Civil Engineer
Stormwater Best Management Practice (permanent) Certification Letter

November 9, 2026

El Paso County
Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Attn.: Brad Walters, Inspections Supervisor

RE: **Hannah Ridge at Feathergrass Filing No. 7**

The permanent stormwater Best Management Practices (BMPs) for **Hannah Ridge at Feathergrass Filing No. 7** consists of a Private Full Spectrum Extended Detention Basin. This facility is described by the following:

Detention Facility 1 within Tract A, Hannah Ridge at Feathergrass Filing No. 7

The site and adjacent properties (as affected by work performed under the County permit) appear to be stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover and the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements. The detention/stormwater quality facility provides the required storage volume and will meet the required release rates (as documented by the attached UDFCD design form submitted with the original application), the stage areas, elevations and outlet dimensions. The 24" RCP pond outlet pipe daylights into a fiber mesh lined natural channel that routes the release flows to the adjacent existing concrete trickle channel. Approximate dimensions of this lined channel: (6' wide, 18"-24" depth, 70' long at 0.50% slope, lined with fiber mesh erosion control blanket)

Statement Of Engineer In Responsible Charge:

I, Marc A. Whorton, a registered Professional Engineer in the State of Colorado, in accordance with Sections 5.2 and 5.3 of the Bylaws and Rules of the State Board of Registration for Professional Engineers and Professional Land Surveyors, do hereby certify that I or a person under my responsible charge periodically observed the construction of the above-mentioned project. Based on the on-site

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field observations and review of pertinent as-built documentation, it is my professional opinion that the required permanent BMP has been installed and is in general compliance with the approved Construction Plans, and Specifications as filed with El Paso County. For BMPs with a Water Quality Capture Volume (WQCV), I have attached the post-construction As-Built drawings and calculations. The As-Built drawings accurately depict the final installation of the stormwater BMP.



11/9/2026

Marc A. Whorton, P.E.
Colorado No. 37155

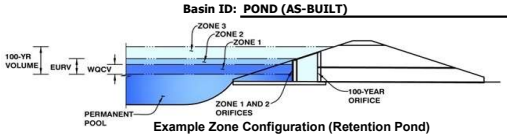
Seal & Signature of P.E. Goes Here

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.08 (April 2026)

Project: HANNAH RIDGE AT FEATHERGRASS FILING NO. 5, 6 & 7

Basin ID: POND (AS-BUILT)



Example Zone Configuration (Retention Pond)

AS-BUILT

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft²)	Optional Override Area (ft²)	Area (acre)	Volume (ft³)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	176	0.004		
6462	--	0.50	--	--	--	267	0.006	111	0.003
6464	--	2.50	--	--	--	12,425	0.285	12,803	0.294
6466	--	4.50	--	--	--	36,120	0.829	61,348	1.408
6468	--	6.50	--	--	--	45,800	1.051	143,268	3.289
6470	--	8.50	--	--	--	52,345	1.202	241,413	5.542
6471	--	9.50	--	--	--	57,625	1.323	296,398	6.804

Watershed Information

Selected SCM Type =	**EDB**	
Watershed Area =	37.50	acres
Watershed Length =	1,700	ft
Watershed Length to Centroid =	1,000	ft
Watershed Slope =	0.015	ft/ft
Watershed Imperviousness =	60.00%	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 =	40.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	

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

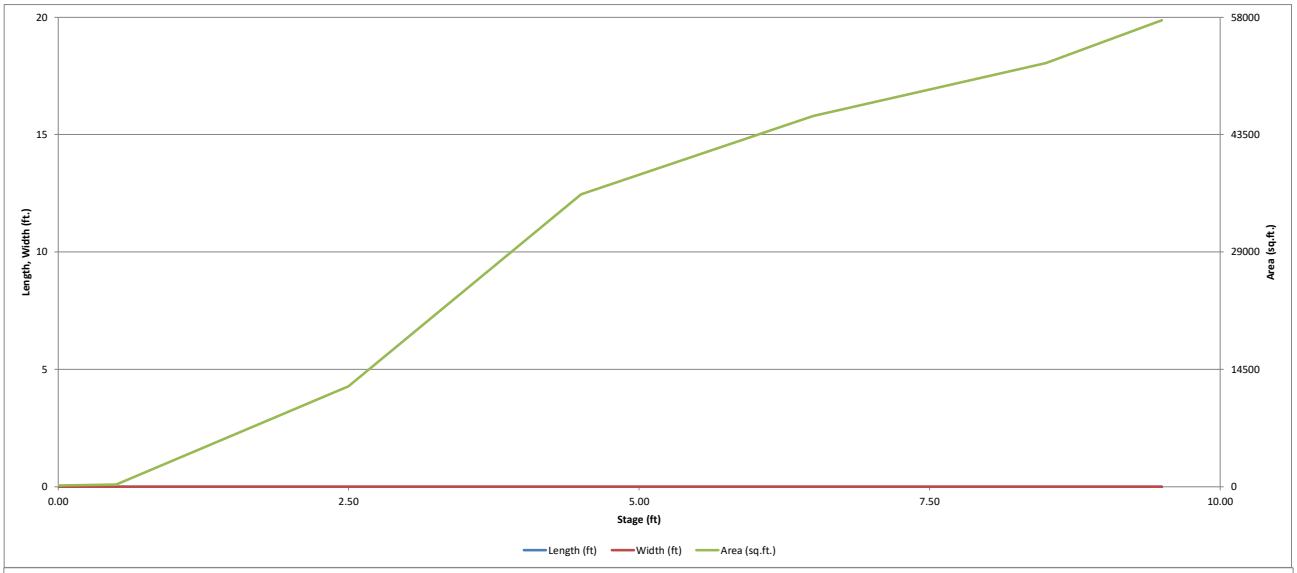
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.738	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.441	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	2.270	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	3.135	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	3.878	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.820	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	5.614	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	6.594	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.85 in.) =	10.979	acre-feet	3.85	inches
Approximate 2-yr Detention Volume =	1.877	acre-feet		
Approximate 5-yr Detention Volume =	2.533	acre-feet		
Approximate 10-yr Detention Volume =	3.265	acre-feet		
Approximate 25-yr Detention Volume =	3.531	acre-feet		
Approximate 50-yr Detention Volume =	3.681	acre-feet		
Approximate 100-yr Detention Volume =	4.019	acre-feet		

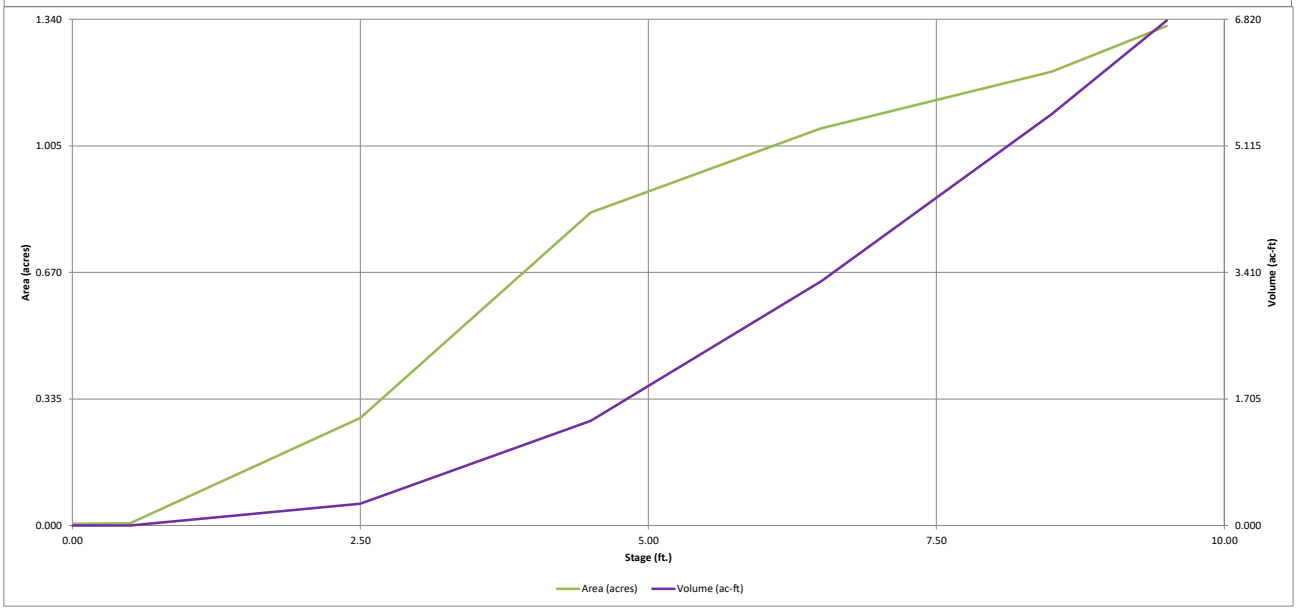
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.738	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.703	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.578	acre-feet
Total Detention Basin Volume =	4.019	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge 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_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.08 (April 2026)



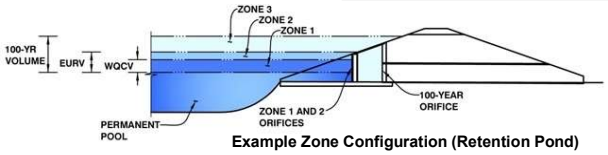


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.08 (April 2026)

Project: **HANNAH RIDGE AT FEATHERGRASS FILING NO. 5, 6 & 7**

Basin ID: **POND (AS-BUILT)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.55	0.738	Orifice Plate
Zone 2 (EURV)	5.66	1.703	Orifice Plate
Zone 3 (100-year)	7.18	1.578	Weir&Pipe (Restrict)
Total (all zones)		4.019	

AS-BUILT

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

			Calculated Parameters for Underdrain		
Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft^2
Underdrain Orifice Diameter =		inches	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 SCM)

			Calculated Parameters for Plate		
Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	5.74	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	13.80	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	sq. inches	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	1.20	2.40	3.60	4.80			
Orifice Area (sq. inches)	2.23	2.23	2.58	4.43	4.43			

	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		Calculated Parameters for Vertical Orifice	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

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		Calculated Parameters for Overflow Weir	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.74	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	6.74	N/A	feet
Overflow Weir Front Edge Length =	6.00	N/A	feet	Overflow Weir Slope Length =	4.12	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	5.48	N/A	
Horiz. Length of Weir Sides =	4.00	N/A	feet	Overflow Grate Open Area w/o Debris =	17.22	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	8.61	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

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

	Zone 3 Restrictor	Not Selected		Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	3.14	N/A	ft^2
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	1.00	N/A	feet
Restrictor Plate Height Above Pipe Invert =	24.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

			Calculated Parameters for Spillway		
Spillway Invert Stage=	7.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.92	feet
Spillway Crest Length =	37.90	feet	Stage at Top of Freeboard =	9.42	feet
Spillway End Slopes =	3.00	H:V	Basin Area at Top of Freeboard =	1.31	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	6.70	acre-ft

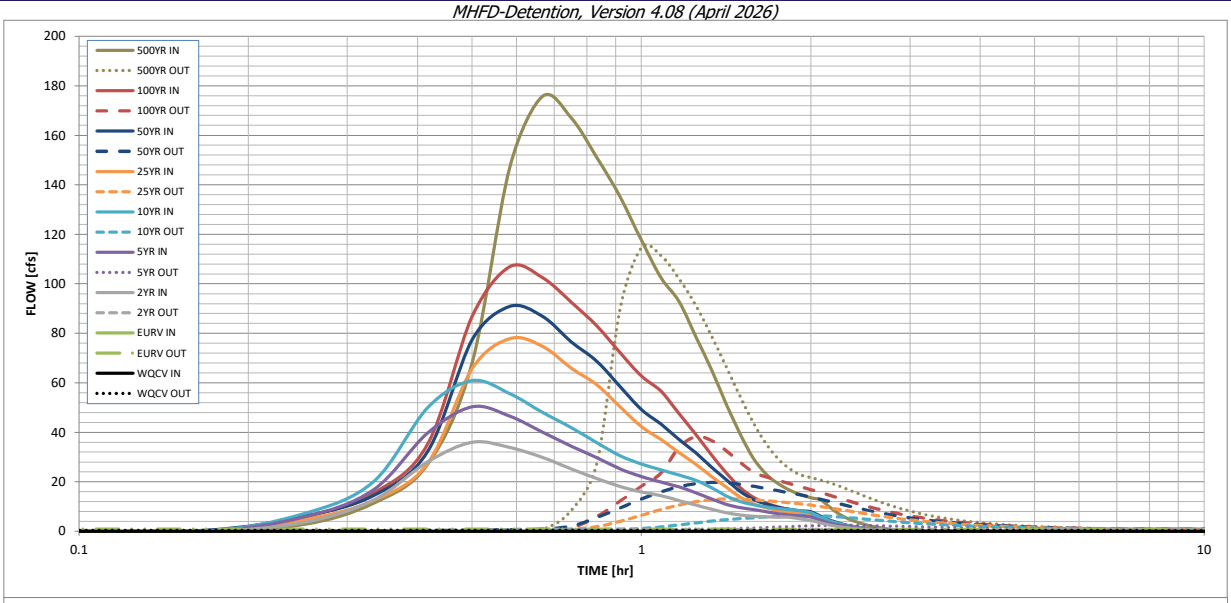
Routed Hydrograph Results

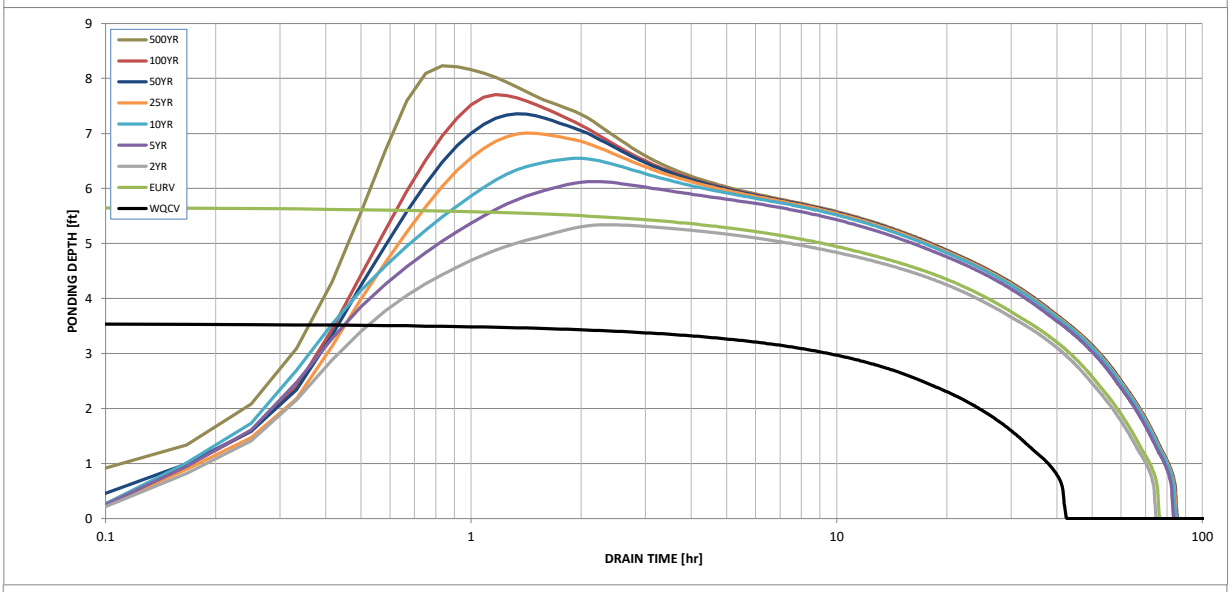
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

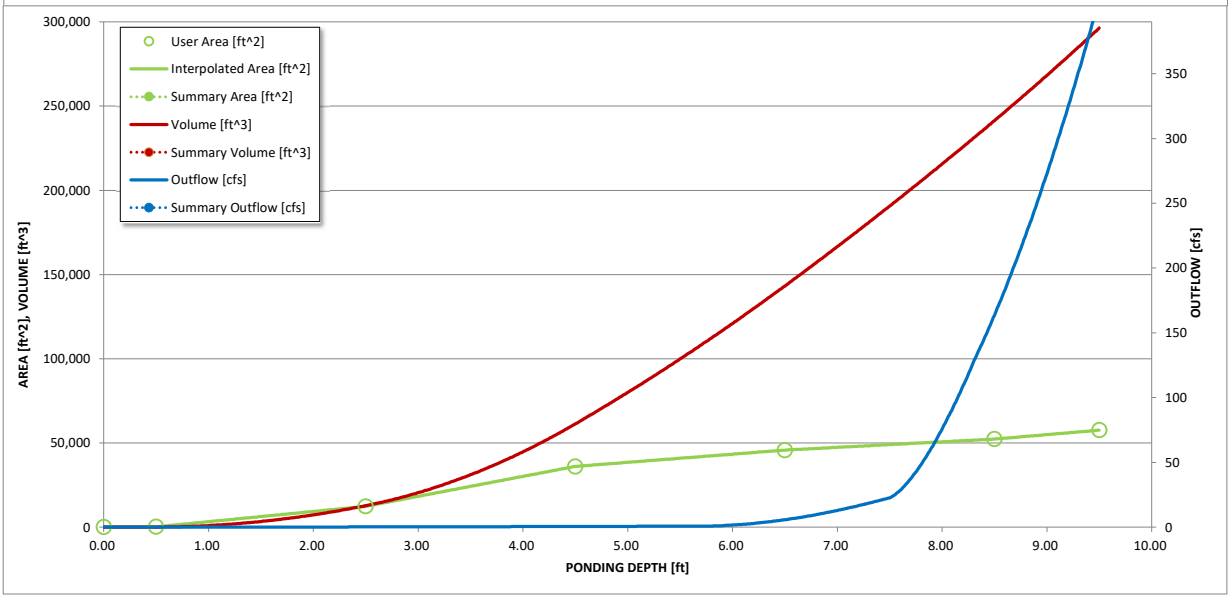
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.85
CUHP Runoff Volume (acre-ft) =	0.738	2.441	2.270	3.135	3.878	4.820	5.614	6.594	10.979
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	2.270	3.135	3.878	4.820	5.614	6.594	10.979
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	4.5	11.2	16.6	29.1	36.3	46.1	85.4
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.12	0.30	0.44	0.78	0.97	1.23	2.28
Peak Inflow Q (cfs) =	N/A	N/A	36.0	50.3	60.9	77.8	90.8	106.9	175.7
Peak Outflow Q (cfs) =	0.4	0.9	0.8	2.4	6.4	13.1	19.8	38.2	114.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.4	0.5	0.5	0.8	1.3
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.3	0.7	1.1	1.5	2.3
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	66	65	71	70	69	67	66	58
Time to Drain 99% of Inflow Volume (hours) =	**41**	72	70	78	78	77	76	75	72
Maximum Ponding Depth (ft) =	3.55	5.66	5.34	6.13	6.55	7.01	7.36	7.71	8.23
Area at Maximum Ponding Depth (acres) =	0.57	0.96	0.92	1.01	1.05	1.09	1.12	1.14	1.18
Maximum Volume Stored (acre-ft) =	0.743	2.445	2.144	2.897	3.331	3.824	4.210	4.605	5.220

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.08 (April 2026)







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.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	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	0.39	0.04	2.66
	0:15:00	0.00	0.00	3.47	5.66	7.01	4.71	5.90	5.73	11.29
	0:20:00	0.00	0.00	12.59	16.64	19.89	12.35	14.40	15.39	27.01
	0:25:00	0.00	0.00	28.01	39.70	49.93	27.45	32.16	35.20	67.89
	0:30:00	0.00	0.00	35.99	50.29	60.87	65.72	77.33	86.70	147.03
	0:35:00	0.00	0.00	33.92	46.48	55.64	77.82	90.84	106.92	175.69
	0:40:00	0.00	0.00	29.88	40.11	48.05	74.77	86.87	102.46	167.08
	0:45:00	0.00	0.00	25.26	34.41	41.86	65.93	76.56	92.63	151.05
	0:50:00	0.00	0.00	21.32	29.78	35.81	59.16	68.70	82.96	135.13
	0:55:00	0.00	0.00	18.13	25.22	30.52	50.25	58.41	72.17	117.48
	1:00:00	0.00	0.00	15.95	22.06	27.19	42.25	49.18	62.66	102.46
	1:05:00	0.00	0.00	14.42	19.86	24.86	37.06	43.25	56.63	92.89
	1:10:00	0.00	0.00	12.46	17.94	22.72	31.77	37.14	47.53	78.53
	1:15:00	0.00	0.00	10.59	15.56	20.58	27.04	31.66	39.06	65.16
	1:20:00	0.00	0.00	8.90	13.02	17.62	22.12	25.88	30.77	51.25
	1:25:00	0.00	0.00	7.50	10.89	14.29	17.81	20.80	23.59	39.09
	1:30:00	0.00	0.00	6.57	9.54	12.03	13.77	16.01	17.61	29.31
	1:35:00	0.00	0.00	6.10	8.84	10.72	11.10	12.85	13.73	23.05
	1:40:00	0.00	0.00	5.88	7.92	9.85	9.49	10.95	11.44	19.26
	1:45:00	0.00	0.00	5.75	7.17	9.22	8.46	9.71	9.88	16.64
	1:50:00	0.00	0.00	5.66	6.63	8.79	7.76	8.87	8.81	14.86
	1:55:00	0.00	0.00	5.01	6.23	8.29	7.29	8.30	8.05	13.57
	2:00:00	0.00	0.00	4.40	5.76	7.52	6.98	7.91	7.52	12.64
	2:05:00	0.00	0.00	3.39	4.43	5.75	5.38	6.08	5.69	9.55
	2:10:00	0.00	0.00	2.52	3.26	4.19	3.93	4.43	4.14	6.92
	2:15:00	0.00	0.00	1.86	2.40	3.06	2.88	3.24	3.04	5.06
	2:20:00	0.00	0.00	1.37	1.76	2.23	2.12	2.38	2.25	3.74
	2:25:00	0.00	0.00	0.99	1.25	1.60	1.52	1.70	1.63	2.70
	2:30:00	0.00	0.00	0.70	0.87	1.14	1.07	1.20	1.15	1.91
	2:35:00	0.00	0.00	0.48	0.61	0.81	0.77	0.87	0.83	1.37
	2:40:00	0.00	0.00	0.31	0.41	0.54	0.53	0.59	0.56	0.93
	2:45:00	0.00	0.00	0.18	0.25	0.32	0.33	0.37	0.35	0.57
	2:50:00	0.00	0.00	0.09	0.13	0.17	0.18	0.20	0.19	0.30
	2:55:00	0.00	0.00	0.03	0.05	0.06	0.07	0.08	0.07	0.12
	3:00:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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