

April 08, 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. Discuss need for concrete cut-off wall
3. Shown plain riprap around forebay, instead of soil riprap
4. Restrictor Plate Height
5. 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. This as-built condition is temporary, as the outfall will be modified to discharge onto a grouted boulder drop-structure with the Sand Creek Channel Improvements. Therefore, I recommend that the riprap pad as constructed be accepted as the Pond 1 outfall erosion protection. A concrete cut-off wall is not necessary in our opinion. Any undermining should be filled with Type L Riprap, should it occur. We believe the observed undermining was a result of incomplete riprap placement.

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.

Restrictor Plate Height

The approved construction plans called out a restrictor plate height of 21.75" above the outfall pipe invert, however the UD-Detention workbook included in the approved FDR specified a height of 13.3". The plate was installed at 14" above the as-built invert, according to surveyed data. The as-built plans and as-built UD-Detention workbook reflect this as-built condition.

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)

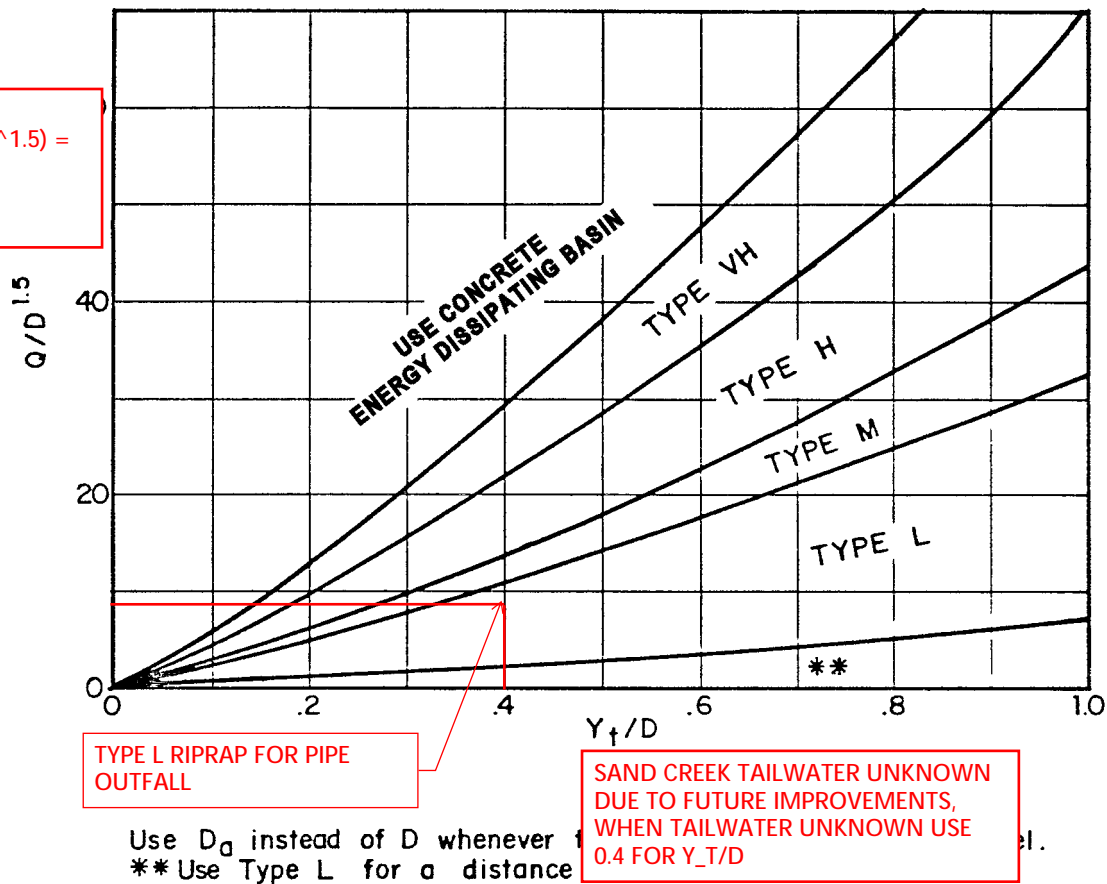


Figure 9-38. Riprap erosion protection at circular conduit outlet (valid for $Q/D^{2.5} \leq 6.0$)

May 30, 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 or below the historic 100-yr design storm level. Although the 5-yr peak out-flow rate exceeds the original design, it still meets the required drain time guidance. The outfall was designed to remain stable for the peak 100-year release rate, therefore, the outfall is adequate to handle the peak 5-yr as-built anticipated flow rate of 2.8 cfs. It is our opinion that the site and adjacent properties (as affected by work performed under the County permit) are stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and that the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements. The PCM(s) provide the required storage volume and meet the required release rates, stage areas, elevations, and outlet dimensions, as documented by the attached revised MHFD-Detention spreadsheet that shows the as-built conditions.

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,

NICHOLAS JOKERST, PE

All Terrain Engineering LLC

njokerst@allterraineng.com

530.391.7635



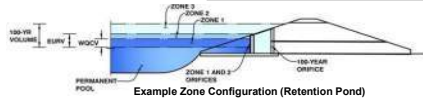
Ryan - per our phone call on 6/12, please just quantify this increase in comparison to the 5-yr storm for Sand Creek per calcs in CDR204. And based on that % increase value, state something like "this increase is deemed to be negligible."

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Homestead At Sterling Ranch Filing No. 2

Basin ID: FSD Pond 1 - As-Built Condition



Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	16.51	acres
Watershed Length =	875	feet
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	44.10%	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
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depth =		
	User Input	
Water Quality Capture Volume (WQCV) =	0.262	acre-feet
Excess Urban Runoff Volume (EURV) =	0.771	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.614	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.847	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	1.177	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	1.710	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	2.073	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	2.550	acre-feet
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet
Approximate 2-yr Detention Volume =	0.574	acre-feet
Approximate 5-yr Detention Volume =	0.795	acre-feet
Approximate 10-yr Detention Volume =	1.075	acre-feet
Approximate 25-yr Detention Volume =	1.190	acre-feet
Approximate 50-yr Detention Volume =	1.247	acre-feet
Approximate 100-yr Detention Volume =	1.412	acre-feet

Water Quality Capture Volume (WQCV) =	0.262	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.771	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.614	acre-feet		1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.847	acre-feet		1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.177	acre-feet		1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	1.710	acre-feet		2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.073	acre-feet	2.25 inches	
100-yr Runoff Volume (P1 = 2.52 in.) =	2.550	acre-feet	2.52 inches	
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet	0.00 inches	

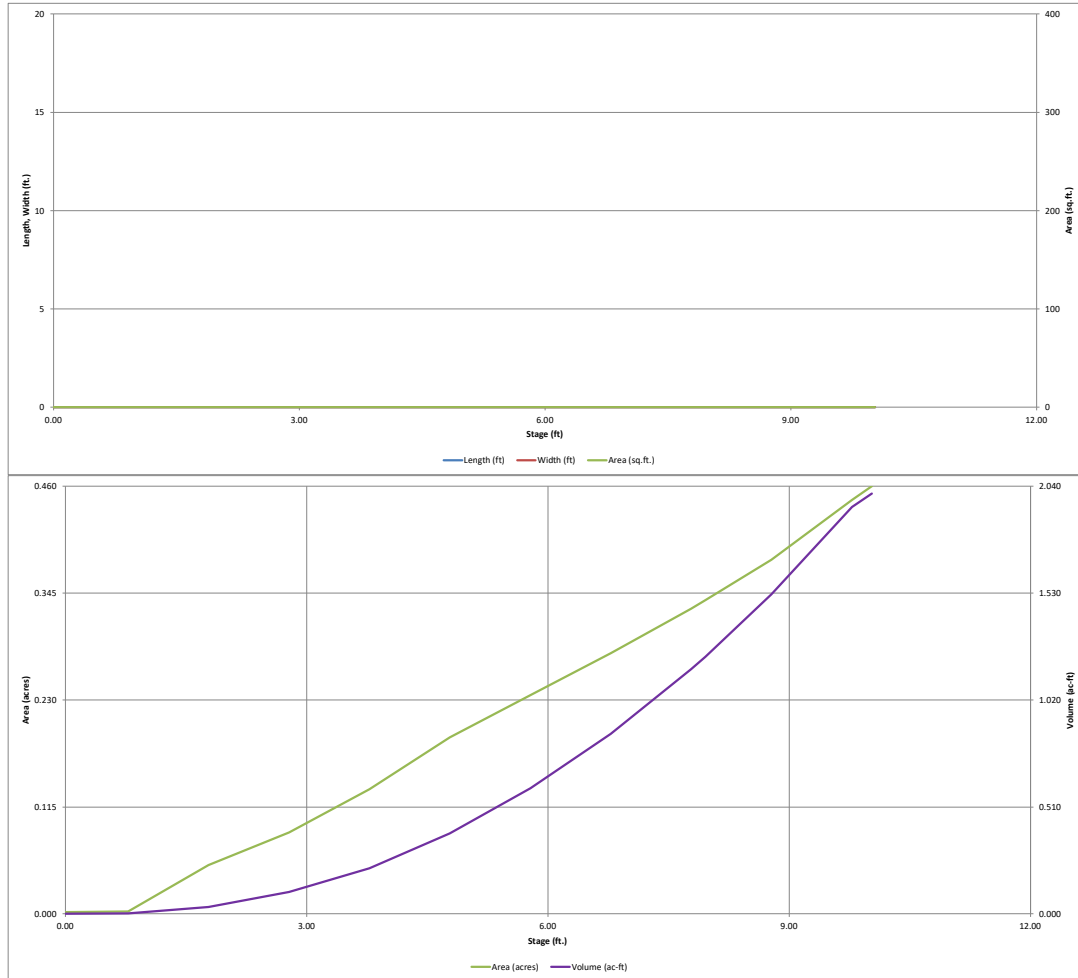
Stage-Storage Calculation

Zone 1 Volume (WQV_1) =	0.262	acre-feet
Zone 2 Volume ($EURV - Zone 1$) =	0.508	acre-feet
Zone 3 Volume ($100\text{ Year} - Zones 1 \& 2$) =	0.642	acre-feet
Total Detention Basin Volume =	1.412	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth ($H_{(max)}$) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides ($S_{(max)}$) =	user	H-V
Basin Length-to-Width Ratio ($R_{(W)}$) =	user	
Initial Surcharge Area (A_{IS}) =	user	ft ²
Surcharge Volume Length (L_{IS}) =	user	ft
Surcharge Volume Width (W_{IS}) =	user	ft
Depth of Basin Floor ($H_{(LFloor)}$) =	user	ft
Length of Basin Floor ($L_{(LFloor)}$) =	user	ft
Width of Basin Floor ($W_{(LFloor)}$) =	user	ft
Area of Basin Floor ($A_{(LFloor)}$) =	user	ft ²
Volume of Basin Floor ($V_{(LFloor)}$) =	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

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DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

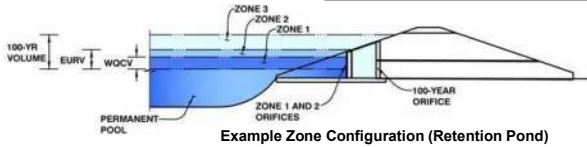


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

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

Basin ID: **FSD Pond 1 - As-Built Condition**



Example Zone Configuration (Retention Pond)

	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)	0.06	3.90						
Orifice Area (sq. inches)	1.42	1.42						

	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, H _o =	5.97	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 _u =	6.97	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 =	0.55	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 =	8.55	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 =	0.92	feet
Stage at Top of Freeboard =	10.47	feet
Basin Area at Top of Freeboard =	0.46	acres

8.02 (cannot input value less than 8.55 due to workbook formulas.

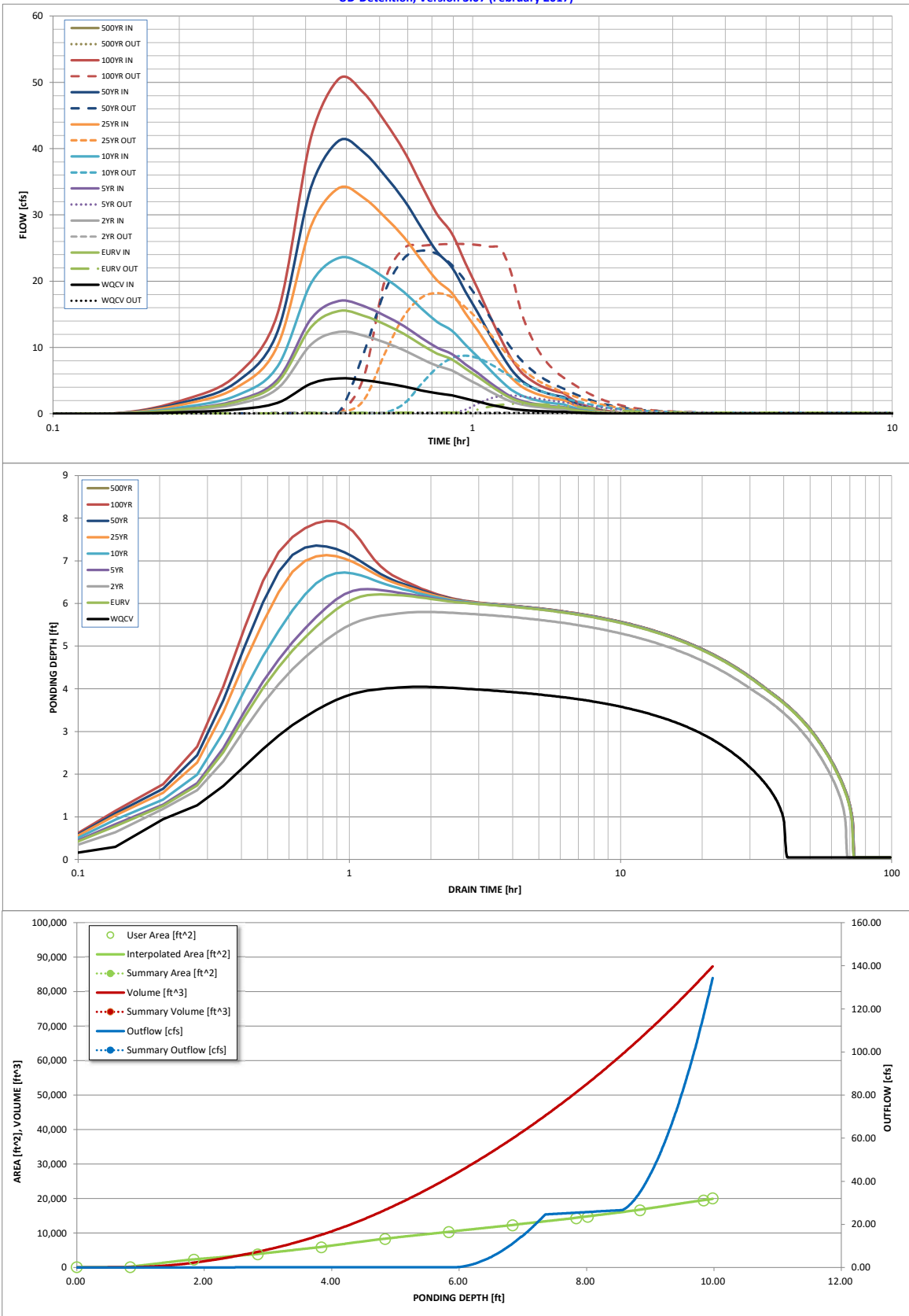
Causes error, will not accept lesser value.

Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	0.00
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	1.5	0.2	2.8	8.8	18.2	24.6	25.6	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	6.3	2.0	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	0.10	N/A	0.2	0.6	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) =	39	67	64	66	65	62	60	58	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	70	67	70	69	68	68	67	#N/A
Maximum Ponding Depth (ft) =	4.05	6.21	5.80	6.34	6.73	7.13	7.36	7.94	#N/A
Area at Maximum Ponding Depth (acres) =	0.15	0.25	0.24	0.26	0.28	0.30	0.31	0.34	#N/A
Maximum Volume Stored (acre-ft) =	0.247	0.690	0.589	0.721	0.826	0.943	1.010	1.196	#N/A

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



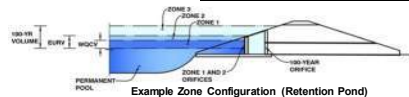
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Homestead At Sterling Ranch Filings Nos. 2

Basin ID: FSD Pond 1



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	16.51	acres
Watershed Length =	875	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	44.10%	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
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depth =	User Input	
Water Quality Capture Volume (WQCV) =	0.262	acres-feet
Excess Urban Runoff Volume (EURV) =	0.771	acres-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.847	acres-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.814	acres-feet
10-yr Runoff Volume (P1 = 1.7 in.) =	1.177	acres-feet
25-yr Runoff Volume (P1 = 2 in.) =	1.710	acres-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	2.073	acres-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	2.550	acres-feet
50-yr Runoff Volume (P1 = 0 in.) =	0.000	acres-feet
Approximate 2-yr Detention Volume =	0.574	acres-feet
Approximate 5-yr Detention Volume =	0.795	acres-feet
Approximate 10-yr Detention Volume =	1.075	acres-feet
Approximate 25-yr Detention Volume =	1.190	acres-feet
Approximate 50-yr Detention Volume =	1.247	acres-feet
Approximate 100-yr Detention Volume =	1.412	acres-feet

Water Quality Capture Volume (WQCV) =	0.262	acre-feet	Optional User Override 1-hr Precipitation
Excess Urban Runoff Volume (EURV) =	0.771	acre-feet	
2-yr Runoff Volume (P1 = 1.19 in.) =	0.614	acre-feet	1.19 inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.847	acre-feet	1.50 inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.177	acre-feet	1.75 inches
25-yr Runoff Volume (P1 = 2 in.) =	1.710	acre-feet	2.00 inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.073	acre-feet	2.25 inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.550	acre-feet	2.52 inches
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet	inches

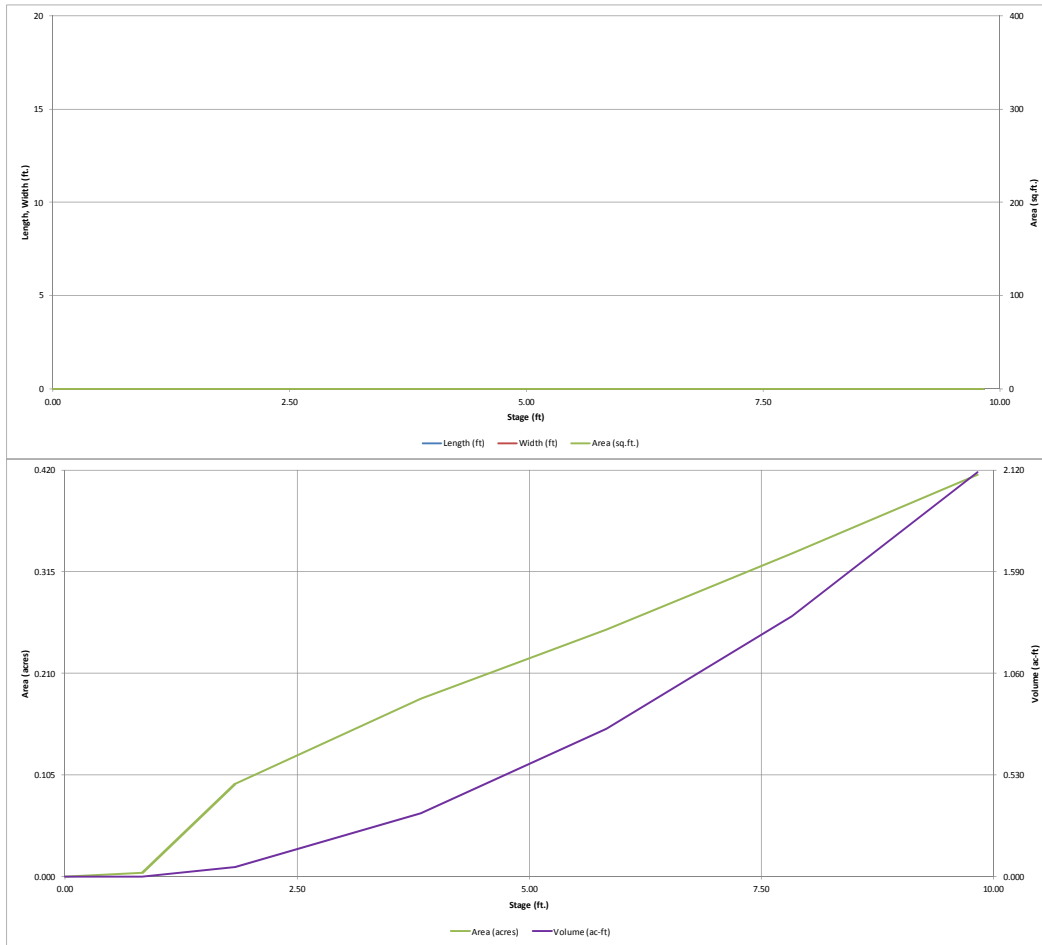
Stage-Storage Calculation

Zone 1 Volume (V_{WCV})	0.262	acre-foot
Zone 2 Volume (EU/RV - Zone 1)	0.508	acre-foot
Zone 3 Volume (100-year - Zones 1 & 2)	0.642	acre-foot
Zone 2 Detention Basin Volume	1.412	acre-foot
Initial Surcharge Area (ISV)	user	ft ²
Initial Surcharge Depth (ISD)	user	ft
Total Available Detention Depth (H_{DAV})	user	ft
Depth of Trickle Channel (H_{TC})	user	ft
Slope of Trickle Channel (S_{TC})	user	ft/ft
Slopes of Main Basin Sides (S_{MAIN})	user	H/V
Basin Length-to-Width Ratio ($R_{L/W}$)	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 ($H_{1(BOA)}$)	user	ft
Length of Basin Floor ($H_{1(BOA)}$)	user	ft
Width of Basin Floor ($W_{1(BOA)}$)	user	ft
Area of Basin Floor ($A_{1(BOA)}$)	user	ft ²
Volume of Basin Floor ($V_{1(BOA)}$)	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_{TOT})	user	acre-foot

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DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

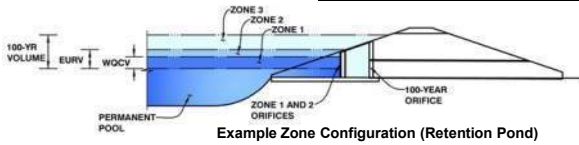


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: _____

Basin ID: _____



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.45	0.262	Orifice Plate
Zone 2 (EURV)	5.84	0.508	Orifice Plate
Zone 3 (100-year)	8.00	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 = ft (distance below the filtration media surface)
Underdrain Orifice Diameter = inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft²
Underdrain Orifice Centroid = 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 = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = inches
Orifice Plate: Orifice Area per Row = sq. inches (diameter = 1-3/16 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = ft²

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	1.95	3.89					
Orifice Area (sq. inches)	1.19	1.19	1.19					

	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, H _o =	5.84	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 =	2.91	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 _t =	6.81	N/A	feet
Over Flow Weir Slope Length =	3.07	N/A	feet
Grate Open Area / 100-yr Orifice Area =	7.21	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	12.88	N/A	ft ²
Overflow Grate Open Area w/ Debris =	6.44	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 =	0.25	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 =	13.30		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.79	N/A	ft ²
Outlet Orifice Centroid =	0.63	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.68	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	7.80	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	17.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

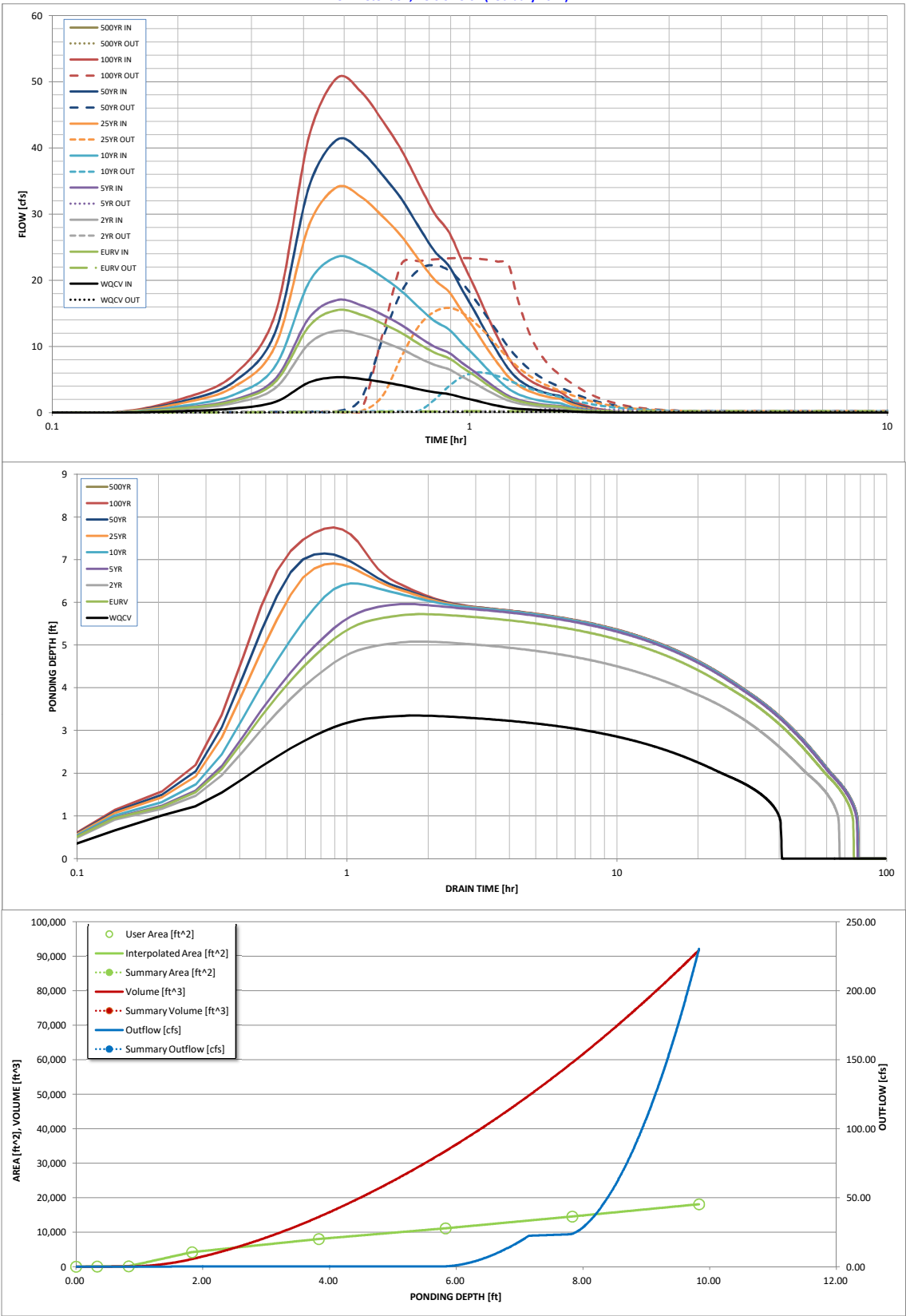
Spillway Design Flow Depth =	0.89	feet
Stage at Top of Freeboard =	9.69	feet
Basin Area at Top of Freeboard =	0.41	acres

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	0.2	0.2	0.7	6.0	15.8	22.3	23.4	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.5	1.4	1.1	1.2	0.9	#N/A
Structure Controlling Flow =	Plate	Plate	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	N/A	N/A	0.0	0.4	1.2	1.7	1.8	#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) =	39	69	62	71	69	66	63	61	#N/A
Time to Drain 99% of Inflow Volume (hours) =	40	73	65	76	75	74	73	72	#N/A
Maximum Ponding Depth (ft) =	3.35	5.72	5.08	5.96	6.44	6.91	7.15	7.75	#N/A
Area at Maximum Ponding Depth (acres) =	0.16	0.25	0.23	0.26	0.28	0.30	0.31	0.33	#N/A
Maximum Volume Stored (acre-ft) =	0.245	0.741	0.588	0.802	0.932	1.067	1.137	1.331	#N/A

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



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

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, appearing to read "Nick Jokerst".

NICHOLAS JOKERST, PE

All Terrain Engineering LLC

njokerst@allterraineng.com

530.391.7635



April 08, 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. It is our opinion that the site and adjacent properties (as affected by work performed under the County permit) are stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and that the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements. The PCM(s) provide the required storage volume and meet the required release rates, stage areas, elevations, and outlet dimensions, as documented by the attached revised MHFD-Detention spreadsheet that shows the as-built conditions.

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 cursive script, appearing to read "Nick Jokerst".

NICHOLAS JOKERST, PE

All Terrain Engineering LLC

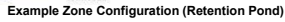
njokerst@allterraineng.com

530.391.7635



MHFD-Detention, Version 4.04 (February 2021)

Basin ID: Sand Filter - Basin X1 AS-BUILT

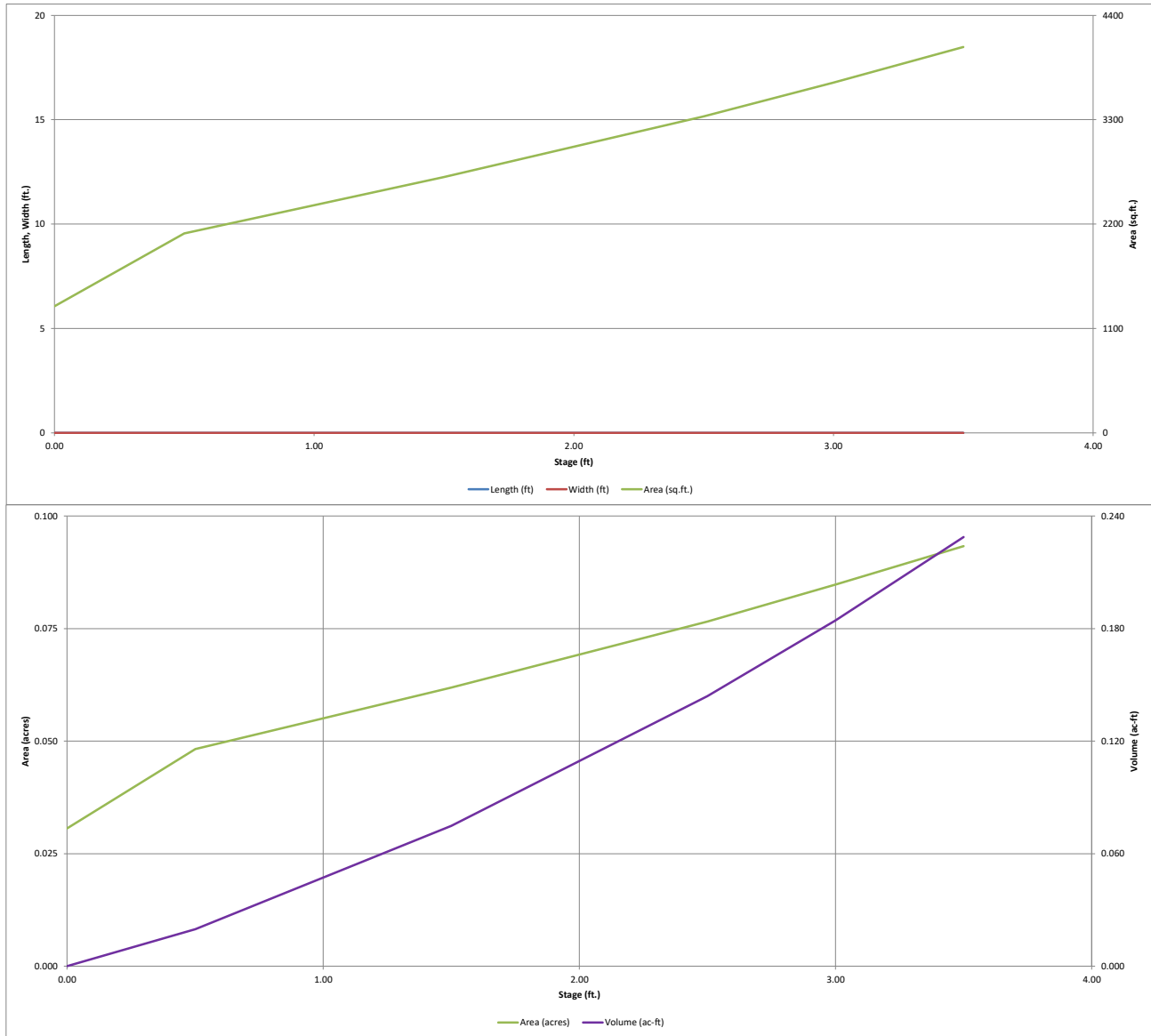


	acre-feet
	acre-feet
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
	inches

[illegible]

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

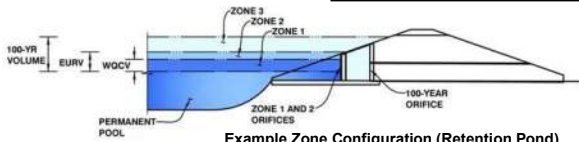


DETENTION BASIN OUTLET STRUCTURE DESIGN

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	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 =	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 _u =	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	N/A	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 =	3.73	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	12.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.42	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =	0.09	feet
Stage at Top of Freeboard =	5.24	feet
Basin Area at Top of Freeboard =	0.09	acres
Basin Volume at Top of Freeboard =	0.23	acre-ft

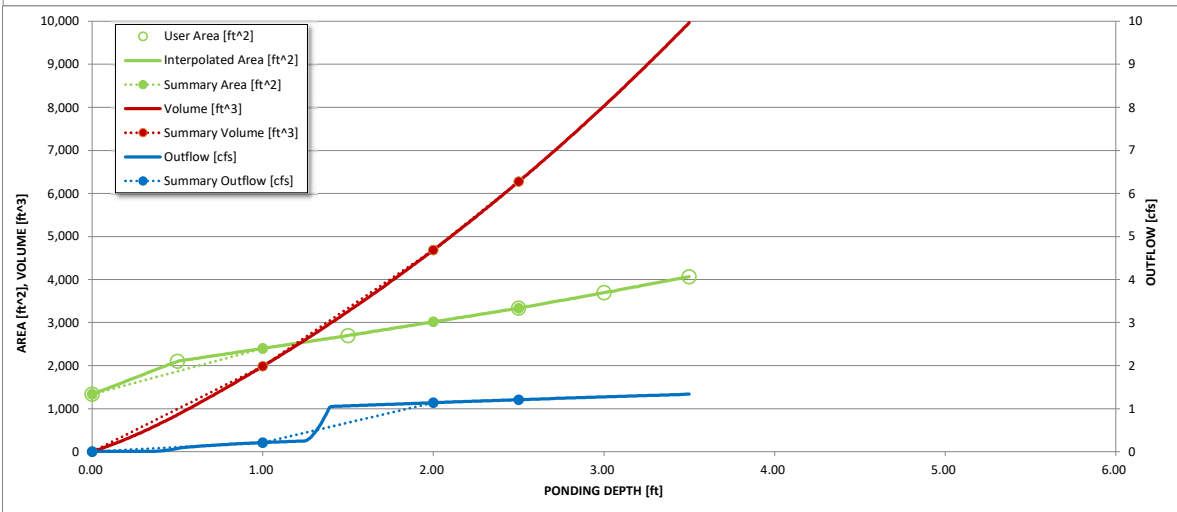
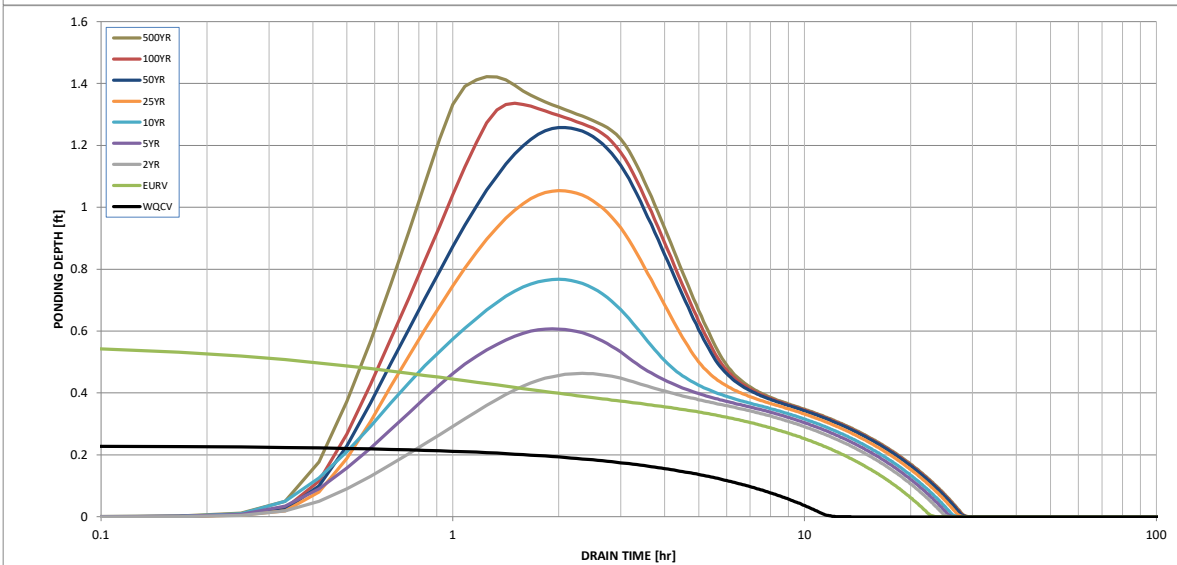
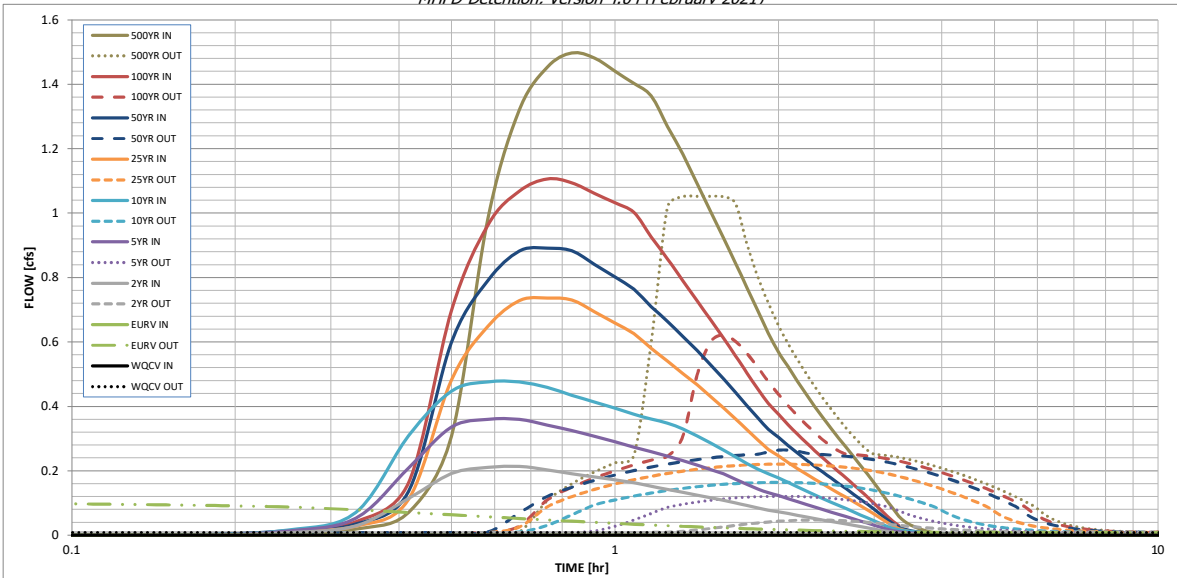
Routed Hydrograph Results

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) =	0.008	0.023	0.024	0.041	0.056	0.081	0.099	0.124	0.171
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.024	0.041	0.056	0.081	0.099	0.124	0.171
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.1	0.2	0.3	0.6	0.7	0.9	1.2
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	0.33	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	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0.1	0.2
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	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

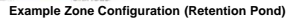
MHFD-Detention, Version 4.04 (February 2021)



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

MHED Notation Version 1.0A (February 2021)

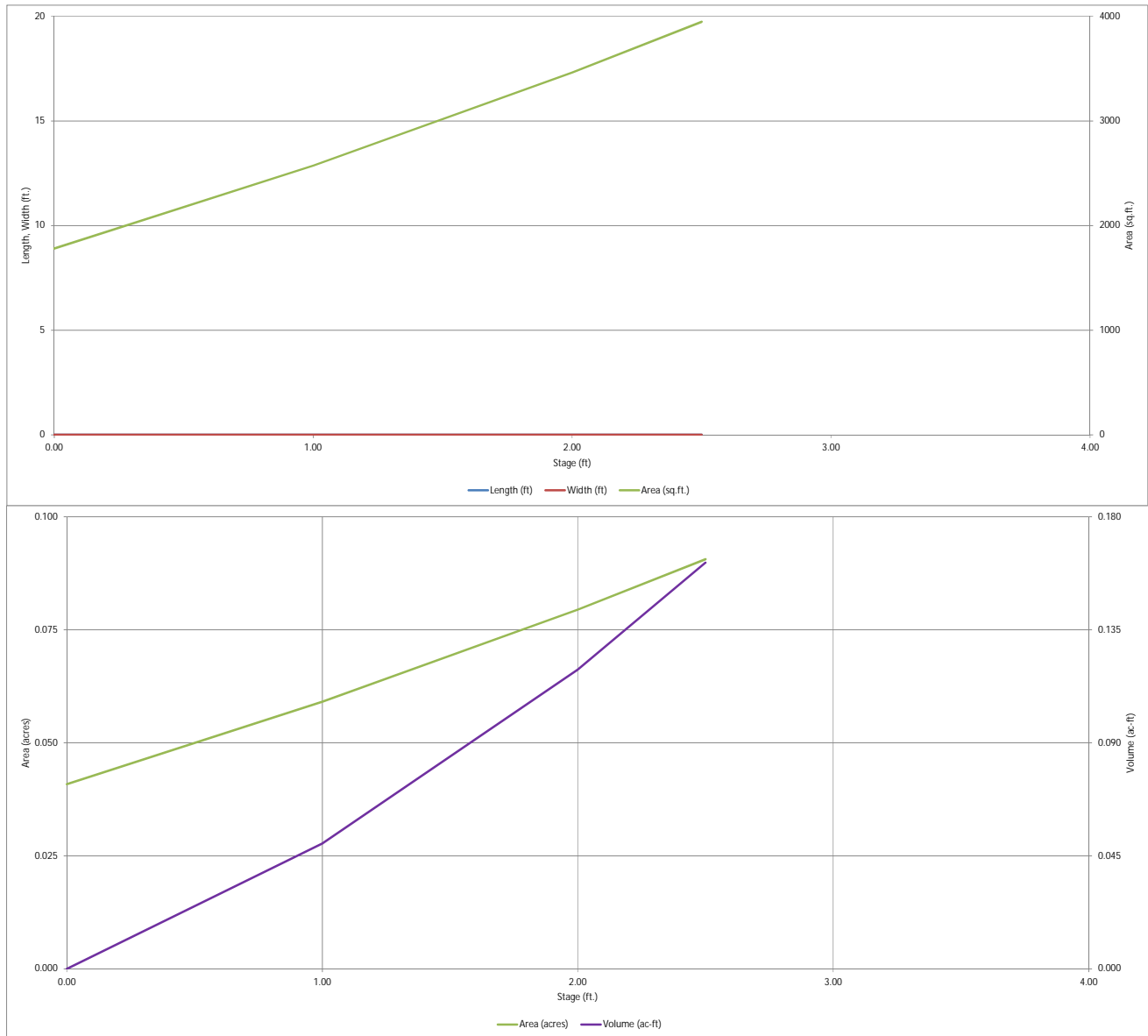
Basin ID: Sand Filter - Basin X1 - Existing



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

12/20/2022, 12:20 PM

FROM APPROVED "ADDENDUM 2 TO THE FINAL DRAINAGE
REPORT FOR HOMESTEAD 2 AT STERLING RANCH FILING NO. 2"



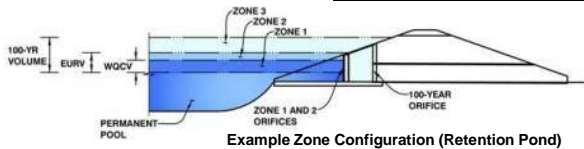
FROM APPROVED "ADDENDUM 2 TO THE FINAL DRAINAGE
REPORT FOR HOMESTEAD 2 AT STERLING RANCH FILING NO. 2"

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 - Existing



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WOCV)	0.20	0.008	Filtration Media
Zone 2 (EURV)	0.51	0.015	Rectangular Orifice
Zone 3 (100-year)	1.08	0.031	Weir&Pipe (Restrict)
Total (all zones)		0.054	

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV 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 ft²
Underdrain Orifice Centroid = 0.02 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 ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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 ft²
Vertical Orifice Centroid = 0.08 ft

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

Zone 3 Weir Not Selected
Overflow Weir Front Edge Height, H_o = 0.75 N/A ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 2.21 N/A feet
Overflow Weir Gate Slope = 0.00 N/A H:V
Horiz. Length of Weir Sides = 2.21 N/A feet
Overflow Gate Type = Type C Gate N/A
Debris Clogging % = 50% N/A %

Calculated Parameters for Overflow Weir
Zone 3 Weir Not Selected
Height of Gate Upper Edge, H₁ = 0.75 N/A feet
Overflow Weir Slope Length = 2.21 N/A feet
Gate Open Area / 100-yr Orifice Area = 28.68 N/A
Overflow Gate Open Area w/o Debris = 3.40 N/A ft²
Overflow Gate Open Area w/ Debris = 1.70 N/A ft²

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 ft²
Outlet Orifice Centroid = 0.12 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 = 0.09 acres
Basin Volume at Top of Freeboard = 0.16 acre-ft

Routed Hydrograph Results

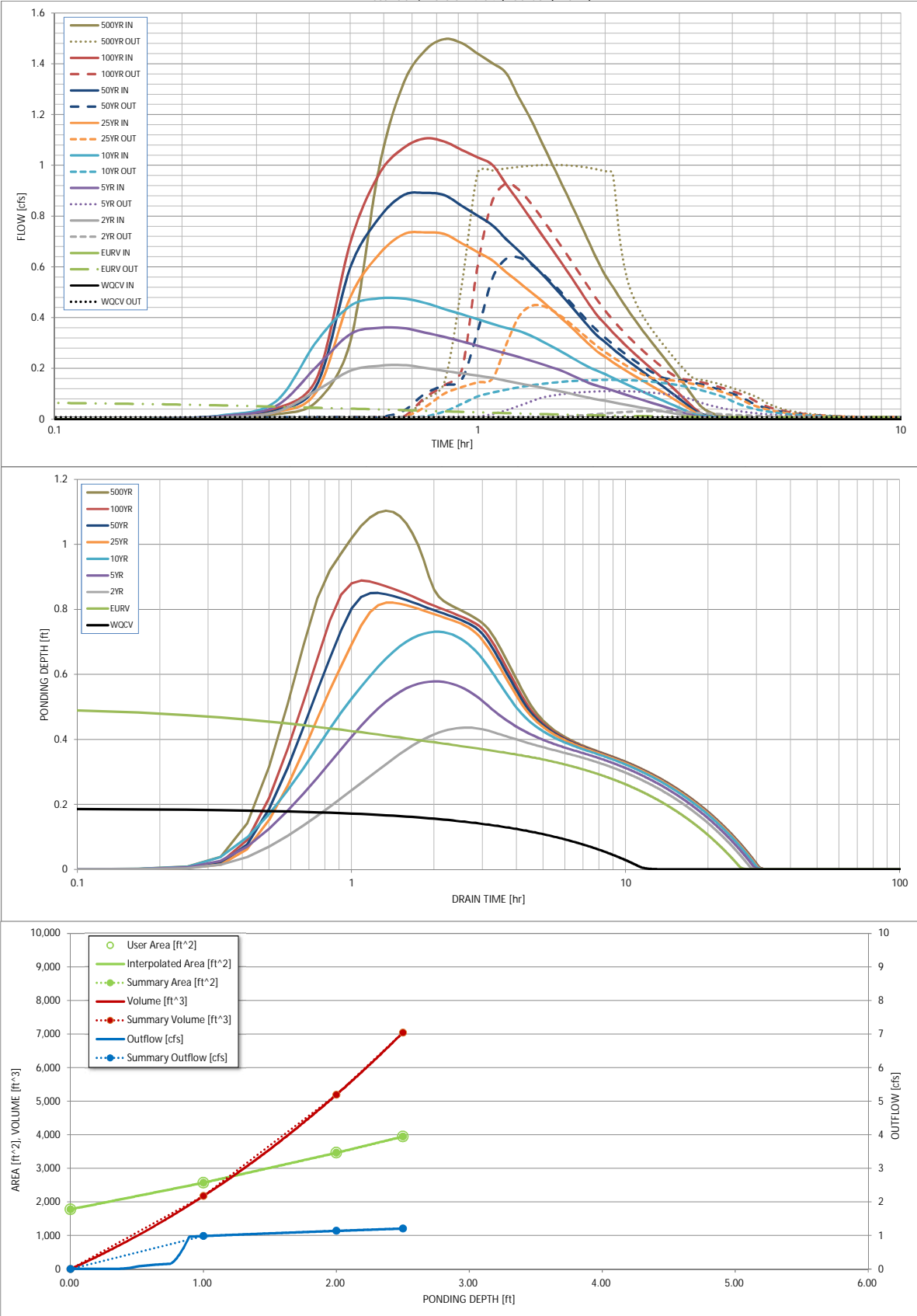
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WOCV	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)	N/A	N/A	0.008	0.023	0.024	0.041	0.056	0.081	0.099
CUHP Runoff Volume (acre-ft)	N/A	N/A	0.008	0.023	0.024	0.041	0.056	0.081	0.099
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	0.008	0.023	0.024	0.041	0.056	0.081	0.099
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	0.08	0.22	0.33	0.61	0.76	0.97	1.36
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.2	0.4	0.5	0.7	0.9	1.1	1.5
Peak Inflow Q (cfs)	N/A	N/A	0.0	0.1	0.2	0.4	0.6	0.9	1.0
Peak Outflow Q (cfs)	N/A	N/A	0.0	0.1	0.2	0.4	0.6	0.9	1.0
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.6	0.5	0.8	0.9	1.0	0.8
Structure Controlling Flow	Filtration Media	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	0.1	0.1	0.2
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)	12	26	28	28	28	27	27	26	24
Time to Drain 99% of Inflow Volume (hours)	12	26	29	29	30	30	30	29	29
Maximum Ponding Depth (ft)	0.19	0.51	0.44	0.58	0.73	0.82	0.85	0.89	1.10
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	0.019	0.026	0.035	0.040	0.041	0.043	0.056

FROM APPROVED "ADDENDUM 2 TO THE FINAL DRAINAGE
REPORT FOR HOMESTEAD 2 AT STERLING RANCH FILING NO. 2"

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			

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,

NICHOLAS JOKERST, PE

All Terrain Engineering LLC

njokerst@allterraineng.com

530.391.7635



April 08, 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. It is our opinion that the site and adjacent properties (as affected by work performed under the County permit) are stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and that the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements. The PCM(s) provide the required storage volume and meet the required release rates, stage areas, elevations, and outlet dimensions, as documented by the attached revised MHFD-Detention spreadsheet that shows the as-built conditions.

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, appearing to read "Nick Jokerst".

NICHOLAS JOKERST, PE

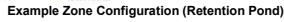
All Terrain Engineering LLC

njokerst@allterraineng.com

530.391.7635

MHFD-Detention, Version 4.04 (February 2021)

Basin ID: Sand Filter - Basin Y1, W1, X2 AS-BUILT



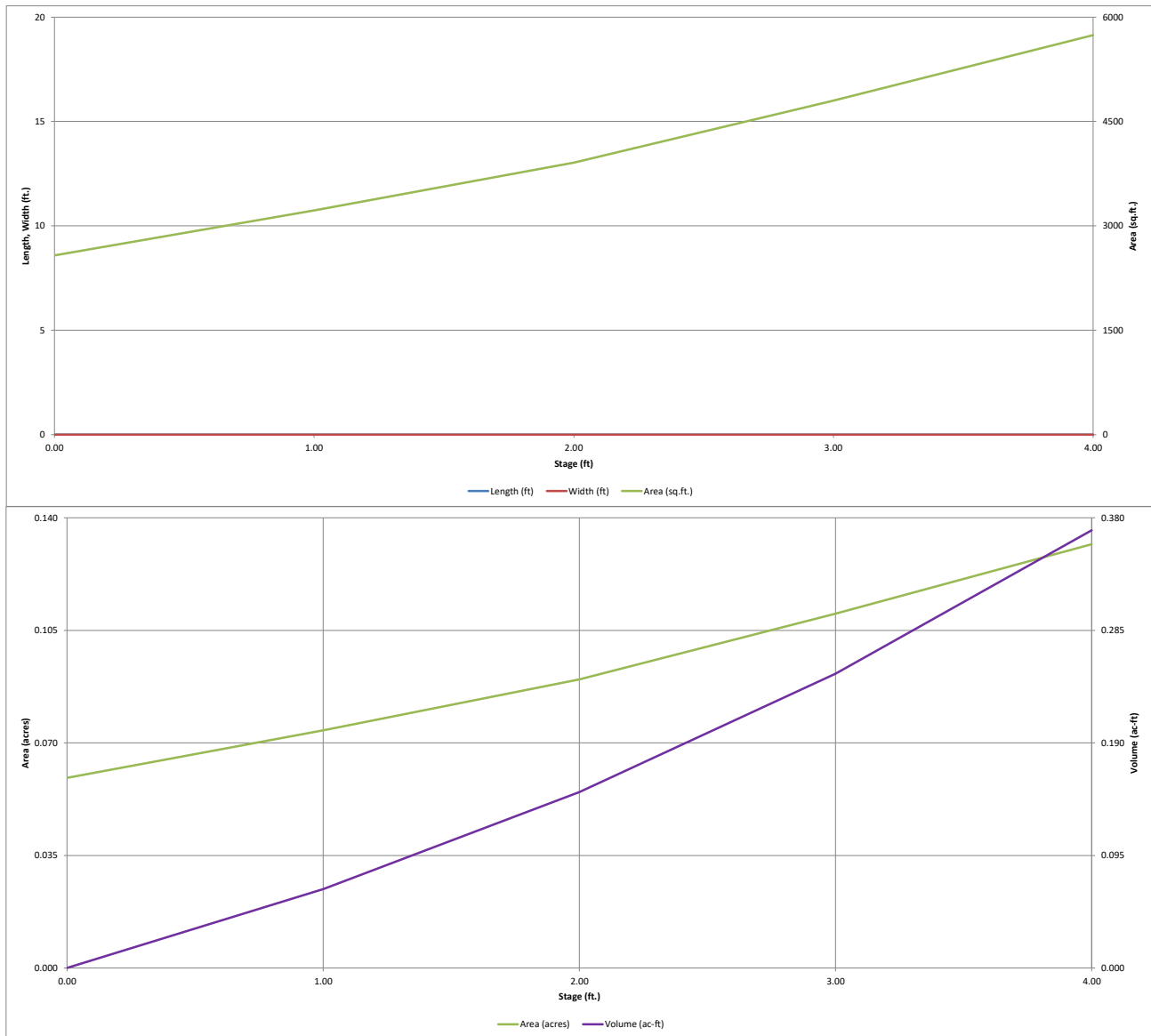
Initial Surcharge Area (A_{ISV})	=	user	ft ²
Surcharge Volume Length (L_{ISV})	=	user	ft
Surcharge Volume Width (W_{ISV})	=	user	ft
Depth of Basin Floor (H_{LFloor})	=	user	ft
Length of Basin Floor (L_{LFloor})	=	user	ft
Width of Basin Floor (W_{LFloor})	=	user	ft
Area of Basin Floor (A_{LFloor})	=	user	ft ²
Volume of Basin Floor (V_{LFloor})	=	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

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

[illegible]

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

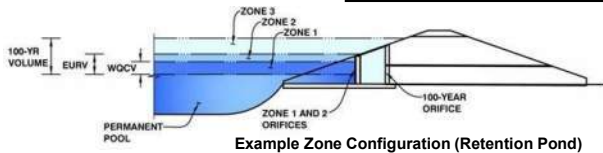


DETENTION BASIN OUTLET STRUCTURE DESIGN

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**



Example Zone Configuration (Retention Pond)

	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 ft²
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 ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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)

Invert of Vertical Orifice = 0.33 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = 1.03 ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height = 2.00 inches
Vertical Orifice Width = 4.00 inches

Calculated Parameters for Vertical Orifice
Zone 2 Rectangular Not Selected
Vertical Orifice Area = 0.06 ft²
Vertical Orifice Centroid = 0.08 feet

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, H_o = 0.58 ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 2.21 feet
Overflow Weir Grate Slope = 0.00 H:V
Horiz. Length of Weir Sides = 2.21 feet
Overflow Grate Type = Type C Grate
Debris Clogging % = 50%

Calculated Parameters for Overflow Weir
Zone 3 Weir Not Selected
Height of Grate Upper Edge, H_u = 0.58 feet
Overflow Weir Slope Length = 2.21 feet
Grate Open Area / 100-yr Orifice Area = 10.98
Overflow Grate Open Area w/o Debris = 3.40 ft²
Overflow Grate Open Area w/ Debris = 1.70 ft²

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

Depth to Invert of Outlet Pipe = 2.10 ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter = 15.00 inches
Restrictor Plate Height Above Pipe Invert = 4.50 inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Zone 3 Restrictor Not Selected
Outlet Orifice Area = 0.31 ft²
Outlet Orifice Centroid = 0.22 feet
Half-Central Angle of Restrictor Plate on Pipe = 1.16 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = 2.73 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 = 1.05 feet

Calculated Parameters for Spillway
Spillway Design Flow Depth = 0.22 feet
Stage at Top of Freeboard = 4.00 feet
Basin Area at Top of Freeboard = 0.13 acres
Basin Volume at Top of Freeboard = 0.37 acre-ft

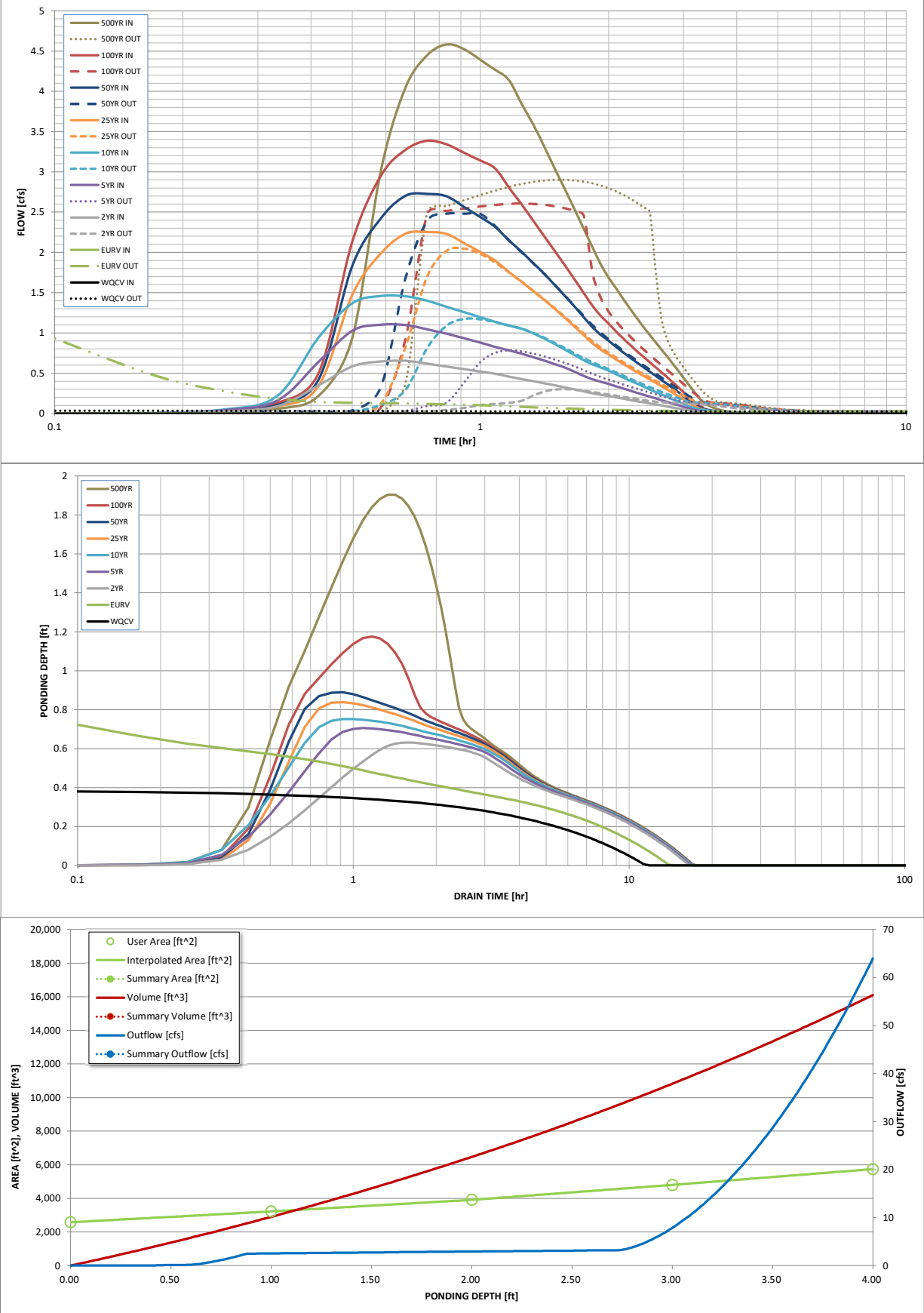
Routed Hydrograph Results

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

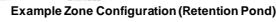
MHFD-*Detention*, Version 4.04 (February 2021)



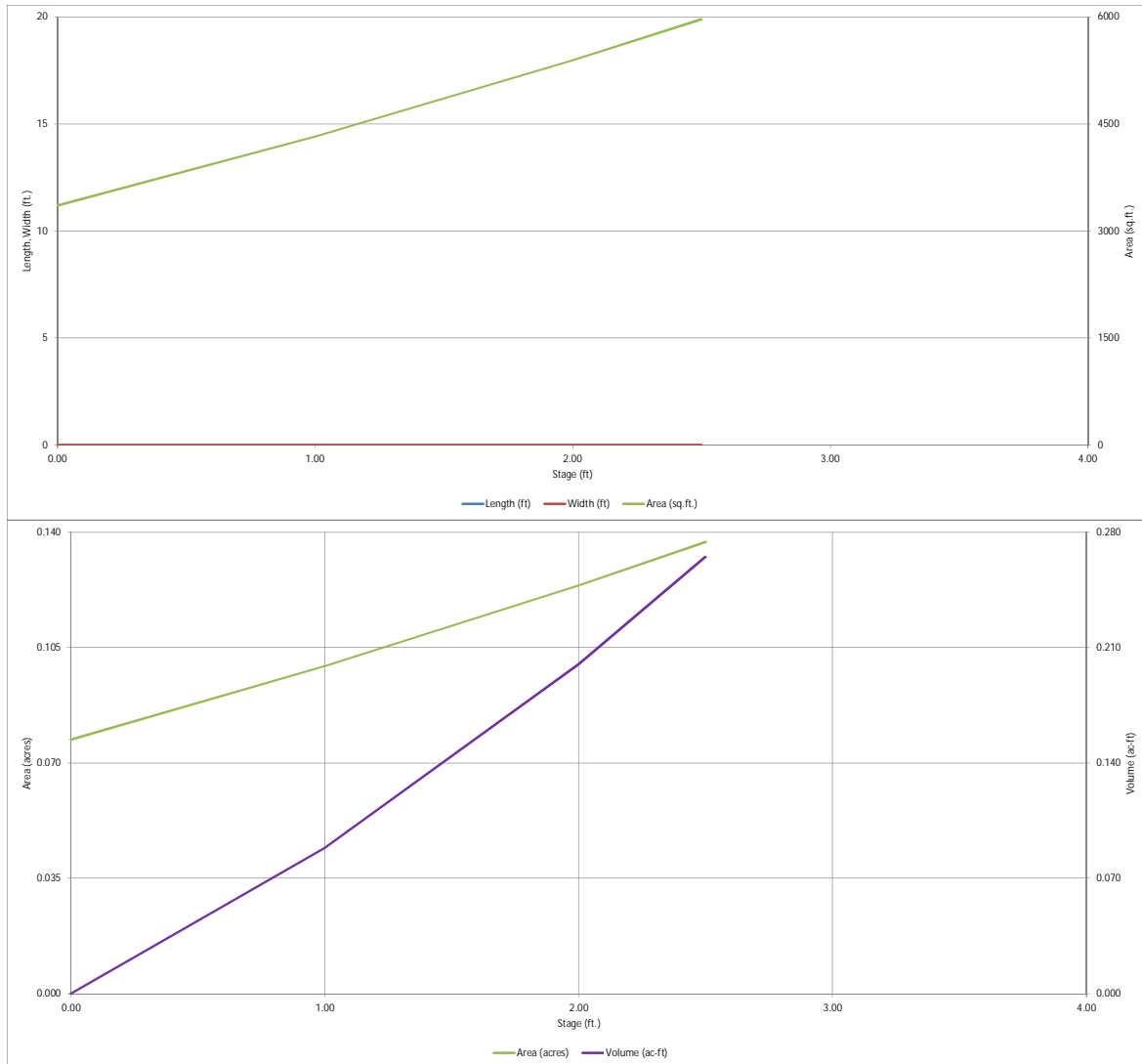
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

MHFD-Detention, Version 4.04 (February 2021)

Basin ID: Sand Filter - Basin Y1, W1, X2 - Existing

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FROM APPROVED "ADDENDUM 2 TO THE FINAL DRAINAGE
REPORT FOR HOMESTEAD 2 AT STERLING RANCH FILING NO. 2"



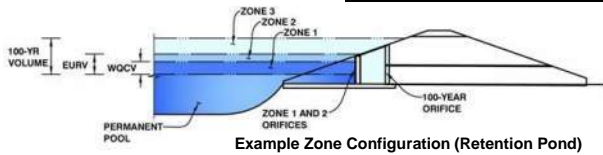
FROM APPROVED "ADDENDUM 2 TO THE FINAL DRAINAGE REPORT FOR HOMESTEAD 2 AT STERLING RANCH FILING NO. 2"

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 - Existing



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.31	0.024	Filtration Media
Zone 2 (EURV)	0.80	0.044	Rectangular Orifice
Zone 3 (100-year)	1.69	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 = 2.10 ft (distance below the filtration media surface)

Underdrain Orifice Diameter = 0.80 inches

Calculated Parameters for Underdrain

Underdrain Orifice Area = 0.0 ft²

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 ft²

Elliptical Half-Width = N/A feet

Elliptical Slot Centroid = N/A feet

Elliptical Slot Area = N/A ft²

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)

Invert of Vertical Orifice = 0.33 ft (relative to basin bottom at Stage = 0 ft)

Depth at top of Zone using Vertical Orifice = 0.80 ft (relative to basin bottom at Stage = 0 ft)

Vertical Orifice Height = 2.00 inches

Vertical Orifice Width = 4.00 inches

Calculated Parameters for Vertical Orifice

Zone 2 Rectangular = 0.06 ft²

Not Selected = N/A ft²

Vertical Orifice Centroid = 0.08 feet

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, H_o = 1.00 ft (relative to basin bottom at Stage = 0 ft)

Overflow Weir Front Edge Length = 2.21 feet

Overflow Weir Grate Slope = 0.00 H:V

Horiz. Length of Weir Sides = 2.21 feet

Overflow Grate Type = Type C Grate

Debris Clogging % = 50%

Calculated Parameters for Overflow Weir

Zone 3 Weir = 1.00 feet

Not Selected = N/A feet

Height of Grate Upper Edge, H_u = 2.21 feet

Overflow Weir Slope Length = 10.98 feet

Grate Open Area / 100-yr Orifice Area = 3.40 ft²

Overflow Grate Open Area w/o Debris = 1.70 ft²

Overflow Grate Open Area w/ Debris = N/A ft²

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

Depth to Invert of Outlet Pipe = 2.10 ft (distance below basin bottom at Stage = 0 ft)

Outlet Pipe Diameter = 15.00 inches

Restrictor Plate Height Above Pipe Invert = 4.50 inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Zone 3 Restrictor = 0.31 ft²

Not Selected = N/A ft²

Outlet Orifice Area = 0.22 feet

Outlet Orifice Centroid = 1.16 radians

Half-Central Angle of Restrictor Plate on Pipe = N/A

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 = 0.14 acres

Basin Volume at Top of Freeboard = 0.26 acre-ft

Routed Hydrograph Results

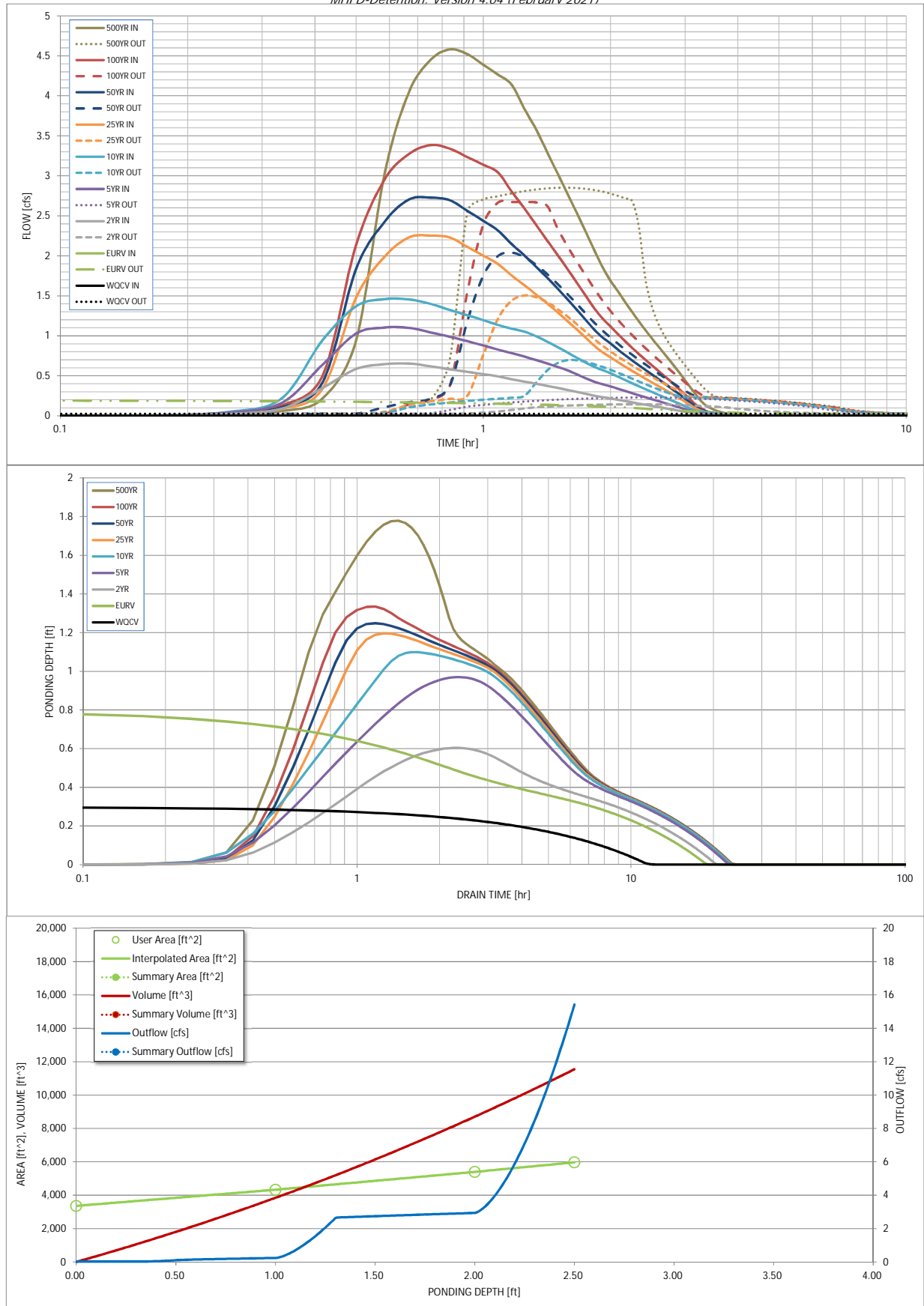
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	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	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	0.2	0.1	0.2	0.7	1.5	2.0	2.7	2.9
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.4	0.8	0.9	1.0	1.0	0.7
Structure Controlling Flow	Filtration Media	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	N/A	0.1	0.4	0.5	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	18	20	21	21	20	19	18	16
Time to Drain 99% of Inflow Volume (hours)	12	19	20	22	22	22	22	22	21
Maximum Ponding Depth (ft)	0.30	0.81	0.60	0.97	1.10	1.20	1.25	1.33	1.78
Area at Maximum Ponding Depth (acres)	0.08	0.10	0.09	0.10	0.10	0.10	0.11	0.11	0.12
Maximum Volume Stored (acre-ft)	0.024	0.070	0.050	0.085	0.097	0.108	0.113	0.122	0.172

FROM APPROVED "ADDENDUM 2 TO THE FINAL DRAINAGE REPORT FOR HOMESTEAD 2 AT STERLING RANCH FILING NO. 2"

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			