

January 29, 2025

Attn: Gleen Reese

Stormwater Engineer

El Paso County - Department of Public Works

3275 Akers Drive

Colorado Springs, CO 80922



RE: HOMESTEAD FILING 2 – PRELIMINARY ACCEPTANCE PUNCHLIST FOR FULL SPECTRUM DETENTION POND 1

Dear Mr. Reese,

The El Paso County punchlist from 11/28/2023 site walk identified a few inconsistencies within Pond 1 when compared to the approved construction documents.

1. Micro screen installed with V-wire bars are horizontal and not vertical
2. Pond outfall not installed per plans. Plunge pool approved, 8' x 30' riprap pad installed.
3. Shown plan riprap around forebay, instead of soil riprap
4. Flat portion of Section A-A (spillway) is installed at less than 20 ft wide.

Horizontal Microscreen

In response to the horizontal V-wire microscreen, the Sterling Ranch Metro District is responsible for maintenance of this pond and is aware the horizontal V-wire orientation will need to be monitored and cleaned more frequently than a vertical orientation. Additionally, the horizontal V-wire performs as intended and functionality is not adversely affected by a horizontal orientation, with the necessary monitoring and maintenance. Therefore, I recommend that the microscreen be accepted “as-is”.

Pond Outfall

The pond outfall was constructed with an 8' x 30' Type L riprap pad. The riprap pad provides the necessary energy dissipation for the pond outfall. See attached riprap sizing for verification. Therefore, I recommend that the riprap pad be accepted as the Pond 1 outfall erosion protection

Forebay Riprap

The reason for calling out soil riprap for the forebay protection is that soil riprap gives a finished look and can be revegetated, however; both clean riprap and soil riprap are acceptable erosion protection treatments around the forebay. Therefore, I recommend the clean riprap remain around the forebay.

Spillway Width

The spillway was proposed at 20' in the approved construction documents. However, it was constructed 16' wide. The UD-Detention 3.07 spreadsheet for Pond 1 has been updated with the 16' spillway width and confirms the spillway will pass the undetained 100-year flow with 1.0' freeboard. Therefore, I recommend the 16' spillway remain as is.

Respectfully submitted,



NICHOLAS JOKERST, PE

All Terrain Engineering LLC

njokerst@allterraineng.com

530.391.7635



$$H_a = \frac{(H + Y_n)}{2}$$

Equation 9-19

Where the maximum value of H_a shall not exceed H , and:

D_a = parameter to use in place of D in Figure 9-38 when flow is supercritical (ft)

D_c = diameter of circular culvert (ft)

H_a = parameter to use in place of H in Figure 9-39 when flow is supercritical (ft)

H = height of rectangular culvert (ft)

Y_n = normal depth of supercritical flow in the culvert (ft)

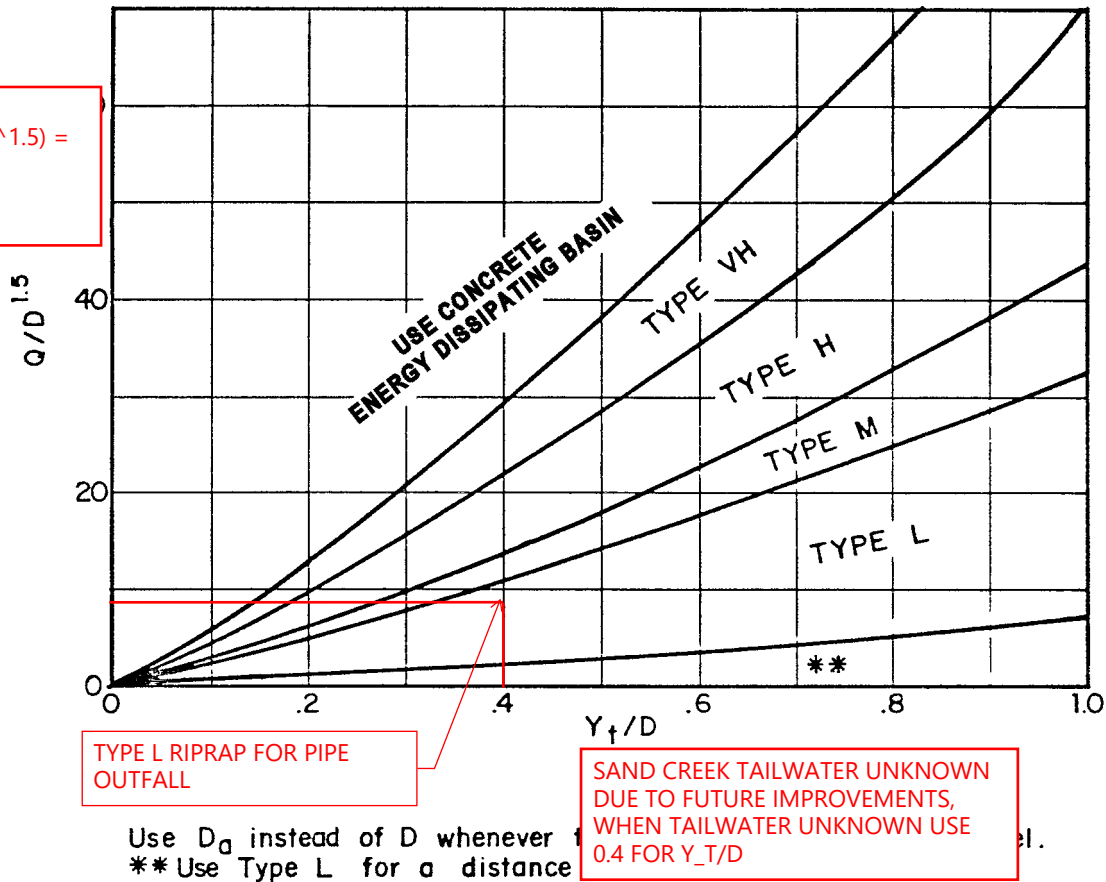
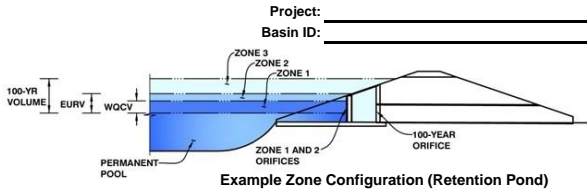


Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for $Q/D^{2.5} \leq 6.0$)

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.15	0.262	Orifice Plate
Zone 2 (EURV)	6.52	0.508	Orifice Plate
Zone 3 (100-year)	8.55	0.642	Weir&Pipe (Restrict)
		1.412	Total

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft ²
Underdrain Orifice Centroid =	N/A	feet

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

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	6.52	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	ft ²
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft ²

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

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	3.84						
Orifice Area (sq. inches)	1.41	1.41						
	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft ²
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.91	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	6.00	N/A	feet
Overflow Weir Slope =	3.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	3.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	% grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H _g =	6.91	N/A	feet
Over Flow Weir Slope Length =	3.16	N/A	feet
Grate Open Area / 100-yr Orifice Area =	6.98	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	13.28	N/A	ft ²
Overflow Grate Open Area w/ Debris =	6.64	N/A	ft ²

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.61	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	14.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.90	N/A	ft ²
Outlet Orifice Centroid =	0.66	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.74	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	7.96	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	16.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =	0.91	feet
Stage at Top of Freeboard =	9.87	feet
Basin Area at Top of Freeboard =	1.917	acres

Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	0.00
Calculated Runoff Volume (acre-ft) =	0.262	0.771	0.614	0.847	1.177	1.710	2.073	2.550	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.262	0.771	0.614	0.847	1.176	1.710	2.074	2.551	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.02	0.03	0.27	0.84	1.16	1.55	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	0.3	0.4	4.4	13.9	19.2	25.5	0.0
Peak Inflow Q (cfs) =	5.3	15.5	12.4	17.0	23.5	34.1	41.2	50.5	#N/A
Peak Outflow Q (cfs) =	0.1	1.7	0.2	3.0	9.0	18.5	24.7	25.7	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	6.9	2.1	1.3	1.3	1.0	#N/A
Structure Controlling Flow =	Plate	Overflow Grate 1	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	#N/A
Max Velocity through Grate 1 (fps) =	N/A	0.12	N/A	0.2	0.7	1.4	1.8	1.9	#N/A
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) =	38	65	63	65	63	60	59	56	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	69	66	69	68	67	66	65	#N/A
Maximum Ponding Depth (ft) =	4.05	6.18	5.80	6.30	6.68	7.08	7.31	7.90	#N/A
Area at Maximum Ponding Depth (acres) =	0.15	0.25	0.24	0.26	0.28	0.29	0.31	0.33	#N/A
Maximum Volume Stored (acre-ft) =	0.247	0.680	0.589	0.713	0.815	0.929	0.995	1.186	#N/A

January 29, 2025

Attn: Gleen Reese
Stormwater Engineer
El Paso County - Department of Public Works
3275 Akers Drive
Colorado Springs, CO 80922



RE: HOMESTEAD FILING 2 – VOLUME CERTIFICATION LETTER FOR FULL SPECTRUM DETENTION POND 1

Dear Mr. Reese,

Based upon survey of the as-built condition of Homestead Filing 2 Pond 1, the required storage volume for WQCV, EURV and 100-year is provided. Additionally, the release rate for Pond 1 is at historic levels.

I hereby certify that Pond 1 has been reasonably constructed, to the best of my knowledge and belief, per the approved Pond 1 design.

Respectfully submitted,

A handwritten signature in black ink that reads "Nicholas Jokerst".

NICHOLAS JOKERST, PE

All Terrain Engineering LLC

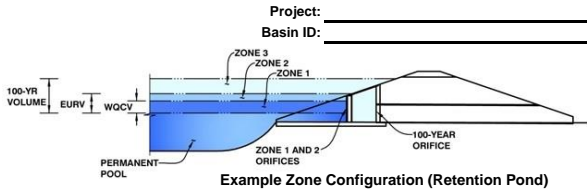
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		1.412	Total

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

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft ²
Underdrain Orifice Centroid =	N/A	feet

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Orifice Plate: Orifice Area per Row =	N/A	inches

Calculated Parameters for Plate

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Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
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User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

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Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	6.9	2.1	1.3	1.3	1.0	#N/A
Structure Controlling Flow =	Plate	Overflow Grate 1	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	#N/A
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Time to Drain 97% of Inflow Volume (hours) =	38	65	63	65	63	60	59	56	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	69	66	69	68	67	66	65	#N/A
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Area at Maximum Ponding Depth (acres) =	0.15	0.25	0.24	0.26	0.28	0.29	0.31	0.33	#N/A
Maximum Volume Stored (acre-ft) =	0.247	0.680	0.589	0.713	0.815	0.929	0.995	1.186	#N/A

January 29, 2025

Attn: Gleen Reese
Stormwater Engineer
El Paso County - Department of Public Works
3275 Akers Drive
Colorado Springs, CO 80922



RE: HOMESTEAD FILING 2 – PRELIMINARY ACCEPTANCE PUNCHLIST FOR NORTH SAND FILTER BASIN

Dear Mr. Reese,

The El Paso County punchlist from 11/28/2023 site walk identified a few inconsistencies within the North Sand Filter Basin when compared to the approved construction documents.

1. Spillway constructed with plain riprap instead of soil riprap

Spillway Riprap

The reason for calling out soil riprap for the spillway protection is that soil riprap gives a finished look and can be revegetated, however; both clean riprap and soil riprap are acceptable erosion protection treatments for the spillway. Therefore, I recommend the clean riprap remain within the spillway.

Respectfully submitted,

A handwritten signature in black ink that reads "Nicholas Jokerst".

NICHOLAS JOKERST, PE

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January 29, 2025

Attn: Gleen Reese

Stormwater Engineer

El Paso County - Department of Public Works

3275 Akers Drive

Colorado Springs, CO 80922



RE: HOMESTEAD FILING 2 – VOLUME CERTIFICATION LETTER FOR NORTH SAND FILTER BASIN

Dear Mr. Reese,

Based upon a survey of the as-built condition of Homestead Filing 2 North Sand Filter Basin, the required storage volume for WQCV, EURV and 100-year is provided. Additionally, the release rate for the North Sand Filter Basin is at historic levels.

I hereby certify that the Homestead Filing 2 North Sand Filter Basin has been reasonably constructed, to the best of my knowledge and belief, to the approved design.

Respectfully submitted,

A handwritten signature in black ink that reads "Nicholas Jokerst".



NICHOLAS JOKERST, PE

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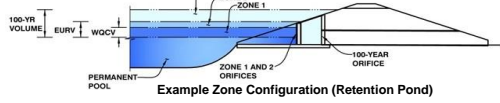
530.391.7635

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Homestead at Sterling Ranch Filing No. 2**

Basin ID: **Sand Filter - Basin X1 AS-BUILT**



Watershed Information

Selected BMP Type =	SF
Watershed Area =	0.91 acres
Watershed Length =	450 ft
Watershed Length to Centroid =	225 ft
Watershed Slope =	0.020 ft/ft
Watershed Imperviousness =	25.00% percent
Percentage Hydrologic Soil Group A =	0.0% percent
Percentage Hydrologic Soil Group B =	100.0% percent
Percentage Hydrologic Soil Groups C/D =	0.0% percent
Target WQCV Drain Time =	12.0 hours
Location for 1-hr Rainfall Depths =	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.

Water Quality Capture Volume (WQCV) =	0.008	acre-feet
Excess Urban Runoff Volume (EURV) =	0.023	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.024	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.041	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.056	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.081	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.099	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.124	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.171	acre-feet
Approximate 2-yr Detention Volume =	0.016	acre-feet
Approximate 5-yr Detention Volume =	0.023	acre-feet
Approximate 10-yr Detention Volume =	0.036	acre-feet
Approximate 25-yr Detention Volume =	0.043	acre-feet
Approximate 50-yr Detention Volume =	0.045	acre-feet
Approximate 100-yr Detention Volume =	0.054	acre-feet

Optional User Overrides

	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
	inches

Define Zones and Basin Geometry

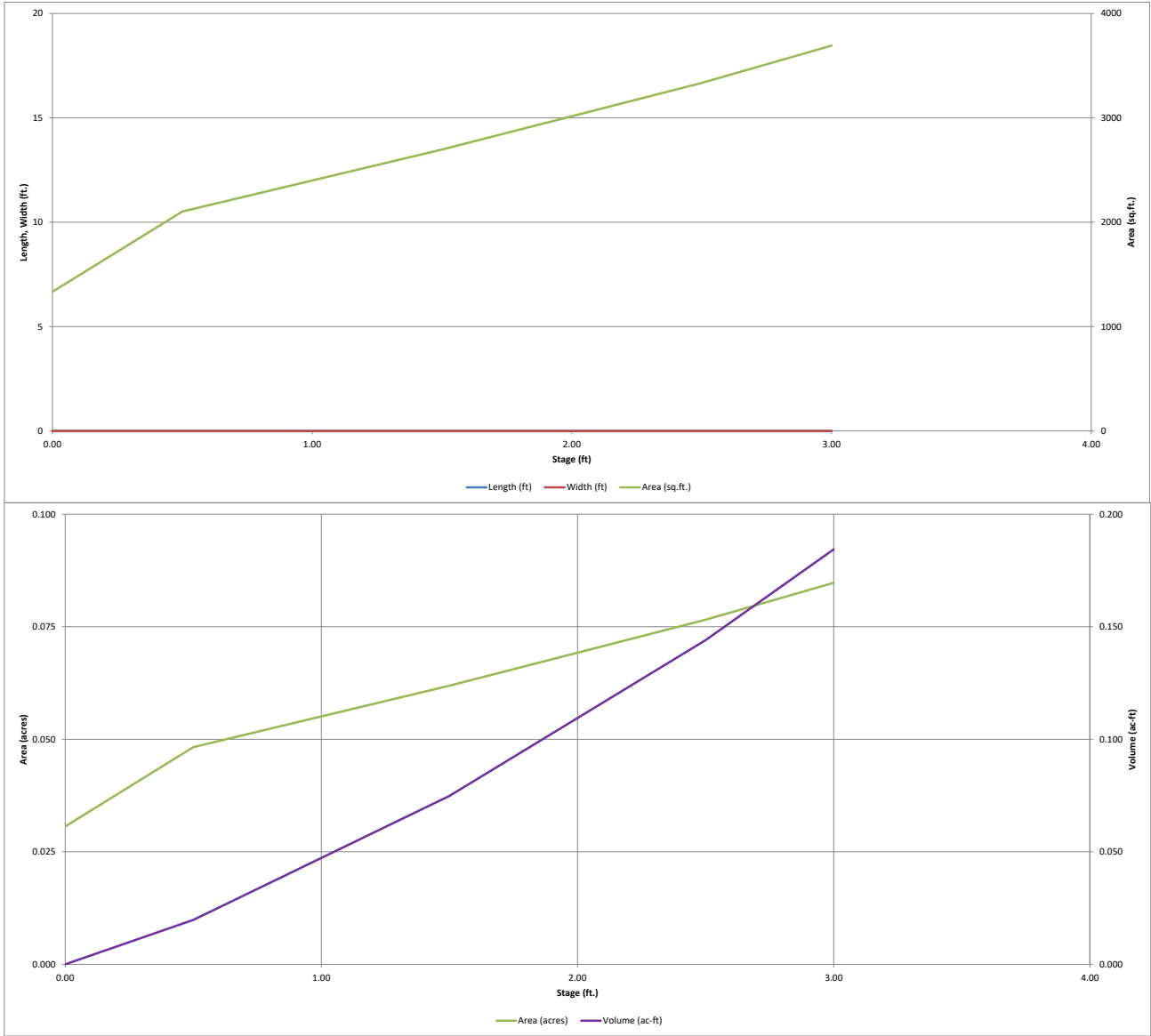
Zone 1 Volume (WQCV) =	0.008	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.015	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.031	acre-feet
Total Detention Basin Volume =	0.054	acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft ³
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (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 (R _{LW}) =	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

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft ²)	Optional Override Area (ft ²)	Area (acre)	Volume (ft ³)	Volume (ac-ft)
Media Surface	--	0.00	--	--	--	1,334	0.031		
7088	--	0.50	--	--	--	2,102	0.048	859	0.020
7089	--	1.50	--	--	--	2,697	0.062	3,258	0.075
7090	--	2.50	--	--	--	3,335	0.077	6,274	0.144
7090.5	--	3.00	--	--	--	3,692	0.085	8,031	0.184

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

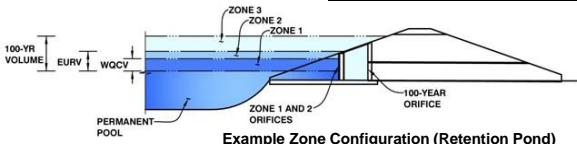


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Homestead at Sterling Ranch Filing No. 2

Basin ID: Sand Filter - Basin X1 AS-BUILT



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.24	0.008	Filtration Media
Zone 2 (EURV)	0.57	0.015	Rectangular Orifice
Zone 3 (100-year)	1.16	0.031	Weir&Pipe (Restrict)
Total (all zones)		0.054	

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

Underdrain Orifice Invert Depth =	2.10	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.46	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft ²
Underdrain Orifice Centroid =	0.02	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV 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	ft ²
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft ²

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

	Row 1 (optional)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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 Rectangular	Not Selected	
Invert of Vertical Orifice =	0.35	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	0.51	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	2.00	N/A	inches
Vertical Orifice Width =	4.00		inches

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected	
Vertical Orifice Area =	0.06	N/A	ft ²
Vertical Orifice Centroid =	0.08	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	1.25	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.21	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	2.21	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H ₁ =	1.25	N/A	feet
Overflow Weir Slope Length =	2.21	N/A	feet
Grate Open Area / 100-yr Orifice Area =	28.68	N/A	
Overflow Grate Open Area w/o Debris =	3.40	N/A	ft ²
Overflow Grate Open Area w/ Debris =	1.70	N/A	ft ²

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.10	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	12.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	2.50		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.12	N/A	ft ²
Outlet Orifice Centroid =	0.12	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	0.95	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	2.50	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	5.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.50	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =	0.14	feet
Stage at Top of Freeboard =	4.14	feet
Basin Area at Top of Freeboard =	0.08	acres
Basin Volume at Top of Freeboard =	0.18	acre-ft

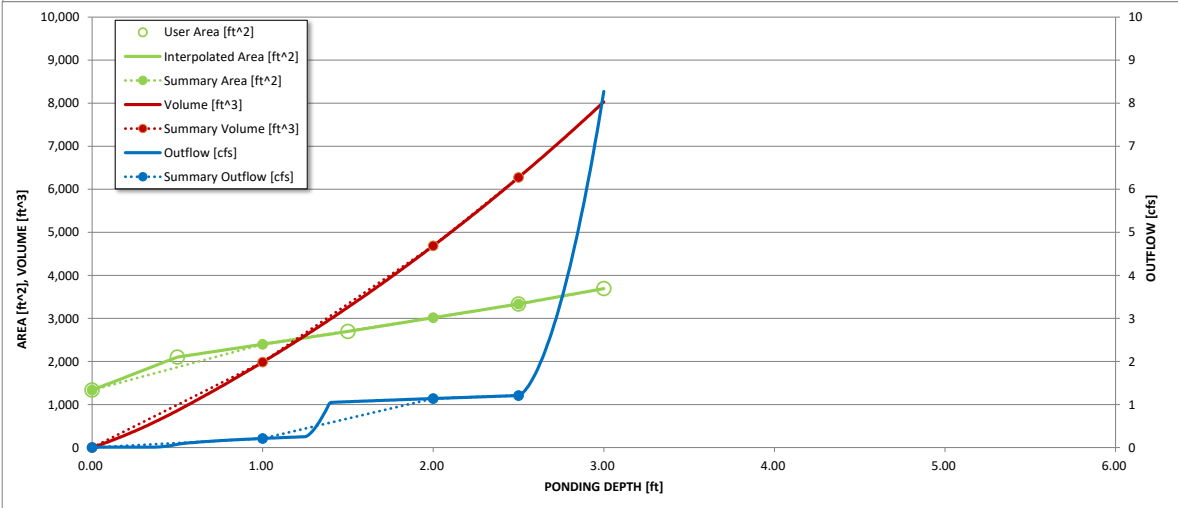
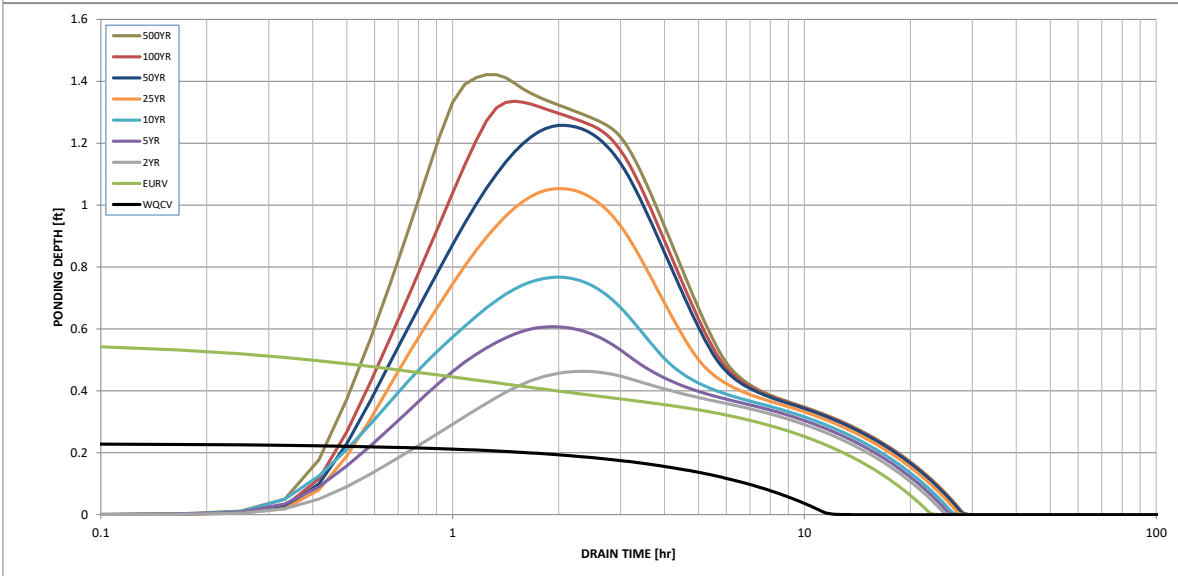
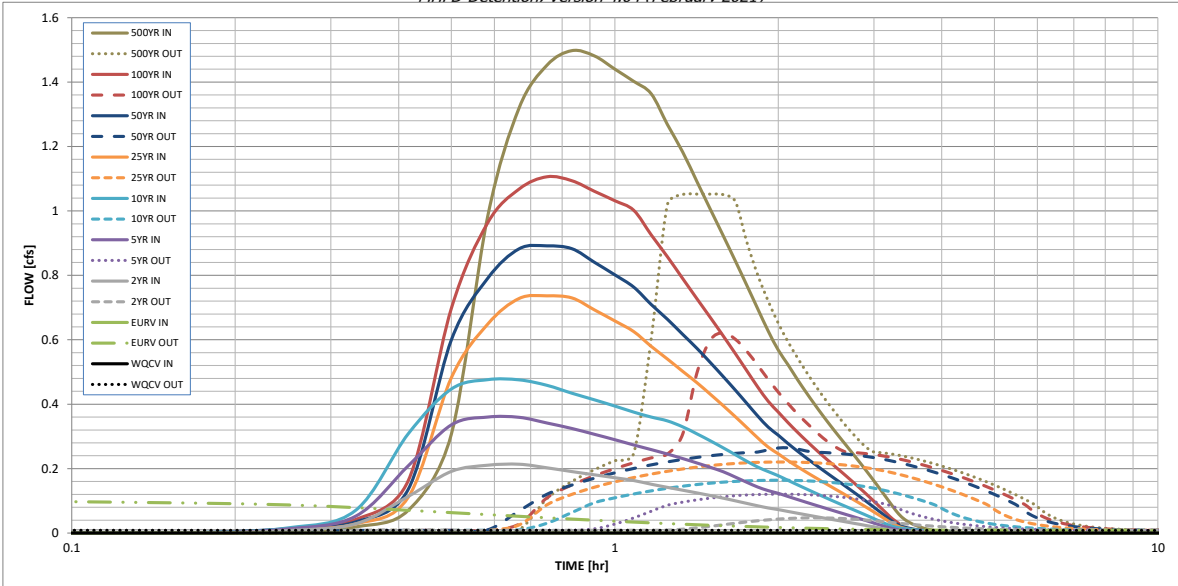
Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.008	0.023	0.024	0.041	0.056	0.081	0.099	0.124	0.171
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.024	0.041	0.056	0.081	0.099	0.124	0.171
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.2	0.3	0.6	0.7	0.9	1.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.08	0.22	0.33	0.61	0.76	0.97	1.36
Peak Inflow Q (cfs) =	N/A	N/A	0.2	0.4	0.5	0.7	0.9	1.1	1.5
Peak Outflow Q (cfs) =	0.0	0.1	0.0	0.1	0.2	0.2	0.3	0.6	1.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.5	0.4	0.4	0.7	0.8
Structure Controlling Flow =	Filtration Media	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0.1
Max Velocity through Gate 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) =	11	22	24	24	24	24	24	23	21
Time to Drain 99% of Inflow Volume (hours) =	12	23	25	25	26	26	27	27	26
Maximum Ponding Depth (ft) =	0.24	0.57	0.46	0.61	0.77	1.05	1.26	1.34	1.42
Area at Maximum Ponding Depth (acres) =	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06
Maximum Volume Stored (acre-ft) =	0.008	0.023	0.018	0.025	0.033	0.048	0.060	0.064	0.070

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)



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

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:15:00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01
	0:20:00	0.00	0.00	0.03	0.05	0.07	0.03	0.03	0.04	0.07
	0:25:00	0.00	0.00	0.11	0.21	0.31	0.11	0.14	0.16	0.31
	0:30:00	0.00	0.00	0.19	0.34	0.45	0.48	0.60	0.70	0.98
	0:35:00	0.00	0.00	0.21	0.36	0.48	0.65	0.79	0.96	1.32
	0:40:00	0.00	0.00	0.21	0.36	0.48	0.73	0.88	1.07	1.45
	0:45:00	0.00	0.00	0.20	0.34	0.46	0.74	0.89	1.11	1.50
	0:50:00	0.00	0.00	0.19	0.32	0.43	0.73	0.88	1.09	1.48
	0:55:00	0.00	0.00	0.18	0.31	0.41	0.69	0.84	1.06	1.44
	1:00:00	0.00	0.00	0.17	0.29	0.39	0.66	0.80	1.03	1.40
	1:05:00	0.00	0.00	0.16	0.27	0.38	0.63	0.76	1.00	1.36
	1:10:00	0.00	0.00	0.15	0.26	0.36	0.58	0.71	0.93	1.27
	1:15:00	0.00	0.00	0.14	0.25	0.35	0.54	0.66	0.86	1.18
	1:20:00	0.00	0.00	0.13	0.23	0.33	0.50	0.62	0.79	1.09
	1:25:00	0.00	0.00	0.12	0.22	0.31	0.47	0.57	0.73	1.00
	1:30:00	0.00	0.00	0.12	0.20	0.29	0.43	0.53	0.67	0.92
	1:35:00	0.00	0.00	0.11	0.19	0.26	0.40	0.49	0.61	0.85
	1:40:00	0.00	0.00	0.10	0.17	0.24	0.36	0.44	0.56	0.77
	1:45:00	0.00	0.00	0.09	0.16	0.22	0.33	0.40	0.50	0.70
	1:50:00	0.00	0.00	0.08	0.14	0.20	0.30	0.36	0.45	0.63
	1:55:00	0.00	0.00	0.08	0.13	0.19	0.27	0.33	0.41	0.57
	2:00:00	0.00	0.00	0.07	0.12	0.18	0.25	0.30	0.38	0.52
	2:05:00	0.00	0.00	0.07	0.11	0.16	0.23	0.28	0.34	0.48
	2:10:00	0.00	0.00	0.06	0.10	0.15	0.21	0.26	0.31	0.44
	2:15:00	0.00	0.00	0.06	0.10	0.14	0.19	0.23	0.29	0.40
	2:20:00	0.00	0.00	0.05	0.09	0.13	0.17	0.21	0.26	0.36
	2:25:00	0.00	0.00	0.05	0.08	0.11	0.16	0.20	0.24	0.33
	2:30:00	0.00	0.00	0.04	0.07	0.10	0.14	0.18	0.22	0.30
	2:35:00	0.00	0.00	0.04	0.06	0.09	0.13	0.16	0.20	0.27
	2:40:00	0.00	0.00	0.03	0.06	0.08	0.12	0.14	0.18	0.24
	2:45:00	0.00	0.00	0.03	0.05	0.07	0.10	0.13	0.16	0.22
	2:50:00	0.00	0.00	0.03	0.04	0.06	0.09	0.11	0.14	0.19
	2:55:00	0.00	0.00	0.02	0.04	0.05	0.08	0.10	0.12	0.16
	3:00:00	0.00	0.00	0.02	0.03	0.04	0.07	0.08	0.10	0.14
	3:05:00	0.00	0.00	0.02	0.02	0.04	0.05	0.06	0.08	0.11
	3:10:00	0.00	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.08
	3:15:00	0.00	0.00	0.01	0.01	0.02	0.03	0.04	0.04	0.06
	3:20:00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.04
	3:25:00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.03
	3:30:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02
	3:35:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02
	3:40:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
	3:45:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

January 29, 2025

Attn: Gleen Reese
Stormwater Engineer
El Paso County - Department of Public Works
3275 Akers Drive
Colorado Springs, CO 80922



RE: HOMESTEAD FILING 2 – PRELIMINARY ACCEPTANCE PUNCHLIST FOR SOUTH SAND FILTER BASIN

Dear Mr. Reese,

The El Paso County punchlist from 11/28/2023 site walk identified a few inconsistencies within the South Sand Filter Basin when compared to the approved construction documents.

1. Spillway constructed with plain riprap instead of soil riprap

Spillway Riprap

The reason for calling out soil riprap for the spillway protection is that soil riprap gives a finished look and can be revegetated, however; both clean riprap and soil riprap are acceptable erosion protection treatments for the spillway. Therefore, I recommend the clean riprap remain within the spillway.

Respectfully submitted,

A handwritten signature in black ink that reads "Nicholas Jokerst".

NICHOLAS JOKERST, PE

All Terrain Engineering LLC

njokerst@allterraineng.com

530.391.7635



January 29, 2025

Attn: Gleen Reese

Stormwater Engineer

El Paso County - Department of Public Works

3275 Akers Drive

Colorado Springs, CO 80922



RE: HOMESTEAD FILING 2 – VOLUME CERTIFICATION LETTER FOR SOUTH SAND FILTER BASIN

Dear Mr. Reese,

Based upon a survey of the as-built condition of Homestead Filing 2 South Sand Filter Basin, the required storage volume for WQCV, EURV and 100-year is provided. Additionally, the release rate for the South Sand Filter Basin is at historic levels.

I hereby certify that the Homestead Filing 2 South Sand Filter Basin has been reasonably constructed, to the best of my knowledge and belief, to the approved design.

Respectfully submitted,

A handwritten signature in black ink that reads "Nicholas Jokerst".

NICHOLAS JOKERST, PE

All Terrain Engineering LLC

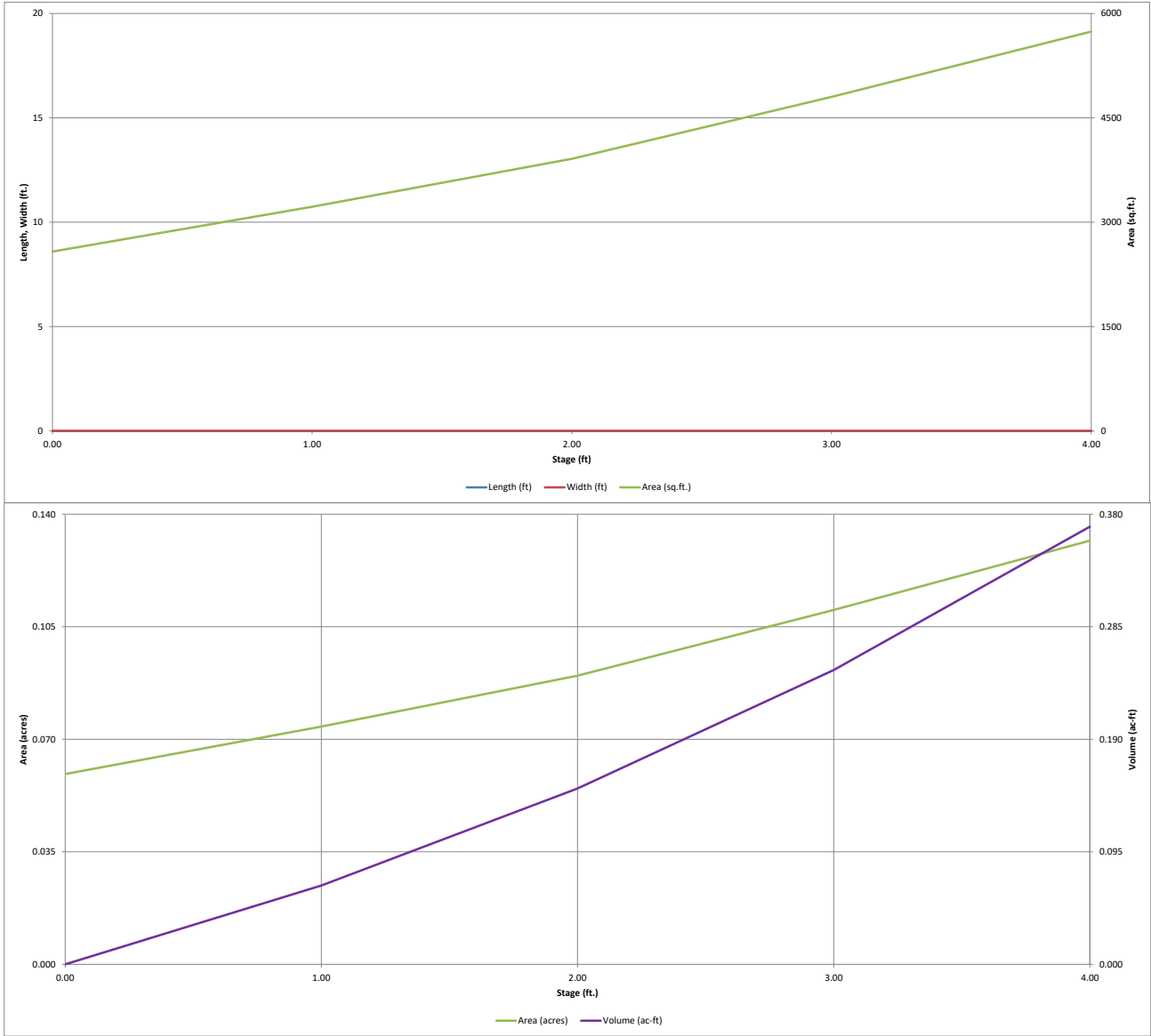
njokerst@allterraineng.com

530.391.7635



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

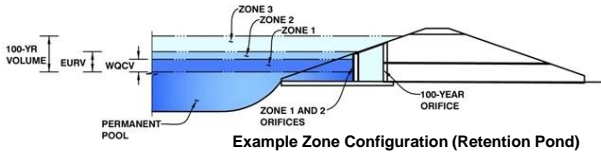
MHFD-Detention, Version 4.04 (February 2021)



DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Homestead at Sterling Ranch Filing No. 2
Basin ID: Sand Filter - Basin Y1, W1, X2 AS-BUILT



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.40	0.024	Filtration Media
Zone 2 (EURV)	1.03	0.044	Rectangular Orifice
Zone 3 (100-year)	2.15	0.093	Weir&Pipe (Restrict)
Total (all zones)		0.162	

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

Underdrain Orifice Invert Depth =	2.00	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.80	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft ²
Underdrain Orifice Centroid =	0.03	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV 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	ft ²
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft ²

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

	Row 1 (optional)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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 Rectangular	Not Selected	
Invert of Vertical Orifice =	0.33	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	1.03	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	2.00	N/A	inches
Vertical Orifice Width =	4.00	N/A	inches

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected	
Vertical Orifice Area =	0.06	N/A	ft ²
Vertical Orifice Centroid =	0.08	N/A	feet

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

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	0.58	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	2.21	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	2.21	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H _u =	2.25	N/A	feet
Overflow Weir Slope Length =	2.21	N/A	feet
Grate Open Area / 100-yr Orifice Area =	10.98	N/A	
Overflow Grate Open Area w/o Debris =	3.40	N/A	ft ²
Overflow Grate Open Area w/ Debris =	1.70	N/A	ft ²

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

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	2.10	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	15.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	4.50	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.31	N/A	ft ²
Outlet Orifice Centroid =	0.22	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.16	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	2.00	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	10.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.50	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =	0.22	feet
Stage at Top of Freeboard =	3.72	feet
Basin Area at Top of Freeboard =	0.13	acres
Basin Volume at Top of Freeboard =	0.33	acre-ft

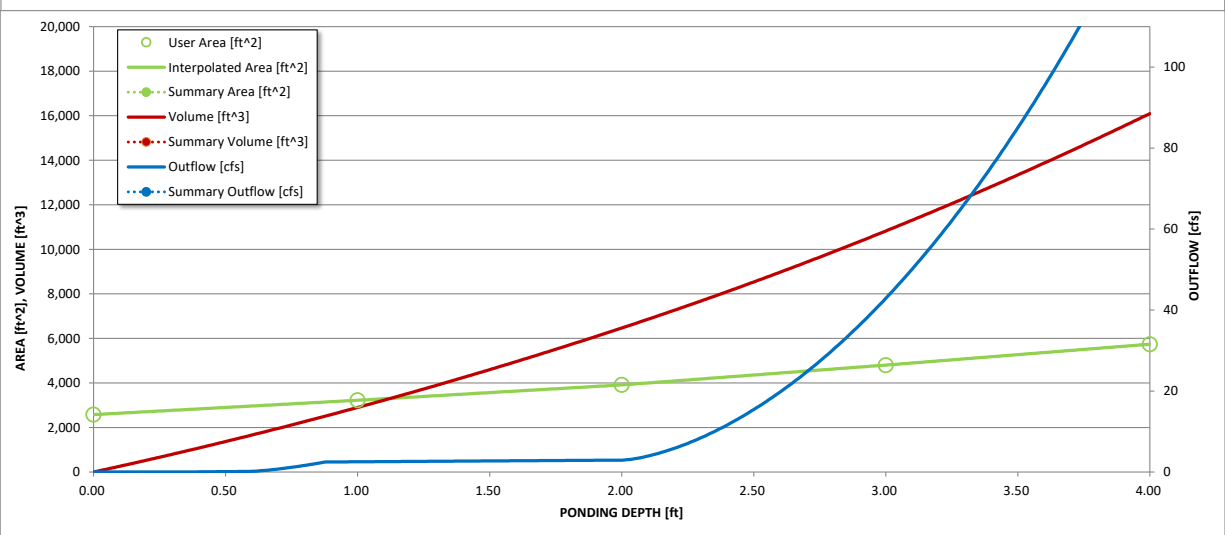
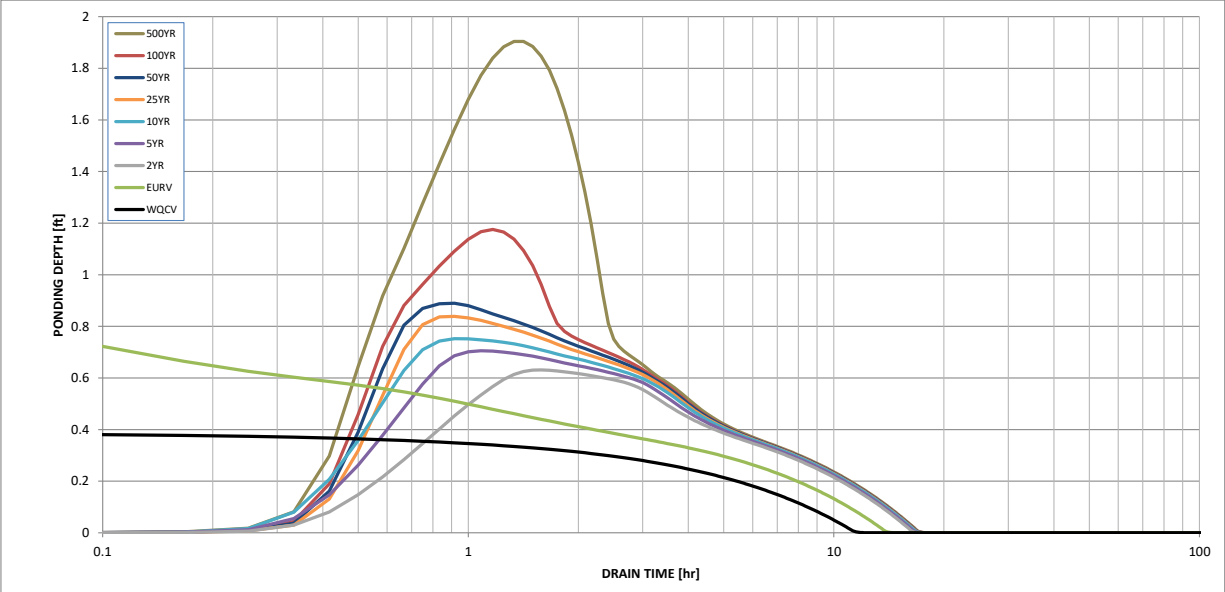
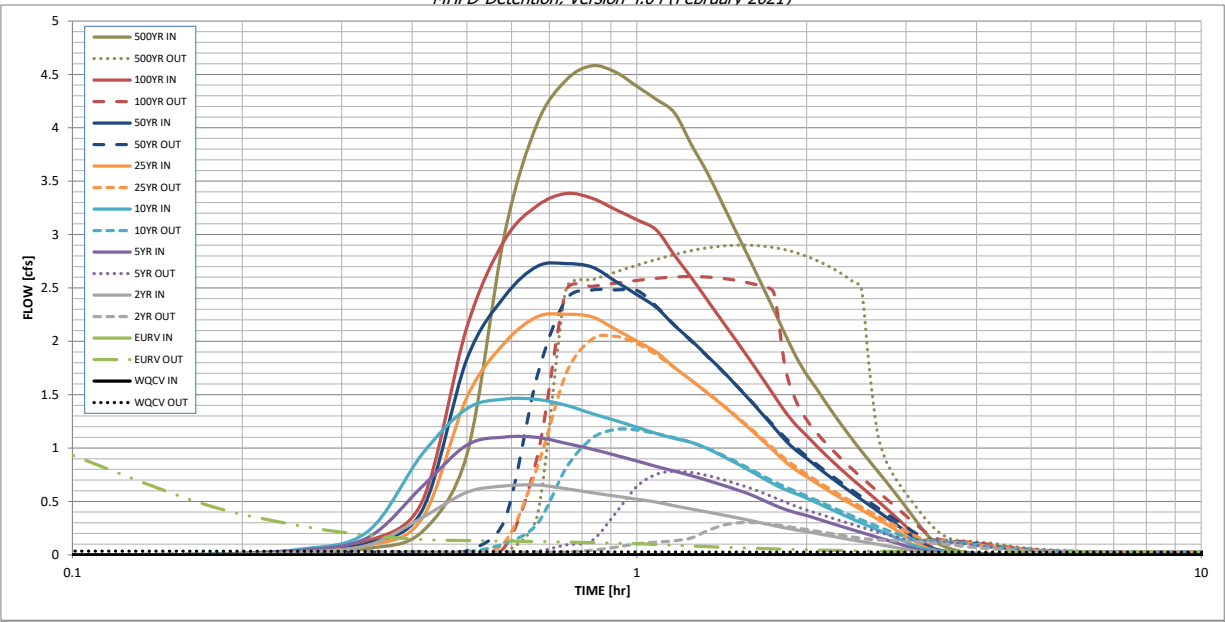
Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
One-Hour Rainfall Depth (in) =	0.024	0.069	0.071	0.122	0.169	0.243	0.297	0.372	0.512
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.071	0.122	0.169	0.243	0.297	0.372	0.512
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.2	0.6	0.9	1.7	2.1	2.7	3.8
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.08	0.22	0.34	0.62	0.78	1.00	1.40
Peak Inflow Q (cfs) =	N/A	N/A	0.7	1.1	1.5	2.3	2.7	3.4	4.6
Peak Outflow Q (cfs) =	0.0	2.5	0.3	0.8	1.2	2.0	2.5	2.6	2.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.3	1.3	1.2	1.2	1.0	0.8
Structure Controlling Flow =	Vertical Orifice 1	Outlet Plate 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	0.68	0.04	0.2	0.3	0.5	0.7	0.7	0.7
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) =	11	13	16	15	14	13	13	12	10
Time to Drain 99% of Inflow Volume (hours) =	12	14	16	16	16	16	16	15	15
Maximum Ponding Depth (ft) =	0.39	1.04	0.63	0.71	0.75	0.84	0.89	1.18	1.90
Area at Maximum Ponding Depth (acres) =	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.09
Maximum Volume Stored (acre-ft) =	0.024	0.070	0.040	0.045	0.049	0.054	0.058	0.079	0.140

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)



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

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	0:15:00	0.00	0.00	0.02	0.04	0.05	0.03	0.04	0.04	0.06
	0:20:00	0.00	0.00	0.09	0.16	0.22	0.09	0.11	0.13	0.22
	0:25:00	0.00	0.00	0.35	0.64	0.94	0.34	0.42	0.50	0.94
	0:30:00	0.00	0.00	0.59	1.03	1.37	1.47	1.83	2.13	3.01
	0:35:00	0.00	0.00	0.64	1.10	1.46	1.99	2.42	2.95	4.04
	0:40:00	0.00	0.00	0.65	1.10	1.46	2.23	2.70	3.27	4.45
	0:45:00	0.00	0.00	0.62	1.04	1.40	2.25	2.73	3.38	4.58
	0:50:00	0.00	0.00	0.58	0.99	1.32	2.23	2.70	3.34	4.52
	0:55:00	0.00	0.00	0.55	0.93	1.26	2.11	2.56	3.23	4.39
	1:00:00	0.00	0.00	0.52	0.88	1.20	2.00	2.44	3.14	4.27
	1:05:00	0.00	0.00	0.49	0.83	1.14	1.90	2.32	3.04	4.14
	1:10:00	0.00	0.00	0.46	0.78	1.09	1.75	2.15	2.80	3.84
	1:15:00	0.00	0.00	0.43	0.74	1.05	1.63	2.01	2.60	3.58
	1:20:00	0.00	0.00	0.40	0.70	0.99	1.52	1.86	2.39	3.30
	1:25:00	0.00	0.00	0.37	0.65	0.93	1.41	1.73	2.19	3.03
	1:30:00	0.00	0.00	0.35	0.61	0.86	1.29	1.59	2.01	2.77
	1:35:00	0.00	0.00	0.32	0.57	0.79	1.18	1.45	1.83	2.53
	1:40:00	0.00	0.00	0.30	0.52	0.72	1.08	1.32	1.66	2.29
	1:45:00	0.00	0.00	0.27	0.47	0.66	0.97	1.19	1.49	2.06
	1:50:00	0.00	0.00	0.25	0.42	0.61	0.87	1.07	1.34	1.85
	1:55:00	0.00	0.00	0.23	0.39	0.57	0.79	0.98	1.21	1.69
	2:00:00	0.00	0.00	0.22	0.37	0.53	0.73	0.90	1.12	1.56
	2:05:00	0.00	0.00	0.20	0.34	0.49	0.67	0.83	1.02	1.42
	2:10:00	0.00	0.00	0.18	0.31	0.45	0.61	0.76	0.93	1.30
	2:15:00	0.00	0.00	0.17	0.28	0.41	0.56	0.69	0.85	1.18
	2:20:00	0.00	0.00	0.15	0.26	0.37	0.51	0.63	0.77	1.07
	2:25:00	0.00	0.00	0.14	0.23	0.33	0.47	0.57	0.70	0.97
	2:30:00	0.00	0.00	0.12	0.21	0.30	0.42	0.52	0.64	0.88
	2:35:00	0.00	0.00	0.11	0.19	0.27	0.38	0.47	0.57	0.79
	2:40:00	0.00	0.00	0.10	0.16	0.24	0.34	0.41	0.51	0.70
	2:45:00	0.00	0.00	0.09	0.14	0.21	0.30	0.36	0.45	0.62
	2:50:00	0.00	0.00	0.07	0.12	0.18	0.26	0.31	0.39	0.53
	2:55:00	0.00	0.00	0.06	0.10	0.15	0.22	0.26	0.33	0.45
	3:00:00	0.00	0.00	0.05	0.08	0.12	0.18	0.22	0.26	0.36
	3:05:00	0.00	0.00	0.04	0.06	0.09	0.14	0.17	0.21	0.28
	3:10:00	0.00	0.00	0.03	0.05	0.07	0.10	0.12	0.15	0.20
	3:15:00	0.00	0.00	0.02	0.03	0.05	0.07	0.08	0.10	0.14
	3:20:00	0.00	0.00	0.02	0.03	0.04	0.05	0.06	0.07	0.11
	3:25:00	0.00	0.00	0.01	0.02	0.04	0.04	0.05	0.05	0.08
	3:30:00	0.00	0.00	0.01	0.02	0.03	0.03	0.04	0.04	0.06
	3:35:00	0.00	0.00	0.01	0.02	0.03	0.02	0.03	0.03	0.04
	3:40:00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.03
	3:45:00	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.02	0.02
	3:50:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02
	3:55:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
	4:00:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
	4:05:00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00