

March 13th, 2026

Attn: Mikayla Hartford

Stormwater Engineer

El Paso County - Department of Public Works

3275 Akers Drive

Colorado Springs, CO 80922



RE: VOLLMER RV STORAGE – VOLUME CERTIFICATION LETTER FOR POND V1

Dear Mr. Reese,

Based upon survey of the as-built condition Vollmer RV Storage, POND V1, the required storage volume for WQCV, EURV and 100-year is provided. Additionally, the release rate for Pond V1 is at or below the historic 100-yr design storm level. 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.

It should be noted that a third of an acre portion of site, along the eastern boundary & tributary to Pond V1 was hardscaped (recycled asphalt) instead of vegetated. The site's imperviousness calculation has been updated to reflect this change on the attached As-built MHFD Detention workbook. It was found that one hole needed to be up-sized from $\frac{3}{4}$ " to $\frac{7}{8}$ " inch to restore the required drain times. No other changes were necessary, and the site and drainage infrastructure will function as designed. The PCM provides the required storage volume and meets 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 V1 has been reasonably constructed, to the best of my knowledge and belief, per the approved Pond V1 design.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "Ryan Burns".

RYAN BURNS, PE

All Terrain Engineering LLC

rburns@allterraineng.com

203.577.8656

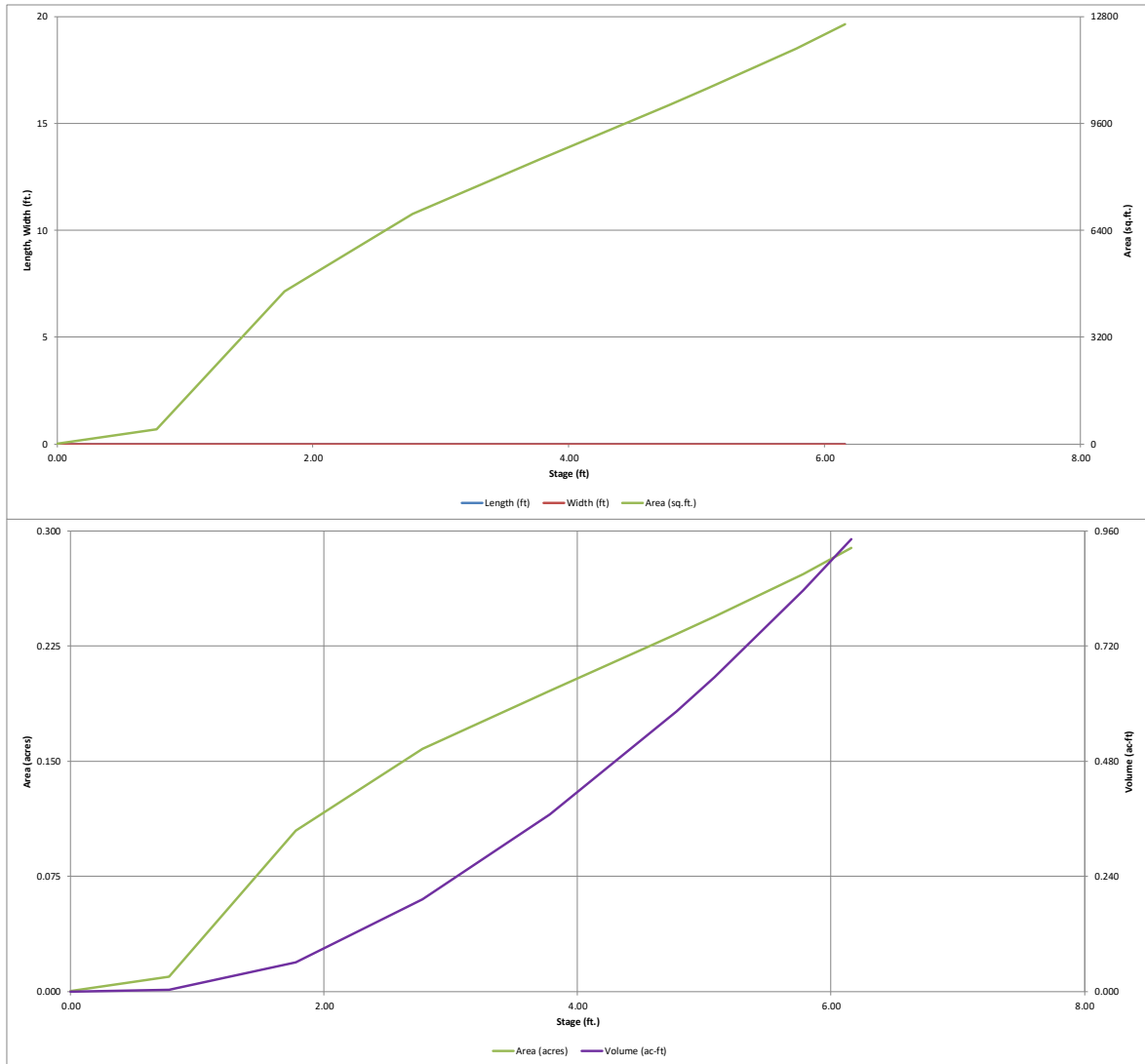
MHFD-Detention, Version 4.06 (July 2022)

AB IA =
5.02/6.02 =
83.4%
EFFECTIVE
IMP.

4/14/2026, 6:40 PM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

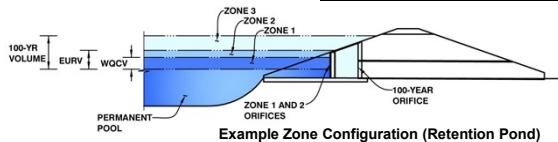


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Vollmer RV Storage - As-Built

Basin ID: Pond V1 (As-Built Condition)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.68	0.176	Orifice Plate
Zone 2 (EURV)	4.68	0.383	Circular Orifice
Zone 3 (100-year)	5.80	0.283	Weir&Pipe (Restrict)
Total (all zones)		0.842	

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)

Centroid 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

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	0.75	1.67					
Orifice Area (sq. inches)	0.44	0.69	0.78					

	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)

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

Calculated Parameters for Vertical Orifice
Vertical Orifice Area = ft²
Vertical Orifice Centroid = 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 = ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Grate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Grate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir
Height of Grate Upper Edge, H_u = feet
Overflow Weir Slope Length = feet
Grate Open Area / 100-yr Orifice Area =
Overflow Grate Open Area w/o Debris = ft²
Overflow Grate Open Area w/ Debris = ft²

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

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

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

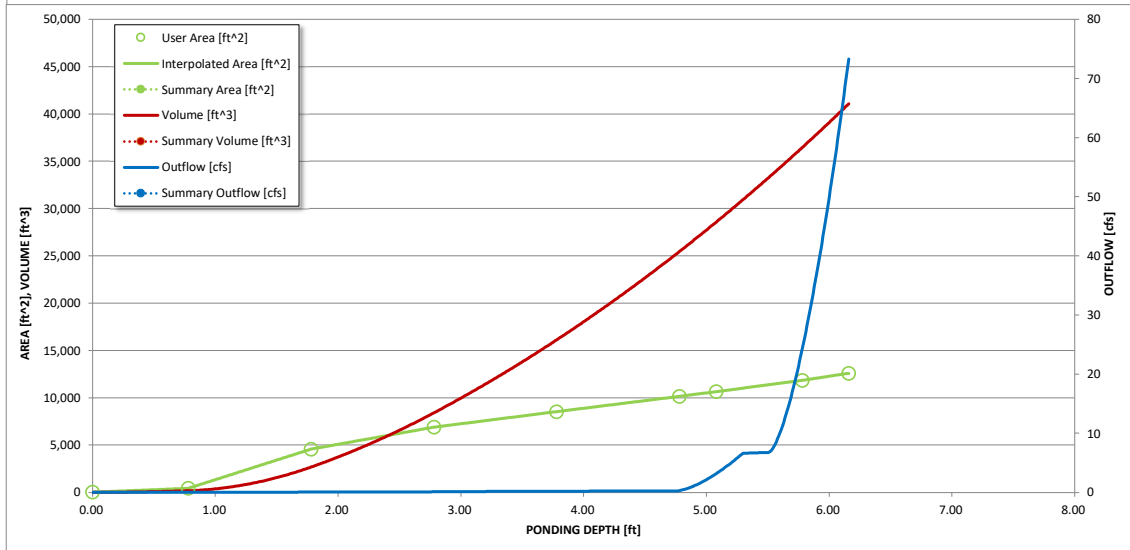
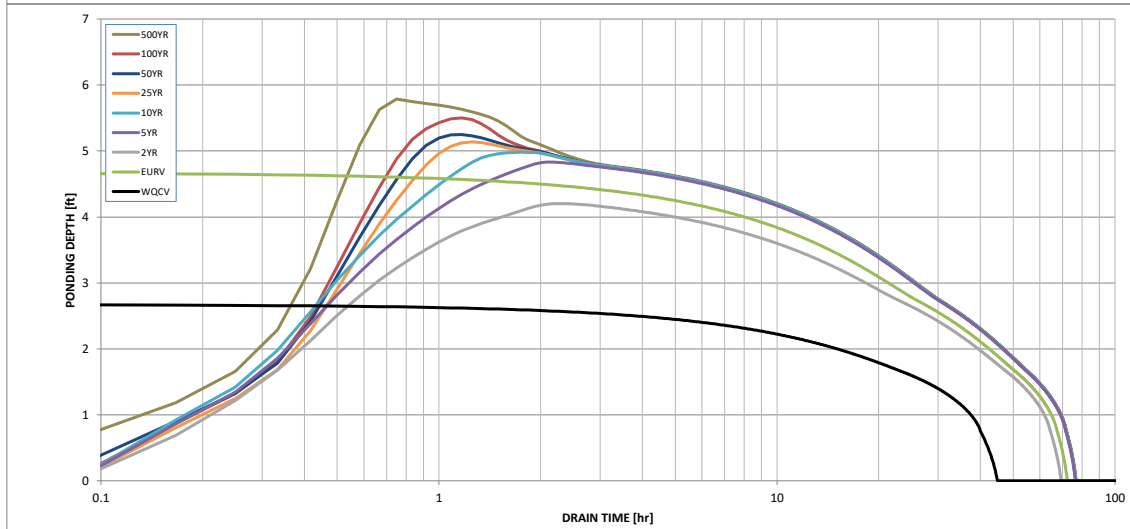
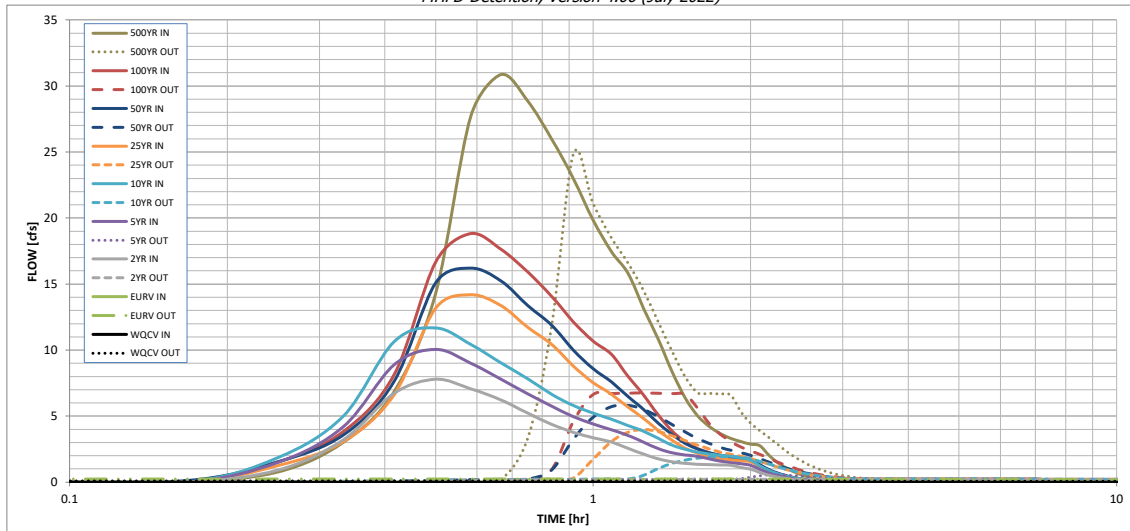
Routed Hydrograph Results

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	4.00
One-Hour Rainfall Depth (in)	N/A	N/A	0.488	0.642	0.769	0.906	1.036	1.183	1.962
CUHP Runoff Volume (acre-ft)	N/A	N/A	0.488	0.642	0.769	0.906	1.036	1.183	1.962
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	0.5	1.5	2.2	4.0	5.1	6.5	12.8
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.09	0.24	0.37	0.67	0.84	1.08	2.13
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A	0.09	0.24	0.37	0.67	0.84	1.08	2.13
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	7.8	10.0	11.7	14.2	16.2	18.8	30.9
Peak Inflow Q (cfs)	N/A	N/A	0.2	0.6	1.9	4.0	5.8	6.7	24.8
Peak Outflow Q (cfs)	N/A	N/A	0.4	0.9	1.0	1.2	1.0	1.9	
Ratio Peak Outflow to Predevelopment Q	Plate	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Structure Controlling Flow	N/A	N/A	N/A	0.1	0.4	0.9	1.3	1.5	1.5
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 2 (fps)	39	61	59	65	63	62	61	59	53
Time to Drain 97% of Inflow Volume (hours)	42	66	64	70	70	69	68	68	65
Time to Drain 99% of Inflow Volume (hours)	2.68	4.68	4.20	4.83	4.98	5.14	5.25	5.50	5.79
Maximum Ponding Depth (ft)	0.15	0.23	0.21	0.23	0.24	0.25	0.25	0.26	0.27
Area at Maximum Ponding Depth (acres)	0.177	0.561	0.455	0.596	0.632	0.668	0.698	0.762	0.836
Maximum Volume Stored (acre-ft)									

DETENTION BASIN OUTLET STRUCTURE DESIGN

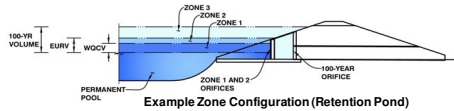
MHFD-Detention, Version 4.06 (July 2022)



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

MHFD-Detention, Version 4.06 (July 2022)

Basin ID: Pond V1



Example Zone Configuration (Retention Pond)

Selected BMP Type =	EDB	
Watershed Area =	6.02	acres
Watershed Length =	1,200	ft
Watershed Length to Centroid =	400	ft
Watershed Slope =	0.021	ft/ft
Watershed Imperviousness =	71.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Group C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	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) =	0.140	acre-feet
Excess Urban Runoff Volume (EURV) =	0.470	acre-feet
2-yr Runoff Volume ($P_1 = 1.19$ in.) =	0.419	acre-feet
5-yr Runoff Volume ($P_1 = 1.5$ in.) =	0.563	acre-feet
10-yr Runoff Volume ($P_1 = 1.75$ in.) =	0.685	acre-feet
25-yr Runoff Volume ($P_1 = 2$ in.) =	0.828	acre-feet
50-yr Runoff Volume ($P_1 = 2.25$ in.) =	0.955	acre-feet
100-yr Runoff Volume ($P_1 = 2.52$ in.) =	1.106	acre-feet
500-yr Runoff Volume ($P_1 = 4$ in.) =	1.879	acre-feet
Approximate 2-yr Detention Volume =	0.368	acre-feet
Approximate 5-yr Detention Volume =	0.489	acre-feet
Approximate 10-yr Detention Volume =	0.617	acre-feet
Approximate 25-yr Detention Volume =	0.662	acre-feet
Approximate 50-yr Detention Volume =	0.689	acre-feet
Approximate 100-yr Detention Volume =	0.737	acre-feet

Zone 1 Volume (WQCV) =	0.140	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.330	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.267	acre-feet
Total Detention Basin Volume =	0.737	acre-feet
Initial Surge Volume (ISV) =	user	ft ³
Initial Surge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	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	

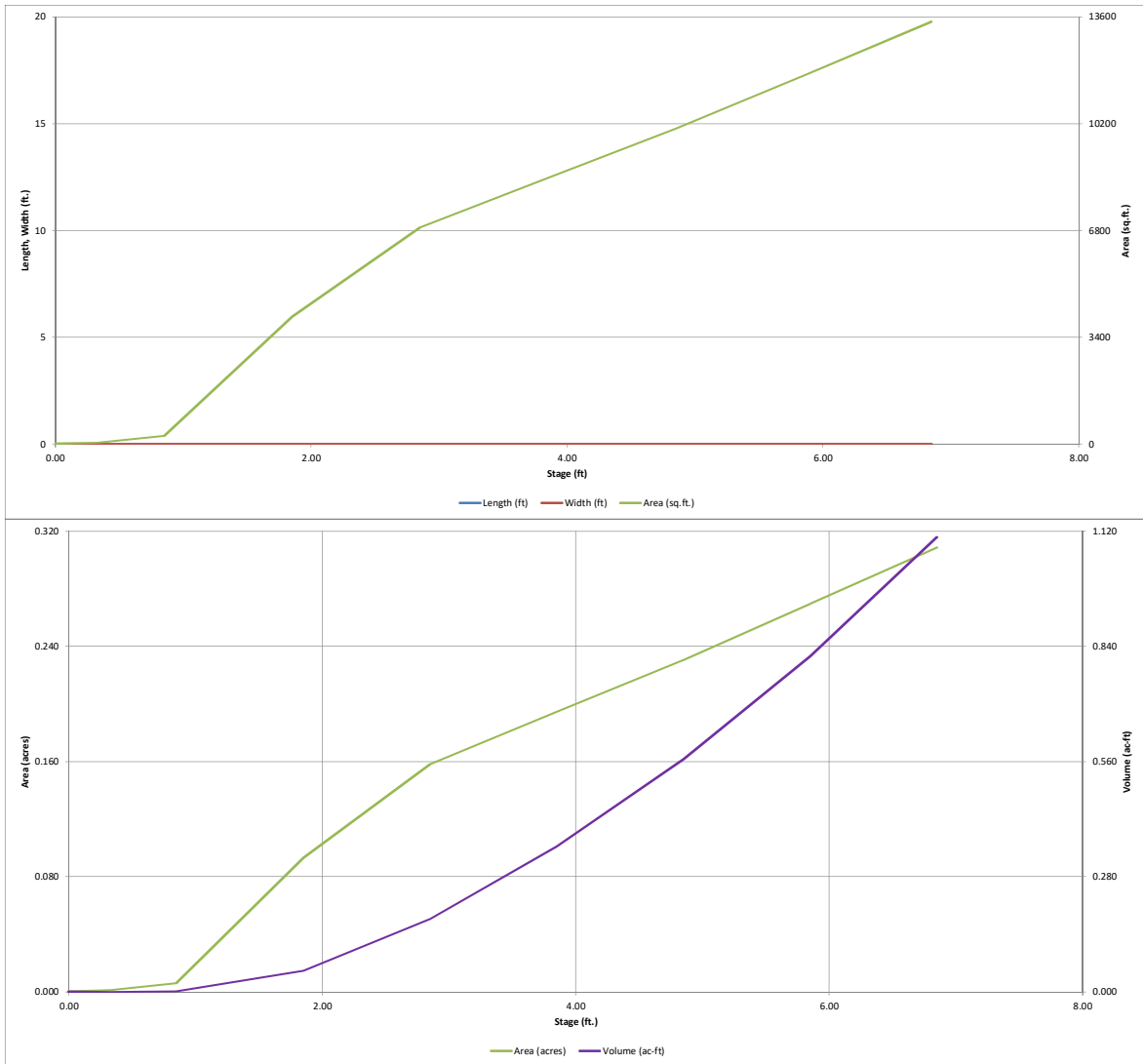
Initial Surcharge Area (A_{S1})	=	user	ft ²
Surcharge Volume Length (L_{S1})	=	user	ft
Surcharge Volume Width (W_{S1})	=	user	ft
Depth of Basin Floor (H_{FLOOR})	=	user	ft
Length of Basin Floor (L_{FLOOR})	=	user	ft
Width of Basin Floor (W_{FLOOR})	=	user	ft
Area of Basin Floor (A_{FLOOR})	=	user	ft 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 =	
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MHFD-Detention v4-06.xlsm, Basin

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

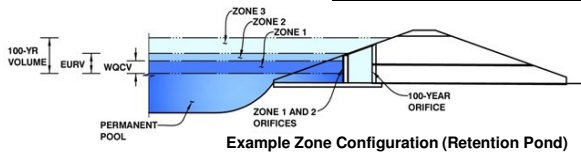


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Vollmer RV Storage

Basin ID: Pond V1



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.61	0.140	Orifice Plate
Zone 2 (EURV)	4.42	0.330	Circular Orifice
Zone 3 (100-year)	5.55	0.267	Weir&Pipe (Restrict)
Total (all zones)		0.737	

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)

Centroid 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

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	0.75	1.67					
Orifice Area (sq. inches)	0.44	0.44	0.44					

	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)

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

Calculated Parameters for Vertical Orifice
Zone 2 Circular
Vertical Orifice Area = ft²
Vertical Orifice Centroid = feet

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

Overflow Weir Front Edge Height, H_o = ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Gate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Gate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir
Zone 3 Weir
Height of Gate Upper Edge, H_u = feet
Overflow Weir Slope Length = feet
Gate Open Area / 100-yr Orifice Area =
Overflow Gate Open Area w/o Debris = ft²
Overflow Gate Open Area w/ Debris = ft²

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

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Zone 3 Restrictor
Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

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

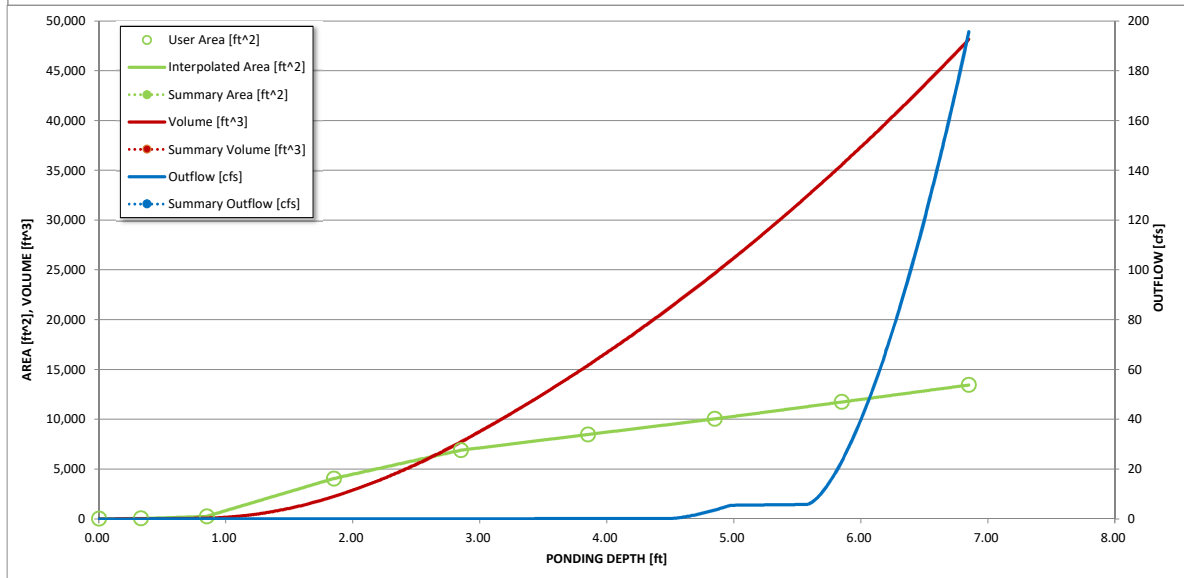
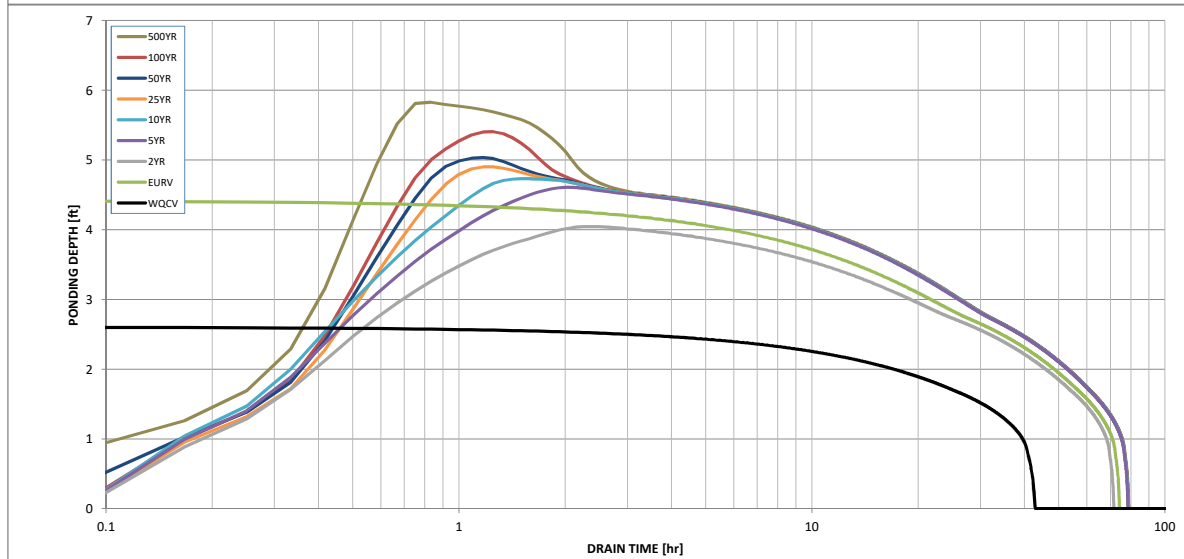
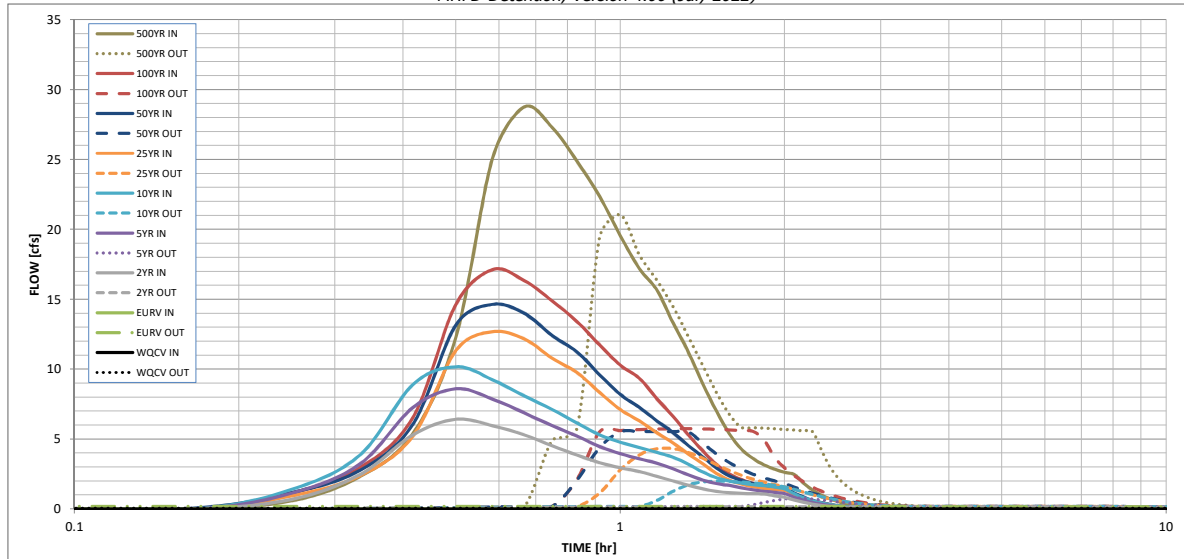
Routed Hydrograph Results

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	4.00
One-Hour Rainfall Depth (in) =	N/A	N/A	0.419	0.563	0.685	0.828	0.955	1.106	1.879
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.419	0.563	0.685	0.828	0.955	1.106	1.879
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.5	1.5	2.2	4.0	5.1	6.5	12.8
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.09	0.24	0.37	0.67	0.84	1.08	2.13
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A	0.09	0.24	0.37	0.67	0.84	1.08	2.13
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	6.4	8.6	10.2	12.7	14.6	17.1	28.8
Peak Inflow Q (cfs) =	0.1	0.2	0.2	0.8	2.0	4.3	5.5	5.7	21.1
Peak Outflow Q (cfs) =	N/A	N/A	N/A	0.5	0.9	1.1	1.1	0.9	1.6
Ratio Peak Outflow to Predevelopment Q =	Plate	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Structure Controlling Flow =	N/A	N/A	N/A	0.1	0.4	0.9	1.2	1.3	1.3
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Gate 2 (fps) =	39	66	64	69	68	66	65	63	56
Time to Drain 97% of Inflow Volume (hours) =	41	71	68	74	74	73	73	72	69
Time to Drain 99% of Inflow Volume (hours) =	2.61	4.42	4.04	4.61	4.73	4.90	5.04	5.40	5.83
Maximum Ponding Depth (ft) =	0.14	0.22	0.20	0.22	0.23	0.23	0.24	0.25	0.27
Area at Maximum Ponding Depth (acres) =	0.141	0.470	0.391	0.510	0.539	0.578	0.608	0.699	0.808
Maximum Volume Stored (acre-ft) =									

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



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