

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
5\5508RPL4-100 YR-BMP 5.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 5\

=====
JOB TITLE
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Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: NODE 64
5508rpl4 - Detention Pond - BMP 5

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

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Type.... Master Network Summary
 Name.... Watershed
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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	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond cu.ft
DETENTION 5	IN	POND	100		224899	255.00	67.89	
DETENTION 5	OUT	POND	100	R	205289	266.00	30.84	357.52
140623								
HYD 5		HYG	100	R	225013	255.00	67.89	
*OUT 1 - N89		JCT	100	R	205288	266.00	30.84	

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Type.... Executive Summary (Nodes)

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Name.... Watershed

Event: 100 yr

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 5\

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 5 IN	POND	224899		255.00	67.89	
DETENTION 5 OUT	POND	205289	R	266.00	30.84	357.52
HYD 5	HYG	225013	R	255.00	67.89	
Outfall OUT 1 - N89	JCT	205288	R	266.00	30.84	

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Type.... Read HYG
 Name.... HYD 5 Tag: 100 Page 3.01
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 5\5508RPL4-100 YR-BMP 5.PPW Event: 100 yr
 Storm... Tag: 100

HYG file =
 HYG ID = HYG 5
 HYG Tag = N-64

 Peak Discharge = 67.89 cfs
 Time to Peak = 255.00 min
 HYG Volume = 225013 cu.ft

HYDROGRAPH ORDINATES (cfs)					
Output Time increment = 17.00 min					
Time min	Time on left represents time for first value in each row.				
-----	-----				
.00	.00	3.92	4.05	4.34	4.51
85.00	4.90	5.13	5.69	6.04	6.92
170.00	7.50	9.17	10.45	15.34	21.61
255.00	67.89	12.30	8.23	6.44	5.39
340.00	4.70	4.19	3.80		

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

Type.... Vol: Elev-Area
Name.... DETENTION 5

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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)
355.00	-----	50800	0	0	0
356.00	-----	54650	158140	52713	52713
358.00	-----	62800	176033	117356	170069
360.00	-----	71600	201456	134304	304373

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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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REQUESTED POND WS ELEVATIONS:

Min. Elev.= 355.00 ft
Increment = .10 ft
Max. Elev.= 360.00 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	356.250	360.000
Stand Pipe	RP	--->	CV	357.150	360.000
Orifice-Circular	O1	--->	CV	355.000	360.000
Culvert-Circular	CV	--->	TW	350.800	360.000
TW SETUP, DS Channel					

S/N:

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Compute Time:

Date:

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

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OUTLET STRUCTURE INPUT DATA

Structure ID = 00
Structure Type = Orifice-Circular

of Openings = 5
Invert Elev. = 356.25 ft
Diameter = 1.0000 ft
Orifice Coeff. = .600

Structure ID = RP
Structure Type = Stand Pipe

of Openings = 1
Invert Elev. = 357.15 ft
Diameter = 5.5000 ft
Orifice Area = 23.7583 sq.ft
Orifice Coeff. = .600
Weir Length = 17.28 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 = 3
Invert Elev. = 355.00 ft
Diameter = .3330 ft
Orifice Coeff. = .600

S/N:

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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 = 350.80 ft
Dnstream Invert = 350.00 ft
Horiz. Length = 108.83 ft
Barrel Length = 108.83 ft
Barrel Slope = .00735 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 = 354.20 ft ---> Flow = 42.85 cfs
At T2 Elev = 354.68 ft ---> Flow = 48.97 cfs

S/N:

PondPack Ver:

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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 = .003300 ft/ft
Mannings n = 0.02200
Invert Elev. = 349.00 ft
Top of Channel = 352.50 ft
Base width = 12.00 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
 Name.... DETENTION 5
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LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
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 Inflow HYG file = NONE STORED - DETENTION 5 IN 100
 Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5
 Pond Volume Data = DETENTION 5
 Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

 Starting WS Elev = 355.00 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
355.00	.00	0	50800	.00	.00	.00
355.10	.06	5099	51179	.12	.18	170.15
355.20	.20	10236	51559	.12	.32	341.54
355.30	.42	15410	51940	.12	.54	514.20
355.40	.61	20624	52323	.12	.73	688.18
355.50	.72	25875	52707	.12	.85	863.36
355.60	.83	31166	53093	.12	.95	1039.81
355.70	.92	36495	53480	.12	1.04	1217.53
355.80	1.00	41861	53869	.12	1.13	1396.48
355.90	1.08	47268	54259	.13	1.20	1576.78
356.00	1.15	52713	54650	.13	1.27	1758.38
356.10	1.21	58198	55044	.13	1.34	1941.28
356.20	1.28	63723	55440	.13	1.41	2125.50
356.25	1.31	66499	55638	.13	1.44	2218.07
356.30	1.38	69285	55836	.13	1.51	2311.01
356.40	1.77	74889	56235	.13	1.90	2498.20
356.50	2.47	80533	56634	.13	2.60	2687.03
356.60	3.47	86217	57036	.13	3.60	2877.48
356.70	4.69	91941	57438	.13	4.82	3069.51
356.80	6.15	97703	57842	.13	6.29	3263.06

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table
 Name.... DETENTION 5
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
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LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
 Pack\BMP 5\
 Inflow HYG file = NONE STORED - DETENTION 5 IN 100
 Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5
 Pond Volume Data = DETENTION 5
 Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

 Starting WS Elev = 355.00 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
356.90	7.81	103508	58247	.13	7.94	3458.21
357.00	9.64	109354	58654	.14	9.77	3654.89
357.10	11.61	115240	59062	.14	11.75	3853.07
357.15	12.62	118197	59267	.14	12.76	3952.66
357.20	14.26	121167	59472	.14	14.40	4053.28
357.30	18.96	127133	59883	.14	19.10	4256.86
357.40	23.82	133142	60296	.14	23.96	4462.03
357.50	29.39	139193	60709	.14	29.53	4669.29
357.60	35.58	145285	61125	.14	35.72	4878.54
357.70	42.27	151419	61541	.14	42.42	5089.70
357.80	49.46	157592	61959	.14	49.60	5302.67
357.90	57.03	163810	62379	.14	57.17	5517.48
358.00	64.80	170069	62800	.15	64.95	5733.90
358.10	72.34	176371	63226	.15	72.48	5951.49
358.20	76.63	182715	63654	.15	76.78	6167.26
358.30	80.54	189100	64083	.15	80.69	6384.02
358.40	83.90	195531	64514	.15	84.05	6601.72
358.50	86.14	202004	64946	.15	86.29	6819.74
358.60	86.99	208521	65379	.15	87.14	7037.81
358.70	87.75	215081	65814	.15	87.90	7257.24

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PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table
 Name.... DETENTION 5
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
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LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
 Pack\BMP 5\
 Inflow HYG file = NONE STORED - DETENTION 5 IN 100
 Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5
 Pond Volume Data = DETENTION 5
 Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

 Starting WS Elev = 355.00 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
358.80	88.50	221682	66251	.15	88.65	7478.05
358.90	89.24	228330	66689	.15	89.39	7700.37
359.00	89.98	235021	67128	.16	90.13	7924.15
359.10	90.71	241756	67569	.16	90.86	8149.38
359.20	91.43	248535	68011	.16	91.59	8376.09
359.30	92.15	255357	68454	.16	92.31	8604.19
359.40	92.86	262225	68899	.16	93.02	8833.84
359.50	93.57	269138	69346	.16	93.73	9064.97
359.60	94.27	276095	69794	.16	94.43	9297.59
359.70	94.96	283098	70243	.16	95.12	9531.69
359.80	95.65	290143	70694	.16	95.82	9767.22
359.90	96.34	297235	71146	.16	96.51	10004.33
360.00	97.02	304373	71600	.17	97.19	10242.93

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PondPack Ver:

Compute Time:

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Type.... Pond Routing Summary
Name.... DETENTION 5 OUT Tag: 100
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
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Storm... 100 Tag: 100

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Event: 100 yr

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
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Inflow HYG file = NONE STORED - DETENTION 5 IN 100
Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5
Pond Volume Data = DETENTION 5
Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 355.00 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	=	67.89 cfs	at	255.00 min
Peak Outflow	=	30.84 cfs	at	266.00 min
Peak Infiltration	=	.14 cfs	at	266.00 min

Peak Elevation	=	357.52 ft
Peak Storage	=	140623 cu.ft

=====

MASS BALANCE (cu.ft)

+ Initial Vol = 0
+ HYG Vol IN = 224899
- Infiltration = 14741
- HYG Vol OUT = 205289
- Retained Vol = 4868

Unrouted Vol = -1 cu.ft (.000% of Inflow Volume)

WARNING: Outflow hydrograph truncated on right side.

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Detention Time
Name.... DETENTION 5 OUT Tag: 100
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
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Storm... 100 Tag: 100

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Event: 100 yr

DETENTION TIMES SUMMARY

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
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Inflow HYG file = NONE STORED - DETENTION 5 IN 100

Outflow HYG file = NONE STORED - DETENTION 5 OUT 100

Pond Node Data = DETENTION 5

Pond Volume Data = DETENTION 5

Pond Outlet Data = Outlet 1

Infiltration = .1000 in/hr

APPROXIMATE DETENTION TIME

Tp, Outflow + Infilt. = 266.00 min
Tp, Total Inflow = 255.00 min
Peak to Peak = 11.00 min

Qout+Infilt. Centroid = 524.94 min
Inflow Centroid = 219.43 min
Centroid to Centroid = 305.51 min

Weighted Avg. Plug Time = 342.04 min
Max.Plug Vol. Plug Time = 208.37 min
Max.Inflow Plug Volume = 3992 cu.ft (From 254.00 to 255.00 min)

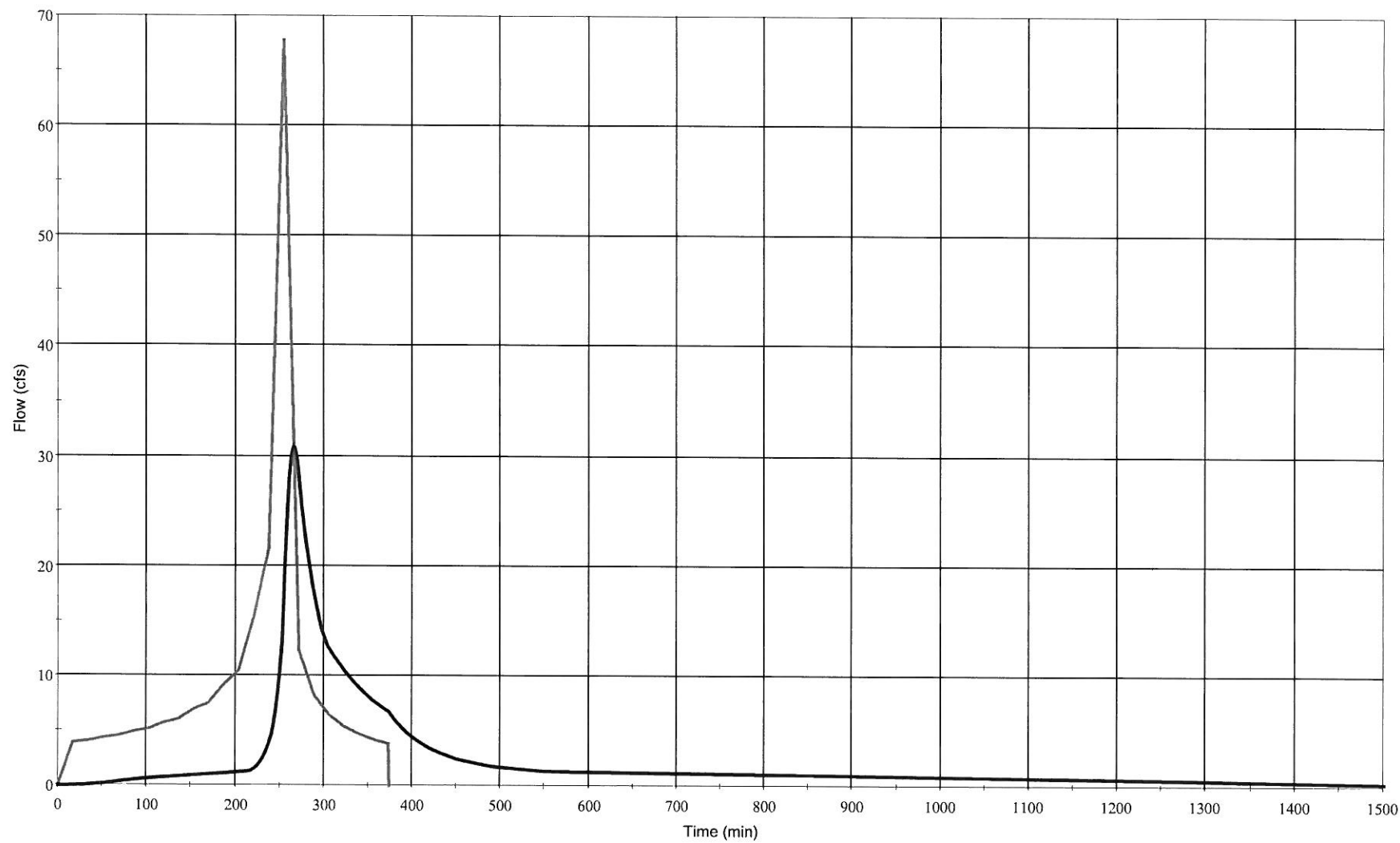
S/N:

PondPack Ver:

Compute Time:

Date:

NODE 64 - DETENTION POND - BMP 5
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



— INFLOW= 67.89 CFS — OUTFLOW= 30.84 CFS

Bio-Retention Pond-6

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: 11/14/12

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

WARNER RANCH

100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 6

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 95.100 to Point/Station 95.200
**** 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

[MEDIUM DENSITY RESIDENTIAL

(4.3 DU/A or Less

Impervious value, Ai = 0.300

Sub-Area C Value = 0.450

Initial subarea total flow distance = 666.240(Ft.)

Highest elevation = 382.000(Ft.)

Lowest elevation = 376.000(Ft.)

Elevation difference = 6.000(Ft.) Slope = 0.901 %

Top of Initial Area Slope adjusted by User to 2.000 %

Bottom of Initial Area Slope adjusted by User to 1.000 %

INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:

The maximum overland flow distance is 80.00 (Ft)

for the top area slope value of 2.00 %, in a development type of

4.3 DU/A or Less

In Accordance With Figure 3-3

Initial Area Time of Concentration = 8.31 minutes

TC = $[1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})]$

TC = $[1.8 * (1.1 - 0.4500) * (80.000^{.5}) / (2.000^{(1/3)})] = 8.31$

The initial area total distance of 666.24 (Ft.) entered leaves a

remaining distance of 586.24 (Ft.)

Using Figure 3-4, the travel time for this distance is 6.22 minutes

for a distance of 586.24 (Ft.) and a slope of 1.00 %

with an elevation difference of 5.86(Ft.) from the end of the top area

Tt = $[11.9 * \text{length}(\text{Mi})^3] / (\text{elevation change}(\text{Ft.}))^{.385} * 60 (\text{min/hr})$
= 6.223 Minutes
Tt = $[(11.9 * 0.1110^3) / (5.86)]^{.385} = 6.22$
Total initial area Ti = 8.31 minutes from Figure 3-3 formula plus
6.22 minutes from the Figure 3-4 formula = 14.53 minutes
Rainfall intensity (I) = 4.634(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 2.899(CFS)
Total initial stream area = 1.390(Ac.)

Process from Point/Station 95.200 to Point/Station 73.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 371.500(Ft.)
Downstream point/station elevation = 370.500(Ft.)
Pipe length = 266.68(Ft.) Manning's N = 0.015
No. of pipes = 1 Required pipe flow = 2.899(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 2.899(CFS)
Normal flow depth in pipe = 8.03(In.)
Flow top width inside pipe = 22.65(In.)
Critical Depth = 7.13(In.)
Pipe flow velocity = 3.15(Ft/s)
Travel time through pipe = 1.41 min.
Time of concentration (TC) = 15.94 min.

Process from Point/Station 95.200 to Point/Station 73.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1

Stream flow area = 1.390(Ac.)

Runoff from this stream = 2.899(CFS)

Time of concentration = 15.94 min.

Rainfall intensity = 4.365(In/Hr)

Program is now starting with Main Stream No. 2

Process from Point/Station 96.100 to Point/Station 96.200
**** 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

[MEDIUM DENSITY RESIDENTIAL

(4.3 DU/A or Less

Impervious value, Ai = 0.300

Sub-Area C Value = 0.450

Initial subarea total flow distance = 413.050(Ft.)

Highest elevation = 378.000(Ft.)

Lowest elevation = 374.000(Ft.)

Elevation difference = 4.000(Ft.) Slope = 0.968 %
 Top of Initial Area Slope adjusted by User to 1.000 %
 Bottom of Initial Area Slope adjusted by User to 1.000 %
 INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
 The maximum overland flow distance is 70.00 (Ft)
 for the top area slope value of 1.00 %, in a development type of
 4.3 DU/A or Less
 In Accordance With Figure 3-3
 Initial Area Time of Concentration = 9.79 minutes
 $TC = [1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})]$
 $TC = [1.8 * (1.1 - 0.4500) * (70.000^{.5})] / (1.000^{(1/3)}) = 9.79$
 The initial area total distance of 413.05 (Ft.) entered leaves a
 remaining distance of 343.05 (Ft.)
 Using Figure 3-4, the travel time for this distance is 4.12 minutes
 for a distance of 343.05 (Ft.) and a slope of 1.00 %
 with an elevation difference of 3.43(Ft.) from the end of the top area
 $Tt = [11.9 * \text{length}(\text{Mi})^3 / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})]$
 $= 4.119 \text{ Minutes}$
 $Tt = [(11.9 * 0.0650^3) / (3.43)]^{.385} = 4.12$
 Total initial area $Ti = 9.79$ minutes from Figure 3-3 formula plus
 4.12 minutes from the Figure 3-4 formula = 13.91 minutes
 Rainfall intensity (I) = 4.767(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
 Subarea runoff = 1.888(CFS)
 Total initial stream area = 0.880(Ac.)

 Process from Point/Station 96.200 to Point/Station 73.000
 *** PIPEFLOW TRAVEL TIME (User specified size) ***

Upstream point/station elevation = 371.000(Ft.)
 Downstream point/station elevation = 370.500(Ft.)
 Pipe length = 36.16(Ft.) Manning's N = 0.015
 No. of pipes = 1 Required pipe flow = 1.888(CFS)
 Given pipe size = 24.00(In.)
 Calculated individual pipe flow = 1.888(CFS)
 Normal flow depth in pipe = 4.64(In.)
 Flow top width inside pipe = 18.96(In.)
 Critical Depth = 5.70(In.)
 Pipe flow velocity = 4.43(Ft/s)
 Travel time through pipe = 0.14 min.
 Time of concentration (TC) = 14.04 min.

 Process from Point/Station 96.200 to Point/Station 73.000
 *** CONFLUENCE OF MAIN STREAMS ***

The following data inside Main Stream is listed:
 In Main Stream number: 2
 Stream flow area = 0.880(Ac.)
 Runoff from this stream = 1.888(CFS)
 Time of concentration = 14.04 min.
 Rainfall intensity = 4.737(In/Hr)
 Program is now starting with Main Stream No. 3

Process from Point/Station 97.100 to Point/Station 97.200
 **** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.900
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.100
 [MEDIUM DENSITY RESIDENTIAL]
 (4.3 DU/A or Less)
 Impervious value, $A_i = 0.300$
 Sub-Area C Value = 0.457
 Initial subarea total flow distance = 347.029(Ft.)
 Highest elevation = 386.000(Ft.)
 Lowest elevation = 374.000(Ft.)
 Elevation difference = 12.000(Ft.) Slope = 3.458 %
 Top of Initial Area Slope adjusted by User to 6.000 %
 Bottom of Initial Area Slope adjusted by User to 1.000 %
 INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
 The maximum overland flow distance is 100.00 (Ft)
 for the top area slope value of 6.00 %, in a development type of
 4.3 DU/A or Less

In Accordance With Figure 3-3
 Initial Area Time of Concentration = 6.37 minutes
 $TC = [1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / (\% \text{ slope}^{(1/3)})]$
 $TC = [1.8 * (1.1 - 0.4570) * (100.000^{.5})] / (6.000^{(1/3)}) = 6.37$
 The initial area total distance of 347.03 (Ft.) entered leaves a
 remaining distance of 247.03 (Ft.)
 Using Figure 3-4, the travel time for this distance is 3.20 minutes
 for a distance of 247.03 (Ft.) and a slope of 1.00 %
 with an elevation difference of 2.47(Ft.) from the end of the top area
 $Tt = [11.9 * \text{length}(\text{Mi})^3 / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})]$
 $= 3.199 \text{ Minutes}$
 $Tt = [(11.9 * 0.0468^3) / (2.47)]^{.385} = 3.20$
 Total initial area $Ti = 6.37$ minutes from Figure 3-3 formula plus
 3.20 minutes from the Figure 3-4 formula = 9.57 minutes
 Rainfall intensity (I) = 6.067(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area (Q=KCIA) is C = 0.457
 Subarea runoff = 2.773(CFS)
 Total initial stream area = 1.000(Ac.)

 Process from Point/Station 97.200 to Point/Station 73.000
 *** PIPEFLOW TRAVEL TIME (User specified size) ***

Upstream point/station elevation = 371.000(Ft.)
 Downstream point/station elevation = 370.500(Ft.)
 Pipe length = 9.91(Ft.) Manning's N = 0.015
 No. of pipes = 1 Required pipe flow = 2.773(CFS)
 Given pipe size = 24.00(In.)
 Calculated individual pipe flow = 2.773(CFS)
 Normal flow depth in pipe = 4.08(In.)
 Flow top width inside pipe = 18.04(In.)
 Critical Depth = 6.96(In.)
 Pipe flow velocity = 7.82(Ft/s)
 Travel time through pipe = 0.02 min.
 Time of concentration (TC) = 9.59 min.

 Process from Point/Station 97.200 to Point/Station 73.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3
 Stream flow area = 1.000 (Ac.)
 Runoff from this stream = 2.773 (CFS)
 Time of concentration = 9.59 min.
 Rainfall intensity = 6.059 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.899	15.94	4.365
2	1.888	14.04	4.737
3	2.773	9.59	6.059

Qmax(1) =
 1.000 * 1.000 * 2.899) +
 0.922 * 1.000 * 1.888) +
 0.720 * 1.000 * 2.773) + = 6.636

Qmax(2) =
 1.000 * 0.881 * 2.899) +
 1.000 * 1.000 * 1.888) +
 0.782 * 1.000 * 2.773) + = 6.609

Qmax(3) =
 1.000 * 0.602 * 2.899) +
 1.000 * 0.683 * 1.888) +
 1.000 * 1.000 * 2.773) + = 5.805

Total of 3 main streams to confluence:

Flow rates before confluence point:

2.899 1.888 2.773

Maximum flow rates at confluence using above data:

6.636 6.609 5.805

Area of streams before confluence:

1.390 0.880 1.000

Results of confluence:

Total flow rate = 6.636 (CFS)

Time of concentration = 15.942 min.

Effective stream area after confluence = 3.270 (Ac.)

 Process from Point/Station 73.000 to Point/Station 74.000
 **** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 370.500 (Ft.)
 Downstream point/station elevation = 370.000 (Ft.)
 Pipe length = 142.31 (Ft.) Manning's N = 0.015
 No. of pipes = 1 Required pipe flow = 6.636 (CFS)
 Given pipe size = 24.00 (In.)

Calculated individual pipe flow = 6.636 (CFS)
 Normal flow depth in pipe = 13.00 (In.)
 Flow top width inside pipe = 23.92 (In.)
 Critical Depth = 10.96 (In.)
 Pipe flow velocity = 3.82 (Ft/s)
 Travel time through pipe = 0.62 min.
 Time of concentration (TC) = 16.56 min.
 End of computations, total study area = 3.270 (Ac.)

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: 11/14/12

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

WARNER RANCH

100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 6

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 98.100 to Point/Station 75.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.500

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.500

[Street and Roads]

(Paved)

Impervious value, Ai = 0.950

Sub-Area C Value = 0.870

Initial subarea total flow distance = 663.000(Ft.)

Highest elevation = 391.000(Ft.)

Lowest elevation = 370.000(Ft.)

Elevation difference = 21.000(Ft.) Slope = 3.167 %

Top of Initial Area Slope adjusted by User to 3.500 %

Bottom of Initial Area Slope adjusted by User to 2.000 %

INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:

The maximum overland flow distance is 80.00 (Ft)

for the top area slope value of 3.50 %, in a development type of

General Industrial

In Accordance With Figure 3-3

Initial Area Time of Concentration = 2.44 minutes

TC = $[1.8 * (1.1 - C) * \text{distance}(\text{Ft.})^{.5}] / [\% \text{ slope}^{(1/3)}]$

TC = $[1.8 * (1.1 - 0.8700) * (80.000^{.5})] / (3.500^{(1/3)}) = 2.44$

The initial area total distance of 663.00 (Ft.) entered leaves a

remaining distance of 583.00 (Ft.)

Using Figure 3-4, the travel time for this distance is 4.75 minutes

for a distance of 583.00 (Ft.) and a slope of 2.00 %

with an elevation difference of 11.66(Ft.) from the end of the top area

Tt = $[11.9 * \text{length}(\text{Mi})^3] / (\text{elevation change}(\text{Ft.}))^{.385} * 60(\text{min/hr})$

= 4.745 Minutes

Tt = $[(11.9 * 0.1104^3) / (11.66)]^{.385} = 4.75$

Total initial area Ti = 2.44 minutes from Figure 3-3 formula plus

4.75 minutes from the Figure 3-4 formula = 7.18 minutes

Rainfall intensity (I) = 7.299(In/Hr) for a 100.0 year storm

Effective runoff coefficient used for area (Q=KCIA) is C = 0.870

Subarea runoff = 5.398(CFS)

Total initial stream area = 0.850 (Ac.)

Process from Point/Station 98.100 to Point/Station 75.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1

Stream flow area = 0.850 (Ac.)

Runoff from this stream = 5.398(CFS)

Time of concentration = 7.18 min.

Rainfall intensity = 7.299(In/Hr)

Program is now starting with Main Stream No. 2

Process from Point/Station 74.000 to Point/Station 75.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.950

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.050

[MEDIUM DENSITY RESIDENTIAL]

(4.3 DU/A or Less)

Impervious value, Ai = 0.300

Sub-Area C Value = 0.454

Rainfall intensity (I) = 4.259(In/Hr) for a 100.0 year storm

User specified values are as follows:

TC = 16.56 min. Rain intensity = 4.26(In/Hr)

Total area = 3.270 (Ac.) Total runoff = 6.636 (CFS)

 Process from Point/Station 74.000 to Point/Station 75.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 3.270 (Ac.)
 Runoff from this stream = 6.636 (CFS)
 Time of concentration = 16.56 min.
 Rainfall intensity = 4.259 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.398	7.18	7.299
2	6.636	16.56	4.259
Qmax(1) =			
	1.000 *	1.000 *	5.398) +
	1.000 *	0.434 *	6.636) + = 8.277
Qmax(2) =			
	0.584 *	1.000 *	5.398) +
	1.000 *	1.000 *	6.636) + = 9.786

Total of 2 main streams to confluence:

Flow rates before confluence point:

5.398 6.636

Maximum flow rates at confluence using above data:

8.277 9.786

Area of streams before confluence:

0.850 3.270

Results of confluence:

Total flow rate = 9.786 (CFS)

Time of concentration = 16.560 min.

Effective stream area after confluence = 4.120 (Ac.)

 Process from Point/Station 75.000 to Point/Station 75.000
 **** 6 HOUR HYDROGRAPH ****

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

Time (Min)	Discharge (CFS)
0	0.000
16	0.461
32	0.490
48	0.506
64	0.542
80	0.563
96	0.612
112	0.641
128	0.711
144	0.754
160	0.865
176	0.937
192	1.146
208	1.305
224	1.916
240	2.700
256	9.786
272	1.537
288	1.028
304	0.805
320	0.674
336	0.587
352	0.523
368	0.475

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
6\5508RPL4-100 YR-BMP 6.PFW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 6\

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

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: NODE 75
5508rpl4 - Bioretention - BMP 6

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

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HYD 6..... 100
Read HYG 3.01

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Vol: Void Adjustments 4.02

***** OUTLET STRUCTURES *****

Outlet 1..... Outlet Input Data 5.01

***** POND ROUTING *****

BIORETENTION6... Pond E-V-Q Table 6.01

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BIORETENTION6OUT 100

Pond Routing Summary	6.05
Detention Time	6.06

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Master Network Summary
 Name.... Watershed
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 6\5508RPL4-100 YR-BMP 6.PPW

Page 1.01

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	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond cu.ft
BIORETENTION6IN	POND	100	28139		256.00	9.79		
BIORETENTION6OUT	POND	100	15167		264.00	5.38	371.91	
15623								
HYD 6	HYG	100	28153	R	256.00	9.79		
*OUT 6 - N81	JCT	100	15167		264.00	5.38		

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 6\

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
BIORETENTION6IN	POND	28139		256.00	9.79	
BIORETENTION6OUT	POND	15167		264.00	5.38	371.91
HYD 6	HYG	28153	R	256.00	9.79	
Outfall OUT 6 - N81	JCT	15167		264.00	5.38	

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Read HYG
 Name.... HYD 6 Tag: 100 Event: 100 yr
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 6\5508RPL4-100 YR-BMP 6.PPW
 Storm... Tag: 100

HYG file =
 HYG ID = HYG 6
 HYG Tag = N-75

 Peak Discharge = 9.79 cfs
 Time to Peak = 256.00 min
 HYG Volume = 28153 cu.ft

HYDROGRAPH ORDINATES (cfs)					
Output Time increment = 16.00 min					
Time on left represents time for first value in each row.					
Time min					
.00	.00	.46	.49	.51	.54
80.00	.56	.61	.64	.71	.75
160.00	.87	.94	1.15	1.31	1.92
240.00	2.70	9.79	1.54	1.03	.81
320.00	.67	.59	.52	.48	

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

Type.... Vol: Elev-Area
Name.... BIORETENTION6

Page 4.01

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
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Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	$A1+A2+\sqrt{A1*A2}$ (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
369.00	-----	6200	0	0	0
370.50	-----	6200	18600	9300	9300
371.00	-----	7600	20664	3444	12744
372.00	-----	10500	27033	9011	21755

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Vol: Void Adjustments
Name.... BIORETENTION6

Page 4.02

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
6\5508RPL4-100 YR-BMP 6.PPW

VOLUME COMPLETELY FILLED WITH MATERIAL
(Adjust Volumes for Voids)

Void Spaces = 75.00000 %

HW Elv, ft	Total, cu.ft	Adjusted,cu.ft
-----	-----	-----
369.00	0	0
370.50	9300	6975
371.00	12744	9558
372.00	21755	16316

S/N:

PondPack Ver:

Compute Time:

Date:

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

Page 5.01

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
6\5508RPL4-100 YR-BMP 6.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 369.00 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
Stand Pipe	R2	--->	CV	371.250	372.000
Stand Pipe	R0	--->	CV	371.250	372.000
Stand Pipe	R3	--->	CV	371.250	372.000
Stand Pipe	RP	--->	CV	371.250	372.000
Stand Pipe	R1	--->	CV	371.250	372.000
Culvert-Circular	CV	--->	TW	365.000	372.000
Stand Pipe	R4	--->	TW	371.250	372.000
Stand Pipe	R5	--->	TW	371.250	372.000
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
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OUTLET STRUCTURE INPUT DATA

Structure ID = R2
Structure Type = Stand Pipe

of Openings = 1
Invert Elev. = 371.25 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. = 371.25 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 5.03

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

Structure ID	=	R3
Structure Type	=	Stand Pipe

# of Openings	=	1
Invert Elev.	=	371.25 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.	=	371.25 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 5.04

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

Structure ID	=	R1
Structure Type	=	Stand Pipe

# of Openings	=	1
Invert Elev.	=	371.25 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

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OUTLET STRUCTURE INPUT DATA

Structure ID = CV
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = 2.0000 ft
Upstream Invert = 365.00 ft
Dnstream Invert = 359.53 ft
Horiz. Length = 54.78 ft
Barrel Length = 55.05 ft
Barrel Slope = .09985 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) = 1.086
T2 ratio (HW/D) = 1.246
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 = 367.17 ft ---> Flow = 15.55 cfs
At T2 Elev = 367.49 ft ---> Flow = 17.77 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
6\5508RPL4-100 YR-BMP 6.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = R4
Structure Type = Stand Pipe

of Openings = 1
Invert Elev. = 371.25 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
Orifice H to crest= Yes

Structure ID = R5
Structure Type = Stand Pipe

of Openings = 1
Invert Elev. = 371.25 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
Orifice H to crest= Yes

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
6\5508RPL4-100 YR-BMP 6.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 5.08

File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
6\5508RPL4-100 YR-BMP 6.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 = .014900 ft/ft
Mannings n = 0.01300
Invert Elev. = 359.53 ft
Top of Channel = 365.03 ft
Diameter = 5.5000 ft

S/N:
PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table
 Name.... BIORETENTION6
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 6\5508RPL4-100 YR-BMP 6.PPW

Page 6.01

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
 Pack\BMP 6\
 Inflow HYG file = NONE STORED - BIORETENTION6IN 100
 Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
 Pond Volume Data = BIORETENTION6
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

 Starting WS Elev = 369.00 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	.00	0	6200	.00	.00	.00
369.05	.00	232	6200	.07	.07	7.82
369.10	.00	465	6200	.07	.07	15.57
369.15	.00	697	6200	.07	.07	23.32
369.20	.00	930	6200	.07	.07	31.07
369.25	.00	1163	6200	.07	.07	38.82
369.30	.00	1395	6200	.07	.07	46.57
369.35	.00	1628	6200	.07	.07	54.32
369.40	.00	1860	6200	.07	.07	62.07
369.45	.00	2093	6200	.07	.07	69.82
369.50	.00	2325	6200	.07	.07	77.57
369.55	.00	2557	6200	.07	.07	85.32
369.60	.00	2790	6200	.07	.07	93.07
369.65	.00	3022	6200	.07	.07	100.82
369.70	.00	3255	6200	.07	.07	108.57
369.75	.00	3488	6200	.07	.07	116.32
369.80	.00	3720	6200	.07	.07	124.07
369.85	.00	3953	6200	.07	.07	131.82
369.90	.00	4185	6200	.07	.07	139.57
369.95	.00	4418	6200	.07	.07	147.32

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table
 Name.... BIORETENTION6
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 6\5508RPL4-100 YR-BMP 6.PPW

Page 6.02

LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
 Pack\BMP 6\
 Inflow HYG file = NONE STORED - BIORETENTION6IN 100
 Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
 Pond Volume Data = BIORETENTION6
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

 Starting WS Elev = 369.00 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	.00	4650	6200	.07	.07	155.07
370.05	.00	4882	6200	.07	.07	162.82
370.10	.00	5115	6200	.07	.07	170.57
370.15	.00	5347	6200	.07	.07	178.32
370.20	.00	5580	6200	.07	.07	186.07
370.25	.00	5813	6200	.07	.07	193.82
370.30	.00	6045	6200	.07	.07	201.57
370.35	.00	6278	6200	.07	.07	209.32
370.40	.00	6510	6200	.07	.07	217.07
370.45	.00	6743	6200	.07	.07	224.82
370.50	.00	6975	6200	.07	.07	232.57
370.55	.00	7210	6334	.07	.07	240.40
370.60	.00	7450	6469	.07	.07	248.41
370.65	.00	7695	6605	.08	.08	256.58
370.70	.00	7945	6743	.08	.08	264.93
370.75	.00	8201	6882	.08	.08	273.44
370.80	.00	8462	7023	.08	.08	282.13
370.85	.00	8728	7165	.08	.08	291.00
370.90	.00	8999	7309	.08	.08	300.05
370.95	.00	9276	7454	.09	.09	309.28

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table
 Name.... BIORETENTION6
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 6\5508RPL4-100 YR-BMP 6.PPW

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LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
 Pack\BMP 6\
 Inflow HYG file = NONE STORED - BIORETENTION6IN 100
 Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
 Pond Volume Data = BIORETENTION6
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

 Starting WS Elev = 369.00 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	Infilt. cfs	Q Total cfs	2S/t + O cfs
371.00	.00	9558	7600	.09	.09	318.69
371.05	.00	9845	7734	.09	.09	328.27
371.10	.00	10138	7869	.09	.09	338.03
371.15	.00	10436	8005	.09	.09	347.95
371.20	.00	10739	8143	.09	.09	358.05
371.25	.00	11046	8281	.10	.10	368.31
371.30	.38	11360	8421	.10	.48	379.13
371.35	1.08	11678	8562	.10	1.18	390.45
371.40	1.99	12002	8704	.10	2.09	402.14
371.45	2.96	12331	8847	.10	3.06	414.09
371.50	3.31	12665	8992	.10	3.41	425.59
371.55	3.62	13005	9137	.11	3.73	437.23
371.60	3.91	13351	9284	.11	4.02	449.04
371.65	4.18	13701	9432	.11	4.29	461.01
371.70	4.44	14058	9581	.11	4.55	473.15
371.75	4.68	14420	9731	.11	4.79	485.46
371.80	4.94	14788	9883	.11	5.05	497.97
371.85	5.13	15161	10035	.12	5.24	510.62
371.90	5.33	15540	10189	.12	5.45	523.46
371.95	5.53	15926	10344	.12	5.65	536.51

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Pond E-V-Q Table
 Name.... BIORETENTION6
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 6\5508RPL4-100 YR-BMP 6.PPW

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LEVEL POOL ROUTING DATA

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
 Pack\BMP 6\
 Inflow HYG file = NONE STORED - BIORETENTION6IN 100
 Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
 Pond Volume Data = BIORETENTION6
 Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

 Starting WS Elev = 369.00 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	5.73	16316	10500	.12	5.85	549.73

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Pond Routing Summary
Name.... BIORETENTION6OUT Tag: 100
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
6\5508RPL4-100 YR-BMP 6.PPW
Storm... 100 Tag: 100

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Event: 100 yr

LEVEL POOL ROUTING SUMMARY

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
Pack\BMP 6\

Inflow HYG file = NONE STORED - BIORETENTION6IN 100
Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
Pond Volume Data = BIORETENTION6
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

INITIAL CONDITIONS

Starting WS Elev = 369.00 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	=	9.79 cfs	at	256.00 min
Peak Outflow	=	5.38 cfs	at	264.00 min
Peak Infiltration	=	.12 cfs	at	264.00 min

Peak Elevation	=	371.91 ft
Peak Storage	=	15623 cu.ft

=====

MASS BALANCE (cu.ft)

+ Initial Vol	=	0
+ HYG Vol IN	=	28139
- Infiltration	=	9442
- HYG Vol OUT	=	15167
- Retained Vol	=	3530

Unrouted Vol = - cu.ft (.000% of Inflow Volume)

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Detention Time
Name.... BIORETENTION6OUT Tag: 100
File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
6\5508RPL4-100 YR-BMP 6.PPW
Storm... 100 Tag: 100

Page 6.06

Event: 100 yr

DETENTION TIMES SUMMARY

HYG Dir = C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond
Pack\BMP 6\

Inflow HYG file = NONE STORED - BIORETENTION6IN 100
Outflow HYG file = NONE STORED - BIORETENTION6OUT 100

Pond Node Data = BIORETENTION6
Pond Volume Data = BIORETENTION6
Pond Outlet Data = Outlet 1

Infiltration = .5000 in/hr

APPROXIMATE DETENTION TIME

Tp, Outflow + Infilt. = 264.00 min
Tp, Total Inflow = 256.00 min
Peak to Peak = 8.00 min

Qout+Infilt. Centroid = 541.19 min
Inflow Centroid = 220.76 min
Centroid to Centroid = 320.43 min

Weighted Avg. Plug Time = 514.76 min
Max.Plug Vol. Plug Time = 347.34 min
Max.Inflow Plug Volume = 574 cu.ft (From 255.00 to 256.00 min)

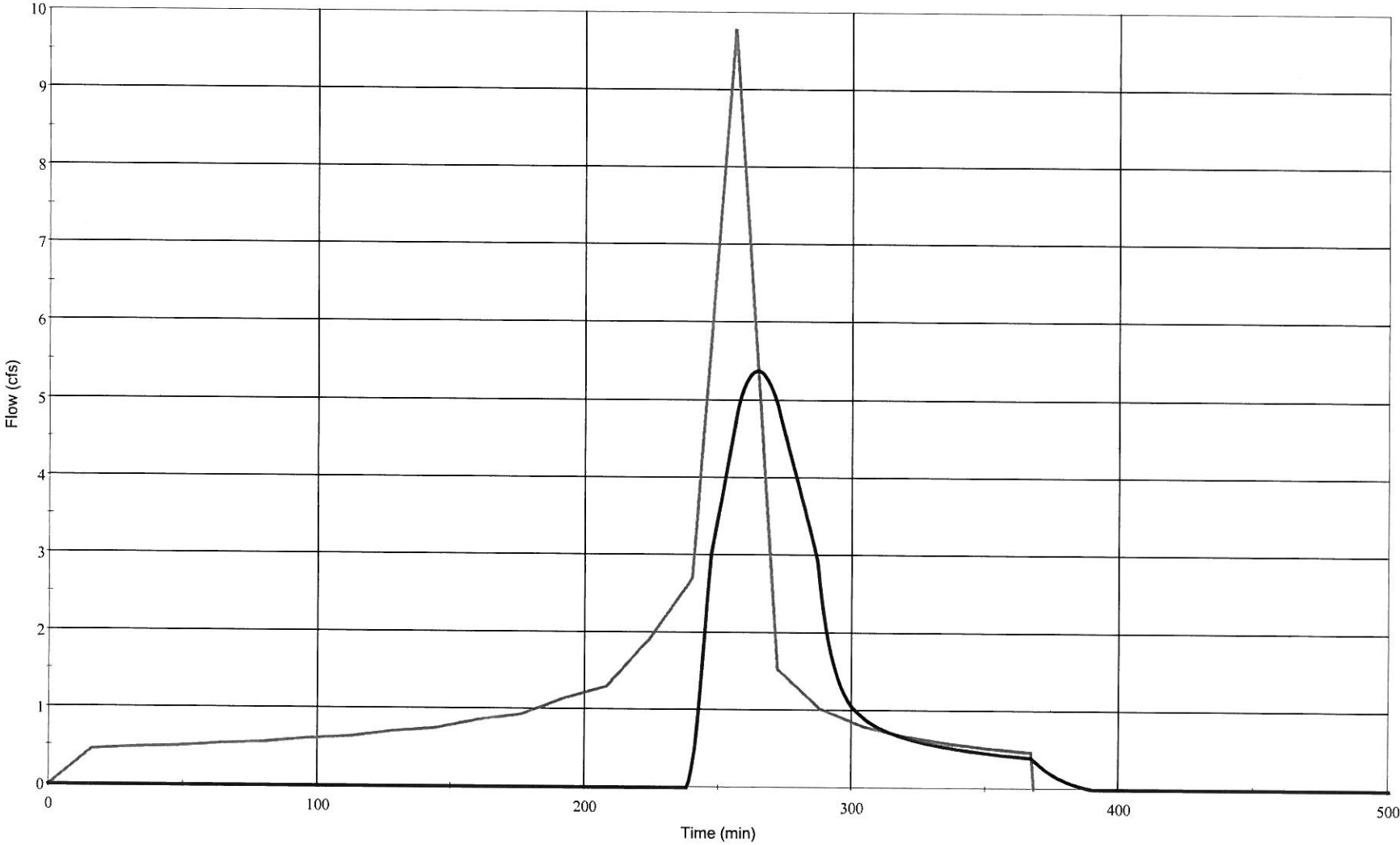
S/N:

PondPack Ver:

Compute Time:

Date:

NODE 75 - BIORETENTION - BMP 6
INFLOW/OUTFLOW HYDROGRAPH
100-YEAR STORM EVENT



— INFLOW= 9.79 CFS — OUTFLOW= 5.38 CFS

Bio-Retention Pond-7

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: 11/14/12

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

WARNER RANCH
100-YEAR STORM EVENT DEVELOPMENT CONDITIONS
BIO-RETENTION POND 7

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 99.100 to Point/Station 76.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.700
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[Park and Recreation]
Impervious value, Ai = 0.100
Sub-Area C Value = 0.285
Initial subarea total flow distance = 785.000(Ft.)
Highest elevation = 374.000(Ft.)
Lowest elevation = 360.000(Ft.)
Elevation difference = 14.000(Ft.) Slope = 1.783 %
Top of Initial Area Slope adjusted by User to 1.430 %
Bottom of Initial Area Slope adjusted by User to 2.270 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of 1.43 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 10.89 minutes
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.285) * (70.000^{.5})] / (1.430^{(1/3)}) = 10.89$
The initial area total distance of 785.00 (Ft.) entered leaves a
remaining distance of 715.00 (Ft.)
Using Figure 3-4, the travel time for this distance is 5.29 minutes
for a distance of 715.00 (Ft.) and a slope of 2.27 %
with an elevation difference of 16.23(Ft.) from the end of the top area
 $Tt = [11.9 * length(Mi)^3] / (elevation change(Ft.))^{.385} * 60(min/hr)$
= 5.289 Minutes
 $Tt = [(11.9 * 0.1354^3) / (16.23)]^{.385} = 5.29$

Total initial area Ti = 10.89 minutes from Figure 3-3 formula plus
5.29 minutes from the Figure 3-4 formula = 16.18 minutes
Rainfall intensity (I) = 4.323(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.285
Subarea runoff = 3.622(CFS)
Total initial stream area = 2.940 (Ac.)

Process from Point/Station 99.100 to Point/Station 76.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 2.940 (Ac.)
Runoff from this stream = 3.622(CFS)
Time of concentration = 16.18 min.
Rainfall intensity = 4.323(In/Hr)
Program is now starting with Main Stream No. 2

Process from Point/Station 100.100 to Point/Station 100.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.200
[Street and Roads]
(Paved)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance = 629.500(Ft.)
Highest elevation = 379.000(Ft.)
Lowest elevation = 360.000(Ft.)
Elevation difference = 19.000(Ft.) Slope = 3.018 %
Top of Initial Area Slope adjusted by User to 2.370 %
Bottom of Initial Area Slope adjusted by User to 1.140 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of 2.37 %, in a development type of
General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration = 2.60 minutes
 $TC = [1.8 * (1.1 - C) * distance(Ft.)^{.5}] / (\% slope^{(1/3)})$
 $TC = [1.8 * (1.1 - 0.870) * (70.000^{.5})] / (2.370^{(1/3)}) = 2.60$
The initial area total distance of 629.50 (Ft.) entered leaves a
remaining distance of 559.50 (Ft.)
Using Figure 3-4, the travel time for this distance is 5.71 minutes
for a distance of 559.50 (Ft.) and a slope of 1.14 %
with an elevation difference of 6.38(Ft.) from the end of the top area
 $Tt = [11.9 * length(Mi)^3] / (elevation change(Ft.))^{.385} * 60(min/hr)$
= 5.708 Minutes
 $Tt = [(11.9 * 0.1060^3) / (6.38)]^{.385} = 5.71$
Total initial area Ti = 2.60 minutes from Figure 3-3 formula plus
5.71 minutes from the Figure 3-4 formula = 8.31 minutes
Rainfall intensity (I) = 6.647(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870

Subarea runoff = 7.055 (CFS)
Total initial stream area = 1.220 (Ac.)

Process from Point/Station 100.100 to Point/Station 100.200
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 1.220 (Ac.)
Runoff from this stream = 7.055 (CFS)
Time of concentration = 8.31 min.
Rainfall intensity = 6.647 (In/Hr)
Summary of stream data:

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

1	3.622	16.18	4.323
2	7.055	8.31	6.647

Qmax(1) =
1.000 * 1.000 * 3.622) +
0.650 * 1.000 * 7.055) + = 8.211
Qmax(2) =
1.000 * 0.513 * 3.622) +
1.000 * 1.000 * 7.055) + = 8.914

Total of 2 main streams to confluence:

Flow rates before confluence point:
3.622 7.055

Maximum flow rates at confluence using above data:
8.211 8.914

Area of streams before confluence:
2.940 1.220

Results of confluence:

Total flow rate = 8.914 (CFS)
Time of concentration = 8.306 min.
Effective stream area after confluence = 4.160 (Ac.)

Process from Point/Station 76.000 to Point/Station 76.000
**** 6 HOUR HYDROGRAPH ****

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

Time of Concentration = 8.31
Basin Area = 4.16 Acres
6 Hour Rainfall = 3.500 Inches
Runoff Coefficient = 0.457
Peak Discharge = 8.91 CFS

Time (Min)	Discharge (CFS)
0	0.000
8	0.397
16	0.403
24	0.415
32	0.422
40	0.436
48	0.443
56	0.459
64	0.468
72	0.486
80	0.496
88	0.518
96	0.529
104	0.555
112	0.569
120	0.599
128	0.616
136	0.655
144	0.676
152	0.725
160	0.753
168	0.818
176	0.857
184	0.951
192	1.008
200	1.155
208	1.253
216	1.531
224	1.744
232	2.561
240	3.608
248	8.914
256	2.054
264	1.374
272	1.075
280	0.901
288	0.784
296	0.699
304	0.635
312	0.583
320	0.542
328	0.507
336	0.477
344	0.451
352	0.429
360	0.409
368	0.391

Job File: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
7\5508RPL4-100 YR-BMP 7.PPW
Rain Dir: C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP 7\

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

Project Date: 11/23/2012
Project Engineer: Shapouri & Associates
Project Title: 5508rpl4
Project Comments: NODE 76
5508rpl4 - Bioretention - BMP 7

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

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Watershed..... Master Network Summary 1.01

***** NETWORK SUMMARIES (DETAILED) *****

Watershed..... 100

Executive Summary (Nodes) 2.01

***** RUNOFF HYDROGRAPHS *****

HYD 7..... 100

Read HYG 3.01

***** POND VOLUMES *****

BIORETENTION7... Vol: Elev-Area 4.01

Vol: Void Adjustments 4.02

***** OUTLET STRUCTURES *****

Outlet 1..... Outlet Input Data 5.01

***** POND ROUTING *****

BIORETENTION7... Pond E-V-Q Table 6.01

S/N:

PondPack Ver:

Compute Time:

Date:

Table of Contents (continued)

BIORETENTION7OUT 100

Pond Routing Summary	6.05
Detention Time	6.06

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Master Network Summary
 Name.... Watershed
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 7\5508RPL4-100 YR-BMP 7.PPW

Page 1.01

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	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak min	Qpeak cfs	Max WSEL ft	Max Pond cu.ft
BIORETENTION7IN	POND	100	22133		248.00	8.91		
BIORETENTION7OUT	POND	100	10945		253.00	4.39	361.85	
12649								
HYD 7	HYG	100	22145	R	248.00	8.91		
*OUT 7 - N90	JCT	100	10945		253.00	4.39		

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 7\

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
BIORETENTION7IN	POND	22133		248.00	8.91	
BIORETENTION7OUT	POND	10945		253.00	4.39	361.85
HYD 7	HYG	22145	R	248.00	8.91	
Outfall OUT 7 - N90	JCT	10945		253.00	4.39	

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Read HYG
 Name.... HYD 7 Tag: 100 Page 3.01
 File.... C:\Shap_Ass\Active Projects\Warner Ranch\3rd Submittal\Pond Pack\BMP
 7\5508RPL4-100 YR-BMP 7.PPW Event: 100 yr
 Storm... Tag: 100

HYG file =
 HYG ID = HYG 7
 HYG Tag = N-76

 Peak Discharge = 8.91 cfs
 Time to Peak = 248.00 min
 HYG Volume = 22145 cu.ft

HYDROGRAPH ORDINATES (cfs)					
Output Time increment = 8.00 min					
Time min	Time on left represents time for first value in each row.				
.00	.00	.40	.40	.42	.42
40.00	.44	.44	.46	.47	.49
80.00	.50	.52	.53	.56	.57
120.00	.60	.62	.66	.68	.73
160.00	.75	.82	.86	.95	1.01
200.00	1.16	1.25	1.53	1.74	2.56
240.00	3.61	8.91	2.05	1.37	1.08
280.00	.90	.78	.70	.64	.58
320.00	.54	.51	.48	.45	.43
360.00	.41	.39			

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

Type.... Vol: Elev-Area
Name.... BIORETENTION7

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Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
359.00	-----	5700	0	0	0
360.50	-----	5700	17100	8550	8550
361.00	-----	6450	18213	3036	11586
362.00	-----	7900	21488	7163	18748

S/N:

PondPack Ver:

Compute Time:

Date:

Type.... Vol: Void Adjustments
Name.... BIORETENTION7

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VOLUME COMPLETELY FILLED WITH MATERIAL
(Adjust Volumes for Voids)

Void Spaces = 72.00000 %

HW Elv, ft	Total, cu.ft	Adjusted,cu.ft
359.00	0	0
360.50	8550	6156
361.00	11586	8342
362.00	18748	13499

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

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REQUESTED POND WS ELEVATIONS:

Min. Elev.= 359.00 ft
Increment = .05 ft
Max. Elev.= 362.00 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	R5	--->	CV	361.250	362.000
Stand Pipe	R2	--->	CV	361.250	362.000
Stand Pipe	R6	--->	CV	361.250	362.000
Stand Pipe	R1	--->	CV	370.500	372.000
Stand Pipe	R4	--->	CV	361.250	362.000
Stand Pipe	R0	--->	CV	370.500	372.000
Stand Pipe	R7	--->	CV	361.250	362.000
Stand Pipe	RP	--->	CV	370.500	372.000
Stand Pipe	R3	--->	CV	361.250	362.000
Culvert-Circular	CV	--->	TW	354.000	362.000
TW SETUP, DS Channel					

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

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OUTLET STRUCTURE INPUT DATA

Structure ID	=	R5
Structure Type	=	Stand Pipe

# of Openings	=	1
Invert Elev.	=	361.25 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.	=	361.25 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

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OUTLET STRUCTURE INPUT DATA

Structure ID	=	R6
Structure Type	=	Stand Pipe

# of Openings	=	1
Invert Elev.	=	361.25 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.	=	361.25 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

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OUTLET STRUCTURE INPUT DATA

Structure ID	= R4
Structure Type	= Stand Pipe

# of Openings	= 1
Invert Elev.	= 361.25 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.	= 361.25 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

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OUTLET STRUCTURE INPUT DATA

Structure ID	=	R7
Structure Type	=	Stand Pipe

# of Openings	=	1
Invert Elev.	=	361.25 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.	=	361.25 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

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OUTLET STRUCTURE INPUT DATA

Structure ID	=	R3
Structure Type	=	Stand Pipe

# of Openings	=	1
Invert Elev.	=	361.25 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

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OUTLET STRUCTURE INPUT DATA

Structure ID = CV
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = 2.0000 ft
Upstream Invert = 354.00 ft
Dnstream Invert = 353.00 ft
Horiz. Length = 112.22 ft
Barrel Length = 112.22 ft
Barrel Slope = .00891 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) = 1.131
T2 ratio (HW/D) = 1.292
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 = 356.26 ft ---> Flow = 15.55 cfs
At T2 Elev = 356.58 ft ---> Flow = 17.77 cfs

S/N:

PondPack Ver:

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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: