May 20, 2022

Matthew Marro – Conservation Agent
Winchendon Conservation Commission
Town Hall
109 Front Street, Dept 11
Winchendon, MA 01475

Subject: Former Mabardy Landfill, Winchendon, MA
Request to Amend the Order of Conditions
MassDEP File No. 345-0675
CEC Project 306-000

Dear Mr. Marro:

On behalf of 580 River Street LLC (the Applicant), Civil & Environmental Consultants, Inc. (CEC) is pleased to submit this Request to Amend the Order of Conditions (MassDEP File # 345-0675) with supporting information for the final closure of the former Mabardy Landfill located on River Street (Map 17 - Lot 42 and Map 17 – Lot 41) in Winchendon, Massachusetts (Site). This Request to Amend the Order of Conditions is submitted in accordance with the Massachusetts Wetlands Program Policy 85-4: Amended Orders and in accordance with Condition numbers 14 and 29 from the Order of Conditions that was issued for the project.

The Applicant submits this Request to Amend the Order of Conditions to incorporate modifications to the north stormwater basin design based on test pits performed upon commencement of the site work which revealed existing groundwater conditions were different than originally assumed in the design. Condition number 27 of the Order of Conditions that was issued for the project required that test pit investigations be performed within the areas of the proposed stormwater basins to confirm that the bottom of the proposed basin provides the minimum 2-foot separation from existing groundwater, in accordance with the Massachusetts Stormwater Management Standards.

Test pit excavations were performed by W.L. French Excavating Corporation (W.L. French) in December 2020. The excavations revealed that existing groundwater was at approximate elevation 857 feet (National Geodetic Vertical Datum of 1988 (NGVD88)) in the area of the north stormwater basin, which had a proposed base elevation of 850 feet NGVD88. Therefore, the proposed basin design did not meet the groundwater separation requirements outlined in the

Massachusetts Stormwater Management Standards. The Commission was originally notified of the test pit results in an email dated January 7, 2021, prepared by Langdon Environmental LLC.

This request for an Amended Order is reflected within the modified permit plans, and documents the modifications from the original approved permitted plans. The changes generally consist of re-grading the stormwater basin, revising the stormwater outlet structure, and adding an additional settlement basin prior to discharging stormwater off site. All of the proposed modifications are located outside of the wetland buffer zone and Riverfront areas. These modifications do not result in any adverse impacts on the interests protected by the Wetlands Protection Act, G.L. c. 131, § 30 (Act). To allow for the smooth operation of the permitting procedure and to avoid unnecessary and unproductive duplication of regulatory effort, we respectfully request that the Commission review the minor revisions as an Amendment to the Order of Conditions.

Proposed Modifications

The proposed modifications involve altering the layout and grading of the north basin. In order to provide the minimum separation of 2 feet to the existing groundwater level, the bottom of the north basin has been raised to an elevation of 860 feet, which roughly coincides with the elevation of the existing ground in the area and provides 3 feet of separation to existing groundwater elevations observed during excavation of the December 2020 test pits.

The previous design of the north basin provided sufficient depth such that stormwater collected within the basin was below the lowest elevation of the nearby edge of final cap. As a result of the base elevation of the north basin being raised under the proposed modifications, stormwater collected in the basin is at or above the elevation of the edge of nearby final cap. To prevent stormwater from ponding against the landfill final cap, the proposed modifications include the construction of a soil berm along the southern and western perimeter sides of the basin. The soil berm provides horizontal separation between the basin and the landfill to prevent the ponding of stormwater above and/or against the final cap.

The outlet control structure proposed for the modified north basin has been altered from the permitted design. The permitted outlet structure consisted of a concrete V-notch weir with an invert elevation of 853.75 feet. The proposed outlet structure consists of a vertical HDPE perforated standpipe with a single 24-inch diameter corrugated HDPE outlet culvert. The proposed standpipe is 36-inch diameter HDPE with five rows of 1-inch diameter perforations evenly spaced around the circumference of the standpipe. The invert of the lowest row of perforations is at elevation 862 feet. Stormwater will be conveyed through the 24-inch diameter corrugated HDPE outlet culvert to a stormwater outlet channel. The outlet channel will discharge stormwater into a new stilling basin, which will then discharge off-site to the wetlands located to the west of the

property. The discharge location is the same as previously permitted and there will be no increase in peak discharge off-site as compared to the currently permitted conditions.

As part of this design modification, an additional stilling basin is proposed to be added along the western limit of the property. Outflow from the north basin outlet channel will be directed to this stilling basin prior to discharging off-site. This basin will provide additional attenuation of peak flow prior to discharging off site, while also allowing an additional sedimentation settling area. The outlet for this stilling basin is a rip-rap weir that will discharge to the currently permitted outlet discharge location. Based on original test pits conducted as part of the original Corrective Action Design (CAD) Application, there appears to be no solid waste in the location of this additional stilling basin. However, the limit of final cover geosynthetics within this area is proposed to remain unchanged along the western limit of the Facility for continuity of the final cover system, and the basin will be constructed within the final cover system

Stormwater Analysis

The proposed stormwater modifications have been analyzed using the computer software program HydroCAD. This program analyzes site hydrology by the graphic peak discharge method documented in Technical Release No. 20 and Technical Release No. 55 published by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS).

The permitted conditions of the stormwater management system for the Facility were described in the 2019 CAD application and design plans. The pre-development and post-development peak stormwater discharge rates were presented in the Stormwater Management Report developed by Langdon Environmental, LLC, dated May 13, 2019, and included in the Notice of Intent (NOI) dated July 24, 2019 submitted to the Winchendon Conservation Commission and Massachusetts Department of Environmental Protection (MassDEP). The pre-development analysis represented the site conditions prior to any disturbances related to the acceptance of grading and shaping materials. The post-development analysis represented the site conditions upon final closure, including the installation of the final cap and establishment of stormwater conveyance and control structures. The pre- and post-development peak-stormwater discharge rates from the original design are included below in Table 1.

The stormwater analyses were performed for the 24-hour, 2-year, 10-year, 25-year, and 100-year design storm events in order to verify that there will be no increase in peak stormwater discharge rates a result of the proposed modifications as compared to pre-development flow rates. The rainfall depths used in the analysis are the same as those presented in the 2019 CAD application, and are based on data from the National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server for Milford Massachusetts for the storm events identified.

Detailed calculations are provided in Appendix A. The point of interest for the post-development conditions (the conditions as previously permitted and the conditions upon implementation of the proposed modifications) is the outlet of the channel that conveys stormwater discharge from the north basin. Summaries of the peak stormwater discharges from the new stilling basin prior to discharging off site at this same discharge location are provided in Table 1 below. As no changes are proposed to the south basin or to its contributing drainage areas, the peak discharge rates from the south basin do not change and the south basin was not included in this analysis.

Table 1: North Basin Stormwater Analysis

Storm Event	Permitted Pre-Development Peak Discharge Rates (cfs)	Permitted Post-Development Peak Discharge Rates (cfs)	Proposed Post-Development Peak Discharge Rates (cfs)
2-Year, 24-Hour Storm	22.22	0.96	0.56
10-Year, 24-Hour Storm	37.31	4.32	1.56
25-Year, 24-Hour Storm	49.19	9.82	2.92
100-Year, 24-Hour Storm	73.24	26.83	26.81

As shown in Table 1, the peak discharge rates from the Facility do not increase as a result of the proposed modifications.

Summary

The existing resource areas located on and adjacent to the property include Bordering Vegetated Wetlands and a Riverfront Area. The overall limits of work will continue to be located on the same parcels of land included on the original Notice of Intent and the overall limits of disturbance for the project will not change. The changes do not affect the overall drainage patterns at the Site, and the originally designed drainage system will continue to function as designed.

Pursuant to Massachusetts Wetlands Program Policy 85-4: Amended Orders, an Amended Order of Conditions is appropriate if the purpose of the project has not changed, the scope of the project has not increased, if the project meets relevant performance standards, and if the potential for adverse impacts to the protected statutory interests will be not increased. Indeed, changes which result in the same or decreased impact on the interests protected by the Act are appropriate for amendments. By every measure, the proposed changes meet this criteria.

The proposed design achieves the goals of the Applicant, while being sensitive to adjacent regulated resource areas. Accordingly, the Applicant respectfully requests that the Conservation Commission find that the proposed design is adequately protective of the interests identified in the Act and issue an Amended Order of Conditions approving the project as described in this letter and as shown on the attached Plans.

We respectfully request that you place this matter on your next available agenda for the Public Hearing. Please contact us at (774) 501-2176 or via email at pshamoian@cecinc.com if you have any questions. Thank you for your consideration of this matter.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Paul J. Shamoian, P.E.
Project Manager

Amy J. Knight, P.E.
Principal

Attachments: Appendix A - Revised HydroCAD analysis
Appendix B - Revised Plans

Cc: MassDEP – Central Region

NORTH

PERMITTED LOCATION OF STORMWATER CHANNEL OUTLET

TIME OF CONCENTRATION (T_C) PATH (TYP.)

PERMITTED LOCATION STORMWATER SWALE ON FINAL CAP (SLOPE = 0.015 FT./FT.)(TYP.)

3
4.42
74

5
0.42
74

1
2.28
74

2A
1.19
74

4
3.02
74

2B
4.30
70

PERMITTED LOCATION OF RIP-RAP DOWNCHUTE

NORTH STORMWATER BASIN

PERMITTED LOCATION OF RIP-RAP DOWNCHUTE

PROPOSED STORMWATER SWALE ON CAP

SCALE IN FEET
0 100 200

LEGEND

- EXISTING SUBJECT PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- PERMITTED LIMIT OF FINAL CAP
- EXISTING INDEX (MAJOR) CONTOUR
- EXISTING INTERMEDIATE (MINOR) CONTOUR
- SUBCATCHMENT BOUNDARY
- TIME OF CONCENTRATION (T_C) PATH

4
0.66
74

- SUBCATCHMENT IDENTIFICATION
- SUBCATCHMENT AREA (ACRES)
- WEIGHTED CURVE NUMBER

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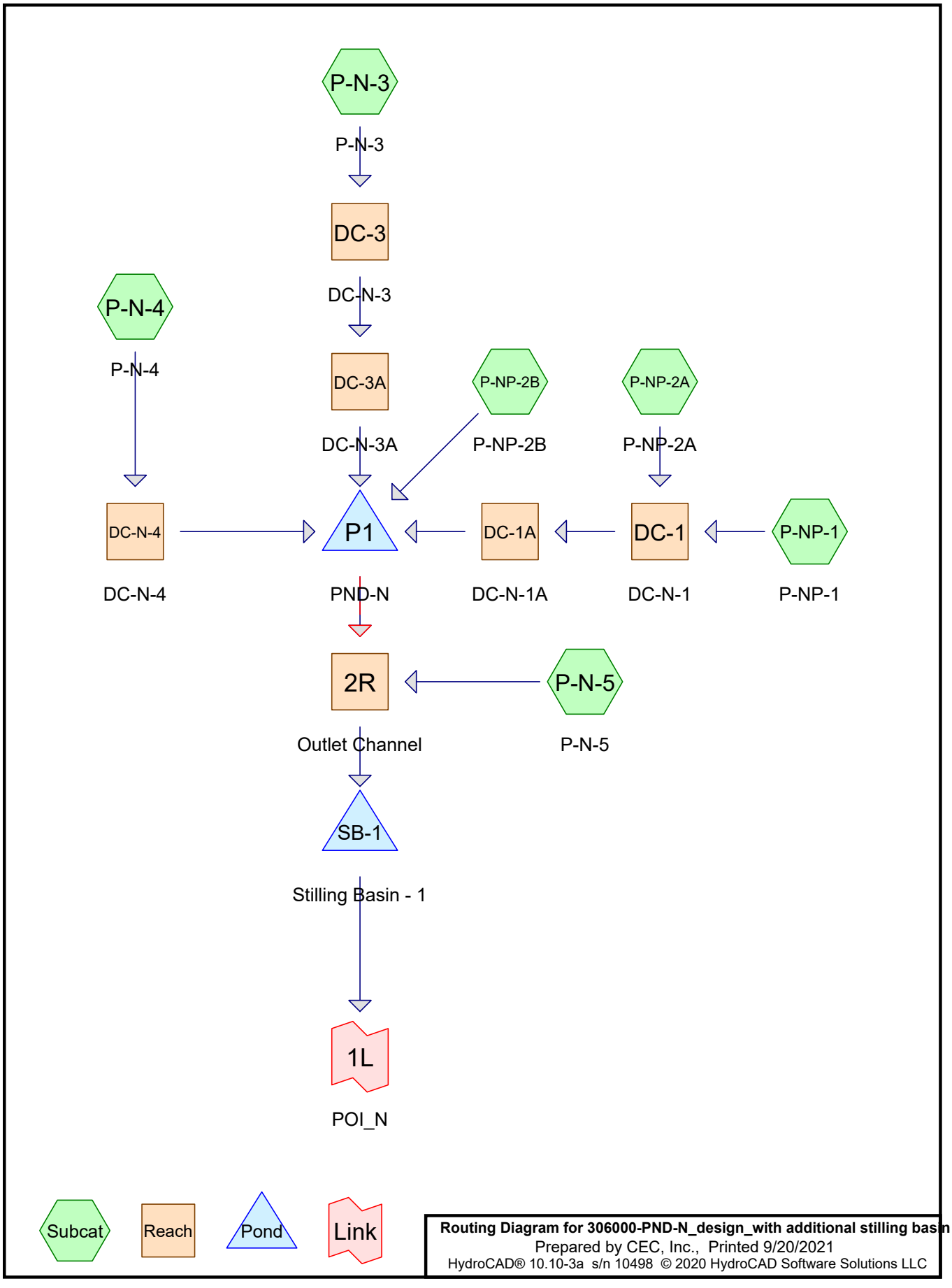
www.cecinc.com

W.L. FRENCH EXCAVATING CORPORATION
PERMIT MODIFICATION
FORMER MABARDY LANDFILL
WINCHENDON, MASSACHUSETTS

DRAINAGE AREAS MAP

DRAWN BY:	KFH	CHECKED BY:	PJS	APPROVED BY:	PJS	FIGURE NO.:
DATE:	SEPTEMBER 2021	DWG SCALE:	1"=100'	PROJECT NO:	306-000	HYD-1

P:\300-000\306-000\-CADD\Dwg\SW01 - North Pond Redesign\306000-SW01-SP2-1_HYD-P-Drainage Area Map.dwg{LAYOUT1} LS:(9/20/2021 - pshamoian) - LP: 9/20/2021 4:45 PM



Routing Diagram for 306000-PND-N_design_with additional stilling basin

Prepared by CEC, Inc., Printed 9/20/2021

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr 24-hr	Type III 24-hr		Default	24.00	1	3.20	2
2	10-yr 24-hr	Type III 24-hr		Default	24.00	1	4.84	2
3	25-yr 24-hr	Type III 24-hr		Default	24.00	1	6.14	2
4	100-yr 24-hr	Type III 24-hr		Default	24.00	1	8.80	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
12.460	74	>75% Grass cover, Good, HSG C (P-N-3, P-N-4, P-N-5, P-NP-1, P-NP-2A, P-NP-2B)
0.198	85	Gravel Road (P-NP-2B)
0.963	98	North Pond (P-NP-2B)
2.558	57	Woods/grass comb., Poor, HSG A (P-NP-2B)
16.178	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.558	HSG A	P-NP-2B
0.000	HSG B	
12.460	HSG C	P-N-3, P-N-4, P-N-5, P-NP-1, P-NP-2A, P-NP-2B
0.000	HSG D	
1.160	Other	P-NP-2B
16.178		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	12.460	0.000	0.000	12.460	>75% Grass cover, Good	P-N-3, P-N-4, P-N-5, P-NP-1, P-NP-2A, P-NP-2B
0.000	0.000	0.000	0.000	0.198	0.198	Gravel Road	P-NP-2B
0.000	0.000	0.000	0.000	0.963	0.963	North Pond	P-NP-2B
2.558	0.000	0.000	0.000	0.000	2.558	Woods/grass comb., Poor	P-NP-2B
2.558	**0.000**	**12.460**	**0.000**	**1.160**	**16.178**	**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	P1	860.00	859.00	60.0	0.0167	0.013	24.0	0.0	0.0

Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-N-3: P-N-3 Runoff Area=205,200 sf 0.00% Impervious Runoff Depth=1.04"
Flow Length=1,188' Tc=10.6 min CN=74 Runoff=4.60 cfs 0.407 af

Subcatchment P-N-4: P-N-4 Runoff Area=131,400 sf 0.00% Impervious Runoff Depth=1.04"
Flow Length=888' Tc=9.0 min CN=74 Runoff=3.08 cfs 0.261 af

Subcatchment P-N-5: P-N-5 Runoff Area=15,586 sf 0.00% Impervious Runoff Depth=1.04"
Flow Length=35' Slope=0.0250 '/' Tc=5.6 min CN=74 Runoff=0.41 cfs 0.031 af

Subcatchment P-NP-1: P-NP-1 Runoff Area=113,832 sf 0.00% Impervious Runoff Depth=1.04"
Flow Length=835' Tc=6.9 min CN=74 Runoff=2.88 cfs 0.226 af

Subcatchment P-NP-2A: P-NP-2A Runoff Area=51,529 sf 0.00% Impervious Runoff Depth=1.04"
Flow Length=485' Tc=6.3 min CN=74 Runoff=1.33 cfs 0.102 af

Subcatchment P-NP-2B: P-NP-2B Runoff Area=187,165 sf 22.40% Impervious Runoff Depth=0.83"
Flow Length=340' Tc=15.6 min CN=70 Runoff=2.74 cfs 0.297 af

Reach 2R: Outlet Channel Avg. Flow Depth=0.06' Max Vel=1.60 fps Inflow=0.56 cfs 1.317 af
n=0.022 L=150.0' S=0.0267 '/' Capacity=80.50 cfs Outflow=0.56 cfs 1.317 af

Reach DC-1: DC-N-1 Avg. Flow Depth=0.28' Max Vel=3.97 fps Inflow=4.21 cfs 0.328 af
n=0.051 L=65.0' S=0.1385 '/' Capacity=214.24 cfs Outflow=4.15 cfs 0.328 af

Reach DC-1A: DC-N-1A Avg. Flow Depth=0.36' Max Vel=2.77 fps Inflow=4.15 cfs 0.328 af
n=0.051 L=40.0' S=0.0500 '/' Capacity=128.74 cfs Outflow=4.09 cfs 0.328 af

Reach DC-3: DC-N-3 Avg. Flow Depth=0.23' Max Vel=5.37 fps Inflow=4.60 cfs 0.407 af
n=0.051 L=84.0' S=0.3095 '/' Capacity=320.32 cfs Outflow=4.56 cfs 0.407 af

Reach DC-3A: DC-N-3A Avg. Flow Depth=0.30' Max Vel=3.93 fps Inflow=4.56 cfs 0.407 af
n=0.051 L=32.0' S=0.1250 '/' Capacity=203.56 cfs Outflow=4.54 cfs 0.407 af

Reach DC-N-4: DC-N-4 Avg. Flow Depth=0.20' Max Vel=4.23 fps Inflow=3.08 cfs 0.261 af
n=0.051 L=171.0' S=0.2222 '/' Capacity=271.42 cfs Outflow=3.03 cfs 0.261 af

Pond P1: PND-N Peak Elev=863.03' Storage=106,078 cf Inflow=13.70 cfs 1.293 af
Primary=0.55 cfs 1.286 af Secondary=0.00 cfs 0.000 af Outflow=0.55 cfs 1.286 af

Pond SB-1: Stilling Basin - 1 Peak Elev=857.06' Storage=0.019 af Inflow=0.56 cfs 1.317 af
Outflow=0.56 cfs 1.298 af

Link 1L: POI_N Inflow=0.56 cfs 1.298 af
Primary=0.56 cfs 1.298 af

Total Runoff Area = 16.178 ac Runoff Volume = 1.324 af Average Runoff Depth = 0.98"
94.05% Pervious = 15.215 ac 5.95% Impervious = 0.963 ac

Summary for Subcatchment P-N-3: P-N-3

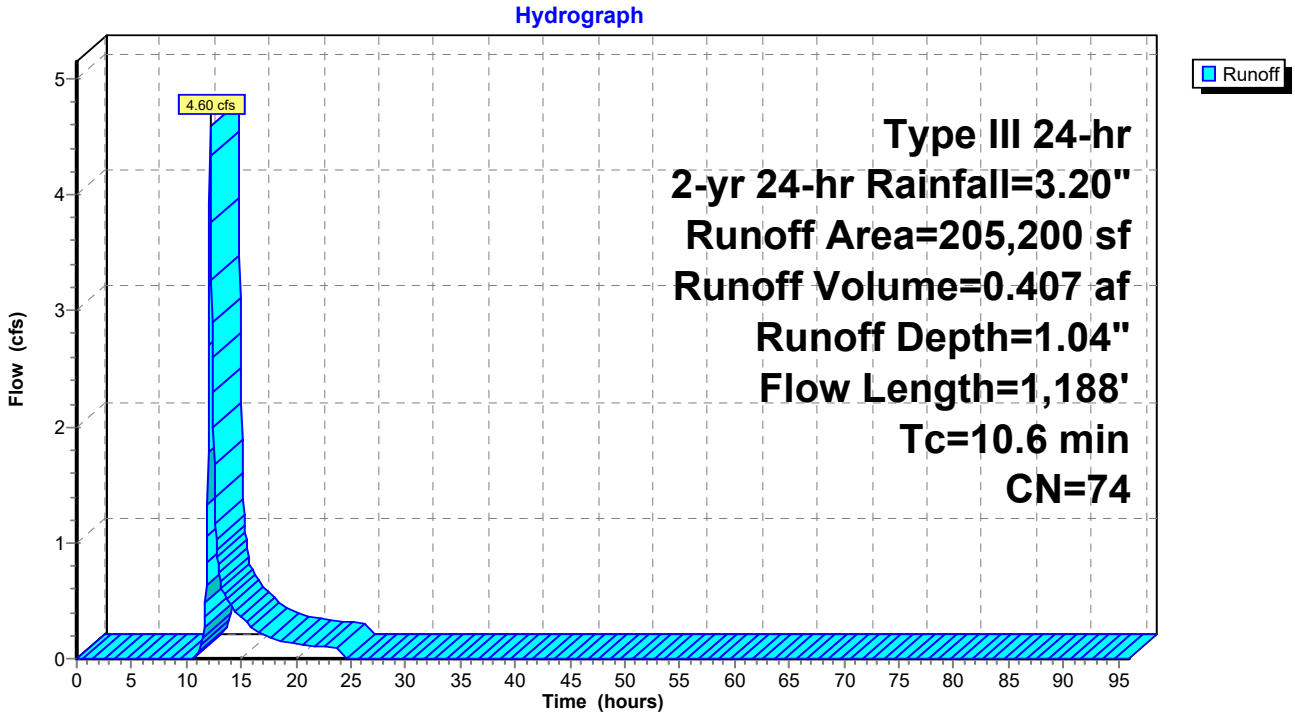
Runoff = 4.60 cfs @ 12.16 hrs, Volume= 0.407 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr 24-hr Rainfall=3.20"

Area (sf)	CN	Description
205,200	74	>75% Grass cover, Good, HSG C
205,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
4.2	1,110	0.0090	4.36	34.90	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030
10.6	1,188	Total			

Subcatchment P-N-3: P-N-3



Summary for Subcatchment P-N-4: P-N-4

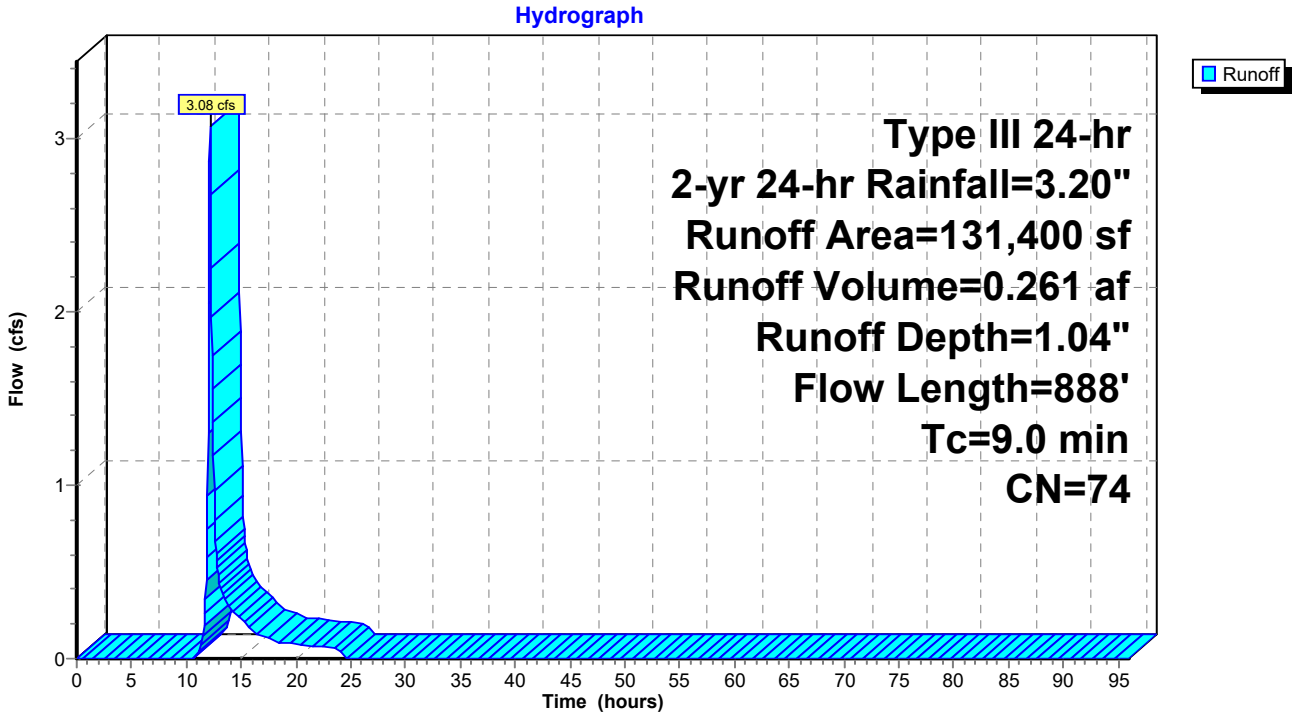
Runoff = 3.08 cfs @ 12.14 hrs, Volume= 0.261 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr 24-hr Rainfall=3.20"

Area (sf)	CN	Description
131,400	74	>75% Grass cover, Good, HSG C
131,400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
1.8	250	0.1040	2.26		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.2	600	0.0330	8.35	66.83	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
9.0	888	Total			

Subcatchment P-N-4: P-N-4



Summary for Subcatchment P-N-5: P-N-5

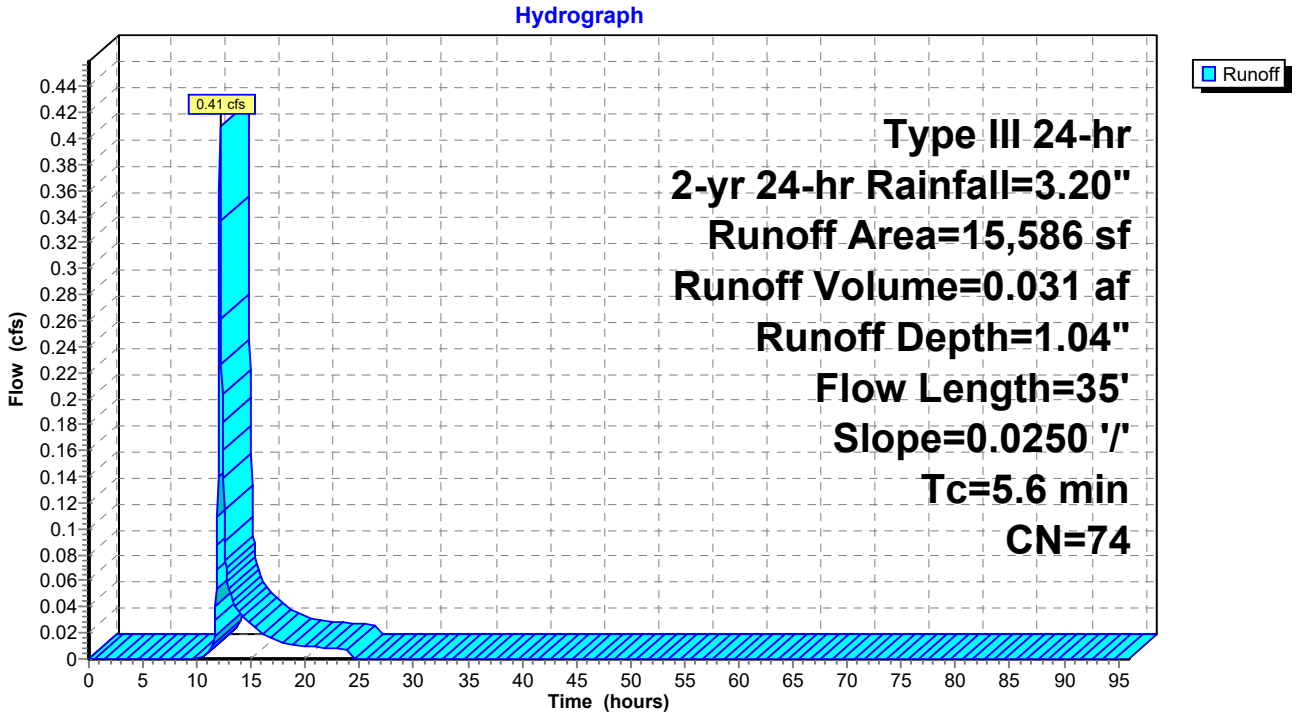
Runoff = 0.41 cfs @ 12.10 hrs, Volume= 0.031 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr 24-hr Rainfall=3.20"

Area (sf)	CN	Description
15,586	74	>75% Grass cover, Good, HSG C
15,586		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"

Subcatchment P-N-5: P-N-5



Summary for Subcatchment P-NP-1: P-NP-1

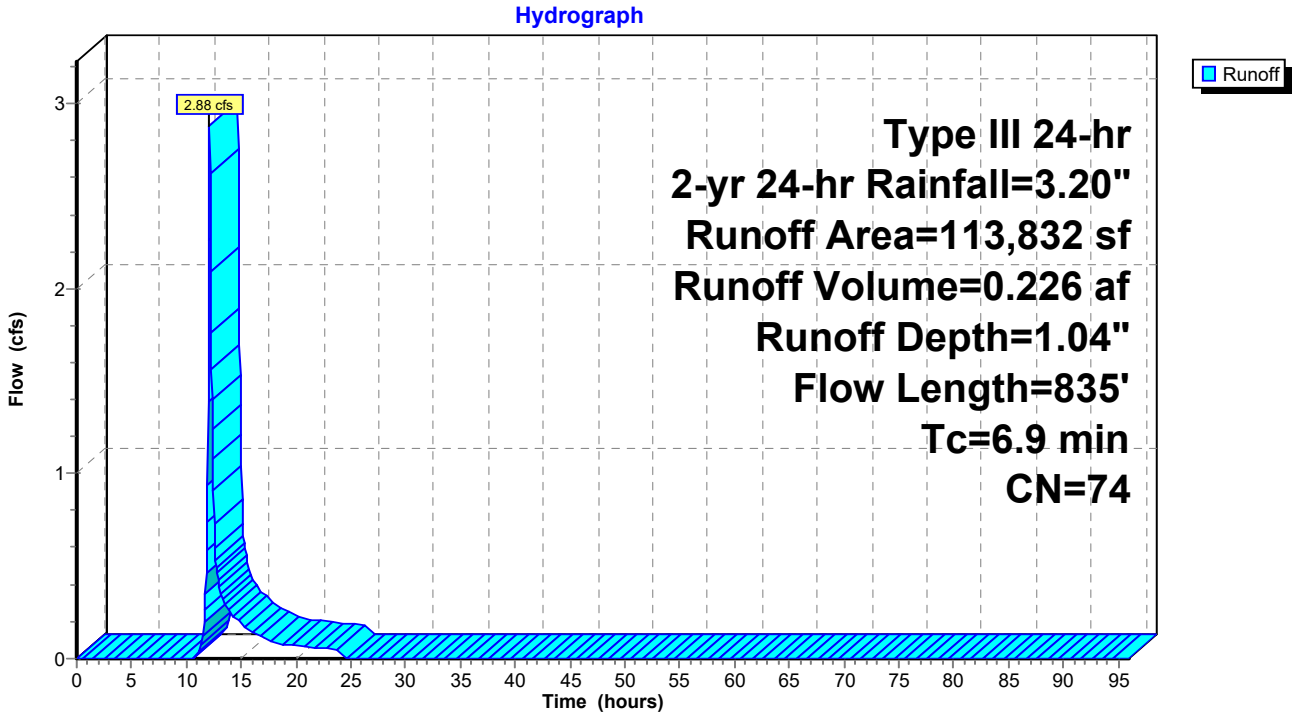
Runoff = 2.88 cfs @ 12.11 hrs, Volume= 0.226 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr 24-hr Rainfall=3.20"

Area (sf)	CN	Description
113,832	74	>75% Grass cover, Good, HSG C
113,832		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
2.2	770	0.0156	5.74	45.95	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.9	835	Total			

Subcatchment P-NP-1: P-NP-1



Summary for Subcatchment P-NP-2A: P-NP-2A

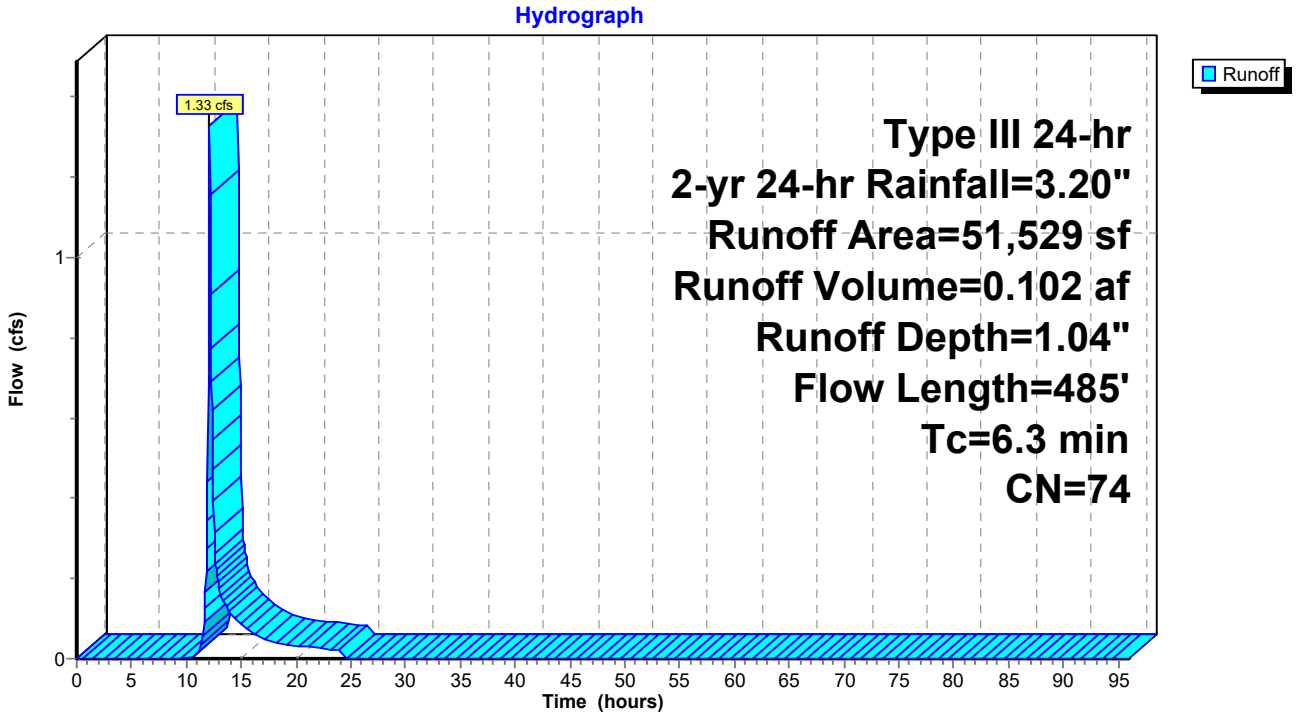
Runoff = 1.33 cfs @ 12.10 hrs, Volume= 0.102 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr 24-hr Rainfall=3.20"

Area (sf)	CN	Description
51,529	74	>75% Grass cover, Good, HSG C
51,529		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.6	420	0.0095	4.48	35.85	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.3	485	Total			

Subcatchment P-NP-2A: P-NP-2A



Summary for Subcatchment P-NP-2B: P-NP-2B

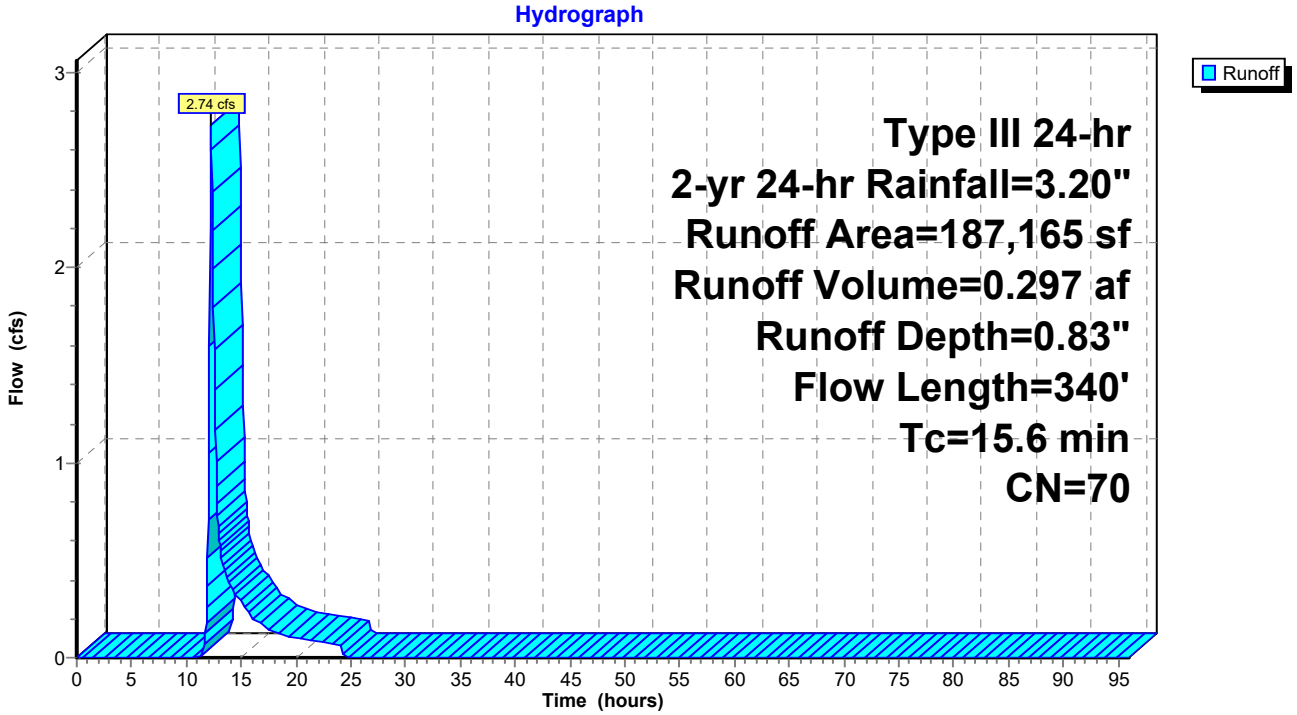
Runoff = 2.74 cfs @ 12.25 hrs, Volume= 0.297 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr 24-hr Rainfall=3.20"

	Area (sf)	CN	Description
	25,195	74	>75% Grass cover, Good, HSG C
	111,432	57	Woods/grass comb., Poor, HSG A
*	41,933	98	North Pond
*	8,605	85	Gravel Road
	187,165	70	Weighted Average
	145,232		77.60% Pervious Area
	41,933		22.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0250	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
2.6	240	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
15.6	340	Total			

Subcatchment P-NP-2B: P-NP-2B



Summary for Reach 2R: Outlet Channel

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 0.98" for 2-yr 24-hr event
Inflow = 0.56 cfs @ 17.47 hrs, Volume= 1.317 af
Outflow = 0.56 cfs @ 17.51 hrs, Volume= 1.317 af, Atten= 0%, Lag= 2.5 min

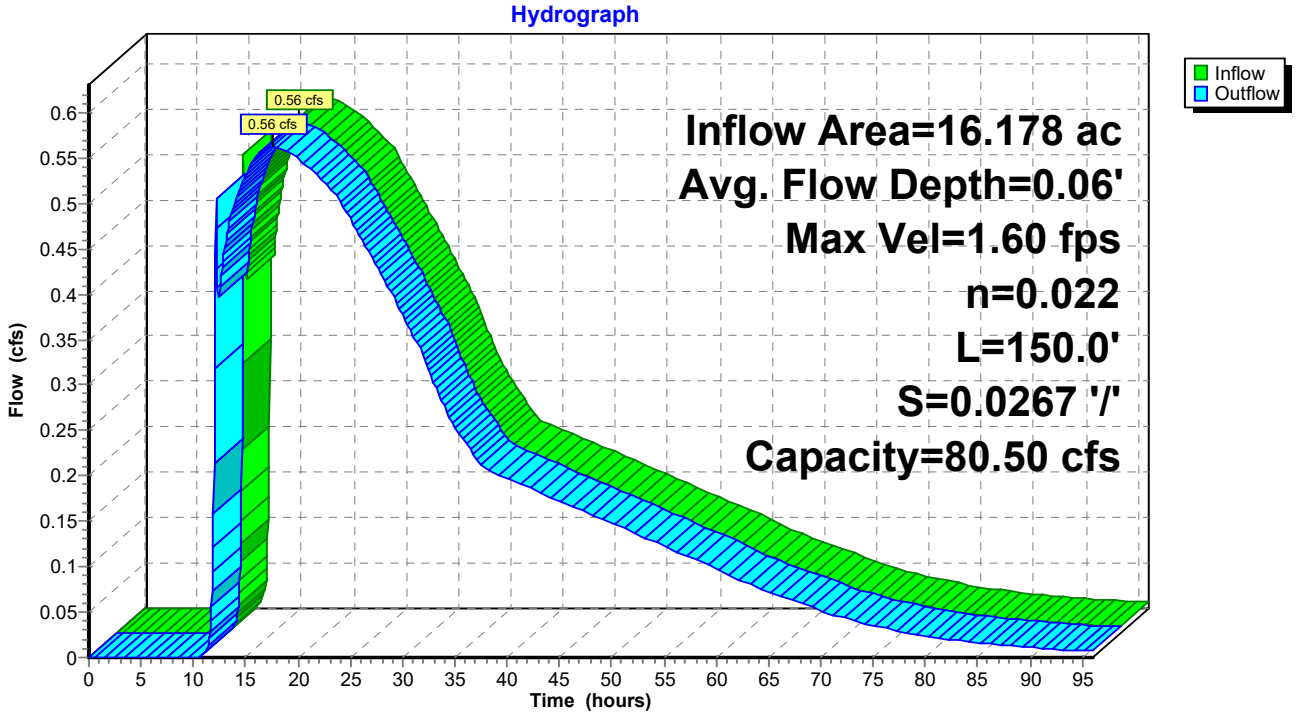
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.60 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 2.7 min

Peak Storage= 53 cf @ 17.48 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 6.34'
Bank-Full Depth= 1.00' Flow Area= 9.0 sf, Capacity= 80.50 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 12.00'
Length= 150.0' Slope= 0.0267 '/'
Inlet Invert= 858.00', Outlet Invert= 854.00'

‡

Reach 2R: Outlet Channel



Summary for Reach DC-1: DC-N-1

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2-yr 24-hr event
Inflow = 4.21 cfs @ 12.11 hrs, Volume= 0.328 af
Outflow = 4.15 cfs @ 12.12 hrs, Volume= 0.328 af, Atten= 1%, Lag= 0.4 min

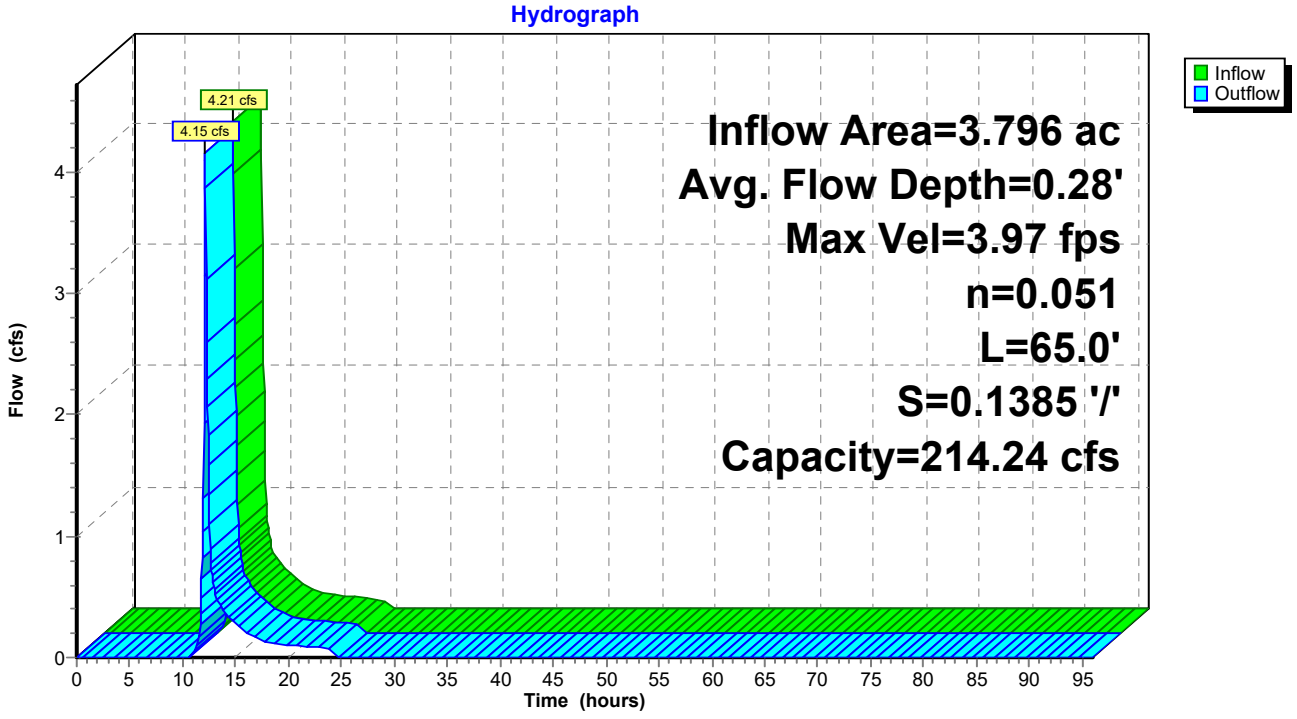
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.97 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.36 fps, Avg. Travel Time= 0.8 min

Peak Storage= 69 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 4.66'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 214.24 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 65.0' Slope= 0.1385 '/'
Inlet Invert= 876.00', Outlet Invert= 867.00'

‡

Reach DC-1: DC-N-1



Summary for Reach DC-1A: DC-N-1A

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2-yr 24-hr event
Inflow = 4.15 cfs @ 12.12 hrs, Volume= 0.328 af
Outflow = 4.09 cfs @ 12.12 hrs, Volume= 0.328 af, Atten= 1%, Lag= 0.4 min

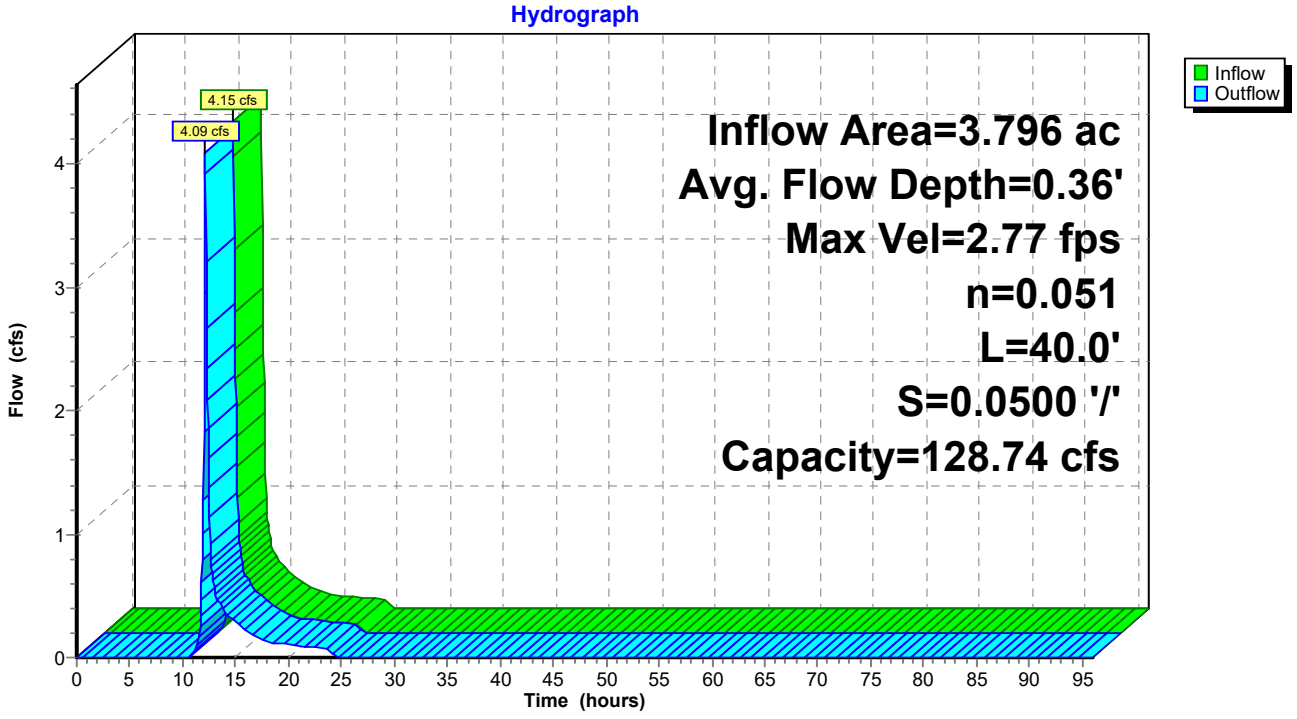
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.77 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 0.7 min

Peak Storage= 59 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 5.18'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 128.74 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 40.0' Slope= 0.0500 '/'
Inlet Invert= 867.00', Outlet Invert= 865.00'

‡

Reach DC-1A: DC-N-1A



Summary for Reach DC-3: DC-N-3

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2-yr 24-hr event
Inflow = 4.60 cfs @ 12.16 hrs, Volume= 0.407 af
Outflow = 4.56 cfs @ 12.17 hrs, Volume= 0.407 af, Atten= 1%, Lag= 0.4 min

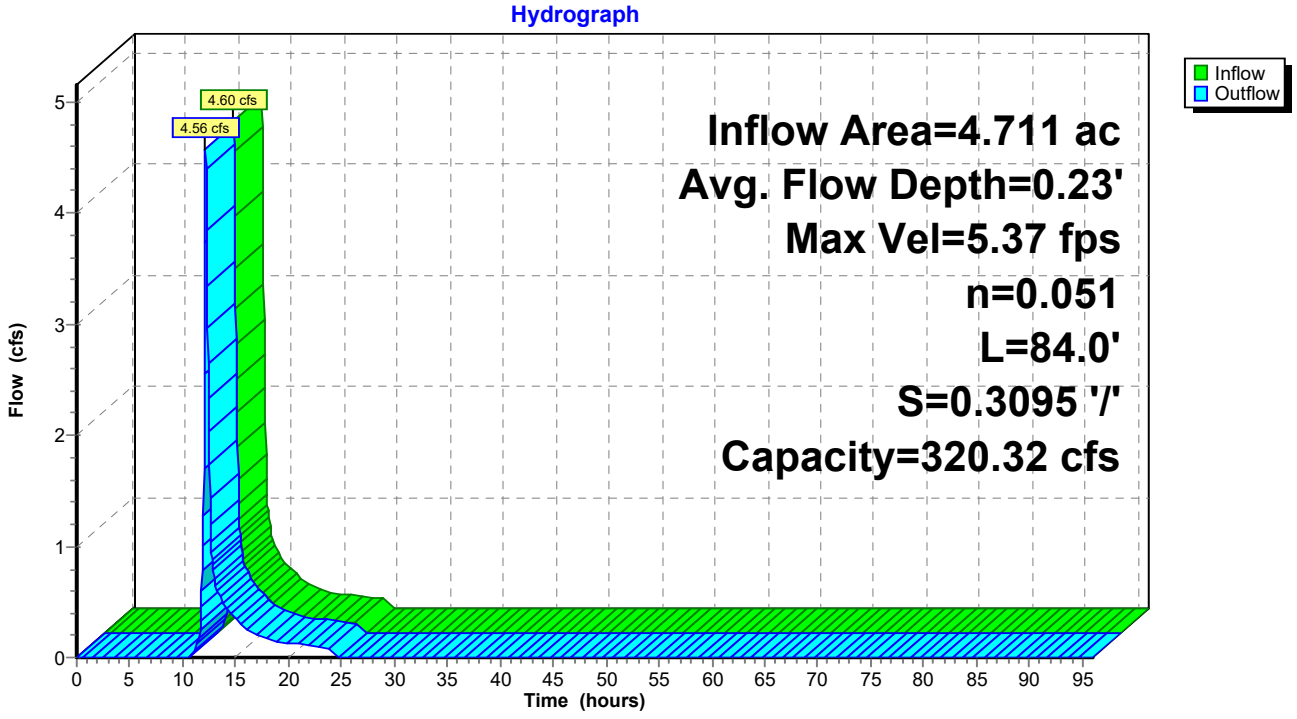
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.37 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.90 fps, Avg. Travel Time= 0.7 min

Peak Storage= 72 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 4.39'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 320.32 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 84.0' Slope= 0.3095 '/'
Inlet Invert= 896.00', Outlet Invert= 870.00'

‡

Reach DC-3: DC-N-3



Summary for Reach DC-3A: DC-N-3A

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2-yr 24-hr event
Inflow = 4.56 cfs @ 12.17 hrs, Volume= 0.407 af
Outflow = 4.54 cfs @ 12.17 hrs, Volume= 0.407 af, Atten= 0%, Lag= 0.2 min

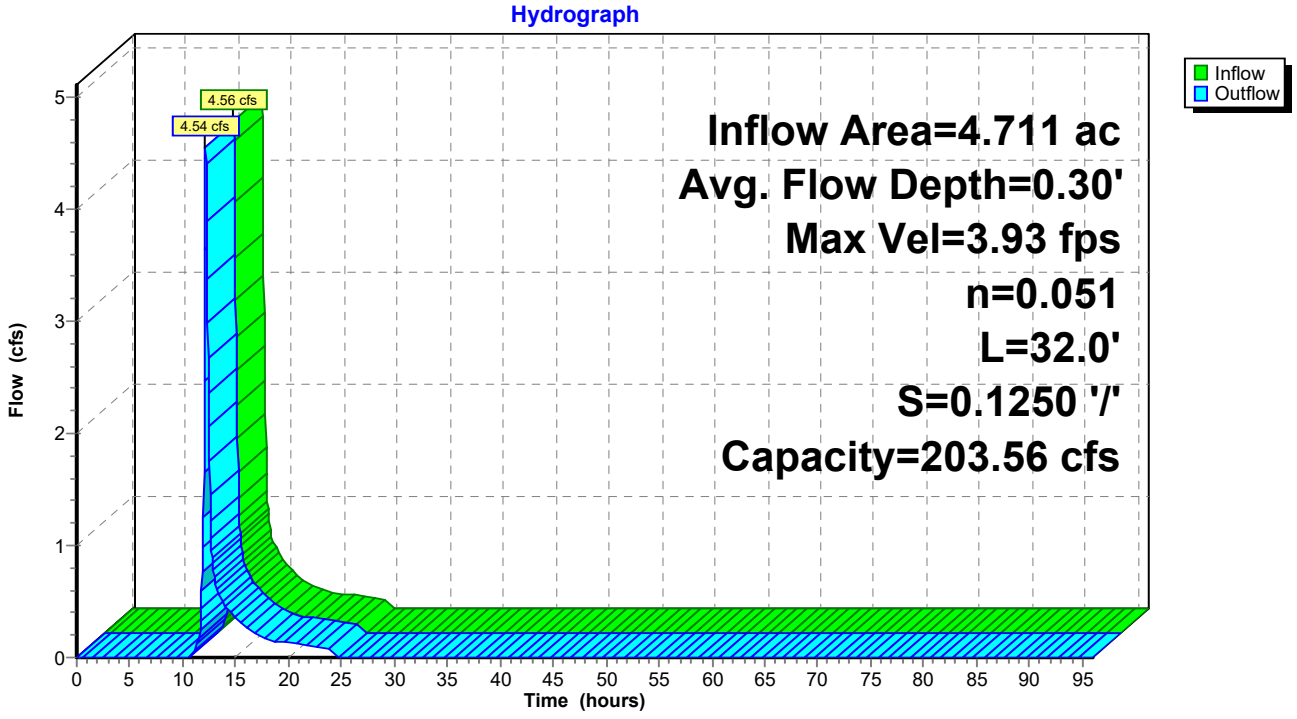
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.93 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.41 fps, Avg. Travel Time= 0.4 min

Peak Storage= 37 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 4.78'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 203.56 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 32.0' Slope= 0.1250 '/'
Inlet Invert= 870.00', Outlet Invert= 866.00'

‡

Reach DC-3A: DC-N-3A



Summary for Reach DC-N-4: DC-N-4

Inflow Area = 3.017 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2-yr 24-hr event
Inflow = 3.08 cfs @ 12.14 hrs, Volume= 0.261 af
Outflow = 3.03 cfs @ 12.16 hrs, Volume= 0.261 af, Atten= 2%, Lag= 1.2 min

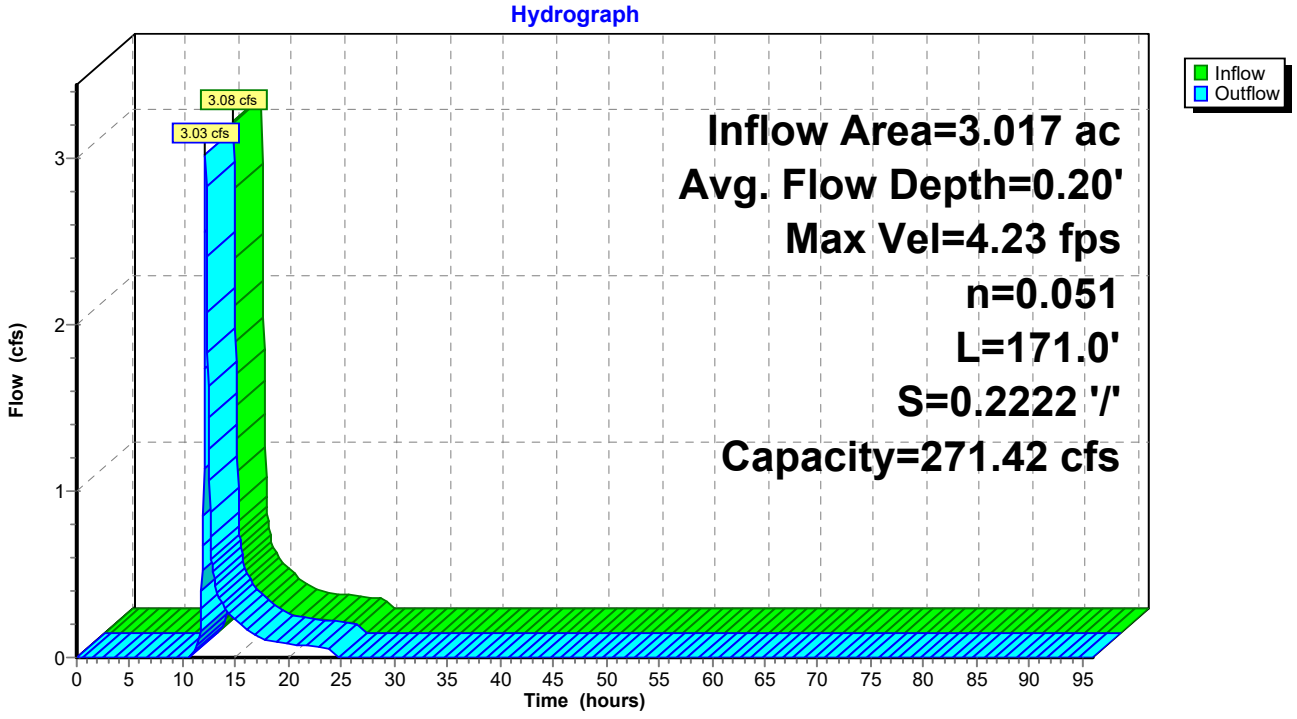
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.23 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.45 fps, Avg. Travel Time= 2.0 min

Peak Storage= 125 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 4.21'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 271.42 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 171.0' Slope= 0.2222 '/'
Inlet Invert= 914.00', Outlet Invert= 876.00'

‡

Reach DC-N-4: DC-N-4



Summary for Pond P1: PND-N

Inflow Area = 15.820 ac, 6.08% Impervious, Inflow Depth = 0.98" for 2-yr 24-hr event
Inflow = 13.70 cfs @ 12.16 hrs, Volume= 1.293 af
Outflow = 0.55 cfs @ 17.83 hrs, Volume= 1.286 af, Atten= 96%, Lag= 340.0 min
Primary = 0.55 cfs @ 17.83 hrs, Volume= 1.286 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Starting Elev= 862.00' Surf.Area= 35,753 sf Storage= 68,544 cf
Peak Elev= 863.03' @ 17.83 hrs Surf.Area= 37,348 sf Storage= 106,078 cf (37,534 cf above start)
Flood Elev= 867.00' Surf.Area= 43,936 sf Storage= 267,199 cf (198,655 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1,091.5 min (1,962.0 - 870.5)

Volume	Invert	Avail.Storage	Storage Description
#1	860.00'	312,031 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

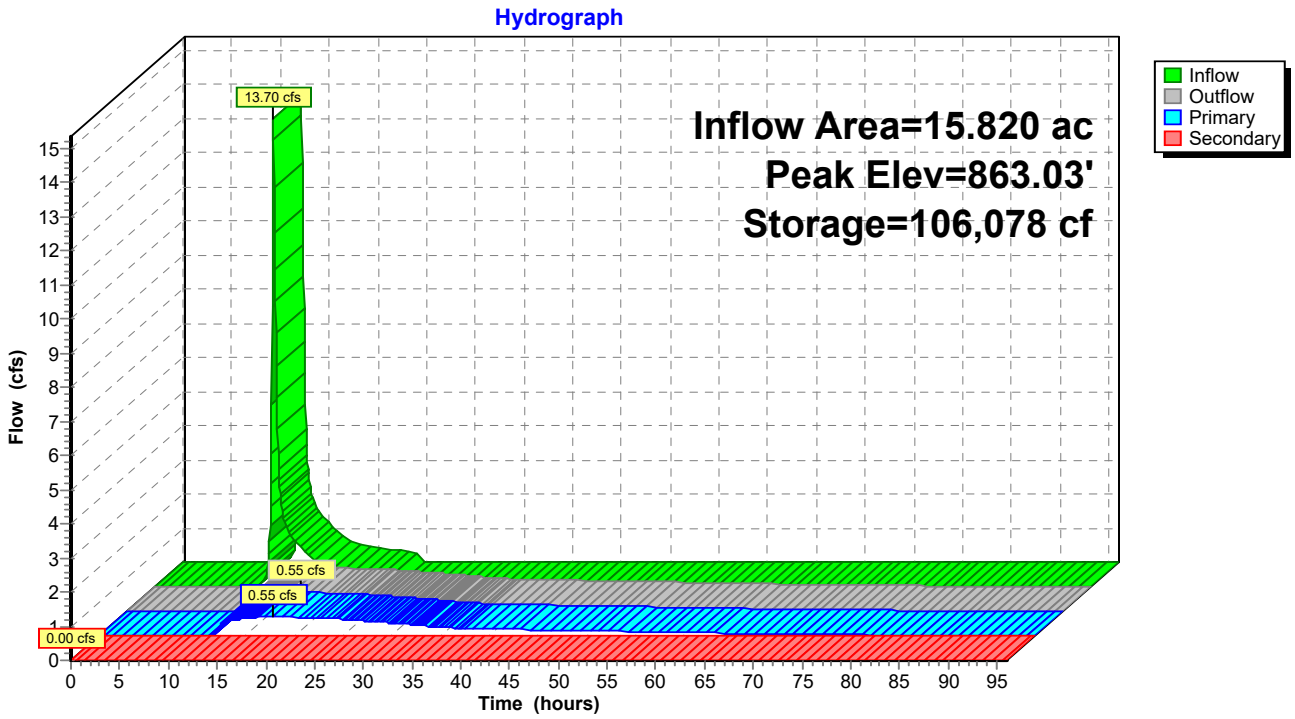
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.00	32,791	0	0
862.00	35,753	68,544	68,544
864.00	38,860	74,613	143,157
866.00	42,143	81,003	224,160
868.00	45,728	87,871	312,031

Device	Routing	Invert	Outlet Devices
#1	Primary	860.00'	**24.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 860.00' / 859.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	862.00'	**1.0" Vert. Orifice/Grate X 12.00 columns** X 5 rows with 6.0" cc spacing C= 0.600 Limited to weir flow at low heads
#3	Device 1	865.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	866.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.54 cfs @ 17.83 hrs HW=863.03' (Free Discharge)
└**1=Culvert** (Passes 0.54 cfs of 21.54 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.54 cfs @ 3.64 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=862.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: PND-N


Hydrograph
Inflow Area=15.820 ac
Peak Elev=863.03'
Storage=106,078 cf
Inflow
Outflow
Primary
Secondary
13.70 cfs
0.55 cfs
0.55 cfs
0.00 cfs
Flow (cfs)
Time (hours)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Summary for Pond SB-1: Stilling Basin - 1

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 0.98" for 2-yr 24-hr event
Inflow = 0.56 cfs @ 17.51 hrs, Volume= 1.317 af
Outflow = 0.56 cfs @ 17.52 hrs, Volume= 1.298 af, Atten= 0%, Lag= 0.8 min
Primary = 0.56 cfs @ 17.52 hrs, Volume= 1.298 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Peak Elev= 857.06' @ 17.52 hrs Surf.Area= 0.014 ac Storage= 0.019 af

Plug-Flow detention time= 64.4 min calculated for 1.298 af (99% of inflow)
Center-of-Mass det. time= 18.4 min (1,958.0 - 1,939.6)

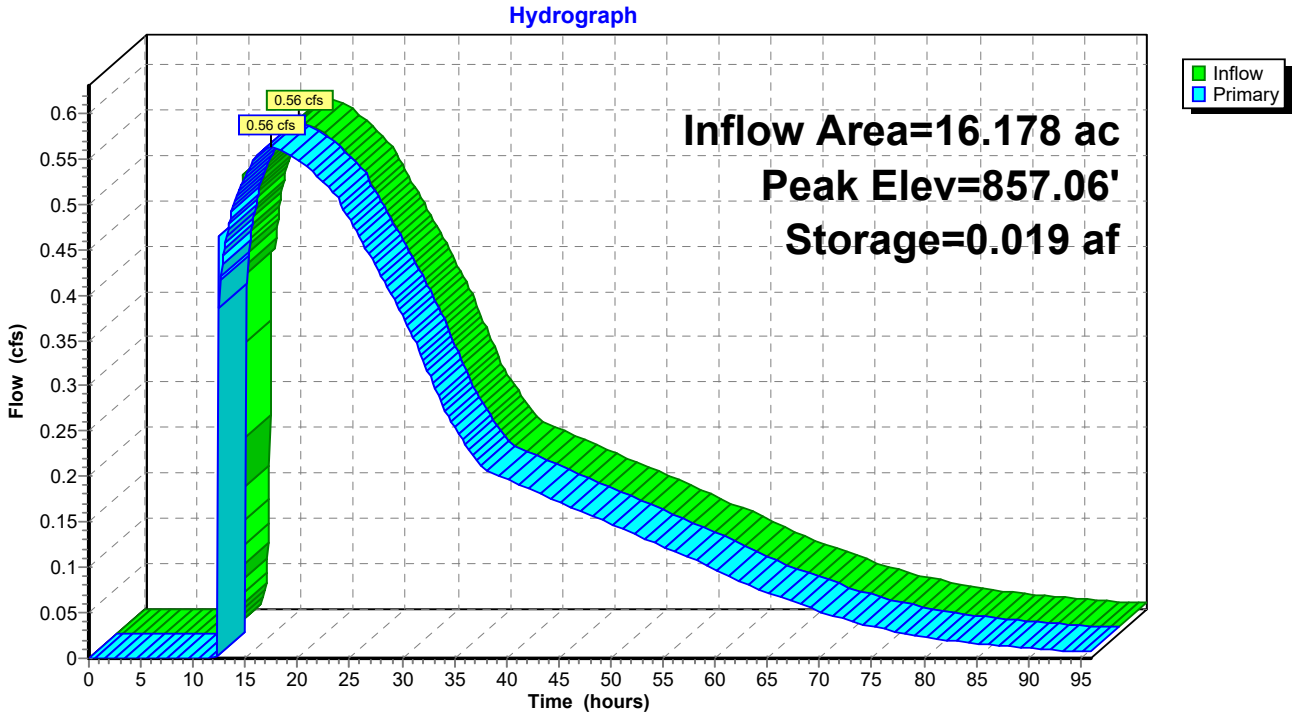
Volume	Invert	Avail.Storage	Storage Description
#1	854.00'	0.044 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
854.00	0.002	0.000	0.000
856.00	0.007	0.009	0.009
857.00	0.012	0.010	0.019
858.00	0.038	0.025	0.044

Device	Routing	Invert	Outlet Devices
#1	Primary	857.00'	**15.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.54 cfs @ 17.52 hrs HW=857.06' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.54 cfs @ 0.59 fps)

Pond SB-1: Stilling Basin - 1

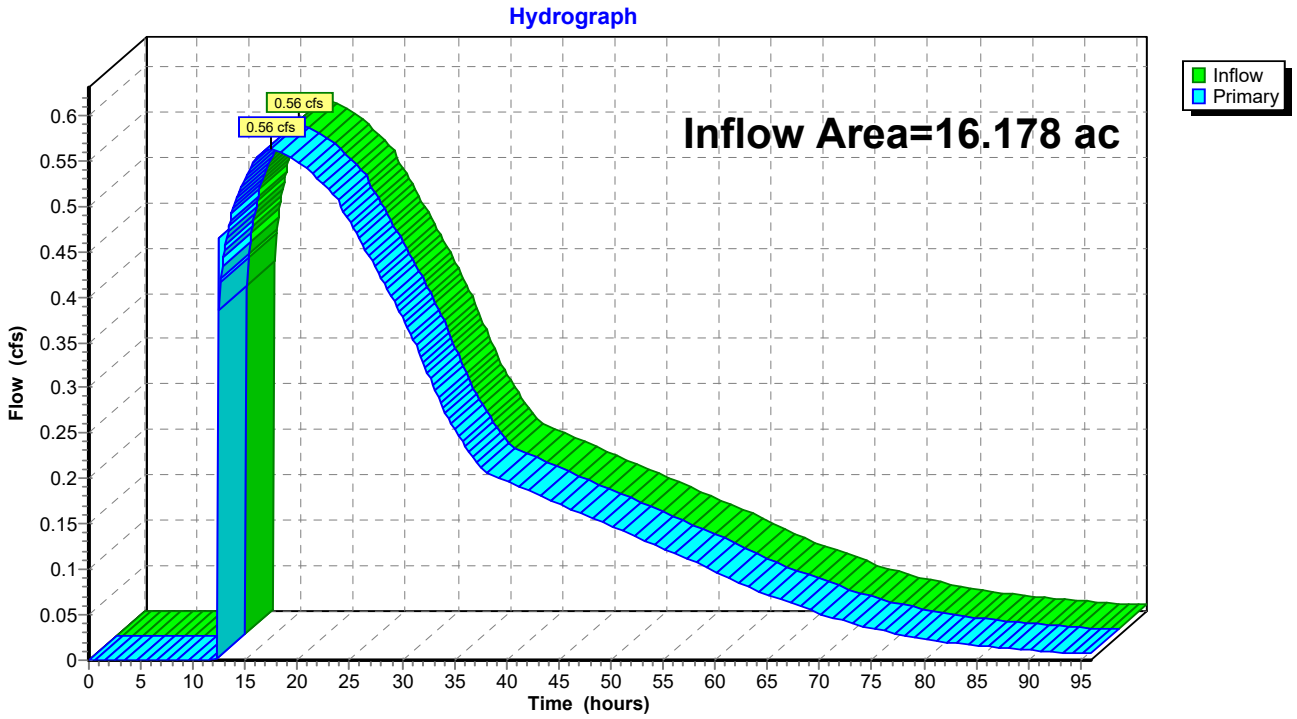


Summary for Link 1L: POI_N

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 0.96" for 2-yr 24-hr event
Inflow = 0.56 cfs @ 17.52 hrs, Volume= 1.298 af
Primary = 0.56 cfs @ 17.52 hrs, Volume= 1.298 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 1L: POI_N



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-N-3: P-N-3 Runoff Area=205,200 sf 0.00% Impervious Runoff Depth=2.24"
Flow Length=1,188' Tc=10.6 min CN=74 Runoff=10.42 cfs 0.878 af

Subcatchment P-N-4: P-N-4 Runoff Area=131,400 sf 0.00% Impervious Runoff Depth=2.24"
Flow Length=888' Tc=9.0 min CN=74 Runoff=6.96 cfs 0.562 af

Subcatchment P-N-5: P-N-5 Runoff Area=15,586 sf 0.00% Impervious Runoff Depth=2.24"
Flow Length=35' Slope=0.0250 '/' Tc=5.6 min CN=74 Runoff=0.92 cfs 0.067 af

Subcatchment P-NP-1: P-NP-1 Runoff Area=113,832 sf 0.00% Impervious Runoff Depth=2.24"
Flow Length=835' Tc=6.9 min CN=74 Runoff=6.52 cfs 0.487 af

Subcatchment P-NP-2A: P-NP-2A Runoff Area=51,529 sf 0.00% Impervious Runoff Depth=2.24"
Flow Length=485' Tc=6.3 min CN=74 Runoff=3.00 cfs 0.221 af

Subcatchment P-NP-2B: P-NP-2B Runoff Area=187,165 sf 22.40% Impervious Runoff Depth=1.92"
Flow Length=340' Tc=15.6 min CN=70 Runoff=6.96 cfs 0.687 af

Reach 2R: Outlet Channel Avg. Flow Depth=0.10' Max Vel=2.36 fps Inflow=1.56 cfs 2.885 af
n=0.022 L=150.0' S=0.0267 '/' Capacity=80.50 cfs Outflow=1.56 cfs 2.885 af

Reach DC-1: DC-N-1 Avg. Flow Depth=0.43' Max Vel=5.12 fps Inflow=9.52 cfs 0.708 af
n=0.051 L=65.0' S=0.1385 '/' Capacity=214.24 cfs Outflow=9.42 cfs 0.708 af

Reach DC-1A: DC-N-1A Avg. Flow Depth=0.56' Max Vel=3.55 fps Inflow=9.42 cfs 0.708 af
n=0.051 L=40.0' S=0.0500 '/' Capacity=128.74 cfs Outflow=9.33 cfs 0.708 af

Reach DC-3: DC-N-3 Avg. Flow Depth=0.37' Max Vel=6.97 fps Inflow=10.42 cfs 0.878 af
n=0.051 L=84.0' S=0.3095 '/' Capacity=320.32 cfs Outflow=10.37 cfs 0.878 af

Reach DC-3A: DC-N-3A Avg. Flow Depth=0.47' Max Vel=5.06 fps Inflow=10.37 cfs 0.878 af
n=0.051 L=32.0' S=0.1250 '/' Capacity=203.56 cfs Outflow=10.33 cfs 0.878 af

Reach DC-N-4: DC-N-4 Avg. Flow Depth=0.32' Max Vel=5.49 fps Inflow=6.96 cfs 0.562 af
n=0.051 L=171.0' S=0.2222 '/' Capacity=271.42 cfs Outflow=6.88 cfs 0.562 af

Pond P1: PND-N Peak Elev=864.14' Storage=148,477 cf Inflow=31.87 cfs 2.835 af
Primary=1.52 cfs 2.819 af Secondary=0.00 cfs 0.000 af Outflow=1.52 cfs 2.819 af

Pond SB-1: Stilling Basin - 1 Peak Elev=857.12' Storage=0.020 af Inflow=1.56 cfs 2.885 af
Outflow=1.56 cfs 2.867 af

Link 1L: POI_N Inflow=1.56 cfs 2.867 af
Primary=1.56 cfs 2.867 af

Total Runoff Area = 16.178 ac Runoff Volume = 2.902 af Average Runoff Depth = 2.15"
94.05% Pervious = 15.215 ac 5.95% Impervious = 0.963 ac

Summary for Subcatchment P-N-3: P-N-3

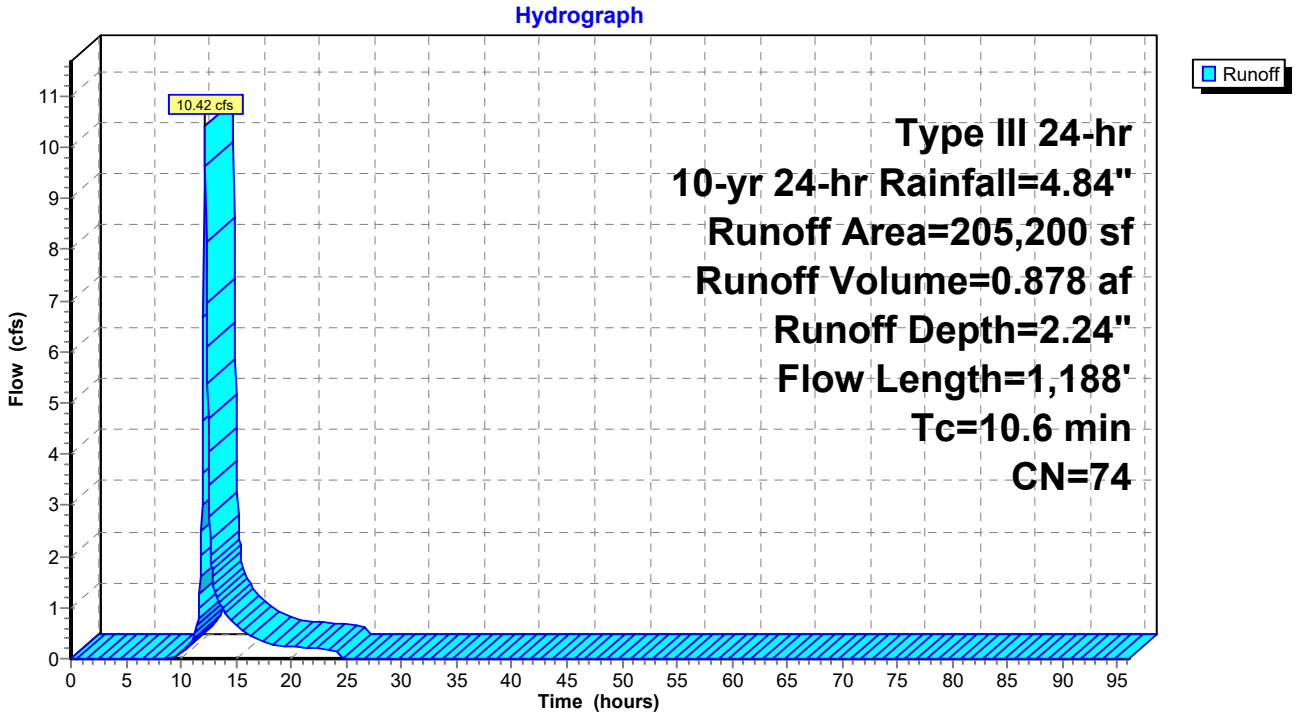
Runoff = 10.42 cfs @ 12.15 hrs, Volume= 0.878 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr 24-hr Rainfall=4.84"

Area (sf)	CN	Description
205,200	74	>75% Grass cover, Good, HSG C
205,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
4.2	1,110	0.0090	4.36	34.90	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030
10.6	1,188	Total			

Subcatchment P-N-3: P-N-3



Summary for Subcatchment P-N-4: P-N-4

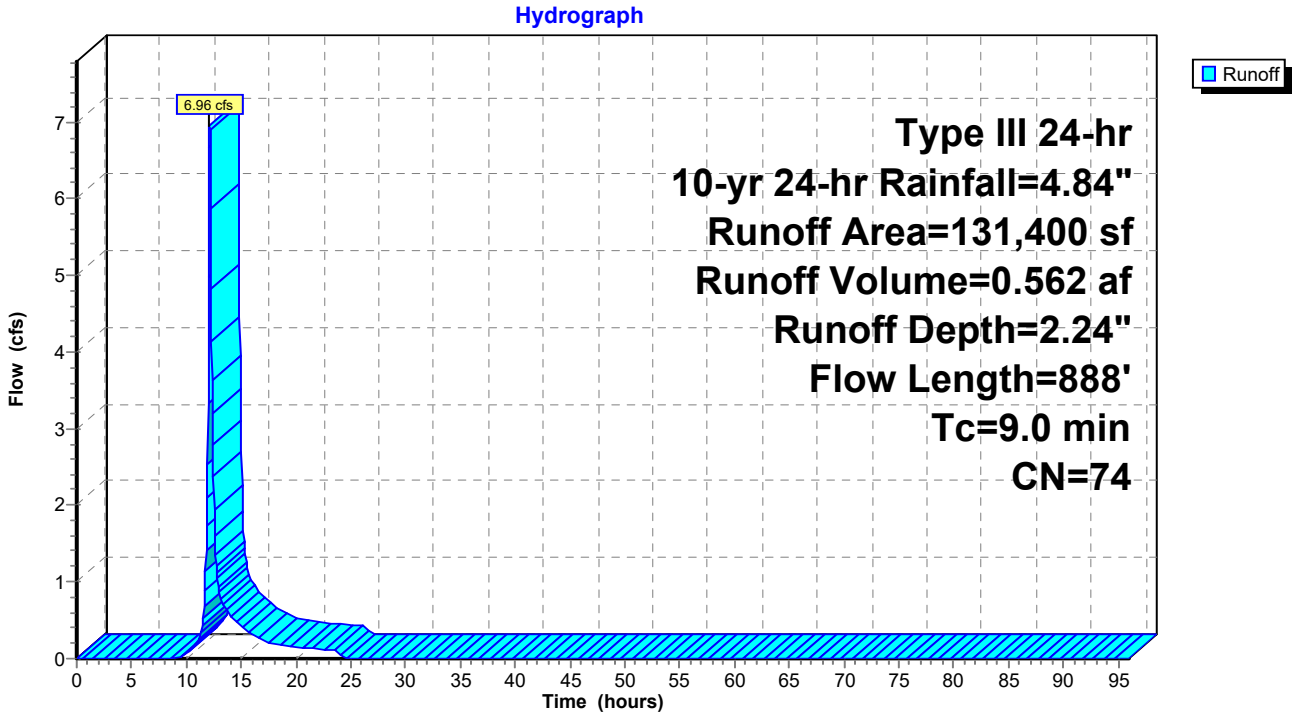
Runoff = 6.96 cfs @ 12.13 hrs, Volume= 0.562 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr 24-hr Rainfall=4.84"

Area (sf)	CN	Description
131,400	74	>75% Grass cover, Good, HSG C
131,400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
1.8	250	0.1040	2.26		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.2	600	0.0330	8.35	66.83	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
9.0	888	Total			

Subcatchment P-N-4: P-N-4



Summary for Subcatchment P-N-5: P-N-5

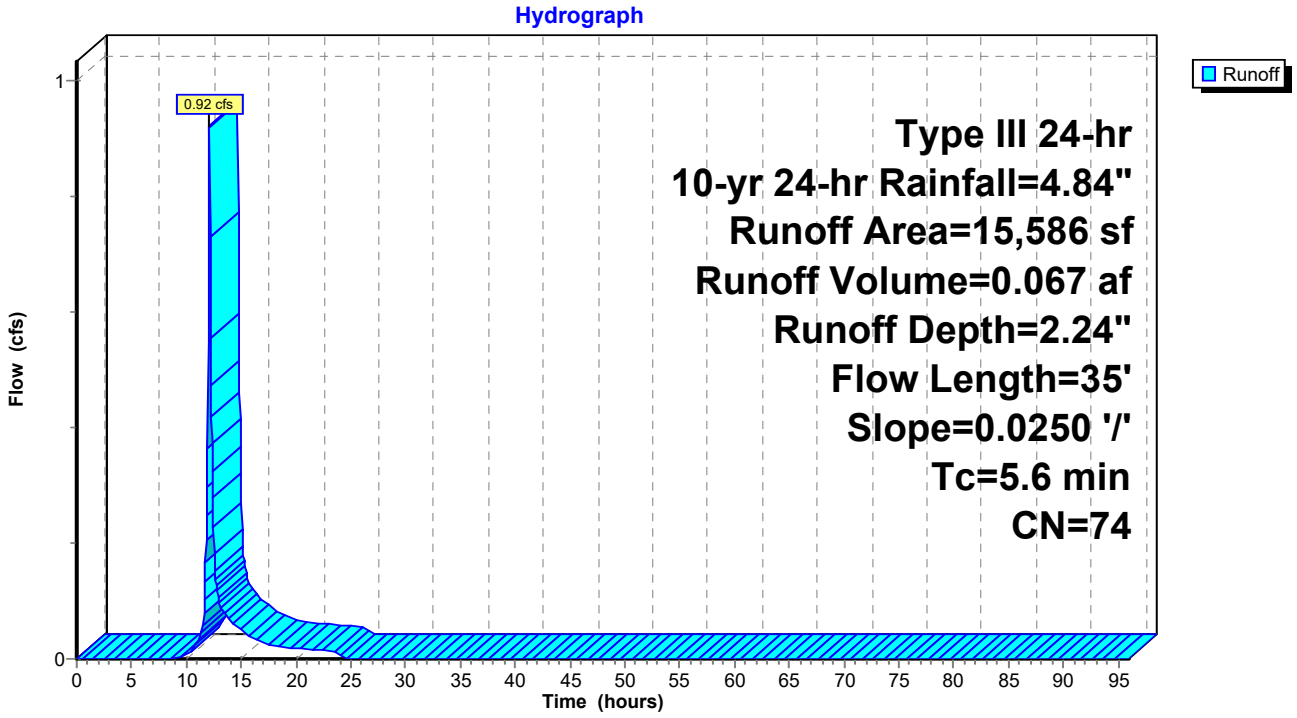
Runoff = 0.92 cfs @ 12.09 hrs, Volume= 0.067 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr 24-hr Rainfall=4.84"

Area (sf)	CN	Description
15,586	74	>75% Grass cover, Good, HSG C
15,586		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"

Subcatchment P-N-5: P-N-5



Summary for Subcatchment P-NP-1: P-NP-1

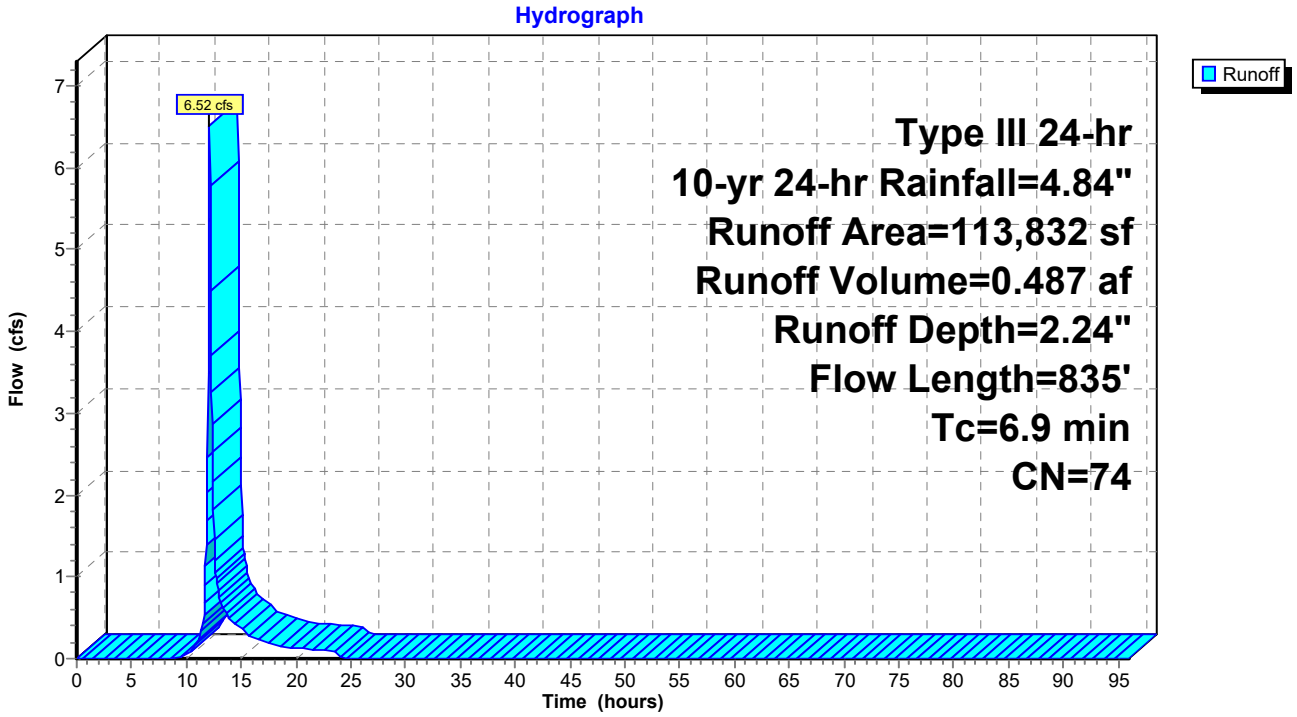
Runoff = 6.52 cfs @ 12.11 hrs, Volume= 0.487 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr 24-hr Rainfall=4.84"

Area (sf)	CN	Description
113,832	74	>75% Grass cover, Good, HSG C
113,832		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
2.2	770	0.0156	5.74	45.95	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.9	835	Total			

Subcatchment P-NP-1: P-NP-1



Summary for Subcatchment P-NP-2A: P-NP-2A

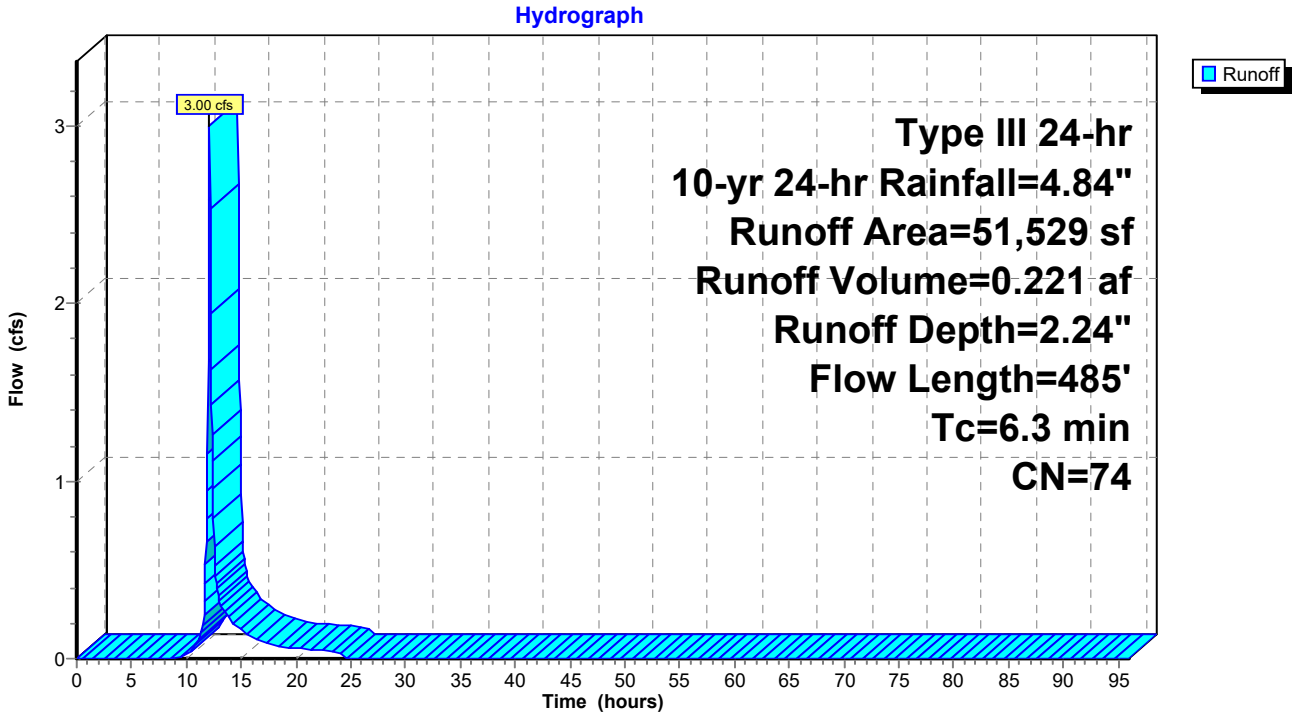
Runoff = 3.00 cfs @ 12.10 hrs, Volume= 0.221 af, Depth= 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr 24-hr Rainfall=4.84"

Area (sf)	CN	Description
51,529	74	>75% Grass cover, Good, HSG C
51,529		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.6	420	0.0095	4.48	35.85	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.3	485	Total			

Subcatchment P-NP-2A: P-NP-2A



Summary for Subcatchment P-NP-2B: P-NP-2B

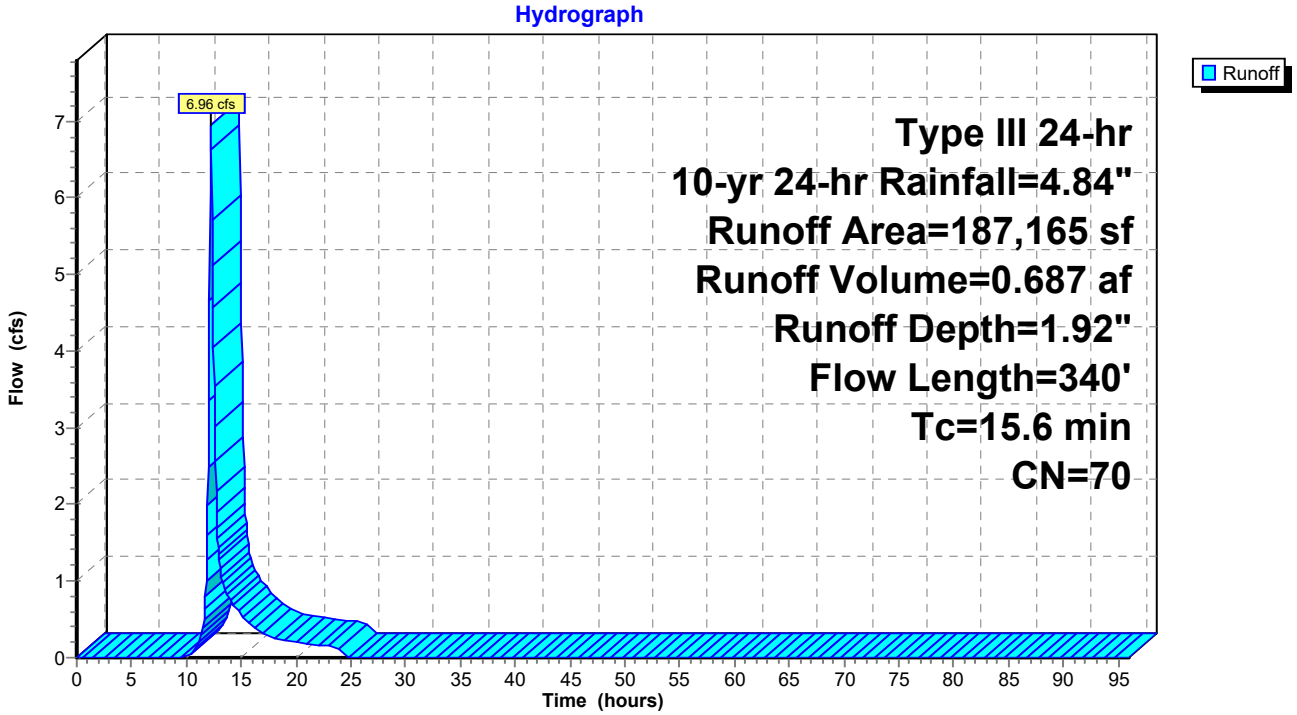
Runoff = 6.96 cfs @ 12.23 hrs, Volume= 0.687 af, Depth= 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr 24-hr Rainfall=4.84"

	Area (sf)	CN	Description
	25,195	74	>75% Grass cover, Good, HSG C
	111,432	57	Woods/grass comb., Poor, HSG A
*	41,933	98	North Pond
*	8,605	85	Gravel Road
	187,165	70	Weighted Average
	145,232		77.60% Pervious Area
	41,933		22.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0250	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
2.6	240	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
15.6	340	Total			

Subcatchment P-NP-2B: P-NP-2B



Summary for Reach 2R: Outlet Channel

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 2.14" for 10-yr 24-hr event
Inflow = 1.56 cfs @ 15.90 hrs, Volume= 2.885 af
Outflow = 1.56 cfs @ 15.93 hrs, Volume= 2.885 af, Atten= 0%, Lag= 1.7 min

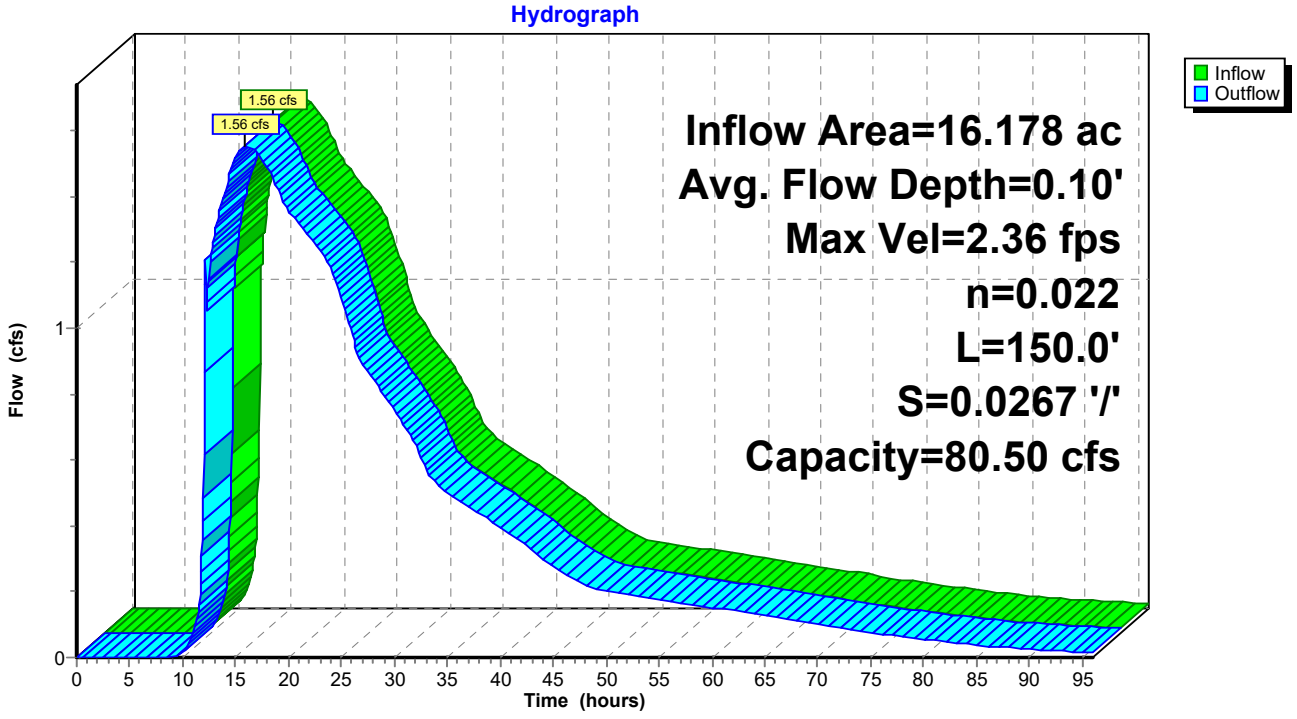
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.36 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 2.1 min

Peak Storage= 99 cf @ 15.91 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 6.63'
Bank-Full Depth= 1.00' Flow Area= 9.0 sf, Capacity= 80.50 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 12.00'
Length= 150.0' Slope= 0.0267 '/'
Inlet Invert= 858.00', Outlet Invert= 854.00'

‡

Reach 2R: Outlet Channel



Summary for Reach DC-1: DC-N-1

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 2.24" for 10-yr 24-hr event
Inflow = 9.52 cfs @ 12.10 hrs, Volume= 0.708 af
Outflow = 9.42 cfs @ 12.11 hrs, Volume= 0.708 af, Atten= 1%, Lag= 0.3 min

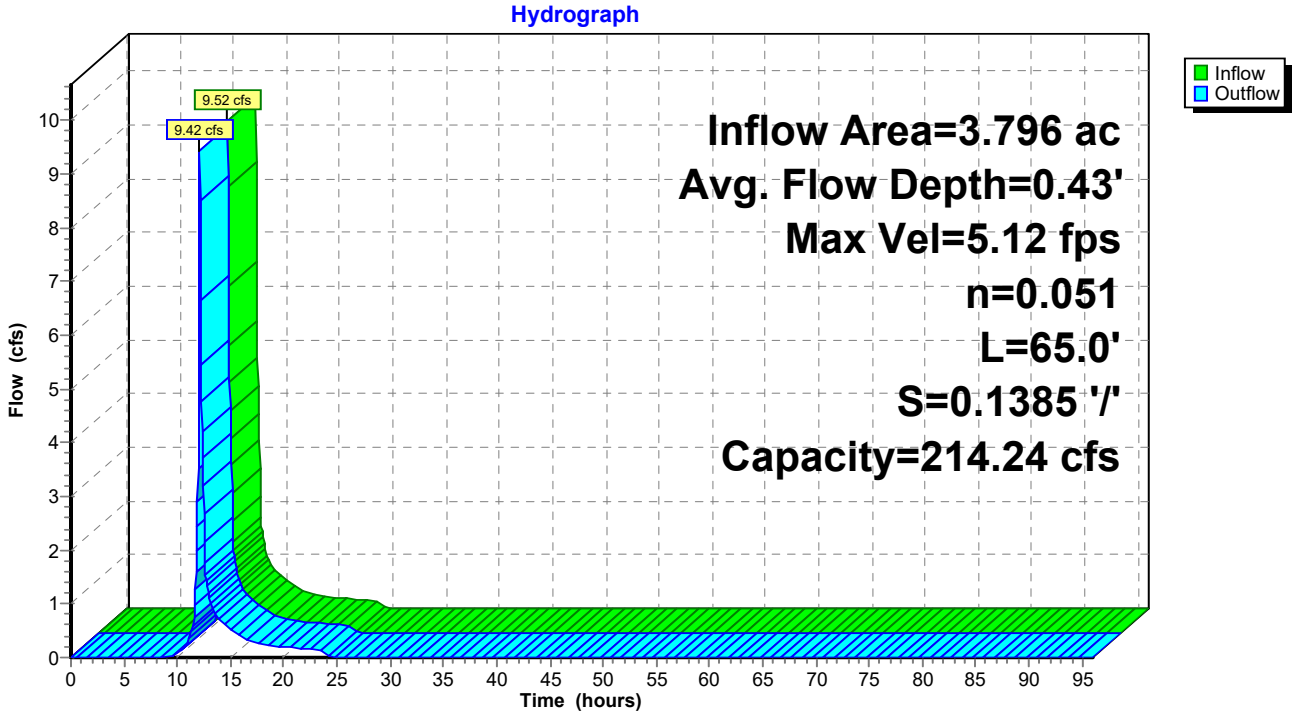
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.12 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.67 fps, Avg. Travel Time= 0.6 min

Peak Storage= 121 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 5.60'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 214.24 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 65.0' Slope= 0.1385 '/'
Inlet Invert= 876.00', Outlet Invert= 867.00'

‡

Reach DC-1: DC-N-1



Summary for Reach DC-1A: DC-N-1A

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 2.24" for 10-yr 24-hr event
Inflow = 9.42 cfs @ 12.11 hrs, Volume= 0.708 af
Outflow = 9.33 cfs @ 12.11 hrs, Volume= 0.708 af, Atten= 1%, Lag= 0.3 min

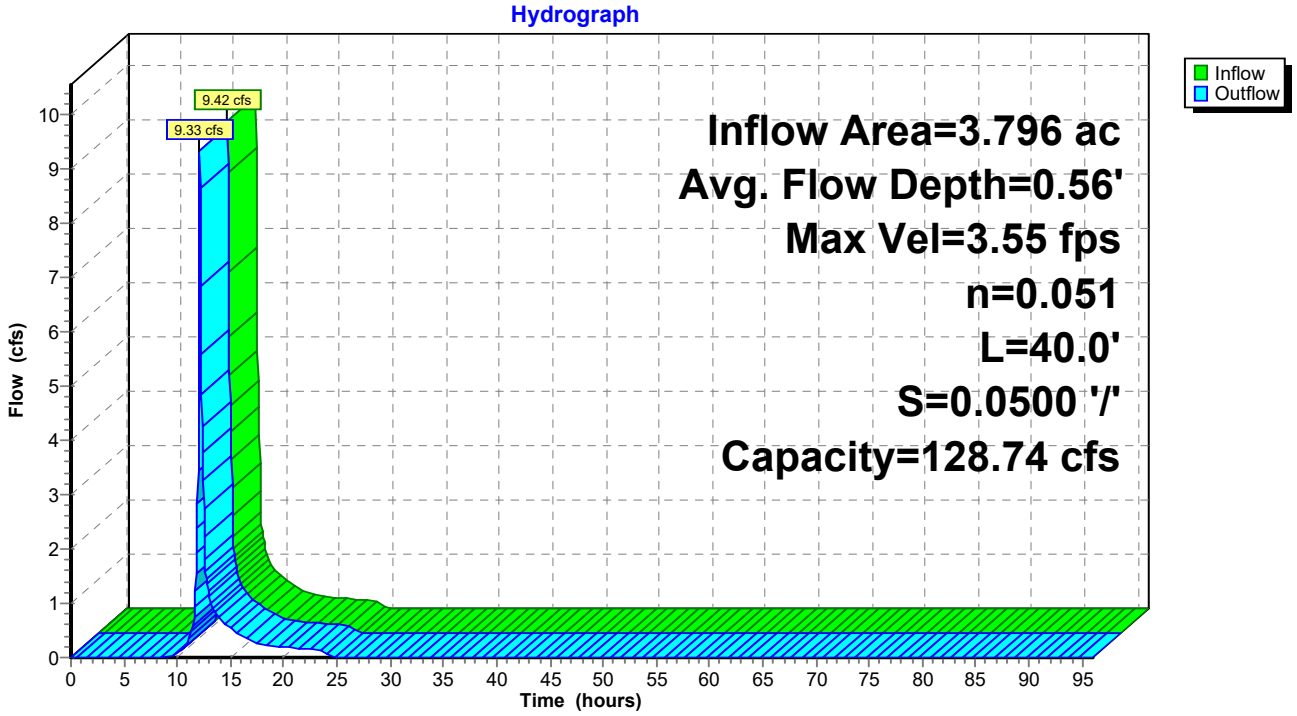
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.55 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 0.6 min

Peak Storage= 106 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.56' , Surface Width= 6.39'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 128.74 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 40.0' Slope= 0.0500 '/'
Inlet Invert= 867.00', Outlet Invert= 865.00'

‡

Reach DC-1A: DC-N-1A



Summary for Reach DC-3: DC-N-3

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 2.24" for 10-yr 24-hr event
Inflow = 10.42 cfs @ 12.15 hrs, Volume= 0.878 af
Outflow = 10.37 cfs @ 12.16 hrs, Volume= 0.878 af, Atten= 1%, Lag= 0.3 min

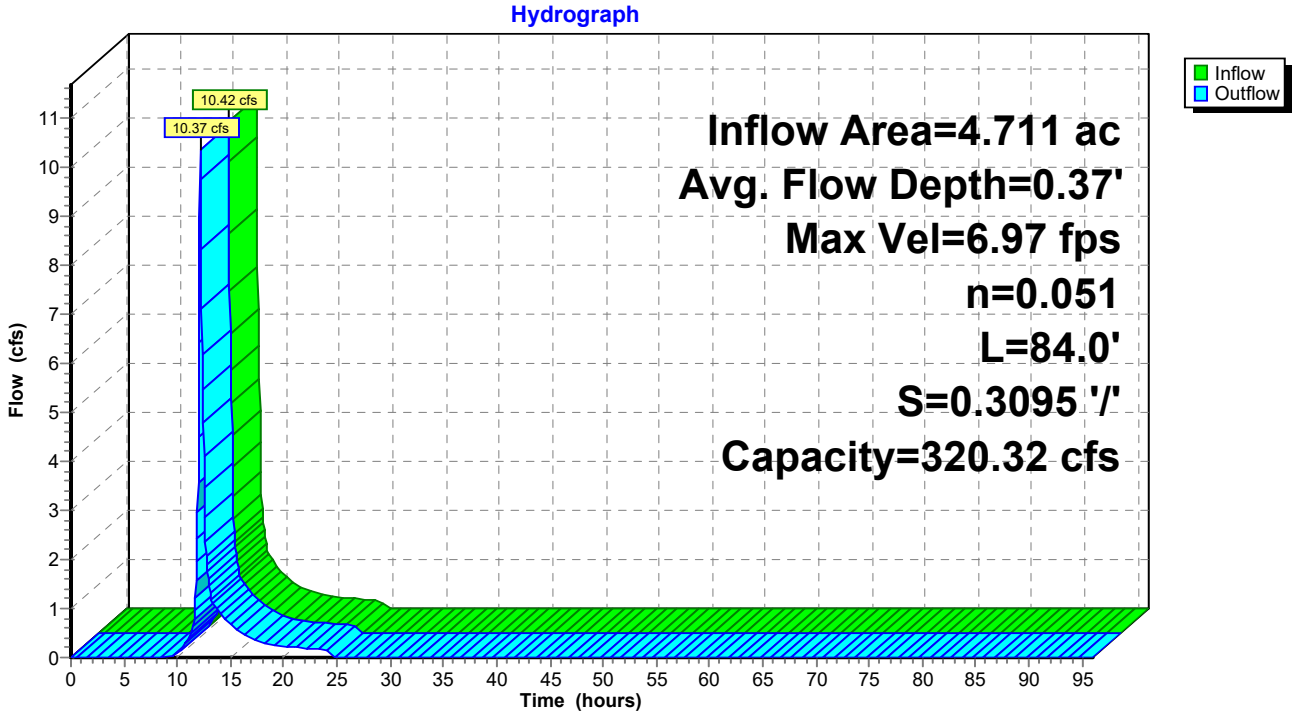
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.97 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.33 fps, Avg. Travel Time= 0.6 min

Peak Storage= 126 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.37' , Surface Width= 5.19'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 320.32 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 84.0' Slope= 0.3095 '/'
Inlet Invert= 896.00', Outlet Invert= 870.00'

‡

Reach DC-3: DC-N-3



Summary for Reach DC-3A: DC-N-3A

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 2.24" for 10-yr 24-hr event
Inflow = 10.37 cfs @ 12.16 hrs, Volume= 0.878 af
Outflow = 10.33 cfs @ 12.16 hrs, Volume= 0.878 af, Atten= 0%, Lag= 0.2 min

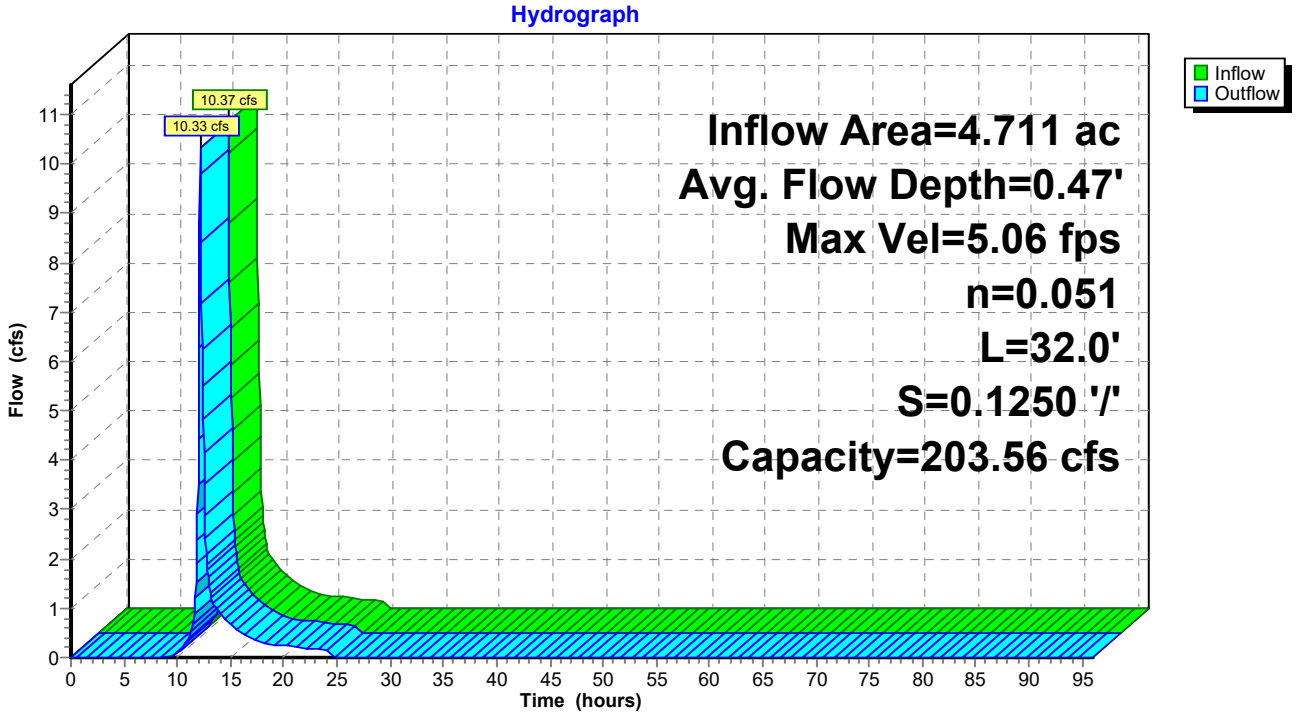
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.06 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 0.3 min

Peak Storage= 66 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.47' , Surface Width= 5.79'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 203.56 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 32.0' Slope= 0.1250 '/'
Inlet Invert= 870.00', Outlet Invert= 866.00'

‡

Reach DC-3A: DC-N-3A



Summary for Reach DC-N-4: DC-N-4

Inflow Area = 3.017 ac, 0.00% Impervious, Inflow Depth = 2.24" for 10-yr 24-hr event
Inflow = 6.96 cfs @ 12.13 hrs, Volume= 0.562 af
Outflow = 6.88 cfs @ 12.15 hrs, Volume= 0.562 af, Atten= 1%, Lag= 1.0 min

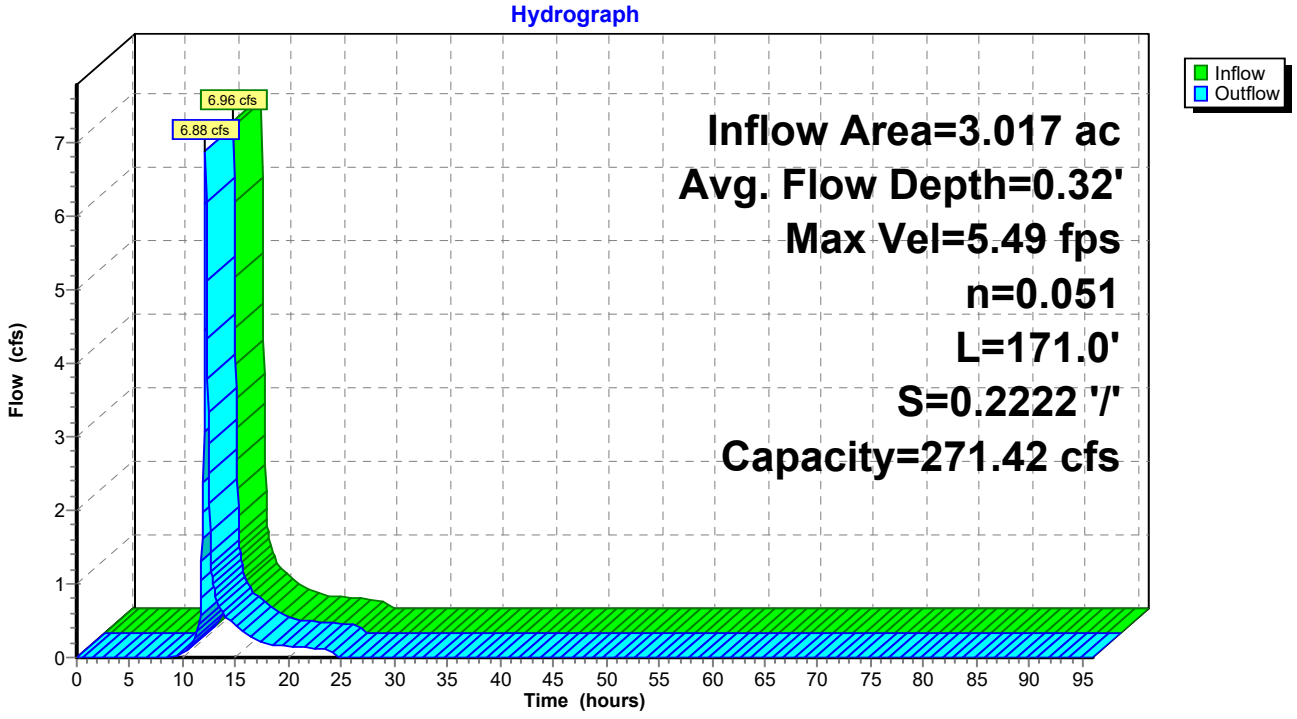
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.49 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.80 fps, Avg. Travel Time= 1.6 min

Peak Storage= 217 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.32' , Surface Width= 4.92'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 271.42 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 171.0' Slope= 0.2222 '/'
Inlet Invert= 914.00', Outlet Invert= 876.00'

‡

Reach DC-N-4: DC-N-4



Summary for Pond P1: PND-N

Inflow Area = 15.820 ac, 6.08% Impervious, Inflow Depth = 2.15" for 10-yr 24-hr event
Inflow = 31.87 cfs @ 12.15 hrs, Volume= 2.835 af
Outflow = 1.52 cfs @ 16.12 hrs, Volume= 2.819 af, Atten= 95%, Lag= 238.0 min
Primary = 1.52 cfs @ 16.12 hrs, Volume= 2.819 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Starting Elev= 862.00' Surf.Area= 35,753 sf Storage= 68,544 cf
Peak Elev= 864.14' @ 16.12 hrs Surf.Area= 39,084 sf Storage= 148,477 cf (79,933 cf above start)
Flood Elev= 867.00' Surf.Area= 43,936 sf Storage= 267,199 cf (198,655 cf above start)

Plug-Flow detention time= 1,920.7 min calculated for 1.244 af (44% of inflow)
Center-of-Mass det. time= 962.7 min (1,809.4 - 846.7)

Volume	Invert	Avail.Storage	Storage Description
#1	860.00'	312,031 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

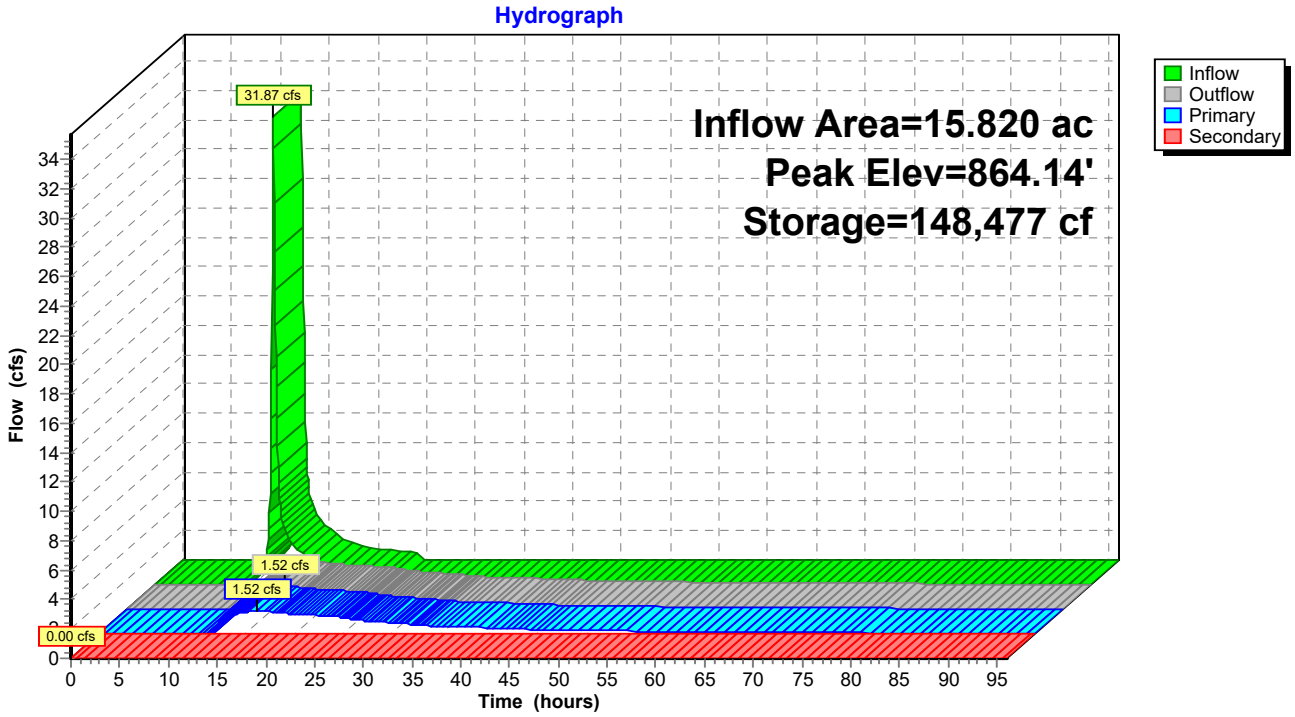
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.00	32,791	0	0
862.00	35,753	68,544	68,544
864.00	38,860	74,613	143,157
866.00	42,143	81,003	224,160
868.00	45,728	87,871	312,031

Device	Routing	Invert	Outlet Devices
#1	Primary	860.00'	**24.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 860.00' / 859.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	862.00'	**1.0" Vert. Orifice/Grate X 12.00 columns** X 5 rows with 6.0" cc spacing C= 0.600 Limited to weir flow at low heads
#3	Device 1	865.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	866.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.52 cfs @ 16.12 hrs HW=864.14' (Free Discharge)
└**1=Culvert** (Passes 1.52 cfs of 26.79 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 1.52 cfs @ 4.66 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=862.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: PND-N


Hydrograph
Inflow Area=15.820 ac
Peak Elev=864.14'
Storage=148,477 cf
31.87 cfs
1.52 cfs
1.52 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95

Summary for Pond SB-1: Stilling Basin - 1

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 2.14" for 10-yr 24-hr event
Inflow = 1.56 cfs @ 15.93 hrs, Volume= 2.885 af
Outflow = 1.56 cfs @ 15.94 hrs, Volume= 2.867 af, Atten= 0%, Lag= 0.6 min
Primary = 1.56 cfs @ 15.94 hrs, Volume= 2.867 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Peak Elev= 857.12' @ 15.94 hrs Surf.Area= 0.015 ac Storage= 0.020 af

Plug-Flow detention time= 31.6 min calculated for 2.867 af (99% of inflow)
Center-of-Mass det. time= 8.0 min (1,797.4 - 1,789.3)

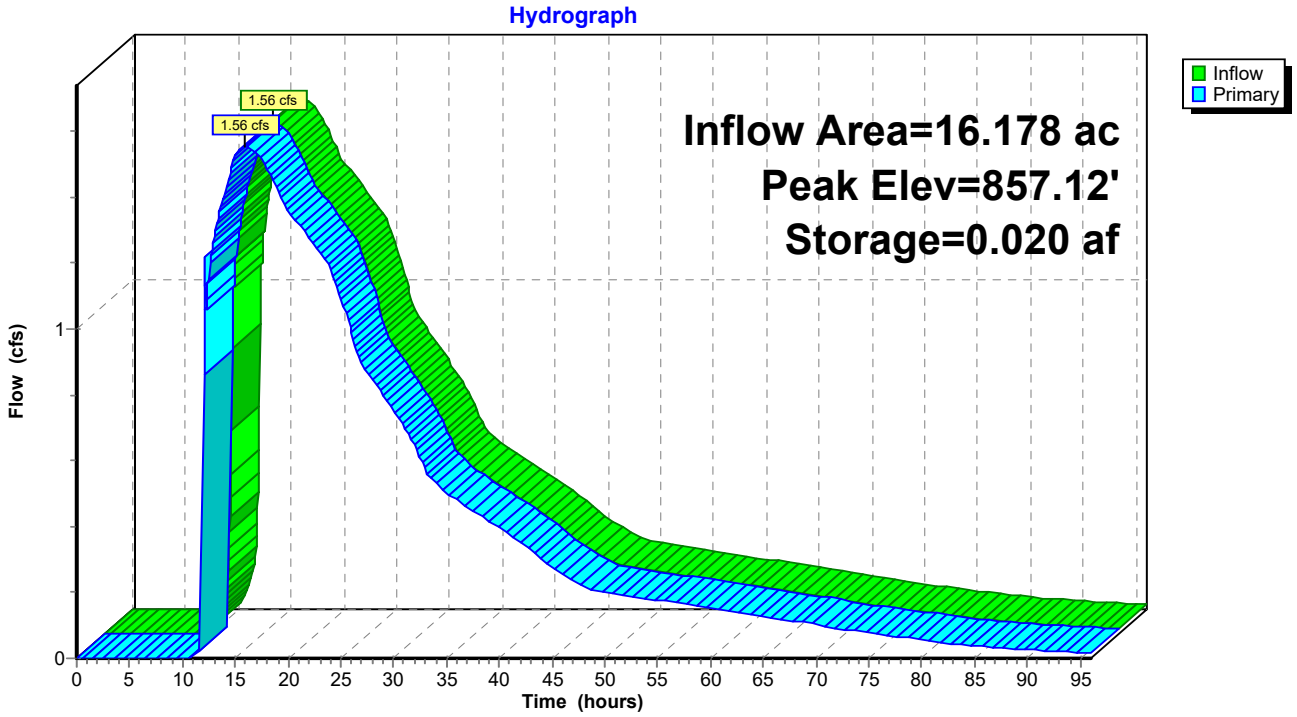
Volume	Invert	Avail.Storage	Storage Description
#1	854.00'	0.044 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
854.00	0.002	0.000	0.000
856.00	0.007	0.009	0.009
857.00	0.012	0.010	0.019
858.00	0.038	0.025	0.044

Device	Routing	Invert	Outlet Devices
#1	Primary	857.00'	**15.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.55 cfs @ 15.94 hrs HW=857.12' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.55 cfs @ 0.84 fps)

Pond SB-1: Stilling Basin - 1

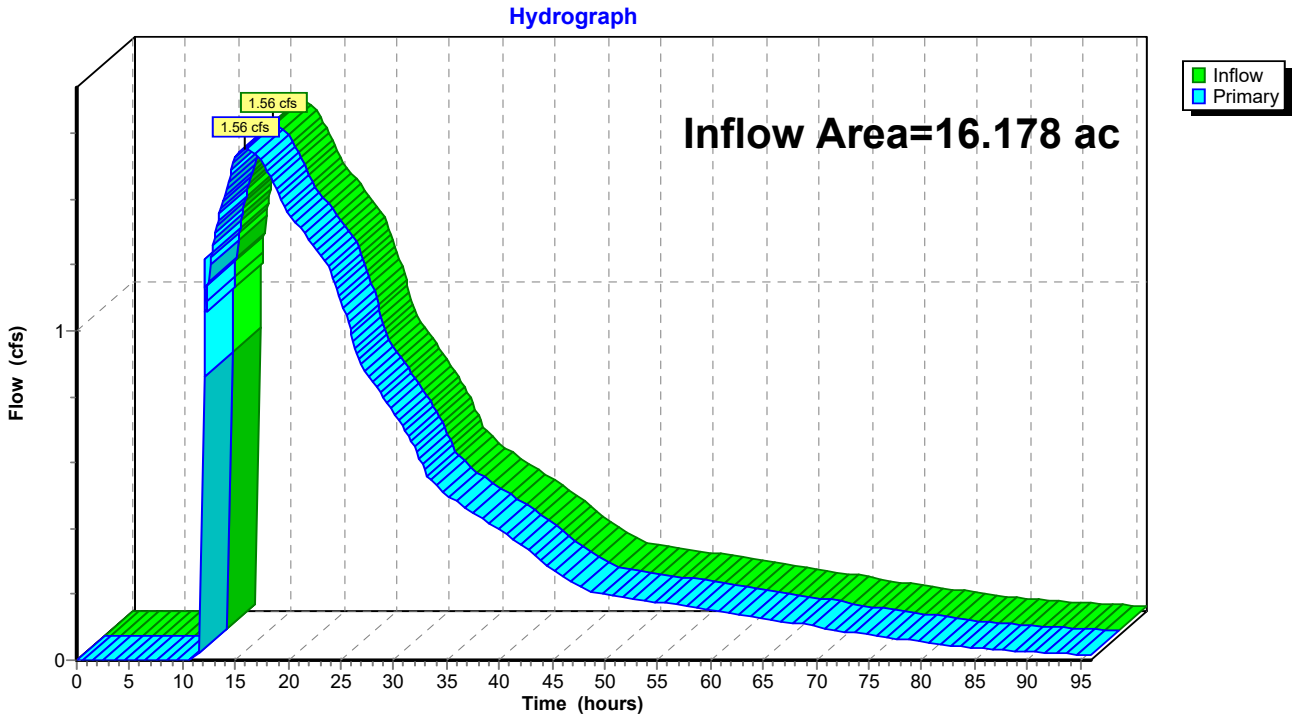


Summary for Link 1L: POI_N

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 2.13" for 10-yr 24-hr event
Inflow = 1.56 cfs @ 15.94 hrs, Volume= 2.867 af
Primary = 1.56 cfs @ 15.94 hrs, Volume= 2.867 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 1L: POI_N



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-N-3: P-N-3 Runoff Area=205,200 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=1,188' Tc=10.6 min CN=74 Runoff=15.50 cfs 1.297 af

Subcatchment P-N-4: P-N-4 Runoff Area=131,400 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=888' Tc=9.0 min CN=74 Runoff=10.34 cfs 0.830 af

Subcatchment P-N-5: P-N-5 Runoff Area=15,586 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=35' Slope=0.0250 '/' Tc=5.6 min CN=74 Runoff=1.37 cfs 0.098 af

Subcatchment P-NP-1: P-NP-1 Runoff Area=113,832 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=835' Tc=6.9 min CN=74 Runoff=9.68 cfs 0.719 af

Subcatchment P-NP-2A: P-NP-2A Runoff Area=51,529 sf 0.00% Impervious Runoff Depth=3.30"
Flow Length=485' Tc=6.3 min CN=74 Runoff=4.46 cfs 0.326 af

Subcatchment P-NP-2B: P-NP-2B Runoff Area=187,165 sf 22.40% Impervious Runoff Depth=2.92"
Flow Length=340' Tc=15.6 min CN=70 Runoff=10.84 cfs 1.044 af

Reach 2R: Outlet Channel Avg. Flow Depth=0.15' Max Vel=2.98 fps Inflow=2.92 cfs 4.290 af
n=0.022 L=150.0' S=0.0267 '/' Capacity=80.50 cfs Outflow=2.92 cfs 4.290 af

Reach DC-1: DC-N-1 Avg. Flow Depth=0.53' Max Vel=5.74 fps Inflow=14.13 cfs 1.045 af
n=0.051 L=65.0' S=0.1385 '/' Capacity=214.24 cfs Outflow=14.01 cfs 1.045 af

Reach DC-1A: DC-N-1A Avg. Flow Depth=0.69' Max Vel=3.97 fps Inflow=14.01 cfs 1.045 af
n=0.051 L=40.0' S=0.0500 '/' Capacity=128.74 cfs Outflow=13.90 cfs 1.045 af

Reach DC-3: DC-N-3 Avg. Flow Depth=0.45' Max Vel=7.85 fps Inflow=15.50 cfs 1.297 af
n=0.051 L=84.0' S=0.3095 '/' Capacity=320.32 cfs Outflow=15.43 cfs 1.297 af

Reach DC-3A: DC-N-3A Avg. Flow Depth=0.58' Max Vel=5.68 fps Inflow=15.43 cfs 1.297 af
n=0.051 L=32.0' S=0.1250 '/' Capacity=203.56 cfs Outflow=15.38 cfs 1.297 af

Reach DC-N-4: DC-N-4 Avg. Flow Depth=0.40' Max Vel=6.19 fps Inflow=10.34 cfs 0.830 af
n=0.051 L=171.0' S=0.2222 '/' Capacity=271.42 cfs Outflow=10.23 cfs 0.830 af

Pond P1: PND-N Peak Elev=865.07' Storage=185,707 cf Inflow=47.83 cfs 4.216 af
Primary=2.85 cfs 4.191 af Secondary=0.00 cfs 0.000 af Outflow=2.85 cfs 4.191 af

Pond SB-1: Stilling Basin - 1 Peak Elev=857.19' Storage=0.021 af Inflow=2.92 cfs 4.290 af
Outflow=2.92 cfs 4.271 af

Link 1L: POI_N Inflow=2.92 cfs 4.271 af
Primary=2.92 cfs 4.271 af

Total Runoff Area = 16.178 ac Runoff Volume = 4.315 af Average Runoff Depth = 3.20"
94.05% Pervious = 15.215 ac 5.95% Impervious = 0.963 ac

Summary for Subcatchment P-N-3: P-N-3

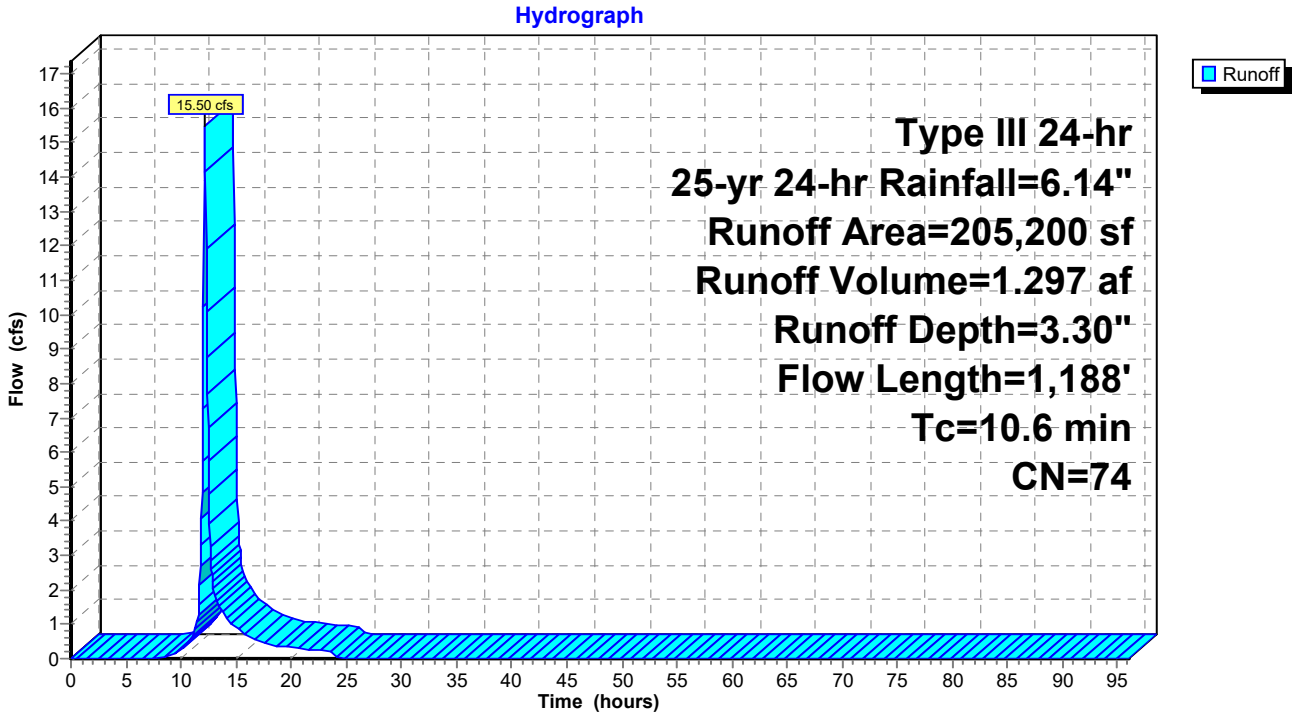
Runoff = 15.50 cfs @ 12.15 hrs, Volume= 1.297 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr 24-hr Rainfall=6.14"

Area (sf)	CN	Description
205,200	74	>75% Grass cover, Good, HSG C
205,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
4.2	1,110	0.0090	4.36	34.90	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030
10.6	1,188	Total			

Subcatchment P-N-3: P-N-3



Summary for Subcatchment P-N-4: P-N-4

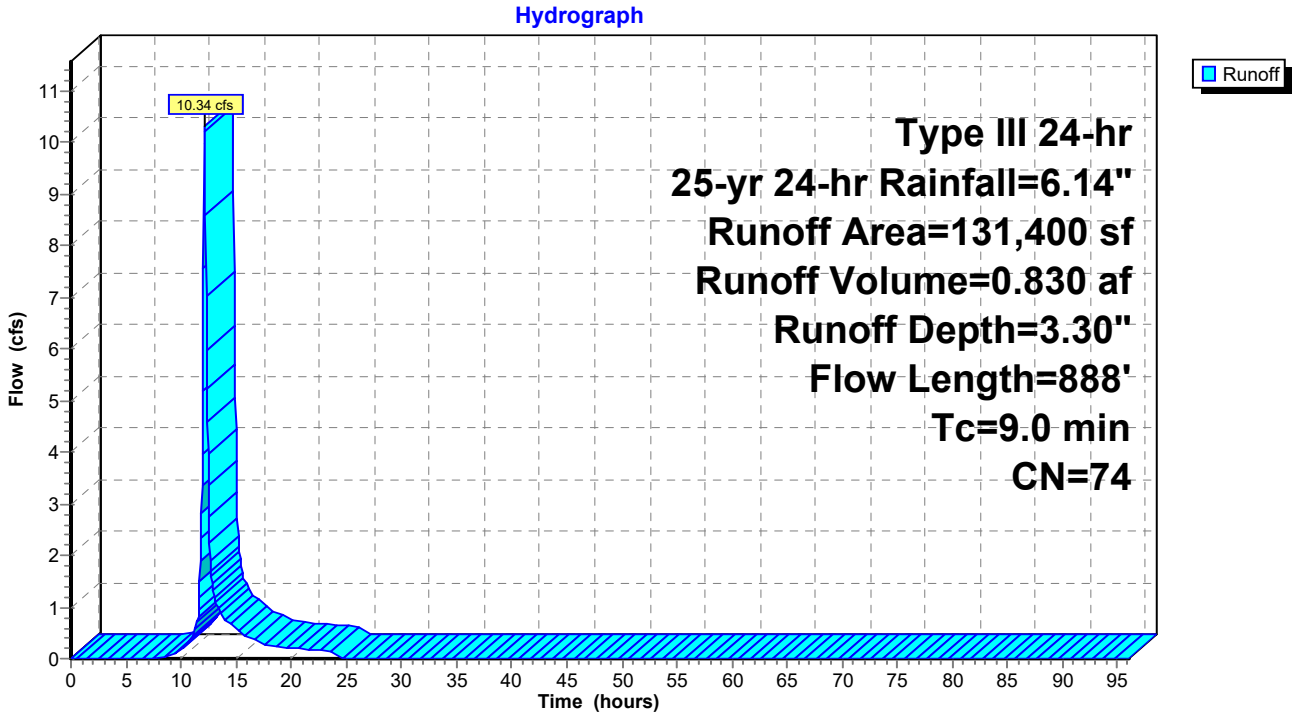
Runoff = 10.34 cfs @ 12.13 hrs, Volume= 0.830 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr 24-hr Rainfall=6.14"

Area (sf)	CN	Description
131,400	74	>75% Grass cover, Good, HSG C
131,400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
1.8	250	0.1040	2.26		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.2	600	0.0330	8.35	66.83	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
9.0	888	Total			

Subcatchment P-N-4: P-N-4



Summary for Subcatchment P-N-5: P-N-5

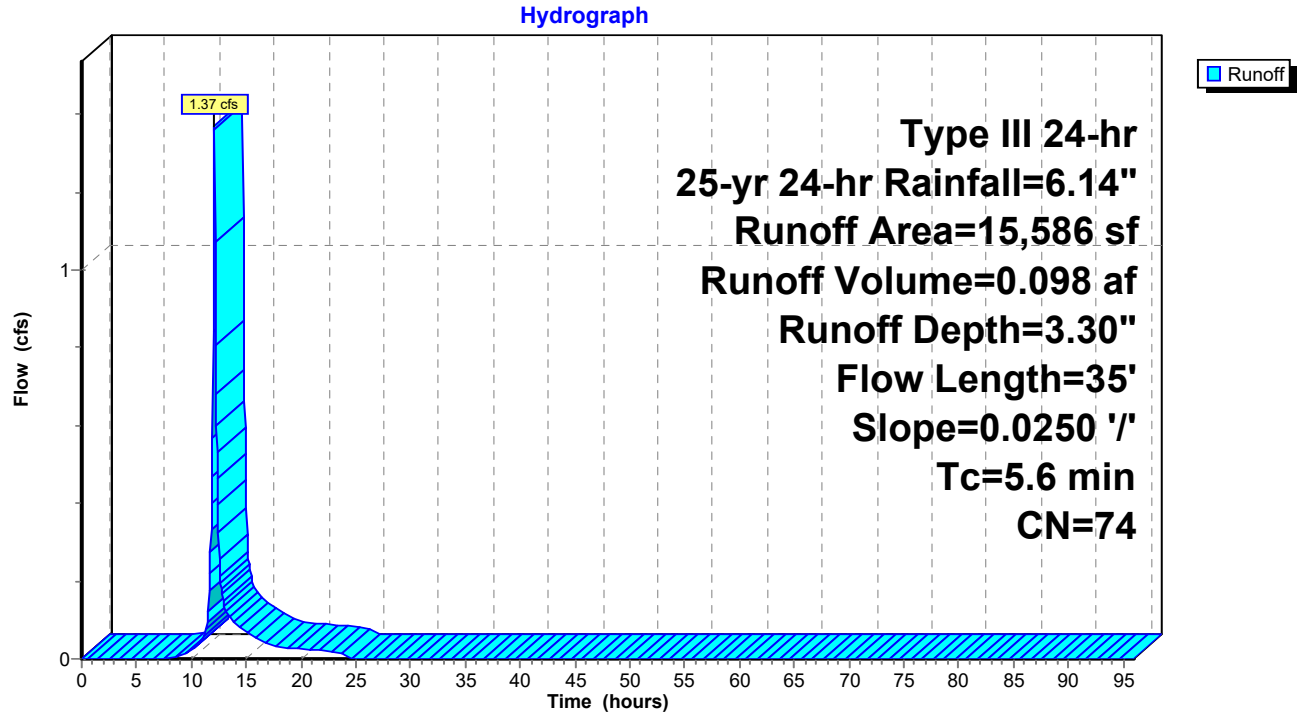
Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.098 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr 24-hr Rainfall=6.14"

Area (sf)	CN	Description
15,586	74	>75% Grass cover, Good, HSG C
15,586		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"

Subcatchment P-N-5: P-N-5



Summary for Subcatchment P-NP-1: P-NP-1

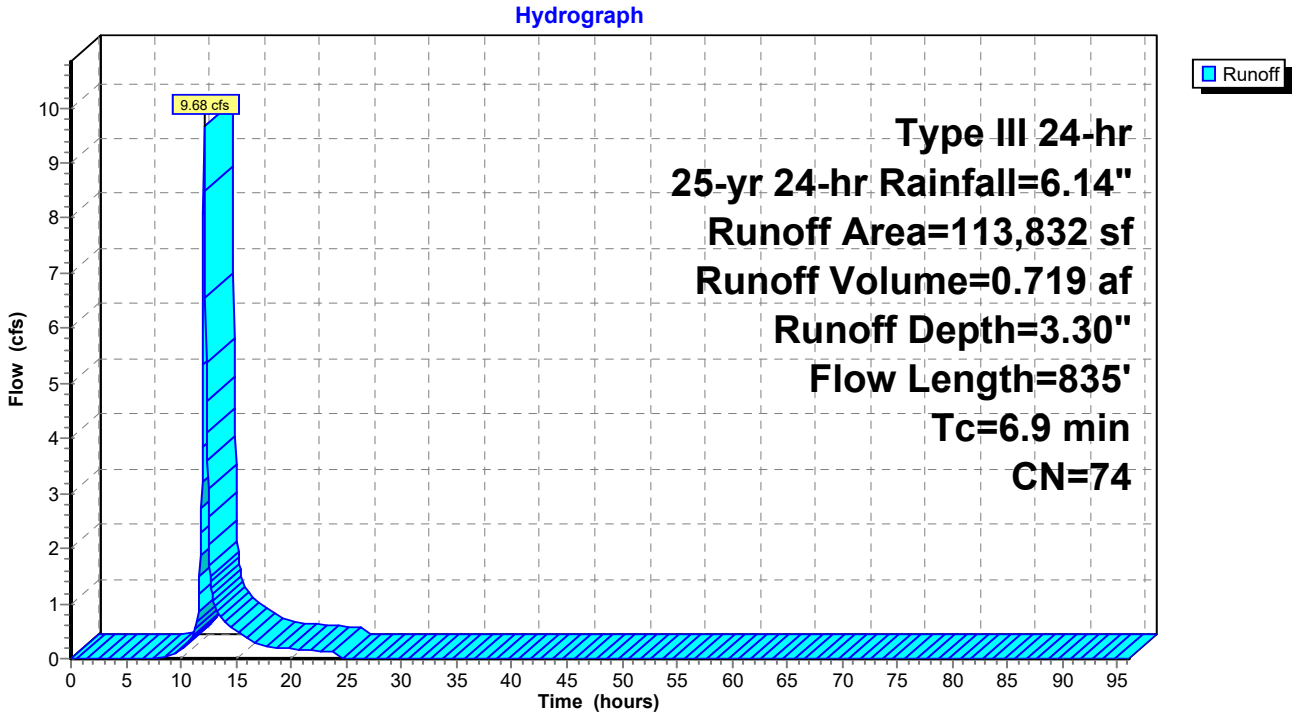
Runoff = 9.68 cfs @ 12.10 hrs, Volume= 0.719 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr 24-hr Rainfall=6.14"

Area (sf)	CN	Description
113,832	74	>75% Grass cover, Good, HSG C
113,832		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
2.2	770	0.0156	5.74	45.95	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.9	835	Total			

Subcatchment P-NP-1: P-NP-1



Summary for Subcatchment P-NP-2A: P-NP-2A

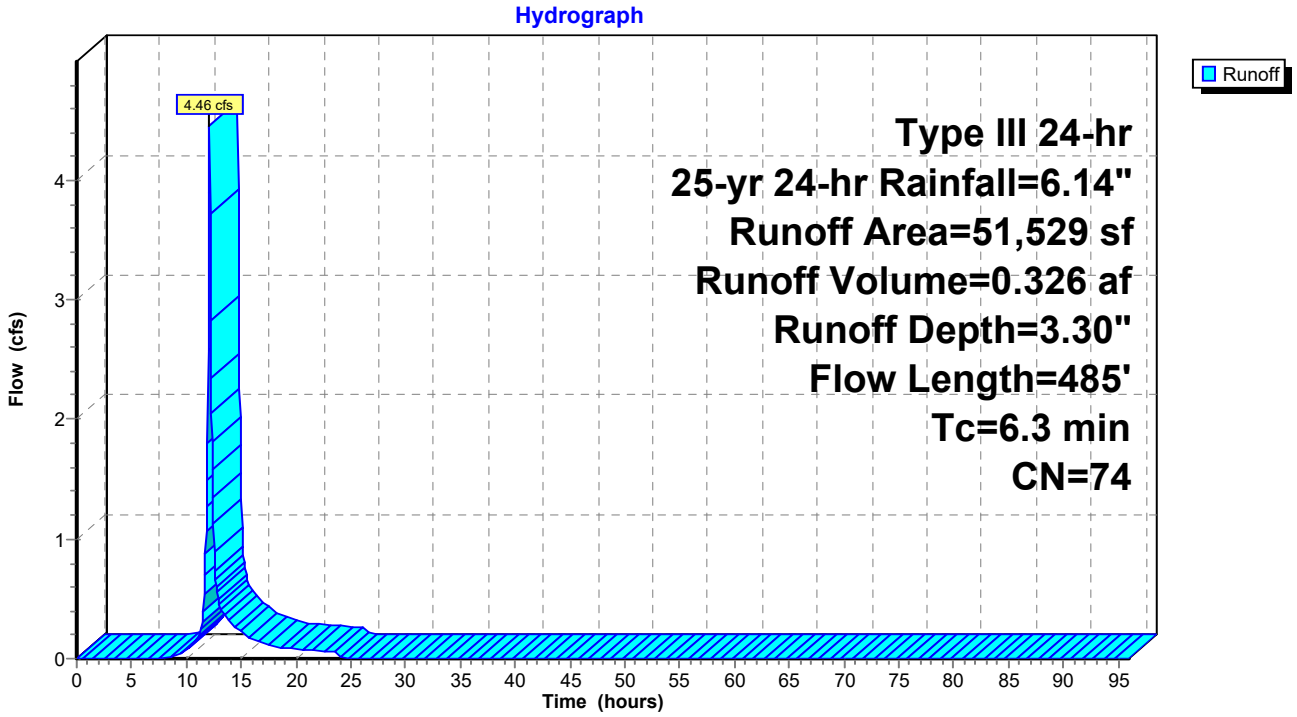
Runoff = 4.46 cfs @ 12.10 hrs, Volume= 0.326 af, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr 24-hr Rainfall=6.14"

Area (sf)	CN	Description
51,529	74	>75% Grass cover, Good, HSG C
51,529		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.6	420	0.0095	4.48	35.85	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.3	485	Total			

Subcatchment P-NP-2A: P-NP-2A



Summary for Subcatchment P-NP-2B: P-NP-2B

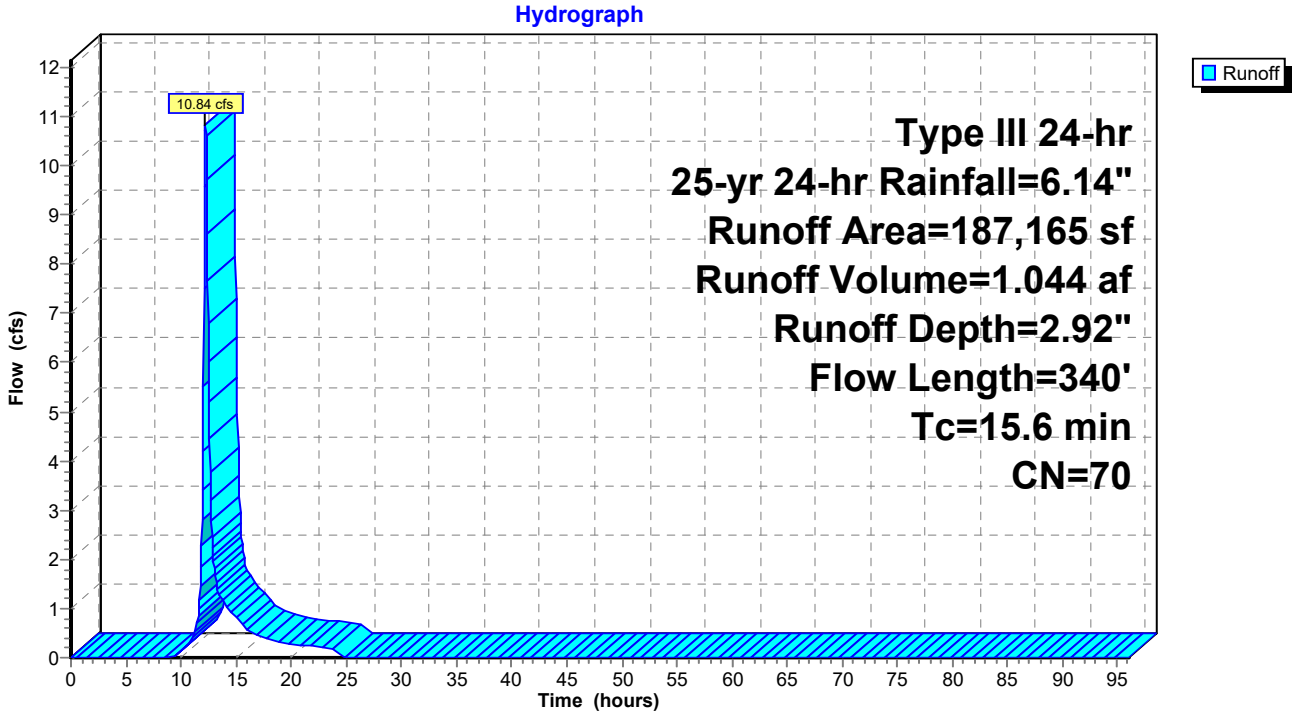
Runoff = 10.84 cfs @ 12.22 hrs, Volume= 1.044 af, Depth= 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr 24-hr Rainfall=6.14"

	Area (sf)	CN	Description
	25,195	74	>75% Grass cover, Good, HSG C
	111,432	57	Woods/grass comb., Poor, HSG A
*	41,933	98	North Pond
*	8,605	85	Gravel Road
	187,165	70	Weighted Average
	145,232		77.60% Pervious Area
	41,933		22.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0250	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
2.6	240	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
15.6	340	Total			

Subcatchment P-NP-2B: P-NP-2B



Summary for Reach 2R: Outlet Channel

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 3.18" for 25-yr 24-hr event
Inflow = 2.92 cfs @ 15.24 hrs, Volume= 4.290 af
Outflow = 2.92 cfs @ 15.26 hrs, Volume= 4.290 af, Atten= 0%, Lag= 1.4 min

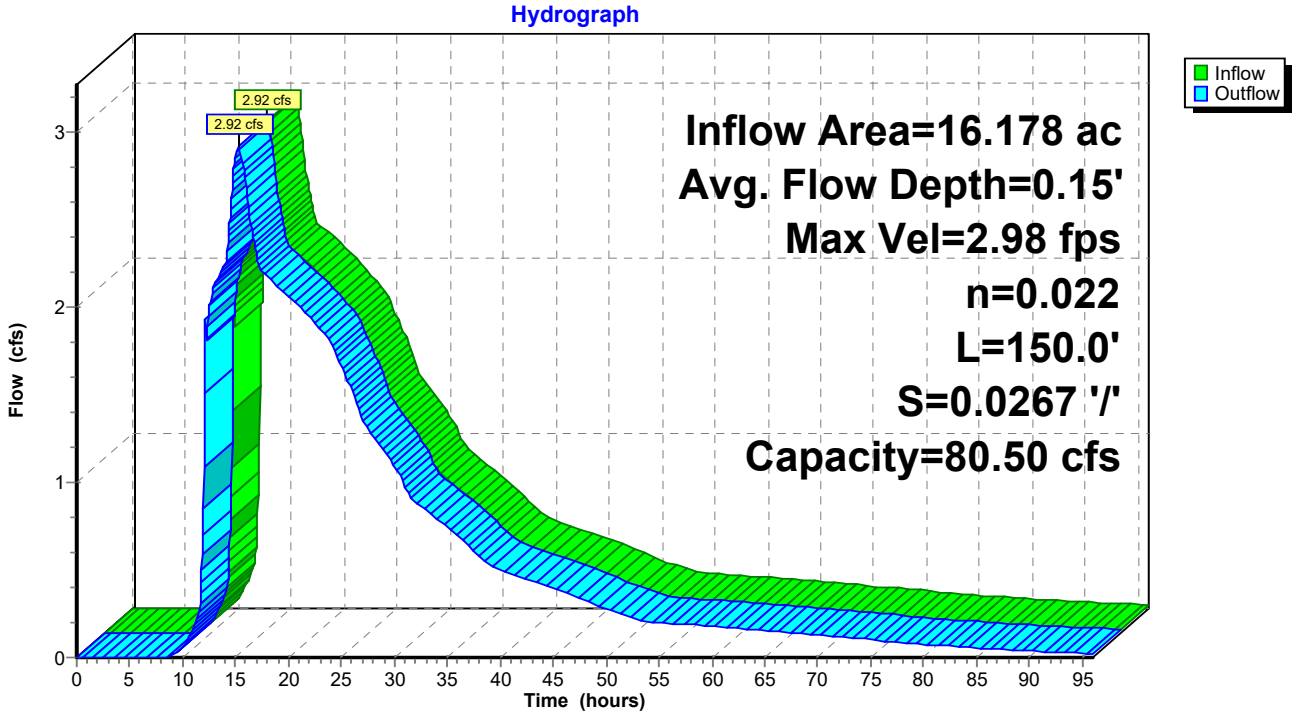
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.98 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.36 fps, Avg. Travel Time= 1.8 min

Peak Storage= 147 cf @ 15.25 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 6.91'
Bank-Full Depth= 1.00' Flow Area= 9.0 sf, Capacity= 80.50 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 12.00'
Length= 150.0' Slope= 0.0267 '/'
Inlet Invert= 858.00', Outlet Invert= 854.00'

‡

Reach 2R: Outlet Channel



Summary for Reach DC-1: DC-N-1

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 3.30" for 25-yr 24-hr event
Inflow = 14.13 cfs @ 12.10 hrs, Volume= 1.045 af
Outflow = 14.01 cfs @ 12.11 hrs, Volume= 1.045 af, Atten= 1%, Lag= 0.3 min

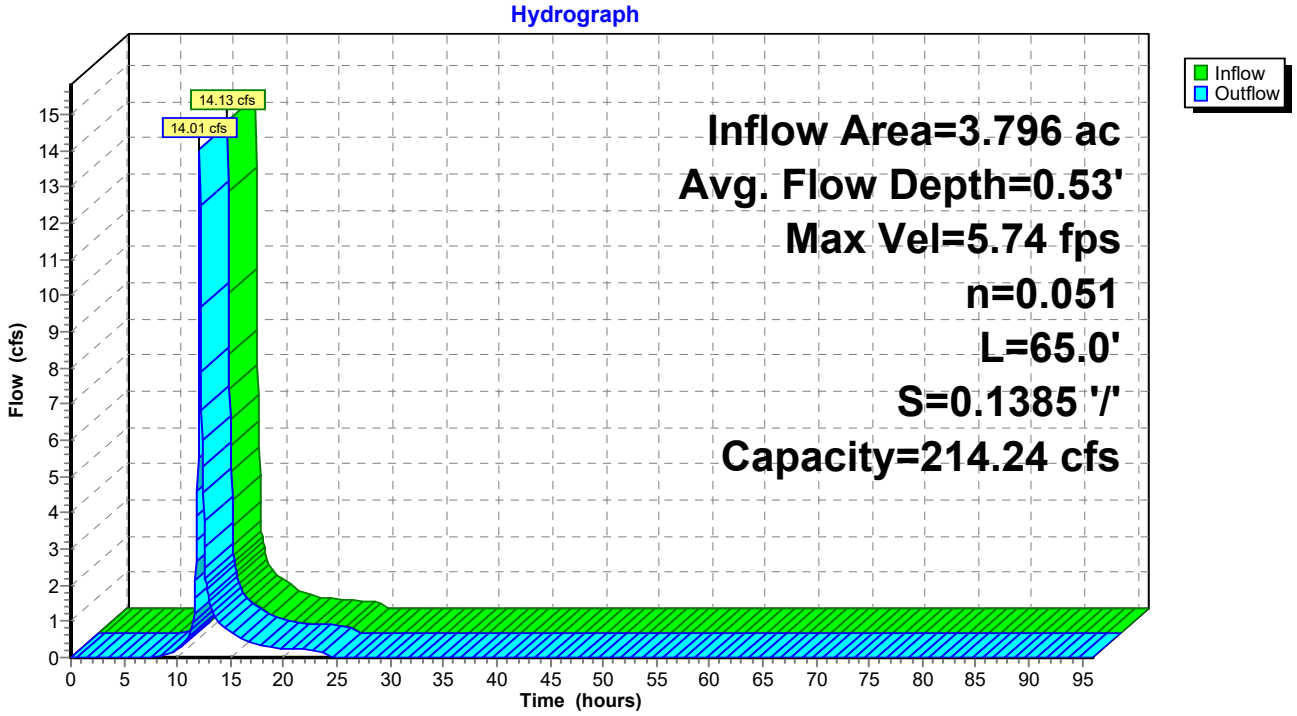
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.74 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.86 fps, Avg. Travel Time= 0.6 min

Peak Storage= 160 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 6.21'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 214.24 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 65.0' Slope= 0.1385 '/'
Inlet Invert= 876.00', Outlet Invert= 867.00'

‡

Reach DC-1: DC-N-1



Summary for Reach DC-1A: DC-N-1A

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 3.30" for 25-yr 24-hr event
Inflow = 14.01 cfs @ 12.11 hrs, Volume= 1.045 af
Outflow = 13.90 cfs @ 12.11 hrs, Volume= 1.045 af, Atten= 1%, Lag= 0.3 min

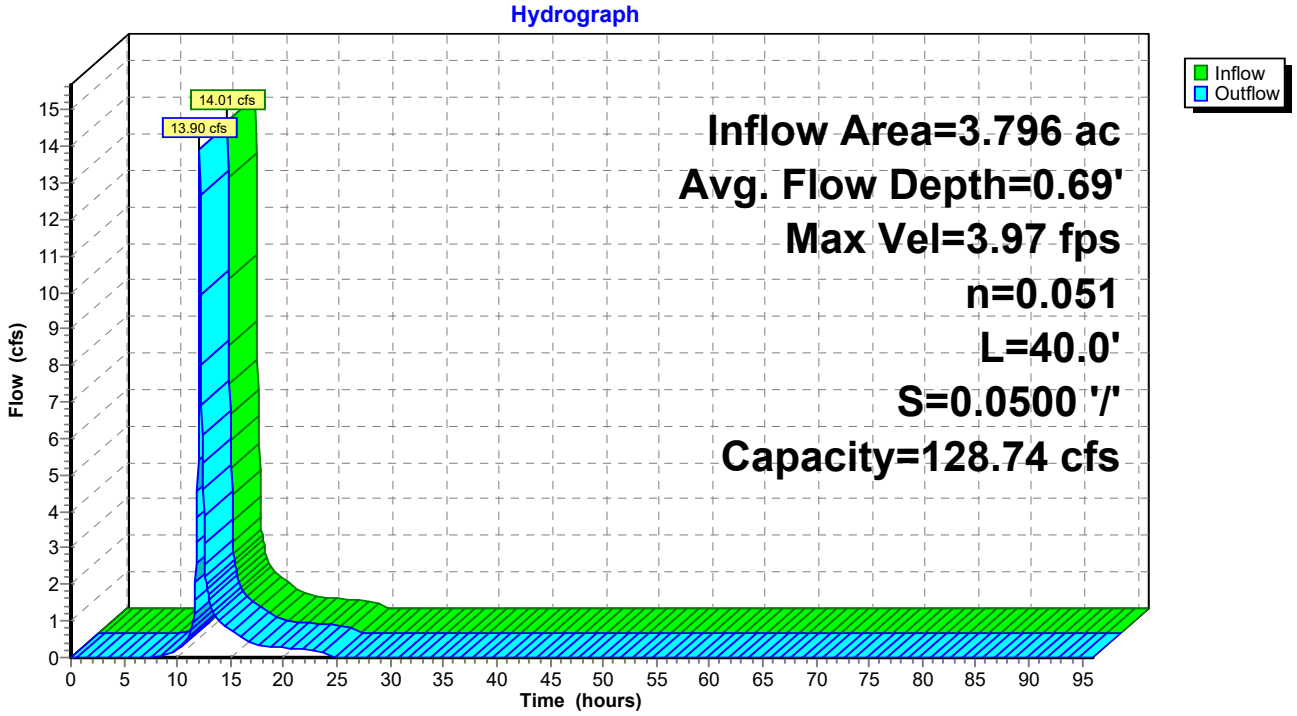
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.97 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 0.5 min

Peak Storage= 141 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.69' , Surface Width= 7.16'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 128.74 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 40.0' Slope= 0.0500 '/'
Inlet Invert= 867.00', Outlet Invert= 865.00'

‡

Reach DC-1A: DC-N-1A



Summary for Reach DC-3: DC-N-3

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 3.30" for 25-yr 24-hr event
Inflow = 15.50 cfs @ 12.15 hrs, Volume= 1.297 af
Outflow = 15.43 cfs @ 12.16 hrs, Volume= 1.297 af, Atten= 0%, Lag= 0.3 min

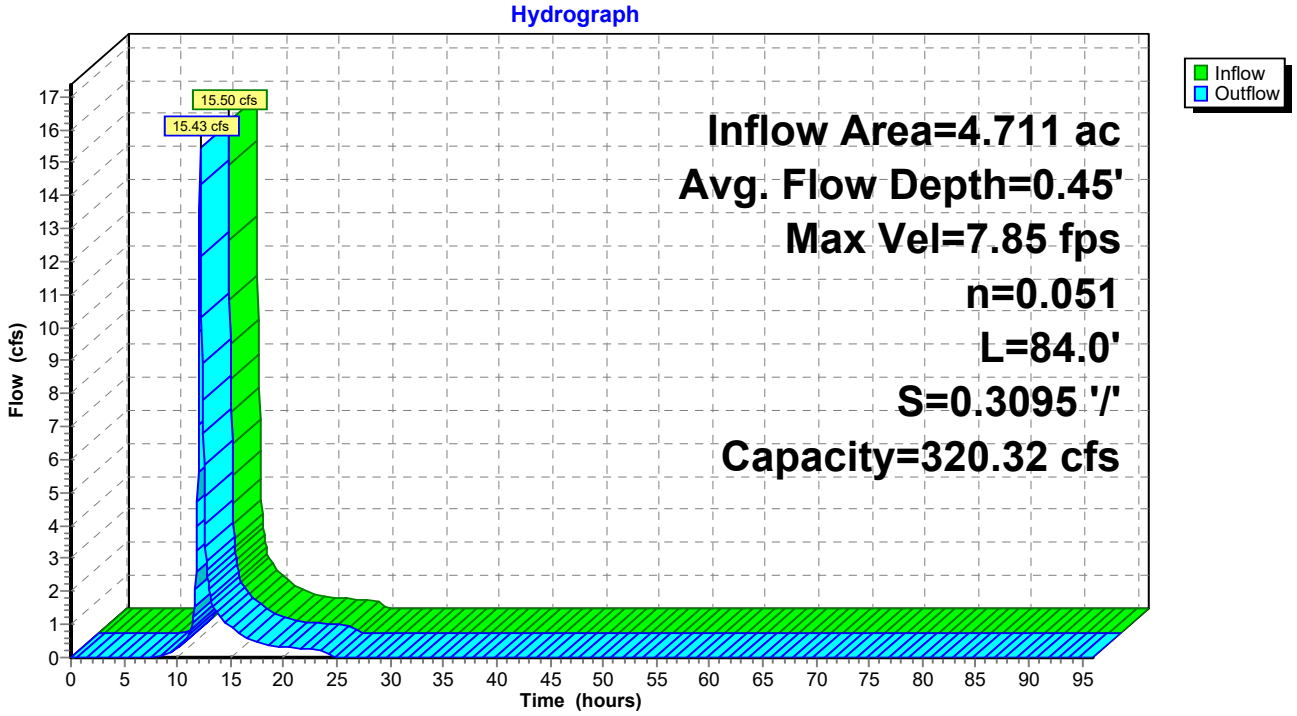
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.85 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.59 fps, Avg. Travel Time= 0.5 min

Peak Storage= 166 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.45' , Surface Width= 5.72'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 320.32 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 84.0' Slope= 0.3095 '/'
Inlet Invert= 896.00', Outlet Invert= 870.00'

‡

Reach DC-3: DC-N-3



Summary for Reach DC-3A: DC-N-3A

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 3.30" for 25-yr 24-hr event
Inflow = 15.43 cfs @ 12.16 hrs, Volume= 1.297 af
Outflow = 15.38 cfs @ 12.16 hrs, Volume= 1.297 af, Atten= 0%, Lag= 0.1 min

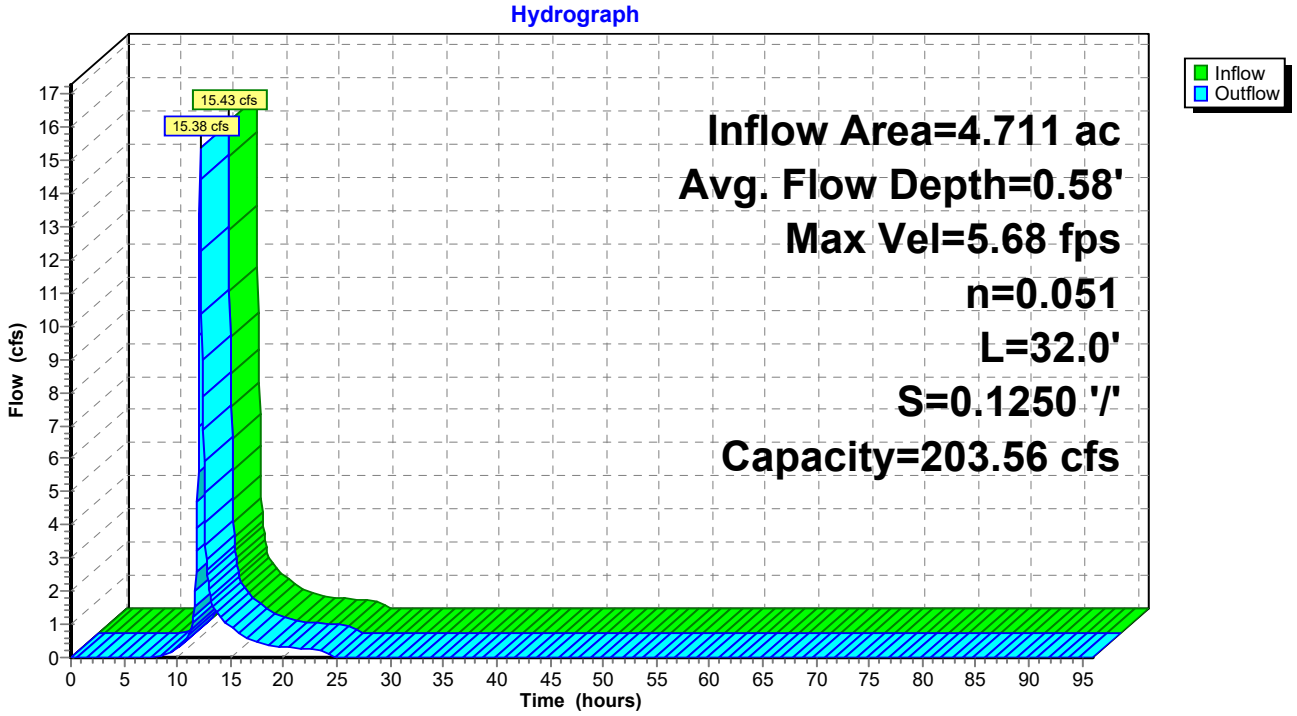
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.68 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 0.3 min

Peak Storage= 87 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.58' , Surface Width= 6.45'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 203.56 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 32.0' Slope= 0.1250 '/'
Inlet Invert= 870.00', Outlet Invert= 866.00'

‡

Reach DC-3A: DC-N-3A



Summary for Reach DC-N-4: DC-N-4

Inflow Area = 3.017 ac, 0.00% Impervious, Inflow Depth = 3.30" for 25-yr 24-hr event
Inflow = 10.34 cfs @ 12.13 hrs, Volume= 0.830 af
Outflow = 10.23 cfs @ 12.15 hrs, Volume= 0.830 af, Atten= 1%, Lag= 0.9 min

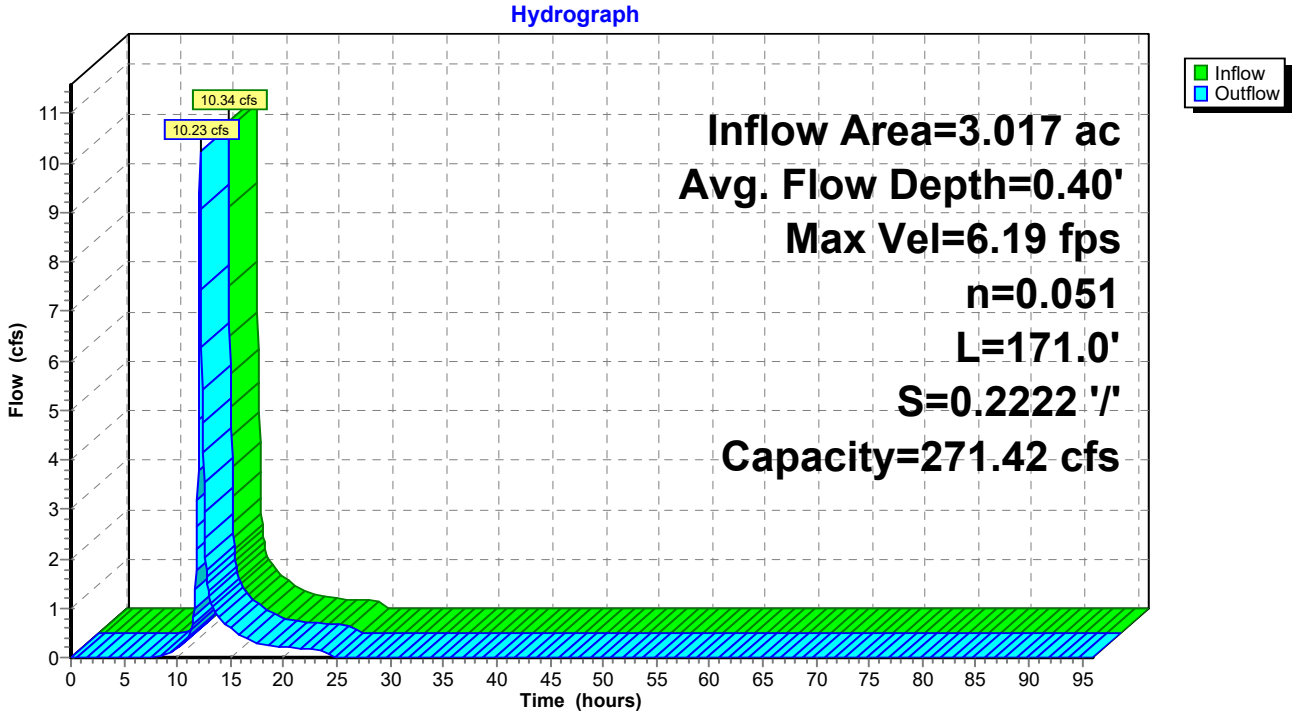
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.19 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.99 fps, Avg. Travel Time= 1.4 min

Peak Storage= 286 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 5.39'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 271.42 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 171.0' Slope= 0.2222 '/'
Inlet Invert= 914.00', Outlet Invert= 876.00'

‡

Reach DC-N-4: DC-N-4



Summary for Pond P1: PND-N

Inflow Area = 15.820 ac, 6.08% Impervious, Inflow Depth = 3.20" for 25-yr 24-hr event
Inflow = 47.83 cfs @ 12.15 hrs, Volume= 4.216 af
Outflow = 2.85 cfs @ 15.26 hrs, Volume= 4.191 af, Atten= 94%, Lag= 186.4 min
Primary = 2.85 cfs @ 15.26 hrs, Volume= 4.191 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Starting Elev= 862.00' Surf.Area= 35,753 sf Storage= 68,544 cf
Peak Elev= 865.07' @ 15.26 hrs Surf.Area= 40,618 sf Storage= 185,707 cf (117,163 cf above start)
Flood Elev= 867.00' Surf.Area= 43,936 sf Storage= 267,199 cf (198,655 cf above start)

Plug-Flow detention time= 1,458.0 min calculated for 2.618 af (62% of inflow)
Center-of-Mass det. time= 896.3 min (1,731.4 - 835.1)

Volume	Invert	Avail.Storage	Storage Description
#1	860.00'	312,031 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

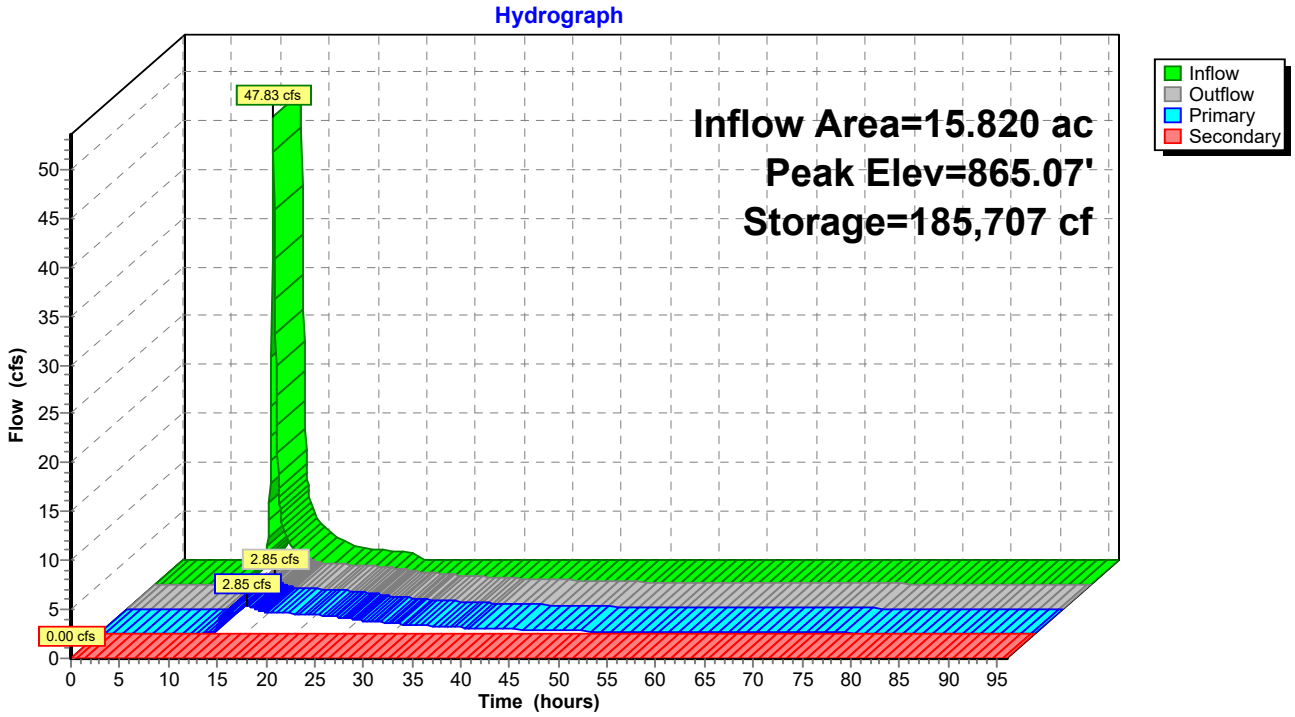
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.00	32,791	0	0
862.00	35,753	68,544	68,544
864.00	38,860	74,613	143,157
866.00	42,143	81,003	224,160
868.00	45,728	87,871	312,031

Device	Routing	Invert	Outlet Devices
#1	Primary	860.00'	**24.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 860.00' / 859.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	862.00'	**1.0" Vert. Orifice/Grate X 12.00 columns** X 5 rows with 6.0" cc spacing C= 0.600 Limited to weir flow at low heads
#3	Device 1	865.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	866.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.79 cfs @ 15.26 hrs HW=865.07' (Free Discharge)
└**1=Culvert** (Passes 2.79 cfs of 30.52 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 2.21 cfs @ 6.75 fps)
└**3=Orifice/Grate** (Weir Controls 0.58 cfs @ 0.87 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=862.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: PND-N


Hydrograph
Inflow Area=15.820 ac
Peak Elev=865.07'
Storage=185,707 cf
Inflow
Outflow
Primary
Secondary
47.83 cfs
2.85 cfs
2.85 cfs
0.00 cfs
Flow (cfs)
Time (hours)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95

Summary for Pond SB-1: Stilling Basin - 1

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 3.18" for 25-yr 24-hr event
Inflow = 2.92 cfs @ 15.26 hrs, Volume= 4.290 af
Outflow = 2.92 cfs @ 15.27 hrs, Volume= 4.271 af, Atten= 0%, Lag= 0.5 min
Primary = 2.92 cfs @ 15.27 hrs, Volume= 4.271 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Peak Elev= 857.19' @ 15.27 hrs Surf.Area= 0.017 ac Storage= 0.021 af

Plug-Flow detention time= 21.8 min calculated for 4.269 af (100% of inflow)
Center-of-Mass det. time= 5.5 min (1,718.1 - 1,712.6)

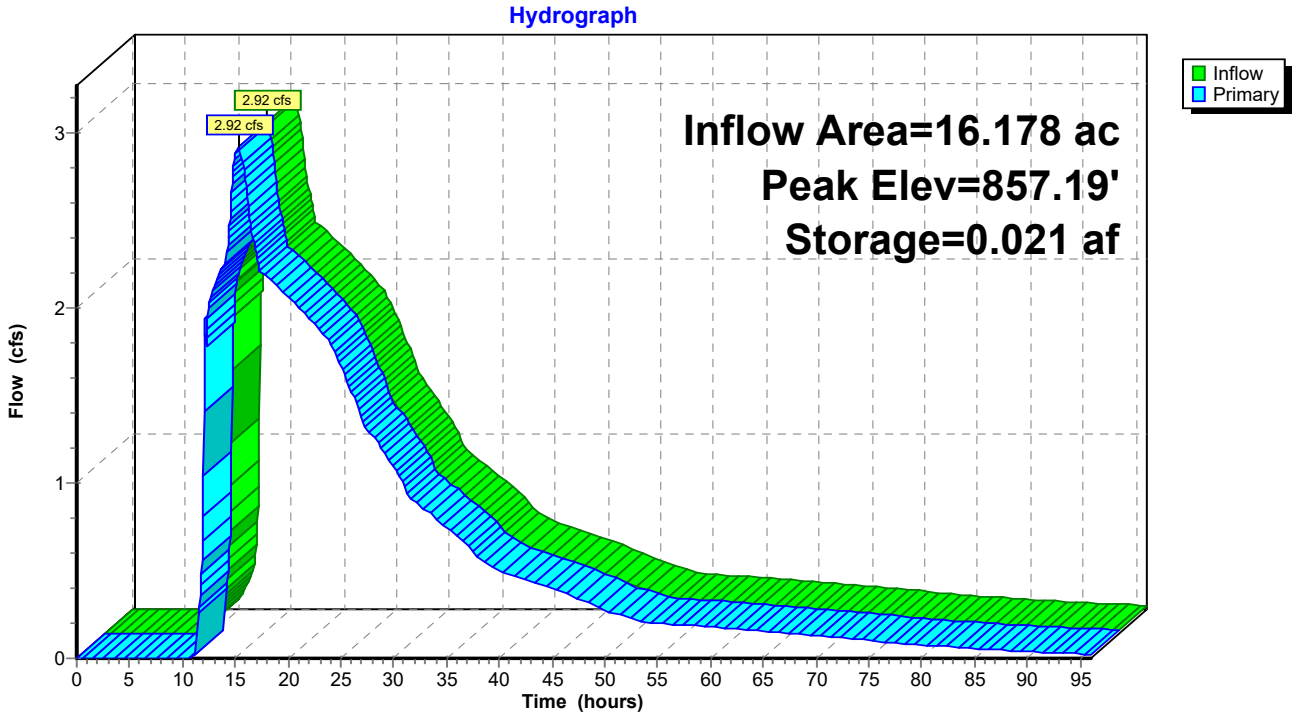
Volume	Invert	Avail.Storage	Storage Description
#1	854.00'	0.044 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
854.00	0.002	0.000	0.000
856.00	0.007	0.009	0.009
857.00	0.012	0.010	0.019
858.00	0.038	0.025	0.044

Device	Routing	Invert	Outlet Devices
#1	Primary	857.00'	**15.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=2.90 cfs @ 15.27 hrs HW=857.19' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 2.90 cfs @ 1.03 fps)

Pond SB-1: Stilling Basin - 1

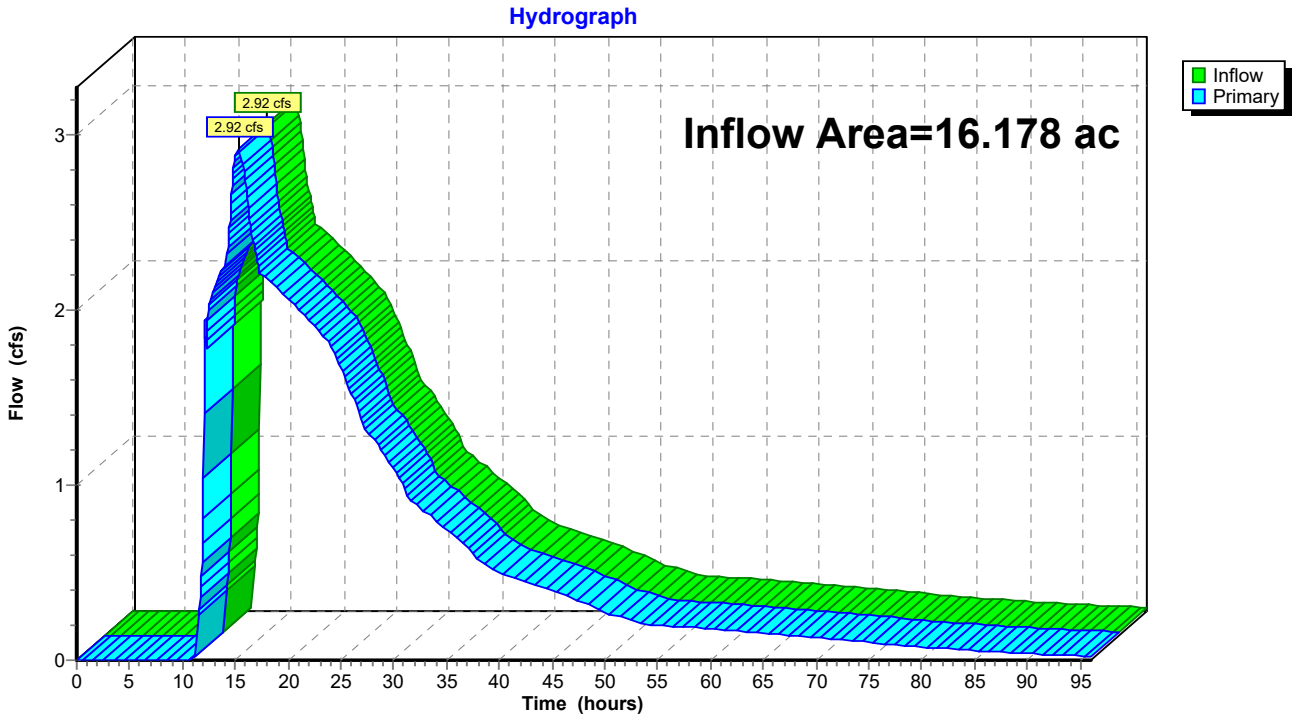


Summary for Link 1L: POI_N

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 3.17" for 25-yr 24-hr event
Inflow = 2.92 cfs @ 15.27 hrs, Volume= 4.271 af
Primary = 2.92 cfs @ 15.27 hrs, Volume= 4.271 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 1L: POI_N



Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-N-3: P-N-3 Runoff Area=205,200 sf 0.00% Impervious Runoff Depth=5.65"
Flow Length=1,188' Tc=10.6 min CN=74 Runoff=26.38 cfs 2.217 af

Subcatchment P-N-4: P-N-4 Runoff Area=131,400 sf 0.00% Impervious Runoff Depth=5.65"
Flow Length=888' Tc=9.0 min CN=74 Runoff=17.58 cfs 1.420 af

Subcatchment P-N-5: P-N-5 Runoff Area=15,586 sf 0.00% Impervious Runoff Depth=5.65"
Flow Length=35' Slope=0.0250 '/' Tc=5.6 min CN=74 Runoff=2.33 cfs 0.168 af

Subcatchment P-NP-1: P-NP-1 Runoff Area=113,832 sf 0.00% Impervious Runoff Depth=5.65"
Flow Length=835' Tc=6.9 min CN=74 Runoff=16.46 cfs 1.230 af

Subcatchment P-NP-2A: P-NP-2A Runoff Area=51,529 sf 0.00% Impervious Runoff Depth=5.65"
Flow Length=485' Tc=6.3 min CN=74 Runoff=7.57 cfs 0.557 af

Subcatchment P-NP-2B: P-NP-2B Runoff Area=187,165 sf 22.40% Impervious Runoff Depth=5.16"
Flow Length=340' Tc=15.6 min CN=70 Runoff=19.31 cfs 1.847 af

Reach 2R: Outlet Channel Avg. Flow Depth=0.55' Max Vel=6.41 fps Inflow=26.86 cfs 7.410 af
n=0.022 L=150.0' S=0.0267 '/' Capacity=80.50 cfs Outflow=26.82 cfs 7.410 af

Reach DC-1: DC-N-1 Avg. Flow Depth=0.70' Max Vel=6.68 fps Inflow=24.01 cfs 1.786 af
n=0.051 L=65.0' S=0.1385 '/' Capacity=214.24 cfs Outflow=23.85 cfs 1.786 af

Reach DC-1A: DC-N-1A Avg. Flow Depth=0.91' Max Vel=4.60 fps Inflow=23.85 cfs 1.786 af
n=0.051 L=40.0' S=0.0500 '/' Capacity=128.74 cfs Outflow=23.69 cfs 1.786 af

Reach DC-3: DC-N-3 Avg. Flow Depth=0.60' Max Vel=9.15 fps Inflow=26.38 cfs 2.217 af
n=0.051 L=84.0' S=0.3095 '/' Capacity=320.32 cfs Outflow=26.28 cfs 2.217 af

Reach DC-3A: DC-N-3A Avg. Flow Depth=0.76' Max Vel=6.59 fps Inflow=26.28 cfs 2.217 af
n=0.051 L=32.0' S=0.1250 '/' Capacity=203.56 cfs Outflow=26.22 cfs 2.217 af

Reach DC-N-4: DC-N-4 Avg. Flow Depth=0.53' Max Vel=7.22 fps Inflow=17.58 cfs 1.420 af
n=0.051 L=171.0' S=0.2222 '/' Capacity=271.42 cfs Outflow=17.42 cfs 1.420 af

Pond P1: PND-N Peak Elev=865.84' Storage=217,540 cf Inflow=82.24 cfs 7.270 af
Primary=26.45 cfs 7.242 af Secondary=0.00 cfs 0.000 af Outflow=26.45 cfs 7.242 af

Pond SB-1: Stilling Basin - 1 Peak Elev=857.76' Storage=0.035 af Inflow=26.82 cfs 7.410 af
Outflow=26.81 cfs 7.391 af

Link 1L: POI_N Inflow=26.81 cfs 7.391 af
Primary=26.81 cfs 7.391 af

Total Runoff Area = 16.178 ac Runoff Volume = 7.438 af Average Runoff Depth = 5.52"
94.05% Pervious = 15.215 ac 5.95% Impervious = 0.963 ac

Summary for Subcatchment P-N-3: P-N-3

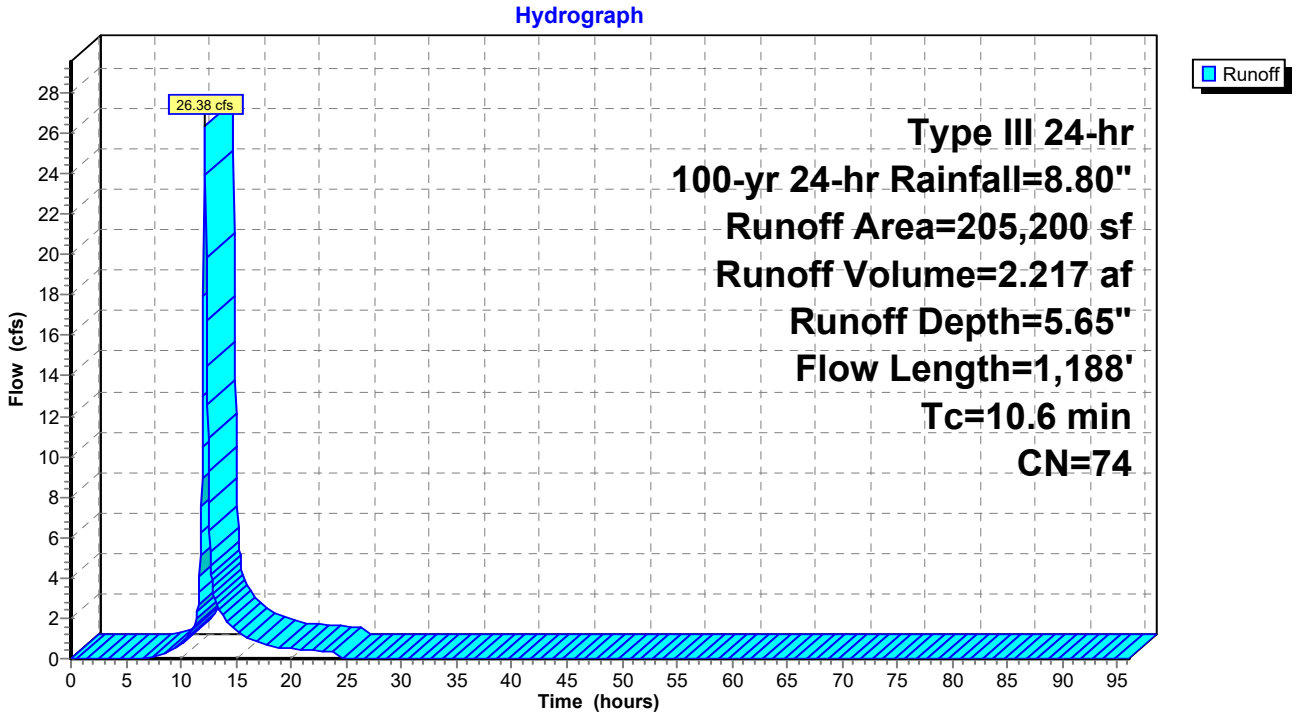
Runoff = 26.38 cfs @ 12.15 hrs, Volume= 2.217 af, Depth= 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr 24-hr Rainfall=8.80"

Area (sf)	CN	Description
205,200	74	>75% Grass cover, Good, HSG C
205,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
4.2	1,110	0.0090	4.36	34.90	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030
10.6	1,188	Total			

Subcatchment P-N-3: P-N-3



Summary for Subcatchment P-N-4: P-N-4

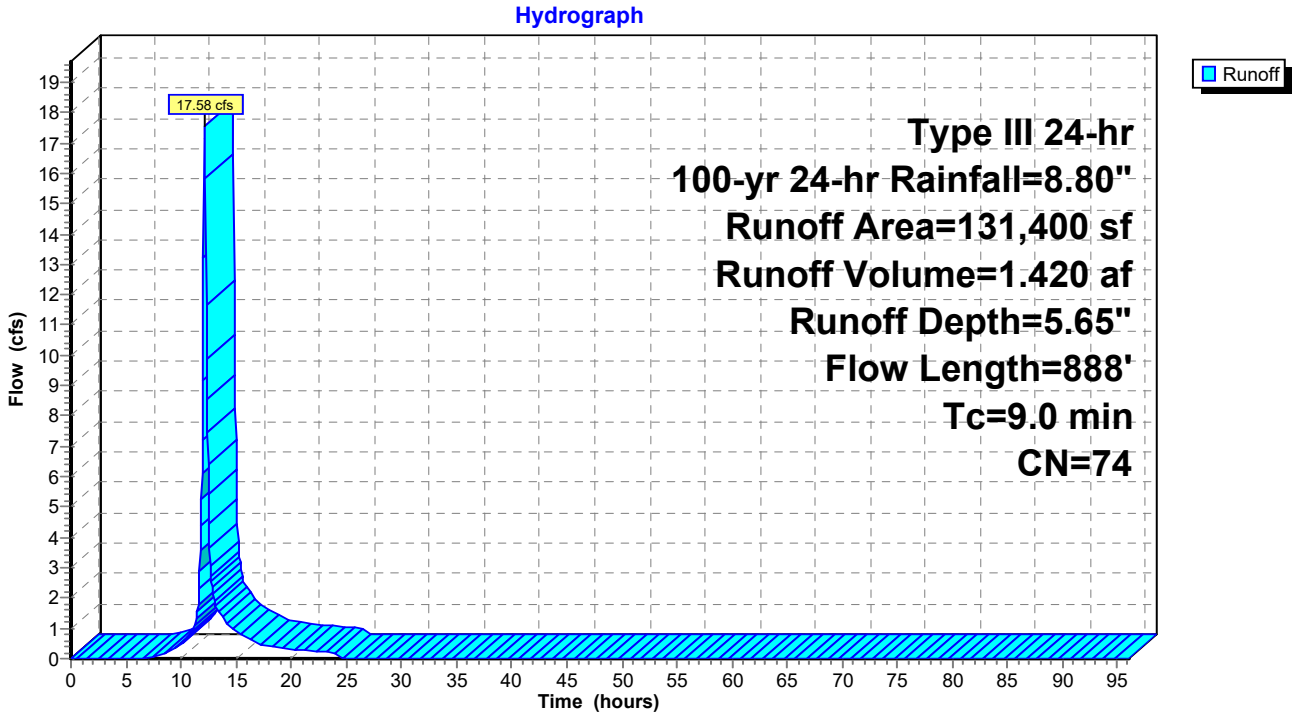
Runoff = 17.58 cfs @ 12.13 hrs, Volume= 1.420 af, Depth= 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr 24-hr Rainfall=8.80"

Area (sf)	CN	Description
131,400	74	>75% Grass cover, Good, HSG C
131,400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	38	0.0250	0.11		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
1.8	250	0.1040	2.26		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.2	600	0.0330	8.35	66.83	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
9.0	888	Total			

Subcatchment P-N-4: P-N-4



Summary for Subcatchment P-N-5: P-N-5

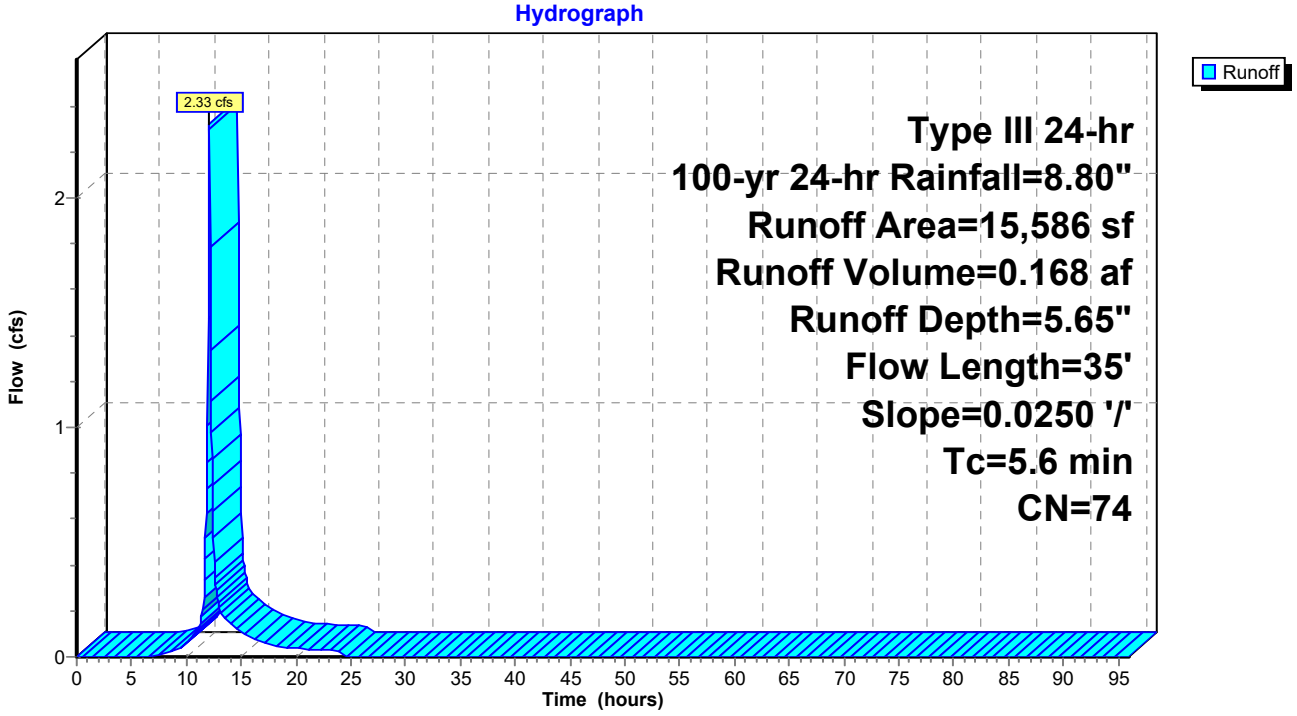
Runoff = 2.33 cfs @ 12.09 hrs, Volume= 0.168 af, Depth= 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr 24-hr Rainfall=8.80"

Area (sf)	CN	Description
15,586	74	>75% Grass cover, Good, HSG C
15,586		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	35	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"

Subcatchment P-N-5: P-N-5



Summary for Subcatchment P-NP-1: P-NP-1

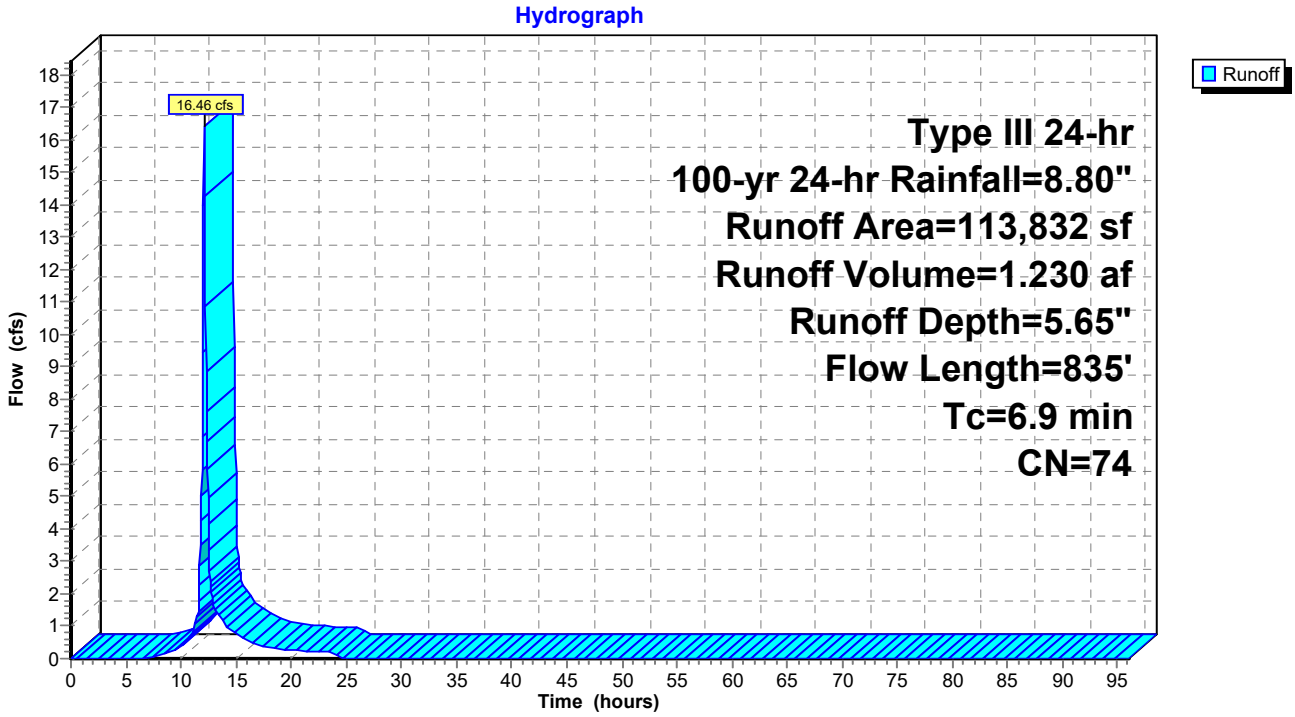
Runoff = 16.46 cfs @ 12.10 hrs, Volume= 1.230 af, Depth= 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr 24-hr Rainfall=8.80"

Area (sf)	CN	Description
113,832	74	>75% Grass cover, Good, HSG C
113,832		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
2.2	770	0.0156	5.74	45.95	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.9	835	Total			

Subcatchment P-NP-1: P-NP-1



Summary for Subcatchment P-NP-2A: P-NP-2A

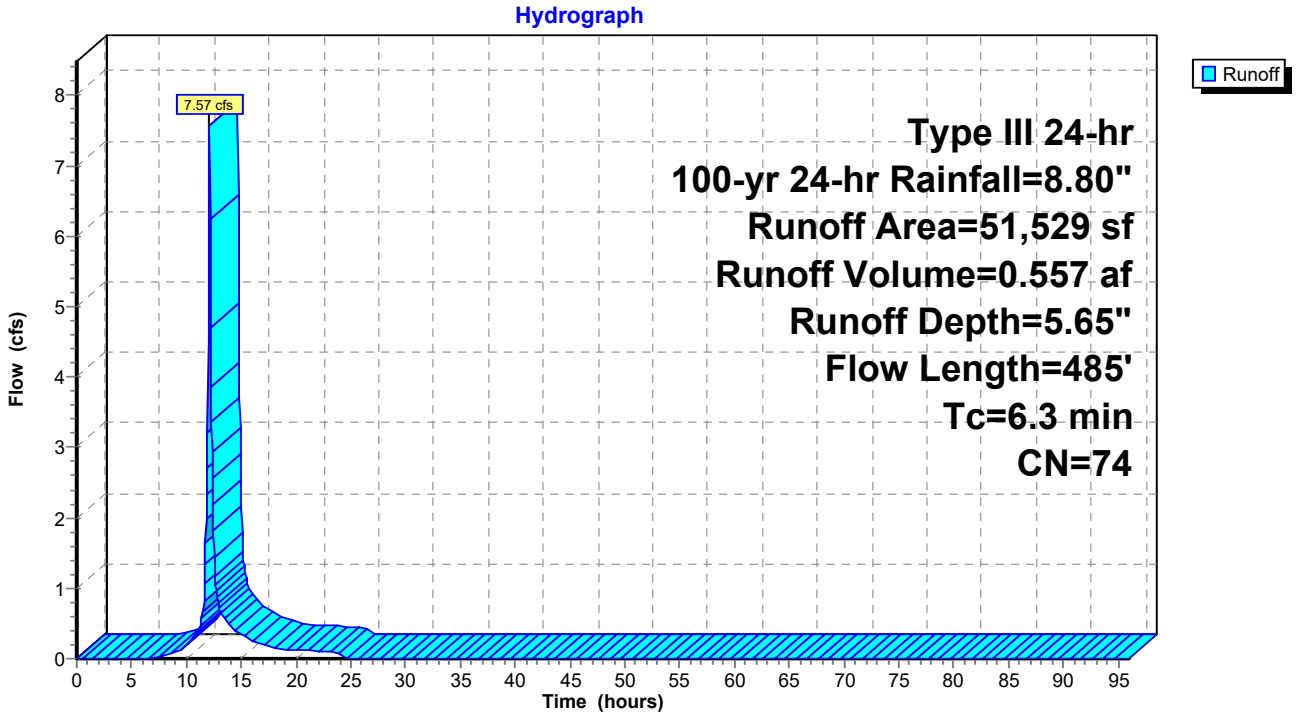
Runoff = 7.57 cfs @ 12.09 hrs, Volume= 0.557 af, Depth= 5.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr 24-hr Rainfall=8.80"

Area (sf)	CN	Description
51,529	74	>75% Grass cover, Good, HSG C
51,529		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	25	0.0250	0.10		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
0.4	40	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
1.6	420	0.0095	4.48	35.85	**Trap/Vee/Rect Channel Flow, Sideslope Swale** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
6.3	485	Total			

Subcatchment P-NP-2A: P-NP-2A



Summary for Subcatchment P-NP-2B: P-NP-2B

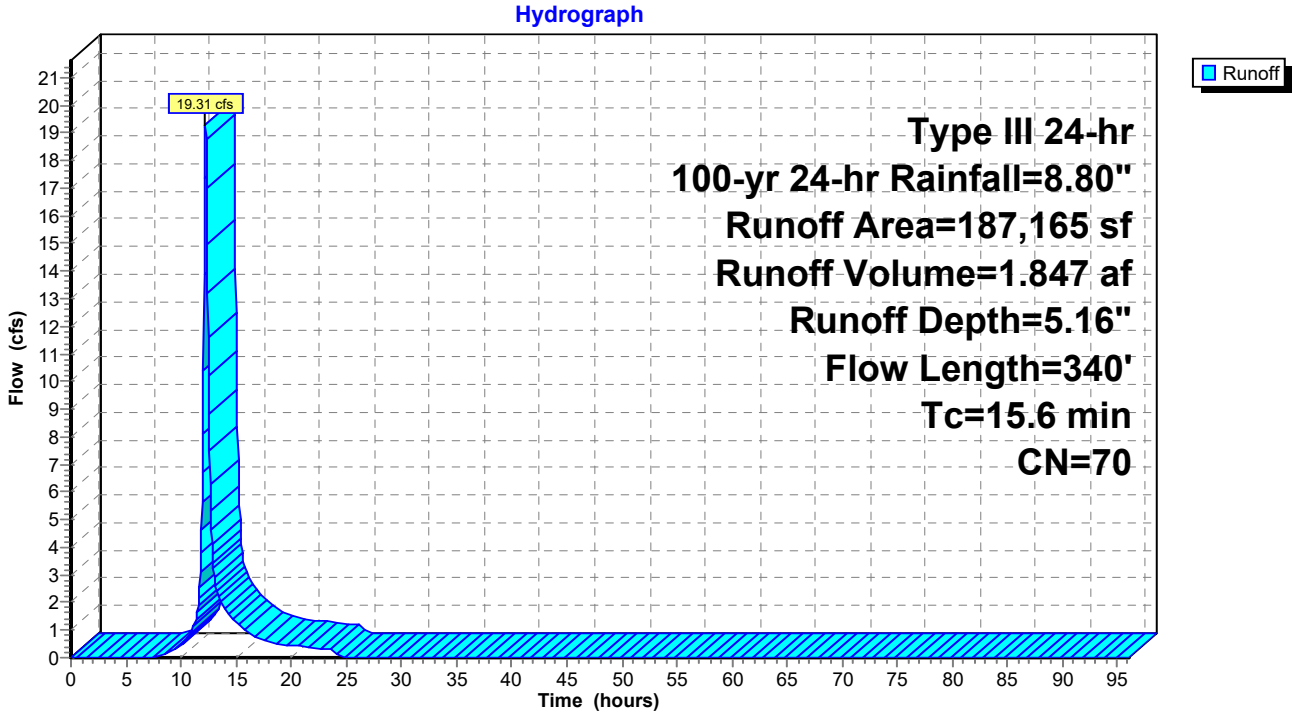
Runoff = 19.31 cfs @ 12.22 hrs, Volume= 1.847 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr 24-hr Rainfall=8.80"

	Area (sf)	CN	Description
	25,195	74	>75% Grass cover, Good, HSG C
	111,432	57	Woods/grass comb., Poor, HSG A
*	41,933	98	North Pond
*	8,605	85	Gravel Road
	187,165	70	Weighted Average
	145,232		77.60% Pervious Area
	41,933		22.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0250	0.13		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.23"
2.6	240	0.0500	1.57		**Shallow Concentrated Flow, Shallow Conc** Short Grass Pasture Kv= 7.0 fps
15.6	340	Total			

Subcatchment P-NP-2B: P-NP-2B



Summary for Reach 2R: Outlet Channel

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 5.50" for 100-yr 24-hr event
Inflow = 26.86 cfs @ 12.55 hrs, Volume= 7.410 af
Outflow = 26.82 cfs @ 12.56 hrs, Volume= 7.410 af, Atten= 0%, Lag= 0.7 min

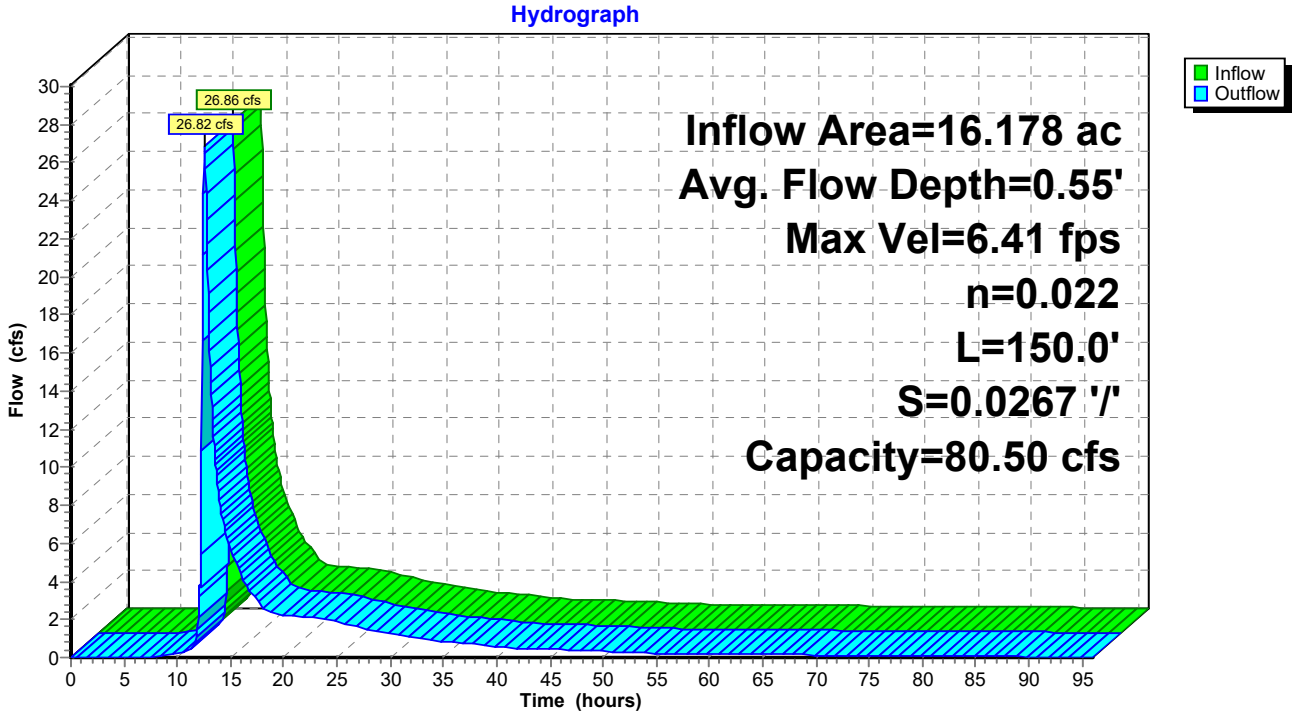
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.41 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.49 fps, Avg. Travel Time= 1.7 min

Peak Storage= 629 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.55' , Surface Width= 9.29'
Bank-Full Depth= 1.00' Flow Area= 9.0 sf, Capacity= 80.50 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 12.00'
Length= 150.0' Slope= 0.0267 '/'
Inlet Invert= 858.00', Outlet Invert= 854.00'

‡

Reach 2R: Outlet Channel



Summary for Reach DC-1: DC-N-1

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 5.65" for 100-yr 24-hr event
Inflow = 24.01 cfs @ 12.10 hrs, Volume= 1.786 af
Outflow = 23.85 cfs @ 12.10 hrs, Volume= 1.786 af, Atten= 1%, Lag= 0.2 min

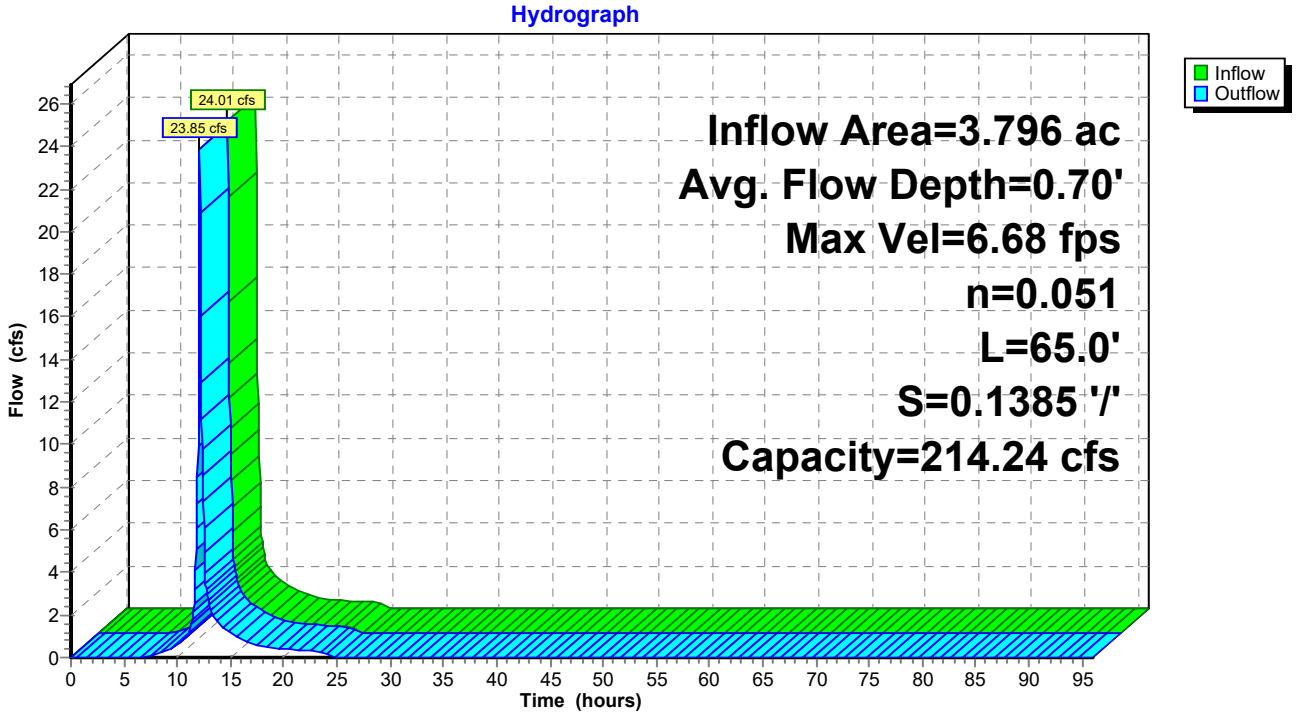
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.68 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.13 fps, Avg. Travel Time= 0.5 min

Peak Storage= 234 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.70' , Surface Width= 7.23'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 214.24 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 65.0' Slope= 0.1385 '/'
Inlet Invert= 876.00', Outlet Invert= 867.00'

‡

Reach DC-1: DC-N-1



Summary for Reach DC-1A: DC-N-1A

Inflow Area = 3.796 ac, 0.00% Impervious, Inflow Depth = 5.65" for 100-yr 24-hr event
Inflow = 23.85 cfs @ 12.10 hrs, Volume= 1.786 af
Outflow = 23.69 cfs @ 12.11 hrs, Volume= 1.786 af, Atten= 1%, Lag= 0.2 min

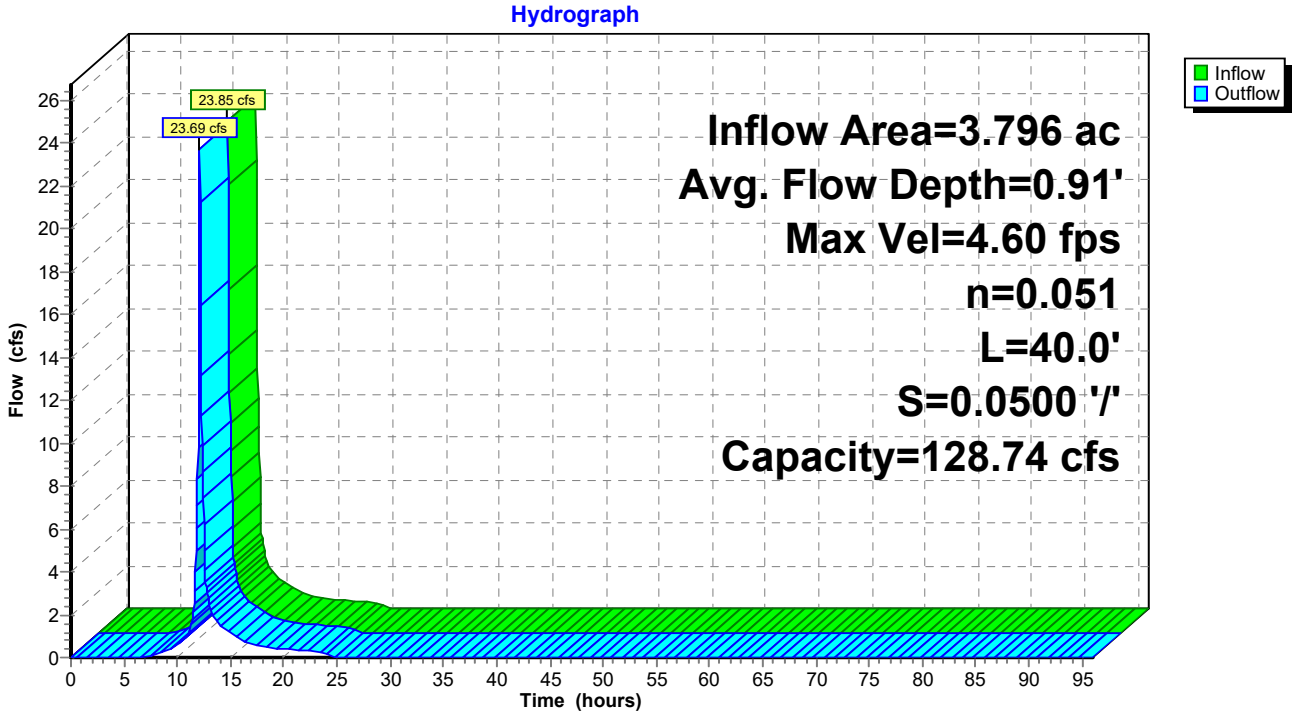
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.60 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.52 fps, Avg. Travel Time= 0.4 min

Peak Storage= 207 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.91' , Surface Width= 8.44'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 128.74 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 40.0' Slope= 0.0500 '/'
Inlet Invert= 867.00', Outlet Invert= 865.00'

‡

Reach DC-1A: DC-N-1A



Summary for Reach DC-3: DC-N-3

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 5.65" for 100-yr 24-hr event
Inflow = 26.38 cfs @ 12.15 hrs, Volume= 2.217 af
Outflow = 26.28 cfs @ 12.15 hrs, Volume= 2.217 af, Atten= 0%, Lag= 0.2 min

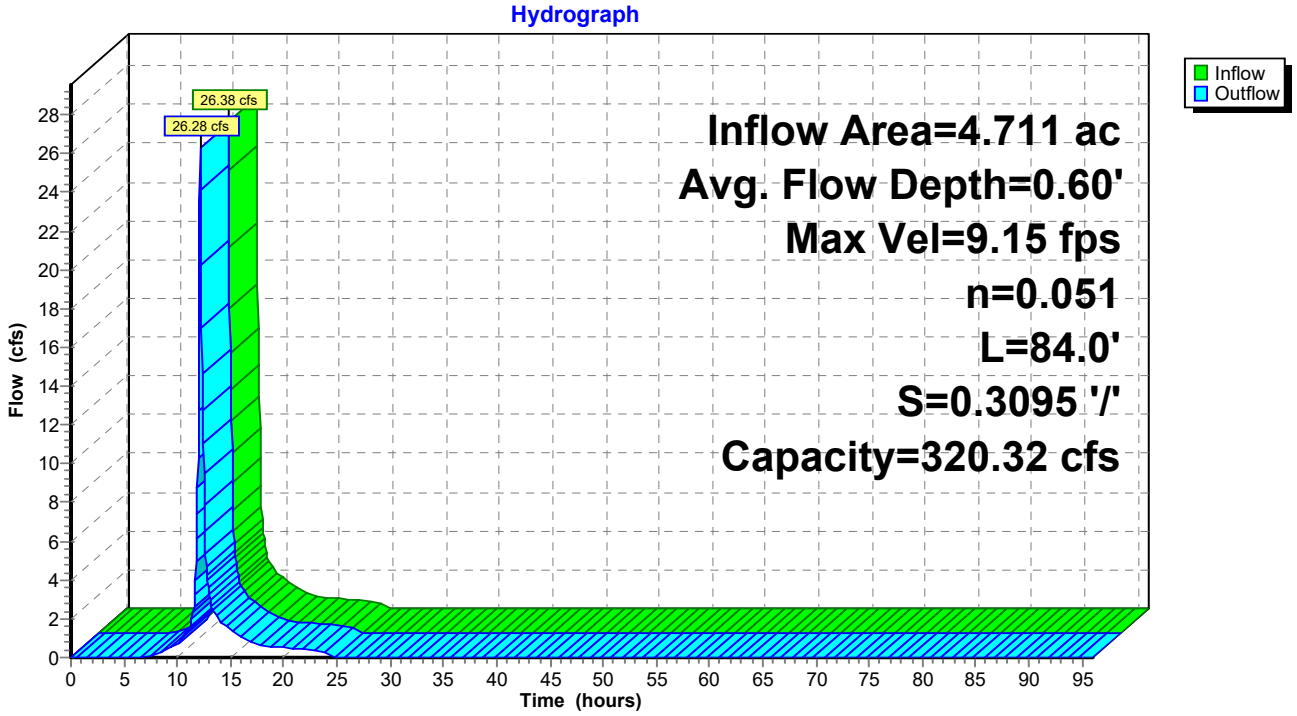
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.15 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.98 fps, Avg. Travel Time= 0.5 min

Peak Storage= 242 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.60' , Surface Width= 6.60'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 320.32 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 84.0' Slope= 0.3095 '/'
Inlet Invert= 896.00', Outlet Invert= 870.00'

‡

Reach DC-3: DC-N-3



Summary for Reach DC-3A: DC-N-3A

Inflow Area = 4.711 ac, 0.00% Impervious, Inflow Depth = 5.65" for 100-yr 24-hr event
Inflow = 26.28 cfs @ 12.15 hrs, Volume= 2.217 af
Outflow = 26.22 cfs @ 12.16 hrs, Volume= 2.217 af, Atten= 0%, Lag= 0.1 min

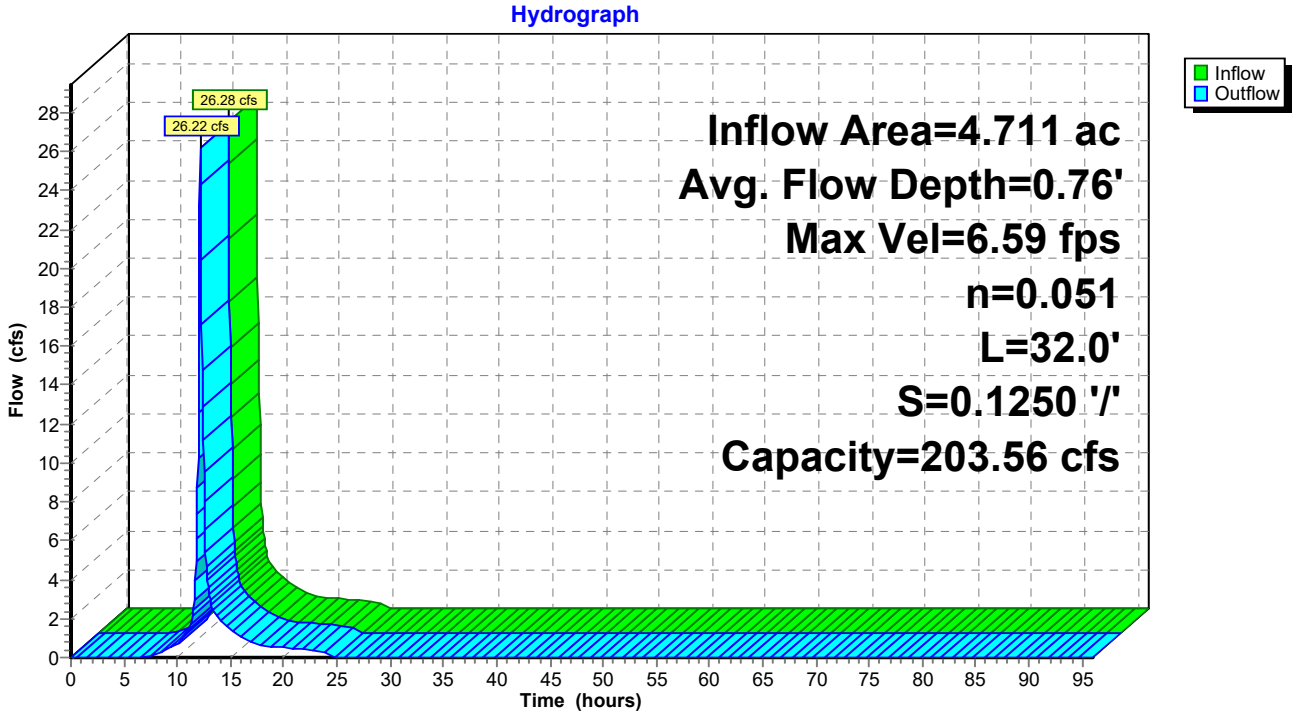
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.59 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.20 fps, Avg. Travel Time= 0.2 min

Peak Storage= 128 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.76' , Surface Width= 7.54'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 203.56 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 32.0' Slope= 0.1250 '/'
Inlet Invert= 870.00', Outlet Invert= 866.00'

‡

Reach DC-3A: DC-N-3A



Summary for Reach DC-N-4: DC-N-4

Inflow Area = 3.017 ac, 0.00% Impervious, Inflow Depth = 5.65" for 100-yr 24-hr event
Inflow = 17.58 cfs @ 12.13 hrs, Volume= 1.420 af
Outflow = 17.42 cfs @ 12.14 hrs, Volume= 1.420 af, Atten= 1%, Lag= 0.8 min

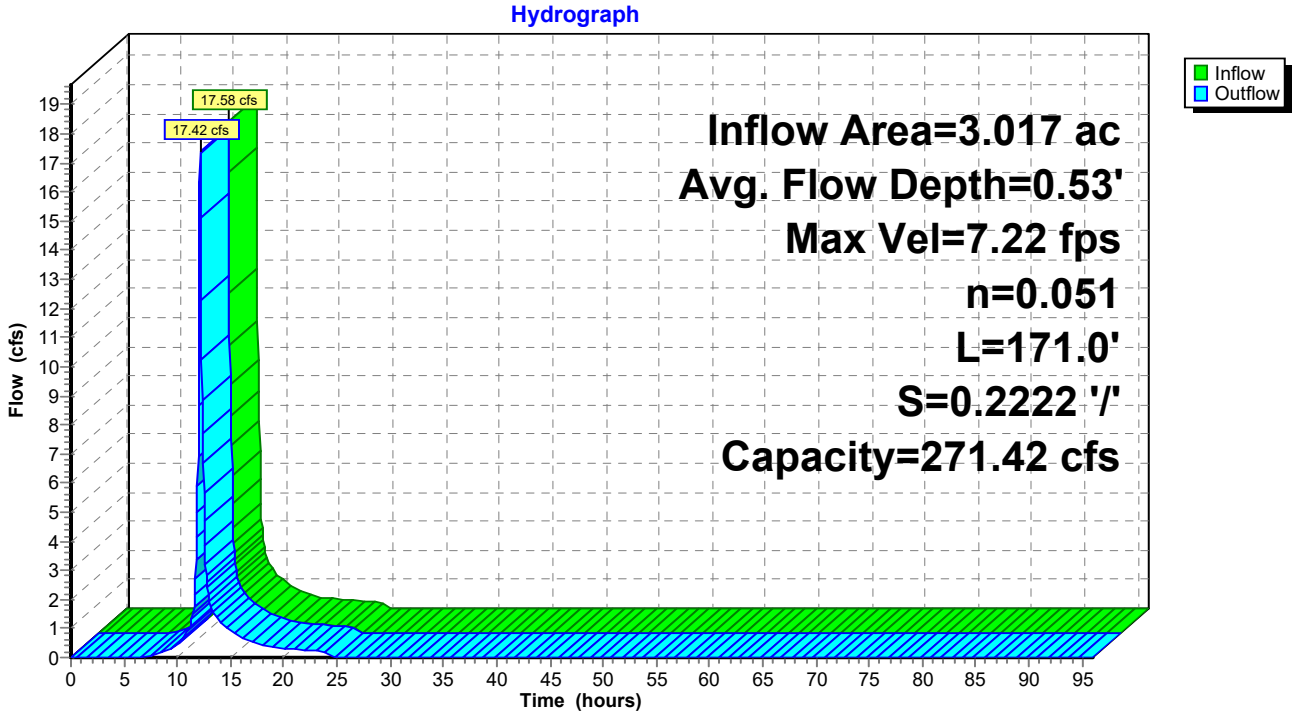
Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.22 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.29 fps, Avg. Travel Time= 1.2 min

Peak Storage= 416 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 6.18'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 271.42 cfs

3.00' x 2.00' deep channel, n= 0.051
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 171.0' Slope= 0.2222 '/'
Inlet Invert= 914.00', Outlet Invert= 876.00'

‡

Reach DC-N-4: DC-N-4



Summary for Pond P1: PND-N

Inflow Area = 15.820 ac, 6.08% Impervious, Inflow Depth = 5.51" for 100-yr 24-hr event
Inflow = 82.24 cfs @ 12.15 hrs, Volume= 7.270 af
Outflow = 26.45 cfs @ 12.55 hrs, Volume= 7.242 af, Atten= 68%, Lag= 24.5 min
Primary = 26.45 cfs @ 12.55 hrs, Volume= 7.242 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Starting Elev= 862.00' Surf.Area= 35,753 sf Storage= 68,544 cf
Peak Elev= 865.84' @ 12.55 hrs Surf.Area= 41,884 sf Storage= 217,540 cf (148,996 cf above start)
Flood Elev= 867.00' Surf.Area= 43,936 sf Storage= 267,199 cf (198,655 cf above start)

Plug-Flow detention time= 844.8 min calculated for 5.668 af (78% of inflow)
Center-of-Mass det. time= 583.8 min (1,403.2 - 819.5)

Volume	Invert	Avail.Storage	Storage Description
#1	860.00'	312,031 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

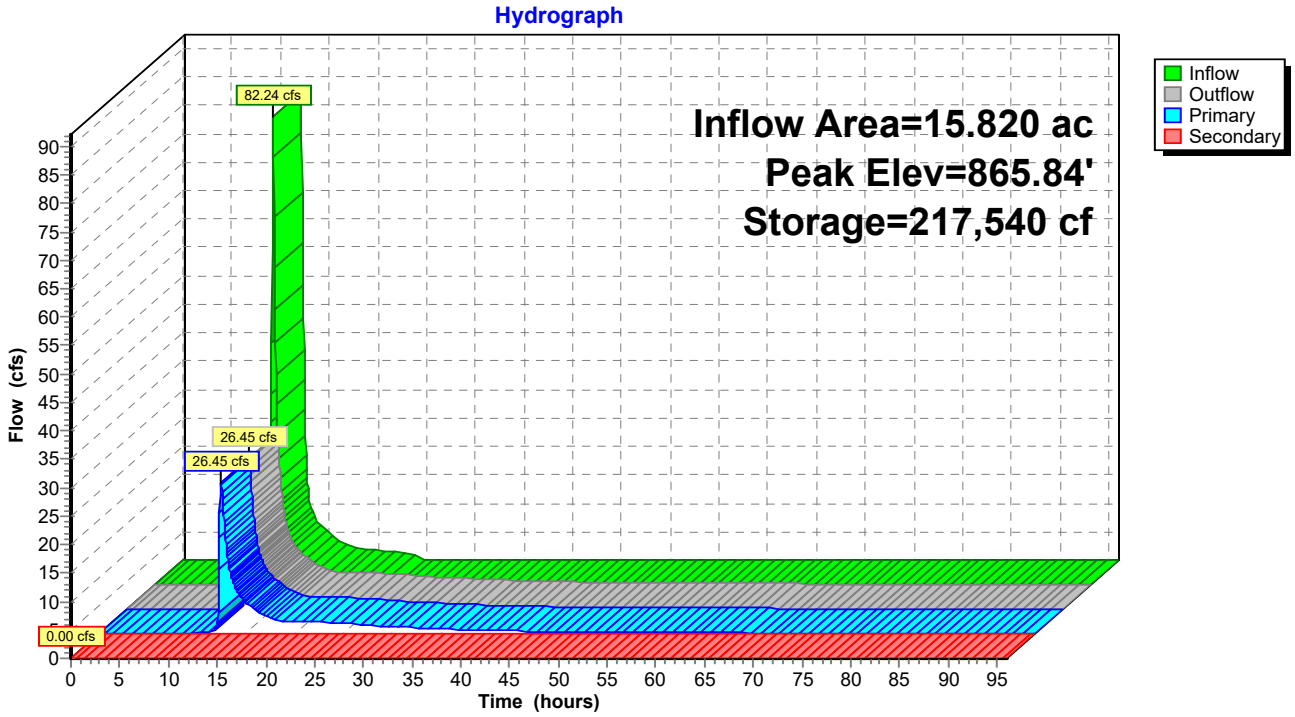
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.00	32,791	0	0
862.00	35,753	68,544	68,544
864.00	38,860	74,613	143,157
866.00	42,143	81,003	224,160
868.00	45,728	87,871	312,031

Device	Routing	Invert	Outlet Devices
#1	Primary	860.00'	**24.0" Round Culvert** L= 60.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 860.00' / 859.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	862.00'	**1.0" Vert. Orifice/Grate X 12.00 columns** X 5 rows with 6.0" cc spacing C= 0.600 Limited to weir flow at low heads
#3	Device 1	865.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	866.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=26.41 cfs @ 12.55 hrs HW=865.84' (Free Discharge)
└**1=Culvert** (Passes 26.41 cfs of 33.28 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 2.61 cfs @ 7.99 fps)
└**3=Orifice/Grate** (Weir Controls 23.79 cfs @ 3.00 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=862.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: PND-N


Hydrograph
Inflow
Outflow
Primary
Secondary
82.24 cfs
26.45 cfs
26.45 cfs
0.00 cfs
Inflow Area=15.820 ac
Peak Elev=865.84'
Storage=217,540 cf
Flow (cfs)
Time (hours)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95

Summary for Pond SB-1: Stilling Basin - 1

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 5.50" for 100-yr 24-hr event
Inflow = 26.82 cfs @ 12.56 hrs, Volume= 7.410 af
Outflow = 26.81 cfs @ 12.57 hrs, Volume= 7.391 af, Atten= 0%, Lag= 0.4 min
Primary = 26.81 cfs @ 12.57 hrs, Volume= 7.391 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
Peak Elev= 857.76' @ 12.57 hrs Surf.Area= 0.032 ac Storage= 0.035 af

Plug-Flow detention time= 13.0 min calculated for 7.387 af (100% of inflow)
Center-of-Mass det. time= 2.8 min (1,393.8 - 1,391.0)

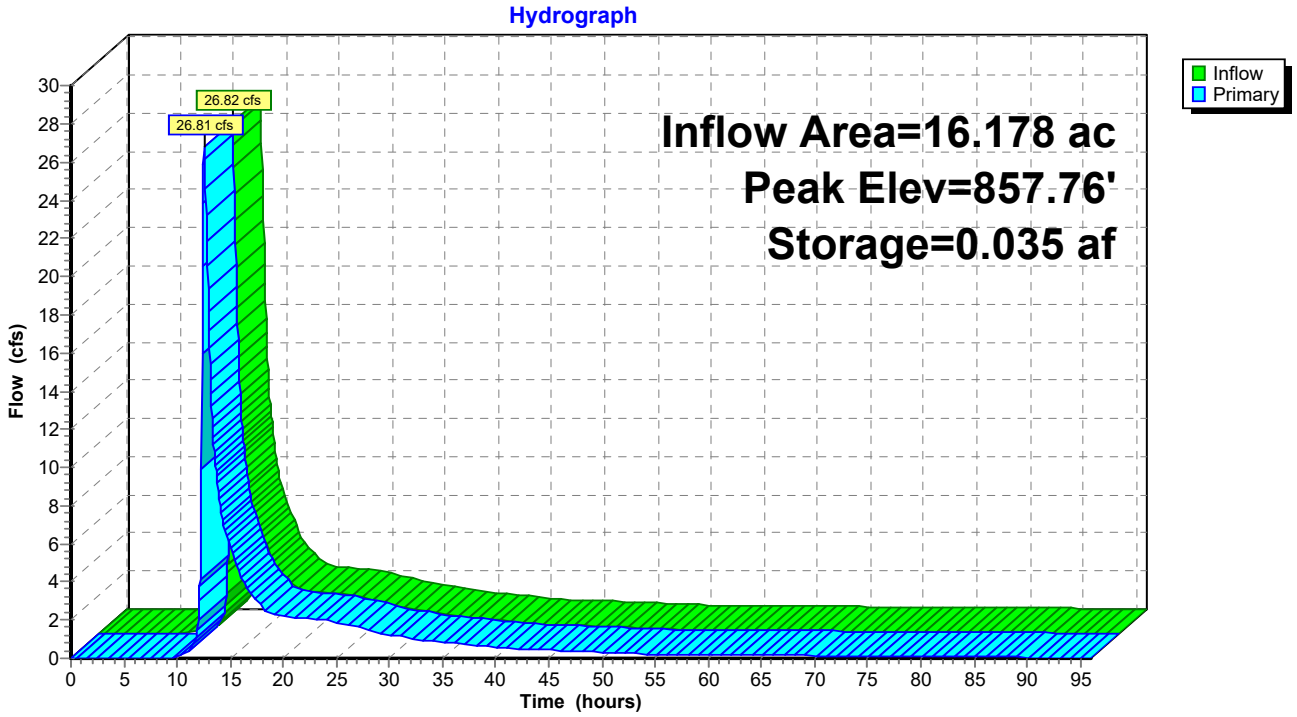
Volume	Invert	Avail.Storage	Storage Description
#1	854.00'	0.044 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
854.00	0.002	0.000	0.000
856.00	0.007	0.009	0.009
857.00	0.012	0.010	0.019
858.00	0.038	0.025	0.044

Device	Routing	Invert	Outlet Devices
#1	Primary	857.00'	**15.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=26.70 cfs @ 12.57 hrs HW=857.76' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 26.70 cfs @ 2.34 fps)

Pond SB-1: Stilling Basin - 1

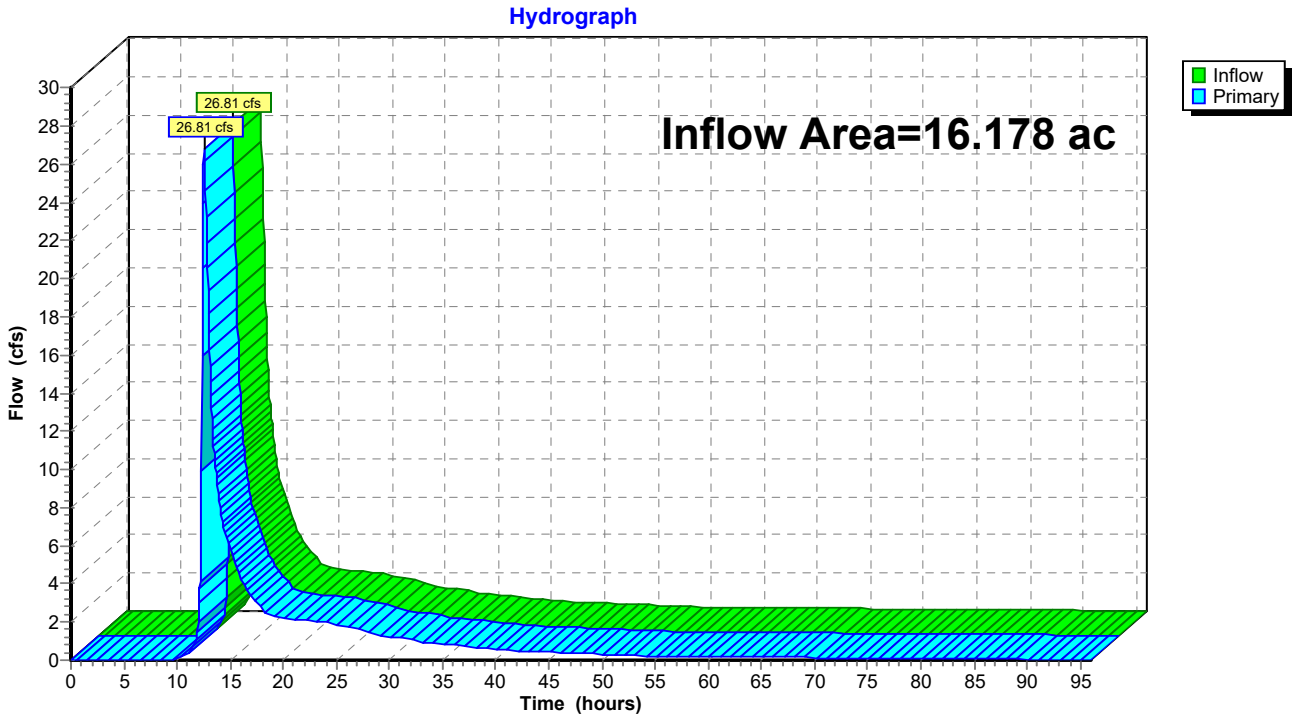


Summary for Link 1L: POI_N

Inflow Area = 16.178 ac, 5.95% Impervious, Inflow Depth > 5.48" for 100-yr 24-hr event
Inflow = 26.81 cfs @ 12.57 hrs, Volume= 7.391 af
Primary = 26.81 cfs @ 12.57 hrs, Volume= 7.391 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 1L: POI_N



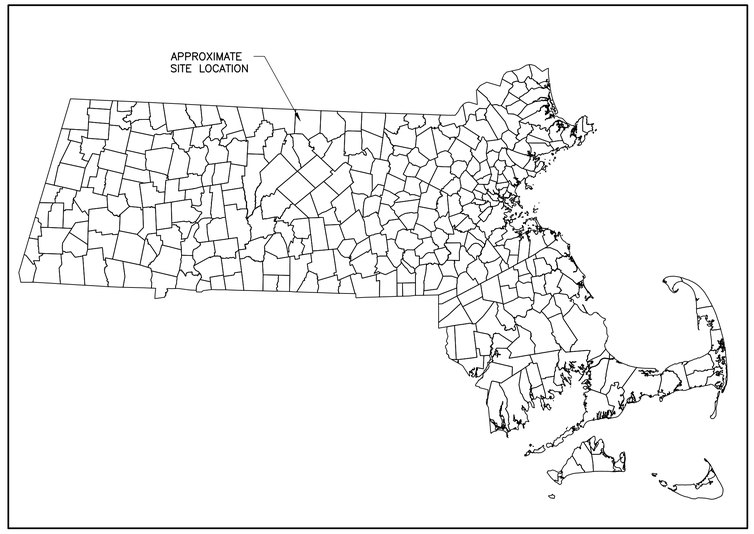
PERMIT MODIFICATION PLANS

FORMER MABARDY LANDFILL

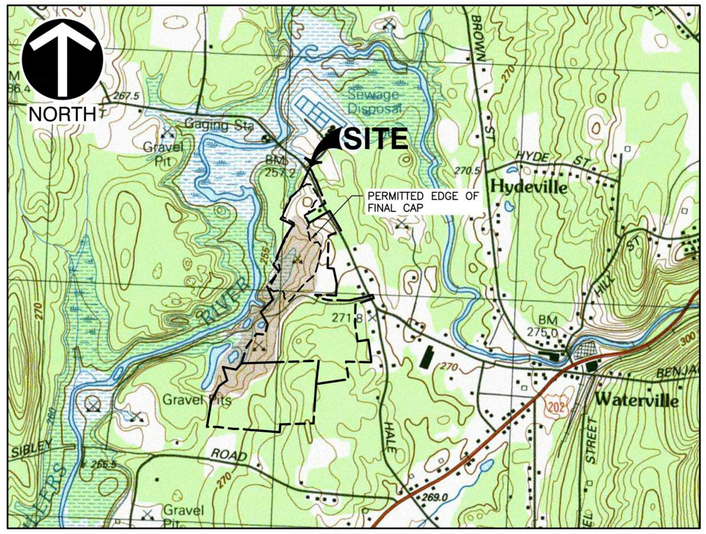
WINCHENDON, MASSACHUSETTS

PREPARED FOR:

W.L. FRENCH EXCAVATING CORPORATION



LOCATION OF SITE IN MASSACHUSETTS



SITE LOCATION MAP
SCALE: 1"= 1,000'

REFERENCE: USGS TOPOGRAPHIC MAP QUADRANGLES OBTAINED FROM MASSACHUSETTS BUREAU OF INFORMATION TECHNOLOGY (MASSGIS). WINCHENDON QUAD LAST REVISED 1988. CONTOUR ELEVATIONS ARE IN METERS.

DRAWING INDEX:

MAY 2022

COMMONWEALTH OF MASSACHUSETTS
PAUL J. SHAMOIAN
CIVIL
NO. 51806
REGISTERED
PROFESSIONAL ENGINEER
5-12-2022

REVISION RECORD

NO	DATE	DESCRIPTION

CEC
Civil & Environmental Consultants, Inc.
31 Bellows Road · Raynham, MA 02767
Ph: 774.501.2176 · 866.312.2024 · Fax: 774.501.2669
www.cecinc.com

FORMER MABARDY LANDFILL
PERMIT MODIFICATION PLANS
W.L. FRENCH EXCAVATING CORPORATION
RIVER ROAD
WINCHENDON, MA

COVER SHEET

DATE:	MAY 2022
DWG SCALE:	AS SHOWN
PROJECT NO:	306-000
DRAWN BY:	KPH
CHECKED BY:	AJK
APPROVED BY:	PJS

DRAWING NO.: C000

SHEET 1 OF 5

P:\300-0001\306-000\-CADD\Dwg\SW01 - North Pond Redesign\300000-SW01-C000-Cover Sheet.dwg[Layout1] LS:5/12/2022 - cdossantos - LP: 5/12/2022 11:05 AM

NORTH

N/F
UNITED STATES OF AMERICA
109 FRONT STREET
WINCHENDON, MA

MILLERS RIVER

PERMITTED MONITORING WELL LOCATION (TYP.)

EXISTING MONITORING WELL (TYP.)

MW-2

MW-3

MW-4

200 FOOT RIVERFRONT BUFFER

100 FOOT WETLAND BUFFER ZONE

PERMITTED PASSIVE GAS VENT (TYP.)

BORDERING LAND SUBJECT TO FLOODING (ELEV. 852.26 NAVD88)

PERMITTED BASIN SPILLWAY

PERMITTED STORMWATER BASIN (SOUTH BASIN)

PERMITTED BASIN OUTLET RISER PIPE

REFER TO SHEETS C300 & C301 FOR PROPOSED MODIFICATIONS

PERMITTED LOCATION OF STORMWATER CHANNEL OUTLET

PERMITTED LOCATION OF CONCRETE V-NOTCH WEIR OUTLET STRUCTURE

PERMITTED 18" PERFORATED HDPE FLAT PANEL PIPE (TYP.)

EXISTING SCALE

EXISTING SCALE HOUSE

PERMITTED EDGE OF FINAL CAP

PERMITTED FINAL CAP ACCESS ROAD

PERMITTED DRAINAGE SWALE ON CAP (TYP.)

PERMITTED LOCATION OF RIP-RAP DOWNCHUTE (TYP.)

PERMITTED LOCATION OF SEDIMENT FOREBAY (TYP.)

PERMITTED STORMWATER BASIN (NORTH BASIN)

SITE PROPERTY BOUNDARY

N/F
580 RIVER STREET, LLC
355 MAIN ST SUITE 25
WOBURN, MA

N/F
HOWLETT, MELISSA A.
630 RIVER STREET
WINCHENDON, MA

N/F
ALLEN, JENNIFER M.
582 RIVER STREET
WINCHENDON, MA

N/F
JORDAN, KEVIN J.
608 RIVER STREET
WINCHENDON, MA

N/F
LUNDIN, ROBERT D. III
596 RIVER STREET
WINCHENDON, MA

N/F
BOWLER, CAROL
607 RIVER STREET
WINCHENDON, MA

N/F
COSTA, AUGUSTO M.
605 RIVER STREET
WINCHENDON, MA

N/F
580 RIVER LAND NG LLC
267 WATER STREET 2ND FLOOR
WARREN, RI

RIVER STREET

N/F
MABARDY, CHARLES
355 MAIN ST SUITE 25
WOBURN, MA

N/F
ROMANO, ANTHONY
586 RIVER STREET
WINCHENDON, MA

LEGEND

- EXISTING SUBJECT PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- PERMITTED LIMIT OF FINAL CAP
- EXISTING INDEX (MAJOR) CONTOUR
- EXISTING INTERMEDIATE (MINOR) CONTOUR
- EXISTING WETLAND
- 100-FOOT WETLAND BUFFER
- 200-FOOT RIVERFRONT BUFFER
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- PERMITTED INDEX (MAJOR) CONTOUR
- PERMITTED INTERMEDIATE (MINOR) CONTOUR
- PERMITTED STORMWATER SWALE
- PERMITTED STORMWATER SUBDRAIN
- PERMITTED PASSIVE GAS VENT

REFERENCE

1. EXISTING TOPOGRAPHIC INFORMATION SHOWN ON THIS PLAN REPRESENTS THE EXISTING CONDITIONS UTILIZED AT THE TIME OF PERMITTING, AND IS BASED ON A SURVEY PERFORMED BY EXISTING GRADE, INC. OF DOUGLAS, MASSACHUSETTS DATED JANUARY 2019.
2. SITE PROPERTY BOUNDARY WAS PROVIDED BY W.L. FRENCH. CEC HAS NOT VERIFIED THE ACCURACY OF THE INFORMATION.
3. ADJACENT PROPERTY BOUNDARIES AND INFORMATION WERE OBTAINED FROM THE MASSACHUSETTS OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GEOGRAPHIC INFORMATION (MASSGIS) ONLINE RESOURCES. LAST UPDATED MARCH 2021 FOR WINCHENDON MA. PROPERTY BOUNDARIES SHOULD BE CONSIDERED APPROXIMATE.
4. EXISTING WETLAND DELINEATIONS WERE FLAGGED BY EPSILON ASSOCIATES, INC. ON MAY 11, 2018. CEC HAS NOT VERIFIED THE ACCURACY OF THIS INFORMATION.
5. PERMITTED FINAL CLOSURE CONDITIONS SHOWN ON THIS PLAN WERE OBTAINED FROM THE PLAN SET TITLED "FORMER MABARDY LANDFILL – CORRECTIVE ACTION DESIGN" DATED JUNE 2019, REVISED OCTOBER 2019, PREPARED BY LANGDON ENVIRONMENTAL LLC. CEC TAKES NO RESPONSIBILITY FOR THE PREVIOUSLY APPROVED DESIGN.

NOTES

1. SOLID DARK CONTOURS SHOWN ON THIS PLAN REPRESENT PERMITTED FINAL CLOSURE CONDITIONS (TOP OF FINAL COVER) AS SHOWN IN THE CORRECTIVE ACTION DESIGN PLANS. REFER TO REFERENCE NOTE 5 ABOVE.

SCALE IN FEET
0 80 160

COMMONWEALTH OF MASSACHUSETTS
PAUL J. SHAMOIAN
CIVIL
NO. 51806
REGISTERED PROFESSIONAL ENGINEER
5-12-2022

REVISION RECORD

NO	DATE	DESCRIPTION

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FORMER MABARDY LANDFILL
PERMIT MODIFICATION PLANS
W.L. FRENCH EXCAVATING CORPORATION
RIVER ROAD
WINCHENDON, MA

PERMITTED CONDITIONS SITE PLAN

DATE:	MAY 2022
DWG SCALE:	1" = 80'
PROJECT NO:	306-000
DRAWN BY:	KFH
CHECKED BY:	AJK
APPROVED BY:	PJS

DRAWING NO.:
C100
SHEET 2 OF 5

P:\300-000\306-000_CADD\Dwg\SHEET - Amended Order of Conditions\306000-SHEET-C100-Permitted Site Plan.dwg[LAYOUT1] LS(1/13/2022 - jshamoian) - LP: 5/12/2022 1:20 PM

NORTH

PROPOSED STORMWATER STILLING BASIN PRIOR TO OFF-SITE DISCHARGE

LOCATION OF PERMITTED STORMWATER CHANNEL OUTLET

PROPOSED MODIFIED GRADING TO ACOMMODATE STORMWATER REDESIGN OUTLET (TYP.)

24-INCH CORRUGATED HDPE PIPE

MODIFIED LIMIT OF LANDFILL FINAL COVER

PROPOSED TEMPORARY STORMWATER BASIN CONTAINMENT BERM (SEE NOTE #6)

PROPOSED STORMWATER BASIN OUTLET CONTROL STRUCTURE (4/C800)

TEMPORARY STORMWATER BASIN (SEE NOTE #6)

PERMITTED EDGE OF FINAL CAP

PROPOSED 20' WIDE GRAVEL ACCESS ROAD (5/C800)

SITE PROPERTY BOUNDARY

859.00

865.75

SCALE IN FEET
0 30 60

LEGEND

- EXISTING SUBJECT PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- PERMITTED LIMIT OF FINAL CAP
- EXISTING INDEX (MAJOR) CONTOUR
- EXISTING INTERMEDIATE (MINOR) CONTOUR
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- PERMITTED INDEX (MAJOR) CONTOUR
- PERMITTED INTERMEDIATE (MINOR) CONTOUR
- PROPOSED SPOT ELEVATION
- PROPOSED INDEX (MAJOR) CONTOUR
- PROPOSED INTERMEDIATE (MINOR) CONTOUR
- PROPOSED ACCESS ROAD
- PROPOSED STORMWATER SWALE
- PROPOSED STORMWATER CULVERT

REFERENCE

1. REFER TO SHEET C100 FOR ADDITIONAL REFERENCE NOTES.
2. EXISTING TOPOGRAPHIC CONTOURS WITHIN THE SITE PROPERTY BOUNDARY WERE PRODUCED BY A DRONE FLIGHT COMPLETED ON MARCH 30, 2021, AND WERE PROVIDED ELECTRONICALLY TO CEC BY W.L. FRENCH. CEC HAS NOT VERIFIED THE ACCURACY OF THE INFORMATION.
3. EXISTING TOPOGRAPHIC INFORMATION SHOWN OUTSIDE THE SITE PROPERTY BOUNDARY IS BASED ON A SURVEY PERFORMED BY EXISTING GRADE, INC. OF DOUGLAS, MASSACHUSETTS DATED JANUARY 2019.

NOTES

1. NO CHANGES ARE PROPOSED TO THE PERMITTED HORIZONTAL EXTENTS OF GRADING AND SHAPING MATERIAL PLACEMENT. MINOR CHANGES IN VERTICAL ELEVATIONS OF GRADING AND SHAPING MATERIAL PLACEMENT IS REQUIRED TO TIE INTO EXISTING ELEVATIONS, AND TO ACCOMMODATE MODIFIED STORMWATER CHANGES FOR THE NORTH BASIN OUTLET CONTROL STRUCTURE,
2. DASHED LIGHT CONTOURS REPRESENT EXISTING GROUND ELEVATIONS. REFER TO REFERENCE NOTES ABOVE.
3. SOLID LIGHT CONTOURS REPRESENT PERMITTED SUBGRADE ELEVATIONS, AS SHOWN ON THE PLAN TITLED "SUBGRADE PLAN" PREPARED BY LANGDON ENVIRONMENTAL, LLC LAST REVISED OCTOBER 1, 2019.
4. SOLID DARK CONTOURS REPRESENT PROPOSED SUBGRADE ELEVATIONS.
5. THE SEASONAL HIGH GROUNDWATER ELEVATION WITHIN THE LIMITS OF THE NORTH BASIN IS ASSUMED TO BE 857 FEET (NAVD88) BASED ON TEST PITS COMPLETED BY W.L. FRENCH IN DECEMBER 2020.
6. PROPOSED GRADES SHOWN FOR TEMPORARY STORMWATER BASIN ARE APPROXIMATE AND FOR REFERENCE ONLY. OUTLET CONTROL STRUCTURE SHOWN IS SAME AS FINAL CONDITIONS, BUT CONTRACTOR MAY PROVIDE SIMILAR STORMWATER BASIN GRADING TO PROVIDE ADEQUATE STORMWATER STORAGE VOLUME BASED ON CURRENT OPERATIONS WITHOUT EXCAVATING BELOW ELEVATION 860 FEET.

COMMONWEALTH OF MASSACHUSETTS
PAUL J. SHAMOIAN
CIVIL
NO. 51806
REGISTERED PROFESSIONAL ENGINEER
5-12-2022

REVISION RECORD

NO	DATE	DESCRIPTION

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www.cecinc.com

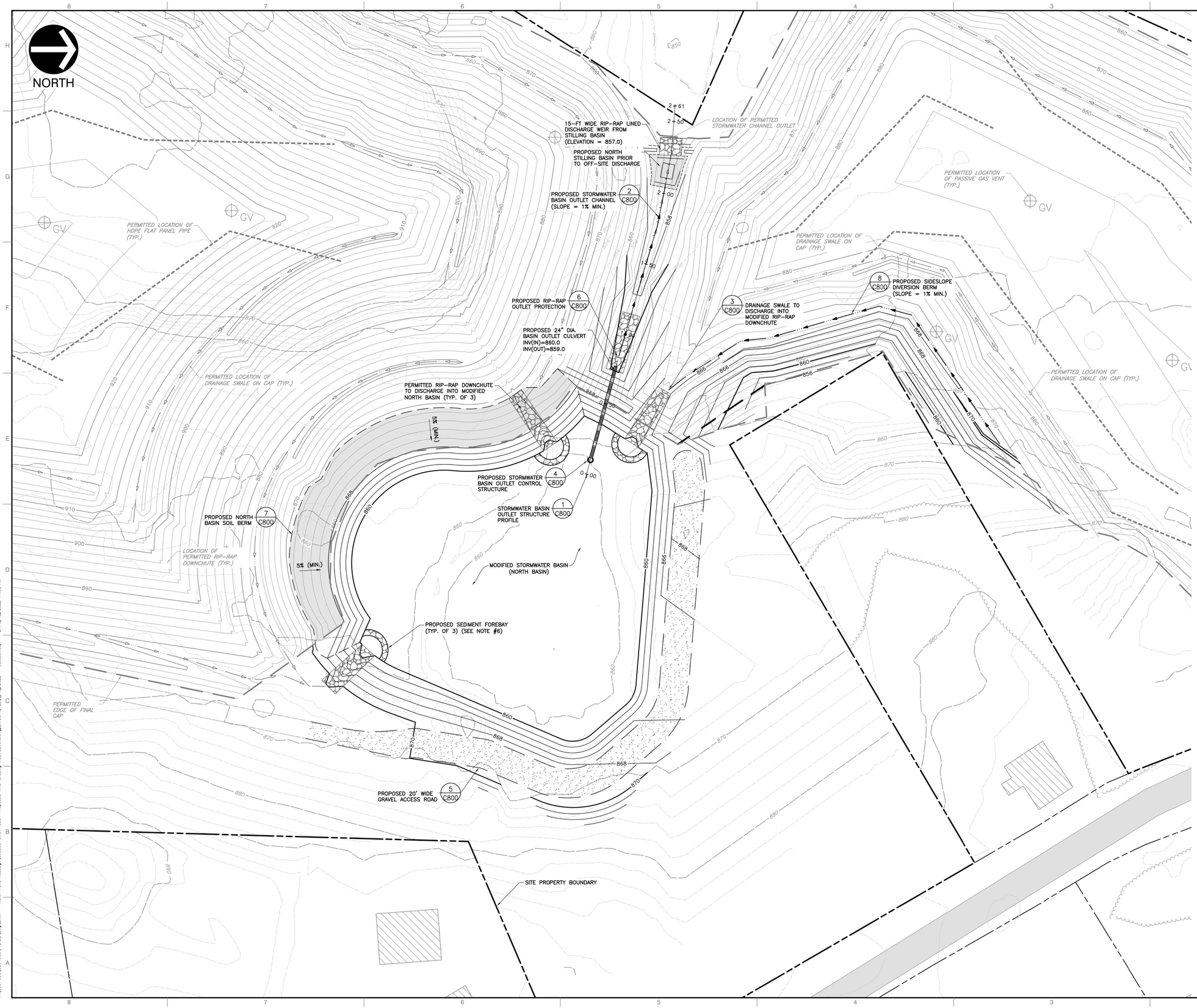
FORMER MABARDY LANDFILL
PERMIT MODIFICATION PLANS
W.L. FRENCH EXCAVATING CORPORATION
RIVER ROAD
WINCHENDON, MA

SUBGRADE ELEVATIONS NORTH BASIN MODIFICATIONS

DATE:	MAY 2022
DWG SCALE:	1" = 30'
PROJECT NO.:	306-000
DRAWN BY:	KFH
CHECKED BY:	AJK
APPROVED BY:	PJS

DRAWING NO.: C300
SHEET 3 OF 5

P:\306-000\306-0001-0400\Dwg\SW01 - North Pond Redesign\306000-SW01-C300-Proposed Subgrade Modifications.dwg[LAYOUT1] LS(5/12/2022 - sdasantos) - LP: 5/12/2022 11:06 AM



LEGEND

- EXISTING SUBJECT PROPERTY LINE
- EXISTING ADJACENT PROPERTY LINE
- PERMITTED LIMIT OF FINAL CAP
- EXISTING INDEX (MAJOR) CONTOUR
- EXISTING INTERMEDIATE (MINOR) CONTOUR
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING STRUCTURE
- PERMITTED INDEX (MAJOR) CONTOUR
- PERMITTED INTERMEDIATE (MINOR) CONTOUR
- PERMITTED STORMWATER SWALE
- PERMITTED STORMWATER SUBDRAIN
- PROPOSED INDEX (MAJOR) CONTOUR
- PROPOSED INTERMEDIATE (MINOR) CONTOUR
- PROPOSED ACCESS ROAD
- PROPOSED STORMWATER SWALE
- PROPOSED STORMWATER CULVERT
- PROPOSED RIP-RAP

REFERENCE

1. REFER TO SHEET C100 FOR ADDITIONAL REFERENCE NOTES.
2. EXISTING TOPOGRAPHIC CONTOURS WITHIN THE SITE PROPERTY BOUNDARY WERE PRODUCED BY A DRONE FLIGHT COMPLETED ON MARCH 30, 2021, AND WERE PROVIDED ELECTRONICALLY TO CEC BY W.L. FRENCH. CEC HAS NOT VERIFIED THE ACCURACY OF THE INFORMATION.
3. EXISTING TOPOGRAPHIC INFORMATION SHOWN OUTSIDE THE SITE PROPERTY BOUNDARY IS BASED ON A SURVEY PERFORMED BY EXISTING GRADE, INC. OF DOUGLAS, MASSACHUSETTS DATED JANUARY 2019.

NOTES

1. NO CHANGES ARE PROPOSED TO THE PERMITTED HORIZONTAL AND VERTICAL EXTENTS OF GRADING AND SHAPING MATERIAL PLACEMENT.
2. DASHED LIGHT CONTOURS REPRESENT EXISTING GROUND ELEVATIONS. REFER TO REFERENCE NOTES ABOVE.
3. SOLID LIGHT CONTOURS REPRESENT PERMITTED FINAL GRADES (TOP OF FINAL COVER), AS SHOWN ON THE PLAN TITLED "FINAL GRADING PLAN" PREPARED BY LANGDON ENVIRONMENTAL, LLC LAST REVISED OCTOBER 1, 2019.
4. SOLID DARK CONTOURS REPRESENT PROPOSED FINISH GRADES.
5. THE SEASONAL HIGH GROUNDWATER ELEVATION WITHIN THE LIMITS OF THE NORTH BASIN IS ASSUMED TO BE 857 FEET (NAVD88) BASED ON TEST PITS COMPLETED BY W.L. FRENCH IN DECEMBER 2020.
6. SEDIMENT FOREBAYS SHOWN WITHIN NORTH BASIN ARE BASED ON ORIGINAL PERMITTED DESIGN AND HAVE NOT BEEN MODIFIED.

REVISION RECORD

NO	DATE	DESCRIPTION

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www.cecinc.com

FORMER MABARDY LANDFILL
PERMIT MODIFICATION PLANS
W.L. FRENCH EXCAVATING CORPORATION
RIVER ROAD
WINCHENDON, MA

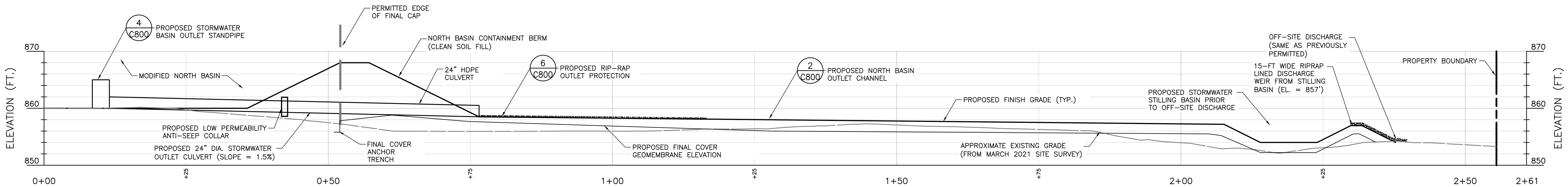
FINAL GRADNG PLAN
NORTH BASIN MODIFICATIONS

DATE:	MAY 2022
DWG SCALE:	1" = 30'
PROJECT NO.:	306-000
DRAWN BY:	KFH
CHECKED BY:	AJK
APPROVED BY:	PJS

COMMONWEALTH OF MASSACHUSETTS
PAUL J. SHAMOIAN
CIVIL
NO. 51806
REGISTERED
PROFESSIONAL ENGINEER
5-12-2022

DRAWING NO.:
C301
SHEET 4 OF 5

P:\306-000\306-0001\306-0001-CAD\Dwg\SW01 - North Pond Redesign\SW000-SW01-C301-Proposed Final Grading Modifications.dwg(LAYOUT1 LS(5/12/2022 - sdosantos) - LP: 5/12/2022 11:08 AM

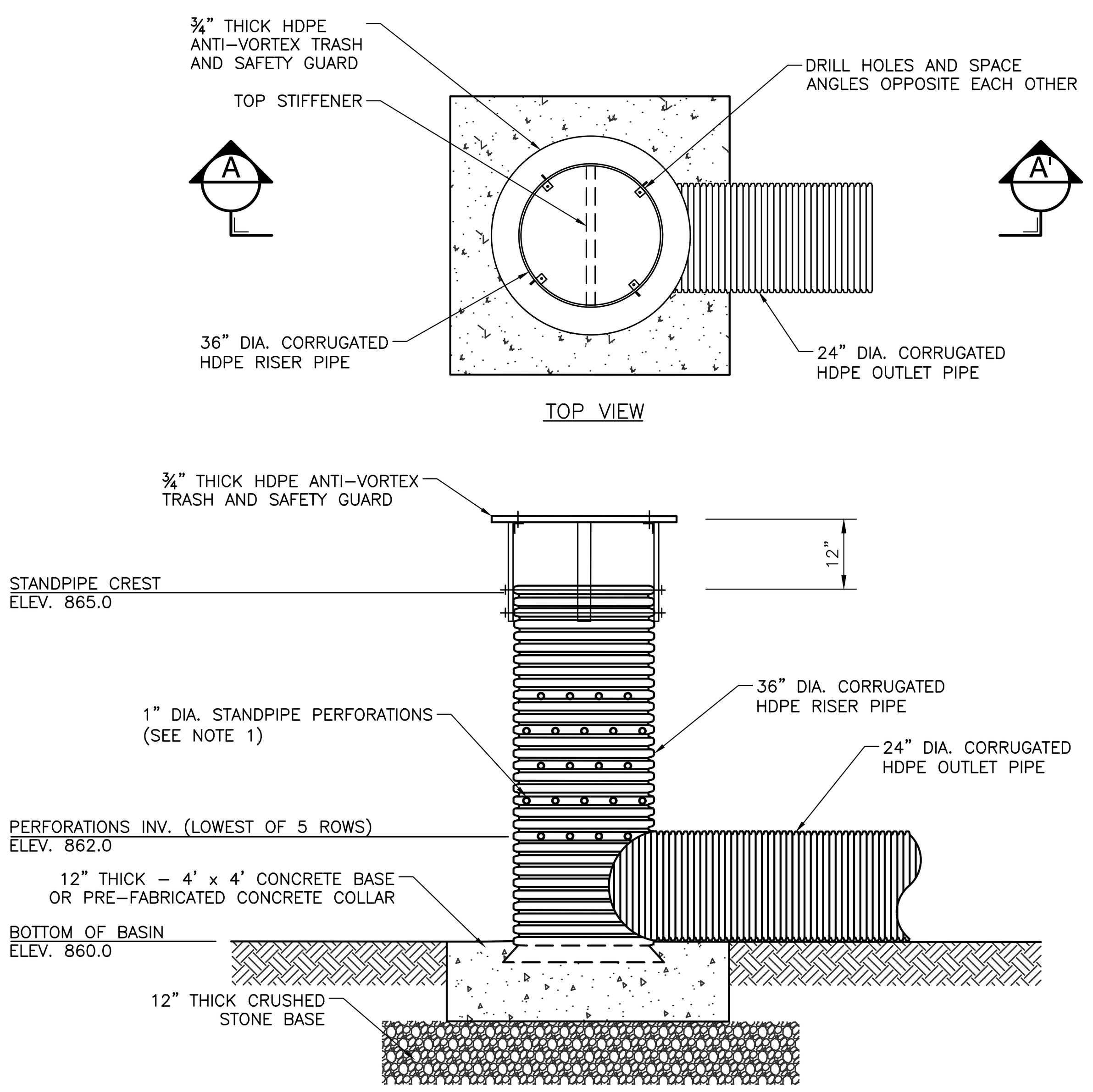


NOTE:

1. THIS PROFILE IS ILLUSTRATIVE IN NATURE, AND IS INTENDED TO DEPICT THE FINISH GRADES AND THE STORMWATER CONVEYANCE STRUCTURES FOR THE NORTH BASIN OUTLET. REFER TO SHEET C301 FOR THE LOCATION AND STATIONING OF THE ALIGNMENT THAT CORRESPONDS TO THIS PROFILE.

1/C800 STORMWATER BASIN OUTLET STRUCTURE PROFILE

SCALE: NOT TO SCALE

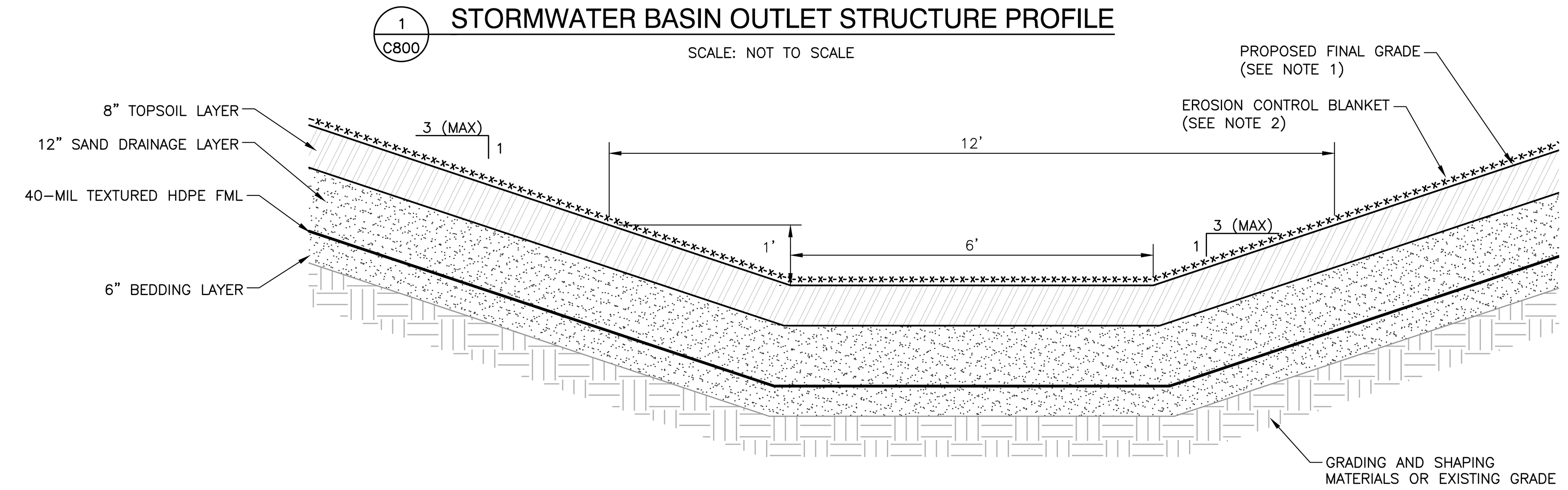


NOTES:

1. THE OUTLET CONTROL STRUCTURE SHALL CONTAIN 1" DIA. PERFORATIONS EVENLY SPACED AS 12 COLUMNS AROUND THE RISER PIPE CIRCUMFERENCE. ROWS SHALL BE VERTICALLY SPACED 6 INCHES APART AND OFFSET HALF THE DISTANCE BETWEEN PERFORATIONS ON CENTER.

4/C800 STORMWATER BASIN OUTLET CONTROL STRUCTURE

SCALE: NOT TO SCALE

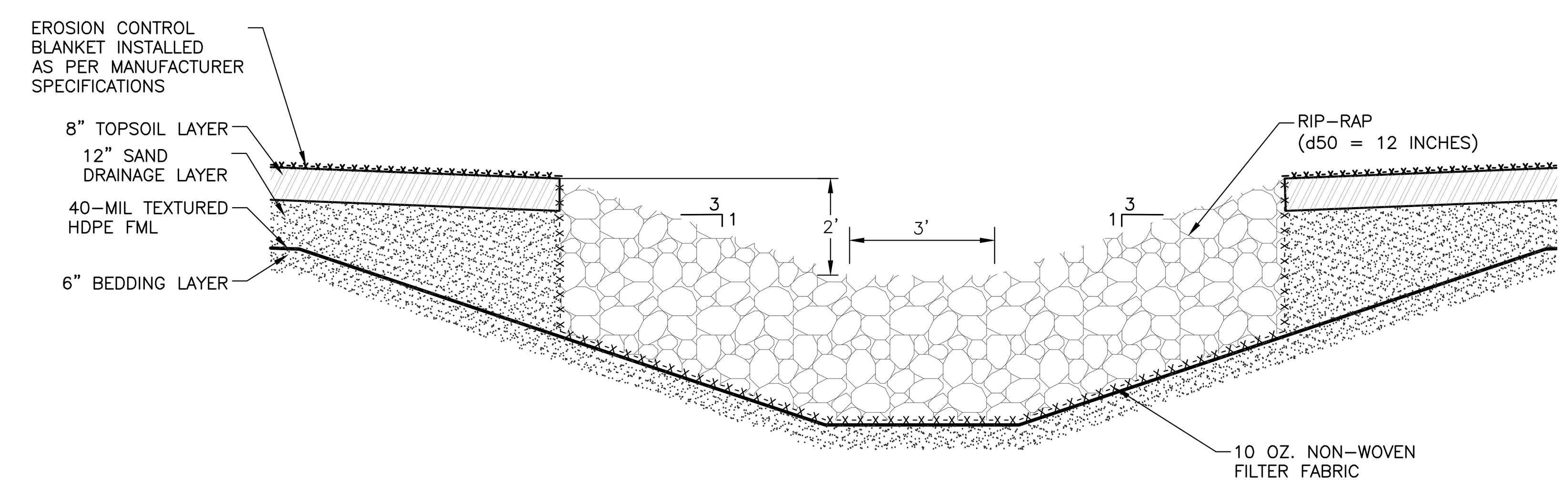


NOTES:

1. REFER TO SHEET C301 FOR FINAL CLOSURE GRADES.
2. EROSION CONTROL BLANKET SHALL BE INSTALLED ON SLOPES STEEPER THAN 4H:1V AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

2/C800 NORTH BASIN OUTLET CHANNEL

SCALE: 1"=2'

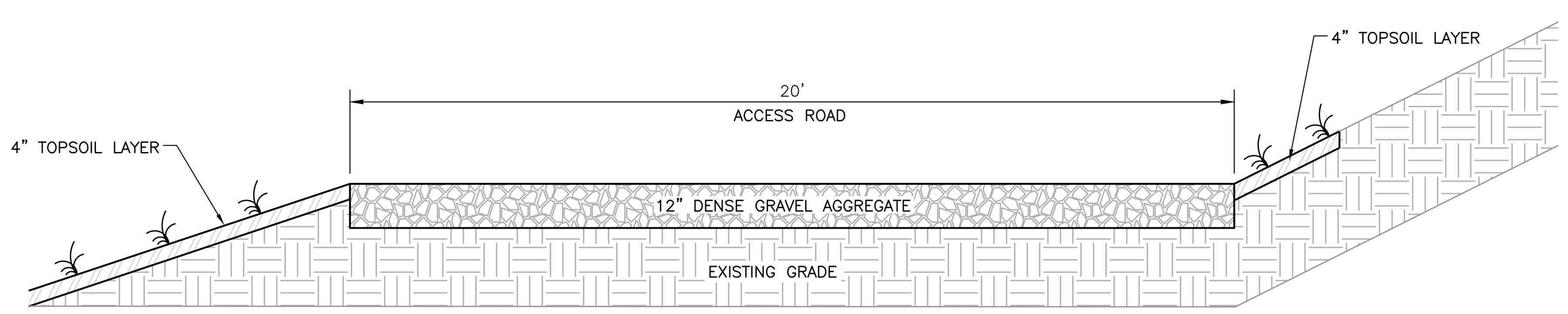


NOTES:

1. RIP-RAP USED IN DOWNCHUTE SHALL CONSIST OF WELL GRADED RIP-RAP, CONSISTING OF A d50 OF 12-INCHES.
2. GEOSYNTHETIC MATERIALS ARE NOT TO SCALE. THEY HAVE BEEN ENLARGED TO SHOW DETAIL.

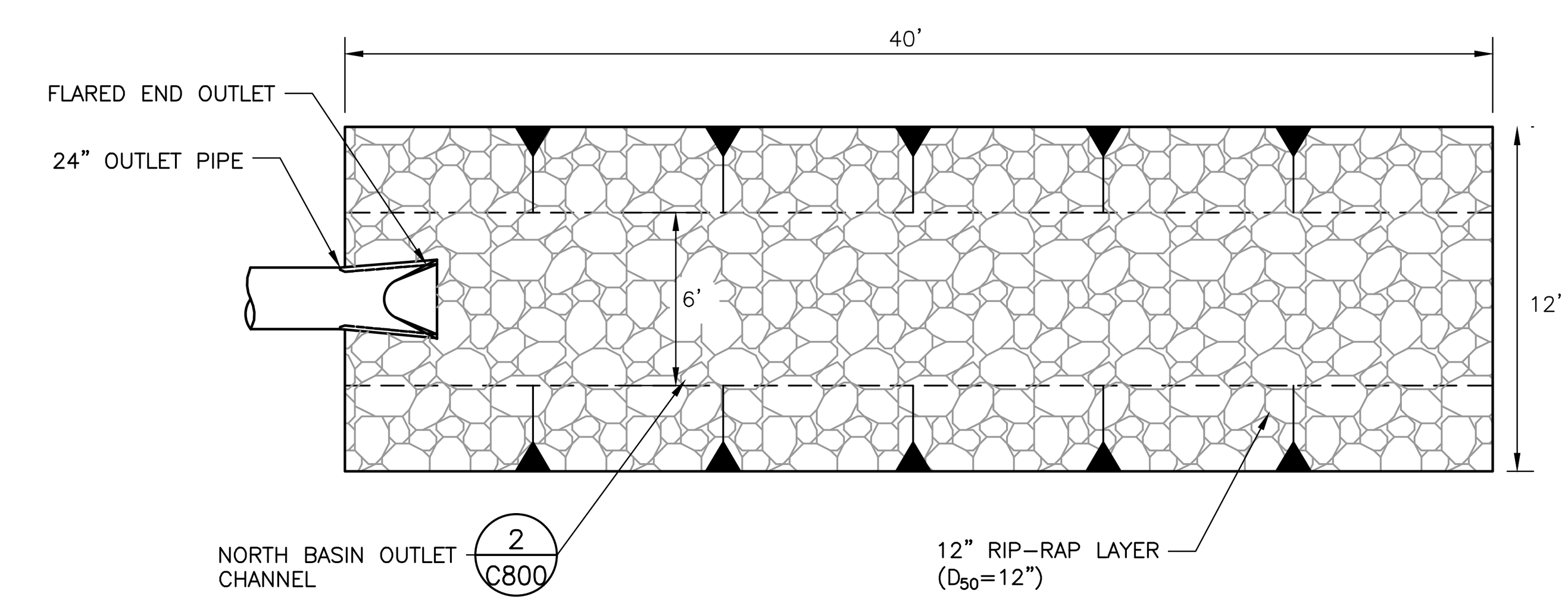
3/C800 DOWNCHUTE DETAIL

SCALE: 1" = 2'



5/C800 GRAVEL ACCESS ROAD DETAIL

SCALE: 1"=3'

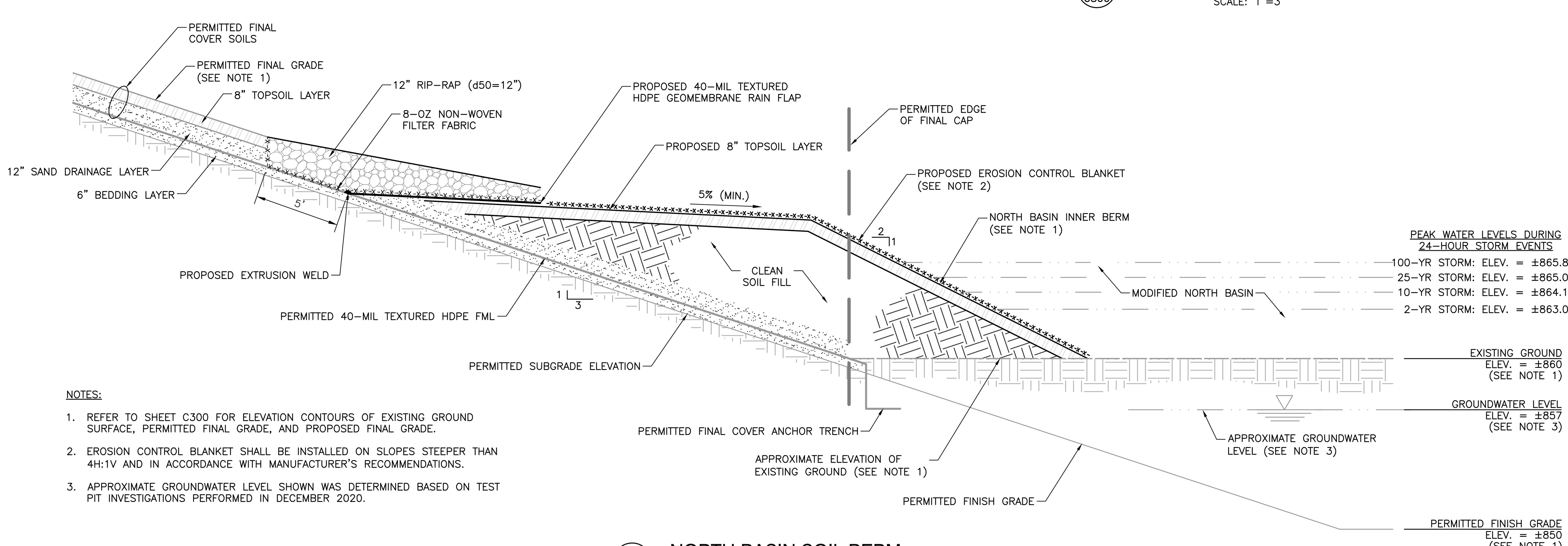


NOTES:

1. REFER TO SHEET C301 FOR LOCATION AND ALIGNMENT OF OUTLET PIPE.

6/C800 RIP-RAP OUTLET PROTECTION

NOT TO SCALE

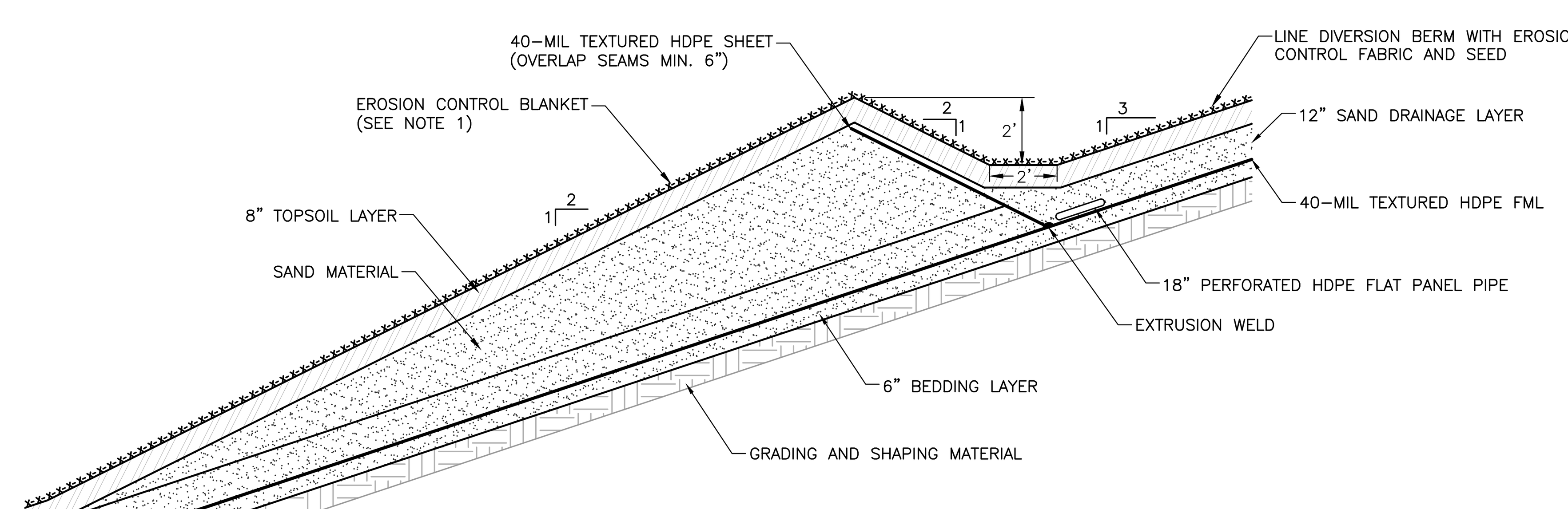


NOTES:

1. REFER TO SHEET C300 FOR ELEVATION CONTOURS OF EXISTING GROUND SURFACE, PERMITTED FINAL GRADE, AND PROPOSED FINAL GRADE.
2. EROSION CONTROL BLANKET SHALL BE INSTALLED ON SLOPES STEEPER THAN 4H:1V AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
3. APPROXIMATE GROUNDWATER LEVEL SHOWN WAS DETERMINED BASED ON TEST PIT INVESTIGATIONS PERFORMED IN DECEMBER 2020.

7/C800 NORTH BASIN SOIL BERM

SCALE: NOT TO SCALE



NOTES:

1. EROSION CONTROL BLANKET SHALL BE INSTALLED ON SLOPES STEEPER THAN 4H:1V AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. THE PERFORATED HDPE FLAT PANEL PIPE SHALL BE PLACED ALONG THE ENTIRE LENGTH OF THE DRAINAGE SWALE ON TOP OF CAP AS SHOWN.

8/C800 SIDESLOPE DIVERSION BERM DETAIL

SCALE: 1"=4'

REVISION RECORD

NO	DATE	DESCRIPTION

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FORMER MABARDY LANDFILL
PERMIT MODIFICATION PLANS
W.L. FRENCH EXCAVATING CORPORATION
RIVER ROAD
WINCHENDON, MA

STORMWATER MANAGEMENT SYSTEM DETAILS

DATE:	MAY 2022	DRAWN BY:	KFH
DWG SCALE:	AS SHOWN	CHECKED BY:	AJK
PROJECT NO:	306-000	APPROVED BY:	PJS

COMMONWEALTH OF MASSACHUSETTS PAUL J. SHAMOIAN CIVIL NO. 51806 REGISTERED PROFESSIONAL ENGINEER
5-12-2022

DRAWING NO.: C800

SHEET 5 OF 5