Transcontinental Gas Pipe Line Company, LLC

Requirement N – Hydrology and Hydraulics Analysis Statement

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

April 2021
(Revised March 2022)

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

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: Williams REAE – S6-T5 and S5-T5
LOCATION: Laflin, PA
PREPARED BY: BM DATE: 02/22/2022
CHECKED BY: PW DATE: 02/22/2022

CHANNEL OR CHANNEL SECTION		REACH A	REACH B	REACH C	REACH D
TEMPORARY OR PERMANENT?	(T OR P)	P	P	P	P
DESIGN STORM		10 YR	10 YR	10 YR	10 YR
ACRES	(AC)	0.262	0.354	0.529	0.658
MULTIPLIER	(1.6, 2.25, or 2.75)[1]	N/A	N/A	N/A	N/A
Q_r (REQUIRED CAPACITY)	(CFS)	0.59	0.89	1.35	1.66
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	17.9	18.0	12.8	15.9
PROTECTIVE LINING[2]		R-4 RIPRAP	R-4 RIPRAP	R-4 RIPRAP	R-4 RIPRAP
n (MANNING'S COEFFICIENT)[2]		0.0636	0.0636	0.0636	0.0636
V_a (ALLOWABLE VELOCITY)	(FPS)	9.0	9.0	9.0	9.0
V (CALCULATED AT FLOW DEPTH d)	(FPS)	7.2	7.2	5.1	6.3
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	2.0	2.0	2.0	2.0
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.5	0.5	0.5	0.4
CHANNEL BOTTOM WIDTH	(FT)	4.0	4.0	4.0	4.0
CHANNEL SIDE SLOPES	(H:V)	2.0	2.0	2.0	2.0
D (TOTAL DEPTH)	(FT)	1.0	1.0	1.0	1.0
CHANNEL TOP WIDTH @ D	(FT)	8.0	8.0	8.0	8.0
d (CALCULATED FLOW DEPTH)	(FT)	0.5	0.5	0.5	0.5
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	6.0	6.0	6.0	6.0
BOTTOM WIDTH: FLOW DEPTH RATIO	(12:1 MAX)	8.0	8.0	8.0	8.0
d_{50} STONE SIZE	(IN)	6	6	6	6
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	2.5	2.5	2.5	2.5
R (HYDRAULIC RADIUS)	(FT)	0.401	0.401	0.401	0.401
S (BED SLOPE)[3]	(FT/FT)	0.318	0.320	0.162	0.250
S_c (CRITICAL SLOPE)	(FT/FT)	0.083	0.083	0.083	0.083
$.7S_c$	(FT/FT)	0.0582	0.0582	0.0582	0.0582
$1.3S_c$	(FT/FT)	0.11	0.11	0.11	0.11
STABLE FLOW?	(Y/N)	Y	Y	Y	Y
FREEBOARD BASED ON UNSTABLE FLOW	(FT)	-	-	-	-
FREEBOARD BASED ON STABLE FLOW	(FT)	0.5	0.5	0.5	0.5
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.5	0.5	0.5	0.5
DESIGN METHOD FOR PROTECTIVE LINING [5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	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.

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: Williams REAE – S6-T5 and S6-T5
LOCATION: Laflin, PA
PREPARED BY: BM DATE: 02/22/2022
CHECKED BY: PW DATE: 02/22/2022

CHANNEL OR CHANNEL SECTION		REACH E	REACH F	S5-T5	
TEMPORARY OR PERMANENT?	(T OR P)	P	P	P	
DESIGN STORM		10 YR	10 YR	10 YR	
ACRES	(AC)	1.426	1.642	1.147	
MULTIPLIER	(1.6, 2.25, or 2.75)[1]	N/A	N/A	N/A	
Q_r (REQUIRED CAPACITY)	(CFS)	4.88	5.17	2.76	
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	21.3	14.2	11.0	
PROTECTIVE LINING[2]		R-4 RIPRAP	R-4 RIPRAP	R-4 RIPRAP	
n (MANNING'S COEFFICIENT)[2]		0.0636	0.0636	0.0636	
V_a (ALLOWABLE VELOCITY)	(FPS)	9.0	9.0	9.0	
V (CALCULATED AT FLOW DEPTH d)	(FPS)	8.5	5.7	4.4	
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	2.0	2.0	2	
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.7	0.3	0.2	
CHANNEL BOTTOM WIDTH	(FT)	4.0	4.0	4	
CHANNEL SIDE SLOPES	(H:V)	2.0	2.0	2	
D (TOTAL DEPTH)	(FT)	1.0	1.0	1.0	
CHANNEL TOP WIDTH @ D	(FT)	8.0	8.0	8	
d (CALCULATED FLOW DEPTH)	(FT)	0.5	0.5	0.5	
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	6.0	6.0	6.0	
BOTTOM WIDTH: FLOW DEPTH RATIO	(12:1 MAX)	8.0	8.0	8.0	
d_{50} STONE SIZE	(IN)	6	6	6	
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	2.5	2.5	2.500	
R (HYDRAULIC RADIUS)	(FT)	0.401	0.401	0.401	
S (BED SLOPE)[3]	(FT/FT)	0.450	0.200	0.120	
S_c (CRITICAL SLOPE)	(FT/FT)	0.083	0.083	0.083	
$.7S_c$	(FT/FT)	0.0582	0.0582	0.0582	
$1.3S_c$	(FT/FT)	0.11	0.11	0.11	
STABLE FLOW?	(Y/N)	Y	Y	Y	
FREEBOARD BASED ON UNSTABLE FLOW	(FT)	-	-	-	
FREEBOARD BASED ON STABLE FLOW	(FT)	0.5	0.5	0.5	
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.5	0.5	0.5	
DESIGN METHOD FOR PROTECTIVE LINING [5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		S	S	S	

6. 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.
7. 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.
8. Slopes may not be averaged.
9. Minimum Freeboard is 0.5 ft. or ¼ Total Channel Depth, whichever is greater
10. 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.

STANDARD E&S WORKSHEET # 11
Channel Design Data

PROJECT NAME: Williams REAE – S4A-T5/S4-T5
LOCATION: Laflin, PA
PREPARED BY: BM DATE: 02/22/2022
CHECKED BY: PW DATE: 02/22/2022

CHANNEL OR CHANNEL SECTION		REACH A	REACH B	REACH C	
TEMPORARY OR PERMANENT?	(T OR P)	P	P	P	
DESIGN STORM		10 YR	10 YR	10 YR	
ACRES	(AC)	1.119	1.448	1.606	
MULTIPLIER	(1.6, 2.25, or 2.75)[1]	N/A	N/A	N/A	
Q_r (REQUIRED CAPACITY)	(CFS)	24.2	24.2	24.3	
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	24.2	24.2	24.3	
PROTECTIVE LINING[2]		R-3 RIPRAP	R-4 RIPRAP	R-4 RIPRAP	
n (MANNING'S COEFFICIENT)[2]		0.0381	0.0566	0.0611	
V_a (ALLOWABLE VELOCITY)	(FPS)	6.5	9.0	9.0	
V (CALCULATED AT FLOW DEPTH d)	(FPS)	4.9	5.9	7.3	
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	-	2.0	2.0	
τ_d (CALC'D SHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	1.3	1.5	1.0	
CHANNEL BOTTOM WIDTH	(FT)	4	5	5	
CHANNEL SIDE SLOPES	(H:V)	2	2	2	
D (TOTAL DEPTH)	(FT)	1.5	1.25	1.25	
CHANNEL TOP WIDTH @ D	(FT)	10.0	10.0	10.0	
d (CALCULATED FLOW DEPTH)	(FT)	0.86	0.65	0.54	
CHANNEL TOP WIDTH @ FLOW DEPTH d	(FT)	7.46	7.59	7.18	
BOTTOM WIDTH: FLOW DEPTH RATIO	(12:1 MAX)	4.63	7.72	9.19	
d_{50} STONE SIZE	(IN)	3	6	6	
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	4.955	4.080	3.313	
R (HYDRAULIC RADIUS)	(FT)	0.630	0.517	0.466	
S (BED SLOPE)[3]	(FT/FT)	0.029	0.123	0.267	
S_c (CRITICAL SLOPE)	(FT/FT)	0.026	0.060	0.074	
$.7S_c$	(FT/FT)	0.0182	0.0423	0.0515	
$1.3S_c$	(FT/FT)	0.03	0.08	0.10	
STABLE FLOW?	(Y/N)	N	Y	Y	
FREEBOARD BASED ON UNSTABLE FLOW	(FT)	0.13	-	-	
FREEBOARD BASED ON STABLE FLOW	(FT)	-	0.5	0.5	
MINIMUM REQUIRED FREEBOARD[4]	(FT)	0.5	0.5	0.5	
DESIGN METHOD FOR PROTECTIVE LINING [5] PERMISSIBLE VELOCITY (V) OR SHEAR STRESS (S)		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.

STANDARD E&S WORKSHEET # 9
Time of Concentration

PROJECT NAME: Williams REAE – S4A-T5/S4-T5 Stream Stabilization
LOCATION: Laflin, PA
PREPARED BY: CE DATE: 02/21/2022
CHECKED BY: PW DATE: 02/21/2022

OVERLAND FLOW:

PATH NUMBER	LENGTH L (FT)	"n" VALUE	AVERAGE SLOPE (S) (ft/ft)	TIME (minutes)
001	100	0.15	0.070	6.6
002	100	0.15	0.070	6.6
003	100	0.15	0.100	5.7
REACH A	78	0.15	0.077	5.2
REACH B	81	0.15	0.086	5.1
REACH C	100	0.15	0.078	6.3

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

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	312	Short Grass Past.	0.095	7.0	2.4	9.4
	180	Paved	0.120	20.3	0.4	
002	797	Short Grass Past.	0.086	7.0	6.5	13.1
003	173	Short Grass Past.	0.110	7.0	1.2	8.9
	740	Short Grass Past.	0.094	20.3	2.0	
REACH A	197	Unpaved	0.264	16.1	0.4	5.6
REACH B	219	Unpaved	0.292	16.1	0.4	5.5
REACH C	234	Unpaved	0.286	16.1	0.5	6.8

CHANNEL DIMENSIONS:

CHANNEL	BOTTOM WIDTH (ft)	LEFT SIDE SLOPE (H:V)	RIGHT SIDE SLOPE (H:V)	TOTAL DEPTH (ft)	TOP WIDTH (ft)
REACH A	4.0	2:1	2:1	1.50	10.0
REACH B	5.0	2:1	2:1	1.25	10.0
REACH C	5.0	2:1	2:1	1.25	10.0

STANDARD E&S WORKSHEET # 9
Time of Concentration

PROJECT NAME: Williams REAE – S5-T5 Stream Stabilization
LOCATION: Laflin, PA
PREPARED BY: CE DATE: 02/21/2022
CHECKED BY: PW DATE: 02/21/2022

OVERLAND FLOW:

PATH NUMBER	LENGTH L (FT)	"n" VALUE	AVERAGE SLOPE (S) (ft/ft)	TIME (minutes)
S5-T5	88	0.15	0.068	6.0

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

n	Type of Cover
0.02	smooth pavement
0.1	bare parched soil
0.5	poor grass cover
0.6	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)
S5-T5	268	Unpaved	0.216	16.1	0.6	6.6

CHANNEL DIMENSIONS:

CHANNEL	BOTTOM WIDTH (ft)	LEFT SIDE SLOPE (H:V)	RIGHT SIDE SLOPE (H:V)	TOTAL DEPTH (ft)	TOP WIDTH (ft)
S5-T5	4.0	2:1	2:1	1.0	10.0

STANDARD E&S WORKSHEET # 9
Time of Concentration

PROJECT NAME: Williams REAE – S6-T5 Stream Stabilization
LOCATION: Laflin, PA
PREPARED BY: CE DATE: 02/21/2022
CHECKED BY: PW DATE: 02/21/2022

OVERLAND FLOW:

PATH NUMBER	LENGTH L (FT)	"n" VALUE	AVERAGE SLOPE (S) (ft/ft)	TIME (minutes)
REACH A	100	0.15	0.03	9.3
REACH B	100	0.15	0.03	9.3
REACH C	100	0.15	0.03	9.3
REACH D	100	0.15	0.03	9.3
REACH E	100	0.15	0.035	8.7
REACH F	100	0.15	0.01	14.4

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

n	Type of Cover
0.02	smooth pavement
0.1	bare parched soil
0.7	poor grass cover
0.8	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)
REACH A	132	Unpaved	0.320	16.1	0.2	9.5
REACH B	180	Unpaved	0.310	16.1	0.3	9.6
REACH C	207	Unpaved	0.310	16.1	0.4	9.7
REACH D	195	Unpaved	0.300	16.1	0.4	9.7
REACH E	291	Unpaved	0.278	16.1	0.6	9.3
REACH F	457	Unpaved	0.175	16.1	1.1	15.5

CHANNEL DIMENSIONS:

CHANNEL	BOTTOM WIDTH (ft)	LEFT SIDE SLOPE (H:V)	RIGHT SIDE SLOPE (H:V)	TOTAL DEPTH (ft)	TOP WIDTH (ft)
REACH A	4.0	2:1	2:1	1.00	10.0
REACH B	4.0	2:1	2:1	1.00	10.0
REACH C	4.0	2:1	2:1	1.00	10.0
REACH D	4.0	2:1	2:1	1.00	10.0
REACH E	4.0	2:1	2:1	1.00	10.0
REACH F	4.0	2:1	2:1	1.00	10.0

Channel Design
S4A-T5/S4-T5

Waterway Description	Channel Slope ft/ft	Lining Type	Manning's "n"	Control Criteria (1) Velocity <fps	Control Criteria (1) Shear Stress <lb/ft^2	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraulic Radius ft.	Velocity fps	Shear Stress <lb/ft^2	Flow cfs	Critical Slope ft/ft	Flow Type (2)	Min. Depth ft	Final Dimensions (ft) Bottom Width	Depth	Side Slopes	Top Width
REACH A	*Required capacity of 24.2 cfs*																				
STA. 0+42 to 1+80	**0.029**	**R-3 Riprap**	**0.0381**	**6.5**	**-**	**4**	**2**	**0.86**	**4.955**	**7.867**	**0.630**	**4.9**	**1.3**	**24.2**	**0.026**	**Unstable**	**1.36**	**4**	**1.50**	**2**	**10.00**
REACH B	*Required capacity of 24.2 cfs*																				
STA. 1+80 to 2+45	**0.123**	**R-4 Riprap**	**0.0566**	**9.0**	**2.00**	**5**	**2**	**0.65**	**4.080**	**7.898**	**0.517**	**5.9**	**1.5**	**24.2**	**0.060**	**Stable**	**1.15**	**5**	**1.25**	**2**	**10.00**
REACH C	*Required capacity of 24.3 cfs*																				
STA. 2+45 to 2+60	**0.267**	**R-4 Riprap**	**0.0611**	**9.0**	**2.00**	**5**	**2**	**0.54**	**3.313**	**7.433**	**0.446**	**7.3**	**1.0**	**24.3**	**0.074**	**Stable**	**1.04**	**5**	**1.25**	**2**	**10.00**

(1) Max Flow Velocity for vegetated channels is from Table 6.4 of the PaDEP E&S Manual requirements.
Max Flow Velocity for RipRap is from Table 6.6 of the PaDEP E&S Manual requirements.
Max Flow Velocity and Permissible Shear Stress for the RipRap is form Tables 6.2 and 6.6 of the PaDEP E&S Manual requirements.

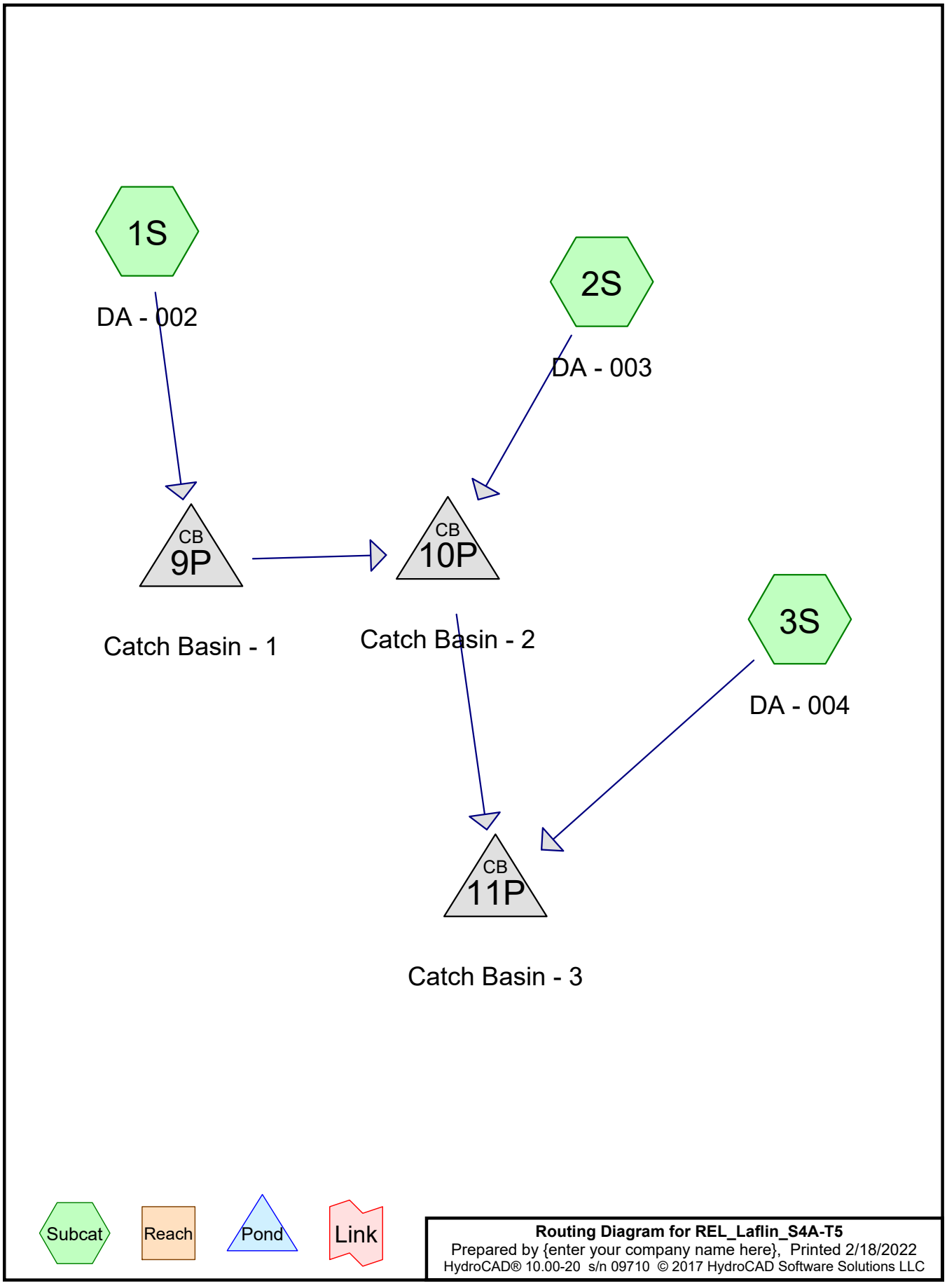
(2) Channels are checked for stable vs. unstable conditions with additional freeboard provided in accordance with the PaDEP E&S Manual requirements

(3) Channel design flows are based off HydroCAD Calcualations

(4) Shear stress calculations assume a 40% void ratio in the riprap on channel bottoms (not side slopes) in accordance with Chapter 6 of the E&S Manual.

Final Dimensions:

	Lining	Bottom Width	Depth	Side Slope	Top Width
Reach A	R-3 Riprap	4.00	1.50	2.00	10.00
Reach B	R-4 Riprap	5.00	1.25	2.00	10.00
Reach C	R-4 Riprap	5.00	1.25	2.00	10.00



Routing Diagram for REL_Laflin_S4A-T5
Prepared by {enter your company name here}, Printed 2/18/2022
HydroCAD® 10.00-20 s/n 09710 © 2017 HydroCAD Software Solutions LLC

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, 3S)
3.555	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S)
0.010	72	Dirt roads, HSG A (3S)
2.754	98	Impervious (1S, 2S, 3S)
6.701	**87**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.022	HSG A	2S, 3S
0.000	HSG B	
0.370	HSG C	1S, 2S, 3S
3.555	HSG D	1S, 2S, 3S
2.754	Other	1S, 2S, 3S
6.701		**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	3.555	0.000	3.937	>75% Grass cover, Good	1S, 2S, 3S
0.010	0.000	0.000	0.000	0.000	0.010	Dirt roads	3S
0.000	0.000	0.000	0.000	2.754	2.754	Impervious	1S, 2S, 3S
0.022	**0.000**	**0.370**	**3.555**	**2.754**	**6.701**	**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>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 3S: 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

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 = 6.701 ac Runoff Volume = 1.230 af Average Runoff Depth = 2.20"
58.90% Pervious = 3.947 ac 41.10% Impervious = 2.754 ac

Summary for Subcatchment 1S: DA - 002

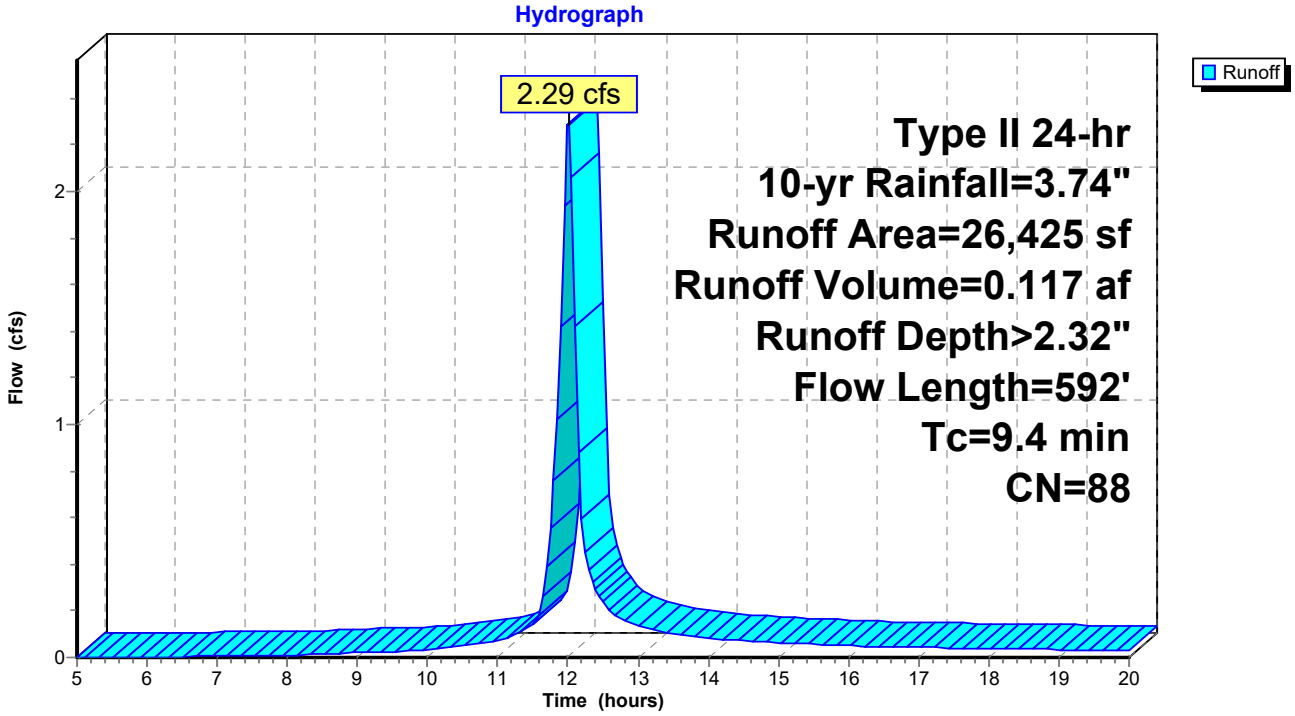
Runoff = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af, Depth> 2.32"

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

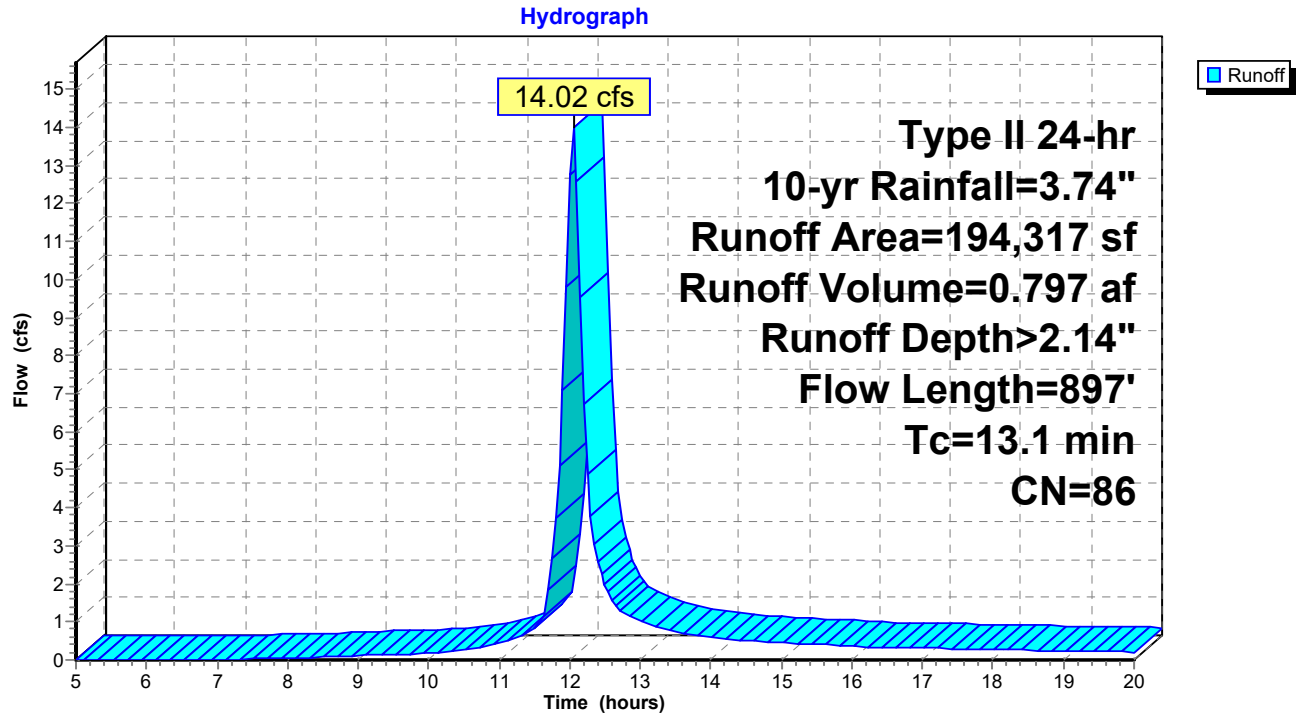
Runoff = 14.02 cfs @ 12.05 hrs, Volume= 0.797 af, Depth> 2.14"

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 3S: DA - 004

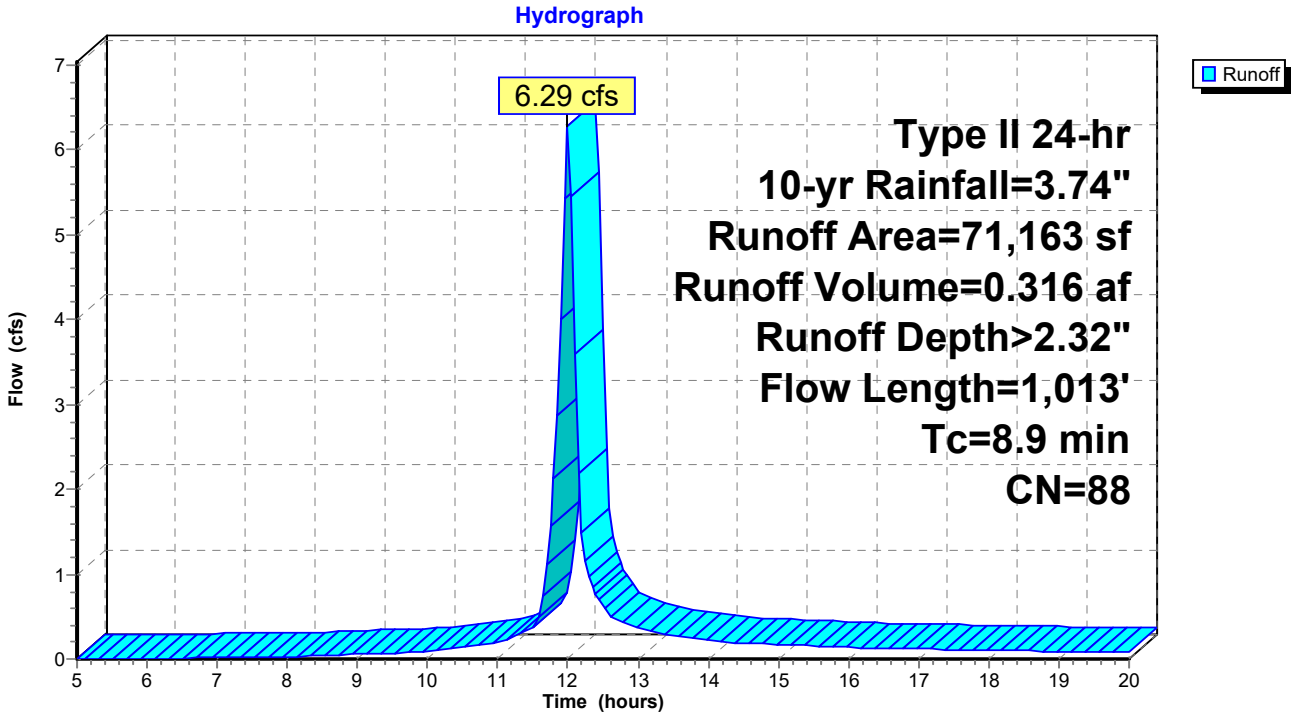
Runoff = 6.29 cfs @ 12.00 hrs, Volume= 0.316 af, Depth> 2.32"

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 3S: DA - 004



Summary for Pond 9P: Catch Basin - 1

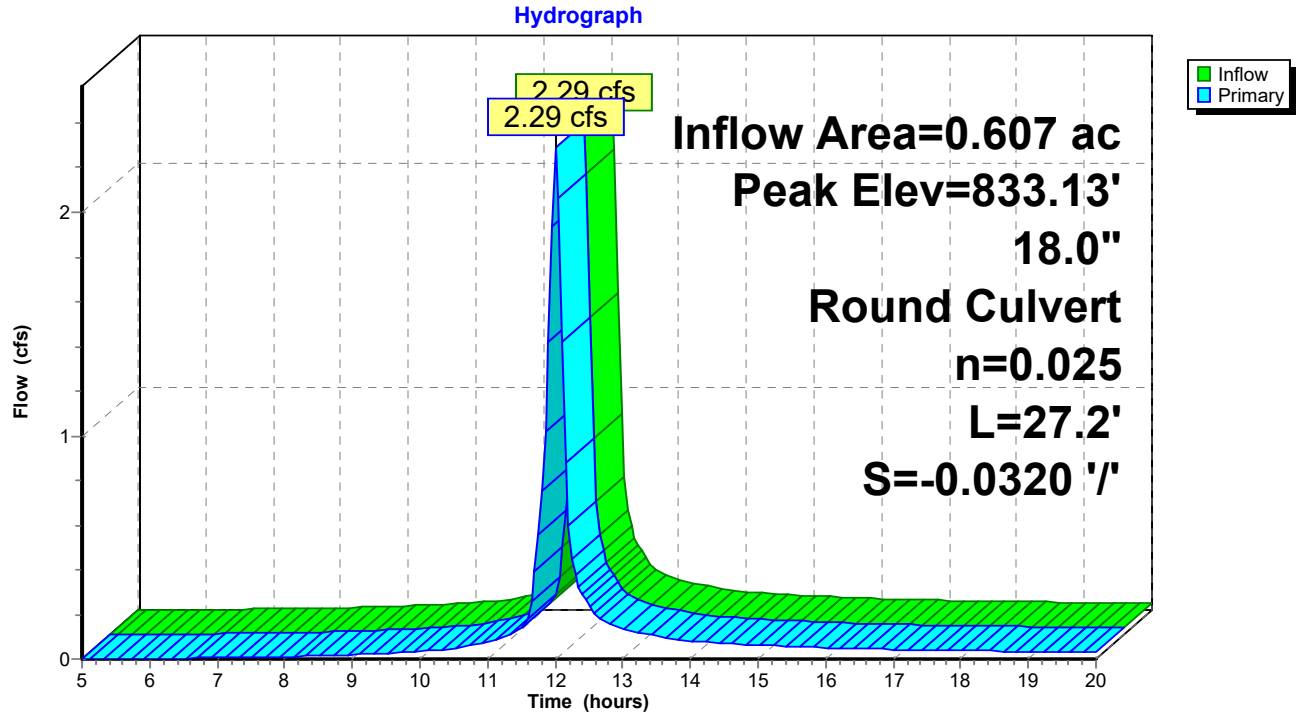
Inflow Area = 0.607 ac, 48.88% Impervious, Inflow Depth > 2.32" for 10-yr event
Inflow = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af
Outflow = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min
Primary = 2.29 cfs @ 12.01 hrs, Volume= 0.117 af

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

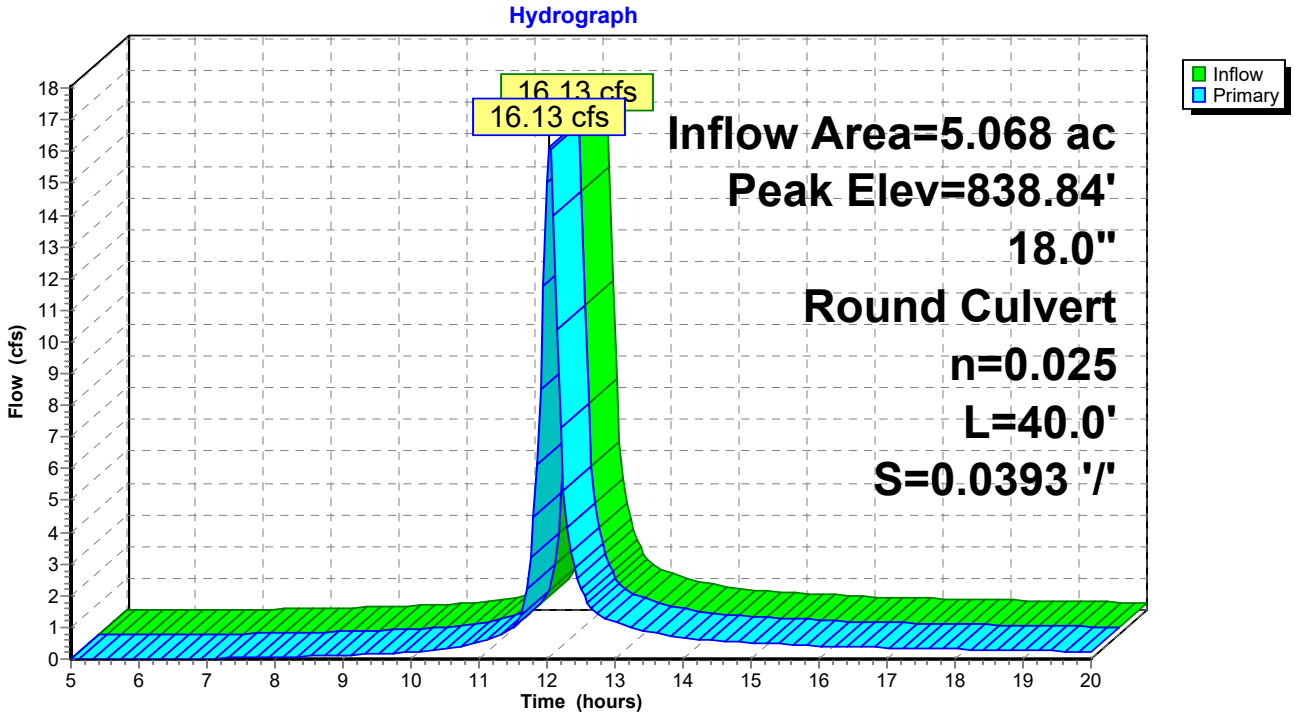
Inflow Area = 5.068 ac, 38.84% Impervious, Inflow Depth > 2.17" for 10-yr event
Inflow = 16.13 cfs @ 12.04 hrs, Volume= 0.914 af
Outflow = 16.13 cfs @ 12.04 hrs, Volume= 0.914 af, Atten= 0%, Lag= 0.0 min
Primary = 16.13 cfs @ 12.04 hrs, Volume= 0.914 af

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

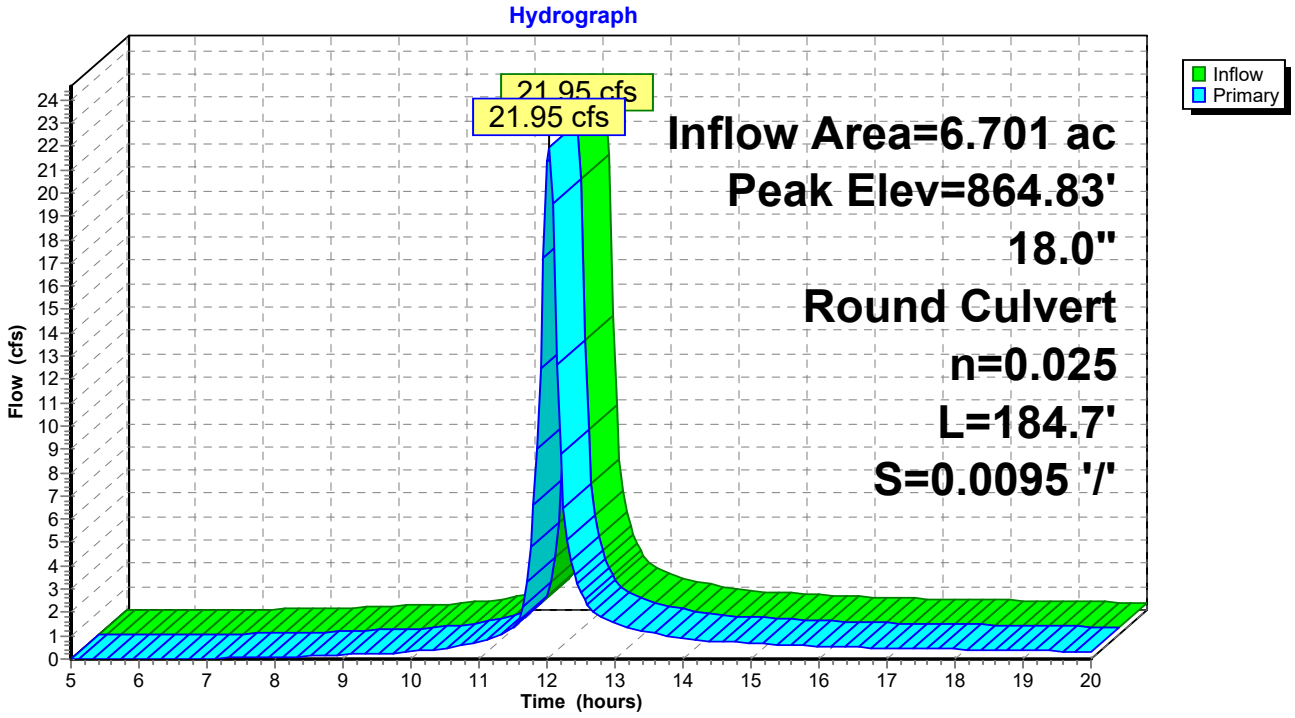
Inflow Area = 6.701 ac, 41.10% Impervious, Inflow Depth > 2.20" for 10-yr event
Inflow = 21.95 cfs @ 12.03 hrs, Volume= 1.230 af
Outflow = 21.95 cfs @ 12.03 hrs, Volume= 1.230 af, Atten= 0%, Lag= 0.0 min
Primary = 21.95 cfs @ 12.03 hrs, Volume= 1.230 af

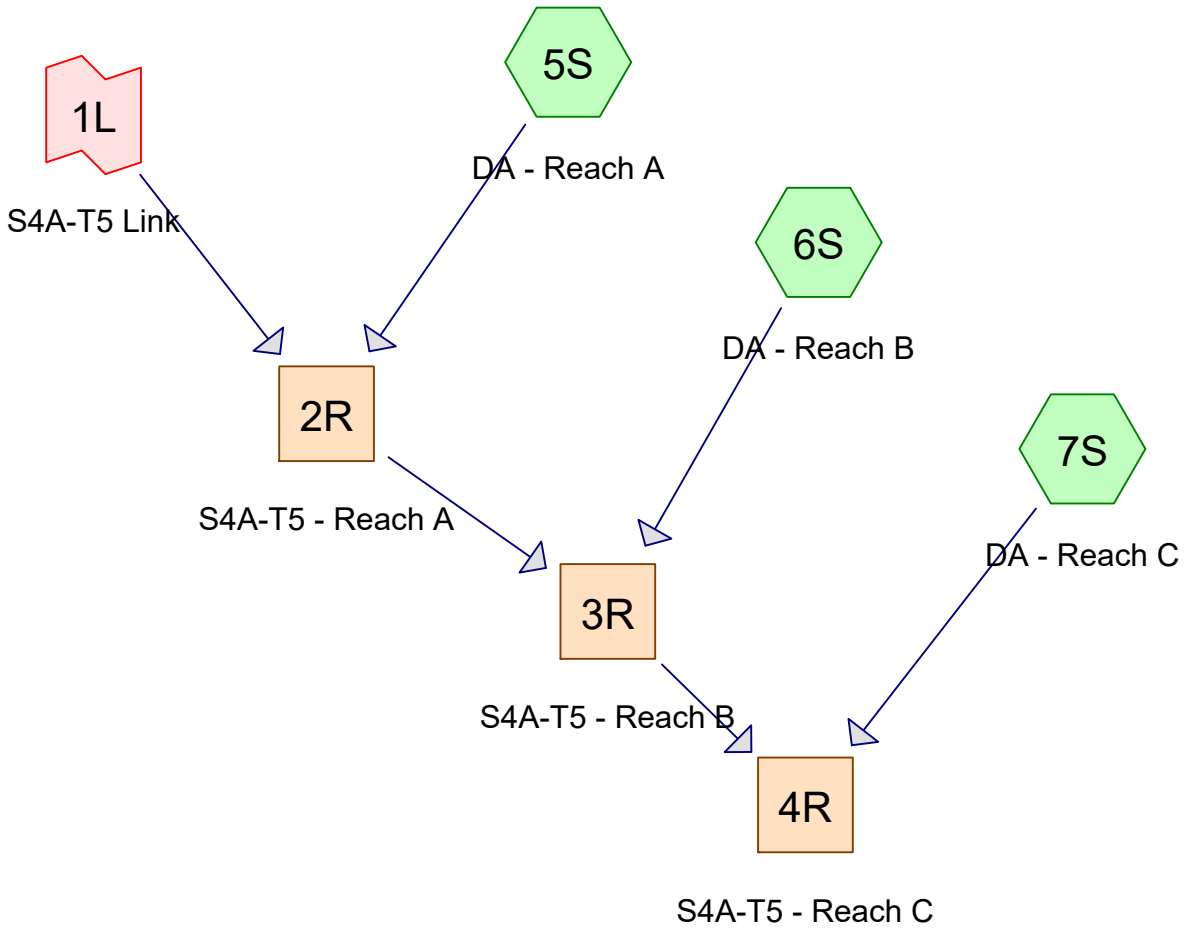
Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 864.83' @ 12.03 hrs
Flood Elev= 835.66'

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





Subcat Reach Pond Link

Routing Diagram for REL_Laflin_S4A-T5 - (Reach A-C)
Prepared by {enter your company name here}, Printed 2/18/2022

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.156	98	Impervious (5S, 6S, 7S)
0.484	71	Meadow, non-grazed, HSG C (5S, 6S, 7S)
0.035	78	Meadow, non-grazed, HSG D (5S, 6S, 7S)
0.098	36	Woods, Fair, HSG A (5S, 6S, 7S)
0.833	73	Woods, Fair, HSG C (5S, 6S, 7S)
1.606	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.098	HSG A	5S, 6S, 7S
0.000	HSG B	
1.317	HSG C	5S, 6S, 7S
0.035	HSG D	5S, 6S, 7S
0.156	Other	5S, 6S, 7S
1.606		**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	0.000	0.000	0.156	0.156	Impervious	5S, 6S, 7S
0.000	0.000	0.484	0.035	0.000	0.519	Meadow, non-grazed	5S, 6S, 7S
0.098	0.000	0.833	0.000	0.000	0.931	Woods, Fair	5S, 6S, 7S
0.098	**0.000**	**1.317**	**0.035**	**0.156**	**1.606**	**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 5S: DA - Reach A Runoff Area=48,750 sf 10.23% Impervious Runoff Depth>1.28"
Flow Length=275' Tc=5.6 min CN=74 Runoff=2.75 cfs 0.119 af

Subcatchment 6S: DA - Reach B Runoff Area=14,301 sf 4.90% Impervious Runoff Depth>0.88"
Flow Length=300' Tc=5.5 min CN=67 Runoff=0.55 cfs 0.024 af

Subcatchment 7S: DA - Reach C Runoff Area=6,904 sf 15.90% Impervious Runoff Depth>1.16"
Flow Length=334' Tc=6.8 min CN=72 Runoff=0.34 cfs 0.015 af

Reach 2R: S4A-T5 - Reach A Avg. Flow Depth=0.87' Max Vel=4.83 fps Inflow=24.21 cfs 1.349 af
n=0.038 L=140.0' S=0.0286 '/' Capacity=68.50 cfs Outflow=23.79 cfs 1.348 af

Reach 3R: S4A-T5 - Reach B Avg. Flow Depth=0.65' Max Vel=5.88 fps Inflow=24.19 cfs 1.372 af
n=0.057 L=65.0' S=0.1231 '/' Capacity=79.05 cfs Outflow=24.08 cfs 1.372 af

Reach 4R: S4A-T5 - Reach C Avg. Flow Depth=0.54' Max Vel=7.32 fps Inflow=24.36 cfs 1.387 af
n=0.061 L=15.0' S=0.2667 '/' Capacity=108.73 cfs Outflow=24.34 cfs 1.387 af

Link 1L: 10-yr Primary Outflow Imported from REL_Laflin_S4A-T5~Pond 11P.hce Inflow=21.95 cfs 1.230 af
Area= 6.701 ac 41.10% Imperv. Primary=21.95 cfs 1.230 af

Total Runoff Area = 1.606 ac Runoff Volume = 0.159 af Average Runoff Depth = 1.19"
90.30% Pervious = 1.450 ac 9.70% Impervious = 0.156 ac

Summary for Subcatchment 5S: DA - Reach A

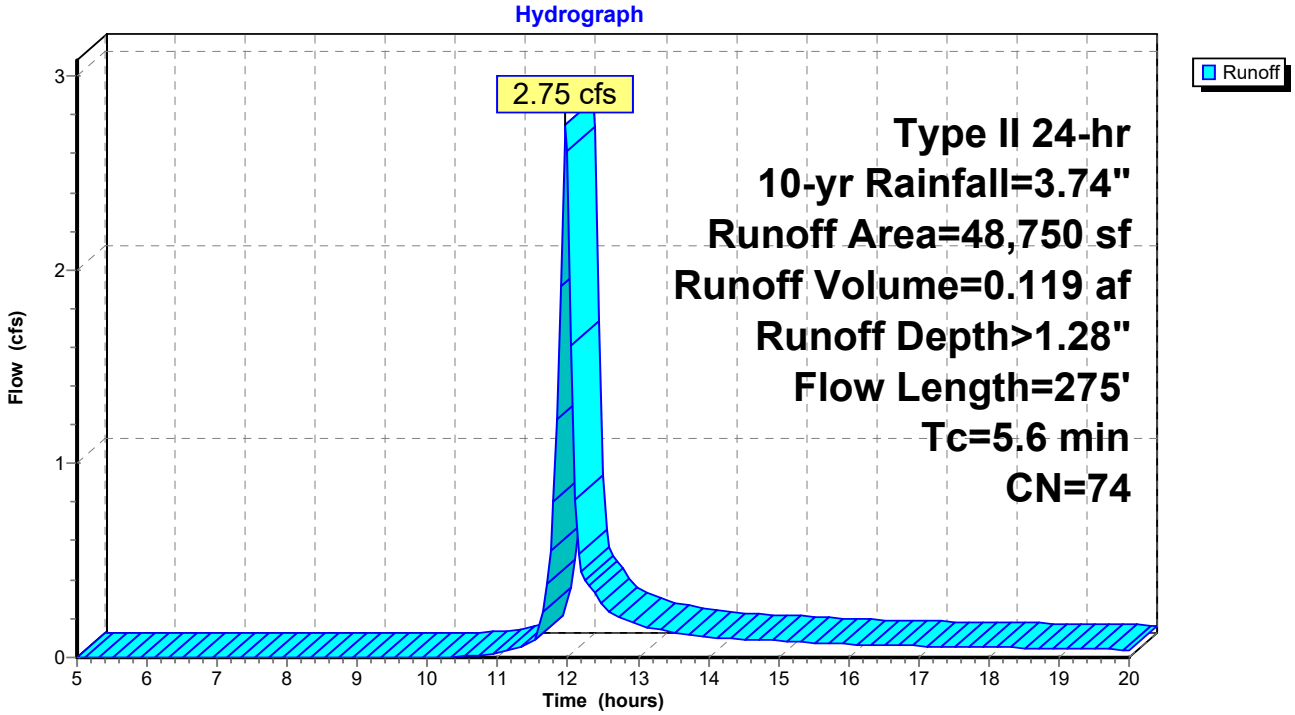
Runoff = 2.75 cfs @ 11.97 hrs, Volume= 0.119 af, Depth> 1.28"

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
	813	36	Woods, Fair, HSG A
	26,936	73	Woods, Fair, HSG C
	15,221	71	Meadow, non-grazed, HSG C
	791	78	Meadow, non-grazed, HSG D
*	4,989	98	Impervious
	48,750	74	Weighted Average
	43,761		89.77% Pervious Area
	4,989		10.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	78	0.0770	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.4	197	0.2640	8.27		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.6	275	Total			

Subcatchment 5S: DA - Reach A



Summary for Subcatchment 6S: DA - Reach B

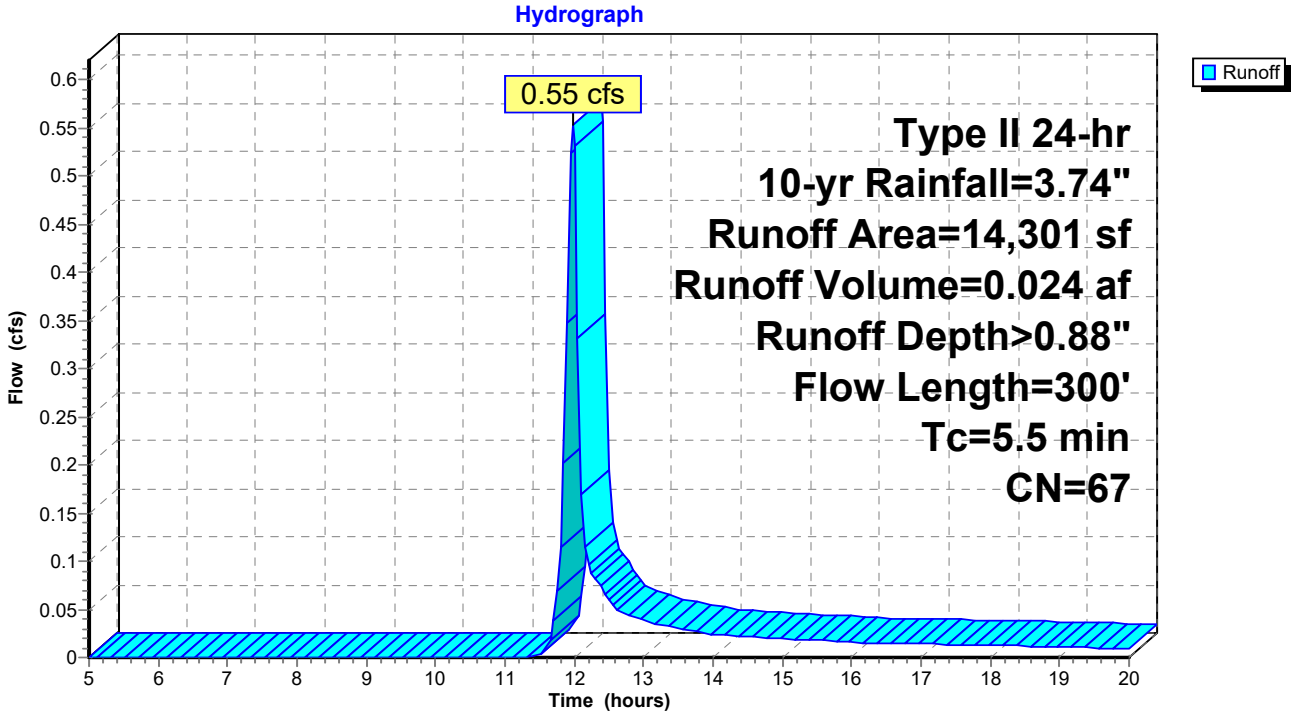
Runoff = 0.55 cfs @ 11.98 hrs, Volume= 0.024 af, Depth> 0.88"

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 10-yr Rainfall=3.74"

	Area (sf)	CN	Description
	2,585	36	Woods, Fair, HSG A
	7,482	73	Woods, Fair, HSG C
	3,292	71	Meadow, non-grazed, HSG C
	241	78	Meadow, non-grazed, HSG D
*	701	98	Impervious
	14,301	67	Weighted Average
	13,600		95.10% Pervious Area
	701		4.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	81	0.0860	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.4	219	0.2920	8.70		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.5	300	Total			

Subcatchment 6S: DA - Reach B



Summary for Subcatchment 7S: DA - Reach C

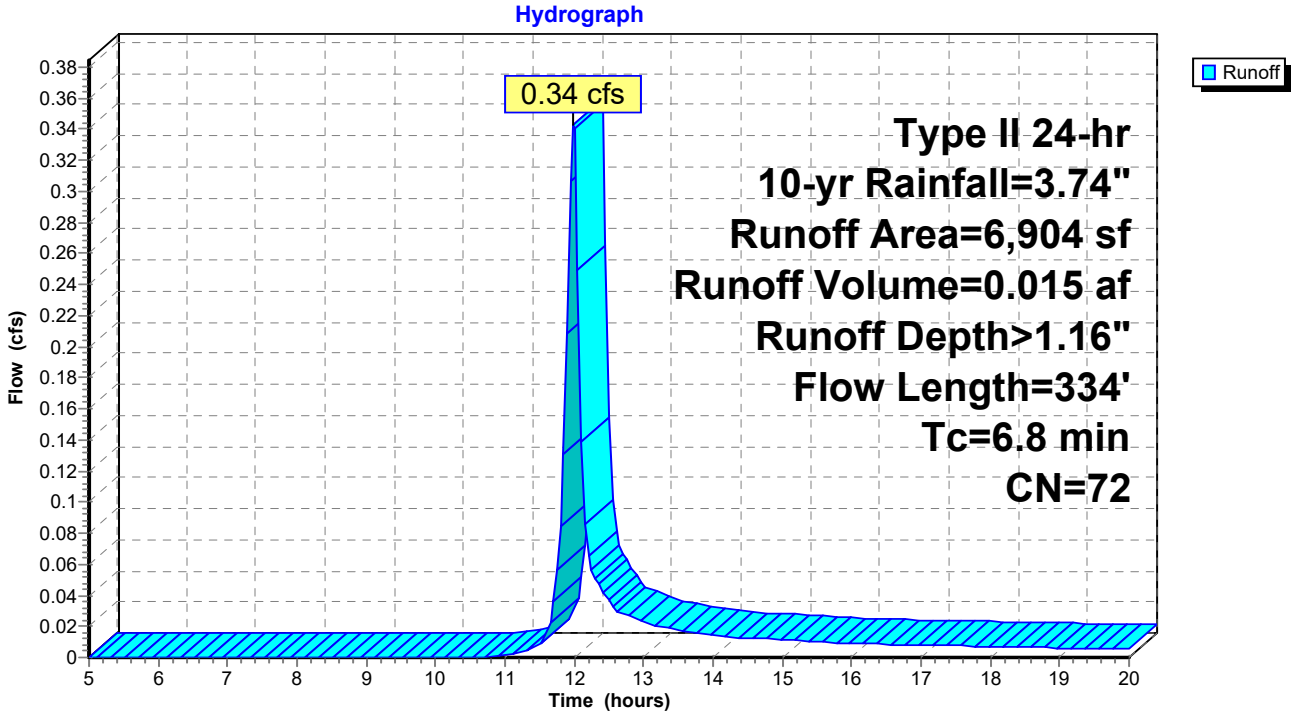
Runoff = 0.34 cfs @ 11.99 hrs, Volume= 0.015 af, Depth> 1.16"

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
	863	36	Woods, Fair, HSG A
	1,869	73	Woods, Fair, HSG C
	2,587	71	Meadow, non-grazed, HSG C
	487	78	Meadow, non-grazed, HSG D
*	1,098	98	Impervious
	6,904	72	Weighted Average
	5,806		84.10% Pervious Area
	1,098		15.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	100	0.0780	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.5	234	0.2860	8.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.8	334	Total			

Subcatchment 7S: DA - Reach C



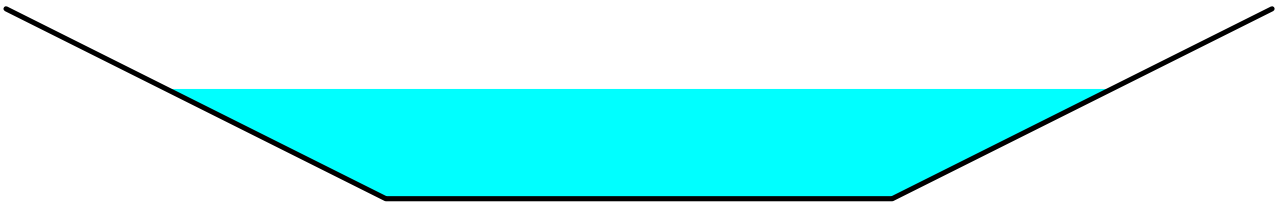
Summary for Reach 2R: S4A-T5 - Reach A

Inflow Area = 7.820 ac, 36.68% Impervious, Inflow Depth > 2.07" for 10-yr event
Inflow = 24.21 cfs @ 12.02 hrs, Volume= 1.349 af
Outflow = 23.79 cfs @ 12.03 hrs, Volume= 1.348 af, Atten= 2%, Lag= 0.9 min

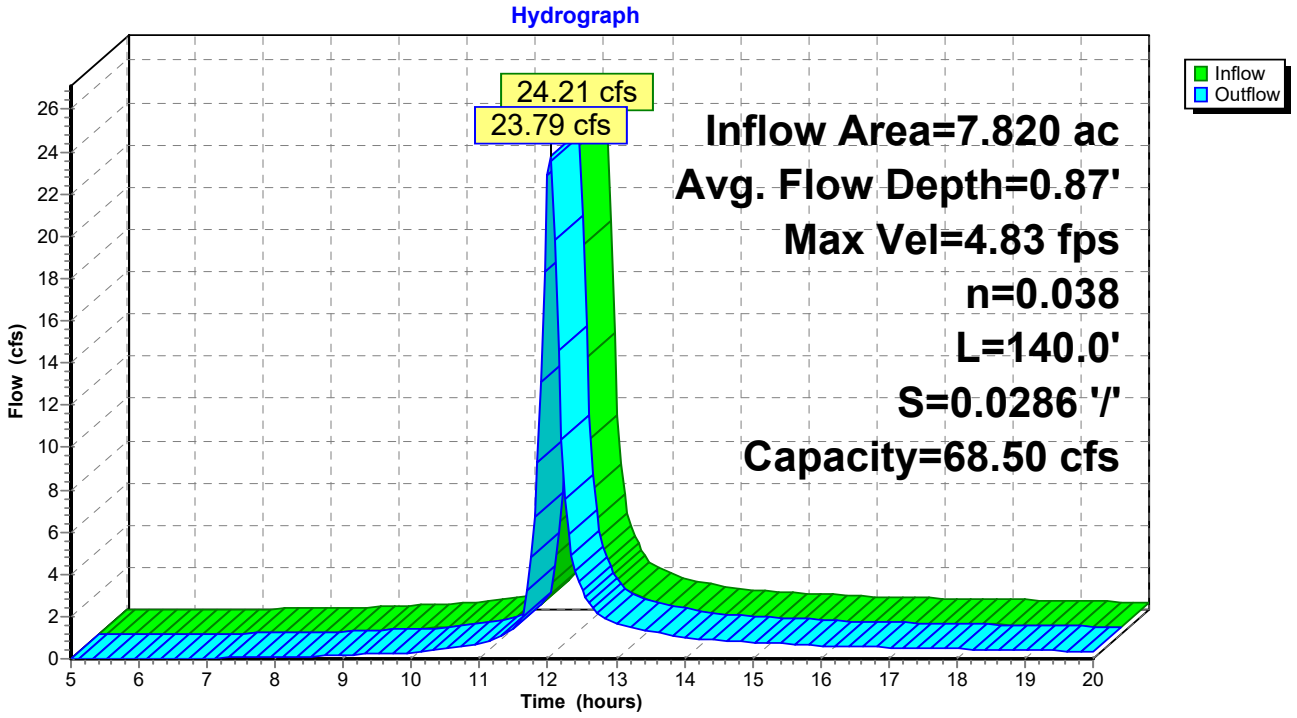
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.83 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 1.7 min

Peak Storage= 695 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.87'
Bank-Full Depth= 1.50' Flow Area= 10.5 sf, Capacity= 68.50 cfs

4.00' x 1.50' deep channel, n= 0.038
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 140.0' Slope= 0.0286 '/'
Inlet Invert= 810.00', Outlet Invert= 806.00'



Reach 2R: S4A-T5 - Reach A



Summary for Reach 3R: S4A-T5 - Reach B

Inflow Area = 8.149 ac, 35.40% Impervious, Inflow Depth > 2.02" for 10-yr event
Inflow = 24.19 cfs @ 12.03 hrs, Volume= 1.372 af
Outflow = 24.08 cfs @ 12.04 hrs, Volume= 1.372 af, Atten= 0%, Lag= 0.3 min

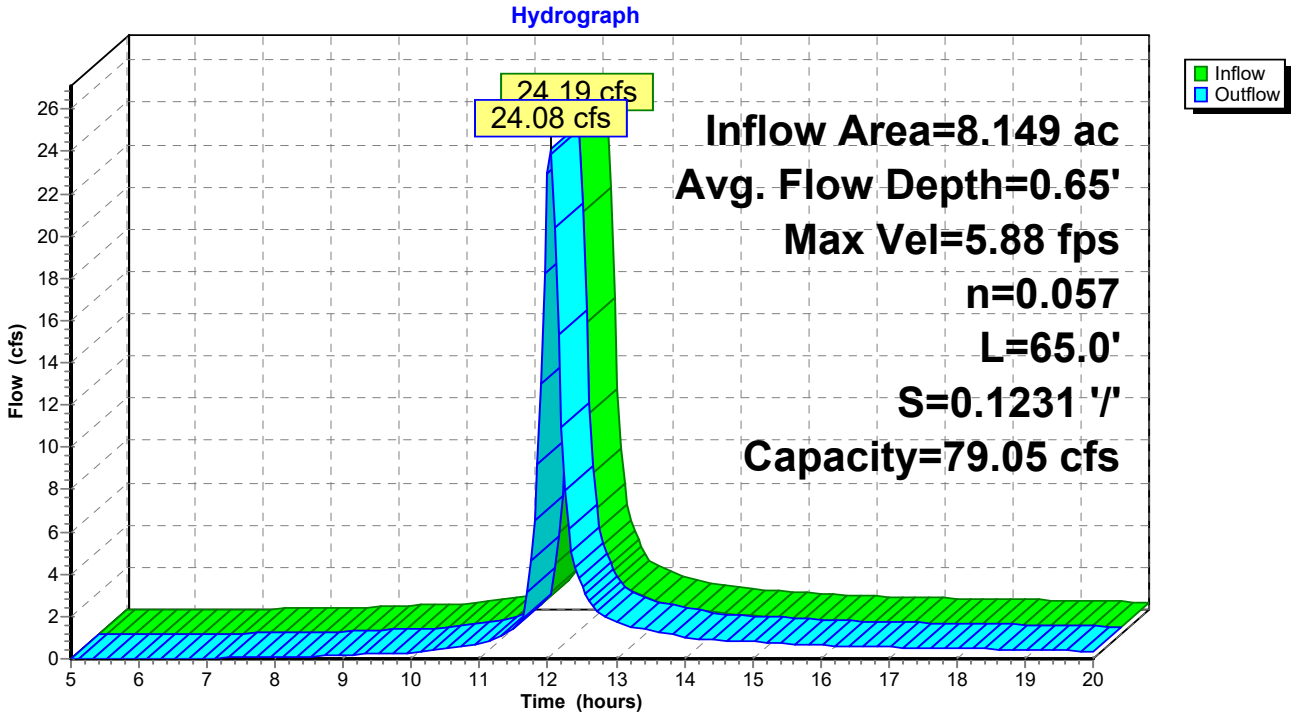
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.88 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.56 fps, Avg. Travel Time= 0.7 min

Peak Storage= 267 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 1.25' Flow Area= 9.4 sf, Capacity= 79.05 cfs

5.00' x 1.25' deep channel, n= 0.057
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 65.0' Slope= 0.1231 '/'
Inlet Invert= 806.00', Outlet Invert= 798.00'

‡

Reach 3R: S4A-T5 - Reach B



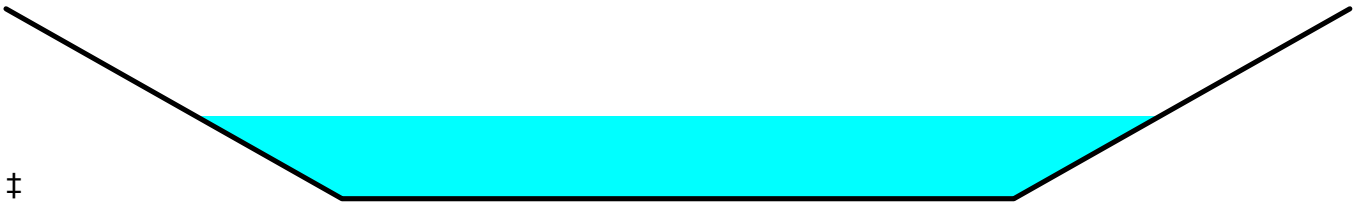
Summary for Reach 4R: S4A-T5 - Reach C

Inflow Area = 8.307 ac, 35.03% Impervious, Inflow Depth > 2.00" for 10-yr event
Inflow = 24.36 cfs @ 12.03 hrs, Volume= 1.387 af
Outflow = 24.34 cfs @ 12.04 hrs, Volume= 1.387 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.32 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 0.1 min

Peak Storage= 50 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 1.25' Flow Area= 9.4 sf, Capacity= 108.73 cfs

5.00' x 1.25' deep channel, n= 0.061
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 15.0' Slope= 0.2667 '/'
Inlet Invert= 798.00', Outlet Invert= 794.00'



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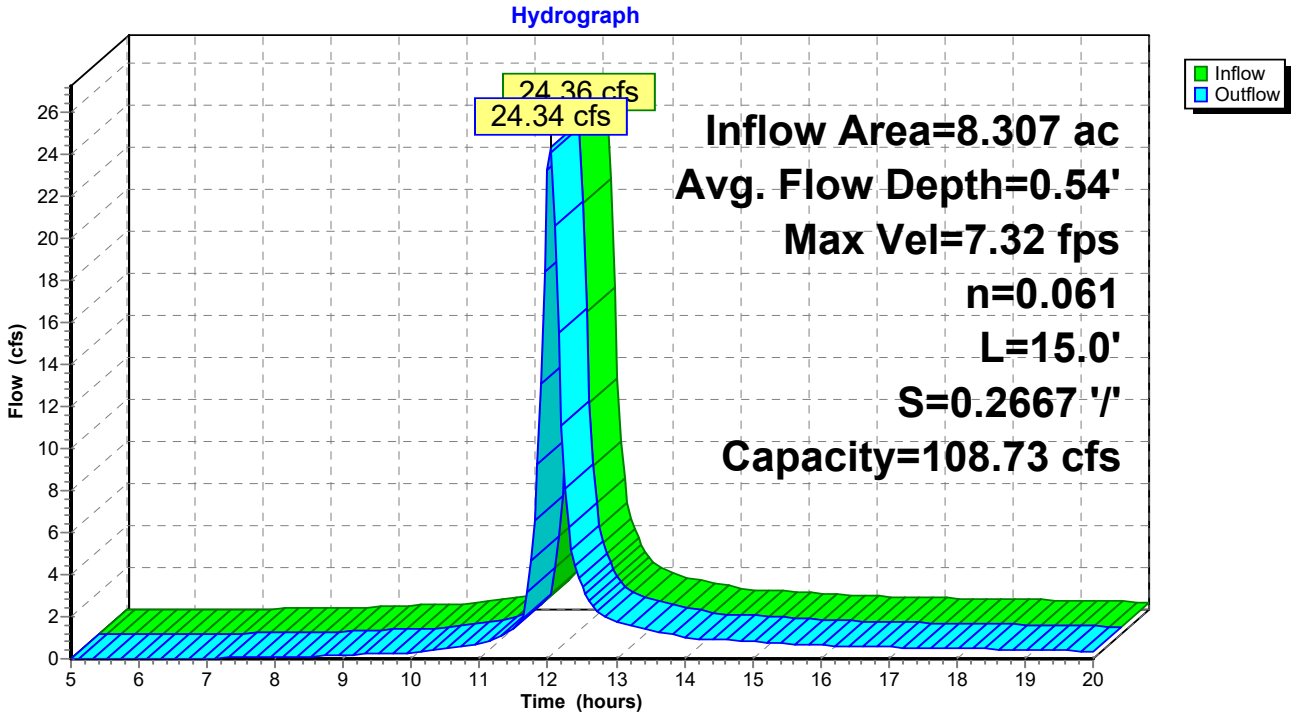
Reach 4R: S4A-T5 - Reach C



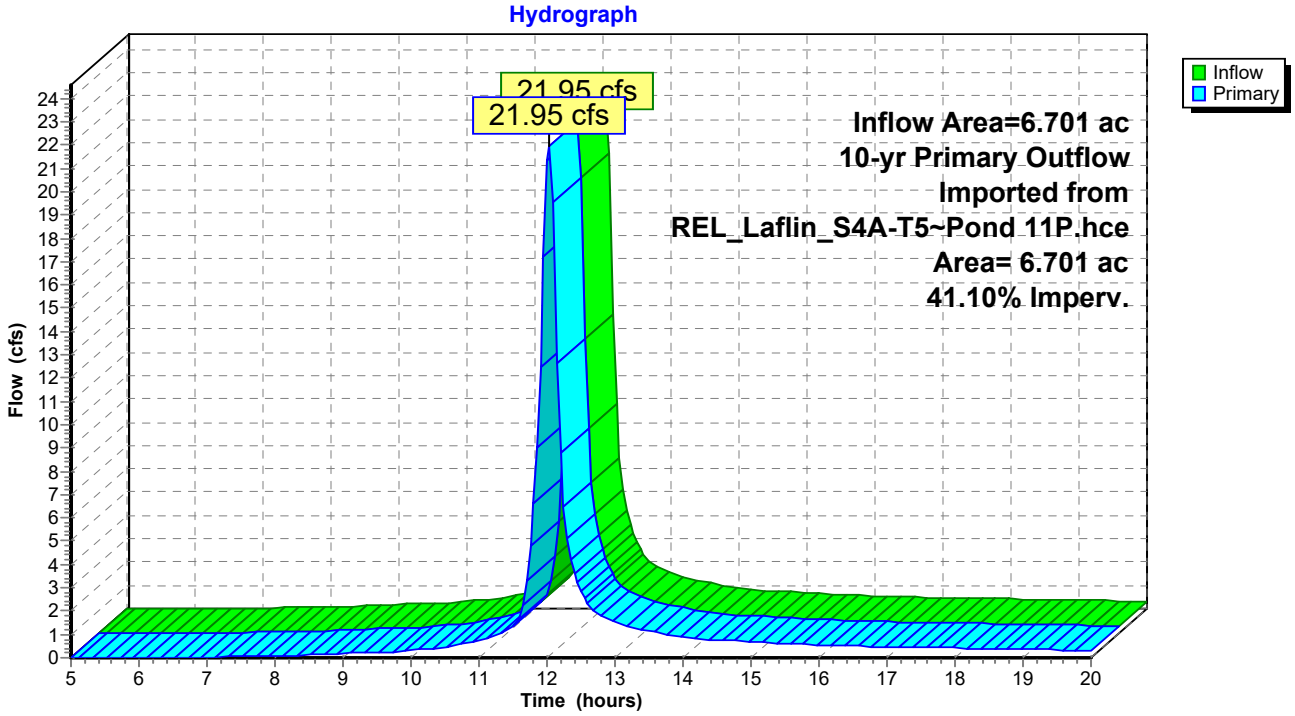
Summary for Link 1L: S4A-T5 Link

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
Primary = 21.95 cfs @ 12.03 hrs, Volume= 1.230 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

10-yr Primary Outflow Imported from REL_Laflin_S4A-T5~Pond 11P.hce

Link 1L: S4A-T5 Link



Channel Design
S6-T5 and S5-T5

Waterway Description	Channel Slope ft/ft	Lining Type	Manning's "n"	Control Criteria (1) Velocity <fps	Control Criteria (1) Shear Stress <lb/ft²	Base Width ft.	Side Slope x:1	Flow Depth ft.	Flow Area sq. ft.	Wetted Perim. ft.	Hydraulic Radius ft.	Velocity fps	Shear Stress <lb/ft²	Flow cfs	Critical Slope ft/ft	Flow Type (2)	Min. Depth ft	Final Dimensions (ft) Bottom Width	Depth	Side Slopes	Top Width
REACH A	*Required capacity of 0.59 cfs*																				
STA. 0+73 to 0+95	**0.318**	**R-4 Riprap**	**0.0636**	**9.0**	**2.00**	**4**	**2**	**0.50**	**2.500**	**6.236**	**0.401**	**7.2**	**0.5**	**17.9**	**0.083**	**Stable**	**1.00**	**4**	**1.00**	**2**	**8.00**
REACH B	*Required capacity of 0.89 cfs*																				
STA. 0+95 to 1+20	**0.320**	**R-4 Riprap**	**0.0636**	**9.0**	**2.00**	**4**	**2**	**0.50**	**2.500**	**6.236**	**0.401**	**7.2**	**0.5**	**18.0**	**0.083**	**Stable**	**1.00**	**4**	**1.00**	**2**	**8.00**
REACH C	*Required capacity of 1.35 cfs*																				
STA. 1+20 to 1+85	**0.162**	**R-4 Riprap**	**0.0636**	**9.0**	**2.00**	**4**	**2**	**0.50**	**2.500**	**6.236**	**0.401**	**5.1**	**0.2**	**12.8**	**0.083**	**Stable**	**1.00**	**4**	**1.00**	**2**	**8.00**
REACH D	*Required capacity of 1.66 cfs*																				
STA. 1+85 to 1+95	**0.250**	**R-4 Riprap**	**0.0636**	**9.0**	**2.00**	**4**	**2**	**0.50**	**2.500**	**6.236**	**0.401**	**6.3**	**0.4**	**15.9**	**0.083**	**Stable**	**1.00**	**4**	**1.00**	**2**	**8.00**
REACH E	*Required capacity of 4.88 cfs*																				
STA. 1+95 to 2+35	**0.450**	**R-4 Riprap**	**0.0636**	**9.0**	**2.00**	**4**	**2**	**0.50**	**2.500**	**6.236**	**0.401**	**8.5**	**0.7**	**21.3**	**0.083**	**Stable**	**1.00**	**4**	**1.00**	**2**	**8.00**
REACH F	*Required capacity of 5.17 cfs*																				
STA. 2+35 to 2+65	**0.200**	**R-4 Riprap**	**0.0636**	**9.0**	**2.00**	**4**	**2**	**0.50**	**2.500**	**6.236**	**0.401**	**5.7**	**0.3**	**14.2**	**0.083**	**Stable**	**1.00**	**4**	**1.00**	**2**	**8.00**
S5-T5	*Required capacity of 2.76 cfs*																				
	0.120	**R-4 Riprap**	**0.0636**	**9.0**	**2.00**	**4**	**2**	**0.50**	**2.500**	**6.236**	**0.401**	**4.4**	**0.2**	**11.0**	**0.083**	**Stable**	**1.00**	**4**	**1.00**	**2**	**8.00**

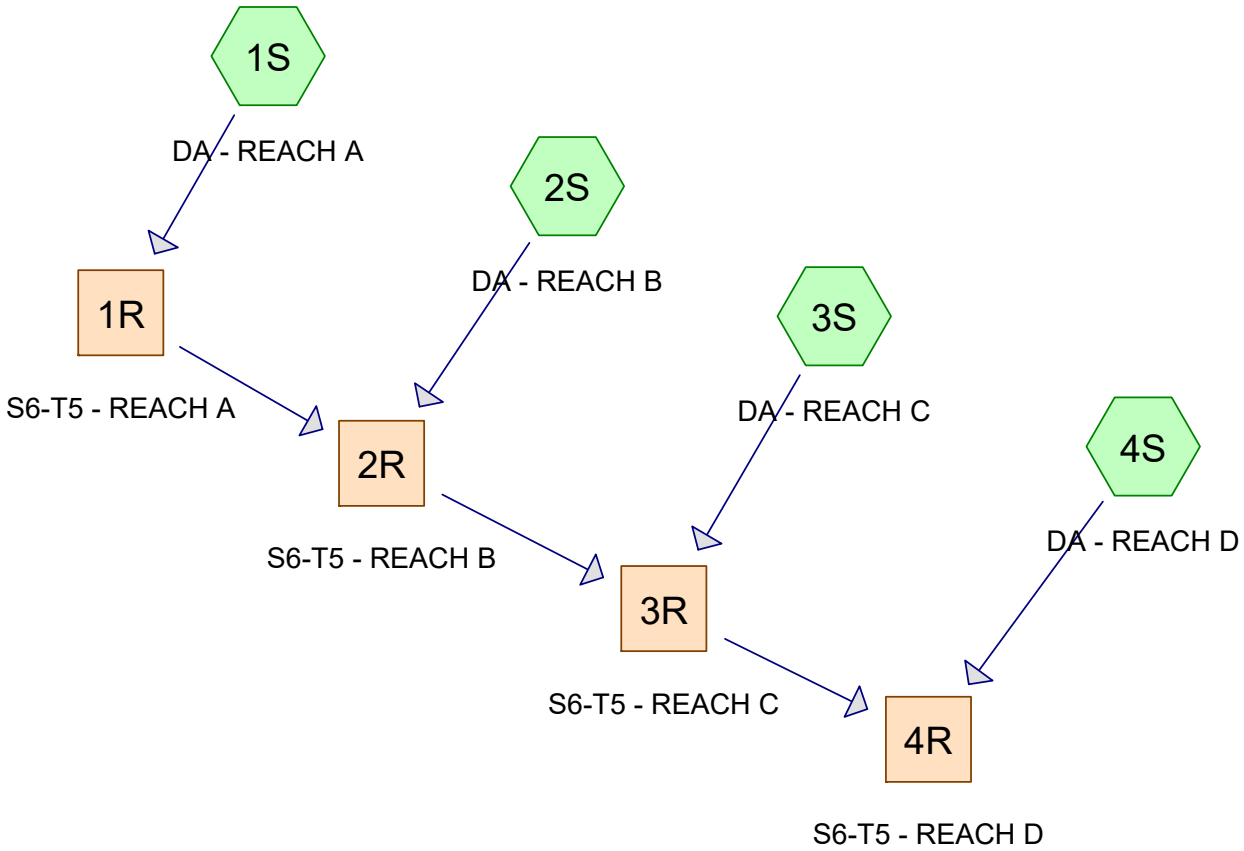
(1) Max Flow Velocity for vegetated channels is from Table 6.4 of the PaDEP E&S Manual requirements.
Max Flow Velocity for RipRap is from Table 6.6 of the PaDEP E&S Manual requirements.
Max Flow Velocity and Permissible Shear Stress for the RipRap is form Tables 6.2 and 6.6 of the PaDEP E&S Manual requirements.

(2) Channels are checked for stable vs. unstable conditions with additional freeboard provided in accordance with the PaDEP E&S Manual requirements

(3) Channel design flows are based off HydroCAD Calcualations

(4) Shear stress calculations assume a 40% void ratio in the riprap on channel bottoms (not side slopes) in accordance with Chapter 6 of the E&S Manual.

		final dimensions			
	Lining	Bottom Width	Depth	Side Slope	Top Width
Reach A	R-4 Riprap	4.00	1.00	2.00	8.00
Reach B	R-4 Riprap	4.00	1.00	2.00	8.00
Reach C	R-4 Riprap	4.00	1.00	2.00	8.00
Reach D	R-4 Riprap	4.00	1.00	2.00	8.00
Reach E	R-4 Riprap	4.00	1.00	2.00	8.00
Reach F	R-4 Riprap	4.00	1.00	2.00	8.00
S5-T5	R-4 Riprap	4.00	1.00	2.00	8.00



Subcat Reach Pond Link

Routing Diagram for REL_Laflin_S6-T5 (Reach A-D)
Prepared by {enter your company name here}, Printed 2/18/2022

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
6,359	98	Impervious (1S, 2S, 3S, 4S)
6,976	71	Meadow, non-grazed, HSG C (1S, 2S, 3S, 4S)
15,301	73	Woods, Fair, HSG C (1S, 2S, 3S, 4S)
28,636	**78**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
22,277	HSG C	1S, 2S, 3S, 4S
0	HSG D	
6,359	Other	1S, 2S, 3S, 4S
28,636		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatc Numbers
0	0	0	0	6,359	6,359	Impervious	
0	0	6,976	0	0	6,976	Meadow, non-grazed	
0	0	15,301	0	0	15,301	Woods, Fair	
0	**0**	**22,277**	**0**	**6,359**	**28,636**	**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 1S: DA - REACH A Runoff Area=11,404 sf 10.74% Impervious Runoff Depth>1.34"
Flow Length=232' Tc=9.5 min CN=75 Runoff=0.59 cfs 1,274 cf

Subcatchment 2S: DA - REACH B Runoff Area=4,018 sf 44.97% Impervious Runoff Depth>1.98"
Flow Length=260' Tc=9.6 min CN=84 Runoff=0.30 cfs 664 cf

Subcatchment 3S: DA - REACH C Runoff Area=7,611 sf 23.69% Impervious Runoff Depth>1.61"
Flow Length=307' Tc=9.7 min CN=79 Runoff=0.47 cfs 1,020 cf

Subcatchment 4S: DA - REACH D Runoff Area=5,603 sf 27.20% Impervious Runoff Depth>1.61"
Flow Length=295' Tc=9.7 min CN=79 Runoff=0.35 cfs 751 cf

Reach 1R: S6-T5 - REACH A Avg. Flow Depth=0.07' Max Vel=2.08 fps Inflow=0.59 cfs 1,274 cf
n=0.064 L=23.0' S=0.3043 '/' Capacity=61.06 cfs Outflow=0.59 cfs 1,273 cf

Reach 2R: S6-T5 - REACH B Avg. Flow Depth=0.08' Max Vel=2.56 fps Inflow=0.89 cfs 1,937 cf
n=0.064 L=22.0' S=0.3636 '/' Capacity=66.75 cfs Outflow=0.88 cfs 1,937 cf

Reach 3R: S6-T5 - REACH C Avg. Flow Depth=0.14' Max Vel=2.24 fps Inflow=1.35 cfs 2,957 cf
n=0.064 L=72.0' S=0.1458 '/' Capacity=42.27 cfs Outflow=1.32 cfs 2,953 cf

Reach 4R: S6-T5 - REACH D Avg. Flow Depth=0.10' Max Vel=3.84 fps Inflow=1.66 cfs 3,704 cf
n=0.064 L=4.0' S=0.6250 '/' Capacity=87.51 cfs Outflow=1.66 cfs 3,704 cf

Total Runoff Area = 28,636 sf Runoff Volume = 3,709 cf Average Runoff Depth = 1.55"
77.79% Pervious = 22,277 sf 22.21% Impervious = 6,359 sf

Summary for Subcatchment 1S: DA - REACH A

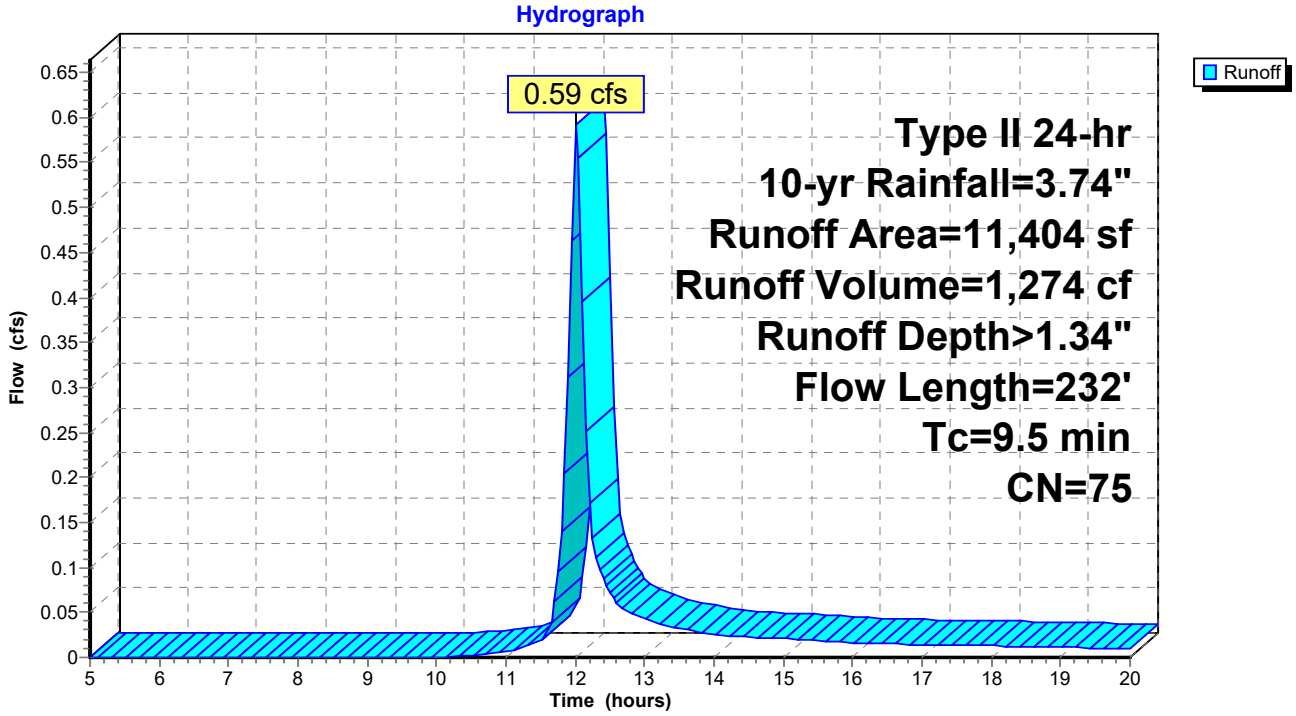
Runoff = 0.59 cfs @ 12.01 hrs, Volume= 1,274 cf, Depth> 1.34"

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 10-yr Rainfall=3.74"

	Area (sf)	CN	Description
	6,877	73	Woods, Fair, HSG C
	3,302	71	Meadow, non-grazed, HSG C
*	1,225	98	Impervious
	11,404	75	Weighted Average
	10,179		89.26% Pervious Area
	1,225		10.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0300	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.2	132	0.3200	9.11		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.5	232	Total			

Subcatchment 1S: DA - REACH A



Summary for Subcatchment 2S: DA - REACH B

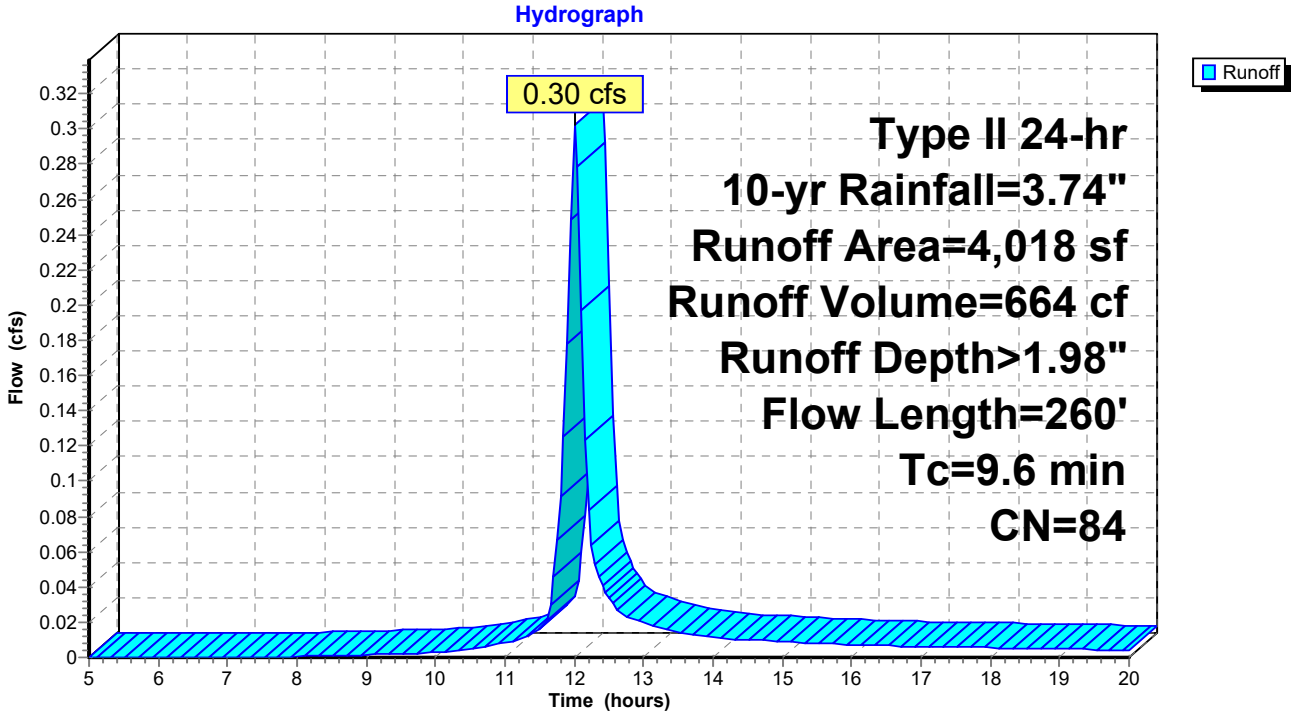
Runoff = 0.30 cfs @ 12.01 hrs, Volume= 664 cf, Depth> 1.98"

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
	1,786	73	Woods, Fair, HSG C
	425	71	Meadow, non-grazed, HSG C
*	1,807	98	Impervious
	4,018	84	Weighted Average
	2,211		55.03% Pervious Area
	1,807		44.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0300	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.3	160	0.3100	8.96		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.6	260	Total			

Subcatchment 2S: DA - REACH B



Summary for Subcatchment 3S: DA - REACH C

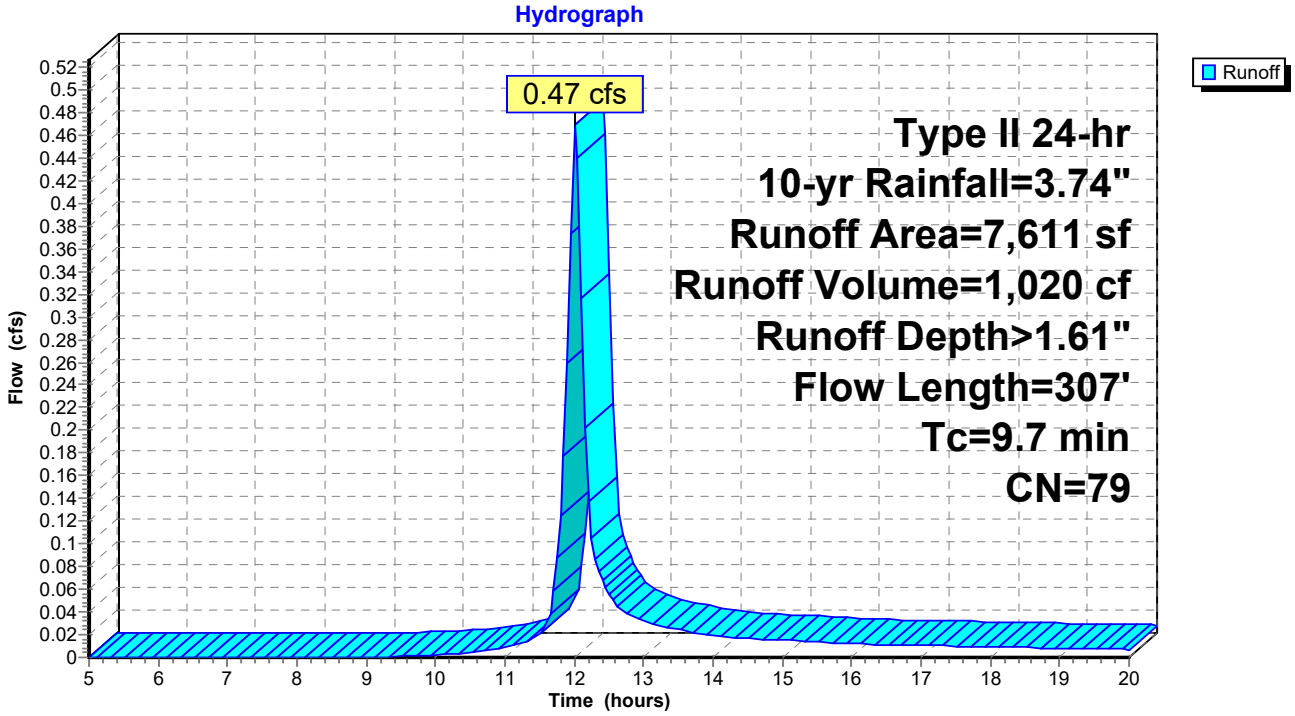
Runoff = 0.47 cfs @ 12.01 hrs, Volume= 1,020 cf, Depth> 1.61"

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
	4,863	73	Woods, Fair, HSG C
	945	71	Meadow, non-grazed, HSG C
*	1,803	98	Impervious
	7,611	79	Weighted Average
	5,808		76.31% Pervious Area
	1,803		23.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0300	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.4	207	0.3100	8.96		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.7	307	Total			

Subcatchment 3S: DA - REACH C



Summary for Subcatchment 4S: DA - REACH D

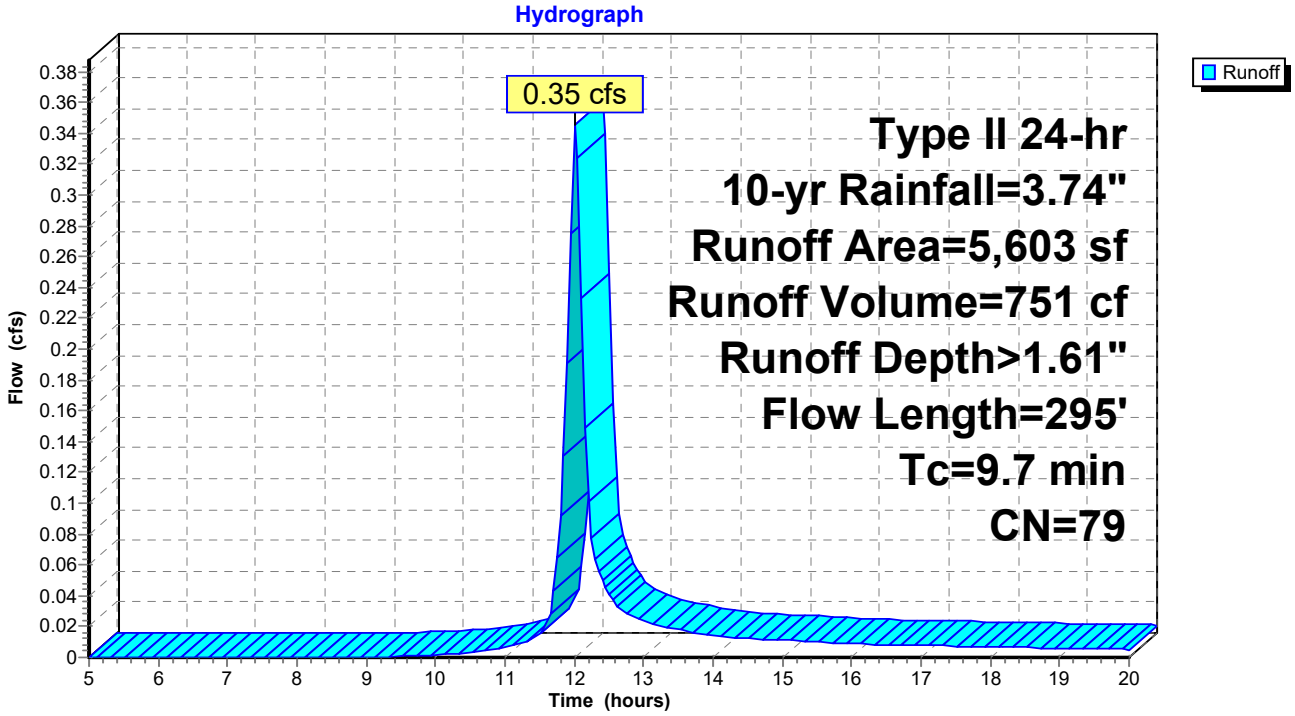
Runoff = 0.35 cfs @ 12.01 hrs, Volume= 751 cf, Depth> 1.61"

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
	1,775	73	Woods, Fair, HSG C
	2,304	71	Meadow, non-grazed, HSG C
*	1,524	98	Impervious
	5,603	79	Weighted Average
	4,079		72.80% Pervious Area
	1,524		27.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0300	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.4	195	0.3000	8.82		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.7	295	Total			

Subcatchment 4S: DA - REACH D



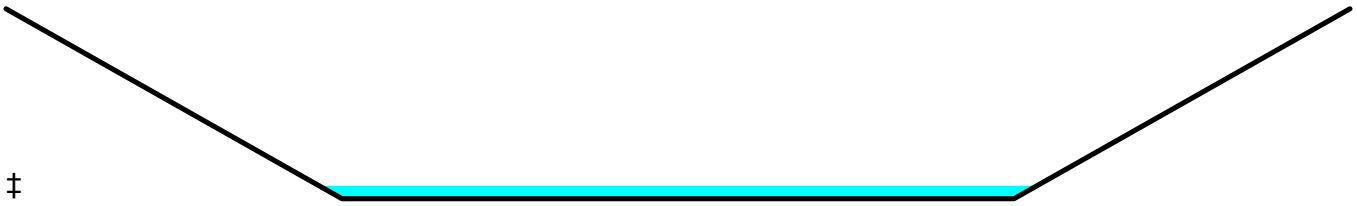
Summary for Reach 1R: S6-T5 - REACH A

Inflow Area = 11,404 sf, 10.74% Impervious, Inflow Depth > 1.34" for 10-yr event
Inflow = 0.59 cfs @ 12.01 hrs, Volume= 1,274 cf
Outflow = 0.59 cfs @ 12.02 hrs, Volume= 1,273 cf, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.08 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 0.6 min

Peak Storage= 7 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 61.06 cfs

4.00' x 1.00' deep channel, n= 0.064
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 23.0' Slope= 0.3043 '/'
Inlet Invert= 796.00', Outlet Invert= 789.00'



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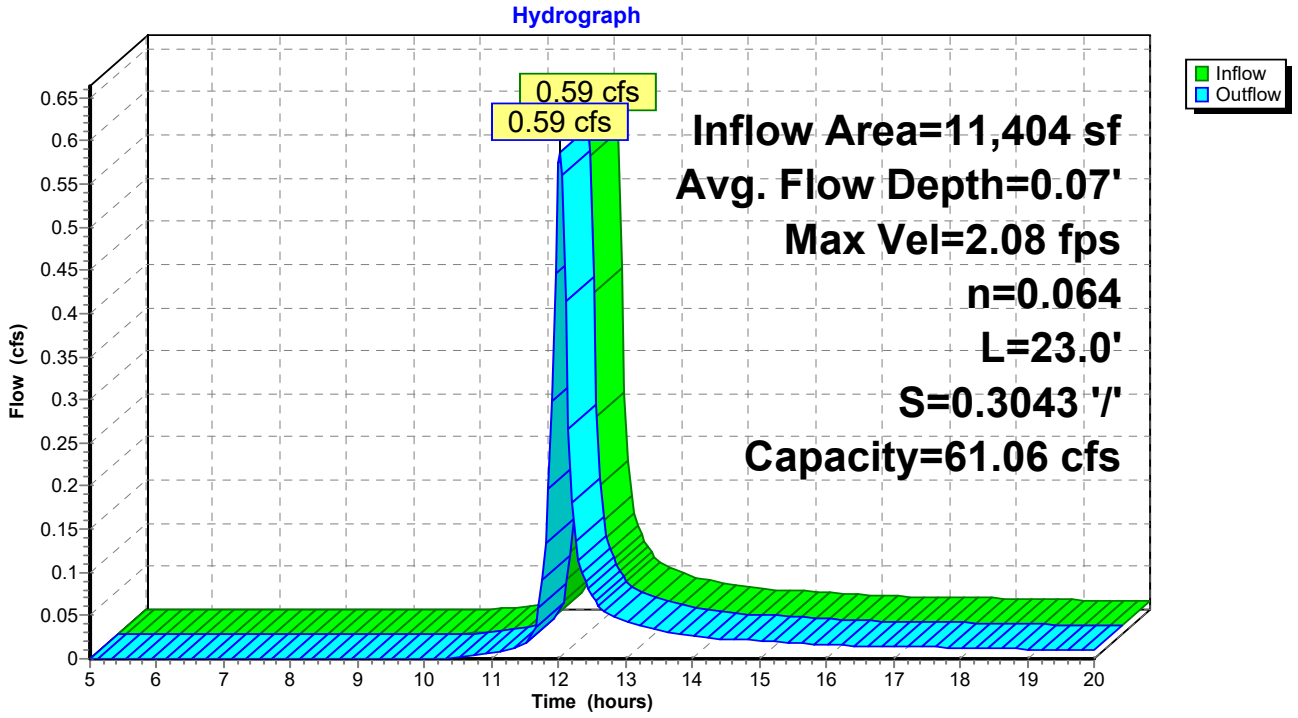
Reach 1R: S6-T5 - REACH A



Summary for Reach 2R: S6-T5 - REACH B

Inflow Area = 15,422 sf, 19.66% Impervious, Inflow Depth > 1.51" for 10-yr event
Inflow = 0.89 cfs @ 12.02 hrs, Volume= 1,937 cf
Outflow = 0.88 cfs @ 12.02 hrs, Volume= 1,937 cf, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.56 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 0.5 min

Peak Storage= 8 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 66.75 cfs

4.00' x 1.00' deep channel, n= 0.064
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 22.0' Slope= 0.3636 '/'
Inlet Invert= 789.00', Outlet Invert= 781.00'

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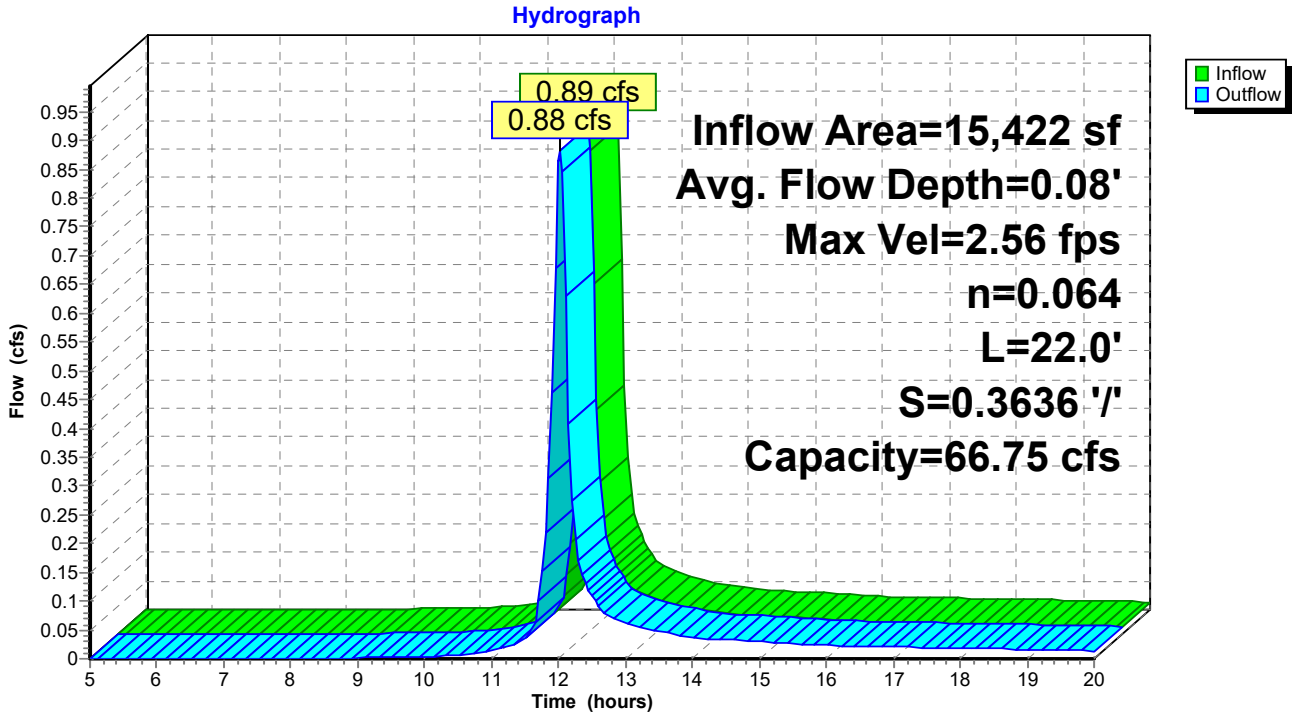
Reach 2R: S6-T5 - REACH B



Summary for Reach 3R: S6-T5 - REACH C

Inflow Area = 23,033 sf, 20.99% Impervious, Inflow Depth > 1.54" for 10-yr event
Inflow = 1.35 cfs @ 12.02 hrs, Volume= 2,957 cf
Outflow = 1.32 cfs @ 12.03 hrs, Volume= 2,953 cf, Atten= 2%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.24 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 2.0 min

Peak Storage= 43 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 42.27 cfs

4.00' x 1.00' deep channel, n= 0.064
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 72.0' Slope= 0.1458 '/'
Inlet Invert= 781.00', Outlet Invert= 770.50'

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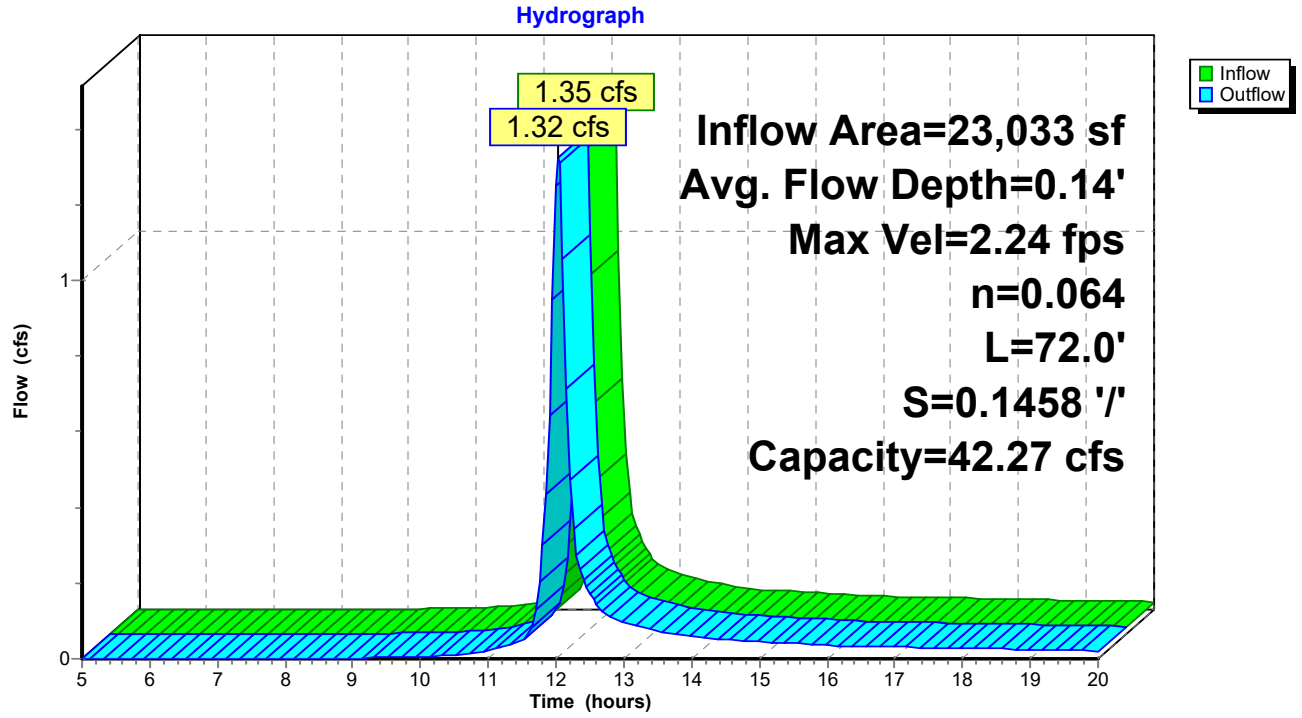
Reach 3R: S6-T5 - REACH C



Summary for Reach 4R: S6-T5 - REACH D

Inflow Area = 28,636 sf, 22.21% Impervious, Inflow Depth > 1.55" for 10-yr event
Inflow = 1.66 cfs @ 12.03 hrs, Volume= 3,704 cf
Outflow = 1.66 cfs @ 12.03 hrs, Volume= 3,704 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.84 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.08 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 87.51 cfs

4.00' x 1.00' deep channel, n= 0.064
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 4.0' Slope= 0.6250 '/'
Inlet Invert= 770.50', Outlet Invert= 768.00'

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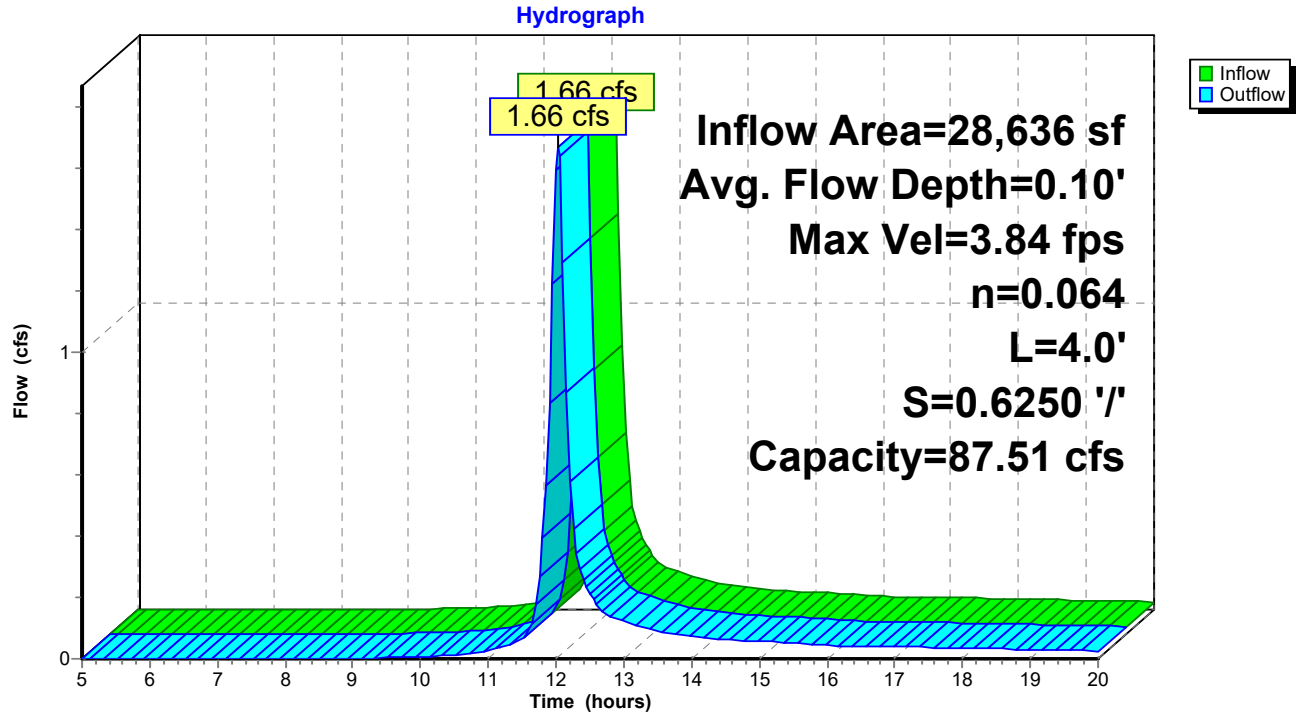
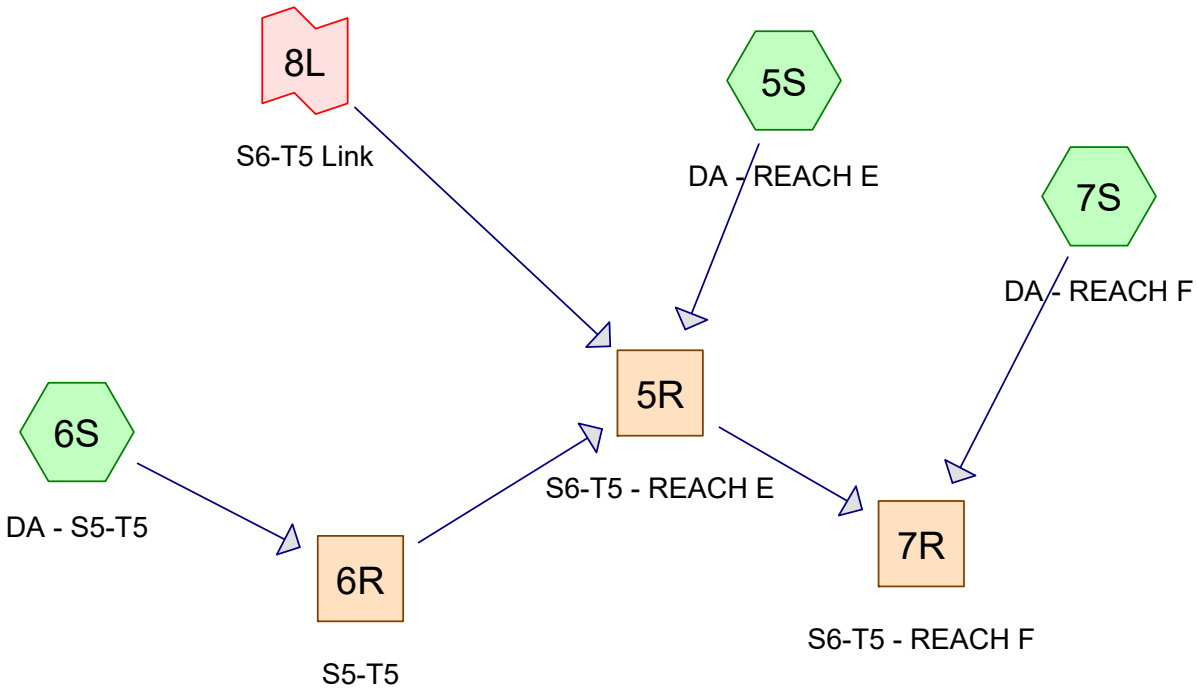
Reach 4R: S6-T5 - REACH D





Subcat Reach Pond Link

Routing Diagram for REL_Laflin_S6-T5 (Reach E-F) AND S5-T5
Prepared by {enter your company name here}, Printed 2/18/2022

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,327	98	Impervious (5S, 6S, 7S)
41,356	71	Meadow, non-grazed, HSG C (5S, 6S, 7S)
3,162	78	Meadow, non-grazed, HSG D (6S)
21,654	73	Woods, Fair, HSG C (5S, 6S, 7S)
1,109	79	Woods, Fair, HSG D (6S)
71,608	**74**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
63,010	HSG C	5S, 6S, 7S
4,271	HSG D	6S
4,327	Other	5S, 6S, 7S
71,608		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatc Numbers
0	0	0	0	4,327	4,327	Impervious	
0	0	41,356	3,162	0	44,518	Meadow, non-grazed	
0	0	21,654	1,109	0	22,763	Woods, Fair	
0	**0**	**63,010**	**4,271**	**4,327**	**71,608**	**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 5S: DA - REACH E Runoff Area=12,174 sf 2.21% Impervious Runoff Depth>1.22"
Flow Length=391' Tc=9.3 min CN=73 Runoff=0.58 cfs 1,234 cf

Subcatchment 6S: DA - S5-T5 Runoff Area=49,978 sf 6.60% Impervious Runoff Depth>1.28"
Flow Length=356' Tc=6.6 min CN=74 Runoff=2.76 cfs 5,328 cf

Subcatchment 7S: DA - REACH F Runoff Area=9,456 sf 8.04% Impervious Runoff Depth>1.27"
Flow Length=557' Tc=15.5 min CN=74 Runoff=0.38 cfs 1,004 cf

Reach 5R: S6-T5 - REACH E Avg. Flow Depth=0.22' Max Vel=5.08 fps Inflow=4.88 cfs 10,263 cf
n=0.064 L=42.0' S=0.4286 '/' Capacity=72.46 cfs Outflow=4.84 cfs 10,260 cf

Reach 6R: S5-T5 Avg. Flow Depth=0.23' Max Vel=2.74 fps Inflow=2.76 cfs 5,328 cf
n=0.064 L=25.0' S=0.1200 '/' Capacity=38.34 cfs Outflow=2.74 cfs 5,325 cf

Reach 7R: S6-T5 - REACH F Avg. Flow Depth=0.28' Max Vel=4.03 fps Inflow=5.14 cfs 11,264 cf
n=0.064 L=30.0' S=0.2000 '/' Capacity=49.50 cfs Outflow=5.11 cfs 11,261 cf

Link 8L: 10-yr Outflow Imported from REL_Laflin_S6-T5 (Reach A-D)~Reach 4R.hce Inflow=1.66 cfs 3,704 cf
Area= 28,636 sf 22.21% Imperv. Primary=1.66 cfs 3,704 cf

Total Runoff Area = 71,608 sf Runoff Volume = 7,566 cf Average Runoff Depth = 1.27"
93.96% Pervious = 67,281 sf 6.04% Impervious = 4,327 sf

Summary for Subcatchment 5S: DA - REACH E

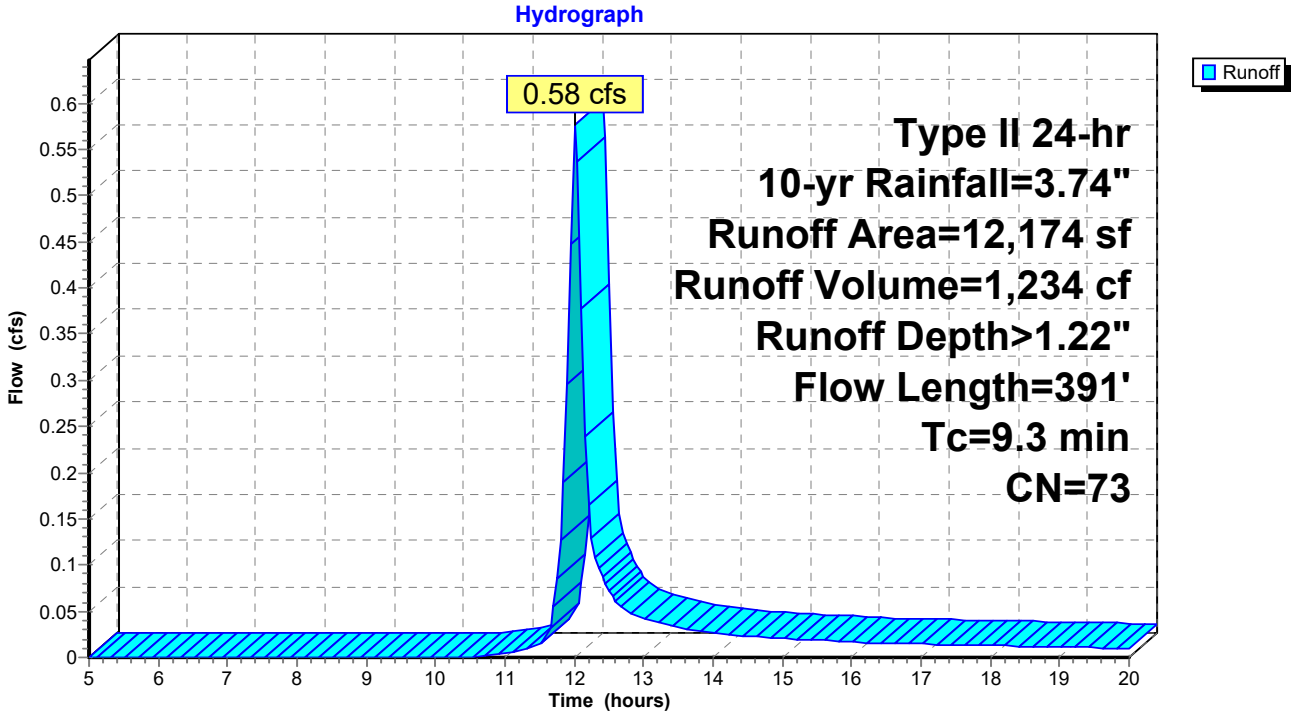
Runoff = 0.58 cfs @ 12.01 hrs, Volume= 1,234 cf, Depth> 1.22"

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
	7,703	73	Woods, Fair, HSG C
	4,202	71	Meadow, non-grazed, HSG C
*	269	98	Impervious
	12,174	73	Weighted Average
	11,905		97.79% Pervious Area
	269		2.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.0350	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.6	291	0.2780	8.49		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.3	391	Total			

Subcatchment 5S: DA - REACH E



Summary for Subcatchment 6S: DA - S5-T5

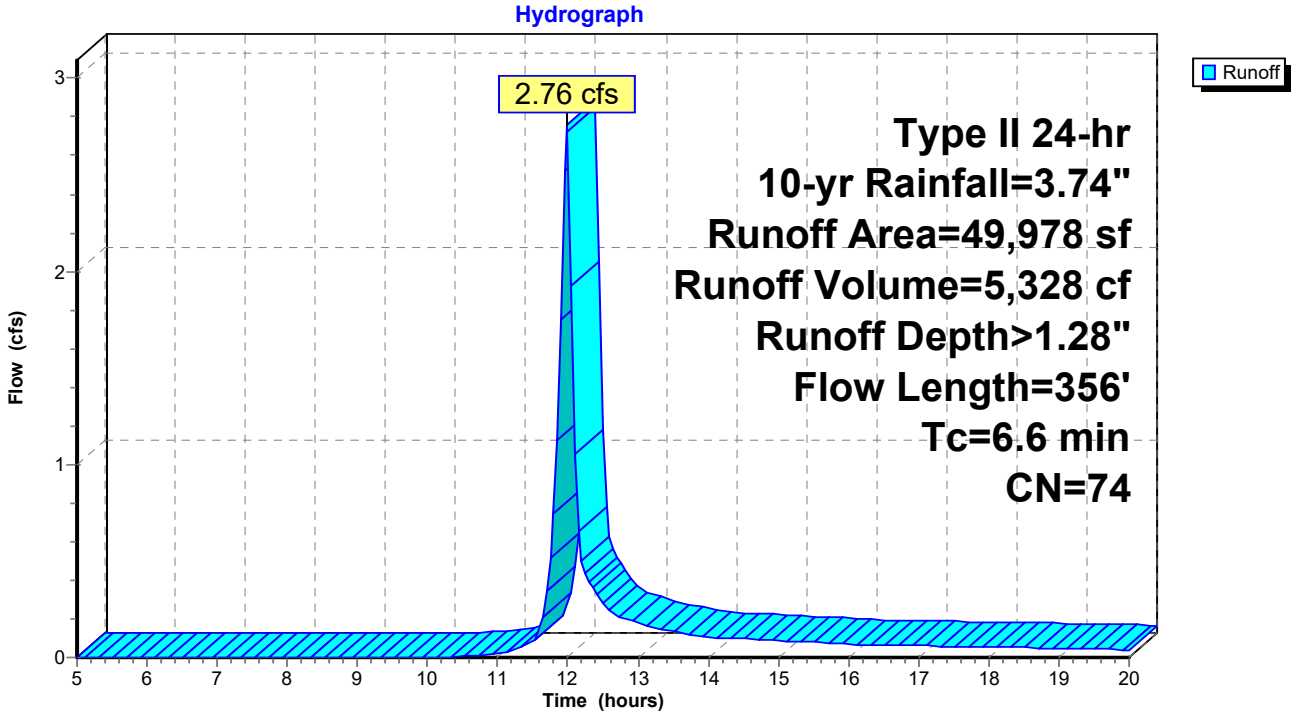
Runoff = 2.76 cfs @ 11.98 hrs, Volume= 5,328 cf, Depth> 1.28"

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
	12,070	73	Woods, Fair, HSG C
	1,109	79	Woods, Fair, HSG D
	30,339	71	Meadow, non-grazed, HSG C
	3,162	78	Meadow, non-grazed, HSG D
*	3,298	98	Impervious
	49,978	74	Weighted Average
	46,680		93.40% Pervious Area
	3,298		6.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	88	0.0680	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
0.6	268	0.2160	7.48		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.6	356	Total			

Subcatchment 6S: DA - S5-T5



Summary for Subcatchment 7S: DA - REACH F

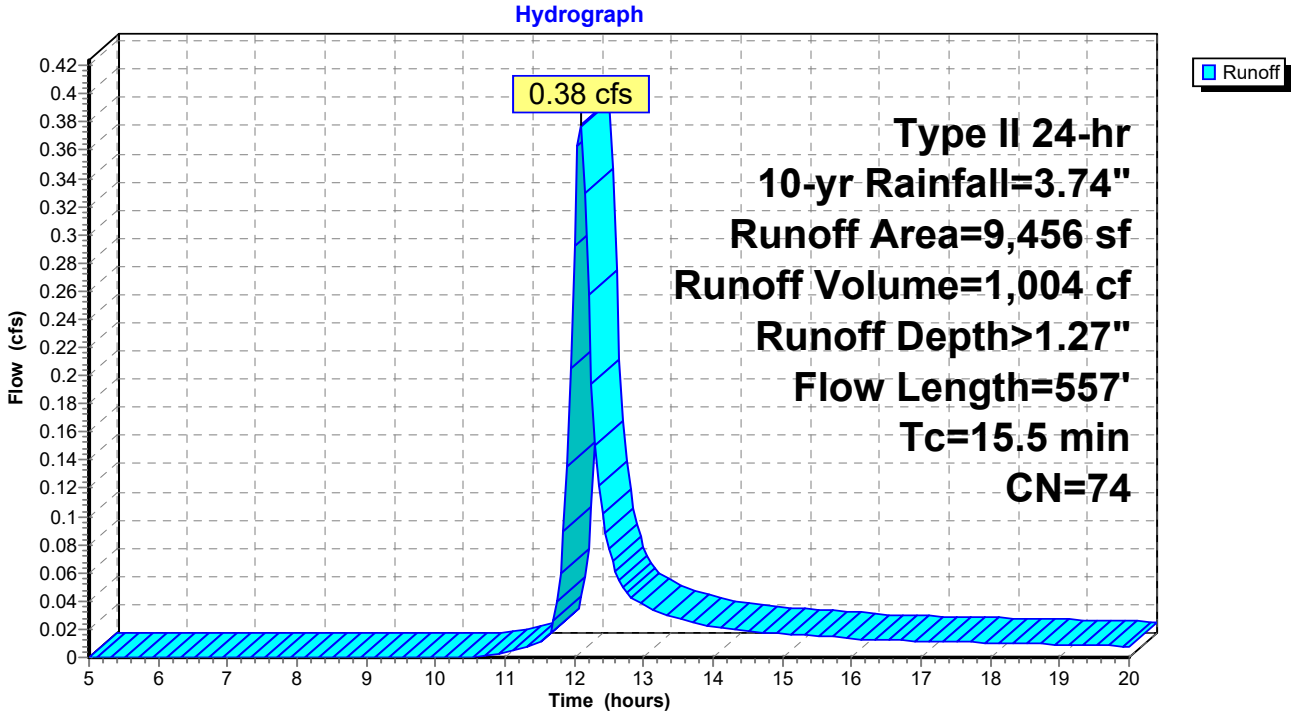
Runoff = 0.38 cfs @ 12.09 hrs, Volume= 1,004 cf, Depth> 1.27"

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
	1,881	73	Woods, Fair, HSG C
	6,815	71	Meadow, non-grazed, HSG C
*	760	98	Impervious
	9,456	74	Weighted Average
	8,696		91.96% Pervious Area
	760		8.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.58"
1.1	457	0.1750	6.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.5	557	Total			

Subcatchment 7S: DA - REACH F



Summary for Reach 5R: S6-T5 - REACH E

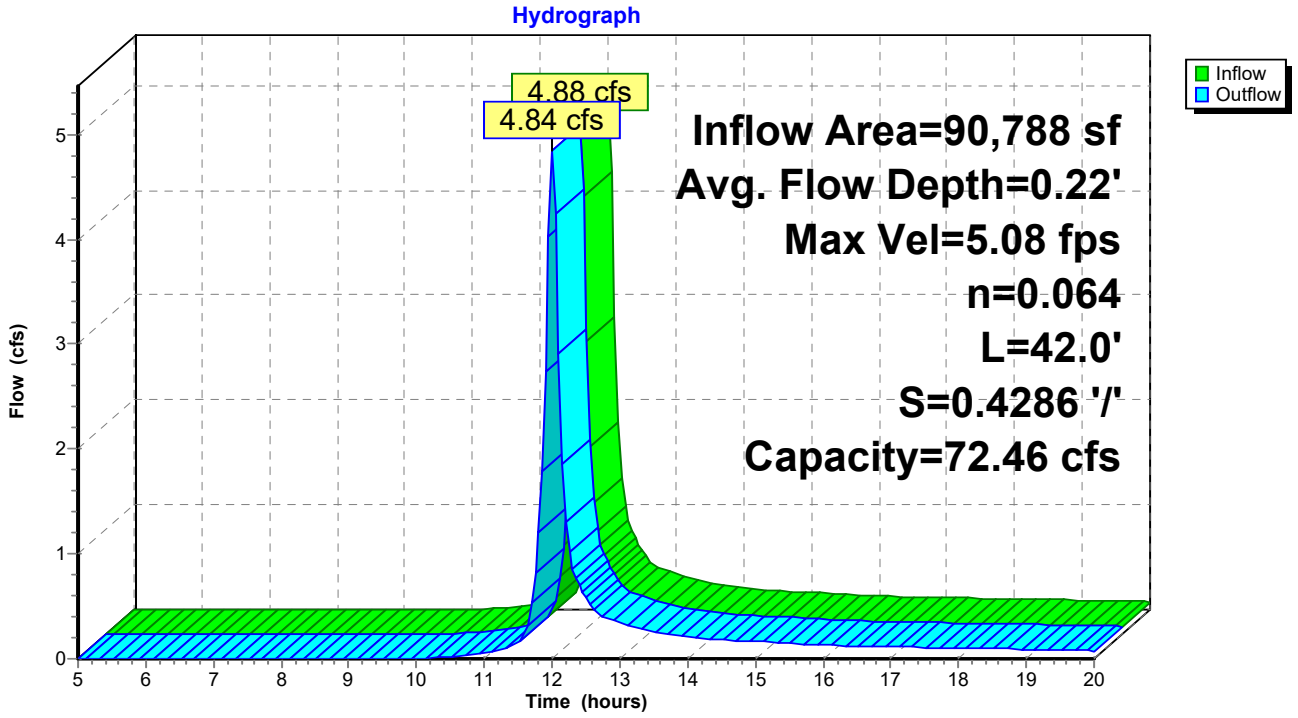
Inflow Area = 90,788 sf, 10.93% Impervious, Inflow Depth > 1.36" for 10-yr event
Inflow = 4.88 cfs @ 12.00 hrs, Volume= 10,263 cf
Outflow = 4.84 cfs @ 12.00 hrs, Volume= 10,260 cf, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.08 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.31 fps, Avg. Travel Time= 0.5 min

Peak Storage= 40 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 72.46 cfs

4.00' x 1.00' deep channel, n= 0.064
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 42.0' Slope= 0.4286 '/'
Inlet Invert= 768.00', Outlet Invert= 750.00'

‡



Summary for Reach 6R: S5-T5

Inflow Area = 49,978 sf, 6.60% Impervious, Inflow Depth > 1.28" for 10-yr event
Inflow = 2.76 cfs @ 11.98 hrs, Volume= 5,328 cf
Outflow = 2.74 cfs @ 11.99 hrs, Volume= 5,325 cf, Atten= 1%, Lag= 0.2 min

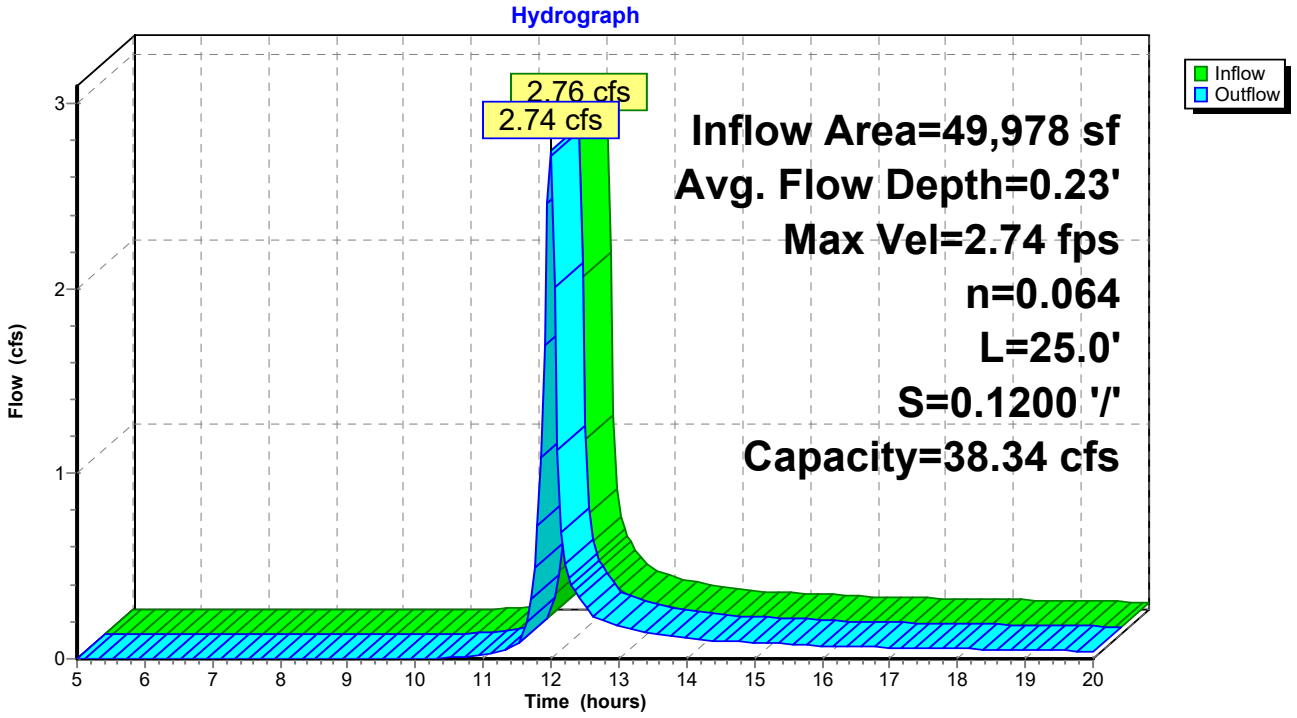
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.74 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 0.5 min

Peak Storage= 25 cf @ 11.99 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 38.34 cfs

4.00' x 1.00' deep channel, n= 0.064
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 25.0' Slope= 0.1200 '/'
Inlet Invert= 776.00', Outlet Invert= 773.00'

‡

Reach 6R: S5-T5



Summary for Reach 7R: S6-T5 - REACH F

Inflow Area = 100,244 sf, 10.66% Impervious, Inflow Depth > 1.35" for 10-yr event
Inflow = 5.14 cfs @ 12.01 hrs, Volume= 11,264 cf
Outflow = 5.11 cfs @ 12.01 hrs, Volume= 11,261 cf, Atten= 1%, Lag= 0.2 min

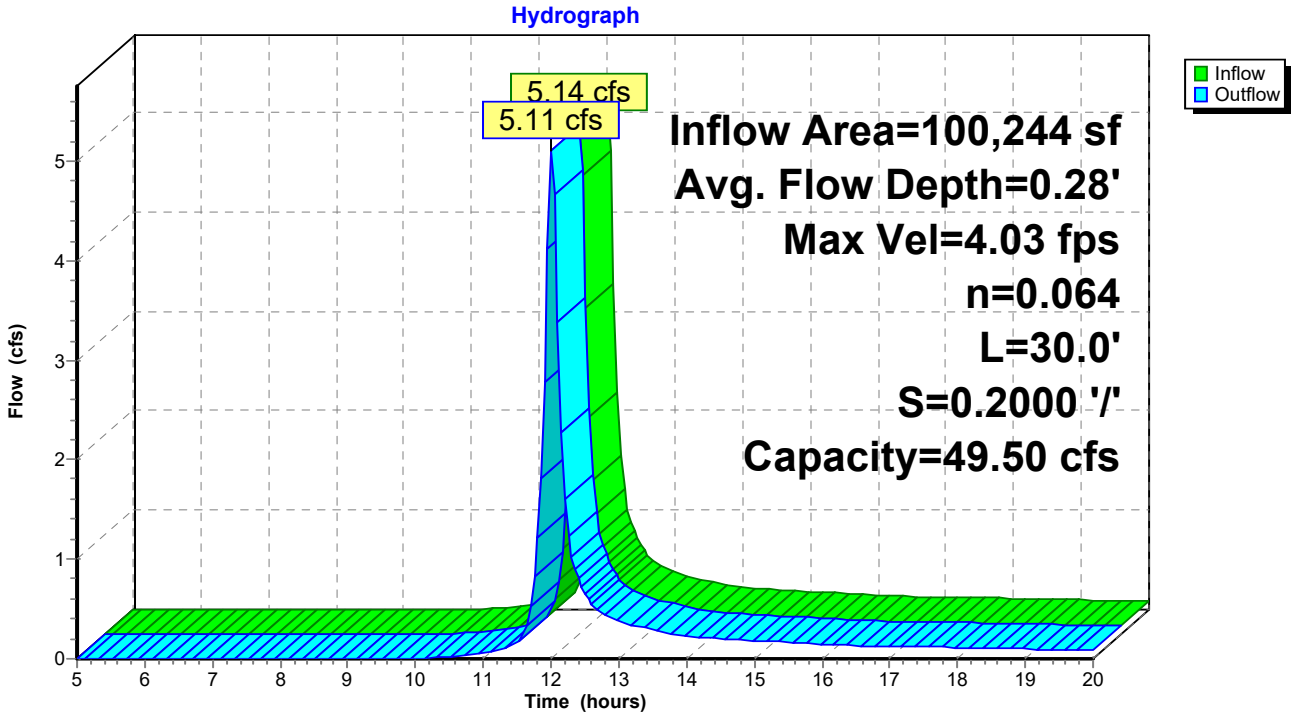
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.03 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.05 fps, Avg. Travel Time= 0.5 min

Peak Storage= 38 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 6.0 sf, Capacity= 49.50 cfs

4.00' x 1.00' deep channel, n= 0.064
Side Slope Z-value= 2.0 '/' Top Width= 8.00'
Length= 30.0' Slope= 0.2000 '/'
Inlet Invert= 750.00', Outlet Invert= 744.00'

‡

Reach 7R: S6-T5 - REACH F



Summary for Link 8L: S6-T5 Link

Inflow Area = 28,636 sf, 22.21% Impervious, Inflow Depth > 1.55" for 10-yr event
Inflow = 1.66 cfs @ 12.03 hrs, Volume= 3,704 cf
Primary = 1.66 cfs @ 12.03 hrs, Volume= 3,704 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

10-yr Outflow Imported from REL_Laflin_S6-T5 (Reach A-D)~Reach 4R.hce

Link 8L: S6-T5 Link