

Job File: N:\Projects\00\00075\Engineer\PondPak\Version 8\VERSION 8 - REV
PMF.PPW

Rain Dir: N:\Projects\00\00075\Engineer\PondPak\Version 8\

=====

JOB TITLE

=====

Project Date: 4/15/2003

Project Engineer:

Project Title: Watershed

Project Comments:

S/N: 021301E070CC Engineering Concepts

PondPack Ver: Compute Time:

Date:

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MASTER DESIGN STORM SUMMARY

Network Storm Collection: Roanoke

Return Event	Total Depth in	Rainfall Type	RNF ID
-----	-----	-----	-----
PMF	37.0000	Synthetic Curve	PMP

MASTER NETWORK SUMMARY SCS Unit Hydrograph Method

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

Max Pond Storage Node ID ac-ft	Return Type Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	--	-----	-----	-----
DRAINAGE BASIN	AREA 1000	3551.069		6.0000	4131.69	
*MUD LICK CREEK	JCT 1000	3528.962		6.0200	4126.57	
REG. FACILITYIN	POND 1000	3551.069		6.0000	4131.69	
REG. FACILITYOUT	POND 1000	3528.962		6.0200	4126.57	1124.53

111.678

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Type.... Executive Summary (Nodes) Page 2.01
 Name.... Watershed Event: 1000 yr
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 Storm... PMP Tag: PMF

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

DEFAULT Design Storm File, ID = Roanoke

Storm Tag Name = PMF

 Data Type, File, ID = Synthetic Storm PMP
 Storm Frequency = 1000 yr
 Total Rainfall Depth= 37.0000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= 6.0000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
-----	-----	-----	-----	-----	-----
DRAINAGE BASIN	AREA	3551.069	6.0000	4131.69	
Outfall MUD LICK CREEK	JCT	3528.962	6.0200	4126.57	
REG. FACILITYIN	POND	3551.069	6.0000	4131.69	
REG. FACILITYOUT	POND	3528.962	6.0200	4126.57	1124.53
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Type.... Executive Summary (Links) Page 2.02
 Name.... Watershed Event: 1000 yr
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 Storm... PMP Tag: PMF

NETWORK SUMMARY -- LINKS
 (UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
 (Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File, ID = Roanoke

Storm Tag Name = PMF

 Data Type, File, ID = Synthetic Storm PMP
 Storm Frequency = 1000 yr
 Total Rainfall Depth= 37.0000 in
 Duration Multiplier = 1
 Resulting Duration = 24.0000 hrs
 Resulting Start Time= .0000 hrs Step= 6.0000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
OUTLET	PONDrt	UN	3551.069		6.0000	4131.69	REG. FACILITYIN
OUTLET			3528.962		6.0200	4126.57	REG. FACILITYOUT
		DL	3528.962		6.0200	4126.57	
		DN	3528.962		6.0200	4126.57	MUD LICK CREEK
TO FACILITY	ADD	UN	3551.069		6.0000	4131.69	DRAINAGE BASIN
		DL	3551.069		6.0000	4131.69	
		DN	3551.069		6.0000	4131.69	REG. FACILITYIN

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 PondPack Ver: Compute Time: Date:

Type.... Design Storms
Name.... Roanoke

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Project Engineer:
Project Title: Watershed
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = Roanoke

Storm Tag Name = PMF

Data Type, File, ID = Synthetic Storm PMP
Storm Frequency = 1000 yr
Total Rainfall Depth= 37.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= 6.0000 hrs End= 24.0000 hrs

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Type.... Tc Calcs
Name.... DRAINAGE BASIN

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::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: User Defined

Segment #1 Time: 1.0000 hrs

=====
Total Tc: 1.0000 hrs
=====

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Type.... Tc Calcs
Name.... DRAINAGE BASIN

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Tc Equations used...

==== User Defined =====

Tc = Value entered by user

Where: Tc = Time of concentration

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Type.... Runoff CN-Area
Name.... DRAINAGE BASIN

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RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C %UC	Adjusted CN
User Defined (Imported)	85	1218.800		85.00

COMPOSITE AREA & WEIGHTED CN ---> 1218.800 85.00 (85).
.....

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Type.... Vol: Planimeter
Name.... REG. FACILITY

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POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
1095.50	.000	.0000	.0000	.000	.000
1096.00	237.400	.0054	.0054	.001	.001
1098.00	3448.900	.0792	.1054	.070	.071
1100.00	12346.400	.2834	.5124	.342	.413
1102.00	42147.500	.9676	1.7747	1.183	1.596
1104.00	67405.500	1.5474	3.7386	2.492	4.088
1106.00	99408.300	2.2821	5.7087	3.806	7.894
1108.00	130635.700	2.9990	7.8972	5.265	13.159
1110.00	153457.700	3.5229	9.7723	6.515	19.674
1112.00	174184.600	3.9987	11.2749	7.517	27.190
1114.00	195143.100	4.4799	12.7111	8.474	35.664
1116.00	216531.200	4.9709	14.1697	9.446	45.111
1118.00	245234.200	5.6298	15.8908	10.594	55.705
1120.00	297063.800	6.8196	18.6457	12.430	68.135
1122.00	416937.500	9.5716	24.4705	16.314	84.449
1124.00	501254.100	11.5072	31.5736	21.049	105.498
1126.00	573525.700	13.1663	36.9824	24.655	130.153
1128.00	634965.500	14.5768	41.5968	27.731	157.884
1130.00	713025.200	16.3688	46.3925	30.928	188.812
1132.00	762151.900	17.4966	50.7887	33.859	222.672

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Type.... Outlet Input Data
Name.... Use 12-1/2' dia.

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REQUESTED POND WS ELEVATIONS:

Min. Elev.= 1095.50 ft
Increment = .50 ft
Max. Elev.= 1132.00 ft

Spot Elevations, ft
1124.60
1127.60

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	or	--->	tw	1095.500	1132.000
Culvert-Circular	cv	--->	TW	1110.500	1132.000
Weir-XY Points	wr	--->	TW	1124.600	1132.000
TW SETUP, DS Channel					

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Type.... Outlet Input Data
Name.... Use 12-1/2' dia.

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OUTLET STRUCTURE INPUT DATA

Structure ID	= or
Structure Type	= Orifice-Circular

# of Openings	= 1
Invert Elev.	= 1095.50 ft
Diameter	= 1.5000 ft
Orifice Coeff.	= .600

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Type.... Outlet Input Data
Name.... Use 12-1/2' dia.

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OUTLET STRUCTURE INPUT DATA

Structure ID = cv
Structure Type = Culvert-Circular

No. Barrels = 3
Barrel Diameter = 12.5000 ft
Upstream Invert = 1110.50 ft
Dnstream Invert = 1104.90 ft
Horiz. Length = 154.00 ft
Barrel Length = 154.10 ft
Barrel Slope = .03636 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0240
Ke = .5000 (forward entrance loss)
Kb = .003674 (per ft of full flow)
Kr = .5000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 1
Inlet Control K = .0210
Inlet Control M = 1.3300
Inlet Control c = .04630
Inlet Control Y = .7500
T1 ratio (HW/D) = 1.133
T2 ratio (HW/D) = 1.473
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 = 1124.66 ft ---> Flow = 1518.56 cfs
At T2 Elev = 1128.91 ft ---> Flow = 1735.50 cfs

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Type.... Outlet Input Data
Name.... Use 12-1/2' dia.

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OUTLET STRUCTURE INPUT DATA

Structure ID = wr
Structure Type = Weir-XY Points

of Openings = 1
WEIR X-Y GROUND POINTS

X, ft	Elev, ft
-----	-----
.00	1132.30
25.00	1130.50
50.00	1128.90
75.00	1127.60
100.00	1126.50
125.00	1125.60
150.00	1125.00
175.00	1124.70
200.00	1124.60
225.00	1124.70
250.00	1125.10
275.00	1125.80
300.00	1126.70
325.00	1127.80
350.00	1129.20
375.00	1130.80
400.00	1132.70

Lowest Elev. = 1124.60 ft

Weir Coeff. = 3.300000

Weir TW effects (Use adjustment equation)

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Type.... Outlet Input Data
Name.... Use 12-1/2' dia.

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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: Elev-Flow
Channel ID: tailwater

CONVERGENCE TOLERANCES...
Maximum Iterations= 30
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .10 cfs
Max. Q tolerance = .10 cfs

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Type.... Outlet Input Data
Name.... Use 12-1/2' dia.

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USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Elev-Flow
Channel ID: tailwater

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

Slope = .000000 ft/ft
Mannings n = 0.00000
Invert Elev. = 1093.50 ft
Top of Channel = 1108.00 ft

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Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = or (Orifice-Circular)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1095.50	.00	1093.50	.000	Upstream HW & DNstream TW < Inv.El
1096.00	.98	1093.51	.000	CRIT.DEPTH CONTROL Vh= .131ft Dcr=
.369ft	CRIT.DEPTH			
1096.50	3.55	1093.52	.000	CRIT.DEPTH CONTROL Vh= .279ft Dcr=
.720ft	CRIT.DEPTH			
1097.00	7.37	1093.55	.000	H =.75
1097.50	9.51	1093.56	.000	H =1.25
1098.00	11.25	1093.57	.000	H =1.75
1098.50	12.76	1093.58	.000	H =2.25
1099.00	14.10	1093.59	.000	H =2.75
1099.50	15.33	1093.59	.000	H =3.25
1100.00	16.47	1093.60	.000	H =3.75
1100.50	17.53	1093.61	.000	H =4.25
1101.00	18.54	1093.61	.000	H =4.75
1101.50	19.49	1093.62	.000	H =5.25
1102.00	20.40	1093.63	.000	H =5.75
1102.50	21.26	1093.63	.000	H =6.25
1103.00	22.10	1093.64	.000	H =6.75
1103.50	22.90	1093.64	.000	H =7.25
1104.00	23.68	1093.65	.000	H =7.75
1104.50	24.43	1093.65	.000	H =8.25
1105.00	25.16	1093.66	.000	H =8.75
1105.50	25.87	1093.66	.000	H =9.25
1106.00	26.56	1093.66	.000	H =9.75
1106.50	27.23	1093.67	.000	H =10.25
1107.00	27.89	1093.67	.000	H =10.75
1107.50	28.53	1093.68	.000	H =11.25
1108.00	29.15	1093.68	.000	H =11.75
1108.50	29.77	1093.68	.000	H =12.25
1109.00	30.37	1093.69	.000	H =12.75
1109.50	30.96	1093.69	.000	H =13.25
1110.00	31.54	1093.69	.000	H =13.75
1110.50	32.11	1093.70	.000	H =14.25
1111.00	32.67	1093.75	.000	H =14.75
1111.50	33.21	1093.88	.000	H =15.25
1112.00	33.75	1094.10	.000	H =15.75

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = or (Orifice-Circular)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1112.50	34.29	1094.40	.000	H =16.25
1113.00	34.81	1094.78	.000	H =16.75
1113.50	35.33	1095.24	.000	H =17.25
1114.00	35.83	1095.77	.000	H =17.75
1114.50	36.21	1096.38	.001	H =18.12
1115.00	36.04	1097.05	.004	H =17.95
1115.50	35.80	1097.79	.005	H =17.71
1116.00	35.50	1098.58	.005	H =17.42
1116.50	35.13	1099.44	.005	H =17.06
1117.00	34.70	1100.36	.006	H =16.64
1117.50	34.21	1101.32	.006	H =16.18
1118.00	33.65	1102.35	.007	H =15.65
1118.50	33.04	1103.41	.007	H =15.09
1119.00	32.36	1104.52	.007	H =14.48
1119.50	31.62	1105.68	.008	H =13.82
1120.00	31.81	1106.01	.000	H =13.99
1120.50	32.36	1106.02	.000	H =14.48
1121.00	32.90	1106.04	.000	H =14.96
1121.50	33.43	1106.05	.000	H =15.45
1122.00	33.95	1106.07	.000	H =15.93
1122.50	34.46	1106.09	.000	H =16.41
1123.00	34.96	1106.10	.000	H =16.90
1123.50	35.46	1106.12	.000	H =17.38
1124.00	35.95	1106.13	.000	H =17.87
1124.50	36.44	1106.15	.000	H =18.35
1124.60	36.53	1106.15	.000	H =18.45
1125.00	36.91	1106.17	.000	H =18.83
1125.50	37.37	1106.20	.000	H =19.30
1126.00	37.81	1106.24	.000	H =19.76
1126.50	38.25	1106.27	.000	H =20.23
1127.00	38.68	1106.32	.000	H =20.68
1127.50	39.09	1106.38	.000	H =21.12
1127.60	39.17	1106.39	.000	H =21.21
1128.00	39.49	1106.45	.000	H =21.55

Type.... Individual Outlet Curves
Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = or (Orifice-Circular)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1128.50	39.87	1106.52	.000	H =21.98
1129.00	40.24	1106.61	.000	H =22.39
1129.50	40.60	1106.71	.000	H =22.79
1130.00	40.95	1106.82	.000	H =23.18
1130.50	41.28	1106.95	.000	H =23.56
1131.00	41.60	1107.08	.000	H =23.92
1131.50	41.91	1107.22	.000	H =24.28
1132.00	42.21	1107.37	.000	H =24.63

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Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = cv (Culvert-Circular)

Mannings open channel maximum capacity: 3331.35 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3

EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1095.50	.00	1093.50	.000	Upstream HW & DNstream TW < Inv.El
1096.00	.00	1093.51	.000	Upstream HW & DNstream TW < Inv.El
1096.50	.00	1093.52	.000	Upstream HW & DNstream TW < Inv.El
1097.00	.00	1093.55	.000	Upstream HW & DNstream TW < Inv.El
1097.50	.00	1093.56	.000	Upstream HW & DNstream TW < Inv.El
1098.00	.00	1093.57	.000	Upstream HW & DNstream TW < Inv.El
1098.50	.00	1093.58	.000	Upstream HW & DNstream TW < Inv.El
1099.00	.00	1093.59	.000	Upstream HW & DNstream TW < Inv.El
1099.50	.00	1093.59	.000	Upstream HW & DNstream TW < Inv.El
1100.00	.00	1093.60	.000	Upstream HW & DNstream TW < Inv.El
1100.50	.00	1093.61	.000	Upstream HW & DNstream TW < Inv.El
1101.00	.00	1093.61	.000	Upstream HW & DNstream TW < Inv.El
1101.50	.00	1093.62	.000	Upstream HW & DNstream TW < Inv.El
1102.00	.00	1093.63	.000	Upstream HW & DNstream TW < Inv.El
1102.50	.00	1093.63	.000	Upstream HW & DNstream TW < Inv.El

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = cv (Culvert-Circular)

Mannings open channel maximum capacity: 3331.35 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3

EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev,Device Q		Tail Water		Notes
WS Elev.	Q	TW Elev	Converge	
ft	cfs	ft	+/-ft	Computation Messages
1103.00	.00	1093.64	.000	
		Upstream HW & DNstream TW < Inv.El		
1103.50	.00	1093.64	.000	
		Upstream HW & DNstream TW < Inv.El		
1104.00	.00	1093.65	.000	
		Upstream HW & DNstream TW < Inv.El		
1104.50	.00	1093.65	.000	
		Upstream HW & DNstream TW < Inv.El		
1105.00	.00	1093.66	.000	
		Upstream HW & DNstream TW < Inv.El		
1105.50	.00	1093.66	.000	
		Upstream HW & DNstream TW < Inv.El		
1106.00	.00	1093.66	.000	
		Upstream HW & DNstream TW < Inv.El		
1106.50	.00	1093.67	.000	
		Upstream HW & DNstream TW < Inv.El		
1107.00	.00	1093.67	.000	
		Upstream HW & DNstream TW < Inv.El		
1107.50	.00	1093.68	.000	
		Upstream HW & DNstream TW < Inv.El		
1108.00	.00	1093.68	.000	
		Upstream HW & DNstream TW < Inv.El		
1108.50	.00	1093.68	.000	
		Upstream HW & DNstream TW < Inv.El		
1109.00	.00	1093.69	.000	
		Upstream HW & DNstream TW < Inv.El		
1109.50	.00	1093.69	.000	
		Upstream HW & DNstream TW < Inv.El		
1110.00	.00	1093.69	.000	
		Upstream HW & DNstream TW < Inv.El		

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = cv (Culvert-Circular)

Mannings open channel maximum capacity: 3331.35 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3

EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q		Tail Water		Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages		
1110.50	.00	1093.70	.000	Upstream HW & DNstream TW < Inv.El		
1111.00	7.19	1093.75	.000	CRIT.DEPTH CONTROL Vh= .111ft Dcr= .332ft CRIT.DEPTH		
1111.50	28.55	1093.88	.000	CRIT.DEPTH CONTROL Vh= .224ft Dcr= .664ft CRIT.DEPTH		
1112.00	63.75	1094.10	.000	CRIT.DEPTH CONTROL Vh= .337ft Dcr= .995ft CRIT.DEPTH		
1112.50	112.21	1094.40	.000	CRIT.DEPTH CONTROL Vh= .451ft Dcr= 1.323ft CRIT.DEPTH		
1113.00	173.57	1094.78	.000	CRIT.DEPTH CONTROL Vh= .566ft Dcr= 1.650ft CRIT.DEPTH		
1113.50	247.66	1095.24	.000	CRIT.DEPTH CONTROL Vh= .683ft Dcr= 1.976ft CRIT.DEPTH		
1114.00	333.81	1095.77	.000	CRIT.DEPTH CONTROL Vh= .800ft Dcr= 2.300ft CRIT.DEPTH		
1114.50	431.33	1096.38	.001	CRIT.DEPTH CONTROL Vh= .919ft Dcr= 2.622ft CRIT.DEPTH		
1115.00	540.20	1097.05	.004	CRIT.DEPTH CONTROL Vh= 1.039ft Dcr= 2.942ft CRIT.DEPTH		
1115.50	660.07	1097.79	.005	CRIT.DEPTH CONTROL Vh= 1.160ft Dcr= 3.260ft CRIT.DEPTH		
1116.00	789.86	1098.58	.005	CRIT.DEPTH CONTROL Vh= 1.283ft Dcr= 3.576ft CRIT.DEPTH		
1116.50	929.48	1099.44	.005	CRIT.DEPTH CONTROL Vh= 1.407ft Dcr= 3.889ft CRIT.DEPTH		
1117.00	1078.96	1100.36	.006	CRIT.DEPTH CONTROL Vh= 1.533ft Dcr= 4.201ft CRIT.DEPTH		
1117.50	1236.68	1101.32	.006	CRIT.DEPTH CONTROL Vh= 1.661ft Dcr= 4.509ft CRIT.DEPTH		

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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 PMF.PPW

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = cv (Culvert-Circular)

Mannings open channel maximum capacity: 3331.35 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3

EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev,Device Q		Tail Water		Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages		
1118.00	1403.15	1102.35	.007			
		CRIT.DEPTH	CONTROL	Vh= 1.791ft	Dcr= 4.814ft	CRIT.DEPTH
1118.50	1577.34	1103.41	.007			
		CRIT.DEPTH	CONTROL	Vh= 1.923ft	Dcr= 5.117ft	CRIT.DEPTH
1119.00	1758.32	1104.52	.007			
		CRIT.DEPTH	CONTROL	Vh= 2.056ft	Dcr= 5.415ft	CRIT.DEPTH
1119.50	1946.92	1105.68	.008			
		CRIT.DEPTH	CONTROL	Vh= 2.193ft	Dcr= 5.711ft	CRIT.DEPTH
1120.00	2141.09	1106.01	.000			
		CRIT.DEPTH	CONTROL	Vh= 2.332ft	Dcr= 6.002ft	CRIT.DEPTH
1120.50	2341.27	1106.02	.000			
		CRIT.DEPTH	CONTROL	Vh= 2.474ft	Dcr= 6.289ft	CRIT.DEPTH
1121.00	2546.18	1106.04	.000			
		CRIT.DEPTH	CONTROL	Vh= 2.619ft	Dcr= 6.572ft	CRIT.DEPTH
1121.50	2755.60	1106.05	.000			
		CRIT.DEPTH	CONTROL	Vh= 2.766ft	Dcr= 6.850ft	CRIT.DEPTH
1122.00	2969.90	1106.07	.000			
		CRIT.DEPTH	CONTROL	Vh= 2.918ft	Dcr= 7.123ft	CRIT.DEPTH
1122.50	3186.87	1106.09	.000			
		CRIT.DEPTH	CONTROL	Vh= 3.073ft	Dcr= 7.391ft	CRIT.DEPTH
1123.00	3406.72	1106.10	.000			
		CRIT.DEPTH	CONTROL	Vh= 3.232ft	Dcr= 7.652ft	CRIT.DEPTH
1123.50	3628.14	1106.12	.000			
		CRIT.DEPTH	CONTROL	Vh= 3.395ft	Dcr= 7.907ft	CRIT.DEPTH
1124.00	3852.38	1106.13	.000			
		CRIT.DEPTH	CONTROL	Vh= 3.562ft	Dcr= 8.156ft	CRIT.DEPTH
1124.50	4077.78	1106.15	.000			
		CRIT.DEPTH	CONTROL	Vh= 3.735ft	Dcr= 8.399ft	CRIT.DEPTH
1124.60	4122.81	1106.15	.000			
		CRIT.DEPTH	CONTROL	Vh= 3.770ft	Dcr= 8.446ft	CRIT.DEPTH

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = cv (Culvert-Circular)

Mannings open channel maximum capacity: 3331.35 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3

EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q		Tail Water		Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages		
1125.00	4302.35	1106.17	.000			
		CRIT.DEPTH CONTROL		Vh= 3.911ft	Dcr= 8.632ft	CRIT.DEPTH
1125.50	4528.34	1106.20	.000			
		CRIT.DEPTH CONTROL		Vh= 4.094ft	Dcr= 8.859ft	CRIT.DEPTH
1126.00	4753.57	1106.24	.000			
		CRIT.DEPTH CONTROL		Vh= 4.282ft	Dcr= 9.078ft	CRIT.DEPTH
1126.50	4837.23	1106.27	.000			
		INLET CONTROL...		Transition: HW =16.00		
1127.00	4913.91	1106.32	.000			
		INLET CONTROL...		Transition: HW =16.50		
1127.50	4990.60	1106.38	.000			
		INLET CONTROL...		Transition: HW =17.00		
1127.60	5005.93	1106.39	.000			
		INLET CONTROL...		Transition: HW =17.10		
1128.00	5067.29	1106.45	.000			
		INLET CONTROL...		Transition: HW =17.50		
1128.50	5143.97	1106.52	.000			
		INLET CONTROL...		Transition: HW =18.00		
1129.00	5232.24	1106.61	.000			
		INLET CONTROL...		Submerged: HW =18.50		
1129.50	5370.43	1106.71	.000			
		INLET CONTROL...		Submerged: HW =19.00		
1130.00	5505.18	1106.82	.000			
		INLET CONTROL...		Submerged: HW =19.50		
1130.50	5636.22	1106.95	.000			
		INLET CONTROL...		Submerged: HW =20.00		
1131.00	5764.96	1107.08	.000			
		INLET CONTROL...		Submerged: HW =20.50		
1131.50	5890.27	1107.22	.000			
		INLET CONTROL...		Submerged: HW =21.00		

Type.... Individual Outlet Curves
Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = cv (Culvert-Circular)

Mannings open channel maximum capacity: 3331.35 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

NUMBER OF BARRELS = 3

EACH FLOW = SUM OF BARRELS x FLOW FOR ONE BARREL

WS Elev, Device Q	Tail Water	Notes
WS Elev. Q	TW Elev Converge	
ft cfs	ft +/-ft	Computation Messages
1132.00 6013.30	1107.37 .000	
INLET CONTROL... Submerged: HW =21.50		

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Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = wr (Weir-XY Points)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1095.50	.00	1093.50	.000	
	E < Y min=1124.60			
1096.00	.00	1093.51	.000	
	E < Y min=1124.60			
1096.50	.00	1093.52	.000	
	E < Y min=1124.60			
1097.00	.00	1093.55	.000	
	E < Y min=1124.60			
1097.50	.00	1093.56	.000	
	E < Y min=1124.60			
1098.00	.00	1093.57	.000	
	E < Y min=1124.60			
1098.50	.00	1093.58	.000	
	E < Y min=1124.60			
1099.00	.00	1093.59	.000	
	E < Y min=1124.60			
1099.50	.00	1093.59	.000	
	E < Y min=1124.60			
1100.00	.00	1093.60	.000	
	E < Y min=1124.60			
1100.50	.00	1093.61	.000	
	E < Y min=1124.60			
1101.00	.00	1093.61	.000	
	E < Y min=1124.60			
1101.50	.00	1093.62	.000	
	E < Y min=1124.60			
1102.00	.00	1093.63	.000	
	E < Y min=1124.60			
1102.50	.00	1093.63	.000	
	E < Y min=1124.60			
1103.00	.00	1093.64	.000	
	E < Y min=1124.60			
1103.50	.00	1093.64	.000	
	E < Y min=1124.60			

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = wr (Weir-XY Points)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1104.00	.00	1093.65	.000	
	E < Y min=1124.60			
1104.50	.00	1093.65	.000	
	E < Y min=1124.60			
1105.00	.00	1093.66	.000	
	E < Y min=1124.60			
1105.50	.00	1093.66	.000	
	E < Y min=1124.60			
1106.00	.00	1093.66	.000	
	E < Y min=1124.60			
1106.50	.00	1093.67	.000	
	E < Y min=1124.60			
1107.00	.00	1093.67	.000	
	E < Y min=1124.60			
1107.50	.00	1093.68	.000	
	E < Y min=1124.60			
1108.00	.00	1093.68	.000	
	E < Y min=1124.60			
1108.50	.00	1093.68	.000	
	E < Y min=1124.60			
1109.00	.00	1093.69	.000	
	E < Y min=1124.60			
1109.50	.00	1093.69	.000	
	E < Y min=1124.60			
1110.00	.00	1093.69	.000	
	E < Y min=1124.60			
1110.50	.00	1093.70	.000	
	E < Y min=1124.60			
1111.00	.00	1093.75	.000	
	E < Y min=1124.60			
1111.50	.00	1093.88	.000	
	E < Y min=1124.60			
1112.00	.00	1094.10	.000	
	E < Y min=1124.60			

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = wr (Weir-XY Points)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1112.50	.00	1094.40	.000	
	E < Y min=1124.60			
1113.00	.00	1094.78	.000	
	E < Y min=1124.60			
1113.50	.00	1095.24	.000	
	E < Y min=1124.60			
1114.00	.00	1095.77	.000	
	E < Y min=1124.60			
1114.50	.00	1096.38	.001	
	E < Y min=1124.60			
1115.00	.00	1097.05	.004	
	E < Y min=1124.60			
1115.50	.00	1097.79	.005	
	E < Y min=1124.60			
1116.00	.00	1098.58	.005	
	E < Y min=1124.60			
1116.50	.00	1099.44	.005	
	E < Y min=1124.60			
1117.00	.00	1100.36	.006	
	E < Y min=1124.60			
1117.50	.00	1101.32	.006	
	E < Y min=1124.60			
1118.00	.00	1102.35	.007	
	E < Y min=1124.60			
1118.50	.00	1103.41	.007	
	E < Y min=1124.60			
1119.00	.00	1104.52	.007	
	E < Y min=1124.60			
1119.50	.00	1105.68	.008	
	E < Y min=1124.60			
1120.00	.00	1106.01	.000	
	E < Y min=1124.60			
1120.50	.00	1106.02	.000	
	E < Y min=1124.60			

Type.... Individual Outlet Curves
 Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = wr (Weir-XY Points)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1121.00	.00	1106.04	.000	
	E < Y min=1124.60			
1121.50	.00	1106.05	.000	
	E < Y min=1124.60			
1122.00	.00	1106.07	.000	
	E < Y min=1124.60			
1122.50	.00	1106.09	.000	
	E < Y min=1124.60			
1123.00	.00	1106.10	.000	
	E < Y min=1124.60			
1123.50	.00	1106.12	.000	
	E < Y min=1124.60			
1124.00	.00	1106.13	.000	
	E < Y min=1124.60			
1124.50	.00	1106.15	.000	
	E < Y min=1124.60			
1124.60	.00	1106.15	.000	
	E = Y min=1124.60			
1125.00	42.57	1106.17	.000	
	Max.H=.40; Max.Htw=-18.43;; W(ft)=93.75			
1125.50	223.72	1106.20	.000	
	Max.H=.90; Max.Htw=-18.40;; W(ft)=135.12			
1126.00	541.60	1106.24	.000	
	Max.H=1.40; Max.Htw=-18.36;; W(ft)=166.67			
1126.50	992.46	1106.27	.000	
	Max.H=1.90; Max.Htw=-18.33;; W(ft)=194.45			
1127.00	1583.65	1106.32	.000	
	Max.H=2.40; Max.Htw=-18.28;; W(ft)=218.18			
1127.50	2308.10	1106.38	.000	
	Max.H=2.90; Max.Htw=-18.22;; W(ft)=240.91			
1127.60	2468.77	1106.39	.000	
	Max.H=3.00; Max.Htw=-18.21;; W(ft)=245.45			
1128.00	3173.50	1106.45	.000	
	Max.H=3.40; Max.Htw=-18.15;; W(ft)=261.26			

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Type.... Individual Outlet Curves
Name.... Use 12-1/2' dia.

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = wr (Weir-XY Points)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
1128.50	4176.97	1106.52	.000	
	Max.H=3.90; Max.Htw=-18.08;; W(ft)=279.81			
1129.00	5314.79	1106.61	.000	
	Max.H=4.40; Max.Htw=-17.99;; W(ft)=297.99			
1129.50	6596.77	1106.71	.000	
	Max.H=4.90; Max.Htw=-17.89;; W(ft)=314.06			
1130.00	8014.71	1106.82	.000	
	Max.H=5.40; Max.Htw=-17.78;; W(ft)=329.69			
1130.50	9565.74	1106.95	.000	
	Max.H=5.90; Max.Htw=-17.66;; W(ft)=345.31			
1131.00	11262.58	1107.08	.000	
	Max.H=6.40; Max.Htw=-17.52;; W(ft)=359.58			
1131.50	13097.86	1107.22	.000	
	Max.H=6.90; Max.Htw=-17.38;; W(ft)=373.10			
1132.00	15066.59	1107.37	.000	
	Max.H=7.40; Max.Htw=-17.23;; W(ft)=386.62			

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Type.... Composite Rating Curve
 Name.... Use 12-1/2' dia.

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***** COMPOSITE OUTFLOW SUMMARY *****

CUMULATIVE HGL CONVERGENCE ERROR .008 (+/- ft)
 FLOW PATH: Elev= 1119.5; Branch: wr-TW

* Max. convergence errors shown may also occur for
 flow paths other than the ones listed above.

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1095.50	.00	1093.50	.000	None contributing
1096.00	.98	1093.51	.000	or
1096.50	3.55	1093.52	.000	or
1097.00	7.37	1093.55	.000	or
1097.50	9.51	1093.56	.000	or
1098.00	11.25	1093.57	.000	or
1098.50	12.76	1093.58	.000	or
1099.00	14.10	1093.59	.000	or
1099.50	15.33	1093.59	.000	or
1100.00	16.47	1093.60	.000	or
1100.50	17.53	1093.61	.000	or
1101.00	18.54	1093.61	.000	or
1101.50	19.49	1093.62	.000	or
1102.00	20.40	1093.63	.000	or
1102.50	21.26	1093.63	.000	or
1103.00	22.10	1093.64	.000	or
1103.50	22.90	1093.64	.000	or
1104.00	23.68	1093.65	.000	or
1104.50	24.43	1093.65	.000	or
1105.00	25.16	1093.66	.000	or
1105.50	25.87	1093.66	.000	or
1106.00	26.56	1093.66	.000	or
1106.50	27.23	1093.67	.000	or
1107.00	27.89	1093.67	.000	or
1107.50	28.53	1093.68	.000	or
1108.00	29.15	1093.68	.000	or
1108.50	29.77	1093.68	.000	or
1109.00	30.37	1093.69	.000	or
1109.50	30.96	1093.69	.000	or
1110.00	31.54	1093.69	.000	or
1110.50	32.11	1093.70	.000	or
1111.00	39.85	1093.75	.000	or +cv

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Type.... Composite Rating Curve
Name.... Use 12-1/2' dia.

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***** COMPOSITE OUTFLOW SUMMARY *****

CUMULATIVE HGL CONVERGENCE ERROR .008 (+/- ft)
FLOW PATH: Elev= 1119.5; Branch: wr-TW

* Max. convergence errors shown may also occur for
flow paths other than the ones listed above.

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1111.50	61.76	1093.88	.000	or +cv
1112.00	97.50	1094.10	.000	or +cv
1112.50	146.49	1094.40	.000	or +cv
1113.00	208.38	1094.78	.000	or +cv
1113.50	282.98	1095.24	.000	or +cv
1114.00	369.64	1095.77	.000	or +cv
1114.50	467.54	1096.38	.001	or +cv
1115.00	576.24	1097.05	.004	or +cv
1115.50	695.87	1097.79	.005	or +cv
1116.00	825.36	1098.58	.005	or +cv
1116.50	964.61	1099.44	.005	or +cv
1117.00	1113.66	1100.36	.006	or +cv
1117.50	1270.89	1101.32	.006	or +cv
1118.00	1436.80	1102.35	.007	or +cv
1118.50	1610.38	1103.41	.007	or +cv
1119.00	1790.68	1104.52	.007	or +cv
1119.50	1978.54	1105.68	.008	or +cv
1120.00	2172.90	1106.01	.000	or +cv
1120.50	2373.63	1106.02	.000	or +cv
1121.00	2579.08	1106.04	.000	or +cv
1121.50	2789.03	1106.05	.000	or +cv
1122.00	3003.85	1106.07	.000	or +cv
1122.50	3221.32	1106.09	.000	or +cv
1123.00	3441.68	1106.10	.000	or +cv
1123.50	3663.60	1106.12	.000	or +cv
1124.00	3888.33	1106.13	.000	or +cv
1124.50	4114.21	1106.15	.000	or +cv
1124.60	4159.34	1106.15	.000	or +cv +wr
1125.00	4381.83	1106.17	.000	or +cv +wr
1125.50	4789.43	1106.20	.000	or +cv +wr
1126.00	5332.98	1106.24	.000	or +cv +wr
1126.50	5867.94	1106.27	.000	or +cv +wr

S/N: 021301E070CC

Engineering Concepts

PondPack Ver:

Compute Time:

Date:

Type.... Composite Rating Curve
Name.... Use 12-1/2' dia.

Page 7.23

File.... N:\Projects\00\00075\Engineer\PondPak\Version 8\VERSION 8 - REV
PMF.PPW

***** COMPOSITE OUTFLOW SUMMARY *****

CUMULATIVE HGL CONVERGENCE ERROR .008 (+/- ft)
FLOW PATH: Elev= 1119.5; Branch: wr-TW

* Max. convergence errors shown may also occur for
flow paths other than the ones listed above.

WS Elev, Total Q		Converge		Notes
Elev.	Q	TW Elev	Error	
ft	cfs	ft	+/-ft	Contributing Structures
1127.00	6536.24	1106.32	.000	or +cv +wr
1127.50	7337.78	1106.38	.000	or +cv +wr
1127.60	7513.88	1106.39	.000	or +cv +wr
1128.00	8280.27	1106.45	.000	or +cv +wr
1128.50	9360.81	1106.52	.000	or +cv +wr
1129.00	10587.27	1106.61	.000	or +cv +wr
1129.50	12007.80	1106.71	.000	or +cv +wr
1130.00	13560.84	1106.82	.000	or +cv +wr
1130.50	15243.24	1106.95	.000	or +cv +wr
1131.00	17069.14	1107.08	.000	or +cv +wr
1131.50	19030.05	1107.22	.000	or +cv +wr
1132.00	21122.11	1107.37	.000	or +cv +wr

S/N: 021301E070CC
PondPack Ver:

Engineering Concepts
Compute Time:

Date:

Type.... Pond Routing Summary Page 8.01
Name.... REG. FACILITYOUT Tag: PMF Event: 1000 yr
File.... N:\Projects\00\00075\Engineer\PondPak\Version 8\VERSION 8 - REV
PMF.PPW
Storm... PMP Tag: PMF

LEVEL POOL ROUTING SUMMARY

HYG Dir = N:\Projects\00\00075\Engineer\PondPak\Version 8\
Inflow HYG file = work_pad.hyg - REG. FACILITYIN PMF
Outflow HYG file = work_pad.hyg - REG. FACILITYOUT PMF

Pond Node Data = REG. FACILITY
Pond Volume Data = REG. FACILITY
Pond Outlet Data = Use 12-1/2' dia.

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 1095.50 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0100 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

=====

Peak Inflow	=	4131.69 cfs	at	6.0000 hrs
Peak Outflow	=	4126.57 cfs	at	6.0200 hrs

Peak Elevation	=	1124.53 ft
Peak Storage	=	111.678 ac-ft

=====

MASS BALANCE (ac-ft)

+ Initial Vol	=	.000
+ HYG Vol IN	=	3551.069
- Infiltration	=	.000
- HYG Vol OUT	=	3528.962
- Retained Vol	=	22.088

Unrouted Vol = -.019 ac-ft (.001% of Inflow Volume)

S/N: 021301E070CC Engineering Concepts
PondPack Ver: Compute Time: Date:

Index of Starting Page Numbers for ID Names

----- D -----

DRAINAGE BASIN... 4.01, 5.01

----- R -----

REG. FACILITY... 6.01, 8.01

Roanoke... 3.01

----- U -----

Use 12-1/2' dia.... 7.01, 7.07,
7.21

----- W -----

Watershed... 1.01, 2.01, 2.02

S/N:

PondPack Ver:

Compute Time:

Date:



COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION
DIVISION OF DAM SAFETY
VIRGINIA SOIL AND WATER CONSERVATION BOARD

DAM SAFETY PROGRAM CONSTRUCTION PERMIT NUMBER 16105

This permit entitles the owner, Roanoke County, to construct Woods End Dam in Roanoke County, pursuant to the provisions of the Dam Safety Act (Section 10.1-604 et seq., Code of Virginia) and Regulations promulgated thereunder.

Construction must commence within two years of the effective date of the permit or the permit will expire. The effective date is September 21, 2000 and expires September 30, 2002.

A handwritten signature in black ink, appearing to read "DGD Brickley", written over a horizontal line.

David G. Brickley
Secretary, Virginia Soil and Water
Conservation Board

DATA SHEET – CONSTRUCTION PERMIT**Department of Conservation & Recreation****Division of Dam Safety****203 Governor Street, Suite 402****Richmond, VA 23219**

Name of Dam: Woods End Dam	Inventory Number: 16105
Location: Mud Lick Creek	City/County: Roanoke
Owner: Roanoke County Address: 5204 Brambleton Avenue, P.O. Box 29800 City/Town/Zip: Roanoke, VA 24018-0798	Designed by: Engineering Concepts Constructed by: Year Constructed (Modified):
Type of Dam: Earthfill	Purpose: Stormwater Management
Drainage Area (Sq. Mi.): 1.9	Type of Watershed: Urban, Wooded
Total Height (Ft.): 33.0	Elevation: 1124.6
Normal Pool Height (Ft.): 0	Elevation: 1095.5
Maximum Capacity (Acre Ft.): 112.9	Maximum Area (Acres): 12.9
Normal Capacity (Acre Ft.): 0	Normal Area (Acres): 0
Size Classification: Small	Hazard Classification: I
Required Spillway Design Flood: 50% PMF	Available Spillway Design Flood: 50% PMF
Type of Spillway: Large Diameter CMP	<i>(Note if Section 130):</i>

Operation and Maintenance Plans & Schedule by: **Bobby Wampler, PE VA #034713**(X) Design or () Inventory Report by: **Bobby Wampler, PE VA #034713**

Emergency Action Plan filed with:

(X) Virginia Dept. of Emergency Services

(X) Local Coordinator of Emergency Services

City/County: **Roanoke**Application Reviewed and Recommended for: **Construction Permit**By: **Duncan C. McGregor, PE**

/S/ Duncan C. McGregor

Date: **September 01, 2000**

Concurrence with the Recommendation:

By: **Jonathan T. Phillippe, PE, LS**

Date:

*Jonathan T. Phillippe**9/01/00*