Section 12: Stormwater Management Plan

12.0 Stormwater Management Plan

Stormwater management plan for the proposed project is attached within this section.

12.1 Coordination with Regulatory

Coordination efforts with regulatory agencies for the proposed project is included within Section 11 of this permit.

12.2 Basic Standard, General Standard, Flooding Standard, Discharge to Wetlands Standard

Per State of Maine and City of Portland statute, the Basic Standard, General Standard, Discharge to Wetlands Standard, and Flooding Standard will apply for the proposed project. This information is incorporated within the attached Stormwater Management Plan.

12.3 Maintenance and Insepction

A sample maintenance plan is attached. The applicant currently maintains a landscaping service for the property. The applicant anticipates entering a maintenance agreement for stormwater treatment with their current landscaping service as a condition of approval for the proposed development.

STORMWATER MANAGEMENT PLAN

THE CEDARS LONG TERM AND A.L. MEMORYCARE FACILITY

PORTLAND, MAINE

INTRODUCTION

The proposed project will redevelop the existing site to accommodate a Long-Term and Assisted Living (AL) memory Care Facility at The Cedars. Parking lots, utility improvements, and stormwater treatment will be constructed to accommodate the proposed three-story building.

In general, the proposed project consists of the following construction items:

- Clearing
- Erosion and sedimentation control
- Utility construction
- Building construction
- Parking lot improvements
- Stormwater treatment facilities
- Site landscaping

EXISTING DRAINAGE CONDITIONS

The existing site includes buildings, parking and roadway infrastructure, plantings/trees within parking islands, several detention areas, and wetlands. The site is located along a ridge, and generally slopes from higher areas in the northern portions of the site towards the south, with a portion of the property conveying surface flows towards the west. The majority of surface runoff flows from the northern edge of the property, is conveyed through a series of drainage pipes into several detention and retention facilities, and then into the wetland complex at the southern portion of the site. From this wetland, surface flows then discharge into Ocean Avenue. These surface flows then ultimately discharge into the Atlantic Ocean at Back Cove in Portland.

The far western portion of the site discharges to Fall Brook. This portion of the site will not be disturbed or redeveloped as part of the proposed work.

Soils mapping and characteristics were obtained from the Medium Intensity Soil Survey for Cumberland County. As indicted on the soils map provided in Section 11, the primary hydrological soils group

covering the site is Type D, or poorly draining soils. This information is supported by the site being predominately ledge and wetlands, both of which are Type D soils.

PROPOSED DRAINAGE CONDITIONS

The proposed conditions will not substantially alter the existing drainage patterns. The proposed improvements include incorporating two new stormwater treatment measures, and modification to the Outlet Control Structure of one of the existing detention basins. Several structures will have frame/cover elevations modified as part of the improvements to accommodate minor grading changes for the roadway work. No improvements are proposed within the Fall Brook watershed.

REGULATORY REQUIREMENTS

City of Portland, Maine

The proposed project will require adherence to the Stormwater Runoff policies within the City of Portland Technical Manual. According to the Section 5, "PORTLAND STORMWATER MANAGEMENT STANDARDS AND MAINE DEP CHAPTER 500 STORMWATER MANAGEMENT", *"Stormwater Management Plans for New Development: Except as provided in below, the following development proposals shall submit a stormwater management plan pursuant to the regulations of Maine DEP Chapter 500 Stormwater Management Rules, including General and Flooding standards: Level I: Site Alteration, which will result in the creation of more than 1,000 square-feet of new impervious area or 10,000 square-feet of new non-impervious developed area, as defined under Developed Area and listed under Definitions of Chapter 500".*

The proposed project will also require adherence to the MDEP Chapters 500 and 502, which describe stormwater management requirements for new and re-development projects. These rules describe performance standards divided into six major categories: Basic Standards, General Standards, Phosphorous Standards, Urban Impaired Stream Standards, Flooding Standards, and Discharge to Wetlands Standard. The following sections describe how this project will address these stormwater management performance standards.

> Basic Standards: A project must meet basic standards if it disturbs an area greater than one (1) acre. The proposed project will disturb greater than one acre of land, and therefore state and local regulations require adherence to this standard. These standards include erosion and sedimentation controls, inspection and maintenance procedures, and general housekeeping requirements. These

performance standards have been addressed in two separate reports entitled "Erosion and Sedimentation Control Plan" and "Inspection, Maintenance, and Housekeeping Plan", both included as attachments to this report.

General Standards: A project is subject to the general standards if it results in the creation of one (1) or more acres of impervious area or developed areas greater than five (5) acres. The project has an existing site law permit for the existing buildings that was issued in 2005, and the project will be redeveloping a portion of the site.   The proposed parcel contains more than one acre of impervious area and more than 5 acres of developed area. As such, this project has been designed to meet the general standards. These standards require that a minimum of 95% of all impervious areas and at least 80% of all developed areas are designed to be tributary to stormwater BMPs. Standard BMPs have been defined by the MDEP and are described thoroughly in their publication Stormwater Management for Maine: Best Management Practices manual, as most recently revised. The General Standards section of this Stormwater Management Plan describes the BMPs proposed for this project and specific design information for each BMP.

Development on the existing parcel was permitted or constructed prior to January 1, 2006, and this work was subject to either the Site Law Ordinance of Development Act, and has several detention and retention facilities installed as part of a Stormwater Law Permit associated with much of this development. Therefore, the existing portions of the parcel are not anticipated to be subject to the General Standards, and adherence to the General Standards is only proposed for the new development.

Phosphorus Standards: A project is subject to the phosphorous standards when it is in the watershed of a lake most at risk as identified in Chapter 502. This project is not located in the watershed of a lake that is identified as being Most at Risk in Chapter 502 and therefore the project is not subject to the Phosphorous Standards.

Urban Impaired Stream Standards: A project is subject to the Urban Impaired Stream Standards when the proposed project incorporates additional development within the watershed of a body of water identified as an "Urban Impaired Stream" as defined by MDEP Chapter 502. No work is proposed within urban impaired stream watersheds and, therefore, the project is not subject to the urban impaired stream standards.

Flooding Standards: The MDEP requires that projects creating impervious areas greater than three (3) acres, or developed areas greater than twenty (20) acres, address various flooding standards. The site totals more than 3 acres of impervious area, and as such is subject to the Flooding Standards. The site has been designed to meet the Flooding Standards by analyzing post-development flows for the 2-, 10-, and 25-year interval storms and comparing those interval storms to the pre-development conditions.

Discharge to Wetlands Standard: The MDEP requires that any project that discharges to a wetland must indicate that the water level within the wetland is not increased by more than 2" for a 24-hour period following a 2-year rain event.

WATER QUALITY TREATMENT

The proposed development will create 16,339 square feet of new impervious surfaces in the form of additional parking and building footprint. The new building will be located over a portion of an existing parking lot and other existing impervious surfaces. The existing site has greater than 1 acre of total impervious surfaces, and as such the proposed improvements are subject to water quality standards.

Two Grassed Underdrained Soil Filters (USFs) were designed to accommodate this volume and are identified as USF A and USF B. USF A is located in a parking lot area, where curb cuts and drainage infrastructure have been designed to convey surface flows to the proposed basin. Surface flows and rain drains will convey flows to the USF B, which has been located adjacent to the proposed building.

For USF A, a top-of-basin elevation of 76.00' was chosen, with 77.50' serving as the overflow and 77.00' as the storm drain inlet elevation These elevations were chosen to accommodate existing site grading. Curb cut inlets were designed to convey flows from the parking lot area through a riprap channel and into the basin. These riprap channels serve to mitigate sand from 10 storms per year, at 500 lbs/acre for each storm, with a sand density of 90 pcf. Given the 0.13 acres of sanded surfaces (impervious surfaces), this yields 7.22 cf of sand annually. Using a porosity of 0.4 for riprap, 18 CF of riprap is required. Rirap will be placed at 18" depth, and therefore 12 SF of riprap is required. A total of 40 SF of riprap has been provided at the outlet locations, and therefore the provided riprap incorporates the required amount of sand mitigation.

For USF B, a top-of-basin elevation of 70.25' was chosen, with 72.25' serving as the overflow and 72.00' as the storm drain inlet elevation. While this basin is 21" from the loam layer to the storm drain overflow,

only 18" of ponding has been allocated for water quality treatment, with the basin being over-sized to accommodate the flooding standard. These elevations were chosen to incorporate roof drain elevations and blend into the existing roadway corridor.

Both basins were designed using a filter media draining at 2.41 in/hr. Given the ledge and anticipated high water table, an impermeable liner has been incorporated as part of the proposed design. Additional information requiring the design of the USF has been incorporated within the project plans, particularly noting the layers of the proposed filter. The treatment volume calculations for each USF are indicated in the below tables:

Underdrained Soil Filter A					
Subcatchment Review					
Total Impervious Surfaces	5794	sf		0.13	acres
Total Developed Surfaces	2748	sf		0.06	acres
Total Drainage Area	8542	sf		0.20	acres
Basin Design					
Treatment V	Total acres	Multiplier		Volume	
Impervious Area	0.133	1.0		483	
Developed Area	0.063	0.4		92	
Treatment Volume Required				**574**	**cf**
Treatment Volume Provided				**580**	**cf**
Surface Area at Filter Elevation		580	s.f.		
Water Quaility Vol. (12-inch Ponding)		580	cf		
Surface Area Check					
Impervious A	5794	5%		290	
Non-Impervious Developed Area	2748	2%		55	
Total Surface Area Required, min.				**345**	**sf**

Underdrained Soil Filter B				
Subcatchment Review				
Total Impervious Surfaces	11919	sf	0.27	acres
Total Developed Surfaces	2199	sf	0.05	acres
Total Drainage Area	14118	sf	0.32	acres
Basin Design				
	Treatment V	Total acres	Multiplier	Volume
Impervious Area	0.274	1.0	993	
Developed Area	0.050	0.4	73	
Treatment Volume Required			**1,067**	**cf**
Treatment Volume Provided			**1,073**	**cf**
Surface Area at Filter Elevation		715	s.f.	
Water Quaility Vol. (18-inch Ponding)		1072.5	cf	
Surface Area Check				
Impervious A	11919	5%	596	
Non-Impervious Developed Area	2199	2%	44	
Total Surface Area Required, min.			**640**	**sf**

The general standards require that 95% of the new impervious surface area and 80% of the total developed surface area be treated. The proposed project is generating a net gain of 16,339 square feet of impervious area, and a net gain of 2,066 square feet of developed lawn area. The proposed treatment facilities are sized to treat 17,713 square feet of impervious area and 4,947 square feet of developed area. Therefore, greater than 100% of increased impervious and developed surfaces are being treated as part of the proposed project, and the water quality standard is met.

FLOODING STANDARD (WATER QUANTITY TREATMENT)

The site has been analyzed for pre-development and post-development runoff corresponding to the 2, 10 and 25 year storms. The Soil Conservation Service (SCS) TR-20 methodology was selected to determine the flow rates for this hydrologic analysis and HydroCAD (release 10.00) computer modeling software was utilized to perform the computations. This method relies heavily upon detailed watershed characteristics and historical rainfall data to model estimated peak discharges at selected recurrence intervals. The HydroCAD reports for these events is attached to this report.

In recent years, many organizations in the environmental science community have noticed an upward trend in total rainfall for the northeastern United States. In response, the National Resource Conservation Service (formerly SCS) has partnered with Cornell University and the Northeast Regional Climate Center (NRCC) to prepare updated statistical rainfall information (see www.precip.net). The NRCC has published a new statistical analysis of rainfall information in the northeast. The NRCC 24-hour duration rainfall data specific to Portland for various recurrences intervals have been used in these calculations.

Site specific watershed (subcatchment) details, including drainage area, land use cover, and time of concentration have been calculated. Retention and detention ponds, as well as low-lying areas and stormwater treatment cells, were designed as ponds with specific storage and outlet information. Four appurtenant Study Points were evaluated in order to determine where stormwater exits the property in the pre- and post-development condition. Study Points were designed at both outlets to the large on-site wetland, to Ocean Avenue, and to the western property boundary. The results for runoff existing the site at these Study Points are summarized in the table below:

STUDY POINT ANALYSIS (PEAK FLOW RATES: CFS)

Study Point	Pre 2-yr	Post 2-yr	Pre 10-yr	Post 10-yr	Pre 25-yr	Post 25-yr
1SP	1.13	0.99	4.87	4.87	5.27	5.27
2SP	0.00	0.00	1.03	1.02	5.04	5.00
3SP	0.96	0.10	1.68	0.18	4.94	4.60
4SP	1.63	1.63	2.73	2.73	3.60	3.60

As indicated in the above table, the discharge rate in the proposed condition is either equal to or less than the existing condition for the 2-year, 10-year and 25-year rain events. Therefore, the proposed development meets the flooding standard. Flooding controls for the site were largely completed within the two USF cells (noted in HydroCAD as PA, and PB), but also with modifications to the Detention Pond 4 (4P) outlets.

DISCHARGE TO WETLANDS

Whereas the proposed project will be discharging to certain wetlands, each wetland discharged to will have an associated analysis that indicates that the post-development wetland water level does not exceed 2" of ponding when compared to the pre-development wetland water level.

Wetland A is the only wetland on-site for which the post-development flows will be modified from the

pre-development condition. For Wetland A, pre-development flows to the existing wetland were compared to the post-development conditions. Wetland A is modeled as pond with a broad-crested weir in its southern outlet, and with a catch basin at its eastern outlet. The wetland is modeled with standing water at elevation 63.50', the approximate elevation of several of the wetland delineation flags.

Pre-development flows conveyed from a 2-year storm ponded this wetland to an elevation of 65.34'. Post-development flows conveyed from a 2-year storm ponded this wetland to an elevation of 65.32'. The difference between pre-development and post-development flows is therefore -0.02', and well below the 2" (or 0.17') maximum identified in the Discharge to Wetlands standard. Calculations for the 2-year storm are indicated in the HydroCAD report, attached to this report.

CONCLUSION

By incorporating various treatment methods and measures, surface runoff from the proposed development will receive treatment that meets the Basic, General, Flooding, and Discharge to Wetlands Standards.

8S
Subcatchment 8

3SP
Study Point 3

4S
Subcatchment 4

7P
Riprap Surface
Detention

7S
Subcatchment 7

4P
Surface Detention

5S
Subcatchment 5

6S
Subcatchment 6

10P
Isolator Row x5

9P
UG Detention

6P
Atrium Surface
Detention

CB
8P
OCS-DMH7

CB
5P
OCS-4P

3P
Surface Detention

3S
Subcatchment 3

4SP
Study Point 4

2S
Subcatchment 2

1S
Subcatchment 1

1P
Wetland A

1SP
Study Point 1

2P
Wetland B

2SP
Study Point 2

Subcat   Reach   Pond   Link

Routing Diagram for Pre-Development Cedars Model 17-10-11
Prepared by Microsoft, Printed 11/17/2017
HydroCAD® 10.00-12 s/n 01135 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.979	98	(1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
5.587	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
10.566	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
5.587	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
4.979	Other	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
10.566		**TOTAL AREA**

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	4.979	4.979		1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0.000	0.000	0.000	5.587	0.000	5.587	>75% Grass cover, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0.000	**0.000**	**0.000**	**5.587**	**4.979**	**10.566**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	62.86	58.69	48.0	0.0869	0.013	12.0	0.0	0.0
2	3P	69.10	68.75	70.0	0.0050	0.013	15.0	0.0	0.0
3	4P	67.66	67.65	5.0	0.0020	0.013	3.5	0.0	0.0
4	5P	67.48	66.86	81.0	0.0077	0.013	12.0	0.0	0.0
5	6P	71.00	69.20	220.0	0.0082	0.013	0.1	0.0	0.0
6	7P	71.83	69.20	375.0	0.0070	0.013	12.0	0.0	0.0
7	8P	66.60	66.60	10.0	0.0000	0.013	12.0	0.0	0.0
8	8P	65.70	65.50	40.0	0.0050	0.013	24.0	0.0	0.0
9	9P	65.70	65.60	10.0	0.0100	0.013	4.0	0.0	0.0
10	9P	67.00	66.90	10.0	0.0100	0.013	4.0	0.0	0.0
11	10P	66.60	66.55	5.0	0.0100	0.013	4.0	0.0	0.0
12	10P	67.00	66.55	50.0	0.0090	0.013	12.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1　　Runoff Area=87,665 sf 15.27% Impervious Runoff Depth=1.58"
　　　　　Flow Length=177' Slope=0.0100 '/' Tc=29.9 min CN=83 Runoff=2.75 cfs 0.266 af

Subcatchment 2S: Subcatchment 2　　Runoff Area=90,682 sf 66.45% Impervious Runoff Depth=2.32"
　　　　　Flow Length=178' Slope=0.0075 '/' Tc=33.7 min CN=92 Runoff=3.84 cfs 0.403 af

Subcatchment 3S: Subcatchment 3　　Runoff Area=40,444 sf 47.45% Impervious Runoff Depth=2.05"
　　　　　Flow Length=185' Slope=0.0200 '/' Tc=30.6 min CN=89 Runoff=1.63 cfs 0.159 af

Subcatchment 4S: Subcatchment 4　　Runoff Area=26,132 sf 52.50% Impervious Runoff Depth=2.05"
　　　　　　　　　　　　　　Tc=7.0 min CN=89 Runoff=2.03 cfs 0.103 af

Subcatchment 5S: Subcatchment 5　　Runoff Area=114,414 sf 56.89% Impervious Runoff Depth=2.14"
　　　　　　　　　　　　　　Tc=7.0 min CN=90 Runoff=9.20 cfs 0.469 af

Subcatchment 6S: Subcatchment 6　　Runoff Area=39,891 sf 54.44% Impervious Runoff Depth=2.14"
　　　　　　　　　　　　　　Tc=7.0 min CN=90 Runoff=3.21 cfs 0.163 af

Subcatchment 7S: Subcatchment 7　　Runoff Area=46,652 sf 42.35% Impervious Runoff Depth=1.97"
　　　　　　　　　　　　　　Tc=7.0 min CN=88 Runoff=3.50 cfs 0.176 af

Subcatchment 8S: Subcatchment 8　　Runoff Area=14,355 sf 26.13% Impervious Runoff Depth=1.73"
　　　　　　　　　　　　　　Tc=7.0 min CN=85 Runoff=0.96 cfs 0.048 af

Reach 1SP: Study Point 1　　　　　　　　　　　　Inflow=1.13 cfs 0.659 af
　　　　　　　　　　　　　　　　　　　　　Outflow=1.13 cfs 0.659 af

Reach 2SP: Study Point 2　　　　　　　　　　　　Inflow=0.00 cfs 0.000 af
　　　　　　　　　　　　　　　　　　　　　Outflow=0.00 cfs 0.000 af

Reach 3SP: Study Point 3　　　　　　　　　　　　Inflow=0.96 cfs 0.048 af
　　　　　　　　　　　　　　　　　　　　　Outflow=0.96 cfs 0.048 af

Reach 4SP: Study Point 4　　　　　　　　　　　　Inflow=1.63 cfs 0.159 af
　　　　　　　　　　　　　　　　　　　　　Outflow=1.63 cfs 0.159 af

Pond 1P: Wetland A　　　　　Peak Elev=65.34' Storage=51,716 cf Inflow=9.15 cfs 1.315 af
　　Primary=0.00 cfs 0.000 af Secondary=1.13 cfs 0.659 af Outflow=1.13 cfs 0.659 af

Pond 2P: Wetland B　　　　　Peak Elev=69.11' Storage=9,275 cf Inflow=3.84 cfs 0.403 af
　　　　　　　　　　　　　　　　　　　Outflow=1.59 cfs 0.208 af

Pond 3P: Surface Detention　　　Peak Elev=71.44' Storage=7,457 cf Inflow=13.88 cfs 0.676 af
　　Primary=6.11 cfs 0.674 af Secondary=0.00 cfs 0.000 af Outflow=6.11 cfs 0.674 af

Pond 4P: Surface Detention　　　Peak Elev=69.90' Storage=3,402 cf Inflow=3.50 cfs 0.176 af
　Primary=0.37 cfs 0.155 af Secondary=0.00 cfs 0.000 af Tertiary=0.37 cfs 0.013 af Outflow=0.74 cfs 0.167 af

Pond 5P: OCS-4P   Peak Elev=67.98' Inflow=0.74 cfs 0.167 af
12.0" Round Culvert n=0.013 L=81.0' S=0.0077 '/' Outflow=0.74 cfs 0.167 af

Pond 6P: Atrium Surface Detention   Peak Elev=73.88' Storage=3,640 cf Inflow=9.20 cfs 0.469 af
Outflow=8.80 cfs 0.412 af

Pond 7P: Riprap Surface Detention   Peak Elev=72.74' Storage=285 cf Inflow=2.03 cfs 0.103 af
12.0" Round Culvert n=0.013 L=375.0' S=0.0070 '/' Outflow=1.93 cfs 0.101 af

Pond 8P: OCS-DMH7   Peak Elev=67.01' Inflow=6.11 cfs 0.674 af
Primary=0.34 cfs 0.011 af Secondary=5.77 cfs 0.664 af Outflow=6.11 cfs 0.674 af

Pond 9P: UG Detention   Peak Elev=65.90' Storage=286 cf Inflow=0.22 cfs 0.008 af
Outflow=0.06 cfs 0.008 af

Pond 10P: Isolator Row x5   Peak Elev=67.19' Storage=0.001 af Inflow=0.34 cfs 0.011 af
Primary=0.22 cfs 0.008 af Secondary=0.12 cfs 0.002 af Outflow=0.34 cfs 0.011 af

Total Runoff Area = 10.566 ac   Runoff Volume = 1.786 af   Average Runoff Depth = 2.03"
52.88% Pervious = 5.587 ac   47.12% Impervious = 4.979 ac

Summary for Subcatchment 1S: Subcatchment 1

Runoff   =   2.75 cfs @ 12.25 hrs, Volume=   0.266 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	13,390	98	
	74,275	80	>75% Grass cover, Good, HSG D
	87,665	83	Weighted Average
	74,275		84.73% Pervious Area
	13,390		15.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.9	177	0.0100	0.10		**Sheet Flow,**
					Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 1S: Subcatchment 1

Hydrograph

Pre-Development Cedars Model 17-10-11
Prepared by Microsoft
HydroCAD® 10.00-12 s/n 01135 © 2014 HydroCAD Software Solutions LLC

Type II 24-hr 2-yr Rainfall=3.17"
Printed 11/17/2017
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Summary for Subcatchment 2S: Subcatchment 2

Runoff   =   3.84 cfs @ 12.28 hrs, Volume=   0.403 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	60,255	98	
	30,427	80	>75% Grass cover, Good, HSG D
	90,682	92	Weighted Average
	30,427		33.55% Pervious Area
	60,255		66.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	178	0.0075	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 2S: Subcatchment 2

Hydrograph

Summary for Subcatchment 3S: Subcatchment 3

Runoff   =   1.63 cfs @ 12.25 hrs, Volume=   0.159 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

Area (sf)	CN	Description
21,255	80	>75% Grass cover, Good, HSG D
* 19,189	98	
40,444	89	Weighted Average
21,255		52.55% Pervious Area
19,189		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	150	0.0200	0.08		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.17"
0.8	35	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.6	185	Total			

Subcatchment 3S: Subcatchment 3

Hydrograph

Summary for Subcatchment 4S: Subcatchment 4

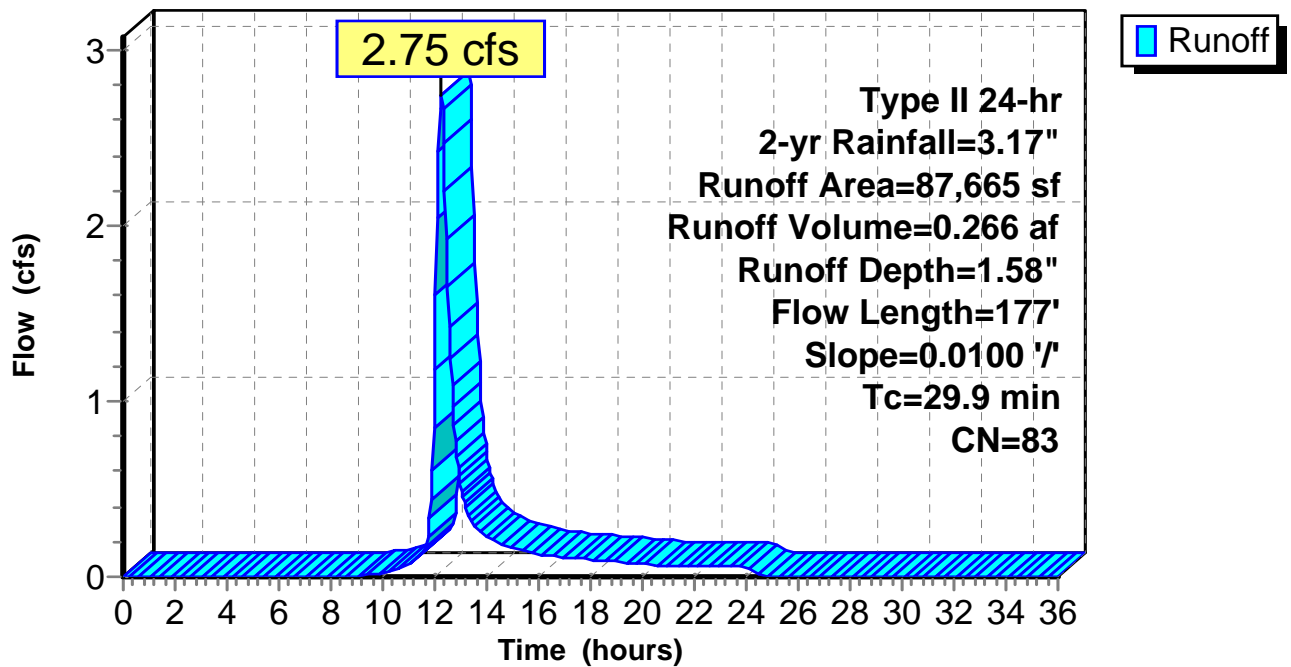Runoff   =   2.03 cfs @   11.98 hrs, Volume=   0.103 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	13,720	98	
	12,412	80	>75% Grass cover, Good, HSG D
	26,132	89	Weighted Average
	12,412		47.50% Pervious Area
	13,720		52.50% Impervious Area

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

Subcatchment 4S: Subcatchment 4

Hydrograph

Summary for Subcatchment 5S: Subcatchment 5

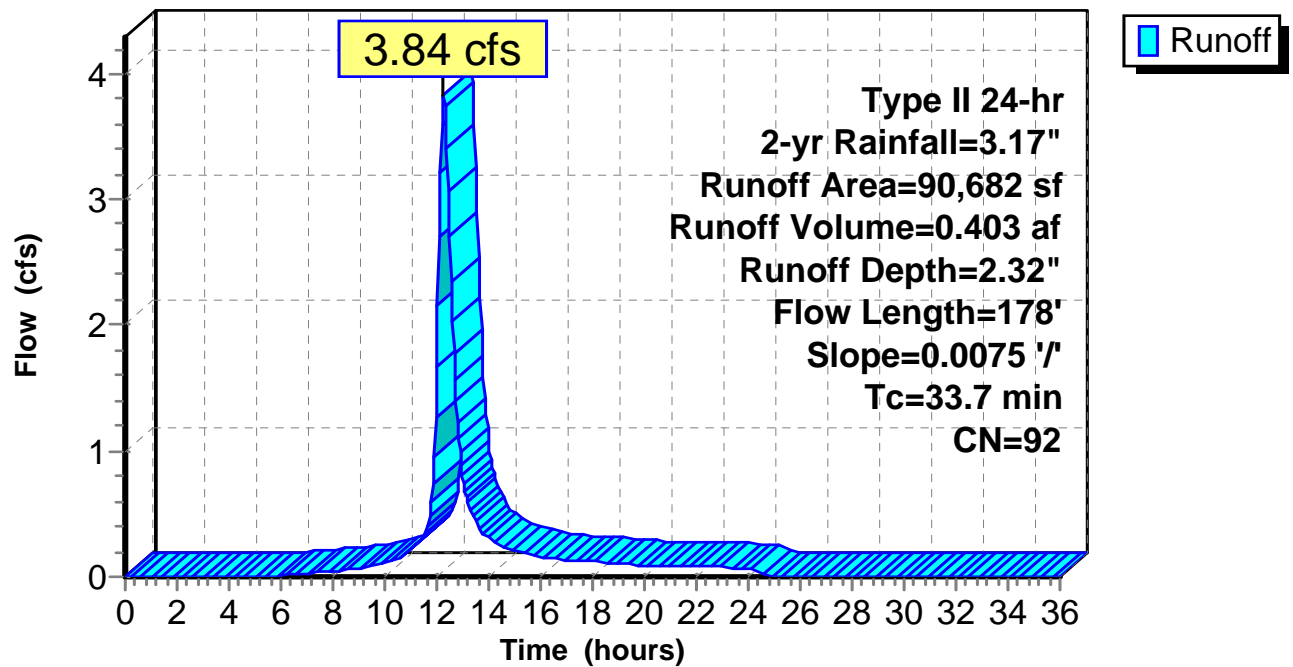Runoff   =   9.20 cfs @   11.98 hrs, Volume=   0.469 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	65,087	98	
	49,327	80	>75% Grass cover, Good, HSG D
	114,414	90	Weighted Average
	49,327		43.11% Pervious Area
	65,087		56.89% Impervious Area

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

Subcatchment 5S: Subcatchment 5

Hydrograph

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Type II 24-hr 2-yr Rainfall=3.17"
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Summary for Subcatchment 6S: Subcatchment 6

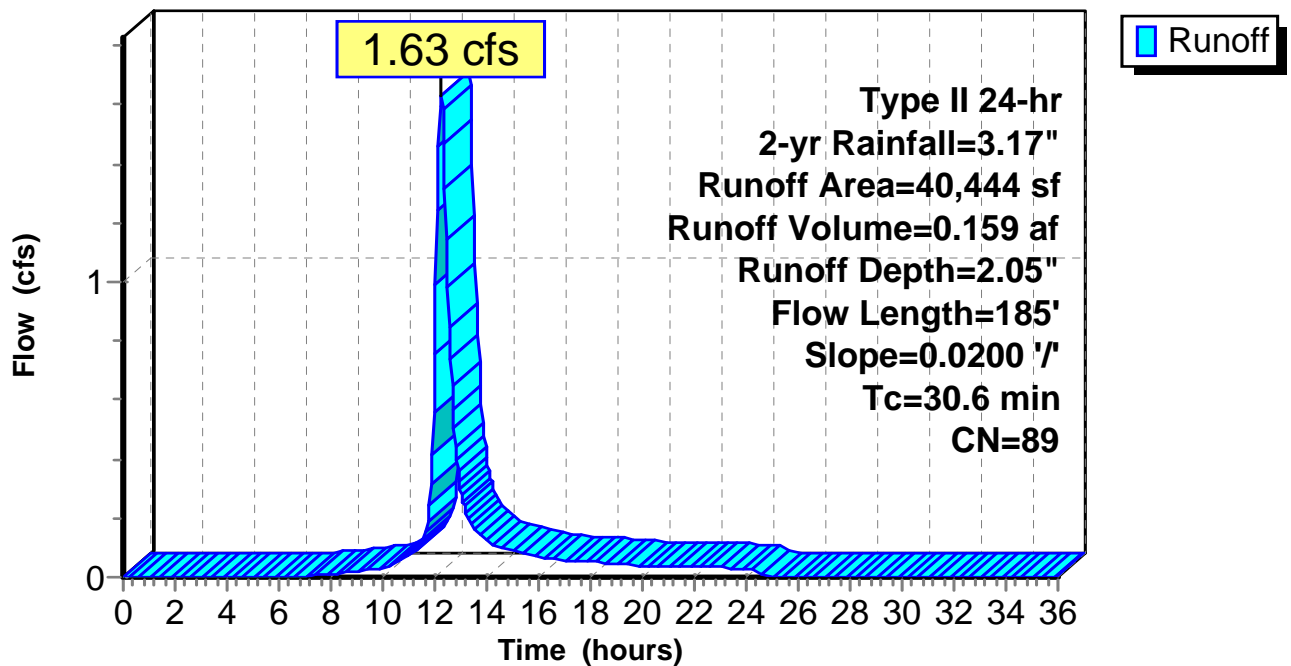Runoff   =   3.21 cfs @ 11.98 hrs, Volume=   0.163 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	21,718	98	
	18,173	80	>75% Grass cover, Good, HSG D
	39,891	90	Weighted Average
	18,173		45.56% Pervious Area
	21,718		54.44% Impervious Area

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

Subcatchment 6S: Subcatchment 6

Hydrograph

Summary for Subcatchment 7S: Subcatchment 7

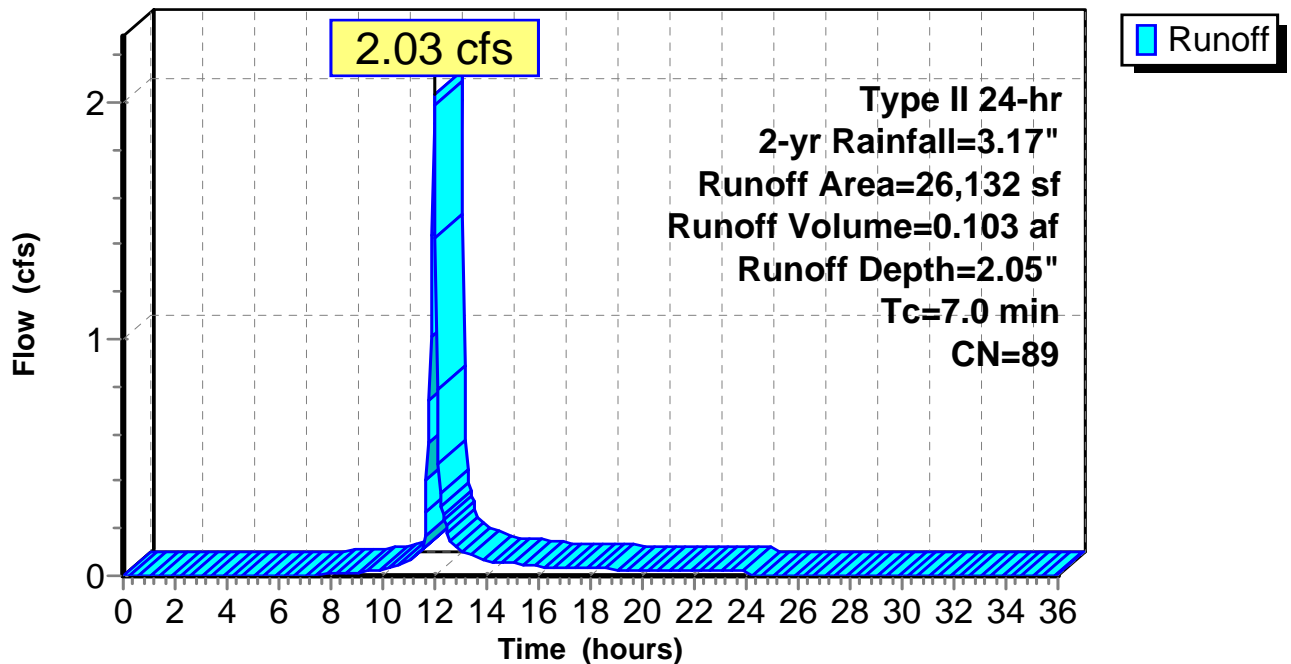Runoff   =   3.50 cfs @   11.98 hrs, Volume=   0.176 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	19,759	98	
	26,893	80	>75% Grass cover, Good, HSG D
	46,652	88	Weighted Average
	26,893		57.65% Pervious Area
	19,759		42.35% Impervious Area

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

Subcatchment 7S: Subcatchment 7

Hydrograph

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Type II 24-hr 2-yr Rainfall=3.17"
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Summary for Subcatchment 8S: Subcatchment 8

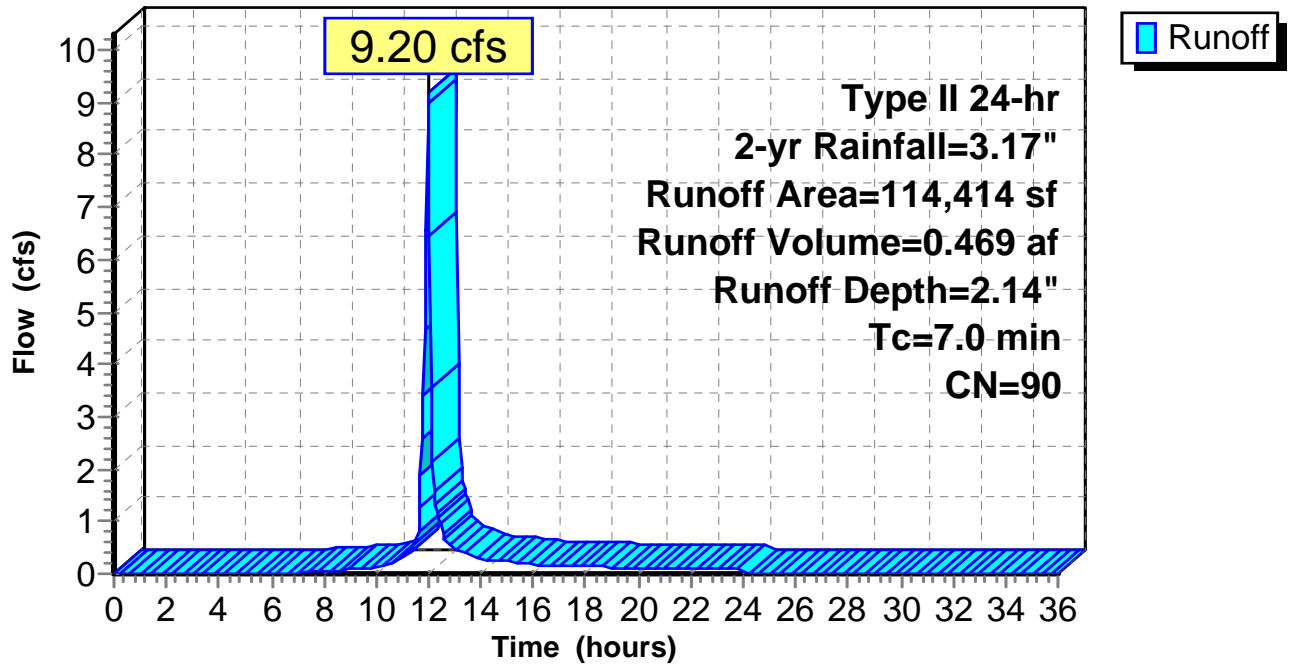Runoff   =   0.96 cfs @   11.98 hrs, Volume=   0.048 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
	10,604	80	>75% Grass cover, Good, HSG D
*	3,751	98	
	14,355	85	Weighted Average
	10,604		73.87% Pervious Area
	3,751		26.13% Impervious Area

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

Subcatchment 8S: Subcatchment 8

Hydrograph

Summary for Reach 1SP: Study Point 1

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

Inflow   =   1.13 cfs @   14.66 hrs, Volume=   0.659 af
Outflow   =   1.13 cfs @   14.66 hrs, Volume=   0.659 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 1SP: Study Point 1

Hydrograph

Summary for Reach 2SP: Study Point 2

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

Inflow Area =   9.308 ac, 47.83% Impervious, Inflow Depth = 0.00"   for 2-yr event
Inflow   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Outflow   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 2SP: Study Point 2

Hydrograph

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Summary for Reach 3SP: Study Point 3

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

Inflow Area =   0.330 ac, 26.13% Impervious, Inflow Depth = 1.73"   for 2-yr event
Inflow   =   0.96 cfs @   11.98 hrs, Volume=   0.048 af
Outflow   =   0.96 cfs @   11.98 hrs, Volume=   0.048 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 3SP: Study Point 3

Hydrograph

Summary for Reach 4SP: Study Point 4

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

Inflow Area =   0.928 ac, 47.45% Impervious, Inflow Depth = 2.05"   for 2-yr event
Inflow   =   1.63 cfs @   12.25 hrs, Volume=   0.159 af
Outflow   =   1.63 cfs @   12.25 hrs, Volume=   0.159 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 4SP: Study Point 4

Hydrograph
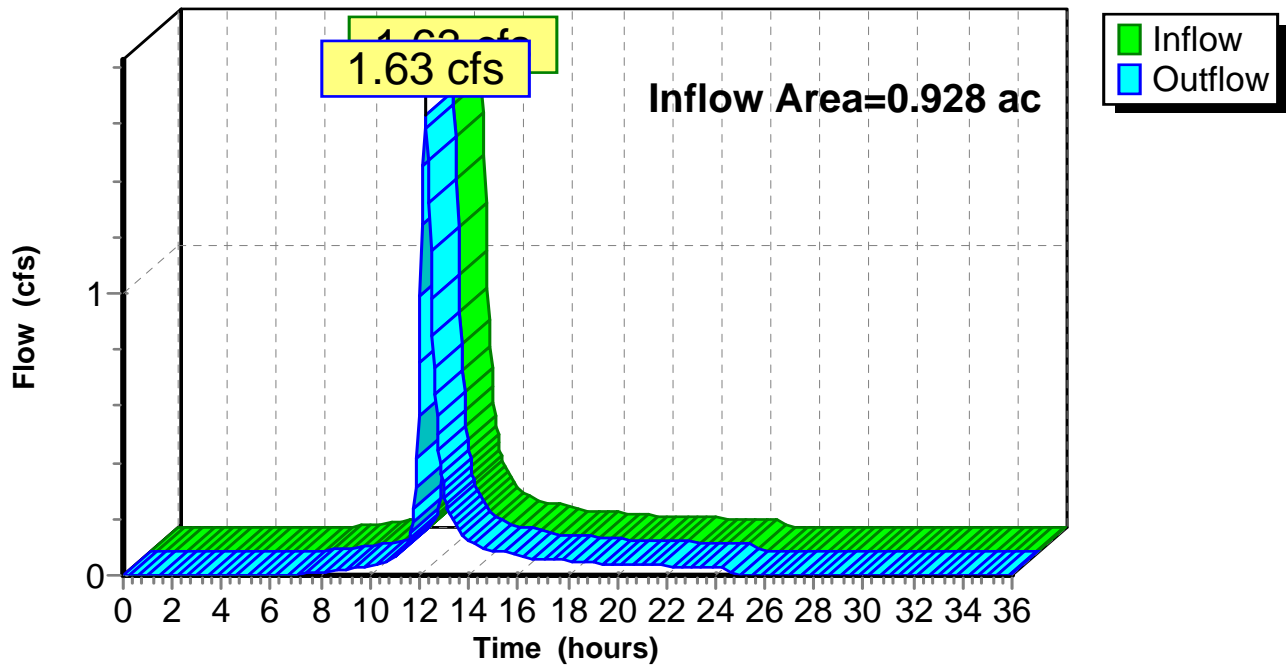
Summary for Pond 1P: Wetland A

Inflow Area =   9.308 ac, 47.83% Impervious, Inflow Depth = 1.70"   for 2-yr event
Inflow   =   9.15 cfs @   12.20 hrs, Volume=   1.315 af
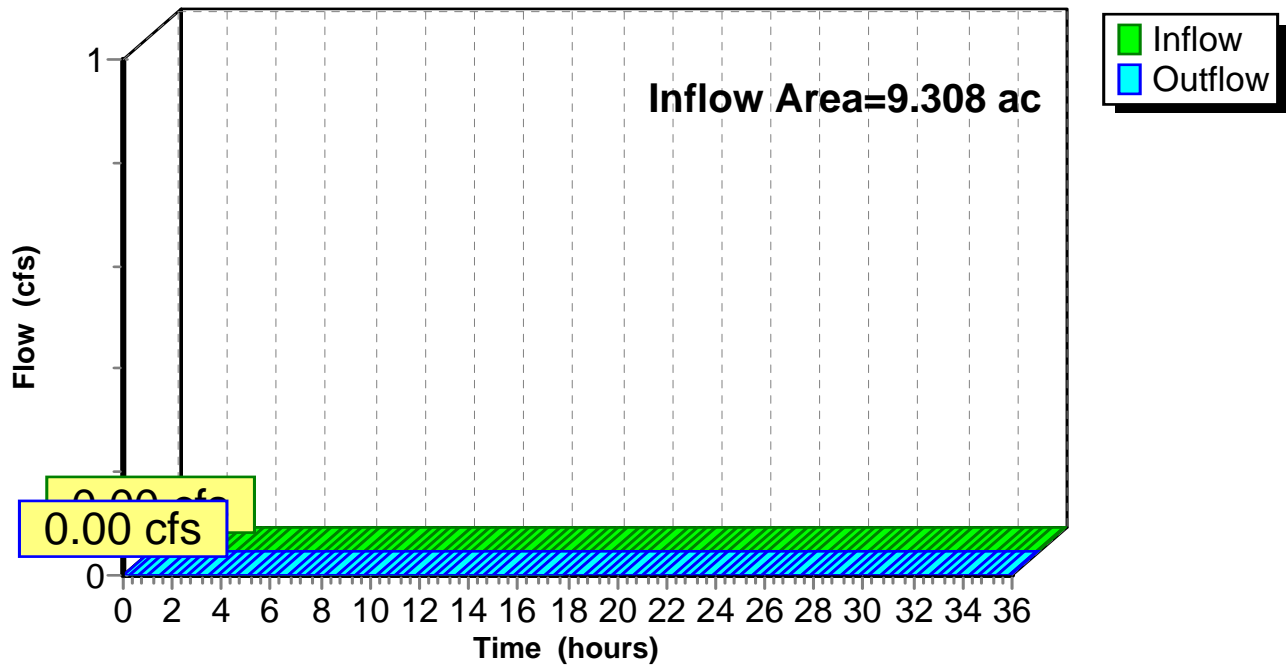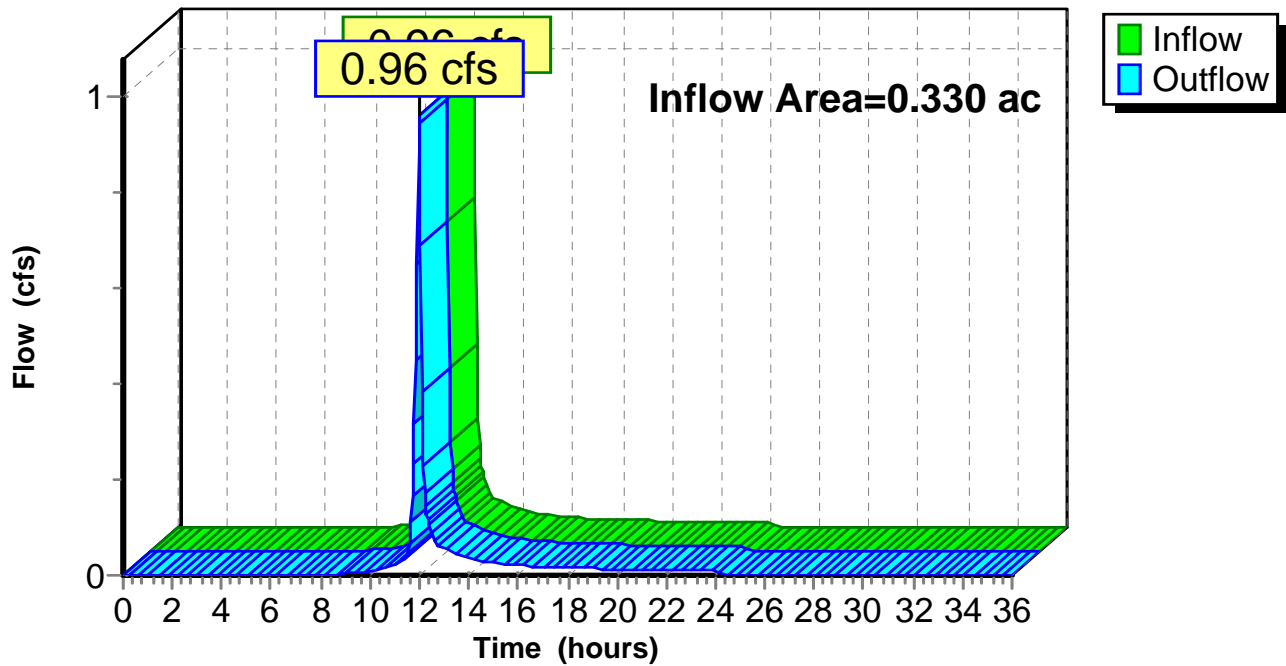Outflow   =   1.13 cfs @   14.66 hrs, Volume=   0.659 af, Atten= 88%, Lag= 147.5 min
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Secondary =   1.13 cfs @   14.66 hrs, Volume=   0.659 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Starting Elev= 63.50' Surf.Area= 14,739 sf   Storage= 17,429 cf
Peak Elev= 65.34' @ 14.66 hrs   Surf.Area= 22,633 sf   Storage= 51,716 cf   (34,287 cf above start)

Plug-Flow detention time= 644.1 min calculated for 0.259 af (20% of inflow)
Center-of-Mass det. time= 236.4 min (1,106.2 - 869.8)

Volume	Invert	Avail.Storage	Storage Description
#1	62.00'	209,276 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.00	8,500	0	0
65.00	20,977	44,216	44,216
70.00	45,047	165,060	209,276

Device	Routing	Invert	Outlet Devices
#1	Primary	65.75'	**3.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Secondary	62.86'	**12.0" Round Culvert** L= 48.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 62.86' / 58.69' S= 0.0869 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	65.08'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=63.50'   (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=1.12 cfs @ 14.66 hrs HW=65.34'   (Free Discharge)
└─**2=Culvert** (Passes 1.12 cfs of 4.21 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.12 cfs @ 1.73 fps)

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Type II 24-hr 2-yr Rainfall=3.17"

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Pond 1P: Wetland A

Hydrograph

9.15 cfs

Inflow Area=9.308 ac
Peak Elev=65.34'
Storage=51,716 cf

1.13 cfs

1.13 cfs

0.00 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs)

Time (hours)

Summary for Pond 2P: Wetland B

Inflow Area =   2.082 ac, 66.45% Impervious, Inflow Depth = 2.32"   for 2-yr event
Inflow   =   3.84 cfs @   12.28 hrs, Volume=   0.403 af
Outflow   =   1.59 cfs @   12.70 hrs, Volume=   0.208 af, Atten= 58%, Lag= 25.5 min
Primary   =   1.59 cfs @   12.70 hrs, Volume=   0.208 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.11' @ 12.70 hrs   Surf.Area= 7,808 sf   Storage= 9,275 cf

Plug-Flow detention time= 236.6 min calculated for 0.208 af (52% of inflow)
Center-of-Mass det. time= 123.2 min (943.8 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	21,636 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.00	2,200	0	0
68.00	4,250	3,225	3,225
69.00	6,286	5,268	8,493
70.00	20,000	13,143	21,636

Device	Routing	Invert	Outlet Devices
#1	Primary	69.00'	**18.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.58 cfs @ 12.70 hrs HW=69.11'   (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.58 cfs @ 0.79 fps)

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Pond 2P: Wetland B

Hydrograph

Inflow Area=2.082 ac
Peak Elev=69.11'
Storage=9,275 cf

Legend: Inflow (green), Primary (blue)

3.84 cfs

1.59 cfs

Flow (cfs) vs. Time (hours)

Summary for Pond 3P: Surface Detention

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 0.42'
[79] Warning: Submerged Pond 7P Primary device # 1 OUTLET by 2.22'

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth = 1.96"   for 2-yr event
Inflow   =   13.88 cfs @ 12.00 hrs, Volume=   0.676 af
Outflow   =   6.11 cfs @ 12.12 hrs, Volume=   0.674 af, Atten= 56%, Lag= 7.6 min
Primary   =   6.11 cfs @ 12.12 hrs, Volume=   0.674 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 71.44' @ 12.12 hrs   Surf.Area= 5,020 sf   Storage= 7,457 cf

Plug-Flow detention time= 18.6 min calculated for 0.674 af (100% of inflow)
Center-of-Mass det. time= 17.8 min (843.4 - 825.7)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	21,926 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.00	400	0	0
70.00	2,991	1,696	1,696
72.00	5,812	8,803	10,499
73.50	9,425	11,428	21,926

Device	Routing	Invert	Outlet Devices
#1	Primary	69.10'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 69.10' / 68.75' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	72.50'	**35.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.08 cfs @ 12.12 hrs HW=71.42'   (Free Discharge)
└—**1=Culvert** (Inlet Controls 6.08 cfs @ 4.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=69.00'   (Free Discharge)
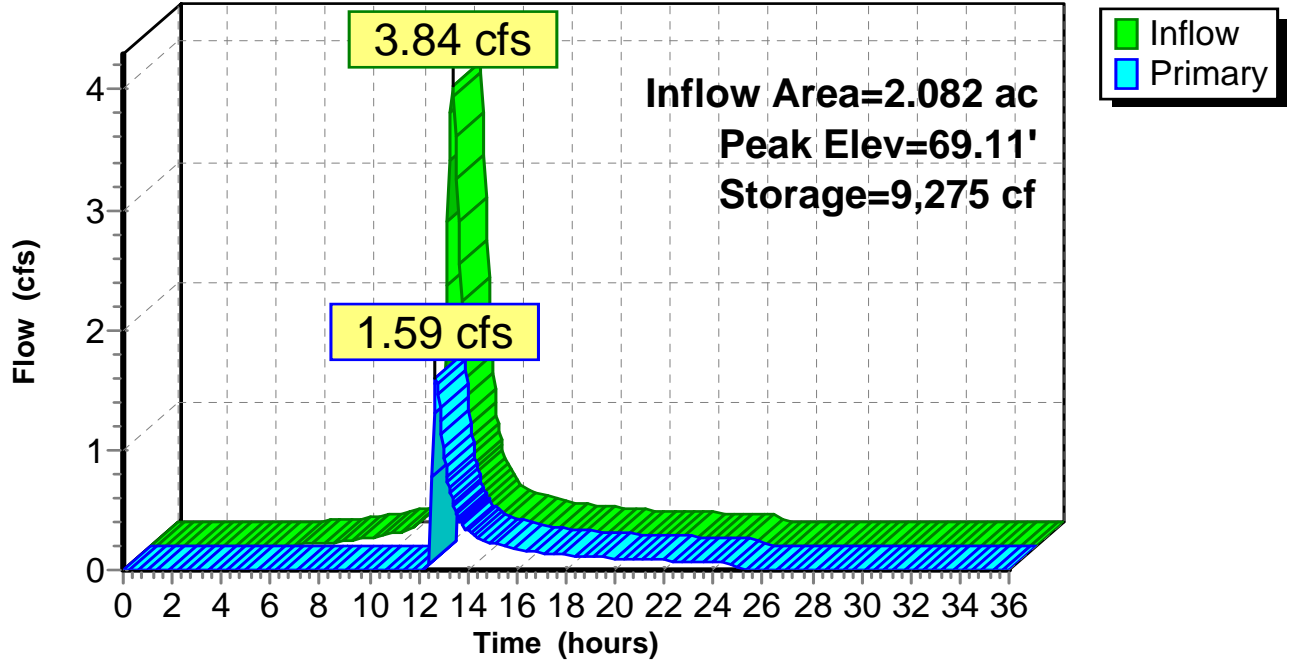└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Pond 3P: Surface Detention

Hydrograph

Inflow Area=4.142 ac
Peak Elev=71.44'
Storage=7,457 cf

13.88 cfs
6.11 cfs
0.00 cfs

Flow (cfs)

Time (hours)

Inflow
Outflow
Primary
Secondary
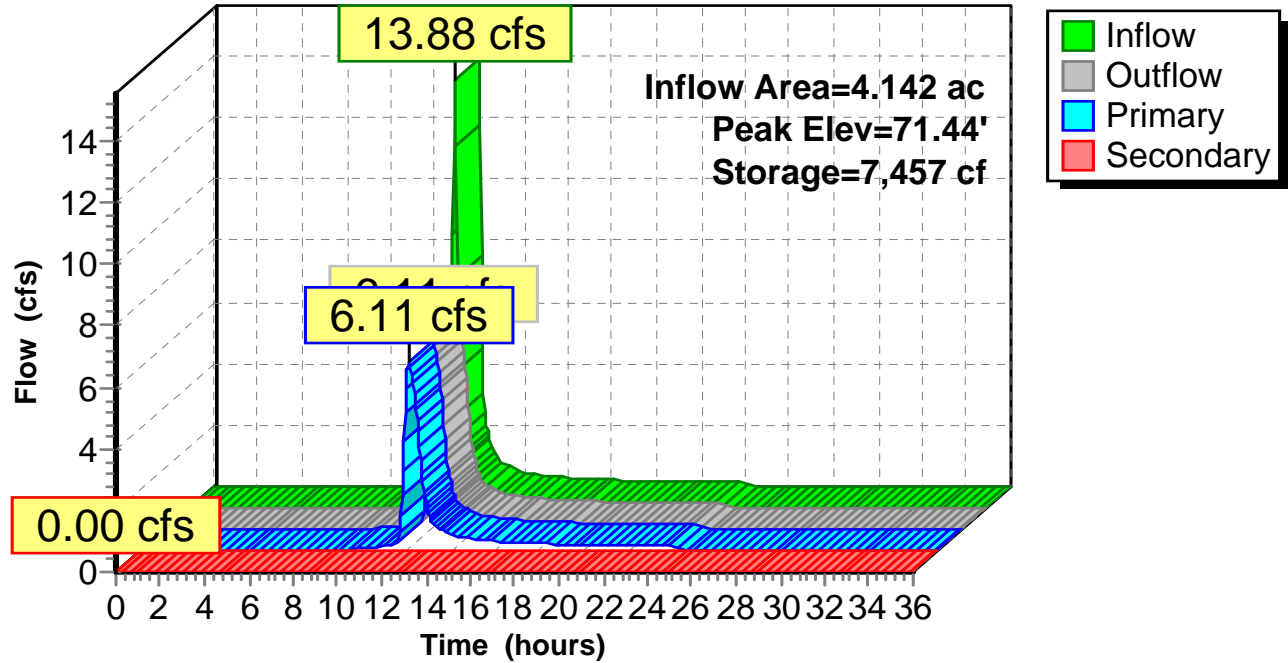
Summary for Pond 4P: Surface Detention

Inflow Area =   1.071 ac, 42.35% Impervious, Inflow Depth = 1.97"   for 2-yr event
Inflow   =   3.50 cfs @ 11.98 hrs, Volume=   0.176 af
Outflow   =   0.74 cfs @ 12.17 hrs, Volume=   0.167 af, Atten= 79%, Lag= 11.4 min
Primary   =   0.37 cfs @ 12.17 hrs, Volume=   0.155 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Tertiary   =   0.37 cfs @ 12.17 hrs, Volume=   0.013 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.90' @ 12.17 hrs   Surf.Area= 2,247 sf   Storage= 3,402 cf

Plug-Flow detention time= 117.9 min calculated for 0.167 af (95% of inflow)
Center-of-Mass det. time= 91.2 min (904.5 - 813.3)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	10,990 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	13	0	0
67.00	71	126	126
68.00	928	500	626
69.00	1,378	1,153	1,779
70.00	2,348	1,863	3,642
72.00	5,000	7,348	10,990

Device	Routing	Invert	Outlet Devices
#1	Primary	67.66'	**3.5" Round Culvert** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.66' / 67.65' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 0.07 sf
#2	Tertiary	69.66'	**1.2' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Secondary	70.50'	**45.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.37 cfs @ 12.17 hrs HW=69.89' (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.37 cfs @ 5.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.36 cfs @ 12.17 hrs HW=69.89' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.36 cfs @ 1.30 fps)

Pond 4P: Surface Detention

Hydrograph

Inflow Area=1.071 ac
Peak Elev=69.90'
Storage=3,402 cf

Legend:
- Inflow
- Outflow
- Primary
- Secondary
- Tertiary
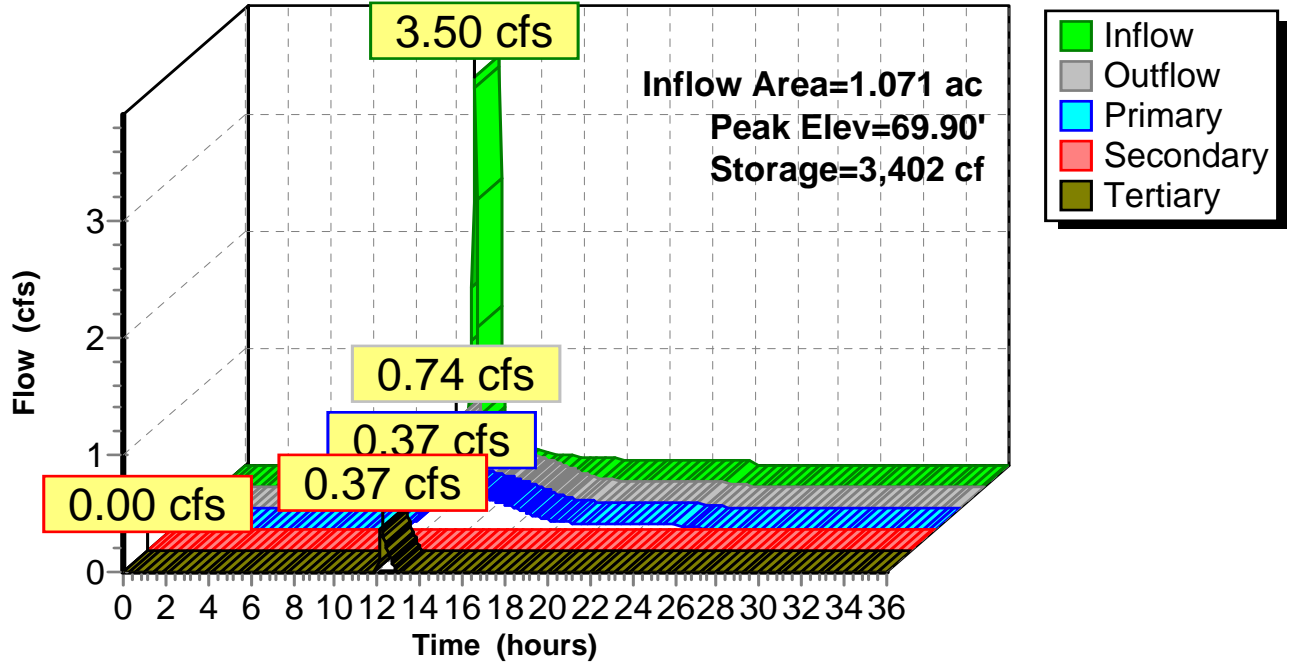
Summary for Pond 5P: OCS-4P

[57] Hint: Peaked at 67.98' (Flood elevation advised)
[79] Warning: Submerged Pond 4P Primary device # 1 INLET by 0.31'

Inflow Area =   1.071 ac, 42.35% Impervious, Inflow Depth > 1.88"   for 2-yr event
Inflow   =   0.74 cfs @   12.17 hrs, Volume=   0.167 af
Outflow   =   0.74 cfs @   12.17 hrs, Volume=   0.167 af, Atten= 0%, Lag= 0.0 min
Primary   =   0.74 cfs @   12.17 hrs, Volume=   0.167 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.98' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	67.48'	**12.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.48' / 66.86' S= 0.0077 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.73 cfs @ 12.17 hrs HW=67.97'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.73 cfs @ 1.89 fps)

Pond 5P: OCS-4P

Hydrograph
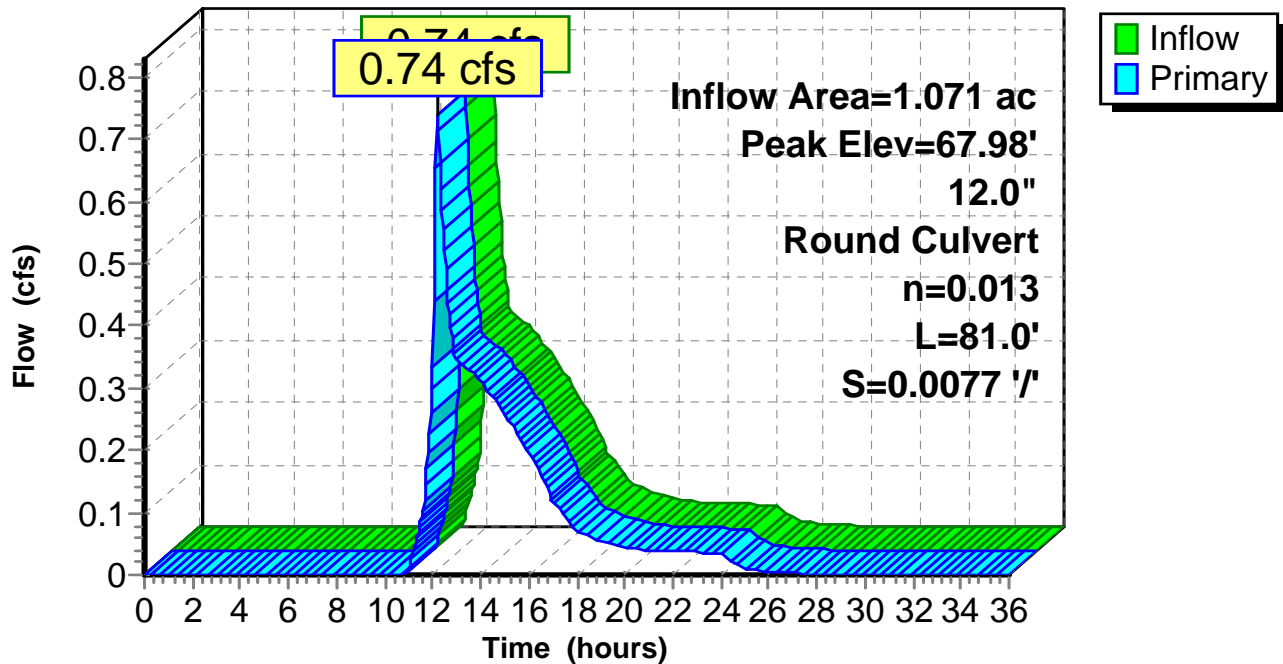
Summary for Pond 6P: Atrium Surface Detention

Inflow Area =   2.627 ac, 56.89% Impervious, Inflow Depth = 2.14"   for 2-yr event
Inflow   =   9.20 cfs @   11.98 hrs, Volume=   0.469 af
Outflow   =   8.80 cfs @   12.00 hrs, Volume=   0.412 af, Atten= 4%, Lag= 1.3 min
Primary   =   8.80 cfs @   12.00 hrs, Volume=   0.412 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 73.88' @ 12.00 hrs   Surf.Area= 3,405 sf   Storage= 3,640 cf

Plug-Flow detention time= 89.4 min calculated for 0.412 af (88% of inflow)
Center-of-Mass det. time= 30.1 min (835.2 - 805.1)

Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	5,026 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	55	0	0
72.00	327	382	382
73.00	1,694	1,011	1,393
74.25	4,120	3,634	5,026

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**0.1" Round Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 69.20' S= 0.0082 '/' Cc= 0.900 n= 0.013, Flow Area= 0.00 sf
#2	Primary	73.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.73 cfs @ 12.00 hrs HW=73.88'   (Free Discharge)
┌─**1=Culvert** (Barrel Controls 0.00 cfs @ 0.27 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 8.73 cfs @ 1.53 fps)

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Pond 6P: Atrium Surface Detention

Hydrograph

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Summary for Pond 7P: Riprap Surface Detention

Inflow Area =   0.600 ac, 52.50% Impervious, Inflow Depth = 2.05"   for 2-yr event
Inflow   =   2.03 cfs @   11.98 hrs, Volume=   0.103 af
Outflow   =   1.93 cfs @   12.00 hrs, Volume=   0.101 af, Atten= 5%, Lag= 1.2 min
Primary   =   1.93 cfs @   12.00 hrs, Volume=   0.101 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.74' @ 12.00 hrs   Surf.Area= 277 sf   Storage= 285 cf

Plug-Flow detention time= 22.6 min calculated for 0.101 af (98% of inflow)
Center-of-Mass det. time= 10.5 min (819.8 - 809.3)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	2,180 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	50	0	0
73.00	310	360	360
74.00	846	578	938
75.00	1,637	1,242	2,180

Device	Routing	Invert	Outlet Devices
#1	Primary	71.83'	**12.0" Round Culvert** L= 375.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.83' / 69.20' S= 0.0070 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.92 cfs @ 12.00 hrs HW=72.74'   (Free Discharge)
⌐—**1=Culvert** (Inlet Controls 1.92 cfs @ 2.56 fps)

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Type II 24-hr 2-yr Rainfall=3.17"
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Pond 7P: Riprap Surface Detention

Hydrograph

2.03 cfs
1.93 cfs

Inflow Area=0.600 ac
Peak Elev=72.74'
Storage=285 cf
12.0"
Round Culvert
n=0.013
L=375.0'
S=0.0070 '/'

■ Inflow
■ Primary

Flow (cfs)

Time (hours)

Summary for Pond 8P: OCS-DMH7

[57] Hint: Peaked at 67.01' (Flood elevation advised)

Inflow Area = 4.142 ac, 55.71% Impervious, Inflow Depth = 1.95" for 2-yr event
Inflow   = 6.11 cfs @ 12.12 hrs, Volume=   0.674 af
Outflow   = 6.11 cfs @ 12.12 hrs, Volume=   0.674 af, Atten= 0%, Lag= 0.0 min
Primary   = 0.34 cfs @ 12.12 hrs, Volume=   0.011 af
Secondary = 5.77 cfs @ 12.12 hrs, Volume=   0.664 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.01' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 66.60' / 66.60' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	65.70'	**24.0" Round Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 65.70' / 65.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=0.33 cfs @ 12.12 hrs HW=67.01' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.33 cfs @ 1.65 fps)

Secondary OutFlow Max=5.74 cfs @ 12.12 hrs HW=67.01' (Free Discharge)
└─**2=Culvert** (Barrel Controls 5.74 cfs @ 3.75 fps)

Pond 8P: OCS-DMH7

Hydrograph

Summary for Pond 9P: UG Detention

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth = 0.02"   for 2-yr event
Inflow   =   0.22 cfs @   12.13 hrs, Volume=   0.008 af
Outflow   =   0.06 cfs @   12.55 hrs, Volume=   0.008 af, Atten= 71%, Lag= 25.1 min
Primary   =   0.06 cfs @   12.55 hrs, Volume=   0.008 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
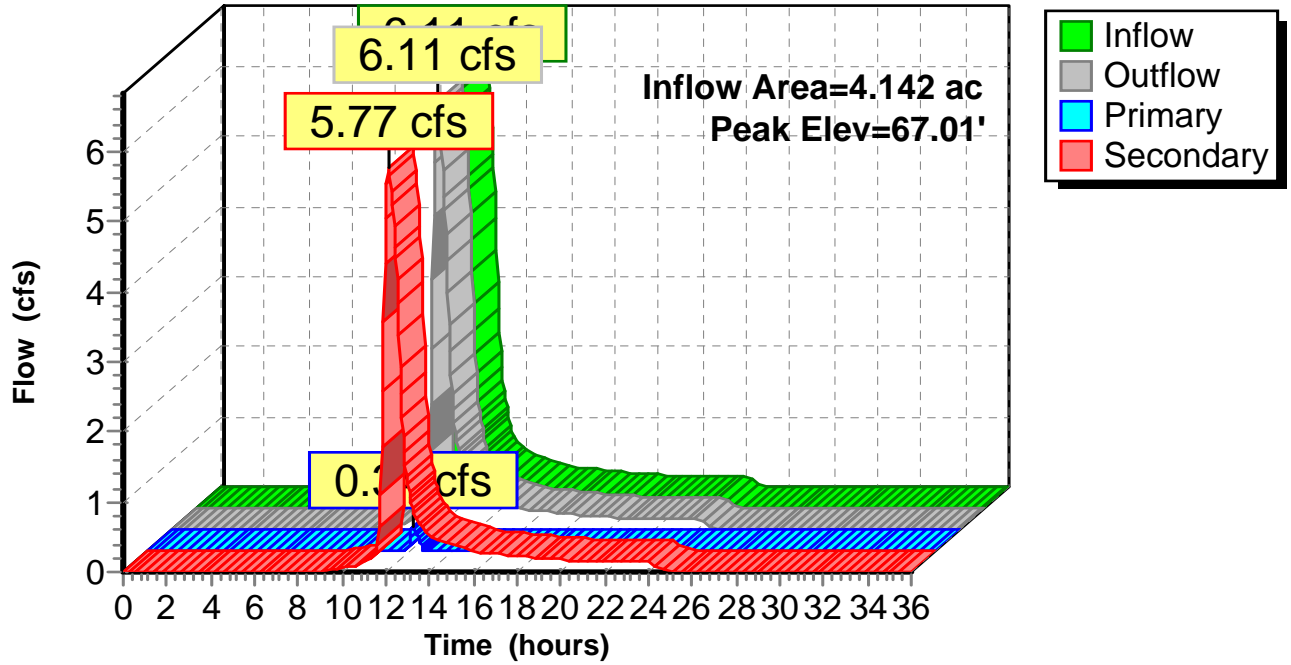Peak Elev= 65.90' @ 12.55 hrs   Surf.Area= 1,536 sf   Storage= 286 cf

Plug-Flow detention time= 141.6 min calculated for 0.008 af (97% of inflow)
Center-of-Mass det. time= 142.1 min (878.1 - 736.0)

Volume	Invert	Avail.Storage	Storage Description
#1	65.70'	2,488 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 2,619 cf Overall x 95.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.70	1,536	0	0
67.40	1,536	2,611	2,611
67.41	5	8	2,619

Device	Routing	Invert	Outlet Devices
#1	Primary	65.70'	**4.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 65.70' / 65.60' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf
#2	Primary	67.00'	**4.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.00' / 66.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.06 cfs @ 12.55 hrs HW=65.90'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.06 cfs @ 1.67 fps)
 └─**2=Culvert** (Controls 0.00 cfs)
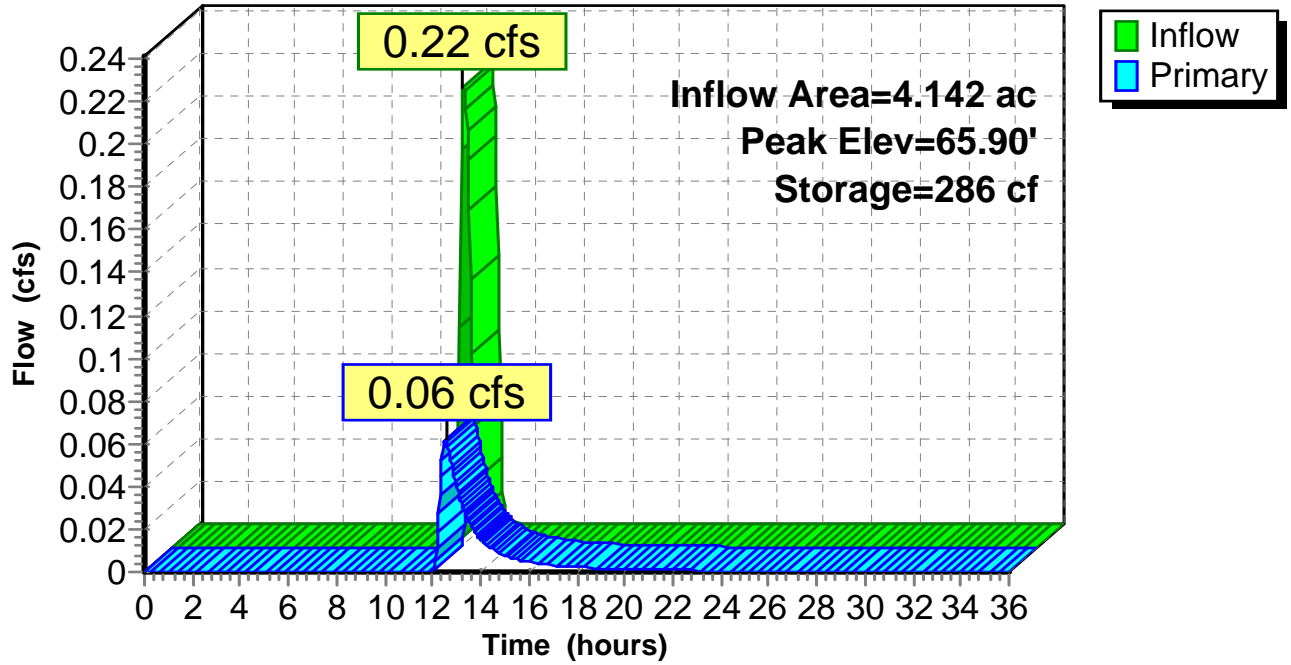
Pond 9P: UG Detention

Hydrograph

Inflow Area=4.142 ac
Peak Elev=65.90'
Storage=286 cf

Legend:
- Inflow
- Primary

Summary for Pond 10P: Isolator Row x5

[81] Warning: Exceeded Pond 8P by 0.90' @ 35.95 hrs

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth =   0.03"   for 2-yr event
Inflow   =   0.34 cfs @ 12.12 hrs, Volume=   0.011 af
Outflow   =   0.34 cfs @ 12.13 hrs, Volume=   0.011 af, Atten= 1%, Lag= 0.2 min
Primary   =   0.22 cfs @ 12.13 hrs, Volume=   0.008 af
Secondary =   0.12 cfs @ 12.13 hrs, Volume=   0.002 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.19' @ 12.13 hrs   Surf.Area= 0.002 ac   Storage= 0.001 af

Plug-Flow detention time= 3.2 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 3.4 min (735.0 - 731.6)

Volume	Invert	Avail.Storage	Storage Description
#1	66.60'	0.002 af	**ADS_StormTech RC-310** x 5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 1 rows

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 66.60' / 66.55' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf
#2	Secondary	67.00'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.00' / 66.55' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.22 cfs @ 12.13 hrs HW=67.19'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.22 cfs @ 2.46 fps)

Secondary OutFlow Max=0.12 cfs @ 12.13 hrs HW=67.19'   (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.12 cfs @ 1.16 fps)

Pond 10P: Isolator Row x5

Hydrograph

Inflow Area=4.142 ac
Peak Elev=67.19'
Storage=0.001 af

Legend:
- Inflow
- Outflow
- Primary
- Secondary

0.34 cfs
0.22 cfs
0.12 cfs

Flow (cfs)

Time (hours)

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1   Runoff Area=87,665 sf 15.27% Impervious Runoff Depth=2.91"
Flow Length=177' Slope=0.0100 '/' Tc=29.9 min CN=83 Runoff=5.08 cfs 0.489 af

Subcatchment 2S: Subcatchment 2   Runoff Area=90,682 sf 66.45% Impervious Runoff Depth=3.81"
Flow Length=178' Slope=0.0075 '/' Tc=33.7 min CN=92 Runoff=6.18 cfs 0.660 af

Subcatchment 3S: Subcatchment 3   Runoff Area=40,444 sf 47.45% Impervious Runoff Depth=3.49"
Flow Length=185' Slope=0.0200 '/' Tc=30.6 min CN=89 Runoff=2.73 cfs 0.270 af

Subcatchment 4S: Subcatchment 4   Runoff Area=26,132 sf 52.50% Impervious Runoff Depth=3.49"
Tc=7.0 min CN=89 Runoff=3.36 cfs 0.175 af

Subcatchment 5S: Subcatchment 5   Runoff Area=114,414 sf 56.89% Impervious Runoff Depth=3.60"
Tc=7.0 min CN=90 Runoff=15.01 cfs 0.787 af

Subcatchment 6S: Subcatchment 6   Runoff Area=39,891 sf 54.44% Impervious Runoff Depth=3.60"
Tc=7.0 min CN=90 Runoff=5.23 cfs 0.275 af

Subcatchment 7S: Subcatchment 7   Runoff Area=46,652 sf 42.35% Impervious Runoff Depth=3.39"
Tc=7.0 min CN=88 Runoff=5.87 cfs 0.303 af

Subcatchment 8S: Subcatchment 8   Runoff Area=14,355 sf 26.13% Impervious Runoff Depth=3.10"
Tc=7.0 min CN=85 Runoff=1.68 cfs 0.085 af

Reach 1SP: Study Point 1   Inflow=4.87 cfs 1.704 af
Outflow=4.87 cfs 1.704 af

Reach 2SP: Study Point 2   Inflow=1.03 cfs 0.064 af
Outflow=1.03 cfs 0.064 af

Reach 3SP: Study Point 3   Inflow=1.68 cfs 0.085 af
Outflow=1.68 cfs 0.085 af

Reach 4SP: Study Point 4   Inflow=2.73 cfs 0.270 af
Outflow=2.73 cfs 0.270 af

Pond 1P: Wetland A   Peak Elev=66.02' Storage=68,176 cf Inflow=18.10 cfs 2.425 af
Primary=1.03 cfs 0.064 af Secondary=4.87 cfs 1.704 af Outflow=5.90 cfs 1.768 af

Pond 2P: Wetland B   Peak Elev=69.25' Storage=10,461 cf Inflow=6.18 cfs 0.660 af
Outflow=5.34 cfs 0.465 af

Pond 3P: Surface Detention   Peak Elev=72.56' Storage=14,137 cf Inflow=22.59 cfs 1.178 af
Primary=7.86 cfs 1.169 af Secondary=1.19 cfs 0.008 af Outflow=9.05 cfs 1.176 af

Pond 4P: Surface Detention   Peak Elev=70.46' Storage=4,860 cf Inflow=5.87 cfs 0.303 af
Primary=0.41 cfs 0.212 af Secondary=0.00 cfs 0.000 af Tertiary=2.45 cfs 0.083 af Outflow=2.86 cfs 0.295 af

Pond 5P: OCS-4P   Peak Elev=68.90' Inflow=2.86 cfs 0.295 af
                        12.0" Round Culvert n=0.013 L=81.0' S=0.0077 '/' Outflow=2.86 cfs 0.295 af

Pond 6P: Atrium Surface Detention   Peak Elev=74.02' Storage=4,114 cf Inflow=15.01 cfs 0.787 af
                                                               Outflow=14.54 cfs 0.730 af

Pond 7P: Riprap Surface Detention   Peak Elev=73.30' Storage=479 cf Inflow=3.36 cfs 0.175 af
                       12.0" Round Culvert n=0.013 L=375.0' S=0.0070 '/' Outflow=2.95 cfs 0.173 af

Pond 8P: OCS-DMH7   Peak Elev=67.19' Inflow=7.86 cfs 1.169 af
              Primary=0.69 cfs 0.037 af   Secondary=7.16 cfs 1.132 af   Outflow=7.86 cfs 1.169 af

Pond 9P: UG Detention   Peak Elev=66.04' Storage=502 cf Inflow=0.26 cfs 0.019 af
                                                               Outflow=0.14 cfs 0.019 af

Pond 10P: Isolator Row x5   Peak Elev=67.37' Storage=0.001 af Inflow=0.69 cfs 0.037 af
              Primary=0.26 cfs 0.019 af   Secondary=0.44 cfs 0.018 af   Outflow=0.69 cfs 0.037 af

Total Runoff Area = 10.566 ac   Runoff Volume = 3.044 af   Average Runoff Depth = 3.46"
52.88% Pervious = 5.587 ac   47.12% Impervious = 4.979 ac

Summary for Subcatchment 1S: Subcatchment 1

Runoff   =   5.08 cfs @ 12.24 hrs, Volume=   0.489 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	13,390	98	
	74,275	80	>75% Grass cover, Good, HSG D
	87,665	83	Weighted Average
	74,275		84.73% Pervious Area
	13,390		15.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.9	177	0.0100	0.10		**Sheet Flow,**
					Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 1S: Subcatchment 1

Hydrograph

Summary for Subcatchment 2S: Subcatchment 2

Runoff   =   6.18 cfs @   12.27 hrs, Volume=   0.660 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	60,255	98	
	30,427	80	>75% Grass cover, Good, HSG D
	90,682	92	Weighted Average
	30,427		33.55% Pervious Area
	60,255		66.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	178	0.0075	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 2S: Subcatchment 2

Hydrograph

Summary for Subcatchment 3S: Subcatchment 3

Runoff   =   2.73 cfs @ 12.24 hrs, Volume=   0.270 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
	21,255	80	>75% Grass cover, Good, HSG D
*	19,189	98	
	40,444	89	Weighted Average
	21,255		52.55% Pervious Area
	19,189		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	150	0.0200	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.17"
0.8	35	0.0200	0.71		**Shallow Concentrated Flow,**
					Woodland Kv= 5.0 fps
30.6	185	Total			

Subcatchment 3S: Subcatchment 3

Hydrograph

Summary for Subcatchment 4S: Subcatchment 4

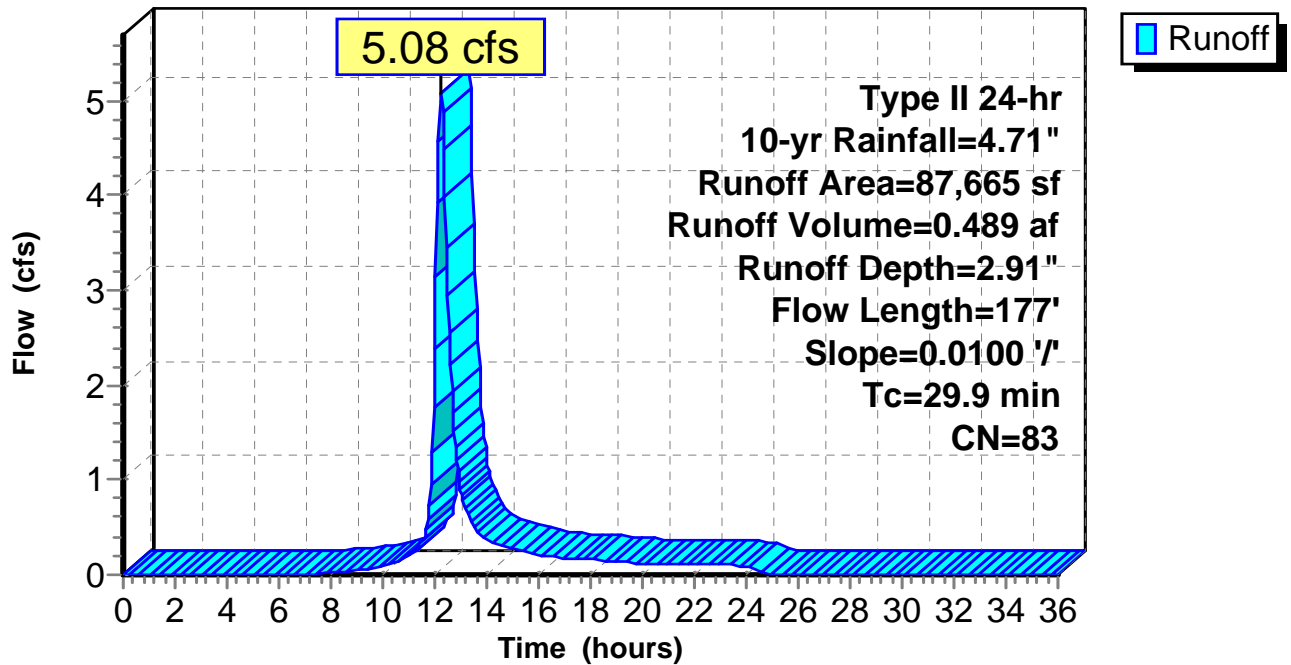Runoff   =   3.36 cfs @   11.98 hrs, Volume=   0.175 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	13,720	98	
	12,412	80	>75% Grass cover, Good, HSG D
	26,132	89	Weighted Average
	12,412		47.50% Pervious Area
	13,720		52.50% Impervious Area

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

Subcatchment 4S: Subcatchment 4

Hydrograph

Summary for Subcatchment 5S: Subcatchment 5

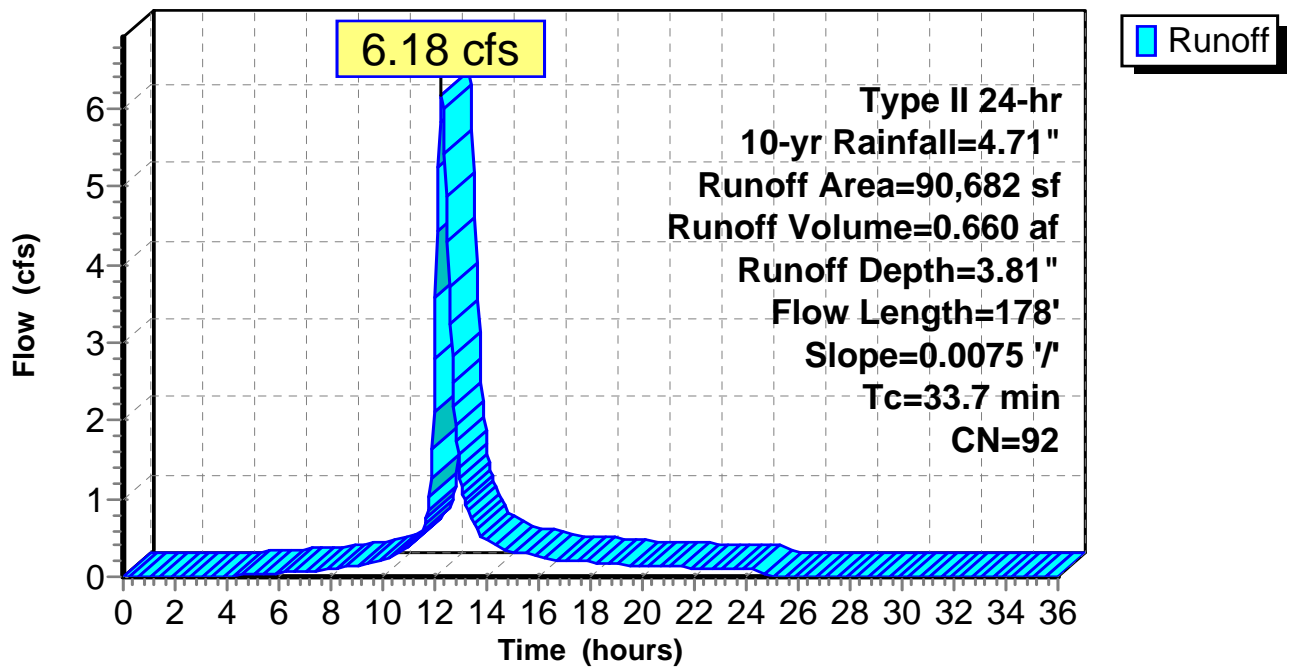Runoff   =   15.01 cfs @   11.98 hrs, Volume=   0.787 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

Area (sf)	CN	Description
* 65,087	98	
49,327	80	>75% Grass cover, Good, HSG D
114,414	90	Weighted Average
49,327		43.11% Pervious Area
65,087		56.89% Impervious Area

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

Subcatchment 5S: Subcatchment 5

Hydrograph

Summary for Subcatchment 6S: Subcatchment 6

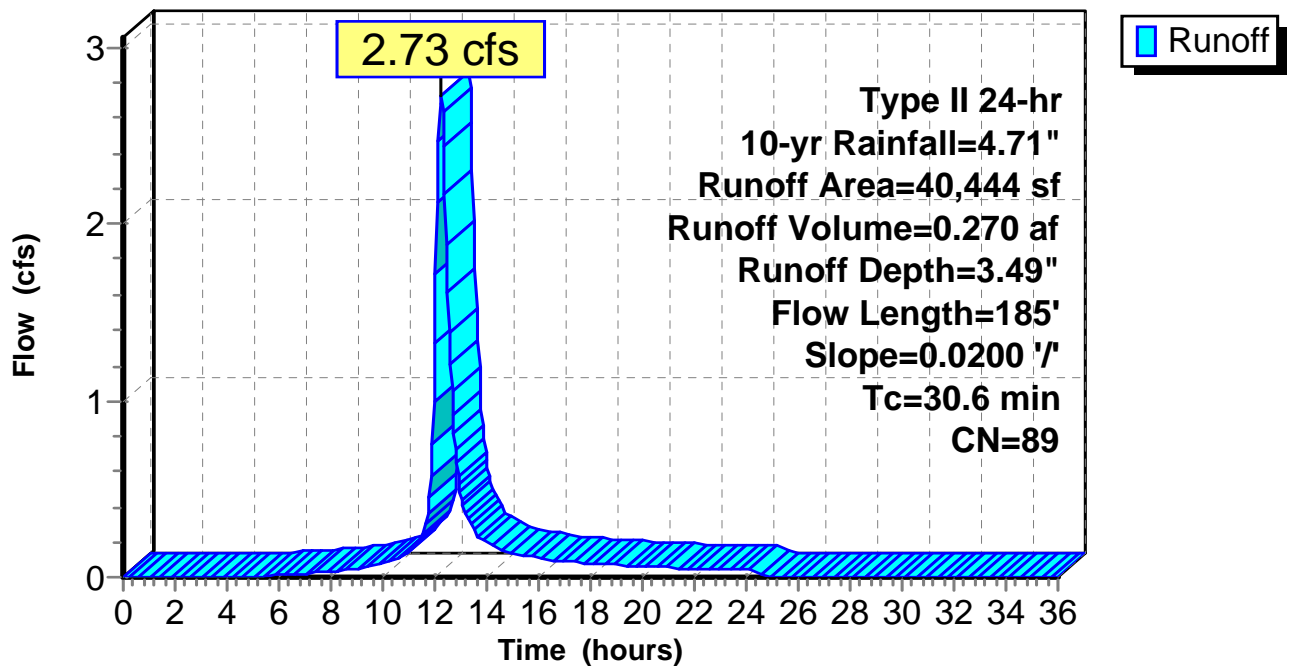Runoff   =   5.23 cfs @   11.98 hrs, Volume=   0.275 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	21,718	98	
	18,173	80	>75% Grass cover, Good, HSG D
	39,891	90	Weighted Average
	18,173		45.56% Pervious Area
	21,718		54.44% Impervious Area

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

Subcatchment 6S: Subcatchment 6

Hydrograph

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Type II 24-hr 10-yr Rainfall=4.71"
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Summary for Subcatchment 7S: Subcatchment 7

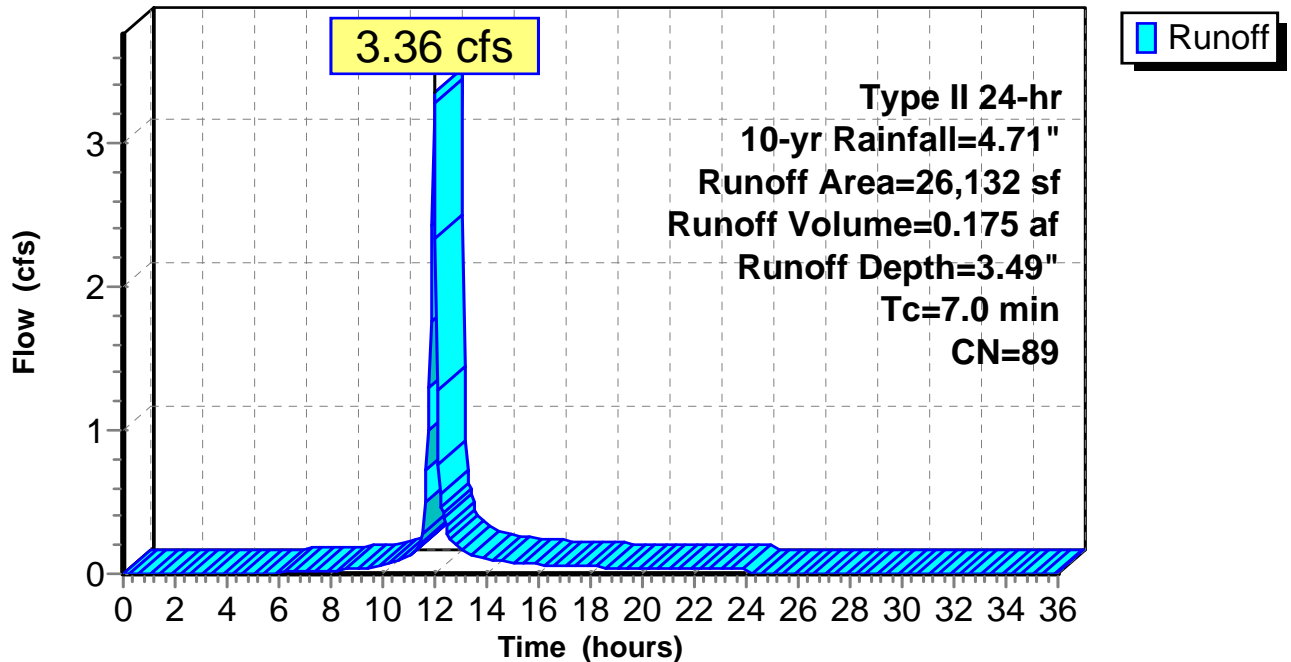Runoff = 5.87 cfs @ 11.98 hrs, Volume= 0.303 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	19,759	98	
	26,893	80	>75% Grass cover, Good, HSG D
	46,652	88	Weighted Average
	26,893		57.65% Pervious Area
	19,759		42.35% Impervious Area

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

Subcatchment 7S: Subcatchment 7

Hydrograph

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Type II 24-hr 10-yr Rainfall=4.71"
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Summary for Subcatchment 8S: Subcatchment 8

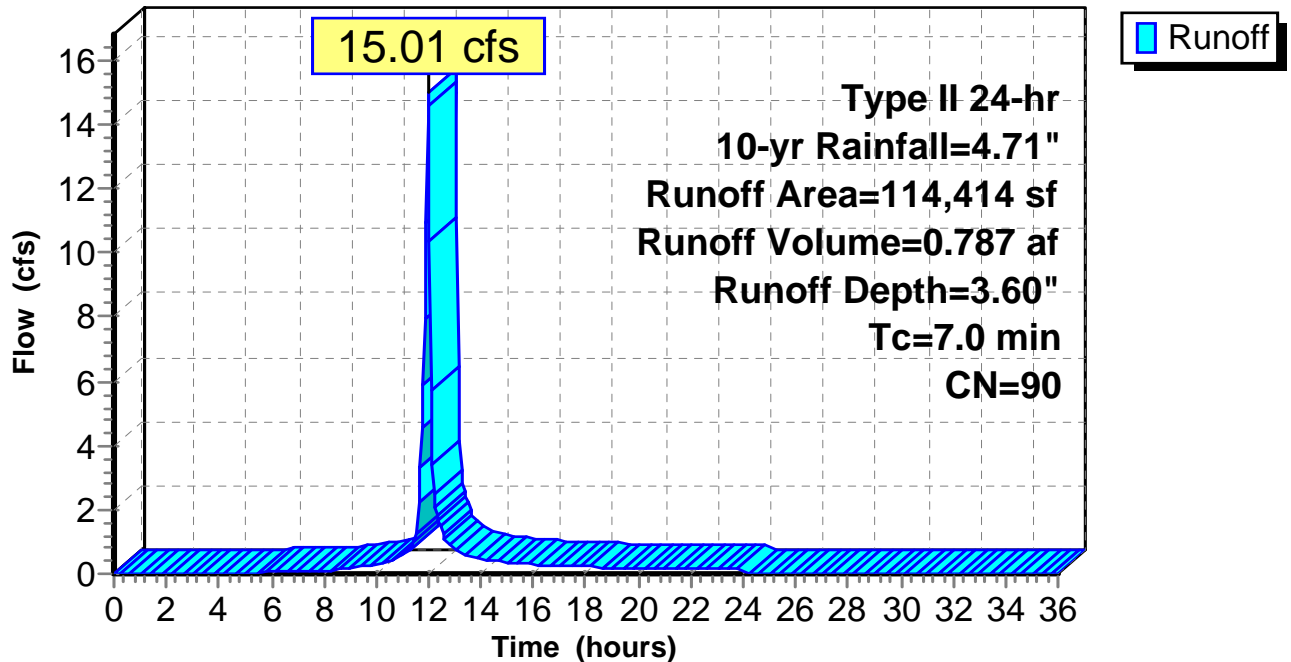Runoff   =   1.68 cfs @   11.98 hrs, Volume=   0.085 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
	10,604	80	>75% Grass cover, Good, HSG D
*	3,751	98	
	14,355	85	Weighted Average
	10,604		73.87% Pervious Area
	3,751		26.13% Impervious Area

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

Subcatchment 8S: Subcatchment 8

Hydrograph

Summary for Reach 1SP: Study Point 1

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

Inflow	=	4.87 cfs @ 13.05 hrs,	Volume=	1.704 af
Outflow	=	4.87 cfs @ 13.05 hrs,	Volume=	1.704 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 1SP: Study Point 1

Hydrograph
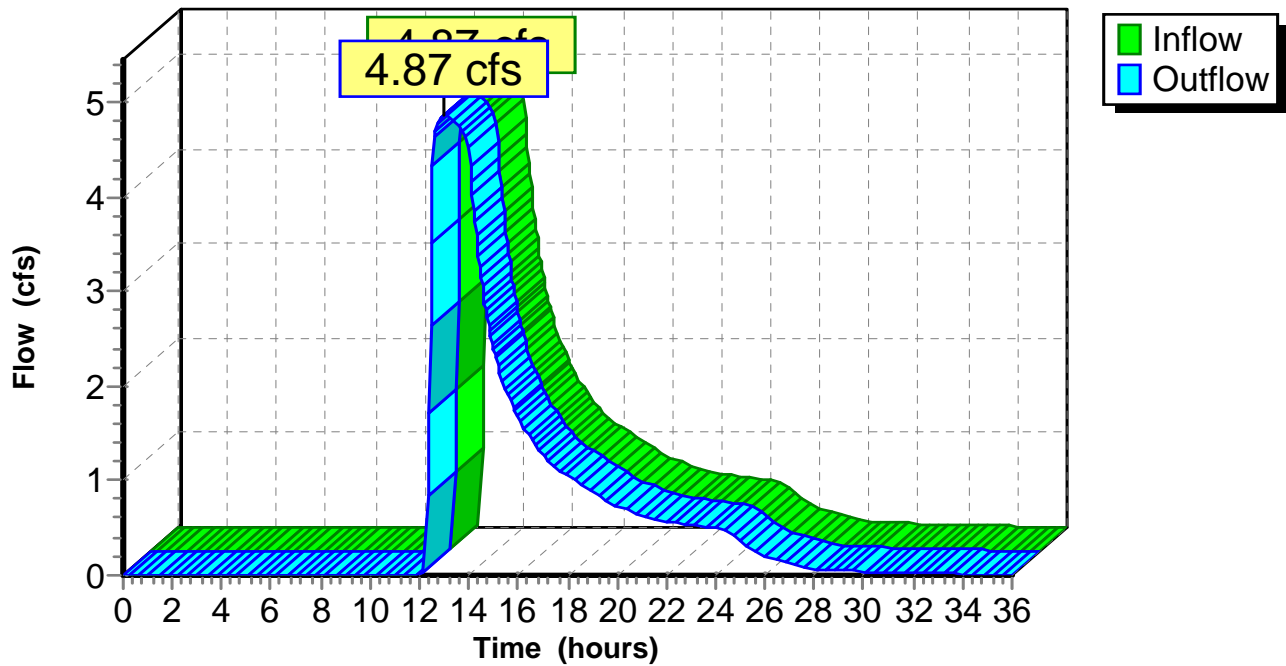
Summary for Reach 2SP: Study Point 2

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

Inflow Area =   9.308 ac, 47.83% Impervious, Inflow Depth = 0.08"   for 10-yr event
Inflow   =   1.03 cfs @   13.05 hrs, Volume=   0.064 af
Outflow   =   1.03 cfs @   13.05 hrs, Volume=   0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 2SP: Study Point 2

Hydrograph

Summary for Reach 3SP: Study Point 3

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

Inflow Area =   0.330 ac, 26.13% Impervious, Inflow Depth = 3.10"   for 10-yr event
Inflow   =   1.68 cfs @   11.98 hrs, Volume=   0.085 af
Outflow   =   1.68 cfs @   11.98 hrs, Volume=   0.085 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 3SP: Study Point 3

Hydrograph

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Type II 24-hr 10-yr Rainfall=4.71"

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Summary for Reach 4SP: Study Point 4

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

Inflow Area =   0.928 ac, 47.45% Impervious, Inflow Depth = 3.49"   for 10-yr event
Inflow   =   2.73 cfs @   12.24 hrs, Volume=   0.270 af
Outflow   =   2.73 cfs @   12.24 hrs, Volume=   0.270 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 4SP: Study Point 4

Hydrograph

Summary for Pond 1P: Wetland A

[79] Warning: Submerged Pond 8P Secondary device # 2 INLET by 0.32'
[81] Warning: Exceeded Pond 9P by 0.04' @ 13.25 hrs

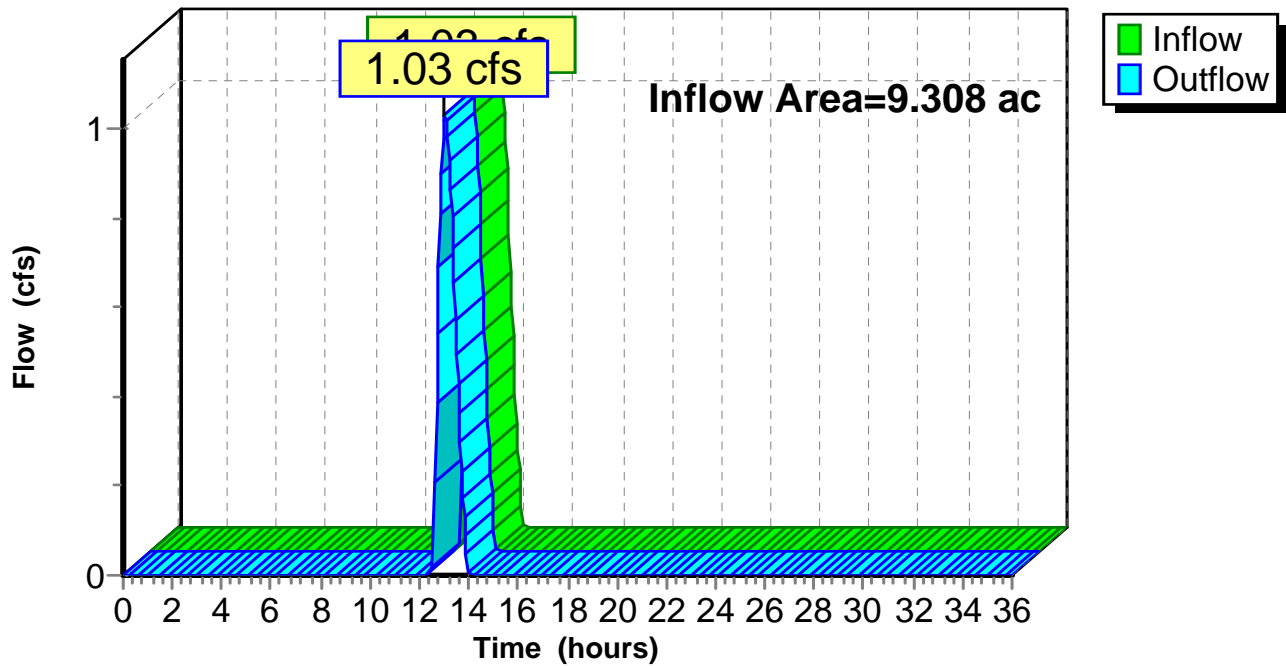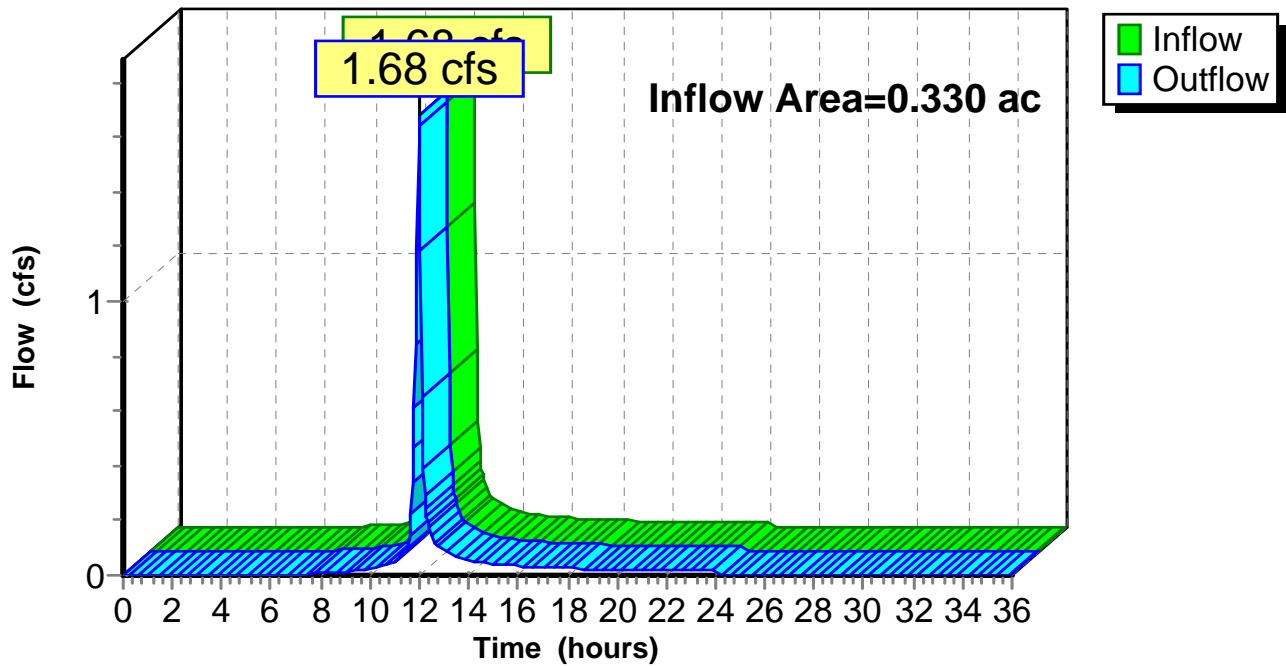Inflow Area =   9.308 ac, 47.83% Impervious, Inflow Depth = 3.13"   for 10-yr event
Inflow   =   18.10 cfs @   12.33 hrs, Volume=   2.425 af
Outflow   =   5.90 cfs @   13.05 hrs, Volume=   1.768 af, Atten= 67%, Lag= 42.9 min
Primary   =   1.03 cfs @   13.05 hrs, Volume=   0.064 af
Secondary =   4.87 cfs @   13.05 hrs, Volume=   1.704 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Starting Elev= 63.50'   Surf.Area= 14,739 sf   Storage= 17,429 cf
Peak Elev= 66.02' @ 13.05 hrs   Surf.Area= 25,898 sf   Storage= 68,176 cf   (50,748 cf above start)

Plug-Flow detention time= 302.4 min calculated for 1.368 af (56% of inflow)
Center-of-Mass det. time= 127.8 min (973.2 - 845.4)

Volume	Invert	Avail.Storage	Storage Description
#1	62.00'	209,276 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.00	8,500	0	0
65.00	20,977	44,216	44,216
70.00	45,047	165,060	209,276

Device	Routing	Invert	Outlet Devices
#1	Primary	65.75'	**3.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Secondary	62.86'	**12.0" Round Culvert** L= 48.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 62.86' / 58.69' S= 0.0869 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	65.08'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=1.02 cfs @ 13.05 hrs HW=66.02'   (Free Discharge)
⌐—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.02 cfs @ 1.25 fps)

Secondary OutFlow Max=4.87 cfs @ 13.05 hrs HW=66.02'   (Free Discharge)
⌐—**2=Culvert** (Inlet Controls 4.87 cfs @ 6.20 fps)
  ⌐—**3=Sharp-Crested Rectangular Weir** (Passes 4.87 cfs of 7.71 cfs potential flow)

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Pond 1P: Wetland A

Hydrograph

18.10 cfs

Inflow Area=9.308 ac
Peak Elev=66.02'
Storage=68,176 cf

5.90 cfs

4.87 cfs

1.__ cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Time (hours): 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36

Summary for Pond 2P: Wetland B

Inflow Area =   2.082 ac, 66.45% Impervious, Inflow Depth = 3.81"   for 10-yr event
Inflow   =   6.18 cfs @   12.27 hrs, Volume=   0.660 af
Outflow   =   5.34 cfs @   12.41 hrs, Volume=   0.465 af, Atten= 14%, Lag= 8.5 min
Primary   =   5.34 cfs @   12.41 hrs, Volume=   0.465 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.25' @ 12.41 hrs   Surf.Area= 9,670 sf   Storage= 10,461 cf

Plug-Flow detention time= 168.7 min calculated for 0.465 af (70% of inflow)
Center-of-Mass det. time= 73.4 min (880.4 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	21,636 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.00	2,200	0	0
68.00	4,250	3,225	3,225
69.00	6,286	5,268	8,493
70.00	20,000	13,143	21,636

Device	Routing	Invert	Outlet Devices
#1	Primary	69.00'	**18.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=5.29 cfs @ 12.41 hrs HW=69.25'   (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 5.29 cfs @ 1.20 fps)

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Pond 2P: Wetland B

Hydrograph

6.18 cfs

5.34 cfs

Inflow Area=2.082 ac
Peak Elev=69.25'
Storage=10,461 cf

Legend:
- ■ Inflow
- ■ Primary

Summary for Pond 3P: Surface Detention

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 1.56'
[81] Warning: Exceeded Pond 7P by 0.20' @ 12.20 hrs

Inflow Area =		4.142 ac, 55.71% Impervious, Inflow Depth = 3.41" for 10-yr event		
Inflow	=	22.59 cfs @ 11.99 hrs, Volume=	1.178 af	
Outflow	=	9.05 cfs @ 12.14 hrs, Volume=	1.176 af, Atten= 60%, Lag= 8.7 min	
Primary	=	7.86 cfs @ 12.14 hrs, Volume=	1.169 af	
Secondary =		1.19 cfs @ 12.14 hrs, Volume=	0.008 af	

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.56' @ 12.14 hrs   Surf.Area= 7,163 sf   Storage= 14,137 cf

Plug-Flow detention time= 20.1 min calculated for 1.175 af (100% of inflow)
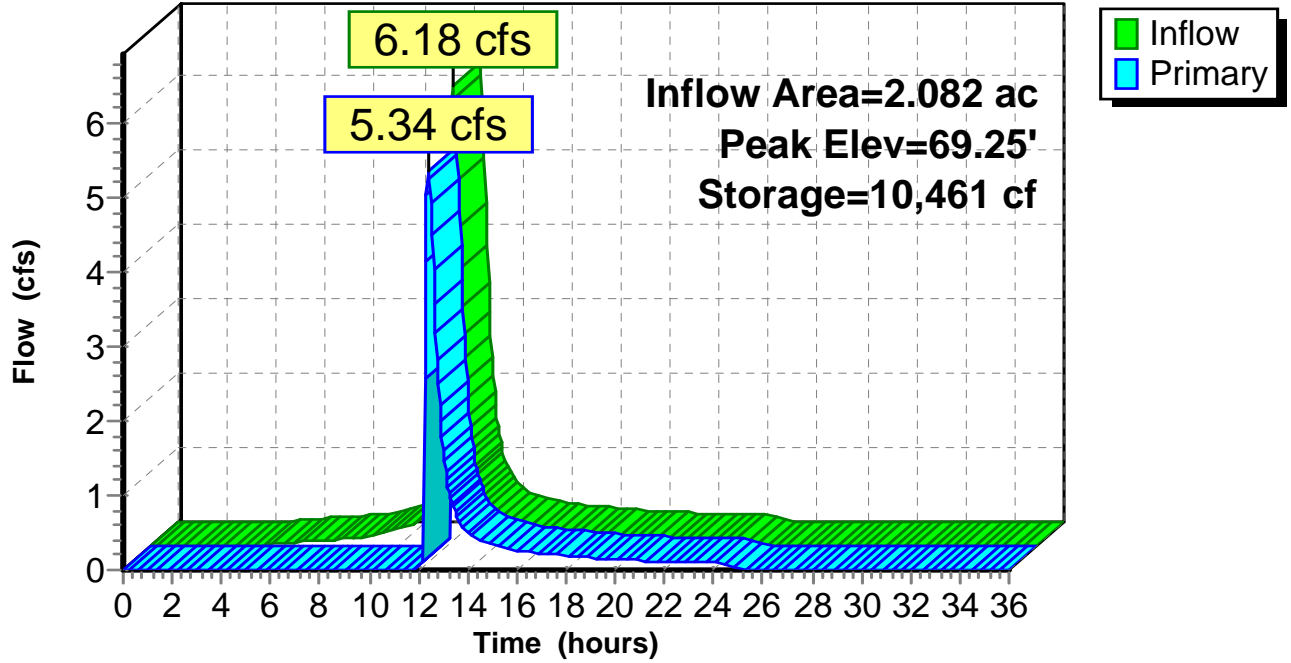Center-of-Mass det. time= 19.7 min (827.6 - 808.0)

Volume	Invert	Avail.Storage	Storage Description	
#1	69.00'	21,926 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)	

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.00	400	0	0
70.00	2,991	1,696	1,696
72.00	5,812	8,803	10,499
73.50	9,425	11,428	21,926

Device	Routing	Invert	Outlet Devices
#1	Primary	69.10'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 69.10' / 68.75' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	72.50'	**35.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.84 cfs @ 12.14 hrs HW=72.55'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 7.84 cfs @ 6.39 fps)

Secondary OutFlow Max=1.02 cfs @ 12.14 hrs HW=72.55'   (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.02 cfs @ 0.54 fps)

Pond 3P: Surface Detention
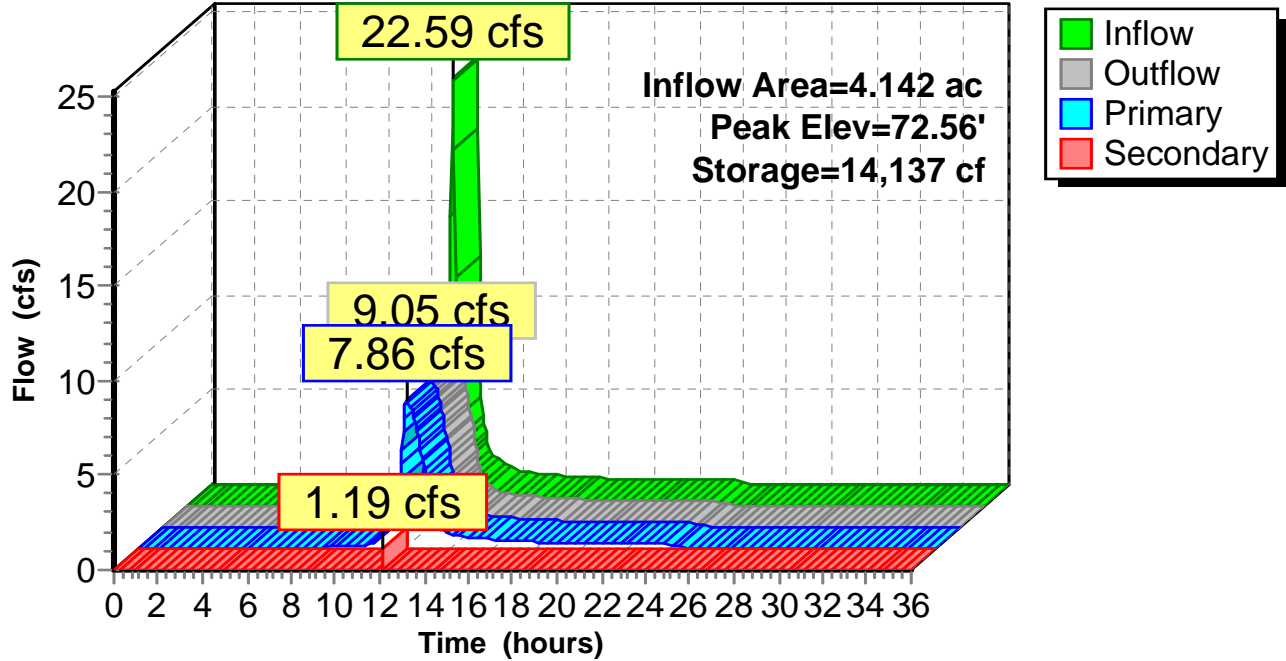
Hydrograph

Inflow Area=4.142 ac
Peak Elev=72.56'
Storage=14,137 cf

22.59 cfs
9.05 cfs
7.86 cfs
1.19 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs)

Time (hours)

Summary for Pond 4P: Surface Detention

Inflow Area =   1.071 ac, 42.35% Impervious, Inflow Depth = 3.39"   for 10-yr event
Inflow   =   5.87 cfs @ 11.98 hrs, Volume=   0.303 af
Outflow   =   2.86 cfs @ 12.09 hrs, Volume=   0.295 af, Atten= 51%, Lag= 6.6 min
Primary   =   0.41 cfs @ 12.09 hrs, Volume=   0.212 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Tertiary   =   2.45 cfs @ 12.09 hrs, Volume=   0.083 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 70.46' @ 12.09 hrs   Surf.Area= 2,957 sf   Storage= 4,860 cf

Plug-Flow detention time= 90.8 min calculated for 0.295 af (97% of inflow)
Center-of-Mass det. time= 73.8 min (871.7 - 797.9)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	10,990 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	13	0	0
67.00	71	126	126
68.00	928	500	626
69.00	1,378	1,153	1,779
70.00	2,348	1,863	3,642
72.00	5,000	7,348	10,990

Device	Routing	Invert	Outlet Devices
#1	Primary	67.66'	**3.5" Round Culvert** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.66' / 67.65' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 0.07 sf
#2	Tertiary	69.66'	**1.2' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Secondary	70.50'	**45.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.41 cfs @ 12.09 hrs HW=70.45'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.41 cfs @ 6.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00'   (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=2.41 cfs @ 12.09 hrs HW=70.45'   (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 2.41 cfs @ 2.53 fps)

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Pond 4P: Surface Detention

Hydrograph

Inflow Area=1.071 ac
Peak Elev=70.46'
Storage=4,860 cf

5.87 cfs

2.86 cfs

2.45 cfs

0.01 cfs

0.00 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary
- Tertiary

Flow (cfs)

Time (hours)

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Summary for Pond 5P: OCS-4P

[57] Hint: Peaked at 68.90' (Flood elevation advised)
[79] Warning: Submerged Pond 4P Primary device # 1 INLET by 1.23'

Inflow Area =   1.071 ac, 42.35% Impervious, Inflow Depth = 3.30"   for 10-yr event
Inflow   =   2.86 cfs @ 12.09 hrs, Volume=   0.295 af
Outflow   =   2.86 cfs @ 12.09 hrs, Volume=   0.295 af, Atten= 0%, Lag= 0.0 min
Primary   =   2.86 cfs @ 12.09 hrs, Volume=   0.295 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 68.90' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	67.48'	**12.0" Round Culvert**
			L= 81.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.48' / 66.86' S= 0.0077 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.83 cfs @ 12.09 hrs HW=68.88'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 2.83 cfs @ 3.60 fps)

Pond 5P: OCS-4P

Hydrograph
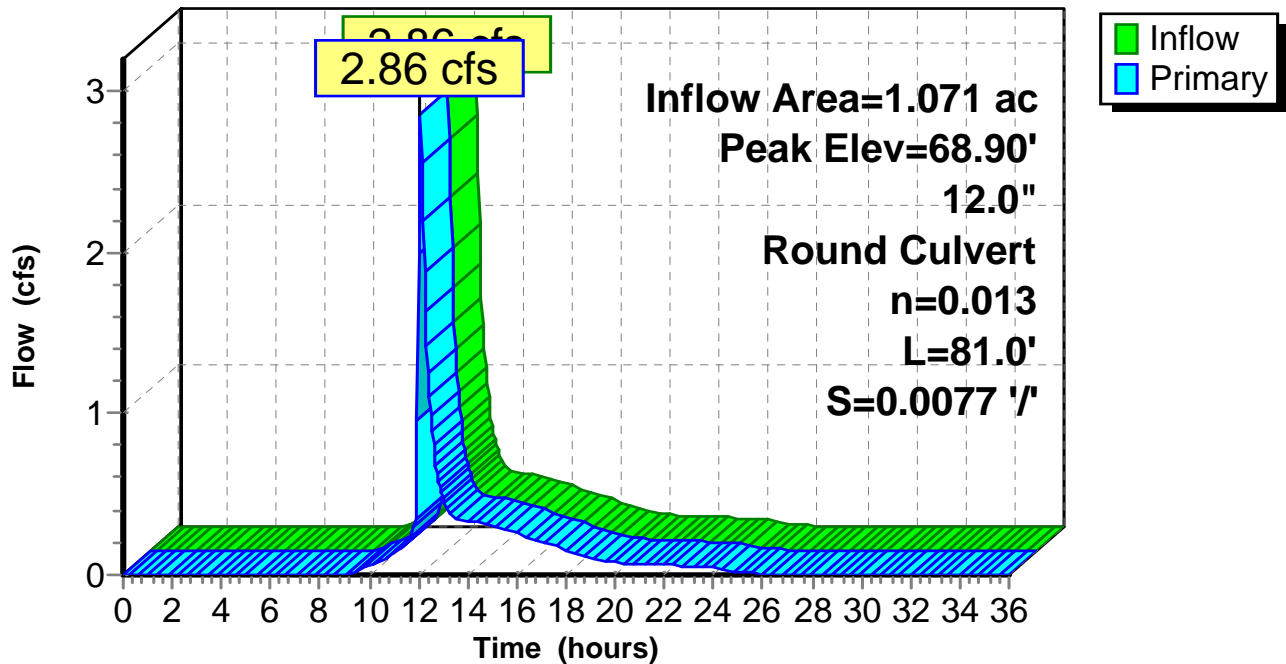
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Summary for Pond 6P: Atrium Surface Detention

Inflow Area =   2.627 ac, 56.89% Impervious, Inflow Depth = 3.60"   for 10-yr event
Inflow   =   15.01 cfs @   11.98 hrs, Volume=   0.787 af
Outflow   =   14.54 cfs @   12.00 hrs, Volume=   0.730 af, Atten= 3%, Lag= 1.1 min
Primary   =   14.54 cfs @   12.00 hrs, Volume=   0.730 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 74.02' @ 12.00 hrs   Surf.Area= 3,665 sf   Storage= 4,114 cf

Plug-Flow detention time= 64.5 min calculated for 0.729 af (93% of inflow)
Center-of-Mass det. time= 25.3 min (815.8 - 790.5)

Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	5,026 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	55	0	0
72.00	327	382	382
73.00	1,694	1,011	1,393
74.25	4,120	3,634	5,026

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**0.1" Round Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 69.20' S= 0.0082 '/' Cc= 0.900 n= 0.013, Flow Area= 0.00 sf
#2	Primary	73.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=14.44 cfs @ 12.00 hrs HW=74.01'   (Free Discharge)
⌐**1=Culvert** (Barrel Controls 0.00 cfs @ 0.28 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 14.44 cfs @ 1.87 fps)

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Pond 6P: Atrium Surface Detention

Hydrograph

15.01 cfs

14.54 cfs

**Inflow Area=2.627 ac
Peak Elev=74.02'
Storage=4,114 cf**

Legend:
- Inflow
- Primary

Summary for Pond 7P: Riprap Surface Detention

Inflow Area =   0.600 ac, 52.50% Impervious, Inflow Depth = 3.49"   for 10-yr event
Inflow   =   3.36 cfs @   11.98 hrs, Volume=   0.175 af
Outflow   =   2.95 cfs @   12.02 hrs, Volume=   0.173 af, Atten= 12%, Lag= 2.3 min
Primary   =   2.95 cfs @   12.02 hrs, Volume=   0.173 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 73.30' @ 12.02 hrs   Surf.Area= 472 sf   Storage= 479 cf

Plug-Flow detention time= 15.5 min calculated for 0.172 af (99% of inflow)
Center-of-Mass det. time= 8.5 min (802.8 - 794.3)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	2,180 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	50	0	0
73.00	310	360	360
74.00	846	578	938
75.00	1,637	1,242	2,180

Device	Routing	Invert	Outlet Devices
#1	Primary	71.83'	**12.0" Round Culvert** L= 375.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.83' / 69.20' S= 0.0070 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.90 cfs @ 12.02 hrs HW=73.28'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 2.90 cfs @ 3.70 fps)

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Pond 7P: Riprap Surface Detention

Hydrograph

3.36 cfs

2.95 cfs

Inflow Area=0.600 ac
Peak Elev=73.30'
Storage=479 cf
12.0"
Round Culvert
n=0.013
L=375.0'
S=0.0070 '/'

- Inflow
- Primary

Flow (cfs)

Time (hours)

Summary for Pond 8P: OCS-DMH7

[57] Hint: Peaked at 67.19' (Flood elevation advised)

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth = 3.39"   for 10-yr event
Inflow   =   7.86 cfs @   12.14 hrs, Volume=   1.169 af
Outflow   =   7.86 cfs @   12.14 hrs, Volume=   1.169 af, Atten= 0%, Lag= 0.0 min
Primary   =   0.69 cfs @   12.14 hrs, Volume=   0.037 af
Secondary =   7.16 cfs @   12.14 hrs, Volume=   1.132 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.19' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 66.60' / 66.60' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	65.70'	**24.0" Round Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 65.70' / 65.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=0.69 cfs @ 12.14 hrs HW=67.19'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.69 cfs @ 2.06 fps)

Secondary OutFlow Max=7.15 cfs @ 12.14 hrs HW=67.19'   (Free Discharge)
└─**2=Culvert** (Barrel Controls 7.15 cfs @ 3.96 fps)

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Pond 8P: OCS-DMH7

Hydrograph

Inflow Area=4.142 ac
Peak Elev=67.19'

7.86 cfs

7.16 cfs

0.09 cfs

Legend: Inflow, Outflow, Primary, Secondary

Flow (cfs) vs Time (hours)

Summary for Pond 9P: UG Detention

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth = 0.06"   for 10-yr event
Inflow   =   0.26 cfs @ 12.14 hrs, Volume=   0.019 af
Outflow   =   0.14 cfs @ 12.84 hrs, Volume=   0.019 af, Atten= 46%, Lag= 41.8 min
Primary =   0.14 cfs @ 12.84 hrs, Volume=   0.019 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
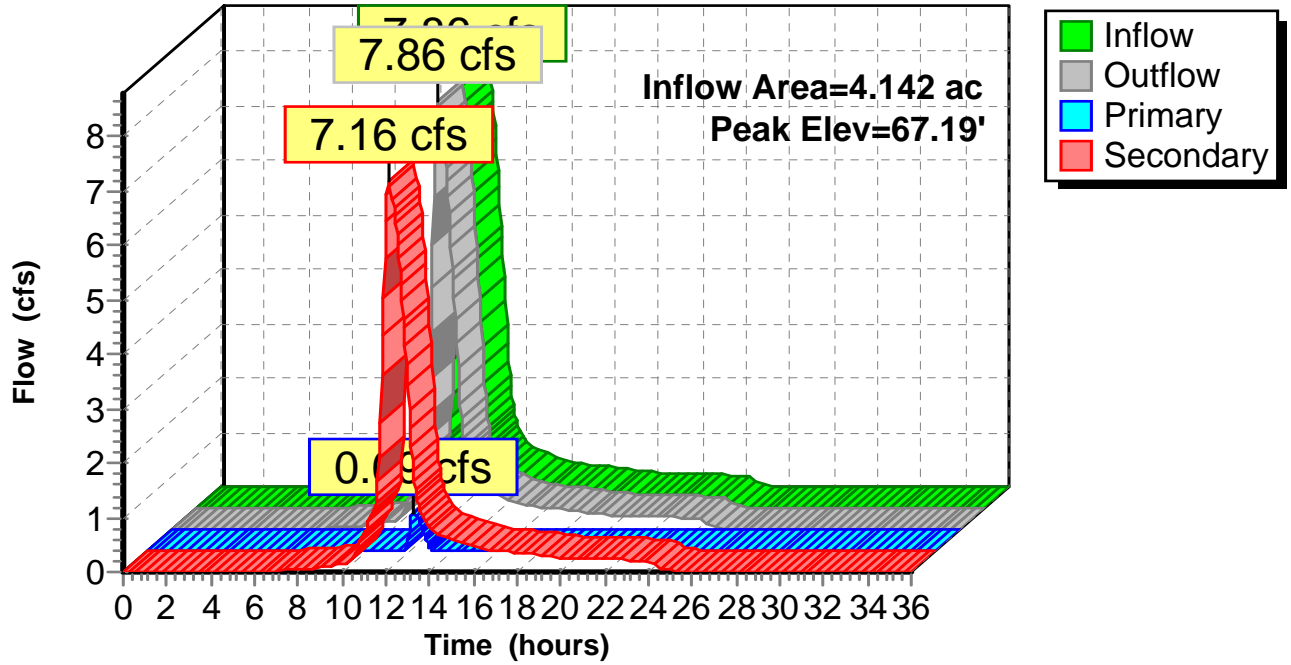Peak Elev= 66.04' @ 12.84 hrs   Surf.Area= 1,536 sf   Storage= 502 cf

Plug-Flow detention time= 95.4 min calculated for 0.019 af (99% of inflow)
Center-of-Mass det. time= 94.6 min (838.2 - 743.6)

Volume	Invert	Avail.Storage	Storage Description
#1	65.70'	2,488 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
			2,619 cf Overall x 95.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.70	1,536	0	0
67.40	1,536	2,611	2,611
67.41	5	8	2,619

Device	Routing	Invert	Outlet Devices
#1	Primary	65.70'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 65.70' / 65.60' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Primary	67.00'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.90' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.14 cfs @ 12.84 hrs HW=66.04'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.14 cfs @ 1.60 fps)
 └─**2=Culvert** (Controls 0.00 cfs)
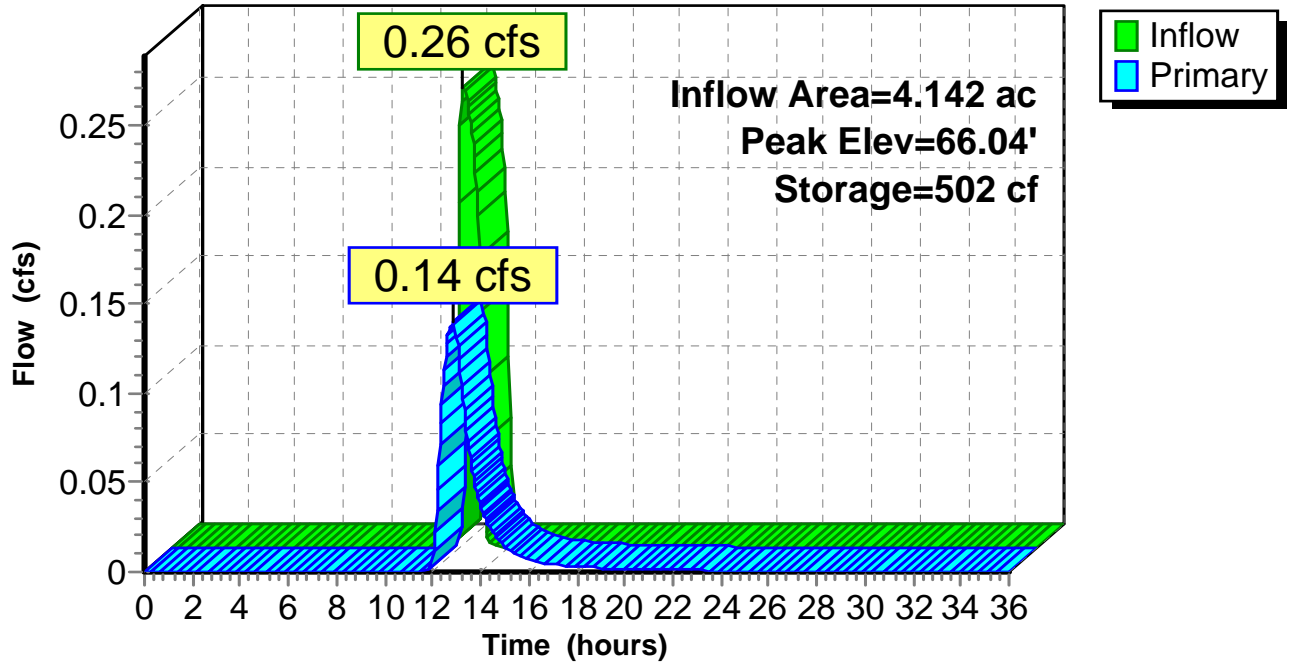
Pond 9P: UG Detention

Hydrograph

Inflow Area=4.142 ac
Peak Elev=66.04'
Storage=502 cf

0.26 cfs

0.14 cfs

Legend: Inflow, Primary

Summary for Pond 10P: Isolator Row x5

[81] Warning: Exceeded Pond 8P by 0.90' @ 35.95 hrs

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth = 0.11"   for 10-yr event
Inflow   =   0.69 cfs @ 12.14 hrs, Volume=   0.037 af
Outflow   =   0.69 cfs @ 12.14 hrs, Volume=   0.037 af, Atten= 0%, Lag= 0.2 min
Primary   =   0.26 cfs @ 12.14 hrs, Volume=   0.019 af
Secondary =   0.44 cfs @ 12.14 hrs, Volume=   0.018 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.37' @ 12.14 hrs Surf.Area= 0.001 ac Storage= 0.001 af

Plug-Flow detention time= 1.9 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (740.2 - 738.1)

Volume	Invert	Avail.Storage	Storage Description
#1	66.60'	0.002 af	**ADS_StormTech RC-310** x 5
			Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
			Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
			Row Length Adjustment= +0.44' x 2.07 sf x 1 rows

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**4.0" Round Culvert**
			L= 5.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 66.60' / 66.55' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Secondary	67.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.55' S= 0.0090 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.14 hrs HW=67.37'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.26 cfs @ 2.95 fps)

Secondary OutFlow Max=0.43 cfs @ 12.14 hrs HW=67.37'   (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.43 cfs @ 1.64 fps)

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Type II 24-hr 10-yr Rainfall=4.71"
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Pond 10P: Isolator Row x5

Hydrograph

Inflow Area=4.142 ac
Peak Elev=67.37'
Storage=0.001 af

0.69 cfs

0.44 cfs

0.2_ cfs

Flow (cfs)

Time (hours)

- Inflow
- Outflow
- Primary
- Secondary

Pre-Development Cedars Model 17-10-11
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Type II 24-hr 25-yr Rainfall=5.92"
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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1   Runoff Area=87,665 sf 15.27% Impervious Runoff Depth=4.02"
Flow Length=177' Slope=0.0100 '/' Tc=29.9 min CN=83 Runoff=6.98 cfs 0.674 af

Subcatchment 2S: Subcatchment 2   Runoff Area=90,682 sf 66.45% Impervious Runoff Depth=4.99"
Flow Length=178' Slope=0.0075 '/' Tc=33.7 min CN=92 Runoff=8.00 cfs 0.866 af

Subcatchment 3S: Subcatchment 3   Runoff Area=40,444 sf 47.45% Impervious Runoff Depth=4.66"
Flow Length=185' Slope=0.0200 '/' Tc=30.6 min CN=89 Runoff=3.60 cfs 0.360 af

Subcatchment 4S: Subcatchment 4   Runoff Area=26,132 sf 52.50% Impervious Runoff Depth=4.66"
Tc=7.0 min CN=89 Runoff=4.40 cfs 0.233 af

Subcatchment 5S: Subcatchment 5   Runoff Area=114,414 sf 56.89% Impervious Runoff Depth=4.77"
Tc=7.0 min CN=90 Runoff=19.53 cfs 1.044 af

Subcatchment 6S: Subcatchment 6   Runoff Area=39,891 sf 54.44% Impervious Runoff Depth=4.77"
Tc=7.0 min CN=90 Runoff=6.81 cfs 0.364 af

Subcatchment 7S: Subcatchment 7   Runoff Area=46,652 sf 42.35% Impervious Runoff Depth=4.55"
Tc=7.0 min CN=88 Runoff=7.72 cfs 0.406 af

Subcatchment 8S: Subcatchment 8   Runoff Area=14,355 sf 26.13% Impervious Runoff Depth=4.23"
Tc=7.0 min CN=85 Runoff=2.25 cfs 0.116 af

Reach 1SP: Study Point 1   Inflow=5.27 cfs 2.178 af
Outflow=5.27 cfs 2.178 af

Reach 2SP: Study Point 2   Inflow=5.04 cfs 0.462 af
Outflow=5.04 cfs 0.462 af

Reach 3SP: Study Point 3   Inflow=4.94 cfs 0.141 af
Outflow=4.94 cfs 0.141 af

Reach 4SP: Study Point 4   Inflow=3.60 cfs 0.360 af
Outflow=3.60 cfs 0.360 af

Pond 1P: Wetland A   Peak Elev=66.48' Storage=80,578 cf Inflow=31.15 cfs 3.297 af
Primary=5.04 cfs 0.462 af Secondary=5.27 cfs 2.178 af Outflow=10.32 cfs 2.640 af

Pond 2P: Wetland B   Peak Elev=69.31' Storage=11,061 cf Inflow=8.00 cfs 0.866 af
Outflow=7.52 cfs 0.671 af

Pond 3P: Surface Detention   Peak Elev=72.83' Storage=16,129 cf Inflow=28.88 cfs 1.581 af
Primary=8.22 cfs 1.435 af Secondary=15.32 cfs 0.145 af Outflow=23.53 cfs 1.580 af

Pond 4P: Surface Detention   Peak Elev=70.59' Storage=5,247 cf Inflow=7.72 cfs 0.406 af
Primary=0.42 cfs 0.253 af Secondary=3.17 cfs 0.025 af Tertiary=3.14 cfs 0.119 af Outflow=6.74 cfs 0.398 af

Pond 5P: OCS-4P   Peak Elev=69.40' Inflow=3.56 cfs 0.372 af
                    12.0" Round Culvert n=0.013 L=81.0' S=0.0077 '/' Outflow=3.56 cfs 0.372 af

Pond 6P: Atrium Surface Detention   Peak Elev=74.10' Storage=4,447 cf Inflow=19.53 cfs 1.044 af
                                                        Outflow=18.97 cfs 0.987 af

Pond 7P: Riprap Surface Detention   Peak Elev=73.85' Storage=818 cf Inflow=4.40 cfs 0.233 af
                    12.0" Round Culvert n=0.013 L=375.0' S=0.0070 '/' Outflow=3.26 cfs 0.231 af

Pond 8P: OCS-DMH7   Peak Elev=67.23' Inflow=8.22 cfs 1.435 af
              Primary=0.78 cfs 0.045 af Secondary=7.44 cfs 1.390 af Outflow=8.22 cfs 1.435 af

Pond 9P: UG Detention   Peak Elev=66.08' Storage=549 cf Inflow=0.27 cfs 0.022 af
                                                        Outflow=0.15 cfs 0.022 af

Pond 10P: Isolator Row x5   Peak Elev=67.41' Storage=0.001 af Inflow=0.78 cfs 0.045 af
              Primary=0.27 cfs 0.022 af Secondary=0.51 cfs 0.023 af Outflow=0.78 cfs 0.045 af

Total Runoff Area = 10.566 ac   Runoff Volume = 4.062 af   Average Runoff Depth = 4.61"
52.88% Pervious = 5.587 ac   47.12% Impervious = 4.979 ac

Summary for Subcatchment 1S: Subcatchment 1

Runoff   =   6.98 cfs @   12.24 hrs, Volume=   0.674 af, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

Area (sf)	CN	Description
* 13,390	98	
74,275	80	>75% Grass cover, Good, HSG D
87,665	83	Weighted Average
74,275		84.73% Pervious Area
13,390		15.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.9	177	0.0100	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 1S: Subcatchment 1

Hydrograph

6.98 cfs

Type II 24-hr
25-yr Rainfall=5.92"
Runoff Area=87,665 sf
Runoff Volume=0.674 af
Runoff Depth=4.02"
Flow Length=177'
Slope=0.0100 '/'
Tc=29.9 min
CN=83

Summary for Subcatchment 2S: Subcatchment 2

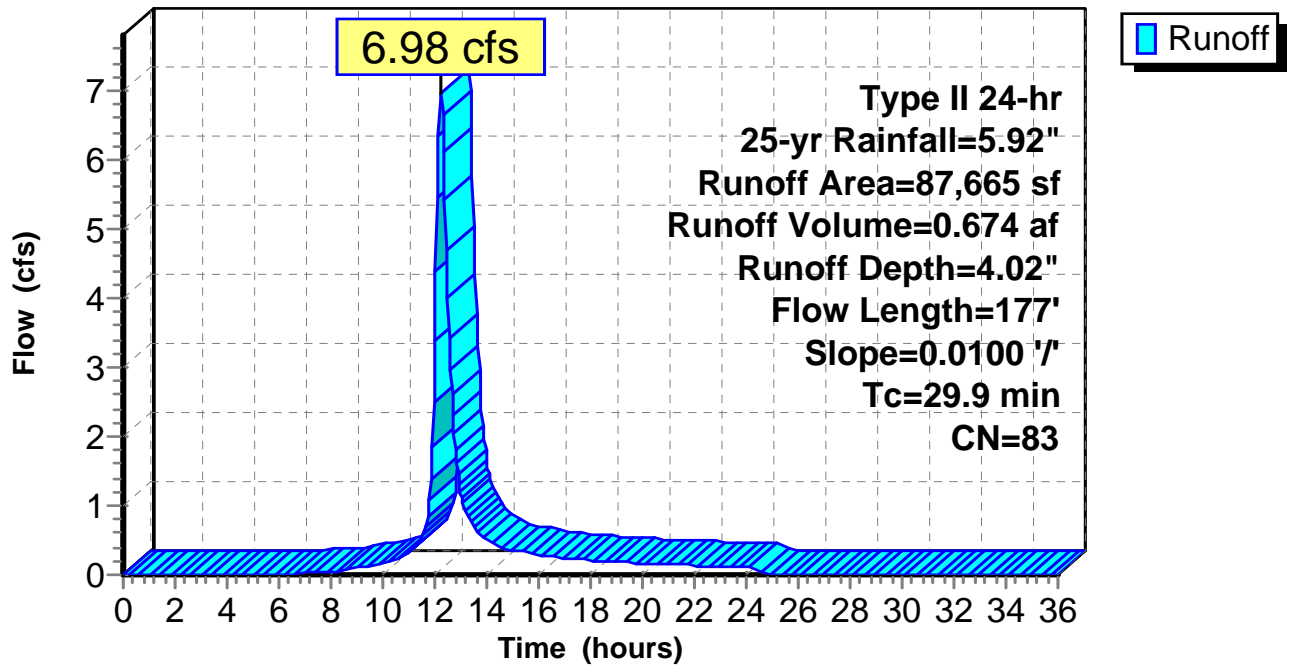Runoff   =   8.00 cfs @ 12.27 hrs, Volume=   0.866 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	60,255	98	
	30,427	80	>75% Grass cover, Good, HSG D
	90,682	92	Weighted Average
	30,427		33.55% Pervious Area
	60,255		66.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	178	0.0075	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 2S: Subcatchment 2

Hydrograph

8.00 cfs

Type II 24-hr
25-yr Rainfall=5.92"
Runoff Area=90,682 sf
Runoff Volume=0.866 af
Runoff Depth=4.99"
Flow Length=178'
Slope=0.0075 '/'
Tc=33.7 min
CN=92

Summary for Subcatchment 3S: Subcatchment 3

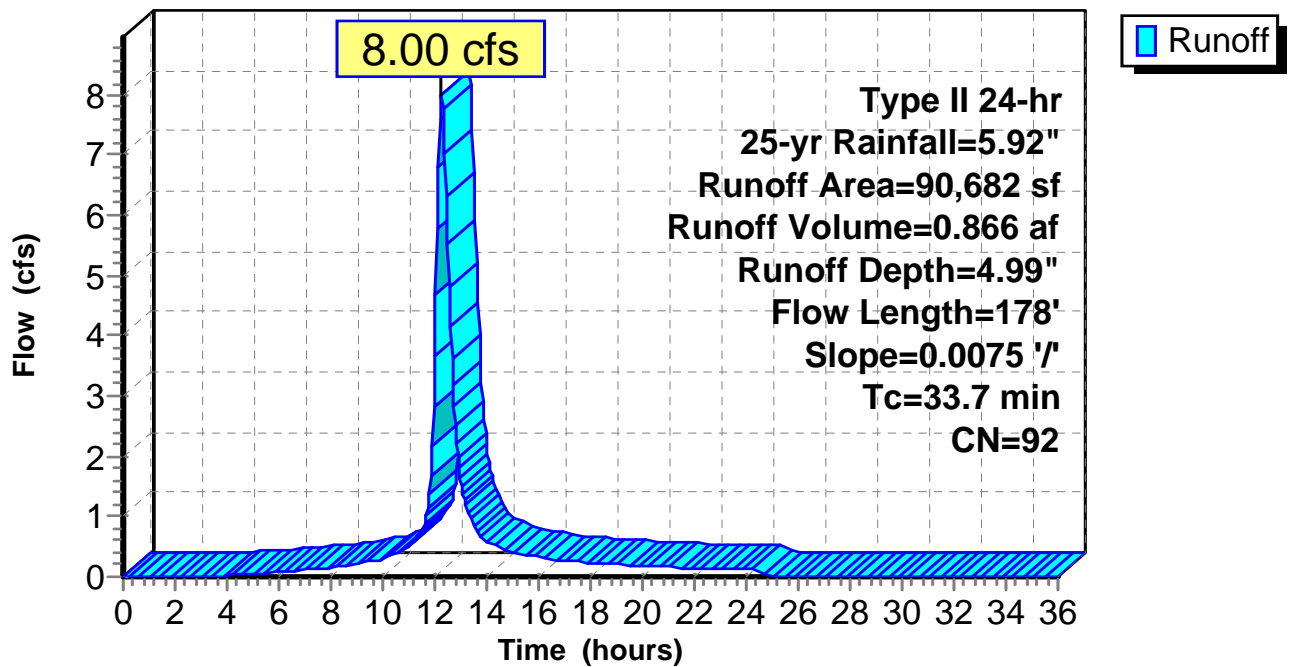Runoff   =   3.60 cfs @ 12.24 hrs, Volume=   0.360 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
	21,255	80	>75% Grass cover, Good, HSG D
*	19,189	98	
	40,444	89	Weighted Average
	21,255		52.55% Pervious Area
	19,189		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	150	0.0200	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.17"
0.8	35	0.0200	0.71		**Shallow Concentrated Flow,**
					Woodland Kv= 5.0 fps
30.6	185	Total			

Subcatchment 3S: Subcatchment 3

Hydrograph

Summary for Subcatchment 4S: Subcatchment 4

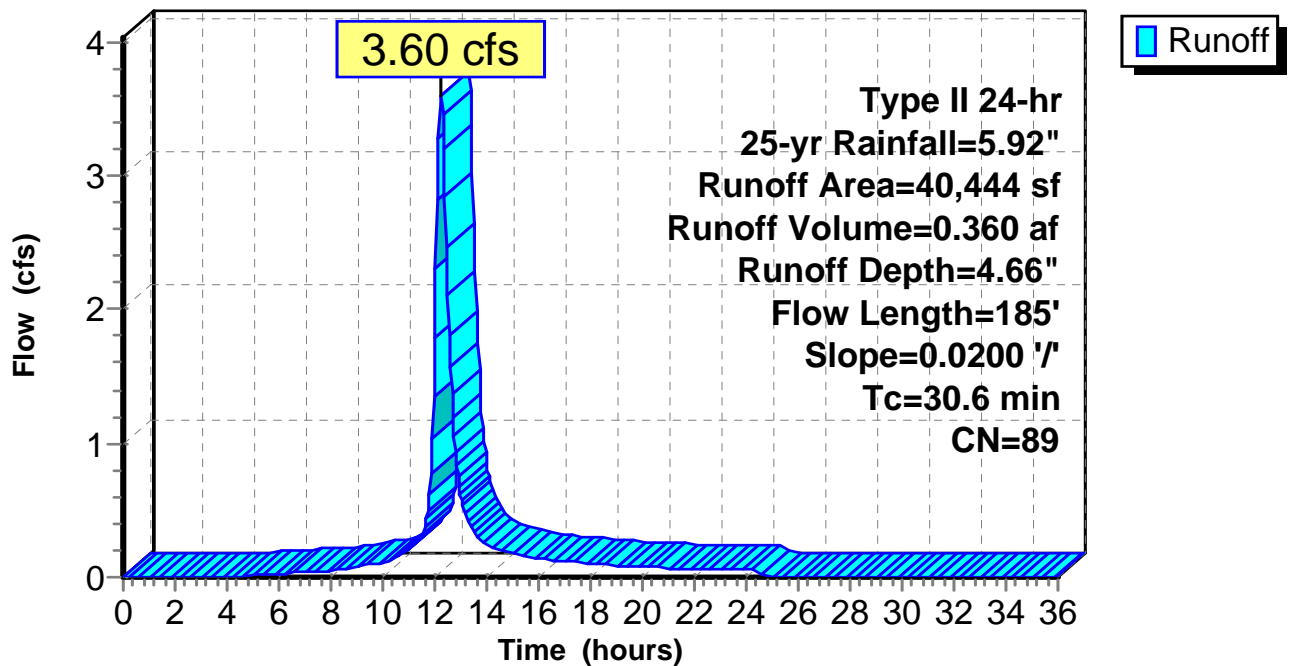Runoff   =   4.40 cfs @   11.98 hrs, Volume=   0.233 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	13,720	98	
	12,412	80	>75% Grass cover, Good, HSG D
	26,132	89	Weighted Average
	12,412		47.50% Pervious Area
	13,720		52.50% Impervious Area

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

Subcatchment 4S: Subcatchment 4

Hydrograph

Summary for Subcatchment 5S: Subcatchment 5

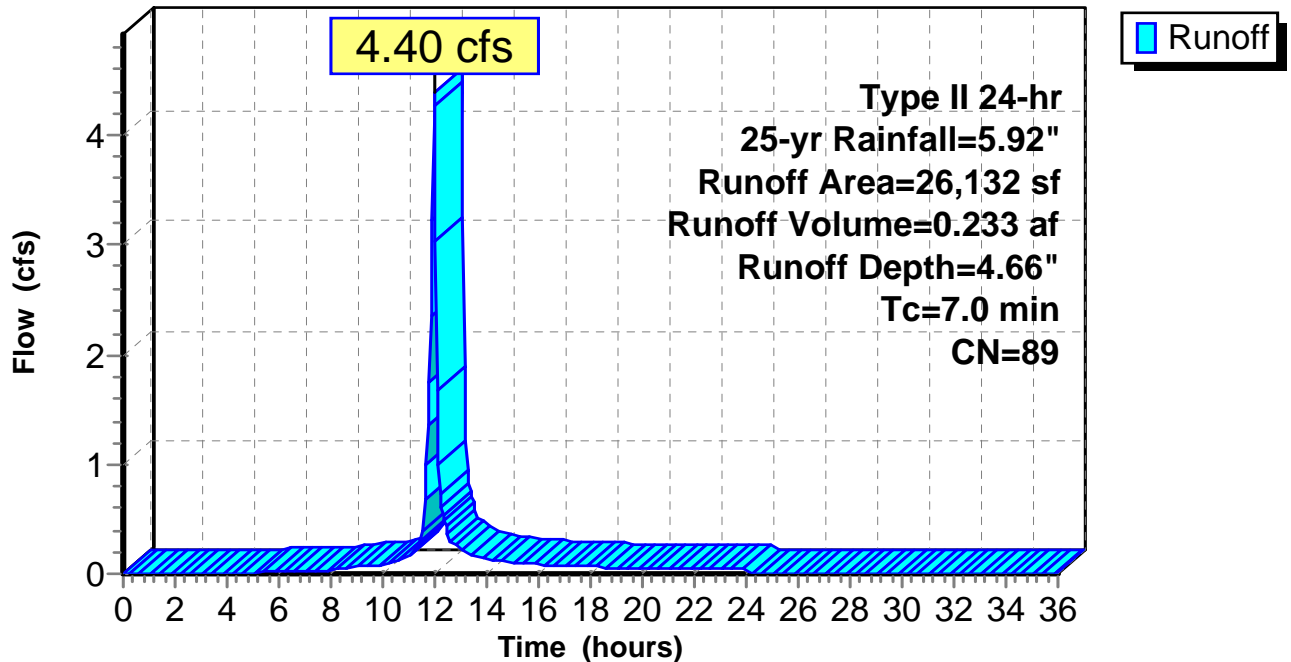Runoff   =   19.53 cfs @   11.98 hrs, Volume=   1.044 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	65,087	98	
	49,327	80	>75% Grass cover, Good, HSG D
	114,414	90	Weighted Average
	49,327		43.11% Pervious Area
	65,087		56.89% Impervious Area

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

Subcatchment 5S: Subcatchment 5

Hydrograph

**Type II 24-hr
25-yr Rainfall=5.92"
Runoff Area=114,414 sf
Runoff Volume=1.044 af
Runoff Depth=4.77"
Tc=7.0 min
CN=90**

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Type II 24-hr 25-yr Rainfall=5.92"
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Summary for Subcatchment 6S: Subcatchment 6

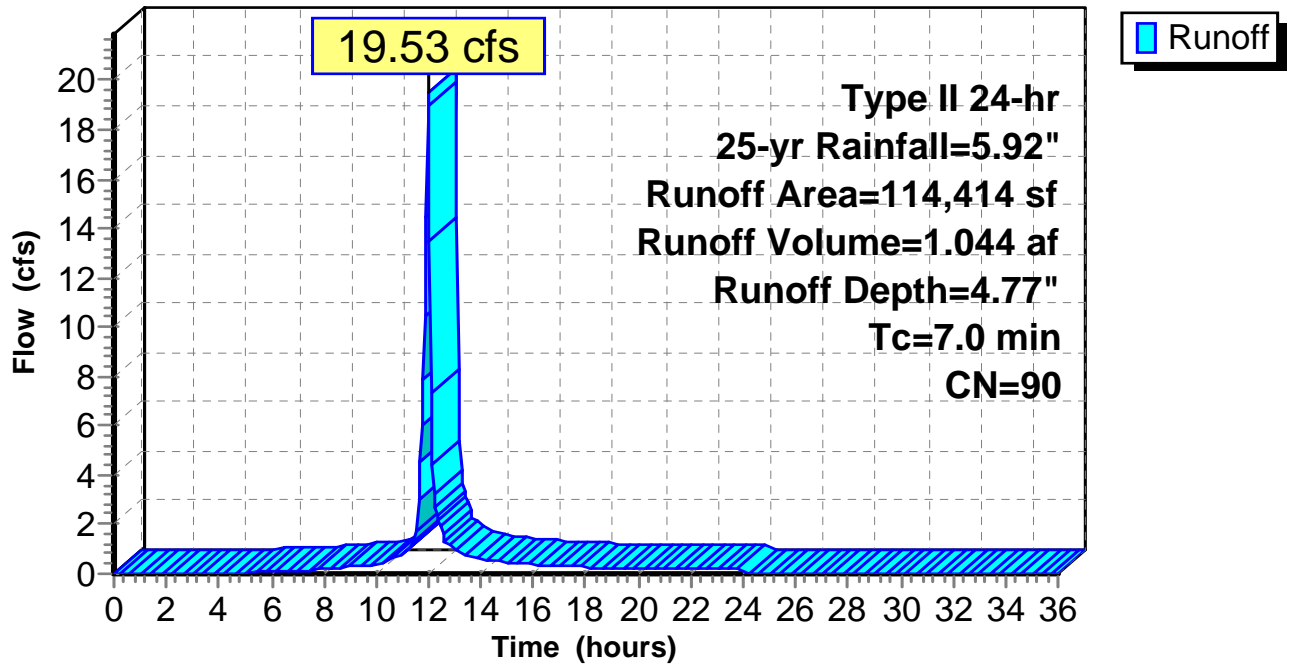Runoff   =   6.81 cfs @ 11.98 hrs, Volume=   0.364 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	21,718	98	
	18,173	80	>75% Grass cover, Good, HSG D
	39,891	90	Weighted Average
	18,173		45.56% Pervious Area
	21,718		54.44% Impervious Area

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

Subcatchment 6S: Subcatchment 6

Hydrograph

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Type II 24-hr 25-yr Rainfall=5.92"
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Summary for Subcatchment 7S: Subcatchment 7

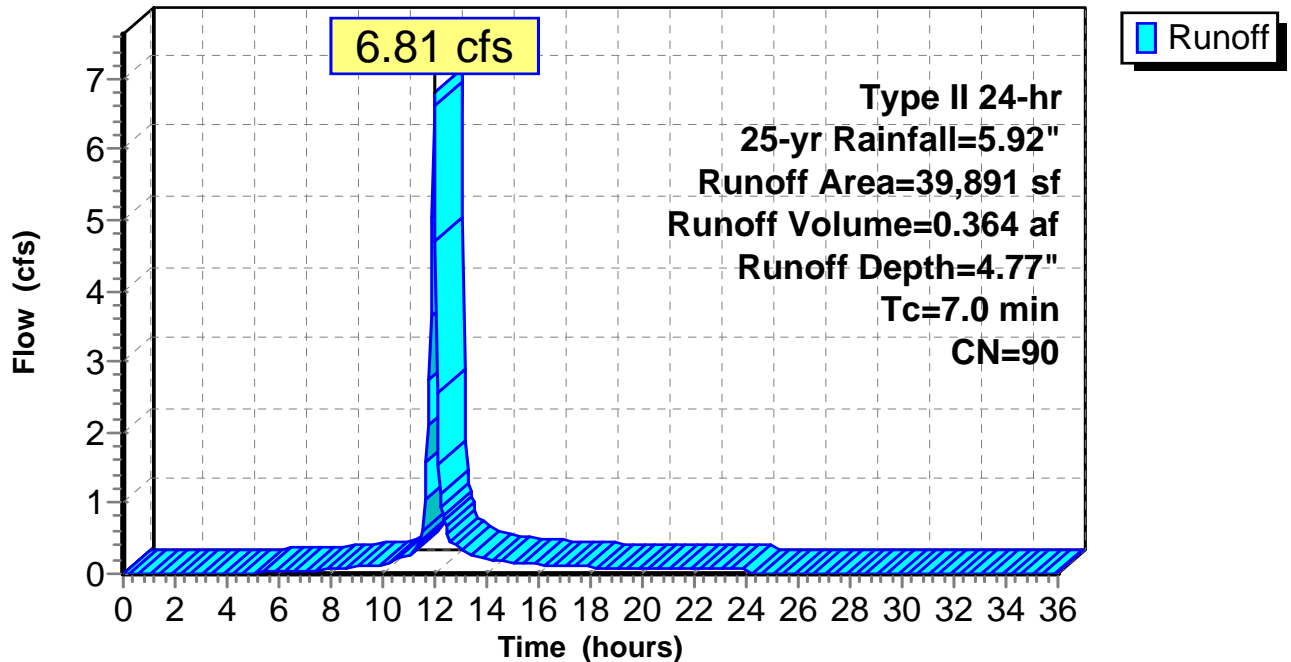Runoff   =   7.72 cfs @   11.98 hrs, Volume=   0.406 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	19,759	98	
	26,893	80	>75% Grass cover, Good, HSG D
	46,652	88	Weighted Average
	26,893		57.65% Pervious Area
	19,759		42.35% Impervious Area

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

Subcatchment 7S: Subcatchment 7

Hydrograph

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Type II 24-hr 25-yr Rainfall=5.92"
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Summary for Subcatchment 8S: Subcatchment 8

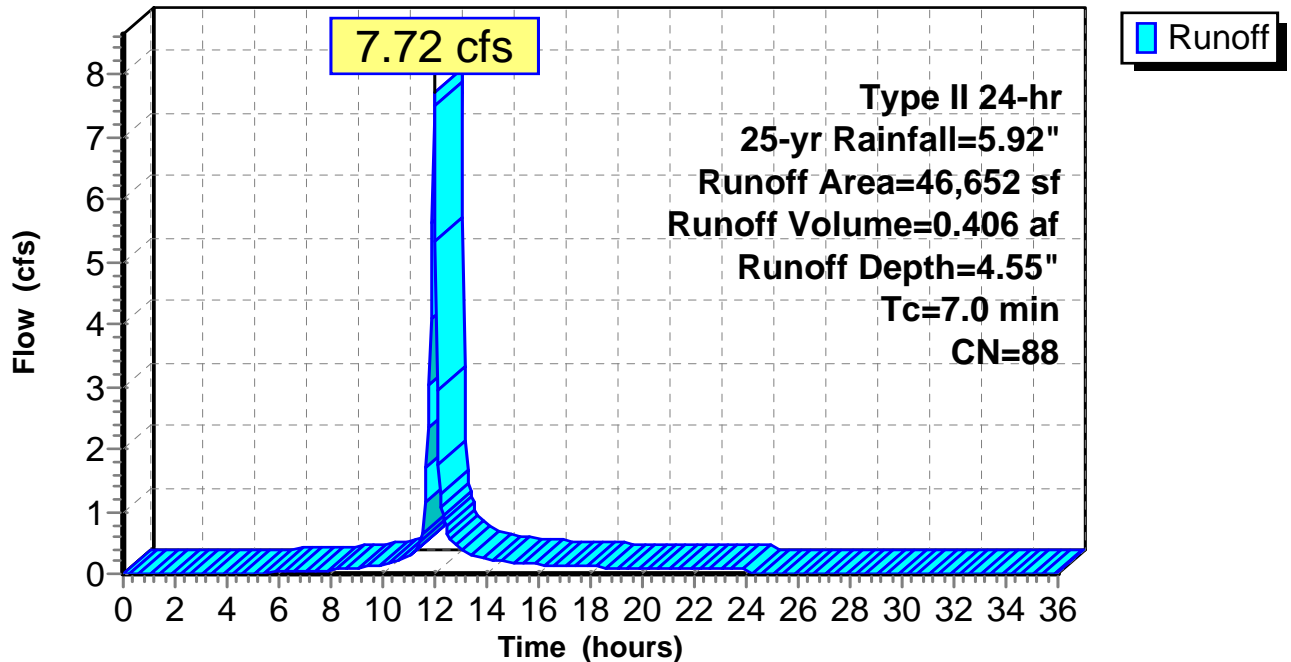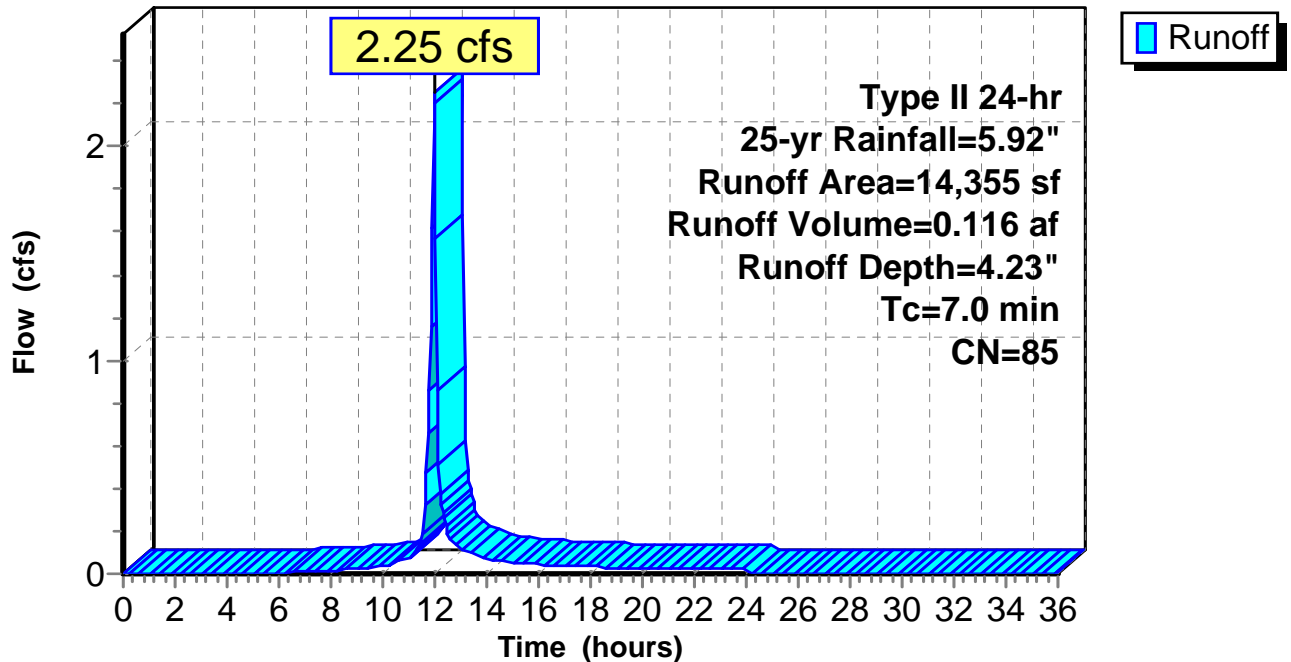Runoff   =   2.25 cfs @   11.98 hrs, Volume=   0.116 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
	10,604	80	>75% Grass cover, Good, HSG D
*	3,751	98	
	14,355	85	Weighted Average
	10,604		73.87% Pervious Area
	3,751		26.13% Impervious Area

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

Subcatchment 8S: Subcatchment 8

Hydrograph

Summary for Reach 1SP: Study Point 1
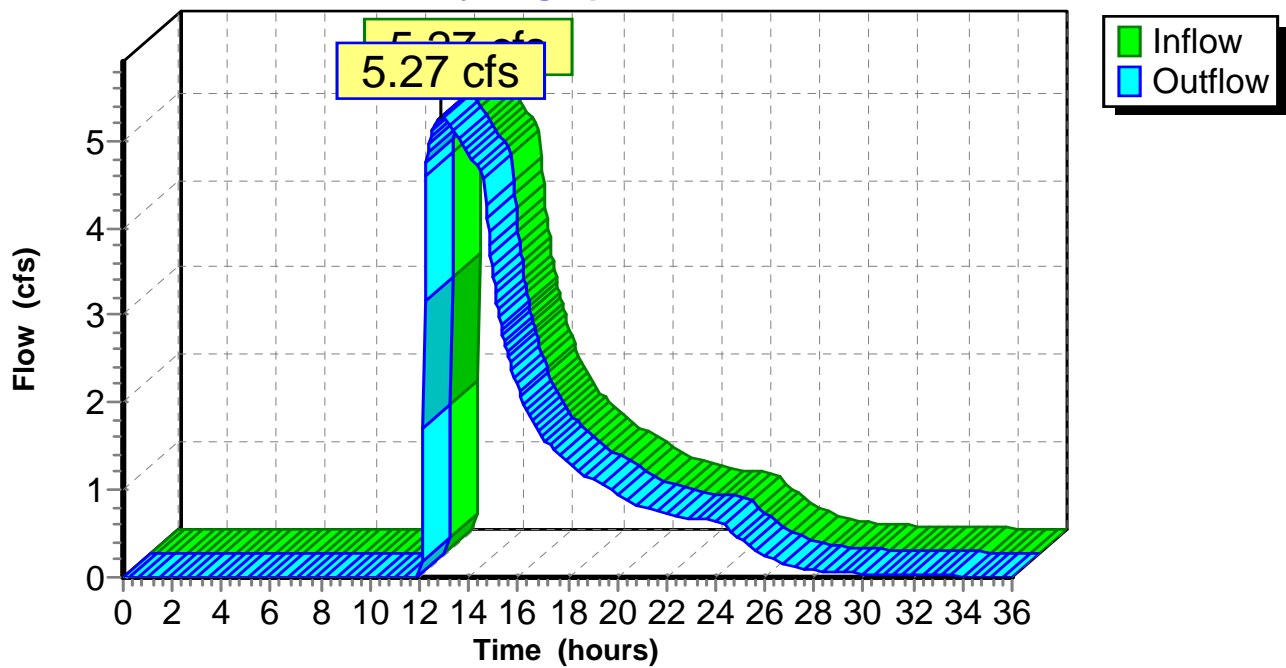
[40] Hint: Not Described (Outflow=Inflow)

Inflow   =   5.27 cfs @ 12.85 hrs, Volume=   2.178 af
Outflow   =   5.27 cfs @ 12.85 hrs, Volume=   2.178 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 1SP: Study Point 1

Hydrograph

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Type II 24-hr 25-yr Rainfall=5.92"
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Summary for Reach 2SP: Study Point 2

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

Inflow Area =   9.308 ac, 47.83% Impervious, Inflow Depth = 0.60"   for 25-yr event
Inflow   =   5.04 cfs @   12.85 hrs, Volume=   0.462 af
Outflow   =   5.04 cfs @   12.85 hrs, Volume=   0.462 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 2SP: Study Point 2

Hydrograph

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Type II 24-hr 25-yr Rainfall=5.92"
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Summary for Reach 3SP: Study Point 3
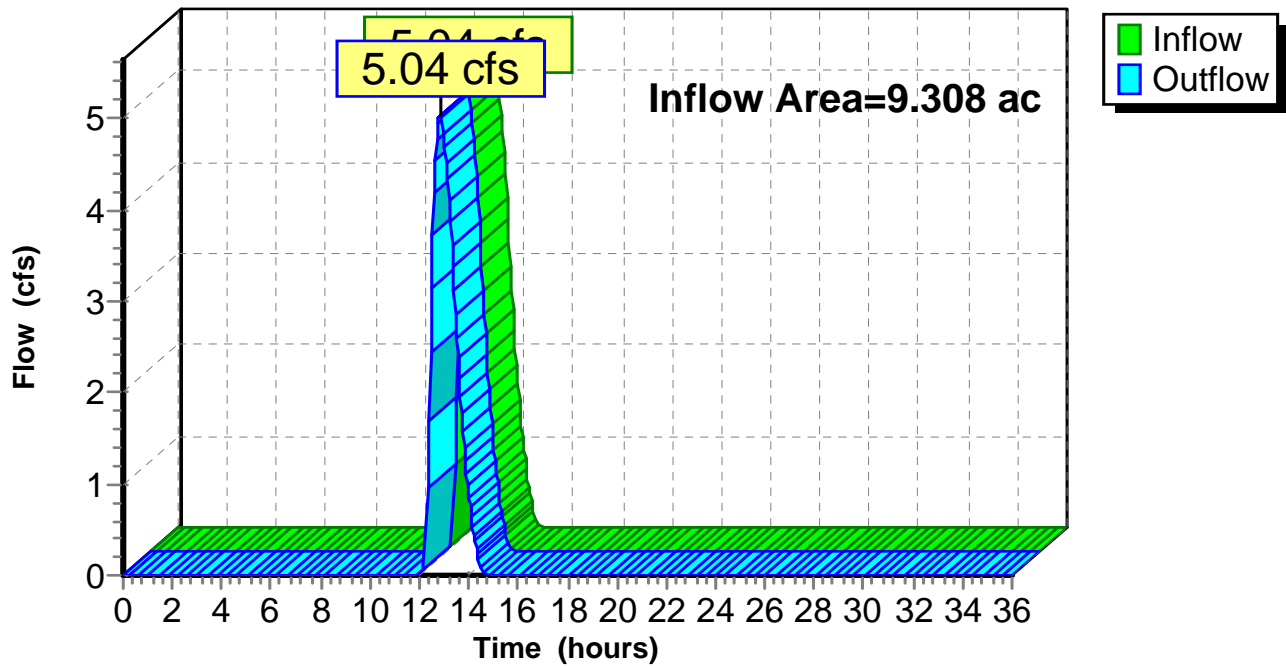
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =   0.330 ac, 26.13% Impervious, Inflow Depth = 5.14"   for 25-yr event
Inflow   =   4.94 cfs @   12.02 hrs, Volume=   0.141 af
Outflow   =   4.94 cfs @   12.02 hrs, Volume=   0.141 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 3SP: Study Point 3

Hydrograph

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Type II 24-hr 25-yr Rainfall=5.92"
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Summary for Reach 4SP: Study Point 4
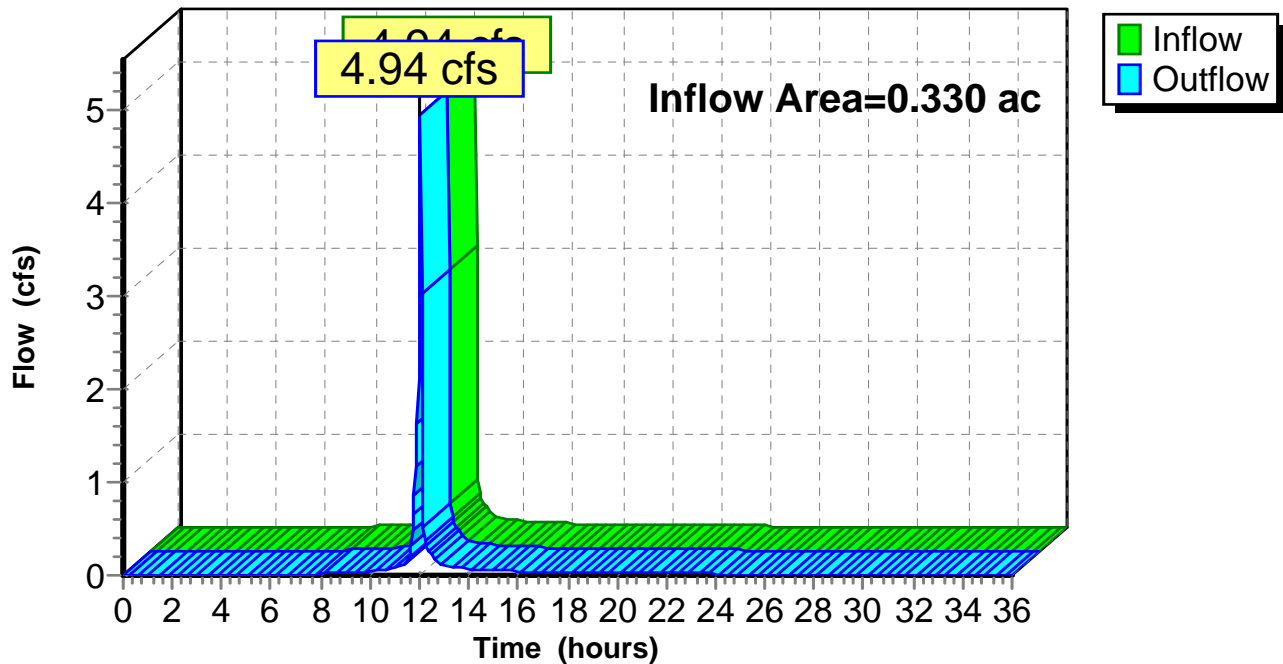
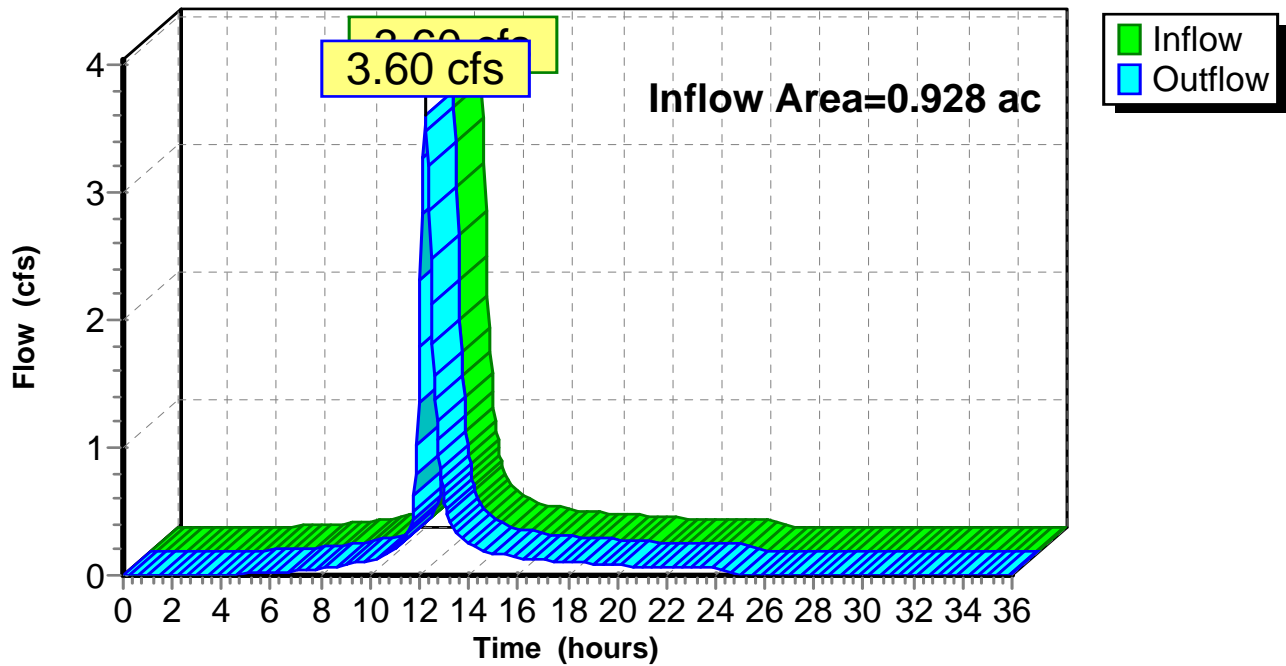[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =   0.928 ac, 47.45% Impervious, Inflow Depth = 4.66"   for 25-yr event
Inflow   =   3.60 cfs @   12.24 hrs, Volume=   0.360 af
Outflow   =   3.60 cfs @   12.24 hrs, Volume=   0.360 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 4SP: Study Point 4

Summary for Pond 1P: Wetland A

[79] Warning: Submerged Pond 8P Secondary device # 2 INLET by 0.78'
[81] Warning: Exceeded Pond 9P by 0.41' @ 12.80 hrs

Inflow Area =   9.308 ac, 47.83% Impervious, Inflow Depth = 4.25"   for 25-yr event
Inflow   =   31.15 cfs @ 12.08 hrs, Volume=   3.297 af
Outflow   =   10.32 cfs @ 12.85 hrs, Volume=   2.640 af, Atten= 67%, Lag= 46.2 min
Primary   =   5.04 cfs @ 12.85 hrs, Volume=   0.462 af
Secondary =   5.27 cfs @ 12.85 hrs, Volume=   2.178 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Starting Elev= 63.50' Surf.Area= 14,739 sf Storage= 17,429 cf
Peak Elev= 66.48' @ 12.85 hrs Surf.Area= 28,109 sf Storage= 80,578 cf (63,149 cf above start)

Plug-Flow detention time= 243.2 min calculated for 2.237 af (68% of inflow)
Center-of-Mass det. time= 107.9 min (941.8 - 833.9)

Volume	Invert	Avail.Storage	Storage Description
#1	62.00'	209,276 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.00	8,500	0	0
65.00	20,977	44,216	44,216
70.00	45,047	165,060	209,276

Device	Routing	Invert	Outlet Devices
#1	Primary	65.75'	**3.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Secondary	62.86'	**12.0" Round Culvert** L= 48.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 62.86' / 58.69' S= 0.0869 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	65.08'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=5.04 cfs @ 12.85 hrs HW=66.48' (Free Discharge)
└—**1=Broad-Crested Rectangular Weir** (Weir Controls 5.04 cfs @ 2.30 fps)

Secondary OutFlow Max=5.27 cfs @ 12.85 hrs HW=66.48' (Free Discharge)
└—**2=Culvert** (Inlet Controls 5.27 cfs @ 6.72 fps)
 └—**3=Sharp-Crested Rectangular Weir** (Passes 5.27 cfs of 14.10 cfs potential flow)

Pond 1P: Wetland A

Hydrograph

Inflow Area=9.308 ac
Peak Elev=66.48'
Storage=80,578 cf

31.15 cfs

10.32 cfs

5.27 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Summary for Pond 2P: Wetland B

Inflow Area =   2.082 ac, 66.45% Impervious, Inflow Depth = 4.99"   for 25-yr event
Inflow   =   8.00 cfs @   12.27 hrs, Volume=   0.866 af
Outflow   =   7.52 cfs @   12.36 hrs, Volume=   0.671 af, Atten= 6%, Lag= 5.2 min
Primary   =   7.52 cfs @   12.36 hrs, Volume=   0.671 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.31' @ 12.36 hrs   Surf.Area= 10,486 sf   Storage= 11,061 cf

Plug-Flow detention time= 146.3 min calculated for 0.670 af (77% of inflow)
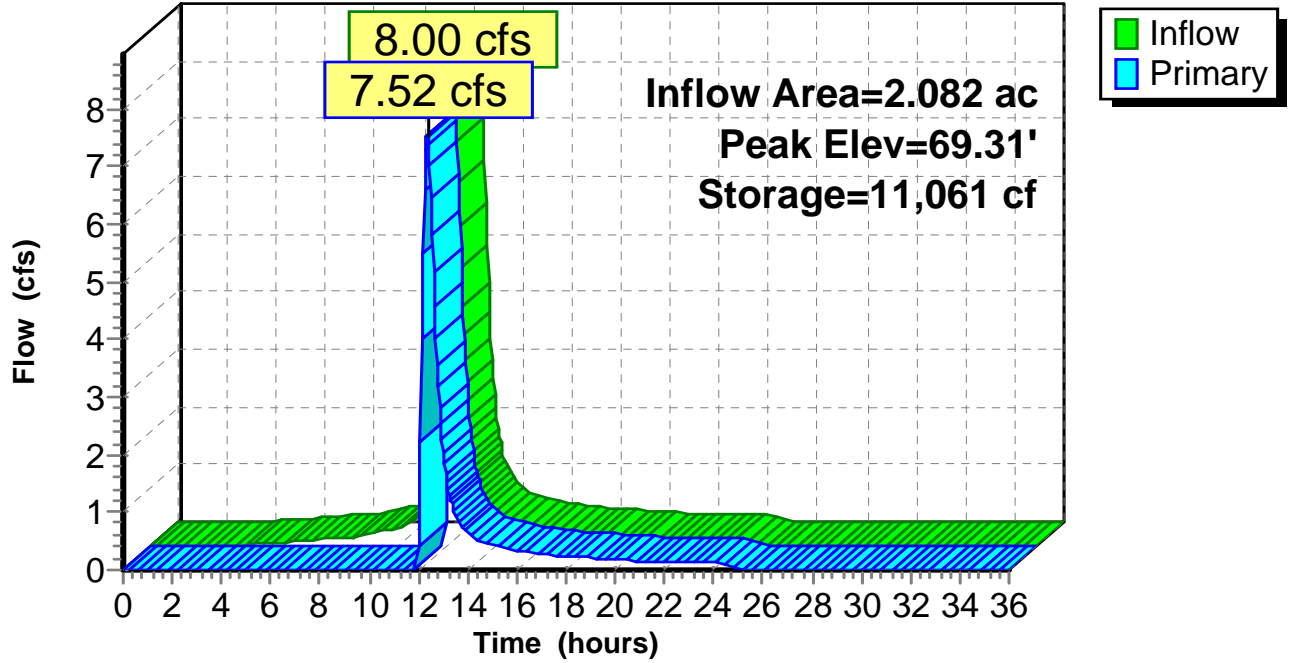Center-of-Mass det. time= 62.7 min (862.5 - 799.8)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	21,636 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.00	2,200	0	0
68.00	4,250	3,225	3,225
69.00	6,286	5,268	8,493
70.00	20,000	13,143	21,636

Device	Routing	Invert	Outlet Devices
#1	Primary	69.00'	**18.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=7.49 cfs @ 12.36 hrs HW=69.31'   (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 7.49 cfs @ 1.36 fps)

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Pond 2P: Wetland B

Hydrograph

Legend: ■ Inflow ■ Primary

8.00 cfs
7.52 cfs

Inflow Area=2.082 ac
Peak Elev=69.31'
Storage=11,061 cf

Flow (cfs) vs Time (hours)

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Summary for Pond 3P: Surface Detention

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 1.81'
[81] Warning: Exceeded Pond 7P by 0.20' @ 12.25 hrs

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth =   4.58"   for 25-yr event
Inflow   =   28.88 cfs @   11.99 hrs, Volume=   1.581 af
Outflow   =   23.53 cfs @   12.07 hrs, Volume=   1.580 af, Atten= 19%, Lag= 4.5 min
Primary   =   8.22 cfs @   12.07 hrs, Volume=   1.435 af
Secondary =   15.32 cfs @   12.07 hrs, Volume=   0.145 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.83' @ 12.07 hrs   Surf.Area= 7,804 sf   Storage= 16,129 cf

Plug-Flow detention time= 18.2 min calculated for 1.578 af (100% of inflow)
Center-of-Mass det. time= 17.9 min (816.6 - 798.7)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	21,926 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.00	400	0	0
70.00	2,991	1,696	1,696
72.00	5,812	8,803	10,499
73.50	9,425	11,428	21,926

Device	Routing	Invert	Outlet Devices
#1	Primary	69.10'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 69.10' / 68.75' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	72.50'	**35.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.17 cfs @ 12.07 hrs HW=72.79'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 8.17 cfs @ 6.66 fps)

Secondary OutFlow Max=13.45 cfs @ 12.07 hrs HW=72.79'   (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.45 cfs @ 1.31 fps)

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Pond 3P: Surface Detention

Hydrograph

Inflow Area=4.142 ac
Peak Elev=72.83'
Storage=16,129 cf

28.88 cfs
23.53 cfs
15.32 cfs
8.22 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs) vs Time (hours)
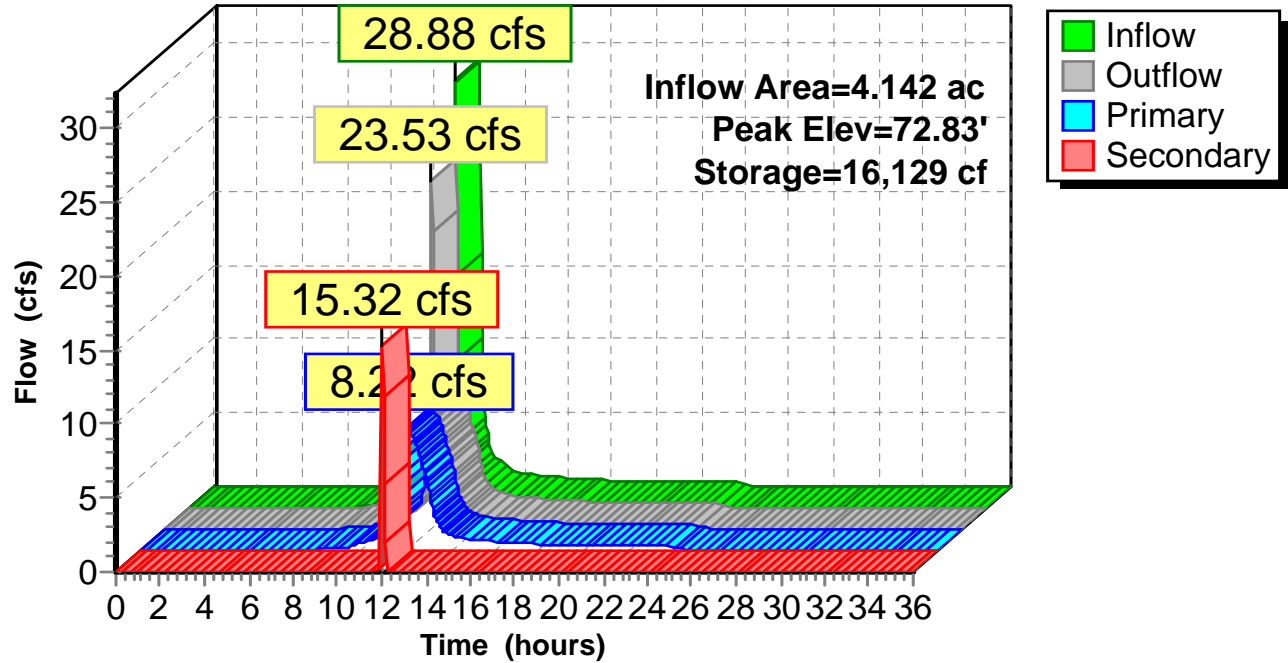
Summary for Pond 4P: Surface Detention

Inflow Area =　　　 1.071 ac, 42.35% Impervious, Inflow Depth = 4.55"　 for 25-yr event
Inflow　　 =　　7.72 cfs @　11.98 hrs, Volume=　　　　 0.406 af
Outflow　 =　　6.74 cfs @　12.03 hrs, Volume=　　　　 0.398 af, Atten= 13%, Lag= 3.3 min
Primary　 =　　0.42 cfs @　12.03 hrs, Volume=　　　　 0.253 af
Secondary =　　3.17 cfs @　12.03 hrs, Volume=　　　　 0.025 af
Tertiary　 =　　3.14 cfs @　12.03 hrs, Volume=　　　　 0.119 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 70.59' @ 12.03 hrs　Surf.Area= 3,126 sf　Storage= 5,247 cf

Plug-Flow detention time= 79.1 min calculated for 0.398 af (98% of inflow)
Center-of-Mass det. time= 66.0 min (855.7 - 789.7)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	10,990 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	13	0	0
67.00	71	126	126
68.00	928	500	626
69.00	1,378	1,153	1,779
70.00	2,348	1,863	3,642
72.00	5,000	7,348	10,990

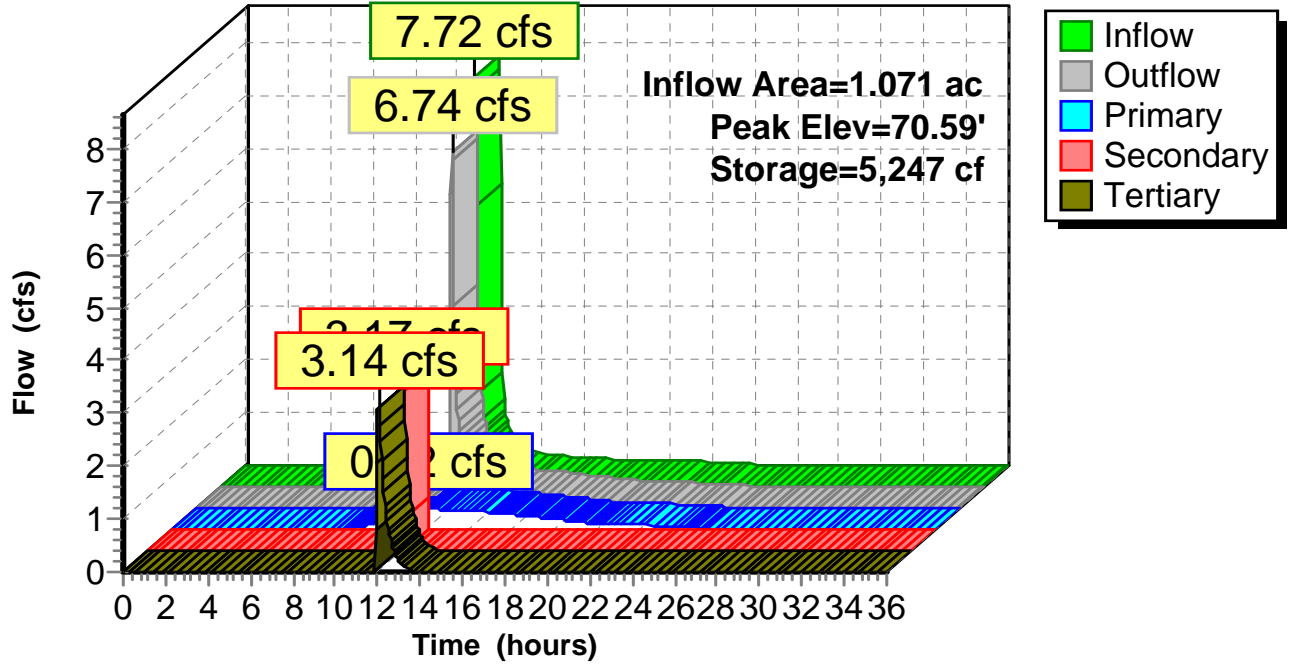| Device	Routing	Invert	Outlet Devices
#1	Primary	67.66'	**3.5" Round Culvert** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.66' / 67.65'　S= 0.0020 '/'　Cc= 0.900 n= 0.013, Flow Area= 0.07 sf
#2	Tertiary	69.66'	**1.2' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#3	Secondary	70.50'	**45.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.42 cfs @ 12.03 hrs HW=70.58'　(Free Discharge)
└─**1=Culvert** (Inlet Controls 0.42 cfs @ 6.33 fps)

Secondary OutFlow Max=2.68 cfs @ 12.03 hrs HW=70.58'　(Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.68 cfs @ 0.75 fps)

Tertiary OutFlow Max=3.09 cfs @ 12.03 hrs HW=70.58'　(Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 3.09 cfs @ 2.81 fps)

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Pond 4P: Surface Detention

Hydrograph

7.72 cfs

6.74 cfs

Inflow Area=1.071 ac
Peak Elev=70.59'
Storage=5,247 cf

Legend:
- Inflow (green)
- Outflow (gray)
- Primary (cyan)
- Secondary (red)
- Tertiary (dark yellow)

3.14 cfs

Flow (cfs) — Time (hours)

Summary for Pond 5P: OCS-4P

[57] Hint: Peaked at 69.40' (Flood elevation advised)
[79] Warning: Submerged Pond 4P Primary device # 1 INLET by 1.73'

Inflow Area =   1.071 ac, 42.35% Impervious, Inflow Depth = 4.17"   for 25-yr event
Inflow   =   3.56 cfs @   12.03 hrs, Volume=   0.372 af
Outflow   =   3.56 cfs @   12.03 hrs, Volume=   0.372 af, Atten= 0%, Lag= 0.0 min
Primary   =   3.56 cfs @   12.03 hrs, Volume=   0.372 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.40' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	67.48'	**12.0" Round Culvert**
			L= 81.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.48' / 66.86' S= 0.0077 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=3.52 cfs @ 12.03 hrs HW=69.37'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 3.52 cfs @ 4.48 fps)

Pond 5P: OCS-4P

Hydrograph
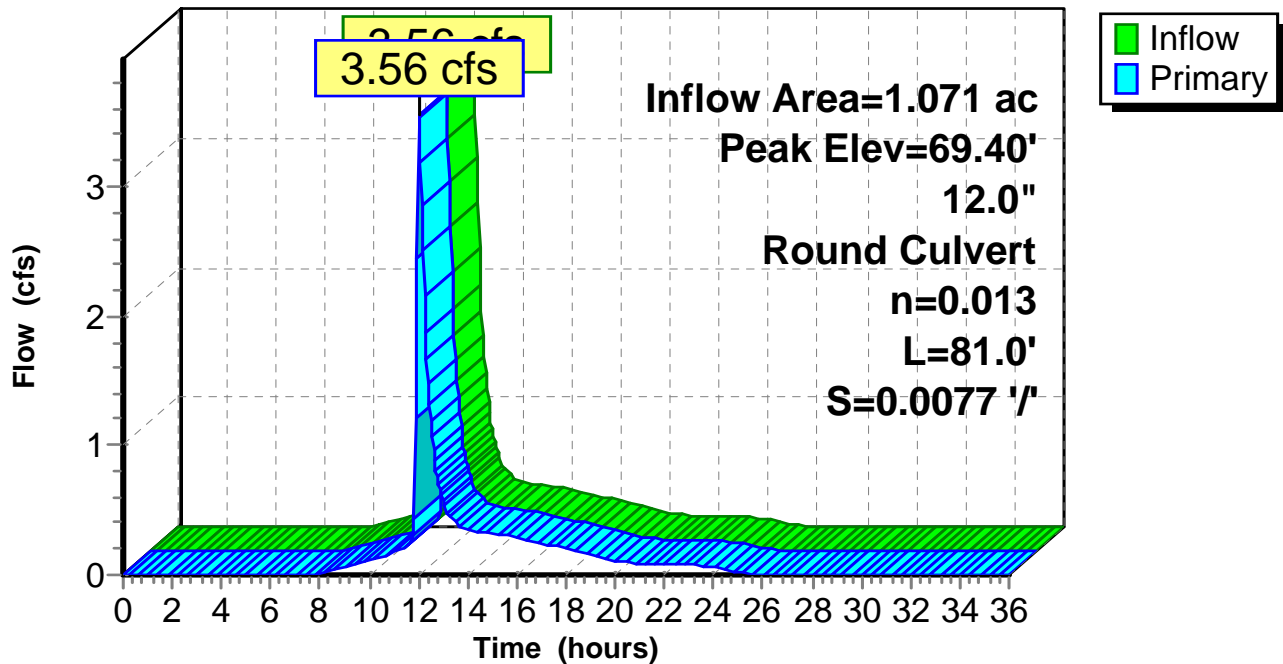
Summary for Pond 6P: Atrium Surface Detention

Inflow Area =   2.627 ac, 56.89% Impervious, Inflow Depth = 4.77"   for 25-yr event
Inflow   =   19.53 cfs @   11.98 hrs, Volume=   1.044 af
Outflow   =   18.97 cfs @   12.00 hrs, Volume=   0.987 af, Atten= 3%, Lag= 1.1 min
Primary   =   18.97 cfs @   12.00 hrs, Volume=   0.987 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 74.10' @ 12.00 hrs   Surf.Area= 3,837 sf   Storage= 4,447 cf

Plug-Flow detention time= 54.7 min calculated for 0.987 af (95% of inflow)
Center-of-Mass det. time= 22.9 min (805.6 - 782.8)

Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	5,026 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	55	0	0
72.00	327	382	382
73.00	1,694	1,011	1,393
74.25	4,120	3,634	5,026

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**0.1" Round Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 69.20' S= 0.0082 '/' Cc= 0.900 n= 0.013, Flow Area= 0.00 sf
#2	Primary	73.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=18.85 cfs @ 12.00 hrs HW=74.10'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.00 cfs @ 0.28 fps)
 └─**2=Broad-Crested Rectangular Weir** (Weir Controls 18.85 cfs @ 2.09 fps)

Pond 6P: Atrium Surface Detention

Hydrograph

Inflow Area=2.627 ac
Peak Elev=74.10'
Storage=4,447 cf

19.53 cfs
18.97 cfs

Legend: Inflow / Primary

Summary for Pond 7P: Riprap Surface Detention

Inflow Area =   0.600 ac, 52.50% Impervious, Inflow Depth = 4.66"   for 25-yr event
Inflow   =   4.40 cfs @   11.98 hrs, Volume=   0.233 af
Outflow   =   3.26 cfs @   12.04 hrs, Volume=   0.231 af, Atten= 26%, Lag= 3.7 min
Primary   =   3.26 cfs @   12.04 hrs, Volume=   0.231 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 73.85' @ 12.04 hrs   Surf.Area= 766 sf   Storage= 818 cf

Plug-Flow detention time= 13.6 min calculated for 0.231 af (99% of inflow)
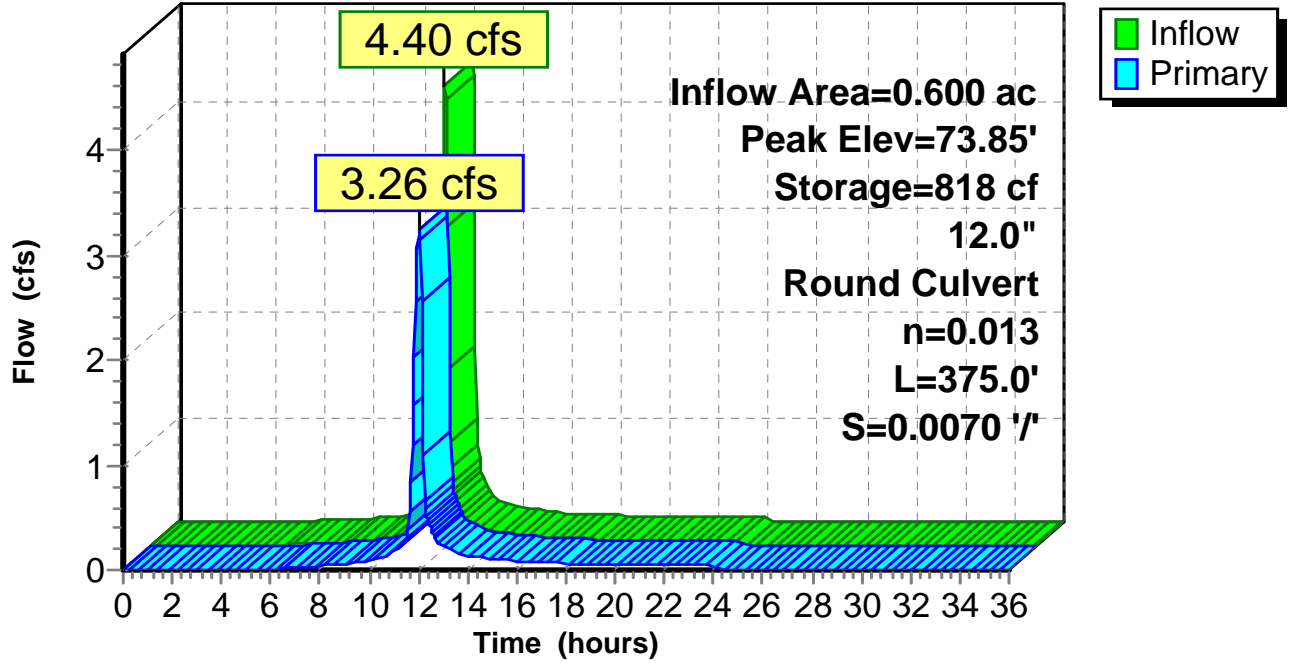Center-of-Mass det. time= 7.8 min (794.1 - 786.3)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	2,180 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	50	0	0
73.00	310	360	360
74.00	846	578	938
75.00	1,637	1,242	2,180

Device	Routing	Invert	Outlet Devices
#1	Primary	71.83'	**12.0" Round Culvert** L= 375.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.83' / 69.20' S= 0.0070 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=3.25 cfs @ 12.04 hrs HW=73.83'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 3.25 cfs @ 4.13 fps)

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Pond 7P: Riprap Surface Detention

Hydrograph

Inflow Area=0.600 ac
Peak Elev=73.85'
Storage=818 cf
12.0"
Round Culvert
n=0.013
L=375.0'
S=0.0070 '/'

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Summary for Pond 8P: OCS-DMH7

[57] Hint: Peaked at 67.23' (Flood elevation advised)

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth = 4.16"   for 25-yr event
Inflow   =   8.22 cfs @ 12.07 hrs, Volume=   1.435 af
Outflow   =   8.22 cfs @ 12.07 hrs, Volume=   1.435 af, Atten= 0%, Lag= 0.0 min
Primary   =   0.78 cfs @ 12.07 hrs, Volume=   0.045 af
Secondary =   7.44 cfs @ 12.07 hrs, Volume=   1.390 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
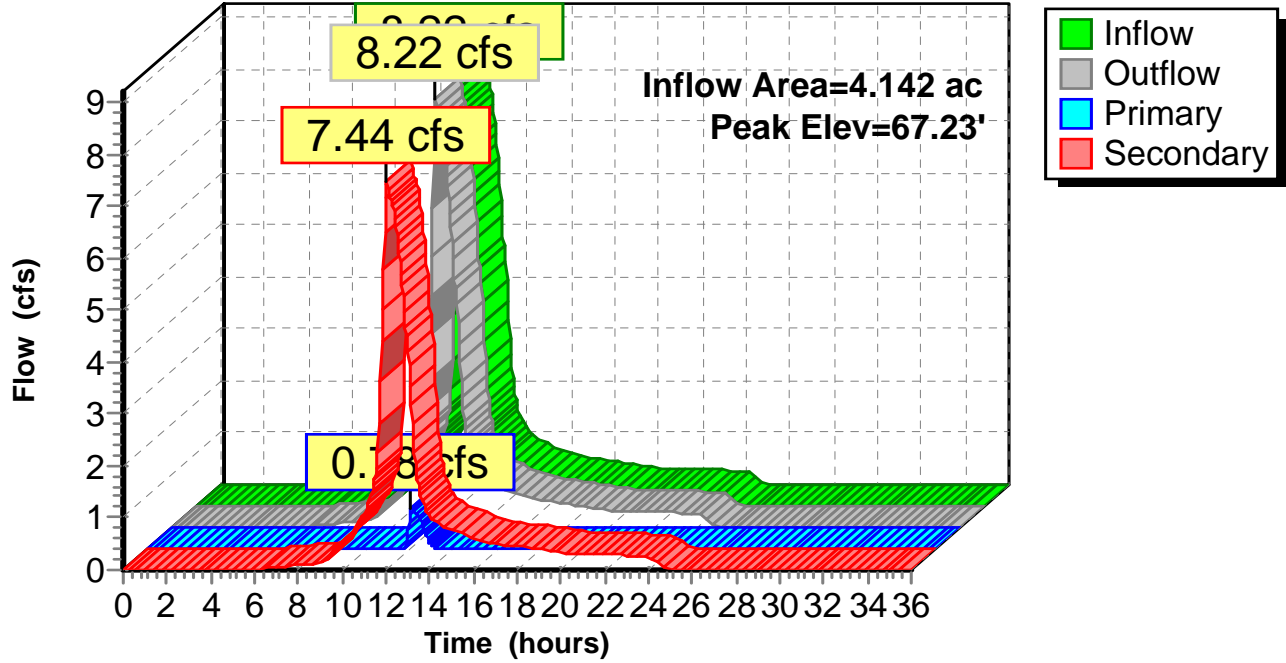Peak Elev= 67.23' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 66.60' / 66.60' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	65.70'	**24.0" Round Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 65.70' / 65.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=0.76 cfs @ 12.07 hrs HW=67.22'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.76 cfs @ 2.12 fps)

Secondary OutFlow Max=7.41 cfs @ 12.07 hrs HW=67.22'   (Free Discharge)
└─**2=Culvert** (Barrel Controls 7.41 cfs @ 3.99 fps)

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Pond 8P: OCS-DMH7

Hydrograph

Inflow Area=4.142 ac
Peak Elev=67.23'

8.22 cfs

7.44 cfs

0.18 cfs

Flow (cfs)

Time (hours)

Inflow
Outflow
Primary
Secondary

Summary for Pond 9P: UG Detention

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth = 0.06"   for 25-yr event
Inflow   =   0.27 cfs @ 12.07 hrs, Volume=   0.022 af
Outflow   =   0.15 cfs @ 12.91 hrs, Volume=   0.022 af, Atten= 43%, Lag= 50.5 min
Primary   =   0.15 cfs @ 12.91 hrs, Volume=   0.022 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 66.08' @ 12.91 hrs   Surf.Area= 1,536 sf   Storage= 549 cf

Plug-Flow detention time= 88.2 min calculated for 0.022 af (99% of inflow)
Center-of-Mass det. time= 89.2 min (834.0 - 744.8)

Volume	Invert	Avail.Storage	Storage Description
#1	65.70'	2,488 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
			2,619 cf Overall x 95.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.70	1,536	0	0
67.40	1,536	2,611	2,611
67.41	5	8	2,619

Device	Routing	Invert	Outlet Devices
#1	Primary	65.70'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 65.70' / 65.60' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Primary	67.00'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.90' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.15 cfs @ 12.91 hrs HW=66.08'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.15 cfs @ 1.74 fps)
 └─**2=Culvert** (Controls 0.00 cfs)
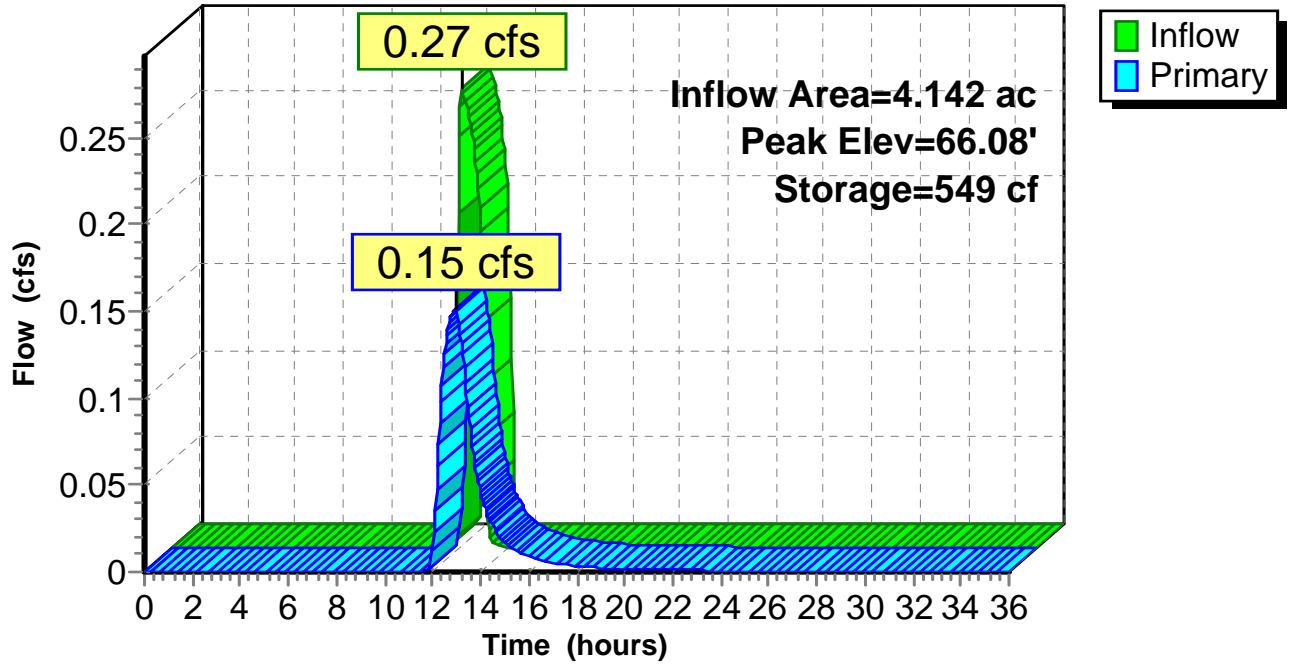
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Pond 9P: UG Detention

Hydrograph

0.27 cfs

0.15 cfs

Inflow Area=4.142 ac
Peak Elev=66.08'
Storage=549 cf

Legend: Inflow, Primary

Flow (cfs): 0, 0.05, 0.1, 0.15, 0.2, 0.25

Time (hours): 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36

Summary for Pond 10P: Isolator Row x5

[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[81] Warning: Exceeded Pond 8P by 0.90' @ 35.95 hrs

Inflow Area =   4.142 ac, 55.71% Impervious, Inflow Depth =   0.13"   for 25-yr event
Inflow   =   0.78 cfs @   12.07 hrs, Volume=   0.045 af
Outflow   =   0.78 cfs @   12.07 hrs, Volume=   0.045 af, Atten= 0%, Lag= 0.1 min
Primary   =   0.27 cfs @   12.07 hrs, Volume=   0.022 af
Secondary =   0.51 cfs @   12.07 hrs, Volume=   0.023 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.41' @ 12.07 hrs   Surf.Area= 0.001 ac   Storage= 0.001 af

Plug-Flow detention time= 1.8 min calculated for 0.045 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (740.6 - 738.6)

Volume	Invert	Avail.Storage	Storage Description
#1	66.60'	0.002 af	**ADS_StormTech RC-310** x 5
			Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
			Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
			Row Length Adjustment= +0.44' x 2.07 sf x 1 rows

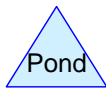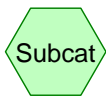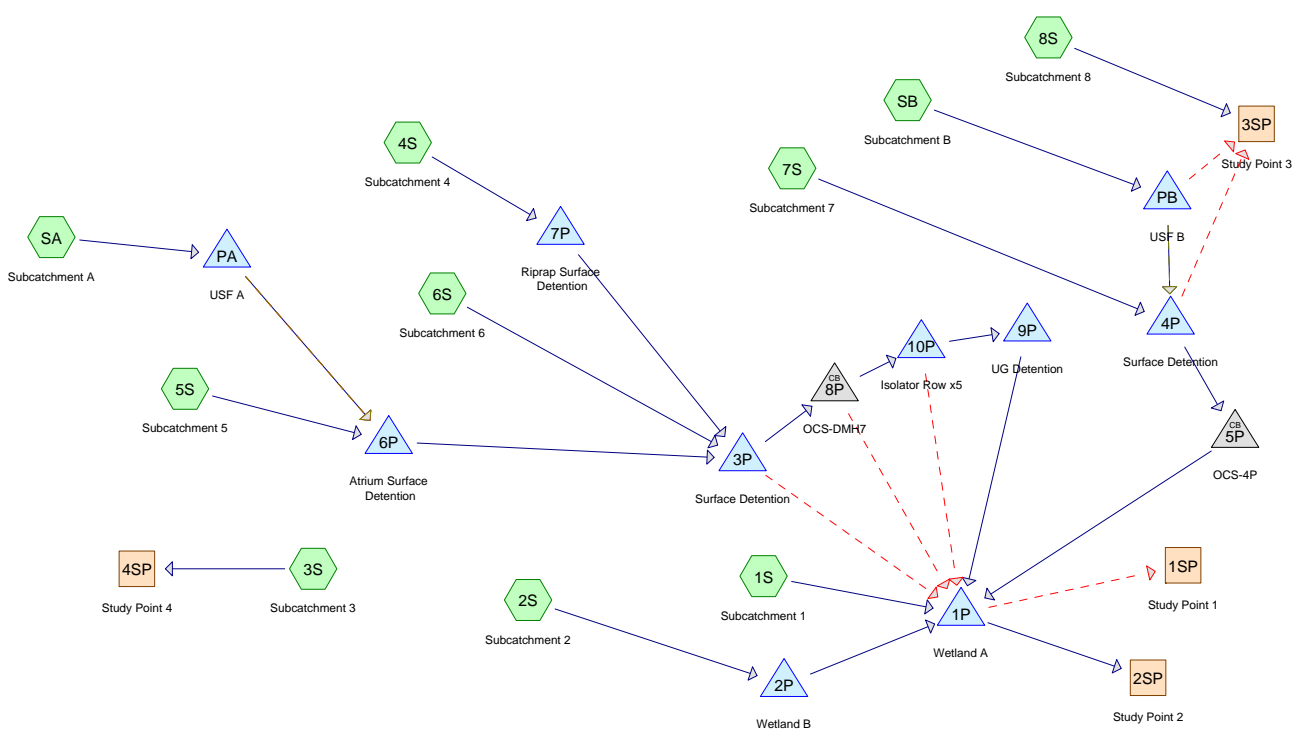| Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**4.0" Round Culvert**
			L= 5.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 66.60' / 66.55' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Secondary	67.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.55' S= 0.0090 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.07 hrs HW=67.40'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.26 cfs @ 3.03 fps)

Secondary OutFlow Max=0.50 cfs @ 12.07 hrs HW=67.40'   (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.50 cfs @ 1.70 fps)

Pond 10P: Isolator Row x5

Hydrograph

Inflow Area=4.142 ac
Peak Elev=67.41'
Storage=0.001 af

Legend: Inflow, Outflow, Primary, Secondary

0.78 cfs
0.51 cfs
0.2_ cfs

Flow (cfs)

Time (hours)

Subcatchment A
SA
PA
USF A

Subcatchment 4
4S
7P
Riprap Surface Detention

Subcatchment 6
6S

Subcatchment 5
5S

6P
Atrium Surface Detention

8S
Subcatchment 8

SB
Subcatchment B

7S
Subcatchment 7

3SP
Study Point 3

PB
USF B

4P
Surface Detention

10P
Isolator Row x5

9P
UG Detention

CB
8P
OCS-DMH7

3P
Surface Detention

CB
5P
OCS-4P

4SP
Study Point 4

3S
Subcatchment 3

1S
Subcatchment 1

2S
Subcatchment 2

1P
Wetland A

1SP
Study Point 1

2P
Wetland B

2SP
Study Point 2

Subcat   Reach   Pond   Link

Routing Diagram for Post-Development Cedars Model 17-10-16
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.370	98	(1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, SA, SB)
5.196	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, SA, SB)
10.566	**89**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
5.196	HSG D	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, SA, SB
5.370	Other	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, SA, SB
10.566		**TOTAL AREA**

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	5.370	5.370		1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, SA, SB
0.000	0.000	0.000	5.196	0.000	5.196	>75% Grass cover, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, SA, SB
0.000	**0.000**	**0.000**	**5.196**	**5.370**	**10.566**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	62.86	58.69	48.0	0.0869	0.013	12.0	0.0	0.0
2	3P	69.10	68.75	70.0	0.0050	0.013	15.0	0.0	0.0
3	4P	67.66	67.65	5.0	0.0020	0.013	1.0	0.0	0.0
4	4P	70.25	70.25	1.0	0.0000	0.013	6.0	0.0	0.0
5	5P	67.48	66.86	81.0	0.0077	0.013	12.0	0.0	0.0
6	6P	71.00	69.20	220.0	0.0082	0.013	0.1	0.0	0.0
7	7P	71.83	69.20	375.0	0.0070	0.013	12.0	0.0	0.0
8	8P	66.60	66.60	10.0	0.0000	0.013	12.0	0.0	0.0
9	8P	65.70	65.50	40.0	0.0050	0.013	24.0	0.0	0.0
10	9P	65.70	65.60	10.0	0.0100	0.013	4.0	0.0	0.0
11	9P	67.00	66.90	10.0	0.0100	0.013	4.0	0.0	0.0
12	10P	66.60	66.55	5.0	0.0100	0.013	4.0	0.0	0.0
13	10P	67.00	66.55	50.0	0.0090	0.013	12.0	0.0	0.0
14	PA	73.00	72.20	60.0	0.0133	0.013	12.0	0.0	0.0
15	PB	67.50	67.40	20.0	0.0050	0.013	15.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1   Runoff Area=87,665 sf 15.27% Impervious   Runoff Depth=1.58"
Flow Length=177' Slope=0.0100 '/' Tc=29.9 min CN=83 Runoff=2.75 cfs 0.266 af

Subcatchment 2S: Subcatchment 2   Runoff Area=90,682 sf 66.45% Impervious   Runoff Depth=2.32"
Flow Length=178' Slope=0.0075 '/' Tc=33.7 min CN=92 Runoff=3.84 cfs 0.403 af

Subcatchment 3S: Subcatchment 3   Runoff Area=40,444 sf 47.45% Impervious   Runoff Depth=2.05"
Flow Length=185' Slope=0.0200 '/' Tc=30.6 min CN=89 Runoff=1.63 cfs 0.159 af

Subcatchment 4S: Subcatchment 4   Runoff Area=26,132 sf 52.50% Impervious   Runoff Depth=2.05"
Tc=7.0 min CN=89 Runoff=2.03 cfs 0.103 af

Subcatchment 5S: Subcatchment 5   Runoff Area=109,598 sf 64.38% Impervious   Runoff Depth=2.32"
Tc=7.0 min CN=92 Runoff=9.39 cfs 0.487 af

Subcatchment 6S: Subcatchment 6   Runoff Area=39,891 sf 54.44% Impervious   Runoff Depth=2.14"
Tc=7.0 min CN=90 Runoff=3.21 cfs 0.163 af

Subcatchment 7S: Subcatchment 7   Runoff Area=41,419 sf 41.76% Impervious   Runoff Depth=1.97"
Tc=7.0 min CN=88 Runoff=3.11 cfs 0.156 af

Subcatchment 8S: Subcatchment 8   Runoff Area=1,744 sf 3.61% Impervious   Runoff Depth=1.45"
Tc=7.0 min CN=81 Runoff=0.10 cfs 0.005 af

Subcatchment SA: Subcatchment A   Runoff Area=8,542 sf 67.83% Impervious   Runoff Depth=2.32"
Flow Length=65' Slope=0.0300 '/' Tc=7.0 min CN=92 Runoff=0.73 cfs 0.038 af

Subcatchment SB: Subcatchment B   Runoff Area=14,118 sf 84.42% Impervious   Runoff Depth=2.62"
Tc=7.0 min CN=95 Runoff=1.31 cfs 0.071 af

Reach 1SP: Study Point 1   Inflow=0.99 cfs 0.664 af
Outflow=0.99 cfs 0.664 af

Reach 2SP: Study Point 2   Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach 3SP: Study Point 3   Inflow=0.10 cfs 0.005 af
Outflow=0.10 cfs 0.005 af

Reach 4SP: Study Point 4   Inflow=1.63 cfs 0.159 af
Outflow=1.63 cfs 0.159 af

Pond 1P: Wetland A   Peak Elev=65.32' Storage=51,207 cf   Inflow=8.55 cfs 1.329 af
Primary=0.00 cfs 0.000 af   Secondary=0.99 cfs 0.664 af   Outflow=0.99 cfs 0.664 af

Pond 2P: Wetland B   Peak Elev=69.11' Storage=9,275 cf   Inflow=3.84 cfs 0.403 af
Outflow=1.59 cfs 0.208 af

Post-Development Cedars Model 17-10-16
Prepared by Microsoft
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Type II 24-hr 2-yr Rainfall=3.17"
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Pond 3P: Surface Detention Peak Elev=71.49' Storage=7,720 cf Inflow=14.09 cfs 0.718 af
Primary=6.20 cfs 0.717 af Secondary=0.00 cfs 0.000 af Outflow=6.20 cfs 0.717 af

Pond 4P: Surface Detention Peak Elev=70.47' Storage=4,082 cf Inflow=3.14 cfs 0.212 af
Primary=0.26 cfs 0.139 af Secondary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.139 af

Pond 5P: OCS-4P Peak Elev=67.76' Inflow=0.26 cfs 0.139 af
12.0" Round Culvert n=0.013 L=81.0' S=0.0077 '/' Outflow=0.26 cfs 0.139 af

Pond 6P: Atrium Surface Detention Peak Elev=73.89' Storage=3,658 cf Inflow=9.40 cfs 0.511 af
Outflow=9.01 cfs 0.454 af

Pond 7P: Riprap Surface Detention Peak Elev=72.74' Storage=285 cf Inflow=2.03 cfs 0.103 af
12.0" Round Culvert n=0.013 L=375.0' S=0.0070 '/' Outflow=1.93 cfs 0.101 af

Pond 8P: OCS-DMH7 Peak Elev=67.02' Inflow=6.20 cfs 0.717 af
Primary=0.36 cfs 0.011 af Secondary=5.84 cfs 0.705 af Outflow=6.20 cfs 0.717 af

Pond 9P: UG Detention Peak Elev=65.91' Storage=300 cf Inflow=0.22 cfs 0.009 af
Outflow=0.07 cfs 0.009 af

Pond 10P: Isolator Row x5 Peak Elev=67.21' Storage=0.001 af Inflow=0.36 cfs 0.011 af
Primary=0.22 cfs 0.009 af Secondary=0.14 cfs 0.002 af Outflow=0.37 cfs 0.011 af

Pond PA: USF A Peak Elev=76.78' Storage=1,128 cf Inflow=0.73 cfs 0.038 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Tertiary=0.02 cfs 0.024 af Outflow=0.02 cfs 0.024 af

Pond PB: USF B Peak Elev=71.59' Storage=2,056 cf Inflow=1.31 cfs 0.071 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Tertiary=0.05 cfs 0.056 af Outflow=0.05 cfs 0.056 af

Total Runoff Area = 10.566 ac   Runoff Volume = 1.850 af   Average Runoff Depth = 2.10"
49.18% Pervious = 5.196 ac   50.82% Impervious = 5.370 ac

Summary for Subcatchment 1S: Subcatchment 1

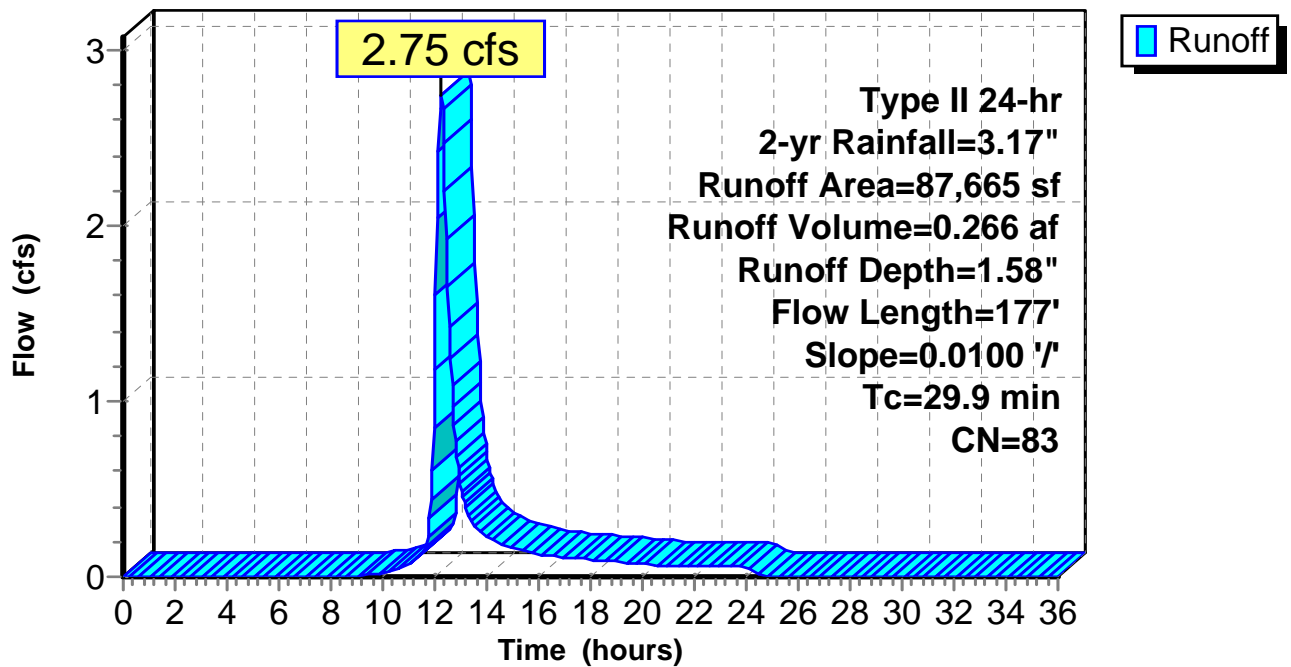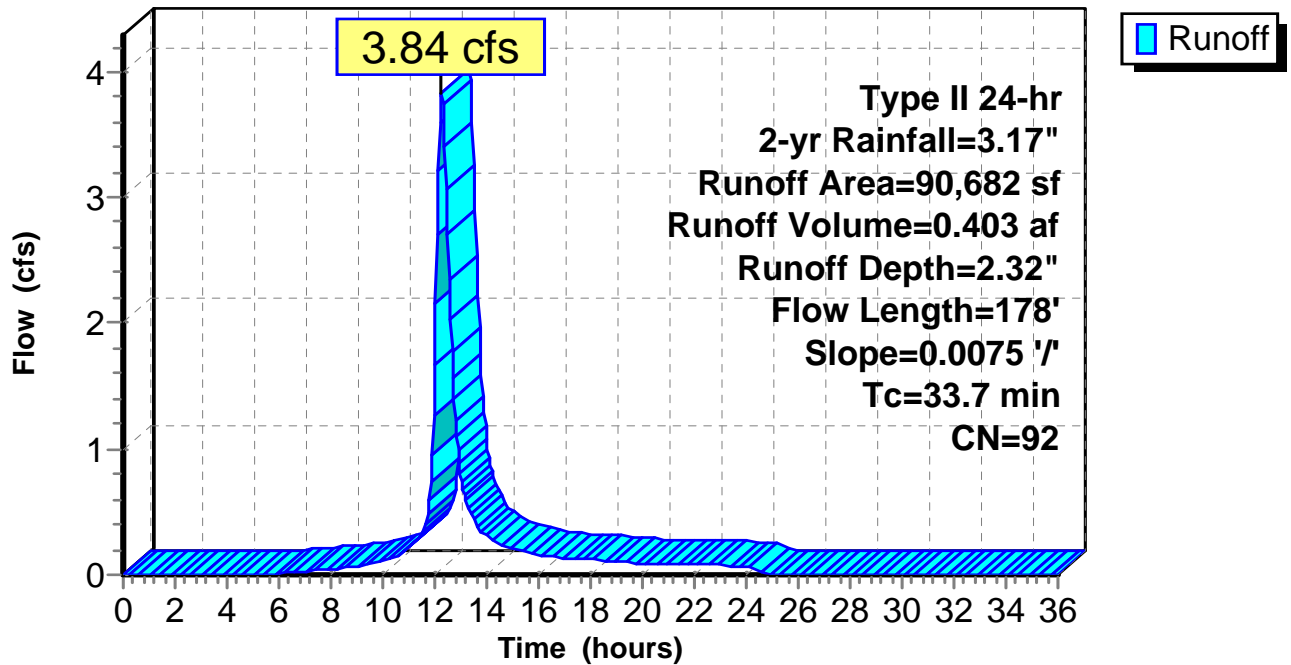Runoff   =   2.75 cfs @   12.25 hrs, Volume=   0.266 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	13,390	98	
	74,275	80	>75% Grass cover, Good, HSG D
	87,665	83	Weighted Average
	74,275		84.73% Pervious Area
	13,390		15.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.9	177	0.0100	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 1S: Subcatchment 1

Hydrograph

2.75 cfs

Type II 24-hr
2-yr Rainfall=3.17"
Runoff Area=87,665 sf
Runoff Volume=0.266 af
Runoff Depth=1.58"
Flow Length=177'
Slope=0.0100 '/'
Tc=29.9 min
CN=83

Summary for Subcatchment 2S: Subcatchment 2

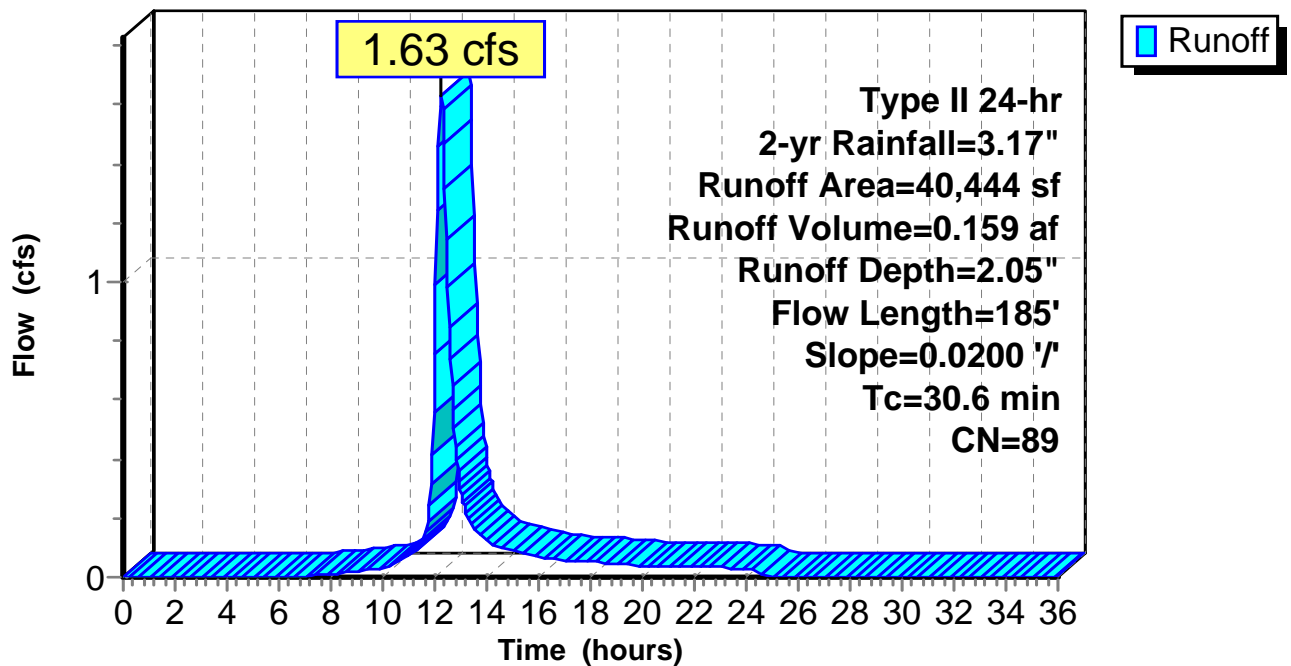Runoff   =   3.84 cfs @   12.28 hrs, Volume=   0.403 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	60,255	98	
	30,427	80	>75% Grass cover, Good, HSG D
	90,682	92	Weighted Average
	30,427		33.55% Pervious Area
	60,255		66.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	178	0.0075	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 2S: Subcatchment 2

Hydrograph

Runoff

3.84 cfs

Type II 24-hr
2-yr Rainfall=3.17"
Runoff Area=90,682 sf
Runoff Volume=0.403 af
Runoff Depth=2.32"
Flow Length=178'
Slope=0.0075 '/'
Tc=33.7 min
CN=92

Summary for Subcatchment 3S: Subcatchment 3

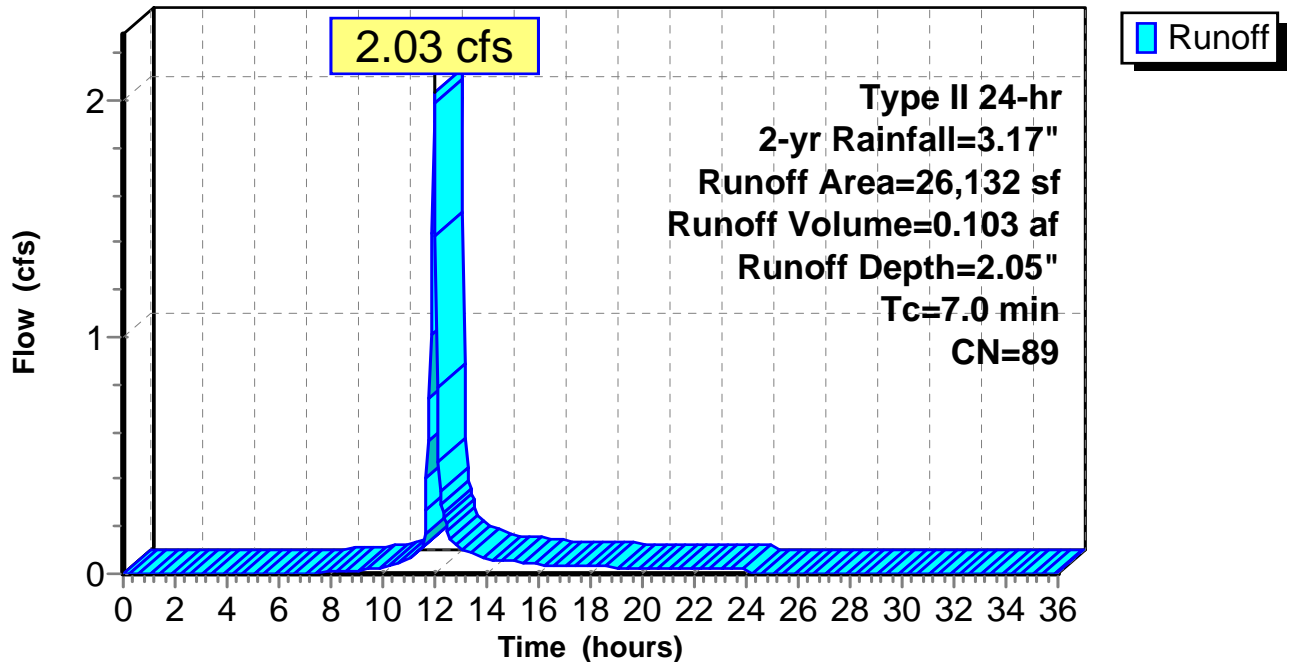Runoff   =   1.63 cfs @   12.25 hrs, Volume=   0.159 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
	21,255	80	>75% Grass cover, Good, HSG D
*	19,189	98	
	40,444	89	Weighted Average
	21,255		52.55% Pervious Area
	19,189		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	150	0.0200	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.17"
0.8	35	0.0200	0.71		**Shallow Concentrated Flow,**
					Woodland Kv= 5.0 fps
30.6	185	Total			

Subcatchment 3S: Subcatchment 3

Hydrograph

1.63 cfs

Type II 24-hr
2-yr Rainfall=3.17"
Runoff Area=40,444 sf
Runoff Volume=0.159 af
Runoff Depth=2.05"
Flow Length=185'
Slope=0.0200 '/'
Tc=30.6 min
CN=89

Summary for Subcatchment 4S: Subcatchment 4

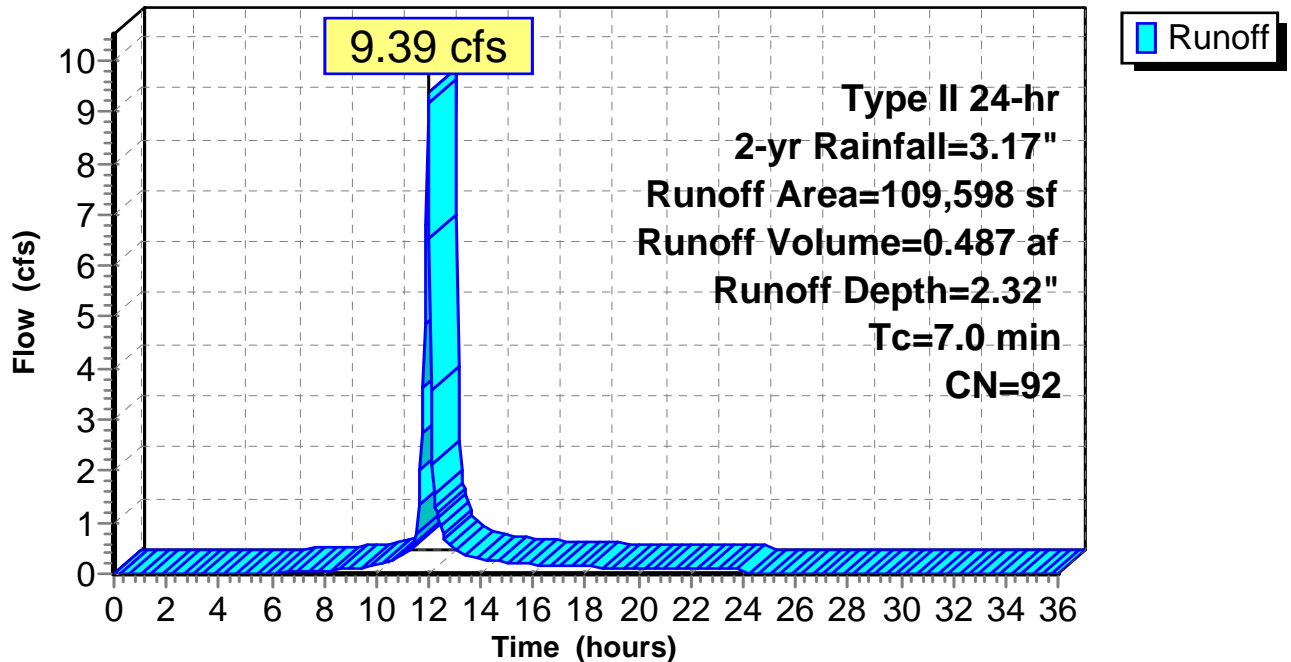Runoff   =   2.03 cfs @   11.98 hrs, Volume=   0.103 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	13,720	98	
	12,412	80	>75% Grass cover, Good, HSG D
	26,132	89	Weighted Average
	12,412		47.50% Pervious Area
	13,720		52.50% Impervious Area

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

Subcatchment 4S: Subcatchment 4

Hydrograph

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Type II 24-hr 2-yr Rainfall=3.17"
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Summary for Subcatchment 5S: Subcatchment 5

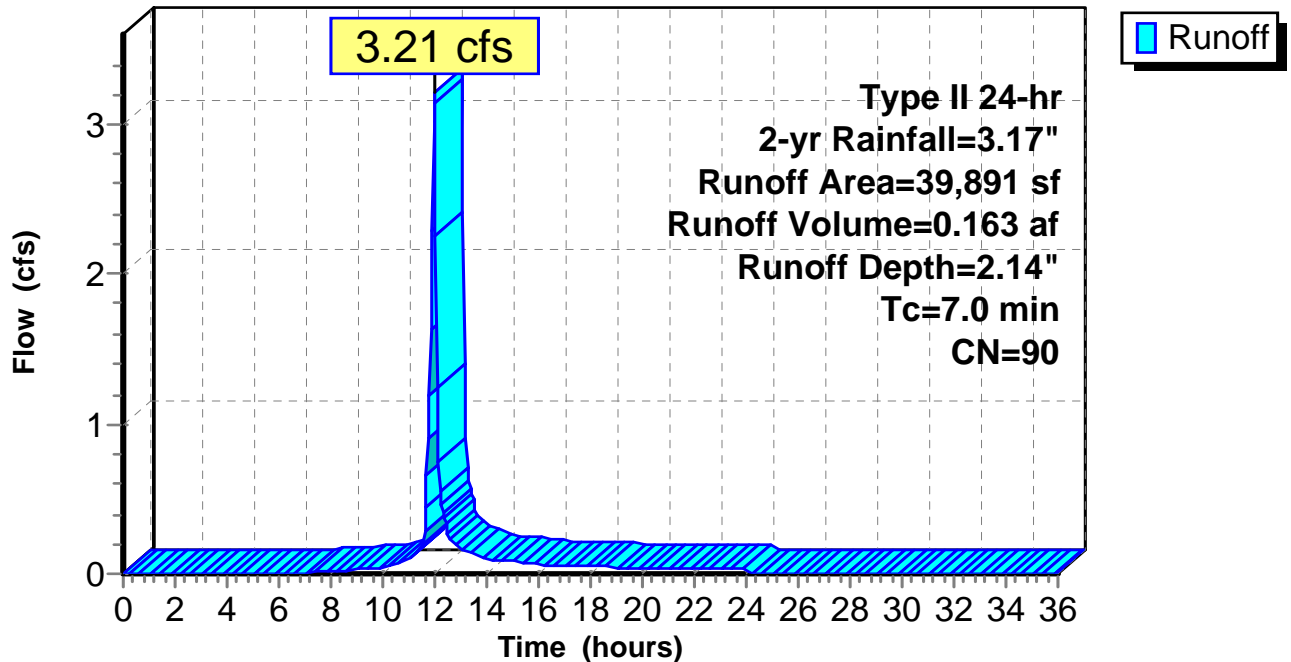Runoff   =   9.39 cfs @   11.98 hrs, Volume=   0.487 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	70,563	98	
	39,035	80	>75% Grass cover, Good, HSG D
	109,598	92	Weighted Average
	39,035		35.62% Pervious Area
	70,563		64.38% Impervious Area

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

Subcatchment 5S: Subcatchment 5

Hydrograph

9.39 cfs

Type II 24-hr
2-yr Rainfall=3.17"
Runoff Area=109,598 sf
Runoff Volume=0.487 af
Runoff Depth=2.32"
Tc=7.0 min
CN=92

□ Runoff

Summary for Subcatchment 6S: Subcatchment 6

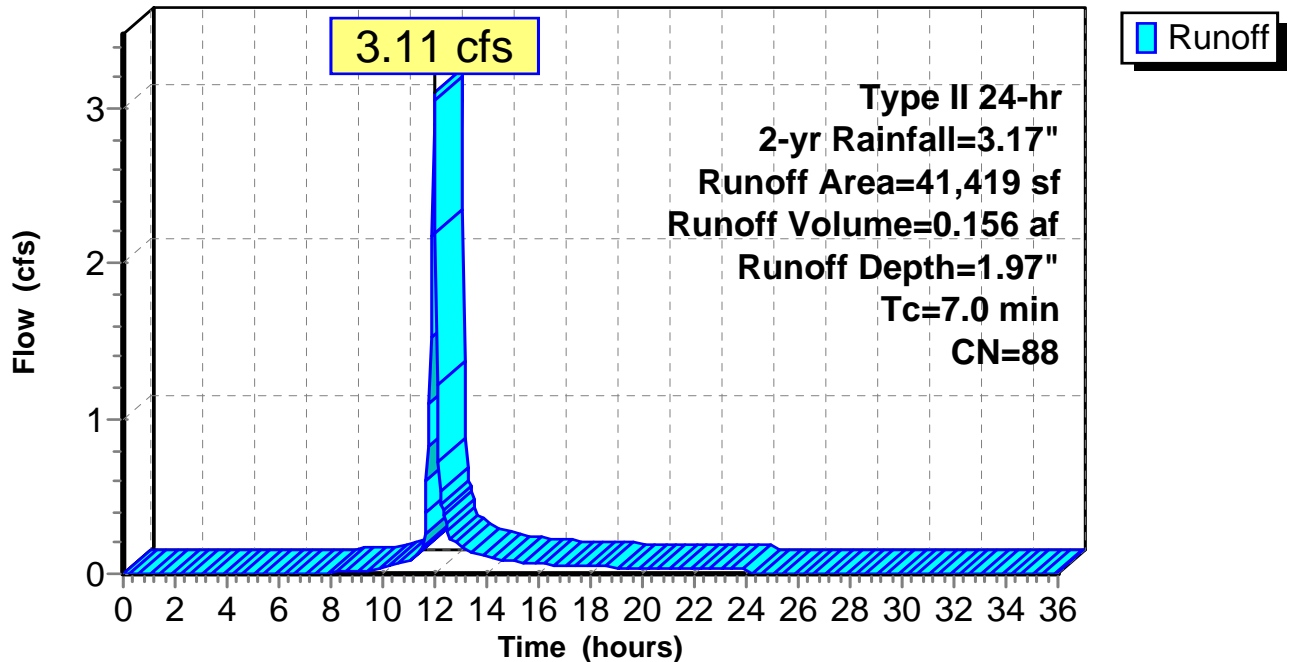Runoff   =   3.21 cfs @   11.98 hrs, Volume=   0.163 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	21,718	98	
	18,173	80	>75% Grass cover, Good, HSG D
	39,891	90	Weighted Average
	18,173		45.56% Pervious Area
	21,718		54.44% Impervious Area

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

Subcatchment 6S: Subcatchment 6

Hydrograph

Summary for Subcatchment 7S: Subcatchment 7

Runoff   =   3.11 cfs @   11.98 hrs, Volume=   0.156 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	17,297	98	
	24,122	80	>75% Grass cover, Good, HSG D
	41,419	88	Weighted Average
	24,122		58.24% Pervious Area
	17,297		41.76% Impervious Area

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

Subcatchment 7S: Subcatchment 7

Hydrograph

Summary for Subcatchment 8S: Subcatchment 8

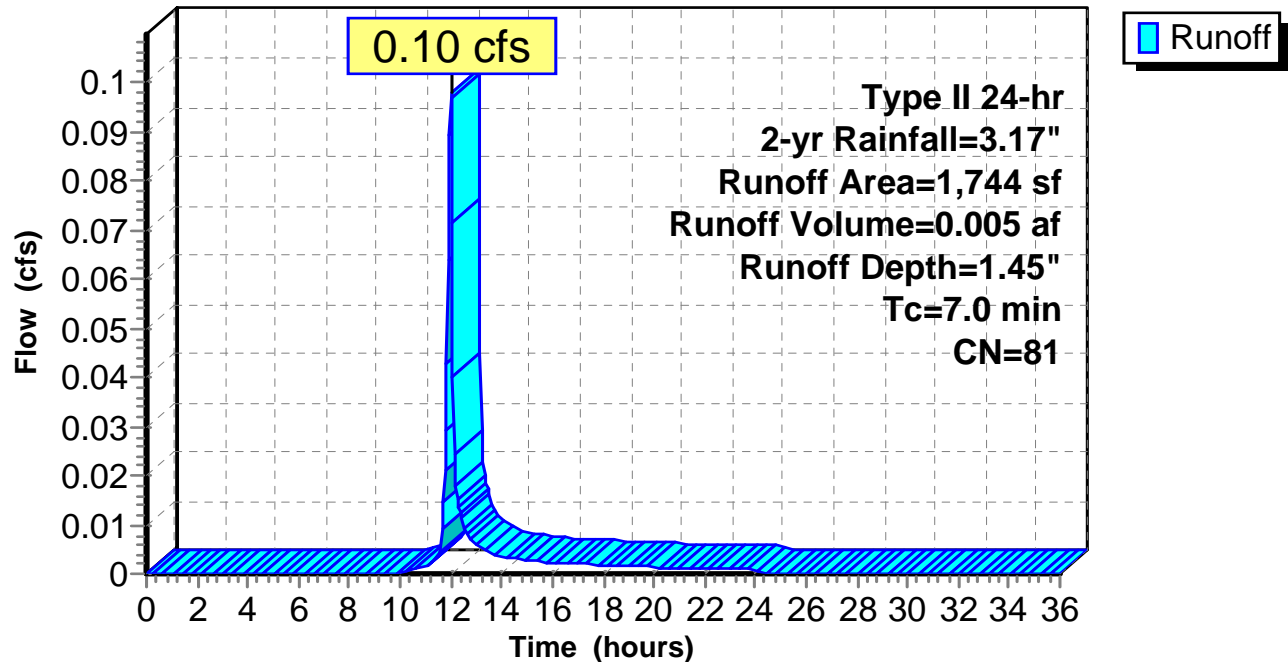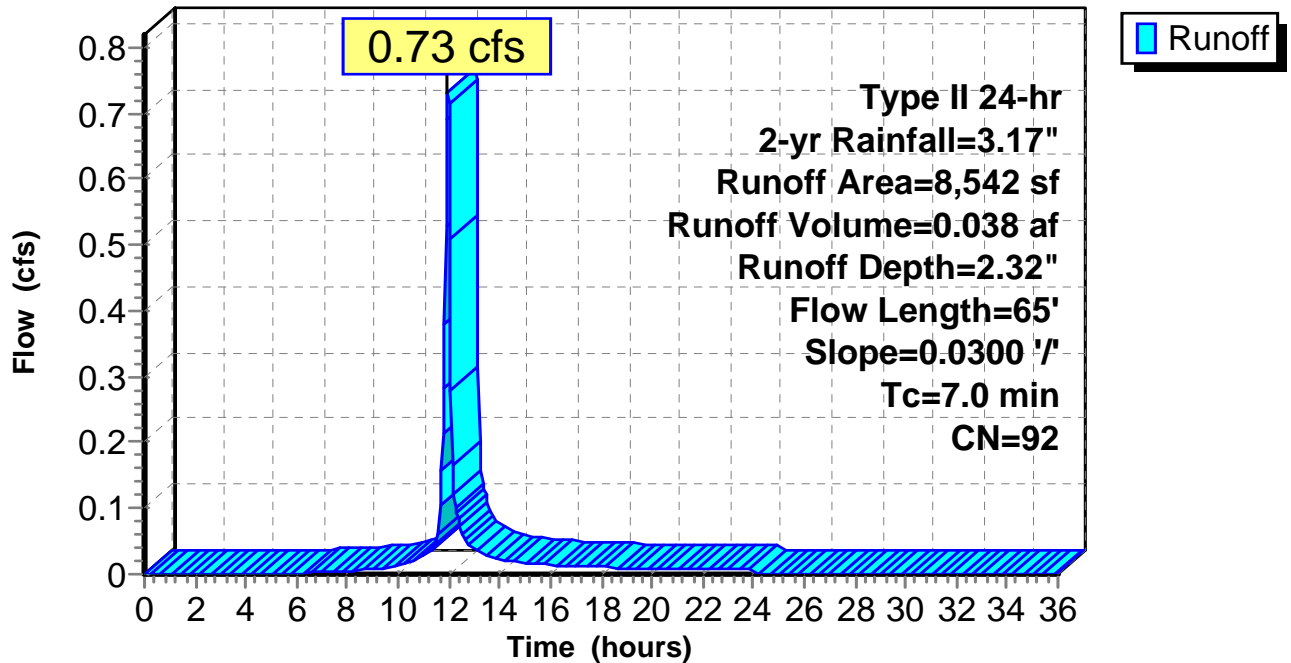Runoff   =   0.10 cfs @   11.99 hrs, Volume=   0.005 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
	1,681	80	>75% Grass cover, Good, HSG D
*	63	98	
	1,744	81	Weighted Average
	1,681		96.39% Pervious Area
	63		3.61% Impervious Area

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

Subcatchment 8S: Subcatchment 8

Hydrograph

Type II 24-hr
2-yr Rainfall=3.17"
Runoff Area=1,744 sf
Runoff Volume=0.005 af
Runoff Depth=1.45"
Tc=7.0 min
CN=81

Summary for Subcatchment SA: Subcatchment A

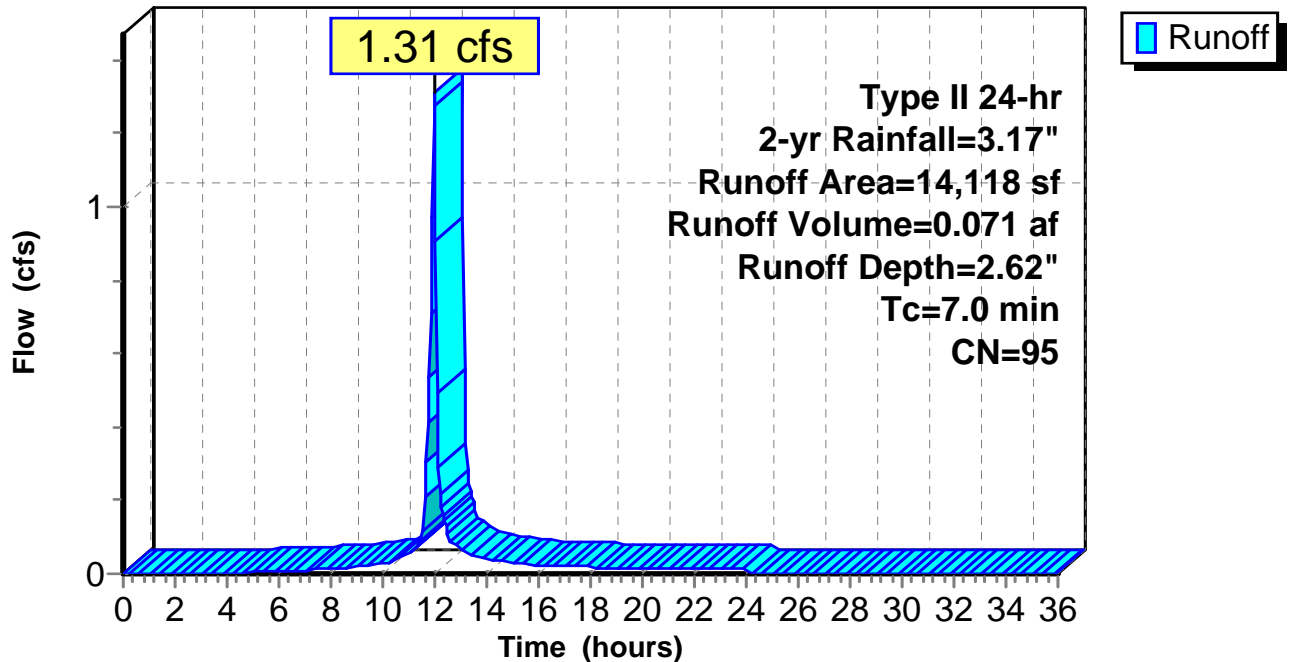Runoff   =   0.73 cfs @   11.98 hrs, Volume=   0.038 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	5,794	98	
	2,748	80	>75% Grass cover, Good, HSG D
	8,542	92	Weighted Average
	2,748		32.17% Pervious Area
	5,794		67.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	65	0.0300	1.48		**Sheet Flow,**
					Smooth surfaces n= 0.011 P2= 3.17"
6.3					**Direct Entry, min**
7.0	65	Total			

Subcatchment SA: Subcatchment A

Hydrograph

Type II 24-hr
2-yr Rainfall=3.17"
Runoff Area=8,542 sf
Runoff Volume=0.038 af
Runoff Depth=2.32"
Flow Length=65'
Slope=0.0300 '/'
Tc=7.0 min
CN=92

0.73 cfs

Runoff

Summary for Subcatchment SB: Subcatchment B

Runoff   =   1.31 cfs @ 11.98 hrs, Volume=   0.071 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	11,919	98	
	2,199	80	>75% Grass cover, Good, HSG D
	14,118	95	Weighted Average
	2,199		15.58% Pervious Area
	11,919		84.42% Impervious Area

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

Subcatchment SB: Subcatchment B

Hydrograph

Summary for Reach 1SP: Study Point 1

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

Inflow   =   0.99 cfs @ 14.74 hrs, Volume=   0.664 af
Outflow   =   0.99 cfs @ 14.74 hrs, Volume=   0.664 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 1SP: Study Point 1

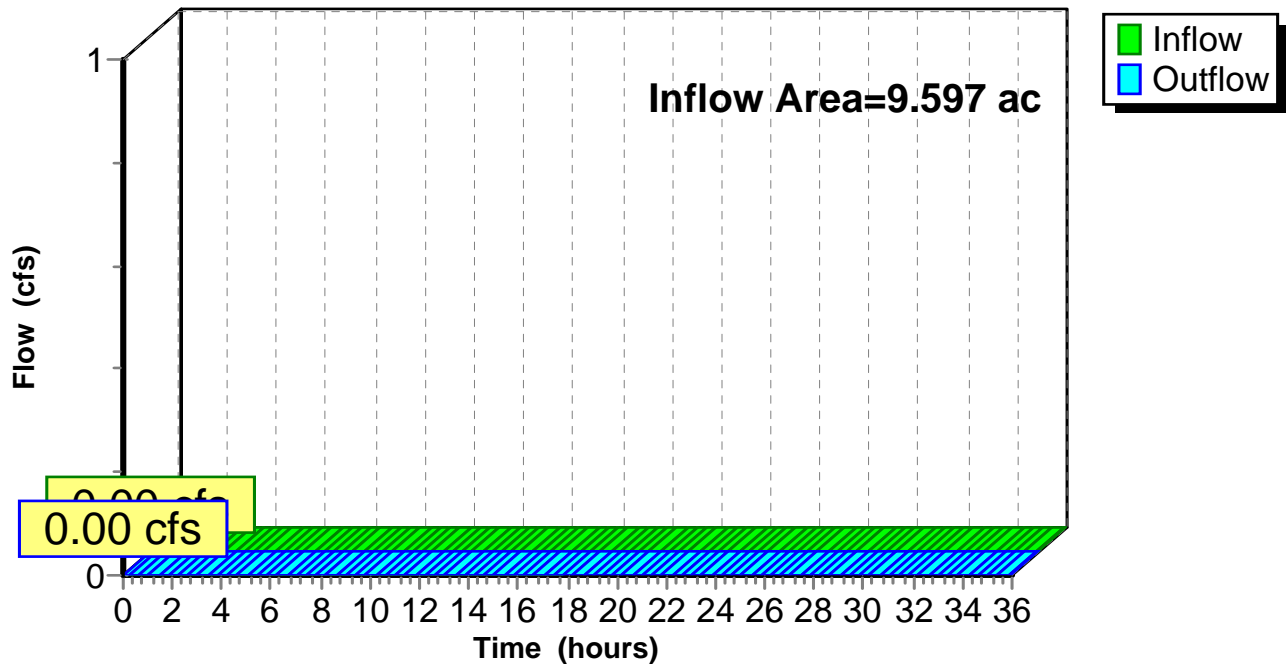**Hydrograph**

Summary for Reach 2SP: Study Point 2

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

Inflow Area =   9.597 ac, 51.35% Impervious, Inflow Depth = 0.00"   for 2-yr event
Inflow   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Outflow   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 2SP: Study Point 2

Hydrograph

Inflow Area=9.597 ac

Legend: Inflow, Outflow

Summary for Reach 3SP: Study Point 3
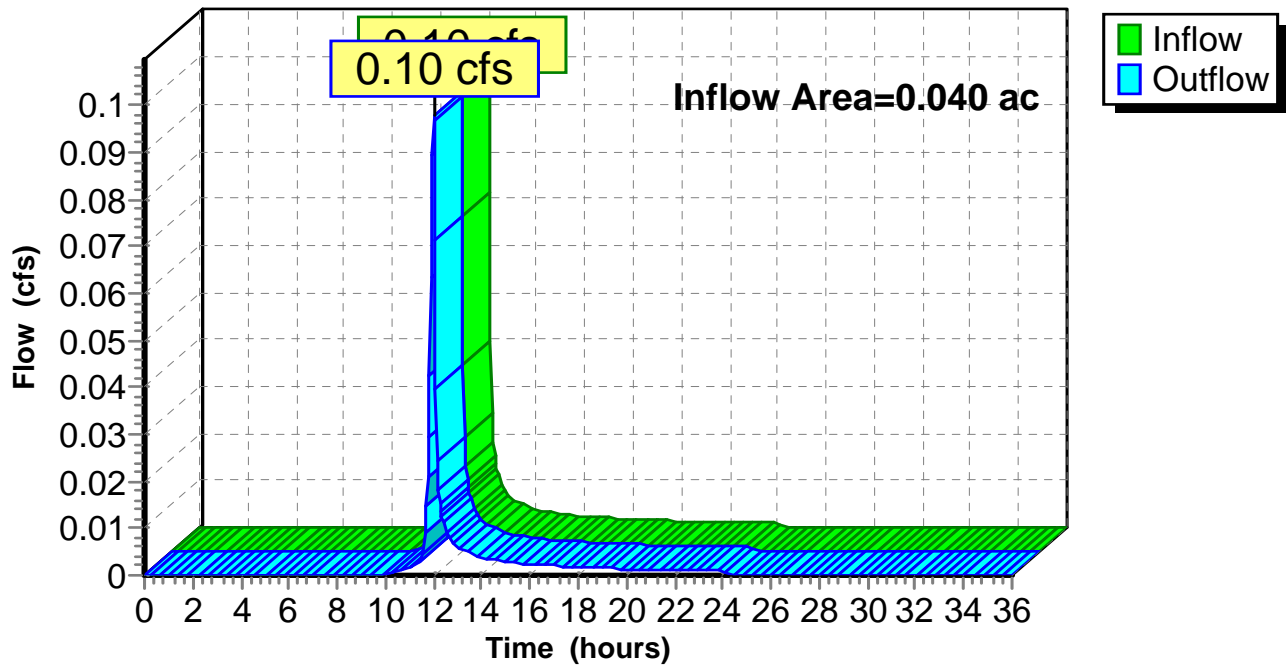
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =   0.040 ac,   3.61% Impervious, Inflow Depth = 1.45"   for 2-yr event
Inflow   =   0.10 cfs @   11.99 hrs, Volume=   0.005 af
Outflow   =   0.10 cfs @   11.99 hrs, Volume=   0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 3SP: Study Point 3

Hydrograph

Summary for Reach 4SP: Study Point 4
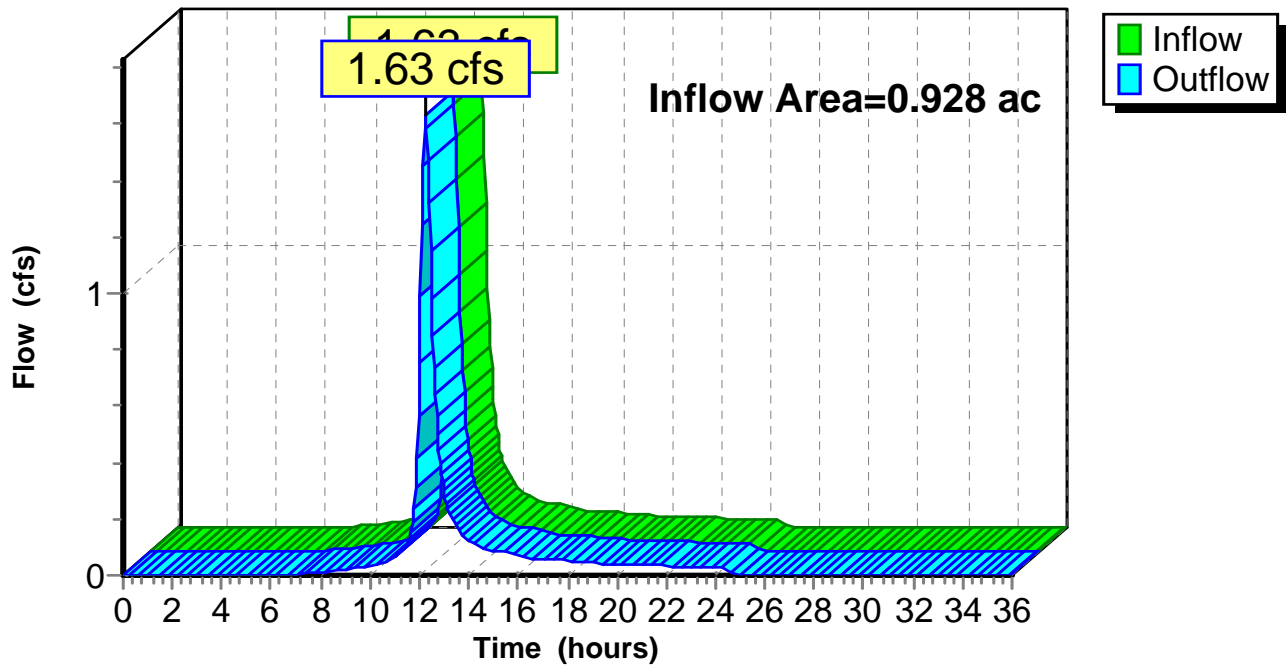
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =   0.928 ac, 47.45% Impervious, Inflow Depth = 2.05"   for 2-yr event
Inflow   =   1.63 cfs @   12.25 hrs, Volume=   0.159 af
Outflow   =   1.63 cfs @   12.25 hrs, Volume=   0.159 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 4SP: Study Point 4

Hydrograph

Summary for Pond 1P: Wetland A

Inflow Area =   9.597 ac, 51.35% Impervious, Inflow Depth > 1.66"   for 2-yr event
Inflow   =   8.55 cfs @ 12.20 hrs, Volume=   1.329 af
Outflow   =   0.99 cfs @ 14.74 hrs, Volume=   0.664 af, Atten= 88%, Lag= 152.1 min
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Secondary =   0.99 cfs @ 14.74 hrs, Volume=   0.664 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Starting Elev= 63.50' Surf.Area= 14,739 sf   Storage= 17,429 cf
Peak Elev= 65.32' @ 14.74 hrs   Surf.Area= 22,524 sf   Storage= 51,207 cf   (33,778 cf above start)

Plug-Flow detention time= 720.2 min calculated for 0.264 af (20% of inflow)
Center-of-Mass det. time= 253.0 min (1,153.6 - 900.7)

Volume	Invert	Avail.Storage	Storage Description
#1	62.00'	209,276 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.00	8,500	0	0
65.00	20,977	44,216	44,216
70.00	45,047	165,060	209,276

Device	Routing	Invert	Outlet Devices
#1	Primary	65.75'	**3.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Secondary	62.86'	**12.0" Round Culvert** L= 48.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 62.86' / 58.69' S= 0.0869 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	65.08'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=63.50'   (Free Discharge)
└—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
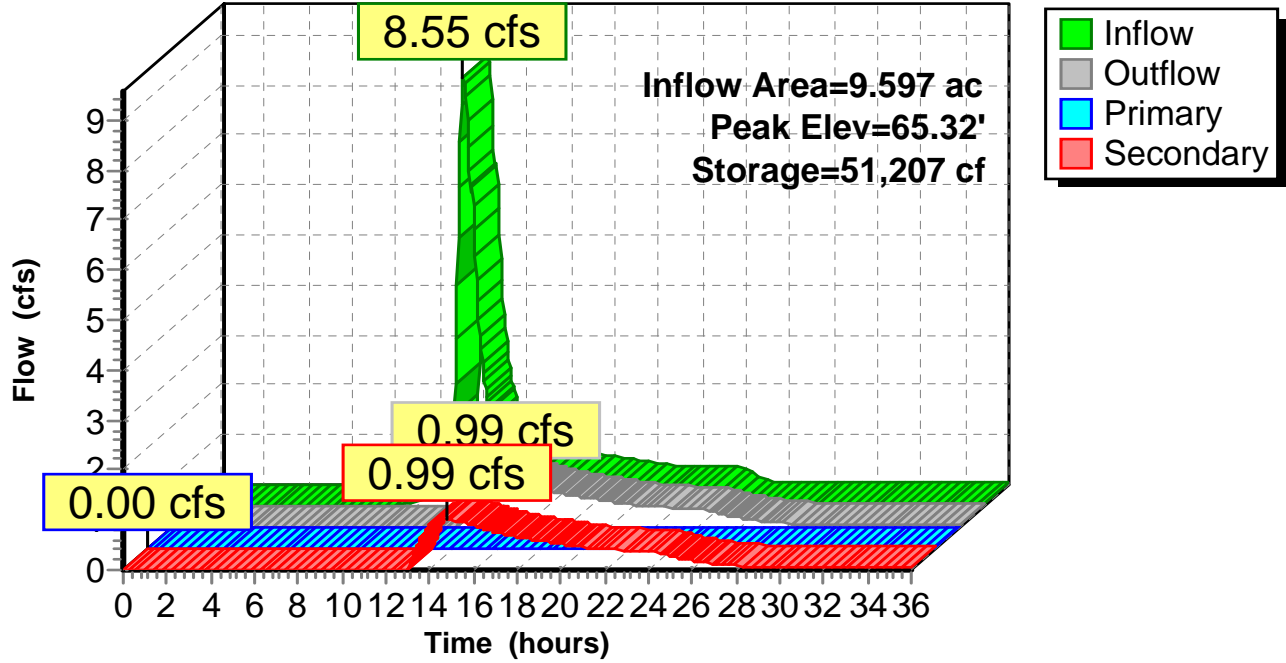
Secondary OutFlow Max=0.98 cfs @ 14.74 hrs HW=65.32'   (Free Discharge)
└—**2=Culvert** (Passes 0.98 cfs of 4.18 cfs potential flow)
   └—**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 1.65 fps)

Pond 1P: Wetland A

Hydrograph

Inflow Area=9.597 ac
Peak Elev=65.32'
Storage=51,207 cf

8.55 cfs
0.99 cfs
0.99 cfs
0.00 cfs

Flow (cfs)

Time (hours)

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Summary for Pond 2P: Wetland B

Inflow Area =   2.082 ac, 66.45% Impervious, Inflow Depth = 2.32"   for 2-yr event
Inflow   =   3.84 cfs @ 12.28 hrs, Volume=   0.403 af
Outflow   =   1.59 cfs @ 12.70 hrs, Volume=   0.208 af, Atten= 58%, Lag= 25.5 min
Primary   =   1.59 cfs @ 12.70 hrs, Volume=   0.208 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.11' @ 12.70 hrs   Surf.Area= 7,808 sf   Storage= 9,275 cf

Plug-Flow detention time= 236.6 min calculated for 0.208 af (52% of inflow)
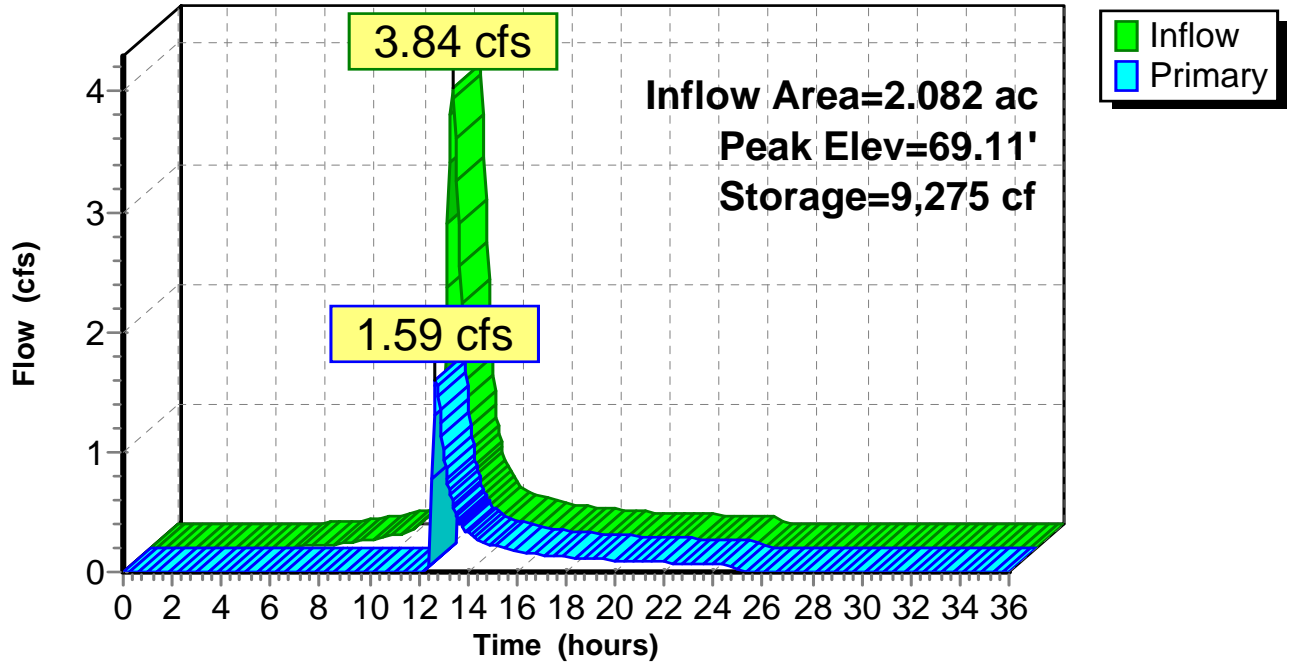Center-of-Mass det. time= 123.2 min (943.8 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	21,636 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.00	2,200	0	0
68.00	4,250	3,225	3,225
69.00	6,286	5,268	8,493
70.00	20,000	13,143	21,636

Device	Routing	Invert	Outlet Devices
#1	Primary	69.00'	**18.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.58 cfs @ 12.70 hrs HW=69.11'   (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.58 cfs @ 0.79 fps)

Pond 2P: Wetland B

Hydrograph

Inflow Area=2.082 ac
Peak Elev=69.11'
Storage=9,275 cf

3.84 cfs

1.59 cfs

Flow (cfs)

Time (hours)

Inflow
Primary

Summary for Pond 3P: Surface Detention

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 0.48'
[79] Warning: Submerged Pond 7P Primary device # 1 OUTLET by 2.28'

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth > 2.04"   for 2-yr event
Inflow   =   14.09 cfs @   12.00 hrs, Volume=   0.718 af
Outflow   =   6.20 cfs @   12.12 hrs, Volume=   0.717 af, Atten= 56%, Lag= 7.6 min
Primary   =   6.20 cfs @   12.12 hrs, Volume=   0.717 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 71.49' @ 12.12 hrs   Surf.Area= 5,093 sf   Storage= 7,720 cf

Plug-Flow detention time= 19.9 min calculated for 0.717 af (100% of inflow)
Center-of-Mass det. time= 17.1 min (852.9 - 835.8)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	21,926 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.00	400	0	0
70.00	2,991	1,696	1,696
72.00	5,812	8,803	10,499
73.50	9,425	11,428	21,926

Device	Routing	Invert	Outlet Devices
#1	Primary	69.10'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 69.10' / 68.75' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	72.50'	**35.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.17 cfs @ 12.12 hrs HW=71.47'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 6.17 cfs @ 5.03 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=69.00'   (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Pond 3P: Surface Detention

Hydrograph

Inflow Area=4.228 ac
Peak Elev=71.49'
Storage=7,720 cf

14.09 cfs
6.20 cfs
0.00 cfs

Legend: Inflow, Outflow, Primary, Secondary

Flow (cfs) vs Time (hours)
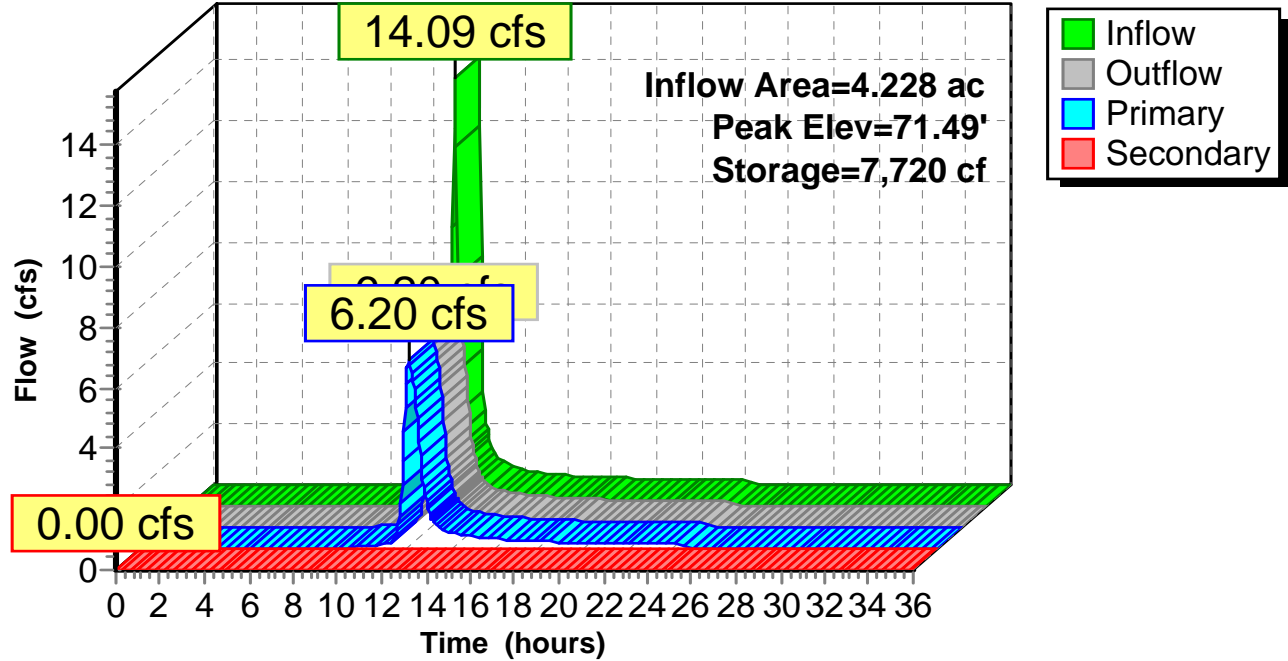
Summary for Pond 4P: Surface Detention

[79] Warning: Submerged Pond PB Primary device # 1 INLET by 2.97'
[78] Warning: Submerged Pond PB Tertiary device # 2 by 2.38'

Inflow Area =	1.275 ac, 52.61% Impervious, Inflow Depth > 2.00" for 2-yr event		
Inflow =	3.14 cfs @ 11.98 hrs, Volume=	0.212 af	
Outflow =	0.26 cfs @ 12.71 hrs, Volume=	0.139 af, Atten= 92%, Lag= 43.5 min	
Primary =	0.26 cfs @ 12.71 hrs, Volume=	0.139 af	
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 70.47' @ 12.71 hrs Surf.Area= 1,840 sf Storage= 4,082 cf

Plug-Flow detention time= 424.7 min calculated for 0.139 af (65% of inflow)
Center-of-Mass det. time= 244.0 min (1,165.9 - 922.0)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	8,676 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	13	0	0
67.00	71	126	126
68.00	928	500	626
69.00	1,378	1,153	1,779
70.00	1,604	1,491	3,270
71.00	2,104	1,854	5,124
72.00	5,000	3,552	8,676

Device	Routing	Invert	Outlet Devices
#1	Primary	67.66'	**1.0" Round Culvert** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.66' / 67.65' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 0.01 sf
#2	Secondary	71.25'	**45.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Primary	70.25'	**6.0" Round Culvert X 3.00** L= 1.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 70.25' / 70.25' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf

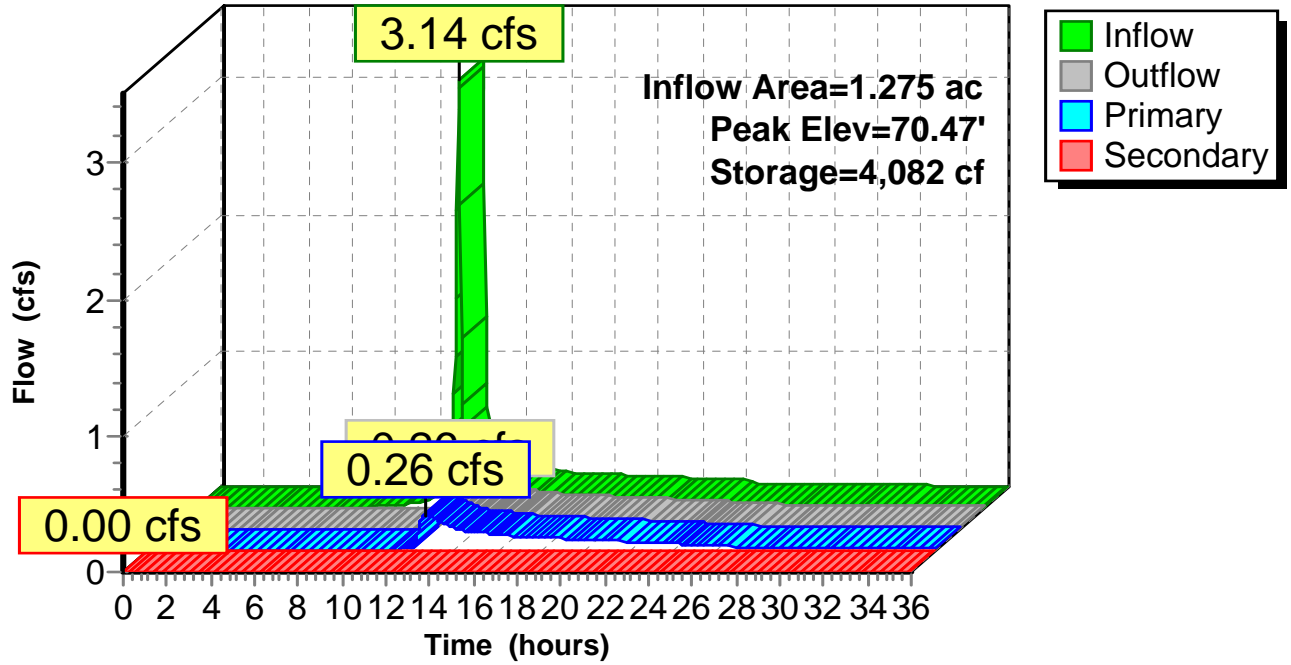**Primary OutFlow** Max=0.26 cfs @ 12.71 hrs HW=70.47' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.03 cfs @ 5.33 fps)
└─**3=Culvert** (Barrel Controls 0.23 cfs @ 1.33 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Pond 4P: Surface Detention

Hydrograph

Inflow Area=1.275 ac
Peak Elev=70.47'
Storage=4,082 cf

3.14 cfs

0.26 cfs

0.00 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs)

Time (hours)

Summary for Pond 5P: OCS-4P

[57] Hint: Peaked at 67.76' (Flood elevation advised)
[79] Warning: Submerged Pond 4P Primary device # 1 INLET by 0.10'

Inflow Area =   1.275 ac, 52.61% Impervious, Inflow Depth > 1.31"   for 2-yr event
Inflow   =   0.26 cfs @   12.71 hrs, Volume=   0.139 af
Outflow   =   0.26 cfs @   12.71 hrs, Volume=   0.139 af, Atten= 0%, Lag= 0.0 min
Primary   =   0.26 cfs @   12.71 hrs, Volume=   0.139 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.76' @ 12.71 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	67.48'	**12.0" Round Culvert**
			L= 81.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.48' / 66.86' S= 0.0077 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.71 hrs HW=67.76'   (Free Discharge)
└—**1=Culvert** (Inlet Controls 0.26 cfs @ 1.43 fps)

Pond 5P: OCS-4P

Hydrograph
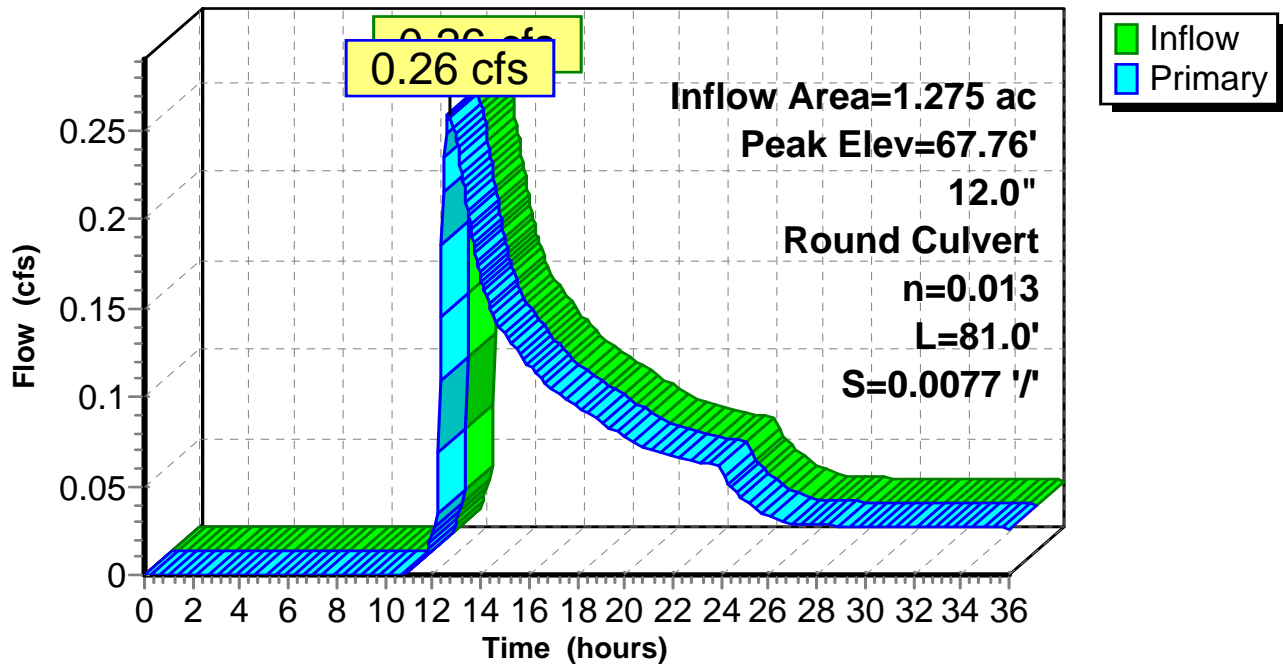
Summary for Pond 6P: Atrium Surface Detention

[79] Warning: Submerged Pond PA Primary device # 1 INLET by 0.89'
[78] Warning: Submerged Pond PA Tertiary device # 2 by 0.06'

Inflow Area	=	2.712 ac, 64.63% Impervious, Inflow Depth > 2.26" for 2-yr event
Inflow	=	9.40 cfs @ 11.98 hrs, Volume= 0.511 af
Outflow	=	9.01 cfs @ 12.00 hrs, Volume= 0.454 af, Atten= 4%, Lag= 1.3 min
Primary	=	9.01 cfs @ 12.00 hrs, Volume= 0.454 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 73.89' @ 12.00 hrs   Surf.Area= 3,415 sf   Storage= 3,658 cf

Plug-Flow detention time= 97.0 min calculated for 0.454 af (89% of inflow)
Center-of-Mass det. time= 33.3 min (850.4 - 817.1)

Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	5,026 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	55	0	0
72.00	327	382	382
73.00	1,694	1,011	1,393
74.25	4,120	3,634	5,026

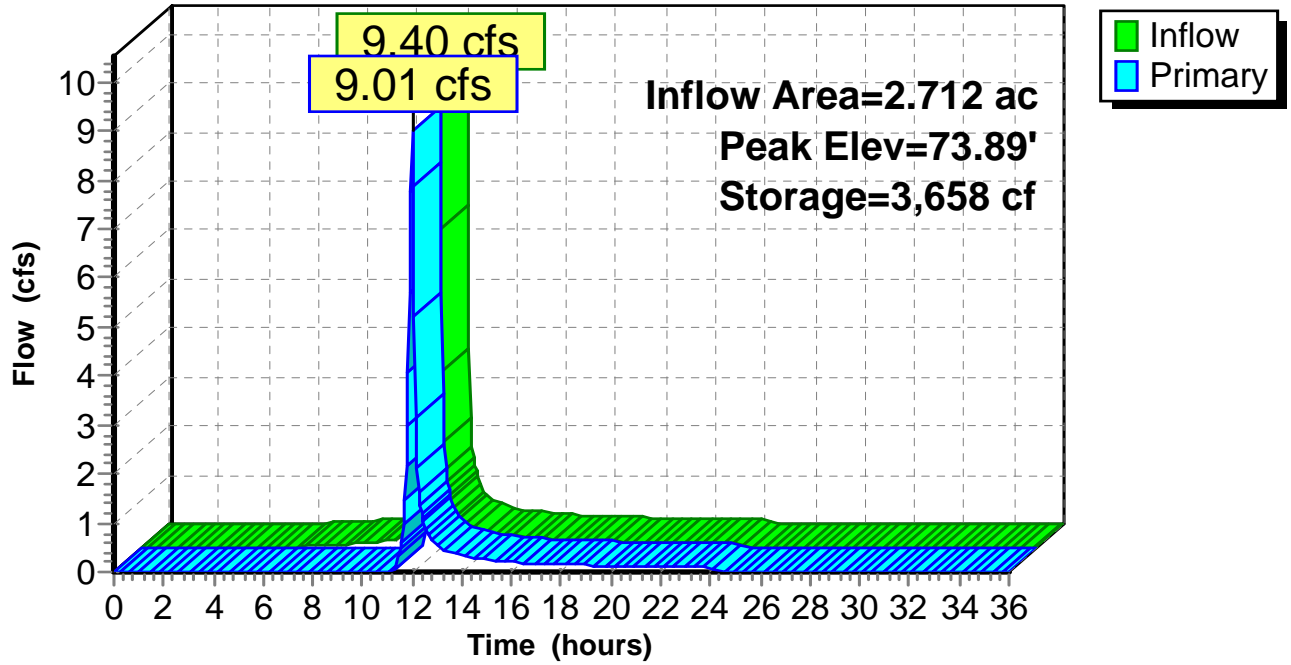| Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**0.1" Round Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 69.20' S= 0.0082 '/' Cc= 0.900 n= 0.013, Flow Area= 0.00 sf
#2	Primary	73.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.96 cfs @ 12.00 hrs HW=73.89'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.00 cfs @ 0.27 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 8.96 cfs @ 1.55 fps)

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Pond 6P: Atrium Surface Detention

Hydrograph

Inflow Area=2.712 ac
Peak Elev=73.89'
Storage=3,658 cf

9.40 cfs
9.01 cfs

Inflow
Primary

Summary for Pond 7P: Riprap Surface Detention

Inflow Area =   0.600 ac, 52.50% Impervious, Inflow Depth = 2.05"   for 2-yr event
Inflow   =   2.03 cfs @   11.98 hrs, Volume=   0.103 af
Outflow   =   1.93 cfs @   12.00 hrs, Volume=   0.101 af, Atten= 5%, Lag= 1.2 min
Primary   =   1.93 cfs @   12.00 hrs, Volume=   0.101 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.74' @ 12.00 hrs   Surf.Area= 277 sf   Storage= 285 cf

Plug-Flow detention time= 22.6 min calculated for 0.101 af (98% of inflow)
Center-of-Mass det. time= 10.5 min (819.8 - 809.3)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	2,180 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	50	0	0
73.00	310	360	360
74.00	846	578	938
75.00	1,637	1,242	2,180

Device	Routing	Invert	Outlet Devices
#1	Primary	71.83'	**12.0" Round Culvert** L= 375.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.83' / 69.20' S= 0.0070 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.92 cfs @ 12.00 hrs HW=72.74'   (Free Discharge)
 └─**1=Culvert** (Inlet Controls 1.92 cfs @ 2.56 fps)

Pond 7P: Riprap Surface Detention

Hydrograph

Inflow Area=0.600 ac
Peak Elev=72.74'
Storage=285 cf
12.0"
Round Culvert
n=0.013
L=375.0'
S=0.0070 '/'

2.03 cfs
1.93 cfs

Legend: Inflow, Primary

Flow (cfs) vs Time (hours)
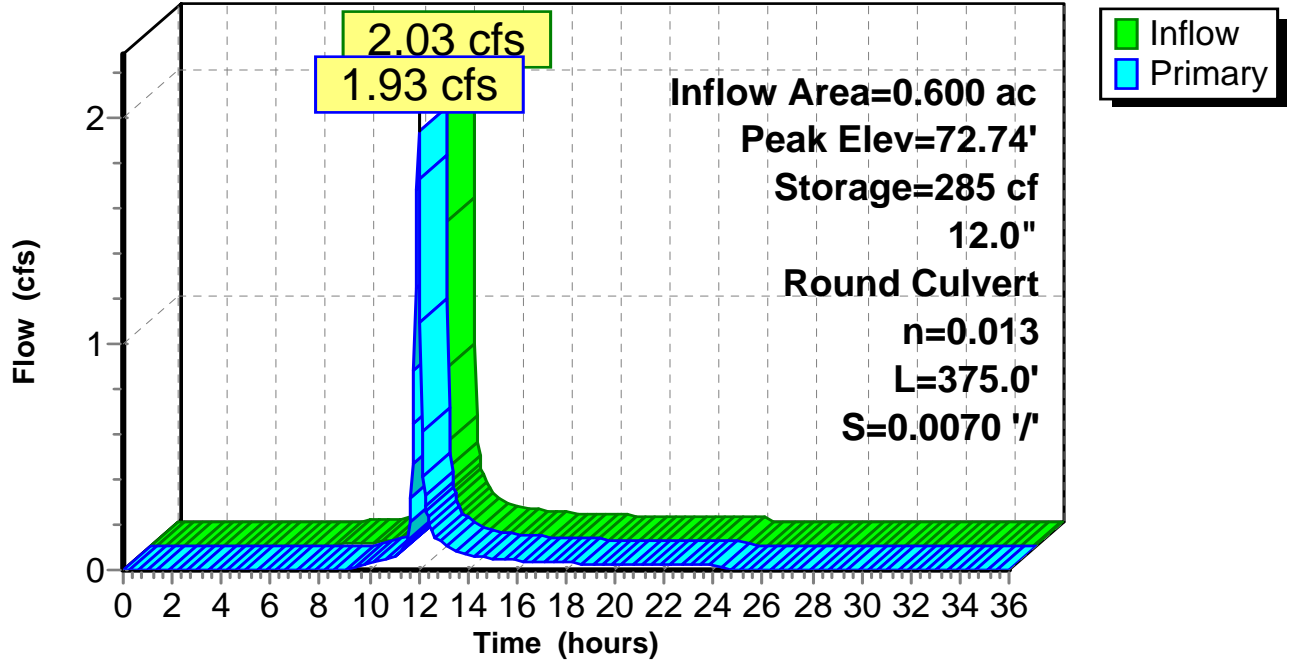
Summary for Pond 8P: OCS-DMH7

[57] Hint: Peaked at 67.02' (Flood elevation advised)

Inflow Area =	4.228 ac, 60.70% Impervious, Inflow Depth > 2.03" for 2-yr event			
Inflow =	6.20 cfs @ 12.12 hrs,	Volume=	0.717 af	
Outflow =	6.20 cfs @ 12.12 hrs,	Volume=	0.717 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.36 cfs @ 12.12 hrs,	Volume=	0.011 af	
Secondary =	5.84 cfs @ 12.12 hrs,	Volume=	0.705 af	

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.02' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**12.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 66.60' / 66.60' S= 0.0000 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#2	Secondary	65.70'	**24.0" Round Culvert**
			L= 40.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 65.70' / 65.50' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=0.35 cfs @ 12.12 hrs HW=67.02' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.35 cfs @ 1.67 fps)

Secondary OutFlow Max=5.82 cfs @ 12.12 hrs HW=67.02' (Free Discharge)
└─**2=Culvert** (Barrel Controls 5.82 cfs @ 3.76 fps)

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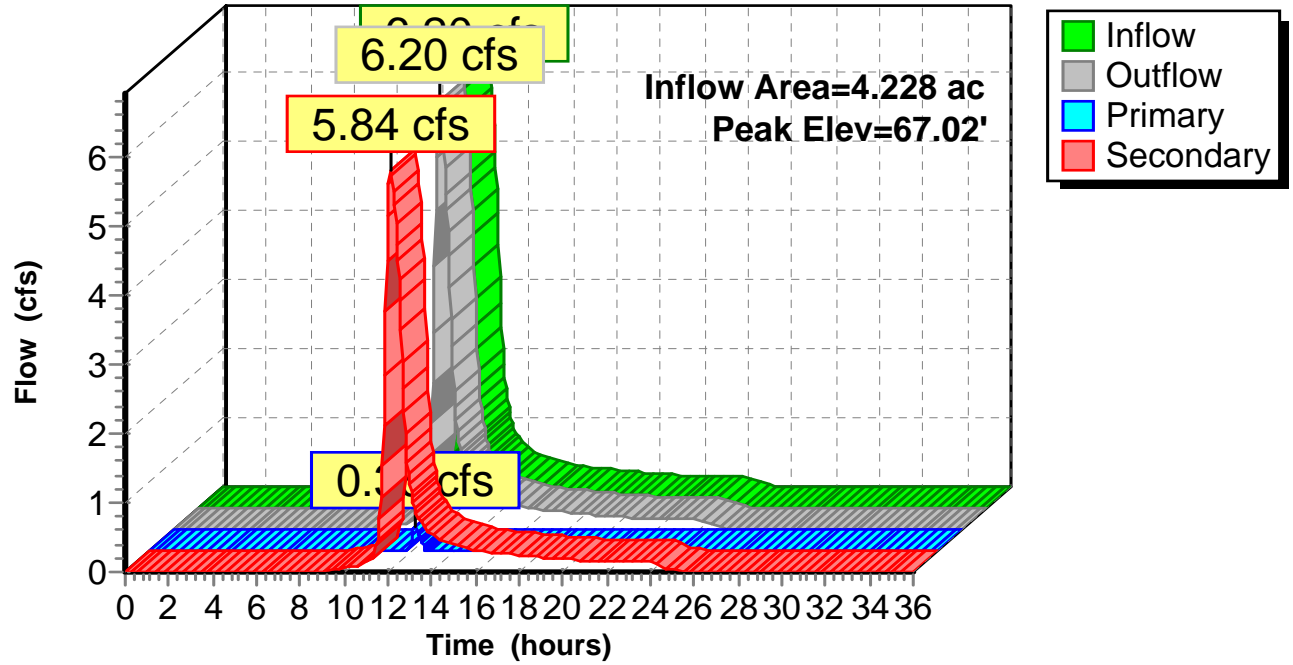
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Pond 8P: OCS-DMH7

Hydrograph

Inflow Area=4.228 ac
Peak Elev=67.02'

6.20 cfs

5.84 cfs

0.?? cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs)

Time (hours)

Summary for Pond 9P: UG Detention

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth = 0.03"   for 2-yr event
Inflow   =   0.22 cfs @   12.10 hrs, Volume=   0.009 af
Outflow   =   0.07 cfs @   12.55 hrs, Volume=   0.009 af, Atten= 69%, Lag= 27.2 min
Primary   =   0.07 cfs @   12.55 hrs, Volume=   0.009 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 65.91' @ 12.55 hrs   Surf.Area= 1,536 sf   Storage= 300 cf

Plug-Flow detention time= 137.0 min calculated for 0.009 af (97% of inflow)
Center-of-Mass det. time= 137.6 min (873.6 - 736.1)

Volume	Invert	Avail.Storage	Storage Description
#1	65.70'	2,488 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
			2,619 cf Overall x 95.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.70	1,536	0	0
67.40	1,536	2,611	2,611
67.41	5	8	2,619

Device	Routing	Invert	Outlet Devices
#1	Primary	65.70'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 65.70' / 65.60' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Primary	67.00'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.90' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.07 cfs @ 12.55 hrs HW=65.91'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.07 cfs @ 1.70 fps)
 └─**2=Culvert** (Controls 0.00 cfs)
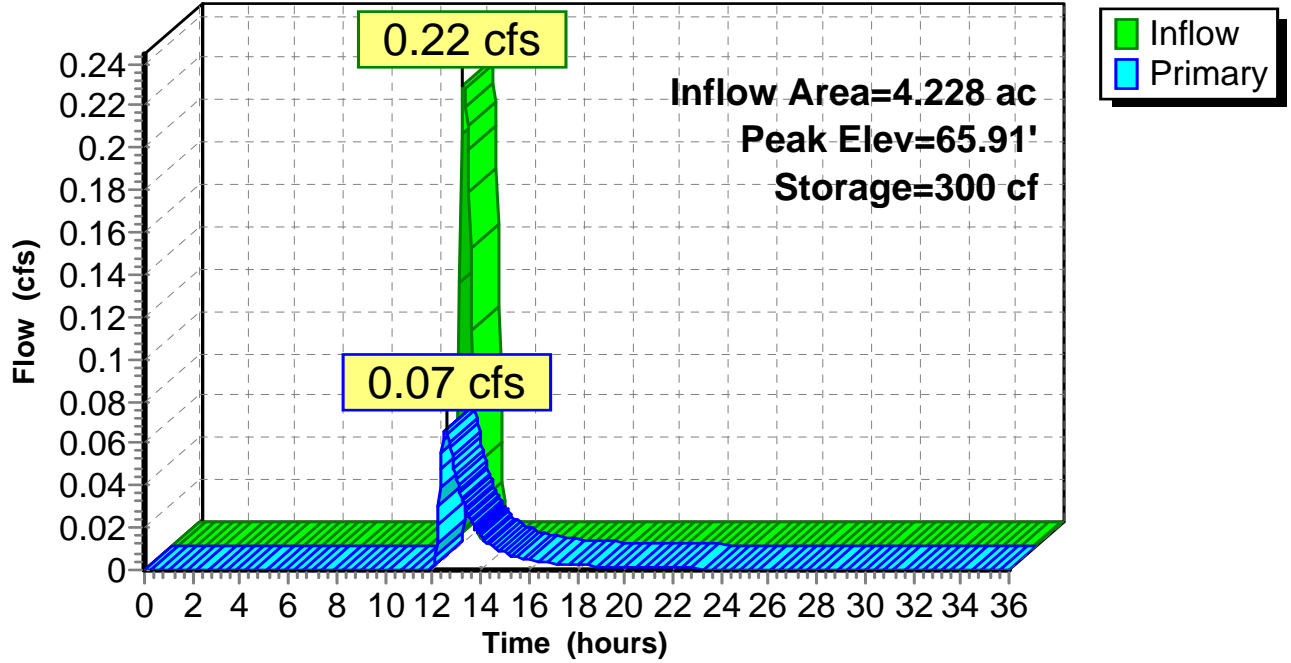
Pond 9P: UG Detention

Hydrograph

Inflow Area=4.228 ac
Peak Elev=65.91'
Storage=300 cf

0.22 cfs

0.07 cfs

Flow (cfs)

Time (hours)

Inflow
Primary

Summary for Pond 10P: Isolator Row x5

[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[81] Warning: Exceeded Pond 8P by 0.87' @ 35.95 hrs

Inflow Area =		4.228 ac,	60.70% Impervious,	Inflow Depth =	0.03" for 2-yr event
Inflow	=	0.36 cfs @	12.12 hrs,	Volume=	0.011 af
Outflow	=	0.37 cfs @	12.12 hrs,	Volume=	0.011 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.22 cfs @	12.10 hrs,	Volume=	0.009 af
Secondary =		0.14 cfs @	12.12 hrs,	Volume=	0.002 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.21' @ 12.12 hrs   Surf.Area= 0.002 ac   Storage= 0.001 af

Plug-Flow detention time= 3.1 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 3.3 min (734.9 - 731.7)

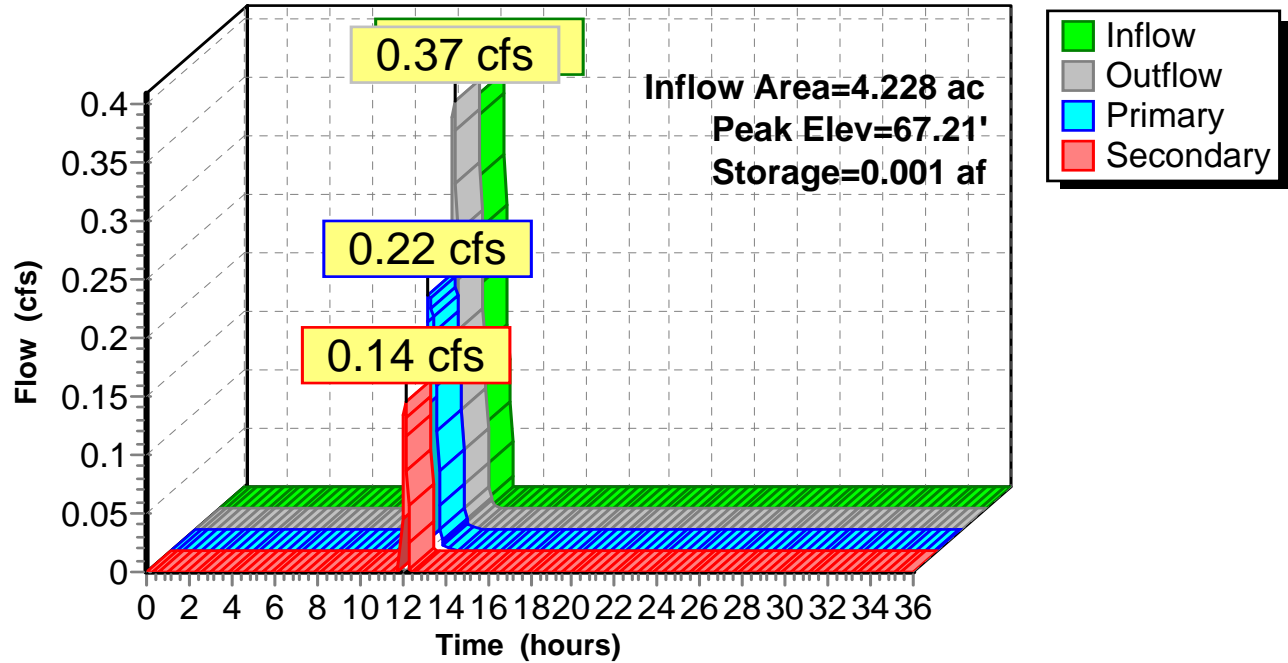| Volume	Invert	Avail.Storage	Storage Description
#1	66.60'	0.002 af	**ADS_StormTech RC-310** x 5
			Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
			Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
			Row Length Adjustment= +0.44' x 2.07 sf x 1 rows

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**4.0" Round Culvert**
			L= 5.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 66.60' / 66.55' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Secondary	67.00'	**12.0" Round Culvert**
			L= 50.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.55' S= 0.0090 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.22 cfs @ 12.10 hrs HW=67.20'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.22 cfs @ 2.50 fps)

Secondary OutFlow Max=0.13 cfs @ 12.12 hrs HW=67.20'   (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.13 cfs @ 1.20 fps)

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Pond 10P: Isolator Row x5

Hydrograph

Summary for Pond PA: USF A

Inflow Area =   0.196 ac, 67.83% Impervious, Inflow Depth = 2.32"   for 2-yr event
Inflow   =   0.73 cfs @   11.98 hrs, Volume=   0.038 af
Outflow   =   0.02 cfs @   14.39 hrs, Volume=   0.024 af, Atten= 97%, Lag= 144.8 min
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Tertiary   =   0.02 cfs @   14.39 hrs, Volume=   0.024 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 76.78' @ 14.39 hrs   Surf.Area= 951 sf   Storage= 1,128 cf

Plug-Flow detention time= 545.8 min calculated for 0.024 af (64% of inflow)
Center-of-Mass det. time= 444.8 min (1,240.6 - 795.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	2,192 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	585	0.0	0	0
73.01	585	30.0	2	2
75.99	585	30.0	523	525
76.00	585	100.0	6	531
77.00	1,056	100.0	821	1,351
77.33	1,260	100.0	382	1,733
77.67	1,437	100.0	458	2,192

Device	Routing	Invert	Outlet Devices
#1	Primary	73.00'	**12.0" Round Culvert** L= 60.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 73.00' / 72.20' S= 0.0133 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Tertiary	73.83'	**2.410 in/hr Exfiltration over Surface area above 73.83'** Excluded Surface area = 585 sf
#3	Device 1	77.00'	**24.0" x 24.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 in 4.0" x 4.0" Grate Limited to weir flow at low heads
#4	Secondary	77.50'	**30.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

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Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00'   (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
　└─**3=Orifice/Grate** (Controls 0.00 cfs)

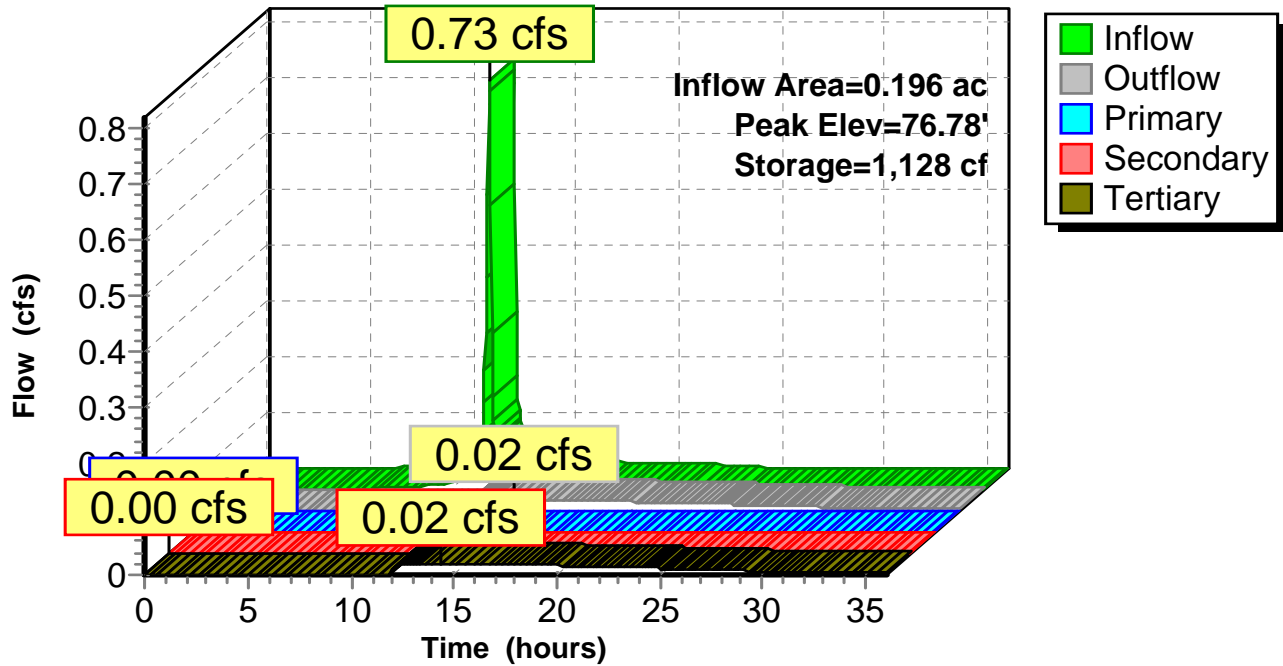**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=73.00'   (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.02 cfs @ 14.39 hrs HW=76.78'   (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond PA: USF A

Hydrograph

0.73 cfs

Inflow Area=0.196 ac
Peak Elev=76.78'
Storage=1,128 cf

- Inflow
- Outflow
- Primary
- Secondary
- Tertiary

0.02 cfs

0.00 cfs   **0.02 cfs**

Flow (cfs)

Time (hours)

Summary for Pond PB: USF B

Inflow Area =   0.324 ac, 84.42% Impervious, Inflow Depth = 2.62"   for 2-yr event
Inflow   =   1.31 cfs @   11.98 hrs, Volume=   0.071 af
Outflow   =   0.05 cfs @   13.55 hrs, Volume=   0.056 af, Atten= 96%, Lag= 94.6 min
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Tertiary   =   0.05 cfs @   13.55 hrs, Volume=   0.056 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 71.59' @ 13.55 hrs   Surf.Area= 1,588 sf   Storage= 2,056 cf

Plug-Flow detention time= 526.6 min calculated for 0.056 af (79% of inflow)
Center-of-Mass det. time= 446.4 min (1,225.2 - 778.8)

Volume	Invert	Avail.Storage	Storage Description
#1	67.86'	3,817 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.86	715	0.0	0	0
67.87	715	30.0	2	2
70.25	715	30.0	511	513
70.26	715	100.0	7	520
72.00	1,853	100.0	2,234	2,754
72.50	2,400	100.0	1,063	3,817

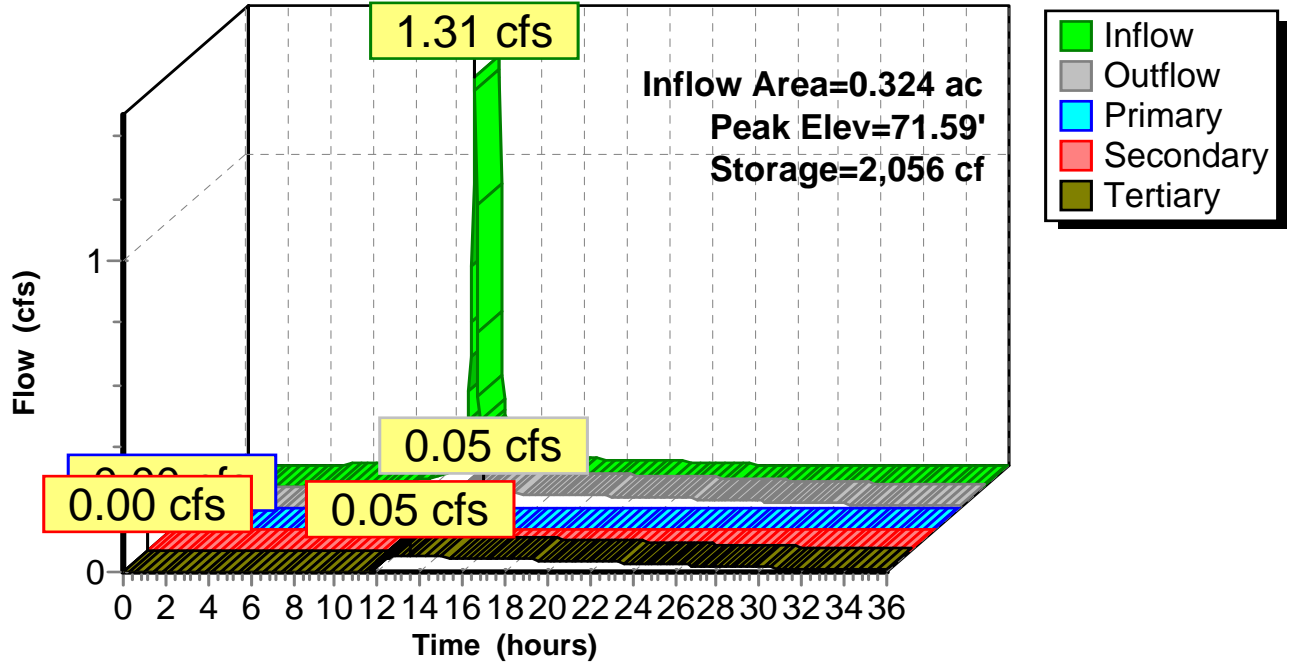| Device	Routing	Invert	Outlet Devices
#1	Primary	67.50'	**15.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.50' / 67.40' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Tertiary	68.09'	**2.410 in/hr Exfiltration over Surface area above 68.09'** Excluded Surface area = 715 sf
#3	Device 1	72.00'	**24.0" x 24.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 in 4.0" x 4.0" Grate Limited to weir flow at low heads
#4	Secondary	72.25'	**30.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=67.86'   (Free Discharge)
└─**1=Culvert** (Passes 0.00 cfs of 0.39 cfs potential flow)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=67.86'   (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.05 cfs @ 13.55 hrs HW=71.59'   (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

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Pond PB: USF B

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1   Runoff Area=87,665 sf 15.27% Impervious Runoff Depth=2.91"
Flow Length=177' Slope=0.0100 '/' Tc=29.9 min CN=83 Runoff=5.08 cfs 0.489 af

Subcatchment 2S: Subcatchment 2   Runoff Area=90,682 sf 66.45% Impervious Runoff Depth=3.81"
Flow Length=178' Slope=0.0075 '/' Tc=33.7 min CN=92 Runoff=6.18 cfs 0.660 af

Subcatchment 3S: Subcatchment 3   Runoff Area=40,444 sf 47.45% Impervious Runoff Depth=3.49"
Flow Length=185' Slope=0.0200 '/' Tc=30.6 min CN=89 Runoff=2.73 cfs 0.270 af

Subcatchment 4S: Subcatchment 4   Runoff Area=26,132 sf 52.50% Impervious Runoff Depth=3.49"
Tc=7.0 min CN=89 Runoff=3.36 cfs 0.175 af

Subcatchment 5S: Subcatchment 5   Runoff Area=109,598 sf 64.38% Impervious Runoff Depth=3.81"
Tc=7.0 min CN=92 Runoff=14.92 cfs 0.798 af

Subcatchment 6S: Subcatchment 6   Runoff Area=39,891 sf 54.44% Impervious Runoff Depth=3.60"
Tc=7.0 min CN=90 Runoff=5.23 cfs 0.275 af

Subcatchment 7S: Subcatchment 7   Runoff Area=41,419 sf 41.76% Impervious Runoff Depth=3.39"
Tc=7.0 min CN=88 Runoff=5.21 cfs 0.269 af

Subcatchment 8S: Subcatchment 8   Runoff Area=1,744 sf 3.61% Impervious Runoff Depth=2.73"
Tc=7.0 min CN=81 Runoff=0.18 cfs 0.009 af

Subcatchment SA: Subcatchment A   Runoff Area=8,542 sf 67.83% Impervious Runoff Depth=3.81"
Flow Length=65' Slope=0.0300 '/' Tc=7.0 min CN=92 Runoff=1.16 cfs 0.062 af

Subcatchment SB: Subcatchment B   Runoff Area=14,118 sf 84.42% Impervious Runoff Depth=4.13"
Tc=7.0 min CN=95 Runoff=2.01 cfs 0.112 af

Reach 1SP: Study Point 1   Inflow=4.87 cfs 1.743 af
Outflow=4.87 cfs 1.743 af

Reach 2SP: Study Point 2   Inflow=1.02 cfs 0.063 af
Outflow=1.02 cfs 0.063 af

Reach 3SP: Study Point 3   Inflow=0.18 cfs 0.009 af
Outflow=0.18 cfs 0.009 af

Reach 4SP: Study Point 4   Inflow=2.73 cfs 0.270 af
Outflow=2.73 cfs 0.270 af

Pond 1P: Wetland A   Peak Elev=66.02' Storage=68,121 cf Inflow=18.24 cfs 2.472 af
Primary=1.02 cfs 0.063 af Secondary=4.87 cfs 1.743 af Outflow=5.89 cfs 1.806 af

Pond 2P: Wetland B   Peak Elev=69.25' Storage=10,461 cf Inflow=6.18 cfs 0.660 af
Outflow=5.34 cfs 0.465 af

Pond 3P: Surface Detention   Peak Elev=72.57' Storage=14,180 cf Inflow=22.54 cfs 1.236 af
Primary=7.86 cfs 1.225 af Secondary=1.40 cfs 0.009 af Outflow=9.27 cfs 1.234 af

Pond 4P: Surface Detention   Peak Elev=71.21' Storage=5,616 cf Inflow=5.26 cfs 0.363 af
Primary=1.91 cfs 0.284 af Secondary=0.00 cfs 0.000 af Outflow=1.91 cfs 0.284 af

Pond 5P: OCS-4P   Peak Elev=68.39' Inflow=1.91 cfs 0.284 af
12.0" Round Culvert n=0.013 L=81.0' S=0.0077 '/' Outflow=1.91 cfs 0.284 af

Pond 6P: Atrium Surface Detention   Peak Elev=74.01' Storage=4,109 cf Inflow=14.93 cfs 0.846 af
Outflow=14.48 cfs 0.789 af

Pond 7P: Riprap Surface Detention   Peak Elev=73.30' Storage=479 cf Inflow=3.36 cfs 0.175 af
12.0" Round Culvert n=0.013 L=375.0' S=0.0070 '/' Outflow=2.95 cfs 0.173 af

Pond 8P: OCS-DMH7   Peak Elev=67.19' Inflow=7.86 cfs 1.225 af
Primary=0.70 cfs 0.038 af Secondary=7.17 cfs 1.187 af Outflow=7.86 cfs 1.225 af

Pond 9P: UG Detention   Peak Elev=66.05' Storage=509 cf Inflow=0.26 cfs 0.019 af
Outflow=0.14 cfs 0.019 af

Pond 10P: Isolator Row x5   Peak Elev=67.37' Storage=0.001 af Inflow=0.70 cfs 0.038 af
Primary=0.26 cfs 0.019 af Secondary=0.44 cfs 0.018 af Outflow=0.70 cfs 0.038 af

Pond PA: USF A   Peak Elev=77.16' Storage=1,532 cf Inflow=1.16 cfs 0.062 af
Primary=0.22 cfs 0.013 af Secondary=0.00 cfs 0.000 af Tertiary=0.03 cfs 0.035 af Outflow=0.25 cfs 0.048 af

Pond PB: USF B   Peak Elev=72.11' Storage=2,962 cf Inflow=2.01 cfs 0.112 af
Primary=0.15 cfs 0.012 af Secondary=0.00 cfs 0.000 af Tertiary=0.07 cfs 0.083 af Outflow=0.22 cfs 0.094 af

Total Runoff Area = 10.566 ac   Runoff Volume = 3.118 af   Average Runoff Depth = 3.54"
49.18% Pervious = 5.196 ac   50.82% Impervious = 5.370 ac

Summary for Subcatchment 1S: Subcatchment 1

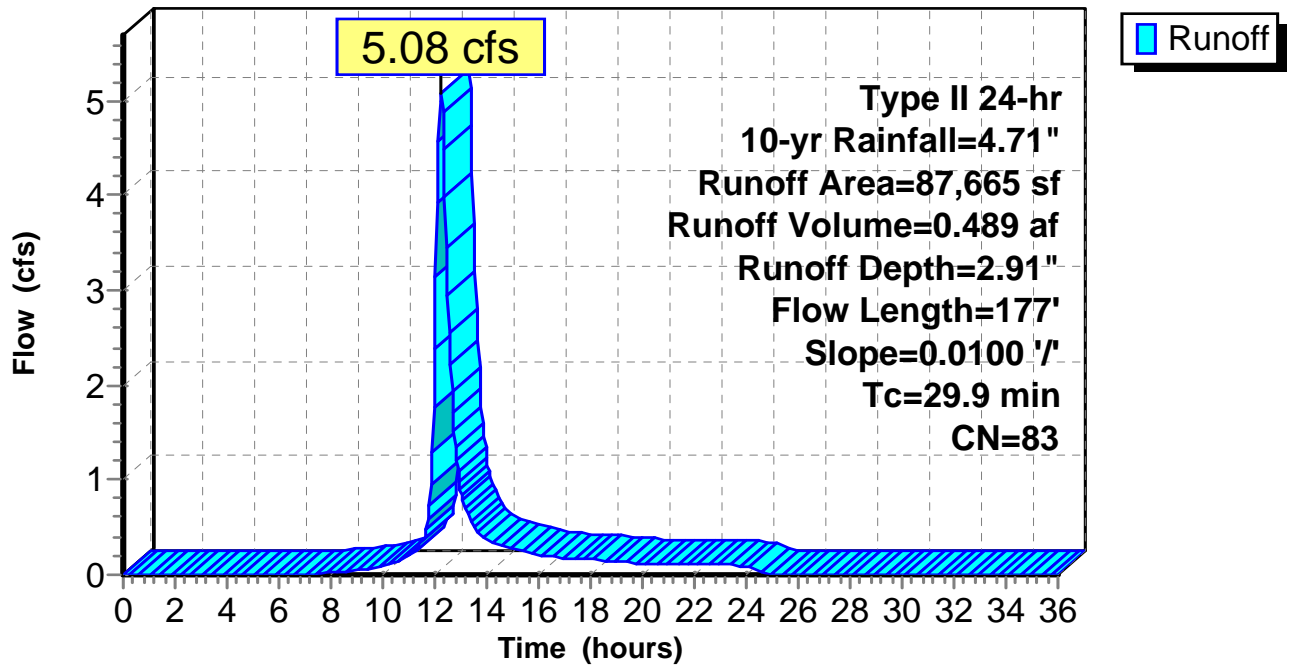Runoff   =   5.08 cfs @ 12.24 hrs, Volume=   0.489 af, Depth= 2.91"
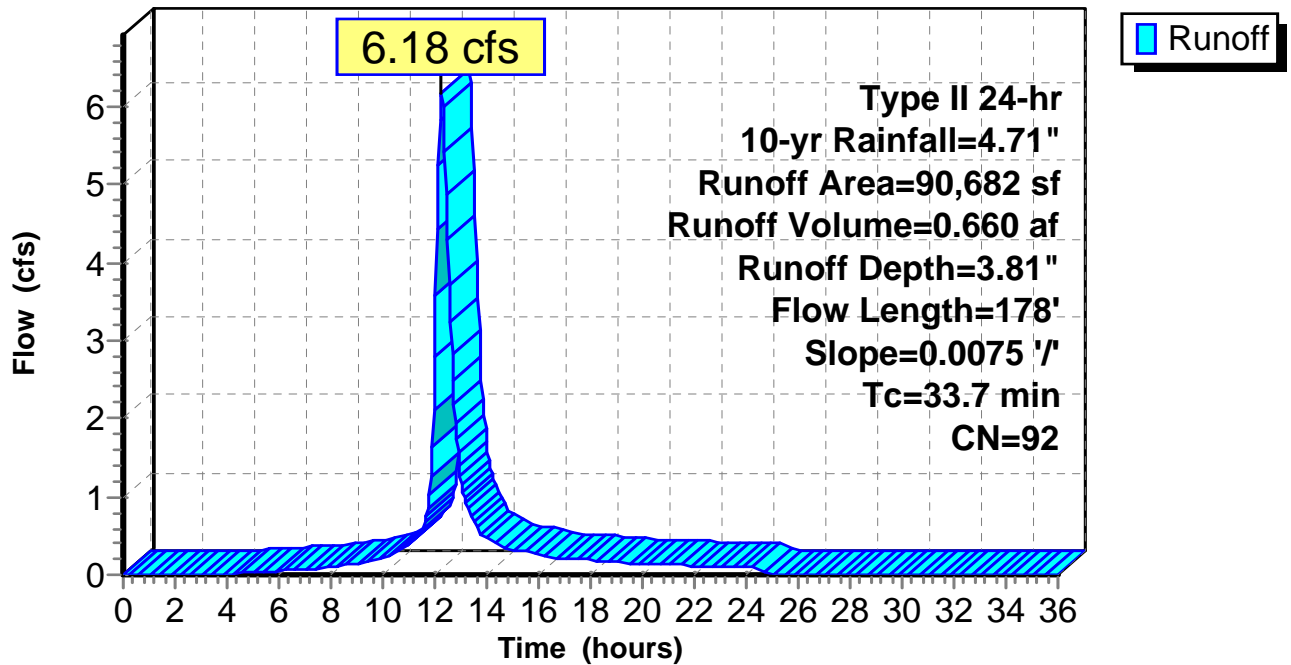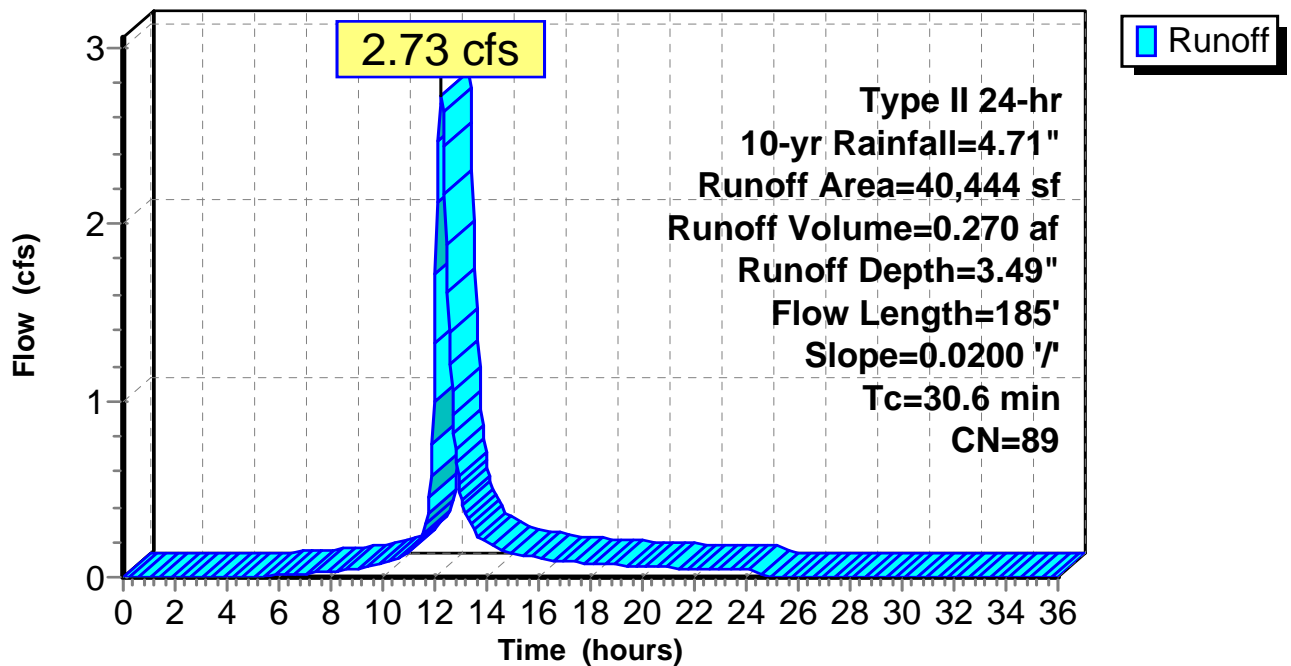
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	13,390	98	
	74,275	80	>75% Grass cover, Good, HSG D
	87,665	83	Weighted Average
	74,275		84.73% Pervious Area
	13,390		15.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.9	177	0.0100	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 1S: Subcatchment 1

Hydrograph

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Summary for Subcatchment 2S: Subcatchment 2

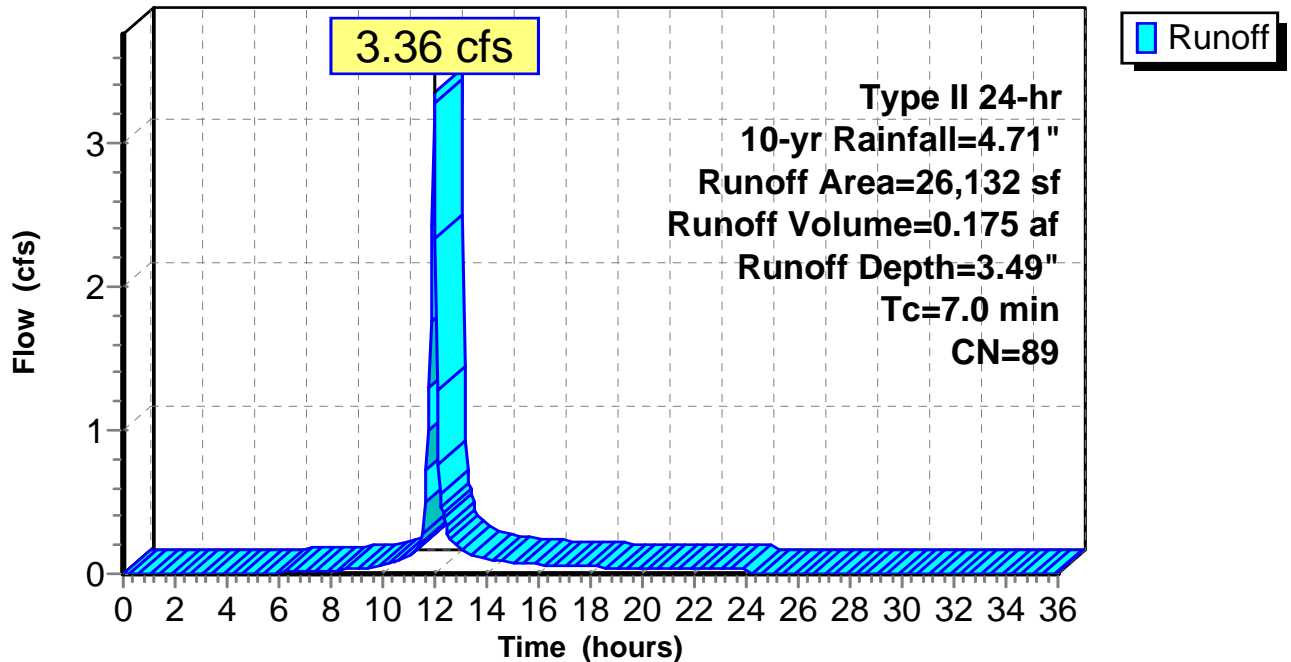Runoff   =   6.18 cfs @   12.27 hrs, Volume=   0.660 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	60,255	98	
	30,427	80	>75% Grass cover, Good, HSG D
	90,682	92	Weighted Average
	30,427		33.55% Pervious Area
	60,255		66.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	178	0.0075	0.09		**Sheet Flow,**
					Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 2S: Subcatchment 2

Hydrograph

6.18 cfs

Type II 24-hr
10-yr Rainfall=4.71"
Runoff Area=90,682 sf
Runoff Volume=0.660 af
Runoff Depth=3.81"
Flow Length=178'
Slope=0.0075 '/'
Tc=33.7 min
CN=92

Summary for Subcatchment 3S: Subcatchment 3

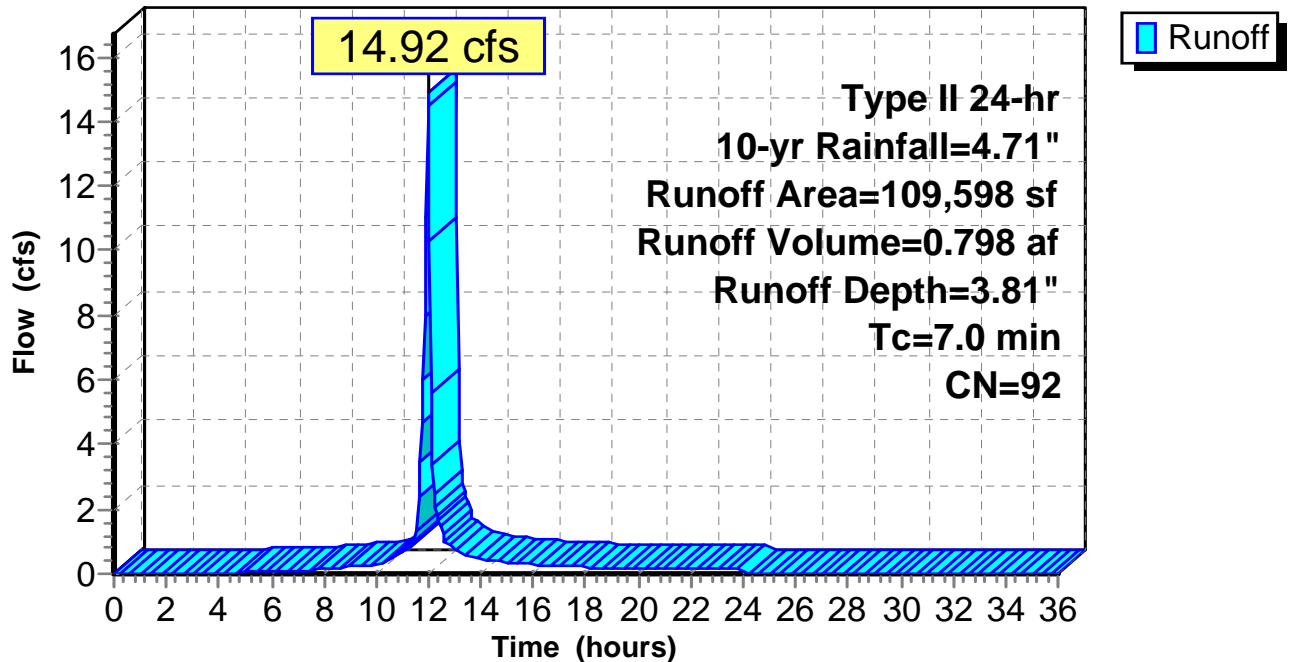Runoff   =   2.73 cfs @   12.24 hrs, Volume=   0.270 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description		
	21,255	80	>75% Grass cover, Good, HSG D		
*	19,189	98			
	40,444	89	Weighted Average		
	21,255		52.55% Pervious Area		
	19,189		47.45% Impervious Area		

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	150	0.0200	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.17"
0.8	35	0.0200	0.71		**Shallow Concentrated Flow,**
					Woodland Kv= 5.0 fps
30.6	185	Total			

Subcatchment 3S: Subcatchment 3

Hydrograph

Summary for Subcatchment 4S: Subcatchment 4

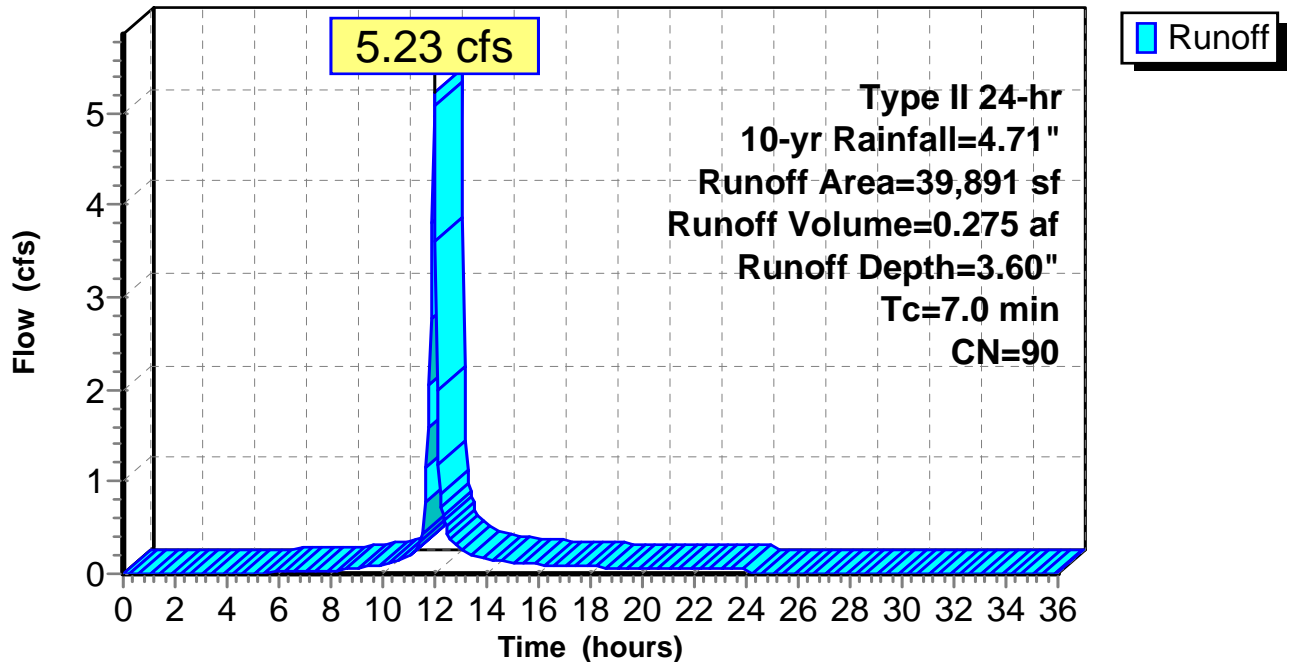Runoff   =   3.36 cfs @ 11.98 hrs, Volume=   0.175 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

Area (sf)	CN	Description
* 13,720	98	
12,412	80	>75% Grass cover, Good, HSG D
26,132	89	Weighted Average
12,412		47.50% Pervious Area
13,720		52.50% Impervious Area

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

Subcatchment 4S: Subcatchment 4

Hydrograph

Summary for Subcatchment 5S: Subcatchment 5

Runoff   =   14.92 cfs @   11.98 hrs, Volume=   0.798 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

Area (sf)	CN	Description
* 70,563	98	
39,035	80	>75% Grass cover, Good, HSG D
109,598	92	Weighted Average
39,035		35.62% Pervious Area
70,563		64.38% Impervious Area

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

Subcatchment 5S: Subcatchment 5

Hydrograph

Summary for Subcatchment 6S: Subcatchment 6

Runoff   =   5.23 cfs @   11.98 hrs, Volume=   0.275 af, Depth= 3.60"
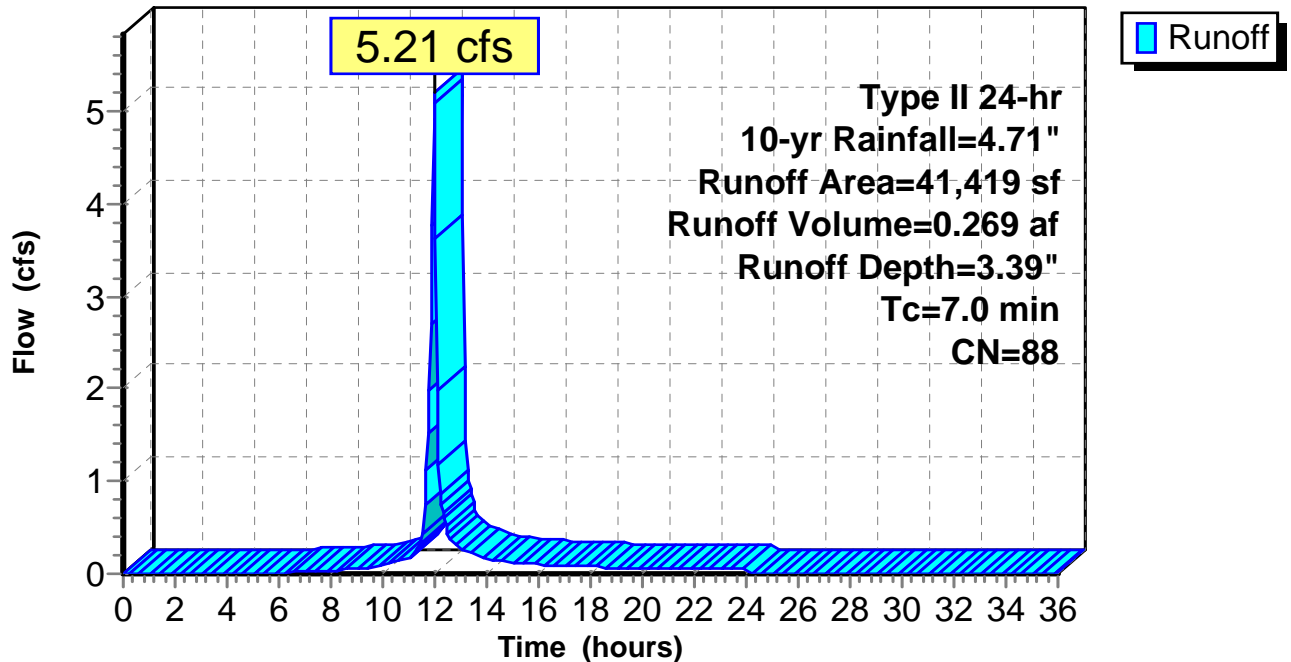
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

Area (sf)	CN	Description
* 21,718	98	
18,173	80	>75% Grass cover, Good, HSG D
39,891	90	Weighted Average
18,173		45.56% Pervious Area
21,718		54.44% Impervious Area

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

Subcatchment 6S: Subcatchment 6

Hydrograph

Summary for Subcatchment 7S: Subcatchment 7

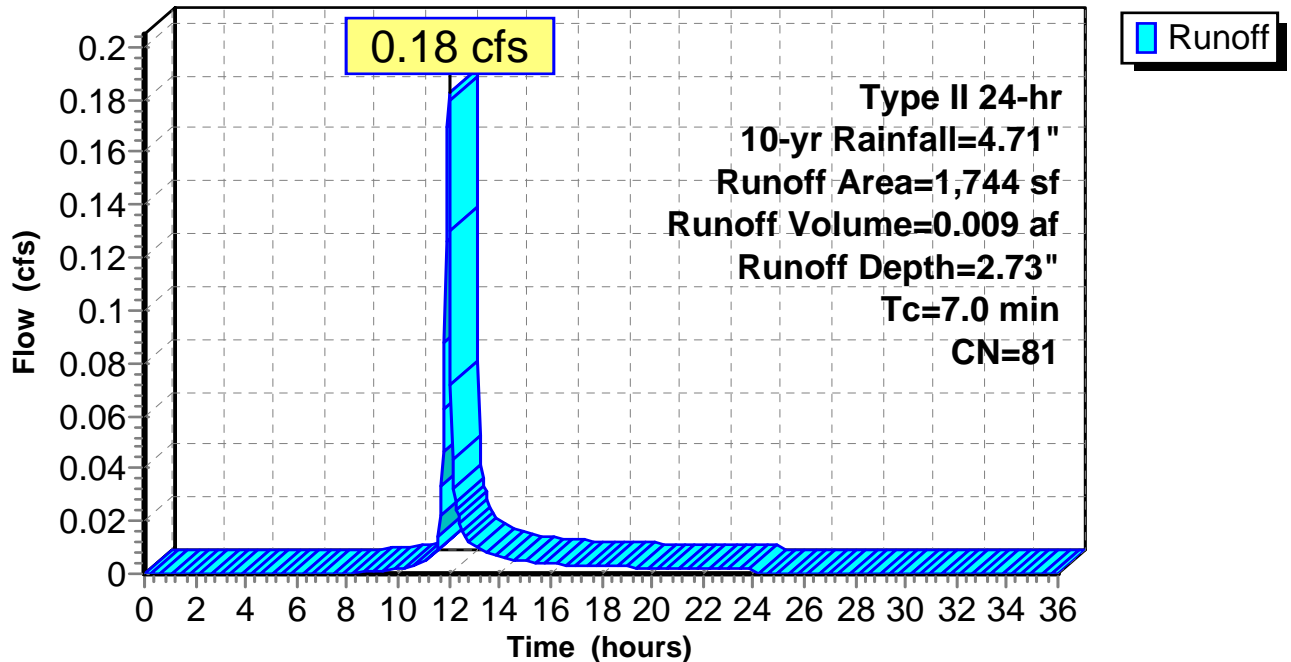Runoff = 5.21 cfs @ 11.98 hrs, Volume= 0.269 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	17,297	98	
	24,122	80	>75% Grass cover, Good, HSG D
	41,419	88	Weighted Average
	24,122		58.24% Pervious Area
	17,297		41.76% Impervious Area

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

Subcatchment 7S: Subcatchment 7

Hydrograph

Summary for Subcatchment 8S: Subcatchment 8

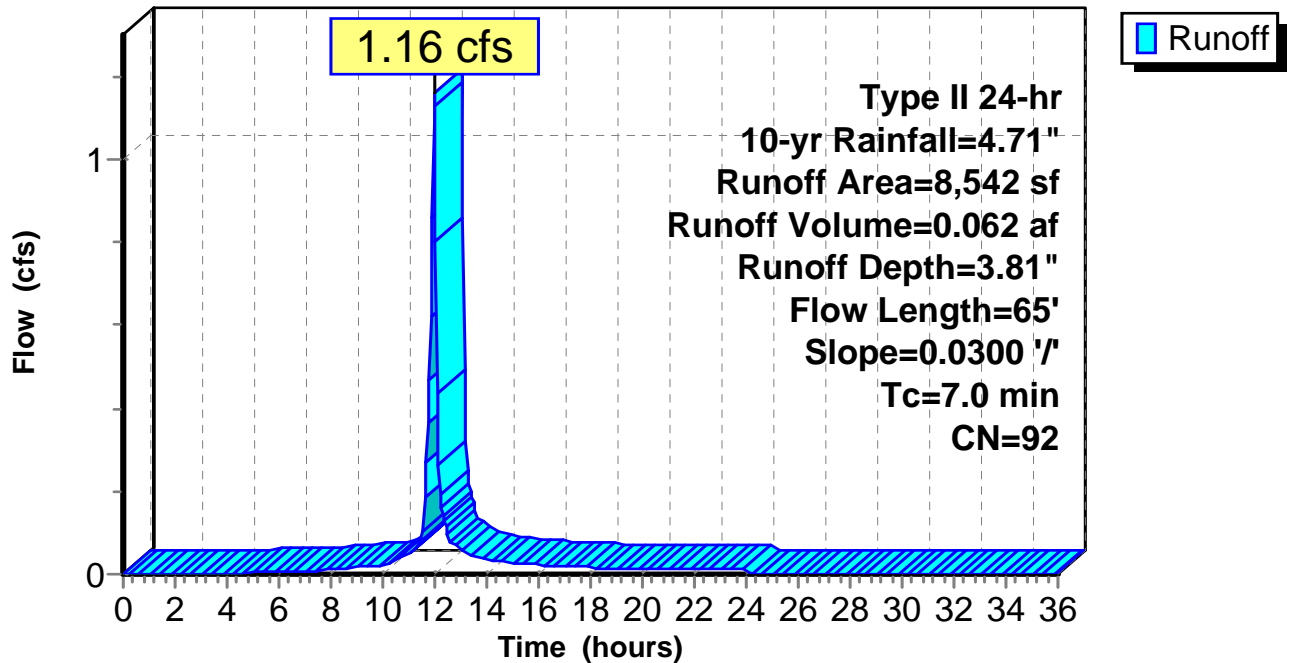Runoff   =   0.18 cfs @   11.98 hrs, Volume=   0.009 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

Area (sf)	CN	Description
1,681	80	>75% Grass cover, Good, HSG D
* 63	98	
1,744	81	Weighted Average
1,681		96.39% Pervious Area
63		3.61% Impervious Area

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

Subcatchment 8S: Subcatchment 8

Hydrograph

Summary for Subcatchment SA: Subcatchment A

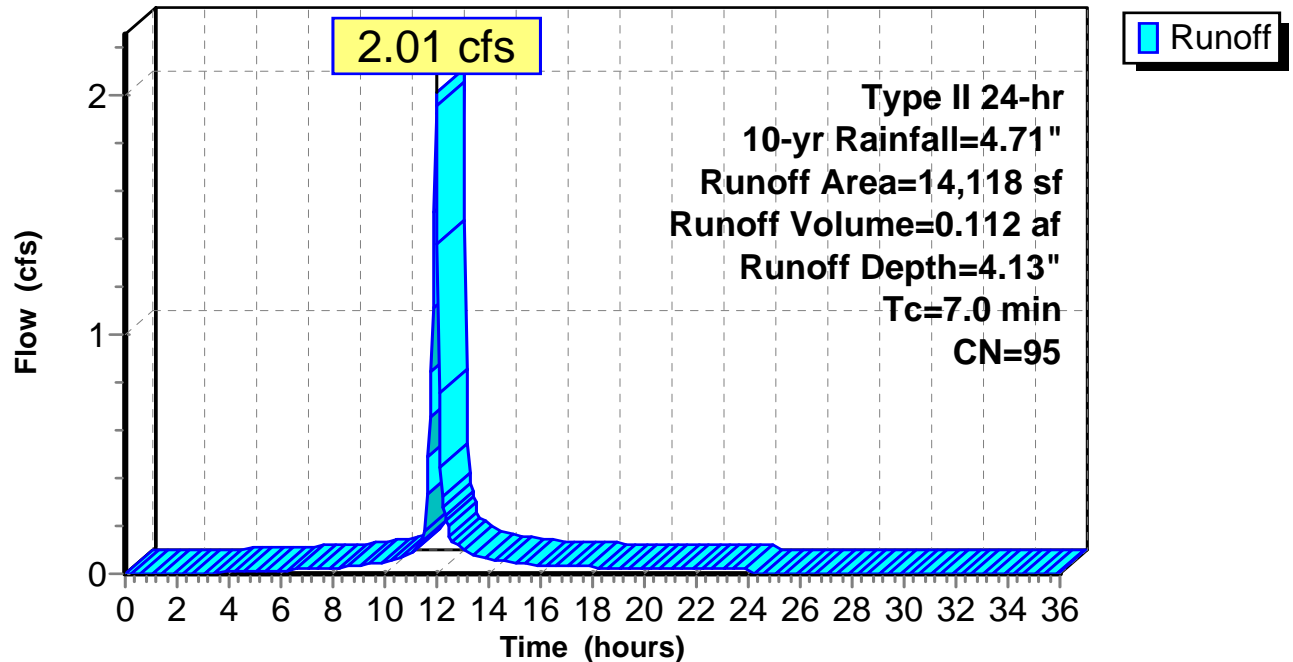Runoff   =   1.16 cfs @ 11.98 hrs, Volume=   0.062 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	5,794	98	
	2,748	80	>75% Grass cover, Good, HSG D
	8,542	92	Weighted Average
	2,748		32.17% Pervious Area
	5,794		67.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	65	0.0300	1.48		**Sheet Flow,**
					Smooth surfaces n= 0.011 P2= 3.17"
6.3					**Direct Entry, min**
7.0	65	Total			

Subcatchment SA: Subcatchment A

Hydrograph

1.16 cfs

Type II 24-hr
10-yr Rainfall=4.71"
Runoff Area=8,542 sf
Runoff Volume=0.062 af
Runoff Depth=3.81"
Flow Length=65'
Slope=0.0300 '/'
Tc=7.0 min
CN=92

Summary for Subcatchment SB: Subcatchment B

Runoff   =   2.01 cfs @   11.98 hrs, Volume=   0.112 af, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=4.71"

	Area (sf)	CN	Description
*	11,919	98	
	2,199	80	>75% Grass cover, Good, HSG D
	14,118	95	Weighted Average
	2,199		15.58% Pervious Area
	11,919		84.42% Impervious Area

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

Subcatchment SB: Subcatchment B

Hydrograph

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Type II 24-hr 10-yr Rainfall=4.71"
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Summary for Reach 1SP: Study Point 1

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

Inflow	=	4.87 cfs @	13.07 hrs,	Volume=	1.743 af
Outflow	=	4.87 cfs @	13.07 hrs,	Volume=	1.743 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 1SP: Study Point 1

Hydrograph

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Type II 24-hr 10-yr Rainfall=4.71"
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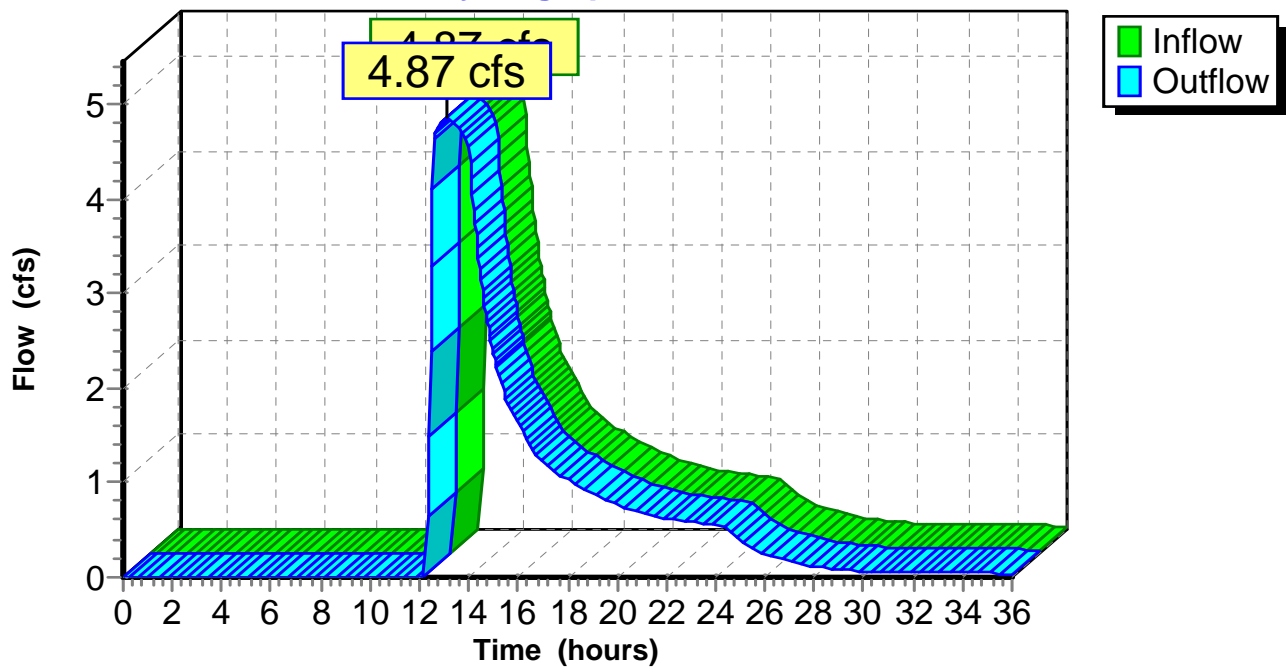
Summary for Reach 2SP: Study Point 2
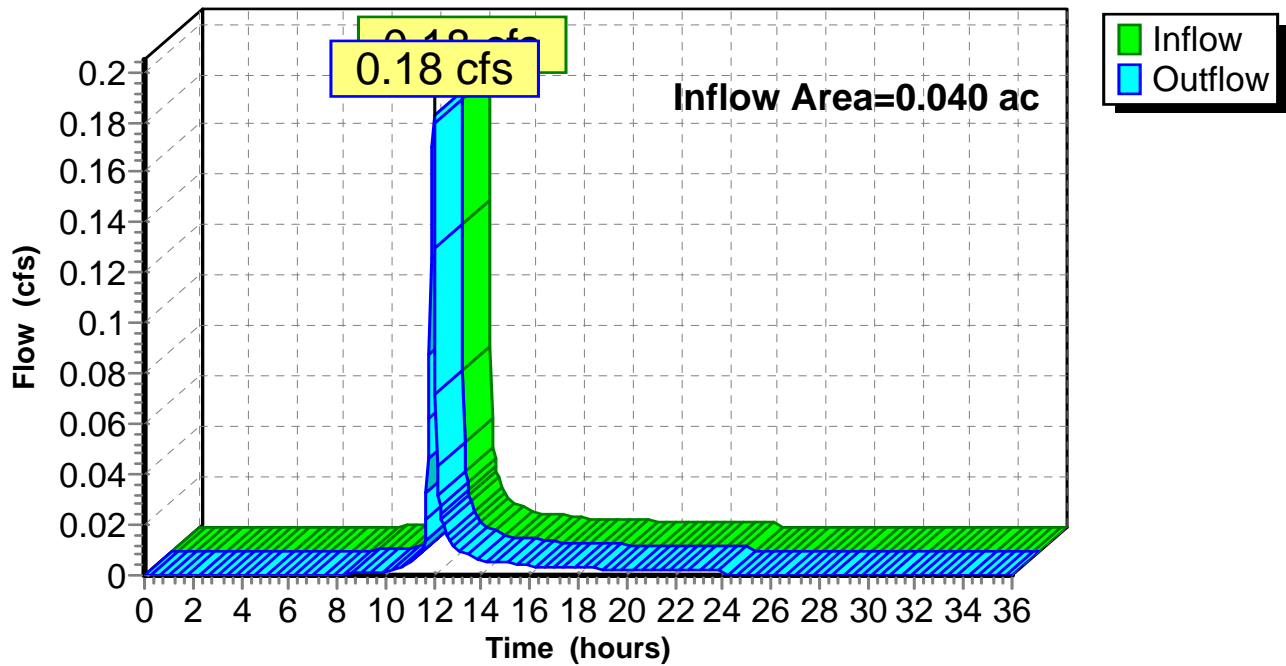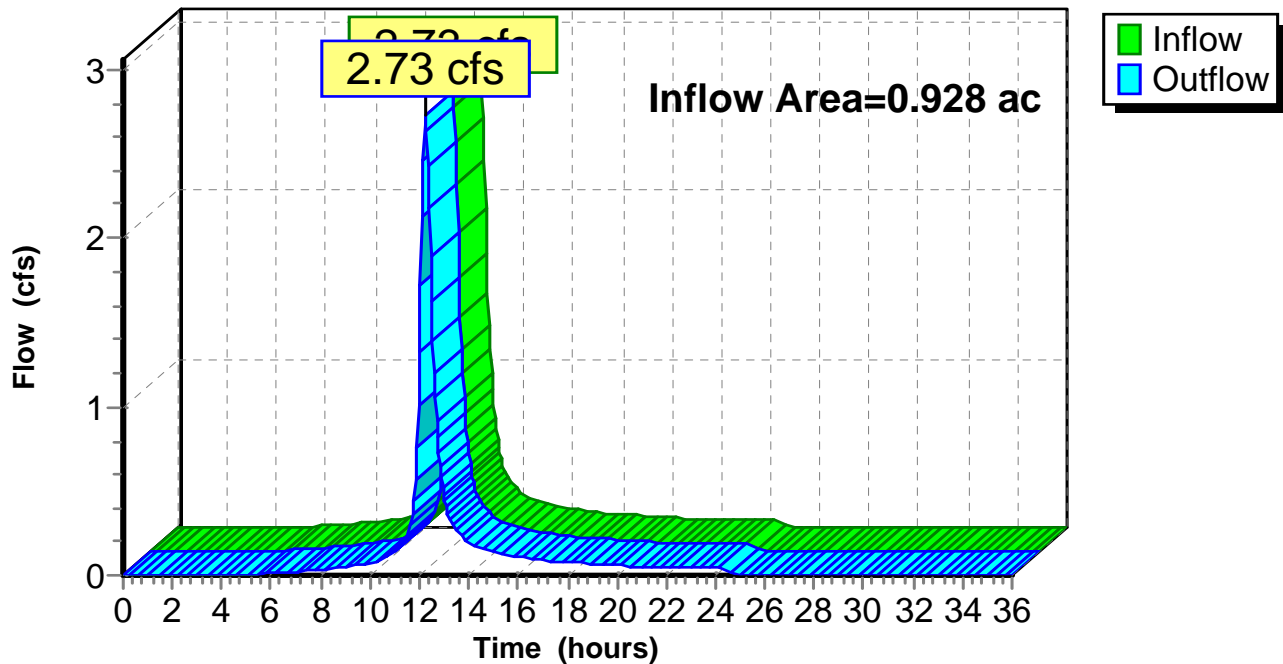
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =   9.597 ac, 51.35% Impervious, Inflow Depth = 0.08"   for 10-yr event
Inflow   =   1.02 cfs @   13.07 hrs, Volume=   0.063 af
Outflow   =   1.02 cfs @   13.07 hrs, Volume=   0.063 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 2SP: Study Point 2

Hydrograph

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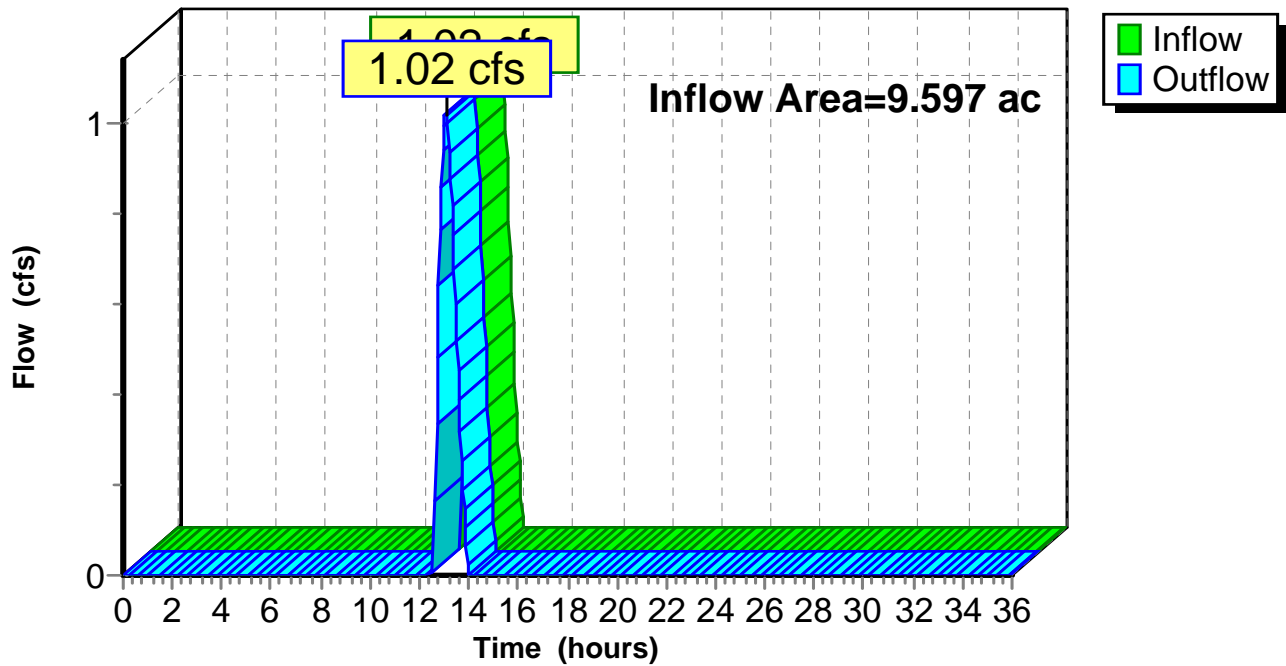
Summary for Reach 3SP: Study Point 3

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

Inflow Area =   0.040 ac,   3.61% Impervious, Inflow Depth = 2.73"   for 10-yr event
Inflow   =   0.18 cfs @   11.98 hrs, Volume=   0.009 af
Outflow   =   0.18 cfs @   11.98 hrs, Volume=   0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 3SP: Study Point 3

Hydrograph

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Type II 24-hr 10-yr Rainfall=4.71"
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Summary for Reach 4SP: Study Point 4

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

Inflow Area =   0.928 ac, 47.45% Impervious, Inflow Depth = 3.49"   for 10-yr event
Inflow   =   2.73 cfs @ 12.24 hrs, Volume=   0.270 af
Outflow   =   2.73 cfs @ 12.24 hrs, Volume=   0.270 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 4SP: Study Point 4

Hydrograph

Summary for Pond 1P: Wetland A

[79] Warning: Submerged Pond 8P Secondary device # 2 INLET by 0.32'
[81] Warning: Exceeded Pond 9P by 0.03' @ 13.25 hrs

Inflow Area =   9.597 ac, 51.35% Impervious, Inflow Depth > 3.09"   for 10-yr event
Inflow   =   18.24 cfs @ 12.34 hrs, Volume=   2.472 af
Outflow   =   5.89 cfs @ 13.07 hrs, Volume=   1.806 af, Atten= 68%, Lag= 43.6 min
Primary   =   1.02 cfs @ 13.07 hrs, Volume=   0.063 af
Secondary =   4.87 cfs @ 13.07 hrs, Volume=   1.743 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Starting Elev= 63.50'   Surf.Area= 14,739 sf   Storage= 17,429 cf
Peak Elev= 66.02' @ 13.07 hrs   Surf.Area= 25,888 sf   Storage= 68,121 cf   (50,693 cf above start)

Plug-Flow detention time= 324.6 min calculated for 1.406 af (57% of inflow)
Center-of-Mass det. time= 128.6 min (993.3 - 864.8)

Volume	Invert	Avail.Storage	Storage Description
#1	62.00'	209,276 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.00	8,500	0	0
65.00	20,977	44,216	44,216
70.00	45,047	165,060	209,276

Device	Routing	Invert	Outlet Devices
#1	Primary	65.75'	**3.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Secondary	62.86'	**12.0" Round Culvert** L= 48.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 62.86' / 58.69' S= 0.0869 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	65.08'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=1.01 cfs @ 13.07 hrs HW=66.02'   (Free Discharge)
└—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.01 cfs @ 1.24 fps)

Secondary OutFlow Max=4.87 cfs @ 13.07 hrs HW=66.02'   (Free Discharge)
└—**2=Culvert** (Inlet Controls 4.87 cfs @ 6.20 fps)
   └—**3=Sharp-Crested Rectangular Weir** (Passes 4.87 cfs of 7.68 cfs potential flow)

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Pond 1P: Wetland A

Hydrograph

18.24 cfs

Inflow Area=9.597 ac
Peak Elev=66.02'
Storage=68,121 cf

5.89 cfs

4.87 cfs

1. cfs

- Inflow
- Outflow
- Primary
- Secondary

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Summary for Pond 2P: Wetland B

Inflow Area =   2.082 ac, 66.45% Impervious, Inflow Depth = 3.81"   for 10-yr event
Inflow   =   6.18 cfs @ 12.27 hrs, Volume=   0.660 af
Outflow   =   5.34 cfs @ 12.41 hrs, Volume=   0.465 af, Atten= 14%, Lag= 8.5 min
Primary   =   5.34 cfs @ 12.41 hrs, Volume=   0.465 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.25' @ 12.41 hrs   Surf.Area= 9,670 sf   Storage= 10,461 cf

Plug-Flow detention time= 168.7 min calculated for 0.465 af (70% of inflow)
Center-of-Mass det. time= 73.4 min (880.4 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	21,636 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.00	2,200	0	0
68.00	4,250	3,225	3,225
69.00	6,286	5,268	8,493
70.00	20,000	13,143	21,636

Device	Routing	Invert	Outlet Devices
#1	Primary	69.00'	**18.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=5.29 cfs @ 12.41 hrs HW=69.25'   (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 5.29 cfs @ 1.20 fps)

Pond 2P: Wetland B

Hydrograph

Inflow Area=2.082 ac
Peak Elev=69.25'
Storage=10,461 cf

6.18 cfs

5.34 cfs

Legend: Inflow, Primary

Flow (cfs) vs Time (hours)

Summary for Pond 3P: Surface Detention

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 1.56'
[81] Warning: Exceeded Pond 7P by 0.21' @ 12.20 hrs

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth > 3.51"   for 10-yr event
Inflow   =   22.54 cfs @   11.99 hrs, Volume=   1.236 af
Outflow   =   9.27 cfs @   12.14 hrs, Volume=   1.234 af, Atten= 59%, Lag= 8.7 min
Primary   =   7.86 cfs @   12.14 hrs, Volume=   1.225 af
Secondary =   1.40 cfs @   12.14 hrs, Volume=   0.009 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.57' @ 12.14 hrs   Surf.Area= 7,177 sf   Storage= 14,180 cf

Plug-Flow detention time= 20.6 min calculated for 1.232 af (100% of inflow)
Center-of-Mass det. time= 19.1 min (835.5 - 816.4)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	21,926 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.00	400	0	0
70.00	2,991	1,696	1,696
72.00	5,812	8,803	10,499
73.50	9,425	11,428	21,926

Device	Routing	Invert	Outlet Devices
#1	Primary	69.10'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 69.10' / 68.75' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	72.50'	**35.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.85 cfs @ 12.14 hrs HW=72.56'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 7.85 cfs @ 6.40 fps)

Secondary OutFlow Max=1.19 cfs @ 12.14 hrs HW=72.56'   (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.19 cfs @ 0.57 fps)

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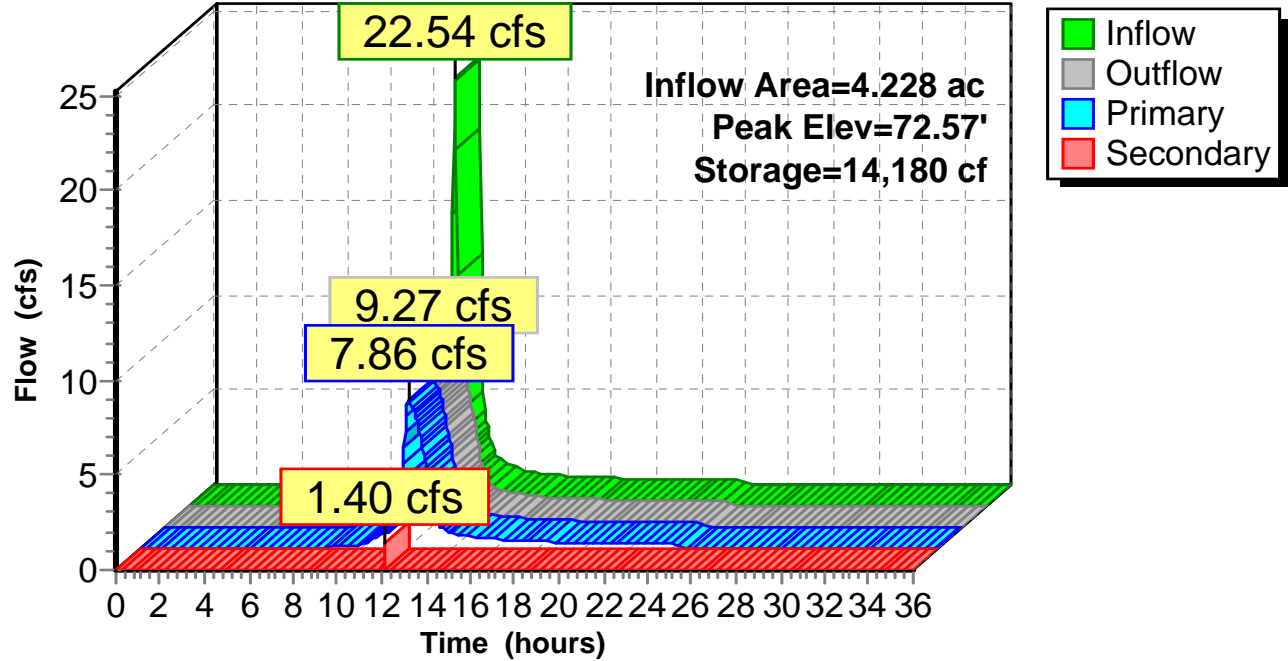
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Pond 3P: Surface Detention

Hydrograph

Inflow Area=4.228 ac
Peak Elev=72.57'
Storage=14,180 cf

22.54 cfs
9.27 cfs
7.86 cfs
1.40 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs)
Time (hours)

Summary for Pond 4P: Surface Detention

[79] Warning: Submerged Pond PB Primary device # 1 INLET by 3.70'
[78] Warning: Submerged Pond PB Tertiary device # 2 by 3.11'

Inflow Area =   1.275 ac, 52.61% Impervious, Inflow Depth > 3.42"   for 10-yr event
Inflow   =   5.26 cfs @   11.98 hrs, Volume=   0.363 af
Outflow   =   1.91 cfs @   12.12 hrs, Volume=   0.284 af, Atten= 64%, Lag= 8.2 min
Primary   =   1.91 cfs @   12.12 hrs, Volume=   0.284 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 71.21' @ 12.12 hrs   Surf.Area= 2,698 sf   Storage= 5,616 cf

Plug-Flow detention time= 250.8 min calculated for 0.284 af (78% of inflow)
Center-of-Mass det. time= 113.4 min (1,010.9 - 897.4)

Volume	Invert	Avail.Storage	Storage Description	
#1	64.00'	8,676 cf	**Custom Stage Data (Prismatic)**	Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	13	0	0
67.00	71	126	126
68.00	928	500	626
69.00	1,378	1,153	1,779
70.00	1,604	1,491	3,270
71.00	2,104	1,854	5,124
72.00	5,000	3,552	8,676

Device	Routing	Invert	Outlet Devices
#1	Primary	67.66'	**1.0" Round Culvert** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.66' / 67.65' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 0.01 sf
#2	Secondary	71.25'	**45.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Primary	70.25'	**6.0" Round Culvert X 3.00** L= 1.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 70.25' / 70.25' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf

Primary OutFlow Max=1.90 cfs @ 12.12 hrs HW=71.20'   (Free Discharge)
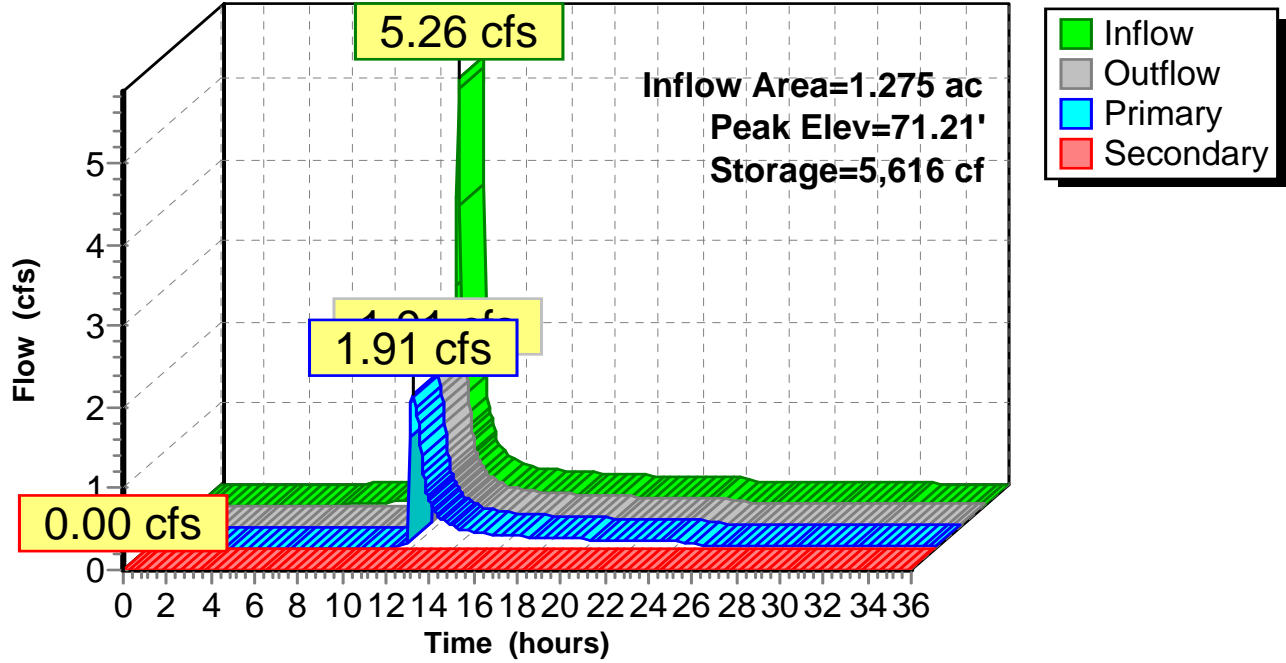⌐—**1=Culvert** (Barrel Controls 0.03 cfs @ 5.99 fps)
└—**3=Culvert** (Inlet Controls 1.87 cfs @ 3.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=64.00'   (Free Discharge)
⌐—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Pond 4P: Surface Detention

Hydrograph

Inflow Area=1.275 ac
Peak Elev=71.21'
Storage=5,616 cf

5.26 cfs

1.91 cfs

0.00 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs)

Time (hours)

Summary for Pond 5P: OCS-4P

[57] Hint: Peaked at 68.39' (Flood elevation advised)
[79] Warning: Submerged Pond 4P Primary device # 1 INLET by 0.72'

Inflow Area =   1.275 ac, 52.61% Impervious, Inflow Depth > 2.67"   for 10-yr event
Inflow   =   1.91 cfs @   12.12 hrs, Volume=   0.284 af
Outflow   =   1.91 cfs @   12.12 hrs, Volume=   0.284 af, Atten= 0%, Lag= 0.0 min
Primary   =   1.91 cfs @   12.12 hrs, Volume=   0.284 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 68.39' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	67.48'	**12.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.48' / 66.86' S= 0.0077 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.90 cfs @ 12.12 hrs HW=68.38'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 1.90 cfs @ 2.55 fps)

Pond 5P: OCS-4P
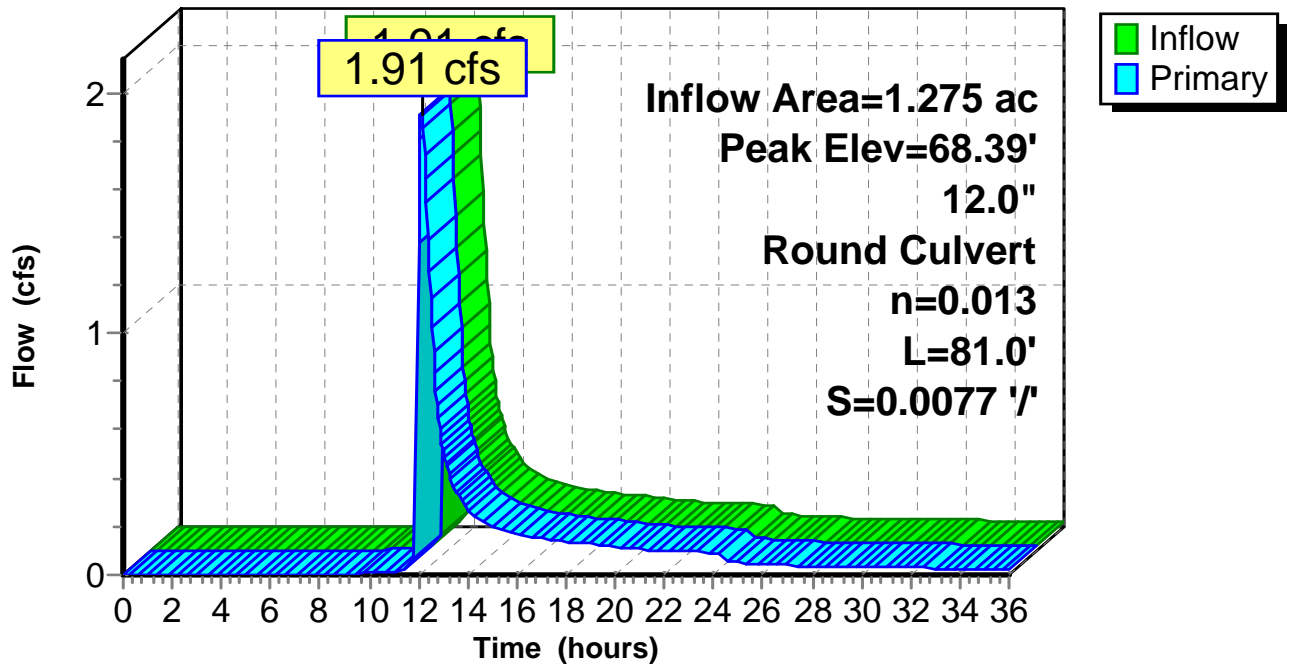
Summary for Pond 6P: Atrium Surface Detention

[79] Warning: Submerged Pond PA Primary device # 1 INLET by 1.01'
[78] Warning: Submerged Pond PA Tertiary device # 2 by 0.18'

Inflow Area =   2.712 ac, 64.63% Impervious, Inflow Depth > 3.74"   for 10-yr event
Inflow   =   14.93 cfs @   11.98 hrs, Volume=   0.846 af
Outflow   =   14.48 cfs @   12.00 hrs, Volume=   0.789 af, Atten= 3%, Lag= 1.1 min
Primary   =   14.48 cfs @   12.00 hrs, Volume=   0.789 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 74.01' @ 12.00 hrs   Surf.Area= 3,663 sf   Storage= 4,109 cf

Plug-Flow detention time= 70.7 min calculated for 0.789 af (93% of inflow)
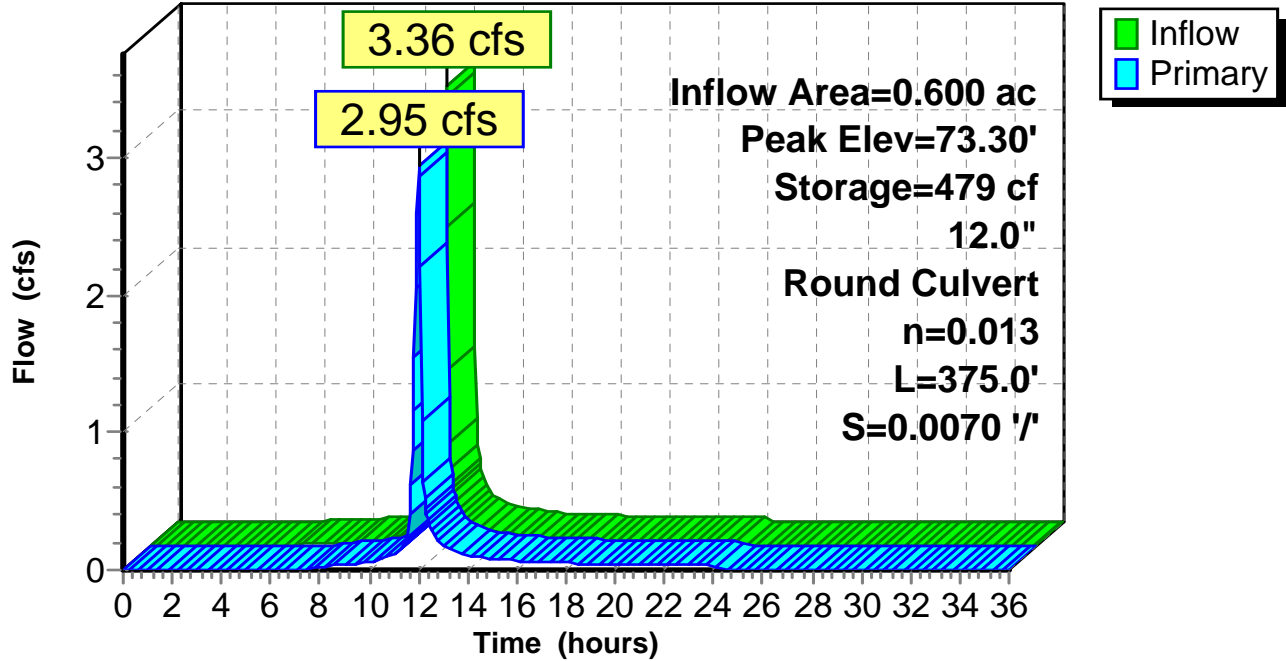Center-of-Mass det. time= 27.3 min (828.4 - 801.2)

Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	5,026 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	55	0	0
72.00	327	382	382
73.00	1,694	1,011	1,393
74.25	4,120	3,634	5,026

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**0.1" Round Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 69.20' S= 0.0082 '/' Cc= 0.900 n= 0.013, Flow Area= 0.00 sf
#2	Primary	73.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=14.37 cfs @ 12.00 hrs HW=74.01'   (Free Discharge)
┬─**1=Culvert** (Barrel Controls 0.00 cfs @ 0.28 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 14.37 cfs @ 1.87 fps)

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Pond 6P: Atrium Surface Detention

Hydrograph

14.93 cfs
14.48 cfs

Inflow Area=2.712 ac
Peak Elev=74.01'
Storage=4,109 cf

Inflow
Primary

Summary for Pond 7P: Riprap Surface Detention

Inflow Area =   0.600 ac, 52.50% Impervious, Inflow Depth = 3.49"   for 10-yr event
Inflow   =   3.36 cfs @   11.98 hrs, Volume=   0.175 af
Outflow   =   2.95 cfs @   12.02 hrs, Volume=   0.173 af, Atten= 12%, Lag= 2.3 min
Primary   =   2.95 cfs @   12.02 hrs, Volume=   0.173 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
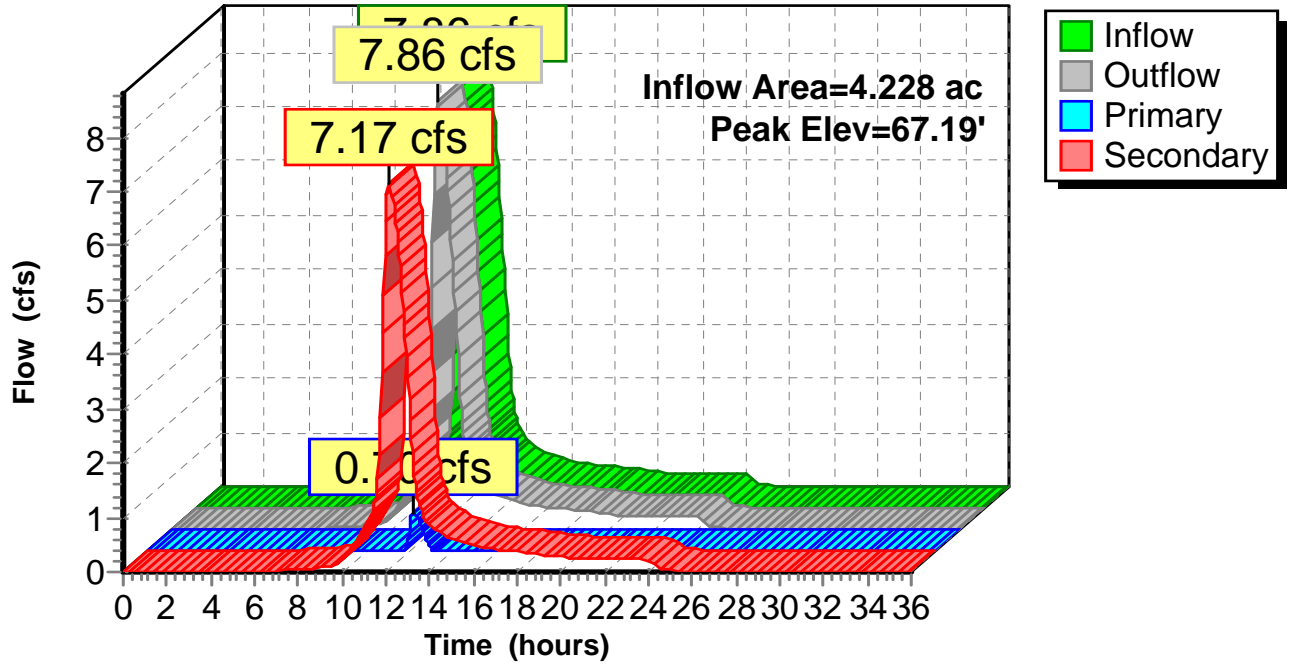Peak Elev= 73.30' @ 12.02 hrs   Surf.Area= 472 sf   Storage= 479 cf

Plug-Flow detention time= 15.5 min calculated for 0.172 af (99% of inflow)
Center-of-Mass det. time= 8.5 min (802.8 - 794.3)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	2,180 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	50	0	0
73.00	310	360	360
74.00	846	578	938
75.00	1,637	1,242	2,180

Device	Routing	Invert	Outlet Devices
#1	Primary	71.83'	**12.0" Round Culvert** L= 375.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.83' / 69.20' S= 0.0070 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.90 cfs @ 12.02 hrs HW=73.28'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 2.90 cfs @ 3.70 fps)

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Pond 7P: Riprap Surface Detention

Hydrograph

Legend: Inflow, Primary

3.36 cfs
2.95 cfs

Inflow Area=0.600 ac
Peak Elev=73.30'
Storage=479 cf
12.0"
Round Culvert
n=0.013
L=375.0'
S=0.0070 '/'

Summary for Pond 8P: OCS-DMH7

[57] Hint: Peaked at 67.19' (Flood elevation advised)

Inflow Area =	4.228 ac,	60.70% Impervious,	Inflow Depth > 3.48"	for 10-yr event
Inflow =	7.86 cfs @	12.14 hrs,	Volume=	1.225 af
Outflow =	7.86 cfs @	12.14 hrs,	Volume=	1.225 af, Atten= 0%, Lag= 0.0 min
Primary =	0.70 cfs @	12.14 hrs,	Volume=	0.038 af
Secondary =	7.17 cfs @	12.14 hrs,	Volume=	1.187 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.19' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**12.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 66.60' / 66.60' S= 0.0000 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.79 sf
#2	Secondary	65.70'	**24.0" Round Culvert**
			L= 40.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 65.70' / 65.50' S= 0.0050 '/' Cc= 0.900
			n= 0.013, Flow Area= 3.14 sf

Primary OutFlow Max=0.69 cfs @ 12.14 hrs HW=67.19'   (Free Discharge)
└**1=Culvert** (Barrel Controls 0.69 cfs @ 2.06 fps)

Secondary OutFlow Max=7.16 cfs @ 12.14 hrs HW=67.19'   (Free Discharge)
└**2=Culvert** (Barrel Controls 7.16 cfs @ 3.96 fps)

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Pond 8P: OCS-DMH7

Hydrograph

Inflow Area=4.228 ac
Peak Elev=67.19'

7.86 cfs

7.17 cfs

0.10 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs) vs Time (hours)

Summary for Pond 9P: UG Detention

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth = 0.06"   for 10-yr event
Inflow   =   0.26 cfs @   12.14 hrs, Volume=   0.019 af
Outflow   =   0.14 cfs @   12.85 hrs, Volume=   0.019 af, Atten= 45%, Lag= 42.7 min
Primary   =   0.14 cfs @   12.85 hrs, Volume=   0.019 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 66.05' @ 12.85 hrs   Surf.Area= 1,536 sf   Storage= 509 cf

Plug-Flow detention time= 92.8 min calculated for 0.019 af (99% of inflow)
Center-of-Mass det. time= 93.8 min (837.8 - 744.0)

Volume	Invert	Avail.Storage	Storage Description
#1	65.70'	2,488 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
			2,619 cf Overall x 95.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.70	1,536	0	0
67.40	1,536	2,611	2,611
67.41	5	8	2,619

Device	Routing	Invert	Outlet Devices
#1	Primary	65.70'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 65.70' / 65.60' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Primary	67.00'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.90' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.14 cfs @ 12.85 hrs HW=66.05'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.14 cfs @ 1.62 fps)
 └─**2=Culvert** (Controls 0.00 cfs)
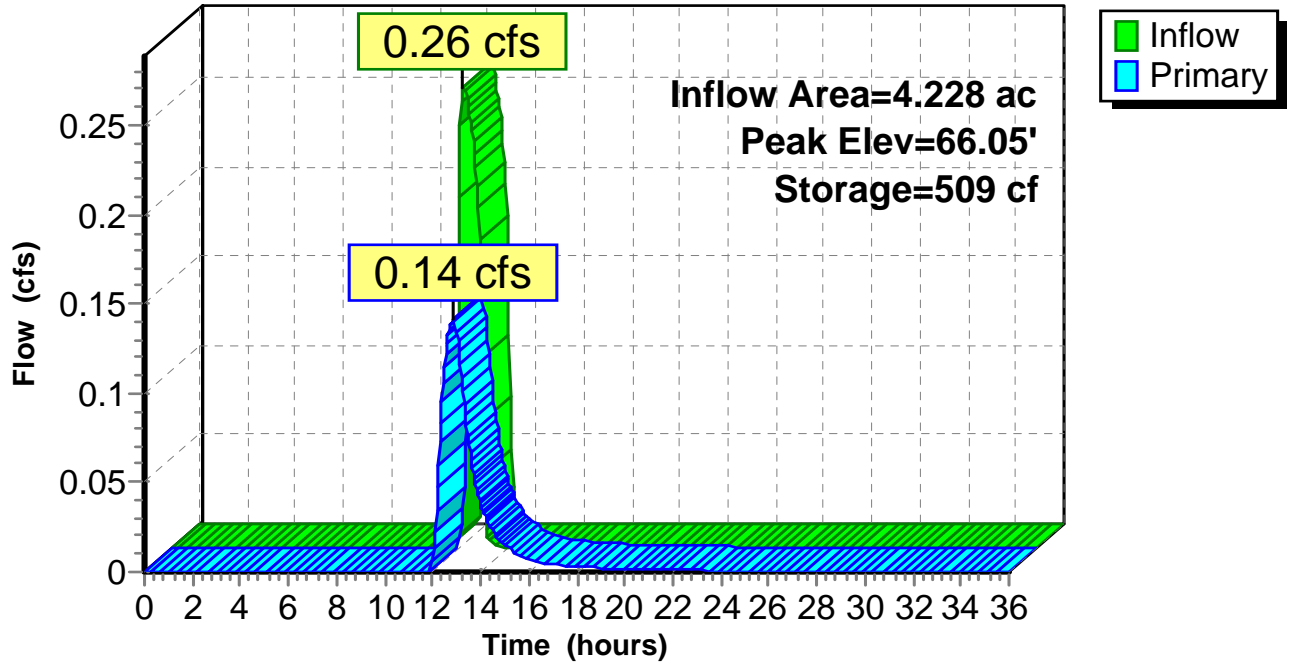
Pond 9P: UG Detention

Hydrograph

Inflow Area=4.228 ac
Peak Elev=66.05'
Storage=509 cf

0.26 cfs

0.14 cfs

Legend: ■ Inflow ■ Primary

Flow (cfs) vs Time (hours)

Summary for Pond 10P: Isolator Row x5

[81] Warning: Exceeded Pond 8P by 0.86' @ 35.95 hrs

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth = 0.11"   for 10-yr event
Inflow   =   0.70 cfs @ 12.14 hrs, Volume=   0.038 af
Outflow   =   0.70 cfs @ 12.14 hrs, Volume=   0.038 af, Atten= 0%, Lag= 0.2 min
Primary   =   0.26 cfs @ 12.14 hrs, Volume=   0.019 af
Secondary =   0.44 cfs @ 12.14 hrs, Volume=   0.018 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.37' @ 12.14 hrs   Surf.Area= 0.001 ac   Storage= 0.001 af

Plug-Flow detention time= 2.9 min calculated for 0.038 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (740.5 - 738.5)

Volume	Invert	Avail.Storage	Storage Description
#1	66.60'	0.002 af	**ADS_StormTech RC-310** x 5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 1 rows

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 66.60' / 66.55' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf
#2	Secondary	67.00'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.00' / 66.55' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.14 hrs HW=67.37'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.26 cfs @ 2.96 fps)

Secondary OutFlow Max=0.44 cfs @ 12.14 hrs HW=67.37'   (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.44 cfs @ 1.64 fps)

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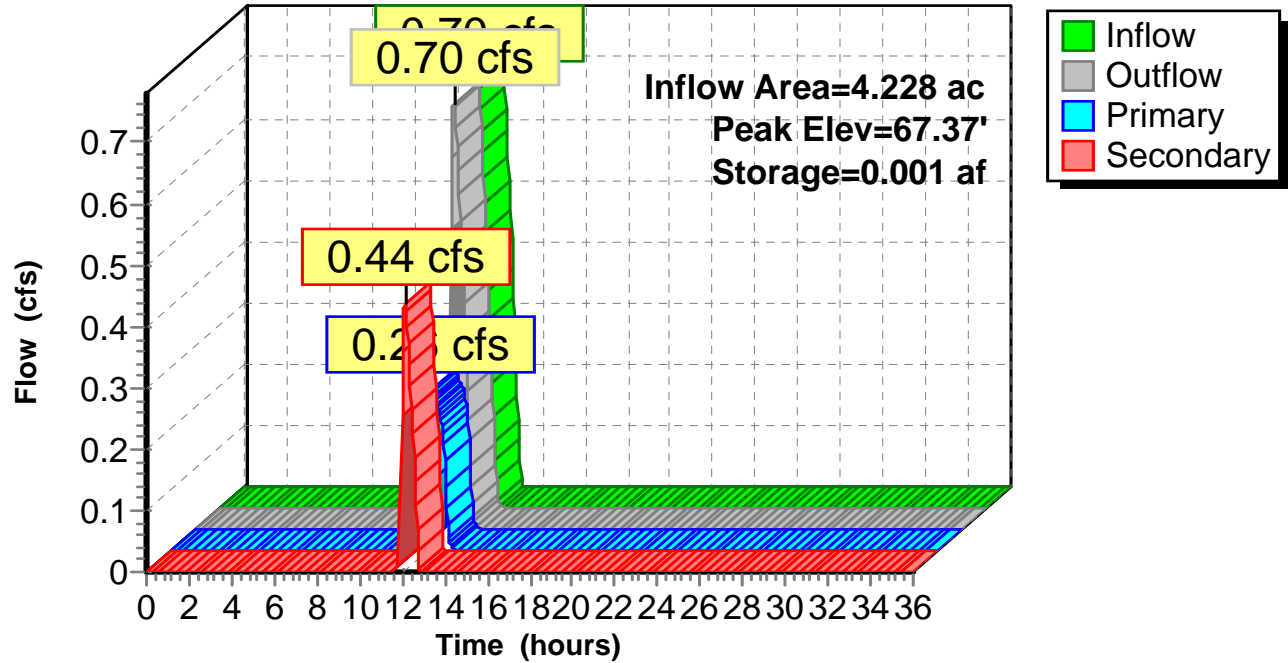
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Pond 10P: Isolator Row x5

Hydrograph

Inflow Area=4.228 ac
Peak Elev=67.37'
Storage=0.001 af

Summary for Pond PA: USF A

Inflow Area =   0.196 ac, 67.83% Impervious, Inflow Depth = 3.81"   for 10-yr event
Inflow   =   1.16 cfs @   11.98 hrs, Volume=   0.062 af
Outflow   =   0.25 cfs @   12.17 hrs, Volume=   0.048 af, Atten= 79%, Lag= 11.5 min
Primary   =   0.22 cfs @   12.17 hrs, Volume=   0.013 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Tertiary   =   0.03 cfs @   12.17 hrs, Volume=   0.035 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 77.16' @ 12.17 hrs   Surf.Area= 1,157 sf   Storage= 1,532 cf

Plug-Flow detention time= 422.4 min calculated for 0.048 af (77% of inflow)
Center-of-Mass det. time= 336.4 min (1,118.6 - 782.2)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	2,192 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	585	0.0	0	0
73.01	585	30.0	2	2
75.99	585	30.0	523	525
76.00	585	100.0	6	531
77.00	1,056	100.0	821	1,351
77.33	1,260	100.0	382	1,733
77.67	1,437	100.0	458	2,192

Device	Routing	Invert	Outlet Devices
#1	Primary	73.00'	**12.0" Round Culvert** L= 60.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 73.00' / 72.20' S= 0.0133 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Tertiary	73.83'	**2.410 in/hr Exfiltration over Surface area above 73.83'** Excluded Surface area = 585 sf
#3	Device 1	77.00'	**24.0" x 24.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 in 4.0" x 4.0" Grate Limited to weir flow at low heads
#4	Secondary	77.50'	**30.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

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Primary OutFlow Max=0.21 cfs @ 12.17 hrs HW=77.16'   (Free Discharge)
└─**1=Culvert** (Passes 0.21 cfs of 6.82 cfs potential flow)
 └─**3=Orifice/Grate** (Orifice Controls 0.21 cfs @ 1.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00'   (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.03 cfs @ 12.17 hrs HW=77.16'   (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond PA: USF A
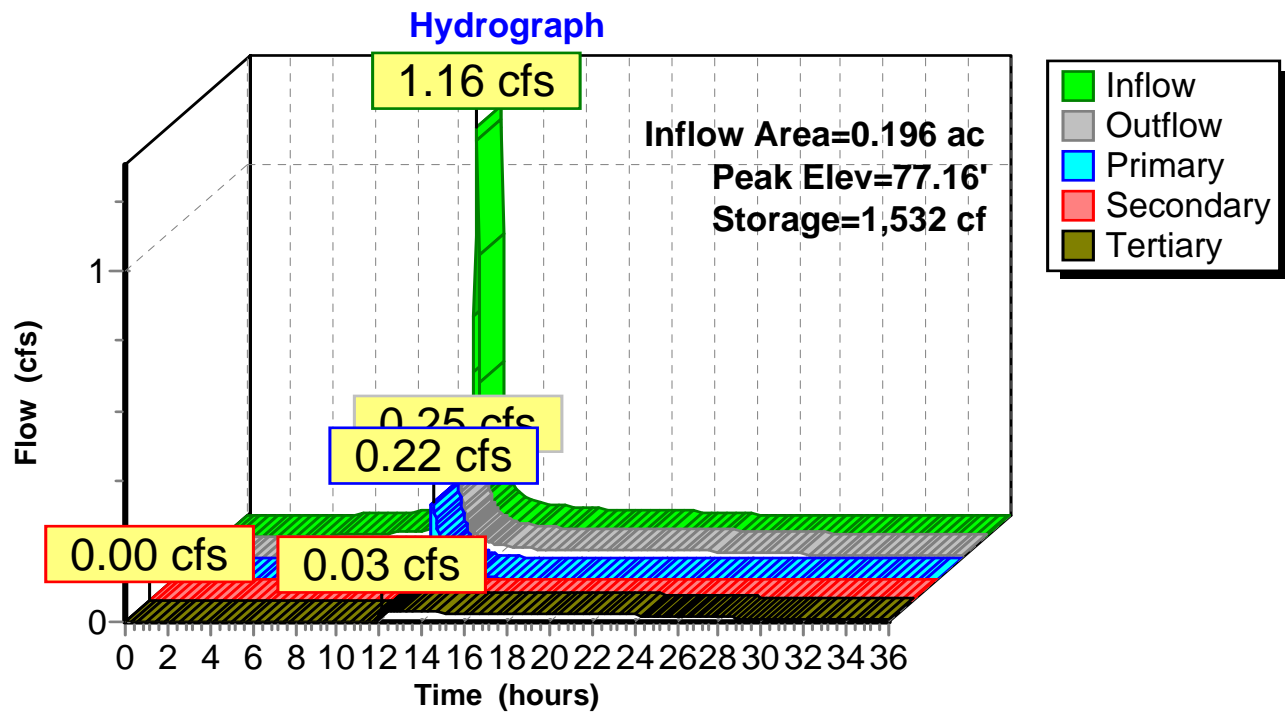
Summary for Pond PB: USF B

Inflow Area =   0.324 ac, 84.42% Impervious, Inflow Depth = 4.13"   for 10-yr event
Inflow   =   2.01 cfs @   11.98 hrs, Volume=   0.112 af
Outflow   =   0.22 cfs @   12.35 hrs, Volume=   0.094 af, Atten= 89%, Lag= 22.2 min
Primary   =   0.15 cfs @   12.35 hrs, Volume=   0.012 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Tertiary   =   0.07 cfs @   12.35 hrs, Volume=   0.083 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.11' @ 12.35 hrs   Surf.Area= 1,972 sf   Storage= 2,962 cf

Plug-Flow detention time= 482.5 min calculated for 0.094 af (84% of inflow)
Center-of-Mass det. time= 414.4 min (1,181.6 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	67.86'	3,817 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.86	715	0.0	0	0
67.87	715	30.0	2	2
70.25	715	30.0	511	513
70.26	715	100.0	7	520
72.00	1,853	100.0	2,234	2,754
72.50	2,400	100.0	1,063	3,817

Device	Routing	Invert	Outlet Devices
#1	Primary	67.50'	**15.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.50' / 67.40' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Tertiary	68.09'	**2.410 in/hr Exfiltration over Surface area above 68.09'** Excluded Surface area = 715 sf
#3	Device 1	72.00'	**24.0" x 24.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 in 4.0" x 4.0" Grate Limited to weir flow at low heads
#4	Secondary	72.25'	**30.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.16 cfs @ 12.35 hrs HW=72.11'   (Free Discharge)
└─**1=Culvert** (Passes 0.16 cfs of 9.31 cfs potential flow)
  └─**3=Orifice/Grate** (Weir Controls 0.16 cfs @ 1.08 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=67.86'   (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.07 cfs @ 12.35 hrs HW=72.11'   (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

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Pond PB: USF B

Hydrograph

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcatchment 1   Runoff Area=87,665 sf 15.27% Impervious Runoff Depth=4.02"
Flow Length=177' Slope=0.0100 '/' Tc=29.9 min CN=83 Runoff=6.98 cfs 0.674 af

Subcatchment 2S: Subcatchment 2   Runoff Area=90,682 sf 66.45% Impervious Runoff Depth=4.99"
Flow Length=178' Slope=0.0075 '/' Tc=33.7 min CN=92 Runoff=8.00 cfs 0.866 af

Subcatchment 3S: Subcatchment 3   Runoff Area=40,444 sf 47.45% Impervious Runoff Depth=4.66"
Flow Length=185' Slope=0.0200 '/' Tc=30.6 min CN=89 Runoff=3.60 cfs 0.360 af

Subcatchment 4S: Subcatchment 4   Runoff Area=26,132 sf 52.50% Impervious Runoff Depth=4.66"
Tc=7.0 min CN=89 Runoff=4.40 cfs 0.233 af

Subcatchment 5S: Subcatchment 5   Runoff Area=109,598 sf 64.38% Impervious Runoff Depth=4.99"
Tc=7.0 min CN=92 Runoff=19.21 cfs 1.046 af

Subcatchment 6S: Subcatchment 6   Runoff Area=39,891 sf 54.44% Impervious Runoff Depth=4.77"
Tc=7.0 min CN=90 Runoff=6.81 cfs 0.364 af

Subcatchment 7S: Subcatchment 7   Runoff Area=41,419 sf 41.76% Impervious Runoff Depth=4.55"
Tc=7.0 min CN=88 Runoff=6.86 cfs 0.360 af

Subcatchment 8S: Subcatchment 8   Runoff Area=1,744 sf 3.61% Impervious Runoff Depth=3.81"
Tc=7.0 min CN=81 Runoff=0.25 cfs 0.013 af

Subcatchment SA: Subcatchment A   Runoff Area=8,542 sf 67.83% Impervious Runoff Depth=4.99"
Flow Length=65' Slope=0.0300 '/' Tc=7.0 min CN=92 Runoff=1.50 cfs 0.082 af

Subcatchment SB: Subcatchment B   Runoff Area=14,118 sf 84.42% Impervious Runoff Depth=5.33"
Tc=7.0 min CN=95 Runoff=2.55 cfs 0.144 af

Reach 1SP: Study Point 1   Inflow=5.27 cfs 2.219 af
Outflow=5.27 cfs 2.219 af

Reach 2SP: Study Point 2   Inflow=5.00 cfs 0.465 af
Outflow=5.00 cfs 0.465 af

Reach 3SP: Study Point 3   Inflow=4.60 cfs 0.062 af
Outflow=4.60 cfs 0.062 af

Reach 4SP: Study Point 4   Inflow=3.60 cfs 0.360 af
Outflow=3.60 cfs 0.360 af

Pond 1P: Wetland A   Peak Elev=66.48' Storage=80,466 cf Inflow=29.94 cfs 3.350 af
Primary=5.00 cfs 0.465 af Secondary=5.27 cfs 2.219 af Outflow=10.28 cfs 2.684 af

Pond 2P: Wetland B   Peak Elev=69.31' Storage=11,061 cf Inflow=8.00 cfs 0.866 af
Outflow=7.52 cfs 0.671 af

Pond 3P: Surface Detention Peak Elev=72.83' Storage=16,133 cf Inflow=28.80 cfs 1.651 af
Primary=8.22 cfs 1.502 af Secondary=15.34 cfs 0.147 af Outflow=23.56 cfs 1.649 af

Pond 4P: Surface Detention Peak Elev=71.37' Storage=6,107 cf Inflow=7.06 cfs 0.478 af
Primary=2.13 cfs 0.357 af Secondary=4.42 cfs 0.041 af Outflow=6.54 cfs 0.398 af

Pond 5P: OCS-4P Peak Elev=68.48' Inflow=2.13 cfs 0.357 af
12.0" Round Culvert n=0.013 L=81.0' S=0.0077 '/' Outflow=2.13 cfs 0.357 af

Pond 6P: Atrium Surface Detention Peak Elev=74.10' Storage=4,441 cf Inflow=19.46 cfs 1.113 af
Outflow=18.90 cfs 1.056 af

Pond 7P: Riprap Surface Detention Peak Elev=73.85' Storage=818 cf Inflow=4.40 cfs 0.233 af
12.0" Round Culvert n=0.013 L=375.0' S=0.0070 '/' Outflow=3.26 cfs 0.231 af

Pond 8P: OCS-DMH7 Peak Elev=67.23' Inflow=8.22 cfs 1.502 af
Primary=0.78 cfs 0.047 af Secondary=7.44 cfs 1.455 af Outflow=8.22 cfs 1.502 af

Pond 9P: UG Detention Peak Elev=66.08' Storage=559 cf Inflow=0.27 cfs 0.023 af
Outflow=0.15 cfs 0.023 af

Pond 10P: Isolator Row x5 Peak Elev=67.41' Storage=0.001 af Inflow=0.78 cfs 0.047 af
Primary=0.27 cfs 0.023 af Secondary=0.51 cfs 0.024 af Outflow=0.78 cfs 0.047 af

Pond PA: USF A Peak Elev=77.46' Storage=1,902 cf Inflow=1.50 cfs 0.082 af
Primary=0.36 cfs 0.029 af Secondary=0.00 cfs 0.000 af Tertiary=0.04 cfs 0.038 af Outflow=0.40 cfs 0.067 af

Pond PB: USF B Peak Elev=72.30' Storage=3,366 cf Inflow=2.55 cfs 0.144 af
Primary=0.29 cfs 0.027 af Secondary=0.95 cfs 0.008 af Tertiary=0.08 cfs 0.090 af Outflow=1.33 cfs 0.126 af

Total Runoff Area = 10.566 ac Runoff Volume = 4.142 af Average Runoff Depth = 4.70"
49.18% Pervious = 5.196 ac 50.82% Impervious = 5.370 ac

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Summary for Subcatchment 1S: Subcatchment 1

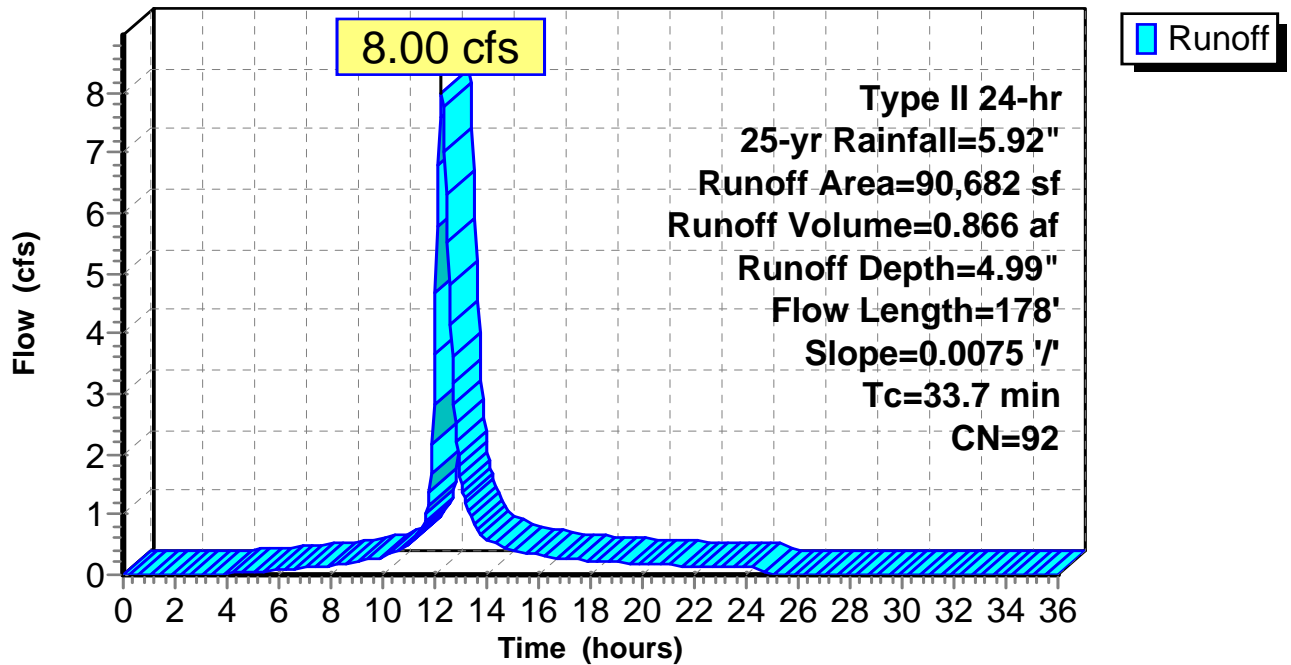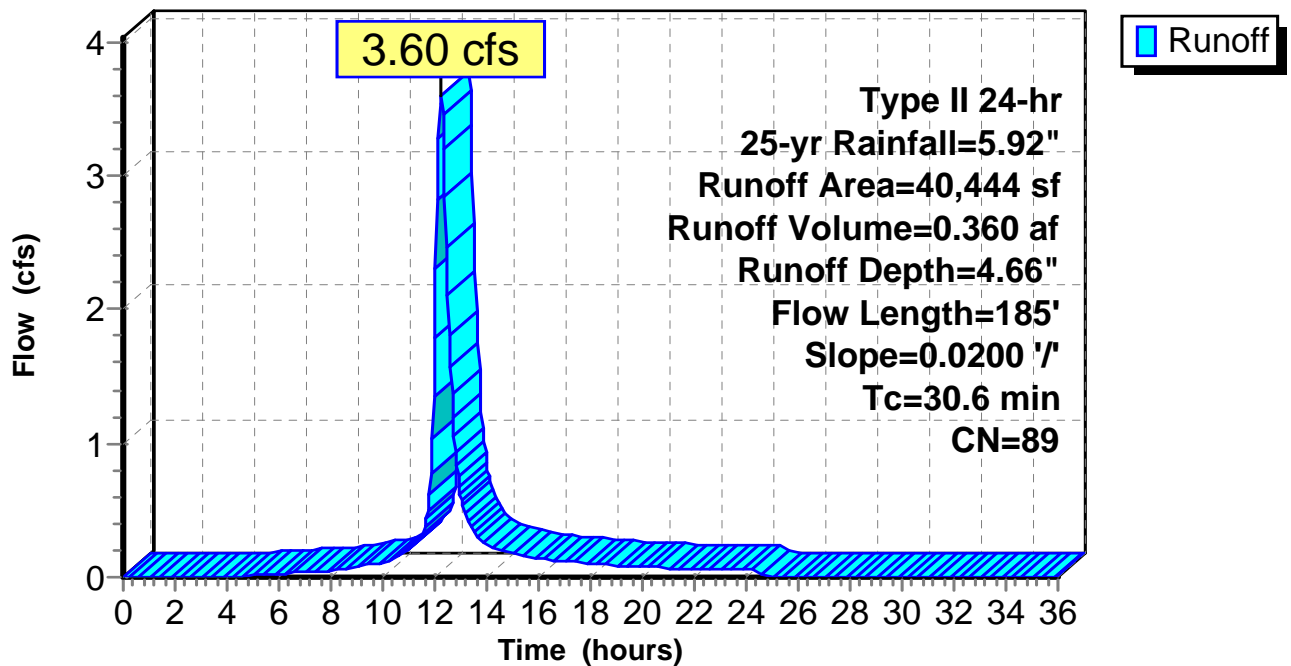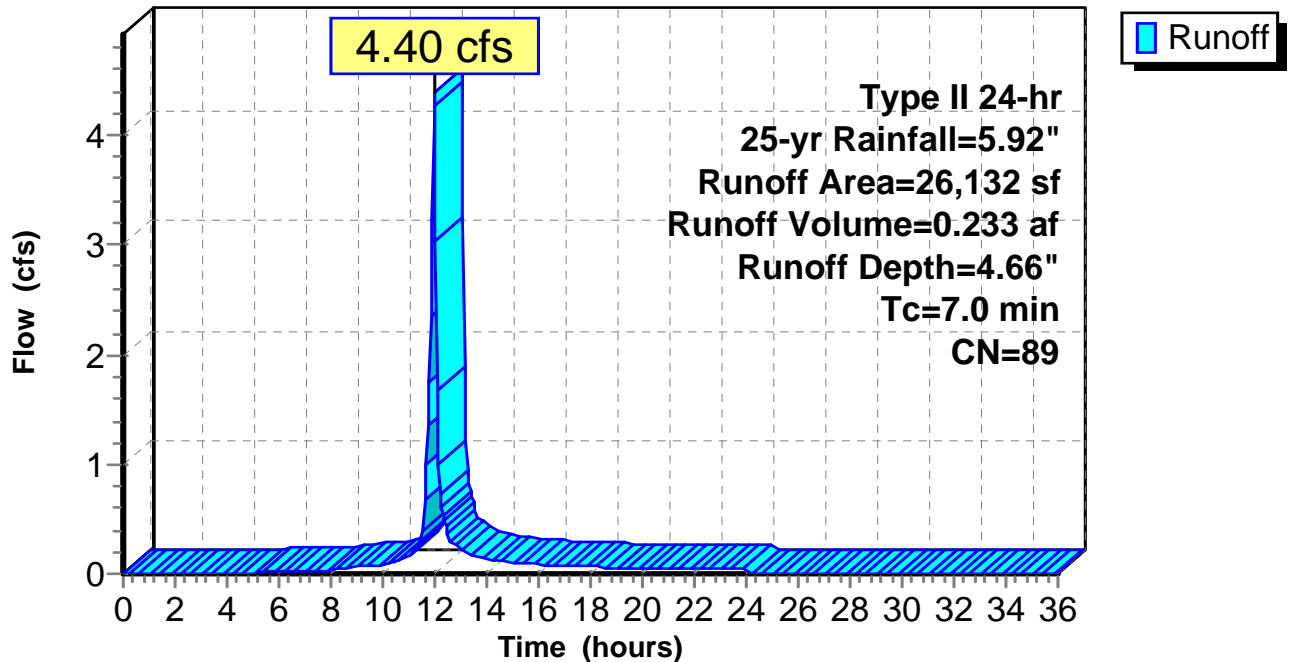Runoff   =   6.98 cfs @   12.24 hrs, Volume=   0.674 af, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

Area (sf)	CN	Description
* 13,390	98	
74,275	80	>75% Grass cover, Good, HSG D
87,665	83	Weighted Average
74,275		84.73% Pervious Area
13,390		15.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.9	177	0.0100	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 1S: Subcatchment 1

Hydrograph

Summary for Subcatchment 2S: Subcatchment 2

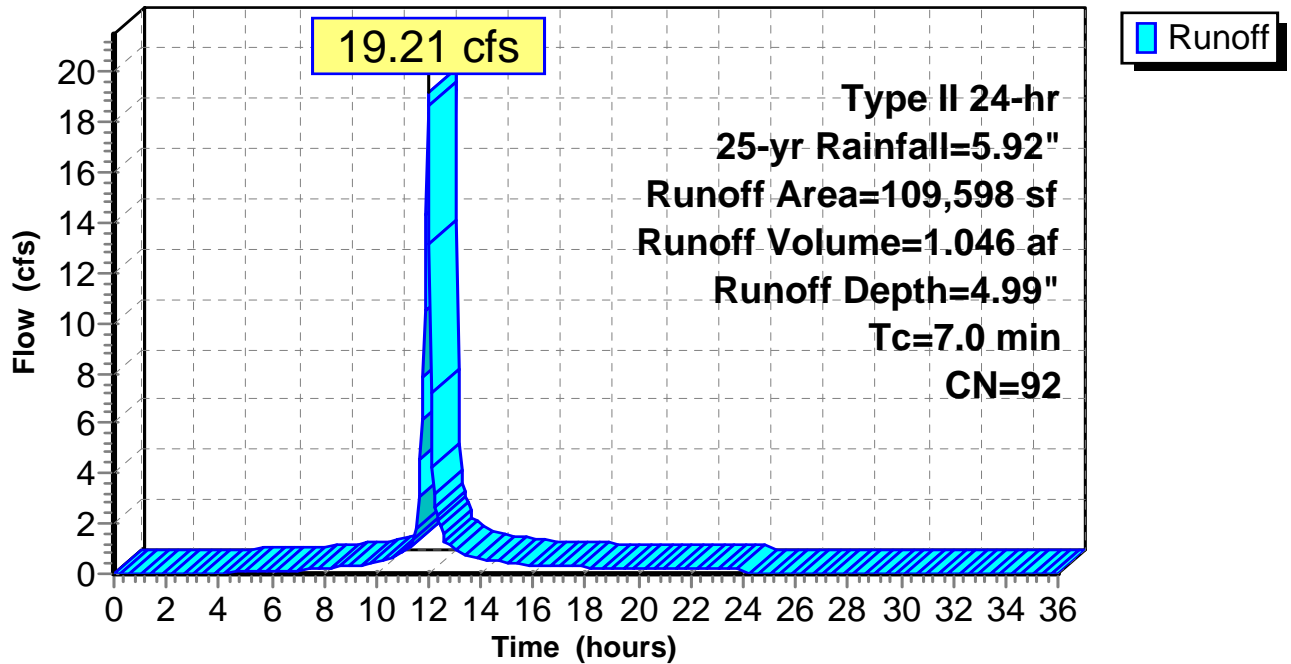Runoff   =   8.00 cfs @   12.27 hrs, Volume=   0.866 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	60,255	98	
	30,427	80	>75% Grass cover, Good, HSG D
	90,682	92	Weighted Average
	30,427		33.55% Pervious Area
	60,255		66.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	178	0.0075	0.09		**Sheet Flow,**
					Grass: Dense n= 0.240 P2= 3.17"

Subcatchment 2S: Subcatchment 2

Hydrograph

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Summary for Subcatchment 3S: Subcatchment 3

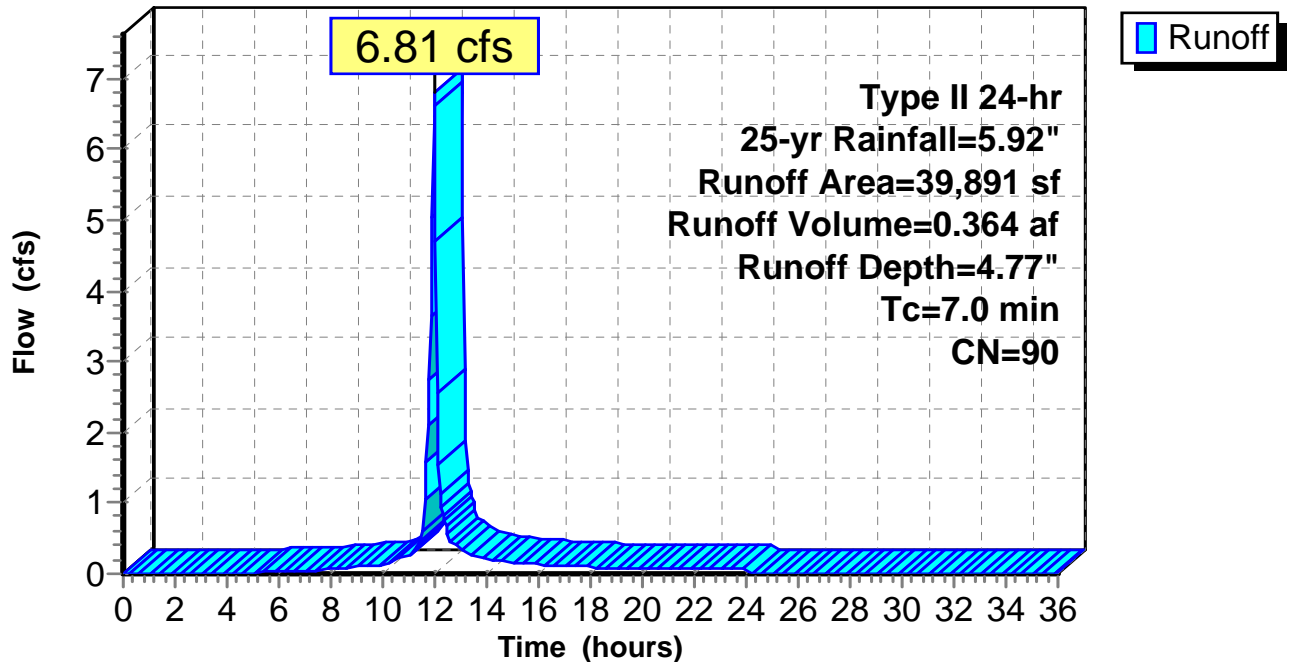Runoff   =   3.60 cfs @   12.24 hrs, Volume=   0.360 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
	21,255	80	>75% Grass cover, Good, HSG D
*	19,189	98	
	40,444	89	Weighted Average
	21,255		52.55% Pervious Area
	19,189		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	150	0.0200	0.08		**Sheet Flow, Sheet**
					Woods: Light underbrush n= 0.400 P2= 3.17"
0.8	35	0.0200	0.71		**Shallow Concentrated Flow,**
					Woodland Kv= 5.0 fps
30.6	185	Total			

Subcatchment 3S: Subcatchment 3

Hydrograph

Summary for Subcatchment 4S: Subcatchment 4

Runoff   =   4.40 cfs @   11.98 hrs, Volume=   0.233 af, Depth= 4.66"
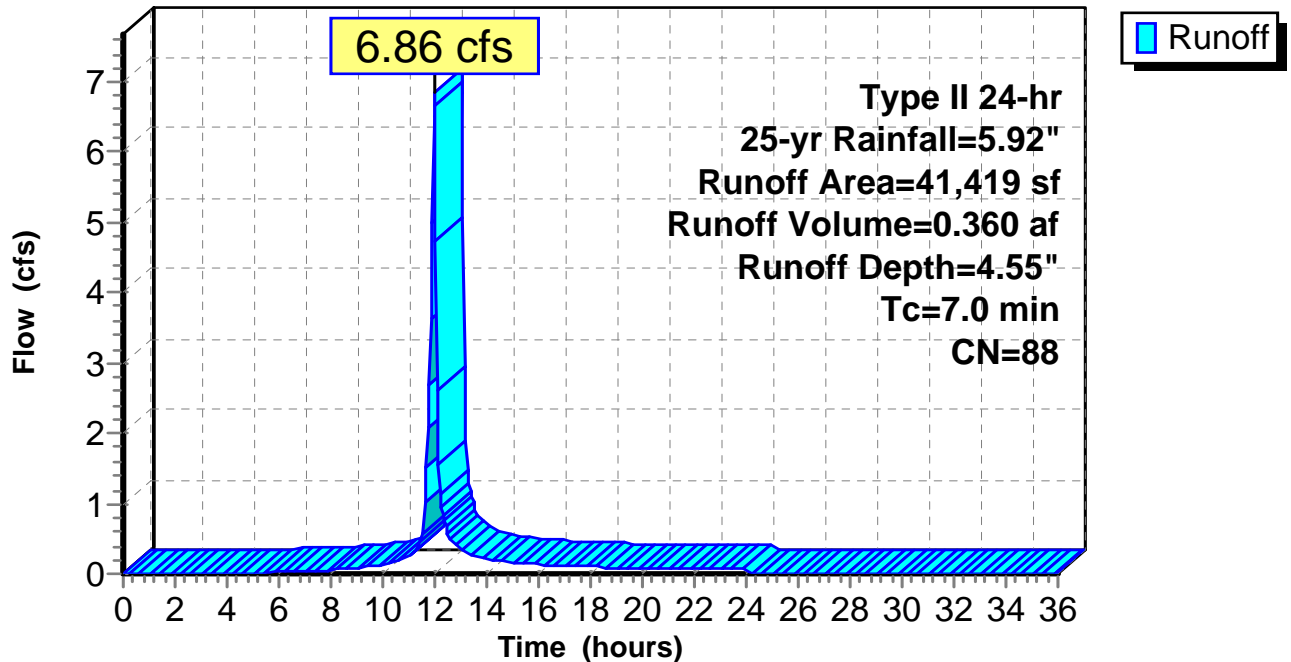
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

Area (sf)	CN	Description
* 13,720	98	
12,412	80	>75% Grass cover, Good, HSG D
26,132	89	Weighted Average
12,412		47.50% Pervious Area
13,720		52.50% Impervious Area

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

Subcatchment 4S: Subcatchment 4

Hydrograph

Summary for Subcatchment 5S: Subcatchment 5

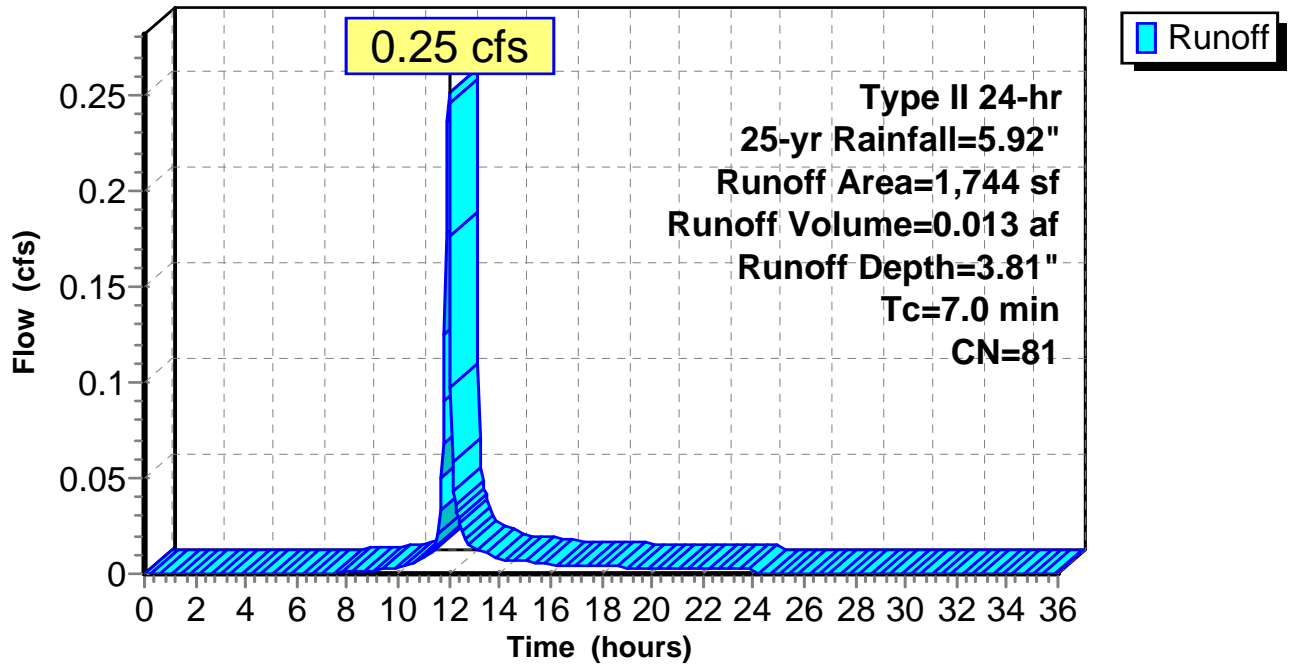Runoff   =   19.21 cfs @   11.98 hrs, Volume=   1.046 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

Area (sf)	CN	Description
* 70,563	98	
39,035	80	>75% Grass cover, Good, HSG D
109,598	92	Weighted Average
39,035		35.62% Pervious Area
70,563		64.38% Impervious Area

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

Subcatchment 5S: Subcatchment 5

Hydrograph

Summary for Subcatchment 6S: Subcatchment 6

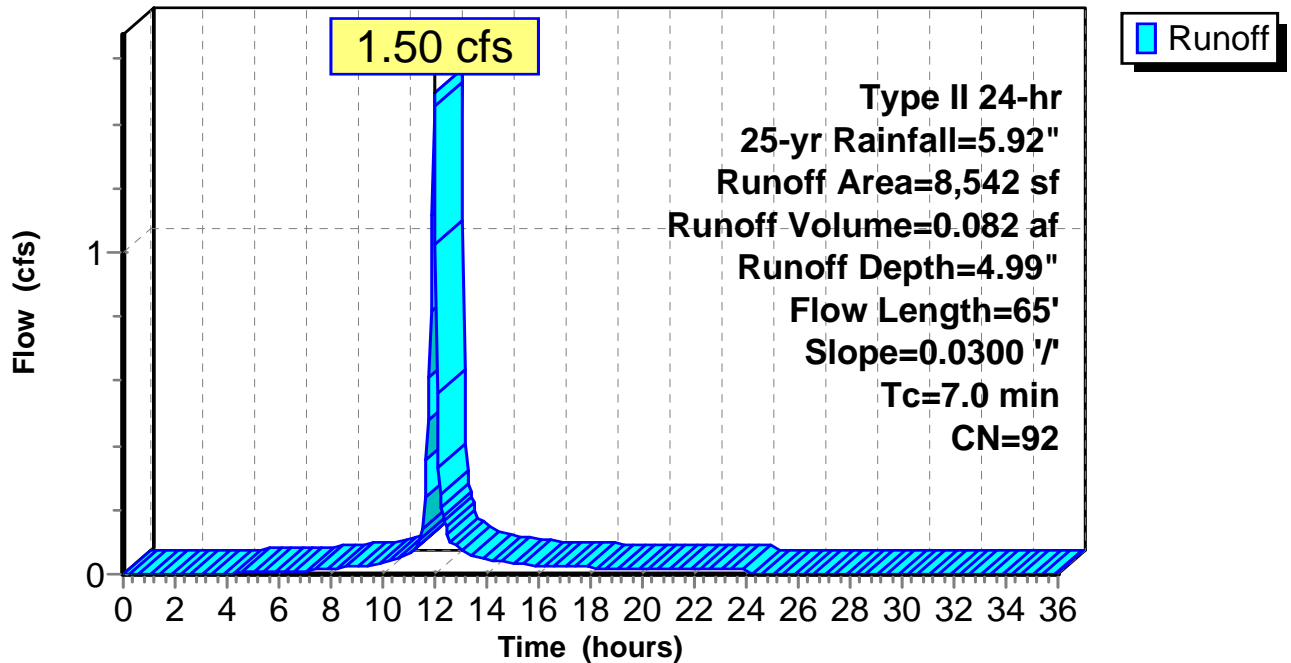Runoff   =   6.81 cfs @   11.98 hrs, Volume=   0.364 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	21,718	98	
	18,173	80	>75% Grass cover, Good, HSG D
	39,891	90	Weighted Average
	18,173		45.56% Pervious Area
	21,718		54.44% Impervious Area

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

Subcatchment 6S: Subcatchment 6

Hydrograph

**Type II 24-hr
25-yr Rainfall=5.92"
Runoff Area=39,891 sf
Runoff Volume=0.364 af
Runoff Depth=4.77"
Tc=7.0 min
CN=90**

6.81 cfs

Summary for Subcatchment 7S: Subcatchment 7

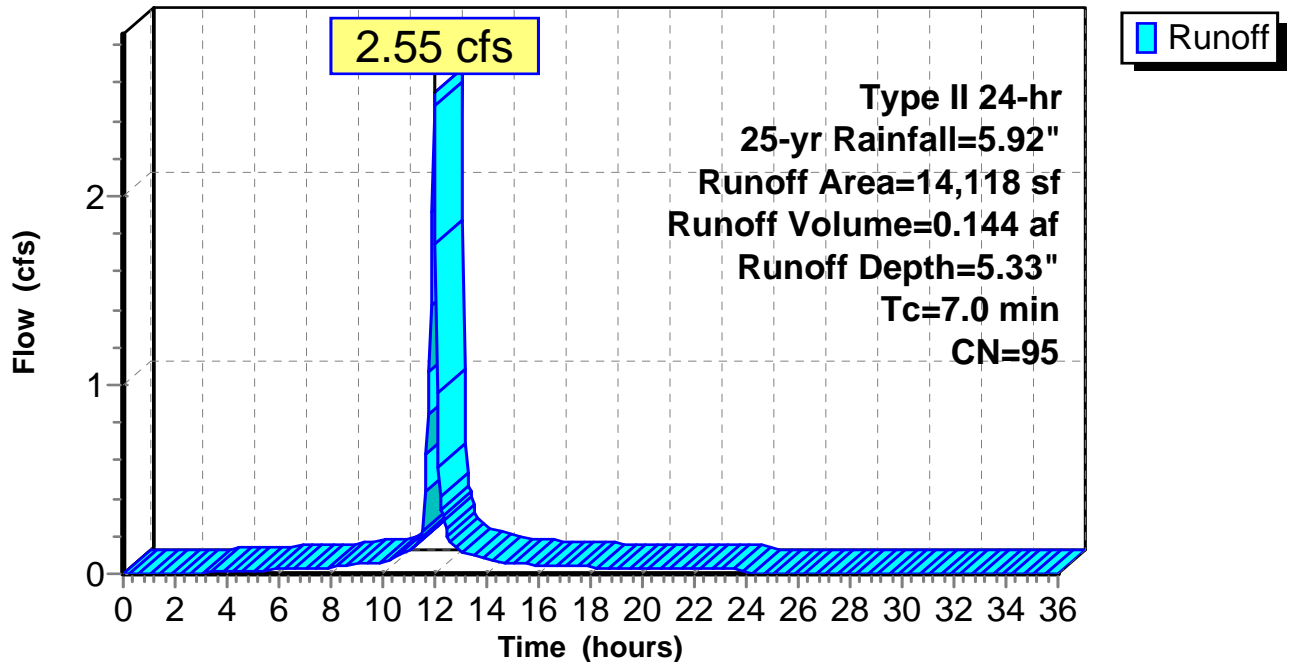Runoff   =   6.86 cfs @   11.98 hrs, Volume=   0.360 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	17,297	98	
	24,122	80	>75% Grass cover, Good, HSG D
	41,419	88	Weighted Average
	24,122		58.24% Pervious Area
	17,297		41.76% Impervious Area

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

Subcatchment 7S: Subcatchment 7

Hydrograph

Summary for Subcatchment 8S: Subcatchment 8

Runoff   =   0.25 cfs @   11.98 hrs, Volume=   0.013 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
	1,681	80	>75% Grass cover, Good, HSG D
*	63	98	
	1,744	81	Weighted Average
	1,681		96.39% Pervious Area
	63		3.61% Impervious Area

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

Subcatchment 8S: Subcatchment 8

Hydrograph

Summary for Subcatchment SA: Subcatchment A

Runoff   =   1.50 cfs @ 11.98 hrs, Volume=   0.082 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

	Area (sf)	CN	Description
*	5,794	98	
	2,748	80	>75% Grass cover, Good, HSG D
	8,542	92	Weighted Average
	2,748		32.17% Pervious Area
	5,794		67.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	65	0.0300	1.48		**Sheet Flow,**
					Smooth surfaces n= 0.011 P2= 3.17"
6.3					**Direct Entry, min**
7.0	65	Total			

Subcatchment SA: Subcatchment A

Hydrograph

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Type II 24-hr 25-yr Rainfall=5.92"
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Summary for Subcatchment SB: Subcatchment B

Runoff   =   2.55 cfs @   11.98 hrs, Volume=   0.144 af, Depth= 5.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=5.92"

Area (sf)	CN	Description
* 11,919	98	
2,199	80	>75% Grass cover, Good, HSG D
14,118	95	Weighted Average
2,199		15.58% Pervious Area
11,919		84.42% Impervious Area

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

Subcatchment SB: Subcatchment B

Hydrograph

Summary for Reach 1SP: Study Point 1

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

Inflow   =   5.27 cfs @ 12.87 hrs, Volume=   2.219 af
Outflow   =   5.27 cfs @ 12.87 hrs, Volume=   2.219 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 1SP: Study Point 1

Hydrograph
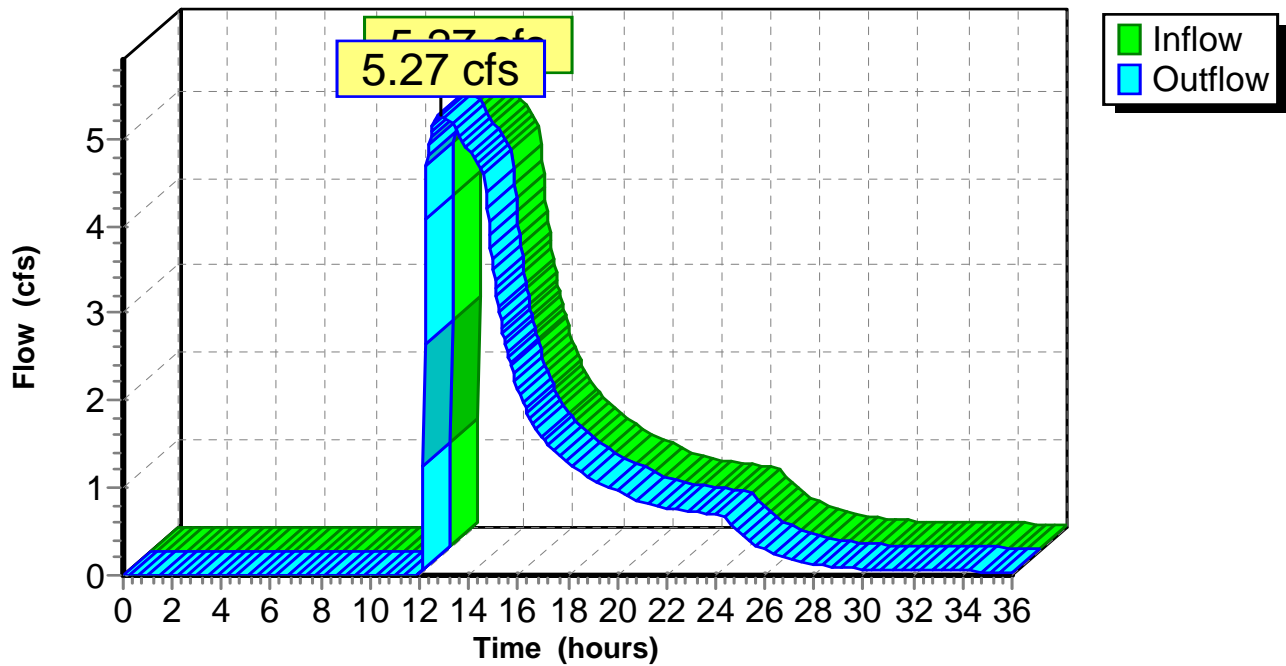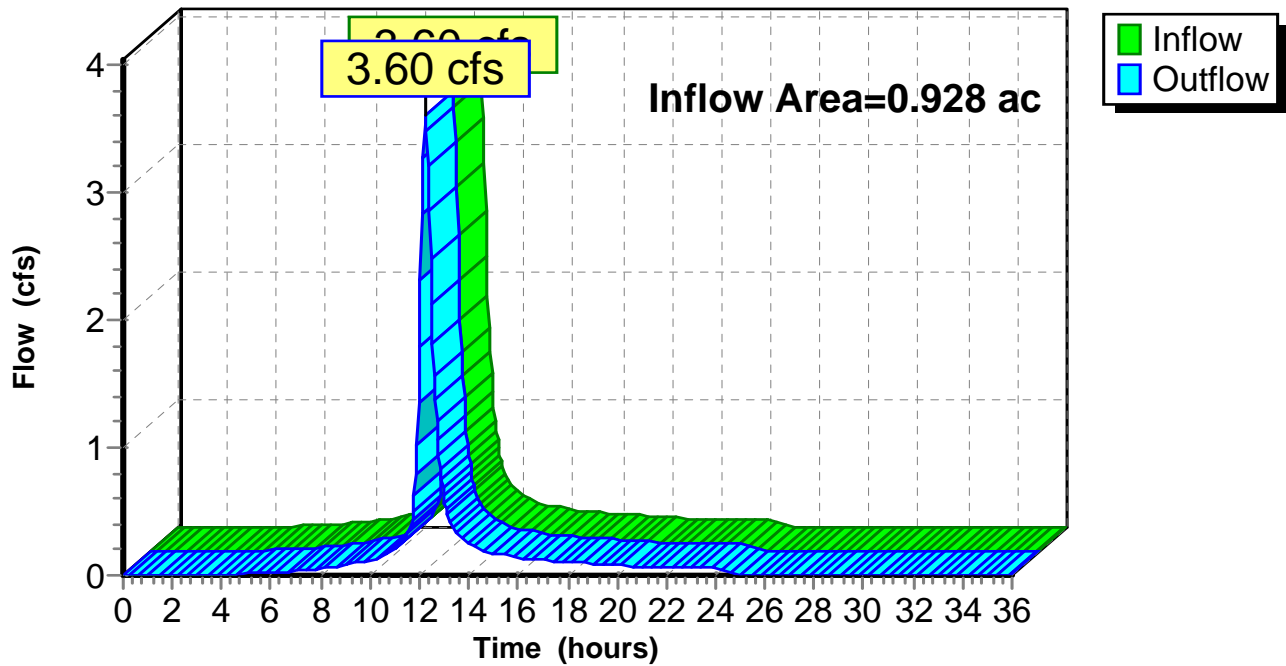
Summary for Reach 2SP: Study Point 2

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

Inflow Area =   9.597 ac, 51.35% Impervious, Inflow Depth = 0.58"   for 25-yr event
Inflow   =   5.00 cfs @   12.87 hrs, Volume=   0.465 af
Outflow   =   5.00 cfs @   12.87 hrs, Volume=   0.465 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 2SP: Study Point 2

Hydrograph

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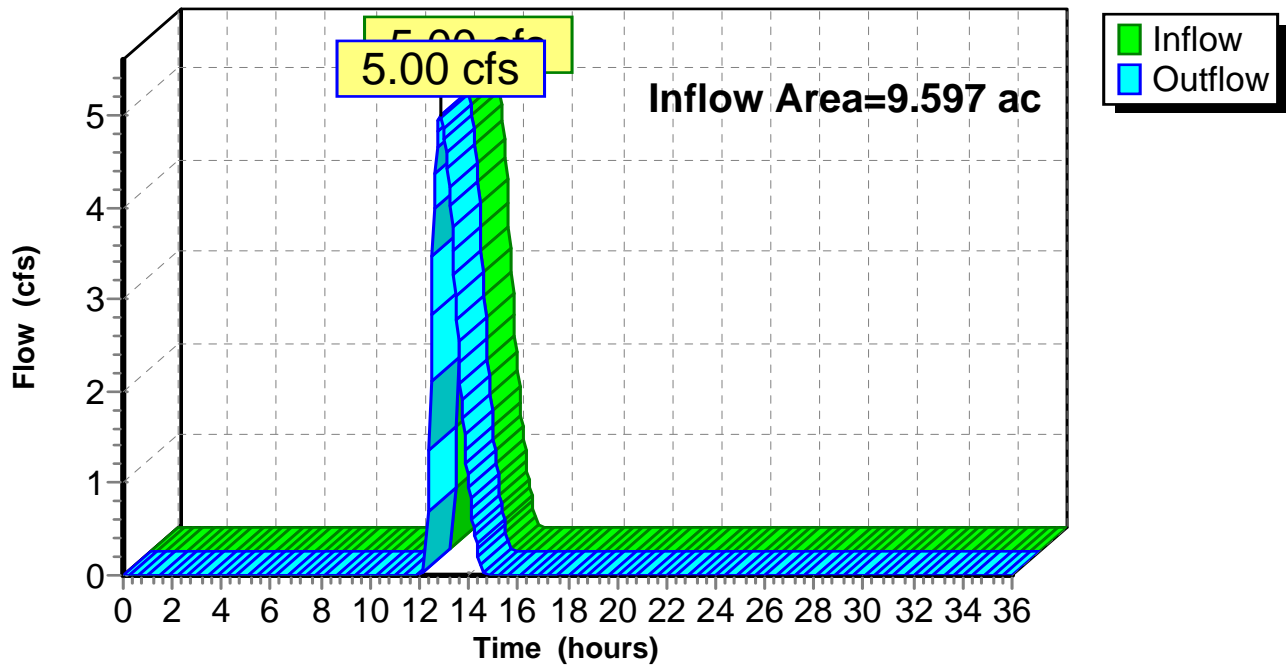
Summary for Reach 3SP: Study Point 3

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

Inflow Area =   0.040 ac,   3.61% Impervious, Inflow Depth = 18.47"   for 25-yr event
Inflow   =   4.60 cfs @   12.03 hrs, Volume=   0.062 af
Outflow   =   4.60 cfs @   12.03 hrs, Volume=   0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 3SP: Study Point 3

Hydrograph

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Summary for Reach 4SP: Study Point 4

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

Inflow Area =   0.928 ac, 47.45% Impervious, Inflow Depth = 4.66"   for 25-yr event
Inflow   =   3.60 cfs @   12.24 hrs, Volume=   0.360 af
Outflow   =   3.60 cfs @   12.24 hrs, Volume=   0.360 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach 4SP: Study Point 4

Hydrograph

Summary for Pond 1P: Wetland A

[79] Warning: Submerged Pond 8P Secondary device # 2 INLET by 0.78'
[81] Warning: Exceeded Pond 9P by 0.40' @ 12.80 hrs

Inflow Area =   9.597 ac, 51.35% Impervious, Inflow Depth > 4.19"   for 25-yr event
Inflow   =   29.94 cfs @ 12.08 hrs, Volume=   3.350 af
Outflow   =   10.28 cfs @ 12.87 hrs, Volume=   2.684 af, Atten= 66%, Lag= 47.6 min
Primary   =   5.00 cfs @ 12.87 hrs, Volume=   0.465 af
Secondary =   5.27 cfs @ 12.87 hrs, Volume=   2.219 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Starting Elev= 63.50'   Surf.Area= 14,739 sf   Storage= 17,429 cf
Peak Elev= 66.48' @ 12.87 hrs   Surf.Area= 28,090 sf   Storage= 80,466 cf   (63,038 cf above start)

Plug-Flow detention time= 257.9 min calculated for 2.283 af (68% of inflow)
Center-of-Mass det. time= 107.2 min (956.0 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	62.00'	209,276 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.00	8,500	0	0
65.00	20,977	44,216	44,216
70.00	45,047	165,060	209,276

Device	Routing	Invert	Outlet Devices
#1	Primary	65.75'	**3.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Secondary	62.86'	**12.0" Round Culvert** L= 48.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 62.86' / 58.69' S= 0.0869 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	65.08'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=5.00 cfs @ 12.87 hrs HW=66.48'   (Free Discharge)
└—**1=Broad-Crested Rectangular Weir** (Weir Controls 5.00 cfs @ 2.29 fps)

Secondary OutFlow Max=5.27 cfs @ 12.87 hrs HW=66.48'   (Free Discharge)
└—**2=Culvert** (Inlet Controls 5.27 cfs @ 6.71 fps)
  └—**3=Sharp-Crested Rectangular Weir** (Passes 5.27 cfs of 14.04 cfs potential flow)

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Pond 1P: Wetland A

Hydrograph

29.94 cfs

Inflow Area=9.597 ac
Peak Elev=66.48'
Storage=80,466 cf

10.28 cfs

5.27 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs) — y-axis: 0, 5, 10, 15, 20, 25, 30

Time (hours) — x-axis: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36

Summary for Pond 2P: Wetland B

Inflow Area =   2.082 ac, 66.45% Impervious, Inflow Depth = 4.99"   for 25-yr event
Inflow   =   8.00 cfs @ 12.27 hrs, Volume=   0.866 af
Outflow   =   7.52 cfs @ 12.36 hrs, Volume=   0.671 af, Atten= 6%, Lag= 5.2 min
Primary   =   7.52 cfs @ 12.36 hrs, Volume=   0.671 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 69.31' @ 12.36 hrs   Surf.Area= 10,486 sf   Storage= 11,061 cf

Plug-Flow detention time= 146.3 min calculated for 0.670 af (77% of inflow)
Center-of-Mass det. time= 62.7 min (862.5 - 799.8)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	21,636 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.00	2,200	0	0
68.00	4,250	3,225	3,225
69.00	6,286	5,268	8,493
70.00	20,000	13,143	21,636

Device	Routing	Invert	Outlet Devices
#1	Primary	69.00'	**18.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=7.49 cfs @ 12.36 hrs HW=69.31'   (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 7.49 cfs @ 1.36 fps)

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Pond 2P: Wetland B

Hydrograph

Inflow Area=2.082 ac
Peak Elev=69.31'
Storage=11,061 cf

8.00 cfs
7.52 cfs

Flow (cfs)

Time (hours)

Inflow
Primary

Summary for Pond 3P: Surface Detention

[79] Warning: Submerged Pond 6P Primary device # 1 INLET by 1.81'
[81] Warning: Exceeded Pond 7P by 0.21' @ 12.25 hrs

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth > 4.69"   for 25-yr event
Inflow   =   28.80 cfs @   11.99 hrs, Volume=   1.651 af
Outflow   =   23.56 cfs @   12.07 hrs, Volume=   1.649 af, Atten= 18%, Lag= 4.5 min
Primary   =   8.22 cfs @   12.07 hrs, Volume=   1.502 af
Secondary =   15.34 cfs @   12.07 hrs, Volume=   0.147 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.83' @ 12.07 hrs   Surf.Area= 7,805 sf   Storage= 16,133 cf

Plug-Flow detention time= 18.9 min calculated for 1.649 af (100% of inflow)
Center-of-Mass det. time= 17.5 min (822.5 - 805.0)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	21,926 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.00	400	0	0
70.00	2,991	1,696	1,696
72.00	5,812	8,803	10,499
73.50	9,425	11,428	21,926

Device	Routing	Invert	Outlet Devices
#1	Primary	69.10'	**15.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 69.10' / 68.75' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Secondary	72.50'	**35.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.17 cfs @ 12.07 hrs HW=72.79'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 8.17 cfs @ 6.66 fps)

Secondary OutFlow Max=13.49 cfs @ 12.07 hrs HW=72.79'   (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.49 cfs @ 1.31 fps)

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Type II 24-hr 25-yr Rainfall=5.92"
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Pond 3P: Surface Detention

Hydrograph

Inflow Area=4.228 ac
Peak Elev=72.83'
Storage=16,133 cf

28.80 cfs
23.56 cfs
15.34 cfs
8.2? cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

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Summary for Pond 4P: Surface Detention

[79] Warning: Submerged Pond PB Primary device # 1 INLET by 3.85'
[78] Warning: Submerged Pond PB Tertiary device # 2 by 3.26'

Inflow Area =		1.275 ac,	52.61% Impervious,	Inflow Depth > 4.50"	for 25-yr event
Inflow	=	7.06 cfs @	11.98 hrs,	Volume=	0.478 af
Outflow	=	6.54 cfs @	12.02 hrs,	Volume=	0.398 af, Atten= 7%, Lag= 2.5 min
Primary	=	2.13 cfs @	12.02 hrs,	Volume=	0.357 af
Secondary =		4.42 cfs @	12.02 hrs,	Volume=	0.041 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 71.37' @ 12.02 hrs   Surf.Area= 3,181 sf   Storage= 6,107 cf

Plug-Flow detention time= 193.9 min calculated for 0.397 af (83% of inflow)
Center-of-Mass det. time= 83.1 min (955.9 - 872.8)

Volume	Invert	Avail.Storage	Storage Description	
#1	64.00'	8,676 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)	

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	13	0	0
67.00	71	126	126
68.00	928	500	626
69.00	1,378	1,153	1,779
70.00	1,604	1,491	3,270
71.00	2,104	1,854	5,124
72.00	5,000	3,552	8,676

Device	Routing	Invert	Outlet Devices
#1	Primary	67.66'	**1.0" Round Culvert** L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.66' / 67.65' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 0.01 sf
#2	Secondary	71.25'	**45.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Primary	70.25'	**6.0" Round Culvert X 3.00** L= 1.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 70.25' / 70.25' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.20 sf

Primary OutFlow Max=2.10 cfs @ 12.02 hrs HW=71.35'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.03 cfs @ 6.12 fps)
└─**3=Culvert** (Inlet Controls 2.06 cfs @ 3.50 fps)

Secondary OutFlow Max=3.81 cfs @ 12.02 hrs HW=71.35'   (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 3.81 cfs @ 0.85 fps)

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Pond 4P: Surface Detention

Hydrograph

Inflow Area=1.275 ac
Peak Elev=71.37'
Storage=6,107 cf

7.06 cfs
6.54 cfs
4.42 cfs
2.1 cfs

Legend:
- Inflow
- Outflow
- Primary
- Secondary

Flow (cfs) vs Time (hours)

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Summary for Pond 5P: OCS-4P

[57] Hint: Peaked at 68.48' (Flood elevation advised)
[79] Warning: Submerged Pond 4P Primary device # 1 INLET by 0.81'

Inflow Area =   1.275 ac, 52.61% Impervious, Inflow Depth > 3.36"   for 25-yr event
Inflow   =   2.13 cfs @   12.02 hrs, Volume=   0.357 af
Outflow   =   2.13 cfs @   12.02 hrs, Volume=   0.357 af, Atten= 0%, Lag= 0.0 min
Primary   =   2.13 cfs @   12.02 hrs, Volume=   0.357 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 68.48' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	67.48'	**12.0" Round Culvert** L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.48' / 66.86' S= 0.0077 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.10 cfs @ 12.02 hrs HW=68.47'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 2.10 cfs @ 2.67 fps)

Pond 5P: OCS-4P

Hydrograph
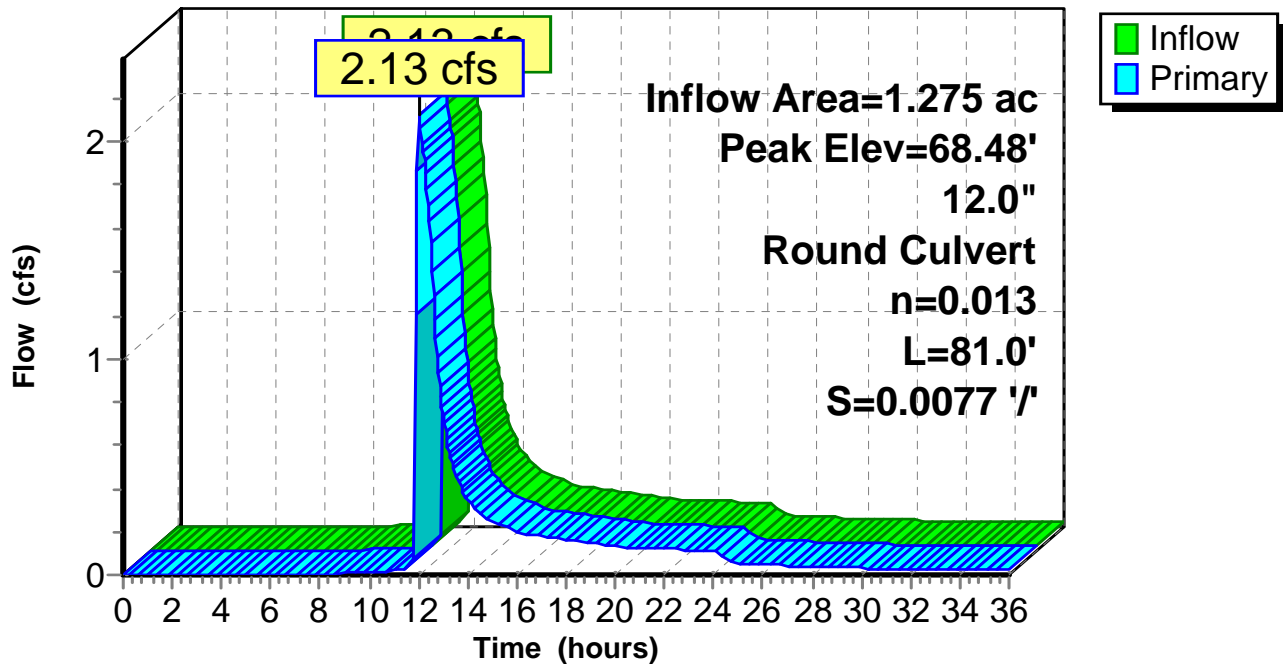
Summary for Pond 6P: Atrium Surface Detention

[79] Warning: Submerged Pond PA Primary device # 1 INLET by 1.10'
[78] Warning: Submerged Pond PA Tertiary device # 2 by 0.27'

Inflow Area =   2.712 ac, 64.63% Impervious, Inflow Depth > 4.92"   for 25-yr event
Inflow   =   19.46 cfs @   11.98 hrs, Volume=   1.113 af
Outflow   =   18.90 cfs @   12.00 hrs, Volume=   1.056 af, Atten= 3%, Lag= 1.0 min
Primary   =   18.90 cfs @   12.00 hrs, Volume=   1.056 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
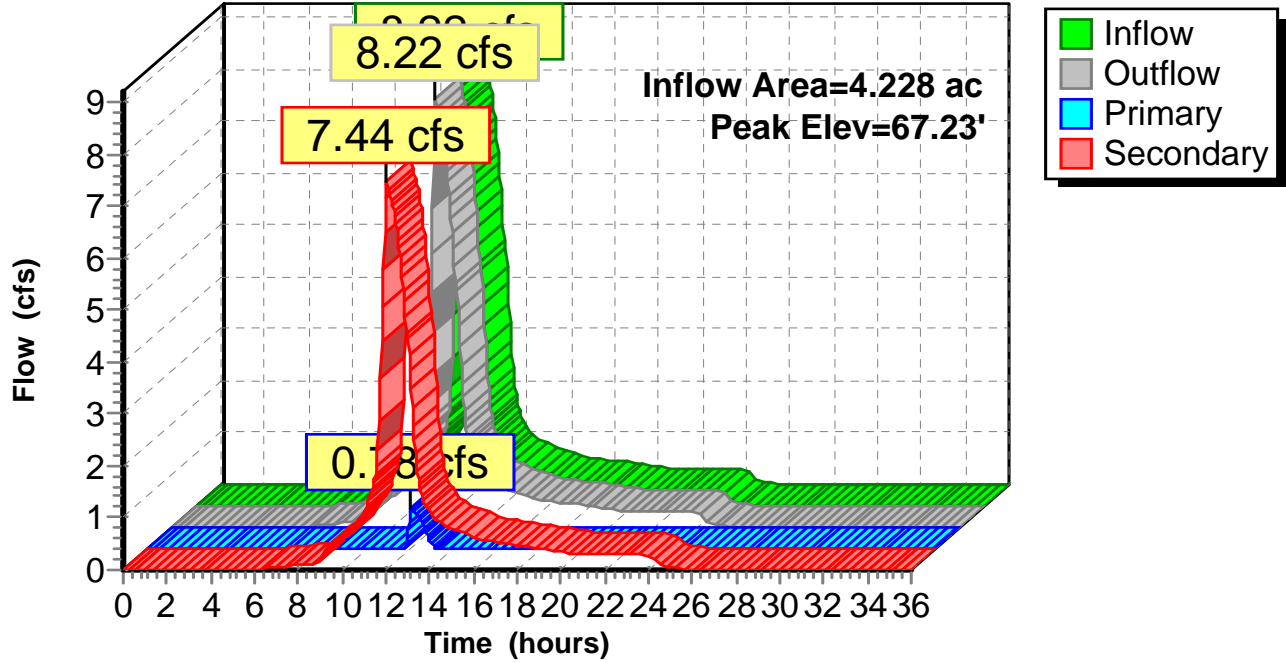Peak Elev= 74.10' @ 12.00 hrs   Surf.Area= 3,835 sf   Storage= 4,441 cf

Plug-Flow detention time= 58.5 min calculated for 1.056 af (95% of inflow)
Center-of-Mass det. time= 24.0 min (815.1 - 791.1)

Volume	Invert	Avail.Storage	Storage Description
#1	70.00'	5,026 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
70.00	55	0	0
72.00	327	382	382
73.00	1,694	1,011	1,393
74.25	4,120	3,634	5,026

Device	Routing	Invert	Outlet Devices
#1	Primary	71.00'	**0.1" Round Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.00' / 69.20' S= 0.0082 '/' Cc= 0.900 n= 0.013, Flow Area= 0.00 sf
#2	Primary	73.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=18.81 cfs @ 12.00 hrs HW=74.10'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.00 cfs @ 0.28 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 18.81 cfs @ 2.09 fps)

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Pond 6P: Atrium Surface Detention

Hydrograph

Inflow Area=2.712 ac
Peak Elev=74.10'
Storage=4,441 cf

19.46 cfs
18.90 cfs

Inflow
Primary

Summary for Pond 7P: Riprap Surface Detention

Inflow Area =   0.600 ac, 52.50% Impervious, Inflow Depth = 4.66"   for 25-yr event
Inflow   =   4.40 cfs @   11.98 hrs, Volume=   0.233 af
Outflow   =   3.26 cfs @   12.04 hrs, Volume=   0.231 af, Atten= 26%, Lag= 3.7 min
Primary   =   3.26 cfs @   12.04 hrs, Volume=   0.231 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 73.85' @ 12.04 hrs   Surf.Area= 766 sf   Storage= 818 cf

Plug-Flow detention time= 13.6 min calculated for 0.231 af (99% of inflow)
Center-of-Mass det. time= 7.8 min (794.1 - 786.3)

Volume	Invert	Avail.Storage	Storage Description
#1	71.00'	2,180 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.00	50	0	0
73.00	310	360	360
74.00	846	578	938
75.00	1,637	1,242	2,180

Device	Routing	Invert	Outlet Devices
#1	Primary	71.83'	**12.0" Round Culvert** L= 375.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.83' / 69.20' S= 0.0070 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=3.25 cfs @ 12.04 hrs HW=73.83'   (Free Discharge)
└─**1=Culvert** (Barrel Controls 3.25 cfs @ 4.13 fps)

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Pond 7P: Riprap Surface Detention

Hydrograph

4.40 cfs

3.26 cfs

Inflow Area=0.600 ac
Peak Elev=73.85'
Storage=818 cf
12.0"
Round Culvert
n=0.013
L=375.0'
S=0.0070 '/'

Legend: ■ Inflow ■ Primary

Flow (cfs)

Time (hours)

Summary for Pond 8P: OCS-DMH7

[57] Hint: Peaked at 67.23' (Flood elevation advised)

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth > 4.26"   for 25-yr event
Inflow   =   8.22 cfs @ 12.07 hrs, Volume=   1.502 af
Outflow   =   8.22 cfs @ 12.07 hrs, Volume=   1.502 af, Atten= 0%, Lag= 0.0 min
Primary   =   0.78 cfs @ 12.07 hrs, Volume=   0.047 af
Secondary =   7.44 cfs @ 12.07 hrs, Volume=   1.455 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.23' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 66.60' / 66.60' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	65.70'	**24.0" Round Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 65.70' / 65.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf

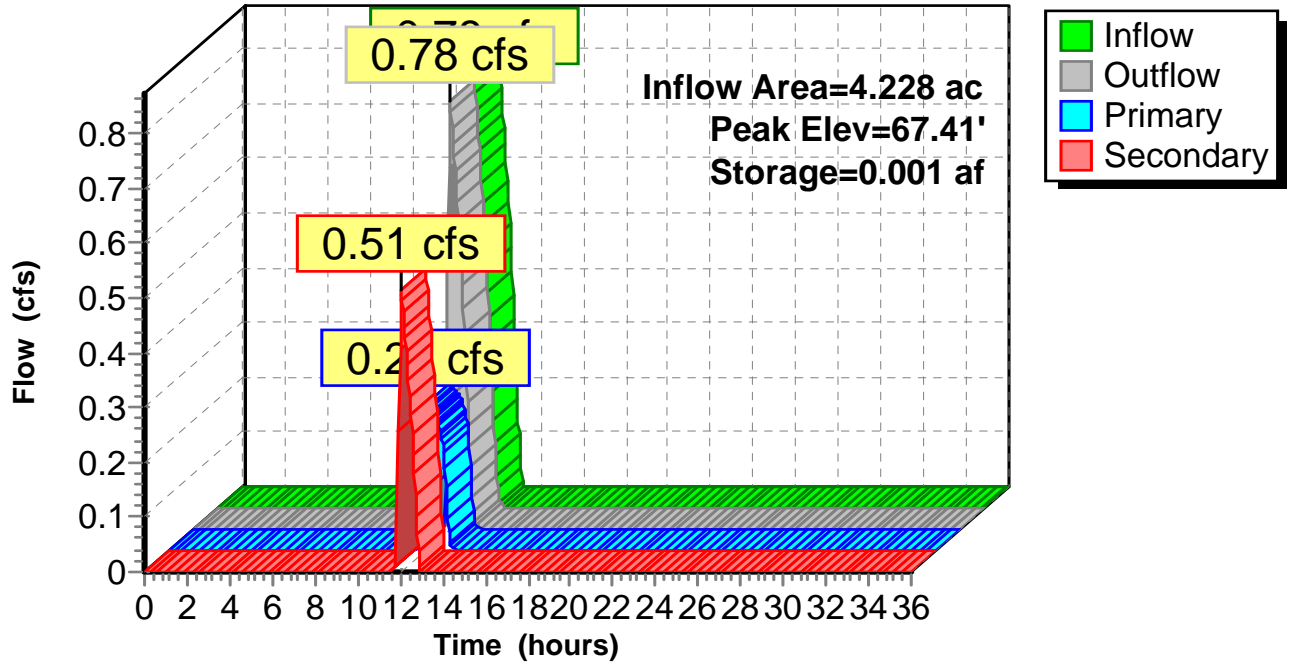**Primary OutFlow** Max=0.76 cfs @ 12.07 hrs HW=67.22' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.76 cfs @ 2.12 fps)

Secondary OutFlow Max=7.41 cfs @ 12.07 hrs HW=67.22' (Free Discharge)
└─**2=Culvert** (Barrel Controls 7.41 cfs @ 3.99 fps)

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Pond 8P: OCS-DMH7

Hydrograph

Summary for Pond 9P: UG Detention

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth = 0.07"   for 25-yr event
Inflow   =   0.27 cfs @   12.07 hrs, Volume=   0.023 af
Outflow   =   0.15 cfs @   12.94 hrs, Volume=   0.023 af, Atten= 42%, Lag= 52.3 min
Primary   =   0.15 cfs @   12.94 hrs, Volume=   0.023 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 66.08' @ 12.94 hrs   Surf.Area= 1,536 sf   Storage= 559 cf

Plug-Flow detention time= 88.9 min calculated for 0.023 af (99% of inflow)
Center-of-Mass det. time= 88.2 min (834.0 - 745.8)

Volume	Invert	Avail.Storage	Storage Description
#1	65.70'	2,488 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
			2,619 cf Overall x 95.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.70	1,536	0	0
67.40	1,536	2,611	2,611
67.41	5	8	2,619

Device	Routing	Invert	Outlet Devices
#1	Primary	65.70'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 65.70' / 65.60' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf
#2	Primary	67.00'	**4.0" Round Culvert**
			L= 10.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 67.00' / 66.90' S= 0.0100 '/' Cc= 0.900
			n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.15 cfs @ 12.94 hrs HW=66.08'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.15 cfs @ 1.77 fps)
　└─**2=Culvert** (Controls 0.00 cfs)
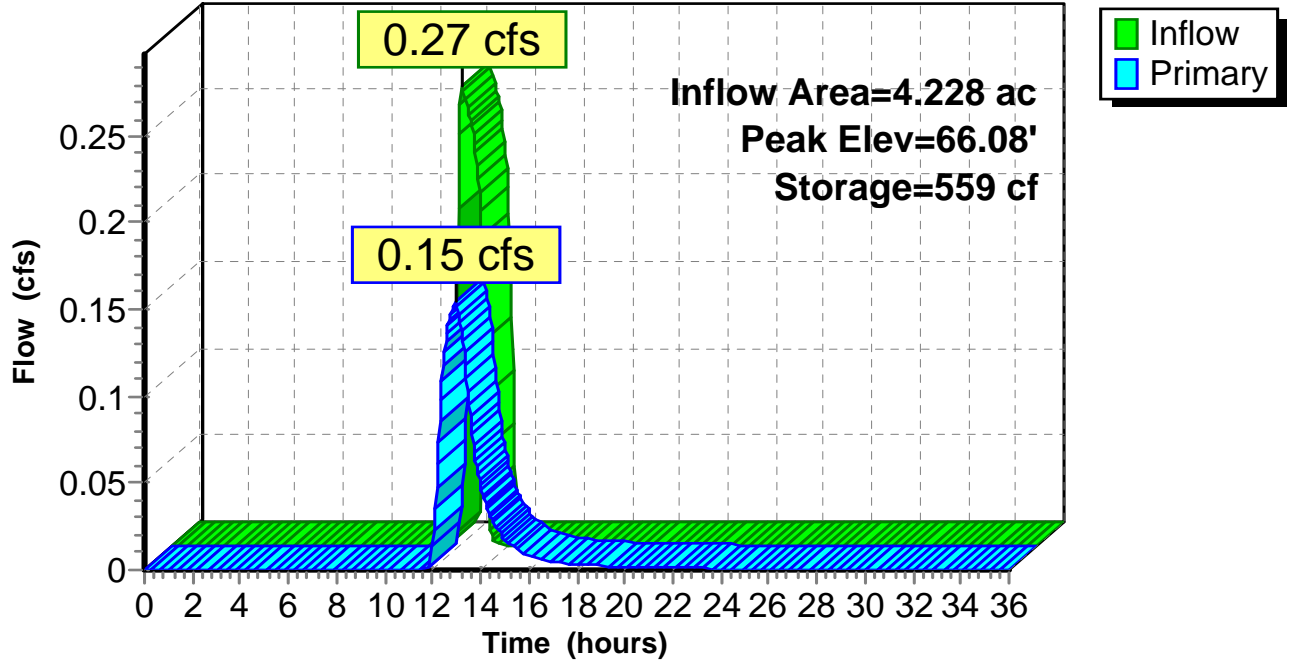
Pond 9P: UG Detention

Hydrograph

Inflow Area=4.228 ac
Peak Elev=66.08'
Storage=559 cf

0.27 cfs

0.15 cfs

Inflow
Primary

Flow (cfs)

Time (hours)

Summary for Pond 10P: Isolator Row x5

[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[81] Warning: Exceeded Pond 8P by 0.86' @ 35.95 hrs

Inflow Area =   4.228 ac, 60.70% Impervious, Inflow Depth =   0.13"   for 25-yr event
Inflow   =   0.78 cfs @   12.07 hrs, Volume=   0.047 af
Outflow   =   0.78 cfs @   12.07 hrs, Volume=   0.047 af, Atten= 0%, Lag= 0.1 min
Primary   =   0.27 cfs @   12.07 hrs, Volume=   0.023 af
Secondary =   0.51 cfs @   12.07 hrs, Volume=   0.024 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 67.41' @ 12.07 hrs   Surf.Area= 0.001 ac   Storage= 0.001 af

Plug-Flow detention time= 2.8 min calculated for 0.047 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (741.4 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1	66.60'	0.002 af	**ADS_StormTech RC-310** x 5 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 1 rows

Device	Routing	Invert	Outlet Devices
#1	Primary	66.60'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 66.60' / 66.55' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf
#2	Secondary	67.00'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.00' / 66.55' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.07 hrs HW=67.40'   (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.26 cfs @ 3.03 fps)

Secondary OutFlow Max=0.50 cfs @ 12.07 hrs HW=67.40'   (Free Discharge)
└─**2=Culvert** (Inlet Controls 0.50 cfs @ 1.70 fps)

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Pond 10P: Isolator Row x5

Hydrograph

Inflow Area=4.228 ac
Peak Elev=67.41'
Storage=0.001 af

Legend:
- Inflow (green)
- Outflow (gray)
- Primary (blue)
- Secondary (red)

0.78 cfs
0.51 cfs
0.2_ cfs

Flow (cfs) vs Time (hours)

Summary for Pond PA: USF A

Inflow Area =   0.196 ac, 67.83% Impervious, Inflow Depth = 4.99"   for 25-yr event
Inflow   =   1.50 cfs @   11.98 hrs, Volume=   0.082 af
Outflow   =   0.40 cfs @   12.14 hrs, Volume=   0.067 af, Atten= 73%, Lag= 9.7 min
Primary   =   0.36 cfs @   12.14 hrs, Volume=   0.029 af
Secondary =   0.00 cfs @   0.00 hrs, Volume=   0.000 af
Tertiary   =   0.04 cfs @   12.14 hrs, Volume=   0.038 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 77.46' @ 12.14 hrs   Surf.Area= 1,328 sf   Storage= 1,902 cf

Plug-Flow detention time= 342.3 min calculated for 0.067 af (82% of inflow)
Center-of-Mass det. time= 267.6 min (1,042.7 - 775.0)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	2,192 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	585	0.0	0	0
73.01	585	30.0	2	2
75.99	585	30.0	523	525
76.00	585	100.0	6	531
77.00	1,056	100.0	821	1,351
77.33	1,260	100.0	382	1,733
77.67	1,437	100.0	458	2,192

Device	Routing	Invert	Outlet Devices
#1	Primary	73.00'	**12.0" Round Culvert** L= 60.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 73.00' / 72.20' S= 0.0133 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Tertiary	73.83'	**2.410 in/hr Exfiltration over Surface area above 73.83'** Excluded Surface area = 585 sf
#3	Device 1	77.00'	**24.0" x 24.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 in 4.0" x 4.0" Grate Limited to weir flow at low heads
#4	Secondary	77.50'	**30.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

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Primary OutFlow Max=0.36 cfs @ 12.14 hrs HW=77.46'   (Free Discharge)
└─**1=Culvert** (Passes 0.36 cfs of 7.07 cfs potential flow)
  └─**3=Orifice/Grate** (Orifice Controls 0.36 cfs @ 3.26 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=73.00'   (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.04 cfs @ 12.14 hrs HW=77.46'   (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond PA: USF A

Hydrograph

Inflow Area=0.196 ac
Peak Elev=77.46'
Storage=1,902 cf

Legend: Inflow, Outflow, Primary, Secondary, Tertiary

1.50 cfs
0.40 cfs
0.36 cfs
0.00 cfs
0.04 cfs

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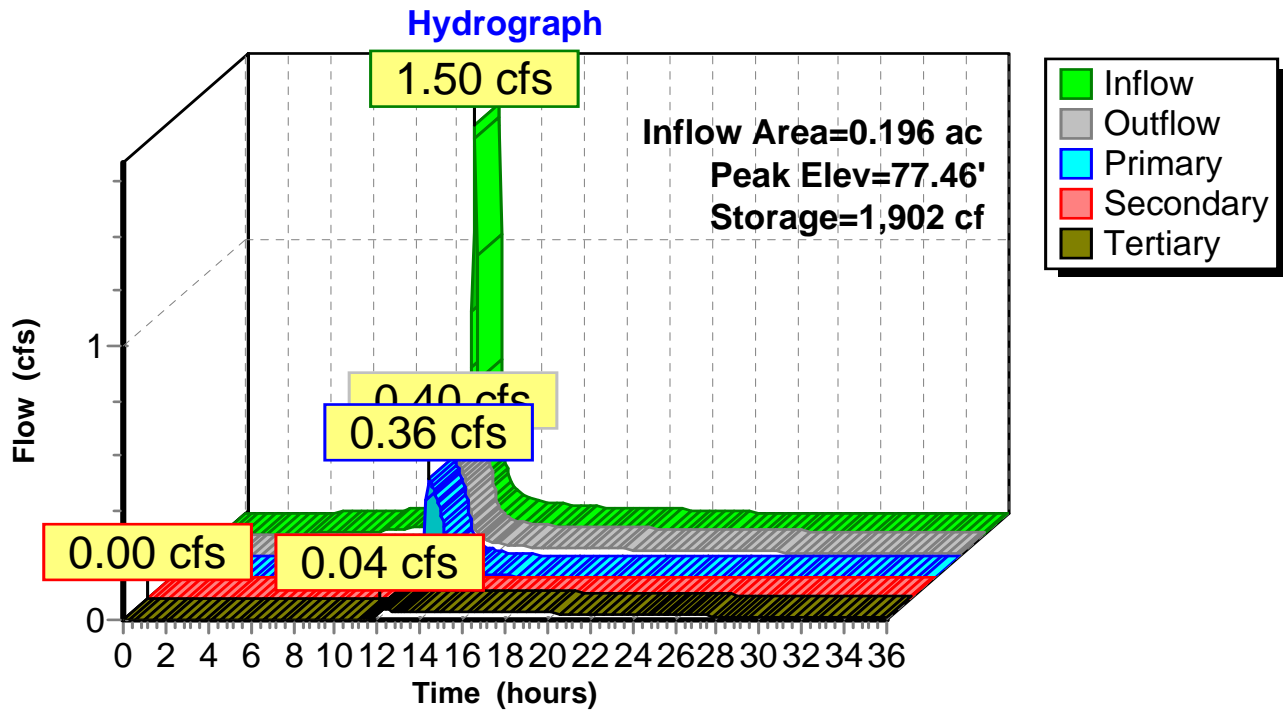
Summary for Pond PB: USF B

Inflow Area =   0.324 ac, 84.42% Impervious, Inflow Depth = 5.33"   for 25-yr event
Inflow   =   2.55 cfs @   11.98 hrs, Volume=   0.144 af
Outflow   =   1.33 cfs @   12.10 hrs, Volume=   0.126 af, Atten= 48%, Lag= 7.5 min
Primary   =   0.29 cfs @   12.10 hrs, Volume=   0.027 af
Secondary =   0.95 cfs @   12.10 hrs, Volume=   0.008 af
Tertiary   =   0.08 cfs @   12.10 hrs, Volume=   0.090 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 72.30' @ 12.10 hrs   Surf.Area= 2,185 sf   Storage= 3,366 cf

Plug-Flow detention time= 400.4 min calculated for 0.126 af (87% of inflow)
Center-of-Mass det. time= 340.4 min (1,101.6 - 761.2)

Volume	Invert	Avail.Storage	Storage Description
#1	67.86'	3,817 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.86	715	0.0	0	0
67.87	715	30.0	2	2
70.25	715	30.0	511	513
70.26	715	100.0	7	520
72.00	1,853	100.0	2,234	2,754
72.50	2,400	100.0	1,063	3,817

Device	Routing	Invert	Outlet Devices
#1	Primary	67.50'	**15.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 67.50' / 67.40' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Tertiary	68.09'	**2.410 in/hr Exfiltration over Surface area above 68.09'** Excluded Surface area = 715 sf
#3	Device 1	72.00'	**24.0" x 24.0" Horiz. Orifice/Grate X 5.00 columns** X 5 rows C= 0.600 in 4.0" x 4.0" Grate Limited to weir flow at low heads
#4	Secondary	72.25'	**30.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.29 cfs @ 12.10 hrs HW=72.30'   (Free Discharge)
└─**1=Culvert** (Passes 0.29 cfs of 9.53 cfs potential flow)
  └─**3=Orifice/Grate** (Orifice Controls 0.29 cfs @ 2.65 fps)

Secondary OutFlow Max=0.88 cfs @ 12.10 hrs HW=72.30'   (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 0.88 cfs @ 0.56 fps)

Tertiary OutFlow Max=0.08 cfs @ 12.10 hrs HW=72.30'   (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

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Pond PB: USF B

Hydrograph

Inflow Area=0.324 ac
Peak Elev=72.30'
Storage=3,366 cf

2.55 cfs
1.33 cfs
0.95 cfs
0.29 cfs
0.08 cfs

Legend: Inflow, Outflow, Primary, Secondary, Tertiary

Flow (cfs)

Time (hours)
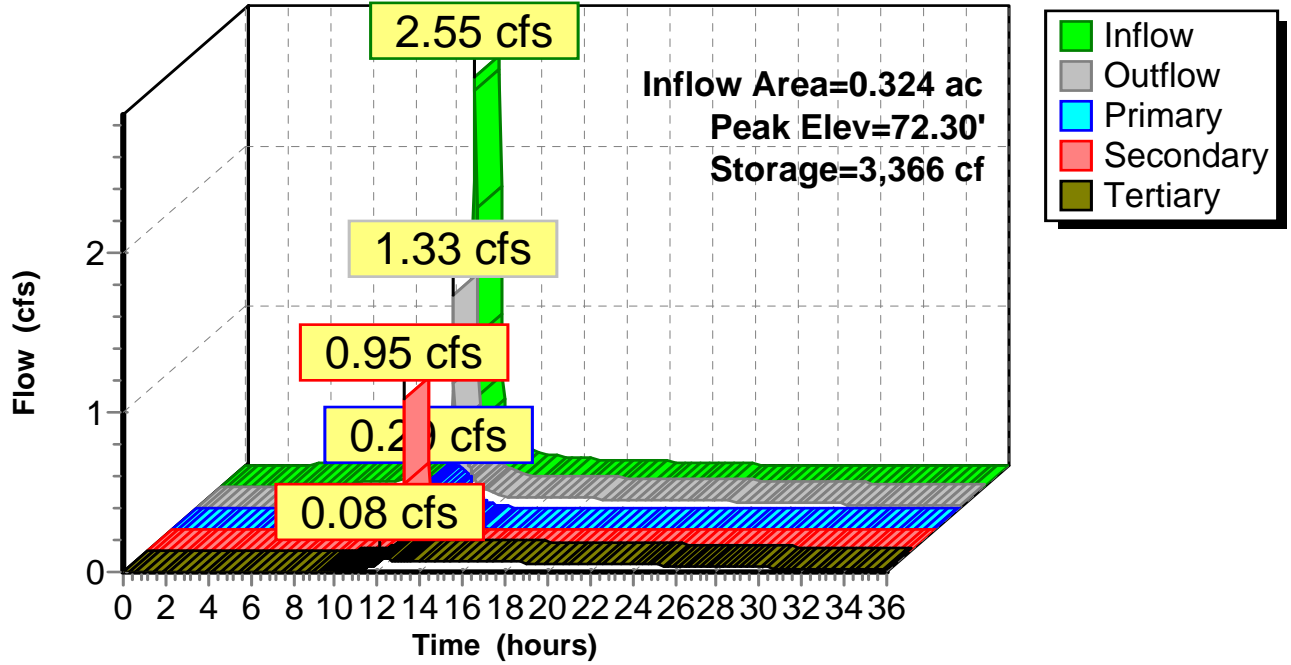
12.4 - INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

The Cedars Long – Term Care Facility
Portland, Maine

Introduction

The following plan outlines the anticipated inspection, maintenance and housekeeping procedures for the erosion and sedimentation controls as well as stormwater management devices for the project site. Also, this plan outlines several housekeeping requirements that shall be followed during and after construction. These procedures should be followed to ensure the intended function of the designed measures and to prevent unreasonable adverse impacts to the surrounding environment.

The procedures outlined in this inspection and maintenance plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional detail on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the Maine Department of Environmental Protection (MDEP).

During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, material storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

A.   Sediment Barriers:

- Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
- If the fabric on silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
- Sediment deposits should be removed after each storm event. They must be removed before deposits reach approximately one-half the height of the barrier.
- Filter berms shall be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

B.   Erosion Control Blankets:

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the specific blanket manufacturer. These tasks shall be included in addition to the requirements of this plan.

C.   Temporary Storm Drain Inlet Protection:

- The inlet protection structure shall be inspected before each rain event and repaired as necessary.
- Sediment shall be removed and the storm drain sediment barrier restored to its original dimensions when the sediment has accumulated to half of the design depth of the trap.
- Barriers shall be removed upon permanent stabilization of the tributary area.
- Upon removal of the barrier, all accumulated sediments downstream of the structure shall be cleaned from the storm drain system.

D.   Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

E.   Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established

temporary vegetative cover.

F. <u>Stabilized Temporary Drainage Swales:</u>

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.
- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

G. <u>Stormwater Best Management Practices:</u>

- Some Stormwater Best Management Practices may require inspection during construction. Each Stormwater Best Management Practice shall be inspected in accordance with its associated detail as indicated on the site plan.
- For all Stormwater Best Management Practices, contractor shall ensure that all areas tributary to each Stormwater Best Management Practice are stabilized prior to construction.

After Construction

1. **Inspection:** After construction, it is the responsibility of the owner or assigned heirs to comply with the inspection and maintenance procedures outlined in this section. All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in all applicable permits, shall conduct the inspections.

2. **Specific Inspection and Maintenance Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection and maintenance tasks to be performed after construction.

A. <u>Vegetated Areas:</u>

- Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems.

- Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

B. <u>Catch Basins:</u>

- Inspect and, if required, clean-out catch basins at least once a year, preferably in early spring.

- Clean out must include the removal and legal disposal of accumulated sediments and debris at the bottom of the basin, at any inlet grates, at any inflow channels to the basin, and at any pipes between basins.

- If the basin outlet is designed to trap floatable materials, then remove the floating debris and any floating oils (using oil-absorptive pads).

C. <u>Winter Sanding:</u>

- Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.

- Accumulations on pavement may be removed by pavement sweeping.

- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.
- Ensure that no winter sanding is done in Porous Pavement locations.

D. <u>Grassed Underdrained Soil Filters</u>

- Fertilization to establish vegetation within the soil filter should be avoided.

- Snow storage shall not occur in the soil filter.

- Check for accumulated sediments in the bottom of the soil filters. Remove sediments when they occupy 10 percent of the filter or sediment forebay bottom; if trenches fail to drain after surface sediment accumulations are removed, the filter medium must be replaced, using the same design, installation measures, and permeability testing procedures described in this application and related documents.

- Check for the dissipation of water after large storm events. The soil filter should be completely drained 72 hours after filling from the storm event.

3.   **Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system.

<u>**Housekeeping**</u>

The following general performance standards apply to the proposed project both during and after construction.

A. <u>Spill prevention</u>: Controls must be used to prevent pollutants from being discharged from materials and equipment on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

B. <u>Groundwater protection</u>: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors, accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

C.   Fugitive sediment and dust: Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control, but other water additives may be considered as needed. A stabilized construction entrance (SCE) should be included to minimize tracking of mud and sediment. If off-site tracking occurs, public roads should be swept immediately and no less than once a week and prior to significant storm events. Operations during dry months, that experience fugitive dust problems, should wet down unpaved access roads once a week or more frequently as needed with a water additive to suppress fugitive sediment and dust.

D.   Debris and other materials: Minimize the exposure of construction debris, building and landscaping materials, trash, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials to precipitation and stormwater runoff. These materials must be prevented from becoming a pollutant source.

E.   Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

F.   Excavation de-watering: Excavation de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water removed from the ponded area, either through gravity or pumping, must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

G.   Authorized non-stormwater discharges: Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

(a)   discharges from firefighting activity;

(b)   fire hydrant flushings;

(c)   vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);

(d)   dust control runoff in accordance with permit conditions and appendix (c)(3);

(e)   routine external building washdown, not including surface paint removal, that does not involve detergents;

(f)   pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;

(g)   uncontaminated air conditioning or compressor condensate;

(h)   uncontaminated groundwater or spring water;

(i)   foundation or footer drain-water where flows are not contaminated;

(j)   uncontaminated excavation dewatering (see requirements in appendix c(5));

(k)   potable water sources including waterline flushings; and

(l)   landscape irrigation.

H.   <u>Unauthorized non-stormwater discharges:</u> The department's approval under this chapter does not authorize a discharge that is mixed with a source of non-stormwater, other than those discharges in compliance with appendix c (6). Specifically, the department's approval does not authorize discharges of the following:

(a)   wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;

(b)   fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;

(c)   soaps, solvents, or detergents used in vehicle and equipment washing; and

(d)   toxic or hazardous substances from a spill or other release.

I.   <u>Staging of Operations:</u> All stockpiling of materials and staging of construction equipment shall be completed in the outlined limit of work, or at the contractor's facilities off-site. All stockpiles shall be stabilized in the manner described in the Erosion and Sedimentation Control Plan and narrative.

J.   <u>Additional requirements.</u> Additional requirements may be applied on a site-specific basis.

The Cedars - Long Term Care Facility

Inspector: _____   Date: _____

Maintenance Personnel: _____

SITE AREA	Inspection		Maintenance	
	Date	Comments	Date	Corrective Action
USF Vegetation and Mulch				
USF Media				
USF Sediment Riprap				
USF Misc				
General: Overflow Structures				
General: Vegetated areas adjacent to pavement runoff				
General: Lawn Vegetation				
General: Slope Vegetation				
General: Entrance Road Sweeping				
General: Catch Basins				

Sediment/Debris Disposal

Location of Sediment/Debris Accumulation	Location of Sediment/Debris Disposal	Date of Disposal

12.6 - EROSION AND SDEIMENTATION CONTROL PLAN

The Cedars Long-Term Care Facility
Portland, Maine

INTRODUCTION

This Erosion and Sedimentation Control Plan (E&S Plan) has been developed to provide a strategy to prevent unreasonable erosion of soil and sediment transport beyond the project site or into a protected natural resource. These strategies apply to the proposed development immediately prior to soil disturbing activities on the site and shall remain in place until the site is permanently stabilized.

The information presented in this E&S Plan is provided as an overview of the anticipated measures to be used on this site. In some instances, additional measures may be required due to unexpected conditions that arise during construction. Also, specific detail on the application of a recommended practice for an unexpected instance may not be covered in this E&S Plan. For additional detail on any of the erosion and sedimentation control measures discussed in this E&S Plan or for further recommendations of applicable practices, refer to the "Maine Erosion and Sedimentation Control BMP" manual published by the Maine Department of Environmental Protection (MDEP) dated March 2003, as revised.

1.0   PLAN IMPLEMENTATION PHASES

Generally, the implementation of this plan occurs in three distinct phases as described below:

1.1   Pre-construction Phase

Prior to the beginning of any construction, perimeter sediment barriers (i.e. silt fence, erosion control mix berm, etc…) shall be installed at, or just below, the limits of clearing or grubbing, and/or just above any adjacent property line or protected natural resource. Prior to any clearing or grubbing, a construction entrance shall be constructed at the intersection with the proposed access drive and the existing roadway to avoid tracking of mud, dust and debris from the site.

1.2   Construction Phase

Areas undergoing actual construction shall only expose that amount of mineral soil necessary for progressive and efficient site construction. Any area that has been disturbed and is not "permanently stabilized" (as described by this E&S Plan) shall be considered "open." Open areas shall be protected and stabilized with temporary erosion and sedimentation control measures as shown on the project plans and as described within this E&S Plan.

Preparation for winter stabilization applies to some disturbed areas that are open on or after September 15th of the construction season (refer to the Winter Construction Section of this E&S Plan, Paragraph B – Overwinter Stabilization Timeframe). Any areas that remain open after November 1 or new soil disturbance that occurs after November 1, but before April 15, must be protected by additional measures as described in the Winter Construction section of this E&S Plan. The recommendations outlined in the Winter Construction section of this E&S Plan shall supersede other conflicting recommendations.

1.3   Post-construction phase

Once the site has reached permanent stabilization, remove any temporary sediment control measures, such as silt fence, within 30 days. All accumulated sediment/debris in the permanent

stormwater management system, ditches, swales, paved surfaces, and/or any other location that has accumulated sediment/debris during construction shall be removed and disposed of in an approved manner.

2.0   PERMANENT STABILIZATION

The strategies outlined in this E&S Plan shall be in effect until the site reaches permanent stabilization. Newly seeded or sodded areas must be protected from vehicle traffic, excessive pedestrian traffic, and concentrated runoff until the vegetation is well established. If necessary, areas must be seeded and mulched again if germination is sparse, plant coverage is spotty, or topsoil erosion is evident. The following list defines permanent stabilization for applicable situations.

2.1   **Seeded Areas:** For seeded areas, permanent stabilization means a 90% cover of vigorous perennial growth with no evidence of washing or rilling of the topsoil.

2.2   **Sodded Areas:** For sodded areas, permanent stabilization means the complete binding of the sod roots into the underlying soil with no slumping of the sod or die-off.

2.3   **Permanent Mulch:** For mulched areas, permanent mulching means total coverage of the exposed area with an approved mulch material. Erosion control mix may be used as mulch for permanent stabilization according to approved application rates and limitations.

2.4   **Riprap:** For areas stabilized with riprap, permanent stabilization means that slopes stabilized with riprap have an appropriate backing of well-graded gravel or approved geotextile to prevent soil movement from behind the riprap.

2.5   **Paved Areas:** For paved areas, permanent stabilization means the placement of compacted gravel subbase is completed.

2.6   **Ditches, channels, and swales**: For open channels, permanent stabilization means the channel is stabilized with a 90% cover of vigorous perennial growth, a well-graded riprap lining, or with another non-erosive lining such as specified. There must be no evidence of slumping of the channel lining, undercutting of the channel banks, or down-cutting of the channel.

3.0   TEMPORARY EROSION AND SEDIMENTATION CONTROL BMPS

The placement/use of the following erosion and sedimentation control measures shall be in accordance with the "Maine Erosion and Sedimentation Control BMP" manual published by the Maine Department of Environmental Protection (MDEP) dated March 2003, as revised.

3.1   **Sediment Barriers:** Prior to the beginning of any construction, sediment barriers (i.e. silt fence, erosion control mix berms, etc…) shall be installed across the slope(s), on the contour, at or just below the limits of clearing or grubbing, and/or just above any adjacent property line or watercourse to protect against construction related erosion. Sediment barriers shall be maintained until all tributary open areas have been permanently stabilized. The following are recommended perimeter sediment barriers.

- **Silt fence**: Shall be installed per the detail on the plans. The effective height of the fence shall not exceed 36 inches. It is recommended that silt fence be removed by cutting the fence materials at ground level so as to avoid additional soil disturbance.
- **Staked hay bales**: Shall be installed per the detail on the plans. Bales shall be wire-bound or string-tied and these bindings must remain parallel with the ground surface during installation to prevent deterioration of the bindings. Bales shall be installed within a minimum four (4) inch deep trench line with ends of adjacent bales tightly abutting another.
- **Erosion control mix berm**: Shall be installed per the detail on the plans. The mix shall consist primarily of organic material and contain a well-graded mixture of particle sizes. The mix must meet the most recent composition specifications published by the MDEP. No trenching is required for installation of this barrier.

3.2   **Surface Stabilization:** All disturbed areas that will not be worked for more than 7 days shall be protected and stabilized with mulch or other non-erodable cover. Areas located within 75 feet of a wetland or waterbody must be protected and stabilized within 48 hours of the initial disturbance of the soil or prior to any storm event, whichever comes first. Areas that have been seeded (temporary or permanent) shall be stabilized immediately. The following are recommended practices for surface stabilization:

- **Hay or straw Mulch:** Organic mulches including hay and straw need to be air-dried, free of undesirable seeds and coarse materials. Application rate shall be 2 bales (70-90 lbs) per 1000 square feet or 1.5 to 2 tons (90-100 bales) per acre. This type of mulch must be anchored with a tackifier amendment and/or via physical means (i.e. vehicle tracking, jute netting, etc...) to avoid displacement by wind or water.
- **Erosion control mix**: Erosion Control Mix can be manufactured on or off the site. It is composed primarily of shredded bark, stump grindings, composted bark, or other acceptable products based on a similar raw source. The mix must meet the most recent composition specifications published by the MDEP. The mix shall be placed evenly and must provide 100% soil coverage. Erosion control mix shall be applied such that the thickness on slopes 3:1 or less is 2 inches plus ½ inch per 20 feet of slope up to 100 feet. The thickness on slopes between 3:1 and 2:1 is 4 inches plus ½ inch per 20 feet of slope up to 100 feet. This shall not be used on slopes greater that 2:1.
- **Erosion control blankets**: Erosion Control Blankets are used on steep slopes (greater than 3H:1V) and also areas that will receive concentrated stormwater flows. Blankets aid in controlling erosion on disturbed soils and critical areas during the establishment period of vegetation. Various forms of erosion control blankets are commercially available, each with different advantages for different applications. The type of blanket to be used for individual applications shall be as indicated on the development plan set or via the use of an approved equivalent blanket. In all applications, the blanket manufacturer's specifications and installation methods shall be referenced and adhered to.

3.3   **Soil Stockpiles:** All topsoil shall be stockpiled for future use on the project at a stable location on-site. Structural measures, such as sediment barriers, may be warranted for additional sediment control of the stockpile areas. Stockpiles of soil or subsoil shall be mulched with hay or straw or with erosion control mix. This must be done within 24 hours of stocking and re-established prior to any rainfall. Any soil stockpile will not be placed (even covered with hay or straw) within 75 feet from any protected natural resources.

3.4   **Stabilized Construction Entrance/Exit:** Prior to any clearing or grubbing, a stabilized construction entrance/exit shall be constructed wherever traffic will exit the construction site onto

a paved roadway in order to minimize the tracking of sediment and debris from the construction site onto public roadways. The entrances and adjacent roadway areas shall be periodically swept or washed to further minimize the tracking of mud, dust or debris from the construction area. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment trapping device. Stabilized construction exits shall be constructed in areas as specified and detailed on the plans.

3.5 **Stone Check Dams:** Stone check dams are generally temporary devices, which are constructed across a swale or drainage ditch. Their purpose is to reduce the velocity of concentrated stormwater flows, thereby reducing erosion of the swale or ditch. These devices will also trap small amounts of sediment generated in the ditch itself, however, they are not an effective sediment trapping device and should not be used as such. Stone check dams are typically constructed of 2"-3" crushed stone and stand 24 inches in height.

3.6 **Storm Drain Inlet Protection:** Storm drains are typically operational prior to permanent stabilization of tributary areas. In these instances, hay bales, crushed stone barriers, and/or silt sacks shall be used within a catch basin or prior to a pipe entrance. This temporary protection will assist in the removal of sediment prior to entrance into a storm drainage system and the prevention of clogging and/or loss of capacity. These devices alone will not prevent all sediment from entering the stormwater system and should be used in conjunction with other devices to achieve desired sediment removal levels.

3.7 **Dewatering:** Water from construction dewatering will pass first through a filter bag or secondary containment structure (e.g. hay bale lined pool) prior to discharge. The discharge site shall be selected to avoid flooding, icing and sediment discharges to a protected natural resource. Discharge is permitted within the filter basin locations prior to the installation of the filter media.

3.8 **Dust Control:** Dust control during construction shall be achieved by the use of a watering truck to periodically sprinkle the exposed roadway areas as necessary to reduce dust during the dry months. Applying other dust control products such as calcium chloride or other manufactured products are allowed if authorized by the proper local, state and/or federal regulating agencies. However, it is the contractor's ultimate responsibility to mitigate dust and soil loss from the site.

3.9 **Concrete Washout:** Concrete washout(s) shall be made available on-site during times when cast-in-place concrete structures are being poured. Concrete washout shall be large enough to wash out trucks, inspection equipment, and working tools as necessary. No concrete washwater shall be directly discharged to any stormwater infrastructure or to any protected natural resources. Once dried, concrete shall be disposed in accordance with proper local, state, and/or federal regulating agencies. Concrete washout shall be constructed in accordance with Dewatering Filter Detail, or other method as approved by engineer.

4.0 **VEGETATIVE MEASURES**

4.1 **Temporary Vegetation:** If any disturbed area of soil will be left bare for more than 7 days, or if construction is to be completed in phases over an extended duration, temporary seeding and mulching shall commence immediately following initial fine grading of the site. In sensitive areas (within 75 feet of protected natural resources) temporary mulch must be applied within 48 hours or prior to any storm event on all disturbed surfaces. It shall be maintained and reseeded, as necessary,

to ensure good vegetative cover for the entire duration of construction. Seed will be selected from the following table (Table 1 - Temporary Seed Mixture) according to the time of year or via an approved equivalent method.

TABLE 1
TEMPORARY SEED MIXTURE

Seed	Lbs./Acre	Lbs./1000s.f.	Recommended Seeding Date
Winter Rye	112	2.6	8/15 thru 10/1
Oats	80	1.8	4/1 thru 7/1 8/15 thru 9/15
Annual Ryegrass	40	0.9	4/1 thru 7/1
Sudangrass	40	0.9	5/15 thru 8/15
Perennial	40	0.9	8/15 thru 9/15

Note:

Some tree and shrub species may be desirable for sites primarily covered with sand and gravel. These methods shall be approved by the appropriate regulatory authority prior to use.

4.2 **Permanent Vegetation:** Revegetation measures shall commence immediately upon completion of final grading of areas to be loamed and seeded. Revegetation measures shall consist of the following:

4.2.1 **Seedbed Preparation**

- Four (4) inches of loam will be spread over disturbed areas and smoothed to a uniform surface. Loam shall be free of subsoil, clay lumps, stones and other objects over 2" in any dimension, and without weeds, roots or other objectionable material.

- Soil tests shall be taken at the time of soil stripping to determine fertilization requirements. Soil tests shall be taken promptly as to not interfere with the 7-day limit on soil exposure (48-hours adjacent to a protected natural resource). Based upon test results, soil amendments shall be incorporated into the soil prior to final seeding. In lieu of soil tests, soil amendments may be applied as shown below in Table 2:

TABLE 2
RECOMMENDED SOIL AMENDMENTS

Item	Application Rate
10-20-20 Fertilizer (N-P205-K20 or equal)	18.4lbs./1,000 s.f.
Ground Limestone (50% calcium and magnesium oxide)	138-lbs./1,000 s.f.

- Work lime and fertilizer into the soil as nearly as practical to a depth of four (4) inches with proper equipment. Roll the area to firm the seedbed except on clay, silty soils or coarse sand.

4.2.2   Application of Seed

- **Seeding**: The seed mixture shown below in Table 3 shall be utilized for permanent seeding for the majority of the project:

TABLE 3
PERMANENT SEED MIXTURE

Seed Type	Application Rate
Creeping Red Fescue	0.46 lbs/1,000 s.f. (20 lbs/acre)
Red Top	0.05 lbs/1,000 s.f. (2 lbs/acre)
Tall Fescue	0.46 lbs/1,000 s.f. (20 lbs/acre)
Total:	0.97 lbs/1,000 s.f. (42 lbs/acre)

- **Seeding**: The seed mixture shown below in Table 4 shall be utilized for permanent seeding for modifications adjacent to the athletics fields:

TABLE 4
PERMANENT SEED MIXTURE

Seed Type	Application Rate
Kentucky Bluegrass	2.5 lbs/1,000 s.f. (110 lbs/acre)

- **Hydroseeding:** Shall be conducted on prepared areas as described above. Hydroseeding shall not be done on slopes steeper than 2H:1V. Lime and fertilizer may be applied simultaneously with the seed. Recommended seeding rates must be increased by 10% when hydroseeding.

- **Surface Stabilization:** Mulching or other approved surface stabilization methods shall commence immediately after seed is applied. Refer to the surface stabilization section of this plan for more information.

4.2.3.   Sodding

Following seedbed preparation, sod can be applied in lieu of seeding in areas where immediate vegetation is most beneficial such as ditches, around stormwater drop inlets and areas of aesthetic value. Sod should be laid at right angles to the direction of flow starting at the lowest elevation. Sod should be rolled or tamped down to even out the joints once laid down. Where flow is prevalent the sod must be properly anchored down. Irrigate the sod immediately after installation. In most cases, sod can be best established between April 1 and November 15 of the construction year.

5.0   WINTER CONSTRUCTION

The winter construction period is from November 1 through April 15. If the construction site is not permanently stabilized by November 15 then the site needs to be protected with over-winter stabilization.

Winter excavation and earthwork shall be completed such that no more than 1 acre of the site is without stabilization at any one time. Limit the exposed area to those areas in which work is expected to be under taken during the proceeding 15 days and that can be mulched in one day prior to any snow event. All areas shall be considered to be denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded and mulched.

Any added measures, which may be necessary to control erosion/sedimentation from the site dependent upon the actual site and weather conditions, must be installed. Continuation of earthwork operations on additional areas shall not begin until the exposed soil surface on the area being worked has been stabilized, in order to minimize areas without erosion control protection.

5.1   Winter Construction BMP Adjustments

1)   **Sediments Barriers:** During frozen conditions, sediment barriers shall consist of erosion control mix berms as frozen soil prevents the proper installation of hay bales and silt fences.

2)   **Mulching:** Between the dates of November 1 and April 15, all mulch shall be anchored by either mulch netting, asphalt emulsion chemical, track or weed cellulose fiber. When the ground surface is not visible through the mulch then cover is sufficient.   After November 1st, mulch and anchoring of all exposed soil shall occur at the end of each final grading workday.

- **Open Surfaces (flatter than 8%)**: Hay and straw mulch shall be applied at a rate of 150 lb. per 1,000 square feet or 3 tons/acre (twice the normal accepted rate of 75-lbs./1,000 square feet or 1.5 tons/acre) and shall be properly anchored. Mulch shall not be spread on top of snow. The snow will be removed down to one-inch depth or less prior to application. After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting. An area shall be considered to have been stabilized when exposed surfaces have been either mulched with straw or hay at a rate of 150 lb. per 1,000 square feet (3 tons/acre) and adequately anchored that ground surface is not visible through the mulch.

- **Open Slopes (8% or steeper) and Drainage Ways**: Slopes shall not be left exposed for any extended time of work suspension unless fully mulched and anchored with netting or erosion control blankets. Mulching shall be applied at a rate of 230-lbs/1,000 square feet on all slopes steeper than 8%. Mulch netting shall

be used to anchor mulch in all drainage ways with a slope steeper than 3% for slopes exposed to direct winds and for all other slopes steeper than 8%. Erosion control blankets shall be used in lieu of mulch in all drainage ways. Erosion control mix can be used to substitute erosion control blankets on slopes that do not exceed 2H:1V. In this case, the erosion control mix shall be spread out, not placed in a berm as it is installed as a sedimentation barrier.

3) **Soil Stockpiles:** Stockpiles of soil or subsoil shall be mulched for over winter protection with hay or straw at twice the normal rate or at 150-lbs/1,000 square feet (3 tons per acre) or with a four-inch layer of wood waste erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpile will not be placed (even covered with hay or straw) within 100 feet from any natural resources.

4) **Natural Resources Protection:** Any areas within 100 feet from any protected natural resources, if not stabilized with a minimum of 90% mature vegetation catch, shall be mulched by December 1 and anchored with plastic netting or protected with erosion control mats. During winter construction, a double line of sediment barriers (i.e. silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource shall be protected a minimum distance of 100 feet on either side from the resource. Existing projects not stabilized by December 1 shall be protected with the second line of sediment barrier to ensure functionality during the spring thaw and rains.

5) **Seeding:** Between the dates of October 15 and April 1st, loam or seed will not be required. During periods of above freezing temperatures finished areas shall be fine graded and either protected with mulch or temporarily seeded and mulched until such time as the final treatment can be applied. If the date is after November 1st and if the exposed area has been loamed, final graded with a uniform surface, then the area may be dormant seeded at a rate of 3 times higher than specified for permanent seed and then mulched.

Dormant seeding may be selected to be placed prior to the placement of mulch and fabric netting anchored with staples. If dormant seeding is used for the site, all disturbed areas shall receive 4" of loam and seed at an application rate of 5-lbs/1000 square feet. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 90% catch) shall be revegetated by replacing loam, seed and mulch. If dormant seeding is not used for the site, all disturbed areas shall be revegetated in the spring.

5.2   Overwinter Stabilization Timeframe

1) **Ditches and Channels:** All stone-lined ditches and channels must be constructed and stabilized on the site by November 15. All grass-lined ditches and channels must be constructed and stabilized by September 15. If a ditch or channel is not grass-lined by September 15, then one of the following actions must be taken to stabilize the ditch for late fall and winter.

- **Install a sod lining in the ditch**: A ditch must be lined with properly installed sod by October 1. Proper installation includes the contractor pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and

underlying soil, watering the sod to promote root growth into the disturbed soil, and anchoring the sod with jute or plastic mesh to prevent the sod strips from sloughing during flow conditions.

- **Install a stone lining in the ditch**: A ditch must be lined with stone riprap by November 15. A registered professional engineer must be hired to determine the stone size and lining thickness needed to withstand the anticipated flow velocities and flow depths within the ditch. If necessary, the ditch must be regraded prior to placing the stone lining to prevent the stone lining from reducing the ditch's cross-sectional area.

2) **Disturbed Slopes:** All stone-covered slopes must be constructed and stabilized by November 15. All slopes to be vegetated must be seeded by September 15. The MDEP will consider any area having a grade greater than 15% (10H:1V) to be a slope. If a slope to be vegetated is not stabilized by September 1, then one of the following actions must be taken to stabilize the slope for late fall and winter.

- **Stabilize the soil with temporary vegetation and erosion control blankets**: By October 1 the disturbed slope must be seeded with winter rye at a seeding rate of 3 pounds per 1,000 square feet and apply erosion control blankets over the mulched slope. If the rye fails to grow at least three inches or cover at least 90% of the disturbed slope by November 1, the slope will be covered with a layer of erosion control mix or stone riprap as described in the following standards.

- **Stabilize the slope with sod**: The disturbed slope must be stabilized with properly installed sod by October 1. Proper installation includes pinning the sod onto the slope with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. Slopes steeper than 33% (3H:1V) or having groundwater seeps on the slope face, may not use late-season sod installation for stabilization.

- **Stabilize the slope with erosion control mix**: A six-inch layer of erosion control mix must be spread over the slope by November 15. Prior to placing the erosion control mix, any snow accumulation on the disturbed slope must be removed. Slopes steeper than 50% (2H:1V) or having groundwater seeps on the slope face can not use erosion control mix to stabilize slopes.

- **Stabilize the slope with stone riprap**: A layer of stone riprap can be placed on the slope by November 15. A registered professional engineer must be hired to determine the stone size needed for stability and to design a filter layer for underneath the riprap.

3) **Other Disturbed Soils:** By September 15, all disturbed soils on areas having a slope flatter than 15% (15H:1V) must receive seed and mulch. If disturbed areas are not stabilized by this date, then one of the following actions must be taken to stabilize the soil for late fall and winter.

- **Stabilize the soil with temporary vegetation**: By October 1, seed the disturbed soil with winter rye at a seeding rate of 3 pounds per 1,000 square feet, lightly mulch the seeded soil with hay or straw at 75 pounds per 1000 square feet, and

anchor the mulch with plastic netting. Monitor growth of the rye over the next 30 days. If the rye fails to grow at least three inches or cover at least 90% of the disturbed soil before November 1, then mulch the area for over-winter protection as described in the following "Stabilize the soil with mulch" standard.

- **Stabilize the soil with sod**: Stabilize the disturbed soil with properly installed sod by October 1. Proper installation includes pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil.

- **Stabilize the soil with mulch**: By November 15, mulch the disturbed soil by spreading hay or straw at a rate of at least 150 pounds per 1000 square feet on the area so that no soil is visible through the mulch. Prior to applying the mulch, any snow accumulation on the disturbed area must be removed. Immediately after applying the mulch, anchor the mulch with plastic netting to prevent wind from moving the mulch off the disturbed soil.

6.0 INSPECTION AND MAINTENANCE

Inspection and maintenance are required of all erosion and sedimentation control measures outlined in this plan. The Owner shall identify a qualified firm or person prior to construction to perform inspections and identify maintenance needs for the proposed project. Refer to the Inspection, Maintenance, and Housekeeping plan for this project (provided under separate cover) for an outline of the associated inspection and maintenance requirements.