10.850	78	Meadow, non-grazed, HSG D
11.080	78	Weighted Average
11.010		99.37% Pervious Area
0.070		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 3S: Area #1



Summary for Subcatchment 7S: Proposed Area #1

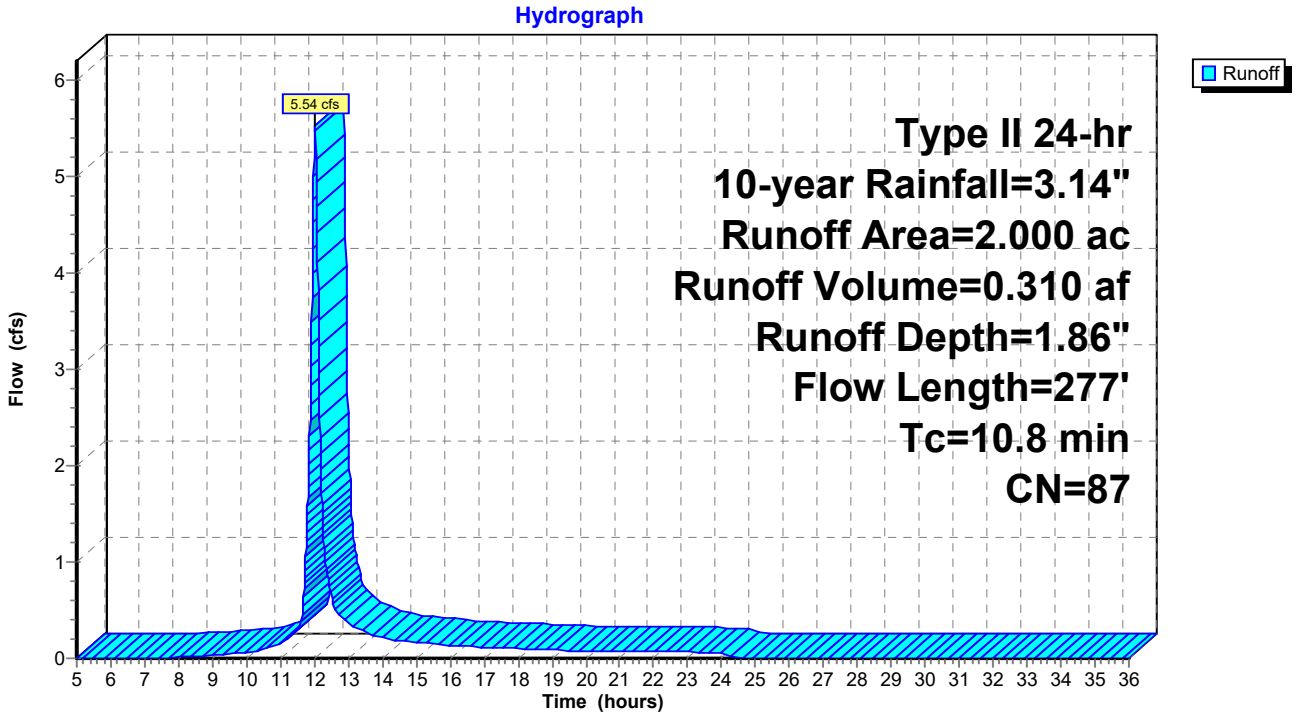
Runoff = 5.54 cfs @ 12.02 hrs, Volume= 0.310 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.14"

Area (ac)	CN	Description
0.620	98	Paved parking, HSG D
0.180	98	Water Surface, HSG D
1.200	80	>75% Grass cover, Good, HSG D
2.000	87	Weighted Average
1.200		60.00% Pervious Area
0.800		40.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0300	0.17		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.18"
0.2	44	0.0700	4.26		**Shallow Concentrated Flow, Shallow cocentrated** Unpaved Kv= 16.1 fps
0.4	73	0.0130	3.31	14.88	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.1	50	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.0	10	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
10.8	277	Total			

Subcatchment 7S: Proposed Area #1



Summary for Subcatchment 13S: Area #2

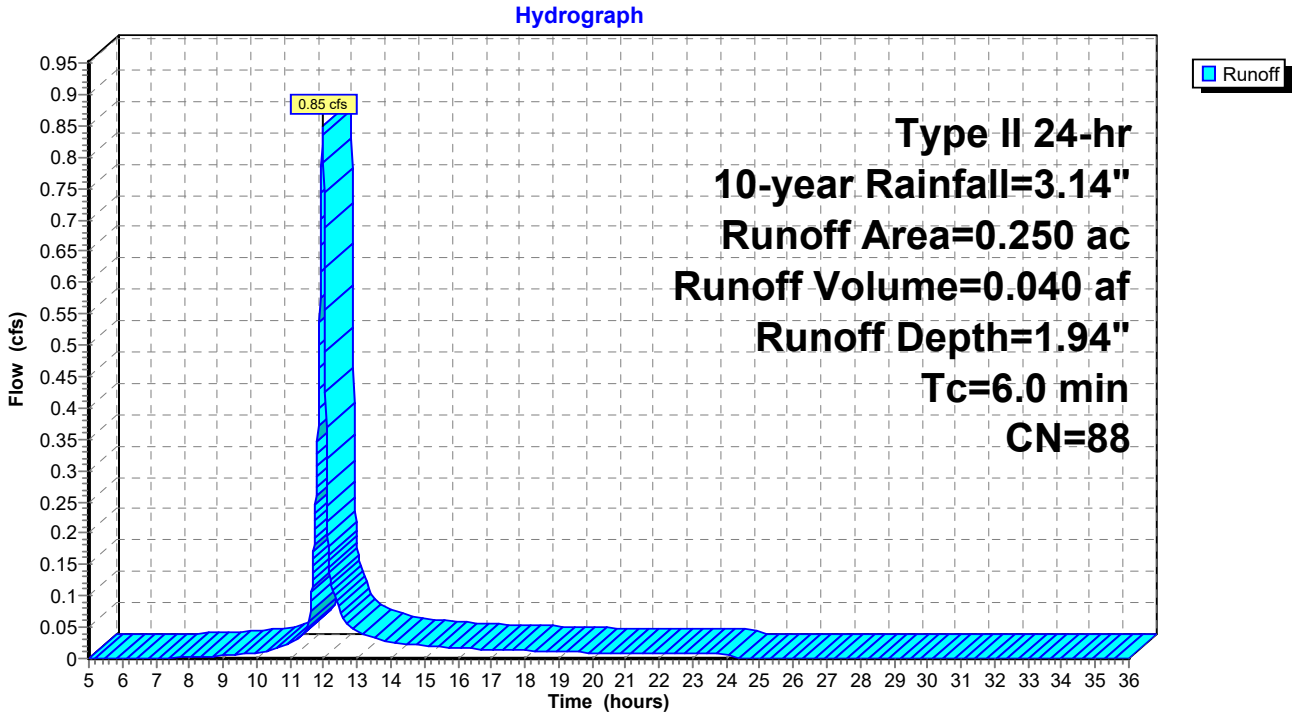
Runoff = 0.85 cfs @ 11.97 hrs, Volume= 0.040 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.14"

Area (ac)	CN	Description
0.110	98	Paved parking, HSG D
0.140	80	>75% Grass cover, Good, HSG D
0.250	88	Weighted Average
0.140		56.00% Pervious Area
0.110		44.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 13S: Area #2



Summary for Subcatchment 20S: Proposed Area #2

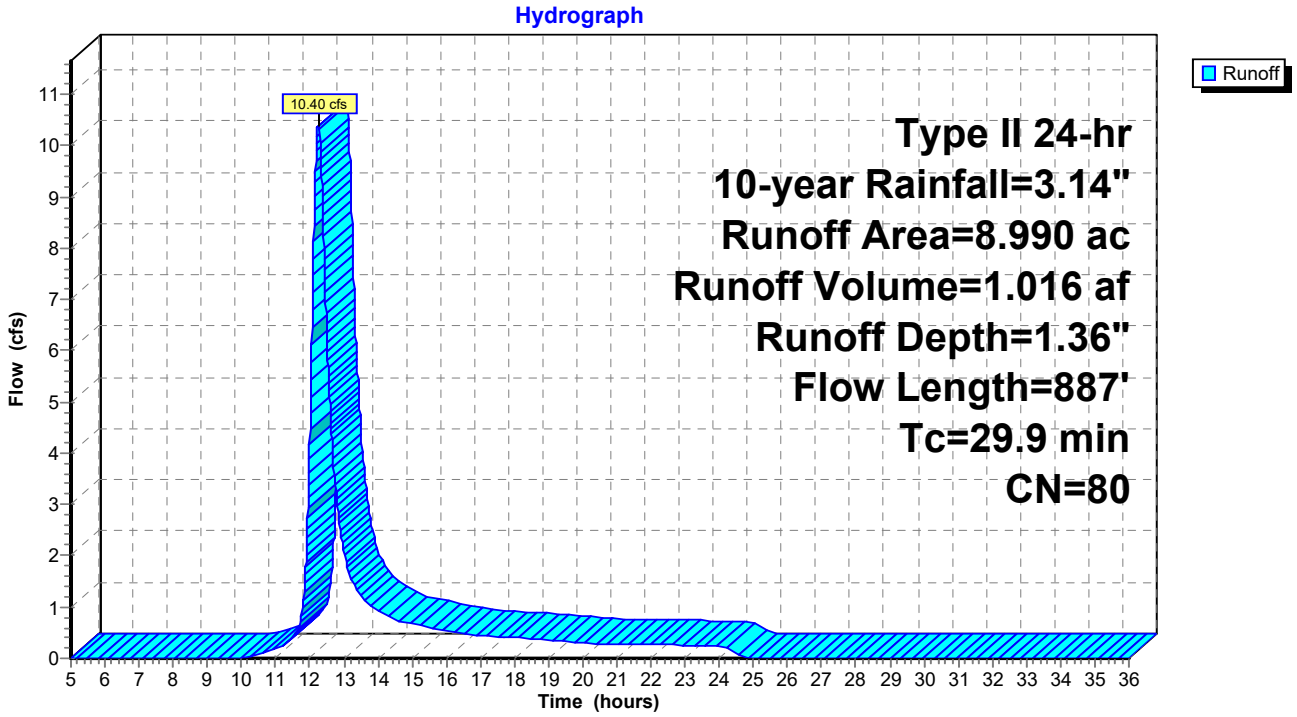
Runoff = 10.40 cfs @ 12.26 hrs, Volume= 1.016 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.14"

Area (ac)	CN	Description
0.580	98	Paved parking, HSG D
1.480	80	>75% Grass cover, Good, HSG D
6.930	78	Meadow, non-grazed, HSG D
8.990	80	Weighted Average
8.410		93.55% Pervious Area
0.580		6.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 20S: Proposed Area #2



Summary for Subcatchment 21S: Proposed Area #3

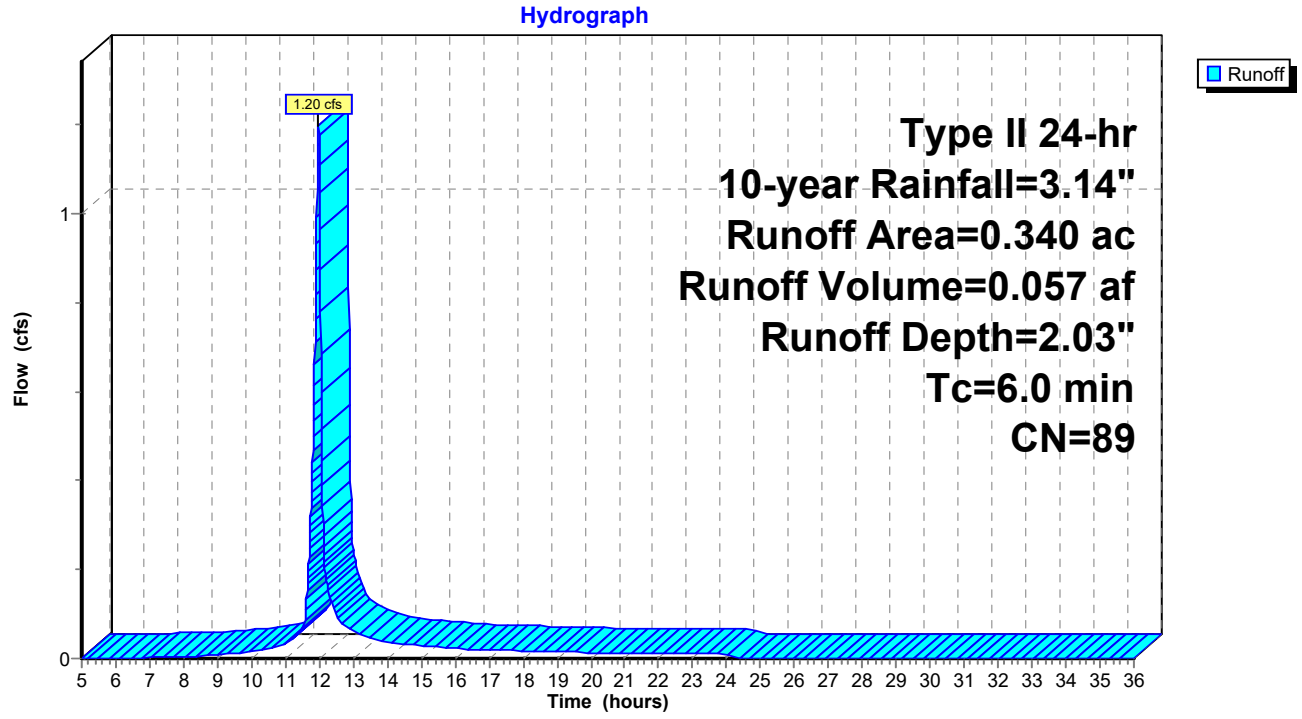
Runoff = 1.20 cfs @ 11.97 hrs, Volume= 0.057 af, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.14"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG D
0.170	80	>75% Grass cover, Good, HSG D
0.340	89	Weighted Average
0.170		50.00% Pervious Area
0.170		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 21S: Proposed Area #3



Summary for Pond 8P: New SWMF

Inflow Area = 2.000 ac, 40.00% Impervious, Inflow Depth = 1.86" for 10-year event
Inflow = 5.54 cfs @ 12.02 hrs, Volume= 0.310 af
Outflow = 0.28 cfs @ 13.48 hrs, Volume= 0.304 af, Atten= 95%, Lag= 87.6 min
Primary = 0.28 cfs @ 13.48 hrs, Volume= 0.304 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 720.98' @ 13.48 hrs Surf.Area= 6,054 sf Storage= 7,631 cf

Plug-Flow detention time= 354.5 min calculated for 0.304 af (98% of inflow)
Center-of-Mass det. time= 342.9 min (1,163.9 - 821.0)

Volume	Invert	Avail.Storage	Storage Description
#1	719.50'	30,752 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

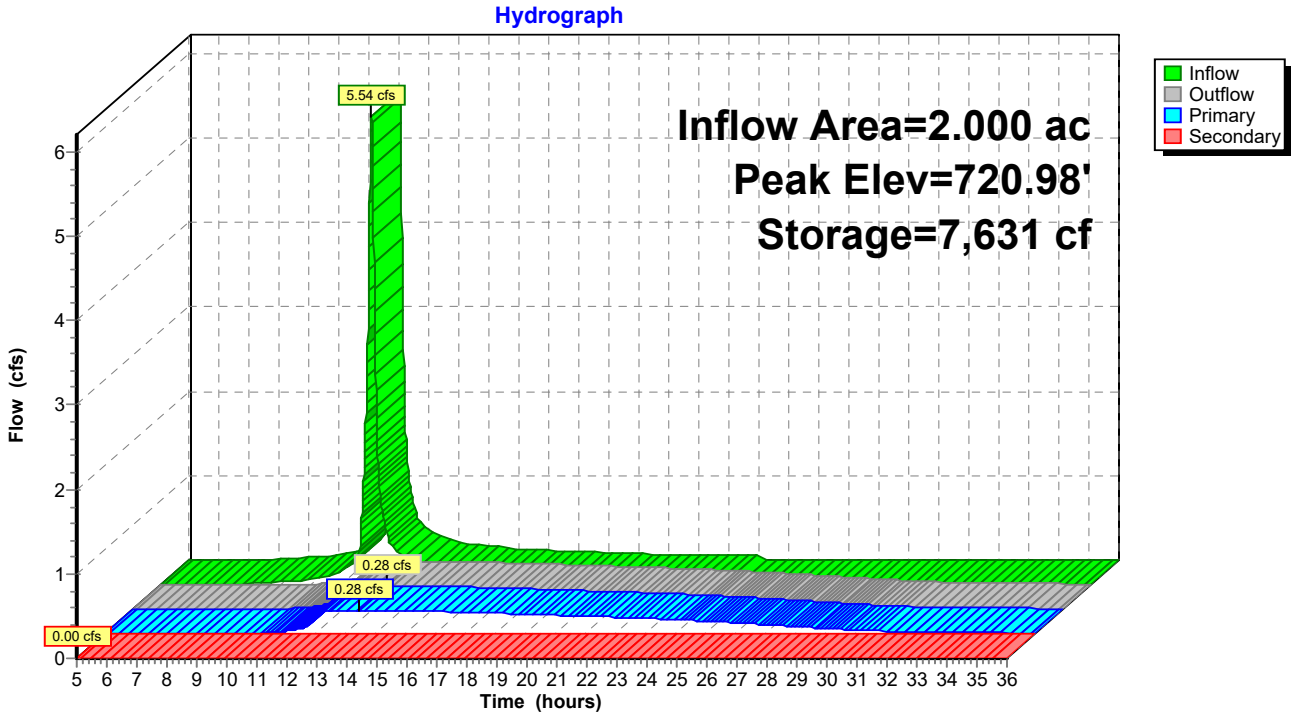
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
719.50	4,263	0	0
720.00	4,837	2,275	2,275
721.00	6,074	5,456	7,731
722.00	8,185	7,130	14,860
723.00	11,333	9,759	24,619
723.50	13,200	6,133	30,752

Device	Routing	Invert	Outlet Devices
#1	Primary	719.50'	**12.0" Round Culvert** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 719.50' / 717.50' S= 0.0230 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	722.00'	**24.0" x 24.0" Horiz. 2'x2' grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	722.50'	**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
#4	Device 1	719.50'	**3.0" Vert. 3" orifice** C= 0.600

Primary OutFlow Max=0.28 cfs @ 13.48 hrs HW=720.98' (Free Discharge)
└─**1=Culvert** (Passes 0.28 cfs of 3.75 cfs potential flow)
  ├─**2=2'x2' grate** (Controls 0.00 cfs)
  └─**4=3" orifice** (Orifice Controls 0.28 cfs @ 5.61 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=719.50' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: New SWMF

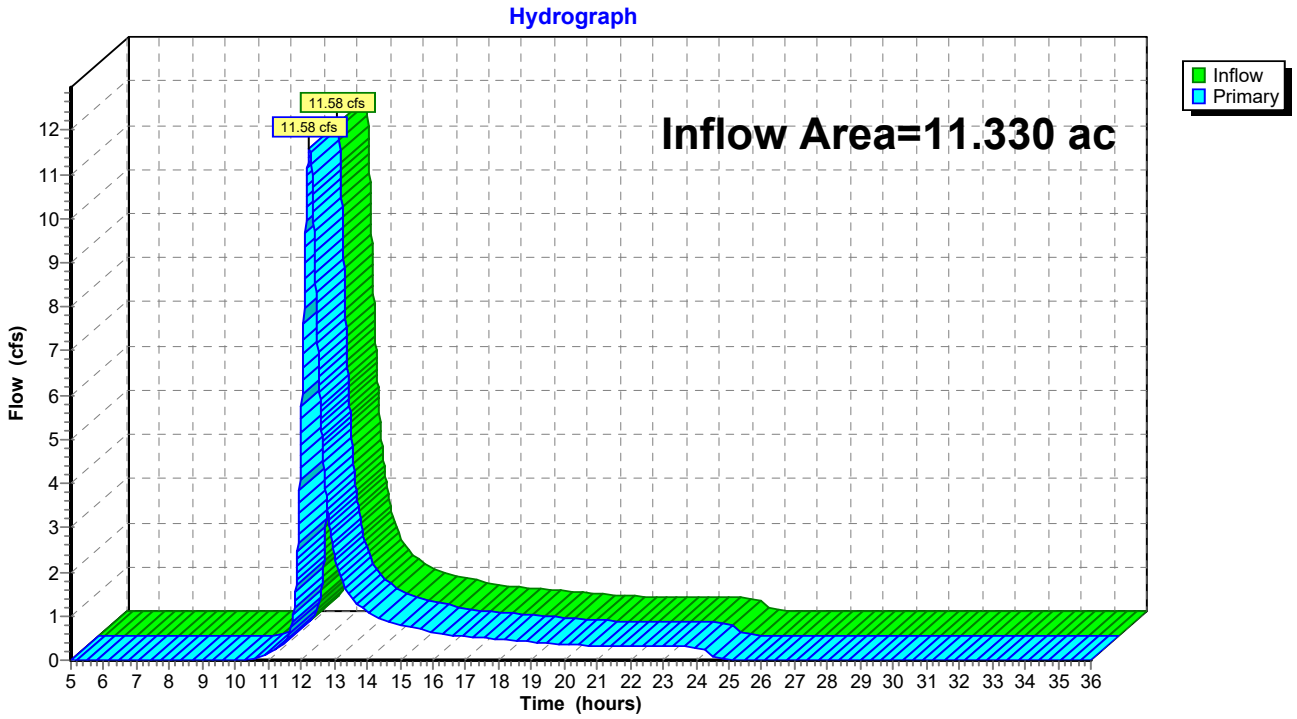


Summary for Link 6L: Total Existing off-site drainage

Inflow Area = 11.330 ac, 1.59% Impervious, Inflow Depth = 1.25" for 10-year event
Inflow = 11.58 cfs @ 12.26 hrs, Volume= 1.176 af
Primary = 11.58 cfs @ 12.26 hrs, Volume= 1.176 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 6L: Total Existing off-site drainage

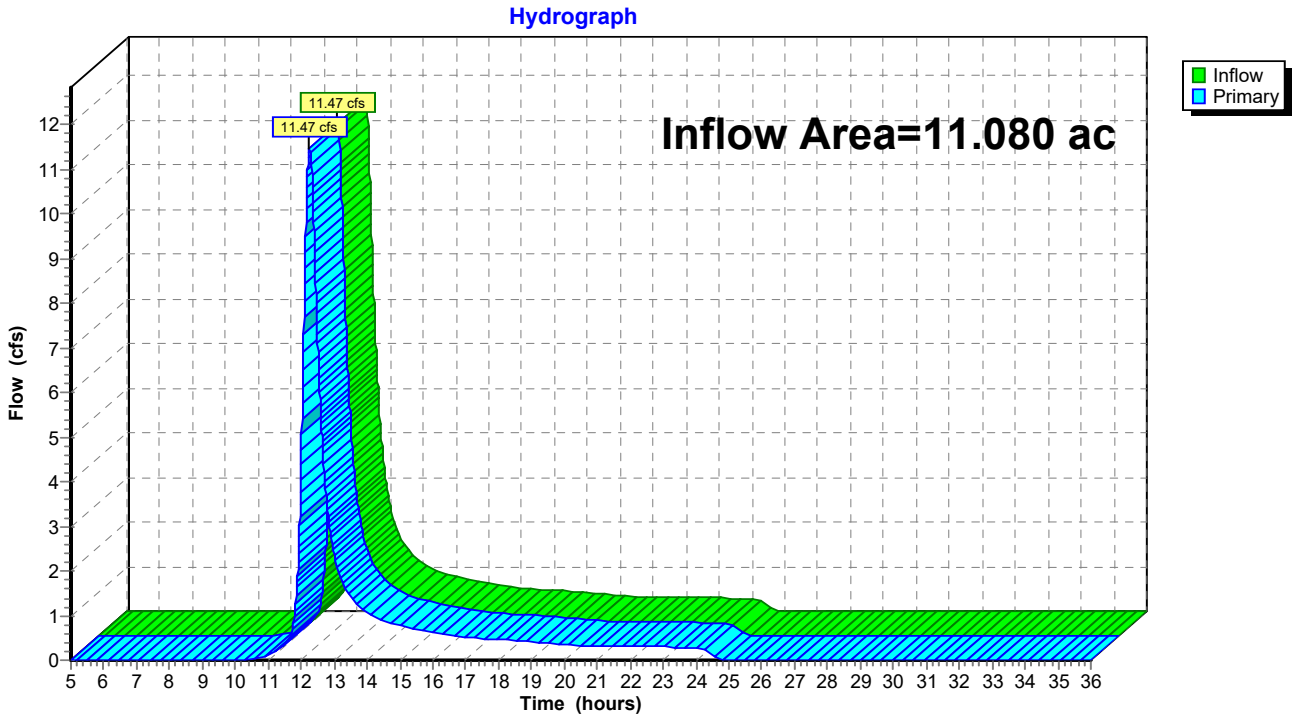


Summary for Link 9L: Existing Analysis Point A

Inflow Area = 11.080 ac, 0.63% Impervious, Inflow Depth = 1.23" for 10-year event
Inflow = 11.47 cfs @ 12.26 hrs, Volume= 1.135 af
Primary = 11.47 cfs @ 12.26 hrs, Volume= 1.135 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 9L: Existing Analysis Point A

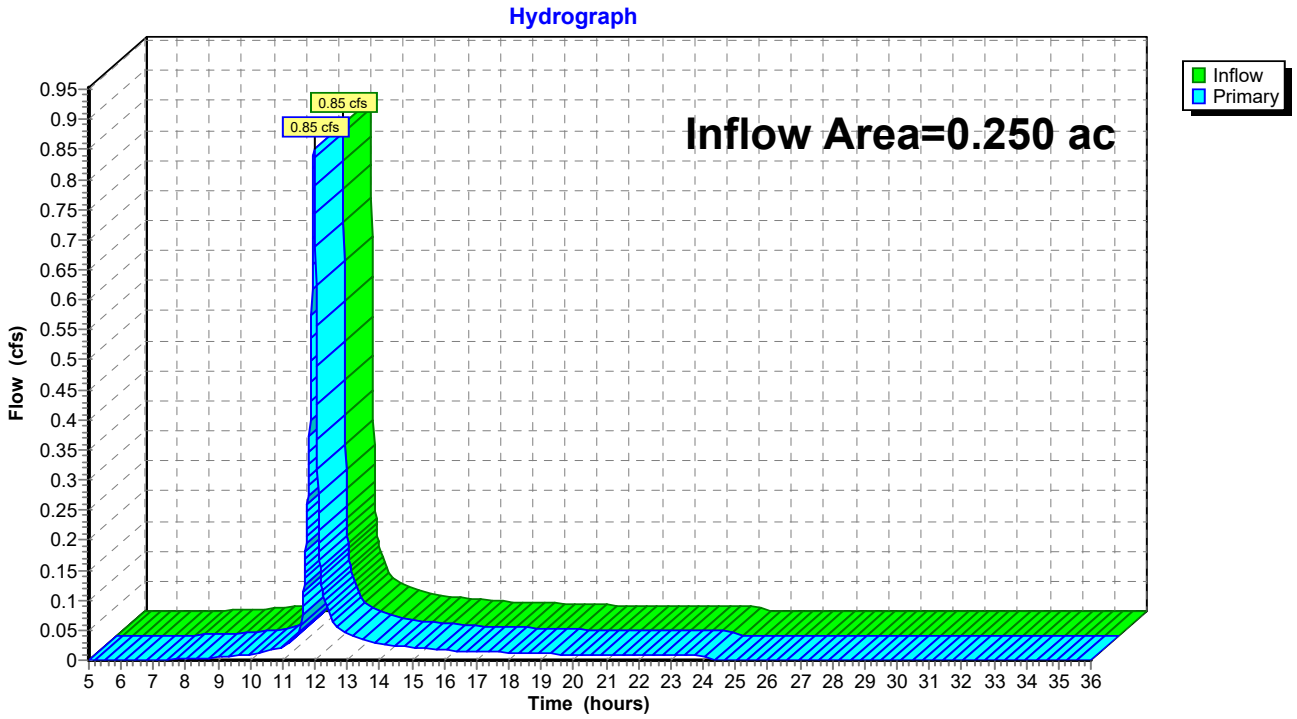


Summary for Link 10L: Existing Analysis point B

Inflow Area = 0.250 ac, 44.00% Impervious, Inflow Depth = 1.94" for 10-year event
Inflow = 0.85 cfs @ 11.97 hrs, Volume= 0.040 af
Primary = 0.85 cfs @ 11.97 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 10L: Existing Analysis point B

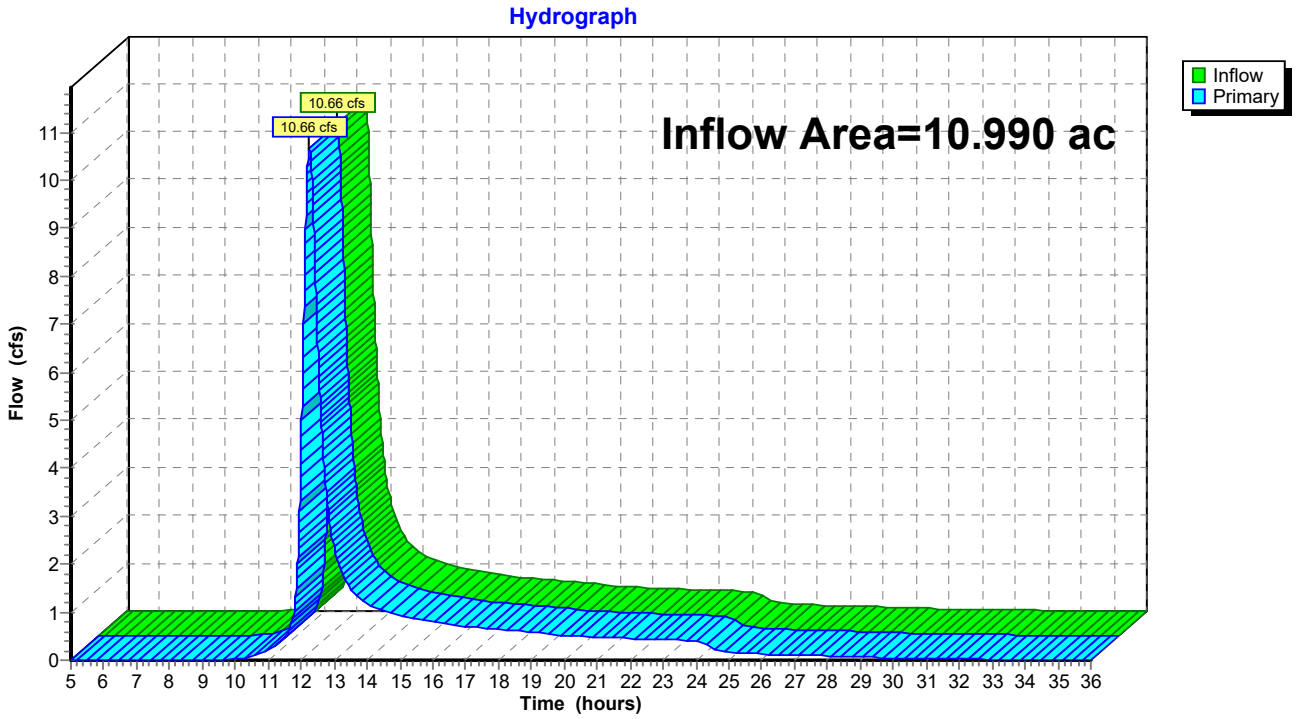


Summary for Link 11L: Proposed Analysis Point A

Inflow Area = 10.990 ac, 12.56% Impervious, Inflow Depth > 1.44" for 10-year event
Inflow = 10.66 cfs @ 12.26 hrs, Volume= 1.320 af
Primary = 10.66 cfs @ 12.26 hrs, Volume= 1.320 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 11L: Proposed Analysis Point A

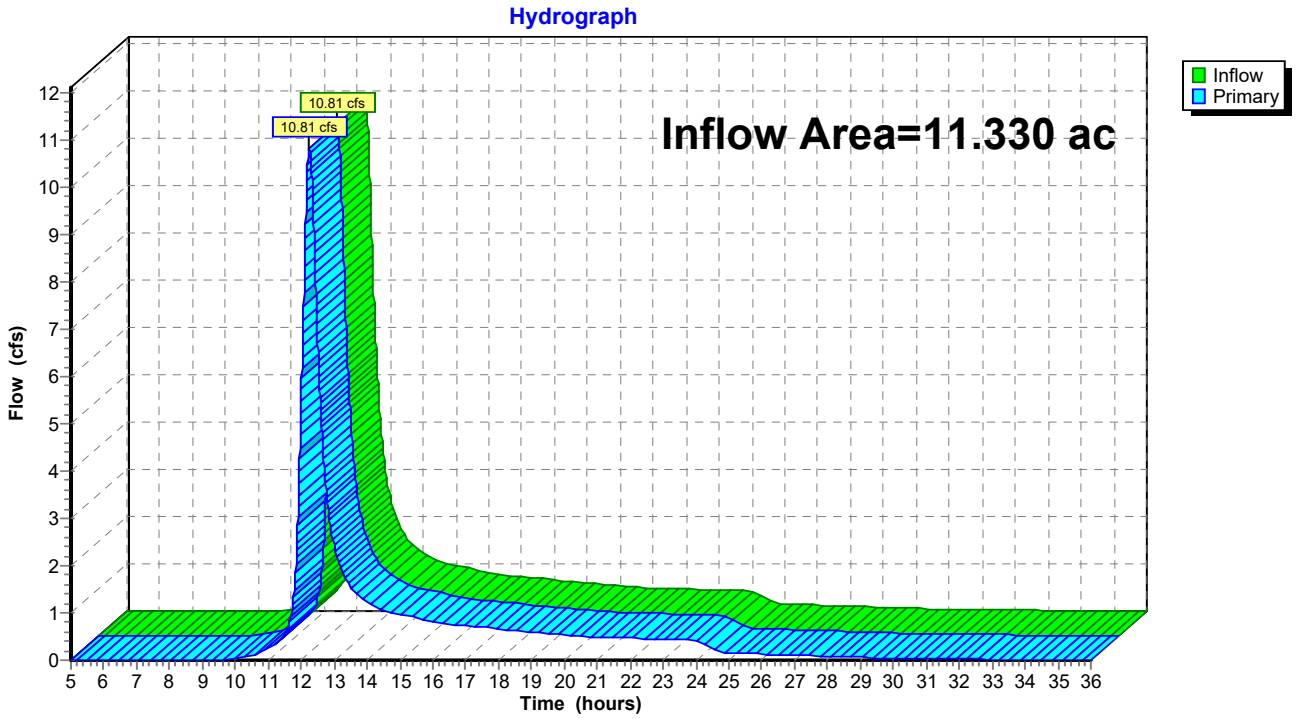


Summary for Link 12L: Total Proposed off-site drainage

Inflow Area = 11.330 ac, 13.68% Impervious, Inflow Depth > 1.46" for 10-year event
Inflow = 10.81 cfs @ 12.26 hrs, Volume= 1.378 af
Primary = 10.81 cfs @ 12.26 hrs, Volume= 1.378 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 12L: Total Proposed off-site drainage

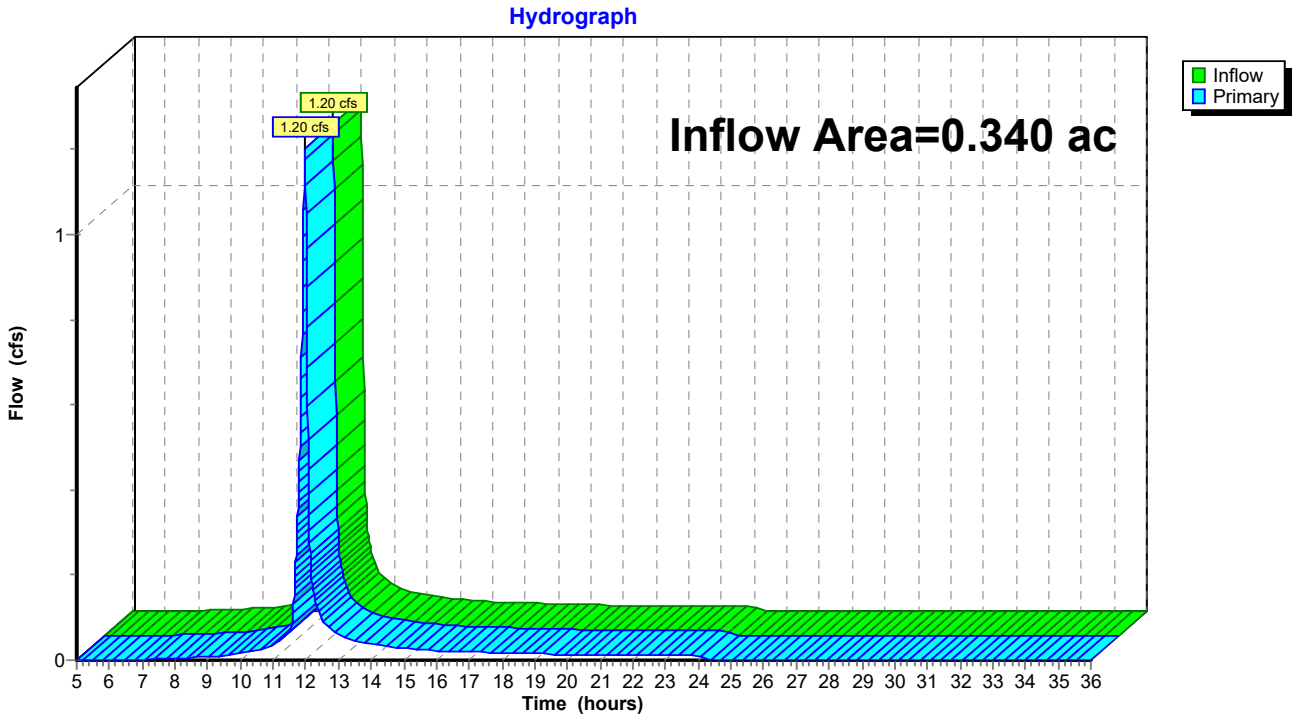


Summary for Link 13L: Proposed Analysis Point B

Inflow Area = 0.340 ac, 50.00% Impervious, Inflow Depth = 2.03" for 10-year event
Inflow = 1.20 cfs @ 11.97 hrs, Volume= 0.057 af
Primary = 1.20 cfs @ 11.97 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 13L: Proposed Analysis Point B



Time span=5.00-36.00 hrs, dt=0.01 hrs, 3101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment3S: Area #1 Runoff Area=11.080 ac 0.63% Impervious Runoff Depth=2.96"
Flow Length=887' Tc=29.9 min CN=78 Runoff=28.48 cfs 2.733 af

Subcatchment7S: Proposed Area #1 Runoff Area=2.000 ac 40.00% Impervious Runoff Depth>3.84"
Flow Length=277' Tc=10.8 min CN=87 Runoff=11.09 cfs 0.640 af

Subcatchment13S: Area #2 Runoff Area=0.250 ac 44.00% Impervious Runoff Depth>3.94"
Tc=6.0 min CN=88 Runoff=1.66 cfs 0.082 af

Subcatchment20S: Proposed Area #2 Runoff Area=8.990 ac 6.45% Impervious Runoff Depth=3.15"
Flow Length=887' Tc=29.9 min CN=80 Runoff=24.59 cfs 2.358 af

Subcatchment21S: Proposed Area #3 Runoff Area=0.340 ac 50.00% Impervious Runoff Depth>4.05"
Tc=6.0 min CN=89 Runoff=2.30 cfs 0.115 af

Pond 8P: New SWMF Peak Elev=722.09' Storage=15,577 cf Inflow=11.09 cfs 0.640 af
Primary=1.05 cfs 0.618 af Secondary=0.00 cfs 0.000 af Outflow=1.05 cfs 0.618 af

Link 6L: Total Existing off-site drainage Inflow=28.68 cfs 2.815 af
Primary=28.68 cfs 2.815 af

Link 9L: Existing Analysis Point A Inflow=28.48 cfs 2.733 af
Primary=28.48 cfs 2.733 af

Link 10L: Existing Analysis point B Inflow=1.66 cfs 0.082 af
Primary=1.66 cfs 0.082 af

Link 11L: Proposed Analysis Point A Inflow=24.95 cfs 2.976 af
Primary=24.95 cfs 2.976 af

Link 12L: Total Proposed off-site drainage Inflow=25.23 cfs 3.091 af
Primary=25.23 cfs 3.091 af

Link 13L: Proposed Analysis Point B Inflow=2.30 cfs 0.115 af
Primary=2.30 cfs 0.115 af

Total Runoff Area = 22.660 ac Runoff Volume = 5.927 af Average Runoff Depth = 3.14"
92.37% Pervious = 20.930 ac 7.63% Impervious = 1.730 ac

Summary for Subcatchment 3S: Area #1

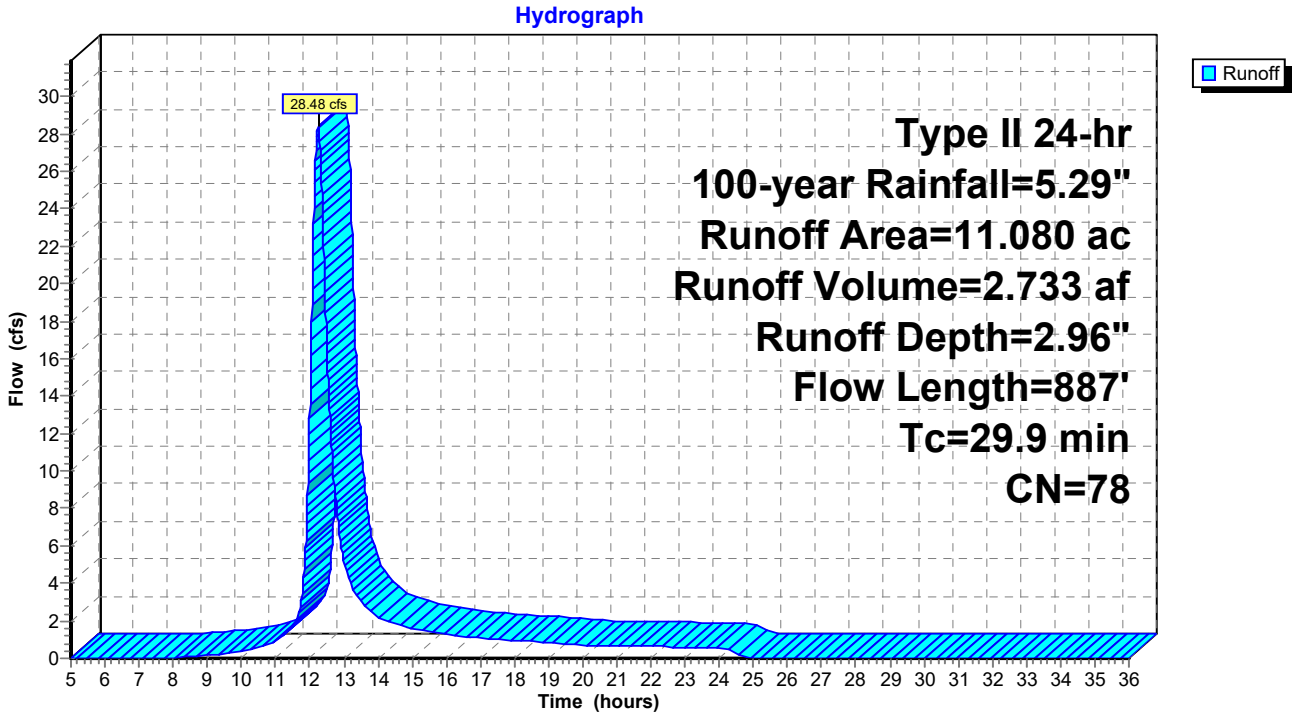
Runoff = 28.48 cfs @ 12.25 hrs, Volume= 2.733 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year Rainfall=5.29"

Area (ac)	CN	Description
0.070	98	Paved parking, HSG D
0.160	80	>75% Grass cover, Good, HSG D
10.850	78	Meadow, non-grazed, HSG D
11.080	78	Weighted Average
11.010		99.37% Pervious Area
0.070		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 3S: Area #1



Summary for Subcatchment 7S: Proposed Area #1

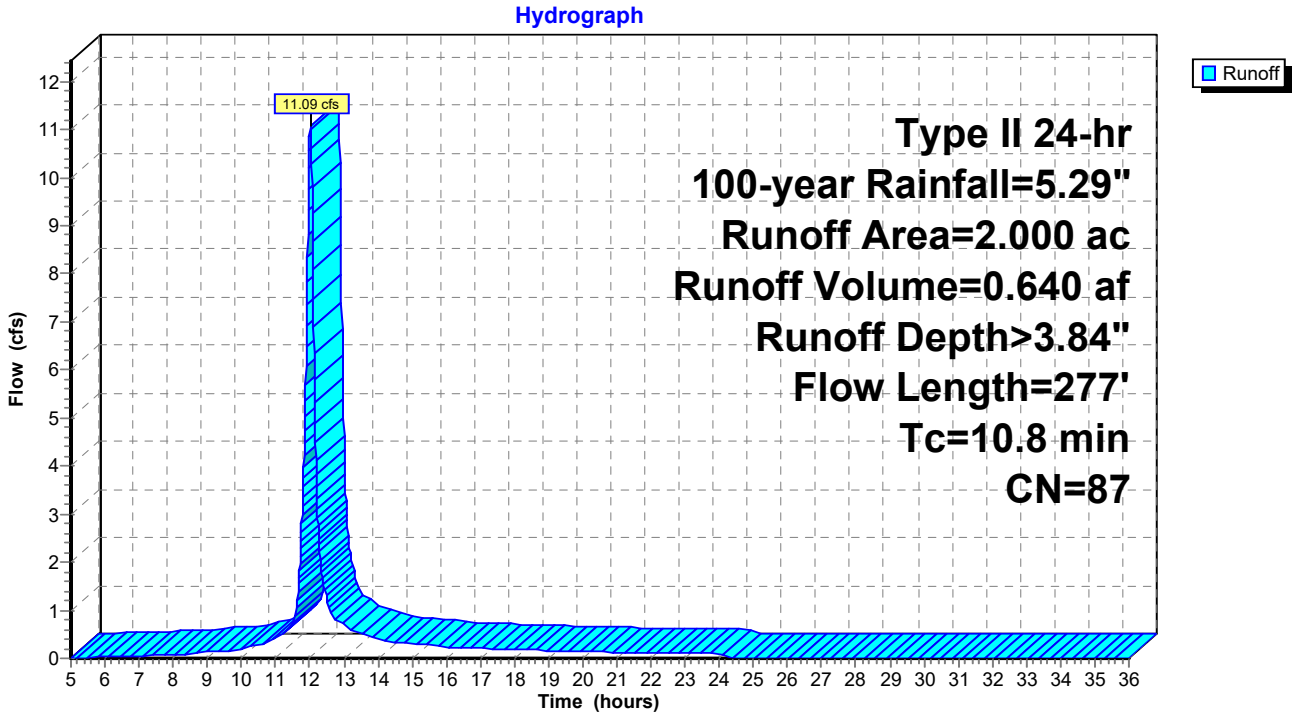
Runoff = 11.09 cfs @ 12.02 hrs, Volume= 0.640 af, Depth> 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year Rainfall=5.29"

Area (ac)	CN	Description
0.620	98	Paved parking, HSG D
0.180	98	Water Surface, HSG D
1.200	80	>75% Grass cover, Good, HSG D
2.000	87	Weighted Average
1.200		60.00% Pervious Area
0.800		40.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0300	0.17		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 2.18"
0.2	44	0.0700	4.26		**Shallow Concentrated Flow, Shallow cocentrated** Unpaved Kv= 16.1 fps
0.4	73	0.0130	3.31	14.88	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.1	50	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
0.0	10	0.0500	6.48	29.18	**Channel Flow, Channel Flow** Area= 4.5 sf Perim= 16.0' r= 0.28' n= 0.022 Earth, clean & straight
10.8	277	Total			

Subcatchment 7S: Proposed Area #1



Summary for Subcatchment 13S: Area #2

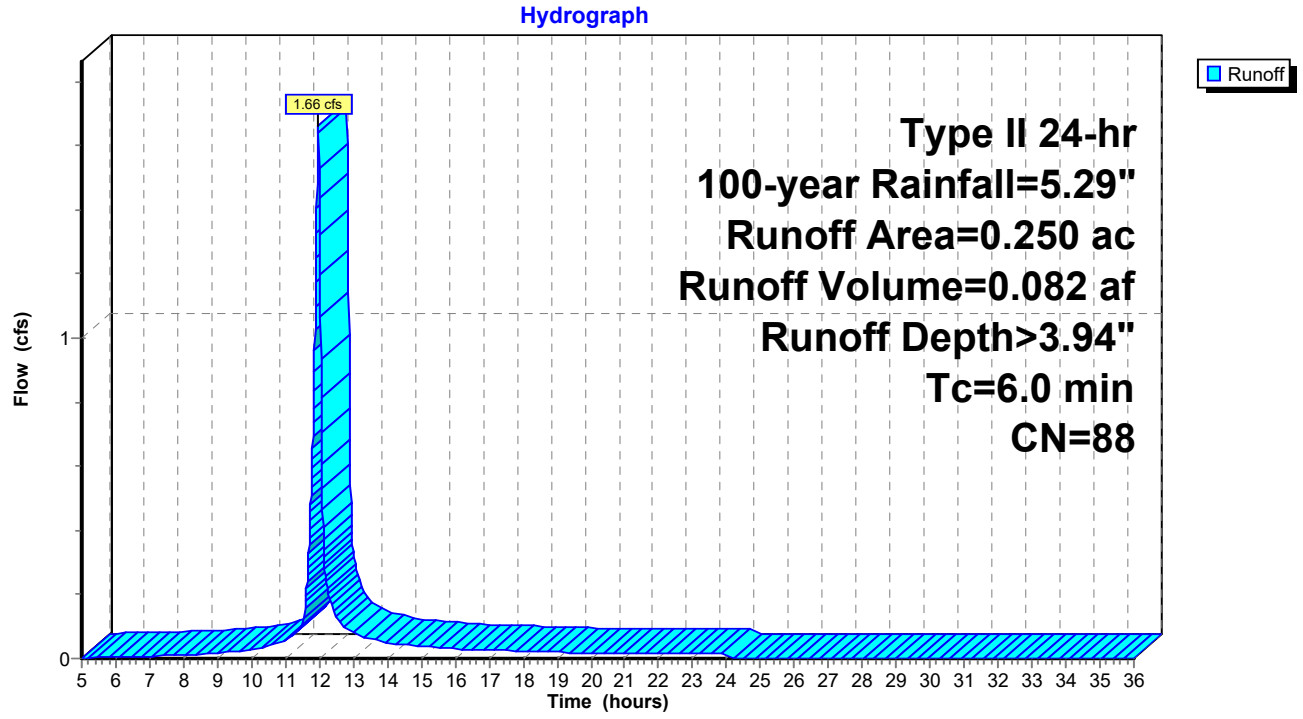
Runoff = 1.66 cfs @ 11.97 hrs, Volume= 0.082 af, Depth> 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year Rainfall=5.29"

Area (ac)	CN	Description
0.110	98	Paved parking, HSG D
0.140	80	>75% Grass cover, Good, HSG D
0.250	88	Weighted Average
0.140		56.00% Pervious Area
0.110		44.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 13S: Area #2



Summary for Subcatchment 20S: Proposed Area #2

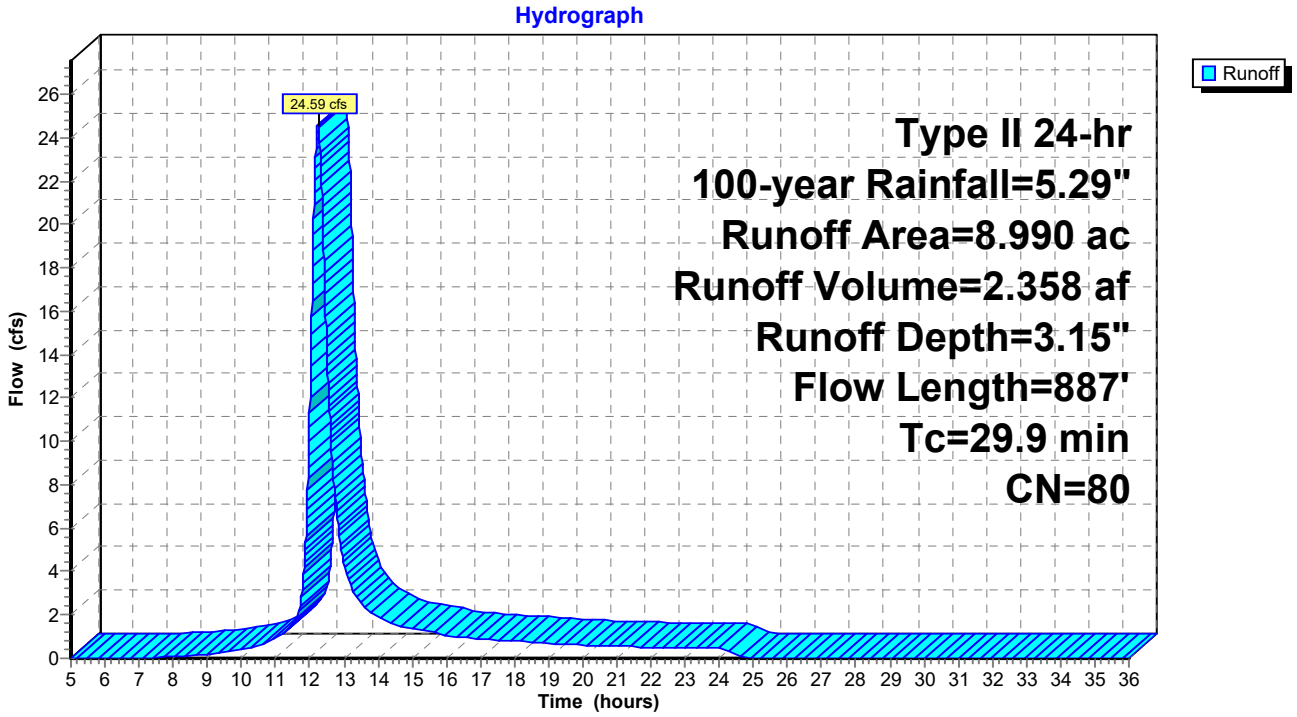
Runoff = 24.59 cfs @ 12.25 hrs, Volume= 2.358 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year Rainfall=5.29"

Area (ac)	CN	Description
0.580	98	Paved parking, HSG D
1.480	80	>75% Grass cover, Good, HSG D
6.930	78	Meadow, non-grazed, HSG D
8.990	80	Weighted Average
8.410		93.55% Pervious Area
0.580		6.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.2	100	0.0060	0.08		**Sheet Flow, Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.18"
4.2	340	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
2.8	260	0.0300	1.56		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
1.4	117	0.0230	1.36		**Shallow Concentrated Flow, Shallow concentrated** Cultivated Straight Rows Kv= 9.0 fps
0.3	70	0.0280	4.12	36.25	**Channel Flow, Channel Flow** Area= 8.8 sf Perim= 40.0' r= 0.22' n= 0.022 Earth, clean & straight
29.9	887	Total			

Subcatchment 20S: Proposed Area #2



Summary for Subcatchment 21S: Proposed Area #3

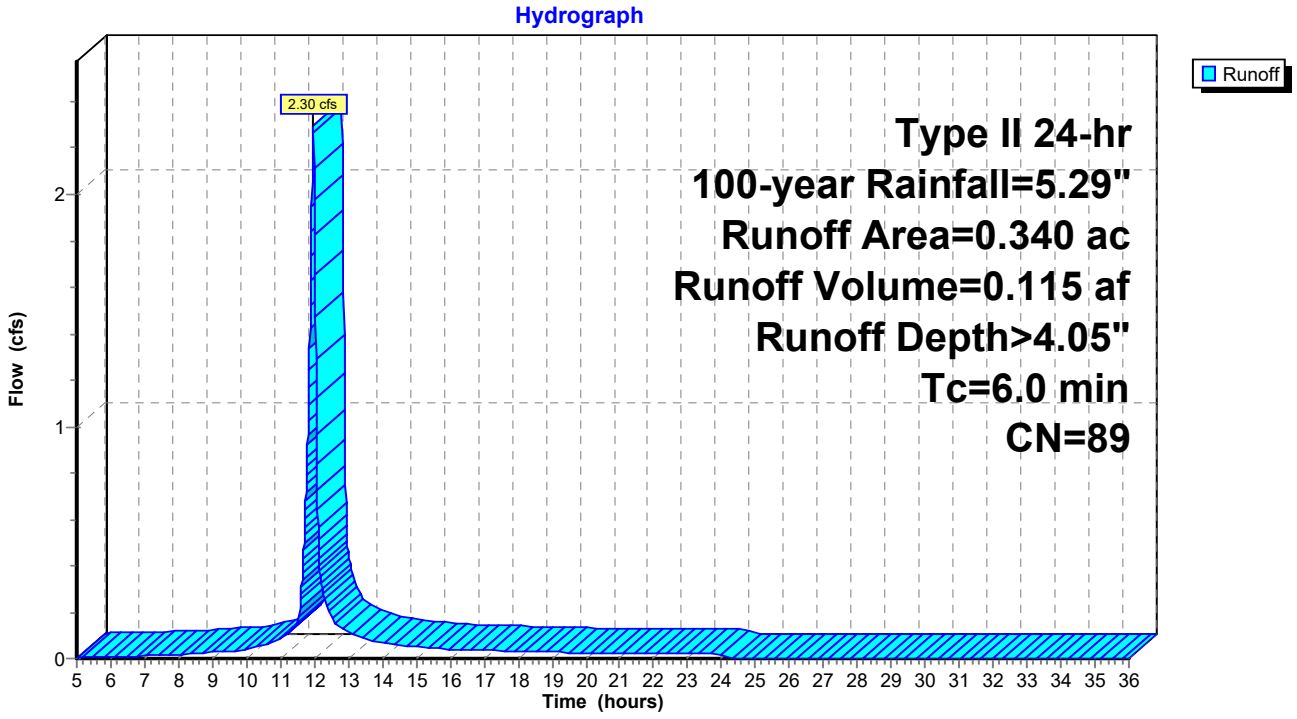
Runoff = 2.30 cfs @ 11.97 hrs, Volume= 0.115 af, Depth> 4.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year Rainfall=5.29"

Area (ac)	CN	Description
0.170	98	Paved parking, HSG D
0.170	80	>75% Grass cover, Good, HSG D
0.340	89	Weighted Average
0.170		50.00% Pervious Area
0.170		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min (TR-55 min)**

Subcatchment 21S: Proposed Area #3



Summary for Pond 8P: New SWMF

Inflow Area = 2.000 ac, 40.00% Impervious, Inflow Depth > 3.84" for 100-year event
Inflow = 11.09 cfs @ 12.02 hrs, Volume= 0.640 af
Outflow = 1.05 cfs @ 12.58 hrs, Volume= 0.618 af, Atten= 91%, Lag= 33.5 min
Primary = 1.05 cfs @ 12.58 hrs, Volume= 0.618 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 722.09' @ 12.58 hrs Surf.Area= 8,456 sf Storage= 15,577 cf

Plug-Flow detention time= 449.5 min calculated for 0.618 af (97% of inflow)
Center-of-Mass det. time= 428.7 min (1,229.3 - 800.5)

Volume	Invert	Avail.Storage	Storage Description
#1	719.50'	30,752 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

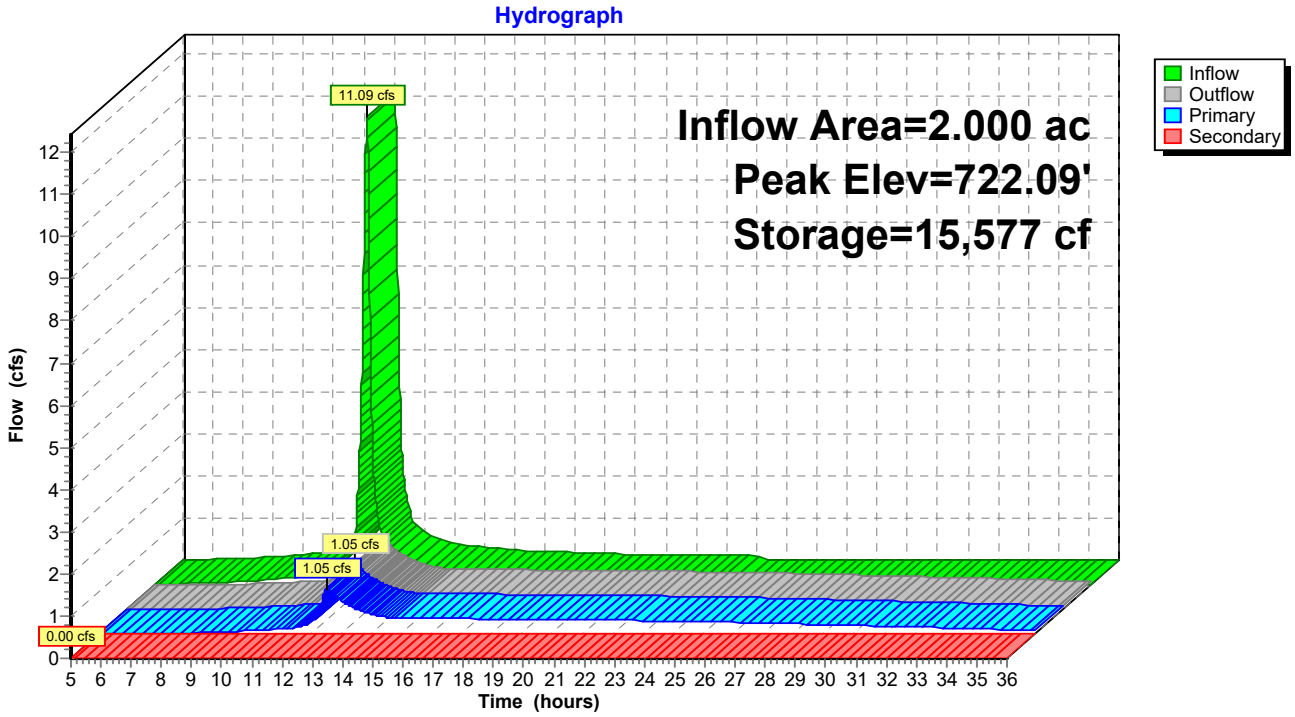
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
719.50	4,263	0	0
720.00	4,837	2,275	2,275
721.00	6,074	5,456	7,731
722.00	8,185	7,130	14,860
723.00	11,333	9,759	24,619
723.50	13,200	6,133	30,752

Device	Routing	Invert	Outlet Devices
#1	Primary	719.50'	**12.0" Round Culvert** L= 87.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 719.50' / 717.50' S= 0.0230 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	722.00'	**24.0" x 24.0" Horiz. 2'x2' grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	722.50'	**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
#4	Device 1	719.50'	**3.0" Vert. 3" orifice** C= 0.600

Primary OutFlow Max=1.03 cfs @ 12.58 hrs HW=722.09' (Free Discharge)
└─**1=Culvert** (Passes 1.03 cfs of 5.46 cfs potential flow)
  ├─**2=2'x2' grate** (Weir Controls 0.66 cfs @ 0.96 fps)
  └─**4=3" orifice** (Orifice Controls 0.37 cfs @ 7.55 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=719.50' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: New SWMF

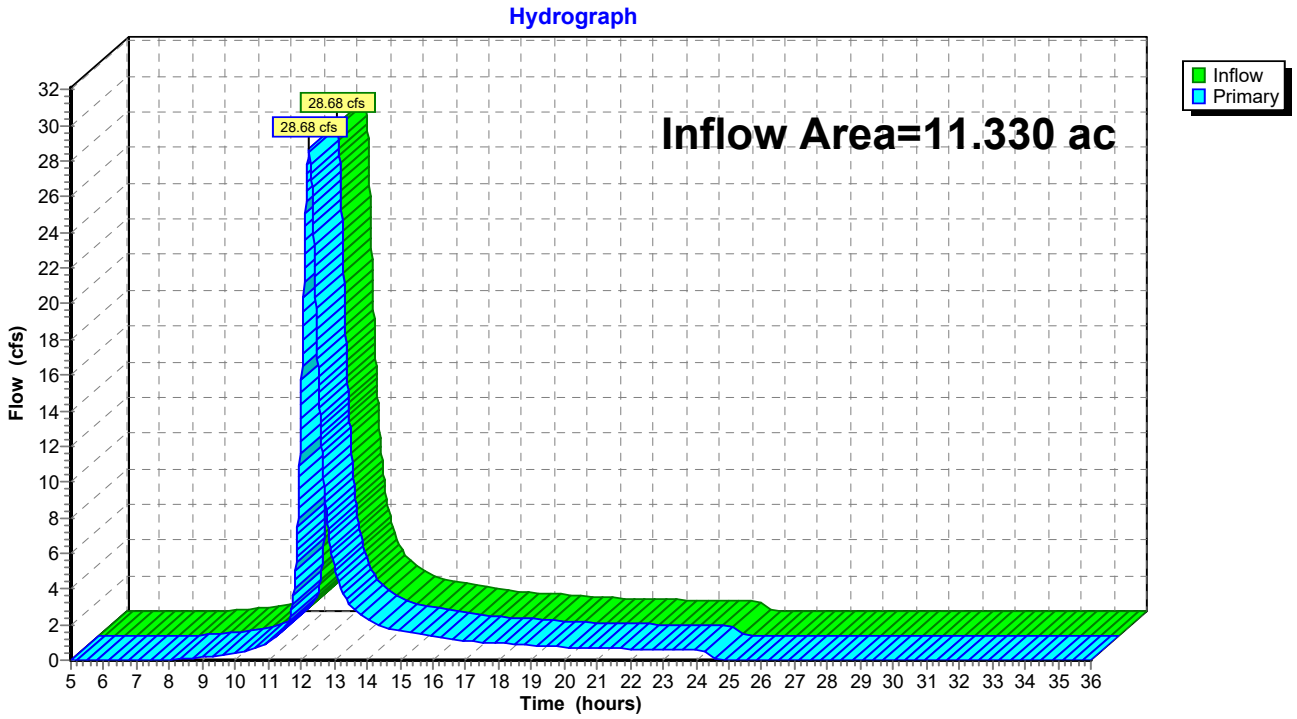


Summary for Link 6L: Total Existing off-site drainage

Inflow Area = 11.330 ac, 1.59% Impervious, Inflow Depth = 2.98" for 100-year event
Inflow = 28.68 cfs @ 12.25 hrs, Volume= 2.815 af
Primary = 28.68 cfs @ 12.25 hrs, Volume= 2.815 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 6L: Total Existing off-site drainage

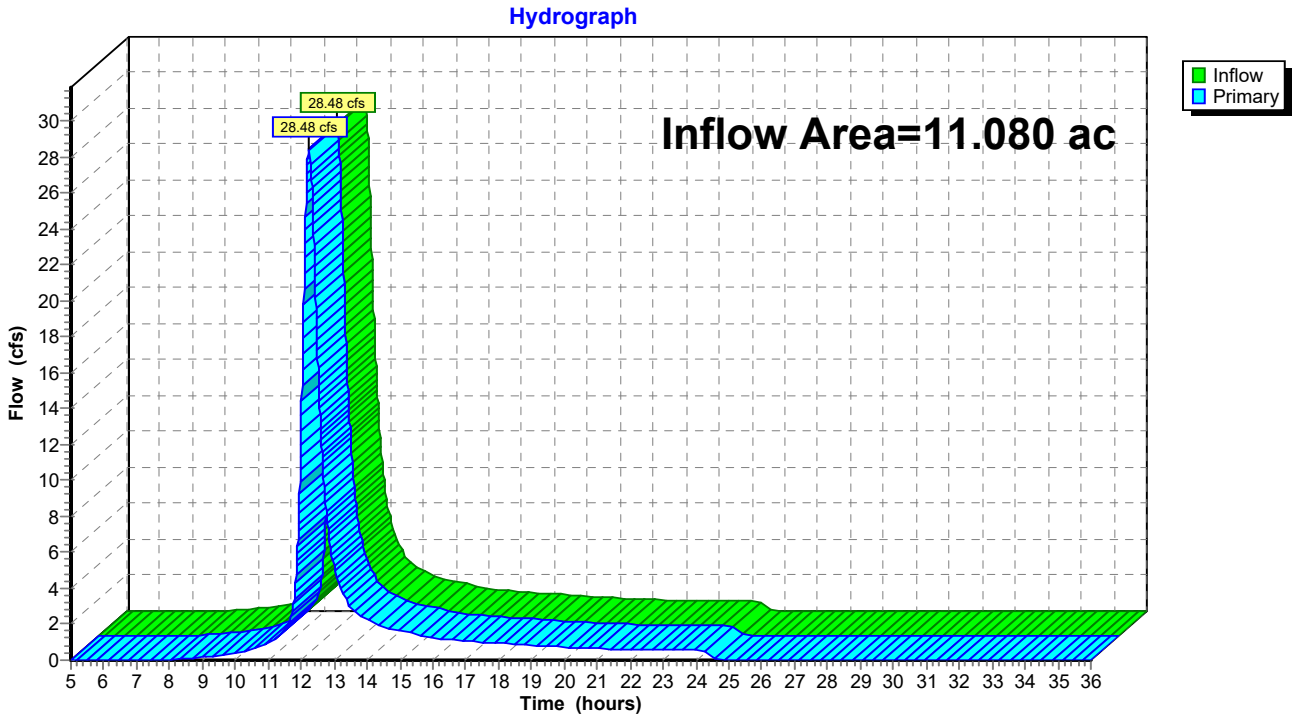


Summary for Link 9L: Existing Analysis Point A

Inflow Area = 11.080 ac, 0.63% Impervious, Inflow Depth = 2.96" for 100-year event
Inflow = 28.48 cfs @ 12.25 hrs, Volume= 2.733 af
Primary = 28.48 cfs @ 12.25 hrs, Volume= 2.733 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 9L: Existing Analysis Point A

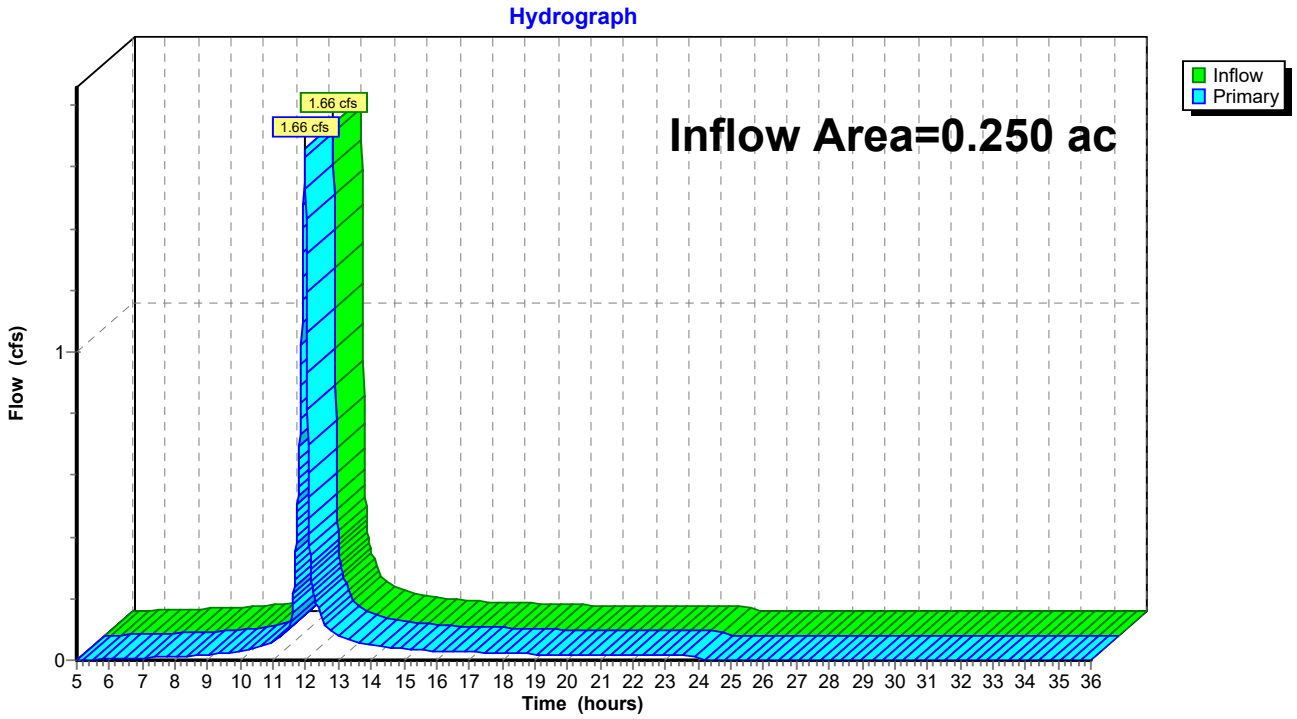


Summary for Link 10L: Existing Analysis point B

Inflow Area = 0.250 ac, 44.00% Impervious, Inflow Depth > 3.94" for 100-year event
Inflow = 1.66 cfs @ 11.97 hrs, Volume= 0.082 af
Primary = 1.66 cfs @ 11.97 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 10L: Existing Analysis point B

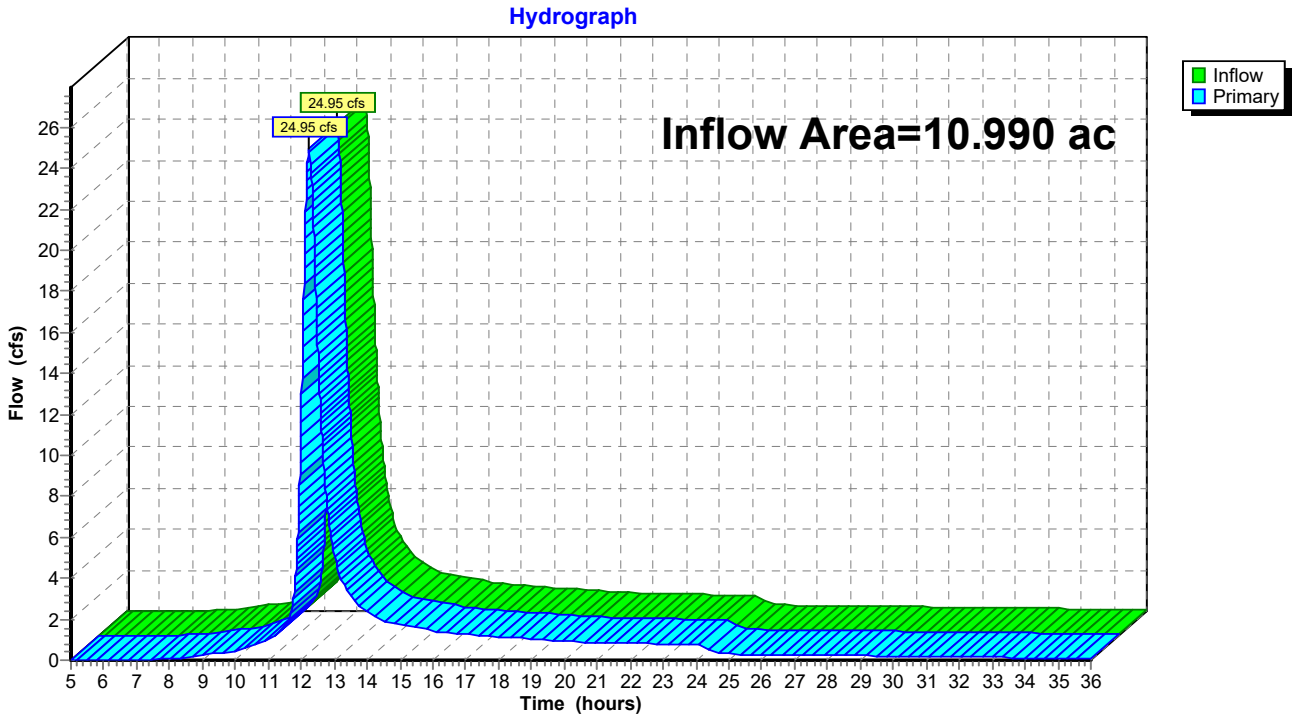


Summary for Link 11L: Proposed Analysis Point A

Inflow Area = 10.990 ac, 12.56% Impervious, Inflow Depth > 3.25" for 100-year event
Inflow = 24.95 cfs @ 12.25 hrs, Volume= 2.976 af
Primary = 24.95 cfs @ 12.25 hrs, Volume= 2.976 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 11L: Proposed Analysis Point A

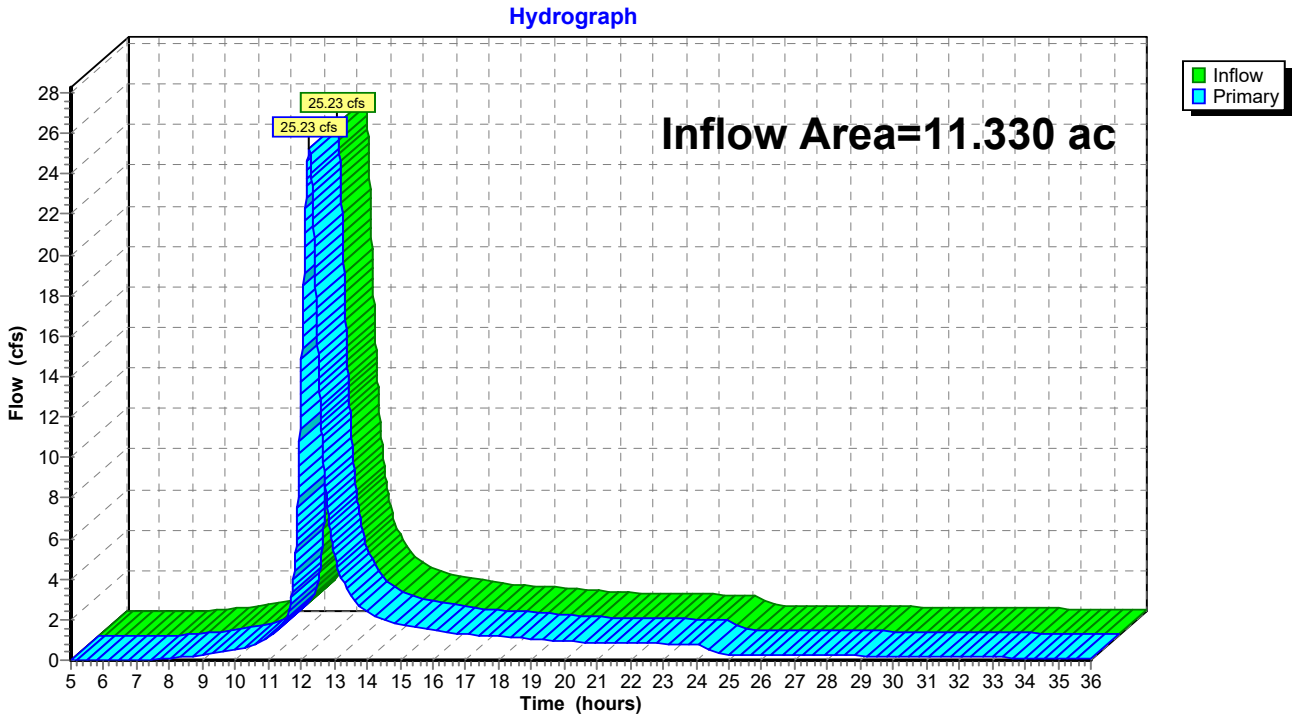


Summary for Link 12L: Total Proposed off-site drainage

Inflow Area = 11.330 ac, 13.68% Impervious, Inflow Depth > 3.27" for 100-year event
Inflow = 25.23 cfs @ 12.25 hrs, Volume= 3.091 af
Primary = 25.23 cfs @ 12.25 hrs, Volume= 3.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 12L: Total Proposed off-site drainage

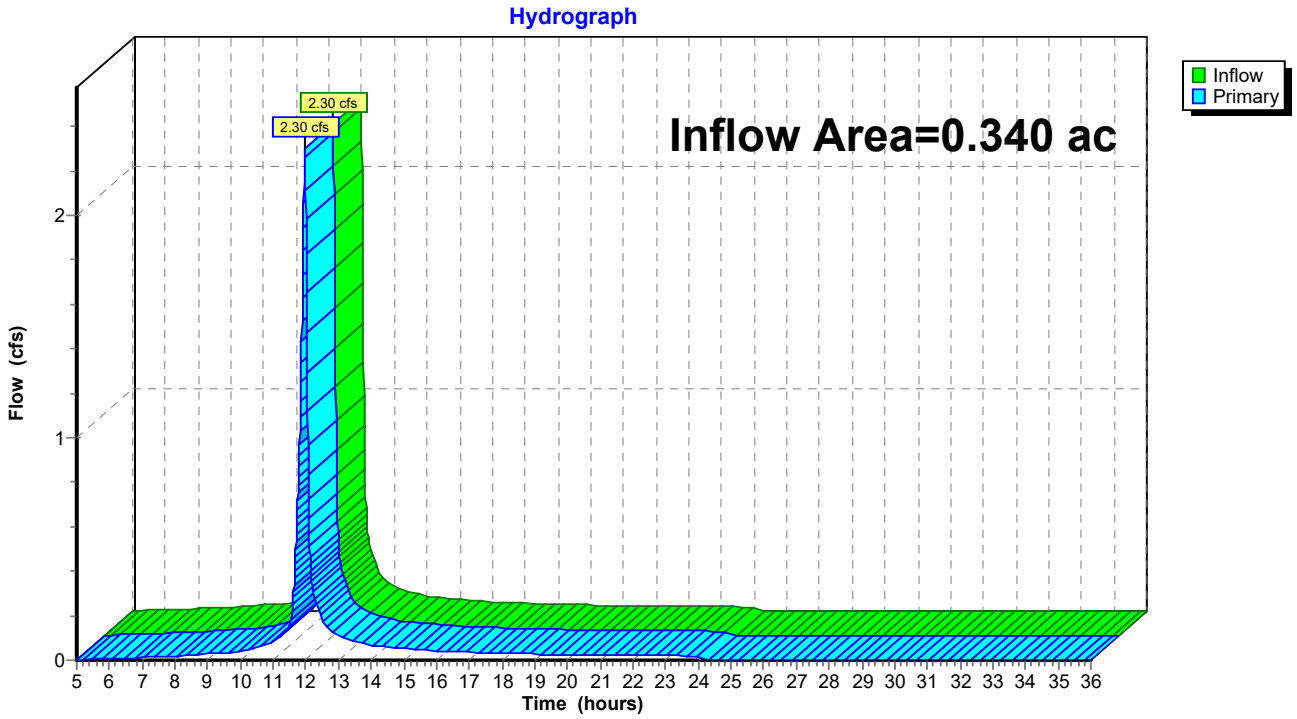


Summary for Link 13L: Proposed Analysis Point B

Inflow Area = 0.340 ac, 50.00% Impervious, Inflow Depth > 4.05" for 100-year event
Inflow = 2.30 cfs @ 11.97 hrs, Volume= 0.115 af
Primary = 2.30 cfs @ 11.97 hrs, Volume= 0.115 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-36.00 hrs, dt= 0.01 hrs

Link 13L: Proposed Analysis Point B



	CALCULATIONS :	Project No.: 22-210
		Date: 11/1/2022
	Project: Diversified Equipment	By: JWJ
	Overall WQv & RRv Calculations	Sheet 1 of 2

Subarea A

P (90% Rainfall Event) =	**1.00**	**inches**
Water Quality Area =	**7.5**	**acres**
Impervious Area =	**1.3**	**acres**
I = % Impervious =	**17.1**	%
Weighted S Value =	**0.20**	

Area= Total Lot Area

Hydrologic Soil Group (HSG) Specific Reduction Factor "S" =

Soil Classification	Area (ac)	S Factor	Weighted #
A Soils	**0**	0.5	0
B Soils	**0**	0.4	0
C Soils	**0**	0.3	0
D Soils	**7.5**	0.2	1.5

Total Area = 7.5 acres
Total Weighted # = 1.5

Weighted S Value = **0.20**

Rv = 0.05 + 0.009(I)

Rv = 0.2038051

WQv Required = P * Area * Rv / 12
WQv = 0.13 AC-FT

WQv = 5541 CF

Minimum allowable RRv = P * 0.95 * S * Impervious Area / 12
RRv Min = 0.0202937 AC-FT

Min Allowable RRv = 884 CF

	CALCULATIONS:	Project No.: 22-210
		Date: 11/1/2022
	Project: Diversified Equipment	By: JWJ
	WQv and RRv Summary	Sheet 2 of 2

Overall Required WQv = **5541 cf**

Minimum Allowable RRv = **884 cf**

WQv Total

WQv provided from Deep Pool	**7,572 cf**
WQv provided by dry swale #1	**1,928 cf**
WQv provided by dry swale #2	**1,863 cf**

Total WQv Provided = **11,363 cf**

RRv Total

RRv Provided by dry swale #1	**459 cf**
RRv Provided by dry swale #2	**617 cf**

Total RRv Provided = **1,076 cf**

Total WQv Provided =	**11,363 cf**	**>**	**5,541 cf**
Total RRv Provided =	**1,076 cf**	**>**	**884 cf**

	CALCULATIONS **:**	Project No.: **22-210**
		Date: **11/1/2022**
	Project: Channel Protection Volume Calculations	By: **JWJ**
		Sheet **1 of 5**

COMPUTE CHANNEL PROTECTION STORAGE VOLUME -
EXISTING STORMWATER MANAGEMENT FACILITY

Channel Protection Volume: Provide 24 hours of extended detention (T) for one-year event.

Design Storms 1-YEAR (in) 1.88

1. DETERMINE THE VALUE OF THE UNIT PEAK DISCHARGE (qu) USING TR-55 AND TYPE II

DRAINAGE AREA (A) TO FACILITY= **2.00 acres**

RUNOFF CURVE NUMBER (CN) = **87**

Ia = (200/CN - 2) **Ia VALUE =** **0.299**

Ia/P **Ia/P VALUE =** **0.159**

TIME OF CONCENTRATION (Tc) = **0.200 hrs.** (FROM DRAINAGE CALCULATIONS)

Peak Unit Discharge, (qu) (Exhibit 4-II) **qu =** **775 csm/in**

When T=24 hours, find qo/qi (Figure 3-15) **qo/qi =** **0.020**

$Vs/Vr = 0.683 - 1.43(qo/qi) + 1.64(qo/qi)^2 - 0.804(qo/qi)^3$
where Vs = channel protection storage (Cpv) and Vr = volume of runoff in inches

Vs/Vr **Vs/Vr VALUE =** **0.655**

Direct Runoff, Q (Figure 2-1) **Q VALUE =** **0.70 inches**

Channel Protection Storage, Vs
Vs = Cpv = (Vs/Vr)(Q)(1/12)(AREA)

Vs **Vs VALUE =** **0.076 ac-ft**
3329 CF

CPv = 3329 CF
CPv #2 = 8202 CF

Release Rate over 24 Hours 3329 ft^3 / [(24 hr) (3600 sec / hr)] = **0.039 cfs**

CHANNEL PROTECTION VOLUME PROVIDED

ELEVATION (ft)	CONTOUR AREA (ft^2)	TOTAL STORAGE (ft^3)
719.50	4,263	0
720.00	4,837	2,275
721.00	6,074	7,731
722.00	8,185	14,861

14,861 > 11,531
OK

Figure 2-1 Solution of runoff equation.

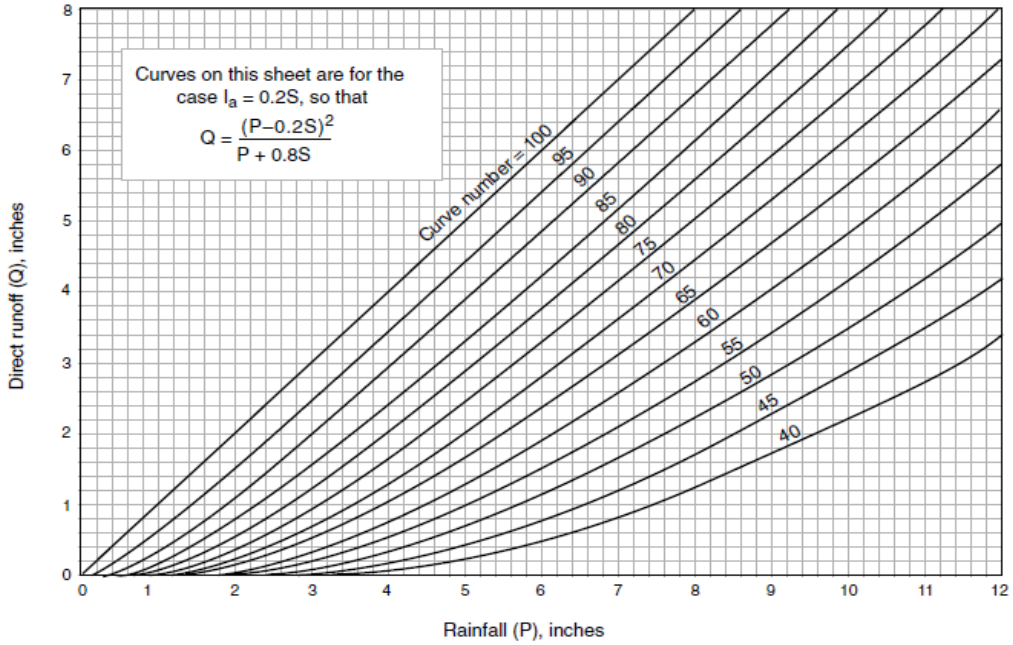


Figure 3-15. Detention Time vs. Discharge Ratios
(Source: Maryland Department of the Environment, 1998)

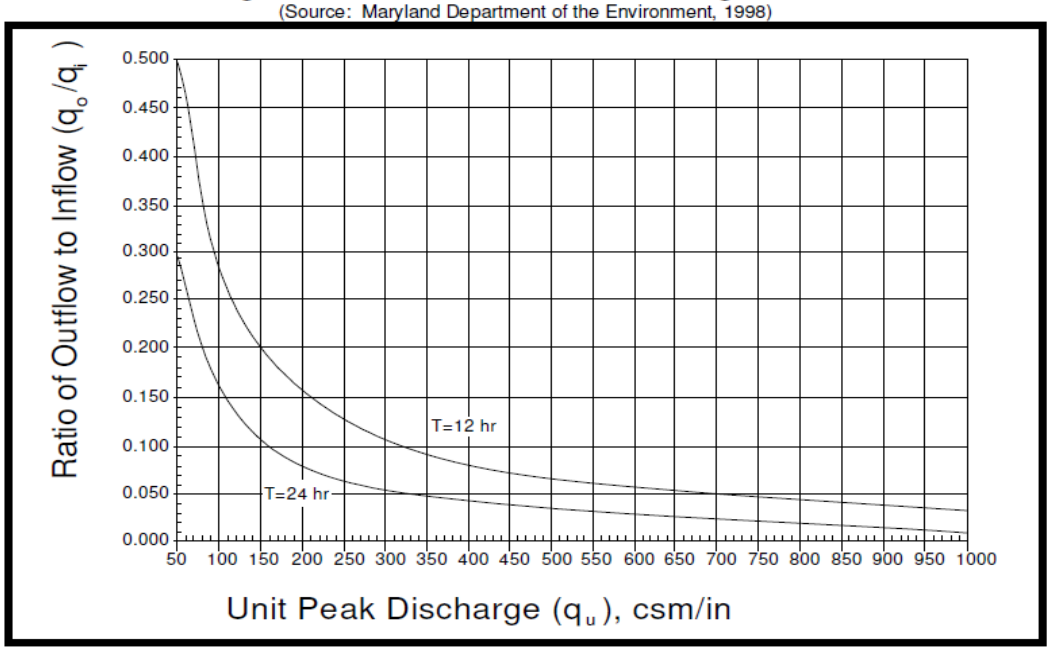
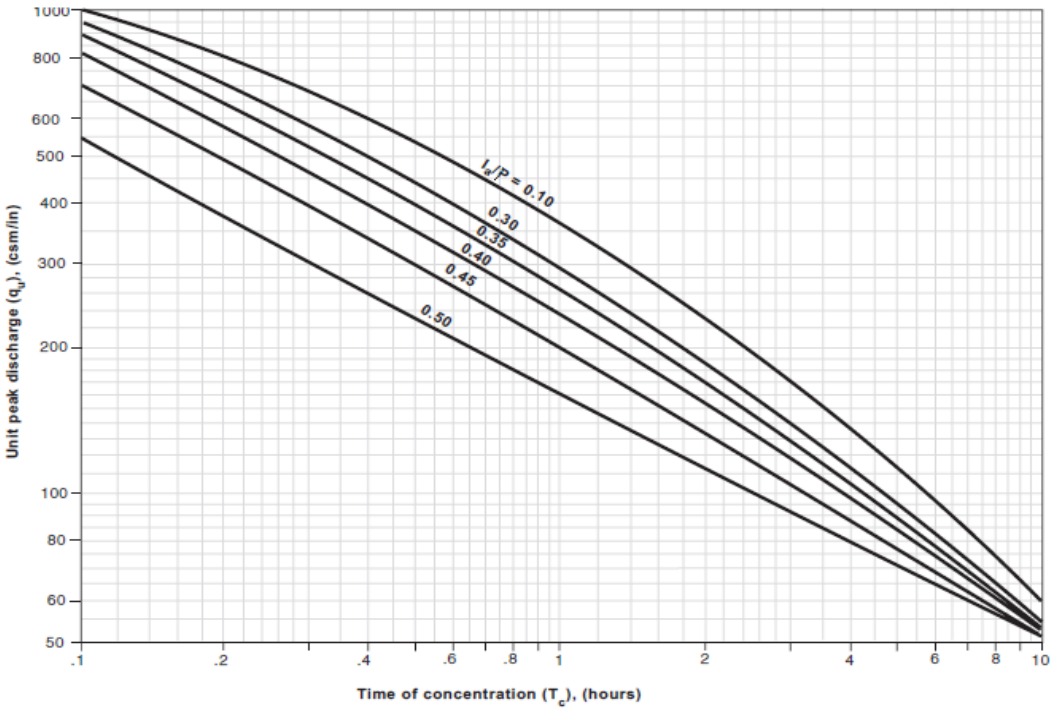


Exhibit 4-II Unit peal discharge (q_u) for NRCS (SCS) type II rainfall distribution



	CALCULATIONS **:**	Project No.: **22-210**
		Date: **11/1/2022**
	Project: Channel Protection Volume Calculations #2	By: **JWJ**
		Sheet **1 of 5**

COMPUTE CHANNEL PROTECTION STORAGE VOLUME -
EXISTING STORMWATER MANAGEMENT FACILITY

Channel Protection Volume: Provide 24 hours of extended detention (T) for one-year event.

Design Storms 1-YEAR (in) 1.88

1. DETERMINE THE VALUE OF THE UNIT PEAK DISCHARGE (qu) USING TR-55 AND TYPE II

DRAINAGE AREA (A) TO FACILITY= **8.99 acres**

RUNOFF CURVE NUMBER (CN) = **80**

Ia = (200/CN - 2) **Ia VALUE =** **0.500**

Ia/P **Ia/P VALUE =** **0.266**

TIME OF CONCENTRATION (Tc) = **0.500 hrs.** (FROM DRAINAGE CALCULATIONS)

Peak Unit Discharge, (qu) (Exhibit 4-II) **qu =** **470 csm/in**

When T=24 hours, find qo/qi (Figure 3-15) **qo/qi =** **0.040**

$Vs/Vr = 0.683 - 1.43(qo/qi) + 1.64(qo/qi)^2 - 0.804(qo/qi)^3$
where Vs = channel protection storage (Cpv) and Vr = volume of runoff in inches

Vs/Vr **Vs/Vr VALUE =** **0.628**

Direct Runoff, Q (Figure 2-1) **Q VALUE =** **0.40 inches**

Channel Protection Storage, Vs
Vs = Cpv = (Vs/Vr)(Q)(1/12)(AREA)

Vs **Vs VALUE =** **0.188 ac-ft**
8202 CF **CPv = 8202 CF**

Release Rate over 24 Hours 8202 ft^3 / [(24 hr) (3600 sec / hr)] = **0.095 cfs**

CHANNEL PROTECTION VOLUME PROVIDED

ELEVATION (ft)	CONTOUR AREA (ft^2)	TOTAL STORAGE (ft^3)

>

	CALCULATIONS **:**	Project No.: **22-210**
		Date: **11/1/2022**
	Project: **Orifice / Spillway Calculations**	By: **JWJ**
	0	Sheet **2 of 5**

COMPUTE OFIFICE DIAMETER

Required Channel Protection Volume (RCPv)= **3294** **cf**

Elevation at RCPv = **720.3**

Flow Required to release RCPv over 24 Hrs.= **0.04** **cfs**

OUTLET ORIFICE = **3** **inch dimeter**

Invert @ Orifice = **719.5** Average Head = **0.34** **ft**

Center of Orifice = **0.125** **FT**

Q = CA[2GH]1/2= **Q=** **0.14** **cfs**

Where C= 0.6

If Avearge Outflow Rate using oriface < Rate to release RCPv over 24 hrs "OK"
*(unless using smallest recommended orifice of 3")

0.137 < 0.04

OK

SPILLWAY CALCULATION

Extreme Flood Protection, Q of undetained 100-year inflow Hydrograph

100-year Storm Event Inflow (Q) to SMWF = **10.4** cfs

Height (H) from Spillway Invert to Top of Berm= **1.00** ft

Q =(0.666)*C*L*((2g)^.5)H^(3/2) L = **3.89** ft **Use L =** **10** **ft**

Where C= 0.5

	CALCULATIONS:	Project No.: **22-210**
		Date: **1/1/2022**
	Project: Deep Pool Sizing Calculations	By: **JWJ**
	Diversified Equipment	Sheet **3 of 5**

WATER QUALITY VOLUME, WQv

DRAINAGE AREA (A) TO FACILITY=	**2.00 acres**	
IMPERVIOUS AREA =	**0.62 acres**	
90 PERCENTILE RAINFALL EVENT =	**1.00 inches**	
CURVE NUMBER (CN) =	**87.0**	
TIME OF CONCENTRATION (Tc) =	**0.200 hours**	
IMPERVIOUS COVER (I) =	**0.31**	
RUNOFF COEFFICENT (Rv) = Rv = 0.05 + (I)(0.9)	**0.33**	
WATER QUALITY VOLUME (WQv) = WQv = P * Rv * A / 12	**0.055 acre-ft**	**2389 cf**

DEEP POOL VOLUME

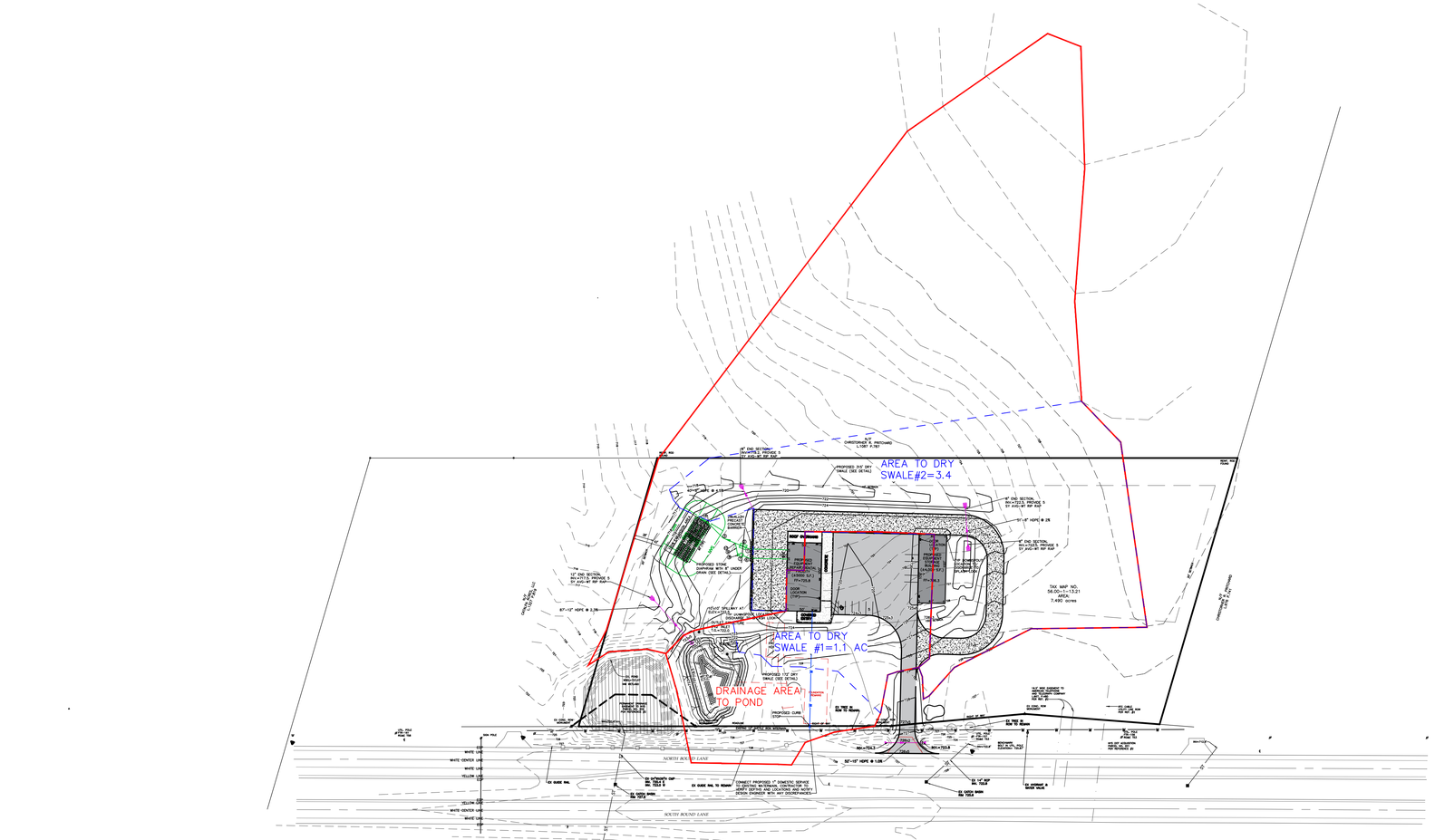
50% WQv= **1,194** cf

ELEVATION (ft)	CONTOUR AREA (ft^2)	TOTAL STORAGE (ft^3)
715.00	543	0
716.00	809	676
717.00	1,124	1,643
718.00	1,471	2,941
719.00	2,958	5,156
719.50	4,262	8,766
		8,766 > 1,194 OK

Pretreatment Forebay Volume

10% WQv= **239** cf

ELEVATION (ft)	CONTOUR AREA (ft^2)	TOTAL STORAGE (ft^3)
720.00	66	0
721.00	292	179
722.00	715	683
		683 > 239 OK



0 100 200 300

LEGEND

	EXISTING	PROPOSED
Iron pin or pipe found		Utility Lines
Benchmark	OHE elec	R.O.W. line
Utility pole		Property line
Hydrant		Easement line
Light pole		Centerline
PERC TEST / DEEP HOLE		Drainage
		Fence Line
	99	Contour Line

ABBREVIATIONS:
EX-EXISTING
CPP-CORRUGATED POLYETHYLENE PIPE
O.C.-ON CENTER
SICPP-SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE
UG-UNDERGROUND
CONC-CONCRETE
CO -CLEAN OUT
TYP-TYPICAL
R-RADIUS
BC-BOTTOM OF CURB
TC-TOP OF CURB
TW-TOP OF WALL
BW-BOTTOM OF WALL
BS-BOTTOM OF STAIRS
PERF-PERFORATED
MIN-MINIMUM
MAX-MAXIMUM
INV-INVERT
CB-CATCH BASIN
MH-MANHOLE
DI-DRAINAGE INLET

1 WQv Map
1"=100'

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093182
PROFESSIONAL ENGINEER
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REVISIONS		
NO.	DATE	DESCRIPTION OF REVISION BY:

NEW COMMERCIAL SITE PLANS PREPARED FOR:
DIVERSIFIED EQUIPMENT, LLC
NEW LAWN & GARDEN EQUIPMENT REPAIR/RENTAL FACILITY AND EQUIPMENT STORAGE BUILDING
SHOWING LAND IN:
1947 STATE ROUTE 332
TOWN OF CANANDAIGUA
COUNTY OF ONTARIO *STATE OF NEW YORK*

DRAWING TITLE:
PROPOSED CONDITIONS

DRAWN BY:	JWJ
DESIGNED BY:	JWJ
CHECKED BY:	BAM
SCALE:	1"=100'
JOB NO.:	22-210
DATE:	10/26/2022
TAX MAP#:	56.00-1-13.21

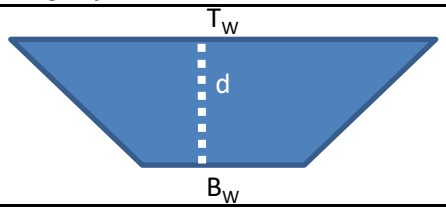
FIGURE 02

Dry Swale 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	1.10	0.64	0.58	0.57	2290.53	1.00	Bio-retention
Enter Impervious Area Reduced by Disconnection of Rooftops			58%	0.57	2,291	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	229	ft^3	

Calculate Available Storage Capacity			
Bottom Width	6	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	6	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	1%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	18	*ft*	
Area	12.00	*sf*	
Minimum Length	172	*ft*	
Actual Length	172	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	2,293	ft^3	
Soil Group (HSG)		D	

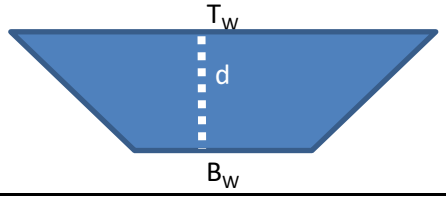
Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	
RRv	**459**	***ft^3***	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**	
Volume Treated	1,832	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	ft^3	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale 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	3.40	0.57	0.17	0.20	2479.29	1.00	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops			17%	0.20	2,479	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	248	ft^3	

Calculate Available Storage Capacity			
Bottom Width	5	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	4	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	1%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	13	*ft*	
Area	9.00	*sf*	
Minimum Length	248	*ft*	
Actual Length	315	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	3,083	ft^3	
Soil Group (HSG)		D	

Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	
RRv	**617**	ft^3	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**	
Volume Treated	1,863	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	ft^3	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

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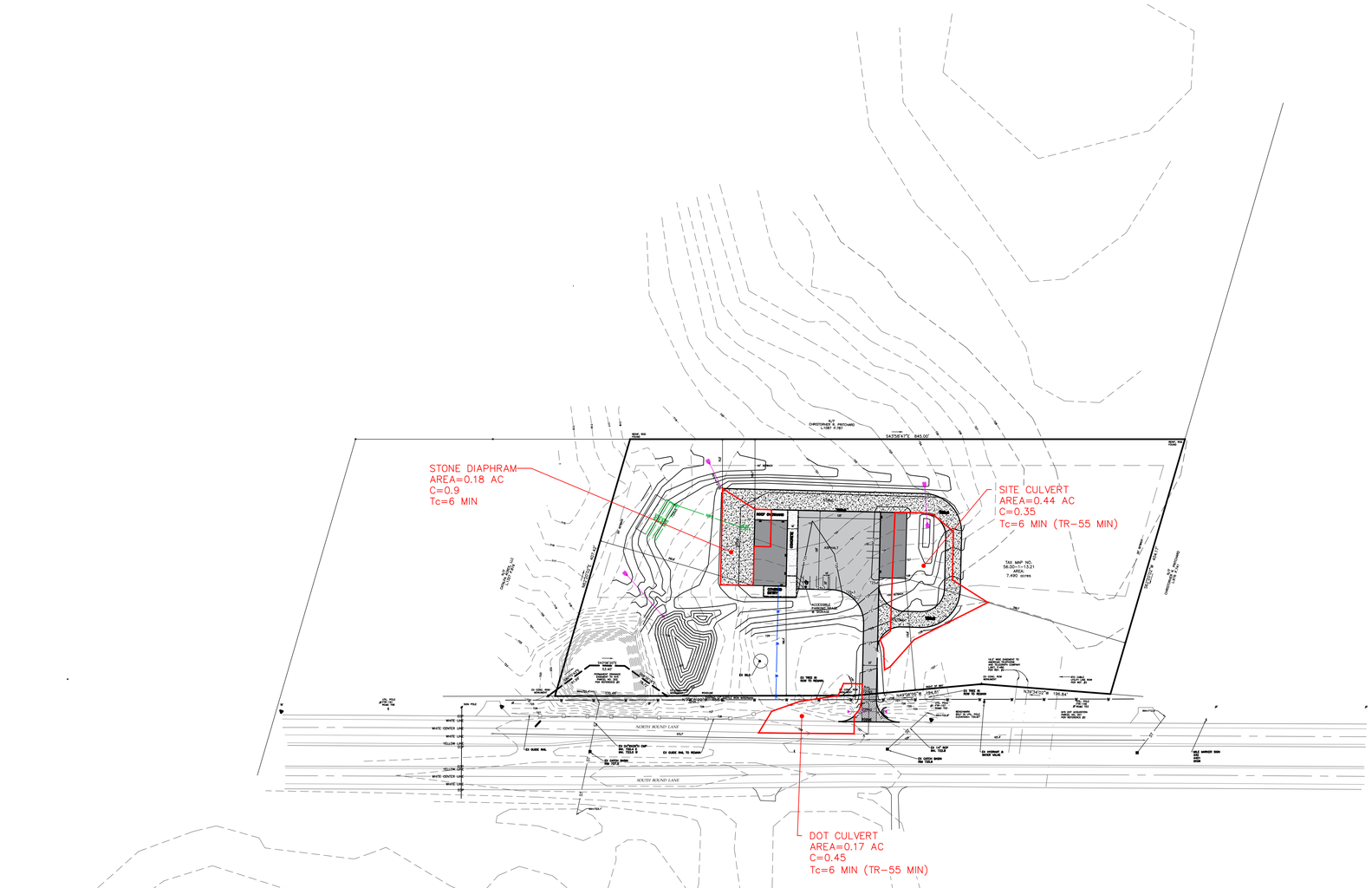
Appendix 3;

Storm Sewer Calcs

(a) Figure 03-Storm Sewer Drainage Areas Map
(b) Storm Sewer Sizing Calculations
(c) Rip-Rap outlet protection calculations



1 Stormsewer Map
1"=100'

LEGEND

EXISTING	PROPOSED	
	OE elec E/T	*Utility Lines*
		R.O.W. line
		Property line
		Easement line
		Centerline
		Drainage
		Fence Line
	99	*Contour Line*

Iron pin or pipe found
Benchmark
Utility pole
Hydrant
Light pole
PERC TEST *DEEP HOLE*

ABBREVIATIONS:
EX–EXISTING
CPP–CORRUGATED POLYETHYLENE PIPE
O.C.–ON CENTER
SICPP–SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE
UG–UNDERGROUND
CONC–CONCRETE
CO –CLEAN OUT
TYP–TYPICAL
R–RADIUS
BC–BOTTOM OF CURB
TC–TOP OF CURB
TW–TOP OF WALL
BW–BOTTOM OF WALL
BS–BOTTOM OF STAIRS
PERF–PERFORATED
MIN–MINIMUM
MAX–MAXIMUM
INV–INVERT
CB–CATCH BASIN
MH–MANHOLE
DI–DRAINAGE INLET

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NO.	DATE	DESCRIPTION OF REVISION	BY

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COUNTY OF ONTARIO
STATE OF NEW YORK

DRAWING TITLE:
STORMSEWER MAP

DRAWN BY:	JWJ
DESIGNED BY:	JWJ
CHECKED BY:	BAM
SCALE:	1"=100'
JOB NO.:	22-210
DATE:	10/26/2022
TAX MAP#:	56.00-1-13.21

FIGURE 04

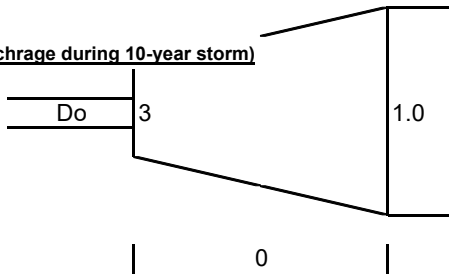
Project:	Diversified Equipment
Project No:	22-210
Date:	11/01/22
By:	JWJ
Sheet	1 of 1

STORM SEWER NETWORK CALCULATIONS

	Drainage Structure		Local				Upstream contribution			Total cA	Controlling Tc	I	Q (cfs)	Pipe			Length of pipe (ft.)	% slope	Diff. In INV	Capacity (cfs)	Ratio of liquid to dia of pipe	velocity (fps)	flow time (min)	Next Point	
	From	To	Tc	c	A	cA	From	Tc	cA					DIA (in)	MATL	n								To	Tc
MH	DOT culv	DOT culv	6.0	0.5	0.17	0.08				0.08	6.0	5.12	0.39	15	CPP	0.012	52	1.00	0.52	7.01	0.16	3.09	0.3	OT cul	6.3
INV	724.30	723.78																							
MH	Site culv.	Site Culv.	6.0	0.4	0.44	0.15				0.15	6.0	5.12	0.79	8	CPP	0.012	51	2.00	1.02	1.86	0.45	5.08	0.2	ite Cul	6.2
INV	723.50	722.48																							
MH						0.00				0.00	0.0	0.00	14.60		CPP	0.012			0.00	####	#DIV/0!	####	####	0.00	####
INV		0.00																							
MH						0.00				0.00	0.0	0.00	0.00		CPP	0.012			0.00	####	#DIV/0!	####	####	0.00	####
INV		0.00																							
MH						0.00				0.00	0.0	0.00	11.00		CPP	0.012			0.00	####	#DIV/0!	####	####	0.00	####
INV		0.00																							
MH	stone dia	stone dia	6.0	0.9	0.20	0.18				0.18	6.0	5.12	0.92	8	CPP	0.012	40	4.50	1.80	2.78	0.39	7.06	0.1	one di	6.1
INV	721.00	719.20																							
MH																									
INV																									
MH																									
INV																									
MH																									
INV																									
MH																									
INV																									
MH																									
INV																									
MH																									
INV																									

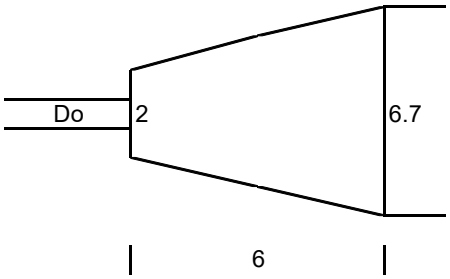
	CALCULATIONS **:**	Project No.: 22-210
	Project: Rip Rap Calculations	Date: 11/1/2022
		By: JWJ
		Sheet 1 of 2

	Pond Outlet (no dischrage during 10-year storm)	
DESIGNATION		
Do-DIA. OF PIPE	12	in
DISCHARGE	0.0	cfs
d50 RIP-RAP SIZE	0.0	ft
La-LENGTH OF APRON	0.0	ft
W=Do+La	1.0	ft
SY OF RIP RAP	5	sy
MIN BLANKET THICKNESS	0	in
AVE WEIGHT	50	lbs



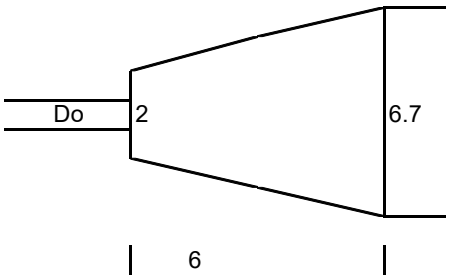
NOTES:

	Site Culvert	
DESIGNATION		
Do-DIA. OF PIPE	8	in
DISCHARGE	1.9	cfs
d50 RIP-RAP SIZE	0.1	ft
La-LENGTH OF APRON	6.0	ft
W=Do+La	6.7	ft
SY OF RIP RAP	5	sy
MIN BLANKET THICKNESS	3	in
AVE WEIGHT	50	lbs



NOTES:

	Stone diaphram	
DESIGNATION		
Do-DIA. OF PIPE	8	in
DISCHARGE	2.8	cfs
d50 RIP-RAP SIZE	0.1	ft
La-LENGTH OF APRON	6.0	ft
W=Do+La	6.7	ft
SY OF RIP RAP	5	sy
MIN BLANKET THICKNESS	3	in
AVE WEIGHT	50	lbs



NOTES: