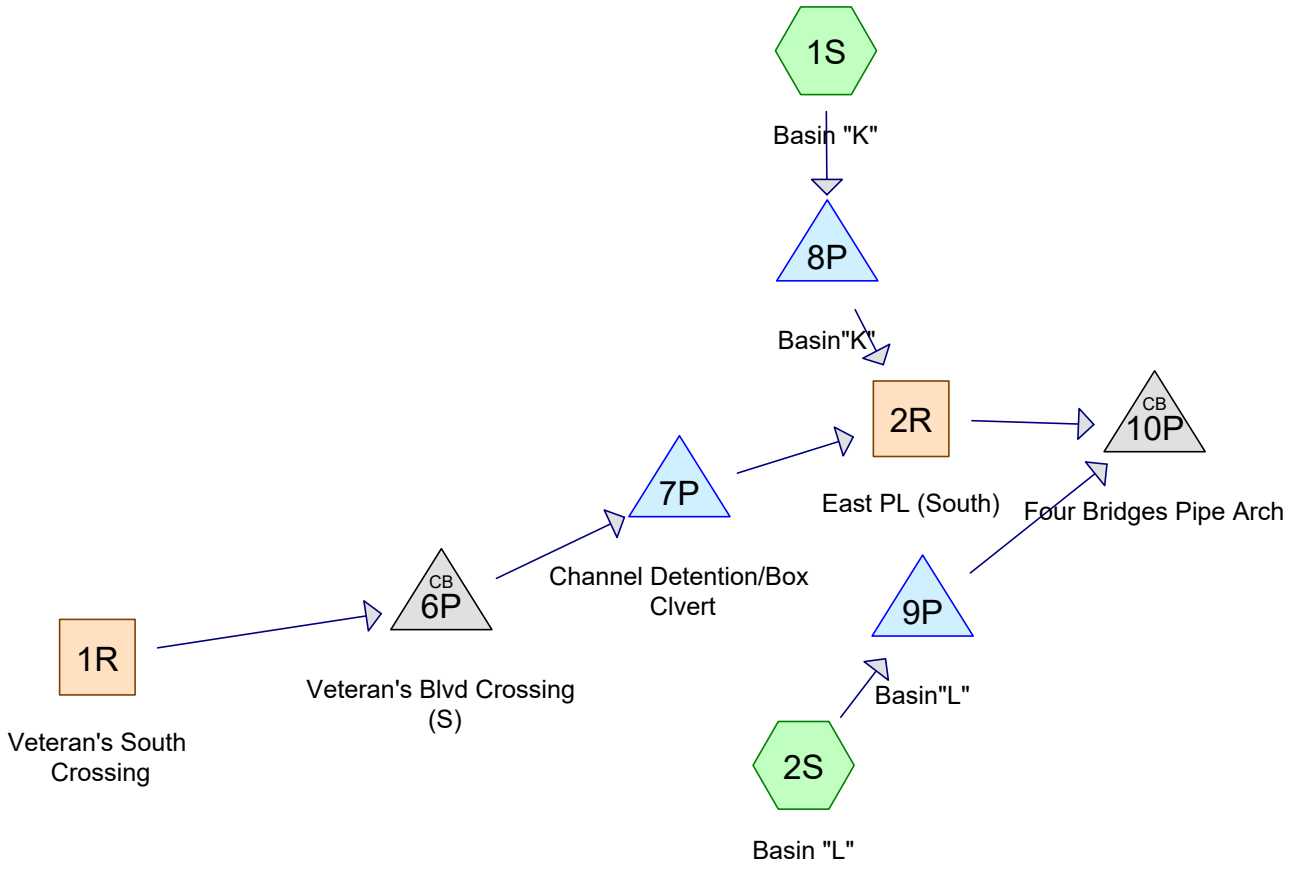


Subcat Reach Pond Link

Routing Diagram for Culvert SE_rational
Prepared by HP Inc., Printed 10/20/2021
HydroCAD® 10.00-26 s/n 10100 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Basin "K"

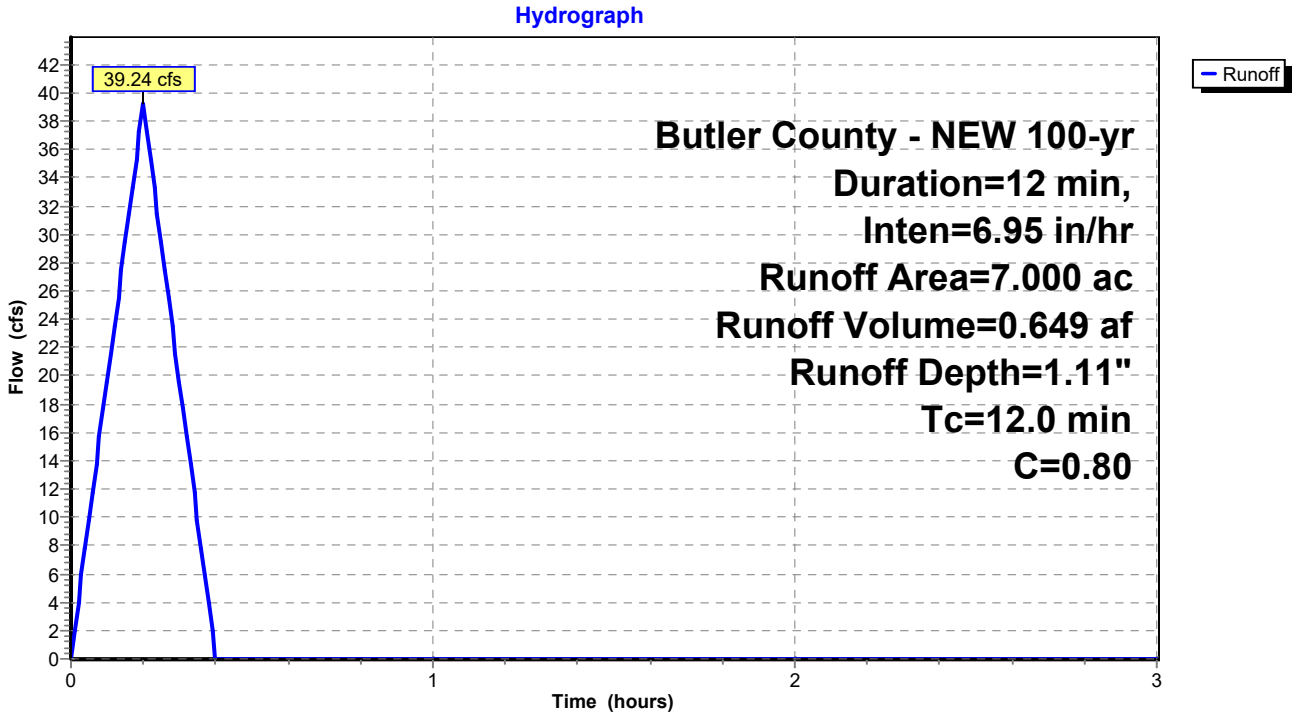
Runoff = 39.24 cfs @ 0.20 hrs, Volume= 0.649 af, Depth= 1.11"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Butler County - NEW 100-yr Duration=12 min, Inten=6.95 in/hr

Area (ac)	C	Description
7.000	0.80	
7.000		100.00% Pervious Area

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

Subcatchment 1S: Basin "K"



Summary for Subcatchment 2S: Basin "L"

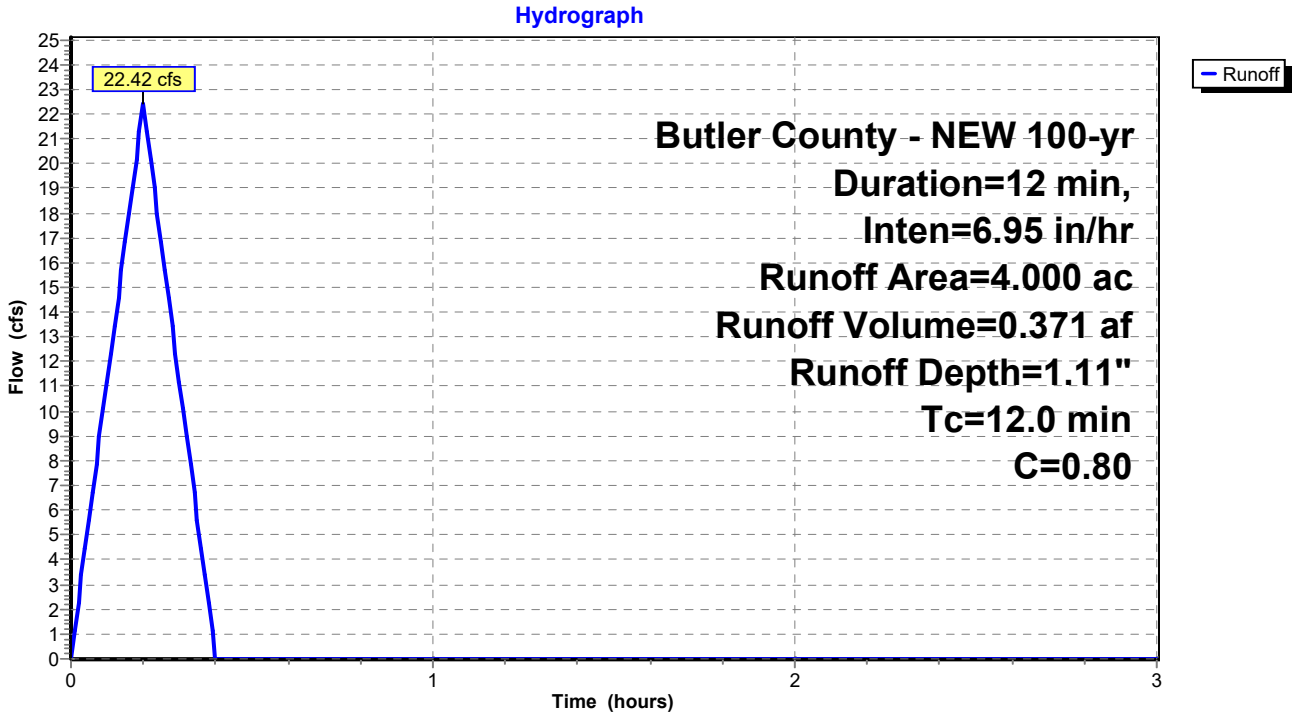
Runoff = 22.42 cfs @ 0.20 hrs, Volume= 0.371 af, Depth= 1.11"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Butler County - NEW 100-yr Duration=12 min, Inten=6.95 in/hr

Area (ac)	C	Description
4.000	0.80	
4.000		100.00% Pervious Area

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

Subcatchment 2S: Basin "L"



Summary for Reach 1R: Veteran's South Crossing

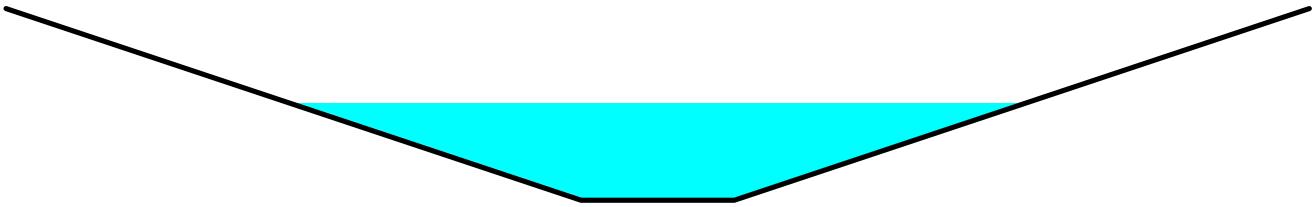
[80] Warning: Exceeded Pond 32P by 0.50' @ 0.00 hrs (10.68 cfs 0.017 af)

Inflow	=	141.14 cfs @	0.01 hrs, Volume=	35.110 af
Outflow	=	141.14 cfs @	0.40 hrs, Volume=	34.930 af, Atten= 0%, Lag= 23.4 min

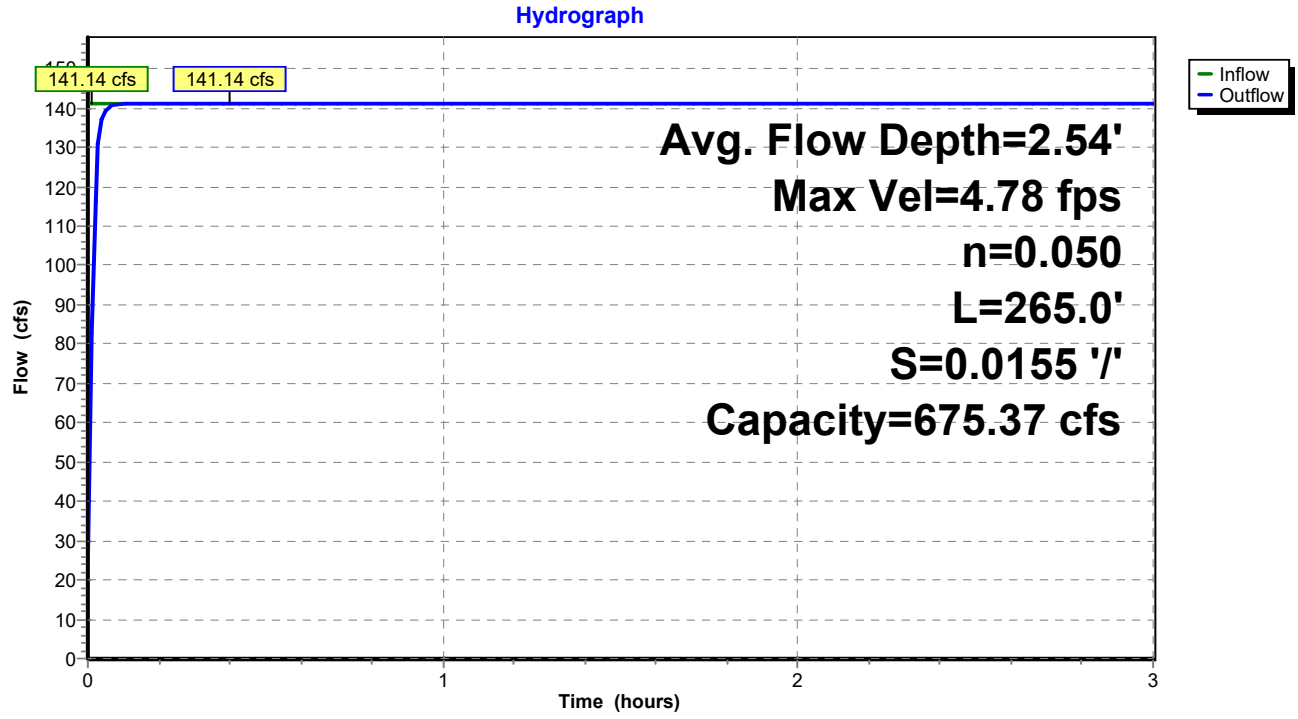
Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.78 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.77 fps, Avg. Travel Time= 0.9 min

Peak Storage= 7,822 cf @ 0.40 hrs
Average Depth at Peak Storage= 2.54'
Bank-Full Depth= 5.00' Flow Area= 95.0 sf, Capacity= 675.37 cfs

4.00' x 5.00' deep channel, n= 0.050
Side Slope Z-value= 3.0 '/' Top Width= 34.00'
Length= 265.0' Slope= 0.0155 '/'
Inlet Invert= 872.50', Outlet Invert= 868.40'



Reach 1R: Veteran's South Crossing



Stage-Discharge for Reach 1R: Veteran's South Crossing

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
872.50	0.00	0.00
872.55	0.49	0.10
872.60	0.76	0.33
872.65	0.97	0.65
872.70	1.16	1.06
872.75	1.32	1.56
872.80	1.46	2.15
872.85	1.60	2.83
872.90	1.72	3.59
872.95	1.84	4.43
873.00	1.95	5.37
873.05	2.06	6.40
873.10	2.16	7.51
873.15	2.26	8.73
873.20	2.35	10.03
873.25	2.44	11.44
873.30	2.53	12.94
873.35	2.61	14.54
873.40	2.69	16.25
873.45	2.77	18.06
873.50	2.85	19.97
873.55	2.93	22.00
873.60	3.00	24.13
873.65	3.08	26.38
873.70	3.15	28.74
873.75	3.22	31.21
873.80	3.29	33.81
873.85	3.36	36.52
873.90	3.43	39.36
873.95	3.50	42.32
874.00	3.56	45.40
874.05	3.63	48.61
874.10	3.69	51.95
874.15	3.75	55.43
874.20	3.82	59.03
874.25	3.88	62.77
874.30	3.94	66.65
874.35	4.00	70.66
874.40	4.06	74.81
874.45	4.12	79.11
874.50	4.18	83.55
874.55	4.24	88.13
874.60	4.29	92.87
874.65	4.35	97.75
874.70	4.41	102.78
874.75	4.46	107.96
874.80	4.52	113.30
874.85	4.57	118.80
874.90	4.63	124.45
874.95	4.68	130.26
875.00	4.74	136.23
875.05	4.79	142.36
875.10	4.85	148.66
875.15	4.90	155.13
875.20	4.95	161.76
875.25	5.00	168.56
875.30	5.06	175.53
875.35	5.11	182.68
875.40	5.16	190.00
875.45	5.21	197.49
875.50	5.26	205.17
875.55	5.31	213.02
875.60	5.36	221.05
875.65	5.41	229.26
875.70	5.46	237.66
875.75	5.51	246.25
875.80	5.56	255.02
875.85	5.61	263.98
875.90	5.66	273.13
875.95	5.71	282.47
876.00	5.75	292.00
876.05	5.80	301.73
876.10	5.85	311.66
876.15	5.90	321.78
876.20	5.94	332.10
876.25	5.99	342.63
876.30	6.04	353.35
876.35	6.08	364.28
876.40	6.13	375.42
876.45	6.18	386.76
876.50	6.22	398.31
876.55	6.27	410.07
876.60	6.32	422.05
876.65	6.36	434.23
876.70	6.41	446.63
876.75	6.45	459.25
876.80	6.50	472.08
876.85	6.54	485.13
876.90	6.59	498.40
876.95	6.63	511.90
877.00	6.67	525.61
877.05	6.72	539.55
877.10	6.76	553.72
877.15	6.81	568.11
877.20	6.85	582.74
877.25	6.89	597.59
877.30	6.94	612.68
877.35	6.98	628.00
877.40	7.02	643.55
877.45	7.07	659.34
877.50	**7.11**	**675.37**

Summary for Reach 2R: East PL (South)

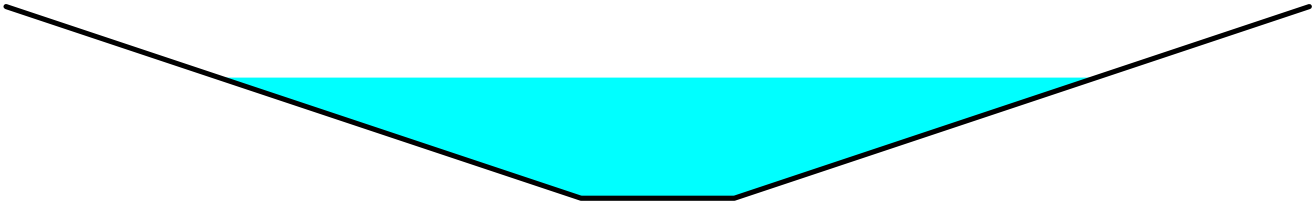
[80] Warning: Exceeded Pond 8P by 1.74' @ 0.07 hrs (0.31 cfs 0.032 af)

Inflow Area = 7.000 ac, 0.00% Impervious, Inflow Depth > 59.64" for 100-yr event
Inflow = 145.77 cfs @ 0.39 hrs, Volume= 34.788 af
Outflow = 145.73 cfs @ 0.40 hrs, Volume= 34.571 af, Atten= 0%, Lag= 0.9 min

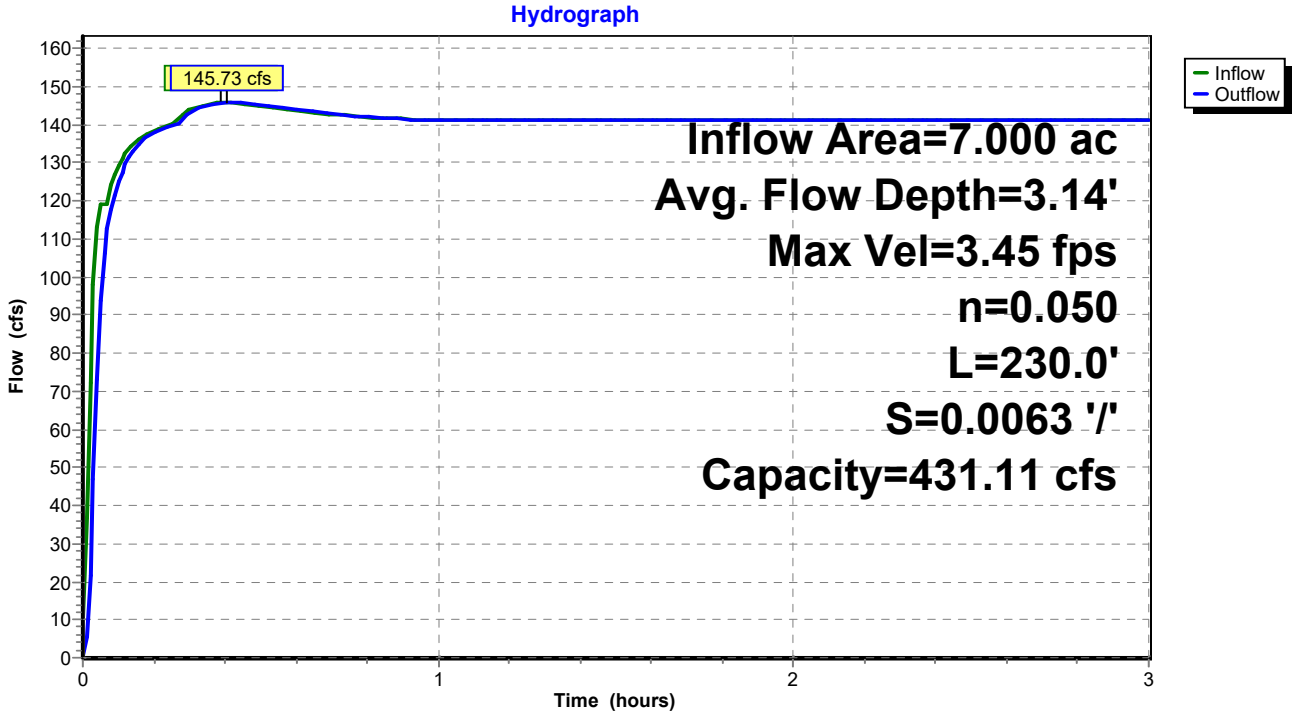
Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.45 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 3.40 fps, Avg. Travel Time= 1.1 min

Peak Storage= 9,714 cf @ 0.40 hrs
Average Depth at Peak Storage= 3.14'
Bank-Full Depth= 5.00' Flow Area= 95.0 sf, Capacity= 431.11 cfs

4.00' x 5.00' deep channel, n= 0.050
Side Slope Z-value= 3.0 '/' Top Width= 34.00'
Length= 230.0' Slope= 0.0063 '/'
Inlet Invert= 866.15', Outlet Invert= 864.70'



Reach 2R: East PL (South)



Stage-Discharge for Reach 2R: East PL (South)

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
866.15	0.00	0.00
866.20	0.31	0.06
866.25	0.48	0.21
866.30	0.62	0.41
866.35	0.74	0.68
866.40	0.84	1.00
866.45	0.93	1.37
866.50	1.02	1.80
866.55	1.10	2.29
866.60	1.18	2.83
866.65	1.25	3.43
866.70	1.31	4.08
866.75	1.38	4.80
866.80	1.44	5.57
866.85	1.50	6.40
866.90	1.56	7.30
866.95	1.61	8.26
867.00	1.67	9.28
867.05	1.72	10.37
867.10	1.77	11.53
867.15	1.82	12.75
867.20	1.87	14.04
867.25	1.92	15.40
867.30	1.97	16.84
867.35	2.01	18.34
867.40	2.06	19.92
867.45	2.10	21.58
867.50	2.15	23.31
867.55	2.19	25.12
867.60	2.23	27.01
867.65	2.27	28.98
867.70	2.31	31.03
867.75	2.36	33.16
867.80	2.40	35.38
867.85	2.44	37.68
867.90	2.48	40.07
867.95	2.51	42.54
868.00	2.55	45.10
868.05	2.59	47.76
868.10	2.63	50.50
868.15	2.67	53.33
868.20	2.70	56.26
868.25	2.74	59.28
868.30	2.78	62.40
868.35	2.81	65.61
868.40	2.85	68.92
868.45	2.88	72.32
868.50	2.92	75.83
868.55	2.96	79.44
868.60	2.99	83.15
868.65	3.02	86.96
868.70	3.06	90.88
868.75	3.09	94.90
868.80	3.13	99.02
868.85	3.16	103.26
868.90	3.19	107.60
868.95	3.23	112.05
869.00	3.26	116.61
869.05	3.29	121.28
869.10	3.33	126.07
869.15	3.36	130.97
869.20	3.39	135.98
869.25	3.42	141.10
869.30	3.45	146.35
869.35	3.49	151.71
869.40	3.52	157.19
869.45	3.55	162.79
869.50	3.58	168.51
869.55	3.61	174.35
869.60	3.64	180.31
869.65	3.67	186.40
869.70	3.70	192.61
869.75	3.73	198.94
869.80	3.76	205.40
869.85	3.79	211.99
869.90	3.82	218.71
869.95	3.85	225.56
870.00	3.88	232.54
870.05	3.91	239.64
870.10	3.94	246.88
870.15	3.97	254.26
870.20	4.00	261.77
870.25	4.03	269.41
870.30	4.06	277.19
870.35	4.09	285.10
870.40	4.12	293.15
870.45	4.15	301.35
870.50	4.18	309.68
870.55	4.20	318.15
870.60	4.23	326.76
870.65	4.26	335.52
870.70	4.29	344.42
870.75	4.32	353.46
870.80	4.34	362.65
870.85	4.37	371.98
870.90	4.40	381.47
870.95	4.43	391.10
871.00	4.46	400.87
871.05	4.48	410.80
871.10	4.51	420.88
871.15	**4.54**	**431.11**

Summary for Pond 6P: Veteran's Blvd Crossing (S)

[57] Hint: Peaked at 873.05' (Flood elevation advised)
[62] Hint: Exceeded Reach 1R OUTLET depth by 2.11' @ 0.49 hrs

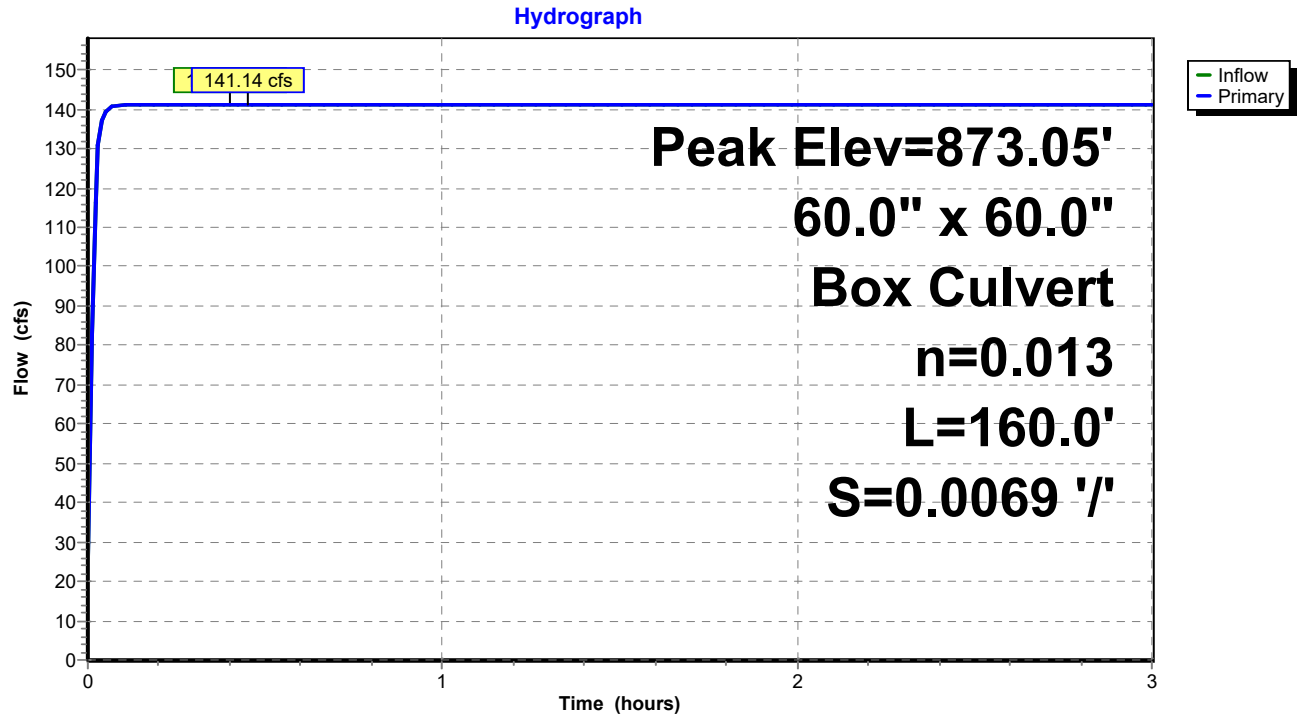
Inflow	=	141.14 cfs @	0.40 hrs,	Volume=	34.930 af
Outflow	=	141.14 cfs @	0.45 hrs,	Volume=	34.930 af, Atten= 0%, Lag= 3.0 min
Primary	=	141.14 cfs @	0.45 hrs,	Volume=	34.930 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 873.05' @ 0.49 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	868.40'	**60.0" W x 60.0" H Box Culvert** L= 160.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 868.40' / 867.30' S= 0.0069 '/' Cc= 0.900 n= 0.013, Flow Area= 25.00 sf

Primary OutFlow Max=141.13 cfs @ 0.45 hrs HW=873.05' TW=870.78' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 141.13 cfs @ 6.07 fps)

Pond 6P: Veteran's Blvd Crossing (S)



Stage-Discharge for Pond 6P: Veteran's Blvd Crossing (S)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
868.40	0.00	870.95	65.36
868.45	0.18	871.00	67.29
868.50	0.51	871.05	69.24
868.55	0.93	871.10	71.21
868.60	1.44	871.15	73.19
868.65	2.01	871.20	75.20
868.70	2.64	871.25	77.22
868.75	3.32	871.30	79.26
868.80	4.06	871.35	81.32
868.85	4.84	871.40	83.40
868.90	5.67	871.45	85.49
868.95	6.55	871.50	87.60
869.00	7.46	871.55	89.64
869.05	8.41	871.60	91.51
869.10	9.40	871.65	93.38
869.15	10.42	871.70	95.27
869.20	11.48	871.75	97.16
869.25	12.58	871.80	99.06
869.30	13.70	871.85	100.98
869.35	14.86	871.90	102.90
869.40	16.05	871.95	104.83
869.45	17.27	872.00	106.77
869.50	18.52	872.05	108.72
869.55	19.79	872.10	110.68
869.60	21.10	872.15	112.65
869.65	22.43	872.20	114.63
869.70	23.79	872.25	116.61
869.75	25.18	872.30	118.61
869.80	26.59	872.35	120.62
869.85	28.02	872.40	122.63
869.90	29.49	872.45	124.65
869.95	30.97	872.50	126.68
870.00	32.48	872.55	128.72
870.05	34.02	872.60	130.77
870.10	35.58	872.65	132.83
870.15	37.16	872.70	134.89
870.20	38.76	872.75	136.97
870.25	40.39	872.80	139.05
870.30	42.03	872.85	141.15
870.35	43.70	872.90	143.25
870.40	45.40	872.95	145.36
870.45	47.11	873.00	147.47
870.50	48.84	873.05	149.60
870.55	50.60	873.10	151.73
870.60	52.37	873.15	153.88
870.65	54.17	873.20	156.03
870.70	55.98	873.25	158.19
870.75	57.82	873.30	160.36
870.80	59.67	873.35	162.53
870.85	61.55	873.40	**164.72**
870.90	63.44		

Summary for Pond 7P: Channel Detention/Box Clvert

[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow	=	141.14 cfs @	0.45 hrs,	Volume=	34.930 af
Outflow	=	141.36 cfs @	0.66 hrs,	Volume=	34.650 af, Atten= 0%, Lag= 12.9 min
Primary	=	141.36 cfs @	0.66 hrs,	Volume=	34.650 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 870.78' @ 0.48 hrs Surf.Area= 7,303 sf Storage= 12,503 cf

Plug-Flow detention time= 1.5 min calculated for 34.529 af (99% of inflow)
Center-of-Mass det. time= 0.7 min (91.2 - 90.5)

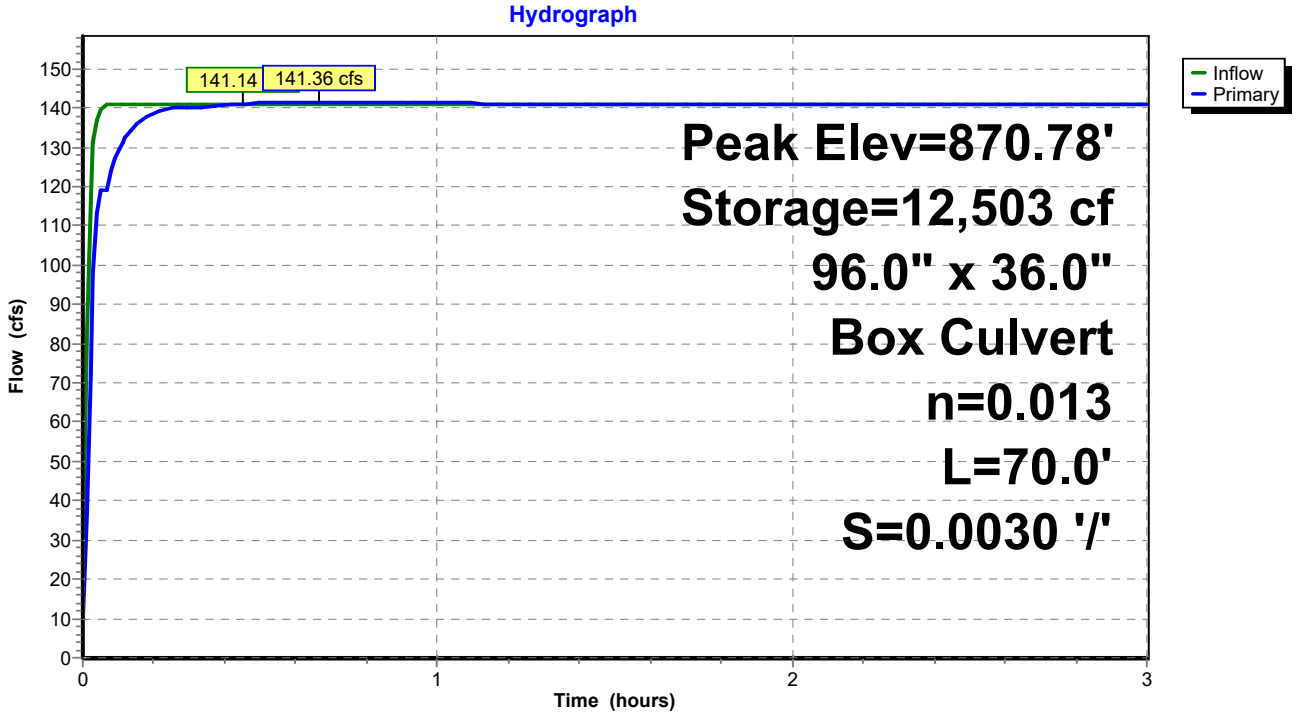
Volume	Invert	Avail.Storage	Storage Description
#1	866.40'	14,140 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
866.40	0	0	0
867.00	1,000	300	300
868.00	1,675	1,338	1,638
869.00	2,620	2,148	3,785
870.00	5,090	3,855	7,640
871.00	7,910	6,500	14,140

Device	Routing	Invert	Outlet Devices
#1	Primary	866.40'	**96.0" W x 36.0" H Box 3'x8' Box** L= 70.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 866.40' / 866.19' S= 0.0030 '/' Cc= 0.900 n= 0.013, Flow Area= 24.00 sf

Primary OutFlow Max=141.41 cfs @ 0.66 hrs HW=870.77' TW=869.27' (Dynamic Tailwater)
↑**1=3'x8' Box** (Inlet Controls 141.41 cfs @ 5.89 fps)

Pond 7P: Channel Detention/Box Clvert



Stage-Discharge for Pond 7P: Channel Detention/Box Clvert

Elevation (feet)	Primary (cfs)
866.40	0.00
866.45	0.21
866.50	0.65
866.55	1.26
866.60	1.99
866.65	2.83
866.70	3.75
866.75	4.75
866.80	5.82
866.85	6.94
866.90	8.12
866.95	9.35
867.00	10.63
867.05	11.96
867.10	13.32
867.15	14.73
867.20	16.18
867.25	17.66
867.30	19.18
867.35	20.74
867.40	22.33
867.45	23.95
867.50	25.61
867.55	27.30
867.60	29.02
867.65	30.77
867.70	32.55
867.75	34.35
867.80	36.19
867.85	38.06
867.90	39.95
867.95	41.87
868.00	43.82
868.05	45.80
868.10	47.80
868.15	49.83
868.20	51.88
868.25	53.96
868.30	56.06
868.35	58.19
868.40	60.34
868.45	62.52
868.50	64.72
868.55	66.94
868.60	69.19
868.65	71.46
868.70	73.75
868.75	76.07
868.80	78.40
868.85	80.77
868.90	83.15
868.95	85.55
869.00	87.98
869.05	90.42
869.10	92.89
869.15	95.38
869.20	97.89
869.25	100.42
869.30	102.97
869.35	105.55
869.40	108.14
869.45	110.75
869.50	113.38
869.55	116.03
869.60	118.70
869.65	121.39
869.70	124.10
869.75	126.83
869.80	129.58
869.85	132.35
869.90	135.13
869.95	137.94
870.00	140.76
870.05	143.60
870.10	146.46
870.15	149.34
870.20	152.24
870.25	155.15
870.30	158.08
870.35	161.03
870.40	157.54
870.45	160.77
870.50	163.93
870.55	167.02
870.60	170.07
870.65	173.06
870.70	175.99
870.75	178.88
870.80	181.73
870.85	184.53
870.90	187.29
870.95	190.01
871.00	**192.69**

FULL FLOW THROUGH
3.0'x8.0' BOX CULVERT
(Mannings Eqn Max = +/-157cfs)

Summary for Pond 8P: Basin"K"

[95] Warning: Outlet Device #2 rise exceeded
[95] Warning: Outlet Device #3 rise exceeded

Inflow Area = 7.000 ac, 0.00% Impervious, Inflow Depth = 1.11" for 100-yr event
Inflow = 39.24 cfs @ 0.20 hrs, Volume= 0.649 af
Outflow = 5.32 cfs @ 0.37 hrs, Volume= 0.138 af, Atten= 86%, Lag= 10.2 min
Primary = 5.32 cfs @ 0.37 hrs, Volume= 0.138 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 869.58' @ 0.37 hrs Surf.Area= 13,232 sf Storage= 26,387 cf

Plug-Flow detention time= 23.7 min calculated for 0.138 af (21% of inflow)
Center-of-Mass det. time= 16.8 min (28.8 - 12.0)

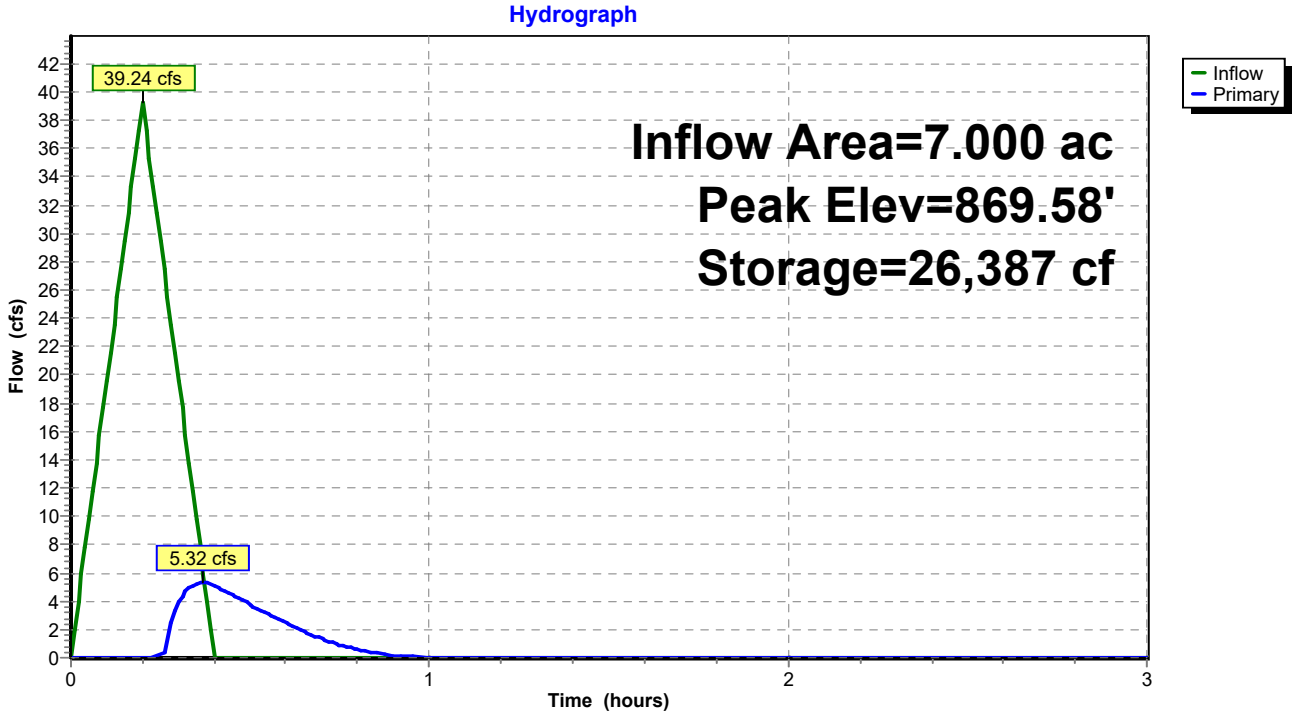
Volume	Invert	Avail.Storage	Storage Description
#1	867.00'	48,625 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	7,800	0	0
868.00	9,600	8,700	8,700
869.00	11,500	10,550	19,250
870.00	14,500	13,000	32,250
871.00	18,250	16,375	48,625

Device	Routing	Invert	Outlet Devices
#1	Primary	867.00'	**3.0" Vert. WQv Orifice** C= 0.600
#2	Primary	869.00'	**Front Window, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.33 Width (feet) 4.00 4.00
#3	Primary	869.00'	**Side Windows X 2.00, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.33 Width (feet) 1.00 1.00
#4	Primary	869.83'	**24.0" x 24.0" Horiz. CB Grate** C= 0.600 in 24.0" x 24.0" Grate (100% open area) Limited to weir flow at low heads
#5	Primary	870.00'	**15.0' long x 10.0' breadth Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=5.30 cfs @ 0.37 hrs HW=869.58' TW=869.29' (Dynamic Tailwater)
- **1=WQv Orifice** (Orifice Controls 0.13 cfs @ 2.57 fps)
- **2=Front Window** (Orifice Controls 3.45 cfs @ 2.61 fps)
- **3=Side Windows** (Orifice Controls 1.72 cfs @ 2.61 fps)
- **4=CB Grate** (Controls 0.00 cfs)
- **5=Spillway** (Controls 0.00 cfs)

Pond 8P: Basin"K"



Stage-Discharge for Pond 8P: Basin"K"

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
867.00	0.00	868.02	0.22	869.04	0.48	870.06	13.03
867.02	0.00	868.04	0.23	869.06	0.62	870.08	13.81
867.04	0.00	868.06	0.23	869.08	0.78	870.10	14.65
867.06	0.01	868.08	0.23	869.10	0.95	870.12	15.54
867.08	0.01	868.10	0.23	869.12	1.15	870.14	16.48
867.10	0.02	868.12	0.24	869.14	1.36	870.16	17.45
867.12	0.03	868.14	0.24	869.16	1.59	870.18	18.47
867.14	0.04	868.16	0.24	869.18	1.84	870.20	19.53
867.16	0.05	868.18	0.24	869.20	2.10	870.22	20.63
867.18	0.05	868.20	0.25	869.22	2.37	870.24	21.78
867.20	0.06	868.22	0.25	869.24	2.65	870.26	22.96
867.22	0.07	868.24	0.25	869.26	2.95	870.28	24.17
867.24	0.08	868.26	0.25	869.28	3.26	870.30	25.43
867.26	0.09	868.28	0.25	869.30	3.58	870.32	26.71
867.28	0.09	868.30	0.26	869.32	3.91	870.34	28.04
867.30	0.10	868.32	0.26	869.34	4.23	870.36	29.39
867.32	0.10	868.34	0.26	869.36	4.50	870.38	30.78
867.34	0.11	868.36	0.26	869.38	4.74	870.40	32.20
867.36	0.11	868.38	0.26	869.40	4.96	870.42	33.68
867.38	0.12	868.40	0.27	869.42	5.18	870.44	35.20
867.40	0.12	868.42	0.27	869.44	5.38	870.46	36.75
867.42	0.13	868.44	0.27	869.46	5.57	870.48	38.34
867.44	0.13	868.46	0.27	869.48	5.76	870.50	39.96
867.46	0.14	868.48	0.28	869.50	5.93	870.52	41.62
867.48	0.14	868.50	0.28	869.52	6.11	870.54	43.31
867.50	0.14	868.52	0.28	869.54	6.27	870.56	45.03
867.52	0.15	868.54	0.28	869.56	6.44	870.58	46.48
867.54	0.15	868.56	0.28	869.58	6.59	870.60	47.81
867.56	0.16	868.58	0.29	869.60	6.75	870.62	49.05
867.58	0.16	868.60	0.29	869.62	6.90	870.64	50.30
867.60	0.16	868.62	0.29	869.64	7.04	870.66	51.57
867.62	0.17	868.64	0.29	869.66	7.19	870.68	52.85
867.64	0.17	868.66	0.29	869.68	7.33	870.70	54.13
867.66	0.17	868.68	0.29	869.70	7.47	870.72	55.43
867.68	0.18	868.70	0.30	869.72	7.60	870.74	56.74
867.70	0.18	868.72	0.30	869.74	7.73	870.76	58.06
867.72	0.18	868.74	0.30	869.76	7.86	870.78	59.39
867.74	0.19	868.76	0.30	869.78	7.99	870.80	60.73
867.76	0.19	868.78	0.30	869.80	8.12	870.82	62.08
867.78	0.19	868.80	0.31	869.82	8.24	870.84	63.44
867.80	0.19	868.82	0.31	869.84	8.39	870.86	64.81
867.82	0.20	868.84	0.31	869.86	8.62	870.88	66.19
867.84	0.20	868.86	0.31	869.88	8.89	870.90	67.58
867.86	0.20	868.88	0.31	869.90	9.20	870.92	68.98
867.88	0.21	868.90	0.31	869.92	9.54	870.94	70.39
867.90	0.21	868.92	0.32	869.94	9.90	870.96	71.80
867.92	0.21	868.94	0.32	869.96	10.28	870.98	73.23
867.94	0.21	868.96	0.32	869.98	10.69	871.00	**74.67**
867.96	0.22	868.98	0.32	870.00	11.11		
867.98	0.22	869.00	0.32	870.02	11.65		
868.00	0.22	869.02	0.38	870.04	12.30		

Summary for Pond 9P: Basin"L"

Inflow Area = 4.000 ac, 0.00% Impervious, Inflow Depth = 1.11" for 100-yr event
Inflow = 22.42 cfs @ 0.20 hrs, Volume= 0.371 af
Outflow = 3.64 cfs @ 0.37 hrs, Volume= 0.121 af, Atten= 84%, Lag= 10.1 min
Primary = 3.64 cfs @ 0.37 hrs, Volume= 0.121 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 868.81' @ 0.37 hrs Surf.Area= 9,801 sf Storage= 14,938 cf

Plug-Flow detention time= 46.9 min calculated for 0.121 af (33% of inflow)
Center-of-Mass det. time= 41.8 min (53.8 - 12.0)

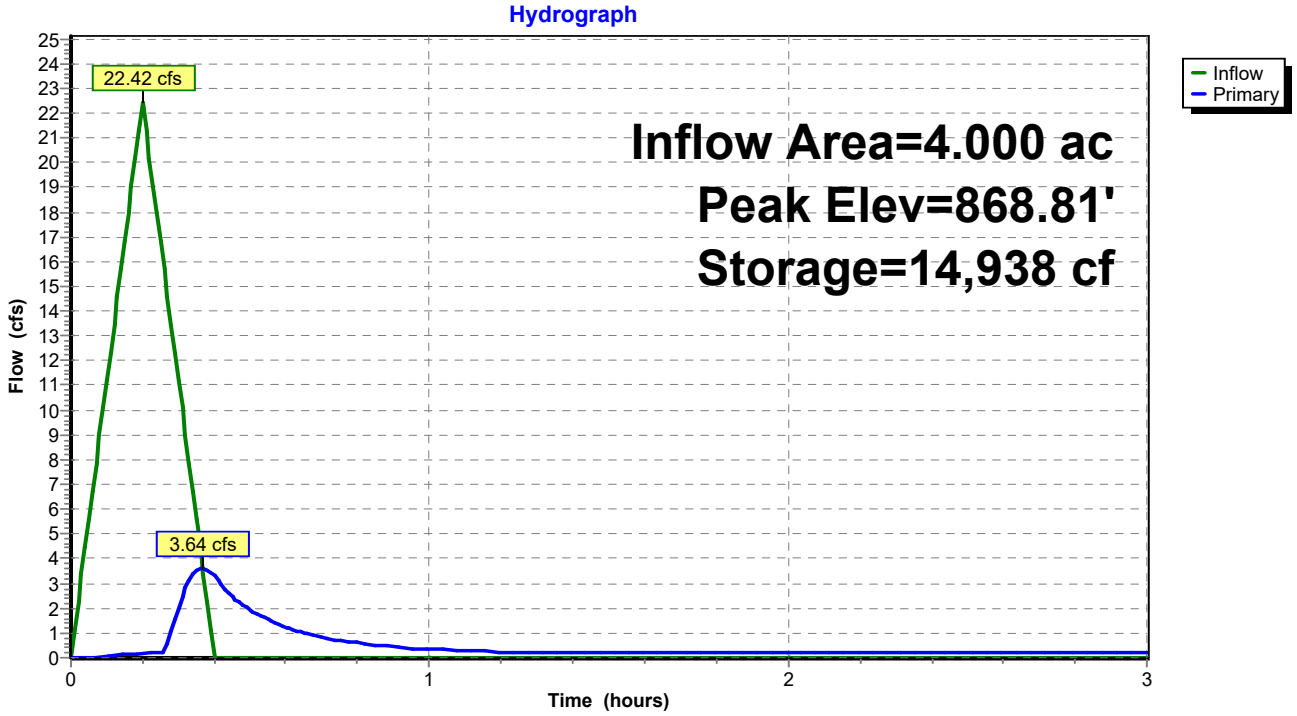
Volume	Invert	Avail.Storage	Storage Description
#1	867.00'	42,250 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	6,700	0	0
868.00	8,400	7,550	7,550
869.00	10,125	9,263	16,813
870.00	12,500	11,313	28,125
871.00	15,750	14,125	42,250

Device	Routing	Invert	Outlet Devices
#1	Primary	867.00'	**2.5" Vert. WQv Orifice** C= 0.600
#2	Primary	868.50'	**Front Window, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 4.00 4.00
#3	Primary	868.50'	**Side Windows X 2.00, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 1.00 1.00
#4	Primary	869.50'	**24.0" x 24.0" Horiz. CB Grate** C= 0.600 in 24.0" x 24.0" Grate (100% open area) Limited to weir flow at low heads
#5	Primary	870.00'	**15.0' long x 10.0' breadth Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=3.63 cfs @ 0.37 hrs HW=868.81' TW=866.37' (Dynamic Tailwater)
- **1=WQv Orifice** (Orifice Controls 0.21 cfs @ 6.29 fps)
- **2=Front Window** (Weir Controls 2.28 cfs @ 1.83 fps)
- **3=Side Windows** (Weir Controls 1.14 cfs @ 1.83 fps)
- **4=CB Grate** (Controls 0.00 cfs)
- **5=Spillway** (Controls 0.00 cfs)

Pond 9P: Basin"L"



Stage-Discharge for Pond 9P: Basin"L"

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
867.00	0.00	868.02	0.16	869.04	7.87	870.06	28.64
867.02	0.00	868.04	0.16	869.06	8.18	870.08	29.65
867.04	0.00	868.06	0.16	869.08	8.47	870.10	30.72
867.06	0.01	868.08	0.16	869.10	8.74	870.12	31.83
867.08	0.01	868.10	0.16	869.12	9.01	870.14	32.99
867.10	0.02	868.12	0.17	869.14	9.27	870.16	34.18
867.12	0.02	868.14	0.17	869.16	9.51	870.18	35.41
867.14	0.03	868.16	0.17	869.18	9.75	870.20	36.67
867.16	0.04	868.18	0.17	869.20	9.99	870.22	37.98
867.18	0.05	868.20	0.17	869.22	10.22	870.24	39.24
867.20	0.05	868.22	0.17	869.24	10.44	870.26	40.16
867.22	0.06	868.24	0.17	869.26	10.66	870.28	41.11
867.24	0.06	868.26	0.18	869.28	10.87	870.30	42.07
867.26	0.06	868.28	0.18	869.30	11.07	870.32	43.06
867.28	0.07	868.30	0.18	869.32	11.28	870.34	44.06
867.30	0.07	868.32	0.18	869.34	11.48	870.36	45.09
867.32	0.08	868.34	0.18	869.36	11.67	870.38	46.13
867.34	0.08	868.36	0.18	869.38	11.87	870.40	47.20
867.36	0.08	868.38	0.19	869.40	12.06	870.42	48.31
867.38	0.09	868.40	0.19	869.42	12.24	870.44	49.44
867.40	0.09	868.42	0.19	869.44	12.42	870.46	50.60
867.42	0.09	868.44	0.19	869.46	12.60	870.48	51.78
867.44	0.10	868.46	0.19	869.48	12.78	870.50	52.99
867.46	0.10	868.48	0.19	869.50	12.96	870.52	54.22
867.48	0.10	868.50	0.19	869.52	13.20	870.54	55.47
867.50	0.10	868.52	0.25	869.54	13.51	870.56	56.74
867.52	0.11	868.54	0.35	869.56	13.85	870.58	58.04
867.54	0.11	868.56	0.49	869.58	14.23	870.60	59.36
867.56	0.11	868.58	0.64	869.60	14.62	870.62	60.59
867.58	0.11	868.60	0.82	869.62	15.05	870.64	61.84
867.60	0.12	868.62	1.02	869.64	15.49	870.66	63.10
867.62	0.12	868.64	1.23	869.66	15.95	870.68	64.37
867.64	0.12	868.66	1.46	869.68	16.43	870.70	65.65
867.66	0.12	868.68	1.71	869.70	16.93	870.72	66.94
867.68	0.12	868.70	1.96	869.72	17.44	870.74	68.25
867.70	0.13	868.72	2.24	869.74	17.97	870.76	69.57
867.72	0.13	868.74	2.52	869.76	18.51	870.78	70.90
867.74	0.13	868.76	2.82	869.78	19.06	870.80	72.24
867.76	0.13	868.78	3.12	869.80	19.63	870.82	73.59
867.78	0.13	868.80	3.44	869.82	20.22	870.84	74.95
867.80	0.14	868.82	3.77	869.84	20.81	870.86	76.32
867.82	0.14	868.84	4.11	869.86	21.42	870.88	77.70
867.84	0.14	868.86	4.46	869.88	22.04	870.90	79.09
867.86	0.14	868.88	4.82	869.90	22.67	870.92	80.50
867.88	0.14	868.90	5.19	869.92	23.31	870.94	81.91
867.90	0.15	868.92	5.57	869.94	23.96	870.96	83.33
867.92	0.15	868.94	5.96	869.96	24.62	870.98	84.76
867.94	0.15	868.96	6.35	869.98	25.29	871.00	**86.21**
867.96	0.15	868.98	6.76	870.00	25.98		
867.98	0.15	869.00	7.17	870.02	26.78		
868.00	0.16	869.02	7.54	870.04	27.67		

Summary for Pond 10P: Four Bridges Pipe Arch

[57] Hint: Peaked at 866.37' (Flood elevation advised)
[61] Hint: Exceeded Reach 2R outlet invert by 1.67' @ 0.38 hrs

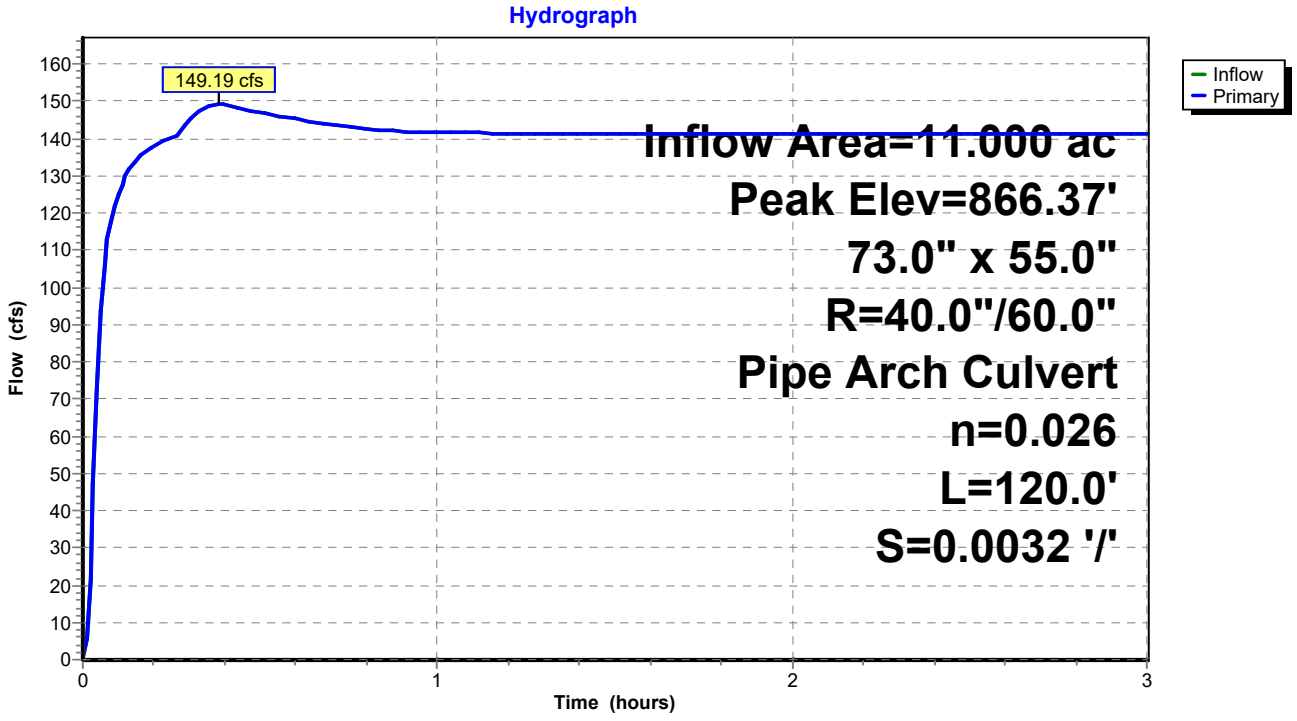
Inflow Area = 11.000 ac, 0.00% Impervious, Inflow Depth > 37.85" for 100-yr event
Inflow = 149.19 cfs @ 0.38 hrs, Volume= 34.692 af
Outflow = 149.19 cfs @ 0.38 hrs, Volume= 34.692 af, Atten= 0%, Lag= 0.0 min
Primary = 149.19 cfs @ 0.38 hrs, Volume= 34.692 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 866.37' @ 0.38 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	859.92'	**73.0" W x 55.0" H, R=40.0"/60.0" Pipe Arch Culvert** L= 120.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 859.92' / 859.53' S= 0.0032 '/' Cc= 0.900 n= 0.026, Flow Area= 22.03 sf

Primary OutFlow Max=149.18 cfs @ 0.38 hrs HW=866.37' (Free Discharge)
1=Culvert (Barrel Controls 149.18 cfs @ 6.77 fps)

Pond 10P: Four Bridges Pipe Arch



Stage-Discharge for Pond 10P: Four Bridges Pipe Arch

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
859.92	0.00	861.96	26.40	864.00	91.04	866.04	137.86
859.96	0.01	862.00	27.41	864.04	92.42	866.08	139.29
860.00	0.02	862.04	28.44	864.08	93.79	866.12	140.70
860.04	0.06	862.08	29.48	864.12	95.16	866.16	142.09
860.08	0.11	862.12	30.54	864.16	96.53	866.20	143.48
860.12	0.18	862.16	31.61	864.20	97.89	866.24	144.84
860.16	0.27	862.20	32.70	864.24	99.24	866.28	146.20
860.20	0.37	862.24	33.80	864.28	100.59	866.32	147.54
860.24	0.50	862.28	34.91	864.32	101.92	866.36	**148.87**
860.28	0.65	862.32	36.04	864.36	103.26		
860.32	0.82	862.36	37.18	864.40	104.58		
860.36	1.01	862.40	38.33	864.44	105.90		
860.40	1.22	862.44	39.49	864.48	107.20		
860.44	1.46	862.48	40.67	864.52	108.50		
860.48	1.72	862.52	41.85	864.56	109.79		
860.52	2.01	862.56	43.05	864.60	111.06		
860.56	2.32	862.60	44.26	864.64	112.33		
860.60	2.65	862.64	45.48	864.68	113.59		
860.64	3.01	862.68	46.71	864.72	114.83		
860.68	3.39	862.72	47.95	864.76	116.06		
860.72	3.79	862.76	49.20	864.80	117.27		
860.76	4.22	862.80	50.46	864.84	118.47		
860.80	4.66	862.84	51.73	864.88	119.66		
860.84	5.13	862.88	53.01	864.92	120.83		
860.88	5.62	862.92	54.30	864.96	121.98		
860.92	6.14	862.96	55.59	865.00	123.11		
860.96	6.67	863.00	56.90	865.04	124.23		
861.00	7.23	863.04	58.21	865.08	125.33		
861.04	7.81	863.08	59.53	865.12	126.40		
861.08	8.41	863.12	60.85	865.16	127.45		
861.12	9.03	863.16	62.19	865.20	128.48		
861.16	9.67	863.20	63.53	865.24	129.49		
861.20	10.33	863.24	64.87	865.28	130.46		
861.24	11.01	863.28	66.22	865.32	131.41		
861.28	11.71	863.32	67.58	865.36	132.33		
861.32	12.43	863.36	68.94	865.40	133.22		
861.36	13.17	863.40	70.30	865.44	134.08		
861.40	13.93	863.44	71.67	865.48	134.90		
861.44	14.70	863.48	73.05	865.52	135.68		
861.48	15.50	863.52	74.42	865.56	136.42		
861.52	16.31	863.56	75.80	865.60	137.11		
861.56	17.14	863.60	77.19	865.64	137.76		
861.60	17.99	863.64	78.57	865.68	138.35		
861.64	18.86	863.68	79.96	865.72	138.88		
861.68	19.75	863.72	81.34	865.76	139.34		
861.72	20.65	863.76	82.73	865.80	139.72		
861.76	21.57	863.80	84.12	865.84	140.01		
861.80	22.50	863.84	85.51	865.88	140.19		
861.84	23.45	863.88	86.89	865.92	140.22		
861.88	24.42	863.92	88.28	865.96	140.03		
861.92	25.40	863.96	89.66	866.00	139.45		

