

Type.... Master Network Summary Page 1.01  
 Name.... Watershed  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 2\5508RPL4-100 YR-BMP 2.PPW

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method  
 Hydrograph File Import Option Used For 1 node(s)

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Return Type	Event	Return	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond cu.ft
DETENTION 2	IN	POND	100	169233		253.00	82.01		
DETENTION 2	OUT	POND	100	134429		261.00	31.07	368.80	
101852									
HYD 2	HYG		100	169317	R	253.00	82.01		
*OUT 1 - N84	JCT		100	134425		261.00	31.07		

S/N:  
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Compute Time:

Date:

Type... Executive Summary (Nodes)

Page 2.01

Name... Watershed

Event: 100 yr

File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 2\

Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
DETENTION 2	IN POND	169233		253.00	82.01	
DETENTION 2	OUT POND	134429		261.00	31.07	368.80
HYD 2	HYG	169317	R	253.00	82.01	
Outfall 1 - N84	JCT	134425		261.00	31.07	

S/N:

PondPack Ver:

Compute Time:

Date:

Type... Read HYG Page 3.01  
 Name... HYD 2 Tag: 100 Event: 100 yr  
 File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 2\5508RPL4-100 YR-BMP 2.PPW  
 Storm... Tag: 100

HYG file =  
 HYG ID = HYG 2  
 HYG Tag = N-38  
 -----  
 Peak Discharge = 82.01 cfs  
 Time to Peak = 253.00 min  
 HYG Volume = 169317 cu.ft  
 -----

Time min	HYDROGRAPH ORDINATES (cfs)				
	Output Time increment = 11.00 min				
Time on left represents time for first value in each row.					
.00	.00	2.69	2.74	2.86	2.93
55.00	3.07	3.14	3.31	3.41	3.62
110.00	3.74	4.01	4.16	4.53	4.74
165.00	5.26	5.57	6.39	6.93	8.47
220.00	9.65	14.16	19.95	82.01	11.36
275.00	7.60	5.95	4.98	4.34	3.87
330.00	3.51	3.23	2.99	2.80	

S/N:  
 PondPack Ver: Compute Time: Date:

Type.... Vol: Elev-Area  
Name.... DETENTION 2

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Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	$A1+A2+\text{sqr}(A1*A2)$ (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
367.00	-----	25600	0	0	0
368.00	-----	68850	136433	45478	45478
369.00	-----	72200	211555	70518	115996
370.00	-----	75650	221755	73918	189914
371.00	-----	79150	232180	77393	267308
372.00	-----	82700	242756	80919	348226

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

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File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
2\5508RPL4-100 YR-BMP 2.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 367.00 ft  
Increment = .05 ft  
Max. Elev.= 372.00 ft

\*\*\*\*\*  
OUTLET CONNECTIVITY  
\*\*\*\*\*

----> Forward Flow Only (UpStream to DnStream)  
<--- Reverse Flow Only (DnStream to UpStream)  
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
-----	----		-----	-----	-----
Orifice-Circular	O0	---->	CV	367.800	372.000
Stand Pipe	RP	---->	CV	368.200	372.000
Orifice-Circular	O1	---->	CV	367.000	372.000
Culvert-Circular	CV	---->	TW	362.000	372.000
TW SETUP, DS Channel					

S/N:

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Type.... Outlet Input Data  
Name.... Outlet 1

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
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OUTLET STRUCTURE INPUT DATA

Structure ID = 00  
Structure Type = Orifice-Circular  
-----  
# of Openings = 2  
Invert Elev. = 367.80 ft  
Diameter = .5830 ft  
Orifice Coeff. = .600

Structure ID = RP  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 368.20 ft  
Diameter = 6.0000 ft  
Orifice Area = 28.2743 sq.ft  
Orifice Coeff. = .600  
Weir Length = 18.85 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

Structure ID = 01  
Structure Type = Orifice-Circular  
-----  
# of Openings = 5  
Invert Elev. = 367.00 ft  
Diameter = .2500 ft  
Orifice Coeff. = .600

S/N:  
PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

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OUTLET STRUCTURE INPUT DATA

Structure ID = CV  
Structure Type = Culvert-Circular  
-----  
No. Barrels = 1  
Barrel Diameter = 3.0000 ft  
Upstream Invert = 362.00 ft  
Dnstream Invert = 361.25 ft  
Horiz. Length = 106.66 ft  
Barrel Length = 106.66 ft  
Barrel Slope = .00703 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0130  
Ke = .5000 (forward entrance loss)  
Kb = .007228 (per ft of full flow)  
Kr = .5000 (reverse entrance loss)  
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 1  
Inlet Control K = .0078  
Inlet Control M = 2.0000  
Inlet Control c = .03790  
Inlet Control Y = .6900  
T1 ratio (HW/D) = 1.132  
T2 ratio (HW/D) = 1.293  
Slope Factor = -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.  
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,  
interpolate between flows at T1 & T2...  
At T1 Elev = 365.40 ft ---> Flow = 42.85 cfs  
At T2 Elev = 365.88 ft ---> Flow = 48.97 cfs

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

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OUTLET STRUCTURE INPUT DATA

Structure ID = TW  
Structure Type = TW SETUP, DS Channel  
-----

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...

Channel Type: Chn-Trapz.  
Channel ID: Chn-Trapz - 1

CONVERGENCE TOLERANCES...

Maximum Iterations= 40  
Min. TW tolerance = .01 ft  
Max. TW tolerance = .01 ft  
Min. HW tolerance = .01 ft  
Max. HW tolerance = .01 ft  
Min. Q tolerance = .00 cfs  
Max. Q tolerance = .00 cfs

S/N:  
PondPack Ver:

Compute Time:

Date:



Type.... Outlet Input Data  
Name.... Outlet 1

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File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
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USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...  
Channel Type: Chn-Trapz.  
Channel ID: Chn-Trapz - 1

Solution to Mannings Open Channel Flow Equation  
(Computed values are based on normal depth.)

TRAPEZOIDAL CROSS SECTION

Slope = .010000 ft/ft  
Mannings n = 0.02200  
Invert Elev. = 353.00 ft  
Top of Channel = 356.00 ft  
Base width = 3.00 ft  
Rt Side slope = 3.000 horizontal :1 vert.  
Lt Side slope = 3.000 horizontal :1 vert.

S/N:  
PondPack Ver:

Compute Time:

Date:

Type... Pond E-V-Q Table

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Name... DETENTION 2

File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
Pack\BMP 2\

Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
Pond Volume Data = DETENTION 2  
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

-----  
Starting WS Elev = 367.00 ft  
Starting Volume = 0 cu.ft  
Starting Outflow = .00 cfs  
Starting Infiltr. = .00 cfs  
Starting Total Qout= .00 cfs  
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
367.00	.00	0	25600	.00	.00	.00
367.05	.02	1321	27264	.25	.27	44.31
367.10	.08	2728	28982	.27	.35	91.26
367.15	.17	4220	30751	.28	.45	141.12
367.20	.28	5804	32573	.30	.58	194.03
367.25	.42	7479	34447	.32	.74	250.02
367.30	.49	9248	36373	.34	.83	309.11
367.35	.56	11117	38353	.36	.92	371.48
367.40	.62	13085	40384	.37	.99	437.15
367.45	.67	15157	42468	.39	1.06	506.28
367.50	.72	17333	44604	.41	1.14	578.89
367.55	.77	19617	46792	.43	1.20	655.09
367.60	.81	22013	49034	.45	1.27	735.03
367.65	.86	24521	51327	.48	1.33	818.70
367.70	.90	27147	53674	.50	1.39	906.29
367.75	.93	29890	56072	.52	1.45	997.77
367.80	.97	32754	58522	.54	1.51	1093.30
367.85	1.02	35743	61026	.57	1.58	1193.02
367.90	1.09	38857	63581	.59	1.68	1296.93
367.95	1.18	42103	66190	.61	1.80	1405.22

S/N:

PondPack Ver:

Compute Time:

Date:

Name.... DETENTION 2

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 2\  
 Pack\BMP 2\  
 Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
 Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
 Pond Volume Data = DETENTION 2  
 Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

-----  
 Starting WS Elev = 367.00 ft  
 Starting Volume = 0 cu.ft  
 Starting Outflow = .00 cfs  
 Starting Infiltr. = .00 cfs  
 Starting Total Qout = .00 cfs  
 Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
368.00	1.30	45478	68850	.64	1.94	1517.85
368.05	1.43	48923	69016	.64	2.07	1632.85
368.10	1.58	52380	69181	.64	2.22	1748.21
368.15	1.75	55842	69347	.64	2.39	1863.78
368.20	1.93	59315	69514	.64	2.57	1979.73
368.25	2.77	62794	69680	.65	3.42	2096.54
368.30	4.17	66281	69847	.65	4.82	2214.18
368.35	5.93	69779	70013	.65	6.57	2332.53
368.40	7.98	73283	70180	.65	8.63	2451.39
368.45	10.21	76797	70348	.65	10.86	2570.77
368.50	12.62	80318	70515	.65	13.27	2690.54
368.55	15.25	83847	70683	.65	15.90	2810.80
368.60	18.06	87387	70850	.66	18.71	2931.60
368.65	21.01	90933	71018	.66	21.67	3052.75
368.70	24.15	94489	71187	.66	24.81	3174.44
368.75	27.44	98052	71355	.66	28.10	3296.48
368.80	30.84	101623	71524	.66	31.50	3418.92
368.85	34.42	105205	71692	.66	35.08	3541.89
368.90	38.11	108793	71861	.67	38.78	3665.19
368.95	41.90	112391	72031	.67	42.57	3788.93

S/N:

PondPack Ver:

Compute Time:

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Name... DETENTION 2

File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
Pack\BMP 2\  
Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
Pond Volume Data = DETENTION 2  
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

-----  
Starting WS Elev = 367.00 ft  
Starting Volume = 0 cu.ft  
Starting Outflow = .00 cfs  
Starting Infiltr. = .00 cfs  
Starting Total Qout= .00 cfs  
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
369.00	45.89	115996	72200	.67	46.55	3913.08
369.05	49.94	119609	72371	.67	50.61	4037.58
369.10	54.12	123234	72541	.67	54.79	4162.57
369.15	58.41	126864	72712	.67	59.09	4287.88
369.20	62.82	130505	72884	.67	63.50	4413.66
369.25	67.17	134153	73055	.68	67.85	4539.60
369.30	71.57	137809	73227	.68	72.25	4665.87
369.35	75.67	141476	73398	.68	76.35	4792.21
369.40	79.54	145149	73570	.68	80.22	4918.51
369.45	83.14	148833	73743	.68	83.82	5044.92
369.50	84.69	152524	73915	.68	85.37	5169.49
369.55	85.07	156223	74087	.69	85.75	5293.18
369.60	85.46	159933	74260	.69	86.15	5417.24
369.65	85.85	163650	74433	.69	86.54	5541.52
369.70	86.24	167377	74607	.69	86.93	5666.15
369.75	86.62	171111	74780	.69	87.31	5790.99
369.80	87.00	174853	74954	.69	87.69	5916.12
369.85	87.37	178607	75127	.70	88.06	6041.60
369.90	87.75	182366	75301	.70	88.45	6167.31
369.95	88.12	186137	75476	.70	88.82	6293.38

S/N:

PondPack Ver:

Compute Time:

Date:

Name.... DETENTION 2

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submital\Pond Pack\BMP  
2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submital\Pond  
Pack\BMP 2\  
Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
Pond Volume Data = DETENTION 2  
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

-----  
Starting WS Elev = 367.00 ft  
Starting Volume = 0 cu.ft  
Starting Outflow = .00 cfs  
Starting Infiltr. = .00 cfs  
Starting Total Qout = .00 cfs  
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
370.00	88.50	189914	75650	.70	89.20	6419.67
370.05	88.87	193700	75823	.70	89.57	6546.23
370.10	89.24	197497	75996	.70	89.94	6673.17
370.15	89.61	201300	76170	.71	90.31	6800.31
370.20	89.98	205115	76344	.71	90.69	6927.82
370.25	90.34	208935	76518	.71	91.05	7055.54
370.30	90.71	212764	76692	.71	91.42	7183.55
370.35	91.06	216605	76866	.71	91.78	7311.92
370.40	91.43	220452	77040	.71	92.15	7440.52
370.45	91.79	224309	77215	.71	92.51	7569.47
370.50	92.15	228174	77390	.72	92.87	7698.63
370.55	92.51	232046	77565	.72	93.22	7828.09
370.60	92.86	235931	77741	.72	93.58	7957.92
370.65	93.21	239821	77916	.72	93.93	8087.95
370.70	93.57	243723	78092	.72	94.29	8218.36
370.75	93.91	247631	78268	.72	94.64	8348.98
370.80	94.27	251547	78444	.73	95.00	8479.90
370.85	94.62	255475	78620	.73	95.34	8611.18
370.90	94.96	259410	78796	.73	95.69	8742.67
370.95	95.31	263356	78973	.73	96.04	8874.54

S/N:

PondPack Ver:

Compute Time:

Date:

Type... Pond E-V-Q Table  
 Name... DETENTION 2  
 File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
 Pack\BMP 2\  
 Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
 Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
 Pond Volume Data = DETENTION 2  
 Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

-----  
 Starting WS Elev = 367.00 ft  
 Starting Volume = 0 cu.ft  
 Starting Outflow = .00 cfs  
 Starting Infiltr. = .00 cfs  
 Starting Total Qout= .00 cfs  
 Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
371.00	95.65	267308	79150	.73	96.39	9006.63
371.05	96.00	271269	79326	.73	96.73	9139.00
371.10	96.34	275241	79502	.74	97.08	9271.76
371.15	96.68	279219	79678	.74	97.42	9404.71
371.20	97.02	283209	79854	.74	97.76	9538.05
371.25	97.36	287205	80030	.74	98.10	9671.59
371.30	97.70	291210	80207	.74	98.45	9805.43
371.35	98.04	295226	80384	.74	98.78	9939.64
371.40	98.37	299249	80561	.75	99.12	10074.06
371.45	98.71	303283	80738	.75	99.45	10208.86
371.50	99.04	307323	80915	.75	99.79	10343.87
371.55	99.37	311372	81093	.75	100.12	10479.18
371.60	99.71	315433	81271	.75	100.46	10614.87
371.65	100.04	319500	81449	.75	100.79	10750.77
371.70	100.36	323578	81627	.76	101.12	10887.04
371.75	100.70	327663	81805	.76	101.45	11023.54
371.80	101.02	331757	81984	.76	101.78	11160.32
371.85	101.34	335862	82163	.76	102.10	11297.48
371.90	101.67	339974	82341	.76	102.44	11434.87
371.95	102.00	344097	82521	.76	102.76	11572.63

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table Page 6.06  
 Name.... DETENTION 2  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 2\5508RPL4-100 YR-BMP 2.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
 Pack\BMP 2\  
 Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
 Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
 Pond Volume Data = DETENTION 2  
 Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

-----  
 Starting WS Elev = 367.00 ft  
 Starting Volume = 0 cu.ft  
 Starting Outflow = .00 cfs  
 Starting Infiltr. = .00 cfs  
 Starting Total Qout = .00 cfs  
 Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
372.00	102.32	348226	82700	.77	103.08	11710.60

S/N:  
 PondPack Ver: Compute Time: Date:

Type.... Pond Routing Summary Page 6.07  
 Name.... DETENTION 2 OUT Tag: 100 Event: 100 yr  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 2\5508RPL4-100 YR-BMP 2.PPW  
 Storm... 100 Tag: 100

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
 Pack\BMP 2\  
 Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
 Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
 Pond Volume Data = DETENTION 2  
 Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

INITIAL CONDITIONS

```

-----
Starting WS Elev = 367.00 ft
Starting Volume = 0 cu.ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = 1.00 min
  
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INFLOW/OUTFLOW HYDROGRAPH SUMMARY

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=====
Peak Inflow = 82.01 cfs at 253.00 min
Peak Outflow = 31.07 cfs at 261.00 min
Peak Infiltration = .66 cfs at 261.00 min
-----
Peak Elevation = 368.80 ft
Peak Storage = 101852 cu.ft
=====
  
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MASS BALANCE (cu.ft)

```

-----
+ Initial Vol = 0
+ HYG Vol IN = 169233
- Infiltration = 34790
- HYG Vol OUT = 134429
- Retained Vol = 14
-----
Unrouted Vol = - cu.ft (.000% of Inflow Volume)
  
```

S/N:  
 PondPack Ver: Compute Time: Date:



Type.... Detention Time  
Name.... DETENTION 2 OUT Tag: 100  
File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
2\5508RPL4-100 YR-BMP 2.PPW  
Storm... 100 Tag: 100

Page 6.08

Event: 100 yr

DETENTION TIMES SUMMARY

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
Pack\BMP 2\

Inflow HYG file = NONE STORED - DETENTION 2 IN 100  
Outflow HYG file = NONE STORED - DETENTION 2 OUT 100

Pond Node Data = DETENTION 2  
Pond Volume Data = DETENTION 2  
Pond Outlet Data = Outlet 1

Infiltration = .4000 in/hr

APPROXIMATE DETENTION TIME

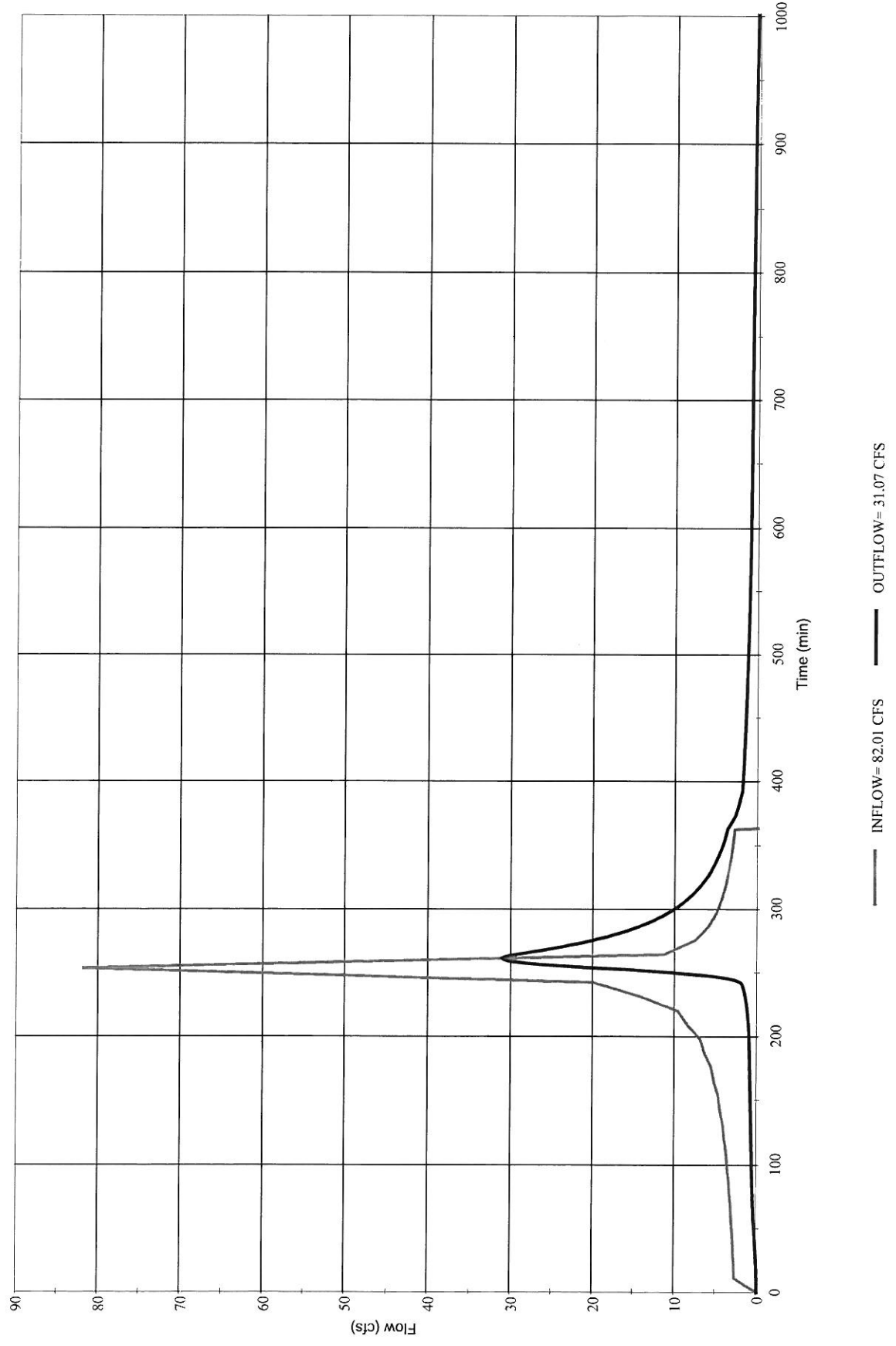
-----  
Tp, Outflow + Infilt. = 261.00 min  
Tp, Total Inflow = 253.00 min  
Peak to Peak = 8.00 min  
  
Qout+Infilt. Centroid = 421.13 min  
Inflow Centroid = 219.12 min  
Centroid to Centroid = 202.01 min  
  
Weighted Avg. Plug Time = 206.18 min  
Max.Plug Vol. Plug Time = 138.30 min  
Max.Inflow Plug Volume = 4751 cu.ft (From 252.00 to 253.00 min)  
-----

S/N:  
PondPack Ver:

Compute Time:

Date:

NODE 38 - DETENTION POND - BMP 2  
INFLOW/OUTFLOW HYDROGRAPH  
100-YEAR STORM EVENT



# Bio-Retention Pond-3

---

100-year Development Conditions

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c)1991-2003 Version 7.3

Rational method hydrology program based on  
San Diego County Flood Control Division 2003 hydrology manual  
Rational Hydrology Study Date: 11/13/12

\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*

WARNER RANCH

100-YEAR STORM EVENT DEVELOPMENT CONDITIONS  
BIO-RETENTION POND 3

Shapouri & Associates, Rancho Santa Fe, CA - S/N 968

Rational hydrology study storm event year is 100.0  
English (in-lb) input data Units used

Map data precipitation entered:  
6 hour, precipitation(inches) = 3.500  
24 hour precipitation(inches) = 6.000  
P6/P24 = 58.3%

San Diego hydrology manual 'C' values used

\*\*\*\*\*  
Process from Point/Station 80.100 to Point/Station 80.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.500  
Decimal fraction soil group C = 0.500  
Decimal fraction soil group D = 0.000  
[HIGH DENSITY RESIDENTIAL ]  
(24.0 DU/A or Less )  
Impervious value, Ai = 0.650  
Sub-Area C Value = 0.680  
Initial subarea total flow distance = 585.460(Ft.)  
Highest elevation = 410.000(Ft.)  
Lowest elevation = 379.000(Ft.)  
Elevation difference = 31.000(Ft.) Slope = 5.295 %  
Top of Initial Area Slope adjusted by User to 2.400 %  
Bottom of Initial Area Slope adjusted by User to 7.000 %  
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
The maximum overland flow distance is 75.00 (Ft)  
for the top area slope value of 2.40 %, in a development type of  
24.0 DU/A or Less  
In Accordance With Figure 3-3  
Initial Area Time of Concentration = 4.89 minutes  
TC = [1.8\*(1.1-C)\*distance(Ft.)^0.5]/(% slope^(1/3))  
TC = [1.8\*(1.1-0.6800)\*( 75.000^0.5)/( 2.400^(1/3))]= 4.89  
The initial area total distance of 585.46 (Ft.) entered leaves a  
remaining distance of 510.46 (Ft.)  
Using Figure 3-4, the travel time for this distance is 2.64 minutes  
for a distance of 510.46 (Ft.) and a slope of 7.00 %  
with an elevation difference of 35.73(Ft.) from the end of the top area  
Tt = [(11.9\*length(Mi)^3)/(elevation change(Ft.))]^0.385 \*60(min/hr)  
= 2.645 Minutes

Tt=[(11.9\*0.0967^3)/( 35.73)]^0.385= 2.64  
Total initial area Ti = 4.89 minutes from Figure 3-3 formula plus  
2.64 minutes from the Figure 3-4 formula = 7.53 minutes  
Rainfall intensity (I) = 7.078(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.680  
Subarea runoff = 7.509(CFS)  
Total initial stream area = 1.560(Ac.)

\*\*\*\*\*  
Process from Point/Station 80.100 to Point/Station 80.200  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:

In Main Stream number: 1  
Stream flow area = 1.560(Ac.)  
Runoff from this stream = 7.509(CFS)  
Time of concentration = 7.53 min.  
Rainfall intensity = 7.078(In/Hr)  
Program is now starting with Main Stream No. 2

\*\*\*\*\*  
Process from Point/Station 81.100 to Point/Station 81.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.100  
Decimal fraction soil group C = 0.900  
Decimal fraction soil group D = 0.000  
[HIGH DENSITY RESIDENTIAL ]  
(24.0 DU/A or Less )  
Impervious value, Ai = 0.650  
Sub-Area C Value = 0.688  
Initial subarea total flow distance = 373.600(Ft.)  
Highest elevation = 407.000(Ft.)  
Lowest elevation = 379.000(Ft.)  
Elevation difference = 28.000(Ft.) Slope = 7.495 %  
Top of Initial Area Slope adjusted by User to 7.000 %  
Bottom of Initial Area Slope adjusted by User to 7.000 %  
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
The maximum overland flow distance is 95.00 (Ft)  
for the top area slope value of 7.00 %, in a development type of  
24.0 DU/A or Less  
In Accordance With Figure 3-3  
Initial Area Time of Concentration = 3.78 minutes  
TC = [1.8\*(1.1-C)\*distance(Ft.)^0.5]/(% slope^(1/3))  
TC = [1.8\*(1.1-0.6880)\*( 95.000^0.5)/( 7.000^(1/3))]= 3.78  
The initial area total distance of 373.60 (Ft.) entered leaves a  
remaining distance of 278.60 (Ft.)  
Using Figure 3-4, the travel time for this distance is 1.66 minutes  
for a distance of 278.60 (Ft.) and a slope of 7.00 %  
with an elevation difference of 19.50(Ft.) from the end of the top area  
Tt = [(11.9\*length(Mi)^3)/(elevation change(Ft.))]^0.385 \*60(min/hr)  
= 1.659 Minutes  
Tt=[(11.9\*0.0528^3)/( 19.50)]^0.385= 1.66  
Total initial area Ti = 3.78 minutes from Figure 3-3 formula plus  
1.66 minutes from the Figure 3-4 formula = 5.44 minutes

Rainfall intensity (I) = 8.736(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.688  
 Subarea runoff = 5.349(CFS)  
 Total initial stream area = 0.890(Ac.)

\*\*\*\*\*  
 Process from Point/Station 81.100 to Point/Station 81.200  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:

In Main Stream number: 2  
 Stream flow area = 0.890(Ac.)  
 Runoff from this stream = 5.349(CFS)  
 Time of concentration = 5.44 min.  
 Rainfall intensity = 8.736(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.509	7.53	7.078
2	5.349	5.44	8.736
Qmax(1) =	1.000 * 0.810	1.000 * 1.000	7.509) + 5.349) + = 11.843
Qmax(2) =	1.000 * 1.000	0.722 * 1.000	7.509) + 5.349) + = 10.768

Total of 2 main streams to confluence:

Flow rates before confluence point:  
 7.509 5.349

Maximum flow rates at confluence using above data:  
 11.843 10.768

Area of streams before confluence:  
 1.560 0.890

Results of confluence:

Total flow rate = 11.843(CFS)  
 Time of concentration = 7.535 min.  
 Effective stream area after confluence = 2.450(Ac.)

\*\*\*\*\*  
 Process from Point/Station 81.100 to Point/Station 81.200  
 \*\*\*\* 6 HOUR HYDROGRAPH \*\*\*\*

\*\*\*\*\*  
 Hydrograph Data - Section 6, San Diego County Hydrology manual, June 2003

Time of Concentration = 7.53  
 Basin Area = 2.45 Acres  
 6 Hour Rainfall = 3.500 Inches  
 Runoff Coefficient = 0.683  
 Peak Discharge = 11.84 CFS

Time (Min)	Discharge (CFS)
0	0.000
7	0.351
14	0.356
21	0.365
28	0.371
35	0.381
42	0.387
49	0.399
56	0.405
63	0.419
70	0.426
77	0.441
84	0.449
91	0.467
98	0.476
105	0.497
112	0.508
119	0.533
126	0.546
133	0.575
140	0.592
147	0.628
154	0.649
161	0.696
168	0.723
175	0.786
182	0.823
189	0.913
196	0.968
203	1.109
210	1.203
217	1.470
224	1.675
231	2.459
238	3.465
245	11.843
252	1.972
259	1.320
266	1.032
273	0.865
280	0.753
287	0.671
294	0.609
301	0.560
308	0.520
315	0.486
322	0.458
329	0.433
336	0.412
343	0.393
350	0.376
357	0.361
364	0.347

Job File: C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW  
Rain Dir: C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 3\

=====  
JOB TITLE  
=====

Project Date: 11/23/2012  
Project Engineer: Shapouri & Associates  
Project Title: 5508rpl4  
Project Comments: NODE 80.2  
5508rpl4 - Bioretention - BMP 3

S/N:  
PondPack Ver:                      Compute Time:                      Date:

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Executive Summary (Nodes) ..... 2.01

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HYD 3..... 100  
Read HYG ..... 3.01

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\*\*\*\*\* POND ROUTING \*\*\*\*\*

BIORETENTION3... Pond E-V-Q Table ..... 6.01

S/N:

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Compute Time:

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    BIORETENTION3OUT 100  
        Pond Routing Summary ..... 6.05  
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S/N:

PondPack Ver:

Compute Time:

Date:



Type.... Master Network Summary Page 1.01  
 Name.... Watershed  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 3\5508RPL4-100 YR-BMP 3.PPW

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY  
 SCS Unit Hydrograph Method  
 Hydrograph File Import Option Used For 1 node(s)

(\*Node=Outfall; +Node=Diversion;)  
 (Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Storage Node ID	Return Type Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond cu.ft
BIORETENTION3IN	POND	100		245.00	11.84		
BIORETENTION3OUT	POND	100		249.00	6.19	381.92	
11291							
HYD 3	HYG	100	R	245.00	11.84		
*OUT 6 - N34	JCT	100		249.00	6.19		

S/N:  
 PondPack Ver: Compute Time: Date:

Type... Executive Summary (Nodes)

Page 2.01

Name... Watershed

Event: 100 yr

File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 3\

Storm... 100 Tag: 100

NETWORK SUMMARY -- NODES

(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BIORETENTION3IN	POND	20884		245.00	11.84	
BIORETENTION3OUT	POND	11136		249.00	6.19	381.92
HYD 3	HYG	20894	R	245.00	11.84	
Outfall OUT 6 - N34	JCT	11136		249.00	6.19	

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Read HYG Page 3.01  
 Name.... HYD 3 Tag: 100 Event: 100 yr  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 3\5508RPL4-100 YR-BMP 3.PPW  
 Storm... Tag: 100

HYG file =  
 HYG ID = HYG 3  
 HYG Tag = N-80.2  
 -----  
 Peak Discharge = 11.84 cfs  
 Time to Peak = 245.00 min  
 HYG Volume = 20894 cu.ft  
 -----

HYDROGRAPH ORDINATES (cfs)						
Output Time increment = 7.00 min						
Time min	Time on left represents time for first value in each row.					
.00	.00	.35	.36	.37	.37	
35.00	.38	.39	.40	.41	.42	
70.00	.43	.44	.45	.47	.48	
105.00	.50	.51	.53	.55	.58	
140.00	.59	.63	.65	.70	.72	
175.00	.79	.82	.91	.97	1.11	
210.00	1.20	1.47	1.68	2.46	3.47	
245.00	11.84	1.97	1.32	1.03	.87	
280.00	.75	.67	.61	.56	.52	
315.00	.49	.46	.43	.41	.39	
350.00	.38	.36	.35			

S/N:  
 PondPack Ver: Compute Time: Date:

Type.... Vol: Elev-Area  
Name.... BIORETENTION3

Page 4.01

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	$A1+A2+\text{sqr}(A1*A2)$ (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
379.00	-----	5050	0	0	0
380.50	-----	5050	15150	7575	7575
381.00	-----	5500	15820	2637	10212
382.00	-----	6500	17979	5993	16205

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Vol: Void Adjustments  
Name.... BIORETENTION3

Page 4.02

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

VOLUME COMPLETELY FILLED WITH MATERIAL  
(Adjust Volumes for Voids)

Void Spaces = 72.00000 %

HW Elv, ft	Total, cu.ft	Adjusted, cu.ft
-----	-----	-----
379.00	0	0
380.50	7575	5454
381.00	10212	7352
382.00	16205	11667

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 379.00 ft  
Increment = .05 ft  
Max. Elev.= 382.00 ft

\*\*\*\*\*  
OUTLET CONNECTIVITY  
\*\*\*\*\*

---> Forward Flow Only (UpStream to DnStream)  
<--- Reverse Flow Only (DnStream to UpStream)  
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	R8	--->	CV	381.250	382.000
Stand Pipe	R3	--->	CV	381.250	382.000
Stand Pipe	R6	--->	CV	381.250	382.000
Stand Pipe	R2	--->	CV	381.250	382.000
Stand Pipe	R9	--->	CV	381.250	382.000
Stand Pipe	R1	--->	CV	381.250	372.000
Stand Pipe	R5	--->	CV	381.250	382.000
Stand Pipe	R0	--->	CV	381.250	372.000
Stand Pipe	R7	--->	CV	381.250	382.000
Stand Pipe	RP	--->	CV	381.250	372.000
Stand Pipe	R4	--->	CV	381.250	382.000
Culvert-Circular	CV	--->	TW	374.000	382.000
TW SETUP, DS Channel					

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

Page 5.02

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = R8  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

Structure ID = R3  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

S/N:  
PondPack Ver:

Compute Time:

Date:

Type... Outlet Input Data  
Name... Outlet 1

File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = R6  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

Structure ID = R2  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

S/N:  
PondPack Ver:

Compute Time:

Date:



Type.... Outlet Input Data  
Name.... Outlet 1

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = R9  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

Structure ID = R1  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

S/N:  
PondPack Ver:

Compute Time:

Date:

Type... Outlet Input Data  
Name... Outlet 1

Page 5.05

File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = R5  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

Structure ID = R0  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

S/N:  
PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

Page 5.06

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = R7  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

Structure ID = RP  
Structure Type = Stand Pipe  
-----  
# of Openings = 1  
Invert Elev. = 381.25 ft  
Diameter = .5000 ft  
Orifice Area = .1963 sq.ft  
Orifice Coeff. = .600  
Weir Length = 1.57 ft  
Weir Coeff. = 3.100  
K, Reverse = 1.000  
Mannings n = .0000  
Kev,Charged Riser = .000  
Weir Submergence = No

S/N:  
PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID	=	R4
Structure Type	=	Stand Pipe
-----		
# of Openings	=	1
Invert Elev.	=	381.25 ft
Diameter	=	.5000 ft
Orifice Area	=	.1963 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	1.57 ft
Weir Coeff.	=	3.100
K, Reverse	=	1.000
Mannings n	=	.0000
Key,Charged Riser	=	.000
Weir Submergence	=	No

S/N:  
PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

Page 5.08

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = CV  
Structure Type = Culvert-Circular  
-----  
No. Barrels = 1  
Barrel Diameter = 2.0000 ft  
Upstream Invert = 374.00 ft  
Dnstream Invert = 373.50 ft  
Horiz. Length = 47.17 ft  
Barrel Length = 47.17 ft  
Barrel Slope = .01060 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0130  
Ke = .5000 (forward entrance loss)  
Kb = .012411 (per ft of full flow)  
Kr = .5000 (reverse entrance loss)  
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 1  
Inlet Control K = .0078  
Inlet Control M = 2.0000  
Inlet Control c = .03790  
Inlet Control Y = .6900  
T1 ratio (HW/D) = 1.130  
T2 ratio (HW/D) = 1.291  
Slope Factor = -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.  
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,  
interpolate between flows at T1 & T2...

At T1 Elev = 376.26 ft ---> Flow = 15.55 cfs  
At T2 Elev = 376.58 ft ---> Flow = 17.77 cfs

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

Page 5.09

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = TW  
Structure Type = TW SETUP, DS Channel  
-----

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...

Channel Type: Chn-Circular  
Channel ID: Chn-Cir - 1

CONVERGENCE TOLERANCES...

Maximum Iterations= 40  
Min. TW tolerance = .01 ft  
Max. TW tolerance = .01 ft  
Min. HW tolerance = .01 ft  
Max. HW tolerance = .01 ft  
Min. Q tolerance = .00 cfs  
Max. Q tolerance = .00 cfs

S/N:  
PondPack Ver:

Compute Time:

Date:

Type.... Outlet Input Data  
Name.... Outlet 1

Page 5.10

File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...  
Channel Type: Chn-Circular  
Channel ID: Chn-Cir - 1

Solution to Mannings Open Channel Flow Equation  
(Computed values are based on normal depth.)

CIRCULAR CROSS SECTION

Slope = .014000 ft/ft  
Mannings n = 0.01300  
Invert Elev. = 373.00 ft  
Top of Channel = 375.00 ft  
Diameter = 2.0000 ft

S/N:  
PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table Page 6.01  
 Name.... BIORETENTION3  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
 Pack\BMP 3\  
 Inflow HYG file = NONE STORED - BIORETENTION3IN 100  
 Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3  
 Pond Volume Data = BIORETENTION3  
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

-----  
 Starting WS Elev = 379.00 ft  
 Starting Volume = 0 cu.ft  
 Starting Outflow = .00 cfs  
 Starting Infiltr. = .00 cfs  
 Starting Total Qout= .00 cfs  
 Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
379.00	.00	0	5050	.00	.00	.00
379.05	.00	182	5050	.06	.06	6.12
379.10	.00	364	5050	.06	.06	12.18
379.15	.00	545	5050	.06	.06	18.24
379.20	.00	727	5050	.06	.06	24.30
379.25	.00	909	5050	.06	.06	30.36
379.30	.00	1091	5050	.06	.06	36.42
379.35	.00	1273	5050	.06	.06	42.48
379.40	.00	1454	5050	.06	.06	48.54
379.45	.00	1636	5050	.06	.06	54.60
379.50	.00	1818	5050	.06	.06	60.66
379.55	.00	2000	5050	.06	.06	66.72
379.60	.00	2182	5050	.06	.06	72.78
379.65	.00	2363	5050	.06	.06	78.84
379.70	.00	2545	5050	.06	.06	84.90
379.75	.00	2727	5050	.06	.06	90.96
379.80	.00	2909	5050	.06	.06	97.02
379.85	.00	3091	5050	.06	.06	103.08
379.90	.00	3272	5050	.06	.06	109.14
379.95	.00	3454	5050	.06	.06	115.20

S/N:

PondPack Ver:

Compute Time:

Date:



Type.... Pond E-V-Q Table Page 6.02  
 Name.... BIORETENTION3  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
 Pack\BMP 3\  
 Inflow HYG file = NONE STORED - BIORETENTION3IN 100  
 Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3  
 Pond Volume Data = BIORETENTION3  
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

-----  
 Starting WS Elev = 379.00 ft  
 Starting Volume = 0 cu.ft  
 Starting Outflow = .00 cfs  
 Starting Infiltr. = .00 cfs  
 Starting Total Qout = .00 cfs  
 Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
380.00	.00	3636	5050	.06	.06	121.26
380.05	.00	3818	5050	.06	.06	127.32
380.10	.00	4000	5050	.06	.06	133.38
380.15	.00	4181	5050	.06	.06	139.44
380.20	.00	4363	5050	.06	.06	145.50
380.25	.00	4545	5050	.06	.06	151.56
380.30	.00	4727	5050	.06	.06	157.62
380.35	.00	4909	5050	.06	.06	163.68
380.40	.00	5090	5050	.06	.06	169.74
380.45	.00	5272	5050	.06	.06	175.80
380.50	.00	5454	5050	.06	.06	181.86
380.55	.00	5637	5094	.06	.06	187.94
380.60	.00	5821	5138	.06	.06	194.09
380.65	.00	6007	5183	.06	.06	200.28
380.70	.00	6194	5228	.06	.06	206.53
380.75	.00	6383	5273	.06	.06	212.83
380.80	.00	6574	5318	.06	.06	219.18
380.85	.00	6766	5363	.06	.06	225.59
380.90	.00	6960	5408	.06	.06	232.05
380.95	.00	7155	5454	.06	.06	238.57

S/N:

PondPack Ver:

Compute Time:

Date:

Type... Pond E-V-Q Table

Page 6.03

Name... BIORETENTION3

File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 3\  
Pack\BMP 3\  
Inflow HYG file = NONE STORED - BIORETENTION3IN 100  
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3  
Pond Volume Data = BIORETENTION3  
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

-----  
Starting WS Elev = 379.00 ft  
Starting Volume = 0 cu.ft  
Starting Outflow = .00 cfs  
Starting Infiltr. = .00 cfs  
Starting Total Qout= .00 cfs  
Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
381.00	.00	7352	5500	.06	.06	245.14
381.05	.00	7551	5548	.06	.06	251.77
381.10	.00	7752	5596	.06	.06	258.46
381.15	.00	7954	5645	.07	.07	265.20
381.20	.00	8158	5693	.07	.07	272.01
381.25	.00	8364	5742	.07	.07	278.87
381.30	.44	8572	5791	.07	.50	286.22
381.35	1.23	8781	5841	.07	1.30	294.00
381.40	2.27	8992	5890	.07	2.33	302.07
381.45	3.38	9205	5940	.07	3.45	310.29
381.50	3.78	9420	5990	.07	3.85	317.85
381.55	4.14	9636	6040	.07	4.21	325.42
381.60	4.47	9855	6090	.07	4.54	333.04
381.65	4.78	10075	6140	.07	4.86	340.69
381.70	5.07	10297	6191	.07	5.14	348.37
381.75	5.35	10521	6242	.07	5.42	356.11
381.80	5.61	10746	6293	.07	5.68	363.89
381.85	5.86	10974	6345	.07	5.93	371.72
381.90	6.10	11203	6396	.07	6.17	379.61
381.95	6.32	11434	6448	.07	6.40	387.54

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table Page 6.04  
 Name.... BIORETENTION3  
 File.... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 3\5508RPL4-100 YR-BMP 3.PPW

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
 Pack\BMP 3\  
 Inflow HYG file = NONE STORED - BIORETENTION3IN 100  
 Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3  
 Pond Volume Data = BIORETENTION3  
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

-----  
 Starting WS Elev = 379.00 ft  
 Starting Volume = 0 cu.ft  
 Starting Outflow = .00 cfs  
 Starting Infiltr. = .00 cfs  
 Starting Total Qout = .00 cfs  
 Time Increment = 1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infiltr. cfs	Q Total cfs	2S/t + O cfs
382.00	6.55	11667	6500	.08	6.62	395.53

S/N:

PondPack Ver:

Compute Time:

Date:

Type... Pond Routing Summary Page 6.05  
 Name... BIORETENTION3OUT Tag: 100 Event: 100 yr  
 File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
 3\5508RPL4-100 YR-BMP 3.PPW  
 Storm... 100 Tag: 100

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
 Pack\BMP 3\  
 Inflow HYG file = NONE STORED - BIORETENTION3IN 100  
 Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3  
 Pond Volume Data = BIORETENTION3  
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

-----  
 Starting WS Elev = 379.00 ft  
 Starting Volume = 0 cu.ft  
 Starting Outflow = .00 cfs  
 Starting Infiltr. = .00 cfs  
 Starting Total Qout= .00 cfs  
 Time Increment = 1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

=====  
 Peak Inflow = 11.84 cfs at 245.00 min  
 Peak Outflow = 6.19 cfs at 249.00 min  
 Peak Infiltration = .07 cfs at 249.00 min  
 -----  
 Peak Elevation = 381.92 ft  
 Peak Storage = 11291 cu.ft  
 =====

MASS BALANCE (cu.ft)

-----  
 + Initial Vol = 0  
 + HYG Vol IN = 20884  
 - Infiltration = 7258  
 - HYG Vol OUT = 11136  
 - Retained Vol = 2489  
 -----  
 Unrouted Vol = - cu.ft (.000% of Inflow Volume)

S/N:  
 PondPack Ver: Compute Time: Date:

Type... Detention Time  
Name... BIORETENTION3OUT Tag: 100 Page 6.06  
File... C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP  
3\5508RPL4-100 YR-BMP 3.PPW Event: 100 yr  
Storm... 100 Tag: 100

DETENTION TIMES SUMMARY

HYG Dir = C:\Shap\_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond  
Pack\BMP 3\

Inflow HYG file = NONE STORED - BIORETENTION3IN 100  
Outflow HYG file = NONE STORED - BIORETENTION3OUT 100

Pond Node Data = BIORETENTION3  
Pond Volume Data = BIORETENTION3  
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

APPROXIMATE DETENTION TIME

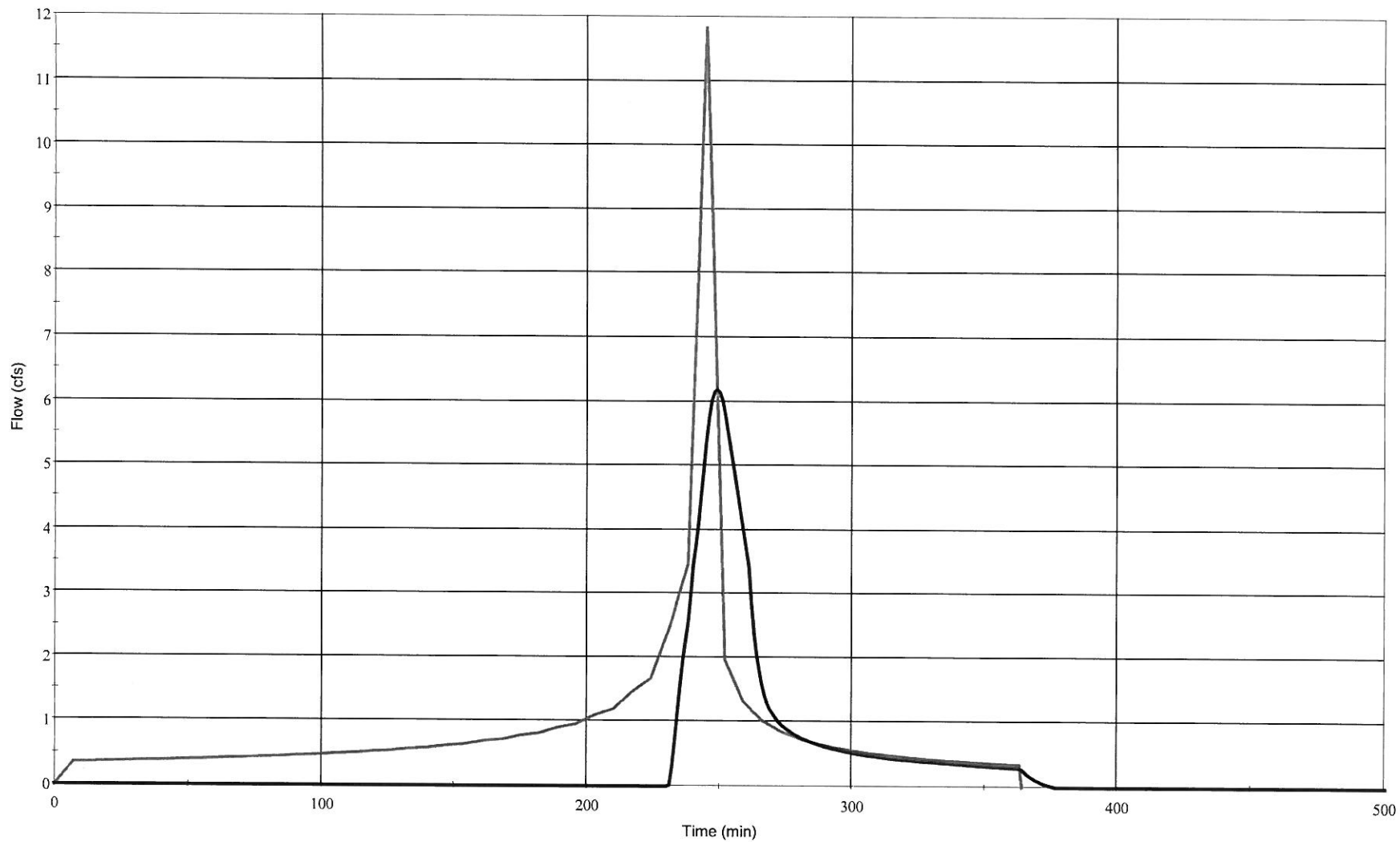
-----  
Tp, Outflow + Infilt. = 249.00 min  
Tp, Total Inflow = 245.00 min  
Peak to Peak = 4.00 min  
  
Qout+Infilt. Centroid = 549.99 min  
Inflow Centroid = 212.13 min  
Centroid to Centroid = 337.86 min  
  
Weighted Avg. Plug Time = 526.38 min  
Max.Plug Vol. Plug Time = 414.91 min  
Max.Inflow Plug Volume = 675 cu.ft (From 244.00 to 245.00 min)  
-----

S/N:  
PondPack Ver:

Compute Time:

Date:

NODE 80.2 - BIORETENTION - BMP 3  
INFLOW/OUTFLOW HYDROGRAPH  
100-YEAR STORM EVENT



— INFLOW= 11.84 CFS    — OUTFLOW= 6.19 CFS

# Bio-Retention Pond-4

---

100-year Development Conditions

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c)1991-2003 Version 7.3

Rational method hydrology program based on  
San Diego County Flood Control Division 2003 hydrology manual  
Rational Hydrology Study Date: 11/13/12

\*\*\*\*\* Hydrology Study Control Information \*\*\*\*\*

WARNER RANCH  
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS  
BIO-RETENTION POND 4

Shapouri & Associates, Rancho Santa Fe, CA - S/N 968

Rational hydrology study storm event year is 100.0  
English (in-lb) input data Units used

Map data precipitation entered:  
6 hour, precipitation(inches) = 3.500  
24 hour precipitation(inches) = 6.000  
P6/P24 = 58.3%  
San Diego hydrology manual 'C' values used

\*\*\*\*\*  
Process from Point/Station 82.100 to Point/Station 82.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 0.900  
Decimal fraction soil group D = 0.100  
[MEDIUM DENSITY RESIDENTIAL ]  
(4.3 DU/A or Less )  
Impervious value, Ai = 0.300  
Sub-Area C Value = 0.484  
Initial subarea total flow distance = 674.140(Ft.)  
Highest elevation = 436.000(Ft.)  
Lowest elevation = 413.000(Ft.)  
Elevation difference = 23.000(Ft.) Slope = 3.412 %  
Top of Initial Area Slope adjusted by User to 7.000 %  
Bottom of Initial Area Slope adjusted by User to 2.270 %  
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
The maximum overland flow distance is 100.00 (Ft)  
for the top area slope value of 7.00 %, in a development type of  
4.3 DU/A or Less  
In Accordance With Figure 3-3  
Initial Area Time of Concentration = 5.80 minutes  
TC =  $[1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})$   
TC =  $[1.8 * (1.1 - 0.4840) * (100.000^{.5})] / (7.000^{(1/3)}) = 5.80$   
The initial area total distance of 674.14 (Ft.) entered leaves a  
remaining distance of 574.14 (Ft.)  
Using Figure 3-4, the travel time for this distance is 4.47 minutes  
for a distance of 574.14 (Ft.) and a slope of 2.27 %  
with an elevation difference of 13.03(Ft.) from the end of the top area

$Tt = [11.9 * \text{length}(\text{Mi})^3] / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})$   
= 4.467 Minutes  
 $Tt = [(11.9 * 0.1087^3) / (13.03)]^{.385} = 4.47$   
Total initial area Ti = 5.80 minutes from Figure 3-3 formula plus  
4.47 minutes from the Figure 3-4 formula = 10.26 minutes  
Rainfall intensity (I) = 5.799(In/Hr) for a 100.0 year storm  
Effective runoff coefficient used for area (Q=KCIA) is C = 0.484  
Subarea runoff = 2.891(CFS)  
Total initial stream area = 1.030 (Ac.)

\*\*\*\*\*  
Process from Point/Station 82.200 to Point/Station 64.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 408.000(Ft.)  
Downstream point/station elevation = 399.500(Ft.)  
Pipe length = 347.44(Ft.) Manning's N = 0.015  
No. of pipes = 1 Required pipe flow = 2.891(CFS)  
Pipe size = 24.00(In.)  
Calculated individual pipe flow = 2.891(CFS)  
Normal flow depth in pipe = 4.98(In.)  
Flow top width inside pipe = 19.47(In.)  
Critical Depth = 7.11(In.)  
Pipe flow velocity = 6.14(Ft/s)  
Travel time through pipe = 0.94 min.  
Time of concentration (TC) = 11.21 min.

\*\*\*\*\*  
Process from Point/Station 82.200 to Point/Station 64.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:  
In Main Stream number: 1  
Stream flow area = 1.030 (Ac.)  
Runoff from this stream = 2.891 (CFS)  
Time of concentration = 11.21 min.  
Rainfall intensity = 5.479 (In/Hr)  
Program is now starting with Main Stream No. 2

\*\*\*\*\*  
Process from Point/Station 83.100 to Point/Station 83.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.800  
Decimal fraction soil group C = 0.200  
Decimal fraction soil group D = 0.000  
[Street and Roads]  
(Paved)  
Impervious value, Ai = 0.950  
Sub-Area C Value = 0.870  
Initial subarea total flow distance = 781.000(Ft.)  
Highest elevation = 420.000(Ft.)  
Lowest elevation = 405.000(Ft.)



Elevation difference = 15.000(Ft.) Slope = 1.921 %  
 Top of Initial Area Slope adjusted by User to 1.330 %  
 Bottom of Initial Area Slope adjusted by User to 2.420 %  
 INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
 The maximum overland flow distance is 60.00 (Ft)  
 for the top area slope value of 1.33 %, in a development type of  
 General Industrial  
 In Accordance With Figure 3-3  
 Initial Area Time of Concentration = 2.92 minutes  
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{1/3})$   
 $TC = [1.8 * (1.1 - 0.8700) * (60.000^{.5}) / (1.330^{1/3})] = 2.92$   
 The initial area total distance of 781.00 (Ft.) entered leaves a  
 remaining distance of 721.00 (Ft.)  
 Using Figure 3-4, the travel time for this distance is 5.19 minutes  
 for a distance of 721.00 (Ft.) and a slope of 2.42 %  
 with an elevation difference of 17.45(Ft.) from the end of the top area  
 $Tt = [11.9 * length(Mi)^3 / (elevation\ change(Ft.))]^{.385} * 60(\text{min/hr})$   
 = 5.193 Minutes  
 $Tt = [(11.9 * 0.1366^3) / (17.45)]^{.385} = 5.19$   
 Total initial area  $Ti = 2.92$  minutes from Figure 3-3 formula plus  
 5.19 minutes from the Figure 3-4 formula = 8.11 minutes  
 Rainfall intensity (I) = 6.751(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.870  
 Subarea runoff = 2.467(CFS)  
 Total initial stream area = 0.420(Ac.)

\*\*\*\*\*  
 Process from Point/Station 83.200 to Point/Station 64.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

---

Upstream point/station elevation = 400.000(Ft.)  
 Downstream point/station elevation = 399.500(Ft.)  
 Pipe length = 27.53(Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 2.467(CFS)  
 Given pipe size = 24.00(In.)  
 Calculated individual pipe flow = 2.467(CFS)  
 Normal flow depth in pipe = 4.95(In.)  
 Flow top width inside pipe = 19.43(In.)  
 Critical Depth = 6.54(In.)  
 Pipe flow velocity = 5.27(Ft/s)  
 Travel time through pipe = 0.09 min.  
 Time of concentration (TC) = 8.20 min.

\*\*\*\*\*  
 Process from Point/Station 83.200 to Point/Station 64.000  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

---

The following data inside Main Stream is listed:  
 In Main Stream number: 2  
 Stream flow area = 0.420(Ac.)  
 Runoff from this stream = 2.467(CFS)  
 Time of concentration = 8.20 min.  
 Rainfall intensity = 6.704(In/Hr)  
 Program is now starting with Main Stream No. 3

\*\*\*\*\*  
 Process from Point/Station 84.100 to Point/Station 84.200  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

---

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 [Street and Roads]  
 (Paved)  
 Impervious value,  $A_i = 0.950$   
 Sub-Area C Value = 0.870  
 Initial subarea total flow distance = 777.000(Ft.)  
 Highest elevation = 414.000(Ft.)  
 Lowest elevation = 405.000(Ft.)  
 Elevation difference = 9.000(Ft.) Slope = 1.158 %  
 Top of Initial Area Slope adjusted by User to 1.000 %  
 Bottom of Initial Area Slope adjusted by User to 2.400 %  
 INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
 The maximum overland flow distance is 60.00 (Ft)  
 for the top area slope value of 1.00 %, in a development type of  
 General Industrial

In Accordance With Figure 3-3  
 Initial Area Time of Concentration = 3.21 minutes  
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{1/3})$   
 $TC = [1.8 * (1.1 - 0.8700) * (60.000^{.5}) / (1.000^{1/3})] = 3.21$   
 The initial area total distance of 777.00 (Ft.) entered leaves a  
 remaining distance of 717.00 (Ft.)  
 Using Figure 3-4, the travel time for this distance is 5.19 minutes  
 for a distance of 717.00 (Ft.) and a slope of 2.40 %  
 with an elevation difference of 17.21(Ft.) from the end of the top area  
 $Tt = [11.9 * length(Mi)^3 / (elevation\ change(Ft.))]^{.385} * 60(\text{min/hr})$   
 = 5.188 Minutes  
 $Tt = [(11.9 * 0.1358^3) / (17.21)]^{.385} = 5.19$   
 Total initial area  $Ti = 3.21$  minutes from Figure 3-3 formula plus  
 5.19 minutes from the Figure 3-4 formula = 8.39 minutes  
 Rainfall intensity (I) = 6.602(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.870  
 Subarea runoff = 3.159(CFS)  
 Total initial stream area = 0.550(Ac.)

\*\*\*\*\*  
 Process from Point/Station 84.200 to Point/Station 64.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

---

Upstream point/station elevation = 400.000(Ft.)  
 Downstream point/station elevation = 399.500(Ft.)  
 Pipe length = 5.77(Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 3.159(CFS)  
 Given pipe size = 24.00(In.)  
 Calculated individual pipe flow = 3.159(CFS)  
 Normal flow depth in pipe = 3.81(In.)  
 Flow top width inside pipe = 17.55(In.)  
 Critical Depth = 7.44(In.)  
 Pipe flow velocity = 9.84(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 8.40 min.

\*\*\*\*\*  
 Process from Point/Station 84.200 to Point/Station 64.000  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:  
 In Main Stream number: 3  
 Stream flow area = 0.550(Ac.)  
 Runoff from this stream = 3.159(CFS)  
 Time of concentration = 8.40 min.  
 Rainfall intensity = 6.597(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.891	11.21	5.479
2	2.467	8.20	6.704
3	3.159	8.40	6.597
Qmax(1) =	1.000 * 0.817 * 0.831 *	1.000 * 1.000 * 1.000 *	2.891) + 2.467) + 3.159) + = 7.531
Qmax(2) =	1.000 * 1.000 * 1.000 *	0.731 * 1.000 * 0.975 *	2.891) + 2.467) + 3.159) + = 7.662
Qmax(3) =	1.000 * 0.984 * 1.000 *	0.750 * 1.000 * 1.000 *	2.891) + 2.467) + 3.159) + = 7.754

Total of 3 main streams to confluence:  
 Flow rates before confluence point:  
 2.891 2.467 3.159  
 Maximum flow rates at confluence using above data:  
 7.531 7.662 7.754  
 Area of streams before confluence:  
 1.030 0.420 0.550

Results of confluence:  
 Total flow rate = 7.754(CFS)  
 Time of concentration = 8.404 min.  
 Effective stream area after confluence = 2.000(Ac.)

\*\*\*\*\*  
 Process from Point/Station 64.000 to Point/Station 66.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 399.500(Ft.)  
 Downstream point/station elevation = 397.500(Ft.)  
 Pipe length = 50.16(Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 7.754(CFS)  
 Given pipe size = 24.00(In.)  
 Calculated individual pipe flow = 7.754(CFS)

Normal flow depth in pipe = 7.24(In.)  
 Flow top width inside pipe = 22.03(In.)  
 Critical Depth = 11.87(In.)  
 Pipe flow velocity = 9.70(Ft/s)  
 Travel time through pipe = 0.09 min.  
 Time of concentration (TC) = 8.49 min.

\*\*\*\*\*  
 Process from Point/Station 64.000 to Point/Station 66.000  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:  
 In Main Stream number: 1  
 Stream flow area = 2.000(Ac.)  
 Runoff from this stream = 7.754(CFS)  
 Time of concentration = 8.49 min.  
 Rainfall intensity = 6.554(In/Hr)  
 Program is now starting with Main Stream No. 2

\*\*\*\*\*  
 Process from Point/Station 85.100 to Point/Station 85.200  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.600  
 Decimal fraction soil group C = 0.400  
 Decimal fraction soil group D = 0.000  
 [HIGH DENSITY RESIDENTIAL ]  
 (24.0 DU/A or Less )  
 Impervious value, Ai = 0.650  
 Sub-Area C Value = 0.678  
 Initial subarea total flow distance = 551.750(Ft.)  
 Highest elevation = 406.000(Ft.)  
 Lowest elevation = 404.000(Ft.)  
 Elevation difference = 2.000(Ft.) Slope = 0.362 %  
 INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
 The maximum overland flow distance is 50.00 (Ft)  
 for the top area slope value of 0.36 %, in a development type of  
 24.0 DU/A or Less  
 In Accordance With Figure 3-3  
 Initial Area Time of Concentration = 7.54 minutes  
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (% slope^{(1/3)})$   
 $TC = [1.8 * (1.1 - 0.6780) * (50.000^{.5})] / (0.362^{(1/3)}) = 7.54$   
 The initial area total distance of 551.75 (Ft.) entered leaves a  
 remaining distance of 501.75 (Ft.)  
 Using Figure 3-4, the travel time for this distance is 8.16 minutes  
 for a distance of 501.75 (Ft.) and a slope of 0.36 %  
 with an elevation difference of 1.82(Ft.) from the end of the top area  
 $Tt = [11.9 * length(Mi)^3] / (elevation change(Ft.))^{.385} * 60(min/hr)$   
 $= 8.163 Minutes$   
 $Tt = [(11.9 * 0.0950^3) / (1.82)]^{.385} = 8.16$   
 Total initial area Ti = 7.54 minutes from Figure 3-3 formula plus  
 8.16 minutes from the Figure 3-4 formula = 15.70 minutes  
 Rainfall intensity (I) = 4.408(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.678  
 Subarea runoff = 8.070(CFS)  
 Total initial stream area = 2.700(Ac.)

\*\*\*\*\*  
 Process from Point/Station 85.200 to Point/Station 65.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 399.000(Ft.)  
 Downstream point/station elevation = 398.500(Ft.)  
 Pipe length = 6.06(Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 8.070(CFS)  
 Given pipe size = 24.00(In.)  
 Calculated individual pipe flow = 8.070(CFS)  
 Normal flow depth in pipe = 6.14(In.)  
 Flow top width inside pipe = 20.94(In.)  
 Critical Depth = 12.13(In.)  
 Pipe flow velocity = 12.73(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 15.71 min.

\*\*\*\*\*  
 Process from Point/Station 85.200 to Point/Station 65.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 2 in normal stream number 1  
 Stream flow area = 2.700(Ac.)  
 Runoff from this stream = 8.070(CFS)  
 Time of concentration = 15.71 min.  
 Rainfall intensity = 4.407(In/Hr)

\*\*\*\*\*  
 Process from Point/Station 86.100 to Point/Station 86.200  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 0.900  
 Decimal fraction soil group D = 0.100  
 [HIGH DENSITY RESIDENTIAL ]  
 (24.0 DU/A or Less )  
 Impervious value, Ai = 0.650  
 Sub-Area C Value = 0.692  
 Initial subarea total flow distance = 555.000(Ft.)  
 Highest elevation = 406.000(Ft.)  
 Lowest elevation = 404.000(Ft.)  
 Elevation difference = 2.000(Ft.) Slope = 0.360 %  
 INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
 The maximum overland flow distance is 50.00 (Ft)  
 for the top area slope value of 0.36 %, in a development type of  
 24.0 DU/A or Less  
 In Accordance With Figure 3-3  
 Initial Area Time of Concentration = 7.30 minutes  
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})$   
 $TC = [1.8 * (1.1 - 0.6920) * (50.000^{.5})] / (0.360^{(1/3)}) = 7.30$   
 The initial area total distance of 555.00 (Ft.) entered leaves a  
 remaining distance of 505.00 (Ft.)  
 Using Figure 3-4, the travel time for this distance is 8.22 minutes  
 for a distance of 505.00 (Ft.) and a slope of 0.36 %

with an elevation difference of 1.82(Ft.) from the end of the top area  
 $Tt = [11.9 * length(Mi)^3] / (elevation\ change(Ft.))^{.385} * 60(\text{min/hr})$   
 = 8.222 Minutes  
 $Tt = [(11.9 * 0.0956^3) / (1.82)]^{.385} = 8.22$   
 Total initial area Ti = 7.30 minutes from Figure 3-3 formula plus  
 8.22 minutes from the Figure 3-4 formula = 15.52 minutes  
 Rainfall intensity (I) = 4.441(In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.692  
 Subarea runoff = 7.407(CFS)  
 Total initial stream area = 2.410(Ac.)

\*\*\*\*\*  
 Process from Point/Station 86.200 to Point/Station 65.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 399.000(Ft.)  
 Downstream point/station elevation = 398.500(Ft.)  
 Pipe length = 27.07(Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 7.407(CFS)  
 Given pipe size = 24.00(In.)  
 Calculated individual pipe flow = 7.407(CFS)  
 Normal flow depth in pipe = 8.65(In.)  
 Flow top width inside pipe = 23.04(In.)  
 Critical Depth = 11.61(In.)  
 Pipe flow velocity = 7.26(Ft/s)  
 Travel time through pipe = 0.06 min.  
 Time of concentration (TC) = 15.58 min.

\*\*\*\*\*  
 Process from Point/Station 86.200 to Point/Station 65.000  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 2 in normal stream number 2  
 Stream flow area = 2.410(Ac.)  
 Runoff from this stream = 7.407(CFS)  
 Time of concentration = 15.58 min.  
 Rainfall intensity = 4.430(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.070	15.71	4.407
2	7.407	15.58	4.430
Qmax(1) =	1.000 * 0.995 *	1.000 * 1.000 *	8.070) + 7.407) + = 15.439
Qmax(2) =	1.000 * 1.000 *	0.992 * 1.000 *	8.070) + 7.407) + = 15.413

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 8.070 7.407  
 Maximum flow rates at confluence using above data:  
 15.439 15.413

Area of streams before confluence:  
2.700 2.410

Results of confluence:

Total flow rate = 15.439(CFS)  
Time of concentration = 15.708 min.  
Effective stream area after confluence = 5.110(Ac.)

\*\*\*\*\*  
Process from Point/Station 65.000 to Point/Station 66.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 398.500(Ft.)  
Downstream point/station elevation = 397.500(Ft.)  
Pipe length = 53.18(Ft.) Manning's N = 0.015  
No. of pipes = 1 Required pipe flow = 15.439(CFS)  
Given pipe size = 24.00(In.)  
Calculated individual pipe flow = 15.439(CFS)  
Normal flow depth in pipe = 13.04(In.)  
Flow top width inside pipe = 23.91(In.)  
Critical Depth = 17.01(In.)  
Pipe flow velocity = 8.85(Ft/s)  
Travel time through pipe = 0.10 min.  
Time of concentration (TC) = 15.81 min.

\*\*\*\*\*  
Process from Point/Station 65.000 to Point/Station 66.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:

In Main Stream number: 2  
Stream flow area = 5.110(Ac.)  
Runoff from this stream = 15.439(CFS)  
Time of concentration = 15.81 min.  
Rainfall intensity = 4.389(In/Hr)  
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	7.754	8.49	6.554
2	15.439	15.81	4.389
Qmax(1) =	1.000 *	1.000 *	7.754) +
	1.000 *	0.537 *	15.439) + = 16.046
Qmax(2) =	0.670 *	1.000 *	7.754) +
	1.000 *	1.000 *	15.439) + = 20.632

Total of 2 main streams to confluence:

Flow rates before confluence point:  
7.754 15.439

Maximum flow rates at confluence using above data:  
16.046 20.632

Area of streams before confluence:  
2.000 5.110

Results of confluence:

Total flow rate = 20.632(CFS)  
Time of concentration = 15.808 min.  
Effective stream area after confluence = 7.110(Ac.)

\*\*\*\*\*  
Process from Point/Station 66.000 to Point/Station 67.000  
\*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 397.500(Ft.)  
Downstream point/station elevation = 391.500(Ft.)  
Pipe length = 253.65(Ft.) Manning's N = 0.015  
No. of pipes = 1 Required pipe flow = 20.632(CFS)  
Given pipe size = 24.00(In.)  
Calculated individual pipe flow = 20.632(CFS)  
Normal flow depth in pipe = 14.58(In.)  
Flow top width inside pipe = 23.44(In.)  
Critical Depth = 19.56(In.)  
Pipe flow velocity = 10.34(Ft/s)  
Travel time through pipe = 0.41 min.  
Time of concentration (TC) = 16.22 min.

\*\*\*\*\*  
Process from Point/Station 66.000 to Point/Station 67.000  
\*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:

In Main Stream number: 1  
Stream flow area = 7.110(Ac.)  
Runoff from this stream = 20.632(CFS)  
Time of concentration = 16.22 min.  
Rainfall intensity = 4.317(In/Hr)  
Program is now starting with Main Stream No. 2

\*\*\*\*\*  
Process from Point/Station 87.100 to Point/Station 87.200  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
Decimal fraction soil group B = 0.000  
Decimal fraction soil group C = 1.000  
Decimal fraction soil group D = 0.000  
[COMMERCIAL area type ]  
(Neighborhood Commercial )  
Impervious value, Ai = 0.800  
Sub-Area C Value = 0.780  
Initial subarea total flow distance = 113.150(Ft.)  
Highest elevation = 404.000(Ft.)  
Lowest elevation = 401.000(Ft.)  
Elevation difference = 3.000(Ft.) Slope = 2.651 %  
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
The maximum overland flow distance is 85.00 (Ft)  
for the top area slope value of 2.65 %, in a development type of

Neighborhood Commercial

In Accordance With Figure 3-3

Initial Area Time of Concentration = 3.84 minutes  
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})$   
 $TC = [1.8 * (1.1 - 0.7800) * (85.000^{.5})] / (2.651^{(1/3)}) = 3.84$   
 The initial area total distance of 113.15 (Ft.) entered leaves a remaining distance of 28.15 (Ft.)  
 Using Figure 3-4, the travel time for this distance is 0.41 minutes for a distance of 28.15 (Ft.) and a slope of 2.65 % with an elevation difference of 0.75 (Ft.) from the end of the top area  
 $Tt = [11.9 * length(Mi)^3] / (elevation change(Ft.))^{.385} * 60(min/hr)$   
 = 0.413 Minutes  
 $Tt = [(11.9 * 0.0053^3) / (0.75)]^{.385} = 0.41$   
 Total initial area  $Ti = 3.84$  minutes from Figure 3-3 formula plus 0.41 minutes from the Figure 3-4 formula = 4.25 minutes  
 Rainfall intensity (I) = 10.241 (In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.780  
 Subarea runoff = 1.757 (CFS)  
 Total initial stream area = 0.220 (Ac.)

\*\*\*\*\*  
 Process from Point/Station 87.200 to Point/Station 88.200  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 396.000 (Ft.)  
 Downstream point/station elevation = 394.000 (Ft.)  
 Pipe length = 102.37 (Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 1.757 (CFS)  
 Given pipe size = 24.00 (In.)  
 Calculated individual pipe flow = 1.757 (CFS)  
 Normal flow depth in pipe = 4.12 (In.)  
 Flow top width inside pipe = 18.10 (In.)  
 Critical Depth = 5.49 (In.)  
 Pipe flow velocity = 4.89 (Ft/s)  
 Travel time through pipe = 0.35 min.  
 Time of concentration (TC) = 4.60 min.

\*\*\*\*\*  
 Process from Point/Station 87.200 to Point/Station 88.200  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 2 in normal stream number 1  
 Stream flow area = 0.220 (Ac.)  
 Runoff from this stream = 1.757 (CFS)  
 Time of concentration = 4.60 min.  
 Rainfall intensity = 9.733 (In/Hr)

\*\*\*\*\*  
 Process from Point/Station 88.100 to Point/Station 88.200  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.000  
 Decimal fraction soil group C = 1.000

Decimal fraction soil group D = 0.000

[COMMERCIAL area type ]  
 (Neighborhood Commercial )

Impervious value,  $A_i = 0.800$   
 Sub-Area C Value = 0.780  
 Initial subarea total flow distance = 150.040 (Ft.)  
 Highest elevation = 401.000 (Ft.)  
 Lowest elevation = 399.000 (Ft.)  
 Elevation difference = 2.000 (Ft.) Slope = 1.333 %  
 INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:  
 The maximum overland flow distance is 60.00 (Ft) for the top area slope value of 1.33 %, in a development type of Neighborhood Commercial

In Accordance With Figure 3-3

Initial Area Time of Concentration = 4.05 minutes  
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})$   
 $TC = [1.8 * (1.1 - 0.7800) * (60.000^{.5})] / (1.333^{(1/3)}) = 4.05$   
 The initial area total distance of 150.04 (Ft.) entered leaves a remaining distance of 90.04 (Ft.)  
 Using Figure 3-4, the travel time for this distance is 1.32 minutes for a distance of 90.04 (Ft.) and a slope of 1.33 % with an elevation difference of 1.20 (Ft.) from the end of the top area  
 $Tt = [11.9 * length(Mi)^3] / (elevation change(Ft.))^{.385} * 60(min/hr)$   
 = 1.317 Minutes  
 $Tt = [(11.9 * 0.0171^3) / (1.20)]^{.385} = 1.32$   
 Total initial area  $Ti = 4.05$  minutes from Figure 3-3 formula plus 1.32 minutes from the Figure 3-4 formula = 5.37 minutes  
 Rainfall intensity (I) = 8.806 (In/Hr) for a 100.0 year storm  
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.780  
 Subarea runoff = 2.129 (CFS)  
 Total initial stream area = 0.310 (Ac.)

\*\*\*\*\*  
 Process from Point/Station 88.100 to Point/Station 88.200  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 2 in normal stream number 2  
 Stream flow area = 0.310 (Ac.)  
 Runoff from this stream = 2.129 (CFS)  
 Time of concentration = 5.37 min.  
 Rainfall intensity = 8.806 (In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	1.757	4.60	9.733
2	2.129	5.37	8.806
Qmax(1) =			
	1.000 *	1.000 *	1.757) +
	1.000 *	0.856 *	2.129) + =
			3.580
Qmax(2) =			
	0.905 *	1.000 *	1.757) +
	1.000 *	1.000 *	2.129) + =
			3.719

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 1.757      2.129  
 Maximum flow rates at confluence using above data:  
 3.580      3.719  
 Area of streams before confluence:  
 0.220      0.310  
 Results of confluence:  
 Total flow rate = 3.719(CFS)  
 Time of concentration = 5.371 min.  
 Effective stream area after confluence = 0.530(Ac.)

\*\*\*\*\*  
 Process from Point/Station 88.200 to Point/Station 67.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 394.000(Ft.)  
 Downstream point/station elevation = 391.500(Ft.)  
 Pipe length = 252.20(Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 3.719(CFS)  
 Given pipe size = 24.00(In.)  
 Calculated individual pipe flow = 3.719(CFS)  
 Normal flow depth in pipe = 7.10(In.)  
 Flow top width inside pipe = 21.91(In.)  
 Critical Depth = 8.10(In.)  
 Pipe flow velocity = 4.79(Ft/s)  
 Travel time through pipe = 0.88 min.  
 Time of concentration (TC) = 6.25 min.

\*\*\*\*\*  
 Process from Point/Station 88.200 to Point/Station 67.000  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:  
 In Main Stream number: 2  
 Stream flow area = 0.530(Ac.)  
 Runoff from this stream = 3.719(CFS)  
 Time of concentration = 6.25 min.  
 Rainfall intensity = 7.986(In/Hr)  
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	20.632	16.22	4.317
2	3.719	6.25	7.986
Qmax(1) =	1.000 * 0.541 *	1.000 * 1.000 *	20.632) + 3.719) + = 22.642
Qmax(2) =	1.000 * 1.000 *	0.385 * 1.000 *	20.632) + 3.719) + = 11.669

Total of 2 main streams to confluence:  
 Flow rates before confluence point:  
 20.632      3.719  
 Maximum flow rates at confluence using above data:  
 22.642      11.669  
 Area of streams before confluence:  
 7.110      0.530

Results of confluence:  
 Total flow rate = 22.642(CFS)  
 Time of concentration = 16.217 min.  
 Effective stream area after confluence = 7.640(Ac.)

\*\*\*\*\*  
 Process from Point/Station 67.000 to Point/Station 68.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (User specified size) \*\*\*\*

Upstream point/station elevation = 391.500(Ft.)  
 Downstream point/station elevation = 389.500(Ft.)  
 Pipe length = 89.84(Ft.) Manning's N = 0.015  
 No. of pipes = 1 Required pipe flow = 22.642(CFS)  
 Given pipe size = 24.00(In.)  
 Calculated individual pipe flow = 22.642(CFS)  
 Normal flow depth in pipe = 15.86(In.)  
 Flow top width inside pipe = 22.73(In.)  
 Critical Depth = 20.34(In.)  
 Pipe flow velocity = 10.28(Ft/s)  
 Travel time through pipe = 0.15 min.  
 Time of concentration (TC) = 16.36 min.

\*\*\*\*\*  
 Process from Point/Station 67.000 to Point/Station 68.000  
 \*\*\*\* CONFLUENCE OF MAIN STREAMS \*\*\*\*

The following data inside Main Stream is listed:  
 In Main Stream number: 1  
 Stream flow area = 7.640(Ac.)  
 Runoff from this stream = 22.642(CFS)  
 Time of concentration = 16.36 min.  
 Rainfall intensity = 4.292(In/Hr)  
 Program is now starting with Main Stream No. 2

\*\*\*\*\*  
 Process from Point/Station 89.100 to Point/Station 89.200  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 0.100  
 Decimal fraction soil group C = 0.200  
 Decimal fraction soil group D = 0.700  
 [COMMERCIAL area type  
 (Neighborhood Commercial )  
 Impervious value, Ai = 0.800