Timberline Storage Yard
Comment Response Letter

November 20, 2019

El Paso County Development Services Department
Pikes Peak Regional Development Center
2880 International Circle
Colorado Springs, CO 80910

RE: Sterling Ranch Comments - SF-17-025 - Homestead at Sterling Ranch Filing No. 1.

Dear Mr. Jeff Rice, PCD-Engineering

Enclosed are the response to comments provided by El Paso County Development Services Department on the Timberline Storage Yard PPR-19-042, Second Submittal

Traffic/Transportation

1. Provide a traffic study meeting all requirements of ECM Appendix B.
2. Per meeting Wednesday October 30th, 2019, Capital Drive will not be widened by the developer of this project, and a Traffic Study is not required. However, a Traffic Study for a City project affecting the same intersections in the general area is submitted herewith.
3. Address completion of construction of Capital Drive, which is currently a half-road, and correct alignment of the road into this site and the Dwire property to the west. Address the current useable width of the road with parking along the west side and provisions for County (or City) maintenance vehicles to turn around. It is anticipated that the City will annex Capital Drive sometime in the near future.

Per meeting Wednesday October 30th, 2019, Capital Drive will not be widened by the developer of this project.

Site Development Plan

1. See Site Development Plan redlines. Noted
2. Remove "future" improvements from the site development plan. These can be shown in the drainage plans but are not being approved.
   The future improvements have been removed from the plans.
3. Provide the plan of the entire site. Label all proposed cover surfaces (gravel/concrete/asphalt/natural vegetation, etc.). In the future if impervious surfaces are placed where more pervious surfaces or natural ground is shown, an amended site development plan will be required prior to that occurring.
   The entire site has been added to the drawings on Sheet 2.

Drainage Report and Plans

1. See FDR Amendment redlines.
   Noted.
2. The statement on page 7 that the County is evaluating the Dwire FSD pond is not the case. This pond needs to be constructed considering that developed areas are already flowing to it. Provide complete FSD design with this report. A PDB/BMP maintenance agreement and the MS4 Post-construction form and SDI worksheet need to be provided for the Dwire pond.

The statement has been revised in the FDR. A maintenance agreement is included with this submittal.

3. Describe how the wash bay is intended to function and any other agency permits (State or utility) required. Any discharge from the wash bay is typically not allowed to flow through the FSD detention basin. Provide permit numbers for any existing industrial permits.
   A Sand / Oil interceptor was constructed, and a was previously approved by PPRBD. The plans are submitted herewith, and the facilities have been added to the plans.

   Additional Response – FDR

   Comment regarding the UD-Detention Basin Outlet Structure Design sheet Ratio of Peak Outflow to Predevelopment Q in excess in 10-year, 25-year and 50-year in excess of acceptable levels. Attempts were made to reduce these outputs to acceptable levels.

   Trial 1: The restrictor plate which at present is at a 27.15" above the pipe invert to release the historic 71.5 cfs would have to be choked down to 7" above the pipe invert (historic flow at 7" release 79.4 cfs through the spillway), in order to achieve the desired levels. The structure control flow would also overtop the spillway prior to the 50 year mark.

   Trial 2: The inlet dimensions are at 4' x 17' to release historic flow of 71.5 cfs, would have to be down sized to a 5' x 3' inlet which would achieve the desired levels but the max velocity through the grate are in unacceptable levels. The inlet would restrict the 100 year historic to 68.4 cfs. The structure control flow would also overtop the spillway prior to the 100 year mark.

   In our opinion both these solutions are an unacceptable engineering practice. Please note the City of Colorado Springs, knowing the difficultly of balancing the above noted UD-Detention sheet, have accepted the above calculations as long as the WQCV, EURV, 5 year and 100 year are meet acceptable levels. See attached Trial (s) spreadsheet.

   Additional Response - DWIRE Pond

   The formal submittal for the Dwire Pond is going to be submitted to EPC for review in the next 30-60 days. Construction drawing of the FSD pond are included herewith this submittal on edarp. It is the intention of Timberline Landscaping to excavate the Dwire pond area for a temporary sediment basin, until the CD's for the Dwire pond are approved. A PDB/BMP maintenance agreement for the Dwire pond is also provided herewith. It is the responsiblity of Timberline Landscaping to construct a TSB and maintain the facility until the Dwire Storage Yard development is approved.

Construction Plans / Geotechnical Issues

1. See CD redlines.
   Noted.
2. Provide geotechnical construction recommendations for the ponds.
   A Geotechnical Report has been provided with this submittal.
3. Provide proof of submittal to the State Engineer for the Dwire pond. Provide the State permit for Pond 1.
   We have contacted John Hunyadi at the State Engineers Office. A permit is pending.

Grading and Erosion Control Plan / SWMP / ESQCP

Note: The ECM was updated by the Board of County Commissioners on July 2nd in order to maintain County compliance with its MS4 permit. https://www.agendasuite.org/iip/elpaso/file/getfile/10009.

1. Ensure that all GEC Plan and SWMP checklist items are provided. See cursory GEC checklist redlines. GEC and SWMP checklists will be reviewed in detail with the next submittal. For any unknown/undetermined items, add a note stating how they will be addressed.
   Updated Checklists have been provided with this submittal.
2. The labels of "No Notable Exist Vegetation" need to be revised on the GEC Plan to whatever the vegetation was before site disturbance.
   Complete. The terminology has been revised on the plans.

Agreements / Forms / Financial Assurances Estimate / Other

1. Provide a drainage easement or other documentation of acceptance of the proposed changed drainage conditions from the offsite property owner to the south.
   Per meeting Wednesday October 30th, 2019, A drainage easement will not be provided.
2. Provide documentation from the City of Colorado Springs that all necessary permitting has been obtained from them (for construction on the City parcel to the south) or waived.
   Per meeting Wednesday October 30th, 2019, Capital Drive will not be widened by the developer of this project.
3. Note: A development agreement may be required to address the construction of Capital Drive.
   Same as above.
4. Update the FAE to the new format;
   a. Include road widening improvements to Capital Drive.
      Same as above
   b. Include the FSD basin on the Dwire site.
      I've included the FSD basin on the FAE for this project. However, I foresee a submittal of the Dwire Site Development plan very soon. We can discuss what developer carries assurance for the pond long term.

   The updated FAE will be reviewed with the next submittal. Noted.
5. See attached Engineering Final Submittal Checklist; the items highlighted in blue will be required prior to the preconstruction meeting. Noted.
6. See PBMP Applicability Form redlines. Noted.

Additional - See recorded drainage and access easement - Dwire / Timberline

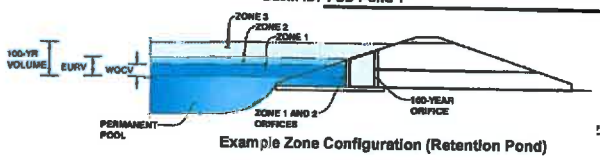
TRIAL #1

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Timberline Storage (Amended)

Basin ID: FSD Pond 1



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.29	0.668	Orifice Plate
Zone 2 (EURV)	4.41	0.737	Orifice Plate
Zone 3 (100-year)	6.84	1.928	Weir&Pipe (Restrict)
		3.333	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 =	4.41	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	19.60	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)	0.00	1.47	2.94					
Orifice Area (sq. inches)	2.51	2.30	1.50					

	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, Ho =	4.41	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	17.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	4.00	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_t =	4.41	N/A	feet
Over Flow Weir Slope Length =	4.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	45.16	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	47.60	N/A	ft^2
Overflow Grate Open Area w/ Debris =	23.80	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 =	42.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	7.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.05	N/A	ft^2
Outlet Orifice Centroid =	0.35	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	0.84	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.85	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	72.50	feet
Spillway End Slopes =	10.00	H:V
Freeboard above Max Water Surface =	0.67	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.65	feet
Stage at Top of Freeboard =	8.17	feet
Basin Area at Top of Freeboard =	0.98	acres

Routed Hydrograph Results

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) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	0.00
Calculated Runoff Volume (acre-ft) =	0.668	1.406	1.016	1.450	2.269	4.027	5.340	7.102	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.668	1.406	1.016	1.451	2.270	4.030	5.336	7.108	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.02	0.16	0.53	0.78	1.12	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	0.6	1.2	10.5	33.6	49.9	71.5	0.0
Peak Inflow Q (cfs) =	12.1	25.2	18.3	26.0	40.4	71.2	93.7	123.9	#N/A
Peak Outflow Q (cfs) =	0.3	0.4	0.3	0.4	11.0	12.7	38.3	79.4	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	1.1	0.4	0.8	1.1	#N/A
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Outlet Plate 1	Outlet Plate 1	Spillway	Spillway	#N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.2	0.3	0.3	0.3	#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) =	40	64	52	65	64	61	58	55	#N/A
Time to Drain 99% of Inflow Volume (hours) =	42	68	55	69	69	68	67	65	#N/A
Maximum Ponding Depth (ft) =	3.22	4.33	3.77	4.39	4.80	6.39	7.08	7.29	#N/A
Area at Maximum Ponding Depth (acres) =	0.55	0.71	0.66	0.71	0.74	0.85	0.90	0.91	#N/A
Maximum Volume Stored (acre-ft) =	0.623	1.350	0.965	1.392	1.682	2.939	3.549	3.730	#N/A

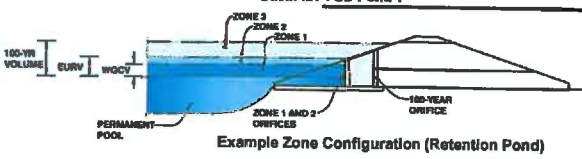
TRAIL #2

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Timberline Storage (Amended)

Basin ID: FSD Pond 1



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.29	0.668	Orifice Plate
Zone 2 (EURV)	4.41	0.737	Orifice Plate
Zone 3 (100-year)	6.84	1.928	Weir&Pipe (Restrict)
		3.333	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 =	4.41	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	19.60	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)	0.00	1.47	2.94					
Orifice Area (sq. inches)	2.51	2.30	1.50					

	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, Ho =	4.41	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	5.00	N/A	feet
Overflow Weir Slope =	0.00	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_t =	4.41	N/A	feet
Over Flow Weir Slope Length =	3.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	1.09	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	10.50	N/A	ft^2
Overflow Grate Open Area w/ Debris =	5.25	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 =	42.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	42.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	9.62	N/A	ft^2
Outlet Orifice Centroid =	1.75	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.85	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	72.50	feet
Spillway End Slopes =	10.00	H:V
Freeboard above Max Water Surface =	0.67	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.65	feet
Stage at Top of Freeboard =	8.17	feet
Basin Area at Top of Freeboard =	0.98	acres

Routed Hydrograph Results

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) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	0.00
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OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.668	1.406	1.016	1.451	2.270	4.030	5.336	7.108	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.02	0.16	0.53	0.78	1.12	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	0.6	1.2	10.5	33.6	49.9	71.5	0.0
Peak Inflow Q (cfs) =	12.1	25.2	18.3	26.0	40.4	71.2	93.7	123.9	#N/A
Peak Outflow Q (cfs) =	0.3	0.4	0.3	0.4	11.4	32.9	41.4	68.4	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	1.1	1.0	0.8	1.0	#N/A
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Spillway	#N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	1.1	3.1	3.9	4.7	#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) =	40	64	52	65	64	60	58	55	#N/A
Time to Drain 99% of Inflow Volume (hours) =	42	68	55	69	70	68	66	65	#N/A
Maximum Ponding Depth (ft) =	3.22	4.33	3.77	4.39	4.88	5.57	6.26	7.04	#N/A
Area at Maximum Ponding Depth (acres) =	0.55	0.71	0.66	0.71	0.74	0.79	0.84	0.89	#N/A
Maximum Volume Stored (acre-ft) =	0.623	1.350	0.965	1.392	1.741	2.277	2.838	3.513	#N/A