Transcontinental Gas Pipe Line Company, LLC

Requirement N – Hydrology and Hydraulics Analysis

Regional Energy Access Expansion Project –
Regional Energy Lateral and Existing Compressor Station 515

April 2021

HYDROLOGIC AND HYDRAULIC ANALYSIS

Wetland, stream, and/or floodway crossings associated with the Regional Energy Lateral and Existing Compressor Station 515 will primarily result in temporary impacts. The Project is proposing to use best management practices (i.e. dam and pump, flume) and temporary bridges, including those with in-stream supports for access during construction with the exception of the following locations:

MLV515RA20

One location will have permanent changes to the 50' floodway, associated with an isolated ephemeral channel, S76-T2 near Milepost 7.55. At this location, MLV515RA20, a proposed mainline valve, has a stormwater best management practice located in the assumed 50' floodway. S76-T2 is an isolated, ephemeral stream with less than a 100-acre drainage area. The stormwater BMP is located downstream of the terminus of the isolated channel, however within 50' of the terminus, therefore still within the 50' floodway. Due to the small size of the resource, small drainage area, and location of the impact, no further analysis was completed.

S4a-T5/S4-T5 and S5-T5/S6-T5

At two locations (S4a-T5/S4-T5 and S5-T5/S6-T5) between MP 11.0 and 11.3, Transco is proposing to relocate the ephemeral streams away from the pipeline alignment. These streams are associated with stormwater from the neighboring residential development. These streams will be stabilized with stone and erosion control blanket post construction. There will be no change outside of the proposed ROW, as the stabilization is limited to the LOD. These channels have been designed to handle the flows associated with runoff from the residential area, as this is the primary source of hydrology for these resources. Design calculations for the stream stabilization design are attached within Appendix A.

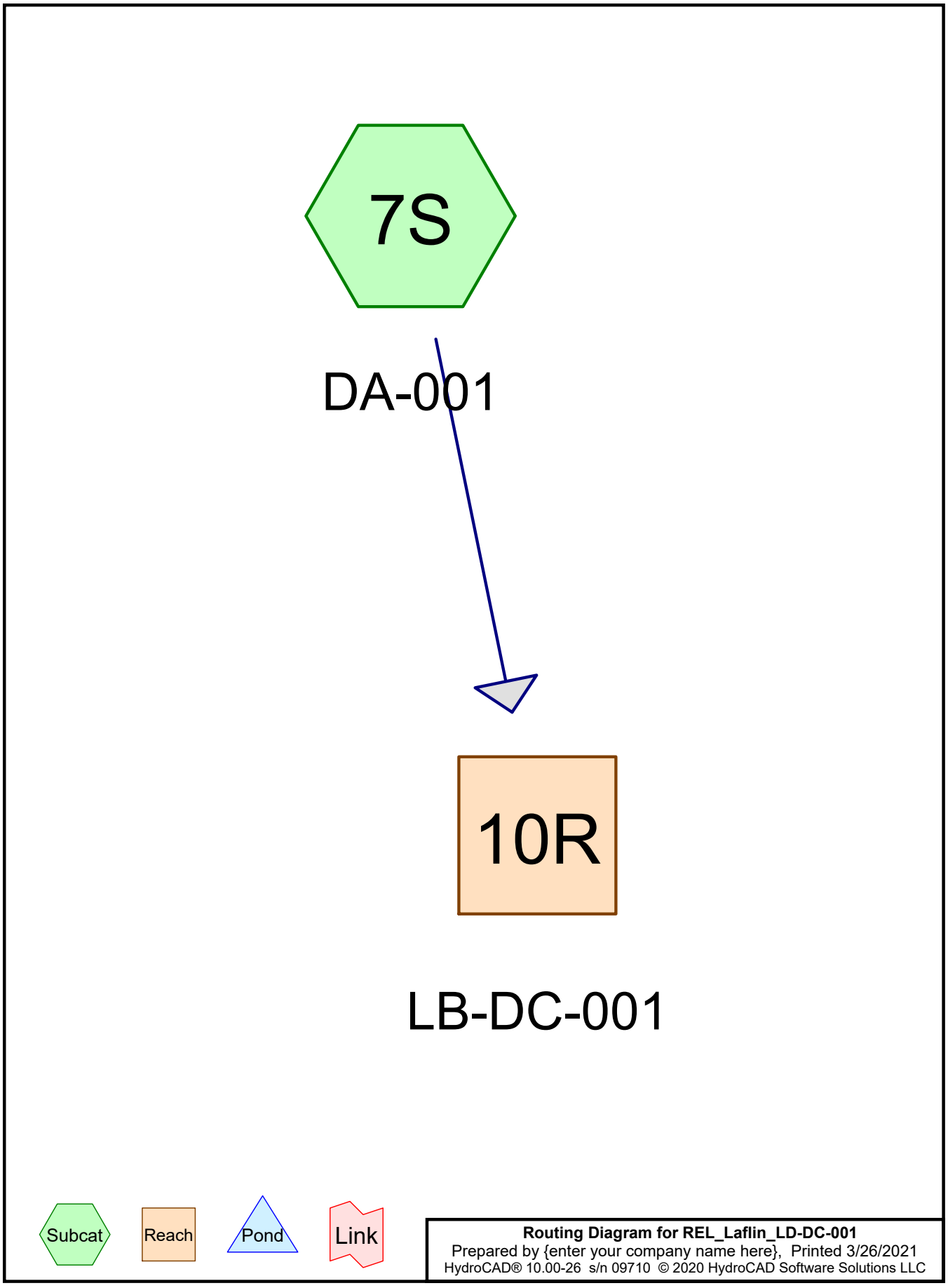
Resources impacted by ATV's

Transco proposes to restore wetlands impacted by ATV use along the existing ROW between MP 3.8 and 5.9. Transco has expanded their workspace in these areas to have additional workspace in the existing ROW to restore these areas while constructing the pipeline. The wetlands include W31-T3, W96-T2, W49-T1, W97-T2, W9-T5, W86-T2, W12-T5, W87-T2, W13-T5, and W89-T2. One stream, S35-T2 will also be relocated within the ROW at this location through wetland W89-T2, as its currently route follows ATV ruts on the existing ROW. The proposed alignment is within W89-T2, along the edge of the ROW, prior to crossing perpendicular to the pipeline ROW and is

designed to be restored to match the existing conditions upstream and downstream of the ROW. Design dimensions of the relocated channel based on the existing conditions are included on the drawings included in Requirement M.

APPENDIX A

DESIGN CALULATIONS FOR STREAMS S4a-T5/S4-T5 & S5-T5/S6-T5



Routing Diagram for REL_Laflin_LD-DC-001
Prepared by {enter your company name here}, Printed 3/26/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.275	74	>75% Grass cover, Good, HSG C (7S)
0.256	98	Impervious (7S)
0.492	73	Woods, Fair, HSG C (7S)
1.023	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.767	HSG C	7S
0.000	HSG D	
0.256	Other	7S
1.023		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.275	0.000	0.000	0.275	>75% Grass cover, Good	7S
0.000	0.000	0.000	0.000	0.256	0.256	Impervious	7S
0.000	0.000	0.492	0.000	0.000	0.492	Woods, Fair	7S
0.000	**0.000**	**0.767**	**0.000**	**0.256**	**1.023**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 7S: DA-001 Runoff Area=1.023 ac 25.02% Impervious Runoff Depth>0.59"
Flow Length=407' Tc=3.3 min CN=80 Runoff=1.28 cfs 0.050 af

Reach 10R: LB-DC-001 Avg. Flow Depth=0.13' Max Vel=4.25 fps Inflow=1.28 cfs 0.050 af
n=0.041 L=209.0' S=0.2488 '/' Capacity=52.47 cfs Outflow=1.18 cfs 0.050 af

Total Runoff Area = 1.023 ac Runoff Volume = 0.050 af Average Runoff Depth = 0.59"
74.98% Pervious = 0.767 ac 25.02% Impervious = 0.256 ac

Summary for Subcatchment 7S: DA-001

[49] Hint: Tc<2dt may require smaller dt

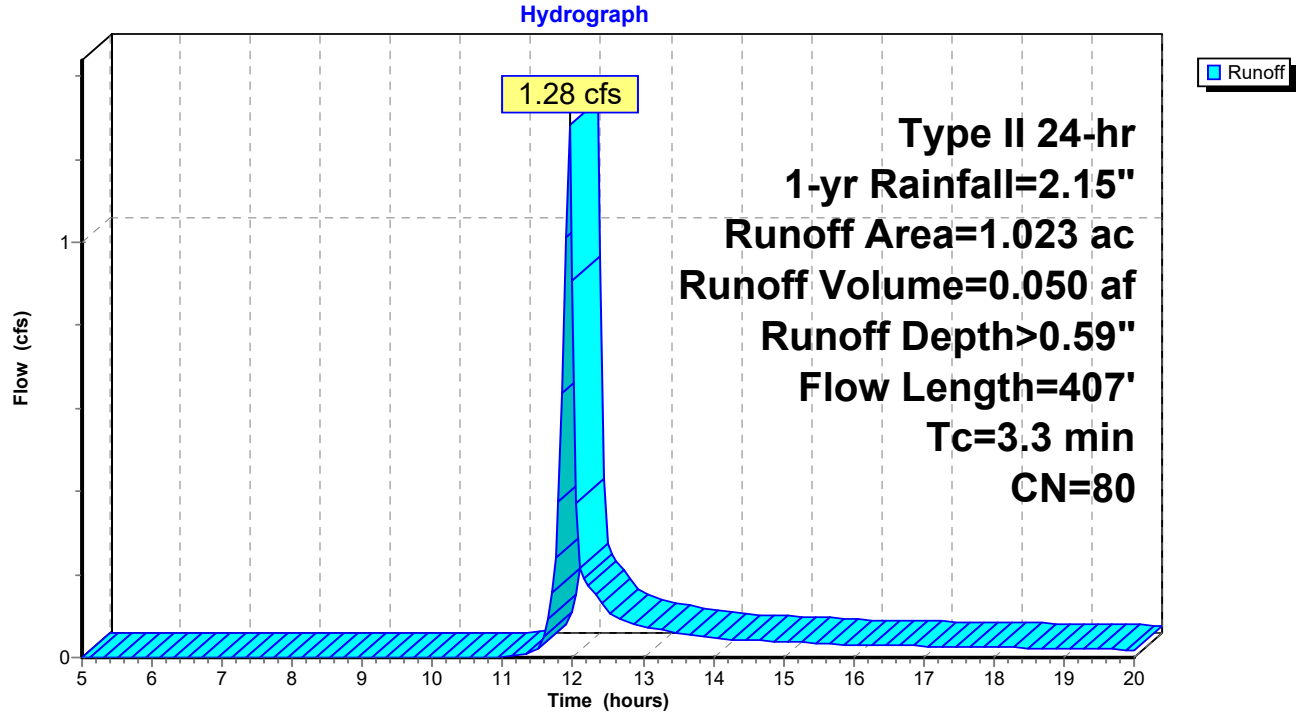
Runoff = 1.28 cfs @ 11.95 hrs, Volume= 0.050 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (ac)	CN	Description
*	0.256	98	Impervious
	0.275	74	>75% Grass cover, Good, HSG C
	0.492	73	Woods, Fair, HSG C
	1.023	80	Weighted Average
	0.767		74.98% Pervious Area
	0.256		25.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.1150	2.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.5	134	0.0449	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	173	0.2890	2.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.3	407	Total			

Subcatchment 7S: DA-001



Summary for Reach 10R: LB-DC-001

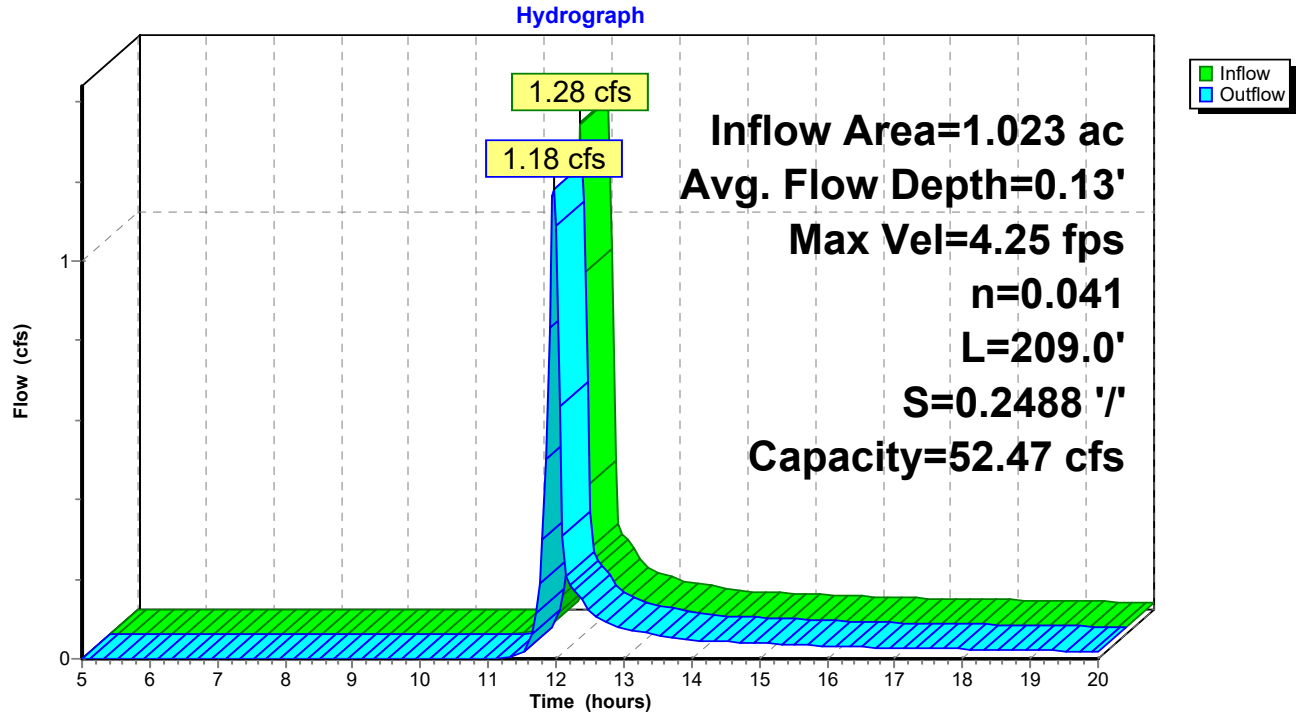
Inflow Area = 1.023 ac, 25.02% Impervious, Inflow Depth > 0.59" for 1-yr event
Inflow = 1.28 cfs @ 11.95 hrs, Volume= 0.050 af
Outflow = 1.18 cfs @ 11.97 hrs, Volume= 0.050 af, Atten= 8%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.25 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 2.8 min

Peak Storage= 61 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 52.47 cfs

2.00' x 1.00' deep channel, n= 0.041 Riprap, 2-inch
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 209.0' Slope= 0.2488 '/'
Inlet Invert= 796.00', Outlet Invert= 744.00'

Reach 10R: LB-DC-001



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 7S: DA-001 Runoff Area=1.023 ac 25.02% Impervious Runoff Depth>0.86"
Flow Length=407' Tc=3.3 min CN=80 Runoff=1.87 cfs 0.073 af

Reach 10R: LB-DC-001 Avg. Flow Depth=0.16' Max Vel=4.84 fps Inflow=1.87 cfs 0.073 af
n=0.041 L=209.0' S=0.2488 '/' Capacity=52.47 cfs Outflow=1.74 cfs 0.073 af

Total Runoff Area = 1.023 ac Runoff Volume = 0.073 af Average Runoff Depth = 0.86"
74.98% Pervious = 0.767 ac 25.02% Impervious = 0.256 ac

Summary for Subcatchment 7S: DA-001

[49] Hint: Tc<2dt may require smaller dt

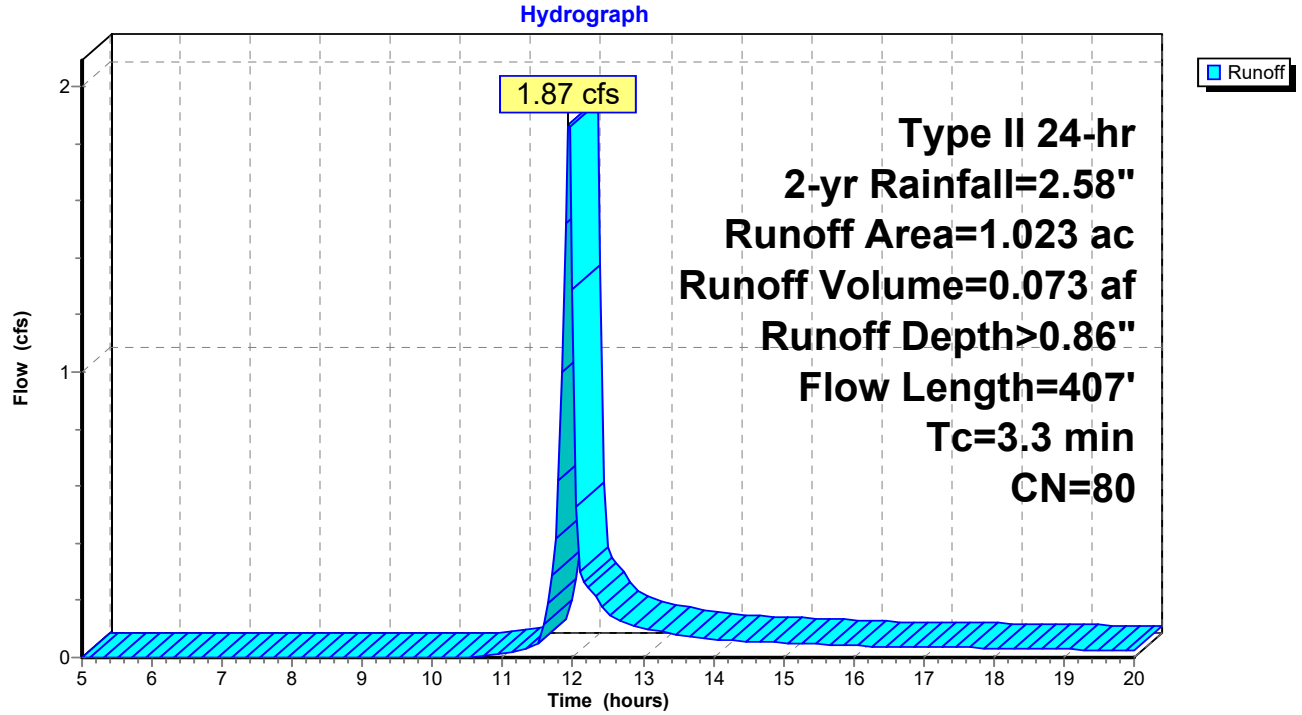
Runoff = 1.87 cfs @ 11.94 hrs, Volume= 0.073 af, Depth> 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.58"

	Area (ac)	CN	Description
*	0.256	98	Impervious
	0.275	74	>75% Grass cover, Good, HSG C
	0.492	73	Woods, Fair, HSG C
	1.023	80	Weighted Average
	0.767		74.98% Pervious Area
	0.256		25.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.1150	2.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.5	134	0.0449	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	173	0.2890	2.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.3	407	Total			

Subcatchment 7S: DA-001



Summary for Reach 10R: LB-DC-001

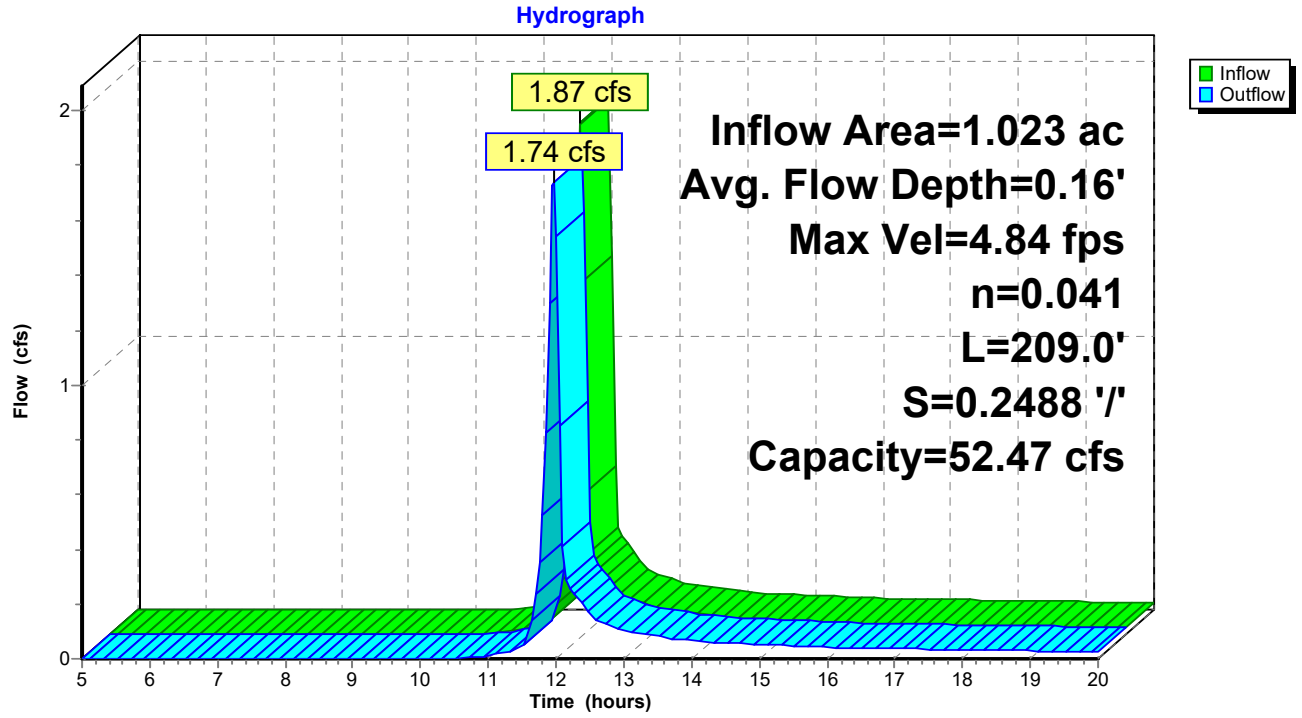
Inflow Area = 1.023 ac, 25.02% Impervious, Inflow Depth > 0.86" for 2-yr event
Inflow = 1.87 cfs @ 11.94 hrs, Volume= 0.073 af
Outflow = 1.74 cfs @ 11.96 hrs, Volume= 0.073 af, Atten= 7%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.84 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.38 fps, Avg. Travel Time= 2.5 min

Peak Storage= 79 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 52.47 cfs

2.00' x 1.00' deep channel, n= 0.041 Riprap, 2-inch
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 209.0' Slope= 0.2488 '/'
Inlet Invert= 796.00', Outlet Invert= 744.00'

Reach 10R: LB-DC-001



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 7S: DA-001 Runoff Area=1.023 ac 25.02% Impervious Runoff Depth>1.68"
Flow Length=407' Tc=3.3 min CN=80 Runoff=3.59 cfs 0.144 af

Reach 10R: LB-DC-001 Avg. Flow Depth=0.24' Max Vel=6.01 fps Inflow=3.59 cfs 0.144 af
n=0.041 L=209.0' S=0.2488 '/' Capacity=52.47 cfs Outflow=3.41 cfs 0.143 af

Total Runoff Area = 1.023 ac Runoff Volume = 0.144 af Average Runoff Depth = 1.68"
74.98% Pervious = 0.767 ac 25.02% Impervious = 0.256 ac

Summary for Subcatchment 7S: DA-001

[49] Hint: Tc<2dt may require smaller dt

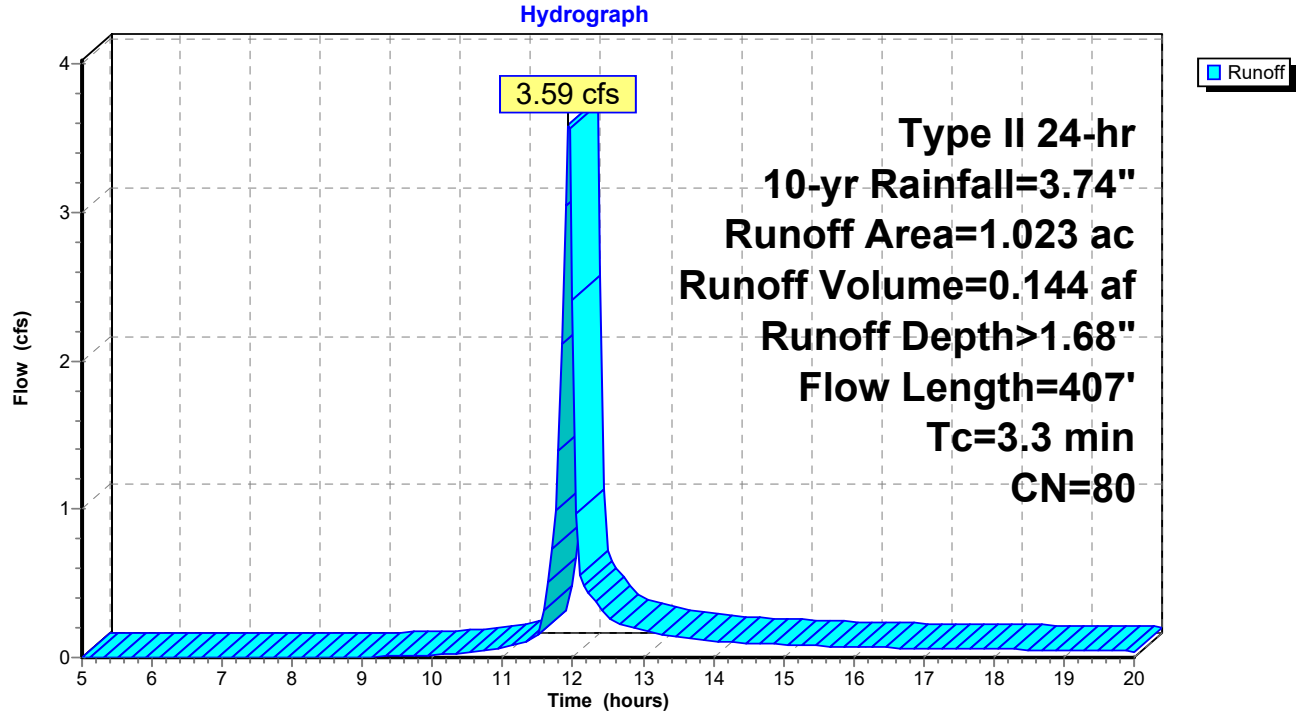
Runoff = 3.59 cfs @ 11.94 hrs, Volume= 0.144 af, Depth> 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.74"

	Area (ac)	CN	Description
*	0.256	98	Impervious
	0.275	74	>75% Grass cover, Good, HSG C
	0.492	73	Woods, Fair, HSG C
	1.023	80	Weighted Average
	0.767		74.98% Pervious Area
	0.256		25.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.1150	2.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.5	134	0.0449	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	173	0.2890	2.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.3	407	Total			

Subcatchment 7S: DA-001



Summary for Reach 10R: LB-DC-001

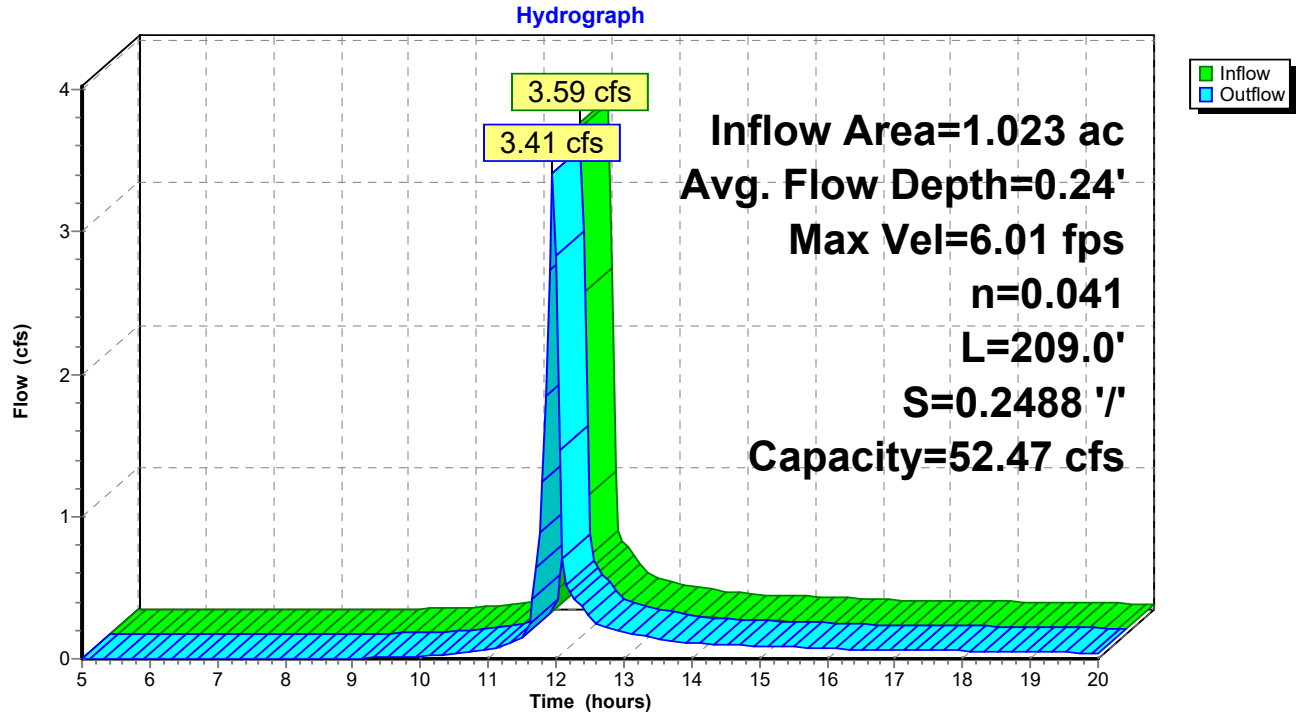
Inflow Area = 1.023 ac, 25.02% Impervious, Inflow Depth > 1.68" for 10-yr event
Inflow = 3.59 cfs @ 11.94 hrs, Volume= 0.144 af
Outflow = 3.41 cfs @ 11.95 hrs, Volume= 0.143 af, Atten= 5%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.01 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.60 fps, Avg. Travel Time= 2.2 min

Peak Storage= 123 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 52.47 cfs

2.00' x 1.00' deep channel, n= 0.041 Riprap, 2-inch
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 209.0' Slope= 0.2488 '/'
Inlet Invert= 796.00', Outlet Invert= 744.00'

Reach 10R: LB-DC-001



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 7S: DA-001 Runoff Area=1.023 ac 25.02% Impervious Runoff Depth>2.37"
Flow Length=407' Tc=3.3 min CN=80 Runoff=4.97 cfs 0.202 af

Reach 10R: LB-DC-001 Avg. Flow Depth=0.29' Max Vel=6.67 fps Inflow=4.97 cfs 0.202 af
n=0.041 L=209.0' S=0.2488 '/' Capacity=52.47 cfs Outflow=4.75 cfs 0.201 af

Total Runoff Area = 1.023 ac Runoff Volume = 0.202 af Average Runoff Depth = 2.37"
74.98% Pervious = 0.767 ac 25.02% Impervious = 0.256 ac

Summary for Subcatchment 7S: DA-001

[49] Hint: Tc<2dt may require smaller dt

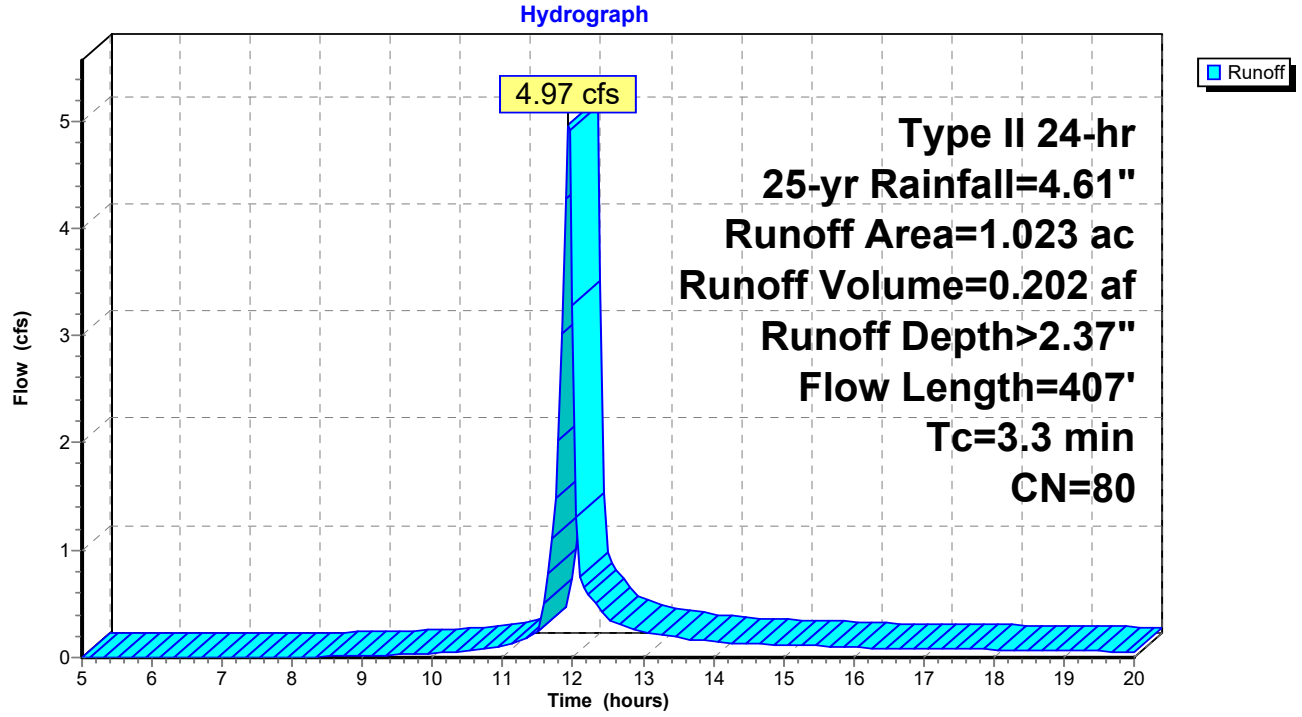
Runoff = 4.97 cfs @ 11.94 hrs, Volume= 0.202 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.61"

	Area (ac)	CN	Description
*	0.256	98	Impervious
	0.275	74	>75% Grass cover, Good, HSG C
	0.492	73	Woods, Fair, HSG C
	1.023	80	Weighted Average
	0.767		74.98% Pervious Area
	0.256		25.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.1150	2.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.5	134	0.0449	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	173	0.2890	2.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.3	407	Total			

Subcatchment 7S: DA-001



Summary for Reach 10R: LB-DC-001

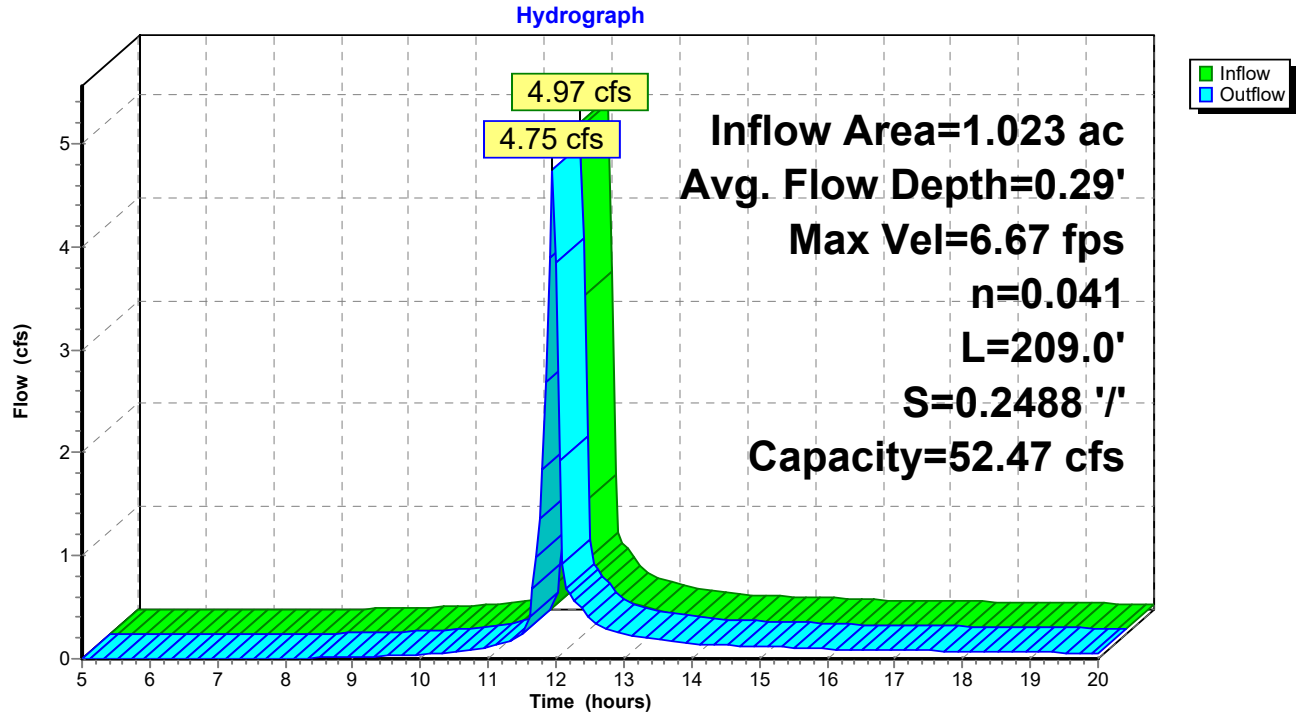
Inflow Area = 1.023 ac, 25.02% Impervious, Inflow Depth > 2.37" for 25-yr event
Inflow = 4.97 cfs @ 11.94 hrs, Volume= 0.202 af
Outflow = 4.75 cfs @ 11.95 hrs, Volume= 0.201 af, Atten= 4%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.67 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 2.0 min

Peak Storage= 154 cf @ 11.94 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 52.47 cfs

2.00' x 1.00' deep channel, n= 0.041 Riprap, 2-inch
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 209.0' Slope= 0.2488 '/'
Inlet Invert= 796.00', Outlet Invert= 744.00'

Reach 10R: LB-DC-001



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 7S: DA-001 Runoff Area=1.023 ac 25.02% Impervious Runoff Depth>3.03"
Flow Length=407' Tc=3.3 min CN=80 Runoff=6.28 cfs 0.258 af

Reach 10R: LB-DC-001 Avg. Flow Depth=0.33' Max Vel=7.17 fps Inflow=6.28 cfs 0.258 af
n=0.041 L=209.0' S=0.2488 '/' Capacity=52.47 cfs Outflow=6.03 cfs 0.258 af

Total Runoff Area = 1.023 ac Runoff Volume = 0.258 af Average Runoff Depth = 3.03"
74.98% Pervious = 0.767 ac 25.02% Impervious = 0.256 ac

Summary for Subcatchment 7S: DA-001

[49] Hint: Tc<2dt may require smaller dt

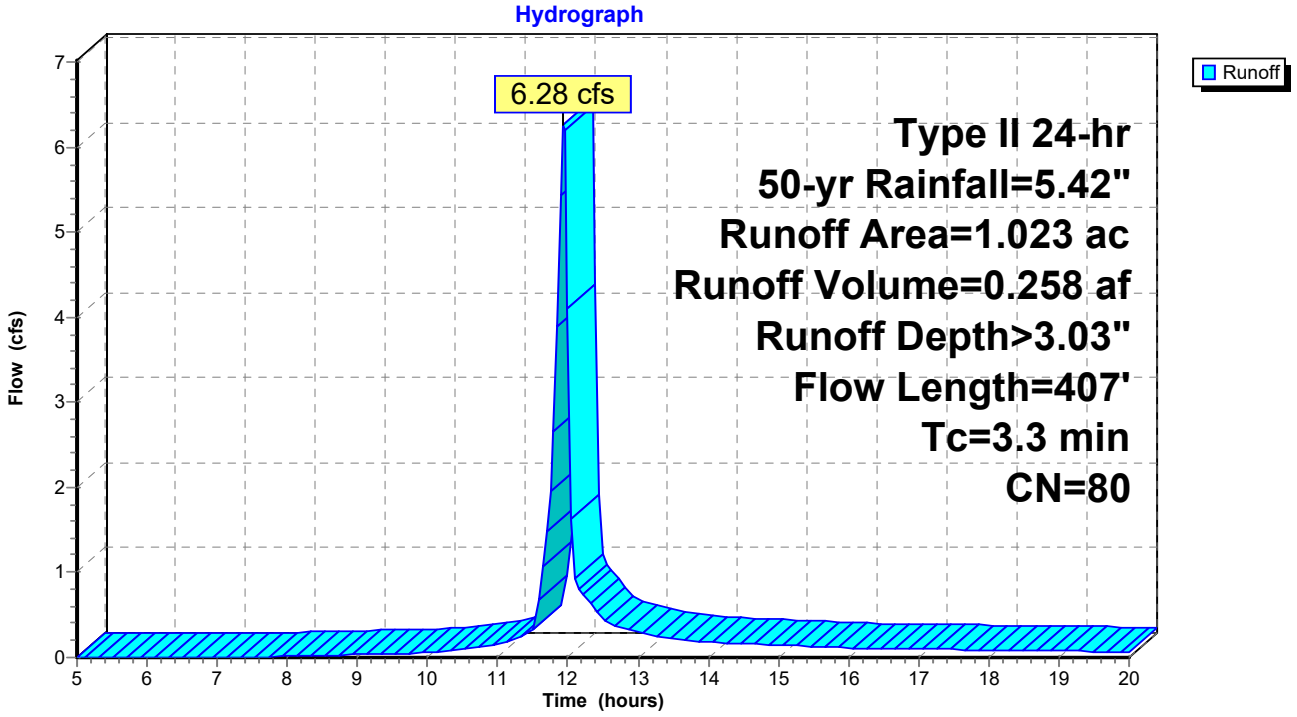
Runoff = 6.28 cfs @ 11.94 hrs, Volume= 0.258 af, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=5.42"

	Area (ac)	CN	Description
*	0.256	98	Impervious
	0.275	74	>75% Grass cover, Good, HSG C
	0.492	73	Woods, Fair, HSG C
	1.023	80	Weighted Average
	0.767		74.98% Pervious Area
	0.256		25.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.1150	2.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.5	134	0.0449	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	173	0.2890	2.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.3	407	Total			

Subcatchment 7S: DA-001



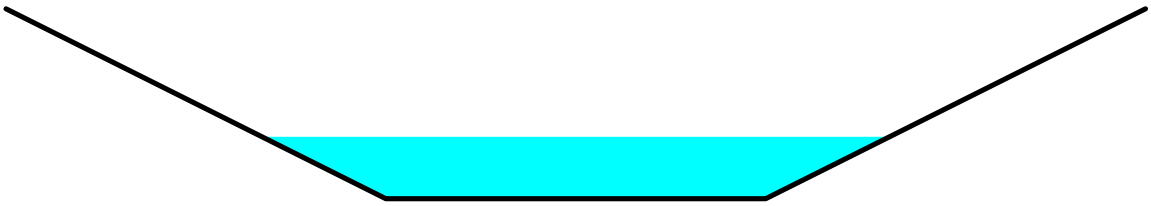
Summary for Reach 10R: LB-DC-001

Inflow Area = 1.023 ac, 25.02% Impervious, Inflow Depth > 3.03" for 50-yr event
Inflow = 6.28 cfs @ 11.94 hrs, Volume= 0.258 af
Outflow = 6.03 cfs @ 11.95 hrs, Volume= 0.258 af, Atten= 4%, Lag= 0.6 min

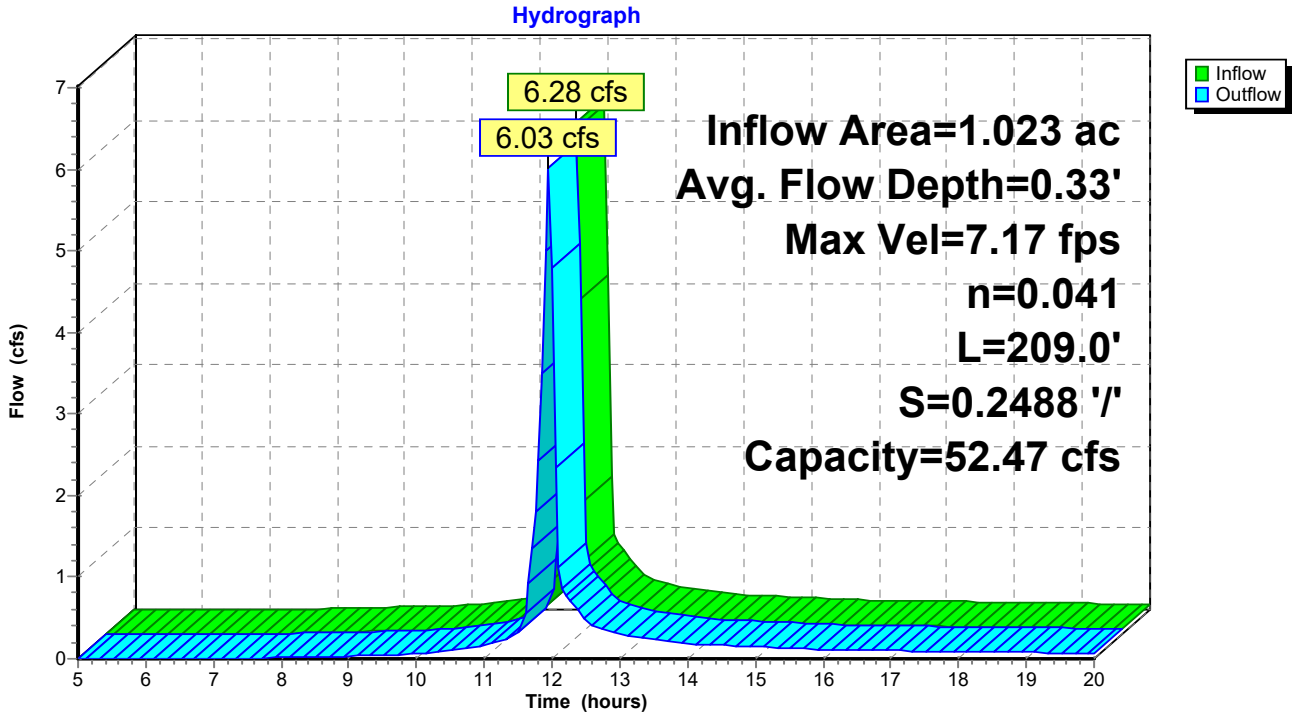
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.17 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.83 fps, Avg. Travel Time= 1.9 min

Peak Storage= 181 cf @ 11.94 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 52.47 cfs

2.00' x 1.00' deep channel, n= 0.041 Riprap, 2-inch
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 209.0' Slope= 0.2488 '/'
Inlet Invert= 796.00', Outlet Invert= 744.00'



Reach 10R: LB-DC-001



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 7S: DA-001 Runoff Area=1.023 ac 25.02% Impervious Runoff Depth>3.84"
Flow Length=407' Tc=3.3 min CN=80 Runoff=7.83 cfs 0.327 af

Reach 10R: LB-DC-001 Avg. Flow Depth=0.37' Max Vel=7.66 fps Inflow=7.83 cfs 0.327 af
n=0.041 L=209.0' S=0.2488 '/' Capacity=52.47 cfs Outflow=7.55 cfs 0.327 af

Total Runoff Area = 1.023 ac Runoff Volume = 0.327 af Average Runoff Depth = 3.84"
74.98% Pervious = 0.767 ac 25.02% Impervious = 0.256 ac

Summary for Subcatchment 7S: DA-001

[49] Hint: Tc<2dt may require smaller dt

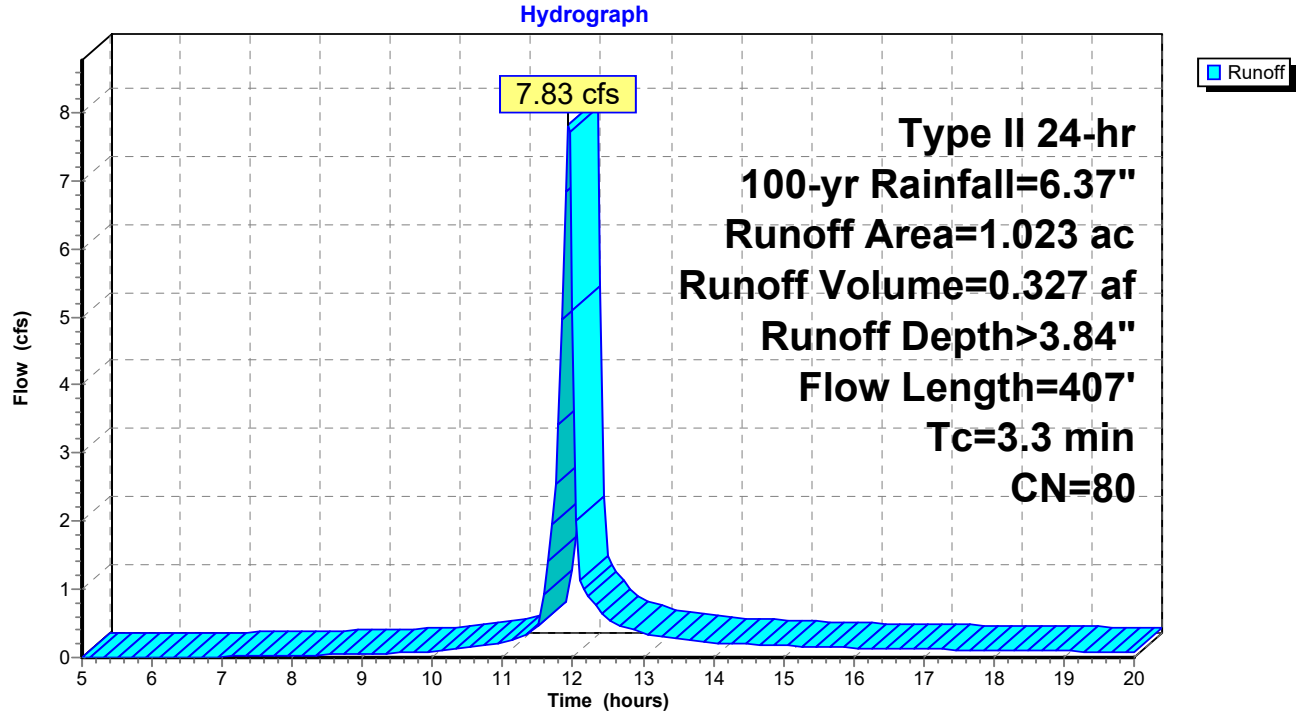
Runoff = 7.83 cfs @ 11.94 hrs, Volume= 0.327 af, Depth> 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.37"

	Area (ac)	CN	Description
*	0.256	98	Impervious
	0.275	74	>75% Grass cover, Good, HSG C
	0.492	73	Woods, Fair, HSG C
	1.023	80	Weighted Average
	0.767		74.98% Pervious Area
	0.256		25.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	100	0.1150	2.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.58"
1.5	134	0.0449	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	173	0.2890	2.69		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.3	407	Total			

Subcatchment 7S: DA-001



Summary for Reach 10R: LB-DC-001

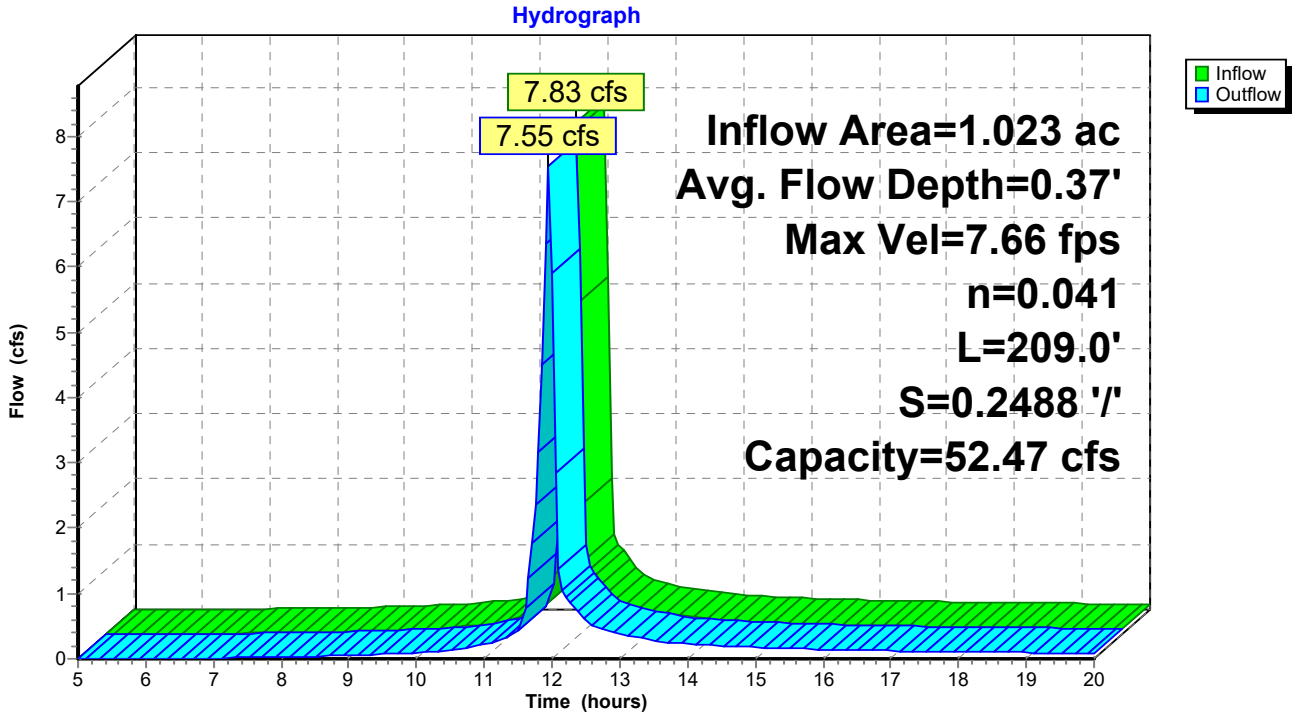
Inflow Area = 1.023 ac, 25.02% Impervious, Inflow Depth > 3.84" for 100-yr event
Inflow = 7.83 cfs @ 11.94 hrs, Volume= 0.327 af
Outflow = 7.55 cfs @ 11.95 hrs, Volume= 0.327 af, Atten= 4%, Lag= 0.5 min

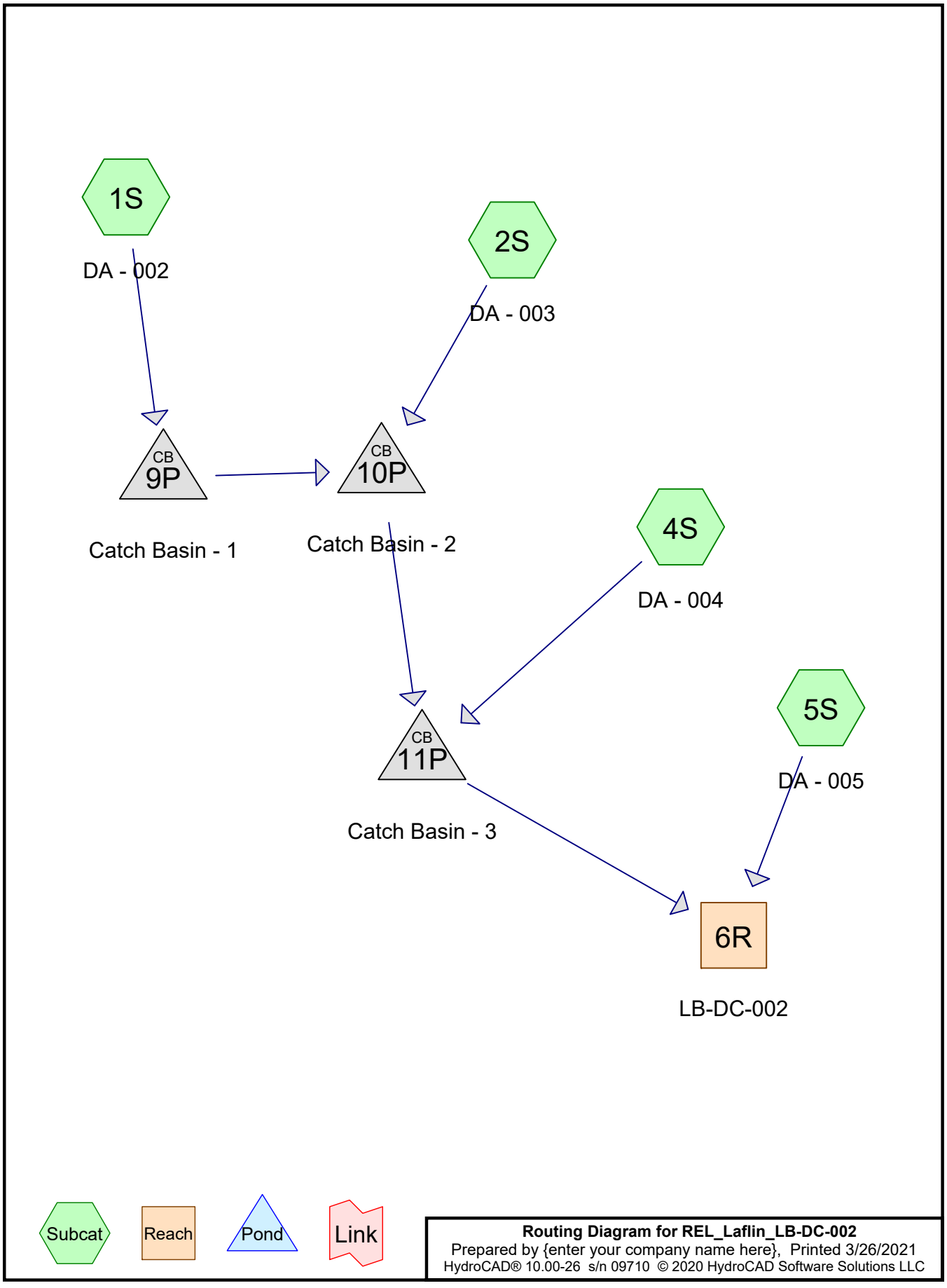
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.66 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.94 fps, Avg. Travel Time= 1.8 min

Peak Storage= 211 cf @ 11.94 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 52.47 cfs

2.00' x 1.00' deep channel, n= 0.041 Riprap, 2-inch
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 209.0' Slope= 0.2488 '/'
Inlet Invert= 796.00', Outlet Invert= 744.00'

Reach 10R: LB-DC-001





Routing Diagram for REL_Laflin_LB-DC-002
Prepared by {enter your company name here}, Printed 3/26/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.012	39	>75% Grass cover, Good, HSG A (2S)
0.370	74	>75% Grass cover, Good, HSG C (1S, 2S, 4S)
3.601	80	>75% Grass cover, Good, HSG D (1S, 2S, 4S, 5S)
0.010	72	Dirt roads, HSG A (4S)
2.968	98	Impervious (1S, 2S, 4S, 5S)
0.142	36	Woods, Fair, HSG A (5S)
1.532	73	Woods, Fair, HSG C (5S)
8.634	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.164	HSG A	2S, 4S, 5S
0.000	HSG B	
1.901	HSG C	1S, 2S, 4S, 5S
3.601	HSG D	1S, 2S, 4S, 5S
2.968	Other	1S, 2S, 4S, 5S
8.634		**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
0.012	0.000	0.370	3.601	0.000	3.982	>75% Grass cover, Good	1S, 2S, 4S, 5S
0.010	0.000	0.000	0.000	0.000	0.010	Dirt roads	4S
0.000	0.000	0.000	0.000	2.968	2.968	Impervious	1S, 2S, 4S, 5S
0.142	0.000	1.532	0.000	0.000	1.674	Woods, Fair	5S
0.164	**0.000**	**1.901**	**3.601**	**2.968**	**8.634**	**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	9P	831.46	832.33	27.2	-0.0320	0.025	18.0	0.0	0.0
2	10P	832.33	830.76	40.0	0.0393	0.025	18.0	0.0	0.0
3	11P	830.76	829.00	184.7	0.0095	0.025	18.0	0.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA - 002 Runoff Area=26,425 sf 48.88% Impervious Runoff Depth>1.00"
Flow Length=592' Tc=9.4 min CN=88 Runoff=1.02 cfs 0.051 af

Subcatchment 2S: DA - 003 Runoff Area=194,317 sf 37.48% Impervious Runoff Depth>0.88"
Flow Length=897' Tc=13.1 min CN=86 Runoff=5.87 cfs 0.327 af

Subcatchment 4S: DA - 004 Runoff Area=71,163 sf 48.10% Impervious Runoff Depth>1.00"
Flow Length=1,013' Tc=8.9 min CN=88 Runoff=2.81 cfs 0.136 af

Subcatchment 5S: DA - 005 Runoff Area=84,205 sf 11.04% Impervious Runoff Depth>0.34"
Flow Length=389' Tc=8.1 min CN=73 Runoff=1.05 cfs 0.055 af

Reach 6R: LB-DC-002 Avg. Flow Depth=0.52' Max Vel=2.83 fps Inflow=10.42 cfs 0.569 af
n=0.088 L=237.7' S=0.0841 '/' Capacity=45.57 cfs Outflow=10.00 cfs 0.567 af

Pond 9P: Catch Basin - 1 Peak Elev=832.84' Inflow=1.02 cfs 0.051 af
18.0" Round Culvert n=0.025 L=27.2' S=-0.0320 '/' Outflow=1.02 cfs 0.051 af

Pond 10P: Catch Basin - 2 Peak Elev=834.11' Inflow=6.81 cfs 0.378 af
18.0" Round Culvert n=0.025 L=40.0' S=0.0393 '/' Outflow=6.81 cfs 0.378 af

Pond 11P: Catch Basin - 3 Peak Elev=836.81' Inflow=9.41 cfs 0.514 af
18.0" Round Culvert n=0.025 L=184.7' S=0.0095 '/' Outflow=9.41 cfs 0.514 af

Total Runoff Area = 8.634 ac Runoff Volume = 0.569 af Average Runoff Depth = 0.79"
65.63% Pervious = 5.667 ac 34.37% Impervious = 2.968 ac

Summary for Subcatchment 1S: DA - 002

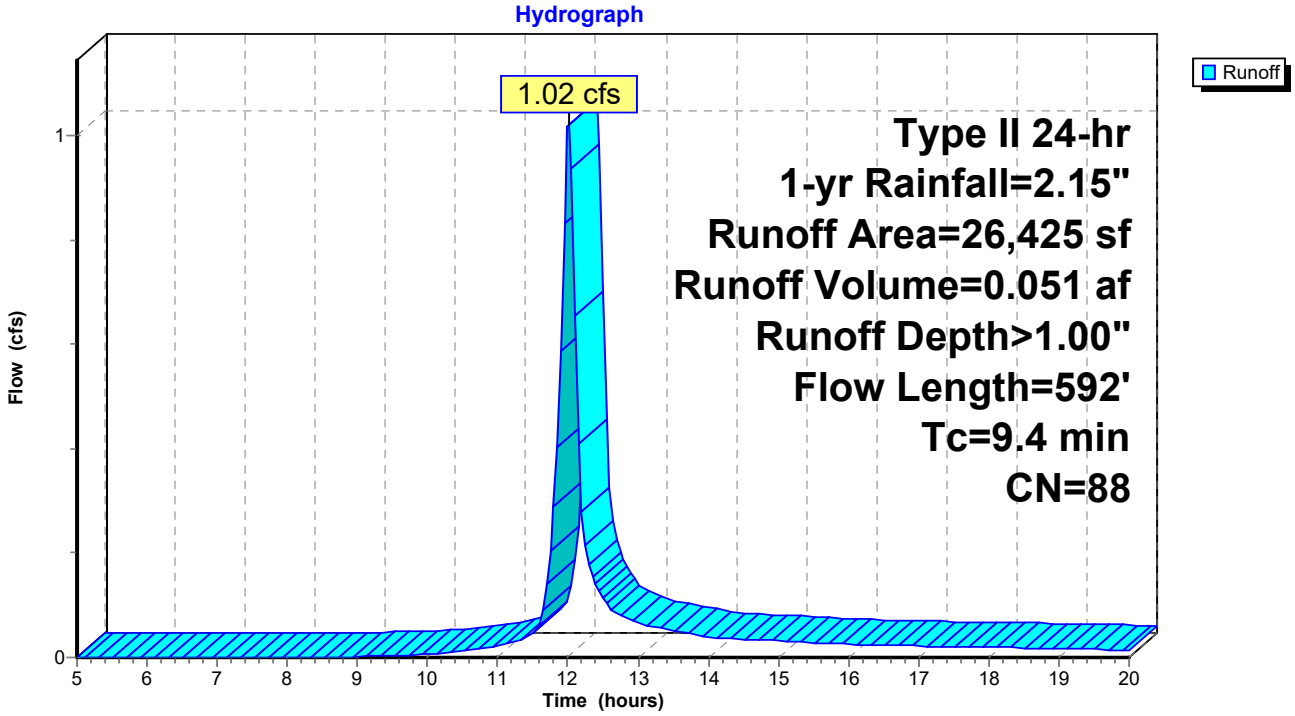
Runoff = 1.02 cfs @ 12.01 hrs, Volume= 0.051 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (sf)	CN	Description
*	12,916	98	Impervious
	9,330	80	>75% Grass cover, Good, HSG D
	4,179	74	>75% Grass cover, Good, HSG C
	26,425	88	Weighted Average
	13,509		51.12% Pervious Area
	12,916		48.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
2.4	312	0.0945	2.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	180	0.1200	7.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.4	592	Total			

Subcatchment 1S: DA - 002



Summary for Subcatchment 2S: DA - 003

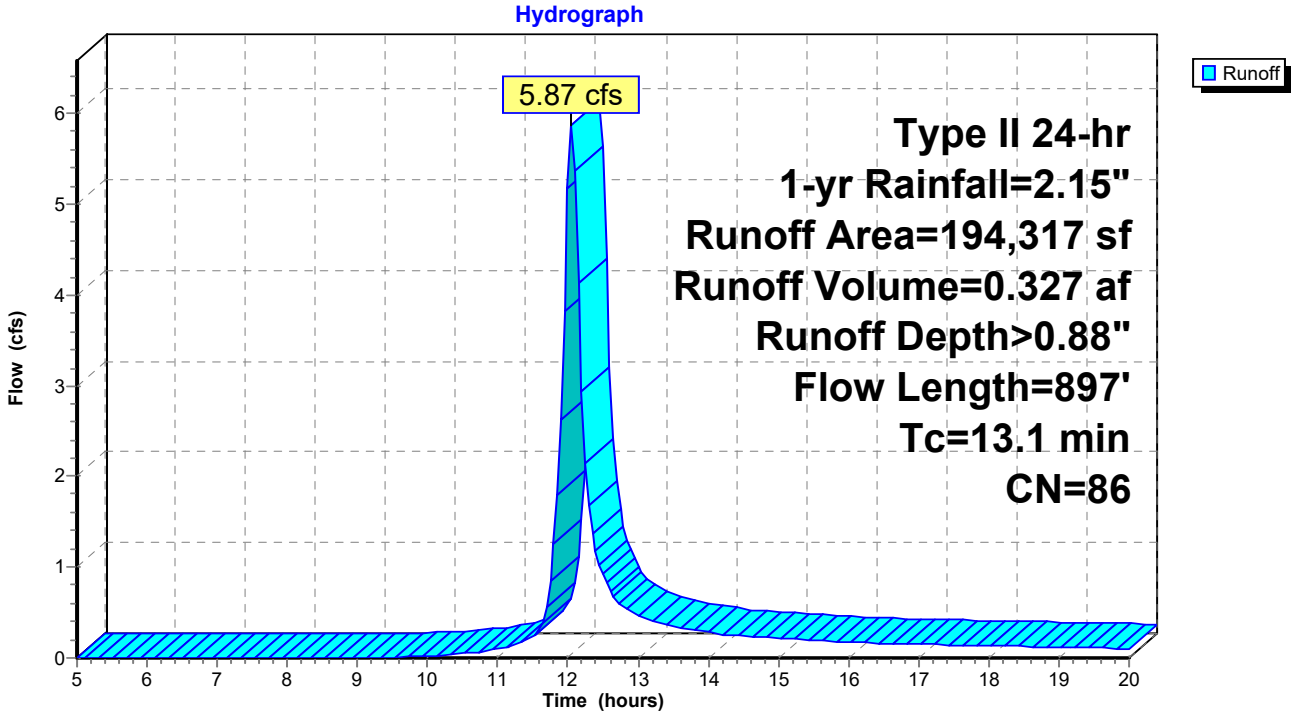
Runoff = 5.87 cfs @ 12.05 hrs, Volume= 0.327 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (sf)	CN	Description
	8,639	74	>75% Grass cover, Good, HSG C
	514	39	>75% Grass cover, Good, HSG A
	112,334	80	>75% Grass cover, Good, HSG D
*	72,830	98	Impervious
	194,317	86	Weighted Average
	121,487		62.52% Pervious Area
	72,830		37.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
6.5	797	0.0857	2.05		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.1	897	Total			

Subcatchment 2S: DA - 003



Summary for Subcatchment 4S: DA - 004

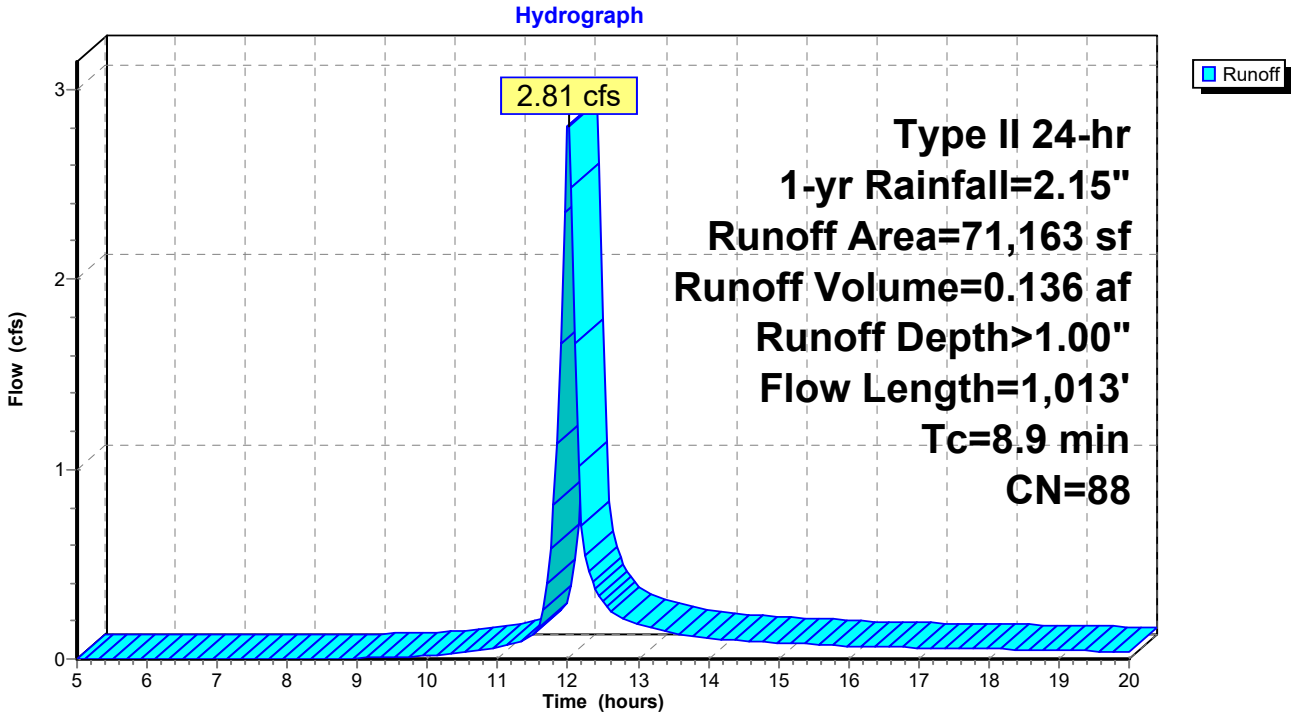
Runoff = 2.81 cfs @ 12.00 hrs, Volume= 0.136 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (sf)	CN	Description
	3,290	74	>75% Grass cover, Good, HSG C
	33,190	80	>75% Grass cover, Good, HSG D
	455	72	Dirt roads, HSG A
*	34,228	98	Impervious
	71,163	88	Weighted Average
	36,935		51.90% Pervious Area
	34,228		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.1000	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.2	173	0.1096	2.32		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.0	740	0.0941	6.23		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.9	1,013	Total			

Subcatchment 4S: DA - 004



Summary for Subcatchment 5S: DA - 005

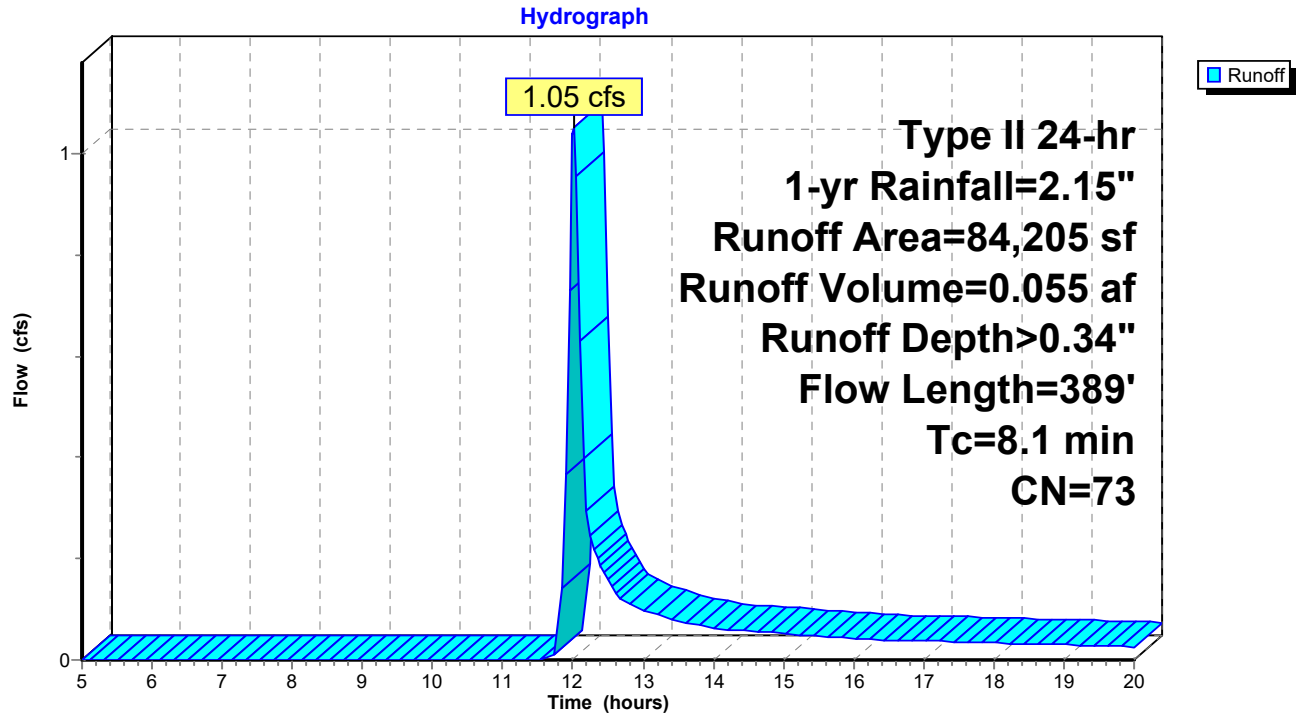
Runoff = 1.05 cfs @ 12.01 hrs, Volume= 0.055 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.15"

	Area (sf)	CN	Description
	6,192	36	Woods, Fair, HSG A
	66,719	73	Woods, Fair, HSG C
	2,001	80	>75% Grass cover, Good, HSG D
*	9,293	98	Impervious
	84,205	73	Weighted Average
	74,912		88.96% Pervious Area
	9,293		11.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0800	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.8	289	0.2870	2.68		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.1	389	Total			

Subcatchment 5S: DA - 005



Summary for Reach 6R: LB-DC-002

Inflow Area = 8.634 ac, 34.37% Impervious, Inflow Depth > 0.79" for 1-yr event
Inflow = 10.42 cfs @ 12.03 hrs, Volume= 0.569 af
Outflow = 10.00 cfs @ 12.07 hrs, Volume= 0.567 af, Atten= 4%, Lag= 2.4 min

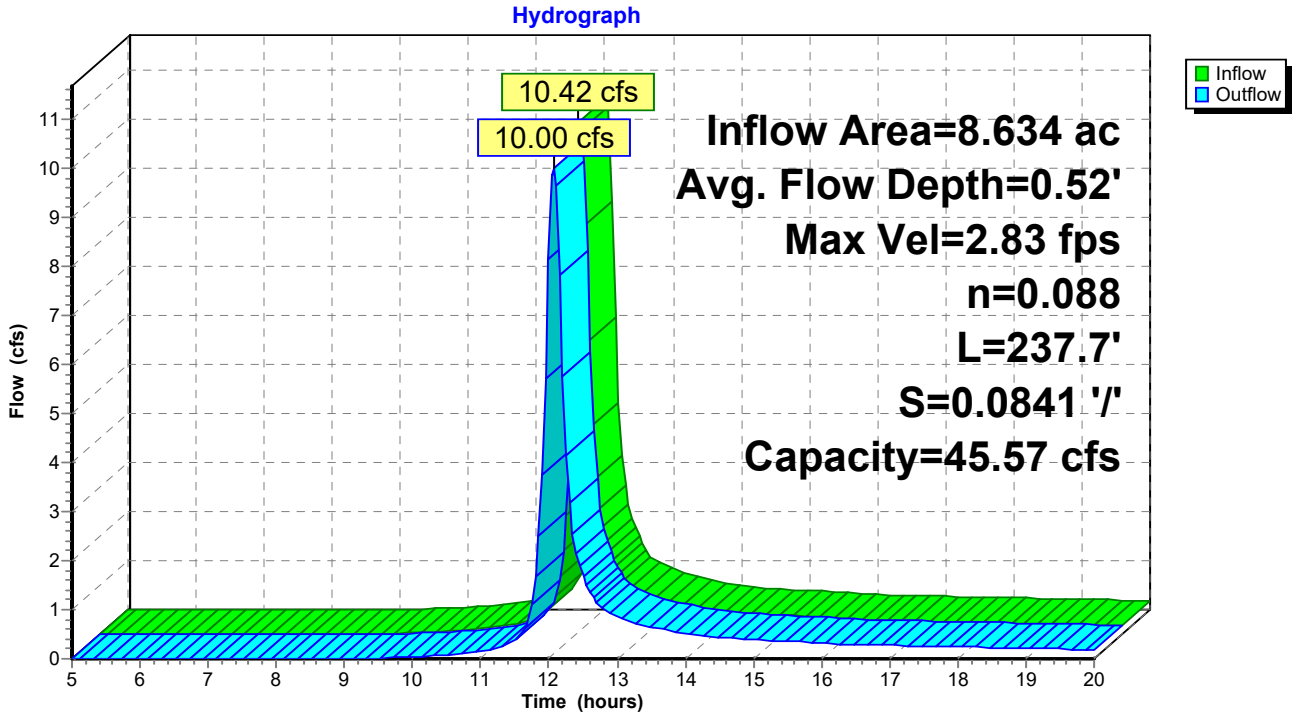
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.83 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 5.0 min

Peak Storage= 868 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 1.20' Flow Area= 10.1 sf, Capacity= 45.57 cfs

6.00' x 1.20' deep channel, n= 0.088
Side Slope Z-value= 2.0 '/' Top Width= 10.80'
Length= 237.7' Slope= 0.0841 '/'
Inlet Invert= 810.00', Outlet Invert= 790.00'

‡

Reach 6R: LB-DC-002



Summary for Pond 9P: Catch Basin - 1

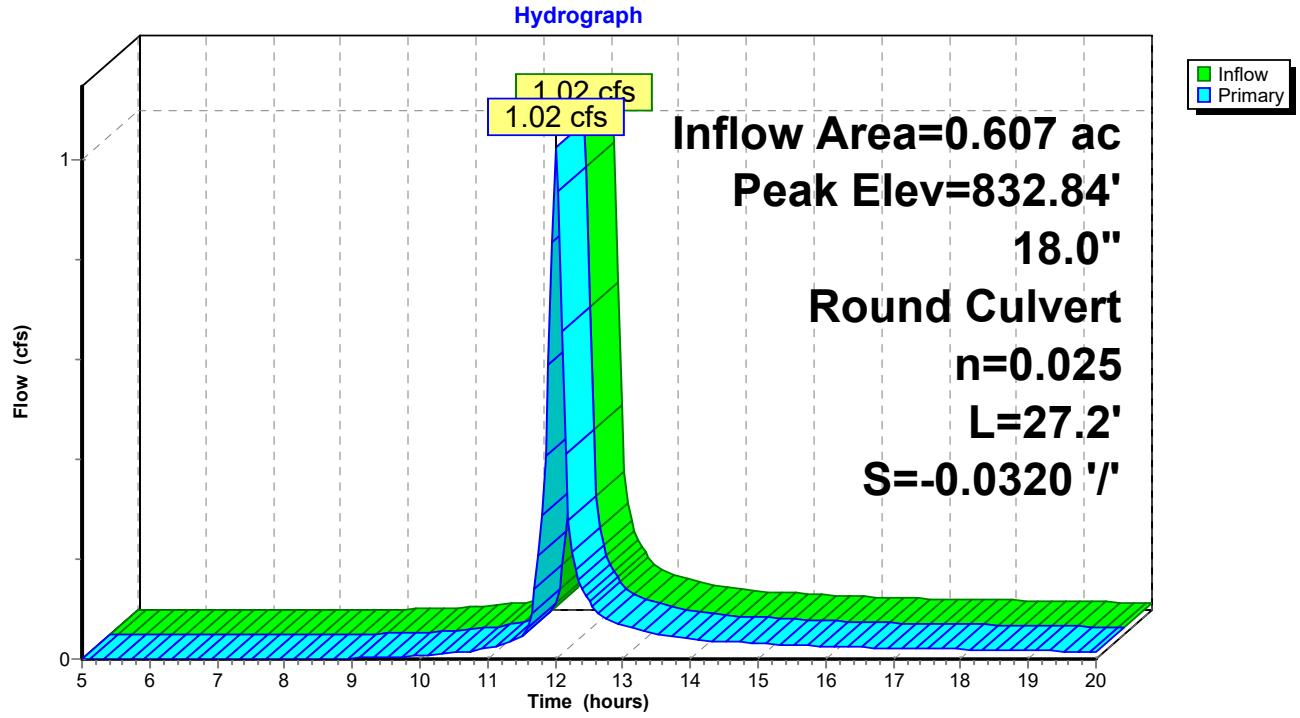
Inflow Area = 0.607 ac, 48.88% Impervious, Inflow Depth > 1.00" for 1-yr event
Inflow = 1.02 cfs @ 12.01 hrs, Volume= 0.051 af
Outflow = 1.02 cfs @ 12.01 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min
Primary = 1.02 cfs @ 12.01 hrs, Volume= 0.051 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 832.84' @ 12.01 hrs
Flood Elev= 834.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 27.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 831.46' / 832.33' S= -0.0320 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=1.00 cfs @ 12.01 hrs HW=832.84' (Free Discharge)
1=Culvert (Inlet Controls 1.00 cfs @ 1.91 fps)

Pond 9P: Catch Basin - 1



Summary for Pond 10P: Catch Basin - 2

[81] Warning: Exceeded Pond 9P by 1.29' @ 12.05 hrs

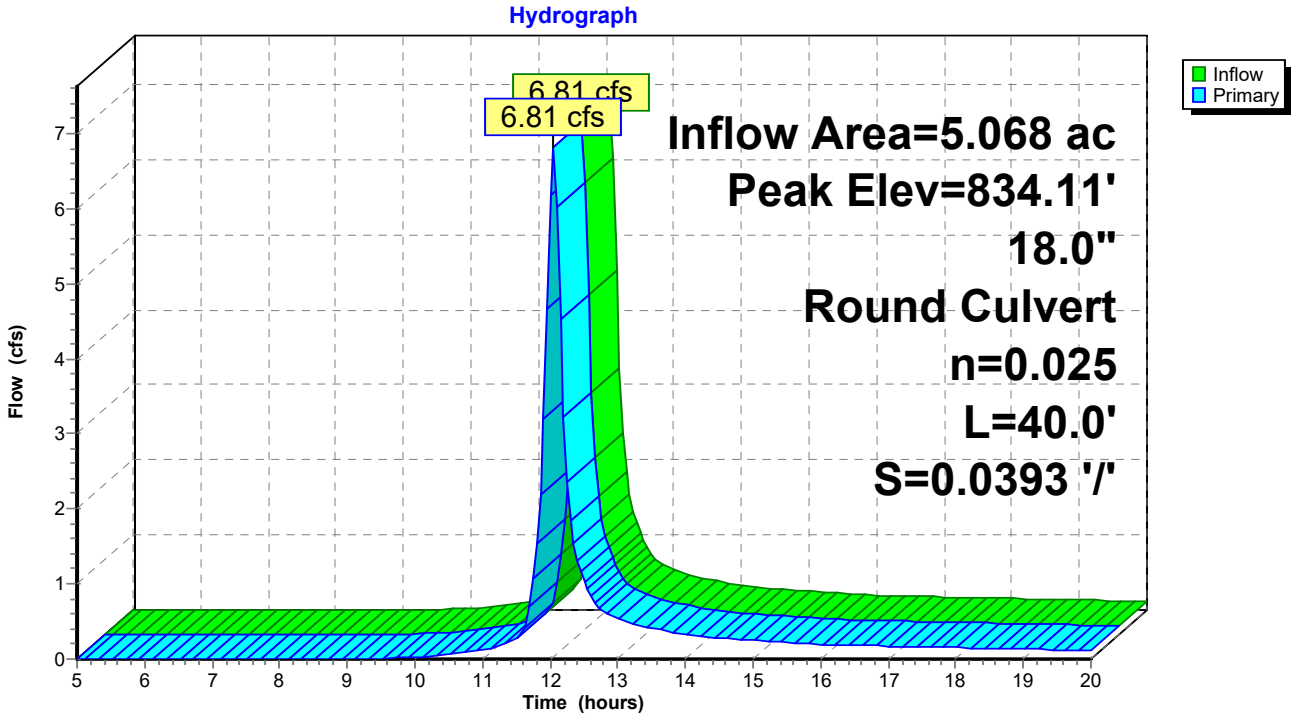
Inflow Area = 5.068 ac, 38.84% Impervious, Inflow Depth > 0.90" for 1-yr event
Inflow = 6.81 cfs @ 12.05 hrs, Volume= 0.378 af
Outflow = 6.81 cfs @ 12.05 hrs, Volume= 0.378 af, Atten= 0%, Lag= 0.0 min
Primary = 6.81 cfs @ 12.05 hrs, Volume= 0.378 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 834.11' @ 12.05 hrs
Flood Elev= 835.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 832.33' / 830.76' S= 0.0393 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=6.77 cfs @ 12.05 hrs HW=834.10' (Free Discharge)
1=Culvert (Inlet Controls 6.77 cfs @ 3.83 fps)

Pond 10P: Catch Basin - 2



Summary for Pond 11P: Catch Basin - 3

[58] Hint: Peaked 1.15' above defined flood level
[81] Warning: Exceeded Pond 10P by 2.57' @ 12.05 hrs

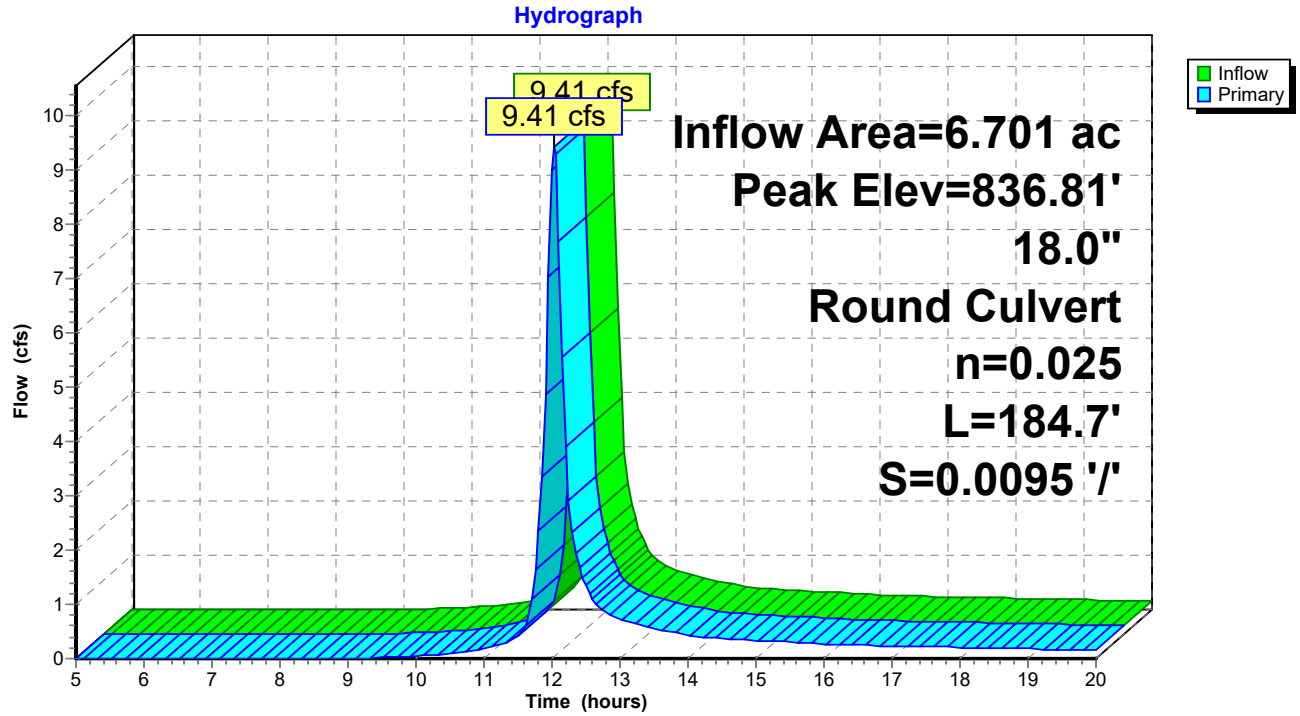
Inflow Area = 6.701 ac, 41.10% Impervious, Inflow Depth > 0.92" for 1-yr event
Inflow = 9.41 cfs @ 12.03 hrs, Volume= 0.514 af
Outflow = 9.41 cfs @ 12.03 hrs, Volume= 0.514 af, Atten= 0%, Lag= 0.0 min
Primary = 9.41 cfs @ 12.03 hrs, Volume= 0.514 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 836.81' @ 12.03 hrs
Flood Elev= 835.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	830.76'	**18.0" Round Culvert** L= 184.7' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 830.76' / 829.00' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=9.19 cfs @ 12.03 hrs HW=836.55' (Free Discharge)
↑**1=Culvert** (Barrel Controls 9.19 cfs @ 5.20 fps)

Pond 11P: Catch Basin - 3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA - 002 Runoff Area=26,425 sf 48.88% Impervious Runoff Depth>1.34"
Flow Length=592' Tc=9.4 min CN=88 Runoff=1.36 cfs 0.068 af

Subcatchment 2S: DA - 003 Runoff Area=194,317 sf 37.48% Impervious Runoff Depth>1.20"
Flow Length=897' Tc=13.1 min CN=86 Runoff=8.00 cfs 0.447 af

Subcatchment 4S: DA - 004 Runoff Area=71,163 sf 48.10% Impervious Runoff Depth>1.34"
Flow Length=1,013' Tc=8.9 min CN=88 Runoff=3.73 cfs 0.183 af

Subcatchment 5S: DA - 005 Runoff Area=84,205 sf 11.04% Impervious Runoff Depth>0.54"
Flow Length=389' Tc=8.1 min CN=73 Runoff=1.80 cfs 0.087 af

Reach 6R: LB-DC-002 Avg. Flow Depth=0.63' Max Vel=3.15 fps Inflow=14.41 cfs 0.785 af
n=0.088 L=237.7' S=0.0841 '/' Capacity=45.57 cfs Outflow=13.90 cfs 0.783 af

Pond 9P: Catch Basin - 1 Peak Elev=832.93' Inflow=1.36 cfs 0.068 af
18.0" Round Culvert n=0.025 L=27.2' S=-0.0320 '/' Outflow=1.36 cfs 0.068 af

Pond 10P: Catch Basin - 2 Peak Elev=834.97' Inflow=9.25 cfs 0.515 af
18.0" Round Culvert n=0.025 L=40.0' S=0.0393 '/' Outflow=9.25 cfs 0.515 af

Pond 11P: Catch Basin - 3 Peak Elev=841.99' Inflow=12.69 cfs 0.697 af
18.0" Round Culvert n=0.025 L=184.7' S=0.0095 '/' Outflow=12.69 cfs 0.697 af

Total Runoff Area = 8.634 ac Runoff Volume = 0.785 af Average Runoff Depth = 1.09"
65.63% Pervious = 5.667 ac 34.37% Impervious = 2.968 ac

Summary for Subcatchment 1S: DA - 002

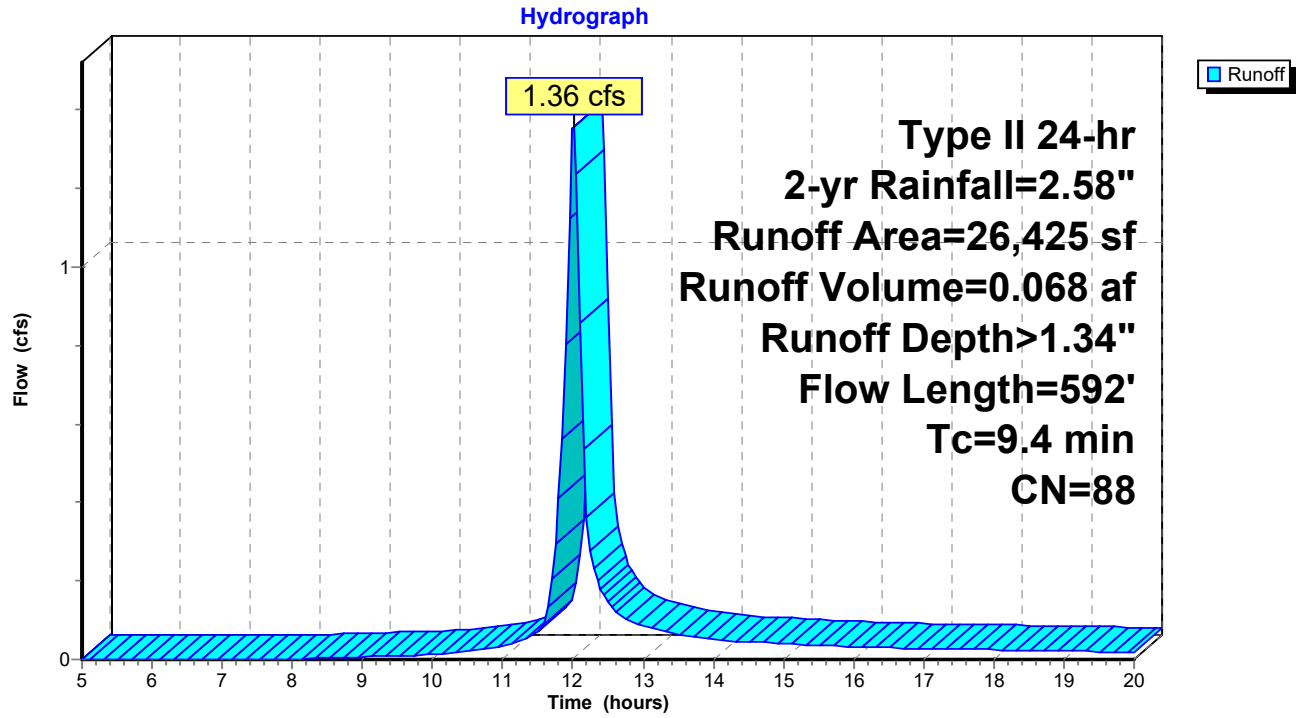
Runoff = 1.36 cfs @ 12.01 hrs, Volume= 0.068 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.58"

	Area (sf)	CN	Description
*	12,916	98	Impervious
	9,330	80	>75% Grass cover, Good, HSG D
	4,179	74	>75% Grass cover, Good, HSG C
	26,425	88	Weighted Average
	13,509		51.12% Pervious Area
	12,916		48.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
2.4	312	0.0945	2.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	180	0.1200	7.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.4	592	Total			

Subcatchment 1S: DA - 002



Summary for Subcatchment 2S: DA - 003

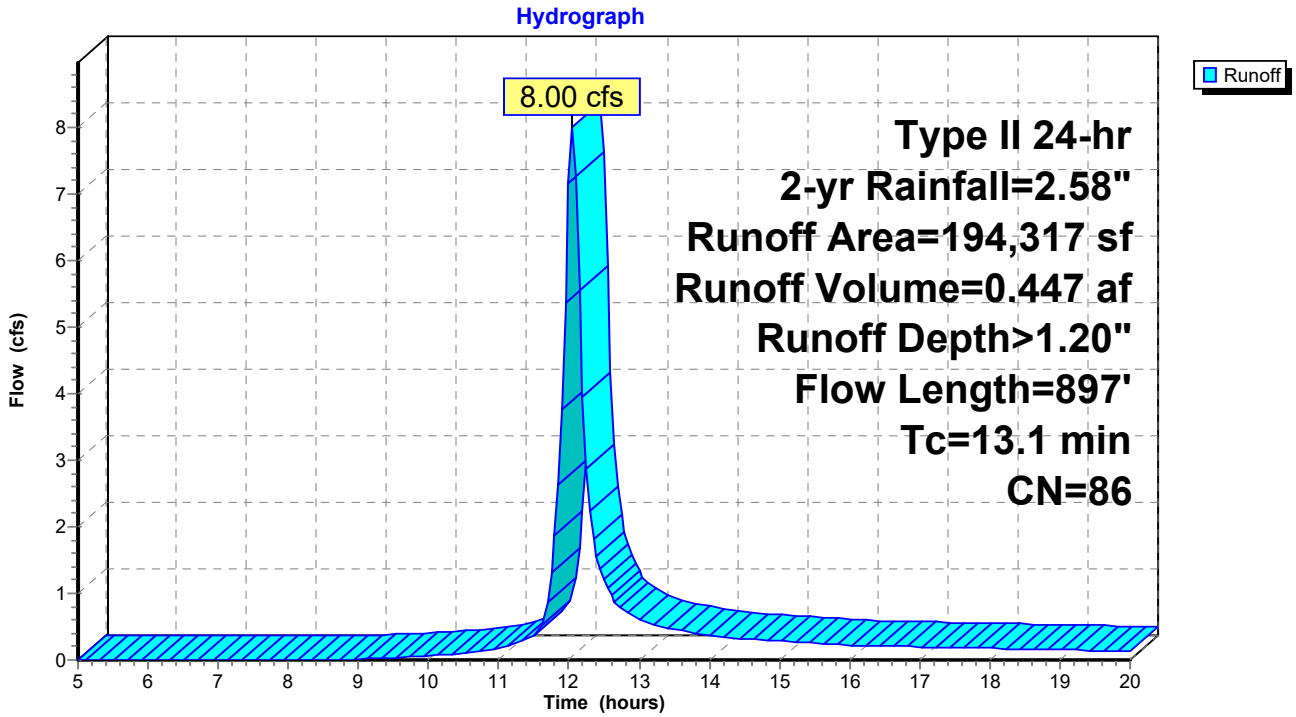
Runoff = 8.00 cfs @ 12.05 hrs, Volume= 0.447 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.58"

	Area (sf)	CN	Description
	8,639	74	>75% Grass cover, Good, HSG C
	514	39	>75% Grass cover, Good, HSG A
	112,334	80	>75% Grass cover, Good, HSG D
*	72,830	98	Impervious
	194,317	86	Weighted Average
	121,487		62.52% Pervious Area
	72,830		37.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
6.5	797	0.0857	2.05		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.1	897	Total			

Subcatchment 2S: DA - 003



Summary for Subcatchment 4S: DA - 004

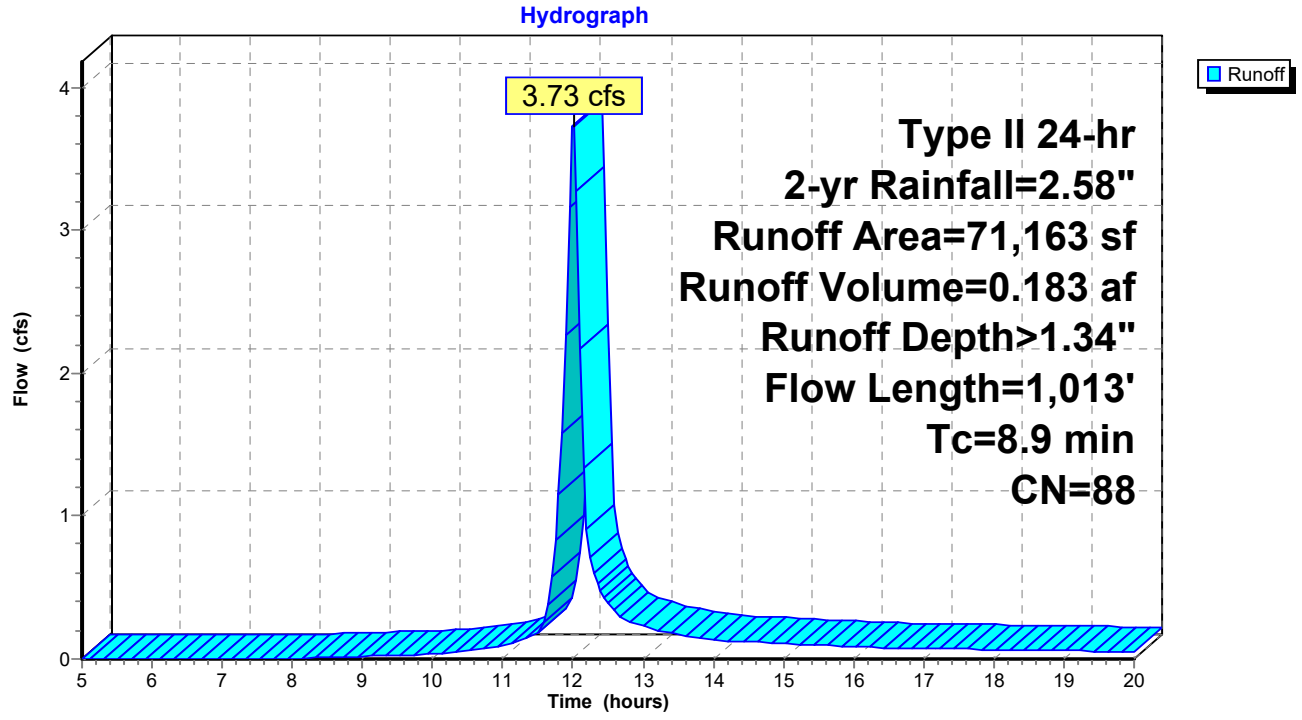
Runoff = 3.73 cfs @ 12.00 hrs, Volume= 0.183 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.58"

	Area (sf)	CN	Description
	3,290	74	>75% Grass cover, Good, HSG C
	33,190	80	>75% Grass cover, Good, HSG D
	455	72	Dirt roads, HSG A
*	34,228	98	Impervious
	71,163	88	Weighted Average
	36,935		51.90% Pervious Area
	34,228		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.1000	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.2	173	0.1096	2.32		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.0	740	0.0941	6.23		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.9	1,013	Total			

Subcatchment 4S: DA - 004



Summary for Subcatchment 5S: DA - 005

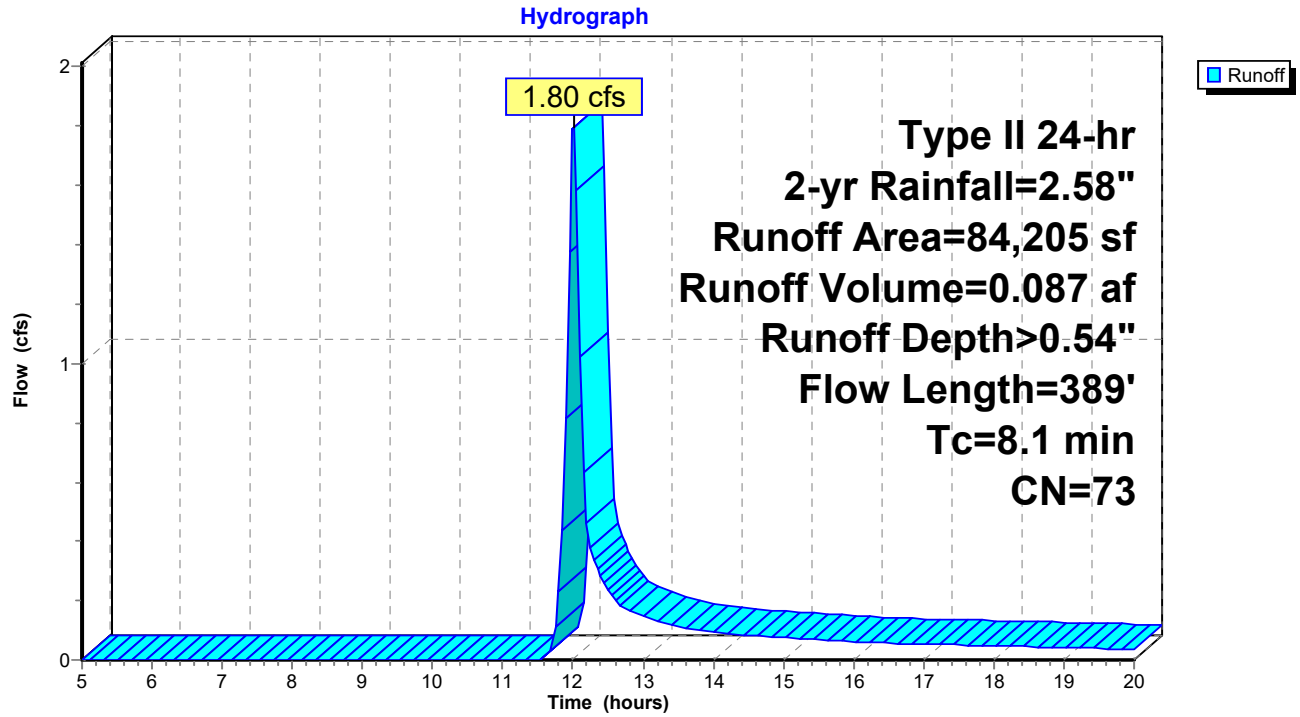
Runoff = 1.80 cfs @ 12.01 hrs, Volume= 0.087 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=2.58"

	Area (sf)	CN	Description
	6,192	36	Woods, Fair, HSG A
	66,719	73	Woods, Fair, HSG C
	2,001	80	>75% Grass cover, Good, HSG D
*	9,293	98	Impervious
	84,205	73	Weighted Average
	74,912		88.96% Pervious Area
	9,293		11.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0800	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.8	289	0.2870	2.68		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.1	389	Total			

Subcatchment 5S: DA - 005



Summary for Reach 6R: LB-DC-002

Inflow Area = 8.634 ac, 34.37% Impervious, Inflow Depth > 1.09" for 2-yr event
Inflow = 14.41 cfs @ 12.03 hrs, Volume= 0.785 af
Outflow = 13.90 cfs @ 12.06 hrs, Volume= 0.783 af, Atten= 4%, Lag= 2.1 min

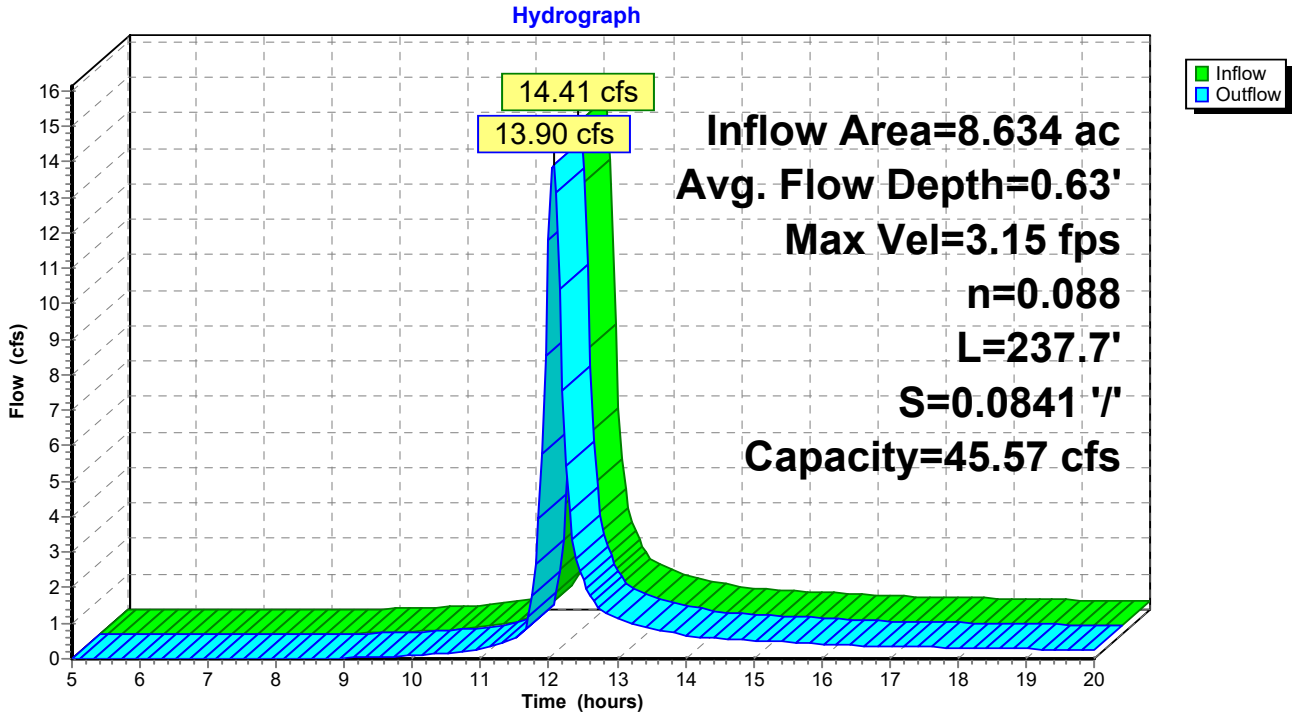
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.15 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 4.6 min

Peak Storage= 1,080 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 1.20' Flow Area= 10.1 sf, Capacity= 45.57 cfs

6.00' x 1.20' deep channel, n= 0.088
Side Slope Z-value= 2.0 '/' Top Width= 10.80'
Length= 237.7' Slope= 0.0841 '/'
Inlet Invert= 810.00', Outlet Invert= 790.00'

‡

Reach 6R: LB-DC-002



Summary for Pond 9P: Catch Basin - 1

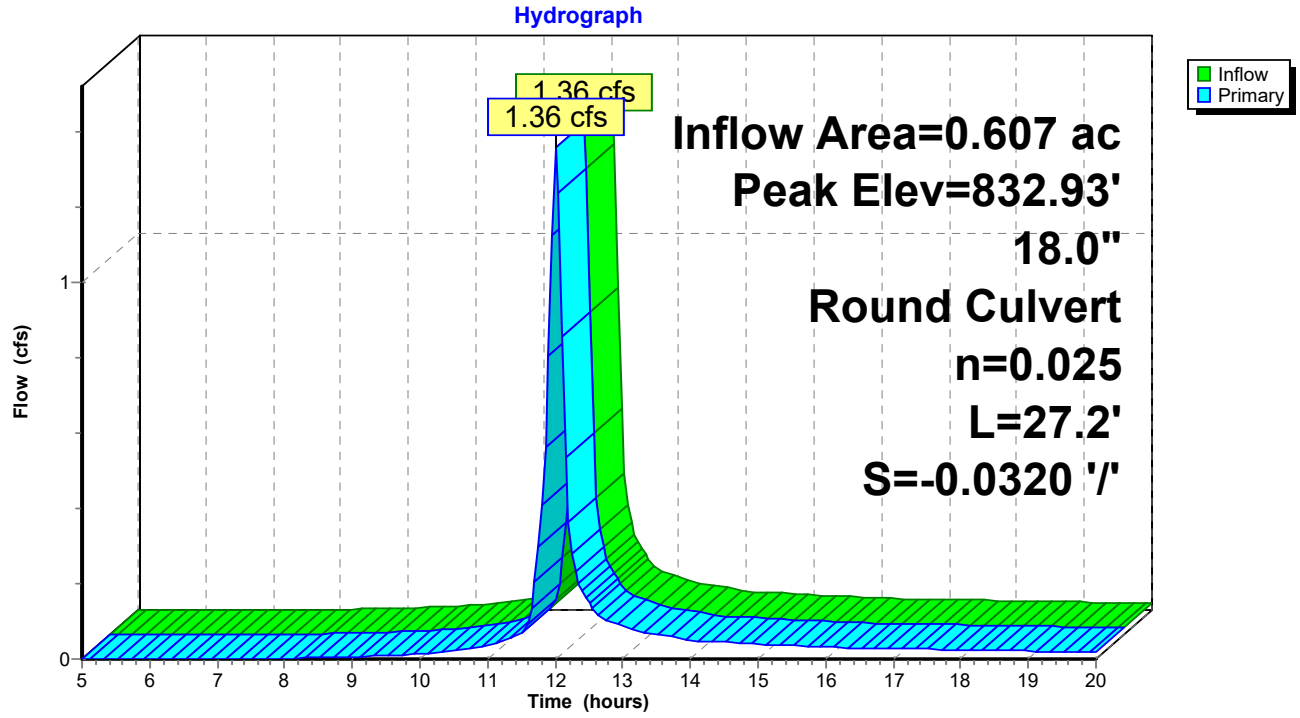
Inflow Area = 0.607 ac, 48.88% Impervious, Inflow Depth > 1.34" for 2-yr event
Inflow = 1.36 cfs @ 12.01 hrs, Volume= 0.068 af
Outflow = 1.36 cfs @ 12.01 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min
Primary = 1.36 cfs @ 12.01 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 832.93' @ 12.01 hrs
Flood Elev= 834.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 27.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 831.46' / 832.33' S= -0.0320 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=1.34 cfs @ 12.01 hrs HW=832.92' (Free Discharge)
1=Culvert (Inlet Controls 1.34 cfs @ 2.07 fps)

Pond 9P: Catch Basin - 1



Summary for Pond 10P: Catch Basin - 2

[81] Warning: Exceeded Pond 9P by 2.07' @ 12.05 hrs

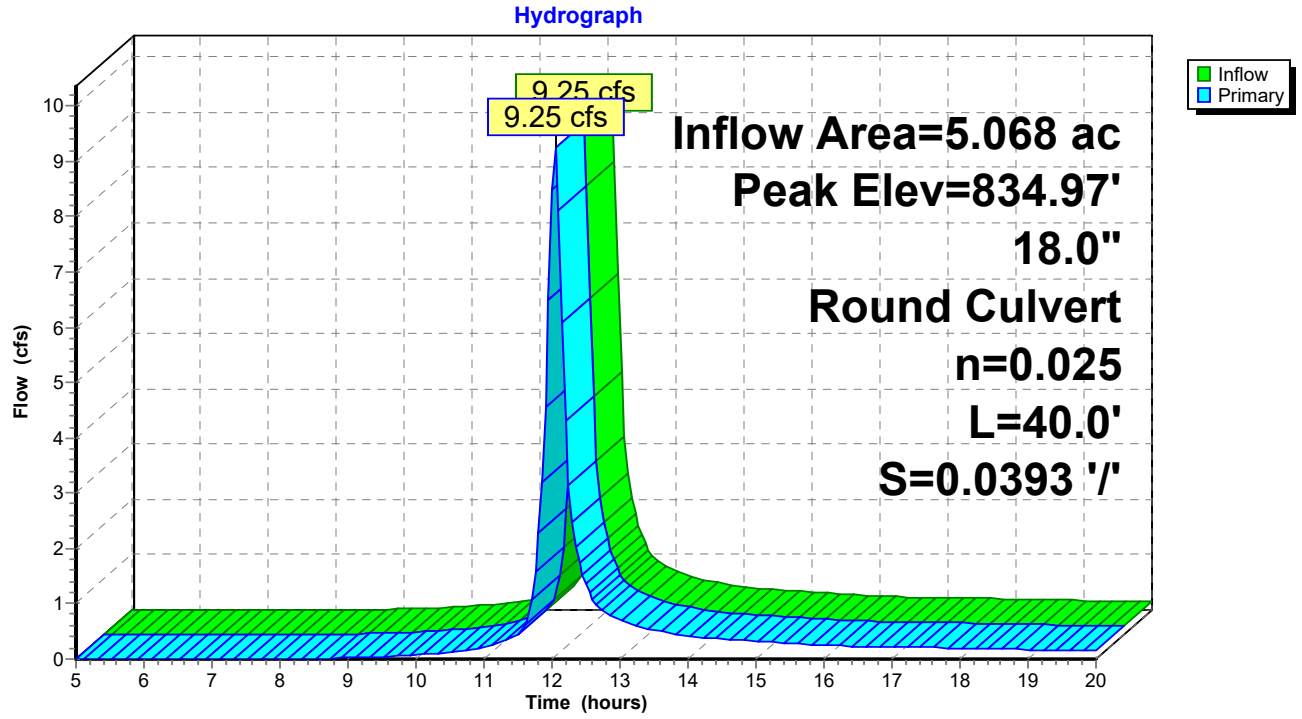
Inflow Area = 5.068 ac, 38.84% Impervious, Inflow Depth > 1.22" for 2-yr event
Inflow = 9.25 cfs @ 12.04 hrs, Volume= 0.515 af
Outflow = 9.25 cfs @ 12.04 hrs, Volume= 0.515 af, Atten= 0%, Lag= 0.0 min
Primary = 9.25 cfs @ 12.04 hrs, Volume= 0.515 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 834.97' @ 12.05 hrs
Flood Elev= 835.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 832.33' / 830.76' S= 0.0393 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=9.16 cfs @ 12.04 hrs HW=834.94' (Free Discharge)
1=Culvert (Inlet Controls 9.16 cfs @ 5.19 fps)

Pond 10P: Catch Basin - 2



Summary for Pond 11P: Catch Basin - 3

[58] Hint: Peaked 6.33' above defined flood level
[81] Warning: Exceeded Pond 10P by 6.73' @ 12.05 hrs

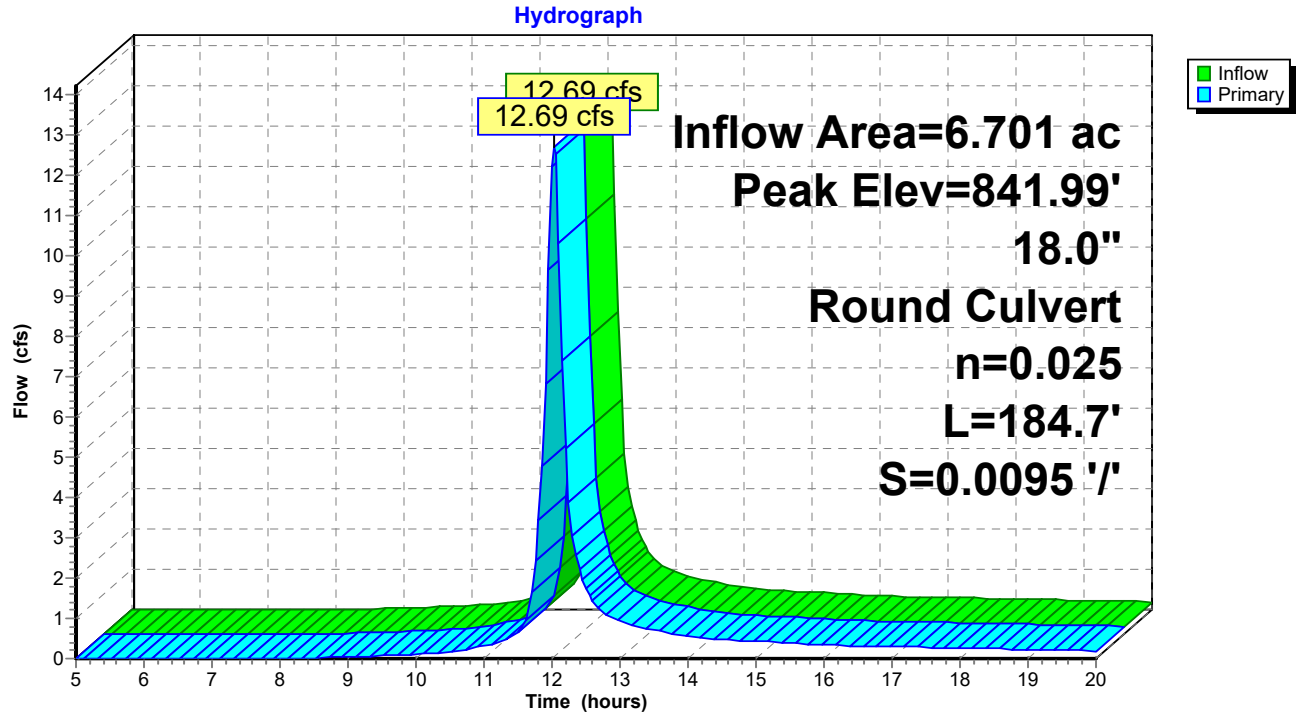
Inflow Area = 6.701 ac, 41.10% Impervious, Inflow Depth > 1.25" for 2-yr event
Inflow = 12.69 cfs @ 12.03 hrs, Volume= 0.697 af
Outflow = 12.69 cfs @ 12.03 hrs, Volume= 0.697 af, Atten= 0%, Lag= 0.0 min
Primary = 12.69 cfs @ 12.03 hrs, Volume= 0.697 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 841.99' @ 12.03 hrs
Flood Elev= 835.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	830.76'	**18.0" Round Culvert** L= 184.7' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 830.76' / 829.00' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=12.40 cfs @ 12.03 hrs HW=841.50' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 12.40 cfs @ 7.02 fps)

Pond 11P: Catch Basin - 3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA - 002 Runoff Area=26,425 sf 48.88% Impervious Runoff Depth>2.32"
Flow Length=592' Tc=9.4 min CN=88 Runoff=2.29 cfs 0.117 af

Subcatchment 2S: DA - 003 Runoff Area=194,317 sf 37.48% Impervious Runoff Depth>2.14"
Flow Length=897' Tc=13.1 min CN=86 Runoff=14.02 cfs 0.797 af

Subcatchment 4S: DA - 004 Runoff Area=71,163 sf 48.10% Impervious Runoff Depth>2.32"
Flow Length=1,013' Tc=8.9 min CN=88 Runoff=6.29 cfs 0.316 af

Subcatchment 5S: DA - 005 Runoff Area=84,205 sf 11.04% Impervious Runoff Depth>1.22"
Flow Length=389' Tc=8.1 min CN=73 Runoff=4.20 cfs 0.196 af

Reach 6R: LB-DC-002 Avg. Flow Depth=0.88' Max Vel=3.79 fps Inflow=25.98 cfs 1.426 af
n=0.088 L=237.7' S=0.0841 '/' Capacity=45.57 cfs Outflow=25.20 cfs 1.423 af

Pond 9P: Catch Basin - 1 Peak Elev=833.13' Inflow=2.29 cfs 0.117 af
18.0" Round Culvert n=0.025 L=27.2' S=-0.0320 '/' Outflow=2.29 cfs 0.117 af

Pond 10P: Catch Basin - 2 Peak Elev=838.84' Inflow=16.13 cfs 0.914 af
18.0" Round Culvert n=0.025 L=40.0' S=0.0393 '/' Outflow=16.13 cfs 0.914 af

Pond 11P: Catch Basin - 3 Peak Elev=864.83' Inflow=21.95 cfs 1.230 af
18.0" Round Culvert n=0.025 L=184.7' S=0.0095 '/' Outflow=21.95 cfs 1.230 af

Total Runoff Area = 8.634 ac Runoff Volume = 1.426 af Average Runoff Depth = 1.98"
65.63% Pervious = 5.667 ac 34.37% Impervious = 2.968 ac

Summary for Subcatchment 1S: DA - 002

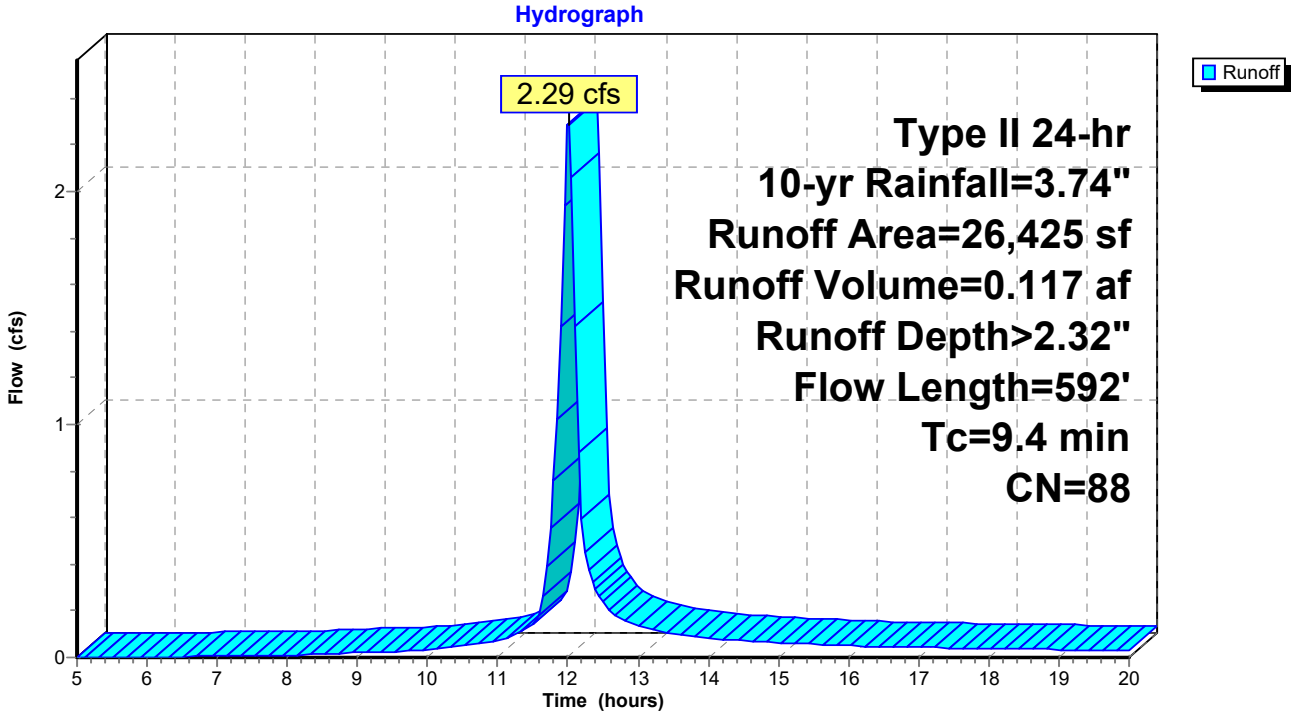
Runoff = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.74"

	Area (sf)	CN	Description
*	12,916	98	Impervious
	9,330	80	>75% Grass cover, Good, HSG D
	4,179	74	>75% Grass cover, Good, HSG C
	26,425	88	Weighted Average
	13,509		51.12% Pervious Area
	12,916		48.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
2.4	312	0.0945	2.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	180	0.1200	7.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.4	592	Total			

Subcatchment 1S: DA - 002



Summary for Subcatchment 2S: DA - 003

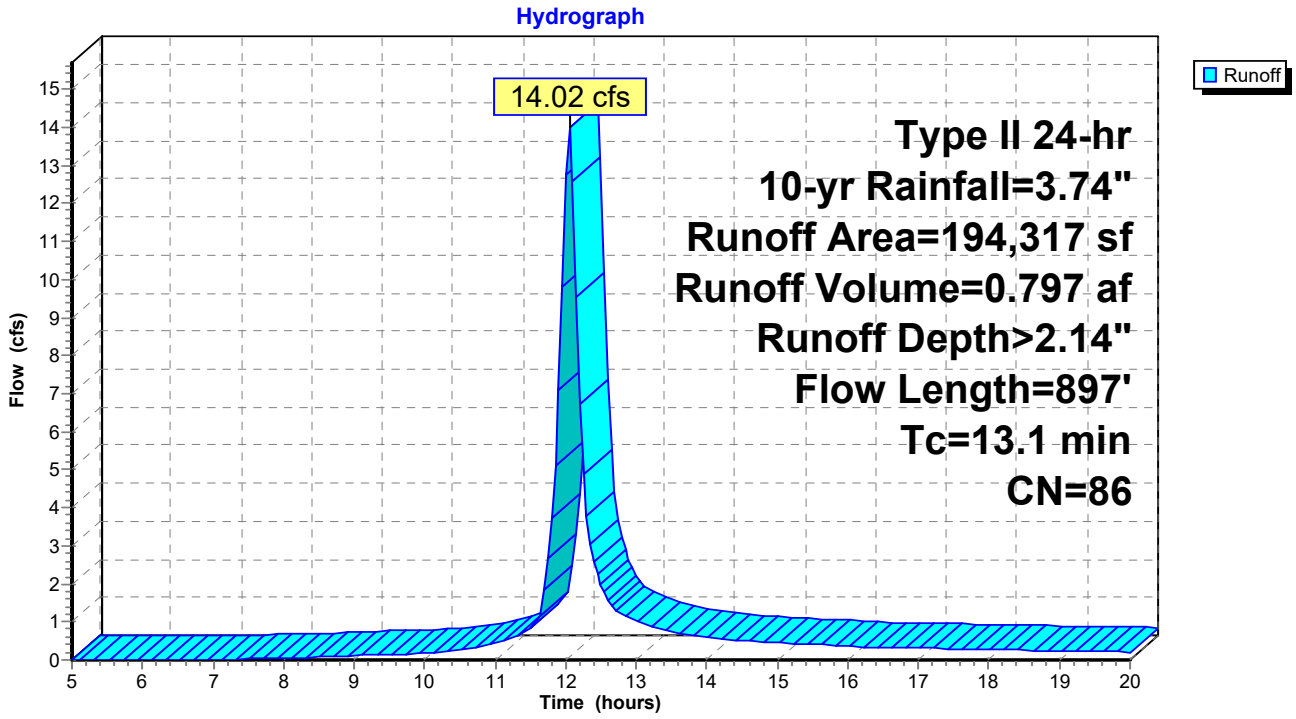
Runoff = 14.02 cfs @ 12.05 hrs, Volume= 0.797 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.74"

	Area (sf)	CN	Description
	8,639	74	>75% Grass cover, Good, HSG C
	514	39	>75% Grass cover, Good, HSG A
	112,334	80	>75% Grass cover, Good, HSG D
*	72,830	98	Impervious
	194,317	86	Weighted Average
	121,487		62.52% Pervious Area
	72,830		37.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
6.5	797	0.0857	2.05		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.1	897	Total			

Subcatchment 2S: DA - 003



Summary for Subcatchment 4S: DA - 004

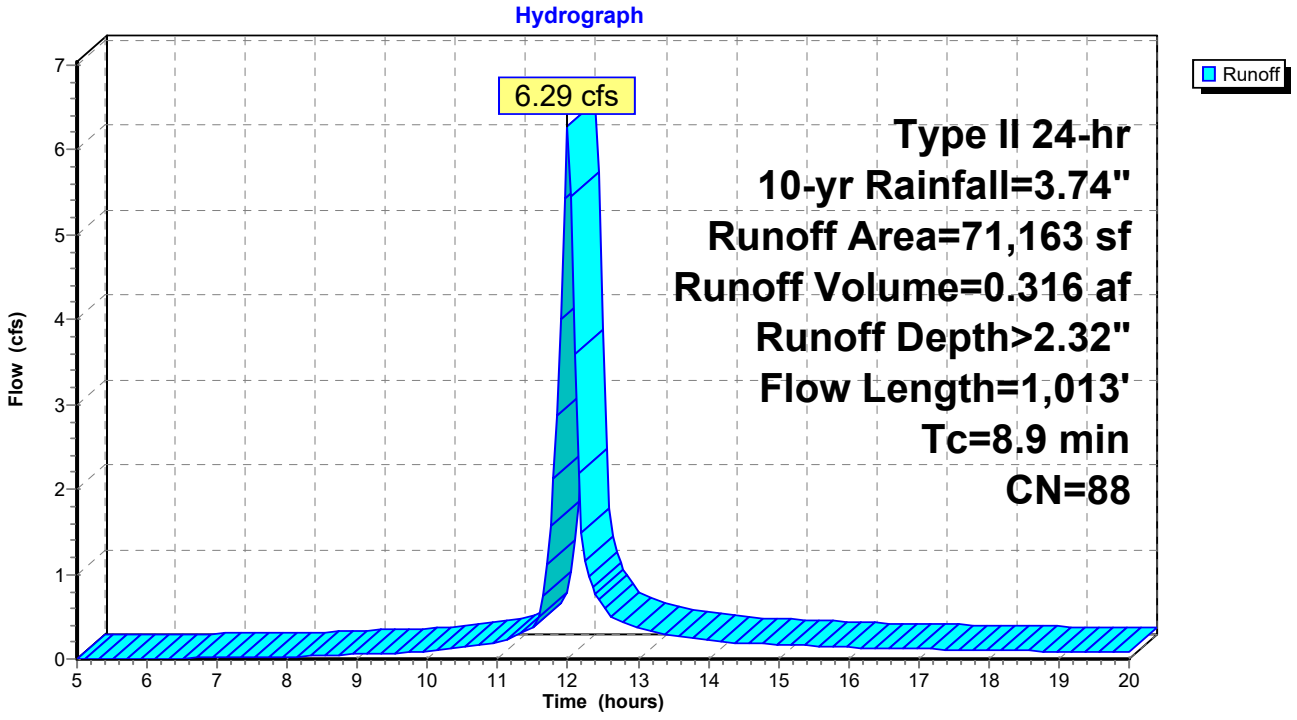
Runoff = 6.29 cfs @ 12.00 hrs, Volume= 0.316 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.74"

	Area (sf)	CN	Description
	3,290	74	>75% Grass cover, Good, HSG C
	33,190	80	>75% Grass cover, Good, HSG D
	455	72	Dirt roads, HSG A
*	34,228	98	Impervious
	71,163	88	Weighted Average
	36,935		51.90% Pervious Area
	34,228		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.1000	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.2	173	0.1096	2.32		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.0	740	0.0941	6.23		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.9	1,013	Total			

Subcatchment 4S: DA - 004



Summary for Subcatchment 5S: DA - 005

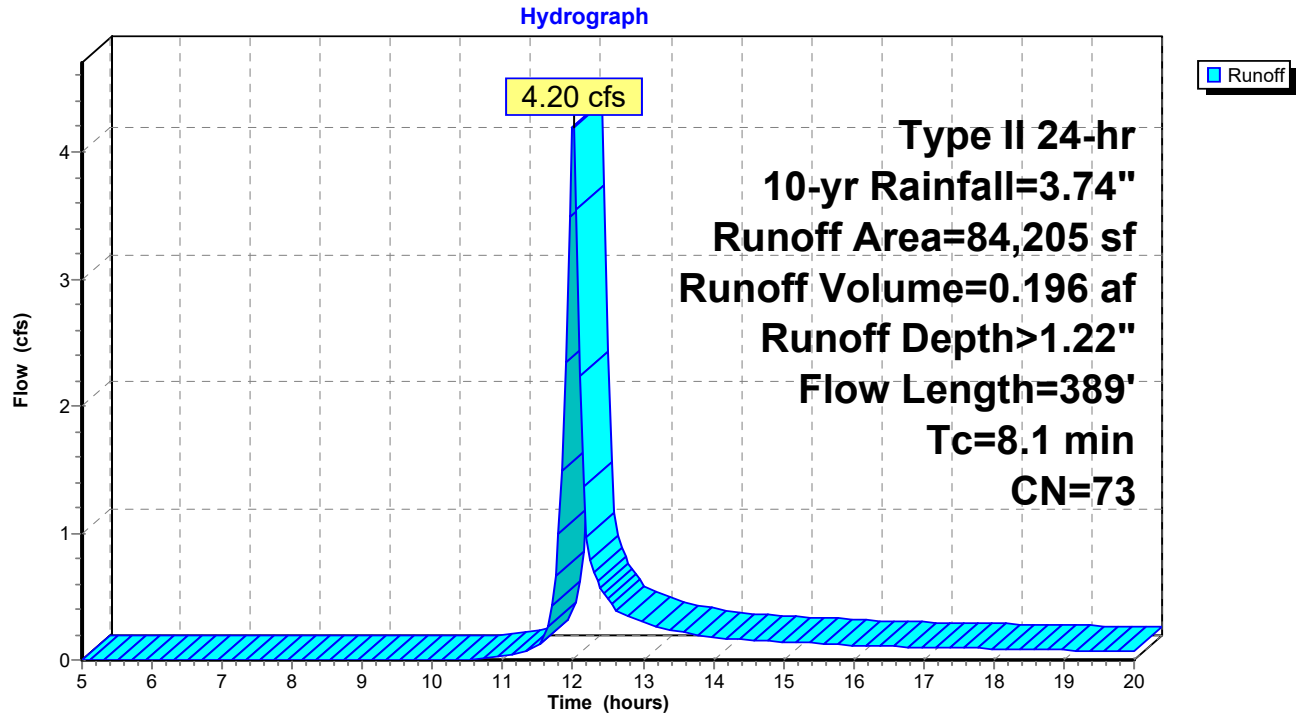
Runoff = 4.20 cfs @ 12.00 hrs, Volume= 0.196 af, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.74"

	Area (sf)	CN	Description
	6,192	36	Woods, Fair, HSG A
	66,719	73	Woods, Fair, HSG C
	2,001	80	>75% Grass cover, Good, HSG D
*	9,293	98	Impervious
	84,205	73	Weighted Average
	74,912		88.96% Pervious Area
	9,293		11.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0800	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.8	289	0.2870	2.68		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.1	389	Total			

Subcatchment 5S: DA - 005



Summary for Reach 6R: LB-DC-002

Inflow Area = 8.634 ac, 34.37% Impervious, Inflow Depth > 1.98" for 10-yr event
Inflow = 25.98 cfs @ 12.02 hrs, Volume= 1.426 af
Outflow = 25.20 cfs @ 12.05 hrs, Volume= 1.423 af, Atten= 3%, Lag= 1.8 min

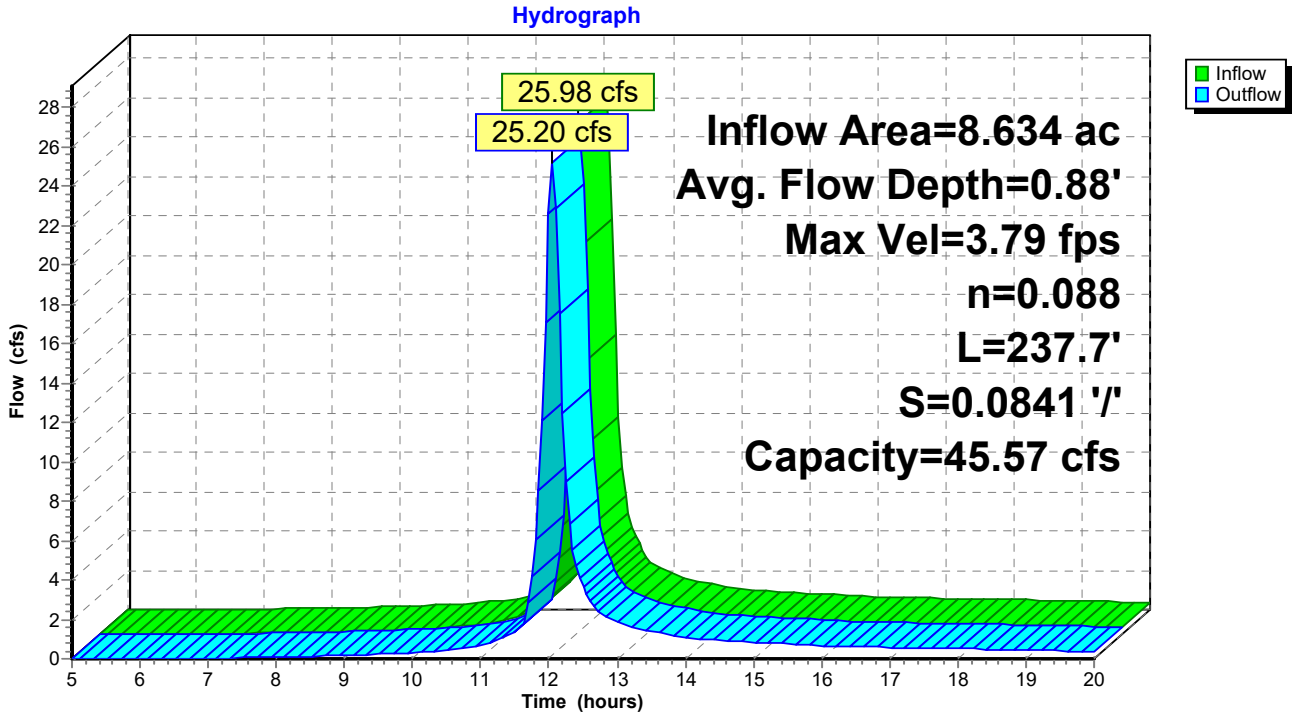
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.79 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 4.0 min

Peak Storage= 1,614 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.88'
Bank-Full Depth= 1.20' Flow Area= 10.1 sf, Capacity= 45.57 cfs

6.00' x 1.20' deep channel, n= 0.088
Side Slope Z-value= 2.0 '/' Top Width= 10.80'
Length= 237.7' Slope= 0.0841 '/'
Inlet Invert= 810.00', Outlet Invert= 790.00'

‡

Reach 6R: LB-DC-002



Summary for Pond 9P: Catch Basin - 1

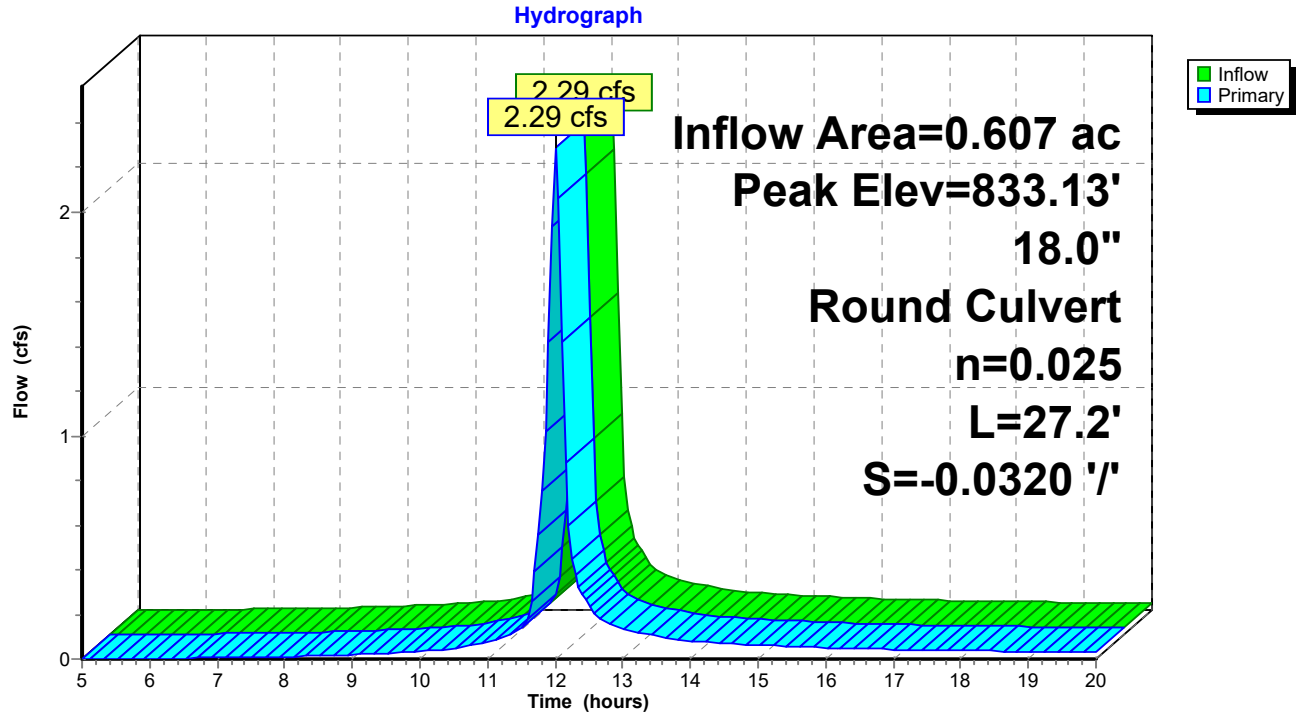
Inflow Area = 0.607 ac, 48.88% Impervious, Inflow Depth > 2.32" for 10-yr event
Inflow = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af
Outflow = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min
Primary = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 833.13' @ 12.01 hrs
Flood Elev= 834.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 27.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 831.46' / 832.33' S= -0.0320 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=2.26 cfs @ 12.01 hrs HW=833.12' (Free Discharge)
1=Culvert (Inlet Controls 2.26 cfs @ 2.39 fps)

Pond 9P: Catch Basin - 1



Summary for Pond 10P: Catch Basin - 2

[58] Hint: Peaked 3.73' above defined flood level
[81] Warning: Exceeded Pond 9P by 5.73' @ 12.05 hrs

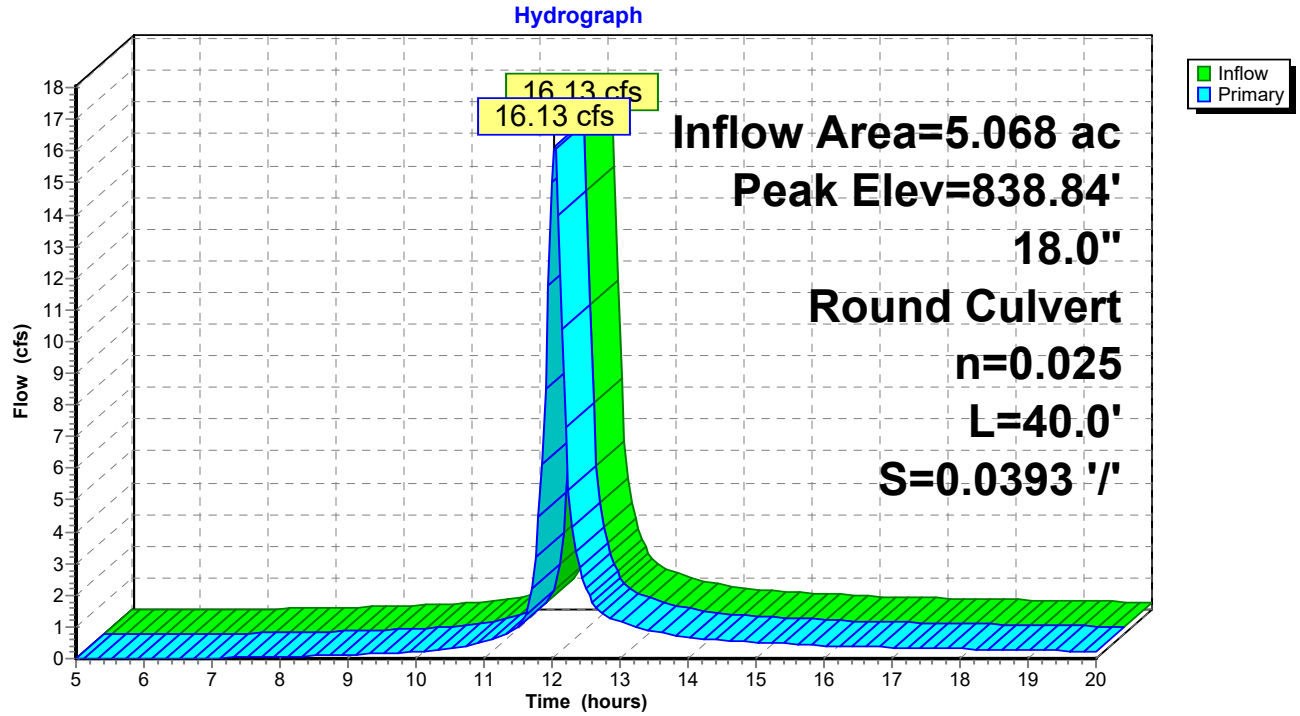
Inflow Area = 5.068 ac, 38.84% Impervious, Inflow Depth > 2.17" for 10-yr event
Inflow = 16.13 cfs @ 12.04 hrs, Volume= 0.914 af
Outflow = 16.13 cfs @ 12.04 hrs, Volume= 0.914 af, Atten= 0%, Lag= 0.0 min
Primary = 16.13 cfs @ 12.04 hrs, Volume= 0.914 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 838.84' @ 12.04 hrs
Flood Elev= 835.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 832.33' / 830.76' S= 0.0393 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=15.91 cfs @ 12.04 hrs HW=838.69' (Free Discharge)
↑**1=Culvert** (Inlet Controls 15.91 cfs @ 9.01 fps)

Pond 10P: Catch Basin - 2



Summary for Pond 11P: Catch Basin - 3

[58] Hint: Peaked 29.17' above defined flood level
[81] Warning: Exceeded Pond 10P by 24.94' @ 12.00 hrs

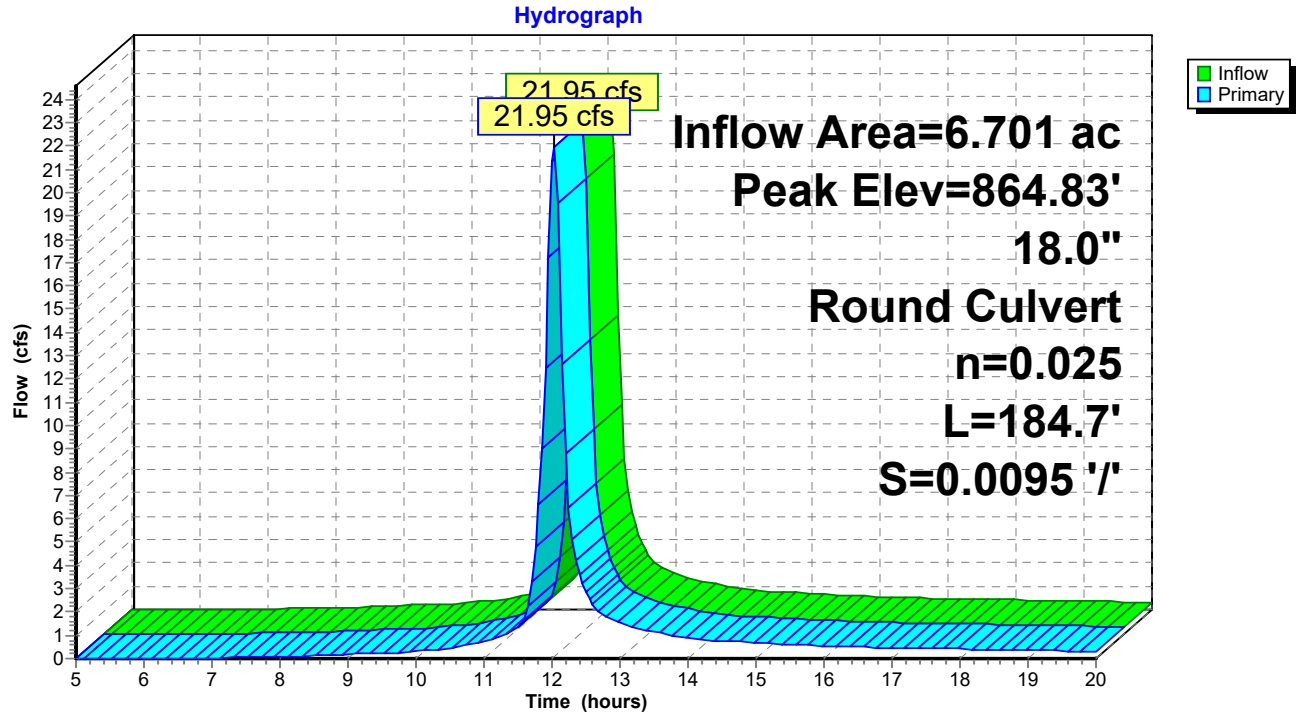
Inflow Area = 6.701 ac, 41.10% Impervious, Inflow Depth > 2.20" for 10-yr event
Inflow = 21.95 cfs @ 12.03 hrs, Volume= 1.230 af
Outflow = 21.95 cfs @ 12.03 hrs, Volume= 1.230 af, Atten= 0%, Lag= 0.0 min
Primary = 21.95 cfs @ 12.03 hrs, Volume= 1.230 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 864.83' @ 12.03 hrs
Flood Elev= 835.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	830.76'	**18.0" Round Culvert** L= 184.7' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 830.76' / 829.00' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=21.44 cfs @ 12.03 hrs HW=863.39' (Free Discharge)
↑**1=Culvert** (Barrel Controls 21.44 cfs @ 12.13 fps)

Pond 11P: Catch Basin - 3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA - 002 Runoff Area=26,425 sf 48.88% Impervious Runoff Depth>3.08"
Flow Length=592' Tc=9.4 min CN=88 Runoff=3.00 cfs 0.156 af

Subcatchment 2S: DA - 003 Runoff Area=194,317 sf 37.48% Impervious Runoff Depth>2.89"
Flow Length=897' Tc=13.1 min CN=86 Runoff=18.65 cfs 1.075 af

Subcatchment 4S: DA - 004 Runoff Area=71,163 sf 48.10% Impervious Runoff Depth>3.09"
Flow Length=1,013' Tc=8.9 min CN=88 Runoff=8.22 cfs 0.420 af

Subcatchment 5S: DA - 005 Runoff Area=84,205 sf 11.04% Impervious Runoff Depth>1.81"
Flow Length=389' Tc=8.1 min CN=73 Runoff=6.24 cfs 0.291 af

Reach 6R: LB-DC-002 Avg. Flow Depth=1.03' Max Vel=4.15 fps Inflow=35.03 cfs 1.942 af
n=0.088 L=237.7' S=0.0841 '/' Capacity=45.57 cfs Outflow=34.05 cfs 1.938 af

Pond 9P: Catch Basin - 1 Peak Elev=833.26' Inflow=3.00 cfs 0.156 af
18.0" Round Culvert n=0.025 L=27.2' S=-0.0320 '/' Outflow=3.00 cfs 0.156 af

Pond 10P: Catch Basin - 2 Peak Elev=843.23' Inflow=21.41 cfs 1.231 af
18.0" Round Culvert n=0.025 L=40.0' S=0.0393 '/' Outflow=21.41 cfs 1.231 af

Pond 11P: Catch Basin - 3 Peak Elev=890.55' Inflow=29.03 cfs 1.651 af
18.0" Round Culvert n=0.025 L=184.7' S=0.0095 '/' Outflow=29.03 cfs 1.651 af

Total Runoff Area = 8.634 ac Runoff Volume = 1.942 af Average Runoff Depth = 2.70"
65.63% Pervious = 5.667 ac 34.37% Impervious = 2.968 ac

Summary for Subcatchment 1S: DA - 002

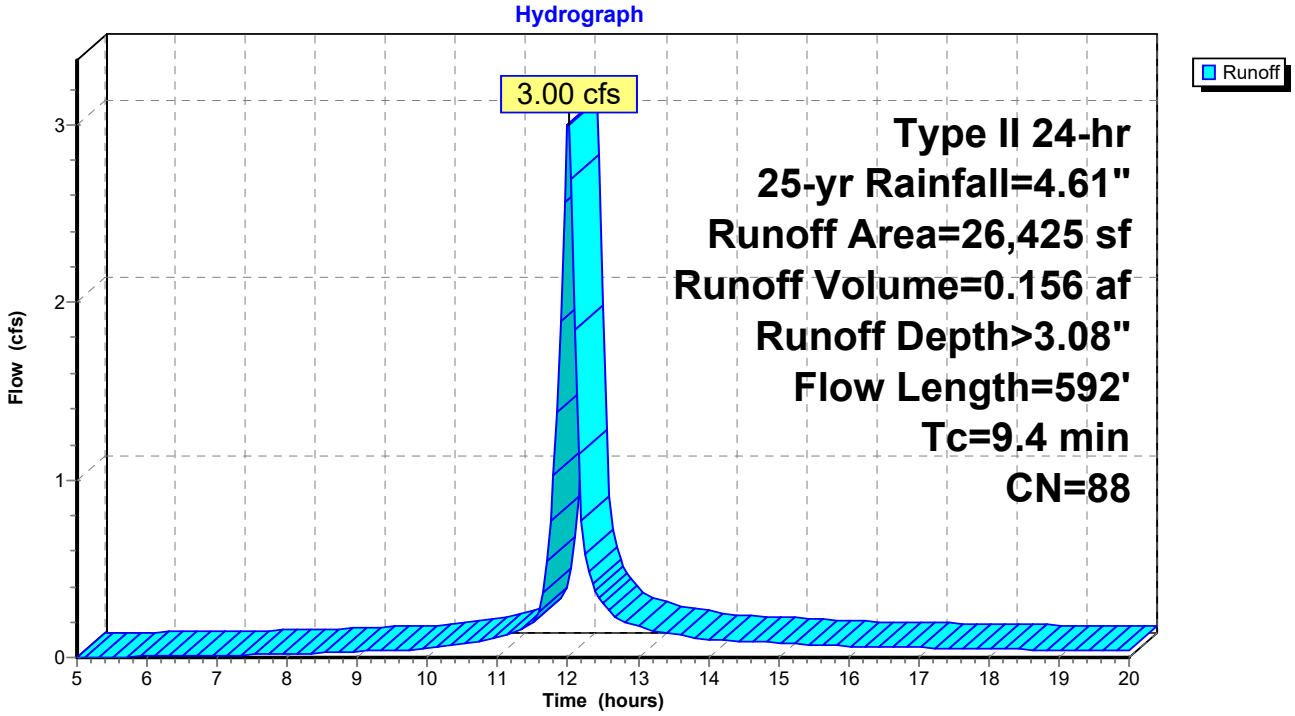
Runoff = 3.00 cfs @ 12.00 hrs, Volume= 0.156 af, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.61"

	Area (sf)	CN	Description
*	12,916	98	Impervious
	9,330	80	>75% Grass cover, Good, HSG D
	4,179	74	>75% Grass cover, Good, HSG C
	26,425	88	Weighted Average
	13,509		51.12% Pervious Area
	12,916		48.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
2.4	312	0.0945	2.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	180	0.1200	7.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.4	592	Total			

Subcatchment 1S: DA - 002



Summary for Subcatchment 2S: DA - 003

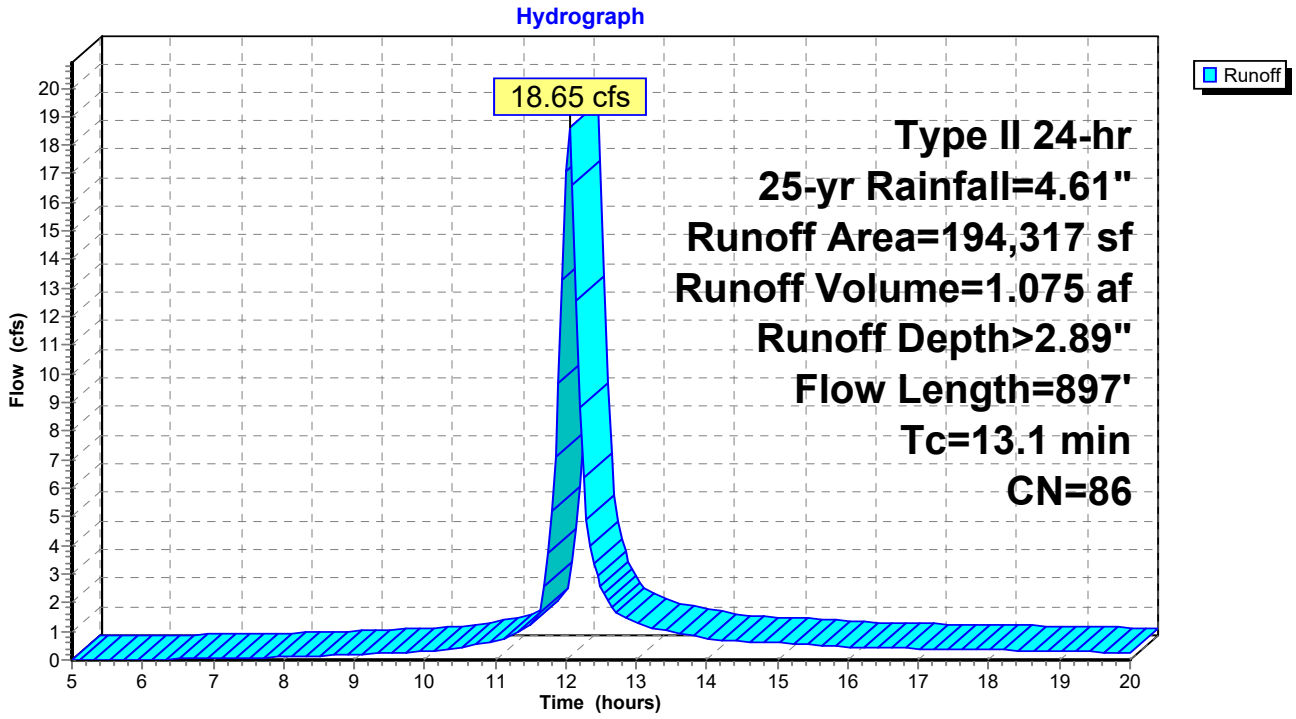
Runoff = 18.65 cfs @ 12.05 hrs, Volume= 1.075 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.61"

	Area (sf)	CN	Description
	8,639	74	>75% Grass cover, Good, HSG C
	514	39	>75% Grass cover, Good, HSG A
	112,334	80	>75% Grass cover, Good, HSG D
*	72,830	98	Impervious
	194,317	86	Weighted Average
	121,487		62.52% Pervious Area
	72,830		37.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
6.5	797	0.0857	2.05		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.1	897	Total			

Subcatchment 2S: DA - 003



Summary for Subcatchment 4S: DA - 004

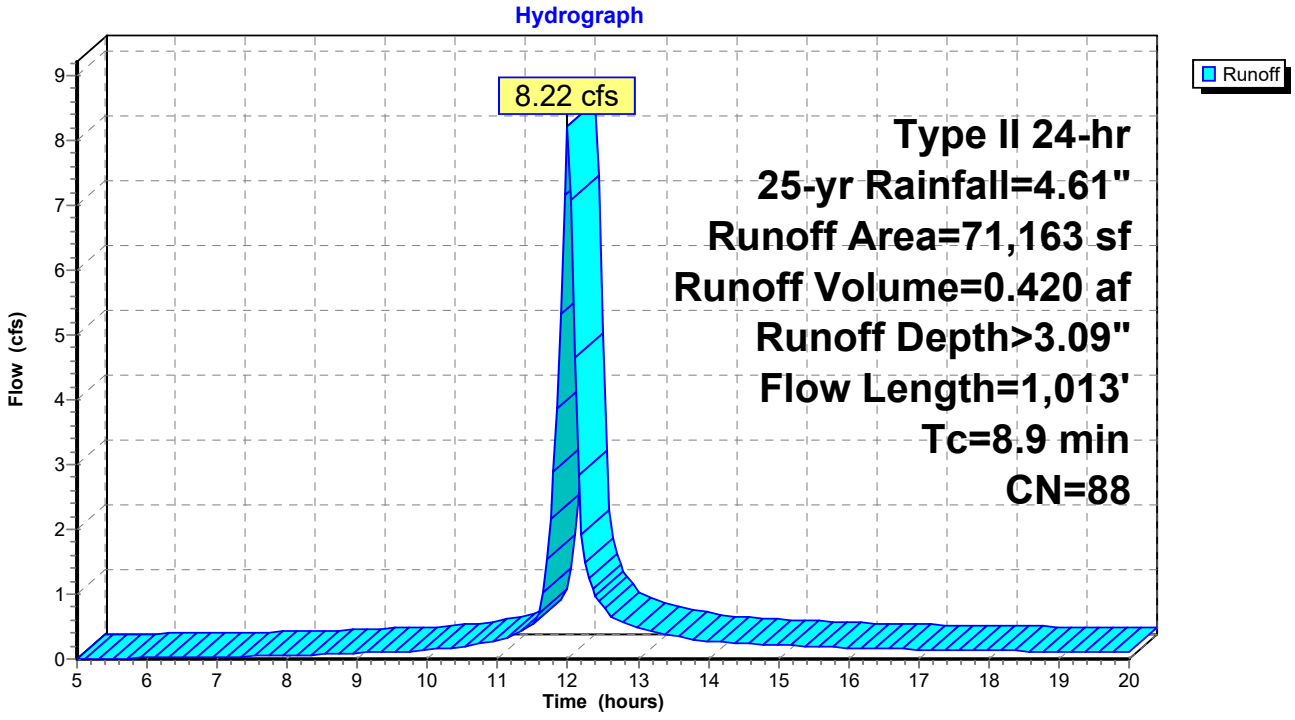
Runoff = 8.22 cfs @ 12.00 hrs, Volume= 0.420 af, Depth> 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.61"

	Area (sf)	CN	Description
	3,290	74	>75% Grass cover, Good, HSG C
	33,190	80	>75% Grass cover, Good, HSG D
	455	72	Dirt roads, HSG A
*	34,228	98	Impervious
	71,163	88	Weighted Average
	36,935		51.90% Pervious Area
	34,228		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.1000	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.2	173	0.1096	2.32		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.0	740	0.0941	6.23		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.9	1,013	Total			

Subcatchment 4S: DA - 004



Summary for Subcatchment 5S: DA - 005

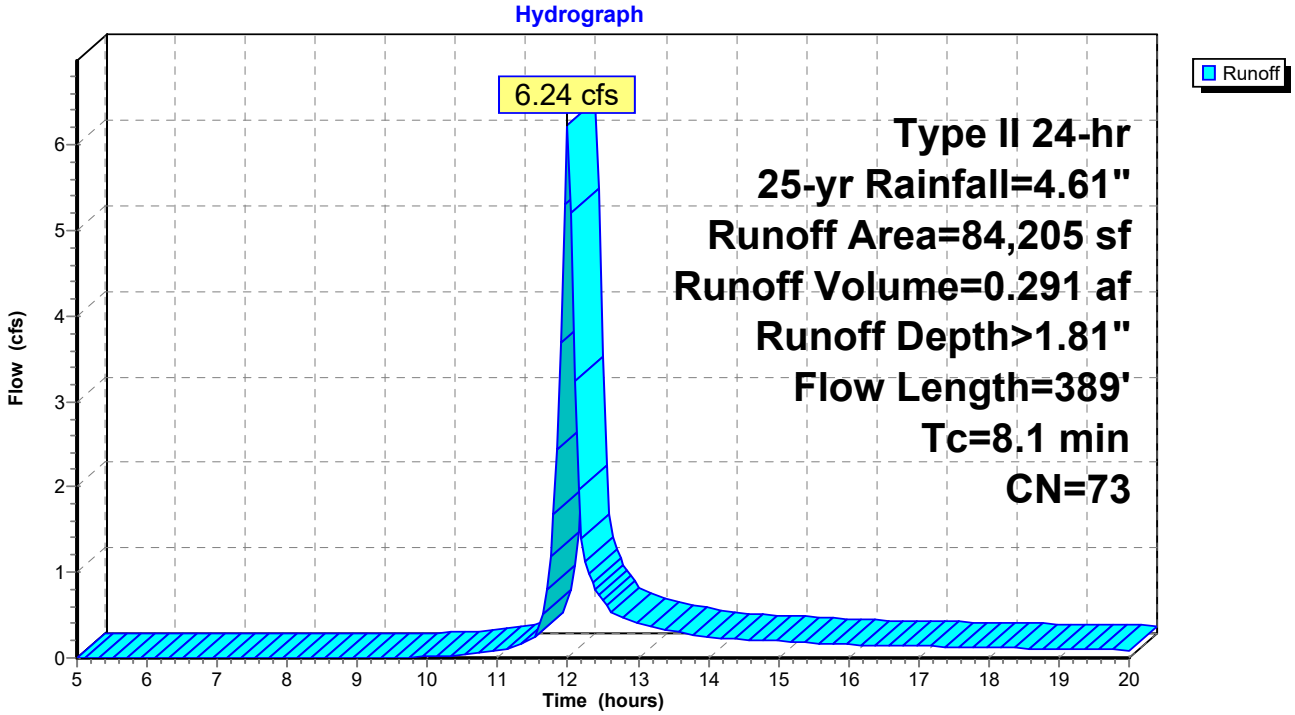
Runoff = 6.24 cfs @ 12.00 hrs, Volume= 0.291 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.61"

	Area (sf)	CN	Description
	6,192	36	Woods, Fair, HSG A
	66,719	73	Woods, Fair, HSG C
	2,001	80	>75% Grass cover, Good, HSG D
*	9,293	98	Impervious
	84,205	73	Weighted Average
	74,912		88.96% Pervious Area
	9,293		11.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0800	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.8	289	0.2870	2.68		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.1	389	Total			

Subcatchment 5S: DA - 005



Summary for Reach 6R: LB-DC-002

Inflow Area = 8.634 ac, 34.37% Impervious, Inflow Depth > 2.70" for 25-yr event
Inflow = 35.03 cfs @ 12.02 hrs, Volume= 1.942 af
Outflow = 34.05 cfs @ 12.05 hrs, Volume= 1.938 af, Atten= 3%, Lag= 1.7 min

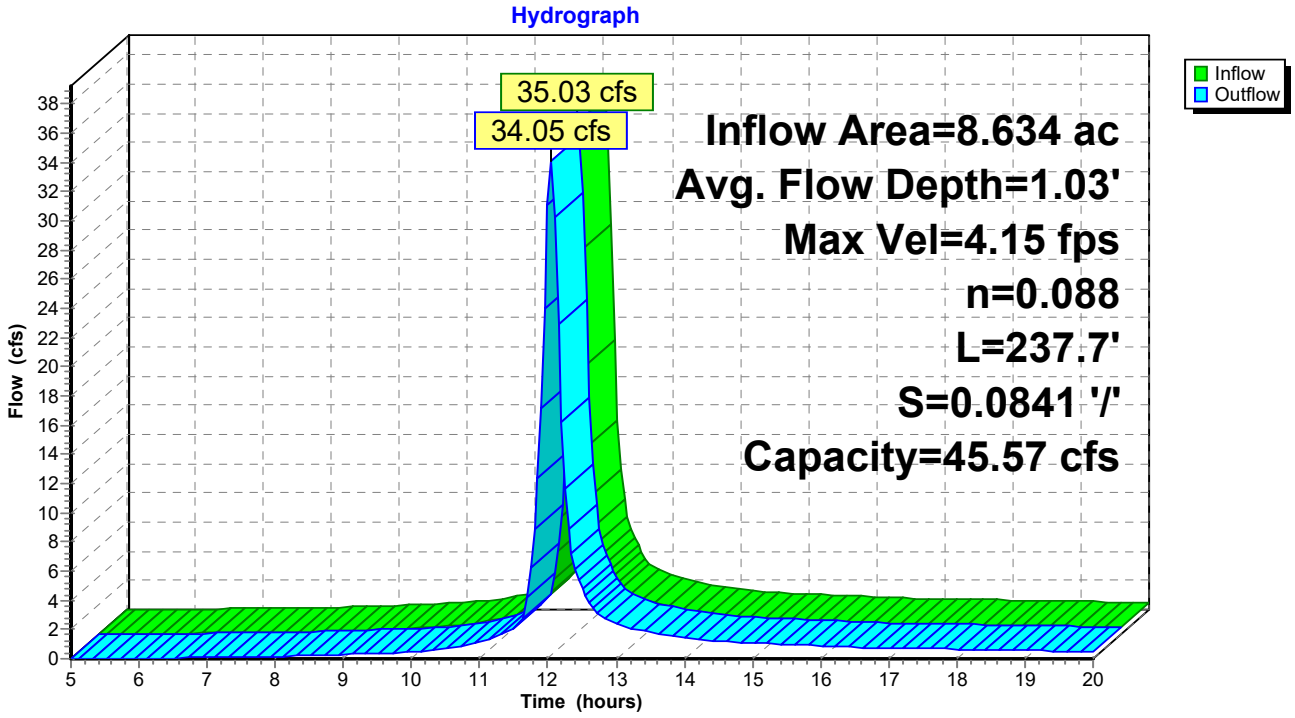
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.15 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 3.6 min

Peak Storage= 1,985 cf @ 12.03 hrs
Average Depth at Peak Storage= 1.03'
Bank-Full Depth= 1.20' Flow Area= 10.1 sf, Capacity= 45.57 cfs

6.00' x 1.20' deep channel, n= 0.088
Side Slope Z-value= 2.0 '/' Top Width= 10.80'
Length= 237.7' Slope= 0.0841 '/'
Inlet Invert= 810.00', Outlet Invert= 790.00'

‡

Reach 6R: LB-DC-002



Summary for Pond 9P: Catch Basin - 1

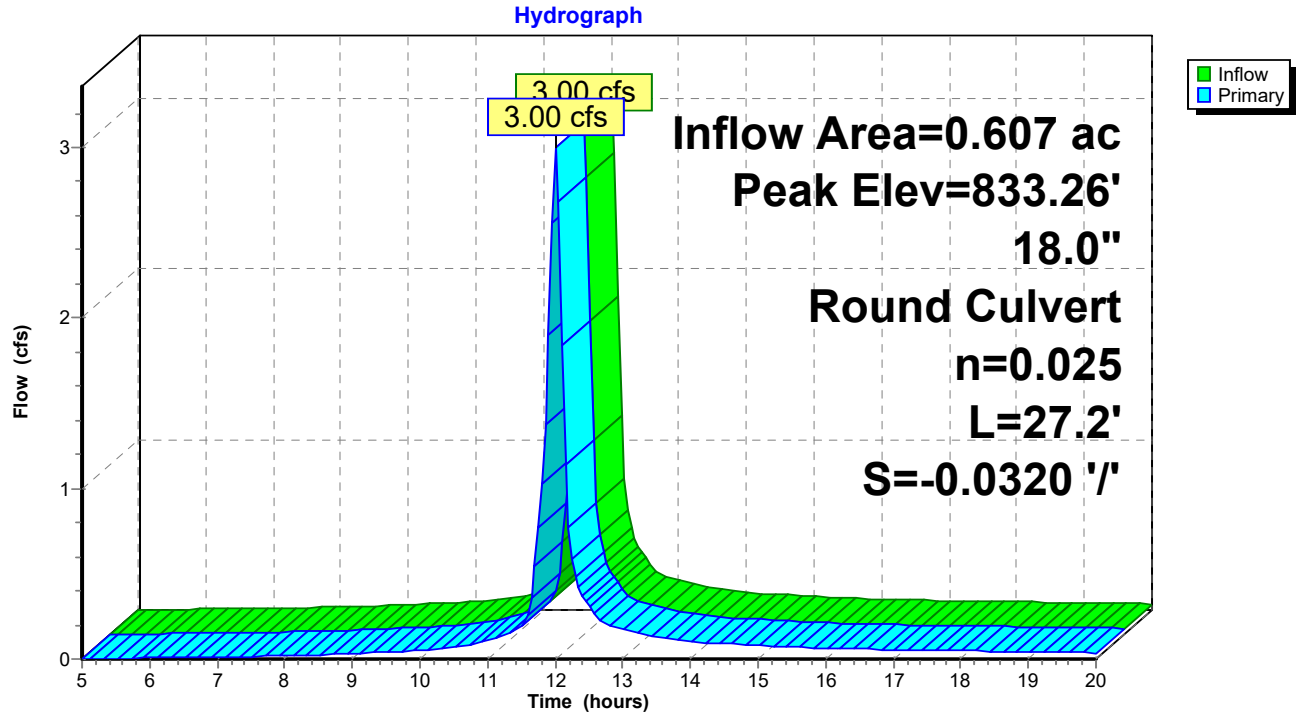
Inflow Area = 0.607 ac, 48.88% Impervious, Inflow Depth > 3.08" for 25-yr event
Inflow = 3.00 cfs @ 12.00 hrs, Volume= 0.156 af
Outflow = 3.00 cfs @ 12.00 hrs, Volume= 0.156 af, Atten= 0%, Lag= 0.0 min
Primary = 3.00 cfs @ 12.00 hrs, Volume= 0.156 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 833.26' @ 12.00 hrs
Flood Elev= 834.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 27.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 831.46' / 832.33' S= -0.0320 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=2.97 cfs @ 12.00 hrs HW=833.26' (Free Discharge)
1=Culvert (Inlet Controls 2.97 cfs @ 2.59 fps)

Pond 9P: Catch Basin - 1



Summary for Pond 10P: Catch Basin - 2

[58] Hint: Peaked 8.12' above defined flood level
[81] Warning: Exceeded Pond 9P by 9.96' @ 12.05 hrs

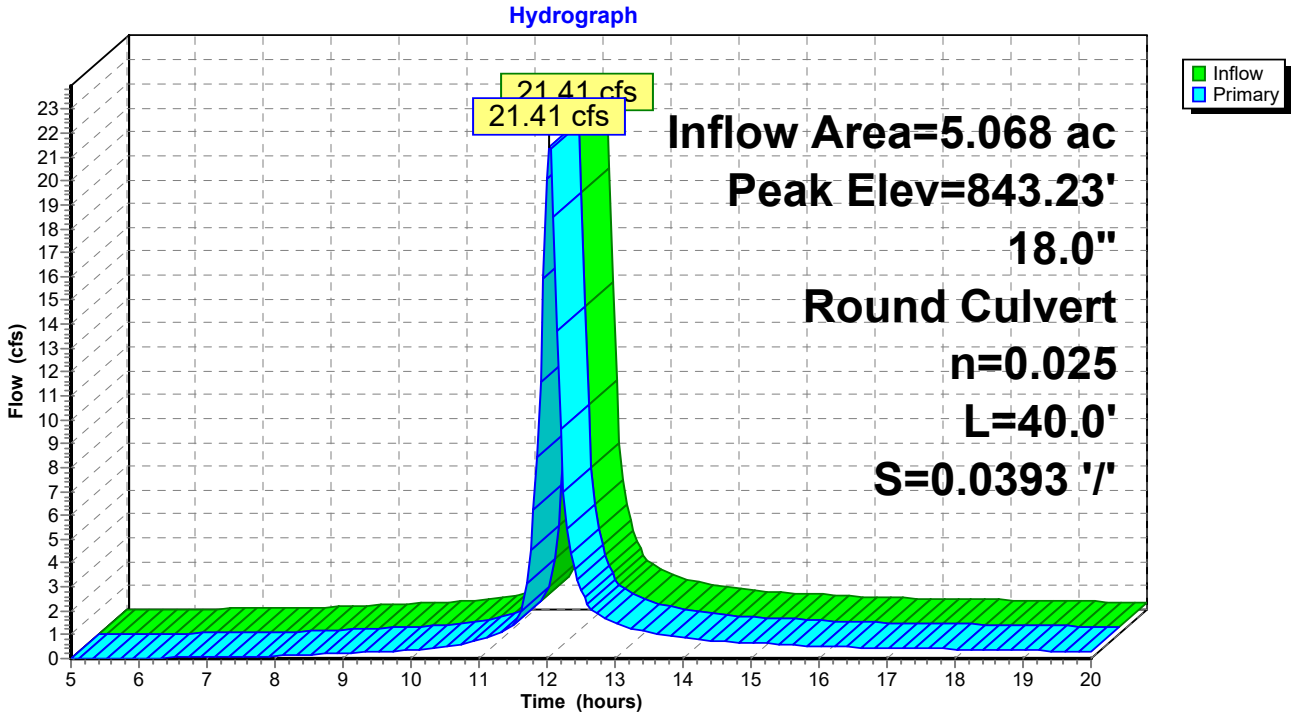
Inflow Area = 5.068 ac, 38.84% Impervious, Inflow Depth > 2.91" for 25-yr event
Inflow = 21.41 cfs @ 12.04 hrs, Volume= 1.231 af
Outflow = 21.41 cfs @ 12.04 hrs, Volume= 1.231 af, Atten= 0%, Lag= 0.0 min
Primary = 21.41 cfs @ 12.04 hrs, Volume= 1.231 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 843.23' @ 12.04 hrs
Flood Elev= 835.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 832.33' / 830.76' S= 0.0393 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=21.09 cfs @ 12.04 hrs HW=842.94' (Free Discharge)
↑**1=Culvert** (Inlet Controls 21.09 cfs @ 11.93 fps)

Pond 10P: Catch Basin - 2



Summary for Pond 11P: Catch Basin - 3

[58] Hint: Peaked 54.89' above defined flood level
[81] Warning: Exceeded Pond 10P by 45.80' @ 12.00 hrs

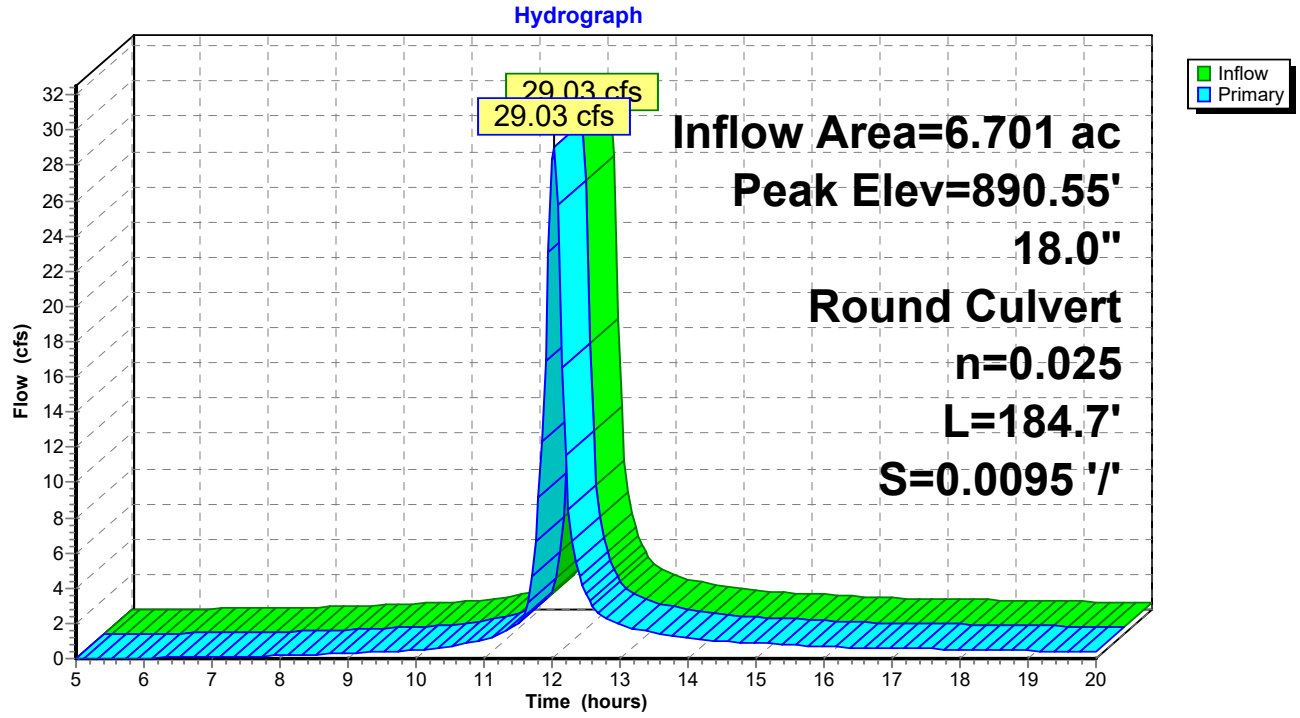
Inflow Area = 6.701 ac, 41.10% Impervious, Inflow Depth > 2.96" for 25-yr event
Inflow = 29.03 cfs @ 12.03 hrs, Volume= 1.651 af
Outflow = 29.03 cfs @ 12.03 hrs, Volume= 1.651 af, Atten= 0%, Lag= 0.0 min
Primary = 29.03 cfs @ 12.03 hrs, Volume= 1.651 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 890.55' @ 12.03 hrs
Flood Elev= 835.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	830.76'	**18.0" Round Culvert** L= 184.7' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 830.76' / 829.00' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=28.36 cfs @ 12.03 hrs HW=888.06' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 28.36 cfs @ 16.05 fps)

Pond 11P: Catch Basin - 3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA - 002 Runoff Area=26,425 sf 48.88% Impervious Runoff Depth>3.81"
Flow Length=592' Tc=9.4 min CN=88 Runoff=3.66 cfs 0.193 af

Subcatchment 2S: DA - 003 Runoff Area=194,317 sf 37.48% Impervious Runoff Depth>3.60"
Flow Length=897' Tc=13.1 min CN=86 Runoff=22.98 cfs 1.340 af

Subcatchment 4S: DA - 004 Runoff Area=71,163 sf 48.10% Impervious Runoff Depth>3.81"
Flow Length=1,013' Tc=8.9 min CN=88 Runoff=10.02 cfs 0.519 af

Subcatchment 5S: DA - 005 Runoff Area=84,205 sf 11.04% Impervious Runoff Depth>2.40"
Flow Length=389' Tc=8.1 min CN=73 Runoff=8.25 cfs 0.387 af

Reach 6R: LB-DC-002 Avg. Flow Depth=1.17' Max Vel=4.43 fps Inflow=43.57 cfs 2.438 af
n=0.088 L=237.7' S=0.0841 '/' Capacity=45.57 cfs Outflow=42.41 cfs 2.434 af

Pond 9P: Catch Basin - 1 Peak Elev=833.38' Inflow=3.66 cfs 0.193 af
18.0" Round Culvert n=0.025 L=27.2' S=-0.0320 '/' Outflow=3.66 cfs 0.193 af

Pond 10P: Catch Basin - 2 Peak Elev=848.44' Inflow=26.35 cfs 1.533 af
18.0" Round Culvert n=0.025 L=40.0' S=0.0393 '/' Outflow=26.35 cfs 1.533 af

Pond 11P: Catch Basin - 3 Peak Elev=921.02' Inflow=35.65 cfs 2.051 af
18.0" Round Culvert n=0.025 L=184.7' S=0.0095 '/' Outflow=35.65 cfs 2.051 af

Total Runoff Area = 8.634 ac Runoff Volume = 2.438 af Average Runoff Depth = 3.39"
65.63% Pervious = 5.667 ac 34.37% Impervious = 2.968 ac

Summary for Subcatchment 1S: DA - 002

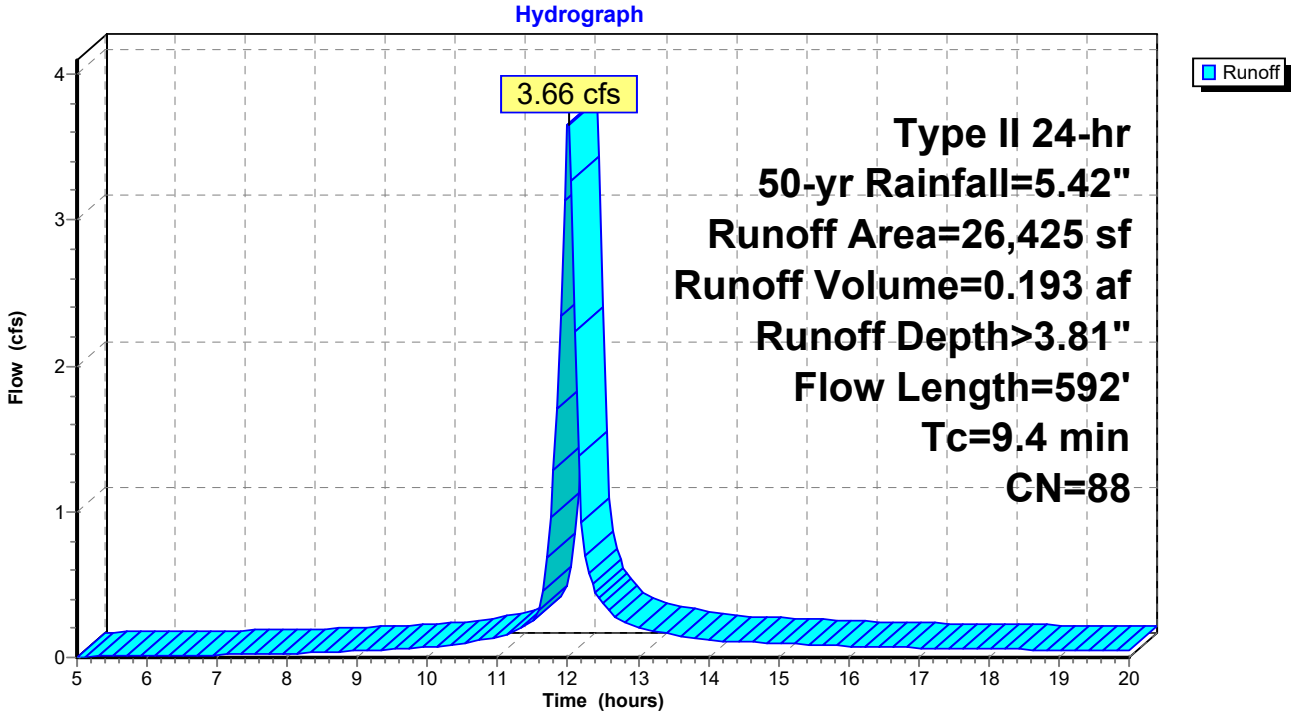
Runoff = 3.66 cfs @ 12.00 hrs, Volume= 0.193 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=5.42"

	Area (sf)	CN	Description
*	12,916	98	Impervious
	9,330	80	>75% Grass cover, Good, HSG D
	4,179	74	>75% Grass cover, Good, HSG C
	26,425	88	Weighted Average
	13,509		51.12% Pervious Area
	12,916		48.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
2.4	312	0.0945	2.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	180	0.1200	7.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.4	592	Total			

Subcatchment 1S: DA - 002



Summary for Subcatchment 2S: DA - 003

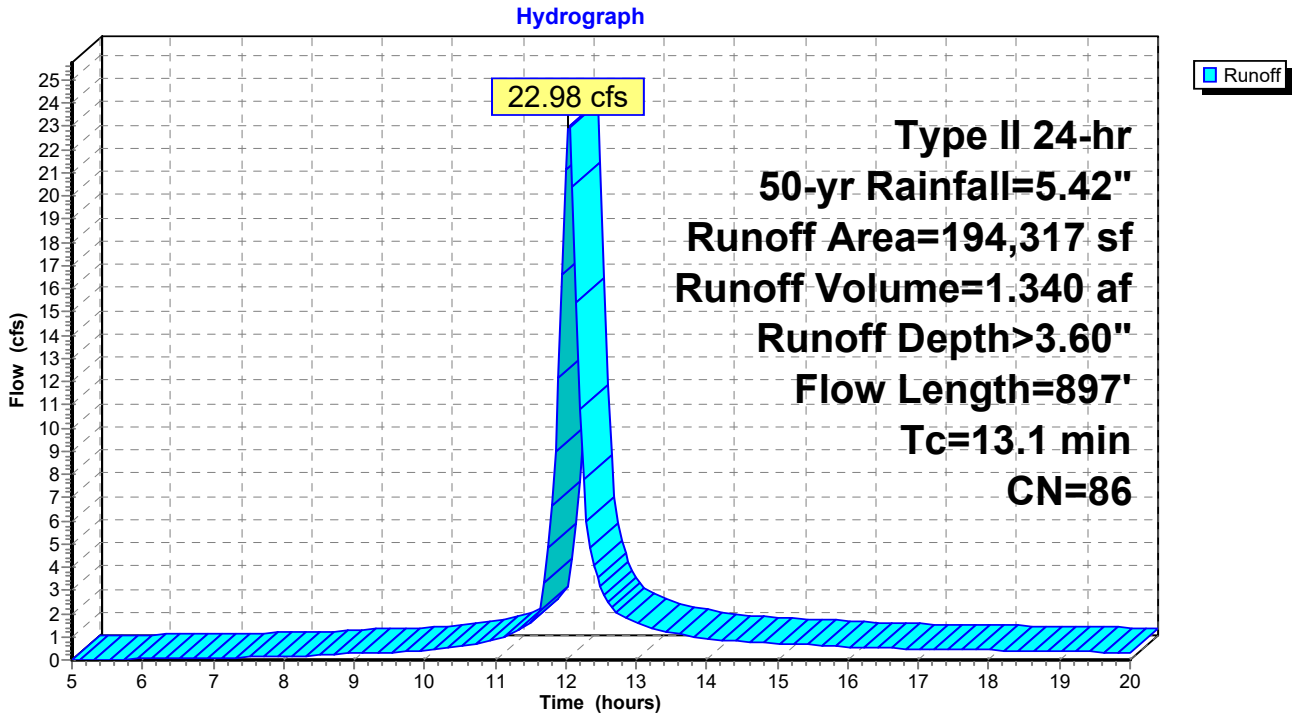
Runoff = 22.98 cfs @ 12.05 hrs, Volume= 1.340 af, Depth> 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=5.42"

	Area (sf)	CN	Description
	8,639	74	>75% Grass cover, Good, HSG C
	514	39	>75% Grass cover, Good, HSG A
	112,334	80	>75% Grass cover, Good, HSG D
*	72,830	98	Impervious
	194,317	86	Weighted Average
	121,487		62.52% Pervious Area
	72,830		37.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
6.5	797	0.0857	2.05		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.1	897	Total			

Subcatchment 2S: DA - 003



Summary for Subcatchment 4S: DA - 004

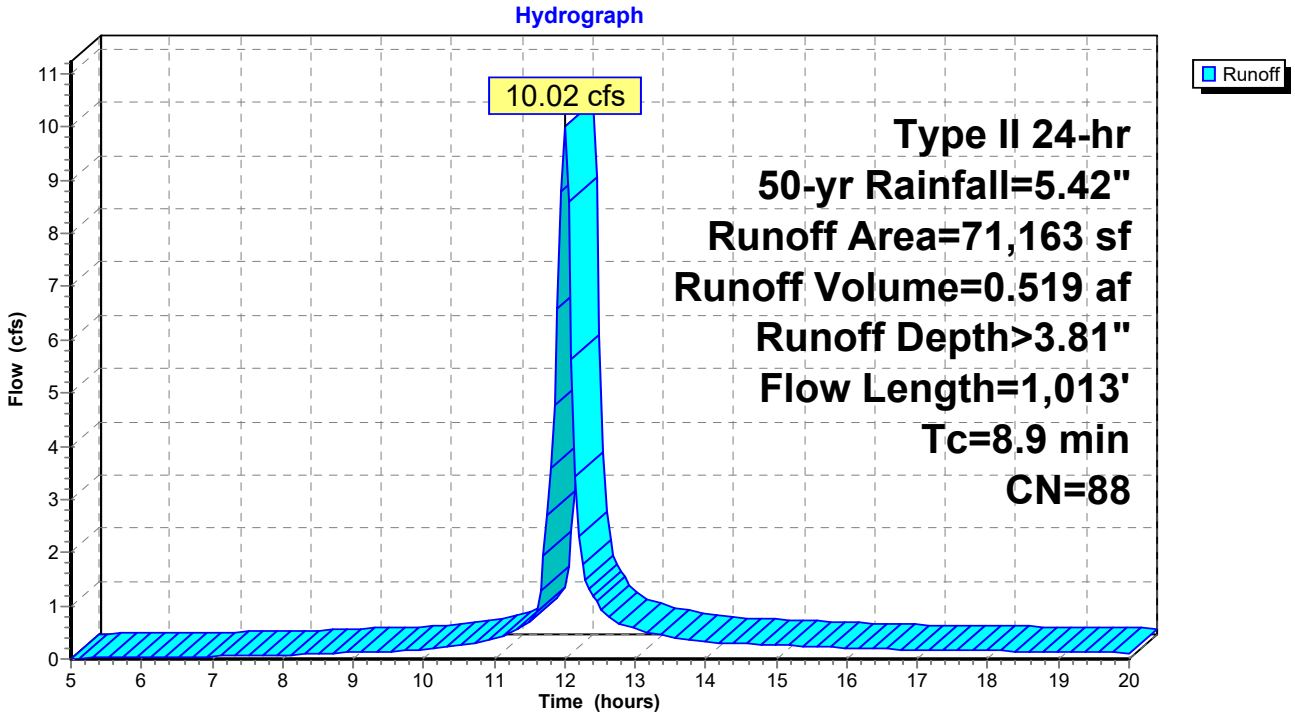
Runoff = 10.02 cfs @ 12.00 hrs, Volume= 0.519 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=5.42"

	Area (sf)	CN	Description
	3,290	74	>75% Grass cover, Good, HSG C
	33,190	80	>75% Grass cover, Good, HSG D
	455	72	Dirt roads, HSG A
*	34,228	98	Impervious
	71,163	88	Weighted Average
	36,935		51.90% Pervious Area
	34,228		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.1000	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.2	173	0.1096	2.32		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.0	740	0.0941	6.23		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.9	1,013	Total			

Subcatchment 4S: DA - 004



Summary for Subcatchment 5S: DA - 005

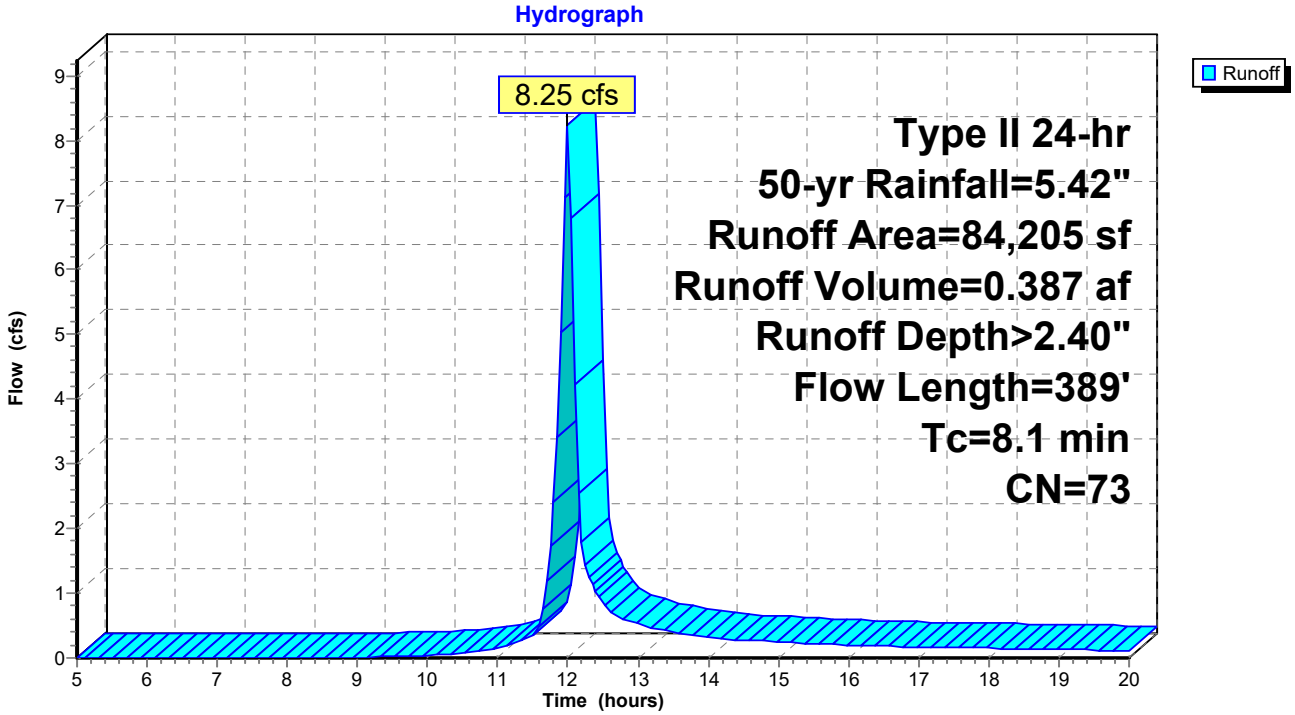
Runoff = 8.25 cfs @ 12.00 hrs, Volume= 0.387 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=5.42"

	Area (sf)	CN	Description
	6,192	36	Woods, Fair, HSG A
	66,719	73	Woods, Fair, HSG C
	2,001	80	>75% Grass cover, Good, HSG D
*	9,293	98	Impervious
	84,205	73	Weighted Average
	74,912		88.96% Pervious Area
	9,293		11.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0800	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.8	289	0.2870	2.68		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.1	389	Total			

Subcatchment 5S: DA - 005



Summary for Reach 6R: LB-DC-002

Inflow Area = 8.634 ac, 34.37% Impervious, Inflow Depth > 3.39" for 50-yr event
Inflow = 43.57 cfs @ 12.02 hrs, Volume= 2.438 af
Outflow = 42.41 cfs @ 12.04 hrs, Volume= 2.434 af, Atten= 3%, Lag= 1.6 min

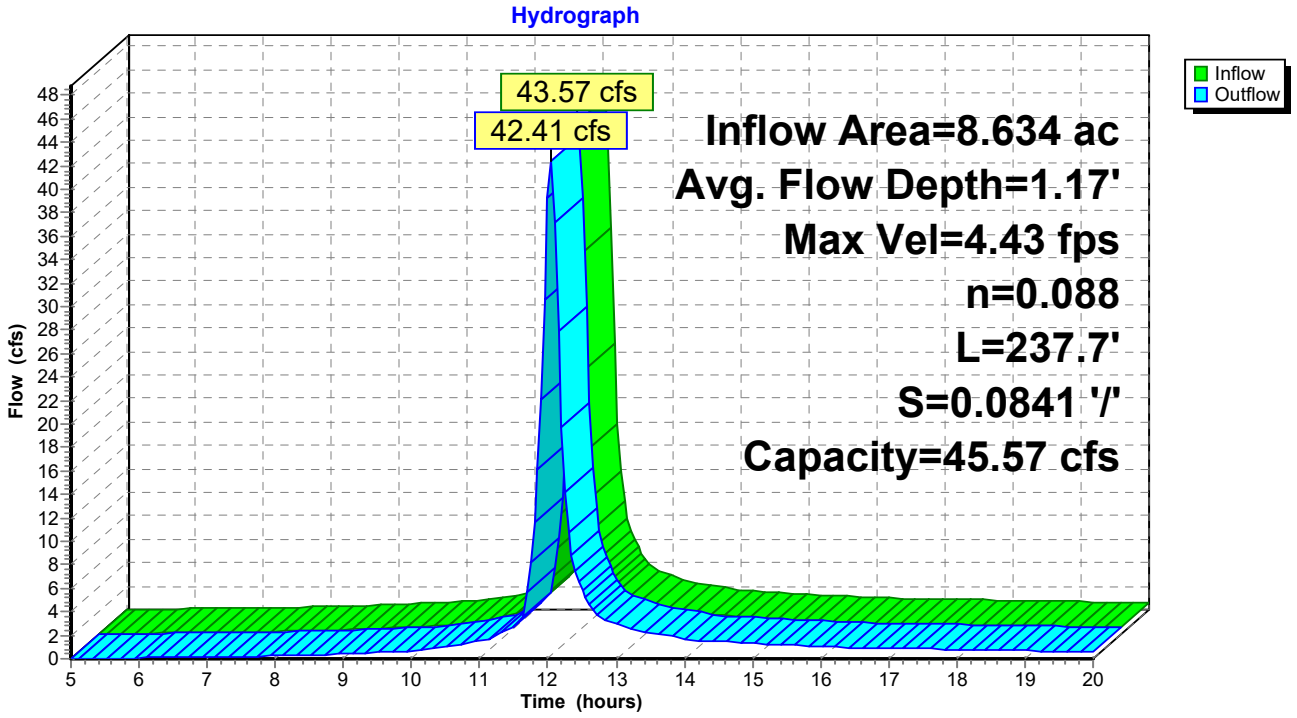
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.43 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 3.3 min

Peak Storage= 2,312 cf @ 12.03 hrs
Average Depth at Peak Storage= 1.17'
Bank-Full Depth= 1.20' Flow Area= 10.1 sf, Capacity= 45.57 cfs

6.00' x 1.20' deep channel, n= 0.088
Side Slope Z-value= 2.0 '/' Top Width= 10.80'
Length= 237.7' Slope= 0.0841 '/'
Inlet Invert= 810.00', Outlet Invert= 790.00'

‡

Reach 6R: LB-DC-002



Summary for Pond 9P: Catch Basin - 1

[82] Warning: Early inflow requires earlier time span

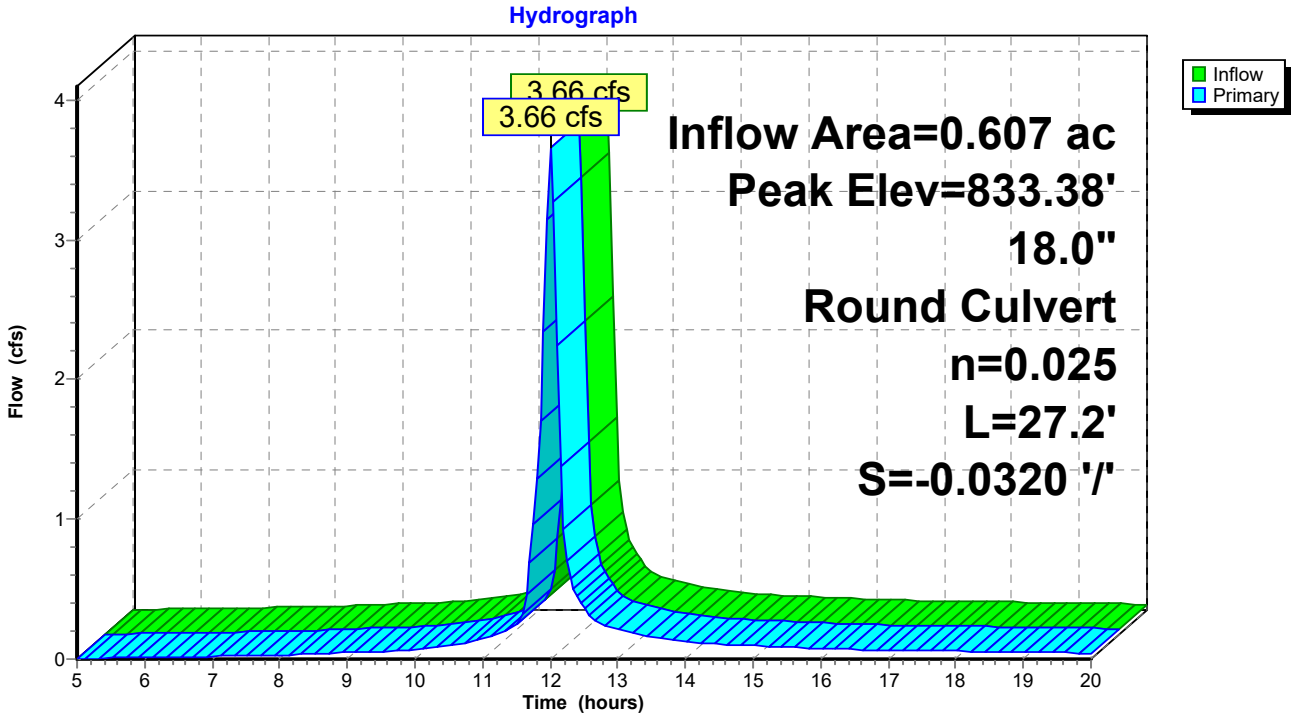
Inflow Area = 0.607 ac, 48.88% Impervious, Inflow Depth > 3.81" for 50-yr event
Inflow = 3.66 cfs @ 12.00 hrs, Volume= 0.193 af
Outflow = 3.66 cfs @ 12.00 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min
Primary = 3.66 cfs @ 12.00 hrs, Volume= 0.193 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 833.38' @ 12.00 hrs
Flood Elev= 834.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 27.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 831.46' / 832.33' S= -0.0320 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=3.63 cfs @ 12.00 hrs HW=833.38' (Free Discharge)
1=Culvert (Inlet Controls 3.63 cfs @ 2.75 fps)

Pond 9P: Catch Basin - 1



Summary for Pond 10P: Catch Basin - 2

[58] Hint: Peaked 13.33' above defined flood level
[81] Warning: Exceeded Pond 9P by 15.02' @ 12.05 hrs

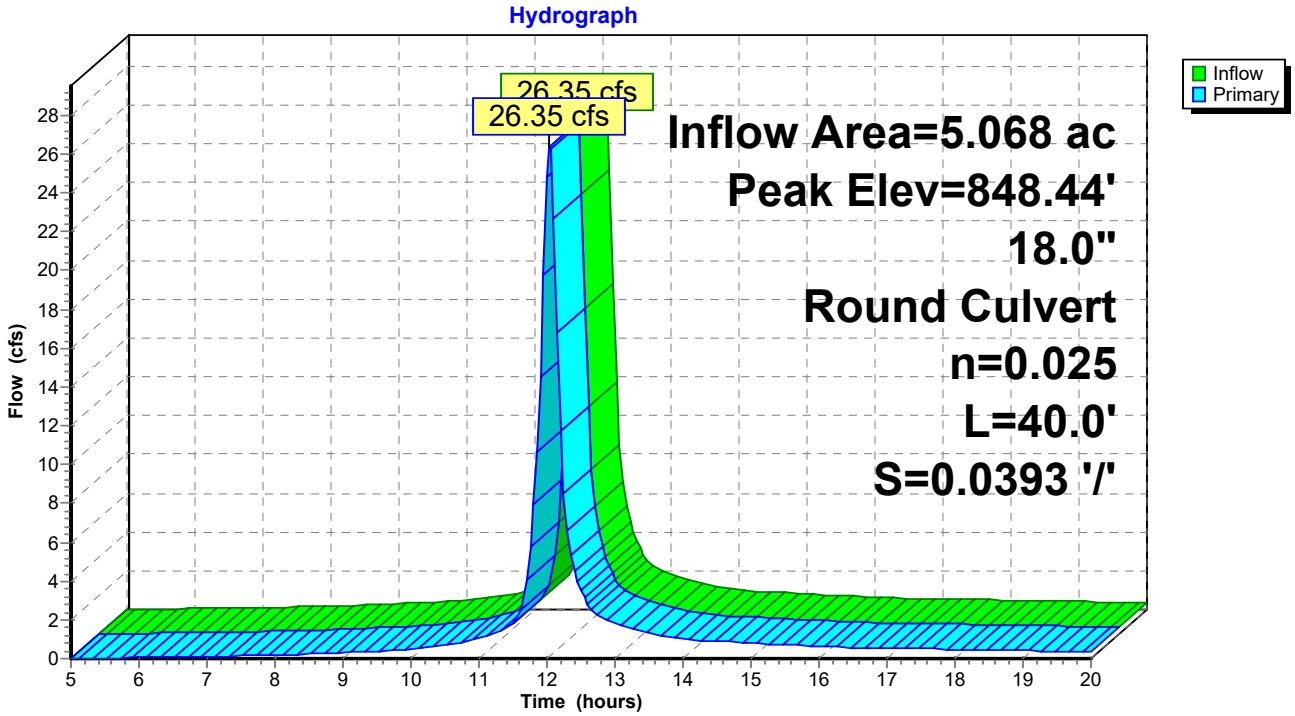
Inflow Area = 5.068 ac, 38.84% Impervious, Inflow Depth > 3.63" for 50-yr event
Inflow = 26.35 cfs @ 12.04 hrs, Volume= 1.533 af
Outflow = 26.35 cfs @ 12.04 hrs, Volume= 1.533 af, Atten= 0%, Lag= 0.0 min
Primary = 26.35 cfs @ 12.04 hrs, Volume= 1.533 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 848.44' @ 12.04 hrs
Flood Elev= 835.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 832.33' / 830.76' S= 0.0393 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=25.93 cfs @ 12.04 hrs HW=847.98' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 25.93 cfs @ 14.67 fps)

Pond 10P: Catch Basin - 2



Summary for Pond 11P: Catch Basin - 3

[58] Hint: Peaked 85.36' above defined flood level
[81] Warning: Exceeded Pond 10P by 70.56' @ 12.00 hrs

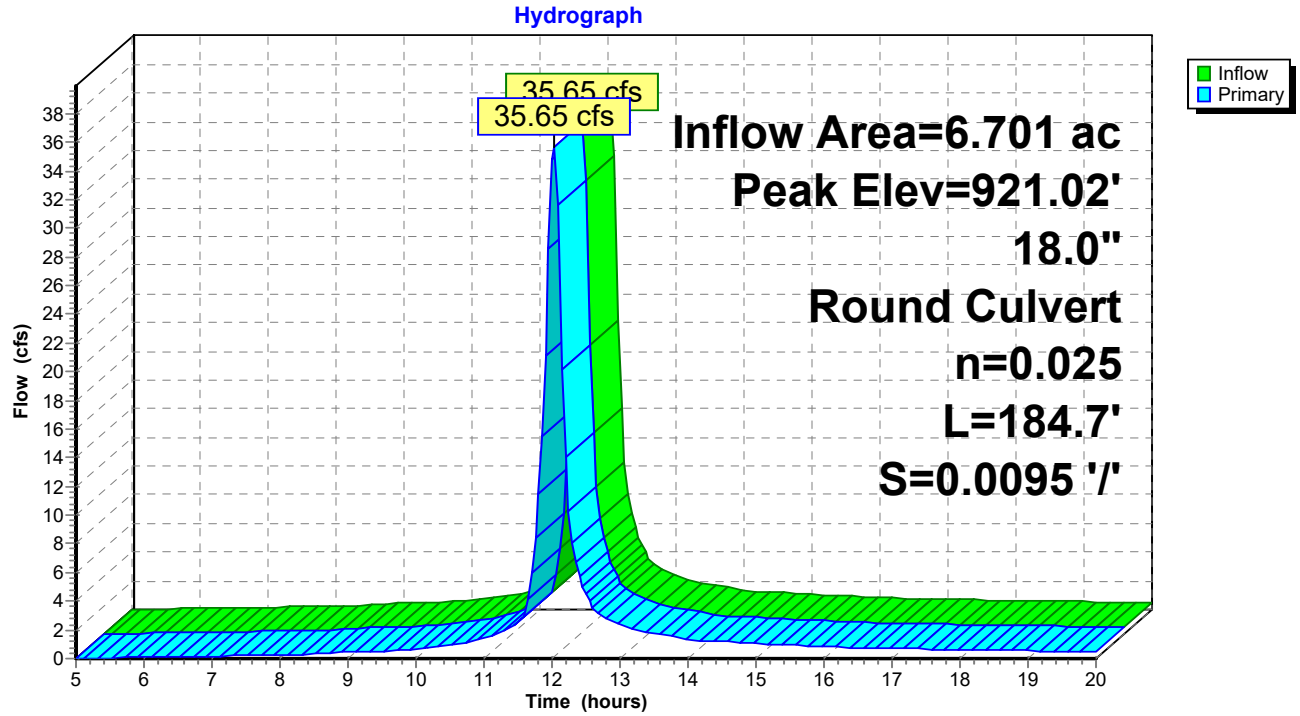
Inflow Area = 6.701 ac, 41.10% Impervious, Inflow Depth > 3.67" for 50-yr event
Inflow = 35.65 cfs @ 12.03 hrs, Volume= 2.051 af
Outflow = 35.65 cfs @ 12.03 hrs, Volume= 2.051 af, Atten= 0%, Lag= 0.0 min
Primary = 35.65 cfs @ 12.03 hrs, Volume= 2.051 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 921.02' @ 12.03 hrs
Flood Elev= 835.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	830.76'	**18.0" Round Culvert** L= 184.7' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 830.76' / 829.00' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=34.83 cfs @ 12.03 hrs HW=917.32' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 34.83 cfs @ 19.71 fps)

Pond 11P: Catch Basin - 3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA - 002 Runoff Area=26,425 sf 48.88% Impervious Runoff Depth>4.67"
Flow Length=592' Tc=9.4 min CN=88 Runoff=4.43 cfs 0.236 af

Subcatchment 2S: DA - 003 Runoff Area=194,317 sf 37.48% Impervious Runoff Depth>4.45"
Flow Length=897' Tc=13.1 min CN=86 Runoff=28.06 cfs 1.656 af

Subcatchment 4S: DA - 004 Runoff Area=71,163 sf 48.10% Impervious Runoff Depth>4.67"
Flow Length=1,013' Tc=8.9 min CN=88 Runoff=12.13 cfs 0.636 af

Subcatchment 5S: DA - 005 Runoff Area=84,205 sf 11.04% Impervious Runoff Depth>3.13"
Flow Length=389' Tc=8.1 min CN=73 Runoff=10.68 cfs 0.505 af

Reach 6R: LB-DC-002 Avg. Flow Depth=1.31' Max Vel=4.70 fps Inflow=53.67 cfs 3.033 af
n=0.088 L=237.7' S=0.0841 '/' Capacity=45.57 cfs Outflow=52.28 cfs 3.028 af

Pond 9P: Catch Basin - 1 Peak Elev=833.52' Inflow=4.43 cfs 0.236 af
18.0" Round Culvert n=0.025 L=27.2' S=-0.0320 '/' Outflow=4.43 cfs 0.236 af

Pond 10P: Catch Basin - 2 Peak Elev=855.93' Inflow=32.13 cfs 1.892 af
18.0" Round Culvert n=0.025 L=40.0' S=0.0393 '/' Outflow=32.13 cfs 1.892 af

Pond 11P: Catch Basin - 3 Peak Elev=964.52' Inflow=43.37 cfs 2.528 af
18.0" Round Culvert n=0.025 L=184.7' S=0.0095 '/' Outflow=43.37 cfs 2.528 af

Total Runoff Area = 8.634 ac Runoff Volume = 3.033 af Average Runoff Depth = 4.21"
65.63% Pervious = 5.667 ac 34.37% Impervious = 2.968 ac

Summary for Subcatchment 1S: DA - 002

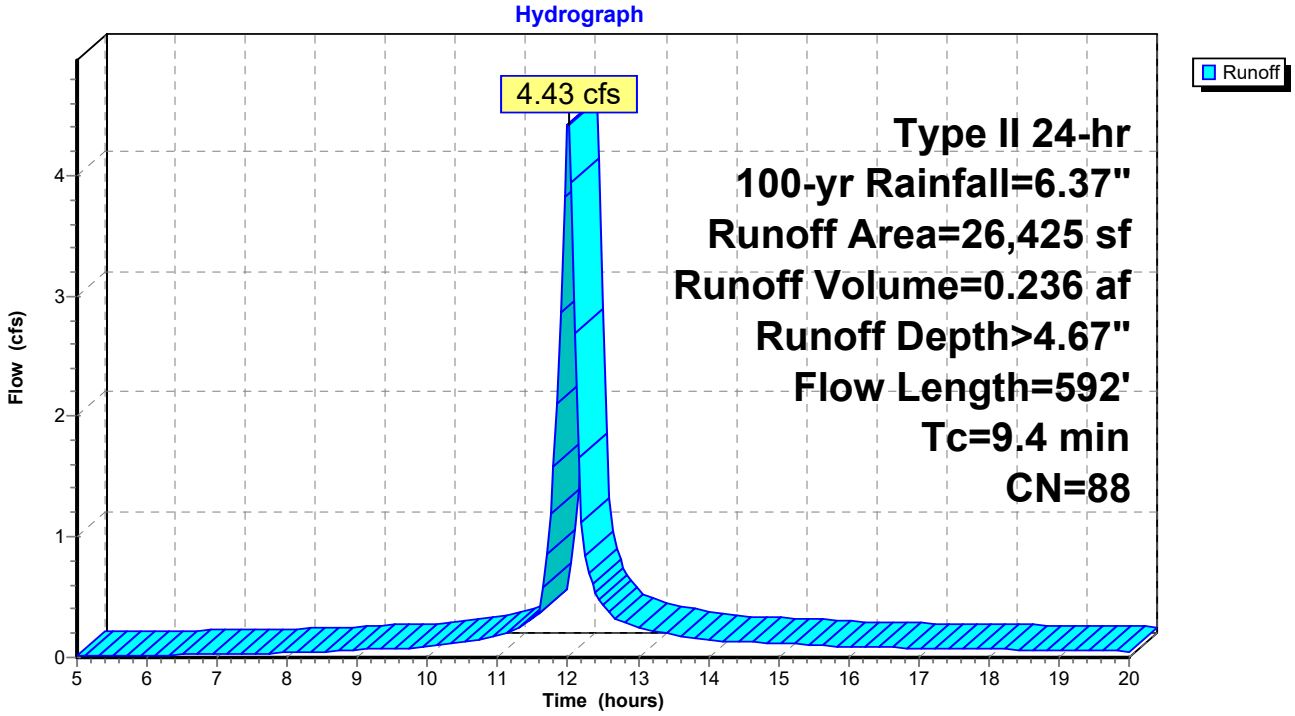
Runoff = 4.43 cfs @ 12.00 hrs, Volume= 0.236 af, Depth> 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	12,916	98	Impervious
	9,330	80	>75% Grass cover, Good, HSG D
	4,179	74	>75% Grass cover, Good, HSG C
	26,425	88	Weighted Average
	13,509		51.12% Pervious Area
	12,916		48.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
2.4	312	0.0945	2.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	180	0.1200	7.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.4	592	Total			

Subcatchment 1S: DA - 002



Summary for Subcatchment 2S: DA - 003

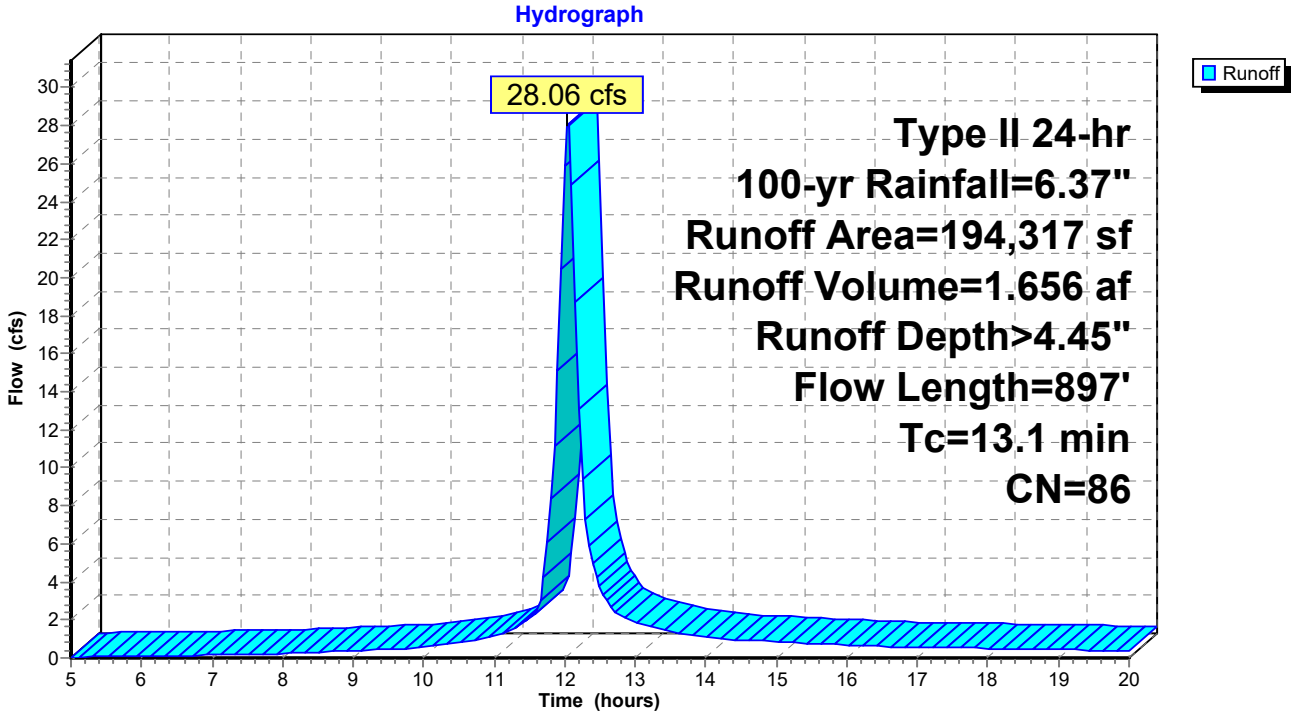
Runoff = 28.06 cfs @ 12.04 hrs, Volume= 1.656 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.37"

	Area (sf)	CN	Description
	8,639	74	>75% Grass cover, Good, HSG C
	514	39	>75% Grass cover, Good, HSG A
	112,334	80	>75% Grass cover, Good, HSG D
*	72,830	98	Impervious
	194,317	86	Weighted Average
	121,487		62.52% Pervious Area
	72,830		37.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
6.5	797	0.0857	2.05		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.1	897	Total			

Subcatchment 2S: DA - 003



Summary for Subcatchment 4S: DA - 004

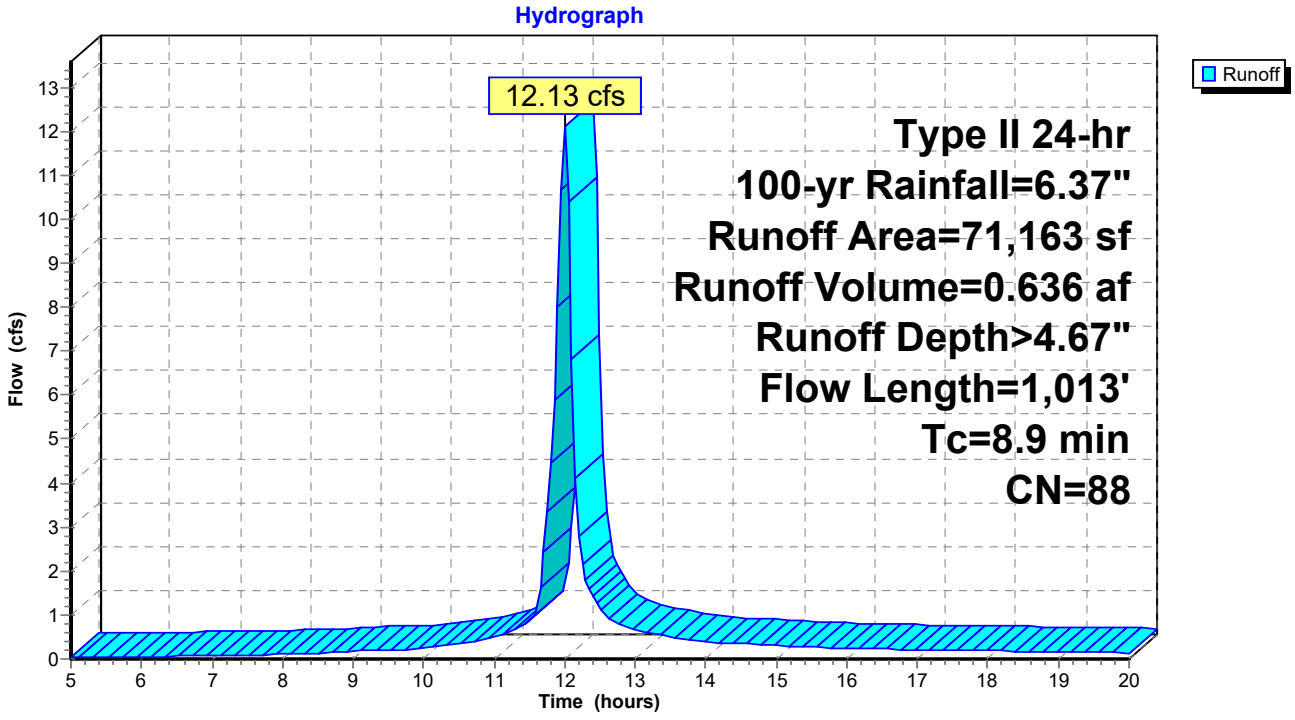
Runoff = 12.13 cfs @ 12.00 hrs, Volume= 0.636 af, Depth> 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.37"

	Area (sf)	CN	Description
	3,290	74	>75% Grass cover, Good, HSG C
	33,190	80	>75% Grass cover, Good, HSG D
	455	72	Dirt roads, HSG A
*	34,228	98	Impervious
	71,163	88	Weighted Average
	36,935		51.90% Pervious Area
	34,228		48.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.1000	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.2	173	0.1096	2.32		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.0	740	0.0941	6.23		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.9	1,013	Total			

Subcatchment 4S: DA - 004



Summary for Subcatchment 5S: DA - 005

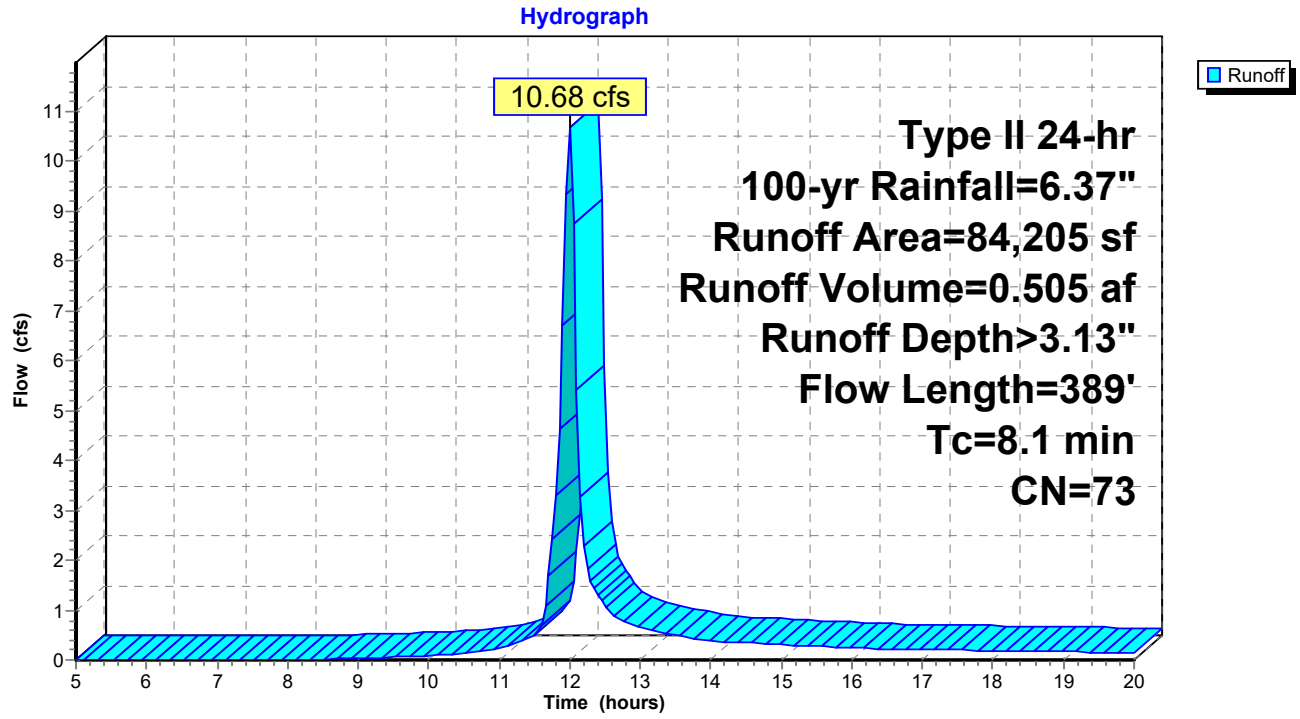
Runoff = 10.68 cfs @ 12.00 hrs, Volume= 0.505 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=6.37"

	Area (sf)	CN	Description
	6,192	36	Woods, Fair, HSG A
	66,719	73	Woods, Fair, HSG C
	2,001	80	>75% Grass cover, Good, HSG D
*	9,293	98	Impervious
	84,205	73	Weighted Average
	74,912		88.96% Pervious Area
	9,293		11.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0800	0.27		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.8	289	0.2870	2.68		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.1	389	Total			

Subcatchment 5S: DA - 005



Summary for Reach 6R: LB-DC-002

[82] Warning: Early inflow requires earlier time span
[91] Warning: Storage range exceeded by 0.11'
[55] Hint: Peak inflow is 118% of Manning's capacity

Inflow Area = 8.634 ac, 34.37% Impervious, Inflow Depth > 4.21" for 100-yr event
Inflow = 53.67 cfs @ 12.02 hrs, Volume= 3.033 af
Outflow = 52.28 cfs @ 12.04 hrs, Volume= 3.028 af, Atten= 3%, Lag= 1.5 min

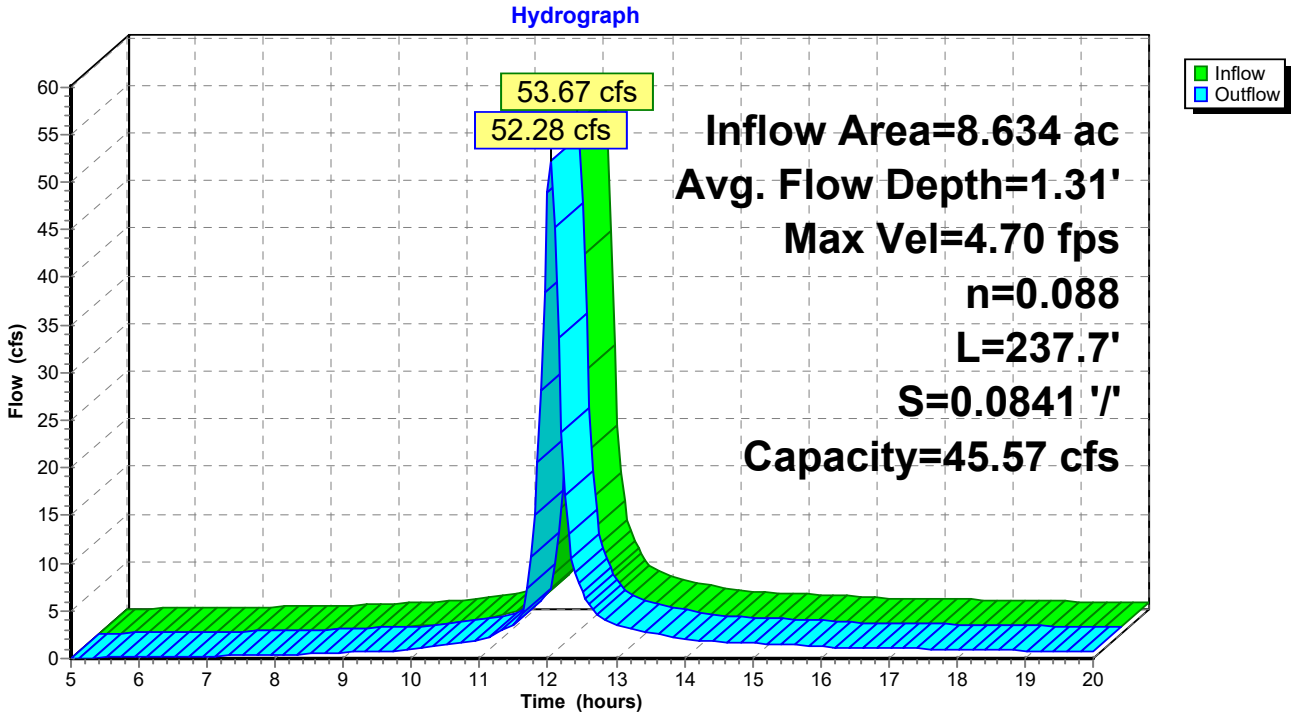
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.70 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 3.0 min

Peak Storage= 2,683 cf @ 12.03 hrs
Average Depth at Peak Storage= 1.31'
Bank-Full Depth= 1.20' Flow Area= 10.1 sf, Capacity= 45.57 cfs

6.00' x 1.20' deep channel, n= 0.088
Side Slope Z-value= 2.0 '/' Top Width= 10.80'
Length= 237.7' Slope= 0.0841 '/'
Inlet Invert= 810.00', Outlet Invert= 790.00'

‡

Reach 6R: LB-DC-002



Summary for Pond 9P: Catch Basin - 1

[82] Warning: Early inflow requires earlier time span

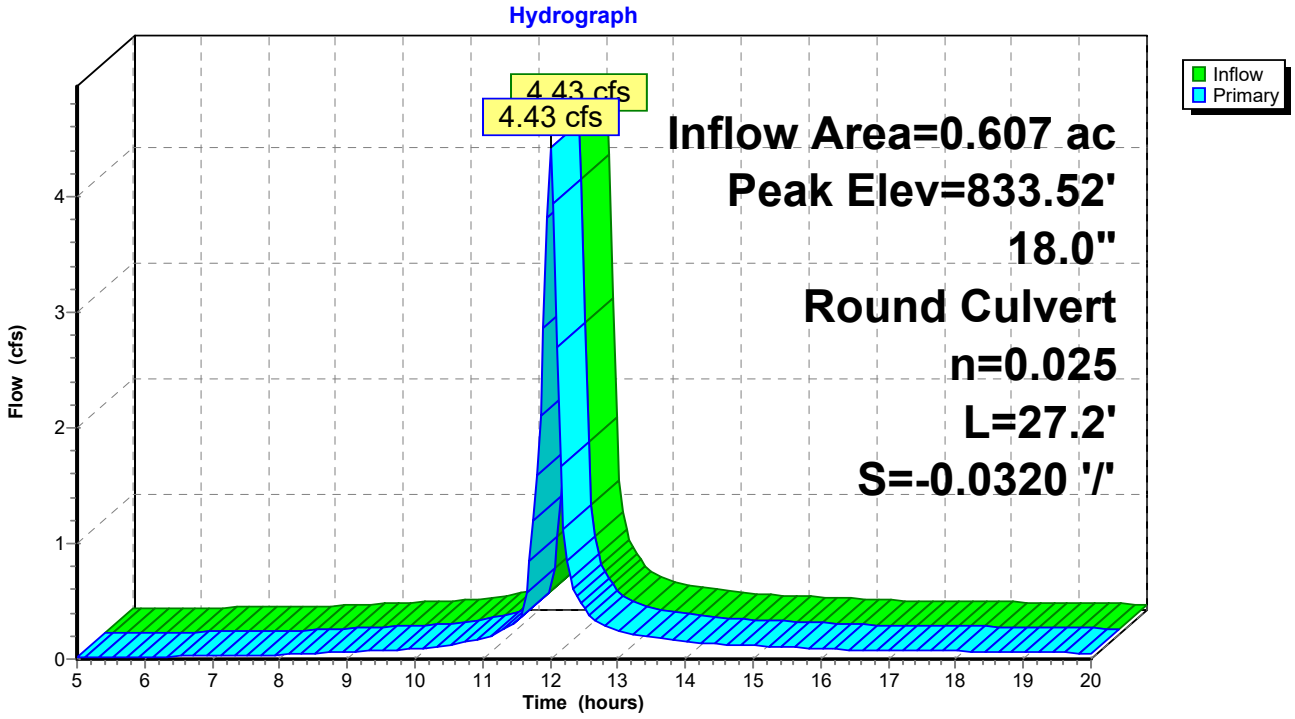
Inflow Area = 0.607 ac, 48.88% Impervious, Inflow Depth > 4.67" for 100-yr event
Inflow = 4.43 cfs @ 12.00 hrs, Volume= 0.236 af
Outflow = 4.43 cfs @ 12.00 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.0 min
Primary = 4.43 cfs @ 12.00 hrs, Volume= 0.236 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 833.52' @ 12.00 hrs
Flood Elev= 834.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 27.2' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 831.46' / 832.33' S= -0.0320 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=4.40 cfs @ 12.00 hrs HW=833.52' (Free Discharge)
1=Culvert (Inlet Controls 4.40 cfs @ 2.93 fps)

Pond 9P: Catch Basin - 1



Summary for Pond 10P: Catch Basin - 2

[82] Warning: Early inflow requires earlier time span
[58] Hint: Peaked 20.82' above defined flood level
[81] Warning: Exceeded Pond 9P by 22.30' @ 12.05 hrs

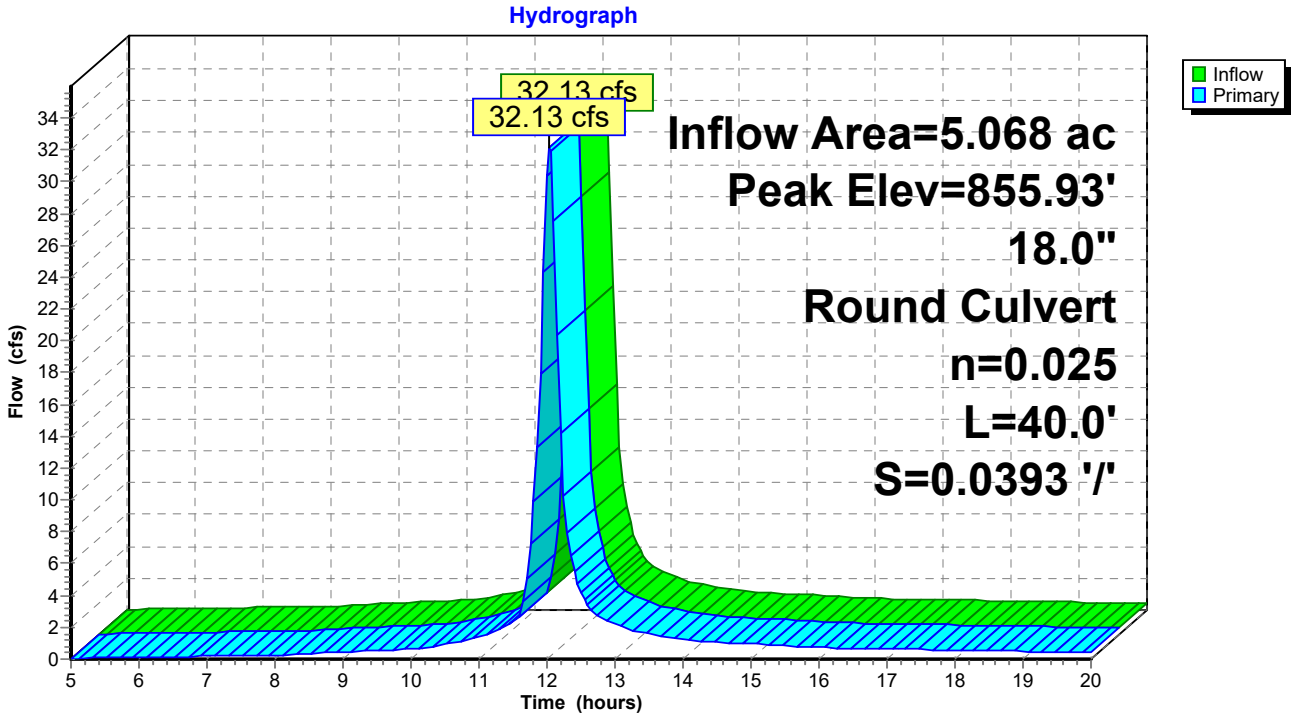
Inflow Area = 5.068 ac, 38.84% Impervious, Inflow Depth > 4.48" for 100-yr event
Inflow = 32.13 cfs @ 12.04 hrs, Volume= 1.892 af
Outflow = 32.13 cfs @ 12.04 hrs, Volume= 1.892 af, Atten= 0%, Lag= 0.0 min
Primary = 32.13 cfs @ 12.04 hrs, Volume= 1.892 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 855.93' @ 12.04 hrs
Flood Elev= 835.11'

Device	Routing	Invert	Outlet Devices
#1	Primary	832.33'	**18.0" Round Culvert** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 832.33' / 830.76' S= 0.0393 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=31.60 cfs @ 12.04 hrs HW=855.21' (Free Discharge)
1=Culvert (Inlet Controls 31.60 cfs @ 17.88 fps)

Pond 10P: Catch Basin - 2



Summary for Pond 11P: Catch Basin - 3

[82] Warning: Early inflow requires earlier time span
[58] Hint: Peaked 128.86' above defined flood level
[81] Warning: Exceeded Pond 10P by 106.08' @ 12.00 hrs

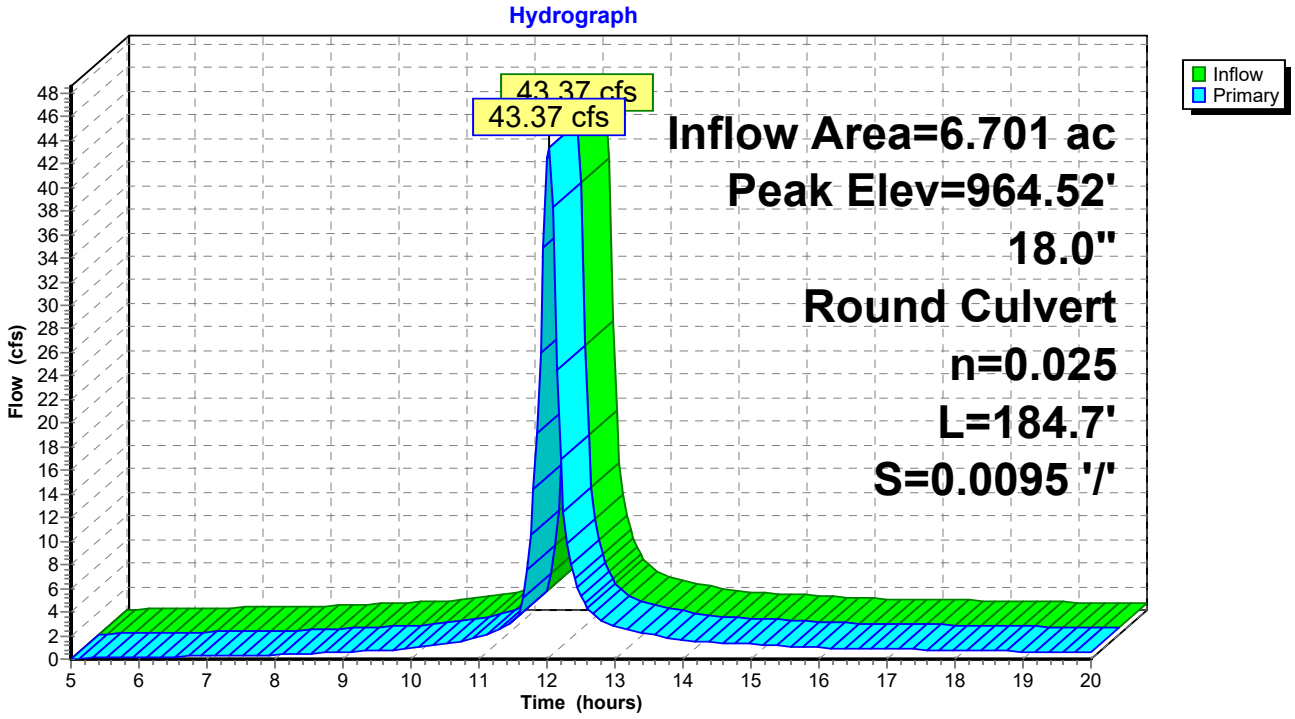
Inflow Area = 6.701 ac, 41.10% Impervious, Inflow Depth > 4.53" for 100-yr event
Inflow = 43.37 cfs @ 12.02 hrs, Volume= 2.528 af
Outflow = 43.37 cfs @ 12.02 hrs, Volume= 2.528 af, Atten= 0%, Lag= 0.0 min
Primary = 43.37 cfs @ 12.02 hrs, Volume= 2.528 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 964.52' @ 12.02 hrs
Flood Elev= 835.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	830.76'	**18.0" Round Culvert** L= 184.7' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 830.76' / 829.00' S= 0.0095 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=42.41 cfs @ 12.02 hrs HW=959.23' (Free Discharge)
1=Culvert (Barrel Controls 42.41 cfs @ 24.00 fps)

Pond 11P: Catch Basin - 3



STANDARD E&S WORKSHEET # 9
Time of Concentration

PROJECT NAME: Williams REAE – S5-T5/S6-T5 and S4a-T5/S4-T5 Stream Stabilization
LOCATION: Laflin, PA
PREPARED BY: CD DATE: 02/25/2021
CHECKED BY: KCC DATE: 02/25/2021

OVERLAND FLOW:

PATH NUMBER	LENGTH L (FT)	"n" VALUE	AVERAGE SLOPE (S) (ft/ft)	TIME (minutes)
001	100	0.011	0.115	0.7
002	100	0.15	0.07	6.6
003	100	0.15	0.07	6.6
004	100	0.15	0.10	5.7
005	100	0.15	0.08	6.3

$$T_{c\,(sheet\,flow)} = \left[\frac{2(n)}{3(S)^{0.5}}\right]^{0.4673}$$

n	Type of Cover
0.02	smooth pavement
0.1	bare parched soil
0.3	poor grass cover
0.4	average grass cover
0.8	dense grass cover

(L = 150' maximum)

SHALLOW CONCENTRATED FLOW:

PATH NUMBER	LENGTH (FT)	TYPE OF COVER	AVERAGE SLOPE(S) (ft/ft)	V (ft/sec)	TIME (minutes)	TOTAL TIME (minutes)
001	134	Pasture	0.045	7	1.5	3.3
	173	Woodland	0.289	5	1.1	
002	312	Pasture	0.095	7	2.4	9.4
	180	Paved	0.120	20.3	0.4	
003	797	Pasture	0.086	7	6.5	13.1
004	173	Pasture	0.110	7	1.2	8.9
	740	Paved	0.094	20.3	2.0	
005	289	Woodland	0.287	5	1.8	8.1

CHANNEL DIMENSIONS:

CHANNEL	BOTTOM WIDTH (ft)	LEFT SIDE SLOPE (H:V)	RIGHT SIDE SLOPE (H:V)	TOTAL DEPTH (ft)	TOP WIDTH (ft)
LB - DC - 001	3	2	2	1	7
LB - DC - 002	6	2	2	1.25	11

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: Williams REAE – S5-T5/S6-T5 and S4a-T5/S4-T5 Stream Stabilization
LOCATION: Laflin, PA
PREPARED BY: CD DATE: 02/25/2021
CHECKED BY: KCC DATE: 02/25/2021

CHANNEL OR CHANNEL SECTION		LB-DC-001	LB-DC-002			
TEMPORARY OR PERMANENT?	(T OR P)	P	P			
DESIGN STORM	(2, 5, OR 10 YR)	10 YR	10 YR			
ACRES	(AC)	1.02	8.6			
MULTIPLIER	(1.6, 2.25, or 2.75)[1]	N/A	N/A			
Q_r (REQUIRED CAPACITY)	(CFS)	3.59	25.98			
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	3.6	26.9			
PROTECTIVE LINING[2]		R-4 RIPRAP	R-6 RIPRAP			
n (MANNING'S COEFFICIENT)[2]		0.0889	0.0884			
V_a (ALLOWABLE VELOCITY)	(FPS)	9.0	13.0			
V (CALCULATED AT FLOW DEPTH d)	(FPS)	3.3	5.2			
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	2.0	4.0			
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.9	3.09			
CHANNEL BOTTOM WIDTH	(FT)	3	6			
CHANNEL SIDE SLOPES	(H:V)	2	2			
D (TOTAL DEPTH)	(FT)	1.0	1.25			
CHANNEL TOP WIDTH @ D	(FT)	7.0	11.0			
d (CALCULATED FLOW DEPTH)	(FT)	0.3	0.7			
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	4.2	8.6			
BOTTOM WIDTH: FLOW DEPTH RATIO	(12:1 MAX)	10.0	8.57			
d_{50} STONE SIZE	(IN)	6	12			
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	1.08	5.18			
R (HYDRAULIC RADIUS)	(FT)	0.249	0.567			
S (BED SLOPE)[3]	(FT/FT)	0.249	0.203			
S_c (CRITICAL SLOPE)	(FT/FT)	0.189	0.143			
$.7S_c$	(FT/FT)	0.13	0.1			
$1.3S_c$	(FT/FT)	0.25	0.19			
STABLE FLOW?	(Y/N)	Y	Y			
FREEBOARD BASED ON UNSTABLE FLOW	(FT)	-	-			
FREEBOARD BASED ON STABLE FLOW	(FT)	0.5	0.5			
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.5	0.5			
DESIGN METHOD FOR PROTECTIVE LINING[5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S			

1. Use 1.6 for Temporary Channels; 2.25 for Temporary Channels in Special Protection (HQ or EV) Watersheds; 2.75 for Permanent Channels. For Rational Method, enter "N/A" and attach E&S Worksheets 9 and 10. For TR-55 enter "N/A" and attach appropriate Worksheets.
2. Adjust "n" value for changes in channel liner and flow depth. For vegetated channels, provide data for manufactured linings without vegetation and with vegetation in separate columns.
3. Slopes may not be averaged.
4. Minimum Freeboard is 0.5 ft. or ¼ Total Channel Depth, whichever is greater
5. Permissible velocity lining design method is not acceptable for channels with a bed slope of 10% or greater. Shear stress lining design method is required for channels with a bed slope of 10% or greater. Shear stress lining design method may be used for any channel bed slope.