POST-CONSTRUCTION STORM WATER MANAGEMENT REPORT

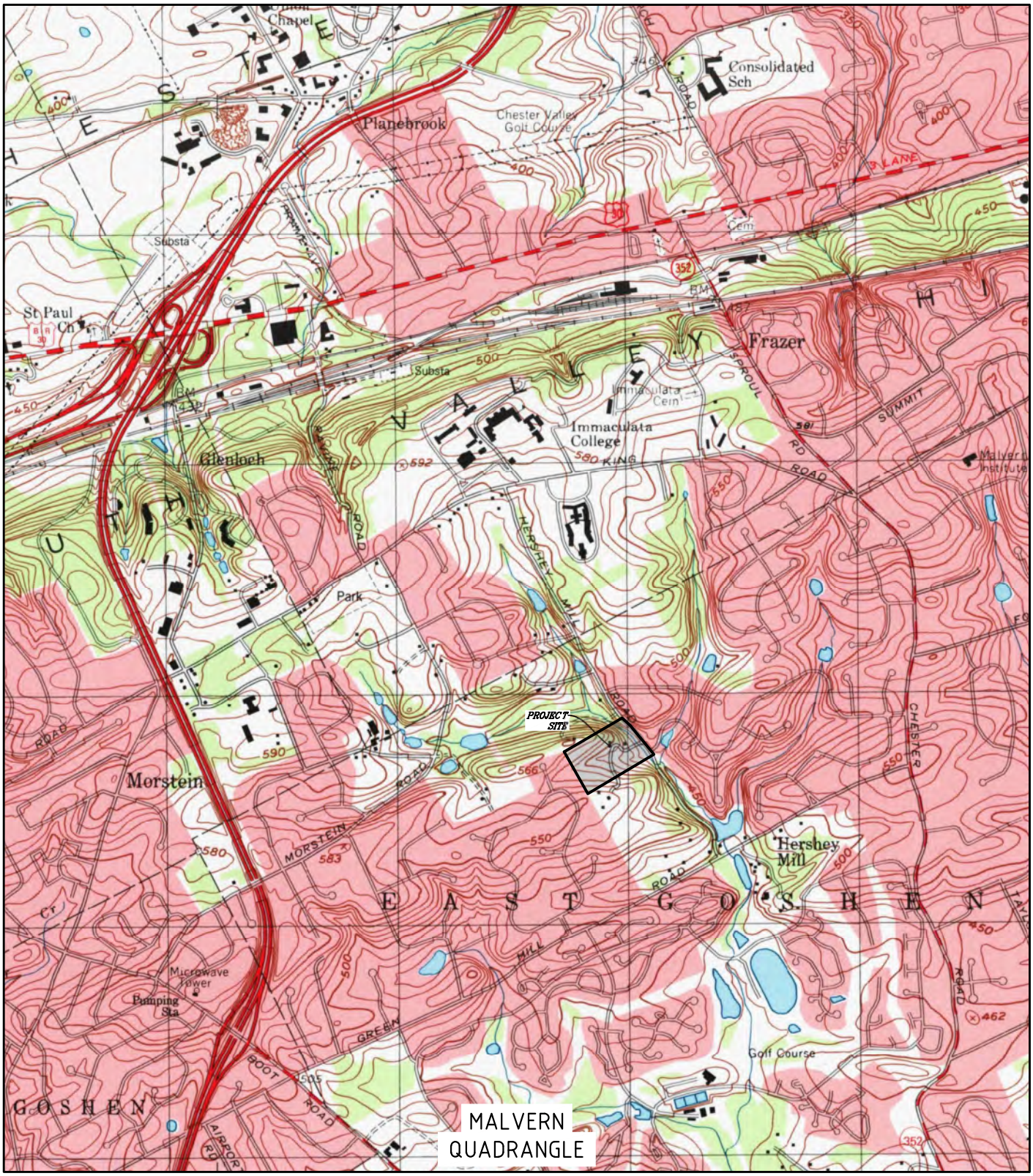
FOR
MILLSTONE MEADOWS
EAST GOSHEN TOWNSHIP
CHESTER COUNTY, PENNSYLVANIA

PROJECT NO. 22-001

CLIENT:
GROVE MEADOWS DEVELOPERS, LLC.

PREPARED BY:
MICHAEL HARTMAN, P.E.
DH ENTERPRISES
2815 PENN AVENUE
WEST LAWN, PA 19609
610-927-4242

DATE: APRIL 20, 2023



2815 PENN AVENUE
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610-927-4242

Enterprises
a civil engineering design & management firm

LOCATION MAP

PROJECT: MILLSTONE MEADOWS
LOCATION: EAST GOSHEN TOWNSHIP, CHESTER COUNTY
SCALE: 1" = 2000'

Custom Soil Resource Report
Soil Map

Map Scale: 1:6,620 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

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

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PROJECT DESCRIPTION

The applicant/permittee, Grove Meadows Developers, LLC., is proposing to subdivide and construct a 12 single family dwellings on a tract of land located within East Goshen Township, Chester County, Pennsylvania. The project site is an existing tract of land, roughly 16 acres in size and located on the western side of Hershey Mills Road at the intersection of Tanglewood drive. The proposed improvements for construction are approximately 1,500 linear feet of roadway, 12 single family dwellings, and associated storm water management facilities. The project area outside of the proposed development area will be maintained as open space with a meadow/grass coverage. This site will be serviced by public water and sewer.

The total project area within the NPDES permit boundary is 16 acres and the anticipated area to be disturbed during the life of this project is 8.8 acres. Consequently, an Individual NPDES Permit will be obtained.

Exhibit I: Site Location

Image Source: Pennsylvania Spatial Data Access

POST CONSTRUCTION STORM WATER MANAGEMENT PLAN PREPARER QUALIFICATIONS

Provided below is documentation that the PCSM Plan was prepared by a person trained and experienced in PCSM design methods and techniques applicable to the size and scope of the project:

Personnel involved in the preparation of the Plan:

Michael Hartman, P.E.

Education:
Pennsylvania State University, State College, PA
Bachelor of Science in Civil Engineering, 1999

Professional Status:
Professional Engineer
– Currently Licensed in Pennsylvania
– Previously Licensed in Maryland, New York and Ohio
LEED accredited professional

Work Experience:

dH Enterprises, Inc.
Responsible for the design and oversight of site layout, grading, erosion control, storm water management, storm water collection and conveyance systems, sanitary sewer design, and acquiring approval and permitting from various local, state and federal agencies including PaDEP, FEMA, U.S. Army Corp of Engineers and Penn DOT.

Schlouch, Incorporated.
Responsible for the design and oversight of site layout, grading, erosion control, storm water management, storm water collection and conveyance systems, sanitary sewer design, and acquiring approval and permitting from various local, state and federal agencies including PaDEP, FEMA, U.S. Army Corp of Engineers and Penn DOT.

Stackhouse Bensinger, Inc.
Responsible for design of private and public land development projects, review of subdivision and land development plans for local municipalities and writing and reviewing of shop drawings and construction specifications. Responsible for design storm water management, site grading and earthwork, erosion and sediment control, floodplain determinations, General Permit and NPDES Permit applications.

PROJECT SITE CHARACTERISTICS

Past, Present and Proposed Land Uses

The proposed alteration to the project site, as described in Project Description section of this Narrative, will occur primarily in areas consisting of meadow/pasture cover conditions with slopes ranging from 3 - 25 percent according to the soil survey. The proposed earthmoving activities include cut and fill operations to construct the proposed improvements, however, it is anticipated that the project site will be balanced (no import or export of material). It is anticipated that excess topsoil, if applicable, will remain onsite to the extent practicable. Site design and layout employ an environmentally sensitive approach that minimizes the effect of land development on surrounding vegetation to the maximum extent practicable. Surface runoff patterns are not anticipated to be adversely impacted by the proposed alteration to the project site.

The past or historical land use(s) for the past 50 years or longer based on a review of historic aerial photographs of Pennsylvania obtained from www.pennpilot.psu.edu appear to be an agricultural/residential use as of 1971. The present or existing land use for the past five (5) years preceding the planned project is agricultural/residential. The proposed land use is residential.

Receiving Surface Waters

The receiving watercourse from the project area is an unnamed tributary to Ridley Creek. The watercourse is located approximately 1,500 feet east of the project area and has a designated Chapter 93 Classification of HQ-TSF, High Quality Trout Stocking Fishes.

SOILS AND GEOLOGIC FORMATIONS

Soil Types

According to the USDA NRCS Web Soil Survey, the project site is located within the following soils series:

Co - Codorus Silt Loam
Ha - Hatboro Silt Loam
GgB - Glenelg Silt Loam, 3 to 8 Percent Slopes
MaB - Manor Loam, 3 to 8 Percent Slopes
MaC - Manor Loam, 8 to 15 Percent Slopes
MaD - Manor Loam, 15 to 25 Percent Slopes
MaE - Manor Loam, 25 to 35 Percent Slopes
UugB - Urban Land - Udorthents Schist And Gneiss Complex, 0 to 8 Percent Slopes

The NRCS soil map for the project site has been provided on page ii.

Hydric Soils

Based upon the publication of the Hydric Soils of the United States, the Codorus and Hatboro soils mapped are noted as being Hydric soils.

Geologic Formations

According to the PA DCNR Geology Web Map, the project site is located within the following geologic formations:

Formation Name	Dominant Lithology
'Glenarm Wissahickon' Formation	Quartz, Albite, Muscovite, And Chlorite

Soils Use Limitations

All soil use limitations are shown in the table below for informational purposes.

Soil Name	Cutbanks Cave	Corrosive To Concrete\Steel	Droughty	Easily Erodible	Flooding	Depth to Saturated Zone/ Seasonal High-Water Table	Hydric/ Hydric Inclusions	Low Strength / Landslide Prone	Slow Percolation	Piping	Poor Source of Topsoil	Frost Action	Shrink - Swell	Potential Sinkhole	Ponding	Wetness
Codorus	X	C/S			X	X	X	X	X	X		X				X
Glenelg	X	C/S		X			X	X	X	X	X	X				X
Hatboro	X	C/S			X	X	X	X	X	X	X	X				X
Manor	X	C		X				X	X	X	X	X				

Soils Use and Geologic Formation Limitation Resolutions

Cutbacks cave – Caution should be taken to limit the amount of trench that is open at any given time. Shoring should be used as recommended by the respective governmental safety agencies.
Corrosive to Concrete/Steel – Concrete exteriors and exposed steel shall be provided with a protective coating and pipe materials will be resistant to corrosion.
Depth to Saturated/ seasonal high-water table - If groundwater is encountered during construction, the area will be de-watered by pumping the groundwater into a "Pumped Water Filter Bag" silt control system.
Droughty – The soils shall be irrigated or watered as necessary to provide adequate moisture.
Easily erodible – Earth disturbance will be limited to the immediate construction area and disturbed surfaces will be stabilized immediately. Erosion Control Blanket will be provided on slopes 3:1. Fill slopes will be tracked cross-slope to deter erosion. All disturbed areas will be monitored on a regular basis and after all storm events.
Flooding - If groundwater is encountered during construction, the area will be de-watered by pumping the groundwater into a "Pumped Water Filter Bag" silt control system.
Hydric/ hydric inclusions – There are no wetlands located within the project area.
Low strength / landslide prone – All slopes will be stabilized by permanent vegetative or impervious cover and/or by turf reinforcement or erosion control mats and blankets.
Slow percolation – Infiltration testing was performed to confirm the suitability of the soils for the proposed BMP. Additionally, the installation of the Infiltration BMP's shall be limited to towards the end of construction.
Piping – This limitation does not apply to this project.
Poor Source of Topsoil (Too Acid) – A representative soil test shall be performed to determine the necessary amount of lime to be used.
Wetness – If soils are not suitable for the specific onsite application, as determined by inspection by the contractor, then suitable soil shall be derived from suitable onsite material or imported.

Geologic Formations/Soil Conditions That May Have the Potential to Cause Pollution

There are no geologic formations or soil conditions within the project area or scope of earth disturbance that have the potential to cause pollution.

SUPPORTING CALCULATIONS

All required and applicable supporting calculations for Post Construction Storm Water Control measures and BMP's are located in the appendix of this report.

Information related to storm water runoff from the project area and the upstream watershed as required to be provided are contained within the Appendix section of this report.

Site Watershed Information

The site has been analyzed using one Discharge Point (DP). For the purposes of this analysis, DP # 1 is along the southern property line where the stream channel crosses.

In pre-development condition, within DP #1, all runoff from the site flows toward the point of interest via overland flow until being collected by the watercourse flowing along the eastern side of the site.

In the post-development condition for DP #1, the majority of the proposed runoff from the development area is conveyed to either the proposed infiltration basins or rain gardens.

For all discharge points, the proposed outflow is permitted to flow towards the respective point in a manner similar to the pre-development condition.

Rate Control (§195.22)

In accordance with the East Goshen Township Stormwater Management Ordinance, runoff rate calculations have been performed using the TR-55 Soil Cover Complex method. The project area is not located within the Chester Creek Watershed, therefore the storm water management facilities have been designed to reduce the 2-year post-developed runoff rates to no greater than the 1-year pre-developed rate and restrict the post-developed runoff rates to no greater than the pre-developed rate for all other the respective storm events.

Water Quality and Volume Control (195.19)

The storm water facilities have been designed to infiltrate as much of the stormwater flows generated from the new development as possible, but at a minimum, the infiltration volume is not less than the increased volume of stormwater generated by the proposed development for the 2-year/24 hour storm.

Infiltration Requirements (§195.20)

The storm water facilities have been designed to infiltrate as much of the stormwater flows generated from the new development as possible, but at a minimum, the infiltration volume of a minimum of one inch of runoff from all proposed impervious surfaces.

Stream Channel Protection (§195.21)

The storm water management facilities have been designed to reduce the 2-year post-developed runoff rates to no greater than the 1-year pre-developed rate.

NPDES Permit Requirements

In accordance with the NPDES Permit CG-1 guidelines, the SCS (TR-55) Method has been utilized for the calculation of the runoff volume and water quality. The calculations demonstrating that runoff volume and water quality are met in accordance with 25 Pa. Code Chapter 102.8(g)(2)(i-iii) are provided in Appendix B.

Design and Analysis Standards

Infiltration/Detention Facilities

- Land covers assumed in good condition
- "CN" values were taken from the East Goshen Township Storm Water Management Ordinance.
- Pre-development times of concentration computed using the TR-55 method. Post-development times of concentration have been assumed to be 6 minutes, or based on the flow time within the conveyance system, unless otherwise specified.
- Detention/Infiltration facilities have been designed to dewater the storage volume for rate control within 24 hours and the storage volume for volume control within 72 hours.
- The emergency spillways have been designed to convey the 100-year basin inflow through the spillway, while maintaining six inches of free-board between the maximum water surface elevation and the top of berm.
- The anti-seep collars have been designed utilizing the 25-year water surface elevation.

Infiltration Facilities

- The infiltration rate for the beds is based on field tests.
- The infiltration facilities have been designed to dewater within 48 hours.
- Infiltration facility storage volume is based on the volume that the facility receives during a 24-hour storm, where applicable.

Water Conveyance Facilities

- Land covers assumed in good condition
- "C" values were taken from the East Goshen Township Storm Water Management Ordinance.
- Times of concentration computed using the TR-55 method
- Storm Sewers have been designed to convey the 25-year storm event

POST-CONSTRUCTION STORM WATER MANAGEMENT REPORT
MILLSTONE MEADOWS

APPENDIX A – RATE CONTOL ANALYSIS

dH Enterprises
2815 Penn Avenue
West Lawn, PA 19609
Phone: 610-927-4242

Project:	Millstone Meadows
Order No.:	22-001
Calc. by:	MDH
Date:	4/20/2023

Project Flow Summary

Discharge Point 010

Storm Event	Pre-development		Allowable		Post-development Flow	Decrease in flow	
	Within LOD	Outside LOD	Storm Event	Flow		Actual	(Per Ordinance)
(yrs)	(cfs)	(cfs)	(yrs)	(cfs)	(cfs)	(cfs)	(cfs)
1	2.69	1.50					
2	3.24	3.09	(1,2)*	5.78	1.53	4.80	4.25
5	13.74		5	13.74	7.10	6.64	6.64
10	21.84		10	21.84	15.91	5.93	5.93
25	34.98		25	34.98	29.41	5.57	5.57
50	49.51		50	49.51	43.96	5.55	5.55
100	78.40		100	78.40	66.48	11.92	11.92

* Pre-development flow rate adjusted to account for undisturbed upslope area.
2-Year Allowable Post-Development Flow = 1-yr Flow Within LOD + 2-yr Flow Outside LOD

Streambank Erosion Requirements

Reduce the 2-year, 24 hour post-development to 1-year, 24 hour pre-development storm events

Discharge Point	010	
Pre-development 1-year Storm* =	5.78	cfs
Post-development 2-year Storm =	1.53	cfs

* Pre-development flow rate adjusted to account for undisturbed upslope area.

Flow for DEP PCSM Spreadsheet
Discharge Point 010

Storm Event	Pre-development Flow	Post-development Flow	Change in Flow
(yrs)	(cfs)	(cfs)	(cfs)
2	6.33	1.53	-4.80
10	21.84	15.91	-5.93
50	49.51	43.96	-5.55
100	78.40	66.48	-11.92

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Drainage Area Summary Table

Pre-Development

By Point of Discharge	CN	DP #011 Within LOD	DP #011 Outside LOD	Total Managed Area Within LOD	Total Managed Area Outside LOD	Total Managed Area Total
Meadow HSG B	58	8.169	7.171	8.169	7.171	15.339
Meadow HSG C	78	0.257	0.000	0.257	0.000	0.257
Impervious	98	0.261	0.000	0.261	0.000	0.261
Impervious (as Impervious)	98	0.209	0.000	0.209	0.000	0.209
Impervious (as Meadow B)	58	0.052		0.052		0.052
Total		8.687	7.171	8.687	7.171	15.858
CN_{avg}		60	58			

Post-Development

	CN	Infiltration Basin #1 Total	Infiltration Basin #1 Onsite	Infiltration Basin #2 Total	Infiltration Basin #2 Onsite	Bypass	Total Managed Area Within LOD	Total Managed Area Outside LOD	Total Managed Area Total
Grass HSG B	65	0.516	0.516	3.157	3.157	0.000	3.673	0.000	3.673
Grass HSG C	77	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Meadow HSG B	58	3.528	1.138	5.209	0.517	0.400	2.056	7.083	9.138
Meadow HSG C	78	0.000	0.000	0.000	0.000	0.233	0.233	0.000	0.233
Impervious	98	0.609	0.521	2.024	2.024	0.180	2.725	0.088	2.813
Total		4.654	2.176	10.391	5.698	0.814	8.687	7.171	15.858
CN_{avg}		64	69	68	76	73			

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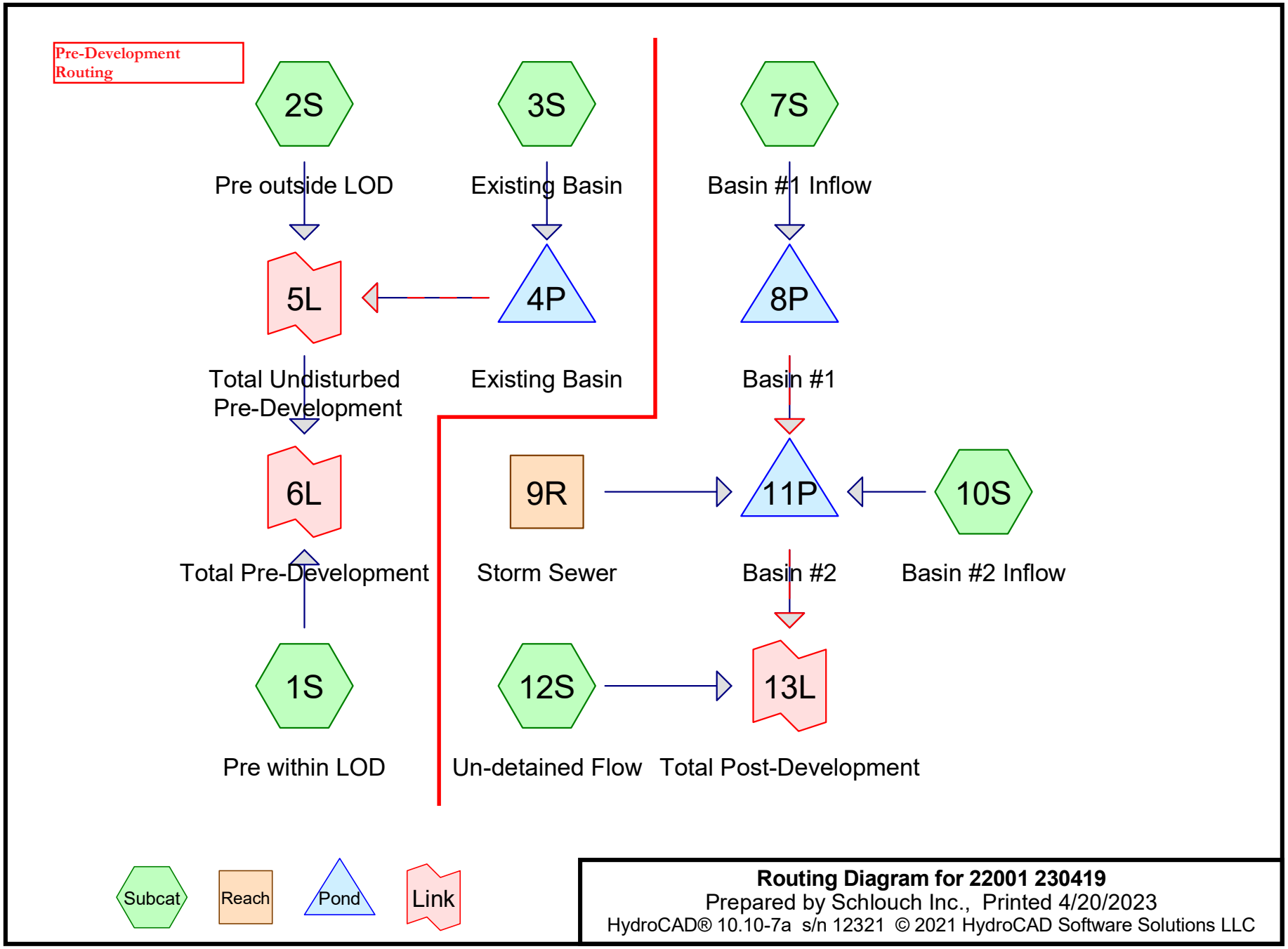
Infiltration Basin Design

		Basin #1	Basin #2
Basin Dimensions			
Top of Berm		488.00	478.00
Spillway Inv.		486.80	477.00
Spillway Length	(ft.)	100.00	100.00
Outlet Pipe Invert		483.50	470.00
Outlet Pipe Length	(ft.)	45	37
Outlet Pipe Diameter	(ft.)	1.25	2.00
Outlet Pipe Slope	(ft/ft)	0.125	0.026
Emergency Spillway Design			
Flow through Spillway	(cfs)	21.42	61.43
	(ft.)	0.17	0.35
Spillway Freeboard	**(ft.)**	**1.03**	**0.65**
Anti-seep Collar Design			
25-year Storm Elevation		486.10	475.29
Z:	(ft.)	6.00	7.00
Y:	(ft.)	2.60	5.29
# of Collars		2	3
Projection:	(ft.)	2.24	1.87
Collar Size	(ft.)	6.2	6.2
Spacing between collars	(ft.)	3	3
Infiltration Test Results			
Field Infiltration Rate:	(in./hr.)	1.13	3.19
Design Infiltration Rate:	(in./hr.)	0.56	1.59
Equiv. Flow Rate:	(CF/hr.)	171	1106
Dewatering Time:	(hr.)	31	6
Infiltration Period*:	(hr.)	43	18

* Infiltration Period = Dewatering Time + 12 hours for strom duration


Pre-Development Routing
2S
Pre outside LOD
3S
Existing Basin
7S
Basin #1 Inflow
5L
4P
8P
Total Undisturbed Pre-Development
Existing Basin
Basin #1
6L
9R
11P
10S
Total Pre-Development
Storm Sewer
Basin #2
Basin #2 Inflow
1S
12S
13L
Pre within LOD
Un-detained Flow
Total Post-Development
Subcat
Reach
Pond
Link
Routing Diagram for 22001 230419
Prepared by Schlouch Inc., Printed 4/20/2023
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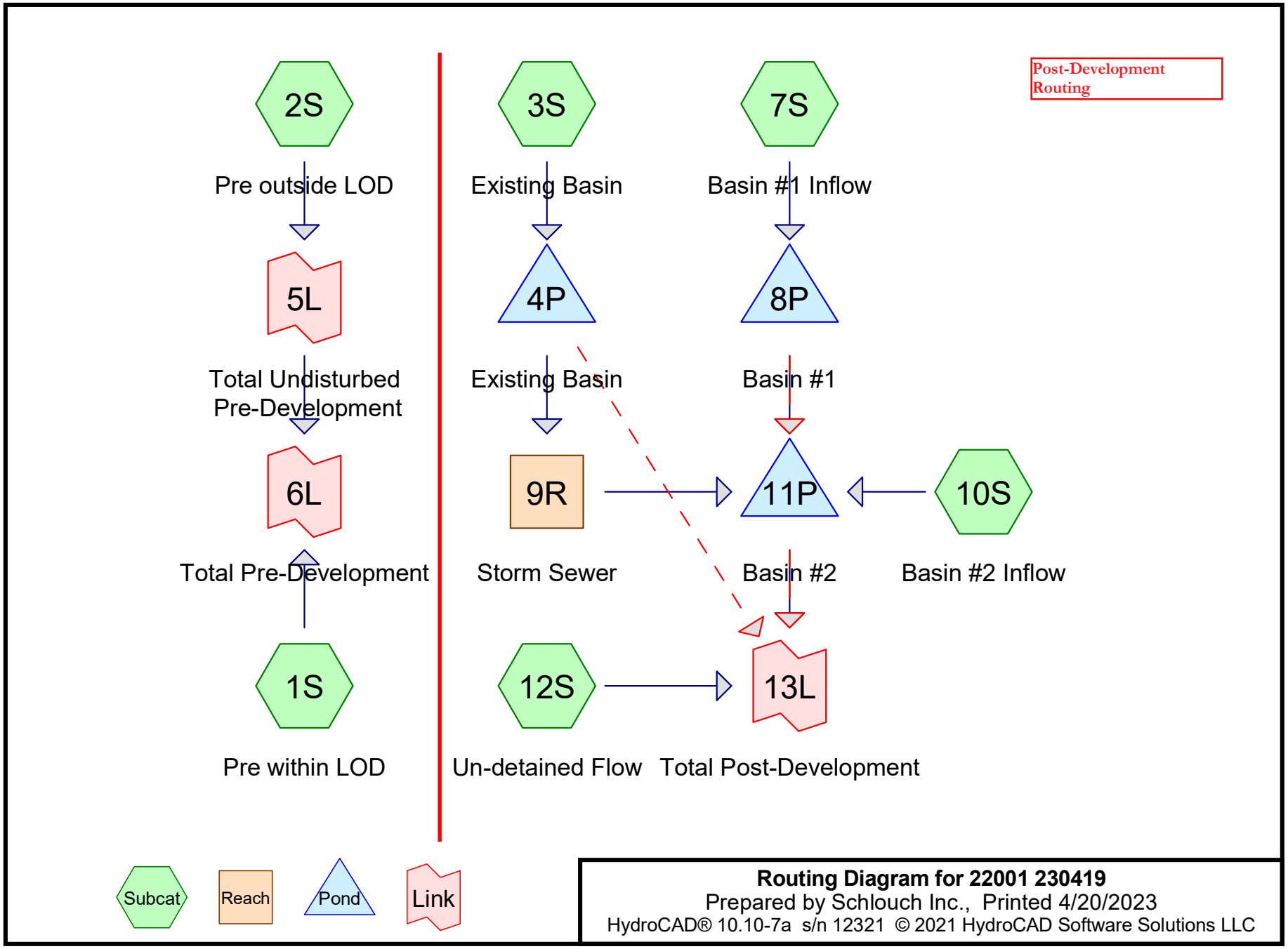

Routing Diagram for 22001 230419
Prepared by Schlouch Inc., Printed 4/20/2023
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Summary for Subcatchment 1S: Pre within LOD

Runoff = 2.88 cfs @ 12.10 hrs, Volume= 0.282 af, Depth= 0.39"
Routed to Link 6L : Total Pre-Development

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.24"

	Area (ac)	CN	Description
	8.169	58	Meadow, non-grazed, HSG B
	0.257	71	Meadow, non-grazed, HSG C
	0.209	98	Unconnected pavement, HSG B
*	0.052	58	Impervious as Meadow
	8.687	59	Weighted Average
	8.478		97.59% Pervious Area
	0.209		2.41% Impervious Area
	0.209		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	150	0.1070	0.25		**Sheet Flow, Segment #1** Grass: Dense n= 0.240 P2= 3.24"
3.4	842	0.0640	4.07		**Shallow Concentrated Flow, Segment #2** Unpaved Kv= 16.1 fps
13.4	992	Total			

Summary for Subcatchment 2S: Pre outside LOD

Runoff = 2.01 cfs @ 12.10 hrs, Volume= 0.212 af, Depth= 0.36"
Routed to Link 5L : Total Undisturbed Pre-Development

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.24"

Area (ac)	CN	Description
7.171	58	Meadow, non-grazed, HSG B
7.171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	150	0.1070	0.25		**Sheet Flow, Segment #1** Grass: Dense n= 0.240 P2= 3.24"
3.4	842	0.0640	4.07		**Shallow Concentrated Flow, Shallow** Unpaved Kv= 16.1 fps
13.4	992	Total			

Summary for Subcatchment 3S: Existing Basin

Runoff = 9.97 cfs @ 12.14 hrs, Volume= 0.910 af, Depth= 0.58"
Routed to Pond 4P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.24"

Area (ac)	CN	Adj	Description
15.610	61		>75% Grass cover, Good, HSG B
3.288	98		Unconnected pavement, HSG B
18.898	67	64	Weighted Average, UI Adjusted
15.610			82.60% Pervious Area
3.288			17.40% Impervious Area
3.288			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	150	0.0330	0.16		**Sheet Flow, Segment #1** Grass: Dense n= 0.240 P2= 3.24"
1.0	202	0.0450	3.42		**Shallow Concentrated Flow, Segment #2** Unpaved Kv= 16.1 fps
0.9	220	0.0410	4.11		**Shallow Concentrated Flow, Segment #3** Paved Kv= 20.3 fps
18.0	572	Total			

Summary for Pond 4P: Existing Basin

Inflow Area = 18.898 ac, 17.40% Impervious, Inflow Depth = 0.58" for 2-yr event
Inflow = 9.97 cfs @ 12.14 hrs, Volume= 0.910 af
Outflow = 1.40 cfs @ 13.22 hrs, Volume= 0.910 af, Atten= 86%, Lag= 64.8 min
Primary = 1.40 cfs @ 13.22 hrs, Volume= 0.910 af
Routed to Link 5L : Total Undisturbed Pre-Development
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 5L : Total Undisturbed Pre-Development

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Peak Elev= 516.63' @ 13.22 hrs Surf.Area= 11,623 sf Storage= 12,228 cf

Plug-Flow detention time= 83.1 min calculated for 0.910 af (100% of inflow)
Center-of-Mass det. time= 83.1 min (990.5 - 907.4)

Volume	Invert	Avail.Storage	Storage Description
#1	514.17'	83,210 cf	**Existing Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
514.17	0	0	0
515.00	1,200	498	498
516.00	9,200	5,200	5,698
517.00	13,064	11,132	16,830
518.00	15,683	14,374	31,204
520.00	23,862	39,545	70,749
520.50	25,985	12,462	83,210

Device	Routing	Invert	Outlet Devices
#1	Primary	514.09'	**24.0" Round Culvert** L= 55.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 514.09' / 513.64' S= 0.0082 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	514.17'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	518.00'	**24.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Secondary	519.00'	**20.0' long + 3.0 '/' SideZ x 32.0' 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=1.40 cfs @ 13.22 hrs HW=516.63' (Free Discharge)
└─**1=Culvert** (Passes 1.40 cfs of 18.28 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.40 cfs @ 7.15 fps)
  └─**3=Riser** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=514.17' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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: Pre within LOD Runoff Area=8.687 ac 2.41% Impervious Runoff Depth=0.20"
Flow Length=992' Tc=13.4 min CN=59 Runoff=0.92 cfs 0.148 af

Subcatchment 2S: Pre outside LOD Runoff Area=7.171 ac 0.00% Impervious Runoff Depth=0.18"
Flow Length=992' Tc=13.4 min CN=58 Runoff=0.55 cfs 0.109 af

Subcatchment 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=0.34"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=4.73 cfs 0.536 af

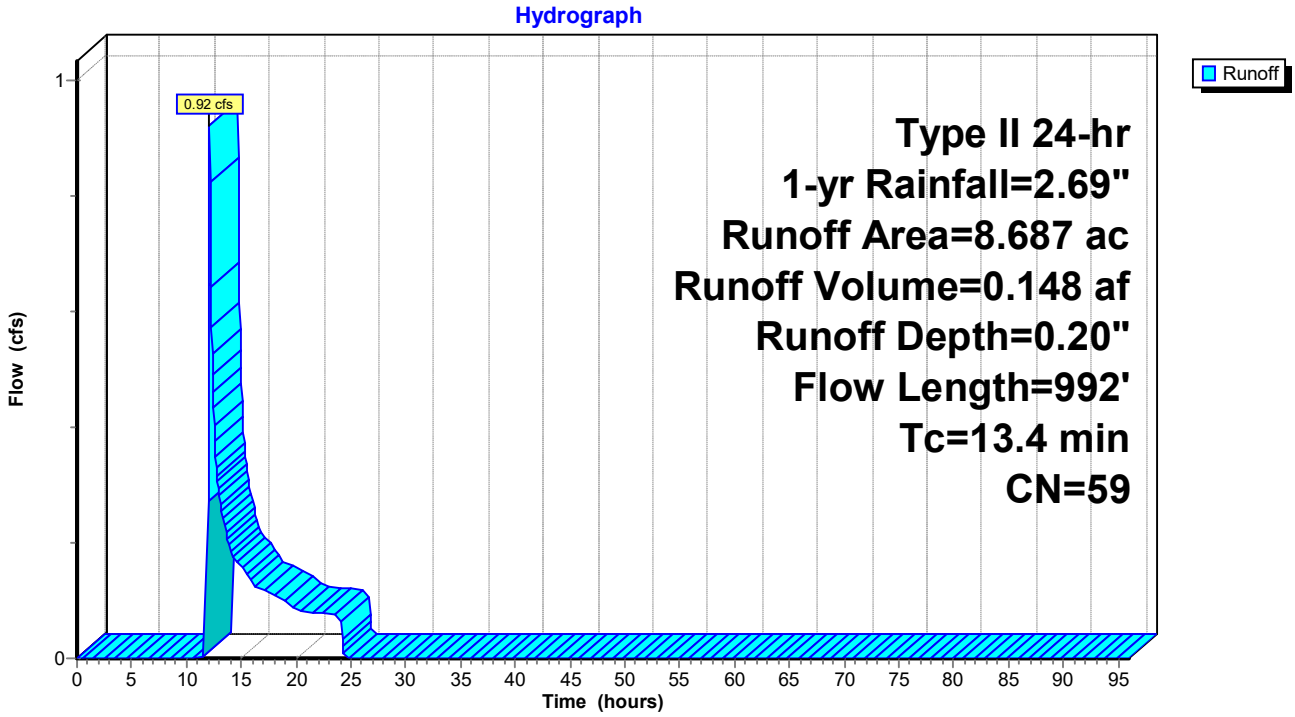
Pond 4P: Existing Basin Peak Elev=515.88' Storage=4,672 cf Inflow=4.73 cfs 0.536 af
Primary=1.14 cfs 0.536 af Secondary=0.00 cfs 0.000 af Outflow=1.14 cfs 0.536 af

Link 5L: Total Undisturbed Pre-Development Inflow=1.50 cfs 0.645 af
Primary=1.50 cfs 0.645 af

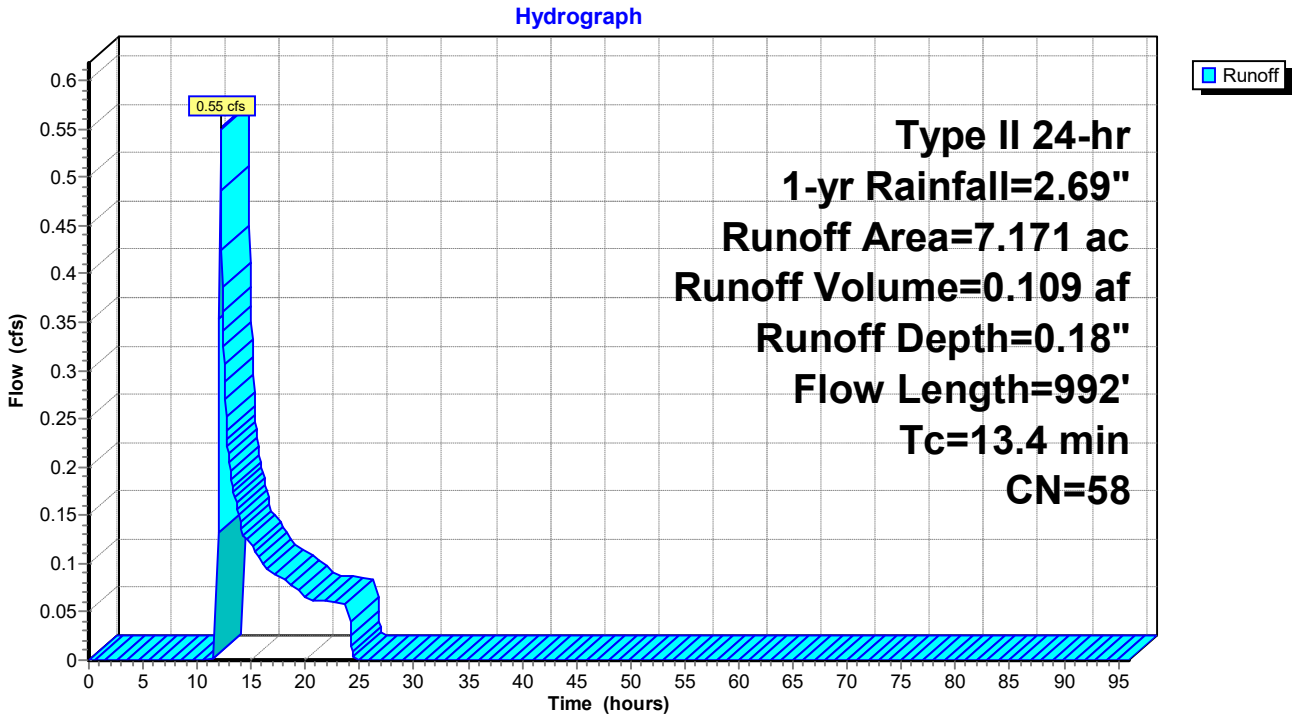
Link 6L: Total Pre-Development Inflow=2.38 cfs 0.793 af
Primary=2.38 cfs 0.793 af

Total Runoff Area = 34.756 ac Runoff Volume = 0.793 af Average Runoff Depth = 0.27"
89.94% Pervious = 31.259 ac 10.06% Impervious = 3.497 ac

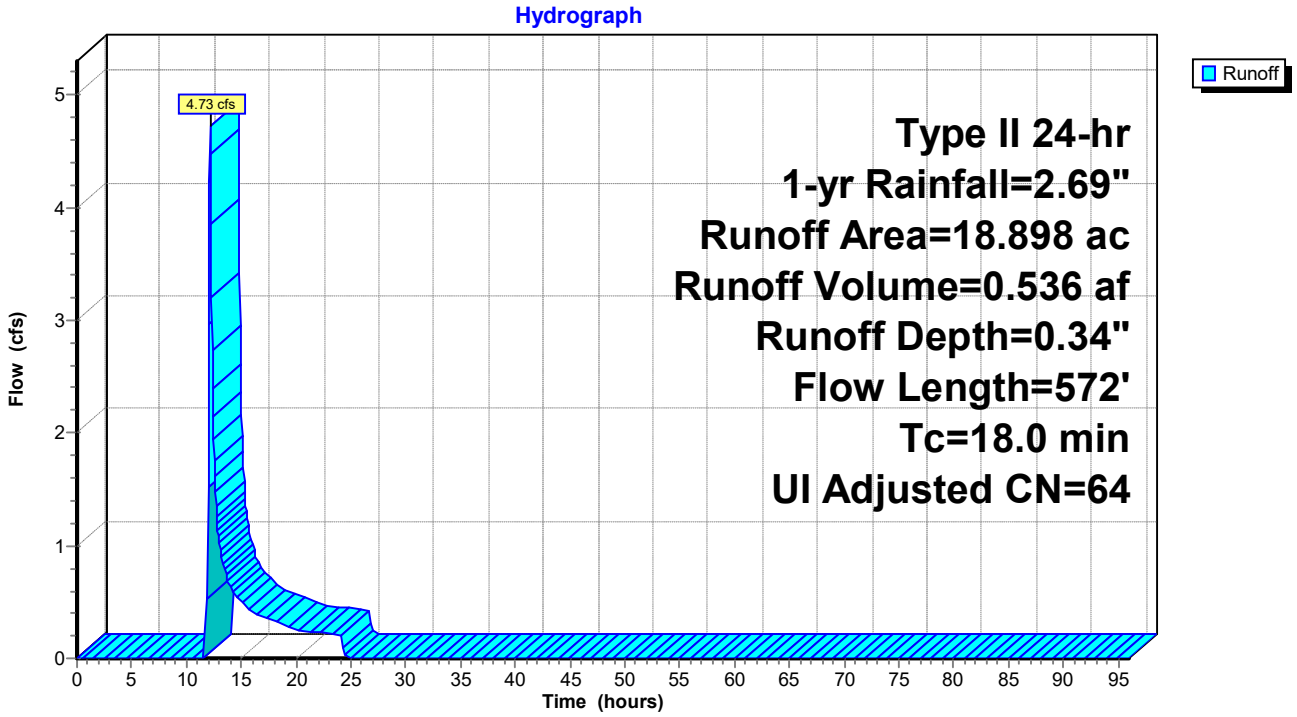
Subcatchment 1S: Pre within LOD



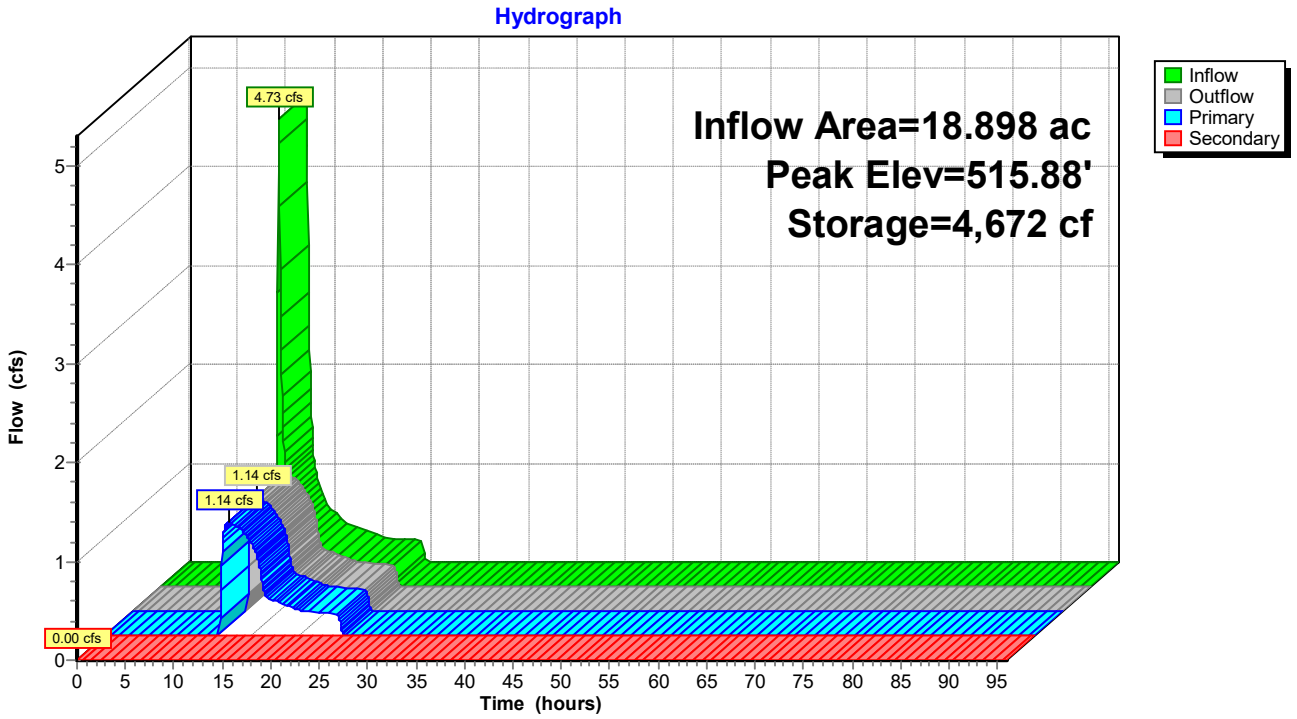
Subcatchment 2S: Pre outside LOD



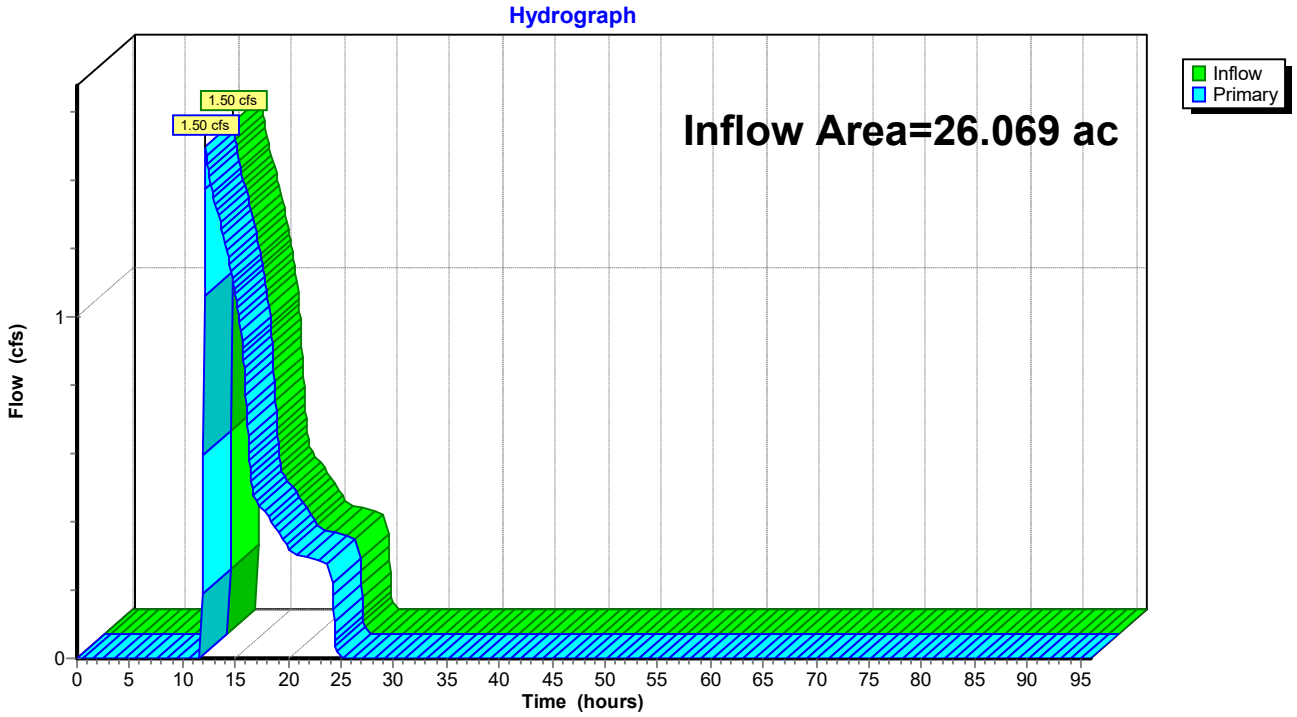
Subcatchment 3S: Existing Basin



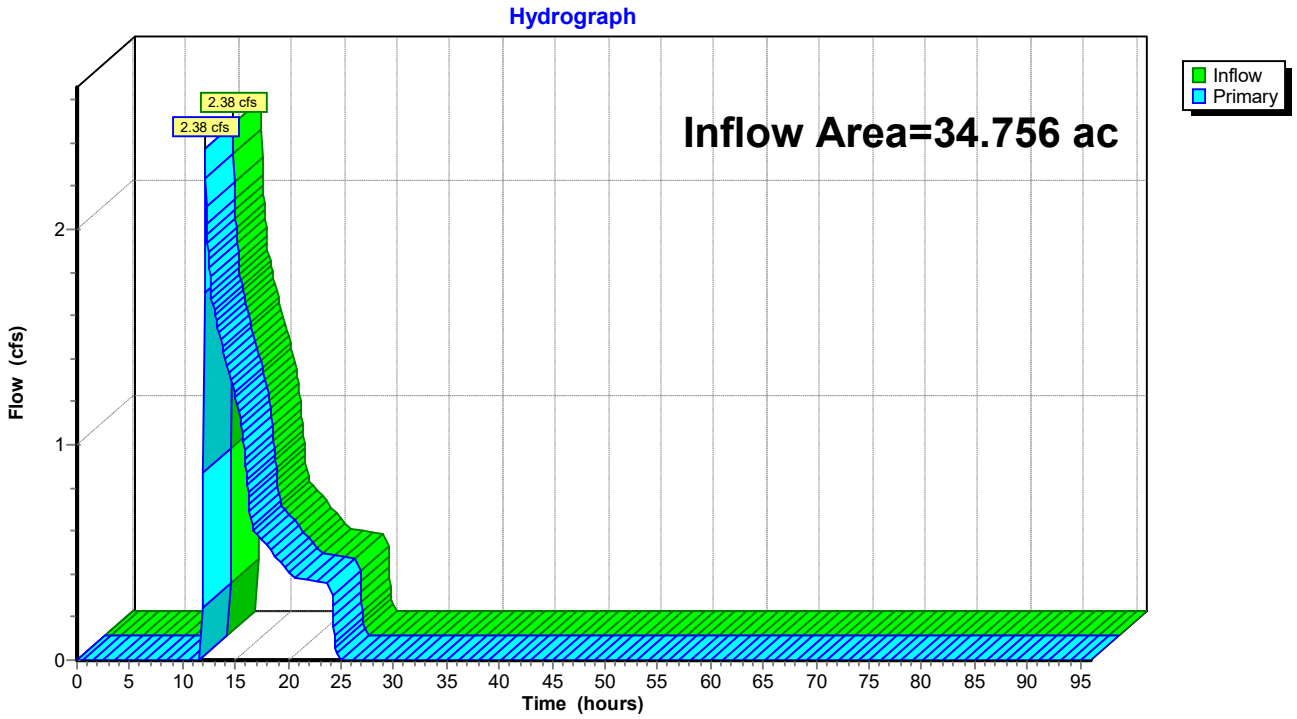
Pond 4P: Existing Basin



Link 5L: Total Undisturbed Pre-Development



Link 6L: Total Pre-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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: Pre within LOD Runoff Area=8.687 ac 2.41% Impervious Runoff Depth=0.39"
Flow Length=992' Tc=13.4 min CN=59 Runoff=2.88 cfs 0.282 af

Subcatchment 2S: Pre outside LOD Runoff Area=7.171 ac 0.00% Impervious Runoff Depth=0.36"
Flow Length=992' Tc=13.4 min CN=58 Runoff=2.01 cfs 0.212 af

Subcatchment 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=0.58"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=9.97 cfs 0.910 af

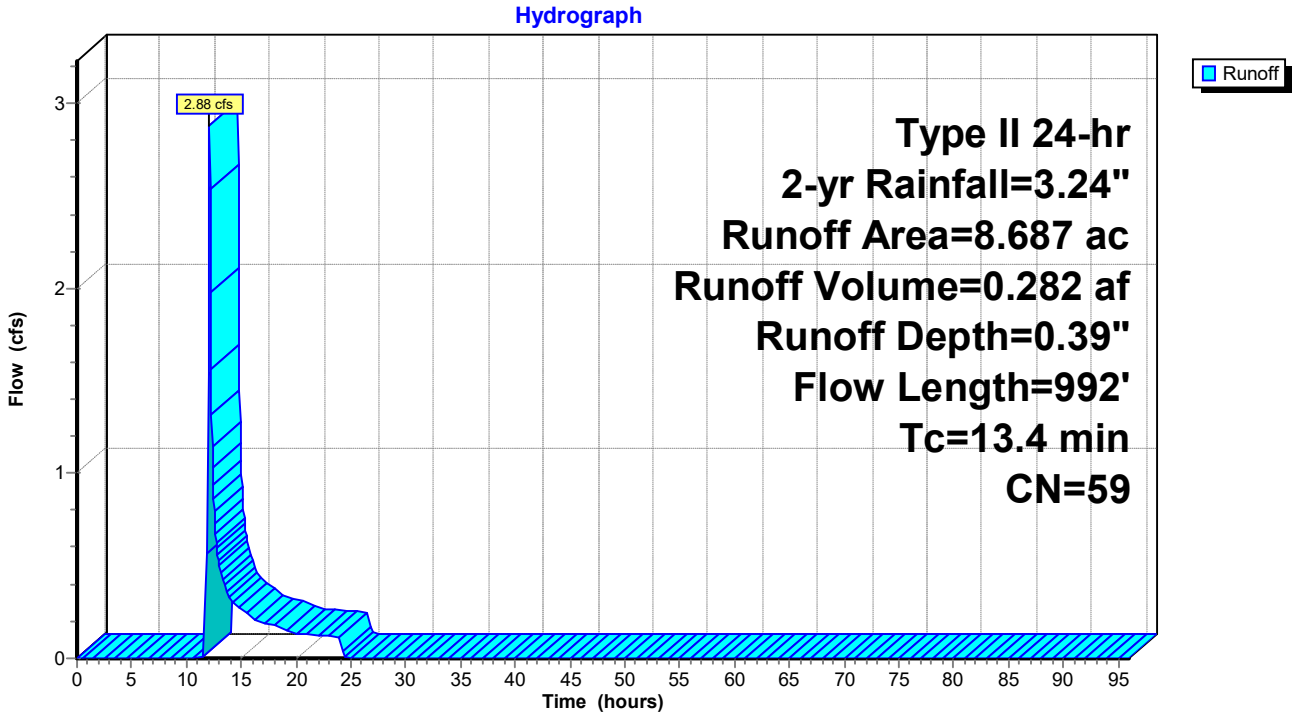
Pond 4P: Existing Basin Peak Elev=516.63' Storage=12,228 cf Inflow=9.97 cfs 0.910 af
Primary=1.40 cfs 0.910 af Secondary=0.00 cfs 0.000 af Outflow=1.40 cfs 0.910 af

Link 5L: Total Undisturbed Pre-Development Inflow=3.09 cfs 1.123 af
Primary=3.09 cfs 1.123 af

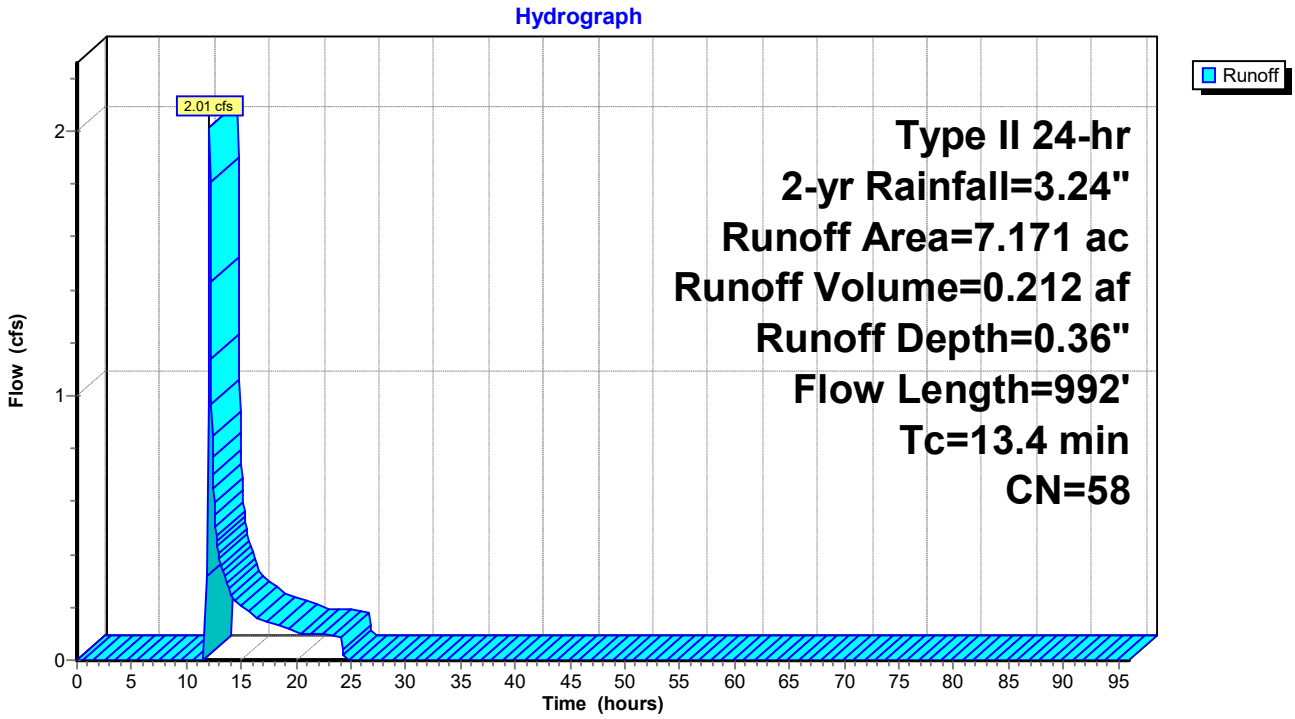
Link 6L: Total Pre-Development Inflow=5.96 cfs 1.404 af
Primary=5.96 cfs 1.404 af

Total Runoff Area = 34.756 ac Runoff Volume = 1.404 af Average Runoff Depth = 0.48"
89.94% Pervious = 31.259 ac 10.06% Impervious = 3.497 ac

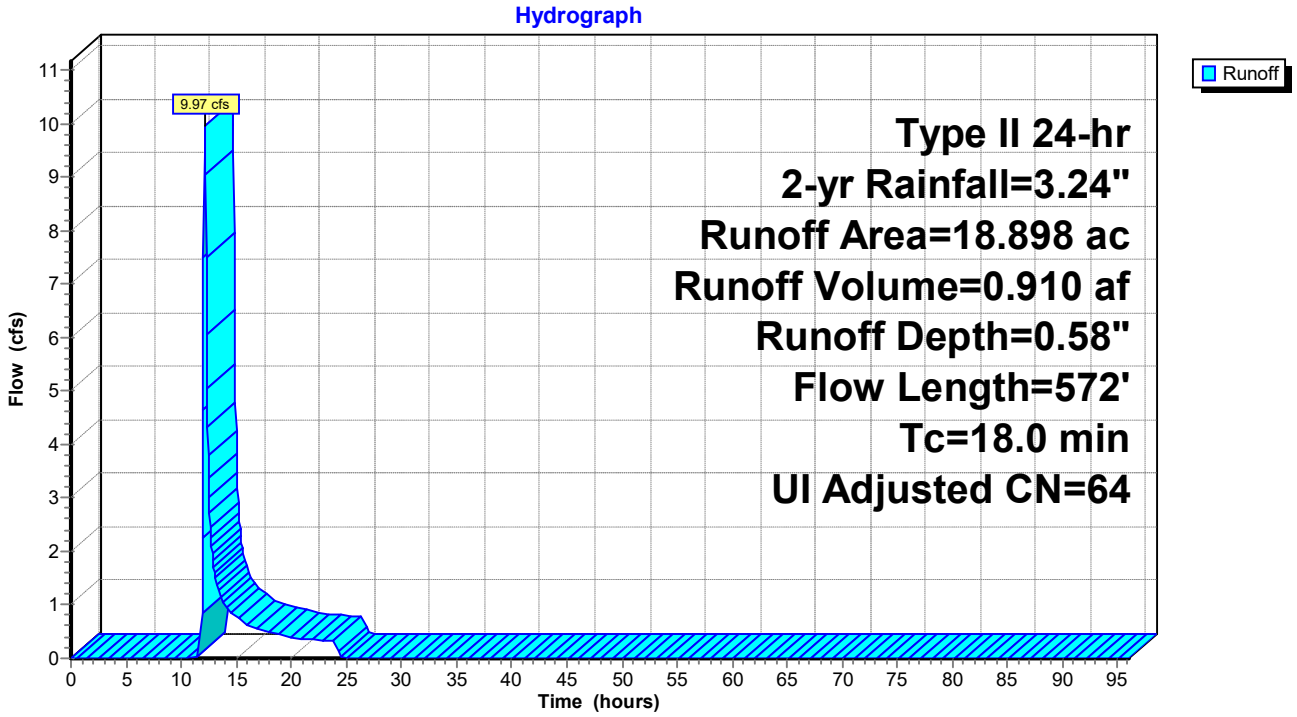
Subcatchment 1S: Pre within LOD



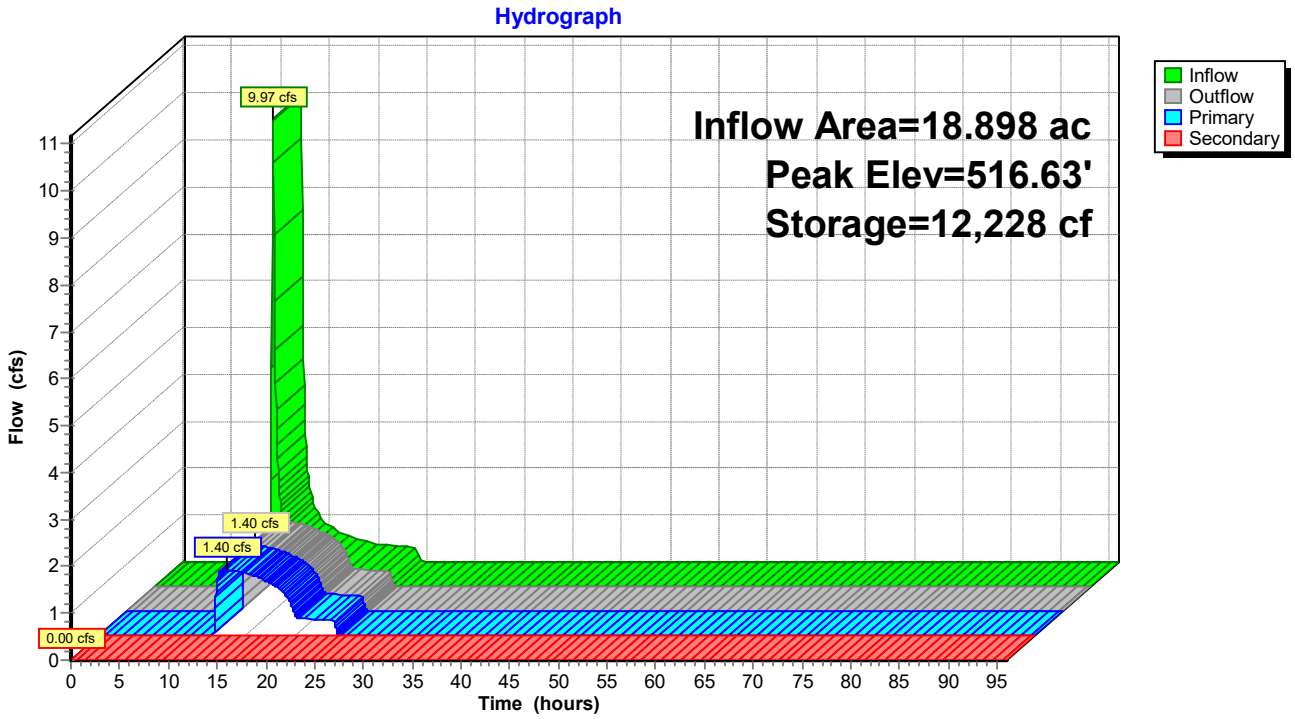
Subcatchment 2S: Pre outside LOD



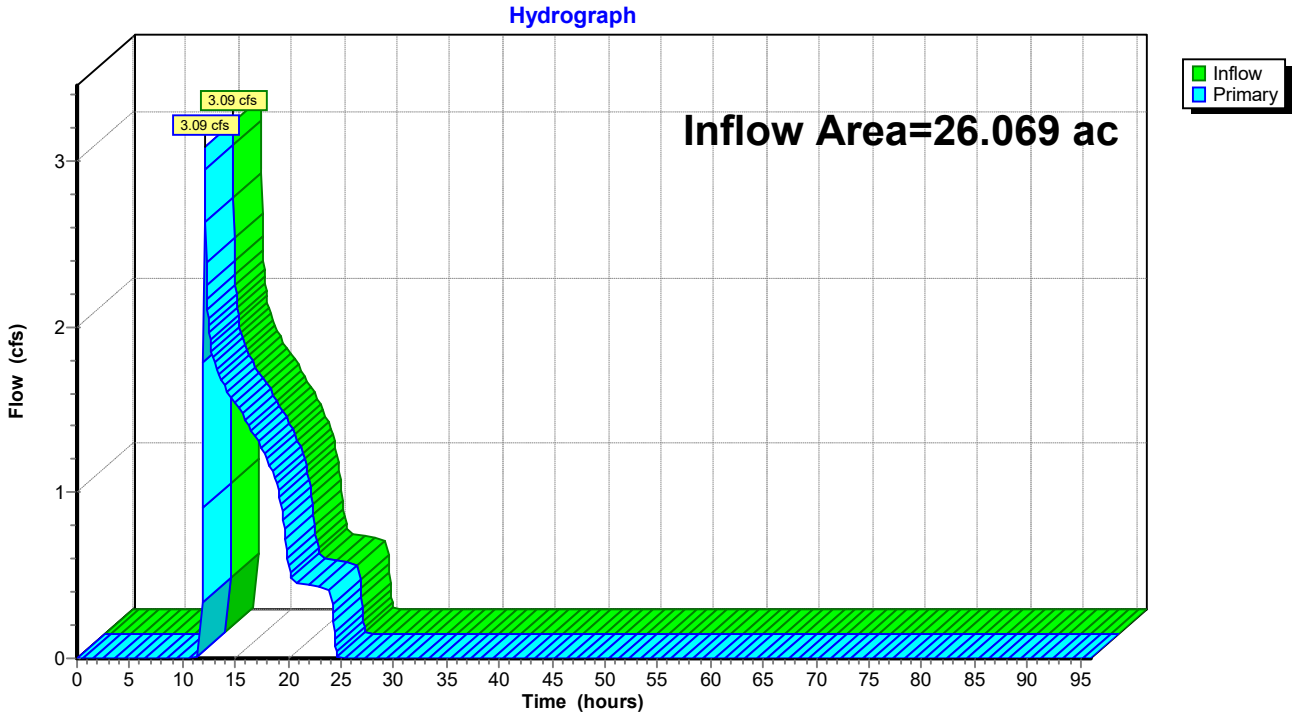
Subcatchment 3S: Existing Basin



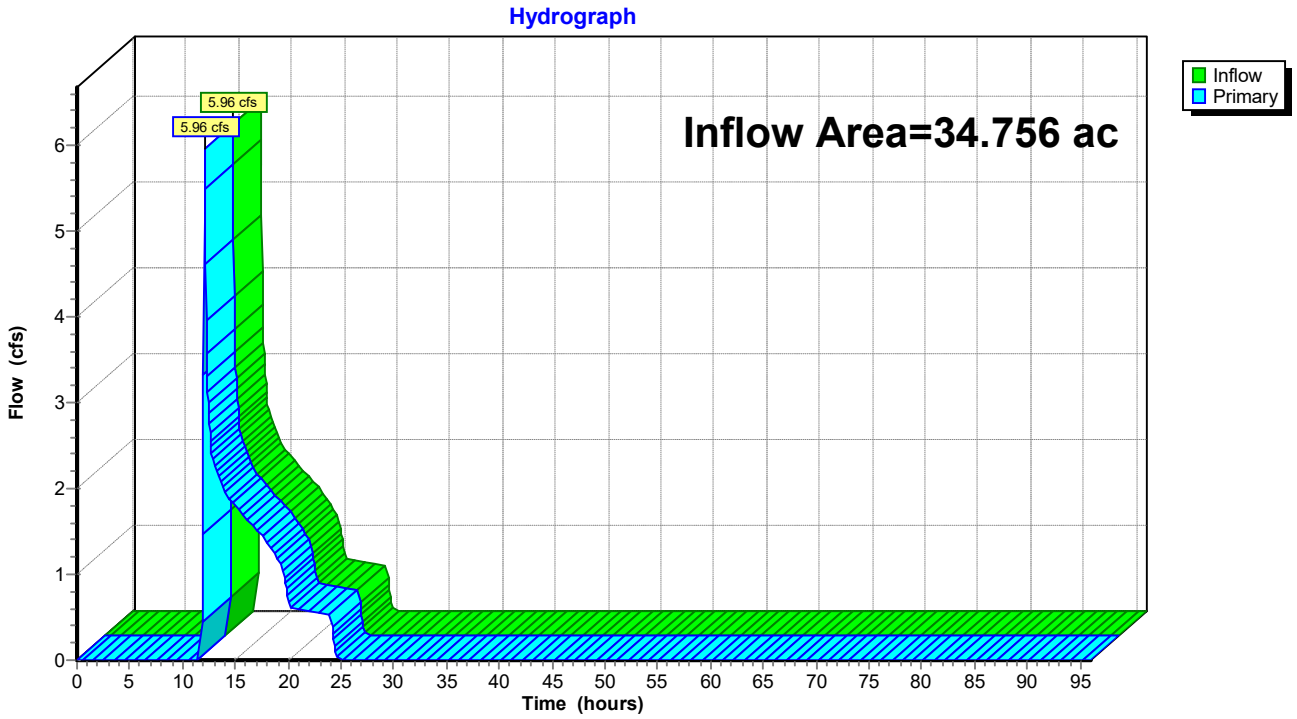
Pond 4P: Existing Basin



Link 5L: Total Undisturbed Pre-Development



Link 6L: Total Pre-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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: Pre within LOD Runoff Area=8.687 ac 2.41% Impervious Runoff Depth=0.75"
Flow Length=992' Tc=13.4 min CN=59 Runoff=7.15 cfs 0.540 af

Subcatchment 2S: Pre outside LOD Runoff Area=7.171 ac 0.00% Impervious Runoff Depth=0.70"
Flow Length=992' Tc=13.4 min CN=58 Runoff=5.34 cfs 0.416 af

Subcatchment 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=1.01"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=19.95 cfs 1.594 af

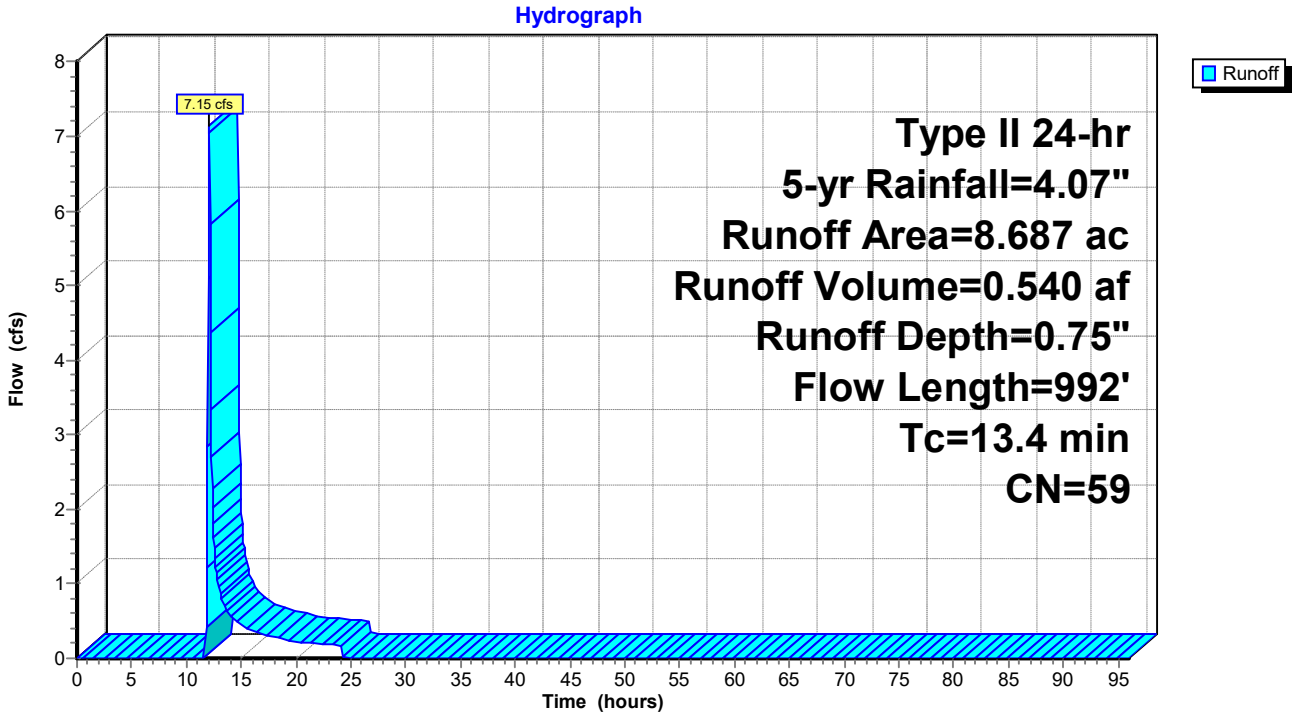
Pond 4P: Existing Basin Peak Elev=517.84' Storage=28,758 cf Inflow=19.95 cfs 1.594 af
Primary=1.75 cfs 1.594 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 1.594 af

Link 5L: Total Undisturbed Pre-Development Inflow=6.60 cfs 2.010 af
Primary=6.60 cfs 2.010 af

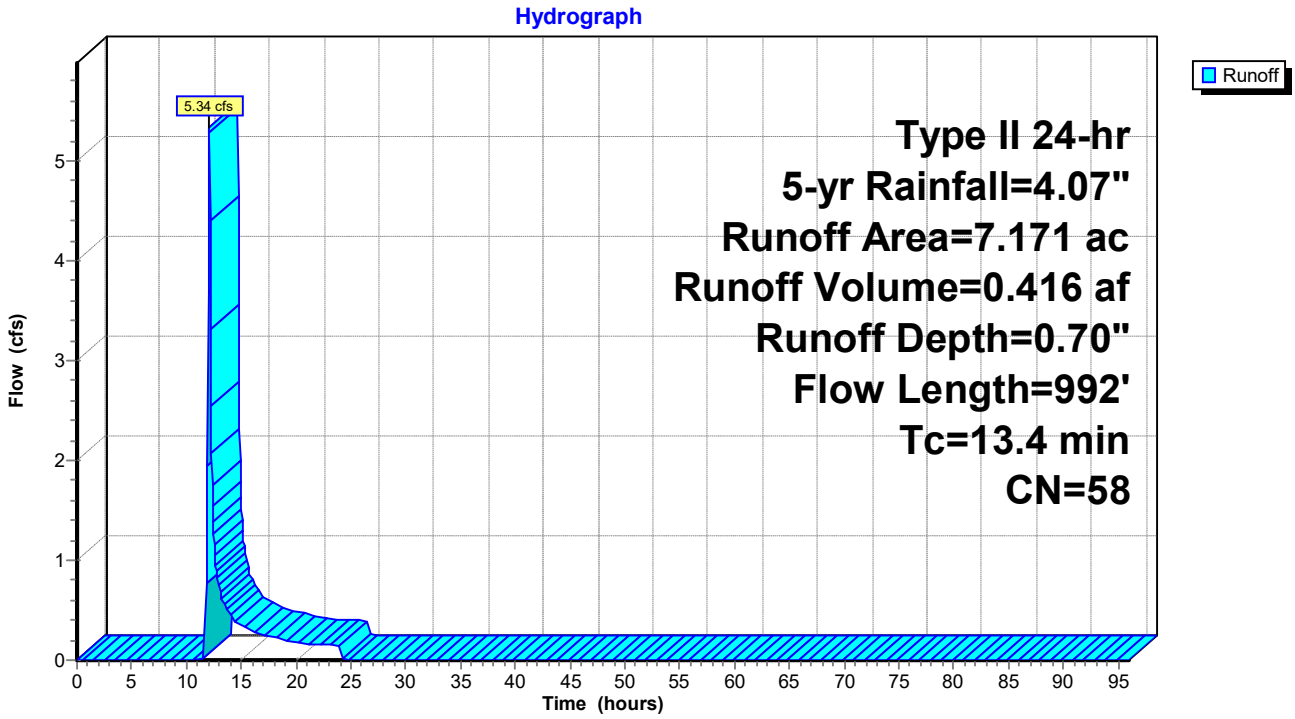
Link 6L: Total Pre-Development Inflow=13.74 cfs 2.550 af
Primary=13.74 cfs 2.550 af

Total Runoff Area = 34.756 ac Runoff Volume = 2.550 af Average Runoff Depth = 0.88"
89.94% Pervious = 31.259 ac 10.06% Impervious = 3.497 ac

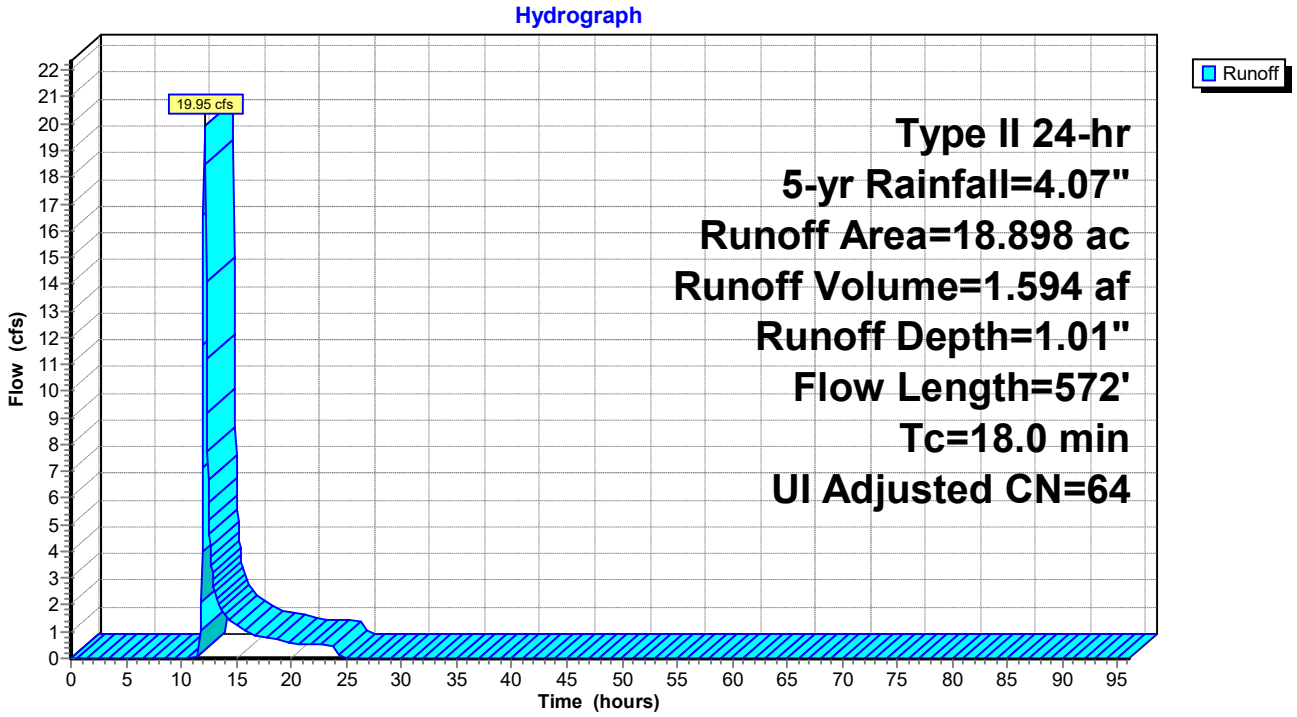
Subcatchment 1S: Pre within LOD



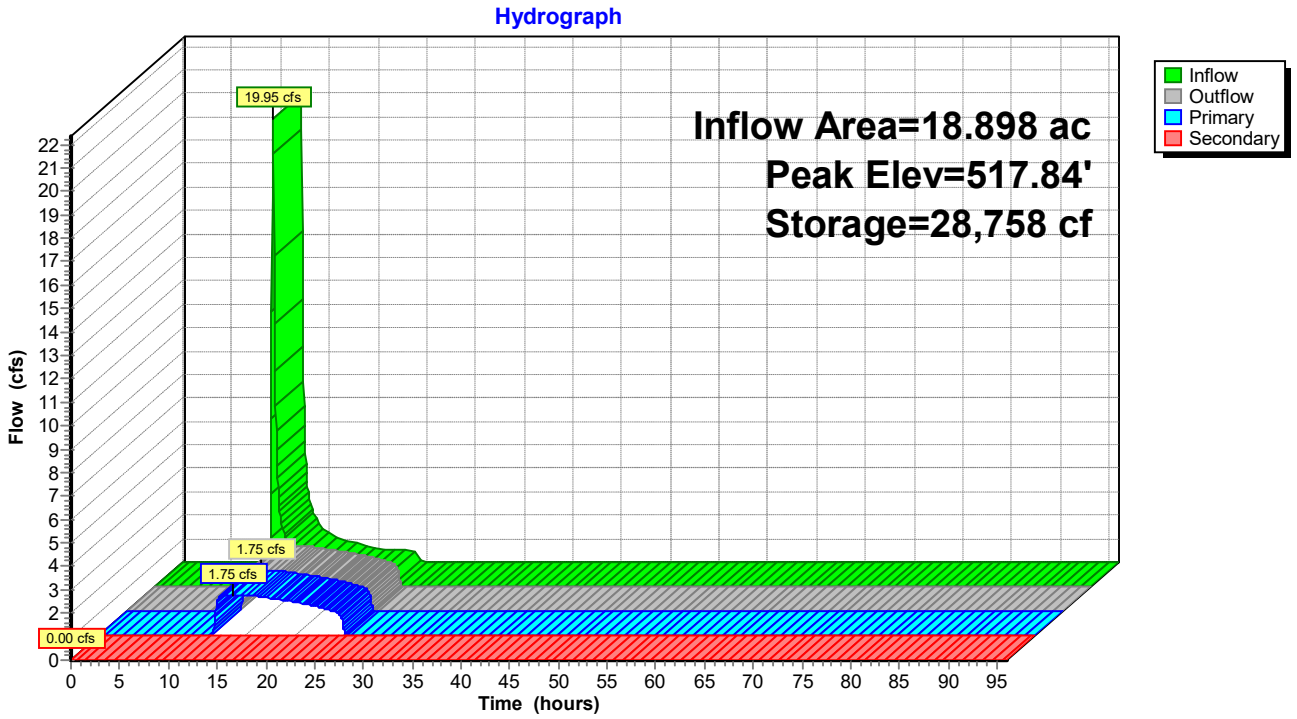
Subcatchment 2S: Pre outside LOD



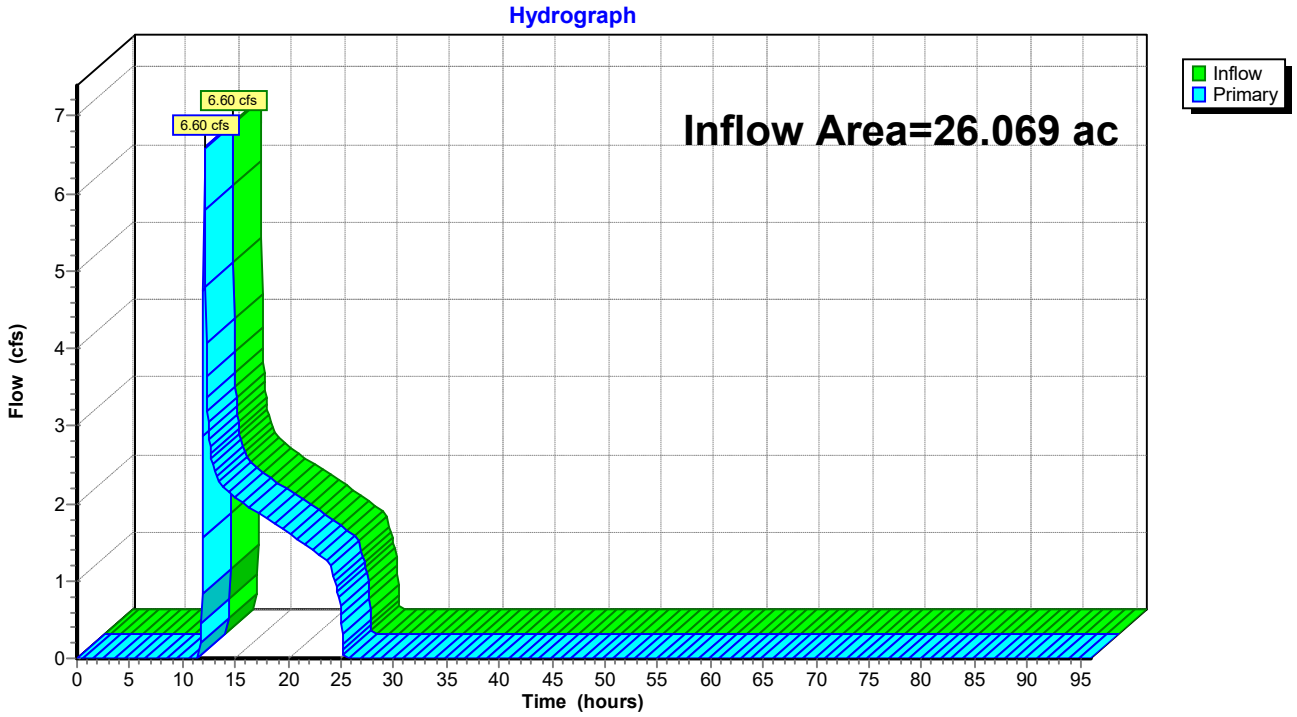
Subcatchment 3S: Existing Basin



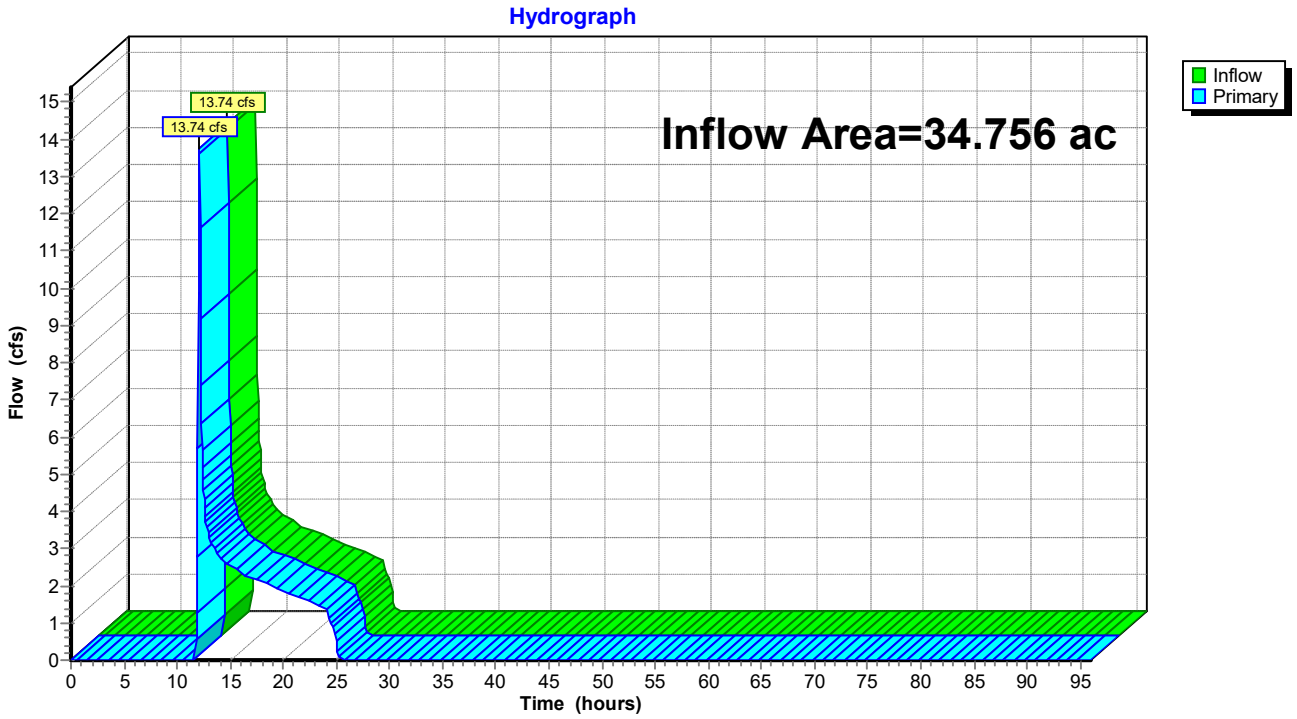
Pond 4P: Existing Basin



Link 5L: Total Undisturbed Pre-Development



Link 6L: Total Pre-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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: Pre within LOD Runoff Area=8.687 ac 2.41% Impervious Runoff Depth=1.10"
Flow Length=992' Tc=13.4 min CN=59 Runoff=11.58 cfs 0.797 af

Subcatchment 2S: Pre outside LOD Runoff Area=7.171 ac 0.00% Impervious Runoff Depth=1.04"
Flow Length=992' Tc=13.4 min CN=58 Runoff=8.86 cfs 0.621 af

Subcatchment 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=1.43"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=29.68 cfs 2.247 af

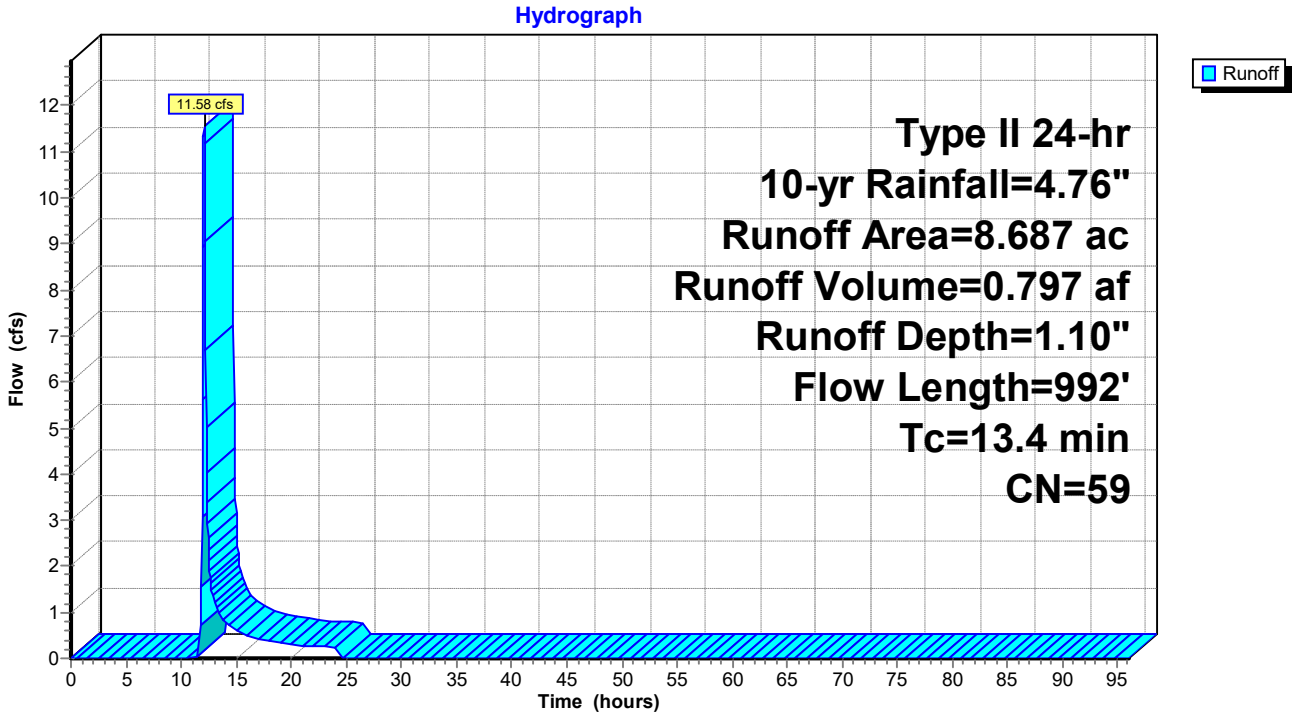
Pond 4P: Existing Basin Peak Elev=518.35' Storage=36,879 cf Inflow=29.68 cfs 2.247 af
Primary=6.06 cfs 2.247 af Secondary=0.00 cfs 0.000 af Outflow=6.06 cfs 2.247 af

Link 5L: Total Undisturbed Pre-Development Inflow=10.21 cfs 2.868 af
Primary=10.21 cfs 2.868 af

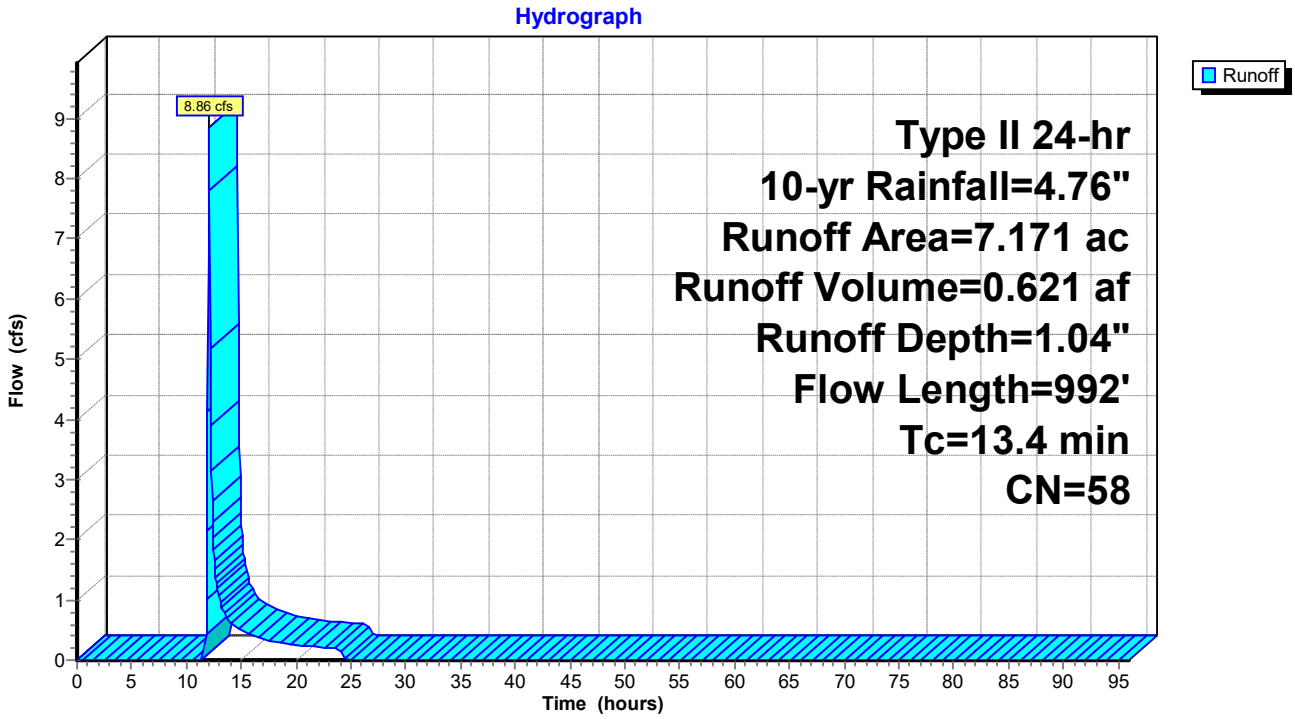
Link 6L: Total Pre-Development Inflow=21.84 cfs 3.665 af
Primary=21.84 cfs 3.665 af

Total Runoff Area = 34.756 ac Runoff Volume = 3.665 af Average Runoff Depth = 1.27"
89.94% Pervious = 31.259 ac 10.06% Impervious = 3.497 ac

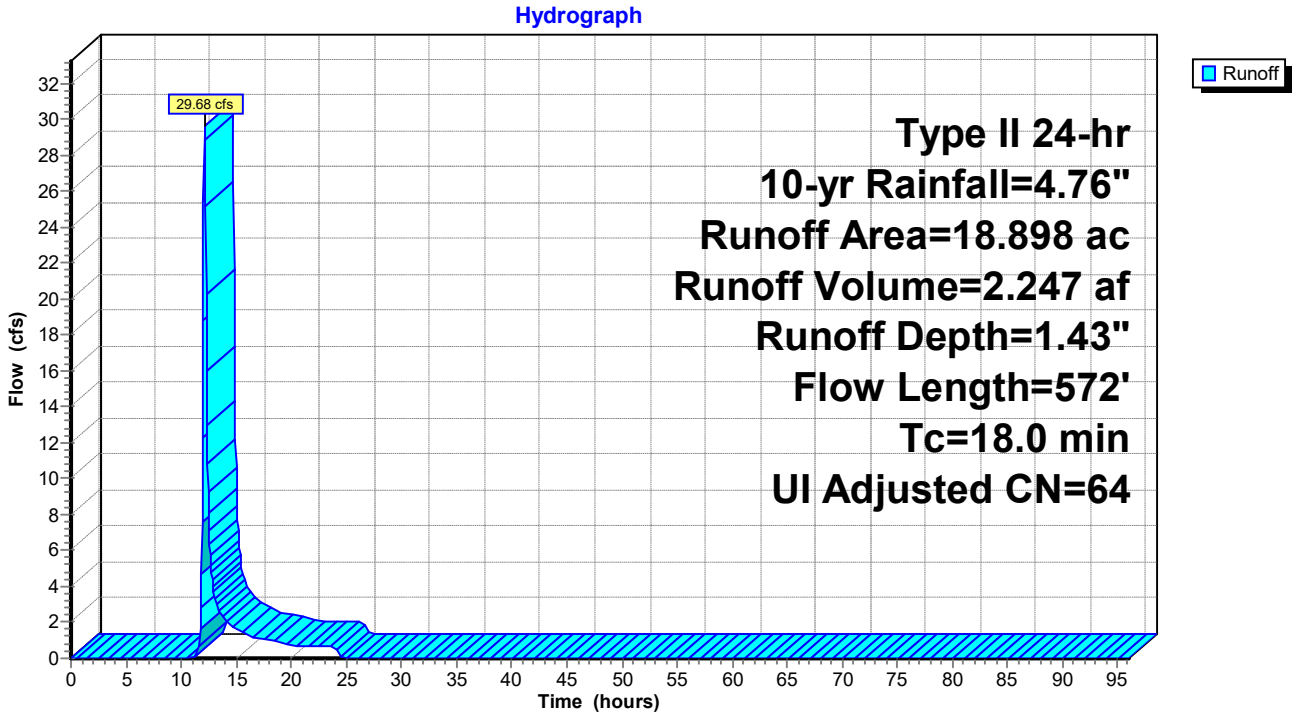
Subcatchment 1S: Pre within LOD



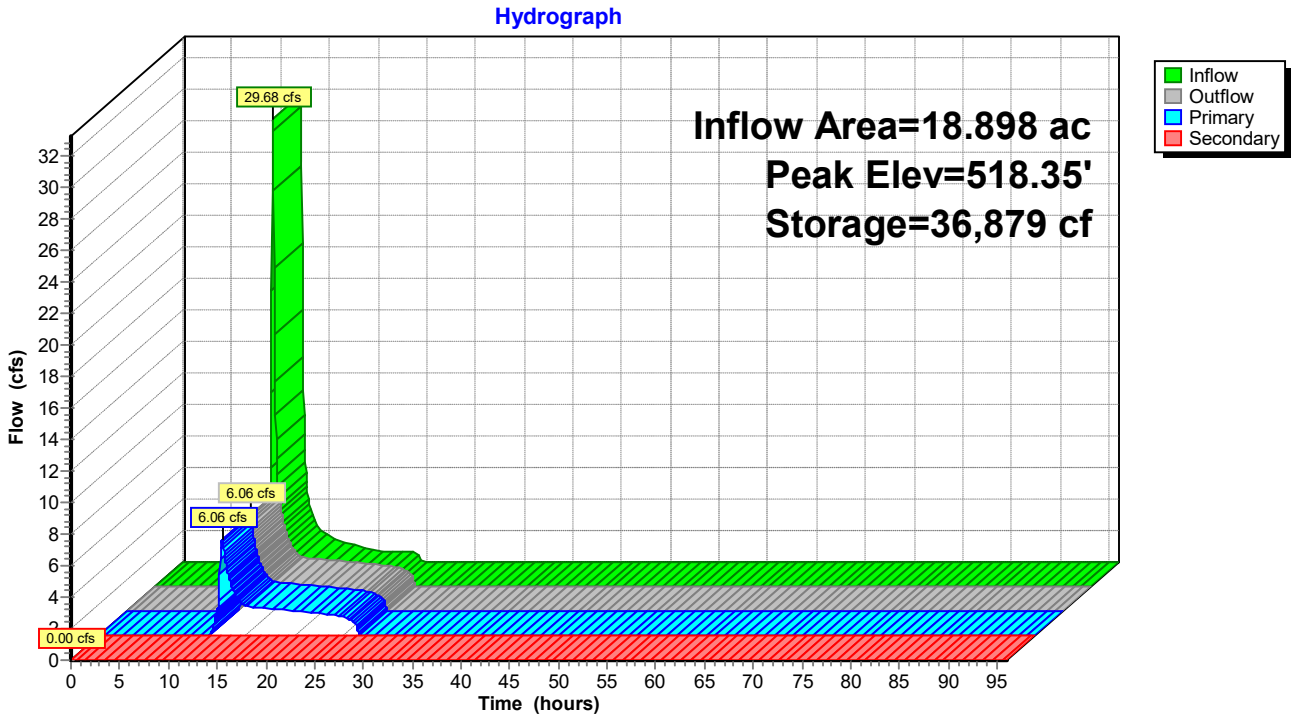
Subcatchment 2S: Pre outside LOD



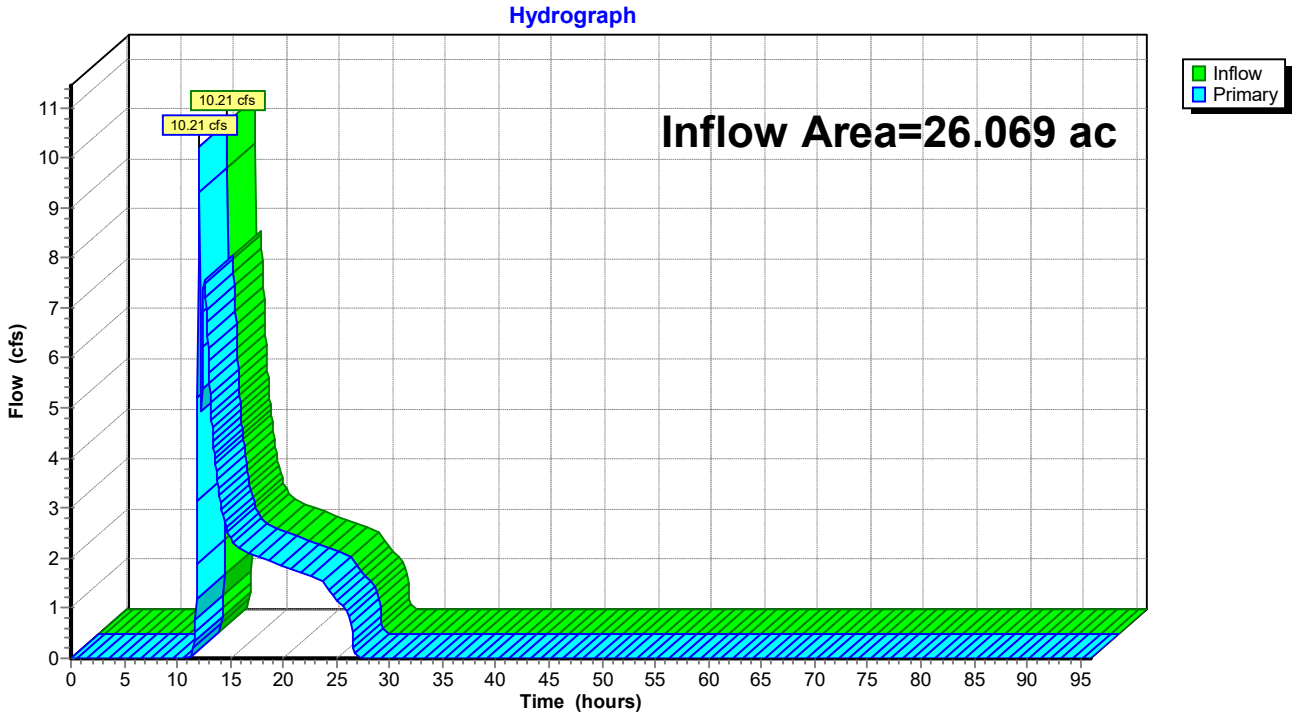
Subcatchment 3S: Existing Basin



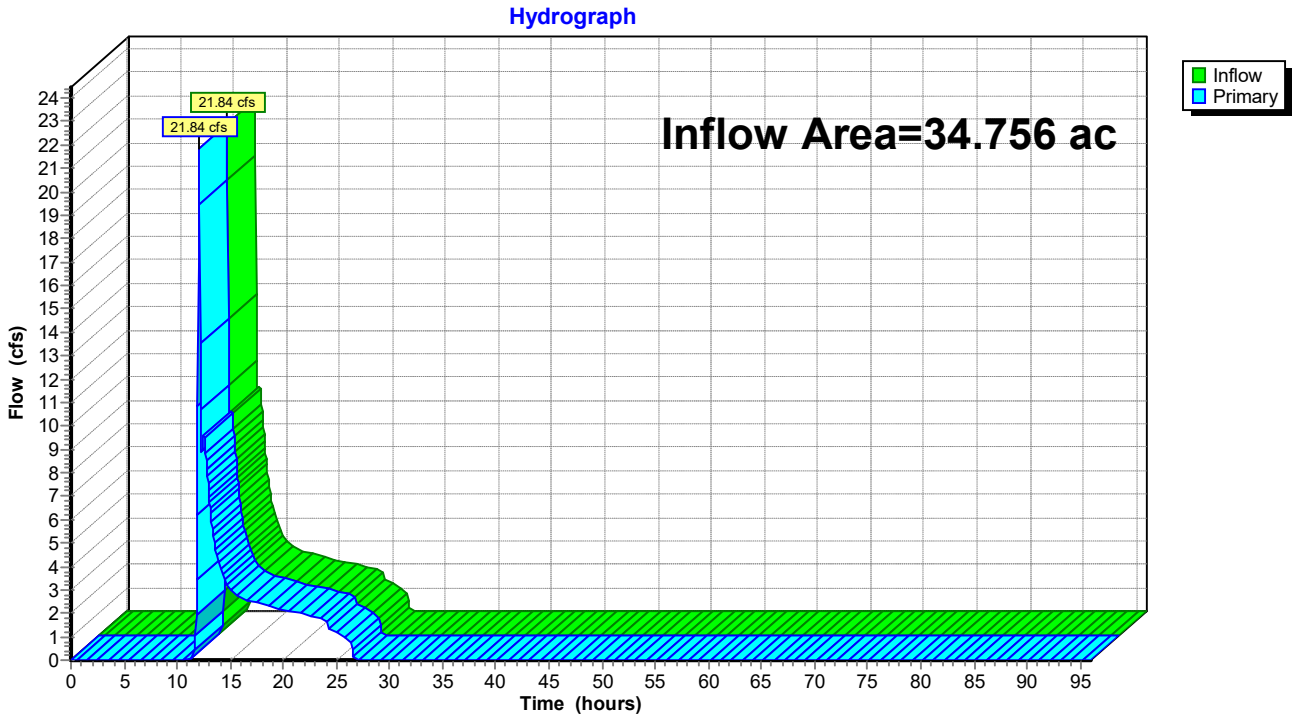
Pond 4P: Existing Basin



Link 5L: Total Undisturbed Pre-Development



Link 6L: Total Pre-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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: Pre within LOD Runoff Area=8.687 ac 2.41% Impervious Runoff Depth=1.68"
Flow Length=992' Tc=13.4 min CN=59 Runoff=18.76 cfs 1.217 af

Subcatchment 2S: Pre outside LOD Runoff Area=7.171 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=992' Tc=13.4 min CN=58 Runoff=14.62 cfs 0.958 af

Subcatchment 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=2.09"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=44.92 cfs 3.287 af

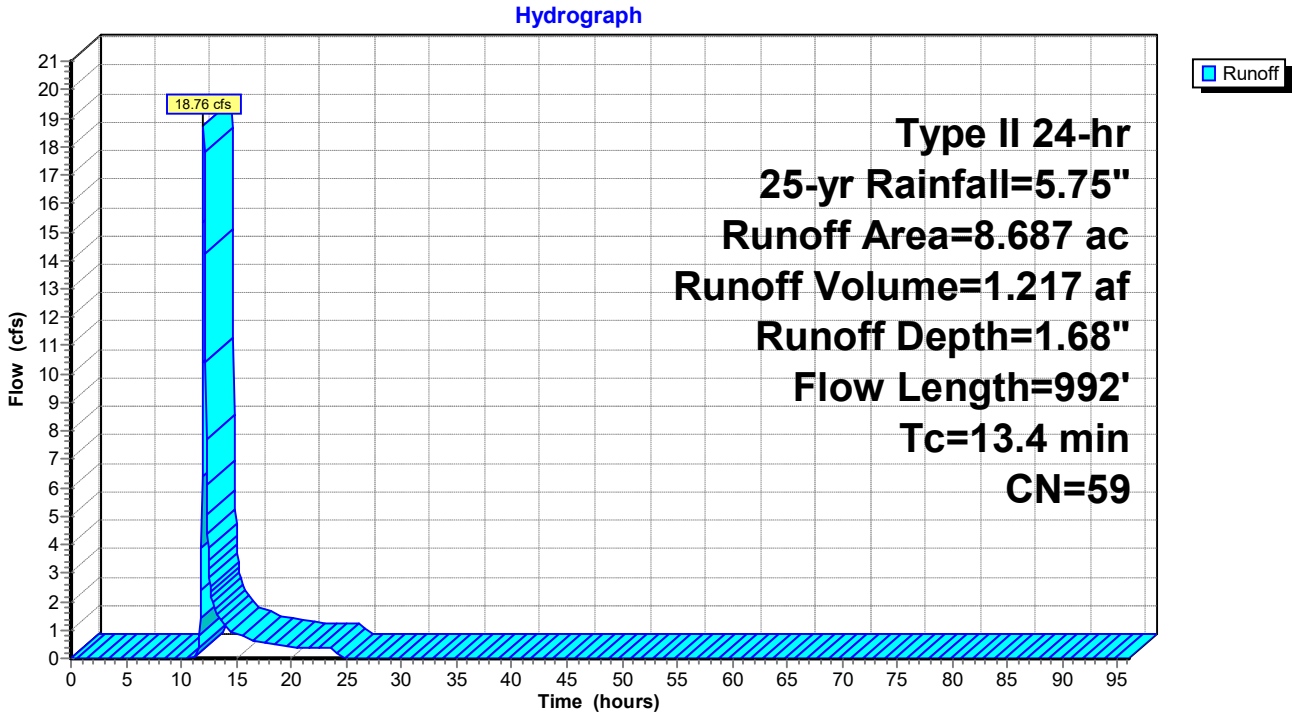
Pond 4P: Existing Basin Peak Elev=518.88' Storage=46,618 cf Inflow=44.92 cfs 3.287 af
Primary=16.20 cfs 3.287 af Secondary=0.00 cfs 0.000 af Outflow=16.20 cfs 3.287 af

Link 5L: Total Undisturbed Pre-Development Inflow=20.52 cfs 4.244 af
Primary=20.52 cfs 4.244 af

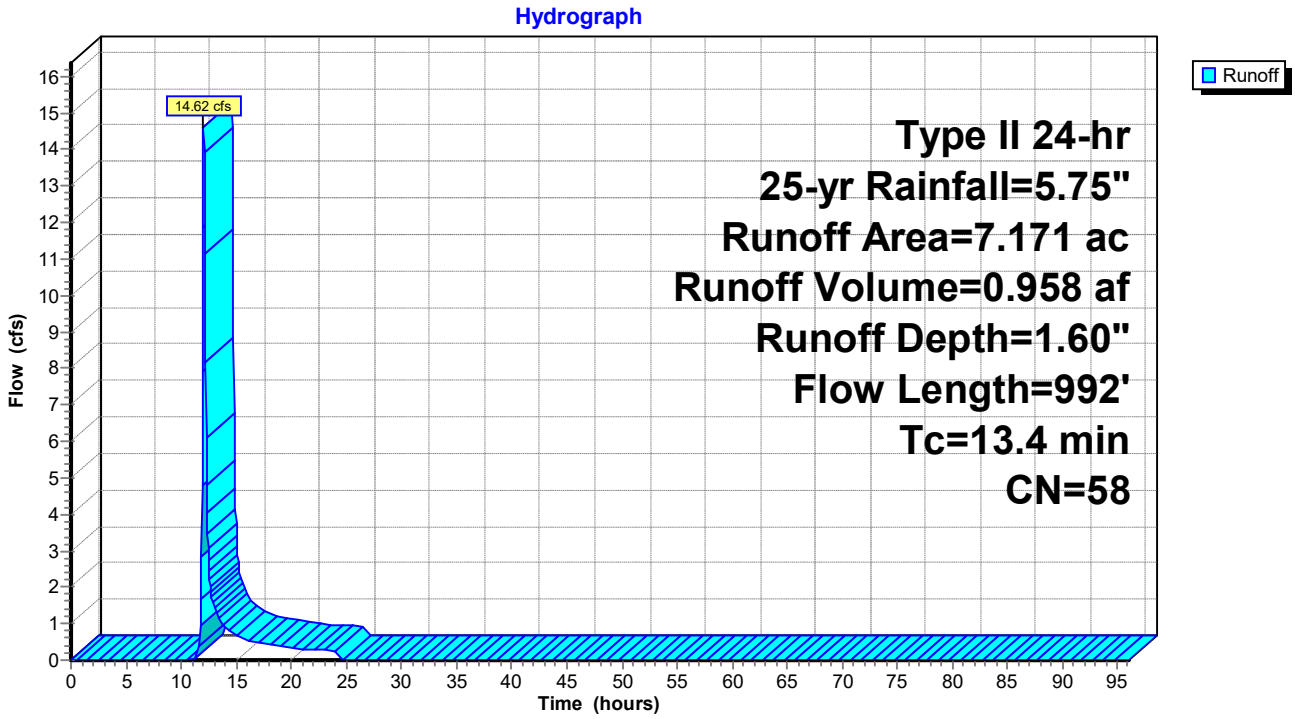
Link 6L: Total Pre-Development Inflow=34.98 cfs 5.461 af
Primary=34.98 cfs 5.461 af

Total Runoff Area = 34.756 ac Runoff Volume = 5.461 af Average Runoff Depth = 1.89"
89.94% Pervious = 31.259 ac 10.06% Impervious = 3.497 ac

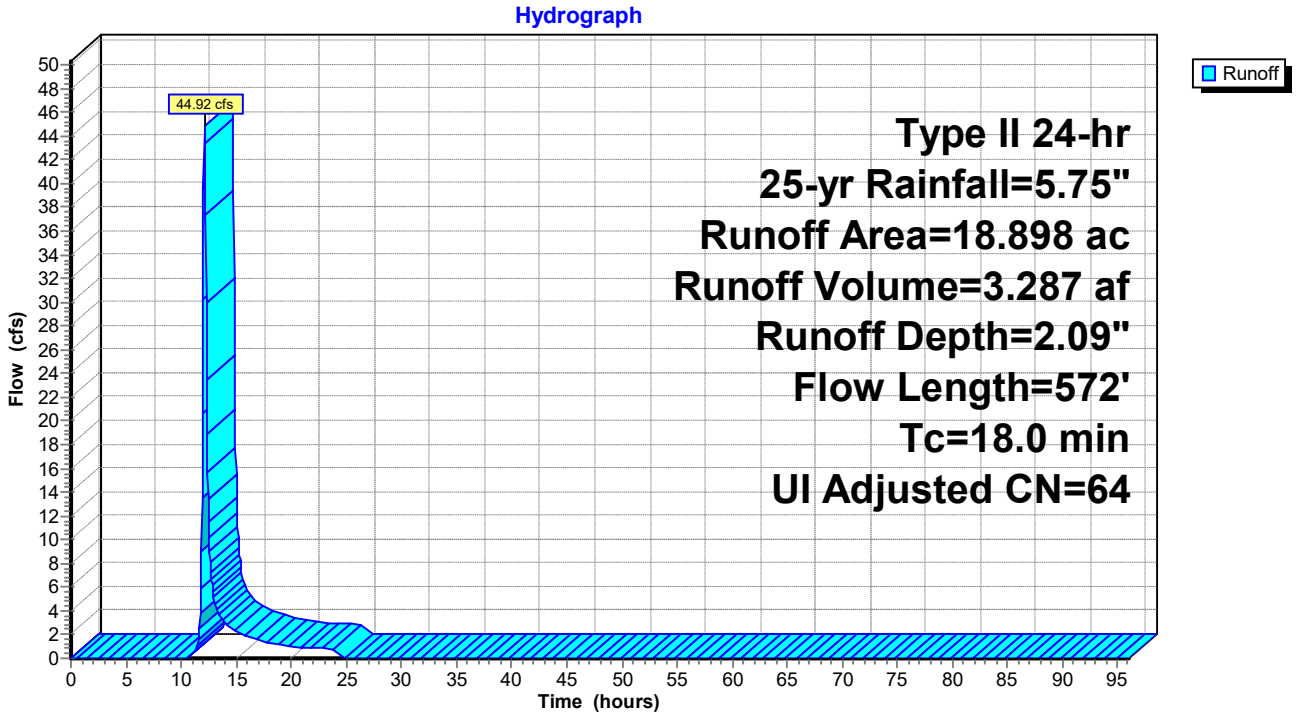
Subcatchment 1S: Pre within LOD



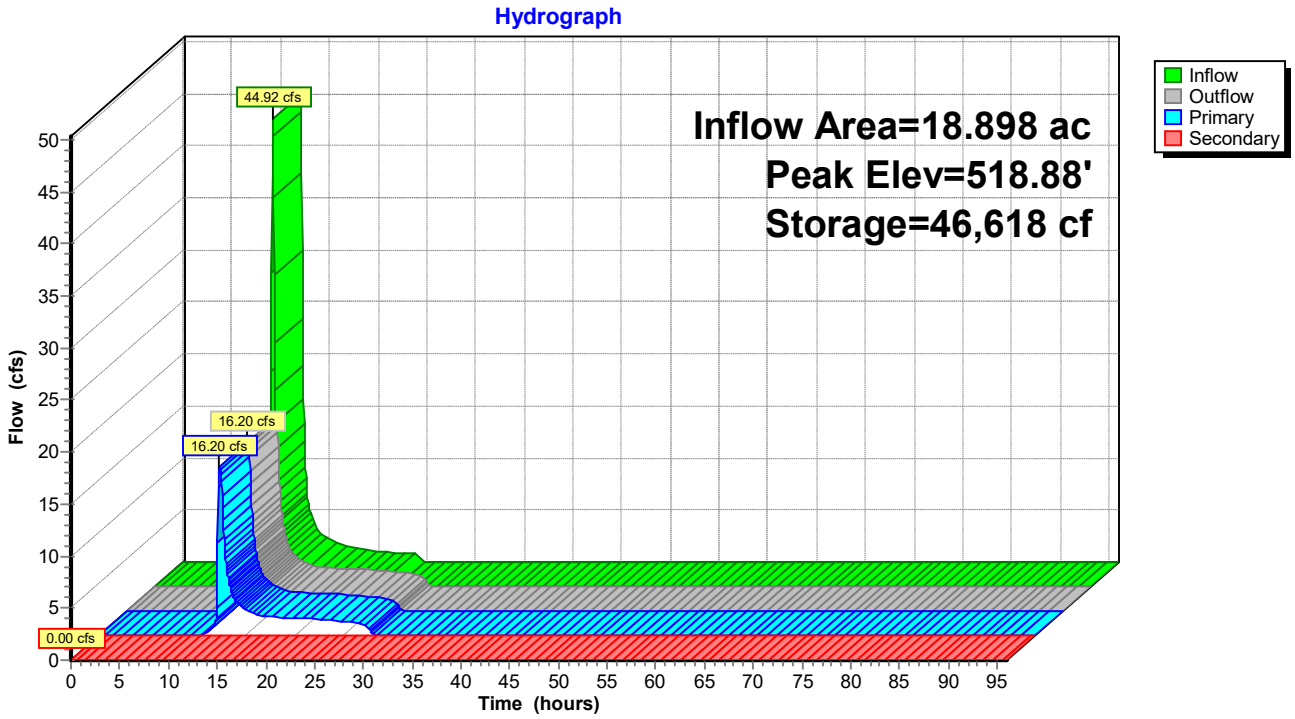
Subcatchment 2S: Pre outside LOD



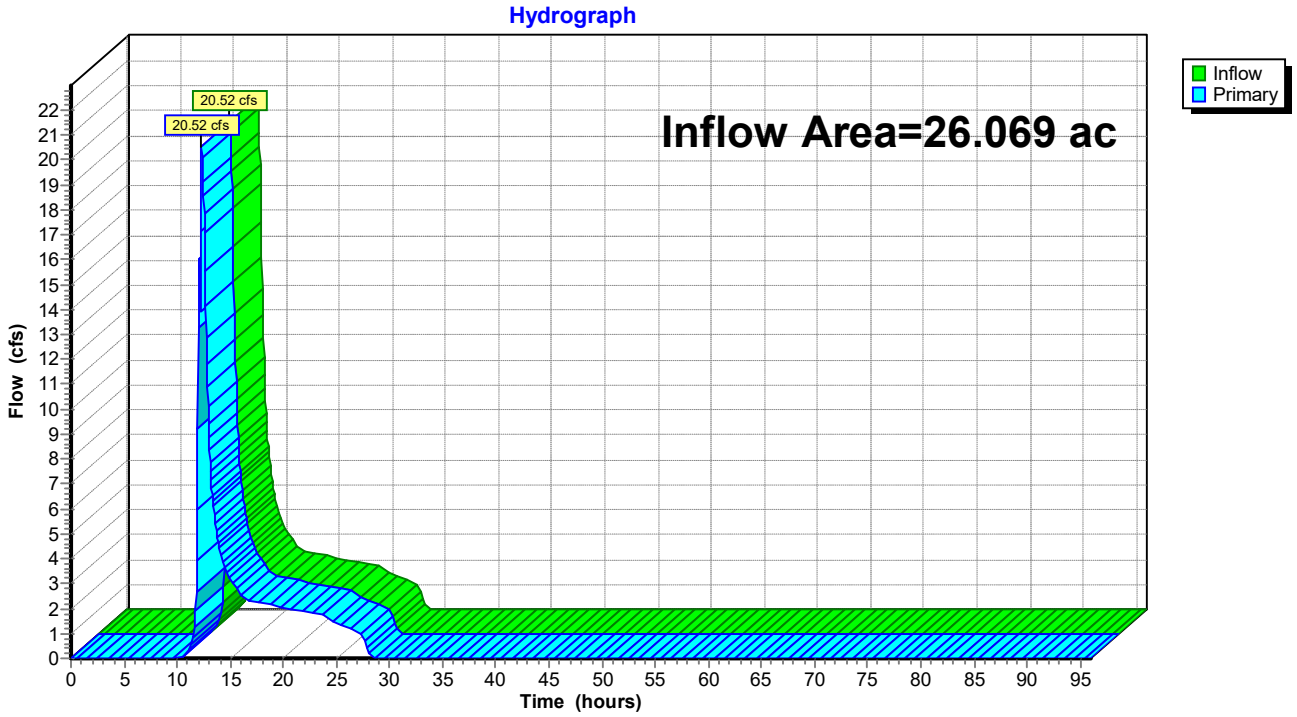
Subcatchment 3S: Existing Basin



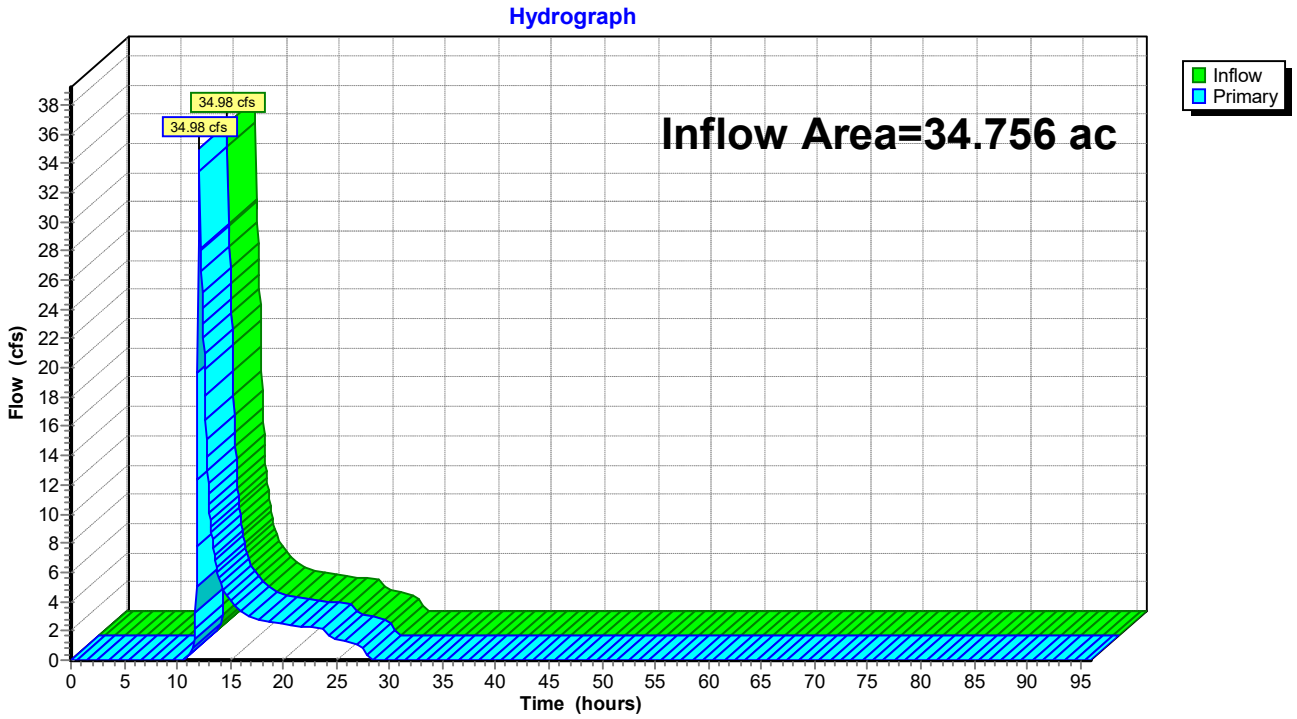
Pond 4P: Existing Basin



Link 5L: Total Undisturbed Pre-Development



Link 6L: Total Pre-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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: Pre within LOD Runoff Area=8.687 ac 2.41% Impervious Runoff Depth=2.22"
Flow Length=992' Tc=13.4 min CN=59 Runoff=25.36 cfs 1.606 af

Subcatchment 2S: Pre outside LOD Runoff Area=7.171 ac 0.00% Impervious Runoff Depth=2.13"
Flow Length=992' Tc=13.4 min CN=58 Runoff=19.96 cfs 1.272 af

Subcatchment 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=2.69"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=58.65 cfs 4.229 af

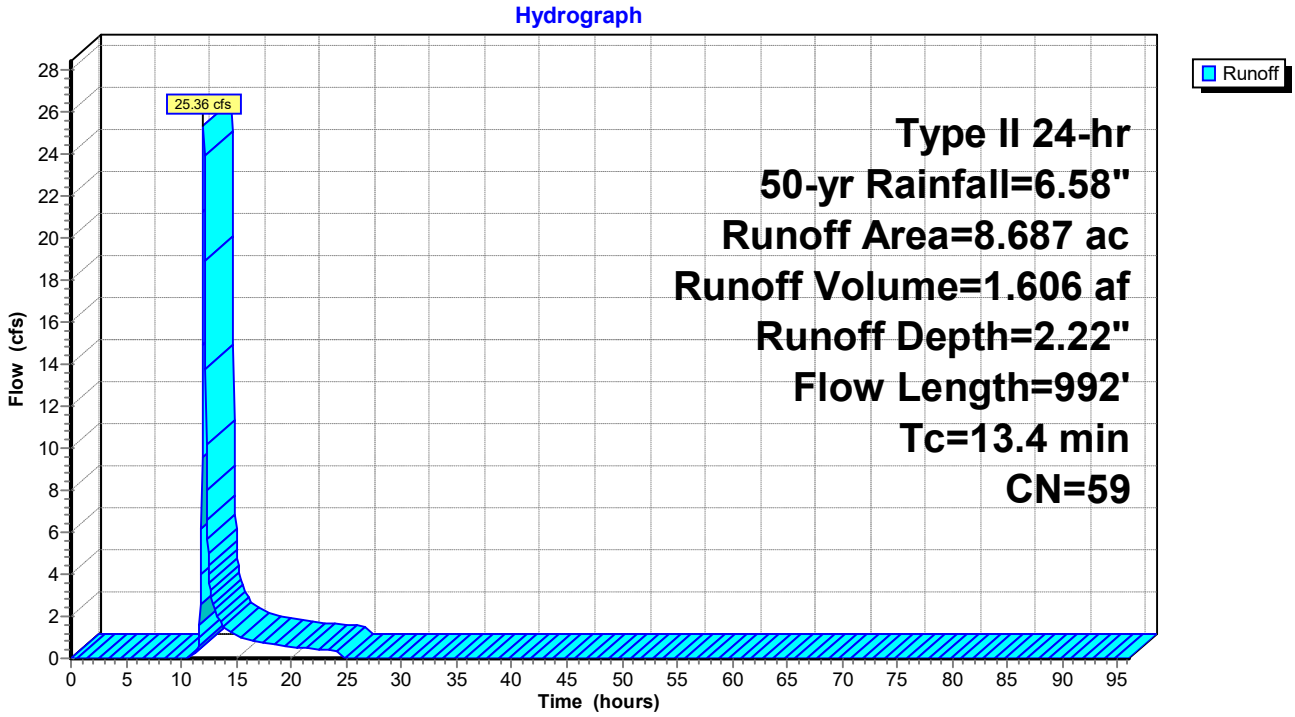
Pond 4P: Existing Basin Peak Elev=519.33' Storage=55,584 cf Inflow=58.65 cfs 4.229 af
Primary=19.51 cfs 4.037 af Secondary=10.42 cfs 0.192 af Outflow=29.93 cfs 4.229 af

Link 5L: Total Undisturbed Pre-Development Inflow=36.26 cfs 5.501 af
Primary=36.26 cfs 5.501 af

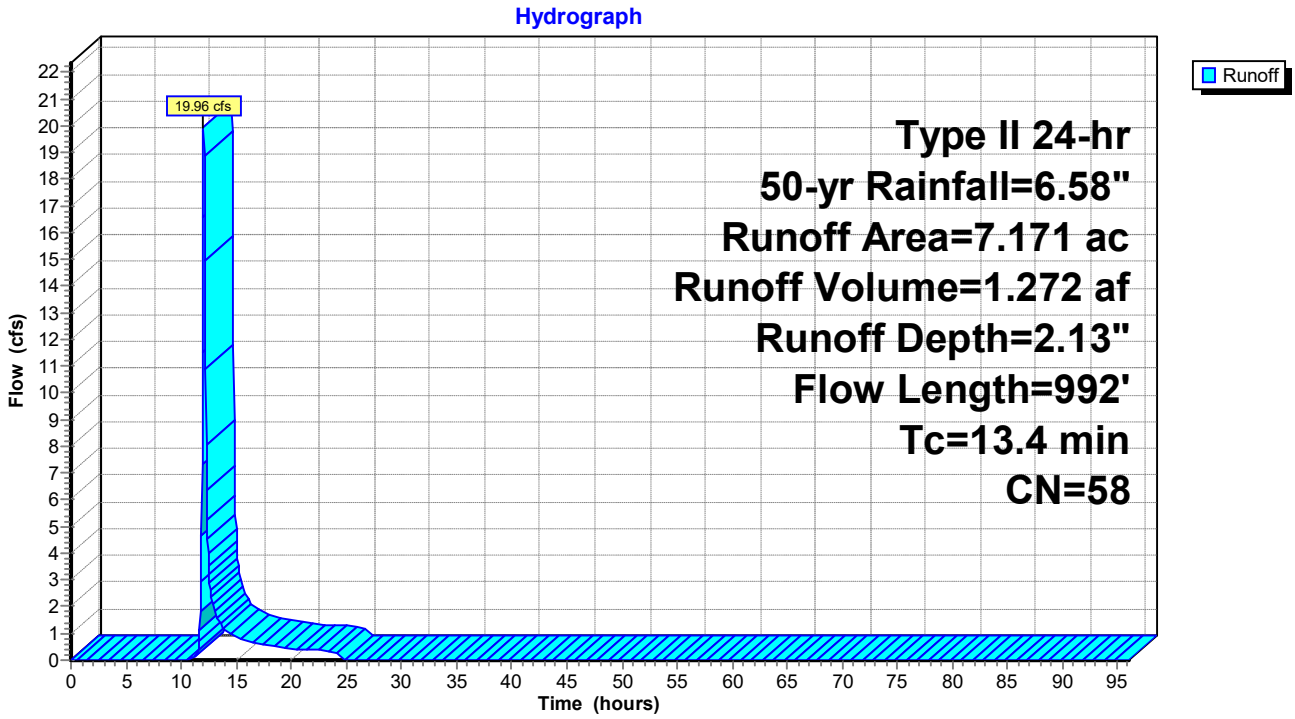
Link 6L: Total Pre-Development Inflow=49.51 cfs 7.108 af
Primary=49.51 cfs 7.108 af

Total Runoff Area = 34.756 ac Runoff Volume = 7.108 af Average Runoff Depth = 2.45"
89.94% Pervious = 31.259 ac 10.06% Impervious = 3.497 ac

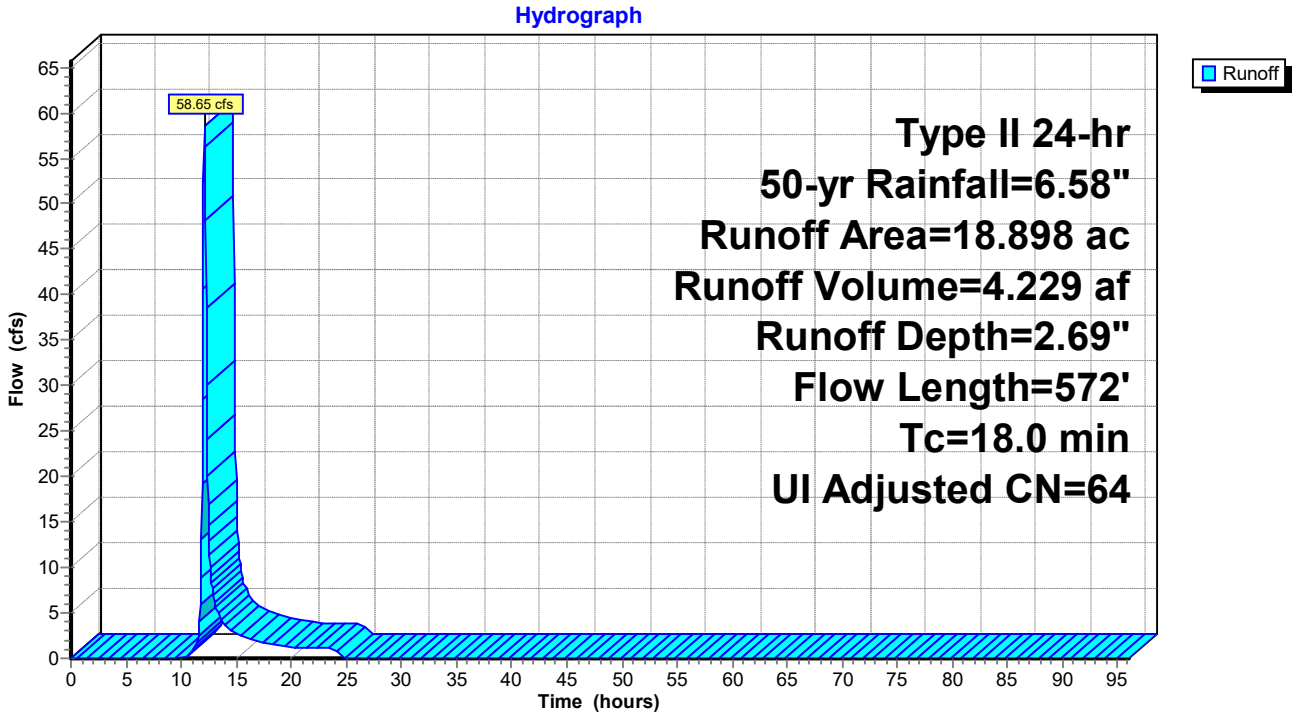
Subcatchment 1S: Pre within LOD



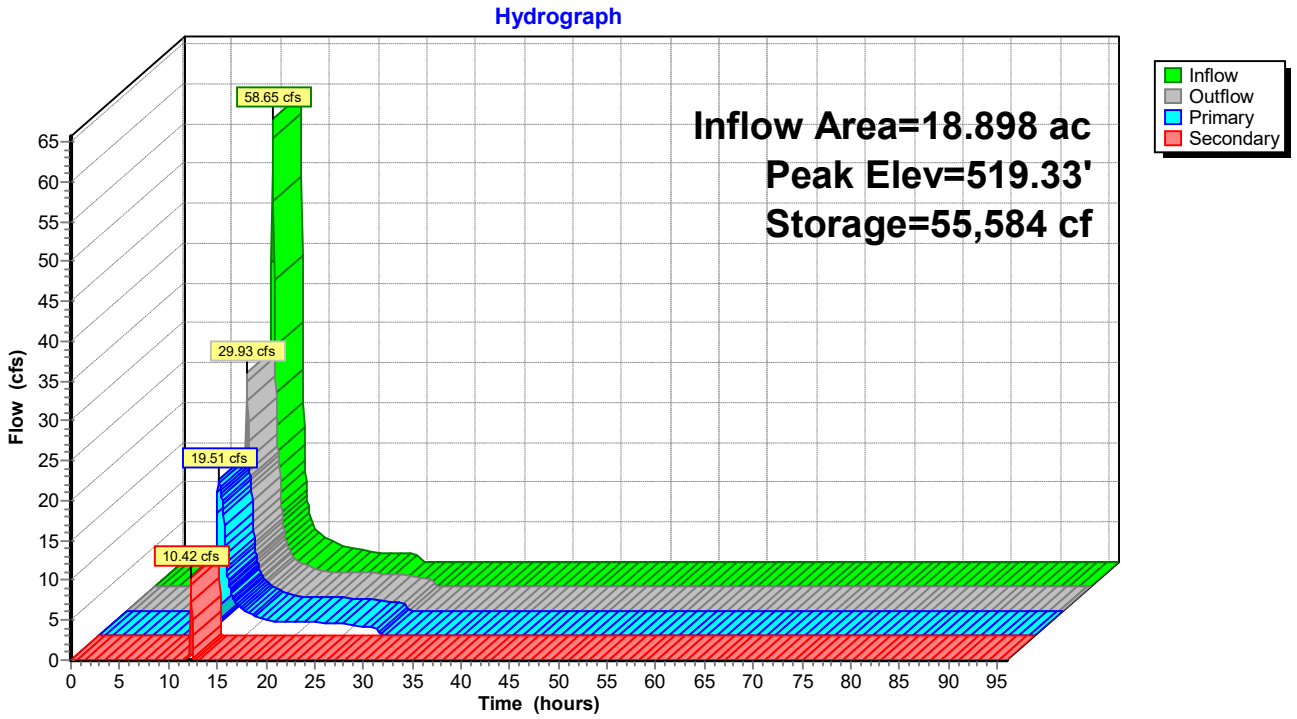
Subcatchment 2S: Pre outside LOD



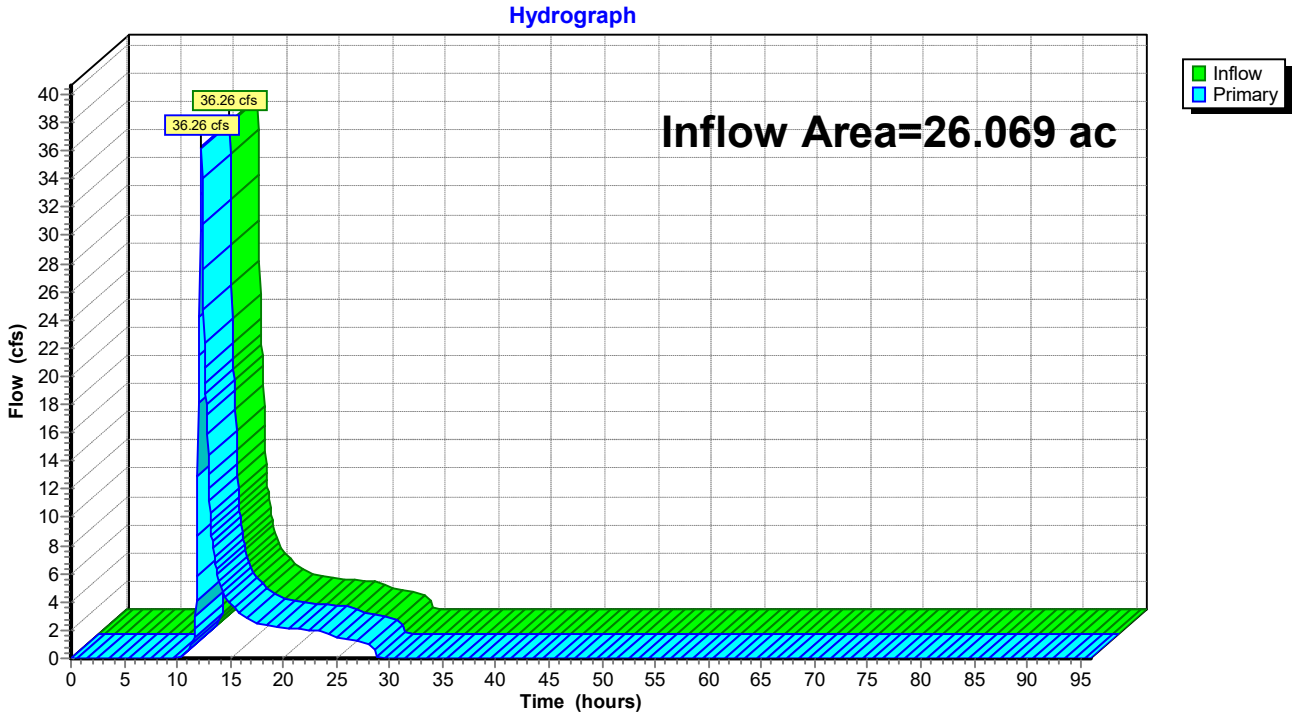
Subcatchment 3S: Existing Basin



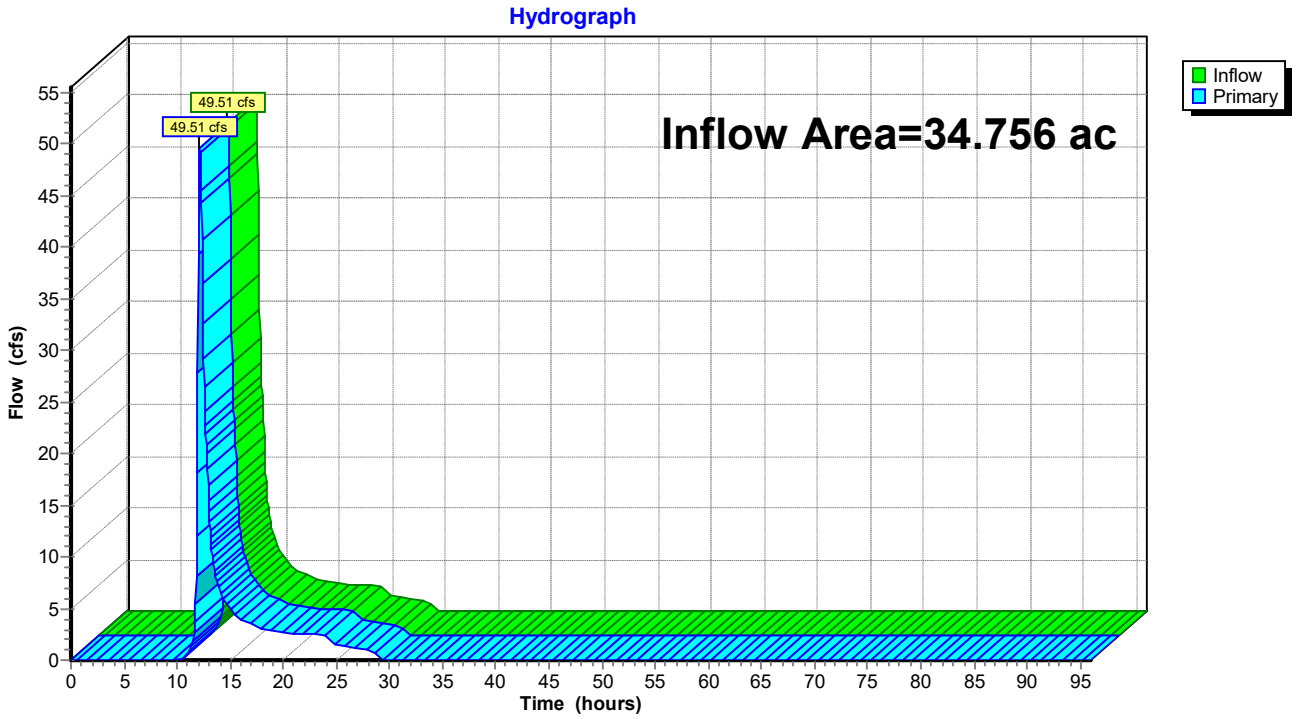
Pond 4P: Existing Basin



Link 5L: Total Undisturbed Pre-Development



Link 6L: Total Pre-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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: Pre within LOD Runoff Area=8.687 ac 2.41% Impervious Runoff Depth=2.84"
Flow Length=992' Tc=13.4 min CN=59 Runoff=32.99 cfs 2.059 af

Subcatchment 2S: Pre outside LOD Runoff Area=7.171 ac 0.00% Impervious Runoff Depth=2.74"
Flow Length=992' Tc=13.4 min CN=58 Runoff=26.14 cfs 1.638 af

Subcatchment 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=3.37"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=74.26 cfs 5.309 af

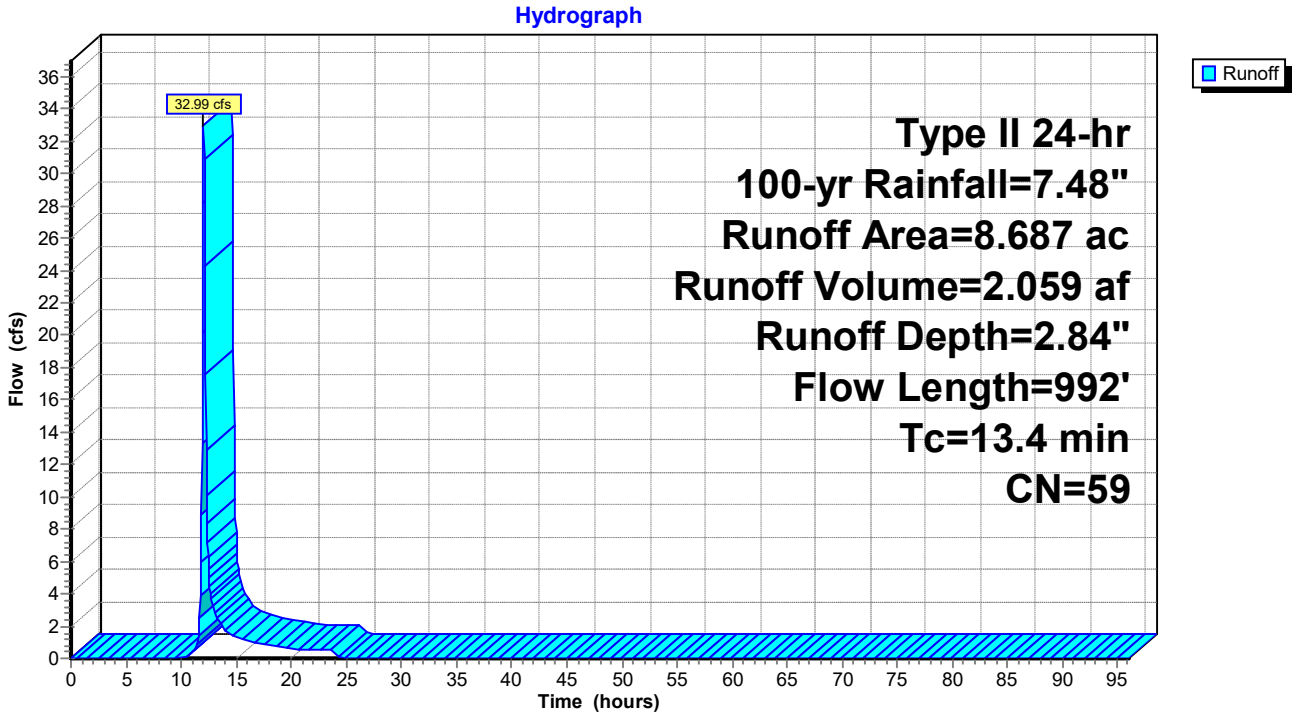
Pond 4P: Existing Basin Peak Elev=519.63' Storage=62,155 cf Inflow=74.26 cfs 5.309 af
Primary=21.46 cfs 4.675 af Secondary=28.83 cfs 0.634 af Outflow=50.29 cfs 5.309 af

Link 5L: Total Undisturbed Pre-Development Inflow=61.87 cfs 6.947 af
Primary=61.87 cfs 6.947 af

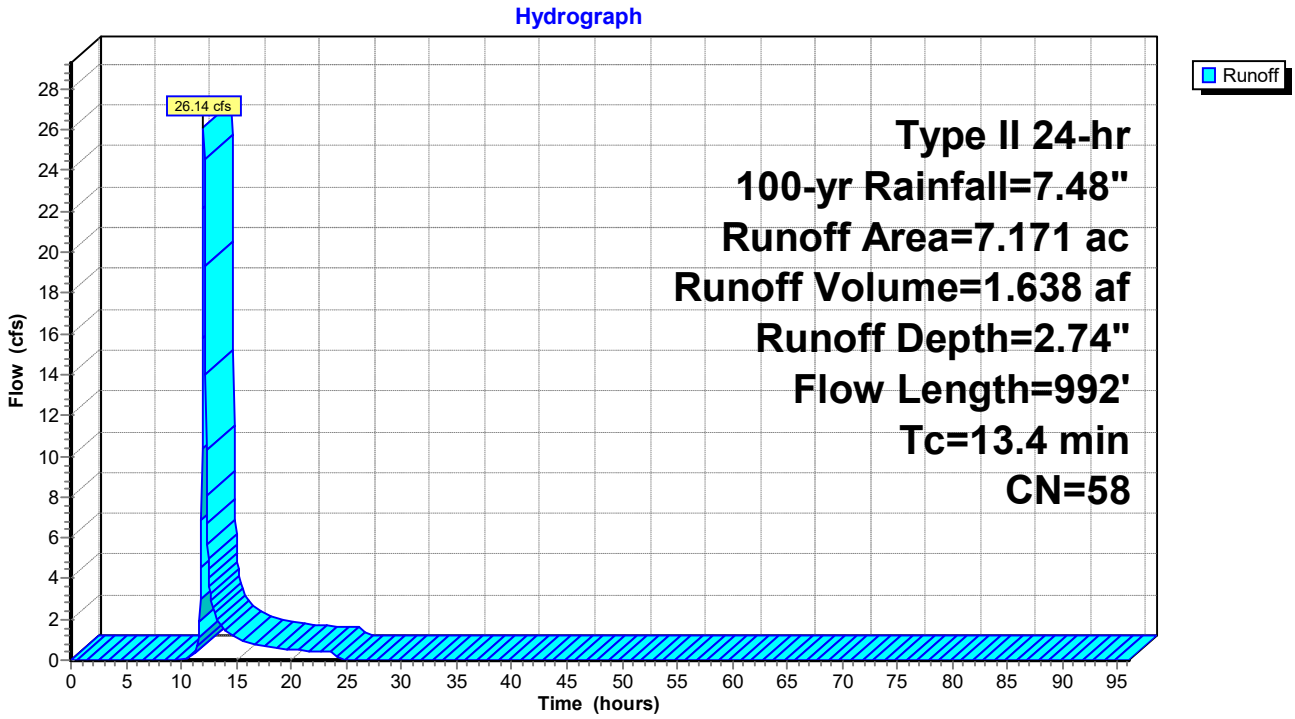
Link 6L: Total Pre-Development Inflow=78.40 cfs 9.006 af
Primary=78.40 cfs 9.006 af

Total Runoff Area = 34.756 ac Runoff Volume = 9.006 af Average Runoff Depth = 3.11"
89.94% Pervious = 31.259 ac 10.06% Impervious = 3.497 ac

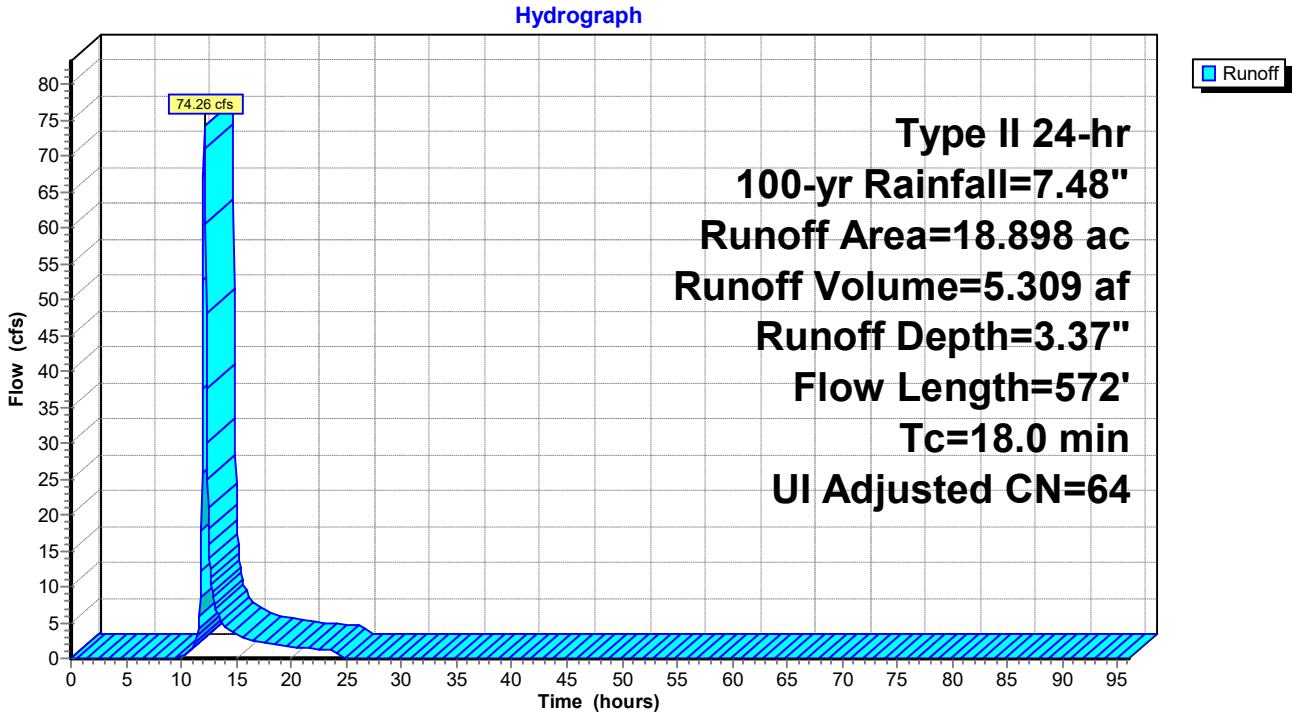
Subcatchment 1S: Pre within LOD



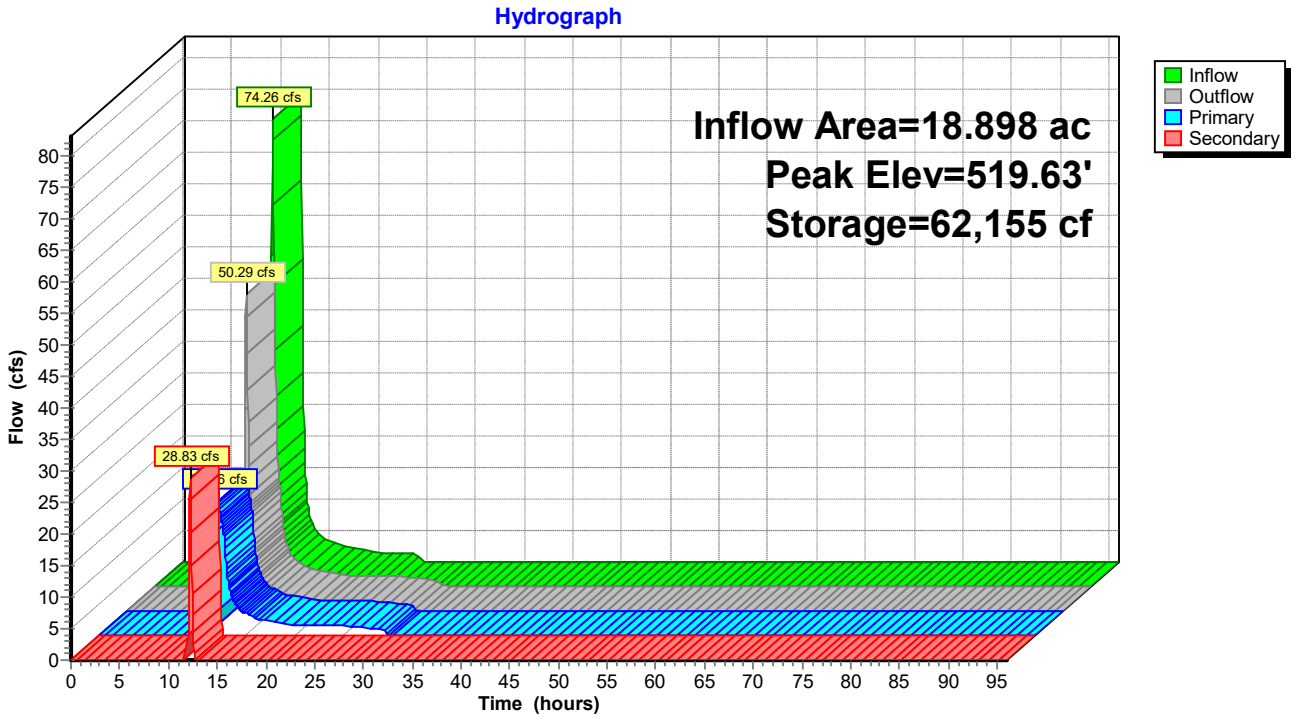
Subcatchment 2S: Pre outside LOD



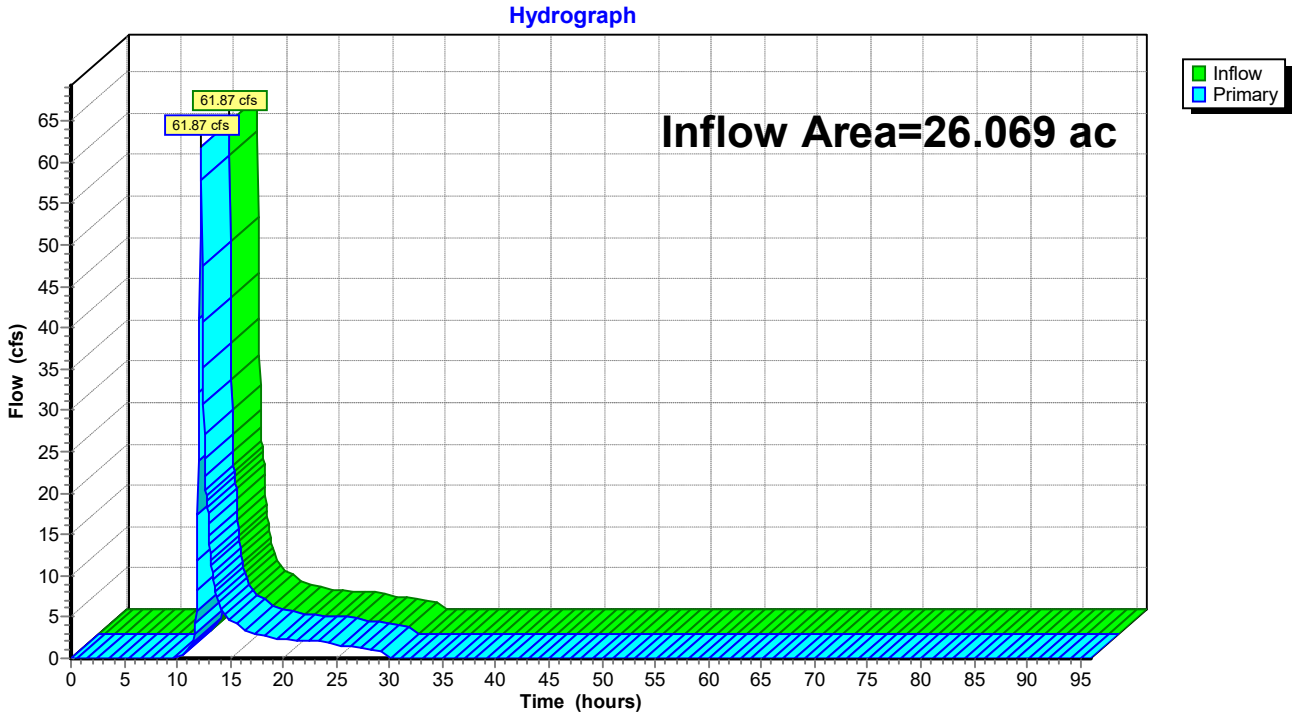
Subcatchment 3S: Existing Basin



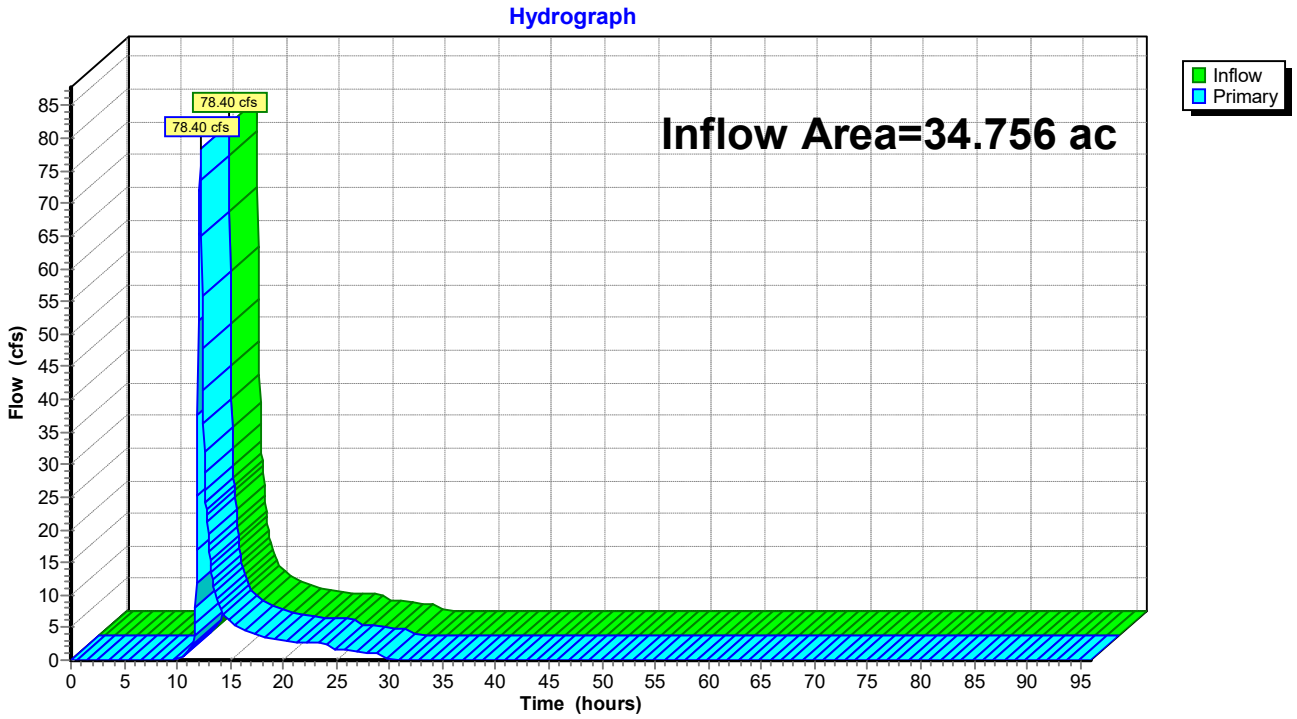
Pond 4P: Existing Basin



Link 5L: Total Undisturbed Pre-Development



Link 6L: Total Pre-Development



Summary for Subcatchment 3S: Existing Basin

Runoff = 9.97 cfs @ 12.14 hrs, Volume= 0.910 af, Depth= 0.58"
Routed to Pond 4P : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.24"

Area (ac)	CN	Adj	Description
15.610	61		>75% Grass cover, Good, HSG B
3.288	98		Unconnected pavement, HSG B
18.898	67	64	Weighted Average, UI Adjusted
15.610			82.60% Pervious Area
3.288			17.40% Impervious Area
3.288			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	150	0.0330	0.16		**Sheet Flow, Segment #1** Grass: Dense n= 0.240 P2= 3.24"
1.0	202	0.0450	3.42		**Shallow Concentrated Flow, Segment #2** Unpaved Kv= 16.1 fps
0.9	220	0.0410	4.11		**Shallow Concentrated Flow, Segment #3** Paved Kv= 20.3 fps
18.0	572	Total			

Summary for Subcatchment 7S: Basin #1 Inflow

Runoff = 2.44 cfs @ 12.05 hrs, Volume= 0.179 af, Depth= 0.46"
Routed to Pond 8P : Basin #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.24"

Area (ac)	CN	Adj	Description
0.516	61		>75% Grass cover, Good, HSG B
3.528	58		Meadow, non-grazed, HSG B
0.609	98		Unconnected pavement, HSG B
4.653	64	61	Weighted Average, UI Adjusted
4.044			86.91% Pervious Area
0.609			13.09% Impervious Area
0.609			100.00% Unconnected

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

Summary for Subcatchment 10S: Basin #2 Inflow

Runoff = 6.89 cfs @ 12.04 hrs, Volume= 0.465 af, Depth= 0.54"
Routed to Pond 11P : Basin #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.24"

Area (ac)	CN	Adj	Description
3.157	61		>75% Grass cover, Good, HSG B
5.209	58		Meadow, non-grazed, HSG B
2.024	98		Unconnected pavement, HSG B
10.390	67	63	Weighted Average, UI Adjusted
8.366			80.52% Pervious Area
2.024			19.48% Impervious Area
2.024			100.00% Unconnected

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

Summary for Subcatchment 12S: Un-detained Flow

Runoff = 0.86 cfs @ 12.01 hrs, Volume= 0.048 af, Depth= 0.71"
Routed to Link 13L : Total Post-Development

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.24"

Area (ac)	CN	Adj	Description
0.000	61		>75% Grass cover, Good, HSG B
0.400	58		Meadow, non-grazed, HSG B
0.233	71		Meadow, non-grazed, HSG C
0.180	98		Unconnected pavement, HSG B
0.813	71	67	Weighted Average, UI Adjusted
0.633			77.86% Pervious Area
0.180			22.14% Impervious Area
0.180			100.00% Unconnected

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

Summary for Pond 4P: Existing Basin

Inflow Area = 18.898 ac, 17.40% Impervious, Inflow Depth = 0.58" for 2-yr event
Inflow = 9.97 cfs @ 12.14 hrs, Volume= 0.910 af
Outflow = 1.40 cfs @ 13.22 hrs, Volume= 0.910 af, Atten= 86%, Lag= 64.8 min
Primary = 1.40 cfs @ 13.22 hrs, Volume= 0.910 af
Routed to Reach 9R : Storm Sewer
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 13L : Total Post-Development

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Peak Elev= 516.63' @ 13.22 hrs Surf.Area= 11,623 sf Storage= 12,228 cf

Plug-Flow detention time= 83.1 min calculated for 0.910 af (100% of inflow)
Center-of-Mass det. time= 83.1 min (990.5 - 907.4)

Volume	Invert	Avail.Storage	Storage Description
#1	514.17'	83,210 cf	**Existing Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
514.17	0	0	0
515.00	1,200	498	498
516.00	9,200	5,200	5,698
517.00	13,064	11,132	16,830
518.00	15,683	14,374	31,204
520.00	23,862	39,545	70,749
520.50	25,985	12,462	83,210

Device	Routing	Invert	Outlet Devices
#1	Primary	514.09'	**24.0" Round Culvert** L= 55.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 514.09' / 513.64' S= 0.0082 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	514.17'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	518.00'	**24.0" Horiz. Riser** C= 0.600 Limited to weir flow at low heads
#4	Secondary	519.00'	**20.0' long + 3.0 '/' SideZ x 32.0' 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=1.40 cfs @ 13.22 hrs HW=516.63' (Free Discharge)
└─**1=Culvert** (Passes 1.40 cfs of 18.28 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.40 cfs @ 7.15 fps)
  └─**3=Riser** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=514.17' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 8P: Basin #1

Inflow Area = 4.653 ac, 13.09% Impervious, Inflow Depth = 0.46" for 2-yr event
Inflow = 2.44 cfs @ 12.05 hrs, Volume= 0.179 af
Outflow = 0.13 cfs @ 15.84 hrs, Volume= 0.179 af, Atten= 94%, Lag= 227.4 min
Discarded = 0.13 cfs @ 15.84 hrs, Volume= 0.179 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 11P : Basin #2
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 11P : Basin #2

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 484.56' @ 15.84 hrs Surf.Area= 7,916 sf Storage= 3,288 cf

Plug-Flow detention time= 315.7 min calculated for 0.179 af (100% of inflow)
Center-of-Mass det. time= 315.6 min (1,231.0 - 915.4)

Volume	Invert	Avail.Storage	Storage Description
#1	483.00'	1,091 cf	**Amended Soils (Prismatic)** Listed below (Recalc) 3,636 cf Overall x 30.0% Voids
#2	484.00'	24,134 cf	**Above Ground Storage (Prismatic)** Listed below (Recalc)
		25,225 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
483.00	3,636	0	0
484.00	3,636	3,636	3,636

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
484.00	3,636	0	0
486.00	5,954	9,590	9,590
488.00	8,590	14,544	24,134

Device	Routing	Invert	Outlet Devices
#1	Discarded	483.00'	**0.563 in/hr Exfiltration - Test SW6 (C&D) over Surface area** Conductivity to Groundwater Elevation = 480.00'
#2	Primary	483.50'	**15.0" Round Culvert** L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 483.50' / 477.84' S= 0.1258 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	485.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	486.00'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 in 36.0" x 60.0" Grate (53% open area) Limited to weir flow at low heads
#5	Secondary	486.75'	**100.0' long + 3.0 '/' SideZ x 20.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.13 cfs @ 15.84 hrs HW=484.56' (Free Discharge)
└─**1=Exfiltration - Test SW6 (C&D)** (Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=483.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=483.00' (Free Discharge)
└─**5=Emergency Spillway** (Controls 0.00 cfs)

Summary for Pond 11P: Basin #2

Inflow Area = 33.941 ac, 17.44% Impervious, Inflow Depth = 0.49" for 2-yr event
Inflow = 7.57 cfs @ 12.05 hrs, Volume= 1.375 af
Outflow = 2.25 cfs @ 12.82 hrs, Volume= 1.376 af, Atten= 70%, Lag= 46.3 min
Discarded = 0.80 cfs @ 12.82 hrs, Volume= 0.874 af
Primary = 1.45 cfs @ 12.82 hrs, Volume= 0.502 af
Routed to Link 13L : Total Post-Development
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 13L : Total Post-Development

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 474.61' @ 12.82 hrs Surf.Area= 17,374 sf Storage= 7,804 cf

Plug-Flow detention time= 85.2 min calculated for 1.375 af (100% of inflow)
Center-of-Mass det. time= 85.5 min (1,050.1 - 964.6)

Volume	Invert	Avail.Storage	Storage Description
#1	473.00'	2,498 cf	**Amended Soils (Prismatic)** Listed below (Recalc) 8,327 cf Overall x 30.0% Voids
#2	474.00'	74,286 cf	**Above Ground Storage (Prismatic)** Listed below (Recalc)
		76,784 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
473.00	8,327	0	0
474.00	8,327	8,327	8,327

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
474.00	8,327	0	0
476.00	10,683	19,010	19,010
478.00	13,276	23,959	42,969
479.00	14,679	13,978	56,947
480.00	20,000	17,340	74,286

Device	Routing	Invert	Outlet Devices
#1	Discarded	473.00'	**1.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 470.00'
#2	Primary	470.00'	**24.0" Round Culvert** L= 37.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 470.00' / 469.04' S= 0.0259 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	474.50'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 in 36.0" x 60.0" Grate (53% open area) Limited to weir flow at low heads
#4	Secondary	477.00'	**100.0' long + 3.0 '/' SideZ x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.80 cfs @ 12.82 hrs HW=474.61' (Free Discharge)
└─**1=Exfiltration** (Controls 0.80 cfs)

Primary OutFlow Max=1.45 cfs @ 12.82 hrs HW=474.61' (Free Discharge)
└─**2=Culvert** (Passes 1.45 cfs of 28.74 cfs potential flow)
  └─**3=Orifice/Grate** (Weir Controls 1.45 cfs @ 1.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=473.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=0.34"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=4.73 cfs 0.536 af

Subcatchment 7S: Basin #1 Inflow Runoff Area=4.653 ac 13.09% Impervious Runoff Depth=0.26"
Tc=10.0 min UI Adjusted CN=61 Runoff=0.97 cfs 0.099 af

Subcatchment 10S: Basin #2 Inflow Runoff Area=10.390 ac 19.48% Impervious Runoff Depth=0.31"
Tc=10.0 min UI Adjusted CN=63 Runoff=3.18 cfs 0.269 af

Subcatchment 12S: Un-detained Flow Runoff Area=0.813 ac 22.14% Impervious Runoff Depth=0.44"
Tc=8.0 min UI Adjusted CN=67 Runoff=0.48 cfs 0.030 af

Reach 9R: Storm Sewer Avg. Flow Depth=0.21' Max Vel=6.37 fps Inflow=1.14 cfs 0.536 af
24.0" Round Pipe n=0.012 L=885.0' S=0.0382 '/' Capacity=47.90 cfs Outflow=1.14 cfs 0.536 af

Pond 4P: Existing Basin Peak Elev=515.88' Storage=4,672 cf Inflow=4.73 cfs 0.536 af
Primary=1.14 cfs 0.536 af Secondary=0.00 cfs 0.000 af Outflow=1.14 cfs 0.536 af

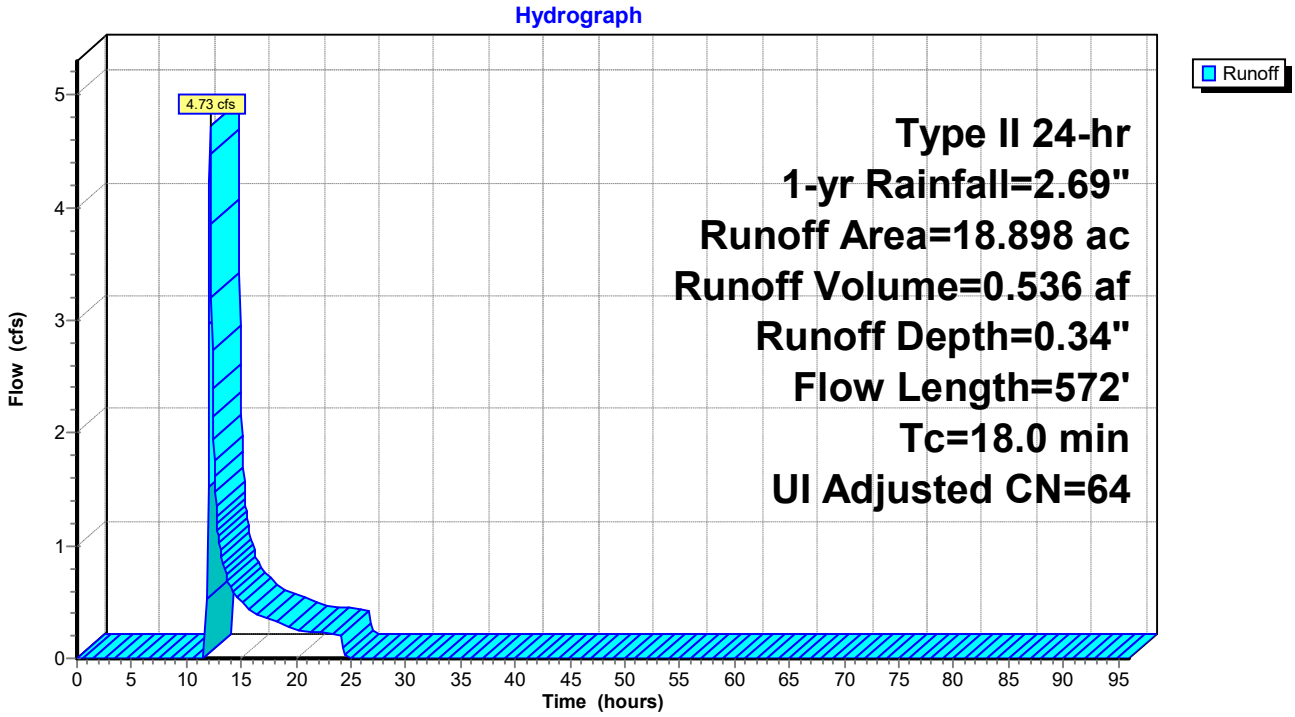
Pond 8P: Basin #1 Peak Elev=484.04' Storage=1,253 cf Inflow=0.97 cfs 0.099 af
Discarded=0.11 cfs 0.099 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.099 af

Pond 11P: Basin #2 Peak Elev=474.56' Storage=7,326 cf Inflow=3.52 cfs 0.806 af
Discarded=0.79 cfs 0.708 af Primary=0.60 cfs 0.098 af Secondary=0.00 cfs 0.000 af Outflow=1.39 cfs 0.806 af

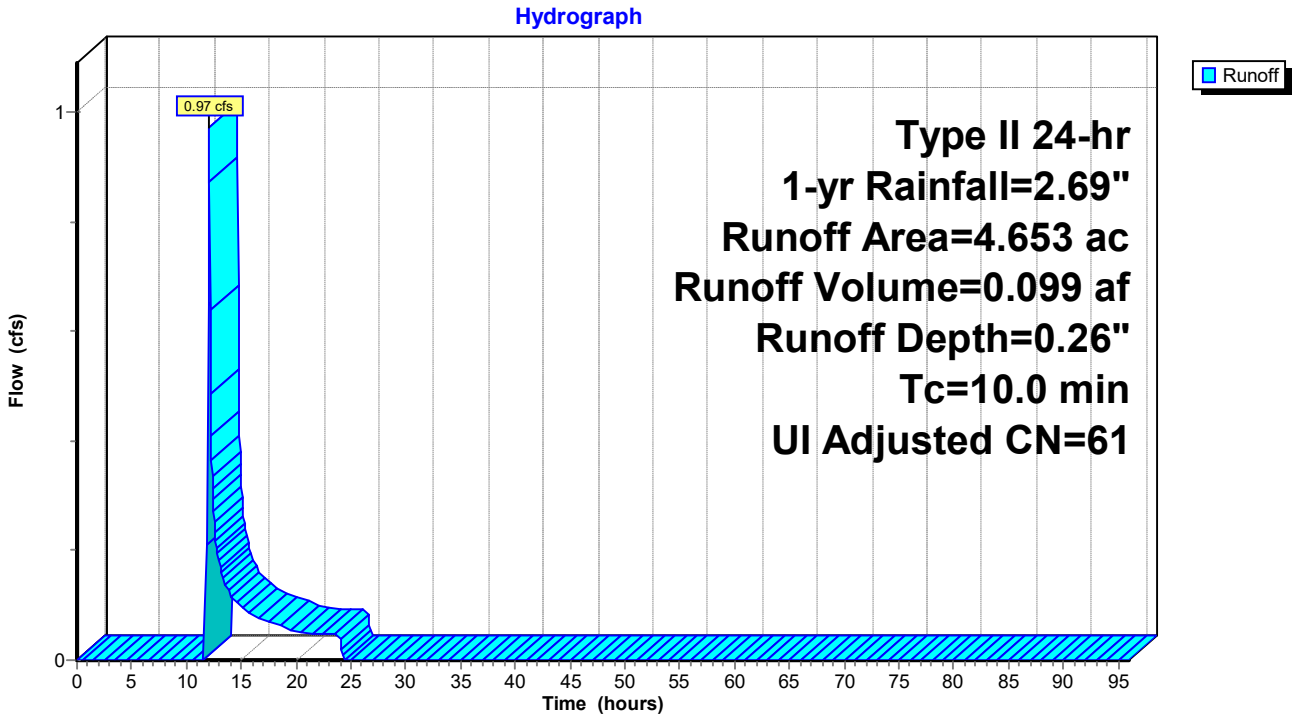
Link 13L: Total Post-Development Inflow=0.63 cfs 0.127 af
Primary=0.63 cfs 0.127 af

Total Runoff Area = 34.754 ac Runoff Volume = 0.934 af Average Runoff Depth = 0.32"
82.45% Pervious = 28.653 ac 17.55% Impervious = 6.101 ac

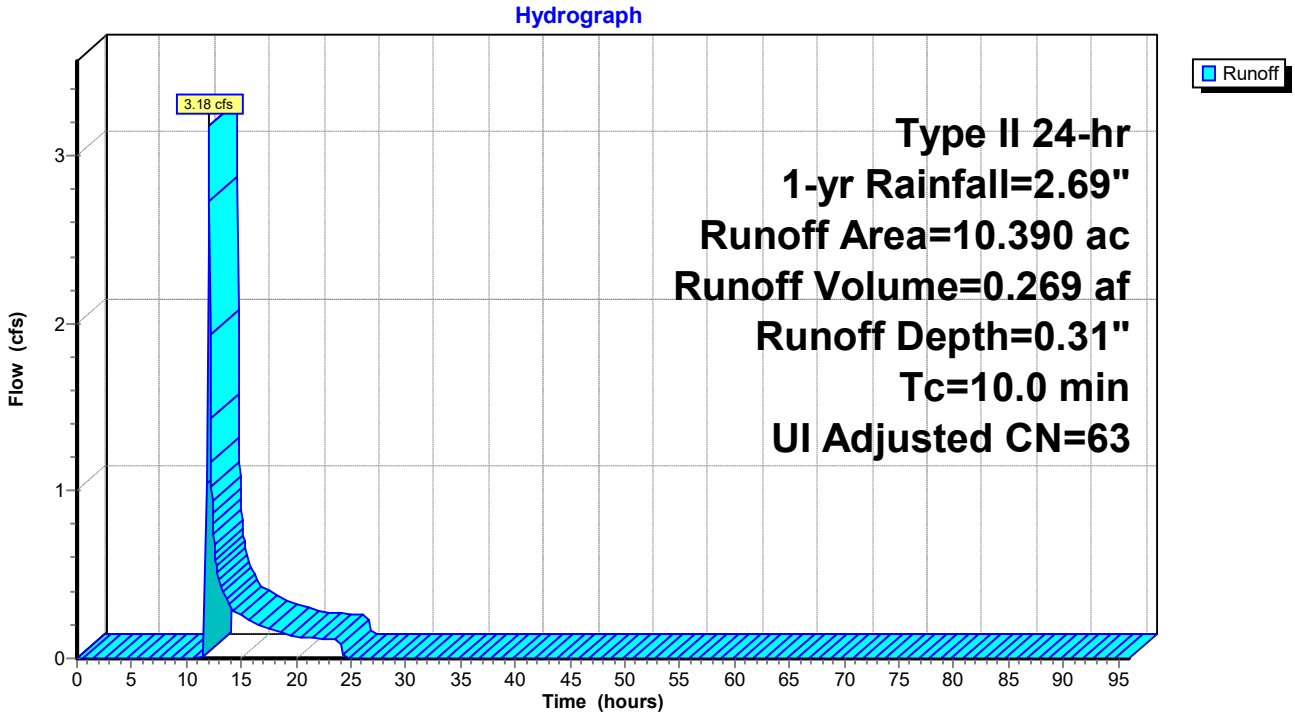
Subcatchment 3S: Existing Basin



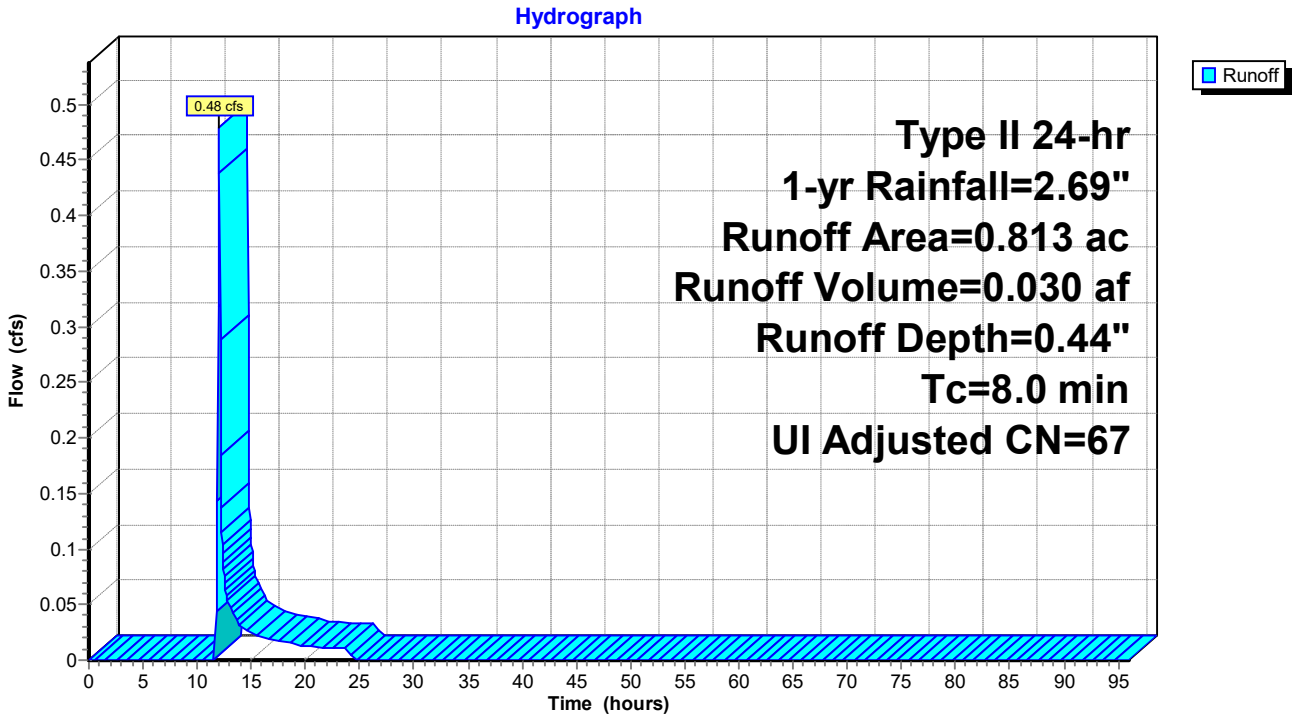
Subcatchment 7S: Basin #1 Inflow



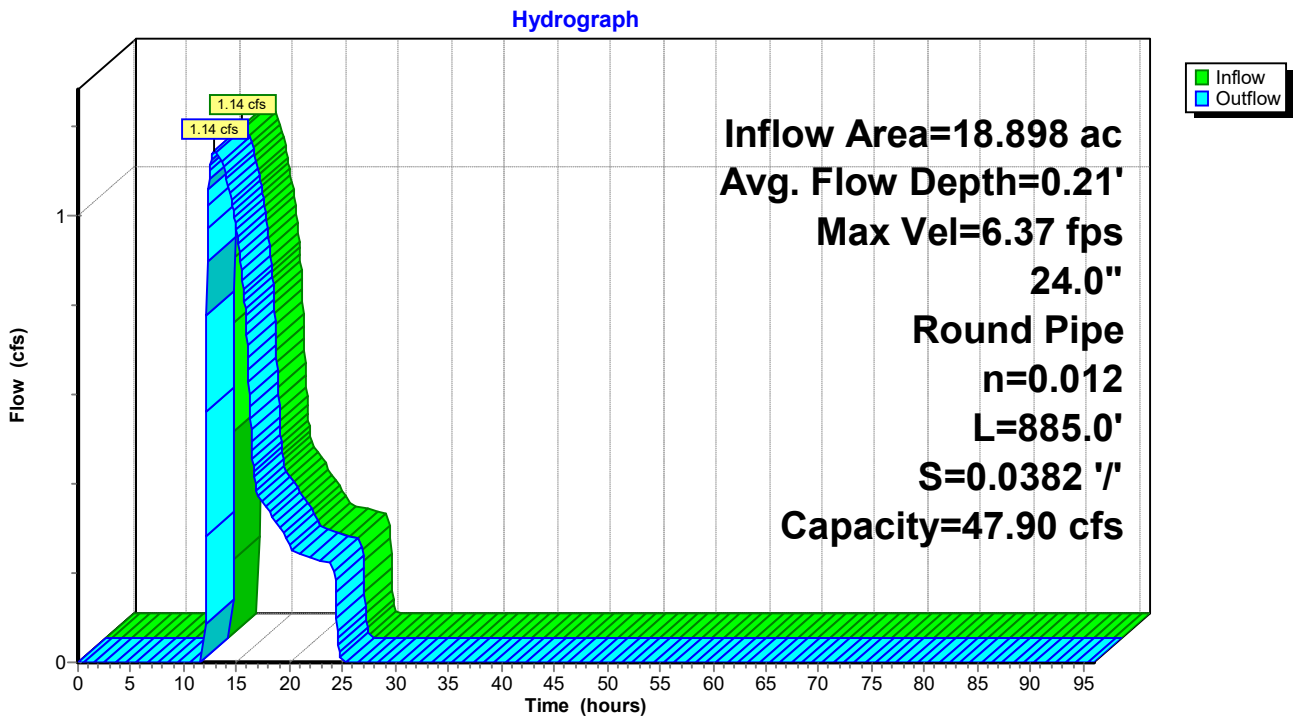
Subcatchment 10S: Basin #2 Inflow



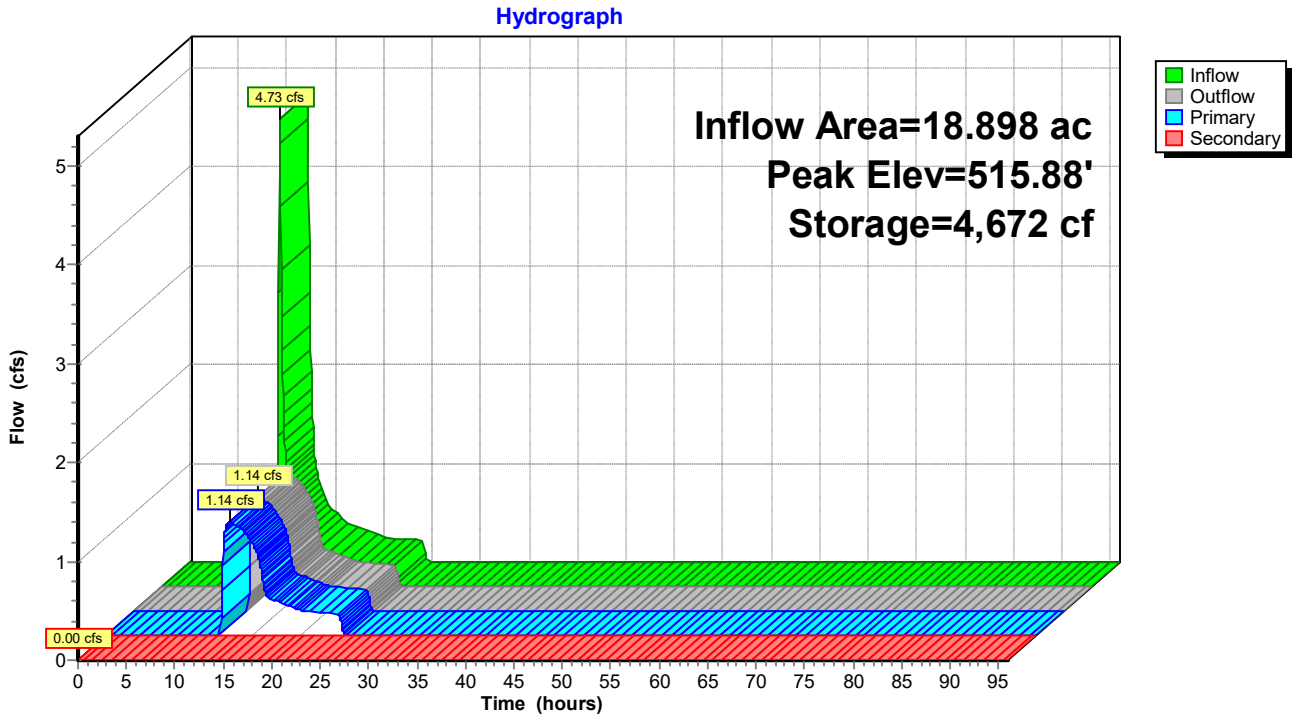
Subcatchment 12S: Un-detained Flow



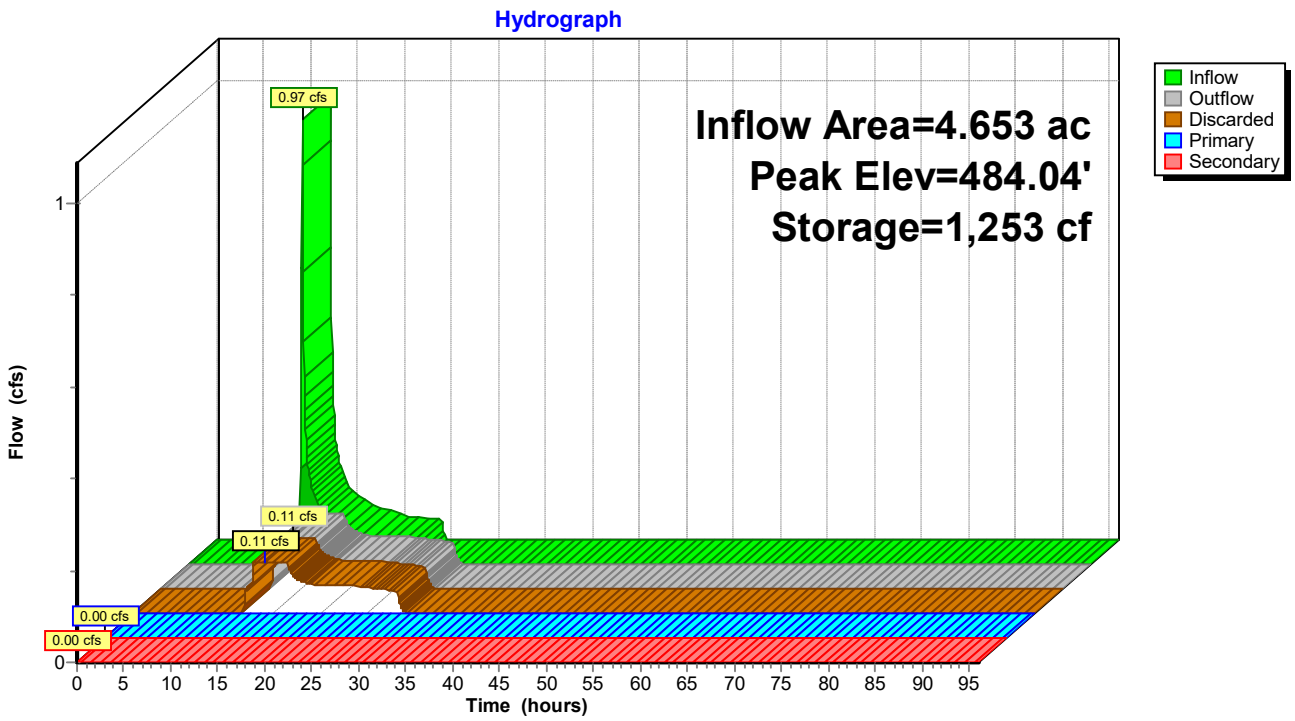
Reach 9R: Storm Sewer



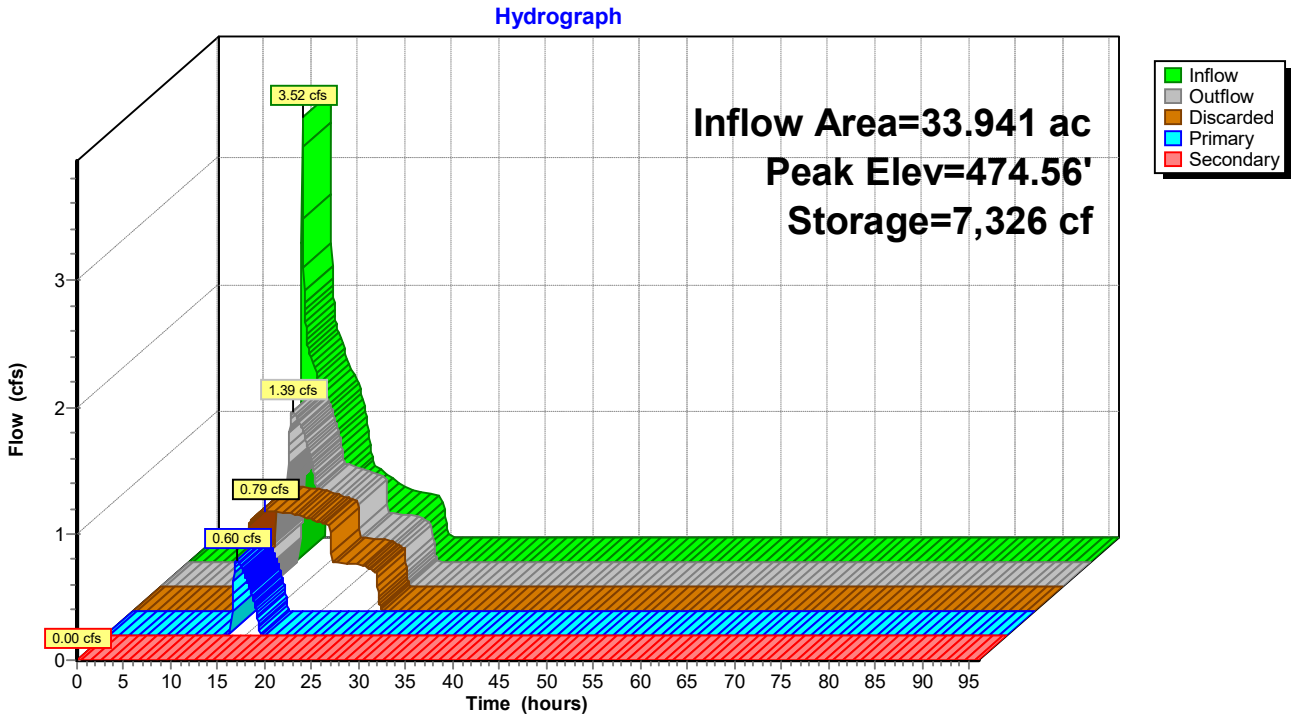
Pond 4P: Existing Basin



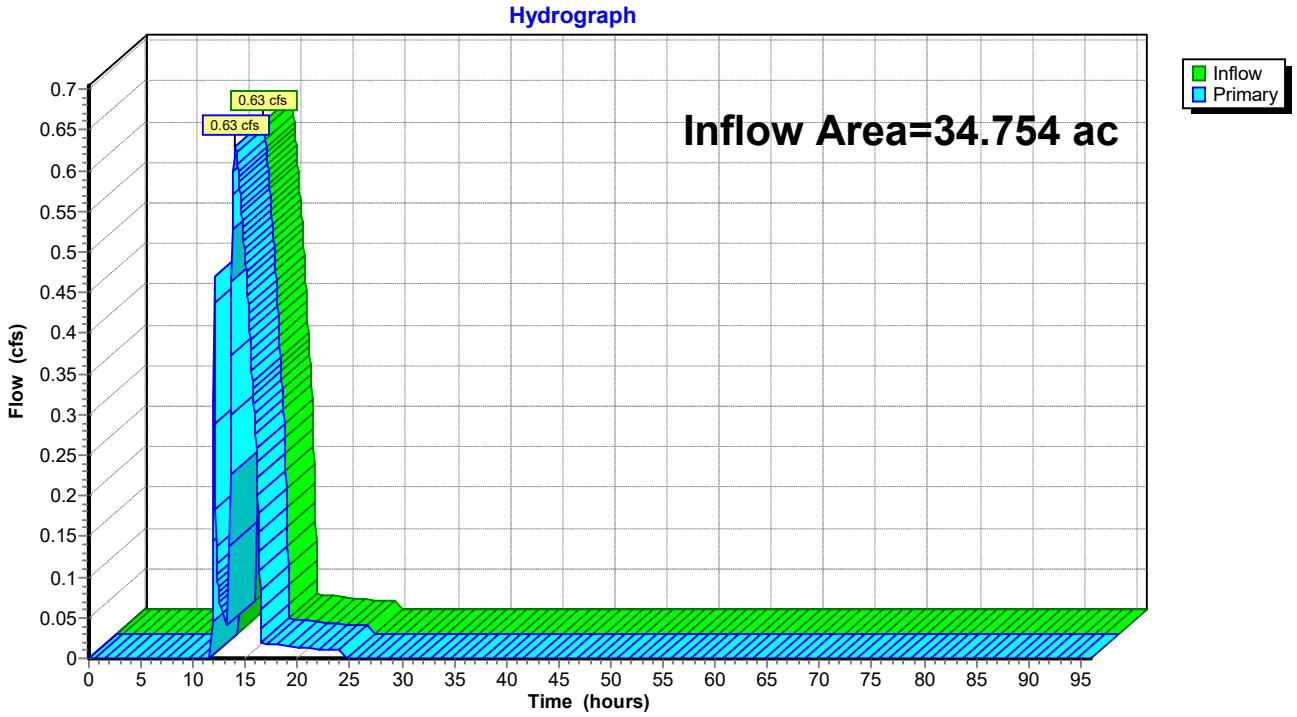
Pond 8P: Basin #1



Pond 11P: Basin #2



Link 13L: Total Post-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=0.58"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=9.97 cfs 0.910 af

Subcatchment 7S: Basin #1 Inflow Runoff Area=4.653 ac 13.09% Impervious Runoff Depth=0.46"
Tc=10.0 min UI Adjusted CN=61 Runoff=2.44 cfs 0.179 af

Subcatchment 10S: Basin #2 Inflow Runoff Area=10.390 ac 19.48% Impervious Runoff Depth=0.54"
Tc=10.0 min UI Adjusted CN=63 Runoff=6.89 cfs 0.465 af

Subcatchment 12S: Un-detained Flow Runoff Area=0.813 ac 22.14% Impervious Runoff Depth=0.71"
Tc=8.0 min UI Adjusted CN=67 Runoff=0.86 cfs 0.048 af

Reach 9R: Storm Sewer Avg. Flow Depth=0.24' Max Vel=6.78 fps Inflow=1.40 cfs 0.910 af
24.0" Round Pipe n=0.012 L=885.0' S=0.0382 '/' Capacity=47.90 cfs Outflow=1.40 cfs 0.910 af

Pond 4P: Existing Basin Peak Elev=516.63' Storage=12,228 cf Inflow=9.97 cfs 0.910 af
Primary=1.40 cfs 0.910 af Secondary=0.00 cfs 0.000 af Outflow=1.40 cfs 0.910 af

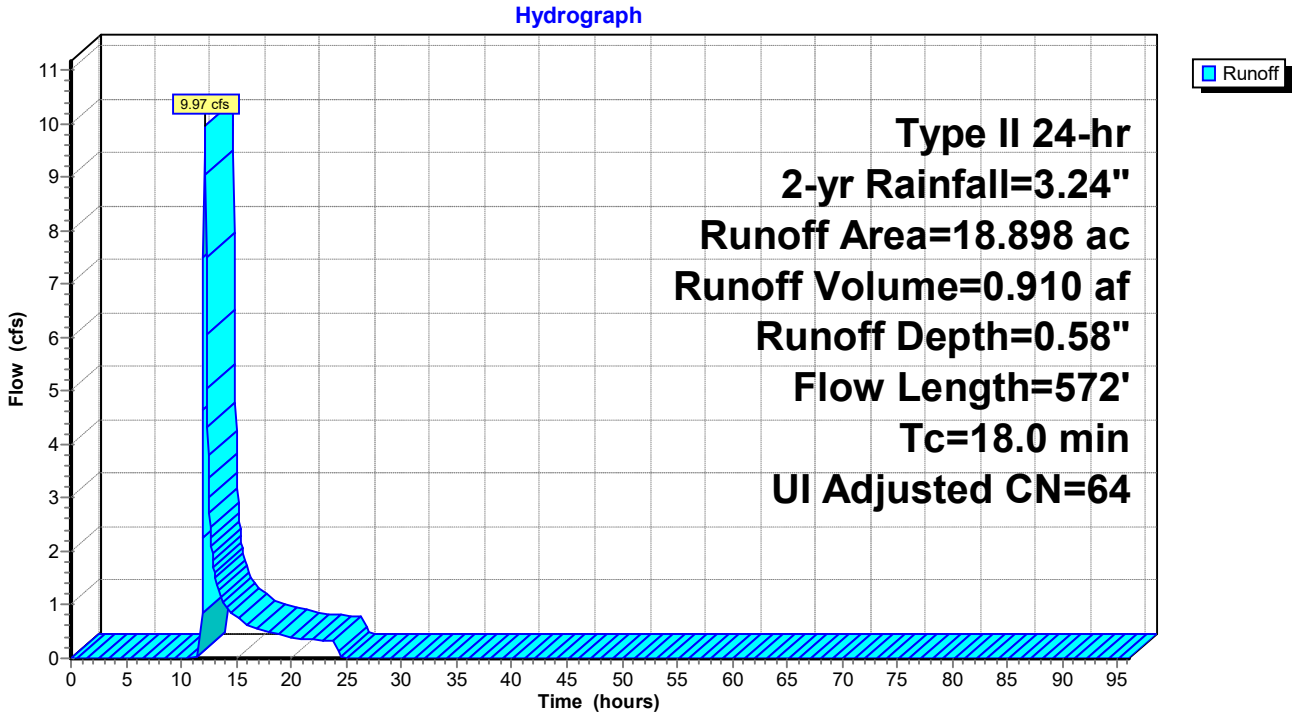
Pond 8P: Basin #1 Peak Elev=484.56' Storage=3,288 cf Inflow=2.44 cfs 0.179 af
Discarded=0.13 cfs 0.179 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.179 af

Pond 11P: Basin #2 Peak Elev=474.61' Storage=7,804 cf Inflow=7.57 cfs 1.375 af
Discarded=0.80 cfs 0.874 af Primary=1.45 cfs 0.502 af Secondary=0.00 cfs 0.000 af Outflow=2.25 cfs 1.376 af

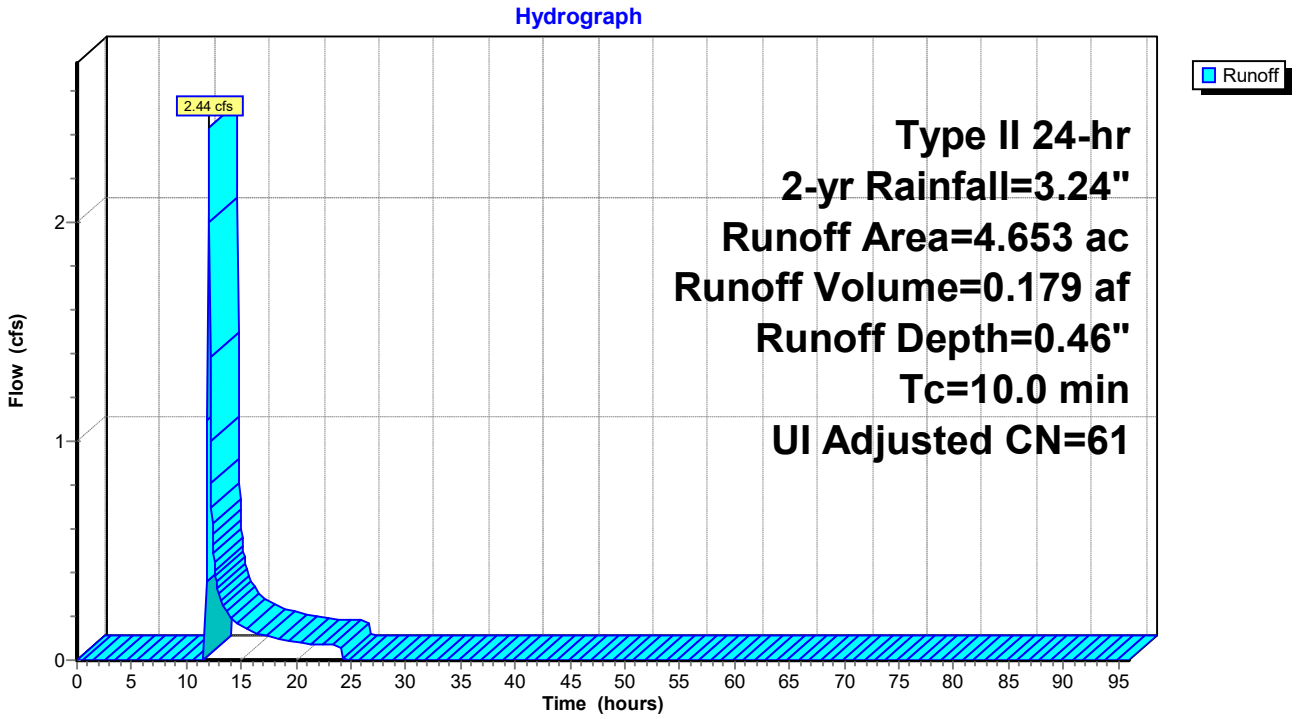
Link 13L: Total Post-Development Inflow=1.53 cfs 0.550 af
Primary=1.53 cfs 0.550 af

Total Runoff Area = 34.754 ac Runoff Volume = 1.602 af Average Runoff Depth = 0.55"
82.45% Pervious = 28.653 ac 17.55% Impervious = 6.101 ac

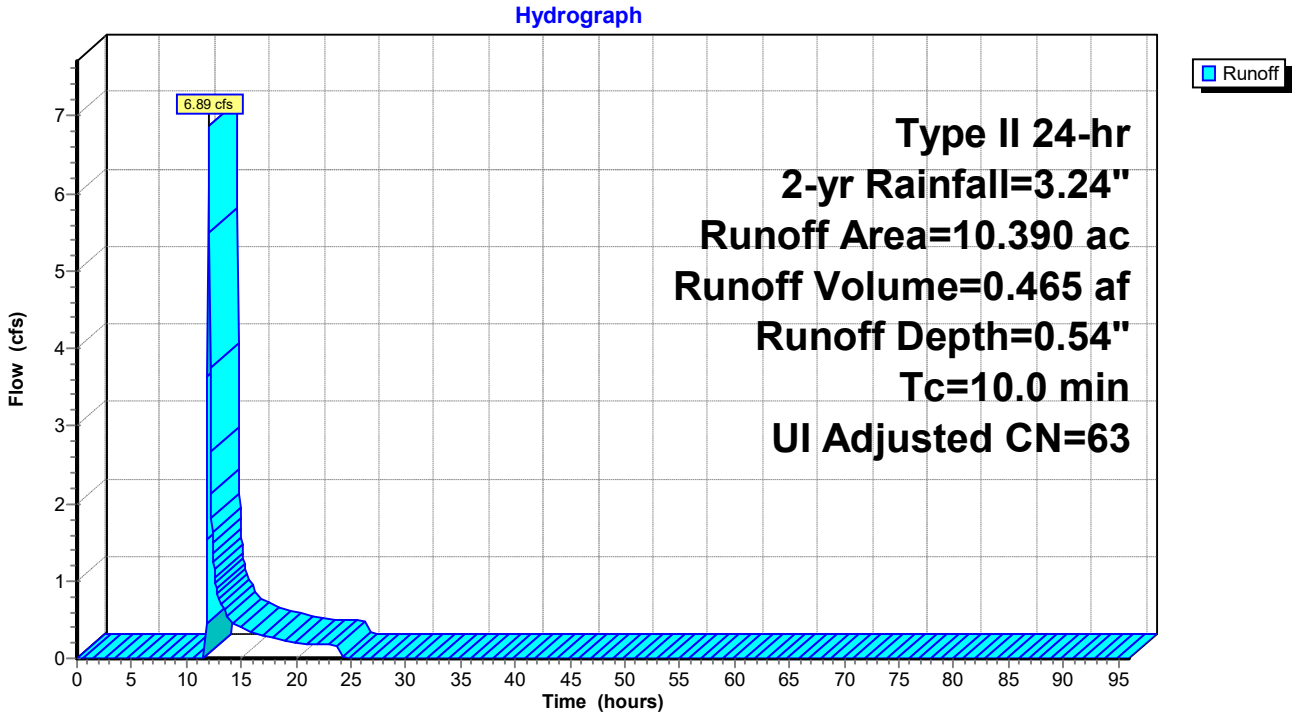
Subcatchment 3S: Existing Basin



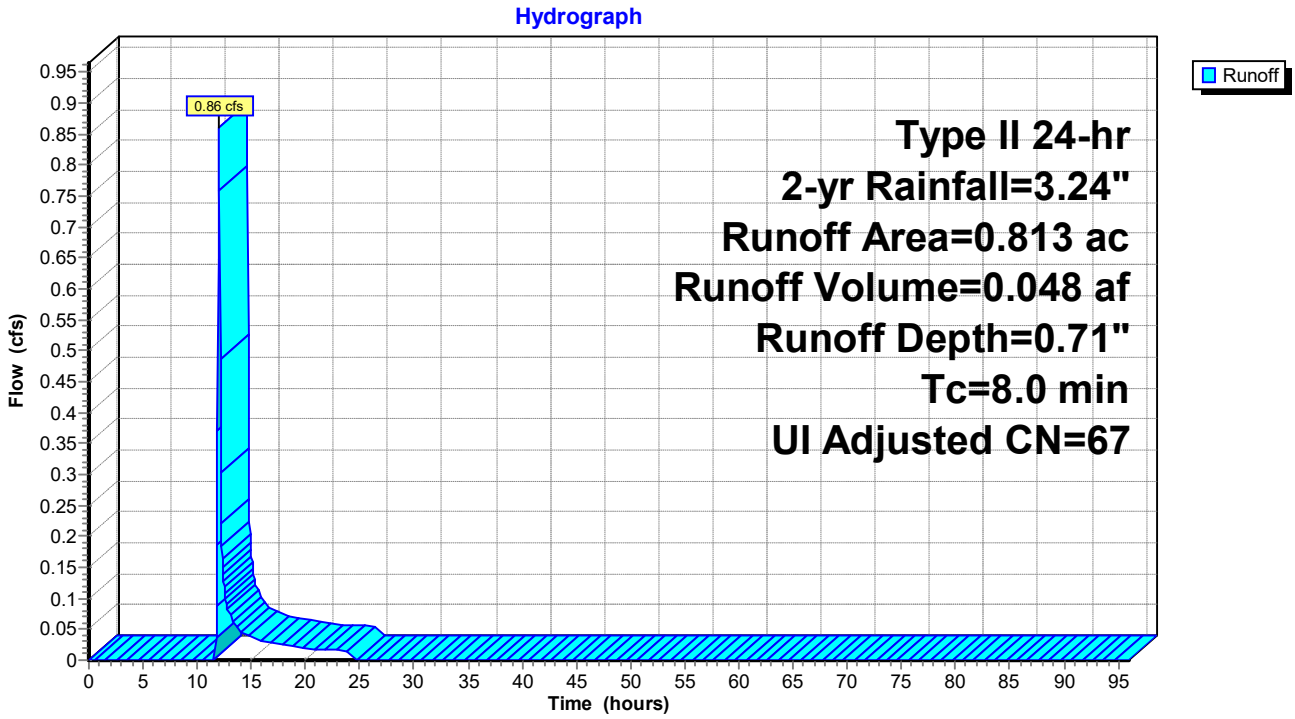
Subcatchment 7S: Basin #1 Inflow



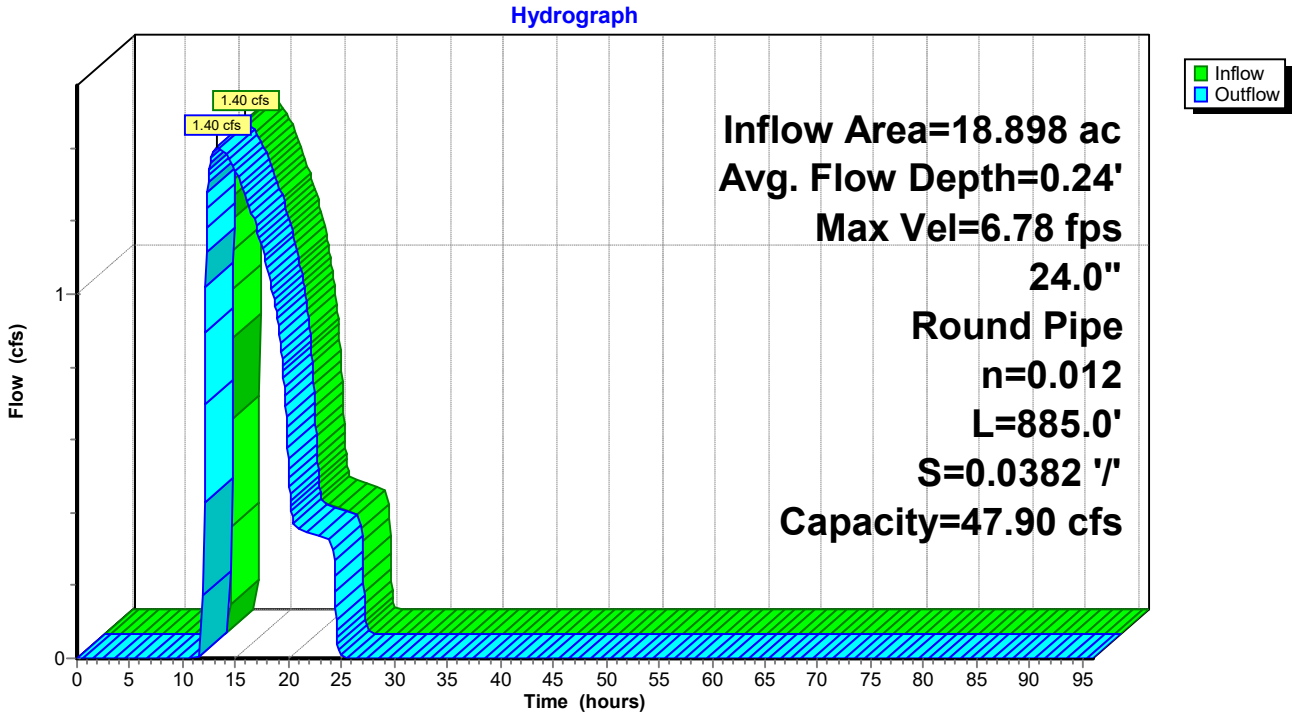
Subcatchment 10S: Basin #2 Inflow



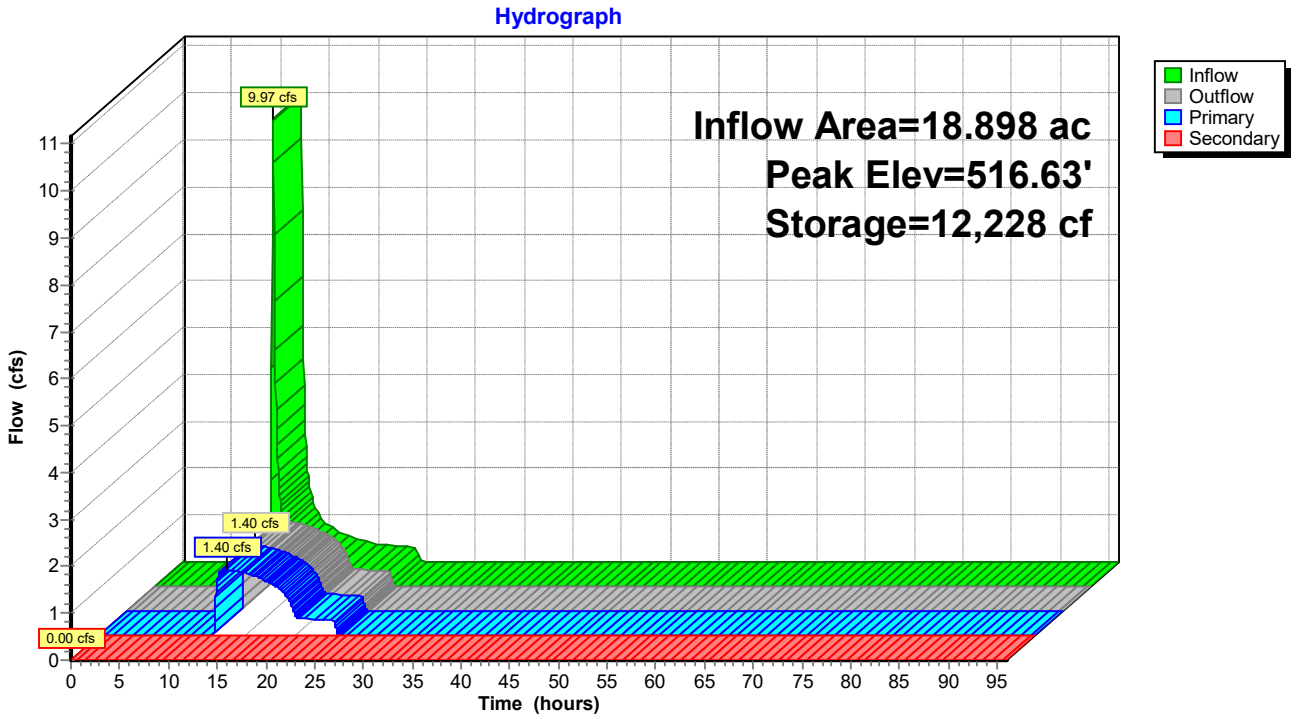
Subcatchment 12S: Un-detained Flow



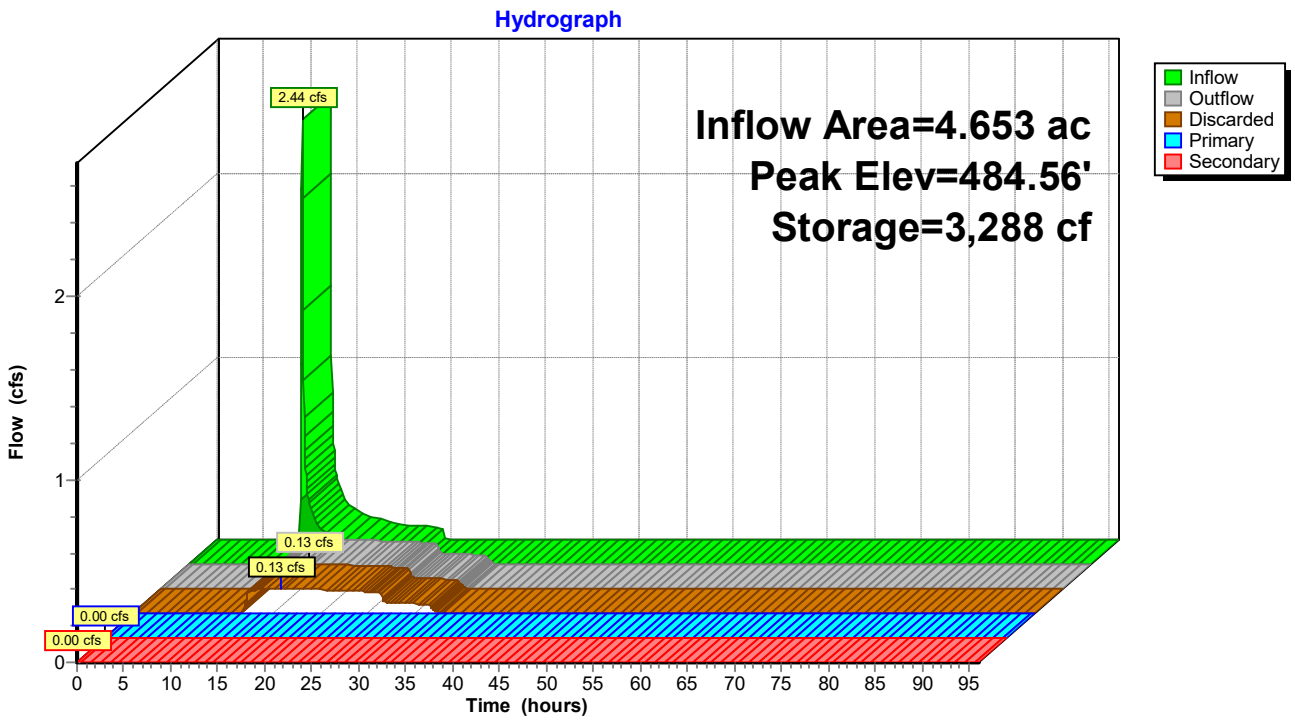
Reach 9R: Storm Sewer



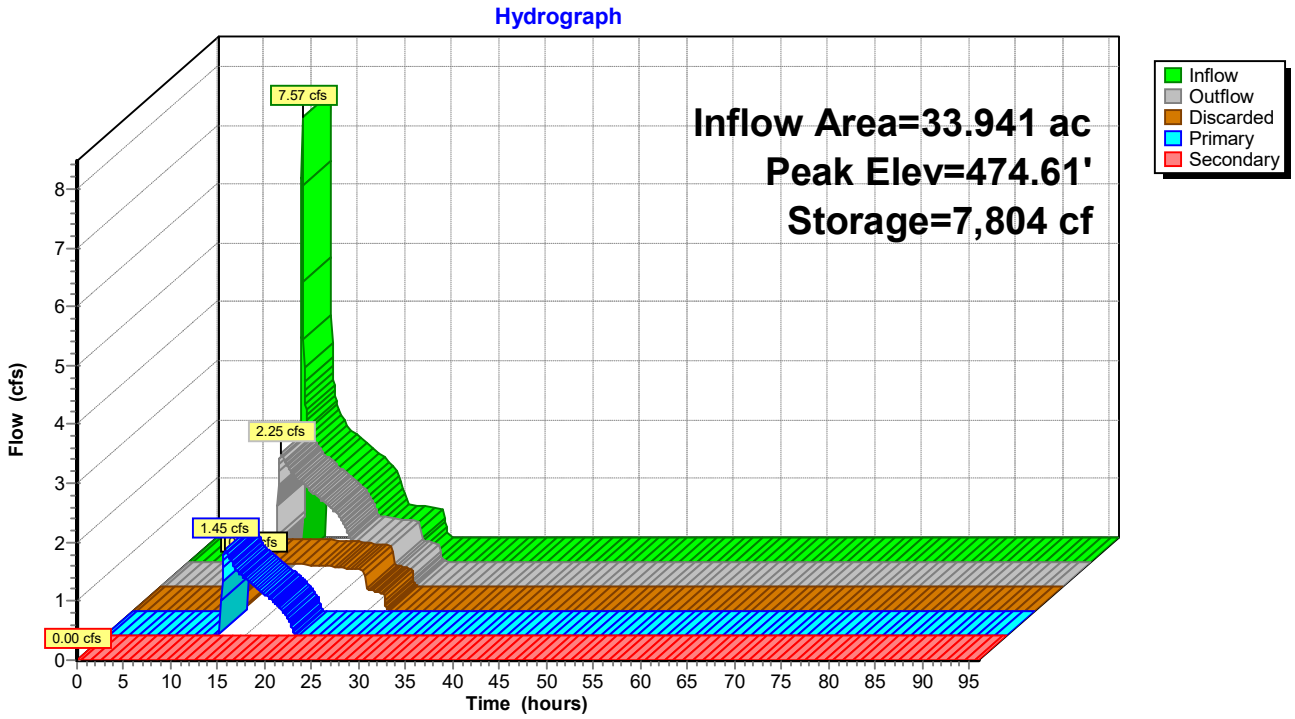
Pond 4P: Existing Basin



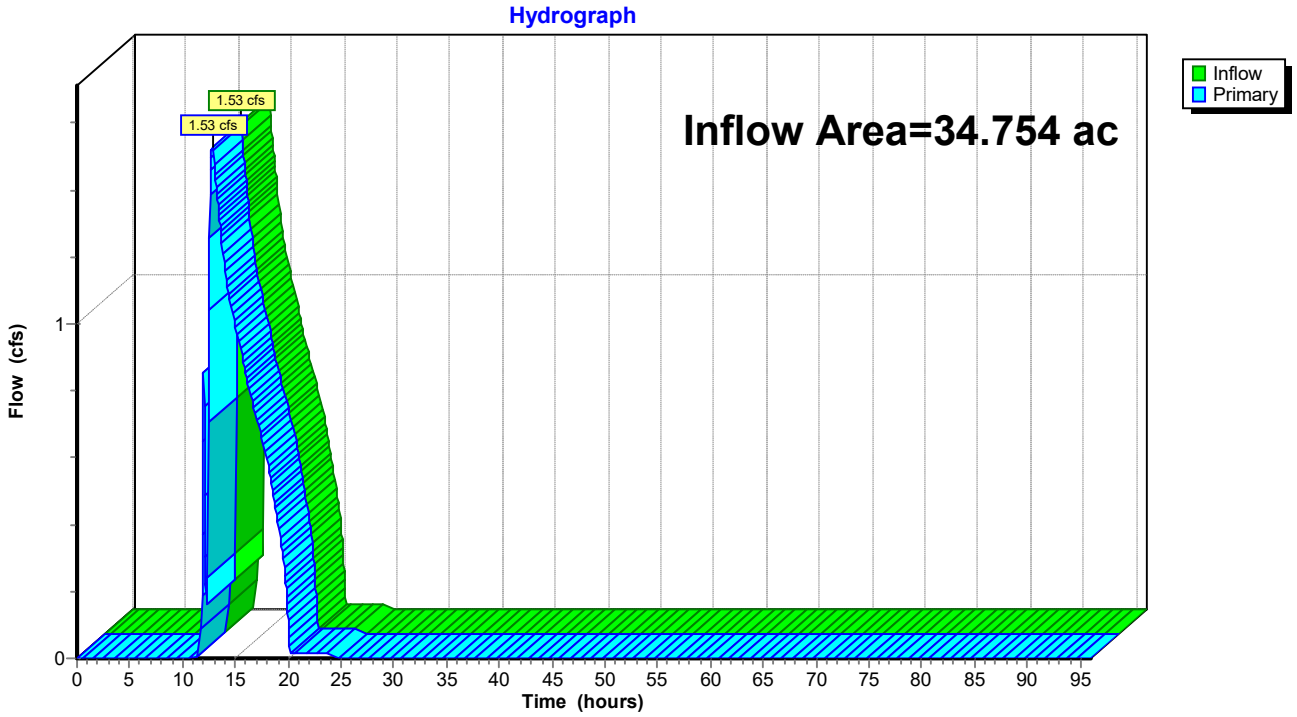
Pond 8P: Basin #1



Pond 11P: Basin #2



Link 13L: Total Post-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=1.01"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=19.95 cfs 1.594 af

Subcatchment 7S: Basin #1 Inflow Runoff Area=4.653 ac 13.09% Impervious Runoff Depth=0.85"
Tc=10.0 min UI Adjusted CN=61 Runoff=5.31 cfs 0.329 af

Subcatchment 10S: Basin #2 Inflow Runoff Area=10.390 ac 19.48% Impervious Runoff Depth=0.96"
Tc=10.0 min UI Adjusted CN=63 Runoff=13.83 cfs 0.828 af

Subcatchment 12S: Un-detained Flow Runoff Area=0.813 ac 22.14% Impervious Runoff Depth=1.19"
Tc=8.0 min UI Adjusted CN=67 Runoff=1.53 cfs 0.080 af

Reach 9R: Storm Sewer Avg. Flow Depth=0.26' Max Vel=7.24 fps Inflow=1.75 cfs 1.594 af
24.0" Round Pipe n=0.012 L=885.0' S=0.0382 '/' Capacity=47.90 cfs Outflow=1.75 cfs 1.594 af

Pond 4P: Existing Basin Peak Elev=517.84' Storage=28,758 cf Inflow=19.95 cfs 1.594 af
Primary=1.75 cfs 1.594 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 1.594 af

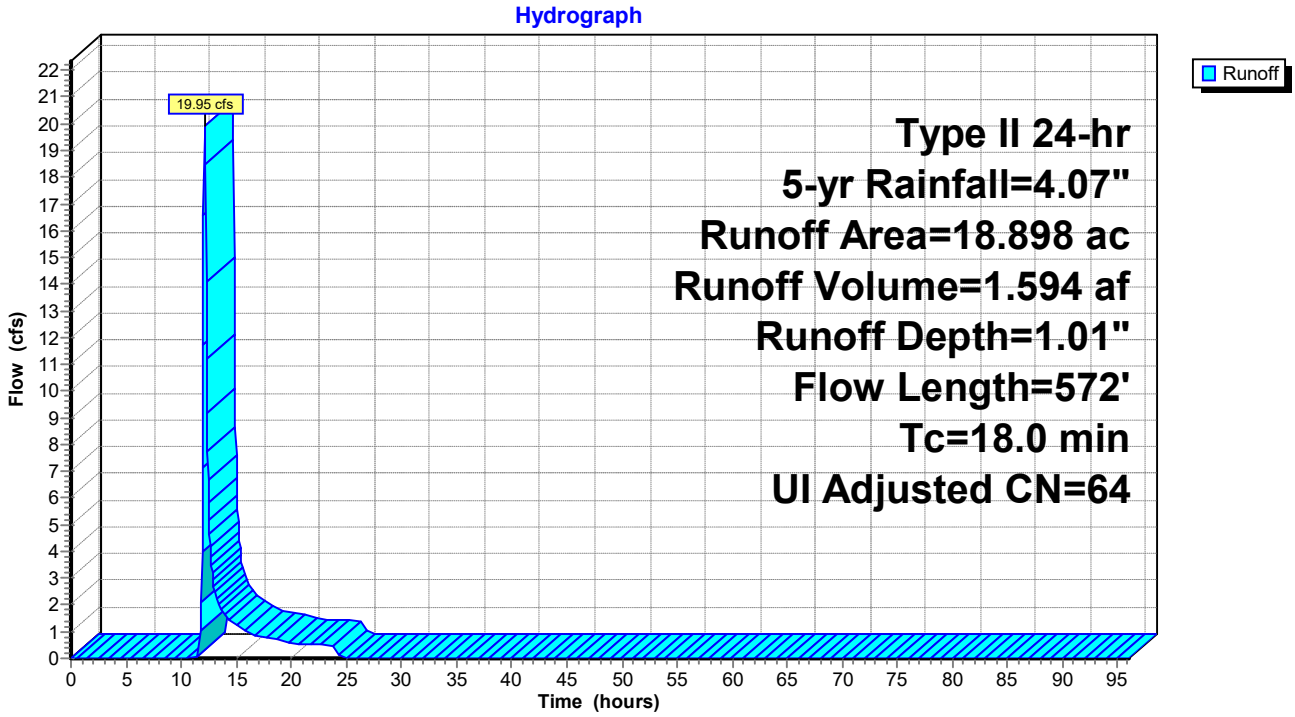
Pond 8P: Basin #1 Peak Elev=485.23' Storage=6,453 cf Inflow=5.31 cfs 0.329 af
Discarded=0.17 cfs 0.274 af Primary=0.18 cfs 0.055 af Secondary=0.00 cfs 0.000 af Outflow=0.35 cfs 0.329 af

Pond 11P: Basin #2 Peak Elev=474.81' Storage=9,600 cf Inflow=14.81 cfs 2.476 af
Discarded=0.84 cfs 1.034 af Primary=6.68 cfs 1.442 af Secondary=0.00 cfs 0.000 af Outflow=7.52 cfs 2.476 af

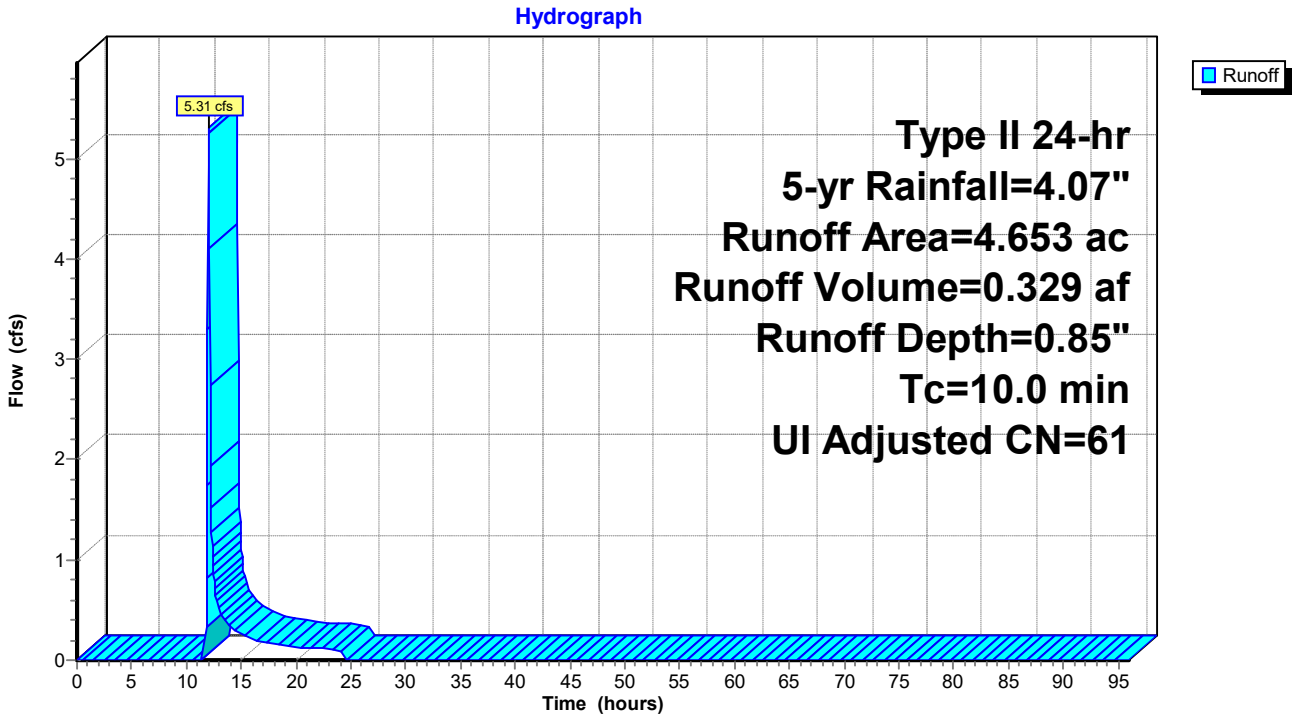
Link 13L: Total Post-Development Inflow=7.10 cfs 1.522 af
Primary=7.10 cfs 1.522 af

Total Runoff Area = 34.754 ac Runoff Volume = 2.831 af Average Runoff Depth = 0.98"
82.45% Pervious = 28.653 ac 17.55% Impervious = 6.101 ac

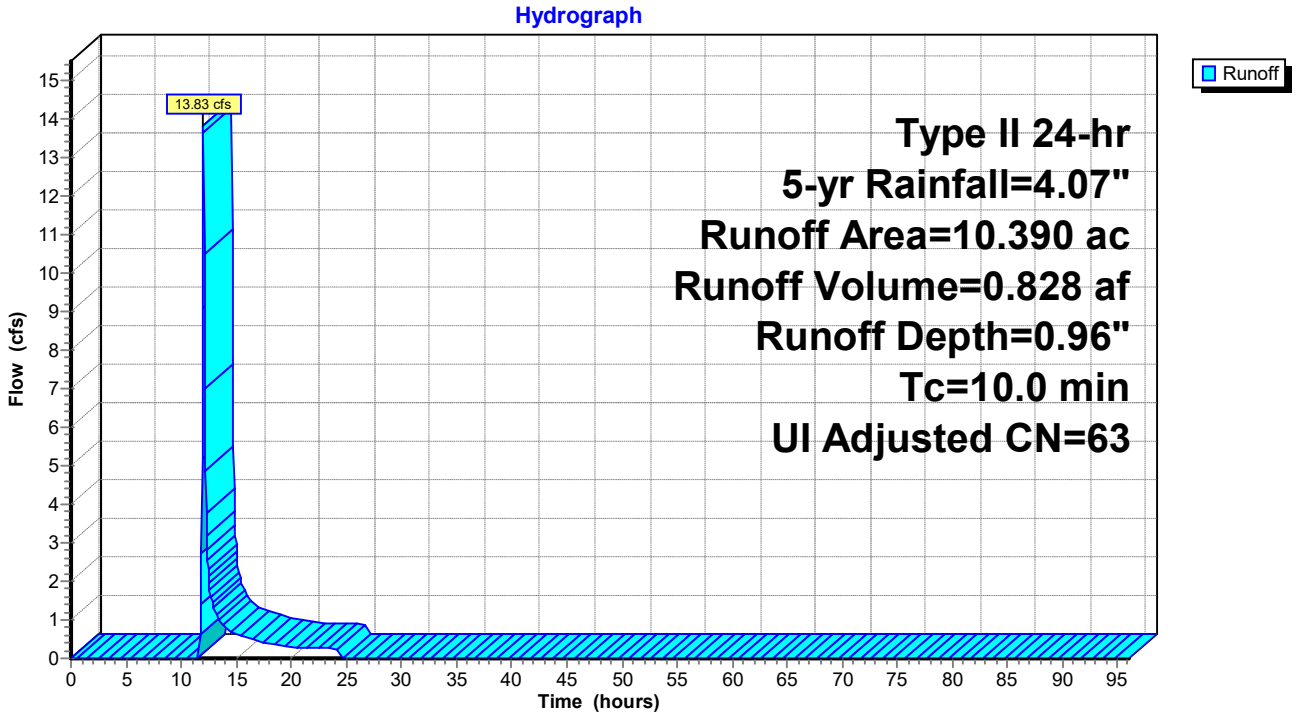
Subcatchment 3S: Existing Basin



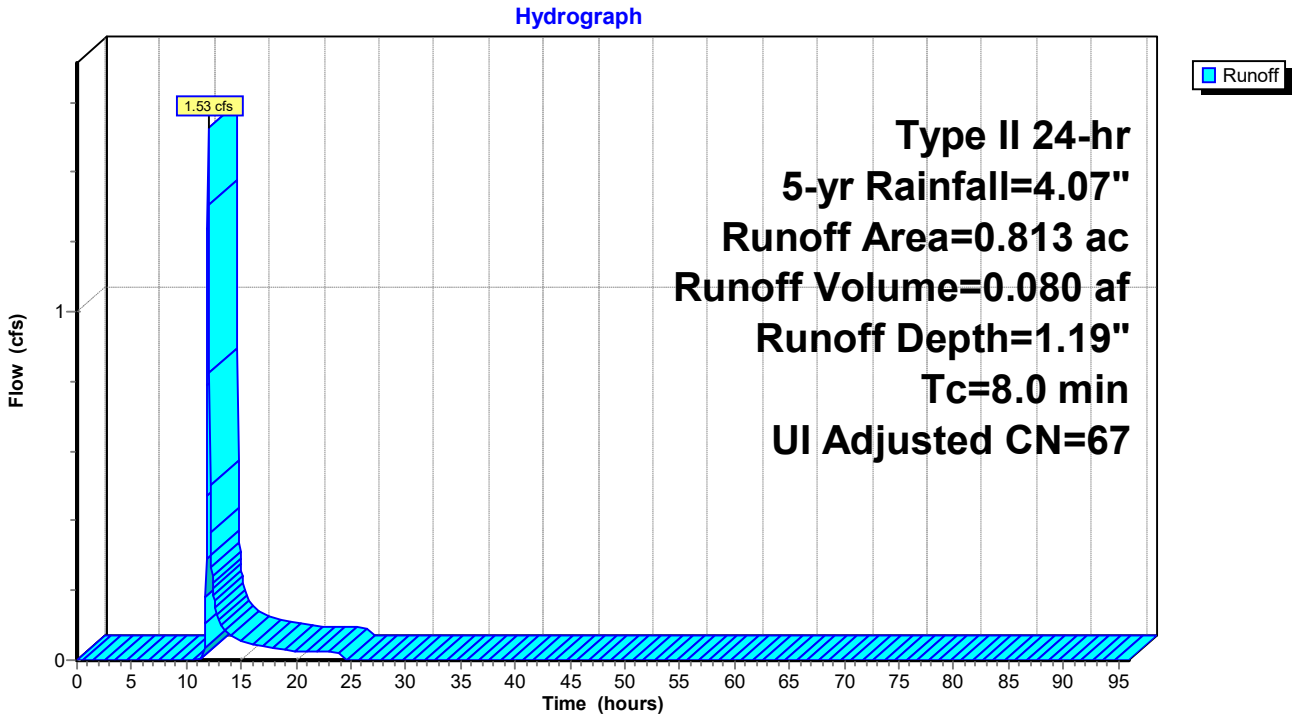
Subcatchment 7S: Basin #1 Inflow



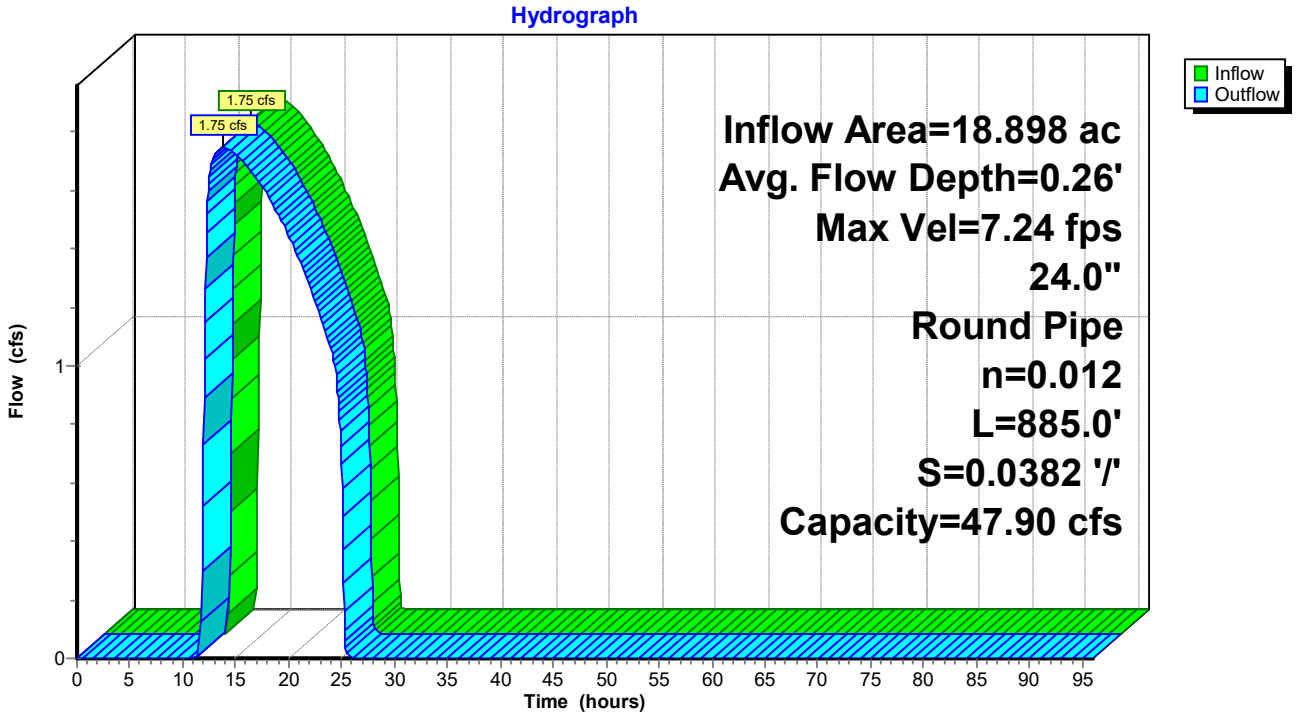
Subcatchment 10S: Basin #2 Inflow



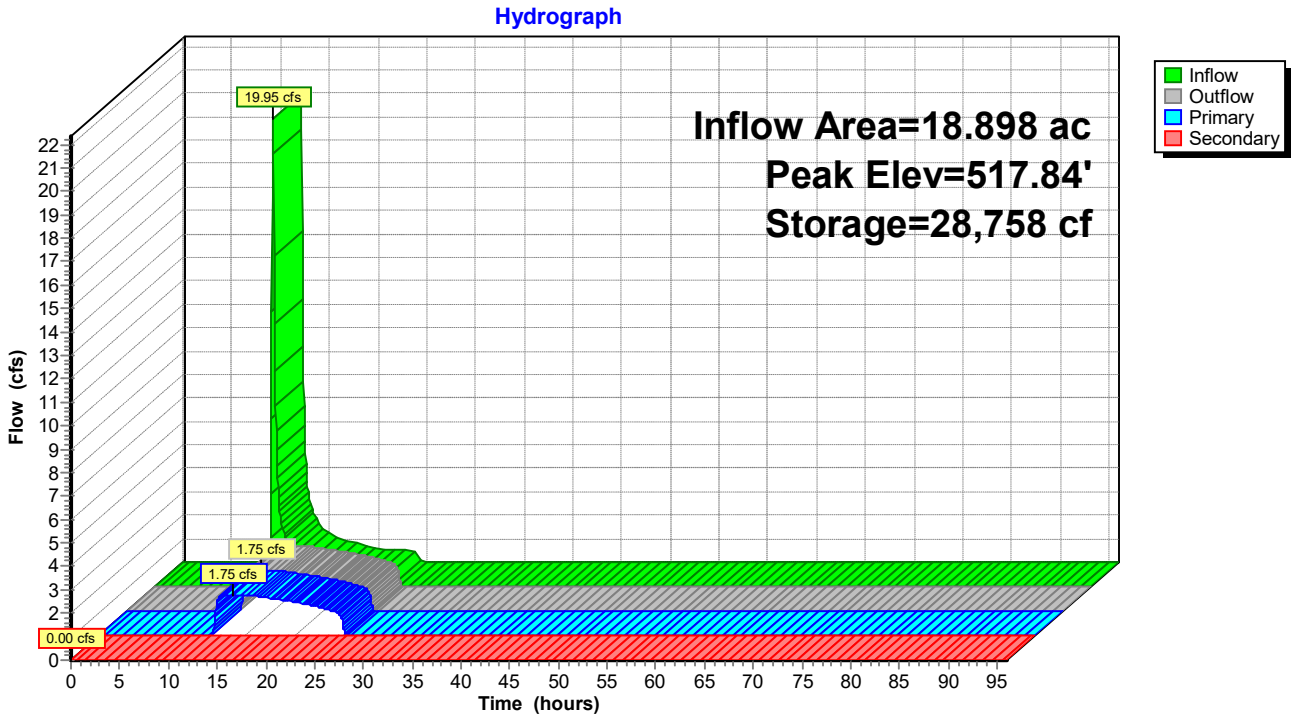
Subcatchment 12S: Un-detained Flow



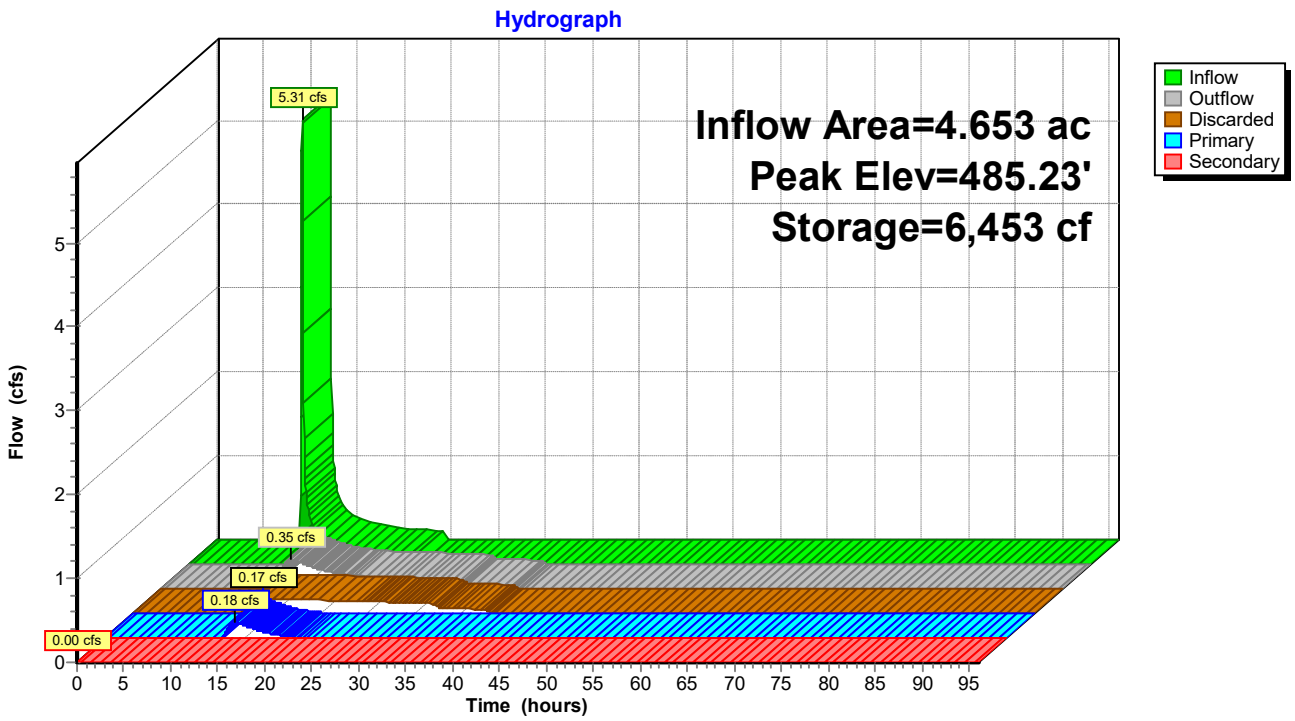
Reach 9R: Storm Sewer



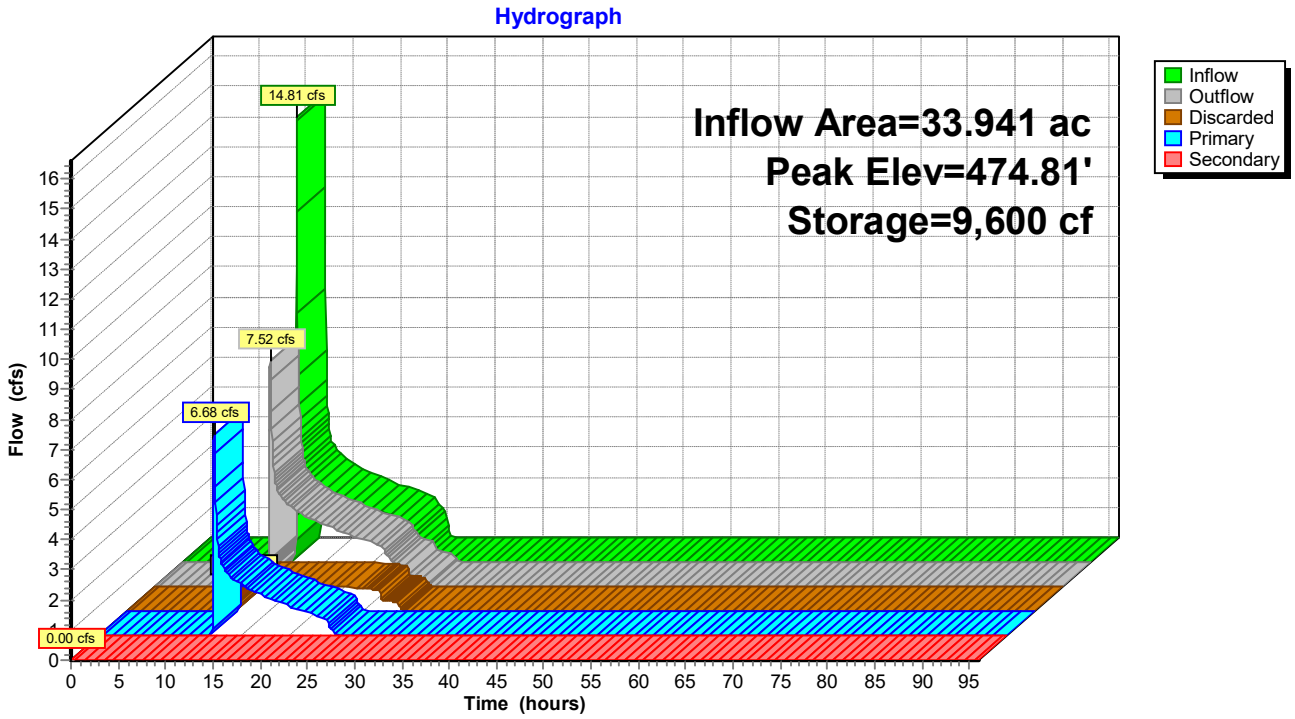
Pond 4P: Existing Basin



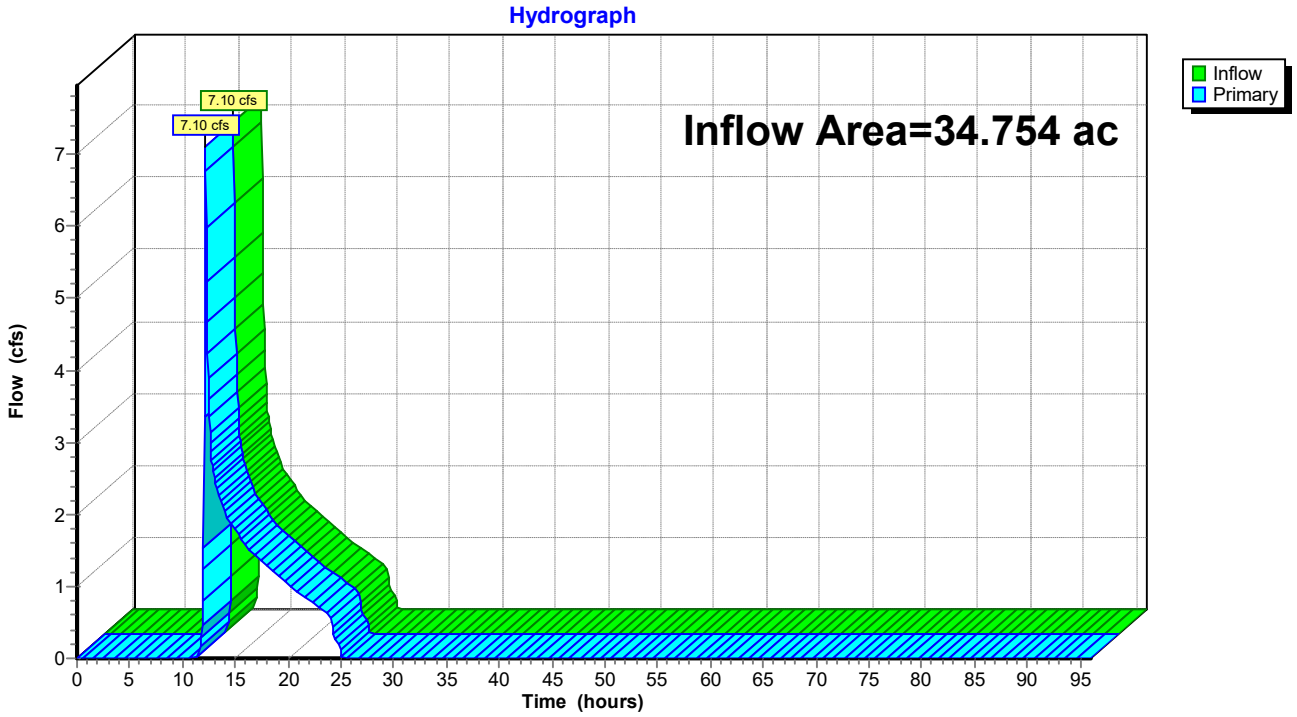
Pond 8P: Basin #1



Pond 11P: Basin #2



Link 13L: Total Post-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=1.43"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=29.68 cfs 2.247 af

Subcatchment 7S: Basin #1 Inflow Runoff Area=4.653 ac 13.09% Impervious Runoff Depth=1.23"
Tc=10.0 min UI Adjusted CN=61 Runoff=8.12 cfs 0.476 af

Subcatchment 10S: Basin #2 Inflow Runoff Area=10.390 ac 19.48% Impervious Runoff Depth=1.36"
Tc=10.0 min UI Adjusted CN=63 Runoff=20.47 cfs 1.177 af

Subcatchment 12S: Un-detained Flow Runoff Area=0.813 ac 22.14% Impervious Runoff Depth=1.64"
Tc=8.0 min UI Adjusted CN=67 Runoff=2.15 cfs 0.111 af

Reach 9R: Storm Sewer Avg. Flow Depth=0.48' Max Vel=10.44 fps Inflow=6.06 cfs 2.247 af
24.0" Round Pipe n=0.012 L=885.0' S=0.0382 '/' Capacity=47.90 cfs Outflow=6.04 cfs 2.247 af

Pond 4P: Existing Basin Peak Elev=518.35' Storage=36,879 cf Inflow=29.68 cfs 2.247 af
Primary=6.06 cfs 2.247 af Secondary=0.00 cfs 0.000 af Outflow=6.06 cfs 2.247 af

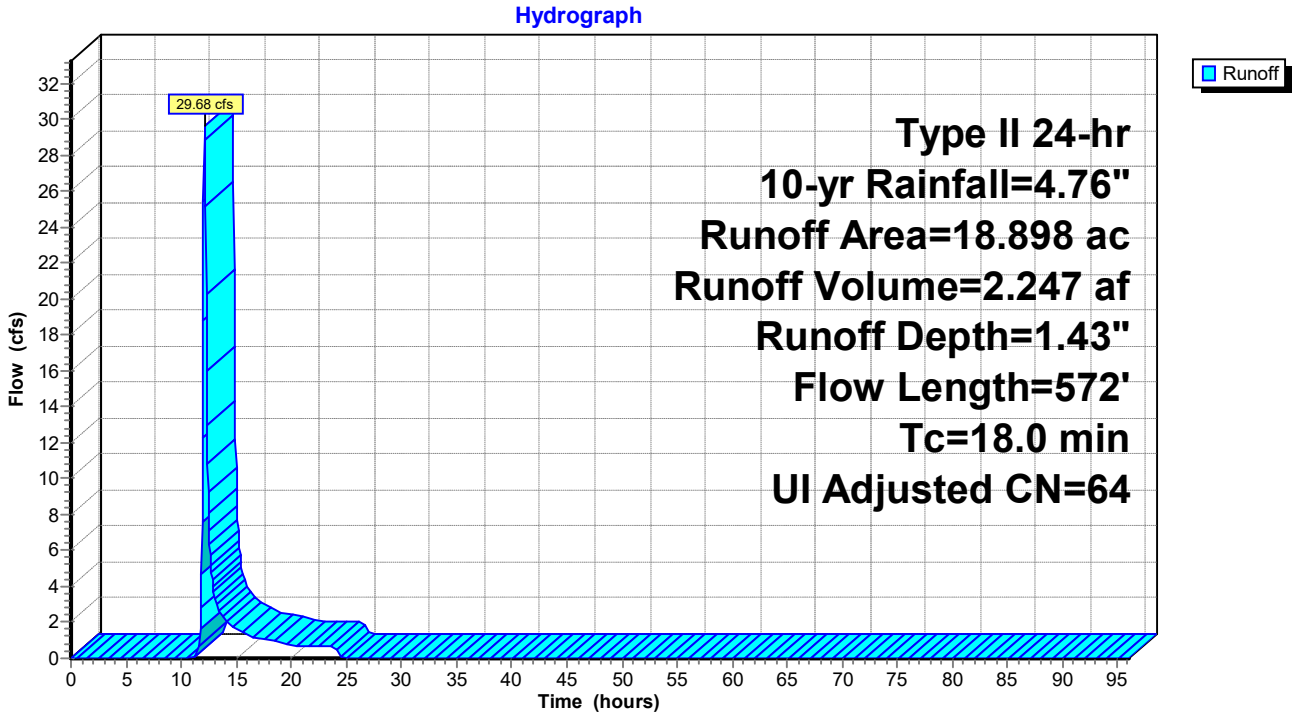
Pond 8P: Basin #1 Peak Elev=485.54' Storage=8,048 cf Inflow=8.12 cfs 0.476 af
Discarded=0.18 cfs 0.293 af Primary=0.75 cfs 0.183 af Secondary=0.00 cfs 0.000 af Outflow=0.93 cfs 0.476 af

Pond 11P: Basin #2 Peak Elev=475.02' Storage=11,647 cf Inflow=21.63 cfs 3.607 af
Discarded=0.89 cfs 1.145 af Primary=14.90 cfs 2.463 af Secondary=0.00 cfs 0.000 af Outflow=15.79 cfs 3.607 af

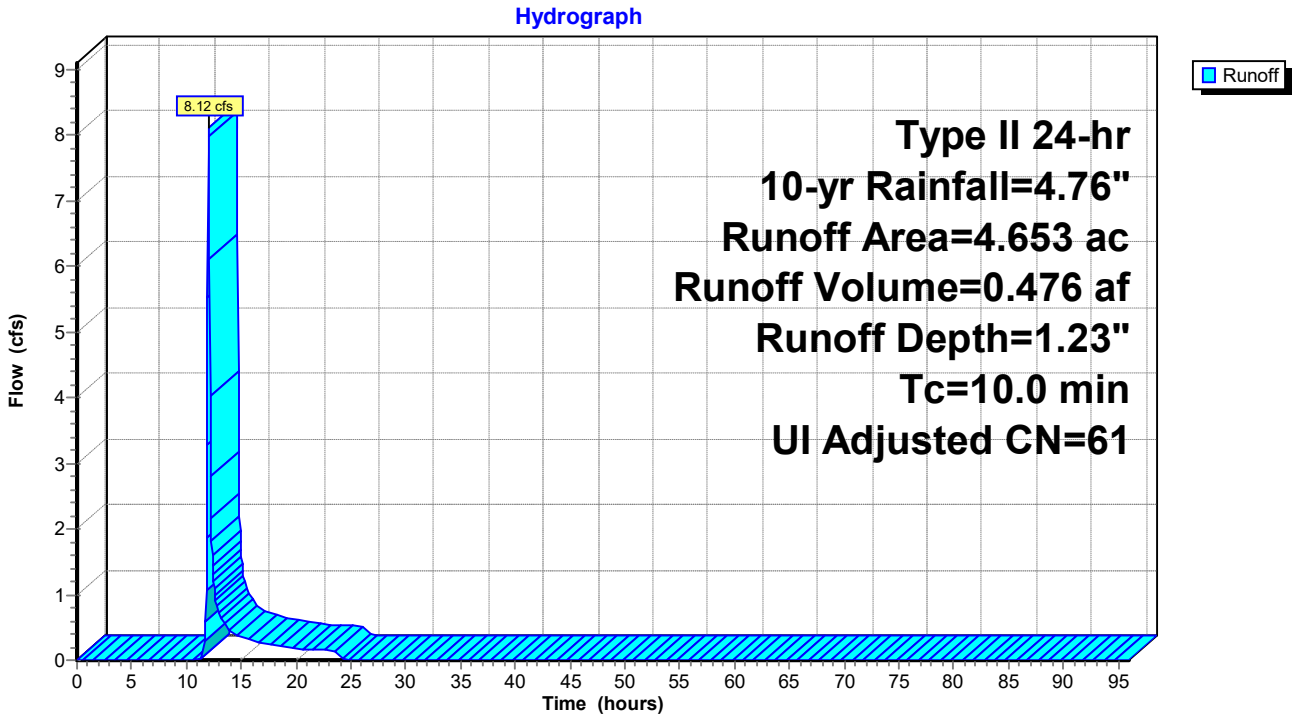
Link 13L: Total Post-Development Inflow=15.91 cfs 2.574 af
Primary=15.91 cfs 2.574 af

Total Runoff Area = 34.754 ac Runoff Volume = 4.011 af Average Runoff Depth = 1.38"
82.45% Pervious = 28.653 ac 17.55% Impervious = 6.101 ac

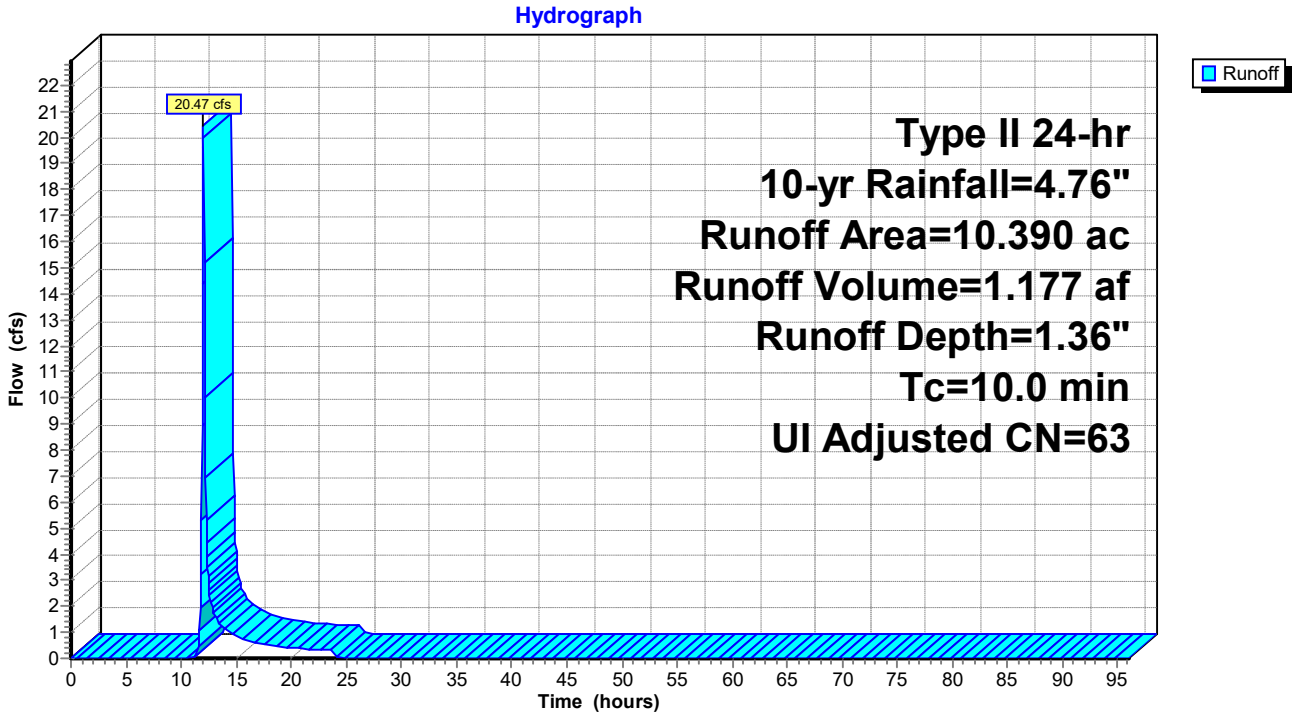
Subcatchment 3S: Existing Basin



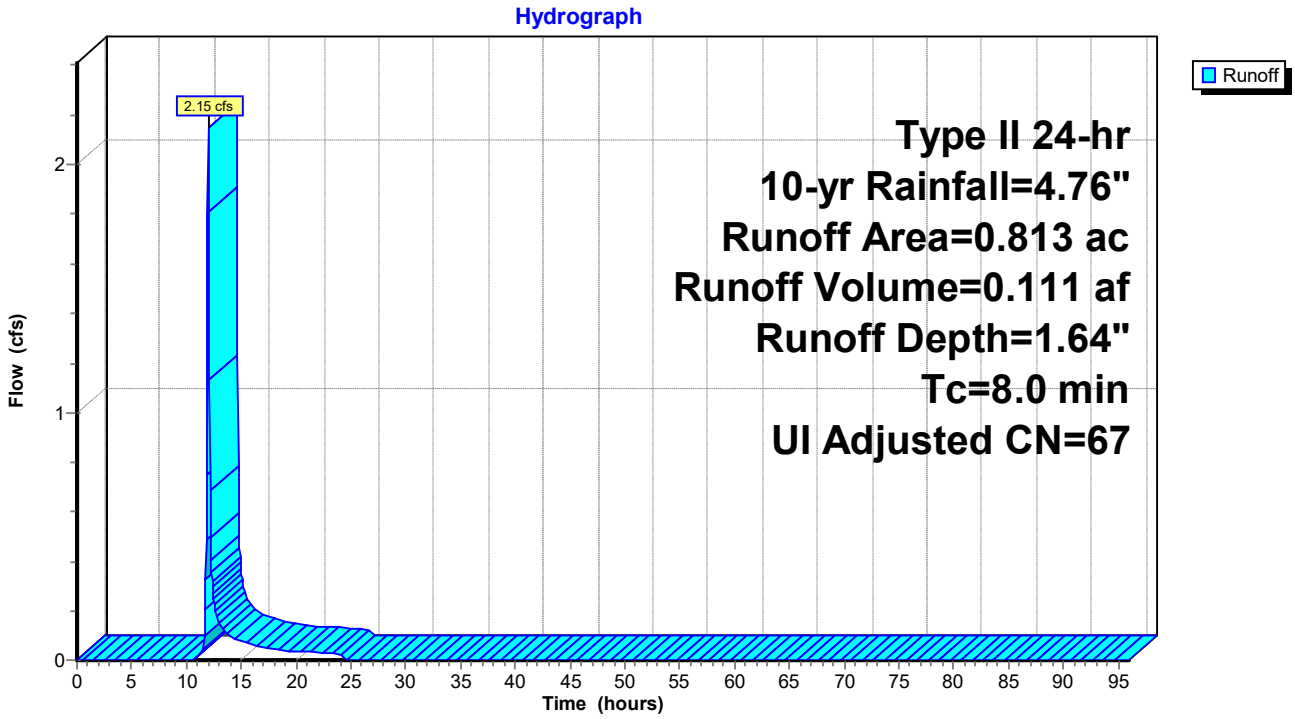
Subcatchment 7S: Basin #1 Inflow



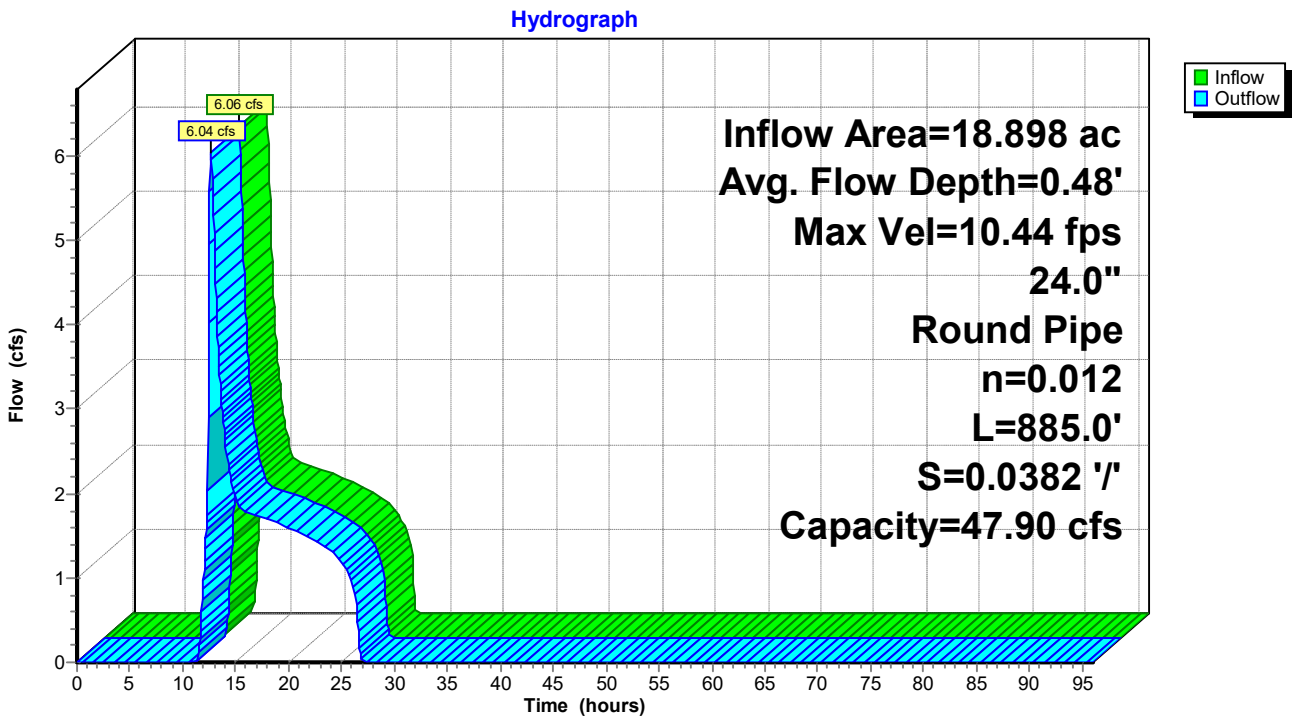
Subcatchment 10S: Basin #2 Inflow



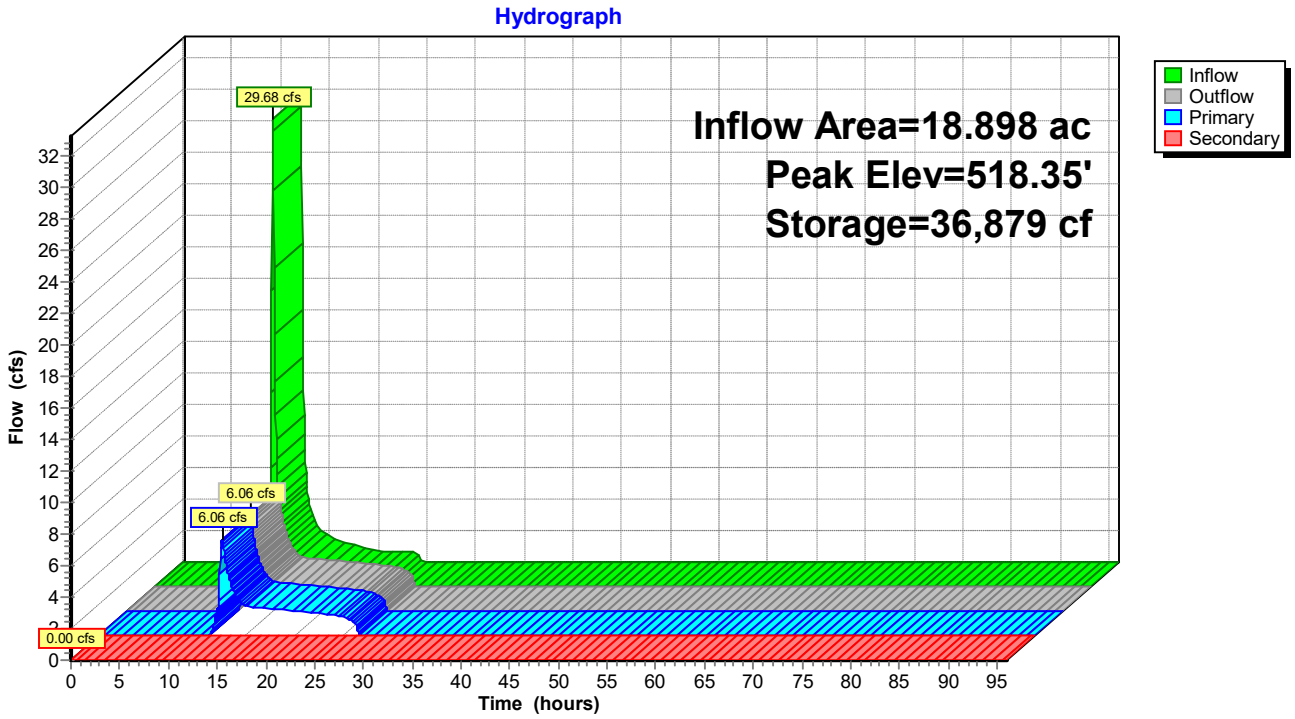
Subcatchment 12S: Un-detained Flow



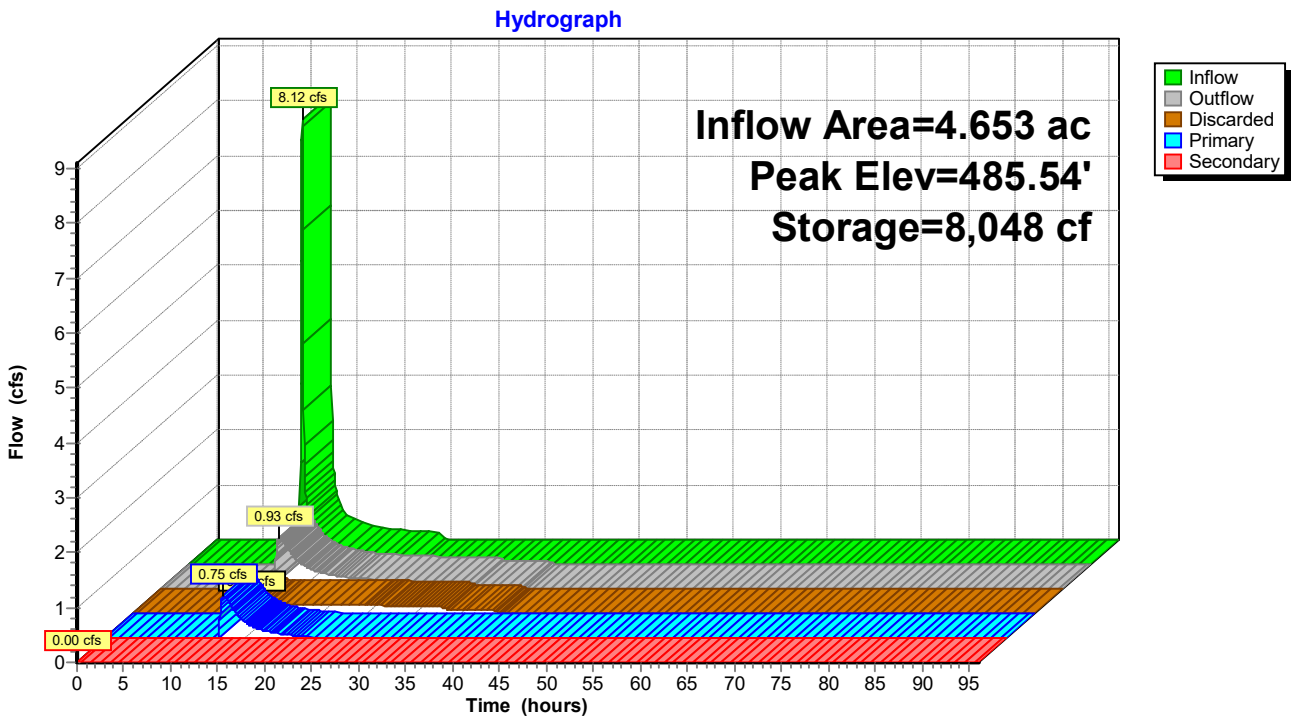
Reach 9R: Storm Sewer



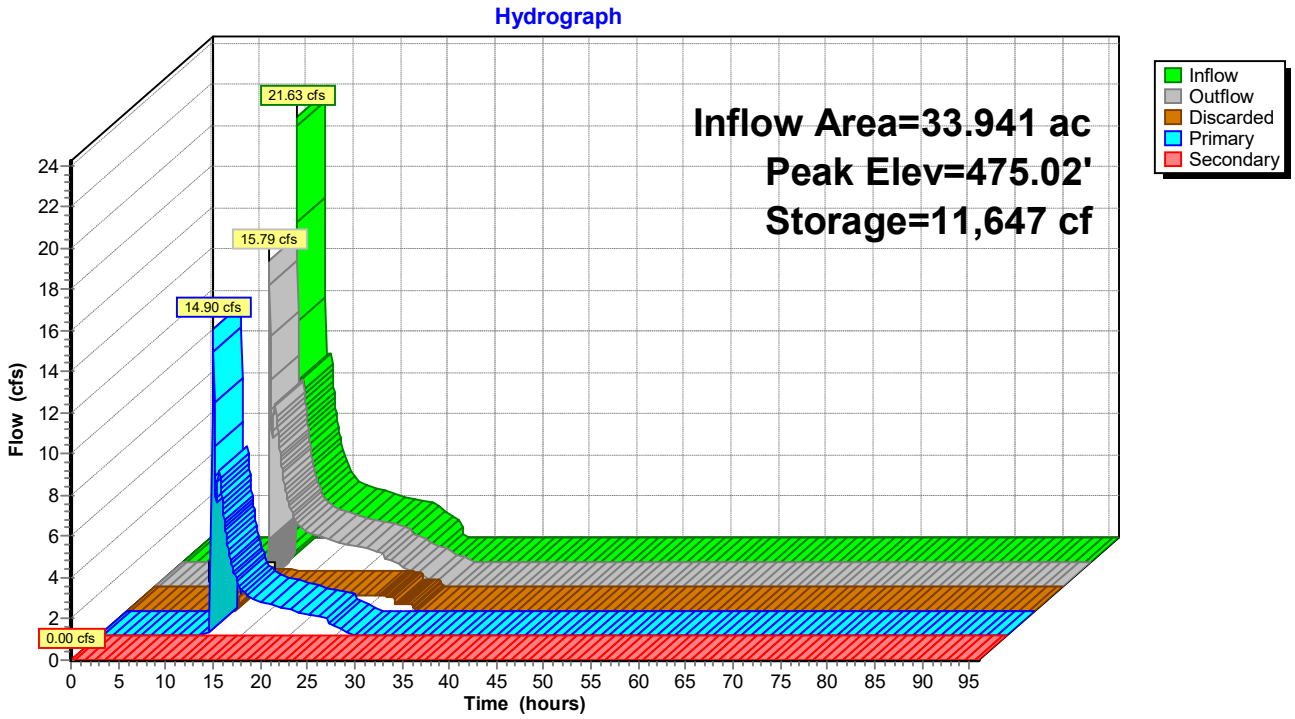
Pond 4P: Existing Basin



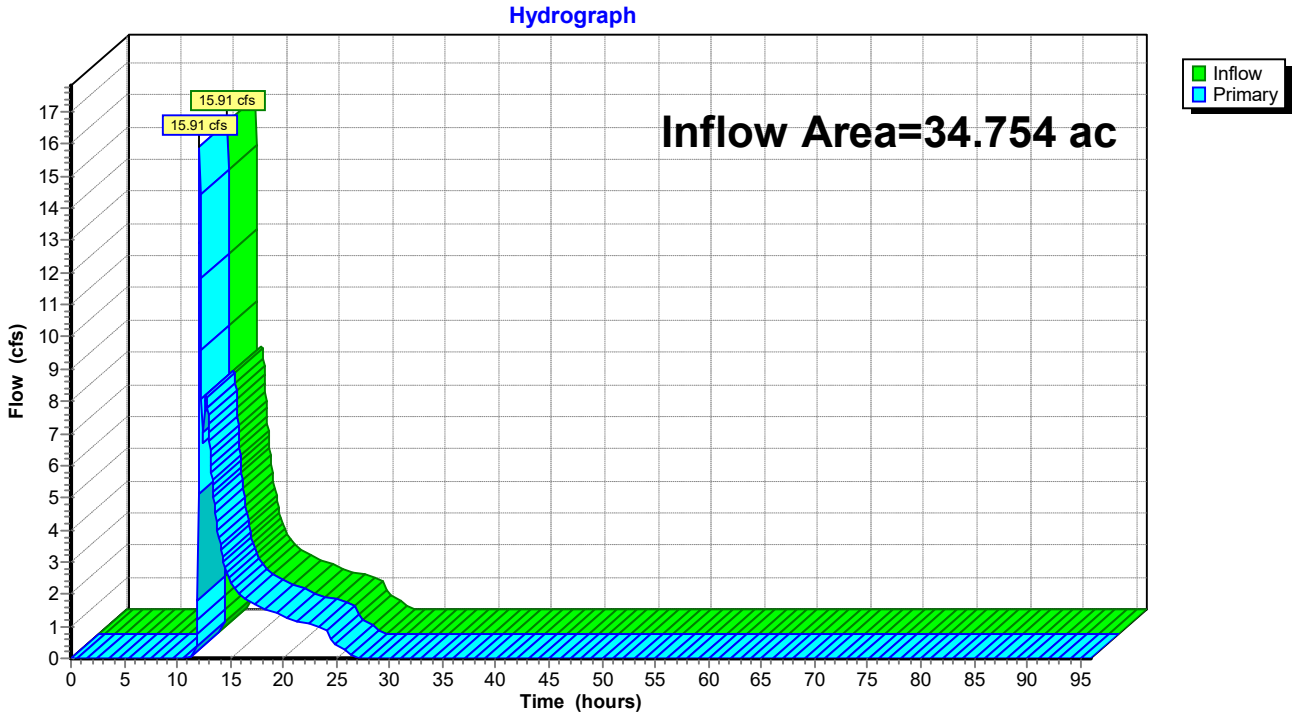
Pond 8P: Basin #1



Pond 11P: Basin #2



Link 13L: Total Post-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=2.09"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=44.92 cfs 3.287 af

Subcatchment 7S: Basin #1 Inflow Runoff Area=4.653 ac 13.09% Impervious Runoff Depth=1.84"
Tc=10.0 min UI Adjusted CN=61 Runoff=12.62 cfs 0.714 af

Subcatchment 10S: Basin #2 Inflow Runoff Area=10.390 ac 19.48% Impervious Runoff Depth=2.00"
Tc=10.0 min UI Adjusted CN=63 Runoff=30.98 cfs 1.735 af

Subcatchment 12S: Un-detained Flow Runoff Area=0.813 ac 22.14% Impervious Runoff Depth=2.34"
Tc=8.0 min UI Adjusted CN=67 Runoff=3.11 cfs 0.159 af

Reach 9R: Storm Sewer Avg. Flow Depth=0.80' Max Vel=13.77 fps Inflow=16.20 cfs 3.287 af
24.0" Round Pipe n=0.012 L=885.0' S=0.0382 '/' Capacity=47.90 cfs Outflow=16.16 cfs 3.287 af

Pond 4P: Existing Basin Peak Elev=518.88' Storage=46,618 cf Inflow=44.92 cfs 3.287 af
Primary=16.20 cfs 3.287 af Secondary=0.00 cfs 0.000 af Outflow=16.20 cfs 3.287 af

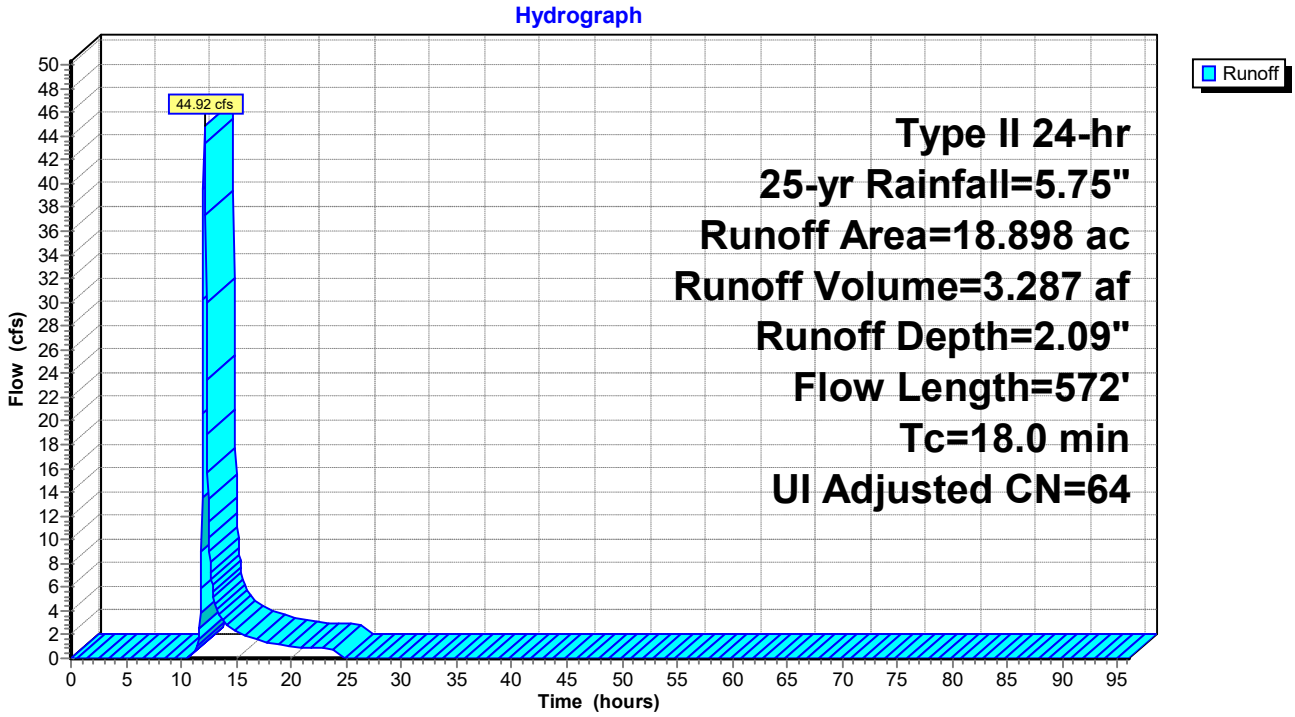
Pond 8P: Basin #1 Peak Elev=486.10' Storage=11,271 cf Inflow=12.62 cfs 0.714 af
Discarded=0.21 cfs 0.309 af Primary=2.68 cfs 0.404 af Secondary=0.00 cfs 0.000 af Outflow=2.89 cfs 0.713 af

Pond 11P: Basin #2 Peak Elev=475.28' Storage=14,131 cf Inflow=32.66 cfs 5.425 af
Discarded=0.95 cfs 1.264 af Primary=27.09 cfs 4.161 af Secondary=0.00 cfs 0.000 af Outflow=28.03 cfs 5.425 af

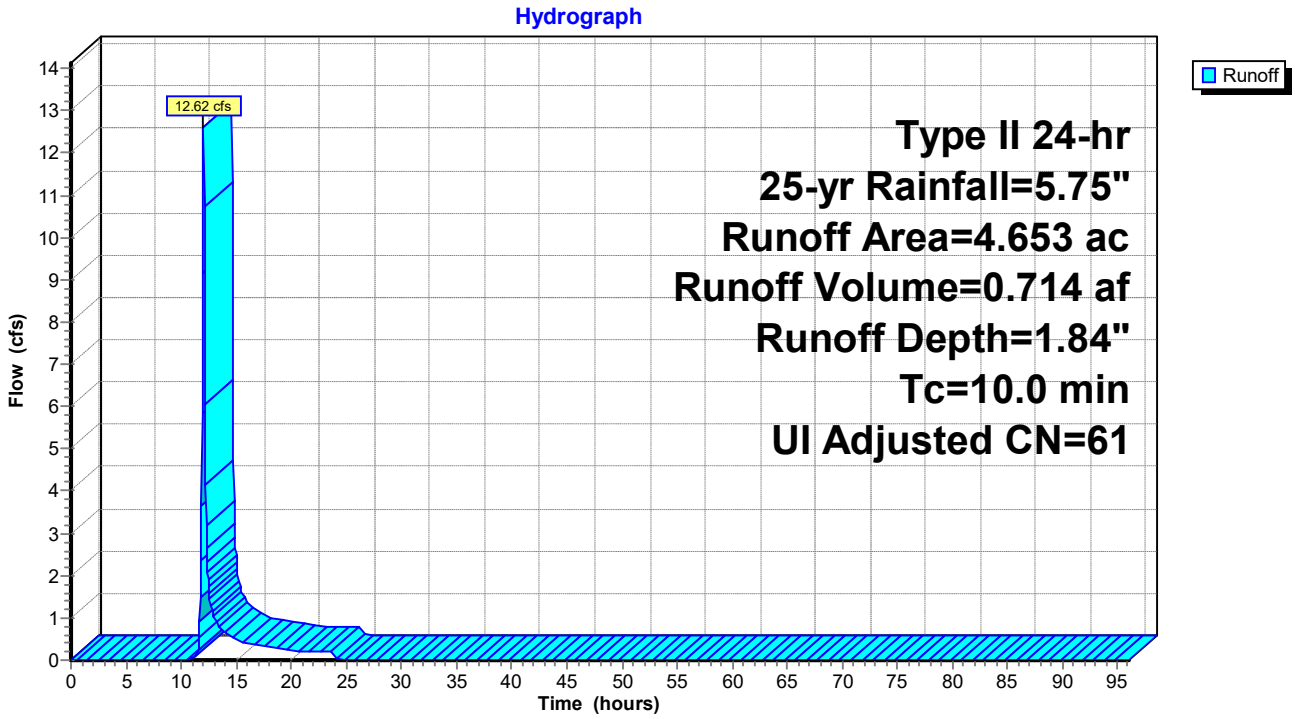
Link 13L: Total Post-Development Inflow=29.41 cfs 4.320 af
Primary=29.41 cfs 4.320 af

Total Runoff Area = 34.754 ac Runoff Volume = 5.894 af Average Runoff Depth = 2.03"
82.45% Pervious = 28.653 ac 17.55% Impervious = 6.101 ac

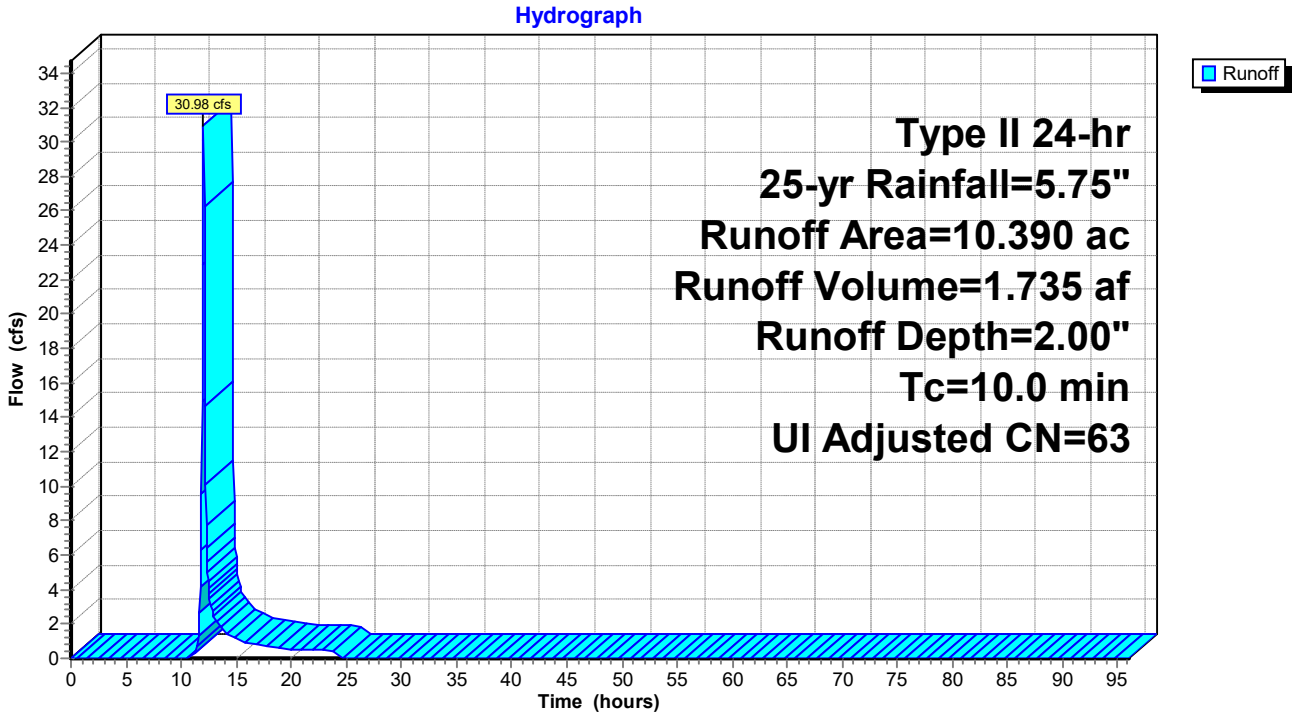
Subcatchment 3S: Existing Basin



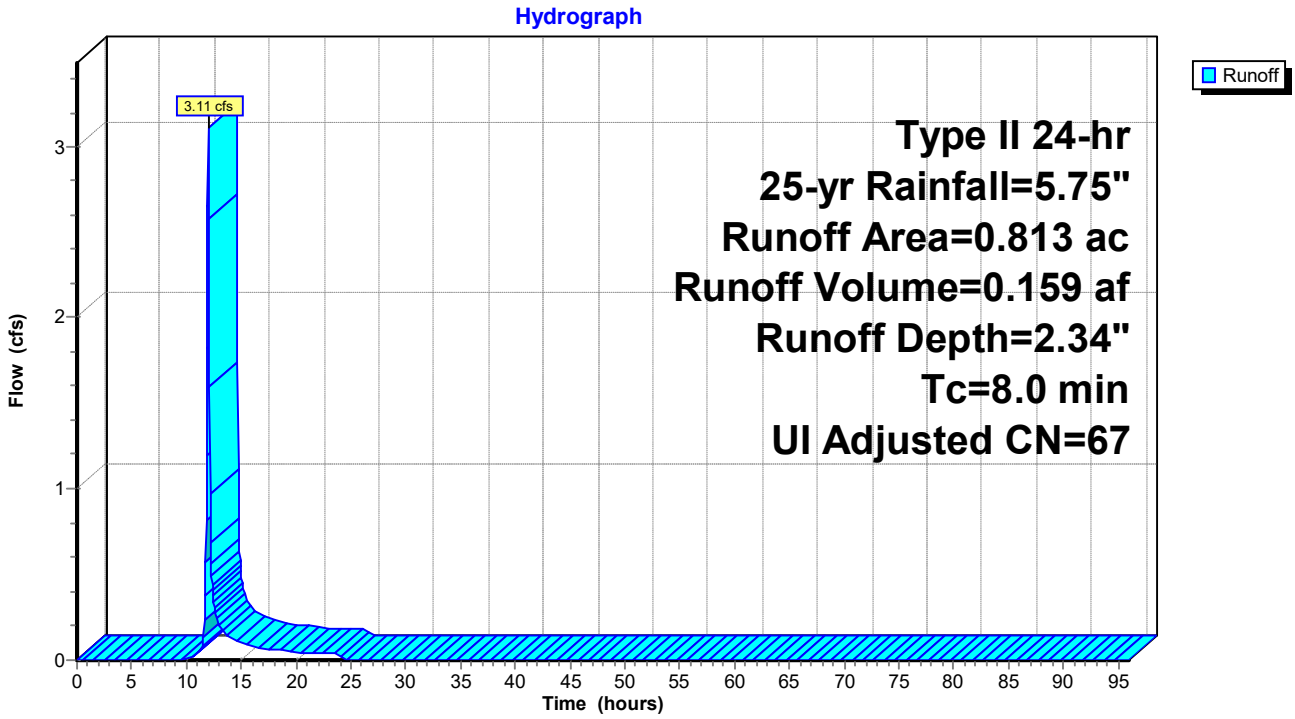
Subcatchment 7S: Basin #1 Inflow



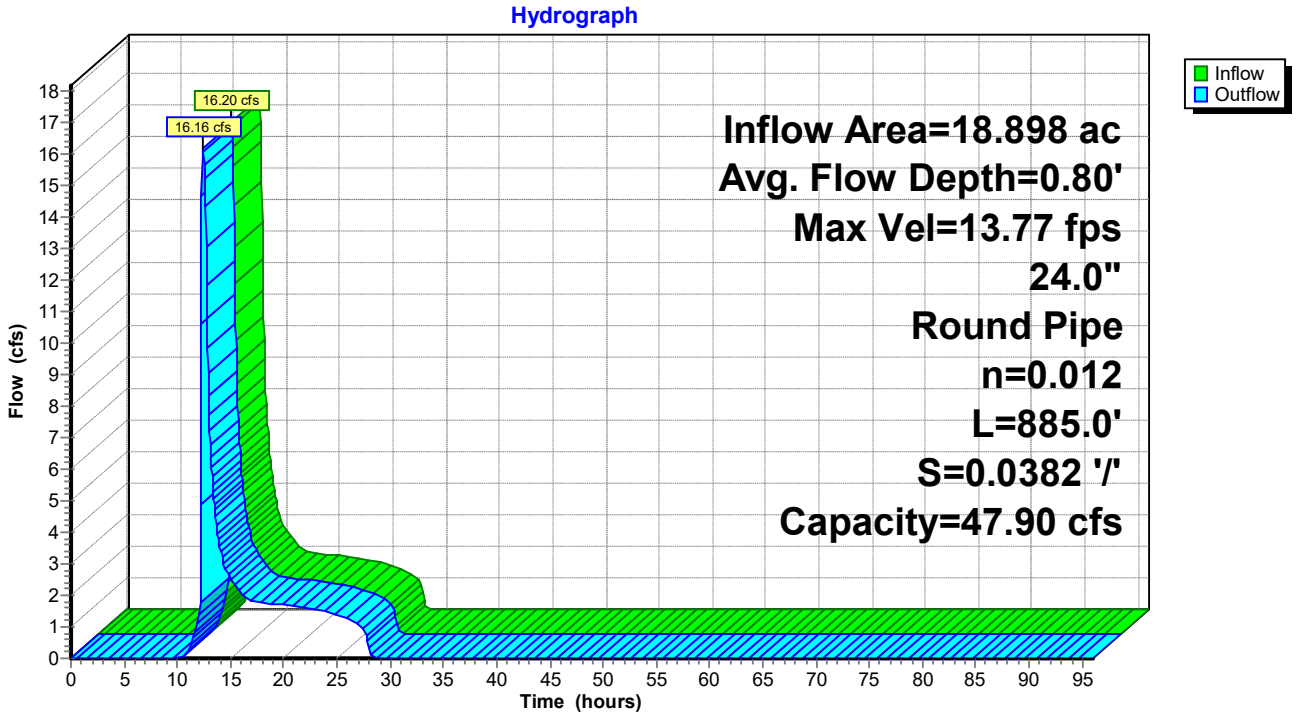
Subcatchment 10S: Basin #2 Inflow



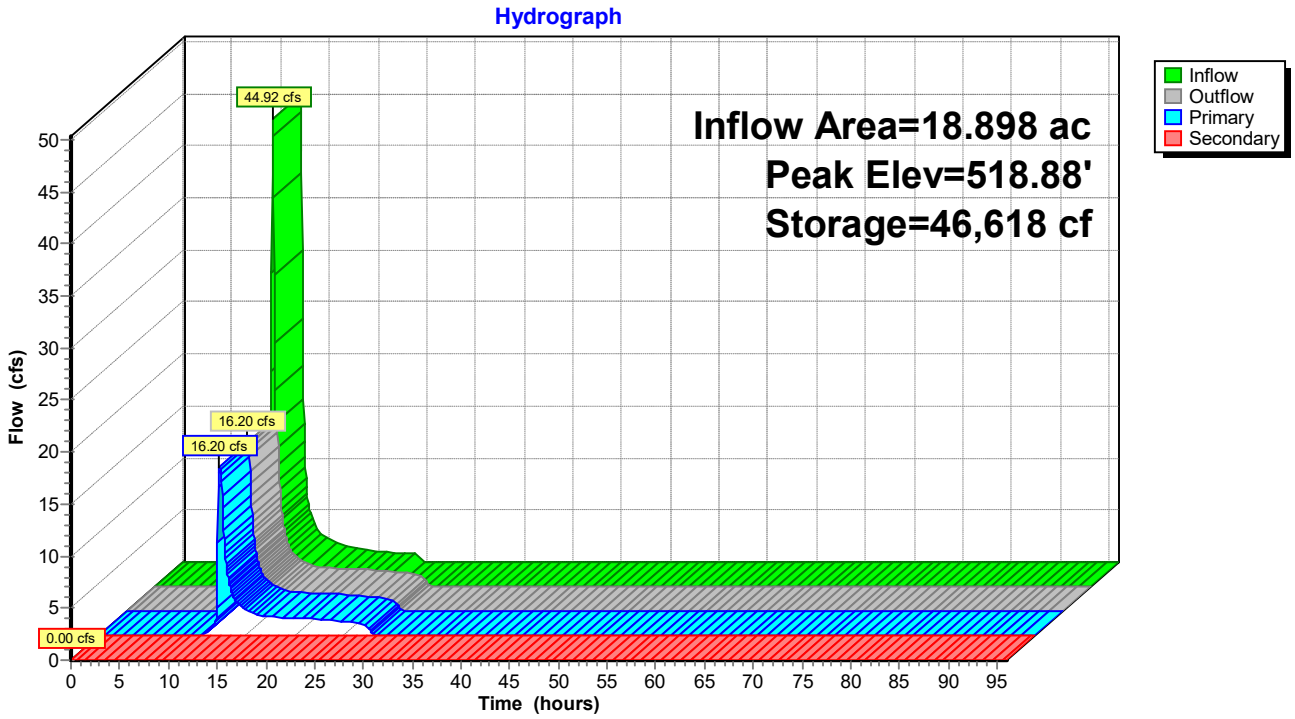
Subcatchment 12S: Un-detained Flow



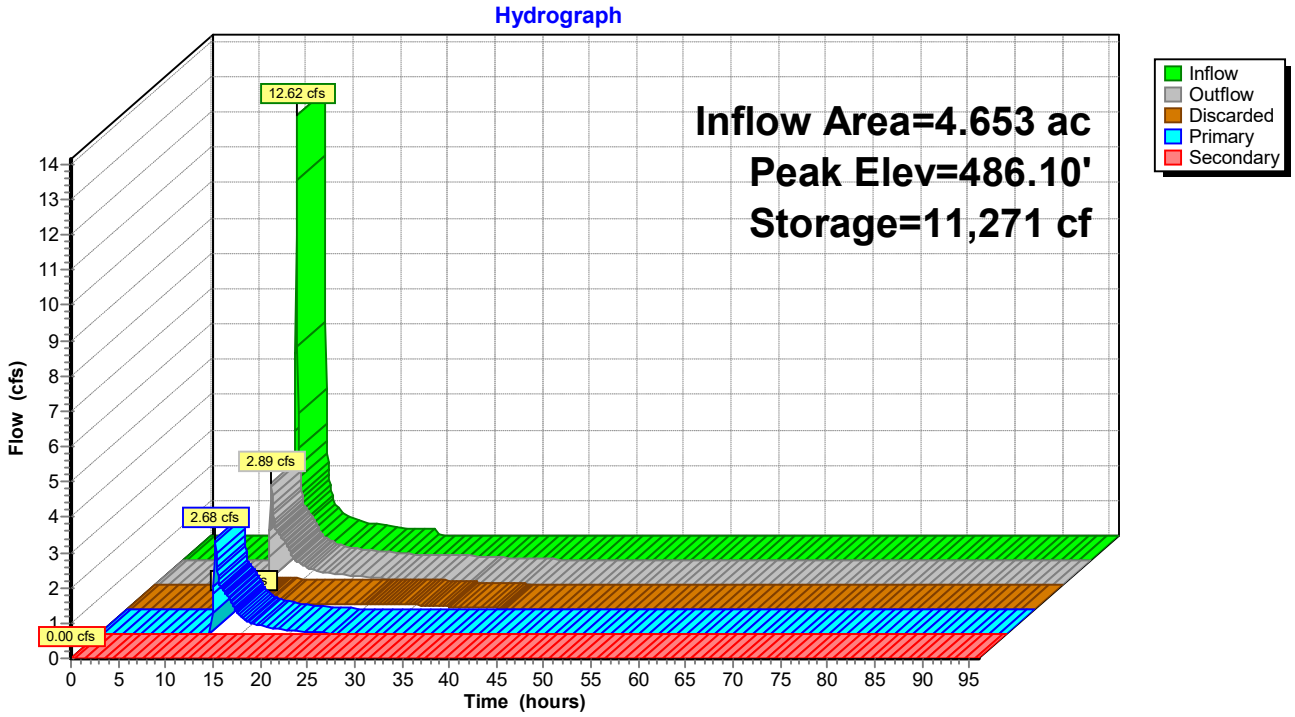
Reach 9R: Storm Sewer



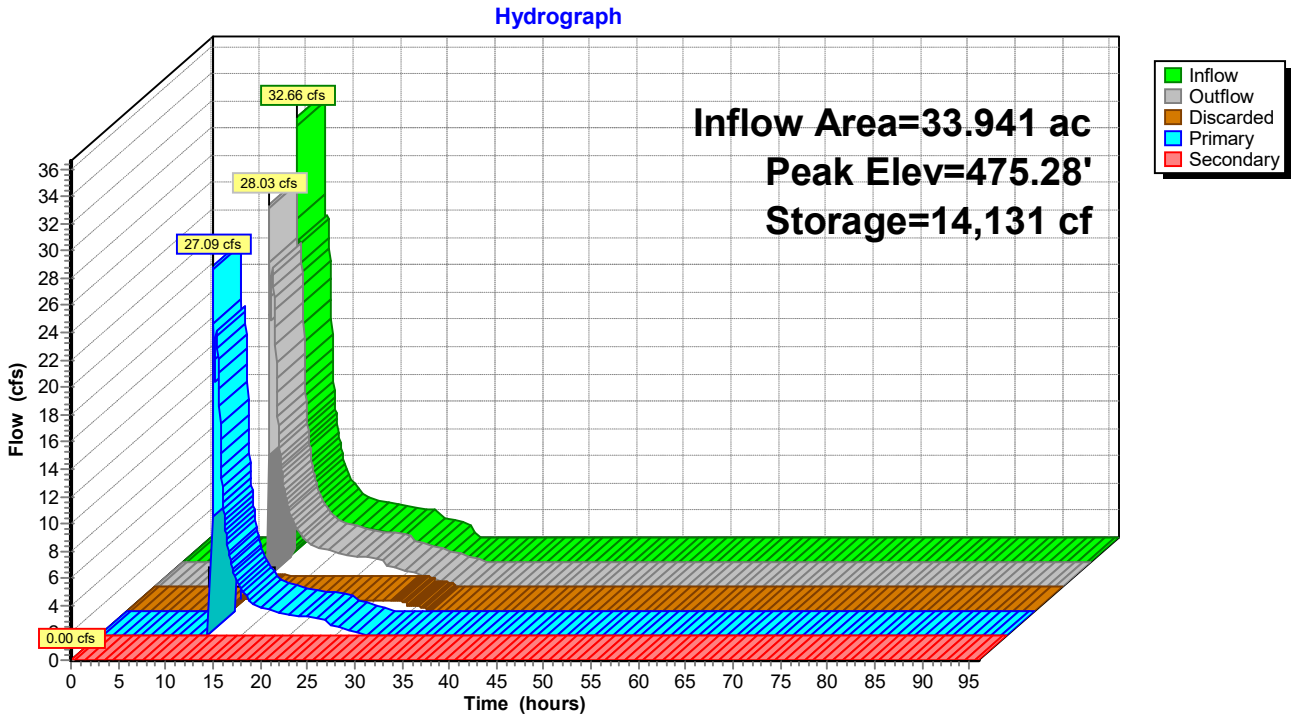
Pond 4P: Existing Basin



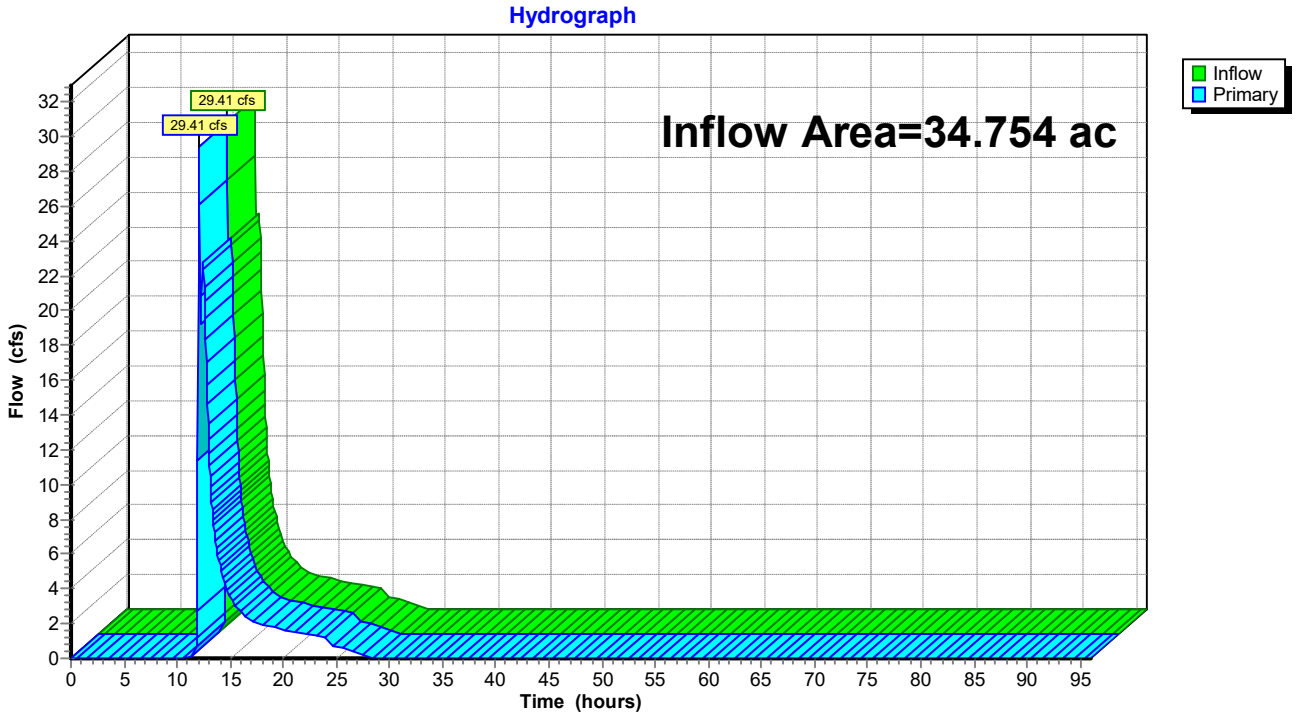
Pond 8P: Basin #1



Pond 11P: Basin #2



Link 13L: Total Post-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=2.69"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=58.65 cfs 4.229 af

Subcatchment 7S: Basin #1 Inflow Runoff Area=4.653 ac 13.09% Impervious Runoff Depth=2.40"
Tc=10.0 min UI Adjusted CN=61 Runoff=16.72 cfs 0.932 af

Subcatchment 10S: Basin #2 Inflow Runoff Area=10.390 ac 19.48% Impervious Runoff Depth=2.59"
Tc=10.0 min UI Adjusted CN=63 Runoff=40.48 cfs 2.243 af

Subcatchment 12S: Un-detained Flow Runoff Area=0.813 ac 22.14% Impervious Runoff Depth=2.98"
Tc=8.0 min UI Adjusted CN=67 Runoff=3.96 cfs 0.202 af

Reach 9R: Storm Sewer Avg. Flow Depth=0.89' Max Vel=14.47 fps Inflow=19.51 cfs 4.037 af
24.0" Round Pipe n=0.012 L=885.0' S=0.0382 '/' Capacity=47.90 cfs Outflow=19.45 cfs 4.037 af

Pond 4P: Existing Basin Peak Elev=519.33' Storage=55,584 cf Inflow=58.65 cfs 4.229 af
Primary=19.51 cfs 4.037 af Secondary=10.42 cfs 0.192 af Outflow=29.93 cfs 4.229 af

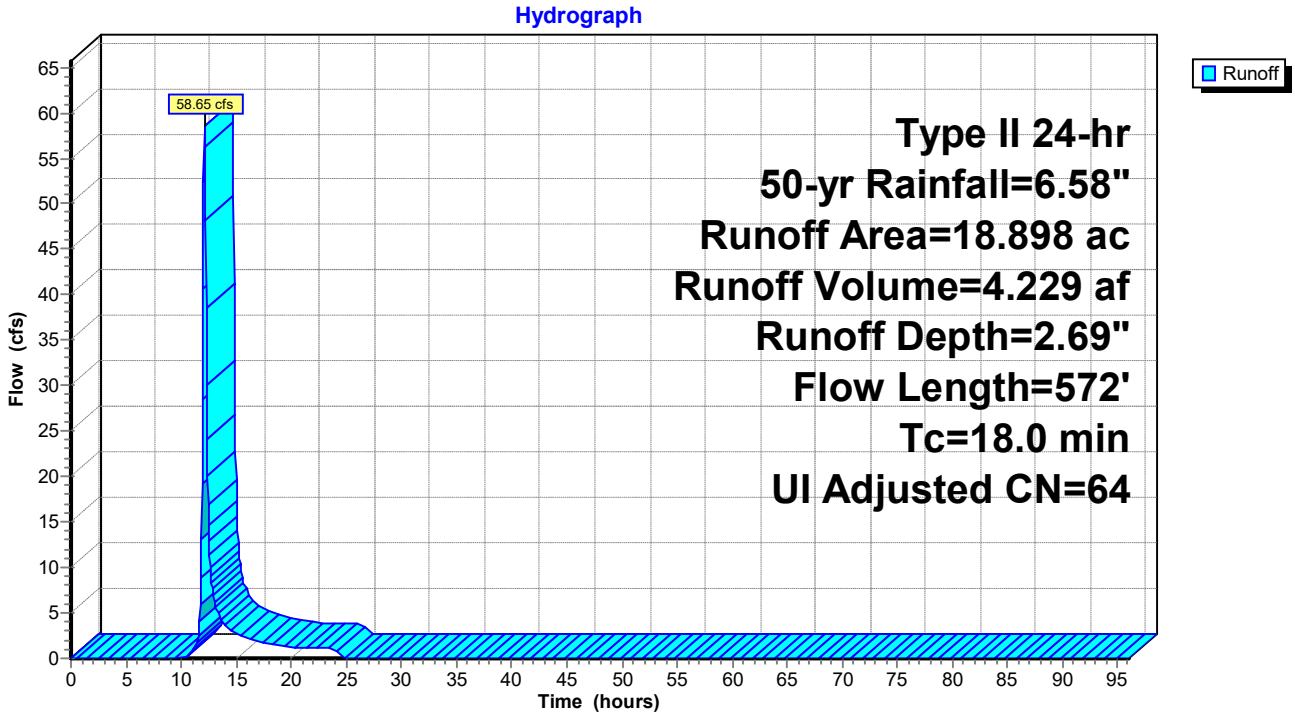
Pond 8P: Basin #1 Peak Elev=486.33' Storage=12,696 cf Inflow=16.72 cfs 0.932 af
Discarded=0.22 cfs 0.319 af Primary=8.48 cfs 0.612 af Secondary=0.00 cfs 0.000 af Outflow=8.70 cfs 0.931 af

Pond 11P: Basin #2 Peak Elev=475.77' Storage=19,087 cf Inflow=42.28 cfs 6.892 af
Discarded=1.05 cfs 1.355 af Primary=33.04 cfs 5.537 af Secondary=0.00 cfs 0.000 af Outflow=34.09 cfs 6.892 af

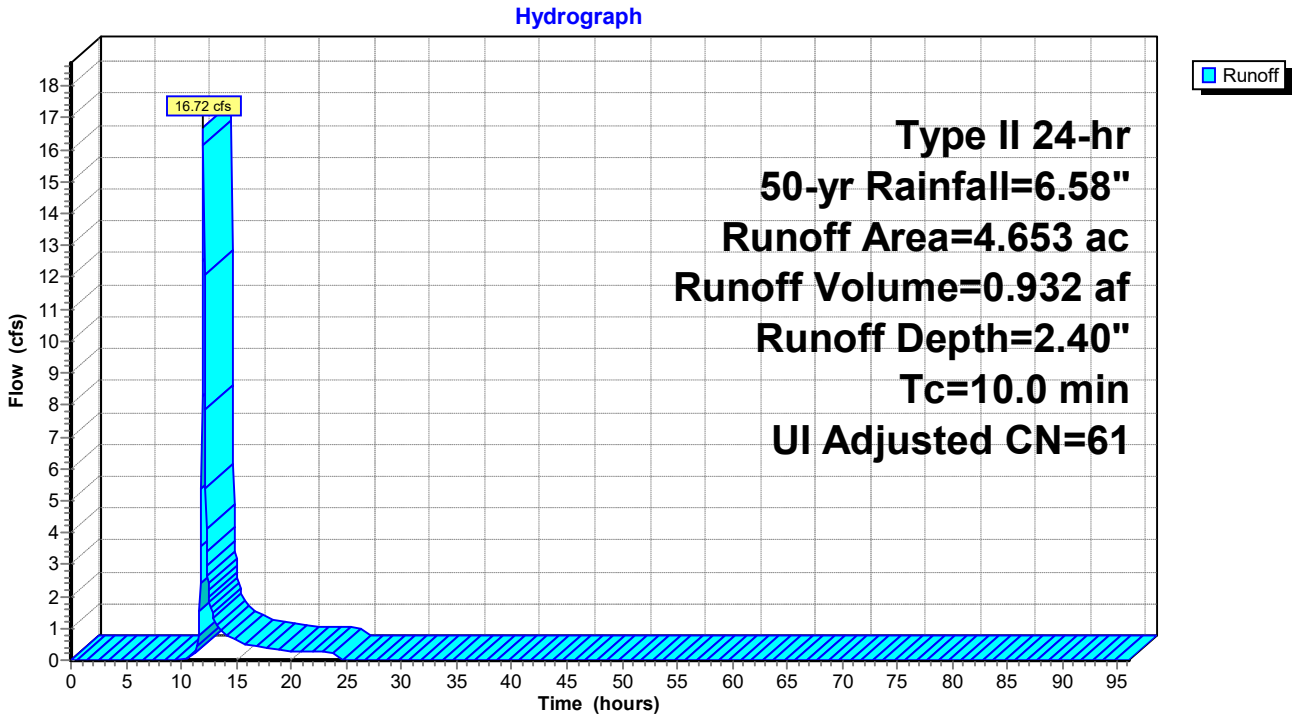
Link 13L: Total Post-Development Inflow=43.96 cfs 5.931 af
Primary=43.96 cfs 5.931 af

Total Runoff Area = 34.754 ac Runoff Volume = 7.606 af Average Runoff Depth = 2.63"
82.45% Pervious = 28.653 ac 17.55% Impervious = 6.101 ac

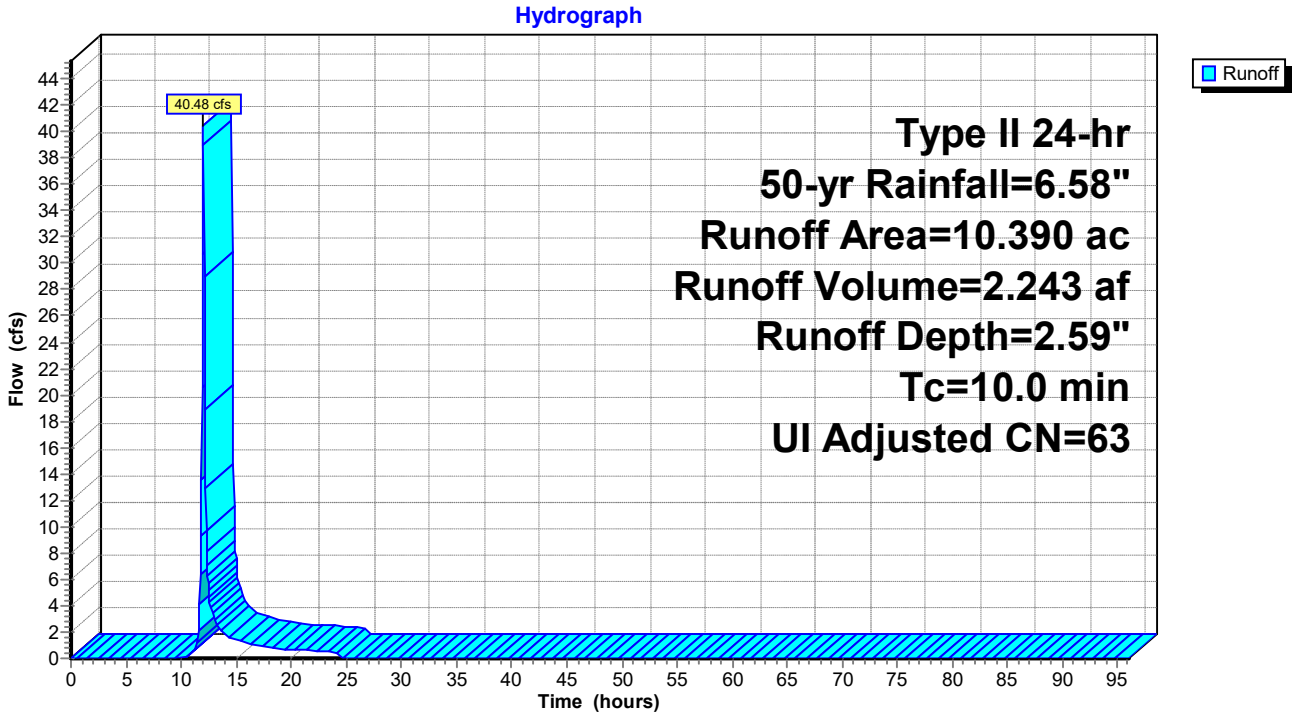
Subcatchment 3S: Existing Basin



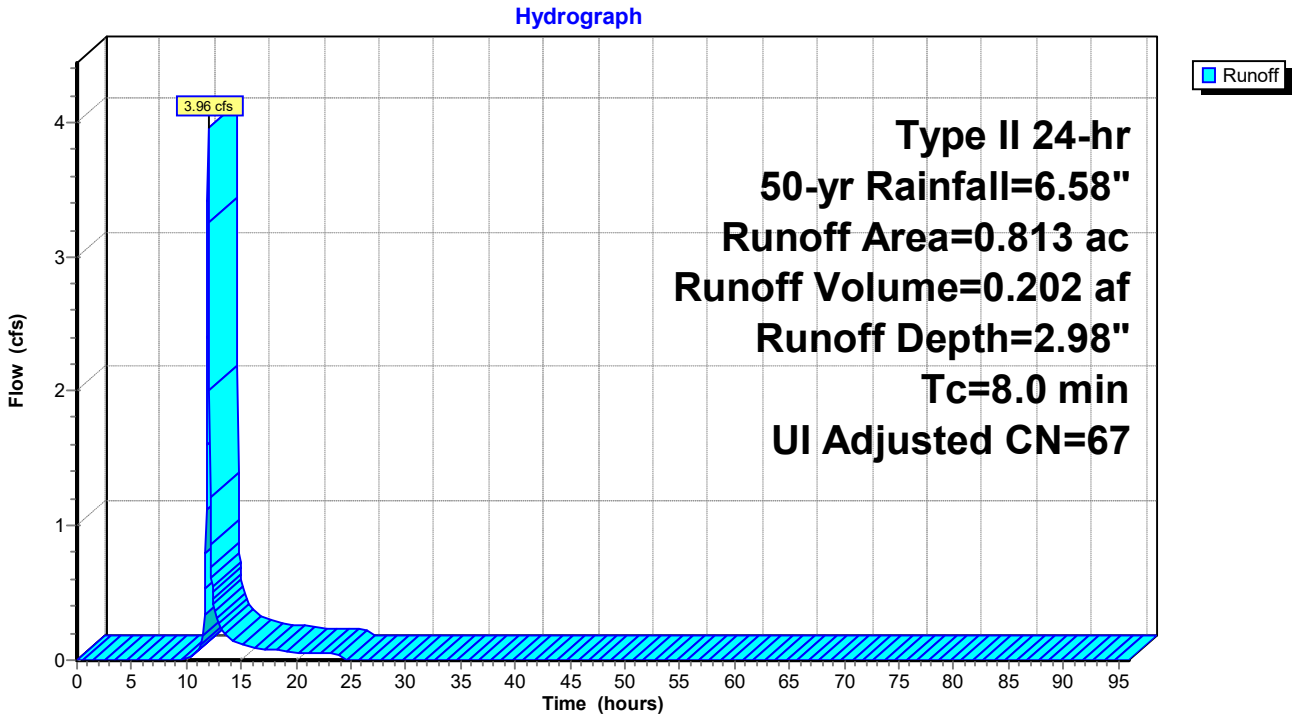
Subcatchment 7S: Basin #1 Inflow



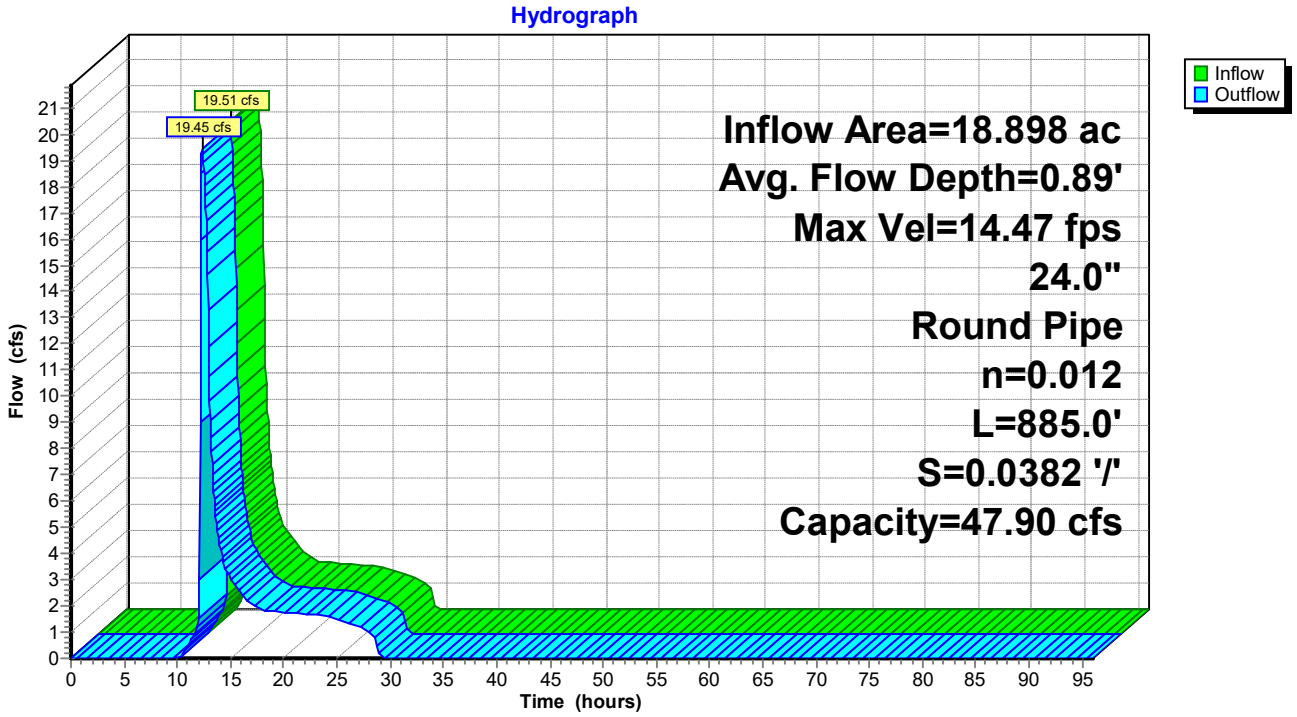
Subcatchment 10S: Basin #2 Inflow



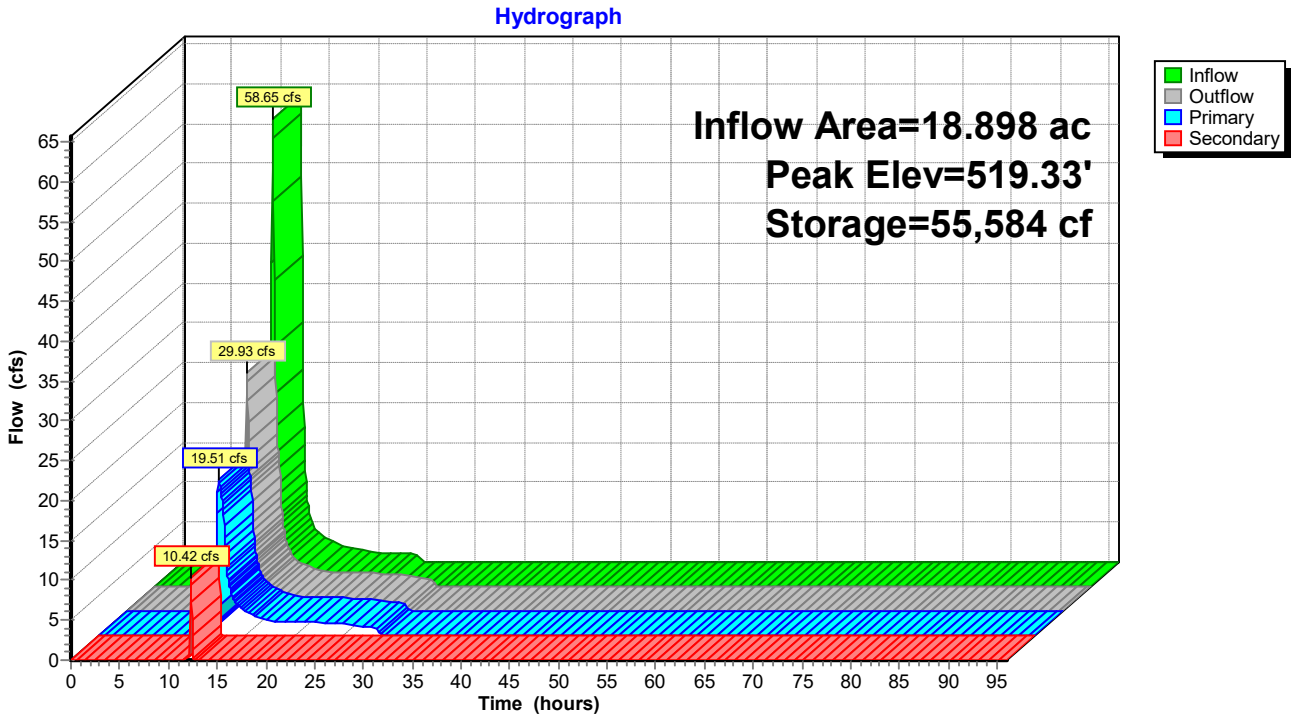
Subcatchment 12S: Un-detained Flow



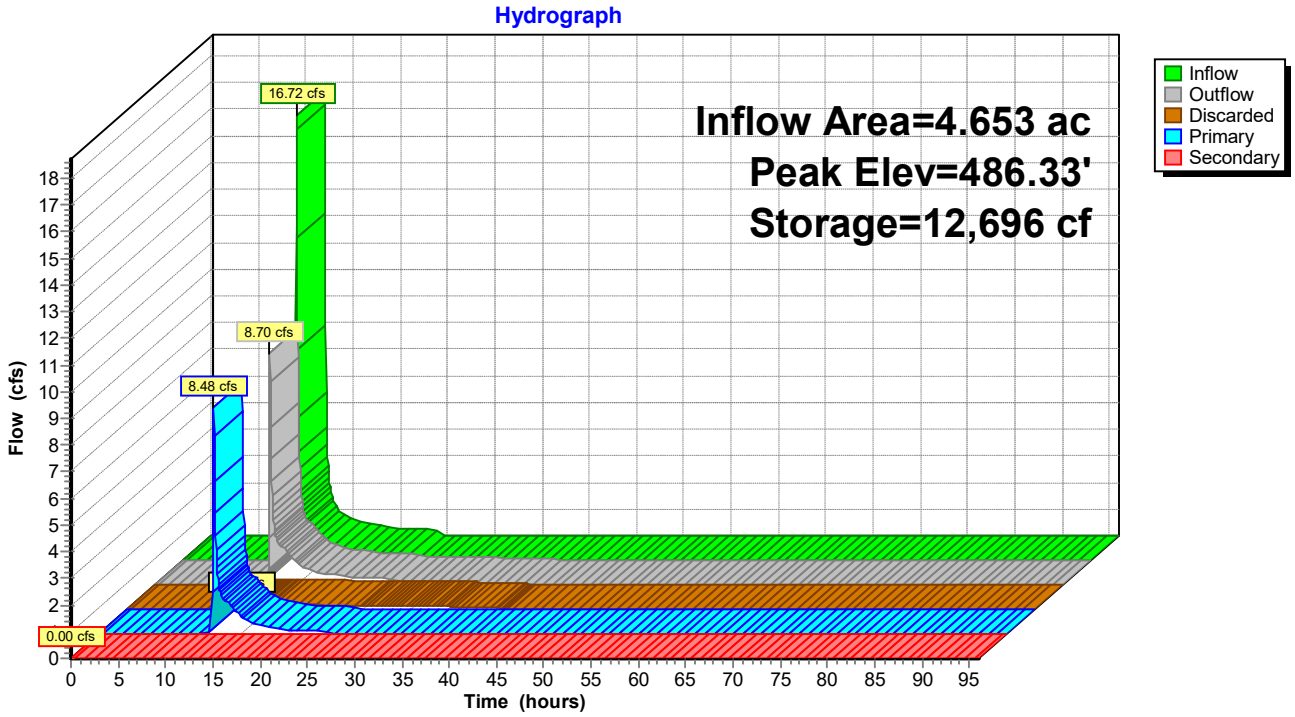
Reach 9R: Storm Sewer



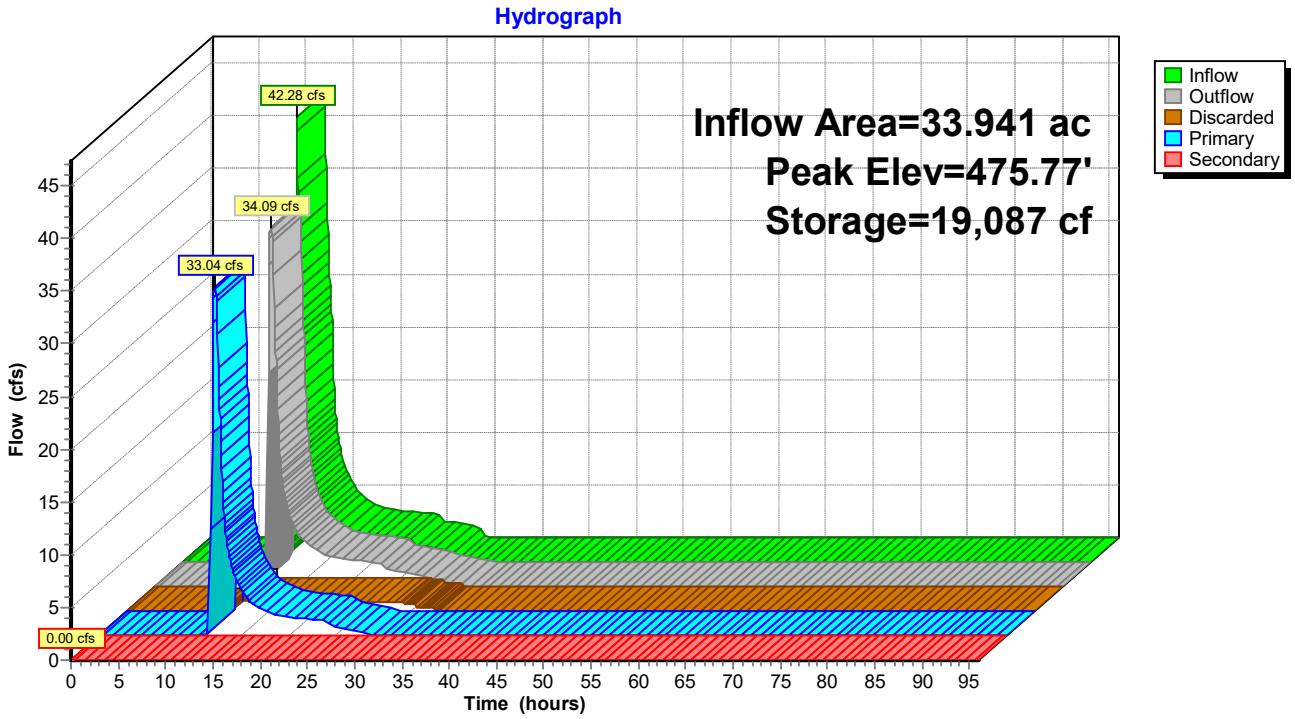
Pond 4P: Existing Basin



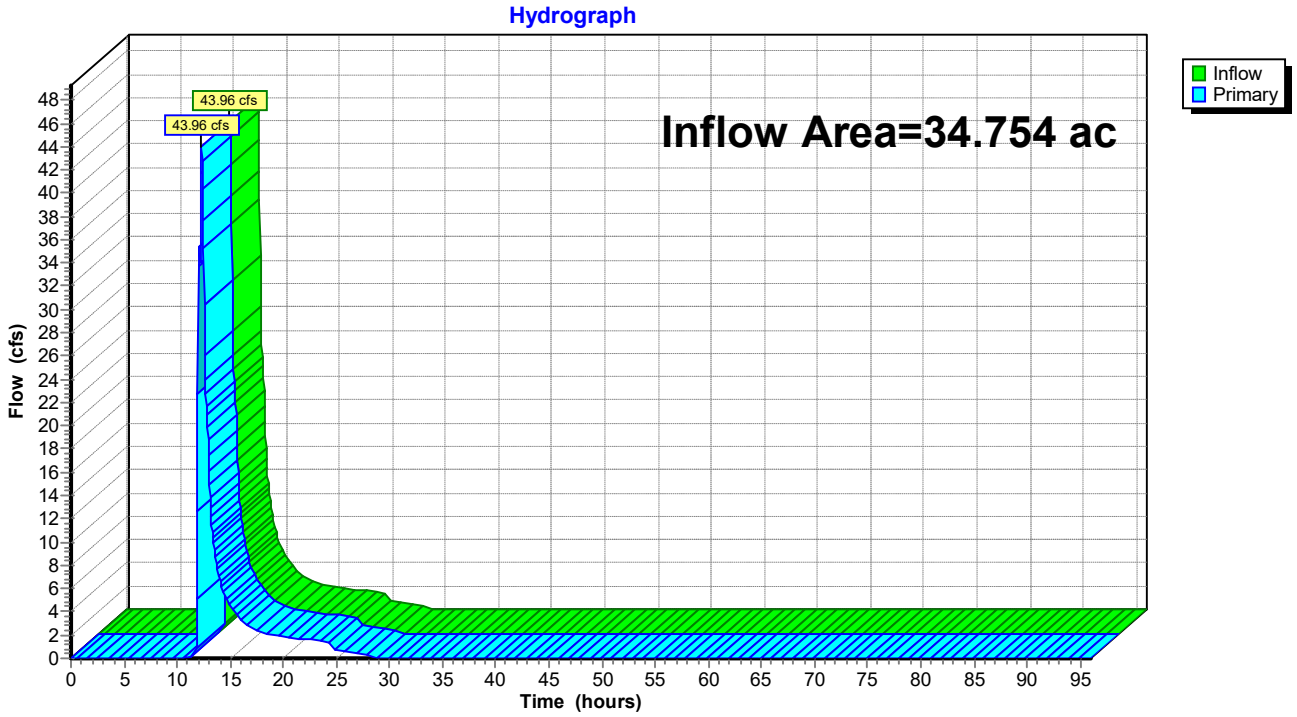
Pond 8P: Basin #1



Pond 11P: Basin #2



Link 13L: Total Post-Development



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 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 3S: Existing Basin Runoff Area=18.898 ac 17.40% Impervious Runoff Depth=3.37"
Flow Length=572' Tc=18.0 min UI Adjusted CN=64 Runoff=74.26 cfs 5.309 af

Subcatchment 7S: Basin #1 Inflow Runoff Area=4.653 ac 13.09% Impervious Runoff Depth=3.05"
Tc=10.0 min UI Adjusted CN=61 Runoff=21.42 cfs 1.184 af

Subcatchment 10S: Basin #2 Inflow Runoff Area=10.390 ac 19.48% Impervious Runoff Depth=3.26"
Tc=10.0 min UI Adjusted CN=63 Runoff=51.29 cfs 2.827 af

Subcatchment 12S: Un-detained Flow Runoff Area=0.813 ac 22.14% Impervious Runoff Depth=3.69"
Tc=8.0 min UI Adjusted CN=67 Runoff=4.92 cfs 0.250 af

Reach 9R: Storm Sewer Avg. Flow Depth=0.94' Max Vel=14.84 fps Inflow=21.46 cfs 4.675 af
24.0" Round Pipe n=0.012 L=885.0' S=0.0382 '/' Capacity=47.90 cfs Outflow=21.36 cfs 4.675 af

Pond 4P: Existing Basin Peak Elev=519.63' Storage=62,155 cf Inflow=74.26 cfs 5.309 af
Primary=21.46 cfs 4.675 af Secondary=28.83 cfs 0.634 af Outflow=50.29 cfs 5.309 af

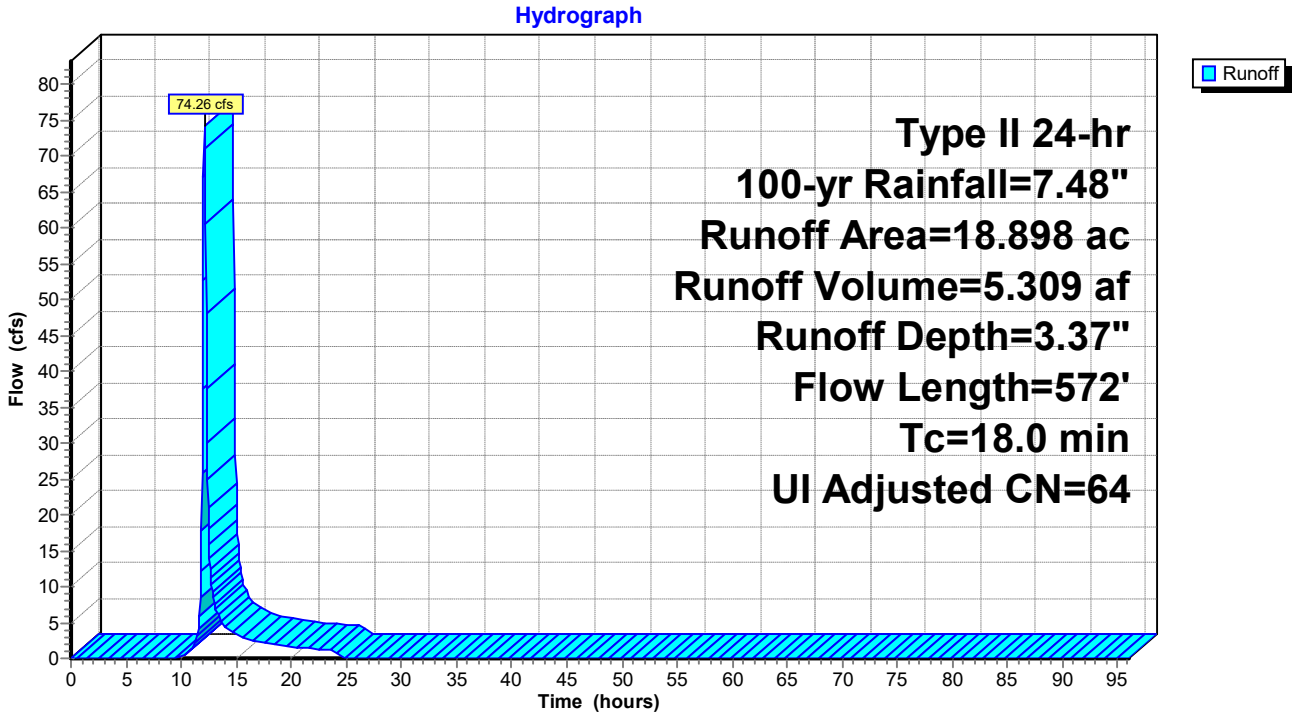
Pond 8P: Basin #1 Peak Elev=486.76' Storage=15,596 cf Inflow=21.42 cfs 1.184 af
Discarded=0.24 cfs 0.328 af Primary=9.59 cfs 0.850 af Secondary=0.65 cfs 0.003 af Outflow=10.48 cfs 1.182 af

Pond 11P: Basin #2 Peak Elev=476.99' Storage=32,661 cf Inflow=61.47 cfs 8.355 af
Discarded=1.33 cfs 1.454 af Primary=37.01 cfs 6.901 af Secondary=0.00 cfs 0.000 af Outflow=38.34 cfs 8.355 af

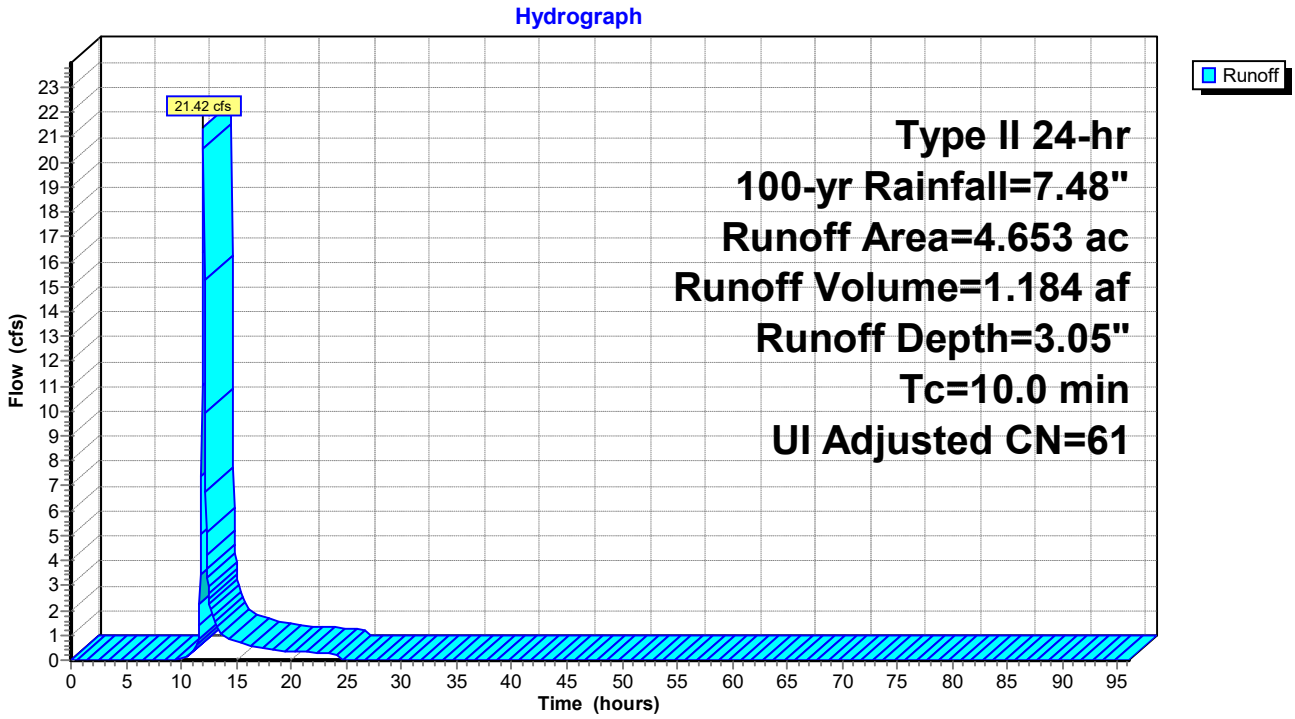
Link 13L: Total Post-Development Inflow=66.48 cfs 7.785 af
Primary=66.48 cfs 7.785 af

Total Runoff Area = 34.754 ac Runoff Volume = 9.570 af Average Runoff Depth = 3.30"
82.45% Pervious = 28.653 ac 17.55% Impervious = 6.101 ac

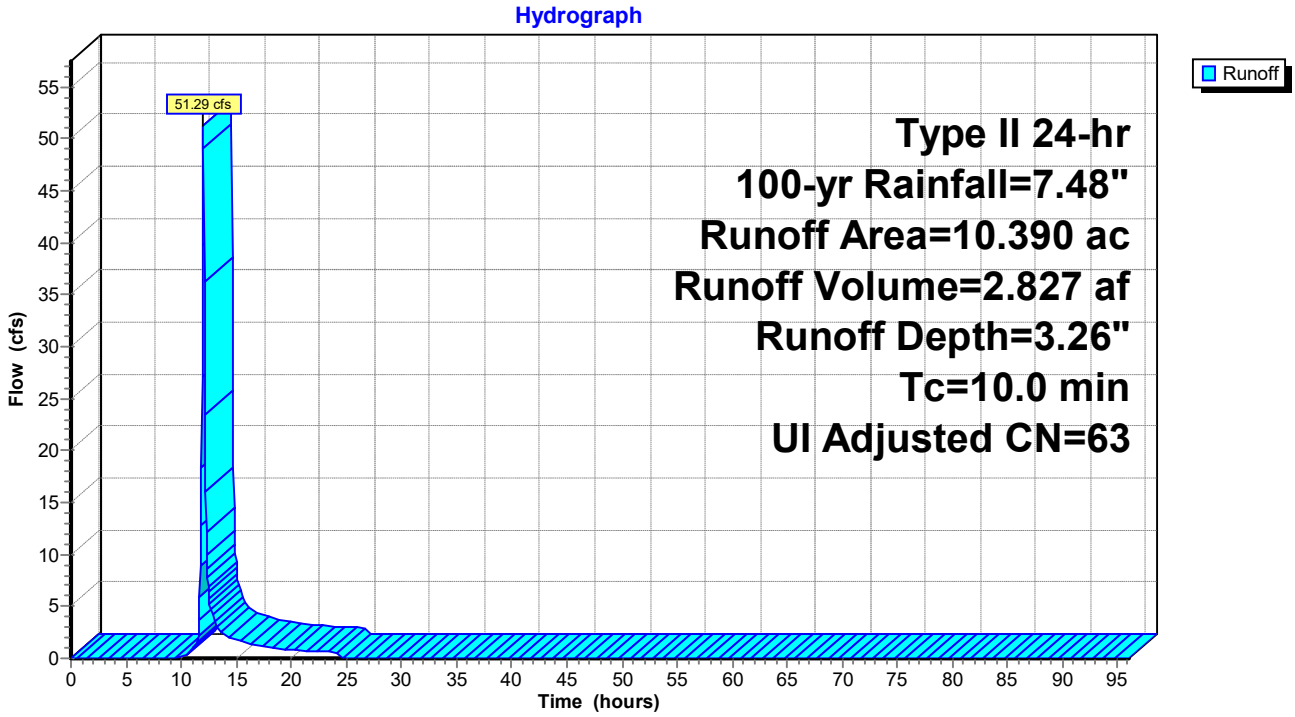
Subcatchment 3S: Existing Basin



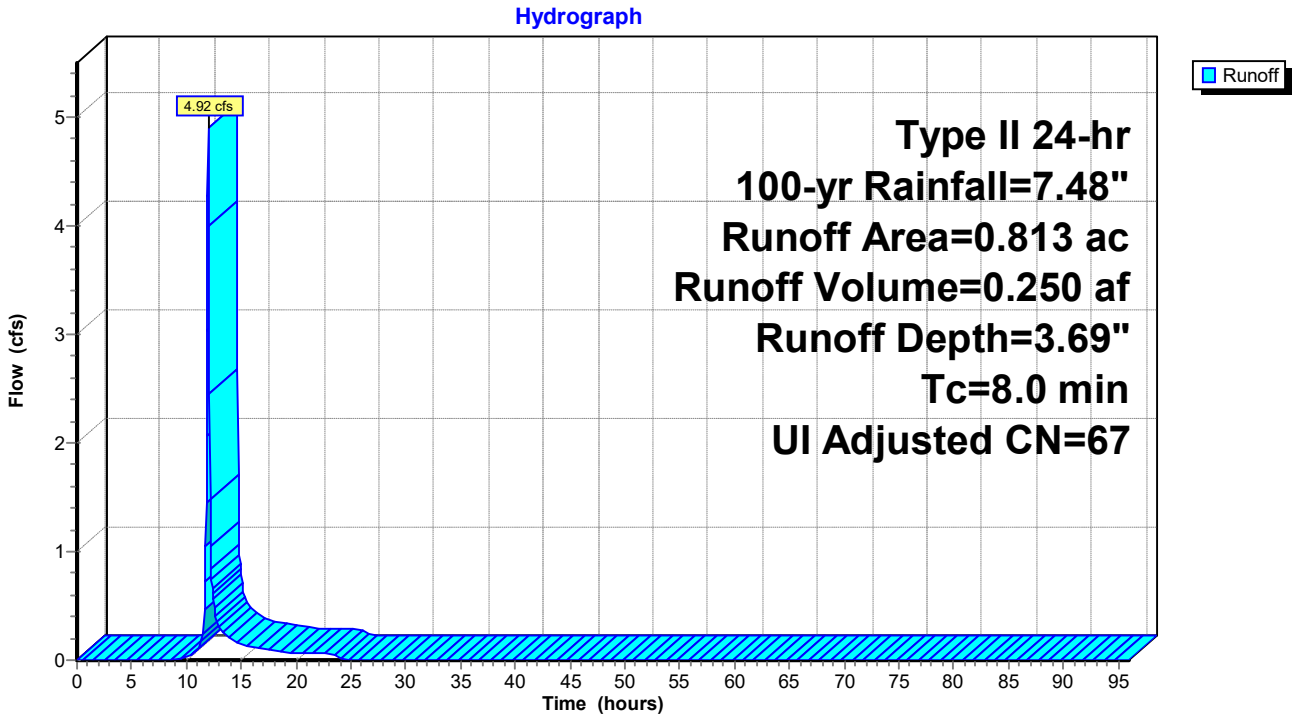
Subcatchment 7S: Basin #1 Inflow



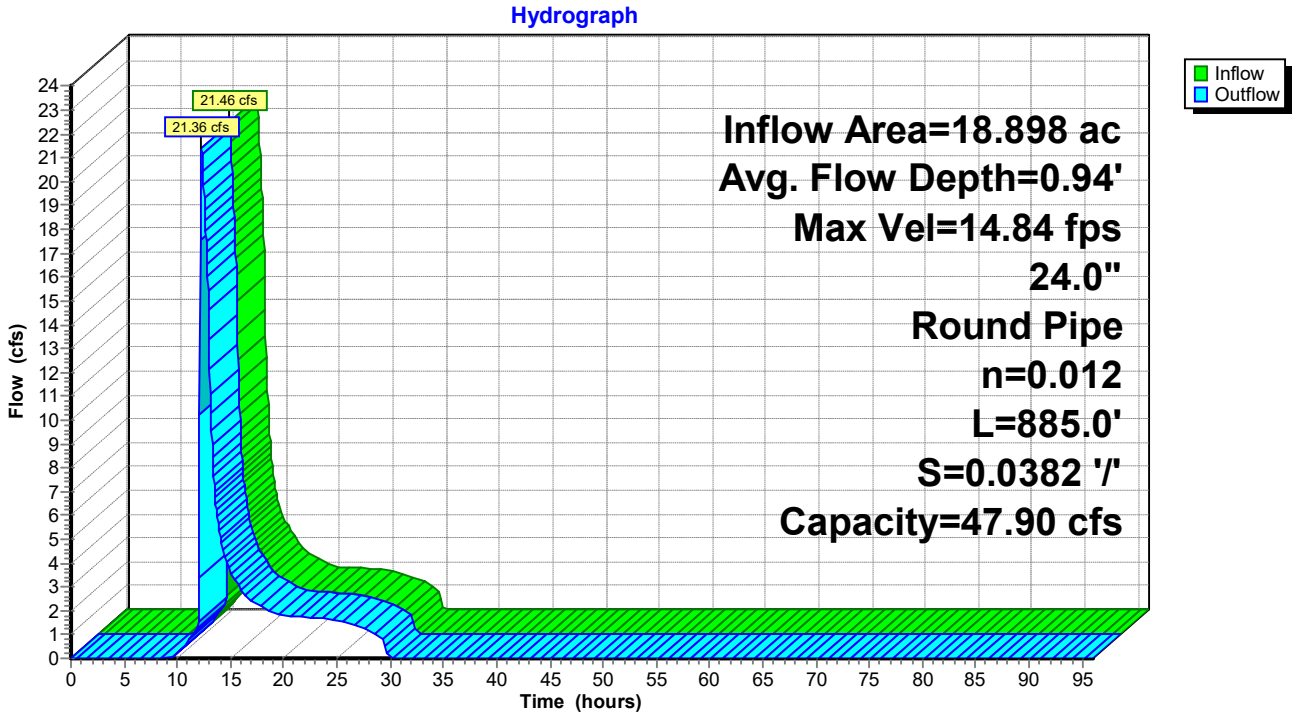
Subcatchment 10S: Basin #2 Inflow



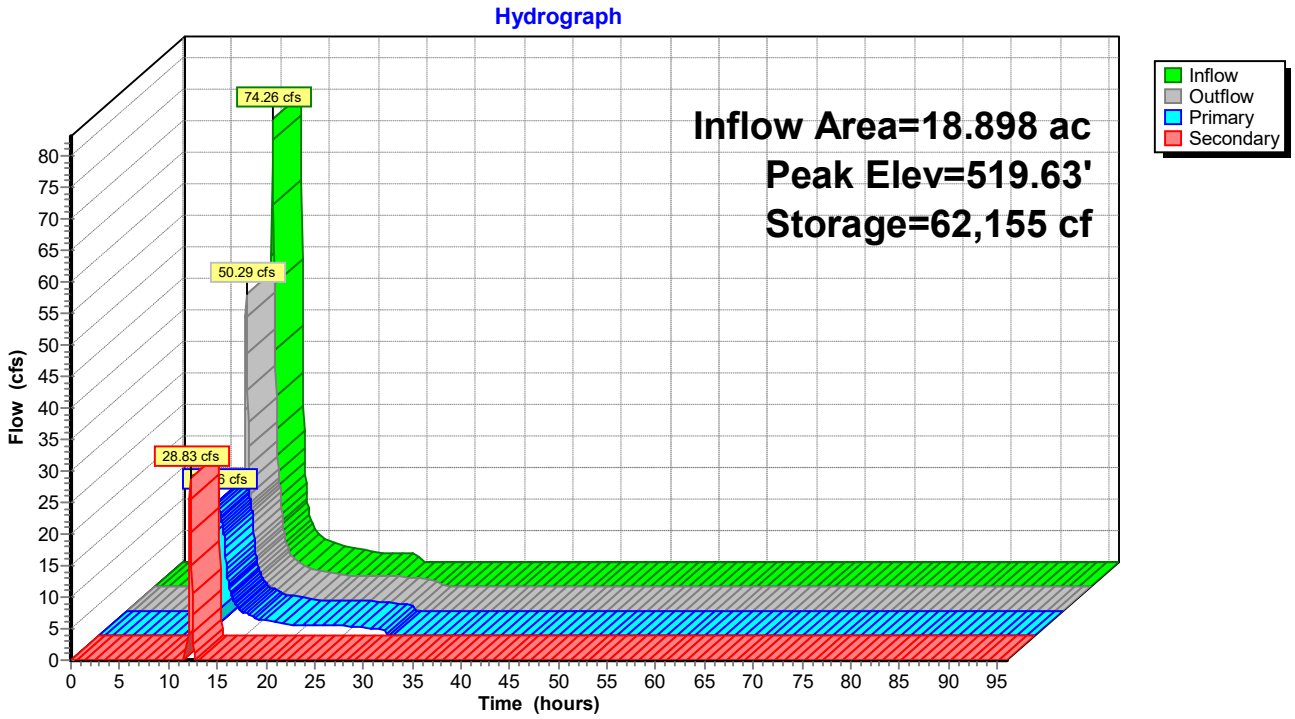
Subcatchment 12S: Un-detained Flow



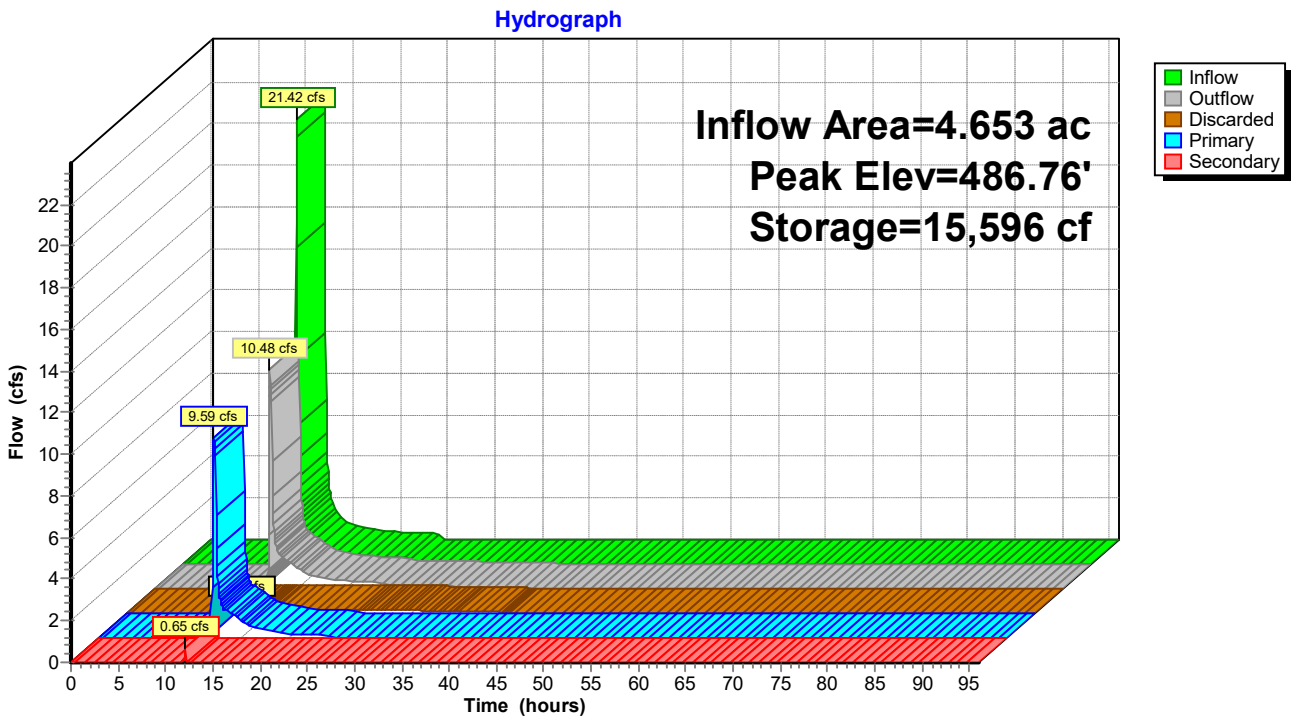
Reach 9R: Storm Sewer



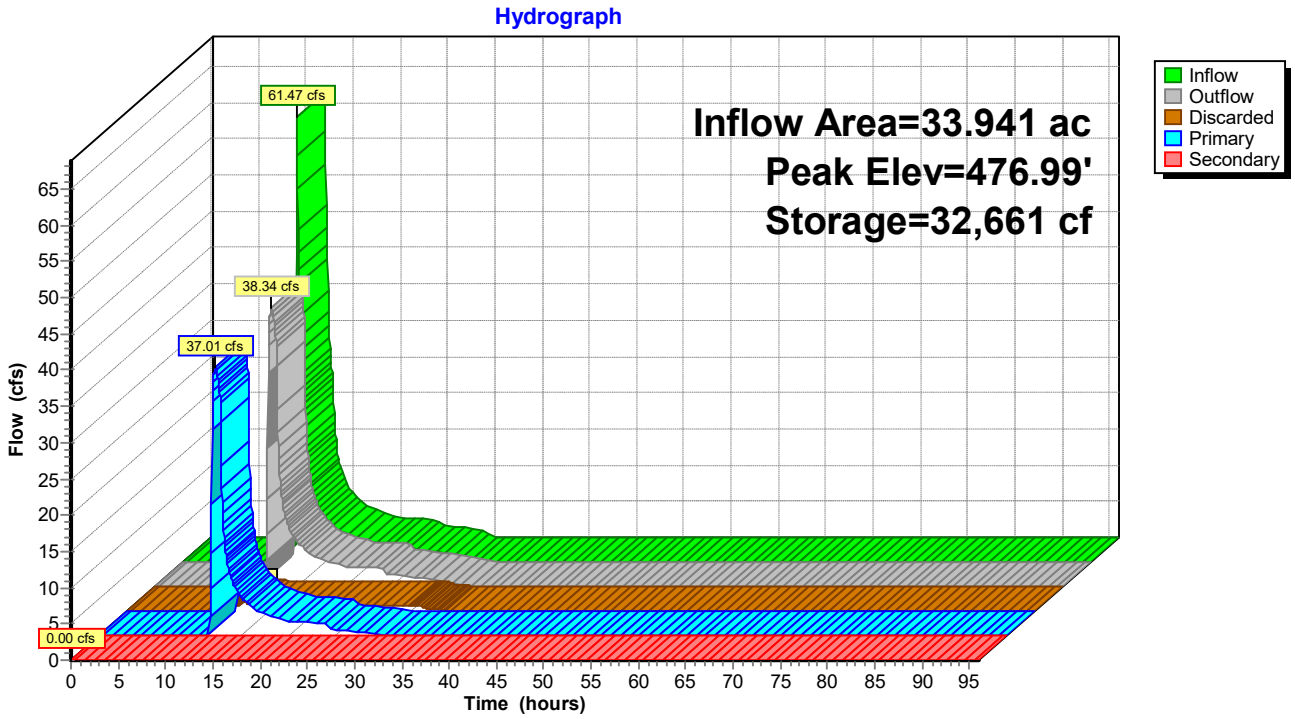
Pond 4P: Existing Basin



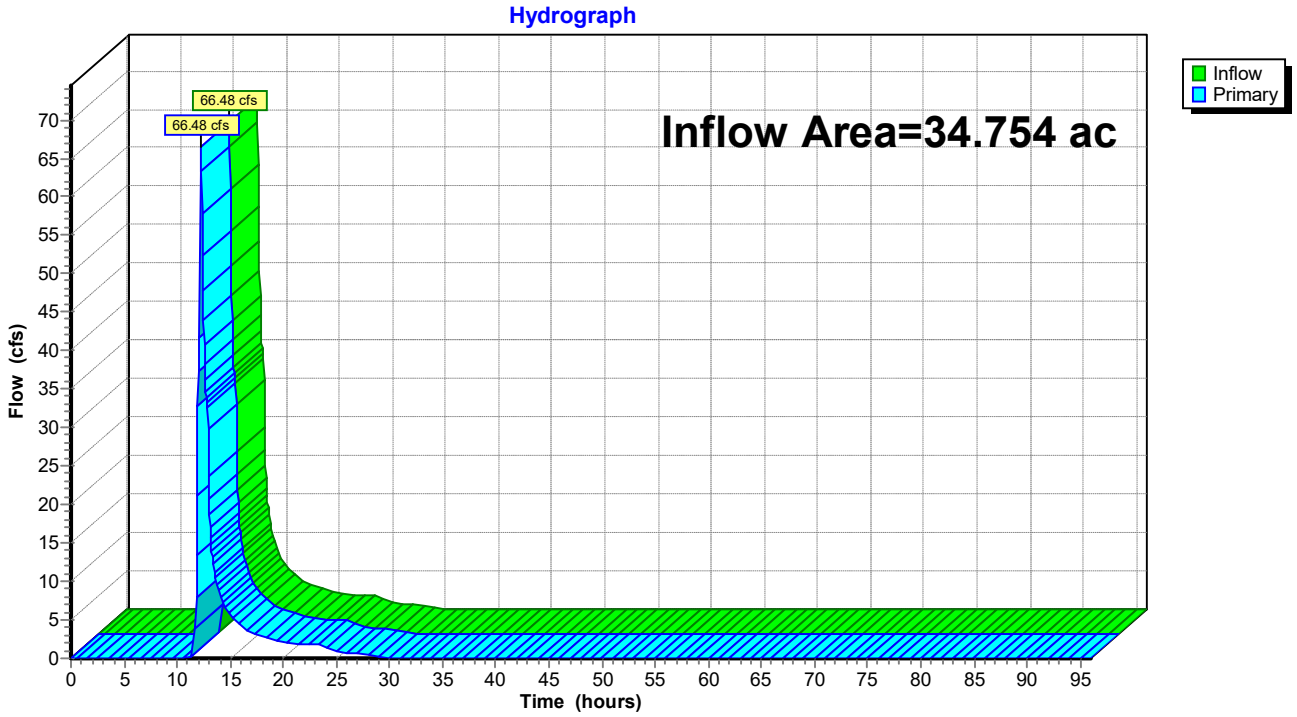
Pond 8P: Basin #1



Pond 11P: Basin #2



Link 13L: Total Post-Development



POST-CONSTRUCTION STORM WATER MANAGEMENT REPORT
MILLSTONE MEADOWS

APPENDIX B – VOLUME & WATER QUALITY ANALYSIS

dH Enterprises
2815 Penn Avenue
West Lawn, PA 19609
Phone: 610-927-4242

Project:	Millstone Meadows
Order No.:	22-001
Calc. by:	MDH
Date:	4/20/2023

Volume Calculations

2-year, 24-year SCS

P_2 = 3.24 inches

BMP Facilites - Within LOD Inflow Volumes

Infiltration Basin #1

	Area (sq.ft.)	Area (ac.)	CN	Ia	Q	Volume
Grass HSG B	22483	0.52	65	5.38	0.62	1161
Grass HSG C	0	0.00	77	2.99	1.24	0
Meadow HSG B	49584	1.14	58	7.24	0.36	1468
Meadow HSG C	0	0.00	78	2.82	1.30	0
Impervious	22698	0.52	98	0.20	3.01	5688
Total	94765	2.18				8318

Infiltration Basin #2

	Area (sq.ft.)	Area (ac.)	CN	Ia	Q	Volume
Grass HSG B	137518	3.16	65	5.38	0.62	7104
Grass HSG C	0	0.00	77	2.99	1.24	0
Meadow HSG B	22512	0.52	58	7.24	0.36	667
Meadow HSG C	0	0.00	78	2.82	1.30	0
Impervious	88178	2.02	98	0.20	3.01	22098
Total	248208	5.70				29869

Tree Plantings **400 cu.ft.**

Deciduous*	Evergreen*
25	25

* Only trees identifed as "Native" per the PA BMP manual have been counted

Amended Soils Area **2,241 cu.ft.**

	Area
Central Open Space	53784

Reforestation **2,761 cu.ft.**

Area
66258

dH Enterprises
2815 Penn Avenue
West Lawn, PA 19609
Phone: 610-927-4242

Project:	Millstone Meadows
Order No.:	22-001
Calc. by:	MDH
Date:	4/20/2023

Volume Control Calculations

Water Quality Requirements (Section 195-19)

Reduce runoff volume from the 2-year, 24 hour post-development to 2-year, 24 hour pre-development storm event

Pre-development 2-year Storm =	13,748	cu. ft.
Post-development 2-year Storm =	38,785	cu. ft.
Difference =	25,037	cu. ft.
BMP Volume =	**28,712**	cu. ft.
Difference =	(3,675)	cu. ft.

Infiltration Requirement (Section 195-20)

1 inch of runoff from all proposed Impervious Surfaces	-	cu. ft.
Area =	-	sq.ft.

Proposed BMP Volume =		**28,712**	**cu. ft.**
Infiltration Basins	23310 cu. ft.		
Non-structural BMPs	5402 cu. ft.		

General Information

Instructions | *General* | Volume | Rate | Quality

Project Name:	**Millstone Meadows**	Application Type:	**Individual NPDES Application**
County:	**Chester**	Municipality:	**East Goshen Township**
Project Type:	**Single-Family Housing**		◉ New Project ○ Minor / Major Amendment
Area: *(In Watershed)*	**15.86** acres	Total Earth Disturbance: *(In Watershed)*	**8.69** acres
No. of Post-Construction Discharge Points:	**1**	Start DP Numbering at:	**001**

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
001	15.05	7.88	0.00	2.63	Ridley Creek	HQ-CWF, MF	Yes
Undetained Areas	0.81	0.81	0.26	0.18	Ridley Creek	HQ-CWF, MF	
Totals:	**15.86**	**8.69**	**0.26**	**2.81**			

Volume Management

Project: Millstone Meadows

Instructions | General | *Volume* | Rate | Quality

2-Year / 24-Hour Storm Event (NOAA Atlas 14): **3.24** inches

Alternative 2-Year / 24-Hour Storm Event: inches

Alternative Source:

Pre-Construction Conditions: *No. Rows:* **4**

☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Pervious as Meadow	8.17	B	58	1.448	0.36	10,540
Pervious as Meadow	0.26	C	71	0.817	0.90	852
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	0.21	N/A	98	0.041	3.01	2,292
Impervious as Meadow	0.05	B	58	1.448	0.36	65
TOTAL (ACRES):	**8.69**				**TOTAL (CF):**	**13,748**

Post-Construction Conditions: *No. Rows:* **4**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	3.67	B	61	1.279	0.46	6,134
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	2.06	B	58	1.448	0.36	2,658
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	0.23	B	58	1.448	0.36	301

Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	2.72	N/A	98	0.041	3.01	29,693
	TOTAL (ACRES):	**8.68**			**TOTAL (CF):**	**38,785**

NET CHANGE IN VOLUME TO MANAGE (CF): **25,037**

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area: 25 **CREDIT (CF):** **150**

Number of new evergreen trees that will be planted within disturbed area: 25 **CREDIT (CF):** **250**

☑ Other (attach calculations):

Description: Non-structral BMP's (See Appendix for calculation) **CREDIT (CF):** **5,002**

Structural BMP Volume Credits: *No. Structural BMPs:* **2** *Start BMP Numbering at:* **1**

B-5

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Infiltration Basin	-	to BMP No. 2	2.18	8,318	3,636	0.56	42	No	1.0	5,306	**6,448**	
001	2	Infiltration Basin	-	Off-Site	5.70	29,869	8,327	1.50	18	No	1.0	6,815	**16,862**	
												Totals:	**23,310**	

INFILTRATION & ET CREDITS (CF): **23,310**

NET CHANGE IN VOLUME TO MANAGE (CF): **25,037**

TOTAL CREDITS (CF): **28,712**

VOLUME REQUIREMENT SATISFIED

Rate Control

Project: Millstone Meadows

Instructions | General | Volume | *Rate* | Quality

Precipitation Amounts:

NOAA 2-Year 24-Hour Storm Event (in):	**3.24**	Alternative 2-Year 24-Hour Storm Event (in):	
NOAA 10-Year 24-Hour Storm Event (in):	**4.76**	Alternative 10-Year 24-Hour Storm Event (in):	
NOAA 50-Year 24-Hour Storm Event (in):	**6.58**	Alternative 50-Year 24-Hour Storm Event (in):	
NOAA 100-Year 24-Hour Storm Event (in):	**7.48**	Alternative 100-Year 24-Hour Storm Event (in):	

B-6

☑ **Report Summary of Peak Rates Only**

Attach model input and output data or other calculations to support the rates reported below.

	Peak Discharge Rates (cfs)			
	Pre-Construction	**Post-Construction**	**Net Change**	
2-Year Storm:	**6.33**	**1.53**	**-4.80**	***Rate Control Satisfied***
10-Year Storm:	**21.84**	**15.91**	**-5.93**	***Rate Control Satisfied***
50-Year Storm:	**49.51**	**43.96**	**-5.55**	***Rate Control Satisfied***
100-Year Storm:	**78.40**	**66.48**	**-11.92**	***Rate Control Satisfied***

Water Quality

Project: Millstone Meadows

PRINT

Instructions | General | Volume | Rate | *Quality*

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Pervious as Meadow	Grassland/Herbaceous	8.17	B	10,540	48.8	0.22	2.30	32.12	0.14	1.51
Pervious as Meadow	Grassland/Herbaceous	0.26	C	852	48.8	0.22	2.30	2.59	0.01	0.12
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	Residential	0.21	N/A	2,292	65.0	0.29	2.05	9.30	0.04	0.29
Impervious as Meadow	Grassland/Herbaceous	0.05	B	65	48.8	0.22	2.30	0.20	0.00	0.01
	TOTAL (ACRES):	**8.69**					**TOTALS:**	**44.21**	**0.20**	**1.94**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	3.67	B	6,134	78.0	0.25	1.25	29.87	0.10	0.48

Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	Grassland/Herbaceous	2.06	B	2,658	48.8	0.22	2.30	8.10	0.04	0.38
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	Grassland/Herbaceous	0.23	B	301	48.8	0.22	2.30	0.92	0.00	0.04
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	Residential	2.72	N/A	29,693	65.0	0.29	2.05	120.52	0.54	3.80
	TOTAL (ACRES):	**8.68**					**TOTALS:**	**159.41**	**0.67**	**4.70**

POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS):	**115.19**	**0.48**	**2.77**

☑ **Characterize Undetained Areas (for Untreated Stormwater)** *No. Rows:* **4**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)		**B**				
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	**0.4**	**B**	**58**	**1.448**	**0.36**	**516**
Meadow-Continuous Grass, Protected from Grazing and Generally Mowed for Hay	**0.23**	**C**	**71**	**0.817**	**0.90**	**753**
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	**0.18**	**N/A**	**98**	**0.041**	**3.01**	**1,965**

Non-Structural BMP Water Quality Credits:

☑ Pervious Undetained Area Credit

TSS	TP	TN
0.97	**0.00**	**0.03**

☐ Other (attach calculations)

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN
001	1	Infiltration Basin	-	2.18	8,318	6,448		1,870	-	-	-	-	-	-
001	2	Infiltration Basin	-	5.70	29,869	16,862		13,007	10.00	0.24	0.96	8.12	0.19	0.78

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	**8.12**	**0.19**	**0.78**
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	**11.84**	**0.05**	**0.43**
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):	**0.97**	**0.00**	**0.03**
NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	**19.00**	**0.24**	**1.19**
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	**44.21**	**0.20**	**1.94**

WATER QUALITY REQUIREMENT NOT SATISFIED

B-9

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its website or, if modifications were made, an explanation of the modifications made is attached to this spreadsheet.

Michael Hartman	4/20/2023
Spreadsheet User Name	Date

POST-CONSTRUCTION STORM WATER MANAGEMENT REPORT
MILLSTONE MEADOWS

APPENDIX C – STORM WATER CONVEYANCE SYSTEM DESIGN

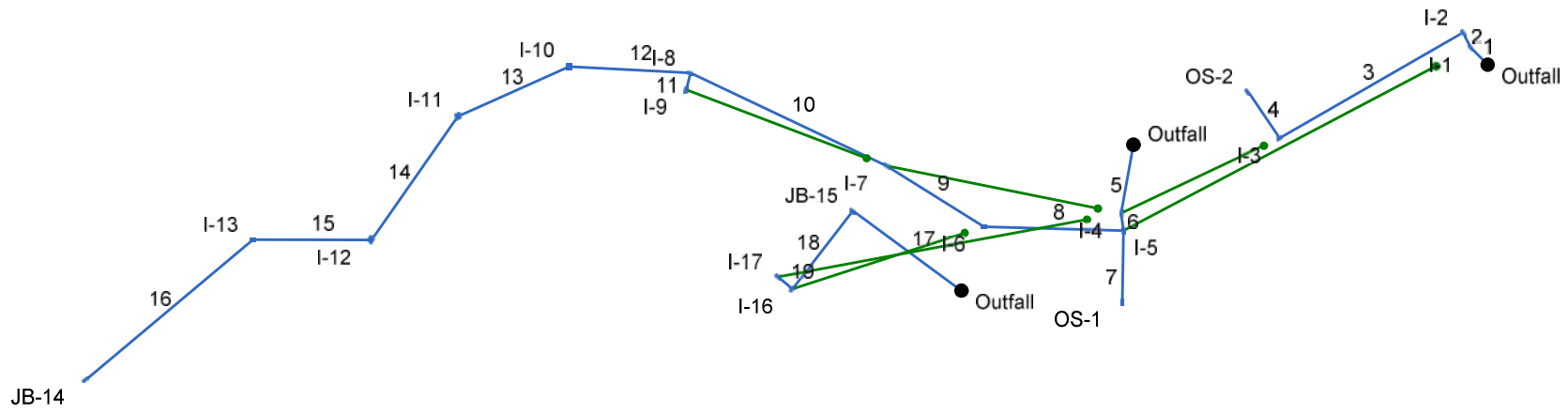
dH Enterprises
2815 Penn Avenue
West Lawn, PA 19609
Phone: 610-927-4242

Project:	Millstone Meadows
Order No.:	22-001
Calc. by:	MDH
Date:	4/20/2023

Sub-Basin Calculation Sheet

Drainage Area	Grass HSG B 0.26	Grass HSG C 0.32	Meadow HSG B 0.37	Meadow HSG C 0.50	Wooded HSG B 0.18	Wooded HSG 0.20	Impervious 0.97	Total Area	C_{avg}
I-1	0.00	0.00	0.15	0.00	0.00	0.00	0.06	0.22	0.55
I-2	0.00	0.00	0.05	0.00	0.00	0.00	0.03	0.08	0.62
I-3	0.00	0.00	0.04	0.00	0.00	0.00	0.03	0.07	0.63
I-4	0.21	0.00	0.01	0.00	0.00	0.00	0.11	0.33	0.50
I-5	0.00	0.00	0.06	0.00	0.00	0.00	0.02	0.08	0.54
I-6	0.08	0.00	0.01	0.00	0.00	0.00	0.07	0.15	0.57
I-7	0.26	0.00	0.00	0.00	0.00	0.00	0.18	0.44	0.56
I-8	0.16	0.00	0.48	0.00	0.00	0.00	0.17	0.81	0.47
I-9	0.76	0.00	0.00	0.00	0.00	0.00	0.10	0.86	0.34
I-10	0.23	0.00	0.69	0.00	0.00	0.00	0.21	1.13	0.46
I-11	0.12	0.00	0.00	0.00	0.00	0.00	0.12	0.24	0.61
I-12	0.47	0.00	0.70	0.00	0.00	0.00	0.34	1.51	0.47
I-13	0.28	0.00	2.13	0.00	0.00	0.00	0.18	2.59	0.40
I-16	0.43	0.00	1.14	0.00	0.00	0.00	0.46	2.03	0.48
I-17	0.15	0.00	0.00	0.00	0.00	0.00	0.06	0.21	0.47
B-1	0.12	0.00	1.74	0.00	0.00	0.00	0.08	1.94	0.39
B-2	0.40	0.00	1.79	0.00	0.00	0.00	0.53	2.72	0.47
BP-1	0.00	0.00	0.16	0.23	0.00	0.00	0.05	0.45	0.51

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: 22-001.stm	Number of lines: 19	Date: 4/20/2023

Storm Sewers v2022.00

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	16.000	-137.977	Comb	0.00	0.22	0.55	5.0	456.00	2.50	456.40	24	Cir	0.012	0.50	461.82	I-1 - EW-1
2	1	11.000	16.403	Comb	0.00	0.08	0.62	5.0	456.55	2.55	456.83	24	Cir	0.012	1.50	461.82	I-2 - I-1
3	2	146.000	-85.471	Comb	0.00	0.07	0.63	5.0	457.84	7.57	468.89	24	Cir	0.012	1.48	473.04	I-3 - I-2
4	3	37.000	79.712	MH	16.20	0.00	0.00	5.0	469.04	2.59	470.00	24	Cir	0.012	1.00	0.00	OS-2 - I-3
5	End	44.000	101.272	Comb	0.00	0.33	0.50	5.0	474.00	2.00	474.88	36	Cir	0.012	0.58	481.32	I-4 - ES-1
6	5	11.000	-19.471	Comb	0.00	0.08	0.54	5.0	475.91	3.91	476.34	36	Cir	0.012	1.50	481.32	I-5 - I-4
7	6	45.000	9.375	MH	2.52	0.00	0.00	5.0	477.84	12.58	483.50	15	Cir	0.012	1.00	487.21	OS-1 - I-5
8	6	99.000	99.606	Comb	0.00	0.15	0.57	5.0	476.84	5.11	481.90	30	Cir	0.012	0.78	486.40	I-6 - I-5
9	8	79.000	27.636	Comb	0.00	0.44	0.56	5.0	482.40	4.43	485.90	24	Cir	0.012	0.50	490.07	I-7 - I-6
10	9	151.000	-6.253	Comb	0.00	0.81	0.47	5.0	486.05	3.99	492.07	24	Cir	0.012	2.02	496.22	I-8 - I-7
11	10	11.000	-96.999	Comb	0.00	0.86	0.34	5.0	492.84	1.18	492.97	15	Cir	0.012	1.00	496.22	I-9 - I-8
12	10	86.000	-20.194	Comb	0.00	1.13	0.46	5.0	492.22	3.44	495.18	24	Cir	0.012	0.70	499.33	I-10 - I-8
13	12	85.000	-24.215	Comb	0.00	0.24	0.61	5.0	495.33	3.94	498.68	24	Cir	0.012	0.84	502.83	I-11 - I-10
14	13	99.000	-30.102	Comb	0.00	1.51	0.47	5.0	498.83	3.92	502.71	24	Cir	0.012	1.23	506.86	I-12 - I-11
15	14	84.000	51.838	Grate	0.00	2.59	0.40	5.0	502.86	1.77	504.35	24	Cir	0.012	0.98	508.00	I-13 - I-12
16	15	148.000	-36.756	MH	16.20	0.00	0.00	5.0	504.50	2.24	507.81	24	Cir	0.012	1.00	515.25	JB-14 - I-13
17	End	92.000	-146.940	MH	0.00	0.00	0.00	5.0	484.00	3.00	486.76	15	Cir	0.012	0.99	491.77	JB-15 - ES-2
18	17	65.000	-82.017	Comb	0.00	2.03	0.48	5.0	488.52	6.98	493.06	15	Cir	0.012	1.49	496.59	I-16 - JB-15
19	18	13.000	84.498	Comb	0.00	0.21	0.47	5.0	493.21	1.00	493.34	15	Cir	0.012	1.00	496.59	I-17 - I-16

Project File: 22-001.stm | Number of lines: 19 | Date: 4/20/2023

Storm Sewers v2022.00

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	16.000	0.22	0.37	0.55	0.12	0.21	5.0	5.3	7.3	17.76	38.74	6.87	24	2.50	456.00	456.40	457.55	457.92	458.21	461.82	I-1 - EW-1
2	1	11.000	0.08	0.15	0.62	0.05	0.09	5.0	5.3	7.3	16.88	39.09	7.08	24	2.55	456.55	456.83	457.92	458.31	461.82	461.82	I-2 - I-1
3	2	146.000	0.07	0.07	0.63	0.04	0.04	5.0	5.1	7.4	16.52	67.41	12.22	24	7.57	457.84	468.89	458.51	470.35	461.82	473.04	I-3 - I-2
4	3	37.000	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	16.20	39.47	7.02	24	2.59	469.04	470.00	470.35	471.45	473.04	0.00	OS-2 - I-3
5	End	44.000	0.33	8.14	0.50	0.17	3.63	5.0	6.5	6.9	43.67	102.2	8.39	36	2.00	474.00	474.88	476.00	477.03	476.33	481.32	I-4 - ES-1
6	5	11.000	0.08	7.81	0.54	0.04	3.46	5.0	6.5	6.9	42.55	142.9	12.79	36	3.91	475.91	476.34	477.03	478.46	481.32	481.32	I-5 - I-4
7	6	45.000	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	2.52	24.81	4.07	15	12.58	477.84	483.50	478.46	484.14	481.32	487.21	OS-1 - I-5
8	6	99.000	0.15	7.73	0.57	0.09	3.42	5.0	6.3	6.9	39.91	100.4	10.40	30	5.11	476.84	481.90	478.46	484.03	481.32	486.40	I-6 - I-5
9	8	79.000	0.44	7.58	0.56	0.25	3.33	5.0	6.2	7.0	39.42	51.57	13.53	24	4.43	482.40	485.90	484.03	487.85	486.40	490.07	I-7 - I-6
10	9	151.000	0.81	7.14	0.47	0.38	3.09	5.0	6.0	7.0	37.91	48.92	12.45	24	3.99	486.05	492.07	487.85	494.01	490.07	496.22	I-8 - I-7
11	10	11.000	0.86	0.86	0.34	0.29	0.29	5.0	5.0	7.4	2.16	7.61	2.82	15	1.18	492.84	492.97	494.01	493.56	496.22	496.22	I-9 - I-8
12	10	86.000	1.13	5.47	0.46	0.52	2.41	5.0	5.9	7.1	33.28	45.46	11.00	24	3.44	492.22	495.18	494.01	497.08	496.22	499.33	I-10 - I-8
13	12	85.000	0.24	4.34	0.61	0.15	1.89	5.0	5.7	7.1	29.69	48.64	9.97	24	3.94	495.33	498.68	497.08	500.54	499.33	502.83	I-11 - I-10
14	13	99.000	1.51	4.10	0.47	0.71	1.75	5.0	5.6	7.2	28.75	48.51	9.79	24	3.92	498.83	502.71	500.54	504.55	502.83	506.86	I-12 - I-11
15	14	84.000	2.59	2.59	0.40	1.04	1.04	5.0	5.4	7.2	23.71	32.63	8.30	24	1.77	502.86	504.35	504.55	506.08	506.86	508.00	I-13 - I-12
16	15	148.000	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	16.20	36.64	6.37	24	2.24	504.50	507.81	506.08	509.26	508.00	515.25	JB-14 - I-13
17	End	92.000	0.00	2.24	0.00	0.00	1.07	5.0	5.2	7.3	7.84	12.12	8.66	15	3.00	484.00	486.76	484.73	487.87	485.52	491.77	JB-15 - ES-2
18	17	65.000	2.03	2.24	0.48	0.97	1.07	5.0	5.1	7.3	7.88	18.49	10.65	15	6.98	488.52	493.06	489.09	494.17	491.77	496.59	I-16 - JB-15
19	18	13.000	0.21	0.21	0.47	0.10	0.10	5.0	5.0	7.4	0.73	7.00	1.75	15	1.00	493.21	493.34	494.17	493.67	496.59	496.59	I-17 - I-16

Project File: 22-001.stm | Number of lines: 19 | Run Date: 4/20/2023

NOTES:Intensity = 48.54 / (Inlet time + 9.00) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	I-1	0.89	0.76	1.20	0.45	Comb	3.0	4.00	0.00	4.00	2.00	0.075	2.00	0.020	0.020	0.015	0.12	5.82	0.09	3.59	0.2	Off
2	I-2	0.37	0.56	0.76	0.17	Comb	3.0	4.00	0.00	4.00	2.00	0.075	2.00	0.020	0.020	0.015	0.09	4.69	0.06	2.48	0.2	Off
3	I-3	0.33	1.57	1.33	0.56	Comb	3.0	4.00	0.00	4.00	2.00	0.075	2.00	0.020	0.020	0.015	0.12	6.13	0.09	3.89	0.2	2
4	OS-2	16.20*	0.00	0.00	16.20	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	I-4	1.22	2.52	2.17	1.57	Comb	3.0	4.00	0.00	4.00	2.00	0.050	2.00	0.020	0.020	0.015	0.17	8.54	0.14	6.16	0.2	3
6	I-5	0.32	1.92	1.48	0.76	Comb	3.0	4.00	0.00	4.00	2.00	0.050	2.00	0.020	0.020	0.015	0.14	7.04	0.11	4.69	0.2	1
7	OS-1	2.52*	0.00	0.00	2.52	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
8	I-6	0.63	3.70	2.41	1.92	Comb	3.0	4.00	0.00	4.00	2.00	0.045	2.00	0.020	0.020	0.015	0.18	9.20	0.15	6.78	0.2	6
9	I-7	1.82	3.30	2.72	2.41	Comb	3.0	4.00	0.00	4.00	2.00	0.045	2.00	0.020	0.020	0.015	0.20	9.80	0.16	7.38	0.2	5
10	I-8	2.81	2.54	2.79	2.57	Comb	3.0	4.00	0.00	4.00	2.00	0.030	2.00	0.020	0.020	0.015	0.21	10.75	0.18	8.16	0.2	9
11	I-9	2.16	0.00	1.42	0.74	Comb	3.0	4.00	0.00	4.00	2.00	0.030	2.00	0.020	0.020	0.015	0.15	7.65	0.12	5.11	0.2	9
12	I-10	3.84	1.49	2.79	2.54	Comb	3.0	4.00	0.00	4.00	2.00	0.040	2.00	0.020	0.020	0.015	0.20	10.16	0.17	7.70	0.2	10
13	I-11	1.08	2.49	2.08	1.49	Comb	3.0	4.00	0.00	4.00	2.00	0.040	2.00	0.020	0.020	0.015	0.17	8.75	0.14	6.30	0.2	12
14	I-12	5.25	0.00	2.76	2.49	Comb	3.0	4.00	0.00	4.00	2.00	0.040	2.00	0.020	0.020	0.015	0.20	10.11	0.17	7.64	0.2	13
15	I-13	7.66	0.00	7.66	0.00	Grate	0.0	0.00	4.50	4.00	2.00	Sag	2.00	0.020	0.020	0.000	0.48	23.98	0.49	23.98	0.2	Off
16	JB-14	16.20*	0.00	0.00	16.20	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	JB-15	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
18	I-16	7.20	0.00	3.51	3.70	Comb	3.0	4.00	0.00	4.00	2.00	0.060	2.00	0.020	0.020	0.015	0.21	10.55	0.18	8.21	0.2	8
19	I-17	0.73	0.00	0.62	0.11	Comb	3.0	4.00	0.00	4.00	2.00	0.060	2.00	0.020	0.020	0.015	0.09	4.47	0.06	2.23	0.2	5

Project File: 22-001.stm | Number of lines: 19 | Run Date: 4/20/2023

NOTES: Inlet N-Values = 0.016; Intensity = 48.54 / (Inlet time + 9.00) ^ 0.71; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	17.76	456.00	457.55	1.55	2.56	6.80	0.75	458.30	0.000	16.000	456.40	457.92 j	1.52**	2.56	6.95	0.75	458.67	0.000	0.000	n/a	0.50	n/a
2	24	16.88	456.55	457.92	1.37	2.29	7.38	0.71	458.63	0.000	11.000	456.83	458.31	1.48**	2.49	6.77	0.71	459.02	0.000	0.000	n/a	1.50	n/a
3	24	16.52	457.84	458.51	0.67*	0.93	17.73	0.70	459.21	0.000	146.000	468.89	470.35	1.46**	2.46	6.70	0.70	471.05	0.000	0.000	n/a	1.48	n/a
4	24	16.20	469.04	470.35	1.31	2.19	7.40	0.69	471.04	0.000	37.000	470.00	471.45	1.45**	2.44	6.64	0.69	472.14	0.000	0.000	n/a	1.00	n/a
5	36	43.67	474.00	476.00	2.00	5.01	8.72	1.01	477.01	0.000	44.000	474.88	477.03	2.15**	5.42	8.05	1.01	478.04	0.000	0.000	n/a	0.58	0.58
6	36	42.55	475.91	477.03	1.12*	2.41	17.63	0.98	478.02	0.000	11.000	476.34	478.46	2.12**	5.35	7.96	0.98	479.45	0.000	0.000	n/a	1.50	1.48
7	15	2.52	477.84	478.46	0.62	0.61	4.12	0.25	478.72	0.000	45.000	483.50	484.14	0.64**	0.63	4.02	0.25	484.39	0.000	0.000	n/a	1.00	n/a
8	30	39.91	476.84	478.46	1.62	3.37	11.83	1.25	479.72	0.000	99.000	481.90	484.03	2.13**	4.45	8.97	1.25	485.28	0.000	0.000	n/a	0.78	n/a
9	24	39.42	482.40	484.03	1.63	2.73	14.42	2.48	486.51	0.000	79.000	485.90	487.85	1.95**	3.12	12.64	2.48	490.33	0.000	0.000	n/a	0.50	n/a
10	24	37.91	486.05	487.85	1.80	2.98	12.74	2.30	490.15	0.000	151.000	492.07	494.01	1.94**	3.11	12.17	2.30	496.31	0.000	0.000	n/a	2.02	4.65
11	15	2.16	492.84	494.01	1.17	0.56	1.81	0.23	494.24	0.000	11.000	492.97	493.56	0.59**	0.56	3.83	0.23	493.78	0.000	0.000	n/a	1.00	0.23
12	24	33.28	492.22	494.01	1.79	2.97	11.22	1.81	495.82	0.000	86.000	495.18	497.08	1.90**	3.09	10.78	1.81	498.89	0.000	0.000	n/a	0.70	n/a
13	24	29.69	495.33	497.08	1.75	2.92	10.17	1.48	498.57	0.000	85.000	498.68	500.54	1.86**	3.04	9.76	1.48	502.02	0.000	0.000	n/a	0.84	1.24
14	24	28.75	498.83	500.54	1.71	2.86	10.07	1.40	501.94	0.000	99.000	502.71	504.55	1.84**	3.02	9.50	1.40	505.96	0.000	0.000	n/a	1.23	1.73
15	24	23.71	502.86	504.55	1.69	2.83	8.37	1.05	505.60	0.000	84.000	504.35	506.08	1.73**	2.88	8.23	1.05	507.13	0.000	0.000	n/a	0.98	n/a
16	24	16.20	504.50	506.08	1.58	2.44	6.10	0.69	506.76	0.000	148.000	507.81	509.26 j	1.45**	2.44	6.64	0.69	509.95	0.000	0.000	n/a	1.00	n/a
17	15	7.84	484.00	484.73	0.73*	0.75	10.50	0.72	485.46	0.000	92.000	486.76	487.87	1.11**	1.15	6.82	0.72	488.59	0.000	0.000	n/a	0.99	0.72
18	15	7.88	488.52	489.09	0.57*	0.55	14.46	0.73	489.82	0.000	65.000	493.06	494.17	1.11**	1.15	6.85	0.73	494.90	0.000	0.000	n/a	1.49	1.09
19	15	0.73	493.21	494.17	0.96	0.26	0.72	0.12	494.29	0.000	13.000	493.34	493.67	0.33**	0.26	2.77	0.12	493.79	0.000	0.000	n/a	1.00	0.12

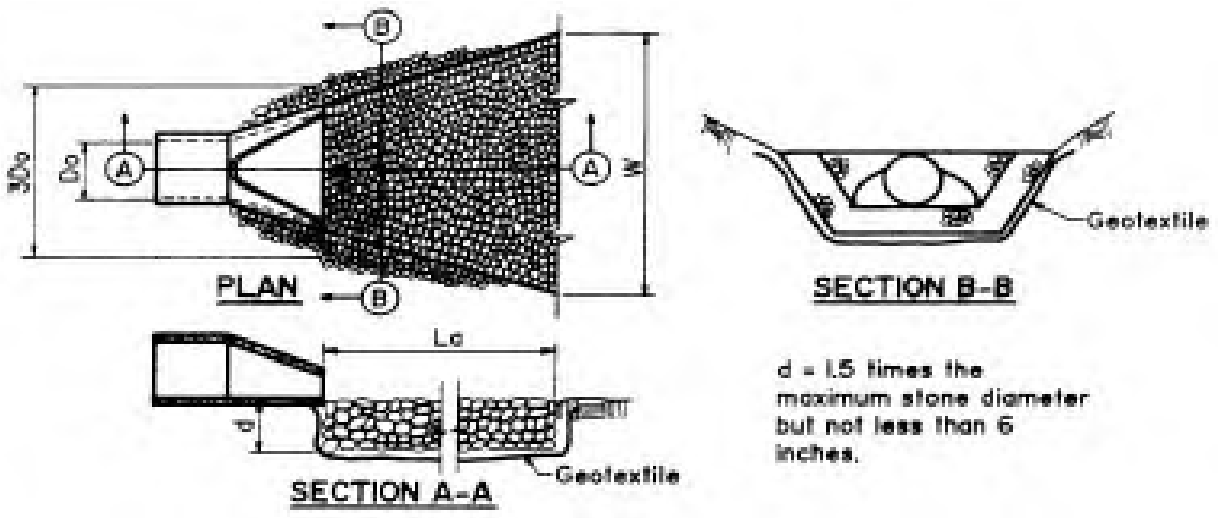
Project File: 22-001.stm | Number of lines: 19 | Run Date: 4/20/2023

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

dH Enterprises
2815 Penn Avenue
West Lawn, PA 19609
Phone: 610-927-4242

Project:	Millstone Meadows
Order No.:	22-001
Calc. by:	MDH
Date:	4/20/2023

Riprap Apron Outlet Protection Design



Outlet Number	Pipe Dia DO (in.)	Slope (ft/ft)	Tail Water Min/Max	Mannings "n"	Q_d (cfs)	V_d (fps)	Allow Veloc.	Rip-Rap Size	3Do (ft)	La (ft)	W (ft)
EW-1	24	0.025	Min	0.0130	17.76	6.22	9.0	R-4	6.00	12.00	18.00
ES-1	36	0.020	Min	0.0130	43.67	12.96	13.0	R-6	9.00	23.00	32.00
ES-2	15	0.030	Min	0.0130	7.82	9.77	11.5	R-5	3.75	10.00	13.75

POST-CONSTRUCTION STORM WATER MANAGEMENT REPORT
MILLSTONE MEADOWS

APPENDIX D – SUPPORTING INFORMATION

dH Enterprises
2815 Penn Avenue
West Lawn, PA 19609
Phone: 610-927-4242

Project:	Millstone Meadows
Order No.:	22-001
Calc. by:	MDH
Date:	4/20/2023

Support Pages

Rainfall, P (in.)

1-yr	2.69	25-yr	5.75
2-yr	3.24	50-yr	6.58
5-yr	4.07	100-yr	7.48
10-yr	4.76		

Cover	C*	CN
Meadow HSG B	0.37	58
Meadow HSG C	0.50	78
Wooded HSG B	0.18	60
Wooded HSG C	0.20	73
Grass HSG B	0.26	65
Grass HSG C	0.32	77
Grass HSG D	0.39	82
Impervious	0.97	98

* Coverages assumed for 6%+ Slope Range and 25-year storm event or greater

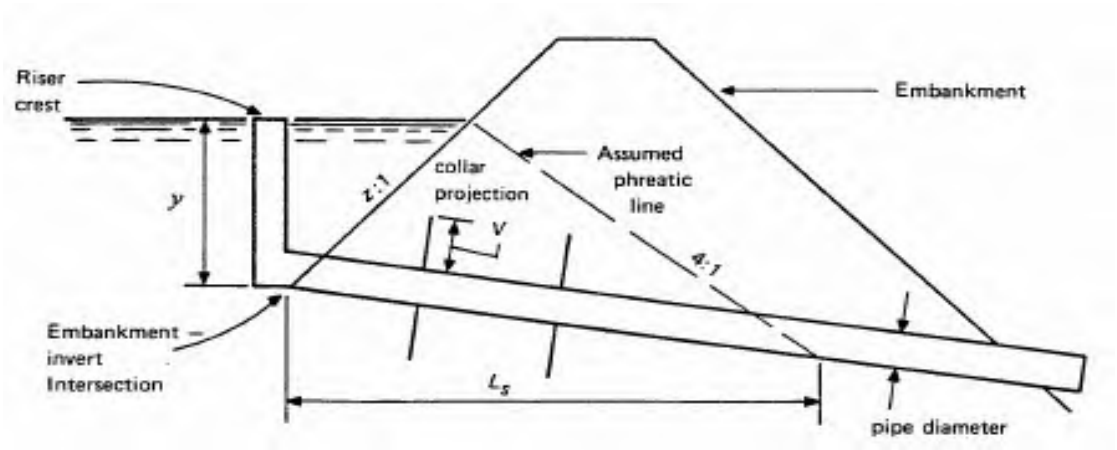
dH Enterprises
2815 Penn Avenue
West Lawn, PA 19609
Phone: 610-927-4242

Project:	Millstone Meadows
Order No.:	22-001
Calc. by:	MDH
Date:	4/20/2023

Support Pages

Infiltration/Detention Basin Design

Anti-Seep Collar Design

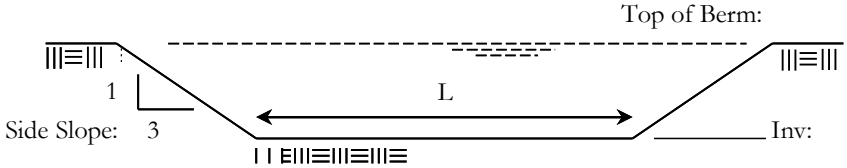


Y (ft) = Design Storm Elevation - Outlet Pipe Invert

V, projection (ft) = 115% L_s / # of Collars

L_s (ft) = Y * (Z + 4) * [1 + Pipe Slope/(0.25 - Pipe Slope)]

Emergency Spillway Calculation



H = $(Q/CL)^{2/3}$

C = 3

Q = 100-year Basin Inflow

Freeboard = Top of Berm - (Spillway Invert + H)

NOAA Atlas 14, Volume 2, Version 3
Location name: West Chester, Pennsylvania, USA*
Latitude: 40.0162°, Longitude: -75.5635°
Elevation: 493.07 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.351 (0.323-0.383)	0.418 (0.385-0.456)	0.489 (0.448-0.533)	0.538 (0.492-0.586)	0.595 (0.541-0.648)	0.633 (0.573-0.690)	0.671 (0.604-0.731)	0.703 (0.629-0.768)	0.738 (0.655-0.809)	0.764 (0.674-0.840)
10-min	0.561 (0.515-0.612)	0.669 (0.615-0.730)	0.783 (0.717-0.854)	0.860 (0.787-0.938)	0.948 (0.863-1.03)	1.01 (0.912-1.10)	1.07 (0.960-1.16)	1.11 (0.998-1.22)	1.17 (1.04-1.28)	1.20 (1.06-1.32)
15-min	0.701 (0.644-0.765)	0.841 (0.773-0.917)	0.990 (0.907-1.08)	1.09 (0.995-1.19)	1.20 (1.09-1.31)	1.28 (1.16-1.39)	1.35 (1.21-1.47)	1.41 (1.26-1.54)	1.47 (1.30-1.61)	1.51 (1.33-1.66)
30-min	0.961 (0.883-1.05)	1.16 (1.07-1.27)	1.41 (1.29-1.53)	1.58 (1.44-1.72)	1.78 (1.62-1.94)	1.92 (1.74-2.10)	2.06 (1.86-2.25)	2.19 (1.96-2.39)	2.34 (2.08-2.56)	2.44 (2.16-2.69)
60-min	1.20 (1.10-1.31)	1.46 (1.34-1.59)	1.80 (1.65-1.97)	2.05 (1.88-2.24)	2.37 (2.16-2.58)	2.61 (2.36-2.84)	2.84 (2.56-3.10)	3.07 (2.75-3.35)	3.35 (2.98-3.68)	3.57 (3.15-3.93)
2-hr	1.43 (1.30-1.57)	1.74 (1.58-1.91)	2.16 (1.96-2.38)	2.48 (2.25-2.73)	2.91 (2.62-3.19)	3.24 (2.90-3.56)	3.57 (3.18-3.92)	3.90 (3.45-4.30)	4.35 (3.80-4.80)	4.69 (4.06-5.19)
3-hr	1.56 (1.42-1.72)	1.89 (1.72-2.08)	2.35 (2.13-2.59)	2.70 (2.45-2.98)	3.17 (2.86-3.49)	3.54 (3.17-3.89)	3.91 (3.48-4.29)	4.28 (3.77-4.71)	4.77 (4.16-5.27)	5.15 (4.45-5.70)
6-hr	1.92 (1.75-2.12)	2.32 (2.11-2.57)	2.88 (2.62-3.18)	3.33 (3.02-3.68)	3.96 (3.56-4.36)	4.46 (3.98-4.91)	4.99 (4.41-5.49)	5.54 (4.85-6.09)	6.30 (5.42-6.96)	6.91 (5.86-7.64)
12-hr	2.33 (2.12-2.60)	2.81 (2.55-3.14)	3.51 (3.19-3.91)	4.10 (3.70-4.56)	4.94 (4.41-5.47)	5.64 (4.99-6.23)	6.39 (5.59-7.07)	7.20 (6.22-7.97)	8.37 (7.08-9.29)	9.33 (7.76-10.4)
24-hr	2.69 (2.47-2.95)	3.24 (2.97-3.56)	4.07 (3.72-4.46)	4.76 (4.34-5.20)	5.75 (5.22-6.27)	6.58 (5.95-7.18)	7.48 (6.72-8.14)	8.45 (7.54-9.19)	9.86 (8.71-10.7)	11.0 (9.65-12.0)
2-day	3.12 (2.85-3.42)	3.76 (3.44-4.13)	4.72 (4.31-5.19)	5.51 (5.02-6.05)	6.62 (6.01-7.25)	7.54 (6.82-8.26)	8.52 (7.66-9.33)	9.56 (8.54-10.5)	11.0 (9.78-12.1)	12.3 (10.8-13.4)
3-day	3.29 (3.01-3.61)	3.96 (3.63-4.36)	4.96 (4.54-5.46)	5.78 (5.27-6.35)	6.93 (6.29-7.60)	7.89 (7.13-8.64)	8.90 (8.00-9.75)	9.98 (8.92-10.9)	11.5 (10.2-12.6)	12.8 (11.2-14.0)
4-day	3.46 (3.16-3.81)	4.17 (3.81-4.58)	5.21 (4.76-5.73)	6.05 (5.52-6.65)	7.25 (6.58-7.95)	8.24 (7.45-9.03)	9.28 (8.35-10.2)	10.4 (9.29-11.4)	12.0 (10.6-13.1)	13.3 (11.7-14.5)
7-day	4.04	4.84	5.99	6.92	8.27	9.38	10.6	11.8	13.6	15.0

NOAA Atlas 14, Volume 2, Version 3
Location name: West Chester, Pennsylvania, USA*
Latitude: 40.0168°, Longitude: -75.5633°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.21** (3.88-4.60)	**5.02** (4.62-5.47)	**5.87** (5.38-6.40)	**6.46** (5.90-7.03)	**7.14** (6.49-7.78)	**7.60** (6.88-8.28)	**8.05** (7.25-8.77)	**8.44** (7.55-9.22)	**8.86** (7.86-9.71)	**9.17** (8.09-10.1)
10-min	**3.37** (3.09-3.67)	**4.01** (3.69-4.38)	**4.70** (4.30-5.12)	**5.16** (4.72-5.63)	**5.69** (5.18-6.20)	**6.05** (5.47-6.59)	**6.40** (5.76-6.97)	**6.68** (5.99-7.30)	**7.00** (6.22-7.67)	**7.22** (6.37-7.94)
15-min	**2.80** (2.58-3.06)	**3.36** (3.09-3.67)	**3.96** (3.63-4.32)	**4.35** (3.98-4.74)	**4.81** (4.38-5.24)	**5.11** (4.62-5.56)	**5.39** (4.85-5.88)	**5.62** (5.04-6.14)	**5.88** (5.22-6.44)	**6.04** (5.33-6.64)
30-min	**1.92** (1.77-2.10)	**2.32** (2.14-2.53)	**2.81** (2.58-3.07)	**3.15** (2.88-3.44)	**3.56** (3.24-3.88)	**3.85** (3.48-4.19)	**4.13** (3.72-4.50)	**4.37** (3.92-4.78)	**4.68** (4.15-5.12)	**4.89** (4.31-5.38)
60-min	**1.20** (1.10-1.31)	**1.46** (1.34-1.59)	**1.80** (1.65-1.97)	**2.05** (1.88-2.24)	**2.37** (2.16-2.58)	**2.61** (2.36-2.84)	**2.84** (2.56-3.10)	**3.07** (2.75-3.35)	**3.35** (2.98-3.68)	**3.57** (3.15-3.93)
2-hr	**0.715** (0.650-0.787)	**0.868** (0.791-0.956)	**1.08** (0.982-1.19)	**1.24** (1.13-1.37)	**1.45** (1.31-1.60)	**1.62** (1.45-1.78)	**1.79** (1.59-1.96)	**1.95** (1.72-2.15)	**2.17** (1.90-2.40)	**2.35** (2.03-2.59)
3-hr	**0.518** (0.472-0.571)	**0.628** (0.571-0.692)	**0.782** (0.710-0.862)	**0.900** (0.816-0.991)	**1.06** (0.951-1.16)	**1.18** (1.05-1.29)	**1.30** (1.16-1.43)	**1.43** (1.26-1.57)	**1.59** (1.38-1.75)	**1.72** (1.48-1.90)
6-hr	**0.320** (0.292-0.354)	**0.387** (0.353-0.428)	**0.481** (0.437-0.532)	**0.557** (0.504-0.614)	**0.661** (0.595-0.728)	**0.745** (0.665-0.820)	**0.834** (0.737-0.916)	**0.926** (0.809-1.02)	**1.05** (0.906-1.16)	**1.15** (0.979-1.28)
12-hr	**0.193** (0.176-0.216)	**0.233** (0.212-0.261)	**0.292** (0.264-0.325)	**0.340** (0.307-0.378)	**0.410** (0.366-0.454)	**0.468** (0.414-0.517)	**0.530** (0.464-0.587)	**0.598** (0.516-0.662)	**0.695** (0.587-0.771)	**0.775** (0.644-0.860)
24-hr	**0.112** (0.103-0.123)	**0.135** (0.124-0.148)	**0.170** (0.155-0.186)	**0.198** (0.181-0.217)	**0.240** (0.217-0.261)	**0.274** (0.248-0.299)	**0.312** (0.280-0.339)	**0.352** (0.314-0.383)	**0.411** (0.363-0.447)	**0.460** (0.402-0.500)
2-day	**0.065** (0.059-0.071)	**0.078** (0.072-0.086)	**0.098** (0.090-0.108)	**0.115** (0.104-0.126)	**0.138** (0.125-0.151)	**0.157** (0.142-0.172)	**0.177** (0.159-0.194)	**0.199** (0.178-0.218)	**0.230** (0.204-0.252)	**0.255** (0.224-0.280)
3-day	**0.046** (0.042-0.050)	**0.055** (0.050-0.061)	**0.069** (0.063-0.076)	**0.080** (0.073-0.088)	**0.096** (0.087-0.106)	**0.110** (0.099-0.120)	**0.124** (0.111-0.135)	**0.139** (0.124-0.152)	**0.160** (0.142-0.175)	**0.177** (0.156-0.194)
4-day	**0.036** (0.033-0.040)	**0.043** (0.040-0.048)	**0.054** (0.050-0.060)	**0.063** (0.057-0.069)	**0.076** (0.069-0.083)	**0.086** (0.078-0.094)	**0.097** (0.087-0.106)	**0.108** (0.097-0.119)	**0.125** (0.111-0.137)	**0.138** (0.121-0.152)
7-day	**0.024**	**0.029**	**0.036**	**0.041**	**0.049**	**0.056**	**0.063**	**0.070**	**0.081**	**0.089**

SOIL SUMMARY REPORT FOR STORMWATER INFILTRATION

PROJECT	Moser / Hershey Mill Rd	PROJECT NUMBER	3660-00	SUBDIVISION	Hershey Mill
SITE LOCATION	1010 Hershey Mill Rd	MUNICIPALITY	East Goshen	COUNTY	Chester
TEST DATE	6/17/2022	PREFORMED BY	RHW	LOT # / TEST AREA	SW-1
WEATHER CONDITIONS	Sun	PRECIPITATION	None		
TEMPERATURE	80's	SOIL CONDITIONS	WET	DRY x	

SOIL PROFILE Test Pit # SW-1

HORIZON	DEPTH UPPER	DEPTH LOWER	BOUNDARY BDRY	BOUNDARY TOPO	COLOR	TEXTURE	% CF	REDOX A	REDOX S	REDOX C	STRUCTURE GRADE	STRUCTURE TYPE	CONSISTENCE	ROOTS	NOTES % clay, macro pores, etc.
A	0	5	a/s		10YR 3/3	channery silt loam	15				2 gran		friable	f	
Bw	5	24	d/w		10YR 4/6	very channery silt loam	50				1 sbk		friable		
C	24	70	c/s		10YR 5/4	ex. Channery silt loam	70				0 massive		friable		
R	70+														

NOTES:

SOIL TYPE:	MaD	SOIL DEPTH CLASS	SOIL DRAINAGE CLASS		
CARBONATE DERIVED	No	x DEEP	x WELL DRAINED	SLOPE:	20%
LIMITING CONDITION		MODERATELLY DEEP	MODERATELY WELL DRAINED		
TYPE:	Rock	SHALLOW	SOMEWHAT POORLY DRAINED	COVER:	Field
DEPTH:	24"		POORLY DRAINED		

REDOX - Redoxymorphic features (Drainage Mottling) A/S/C - Abundance/Size/Contrast
f -few, c -common, m -many; f -fine, m -medium, c -coarse; f -faint, d -distinct, p -prominent

INFILTRATION TEST DATA

HOLE #	DEPTH OF TEST	CASING DIA. (IN)	INITIAL HEIGHT OF WATER COLUMN (IN)	INITIAL FILL TIME	DROP AFTER 1st PRE-SOAK (IN)	DROP AFTER 2st PRE-SOAK (IN)	TIME: 15 MIN OR 30 MIN	READING #1 DROP (IN)	READING #2 DROP (IN)	READING #3 DROP (IN)	READING #4 DROP (IN)	READING #5 DROP (IN)	READING #6 DROP (IN)	READING #7 DROP (IN)	READING #8 DROP (IN)	FIELD RATE OF DROP (in/hr)	INFILTRATION RATE UTILIZING THE HVORSLEV SOLUTION $K_s=[A/(F*D*t)] \times \ln (h_1/h_2)$
SW-1A																	
SW1B																	
															AVERAGE (IN/HR):	#DIV/0!	#DIV/0!

DIAGRAM/COMMENTS:

Testing conducted in general conformace with ASTM 6391-11. A 8" diameter hole is dug to the proposed infiltration depth. A 6" non-perforated casing is installed at the bottom of the 8" hole and sealed in place with a bentonite seal.

EVANS MILL ENVIRONMENTAL, LLC
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SOIL SUMMARY REPORT FOR STORMWATER INFILTRATION

PROJECT	Moser / Hershey Mill Rd	PROJECT NUMBER	3660-00	SUBDIVISION	Hershey Mill
SITE LOCATION	1010 Hershey Mill Rd	MUNICIPALITY	East Goshen	COUNTY	Chester
TEST DATE	6/17/2022	PREFORMED BY	RHW	LOT # / TEST AREA	SW-2
WEATHER CONDITIONS	Sun	PRECIPITATION	None		
TEMPERATURE	80's	SOIL CONDITIONS	WET	DRY x	

SOIL PROFILE Test Pit # SW-2

HORIZON	DEPTH UPPER	DEPTH LOWER	BOUNDARY BDRY	BOUNDARY TOPO	COLOR	TEXTURE	% CF	REDOX A	REDOX S	REDOX C	STRUCTURE GRADE	STRUCTURE TYPE	CONSISTENCE	ROOTS	NOTES % clay, macro pores, etc.
Ap	0	13	a/s		10YR 3/3	silt loam					2 gran		friable	f	
Bw	13	38	c/s		10YR 4/3	channery silt loam	25				1 sbk		friable		
C	38	90			10YR 5/4	very channery silt loam	50				0 massive		very friable		

NOTES:

SOIL TYPE:	MaC	SOIL DEPTH CLASS	SOIL DRAINAGE CLASS		
CARBONATE DERIVED	No	X DEEP	X WELL DRAINED	SLOPE:	20%
LIMITING CONDITION		MODERATELLY DEEP	MODERATELY WELL DRAINED		
TYPE:	Bottom of pit	SHALLOW	SOMEWHAT POORLY DRAINED	COVER:	field
DEPTH:	90"		POORLY DRAINED		

REDOX - Redoxymorphic features (Drainage Mottling) A/S/C - Abundance/Size/Contrast
f -few, c -common, m -many; f -fine, m -medium, c -coarse; f -faint, d -distinct, p -prominent

INFILTRATION TEST DATA

HOLE #	DEPTH OF TEST	CASING DIA. (IN)	INITIAL HEIGHT OF WATER COLUMN (IN)	INITIAL FILL TIME	DROP AFTER 1st PRE-SOAK (IN)	DROP AFTER 2st PRE-SOAK (IN)	TIME: 15 MIN OR 30 MIN	READING #1 DROP (IN)	READING #2 DROP (IN)	READING #3 DROP (IN)	READING #4 DROP (IN)	READING #5 DROP (IN)	READING #6 DROP (IN)	READING #7 DROP (IN)	READING #8 DROP (IN)	FIELD RATE OF DROP (in/hr)	INFILTRATION RATE UTILIZING THE HVORSLEV SOLUTION $K_s=[A/(F*D*t)] \times \ln(h_1/h_2)$
SW-2A	48"	6"	6"	10:30 AM	6.000"	6.000"	02 min	6.000"	6.000"	6.000"	5.875"					235.000	265.347
SW-2B	48"	6"	6"	10:30 AM	6.000"	6.000"	02 min	6.000"	6.000"	6.000"	5.875"					176.250	199.010
															AVERAGE (IN/HR):	205.625	232.179

DIAGRAM/COMMENTS:

Testing conducted in general conformace with ASTM 6391-11. A 8" diameter hole is dug to the proposed infiltration depth. A 6" non-perforated casing is installed at the bottom of the 8" hole and sealed in place with a bentonite seal.

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SOIL SUMMARY REPORT FOR STORMWATER INFILTRATION

PROJECT	Moser / Hershey Mill Rd	PROJECT NUMBER	3660-00	SUBDIVISION	Hershey Mill
SITE LOCATION	1010 Hershey Mill Rd	MUNICIPALITY	East Goshen	COUNTY	Chester
TEST DATE	6/17/2022	PREFORMED BY	RHW	LOT # / TEST AREA	SW-1
WEATHER CONDITIONS	Sun	PRECIPITATION	None		
TEMPERATURE	80's	SOIL CONDITIONS	WET	DRY x	

SOIL PROFILE Test Pit # SW-3

HORIZON	DEPTH UPPER	DEPTH LOWER	BOUNDARY BDRY	BOUNDARY TOPO	COLOR	TEXTURE	% CF	REDOX A	REDOX S	REDOX C	STRUCTURE GRADE	STRUCTURE TYPE	CONSISTENCE	ROOTS	NOTES % clay, macro pores, etc.
A	0	10	a/s		10YR 3/3	silt loam					2 gran		friable		
B	10	28	d/s		10YR 4/4	channery silt loam	20				1 sbk		friable		
C	28	103			10YR 4/4	ex. Channery silt loam	70				o massive		loose		

NOTES:

SOIL TYPE:	MaC	SOIL DEPTH CLASS	SOIL DRAINAGE CLASS		
CARBONATE DERIVED	No	X DEEP	X WELL DRAINED	SLOPE:	15%
LIMITING CONDITION		MODERATELLY DEEP	MODERATELY WELL DRAINED		
TYPE:	Bottom of pit	SHALLOW	SOMEWHAT POORLY DRAINED	COVER:	field
DEPTH:	103"		POORLY DRAINED		

REDOX - Redoxymorphic features (Drainage Mottling) A/S/C - Abundance/Size/Contrast
f -few, c -common, m -many; f -fine, m -medium, c -coarse; f -faint, d -distinct, p -prominent

INFILTRATION TEST DATA

HOLE #	DEPTH OF TEST	CASING DIA. (IN)	INITIAL HEIGHT OF WATER COLUMN (IN)	INITIAL FILL TIME	DROP AFTER 1st PRE-SOAK (IN)	DROP AFTER 2st PRE-SOAK (IN)	TIME: 15 MIN OR 30 MIN	READING #1 DROP (IN)	READING #2 DROP (IN)	READING #3 DROP (IN)	READING #4 DROP (IN)	READING #5 DROP (IN)	READING #6 DROP (IN)	READING #7 DROP (IN)	READING #8 DROP (IN)	FIELD RATE OF DROP (in/hr)	INFILTRATION RATE UTILIZING THE HVORSLEV SOLUTION $K_s=[A/(F*D*t)] \times \ln (h_1/h_2)$
SW-3A	48"	6"	6"	10:30 AM	6.000"	6.000"	02 min	6.000"	6.000"	5.875"	5.875"					176.250	199.010
SW-3B	48"	6"	6"	10:30 AM	6.000"	6.000"	05 min	2.750"	2.125"	1.625"	1.625"	1.375"	1.375"			16.500	5.352
															AVERAGE (IN/HR):	96.375	102.181

DIAGRAM/COMMENTS:

Testing conducted in general conformace with ASTM 6391-11. A 8" diameter hole is dug to the proposed infiltration depth. A 6" non-perforated casing is installed at the bottom of the 8" hole and sealed in place with a bentonite seal.

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SOIL SUMMARY REPORT FOR STORMWATER INFILTRATION

PROJECT	Moser / Hershey Mill Rd	PROJECT NUMBER	3660-00	SUBDIVISION	Hershey Mill
SITE LOCATION	1010 Hershey Mill Rd	MUNICIPALITY	East Goshen	COUNTY	Chester
TEST DATE	6/17/2022	PREFORMED BY	RHW	LOT # / TEST AREA	SW-4
WEATHER CONDITIONS	Sun	PRECIPITATION	None		
TEMPERATURE	80's	SOIL CONDITIONS	WET	DRY x	

SOIL PROFILE Test Pit # SW-4

HORIZON	DEPTH UPPER	DEPTH LOWER	BOUNDARY BDRY	BOUNDARY TOPO	COLOR	TEXTURE	% CF	REDOX A	REDOX S	REDOX C	STRUCTURE GRADE	STRUCTURE TYPE	CONSISTENCE	ROOTS	NOTES % clay, macro pores, etc.
A	0	10	a/s		10YR 3/3	silt loam					2 gran		friable		
B	10	42	c/s		10YR 4/6	channery silt loam	15				2 sbk		friable		
C	42	56	d/w		10YR5/4	very channery silt loam	15				0massive		firm		
Cr	56	110			10YR 5/4	ex. Channery silt loam	80				0 massive		loose		

NOTES:

SOIL TYPE:	MaC	SOIL DEPTH CLASS	SOIL DRAINAGE CLASS		
CARBONATE DERIVED	No	X DEEP	X WELL DRAINED	SLOPE:	15%
LIMITING CONDITION		MODERATELLY DEEP	MODERATELY WELL DRAINED		
TYPE:	Bottom of Pit	SHALLOW	SOMEWHAT POORLY DRAINED	COVER:	Field
DEPTH:	110		POORLY DRAINED		

REDOX - Redoxymorphic features (Drainage Mottling) A/S/C - Abundance/Size/Contrast
f -few, c -common, m -many; f -fine, m -medium, c -coarse; f -faint, d -distinct, p -prominent

INFILTRATION TEST DATA

HOLE #	DEPTH OF TEST	CASING DIA. (IN)	INITIAL HEIGHT OF WATER COLUMN (IN)	INITIAL FILL TIME	DROP AFTER 1st PRE-SOAK (IN)	DROP AFTER 2st PRE-SOAK (IN)	TIME: 15 MIN OR 30 MIN	READING #1 DROP (IN)	READING #2 DROP (IN)	READING #3 DROP (IN)	READING #4 DROP (IN)	READING #5 DROP (IN)	READING #6 DROP (IN)	READING #7 DROP (IN)	READING #8 DROP (IN)	FIELD RATE OF DROP (in/hr)	INFILTRATION RATE UTILIZING THE HVORSLEV SOLUTION $K_s=[A/(F*D*t)] \times \ln (h_1/h_2)$
SW-4A	24"	6"	6"	11:00 AM	3.125"	1.500"	30 min	1.250"	1.125"	1.125"	1.000"					2.000	0.625
SW-4B	24"	6"	6"	11:00 AM	2.625"	0.875"	30 min	0.750"	0.500"	0.500"	0.500"					1.000	0.298
SW-5A	12"	6"	6"	11:00 AM	0.125"	0.000"	30 min	0.125"	0.000"	0.125"	0.125"					0.250	0.072
SW-5B	12"	6"	6"	11:00 AM	1.250"	0.875"	30 min	0.625"	0.625"	0.500"	0.500"					1.000	0.298
															AVERAGE (IN/HR):	1.063	0.323

DIAGRAM/COMMENTS:

SW-4 and SW-5 are located within the same basin area. Testing results for both areas are displayed above. The test pit evaluation for SW-5 is attached.

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SOIL SUMMARY REPORT FOR STORMWATER INFILTRATION

PROJECT	Moser / Hershey Mill Rd	PROJECT NUMBER	3660-00	SUBDIVISION	Hershey Mill
SITE LOCATION	1010 Hershey Mill Rd	MUNICIPALITY	East Goshen	COUNTY	Chester
TEST DATE	6/17/2022	PREFORMED BY	RHW	LOT # / TEST AREA	SW-5
WEATHER CONDITIONS	Sun	PRECIPITATION	None		
TEMPERATURE	80's	SOIL CONDITIONS	WET	DRY x	

SOIL PROFILE Test Pit # SW-5

HORIZON	DEPTH UPPER	DEPTH LOWER	BOUNDARY BDRY	BOUNDARY TOPO	COLOR	TEXTURE	% CF	REDOX A	REDOX S	REDOX C	STRUCTURE GRADE	STRUCTURE TYPE	CONSISTENCE	ROOTS	NOTES % clay, macro pores, etc.
A	0	12	a/s		10YR 3/3	silt loam					2 gran		friable		
B	12	38	c/s		10YR 4/6	mica silt loam					1 sbk		friable		
C	38	63			10YR 4/6	mica silt loam		CMD			0 massive		firm		

NOTES:

SOIL TYPE:	MaC	SOIL DEPTH CLASS	SOIL DRAINAGE CLASS		
CARBONATE DERIVED	No	X DEEP	WELL DRAINED	SLOPE:	8%
LIMITING CONDITION		MODERATELLY DEEP	X MODERATELY WELL DRAINED		
TYPE:	SHWT	SHALLOW	SOMEWHAT POORLY DRAINED	COVER:	Field
DEPTH:	38"		POORLY DRAINED		

REDOX - Redoxymorphic features (Drainage Mottling) A/S/C - Abundance/Size/Contrast
f -few, c -common, m -many; f -fine, m -medium, c -coarse; f -faint, d -distinct, p -prominent

INFILTRATION TEST DATA

HOLE #	DEPTH OF TEST	CASING DIA. (IN)	INITIAL HEIGHT OF WATER COLUMN (IN)	INITIAL FILL TIME	DROP AFTER 1st PRE-SOAK (IN)	DROP AFTER 2st PRE-SOAK (IN)	TIME: 15 MIN OR 30 MIN	READING #1 DROP (IN)	READING #2 DROP (IN)	READING #3 DROP (IN)	READING #4 DROP (IN)	READING #5 DROP (IN)	READING #6 DROP (IN)	READING #7 DROP (IN)	READING #8 DROP (IN)	FIELD RATE OF DROP (in/hr)	INFILTRATION RATE UTILIZING THE HVORSLEV SOLUTION $K_s=[A/(F*D*t)] \times \ln (h_1/h_2)$
															AVERAGE (IN/HR):	#DIV/0!	#DIV/0!

DIAGRAM/COMMENTS:

Infiltration testing results for SW-5 are included with results for SW-4

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SOIL SUMMARY REPORT FOR STORMWATER INFILTRATION

PROJECT	Moser / Hershey Mill Rd	PROJECT NUMBER	3660-00	SUBDIVISION	Hershey Mill
SITE LOCATION	1010 Hershey Mill Rd	MUNICIPALITY	East Goshen	COUNTY	Chester
TEST DATE	6/27/2022	PREFORMED BY	RHW	LOT # / TEST AREA	SW-6
WEATHER CONDITIONS	Sun	PRECIPITATION	None		
TEMPERATURE	80's	SOIL CONDITIONS	WET	DRY x	

SOIL PROFILE Test Pit # SW-6

HORIZON	DEPTH UPPER	DEPTH LOWER	BOUNDARY BDRY	BOUNDARY TOPO	COLOR	TEXTURE	% CF	REDOX A	REDOX S	REDOX C	STRUCTURE GRADE	STRUCTURE TYPE	CONSISTENCE	ROOTS	NOTES % clay, macro pores, etc.
Ap	0	11	a/s		10YR 3/3	silt loam					2 gran		friable		
Bt	11	34	c/s		10YR 4/6	gravely silt loam	15				2 sbk		friable		
C1	34	59	c/s		7.5YR 4/4	channery silt loam	25				0 massive		friable		
C2	59	90			10YR 5/6	ex. channery silt loam	75				0 massive		firm		

NOTES:

SOIL TYPE:	MaC	SOIL DEPTH CLASS	SOIL DRAINAGE CLASS		
CARBONATE DERIVED	No	X DEEP	X WELL DRAINED	SLOPE:	8%
LIMITING CONDITION		MODERATELLY DEEP	MODERATELY WELL DRAINED		
TYPE:	Rock	SHALLOW	SOMEWHAT POORLY DRAINED	COVER:	Field
DEPTH:	90"		POORLY DRAINED		

REDOX - Redoxymorphic features (Drainage Mottling) A/S/C - Abundance/Size/Contrast
f -few, c -common, m -many; f -fine, m -medium, c -coarse; f -faint, d -distinct, p -prominent

INFILTRATION TEST DATA

HOLE #	DEPTH OF TEST	CASING DIA. (IN)	INITIAL HEIGHT OF WATER COLUMN (IN)	INITIAL FILL TIME	DROP AFTER 1st PRE-SOAK (IN)	DROP AFTER 2st PRE-SOAK (IN)	TIME: 15 MIN OR 30 MIN	READING #1 DROP (IN)	READING #2 DROP (IN)	READING #3 DROP (IN)	READING #4 DROP (IN)	READING #5 DROP (IN)	READING #6 DROP (IN)	READING #7 DROP (IN)	READING #8 DROP (IN)	FIELD RATE OF DROP (in/hr)	INFILTRATION RATE UTILIZING THE HVORSLEV SOLUTION $K_s=[A/(F*D*t)] \times \ln (h_1/h_2)$
SW-6A	24"	6"	6"	10:00 AM	0.500"	0.375"	30 min	0.375"	0.250"	0.250"	0.375"					0.750	0.221
SW-6B	24"	6"	6"	10:00 AM	1.000"	1.000"	30 min	0.875"	0.750"	0.500"	0.750"	0.750"				1.500	0.458
SW-6C	48"	6"	6"	10:00 AM	0.500"	0.500"	30 min	0.375"	0.375"	0.250"	0.500"					1.000	0.298
SW-6D	48"	6"	6"	10:00 AM	0.750"	0.625"	30 min	0.625"	0.625"	0.625"	0.625"					1.250	0.377
															AVERAGE (IN/HR):	1.125	0.339

DIAGRAM/COMMENTS:

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SOIL SUMMARY REPORT FOR STORMWATER INFILTRATION

PROJECT	Moser / Hershey Mill Rd	PROJECT NUMBER	3660-00	SUBDIVISION	Hershey Mill
SITE LOCATION	1010 Hershey Mill Rd	MUNICIPALITY	East Goshen	COUNTY	Chester
TEST DATE	6/17/2022	PREFORMED BY	RHW	LOT # / TEST AREA	SW-7
WEATHER CONDITIONS	Sun	PRECIPITATION	None		
TEMPERATURE	80's	SOIL CONDITIONS	WET	DRY x	

SOIL PROFILE Test Pit # SW-7

HORIZON	DEPTH UPPER	DEPTH LOWER	BOUNDARY BDRY	BOUNDARY TOPO	COLOR	TEXTURE	% CF	REDOX A	REDOX S	REDOX C	STRUCTURE GRADE	STRUCTURE TYPE	CONSISTENCE	ROOTS	NOTES % clay, macro pores, etc.
A	0	11	a/s		10YR 3/3	silt loam					2 gran		friable		
Bt1	11	21	c/s		10YR 5/6	gravley silt loam	15				2 sbk		friable		
Bt2	21	35	d/w		10YR 4/4	mica silt loam					2 sbk		friable		
C	35	58	c/w		10YR 4/6	mica silt loam		CMD			0 massive		firm		
R	58+														

NOTES:

SOIL TYPE:	MaC	SOIL DEPTH CLASS	SOIL DRAINAGE CLASS		
CARBONATE DERIVED	No	X DEEP	WELL DRAINED	SLOPE:	8%
LIMITING CONDITION		MODERATELLY DEEP	X MODERATELY WELL DRAINED		
TYPE:	SHWT	SHALLOW	SOMEWHAT POORLY DRAINED	COVER:	Field
DEPTH:	35"		POORLY DRAINED		

REDOX - Redoxymorphic features (Drainage Mottling) A/S/C - Abundance/Size/Contrast
f -few, c -common, m -many; f -fine, m -medium, c -coarse; f -faint, d -distinct, p -prominent

INFILTRATION TEST DATA

HOLE #	DEPTH OF TEST	CASING DIA. (IN)	INITIAL HEIGHT OF WATER COLUMN (IN)	INITIAL FILL TIME	DROP AFTER 1st PRE-SOAK (IN)	DROP AFTER 2st PRE-SOAK (IN)	TIME: 15 MIN OR 30 MIN	READING #1 DROP (IN)	READING #2 DROP (IN)	READING #3 DROP (IN)	READING #4 DROP (IN)	READING #5 DROP (IN)	READING #6 DROP (IN)	READING #7 DROP (IN)	READING #8 DROP (IN)	FIELD RATE OF DROP (in/hr)	INFILTRATION RATE UTILIZING THE HVORSLEV SOLUTION $K_s=[A/(F*D*t)] \times \ln (h_1/h_2)$
SW-7A	8"	6"	6"	10:10 AM	6.000"	2.875"	30 min	2.375"	2.125"	1.875"	1.750"	1.750"	1.625"			3.250	1.082
SW-7B	8"	6"	6"	10:10 AM	3.000"	1.125"	30 min	0.750"	0.625"	0.625"	0.500"					1.000	0.298
SW-7C	14"	6"	6"	10:10 AM	6.000"	1.250"	30 min	0.875"	0.875"	0.875"	0.875"					1.750	0.540
SW-7D	14"	6"	6"	10:10 AM	6.000"	5.000"	30 min	3.875"	3.625"	3.250"	3.125"	3.000"	3.000"			6.000	2.376
															AVERAGE (IN/HR):	3.000	1.074

DIAGRAM/COMMENTS:

Infiltration testing results for SW-5 are included with results for SW-4

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