STAGE-DISCHARGE DATA

RECORD NUMBER : 1
TYPE : STAND PIPE WEIR
DESCRIPTION : Pond A (2- and 10-YR Storms)

[RATING CURVE LIMIT]

Minimum Elevation..... = 317.75 (ft)
Maximum Elevation..... = 330.00 (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..... = 325.50 (ft)
Fraction Open Area..... = 1.00000

[RECTANGULAR STAND PIPE EQUATION]

ORIFICE EQ: Q = Co*A(2gh)^0.5
WEIR EQ: Q = Cw*L*H^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 :
BMP DESCRIPTION :

[OUTLET STRUCTURE INFORMATION]

Radius..... = 0.11 (ft)
Invert Elevation..... = 318.00 (ft)
Coefficient Co..... = 0.60000
# of Openings..... = 1

[CIRCULAR ORIFICE EQUATION]

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

[CULVERT INFORMATION] SEE NOTE THIS SHEET

DESCRIPTION : CIRCULAR CONCRETE w/ square edge w/ headwall

[OUTLET STRUCTURE INFORMATION]

Circular Radius..... = 0.75000 (ft)
Culvert Invert Elevation..... = 317.75000 (ft)
Pipe Length..... = 107.00000 (ft)
Slope..... = 0.01000
Manning's N-value..... = 0.01300
Orifice Coefficient..... = 0.60000
Tailwater..... = 318.00000 (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 = Inertior 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	317.75	0.00	0.00	0.00	0.00	0.00
0.25	318.00	0.00	0.00	0.00	0.27	0.00
0.50	318.25	0.07	0.00	0.00	0.99	0.07
0.75	318.50	0.11	0.00	0.00	2.07	0.11
1.00	318.75	0.15	0.00	0.00	3.37	0.15
1.25	319.00	0.17	0.00	0.00	4.79	0.17
1.50	319.25	0.20	0.00	0.00	6.24	0.20
1.75	319.50	0.22	0.00	0.00	7.58	0.22
2.00	319.75	0.23	0.00	0.00	8.87	0.23
2.25	320.00	0.25	0.00	0.00	9.91	0.25
2.50	320.25	0.27	0.00	0.00	10.86	0.27
2.75	320.50	0.28	0.00	0.00	11.73	0.28
3.00	320.75	0.30	0.00	0.00	12.49	0.30
3.25	321.00	0.31	0.00	0.00	13.06	0.31
3.50	321.25	0.32	0.00	0.00	13.59	0.32
3.75	321.50	0.34	0.00	0.00	14.10	0.34
4.00	321.75	0.35	0.00	0.00	14.60	0.35
4.25	322.00	0.36	0.00	0.00	15.08	0.36
4.50	322.25	0.37	0.00	0.00	15.54	0.37
4.75	322.50	0.38	0.00	0.00	15.99	0.38
5.00	322.75	0.39	0.00	0.00	16.43	0.39
5.25	323.00	0.40	0.00	0.00	16.86	0.40
5.50	323.25	0.41	0.00	0.00	17.28	0.41
5.75	323.50	0.42	0.00	0.00	17.68	0.42
6.00	323.75	0.43	0.00	0.00	18.08	0.43
6.25	324.00	0.44	0.00	0.00	18.47	0.44
6.50	324.25	0.45	0.00	0.00	18.85	0.45
6.75	324.50	0.46	0.00	0.00	19.22	0.46
7.00	324.75	0.47	0.00	0.00	19.59	0.47
7.25	325.00	0.48	0.00	0.00	19.95	0.48
7.50	325.25	0.49	0.00	0.00	20.30	0.49
7.75	325.50	0.50	0.00	0.00	20.65	0.50
8.00	325.75	0.51	0.00	6.54	20.99	7.04
8.25	326.00	0.51	0.00	18.49	21.33	19.01
8.50	326.25	0.52	0.00	33.98	21.66	21.66
8.75	326.50	0.53	0.00	52.31	21.98	21.98
9.00	326.75	0.54	0.00	73.10	22.30	22.30
9.25	327.00	0.55	0.00	94.49	22.62	22.62
9.50	327.25	0.55	0.00	111.24	22.93	22.93
9.75	327.50	0.56	0.00	128.00	23.24	23.24
10.00	327.75	0.57	0.00	141.72	23.54	23.54
10.25	328.00	0.58	0.00	149.39	23.84	23.84
10.50	328.25	0.58	0.00	156.68	24.14	24.14
10.75	328.50	0.59	0.00	163.65	24.43	24.43
11.00	328.75	0.60	0.00	170.33	24.72	24.72
11.25	329.00	0.60	0.00	176.76	25.01	25.01
11.50	329.25	0.61	0.00	182.97	25.29	25.29
11.75	329.50	0.62	0.00	188.97	25.57	25.57
12.00	329.75	0.62	0.00	194.78	25.85	25.85
12.25	330.00	0.63	0.00	200.43	26.12	26.12

STAGE-STORAGE-DISCHARGE DATA

RECORD NUMBER : 1
STORAGE TYPE : MAN STAGE/AREA
DISCHARGE TYPE : COMP STAGE/DIS
DESCRIPTION : Pond A (2- and 10-YR Storms)

[RATING CURVE LIMIT]

Minimum Elevation..... = 317.75 (ft)
Maximum Elevation..... = 330.00 (ft)
Elevation Increment..... = 0.25 (ft)

[STAGE STORAGE INFORMATION]

Input file = NULL
Output file = NULL

[Manual Contour Area vs. Elevation]

ELEVATION (ft)	CONTOUR AREA (sqft)
320.00	1300.00
322.00	2867.00
323.00	6222.00
324.00	11194.00
325.00	16435.00
326.00	19228.00
327.00	22074.00
328.00	24695.00
329.00	27394.00
330.00	30179.00

[STAGE DISCHARGE INFORMATION]

OUTLET STRUCTURE:

STR # : 1
TYPE : STAND PIPE WEIR
DESCRIPTION : Pond A (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	317.75	0.00	0.00	0.00
0.25	318.00	0.00	0.00	0.00
0.50	318.25	162.50	20.31	0.07
0.75	318.50	325.00	81.25	0.11
1.00	318.75	487.50	182.81	0.15
1.25	319.00	650.00	325.00	0.17
1.50	319.25	812.50	507.81	0.20
1.75	319.50	975.00	731.25	0.22
2.00	319.75	1137.50	995.31	0.23
2.25	320.00	1300.00	1300.00	0.25
2.50	320.25	1495.88	1649.48	0.27
2.75	320.50	1691.75	2047.94	0.28
3.00	320.75	1887.62	2495.36	0.30
3.25	321.00	2083.50	2991.75	0.31
3.50	321.25	2279.38	3537.11	0.32
3.75	321.50	2475.25	4131.44	0.34
4.00	321.75	2671.12	4774.73	0.35
4.25	322.00	2867.00	5467.00	0.36
4.50	322.25	3705.75	6288.59	0.37
4.75	322.50	4544.50	7319.88	0.38
5.00	322.75	5383.25	8560.84	0.39
5.25	323.00	6222.00	10011.50	0.40
5.50	323.25	7465.00	11722.38	0.41
5.75	323.50	8708.00	13744.00	0.42
6.00	323.75	9951.00	16076.38	0.43
6.25	324.00	11194.00	18719.50	0.44
6.50	324.25	12504.25	21681.78	0.45
6.75	324.50	13814.50	24971.62	0.46
7.00	324.75	15124.75	28589.03	0.47
7.25	325.00	16435.00	32534.00	0.48
7.50	325.25	17133.25	36730.03	0.49
7.75	325.50	17831.50	41100.62	0.50
8.00	325.75	18529.75	45645.78	7.04
8.25	326.00	19228.00	50365.50	19.01
8.50	326.25	19939.50	55261.44	21.66
8.75	326.50	20651.00	60335.25	21.98
9.00	326.75	21362.50	65586.94	22.30
9.25	327.00	22074.00	71016.50	22.62
9.50	327.25	22729.25	76616.91	22.93
9.75	327.50	23384.50	82381.12	23.24
10.00	327.75	24039.75	88309.16	23.54
10.25	328.00	24695.00	94401.00	23.84
10.50	328.25	25369.75	100659.09	24.14
10.75	328.50	26044.50	107085.88	24.43
11.00	328.75	26719.25	113681.34	24.72
11.25	329.00	27394.00	120445.50	25.01
11.50	329.25	28090.25	127381.03	25.29
11.75	329.50	28786.50	134490.62	25.57
12.00	329.75	29482.75	141774.28	25.85
12.25	330.00	30179.00	149232.00	26.12

STAGE-STORAGE DATA

Pond A (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)
318.00	0.00	0.0000	0	0	0	0	0
320.00	2.00	0.0298	1,300	650	1,300	1,300	0.03
322.00	2.00	0.0658	2,867	2,084	4,167	5,467	0.13
323.00	1.00	0.1428	6,222	4,545	4,545	10,012	0.23
324.00	1.00	0.2570	11,194	8,708	8,708	18,720	0.43
325.00	1.00	0.3773	16,435	13,815	13,815	32,534	0.75
326.00	1.00	0.4414	19,228	17,832	17,832	50,366	1.16
327.00	1.00	0.5067	22,074	20,651	20,651	71,017	1.63
328.00	1.00	0.5669	24,695	23,385	23,385	94,401	2.17
329.00	1.00	0.6289	27,394	26,045	26,045	120,446	2.77
330.00	1.00	0.6928	30,179	28,787	28,787	149,232	3.43

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 : 2
TYPE : RESER STOR. IND
DESCRIPTION : 2-YR Pond A OUTFLOW

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 12.58 (cfs)
Volume..... = 1.46 (acft)
Time Interval..... = 5.00 (min)
Time to Peak..... = 35.00 (min)
Time of Base..... = 1760.00 (min)
Peak Elevation..... = 325.87 (ft)

[RESERVOIR STRUCTURE INFORMATION]

Reservoir #..... = 1
Description..... = Pond A (2- and 10-YR Storms)
Storage type..... = MAN STAGE/AREA
Max storage..... = 149232.00 Cuft
Discharge type..... = COMP STAGE/DIS
Max discharge..... = 26.12 cfs

[RESERVOIR INFORMATION]

Reservoir #..... = 1
Reservoir Description..... = Pond A (2- and 10-YR Storms)

[INFLOW HYDROGRAPH INFORMATION]

Hydrograph #..... = 1
Hydrograph Description..... = 2-YR Pond A INFLOW

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

INTV#	TIME (min)	INFLOW (cfs)	0.5(I1+I2)dt	+	EQUATION S1-0.5(D1)dt	=	S2+0.5(D2)dt	OUTFLOW D2(cfs)	STORAGE (cuft)	ELEVATION (ft)
1	5.0	59.50	8925.00	+	0.00	=	8925.00	0.40	8865.57	322.80
2	10.0	36.30	14370.00	+	8806.13	=	23176.13	0.46	23107.55	324.36
3	15.0	26.90	9480.00	+	23038.97	=	32518.97	0.48	32446.98	324.99
4	20.0	21.50	7260.00	+	32374.98	=	39634.98	0.49	39560.84	325.41
5	25.0	17.80	5895.00	+	39486.70	=	45381.70	5.48	44559.73	325.69
6	30.0	15.10	4935.00	+	43737.75	=	48672.75	10.66	47073.32	325.83
7	35.0	13.20	4245.00	+	45473.90	=	49718.90	12.58	47831.29	325.87
8	40.0	11.40	3690.00	+	45943.67	=	49633.67	12.43	47769.53	325.86
9	45.0	10.40	3270.00	+	45905.40	=	49175.40	11.59	47437.50	325.84

10-YEAR STORM ROUTING

RECORD NUMBER : 4
TYPE : RESER STOR. IND
DESCRIPTION : 10-YR Pond A OUTFLOW

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 20.00 (cfs)
Volume..... = 1.92 (acft)
Time Interval..... = 5.00 (min)
Time to Peak..... = 30.00 (min)
Time of Base..... = 1765.00 (min)
Peak Elevation..... = 326.09 (ft)

[RESERVOIR STRUCTURE INFORMATION]

Reservoir #..... = 1
Description..... = Pond A (2- and 10-YR Storms)
Storage type..... = MAN STAGE/AREA
Max storage..... = 149232.00 Cuft
Discharge type..... = COMP STAGE/DIS
Max discharge..... = 26.12 cfs

[RESERVOIR INFORMATION]

Reservoir #..... = 1
Reservoir Description..... = Pond A (2- and 10-YR Storms)

[INFLOW HYDROGRAPH INFORMATION]

Hydrograph #..... = 3
Hydrograph Description..... = 10-YR Pond A INFLOW

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

INTV#	TIME (min)	INFLOW (cfs)	0.5(I1+I2)dt	+	EQUATION S1-0.5(D1)dt	=	S2+0.5(D2)dt	OUTFLOW D2(cfs)	STORAGE (cuft)	ELEVATION (ft)
1	5.0	75.20	11280.00	+	0.00	=	11280.00	0.41	11218.25	323.18
2	10.0	48.40	18540.00	+	11156.49	=	29696.49	0.47	29625.44	324.82
3	15.0	35.80	12630.00	+	29554.39	=	42184.39	1.69	41930.30	325.55
4	20.0	28.70	9675.00	+	41676.60	=	51351.60	15.58	49014.21	325.93
5	25.0	23.70	7860.00	+	46676.82	=	54536.82	19.67	51586.53	326.06
6	30.0	20.10	6570.00	+	48636.24	=	55206.24	20.00	52205.70	326.09
7	35.0	17.40	5625.00	+	49205.16	=	54830.16	19.82	51857.85	326.08
8	40.0	15.20	4890.00	+	48885.55	=	53775.55	19.29	50882.41	326.03
9	45.0	13.60	4320.00	+	47989.27	=	52309.27	17.34	49708.06	325.97

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 No. 7964 PROFESSIONAL ENGINEER 4/8/04

PROJECT:
2- AND 10-YEAR POND ROUTINGS (POND A)
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: 8 OF 10

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