



February 7, 2023

El Paso County Stormwater
Christina Prete, P.E.
Stormwater Engineer II
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**RE: Widefield Water and Sanitation District
Rolling Hills 2 MG Potable Water Tank
File # PPR216**

To Whom it May Concern:

This letter is being submitted on behalf of Widefield Water and Sanitation District per the request of the El Paso County Stormwater in accordance with ECM Chapter 5.10.6.B. I, being the Engineer of Record for the Widefield Water and Sanitation District Rolling Hills 2 MG Potable Water Tank confirm that the site and all adjacent properties (as affected by work performed under the El Paso County Permit PPR-21-006) are stable with respect to settlement and subsidence, sloughing of cut and fill slopes, and that the improvements which include a sand filter basin that detains developed flows and releases them at or below historic rates for the 10-yr and 100-yr storm events, as well as provides WQCV treatment meet or exceed the minimum design requirements. The sand filter basin constructed on the tank site provides the required storage volume and will meet the required release rates, as documented by the attached UDFCD design form submitted with the original application, the stage areas, elevations, and outlet dimensions.

Regarding revegetation or other ground cover, I completed a site walk on January 16, 2023. I did not see any visible erosion due to stormwater runoff but there are areas where the revegetation has not achieved an "uniform vegetative cover with individual plant density of 70 percent of pre-disturbance level established or equivalent permanent alternative stabilization method". The revegetation will be reevaluated this spring when the grass at the site is alive and Widefield will require the contractor that completed the construction to reseed any areas that have not met the 70% of pre-disturbance level.

Sincerely,

Gwen Dall, P.E. - Design Engineer of Record

Elizabeth Steffens, P.E. - Design Engineer for Drainage Plan and Report

5540 TECH CENTER DRIVE
SUITE 100
COLORADO SPRINGS, CO 80919
719.227.0072

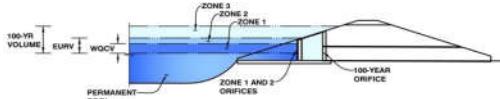
Enclosure: UDFCD Design Form
cc: Robert Bannister, P.E. – District Engineer, Widefield Water and Sanitation District

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.00 (December 2019)

Project: Widefield Water and Sanitation District - Rolling Hills Tank

Basin ID: Subbasin C



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	SF	Note: L / W Ratio > 8
Watershed Area =	1.76	acres L / W Ratio = 13.04

Note: L / W Ratio > 8

L / W Ratio = 13.04

Selected BMP Type =	SF
Watershed Area =	1.76 acres
Watershed Length =	1,000 ft
Watershed Length to Centroid =	650 ft
Watershed Slope =	0.012 ft/ft
Watershed Imperviousness =	36.00% percent
Percentage Hydrologic Soil Group A =	0.0% percent
Percentage Hydrologic Soil Group B =	0.0% percent
Percentage Hydrologic Soil Groups C/D =	100.0% percent
Target WQCV Rainfall Depth =	12.0 hours
Location for 1-hr Rainfall Depth =	User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

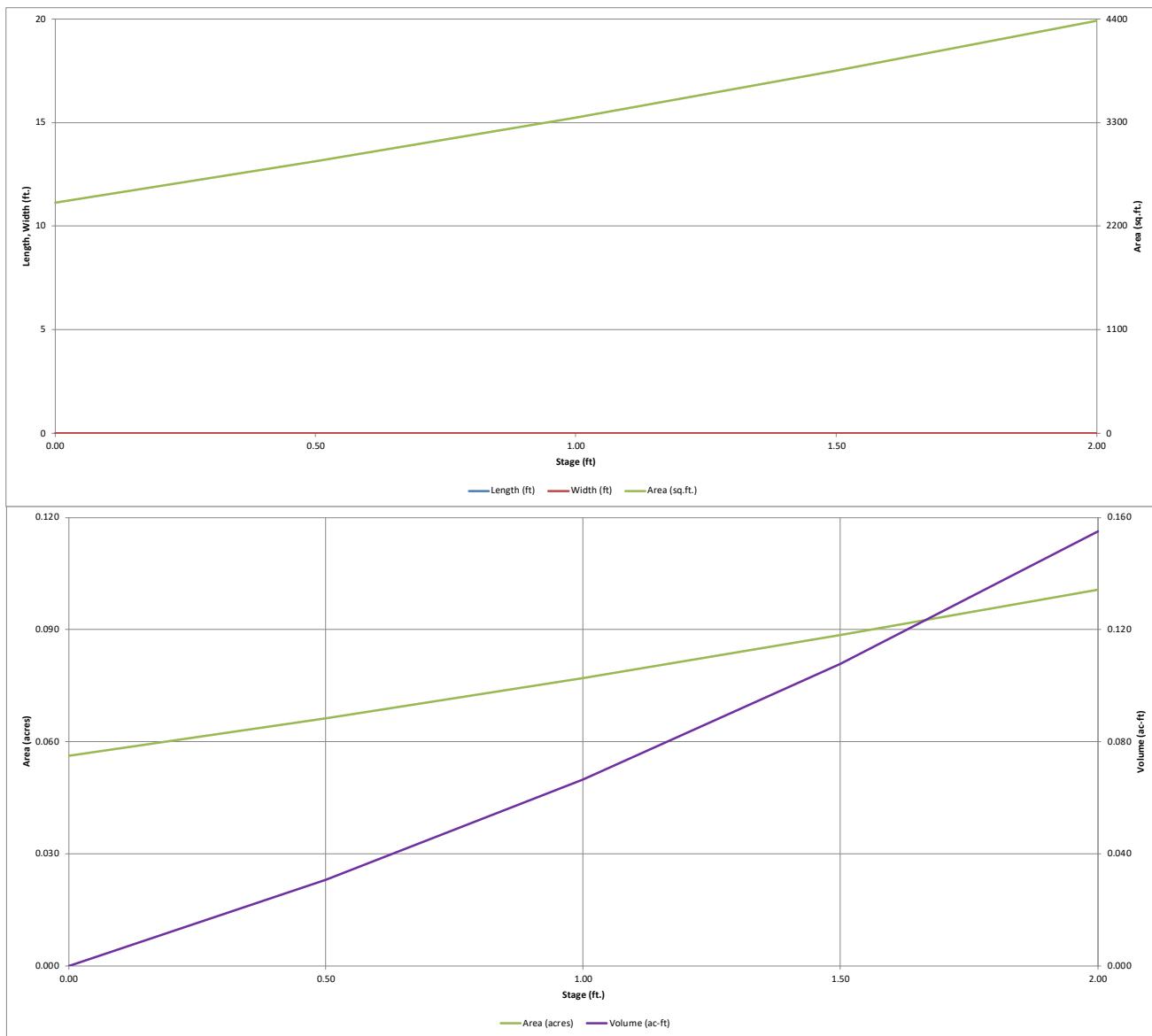
The Unchecked Controls Check (Graphical Procedure)		Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.020	acre-feet
Excess Urban Runoff Volume (EURV) =	0.058	acre-feet
2-yr Runoff Volume ($P_1 = 1.19 \text{ in.}$) =	0.075	acre-feet
5-yr Runoff Volume ($P_1 = 1.5 \text{ in.}$) =	0.116	acre-feet
10-yr Runoff Volume ($P_1 = 1.75 \text{ in.}$) =	0.151	acre-feet
25-yr Runoff Volume ($P_1 = 2 \text{ in.}$) =	0.195	acre-feet
50-yr Runoff Volume ($P_1 = 2.25 \text{ in.}$) =	0.233	acre-feet
100-yr Runoff Volume ($P_1 = 2.52 \text{ in.}$) =	0.280	acre-feet
500-yr Runoff Volume ($P_1 = 3.14 \text{ in.}$) =	0.376	acre-feet
Approximate 2-yr Detention Volume =	0.051	acre-feet
Approximate 5-yr Detention Volume =	0.081	acre-feet
Approximate 10-yr Detention Volume =	0.093	acre-feet
Approximate 25-yr Detention Volume =	0.103	acre-feet
Approximate 50-yr Detention Volume =	0.108	acre-feet
Approximate 100-yr Detention Volume =	0.128	acre-feet

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.020	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.039	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.070	acre-feet
Total Detention Basin Volume =	0.128	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft. ³
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H _{TOTAL}) =	user	ft
Depth of Trickle Channel (H _{TC}) =	N/A	ft
Slope of Trickle Channel (S _{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S _{MAIN}) =	user	H:V
Basin Length-to-Width Ratio (L _W /W) =	user	
Initial Surcharge Area (A _{ISV}) =	user	ft. ²
Surcharge Volume Length (L _{ISV}) =	user	ft
Surcharge Volume Width (W _{ISV}) =	user	ft
Depth of Basin Floor (H _{FLOOR}) =	user	ft
Length of Basin Floor (L _{FLOOR}) =	user	ft
Width of Basin Floor (W _{FLOOR}) =	user	ft
Area of Basin Floor (A _{FLOOR}) =	user	ft. ²
Volume of Basin Floor (V _{FLOOR}) =	user	ft. ³
Depth of Main Basin (H _{MAIN}) =	user	ft
Length of Main Basin (L _{MAIN}) =	user	ft
Width of Main Basin (W _{MAIN}) =	user	ft
Area of Main Basin (A _{MAIN}) =	user	ft. ²
Volume of Main Basin (V _{MAIN}) =	user	ft. ³
Calculated Total Basin Volume (V _{total}) =	user	acre-feet

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

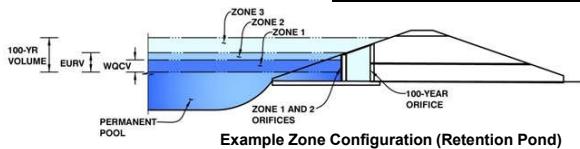
MHFD-Detention, Version 4.00 (December 2019)



DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)

Project: Widefield Water and Sanitation District - Rolling Hills Tank
Basin ID: Subbasin C



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.34	0.020	Filtration Media
Zone 2 (EURV)	0.90	0.039	Circular Orifice
Zone 3 (100-year)	1.73	0.070	Weir&Pipe (Circular)
Total (all zones)		0.128	

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	1.83	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.35	inches

Underdrain Orifice Area =	0.0	ft ²
Underdrain Orifice Centroid =	0.01	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WOCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	N/A	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	N/A	inches

Calculated Parameters for Plate	
WQ Orifice Area per Row =	N/A
Elliptical Half-Width =	N/A
Elliptical Slot Centroid =	N/A
Elliptical Slot Area =	N/A

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

Stage of Orifice Centroid (ft)	Row 1 (optional)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stage of Orifice Centroid (ft)	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	0.05	N/A
Depth at top of Zone using Vertical Orifice =	0.50	N/A
Vertical Orifice Diameter =	1.50	N/A

Calculated Parameters for Vertical Orifice	
Zone 2 Circular	Not Selected
Vertical Orifice Area =	0.01
Vertical Orifice Centroid =	0.06

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe))

Overflow Weir Front Edge Height, Ho =	0.30	N/A	
Overflow Weir Front Edge Length =	4.00	N/A	
Overflow Weir Grate Slope =	3.00	N/A	
Horiz. Length of Weir Sides =	4.00	N/A	
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	0%	N/A	%

Calculated Parameters for Overflow Weir	
Zone 3 Weir	Not Selected
Height of Grate Upper Edge, H _t =	1.63
feet	N/A
Overflow Weir Slope Length =	4.22
feet	N/A
Grate Open Area / 100-yr Orifice Area =	153.92
N/A	ft ²
Overflow Grate Open Area w/o Debris =	11.81
N/A	ft ²
Overflow Grate Open Area w/ Debris =	11.81
N/A	ft ²

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	1.92	N/A
Circular Orifice Diameter =	3.75	N/A

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	
Zone 3 Circular	Not Selected
Outlet Orifice Area =	0.08
Outlet Orifice Centroid =	0.16
Half-Central Angle of Restrictor Plate on Pipe =	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	0.75	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	1.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway	
Stage at Top of Freeboard =	2.11
feet	N/A
Basin Area at Top of Freeboard =	0.10
acres	ft ²
Basin Volume at Top of Freeboard =	0.16
acre-ft	ft ³

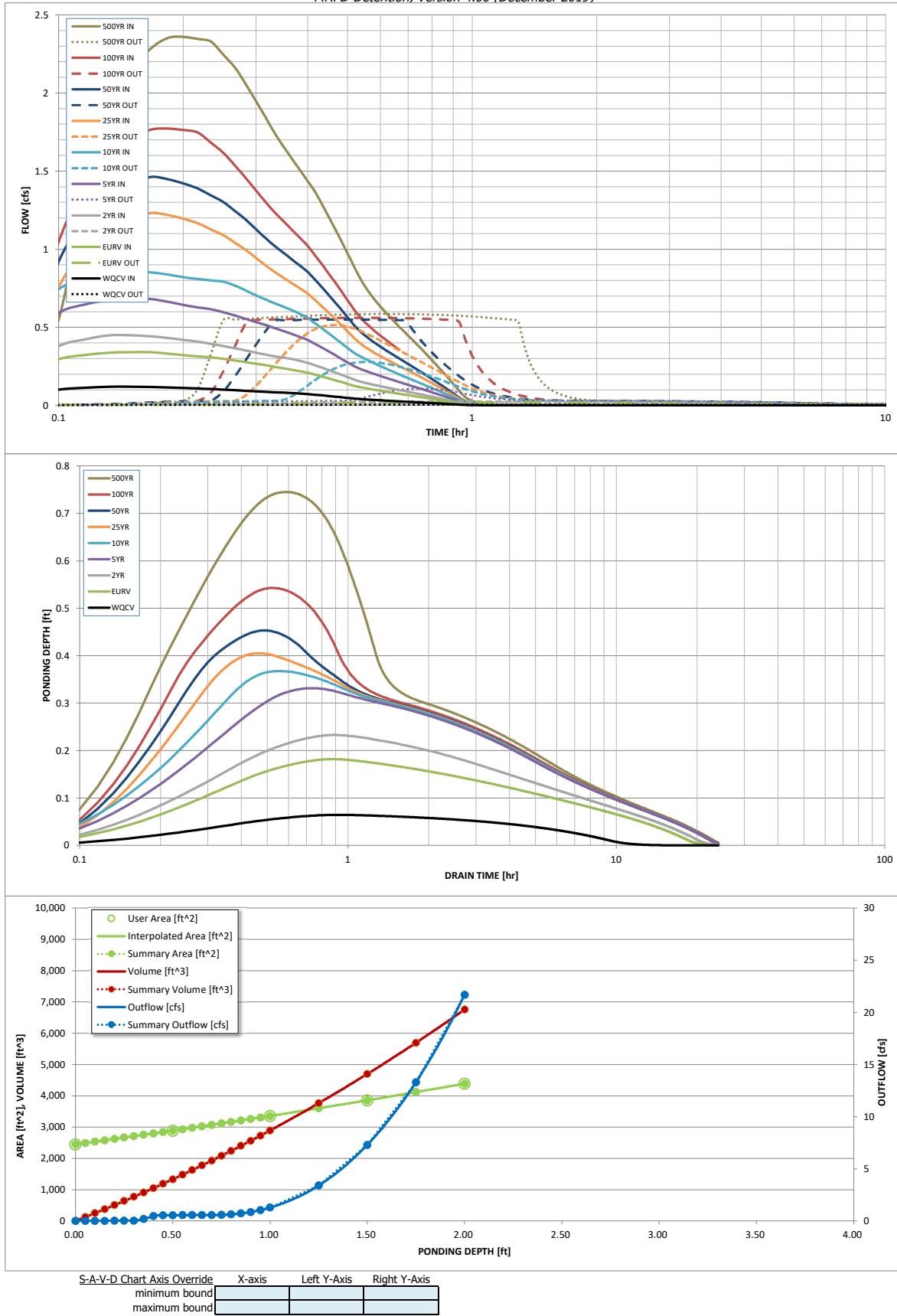
Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.020	0.058	0.075	0.116	0.151	0.195	0.233	0.280	0.376
Inflow Hydrograph Volume (acre-ft) =	0.004	0.012	0.015	0.023	0.030	0.039	0.047	0.056	0.075
CUHP Predevelopment Peak Q (cfs) =	0.0	0.0	0.1	0.3	0.4	0.7	0.8	1.1	1.5
OPTIONAL Override Predevelopment Peak Q (cfs) =	0.0	0.0							
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.08	0.17	0.24	0.38	0.47	0.62	0.86
Peak Inflow Q (cfs) =	0.1	0.3	0.4	0.7	0.9	1.2	1.5	1.8	2.4
Peak Outflow Q (cfs) =	0.005	0.020	0.0	0.1	0.278	0.5	0.5	0.561	0.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.7	0.8	0.7	0.5	0.4
Structure Controlling Flow =	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.0	0.0	0.0	0.0	0.0	0.0
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	12	19	21	22	22	21	20	20	18
Time to Drain 99% of Inflow Volume (hours) =	14	21	22	24	24	23	23	23	23
Maximum Pending Depth (ft) =	0.06	0.18	0.23	0.33	0.37	0.41	0.45	0.54	0.75
Area at Maximum Pending Depth (acres) =	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07
Maximum Volume Stored (acre-ft) =	0.003	0.010	0.013	0.020	0.022	0.024	0.027	0.033	0.047

DETENTION BASIN OUTLET STRUCTURE DESIGN

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S-A-V-D Chart Axis Override
 minimum bound X-axis Left Y-Axis Right Y-Axis
 maximum bound

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

DETENTION BASIN OUTLET STRUCTURE DESIGN

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Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.