Dewberry & Davis LL
A Dewberry Company

Calculation Shee

Designer _____ Date _____ Checker _____ Date _____
Title _____ Job No. _____
Subject POND A Sheet No. ____ of ____

Total Area to Pond	13.72 Acres	
Existing Impervious =	4.70 Acres	- impervious area contrib. to the Pond installed when pond was originally installed
Exist open space =	1.33 Acres	- existing open space that remained when pond + original construction of maint. facility were completed
New Parking area (including pond)	7.69 Acres	- Parking area that has been added to the ponds contrib. area since the pond was originally installed

Area of Pond (including slopes) = 2.38 Acres - just area immediately contributory to pond

Project Area (w/o Pond) 5.31 Acres = 7.69 - 2.38 ac

New impervious = 4.30 Acres - impervious area added to pond's watershed since ponds orig. construction. This is (7.69) - (pond area) - (grassed islands in lot).

% Impervious = 4.3/5.31 = 81% impervious
Sand Filter, Infiltration II, Retention III

Project Area w/ Pond = 7.69 Acres

% Impervious = 4.3/7.69 = 56% impervious ← use

Bioretention Filter, Extended Retention Enhanced, Retention Basin II, Infiltration

Because of the high amount of Class D soils + proximity of 100 yr flood plain, infiltration is not feasible, Also due to Hotspot conditions

Bioretention Filter - would not provide sufficient Quantity control

Utilize Retention Basin II would be an appropriate method w/ lower maintenance than Extended Retention Enhanced

Dewberry & Davis LLC
A Dewberry Company

Calculation Shee

Designer _____ Date _____ Checker _____ Date _____
Title _____ Job No. _____
Subject _____ Sheet No. _____ of _____

Volume Low marsh = 4.3 Acre x 0.5 1/12" = 0.18 Acre-ft

Volume Extended Retention = (4.3 + 4.7) 0.5/12 = 0.38 Acre-ft

Spillway Elevation = 327.5' Assume Max 10 yr @ 327.5

Set Permanent Pool = 324.5 ft

Minimum sed forebay volume 9 Acre x 0.25/12 = 0.18 Acre

Estimated forebay volume 0.68 Acre (footprint could decrease)

Elev High Marsh = Top 324.5' Bottom 324.0' set to 324.25' 20% volume

Elev Low Marsh = 324.0 to 322.5 ft 40% volume
Deep pool = 322.5 to 320 ft - 40% volume

Current volume available below Elev 324 is 0.70 Acre-ft

This is more than adequate for the shallow marsh volume providing proper flow length + high/low marsh will decrease this volume

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              MAY   1991           *
*           VERSION 4.0.1E          *
*     Lahey F77L-EM/32 version 5.01 *
*       Dodson & Associates, Inc.   *
*  RUN DATE  09/05/02  TIME  16:21:46  *
*************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 551-1748          *
*                                   *
*************************************
```

Pond A

```
X     X  XXXXXXX   XXXXX            X
X     X  X         X     X         XX
X     X  X         X                X
XXXXXXX  XXXX      X        XXXXX   X
X     X  X         X                X
X     X  X         X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                   HEC-1 INPUT                                                    PAGE  1

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                *DIAGRAM
    1           ID        LOUDOUN COUNTY MAINTENANCE FACITITY-POND A, DRY POND
    2           ID        ULTIMATE CONDITIONS AS OF AUGUST 2002
    3           ID         POND A
    4           ID           FILE:PONDA.IH1
    5           IT       5                    300
    6           IO       5
                *
                * 24-HR RAINFALL TAKEN FROM LOUDOUN COUNTY MANUAL
                *              2YR    10YR   50 YR  100 YR
    7           JR     PREC     3.5    5.25     6.5     7.5
                *
                *  CURVE NUMBER BASED ON TR-55 METHEDOLOGY AND LOUDOUN COUNTY SOIL MAPS
                *  TIME OF CONCENTRATION BASED ON PROJECT TOPO, VDOT METHODOLOGY
                *

    8           KK  DAPNDA
    9           BA  0.0214
   10           PB       1
   11           IN       6
   12           PC     0.0  .00101  .00202  .00305  .00408  .00513  .00618  .00725  .00832  .00941
   13           PC  .01050  .01161  .01272  .01385  .01498  .01613  .01728  .01845  .01962  .02081
   14           PC    .022  .02321  .02442  .02565  .02688  .02813  .02938  .03065  .03192  .03321
   15           PC  .03450  .03581  .03712  .03845  .03978  .04113  .04248  .04385  .04522  .04661
   16           PC    .048  .04941  .05084  .05229  .05376  .05525  .05676  .05829  .05984  .06141
   17           PC    .063  .06461  .06624  .06789  .06956  .07125  .07296  .07469  .07644  .07821
   18           PC     .08  .08181  .08364  .08549  .08736  .08925  .09116  .09309  .09504  .09701
   19           PC    .099  .10101  .10304  .10509  .10716  .10925  .11136  .11349  .11564  .11781
   20           PC     .12  .12225  .12460  .12705  .12960  .13225    .135  .13785  .14080  .14385
   21           PC    .147   .1502  .15340   .1566   .1598    .163  .16628  .16972  .17332  .17708
   22           PC    .181  .18512  .18948  .19408  .19892    .204   .2094   .2152   .2214    .228
   23           PC    .235  .24268  .25132  .26092  .27148    .283  .30684  .35436  .43079  .56786
   24           PC    .663  .68196  .69864  .71304  .72516    .735  .74344  .75136  .75876  .76564
   25           PC    .772  .78364  .78904  .79416    .799   .8036    .808   .8122   .8162     .82
   26           PC  .82367  .82726  .83079  .83424  .83763  .84094  .84419  .84736  .85047  .85350
   27           PC  .85647  .85936  .86219  .86494  .86763  .87024  .87279  .87526  .87767     .88
   28           PC  .88229  .88455  .88679    .889  .89119  .89335  .89549   .8976  .89969  .90175
   29           PC  .90379   .9058  .90779  .90975  .91169   .9136  .91549  .91735  .91919    .921
   30           PC  .92279  .92455  .92629    .928  .92969  .93135  .93299   .9346  .93619  .93775
   31           PC  .93929   .9408  .94229  .94375  .94519   .9466  .94799  .94935  .95069    .952
   32           PC   .9533  .95459  .95588  .95716  .95844  .95971  .96098  .96224   .9635  .96475
   33           PC    .966  .96724  .96848  .96971  .97094  .97216  .97338  .97459   .9758    .977
   34           PC   .9782  .97939  .98058  .98176  .98294  .98411  .98528  .98644  .98760  .98875
   35           PC   .9899  .99104  .99218  .99331  .99444  .99556  .99668  .99779   .9989     1.0
                *
   36           LS              88
   37           UD    .0624
                *

   38           KK  POND A
   39           KM  ROUTE BASINS THROUGH EXISTING DRY POND
   40           RS       1    ELEV  319.45       0
   41           SA       0    0.10    0.31    0.48    .610
   42           SE  319.45     322     324     326     328
   43           SQ     0.0      .1      .2     .25     .28     .54     1.8     2.9     3.4     3.7
1                                   HEC-1 INPUT                                                    PAGE  2

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   44           SQ     6.4    17.6    33.2    52.4    74.4    99.0   125.8   154.9   185.8   218.7
   45           SE  319.45  320.40  323.20  325.20  326.60  326.80   327.0   327.2   327.4   327.5
   46           SE   327.6   327.8   328.0   328.2   328.4   328.6   328.8   329.0   329.2   329.4
                *

   47           KK  ALTPND
   48           BA  0.0214
                *
```

```
 49          LS              88
 50          UD   .0624
             *
             * Not updated for revised ES

 51          KK  ALTPND
 52          KM  ROUTE BASINS THROUGH REVISED DRY POND, ADD EXCAVATION
 53          RS       1    ELEV  319.45       0
 54          SA       0     .05    0.17     .32     .48    .610
 55          SE  319.45     320     322     324     326     328
 56          SQ     0.0      .1      .2     .25     .28     .54     1.8     2.9     3.4     3.7
 57          SQ     6.2    16.6    31.1    48.9    69.3      92     117   143.8   172.5     203
 58          SE  319.45  320.40  323.20  325.20  326.60  326.80   327.0   327.2   327.4   327.5
 59          SE   327.6   327.8   328.0   328.2   328.4   328.6   328.8   329.0   329.2   329.4
             *

 60          KK  SWMPND
 61          BA  0.0214
             *
 62          LS              88
 63          UD   .0624
             *
             * Not updated for revised ES

 64          KK  SWMPND
 65          KM  ROUTE BASIN THROUGH REVISED DRY POND, ADD EXCAVATION AND NEW SWM-1 RISER
 66          RS       1    ELEV  319.45       0
 67          SA       0     .05    0.17     .32     .48    .610
 68          SE  319.45     320     322     324     326     328
 69          SQ     0.0      .1      .2     .25     .28    1.05     4.7    10.0    15.5    15.6
 70          SQ    18.0    28.1    42.5    60.1    80.3   103.0   127.8   154.6   183.2   213.5
 71          SE  319.45  320.40  323.20  325.20  326.60  326.80   327.0   327.2   327.4   327.5
 72          SE   327.6   327.8   328.0   328.2   328.4   328.6   328.8   329.0   329.2   329.4
             *

 73          KK  WETPND
 74          BA  0.0214
             *
 75          LS              88
 76          UD   .0624
             *
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 77          KK  WETPND
 78          KM  ROUTE BASIN THROUGH WET POND, ADD EXCAVATION AND NEW SWM-1 RISER
 79          RS       1    ELEV  324.48       0
 80          SA       0     .81     .94
 81          SE  324.48     326     328
 82          SQ       0     .03     .28     .76     1.9     3.7     4.7     5.5     6.2     6.5
 83          SQ     6.8     7.1     8.3    12.6    15.3    18.2    29.1    44.5    63.6    85.5
 84          SE  324.48   324.6   325.2   325.4   325.6   325.8   326.0   326.2   326.4   326.5
 85          SE   326.6   326.7   326.8   327.0   327.2   327.6   327.8   328.0   328.2   328.4
             *
 86          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   8      DAPNDA
               V
               V
  38      POND A
               .
               .
  47           .      ALTPND
               .           V
               .           V
  51           .      ALTPND
               .           .
               .           .
  60           .           .      SWMPND
               .           .           V
               .           .           V
  64           .           .      SWMPND
               .           .           .
               .           .           .
  73           .           .           .      WETPND
               .           .           .           V
               .           .           .           V
  77           .           .           .      WETPND
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              MAY   1991              *
*           VERSION 4.0.1E             *
*     Lahey F77L-EM/32 version 5.01    *
*       Dodson & Associates, Inc.      *
*  RUN DATE  09/05/02  TIME  16:21:46  *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*          (916) 551-1748              *
*                                      *
****************************************
```

LOUDOUN COUNTY MAINTENANCE FACITITY-POND A, DRY POND
ULTIMATE CONDITIONS AS OF AUGUST 2002
POND A

FILE:PONDA.IH1

```
  6 IO        OUTPUT CONTROL VARIABLES
                 IPRNT          5  PRINT CONTROL
                 IPLOT          0  PLOT CONTROL
                 QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT         HYDROGRAPH TIME DATA
                 NMIN           5  MINUTES IN COMPUTATION INTERVAL
                 IDATE      1   0  STARTING DATE
                 ITIME       0000  STARTING TIME
                    NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                NDDATE      2   0  ENDING DATE
                NDTIME       0055  ENDING TIME
                 ICENT         19  CENTURY MARK

            COMPUTATION INTERVAL    0.08 HOURS
                 TOTAL TIME BASE   24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

   JP         MULTI-PLAN OPTION
                 NPLAN          1  NUMBER OF PLANS

   JR         MULTI-RATIO OPTION
                RATIOS OF PRECIPITATION
                 3.50      5.25      6.50      7.50
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 3.50	RATIO 2 5.25	RATIO 3 6.50	RATIO 4 7.50
HYDROGRAPH AT								
+	DAPNDA	0.02	1	FLOW	41.	69.	89.	105.
				TIME	11.92	11.92	11.92	11.92
ROUTED TO								
+	POND A	0.02	1	FLOW	2.	24.	63.	88.
				TIME	14.08	12.17	12.08	12.00
			** PEAK STAGES IN FEET **					
			1	STAGE	326.96	327.89	328.30	328.51
				TIME	14.08	12.17	12.08	12.00
HYDROGRAPH AT								
+	ALTPND	0.02	1	FLOW	41.	69.	89.	105.
				TIME	11.92	11.92	11.92	11.92
ROUTED TO								
+	ALTPND	0.02	1	FLOW	1.	15.	55.	78.
				TIME	15.92	12.25	12.08	12.08
			** PEAK STAGES IN FEET **					
			1	STAGE	326.87	327.77	328.26	328.48
				TIME	15.92	12.25	12.08	12.08
HYDROGRAPH AT								
+	SWMPND	0.02	1	FLOW	41.	69.	89.	105.
				TIME	11.92	11.92	11.92	11.92
ROUTED TO								
+	SWMPND	0.02	1	FLOW	1.	18.	55.	78.
				TIME	15.58	12.17	12.08	12.08
			** PEAK STAGES IN FEET **					
			1	STAGE	326.80	327.60	328.15	328.38
				TIME	15.58	12.17	12.08	12.08
HYDROGRAPH AT								
+	WETPND	0.02	1	FLOW	41.	69.	89.	105.
				TIME	11.92	11.92	11.92	11.92
ROUTED TO								
+	WETPND	0.02	1	FLOW	8.	18.	41.	62.
				TIME	12.25	12.17	12.08	12.08
			** PEAK STAGES IN FEET **					
			1	STAGE	326.79	327.57	327.95	328.19
				TIME	12.25	12.17	12.08	12.08

*** NORMAL END OF HEC-1 ***

Project: **Loudoun County Maintenance Facility** Basin: **Dry Pond, Pond A** Engineer: **DRD**
Checker:
Date: **8/22/2002**

STAGE-STORAGE CALCULATIONS
AS BUILT BEFORE PARKING LOT EXPANSION
V = h/3 * [A1 + A2 + SQRT(A1*A2)]

Input data units: english

Elevation (ft)	Area (acres)	Incr. Depth (ft)	Inc. Volume (acre-ft)	TOTAL VOLUME (acre-ft)	(cu.ft)
319.450	0.000	0.00	0.00	0.00	0.00
322.000	0.100	2.55	0.09	0.09	3702.60
324.000	0.310	2.00	0.39	0.48	20722.02
326.000	0.480	2.00	0.78	1.26	54865.68
328.000	0.610	2.00	1.09	2.35	102233.12
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00

Elevation (m)	Area (sq.m)	Incr. Depth (m)	Inc. Volume (cu.m)	TOTAL VOLUME (cu.m)	(cu.m)
97.36836	0.00	0.00	0.00	0.00	0.00
98.1456	404.69	0.78	104.85	104.85	104.85
98.7552	1254.53	0.61	481.94	586.79	586.79
99.3648	1942.50	0.61	966.86	1553.65	1553.63
99.9744	2468.59	0.61	1341.32	2894.96	2894.94
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00

Project: Loudoun County Maintenance Facility

Basin: Dry Pond, Pond A

Engineer: DRD
Checker:
Date: 8/22/2002

SPILLWAY RATING CURVE

ORIFICE FLOW

ORIFICE NO.	INVERT ELEV. (ft.)	CENTROID ELEV. (ft.)	ORIFICE HEIGHT (ft.)	AREA (sq.ft.)	Orifice Coeff. C	DESCRIPTION
1	319.45	319.49	0.08	0.02	0.60	BMP-ORIFICE 4-1"-Dia Holes
2						
3 (riser top)	326.71			0.79	0.60	12" CMP RISER PIPE
4 (Safety slab)						

WEIR FLOW

WEIR NO.	CREST ELEV. (ft.)	LENGTH (ft.)	Weir Coeff. C
1			
2			
3 (riser top)	326.71	3.14	3.0

EMERGENCY SPILLWAY FLOW
(Top of Dam or designed spillway)

CREST ELEV. (ft.) =	327.50
WIDTH (ft.) =	27.00
Side slope (Z-to-1) Z =	3.0
C =	3.0

CULVERT RATING CURVE
SIZE: 18" CMP

ELEV. (ft.)	DISCHARGE (cfs)
319.45	0
320.53	2
320.79	4
321.16	6
321.53	8
322.01	10
323.73	12
325.73	14
328.01	16
330.57	18

ELEV.	ORIFICES Q1	Q2	Q3	Q4	WEIRS Q1	Q2	Q3	RISER FLOW	CULVERT CAPACITY	Q P.S.W. (Control)	Q E.S.W.	TOTAL FLOW	COMMENTS
319.45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	Below Riser Top
320.00	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	0.1	0.0	0.07	Below Riser Top
320.40	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.8	0.1	0.0	0.10	Below Riser Top
320.80	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	4.1	0.1	0.0	0.12	Below Riser Top
321.20	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	6.2	0.1	0.0	0.14	Below Riser Top
321.60	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	8.3	0.2	0.0	0.15	Below Riser Top
322.00	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	10.0	0.2	0.0	0.17	Below Riser Top
322.40	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	10.5	0.2	0.0	0.18	Below Riser Top
322.80	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	10.9	0.2	0.0	0.19	Below Riser Top
323.20	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	11.4	0.2	0.0	0.20	Below Riser Top
323.60	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	11.8	0.2	0.0	0.21	Below Riser Top
324.00	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	12.3	0.2	0.0	0.22	Below Riser Top
324.40	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	12.7	0.2	0.0	0.23	Below Riser Top
324.80	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	13.1	0.2	0.0	0.24	Below Riser Top
325.20	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13.5	0.3	0.0	0.25	Below Riser Top
325.60	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13.9	0.3	0.0	0.26	Below Riser Top
326.00	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	14.2	0.3	0.0	0.27	Below Riser Top
326.40	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	14.6	0.3	0.0	0.276	Below Riser Top
326.60	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	14.8	0.3	0.0	0.280	Below Riser Top
326.70	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	14.9	0.3	0.0	0.282	Below Riser Top
326.80	0.3	0.0	1.1	0.0	0.0	0.0	0.3	0.5	14.9	0.5	0.0	0.54	Riser Weir Control
327.00	0.3	0.0	2.0	0.0	0.0	0.0	1.5	1.8	15.1	1.8	0.0	1.8	Riser Weir Control
327.20	0.3	0.0	2.6	0.0	0.0	0.0	3.2	2.9	15.3	2.9	0.0	2.9	Riser Orifice Control
327.40	0.3	0.0	3.1	0.0	0.0	0.0	5.4	3.4	15.5	3.4	0.0	3.4	Riser Orifice Control
327.50	0.3	0.0	3.4	0.0	0.0	0.0	6.6	3.7	15.6	3.7	0.0	3.7	Riser Orifice Control
327.60	0.3	0.0	3.6	0.0	0.0	0.0	7.9	3.9	15.6	3.9	2.6	6.4	Riser Orifice Control
327.80	0.3	0.0	3.9	0.0	0.0	0.0	10.7	4.3	15.8	4.3	13.3	17.6	Riser Orifice Control
328.00	0.3	0.0	4.3	0.0	0.0	0.0	13.8	4.6	16.0	4.6	28.6	33.2	Riser Orifice Control
328.20	0.3	0.0	4.6	0.0	0.0	0.0	17.1	4.9	16.1	4.9	47.4	52.4	Riser Orifice Control
328.40	0.3	0.0	4.9	0.0	0.0	0.0	20.7	5.2	16.3	5.2	69.2	74.4	Riser Orifice Control
328.60	0.3	0.0	5.2	0.0	0.0	0.0	24.5	5.5	16.5	5.5	93.4	99.0	Riser Orifice Control
328.80	0.3	0.0	5.5	0.0	0.0	0.0	28.5	5.8	16.6	5.8	120.1	125.8	Riser Orifice Control
329.00	0.3	0.0	5.7	0.0	0.0	0.0	32.7	6.0	16.8	6.0	148.8	154.9	Riser Orifice Control
329.20	0.3	0.0	6.0	0.0	0.0	0.0	37.0	6.3	16.9	6.3	179.5	185.8	Riser Orifice Control
329.40	0.3	0.0	6.2	0.0	0.0	0.0	41.5	6.5	17.1	6.5	212.1	218.7	Riser Orifice Control

Project: **Loudoun County Maintenance Facility** Basin: **Dry Pond, Pond A** Engineer: **DRD**

Scenario 1

Checker:

Date: **9/5/2002**

STAGE-STORAGE CALCULATIONS

Wet Pond Design

V = h/3 * [A1 + A2 + SQRT(A1*A2)]

Input data units: english

Elevation (ft)	Area (acres)	Incr. Depth (ft)	Inc. Volume (acre-ft)	TOTAL VOLUME (acre-ft)	(cu.ft)
319.450	0.000	0.00	0.00	0.00	0.00
320.000	0.050	0.55	0.01	0.01	399.30
322.000	0.460	2.00	0.44	0.45	19613.83
324.000	0.600	2.00	0.55	0.56	24305.18
324.480	0.650	0.48	0.27	0.72	31165.09
326.000	0.810	1.52	1.07	1.63	70810.53
328.000	0.940	2.00	1.75	3.37	146970.32
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00
0.000	0.000	0.00	0.00	0.00	0.00

Elevation (m)	Area (sq.m)	Incr. Depth (m)	Inc. Volume (cu.m)	TOTAL VOLUME (cu.m)	(cu.m)
97.36836	0.00	0.00	0.00	0.00	0.00
97.536	202.34	0.17	11.31	11.31	11.31
98.1456	1861.56	0.61	544.10	555.41	555.40
99.3648	3277.96	0.46	1316.90	2005.16	2005.14
99.9744	3804.06	0.61	2156.64	4161.80	4161.76
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00

Scenario 1

Project: Loudoun County Maintenance Facility

Basin: Dry Pond, Pond A

Engineer: DRD
Checker:
Date: 9/5/2002

SPILLWAY RATING CURVE

ORIFICE FLOW

ORIFICE NO.	INVERT ELEV. (ft.)	CENTROID ELEV. (ft.)	ORIFICE HEIGHT (ft.)	AREA (sq.ft.)	Orifice Coeff. C	DESCRIPTION
1	324.48	324.64	0.31	0.08	0.60	BMP-ORIFICE 3.75"-Dia
2	325.25	325.5	0.50	1.25	0.60	.5' by 2.5' slot
3 (riser top)	326.70			4.38	0.60	SWM-1 Riser
4 (Safety slab)						

WEIR FLOW

WEIR NO.	CREST ELEV. (ft.)	LENGTH (ft.)	Weir Coeff. C
1	324.48	0.27	3.0
2	325.25	2.50	3.0
3 (riser top)	326.70	9.43	3.0

EMERGENCY SPILLWAY FLOW
(Top of Dam or designed spillway)

CREST ELEV. (ft.) =		327.50
WIDTH (ft.) =		27.00
Side slope (Z-to-1)	Z =	3.0
	C =	3.0

CULVERT RATING CURVE
SIZE: 18" CMP

ELEV. (ft.)	DISCHARGE (cfs)
319.45	0
320.53	2
320.79	4
321.16	6
321.53	8
322.01	10
323.73	12
325.73	14
328.01	16
330.57	18

ELEV.	ORIFICES				WEIRS			RISER FLOW	CULVERT CAPACITY	Q P.S.W. (Control)	Q E.S.W.	TOTAL FLOW	COMMENTS
	Q1	Q2	Q3	Q4	Q1	Q2	Q3						
319.45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Below Riser Top
324.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	0.0	0.0	0.0	Below Riser Top
324.60	0.0	0.0	0.0	0.0	0.03	0.0	0.0	0.03	12.9	0.0	0.0	0.03	Below Riser Top
324.80	0.1	0.0	0.0	0.0	0.00	0.0	0.0	0.15	13.1	0.1	0.0	0.15	Below Riser Top
325.00	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	13.3	0.2	0.0	0.22	Below Riser Top
325.20	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13.5	0.3	0.0	0.28	Below Riser Top
325.40	0.3	0.0	0.0	0.0	0.0	0.4	0.0	0.8	13.7	0.8	0.0	0.76	Below Riser Top
325.50	0.3	0.0	0.0	0.0	0.0	0.9	0.0	1.3	13.8	1.3	0.0	1.28	Below Riser Top
325.60	0.4	0.0	0.0	0.0	0.0	1.6	0.0	1.9	13.9	1.9	0.0	1.92	Below Riser Top
325.80	0.4	3.3	0.0	0.0	0.0	0.0	0.0	3.7	14.1	3.7	0.0	3.69	Below Riser Top
326.00	0.4	4.3	0.0	0.0	0.0	0.0	0.0	4.7	14.2	4.7	0.0	4.7	Below Riser Top
326.20	0.5	5.0	0.0	0.0	0.0	0.0	0.0	5.5	14.4	5.5	0.0	5.5	Below Riser Top
326.40	0.5	5.7	0.0	0.0	0.0	0.0	0.0	6.2	14.6	6.2	0.0	6.2	Below Riser Top
326.50	0.5	6.0	0.0	0.0	0.0	0.0	0.0	6.5	14.7	6.5	0.0	6.5	Below Riser Top
326.60	0.5	6.3	0.0	0.0	0.0	0.0	0.0	6.8	14.8	6.8	0.0	6.8	Below Riser Top
326.70	0.5	6.6	0.0	0.0	0.0	0.0	0.0	7.1	14.9	7.1	0.0	7.1	Below Riser Top
326.80	0.5	6.9	6.7	0.0	0.0	0.0	0.9	8.3	14.9	8.3	0.0	8.3	Riser Weir Control
327.00	0.6	7.4	11.6	0.0	0.0	0.0	4.6	12.6	15.1	12.6	0.0	12.6	Riser Weir Control
327.20	0.6	7.8	14.9	0.0	0.0	0.0	10.0	18.4	15.3	15.3	0.0	15.3	Culvert Control
327.40	0.6	8.3	17.6	0.0	0.0	0.0	16.6	25.5	15.5	15.5	0.0	15.5	Culvert Control
327.60	0.6	8.7	20.0	0.0	0.0	0.0	24.2	29.4	15.6	15.6	2.6	18.2	Culvert Control
327.80	0.7	9.1	22.1	0.0	0.0	0.0	32.6	31.9	15.8	15.8	13.3	29.1	Culvert Control
328.00	0.7	9.5	24.0	0.0	0.0	0.0	41.9	34.2	16.0	16.0	28.6	44.6	Culvert Control
328.20	0.7	9.9	25.8	0.0	0.0	0.0	52.0	36.4	16.1	16.1	47.4	63.6	Culvert Control
328.40	0.7	10.2	27.5	0.0	0.0	0.0	62.7	38.5	16.3	16.3	69.2	85.5	Culvert Control
328.50	0.7	10.4	28.3	0.0	0.0	0.0	68.3	39.4	16.4	16.4	81.0	97.4	Culvert Control
328.60	0.7	10.6	29.1	0.0	0.0	0.0	74.1	40.4	16.5	16.5	93.4	109.9	Culvert Control
328.70	0.7	10.8	29.8	0.0	0.0	0.0	80.0	41.3	16.5	16.5	106.5	123.0	Culvert Control
328.80	0.8	10.9	30.6	0.0	0.0	0.0	86.1	42.2	16.6	16.6	120.1	136.7	Culvert Control
329.00	0.8	11.3	32.0	0.0	0.0	0.0	98.7	44.0	16.8	16.8	148.8	165.6	Culvert Control
329.20	0.8	11.6	33.3	0.0	0.0	0.0	111.8	45.7	16.9	16.9	179.5	196.5	Culvert Control
329.40	0.8	11.9	34.7	0.0	0.0	0.0	125.5	47.3	17.1	17.1	212.1	229.2	Culvert Control
329.60	0.8	12.2	35.9	0.0	0.0	0.0	139.7	48.9	17.2	17.2	246.5	263.7	Culvert Control
329.80	0.8	12.5	37.1	0.0	0.0	0.0	154.4	50.5	17.4	17.4	282.5	299.9	Culvert Control
330.00	0.9	12.8	38.3	0.0	0.0	0.0	169.6	51.9	17.6	17.6	320.2	337.7	Culvert Control

Scenario 1

Project:	Loudoun County Maintenance Facility Wet Pond Design	Basin:	Dry Pond, Pond A	Engineer:	DRD
				Checker:	
				Date:	9/5/2002

Virginia State Stormwater Management BMP Calculations (VDOT Methodology)

Objective: Provide 4*WQV for 4.3 acres, permanent pool, provide 2*WQV for 4.7 acres with 30 hour drawdown time. WQV=0.5" * Impervious

Total Impervious Area to SWM Basin	9.00 Acres	
Total New Impervious Area to SWM Basin	4.30 Acres	
Total Original Impervious Area to SWM Basin	4.70 Acres	
BMP Volume Required for Total Impervious Area	1.108 Acre - Feet	Min Volume
BMP Volume Required for New Impervious Area	0.717 Acre - Feet	Wet Volume
BMP Volume Required for Original Impervious Area	0.392 Acre - Feet	Dry Volume

Stage - Storage Relationship for SWM Basin

Elevation (ft)	Storage (Cu Ft)	Storage (Ac-Ft)
319.45	0	0.000
320.00	399	0.009
322.00	19614	0.450
324.00	24305	0.558
324.48	31165	0.715
326.00	70811	1.626
328.00	146970	3.374
0.00	0	0.000
0.00	0	0.000

By Interpolation:

Minimum BMP Pool Volume of 1.108 Ac-Ft occurs @ 325.14 feet

Minimum Wet BMP Pool Volume of 0.717 Ac-Ft occurs @ 324.48 feet

Minimum Dry BMP Pool Volume of 0.392 Ac-Ft occurs @ 321.73 feet

BMP Volume and Elevation Calculations

For this SWM Basin, Water Quality is based on **Minimum** BMP Pool Volume

Water Quality Volume Required	1.108 Ac-Ft occurs @	325.14 feet
Water Quality Volume Provided	1.177 Ac-Ft occurs @	325.25 feet

Water Quality Pool Drawdown Time

Draw Down for Dry Volume only

Invert of BMP Opening	324.48 Feet (Elevation)
Dia. of BMP Opening	3.75 Inches
Area of BMP Opening	0.08 Square Feet
Centroid of BMP Opening	324.64 Feet (Elevation)
BMP Drawdown Time (Based on Incremental Calculations)	**30.00 Hours**

Culvert Designer/Analyzer Report
Dry Pond Outfall

Analysis Component			
Storm Event	Design	Discharge	50.00 cfs

Peak Discharge Method: User-Specified			
Design Discharge	50.00 cfs	Check Discharge	100.00 cfs

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	316.92 ft

Name	Description	Discharge	HW Elev	Velocity
Culvert-1	1-18 inch Circular	50.00 cfs	412.34 ft	28.29 ft/s
Weir	Not Considered	N/A	N/A	N/A

Culvert Designer/Analyzer Report
Dry Pond Outfall

Component:Culvert-1

Culvert Summary			
Computed Headwater Elevation	412.34 ft	Discharge	50.00 cfs
Inlet Control HW Elev	364.51 ft	Tailwater Elevation	316.92 ft
Outlet Control HW Elev	412.34 ft	Control Type	Outlet Control
Headwater Depth/ Height	61.93		

Grades			
Upstream Invert	319.45 ft	Downstream Invert	316.92 ft
Length	91.00 ft	Constructed Slope	0.027778 ft/ft

Hydraulic Profile			
Profile	Pressure	Depth, Downstream	1.50 ft
Slope Type	N/A	Normal Depth	N/A ft
Flow Regime	N/A	Critical Depth	1.50 ft
Velocity Downstream	28.29 ft/s	Critical Slope	0.756558 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev	412.34 ft	Upstream Velocity Head	12.44 ft
Ke	0.90	Entrance Loss	11.20 ft

Inlet Control Properties			
Inlet Control HW Elev	364.51 ft	Flow Control	Submerged
Inlet Type	Projecting	Area Full	1.8 ft^2
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Rating Table Report
Dry Pond Outfall

Range Data:

	Minimum	Maximum	Increment
Discharge	15.70	15.80	0.01 cfs

Discharge (cfs)	HW Elev (ft)	(D) Dn V
15.70	327.65	9.07
15.71	327.66	9.08
15.72	327.67	9.08
15.73	327.68	9.09
15.74	327.70	9.09
15.75	327.71	9.10
15.76	327.72	9.10
15.77	327.73	9.11
15.78	327.74	9.11
15.79	327.75	9.12
15.80	327.77	9.12