

Permanent Extended Detention Basin Certification Letter

October 30, 2024

Project: Electronic Storage

Site Location: 7717 Electronic Drive, Colorado Springs, CO

Sand Filter Location: Southeast corner of site

Discussion: The permanent full spectrum detention structure for Electronic Storage is an extended detention basin. The required storage volume was calculated to be 0.202 ac-ft. Based upon as-built surveys by Edward-James Surveying and site inspections, the extended detention basin provides the volume required.

The following notable discrepancies were identified when the surveyed/as-built pond was compared to the approved plans:

- Steps were not installed in the outlet structure.
- The trash rack installed is different than that called out on the plans.
- Additional riprap was installed on the southeast side of the pond.
- The top of the outlet structure was constructed 6" high.
 - Per the design spreadsheet the storage volume and flow rates are still acceptable in this condition.
- The inlet orifice plate bottom orifice was constructed 3" high.
 - Per the design spreadsheet the 99% drain times all look fine in this condition. The 5 year, 97% drain time has been flagged as being too slow.

More detailed information about these discrepancies, and additional minor discrepancies, has been documented on the Extended Detention Basin As-Built.

Based on periodic site visits to the project during significant/key phases of the installation and the survey, Terra Nova Engineering is of the opinion that the extended detention basin has been constructed in general compliance with the approved Grading, Erosion, & Sediment Control Plan; Construction Plans; and Specifications as filed with this project.

Statement of Engineer in Responsible Charge: I, Dane Frank, 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 field observations and review of pertinent documentation, it is my professional opinion that the required stormwater treatment facilities have been installed and are in general compliance with the approved Grading, Erosion, & Sediment Control Plan; Construction Plans; and Specifications as filed with El paso County; provide the required storage volume; and will meet the required release rates with the possible exception of the 97% drain time discrepancy noted above. For structures with a Water Quality Capture Volume (WQCV), I have attached the post-construction As-Built drawings. The As-Built drawings accurately depict the final installation of the stormwater facilities and verify the WQCV.

PREPARED BY: TERRA NOVA ENGINEERING, INC.



Jobs/197100/Drainage/Pond Cert/197100 Pond PE Cert.docx

<u>Attachments</u>

- Extended Detention Basin As-Built, 2024/10/30
- Original UD-Detention Spreadsheet
- As-Built UD-Detention Spreadsheet

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

acre-feet acre-feet

inches

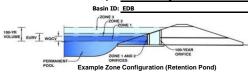
inches 2.25 inches 2.52 inches

1.19 inches inches

1.75

2.00

3.00 inches



Project: Electronic Storage

Watershed Information

Selected BMP Type =	EDB				
Watershed Area =	1.77	acres			
Watershed Length =	340	ft			
Watershed Length to Centroid =	170	ft			
Watershed Slope =	0.060	ft/ft			
Watershed Imperviousness =	62.00%	percent			
Percentage Hydrologic Soil Group A =	98.0%	percent			
Percentage Hydrologic Soil Group B =	2.0%	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.						
Water Quality Capture Volume (WQCV) =	0.036	acre-feet				
Excess Urban Runoff Volume (EURV) =	0.134	acre-feet				
2-yr Runoff Volume (P1 = 1.19 in.) =	0.091	acre-feet				
5-yr Runoff Volume (P1 = 1.5 in.) =	0.120	acre-feet				
10-yr Runoff Volume (P1 = 1.75 in.) =	0.143	acre-feet				
25-yr Runoff Volume (P1 = 2 in.) =	0.175	acre-feet				
50-yr Runoff Volume (P1 = 2.25 in.) =	0.205	acre-feet				
100-yr Runoff Volume (P1 = 2.52 in.) =	0.242	acre-feet				
500-yr Runoff Volume (P1 = 3 in.) =	0.305	acre-feet				
Approximate 2-yr Detention Volume =	0.087	acre-feet				
Approximate 5-yr Detention Volume =	0.114	acre-feet				
Approximate 10-yr Detention Volume =	0.138	acre-feet				
Approximate 25-yr Detention Volume =	0.167	acre-feet				
Approximate 50-yr Detention Volume =	0.184	acre-feet				
Approximate 100-yr Detention Volume =	0.202	acre-feet				

Define Zones and Basin Geometry

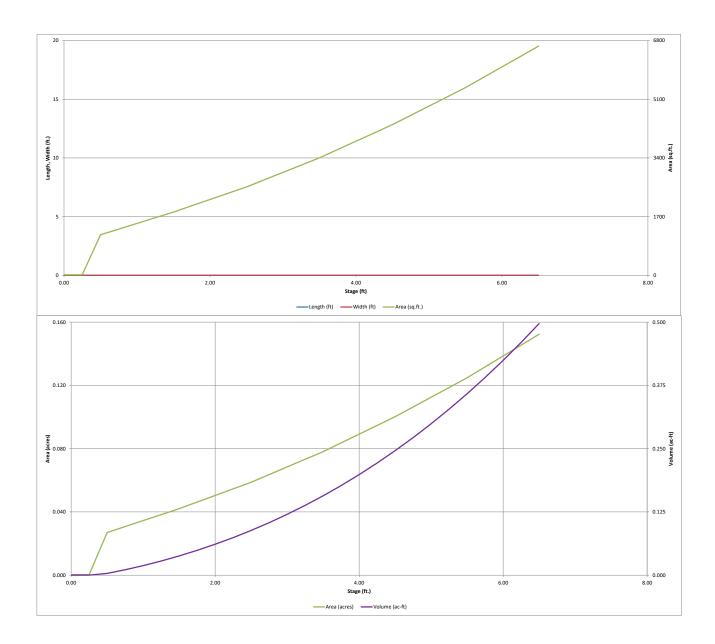
0.036	acre-fee
0.098	acre-fee
0.068	acre-fee
0.202	acre-fee
user	ft ³
user	ft
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user	ft/ft
user	H:V
user	
	0.098 0.068 0.202 user user user user user user

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 (LFLOOR) =	user	ft
Width of Basin Floor (W _{FLOOR}) =	user	ft
Area of Basin Floor (A _{FLOOR}) =	user	ft²
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	ft²
Volume of Main Basin (V _{MAIN}) =	user	ft ³
Calculated Total Basin Volume (V _{total}) =	user	acre-f

Original Design Spreadsheet

Description (ft) Stage (ft)	_		_		ong.		esigi	٠ ٥٢.	Juan	,,,,,
Sage- Storage (right Storage) (right Storage) (right Storage) (right Storage	Depth Increment =					,				
Company Comp	Stage - Storage	Stane		Length	Width	Area	Optional Override	Δrea	Volume	Volume
Bottom of Pools										(ac-ft)
Section of Pond	Top of Micropool						15	0.000		
		-	0.25	-			15	0.000	4	0.000
	Bottom of Pond	-	0.50	-			1,174	0.027	152	0.003
Top of WQ +/				-						0.011
196 196				-						0.019
Top of MOV +/-										0.028
	Top of WO +/-			-						0.038
	rop or reg . ,									0.049
										0.043
										0.074
1										0.074
1										
Top of BURV +/- - 3.25 3.30 3.402 - 0.073 - 6.009 - 1.75 1.75 1.5644 - 0.084 1.75 4.25 1.5644 - 0.084 1.75 1.5644 1.50 1.55 1.5644 - 0.087 1.50 - 1.50 -										
- 3.50 - - - 3.644 0.078 6.834 7.75 0.1										0.120
Top of 100 Yr + y-	Top of EURV +/-									0.138
Top of 100 Yr +/ 4.25 4.25 4.25 0.089 8.555 0.1 - 4.50 4.50 0.0 10,718 0.2 - 4.50 4.50 3 0.00 11,718 0.2 - 5.00 4.50 3 0.00 11,718 0.2 - 5.00 4.50 3 0.00 11,843 0.2 - 5.00 5.43 0.00 11,843 0.3 5.55 5.43 0.119 14,293 0.3 5.55 5.47 0.122 17,016 0.3 5.55 5.77 0.132 17,016 0.3 5.50 5.77 0.132 17,016 0.3 5.50 5.77 0.132 17,016 0.3 5.50 5.37 0.132 17,016 0.3 6.50 6.37 0.152 21,656 0.4 Top of Berm - 6.50 6.637 0.152 21,656 0.4 Top of Berm 6.50 6.637 0.152 21,656 0.4										0.157
4.25 4.355 1.00 1.01 1.07 2.0 2.0 1.00 1.07 1.00 1.07 1.00 1.00 1.00 1.										0.177
4.50 4.835 0.00 107.18 0.2 4.75 4.633 0.100 119.18 0.2 5.00 4.633 0.100 119.18 10.2 5.00 5.76 0.113 13.034 0.2 5.50 5.76 0.113 13.034 0.2 5.50 5.77 0.132 17.016 0.3 6.03 0.139 18.487 0.39 18.487	Top of 100 Yr +/-									0.199
4.75 4.803 0.066 11.843 0.05 5.25 4.801 0.113 13.04 0.2 5.25 5.169 0.113 13.04 0.2 5.75 5.477 0.125 15.619 0.3 5.75 5.777 0.125 15.619 0.3 6.05 6.037 0.139 18.487 0.4 6.05 6.377 0.152 17.016 0.3 6.05 6.377 0.152 17.016 0.3 6.05 6.377 0.152 17.016 0.3 6.07 6.077 0.152 17.016 0.3 6.08 6.077 0.152 17.016 0.3 6.09 6.077 0.152 17.016 0.3 6.09 6.037 0.152 17.016 0.3 6.09										0.222
										0.246
5.25 5.169 0.119 14.293 0.12 15.519 0.13 15.519 0.15 15.51										0.272
		-								0.299
										0.328
-										0.359
Top of Berm - 6.25 6.637 0.145 20,034 0.4 0.4 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5		-							17,016	0.391
Top of Bern - 6.50 6,637 0.152 21,556 0.4 - 6,637 0.152 21,556 0.4 - 7			6.00				6,037	0.139	18,487	0.424
Top of Berm		_	6.25				6,337	0.145		0.460
	Top of Berm	-	6.50	-				0.152		0.497
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197100 UD-Detention - EDB, Basin 9/2/2020, 4:35 PM



197100 UD-Detention - EDB, Basin 9/2/2020, 4:35 PM