STAGE-DISCHARGE DATA

RECORD NUMBER : 3
TYPE : STAND PIPE WEIR
DESCRIPTION : Pond B (2- and 10-YR Storms)

[RATING CURVE LIMIT]

Minimum Elevation..... = 314.00 (ft)
Maximum Elevation..... = 326.00 (ft)
Elevation Increment..... = 0.25 (ft)

[STANDPIPE INFORMATION]

VDOT Std SWM-1 (60" Diameter) DESCRIPTION :

[OUTLET STRUCTURE INFORMATION]

Radius..... = 2.50 (ft)
Crest Length..... = 15.71 (ft)
Crest Elevation..... = 323.65 (ft)
Fraction Open Area..... = 1.00000

[RECTANGULAR STAND PIPE EQUATION]

ORIFICE EQ: Q = CoWA(2gh)^0.5
WEIR EQ: Q = CwWLH^exp
Coefficient Co..... = 0.60000
Coefficient Cw..... = 3.33000
Exponential..... = 1.50000

[DEFINITIONS]

H = Headwater depth above inlet control section invert, (ft)
A = Wetted area, (sqft)
L = Crest length, (ft)

[ORIFICE INFORMATION]

1 SUBRECORD :
RECTANGULAR DESCRIPTION :

[OUTLET STRUCTURE INFORMATION]

Width..... = 3.50 (ft)
Height..... = 0.50 (ft)
Invert Elevation..... = 322.00 (ft)
Coefficient Co..... = 0.60000
# of Openings..... = 3

[RECTANGULAR ORIFICE EQUATION]

Q = CoWA[2gh]/k]^0.5
A = Wetted area, (sqft)
K = 1

[CULVERT INFORMATION] SEE NOTE THIS SHEET

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DESCRIPTION : CIRCULAR CONCRETE w/ square edge w/ headwall

[OUTLET STRUCTURE INFORMATION]

Circular Radius..... = 1.00000 (ft)
Culvert Invert Elevation..... = 315.00000 (ft)
Pipe Length..... = 107.00000 (ft)
Slope..... = 0.01000
Manning's N-value..... = 0.01300
Orifice Coefficient..... = 0.60000
Tailwater..... = 316.00000 (ft)
Number barrels..... = 1

[UNSUBMERGED EQUATION]

H/Diam = Hc/Diam + K *(Q/A*Diam^0.5))^M - 0.5*S^2
Coefficient K..... = 0.00980
coefficient M..... = 2.00000

[SUBMERGED EQUATION]

H/Diam = c*(Q/(A*Diam^0.5))^2 + Y - 0.5*S^2
Coefficient c..... = 0.03980
Coefficient Y..... = 0.67000

[DEFINITIONS]

H = Headwater depth above inlet control section invert, (ft)
Diam = Inerior height of culvert barrel, (ft)
Hc = Specific head at critical depth (dc + Vc^2/2g), (ft)
Q = Discharge, (cuft/s)
A = Full cross sectional area of culvert barrel, (sqft)
S = Culvert barrel slope, (ft/ft)

[Stand Pipe Discharge Value vs. Stage]
(the elevation increment is 0.2)

STAGE	ELEVATION (ft)	ORIFICE (cfs)	WEIR (cfs)	STAND PIPE (cfs)	CULVERT (cfs)	TOTAL FLOW (cfs)
0.00	314.00	0.00	0.00	0.00	0.00	0.00
0.25	314.25	0.00	0.00	0.00	0.00	0.00
0.50	314.50	0.00	0.00	0.00	0.00	0.00
0.75	314.75	0.00	0.00	0.00	0.00	0.00
1.00	315.00	0.00	0.00	0.00	0.00	0.00
1.25	315.25	0.00	0.00	0.00	0.32	0.00
1.50	315.50	0.00	0.00	0.00	1.18	0.00
1.75	315.75	0.00	0.00	0.00	2.55	0.00
2.00	316.00	0.00	0.00	0.00	4.25	0.00
2.25	316.25	0.00	0.00	0.00	6.23	0.00
2.50	316.50	0.00	0.00	0.00	8.38	0.00
2.75	316.75	0.00	0.00	0.00	10.60	0.00
3.00	317.00	0.00	0.00	0.00	12.82	0.00
3.25	317.25	0.00	0.00	0.00	15.00	0.00
3.50	317.50	0.00	0.00	0.00	15.55	0.00
3.75	317.75	0.00	0.00	0.00	18.77	0.00
4.00	318.00	0.00	0.00	0.00	20.35	0.00
4.25	318.25	0.00	0.00	0.00	21.82	0.00
4.50	318.50	0.00	0.00	0.00	23.20	0.00
4.75	318.75	0.00	0.00	0.00	24.45	0.00
5.00	319.00	0.00	0.00	0.00	25.54	0.00
5.25	319.25	0.00	0.00	0.00	26.58	0.00
5.50	319.50	0.00	0.00	0.00	27.59	0.00
5.75	319.75	0.00	0.00	0.00	28.56	0.00
6.00	320.00	0.00	0.00	0.00	29.49	0.00
6.25	320.25	0.00	0.00	0.00	30.40	0.00
6.50	320.50	0.00	0.00	0.00	31.29	0.00
6.75	320.75	0.00	0.00	0.00	32.14	0.00
7.00	321.00	0.00	0.00	0.00	32.98	0.00
7.25	321.25	0.00	0.00	0.00	33.79	0.00
7.50	321.50	0.00	0.00	0.00	34.59	0.00
7.75	321.75	0.00	0.00	0.00	35.36	0.00
8.00	322.00	0.00	0.00	0.00	36.12	0.00
8.25	322.25	4.47	0.00	0.00	36.87	4.47
8.50	322.50	12.63	0.00	0.00	37.60	12.63
8.75	322.75	17.86	0.00	0.00	38.32	17.86
9.00	323.00	21.88	0.00	0.00	39.02	21.88
9.25	323.25	25.26	0.00	0.00	39.71	25.26
9.50	323.50	28.24	0.00	0.00	40.39	28.24
9.75	323.75	30.94	0.00	1.65	41.06	32.59
10.00	324.00	33.42	0.00	10.83	41.71	41.71
10.25	324.25	35.73	0.00	24.31	42.36	42.36
10.50	324.50	37.89	0.00	40.99	43.00	43.00
10.75	324.75	39.94	0.00	60.35	43.63	43.63
11.00	325.00	41.89	0.00	82.05	44.25	44.25
11.25	325.25	43.76	0.00	101.19	44.86	44.86
11.50	325.50	45.54	0.00	117.94	45.46	45.46
11.75	325.75	47.26	0.00	134.69	46.05	46.05
12.00	326.00	48.92	0.00	144.84	46.64	46.64

STAGE-STORAGE-DISCHARGE DATA

RECORD NUMBER : 3
STORAGE TYPE : MAN STAGE/STOR
DISCHARGE TYPE : COMP STAGE/DIS
DESCRIPTION : Pond B (2- and 10-YR Storms)

[RATING CURVE LIMIT]

Minimum Elevation..... = 314.00 (ft)
Maximum Elevation..... = 326.00 (ft)
Elevation Increment..... = 0.25 (ft)

[STAGE STORAGE INFORMATION]

Input file = NULL
Output file = NULL

[Manual Storage vs. Elevation]

ELEVATION (ft)	STORAGE (cuft)
323.00	68478.00
324.00	147922.00
326.00	339528.00

[STAGE DISCHARGE INFORMATION]

OUTLET STRUCTURE:

STR # : 3
TYPE : STAND PIPE WEIR
DESCRIPTION : Pond B (2- and 10-YR Storms)

[Reservoir Discharge Value vs. Stage]
(the elevation increment is 0.2)

STAGE (ft)	ELEVATION (ft)	CONTOUR AREA (sqft)	STORAGE (cuft)	DISCHARGE (cfs)
0.00	314.00	0.00	0.00	0.00
0.25	314.25	0.00	0.00	0.00
0.50	314.50	0.00	0.00	0.00
0.75	314.75	0.00	0.00	0.00
1.00	315.00	0.00	0.00	0.00
1.25	315.25	0.00	0.00	0.00
1.50	315.50	0.00	0.00	0.00
1.75	315.75	0.00	0.00	0.00
2.00	316.00	0.00	0.00	0.00
2.25	316.25	0.00	0.00	0.00
2.50	316.50	0.00	0.00	0.00
2.75	316.75	0.00	0.00	0.00
3.00	317.00	0.00	0.00	0.00
3.25	317.25	0.00	0.00	0.00
3.50	317.50	0.00	0.00	0.00
3.75	317.75	0.00	0.00	0.00
4.00	318.00	0.00	0.00	0.00
4.25	318.25	0.00	0.00	0.00
4.50	318.50	0.00	0.00	0.00
4.75	318.75	0.00	0.00	0.00
5.00	319.00	0.00	0.00	0.00
5.25	319.25	0.00	0.00	0.00
5.50	319.50	0.00	0.00	0.00
5.75	319.75	0.00	0.00	0.00
6.00	320.00	0.00	0.00	0.00
6.25	320.25	0.00	0.00	0.00
6.50	320.50	0.00	0.00	0.00
6.75	320.75	0.00	0.00	0.00
7.00	321.00	0.00	0.00	0.00
7.25	321.25	0.00	0.00	0.00
7.50	321.50	0.00	0.00	0.00
7.75	321.75	0.00	0.00	0.00
8.00	322.00	0.00	0.00	0.00
8.25	322.25	6225.27	17119.50	4.47
8.50	322.50	12084.35	34239.00	12.63
8.75	322.75	17608.63	51358.50	17.86
9.00	323.00	22826.00	68478.00	21.88
9.25	323.25	28650.49	88339.00	25.26
9.50	323.50	34168.42	108200.00	28.24
9.75	323.75	39403.38	128061.00	32.59
10.00	324.00	44376.60	147922.00	41.71
10.25	324.25	50304.22	171872.75	42.36
10.50	324.50	55949.57	195823.50	43.00
10.75	324.75	61332.35	219774.25	43.63
11.00	325.00	66470.45	243725.00	44.25
11.25	325.25	71380.20	267675.75	44.86
11.50	325.50	76076.48	291626.50	45.46
11.75	325.75	80572.91	315577.25	46.05
12.00	326.00	84882.00	339528.00	46.64

STAGE-STORAGE DATA

Pond B (Elevation-Storage) 2- and 10-Yr Storms

Elevation (Ft)	Depth (Ft)	Area (Ac)	Area (Sq Ft)	Ave Area (Sq Ft)	Storage (Cu Ft)	Total Storage (Cu Ft)	Total Storage (Ac-Ft)
322.00	0.00	1.4381	62,645	0	0	0	0
323.00	1.00	1.7059	74,310	68,478	68,478	68,478	1.57
324.00	1.00	1.9417	84,579	79,445	79,445	147,922	3.40
326.00	2.00	2.4570	107,027	95,803	191,606	339,528	7.79

NOTE:
WHILE THE CULVERT SLOPE AND INVERT SHOWN ON THE PROFILE DOES NOT MATCH THE THE COMPUTATIONS, THE RESULTS IN THE COMPUTATIONS ARE STILL VALID.

2-YEAR STORM ROUTING

RECORD NUMBER : 8
TYPE : RESER STOR. IND
DESCRIPTION : 2-YR Pond B OUTFLOW

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 30.11 (cfs)
Volume..... = 5.13 (acft)
Time Interval..... = 5.00 (min)
Time to Peak..... = 45.00 (min)
Time of Base..... = 710.00 (min)
Peak Elevation..... = 323.61 (ft)

[RESERVOIR STRUCTURE INFORMATION]

Reservoir #..... = 3
Description..... = Pond B (2- and 10-YR Storms)
Storage type..... = MAN STAGE/STOR
Max storage..... = 339528.00 Cuft
Discharge type..... = COMP STAGE/DIS
Max discharge..... = 46.64 cfs

[RESERVOIR INFORMATION]

Reservoir #..... = 3
Reservoir Description..... = Pond B (2- and 10-YR Storms)

[INFLOW HYDROGRAPH INFORMATION]

Hydrograph #..... = 7
Hydrograph Description..... = 2-YR Pond B INFLOW

[Computation of Reservoir Outflow Table of Storage Indication Method]
(The time interval is 5.0 min)

INTV#	TIME (min)	INFLOW (cfs)	EQUATION 0.5(I1+I2)dt	+	S1-0.5(D1)dt	=	S2+0.5(D2)dt	OUTFLOW D2(cfs)	STORAGE (cuft)	ELEVATION (ft)
1	5.0	79.00	11850.00	+	0.00	=	11850.00	2.97	11403.77	322.17
2	10.0	141.30	33045.00	+	10957.54	=	44002.54	14.93	41762.90	322.61
3	15.0	104.40	36855.00	+	39523.26	=	76378.26	22.65	72981.39	323.06
4	20.0	72.50	26535.00	+	69584.53	=	96119.53	25.85	92242.19	323.30
5	25.0	55.90	19260.00	+	88364.85	=	107624.85	27.54	103494.11	323.44
6	30.0	45.80	15255.00	+	99363.37	=	114618.37	28.71	110312.25	323.53
7	35.0	38.40	12630.00	+	106006.14	=	118636.14	29.56	114202.22	323.58
8	40.0	32.60	10650.00	+	109768.31	=	120418.31	29.94	115927.71	323.60
9	45.0	32.60	9780.00	+	111437.11	=	121217.11	30.11	116701.10	323.61
10	50.0	24.00	8490.00	+	112185.09	=	120675.09	29.99	116176.32	323.60
11	55.0	21.20	6780.00	+	111677.55	=	118457.55	29.52	114029.32	323.57
12	60.0	18.40	5940.00	+	109601.08	=	115541.08	28.90	111205.62	323.54
13	65.0	16.90	5295.00	+	106870.15	=	112165.15	28.20	107934.41	323.50
14	70.0	15.40	4845.00	+	103703.68	=	108548.68	27.67	104397.59	323.45
15	75.0	13.80	4380.00	+	100246.50	=	104626.50	27.10	100561.80	323.40
16	80.0	12.30	3915.00	+	96497.09	=	100412.09	26.48	96440.21	323.35
17	85.0	10.80	3465.00	+	92468.33	=	95933.33	25.82	92060.09	323.30
18	90.0	9.20	3000.00	+	88186.85	=	91186.85	25.11	87420.88	323.24

10-YEAR STORM ROUTING

RECORD NUMBER : 10
TYPE : RESER STOR. IND
DESCRIPTION : 10-YR Pond B OUTFLOW

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 41.82 (cfs)
Volume..... = 6.00 (acft)
Time Interval..... = 5.00 (min)
Time to Peak..... = 40.00 (min)
Time of Base..... = 710.00 (min)
Peak Elevation..... = 324.04 (ft)

[RESERVOIR STRUCTURE INFORMATION]

Reservoir #..... = 3
Description..... = Pond B (2- and 10-YR Storms)
Storage type..... = MAN STAGE/STOR
Max storage..... = 339528.00 Cuft
Discharge type..... = COMP STAGE/DIS
Max discharge..... = 46.64 cfs

[RESERVOIR INFORMATION]

Reservoir #..... = 3
Reservoir Description..... = Pond B (2- and 10-YR Storms)

[INFLOW HYDROGRAPH INFORMATION]

Hydrograph #..... = 9
Hydrograph Description..... = 10-YR Pond B INFLOW

[Computation of Reservoir Outflow Table of Storage Indication Method]
(The time interval is 5.0 min)

INTV#	TIME (min)	INFLOW (cfs)	EQUATION 0.5(I1+I2)dt	+	S1-0.5(D1)dt	=	S2+0.5(D2)dt	OUTFLOW D2(cfs)	STORAGE (cuft)	ELEVATION (ft)
1	5.0	99.80	14970.00	+	0.00	=	14970.00	3.76	14406.28	322.21
2	10.0	181.90	42255.00	+	13842.57	=	56097.57	18.33	53348.04	322.78
3	15.0	139.20	48165.00	+	50598.52	=	98763.52	26.24	94827.95	323.33
4	20.0	96.50	35355.00	+	90892.37	=	126247.37	31.17	121571.36	323.67
5	25.0	74.60	25665.00	+	116895.35	=	142560.35	36.72	137051.90	323.86
6	30.0	61.10	20355.00	+	131543.46	=	151898.46	40.73	145788.32	323.97
7	35.0	51.30	16860.00	+	139678.18	=	156538.18	41.78	150271.57	324.02
8	40.0	43.30	14190.00	+	144004.96	=	158194.96	41.82	151921.66	324.04
9	45.0	37.20	12075.00	+	145648.36	=	157723.36	41.81	151451.96	324.04
10	50.0	31.90	10365.00	+	145180.56	=	155545.56	41.75	149282.96	324.01
11	55.0	28.30	9030.00	+	143020.35	=	152050.35	40.80	145930.43	323.97
12	60.0	24.60	7935.00	+	139810.50	=	147745.50	38.95	141902.96	323.92

REVISIONS

SURVEY N/A
DESIGN SCP
DRAWN SCP
CHECKED JEM

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SCALE HORZ: N/A
VERT: N/A
SEAL
COMMONWEALTH OF VIRGINIA
JOHN E. MORRIS
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PROFESSIONAL ENGINEER
11/11/01

PROJECT
2- AND 10-YEAR POND ROUTINGS (POND B)
FINAL CONVERSION OF EXISTING SWM FACILITIES
LOUDOUN COUNY GOVERNMENT CENTER
CATOCTIN ELECTION DISTRICT
LOUDOUN COUNTY, VIRGINIA

JOB 2000-0501
CADD 08-09Plt-Comps.dwg
SHEET 9 OF 10

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