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STORMWATER MANAGEMENT MEMO

SITE ENTRANCE MANGINO BUICK, GMC

TOWN OF BALLSTON, NY

December 2021

1. INTRODUCTION

PTR Properties Group, LLC (Applicant) is proposing to construct a ±6,000 SF building addition and a second site entrance to the existing Mangino Buick GMC car dealership located at 1484 Route 50. The second site entrance will provide access to the existing car dealership from NYS Route 67. Additional elements of the proposed construction include a new entrance sign, a small paved vehicle display area, a wetland crossing, and stormwater management features. The project site is located on the west side of NYS Route 67 and the east side of NYS Route 50 in the Town of Ballston, New York. The proposed development will result in total soil disturbance of ±0.95 acres and an increase in impervious area of ±0.32 acres (13,840 sf). The proposed building expansion will be constructed in an area of existing pavement resulting in no net increase in impervious area in this location.

This project will disturb less than one (1) acre and therefore will not require coverage under the NYSDEC SPDES general permit GP-0-20-001, nor will the project be subject to the requirements of Chapter 91 of the Town Code. However, post construction stormwater management features will be included as part of the design to attenuate post-development flows to pre-development conditions. The purpose of this report is to summarize the proposed stormwater management design.

2. EXISTING CONDITIONS

The existing site consists of two parcels. The primary parcel is being used as a car dealership, while the secondary parcel consists of vacant, wooded land. Elevations on the two parcels range from 333 to 362 ft above sea level, and slopes range from 1% to 10%, with localized areas near an intermittent stream of up to 25%. Drainage on site flows towards the intermittent stream which bisects both parcels. The intermittent stream flows to the east of the site to a culvert under NYS Route 67. The intermittent stream is surrounded by NYSDEC wetlands.

3. POST-CONSTRUCTION STORMWATER

The stormwater design will incorporate wing curb, a vegetated swale, and one (1) detention basin in order to attenuate the stormwater runoff from the proposed access drive. Runoff from the access drive will flow along the wing curb into a vegetated swale, to the south of the access drive which

will flow to a detention basin near the proposed vehicle display area. Stormwater modelling indicates the detention basin has been designed to attenuate up to the 100-year storm event with minimal overflows. An emergency overflow has been included in the detention basin which will discharge towards the existing wetland areas and intermittent stream to the southeast of the site. Flows from the vehicle display area will flow over the existing, vegetated, undisturbed soils to the existing stream. A gravel diaphragm is proposed along the vehicle display area and a portion of the driveway by the entrance to provide pretreatment.

A drainage swale has also been provided along the northern portion of the proposed access drive. Any drainage collected in the northern drainage swale will be directed to a shallow, grass depression with a 12-inch culvert outlet. The 12-inch culvert outlet will run under the proposed access drive and will convey the flows towards the intermittent stream (existing drainage corridor).

The intermittent stream flows under Route 67 via an existing ±30" culvert and is considered "unclassified" by both the US Army Corps and NYSDEC. A 36" culvert is proposed where the access drive will cross over the existing intermittent stream to maintain predevelopment flows.

A pre- and post-development HydroCAD model were prepared to analyze the site hydrology. Table 1 below presents a summary of the pre- and post-development 1-year, 10-year and 100-year storm events at the design point. The post-development runoff rates have been limited to the predevelopment rates.

Table 1: Post Development Stormwater Peak Discharge Rates

Peak Discharge Rates in cfs	1-Year Storm	10-Year Storm	100-Year Storm
Pre-Development	0.00	0.02	1.15
Post-Development	0.00	0.03	1.11
Overall Difference (cfs)	0.00	+0.01	-0.04

In order to further protect the existing wetlands from any site sediments, the outlet device has been designed to ensure that discharges velocities from the detention basin are non-erosive. Stormwater modelling indicates the overflow weir will have a discharge velocity of approximately 0.26 ft/sec during the 100-year design storm event.

4. SUMMARY

Development of the proposed project site will alter the stormwater drainage characteristics of the site; impervious area will be added in the form of the access road. Changes to the stormwater drainage characteristics have been evaluated to ensure the post-development flows are attenuated to

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the pre-development flows. As the site disturbances are under one (1) acre, the project does not require coverage under the NYSDEC SPDES general permit GP-0-20-001, nor is the project subject to the requirements of Chapter 91 of the Town Code. In the area of the proposed building expansion no new impervious area is proposed and therefore, no changes to the drainage characteristics are anticipated in this area.

Through the implementation of the proposed stormwater practices, the proposed project will not adversely affect adjacent or downstream properties.

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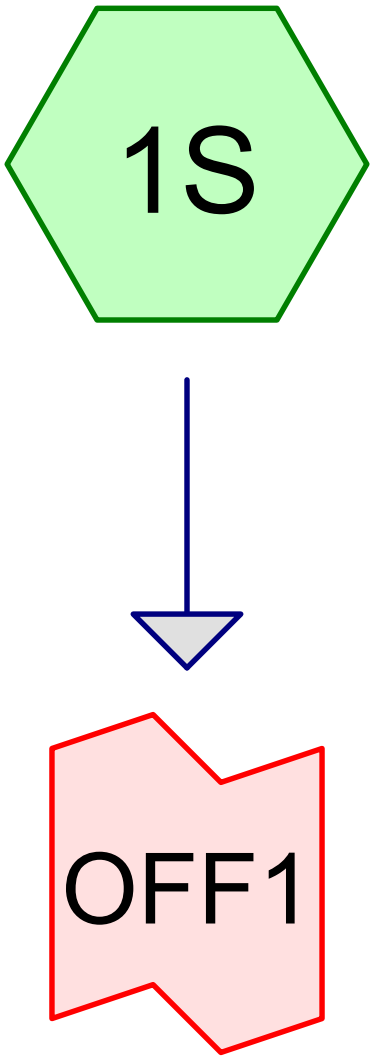


Subcat Reach Pond Link

Routing Diagram for PREDEVELOPMENT
Prepared by The Environmental Design Partnership, LLP, Printed 5/3/2022
HydroCAD® 10.10-3a s/n 10197 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
97,460	39	>75% Grass cover, Good, HSG A (1S)
69,637	98	Unconnected roofs, HSG A (1S)
221,191	30	Woods, Good, HSG A (1S)
388,288	**44**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
388,288	HSG A	1S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
388,288		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
97,460	0	0	0	0	97,460	>75% Grass cover, Good	
69,637	0	0	0	0	69,637	Unconnected roofs	
221,191	0	0	0	0	221,191	Woods, Good	
388,288	**0**	**0**	**0**	**0**	**388,288**	**TOTAL AREA**	

Time span=0.00-200.00 hrs, dt=0.05 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=388,288 sf 17.93% Impervious Runoff Depth=0.47"
Flow Length=1,397' Tc=41.1 min UI Adjusted CN=39 Runoff=1.15 cfs 15,069 cf

Link OFF1: Inflow=1.15 cfs 15,069 cf
Primary=1.15 cfs 15,069 cf

Total Runoff Area = 388,288 sf Runoff Volume = 15,069 cf Average Runoff Depth = 0.47"
82.07% Pervious = 318,651 sf 17.93% Impervious = 69,637 sf

Summary for Subcatchment 1S:

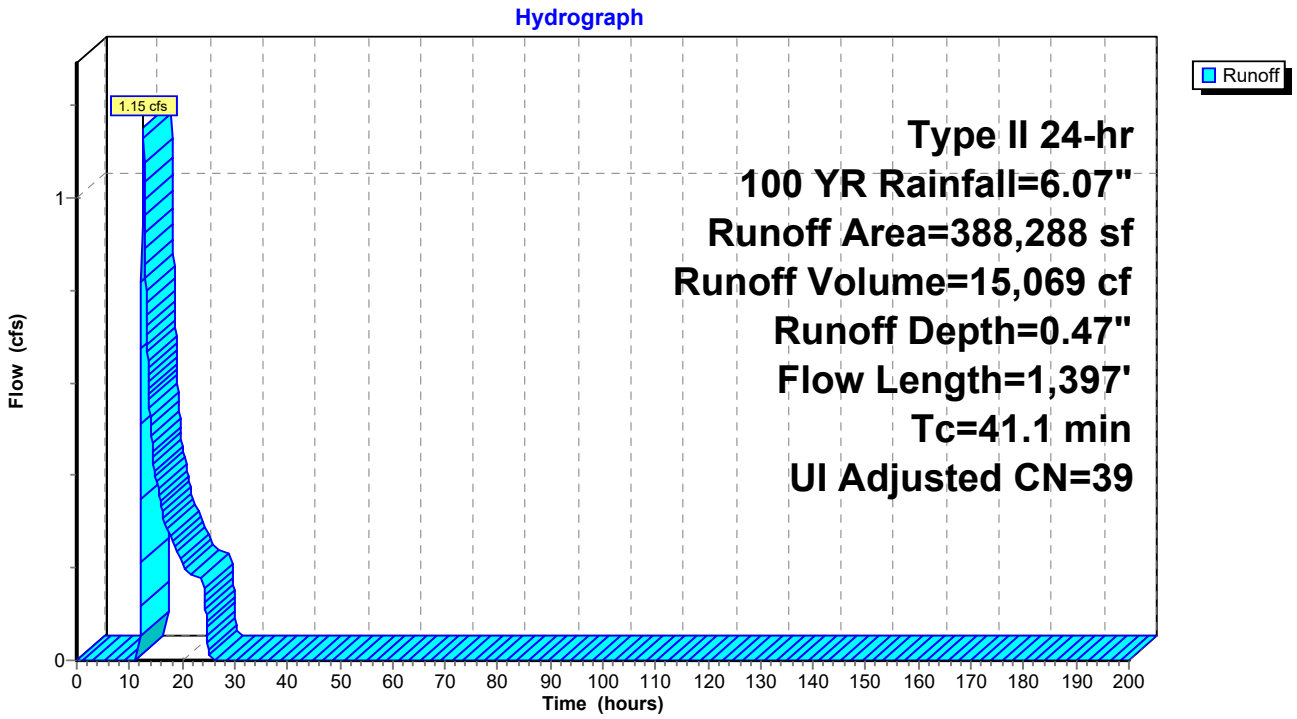
Runoff = 1.15 cfs @ 12.61 hrs, Volume= 15,069 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YR Rainfall=6.07"

Area (sf)	CN	Adj	Description
69,637	98		Unconnected roofs, HSG A
97,460	39		>75% Grass cover, Good, HSG A
221,191	30		Woods, Good, HSG A
388,288	44	39	Weighted Average, UI Adjusted
318,651			82.07% Pervious Area
69,637			17.93% Impervious Area
69,637			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.9	100	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.59"
6.9	104	0.0100	0.25		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
1.9	284	0.0280	2.51		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.9	76	0.0720	0.67		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.4	65	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.2	263	0.0460	0.54		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.9	505	0.0180	9.22	110.61	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=2.00' Z= 1.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
41.1	1,397	Total			

Subcatchment 1S:

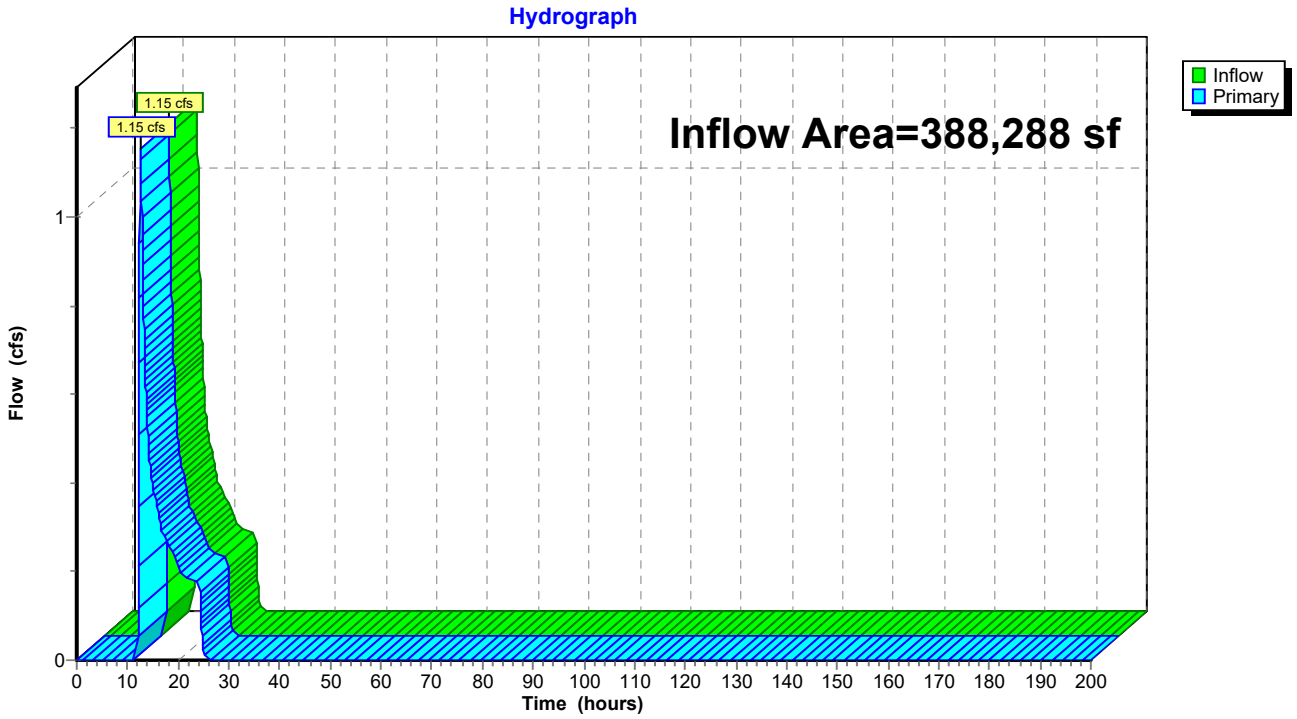


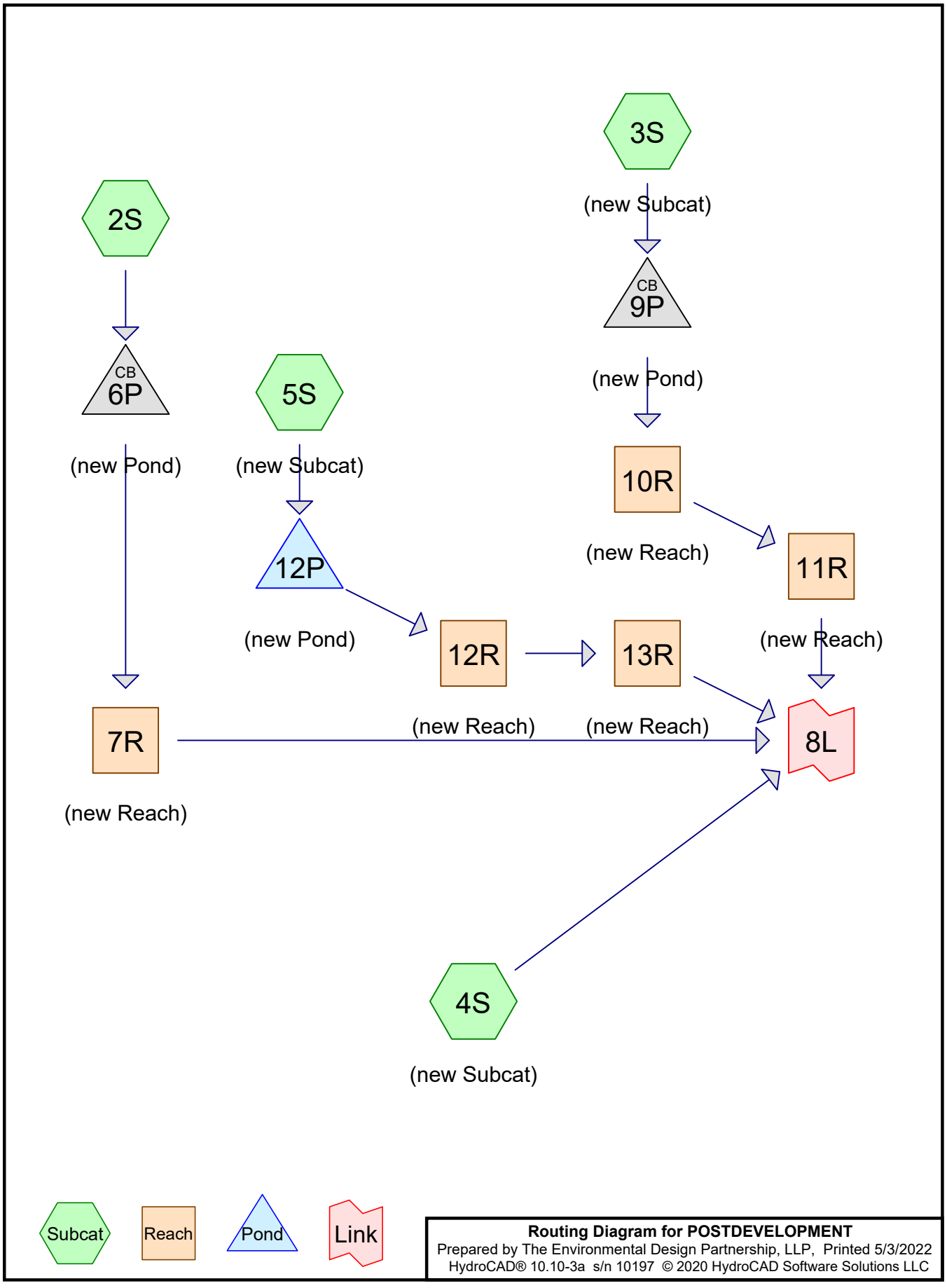
Summary for Link OFF1:

Inflow Area = 388,288 sf, 17.93% Impervious, Inflow Depth = 0.47" for 100 YR event
Inflow = 1.15 cfs @ 12.61 hrs, Volume= 15,069 cf
Primary = 1.15 cfs @ 12.61 hrs, Volume= 15,069 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Link OFF1:




3S
(new Subcat)
2S
CB
9P
(new Pond)
CB
6P
5S
10R
(new Pond)
(new Subcat)
(new Reach)
11R
12P
(new Pond)
12R
13R
(new Reach)
(new Reach)
7R
(new Reach)
(new Reach)
8L
4S
(new Subcat)
Subcat
Reach
Pond
Link
Routing Diagram for POSTDEVELOPMENT
Prepared by The Environmental Design Partnership, LLP, Printed 5/3/2022
HydroCAD® 10.10-3a s/n 10197 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
118,940	39	>75% Grass cover, Good, HSG A (2S, 3S, 4S, 5S)
68,056	98	Unconnected pavement, HSG A (3S, 4S, 5S)
15,420	98	Unconnected roofs, HSG A (2S)
185,871	30	Woods, Good, HSG A (2S, 3S, 4S)
388,287	**47**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
388,287	HSG A	2S, 3S, 4S, 5S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
388,287		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
118,940	0	0	0	0	118,940	>75% Grass cover, Good	
68,056	0	0	0	0	68,056	Unconnected pavement	
15,420	0	0	0	0	15,420	Unconnected roofs	
185,871	0	0	0	0	185,871	Woods, Good	
388,287	**0**	**0**	**0**	**0**	**388,287**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	6P	347.00	341.00	89.0	0.0674	0.012	36.0	0.0	0.0
2	9P	341.29	340.00	40.0	0.0323	0.012	12.0	0.0	0.0

Time span=0.00-200.00 hrs, dt=0.05 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: Runoff Area=128,473 sf 12.00% Impervious Runoff Depth=0.36"
Flow Length=892' Tc=40.2 min UI Adjusted CN=37 Runoff=0.23 cfs 3,860 cf

Subcatchment3S: (new Subcat) Runoff Area=156,341 sf 21.51% Impervious Runoff Depth=0.58"
Flow Length=766' Tc=40.5 min UI Adjusted CN=41 Runoff=0.71 cfs 7,550 cf

Subcatchment4S: (new Subcat) Runoff Area=83,770 sf 26.56% Impervious Runoff Depth=0.64"
Flow Length=423' Tc=10.9 min UI Adjusted CN=42 Runoff=1.06 cfs 4,463 cf

Subcatchment5S: (new Subcat) Runoff Area=19,703 sf 61.81% Impervious Runoff Depth=3.34"
Tc=0.0 min CN=75 Runoff=3.07 cfs 5,487 cf

Reach 7R: (new Reach) Avg. Flow Depth=0.05' Max Vel=1.09 fps Inflow=0.23 cfs 3,860 cf
n=0.025 L=447.0' S=0.0179 '/' Capacity=110.29 cfs Outflow=0.22 cfs 3,860 cf

Reach 10R: (new Reach) Avg. Flow Depth=0.05' Max Vel=1.47 fps Inflow=0.71 cfs 7,550 cf
n=0.030 L=63.0' S=0.0476 '/' Capacity=1,748.87 cfs Outflow=0.71 cfs 7,550 cf

Reach 11R: (new Reach) Avg. Flow Depth=0.02' Max Vel=0.72 fps Inflow=0.71 cfs 7,550 cf
n=0.050 L=93.0' S=0.0430 '/' Capacity=3,383.77 cfs Outflow=0.70 cfs 7,550 cf

Reach 12R: (new Reach) Avg. Flow Depth=0.00' Max Vel=0.96 fps Inflow=0.08 cfs 1,533 cf
n=0.050 L=79.0' S=0.0759 '/' Capacity=4,496.49 cfs Outflow=0.08 cfs 1,533 cf

Reach 13R: (new Reach) Avg. Flow Depth=0.03' Max Vel=0.68 fps Inflow=0.08 cfs 1,533 cf
n=0.025 L=77.0' S=0.0130 '/' Capacity=93.95 cfs Outflow=0.08 cfs 1,533 cf

Pond 6P: (new Pond) Peak Elev=347.17' Inflow=0.23 cfs 3,860 cf
36.0" Round Culvert n=0.012 L=89.0' S=0.0674 '/' Outflow=0.23 cfs 3,860 cf

Pond 9P: (new Pond) Peak Elev=341.72' Inflow=0.71 cfs 7,550 cf
12.0" Round Culvert n=0.012 L=40.0' S=0.0323 '/' Outflow=0.71 cfs 7,550 cf

Pond 12P: (new Pond) Peak Elev=340.01' Storage=3,978 cf Inflow=3.07 cfs 5,487 cf
Outflow=0.08 cfs 1,533 cf

Link 8L: Inflow=1.11 cfs 17,406 cf
Primary=1.11 cfs 17,406 cf

Total Runoff Area = 388,287 sf Runoff Volume = 21,360 cf Average Runoff Depth = 0.66"
78.50% Pervious = 304,811 sf 21.50% Impervious = 83,476 sf

Summary for Subcatchment 2S:

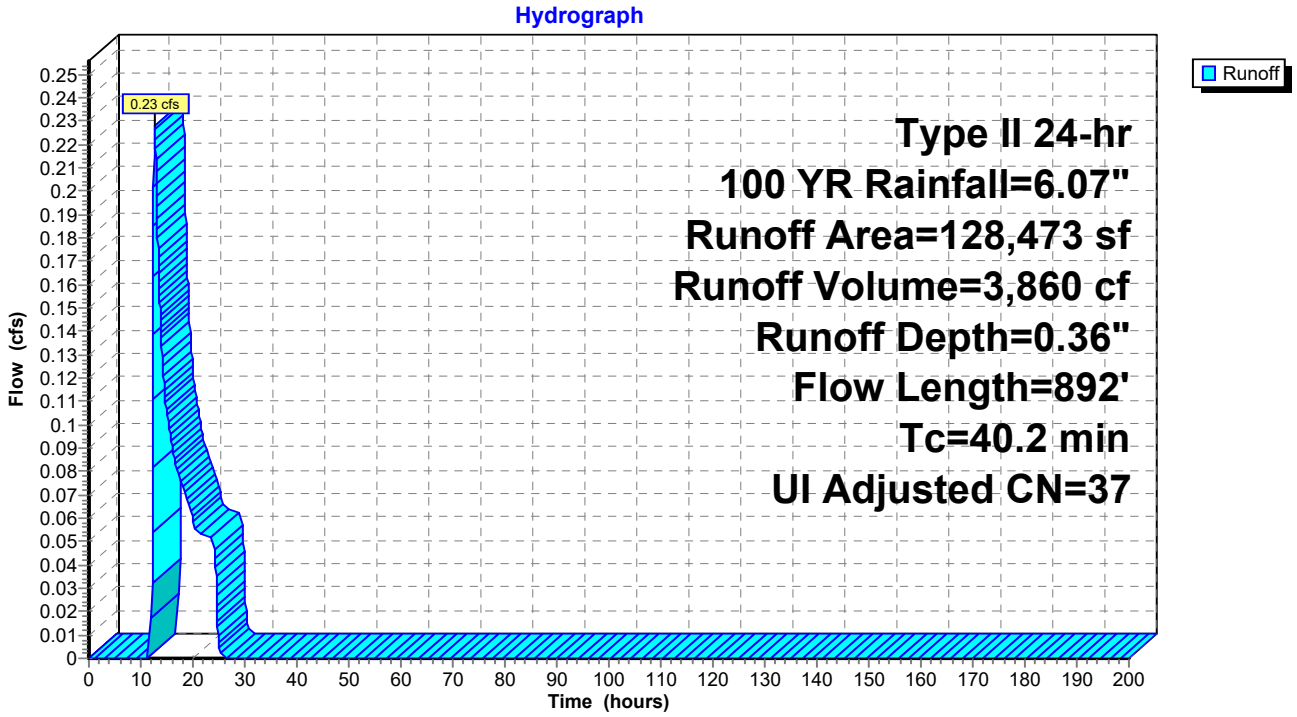
Runoff = 0.23 cfs @ 12.67 hrs, Volume= 3,860 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YR Rainfall=6.07"

Area (sf)	CN	Adj	Description
15,420	98		Unconnected roofs, HSG A
42,515	39		>75% Grass cover, Good, HSG A
70,538	30		Woods, Good, HSG A
128,473	41	37	Weighted Average, UI Adjusted
113,053			88.00% Pervious Area
15,420			12.00% Impervious Area
15,420			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.9	100	0.0100	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.59"
6.9	104	0.0100	0.25		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
1.9	284	0.0280	2.51		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.9	76	0.0720	0.67		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
0.4	65	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
8.2	263	0.0460	0.54		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
40.2	892	Total			

Subcatchment 2S:



Summary for Subcatchment 3S: (new Subcat)

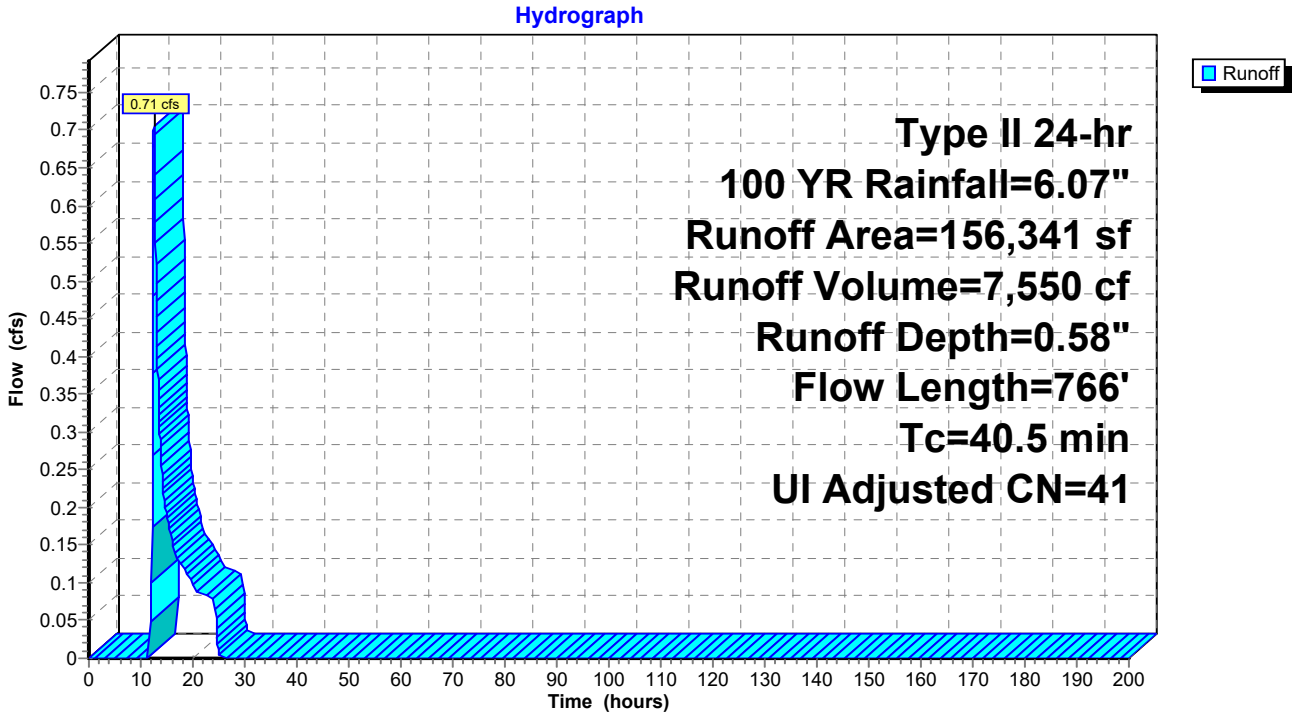
Runoff = 0.71 cfs @ 12.55 hrs, Volume= 7,550 cf, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YR Rainfall=6.07"

Area (sf)	CN	Adj	Description
33,631	98		Unconnected pavement, HSG A
49,064	39		>75% Grass cover, Good, HSG A
73,646	30		Woods, Good, HSG A
156,341	47	41	Weighted Average, UI Adjusted
122,710			78.49% Pervious Area
33,631			21.51% Impervious Area
33,631			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.5	100	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.59"
3.9	81	0.0190	0.34		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
1.5	178	0.0170	1.96		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.0	11	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	26	0.0770	4.16		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.0	12	0.0830	5.85		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	134	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	16	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	60	0.0750	4.11		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.0	14	0.0700	5.37		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	25	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	109	0.0830	0.72		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
40.5	766	Total			

Subcatchment 3S: (new Subcat)



Summary for Subcatchment 4S: (new Subcat)

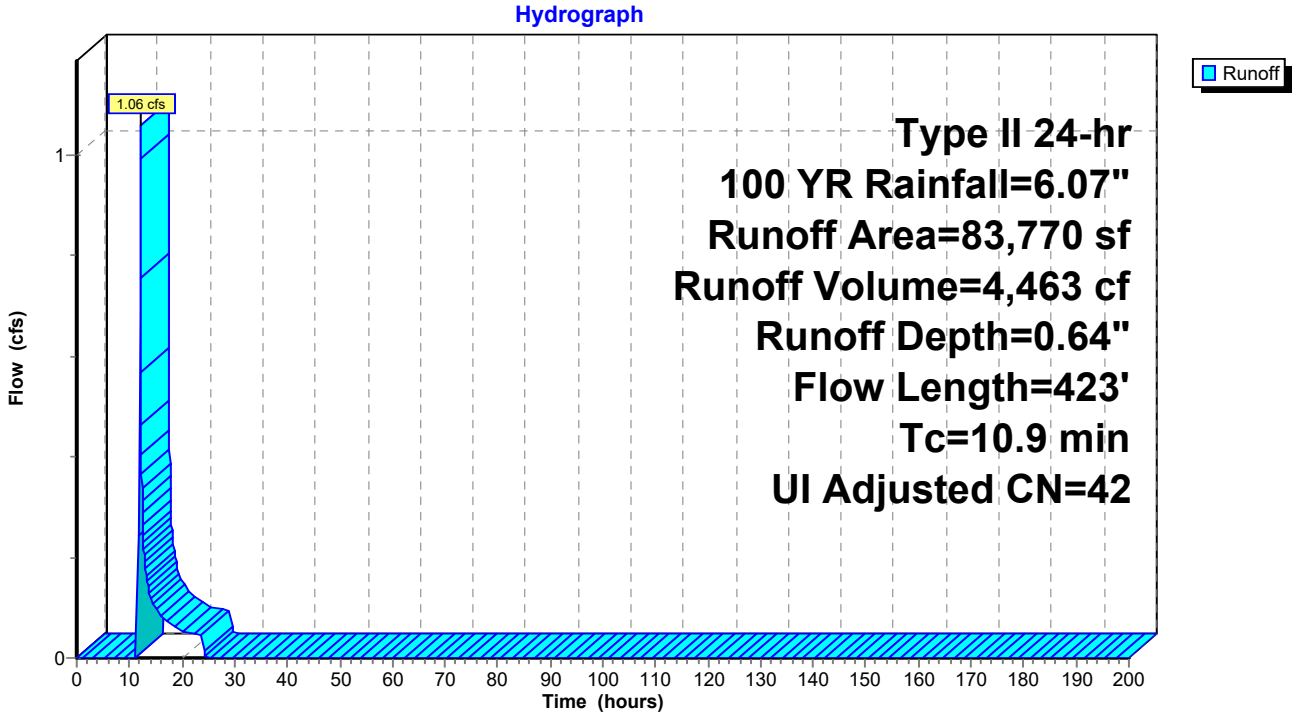
Runoff = 1.06 cfs @ 12.07 hrs, Volume= 4,463 cf, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YR Rainfall=6.07"

Area (sf)	CN	Adj	Description
22,247	98		Unconnected pavement, HSG A
19,836	39		>75% Grass cover, Good, HSG A
41,687	30		Woods, Good, HSG A
83,770	50	42	Weighted Average, UI Adjusted
61,523			73.44% Pervious Area
22,247			26.56% Impervious Area
22,247			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	75	0.0930	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.59"
0.6	348	0.0180	9.22	110.61	**Trap/Vee/Rect Channel Flow,** Bot.W=4.00' D=2.00' Z= 1.0 '/' Top.W=8.00' n= 0.025 Earth, clean & winding
10.9	423	Total			

Subcatchment 4S: (new Subcat)



Summary for Subcatchment 5S: (new Subcat)

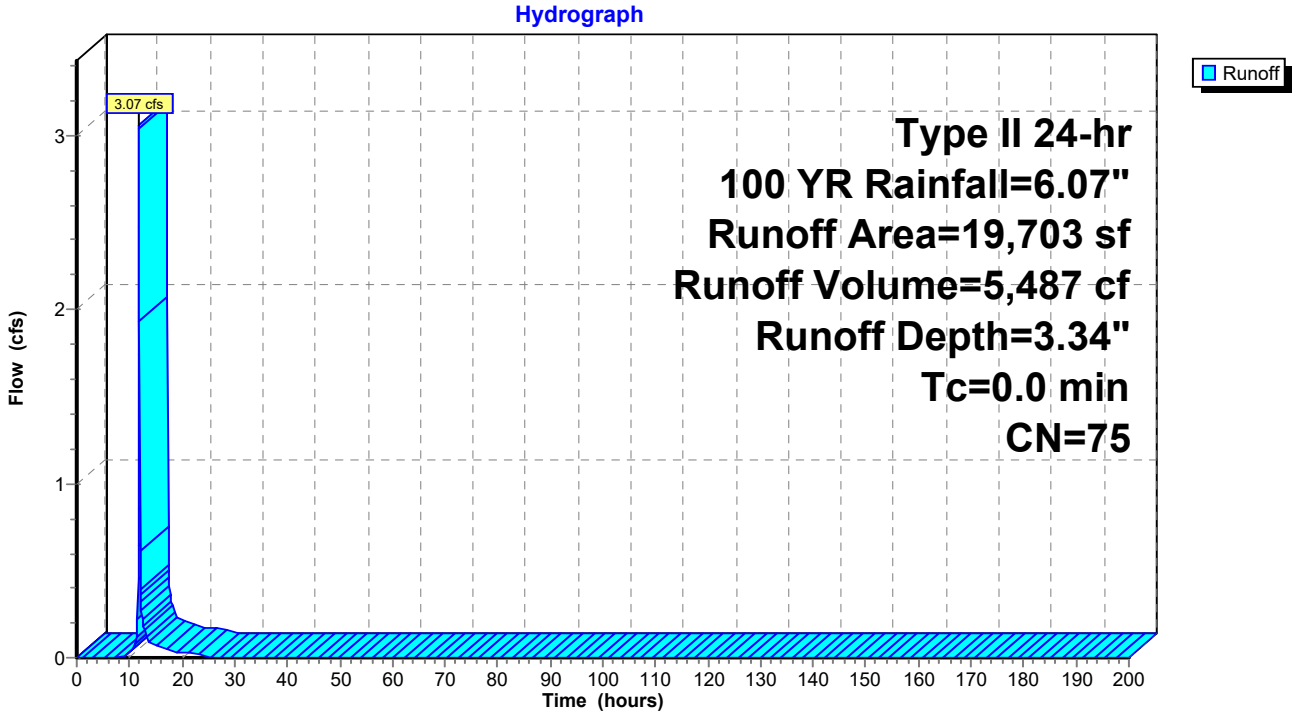
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.07 cfs @ 11.89 hrs, Volume= 5,487 cf, Depth= 3.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 YR Rainfall=6.07"

Area (sf)	CN	Description
12,178	98	Unconnected pavement, HSG A
7,525	39	>75% Grass cover, Good, HSG A
19,703	75	Weighted Average
7,525		38.19% Pervious Area
12,178		61.81% Impervious Area
12,178		100.00% Unconnected

Subcatchment 5S: (new Subcat)



Summary for Reach 7R: (new Reach)

[79] Warning: Submerged Pond 6P Primary device # 1 OUTLET by 0.05'

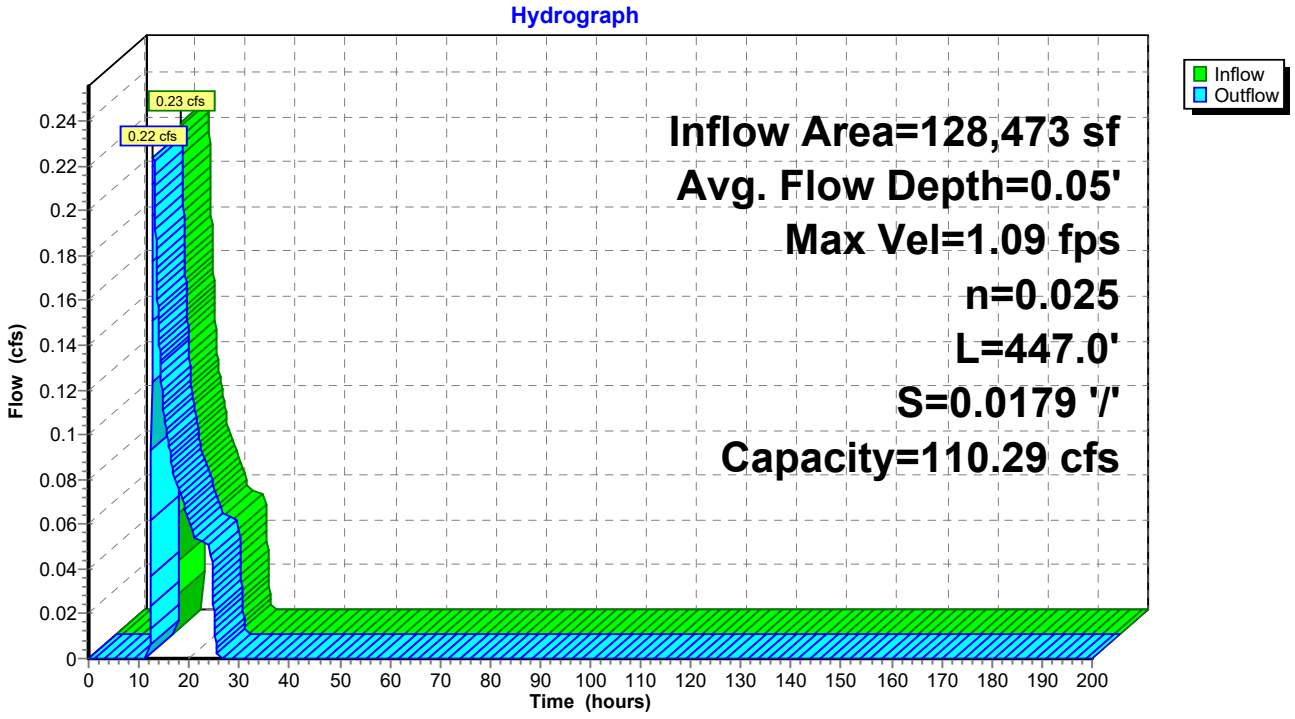
Inflow Area = 128,473 sf, 12.00% Impervious, Inflow Depth = 0.36" for 100 YR event
Inflow = 0.23 cfs @ 12.67 hrs, Volume= 3,860 cf
Outflow = 0.22 cfs @ 12.89 hrs, Volume= 3,860 cf, Atten= 2%, Lag= 13.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.09 fps, Min. Travel Time= 6.8 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 10.4 min

Peak Storage= 92 cf @ 12.77 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 4.10'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 110.29 cfs

4.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 1.0 '/' Top Width= 8.00'
Length= 447.0' Slope= 0.0179 '/'
Inlet Invert= 341.00', Outlet Invert= 333.00'

Reach 7R: (new Reach)



Summary for Reach 10R: (new Reach)

[79] Warning: Submerged Pond 9P Primary device # 1 OUTLET by 0.05'

Inflow Area = 156,341 sf, 21.51% Impervious, Inflow Depth = 0.58" for 100 YR event
Inflow = 0.71 cfs @ 12.55 hrs, Volume= 7,550 cf
Outflow = 0.71 cfs @ 12.57 hrs, Volume= 7,550 cf, Atten= 0%, Lag= 1.2 min

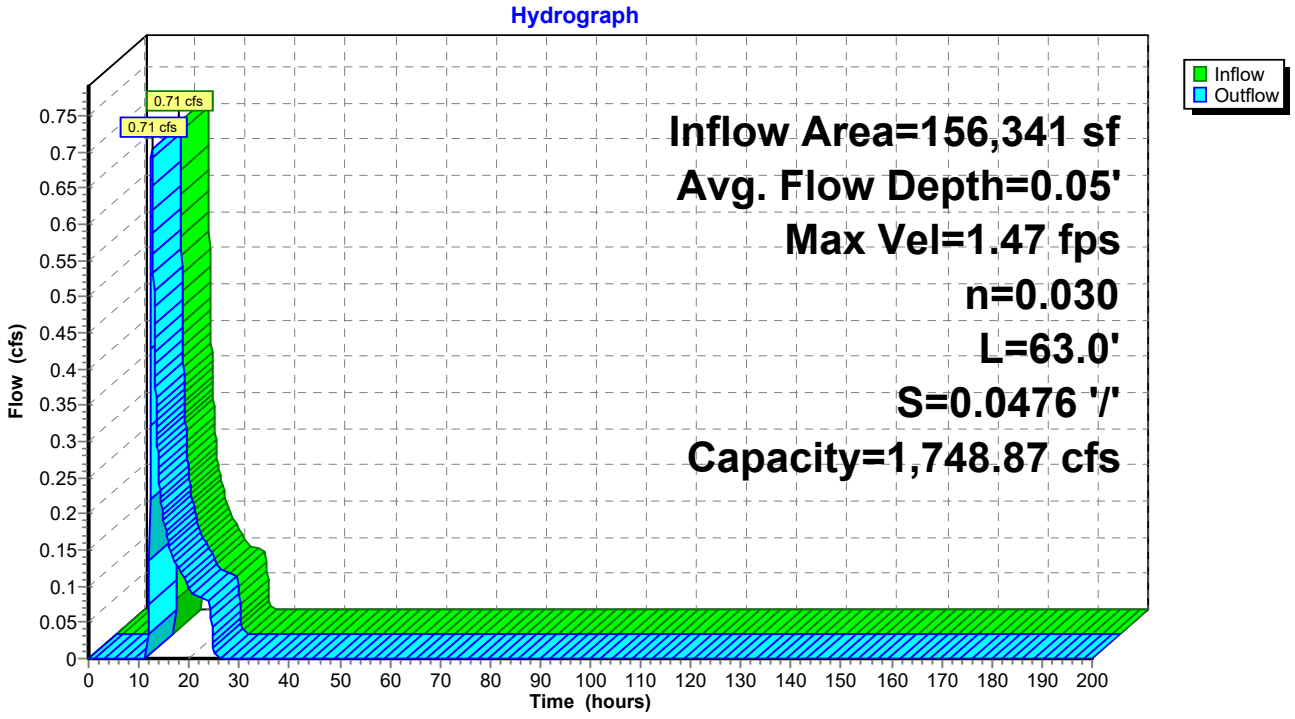
Routing by Stor-Ind+Trans method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.47 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 0.8 min

Peak Storage= 30 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 10.28'
Bank-Full Depth= 4.00' Flow Area= 88.0 sf, Capacity= 1,748.87 cfs

10.00' x 4.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 34.00'
Length= 63.0' Slope= 0.0476 '/'
Inlet Invert= 340.00', Outlet Invert= 337.00'

‡

Reach 10R: (new Reach)



Summary for Reach 11R: (new Reach)

[61] Hint: Exceeded Reach 10R outlet invert by 0.02' @ 12.60 hrs

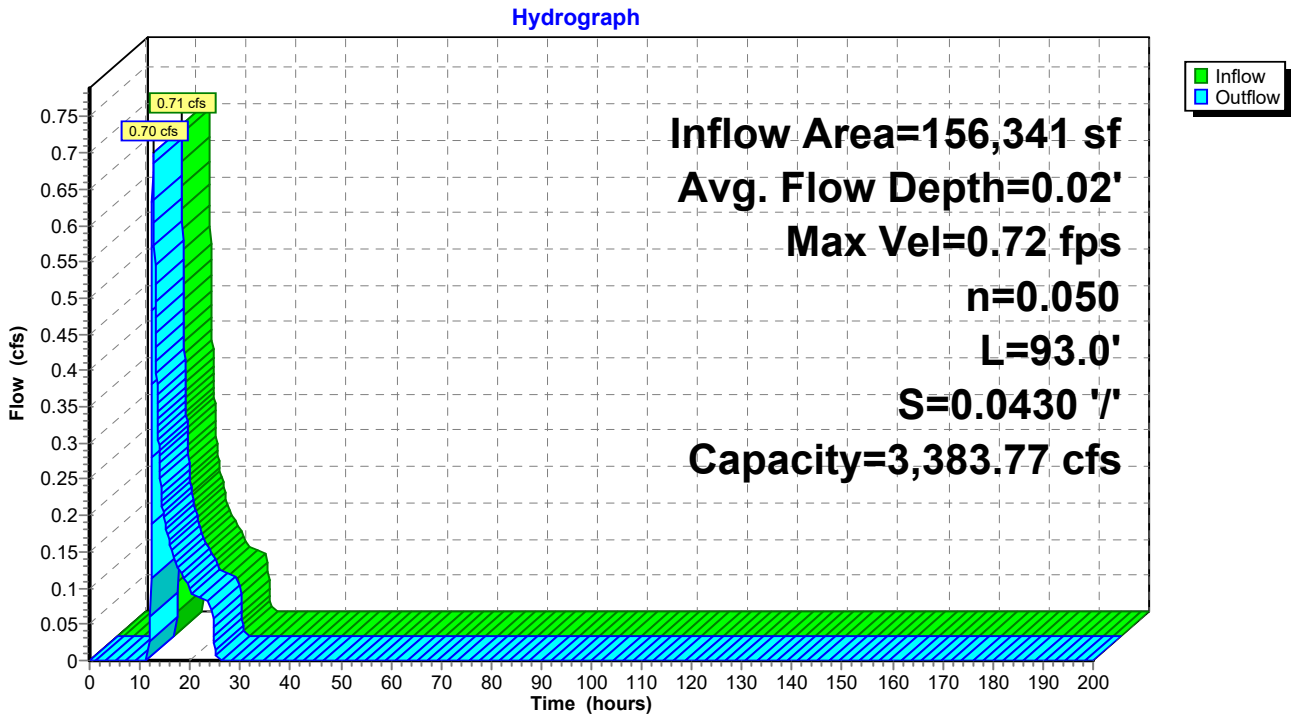
Inflow Area = 156,341 sf, 21.51% Impervious, Inflow Depth = 0.58" for 100 YR event
Inflow = 0.71 cfs @ 12.57 hrs, Volume= 7,550 cf
Outflow = 0.70 cfs @ 12.64 hrs, Volume= 7,550 cf, Atten= 1%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.72 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 2.2 min

Peak Storage= 91 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 50.12'
Bank-Full Depth= 4.00' Flow Area= 248.0 sf, Capacity= 3,383.77 cfs

50.00' x 4.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 3.0 '/' Top Width= 74.00'
Length= 93.0' Slope= 0.0430 '/'
Inlet Invert= 337.00', Outlet Invert= 333.00'

‡



Summary for Reach 12R: (new Reach)

Inflow Area = 19,703 sf, 61.81% Impervious, Inflow Depth = 0.93" for 100 YR event
Inflow = 0.08 cfs @ 14.22 hrs, Volume= 1,533 cf
Outflow = 0.08 cfs @ 14.27 hrs, Volume= 1,533 cf, Atten= 0%, Lag= 3.1 min

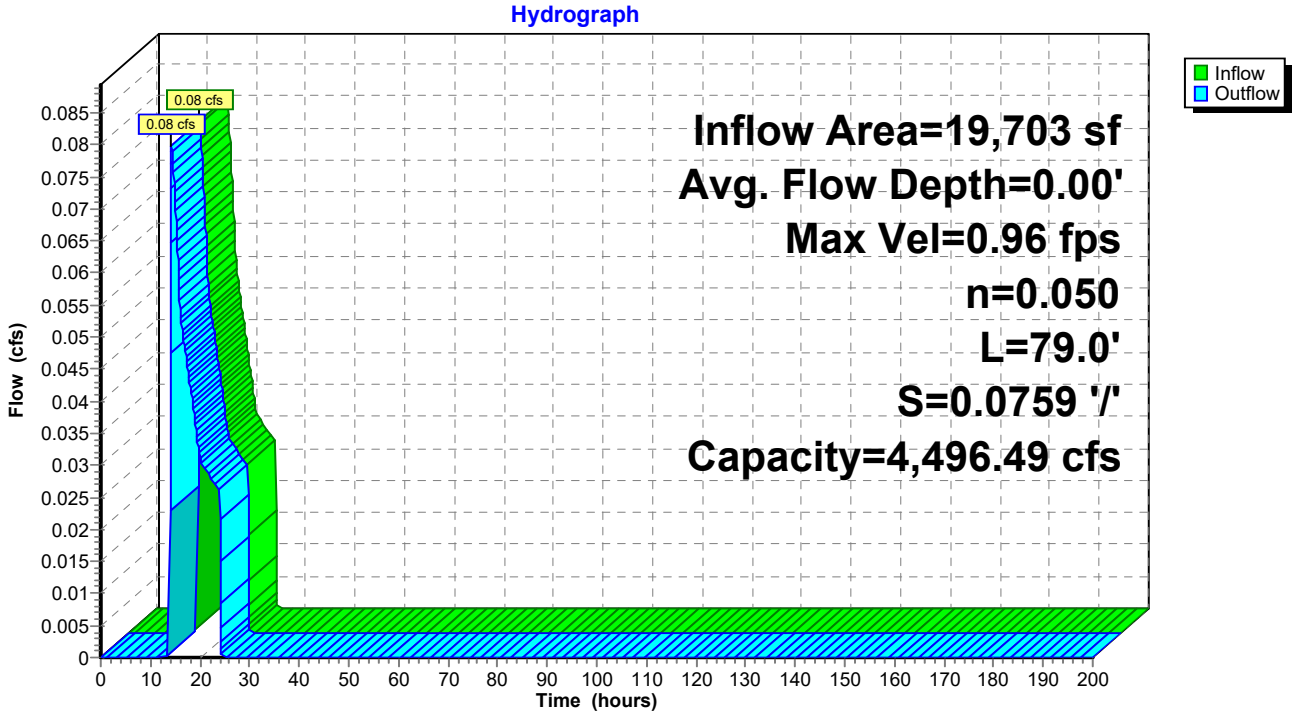
Routing by Stor-Ind+Trans method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.96 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 1.4 min

Peak Storage= 7 cf @ 14.25 hrs
Average Depth at Peak Storage= 0.00' , Surface Width= 50.01'
Bank-Full Depth= 4.00' Flow Area= 248.0 sf, Capacity= 4,496.49 cfs

50.00' x 4.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 3.0 '/' Top Width= 74.00'
Length= 79.0' Slope= 0.0759 '/'
Inlet Invert= 340.00', Outlet Invert= 334.00'

‡

Reach 12R: (new Reach)



Summary for Reach 13R: (new Reach)

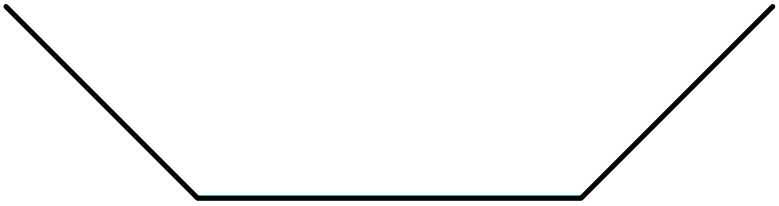
[62] Hint: Exceeded Reach 12R OUTLET depth by 0.03' @ 14.30 hrs

Inflow Area = 19,703 sf, 61.81% Impervious, Inflow Depth = 0.93" for 100 YR event
Inflow = 0.08 cfs @ 14.27 hrs, Volume= 1,533 cf
Outflow = 0.08 cfs @ 14.33 hrs, Volume= 1,533 cf, Atten= 0%, Lag= 3.5 min

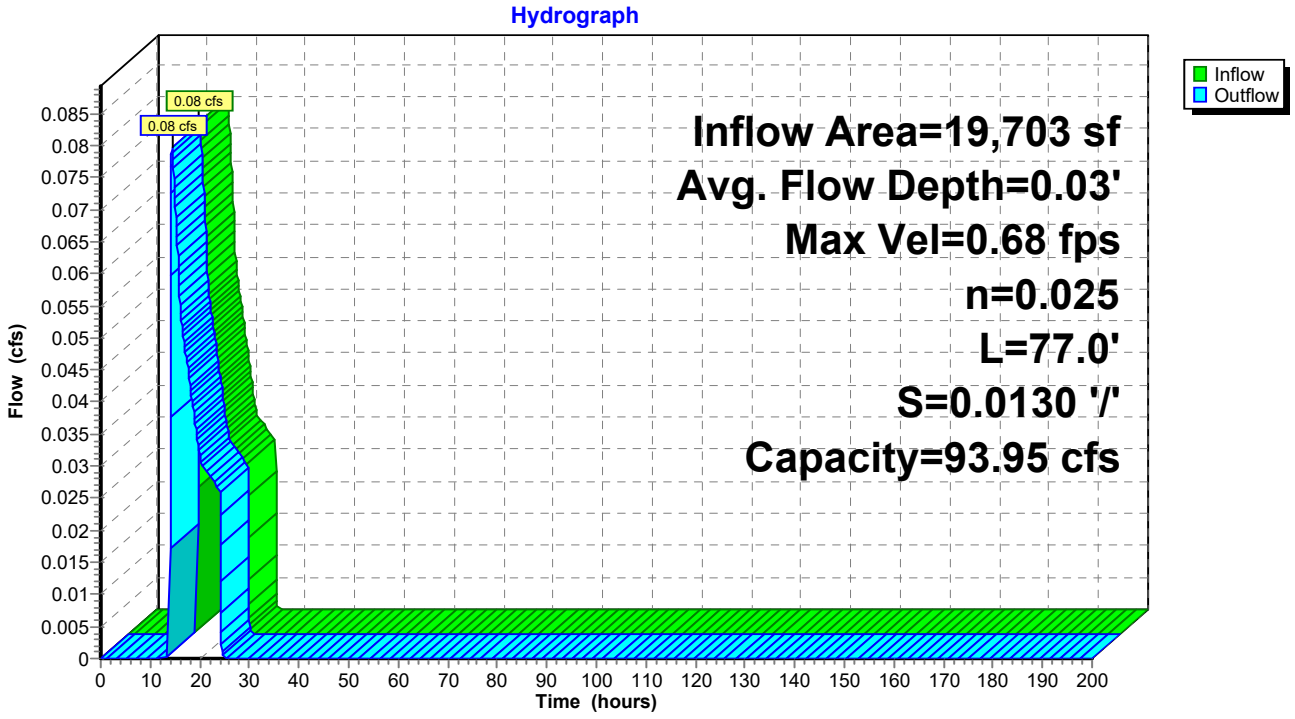
Routing by Stor-Ind+Trans method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.68 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 2.4 min

Peak Storage= 9 cf @ 14.30 hrs
Average Depth at Peak Storage= 0.03' , Surface Width= 4.06'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 93.95 cfs

4.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 1.0 '/' Top Width= 8.00'
Length= 77.0' Slope= 0.0130 '/'
Inlet Invert= 334.00', Outlet Invert= 333.00'



Reach 13R: (new Reach)



Summary for Pond 6P: (new Pond)

[57] Hint: Peaked at 347.17' (Flood elevation advised)

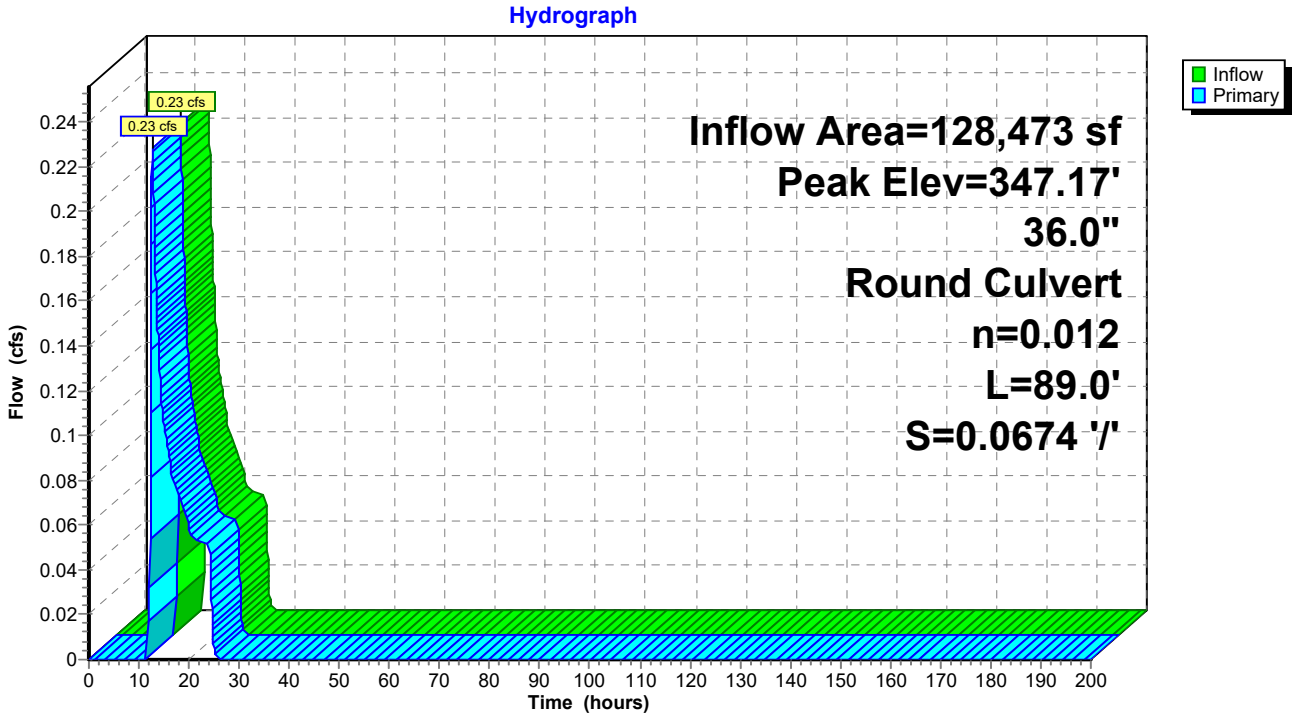
Inflow Area = 128,473 sf, 12.00% Impervious, Inflow Depth = 0.36" for 100 YR event
Inflow = 0.23 cfs @ 12.67 hrs, Volume= 3,860 cf
Outflow = 0.23 cfs @ 12.67 hrs, Volume= 3,860 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.23 cfs @ 12.67 hrs, Volume= 3,860 cf

Routing by Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 347.17' @ 12.67 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	347.00'	**36.0" Round Culvert** L= 89.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 347.00' / 341.00' S= 0.0674 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=0.23 cfs @ 12.67 hrs HW=347.17' (Free Discharge)
1=Culvert (Inlet Controls 0.23 cfs @ 1.41 fps)

Pond 6P: (new Pond)



Summary for Pond 9P: (new Pond)

[57] Hint: Peaked at 341.72' (Flood elevation advised)

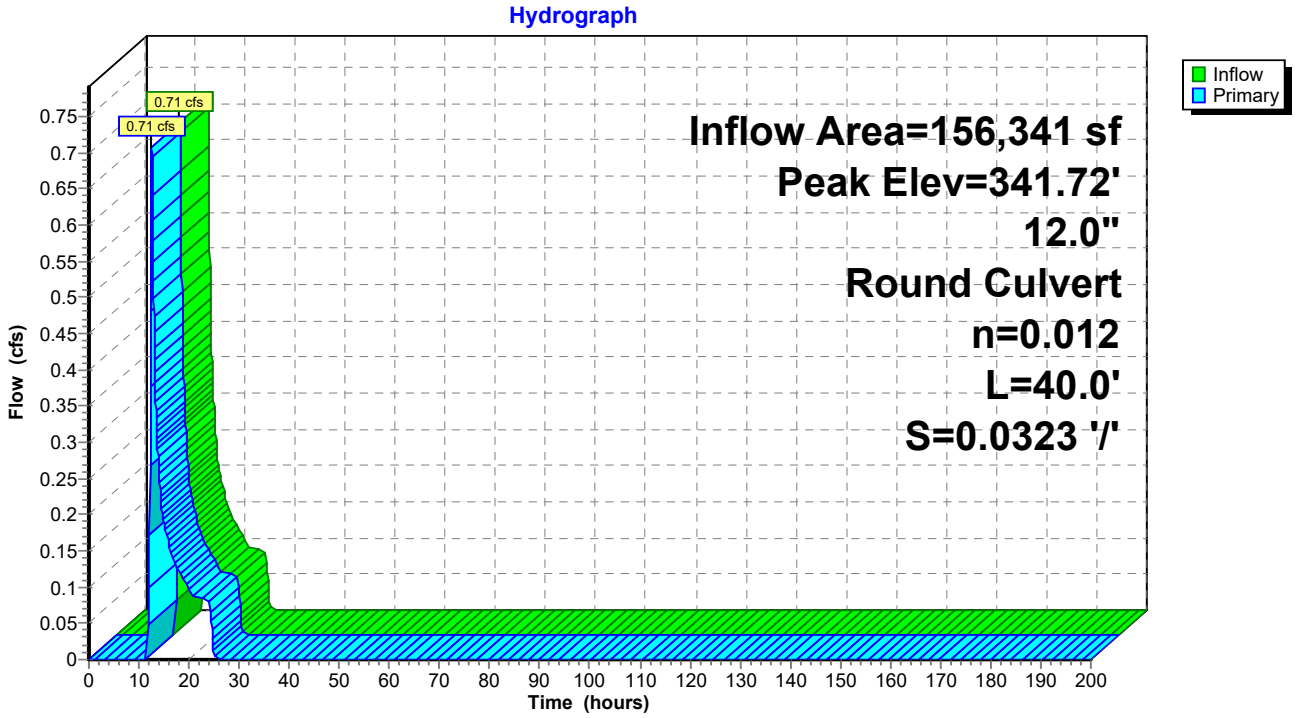
Inflow Area = 156,341 sf, 21.51% Impervious, Inflow Depth = 0.58" for 100 YR event
Inflow = 0.71 cfs @ 12.55 hrs, Volume= 7,550 cf
Outflow = 0.71 cfs @ 12.55 hrs, Volume= 7,550 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.71 cfs @ 12.55 hrs, Volume= 7,550 cf

Routing by Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 341.72' @ 12.55 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	341.29'	**12.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 341.29' / 340.00' S= 0.0323 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 12.55 hrs HW=341.72' (Free Discharge)
1=Culvert (Inlet Controls 0.71 cfs @ 2.22 fps)

Pond 9P: (new Pond)



Summary for Pond 12P: (new Pond)

Inflow Area = 19,703 sf, 61.81% Impervious, Inflow Depth = 3.34" for 100 YR event
Inflow = 3.07 cfs @ 11.89 hrs, Volume= 5,487 cf
Outflow = 0.08 cfs @ 14.22 hrs, Volume= 1,533 cf, Atten= 97%, Lag= 139.8 min
Primary = 0.08 cfs @ 14.22 hrs, Volume= 1,533 cf

Routing by Stor-Ind method, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs
Peak Elev= 340.01' @ 14.22 hrs Surf.Area= 2,520 sf Storage= 3,978 cf

Plug-Flow detention time= 393.3 min calculated for 1,533 cf (28% of inflow)
Center-of-Mass det. time= 261.5 min (1,078.7 - 817.2)

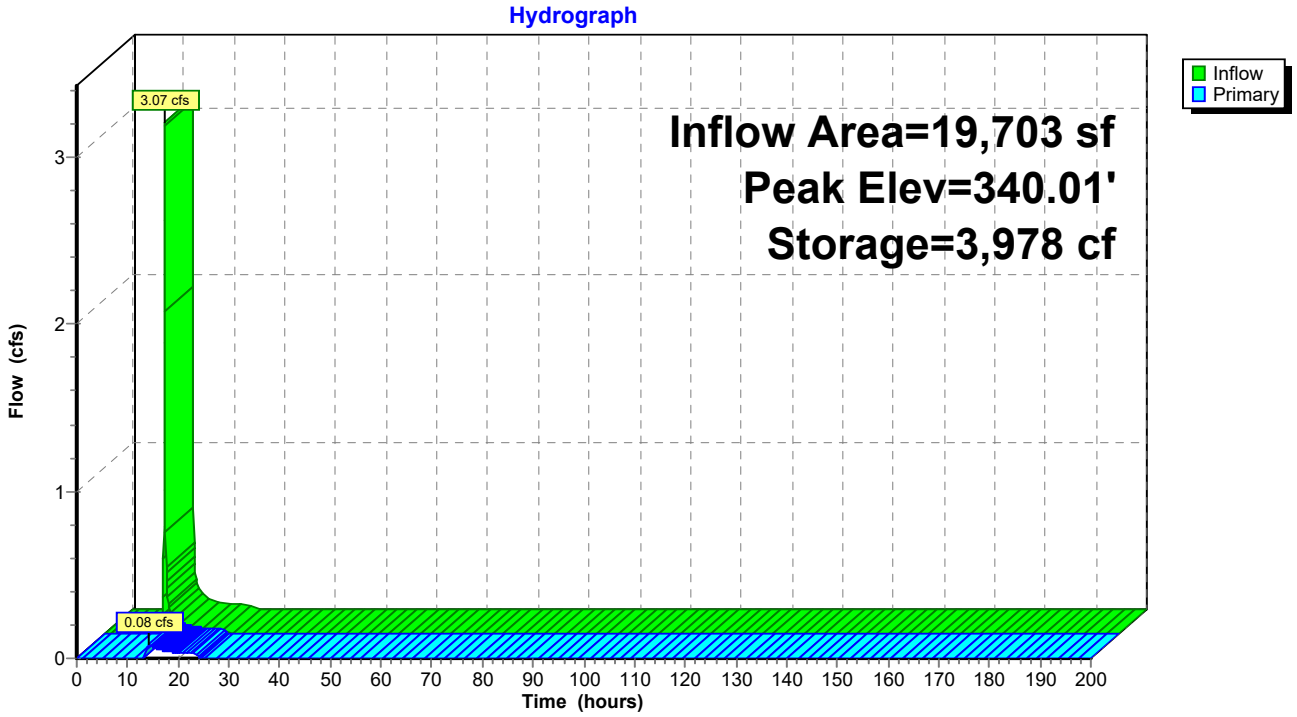
Volume	Invert	Avail.Storage	Storage Description
#1	338.00'	5,285 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
338.00	1,468	0	0
339.00	1,963	1,716	1,716
340.00	2,514	2,239	3,954
340.50	2,811	1,331	5,285

Device	Routing	Invert	Outlet Devices
#1	Primary	340.00'	**20.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.05 cfs @ 14.22 hrs HW=340.01' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.05 cfs @ 0.26 fps)

Pond 12P: (new Pond)



Summary for Link 8L:

Inflow Area = 388,287 sf, 21.50% Impervious, Inflow Depth = 0.54" for 100 YR event
Inflow = 1.11 cfs @ 12.67 hrs, Volume= 17,406 cf
Primary = 1.11 cfs @ 12.67 hrs, Volume= 17,406 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-200.00 hrs, dt= 0.05 hrs

Link 8L: