



September 14, 2026

Glenn Reese, P.E.
El Paso County Department of Public Works
2880 International Circle
Colorado Springs, CO 80910

**RE: Rocky Top Resources – Tract 7 Valley Garden Subdivision
Permanent Control Measure (PCM) Final Letter
Kiowa Project Number 17066**

Dear Glenn:

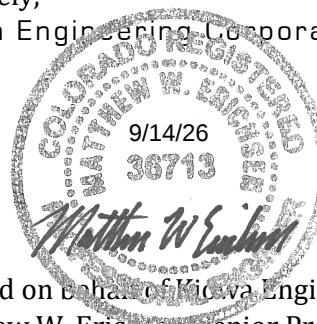
On behalf of Owner of the Rocky Top Resources development, Kiowa Engineering hereby requests the Permanent Control Measures (PCM), constructed as a part of the Rocky Top Resources development, be accepted by the County for final approval.

The Permanent Control Measures (PCM) for Rocky Top Resources consist of a Full Spectrum Detention basin to provide stormwater quality treatment and detention of stormwater runoff from the site. The PCM is located at the south edge of the property. Kiowa Engineering Corp has reviewed the as-built survey completed by Polaris Surveying, Inc (dated February 12, 2024) and completed a site visit to review the improvements constructed. The PCM provides the required storage volume and meets the required release rates, as documented by the attached as-built MHFD -Detention design form.

Based upon this information, Kiowa Engineering Corporation is of the opinion the improvements associated with the Permanent Control Measures have been constructed in substantial conformance with the approved construction plans as filed with the County titled "Rocky Top Resources Extended Detention Basin and Grading & Erosion Control Plan" prepared by Kiowa Engineering Corp, dated February 2020, revised September 2022. 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 the proposed improvements are in substantial conformance with the design requirements. These statements are based on a final site investigation and a review of the field survey data.

Please feel free to contact me if there are any questions or if I may be of further assistance.

Sincerely,
Kiowa Engineering Corporation



For and on behalf of Kiowa Engineering Corporation
Matthew W. Erichsen, Senior Project Manager

Attachment: As-built MHFD-Detention spreadsheet

UD-Detention, Version 3.07 (February 2017)

Basin ID: FSD Design Drainage area 30.45



1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.20	inches

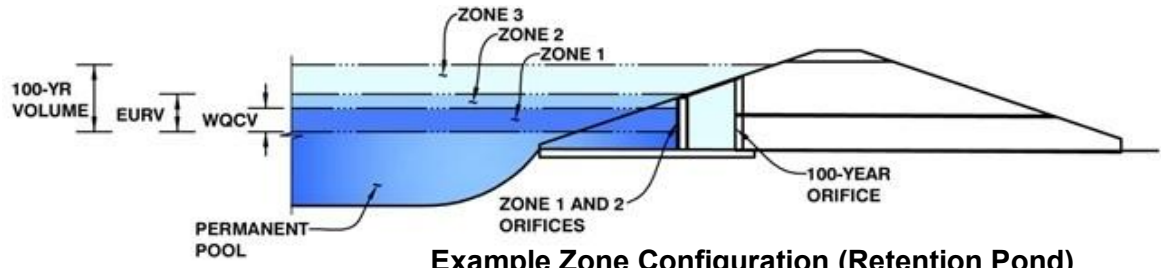
Zone 1 Volume (WQCV) =	0.483	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.946	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.392	acre-feet
Total Detention Basin Volume =	2.820	acre-feet
Initial Surge Volume (ISV) =	user	ft ³
Initial Surge Depth (ISD) =	user	ft
Total Available Detention Depth (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	

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Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Rocky Top Resources
Basin ID: FSD design drainage area 30.45 acres



	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.41	0.483	Orifice Plate
Zone 2 (EURV)	5.94	0.946	Orifice Plate
(100+1/2WQCV)	7.66	1.392	Weir&Pipe (Rect.)
		2.820	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 ft²
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)

Calculated Parameters for Plate

Invert of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 5.94 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

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

Per recent email from Matt E, this will be revised with the next submittal.

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	1.59	3.63					
Orifice Area (sq. inches)	1.00	0.52	8.00					
13/16" diameter Hole								
	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)

Calculated Parameters for Vertical Orifice

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

Vertical Orifice Area = Not Selected N/A ft²
Vertical Orifice Centroid = Not Selected N/A feet

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

Calculated Parameters for Overflow Weir

Overflow Weir Front Edge Height, H_o = Zone 3 Weir 5.94 Not Selected N/A ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 8.58 Not Selected N/A feet
Overflow Weir Slope = 4.54 Not Selected N/A H:V (enter zero for flat grate)
Horiz. Length of Weir Sides = 5.08 Not Selected N/A feet
Overflow Grate Open Area % = 70% Not Selected N/A %, grate open area/total area
Debris Clogging % = 50% Not Selected N/A %

Height of Grate Upper Edge, H_t = Zone 3 Weir 7.06 Not Selected N/A feet
Over Flow Weir Slope Length = 5.20 Not Selected N/A feet
Grate Open Area / 100-yr Orifice Area = 15.88 Not Selected N/A should be ≥ 4
Overflow Grate Open Area w/o Debris = 31.24 Not Selected N/A ft²
Overflow Grate Open Area w/ Debris = 15.62 Not Selected N/A ft²

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe = Zone 3 Rectangular 0.44 Not Selected N/A ft (distance below basin bottom at Stage = 0 ft)
Rectangular Orifice Width = 22.00 Not Selected N/A inches
Rectangular Orifice Height = 12.88 Not Selected N/A inches

Outlet Orifice Area = Zone 3 Rectangular 1.97 Not Selected N/A ft²
Outlet Orifice Centroid = 0.54 Not Selected N/A feet
Half-Central Angle of Restrictor Plate on Pipe = N/A Not Selected N/A radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage = 9.13 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 20.00 feet
Spillway End Slopes = 4.00 H:V
Freeboard above Max Water Surface = 1.97 feet

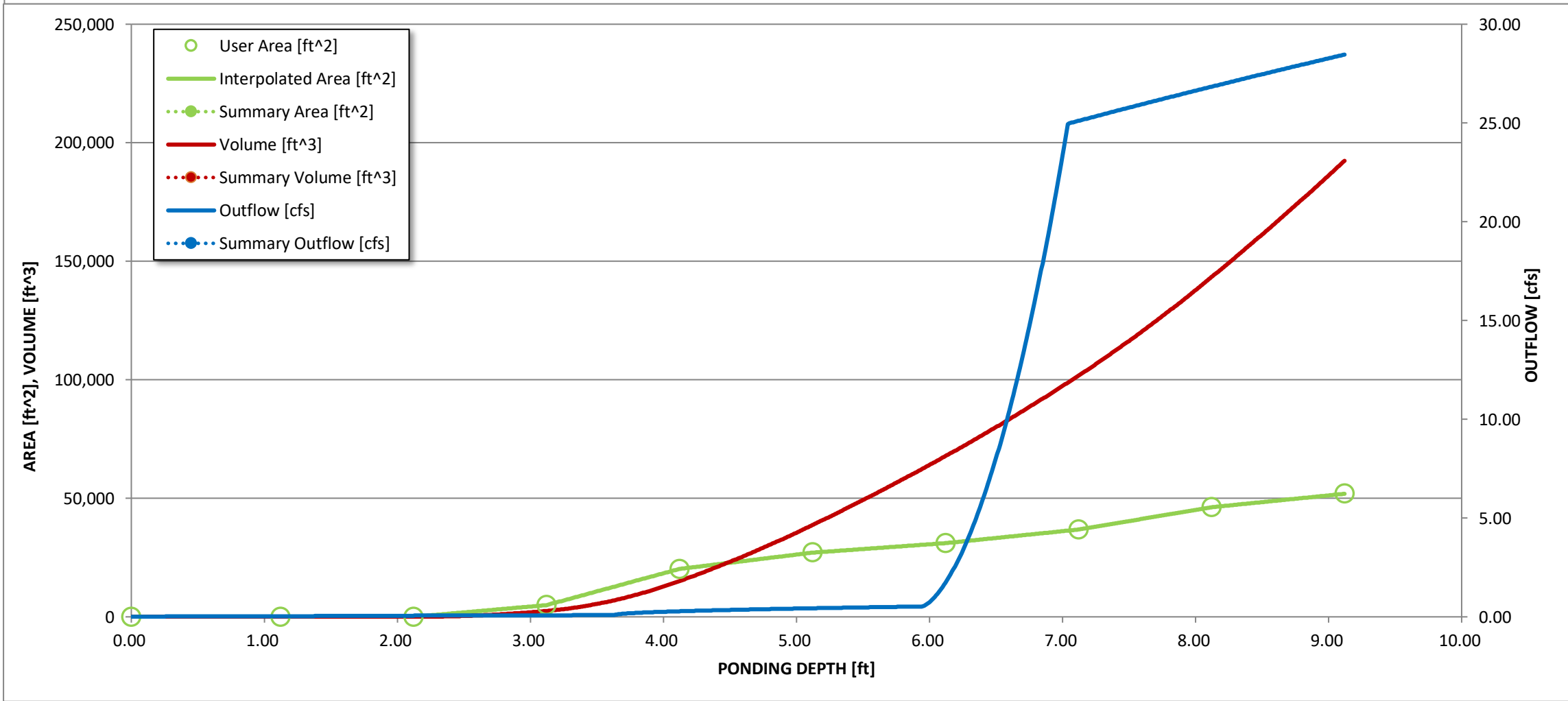
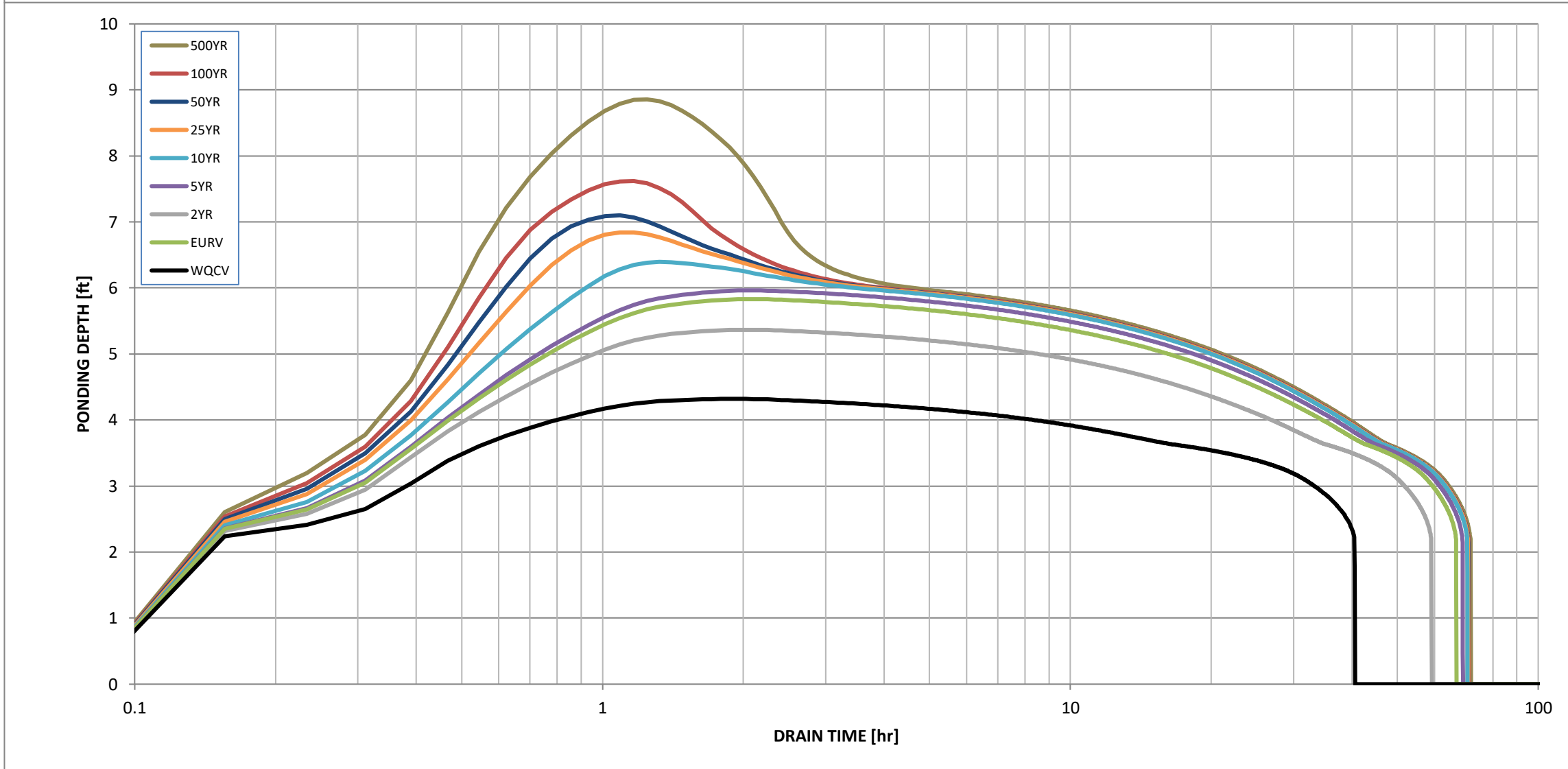
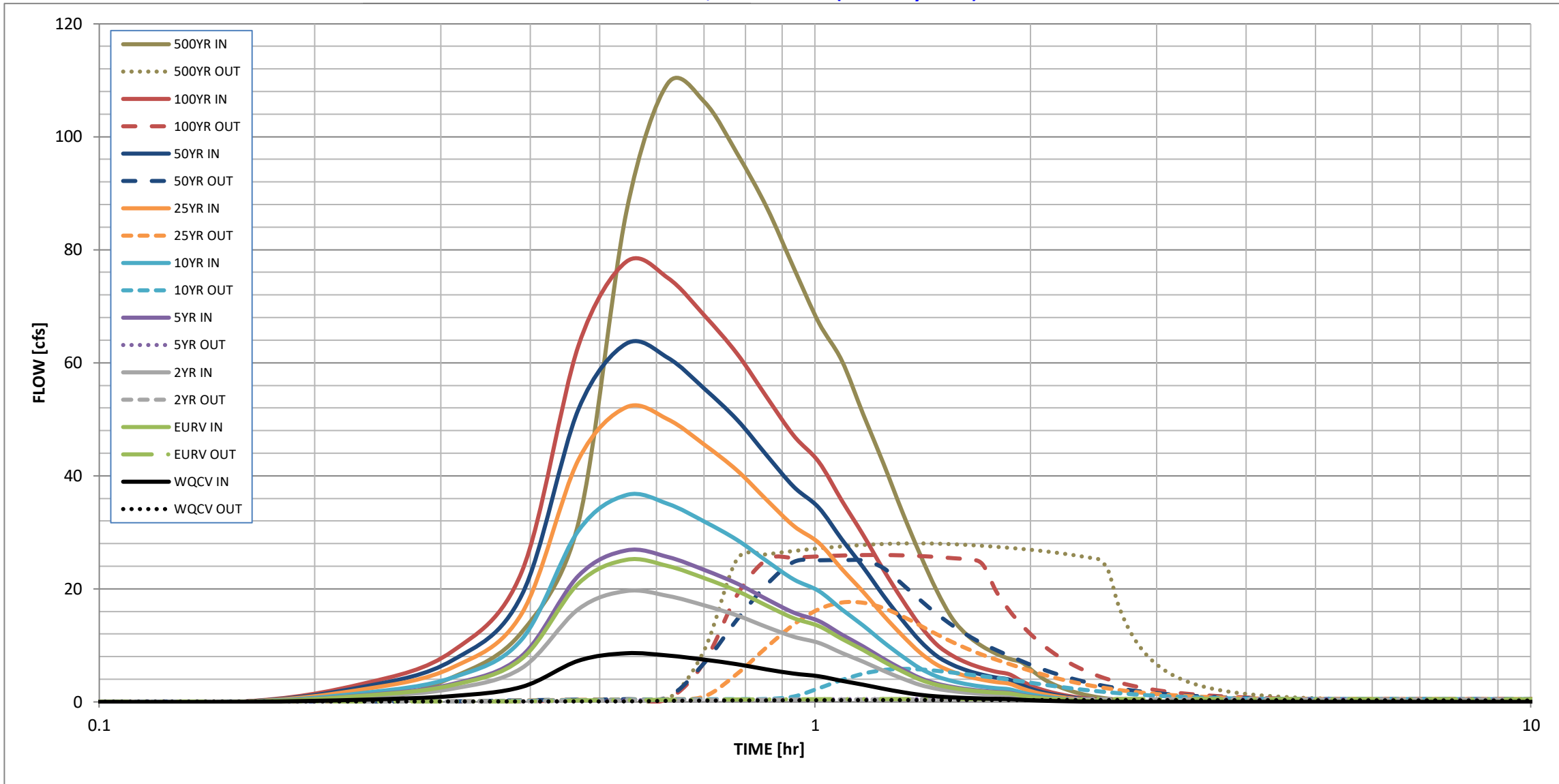
Spillway Design Flow Depth = 1.07 feet
Stage at Top of Freeboard = 12.17 feet
Basin Area at Top of Freeboard = 1.19 acres

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	3.20
One-Hour Rainfall Depth (in) =	0.483	1.429	1.111	1.524	2.089	2.991	3.648	4.499	6.381
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.482	1.427	1.110	1.523	2.087	2.989	3.645	4.496	6.369
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.02	0.19	0.62	0.88	1.22	1.89
Predevelopment Peak Q (cfs) =	0.0	0.0	0.3	0.6	5.8	18.8	26.8	37.1	57.6
Peak Inflow Q (cfs) =	8.6	25.1	19.6	26.8	36.6	52.1	63.4	77.9	109.4
Peak Outflow Q (cfs) =	0.3	0.5	0.5	0.6	5.8	17.6	25.1	26.0	28.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.9	1.0	0.9	0.9	0.7	0.5
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.0	0.2	0.5	0.8	0.8	0.9
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	60	54	61	61	57	54	51	45
Time to Drain 99% of Inflow Volume (hours) =	40	64	57	66	67	66	65	64	62
Maximum Ponding Depth (ft) =	4.32	5.83	5.37	5.96	6.40	6.84	7.10	7.62	8.86
Area at Maximum Ponding Depth (acres) =	0.49	0.69	0.64	0.70	0.75	0.81	0.84	0.95	1.16
Maximum Volume Stored (acre-ft) =	0.437	1.353	1.041	1.443	1.754	2.105	2.311	2.776	4.099

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 Outlet Structure Design

Outflow Hydrograph Workbook Filename: _____

Storm Inflow Hydrographs

UD-Detention, Version 3.07 (February 2017)

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

	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
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]
4.67 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:04:40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph Constant	0:09:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:14:01	0.38	1.09	0.86	1.16	1.57	2.21	2.66	3.21	4.33
1.070	0:18:41	1.03	2.97	2.32	3.16	4.29	6.08	7.35	8.95	12.31
	0:23:21	2.65	7.62	5.97	8.12	11.03	15.60	18.86	22.97	31.62
	0:28:01	7.27	20.93	16.40	22.29	30.26	42.81	51.74	62.98	86.59
	0:32:41	8.60	25.13	19.61	26.80	36.59	52.13	63.38	77.87	109.42
	0:37:22	8.20	24.04	18.75	25.64	35.04	50.00	60.89	75.02	106.16
	0:42:02	7.47	21.89	17.07	23.34	31.90	45.50	55.41	68.37	97.03
	0:46:42	6.66	19.62	15.29	20.93	28.64	40.94	49.90	61.60	87.48
	0:51:22	5.74	17.02	13.24	18.17	24.91	35.72	43.61	53.91	76.77
	0:56:02	5.00	14.80	11.52	15.79	21.66	31.12	38.05	47.09	67.14
	1:00:43	4.53	13.42	10.44	14.32	19.63	28.15	34.38	42.48	60.40
	1:05:23	3.73	11.16	8.66	11.91	16.37	23.53	28.78	35.63	50.89
	1:10:03	3.04	9.18	7.11	9.80	13.51	19.46	23.83	29.54	42.26
	1:14:43	2.33	7.16	5.52	7.65	10.60	15.35	18.84	23.43	33.71
	1:19:23	1.73	5.42	4.16	5.80	8.08	11.79	14.52	18.12	26.19
	1:24:04	1.25	3.95	3.02	4.24	5.95	8.75	10.82	13.55	19.71
	1:28:44	0.97	3.02	2.32	3.24	4.51	6.59	8.13	10.15	14.67
	1:33:24	0.80	2.47	1.90	2.64	3.67	5.33	6.55	8.15	11.72
	1:38:04	0.68	2.09	1.61	2.23	3.10	4.49	5.52	6.86	9.84
	1:42:44	0.60	1.83	1.41	1.95	2.71	3.92	4.81	5.97	8.54
	1:47:25	0.54	1.64	1.27	1.75	2.43	3.51	4.30	5.33	7.62
	1:52:05	0.50	1.51	1.17	1.61	2.23	3.22	3.94	4.88	6.97
	1:56:45	0.37	1.11	0.86	1.19	1.64	2.38	2.93	3.65	5.26
	2:01:25	0.27	0.81	0.63	0.87	1.20	1.73	2.12	2.64	3.80
	2:06:05	0.20	0.60	0.46	0.64	0.88	1.28	1.57	1.95	2.81
	2:10:46	0.14	0.44	0.34	0.47	0.65	0.95	1.17	1.45	2.09
	2:15:26	0.10	0.32	0.25	0.34	0.47	0.69	0.85	1.06	1.54
	2:20:06	0.07	0.23	0.17	0.24	0.34	0.50	0.61	0.76	1.11
	2:24:46	0.05	0.16	0.12	0.18	0.25	0.36	0.44	0.55	0.80
	2:29:26	0.03	0.11	0.08	0.12	0.17	0.25	0.31	0.39	0.57
	2:34:07	0.02	0.07	0.05	0.07	0.11	0.16	0.20	0.25	0.37
	2:38:47	0.01	0.04	0.03	0.04	0.06	0.09	0.11	0.14	0.22
	2:43:27	0.00	0.01	0.01	0.02	0.02	0.04	0.05	0.07	0.10
	2:48:07	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03
	2:52:47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:57:28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:02:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:06:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:11:28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:16:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:34:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:39:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:44:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:48:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:53:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:58:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:02:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:07:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:12:11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:16:51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:21:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:26:11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:44:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:49:32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:54:13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:58:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:03:33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:08:13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:12:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:17:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:22:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:26:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:31:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:36:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

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

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

Stage	Area	Area	Volume	Volume	Total
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