

November 11, 2024

Thomas Hopper  
The Garrett Company  
401 Pennsylvania Parkway, Suite 300  
Indianapolis, IN 46280

Re: **Citizen on Constitution Filing No. 1 - Detention Pond Certification Letter  
El Paso County, Colorado**

Dear Mr. Hopper:

This letter serves as the certification for the Detention Pond at Citizen on Constitution Filing No. 1, El Paso County, CO consistent with El Paso County Engineering Manual (“ECM”) Section 5.10.B, which states that Engineering Record Drawings shall be accompanied by a certification letter from the Engineer of Record which shall state that the site and adjacent properties (as affected by work performed under the County permit) are stable and that the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements.

Based upon this information and information gathered during periodic site visits to the site during significant/key phases of the infrastructure installation, Kimley-Horn is of the opinion that the detention pond work performed under the County Permit, per Section 5.10.B of the ECM, have been constructed in general compliance with the approved Construction Plans as filed with the County dated November 21, 2022.

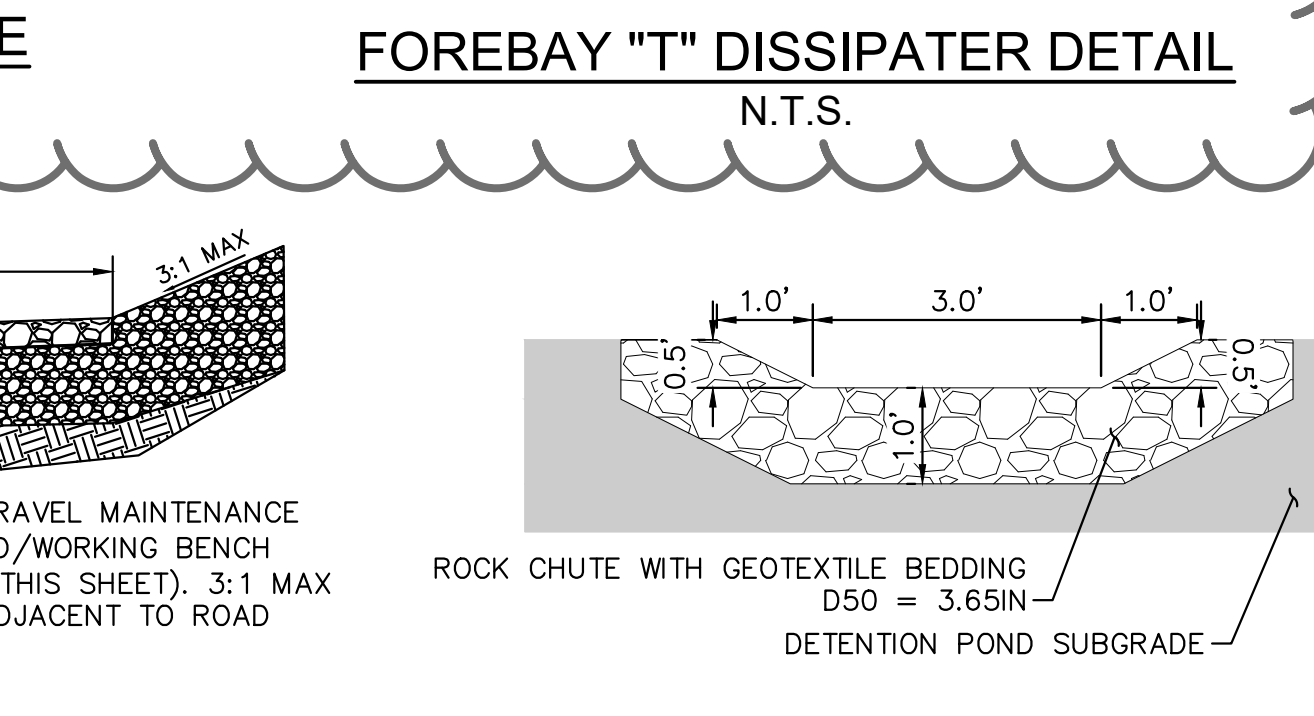
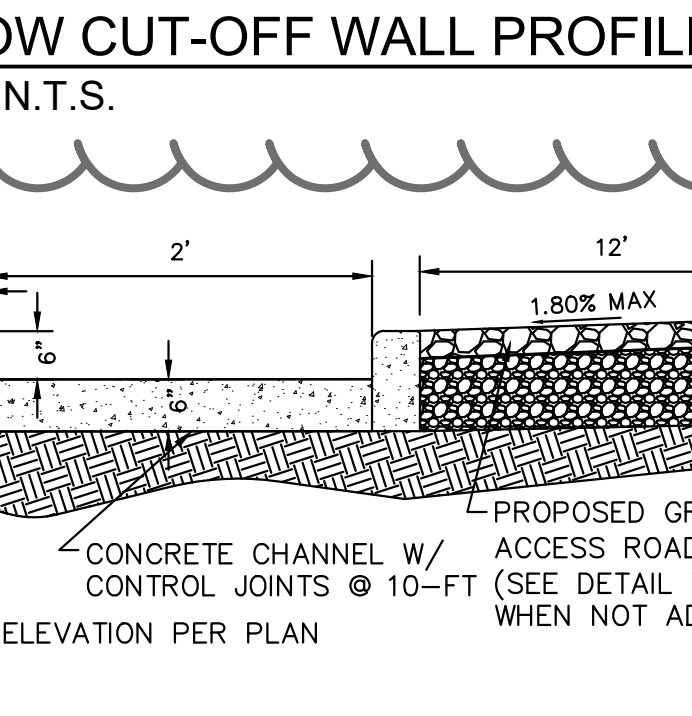
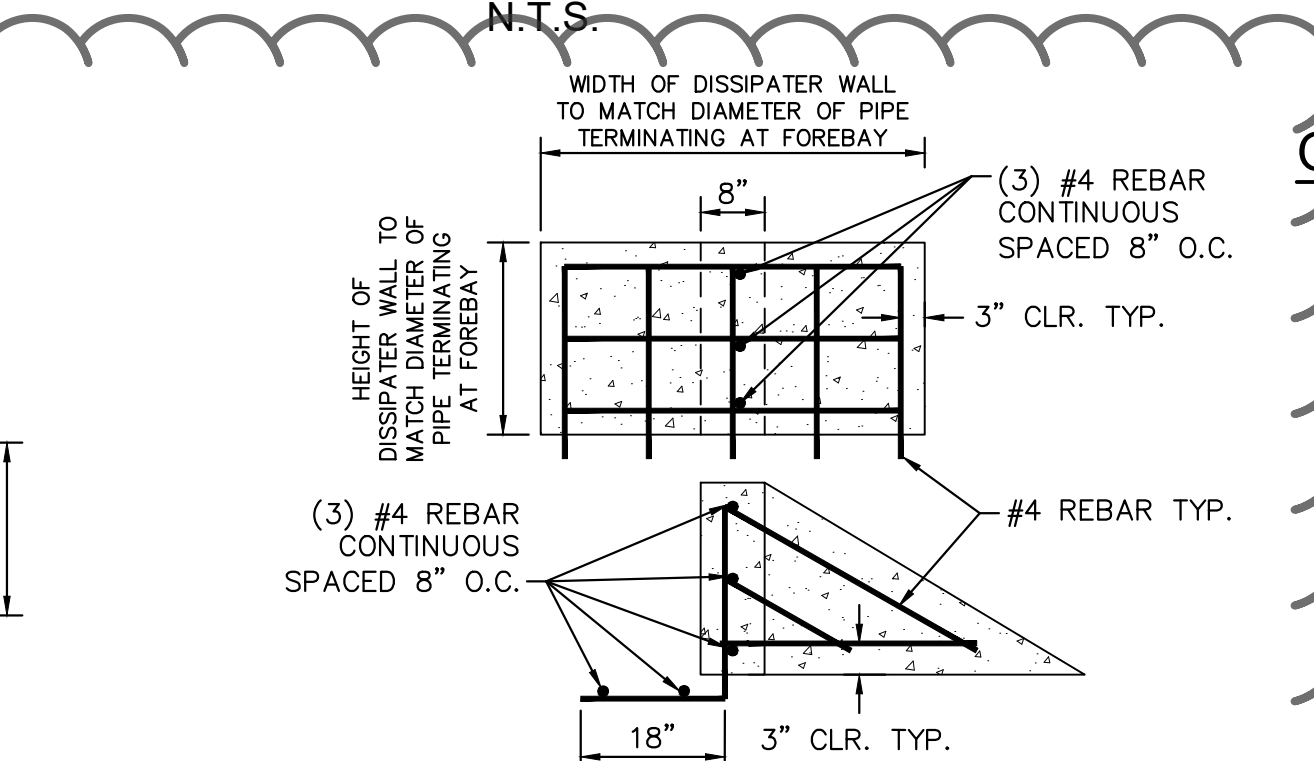
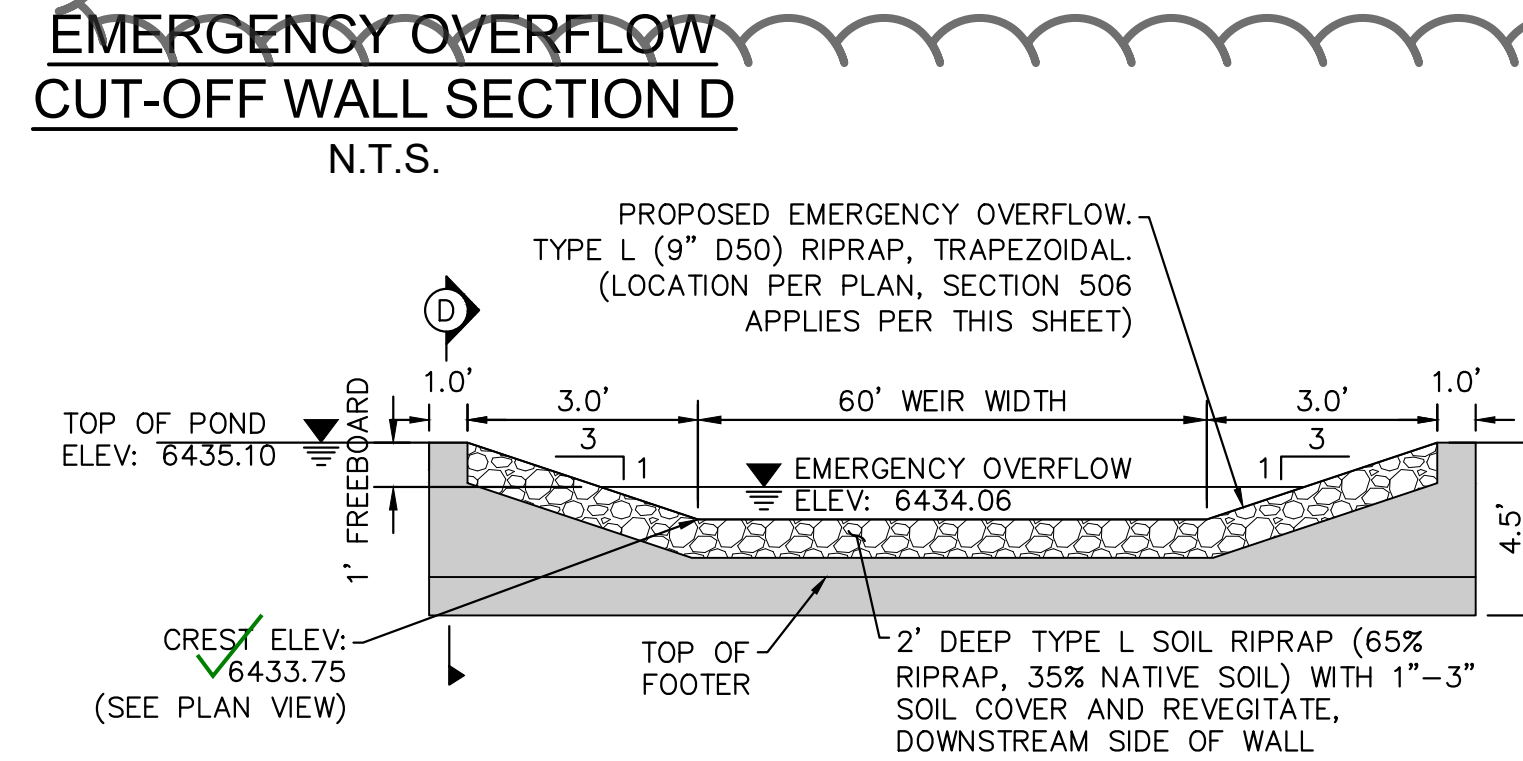
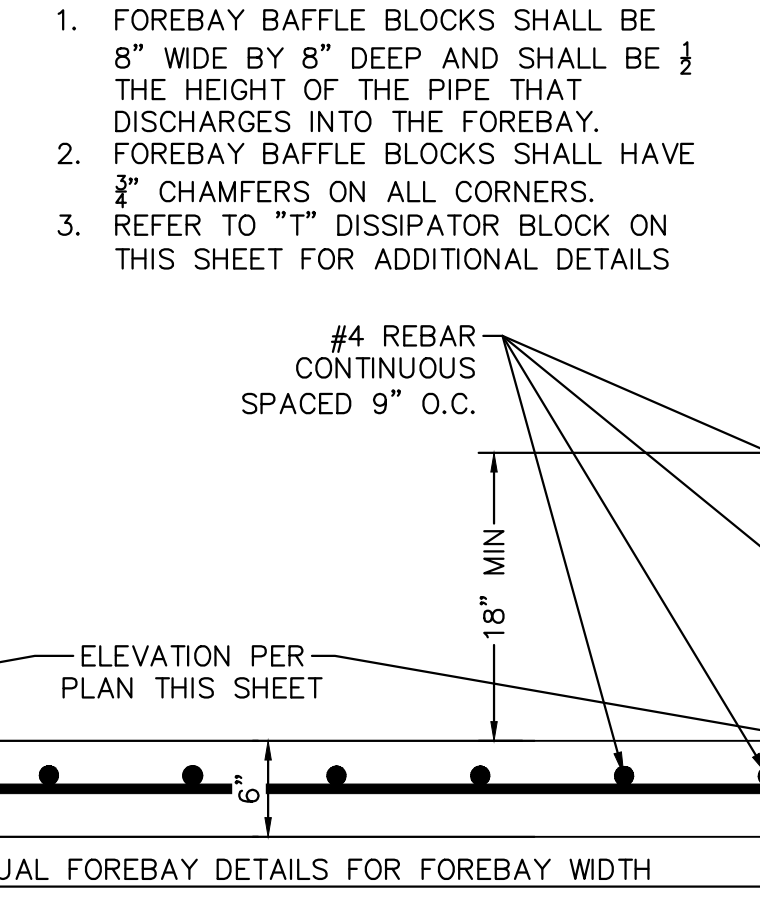
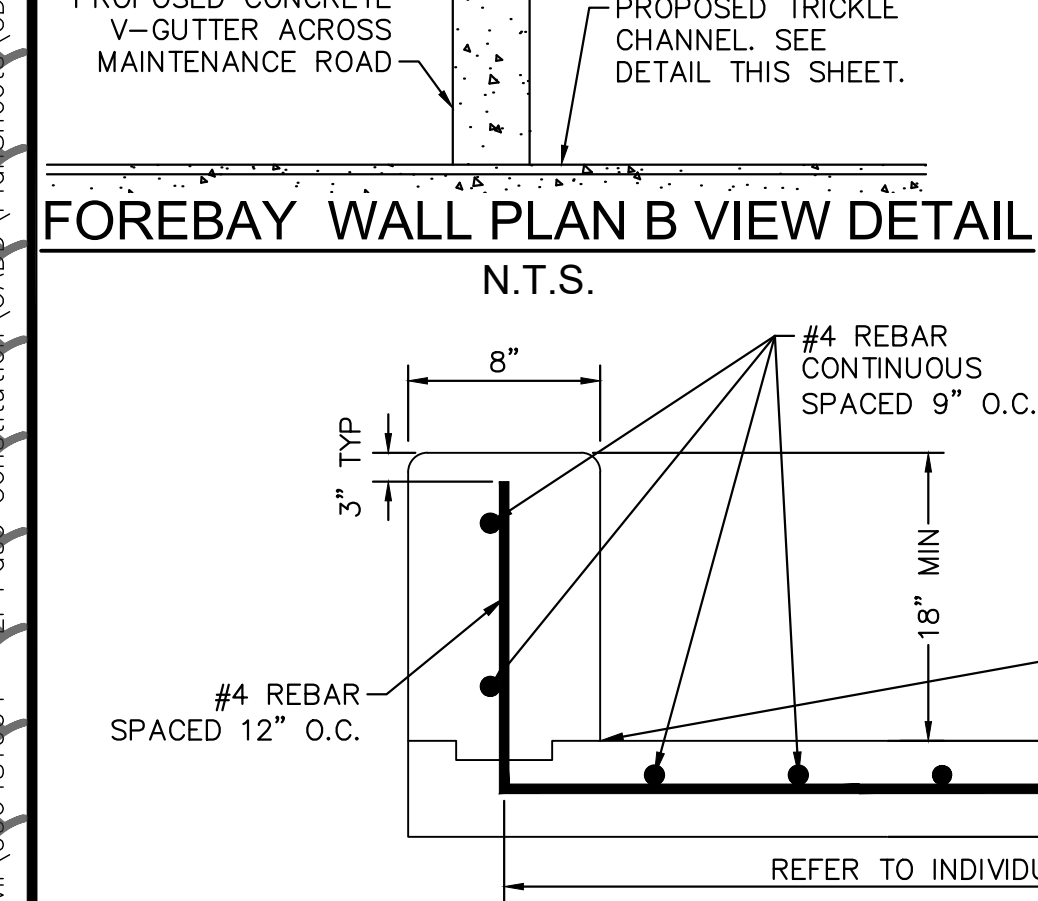
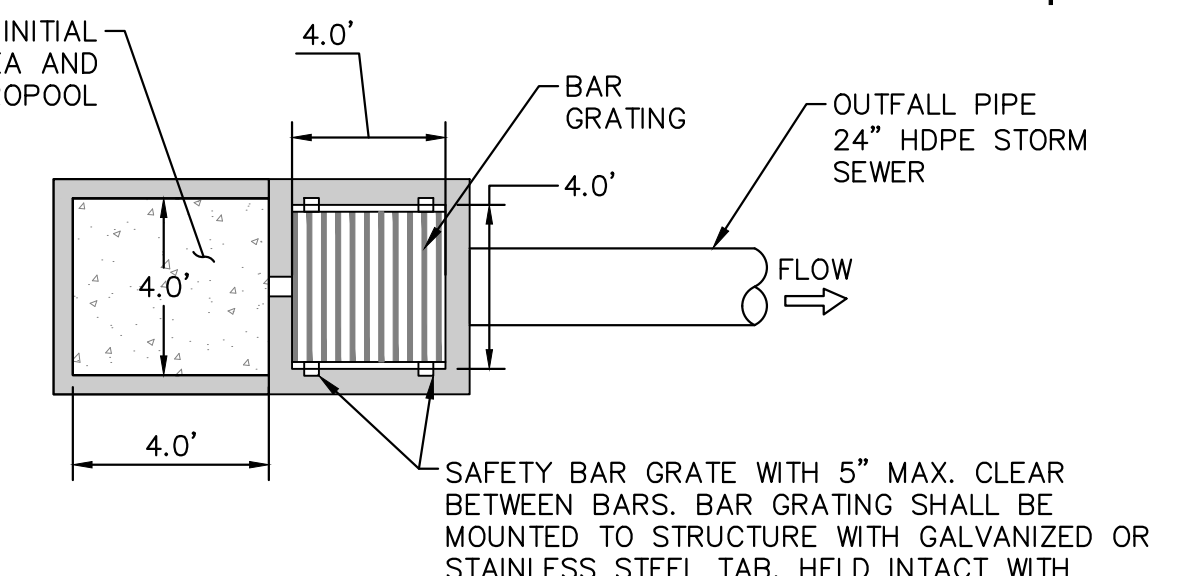
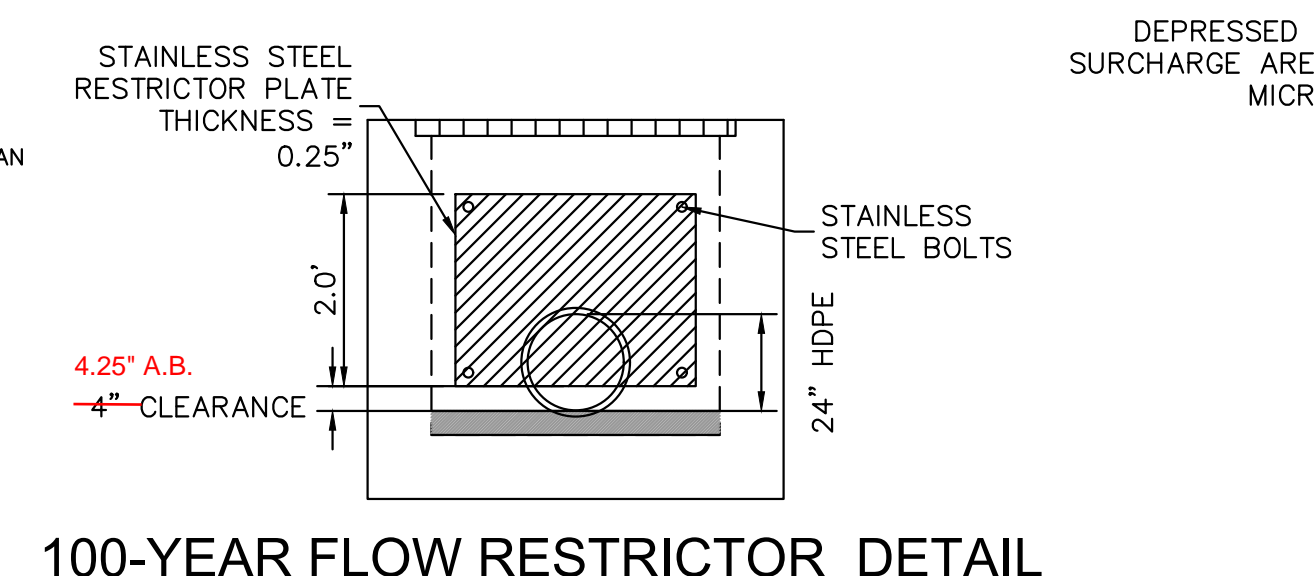
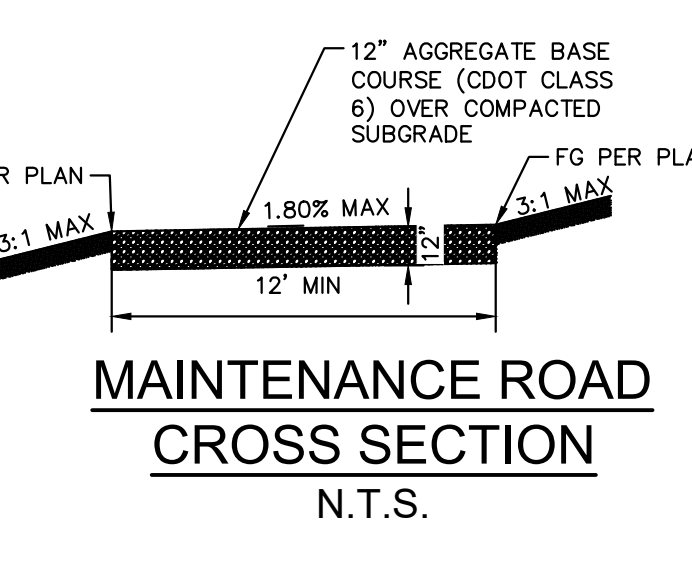
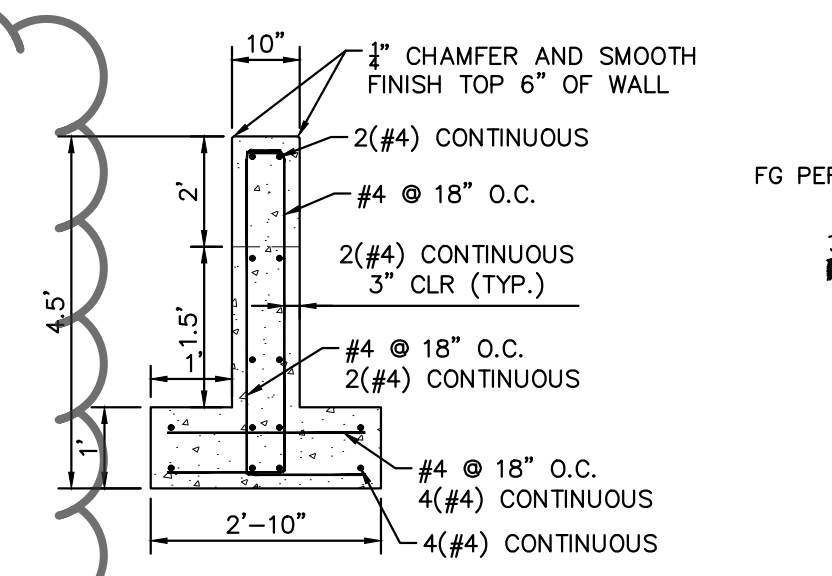
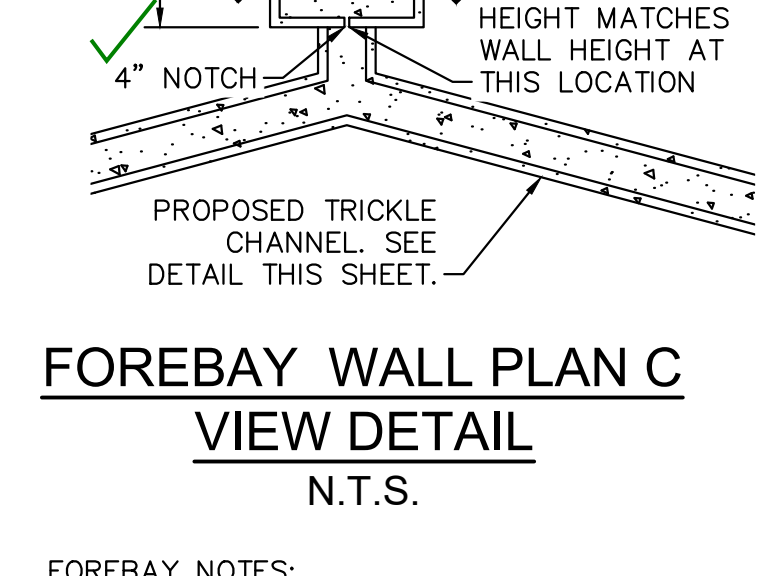
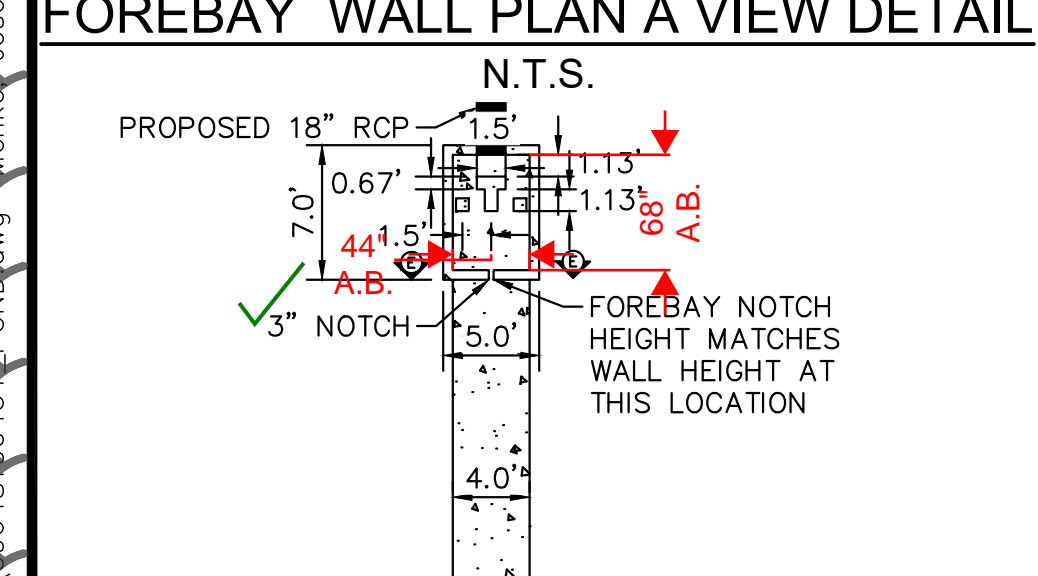
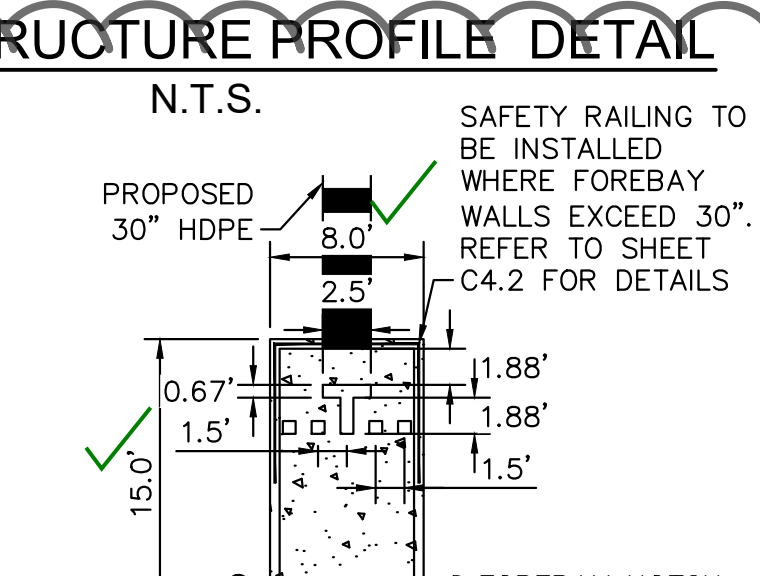
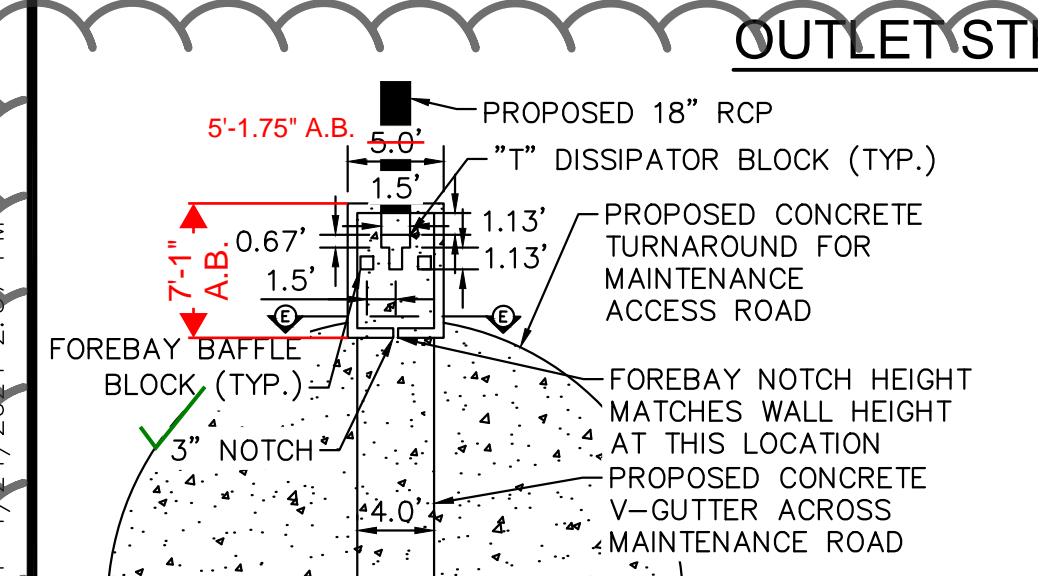
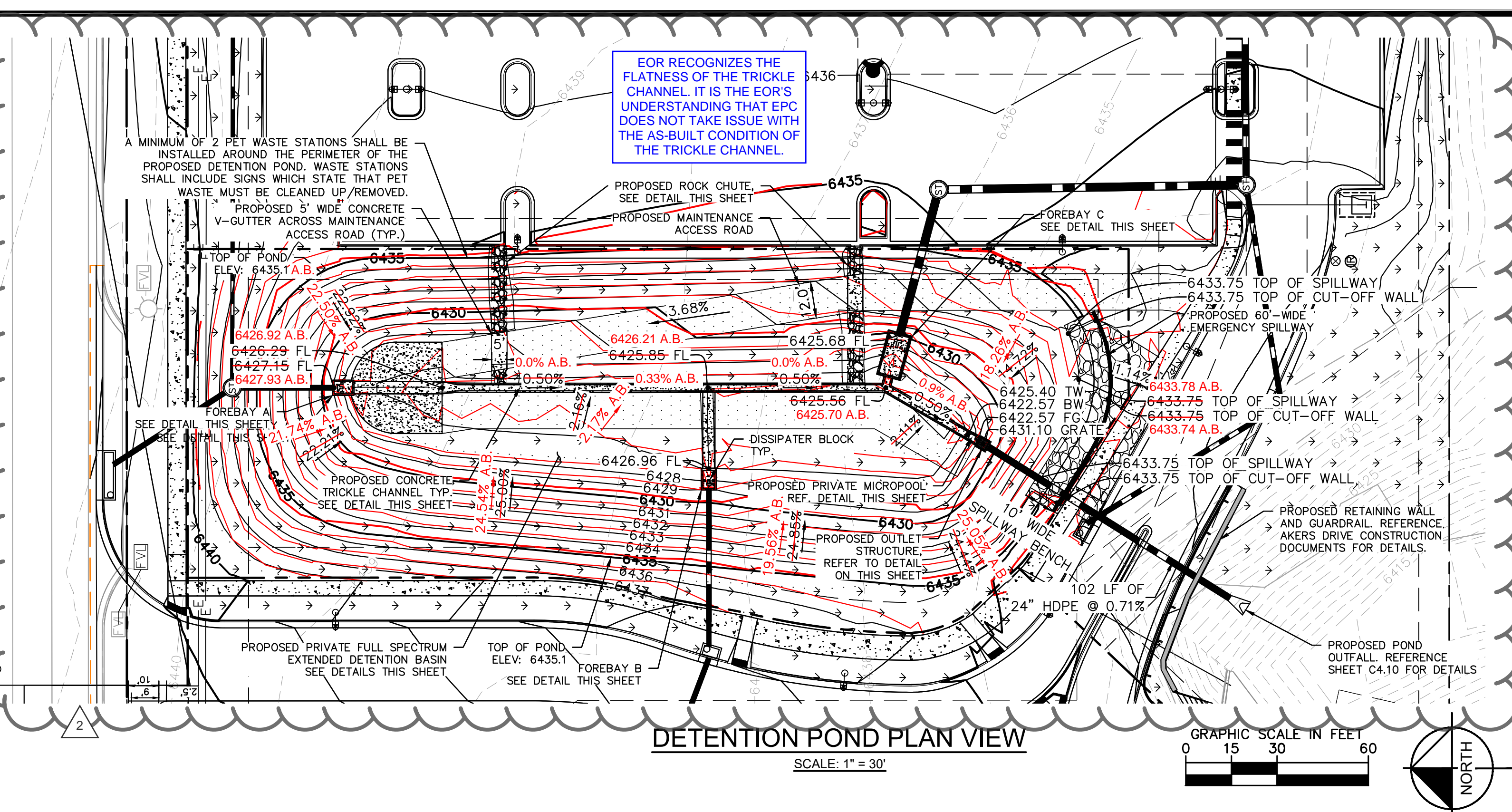
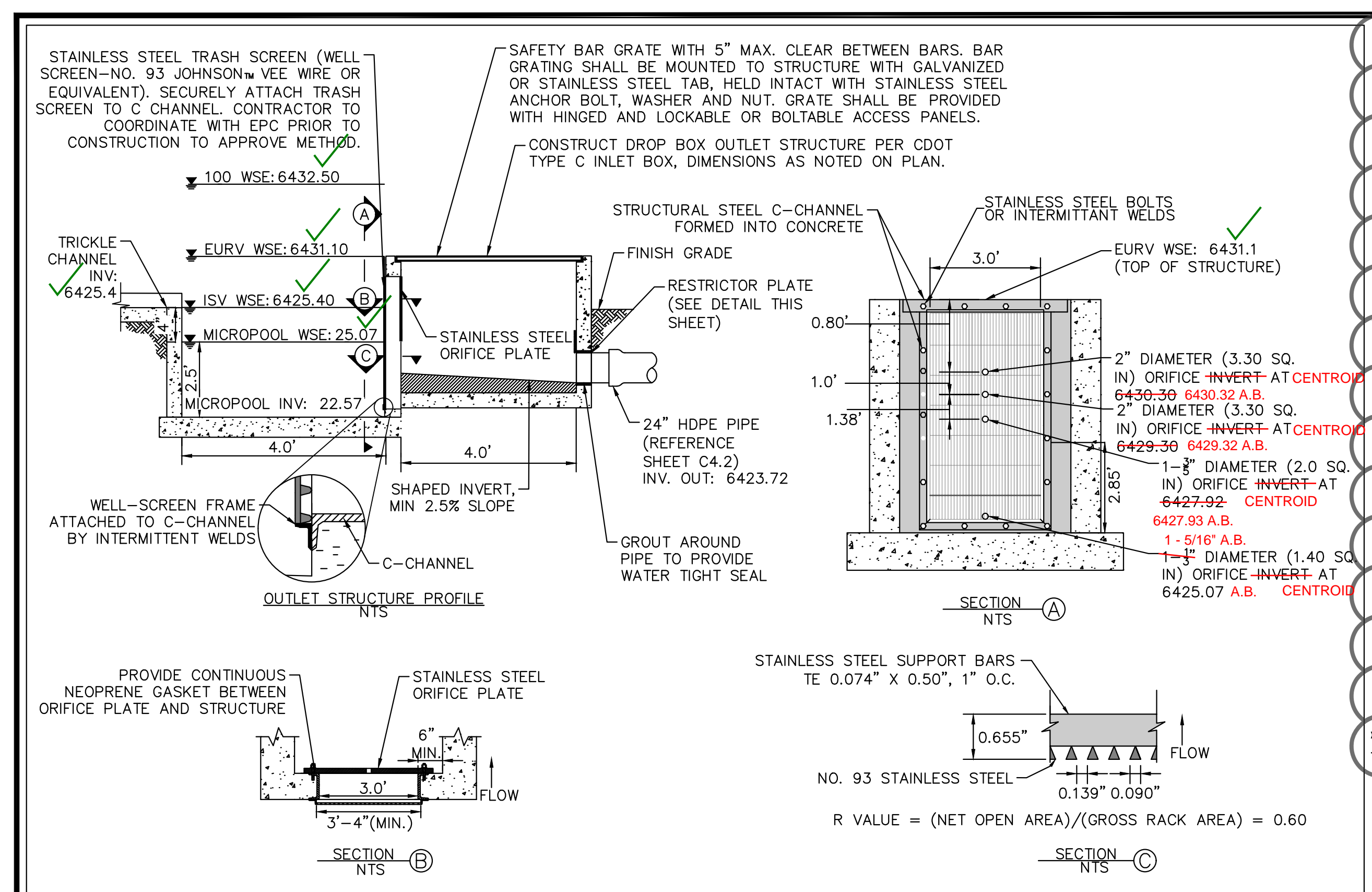
Attached to this letter are Record Drawings which certify that the public improvements meet or exceed the minimum design requirements, except as noted on the Record Drawings, and do not adversely affect the adjacent properties.

**Statement Of Engineer In Responsible Charge:**

I, Mitchell O. Hess, 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 infrastructure improvements have been installed and are in general compliance with the approved Construction Plans as filed with El Paso County.

Mitchell O. Hess, P.E.  
Colorado No. 53916





THESE RECORD DRAWINGS HAVE BEEN PREPARED BY KIMLEY-HORN AND ASSOCIATES, INC. BASED ON SURVEY INFORMATION PROVIDED BY MS CIVIL AS WELL AS MEASUREMENTS PROVIDED BY THE GENERAL CONTRACTOR (THE GARRETT COMPANIES). THESE RECORD DRAWINGS ARE NOT GUARANTEED TO BE "AS-BUILT", BUT RATHER BASED ON THE INFORMATION MADE AVAILABLE.

Pay Item	Stone Size d50 <sup>1</sup> (Inches)	Percent of Material Smaller Than Typical Stone <sup>2</sup>	Typical Stone Dimensions <sup>3</sup> (Inches)	Typical Stone Weight <sup>4</sup> (Pounds)
Riprap 6	6	70-100	12	85
		50-70	9	35
		35-50	6	10
		2-10	2	0.4
Riprap 9	9	70-100	15	160
		50-70	12	85
		35-50	9	35
		2-10	3	1.3
Riprap 12	12	70-100	21	440
		50-70	18	275
		35-50	12	85
		2-10	4	3
Riprap 18	18	100	30	1280
		50-70	24	650
		35-50	18	275
		2-10	6	10
Riprap 24	24	100	42	3500
		50-70	33	1700
		35-50	24	650
		2-10	9	35

<sup>1</sup>d50 = nominal stone size  
<sup>2</sup>based on typical rock mass  
<sup>3</sup>equivalent spherical diameter  
<sup>4</sup>based on a specific gravity = 2.5

Nominal stone size and total thickness of the riprap shall be as shown on the plans.

**Kimley-Horn**  
 2023 KIMLEY-HORN AND ASSOCIATES, INC.  
 2 North Nevada Avenue, Suite 900  
 Colorado Springs, CO 80903 (303) 228-2300

DESIGNED BY: MOH  
 DRAWN BY: JWM  
 DATE: 9/21/2023

THE CITIZEN ON CONSTITUTION  
 EL PASO COUNTY, COLORADO  
 UTILITY AND WATER SERVICE PLANS  
 DETENTION POND PLAN AND DETAILS

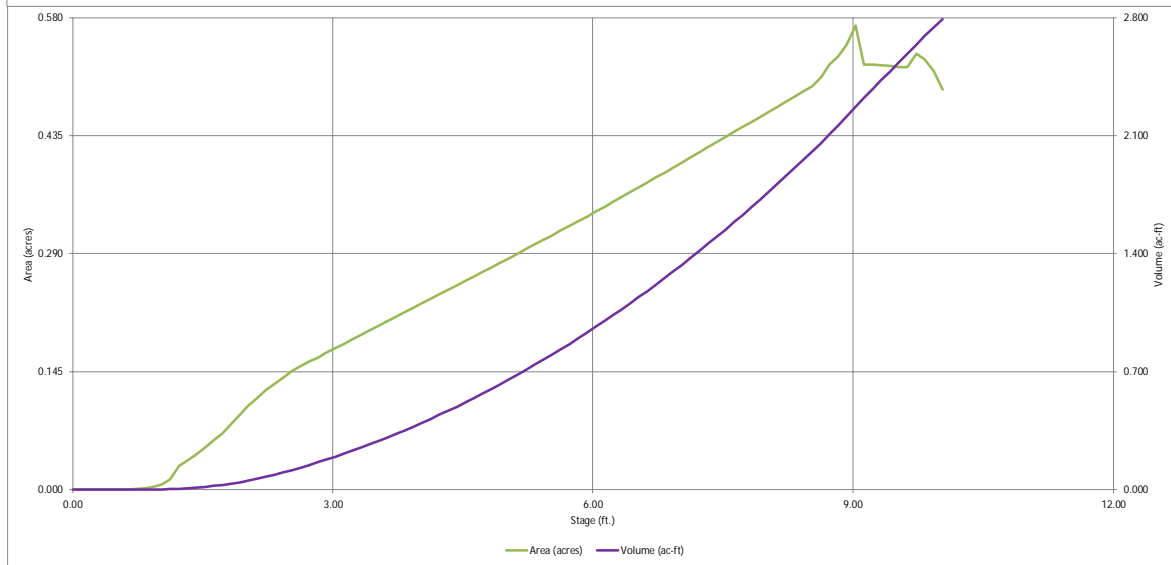
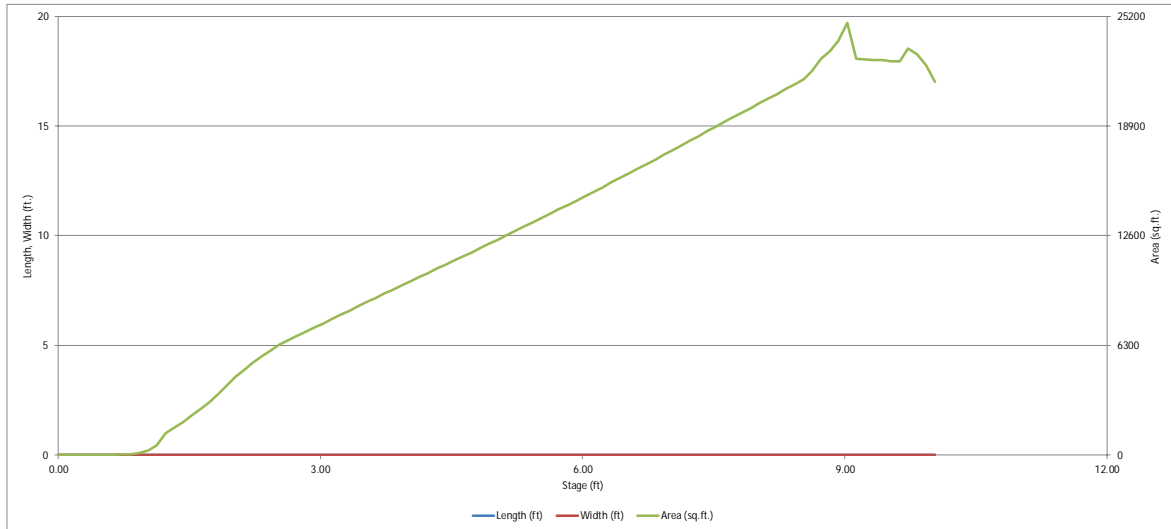
C4.11

NO.	REVISION	BY	DATE	APPR.
1				
2				



# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

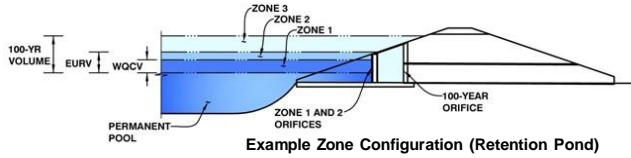
MHFD-Detention, Version 4.04 (February 2021)



# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Citizen On Constitution (El Paso)  
Basin ID: Extended Detention Basin



**Example Zone Configuration (Retention Pond)**

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.39	0.262	Orifice Plate
Zone 2 (EURV)	6.04	0.708	Orifice Plate
Zone 3 (100-year)	7.35	0.496	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>1.466</b>	

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

Underdrain Orifice Invert Depth =  ft (distance below the filtration media surface)  
Underdrain Orifice Diameter =  inches

**Calculated Parameters for Underdrain**  
Underdrain Orifice Area =  ft<sup>2</sup>  
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 BMP)**

Invert of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  inches

**Calculated Parameters for Plate**  
WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

**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	2.86	4.25	5.25				
Orifice Area (sq. inches)	1.35	2.00	3.30	3.30				

	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)**

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

**Calculated Parameters for Vertical Orifice**  
Vertical Orifice Area =  ft<sup>2</sup>  
Vertical Orifice Centroid =  feet

**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	
Overflow Weir Front Edge Height, Ho =	6.03	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Type =	Type C Grate	N/A	
Debris Clogging % =	50%	N/A	%

**Calculated Parameters for Overflow Weir**

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H <sub>t</sub> =	6.03	N/A	feet
Overflow Weir Slope Length =	4.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	29.65	N/A	
Overflow Grate Open Area w/o Debris =	11.14	N/A	ft <sup>2</sup>
Overflow Grate Open Area w/ Debris =	5.57	N/A	ft <sup>2</sup>

**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 =	1.35	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	24.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	4.25	N/A	inches

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	0.38	N/A	ft <sup>2</sup>
Outlet Orifice Centroid =	0.21	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	0.87	N/A	radians

**User Input: Emergency Spillway (Rectangular or Trapezoidal)**

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

**Calculated Parameters for Spillway**

Spillway Design Flow Depth =	0.31	feet
Stage at Top of Freeboard =	9.99	feet
Basin Area at Top of Freeboard =	0.50	acres
Basin Volume at Top of Freeboard =	2.78	acre-ft

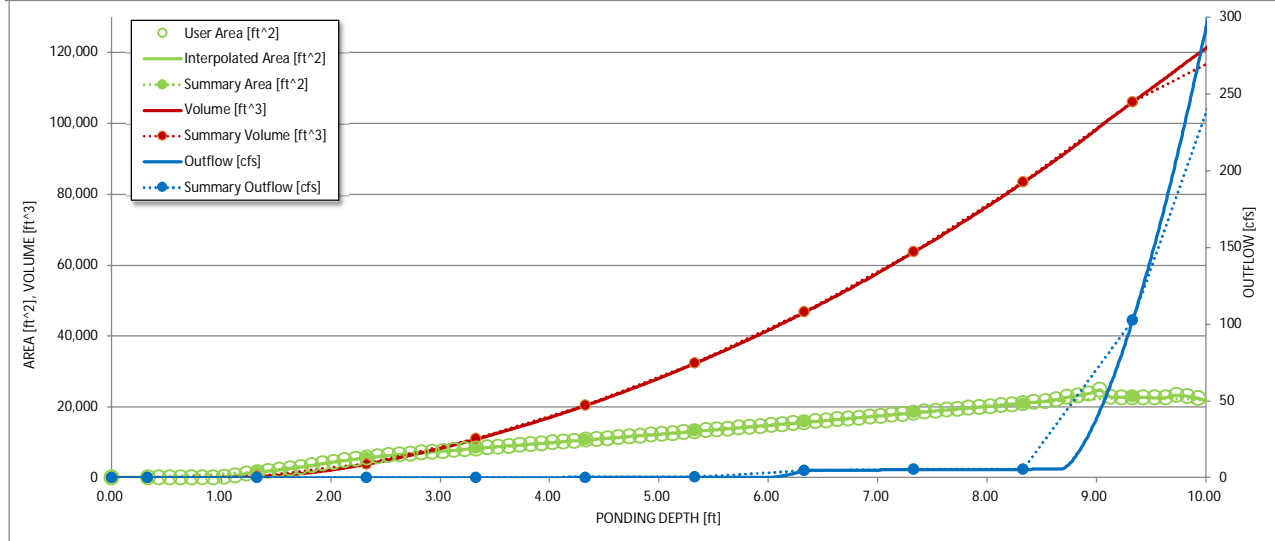
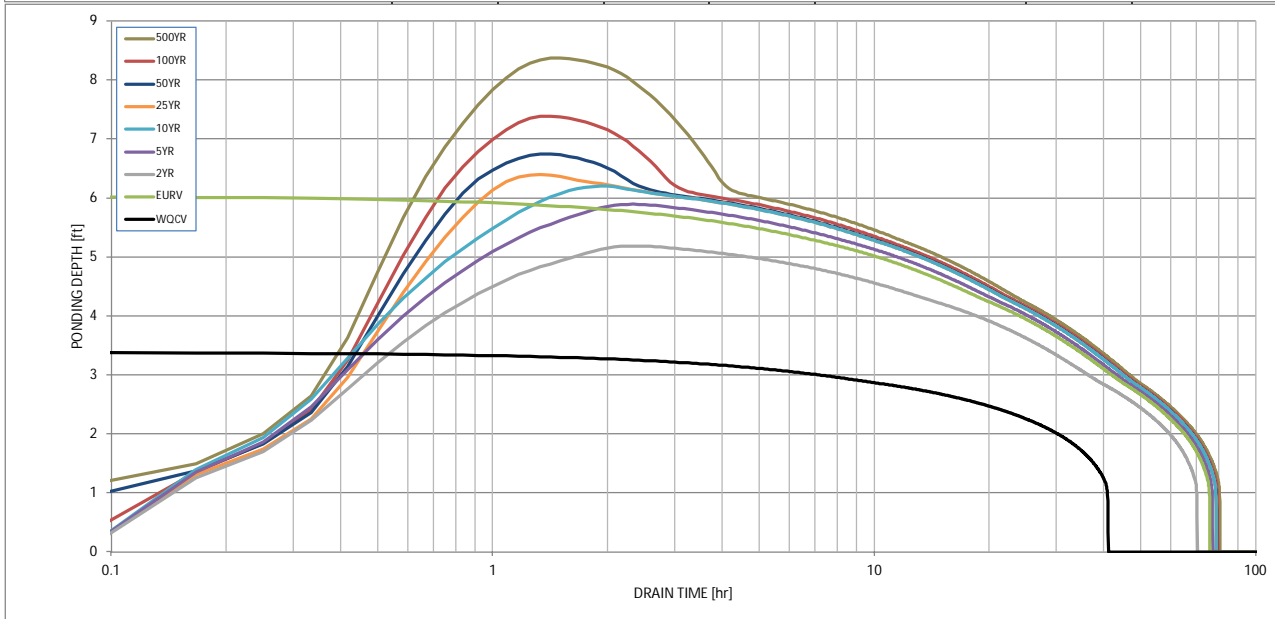
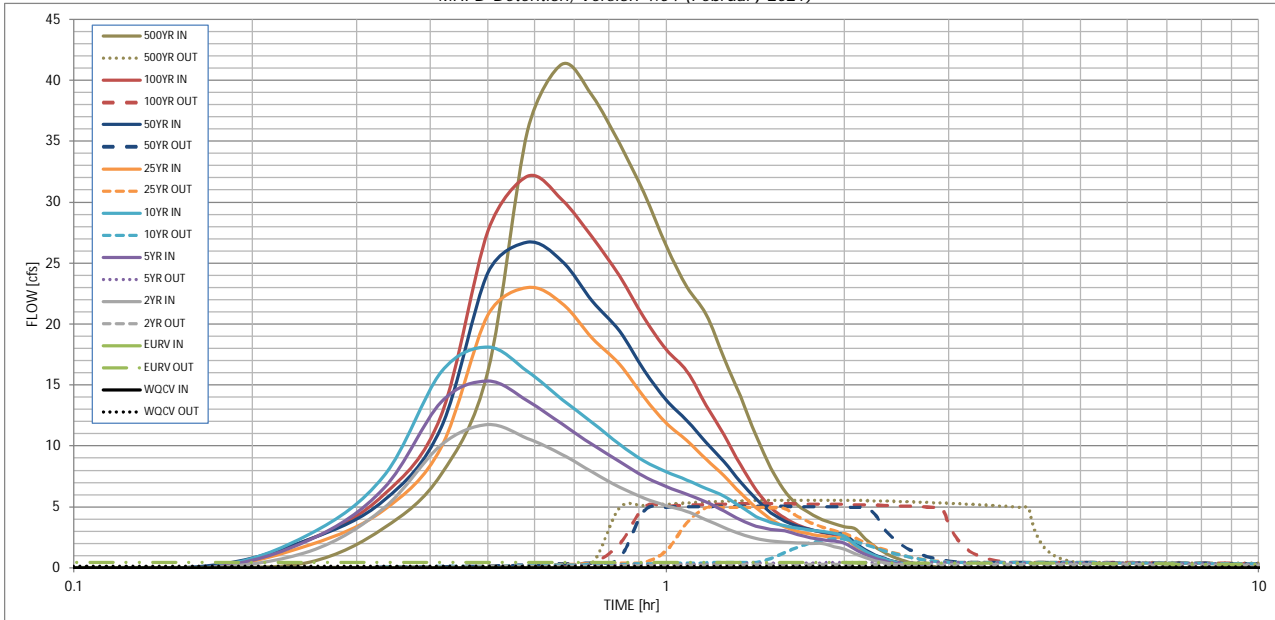
## Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.19	1.52	1.75	2.00	2.25	2.55	3.14
One-Hour Rainfall Depth (in) =	N/A	N/A	0.746	0.986	1.177	1.437	1.663	1.974	2.537
CUHP Runoff Volume (acre-ft) =	0.262	0.970	0.746	0.986	1.177	1.437	1.663	1.974	2.537
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.746	0.986	1.177	1.437	1.663	1.974	2.537
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.2	1.4	4.4	6.2	9.3	14.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A		5.4	7.8			16.9	
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.48	0.69	0.39	0.55	1.50	1.27
Peak Inflow Q (cfs) =	N/A	N/A	11.8	15.3	18.1	23.0	26.7	32.2	41.4
Peak Outflow Q (cfs) =	0.1	0.5	0.3	0.5	2.4	5.0	5.1	5.3	5.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.3	1.1	0.8	0.3	0.4
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Plate	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps) =	N/A	0.00	N/A	N/A	0.2	0.4	0.4	0.4	0.4
Max Velocity through Gate 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) =	39	69	65	71	71	70	68	67	65
Time to Drain 99% of Inflow Volume (hours) =	40	73	68	75	76	75	75	75	75
Maximum Ponding Depth (ft) =	3.39	6.04	5.19	5.90	6.21	6.40	6.75	7.40	8.38
Area at Maximum Ponding Depth (acres) =	0.19	0.34	0.29	0.33	0.35	0.36	0.38	0.42	0.49
Maximum Volume Stored (acre-ft) =	0.262	0.970	0.700	0.919	1.025	1.097	1.228	1.487	1.933

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)



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.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	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	0.16	0.04	0.51
	0:15:00	0.00	0.00	1.40	2.34	2.83	1.90	2.36	2.36	3.29
	0:20:00	0.00	0.00	4.91	6.54	7.55	4.75	5.52	6.01	7.69
	0:25:00	0.00	0.00	10.11	13.61	16.08	9.90	11.52	12.51	16.16
	0:30:00	0.00	0.00	11.77	15.33	18.15	20.78	24.25	27.63	35.91
	0:35:00	0.00	0.00	10.64	13.70	16.11	23.01	26.72	32.15	41.35
	0:40:00	0.00	0.00	9.33	11.82	13.85	21.72	25.19	30.22	38.75
	0:45:00	0.00	0.00	7.87	10.13	11.95	18.88	21.92	27.14	34.81
	0:50:00	0.00	0.00	6.65	8.75	10.16	16.73	19.45	23.97	30.77
	0:55:00	0.00	0.00	5.73	7.52	8.79	14.02	16.27	20.55	26.42
	1:00:00	0.00	0.00	5.13	6.70	7.91	11.89	13.78	17.90	23.05
	1:05:00	0.00	0.00	4.65	6.04	7.22	10.46	12.09	16.16	20.83
	1:10:00	0.00	0.00	3.97	5.42	6.54	8.92	10.31	13.37	17.22
	1:15:00	0.00	0.00	3.33	4.67	5.89	7.57	8.74	10.93	14.07
	1:20:00	0.00	0.00	2.80	3.95	5.05	6.15	7.08	8.48	10.87
	1:25:00	0.00	0.00	2.42	3.45	4.24	4.98	5.70	6.45	8.21
	1:30:00	0.00	0.00	2.22	3.19	3.77	3.99	4.55	4.97	6.31
	1:35:00	0.00	0.00	2.13	3.05	3.47	3.40	3.87	4.10	5.18
	1:40:00	0.00	0.00	2.07	2.74	3.26	3.03	3.44	3.56	4.47
	1:45:00	0.00	0.00	2.04	2.51	3.11	2.79	3.15	3.18	3.98
	1:50:00	0.00	0.00	2.01	2.33	3.00	2.62	2.96	2.93	3.64
	1:55:00	0.00	0.00	1.75	2.20	2.85	2.51	2.83	2.74	3.40
	2:00:00	0.00	0.00	1.54	2.04	2.59	2.43	2.74	2.62	3.24
	2:05:00	0.00	0.00	1.16	1.53	1.93	1.82	2.05	1.95	2.41
	2:10:00	0.00	0.00	0.85	1.12	1.40	1.33	1.49	1.42	1.75
	2:15:00	0.00	0.00	0.62	0.81	1.02	0.97	1.09	1.04	1.28
	2:20:00	0.00	0.00	0.45	0.58	0.73	0.70	0.78	0.76	0.93
	2:25:00	0.00	0.00	0.32	0.40	0.52	0.49	0.55	0.54	0.66
	2:30:00	0.00	0.00	0.22	0.28	0.36	0.35	0.39	0.38	0.46
	2:35:00	0.00	0.00	0.14	0.19	0.25	0.24	0.27	0.26	0.32
	2:40:00	0.00	0.00	0.09	0.12	0.15	0.16	0.17	0.17	0.21
	2:45:00	0.00	0.00	0.04	0.07	0.08	0.09	0.10	0.10	0.12
	2:50:00	0.00	0.00	0.02	0.03	0.04	0.04	0.04	0.04	0.05
	2:55:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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

