



August 12, 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

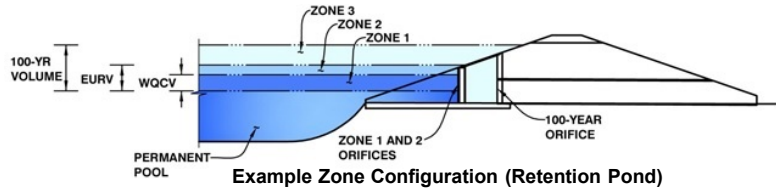
Attachment: As-built MHFD-Detention spreadsheet

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Rocky Top Resources

Basin ID: FSD Design Drainage area 30.45



Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	30.45	acres
Watershed Length =	1,360	ft
Watershed Slope =	0.015	ft/ft
Watershed Imperviousness =	44.00%	percent
Percentage Hydrologic Soil Group A =	15.0%	percent
Percentage Hydrologic Soil Group B =	85.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	1.5	
Water Quality Capture Volume (WQCV) =	0.483	acre-feet
Excess Urban Runoff Volume (EURV) =	1.429	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.111	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	1.524	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	2.089	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	2.991	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	3.648	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	4.499	acre-feet
500-yr Runoff Volume (P1 = 3.2 in.) =	6.381	acre-feet
Approximate 2-yr Detention Volume =	1.040	acre-feet
Approximate 5-yr Detention Volume =	1.432	acre-feet
Approximate 10-yr Detention Volume =	1.914	acre-feet
Approximate 25-yr Detention Volume =	2.148	acre-feet
Approximate 50-yr Detention Volume =	2.272	acre-feet
Approximate 100-yr Detention Volume =	2.579	acre-feet

Optional User Override
1-hr Precipitation

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

Depth Increment =		1	ft						
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
48	--	1.00	--	--	--	5	0.000	2	0.000
49	--	2.00	--	--	--	10	0.000	10	0.000
50	--	3.00	--	--	--	4,935	0.113	2,482	0.057
51	--	4.00	--	--	--	20,218	0.464	15,059	0.346
52	--	5.00	--	--	--	27,086	0.622	38,711	0.889
53	--	6.00	--	--	--	31,092	0.714	67,800	1.556
54	--	7.00	--	--	--	36,829	0.845	101,760	2.336
55	--	8.00	--	--	--	46,247	1.062	143,298	3.290
56	--	9.00	--	--	--	51,912	1.192	192,378	4.416
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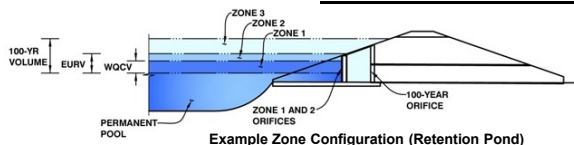
- ✓ = calcs match details in plans
 ✗ = calcs do not match details in plans

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



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.29	0.483	Orifice Plate
Zone 2 (EURV)	5.82	0.946	Orifice Plate
Zone 3 (100+1/2WQCV)	7.54	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

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	1.50	8.00					

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

Vertical Orifice Area = N/A ft²
 Vertical Orifice Centroid = 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 = 5.94 ft (relative to basin bottom at Stage = 0 ft)
 ✓ Overflow Weir Front Edge Length = 8.58 feet
 ✓ Overflow Weir Slope = 4.54 H:V (enter zero for flat grate)
 ✓ Horiz. Length of Weir Sides = 5.08 feet
 Overflow Grate Open Area % = 70% %, grate open area/total area
 Debris Clogging % = 50% %

Height of Grate Upper Edge, H_g = 7.06 feet
 Over Flow Weir Slope Length = 5.20 feet
 Grate Open Area / 100-yr Orifice Area = 15.88 should be ≥ 4
 Overflow Grate Open Area w/o Debris = 31.24 ft²
 Overflow Grate Open Area w/ Debris = 15.62 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 = 0.44 ft (distance below basin bottom at Stage = 0 ft)
 ✓ Rectangular Orifice Width = 22.00 inches
 ✓ Rectangular Orifice Height = 12.88 inches

Outlet Orifice Area = 1.97 ft²
 Outlet Orifice Centroid = 0.54 feet
 Half-Central Angle of Restrictor Plate on Pipe = N/A radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

✗ Spillway Invert Stage = 9.00 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 = 0.50 feet

Spillway Design Flow Depth = 1.07 feet
 Stage at Top of Freeboard = 10.57 feet
 Basin Area at Top of Freeboard = 1.19 acres

closer to 2ft per as-built CDs

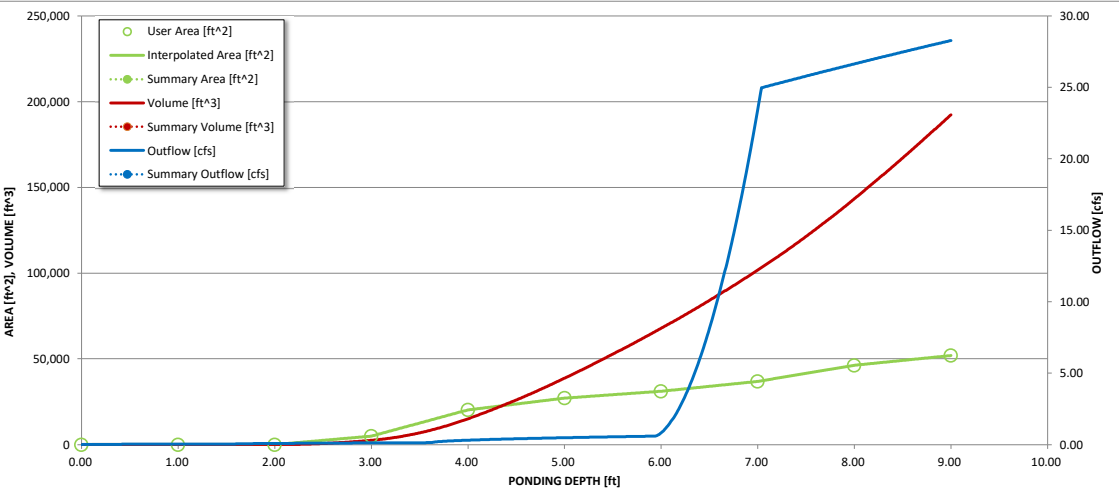
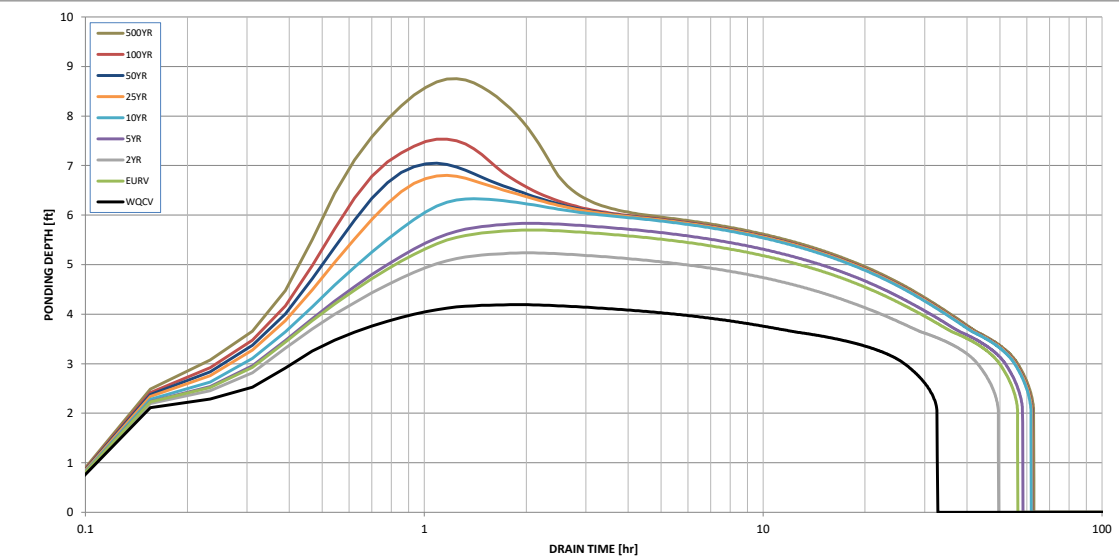
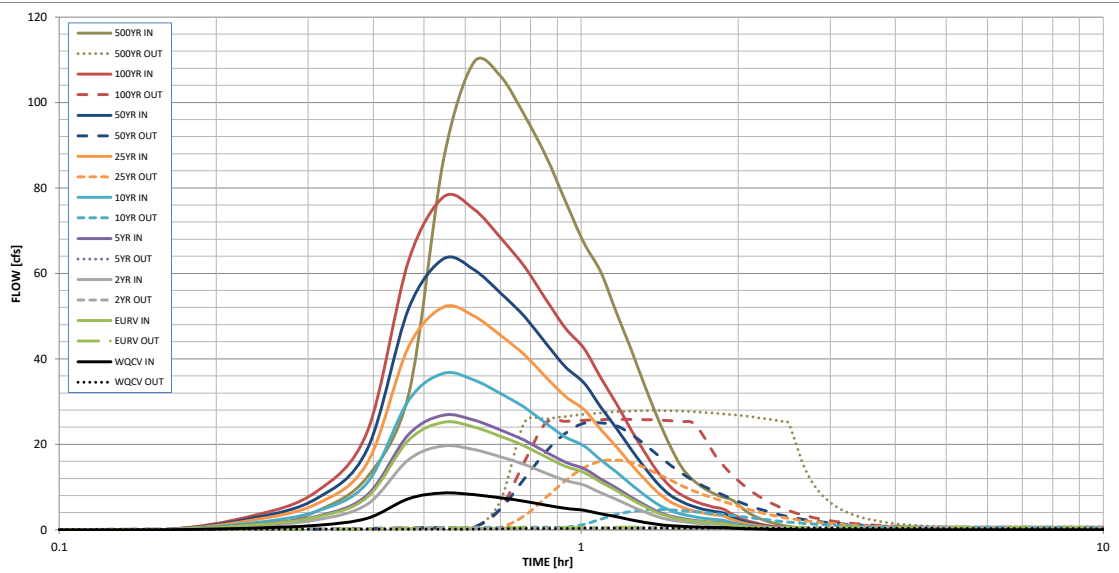
Routed Hydrograph Results

	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
Calculated Runoff Volume (acre-ft)	0.483	1.429	1.111	1.524	2.089	2.991	3.648	4.499	6.381
OPTIONAL Override Runoff Volume (acre-ft)	0.483	1.429	1.111	1.524	2.089	2.991	3.648	4.499	6.381
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	0.6	0.5	0.6	4.7	16.3	25.0	25.8	27.9
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	N/A	0.9	0.8	0.9	0.7	0.5
Structure Controlling Flow	Plate	Plate	Plate	Plate	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	N/A	0.1	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)	31	51	46	53	55	52	51	48	44
Time to Drain 99% of Inflow Volume (hours)	32	55	48	57	59	59	58	57	56
Maximum Ponding Depth (ft)	4.19	5.70	5.24	5.83	6.33	6.80	7.05	7.54	8.76
Area at Maximum Ponding Depth (acres)	0.49	0.69	0.64	0.70	0.76	0.82	0.85	0.96	1.16
Maximum Volume Stored (acre-ft)	0.437	1.340	1.034	1.436	1.799	2.170	2.370	2.815	4.123

This should be a lot closer to 40hrs. It was 41/42 hours in the original design. Can you play with the inputs to see what's the easiest way to improve this in the field? Like maybe just welding over the first orifice hole and re-drilling/cutting the bottom hole?

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			

