HILL INCORPORATED
CIVIL ENGINEERS & LAND SURVEYORS

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STORMWATER MANAGEMENT REPORT

Date: January 19, 2026

To: Andrew Budde
City Engineer
City of Shorewood

Abigaile Couture
Permitting Technician
Minnehaha Creek Watershed District

From: Brady Busselman, P.E.
Project: Watten Ponds 2nd Addition
Shorewood, MN

PROJECT SUMMARY

The proposed project is located at the end of the Maple View Court cul-de-sac, south of Birch Bluff Road. The project and consists of construction of two single family homes.

AREA SUMMARY (Acres)	
TOTAL SITE	3.61
TOTAL DISTURBED	0.96
EXISTING IMPERVIOUS	0.00
PROPOSED IMPERVIOUS	0.46
NET NEW IMPERVIOUS	0.46

EXISTING CONDITIONS SUMMARY

The site is currently an undeveloped lot with woods and wetland (standing water) groundcover. Based on USGS soil maps, a HSG of C was selected. It is assumed that the groundwater elevation is high based on the standing water in the three wetlands on site. Soil borings will be completed prior to applying for building permits. Based on the available information, the site is restricted and abstraction cannot be provided. This is a conservative approach in that it requires sufficient vertical elevation to provide outlets for underdrains from proposed filtration basins.

GOVERNING REGULATIONS

The proposed project is subject to the City of Shorewood's Surface Management Plan and Minnehaha Creek Watershed District's (MCWD) Erosion Control, Floodplain Alteration, Waterbody Crossings and Wetland Protection Rules.

The City of Shorewood requires the following stormwater management standards be met:

Rate Control: No increase in discharge rates for the 1-, 10- and 100-year rainfall events.
Volume Control: Infiltration or filtration of 1" of runoff over the net new impervious area.

MCWD requires the following criteria be met:

No net fill placed within the channel between Wetland 2P and Wetland 1P.
Demonstrate the No-Rise Standard is met within the channel (no increase greater than 0.00 ft in the 100-year HWL of the channel

The proposed project will not disturb over 1 acre and is not subject to the MPCA Construction Stormwater Permit.

The stormwater management system has been designed to meet the most restrictive of the above requirements.

STORMWATER MANAGEMENT SUMMARY

Text.

1. **RATE CONTROL**
   The City of Shorewood requires that proposed peak runoff rates not exceed existing peak runoff rates for the 1-, 10- and 100-year frequency storm events. Refer to Attachment A for existing drainage maps, and Attachment B for HydroCAD calculations.

Rate Control			
	1-YEAR PEAK RUNOFF	10-YEAR PEAK RUNOFF	100-YEAR PEAK RUNOFF
Existing Total Discharge	1.60	6.67	17.47
Proposed Total Discharge	1.37	6.30	17.20

2. **VOLUME CONTROL**
   The City of Shorewood requires an infiltration volume of 1.0" times the net new impervious surfaces. Infiltration is anticipated to be infeasibly due to high groundwater at this site, in which case the city requires filtration of the same volume.

   Required Infiltration Volume Area A = 5,200 SF impervious * 1.0" = **433 CF**
   Provided Infiltration Volume Area A = 768 CF

   Required Infiltration Volume Area B = 2,870 SF impervious * 1.0" = **230 CF**
   Provided Infiltration Volume Area B = 469 CF

   Required Infiltration Volume Area C = 5,580 impervious * 1.0" = **465 CF**
   Provided Infiltration Volume Area C = 662 CF

   Required Infiltration Volume Area D = 6,220 SF impervious * 1.0" = **518 CF**
   Provided Infiltration Volume Area D = 962 CF

FLOODPLAIN SUMMARY

MCWD Requires no net fill within the channel floodplain (between the OHWL and the 100-year HWL). The existing open channel and proposed pipe have been modeled in HydroCAD, and show that the proposed pipe provides over double the volume of storage below the 100-year HWL than the existing channel does. See summary below and refer to Attachment C for the channel and pipe models.

	Upstream invert	Downstream invert	10-Year OHWL	100-Year HWL	Storage Below 10-Year Elev0	Storage Below 100-Year Elev
Existing Channel	947.00	944.00	947.14 (0.14' depth)	947.22 (0.22' depth)	13 CF	26 CF
Proposed Pipe	944.10	944.00	NA	NA	NA	60 CF

Sincerely,

Brady Busselman, P.E.
Vice President
bbusselman@mnhill.com
952.426.4758

HILL INCORPORATED

ATTACHMENT A
DRAINAGE MAPS

LEGEND

1P — POND AREA

1S — DRAINAGE AREA (TOTAL DRAINAGE AREA: 1.234 AC; IMPERVIOUS AREA: 0.123 AC IMP)

1R — REACH

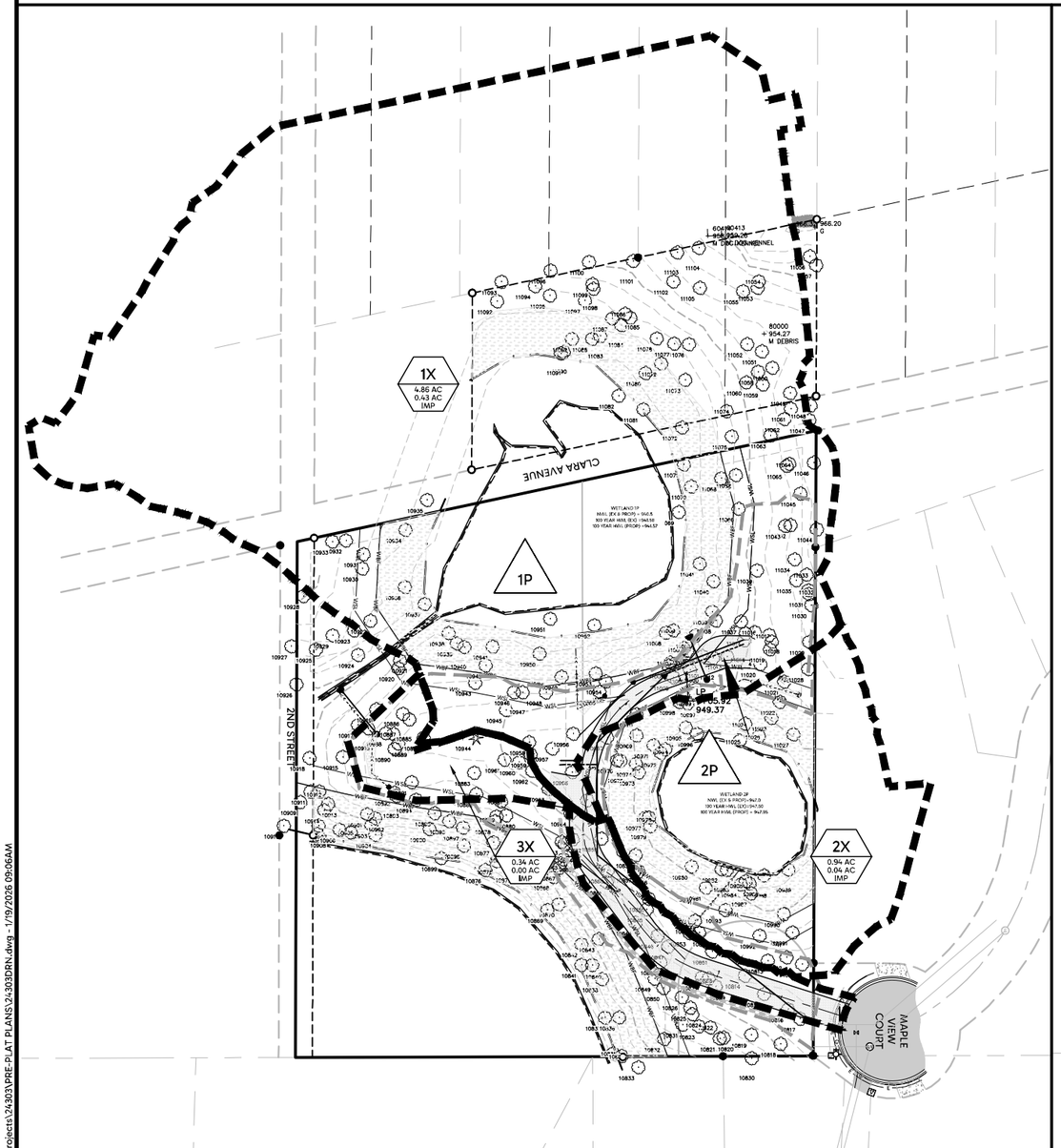
FLOW DIRECTION

ToC PATH

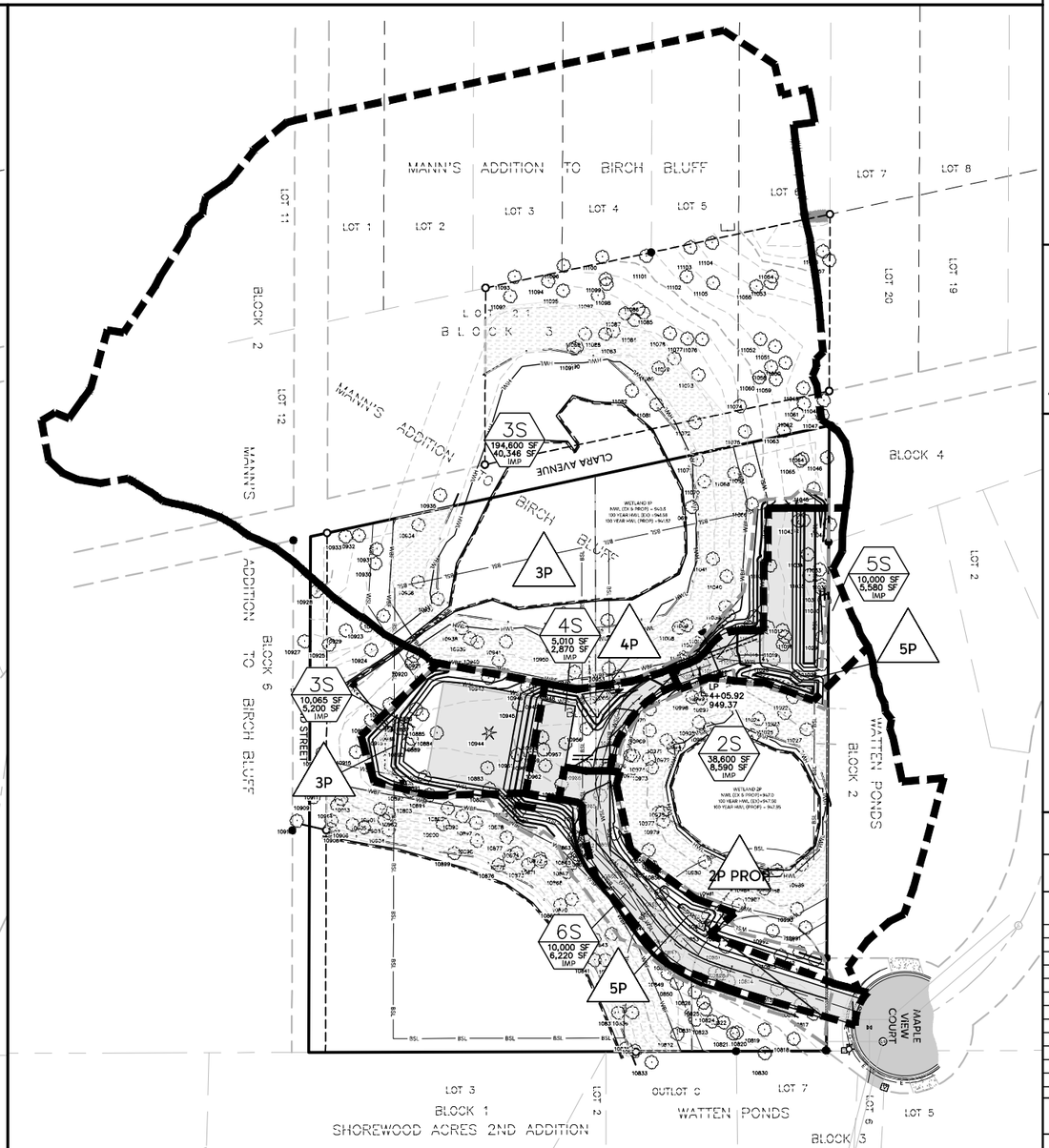
DRAINAGE BOUNDARY

811 Know what's below. Call before you dig.

SCALE IN FEET 0 50 100



EXISTING DRAINAGE MAP



PROPOSED DRAINAGE MAP

HILL INCORPORATED
2999 WEST C.R. 42, SUITE 100
BURNSVILLE, MN 55306
PHONE: 952-890-6044
bbusselman@mnhill.com
www.mnhill.com

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

PRELIMINARY

Reg.No.

Date:

SHOREWOOD RESIDENTIAL
SHOREWOOD, MN

DRAINAGE MAPS

FOR
GRAVITY INVESTMENT LLC

DRAWN BY: BDB
DATE: 10/20/2025
REVISIONS
2026-01-16 CITY & MCWD COMM.
2026-01-19 BASIN OUTLET REVS
CAD FILE: 24303DRN
PROJECT NO.: 24303
COMBINED

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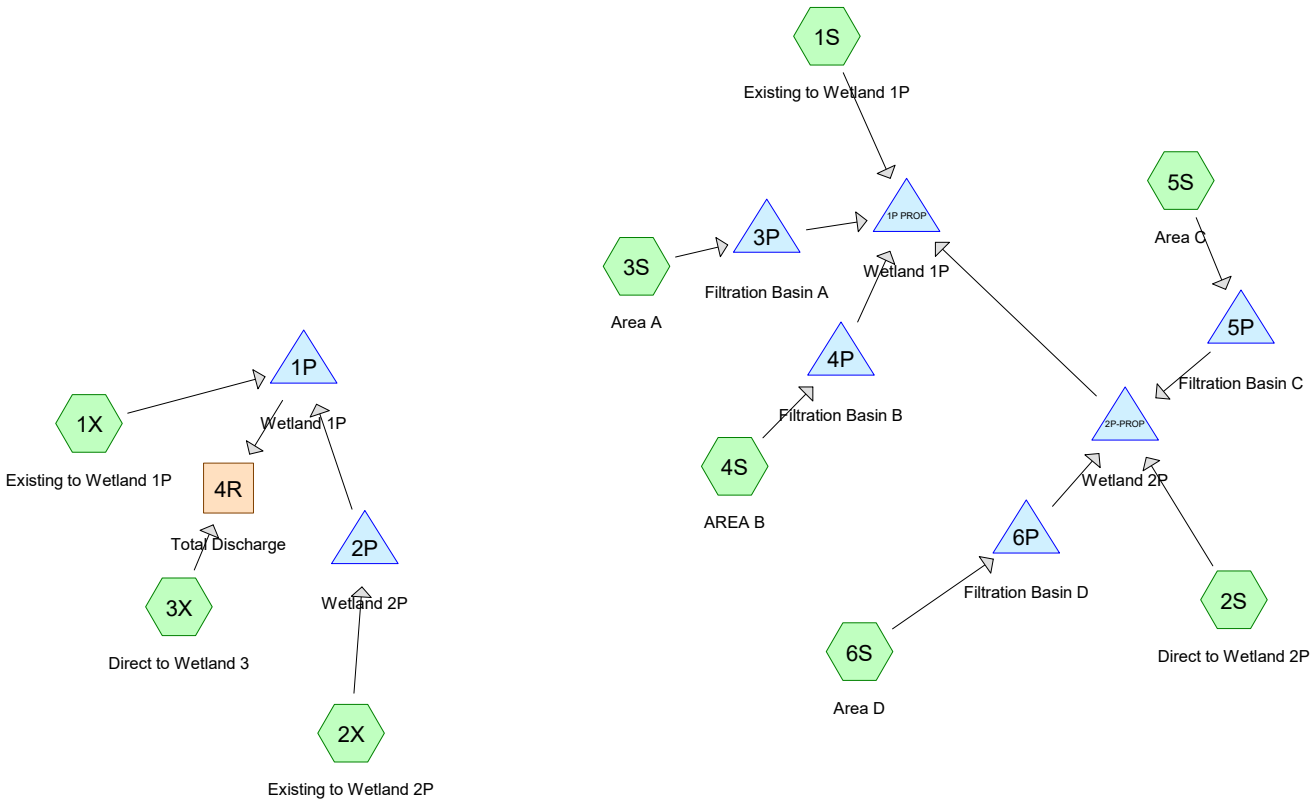
ATTACHMENT B
HYDROCAD CALCULATIONS



Subcat Reach Pond Link

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 5327 MN Hennepin

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.349	74	>75% Grass cover, Good, HSG C (3S, 4S, 5S, 6S)
0.107	96	Gravel surface, HSG C (1S, 1X)
0.597	98	Paved parking, HSG C (1S, 1X, 6S)
0.056	98	Unconnected pavement, HSG C (4S, 5S)
0.702	98	Unconnected roofs, HSG C (1S, 1X, 2X, 3S, 4S, 5S)
1.285	98	Water Surface, 0% imp, HSG C (1S, 1X, 2S, 2X)
9.184	72	Woods/grass comb., Good, HSG C (1S, 1X, 2S, 2X, 3X)
12.280	**78**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
12.280	HSG C	1S, 1X, 2S, 2X, 3S, 3X, 4S, 5S, 6S
0.000	HSG D	
0.000	Other	
12.280		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.349	0.000	0.000	0.349	>75% Grass cover, Good	3S, 4S, 5S, 6S
0.000	0.000	0.107	0.000	0.000	0.107	Gravel surface	1S, 1X
0.000	0.000	0.597	0.000	0.000	0.597	Paved parking	1S, 1X, 6S
0.000	0.000	0.056	0.000	0.000	0.056	Unconnected pavement	4S, 5S
0.000	0.000	0.702	0.000	0.000	0.702	Unconnected roofs	1S, 1X, 2X, 3S, 4S, 5S
0.000	0.000	1.285	0.000	0.000	1.285	Water Surface, 0% imp	1S, 1X, 2S, 2X
0.000	0.000	9.184	0.000	0.000	9.184	Woods/grass comb., Good	1S, 1X, 2S, 2X, 3X
0.000	**0.000**	**12.280**	**0.000**	**0.000**	**12.280**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2P-PROP	944.10	944.00	34.0	0.0029	0.013	18.0	0.0	0.0
2	3P	941.00	940.00	42.0	0.0238	0.013	12.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment 1S: Existing to Wetland 1P Runoff Area=193,772 sf 9.61% Impervious Runoff Depth=0.73"
Flow Length=325' Slope=0.1350 '/' Tc=18.3 min CN=77 Runoff=3.57 cfs 0.270 af

Subcatchment 1X: Existing to Wetland 1P Runoff Area=211,609 sf 8.80% Impervious Runoff Depth=0.68"
Flow Length=325' Slope=0.1350 '/' Tc=18.3 min UI Adjusted CN=76 Runoff=3.60 cfs 0.276 af

Subcatchment 2S: Direct to Wetland 2P Runoff Area=38,600 sf 0.00% Impervious Runoff Depth=0.77"
Flow Length=100' Tc=12.3 min CN=78 Runoff=0.94 cfs 0.057 af

Subcatchment 2X: Existing to Wetland 2P Runoff Area=40,857 sf 4.62% Impervious Runoff Depth=0.77"
Flow Length=100' Tc=12.3 min UI Adjusted CN=78 Runoff=0.99 cfs 0.061 af

Subcatchment 3S: Area A Runoff Area=10,065 sf 51.66% Impervious Runoff Depth=1.23"
Tc=7.0 min CN=86 Runoff=0.51 cfs 0.024 af

Subcatchment 3X: Direct to Wetland 3 Runoff Area=0.344 ac 0.00% Impervious Runoff Depth=0.52"
Tc=7.0 min CN=72 Runoff=0.29 cfs 0.015 af

Subcatchment 4S: AREA B Runoff Area=5,010 sf 57.29% Impervious Runoff Depth=1.36"
Tc=7.0 min CN=88 Runoff=0.28 cfs 0.013 af

Subcatchment 5S: Area C Runoff Area=10,000 sf 55.80% Impervious Runoff Depth=1.29"
Tc=7.0 min CN=87 Runoff=0.53 cfs 0.025 af

Subcatchment 6S: Area D Runoff Area=10,000 sf 62.20% Impervious Runoff Depth=1.44"
Tc=7.0 min CN=89 Runoff=0.58 cfs 0.027 af

Reach 4R: Total Discharge Inflow=1.60 cfs 0.352 af
Outflow=1.60 cfs 0.352 af

Pond 1P: Wetland 1P Peak Elev=940.73' Storage=11,989 cf Inflow=3.90 cfs 0.337 af
Outflow=1.55 cfs 0.337 af

Pond 1P PROP: Wetland 1P Peak Elev=940.71' Storage=11,630 cf Inflow=3.61 cfs 0.350 af
Outflow=1.37 cfs 0.349 af

Pond 2P: Wetland 2P Peak Elev=947.10' Storage=7,131 cf Inflow=0.99 cfs 0.061 af
Outflow=0.39 cfs 0.061 af

Pond 2P-PROP: Wetland 2P Peak Elev=947.16' Storage=7,621 cf Inflow=0.94 cfs 0.073 af
Outflow=0.14 cfs 0.071 af

Pond 3P: Filtration Basin A Peak Elev=944.71' Storage=768 cf Inflow=0.51 cfs 0.024 af
Outflow=0.02 cfs 0.006 af

Pond 4P: Filtration Basin B Peak Elev=949.51' Storage=469 cf Inflow=0.28 cfs 0.013 af
Outflow=0.01 cfs 0.002 af

Pond 5P: Filtration Basin C Peak Elev=951.53' Storage=662 cf Inflow=0.53 cfs 0.025 af
Outflow=0.06 cfs 0.010 af

Pond 6P: Filtration Basin D Peak Elev=952.81' Storage=962 cf Inflow=0.58 cfs 0.027 af
Outflow=0.02 cfs 0.006 af

Total Runoff Area = 12.280 ac Runoff Volume = 0.768 af Average Runoff Depth = 0.75"
88.97% Pervious = 10.925 ac 11.03% Impervious = 1.355 ac

Summary for Subcatchment 1S: Existing to Wetland 1P

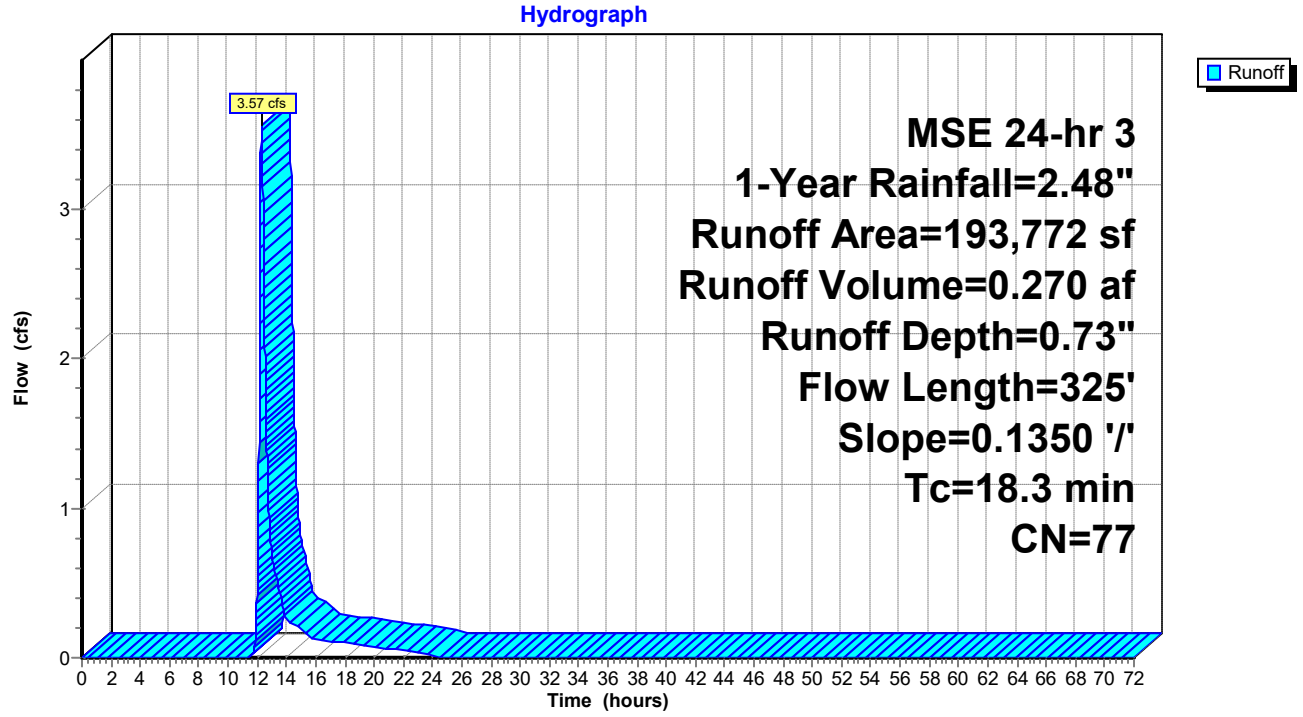
Runoff = 3.57 cfs @ 12.30 hrs, Volume= 0.270 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
8,744	98	Unconnected roofs, HSG C
9,885	98	Paved parking, HSG C
19,395	98	Water Surface, 0% imp, HSG C
2,322	96	Gravel surface, HSG C
153,426	72	Woods/grass comb., Good, HSG C
193,772	77	Weighted Average
175,143		90.39% Pervious Area
18,629		9.61% Impervious Area
8,744		46.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	180	0.1350	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
1.3	145	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	325	Total			

Subcatchment 1S: Existing to Wetland 1P



Summary for Subcatchment 1X: Existing to Wetland 1P

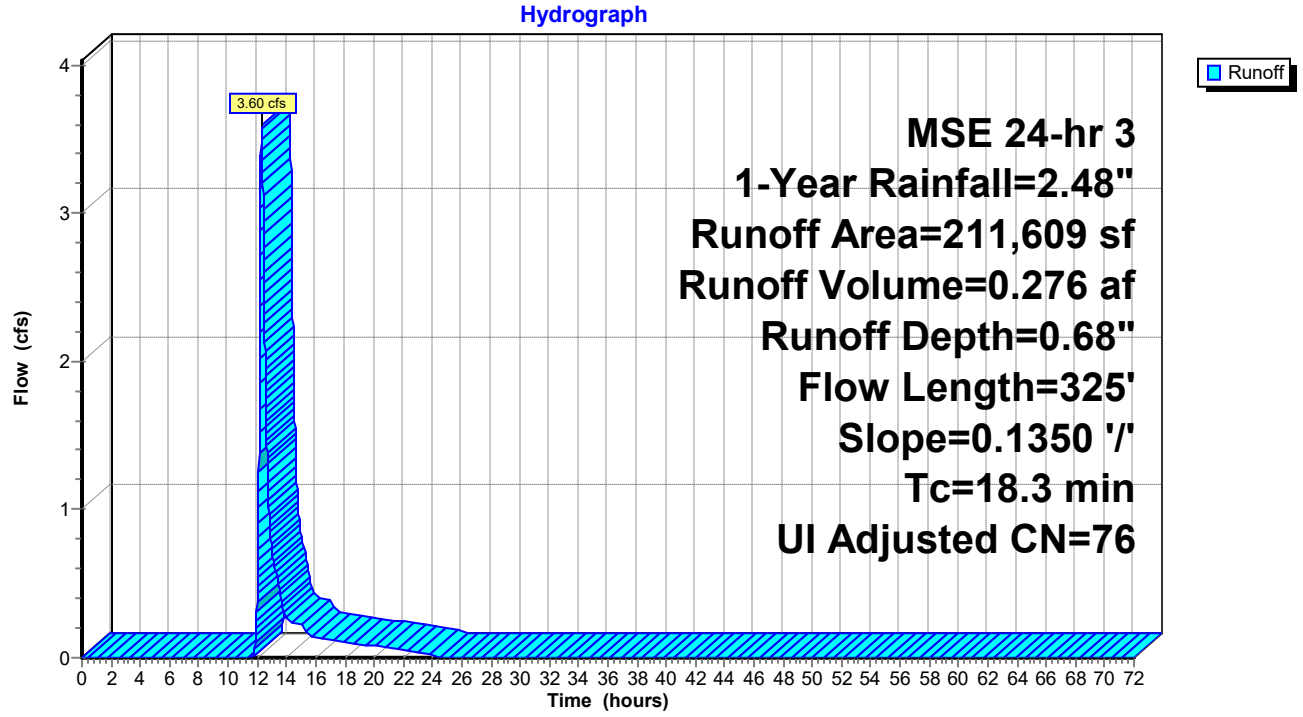
Runoff = 3.60 cfs @ 12.30 hrs, Volume= 0.276 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Adj	Description
8,744	98		Unconnected roofs, HSG C
9,885	98		Paved parking, HSG C
19,395	98		Water Surface, 0% imp, HSG C
2,322	96		Gravel surface, HSG C
171,263	72		Woods/grass comb., Good, HSG C
211,609	77	76	Weighted Average, UI Adjusted
192,980			91.20% Pervious Area
18,629			8.80% Impervious Area
8,744			46.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	180	0.1350	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
1.3	145	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	325	Total			

Subcatchment 1X: Existing to Wetland 1P



Summary for Subcatchment 2S: Direct to Wetland 2P

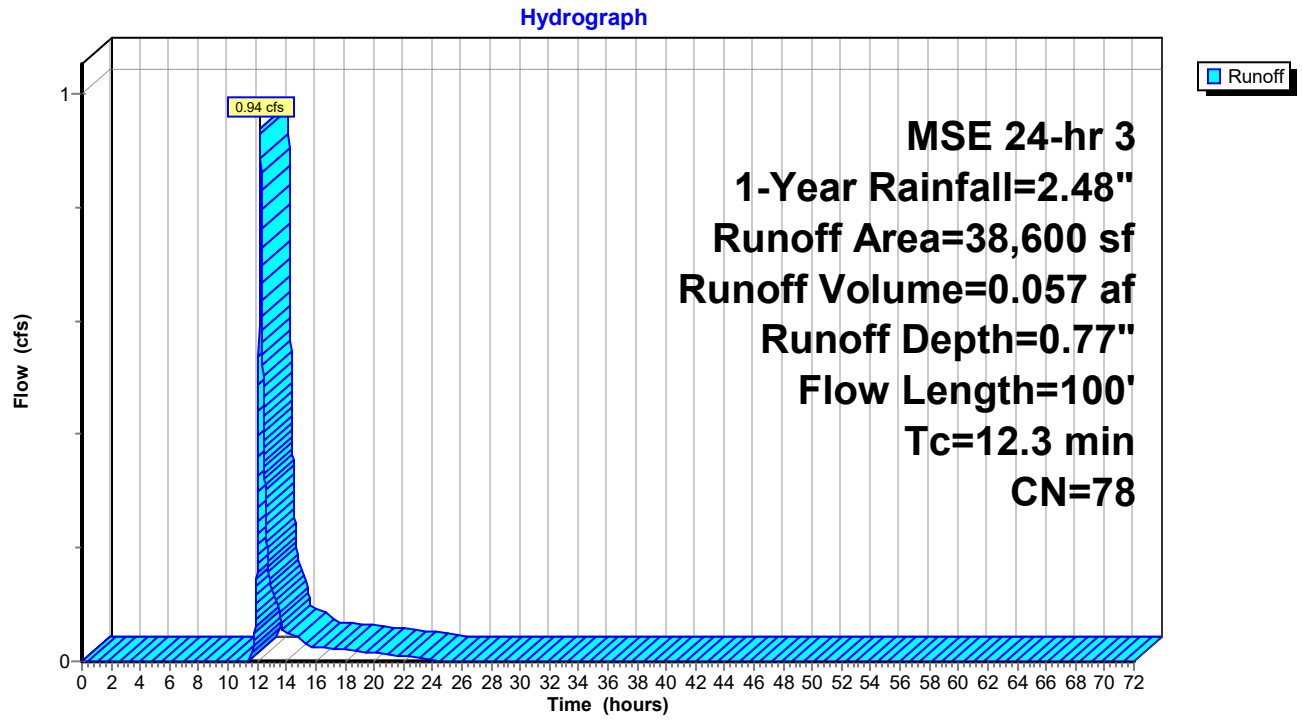
Runoff = 0.94 cfs @ 12.21 hrs, Volume= 0.057 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
8,590	98	Water Surface, 0% imp, HSG C
30,010	72	Woods/grass comb., Good, HSG C
38,600	78	Weighted Average
38,600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	20	0.0830	1.66		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.85"
12.1	80	0.0625	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
12.3	100	Total			

Subcatchment 2S: Direct to Wetland 2P



Summary for Subcatchment 2X: Existing to Wetland 2P

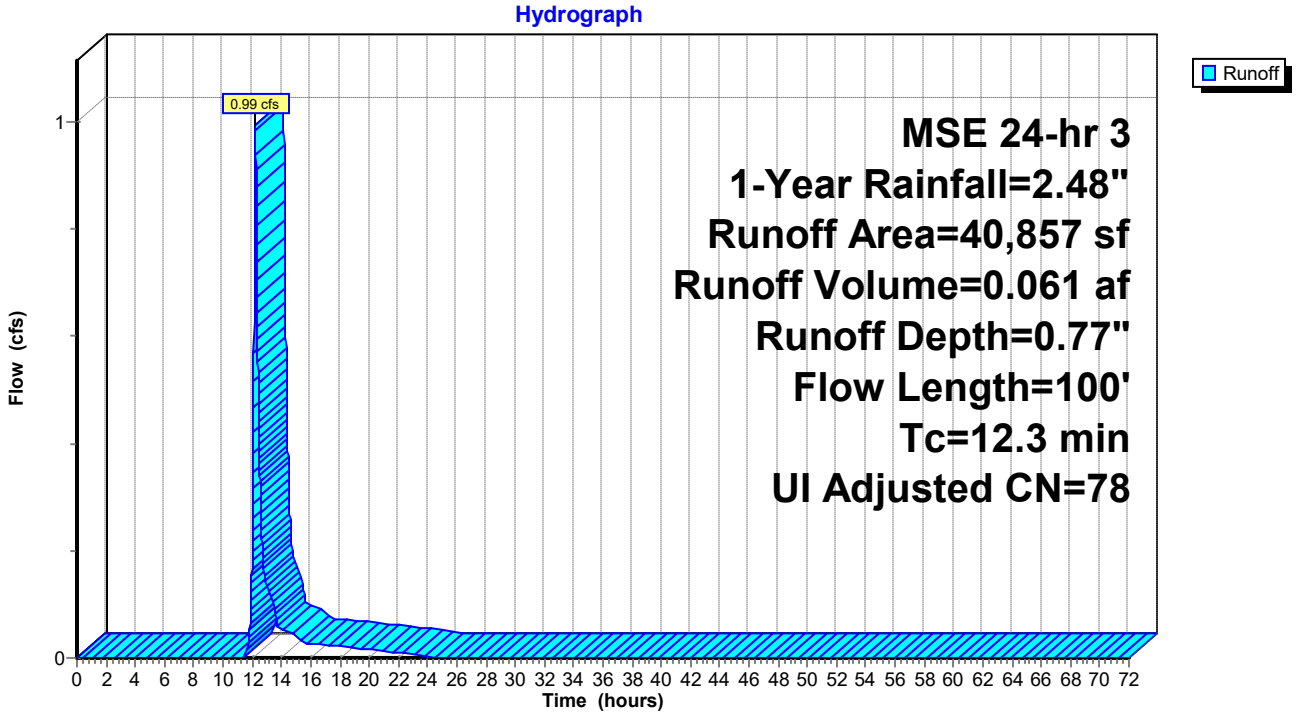
Runoff = 0.99 cfs @ 12.21 hrs, Volume= 0.061 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Adj	Description
1,886	98		Unconnected roofs, HSG C
8,586	98		Water Surface, 0% imp, HSG C
30,385	72		Woods/grass comb., Good, HSG C
40,857	79	78	Weighted Average, UI Adjusted
38,971			95.38% Pervious Area
1,886			4.62% Impervious Area
1,886			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	20	0.0830	1.66		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.85"
12.1	80	0.0625	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
12.3	100	Total			

Subcatchment 2X: Existing to Wetland 2P



Summary for Subcatchment 3S: Area A

5,200 SF impervious requires 434 CF filtration

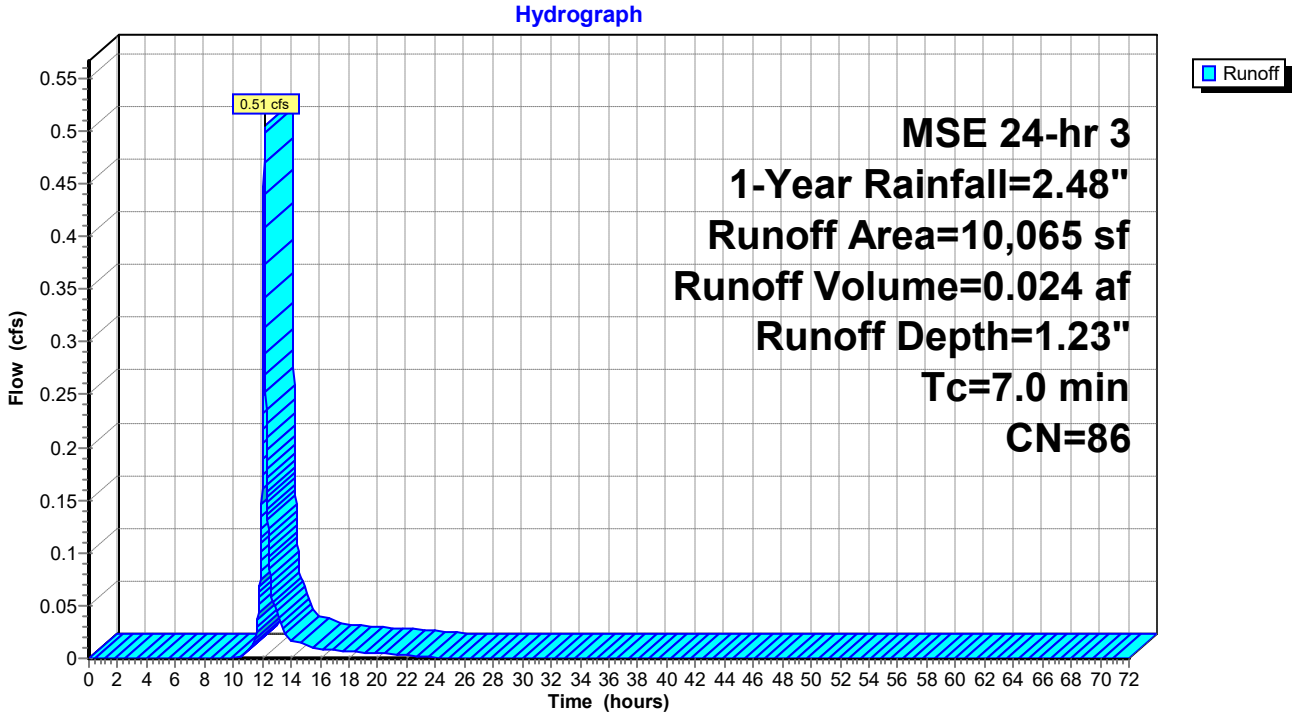
Runoff = 0.51 cfs @ 12.14 hrs, Volume= 0.024 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
5,200	98	Unconnected roofs, HSG C
4,865	74	>75% Grass cover, Good, HSG C
10,065	86	Weighted Average
4,865		48.34% Pervious Area
5,200		51.66% Impervious Area
5,200		100.00% Unconnected

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

Subcatchment 3S: Area A



Summary for Subcatchment 3X: Direct to Wetland 3

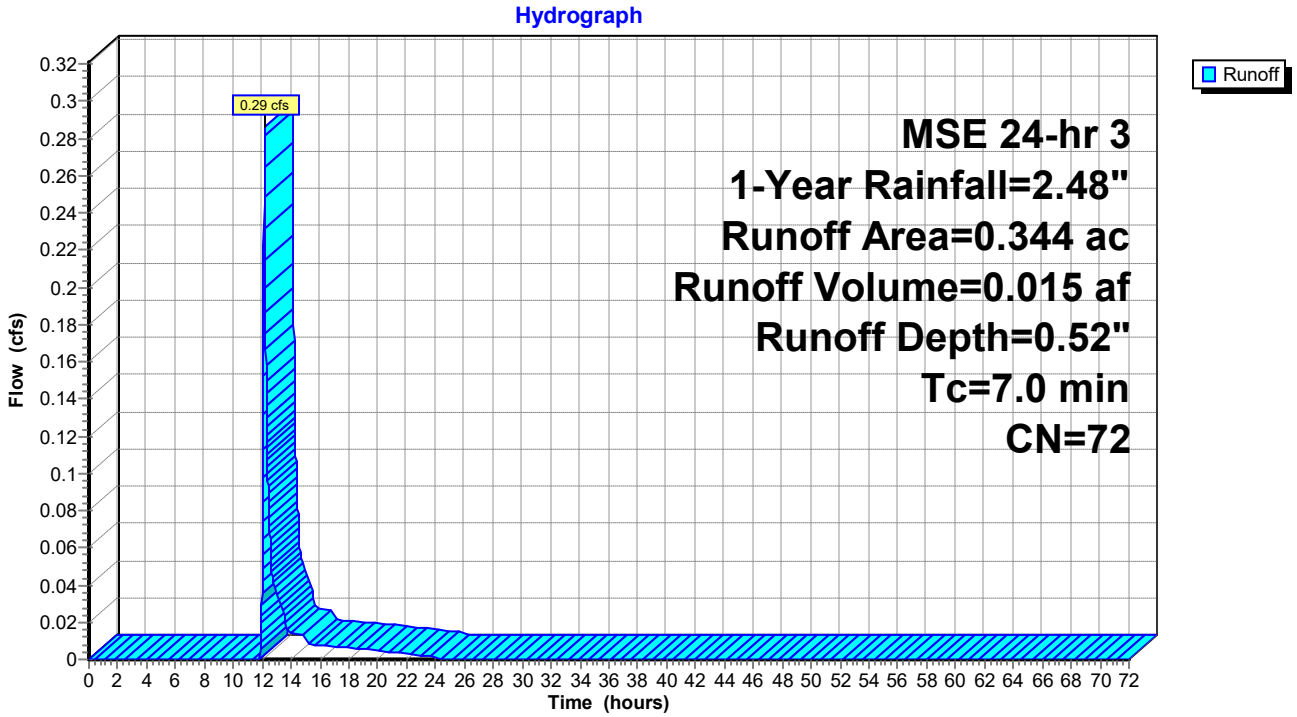
Runoff = 0.29 cfs @ 12.15 hrs, Volume= 0.015 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (ac)	CN	Description
0.344	72	Woods/grass comb., Good, HSG C
0.344		100.00% Pervious Area

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

Subcatchment 3X: Direct to Wetland 3



Summary for Subcatchment 4S: AREA B

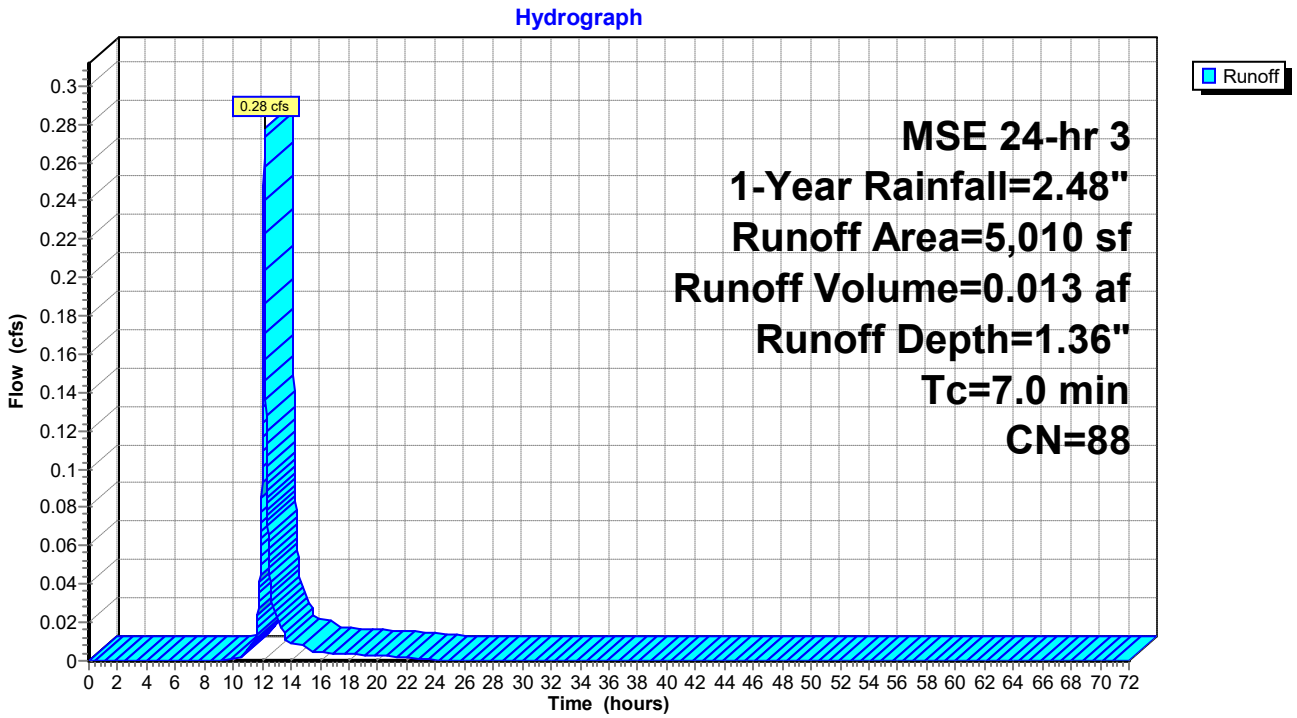
Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.013 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
1,750	98	Unconnected roofs, HSG C
1,120	98	Unconnected pavement, HSG C
2,140	74	>75% Grass cover, Good, HSG C
5,010	88	Weighted Average
2,140		42.71% Pervious Area
2,870		57.29% Impervious Area
2,870		100.00% Unconnected

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

Subcatchment 4S: AREA B



Summary for Subcatchment 5S: Area C

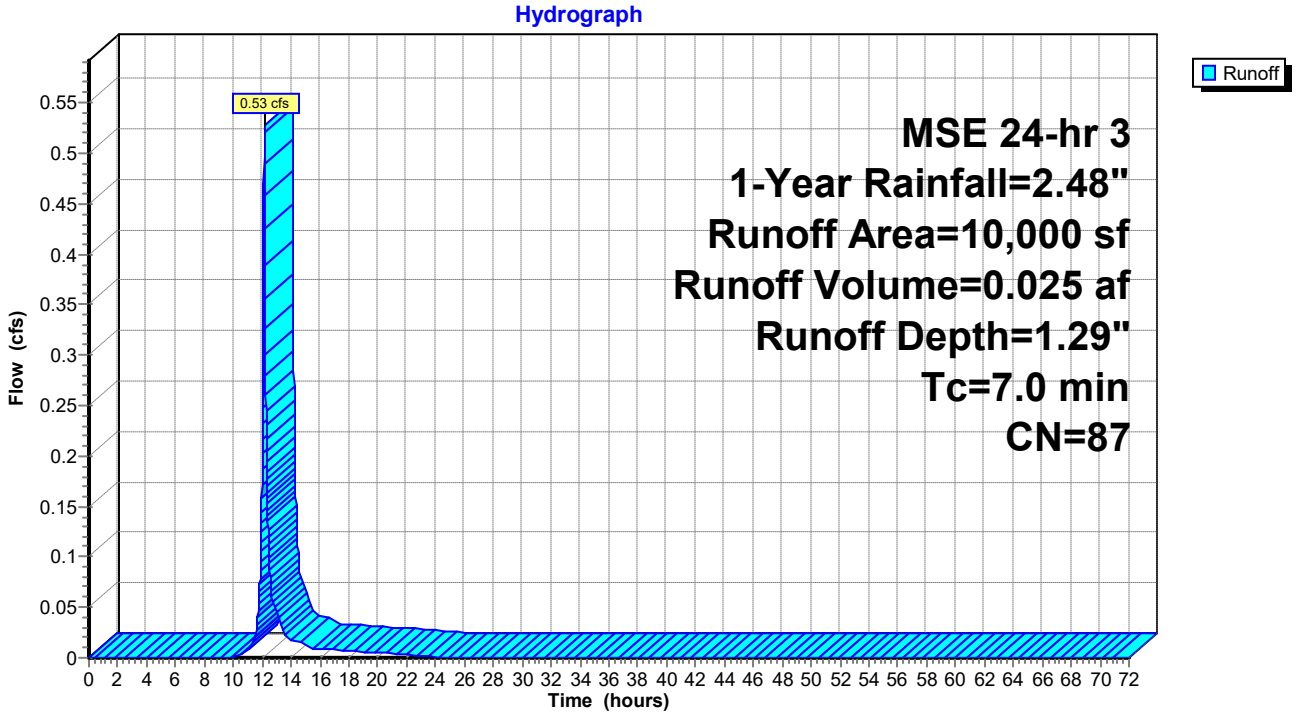
Runoff = 0.53 cfs @ 12.14 hrs, Volume= 0.025 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
4,240	98	Unconnected roofs, HSG C
1,340	98	Unconnected pavement, HSG C
4,420	74	>75% Grass cover, Good, HSG C
10,000	87	Weighted Average
4,420		44.20% Pervious Area
5,580		55.80% Impervious Area
5,580		100.00% Unconnected

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

Subcatchment 5S: Area C



Summary for Subcatchment 6S: Area D

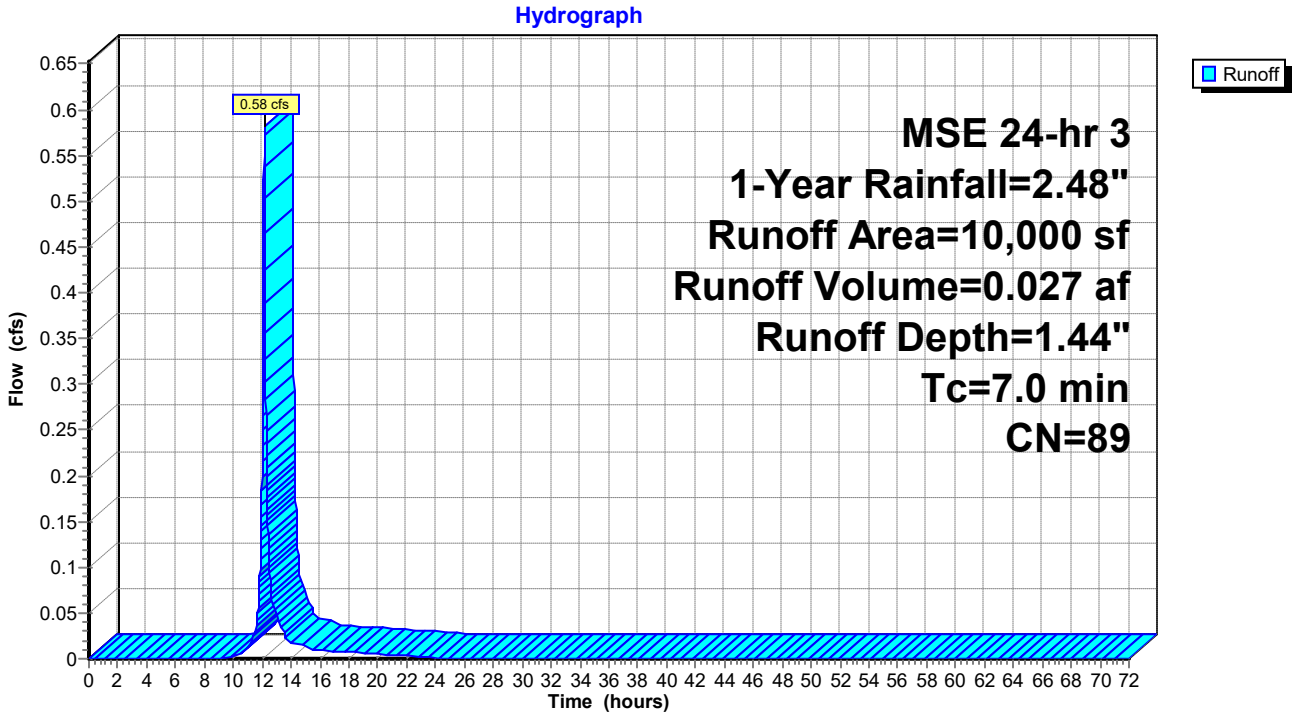
Runoff = 0.58 cfs @ 12.14 hrs, Volume= 0.027 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-Year Rainfall=2.48"

Area (sf)	CN	Description
6,220	98	Paved parking, HSG C
3,780	74	>75% Grass cover, Good, HSG C
10,000	89	Weighted Average
3,780		37.80% Pervious Area
6,220		62.20% Impervious Area

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

Subcatchment 6S: Area D



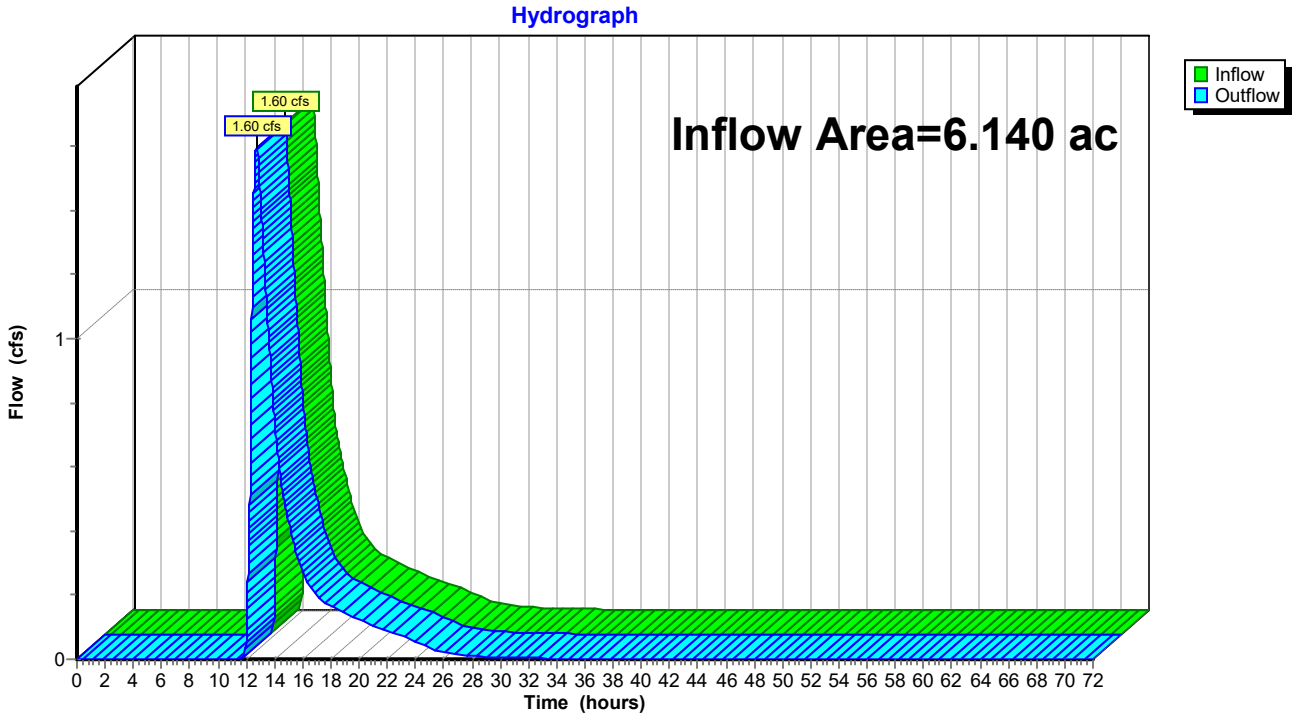
Summary for Reach 4R: Total Discharge

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

Inflow Area = 6.140 ac, 7.67% Impervious, Inflow Depth = 0.69" for 1-Year event
Inflow = 1.60 cfs @ 12.72 hrs, Volume= 0.352 af
Outflow = 1.60 cfs @ 12.73 hrs, Volume= 0.352 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 4R: Total Discharge



Summary for Pond 1P: Wetland 1P

Inflow Area = 5.796 ac, 8.13% Impervious, Inflow Depth = 0.70" for 1-Year event
Inflow = 3.90 cfs @ 12.30 hrs, Volume= 0.337 af
Outflow = 1.55 cfs @ 12.72 hrs, Volume= 0.337 af, Atten= 60%, Lag= 25.0 min
Primary = 1.55 cfs @ 12.72 hrs, Volume= 0.337 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 940.50' Surf.Area= 18,044 sf Storage= 7,632 cf
Peak Elev= 940.73' @ 12.72 hrs Surf.Area= 20,553 sf Storage= 11,989 cf (4,357 cf above start)

Plug-Flow detention time= 339.5 min calculated for 0.162 af (48% of inflow)
Center-of-Mass det. time= 73.1 min (928.9 - 855.9)

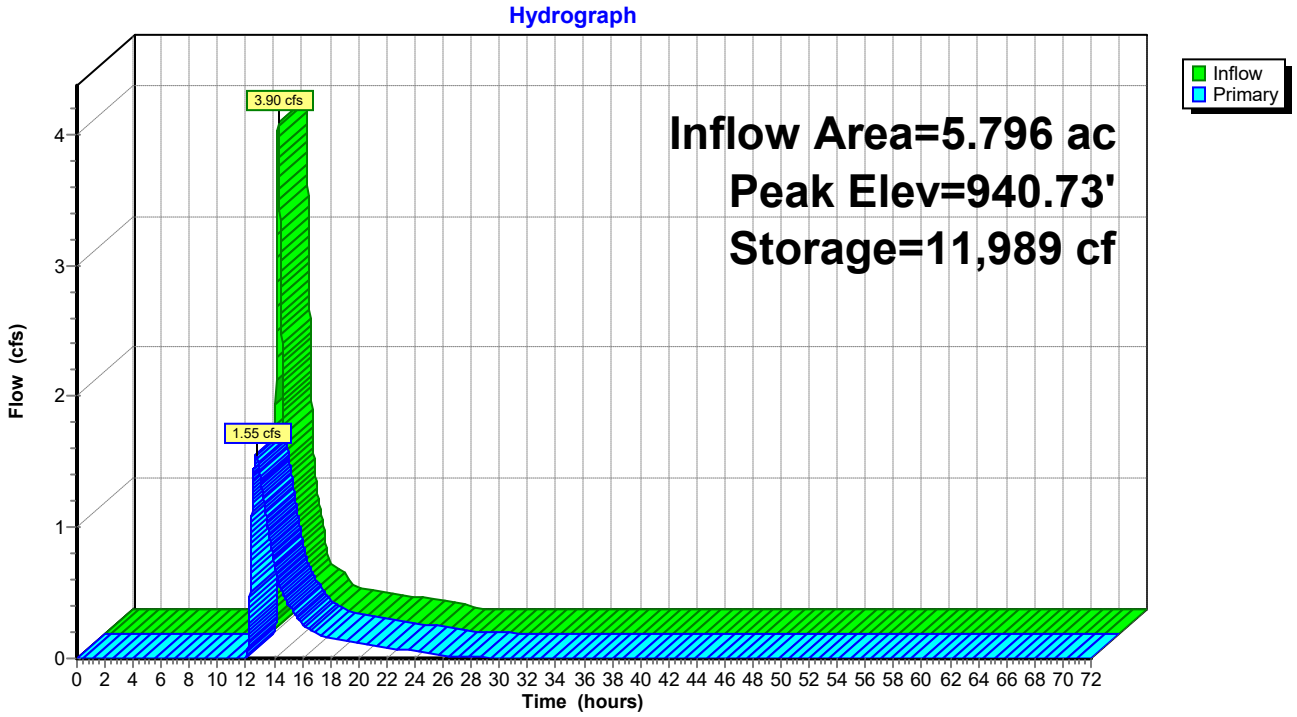
Volume	Invert	Avail.Storage	Storage Description
#1	940.00'	92,346 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
940.00	12,486	0	0
941.00	23,601	18,044	18,044
942.00	38,749	31,175	49,219
943.00	47,506	43,128	92,346

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**5.8' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.55 cfs @ 12.72 hrs HW=940.73' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 1.55 cfs @ 1.19 fps)

Pond 1P: Wetland 1P



Summary for Pond 1P PROP: Wetland 1P

Inflow Area = 6.140 ac, 14.40% Impervious, Inflow Depth = 0.68" for 1-Year event
Inflow = 3.61 cfs @ 12.30 hrs, Volume= 0.350 af
Outflow = 1.37 cfs @ 12.70 hrs, Volume= 0.349 af, Atten= 62%, Lag= 23.9 min
Primary = 1.37 cfs @ 12.70 hrs, Volume= 0.349 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 940.50' Surf.Area= 18,044 sf Storage= 7,632 cf
Peak Elev= 940.71' @ 12.70 hrs Surf.Area= 20,357 sf Storage= 11,630 cf (3,997 cf above start)

Plug-Flow detention time= 422.1 min calculated for 0.174 af (50% of inflow)
Center-of-Mass det. time= 75.8 min (981.9 - 906.2)

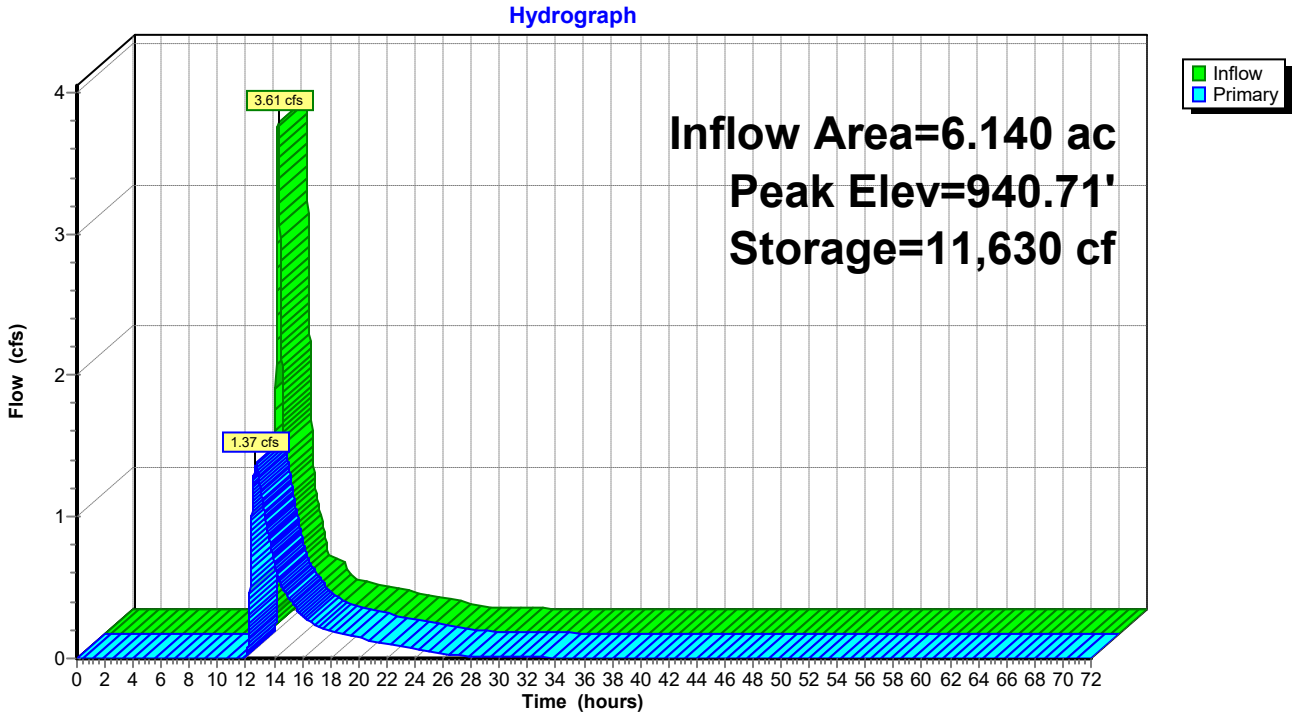
Volume	Invert	Avail.Storage	Storage Description
#1	940.00'	92,346 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
940.00	12,486	0	0
941.00	23,601	18,044	18,044
942.00	38,749	31,175	49,219
943.00	47,506	43,128	92,346

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**5.8' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.37 cfs @ 12.70 hrs HW=940.71' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.37 cfs @ 1.14 fps)

Pond 1P PROP: Wetland 1P



Summary for Pond 2P: Wetland 2P

Inflow Area = 0.938 ac, 4.62% Impervious, Inflow Depth = 0.77" for 1-Year event
Inflow = 0.99 cfs @ 12.21 hrs, Volume= 0.061 af
Outflow = 0.39 cfs @ 12.48 hrs, Volume= 0.061 af, Atten= 61%, Lag= 16.3 min
Primary = 0.39 cfs @ 12.48 hrs, Volume= 0.061 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 947.00' Surf.Area= 7,818 sf Storage= 6,322 cf
Peak Elev= 947.10' @ 12.48 hrs Surf.Area= 8,190 sf Storage= 7,131 cf (810 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 59.3 min (895.2 - 835.9)

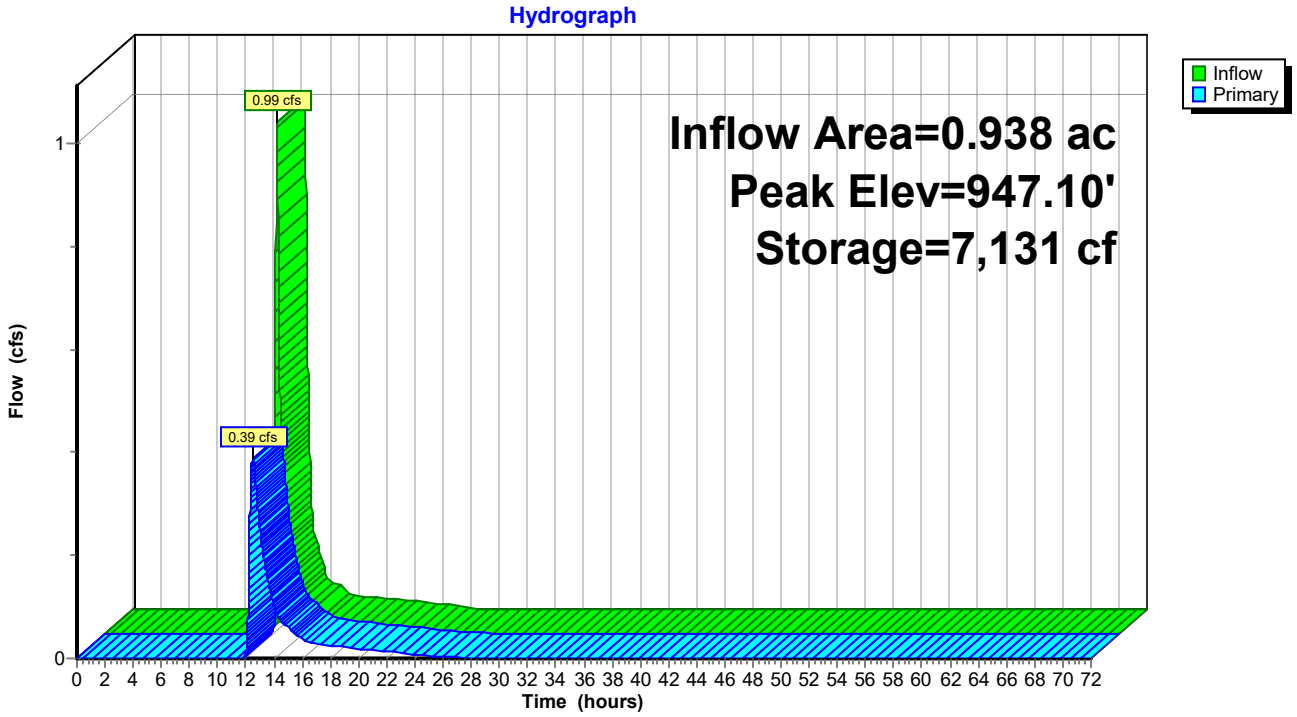
Volume	Invert	Avail.Storage	Storage Description
#1	946.00'	29,308 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.00	4,825	0	0
947.00	7,818	6,322	6,322
948.00	11,496	9,657	15,979
949.00	15,162	13,329	29,308

Device	Routing	Invert	Outlet Devices
#1	Primary	947.00'	**4.5' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.39 cfs @ 12.48 hrs HW=947.10' TW=940.70' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.85 fps)

Pond 2P: Wetland 2P



Summary for Pond 2P-PROP: Wetland 2P

Inflow Area = 1.345 ac, 20.14% Impervious, Inflow Depth = 0.65" for 1-Year event
Inflow = 0.94 cfs @ 12.21 hrs, Volume= 0.073 af
Outflow = 0.14 cfs @ 13.33 hrs, Volume= 0.071 af, Atten= 85%, Lag= 67.3 min
Primary = 0.14 cfs @ 13.33 hrs, Volume= 0.071 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 947.00' Surf.Area= 7,818 sf Storage= 6,322 cf
Peak Elev= 947.16' @ 13.33 hrs Surf.Area= 8,407 sf Storage= 7,621 cf (1,300 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 256.3 min (1,123.3 - 867.0)

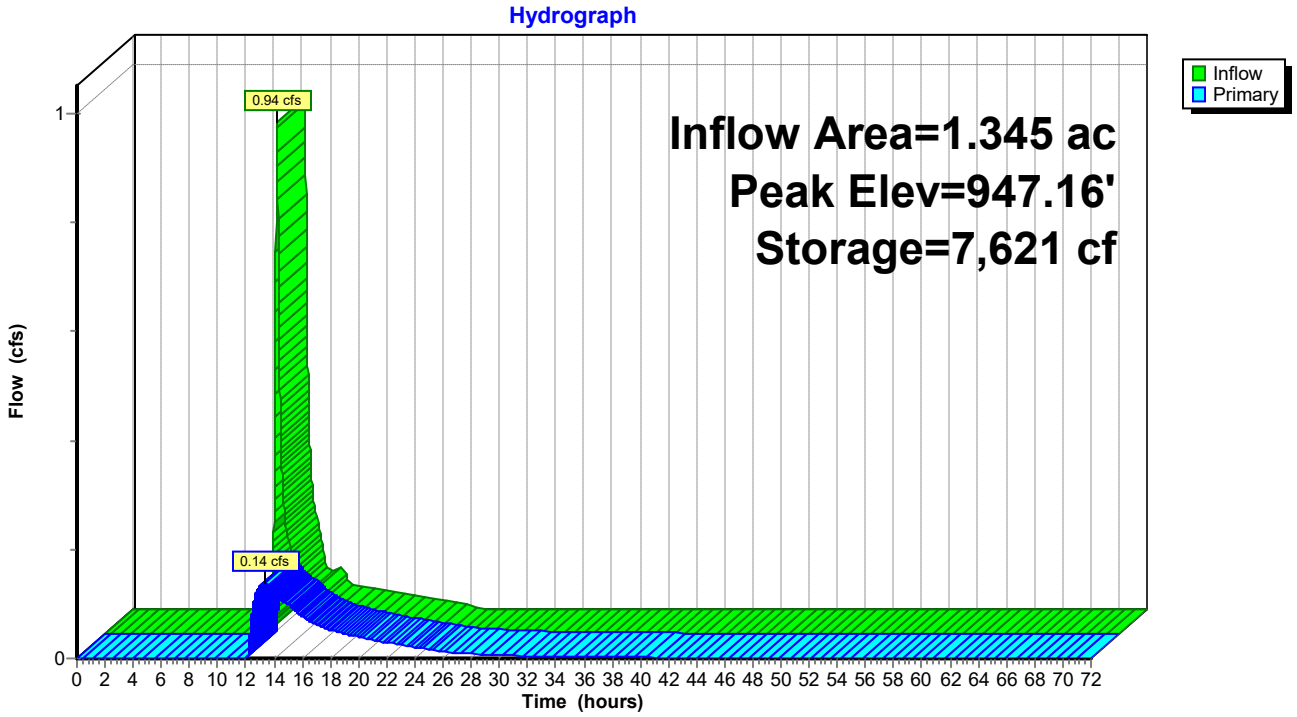
Volume	Invert	Avail.Storage	Storage Description
#1	946.00'	29,308 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.00	4,825	0	0
947.00	7,818	6,322	6,322
948.00	11,496	9,657	15,979
949.00	15,162	13,329	29,308

Device	Routing	Invert	Outlet Devices
#1	Device 2	947.00'	**18.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	944.10'	**18.0" Round Culvert** L= 34.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 944.10' / 944.00' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.14 cfs @ 13.33 hrs HW=947.16' TW=940.67' (Dynamic Tailwater)
↑**2=Culvert** (Passes 0.14 cfs of 11.41 cfs potential flow)
↑**1=Orifice/Grate** (Orifice Controls 0.14 cfs @ 1.36 fps)

Pond 2P-PROP: Wetland 2P



Summary for Pond 3P: Filtration Basin A

Inflow Area = 0.231 ac, 51.66% Impervious, Inflow Depth = 1.23" for 1-Year event
Inflow = 0.51 cfs @ 12.14 hrs, Volume= 0.024 af
Outflow = 0.02 cfs @ 13.68 hrs, Volume= 0.006 af, Atten= 96%, Lag= 92.1 min
Primary = 0.02 cfs @ 13.68 hrs, Volume= 0.006 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 944.71' @ 13.68 hrs Surf.Area= 833 sf Storage= 768 cf

Plug-Flow detention time= 312.9 min calculated for 0.006 af (26% of inflow)
Center-of-Mass det. time= 216.4 min (1,025.5 - 809.1)

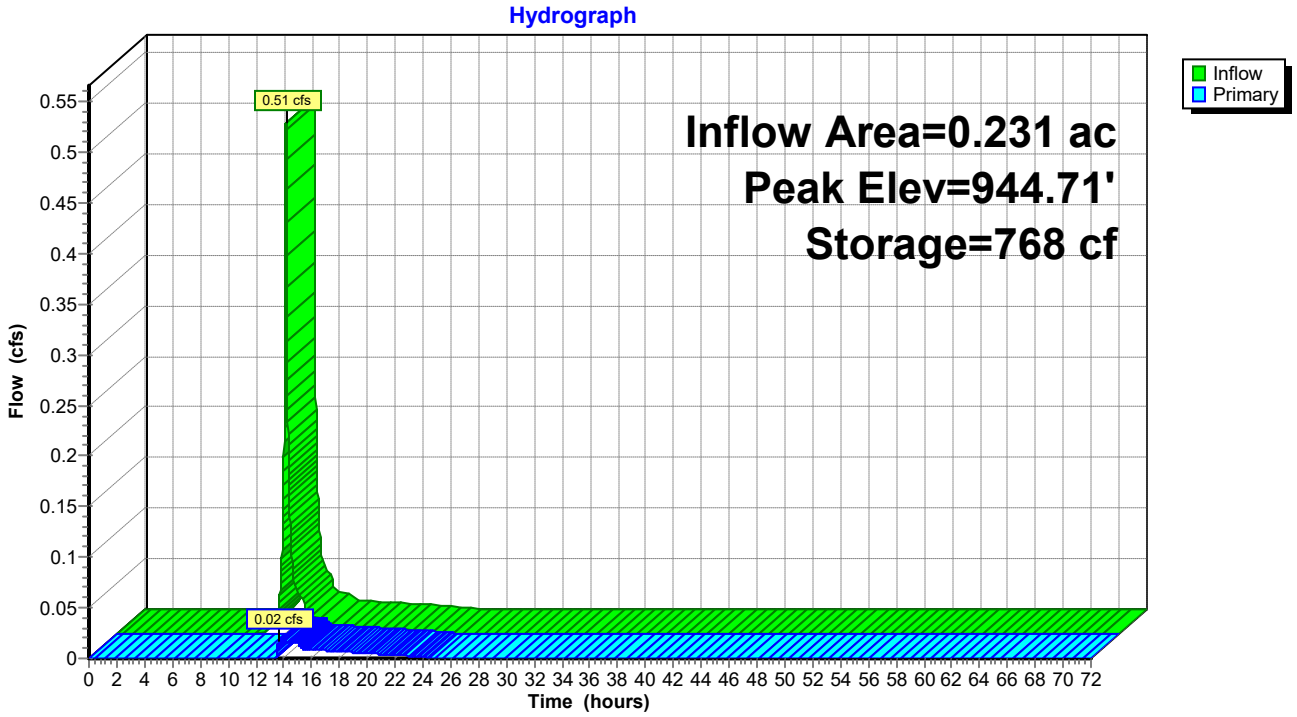
Volume	Invert	Avail.Storage	Storage Description
#1	943.00'	1,032 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
943.00	125	0	0
944.00	480	303	303
945.00	978	729	1,032

Device	Routing	Invert	Outlet Devices
#1	Primary	941.00'	**12.0" Round Culvert** L= 42.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 941.00' / 940.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	944.70'	**27.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 13.68 hrs HW=944.71' TW=940.65' (Dynamic Tailwater)
↑**1=Culvert** (Passes 0.02 cfs of 5.98 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.30 fps)

Pond 3P: Filtration Basin A



Summary for Pond 4P: Filtration Basin B

Inflow Area = 0.115 ac, 57.29% Impervious, Inflow Depth = 1.36" for 1-Year event
Inflow = 0.28 cfs @ 12.14 hrs, Volume= 0.013 af
Outflow = 0.01 cfs @ 15.03 hrs, Volume= 0.002 af, Atten= 97%, Lag= 172.9 min
Primary = 0.01 cfs @ 15.03 hrs, Volume= 0.002 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 949.51' @ 15.03 hrs Surf.Area= 507 sf Storage= 469 cf

Plug-Flow detention time= 388.0 min calculated for 0.002 af (18% of inflow)
Center-of-Mass det. time= 285.1 min (1,088.5 - 803.4)

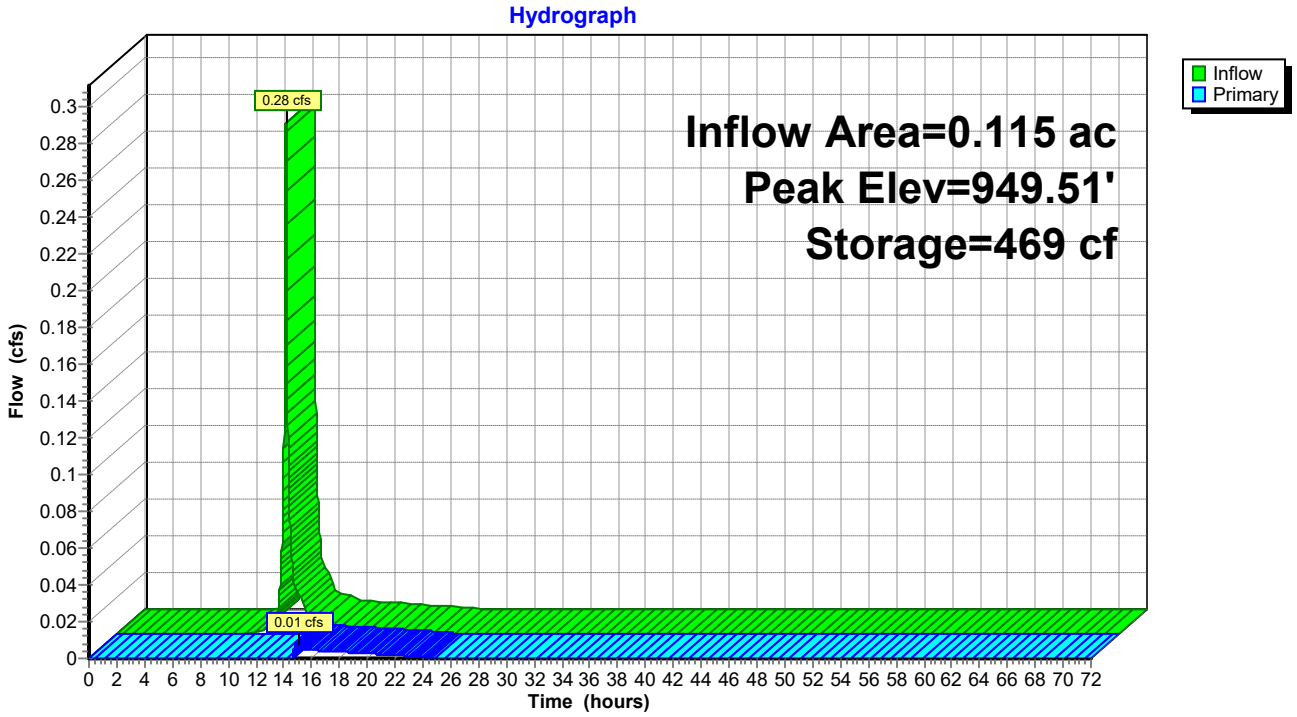
Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	758 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	138	0	0
949.00	360	249	249
949.50	505	216	465
950.00	665	293	758

Device	Routing	Invert	Outlet Devices
#1	Primary	949.50'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.01 cfs @ 15.03 hrs HW=949.51' TW=940.60' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.01 cfs @ 0.22 fps)

Pond 4P: Filtration Basin B



Summary for Pond 5P: Filtration Basin C

Inflow Area = 0.230 ac, 55.80% Impervious, Inflow Depth = 1.29" for 1-Year event
Inflow = 0.53 cfs @ 12.14 hrs, Volume= 0.025 af
Outflow = 0.06 cfs @ 12.70 hrs, Volume= 0.010 af, Atten= 89%, Lag= 33.3 min
Primary = 0.06 cfs @ 12.70 hrs, Volume= 0.010 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 951.53' @ 12.70 hrs Surf.Area= 705 sf Storage= 662 cf

Plug-Flow detention time= 220.0 min calculated for 0.010 af (40% of inflow)
Center-of-Mass det. time= 130.6 min (936.9 - 806.3)

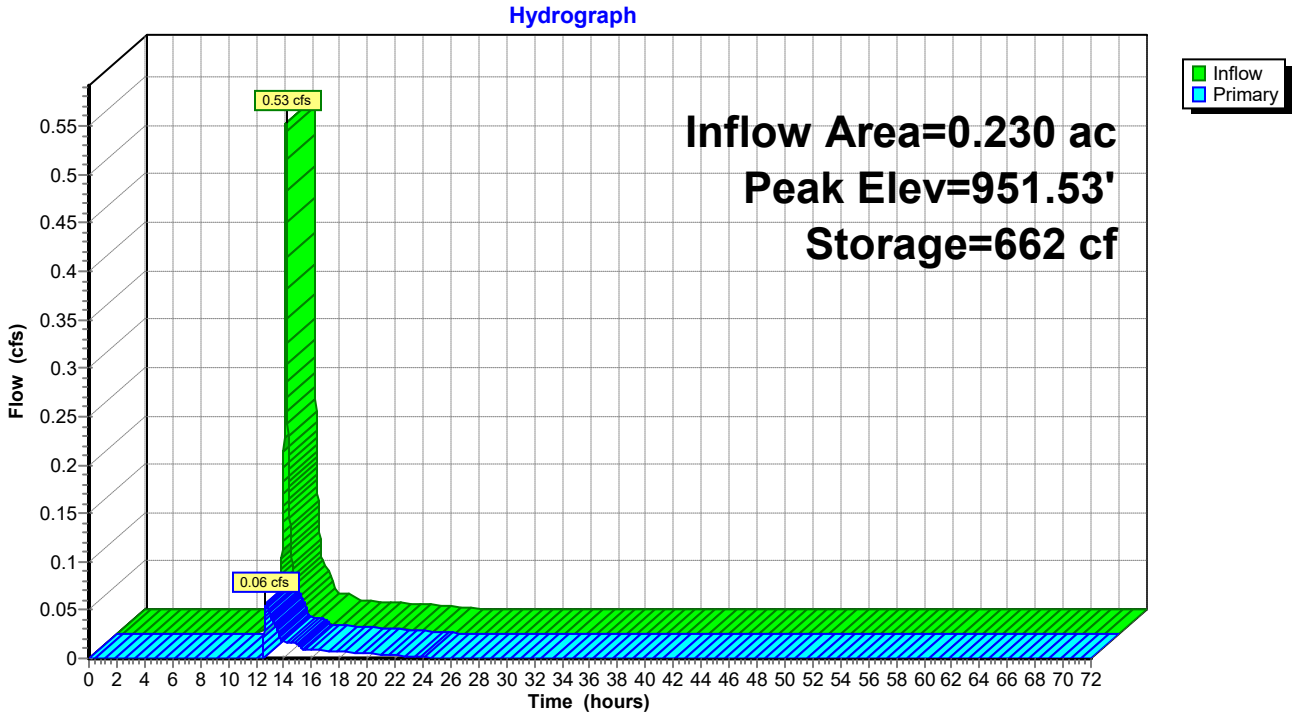
Volume	Invert	Avail.Storage	Storage Description
#1	950.00'	1,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
950.00	190	0	0
951.00	500	345	345
952.00	890	695	1,040

Device	Routing	Invert	Outlet Devices
#1	Primary	951.50'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.06 cfs @ 12.70 hrs HW=951.53' TW=947.15' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 0.42 fps)

Pond 5P: Filtration Basin C



Summary for Pond 6P: Filtration Basin D

Inflow Area = 0.230 ac, 62.20% Impervious, Inflow Depth = 1.44" for 1-Year event
Inflow = 0.58 cfs @ 12.14 hrs, Volume= 0.027 af
Outflow = 0.02 cfs @ 14.56 hrs, Volume= 0.006 af, Atten= 97%, Lag= 144.8 min
Primary = 0.02 cfs @ 14.56 hrs, Volume= 0.006 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 952.81' @ 14.56 hrs Surf.Area= 952 sf Storage= 962 cf

Plug-Flow detention time= 362.5 min calculated for 0.006 af (20% of inflow)
Center-of-Mass det. time= 261.0 min (1,061.3 - 800.3)

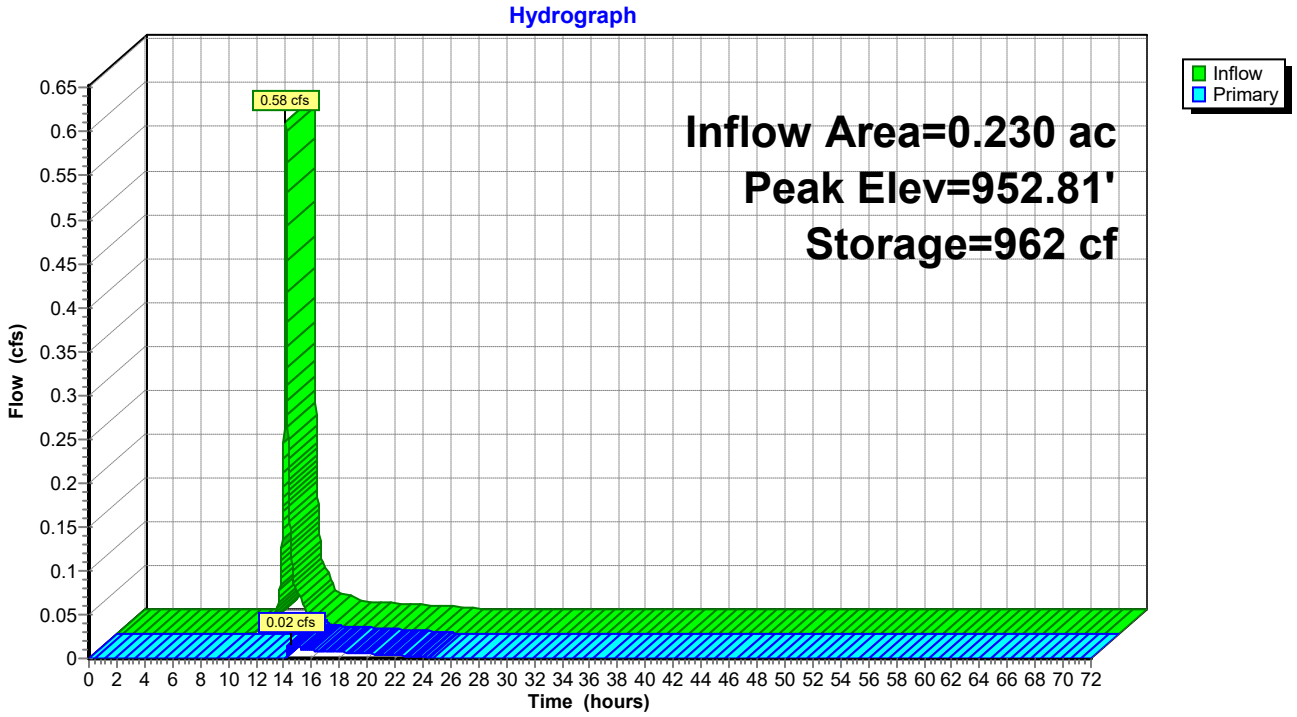
Volume	Invert	Avail.Storage	Storage Description
#1	951.00'	1,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
951.00	180	0	0
952.00	540	360	360
953.00	1,050	795	1,155

Device	Routing	Invert	Outlet Devices
#1	Primary	952.80'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.02 cfs @ 14.56 hrs HW=952.81' TW=947.14' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 0.02 cfs @ 0.22 fps)

Pond 6P: Filtration Basin D



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment 1S: Existing to Wetland 1P Runoff Area=193,772 sf 9.61% Impervious Runoff Depth=2.02"
Flow Length=325' Slope=0.1350 '/' Tc=18.3 min CN=77 Runoff=10.48 cfs 0.748 af

Subcatchment 1X: Existing to Wetland 1P Runoff Area=211,609 sf 8.80% Impervious Runoff Depth=1.94"
Flow Length=325' Slope=0.1350 '/' Tc=18.3 min UI Adjusted CN=76 Runoff=10.99 cfs 0.785 af

Subcatchment 2S: Direct to Wetland 2P Runoff Area=38,600 sf 0.00% Impervious Runoff Depth=2.10"
Flow Length=100' Tc=12.3 min CN=78 Runoff=2.65 cfs 0.155 af

Subcatchment 2X: Existing to Wetland 2P Runoff Area=40,857 sf 4.62% Impervious Runoff Depth=2.10"
Flow Length=100' Tc=12.3 min UI Adjusted CN=78 Runoff=2.80 cfs 0.164 af

Subcatchment 3S: Area A Runoff Area=10,065 sf 51.66% Impervious Runoff Depth=2.78"
Tc=7.0 min CN=86 Runoff=1.12 cfs 0.054 af

Subcatchment 3X: Direct to Wetland 3 Runoff Area=0.344 ac 0.00% Impervious Runoff Depth=1.65"
Tc=7.0 min CN=72 Runoff=1.01 cfs 0.047 af

Subcatchment 4S: AREA B Runoff Area=5,010 sf 57.29% Impervious Runoff Depth=2.97"
Tc=7.0 min CN=88 Runoff=0.59 cfs 0.028 af

Subcatchment 5S: Area C Runoff Area=10,000 sf 55.80% Impervious Runoff Depth=2.88"
Tc=7.0 min CN=87 Runoff=1.14 cfs 0.055 af

Subcatchment 6S: Area D Runoff Area=10,000 sf 62.20% Impervious Runoff Depth=3.07"
Tc=7.0 min CN=89 Runoff=1.20 cfs 0.059 af

Reach 4R: Total Discharge Inflow=6.67 cfs 0.996 af
Outflow=6.67 cfs 0.996 af

Pond 1P: Wetland 1P Peak Elev=941.06' Storage=19,495 cf Inflow=12.33 cfs 0.949 af
Outflow=6.50 cfs 0.949 af

Pond 1P PROP: Wetland 1P Peak Elev=941.05' Storage=19,238 cf Inflow=12.02 cfs 1.032 af
Outflow=6.30 cfs 1.032 af

Pond 2P: Wetland 2P Peak Elev=947.25' Storage=8,357 cf Inflow=2.80 cfs 0.164 af
Outflow=1.48 cfs 0.164 af

Pond 2P-PROP: Wetland 2P Peak Elev=947.47' Storage=10,437 cf Inflow=4.68 cfs 0.232 af
Outflow=1.12 cfs 0.230 af

Pond 3P: Filtration Basin A Peak Elev=944.83' Storage=868 cf Inflow=1.12 cfs 0.054 af
Outflow=1.02 cfs 0.036 af

Pond 4P: Filtration Basin B Peak Elev=949.61' Storage=524 cf Inflow=0.59 cfs 0.028 af
Outflow=0.48 cfs 0.018 af

Pond 5P: Filtration Basin C Peak Elev=951.69' Storage=786 cf Inflow=1.14 cfs 0.055 af
Outflow=1.09 cfs 0.040 af

Pond 6P: Filtration Basin D Peak Elev=952.92' Storage=1,071 cf Inflow=1.20 cfs 0.059 af
Outflow=1.04 cfs 0.037 af

Total Runoff Area = 12.280 ac Runoff Volume = 2.095 af Average Runoff Depth = 2.05"
88.97% Pervious = 10.925 ac 11.03% Impervious = 1.355 ac

Summary for Subcatchment 1S: Existing to Wetland 1P

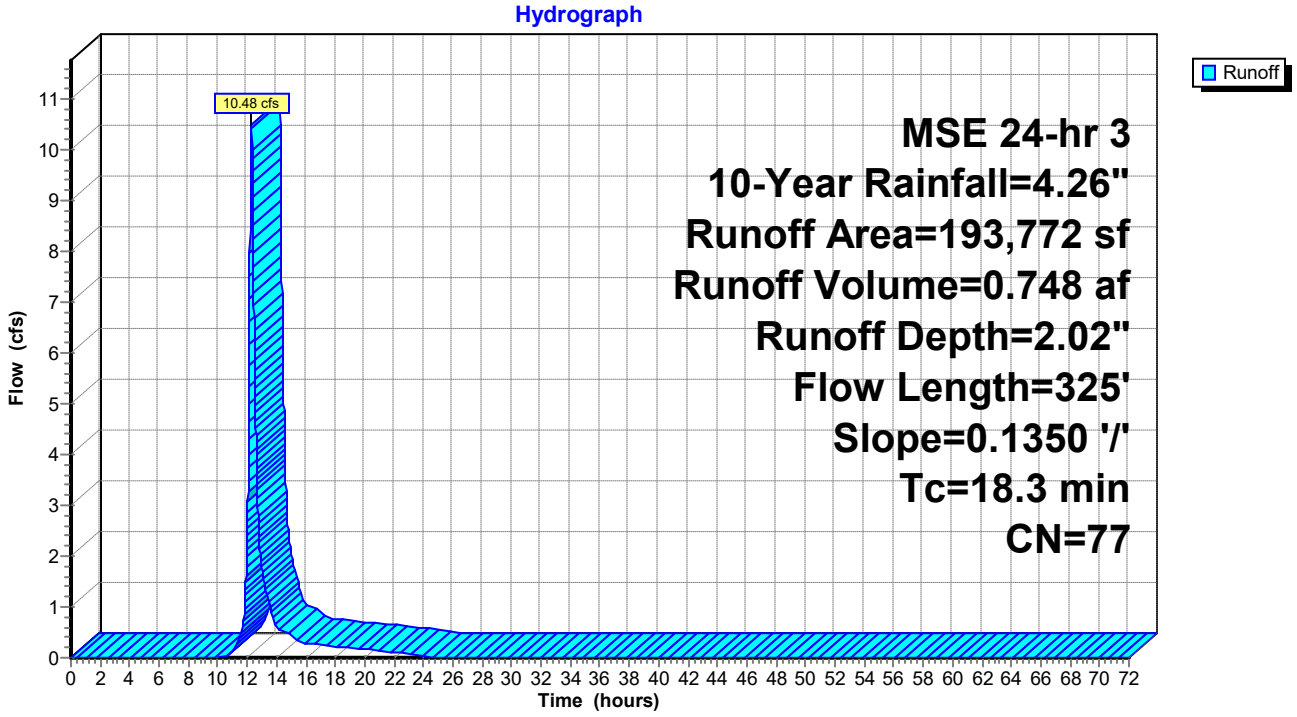
Runoff = 10.48 cfs @ 12.28 hrs, Volume= 0.748 af, Depth= 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
8,744	98	Unconnected roofs, HSG C
9,885	98	Paved parking, HSG C
19,395	98	Water Surface, 0% imp, HSG C
2,322	96	Gravel surface, HSG C
153,426	72	Woods/grass comb., Good, HSG C
193,772	77	Weighted Average
175,143		90.39% Pervious Area
18,629		9.61% Impervious Area
8,744		46.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	180	0.1350	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
1.3	145	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	325	Total			

Subcatchment 1S: Existing to Wetland 1P



Summary for Subcatchment 1X: Existing to Wetland 1P

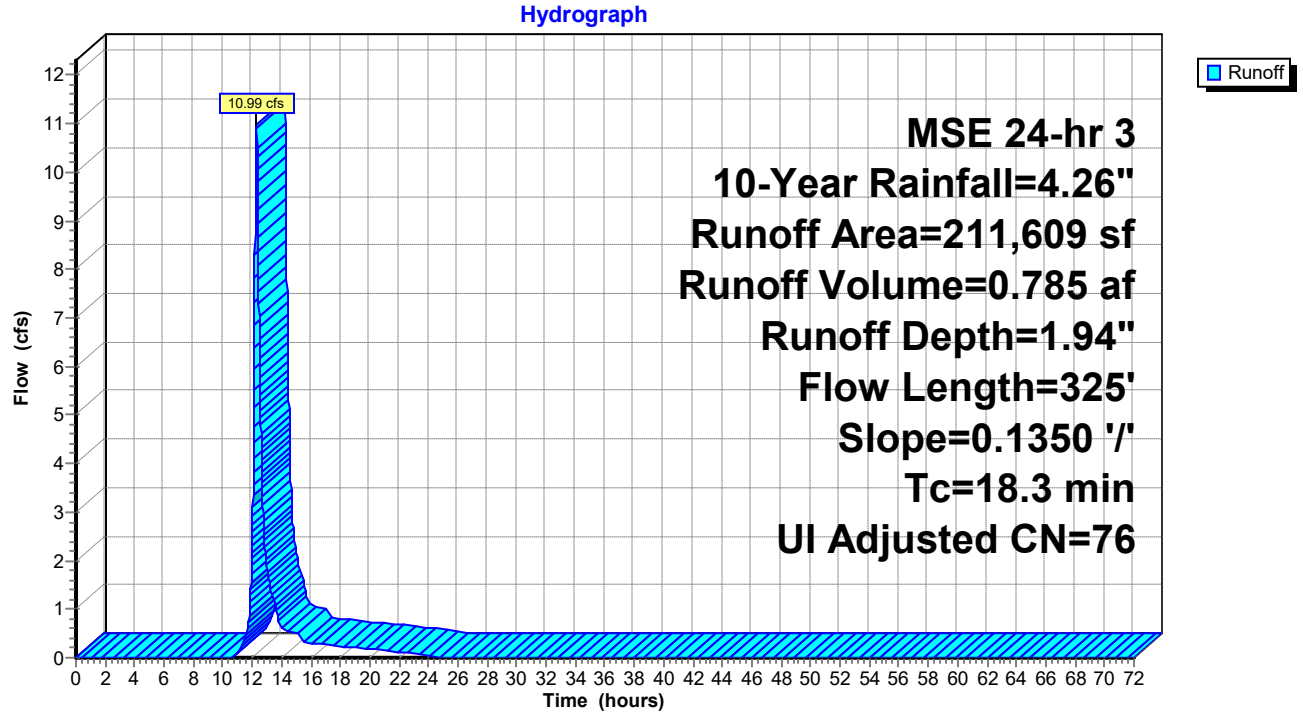
Runoff = 10.99 cfs @ 12.28 hrs, Volume= 0.785 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
8,744	98		Unconnected roofs, HSG C
9,885	98		Paved parking, HSG C
19,395	98		Water Surface, 0% imp, HSG C
2,322	96		Gravel surface, HSG C
171,263	72		Woods/grass comb., Good, HSG C
211,609	77	76	Weighted Average, UI Adjusted
192,980			91.20% Pervious Area
18,629			8.80% Impervious Area
8,744			46.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	180	0.1350	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
1.3	145	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	325	Total			

Subcatchment 1X: Existing to Wetland 1P



Summary for Subcatchment 2S: Direct to Wetland 2P

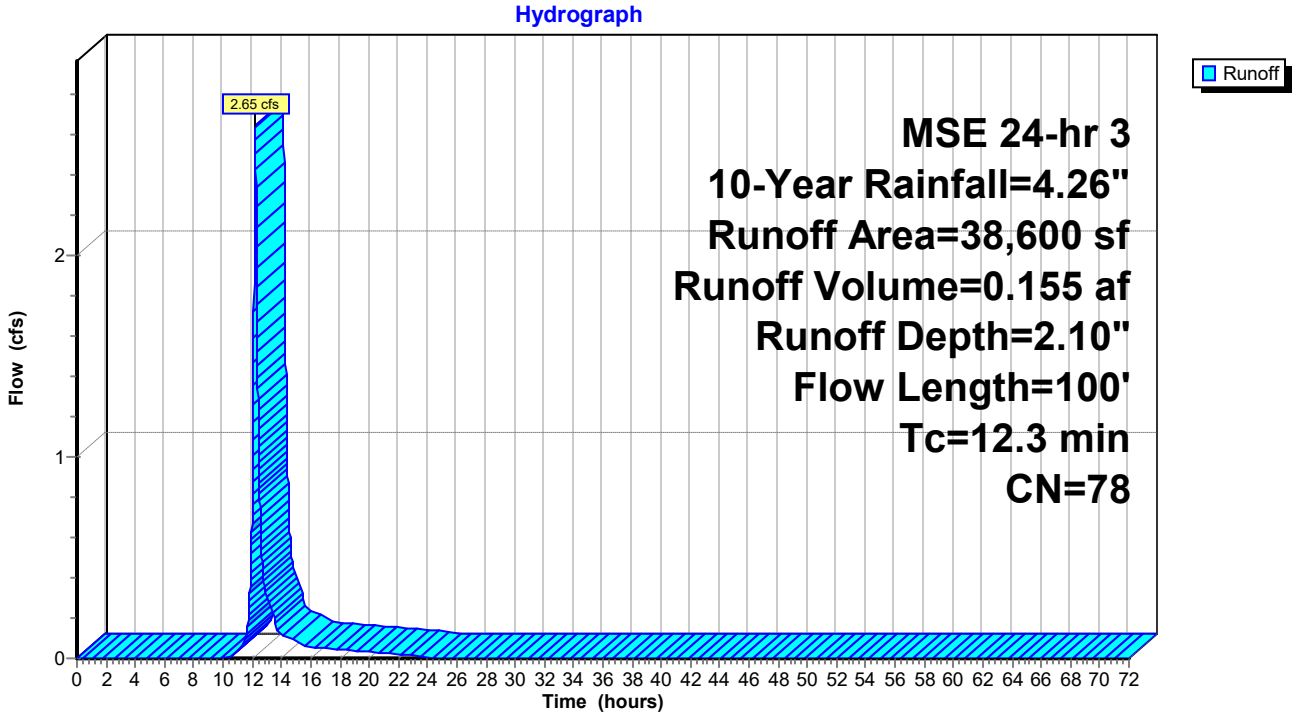
Runoff = 2.65 cfs @ 12.20 hrs, Volume= 0.155 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
8,590	98	Water Surface, 0% imp, HSG C
30,010	72	Woods/grass comb., Good, HSG C
38,600	78	Weighted Average
38,600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	20	0.0830	1.66		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.85"
12.1	80	0.0625	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
12.3	100	Total			

Subcatchment 2S: Direct to Wetland 2P



Summary for Subcatchment 2X: Existing to Wetland 2P

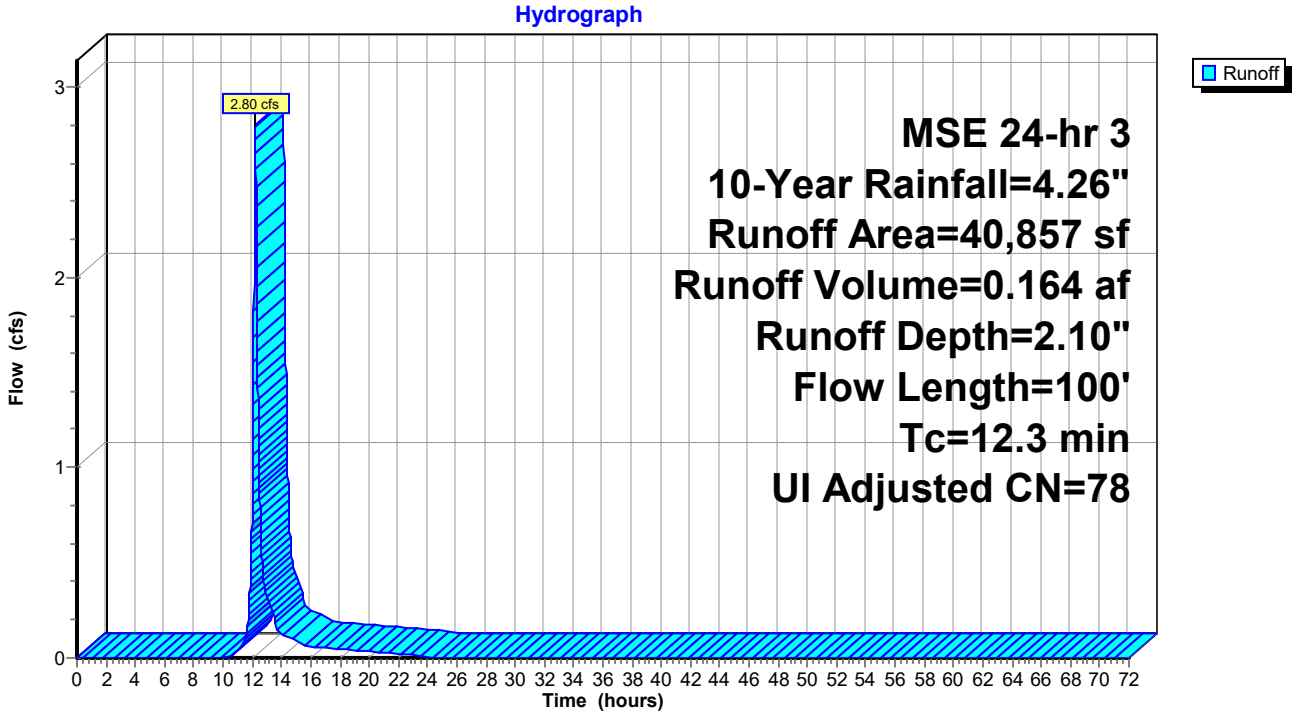
Runoff = 2.80 cfs @ 12.20 hrs, Volume= 0.164 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
1,886	98		Unconnected roofs, HSG C
8,586	98		Water Surface, 0% imp, HSG C
30,385	72		Woods/grass comb., Good, HSG C
40,857	79	78	Weighted Average, UI Adjusted
38,971			95.38% Pervious Area
1,886			4.62% Impervious Area
1,886			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	20	0.0830	1.66		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.85"
12.1	80	0.0625	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
12.3	100	Total			

Subcatchment 2X: Existing to Wetland 2P



Summary for Subcatchment 3S: Area A

5,200 SF impervious requires 434 CF filtration

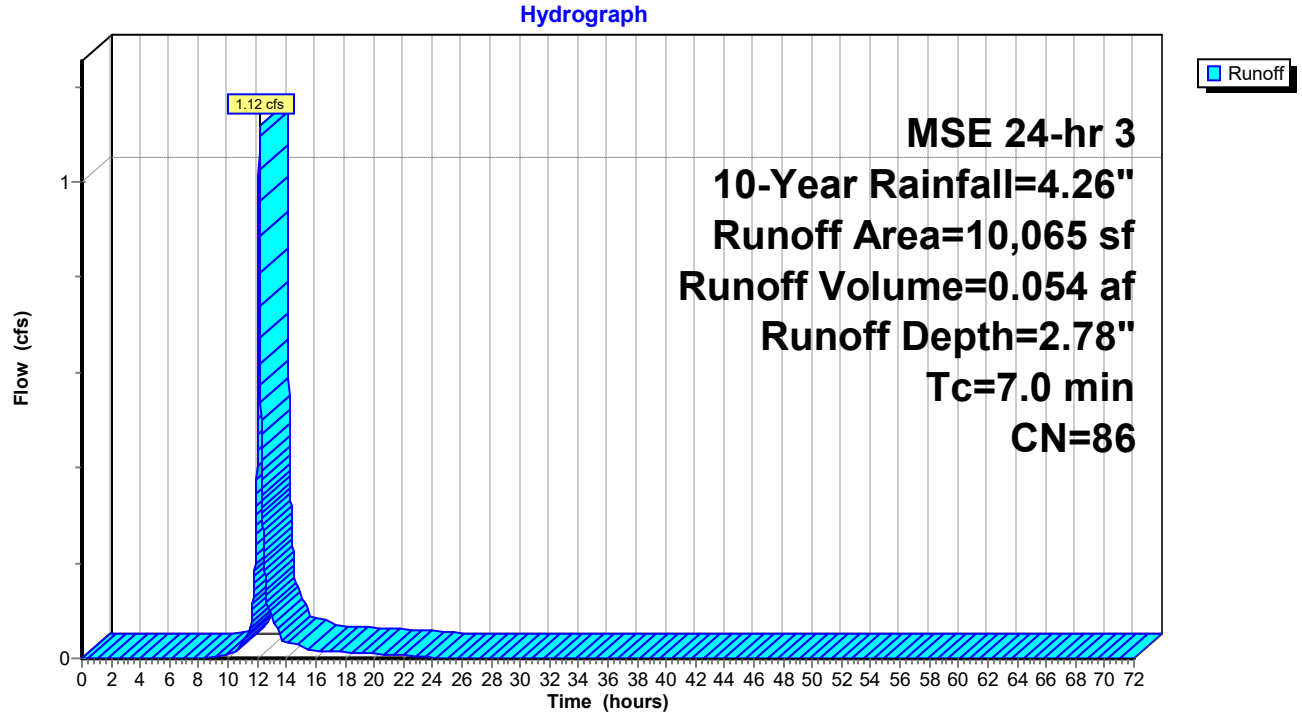
Runoff = 1.12 cfs @ 12.14 hrs, Volume= 0.054 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
5,200	98	Unconnected roofs, HSG C
4,865	74	>75% Grass cover, Good, HSG C
10,065	86	Weighted Average
4,865		48.34% Pervious Area
5,200		51.66% Impervious Area
5,200		100.00% Unconnected

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

Subcatchment 3S: Area A



Summary for Subcatchment 3X: Direct to Wetland 3

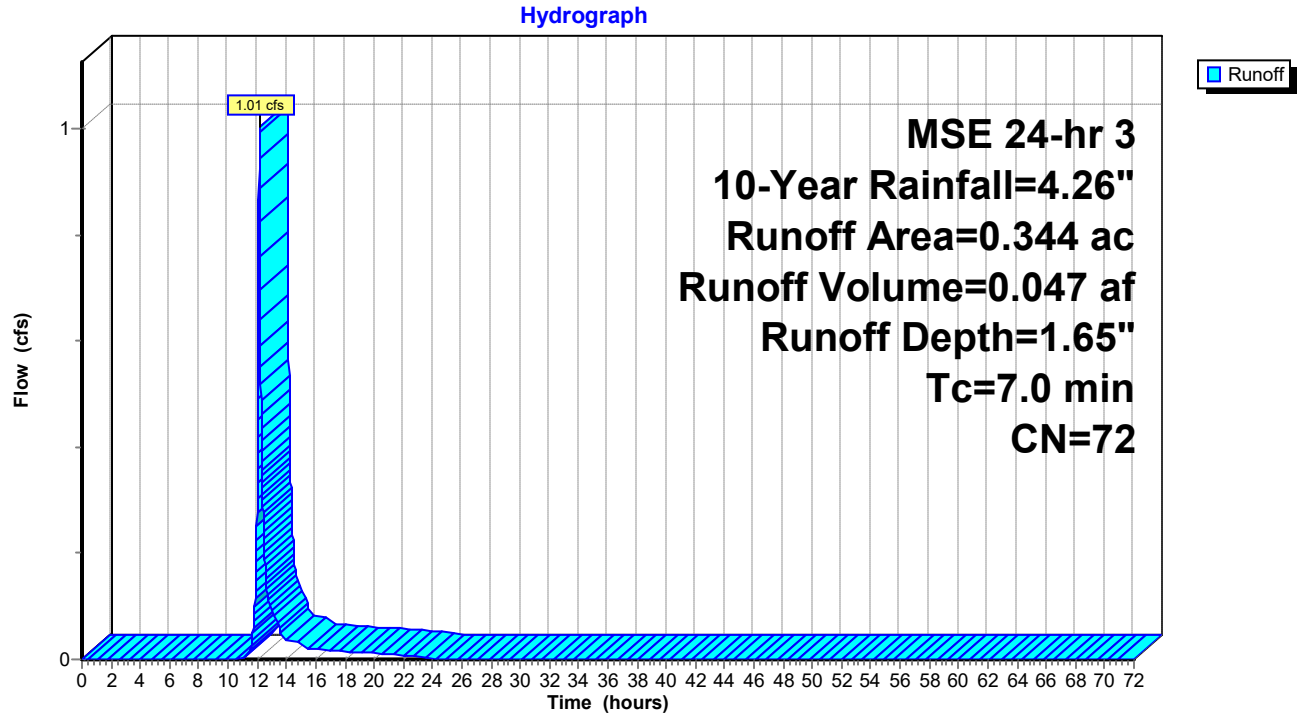
Runoff = 1.01 cfs @ 12.15 hrs, Volume= 0.047 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
0.344	72	Woods/grass comb., Good, HSG C
0.344		100.00% Pervious Area

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

Subcatchment 3X: Direct to Wetland 3



Summary for Subcatchment 4S: AREA B

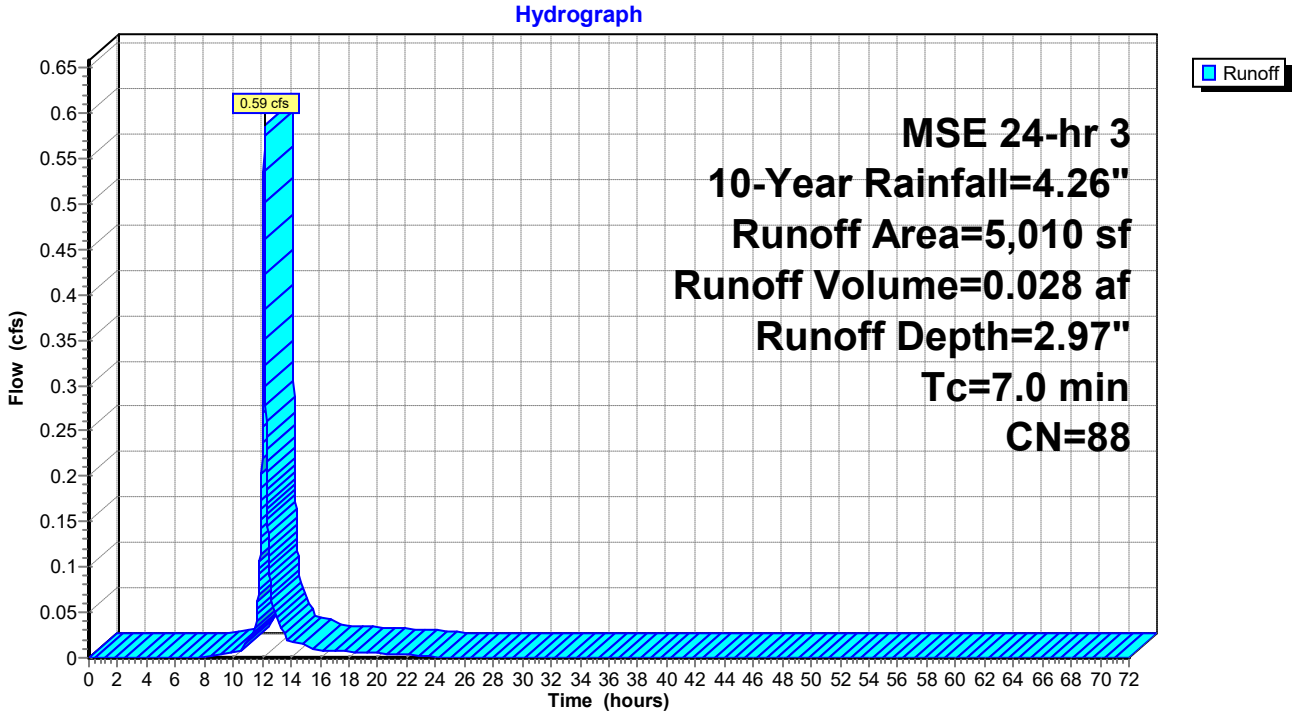
Runoff = 0.59 cfs @ 12.14 hrs, Volume= 0.028 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
1,750	98	Unconnected roofs, HSG C
1,120	98	Unconnected pavement, HSG C
2,140	74	>75% Grass cover, Good, HSG C
5,010	88	Weighted Average
2,140		42.71% Pervious Area
2,870		57.29% Impervious Area
2,870		100.00% Unconnected

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

Subcatchment 4S: AREA B



Summary for Subcatchment 5S: Area C

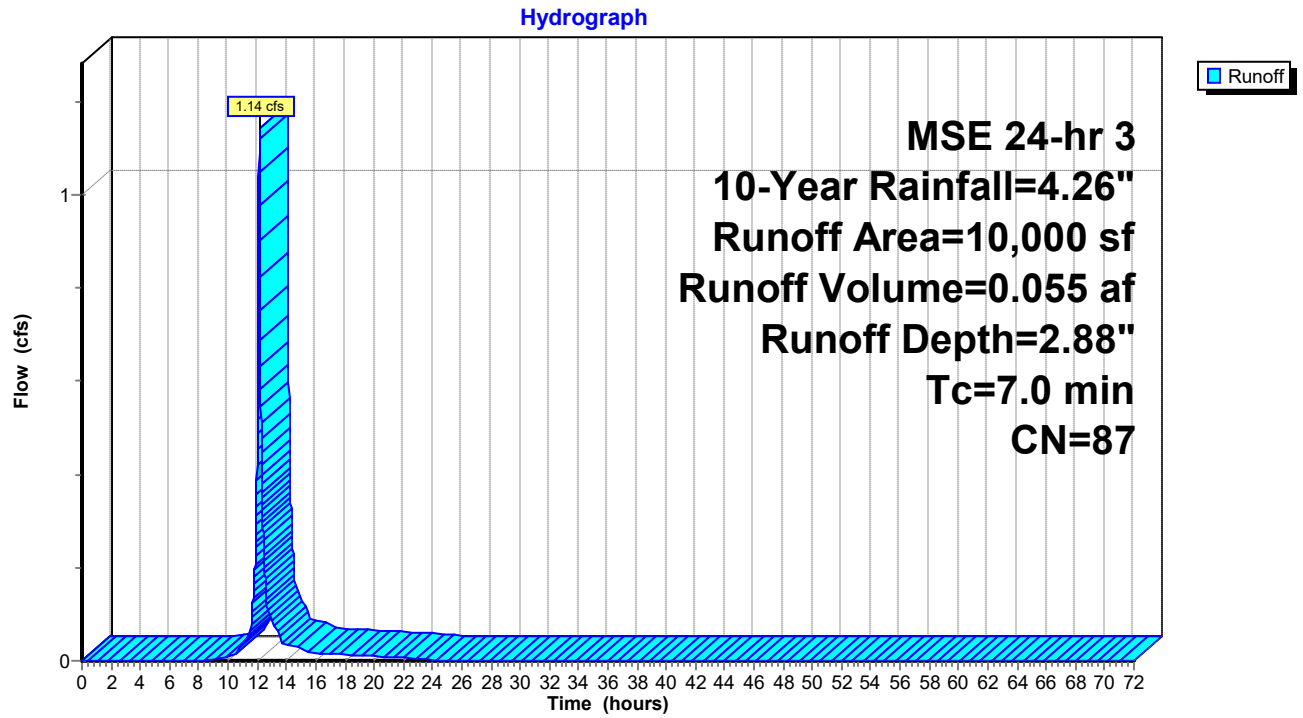
Runoff = 1.14 cfs @ 12.14 hrs, Volume= 0.055 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
4,240	98	Unconnected roofs, HSG C
1,340	98	Unconnected pavement, HSG C
4,420	74	>75% Grass cover, Good, HSG C
10,000	87	Weighted Average
4,420		44.20% Pervious Area
5,580		55.80% Impervious Area
5,580		100.00% Unconnected

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

Subcatchment 5S: Area C



Summary for Subcatchment 6S: Area D

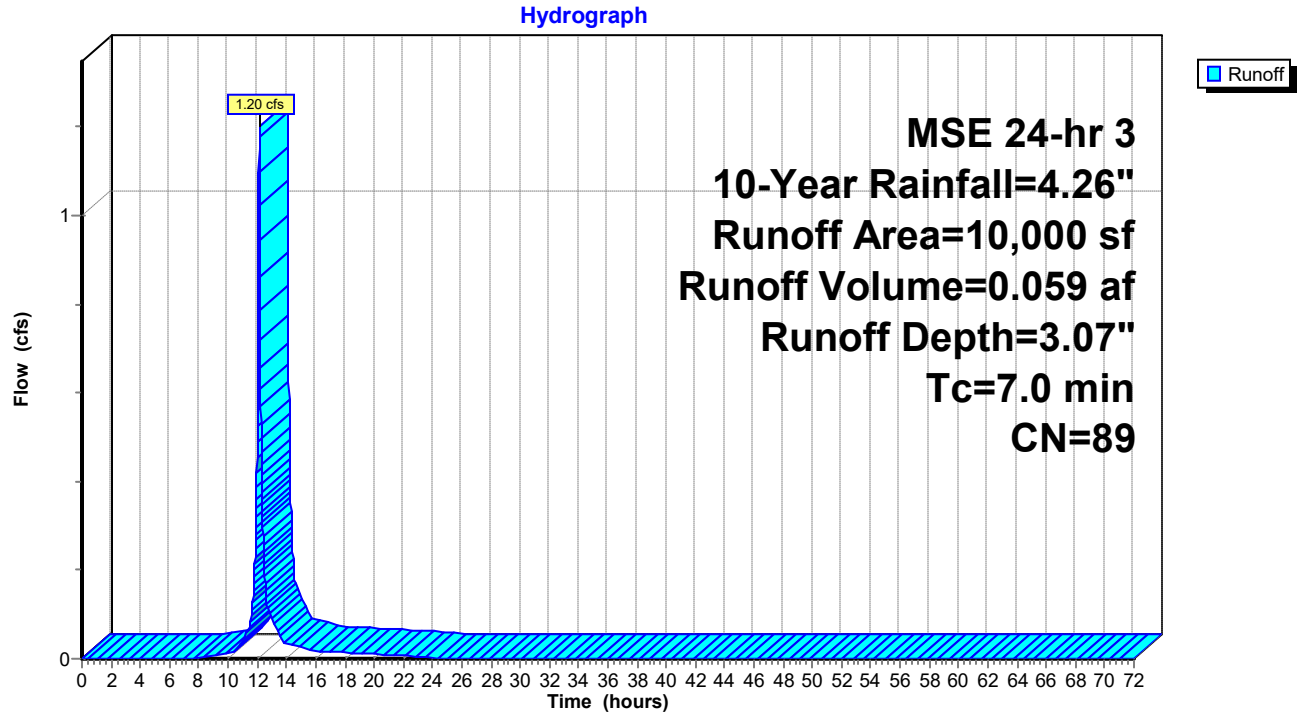
Runoff = 1.20 cfs @ 12.14 hrs, Volume= 0.059 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
6,220	98	Paved parking, HSG C
3,780	74	>75% Grass cover, Good, HSG C
10,000	89	Weighted Average
3,780		37.80% Pervious Area
6,220		62.20% Impervious Area

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

Subcatchment 6S: Area D



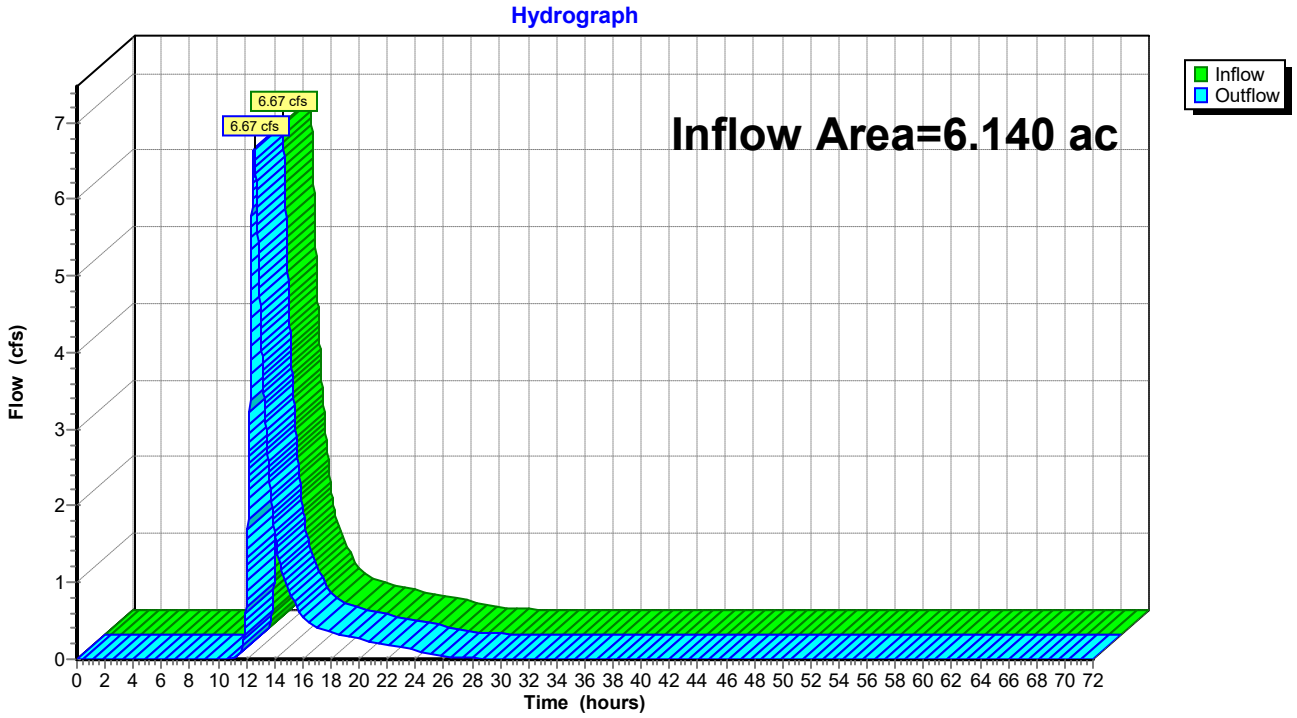
Summary for Reach 4R: Total Discharge

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

Inflow Area = 6.140 ac, 7.67% Impervious, Inflow Depth = 1.95" for 10-Year event
Inflow = 6.67 cfs @ 12.55 hrs, Volume= 0.996 af
Outflow = 6.67 cfs @ 12.56 hrs, Volume= 0.996 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 4R: Total Discharge



Summary for Pond 1P: Wetland 1P

Inflow Area = 5.796 ac, 8.13% Impervious, Inflow Depth = 1.97" for 10-Year event
Inflow = 12.33 cfs @ 12.29 hrs, Volume= 0.949 af
Outflow = 6.50 cfs @ 12.56 hrs, Volume= 0.949 af, Atten= 47%, Lag= 15.9 min
Primary = 6.50 cfs @ 12.56 hrs, Volume= 0.949 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 940.50' Surf.Area= 18,044 sf Storage= 7,632 cf
Peak Elev= 941.06' @ 12.56 hrs Surf.Area= 24,515 sf Storage= 19,495 cf (11,863 cf above start)

Plug-Flow detention time= 147.0 min calculated for 0.774 af (82% of inflow)
Center-of-Mass det. time= 49.9 min (879.2 - 829.2)

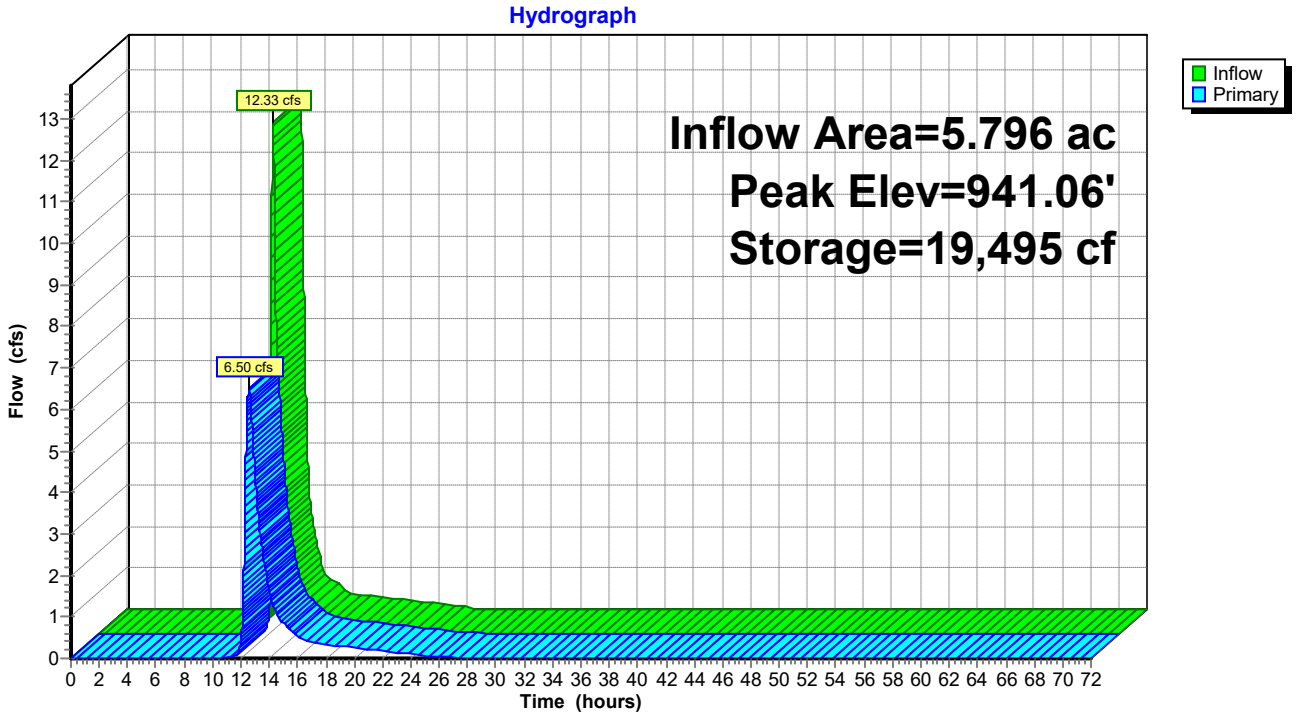
Volume	Invert	Avail.Storage	Storage Description
#1	940.00'	92,346 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
940.00	12,486	0	0
941.00	23,601	18,044	18,044
942.00	38,749	31,175	49,219
943.00	47,506	43,128	92,346

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**5.8' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=6.50 cfs @ 12.56 hrs HW=941.06' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 6.50 cfs @ 2.00 fps)

Pond 1P: Wetland 1P



Summary for Pond 1P PROP: Wetland 1P

Inflow Area = 6.140 ac, 14.40% Impervious, Inflow Depth = 2.02" for 10-Year event
Inflow = 12.02 cfs @ 12.28 hrs, Volume= 1.032 af
Outflow = 6.30 cfs @ 12.56 hrs, Volume= 1.032 af, Atten= 48%, Lag= 16.9 min
Primary = 6.30 cfs @ 12.56 hrs, Volume= 1.032 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 940.50' Surf.Area= 18,044 sf Storage= 7,632 cf
Peak Elev= 941.05' @ 12.56 hrs Surf.Area= 24,355 sf Storage= 19,238 cf (11,605 cf above start)

Plug-Flow detention time= 158.3 min calculated for 0.857 af (83% of inflow)
Center-of-Mass det. time= 50.3 min (902.4 - 852.1)

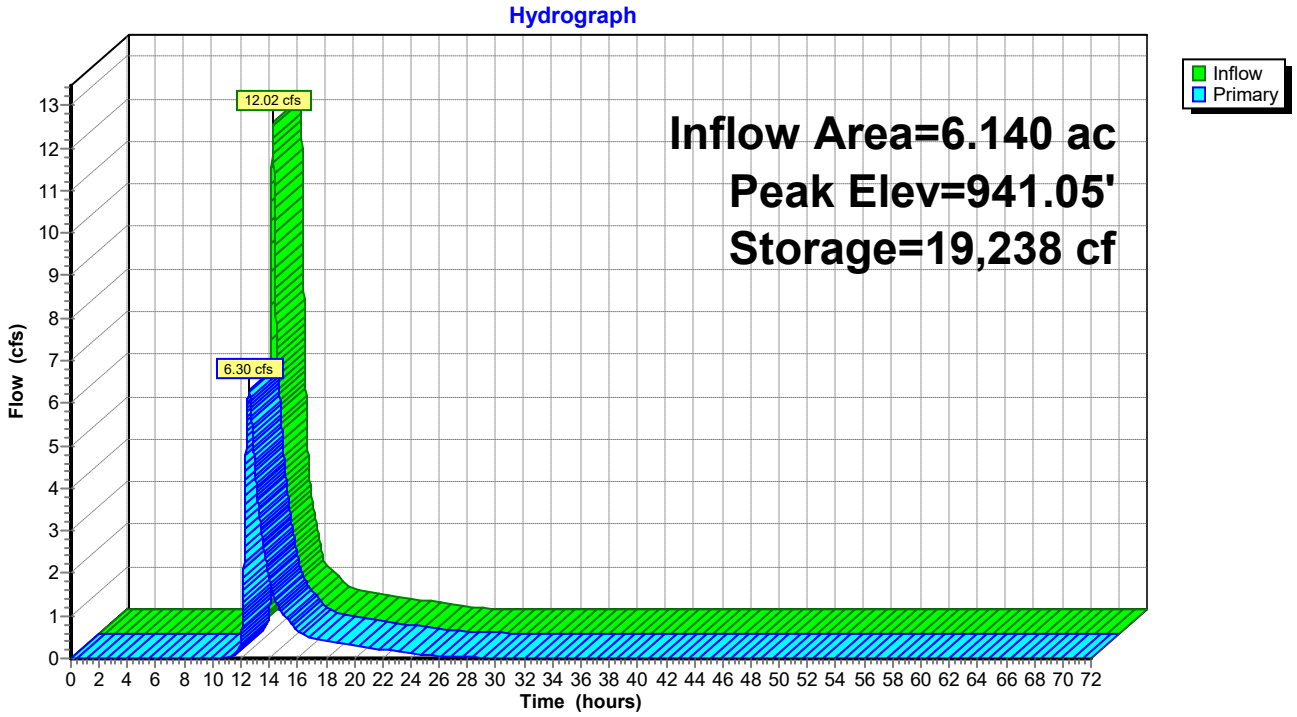
Volume	Invert	Avail.Storage	Storage Description
#1	940.00'	92,346 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
940.00	12,486	0	0
941.00	23,601	18,044	18,044
942.00	38,749	31,175	49,219
943.00	47,506	43,128	92,346

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**5.8' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=6.30 cfs @ 12.56 hrs HW=941.05' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 6.30 cfs @ 1.98 fps)

Pond 1P PROP: Wetland 1P



Summary for Pond 2P: Wetland 2P

Inflow Area = 0.938 ac, 4.62% Impervious, Inflow Depth = 2.10" for 10-Year event
Inflow = 2.80 cfs @ 12.20 hrs, Volume= 0.164 af
Outflow = 1.48 cfs @ 12.38 hrs, Volume= 0.164 af, Atten= 47%, Lag= 10.2 min
Primary = 1.48 cfs @ 12.38 hrs, Volume= 0.164 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 947.00' Surf.Area= 7,818 sf Storage= 6,322 cf
Peak Elev= 947.25' @ 12.38 hrs Surf.Area= 8,723 sf Storage= 8,357 cf (2,036 cf above start)

Plug-Flow detention time= 575.7 min calculated for 0.019 af (11% of inflow)
Center-of-Mass det. time= 41.0 min (855.3 - 814.3)

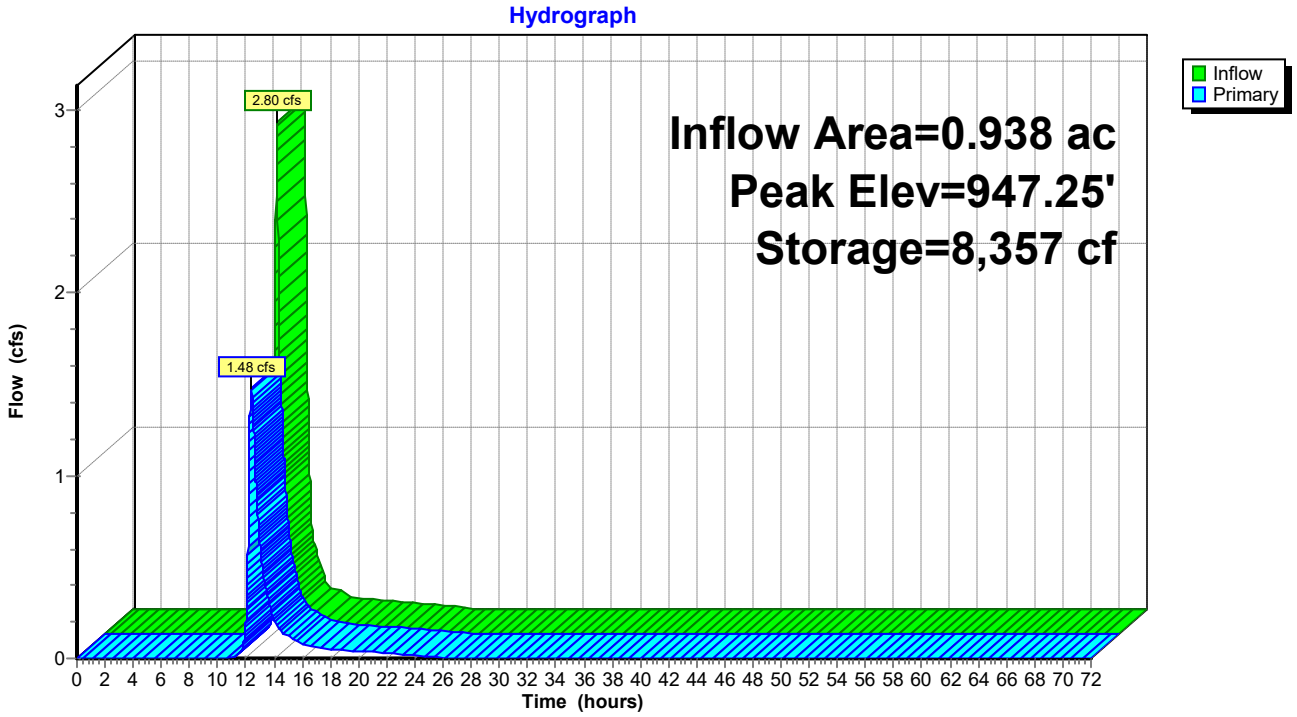
Volume	Invert	Avail.Storage	Storage Description
#1	946.00'	29,308 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.00	4,825	0	0
947.00	7,818	6,322	6,322
948.00	11,496	9,657	15,979
949.00	15,162	13,329	29,308

Device	Routing	Invert	Outlet Devices
#1	Primary	947.00'	**4.5' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.47 cfs @ 12.38 hrs HW=947.25' TW=940.99' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.47 cfs @ 1.33 fps)

Pond 2P: Wetland 2P



Summary for Pond 2P-PROP: Wetland 2P

Inflow Area = 1.345 ac, 20.14% Impervious, Inflow Depth = 2.07" for 10-Year event
Inflow = 4.68 cfs @ 12.19 hrs, Volume= 0.232 af
Outflow = 1.12 cfs @ 12.55 hrs, Volume= 0.230 af, Atten= 76%, Lag= 21.6 min
Primary = 1.12 cfs @ 12.55 hrs, Volume= 0.230 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 947.00' Surf.Area= 7,818 sf Storage= 6,322 cf
Peak Elev= 947.47' @ 12.55 hrs Surf.Area= 9,560 sf Storage= 10,437 cf (4,116 cf above start)

Plug-Flow detention time= 496.7 min calculated for 0.085 af (37% of inflow)
Center-of-Mass det. time= 131.0 min (952.7 - 821.7)

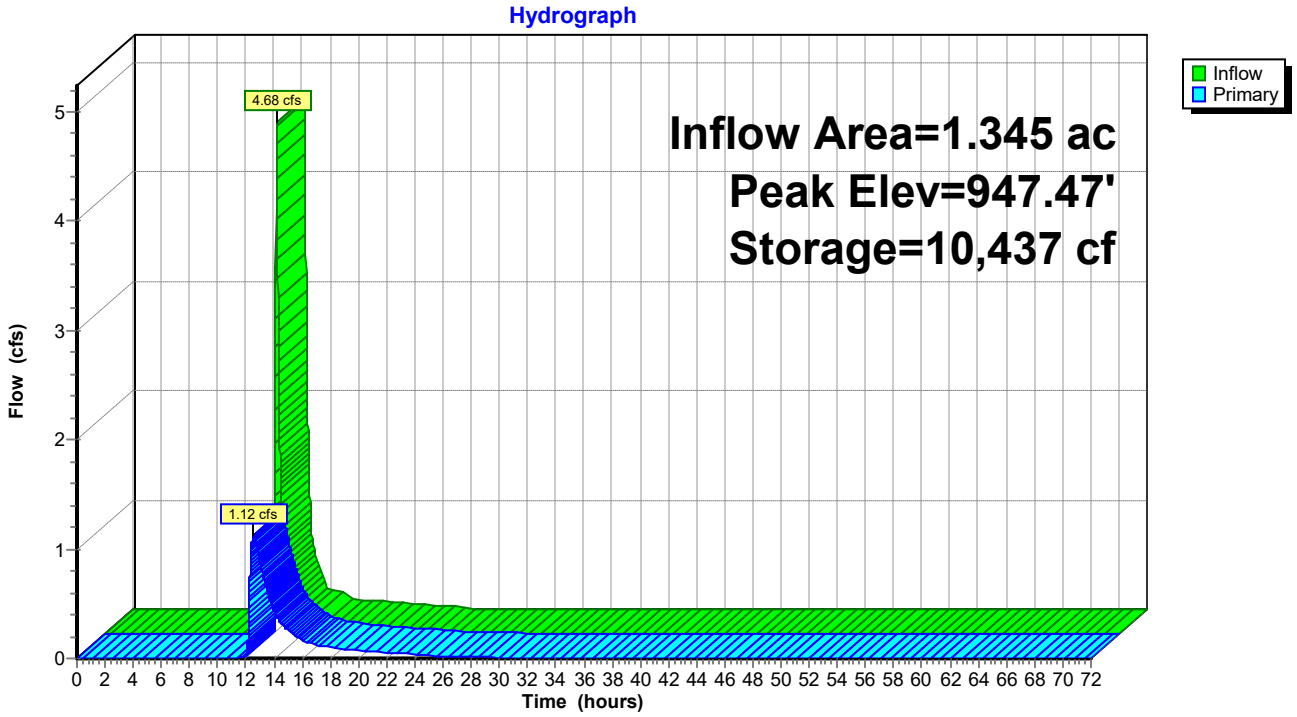
Volume	Invert	Avail.Storage	Storage Description
#1	946.00'	29,308 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.00	4,825	0	0
947.00	7,818	6,322	6,322
948.00	11,496	9,657	15,979
949.00	15,162	13,329	29,308

Device	Routing	Invert	Outlet Devices
#1	Device 2	947.00'	**18.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	944.10'	**18.0" Round Culvert** L= 34.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 944.10' / 944.00' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.12 cfs @ 12.55 hrs HW=947.47' TW=941.05' (Dynamic Tailwater)
↑**2=Culvert** (Passes 1.12 cfs of 12.16 cfs potential flow)
↑**1=Orifice/Grate** (Orifice Controls 1.12 cfs @ 2.34 fps)

Pond 2P-PROP: Wetland 2P



Summary for Pond 3P: Filtration Basin A

Inflow Area = 0.231 ac, 51.66% Impervious, Inflow Depth = 2.78" for 10-Year event
Inflow = 1.12 cfs @ 12.14 hrs, Volume= 0.054 af
Outflow = 1.02 cfs @ 12.18 hrs, Volume= 0.036 af, Atten= 8%, Lag= 2.0 min
Primary = 1.02 cfs @ 12.18 hrs, Volume= 0.036 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 944.83' @ 12.18 hrs Surf.Area= 891 sf Storage= 868 cf

Plug-Flow detention time= 121.2 min calculated for 0.036 af (67% of inflow)
Center-of-Mass det. time= 48.4 min (841.0 - 792.6)

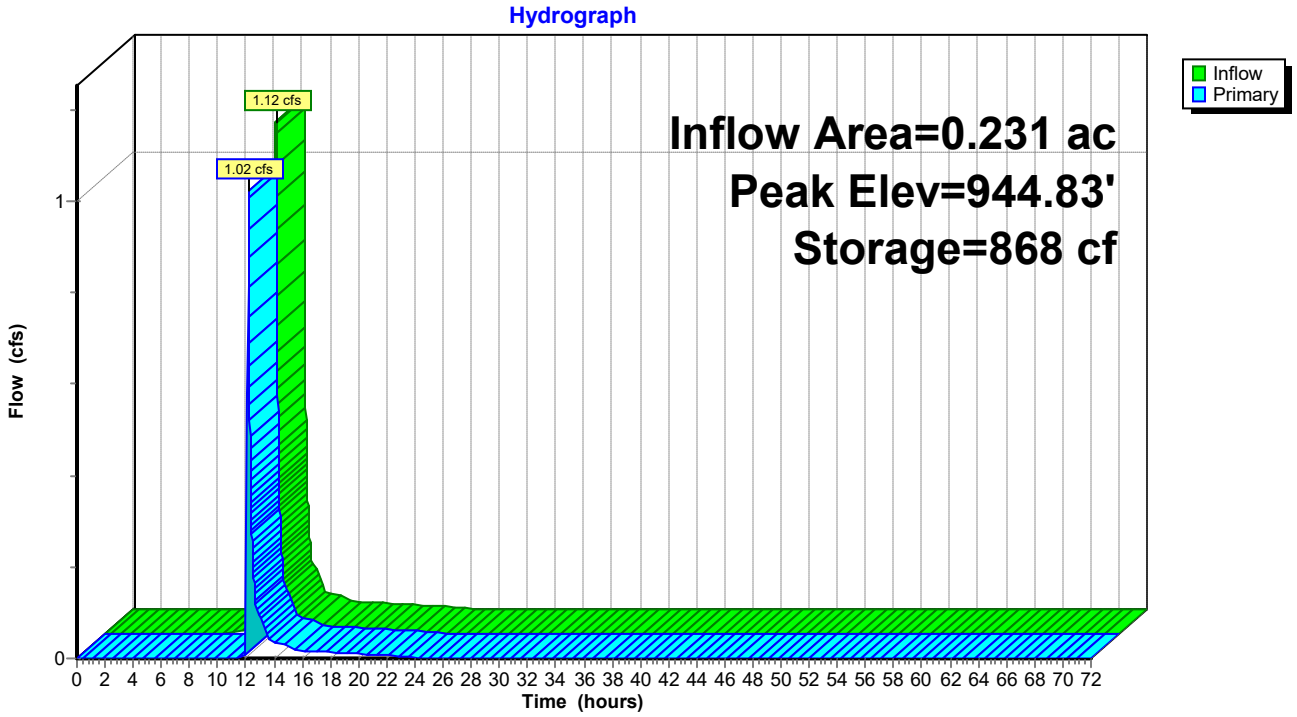
Volume	Invert	Avail.Storage	Storage Description
#1	943.00'	1,032 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
943.00	125	0	0
944.00	480	303	303
945.00	978	729	1,032

Device	Routing	Invert	Outlet Devices
#1	Primary	941.00'	**12.0" Round Culvert** L= 42.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 941.00' / 940.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	944.70'	**27.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.02 cfs @ 12.18 hrs HW=944.82' TW=940.72' (Dynamic Tailwater)
↑**1=Culvert** (Passes 1.02 cfs of 6.08 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 1.02 cfs @ 1.16 fps)

Pond 3P: Filtration Basin A



Summary for Pond 4P: Filtration Basin B

Inflow Area = 0.115 ac, 57.29% Impervious, Inflow Depth = 2.97" for 10-Year event
Inflow = 0.59 cfs @ 12.14 hrs, Volume= 0.028 af
Outflow = 0.48 cfs @ 12.19 hrs, Volume= 0.018 af, Atten= 19%, Lag= 3.1 min
Primary = 0.48 cfs @ 12.19 hrs, Volume= 0.018 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 949.61' @ 12.19 hrs Surf.Area= 541 sf Storage= 524 cf

Plug-Flow detention time= 132.2 min calculated for 0.018 af (62% of inflow)
Center-of-Mass det. time= 57.9 min (845.7 - 787.8)

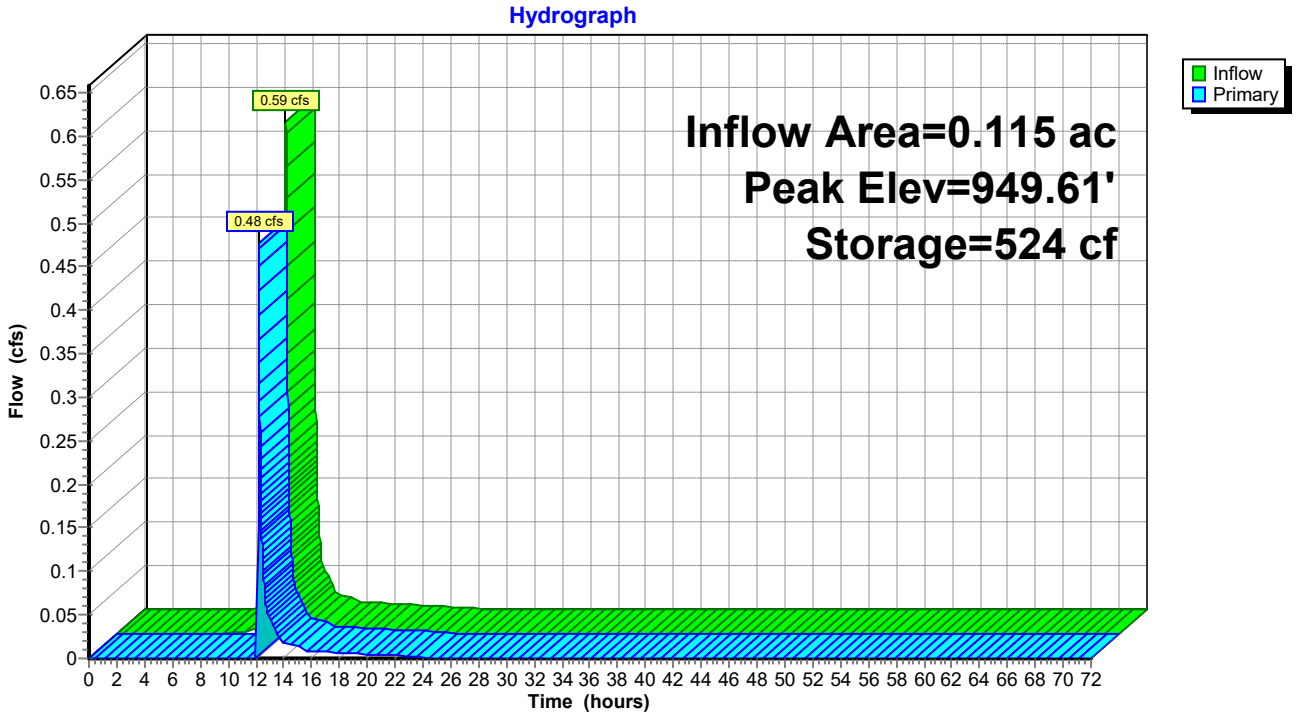
Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	758 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	138	0	0
949.00	360	249	249
949.50	505	216	465
950.00	665	293	758

Device	Routing	Invert	Outlet Devices
#1	Primary	949.50'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.47 cfs @ 12.19 hrs HW=949.61' TW=940.75' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.47 cfs @ 0.85 fps)

Pond 4P: Filtration Basin B



Summary for Pond 5P: Filtration Basin C

Inflow Area = 0.230 ac, 55.80% Impervious, Inflow Depth = 2.88" for 10-Year event
Inflow = 1.14 cfs @ 12.14 hrs, Volume= 0.055 af
Outflow = 1.09 cfs @ 12.17 hrs, Volume= 0.040 af, Atten= 5%, Lag= 1.6 min
Primary = 1.09 cfs @ 12.17 hrs, Volume= 0.040 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 951.69' @ 12.17 hrs Surf.Area= 771 sf Storage= 786 cf

Plug-Flow detention time= 109.1 min calculated for 0.040 af (73% of inflow)
Center-of-Mass det. time= 40.8 min (831.0 - 790.3)

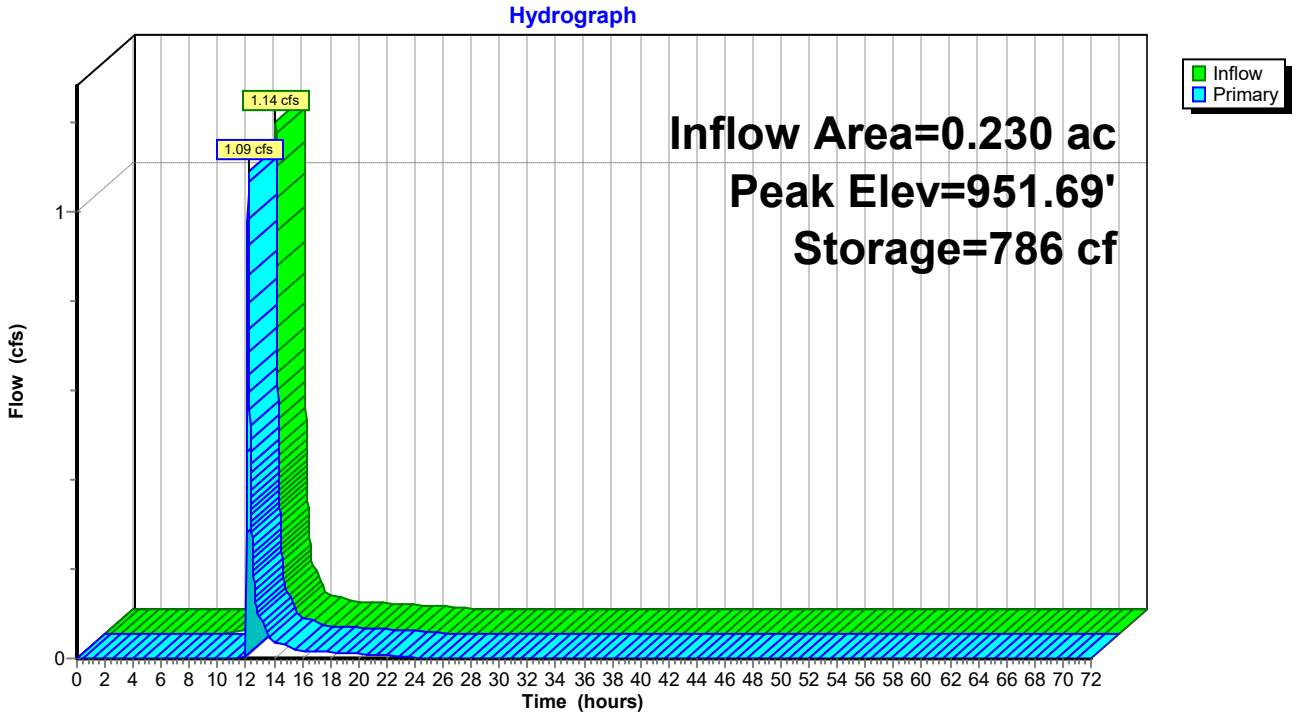
Volume	Invert	Avail.Storage	Storage Description
#1	950.00'	1,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
950.00	190	0	0
951.00	500	345	345
952.00	890	695	1,040

Device	Routing	Invert	Outlet Devices
#1	Primary	951.50'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.09 cfs @ 12.17 hrs HW=951.69' TW=947.21' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 1.09 cfs @ 1.12 fps)

Pond 5P: Filtration Basin C



Summary for Pond 6P: Filtration Basin D

Inflow Area = 0.230 ac, 62.20% Impervious, Inflow Depth = 3.07" for 10-Year event
Inflow = 1.20 cfs @ 12.14 hrs, Volume= 0.059 af
Outflow = 1.04 cfs @ 12.18 hrs, Volume= 0.037 af, Atten= 14%, Lag= 2.6 min
Primary = 1.04 cfs @ 12.18 hrs, Volume= 0.037 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 952.92' @ 12.18 hrs Surf.Area= 1,009 sf Storage= 1,071 cf

Plug-Flow detention time= 131.3 min calculated for 0.037 af (63% of inflow)
Center-of-Mass det. time= 57.5 min (842.7 - 785.2)

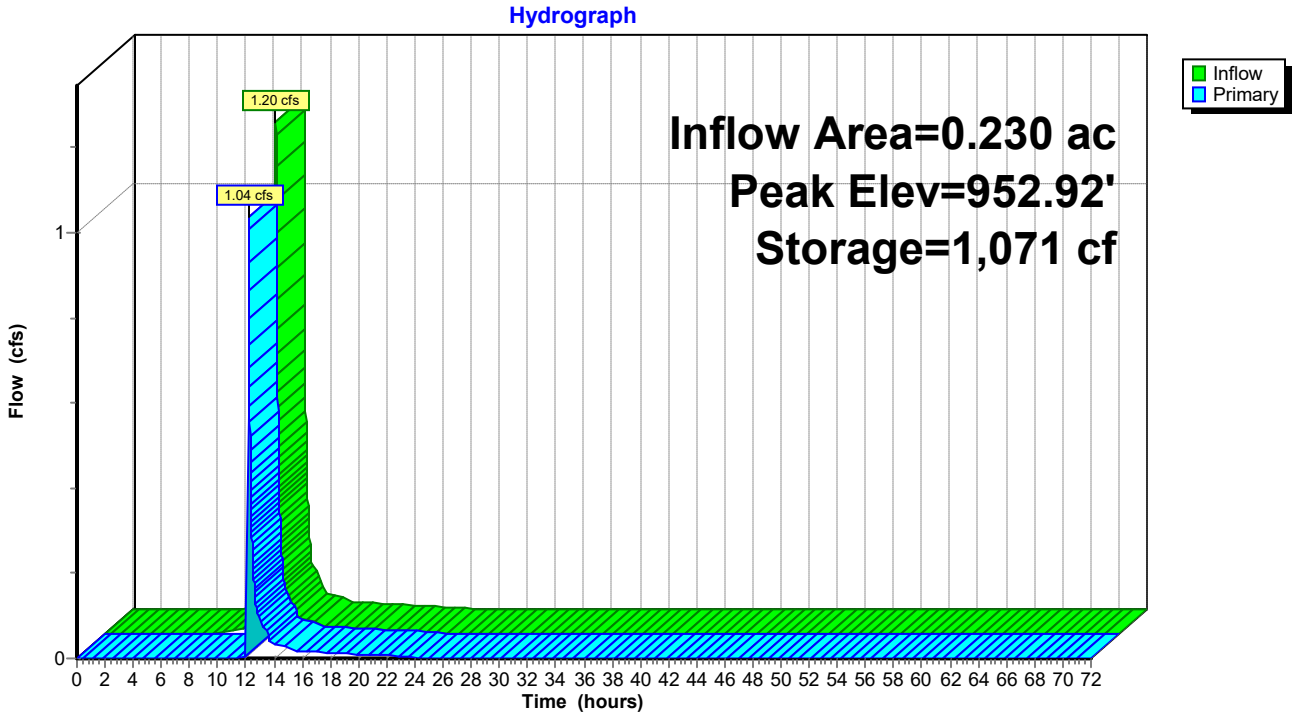
Volume	Invert	Avail.Storage	Storage Description
#1	951.00'	1,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
951.00	180	0	0
952.00	540	360	360
953.00	1,050	795	1,155

Device	Routing	Invert	Outlet Devices
#1	Primary	952.80'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.03 cfs @ 12.18 hrs HW=952.92' TW=947.24' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 1.03 cfs @ 0.87 fps)

Pond 6P: Filtration Basin D



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment 1S: Existing to Wetland 1P Runoff Area=193,772 sf 9.61% Impervious Runoff Depth=4.65"
Flow Length=325' Slope=0.1350 '/' Tc=18.3 min CN=77 Runoff=24.14 cfs 1.725 af

Subcatchment 1X: Existing to Wetland 1P Runoff Area=211,609 sf 8.80% Impervious Runoff Depth=4.54"
Flow Length=325' Slope=0.1350 '/' Tc=18.3 min UI Adjusted CN=76 Runoff=25.77 cfs 1.839 af

Subcatchment 2S: Direct to Wetland 2P Runoff Area=38,600 sf 0.00% Impervious Runoff Depth=4.77"
Flow Length=100' Tc=12.3 min CN=78 Runoff=5.94 cfs 0.352 af

Subcatchment 2X: Existing to Wetland 2P Runoff Area=40,857 sf 4.62% Impervious Runoff Depth=4.77"
Flow Length=100' Tc=12.3 min UI Adjusted CN=78 Runoff=6.29 cfs 0.373 af

Subcatchment 3S: Area A Runoff Area=10,065 sf 51.66% Impervious Runoff Depth=5.67"
Tc=7.0 min CN=86 Runoff=2.19 cfs 0.109 af

Subcatchment 3X: Direct to Wetland 3 Runoff Area=0.344 ac 0.00% Impervious Runoff Depth=4.10"
Tc=7.0 min CN=72 Runoff=2.50 cfs 0.118 af

Subcatchment 4S: AREA B Runoff Area=5,010 sf 57.29% Impervious Runoff Depth=5.90"
Tc=7.0 min CN=88 Runoff=1.12 cfs 0.057 af

Subcatchment 5S: Area C Runoff Area=10,000 sf 55.80% Impervious Runoff Depth=5.79"
Tc=7.0 min CN=87 Runoff=2.21 cfs 0.111 af

Subcatchment 6S: Area D Runoff Area=10,000 sf 62.20% Impervious Runoff Depth=6.02"
Tc=7.0 min CN=89 Runoff=2.26 cfs 0.115 af

Reach 4R: Total Discharge Inflow=17.47 cfs 2.329 af
Outflow=17.47 cfs 2.329 af

Pond 1P: Wetland 1P Peak Elev=941.56' Storage=33,687 cf Inflow=29.49 cfs 2.212 af
Outflow=17.02 cfs 2.212 af

Pond 1P PROP: Wetland 1P Peak Elev=941.57' Storage=33,920 cf Inflow=29.18 cfs 2.403 af
Outflow=17.20 cfs 2.402 af

Pond 2P: Wetland 2P Peak Elev=947.47' Storage=10,390 cf Inflow=6.29 cfs 0.373 af
Outflow=3.90 cfs 0.373 af

Pond 2P-PROP: Wetland 2P Peak Elev=947.95' Storage=15,369 cf Inflow=10.02 cfs 0.541 af
Outflow=3.89 cfs 0.540 af

Pond 3P: Filtration Basin A Peak Elev=944.91' Storage=942 cf Inflow=2.19 cfs 0.109 af
Outflow=2.17 cfs 0.092 af

Pond 4P: Filtration Basin B Peak Elev=949.70' Storage=570 cf Inflow=1.12 cfs 0.057 af
Outflow=1.10 cfs 0.046 af

Pond 5P: Filtration Basin C Peak Elev=951.80' Storage=873 cf Inflow=2.21 cfs 0.111 af
Outflow=2.16 cfs 0.096 af

Pond 6P: Filtration Basin D Peak Elev=953.00' Storage=1,153 cf Inflow=2.26 cfs 0.115 af
Outflow=2.24 cfs 0.093 af

Total Runoff Area = 12.280 ac Runoff Volume = 4.799 af Average Runoff Depth = 4.69"
88.97% Pervious = 10.925 ac 11.03% Impervious = 1.355 ac

Summary for Subcatchment 1S: Existing to Wetland 1P

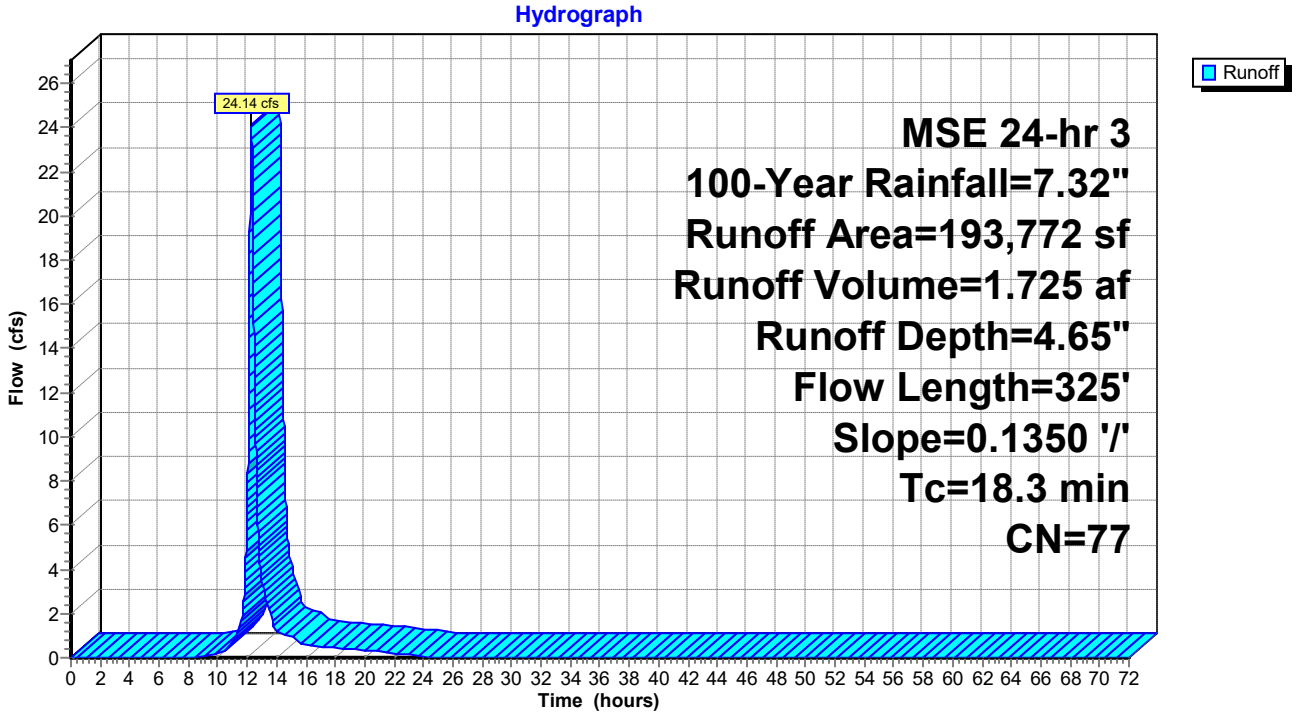
Runoff = 24.14 cfs @ 12.27 hrs, Volume= 1.725 af, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
8,744	98	Unconnected roofs, HSG C
9,885	98	Paved parking, HSG C
19,395	98	Water Surface, 0% imp, HSG C
2,322	96	Gravel surface, HSG C
153,426	72	Woods/grass comb., Good, HSG C
193,772	77	Weighted Average
175,143		90.39% Pervious Area
18,629		9.61% Impervious Area
8,744		46.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	180	0.1350	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
1.3	145	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	325	Total			

Subcatchment 1S: Existing to Wetland 1P



Summary for Subcatchment 1X: Existing to Wetland 1P

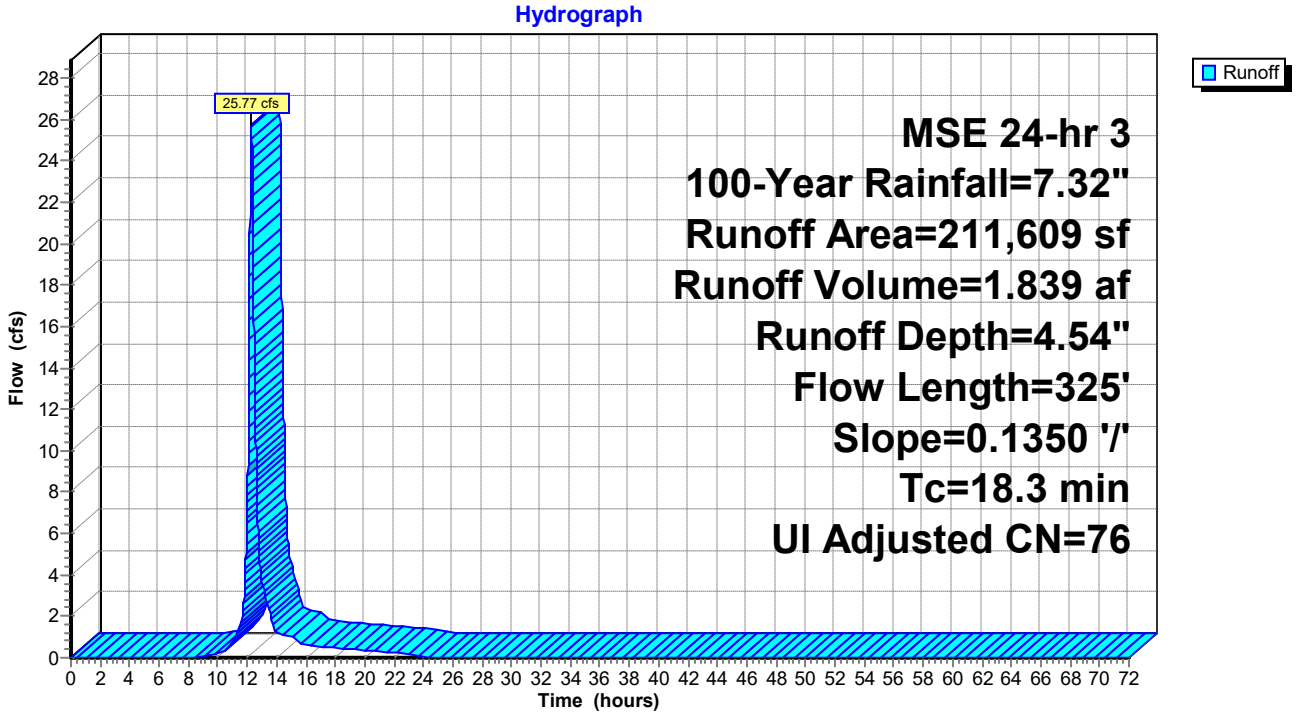
Runoff = 25.77 cfs @ 12.27 hrs, Volume= 1.839 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Adj	Description
8,744	98		Unconnected roofs, HSG C
9,885	98		Paved parking, HSG C
19,395	98		Water Surface, 0% imp, HSG C
2,322	96		Gravel surface, HSG C
171,263	72		Woods/grass comb., Good, HSG C
211,609	77	76	Weighted Average, UI Adjusted
192,980			91.20% Pervious Area
18,629			8.80% Impervious Area
8,744			46.94% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	180	0.1350	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
1.3	145	0.1350	1.84		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.3	325	Total			

Subcatchment 1X: Existing to Wetland 1P



Summary for Subcatchment 2S: Direct to Wetland 2P

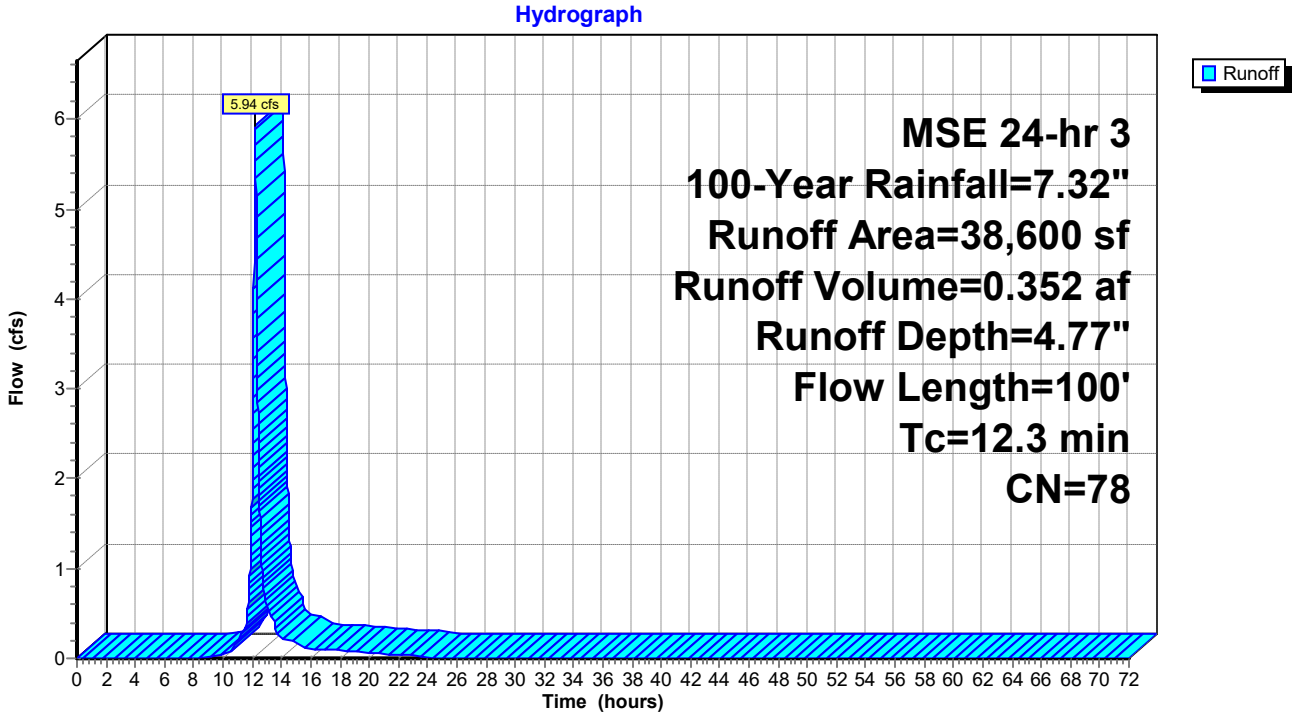
Runoff = 5.94 cfs @ 12.20 hrs, Volume= 0.352 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
8,590	98	Water Surface, 0% imp, HSG C
30,010	72	Woods/grass comb., Good, HSG C
38,600	78	Weighted Average
38,600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	20	0.0830	1.66		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.85"
12.1	80	0.0625	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
12.3	100	Total			

Subcatchment 2S: Direct to Wetland 2P



Summary for Subcatchment 2X: Existing to Wetland 2P

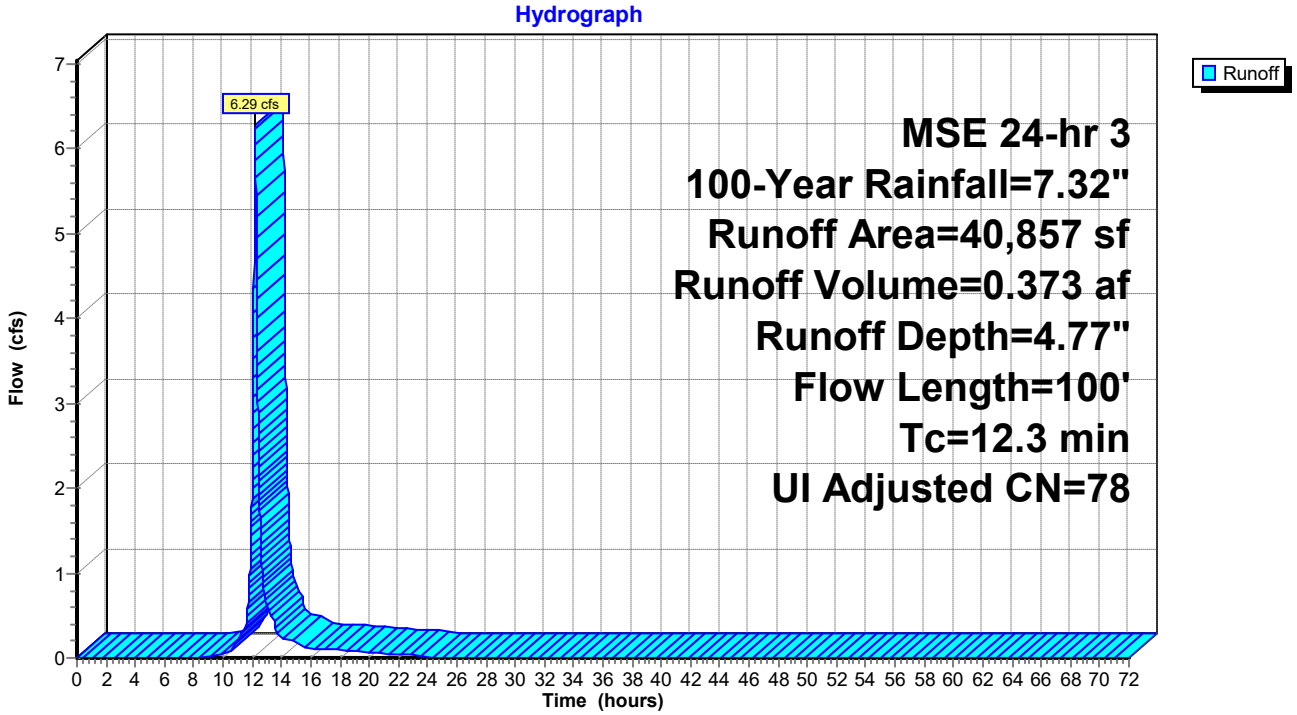
Runoff = 6.29 cfs @ 12.20 hrs, Volume= 0.373 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Adj	Description
1,886	98		Unconnected roofs, HSG C
8,586	98		Water Surface, 0% imp, HSG C
30,385	72		Woods/grass comb., Good, HSG C
40,857	79	78	Weighted Average, UI Adjusted
38,971			95.38% Pervious Area
1,886			4.62% Impervious Area
1,886			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	20	0.0830	1.66		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.85"
12.1	80	0.0625	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.85"
12.3	100	Total			

Subcatchment 2X: Existing to Wetland 2P



Summary for Subcatchment 3S: Area A

5,200 SF impervious requires 434 CF filtration

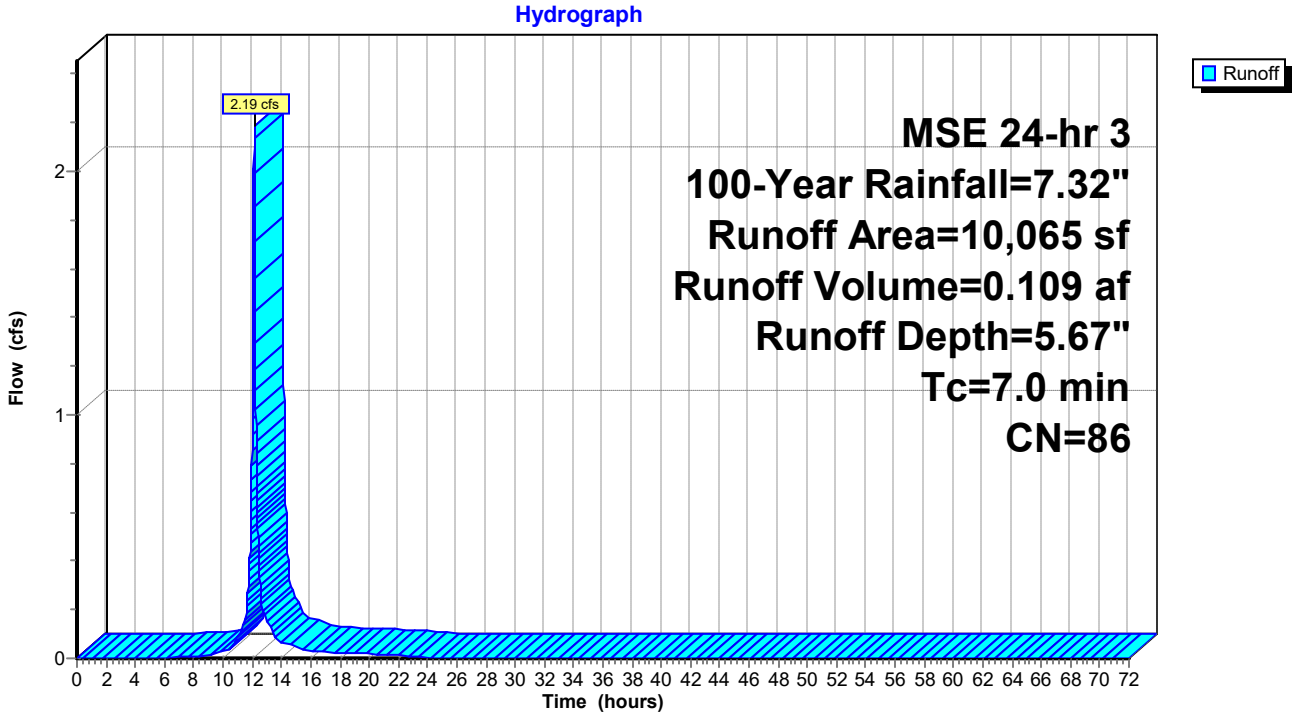
Runoff = 2.19 cfs @ 12.14 hrs, Volume= 0.109 af, Depth= 5.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
5,200	98	Unconnected roofs, HSG C
4,865	74	>75% Grass cover, Good, HSG C
10,065	86	Weighted Average
4,865		48.34% Pervious Area
5,200		51.66% Impervious Area
5,200		100.00% Unconnected

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

Subcatchment 3S: Area A



Summary for Subcatchment 3X: Direct to Wetland 3

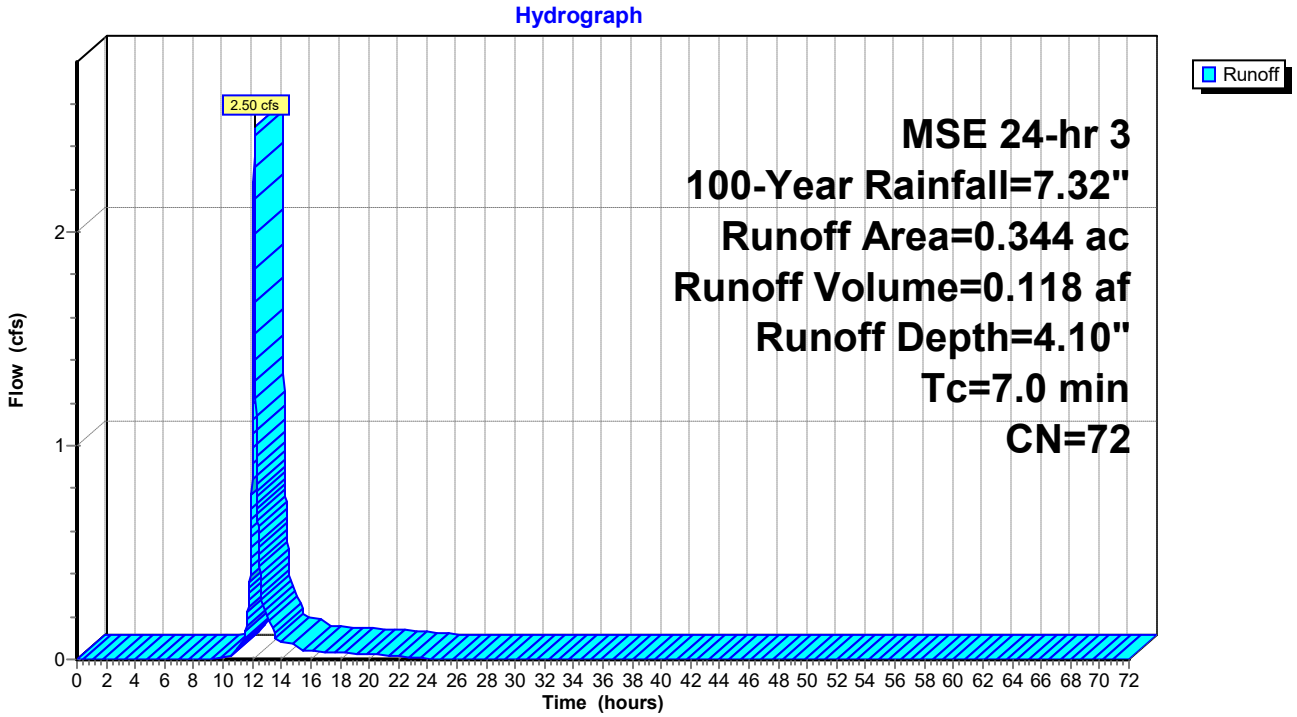
Runoff = 2.50 cfs @ 12.14 hrs, Volume= 0.118 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (ac)	CN	Description
0.344	72	Woods/grass comb., Good, HSG C
0.344		100.00% Pervious Area

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

Subcatchment 3X: Direct to Wetland 3



Summary for Subcatchment 4S: AREA B

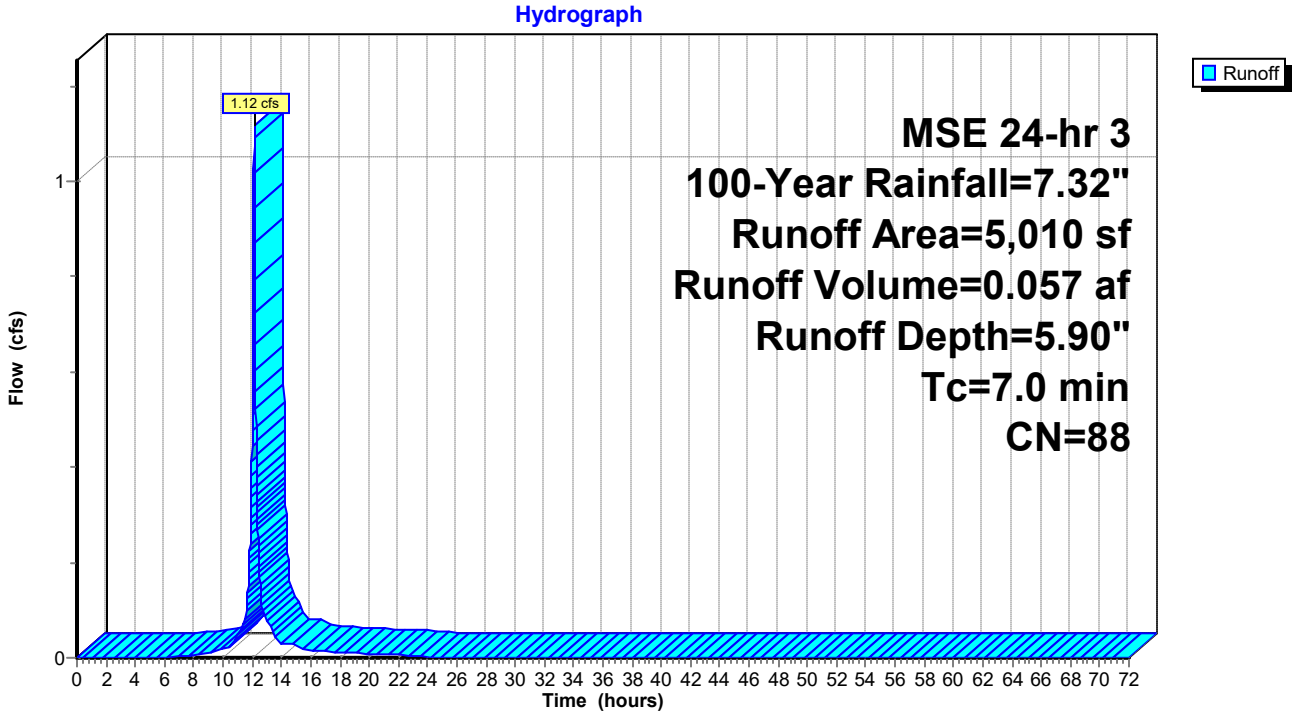
Runoff = 1.12 cfs @ 12.14 hrs, Volume= 0.057 af, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
1,750	98	Unconnected roofs, HSG C
1,120	98	Unconnected pavement, HSG C
2,140	74	>75% Grass cover, Good, HSG C
5,010	88	Weighted Average
2,140		42.71% Pervious Area
2,870		57.29% Impervious Area
2,870		100.00% Unconnected

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

Subcatchment 4S: AREA B



Summary for Subcatchment 5S: Area C

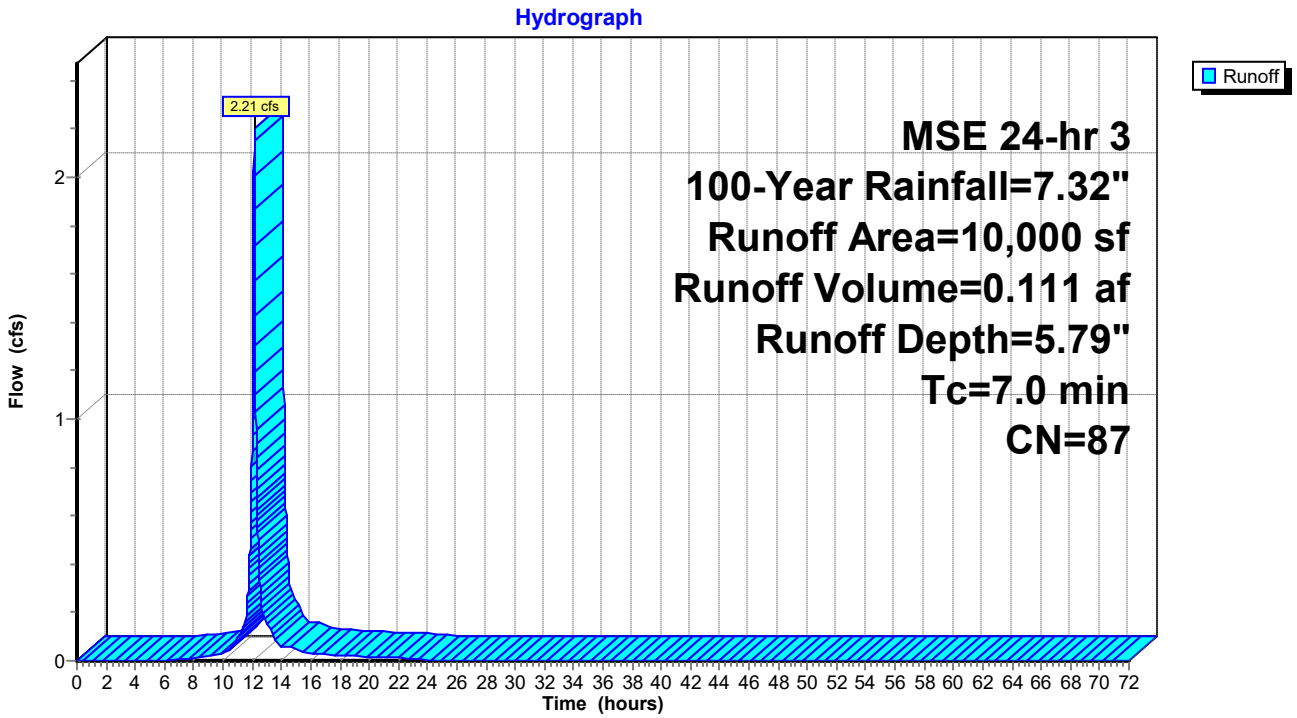
Runoff = 2.21 cfs @ 12.14 hrs, Volume= 0.111 af, Depth= 5.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
4,240	98	Unconnected roofs, HSG C
1,340	98	Unconnected pavement, HSG C
4,420	74	>75% Grass cover, Good, HSG C
10,000	87	Weighted Average
4,420		44.20% Pervious Area
5,580		55.80% Impervious Area
5,580		100.00% Unconnected

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

Subcatchment 5S: Area C



Summary for Subcatchment 6S: Area D

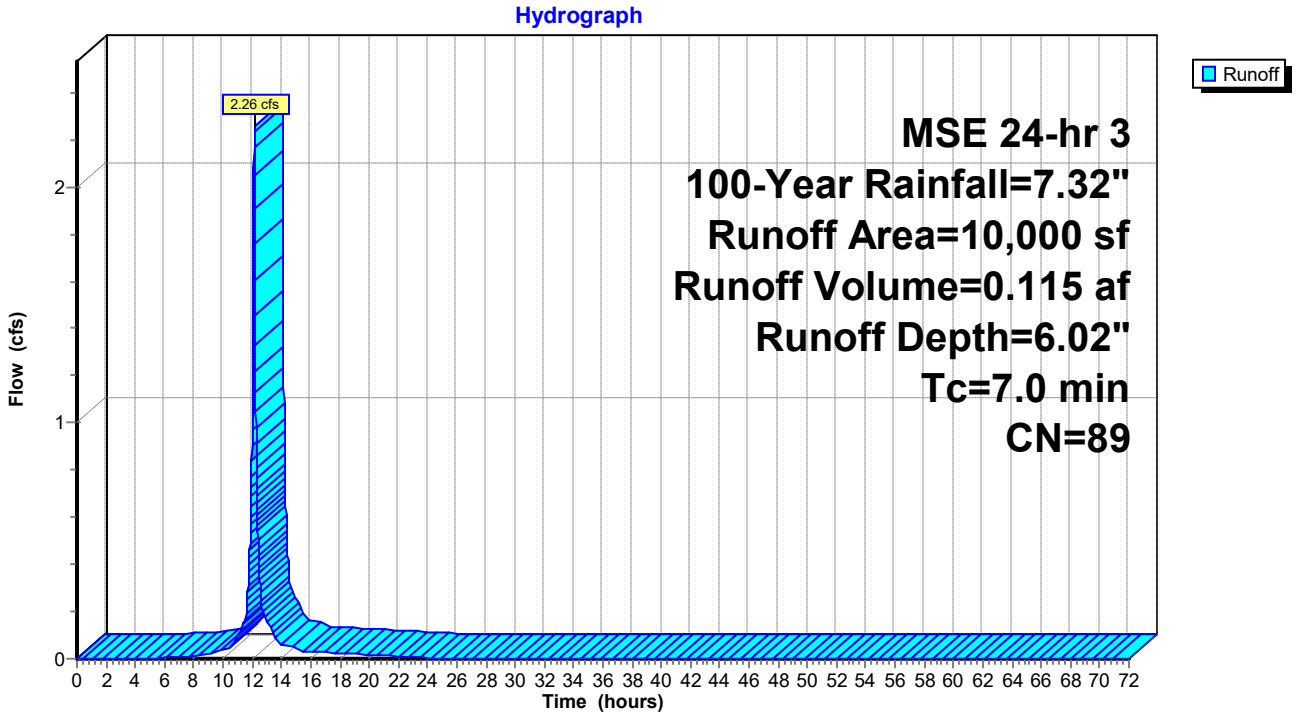
Runoff = 2.26 cfs @ 12.14 hrs, Volume= 0.115 af, Depth= 6.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.32"

Area (sf)	CN	Description
6,220	98	Paved parking, HSG C
3,780	74	>75% Grass cover, Good, HSG C
10,000	89	Weighted Average
3,780		37.80% Pervious Area
6,220		62.20% Impervious Area

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

Subcatchment 6S: Area D



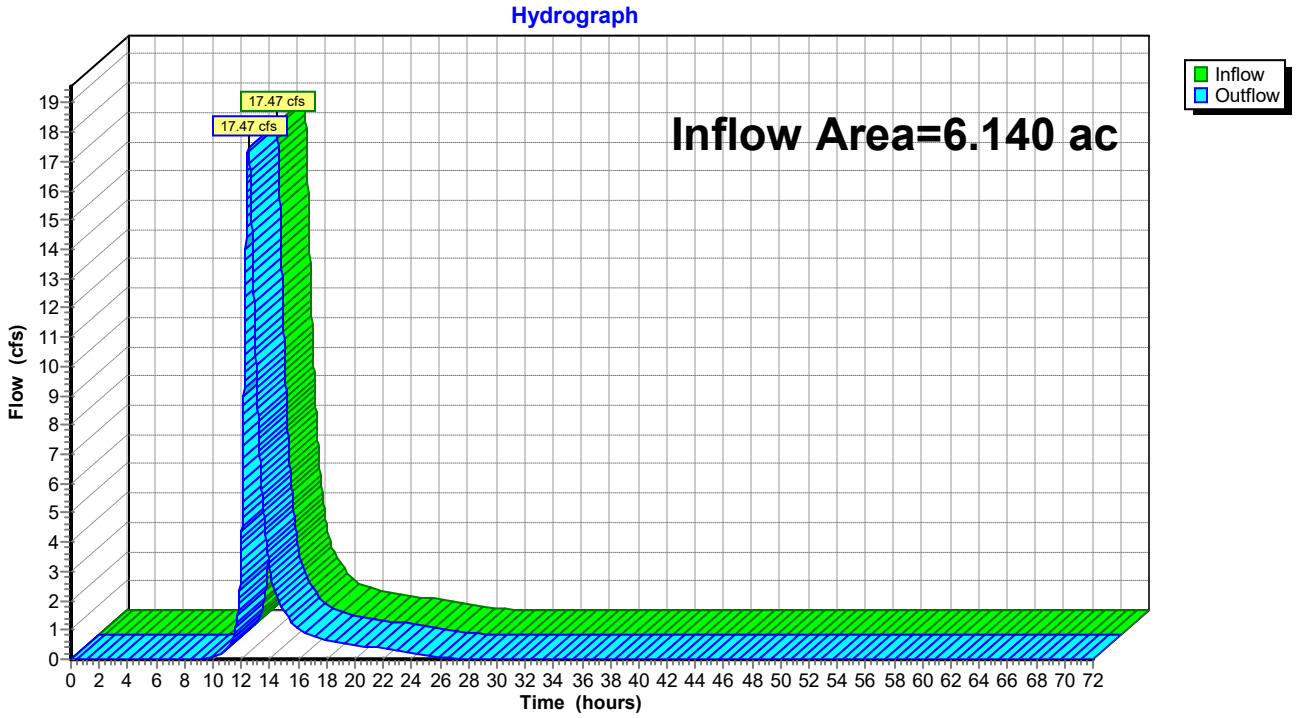
Summary for Reach 4R: Total Discharge

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

Inflow Area = 6.140 ac, 7.67% Impervious, Inflow Depth = 4.55" for 100-Year event
Inflow = 17.47 cfs @ 12.49 hrs, Volume= 2.329 af
Outflow = 17.47 cfs @ 12.50 hrs, Volume= 2.329 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 4R: Total Discharge



Summary for Pond 1P: Wetland 1P

Inflow Area = 5.796 ac, 8.13% Impervious, Inflow Depth = 4.58" for 100-Year event
Inflow = 29.49 cfs @ 12.28 hrs, Volume= 2.212 af
Outflow = 17.02 cfs @ 12.50 hrs, Volume= 2.212 af, Atten= 42%, Lag= 13.4 min
Primary = 17.02 cfs @ 12.50 hrs, Volume= 2.212 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 940.50' Surf.Area= 18,044 sf Storage= 7,632 cf
Peak Elev= 941.56' @ 12.50 hrs Surf.Area= 32,108 sf Storage= 33,687 cf (26,055 cf above start)

Plug-Flow detention time= 87.5 min calculated for 2.036 af (92% of inflow)
Center-of-Mass det. time= 38.8 min (849.2 - 810.4)

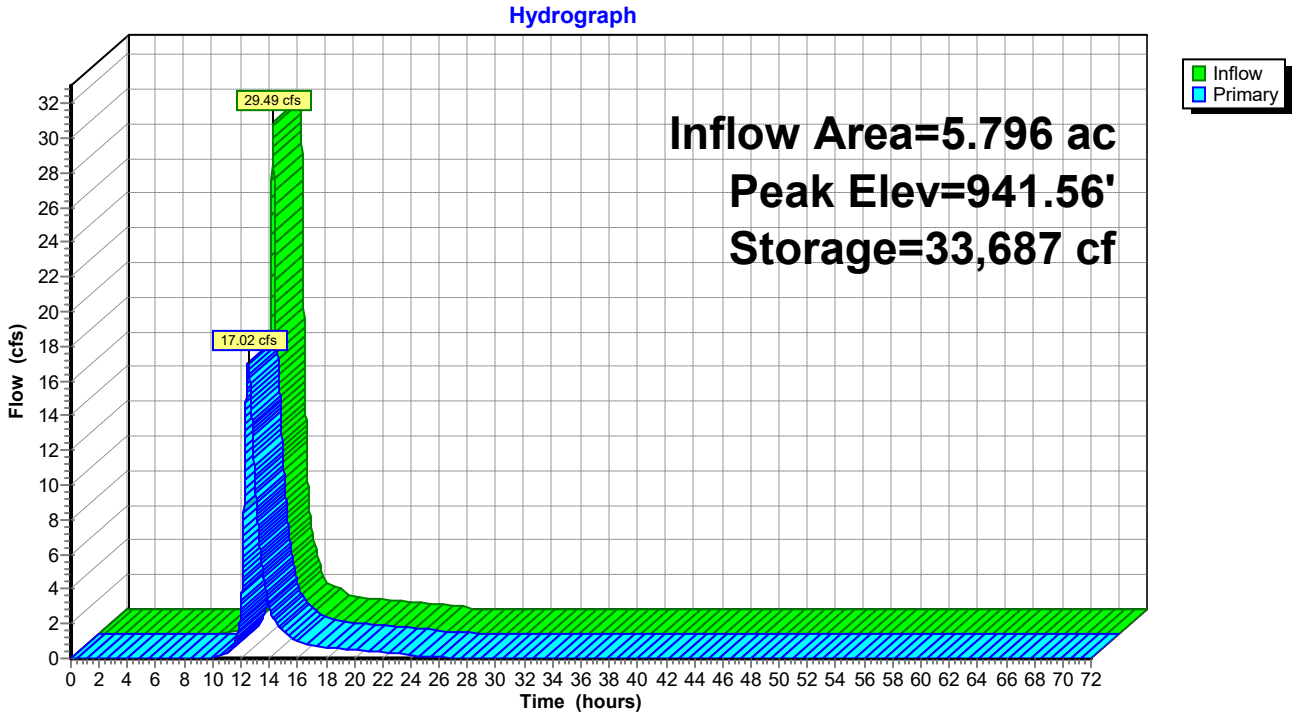
Volume	Invert	Avail.Storage	Storage Description
#1	940.00'	92,346 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
940.00	12,486	0	0
941.00	23,601	18,044	18,044
942.00	38,749	31,175	49,219
943.00	47,506	43,128	92,346

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**5.8' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=17.02 cfs @ 12.50 hrs HW=941.56' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 17.02 cfs @ 2.76 fps)

Pond 1P: Wetland 1P



Summary for Pond 1P PROP: Wetland 1P

Inflow Area = 6.140 ac, 14.40% Impervious, Inflow Depth = 4.70" for 100-Year event
Inflow = 29.18 cfs @ 12.27 hrs, Volume= 2.403 af
Outflow = 17.20 cfs @ 12.50 hrs, Volume= 2.402 af, Atten= 41%, Lag= 14.2 min
Primary = 17.20 cfs @ 12.50 hrs, Volume= 2.402 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 940.50' Surf.Area= 18,044 sf Storage= 7,632 cf
Peak Elev= 941.57' @ 12.50 hrs Surf.Area= 32,218 sf Storage= 33,920 cf (26,288 cf above start)

Plug-Flow detention time= 89.6 min calculated for 2.227 af (93% of inflow)
Center-of-Mass det. time= 38.6 min (861.6 - 823.0)

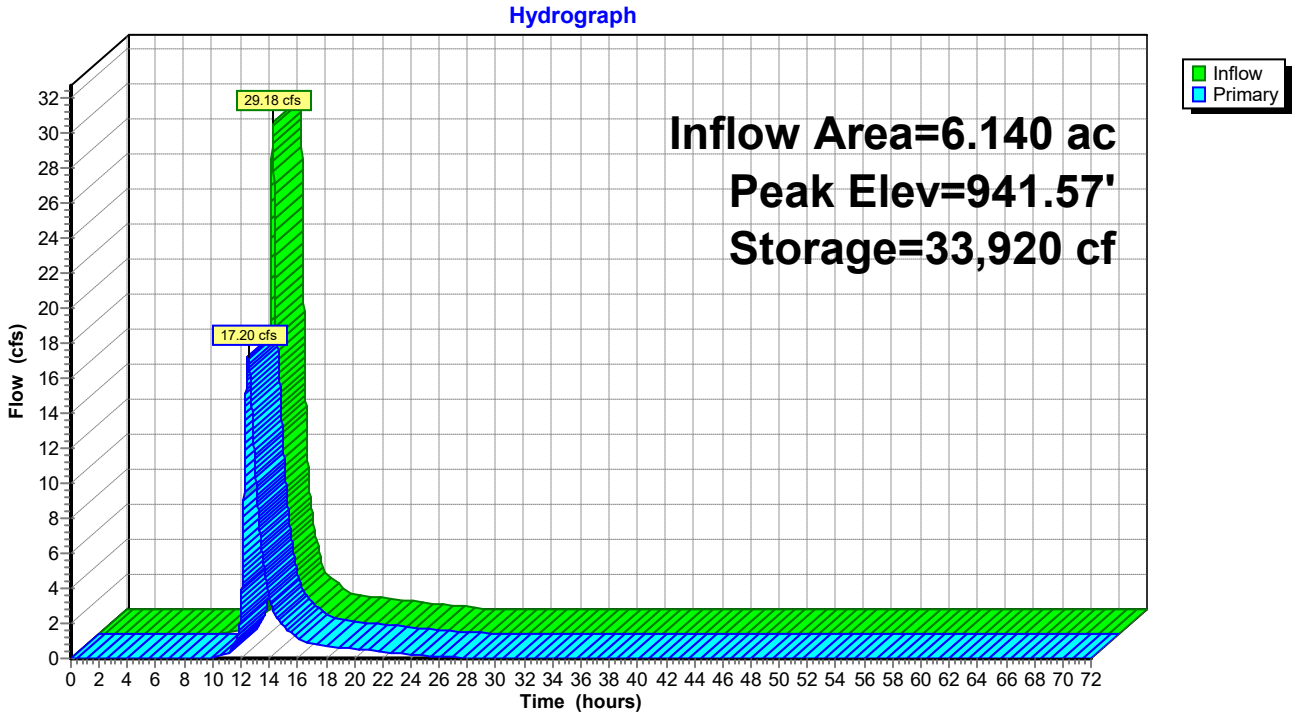
Volume	Invert	Avail.Storage	Storage Description
#1	940.00'	92,346 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
940.00	12,486	0	0
941.00	23,601	18,044	18,044
942.00	38,749	31,175	49,219
943.00	47,506	43,128	92,346

Device	Routing	Invert	Outlet Devices
#1	Primary	940.50'	**5.8' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=17.20 cfs @ 12.50 hrs HW=941.57' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 17.20 cfs @ 2.77 fps)

Pond 1P PROP: Wetland 1P



Summary for Pond 2P: Wetland 2P

Inflow Area = 0.938 ac, 4.62% Impervious, Inflow Depth = 4.77" for 100-Year event
Inflow = 6.29 cfs @ 12.20 hrs, Volume= 0.373 af
Outflow = 3.90 cfs @ 12.33 hrs, Volume= 0.373 af, Atten= 38%, Lag= 7.8 min
Primary = 3.90 cfs @ 12.33 hrs, Volume= 0.373 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 947.00' Surf.Area= 7,818 sf Storage= 6,322 cf
Peak Elev= 947.47' @ 12.33 hrs Surf.Area= 9,542 sf Storage= 10,390 cf (4,068 cf above start)

Plug-Flow detention time= 172.4 min calculated for 0.227 af (61% of inflow)
Center-of-Mass det. time= 31.4 min (829.2 - 797.8)

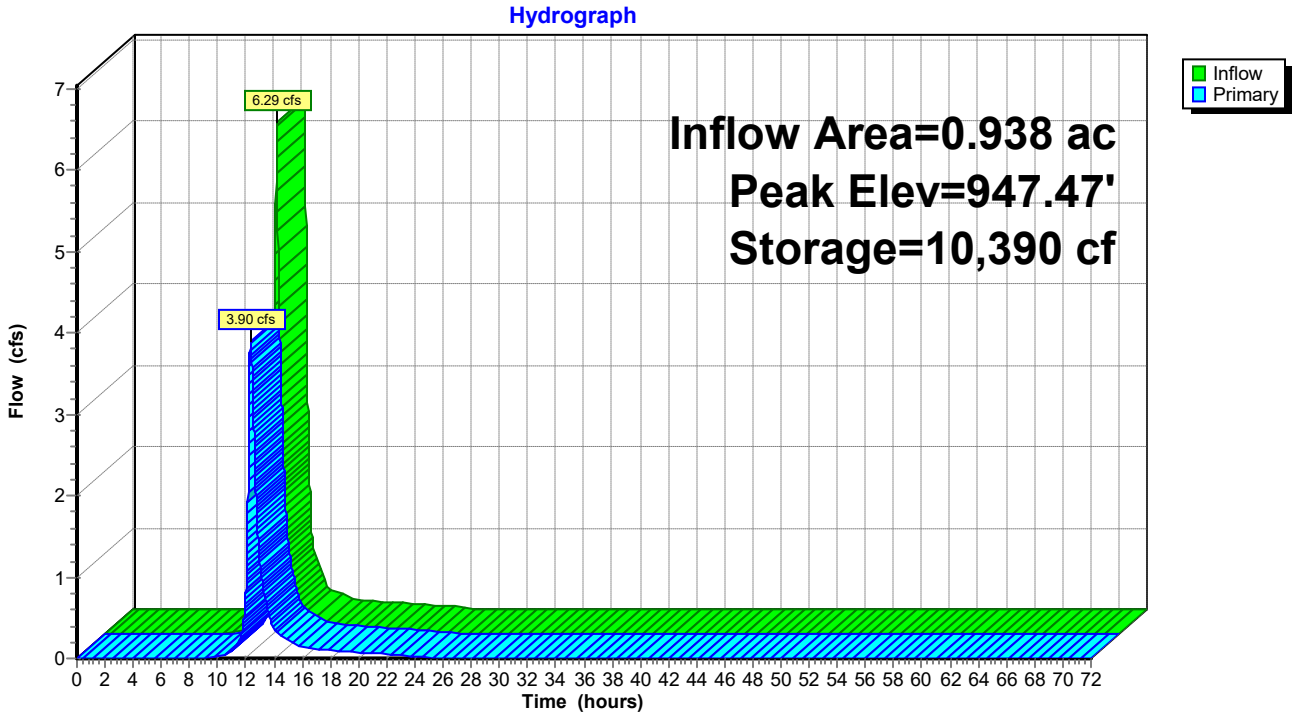
Volume	Invert	Avail.Storage	Storage Description
#1	946.00'	29,308 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.00	4,825	0	0
947.00	7,818	6,322	6,322
948.00	11,496	9,657	15,979
949.00	15,162	13,329	29,308

Device	Routing	Invert	Outlet Devices
#1	Primary	947.00'	**4.5' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.90 cfs @ 12.33 hrs HW=947.47' TW=941.43' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 3.90 cfs @ 1.85 fps)

Pond 2P: Wetland 2P



Summary for Pond 2P-PROP: Wetland 2P

Inflow Area = 1.345 ac, 20.14% Impervious, Inflow Depth = 4.83" for 100-Year event
Inflow = 10.02 cfs @ 12.18 hrs, Volume= 0.541 af
Outflow = 3.89 cfs @ 12.39 hrs, Volume= 0.540 af, Atten= 61%, Lag= 13.2 min
Primary = 3.89 cfs @ 12.39 hrs, Volume= 0.540 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Starting Elev= 947.00' Surf.Area= 7,818 sf Storage= 6,322 cf
Peak Elev= 947.95' @ 12.39 hrs Surf.Area= 11,299 sf Storage= 15,369 cf (9,048 cf above start)

Plug-Flow detention time= 207.0 min calculated for 0.395 af (73% of inflow)
Center-of-Mass det. time= 84.4 min (884.8 - 800.3)

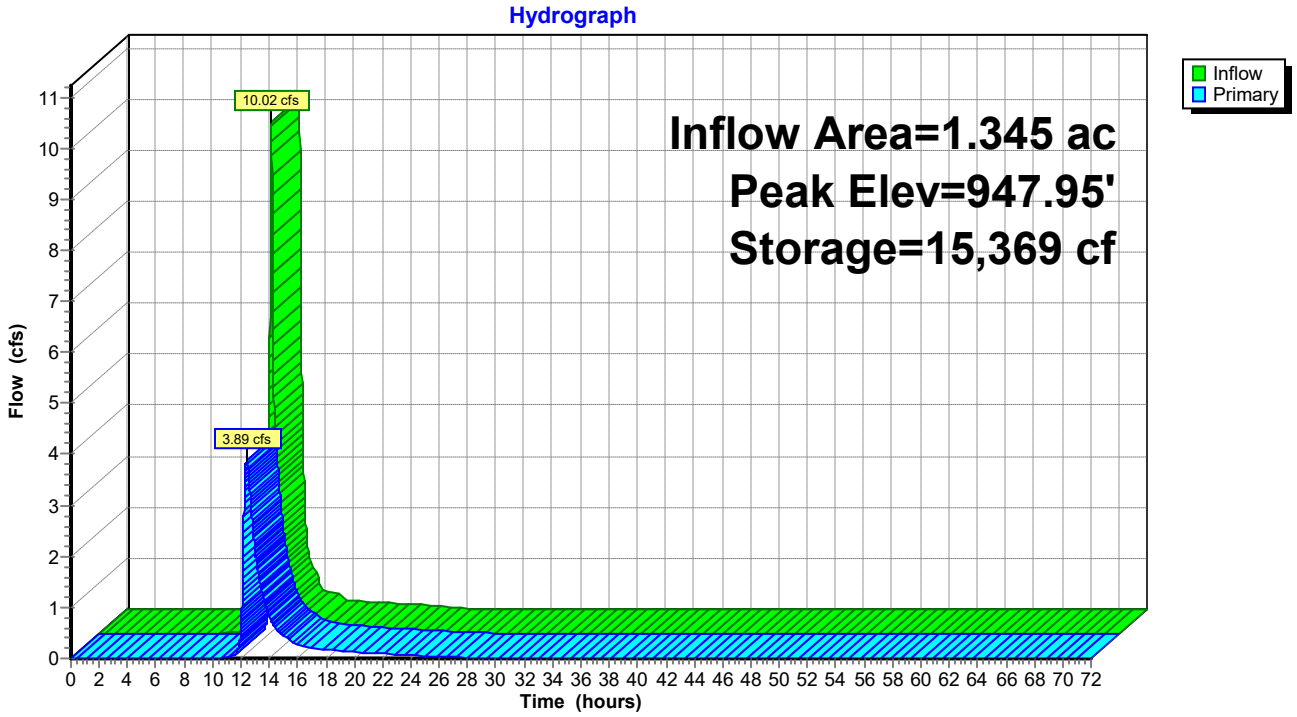
Volume	Invert	Avail.Storage	Storage Description
#1	946.00'	29,308 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.00	4,825	0	0
947.00	7,818	6,322	6,322
948.00	11,496	9,657	15,979
949.00	15,162	13,329	29,308

Device	Routing	Invert	Outlet Devices
#1	Device 2	947.00'	**18.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	944.10'	**18.0" Round Culvert** L= 34.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 944.10' / 944.00' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.89 cfs @ 12.39 hrs HW=947.95' TW=941.53' (Dynamic Tailwater)
↑**2=Culvert** (Passes 3.89 cfs of 13.21 cfs potential flow)
↑**1=Orifice/Grate** (Orifice Controls 3.89 cfs @ 3.31 fps)

Pond 2P-PROP: Wetland 2P



Summary for Pond 3P: Filtration Basin A

Inflow Area = 0.231 ac, 51.66% Impervious, Inflow Depth = 5.67" for 100-Year event
Inflow = 2.19 cfs @ 12.14 hrs, Volume= 0.109 af
Outflow = 2.17 cfs @ 12.16 hrs, Volume= 0.092 af, Atten= 1%, Lag= 1.0 min
Primary = 2.17 cfs @ 12.16 hrs, Volume= 0.092 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 944.91' @ 12.16 hrs Surf.Area= 931 sf Storage= 942 cf

Plug-Flow detention time= 82.4 min calculated for 0.092 af (84% of inflow)
Center-of-Mass det. time= 28.5 min (807.0 - 778.5)

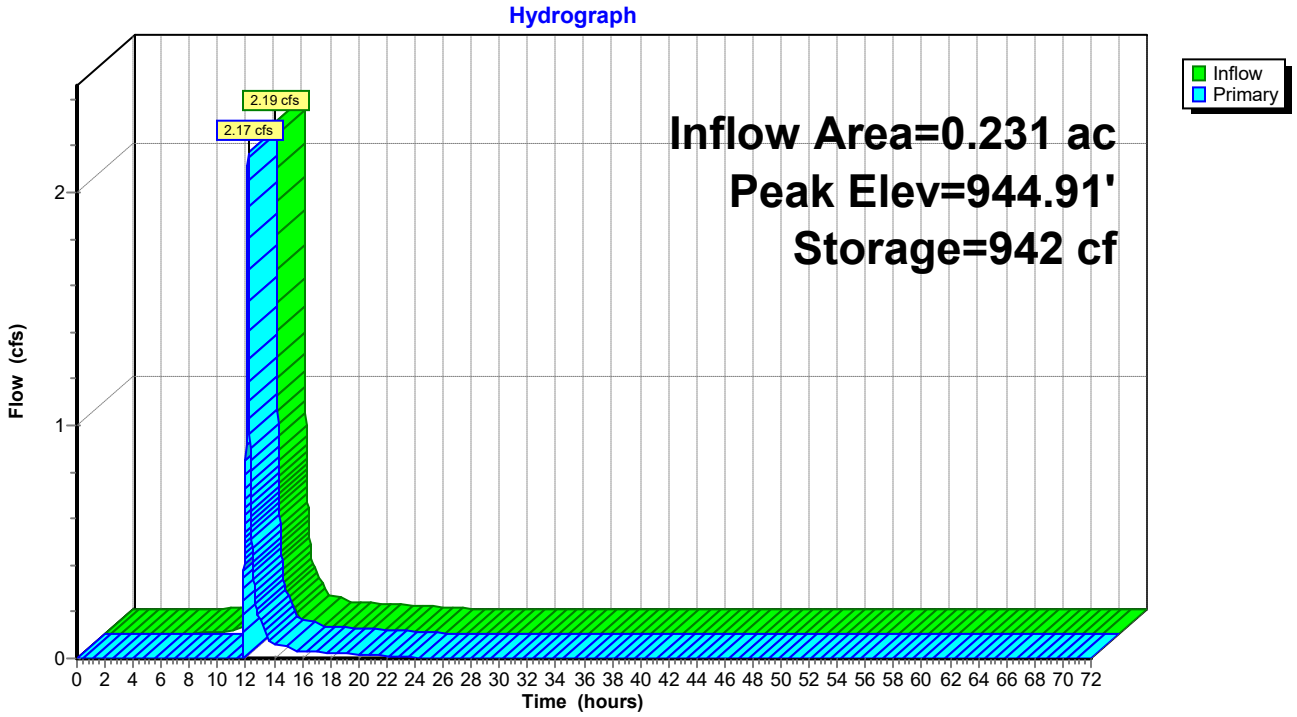
Volume	Invert	Avail.Storage	Storage Description
#1	943.00'	1,032 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
943.00	125	0	0
944.00	480	303	303
945.00	978	729	1,032

Device	Routing	Invert	Outlet Devices
#1	Primary	941.00'	**12.0" Round Culvert** L= 42.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 941.00' / 940.00' S= 0.0238 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	944.70'	**27.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.17 cfs @ 12.16 hrs HW=944.91' TW=941.06' (Dynamic Tailwater)
↑**1=Culvert** (Passes 2.17 cfs of 6.16 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 2.17 cfs @ 1.49 fps)

Pond 3P: Filtration Basin A



Summary for Pond 4P: Filtration Basin B

Inflow Area = 0.115 ac, 57.29% Impervious, Inflow Depth = 5.90" for 100-Year event
Inflow = 1.12 cfs @ 12.14 hrs, Volume= 0.057 af
Outflow = 1.10 cfs @ 12.16 hrs, Volume= 0.046 af, Atten= 1%, Lag= 1.1 min
Primary = 1.10 cfs @ 12.16 hrs, Volume= 0.046 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 949.70' @ 12.16 hrs Surf.Area= 568 sf Storage= 570 cf

Plug-Flow detention time= 91.5 min calculated for 0.046 af (81% of inflow)
Center-of-Mass det. time= 33.9 min (808.2 - 774.2)

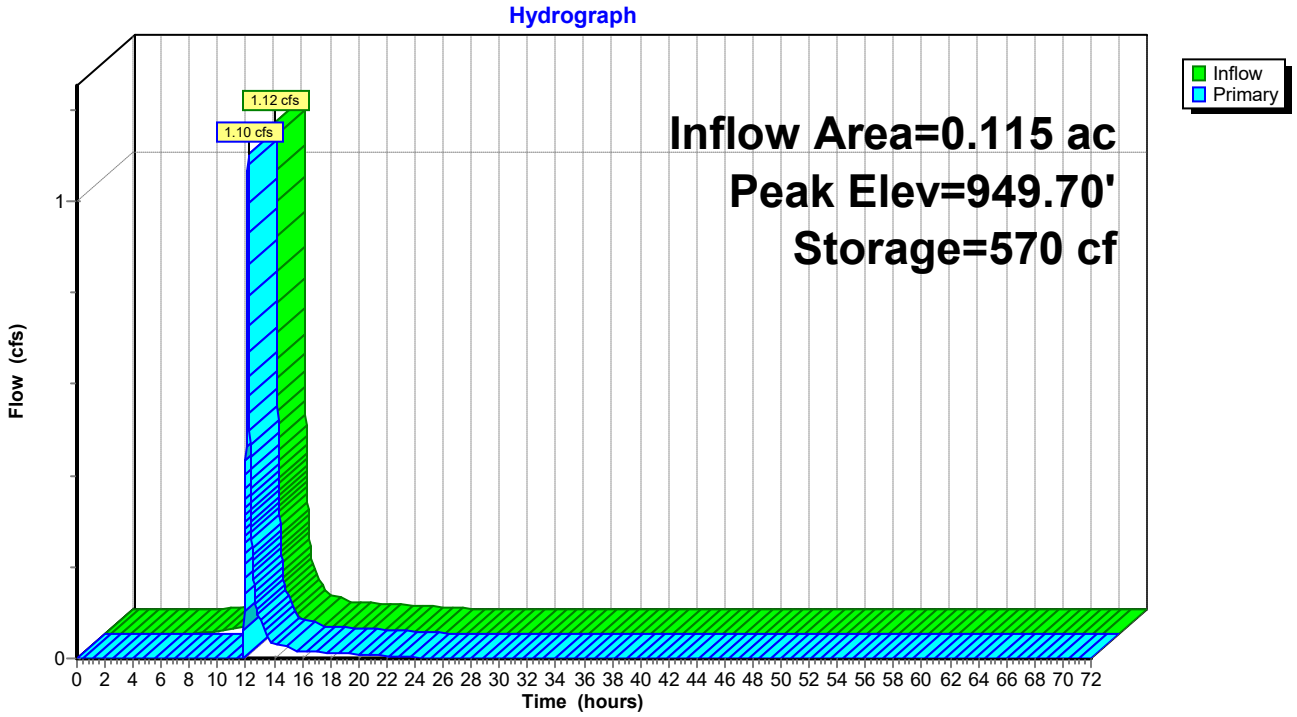
Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	758 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	138	0	0
949.00	360	249	249
949.50	505	216	465
950.00	665	293	758

Device	Routing	Invert	Outlet Devices
#1	Primary	949.50'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.10 cfs @ 12.16 hrs HW=949.70' TW=941.07' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.10 cfs @ 1.12 fps)

Pond 4P: Filtration Basin B



Summary for Pond 5P: Filtration Basin C

Inflow Area = 0.230 ac, 55.80% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 2.21 cfs @ 12.14 hrs, Volume= 0.111 af
Outflow = 2.16 cfs @ 12.16 hrs, Volume= 0.096 af, Atten= 2%, Lag= 1.2 min
Primary = 2.16 cfs @ 12.16 hrs, Volume= 0.096 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 951.80' @ 12.16 hrs Surf.Area= 814 sf Storage= 873 cf

Plug-Flow detention time= 76.2 min calculated for 0.096 af (87% of inflow)
Center-of-Mass det. time= 26.9 min (803.3 - 776.4)

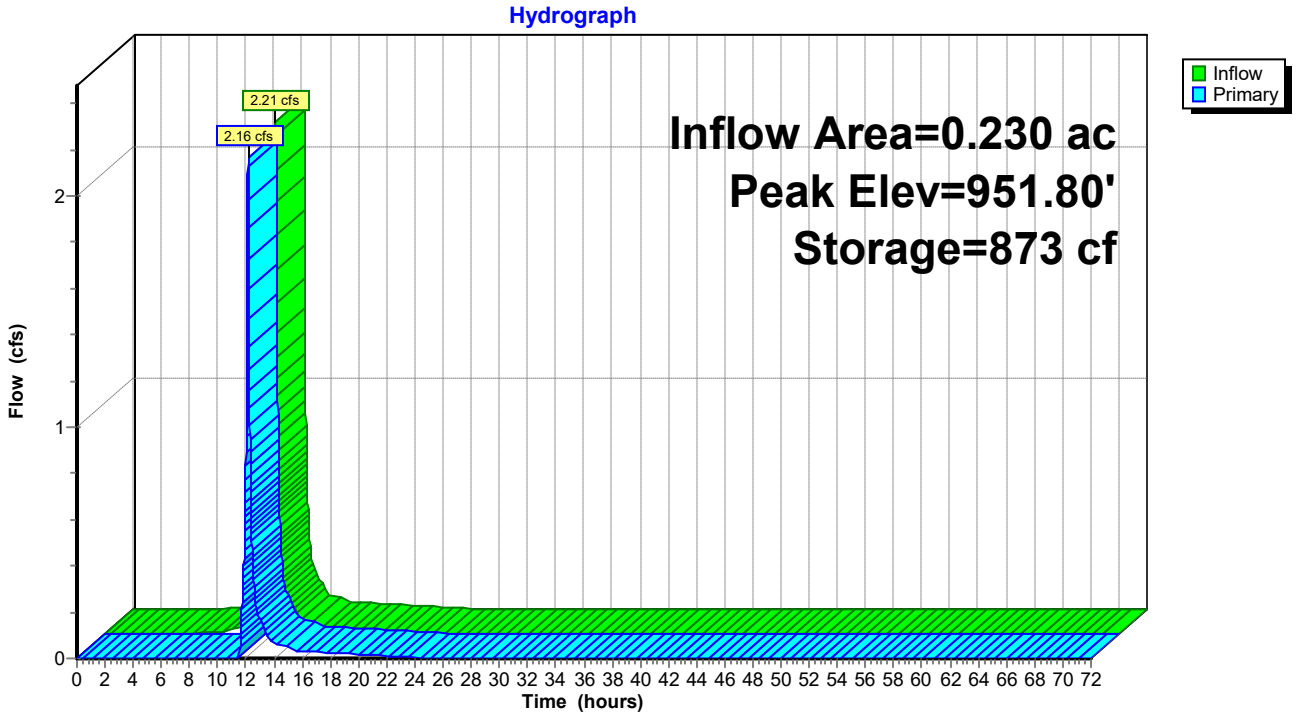
Volume	Invert	Avail.Storage	Storage Description
#1	950.00'	1,040 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
950.00	190	0	0
951.00	500	345	345
952.00	890	695	1,040

Device	Routing	Invert	Outlet Devices
#1	Primary	951.50'	**5.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.16 cfs @ 12.16 hrs HW=951.80' TW=947.65' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 2.16 cfs @ 1.42 fps)

Pond 5P: Filtration Basin C



Summary for Pond 6P: Filtration Basin D

Inflow Area = 0.230 ac, 62.20% Impervious, Inflow Depth = 6.02" for 100-Year event
Inflow = 2.26 cfs @ 12.14 hrs, Volume= 0.115 af
Outflow = 2.24 cfs @ 12.16 hrs, Volume= 0.093 af, Atten= 1%, Lag= 1.0 min
Primary = 2.24 cfs @ 12.16 hrs, Volume= 0.093 af

Routing by Sim-Route method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 953.00' @ 12.16 hrs Surf.Area= 1,049 sf Storage= 1,153 cf

Plug-Flow detention time= 92.4 min calculated for 0.093 af (81% of inflow)
Center-of-Mass det. time= 34.8 min (806.8 - 772.0)

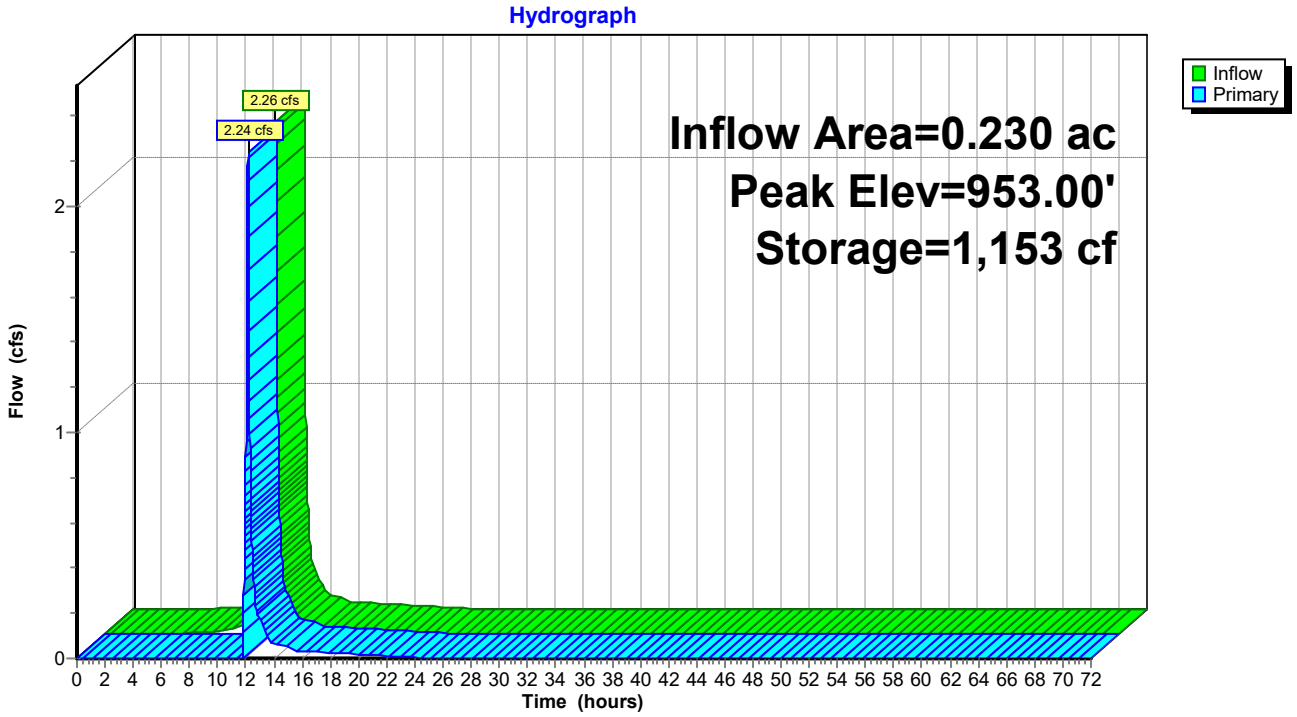
Volume	Invert	Avail.Storage	Storage Description
#1	951.00'	1,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
951.00	180	0	0
952.00	540	360	360
953.00	1,050	795	1,155

Device	Routing	Invert	Outlet Devices
#1	Primary	952.80'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.23 cfs @ 12.16 hrs HW=953.00' TW=947.64' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 2.23 cfs @ 1.13 fps)

Pond 6P: Filtration Basin D



ATTACHMENT C
CHANNEL/PIPE MODELS

Stage-Discharge for Reach 5R: (new Reach)

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
947.00	0.00	0.00
947.01	0.70	0.01
947.02	1.12	0.02
947.03	1.48	0.06
947.04	1.79	0.11
947.05	2.08	0.17
947.06	2.34	0.26
947.07	2.60	0.36
947.08	2.84	0.48
947.09	3.07	0.62
947.10	3.29	0.78
947.11	3.51	0.96
947.12	3.72	1.15
947.13	3.92	1.37
947.14	4.12	1.61
947.15	4.31	1.87
947.16	4.50	2.15
947.17	4.69	2.45
947.18	4.87	2.77
947.19	5.05	3.12
947.20	5.22	3.48
947.21	5.39	3.87
947.22	5.56	4.28
947.23	5.73	4.71
947.24	5.89	5.16
947.25	6.05	5.64
947.26	6.21	6.14
947.27	6.37	6.66
947.28	6.53	7.21
947.29	6.68	7.78
947.30	6.83	8.37
947.31	6.98	8.98
947.32	7.13	9.62
947.33	7.28	10.29
947.34	7.42	10.97
947.35	7.57	11.68
947.36	7.71	12.41
947.37	7.85	13.17
947.38	7.99	13.95
947.39	8.13	14.76
947.40	8.27	15.59
947.41	8.40	16.44
947.42	8.54	17.32
947.43	8.67	18.22
947.44	8.80	19.15
947.45	8.93	20.10
947.46	9.07	21.08
947.47	9.20	22.09
947.48	9.32	23.11
947.49	9.45	24.17
947.50	9.58	25.24
947.51	9.70	26.35
947.52	9.83	27.47
947.53	9.95	28.63
947.54	10.08	29.81
947.55	10.20	31.01
947.56	1	
947.57	1	
947.58	1	
947.59	10.68	36.09
947.60	10.80	37.42
947.61	10.92	38.78
947.62	11.04	40.16
947.63	11.15	41.57
947.64	11.27	43.01
947.65	11.39	44.47
947.66	11.50	45.96
947.67	11.61	47.48
947.68	11.73	49.02
947.69	11.84	50.59
947.70	11.95	52.19
947.71	12.07	53.81
947.72	12.18	55.45
947.73	12.29	57.13
947.74	12.40	58.83
947.75	12.51	60.56
947.76	12.62	62.31
947.77	12.73	64.09
947.78	12.83	65.90
947.79	12.94	67.74
947.80	**13.05**	**69.60**

EXISTING 10-YEAR DISCHARGE = 1.48 CFS
ELEVATION = 947.14

EXISTING 100-YEAR DISCHARGE = 3.90 CFS
ELEVATION = 947.22

Stage-Area-Storage for Reach 5R: (new Reach)

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
947.00	0.0	0
947.01	0.0	0
947.02	0.0	1
947.03	0.0	1
947.04	0.1	2
947.05	0.1	3
947.06	0.1	4
947.07	0.1	5
947.08	0.2	6
947.09	0.2	7
947.10	0.2	8
947.11	0.3	9
947.12	0.3	11
947.13	0.3	12
947.14	0.4	13
947.15	0.4	15
947.16	0.5	16
947.17	0.5	18
947.18	0.6	19
947.19	0.6	21
947.20	0.7	23
947.21	0.7	24
947.22	0.8	26
947.23	0.8	28
947.24	0.9	30
947.25	0.9	32
947.26	1.0	34
947.27	1.0	36
947.28	1.1	38
947.29	1.2	40
947.30	1.2	42
947.31	1.3	44
947.32	1.3	46
947.33	1.4	48
947.34	1.5	50
947.35	1.5	52
947.36	1.6	55
947.37	1.7	57
947.38	1.7	59
947.39	1.8	62
947.40	1.9	64
947.41	2.0	67
947.42	2.0	69
947.43	2.1	71
947.44	2.2	74
947.45	2.3	77
947.46	2.3	79
947.47	2.4	82
947.48	2.5	84
947.49	2.6	87
947.50	2.6	90
947.51	2.7	92
947.52	2.8	95
947.53	2.9	98
947.54	3.0	101
947.55	3.0	103
947.56	3.1	106
947.57		
947.58		
947.59		
947.60		
947.61	3.6	121
947.62	3.6	124
947.63	3.7	127
947.64	3.8	130
947.65	3.9	133
947.66	4.0	136
947.67	4.1	139
947.68	4.2	142
947.69	4.3	145
947.70	4.4	148
947.71	4.5	152
947.72	4.6	155
947.73	4.6	158
947.74	4.7	161
947.75	4.8	165
947.76	4.9	168
947.77	5.0	171
947.78	5.1	175
947.79	5.2	178
947.80	**5.3**	**181**

EXISTING 10-YEAR DISCHARGE
ELEVATION = 947.14
STORAGE = 13 CF

EXISTING 100-YEAR DISCHARGE
ELEVATION = 947.22
STORAGE = 26 CF

Stage-Discharge for Reach 6R: (new Reach)

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
944.10	0.00	0.00
944.11	0.23	0.00
944.12	0.40	0.00
944.13	0.54	0.00
944.14	0.65	0.01
944.15	0.75	0.01
944.16	0.85	0.02
944.17	0.93	0.03
944.18	1.02	0.04
944.19	1.10	0.05
944.20	1.18	0.06
944.21	1.25	0.07
944.22	1.33	0.09
944.23	1.39	0.10
944.24	1.46	0.12
944.25	1.53	0.14
944.26	1.59	0.16
944.27	1.65	0.18
944.28	1.71	0.21
944.29	1.77	0.23
944.30	1.83	0.26
944.31	1.89	0.28
944.32	1.94	0.31
944.33	2.00	0.34
944.34	2.05	0.37
944.35	2.10	0.41
944.36	2.15	0.44
944.37	2.20	0.48
944.38	2.25	0.51
944.39	2.30	0.55
944.40	2.34	0.59
944.41	2.39	0.63
944.42	2.43	0.67
944.43	2.48	0.71
944.44	2.52	0.76
944.45	2.57	0.80
944.46	2.61	0.85
944.47	2.65	0.90
944.48	2.69	0.95
944.49	2.73	1.00
944.50	2.77	1.05
944.51	2.81	1.10
944.52	2.85	1.15
944.53	2.88	1.21
944.54	2.92	1.26
944.55	2.96	1.32
944.56	2.99	1.38
944.57	3.03	1.43
944.58	3.06	1.49
944.59	3.10	1.55
944.60	3.13	1.61
944.61	3.16	1.68
944.62	3.20	1.74
944.63	3.23	1.80
944.64	3.26	1.87
944.65	3.29	1.93
944.66	3.32	2.00
944.67	3.35	2.06
944.68	3.38	2.13
944.69	3.41	2.20
944.70	3.44	2.27
944.71	3.47	2.34
944.72	3.49	2.41
944.73	3.52	2.48
944.74	3.55	2.55
944.75	3.57	2.62
944.76	3.60	2.69
944.77	3.62	2.77
944.78	3.65	2.84
944.79	3.67	2.91
944.80	3.70	2.99
944.81	3.72	3.06
944.82	3.74	3.14
944.83	3.77	3.21
944.84	3.79	3.29
944.85	3.81	3.37
944.86	3.83	3.44
944.87	3.85	3.52
944.88	3.87	3.60
944.89	3.89	3.67
944.90	3.91	3.75
944.91	3.93	3.83
944.92	3.95	3.90
944.93	3.97	3.98
944.94	3.99	4.06
944.95	4.00	4.14
944.96	4.02	4.21
944.97	4.04	4.29
944.98	4.05	4.37
944.99	4.07	4.45
945.00	4.09	4.52
945.01	4.10	4.60
945.02	4.12	4.68
945.03	4.13	4.75
945.04	4.14	4.83
945.05	4.16	4.90
945.06	4.17	4.98
945.07	4.18	5.06
945.08	4.19	5.13
945.09	4.21	5.20
945.10	4.22	5.28
945.11	4.23	5.35
945.12	4.24	5.42
945.13	4.25	5.49
945.14	4.26	5.57
945.15	4.27	5.64
945.16	4.27	5.71
945.17	4.28	5.78
945.18	4.29	5.84
945.19	4.30	5.91
945.20	4.30	5.98
945.21	4.31	6.04
945.22	4.32	6.11
945.23	4.32	6.17
945.24	4.33	6.23
945.25	4.33	6.29
945.26	4.33	6.35
945.27	4.34	6.41
945.28	4.34	6.47
945.29	4.34	6.53
945.30	4.34	6.58
945.31	4.34	6.63
945.32	**4.34**	6.69
945.33	4.34	6.74
945.34	4.34	6.78
945.35	4.34	6.83
945.36	4.34	6.87
945.42	4.31	7.10
945.43	4.30	7.13
945.44	4.29	7.15
945.45	4.28	7.18
945.46	4.27	7.19
945.47	4.26	7.21
945.48	4.25	7.23
945.49	4.23	7.23
945.50	4.22	7.24
945.51	4.20	**7.24**
945.52	4.18	7.24
945.53	4.16	7.23
945.54	4.14	7.21
945.55	4.11	7.19
945.56	4.08	7.15
945.57	4.05	7.11
945.58	4.00	7.05
945.59	3.92	6.92
945.60	3.81	6.73

PROPOSED 100-YEAR
DISCHARGE = 6.50 CFS
ELEV = 945.29

Stage-Area-Storage for Reach 6R: (new Reach)

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
944.10	0.0	0
944.12	0.0	0
944.14	0.0	0
944.16	0.0	1
944.18	0.0	1
944.20	0.1	2
944.22	0.1	2
944.24	0.1	3
944.26	0.1	3
944.28	0.1	4
944.30	0.1	5
944.32	0.2	5
944.34	0.2	6
944.36	0.2	7
944.38	0.2	8
944.40	0.3	9
944.42	0.3	9
944.44	0.3	10
944.46	0.3	11
944.48	0.4	12
944.50	0.4	13
944.52	0.4	14
944.54	0.4	15
944.56	0.5	16
944.58	0.5	17
944.60	0.5	18
944.62	0.5	18
944.64	0.6	19
944.66	0.6	20
944.68	0.6	21
944.70	0.7	22
944.72	0.7	23
944.74	0.7	24
944.76	0.7	25
944.78	0.8	26
944.80	0.8	27
944.82	0.8	29
944.84	0.9	30
944.86	0.9	31
944.88	0.9	32
944.90	1.0	33
944.92	1.0	34
944.94	1.0	35
944.96	1.0	36
944.98	1.1	37
945.00	1.1	38
945.02	1.1	39
945.04	1.2	40
945.06	1.2	41
945.08	1.2	42
945.10	1.3	43
945.12	1.3	44
945.14	1.3	44
945.16	1.3	45
945.18	1.4	46
945.20	1.4	47
945.22	1.4	48
945.24	1.4	49
945.26	1.5	50
945.28	1.5	51
945.30	1.5	52
945.32	1.5	52
945.34	1.6	53
945.36	1.6	54
945.38	1.6	55
945.40	1.6	55
945.42	1.6	56
945.44	1.7	57
945.46	1.7	57
945.48	1.7	58
945.50	1.7	58
945.52	1.7	59
945.54	1.7	59
945.56	1.8	60
945.58	1.8	60
945.60	**1.8**	**60**