



Civil Engineer
Stormwater Best Management Practice (permanent) Certification Letter

May 16, 2023

El Paso County
Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Attn.: Brad Walters, Inspections Supervisor

RE: **Retreat at TimberRidge Filing No. 2**

The permanent stormwater Best Management Practices (BMPs) for the **Retreat at TimberRidge Filing No. 2** consists of a Private Full Spectrum Extended Detention Basin. This facility is described by the following:

Pond 3 within Tract A

Based upon this information and information gathered during periodic site visits to the project during significant/key phases of the stormwater BMP installation, Classic Consulting Engineers & Surveyors, LLC is of the opinion that the stormwater BMPs have been constructed in general compliance with the approved Construction Plans, and Specifications as filed with El Paso County.

Statement Of Engineer In Responsible Charge:

I, Marc A. Whorton, 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 as-built documentation, it is my professional opinion that the required permanent BMPs have been installed and are in general compliance with the approved Construction Plans, and Specifications as filed with El Paso County. For BMPs with a Water Quality Capture Volume (WQCV), I have attached the post-construction As-Built drawings and calculations. The As-Built drawings accurately depict the final installation of the stormwater BMPs.



Marc A. Whorton, P.E.
Colorado No. 37155

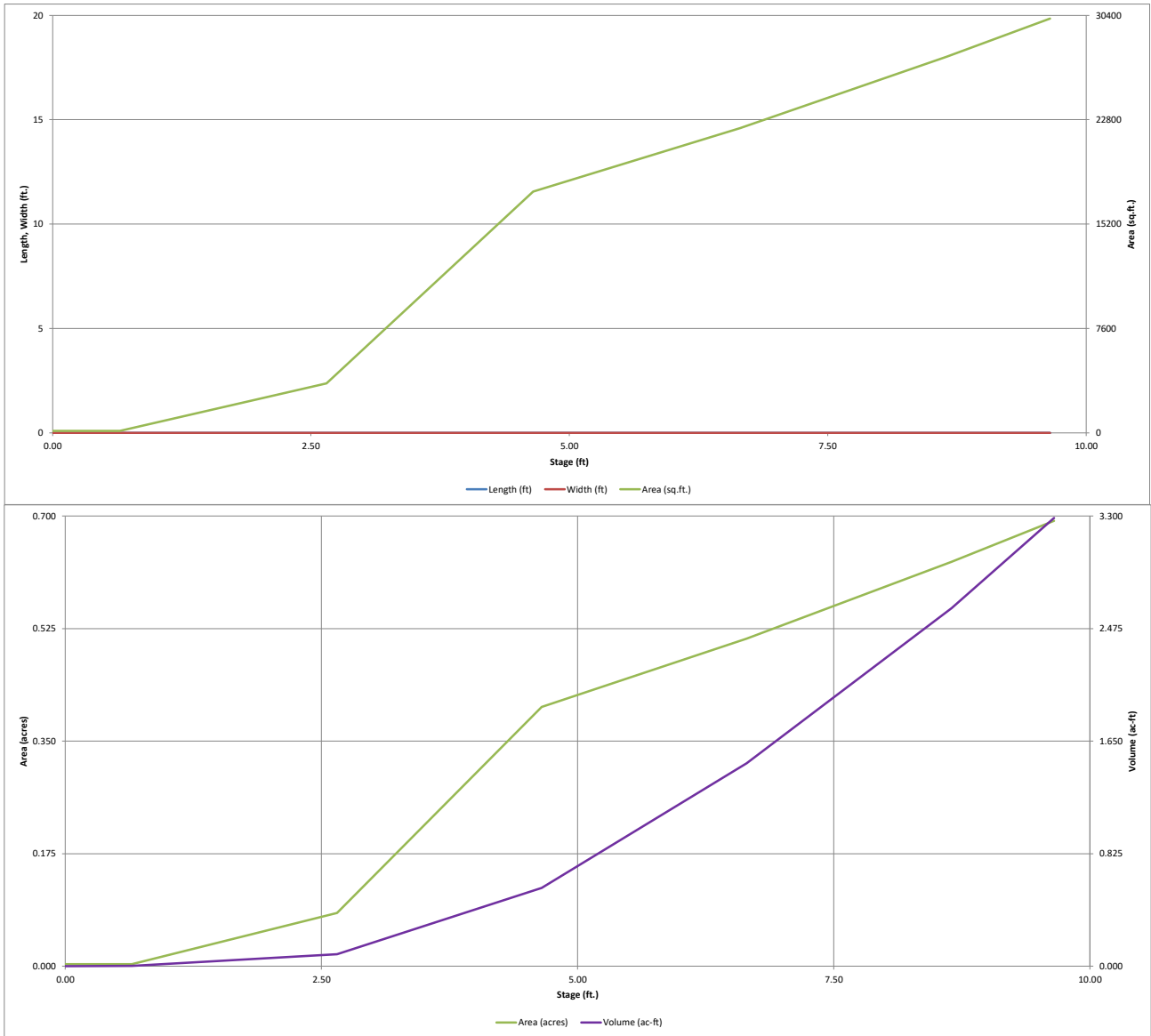


5/17/2023

Seal & Signature of P.E. Goes Here

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.05 (January 2022)

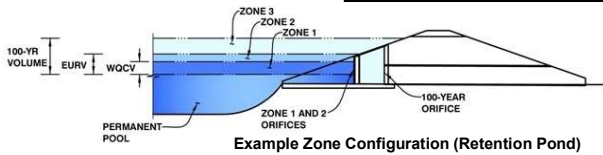


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)

Project: REETREAT AT TIMBERRIDGE FILING NO. 2

Basin ID: POND 3 (AS-BUILT CHECK)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.16	0.395	Orifice Plate
Zone 2 (EURV)	4.97	0.309	Orifice Plate
Zone 3 (100-year)	8.30	1.700	Weir&Pipe (Restrict)
Total (all zones)		2.404	

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)

Centroid of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	5.03	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	20.00	inches
Orifice Plate: Orifice Area per Row =	N/A	sq. 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	1.70	3.40					
Orifice Area (sq. inches)	1.23	1.29	1.29					
	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 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 =	5.03	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	10.00	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Type =	Close Mesh Grate	N/A	
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H _u =	6.03	N/A	feet
Overflow Weir Slope Length =	4.12	N/A	feet
Grate Open Area / 100-yr Orifice Area =	6.64	N/A	
Overflow Grate Open Area w/o Debris =	32.61	N/A	ft ²
Overflow Grate Open Area w/ Debris =	16.31	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 =	0.58	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	30.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	30.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	4.91	N/A	ft ²
Outlet Orifice Centroid =	1.25	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 =	7.65	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	35.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =	0.76	feet
Stage at Top of Freeboard =	9.41	feet
Basin Area at Top of Freeboard =	0.68	acres
Basin Volume at Top of Freeboard =	3.12	acre-ft

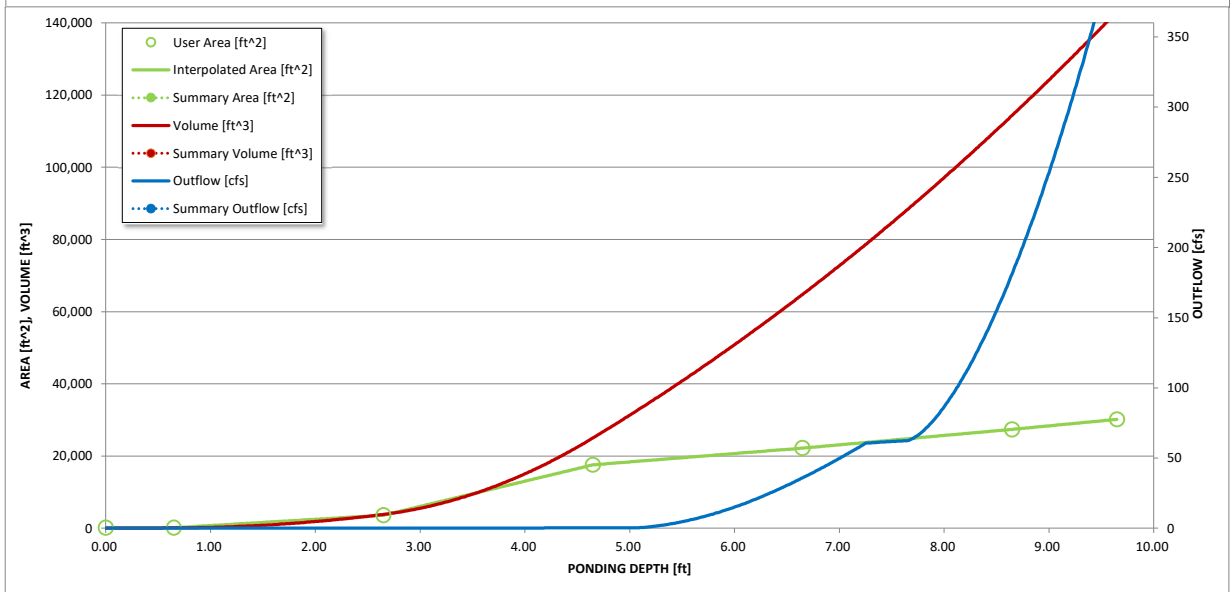
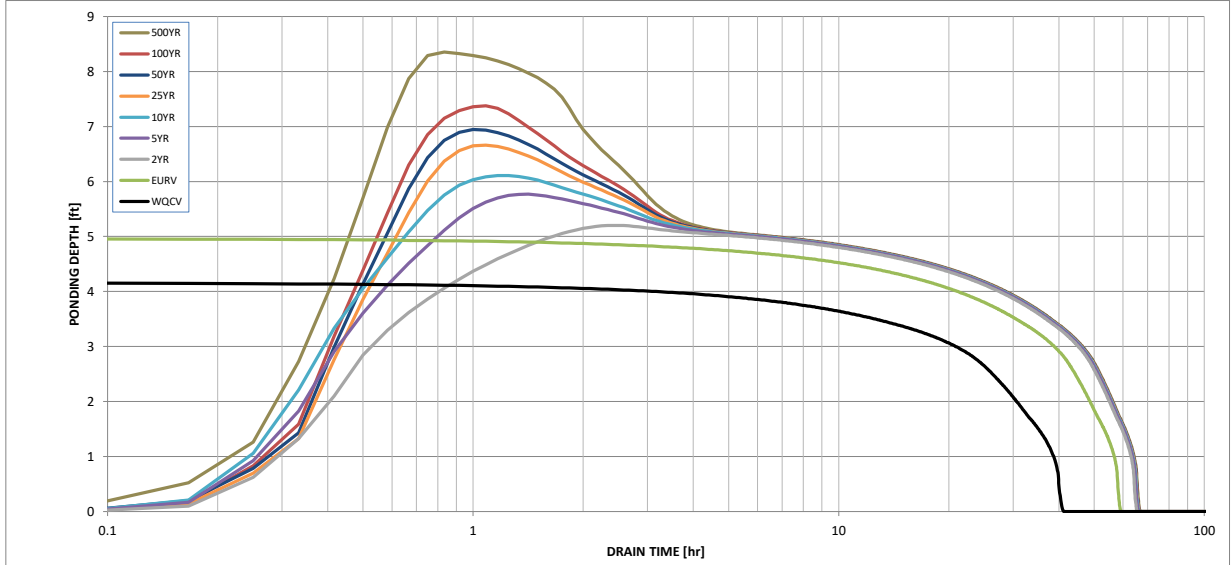
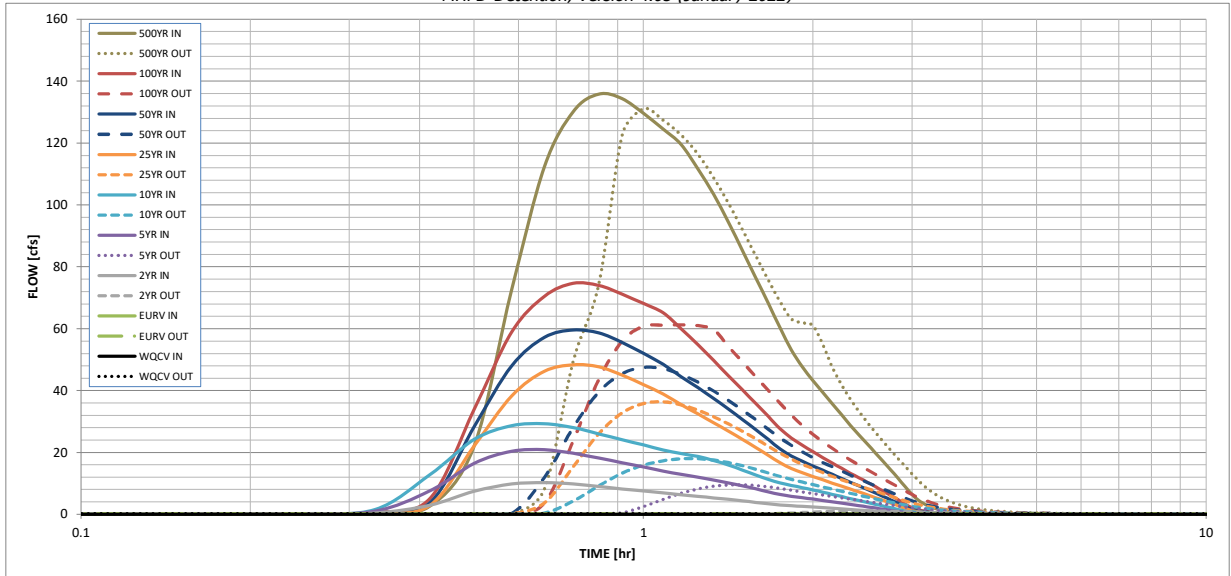
Routed Hydrograph Results

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	1.50	1.75	2.00	2.25	2.52	3.85
One-Hour Rainfall Depth (in) =	0.395	0.703	0.904	1.876	2.832	4.494	5.642	7.279	13.819
CUHP Runoff Volume (acre-ft) =	N/A	N/A	0.904	1.876	2.832	4.494	5.642	7.279	13.819
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	5.6	15.8	24.0	43.0	54.0	69.2	129.0
OPTIONAL Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.10	0.27	0.41	0.74	0.93	1.19	2.21
Peak Inflow Q (cfs) =	N/A	N/A	10.3	20.8	29.3	48.3	59.6	74.7	135.8
Peak Outflow Q (cfs) =	0.2	0.2	1.1	9.5	18.0	36.4	47.5	61.2	131.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.7	0.8	0.9	0.9	1.0
Structure Controlling Flow =	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	0.03	0.3	0.5	1.1	1.5	1.9	2.0
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	53	58	54	50	45	42	38	24
Time to Drain 99% of Inflow Volume (hours) =	40	56	62	60	58	56	54	52	45
Maximum Ponding Depth (ft) =	4.16	4.97	5.20	5.77	6.11	6.66	6.95	7.38	8.35
Area at Maximum Ponding Depth (acres) =	0.32	0.42	0.43	0.46	0.48	0.51	0.53	0.55	0.61
Maximum Volume Stored (acre-ft) =	0.396	0.706	0.804	1.055	1.215	1.493	1.638	1.870	2.440

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

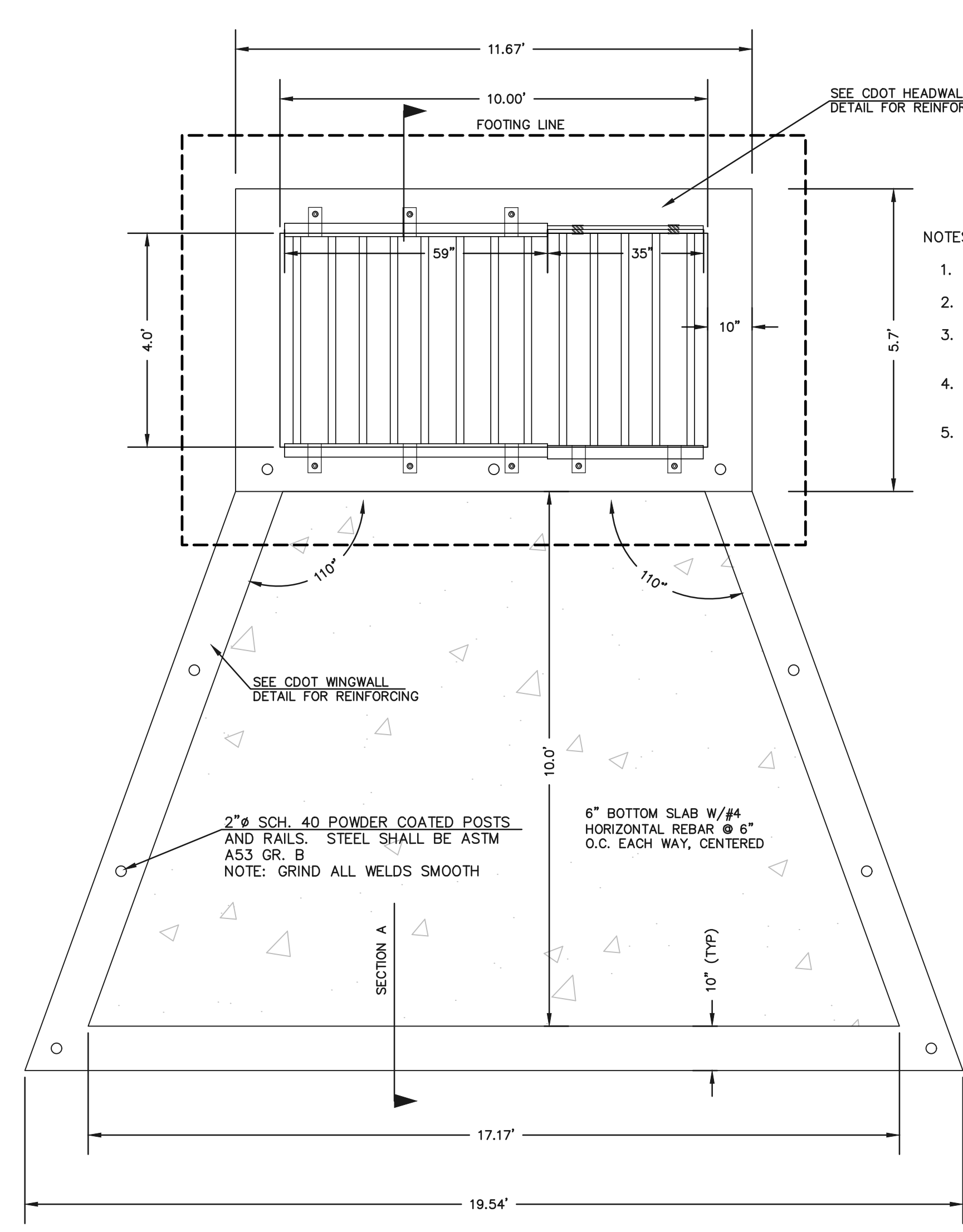
DETENTION BASIN OUTLET STRUCTURE DESIGN

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	0.00	0.01	0.00
	0:15:00	0.00	0.00	0.10	0.17	0.21	0.14	0.18	0.17	0.37
	0:20:00	0.00	0.00	0.41	1.01	1.58	0.43	0.50	0.67	2.55
	0:25:00	0.00	0.00	2.95	7.51	12.72	2.84	3.62	4.99	21.98
	0:30:00	0.00	0.00	7.42	16.44	24.17	22.06	28.28	33.86	72.66
	0:35:00	0.00	0.00	9.78	20.38	28.68	38.31	48.01	58.97	112.34
	0:40:00	0.00	0.00	10.28	20.85	29.25	46.22	57.17	70.48	130.16
	0:45:00	0.00	0.00	9.81	19.73	28.04	48.33	59.58	74.66	135.85
	0:50:00	0.00	0.00	8.97	18.17	26.01	47.63	58.62	74.00	134.31
	0:55:00	0.00	0.00	8.21	16.68	24.13	44.98	55.52	71.13	129.59
	1:00:00	0.00	0.00	7.56	15.30	22.42	41.90	51.98	68.13	124.56
	1:05:00	0.00	0.00	6.95	14.00	20.83	38.93	48.54	65.17	119.60
	1:10:00	0.00	0.00	6.35	12.93	19.65	35.47	44.47	60.02	111.61
	1:15:00	0.00	0.00	5.82	12.02	18.70	32.44	40.91	54.77	103.41
	1:20:00	0.00	0.00	5.32	11.08	17.43	29.61	37.42	49.70	94.43
	1:25:00	0.00	0.00	4.83	10.12	15.90	26.90	34.01	44.80	85.24
	1:30:00	0.00	0.00	4.35	9.17	14.33	24.23	30.65	40.22	76.53
	1:35:00	0.00	0.00	3.88	8.23	12.76	21.63	27.37	35.86	68.18
	1:40:00	0.00	0.00	3.42	7.24	11.26	19.07	24.16	31.62	60.17
	1:45:00	0.00	0.00	3.04	6.41	10.14	16.62	21.10	27.63	53.05
	1:50:00	0.00	0.00	2.79	5.83	9.33	14.81	18.88	24.65	47.66
	1:55:00	0.00	0.00	2.57	5.36	8.62	13.41	17.14	22.30	43.29
	2:00:00	0.00	0.00	2.38	4.92	7.90	12.24	15.67	20.27	39.46
	2:05:00	0.00	0.00	2.17	4.48	7.18	11.13	14.24	18.36	35.73
	2:10:00	0.00	0.00	1.96	4.04	6.46	10.09	12.89	16.56	32.17
	2:15:00	0.00	0.00	1.75	3.62	5.76	9.09	11.60	14.88	28.81
	2:20:00	0.00	0.00	1.56	3.20	5.09	8.13	10.36	13.29	25.66
	2:25:00	0.00	0.00	1.37	2.80	4.46	7.21	9.19	11.83	22.74
	2:30:00	0.00	0.00	1.18	2.41	3.84	6.31	8.04	10.39	19.91
	2:35:00	0.00	0.00	1.00	2.03	3.26	5.42	6.92	8.96	17.16
	2:40:00	0.00	0.00	0.82	1.66	2.69	4.54	5.81	7.55	14.42
	2:45:00	0.00	0.00	0.64	1.29	2.13	3.67	4.71	6.14	11.71
	2:50:00	0.00	0.00	0.47	0.93	1.58	2.81	3.61	4.74	9.03
	2:55:00	0.00	0.00	0.30	0.60	1.09	1.96	2.54	3.36	6.50
	3:00:00	0.00	0.00	0.19	0.40	0.80	1.23	1.63	2.20	4.51
	3:05:00	0.00	0.00	0.14	0.30	0.63	0.81	1.12	1.49	3.23
	3:10:00	0.00	0.00	0.11	0.24	0.51	0.55	0.78	1.03	2.34
	3:15:00	0.00	0.00	0.09	0.20	0.41	0.38	0.56	0.69	1.67
	3:20:00	0.00	0.00	0.07	0.16	0.33	0.26	0.40	0.46	1.17
	3:25:00	0.00	0.00	0.06	0.12	0.26	0.19	0.29	0.29	0.80
	3:30:00	0.00	0.00	0.04	0.10	0.20	0.13	0.21	0.18	0.53
	3:35:00	0.00	0.00	0.04	0.07	0.15	0.10	0.15	0.11	0.36
	3:40:00	0.00	0.00	0.03	0.06	0.11	0.07	0.11	0.09	0.26
	3:45:00	0.00	0.00	0.02	0.04	0.08	0.05	0.08	0.07	0.20
	3:50:00	0.00	0.00	0.02	0.03	0.06	0.04	0.07	0.05	0.16
	3:55:00	0.00	0.00	0.01	0.02	0.04	0.03	0.05	0.04	0.12
	4:00:00	0.00	0.00	0.01	0.01	0.03	0.02	0.04	0.03	0.09
	4:05:00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.06
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	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	



CONCRETE MICROPOOL
SCALE 1" = 2'

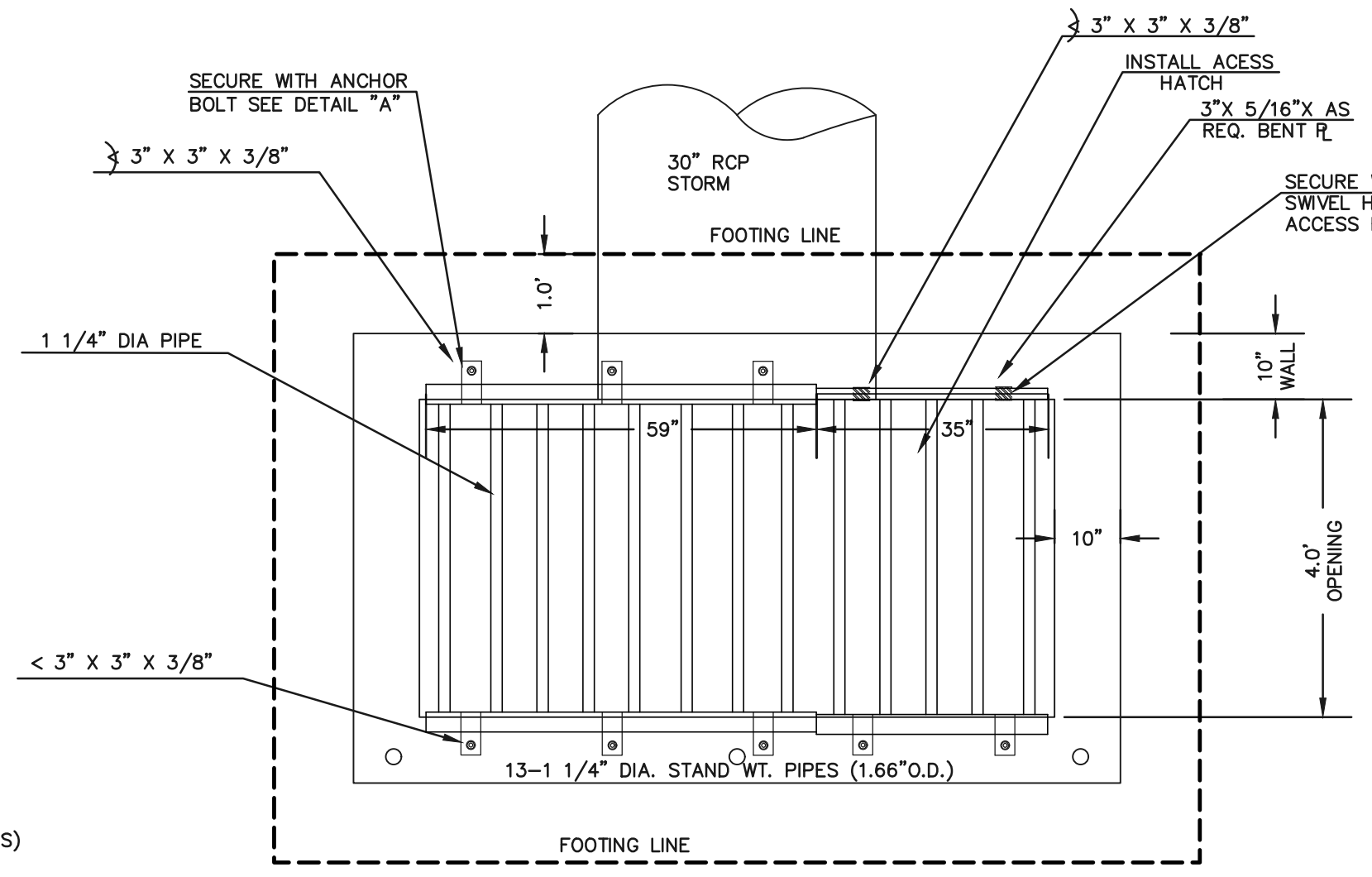
- NOTES:
1. WELD PLATES MAY BE SUBSTITUTED FOR PIPE EMBEDMENT. DESIGN CRITERIA SHALL BE IN ACCORDANCE WITH AASHTO STANDARDS.
 2. HANDRAIL DESIGN SHALL BE COMPATIBLE WITH THE DESIGN OF THE WINGWALLS AND HEADWALLS.
 3. RAILING POSTS SHALL BE SET TO NORMAL TO GRADE. RAILS SHALL RUN PARALLEL TO THE SLOPES OF TOPS OF THE WALLS.
 4. ALL RAILS SHALL HAVE EXPANSION JOINTS SPACED AT 40'-0" MAX. JOINT ENDS SHALL BE FREE OF ANY SHARP EDGES OR CORNERS.

(ALL MATERIALS PER EL PASO COUNTY SPECIFICATIONS)

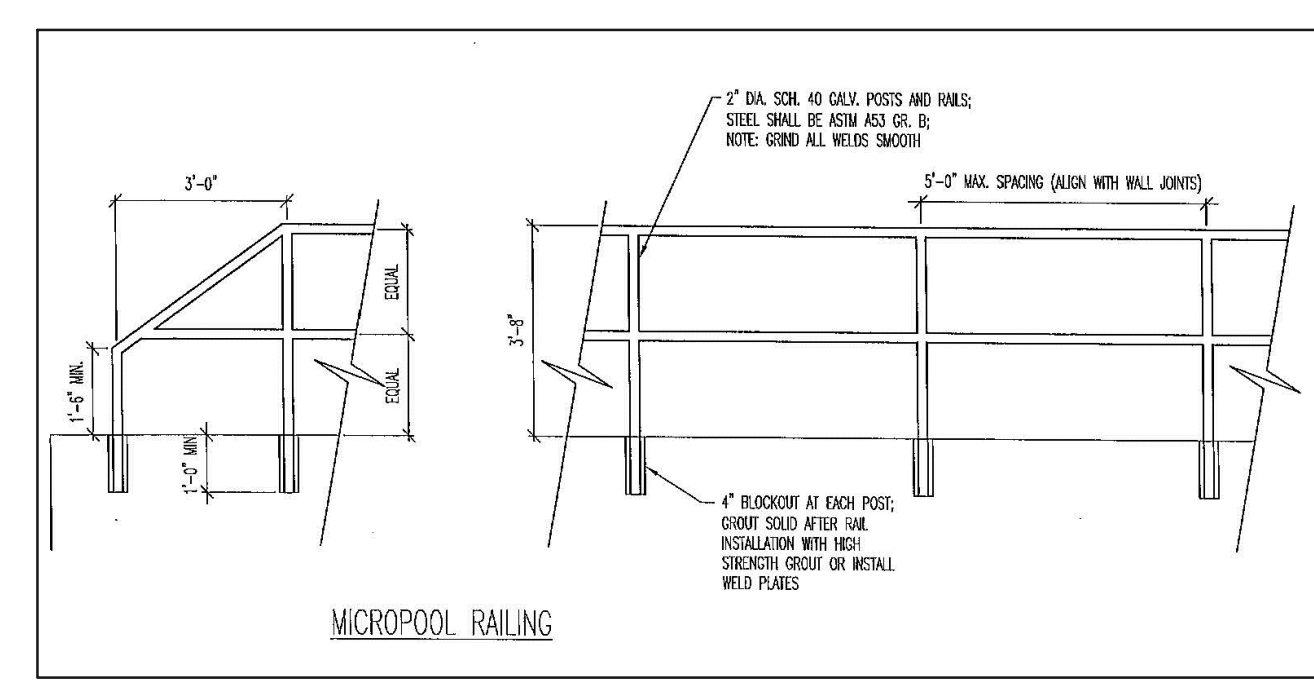
- ORIFICE PLATE NOTES:
1. PROVIDE CONTINUOUS NEOPRENE GASKET MATERIAL BETWEEN THE ORIFICE PLATE AND CONCRETE.
 2. BOLT PLATE TO CONCRETE 12" MAX. ON CENTER

- EURV AND WQCV TRASH RACKS:
1. WELL-SCREEN TRASH RACKS SHALL BE POWDER COATED STAINLESS STEEL AND SHALL BE ATTACHED BY INTERMITTENT WELDS ALONG THE EDGE OF THE MOUNTING FRAME.
 2. BAR GRATE TRASH RACKS SHALL BE ALUMINUM AND SHALL BE BOLTED USING STAINLESS STEEL HARDWARE.
 3. TRASH RACK OPEN AREAS ARE FOR SPECIFIED TRASH RACK MATERIALS. TOTAL TRASH RACK SIZE MAY NEED TO BE ADJUSTED FOR MATERIALS HAVING DIFFERENT OPEN AREA/ GROSS AREA RATIO (R VALUE).
 4. STRUCTURAL DESIGN OF TRASH RACKS SHALL BE BASED ON FULL HYDROSTATIC HEAD WITH ZERO HEAD DOWNSTREAM OF RACK.

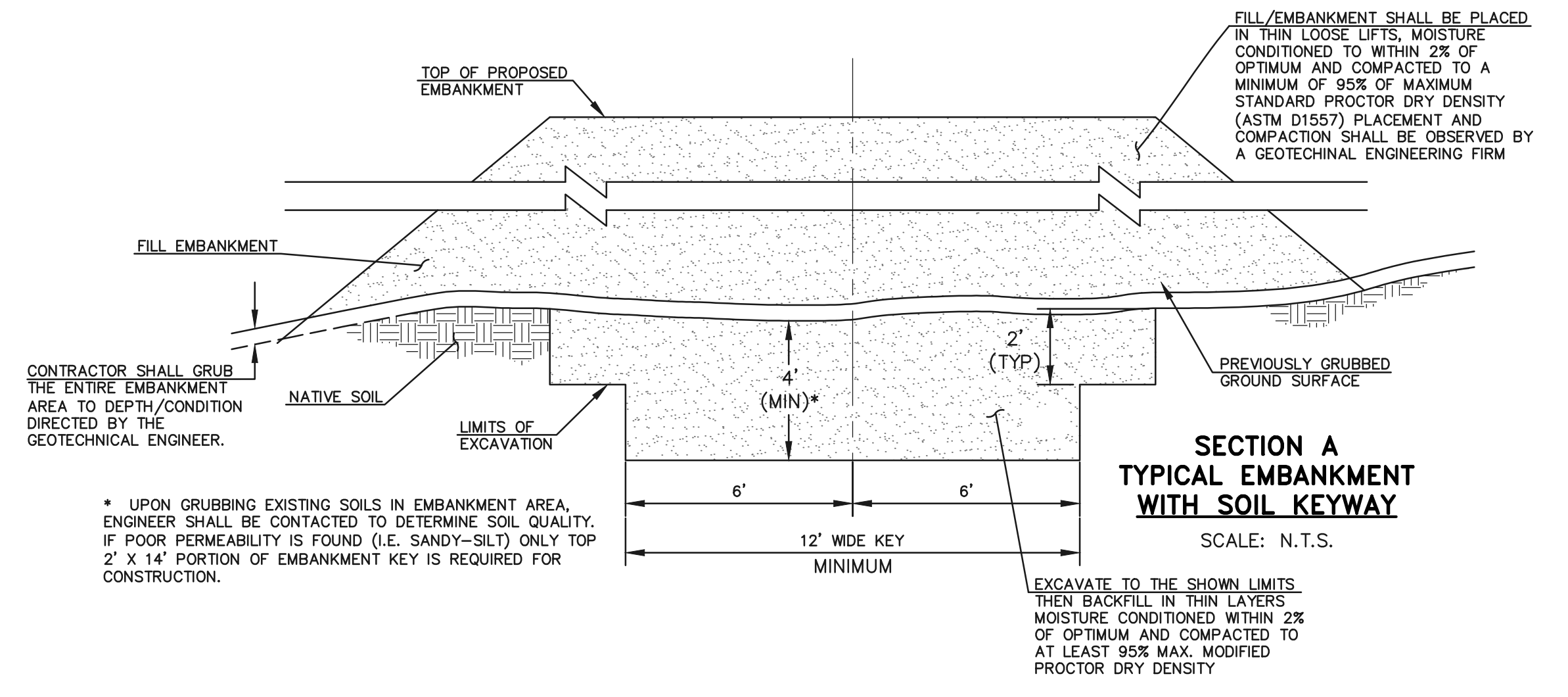
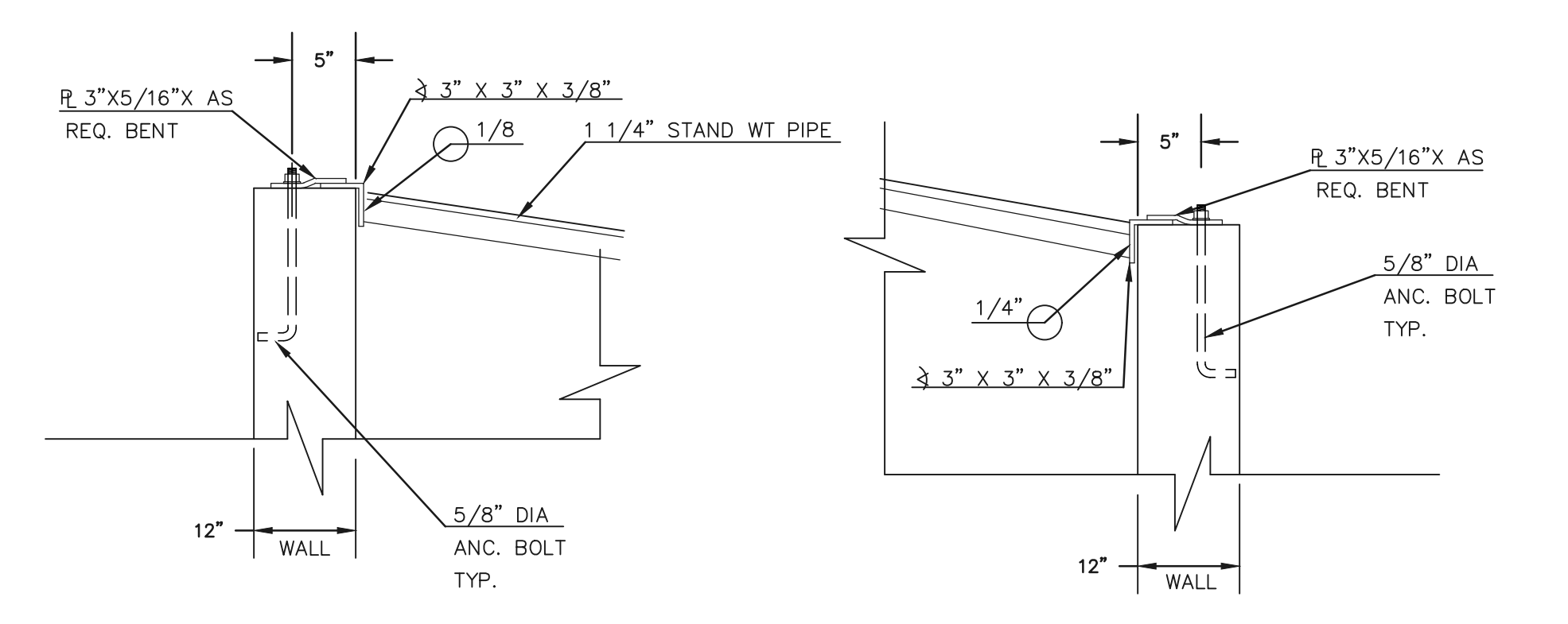
- OVERFLOW TRASH RACKS:
1. ALL TRASH RACKS SHALL BE MOUNTED USING STAINLESS STEEL HARDWARE AND PROVIDED WITH HINGED AND LOCKABLE OR BOLTABLE ACCESS PANELS
 2. TRASH RACKS SHALL BE STAINLESS STEEL, ALUMINUM, OR STEEL. STEEL TRASH RACKS SHALL BE HOT DIP GALVANIZED AND MAY BE HOT POWDER COATED AFTER GALVANIZING.
 3. TRASH RACKS SHALL BE DESIGNED SUCH THAT THE DIAGONAL DIMENSION OF EACH OPENING IS SMALLER THAN THE DIAMETER OF THE OUTLET PIPE.
 4. STRUCTURAL DESIGN OF THE TRASH RACKS SHALL BE BASED ON FULL HYDROSTATIC HEAD WITH ZERO HEAD DOWNSTREAM OF THE RACK.



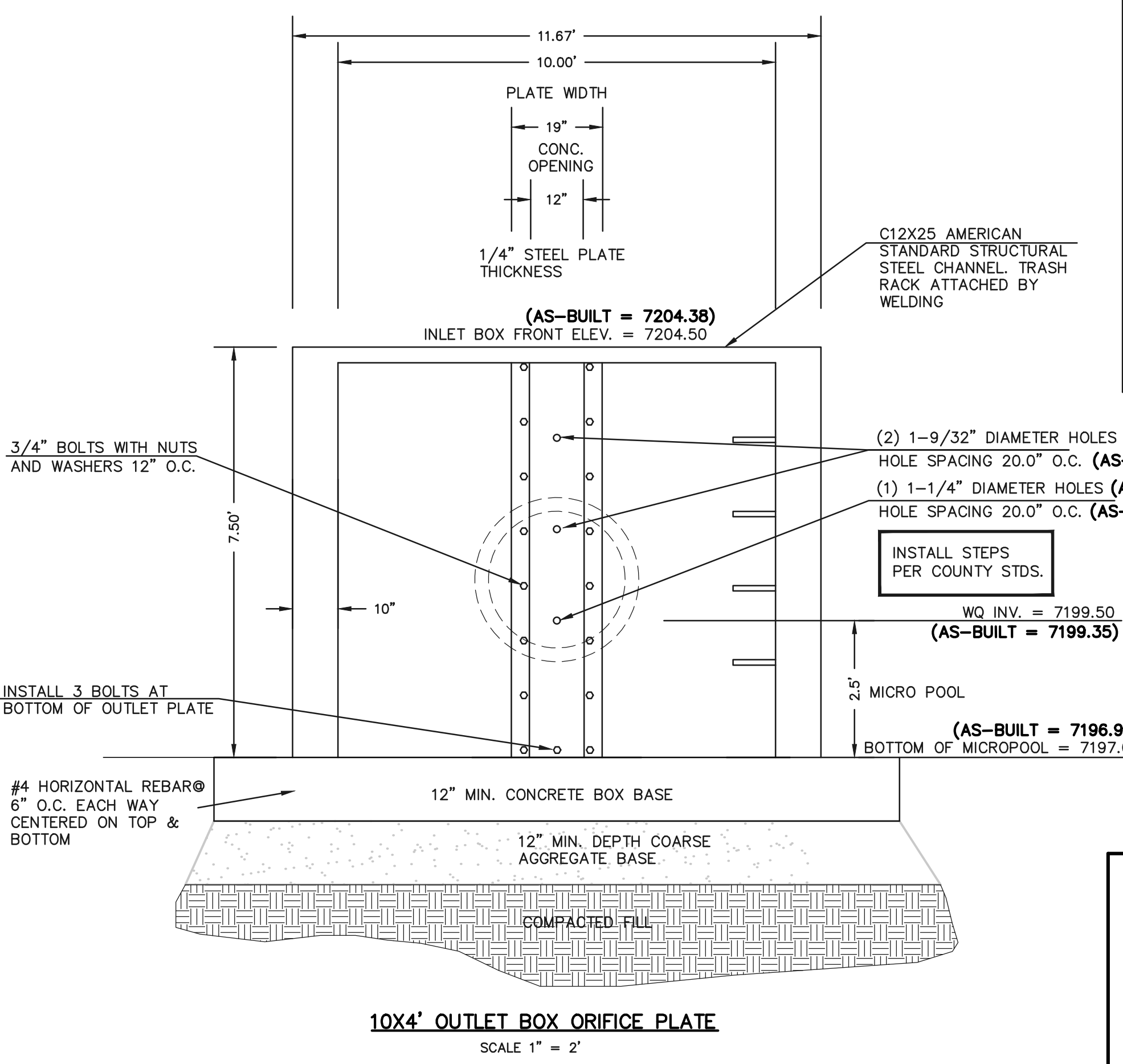
10'X4' OUTLET BOX OVERFLOW TRASH RACK
SCALE 1" = 2'



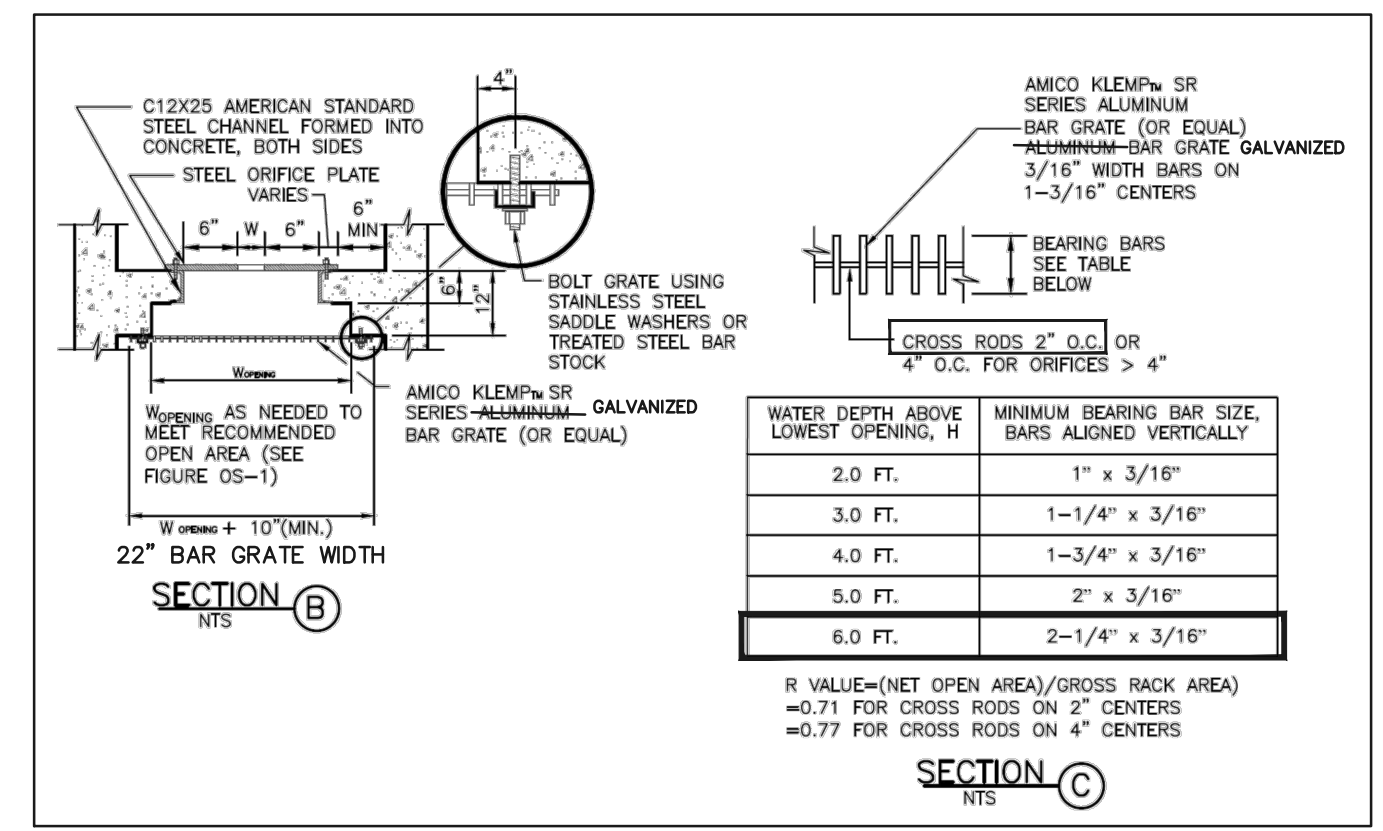
OUTLET BOX RAILING
N.T.S.



**SECTION A
TYPICAL EMBANKMENT
WITH SOIL KEYWAY**
SCALE: N.T.S.

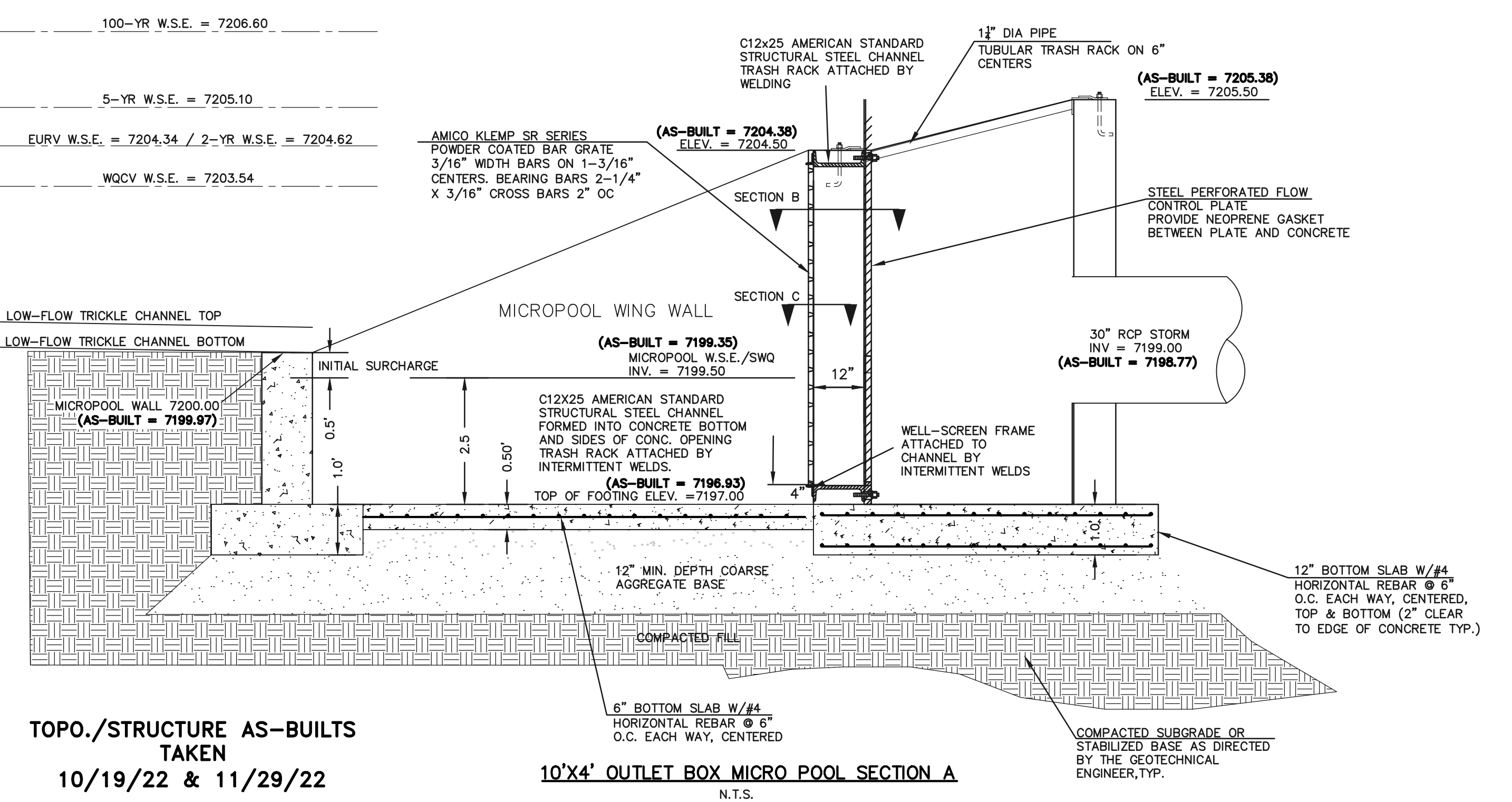


10'X4' OUTLET BOX ORIFICE PLATE
SCALE 1" = 2'



WATER DEPTH ABOVE LOWEST OPENING, H	MINIMUM BEARING BAR SIZE, BARS ALIGNED VERTICALLY
2.0 FT.	1" x 3/16"
3.0 FT.	1-1/4" x 3/16"
4.0 FT.	1-3/4" x 3/16"
5.0 FT.	2" x 3/16"
6.0 FT.	2-1/4" x 3/16"

AS-BUILT



10'X4' OUTLET BOX MICRO POOL SECTION A
N.T.S.

48 HOURS BEFORE YOU DIG,
CALL UTILITY LOCATORS
811
UTILITY NOTIFICATION CENTER OF COLORADO
IT'S THE LAW

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE
1	REVISED PER COUNTY COMMENTS	09-20-21
2	REVISED PER COUNTY COMMENTS	2/7/22
3	REVISED PER COUNTY COMMENTS	3/18/22

REVIEW:
PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF
CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

MARC A. WHORTON
REGISTERED PROFESSIONAL ENGINEER
#37155

5/17/2023
DATE



RETREAT AT TIMBERRIDGE FILING NO. 2
CONSTRUCTION PLANS
DETENTION FACILITY 3
OUTLET BOX DETAILS

DESIGNED BY MAW SCALE DATE 03-23-21
DRAWN BY MAW (H) 1" = N/A SHEET 22 OF 24
CHECKED BY (V) 1" = N/A JOB NO. 1185.20

619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719) 785-0790
(719) 785-0799 (Fax)