

Stormwater Management Report

Owner:

Carlston Development
601 Carlson Parkway #1050
Minnetonka, MN 55305

Attn: Ryan Johnson
8317 Pillsbury Ave S
Bloomington, MN 55420

Project:

West Haven
11140 Bloomington Ferry Road
Bloomington, MN 55438

Engineer's Certification:

All plans and supporting Documentation contained in this report have been reviewed by me and it is hereby certified that to the best of my knowledge the plans comply with the requirements of the ordinance.

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



Anders Melby, P.E.

Registration Number: 58960

Date:

03/28/2026

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2.0 Summary Analysis / Narrative:

2.1 Introduction:

This stormwater management report accompanies the Civil Engineering Plans prepared by Civil Site Group for the subject project dated 03/28/2026 and serves as attachment D to the storm water pollution prevention plan (SWPPP). This report includes a summary of the existing and proposed site conditions, the stormwater requirements of relevant regulatory agencies, and proposed design calculations and data to meet the requirements.

2.2 Existing Site Conditions:

Site Description:

The existing site contains two single family properties and is mostly predominately wooded. The existing site surface coverage areas are shown in the table below:

Existing Conditions

Drainage Area	Impervious Area		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
EX1	35265	98	146255	36	181520	48
EX2	2098	98	17107	36	19205	43

Existing Soils:

A geotechnical evaluation was completed for each parcel, both by Chosen Valley Testing. One report is dated December 10, 2024 and the other January 25, 2026. These reports determined the soils on site are primarily topsoil overlying possible fill soils, underlain by natural clean sands (SP) and silty sands (SP-SM).

fill soils (SP-SM) over poorly graded sands and poorly graded sands with silt (SP-SM). For the purposes of this report, soils have been assumed to have a hydrologic soil group "B" designation.

Groundwater:

Groundwater was not encountered in any borings.

2.3 Proposed Site Conditions:

Site Description:

The proposed site is a single-family residential development with underground stormwater management. The proposed site surface coverage areas are shown in the table below:

Proposed Conditions

Drainage Area	Impervious Area		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
PR1A	60164	98	49676	61	109840	81
PR1B	23813	98	53586	60	77399	72
PR2	1835	98	11651	61	13486	66

2.4 Stormwater Requirements City (Bloomington):

Requirement threshold – Projects that disturb land area greater than 50 cubic yards or 5,000 square feet

Rate Control – Surface-water discharge rates from redevelopments that disturb land area greater than 50 cubic yards or 5,000 square feet must, at a minimum, achieve a net reduction of pre-project discharge rates for the 2, 10, and 100-year storm events.

Water Quality – Stormwater runoff from disturbed areas shall be treated to at least 60% total phosphorus removal, and 90% total suspended solids removal.

Discharge Volume– Surface-water discharge volume from new developments that disturb land area greater than 50 cubic yards or 5,000 square feet shall achieve no net increases in the stormwater discharge volumes from pre-project conditions on an average annual basis.

Volume Retention– Sites that disturb land area more than 50 cubic yards or 5,000 square feet of new and/or fully reconstructed impervious surface shall capture and retain on-site a volume equivalent to 1.1 inches of runoff from the new and/or fully reconstructed impervious area.

2.5 Stormwater Requirements Watershed (Lower Minnesota River Watershed District):

Requirement threshold – Land-disturbing activities of one acre or more. **Stormwater Management Rule triggered if creation of one acre or more of impervious area.**

Rate Control – Stormwater runoff rate from development, redevelopment, and drainage alterations shall not exceed the existing runoff rates for the 1 or 2-year, 10-year, and 100-year 24-hour events using NOAA Atlas 14 values, as amended, and using a nested rainfall distribution.

Water Quality – Projects that create one acre or more of new impervious surfaces shall have no net increase from existing conditions in total phosphorus (TP) and total suspended solids (TSS) to receiving waterbodies.

Volume Control – To the maximum extent practicable, volume control shall be fully met on-site.

For projects that create one acre or more of new impervious surface on sites without restrictions, the post-construction stormwater runoff volume retained on-site shall be equivalent to one inch of runoff from the new and/or reconstructed impervious surfaces, or the MPCA's Construction General Permit volume requirements (as amended), whichever is greater.

Infiltration – Determining the feasibility of infiltration on the site shall be in accordance with this Rule and the "Minnesota Stormwater Manual", as updated or amended. The owner must make soil corrections and/or investigate other locations on the site for feasibility infiltration locations. Infiltration of stormwater must avoid areas of contaminated soil.

2.6 Stormwater Requirements - Minnesota Pollution Control Agency – NPDES permit (MPCA):

Requirement threshold - A permit is required for projects with a disturbed area over 1 acre in size, Stormwater management is required for a project adding 1-acre of more of NEW impervious surface (reconstructed impervious is not included).

Rate Control – No specific regulation, may not degrade downstream facilities.

Water Quality – Stormwater water quality treatment volume must be provided equal to 1.0" over all new impervious surfaces (includes all newly constructed impervious surfaces only, re-constructed impervious surfaces are not included).

Volume Control – Must consider volume reduction if feasible and not prohibited on site. The required infiltration volume is equal to the water quality volume described above.

3.0 Stormwater Calculations:

3.1 Proposed Stormwater Management Strategy & Facilities Description

This project is disturbing approximately 3.2 acres of land. The project will be constructing 1.9 acres of new/reconstructed impervious surfaces. This land disturbance and creation of impervious surfaces will trigger stormwater management requirements from the City of Bloomington, the Lower Minnesota Watershed District and the MPCA NPDES permit. The proposed stormwater strategy for this project is directing the site's stormwater runoff via surface drainage and storm sewer piping to an underground infiltration basin. The basin will discharge to existing downstream storm sewer. This stormwater system has been designed to provide infiltration for the volume requirement and the required water quality and rate control.

3.2 Rate Control

Surface-water discharge rates from redevelopments that disturb land area greater than 50 cubic yards or 5,000 square feet must, at a minimum, achieve a net reduction of pre-project discharge rates for the 2, 10, and 100-year storm events.

Stormwater runoff rate from development, redevelopment, and drainage alterations shall not exceed the existing runoff rates for the 1 or 2-year, 10-year, and 100-year 24-hour events using NOAA Atlas 14 values, as amended, and using a nested rainfall distribution.

Rate control is provided by live storage within the proposed infiltration basin. This information was derived using HydroCAD stormwater modeling software. The existing and proposed runoff rates are shown in the summary table below.

Stormwater Rate Summary

Drainage Area	Existing Rate (cfs)		
	2-YR [2.83"]	10-YR [4.24"]	100-YR [7.50"]
EX1	2.29	5.26	14.75
EX2	0.21	0.61	1.92
TOTAL (REACH)	2.50	5.87	16.67

Drainage Area	Proposed Conditions Rate (cfs)		
	2-YR [2.83"]	10-YR [4.24"]	100-YR [7.50"]
1R (1P + PR1B)	2.12	4.97	14.15
2R (PR2)	0.21	0.56	1.64
TOTAL (REACH)	2.33	5.53	15.78

Overall Stormwater Rate Summary

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
2-Year Event	2.50	2.33
10-Year Event	5.87	5.53
100-Year Event	16.67	15.94

Stormwater Rate Summary - To SW

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
2-Year Event	2.29	2.12
10-Year Event	5.26	5.03
100-Year Event	14.75	14.36

Stormwater Rate Summary - To NW

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
2-Year Event	0.21	0.21
10-Year Event	0.61	0.56
100-Year Event	1.92	1.64

The existing project site discharges to two separate drainage subcatchments. Drainage Area DA1 discharges to the southwest towards Bloomington Ferry Road. Drainage Area DA2 discharges to the northwest towards the adjacent residential development.

The proposed runoff rates are less than the existing peak runoff rates – REQUIREMENT SATISFIED

3.3 Water Quality

Stormwater runoff from disturbed areas shall be treated to at least 60% total phosphorus removal, and 90% total suspended solids removal.

Projects that create one acre or more of new impervious surfaces shall have no net increase from existing conditions in total phosphorus (TP) and total suspended solids (TSS) to receiving waterbodies.

The proposed underground infiltration basin was designed to capture the prescribed water quality volume meeting the watershed requirements.

Stormwater Water Quality Summary

Existing Conditions		
Pollutant	Load Discharged from Site (lb/yr)	Removal Efficiency
TSS	538.3	NA
Particulate TP	1.630	NA
Dissolved TP	1.334	NA

Proposed Conditions				
Pollutant	Load generated from Site (lb/yr)	Load removed from Site (lb/yr)	Load Discharged from Site (lb/yr)	Removal Efficiency
TSS	824.3	755.8	68.50	92.0%
Particulate TP	2.496	1.888	0.61	76.0%
Dissolved TP	2.042	1.544	0.50	

Water quality treatment is provided by the proposed stormwater system – REQUIREMENT SATISFIED

3.4 Volume Control

Surface-water discharge volume from new developments that disturb land area greater than 50 cubic yards or 5,000 square feet shall achieve no net increases in the stormwater discharge volumes from pre-project conditions on an average annual basis.

Sites that disturb land area more than 50 cubic yards or 5,000 square feet of new and/or fully reconstructed impervious surface shall capture and retain on-site a volume equivalent to 1.1 inches of runoff from the new and/or fully reconstructed impervious area.

To the maximum extent practicable, volume control shall be fully met on-site.

For projects that create one acre or more of new impervious surface on sites without restrictions, the post-construction stormwater runoff volume retained on-site shall be equivalent to one inch of runoff from the new and/or reconstructed impervious surfaces, or the MPCA's Construction General Permit volume requirements (as amended), whichever is greater.

Water quality and volume control requirements are met by providing infiltration onsite in the amount exceeding 1.1 inches of runoff from the new or reconstructed impervious surfaces. The proposed underground infiltration basin will be utilized to meet these requirements.

Provide more information about what this note means. Fully reconstructed impervious required to be included. Show existing impervious to remain on removal plans.



The calculations are shown below:

Stormwater Volume Control Summary

Drainage Area	Required Infiltration Vol. Summary	
	New Impv. Area (sf)	Required Volume (cf)
PR1A	60164	5515
PR1B	23813	2183
PR2	1835	168
TOTAL	61999	5683

Infiltration Volume =
1.1**Dist. Impv. Area

Existing Impervious, Excluded

Proposed BMP Area	Provided Vol (cf) (800-801.6)	Drawdown Time Calculations (0.8"/Hour)		
		Inf. Area (sf)	Assoc. Inf. Height (ft)	Drawdown Time (h)
Infiltration Basin 1	5926	4000	1.48	22.22
TOTAL	5926			

As shown in the tables above, the proposed volume of 5,926 CF is larger than the required volume of 5,683 CF – REQUIREMENT SATISFIED

4.0 Conclusions:

To the best of our knowledge, this project meets all State, City, and Watershed stormwater management requirements.

**Bloomington Ferry
Civil Site Group - Stormwater Calculations**

Existing Conditions

Drainage Area	Impervious Area		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
EX1	35265	98	146255	60	181520	67
EX2	2098	98	17107	60	19205	64

Proposed Conditions

Drainage Area	Impervious Area		Pervious Area		Total Area	
	Area [SF]	CN Value	Area [SF]	CN Value	Area [SF]	CN Value
PR1A	60164	98	49931	61	110095	81
PR1B	23813	98	53592	60	77405	72
PR2	1835	98	11390	61	13225	66

Site Area Summary

	Impervious [SF]	Impervious [AC]	Pervious [SF]	Pervious [AC]	Total [SF]	Total [AC]
Existing Site	37363	0.86	163362	3.75	200725	4.61
Proposed Site	85812	1.97	114913	2.64	200725	4.61

Stormwater Rate Summary

Drainage Area	Existing Rate (cfs)		
	2-YR [2.83"]	10-YR [4.24"]	100-YR [7.50"]
EX1	2.29	5.26	14.75
EX2	0.21	0.61	1.92
TOTAL (REACH)	2.50	5.87	16.67

Drainage Area	Proposed Conditions Rate (cfs)		
	2-YR [2.83"]	10-YR [4.24"]	100-YR [7.50"]
1R (1P + PR1B)	2.12	4.97	14.15
2R (PR2)	0.21	0.56	1.64
TOTAL (REACH)	2.33	5.53	15.78

Overall Stormwater Rate Summary

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
2-Year Event	2.50	2.33
10-Year Event	5.87	5.53
100-Year Event	16.67	15.94

Stormwater Rate Summary - To SW

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
2-Year Event	2.29	2.12
10-Year Event	5.26	5.03
100-Year Event	14.75	14.36

Stormwater Rate Summary - To NW

	Existing Conditions Rate (cfs)	Proposed Conditions Rate (cfs)
2-Year Event	0.21	0.21
10-Year Event	0.61	0.56
100-Year Event	1.92	1.64

Stormwater Volume Control Summary

Drainage Area	Required Infiltration Vol. Summary		Infiltration Volume = 1.1**Dist. Impv. Area Existing Impervious, Excluded
	New Impv. Area (sf)	Required Volume (cf)	
PR1A	60164	5515	
PR1B	23813	2183	
PR2	1835	168	
TOTAL	61999	5683	

Proposed BMP Area	Provided Vol (cf) (800-801.6)	Drawdown Time Calculations (0.8"/Hour)		
		Inf. Area (sf)	Assoc. Inf. Height (ft)	Drawdown Time (h)
Infiltration Basin 1	5926	4000	1.48	22.22
TOTAL	5926			

Stormwater Water Quality Summary

Existing Conditions		
Pollutant	Load Discharged from Site (lb/yr)	Removal Efficiency
TSS	538.3	NA
Particulate TP	1.630	NA
Dissolved TP	1.334	NA

Proposed Conditions				
Pollutant	Load generated from Site (lb/yr)	Load removed from Site (lb/yr)	Load Discharged from Site (lb/yr)	Removal Efficiency
TSS	824.3	755.8	68.50	92.0%
Particulate TP	2.496	1.888	0.61	76.0%
Dissolved TP	2.042	1.544	0.50	

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	Bloomington Ferry
User Name / Company Name:	Civil Site Group
Date:	03/27/2026
Project Description:	Proposed single-family residential development with belowground stormwater management system.
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55438
Annual Rainfall (inches):	30.9
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		3.75			3.75
			Impervious Area (acres)		.86
			Total Area (acres)		4.61

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed					0
			Impervious Area (acres)		
			Total Area (acres)		0

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	3434	ft ³
Volume removed by BMPs towards performance goal:		ft ³
Percent volume removed towards performance goal		%

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	3.6315	acre-ft
Annual runoff volume removed by BMPs:		acre-ft
Percent annual runoff volume removed:		%

Post development annual particulate P load:	1.6298	lbs
Annual particulate P removed by BMPs:		lbs
Post development annual dissolved P load:	1.334	lbs
Annual dissolved P removed by BMPs:	0	lbs
Total P removed by BMPs	0	lbs
Percent annual total phosphorus removed:		%

Post development annual TSS load:	538.3	lbs
Annual TSS removed by BMPs:		lbs
Percent annual TSS removed:		%

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft ³)	Volume Recieved (ft ³)	Volume Retained (ft ³)	Volume Outflow (ft ³)	Percent Retained (%)

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
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Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
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TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
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BMP Schematic

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	Bloomington Ferry
User Name / Company Name:	Civil Site Group
Date:	03/27/2026
Project Description:	Proposed single-family residential development with aboveground stormwater management system.
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55438
Annual Rainfall (inches):	30.9
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		2.64			2.64
			Impervious Area (acres)		1.97
			Total Area (acres)		4.61

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		2.639			2.639
			Impervious Area (acres)		1.97
			Total Area (acres)		4.609

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	7866	ft ³
Volume removed by BMPs towards performance goal:	5873	ft ³
Percent volume removed towards performance goal	75	%

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	5.5608	acre-ft
Annual runoff volume removed by BMPs:	4.2047	acre-ft
Percent annual runoff volume removed:	76	%

Post development annual particulate P load:	2.4957	lbs
Annual particulate P removed by BMPs:	1.888	lbs
Post development annual dissolved P load:	2.042	lbs
Annual dissolved P removed by BMPs:	1.544	lbs
Total P removed by BMPs	3.432	lbs
Percent annual total phosphorus removed:	76	%

Post development annual TSS load:	824.3	lbs
Annual TSS removed by BMPs:	755.8	lbs
Percent annual TSS removed:	92	%

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft ³)	Volume Recieved (ft ³)	Volume Retained (ft ³)	Volume Outflow (ft ³)	Percent Retained (%)
PR1A - Infiltration Basin	10365	5542	5542	0	100
PR2	67	168	67	101	40
PR1B	264	2156	264	1892	12
CBMH11 - SUMP	0	3905	0	3905	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
PR1A - Infiltration Basin	1.12	2.3593	3.4363	0.0430000000	99
PR2	0.2134	0	0.1172	0.0962	55
PR1B	1.759	0	0.5425	1.2165	31
CBMH11 - SUMP	2.4679	0	0.1086	2.3593	4

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
PR1A - Infiltration Basin	0.5027	1.0123	1.4963	0.0187	99
PR2	0.0958	0	0.0526	0.0432	55
PR1B	0.7894	0	0.2435	0.5459	31
CBMH11 - SUMP	1.1076	0	0.0953	1.0123	9

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
PR1A - Infiltration Basin	0.4113	0.8663	1.2618	0.0158	99
PR2	0.0784	0	0.0431	0.0353	55
PR1B	0.6459	0	0.1992	0.4467	31
CBMH11 - SUMP	0.9062	0	0.0399	0.8663	4

Total Phosphorus Summary

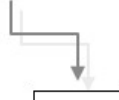
BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
PR1A - Infiltration Basin	0.914	1.8786	2.7581	0.0345	99
PR2	0.1742	0	0.0957	0.0785	55
PR1B	1.4353	0	0.4427	0.9926	31
CBMH11 - SUMP	2.0138	0	0.1352	1.8786	6

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
PR1A - Infiltration Basin	166.04	334.35	494.2	6.19	99
PR2	31.64	0	27.08	4.56	86
PR1B	260.75	0	203.05	57.7	78
CBMH11 - SUMP	365.84	0	31.49	334.35	9

BMP Schematic

Other
CBMH11 - SUMP



PR1A - Infiltration Basin



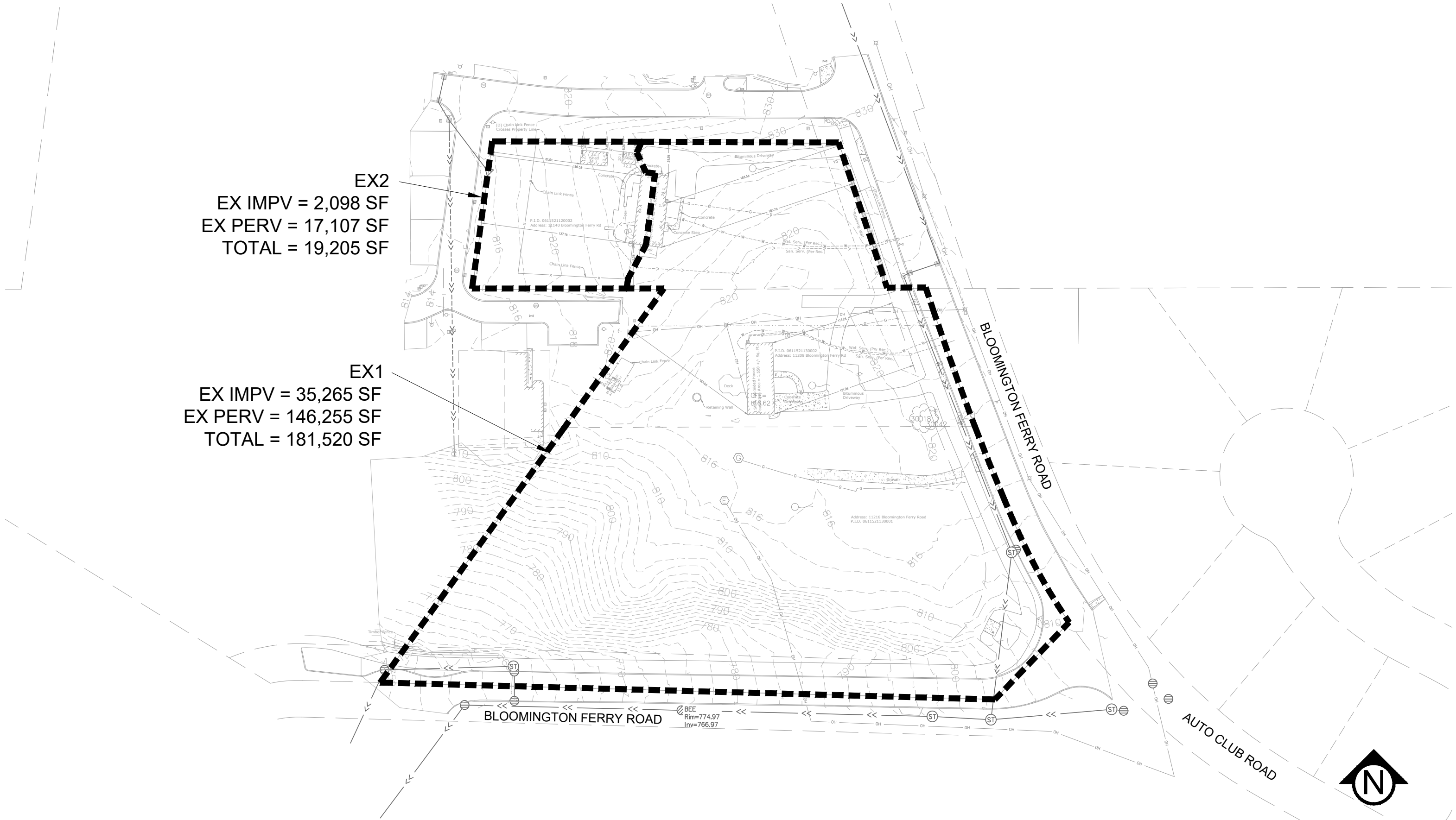
PR1B

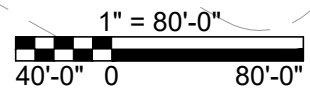
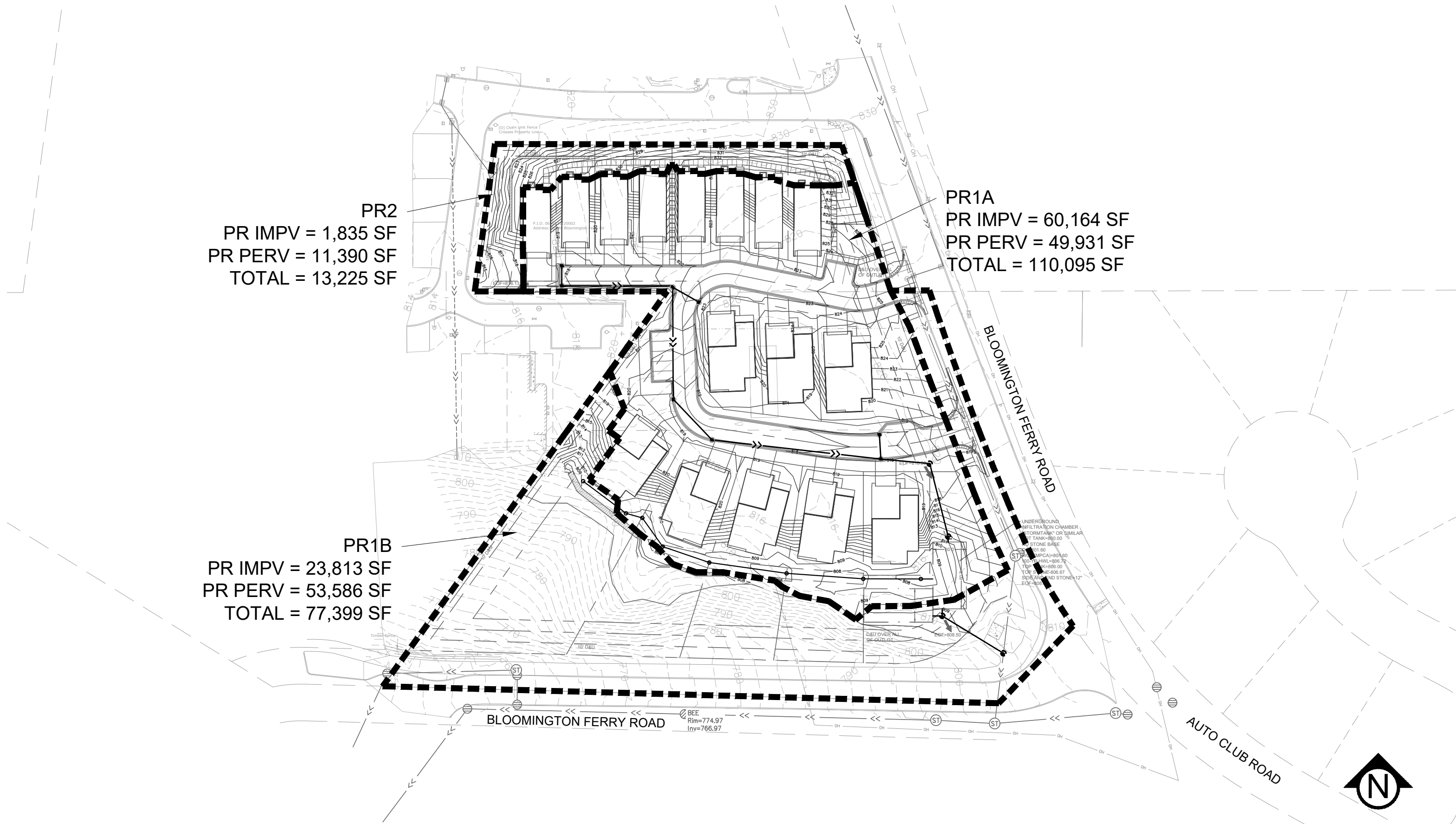


PR2

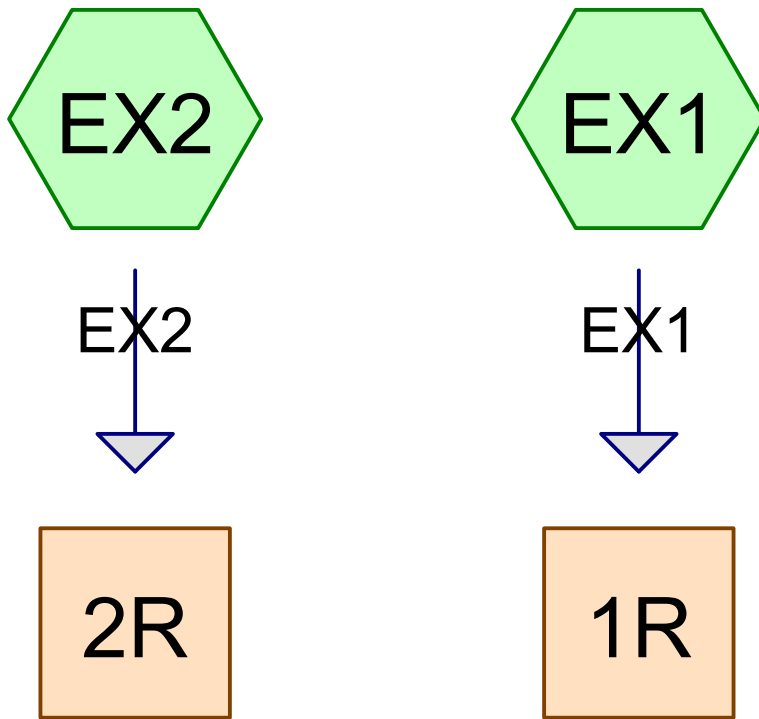
EX2
 EX IMPV = 2,098 SF
 EX PERV = 17,107 SF
 TOTAL = 19,205 SF

EX1
 EX IMPV = 35,265 SF
 EX PERV = 146,255 SF
 TOTAL = 181,520 SF



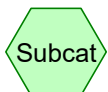


EXISTING CONDITIONS



RUNOFF NW

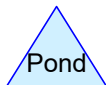
RUNOFF SW



Subcat



Reach



Pond



Link

Routing Diagram for 25185 EXISTING

Prepared by Civil Site Group, Printed 3/27/2026

HydroCAD® 10.20-8a s/n 02202 © 2025 HydroCAD Software Solutions LLC

25185 EXISTING

Prepared by Civil Site Group

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Page 2

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	2.83	2
2	10y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	4.24	2
3	100y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	7.50	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.858	98	Impervious Surface (EX1, EX2)
3.750	60	Woods, Fair, HSG B (EX1, EX2)
4.608	67	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.750	HSG B	EX1, EX2
0.000	HSG C	
0.000	HSG D	
0.858	Other	EX1, EX2
4.608		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.858	0.858	Impervious Surface	EX1, EX2
0.000	3.750	0.000	0.000	0.000	3.750	Woods, Fair	EX1, EX2
0.000	3.750	0.000	0.000	0.858	4.608	TOTAL AREA	

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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment EX1: EX1

Runoff Area=181,520 sf 19.43% Impervious Runoff Depth=0.73"
Flow Length=684' Tc=25.1 min CN=WQ Runoff=2.29 cfs 0.252 af

Subcatchment EX2: EX2

Runoff Area=19,205 sf 10.92% Impervious Runoff Depth=0.53"
Flow Length=182' Tc=14.2 min CN=WQ Runoff=0.21 cfs 0.019 af

Reach 1R: RUNOFF SW

Inflow=2.29 cfs 0.252 af
Outflow=2.29 cfs 0.252 af

Reach 2R: RUNOFF NW

Inflow=0.21 cfs 0.019 af
Outflow=0.21 cfs 0.019 af

Total Runoff Area = 4.608 ac Runoff Volume = 0.272 af Average Runoff Depth = 0.71"
81.39% Pervious = 3.750 ac 18.61% Impervious = 0.858 ac

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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Summary for Subcatchment EX1: EX1

Runoff = 2.29 cfs @ 12.36 hrs, Volume= 0.252 af, Depth= 0.73"
 Routed to Reach 1R : RUNOFF SW

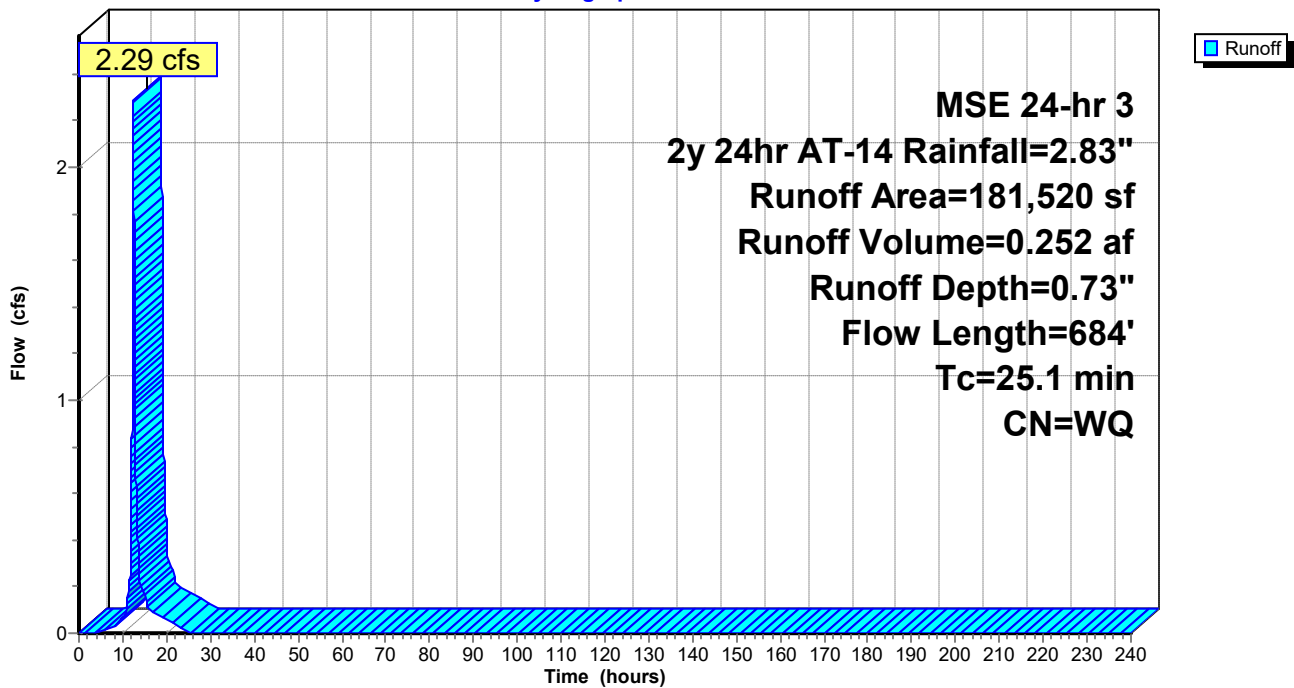
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

Area (sf)	CN	Description
* 35,265	98	Impervious Surface
146,255	60	Woods, Fair, HSG B
181,520		Weighted Average
146,255		80.57% Pervious Area
35,265		19.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	100	0.0350	0.09		Sheet Flow, SF Woods: Light underbrush n= 0.400 P2= 2.94"
4.6	258	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.6	326	0.1700	2.06		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
25.1	684	Total			

Subcatchment EX1: EX1

Hydrograph



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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Summary for Subcatchment EX2: EX2

Runoff = 0.21 cfs @ 12.25 hrs, Volume= 0.019 af, Depth= 0.53"
 Routed to Reach 2R : RUNOFF NW

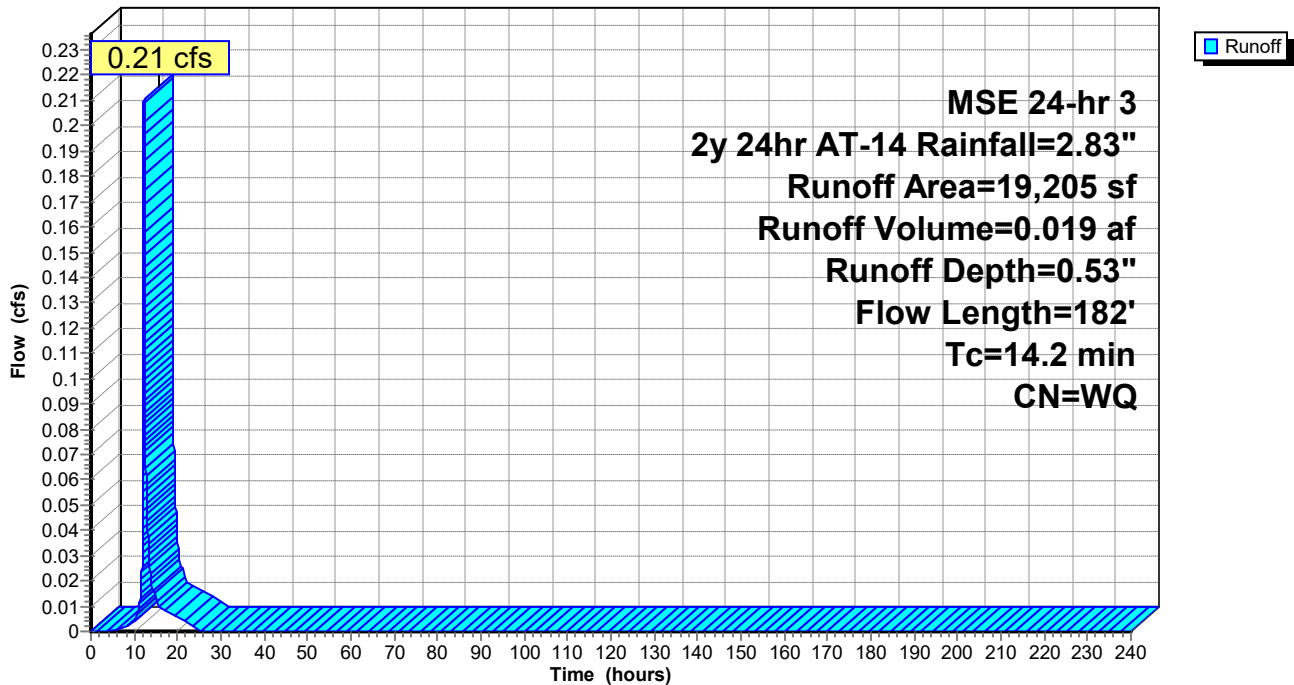
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

Area (sf)	CN	Description
* 2,098	98	Impervious Surface
17,107	60	Woods, Fair, HSG B
19,205		Weighted Average
17,107		89.08% Pervious Area
2,098		10.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0750	0.13		Sheet Flow, SF
					Woods: Light underbrush n= 0.400 P2= 2.94"
1.0	82	0.0730	1.35		Shallow Concentrated Flow, SCF
					Woodland Kv= 5.0 fps
14.2	182	Total			

Subcatchment EX2: EX2

Hydrograph



Summary for Reach 1R: RUNOFF SW

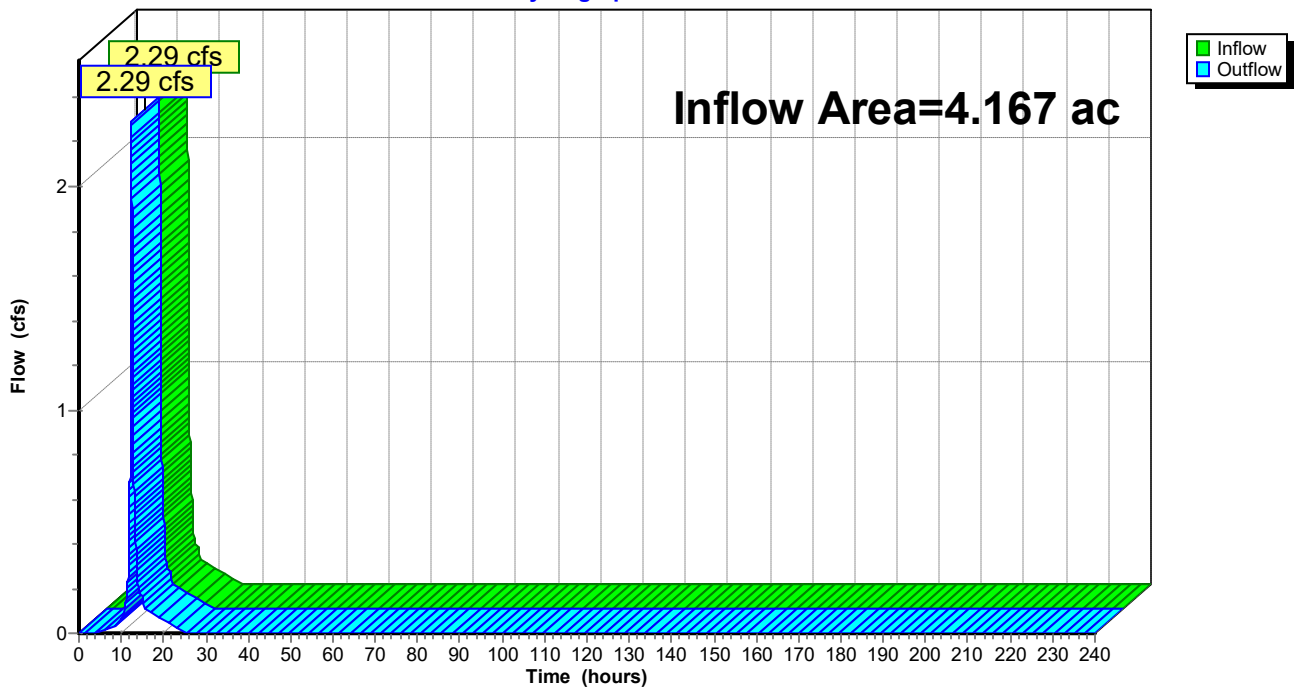
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.167 ac, 19.43% Impervious, Inflow Depth = 0.73" for 2y 24hr AT-14 event
Inflow = 2.29 cfs @ 12.36 hrs, Volume= 0.252 af
Outflow = 2.29 cfs @ 12.36 hrs, Volume= 0.252 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 1R: RUNOFF SW

Hydrograph



Summary for Reach 2R: RUNOFF NW

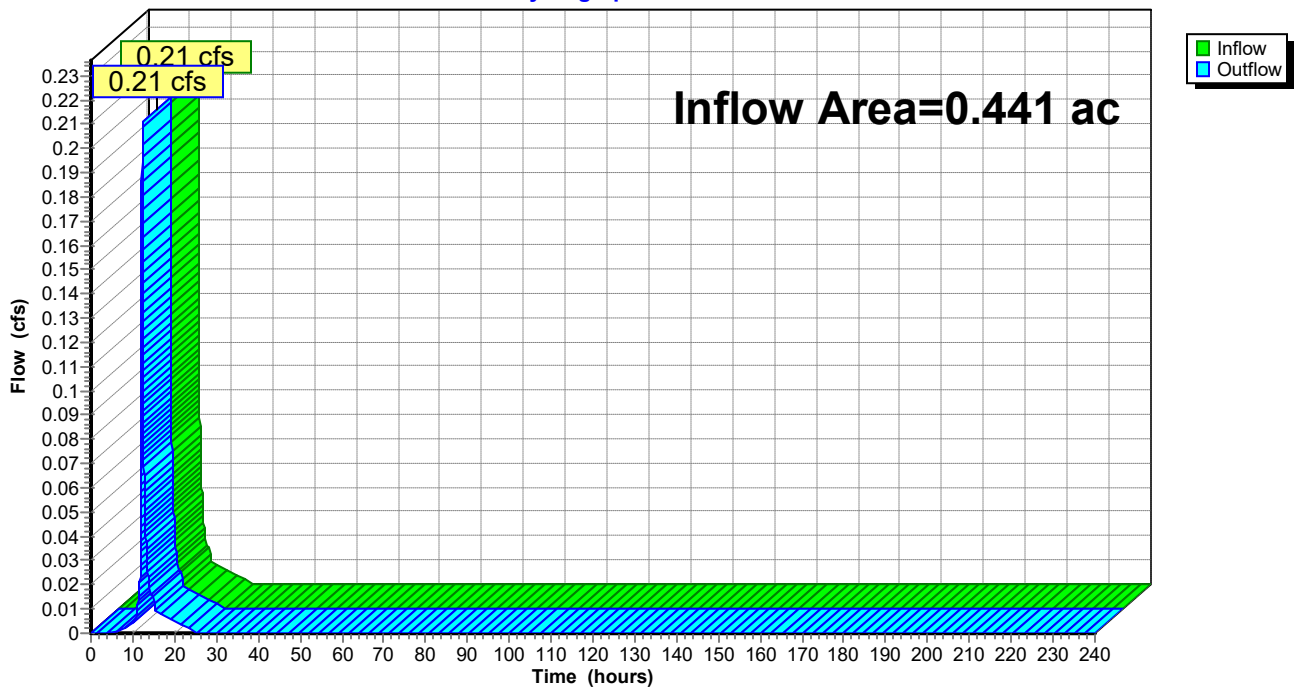
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.441 ac, 10.92% Impervious, Inflow Depth = 0.53" for 2y 24hr AT-14 event
Inflow = 0.21 cfs @ 12.25 hrs, Volume= 0.019 af
Outflow = 0.21 cfs @ 12.25 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 2R: RUNOFF NW

Hydrograph



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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment EX1: EX1

Runoff Area=181,520 sf 19.43% Impervious Runoff Depth=1.49"
Flow Length=684' Tc=25.1 min CN=WQ Runoff=5.26 cfs 0.517 af

Subcatchment EX2: EX2

Runoff Area=19,205 sf 10.92% Impervious Runoff Depth=1.22"
Flow Length=182' Tc=14.2 min CN=WQ Runoff=0.61 cfs 0.045 af

Reach 1R: RUNOFF SW

Inflow=5.26 cfs 0.517 af
Outflow=5.26 cfs 0.517 af

Reach 2R: RUNOFF NW

Inflow=0.61 cfs 0.045 af
Outflow=0.61 cfs 0.045 af

Total Runoff Area = 4.608 ac Runoff Volume = 0.562 af Average Runoff Depth = 1.46"
81.39% Pervious = 3.750 ac 18.61% Impervious = 0.858 ac

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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Summary for Subcatchment EX1: EX1

Runoff = 5.26 cfs @ 12.38 hrs, Volume= 0.517 af, Depth= 1.49"
 Routed to Reach 1R : RUNOFF SW

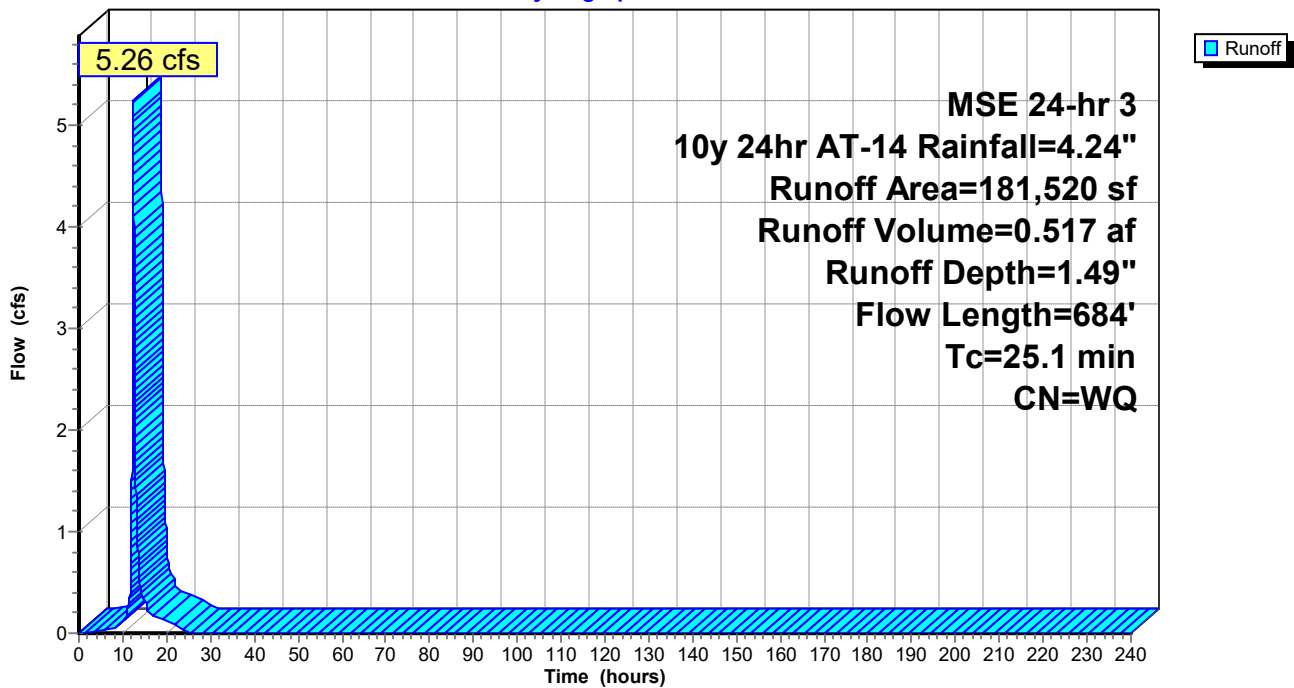
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

Area (sf)	CN	Description
* 35,265	98	Impervious Surface
146,255	60	Woods, Fair, HSG B
181,520		Weighted Average
146,255		80.57% Pervious Area
35,265		19.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	100	0.0350	0.09		Sheet Flow, SF Woods: Light underbrush n= 0.400 P2= 2.94"
4.6	258	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.6	326	0.1700	2.06		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
25.1	684	Total			

Subcatchment EX1: EX1

Hydrograph



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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Summary for Subcatchment EX2: EX2

Runoff = 0.61 cfs @ 12.24 hrs, Volume= 0.045 af, Depth= 1.22"
 Routed to Reach 2R : RUNOFF NW

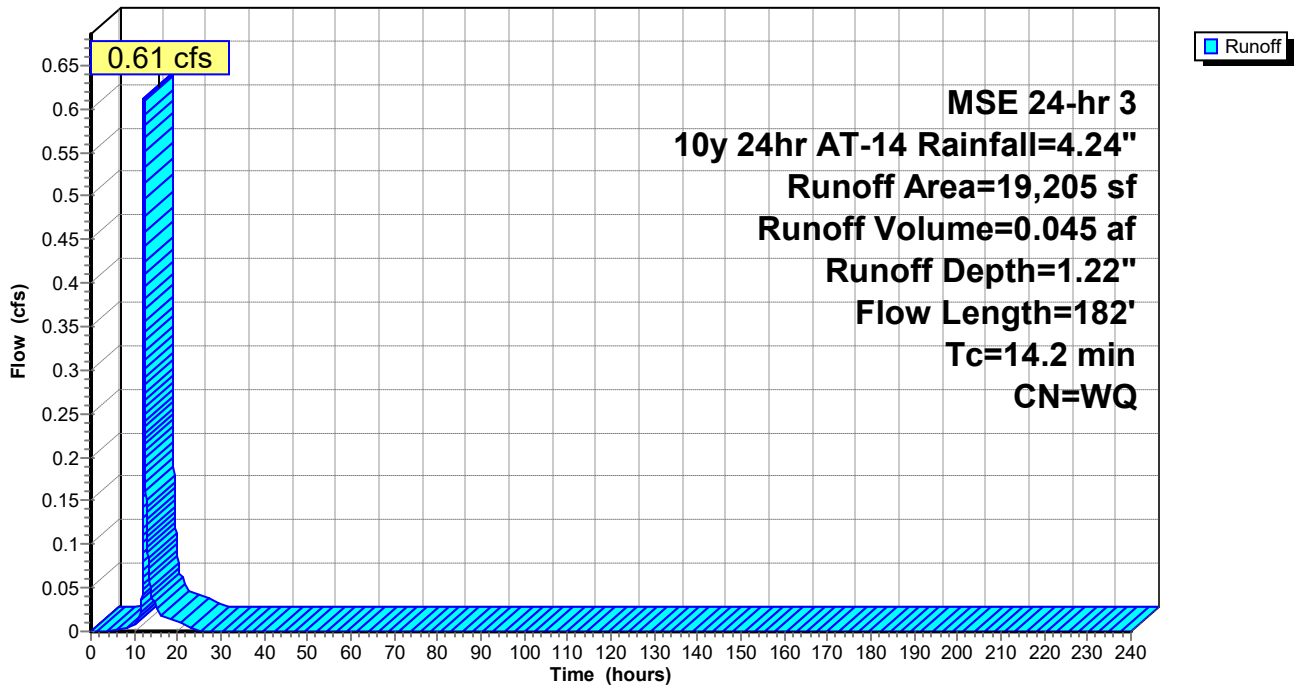
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

Area (sf)	CN	Description
* 2,098	98	Impervious Surface
17,107	60	Woods, Fair, HSG B
19,205		Weighted Average
17,107		89.08% Pervious Area
2,098		10.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0750	0.13		Sheet Flow, SF
					Woods: Light underbrush n= 0.400 P2= 2.94"
1.0	82	0.0730	1.35		Shallow Concentrated Flow, SCF
					Woodland Kv= 5.0 fps
14.2	182	Total			

Subcatchment EX2: EX2

Hydrograph



Summary for Reach 1R: RUNOFF SW

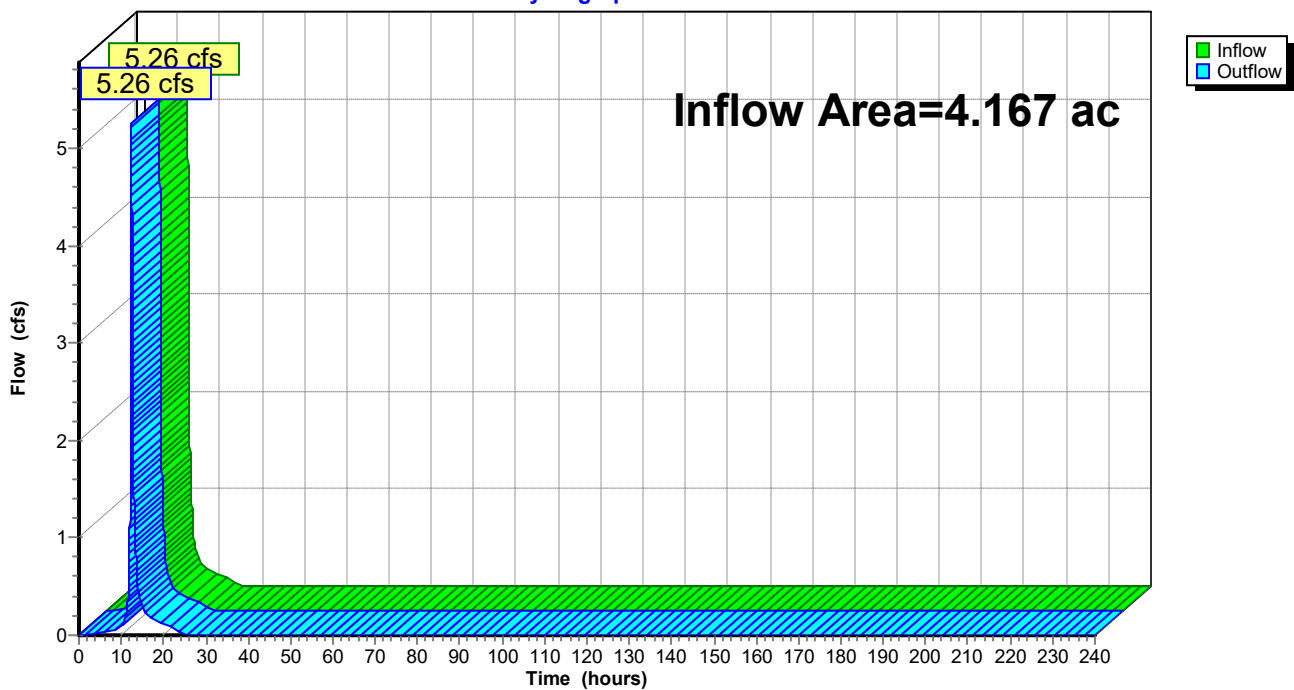
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.167 ac, 19.43% Impervious, Inflow Depth = 1.49" for 10y 24hr AT-14 event
Inflow = 5.26 cfs @ 12.38 hrs, Volume= 0.517 af
Outflow = 5.26 cfs @ 12.38 hrs, Volume= 0.517 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 1R: RUNOFF SW

Hydrograph



Summary for Reach 2R: RUNOFF NW

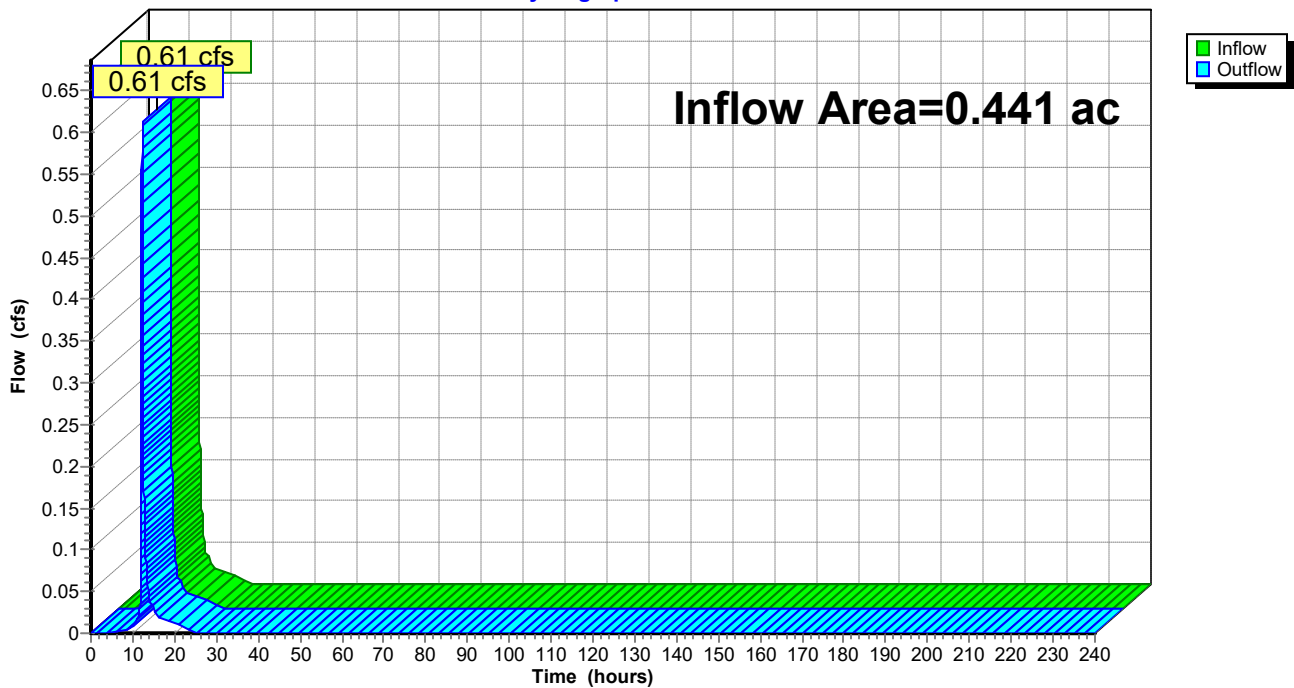
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.441 ac, 10.92% Impervious, Inflow Depth = 1.22" for 10y 24hr AT-14 event
Inflow = 0.61 cfs @ 12.24 hrs, Volume= 0.045 af
Outflow = 0.61 cfs @ 12.24 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 2R: RUNOFF NW

Hydrograph



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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment EX1: EX1

Runoff Area=181,520 sf 19.43% Impervious Runoff Depth=3.80"
Flow Length=684' Tc=25.1 min CN=WQ Runoff=14.75 cfs 1.319 af

Subcatchment EX2: EX2

Runoff Area=19,205 sf 10.92% Impervious Runoff Depth=3.43"
Flow Length=182' Tc=14.2 min CN=WQ Runoff=1.92 cfs 0.126 af

Reach 1R: RUNOFF SW

Inflow=14.75 cfs 1.319 af
Outflow=14.75 cfs 1.319 af

Reach 2R: RUNOFF NW

Inflow=1.92 cfs 0.126 af
Outflow=1.92 cfs 0.126 af

Total Runoff Area = 4.608 ac Runoff Volume = 1.445 af Average Runoff Depth = 3.76"
81.39% Pervious = 3.750 ac 18.61% Impervious = 0.858 ac

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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Summary for Subcatchment EX1: EX1

Runoff = 14.75 cfs @ 12.36 hrs, Volume= 1.319 af, Depth= 3.80"
 Routed to Reach 1R : RUNOFF SW

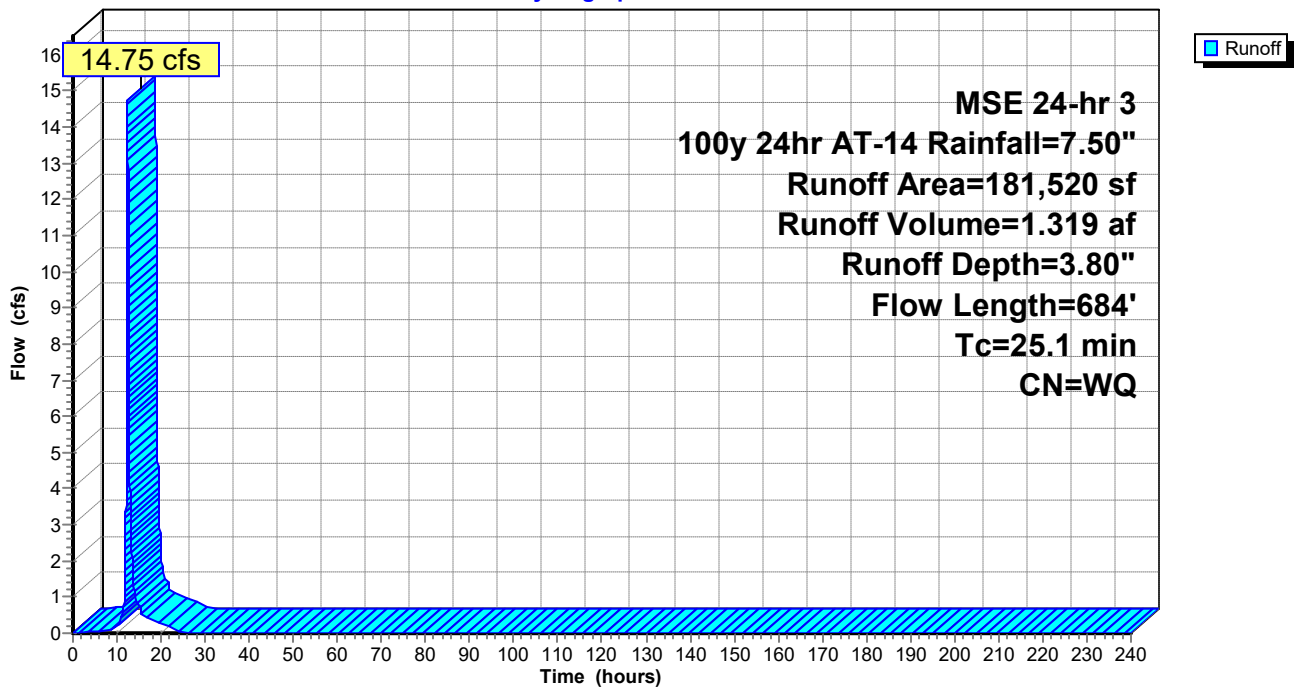
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

Area (sf)	CN	Description
* 35,265	98	Impervious Surface
146,255	60	Woods, Fair, HSG B
181,520		Weighted Average
146,255		80.57% Pervious Area
35,265		19.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	100	0.0350	0.09		Sheet Flow, SF Woods: Light underbrush n= 0.400 P2= 2.94"
4.6	258	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.6	326	0.1700	2.06		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
25.1	684	Total			

Subcatchment EX1: EX1

Hydrograph



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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Summary for Subcatchment EX2: EX2

Runoff = 1.92 cfs @ 12.23 hrs, Volume= 0.126 af, Depth= 3.43"
 Routed to Reach 2R : RUNOFF NW

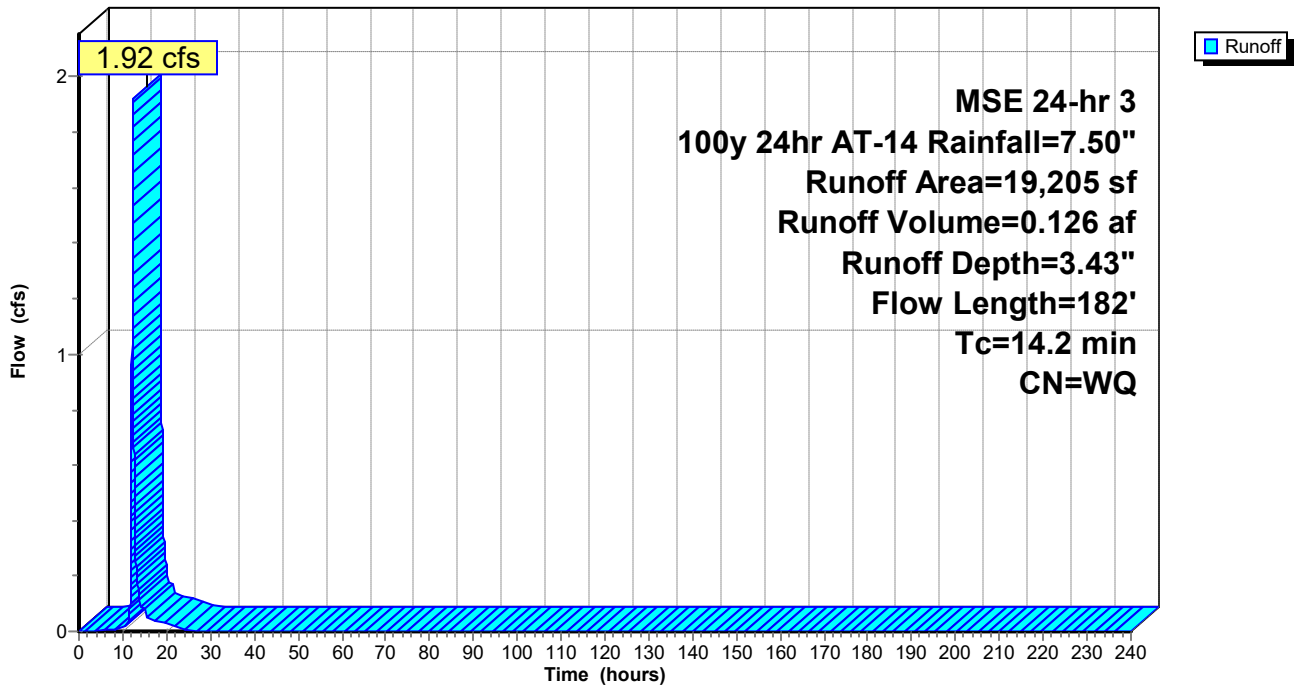
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

Area (sf)	CN	Description
* 2,098	98	Impervious Surface
17,107	60	Woods, Fair, HSG B
19,205		Weighted Average
17,107		89.08% Pervious Area
2,098		10.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0750	0.13		Sheet Flow, SF
1.0	82	0.0730	1.35		Woods: Light underbrush n= 0.400 P2= 2.94"
					Shallow Concentrated Flow, SCF
					Woodland Kv= 5.0 fps
14.2	182	Total			

Subcatchment EX2: EX2

Hydrograph



Summary for Reach 1R: RUNOFF SW

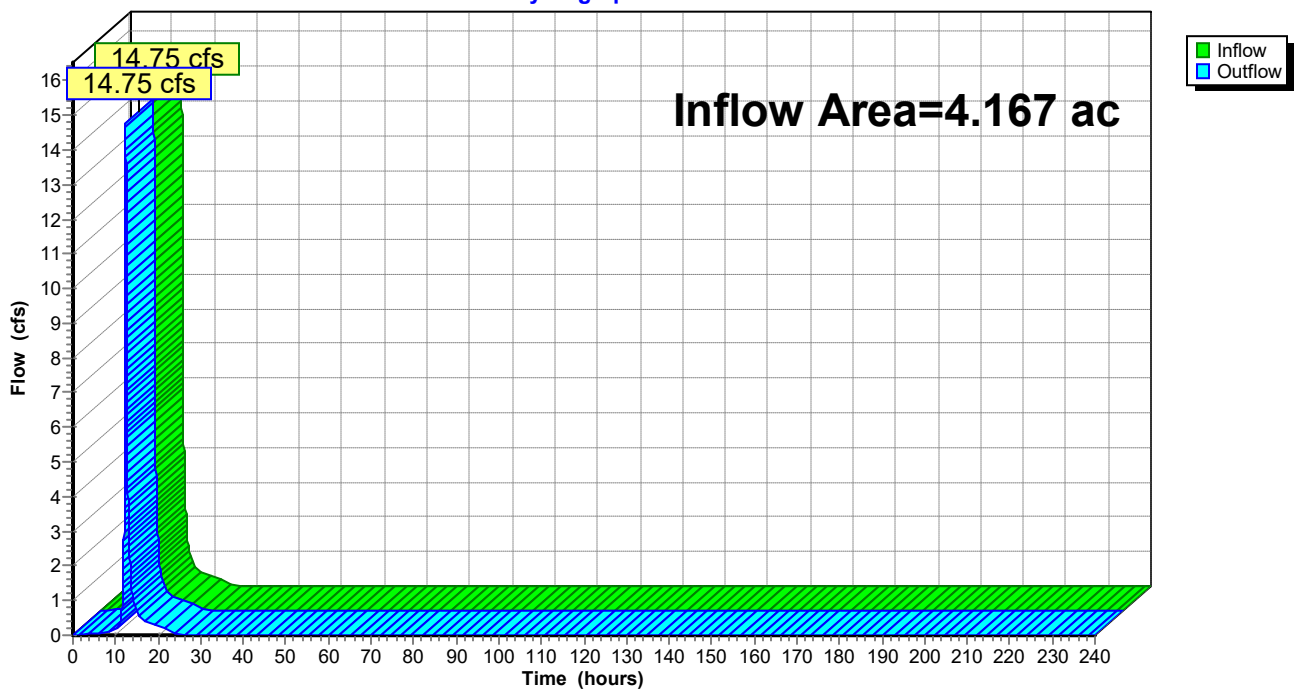
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.167 ac, 19.43% Impervious, Inflow Depth = 3.80" for 100y 24hr AT-14 event
Inflow = 14.75 cfs @ 12.36 hrs, Volume= 1.319 af
Outflow = 14.75 cfs @ 12.36 hrs, Volume= 1.319 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 1R: RUNOFF SW

Hydrograph



Summary for Reach 2R: RUNOFF NW

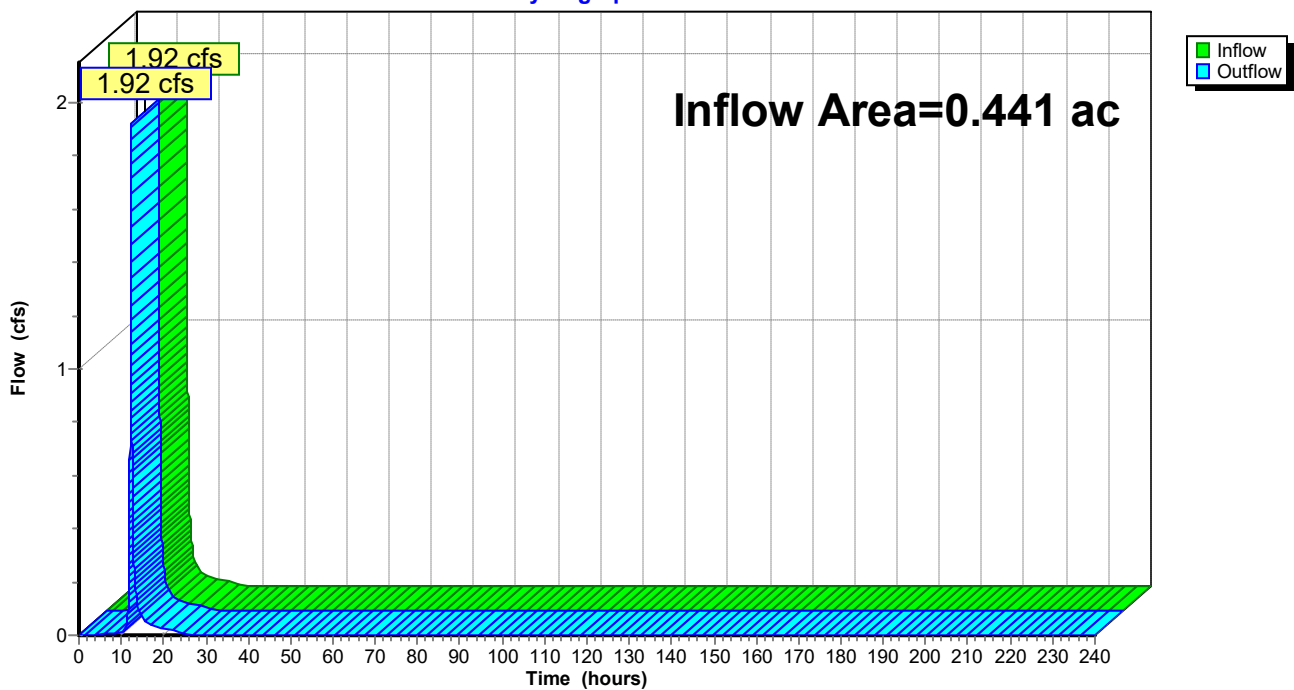
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.441 ac, 10.92% Impervious, Inflow Depth = 3.43" for 100y 24hr AT-14 event
Inflow = 1.92 cfs @ 12.23 hrs, Volume= 0.126 af
Outflow = 1.92 cfs @ 12.23 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

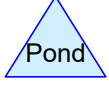
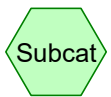
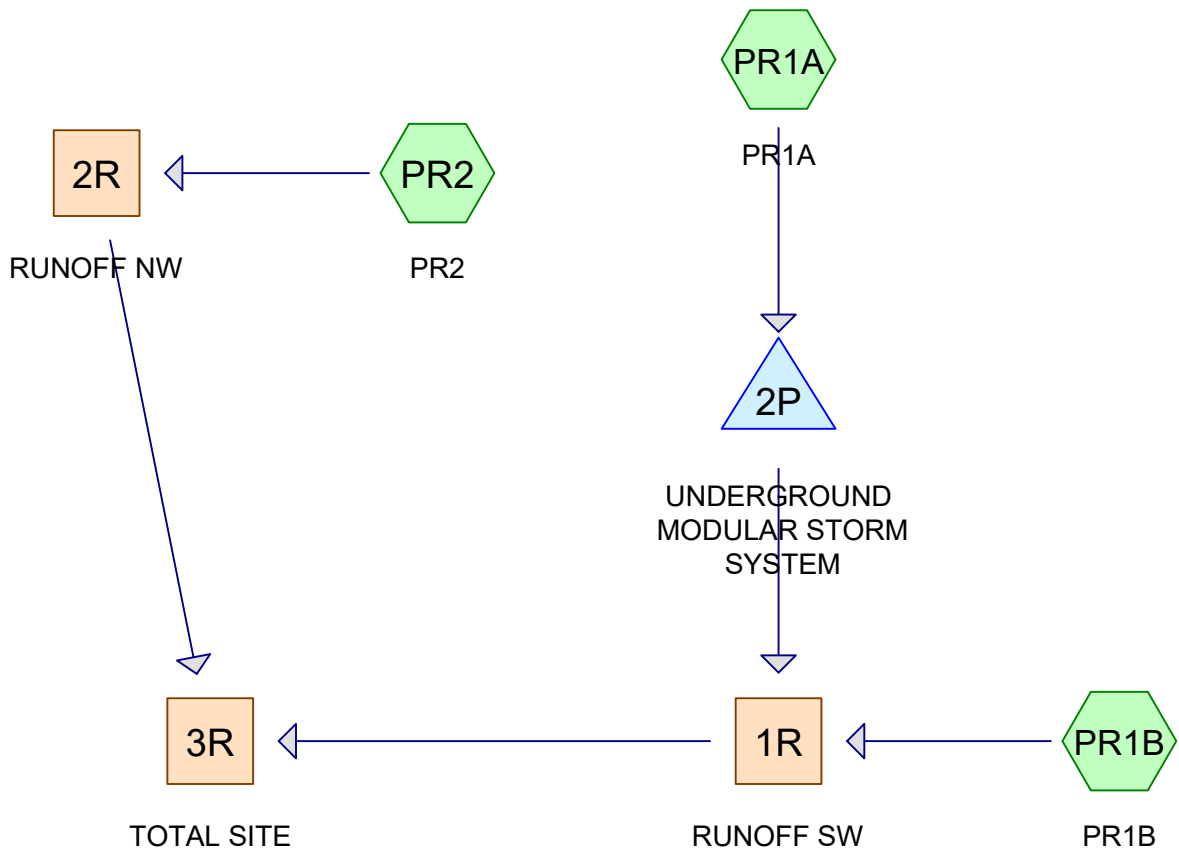
Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 2R: RUNOFF NW

Hydrograph



PROPOSED CONDITIONS



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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1.1" Storm	MSE 24-hr	3	Default	24.00	1	1.10	2
2	2y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	2.83	2
3	10y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	4.24	2
4	100y 24hr AT-14	MSE 24-hr	3	Default	24.00	1	7.50	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.408	61	>75% Grass cover, Good, HSG B (PR1A, PR2)
0.547	98	Existing Impervious Surface (PR1B)
1.423	98	Impervious Surface (PR1A, PR2)
1.230	60	Woods, Fair, HSG B (PR1B)
4.608	77	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
2.638	HSG B	PR1A, PR1B, PR2
0.000	HSG C	
0.000	HSG D	
1.970	Other	PR1A, PR1B, PR2
4.608		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.408	0.000	0.000	0.000	1.408	>75% Grass cover, Good	PR1A, PR2
0.000	0.000	0.000	0.000	0.547	0.547	Existing Impervious Surface	PR1B
0.000	0.000	0.000	0.000	1.423	1.423	Impervious Surface	PR1A, PR2
0.000	1.230	0.000	0.000	0.000	1.230	Woods, Fair	PR1B
0.000	2.638	0.000	0.000	1.970	4.608	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	2P	801.60	799.00	64.0	0.0406	0.013	0.0	9.0	0.0	

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MSE 24-hr 3 1.1" Storm Rainfall=1.10"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A Runoff Area=110,095 sf 54.65% Impervious Runoff Depth=0.49"
Tc=10.0 min CN=WQ Runoff=1.79 cfs 0.102 af

Subcatchment PR1B: PR1B Runoff Area=77,399 sf 30.77% Impervious Runoff Depth=0.27"
Flow Length=315' Tc=10.7 min CN=WQ Runoff=0.69 cfs 0.040 af

Subcatchment PR2: PR2 Runoff Area=13,225 sf 13.88% Impervious Runoff Depth=0.12"
Tc=10.0 min CN=WQ Runoff=0.05 cfs 0.003 af

Reach 1R: RUNOFF SW Inflow=0.69 cfs 0.040 af
Outflow=0.69 cfs 0.040 af

Reach 2R: RUNOFF NW Inflow=0.05 cfs 0.003 af
Outflow=0.05 cfs 0.003 af

Reach 3R: TOTAL SITE Inflow=0.75 cfs 0.044 af
Outflow=0.75 cfs 0.044 af

Pond 2P: UNDERGROUND MODULAR Peak Elev=800.74' Storage=2,733 cf Inflow=1.79 cfs 0.102 af
Discarded=0.07 cfs 0.102 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.102 af

Total Runoff Area = 4.608 ac Runoff Volume = 0.146 af Average Runoff Depth = 0.38"
57.25% Pervious = 2.638 ac 42.75% Impervious = 1.970 ac

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MSE 24-hr 3 1.1" Storm Rainfall=1.10"

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Summary for Subcatchment PR1A: PR1A

Runoff = 1.79 cfs @ 12.17 hrs, Volume= 0.102 af, Depth= 0.49"

Routed to Pond 2P : UNDERGROUND MODULAR STORM SYSTEM

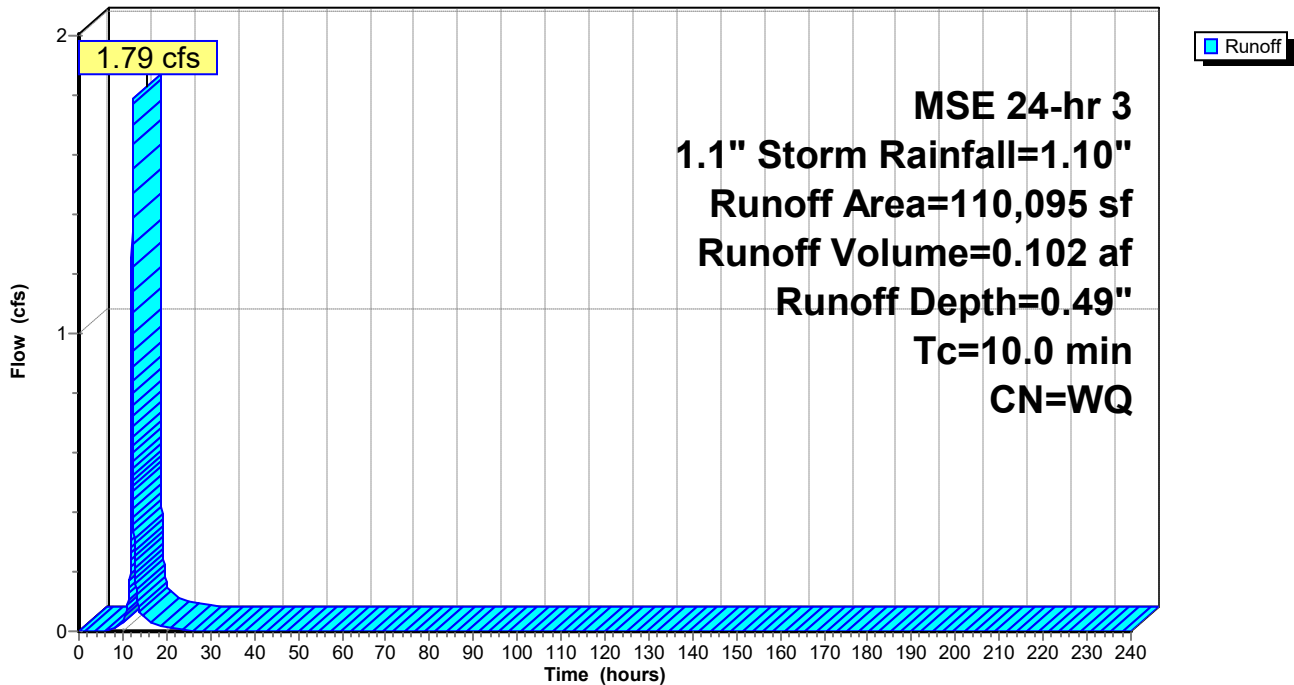
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 1.1" Storm Rainfall=1.10"

Area (sf)	CN	Description
* 60,164	98	Impervious Surface
49,931	61	>75% Grass cover, Good, HSG B
110,095		Weighted Average
49,931		45.35% Pervious Area
60,164		54.65% Impervious Area

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

Subcatchment PR1A: PR1A

Hydrograph



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MSE 24-hr 3 1.1" Storm Rainfall=1.10"

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Summary for Subcatchment PR1B: PR1B

Runoff = 0.69 cfs @ 12.18 hrs, Volume= 0.040 af, Depth= 0.27"
 Routed to Reach 1R : RUNOFF SW

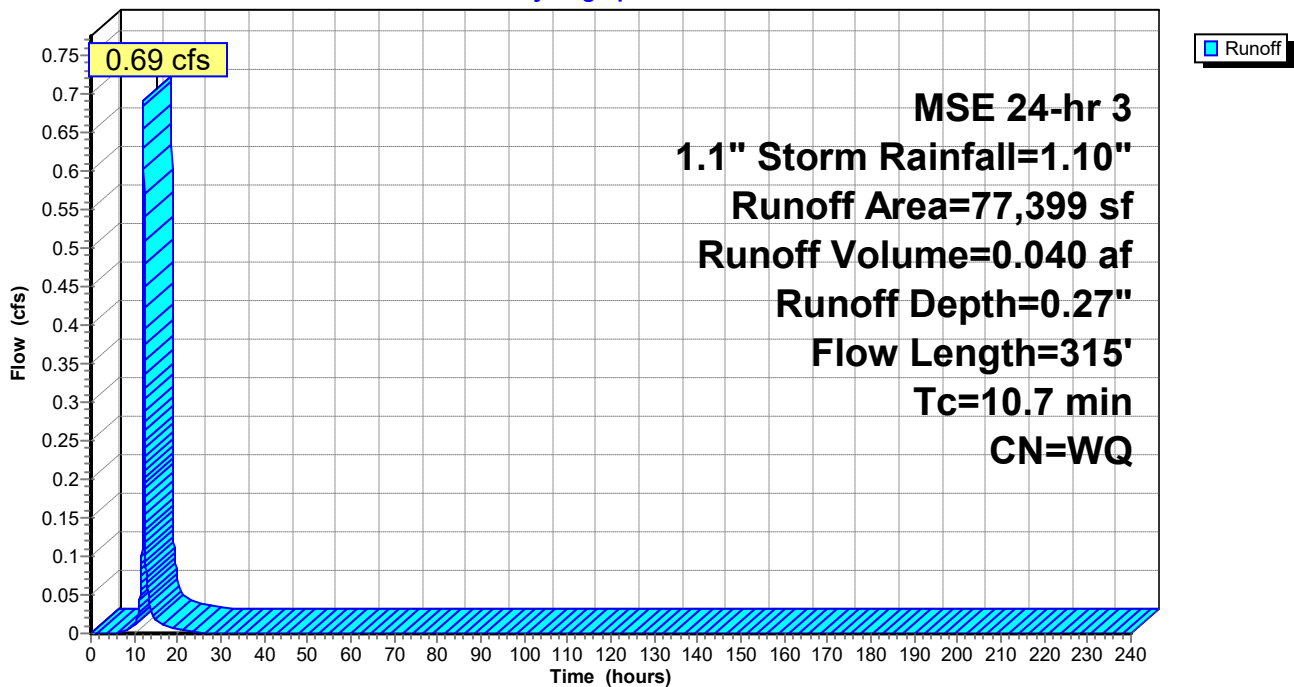
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 1.1" Storm Rainfall=1.10"

Area (sf)	CN	Description
* 23,813	98	Existing Impervious Surface
53,586	60	Woods, Fair, HSG B
77,399		Weighted Average
53,586		69.23% Pervious Area
23,813		30.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2100	0.19		Sheet Flow, SF
					Woods: Light underbrush n= 0.400 P2= 2.94"
2.0	215	0.1300	1.80		Shallow Concentrated Flow, SCF
					Woodland Kv= 5.0 fps
10.7	315	Total			

Subcatchment PR1B: PR1B

Hydrograph



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MSE 24-hr 3 1.1" Storm Rainfall=1.10"

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Summary for Subcatchment PR2: PR2

Runoff = 0.05 cfs @ 12.17 hrs, Volume= 0.003 af, Depth= 0.12"
 Routed to Reach 2R : RUNOFF NW

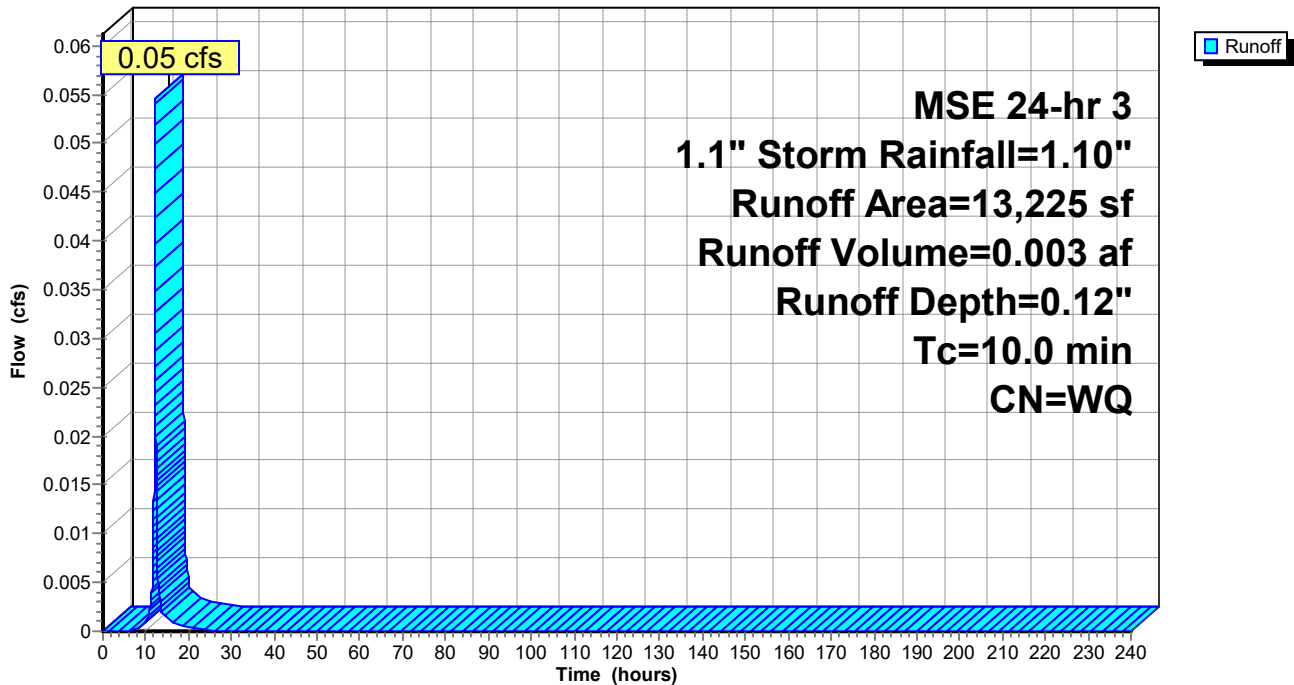
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 1.1" Storm Rainfall=1.10"

	Area (sf)	CN	Description
*	1,835	98	Impervious Surface
	11,390	61	>75% Grass cover, Good, HSG B
	13,225		Weighted Average
	11,390		86.12% Pervious Area
	1,835		13.88% Impervious Area

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

Subcatchment PR2: PR2

Hydrograph



Summary for Reach 1R: RUNOFF SW

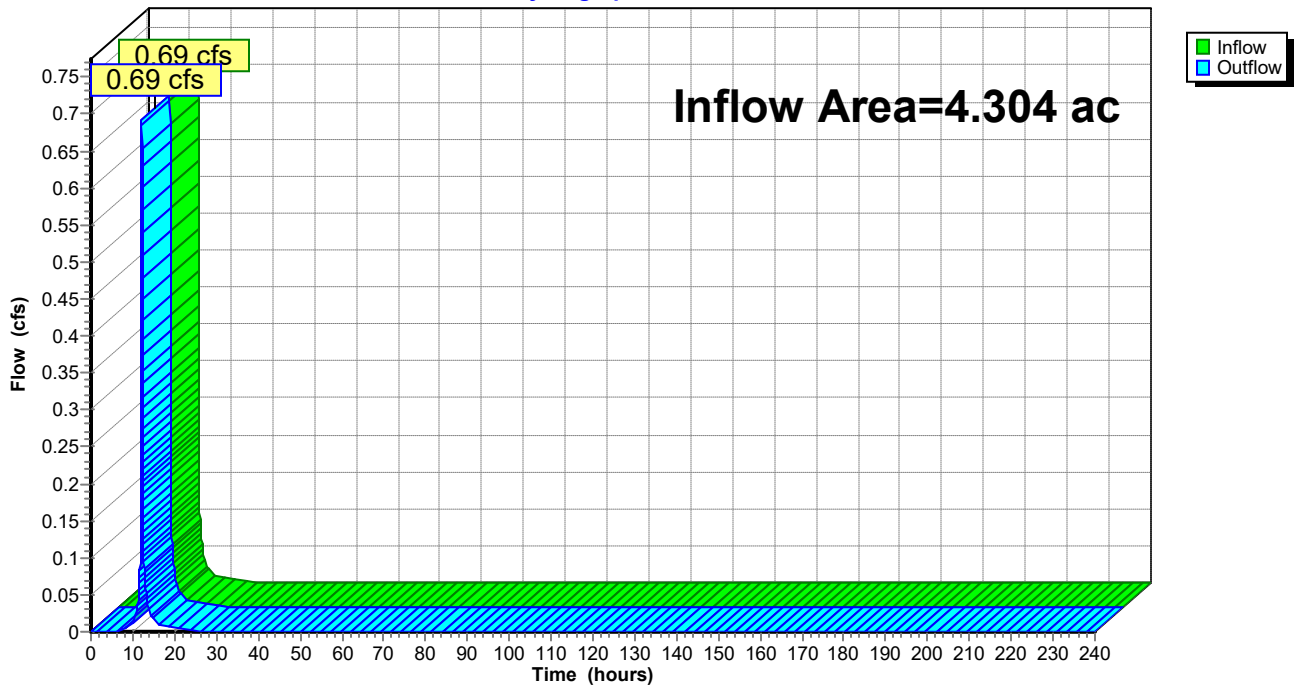
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.304 ac, 44.79% Impervious, Inflow Depth = 0.11" for 1.1" Storm event
Inflow = 0.69 cfs @ 12.18 hrs, Volume= 0.040 af
Outflow = 0.69 cfs @ 12.18 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 1R: RUNOFF SW

Hydrograph



Summary for Reach 2R: RUNOFF NW

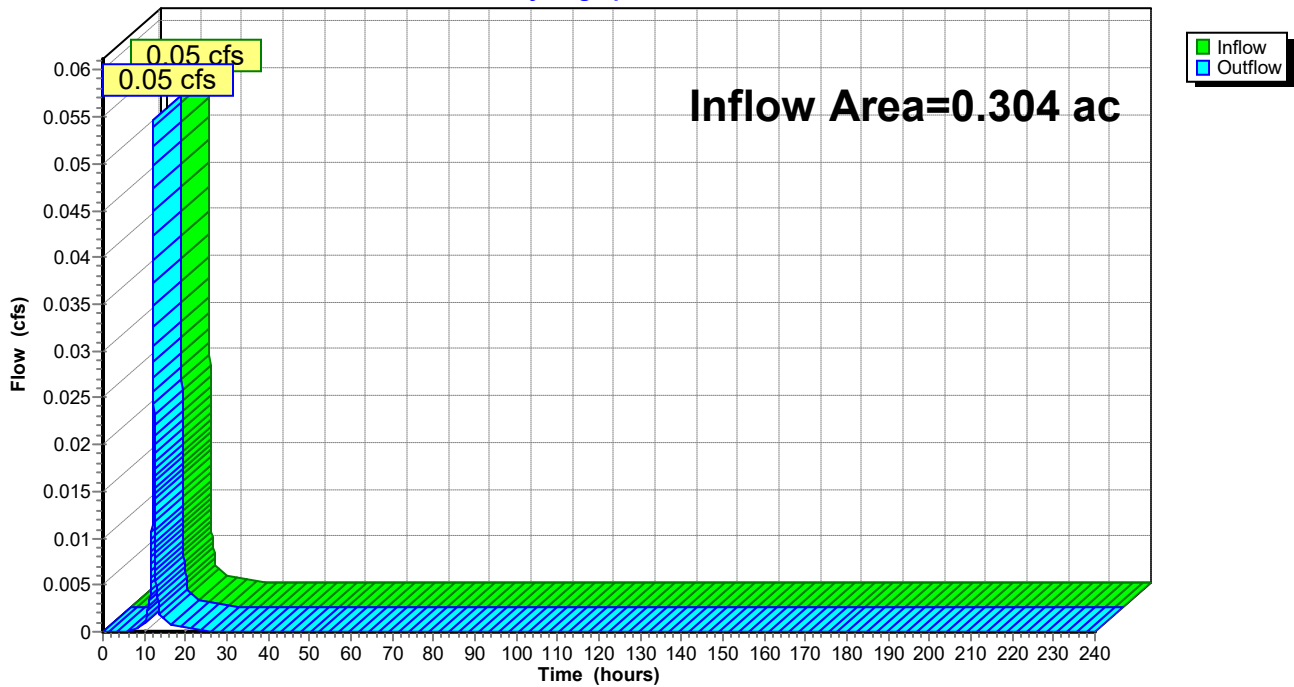
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.304 ac, 13.88% Impervious, Inflow Depth = 0.12" for 1.1" Storm event
Inflow = 0.05 cfs @ 12.17 hrs, Volume= 0.003 af
Outflow = 0.05 cfs @ 12.17 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 2R: RUNOFF NW

Hydrograph



Summary for Reach 3R: TOTAL SITE

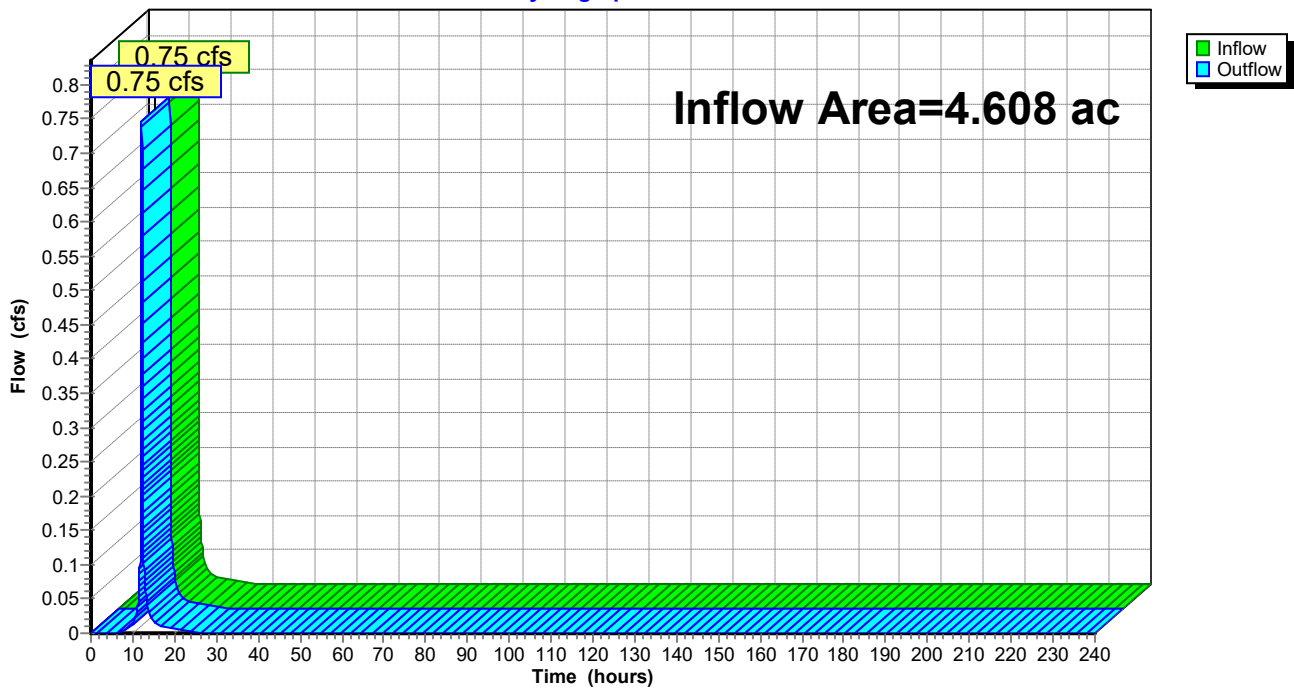
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.608 ac, 42.75% Impervious, Inflow Depth = 0.11" for 1.1" Storm event
Inflow = 0.75 cfs @ 12.18 hrs, Volume= 0.044 af
Outflow = 0.75 cfs @ 12.18 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL SITE

Hydrograph



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MSE 24-hr 3 1.1" Storm Rainfall=1.10"

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Summary for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Inflow Area = 2.527 ac, 54.65% Impervious, Inflow Depth = 0.49" for 1.1" Storm event
 Inflow = 1.79 cfs @ 12.17 hrs, Volume= 0.102 af
 Outflow = 0.07 cfs @ 13.63 hrs, Volume= 0.102 af, Atten= 96%, Lag= 87.7 min
 Discarded = 0.07 cfs @ 13.63 hrs, Volume= 0.102 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 1R : RUNOFF SW

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Peak Elev= 800.74' @ 13.63 hrs Surf.Area= 4,000 sf Storage= 2,733 cf

Plug-Flow detention time= 341.8 min calculated for 0.102 af (100% of inflow)
 Center-of-Mass det. time= 341.8 min (1,118.8 - 776.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	800.00'	1,944 cf	32.00'W x 125.00'L x 6.75'H Field A 27,000 cf Overall - 22,140 cf Embedded = 4,860 cf x 40.0% Voids
#2A	800.00'	21,477 cf	StormTank 25 Series 72" x 820 Inside #1 Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf 820 Chambers in 20 Rows
		23,421 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	800.00'	0.800 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 700.00'
#2	Primary	801.60'	9.0" Round Culvert L= 64.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 801.60' / 799.00' S= 0.0406 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.44 sf
#3	Device 2	801.60'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	803.40'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.07 cfs @ 13.63 hrs HW=800.74' (Free Discharge)
 ↑ **1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=800.00' (Free Discharge)
 ↑ **2=Culvert** (Controls 0.00 cfs)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
 ↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

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MSE 24-hr 3 1.1" Storm Rainfall=1.10"

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Pond 2P: UNDERGROUND MODULAR STORM SYSTEM - Chamber Wizard Field A

Chamber Model = StormTank 25 Series 72" (StormTank Module 25 Series)

Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf

Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf

41 Chambers/Row x 3.00' Long = 123.00' Row Length +12.0" End Stone x 2 = 125.00' Base Length

20 Rows x 18.0" Wide + 12.0" Side Stone x 2 = 32.00' Base Width

72.0" Chamber Height + 9.0" Stone Cover = 6.75' Field Height

820 Chambers x 26.2 cf = 21,477.3 cf Chamber Storage

820 Chambers x 27.0 cf = 22,140.0 cf Displacement

27,000.0 cf Field - 22,140.0 cf Chambers = 4,860.0 cf Stone x 40.0% Voids = 1,944.0 cf Stone Storage

Chamber Storage + Stone Storage = 23,421.3 cf = 0.538 af

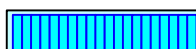
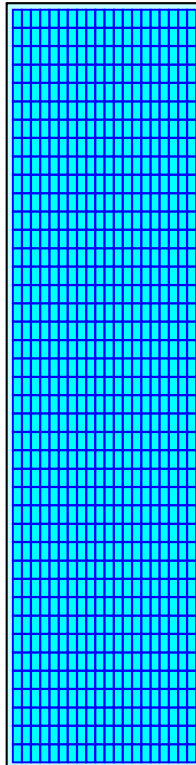
Overall Storage Efficiency = 86.7%

Overall System Size = 125.00' x 32.00' x 6.75'

820 Chambers

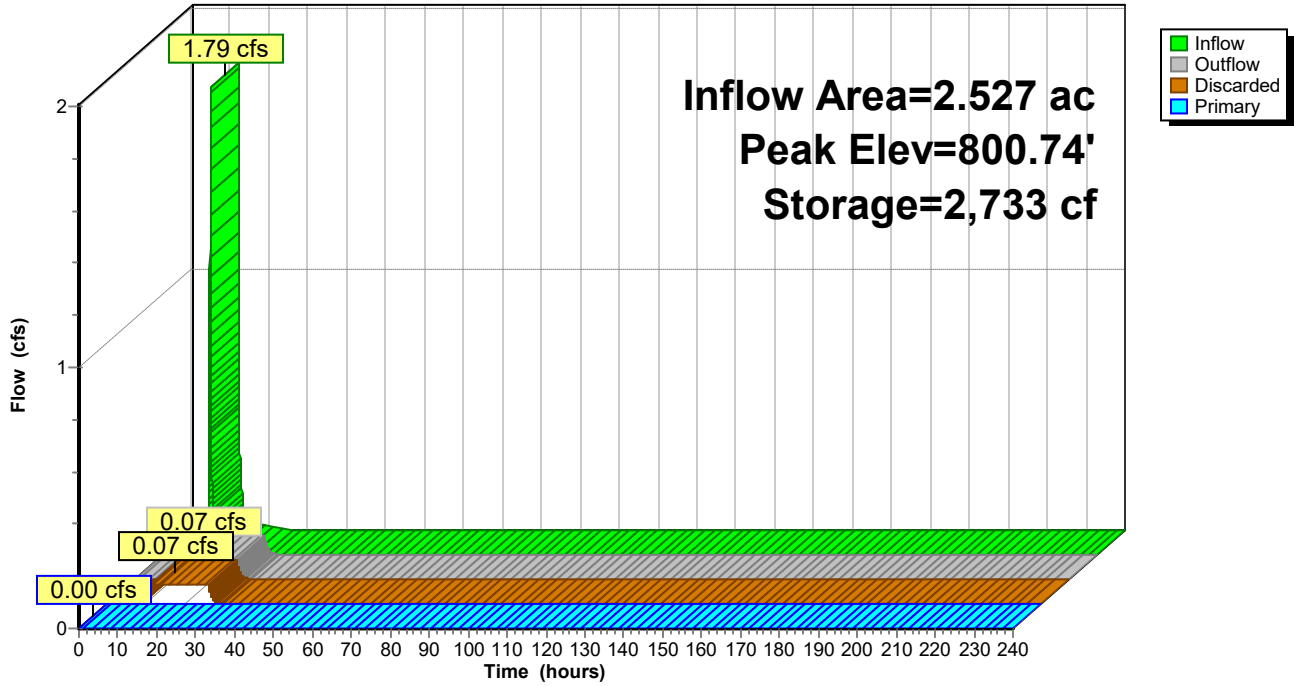
1,000.0 cy Field

180.0 cy Stone



Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Hydrograph



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Stage-Discharge for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
800.00	0.00	0.00	0.00	805.20	3.90	0.08	3.82
800.10	0.07	0.07	0.00	805.30	3.96	0.08	3.88
800.20	0.07	0.07	0.00	805.40	4.01	0.08	3.94
800.30	0.07	0.07	0.00	805.50	4.07	0.08	3.99
800.40	0.07	0.07	0.00	805.60	4.13	0.08	4.05
800.50	0.07	0.07	0.00	805.70	4.18	0.08	4.10
800.60	0.07	0.07	0.00	805.80	4.21	0.08	4.13
800.70	0.07	0.07	0.00	805.90	4.25	0.08	4.17
800.80	0.07	0.07	0.00	806.00	4.28	0.08	4.20
800.90	0.07	0.07	0.00	806.10	4.31	0.08	4.24
801.00	0.07	0.07	0.00	806.20	4.35	0.08	4.27
801.10	0.07	0.07	0.00	806.30	4.38	0.08	4.30
801.20	0.07	0.07	0.00	806.40	4.41	0.08	4.33
801.30	0.08	0.08	0.00	806.50	4.45	0.08	4.37
801.40	0.08	0.08	0.00	806.60	4.48	0.08	4.40
801.50	0.08	0.08	0.00	806.70	4.51	0.08	4.43
801.60	0.08	0.08	0.00				
801.70	0.11	0.08	0.03				
801.80	0.19	0.08	0.11				
801.90	0.30	0.08	0.23				
802.00	0.44	0.08	0.36				
802.10	0.55	0.08	0.47				
802.20	0.64	0.08	0.56				
802.30	0.71	0.08	0.63				
802.40	0.78	0.08	0.70				
802.50	0.84	0.08	0.76				
802.60	0.89	0.08	0.82				
802.70	0.95	0.08	0.87				
802.80	1.00	0.08	0.92				
802.90	1.04	0.08	0.97				
803.00	1.09	0.08	1.01				
803.10	1.13	0.08	1.06				
803.20	1.17	0.08	1.10				
803.30	1.21	0.08	1.14				
803.40	1.25	0.08	1.18				
803.50	1.70	0.08	1.63				
803.60	2.49	0.08	2.41				
803.70	2.87	0.08	2.79				
803.80	2.95	0.08	2.87				
803.90	3.03	0.08	2.95				
804.00	3.10	0.08	3.03				
804.10	3.18	0.08	3.10				
804.20	3.25	0.08	3.17				
804.30	3.32	0.08	3.24				
804.40	3.39	0.08	3.31				
804.50	3.46	0.08	3.38				
804.60	3.52	0.08	3.45				
804.70	3.59	0.08	3.51				
804.80	3.65	0.08	3.58				
804.90	3.72	0.08	3.64				
805.00	3.78	0.08	3.70				
805.10	3.84	0.08	3.76				

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MSE 24-hr 3 1.1" Storm Rainfall=1.10"

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Stage-Area-Storage for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
800.00	4,000	0	805.20	4,000	19,259
800.10	4,000	370	805.30	4,000	19,629
800.20	4,000	741	805.40	4,000	19,999
800.30	4,000	1,111	805.50	4,000	20,370
800.40	4,000	1,481	805.60	4,000	20,740
800.50	4,000	1,852	805.70	4,000	21,110
800.60	4,000	2,222	805.80	4,000	21,481
800.70	4,000	2,592	805.90	4,000	21,851
800.80	4,000	2,963	806.00	4,000	22,221
800.90	4,000	3,333	806.10	4,000	22,381
801.00	4,000	3,704	806.20	4,000	22,541
801.10	4,000	4,074	806.30	4,000	22,701
801.20	4,000	4,444	806.40	4,000	22,861
801.30	4,000	4,815	806.50	4,000	23,021
801.40	4,000	5,185	806.60	4,000	23,181
801.50	4,000	5,555	806.70	4,000	23,341
801.60	4,000	5,926			
801.70	4,000	6,296			
801.80	4,000	6,666			
801.90	4,000	7,037			
802.00	4,000	7,407			
802.10	4,000	7,777			
802.20	4,000	8,148			
802.30	4,000	8,518			
802.40	4,000	8,889			
802.50	4,000	9,259			
802.60	4,000	9,629			
802.70	4,000	10,000			
802.80	4,000	10,370			
802.90	4,000	10,740			
803.00	4,000	11,111			
803.10	4,000	11,481			
803.20	4,000	11,851			
803.30	4,000	12,222			
803.40	4,000	12,592			
803.50	4,000	12,962			
803.60	4,000	13,333			
803.70	4,000	13,703			
803.80	4,000	14,074			
803.90	4,000	14,444			
804.00	4,000	14,814			
804.10	4,000	15,185			
804.20	4,000	15,555			
804.30	4,000	15,925			
804.40	4,000	16,296			
804.50	4,000	16,666			
804.60	4,000	17,036			
804.70	4,000	17,407			
804.80	4,000	17,777			
804.90	4,000	18,147			
805.00	4,000	18,518			
805.10	4,000	18,888			

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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A Runoff Area=110,095 sf 54.65% Impervious Runoff Depth=1.56"
Tc=10.0 min CN=WQ Runoff=5.19 cfs 0.328 af

Subcatchment PR1B: PR1B Runoff Area=77,399 sf 30.77% Impervious Runoff Depth=0.99"
Flow Length=315' Tc=10.7 min CN=WQ Runoff=2.12 cfs 0.147 af

Subcatchment PR2: PR2 Runoff Area=13,225 sf 13.88% Impervious Runoff Depth=0.62"
Tc=10.0 min CN=WQ Runoff=0.21 cfs 0.016 af

Reach 1R: RUNOFF SW Inflow=2.12 cfs 0.245 af
Outflow=2.12 cfs 0.245 af

Reach 2R: RUNOFF NW Inflow=0.21 cfs 0.016 af
Outflow=0.21 cfs 0.016 af

Reach 3R: TOTAL SITE Inflow=2.33 cfs 0.261 af
Outflow=2.33 cfs 0.261 af

Pond 2P: UNDERGROUND MODULAR Peak Elev=802.15' Storage=7,971 cf Inflow=5.19 cfs 0.328 af
Discarded=0.08 cfs 0.229 af Primary=0.52 cfs 0.099 af Outflow=0.60 cfs 0.328 af

Total Runoff Area = 4.608 ac Runoff Volume = 0.490 af Average Runoff Depth = 1.28"
57.25% Pervious = 2.638 ac 42.75% Impervious = 1.970 ac

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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Summary for Subcatchment PR1A: PR1A

Runoff = 5.19 cfs @ 12.17 hrs, Volume= 0.328 af, Depth= 1.56"

Routed to Pond 2P : UNDERGROUND MODULAR STORM SYSTEM

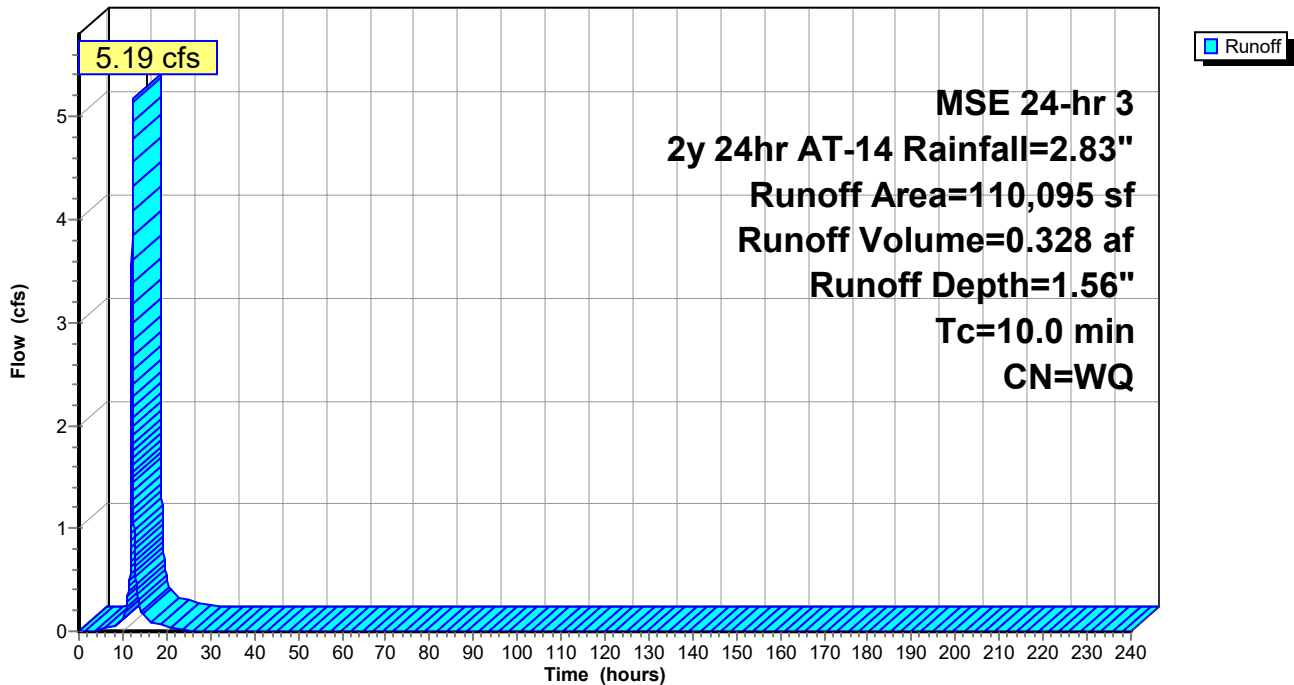
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

	Area (sf)	CN	Description
*	60,164	98	Impervious Surface
	49,931	61	>75% Grass cover, Good, HSG B
	110,095		Weighted Average
	49,931		45.35% Pervious Area
	60,164		54.65% Impervious Area

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

Subcatchment PR1A: PR1A

Hydrograph



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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Summary for Subcatchment PR1B: PR1B

Runoff = 2.12 cfs @ 12.19 hrs, Volume= 0.147 af, Depth= 0.99"
 Routed to Reach 1R : RUNOFF SW

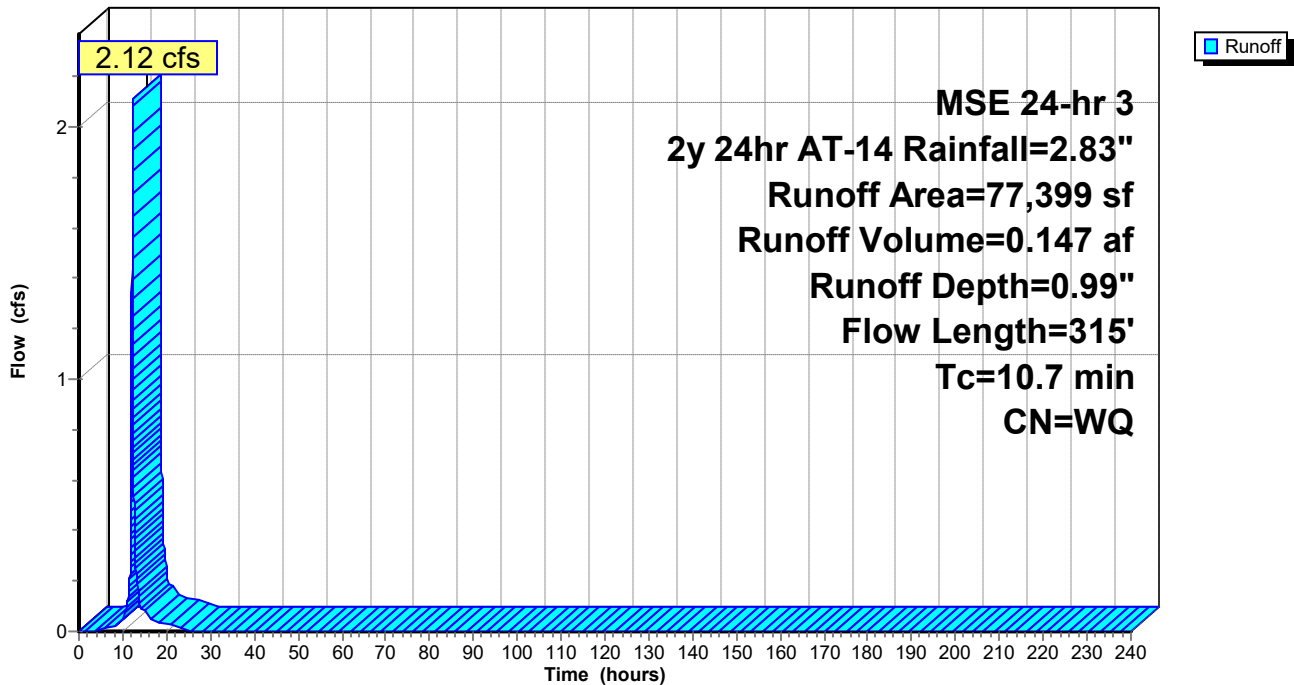
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

Area (sf)	CN	Description
* 23,813	98	Existing Impervious Surface
53,586	60	Woods, Fair, HSG B
77,399		Weighted Average
53,586		69.23% Pervious Area
23,813		30.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2100	0.19		Sheet Flow, SF
2.0	215	0.1300	1.80		Shallow Concentrated Flow, SCF
					Woodland Kv= 5.0 fps
10.7	315	Total			

Subcatchment PR1B: PR1B

Hydrograph



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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Summary for Subcatchment PR2: PR2

Runoff = 0.21 cfs @ 12.19 hrs, Volume= 0.016 af, Depth= 0.62"
Routed to Reach 2R : RUNOFF NW

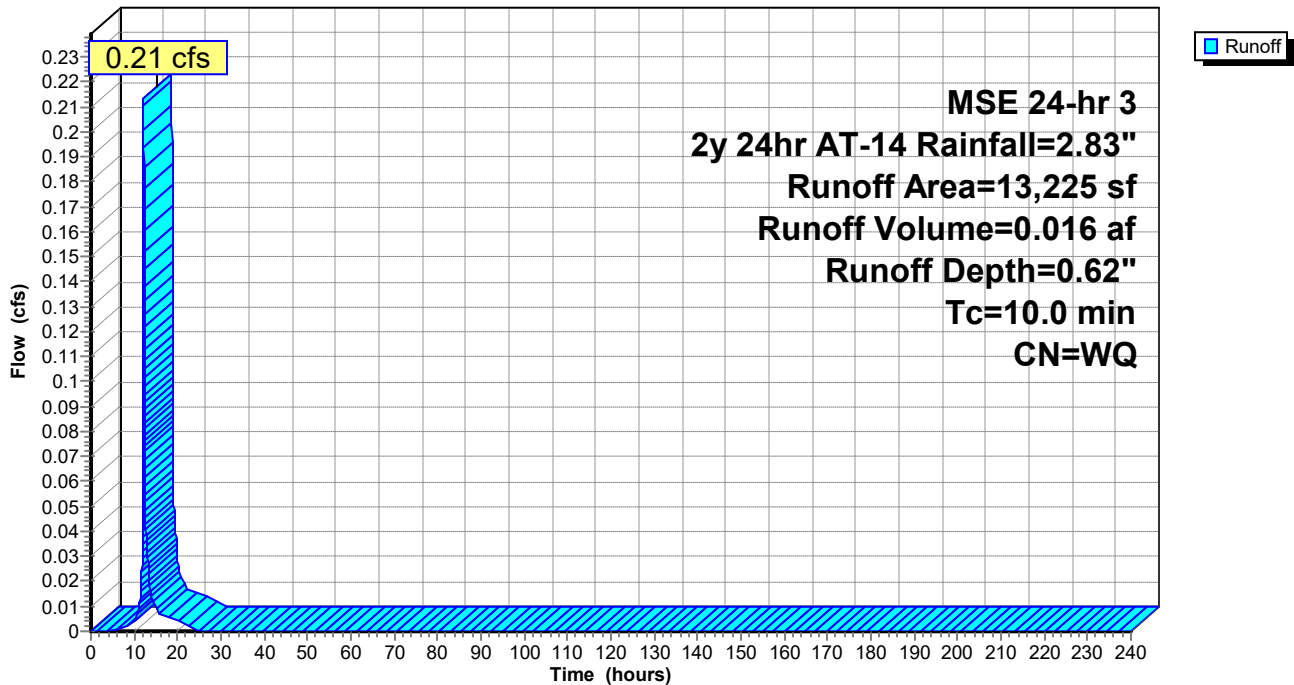
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

	Area (sf)	CN	Description
*	1,835	98	Impervious Surface
	11,390	61	>75% Grass cover, Good, HSG B
	13,225		Weighted Average
	11,390		86.12% Pervious Area
	1,835		13.88% Impervious Area

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

Subcatchment PR2: PR2

Hydrograph



Summary for Reach 1R: RUNOFF SW

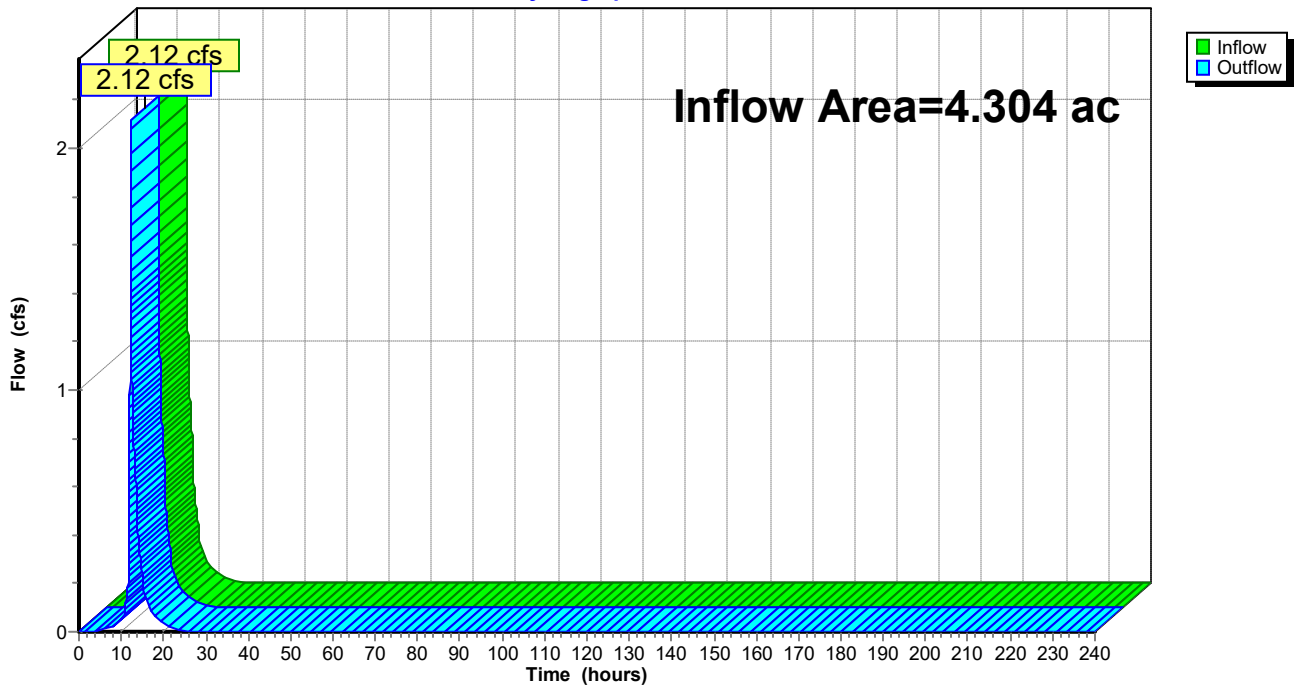
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.304 ac, 44.79% Impervious, Inflow Depth = 0.68" for 2y 24hr AT-14 event
Inflow = 2.12 cfs @ 12.19 hrs, Volume= 0.245 af
Outflow = 2.12 cfs @ 12.19 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 1R: RUNOFF SW

Hydrograph



Summary for Reach 2R: RUNOFF NW

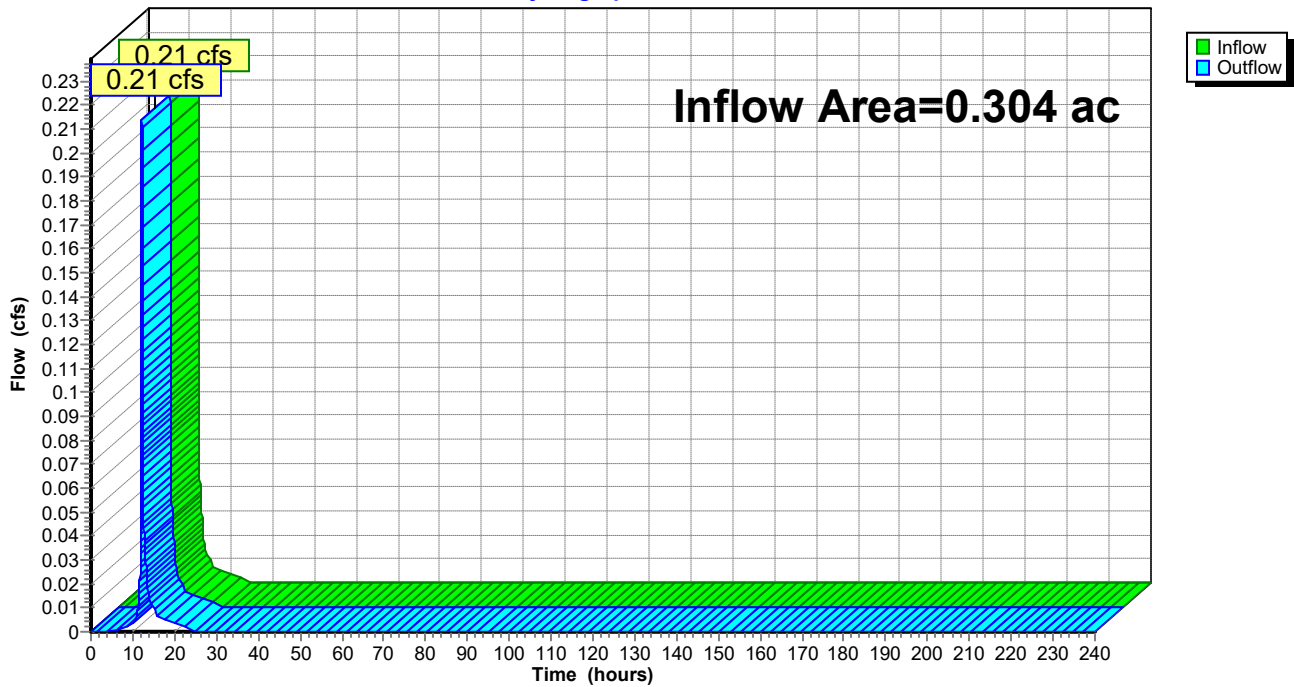
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.304 ac, 13.88% Impervious, Inflow Depth = 0.62" for 2y 24hr AT-14 event
Inflow = 0.21 cfs @ 12.19 hrs, Volume= 0.016 af
Outflow = 0.21 cfs @ 12.19 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 2R: RUNOFF NW

Hydrograph



Summary for Reach 3R: TOTAL SITE

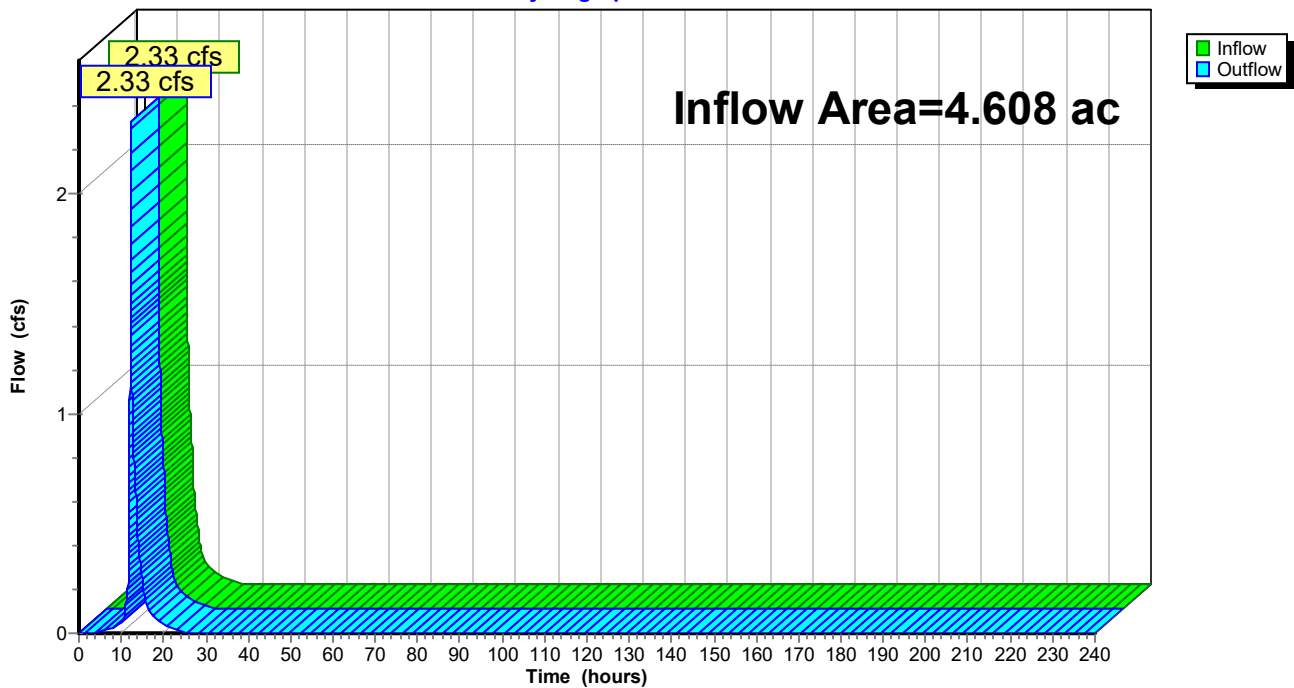
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.608 ac, 42.75% Impervious, Inflow Depth = 0.68" for 2y 24hr AT-14 event
Inflow = 2.33 cfs @ 12.19 hrs, Volume= 0.261 af
Outflow = 2.33 cfs @ 12.19 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL SITE

Hydrograph



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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Summary for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Inflow Area = 2.527 ac, 54.65% Impervious, Inflow Depth = 1.56" for 2y 24hr AT-14 event
 Inflow = 5.19 cfs @ 12.17 hrs, Volume= 0.328 af
 Outflow = 0.60 cfs @ 12.76 hrs, Volume= 0.328 af, Atten= 89%, Lag= 34.9 min
 Discarded = 0.08 cfs @ 12.76 hrs, Volume= 0.229 af
 Primary = 0.52 cfs @ 12.76 hrs, Volume= 0.099 af
 Routed to Reach 1R : RUNOFF SW

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Peak Elev= 802.15' @ 12.76 hrs Surf.Area= 4,000 sf Storage= 7,971 cf

Plug-Flow detention time= 564.3 min calculated for 0.328 af (100% of inflow)
 Center-of-Mass det. time= 564.3 min (1,333.3 - 769.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	800.00'	1,944 cf	32.00'W x 125.00'L x 6.75'H Field A 27,000 cf Overall - 22,140 cf Embedded = 4,860 cf x 40.0% Voids
#2A	800.00'	21,477 cf	StormTank 25 Series 72" x 820 Inside #1 Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf 820 Chambers in 20 Rows
		23,421 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	800.00'	0.800 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 700.00'
#2	Primary	801.60'	9.0" Round Culvert L= 64.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 801.60' / 799.00' S= 0.0406 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.44 sf
#3	Device 2	801.60'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	803.40'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.08 cfs @ 12.76 hrs HW=802.15' (Free Discharge)
 ↑1=Exfiltration (Controls 0.08 cfs)

Primary OutFlow Max=0.52 cfs @ 12.76 hrs HW=802.15' (Free Discharge)
 ↑2=Culvert (Passes 0.52 cfs of 0.88 cfs potential flow)
 ↑3=Orifice/Grate (Orifice Controls 0.52 cfs @ 2.65 fps)
 ↑4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

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Pond 2P: UNDERGROUND MODULAR STORM SYSTEM - Chamber Wizard Field A

Chamber Model = StormTank 25 Series 72" (StormTank Module 25 Series)

Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf

Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf

41 Chambers/Row x 3.00' Long = 123.00' Row Length +12.0" End Stone x 2 = 125.00' Base Length

20 Rows x 18.0" Wide + 12.0" Side Stone x 2 = 32.00' Base Width

72.0" Chamber Height + 9.0" Stone Cover = 6.75' Field Height

820 Chambers x 26.2 cf = 21,477.3 cf Chamber Storage

820 Chambers x 27.0 cf = 22,140.0 cf Displacement

27,000.0 cf Field - 22,140.0 cf Chambers = 4,860.0 cf Stone x 40.0% Voids = 1,944.0 cf Stone Storage

Chamber Storage + Stone Storage = 23,421.3 cf = 0.538 af

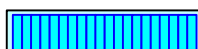
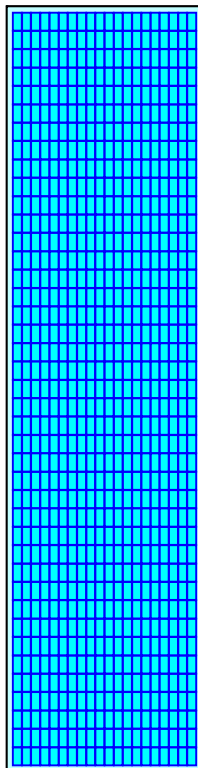
Overall Storage Efficiency = 86.7%

Overall System Size = 125.00' x 32.00' x 6.75'

820 Chambers

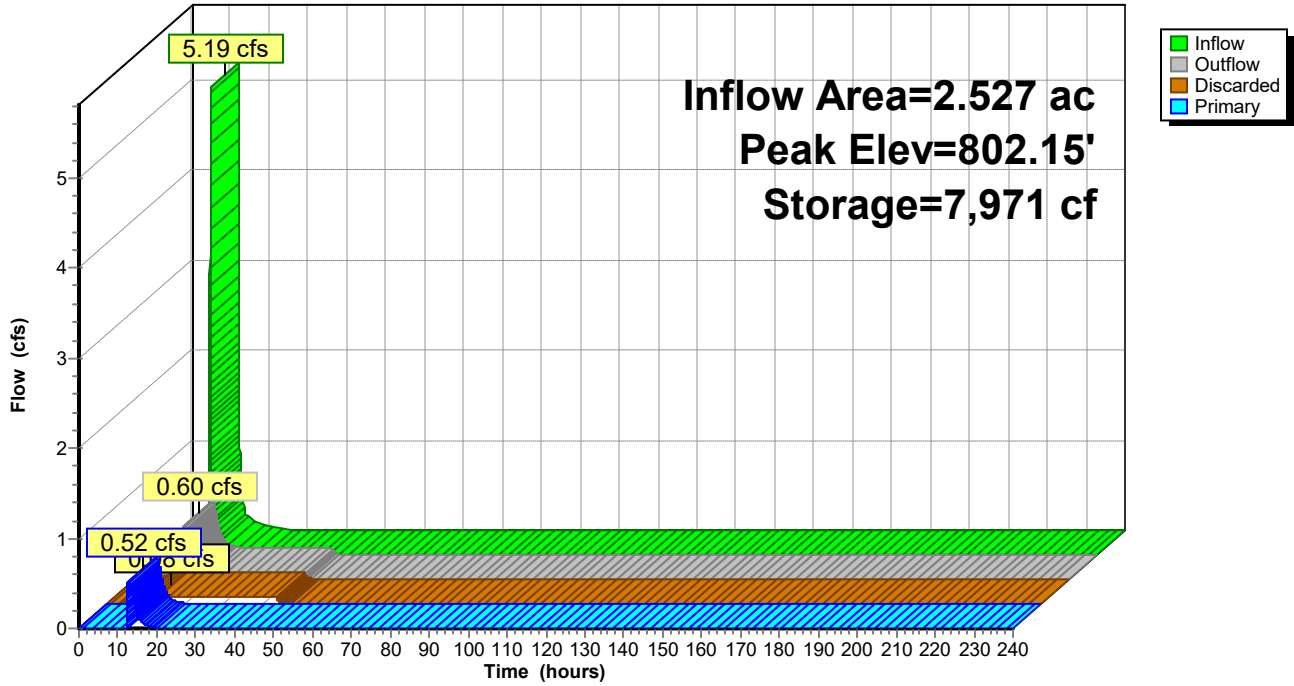
1,000.0 cy Field

180.0 cy Stone



Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Hydrograph



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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Stage-Discharge for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
800.00	0.00	0.00	0.00	805.20	3.90	0.08	3.82
800.10	0.07	0.07	0.00	805.30	3.96	0.08	3.88
800.20	0.07	0.07	0.00	805.40	4.01	0.08	3.94
800.30	0.07	0.07	0.00	805.50	4.07	0.08	3.99
800.40	0.07	0.07	0.00	805.60	4.13	0.08	4.05
800.50	0.07	0.07	0.00	805.70	4.18	0.08	4.10
800.60	0.07	0.07	0.00	805.80	4.21	0.08	4.13
800.70	0.07	0.07	0.00	805.90	4.25	0.08	4.17
800.80	0.07	0.07	0.00	806.00	4.28	0.08	4.20
800.90	0.07	0.07	0.00	806.10	4.31	0.08	4.24
801.00	0.07	0.07	0.00	806.20	4.35	0.08	4.27
801.10	0.07	0.07	0.00	806.30	4.38	0.08	4.30
801.20	0.07	0.07	0.00	806.40	4.41	0.08	4.33
801.30	0.08	0.08	0.00	806.50	4.45	0.08	4.37
801.40	0.08	0.08	0.00	806.60	4.48	0.08	4.40
801.50	0.08	0.08	0.00	806.70	4.51	0.08	4.43
801.60	0.08	0.08	0.00				
801.70	0.11	0.08	0.03				
801.80	0.19	0.08	0.11				
801.90	0.30	0.08	0.23				
802.00	0.44	0.08	0.36				
802.10	0.55	0.08	0.47				
802.20	0.64	0.08	0.56				
802.30	0.71	0.08	0.63				
802.40	0.78	0.08	0.70				
802.50	0.84	0.08	0.76				
802.60	0.89	0.08	0.82				
802.70	0.95	0.08	0.87				
802.80	1.00	0.08	0.92				
802.90	1.04	0.08	0.97				
803.00	1.09	0.08	1.01				
803.10	1.13	0.08	1.06				
803.20	1.17	0.08	1.10				
803.30	1.21	0.08	1.14				
803.40	1.25	0.08	1.18				
803.50	1.70	0.08	1.63				
803.60	2.49	0.08	2.41				
803.70	2.87	0.08	2.79				
803.80	2.95	0.08	2.87				
803.90	3.03	0.08	2.95				
804.00	3.10	0.08	3.03				
804.10	3.18	0.08	3.10				
804.20	3.25	0.08	3.17				
804.30	3.32	0.08	3.24				
804.40	3.39	0.08	3.31				
804.50	3.46	0.08	3.38				
804.60	3.52	0.08	3.45				
804.70	3.59	0.08	3.51				
804.80	3.65	0.08	3.58				
804.90	3.72	0.08	3.64				
805.00	3.78	0.08	3.70				
805.10	3.84	0.08	3.76				

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MSE 24-hr 3 2y 24hr AT-14 Rainfall=2.83"

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Stage-Area-Storage for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
800.00	4,000	0	805.20	4,000	19,259
800.10	4,000	370	805.30	4,000	19,629
800.20	4,000	741	805.40	4,000	19,999
800.30	4,000	1,111	805.50	4,000	20,370
800.40	4,000	1,481	805.60	4,000	20,740
800.50	4,000	1,852	805.70	4,000	21,110
800.60	4,000	2,222	805.80	4,000	21,481
800.70	4,000	2,592	805.90	4,000	21,851
800.80	4,000	2,963	806.00	4,000	22,221
800.90	4,000	3,333	806.10	4,000	22,381
801.00	4,000	3,704	806.20	4,000	22,541
801.10	4,000	4,074	806.30	4,000	22,701
801.20	4,000	4,444	806.40	4,000	22,861
801.30	4,000	4,815	806.50	4,000	23,021
801.40	4,000	5,185	806.60	4,000	23,181
801.50	4,000	5,555	806.70	4,000	23,341
801.60	4,000	5,926			
801.70	4,000	6,296			
801.80	4,000	6,666			
801.90	4,000	7,037			
802.00	4,000	7,407			
802.10	4,000	7,777			
802.20	4,000	8,148			
802.30	4,000	8,518			
802.40	4,000	8,889			
802.50	4,000	9,259			
802.60	4,000	9,629			
802.70	4,000	10,000			
802.80	4,000	10,370			
802.90	4,000	10,740			
803.00	4,000	11,111			
803.10	4,000	11,481			
803.20	4,000	11,851			
803.30	4,000	12,222			
803.40	4,000	12,592			
803.50	4,000	12,962			
803.60	4,000	13,333			
803.70	4,000	13,703			
803.80	4,000	14,074			
803.90	4,000	14,444			
804.00	4,000	14,814			
804.10	4,000	15,185			
804.20	4,000	15,555			
804.30	4,000	15,925			
804.40	4,000	16,296			
804.50	4,000	16,666			
804.60	4,000	17,036			
804.70	4,000	17,407			
804.80	4,000	17,777			
804.90	4,000	18,147			
805.00	4,000	18,518			
805.10	4,000	18,888			

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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A Runoff Area=110,095 sf 54.65% Impervious Runoff Depth=2.61"
Tc=10.0 min CN=WQ Runoff=8.90 cfs 0.550 af

Subcatchment PR1B: PR1B Runoff Area=77,399 sf 30.77% Impervious Runoff Depth=1.84"
Flow Length=315' Tc=10.7 min CN=WQ Runoff=4.28 cfs 0.273 af

Subcatchment PR2: PR2 Runoff Area=13,225 sf 13.88% Impervious Runoff Depth=1.36"
Tc=10.0 min CN=WQ Runoff=0.56 cfs 0.034 af

Reach 1R: RUNOFF SW Inflow=4.97 cfs 0.574 af
Outflow=4.97 cfs 0.574 af

Reach 2R: RUNOFF NW Inflow=0.56 cfs 0.034 af
Outflow=0.56 cfs 0.034 af

Reach 3R: TOTAL SITE Inflow=5.53 cfs 0.608 af
Outflow=5.53 cfs 0.608 af

Pond 2P: UNDERGROUND MODULAR Peak Elev=803.44' Storage=12,722 cf Inflow=8.90 cfs 0.550 af
Discarded=0.08 cfs 0.250 af Primary=1.28 cfs 0.301 af Outflow=1.36 cfs 0.550 af

Total Runoff Area = 4.608 ac Runoff Volume = 0.858 af Average Runoff Depth = 2.23"
57.25% Pervious = 2.638 ac 42.75% Impervious = 1.970 ac

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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Summary for Subcatchment PR1A: PR1A

Runoff = 8.90 cfs @ 12.17 hrs, Volume= 0.550 af, Depth= 2.61"

Routed to Pond 2P : UNDERGROUND MODULAR STORM SYSTEM

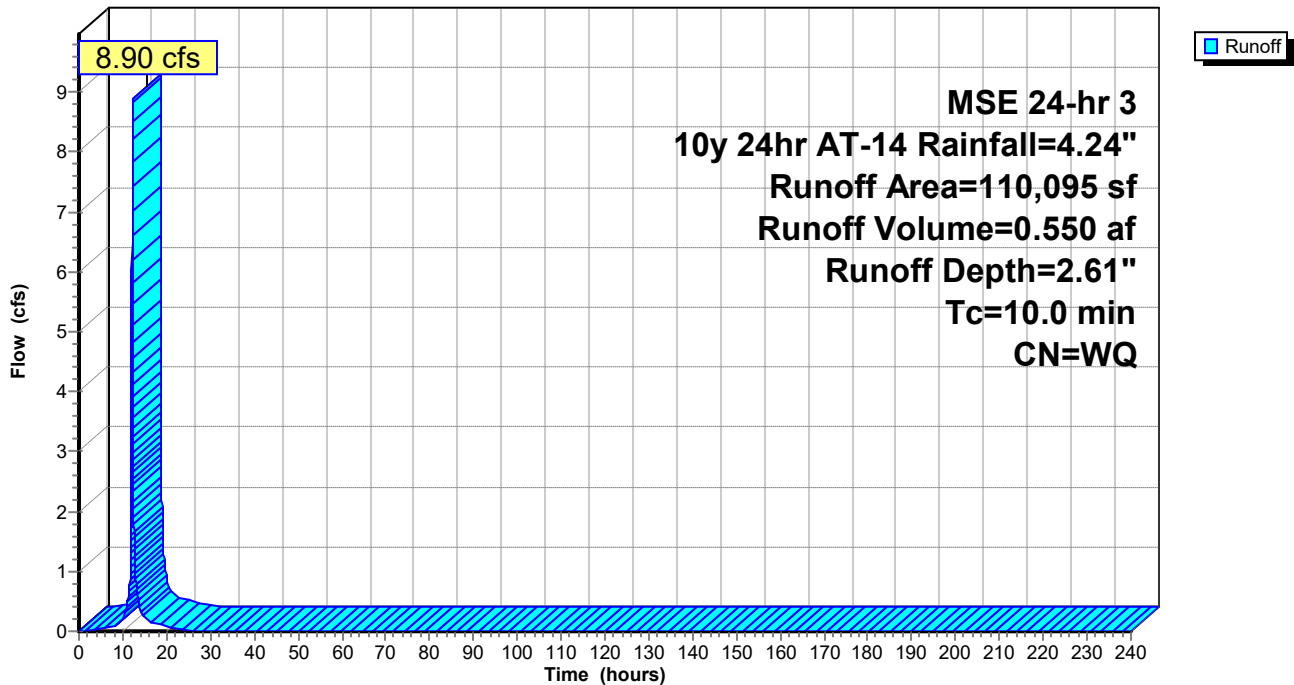
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

	Area (sf)	CN	Description
*	60,164	98	Impervious Surface
	49,931	61	>75% Grass cover, Good, HSG B
	110,095		Weighted Average
	49,931		45.35% Pervious Area
	60,164		54.65% Impervious Area

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

Subcatchment PR1A: PR1A

Hydrograph



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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Summary for Subcatchment PR1B: PR1B

Runoff = 4.28 cfs @ 12.19 hrs, Volume= 0.273 af, Depth= 1.84"
 Routed to Reach 1R : RUNOFF SW

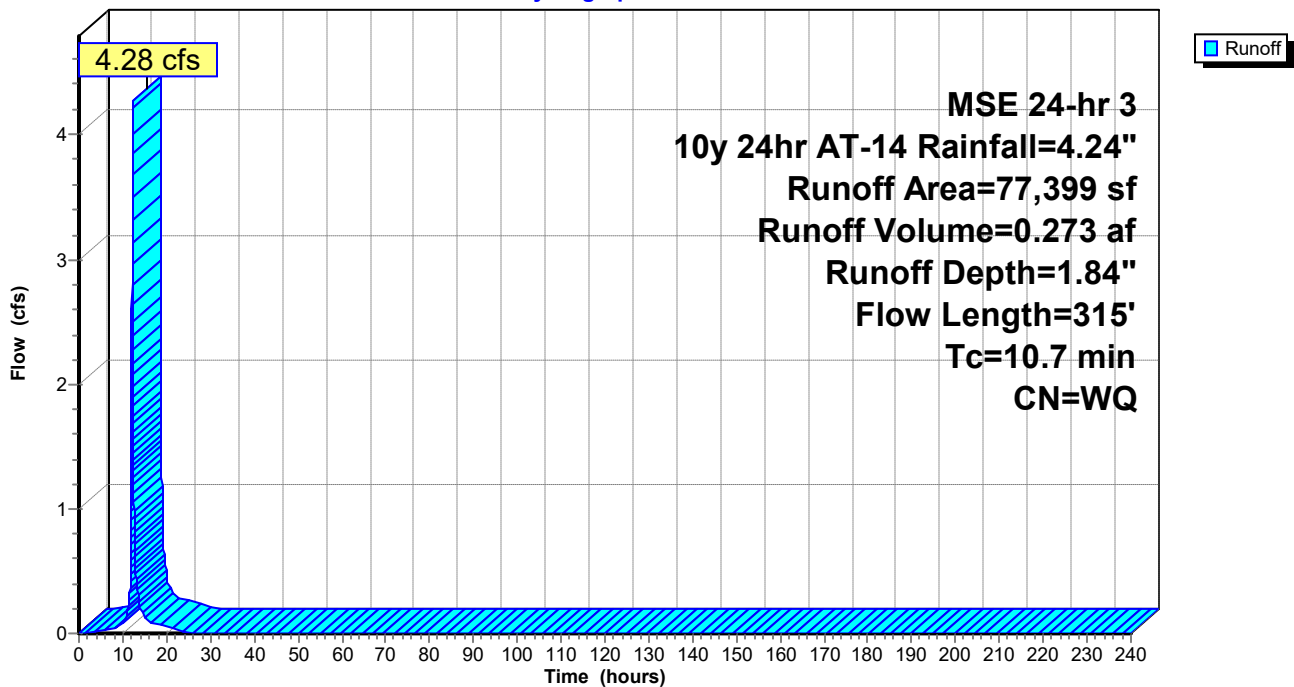
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

Area (sf)	CN	Description
* 23,813	98	Existing Impervious Surface
53,586	60	Woods, Fair, HSG B
77,399		Weighted Average
53,586		69.23% Pervious Area
23,813		30.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2100	0.19		Sheet Flow, SF
					Woods: Light underbrush n= 0.400 P2= 2.94"
2.0	215	0.1300	1.80		Shallow Concentrated Flow, SCF
					Woodland Kv= 5.0 fps
10.7	315	Total			

Subcatchment PR1B: PR1B

Hydrograph



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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Summary for Subcatchment PR2: PR2

Runoff = 0.56 cfs @ 12.18 hrs, Volume= 0.034 af, Depth= 1.36"
Routed to Reach 2R : RUNOFF NW

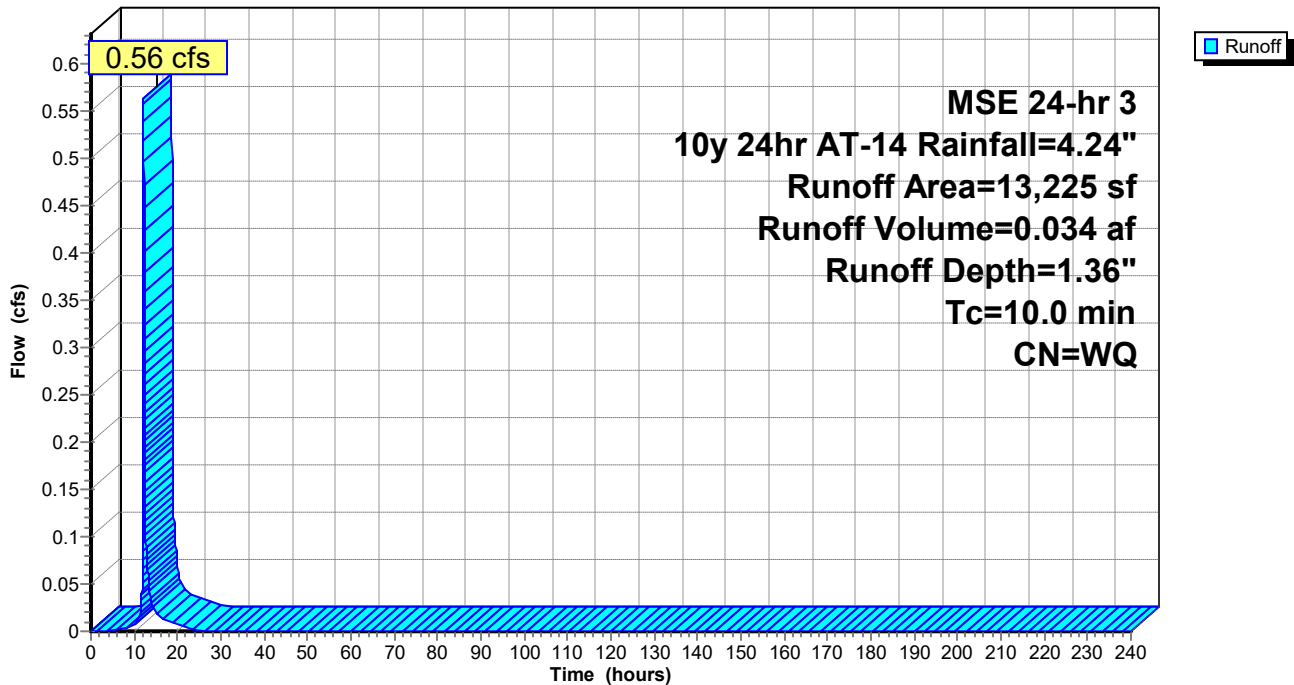
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

	Area (sf)	CN	Description
*	1,835	98	Impervious Surface
	11,390	61	>75% Grass cover, Good, HSG B
	13,225		Weighted Average
	11,390		86.12% Pervious Area
	1,835		13.88% Impervious Area

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

Subcatchment PR2: PR2

Hydrograph



Summary for Reach 1R: RUNOFF SW

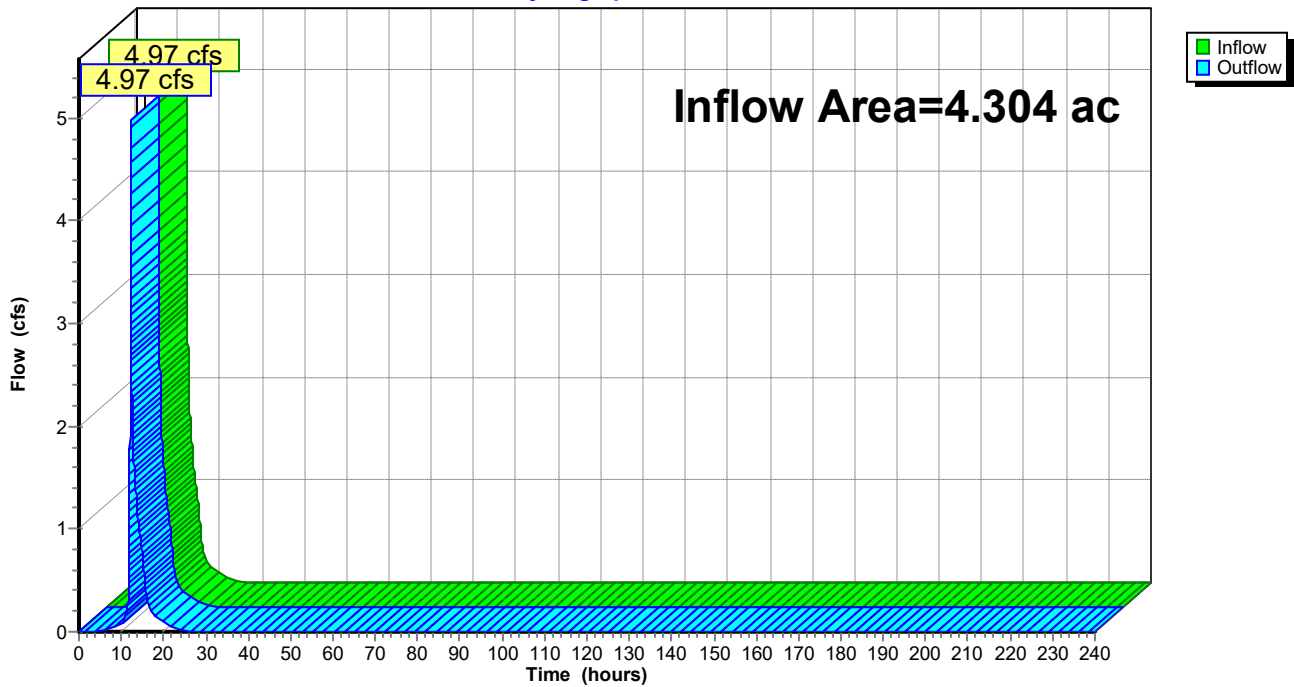
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.304 ac, 44.79% Impervious, Inflow Depth = 1.60" for 10y 24hr AT-14 event
Inflow = 4.97 cfs @ 12.19 hrs, Volume= 0.574 af
Outflow = 4.97 cfs @ 12.19 hrs, Volume= 0.574 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 1R: RUNOFF SW

Hydrograph



Summary for Reach 2R: RUNOFF NW

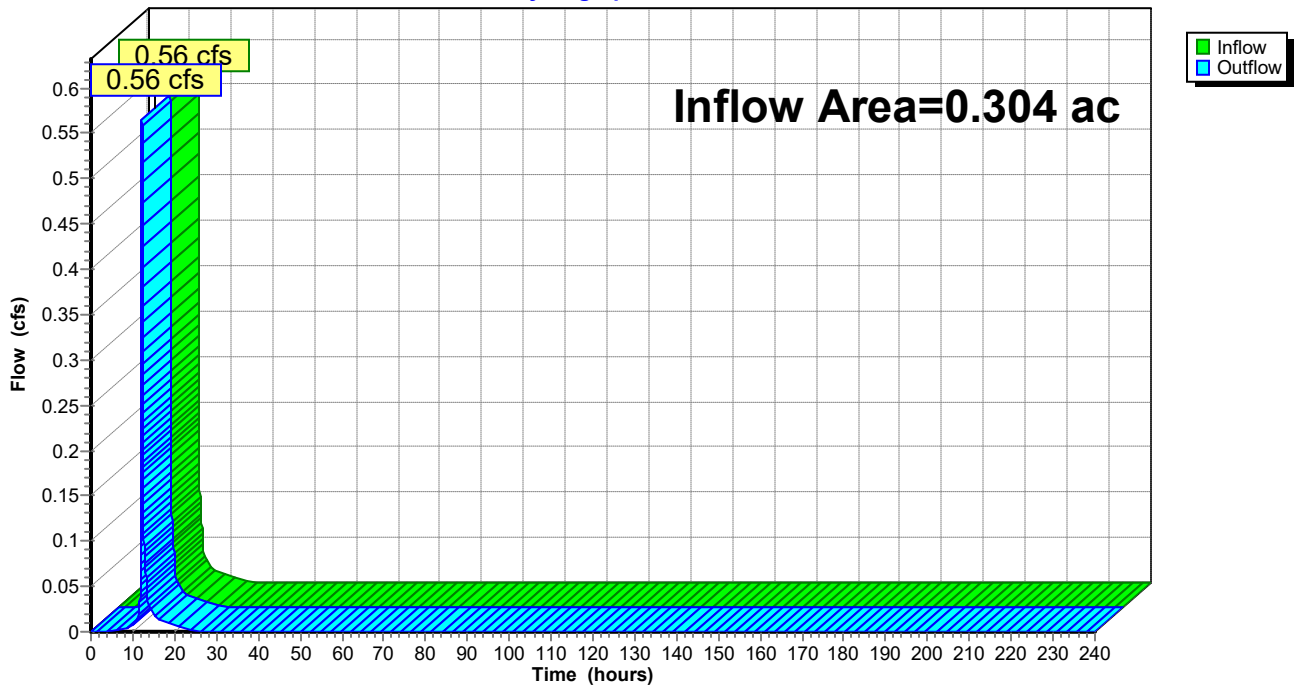
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.304 ac, 13.88% Impervious, Inflow Depth = 1.36" for 10y 24hr AT-14 event
Inflow = 0.56 cfs @ 12.18 hrs, Volume= 0.034 af
Outflow = 0.56 cfs @ 12.18 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 2R: RUNOFF NW

Hydrograph



Summary for Reach 3R: TOTAL SITE

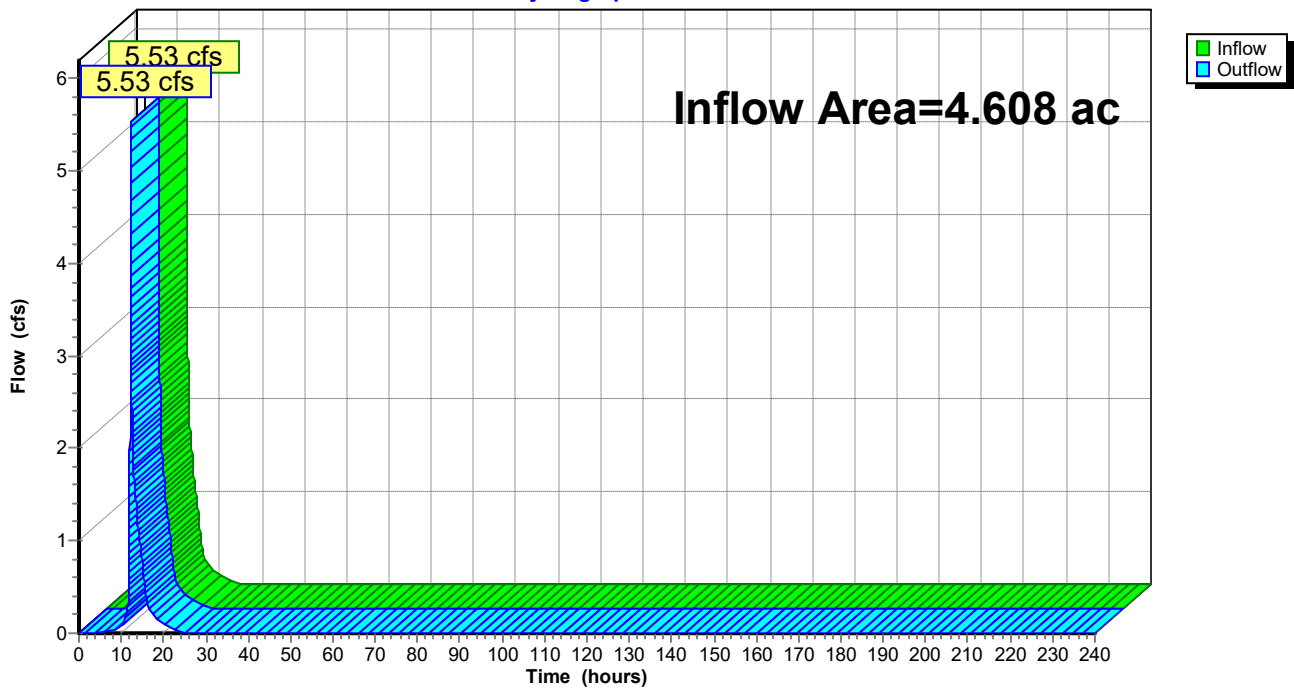
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.608 ac, 42.75% Impervious, Inflow Depth = 1.58" for 10y 24hr AT-14 event
Inflow = 5.53 cfs @ 12.19 hrs, Volume= 0.608 af
Outflow = 5.53 cfs @ 12.19 hrs, Volume= 0.608 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL SITE

Hydrograph



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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Summary for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Inflow Area = 2.527 ac, 54.65% Impervious, Inflow Depth = 2.61" for 10y 24hr AT-14 event
 Inflow = 8.90 cfs @ 12.17 hrs, Volume= 0.550 af
 Outflow = 1.36 cfs @ 12.63 hrs, Volume= 0.550 af, Atten= 85%, Lag= 27.1 min
 Discarded = 0.08 cfs @ 12.63 hrs, Volume= 0.250 af
 Primary = 1.28 cfs @ 12.63 hrs, Volume= 0.301 af
 Routed to Reach 1R : RUNOFF SW

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Peak Elev= 803.44' @ 12.63 hrs Surf.Area= 4,000 sf Storage= 12,722 cf

Plug-Flow detention time= 398.7 min calculated for 0.550 af (100% of inflow)
 Center-of-Mass det. time= 398.7 min (1,165.9 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	800.00'	1,944 cf	32.00'W x 125.00'L x 6.75'H Field A 27,000 cf Overall - 22,140 cf Embedded = 4,860 cf x 40.0% Voids
#2A	800.00'	21,477 cf	StormTank 25 Series 72" x 820 Inside #1 Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf 820 Chambers in 20 Rows
		23,421 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	800.00'	0.800 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 700.00'
#2	Primary	801.60'	9.0" Round Culvert L= 64.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 801.60' / 799.00' S= 0.0406 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.44 sf
#3	Device 2	801.60'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	803.40'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.08 cfs @ 12.63 hrs HW=803.44' (Free Discharge)

↑ **1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=1.28 cfs @ 12.63 hrs HW=803.44' (Free Discharge)

↑ **2=Culvert** (Passes 1.28 cfs of 2.57 cfs potential flow)

↑ **3=Orifice/Grate** (Orifice Controls 1.19 cfs @ 6.06 fps)

↑ **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.61 fps)

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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Pond 2P: UNDERGROUND MODULAR STORM SYSTEM - Chamber Wizard Field A

Chamber Model = StormTank 25 Series 72" (StormTank Module 25 Series)

Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf

Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf

41 Chambers/Row x 3.00' Long = 123.00' Row Length +12.0" End Stone x 2 = 125.00' Base Length

20 Rows x 18.0" Wide + 12.0" Side Stone x 2 = 32.00' Base Width

72.0" Chamber Height + 9.0" Stone Cover = 6.75' Field Height

820 Chambers x 26.2 cf = 21,477.3 cf Chamber Storage

820 Chambers x 27.0 cf = 22,140.0 cf Displacement

27,000.0 cf Field - 22,140.0 cf Chambers = 4,860.0 cf Stone x 40.0% Voids = 1,944.0 cf Stone Storage

Chamber Storage + Stone Storage = 23,421.3 cf = 0.538 af

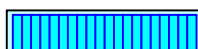
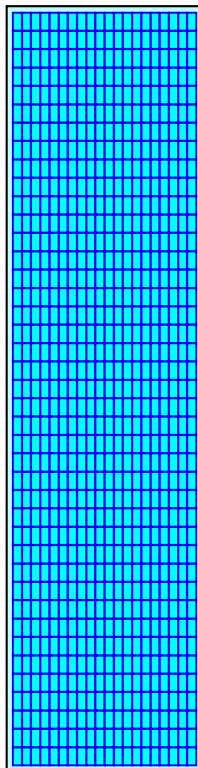
Overall Storage Efficiency = 86.7%

Overall System Size = 125.00' x 32.00' x 6.75'

820 Chambers

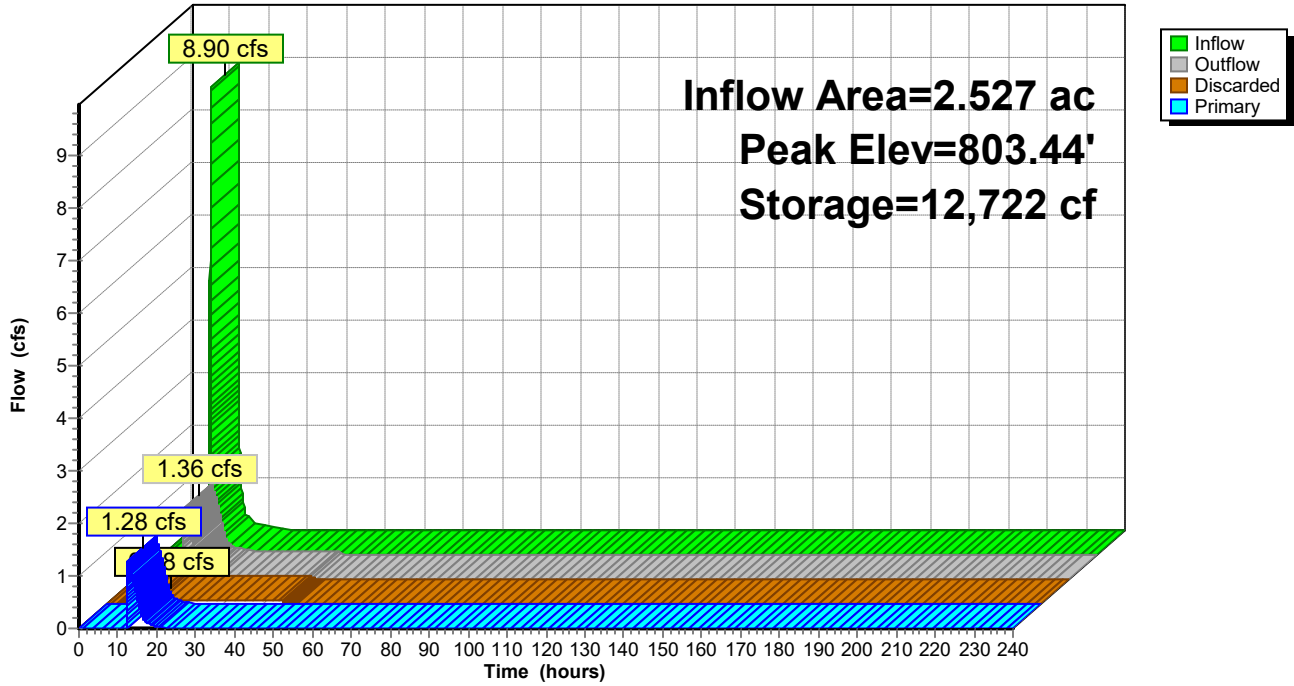
1,000.0 cy Field

180.0 cy Stone



Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Hydrograph



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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Stage-Discharge for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
800.00	0.00	0.00	0.00	805.20	3.90	0.08	3.82
800.10	0.07	0.07	0.00	805.30	3.96	0.08	3.88
800.20	0.07	0.07	0.00	805.40	4.01	0.08	3.94
800.30	0.07	0.07	0.00	805.50	4.07	0.08	3.99
800.40	0.07	0.07	0.00	805.60	4.13	0.08	4.05
800.50	0.07	0.07	0.00	805.70	4.18	0.08	4.10
800.60	0.07	0.07	0.00	805.80	4.21	0.08	4.13
800.70	0.07	0.07	0.00	805.90	4.25	0.08	4.17
800.80	0.07	0.07	0.00	806.00	4.28	0.08	4.20
800.90	0.07	0.07	0.00	806.10	4.31	0.08	4.24
801.00	0.07	0.07	0.00	806.20	4.35	0.08	4.27
801.10	0.07	0.07	0.00	806.30	4.38	0.08	4.30
801.20	0.07	0.07	0.00	806.40	4.41	0.08	4.33
801.30	0.08	0.08	0.00	806.50	4.45	0.08	4.37
801.40	0.08	0.08	0.00	806.60	4.48	0.08	4.40
801.50	0.08	0.08	0.00	806.70	4.51	0.08	4.43
801.60	0.08	0.08	0.00				
801.70	0.11	0.08	0.03				
801.80	0.19	0.08	0.11				
801.90	0.30	0.08	0.23				
802.00	0.44	0.08	0.36				
802.10	0.55	0.08	0.47				
802.20	0.64	0.08	0.56				
802.30	0.71	0.08	0.63				
802.40	0.78	0.08	0.70				
802.50	0.84	0.08	0.76				
802.60	0.89	0.08	0.82				
802.70	0.95	0.08	0.87				
802.80	1.00	0.08	0.92				
802.90	1.04	0.08	0.97				
803.00	1.09	0.08	1.01				
803.10	1.13	0.08	1.06				
803.20	1.17	0.08	1.10				
803.30	1.21	0.08	1.14				
803.40	1.25	0.08	1.18				
803.50	1.70	0.08	1.63				
803.60	2.49	0.08	2.41				
803.70	2.87	0.08	2.79				
803.80	2.95	0.08	2.87				
803.90	3.03	0.08	2.95				
804.00	3.10	0.08	3.03				
804.10	3.18	0.08	3.10				
804.20	3.25	0.08	3.17				
804.30	3.32	0.08	3.24				
804.40	3.39	0.08	3.31				
804.50	3.46	0.08	3.38				
804.60	3.52	0.08	3.45				
804.70	3.59	0.08	3.51				
804.80	3.65	0.08	3.58				
804.90	3.72	0.08	3.64				
805.00	3.78	0.08	3.70				
805.10	3.84	0.08	3.76				

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MSE 24-hr 3 10y 24hr AT-14 Rainfall=4.24"

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Stage-Area-Storage for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
800.00	4,000	0	805.20	4,000	19,259
800.10	4,000	370	805.30	4,000	19,629
800.20	4,000	741	805.40	4,000	19,999
800.30	4,000	1,111	805.50	4,000	20,370
800.40	4,000	1,481	805.60	4,000	20,740
800.50	4,000	1,852	805.70	4,000	21,110
800.60	4,000	2,222	805.80	4,000	21,481
800.70	4,000	2,592	805.90	4,000	21,851
800.80	4,000	2,963	806.00	4,000	22,221
800.90	4,000	3,333	806.10	4,000	22,381
801.00	4,000	3,704	806.20	4,000	22,541
801.10	4,000	4,074	806.30	4,000	22,701
801.20	4,000	4,444	806.40	4,000	22,861
801.30	4,000	4,815	806.50	4,000	23,021
801.40	4,000	5,185	806.60	4,000	23,181
801.50	4,000	5,555	806.70	4,000	23,341
801.60	4,000	5,926			
801.70	4,000	6,296			
801.80	4,000	6,666			
801.90	4,000	7,037			
802.00	4,000	7,407			
802.10	4,000	7,777			
802.20	4,000	8,148			
802.30	4,000	8,518			
802.40	4,000	8,889			
802.50	4,000	9,259			
802.60	4,000	9,629			
802.70	4,000	10,000			
802.80	4,000	10,370			
802.90	4,000	10,740			
803.00	4,000	11,111			
803.10	4,000	11,481			
803.20	4,000	11,851			
803.30	4,000	12,222			
803.40	4,000	12,592			
803.50	4,000	12,962			
803.60	4,000	13,333			
803.70	4,000	13,703			
803.80	4,000	14,074			
803.90	4,000	14,444			
804.00	4,000	14,814			
804.10	4,000	15,185			
804.20	4,000	15,555			
804.30	4,000	15,925			
804.40	4,000	16,296			
804.50	4,000	16,666			
804.60	4,000	17,036			
804.70	4,000	17,407			
804.80	4,000	17,777			
804.90	4,000	18,147			
805.00	4,000	18,518			
805.10	4,000	18,888			

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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Time span=0.00-240.00 hrs, dt=0.01 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment PR1A: PR1A Runoff Area=110,095 sf 54.65% Impervious Runoff Depth=5.36"
Tc=10.0 min CN=WQ Runoff=18.66 cfs 1.129 af

Subcatchment PR1B: PR1B Runoff Area=77,399 sf 30.77% Impervious Runoff Depth=4.29"
Flow Length=315' Tc=10.7 min CN=WQ Runoff=10.58 cfs 0.635 af

Subcatchment PR2: PR2 Runoff Area=13,225 sf 13.88% Impervious Runoff Depth=3.65"
Tc=10.0 min CN=WQ Runoff=1.64 cfs 0.092 af

Reach 1R: RUNOFF SW Inflow=14.15 cfs 1.494 af
Outflow=14.15 cfs 1.494 af

Reach 2R: RUNOFF NW Inflow=1.64 cfs 0.092 af
Outflow=1.64 cfs 0.092 af

Reach 3R: TOTAL SITE Inflow=15.78 cfs 1.586 af
Outflow=15.78 cfs 1.586 af

Pond 2P: UNDERGROUND MODULAR Peak Elev=806.74' Storage=23,399 cf Inflow=18.66 cfs 1.129 af
Discarded=0.08 cfs 0.269 af Primary=4.44 cfs 0.860 af Outflow=4.52 cfs 1.129 af

Total Runoff Area = 4.608 ac Runoff Volume = 1.856 af Average Runoff Depth = 4.83"
57.25% Pervious = 2.638 ac 42.75% Impervious = 1.970 ac

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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Summary for Subcatchment PR1A: PR1A

Runoff = 18.66 cfs @ 12.17 hrs, Volume= 1.129 af, Depth= 5.36"

Routed to Pond 2P : UNDERGROUND MODULAR STORM SYSTEM

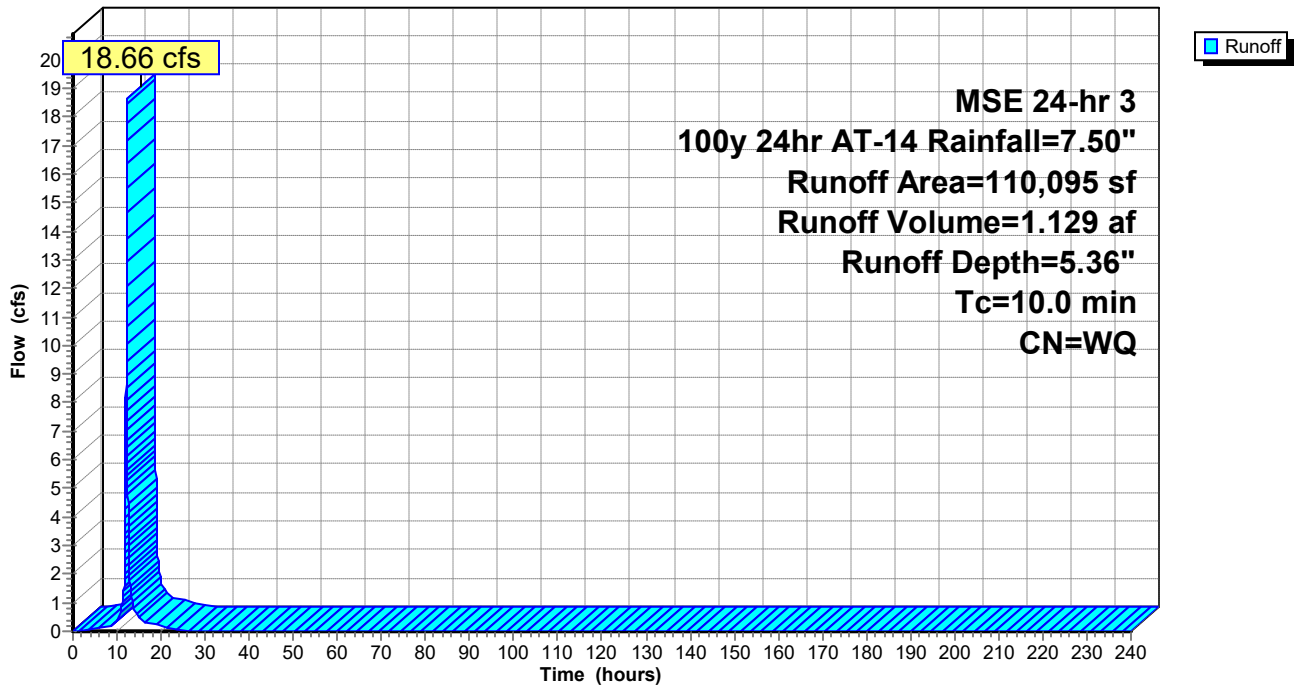
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

	Area (sf)	CN	Description
*	60,164	98	Impervious Surface
	49,931	61	>75% Grass cover, Good, HSG B
	110,095		Weighted Average
	49,931		45.35% Pervious Area
	60,164		54.65% Impervious Area

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

Subcatchment PR1A: PR1A

Hydrograph



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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Summary for Subcatchment PR1B: PR1B

Runoff = 10.58 cfs @ 12.18 hrs, Volume= 0.635 af, Depth= 4.29"
 Routed to Reach 1R : RUNOFF SW

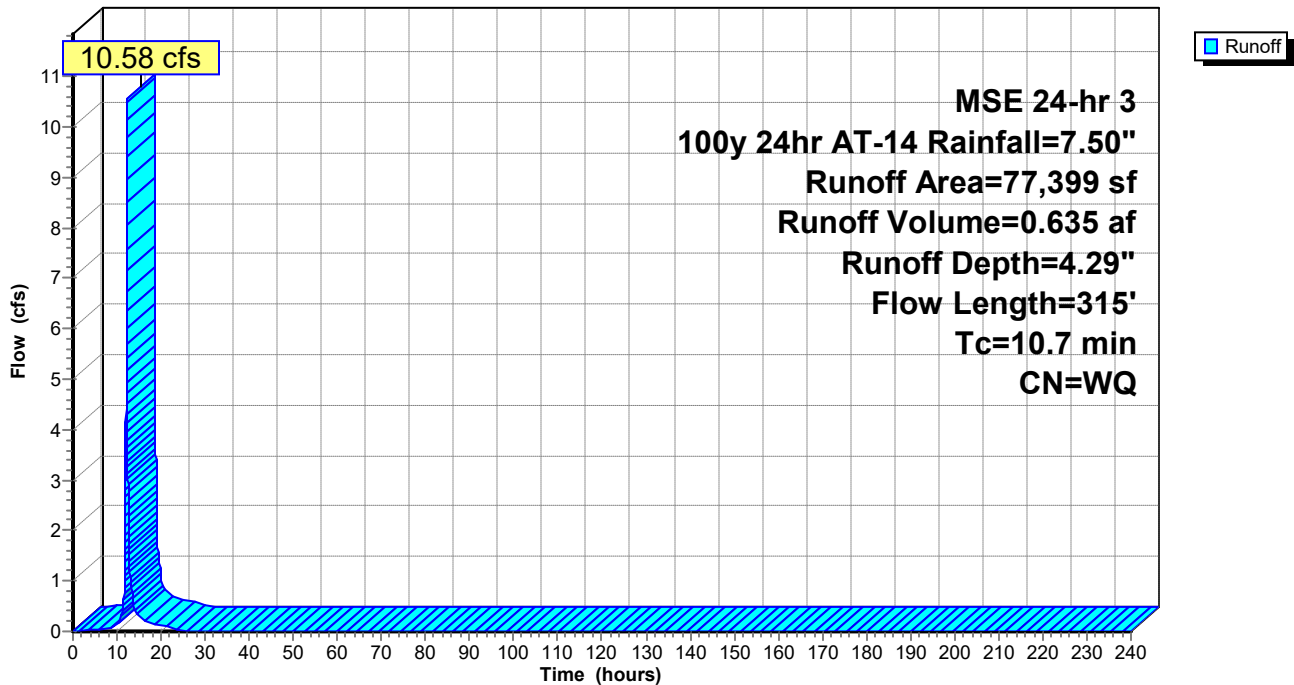
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

Area (sf)	CN	Description
* 23,813	98	Existing Impervious Surface
53,586	60	Woods, Fair, HSG B
77,399		Weighted Average
53,586		69.23% Pervious Area
23,813		30.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.2100	0.19		Sheet Flow, SF Woods: Light underbrush n= 0.400 P2= 2.94"
2.0	215	0.1300	1.80		Shallow Concentrated Flow, SCF Woodland Kv= 5.0 fps
10.7	315	Total			

Subcatchment PR1B: PR1B

Hydrograph



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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Summary for Subcatchment PR2: PR2

Runoff = 1.64 cfs @ 12.18 hrs, Volume= 0.092 af, Depth= 3.65"
 Routed to Reach 2R : RUNOFF NW

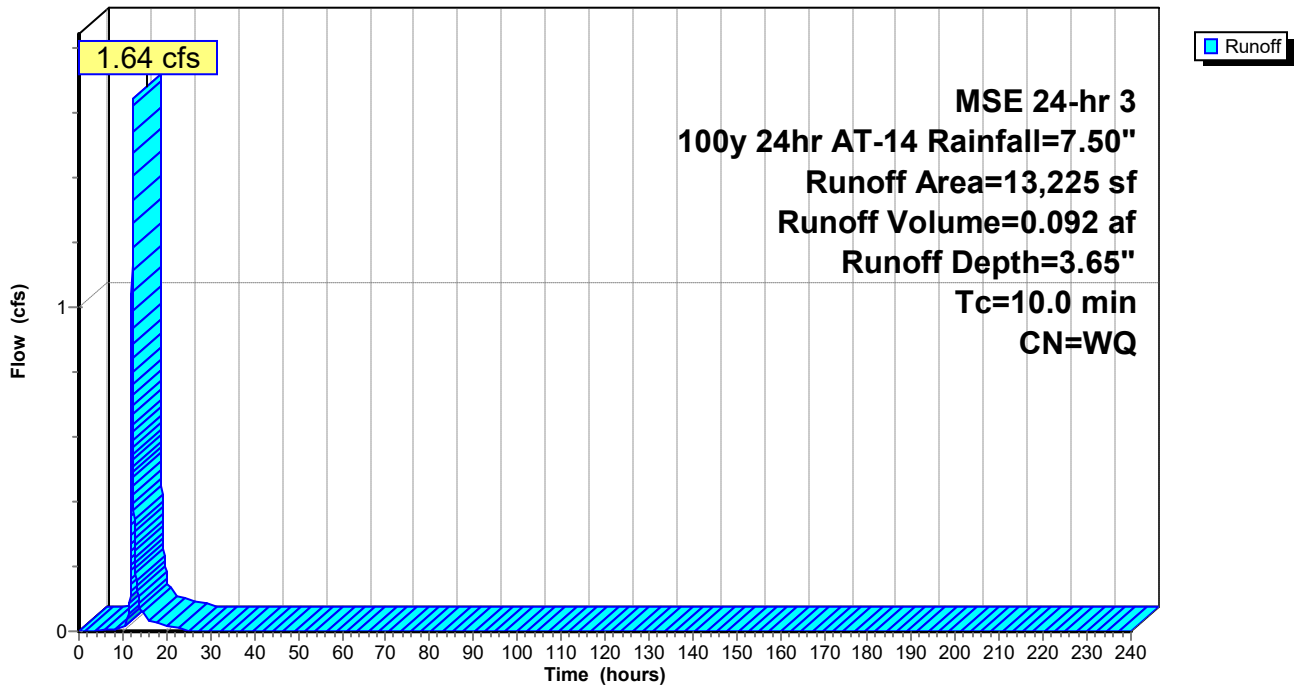
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

	Area (sf)	CN	Description
*	1,835	98	Impervious Surface
	11,390	61	>75% Grass cover, Good, HSG B
	13,225		Weighted Average
	11,390		86.12% Pervious Area
	1,835		13.88% Impervious Area

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

Subcatchment PR2: PR2

Hydrograph



Summary for Reach 1R: RUNOFF SW

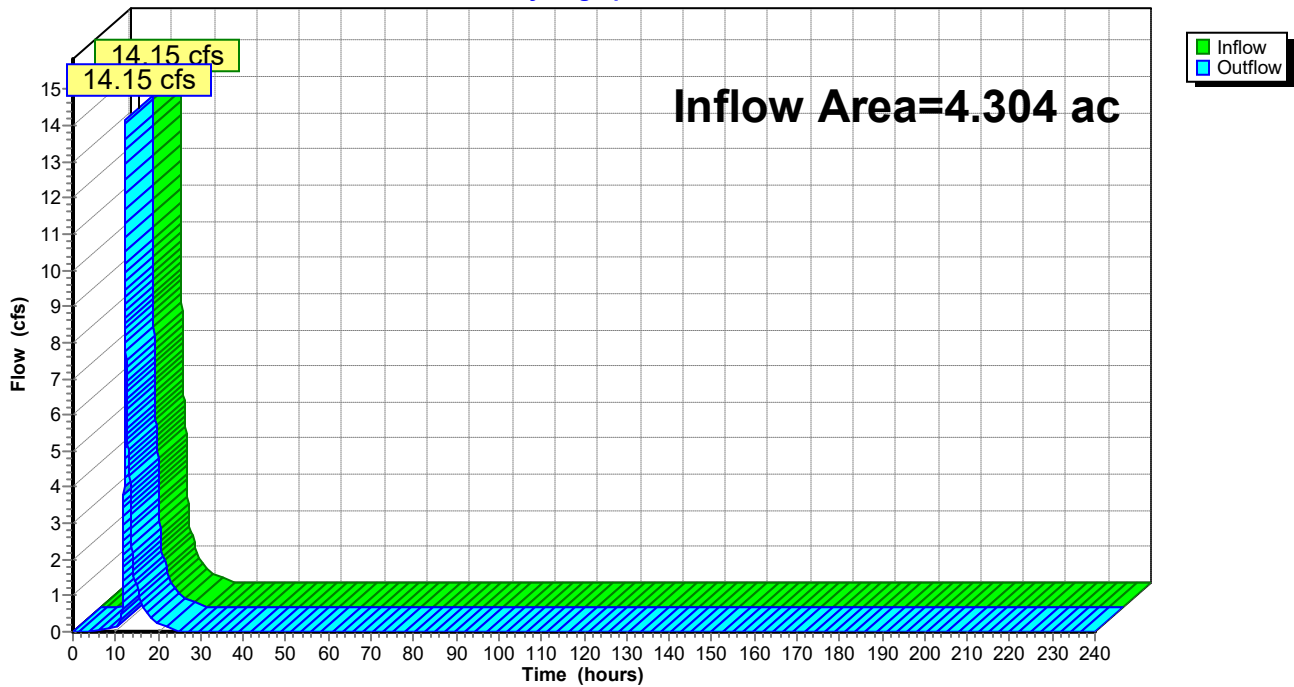
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.304 ac, 44.79% Impervious, Inflow Depth = 4.17" for 100y 24hr AT-14 event
Inflow = 14.15 cfs @ 12.19 hrs, Volume= 1.494 af
Outflow = 14.15 cfs @ 12.19 hrs, Volume= 1.494 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 1R: RUNOFF SW

Hydrograph



Summary for Reach 2R: RUNOFF NW

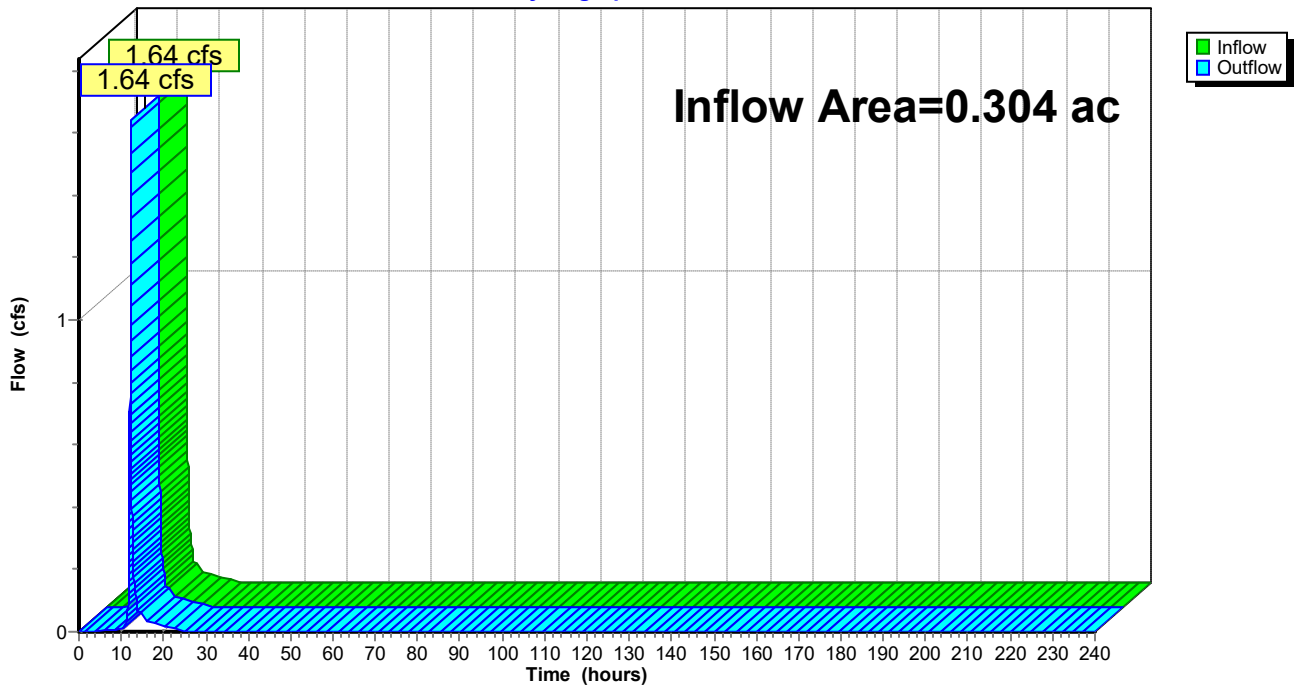
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.304 ac, 13.88% Impervious, Inflow Depth = 3.65" for 100y 24hr AT-14 event
Inflow = 1.64 cfs @ 12.18 hrs, Volume= 0.092 af
Outflow = 1.64 cfs @ 12.18 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min
Routed to Reach 3R : TOTAL SITE

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 2R: RUNOFF NW

Hydrograph



Summary for Reach 3R: TOTAL SITE

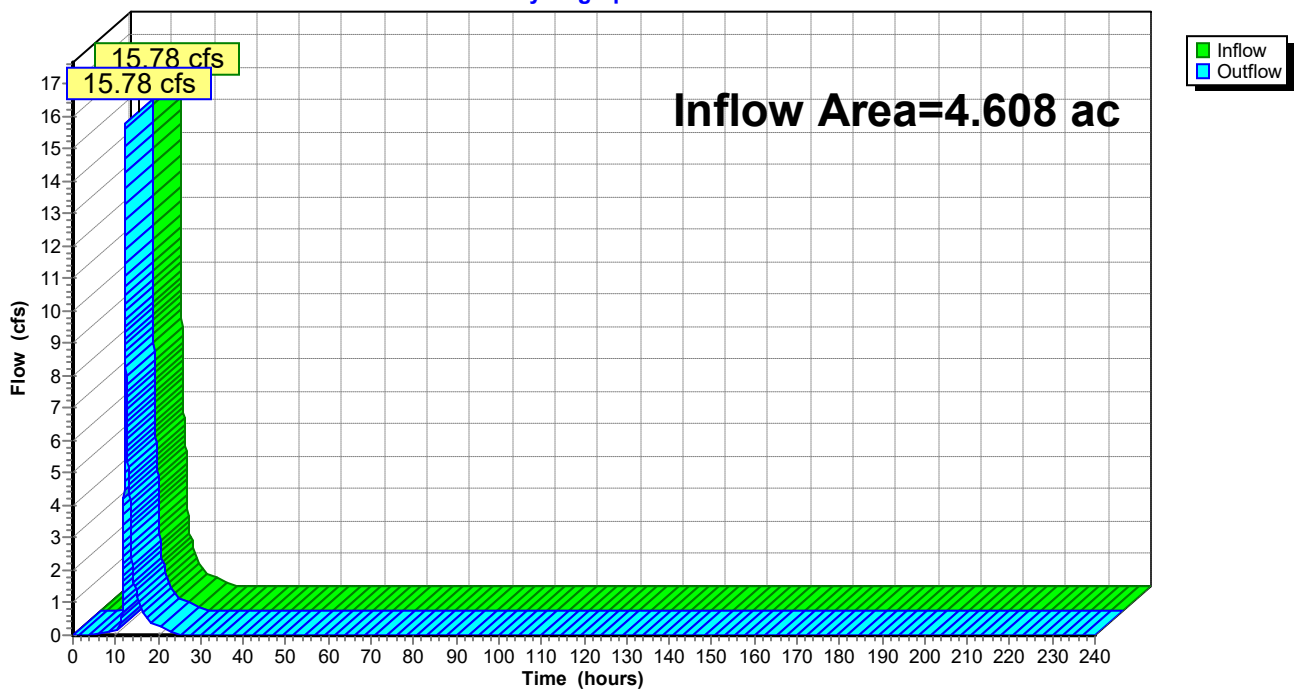
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.608 ac, 42.75% Impervious, Inflow Depth = 4.13" for 100y 24hr AT-14 event
Inflow = 15.78 cfs @ 12.19 hrs, Volume= 1.586 af
Outflow = 15.78 cfs @ 12.19 hrs, Volume= 1.586 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL SITE

Hydrograph



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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Summary for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Inflow Area = 2.527 ac, 54.65% Impervious, Inflow Depth = 5.36" for 100y 24hr AT-14 event
 Inflow = 18.66 cfs @ 12.17 hrs, Volume= 1.129 af
 Outflow = 4.52 cfs @ 12.48 hrs, Volume= 1.129 af, Atten= 76%, Lag= 18.5 min
 Discarded = 0.08 cfs @ 12.48 hrs, Volume= 0.269 af
 Primary = 4.44 cfs @ 12.48 hrs, Volume= 0.860 af
 Routed to Reach 1R : RUNOFF SW

Routing by Stor-Ind method, Time Span= 0.00-240.00 hrs, dt= 0.01 hrs
 Peak Elev= 806.74' @ 12.48 hrs Surf.Area= 4,000 sf Storage= 23,399 cf

Plug-Flow detention time= 241.5 min calculated for 1.129 af (100% of inflow)
 Center-of-Mass det. time= 241.5 min (1,005.6 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	800.00'	1,944 cf	32.00'W x 125.00'L x 6.75'H Field A 27,000 cf Overall - 22,140 cf Embedded = 4,860 cf x 40.0% Voids
#2A	800.00'	21,477 cf	StormTank 25 Series 72" x 820 Inside #1 Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf 820 Chambers in 20 Rows
		23,421 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	800.00'	0.800 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 700.00'
#2	Primary	801.60'	9.0" Round Culvert L= 64.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 801.60' / 799.00' S= 0.0406 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.44 sf
#3	Device 2	801.60'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	803.40'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.08 cfs @ 12.48 hrs HW=806.74' (Free Discharge)

↑ **1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=4.44 cfs @ 12.48 hrs HW=806.74' (Free Discharge)

↑ **2=Culvert** (Barrel Controls 4.44 cfs @ 10.06 fps)

↑ **3=Orifice/Grate** (Passes < 2.09 cfs potential flow)

↑ **4=Sharp-Crested Rectangular Weir** (Passes < 66.39 cfs potential flow)

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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Pond 2P: UNDERGROUND MODULAR STORM SYSTEM - Chamber Wizard Field A

Chamber Model = StormTank 25 Series 72" (StormTank Module 25 Series)

Inside= 18.0"W x 72.0"H => 8.73 sf x 3.00'L = 26.2 cf

Outside= 18.0"W x 72.0"H => 9.00 sf x 3.00'L = 27.0 cf

41 Chambers/Row x 3.00' Long = 123.00' Row Length +12.0" End Stone x 2 = 125.00' Base Length

20 Rows x 18.0" Wide + 12.0" Side Stone x 2 = 32.00' Base Width

72.0" Chamber Height + 9.0" Stone Cover = 6.75' Field Height

820 Chambers x 26.2 cf = 21,477.3 cf Chamber Storage

820 Chambers x 27.0 cf = 22,140.0 cf Displacement

27,000.0 cf Field - 22,140.0 cf Chambers = 4,860.0 cf Stone x 40.0% Voids = 1,944.0 cf Stone Storage

Chamber Storage + Stone Storage = 23,421.3 cf = 0.538 af

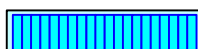
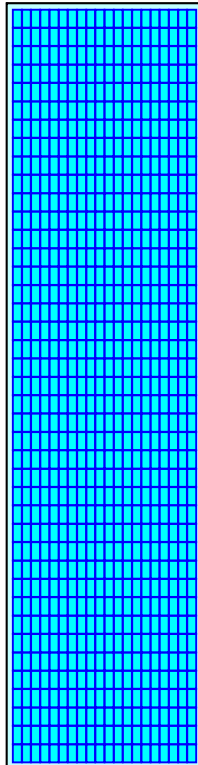
Overall Storage Efficiency = 86.7%

Overall System Size = 125.00' x 32.00' x 6.75'

820 Chambers

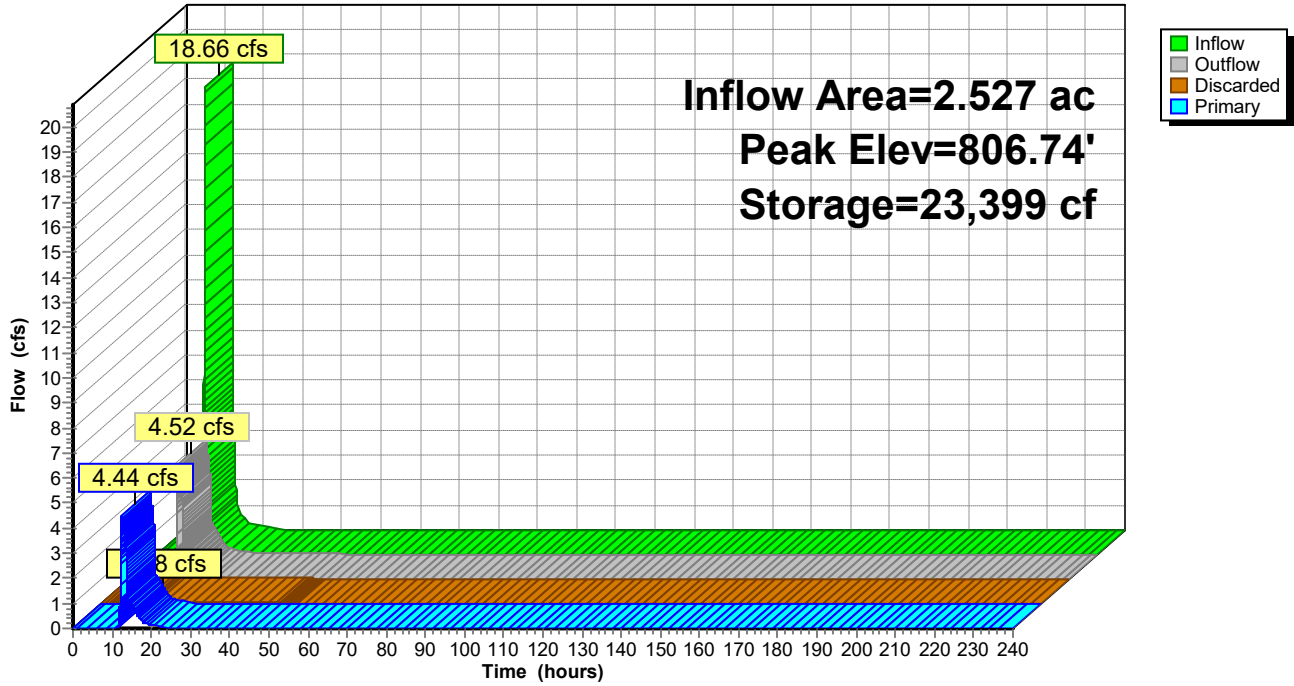
1,000.0 cy Field

180.0 cy Stone



Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Hydrograph



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MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

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Stage-Discharge for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
800.00	0.00	0.00	0.00	805.20	3.90	0.08	3.82
800.10	0.07	0.07	0.00	805.30	3.96	0.08	3.88
800.20	0.07	0.07	0.00	805.40	4.01	0.08	3.94
800.30	0.07	0.07	0.00	805.50	4.07	0.08	3.99
800.40	0.07	0.07	0.00	805.60	4.13	0.08	4.05
800.50	0.07	0.07	0.00	805.70	4.18	0.08	4.10
800.60	0.07	0.07	0.00	805.80	4.21	0.08	4.13
800.70	0.07	0.07	0.00	805.90	4.25	0.08	4.17
800.80	0.07	0.07	0.00	806.00	4.28	0.08	4.20
800.90	0.07	0.07	0.00	806.10	4.31	0.08	4.24
801.00	0.07	0.07	0.00	806.20	4.35	0.08	4.27
801.10	0.07	0.07	0.00	806.30	4.38	0.08	4.30
801.20	0.07	0.07	0.00	806.40	4.41	0.08	4.33
801.30	0.08	0.08	0.00	806.50	4.45	0.08	4.37
801.40	0.08	0.08	0.00	806.60	4.48	0.08	4.40
801.50	0.08	0.08	0.00	806.70	4.51	0.08	4.43
801.60	0.08	0.08	0.00				
801.70	0.11	0.08	0.03				
801.80	0.19	0.08	0.11				
801.90	0.30	0.08	0.23				
802.00	0.44	0.08	0.36				
802.10	0.55	0.08	0.47				
802.20	0.64	0.08	0.56				
802.30	0.71	0.08	0.63				
802.40	0.78	0.08	0.70				
802.50	0.84	0.08	0.76				
802.60	0.89	0.08	0.82				
802.70	0.95	0.08	0.87				
802.80	1.00	0.08	0.92				
802.90	1.04	0.08	0.97				
803.00	1.09	0.08	1.01				
803.10	1.13	0.08	1.06				
803.20	1.17	0.08	1.10				
803.30	1.21	0.08	1.14				
803.40	1.25	0.08	1.18				
803.50	1.70	0.08	1.63				
803.60	2.49	0.08	2.41				
803.70	2.87	0.08	2.79				
803.80	2.95	0.08	2.87				
803.90	3.03	0.08	2.95				
804.00	3.10	0.08	3.03				
804.10	3.18	0.08	3.10				
804.20	3.25	0.08	3.17				
804.30	3.32	0.08	3.24				
804.40	3.39	0.08	3.31				
804.50	3.46	0.08	3.38				
804.60	3.52	0.08	3.45				
804.70	3.59	0.08	3.51				
804.80	3.65	0.08	3.58				
804.90	3.72	0.08	3.64				
805.00	3.78	0.08	3.70				
805.10	3.84	0.08	3.76				

25185 PROPOSED

MSE 24-hr 3 100y 24hr AT-14 Rainfall=7.50"

Prepared by Civil Site Group

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Stage-Area-Storage for Pond 2P: UNDERGROUND MODULAR STORM SYSTEM

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
800.00	4,000	0	805.20	4,000	19,259
800.10	4,000	370	805.30	4,000	19,629
800.20	4,000	741	805.40	4,000	19,999
800.30	4,000	1,111	805.50	4,000	20,370
800.40	4,000	1,481	805.60	4,000	20,740
800.50	4,000	1,852	805.70	4,000	21,110
800.60	4,000	2,222	805.80	4,000	21,481
800.70	4,000	2,592	805.90	4,000	21,851
800.80	4,000	2,963	806.00	4,000	22,221
800.90	4,000	3,333	806.10	4,000	22,381
801.00	4,000	3,704	806.20	4,000	22,541
801.10	4,000	4,074	806.30	4,000	22,701
801.20	4,000	4,444	806.40	4,000	22,861
801.30	4,000	4,815	806.50	4,000	23,021
801.40	4,000	5,185	806.60	4,000	23,181
801.50	4,000	5,555	806.70	4,000	23,341
801.60	4,000	5,926			
801.70	4,000	6,296			
801.80	4,000	6,666			
801.90	4,000	7,037			
802.00	4,000	7,407			
802.10	4,000	7,777			
802.20	4,000	8,148			
802.30	4,000	8,518			
802.40	4,000	8,889			
802.50	4,000	9,259			
802.60	4,000	9,629			
802.70	4,000	10,000			
802.80	4,000	10,370			
802.90	4,000	10,740			
803.00	4,000	11,111			
803.10	4,000	11,481			
803.20	4,000	11,851			
803.30	4,000	12,222			
803.40	4,000	12,592			
803.50	4,000	12,962			
803.60	4,000	13,333			
803.70	4,000	13,703			
803.80	4,000	14,074			
803.90	4,000	14,444			
804.00	4,000	14,814			
804.10	4,000	15,185			
804.20	4,000	15,555			
804.30	4,000	15,925			
804.40	4,000	16,296			
804.50	4,000	16,666			
804.60	4,000	17,036			
804.70	4,000	17,407			
804.80	4,000	17,777			
804.90	4,000	18,147			
805.00	4,000	18,518			
805.10	4,000	18,888			