



**CORE**  
**ENGINEERING GROUP**

June 5, 2023

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

RE: The Hills at Lorson Ranch Filing No. 1 (SF 21-010)  
Certification Letter

Dear El Paso County PCD,

Based upon information gathered from as-built surveys and periodic visits to the project, Core Engineering Group is of the opinion that the subdivision improvements have been constructed in general conformance with the approved design plans as filed with El Paso County.

The site and adjacent properties (as affected by work performed under the County permit) appear to be stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and the improvements (public improvements, common development improvements, site grading and paving) visually appear to meet or exceed the minimum design requirements.

The sanitary and watermain located in the public ROW has also been completed in accordance with Widefield Water and Sanitation Districts criteria.

In addition, Core Engineering Group has verified in a separate certification letter dated May 4, 2023 that Extended Detention Basin/WQ Ponds C1, C2.1, C2.2, C2.3, C3, & C4 meet the volume and elevation requirements and are constructed in general compliance with the approved construction plans. The pond "as-built" documents are attached to this letter.

Based on information gathered during construction and post-construction, Core Engineering Group is of the opinion that the public streets, storm sewer, and Detention Ponds C1, C2.1, C2.2, C2.3, C3, & C4 have been constructed in general accordance with the approved construction documents.

Sincerely,  
Core Engineering Group, LLC



Richard L. Schindler, P.E. 33997

Attachments: Pond Certification Letter



May 4, 2023

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

Attn.: Project Manager

RE: The Hills at Lorson Ranch Filing No. 1 (SF 21-010)  
Private Detention/Stormwater Quality Ponds C1, C2.1, C2.2, C2.3, C3, & C4  
As-built Certification

Dear Project Manager:

Per the approved construction drawings for The Hills at Lorson Ranch Filing No.1 (SF 21-010), improvements were made to construct six full spectrum detention ponds including water quality facility in compliance with the current El Paso County Drainage Criteria and the approved Final Drainage Report for this project.

Based upon this information and periodic site visits by field personnel to the project during significant/key phases of the stormwater BMP installation, Core Engineering Group, LLC is of the opinion that the detention and stormwater BMPs have been constructed in general compliance with the approved design plans and specifications as filed with El Paso County. The Pond C2.2 ratio peak outflow to predeveloped did exceed allowable limits for the 10-year (ratio=1.2, 25cfs) and 25-year (ratio=1.1, 40.3cfs) flows. Pond C2.2 was designed with a downstream oversized storm sewer overflow conveyance system in Fontaine Boulevard for the 100-year storm event and a modified Type D outlet structure to capture emergency overflows. The exceeded outflows will not negatively impact the oversized downstream storm sewer system for the 10-year and 25-year storms. Pond C2.2 flows downstream (in series) into existing Pond C5 located at the East Tributary of Jimmy Camp Creek. Existing Pond C5 is a large pond and the Pond C2.2 larger outflows for the 10-year and 25-year will not have any negative impact on Existing Pond C5 which flows directly into the East Tributary of Jimmy Camp Creek.

Statement Of Engineer of Record

To the best of my knowledge, information and belief, for the referenced project above, the improvements have been constructed in general compliance with the approved design plans and specifications as filed with El Paso County.

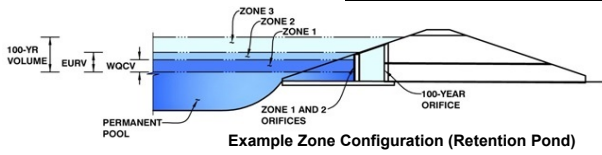
A circular blue ink seal for a Professional Engineer. The outer ring contains the text 'PROFESSIONAL ENGINEER' at the top and 'COLORADO' at the bottom. The inner ring contains the text 'RICHARD L. SCHINDLER' at the top and 'P.E. NO. 33997' at the bottom. A handwritten signature in blue ink is written across the seal, and the date '5/4/2023' is handwritten in the center.  
Richard L. Schindler  
Colorado P.E. No. 33997  
For and on behalf of Core Engineering Group, LLC

Attachments: Pond C1, C2.1, C2.2, C2.3, C3, & C4 As-Built Drawings

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C1-asbuilt**



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.70	1.240	Orifice Plate
Zone 2 (EURV)	5.76	2.759	Rectangular Orifice
Z3 (100+1/2WQCV)	7.86	3.393	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>7.392</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 =  sq. inches (diameter = 2 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	1.20	2.45					
Orifice Area (sq. inches)	3.20	3.20	3.20					

	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)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	3.70	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	5.76	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	19.75		inches

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

	Zone 2 Rectangular	Not Selected
Vertical Orifice Area =	0.82	N/A
Vertical Orifice Centroid =	0.25	N/A

User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe).

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.23	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	5.66	N/A	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	3.00	N/A	feet
Overflow Gate Open Area % =	70%	N/A	% , gate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow We  
 Height of Gate Upper Edge, H<sub>t</sub> =  feet  
 Overflow Weir Slope Length =  feet  
 Gate Open Area / 100-yr Orifice Area =   
 Overflow Gate Open Area w/o Debris =   
 Overflow Gate Open Area w/ Debris =

	Zone 3 Weir	Not Selected
Height of Gate Upper Edge, H <sub>t</sub> =	6.23	N/A
Overflow Weir Slope Length =	3.00	N/A
Gate Open Area / 100-yr Orifice Area =	9.50	N/A
Overflow Gate Open Area w/o Debris =	11.89	N/A
Overflow Gate Open Area w/ Debris =	5.94	N/A

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 =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	12.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Pl  
 Outlet Orifice Area =  ft<sup>2</sup>  
 Outlet Orifice Centroid =  feet  
 Half-Central Angle of Restrictor Plate on Pipe =

	Zone 3 Restrictor	Not Selected
Outlet Orifice Area =	1.25	N/A
Outlet Orifice Centroid =	0.56	N/A
Half-Central Angle of Restrictor Plate on Pipe =	1.91	N/A

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 =  feet  
 Stage at Top of Freeboard =  feet  
 Basin Area at Top of Freeboard =  acres  
 Basin Volume at Top of Freeboard =  acre-ft

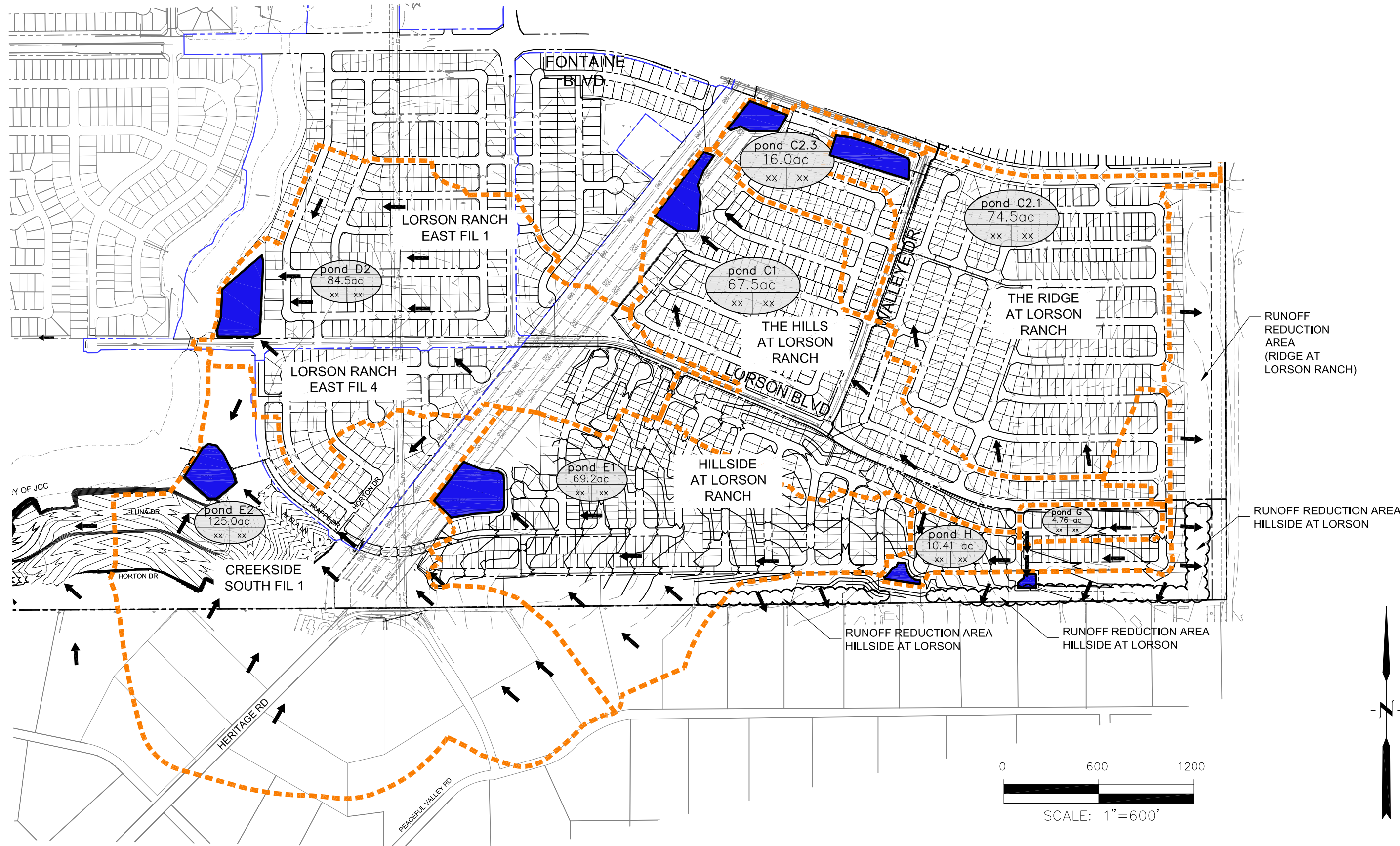
micropool = 0 = 5743.35

## 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
Design Storm Return Period =								
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	1.240	3.999	3.772	5.294	6.615	8.338	9.762	11.547
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.772	5.294	6.615	8.338	9.762	11.547
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	4.8	13.7	21.2	39.0	49.1	63.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.07	0.20	0.31	0.58	0.73	0.94
Peak Inflow Q (cfs) =	N/A	N/A	45.6	64.4	78.4	105.4	123.5	145.4
Peak Outflow Q (cfs) =	0.5	6.0	5.0	6.4	14.6	15.7	16.5	17.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.5	0.7	0.4	0.3	0.3
Structure Controlling Flow =	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	0.6	0.6	0.6	0.6
Max Velocity through Gate 2 (fps) =	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	48	49	50	49	48	47	46
Time to Drain 99% of Inflow Volume (hours) =	41	52	53	55	55	55	56	56
Maximum Ponding Depth (ft) =	3.70	5.76	5.15	6.02	6.57	7.37	8.06	8.95
Area at Maximum Ponding Depth (acres) =	1.10	1.50	1.42	1.53	1.59	1.68	1.76	1.87
Maximum Volume Stored (acre-ft) =	1.248	4.005	3.115	4.398	5.238	6.545	7.732	9.348





**CORE  
ENGINEERING GROUP**

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BURNSVILLE, MN 55306  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

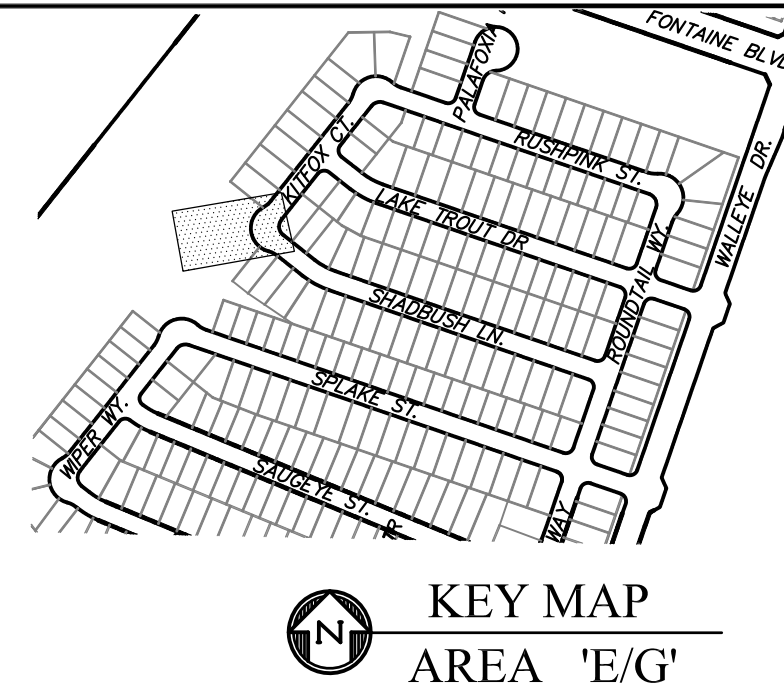
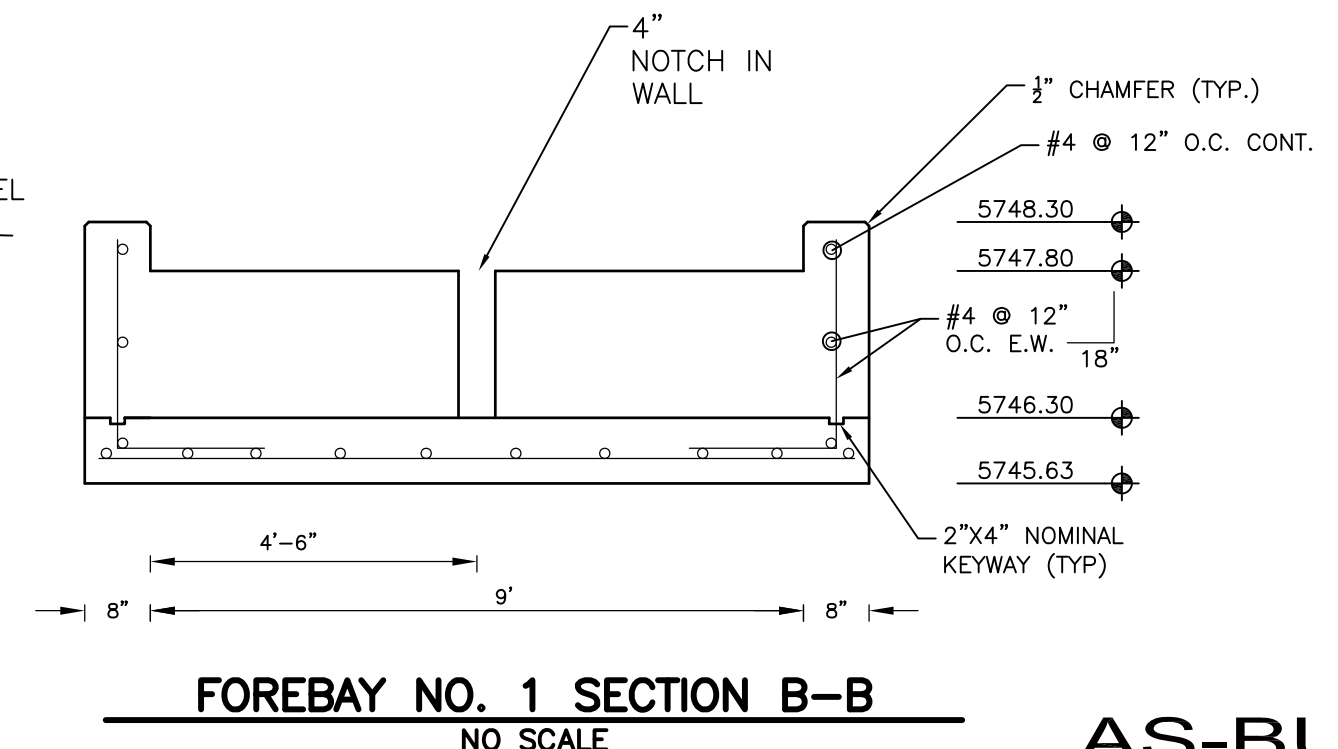
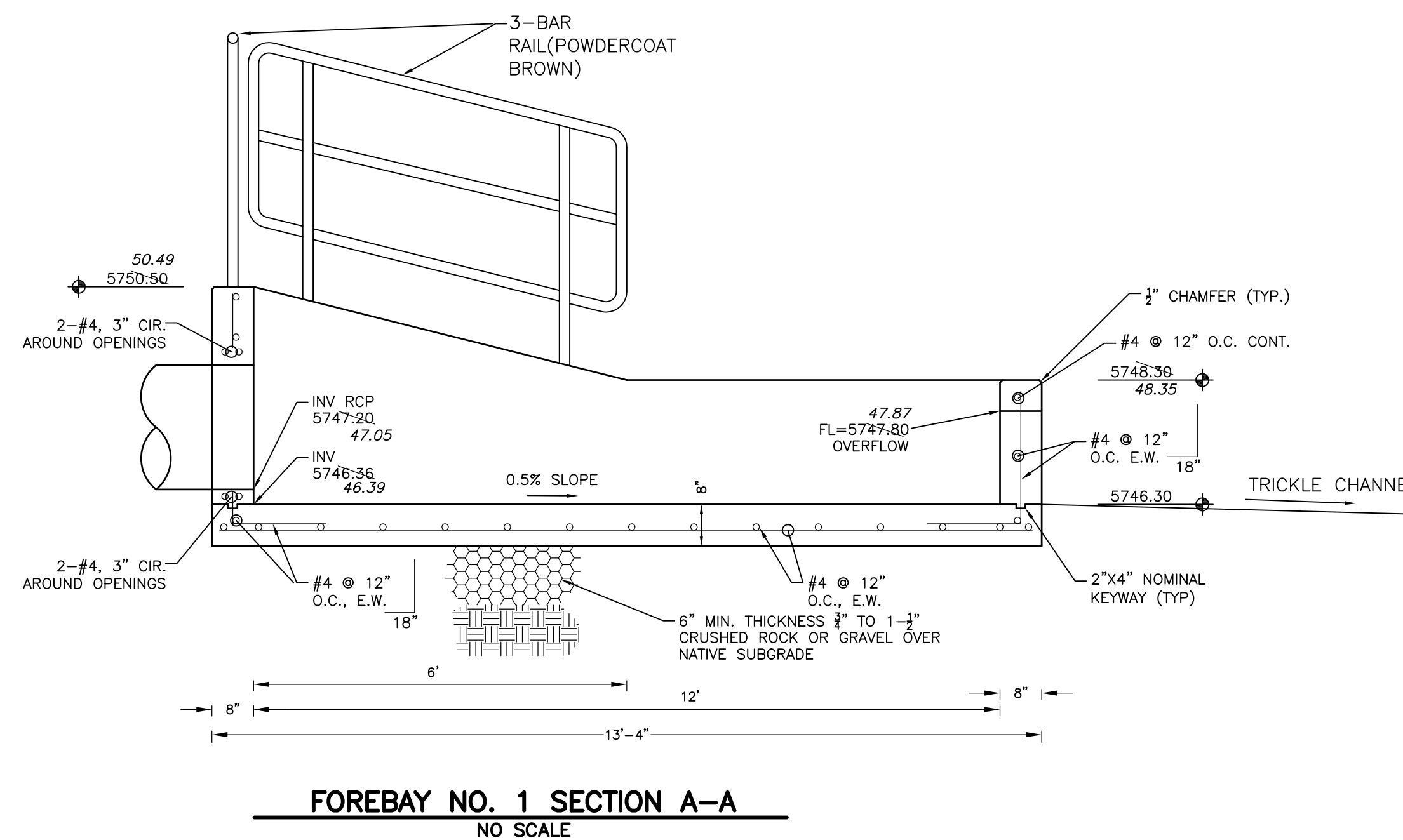
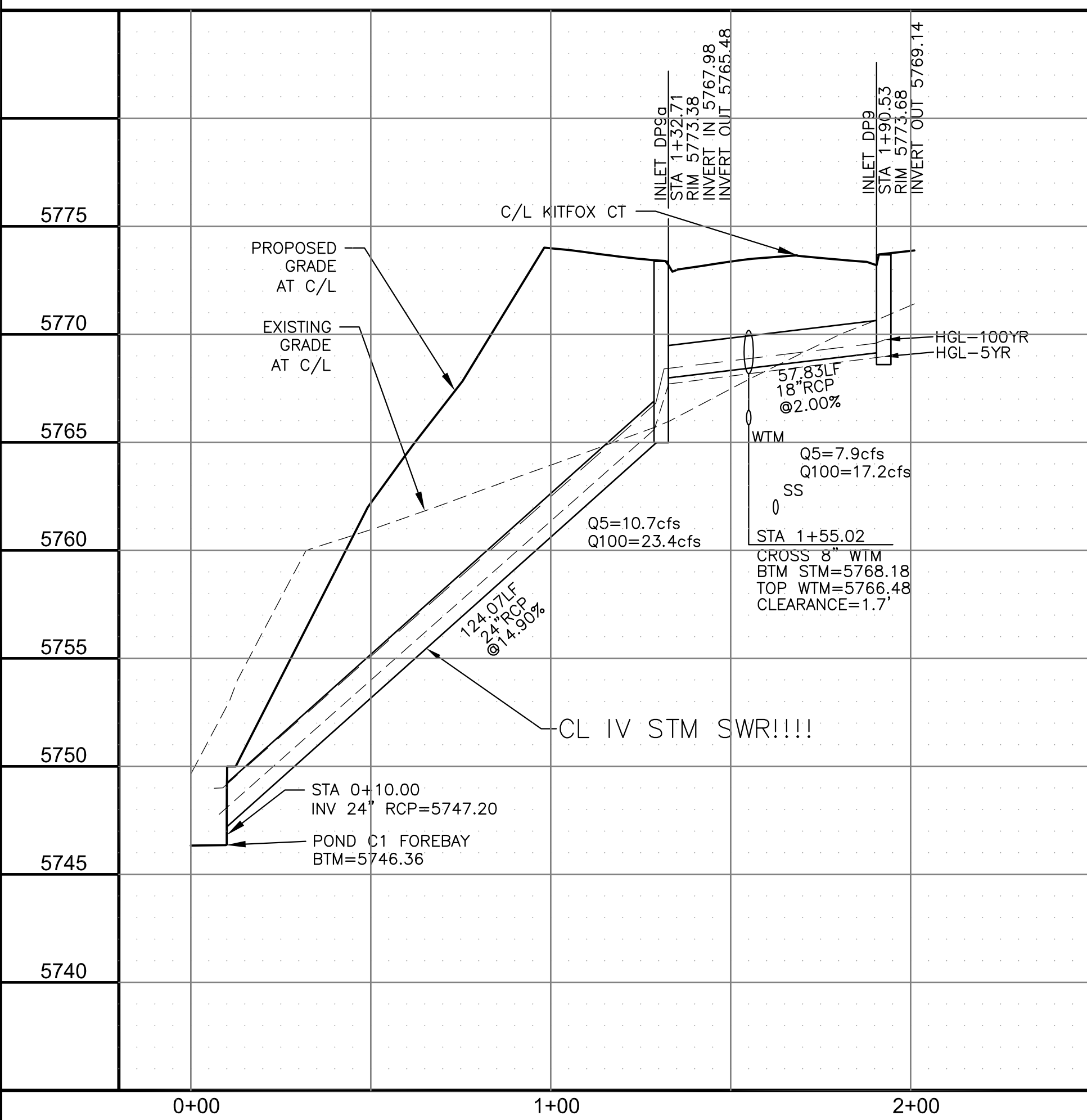
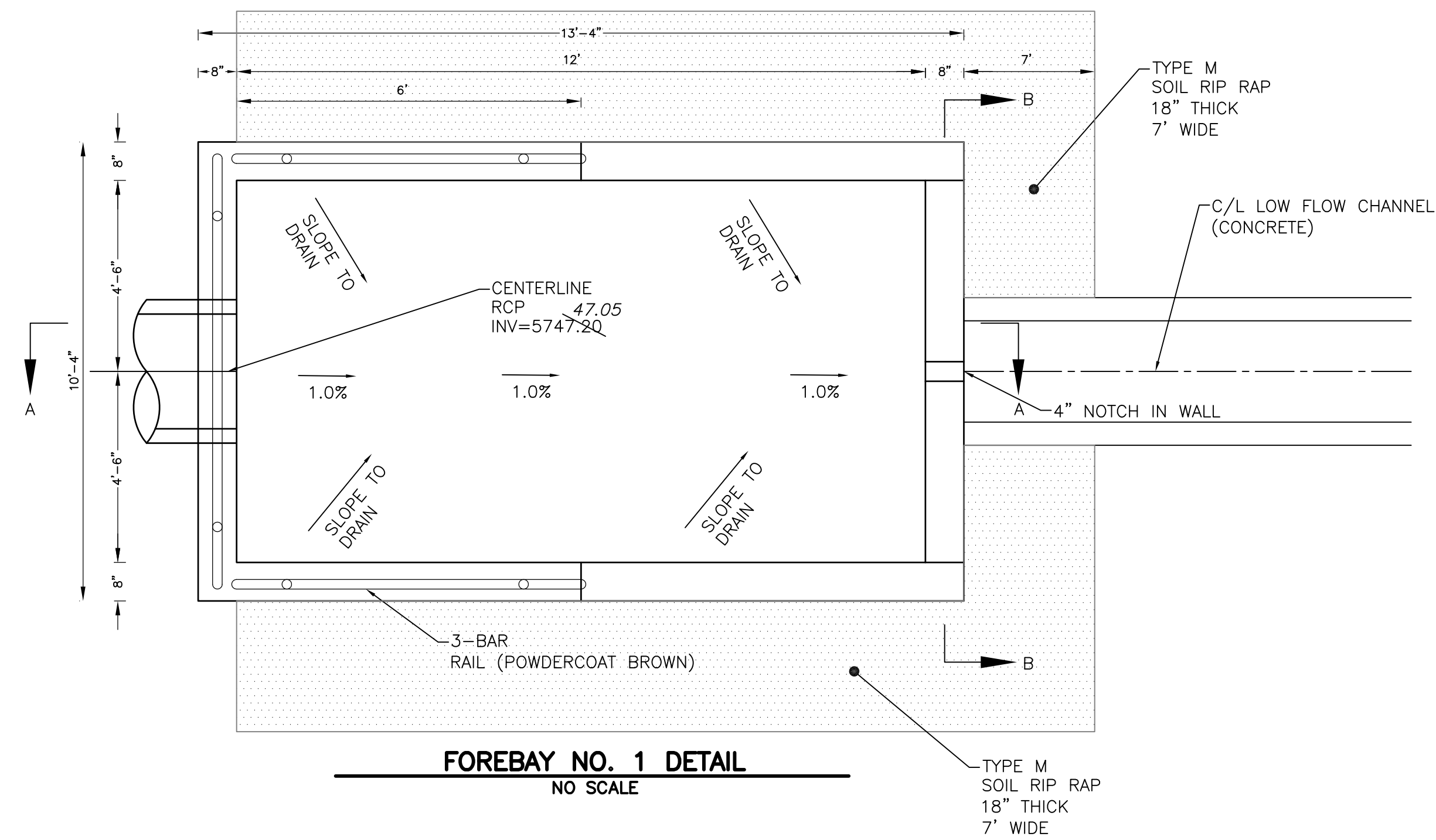
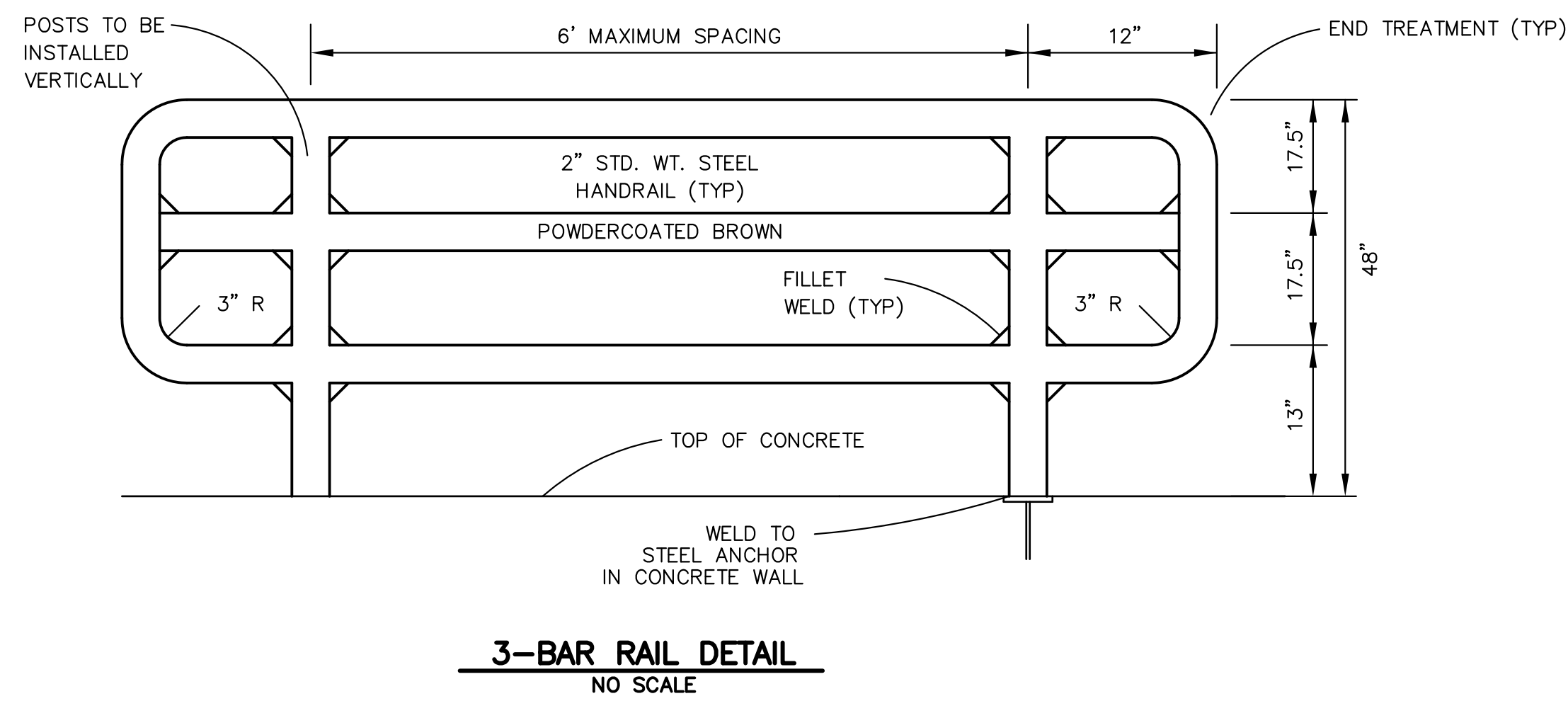
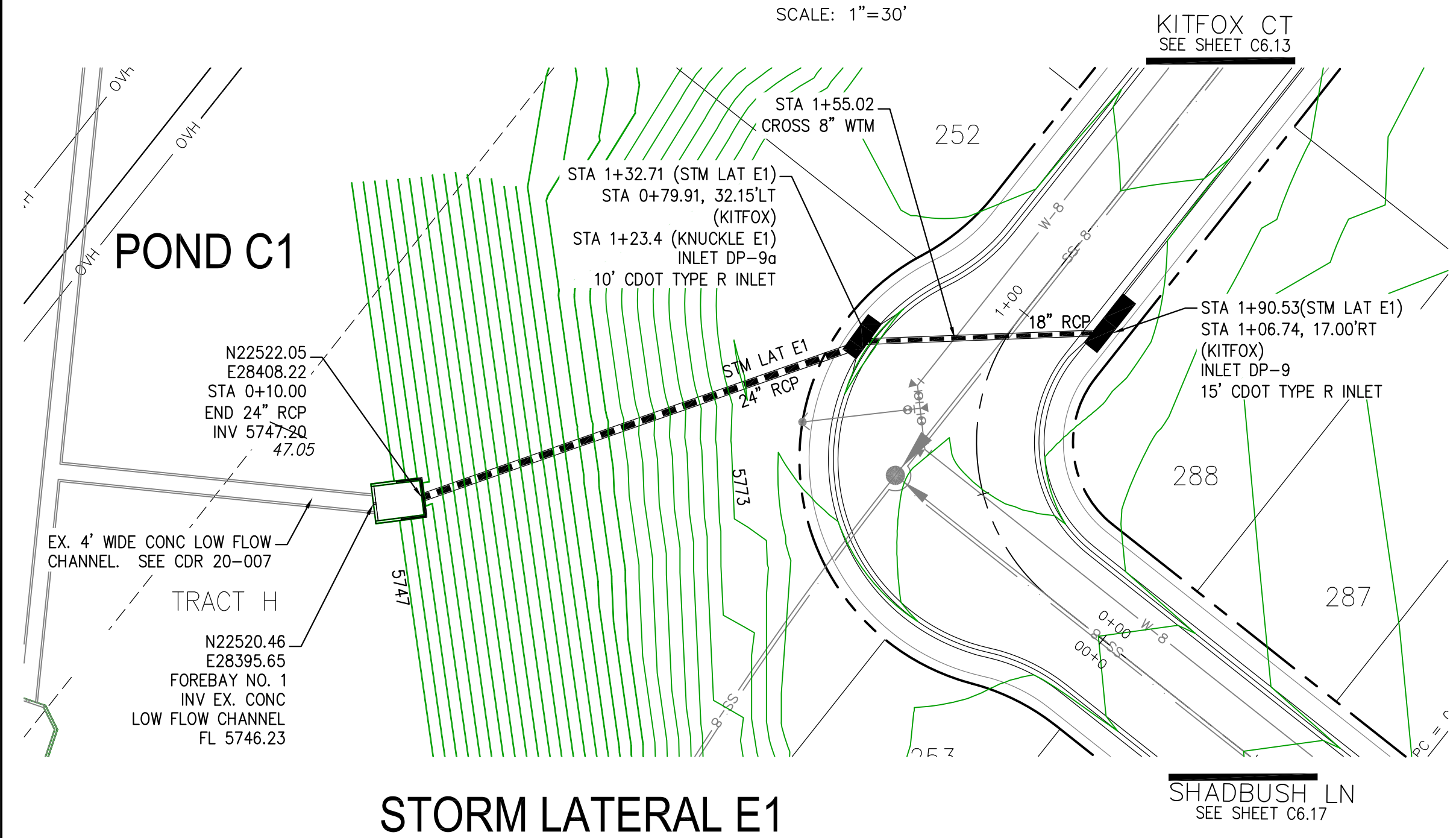
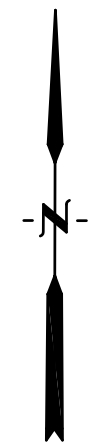
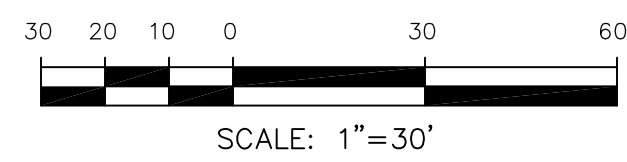
**HILLSIDE AT LORSON RANCH  
WATER QUALITY & POND TRIBUTARY AREAS**

SCALE:	DATE:	FIGURE NO.
NTS	APRIL, 2022	1



- NOTES**
1. ALL SPOT ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE NOTED.
  2. SEE GRADING PLAN FOR GRADING INFORMATION.
  3. ALL STORM SEWER SHALL BE CLASS III RCP.
  4. ALL MHS SHALL BE TYPE 1 UNLESS OTHERWISE NOTED.

- ① CURVE DATA ID
- ② CURB TRANSITIONS
- ③ PEDESTRIAN RAMP, SEE SHEET C10.1



**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
BURNING WOOD, CO 80906  
PHONE: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

DATE: JAN 14, 2021

DESCRIPTION: RAISE SITE BY 1' EAST OF POWERLINES

NO. 1

PROJECT: THE HILLS AT LORSON RANCH FILING NO. 1  
212 N. WAHSATCH AVE., SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
FOUNTAIN BLVD. VALLEJO DR  
COLORADO SPRINGS, COLORADO  
CONTACT: JEFF MARK

PREPARED FOR: LORSON, LLC  
212 N. WAHSATCH AVE., SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

**STORM SEWER LATERAL - AREA 'E / G'**

**STORM LATERAL E1**

**STA 0+00 TO 1+90**

DATE: JUNE 7, 2021

PROJECT NO. 100.062

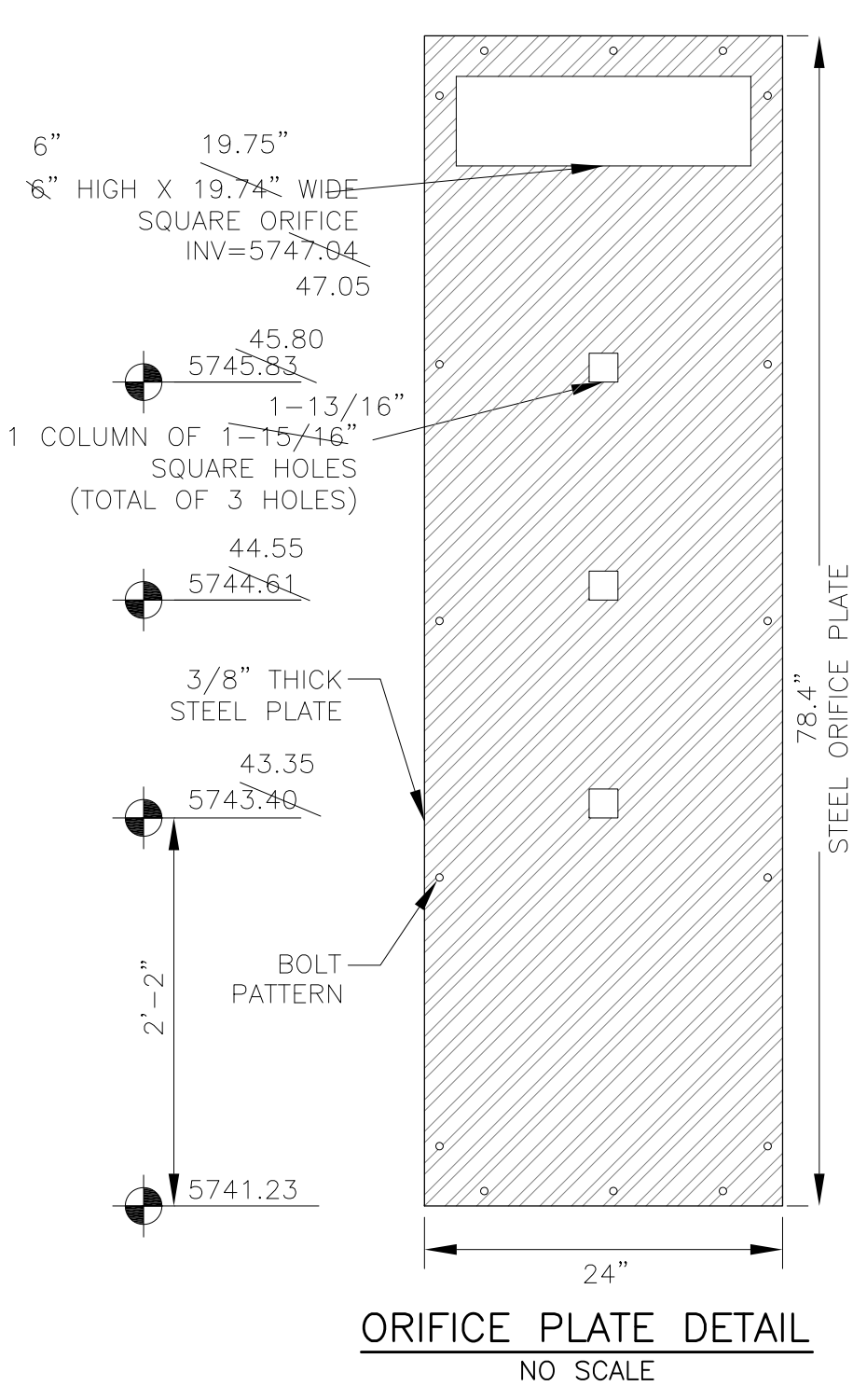
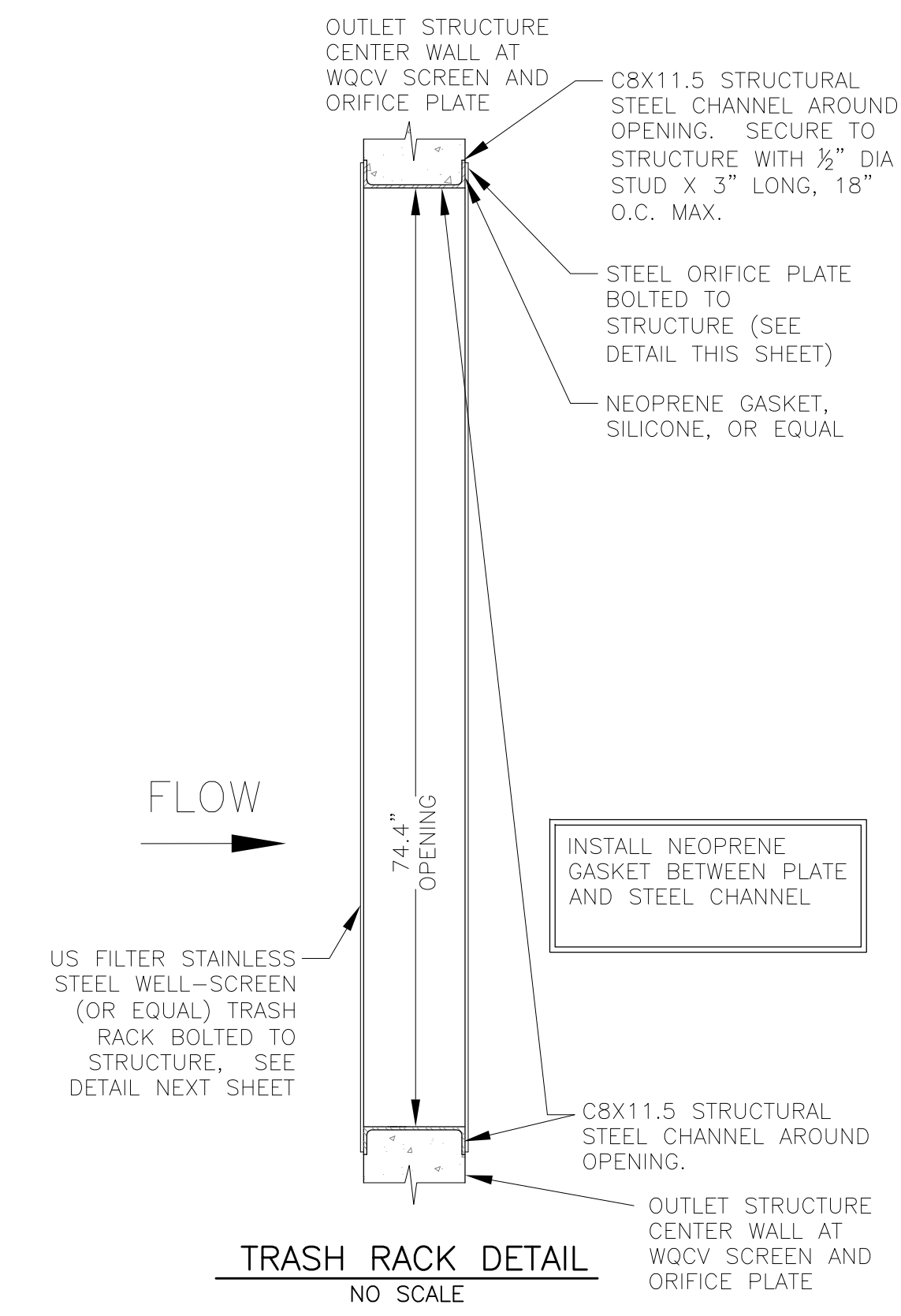
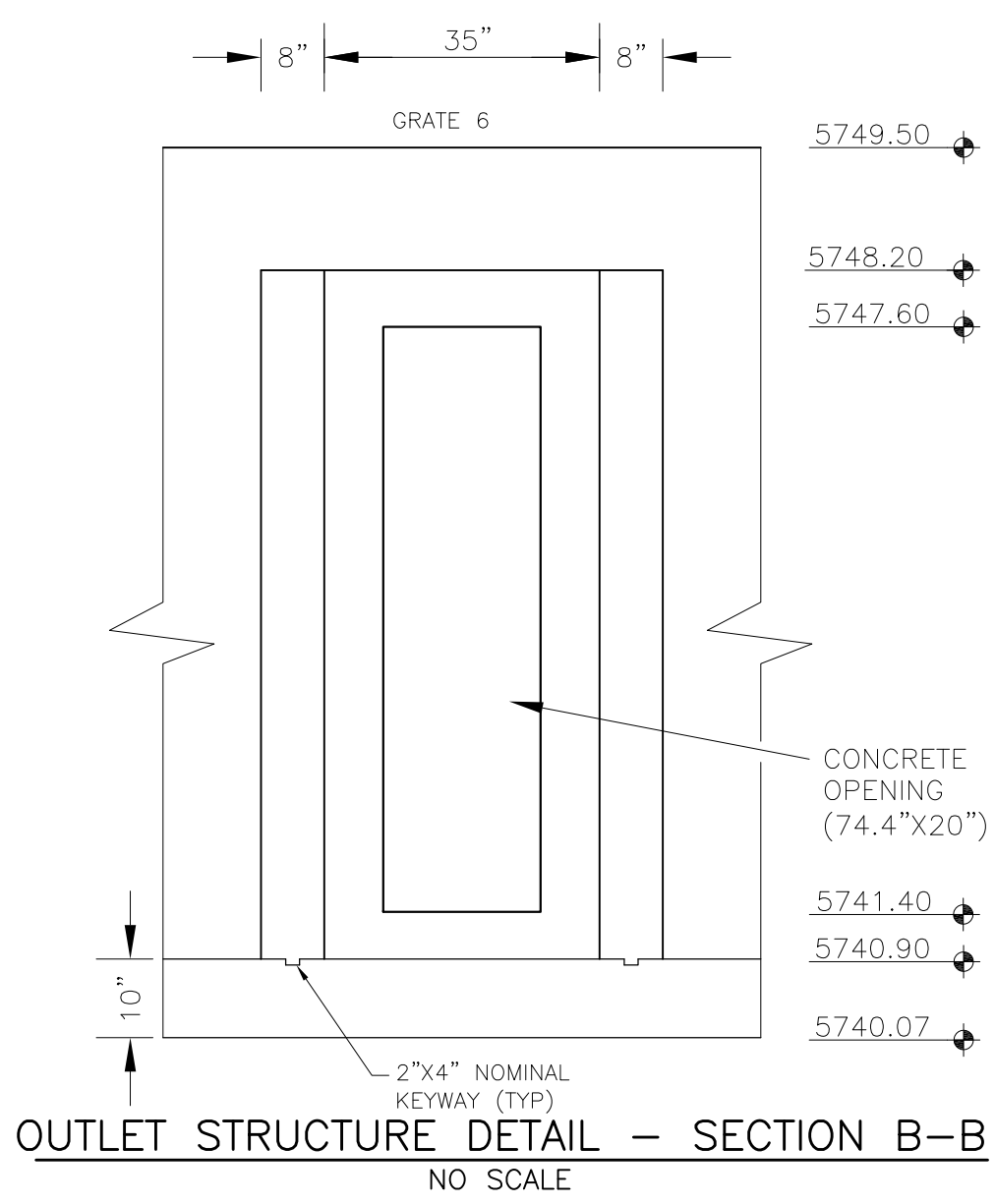
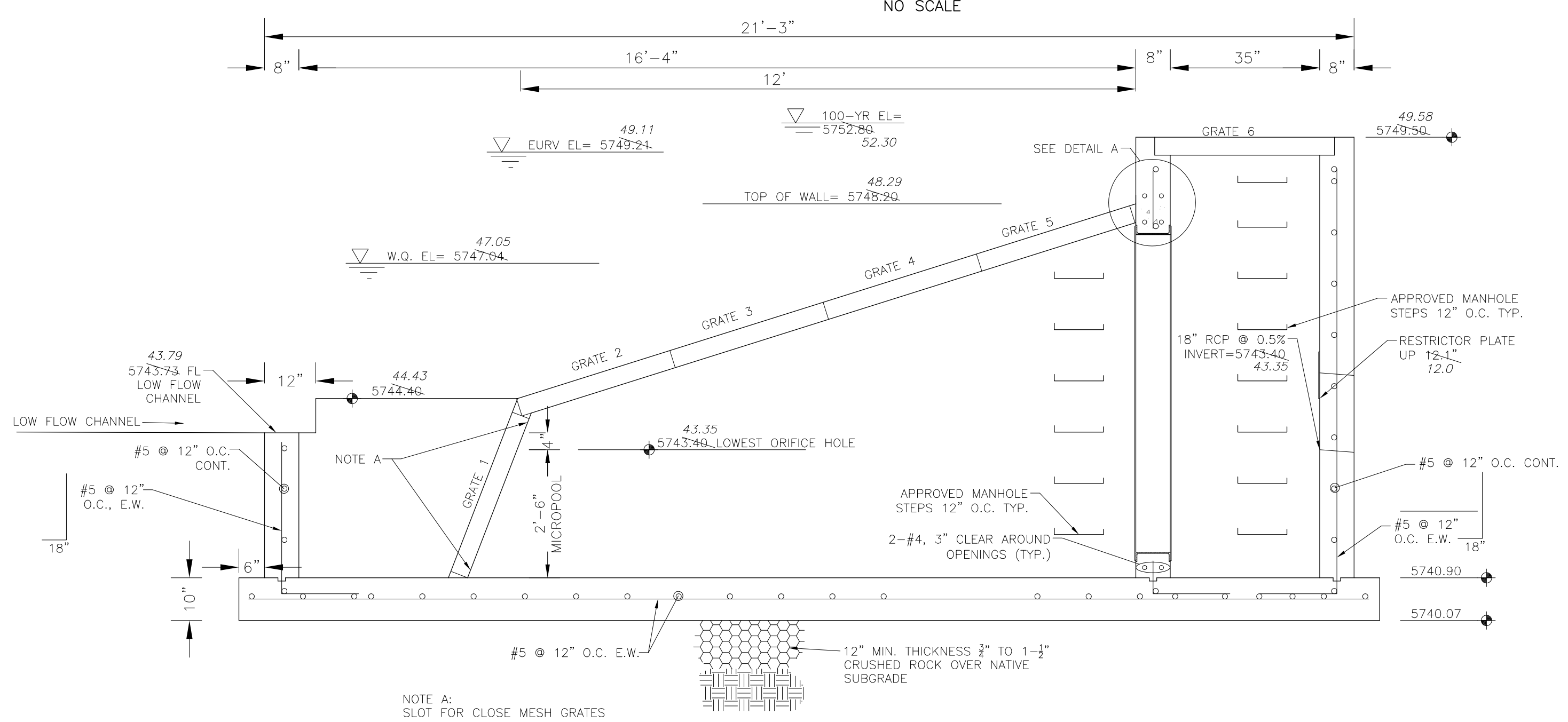
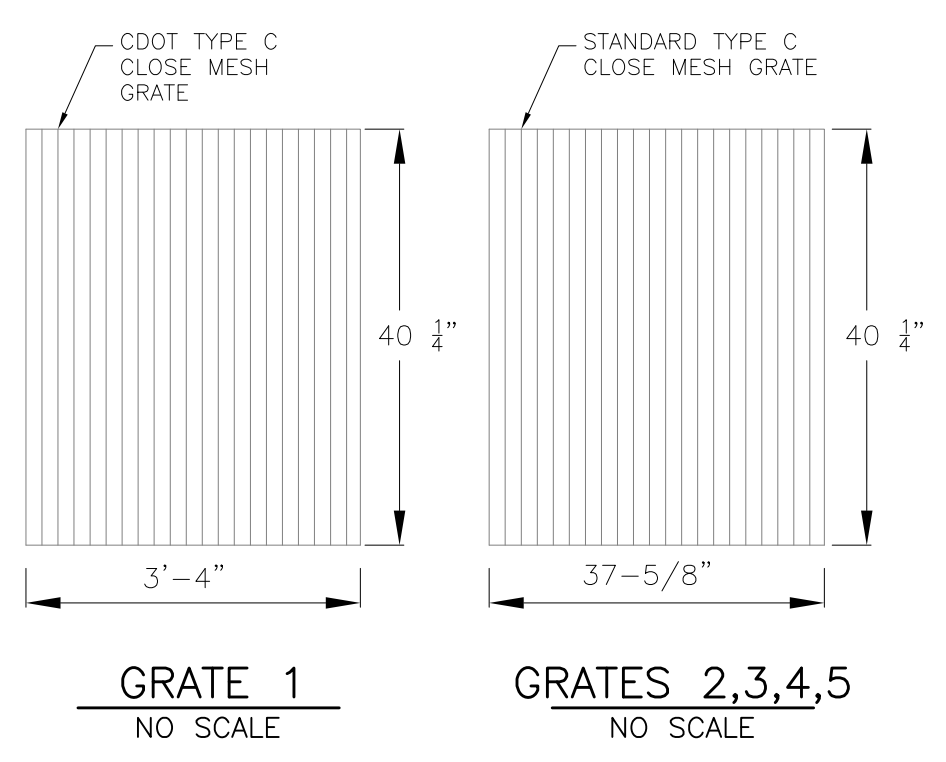
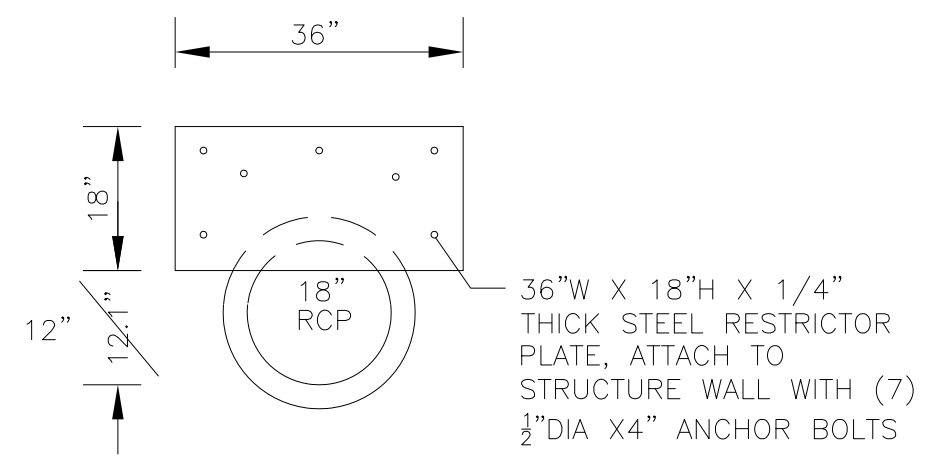
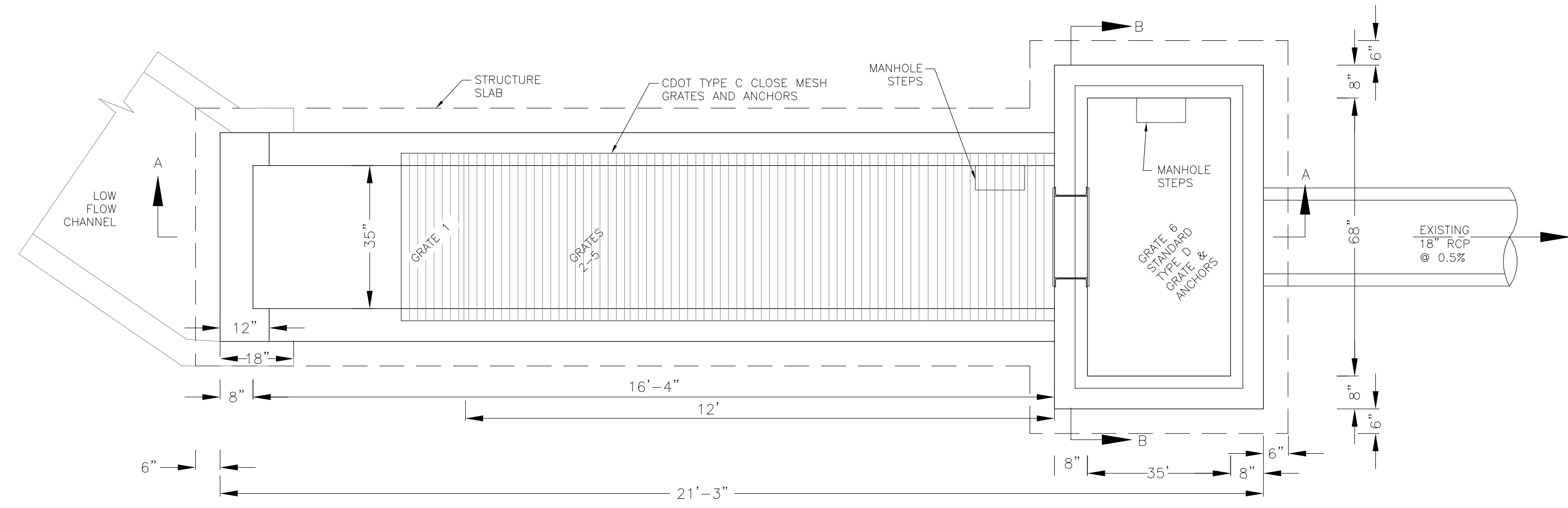
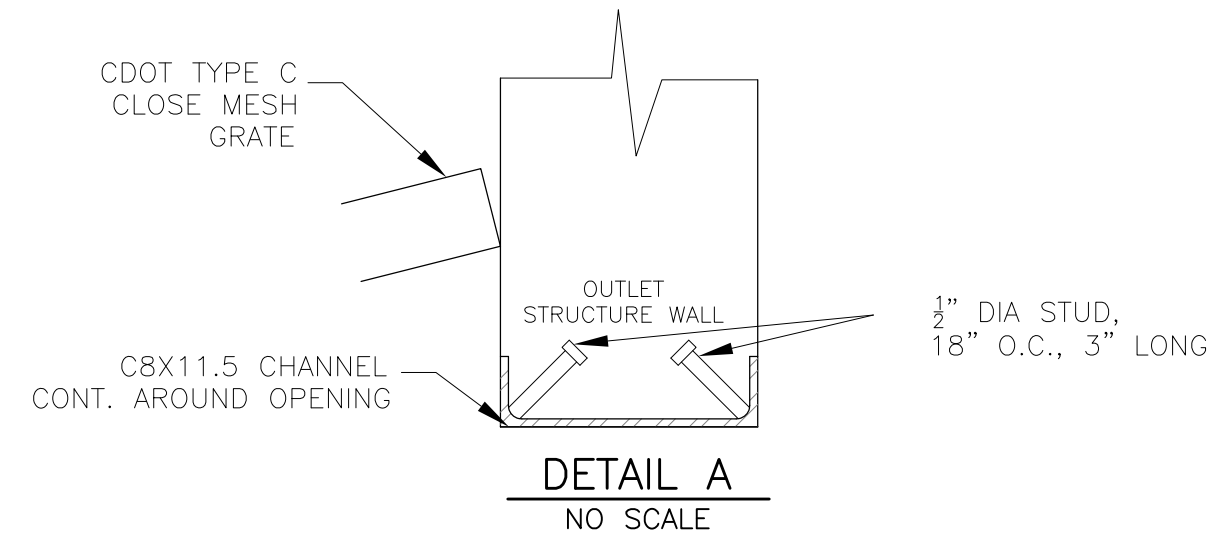
SHEET NUMBER C7.1

TOTAL SHEETS: 42

**AS-BUILT**  
DATE: 09/30/2022





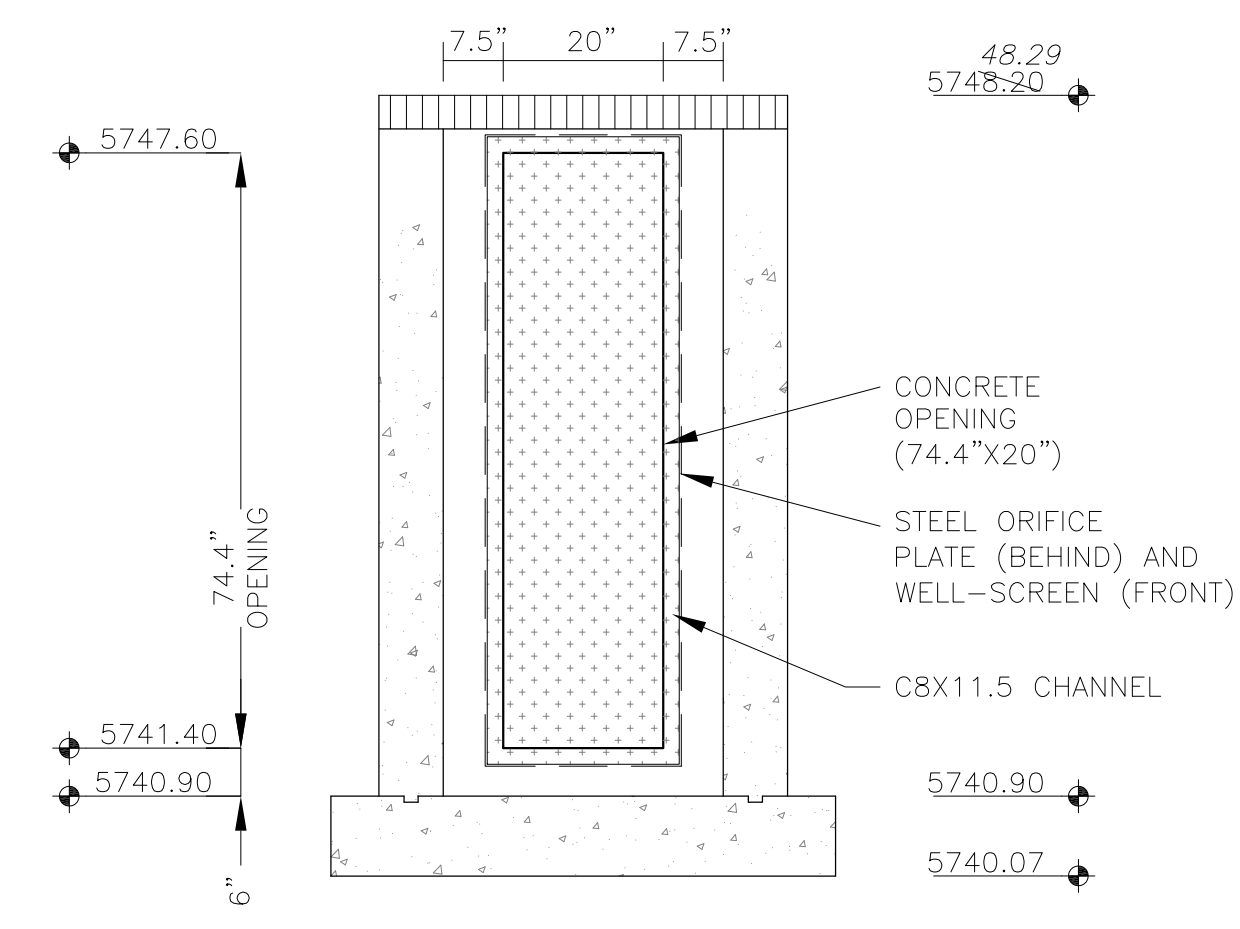


**OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:**

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
  - GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- | BAR SIZE           | #4    | #5    | #6    |
|--------------------|-------|-------|-------|
| MIN. SPLICE LENGTH | 1'-3" | 1'-7" | 2'-0" |
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
  - CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE.
  - EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
  - ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
  - SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
  - REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
  - ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

- WQCV WELL-SCREEN NOTES:**
- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
  - WQCV Well Screen
    - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
    - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
    - Type and Size of Support Rod: TE 0.074"x0.50"
    - Spacing of Support Rod (O.C.): 1.0 Inch
    - Total Screen Thickness: 0.655"
    - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle

**AS-BUILT**  
DATE: 09/30/2022

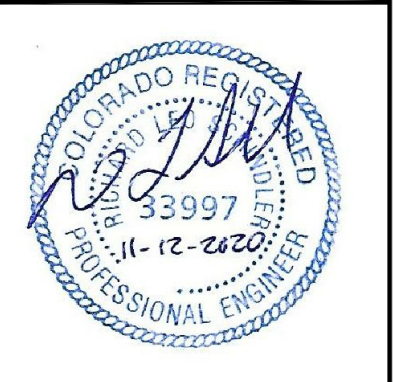


**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
PH: 719.570.5506  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cgei.com

DATE: \_\_\_\_\_  
DESCRIPTION: \_\_\_\_\_  
NO: \_\_\_\_\_  
PREPARED FOR: **LORSON, LLC**  
212 N. WAHSATCH AVE. SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
PROJECT: **THE HILLS COLLECTOR STREET CONSTRUCTION**  
FONTAINE BLVD. - GRAYLING DR  
LORSON BLVD - WALLEYE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

**POND C1  
FULL SPECTRUM  
OUTLET STRUCTURE DETAILS**

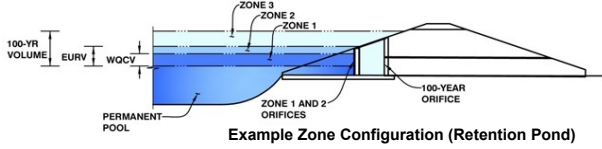


DATE: NOV 12, 2020  
PROJECT NO: 100.061  
SHEET NUMBER: C9.12  
TOTAL SHEETS: 58

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C2.1-asbuilt**



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.32	1.368	Orifice Plate
Zone 2 (EURV)	6.18	3.045	Rectangular Orifice
Z3 (100+1/2WQCV)	8.98	3.745	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>8.159</b>	

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 <sup>2</sup>
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 =	3.32	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	4.00	sq. inches (use rectangular openings)

Calculated Parameters for Plate

WQ Orifice Area per Row =	2.778E-02	ft <sup>2</sup>
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	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	0.95	2.05					
Orifice Area (sq. inches)	4.00	4.00	4.00					

	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)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	3.20	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	6.18	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	6.00	N/A	inches
Vertical Orifice Width =	14.59		inches

Calculated Parameters for Vertical Orif

	Zone 2 Rectangular	Not Selected
Vertical Orifice Area =	0.61	N/A
Vertical Orifice Centroid =	0.25	N/A

User Input: Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe).

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.11	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	8.00	N/A	feet
Overflow Weir Gate Slope =	0.00	N/A	H:V
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Gate Open Area % =	70%	N/A	% , gate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected
Height of Gate Upper Edge, H <sub>t</sub> =	6.11	N/A
Overflow Weir Slope Length =	6.00	N/A
Gate Open Area / 100-yr Orifice Area =	6.84	N/A
Overflow Gate Open Area w/o Debris =	33.60	N/A
Overflow Gate Open Area w/ Debris =	16.80	N/A

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 =	0.43	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
Outlet Orifice Centroid =	1.25	N/A
Half-Central Angle of Restrictor Plate on Pipe =	3.14	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	9.18	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	25.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.01	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =	1.69	feet
Stage at Top of Freeboard =	11.88	feet
Basin Area at Top of Freeboard =	1.71	acres
Basin Volume at Top of Freeboard =	12.77	acre-ft

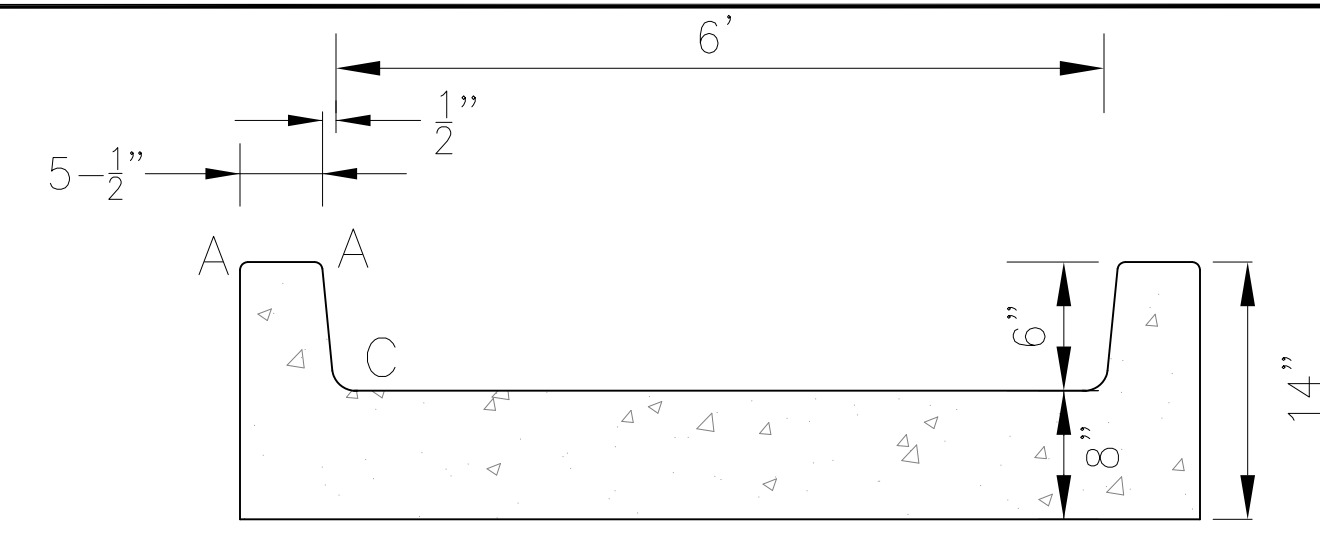
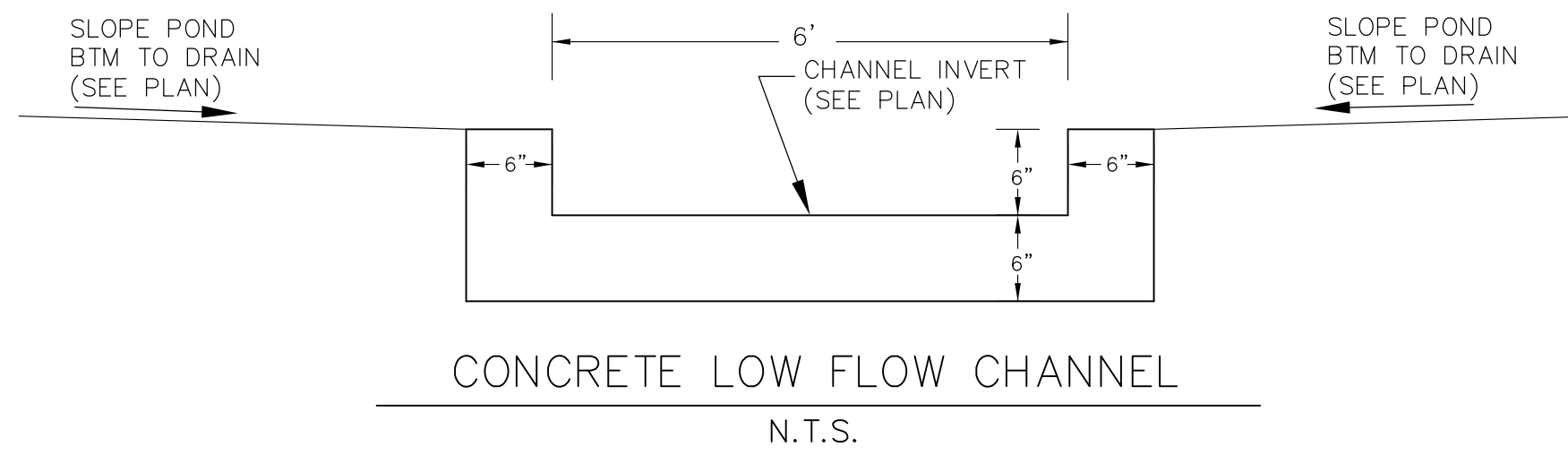
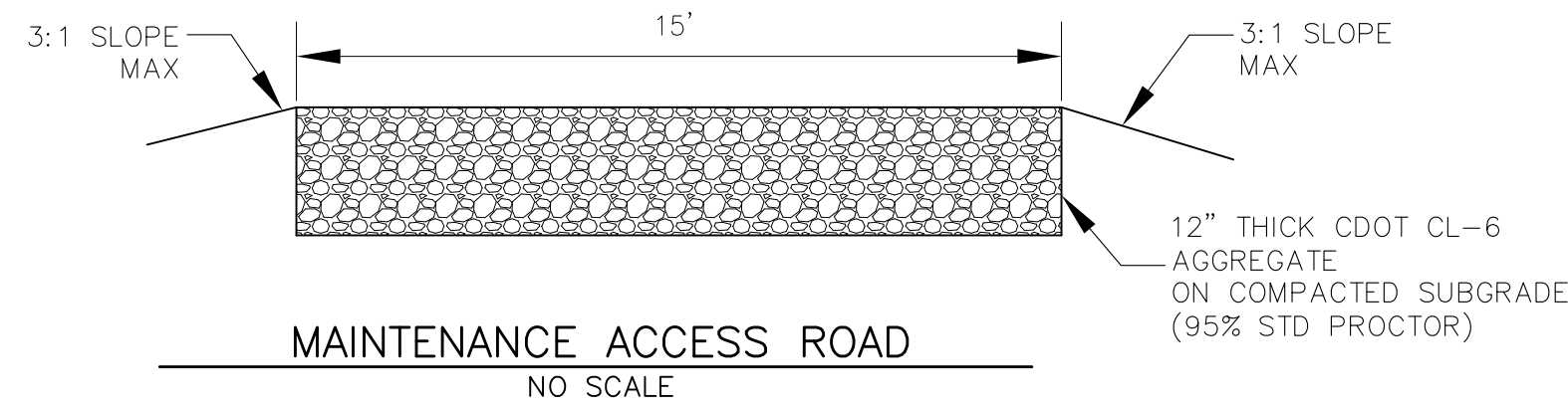
top micropool = 5761.15 = stage 0

## 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)

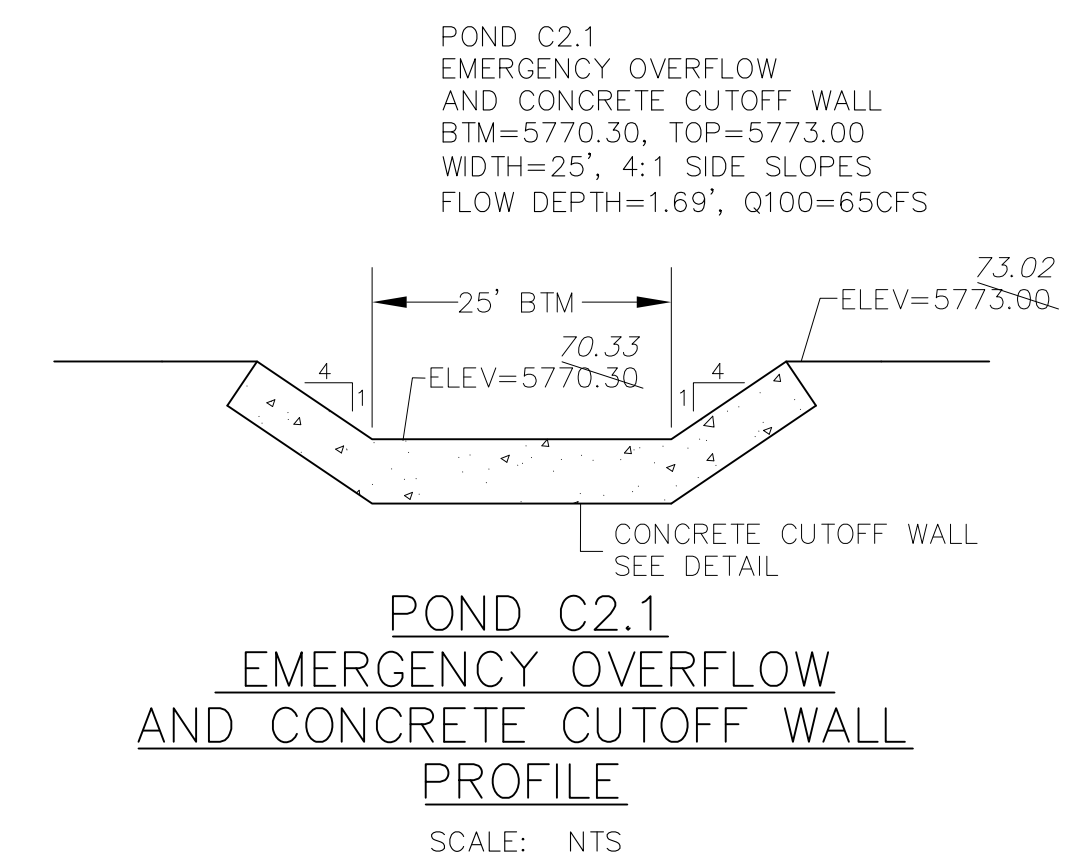
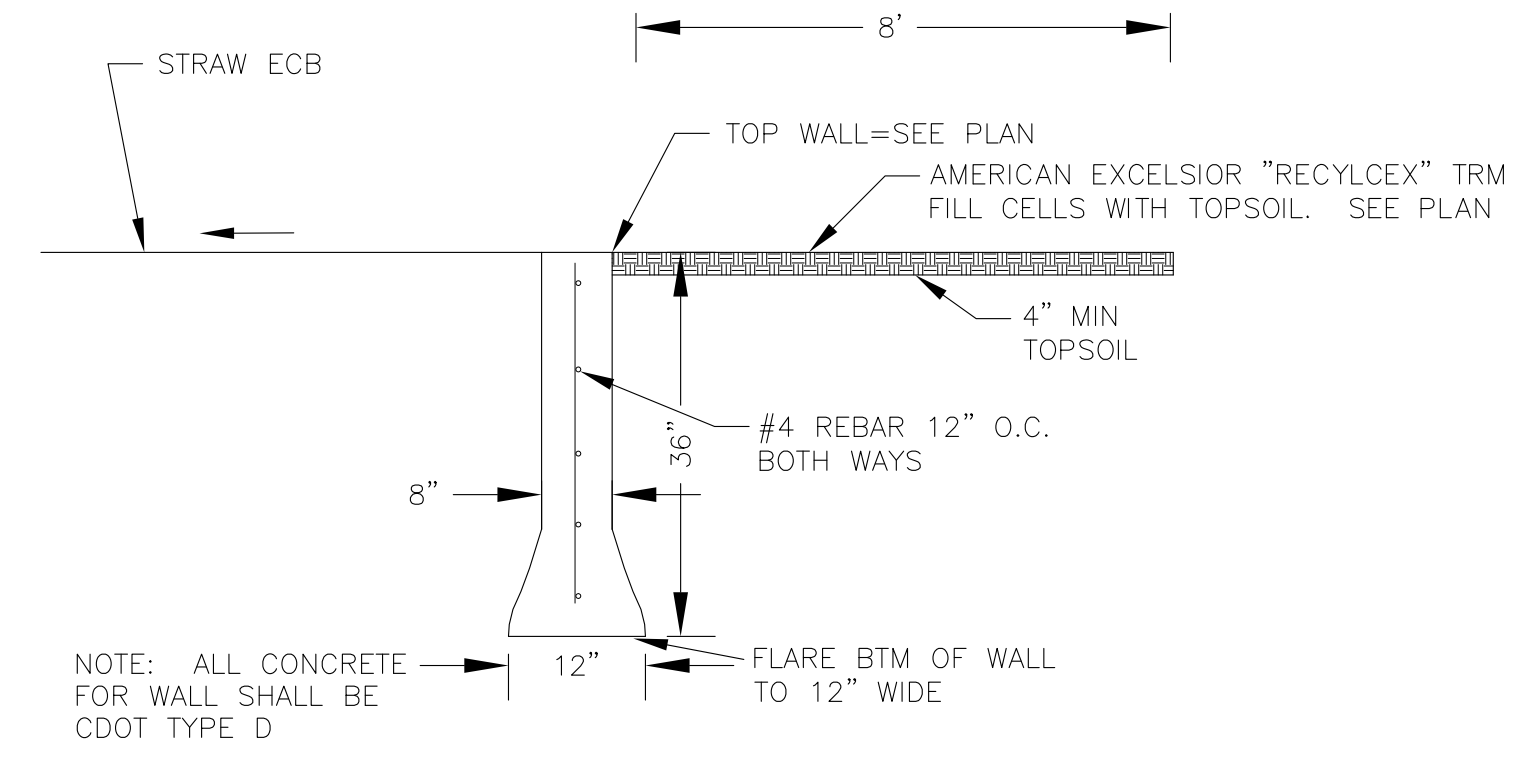
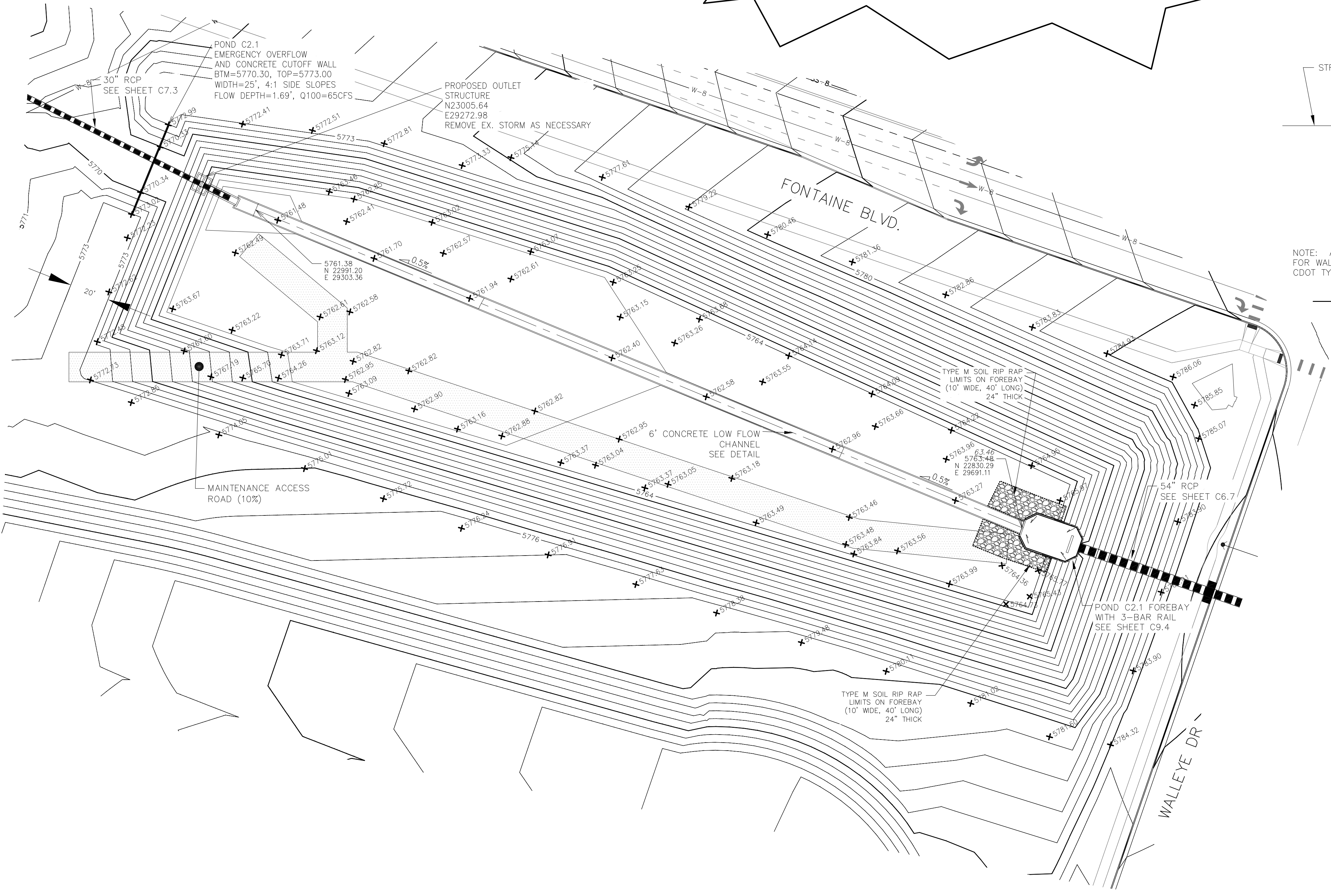
	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period =								
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	1.368	4.414	4.152	5.828	7.285	9.182	10.750	12.716
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	4.152	5.828	7.285	9.182	10.750	12.716
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	7.5	21.2	32.2	57.6	72.4	92.1
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.10	0.28	0.43	0.77	0.97	1.24
Peak Inflow Q (cfs) =	N/A	N/A	63.8	91.4	112.2	146.0	171.6	201.7
Peak Outflow Q (cfs) =	0.7	6.3	4.9	13.5	32.2	59.3	62.0	66.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	1.0	1.0	0.9	0.7
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps) =	N/A	0.03	N/A	0.2	0.8	1.6	1.6	1.7
Max Velocity through Gate 2 (fps) =	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	46	46	46	45	42	41	38
Time to Drain 99% of Inflow Volume (hours) =	40	50	51	52	51	50	49	49
Maximum Ponding Depth (ft) =	3.32	6.18	5.40	6.36	6.68	7.12	7.70	8.69
Area at Maximum Ponding Depth (acres) =	0.93	1.20	1.13	1.22	1.25	1.29	1.34	1.44
Maximum Volume Stored (acre-ft) =	1.369	4.424	3.503	4.642	5.025	5.583	6.347	7.726



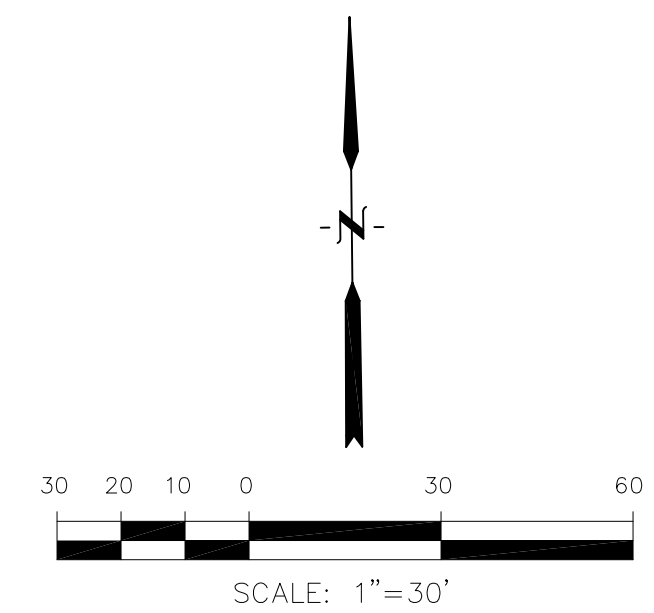


LENGTH FOR RADII	
A	1/2"
C	1-1/2"

POND C2.1 IS LOCATED IN TRACT G, THE HILLS AT LORSON RANCH FILING NO. 1. SEE MAINTENANCE AGREEMENT AT REC. NO. 220211669



**AS-BUILT**  
DATE: 09/30/2022



**CORE ENGINEERING GROUP**  
19004 1ST AVENUE S.  
DENVER, CO 80202  
PHONE: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

DATE: JAN 12, 2021

DESCRIPTION: RAISE SITE 1' EAST OF POWERLINES

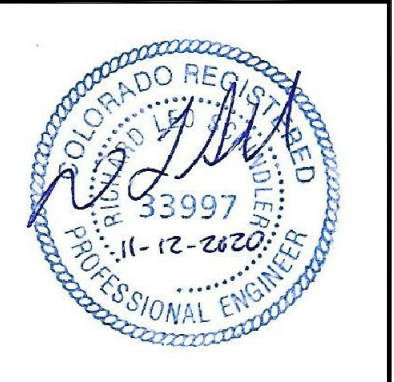
NO. 1

PREPARED FOR: **LORSON, LLC**  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
(719) 635-3200  
CONTACT: JEFF MARK

PROJECT: **THE HILLS COLLECTOR STREET CONSTRUCTION**  
FONTAINE BLVD - GRAYLING DR  
LORSON BLVD - WALLEVE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

**POND C2.1 FOREBAY AND LOW FLOW CHANNEL LAYOUT**

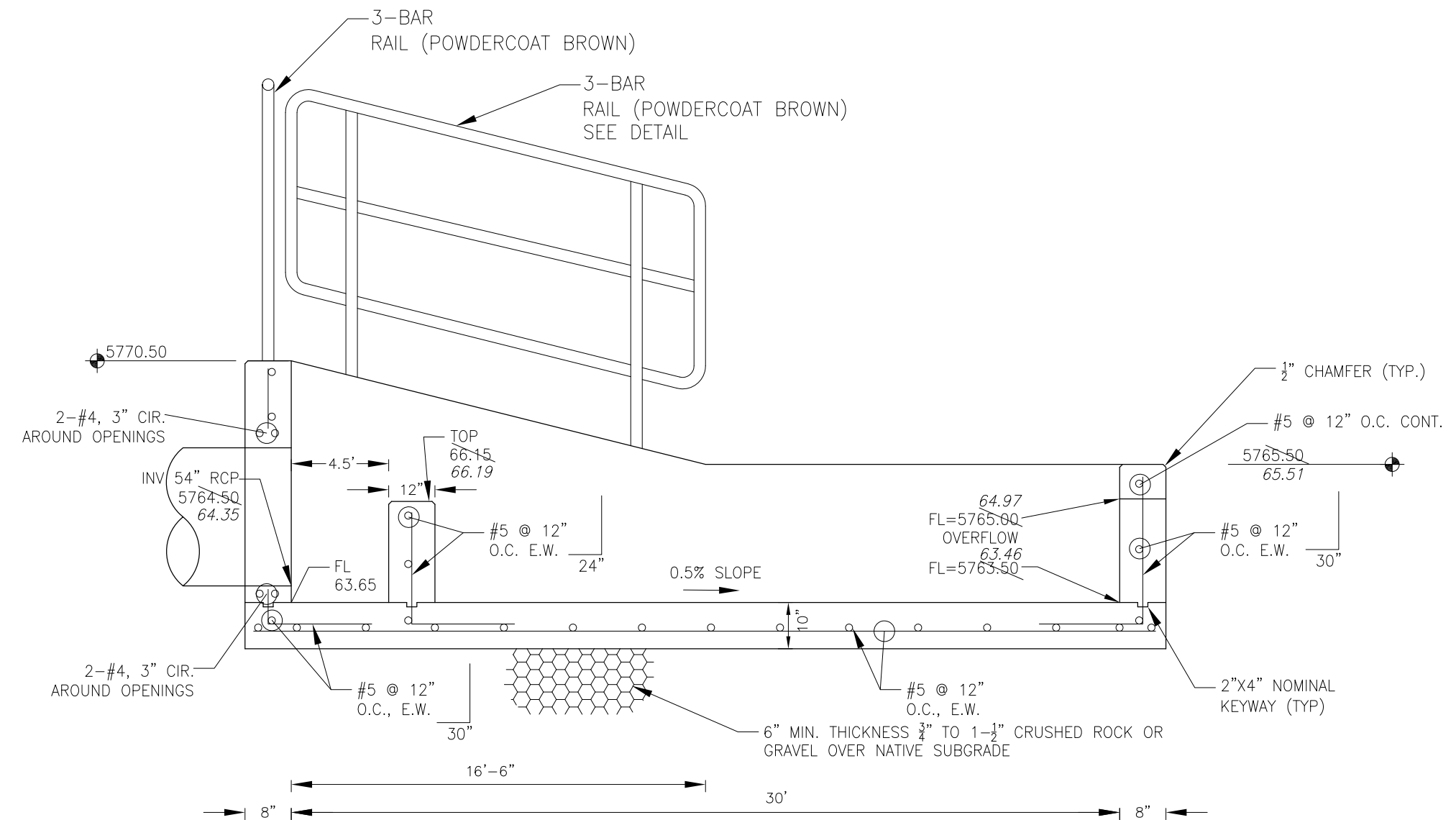


DATE: NOV 12, 2020

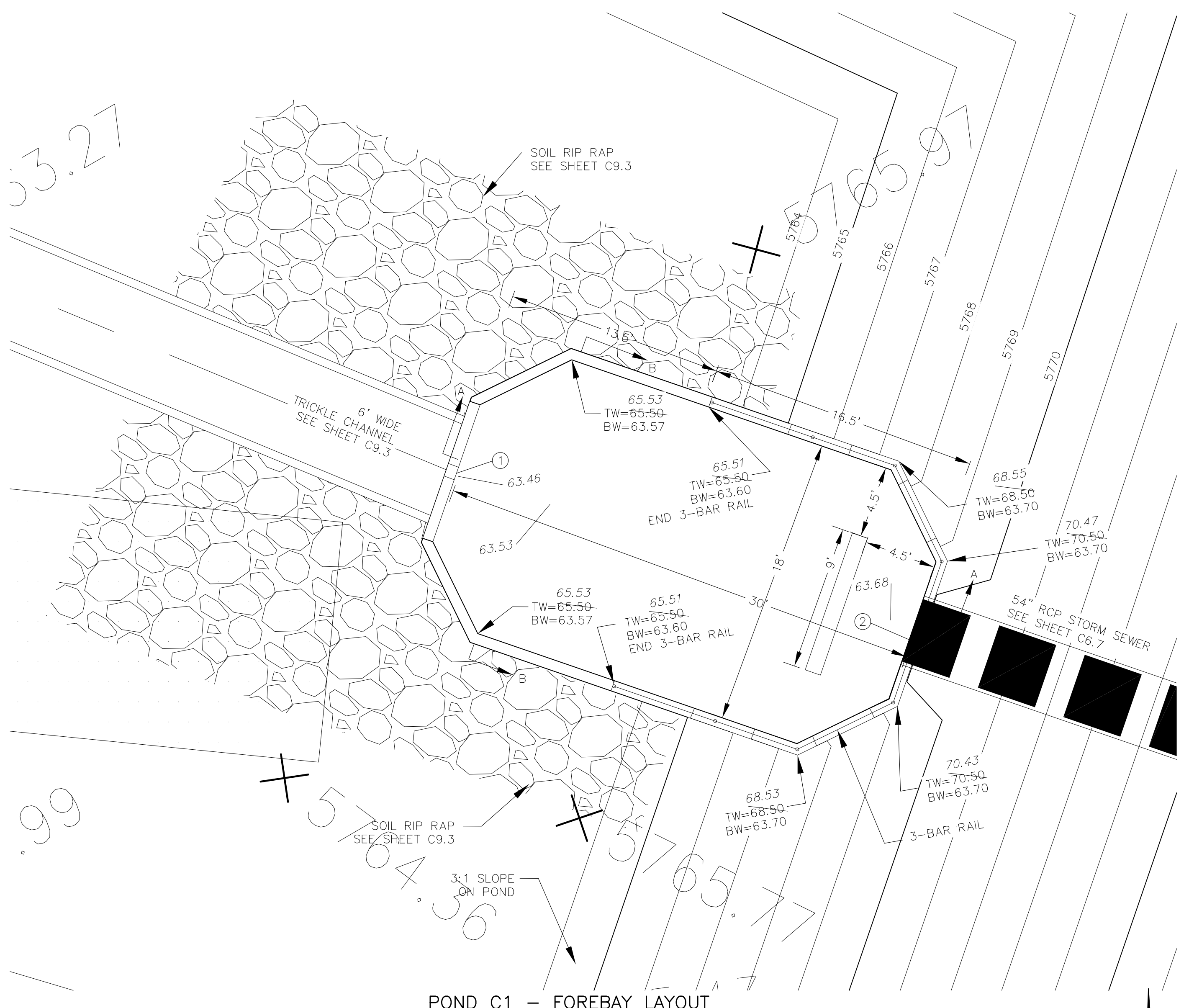
PROJECT NO. 100.061

SHEET NUMBER **C9.3**

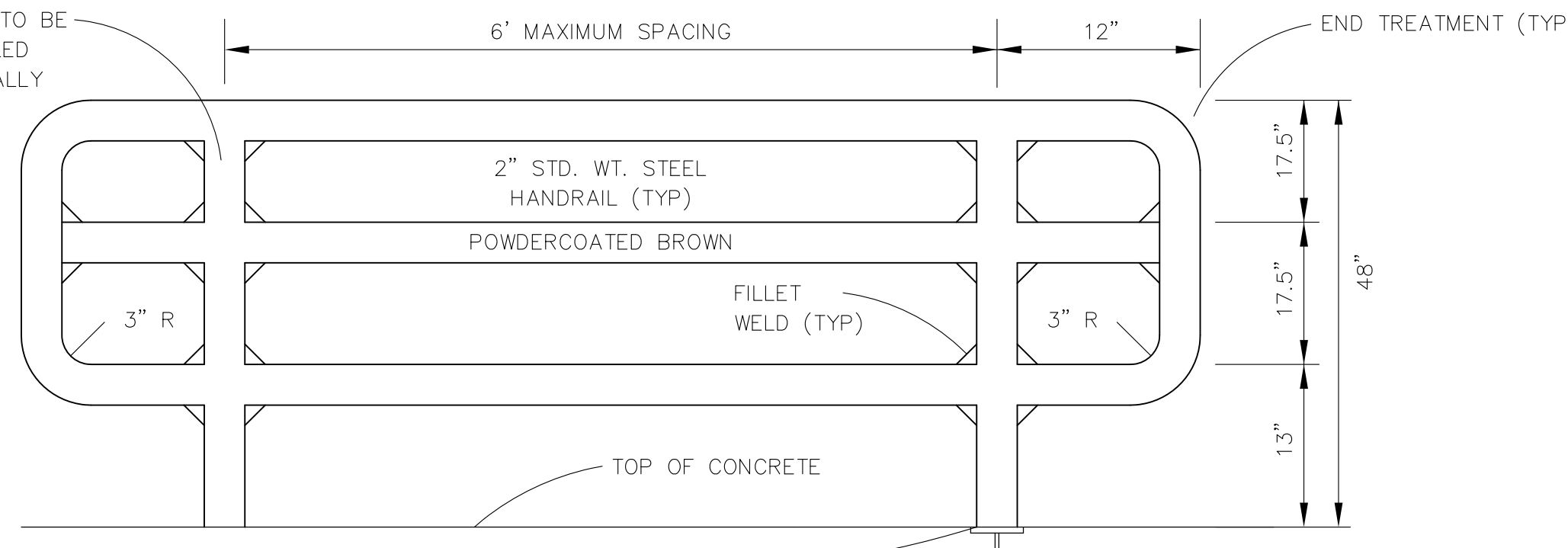
TOTAL SHEETS: 58



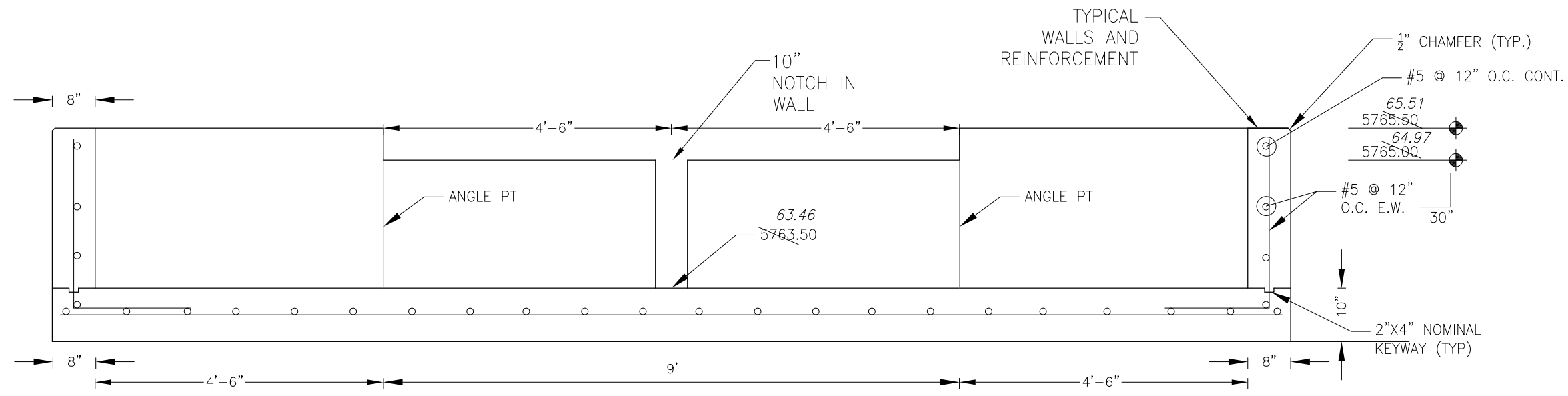
FOREBAY SECTION A-A  
NO SCALE



POND C1 - FOREBAY LAYOUT  
SCALE: 1"=5'



3-BAR RAIL DETAIL  
NO SCALE



FOREBAY SECTION B-B  
NO SCALE

NOTE: ALL CONCRETE FOR FOREBAY SHALL BE CDOT TYPE D

POINT TABLE (FOREBAY)				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	22830.08	29691.75	5763.50	FOREBAY BOTTOM
2	22820.31	29720.11	5763.65	FOREBAY BOTTOM, INV 54"=5764.50

**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
DENVER, CO 80202  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

DATE: JAN 12, 2021  
DESCRIPTION: RAISE SITE 1' EAST OF POWERLINES  
NO. 1

PREPARED FOR:  
**LORSON, LLC**  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: JEFF MARK

PROJECT:  
**THE HILLS COLLECTOR STREET CONSTRUCTION**  
FONTAINE BLVD. - GRAYLING DR  
LORSON BLVD - WALLEYE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

POND C2.1  
FOREBAY DETAILS



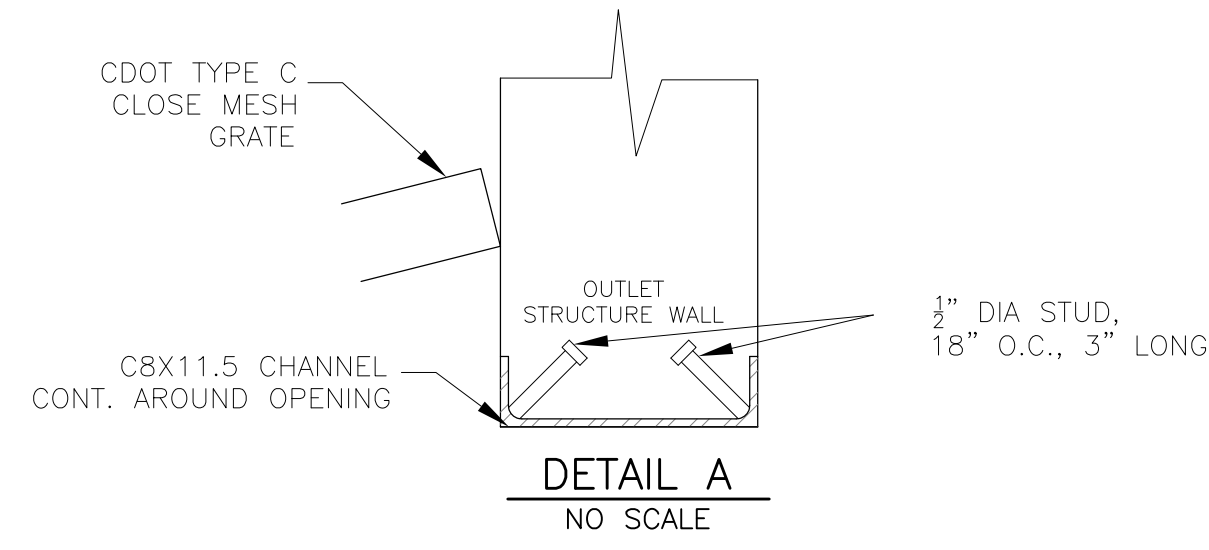
DATE: NOV 12, 2020

PROJECT NO. 100.061

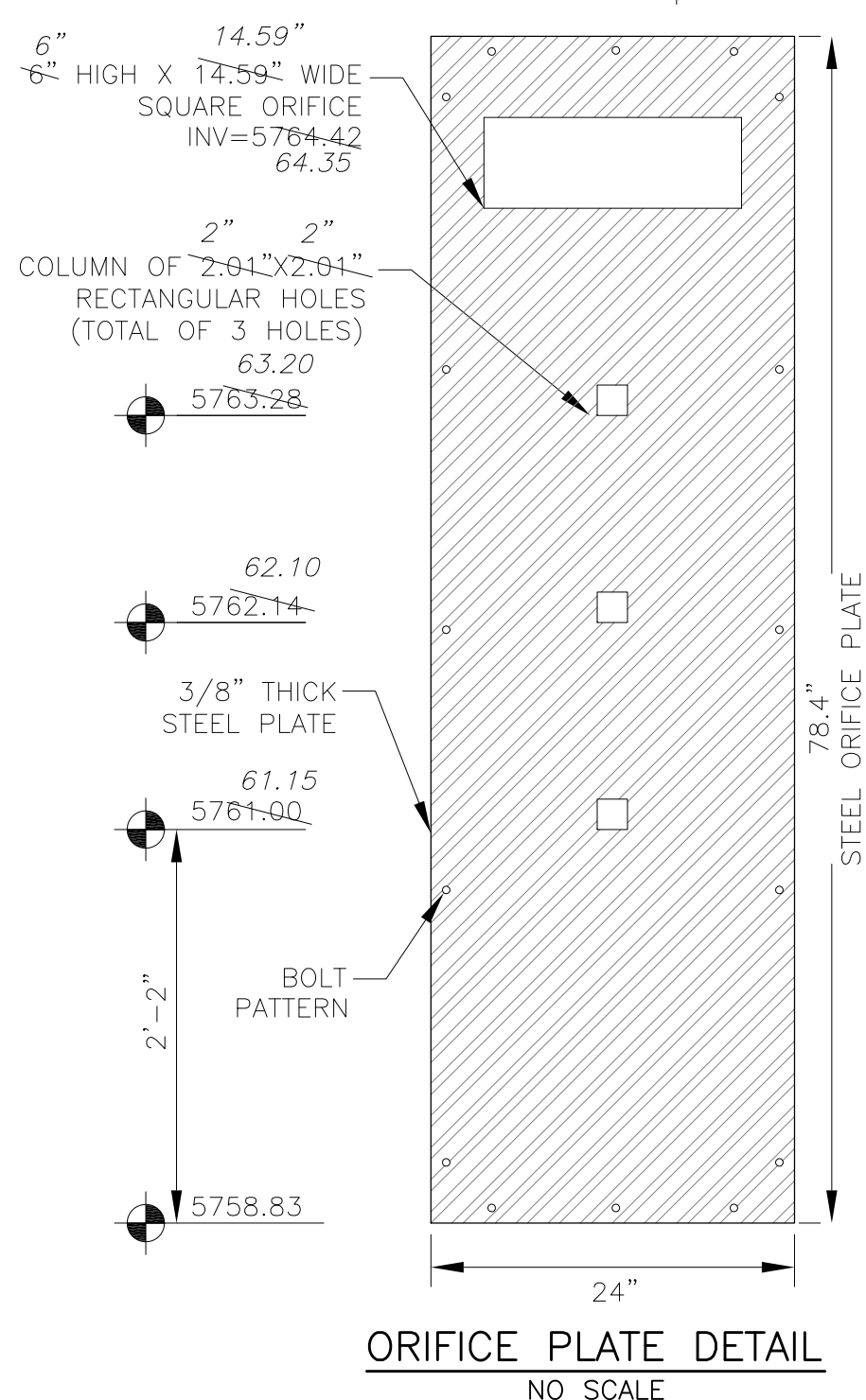
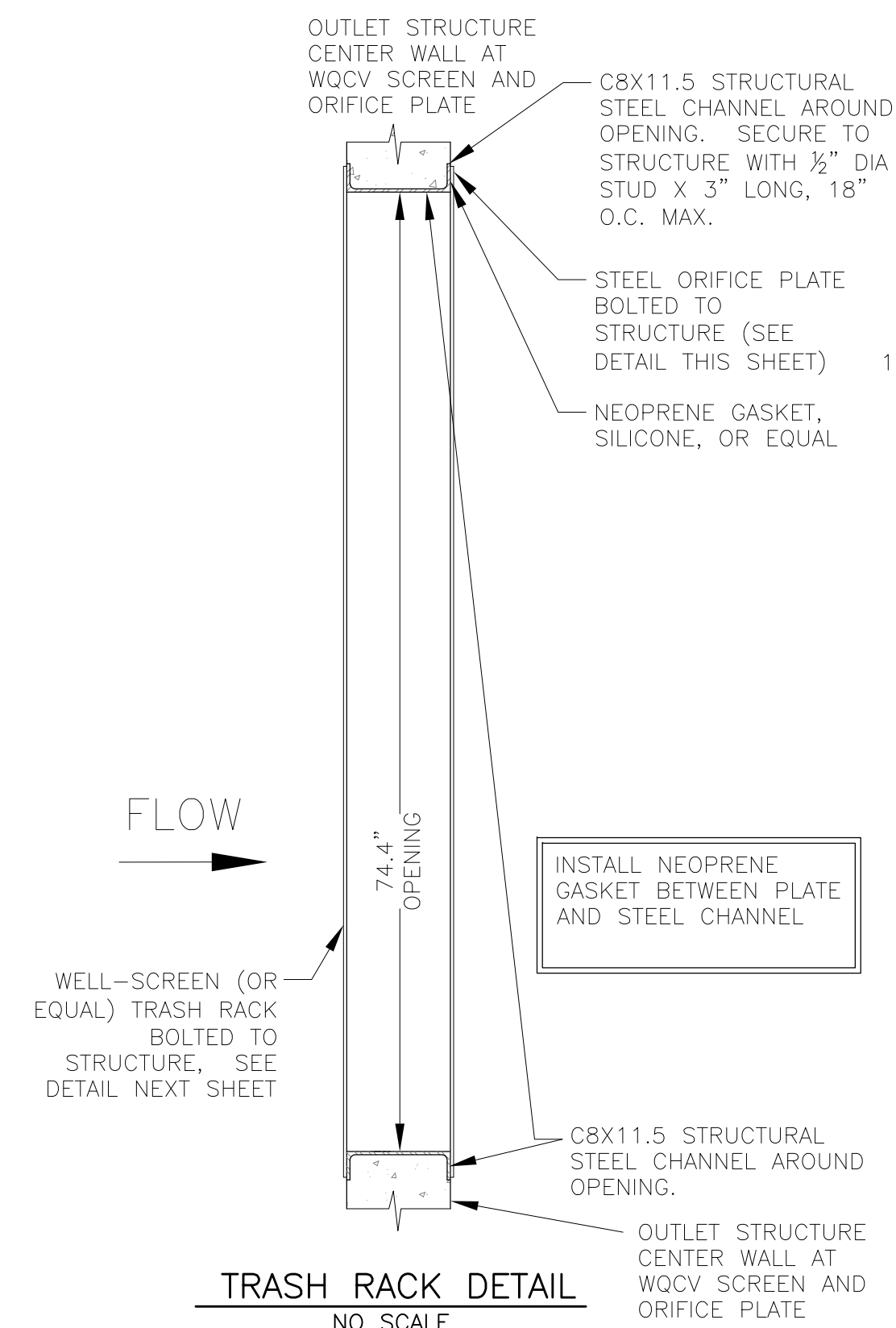
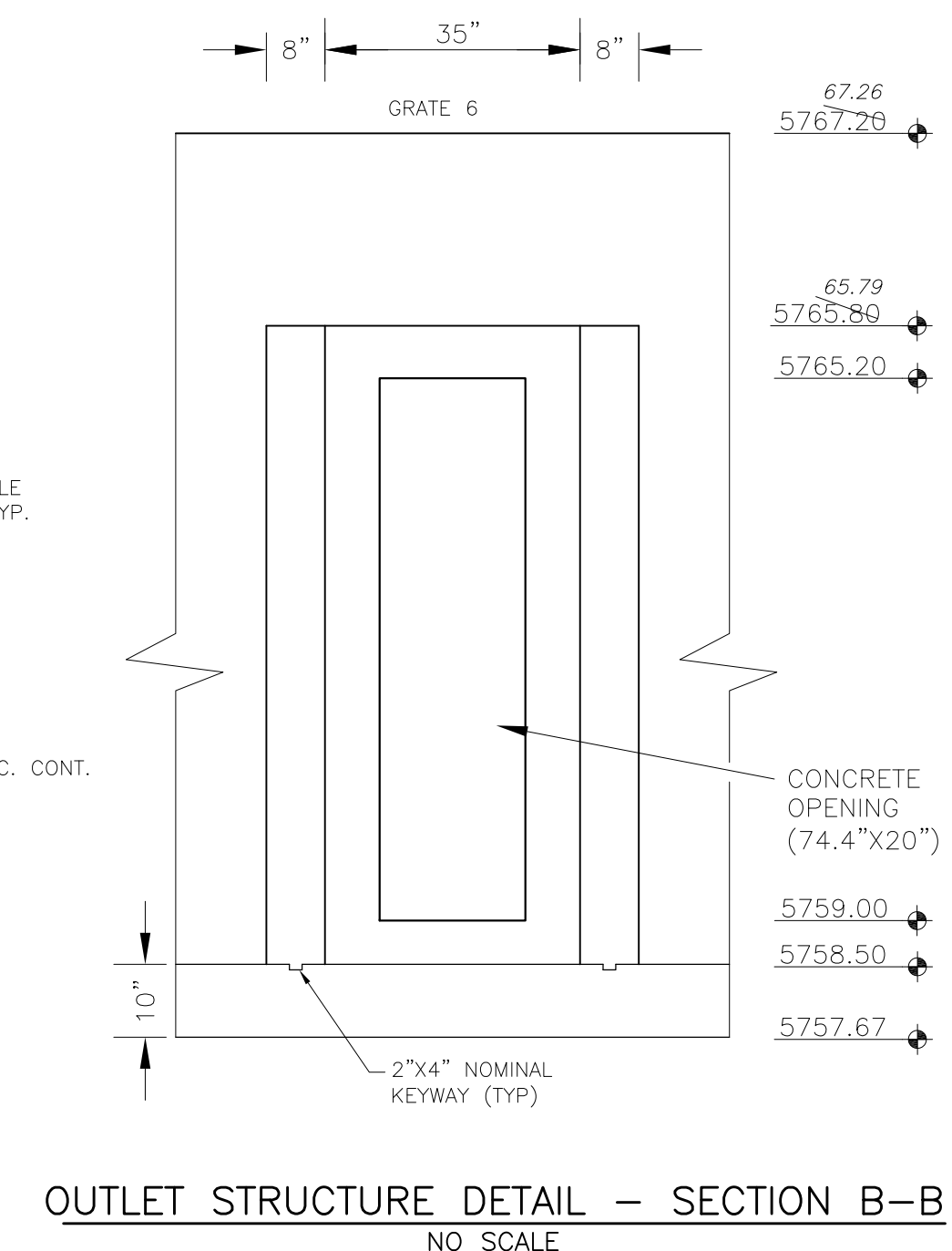
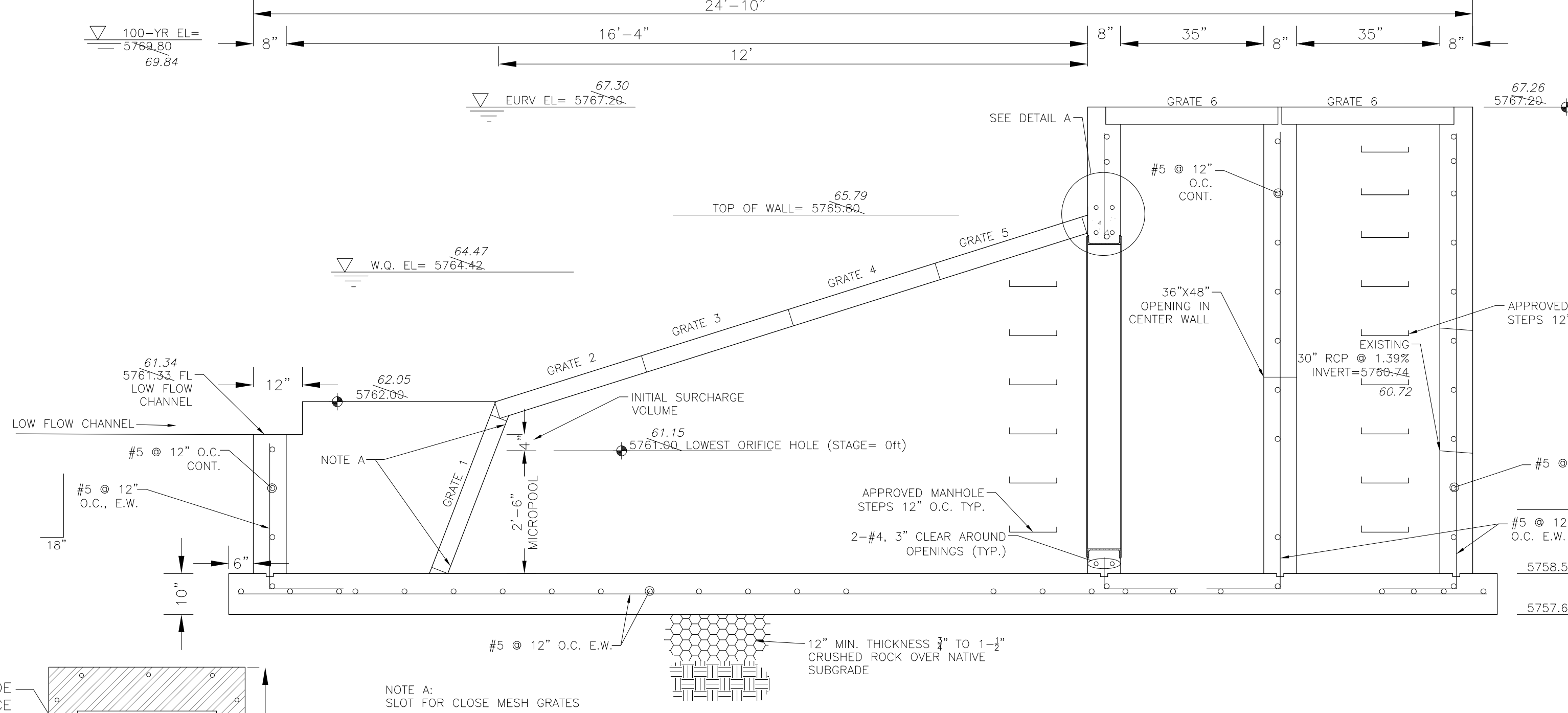
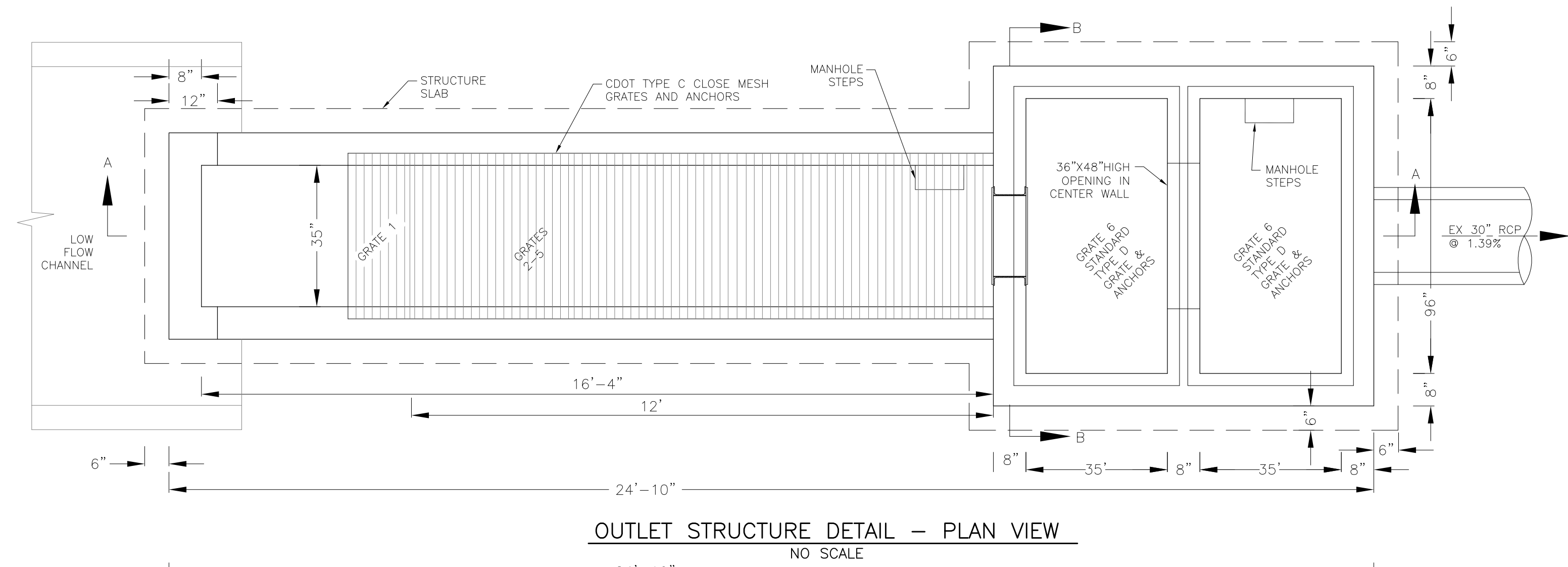
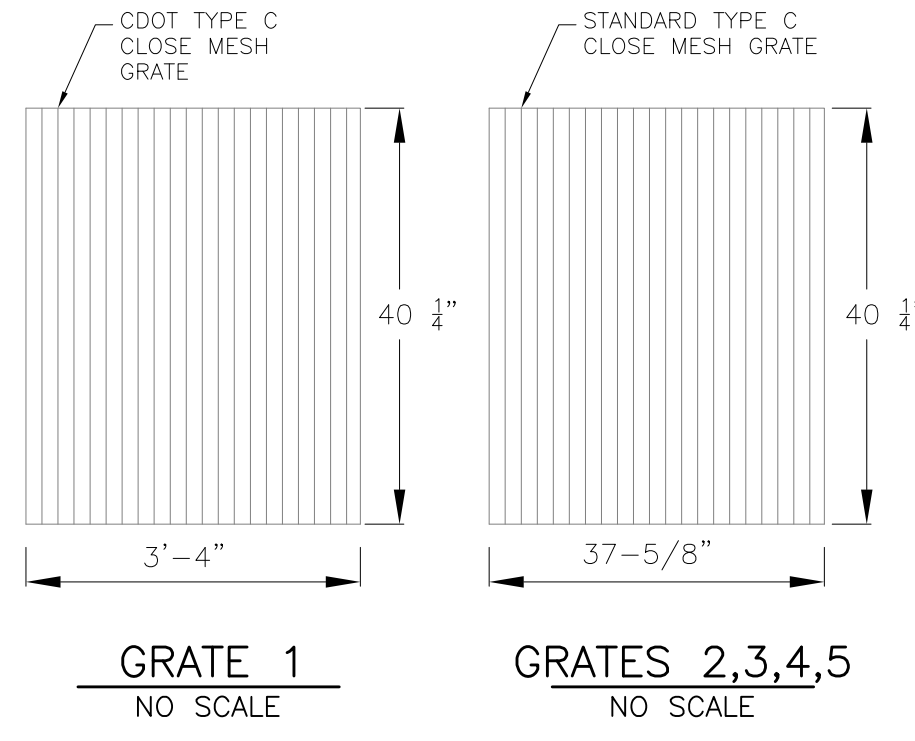
SHEET NUMBER C9.4

TOTAL SHEETS: 58

**AS-BUILT**  
DATE: 09/30/2022



NOTE:  
AFTER CONCRETE STRUCTURE HAS BEEN POURED  
ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED  
PRIOR TO GRATE CONSTRUCTION



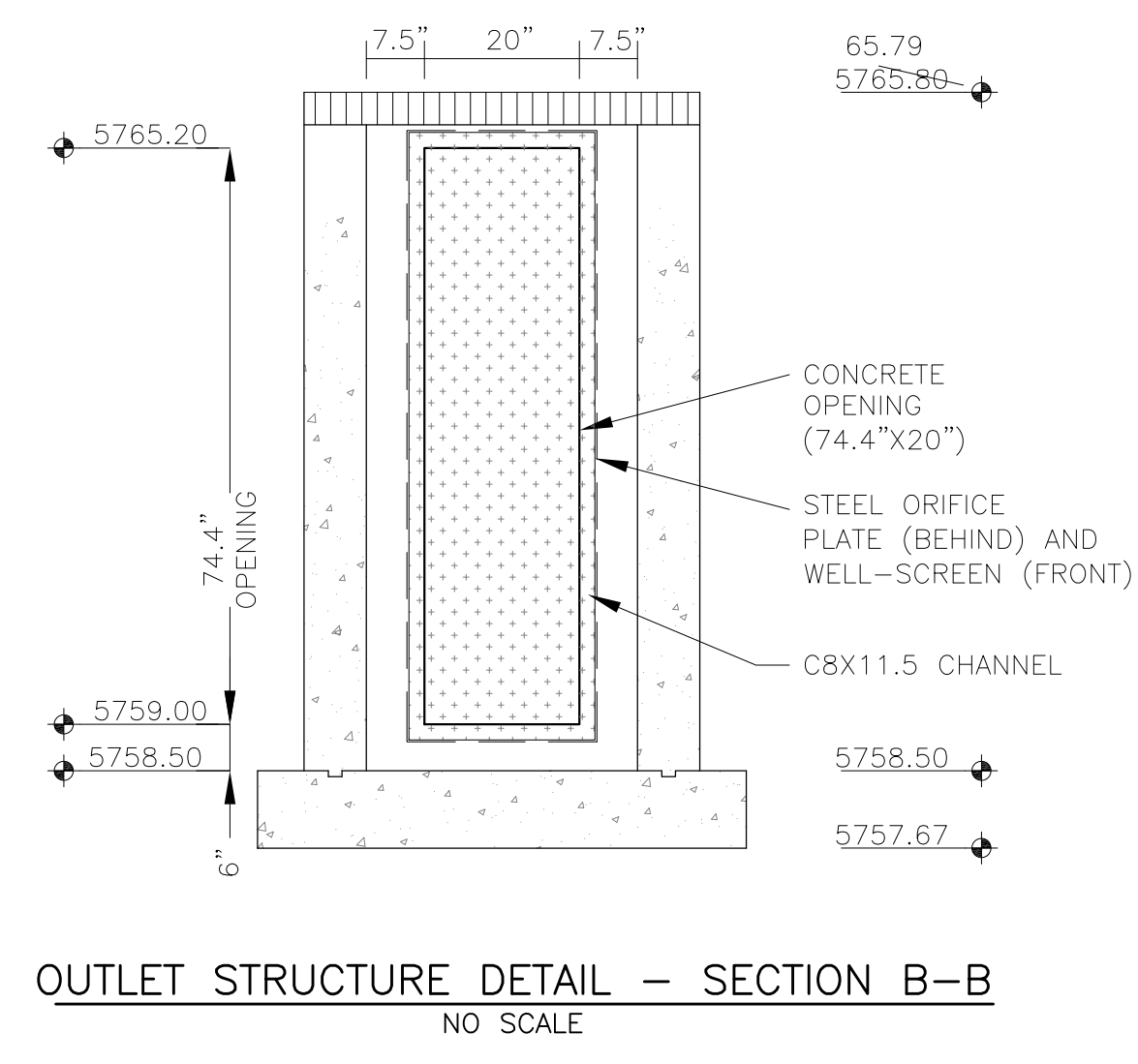
OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
- GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
- CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE
- EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
- ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
- SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
- REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
- ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

BAR SIZE	#4	#5	#6
MIN. SPLICE LENGTH	1'-3"	1'-7"	2'-0"

WQCV WELL-SCREEN NOTES:

- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
- WQCV Well Screen
  - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
  - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
  - Type and Size of Support Rod: TE 0.074"x0.50"
  - Spacing of Support Rod (O.C.): 1.0 Inch
  - Total Screen Thickness: 0.655"
  - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle



**AS-BUILT**  
DATE: 09/30/2022

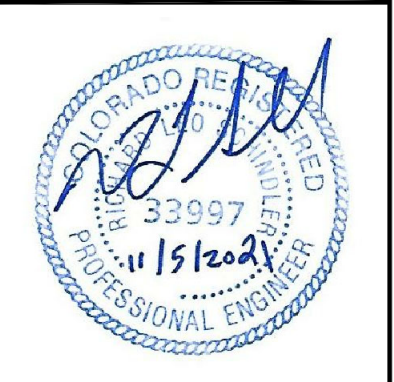
**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
DENVER, CO 80206  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cgei.com

DATE: \_\_\_\_\_  
DESCRIPTION: \_\_\_\_\_  
NO: \_\_\_\_\_  
PREPARED FOR: **LORSON, LLC**  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
(719) 635-3200  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

PROJECT: **THE RIDGE AT LORSON**  
FONTAINE BLVD. - WALLEYE DR  
COLORADO SPRINGS, COLORADO

**POND C2.1**  
**FULL SPECTRUM**  
**OUTLET STRUCTURE DETAILS**



DATE: NOV 5, 2021

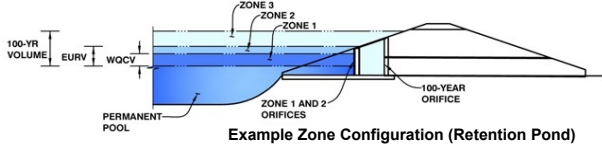
PROJECT NO. 100.064

SHEET NUMBER **C9.4**  
TOTAL SHEETS: 23

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-*Detention, Version 4.02 (February 2020)*

**Project:** The Hills at Lorson Ranch  
**Basin ID:** Pond C2.2-asbuilt



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.40	0.827	Orifice Plate
Zone 2 (EURV)	5.40	1.824	Rectangular Orifice
Z3 (100+1/2WQCV)	7.54	2.269	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>4.920</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 =  sq. inches (diameter = 1-11/16 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	1.15	2.20					
Orifice Area (sq. inches)	2.21	2.21	2.21					

	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)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	<input type="text" value="3.30"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	<input type="text" value="5.40"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	<input type="text" value="6.00"/>	<input type="text" value="N/A"/>	inches
Vertical Orifice Width =	<input type="text" value="6.00"/>	<input type="text" value="N/A"/>	inches

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

**User Input:** Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe).

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	<input type="text" value="7.06"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	<input type="text" value="8.00"/>	<input type="text" value="N/A"/>	feet
Overflow Weir Gate Slope =	<input type="text" value="0.00"/>	<input type="text" value="N/A"/>	H:V
Horiz. Length of Weir Sides =	<input type="text" value="6.00"/>	<input type="text" value="N/A"/>	feet
Overflow Gate Open Area % =	<input type="text" value="70%"/>	<input type="text" value="N/A"/>	% , gate open area/total area
Debris Clogging % =	<input type="text" value="50%"/>	<input type="text" value="N/A"/>	%

**Calculated Parameters for Overflow Weir**  
 Height of Gate Upper Edge, H<sub>t</sub> =  feet  
 Overflow Weir Slope Length =  feet  
 Gate Open Area / 100-yr Orifice Area =  feet  
 Overflow Gate Open Area w/o Debris =  feet  
 Overflow Gate Open Area w/ Debris =  feet

**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 =	<input type="text" value="0.00"/>	<input type="text" value="N/A"/>	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	<input type="text" value="30.00"/>	<input type="text" value="N/A"/>	inches
Restrictor Plate Height Above Pipe Invert =	<input type="text" value="18.50"/>	<input type="text" value="N/A"/>	inches

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**  
 Outlet Orifice Area =  ft<sup>2</sup>  
 Outlet Orifice Centroid =  feet  
 Half-Central Angle of Restrictor Plate on Pipe =  degrees

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

Spillway Invert Stage =	<input type="text" value="10.13"/>	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	<input type="text" value="20.00"/>	feet
Spillway End Slopes =	<input type="text" value="4.00"/>	H:V
Freeboard above Max Water Surface =	<input type="text" value="1.49"/>	feet

**Calculated Parameters for Spillway**  
 Spillway Design Flow Depth =  feet  
 Stage at Top of Freeboard =  feet  
 Basin Area at Top of Freeboard =  acres  
 Basin Volume at Top of Freeboard =  acre-ft

micropool = 0 = 5743.90

**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
Design Storm Return Period =								
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	0.827	2.651	2.510	3.521	4.403	5.541	6.487	7.671
User Override Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	4.057	5.655	8.290	11.856	14.864	18.552
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	5.0	13.5	20.5	36.5	45.7	58.2
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.11	0.30	0.46	0.81	1.02	1.29
Peak Inflow Q (cfs) =	N/A	N/A	41.0	59.5	73.2	94.9	111.3	131.4
Peak Outflow Q (cfs) =	0.4	2.1	2.3	3.9	25.0	40.3	41.5	43.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	1.2	1.1	0.9	0.8
Structure Controlling Flow =	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	0.0	0.7	1.1	1.1	1.2
Max Velocity through Gate 2 (fps) =	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	54	59	62	58	53	49	44
Time to Drain 99% of Inflow Volume (hours) =	41	58	65	70	68	66	64	62
Maximum Ponding Depth (ft) =	3.40	5.40	5.86	7.13	7.57	7.80	8.25	9.04
Area at Maximum Ponding Depth (acres) =	0.78	0.99	1.02	1.10	1.13	1.15	1.18	1.23
Maximum Volume Stored (acre-ft) =	0.834	2.659	3.122	4.468	4.959	5.221	5.745	6.698



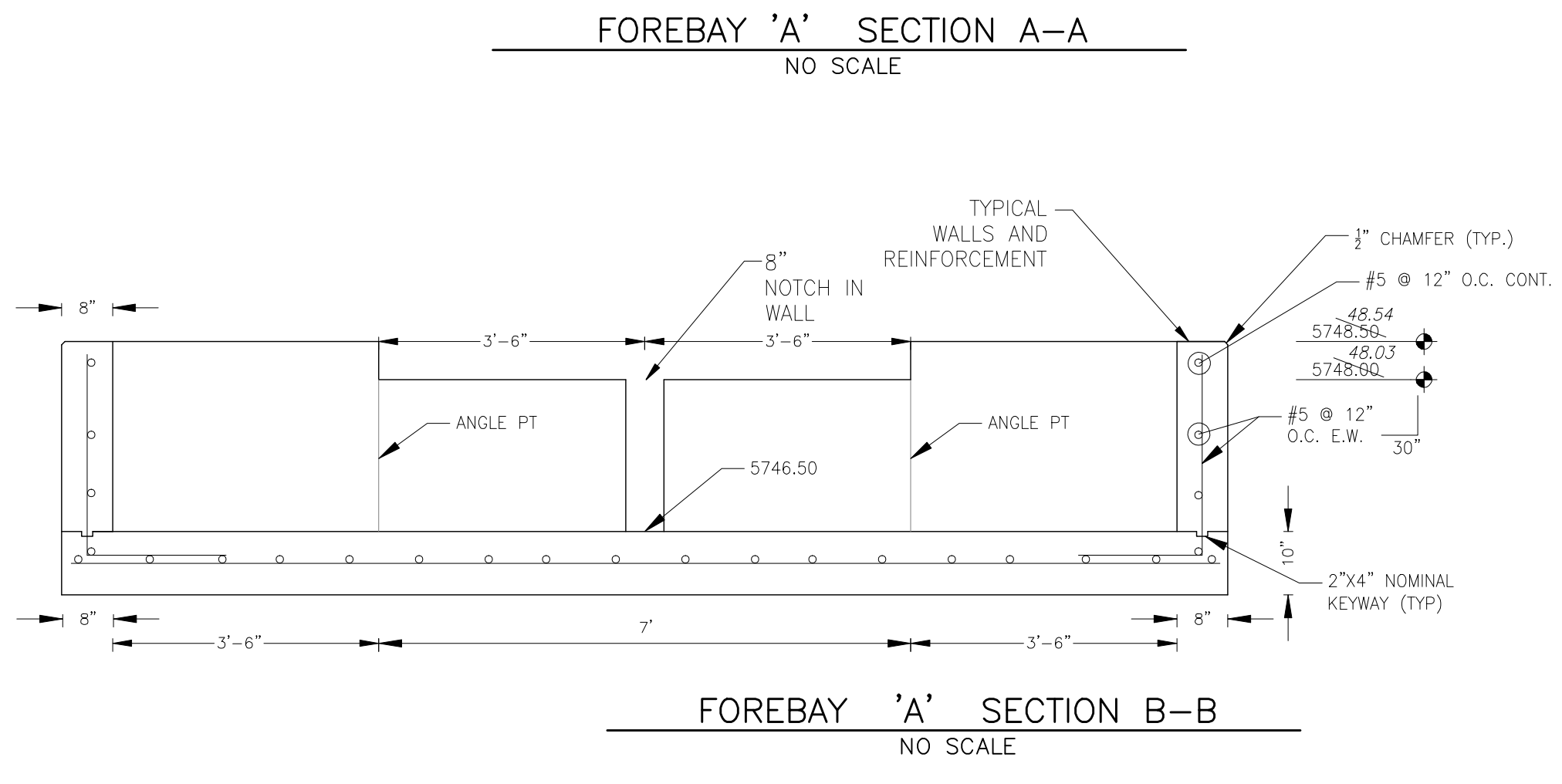
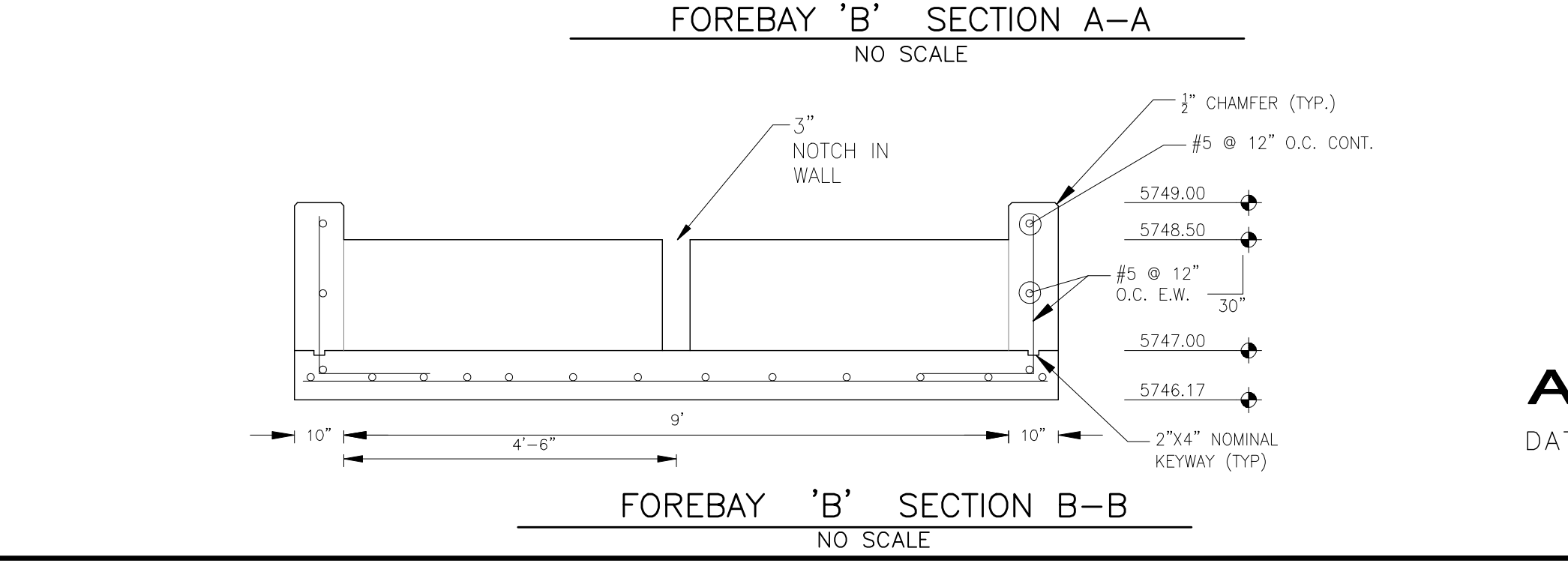
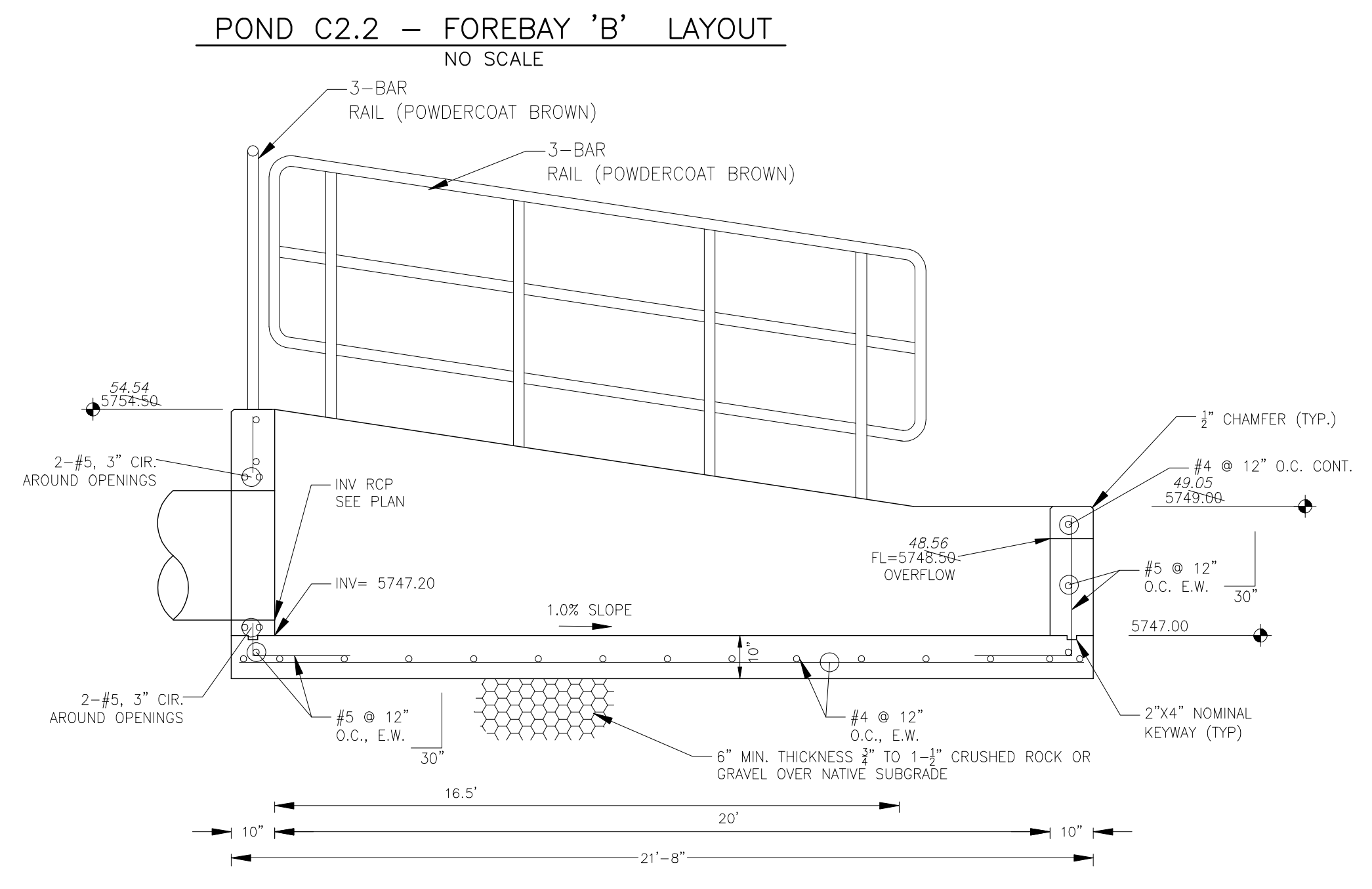
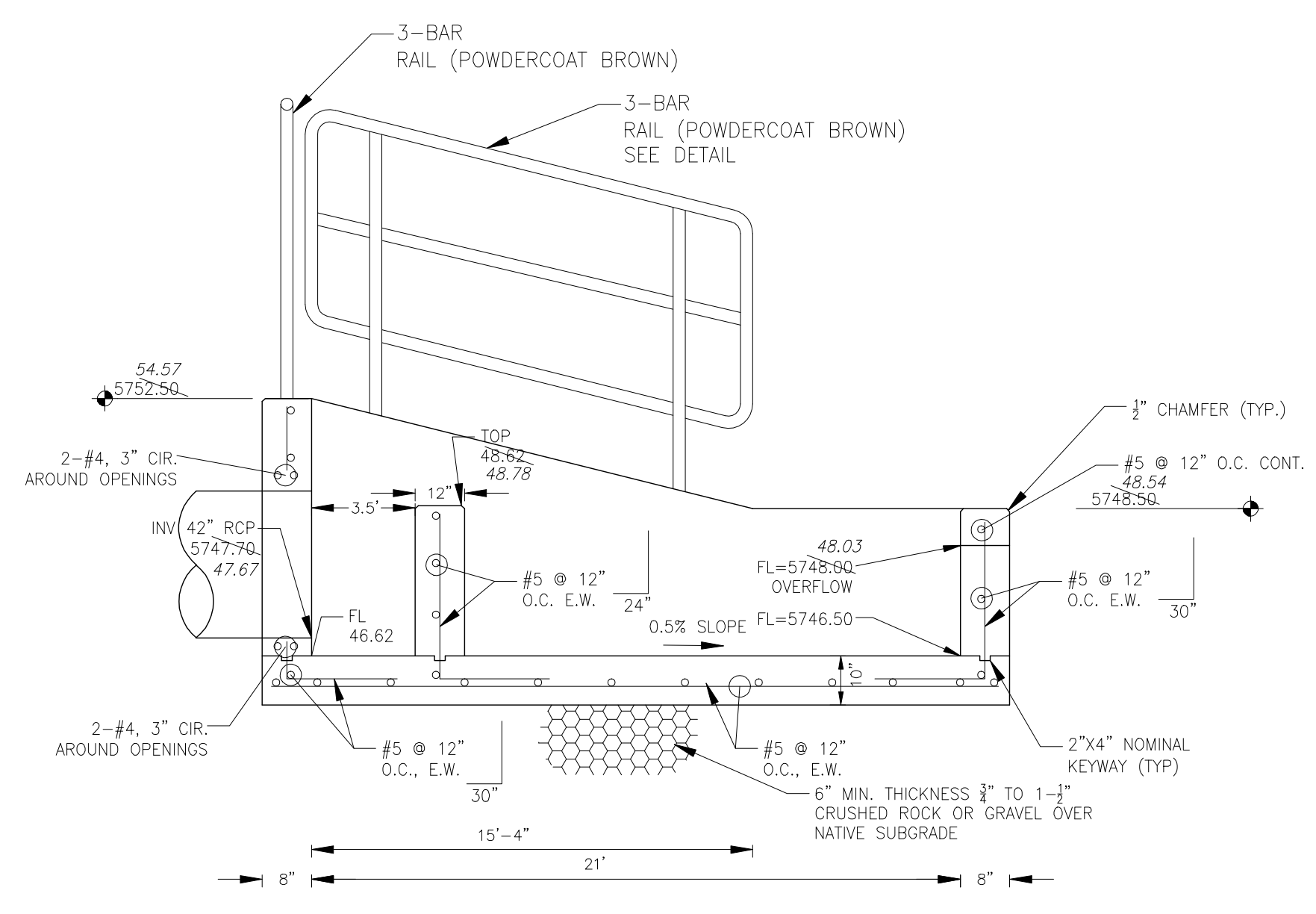
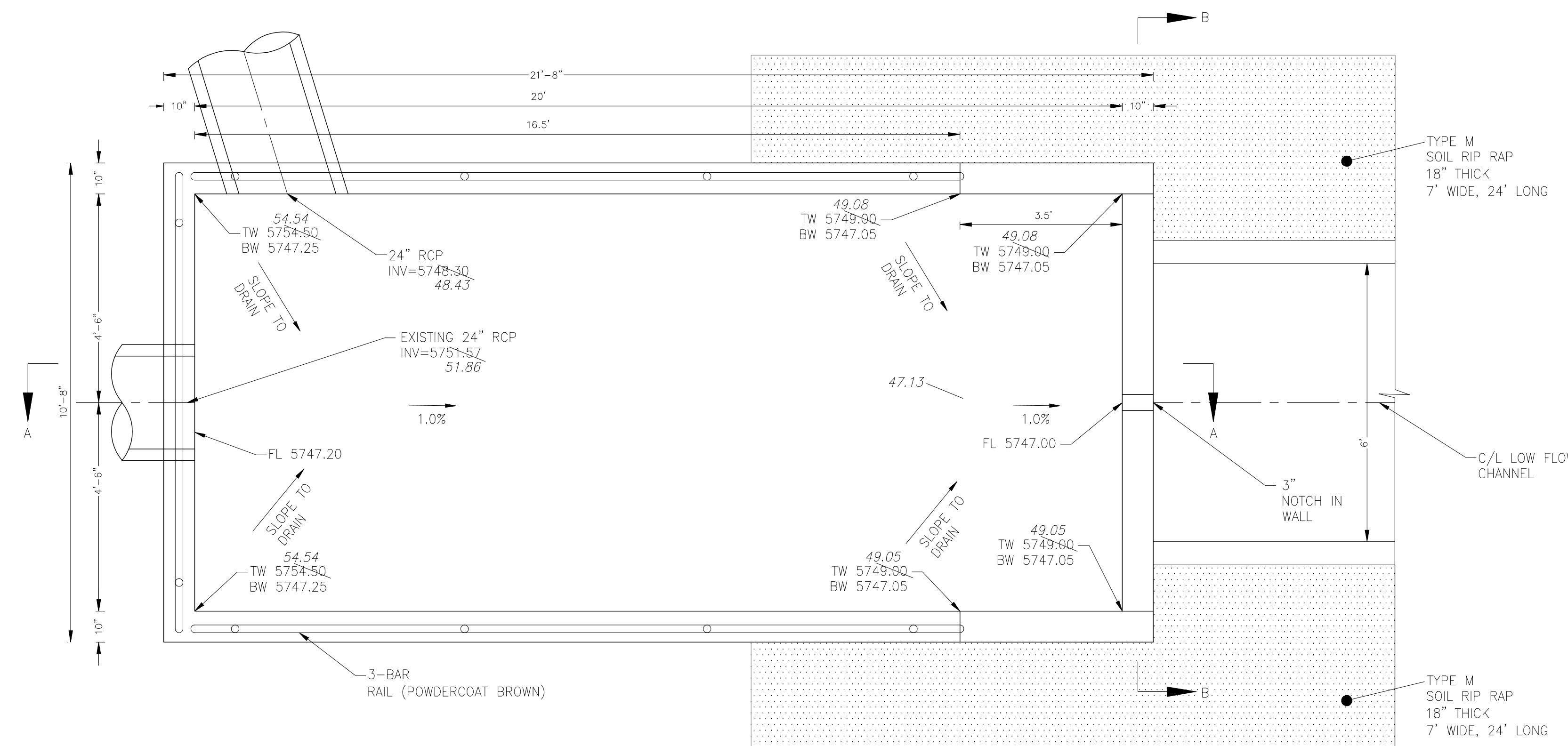
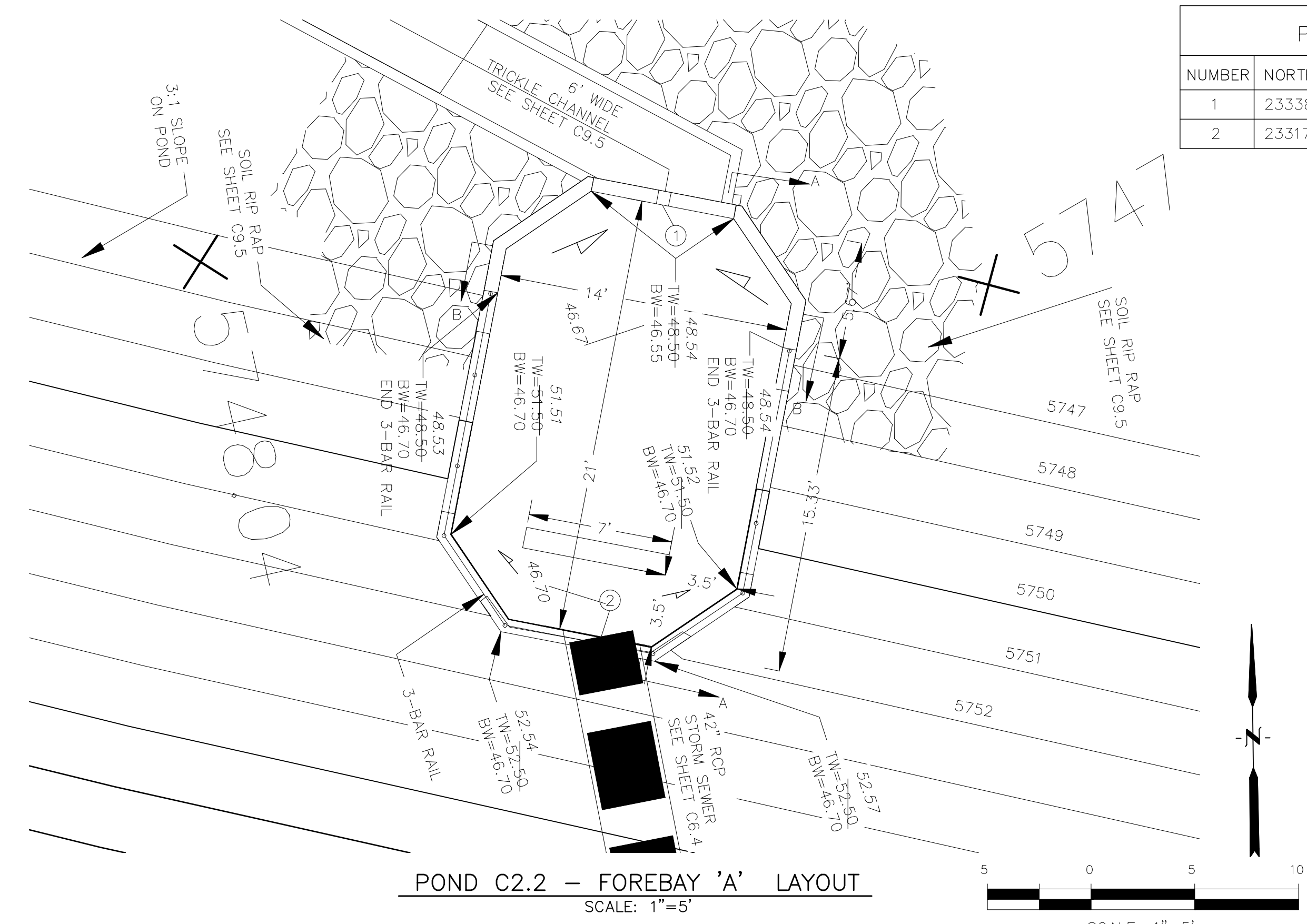


Pond C2.2 Developed Inflow Hydrograph---- asbuilt Pond C3 outflow + C5 Basin + C7 Basin

Time [hr]	Time [min]	2 Year		5yr		10yr		25yr		50yr		100yr		500yr	
		Pond C3 Outflow2 - [cfs]	CUHP	Combined	CUHP	Combined	CUHP	Combined	CUHP	Combined	CUHP	Combined	CUHP	Combined	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.08	5.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00
0.17	10.00	0.07	0.00	0.07	0.00	0.08	0.00	0.08	0.00	0.07	0.00	0.07	0.00	0.08	0.00
0.25	15.00	0.11	3.74	3.85	0.12	6.11	6.23	0.13	7.57	7.70	0.11	5.09	5.20	0.12	6.38
0.33	20.00	0.14	13.60	13.74	0.16	18.00	18.16	0.16	21.92	22.08	0.15	13.38	13.53	0.15	15.61
0.42	25.00	0.17	31.11	31.28	0.19	45.07	45.26	0.18	57.54	58.05	0.18	30.50	30.68	0.23	35.87
0.50	30.00	0.23	40.82	41.05	1.23	58.25	59.48	1.97	71.19	73.16	1.69	76.90	78.59	2.18	91.05
0.58	35.00	0.87	38.60	39.47	2.11	53.89	56.00	2.59	65.04	67.63	2.78	92.11	94.89	3.23	108.06
0.67	40.00	1.68	33.84	35.52	2.54	46.24	48.78	3.04	55.88	58.92	3.52	88.47	91.99	3.95	103.22
0.75	45.00	2.03	28.43	30.46	2.83	39.40	42.23	3.45	48.41	51.86	4.08	77.76	81.84	4.49	90.67
0.83	50.00	2.27	23.82	26.09	3.07	33.85	36.92	3.84	41.10	44.94	4.51	69.49	74.00	4.91	81.04
0.92	55.00	2.46	20.11	22.57	3.28	28.41	31.69	4.17	34.74	38.91	4.86	58.63	63.49	5.26	68.45
1.00	60.00	2.61	17.63	20.24	3.48	24.74	28.22	4.46	30.90	35.36	5.15	48.90	54.05	14.42	57.23
1.08	65.00	2.73	15.89	18.62	3.68	22.20	25.88	4.71	28.16	32.87	8.14	42.78	50.92	27.08	50.23
1.17	70.00	2.82	13.63	16.45	3.85	19.91	23.76	4.93	25.58	30.51	17.52	36.41	53.93	29.18	42.84
1.25	75.00	2.90	11.46	14.36	4.00	17.10	21.10	5.13	23.01	28.14	26.03	30.66	56.69	29.49	36.16
1.33	80.00	2.97	9.51	12.48	4.14	14.14	18.28	5.56	19.48	25.04	29.01	24.76	53.77	29.74	29.17
1.42	85.00	3.03	7.93	10.96	4.26	11.69	15.95	10.03	15.58	25.61	29.20	19.60	48.80	29.95	23.03
1.50	90.00	3.08	6.97	10.05	4.38	10.29	14.67	14.87	13.16	28.03	29.36	14.82	44.18	30.14	17.32
1.58	95.00	3.14	6.50	9.64	4.48	9.58	14.06	18.58	11.74	30.32	29.51	11.96	41.47	30.32	13.95
1.67	100.00	3.19	6.27	9.46	4.57	8.56	13.13	21.01	10.76	31.77	29.64	10.21	39.85	30.47	11.85
1.75	105.00	3.24	6.14	9.38	4.65	7.72	12.37	22.39	10.05	32.44	29.77	9.08	38.85	30.62	10.48
1.83	110.00	3.29	6.04	9.33	4.72	7.11	11.83	22.95	9.57	32.52	29.88	8.29	38.17	30.75	9.52
1.92	115.00	3.33	5.34	8.67	4.78	6.67	11.45	22.82	8.98	31.80	29.98	7.79	37.77	30.88	8.90
2.00	120.00	3.36	4.68	8.04	4.84	6.16	11.00	21.99	8.10	30.09	30.08	7.44	37.52	30.99	8.45
2.08	125.00	3.39	3.59	6.98	4.88	4.72	9.60	20.59	6.16	26.75	30.15	5.71	35.86	31.08	6.47
2.17	130.00	3.42	2.65	6.07	4.91	3.44	8.35	18.90	4.45	23.35	30.17	4.14	34.31	31.16	4.68
2.25	135.00	3.44	1.95	5.39	4.93	2.52	7.45	17.14	3.22	20.36	30.11	3.01	33.12	31.23	3.40
2.33	140.00	3.46	1.42	4.88	4.94	1.83	6.77	15.43	2.34	17.77	29.99	2.20	32.19	31.28	2.48
2.42	145.00	3.48	1.02	4.50	4.96	1.28	6.24	13.86	1.67	15.53	29.83	1.56	31.39	31.33	1.75
2.50	150.00	3.49	0.71	4.20	4.96	0.88	5.84	12.47	1.17	13.64	29.63	1.10	30.73	31.37	1.23
2.58	155.00	3.51	0.49	4.00	4.97	0.61	5.58	11.27	0.82	12.09	29.41	0.79	30.20	31.37	0.88
2.67	160.00	3.52	0.31	3.83	4.97	0.41	5.38	10.29	0.53	10.82	29.17	0.52	29.69	31.31	0.59
2.75	165.00	3.54	0.17	3.71	4.98	0.24	5.22	9.50	0.31	9.81	28.92	0.32	29.24	31.18	0.35
2.83	170.00	3.55	0.08	3.63	4.98	0.12	5.10	8.88	0.15	9.03	28.76	0.16	28.92	31.02	0.18
2.92	175.00	3.56	0.03	3.59	4.99	0.04	5.03	8.38	0.05	8.43	19.25	0.05	19.30	30.82	0.06
3.00	180.00	3.57	0.00	3.57	4.99	0.00	4.99	7.97	0.00	7.97	16.09	0.00	16.09	30.61	0.00
3.08	185.00	3.58		3.58	4.99	0.00	4.99	7.64	0.00	7.64	13.83	0.00	13.83	30.37	0.00
3.17	190.00	3.59		3.59	5.00		5.00	7.36		7.36	12.17	0.00	12.17	30.13	0.00
3.25	195.00	3.61		3.61	5.00		5.00	7.12		7.12	10.92	0.00	10.92	29.87	0.00
3.33	200.00	3.62		3.62	5.00		5.00	6.92		6.92	9.97	0.00	9.97	29.61	0.00
3.42	205.00	3.62		3.62	5.00		5.00	6.75		6.75	9.22	0.00	9.22	29.34	0.00
3.50	210.00	3.63		3.63	5.01		5.01	6.60		6.60	8.63		8.63	29.07	0.00
3.58	215.00	3.64		3.64	5.01		5.01	6.46		6.46	8.15		8.15	27.11	
3.67	220.00	3.65		3.65	5.01		5.01	6.35		6.35	7.76		7.76	21.44	
3.75	225.00	3.66		3.66	5.01		5.01	6.24		6.24	7.44		7.44	17.58	
3.83	230.00	3.67		3.67	5.01		5.01	6.15		6.15	7.17		7.17	14.87	
3.92	235.00	3.67		3.67	5.02		5.02	6.06		6.06	6.94		6.94	12.90	
4.00	240.00	3.68		3.68	5.02		5.02	5.98		5.98	6.74		6.74	11.44	
4.08	245.00	3.69		3.69	5.02		5.02	5.91		5.91	6.58		6.58	10.33	
4.17	250.00	3.69		3.69	5.02		5.02	5.84		5.84	6.43		6.43	9.48	
4.25	255.00	3.70		3.70	5.02		5.02	5.78		5.78	6.30		6.30	8.81	
4.33	260.00	3.70		3.70	5.02		5.02	5.72		5.72	6.19		6.19	8.27	
4.42	265.00	3.71		3.71	5.02		5.02	5.67		5.67	6.08		6.08	7.83	
4.50	270.00	3.71		3.71	5.02		5.02	5.62		5.62	5.99		5.99	7.47	
4.58	275.00	3.72		3.72	5.02		5.02	5.57		5.57	5.91		5.91	7.18	
4.67	280.00	3.72		3.72	5.02		5.02	5.53		5.53	5.83		5.83	6.93	
4.75	285.00	3.72		3.72	5.02		5.02	5.49		5.49	5.76		5.76	6.71	
4.83	290.00	3.73		3.73	5.02		5.02	5.45		5.45	5.70		5.70	6.53	
4.92	295.00	3.73		3.73	5.02		5.02	5.41		5.41	5.64		5.64	6.37	
5.00	300.00	3.73		3.73	5.02		5.02	5.38		5.38	5.58		5.58	6.23	
5.08	305.00	3.73		3.73	5.01		5.01	5.34		5.34	5.53		5.53	6.11	
5.17	310.00	3.73		3.73	5.01		5.01	5.32		5.32	5.49		5.49	6.00	
5.25	315.00	3.74		3.74	5.01		5.01	5.30		5.30	5.44		5.44	5.90	
5.33	320.00	3.74		3.74	5.01		5.01	5.28		5.28	5.40		5.40	5.82	
5.42	325.00	3.74		3.74	5.01		5.01	5.28		5.28	5.37		5.37	5.74	
5.50	330.00	3.74		3.74	5.00		5.00	5.27		5.27	5.33		5.33	5.67	
5.58	335.00	3.74		3.74	5.00		5.00	5.27		5.27	5.31		5.31	5.60	
5.67	340.00	3.74		3.74	5.00		5.00	5.27		5.27	5.29		5.29	5.54	
5.75	345.00	3.74		3.74	4.99		4.99	5.26		5.26	5.28		5.28	5.49	



POINT TABLE (FOREBAY)				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	23338.41	29100.32	5746.50	FOREBAY BOTTOM
2	23317.59	29097.36	5746.62	FOREBAY BOTTOM, INV 42"=5747.70



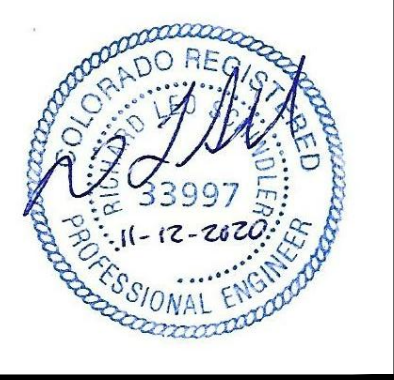
NOTE: ALL CONCRETE FOR FOREBAY SHALL BE CDOT TYPE D

**CORE ENGINEERING GROUP**  
 1500A 1ST AVENUE S.  
 BOULDER, CO 80501  
 PH: 719.570.1100  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: Rich@ceg1.com

DATE: \_\_\_\_\_  
 DESCRIPTION: \_\_\_\_\_  
 NO: \_\_\_\_\_  
 PREPARED FOR: **LORSON, LLC**  
 212 N. WAHSATCH AVE. SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 PROJECT: **THE HILLS COLLECTOR STREET CONSTRUCTION**  
 FONTAINE BLVD. - GRAYLING DR  
 LORSON BLVD - WALLEYE DR - LAMPREY DR  
 COLORADO SPRINGS, COLORADO  
 CONTACT: JEFF MARK

DRAWN: **RLS**  
 DESIGNED: **RLS**  
 CHECKED: **RLS**

**POND C2.2**  
**FOREBAY DETAILS**

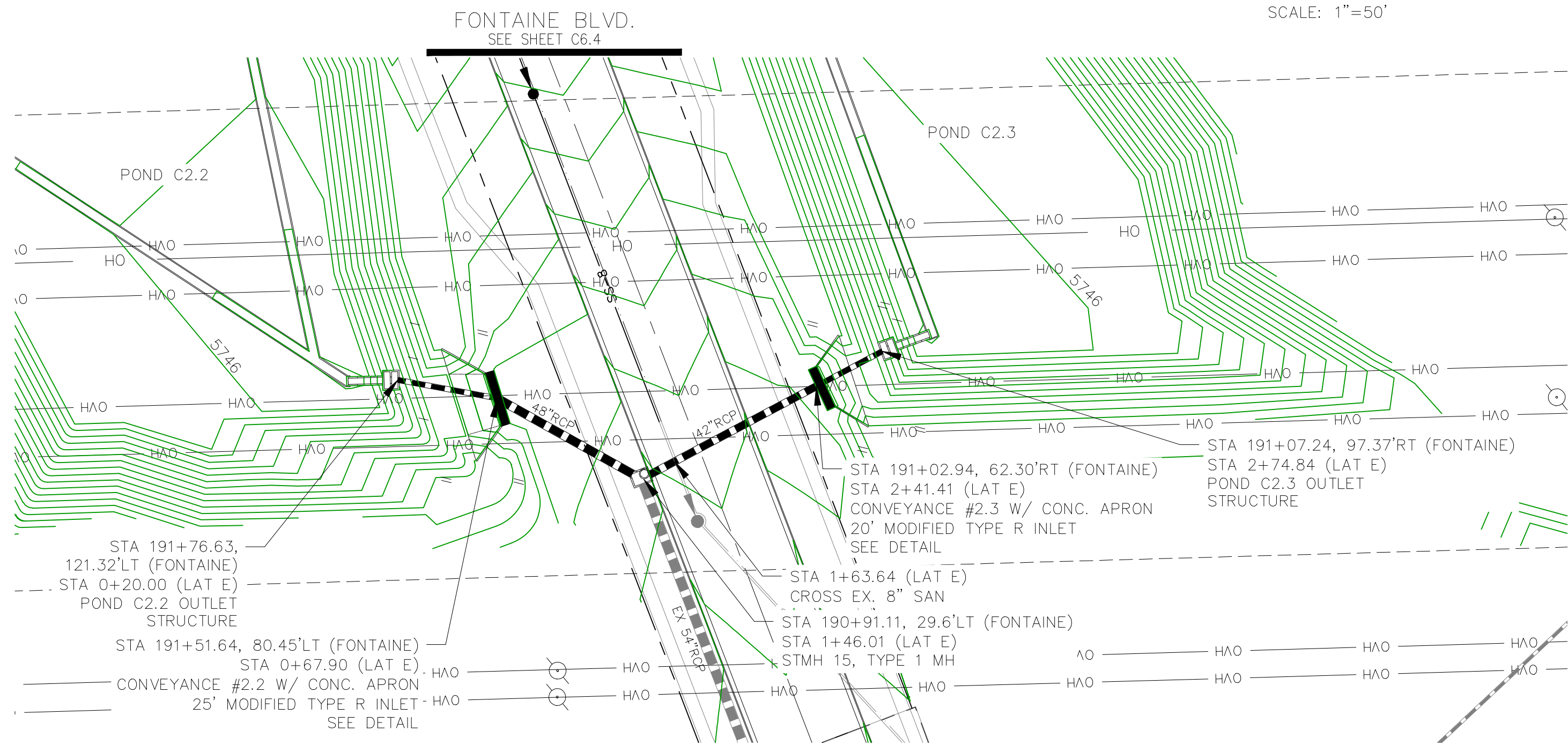
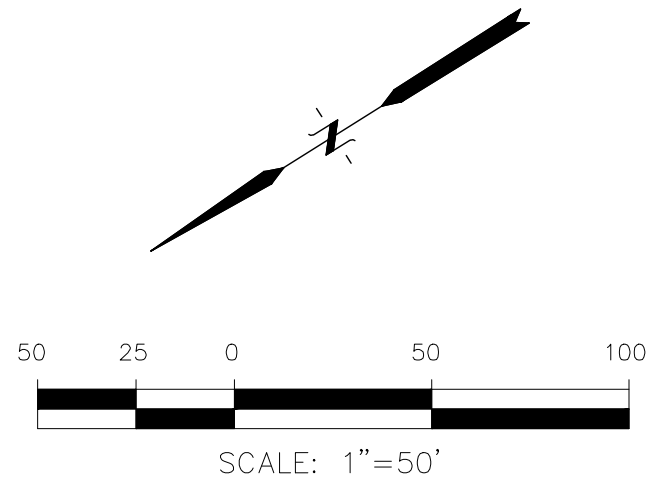


DATE: NOV 12, 2020  
 PROJECT NO: 100.061  
 SHEET NUMBER: **C9.6**  
 TOTAL SHEETS: 58

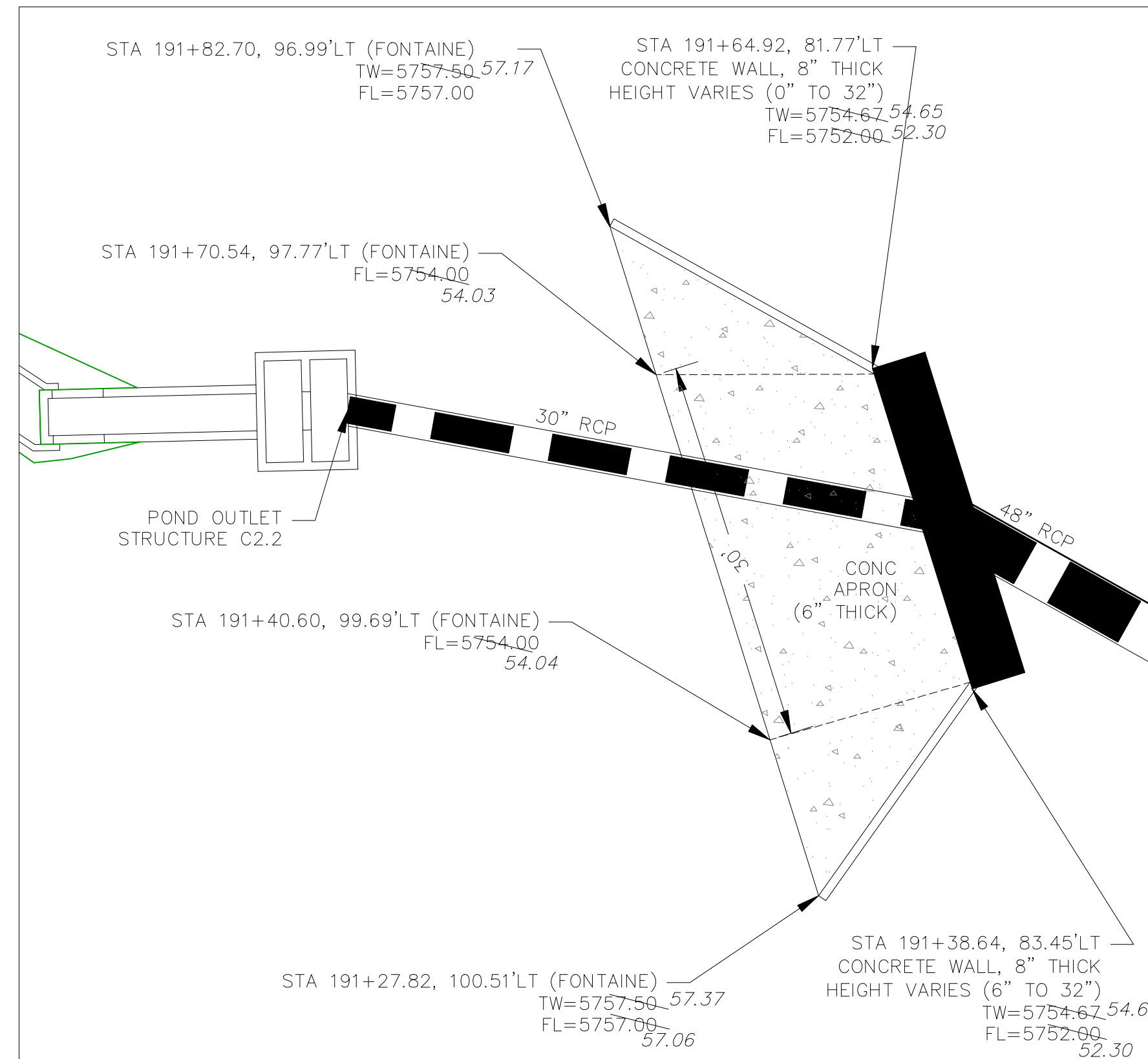
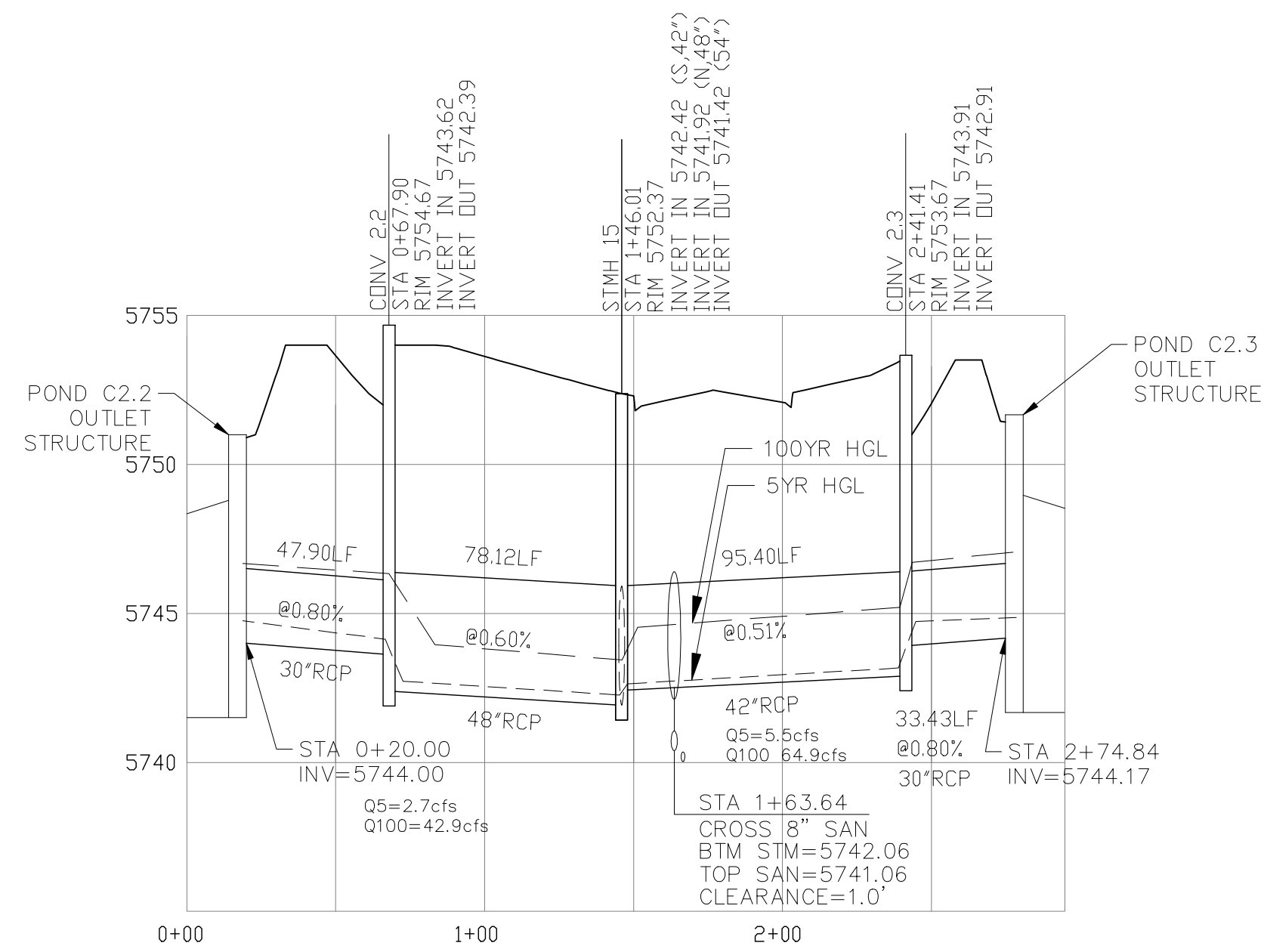
**AS-BUILT**  
 DATE: 09/30/2022

- NOTES**
1. ALL SPOT ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE NOTED.
  2. SEE EARLY GRADING PLAN FOR GRADING INFORMATION.
  3. ALL STORM SEWER SHALL BE CLASS III RCP.
  4. ALL MHS SHALL BE TYPE 1 UNLESS OTHERWISE NOTED.

- 1 CURVE DATA ID
- 2 PEDESTRIAN RAMP, SEE SHEET C10.1
- 3 CURB/GUTTER FLOW LINE POINTS

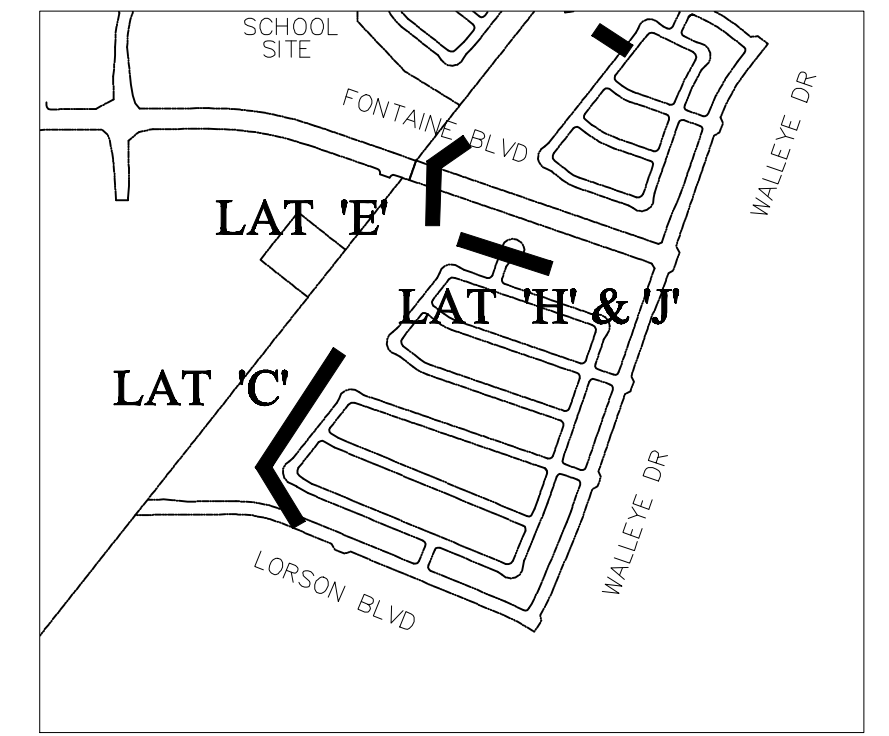


**STORM LATERAL 'E'**



**CONVEYANCE STRUCTURE #2.2**

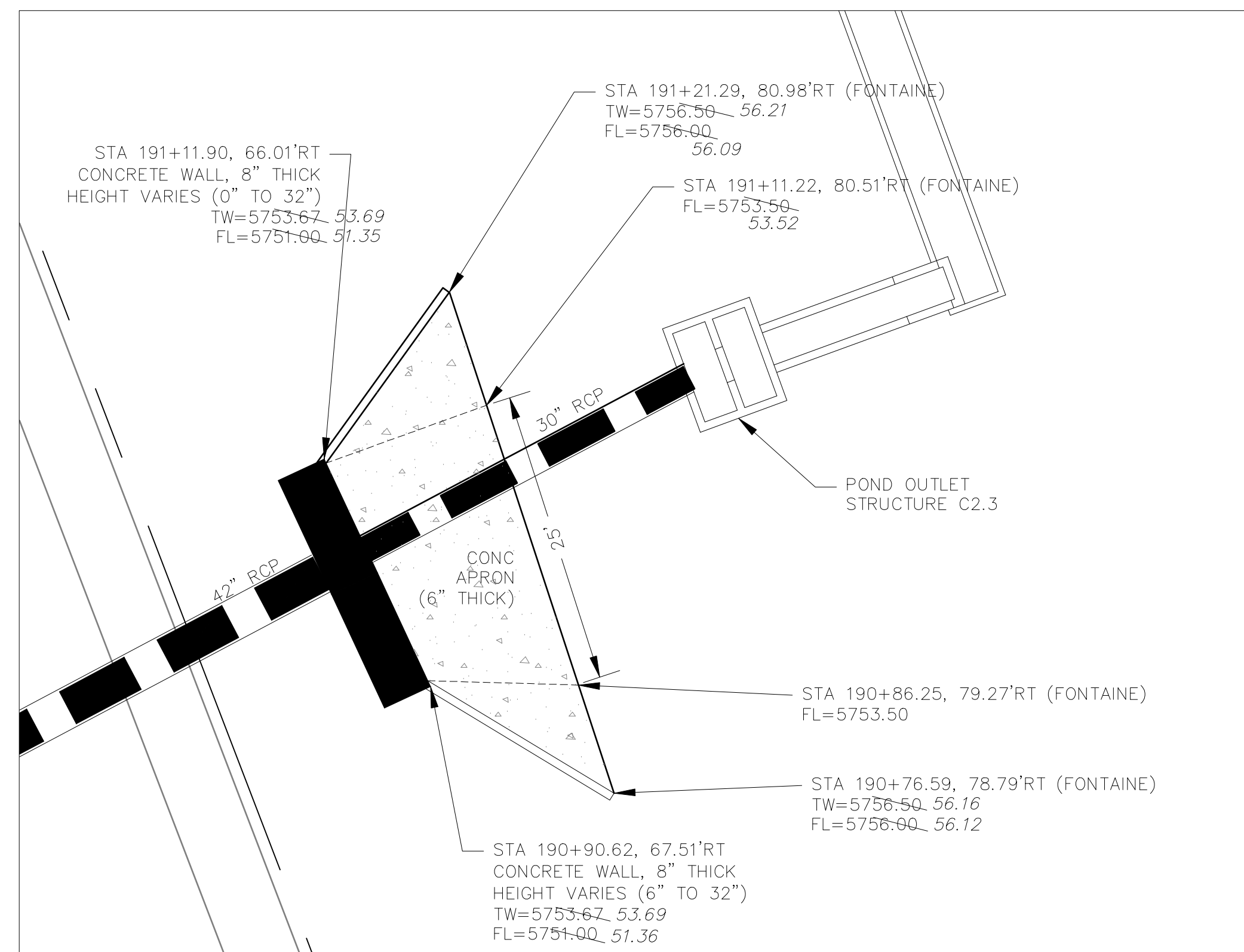
SCALE: 1"=10'



**KEY MAP**

**CONVEYANCE STRUCTURE #2.2 NOTES:**

1. 25' CDOT TYPE R INLET WITH MODIFIED THROAT OPENING
2. THROAT OPENING = 24"
3. EXTEND 1.25" GALVANIZED STEEL ROD SUPPORTS (TYPE R INLET) TO ACCOMMODATE 24" THROAT OPENING
4. CONCRETE APRON TO BE REINFORCED WITH NO. 4 REBAR, 24" O.C. BOTH WAYS. REBAR TO EXTEND INTO CONCRETE WALL W/ NO. 4 "L" BARS, 18" O.C.
5. CONCRETE WALLS SHALL HAVE A MINIMUM OF TWO HORIZONTAL NO. 4 BARS
6. 24" THROAT OPENING TO INCLUDE SAFETY GRATE.



**CONVEYANCE STRUCTURE #2.3**

SCALE: 1"=10'

**CONVEYANCE STRUCTURE #2.3 NOTES:**

1. 20' CDOT TYPE R INLET WITH MODIFIED THROAT OPENING
2. THROAT OPENING = 24"
3. EXTEND 1.25" GALVANIZED STEEL ROD SUPPORTS (TYPE R INLET) TO ACCOMMODATE 24" THROAT OPENING
4. CONCRETE APRON TO BE REINFORCED WITH NO. 4 REBAR, 24" O.C. BOTH WAYS. REBAR TO EXTEND INTO CONCRETE WALL W/ NO. 4 "L" BARS.
5. CONCRETE WALLS SHALL HAVE A MINIMUM OF TWO HORIZONTAL NO. 4 BARS
6. 24" THROAT OPENING TO INCLUDE SAFETY GRATE.

**AS-BUILT**  
DATE: 09/30/2022

**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
DENVER, CO 80202  
PHONE: 719.576.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cegi.com

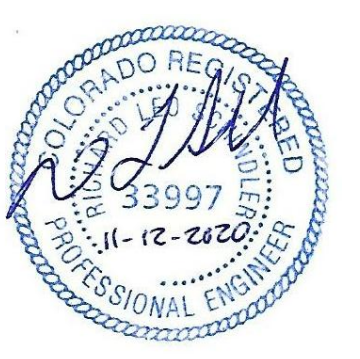
DATE: JAN 12, 2021  
PROJECT NO.: 100.061  
SHEET NUMBER: C7.2  
TOTAL SHEETS: 58

DESCRIPTION: RAISE SITE 1' EAST OF POWERLINES

PREPARED FOR: **LORSON, LLC**  
212 N. WAHSATCH AVE SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

**STREET & STORM SEWER PLAN/PROFILE**  
**STORM LATERAL 'E'**  
**CONVEYANCE #2.2 & #2.3**

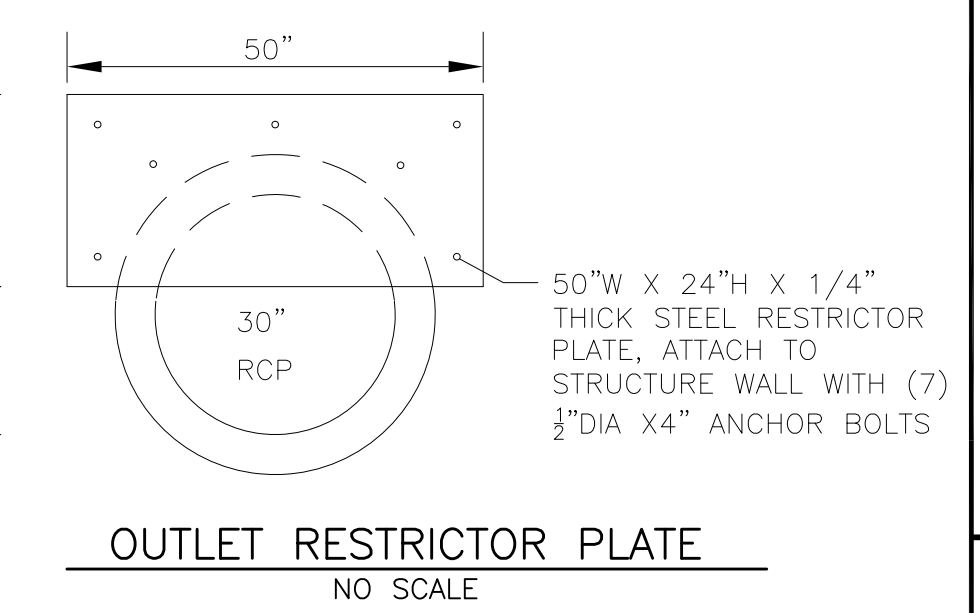
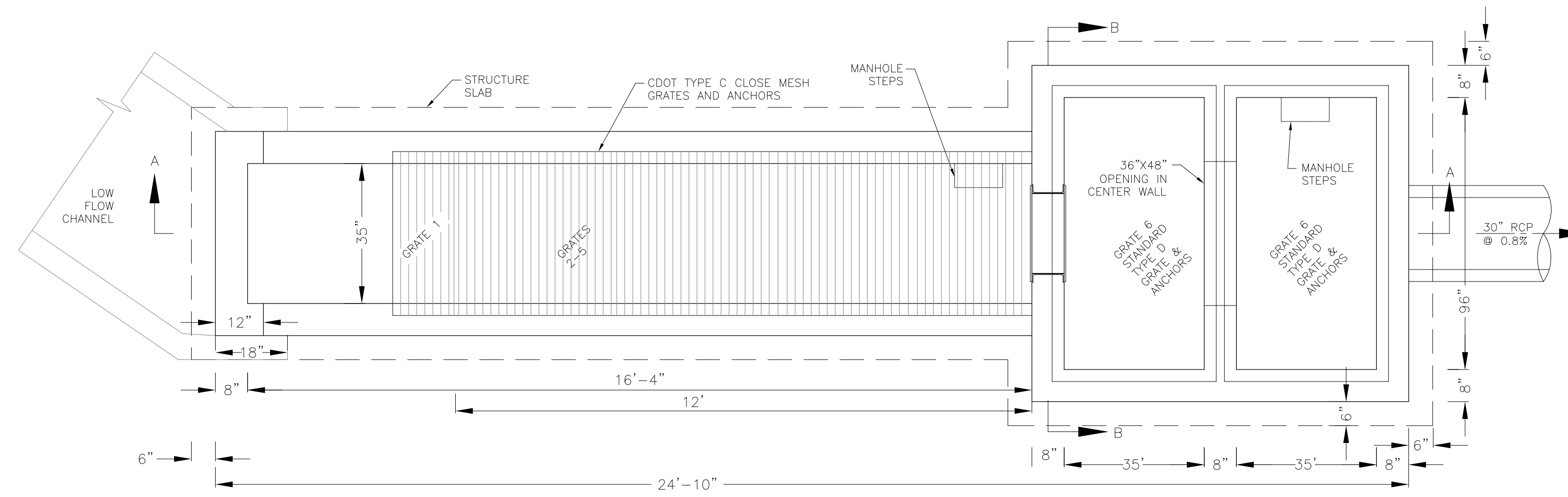
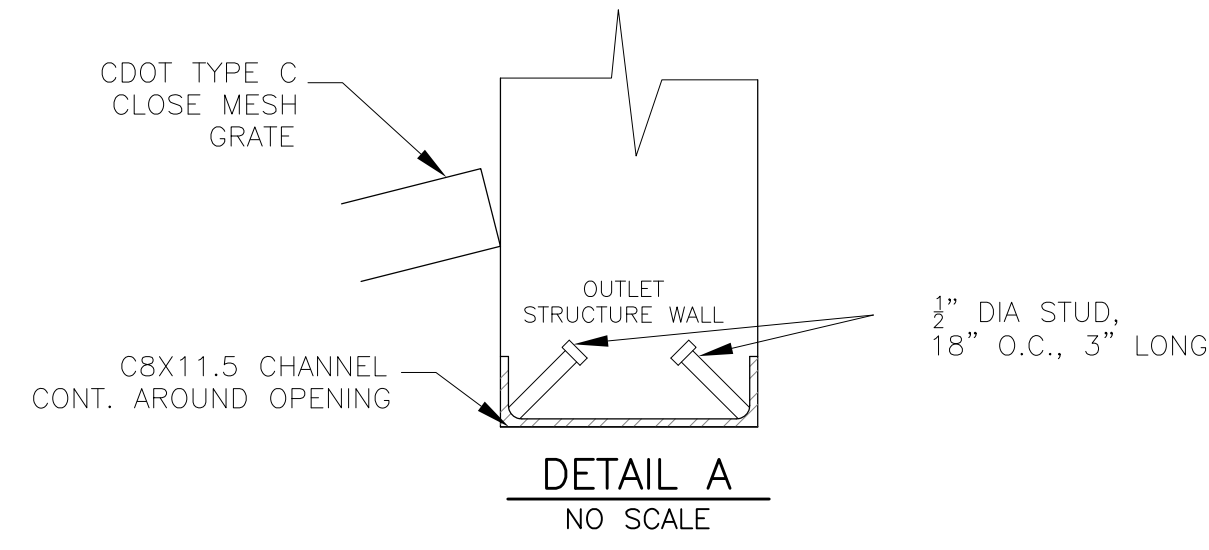


DATE: NOV 12, 2020

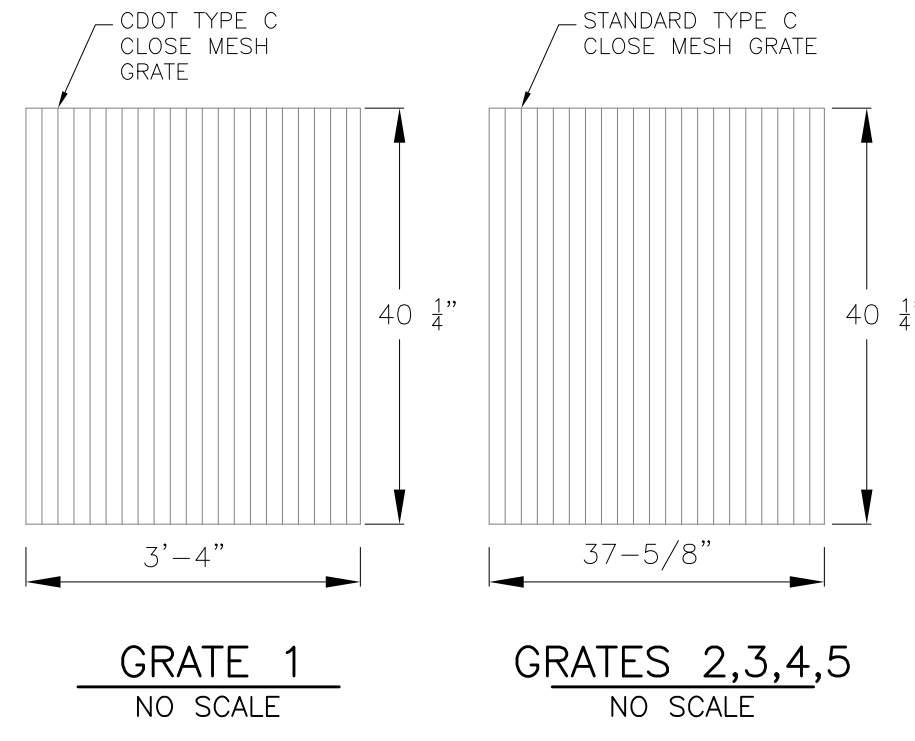
PROJECT NO.: 100.061

SHEET NUMBER: **C7.2**

TOTAL SHEETS: 58



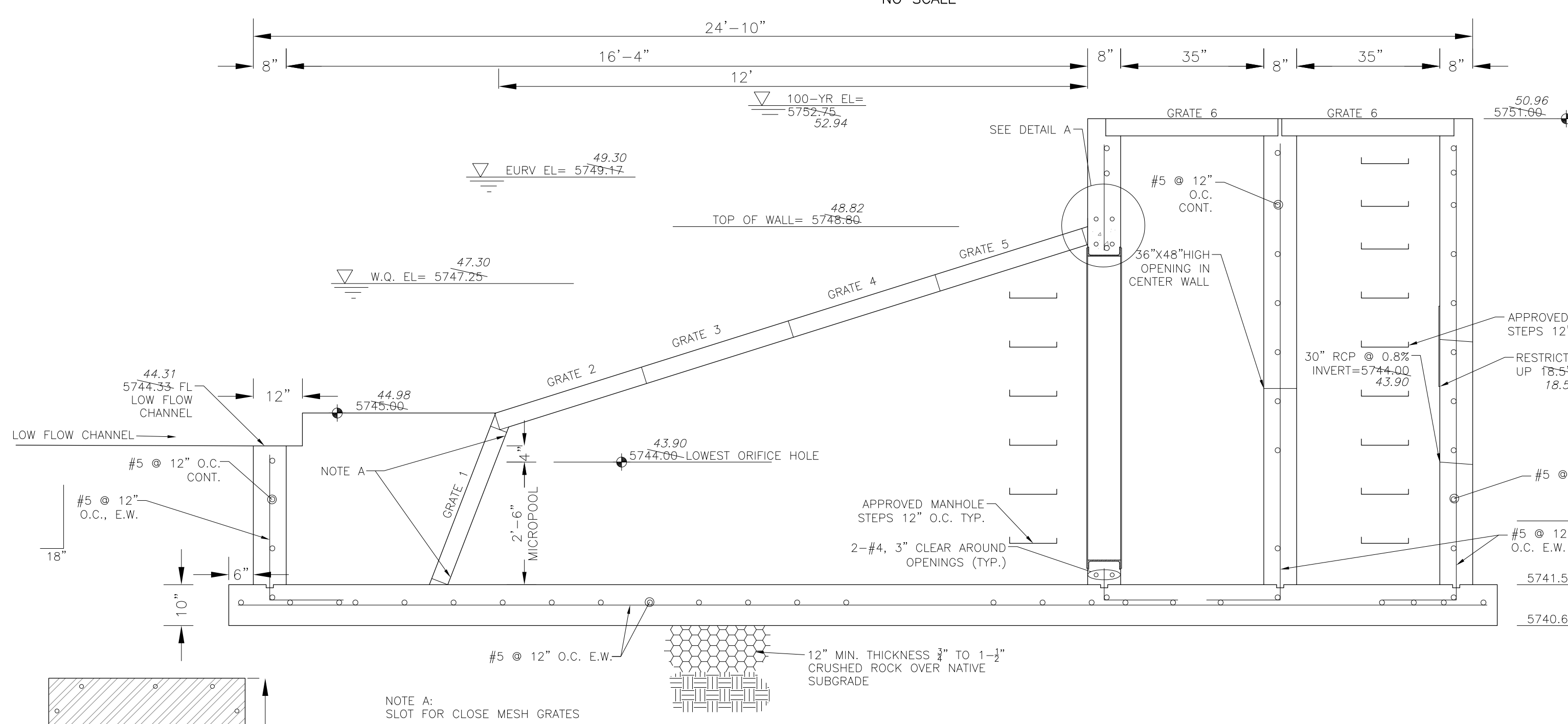
NOTE:  
AFTER CONCRETE STRUCTURE HAS BEEN POURED  
ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED  
PRIOR TO GRATE CONSTRUCTION



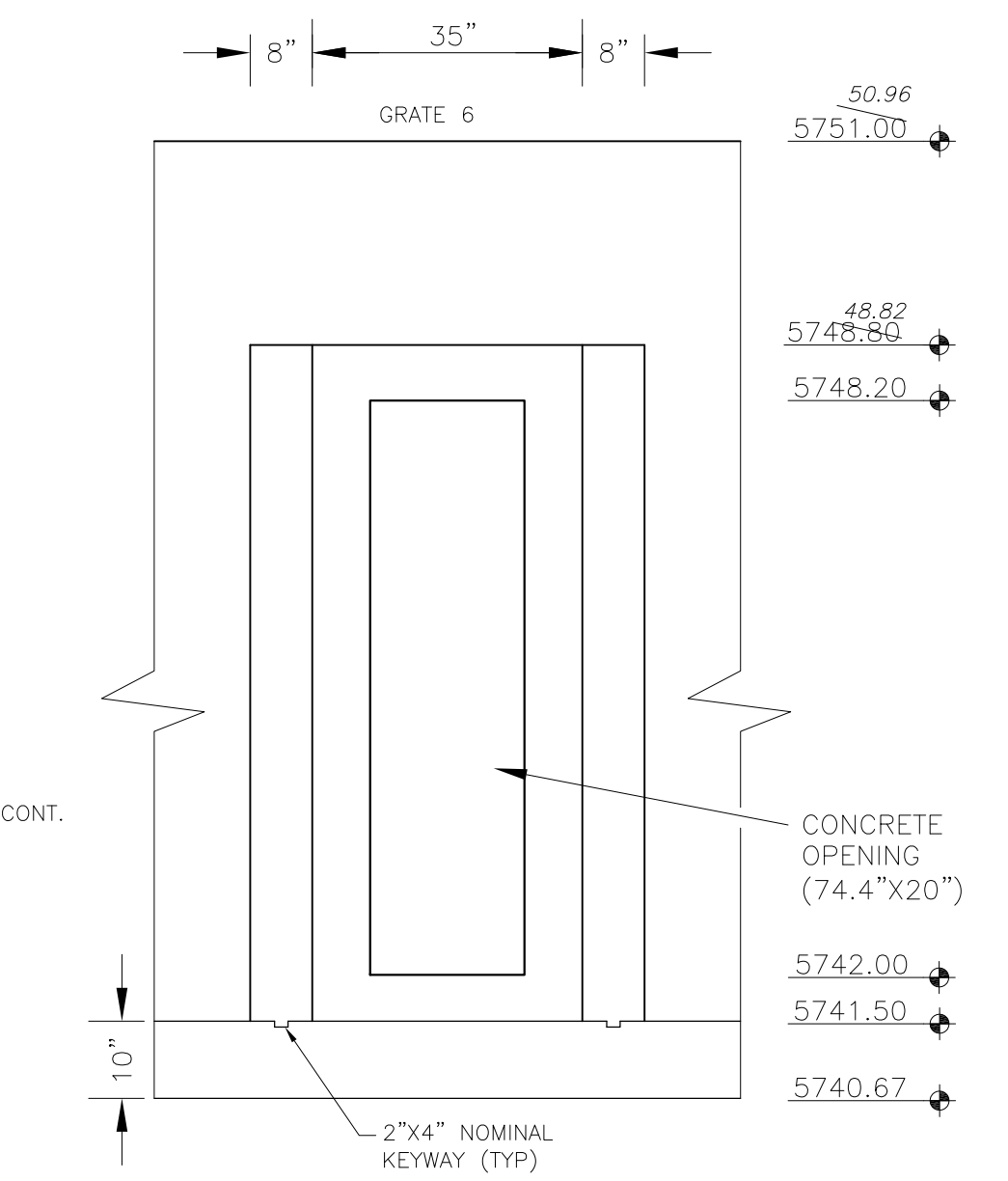
GRATE 1  
NO SCALE



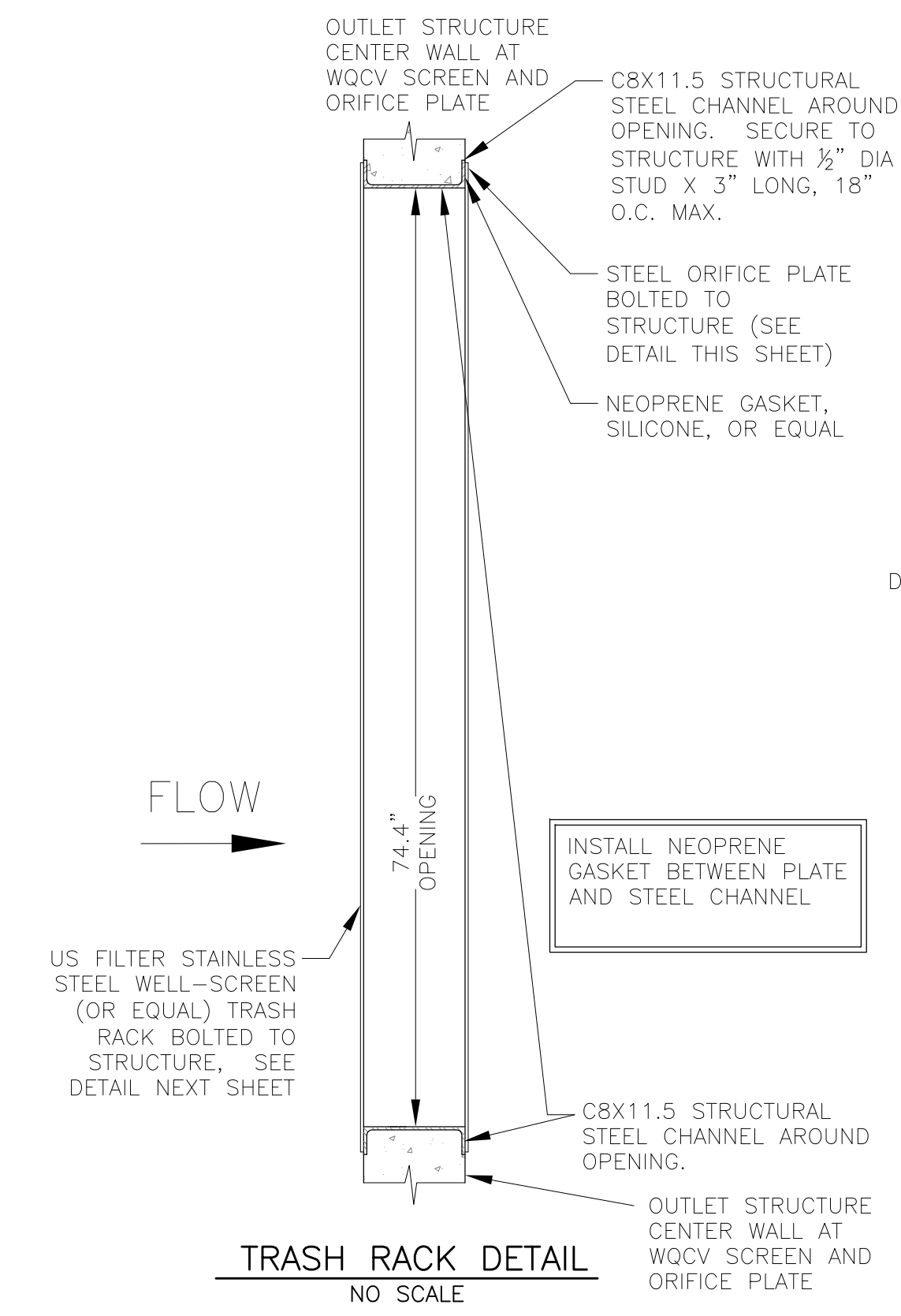
GRATES 2,3,4,5  
NO SCALE



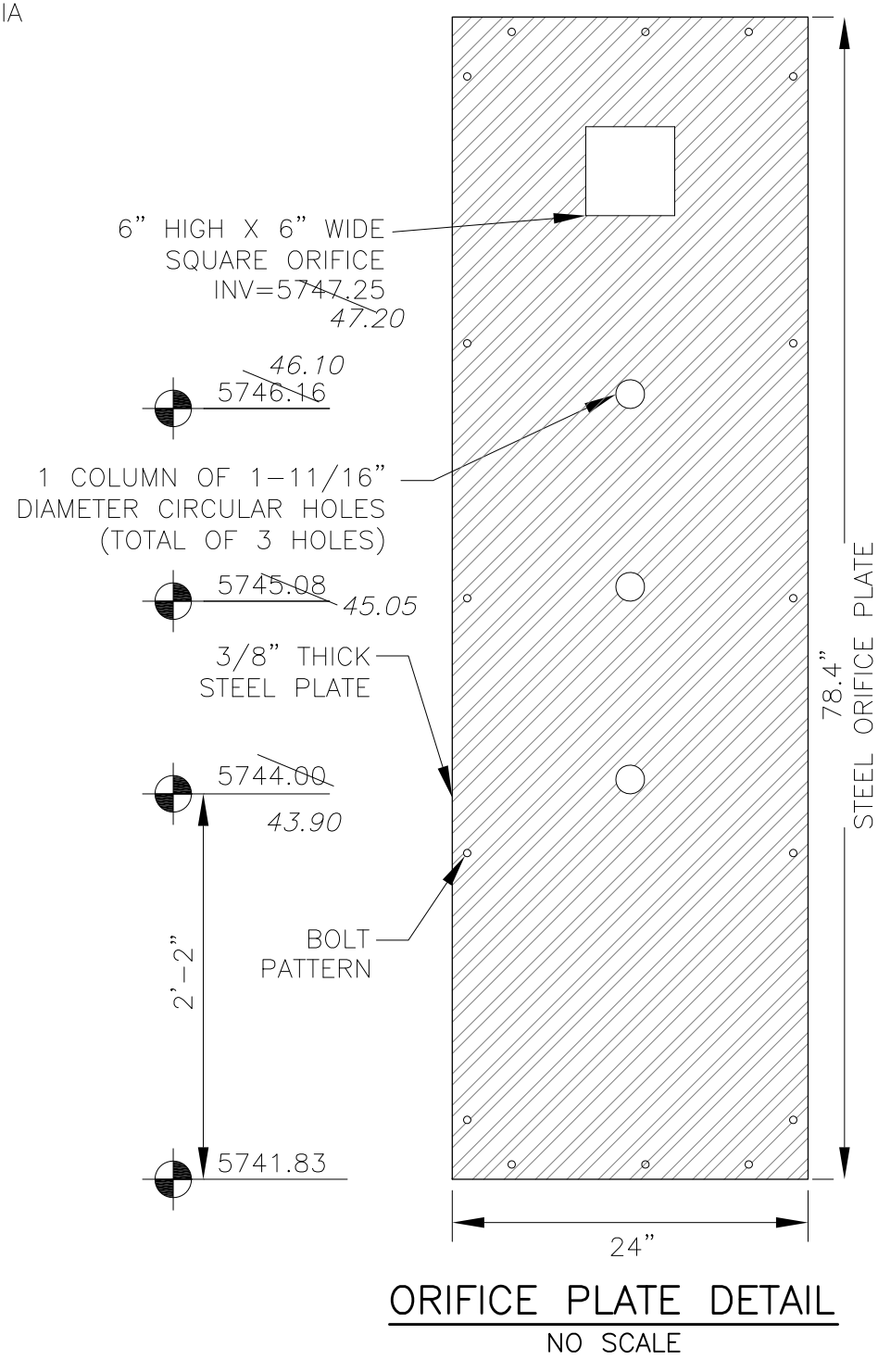
OUTLET STRUCTURE DETAIL - SECTION A-A  
NO SCALE



OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE



TRASH RACK DETAIL  
NO SCALE



ORIFICE PLATE DETAIL  
NO SCALE

OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

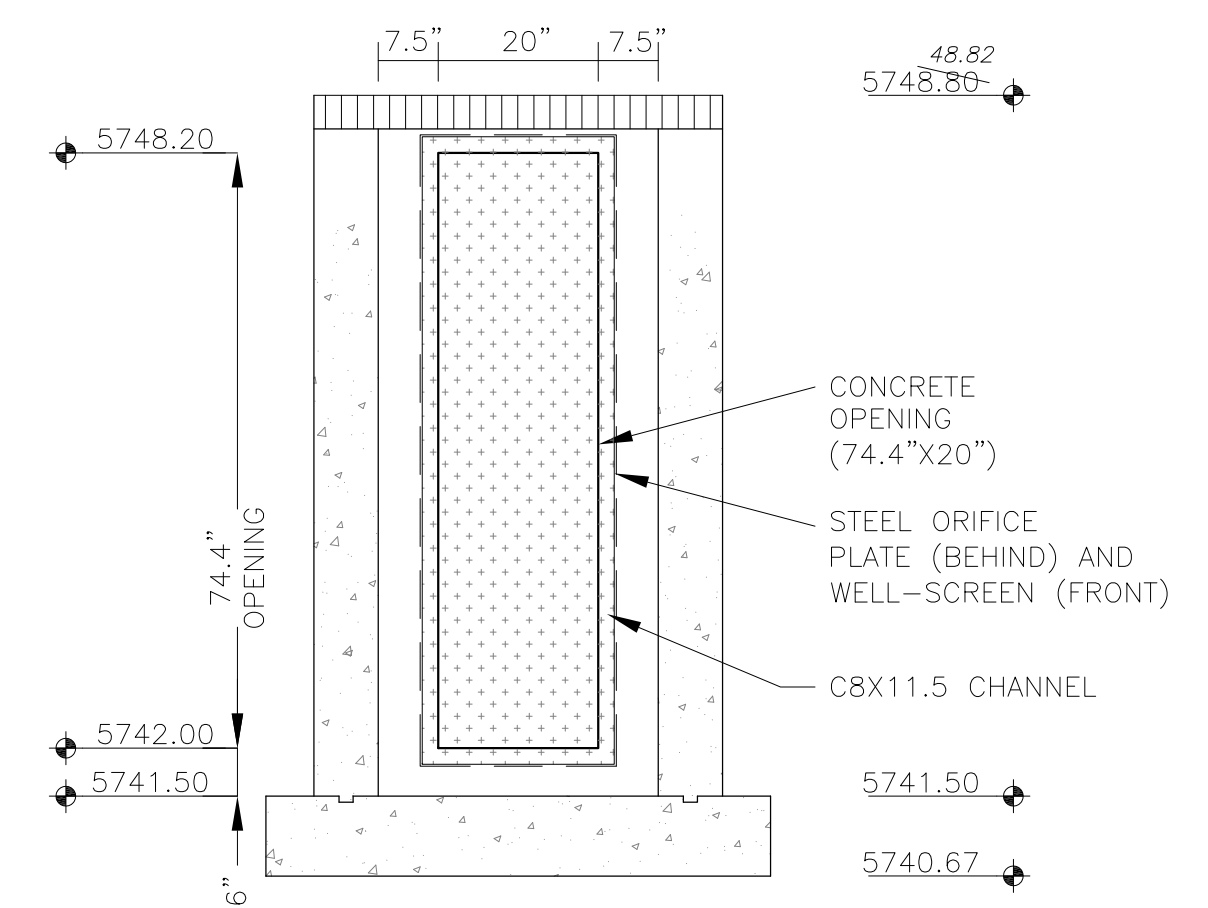
- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
- GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
- CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE
- EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
- ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
- SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
- REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
- ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

BAR SIZE	#4	#5	#6
MIN. SPLICE LENGTH	1'-3"	1'-7"	2'-0"

WQCV WELL-SCREEN NOTES:

- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
- WQCV Well Screen
  - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
  - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
  - Type and Size of Support Rod: TE 0.074"x0.50"
  - Spacing of Support Rod (O.C.): 1.0 Inch
  - Total Screen Thickness: 0.655"
  - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle

**AS-BUILT**  
DATE: 09/30/2022



OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE

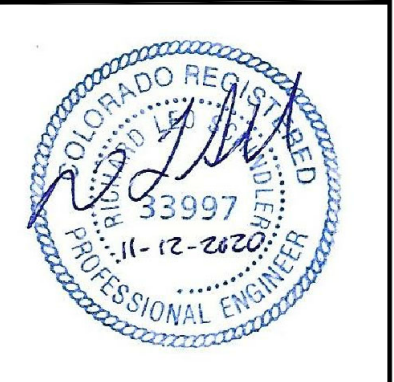
**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
PH: 719.570.5506  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cge1.com

DATE: \_\_\_\_\_  
DESCRIPTION: \_\_\_\_\_  
NO: \_\_\_\_\_  
PREPARED FOR: **LORSON, LLC**  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: JEFF MARK

PROJECT: **THE HILLS COLLECTOR STREET CONSTRUCTION**  
FONTAINE BLVD. - GRAYLING DR  
LORSON BLVD - WALLEYE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

**POND C2.2**  
**FULL SPECTRUM**  
**OUTLET STRUCTURE DETAILS**



DATE:  
NOV 12, 2020

PROJECT NO.  
100.061

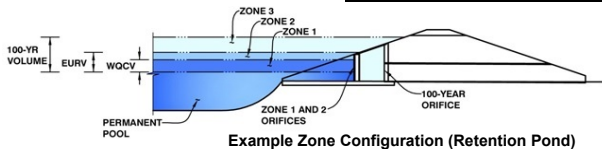
SHEET NUMBER  
**C9.13**

TOTAL SHEETS: 58

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C2.3-asbuilt**



**Example Zone Configuration (Retention Pond)**

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.25	0.294	Orifice Plate
Zone 2 (EURV)	3.34	0.589	Rectangular Orifice
Zone 3 (100+1/2WQCV)	4.62	0.834	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>1.717</b>	

**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 Area =	N/A	ft <sup>2</sup>
Underdrain Orifice Diameter =	N/A	inches	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)	WQ Orifice Area per Row =	6.806E-03	ft <sup>2</sup>
Depth at top of Zone using Orifice Plate =	2.25	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	0.98	sq. inches (diameter = 1-1/8 inches)	Elliptical Slot Area =	N/A	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	0.80	1.63					
Orifice Area (sq. inches)	0.98	0.98	0.98					

	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)**

	Zone 2 Rectangular	Not Selected		Zone 2 Rectangular	Not Selected
Invert of Vertical Orifice =	2.41	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.71
Depth at top of Zone using Vertical Orifice =	3.34	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.25
Vertical Orifice Height =	6.00	N/A	inches		
Vertical Orifice Width =	17.00	N/A	inches		

**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		Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	7.35	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H <sub>g</sub> =	7.35
Overflow Weir Front Edge Length =	8.00	N/A	feet	Overflow Weir Slope Length =	6.00
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	6.84
Horiz. Length of Weir Sides =	6.00	N/A	feet	Overflow Grate Open Area w/o Debris =	33.60
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	16.80
Debris Clogging % =	50%	N/A	%		

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	0.15	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	4.91
Outlet Pipe Diameter =	30.00	N/A	inches	Outlet Orifice Centroid =	1.25
Restrictor Plate Height Above Pipe Invert =	30.00	N/A	inches	Half-Central Angle of Restrictor Plate on Pipe =	3.14

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

			Spillway Design Flow Depth =	1.17	feet
Spillway Invert Stage =	9.20	ft (relative to basin bottom at Stage = 0 ft)	Stage at Top of Freeboard =	11.70	feet
Spillway Crest Length =	20.00	feet	Basin Area at Top of Freeboard =	1.04	acres
Spillway End Slopes =	4.00	H:V	Basin Volume at Top of Freeboard =	6.04	acre-ft
Freeboard above Max Water Surface =	1.33	feet			

micropool = 0 = 5744.30

**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)*

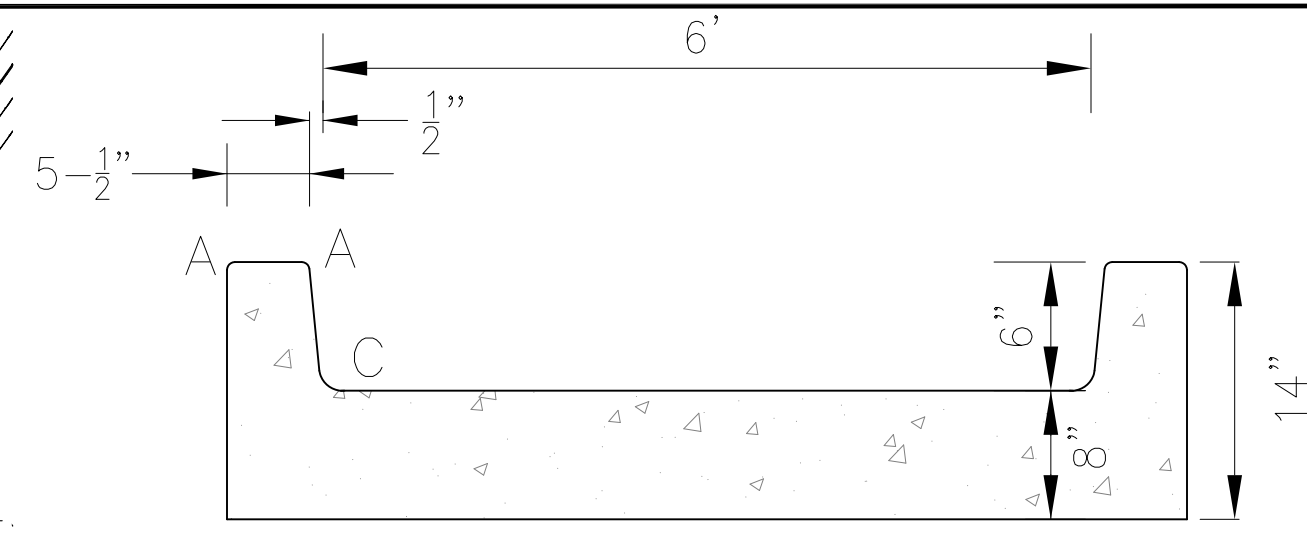
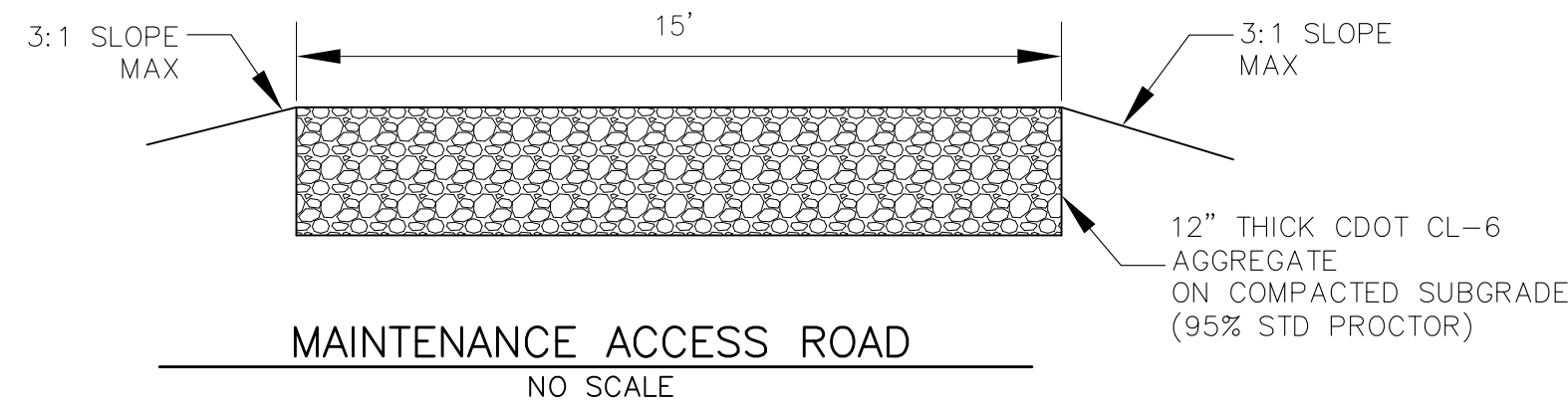
	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
One-Hour Rainfall Depth (in)	N/A	N/A	0.924	1.299	1.627	2.016	2.357	2.775
CUHP Runoff Volume (acre-ft)	0.294	0.883	2.831	4.148	5.891	8.181	10.069	12.414
User Override Inflow Hydrograph Volume (acre-ft)	N/A	N/A	2.2	5.0	7.2	11.8	14.6	18.5
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.14	0.31	0.45	0.74	0.91	1.16
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A	14.3	21.0	40.8	77.8	87.7	97.1
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	4.0	5.5	7.3	36.9	63.5	65.3
Peak Inflow Q (cfs)	N/A	N/A	N/A	1.1	1.0	3.1	4.3	3.5
Peak Outflow Q (cfs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Structure Controlling Flow	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	N/A	N/A	0.9	1.6	1.7
Max Velocity through Gate 2 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours)	45	56	51	46	41	33	27	20
Time to Drain 99% of Inflow Volume (hours)	47	61	62	61	60	56	52	49
Maximum Ponding Depth (ft)	2.25	3.34	3.95	5.07	6.96	7.96	8.33	8.73
Area at Maximum Ponding Depth (acres)	0.40	0.61	0.65	0.71	0.83	0.90	0.93	0.95
Maximum Volume Stored (acre-ft)	0.296	0.886	1.266	2.029	3.493	4.348	4.686	5.061



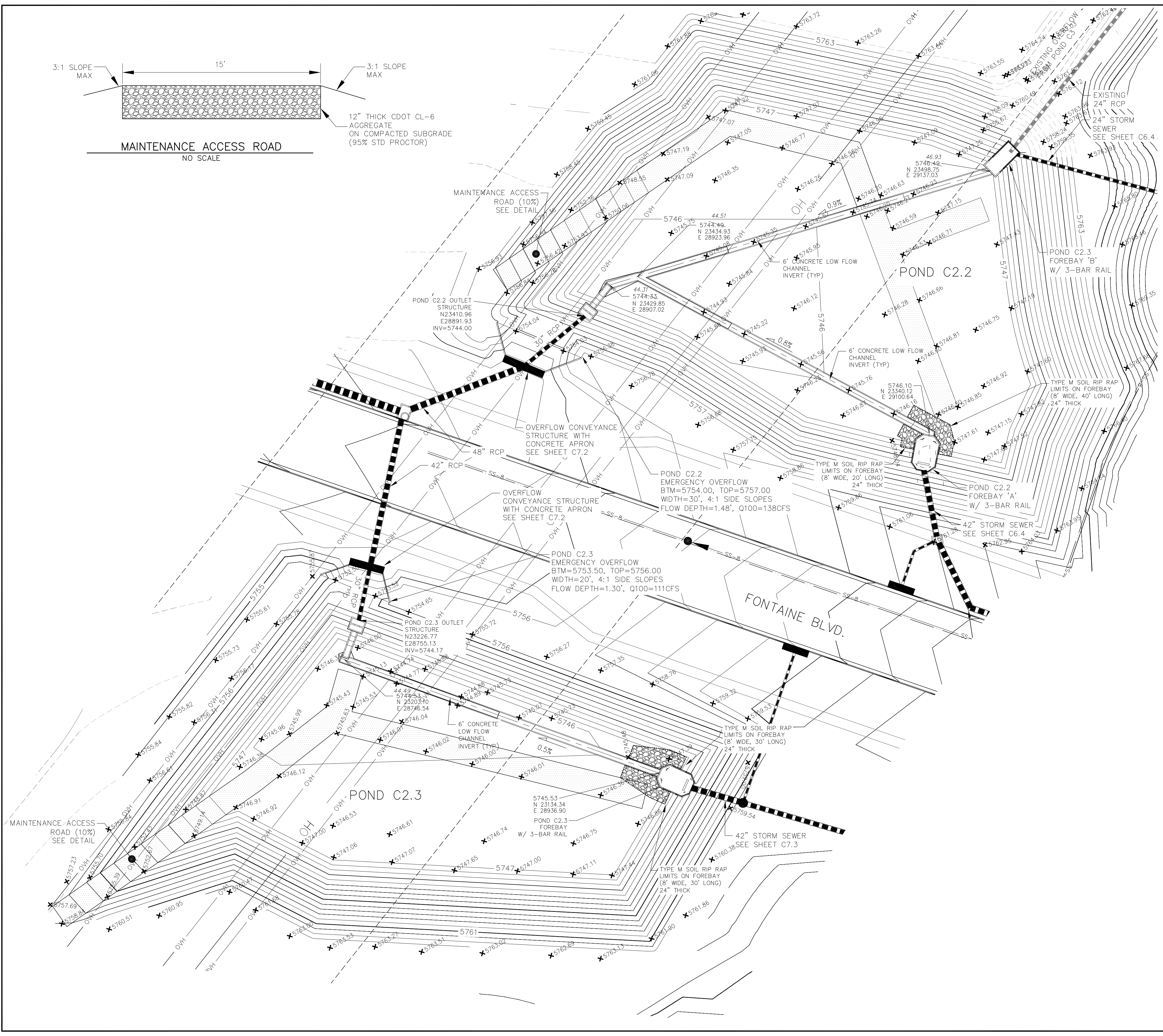
Pond C2.3 Developed Inflow Hydrograph---- asbuilt Pond C2.1 outflow + C3 Basin + C4 Basin

Time [hr]	Time [min]	2 Year		2yr Combined		5 Year		5yr Combined		10 Year		10yr Combined		25 Year		25yr Combined		50 Year		50yr Combined		100 Year		100yr Combined	
		Ponc C2.1 Outflow2 - [cfs]	CUHP 2 Year [cfs]	Hydrograph	Ponc C2.1 Outflow2 - [cfs]	CUHP 5 Year [cfs]	Hydrograph	Ponc C2.1 Outflow2 - [cfs]	CUHP 10 Year [cfs]	Hydrograph	Ponc C2.1 Outflow2 - [cfs]	CUHP 25 Year [cfs]	Hydrograph	Ponc C2.1 Outflow2 - [cfs]	CUHP 50 Year [cfs]	Hydrograph	Ponc C2.1 Outflow2 - [cfs]	CUHP 100 Year [cfs]	Hydrograph	Ponc C2.1 Outflow2 - [cfs]	CUHP 100 Year [cfs]	Hydrograph	Ponc C2.1 Outflow2 - [cfs]	CUHP 100 Year [cfs]	Hydrograph
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.08	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.17	10.00	0.14	0.00	0.14	0.18	0.00	0.18	0.20	0.18	0.20	0.17	0.00	0.20	0.17	0.00	0.19	0.13	0.33	0.18	0.01	0.01	0.20	0.00	0.04	
0.25	15.00	0.25	1.17	1.42	0.27	1.91	2.18	0.28	2.37	2.65	0.26	1.59	1.85	0.27	1.99	2.26	0.27	1.94	0.27	1.94	0.27	1.94	0.27	1.94	
0.33	20.00	0.32	4.21	4.54	0.40	5.61	6.01	0.45	6.91	7.36	0.33	4.12	4.45	0.37	4.81	5.18	0.39	5.14	0.39	5.14	0.39	5.14	0.39	5.14	
0.42	25.00	0.48	9.83	10.31	0.54	14.69	15.23	0.58	18.61	19.20	0.52	9.65	10.17	0.55	11.51	12.05	0.57	12.82	0.57	12.82	0.57	12.82	0.57	12.82	
0.50	30.00	0.56	13.28	13.84	1.55	18.82	20.37	2.81	22.84	25.65	2.25	24.57	26.82	3.01	28.96	31.97	3.48	32.54	3.48	32.54	3.48	32.54	3.48	32.54	
0.58	35.00	1.21	12.88	14.09	3.15	17.81	20.96	3.93	21.42	25.35	4.04	29.19	33.23	4.63	34.09	38.72	5.11	40.16	5.11	40.16	5.11	40.16	5.11	40.16	
0.67	40.00	2.54	11.77	14.31	3.89	15.99	19.88	4.62	19.25	23.87	5.06	28.83	33.89	5.64	33.53	39.17	22.82	39.47	22.82	39.47	22.82	39.47	22.82	39.47	
0.75	45.00	3.14	10.24	13.38	4.40	14.14	18.54	5.12	17.24	22.36	6.33	26.34	32.68	34.39	30.62	65.01	60.13	36.96	65.01	60.13	36.96	65.01	60.13	36.96	
0.83	50.00	3.54	8.93	12.48	4.77	12.65	17.42	5.49	15.26	20.75	30.40	24.16	54.56	59.62	28.08	87.70	62.31	33.83	87.70	62.31	33.83	87.70	62.31	33.83	
0.92	55.00	3.84	7.84	11.67	5.05	11.06	16.11	6.49	13.49	19.98	51.27	21.27	72.54	60.76	24.75	85.51	63.89	30.40	85.51	63.89	30.40	85.51	63.89	30.40	
1.00	60.00	4.07	6.88	10.94	5.28	9.62	14.89	7.49	11.94	18.62	59.24	18.58	77.83	61.49	21.64	83.13	65.94	27.30	83.13	65.94	27.30	83.13	65.94	27.30	
1.08	65.00	4.25	6.17	10.42	5.47	8.60	14.06	8.25	10.89	17.44	66.62	16.29	75.74	61.90	19.00	80.90	65.83	24.59	80.90	65.83	24.59	80.90	65.83	24.59	
1.17	70.00	4.40	5.44	9.84	5.62	7.90	13.52	8.48	10.19	16.67	69.42	14.12	73.54	62.05	16.54	78.58	66.25	20.97	78.58	66.25	20.97	78.58	66.25	20.97	
1.25	75.00	4.51	4.83	9.34	5.94	7.15	13.09	31.24	9.58	40.82	59.16	12.44	71.60	61.95	14.62	76.57	66.34	18.02	76.57	66.34	18.02	76.57	66.34	18.02	
1.33	80.00	4.60	4.29	8.89	6.20	6.33	14.52	31.33	8.56	39.89	52.97	10.74	63.71	61.61	12.61	74.22	66.14	15.09	74.22	66.14	15.09	74.22	66.14	15.09	
1.42	85.00	4.67	3.78	8.45	6.50	5.55	15.84	29.58	7.32	36.90	45.47	9.19	54.66	61.06	10.77	71.83	65.68	12.49	71.83	65.68	12.49	71.83	65.68	12.49	
1.50	90.00	4.72	3.29	8.00	6.72	4.82	16.54	27.15	6.18	33.33	38.42	7.64	46.06	60.30	8.94	69.24	64.99	10.21	69.24	64.99	10.21	69.24	64.99	10.21	
1.58	95.00	4.76	2.84	7.60	6.94	4.18	16.72	24.80	5.20	29.99	32.37	6.21	38.59	59.40	7.26	66.66	64.16	8.15	66.66	64.16	8.15	66.66	64.16	8.15	
1.67	100.00	4.80	2.49	7.30	7.15	3.49	16.33	22.74	4.46	27.21	27.58	4.97	32.56	48.95	5.81	54.75	63.22	6.37	54.75	63.22	6.37	54.75	63.22	6.37	
1.75	105.00	4.84	2.31	7.15	7.29	3.04	15.84	21.02	4.04	25.06	23.88	4.04	27.94	37.96	4.74	42.70	62.21	5.07	42.70	62.21	5.07	42.70	62.21	5.07	
1.83	110.00	4.88	2.22	7.10	7.25	2.77	15.32	19.56	3.77	23.33	21.04	3.51	24.55	30.77	4.11	34.89	61.14	4.28	34.89	61.14	4.28	34.89	61.14	4.28	
1.92	115.00	4.90	1.98	6.88	7.19	2.57	14.76	18.22	3.51	21.72	18.86	3.16	22.02	25.88	3.71	29.59	60.03	3.77	29.59	60.03	3.77	29.59	60.03	3.77	
2.00	120.00	4.92	1.77	6.68	7.11	2.37	13.96	16.71	3.18	19.88	16.91	2.93	19.84	22.12	3.43	25.55	55.41	3.39	25.55	55.41	3.39	25.55	55.41	3.39	
2.08	125.00	4.92	1.41	6.33	7.09	1.88	12.57	14.92	2.52	17.44	14.89	2.20	17.19	18.78	2.69	21.19	48.98	2.61	21.19	48.98	2.61	21.19	48.98	2.61	
2.17	130.00	4.92	1.09	6.01	7.05	1.45	11.11	13.06	1.95	15.01	12.93	1.76	14.68	15.83	2.06	17.89	28.56	1.94	17.89	28.56	1.94	17.89	28.56	1.94	
2.25	135.00	4.90	0.85	5.75	7.02	1.13	9.75	11.33	1.50	12.82	11.16	1.34	12.50	13.34	1.57	14.91	21.64	1.45	14.91	21.64	1.45	14.91	21.64	1.45	
2.33	140.00	4.89	0.65	5.54	7.09	0.86	8.55	9.81	1.13	10.94	9.64	1.02	10.66	11.28	1.19	12.47	16.85	1.08	12.47	16.85	1.08	12.47	16.85	1.08	
2.42	145.00	4.86	0.50	5.36	7.09	0.66	7.54	8.52	0.85	9.37	8.37	0.77	9.14	9.60	0.90	10.50	13.43	0.82	10.50	13.43	0.82	10.50	13.43	0.82	
2.50	150.00	4.84	0.38	5.22	7.06	0.49	6.74	7.46	0.63	8.10	7.34	0.57	7.91	8.26	0.67	8.93	10.93	0.62	8.93	10.93	0.62	8.93	10.93	0.62	
2.58	155.00	4.81	0.29	5.09	7.01	0.36	6.17	6.63	0.47	7.11	6.54	0.43	6.96	7.21	0.50	7.70	9.08	0.46	7.70	9.08	0.46	7.70	9.08	0.46	
2.67	160.00	4.78	0.21	4.99	6.98	0.26	5.97	6.03	0.35	6.29	6.03	0.32	6.29	6.41	0.37	6.79	7.72	0.35	6.79	7.72	0.35	6.79	7.72	0.35	
2.75	165.00	4.74	0.15	4.90	6.88	0.19	5.87	5.72	0.26	5.98	5.72	0.24	5.96	5.88	0.28	6.15	6.71	0.26	6.15	6.71	0.26	6.15	6.71	0.26	
2.83	170.00	4.71	0.10	4.81	6.87	0.13	5.78	5.69	0.18	5.87	5.69	0.18	5.86	5.71	0.19	5.91	6.03	0.18	5.91	6.03	0.18	5.91	6.03	0.18	
2.92	175.00	4.68	0.06	4.74	6.82	0.08	5.70	5.66	0.11	5.77	5.66	0.11	5.77	5.68	0.12	5.81	5.72	0.12	5.81	5.72	0.12	5.81	5.72	0.12	
3.00	180.00	4.64	0.03	4.67	6.75	0.05	5.63	5.63	0.06	5.69	5.63	0.06	5.69	5.65	0.07	5.72	5.69	0.07	5.72	5.69	0.07	5.72	5.69	0.07	
3.08	185.00	4.61	0.01	4.62	6.68	0.02	5.57	5.60	0.03	5.62	5.59	0.03	5.62	5.62	0.03	5.65	5.66	0.03	5.65	5.66	0.03	5.65	5.66	0.03	
3.17	190.00	4.57	0.00	4.58	6.62	0.01	5.52	5.56	0.01	5.57	5.56	0.01	5.57	5.58	0.01	5.59	5.62	0.01	5.59	5.62	0.01	5.59	5.62	0.01	
3.25	195.00	4.54	0.00	4.54	6.54	0.00	5.49	5.53	0.00	5.53	5.53	0.00	5.53	5.55	0.00	5.55	5.59	0.00	5.55	5.59	0.00	5.55	5.59	0.00	
3.33	200.00	4.50	0.00	4.50	6.45	0.00	5.45	5.50	0.00	5.50	5.50	0.00	5.50	5.52	0.00	5.52	5.56	0.00	5.52	5.56	0.00	5.52	5.56	0.00	
3.42	205.00	4.46	0.00	4.46	6.42	0.00	5.42	5.47	0.00	5.47	5.46	0.00	5.46	5.49	0.00	5.49	5.53	0.00	5.49	5.53	0.00	5.49	5.53	0.00	
3.50	210.00	4.43	0.00	4.43	6.39	0.00	5.39	5.43	0.00	5.43	5.43	0.00	5.43	5.45	0.00	5.45	5.49	0.00	5.45	5.49	0.00	5.45	5.49	0.00	
3.58	215.00	4.39	0.00	4.39	6.35	0.00	5.35	5.40	0.00	5.40	5.40	0.00	5.40	5.42	0.00	5.42	5.46	0.00	5.42	5.46	0.00	5.42	5.46	0.00	
3.67	220.00	4.36	0.00	4.36	6.32	0.00	5.32	5.37	0.00	5.37	5.36	0.00	5.36	5.39	0.00	5.39	5.43	0.00	5.39	5.43	0.00	5.39	5.43	0.00	
3.75	225.00	4.32	0.00	4.32	6.29	0.00	5.29	5.33	0.00	5.33	5.33	0.00	5.33	5.35	0.00	5.35	5.40	0.00	5.35	5.40	0.00	5.35	5.40	0.00	
3.83	230.00	4.29	0.00	4.29	6.25	0.00	5.25	5.30	0.00	5.30	5.30	0.00	5.30	5.32	0.00	5.32	5.36	0.00	5.32	5.36	0.00	5.32	5.36	0.00	
3.92	235.00	4.25	0.00	4.25	6.22	0.00	5.22	5.27	0.00	5.27	5.26	0.00	5.26	5.29	0.00	5.29	5.33	0.00	5.29	5.33	0.00	5.29	5.33	0.00	
4.00	240.00	4.21	0.00	4.21	6.19	0.00	5.19	5.23	0.00	5.23	5.23	0.00	5.23	5.25	0.00	5.25	5.30	0.00	5.25	5.30	0.00	5.25	5.30	0.00	
4.08	245.00	4.18	0.00	4.18																					



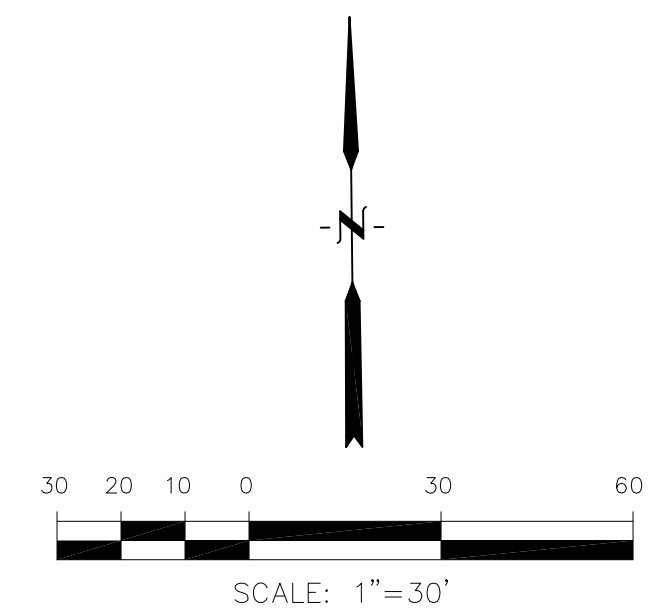


LENGTH FOR RADII	
A	= 1/2"
C	= 1-1/2"



**AS-BUILT**

DATE: 09/30/2022



**CORE ENGINEERING GROUP**

15004 1ST AVE. SUITE 300  
 COLORADO SPRINGS, CO 80903  
 PHONE: 719.570.1100  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: Rich@ceg1.com

DATE: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

NO: \_\_\_\_\_

PREPARED FOR: **LORSON, LLC**  
 212 N. WAHSATCH AVE, SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 (719) 635-3200  
 CONTACT: JEFF MARK

PROJECT: **THE HILLS COLLECTOR STREET CONSTRUCTION**  
 FONTAINE BLVD. - GRAYLING DR  
 LORSON BLVD - WALLEYE DR - LAMPREY DR  
 COLORADO SPRINGS, COLORADO

DRAWN: RLS  
 DESIGNED: RLS  
 CHECKED: RLS

**POND C2.2 & C2.3 FOREBAY, LOW FLOW CHANNEL AND OUTLET STRUCTURE LAYOUT**

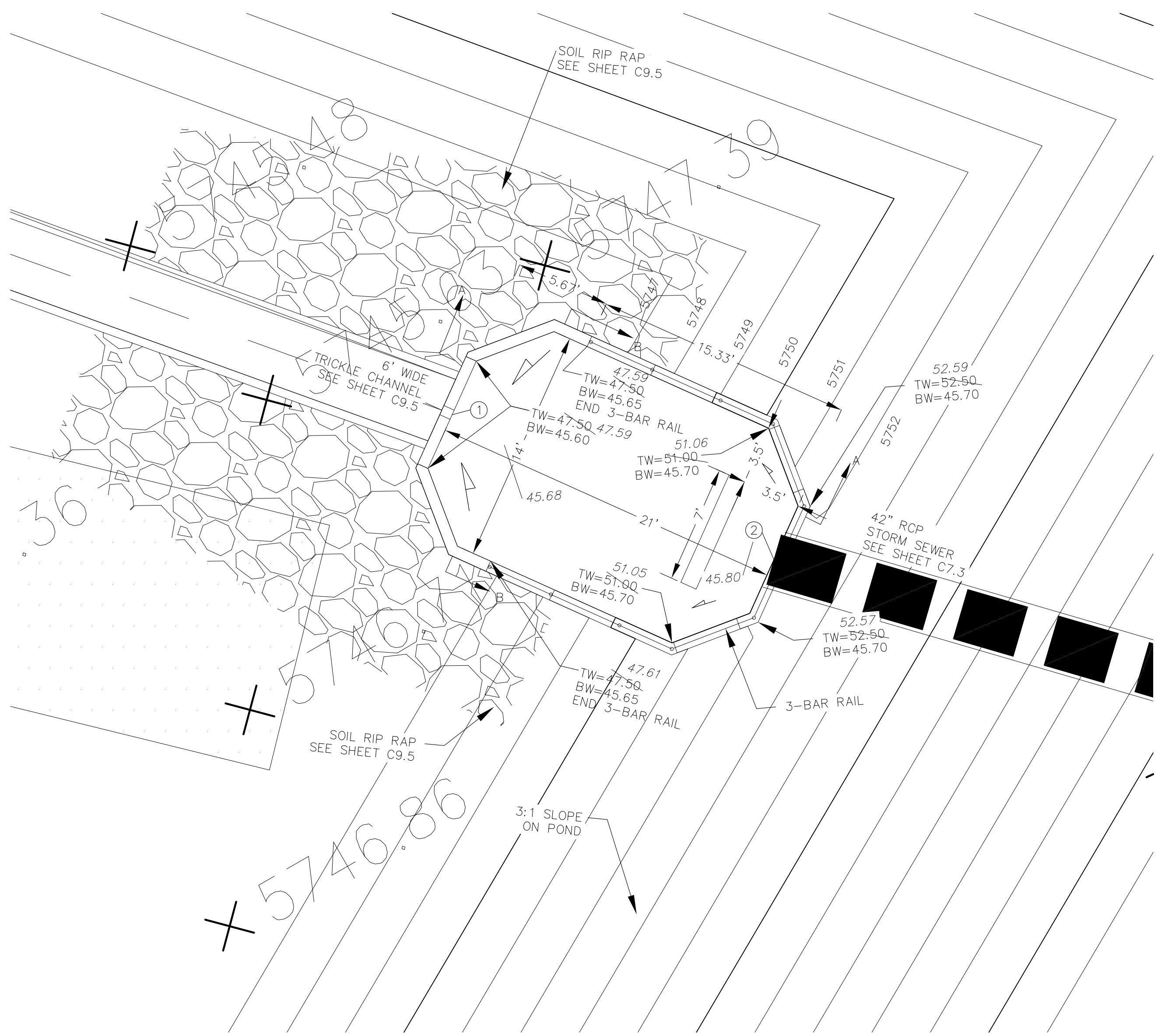


DATE: NOV 12, 2020

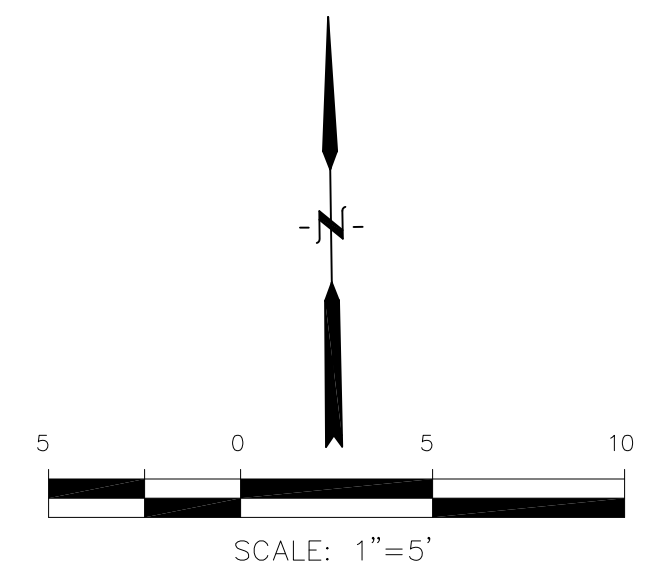
PROJECT NO. 100.061

SHEET NUMBER **C9.5**

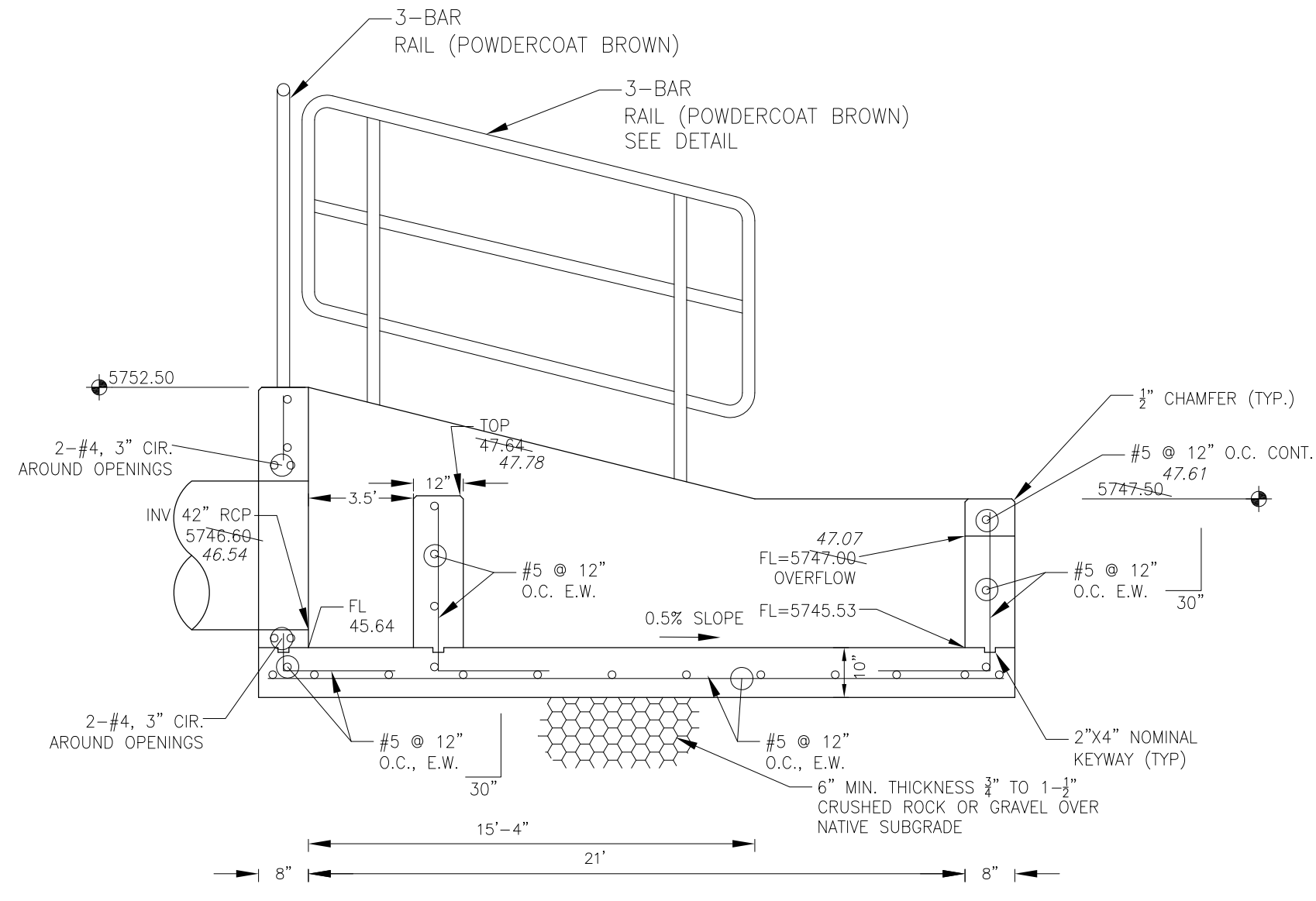
TOTAL SHEETS: 58



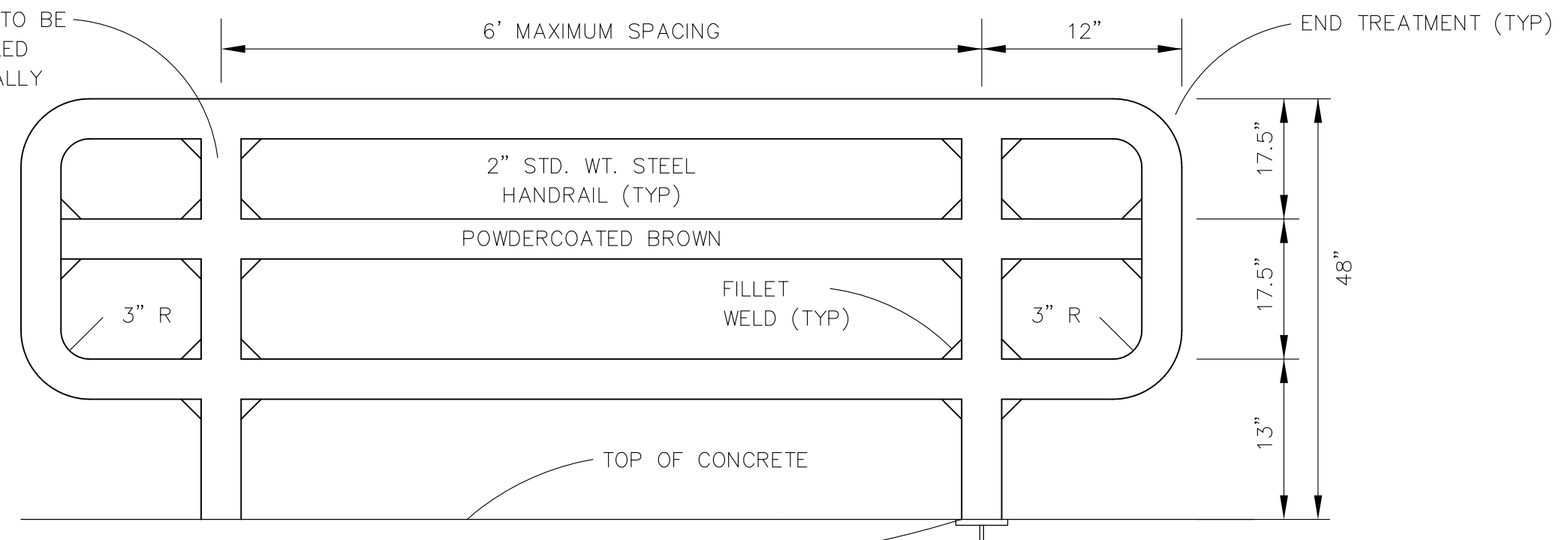
**POND C2.3 - FOREBAY LAYOUT**  
 SCALE: 1"=5'



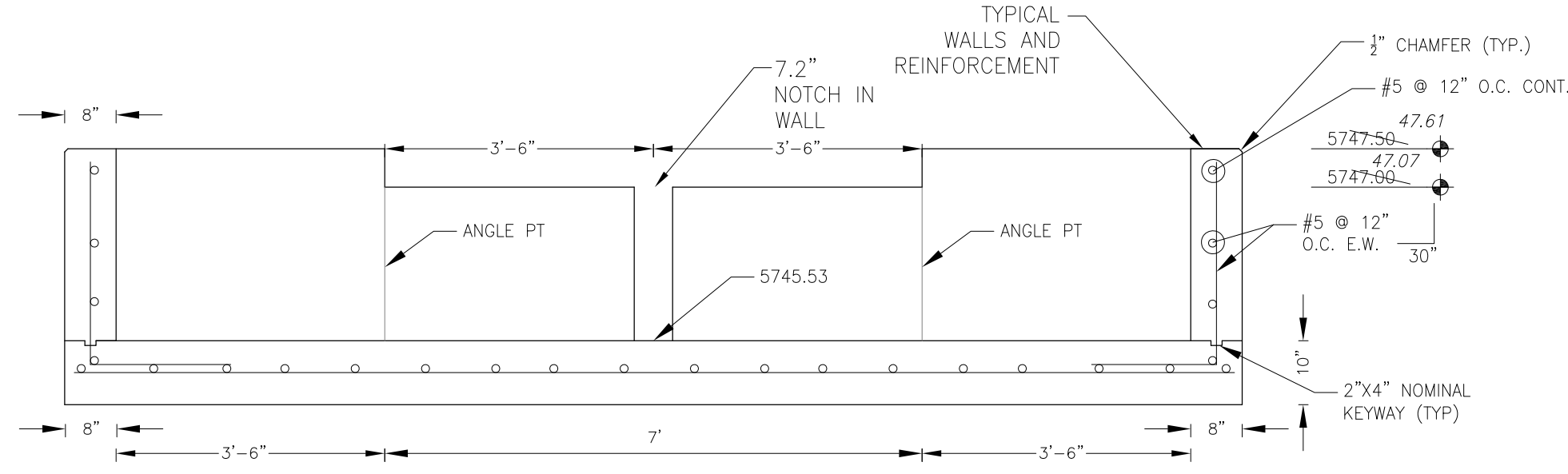
POINT TABLE (FOREBAY)				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	23134.06	28937.51	5745.53	FOREBAY BOTTOM
2	23125.44	28956.66	5745.64	FOREBAY BOTTOM, INV 42"=5746.50



**FOREBAY SECTION A-A**  
 NO SCALE



**3-BAR RAIL DETAIL**  
 NO SCALE



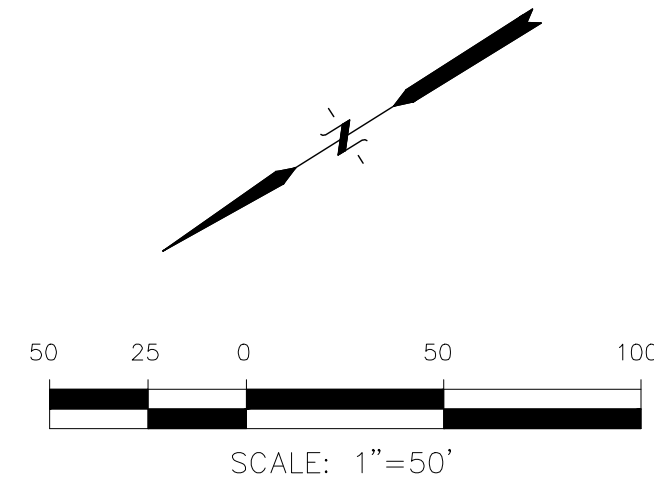
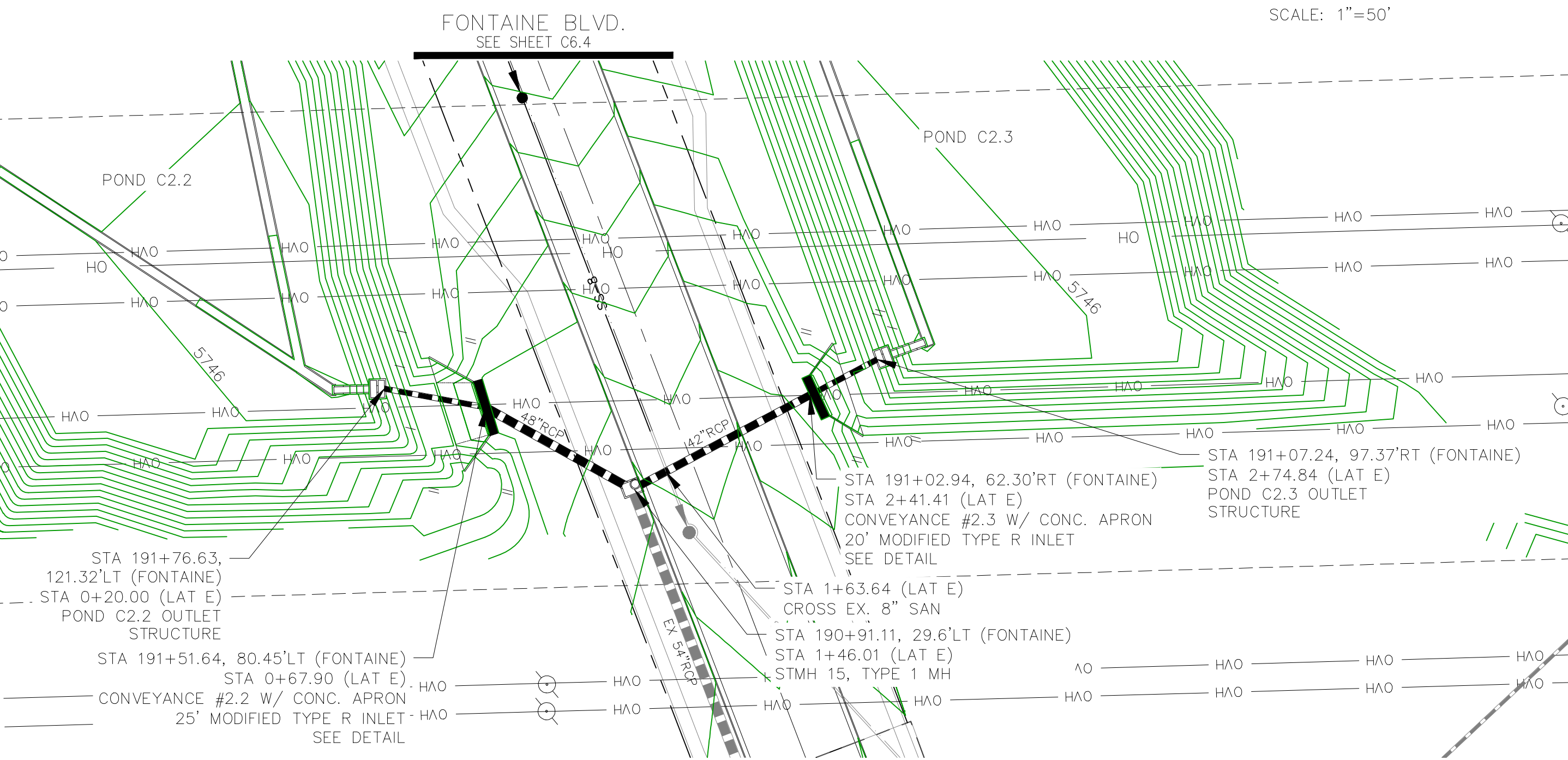
**FOREBAY SECTION B-B**  
 NO SCALE

NOTE: ALL CONCRETE FOR FOREBAY SHALL BE CDOT TYPE D

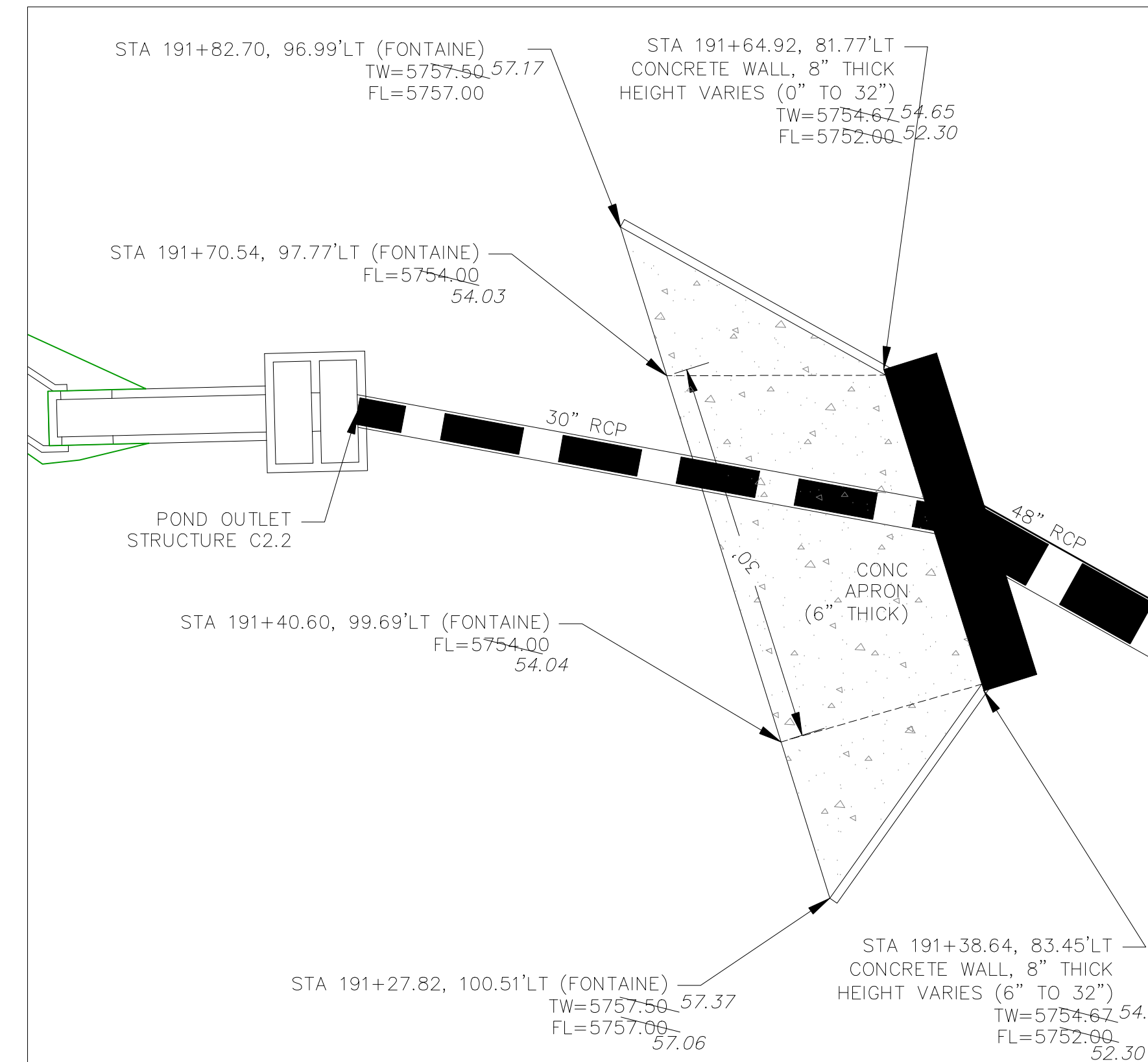
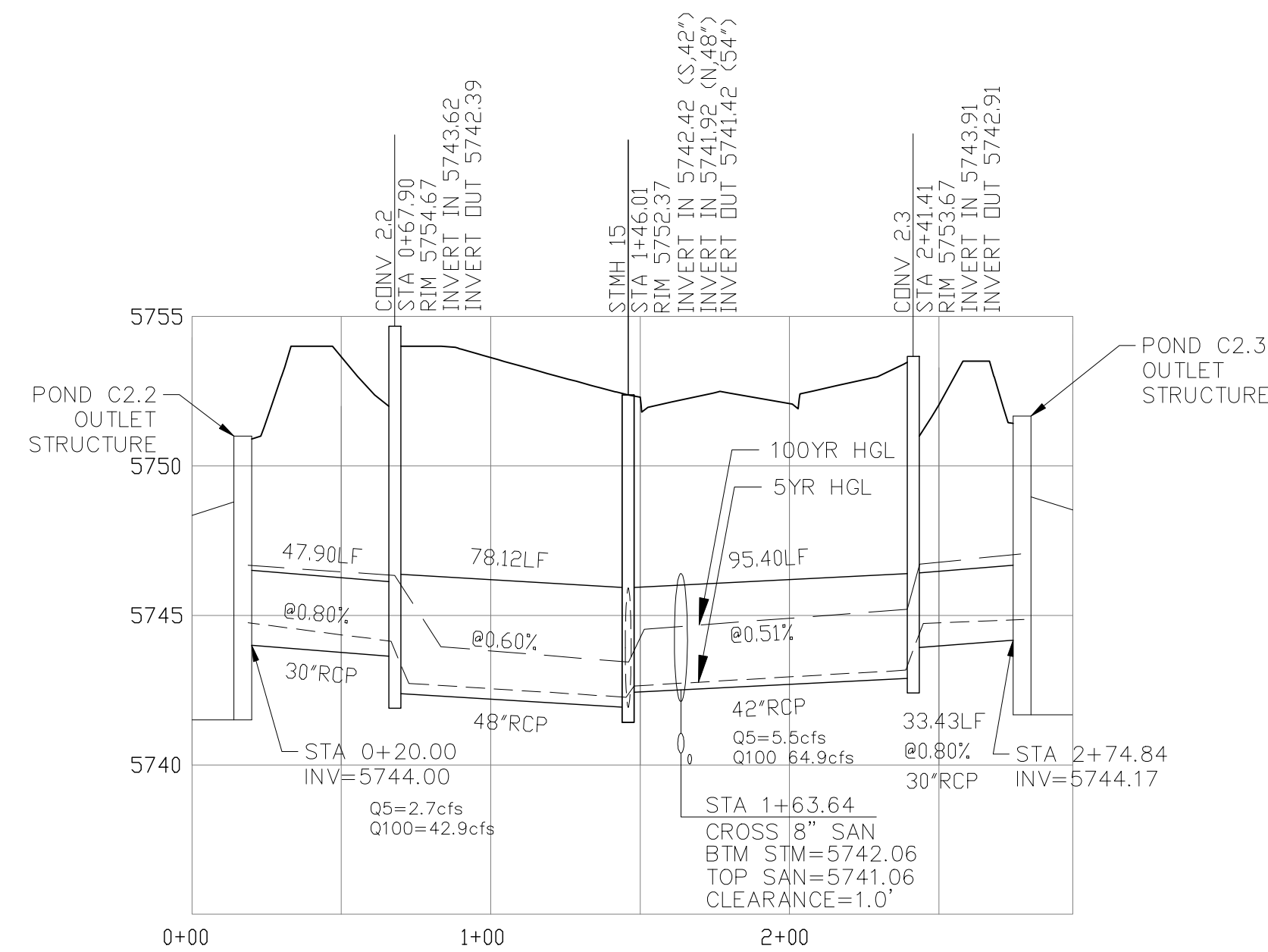
**AS-BUILT**  
 DATE: 09/30/2022

- NOTES**
1. ALL SPOT ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE NOTED.
  2. SEE EARLY GRADING PLAN FOR GRADING INFORMATION.
  3. ALL STORM SEWER SHALL BE CLASS III RCP.
  4. ALL MHS SHALL BE TYPE 1 UNLESS OTHERWISE NOTED.

- 1 CURVE DATA ID
- 2 PEDESTRIAN RAMP, SEE SHEET C10.1
- 3 CURB/GUTTER FLOW LINE POINTS

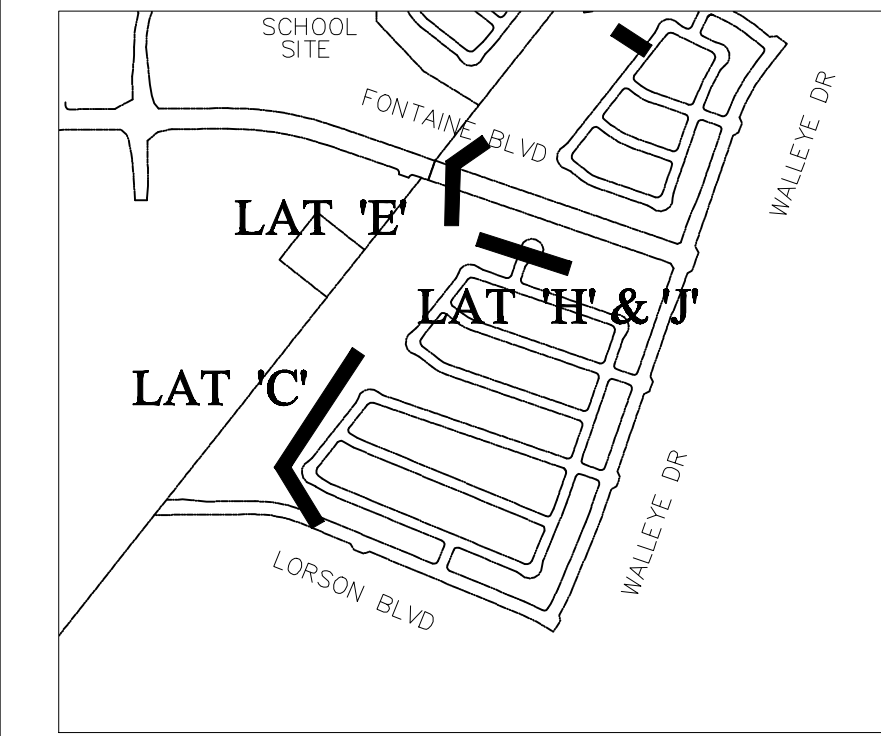


**STORM LATERAL 'E'**



**CONVEYANCE STRUCTURE #2.2**

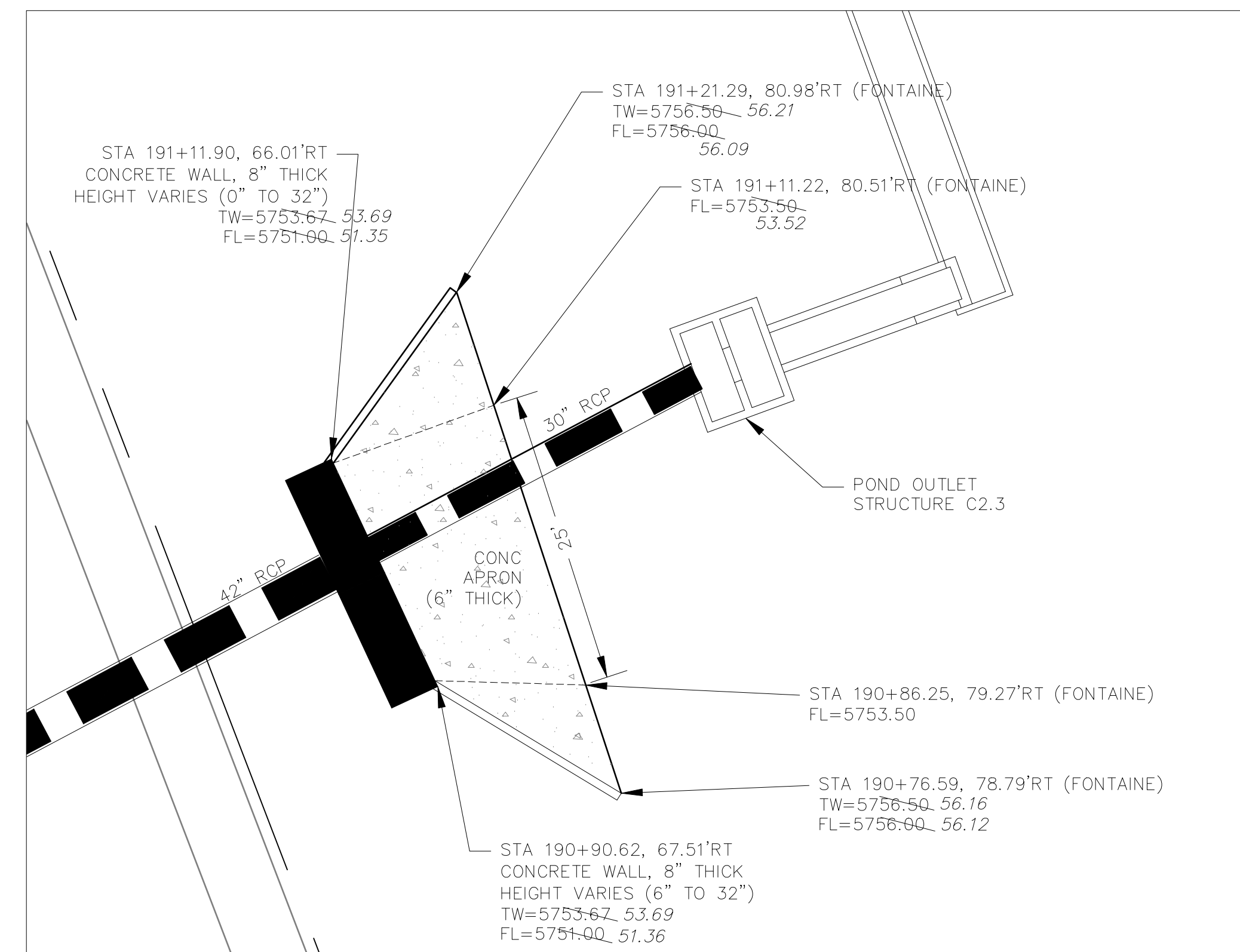
SCALE: 1"=10'



**KEY MAP**

**CONVEYANCE STRUCTURE #2.2 NOTES:**

1. 25' CDOT TYPE R INLET WITH MODIFIED THROAT OPENING
2. THROAT OPENING = 24"
3. EXTEND 1.25" GALVANIZED STEEL ROD SUPPORTS (TYPE R INLET) TO ACCOMMODATE 24" THROAT OPENING
4. CONCRETE APRON TO BE REINFORCED WITH NO. 4 REBAR, 24" O.C. BOTH WAYS. REBAR TO EXTEND INTO CONCRETE WALL W/ NO. 4 "L" BARS, 18" O.C.
5. CONCRETE WALLS SHALL HAVE A MINIMUM OF TWO HORIZONTAL NO. 4 BARS
6. 24" THROAT OPENING TO INCLUDE SAFETY GRATE.



**CONVEYANCE STRUCTURE #2.3**

SCALE: 1"=10'

**CONVEYANCE STRUCTURE #2.3 NOTES:**

1. 20' CDOT TYPE R INLET WITH MODIFIED THROAT OPENING
2. THROAT OPENING = 24"
3. EXTEND 1.25" GALVANIZED STEEL ROD SUPPORTS (TYPE R INLET) TO ACCOMMODATE 24" THROAT OPENING
4. CONCRETE APRON TO BE REINFORCED WITH NO. 4 REBAR, 24" O.C. BOTH WAYS. REBAR TO EXTEND INTO CONCRETE WALL W/ NO. 4 "L" BARS.
5. CONCRETE WALLS SHALL HAVE A MINIMUM OF TWO HORIZONTAL NO. 4 BARS
6. 24" THROAT OPENING TO INCLUDE SAFETY GRATE.

**AS-BUILT**  
DATE: 09/30/2022

**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
DENVER, CO 80202  
PHONE: 719.576.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cegi.com

DATE: JAN 12, 2021

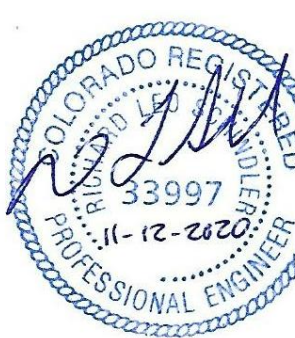
DESCRIPTION: RAISE SITE 1' EAST OF POWERLINES

NO. 1

PROJECT: THE HILLS COLLECTOR STREET CONSTRUCTION  
212 N. WAHSATCH AVE SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
LORSON BLVD - GRAYLING DR  
LORSON BLVD - WALLEVE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO  
PREPARED FOR: LORSON, LLC  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

**STREET & STORM SEWER PLAN/PROFILE**  
**STORM LATERAL 'E'**  
**CONVEYANCE #2.2 & #2.3**

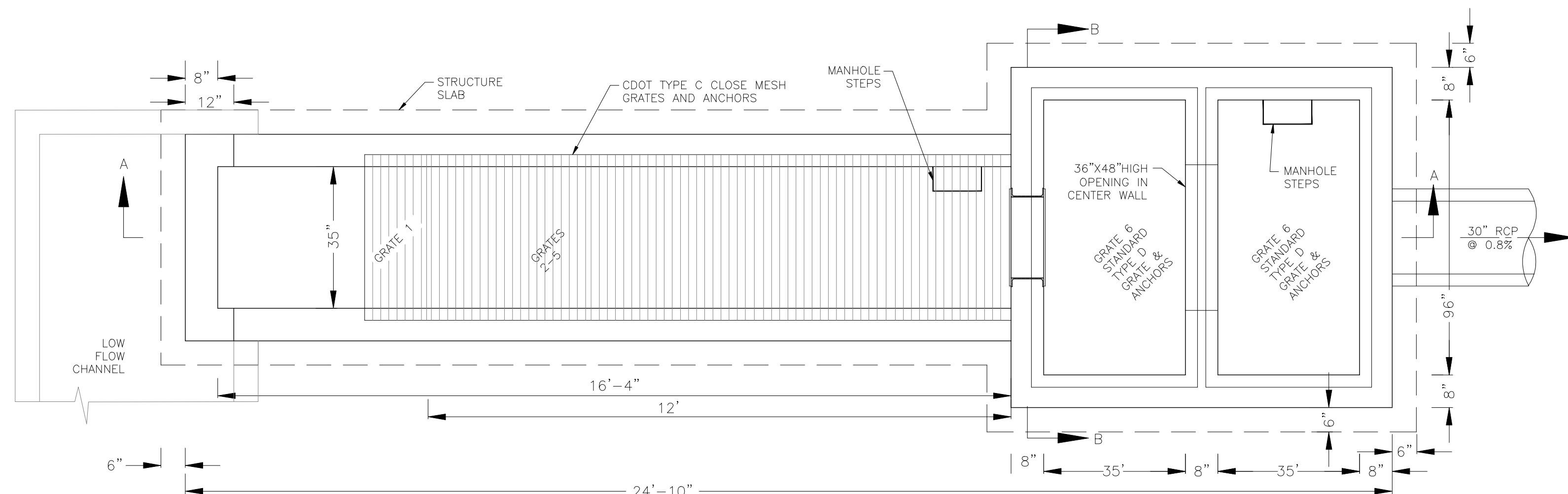
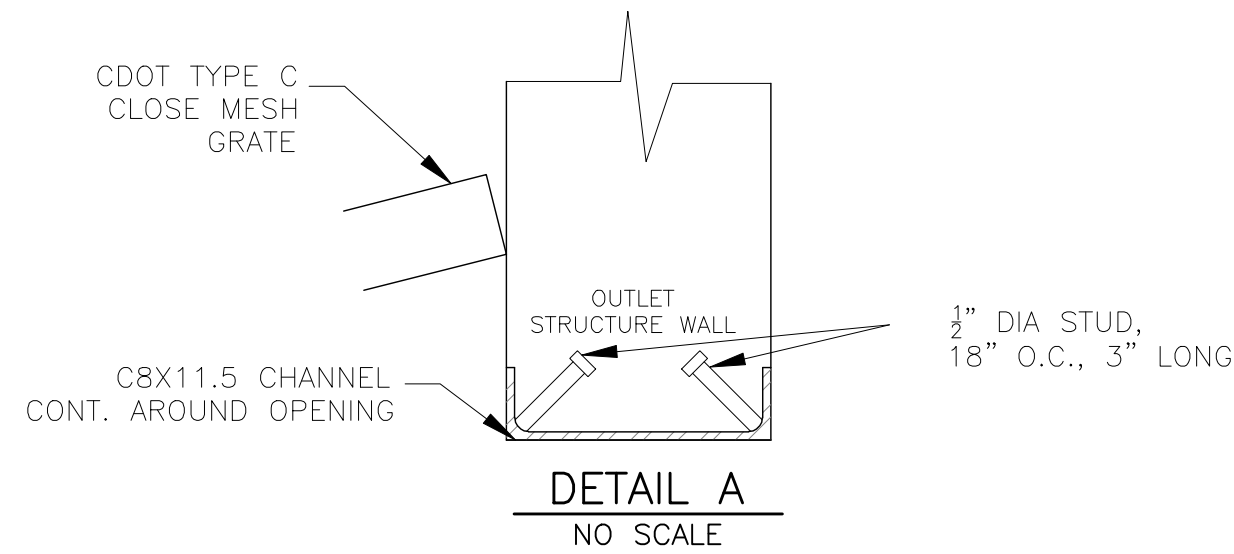


DATE: NOV 12, 2020

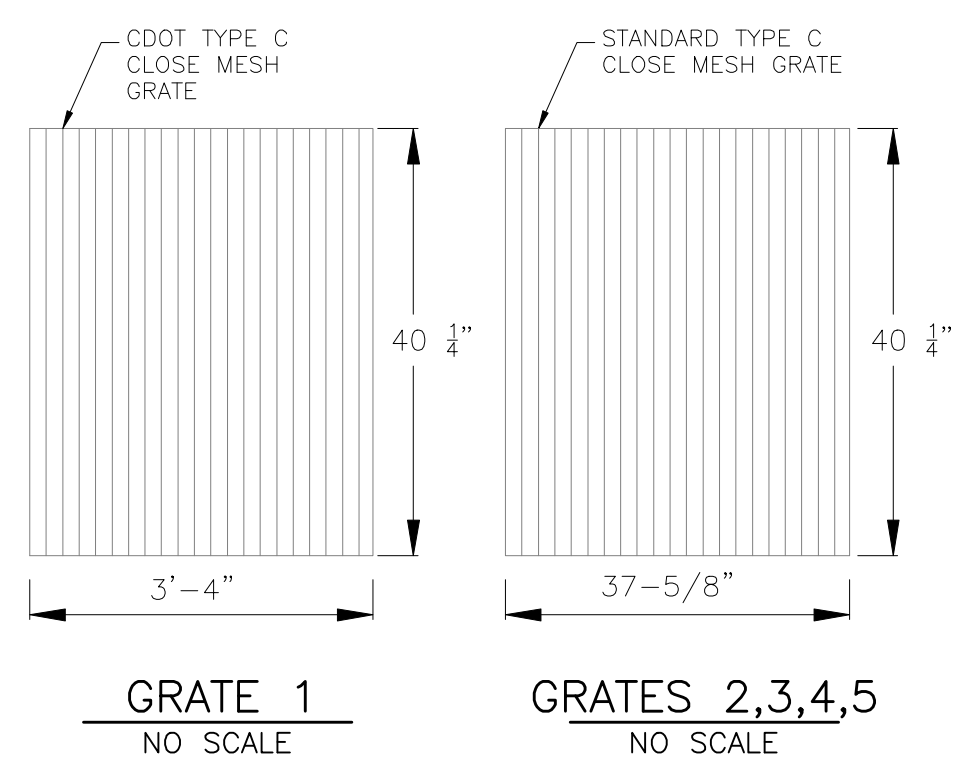
PROJECT NO. 100.061

SHEET NUMBER **C7.2**

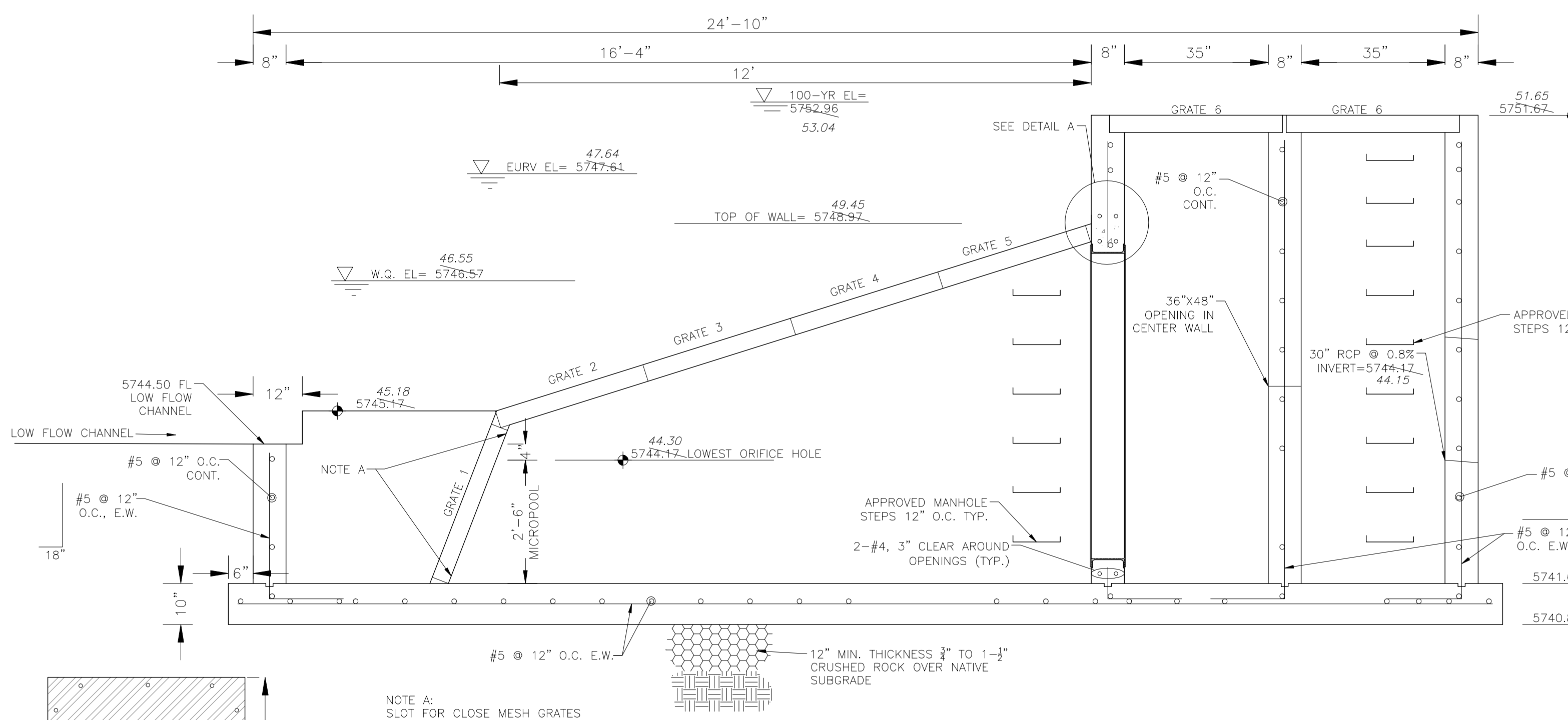
TOTAL SHEETS: 58



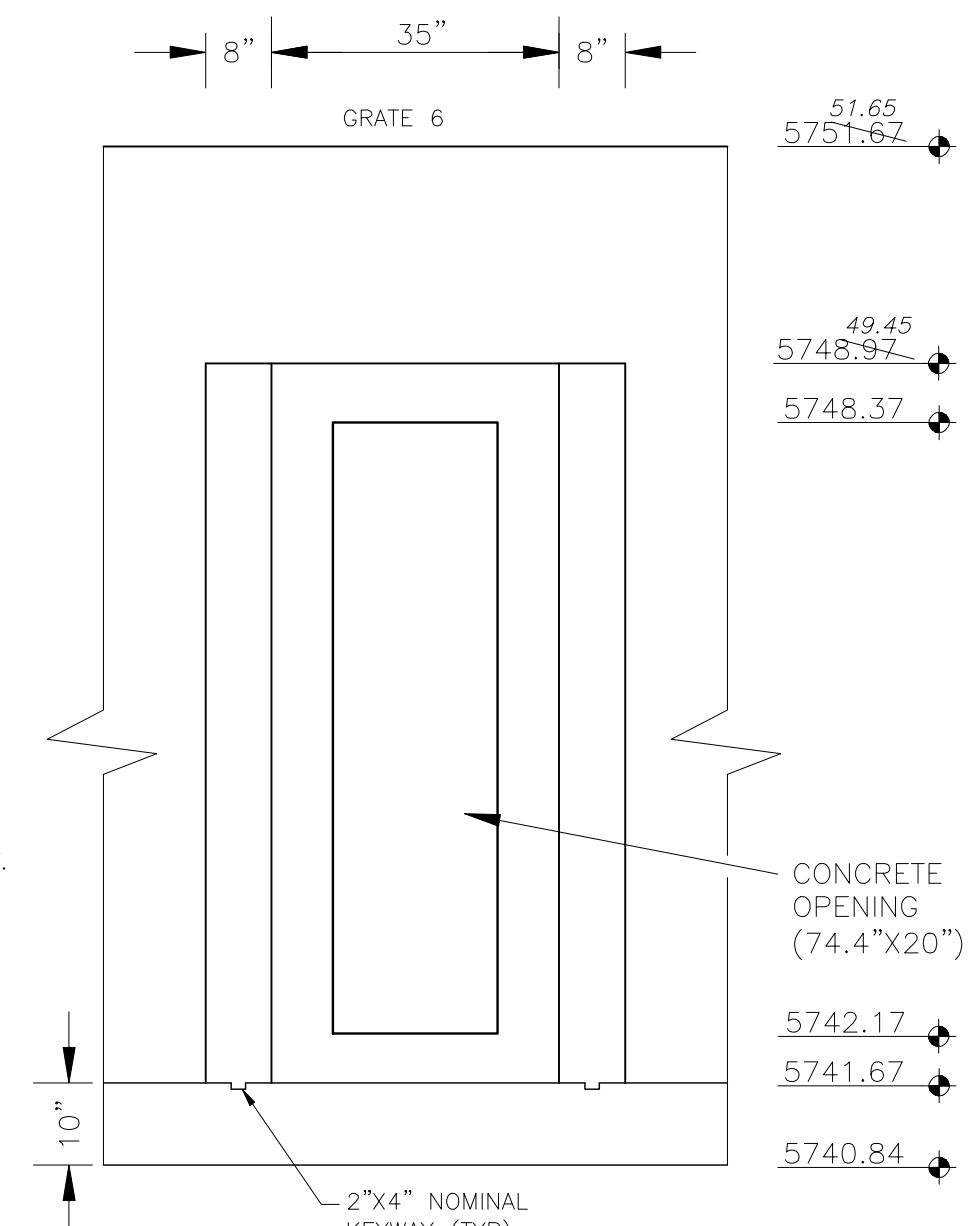
NOTE: AFTER CONCRETE STRUCTURE HAS BEEN POURED ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED PRIOR TO GRATE CONSTRUCTION



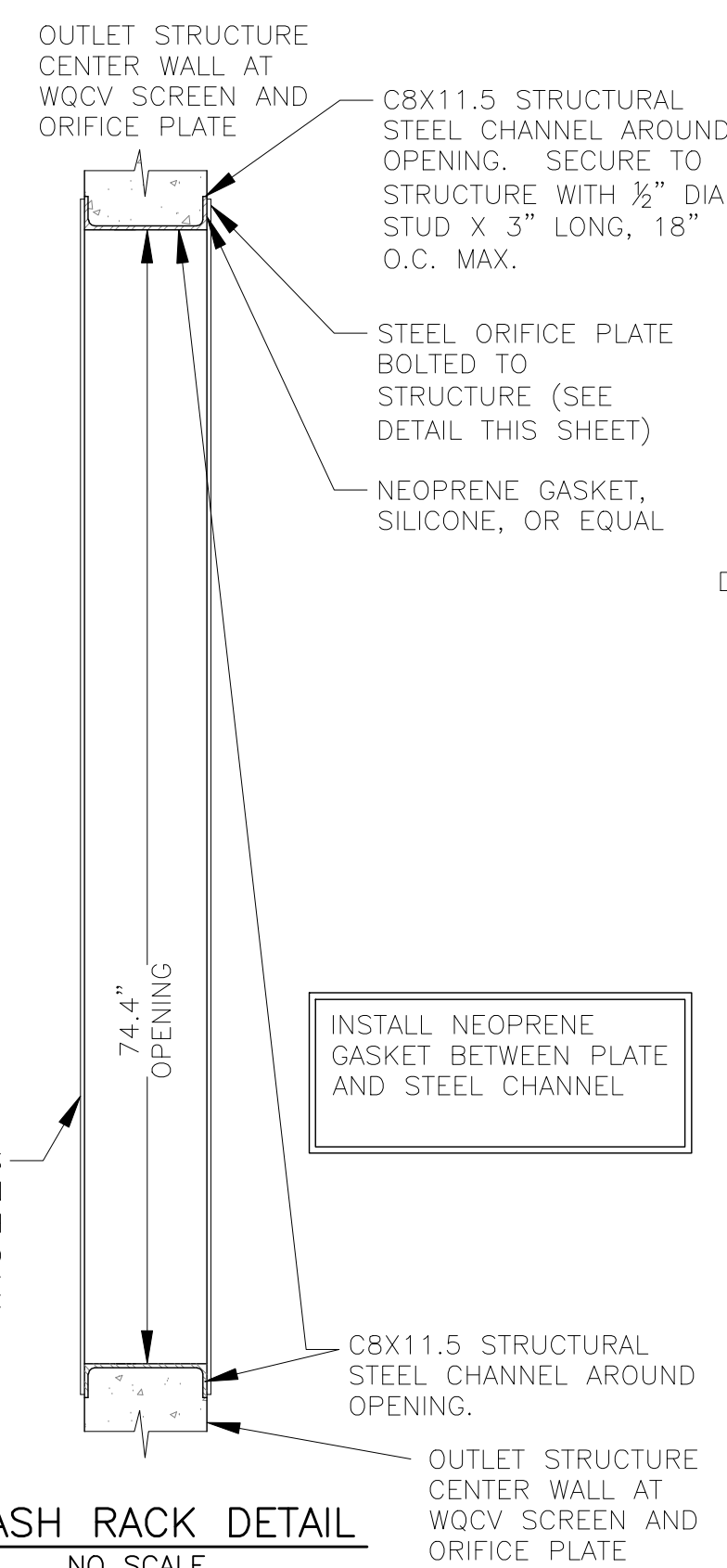
OUTLET STRUCTURE DETAIL - PLAN VIEW  
NO SCALE



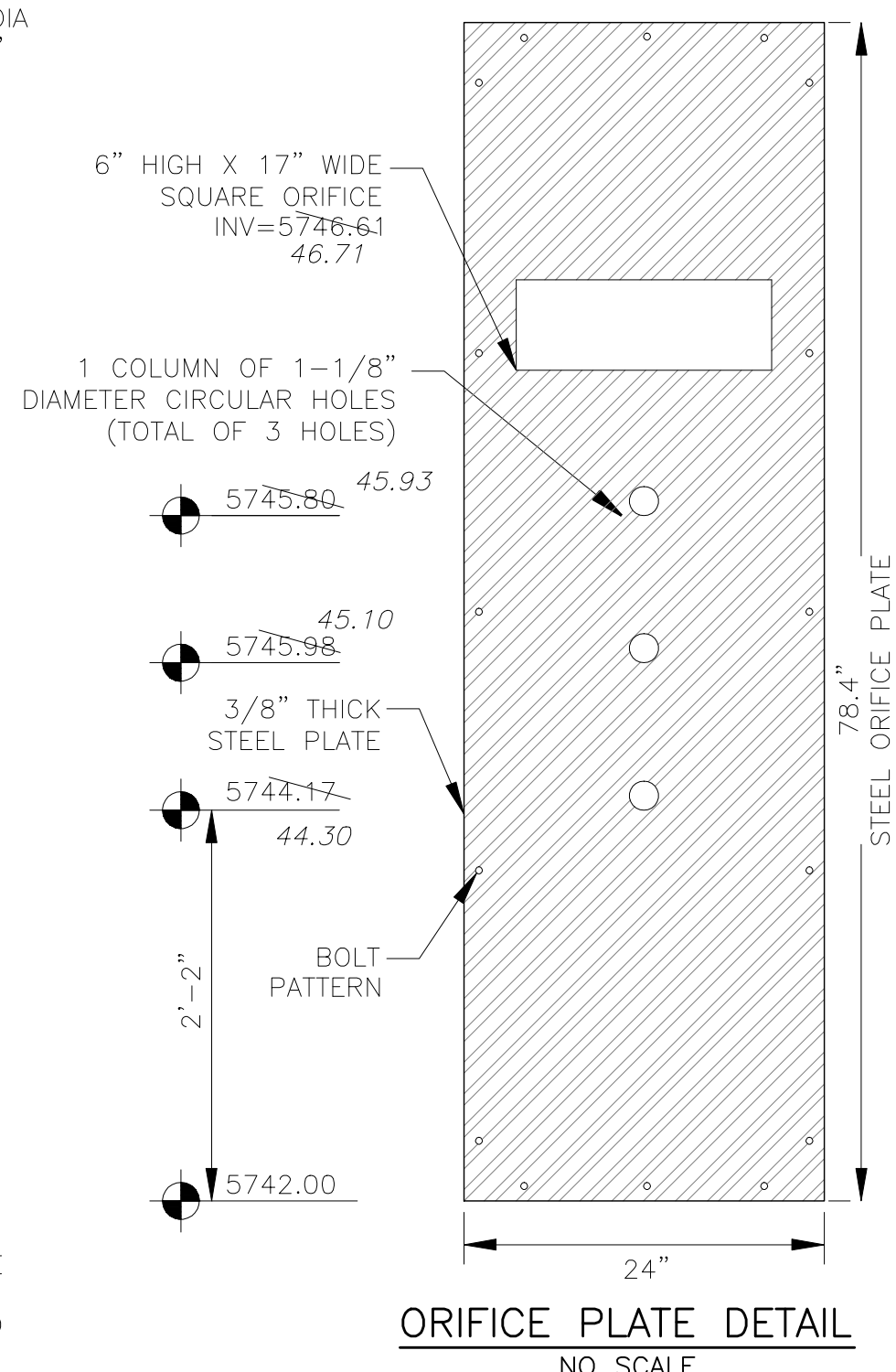
OUTLET STRUCTURE DETAIL - SECTION A-A  
NO SCALE



OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE



TRASH RACK DETAIL  
NO SCALE



ORIFICE PLATE DETAIL  
NO SCALE

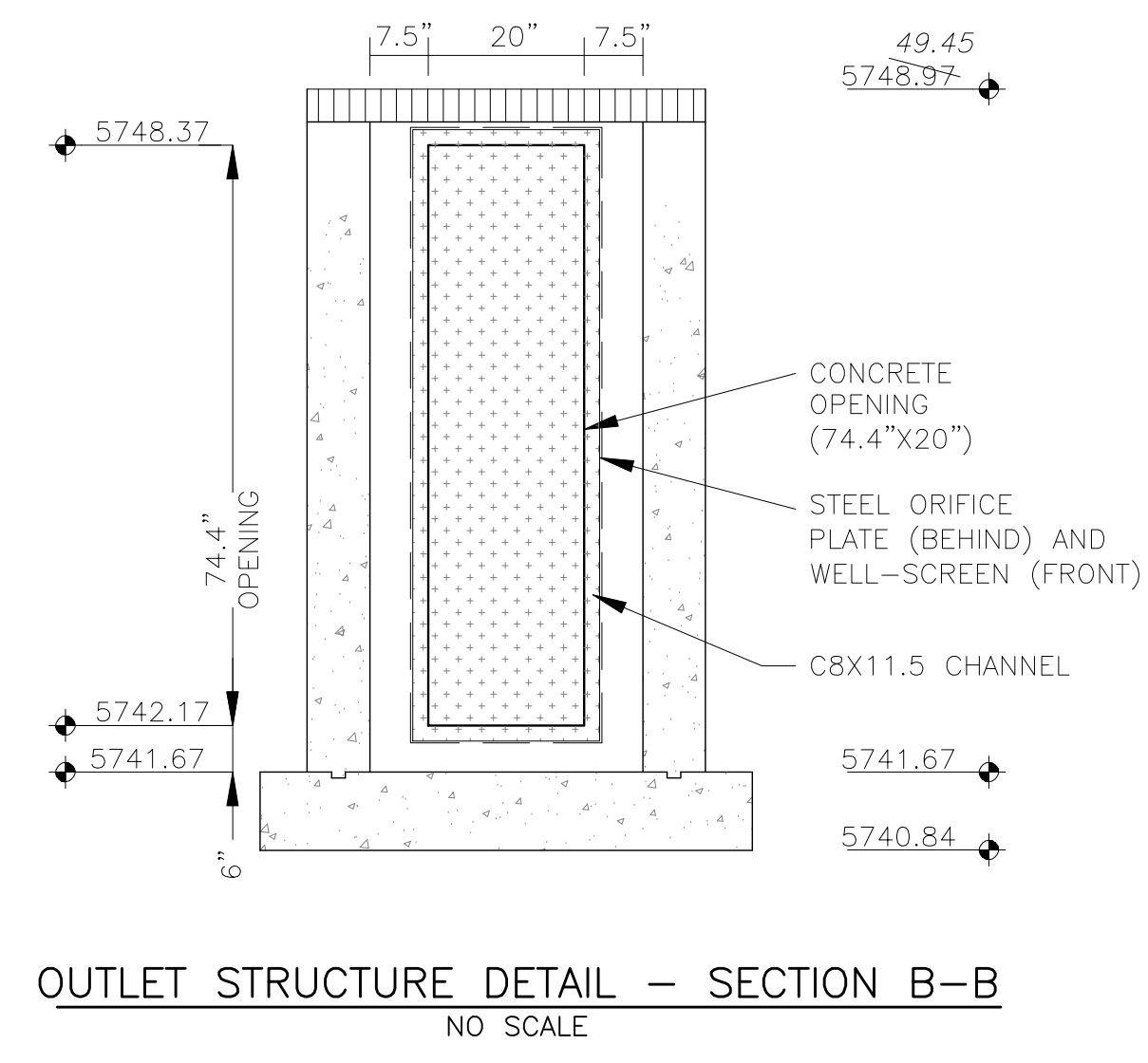
OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
  - GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- | BAR SIZE           | #4    | #5    | #6    |
|--------------------|-------|-------|-------|
| MIN. SPLICE LENGTH | 1'-3" | 1'-7" | 2'-0" |
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
  - CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE
  - EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
  - ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
  - SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
  - REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
  - ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

WQCV WELL-SCREEN NOTES:

- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
- WQCV Well Screen
  - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
  - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
  - Type and Size of Support Rod: TE 0.074"x0.50"
  - Spacing of Support Rod (O.C.): 1.0 Inch
  - Total Screen Thickness: 0.655"
  - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle

**AS-BUILT**  
DATE: 09/30/2022



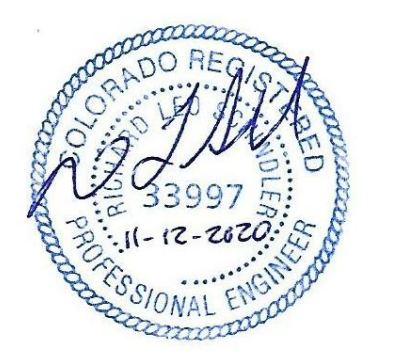
OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE

**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S.  
DENVER, CO 80202  
PHONE: 303.750.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cegi.com

DATE: \_\_\_\_\_  
DESCRIPTION: \_\_\_\_\_  
NO. \_\_\_\_\_  
PROJECT: THE HILLS COLLECTOR STREET CONSTRUCTION  
FONTAINE BLVD. - GRAYLING DR  
LORSON BLVD - WALLEYE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO  
PREPARED FOR: LORSON, LLC  
212 N. WAHSATCH AVE. SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

**POND C2.3**  
**FULL SPECTRUM**  
**OUTLET STRUCTURE DETAILS**



DATE: NOV 12, 2020

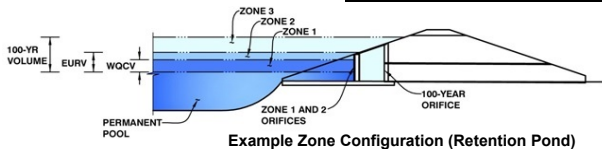
PROJECT NO. 100.061

SHEET NUMBER **C9.14**  
TOTAL SHEETS: 58

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project: The Hills at Lorson Ranch**  
**Basin ID: Pond C3-asbuilt**



**Example Zone Configuration (Retention Pond)**

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.27	0.459	Orifice Plate
Zone 2 (EURV)	4.37	0.858	Rectangular Orifice
Zone 3 (100+1/2WQCV)	5.66	1.346	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>2.663</b>	

**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 Area =	N/A	ft <sup>2</sup>
Underdrain Orifice Diameter =	N/A	inches	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)	WQ Orifice Area per Row =	8.333E-03	ft <sup>2</sup>
Depth at top of Zone using Orifice Plate =	3.27	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.20	sq. inches (diameter = 1-1/4 inches)	Elliptical Slot Area =	N/A	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	1.02	2.02					
Orifice Area (sq. inches)	1.20	1.20	1.20					

	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)**

	Zone 2 Rectangular	Not Selected		Zone 2 Rectangular	Not Selected
Invert of Vertical Orifice =	3.32	N/A	ft (relative to basin bottom at Stage = 0 ft)	0.58	N/A
Depth at top of Zone using Vertical Orifice =	4.37	N/A	ft (relative to basin bottom at Stage = 0 ft)	0.25	N/A
Vertical Orifice Height =	6.00	N/A	inches		
Vertical Orifice Width =	14.00	N/A	inches		

**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		Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, Ho =	6.73	N/A	ft (relative to basin bottom at Stage = 0 ft)	6.73	N/A
Overflow Weir Front Edge Length =	6.00	N/A	feet	6.00	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	10.87	N/A
Horiz. Length of Weir Sides =	6.00	N/A	feet	25.20	N/A
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area	12.60	N/A
Debris Clogging % =	50%	N/A	%		

**User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)**

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	0.17	N/A	ft (distance below basin bottom at Stage = 0 ft)	2.32	N/A
Outlet Pipe Diameter =	24.00	N/A	inches	0.77	N/A
Restrictor Plate Height Above Pipe Invert =	16.60	N/A	inches	1.96	N/A

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

Spillway Invert Stage =	9.59	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth =	1.32	feet
Spillway Crest Length =	20.00	feet	Stage at Top of Freeboard =	12.59	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.66	acres
Freeboard above Max Water Surface =	1.68	feet	Basin Volume at Top of Freeboard =	9.74	acre-ft

micropool = 0 = 5755.15

**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)*

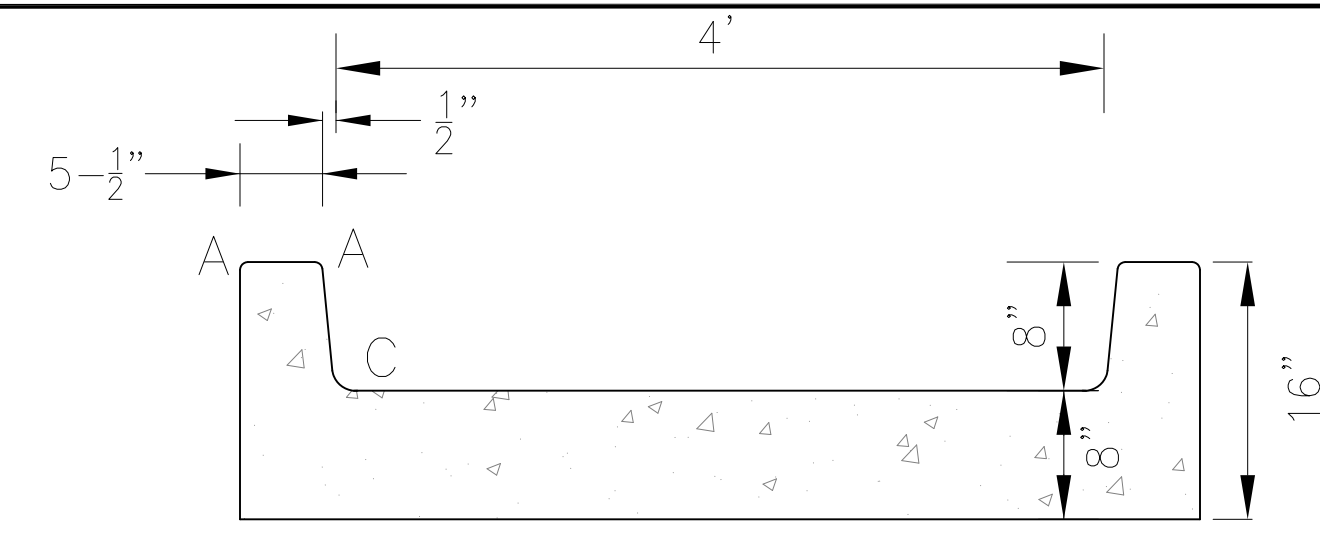
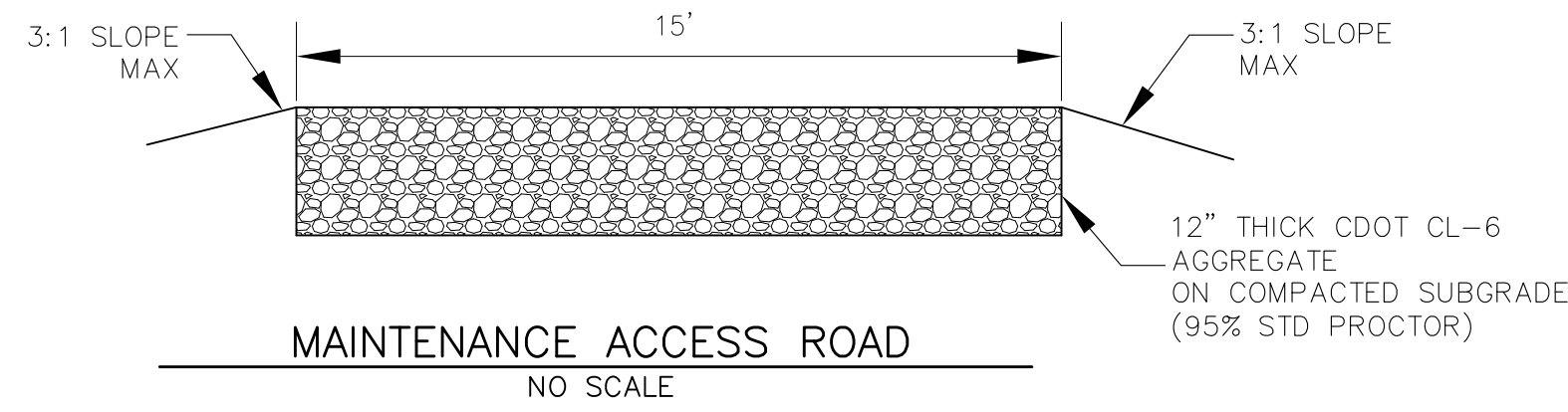
	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
One-Hour Rainfall Depth (in)	N/A	N/A	1.426	2.032	2.557	3.174	3.723	4.395
CUHP Runoff Volume (acre-ft)	0.459	1.316	1.426	2.032	2.557	3.174	3.723	4.395
User Override Inflow Hydrograph Volume (acre-ft)	N/A	N/A	3.549	5.555	7.674	10.126	12.221	14.786
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	5.6	12.2	17.2	27.0	33.3	41.0
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.22	0.47	0.66	1.04	1.28	1.58
Peak Inflow Q (cfs)	N/A	N/A	28.0	41.4	54.0	82.0	98.8	115.3
Peak Outflow Q (cfs)	0.2	2.7	3.7	5.0	22.5	30.2	31.4	32.8
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.4	1.3	1.1	0.9	0.8
Structure Controlling Flow	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps)	N/A	N/A	N/A	N/A	0.7	1.0	1.0	1.0
Max Velocity through Gate 2 (fps)	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	48	50	48	44	39	34	29
Time to Drain 99% of Inflow Volume (hours)	40	52	57	59	57	55	53	51
Maximum Ponding Depth (ft)	3.27	4.37	5.09	6.39	7.20	7.91	8.50	9.24
Area at Maximum Ponding Depth (acres)	0.57	0.93	1.06	1.18	1.26	1.32	1.39	1.48
Maximum Volume Stored (acre-ft)	0.462	1.320	2.044	3.493	4.493	5.407	6.193	7.253



Pond C3 Developed Inflow Hydrograph --- asbuilt Pond C4 Outflow + C10 Basin

Pond C3 Inflow = asbuilt Pond C4 + direct tributary area

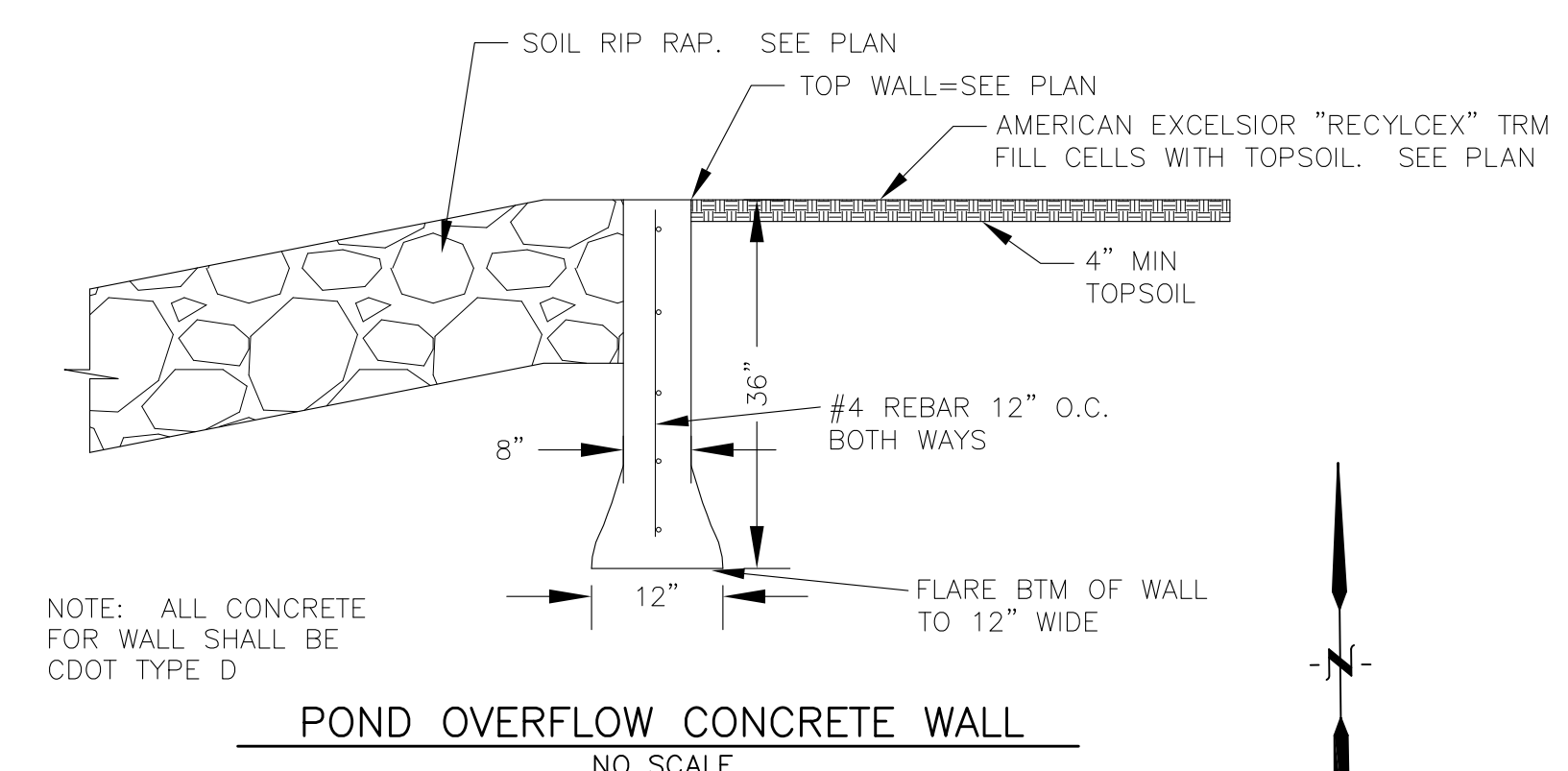
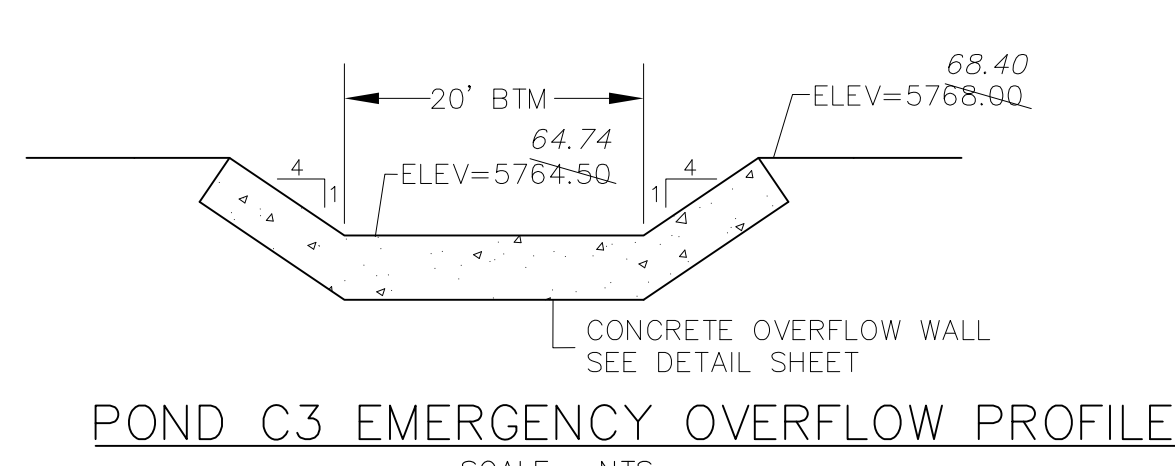
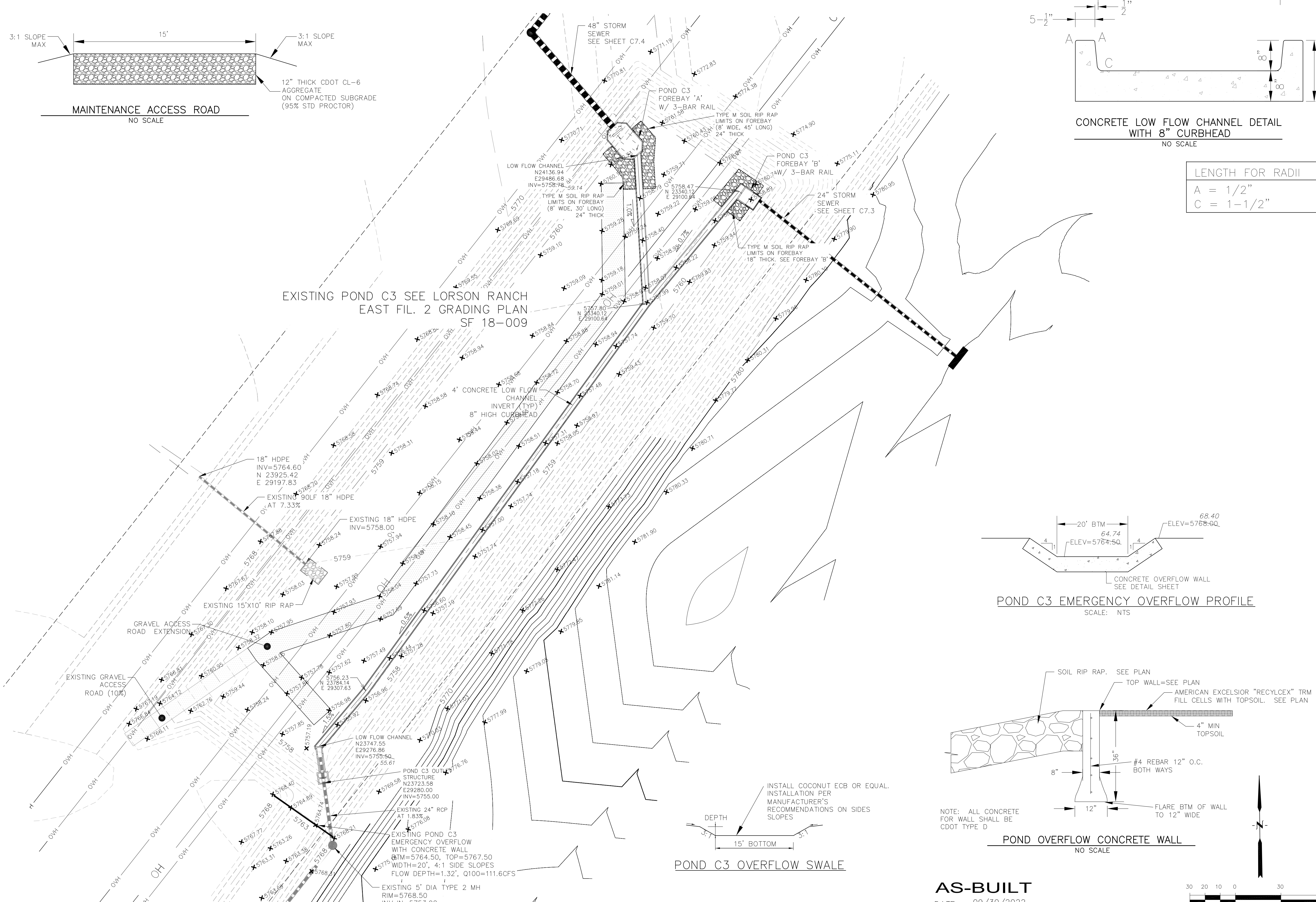
Time [hr]	Time [min]	2 Year		2yr		5yr		10yr		25yr		50yr		100yr	
		Pond C4 Outflow2 - [cfs]	CUHP 2 Year [cfs]	Combined Hydrograph	Pond C4 Outflow2 - [cfs]	CUHP 5 Year [cfs]	Combined Hydrograph	Pond C4 Outflow2 - [cfs]	CUHP 10 Year [cfs]	Combined Hydrograph	Pond C4 Outflow2 - [cfs]	CUHP 25 Year [cfs]	Combined Hydrograph	Pond C4 Outflow2 - [cfs]	CUHP 50 Year [cfs]
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.08	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.06
0.17	10.00	0.24	0.00	0.24	0.26	0.00	0.26	0.27	0.00	0.27	0.26	0.00	0.27	0.29	0.03
0.25	15.00	0.32	2.54	2.86	0.34	4.14	4.49	0.35	5.13	5.49	0.33	3.45	3.77	0.34	4.27
0.33	20.00	0.44	8.76	9.20	0.52	11.77	12.28	0.57	14.53	15.09	0.45	8.43	8.87	0.48	9.78
0.42	25.00	0.59	20.44	21.04	0.91	31.71	32.62	2.44	40.41	42.85	0.65	20.03	20.68	1.16	24.46
0.50	30.00	1.18	26.78	27.96	3.43	37.99	41.42	4.32	45.89	50.20	3.96	53.09	57.05	4.66	62.73
0.58	35.00	2.95	24.15	27.10	4.48	33.33	37.81	5.30	39.98	45.28	5.56	58.17	63.73	11.91	67.93
0.67	40.00	3.70	20.70	24.41	5.12	27.98	33.10	5.93	33.64	39.58	24.54	54.13	78.68	35.81	62.96
0.75	45.00	4.16	16.52	20.69	5.56	22.99	28.54	17.02	28.10	45.12	35.64	46.38	82.02	37.68	53.91
0.83	50.00	4.48	13.25	17.72	5.87	19.04	24.91	28.41	22.85	51.26	36.82	40.15	76.96	38.98	46.60
0.92	55.00	4.70	11.05	15.76	8.69	15.88	24.57	34.44	19.61	54.04	37.60	32.28	69.87	39.85	37.57
1.00	60.00	4.87	9.54	14.41	13.02	13.57	26.58	34.59	17.21	51.80	38.09	27.13	65.22	40.43	31.66
1.08	65.00	4.99	8.16	13.15	16.03	11.50	27.52	34.64	14.96	49.59	38.35	23.19	61.54	40.75	27.12
1.17	70.00	5.07	6.38	11.46	17.74	9.65	27.39	34.63	12.91	47.54	38.41	18.55	56.96	40.87	21.79
1.25	75.00	5.14	4.93	10.06	18.46	7.69	26.15	34.57	11.26	45.83	38.33	14.54	52.88	40.85	17.18
1.33	80.00	5.19	4.06	9.25	18.54	6.44	24.98	34.44	9.60	44.04	38.16	10.73	48.89	40.73	12.68
1.42	85.00	5.24	3.65	8.89	18.27	5.79	24.06	32.01	8.07	40.08	37.93	8.55	46.48	40.54	10.11
1.50	90.00	5.28	3.42	8.70	17.87	5.37	23.25	28.79	7.00	35.79	37.64	6.82	44.46	40.29	8.07
1.58	95.00	5.32	3.31	8.63	17.26	5.10	22.36	26.04	6.25	32.30	37.31	5.71	43.03	40.00	6.76
1.67	100.00	5.36	3.23	8.59	16.40	4.46	20.85	23.78	5.73	29.51	36.96	4.95	41.92	39.69	5.86
1.75	105.00	5.40	3.16	8.56	15.46	3.98	19.44	21.93	5.37	27.31	36.60	4.49	41.09	39.36	5.30
1.83	110.00	5.43	3.12	8.54	14.56	3.64	18.19	20.37	5.11	25.48	36.23	4.15	40.38	39.03	4.89
1.92	115.00	5.45	2.67	8.12	13.72	3.38	17.10	18.88	4.73	23.62	35.85	3.94	43.32	38.68	4.64
2.00	120.00	5.45	2.34	7.79	12.68	3.10	15.78	17.12	4.16	21.28	35.44	3.82	39.25	38.30	4.49
2.08	125.00	5.44	1.68	7.12	11.36	2.22	13.58	15.03	2.94	17.96	34.97	2.72	37.69	37.87	3.20
2.17	130.00	5.42	1.17	6.59	10.01	1.54	11.56	12.96	2.04	15.56	34.55	1.90	36.35	37.50	2.23
2.25	135.00	5.40	0.80	6.20	8.79	1.05	9.84	11.11	1.41	12.52	26.72	1.31	28.03	36.87	1.54
2.33	140.00	5.36	0.54	5.91	7.75	0.69	8.44	9.54	0.95	10.49	20.46	0.89	21.35	36.33	1.04
2.42	145.00	5.33	0.35	5.68	6.92	0.45	7.36	8.26	0.62	8.88	16.06	0.59	16.64	35.77	0.69
2.50	150.00	5.29	0.22	5.51	6.30	0.29	6.59	7.25	0.40	7.65	12.88	0.39	13.27	35.20	0.46
2.58	155.00	5.25	0.12	5.37	5.95	0.17	6.12	6.50	0.23	6.73	10.55	0.23	10.79	34.61	0.27
2.67	160.00	5.21	0.05	5.26	5.90	0.08	5.98	6.03	0.10	6.13	8.86	0.11	8.97	28.41	0.13
2.75	165.00	5.17	0.02	5.19	5.86	0.03	5.89	5.91	0.03	5.94	7.62	0.04	7.66	21.16	0.04
2.83	170.00	5.13	0.00	5.13	5.82	0.00	5.82	5.87	0.00	5.87	6.74	0.00	6.74	16.31	0.00
2.92	175.00	5.09	0.00	5.09	5.78	0.00	5.78	5.83	0.00	5.83	6.16	0.00	6.16	12.95	0.00
3.00	180.00	5.05	0.00	5.05	5.74	0.00	5.74	5.80	0.00	5.80	5.93	0.00	5.93	10.58	0.00
3.08	185.00	5.01	0.00	5.01	5.71	0.00	5.71	5.76	0.00	5.76	5.89	0.00	5.89	8.87	0.00
3.17	190.00	4.97	0.00	4.97	5.67	0.00	5.67	5.72	0.00	5.72	5.85	0.00	5.85	7.63	0.00
3.25	195.00	4.93	0.00	4.93	5.63	0.00	5.63	5.68	0.00	5.68	5.81	0.00	5.81	6.75	0.00
3.33	200.00	4.89	0.00	4.89	5.59	0.00	5.59	5.64	0.00	5.64	5.77	0.00	5.77	6.16	0.00
3.42	205.00	4.85	0.00	4.85	5.55	0.00	5.55	5.60	0.00	5.60	5.73	0.00	5.73	5.93	0.00
3.50	210.00	4.81	0.00	4.81	5.51	0.00	5.51	5.56	0.00	5.56	5.69	0.00	5.69	5.89	0.00
3.58	215.00	4.76	0.00	4.76	5.47	0.00	5.47	5.52	0.00	5.52	5.65	0.00	5.65	5.85	0.00
3.67	220.00	4.72	0.00	4.72	5.43	0.00	5.43	5.48	0.00	5.48	5.61	0.00	5.61	5.81	0.00
3.75	225.00	4.68	0.00	4.68	5.39	0.00	5.39	5.44	0.00	5.44	5.58	0.00	5.58	5.77	0.00
3.83	230.00	4.64	0.00	4.64	5.35	0.00	5.35	5.40	0.00	5.40	5.54	0.00	5.54	5.73	0.00
3.92	235.00	4.60	0.00	4.60	5.31	0.00	5.31	5.36	0.00	5.36	5.50	0.00	5.50	5.69	0.00
4.00	240.00	4.56	0.00	4.56	5.27	0.00	5.27	5.32	0.00	5.32	5.46	0.00	5.46	5.65	0.00
4.08	245.00	4.52	0.00	4.52	5.23	0.00	5.23	5.28	0.00	5.28	5.42	0.00	5.42	5.61	0.00
4.17	250.00	4.47	0.00	4.47	5.19	0.00	5.19	5.24	0.00	5.24	5.38	0.00	5.38	5.58	0.00
4.25	255.00	4.43	0.00	4.43	5.15	0.00	5.15	5.20	0.00	5.20	5.34	0.00	5.34	5.54	0.00
4.33	260.00	4.39	0.00	4.39	5.11	0.00	5.11	5.16	0.00	5.16	5.30	0.00	5.30	5.50	0.00
4.42	265.00	4.35	0.00	4.35	5.07	0.00	5.07	5.12	0.00	5.12	5.26	0.00	5.26	5.46	0.00
4.50	270.00	4.31	0.00	4.31	5.03	0.00	5.03	5.08	0.00	5.08	5.22	0.00	5.22	5.42	0.00
4.58	275.00	4.27	0.00	4.27	4.99	0.00	4.99	5.04	0.00	5.04	5.18	0.00	5.18	5.38	0.00
4.67	280.00	4.22	0.00	4.22	4.95	0.00	4.95	5.00	0.00	5.00	5.14	0.00	5.14	5.34	0.00
4.75	285.00	4.18	0.00	4.18	4.91	0.00	4.91	4.96	0.00	4.96	5.10	0.00	5.10	5.30	0.00
4.83	290.00	4.14	0.00	4.14	4.87	0.00	4.87	4.92	0.00	4.92	5.06	0.00	5.06	5.26	0.00
4.92	295.00	4.10	0.00	4.10	4.83	0.00	4.83	4.88	0.00	4.88	5.02	0.00	5.02	5.22	0.00
5.00	300.00	4.05	0.00	4.05	4.78	0.00	4.78	4.84	0.00	4.84	4.98	0.00	4.98	5.18	0.00
5.08	305.00	4.01	0.00	4.01	4.74	0.00	4.74	4.80	0.00	4.80	4.93	0.00	4.93	5.14	0.00
5.17	310.00	3.97	0.00	3.97	4.70	0.00	4.70	4.76	0.00	4.76	4.89	0.00	4.89	5.10	0.00
5.25	315.00	3.92	0.00	3.92	4.66	0.00	4.66	4.72	0.00	4.72	4.85	0.00	4.85	5.06	0.00
5.33	320.00	3.88	0.00	3.88	4.62	0.00	4.62	4.67	0.00	4.67	4.81	0.00	4.81	5.02	0.00
5.42	325.00	3.84	0.00	3.84	4.58	0.00	4.58	4.63	0.00	4.63	4.77	0.00	4.77	4.98	0.00
5.50	330.00	3.79	0.00	3.79	4.54	0.00	4.54	4.59	0.00	4.59	4.73	0.00	4.73	4.94	0.00
5.58	335.00	3.75	0.00	3.75	4.49	0.00	4.49	4.55	0.00	4.55	4.69	0.00	4.69	4.89	0.00
5.67	340.00	3.71	0.00	3.71	4.45	0.00	4.45	4.51	0.00	4.51	4.65	0.00	4.65	4.85	0.00
5.75	345.00	3.66	0.00	3.66	4.41	0.00	4.41	4.47	0.00	4.47	4.61	0.00	4.61	4.81	0.00
5.83	350.00	3.62	0.00	3.62	4.37	0.00	4.37	4.43	0.00	4.43	4.56	0.00	4.56	4.77	0.00
5.92	355.00	3.58	0.00	3.58	4.33	0.00	4.33	4.38	0.00	4.38	4.52	0.00	4.52	4.73	0.00
6.00	360.00	3.53	0.00	3.53	4.29	0.00	4.29	4.34	0.00	4.34	4.54	0.00	4.69	4.69	0.00



LENGTH FOR RADII

A	= 1/2"
C	= 1-1/2"

EXISTING POND C3 SEE LORSON RANCH EAST FIL. 2 GRADING PLAN SF 18-009



NOTE: ALL CONCRETE FOR WALL SHALL BE CDOT TYPE D

AS-BUILT  
DATE: 09/30/2022



**CORE ENGINEERING GROUP**  
19004 1ST AVE. SUITE 100  
DENVER, CO 80202  
PHONE: 303.750.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

DATE: \_\_\_\_\_  
DESCRIPTION: \_\_\_\_\_  
NO: \_\_\_\_\_

PREPARED FOR: **LORSON, LLC**  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: JEFF MARK

PROJECT: **THE HILLS COLLECTOR STREET CONSTRUCTION**  
FONTAINE BLVD. - GRAYLING DR  
LORSON BLVD - WALLEYE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

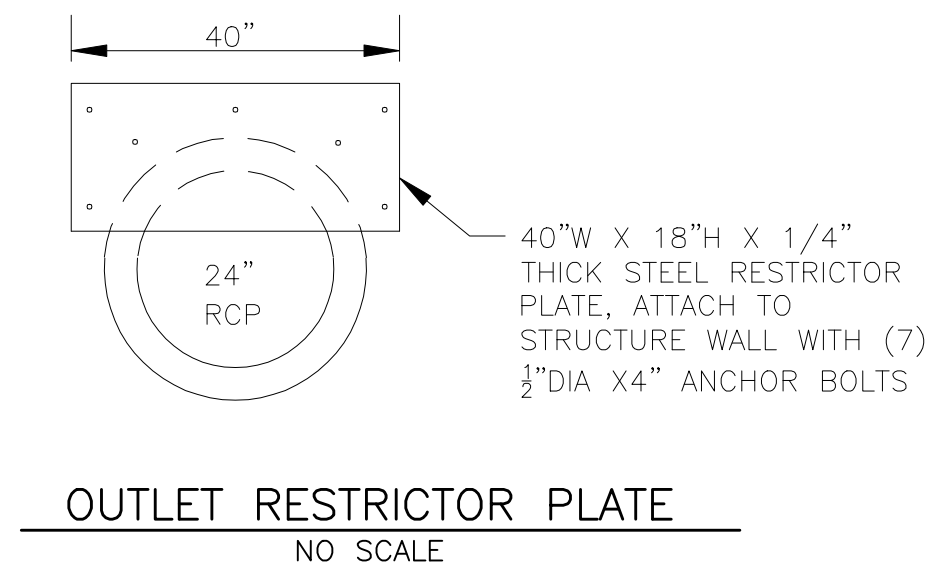
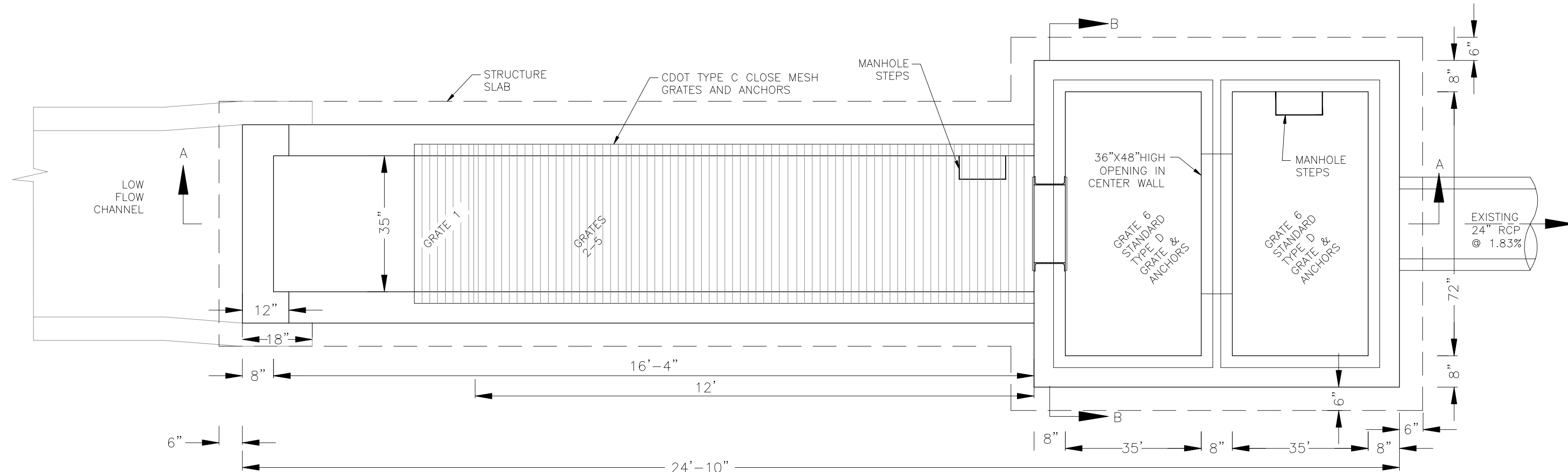
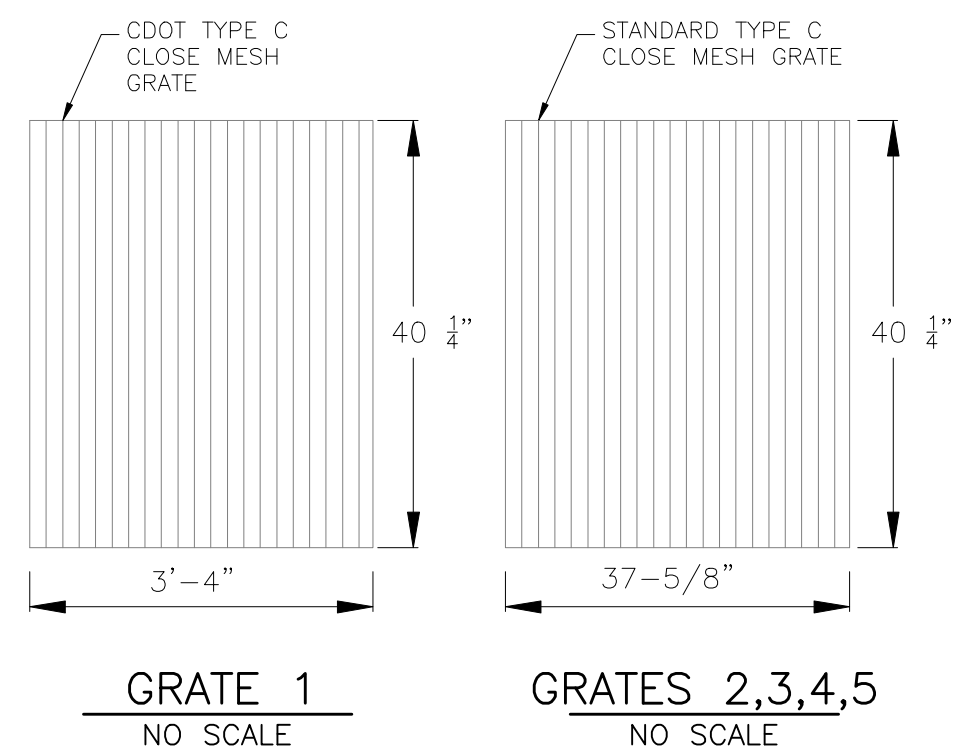
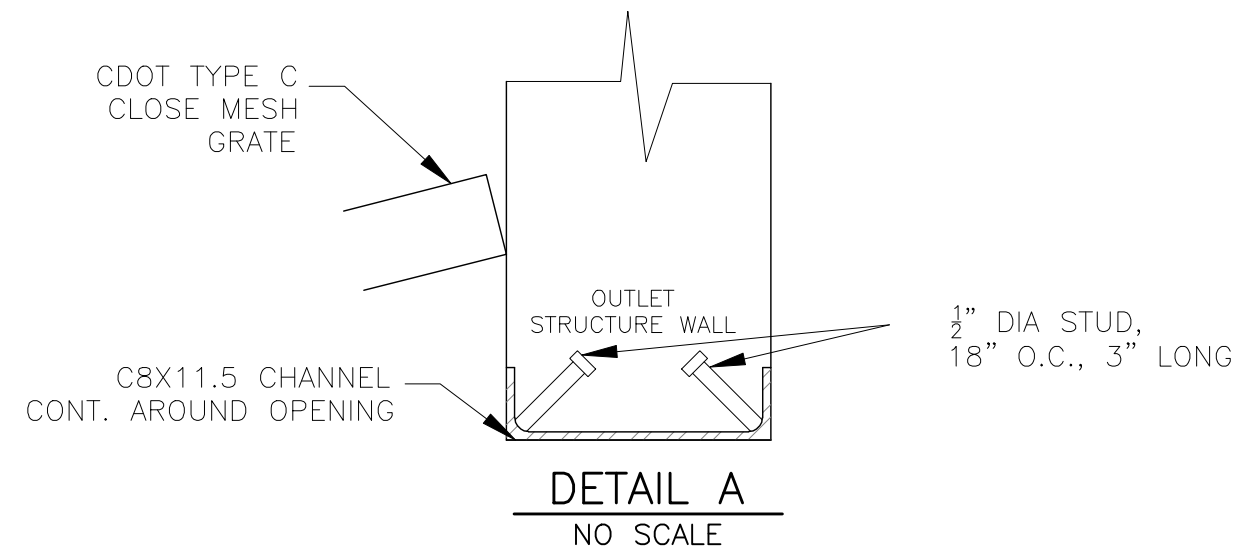
**POND C3 FOREBAY, LOW FLOW CHANNEL AND OUTLET STRUCTURE LAYOUT**



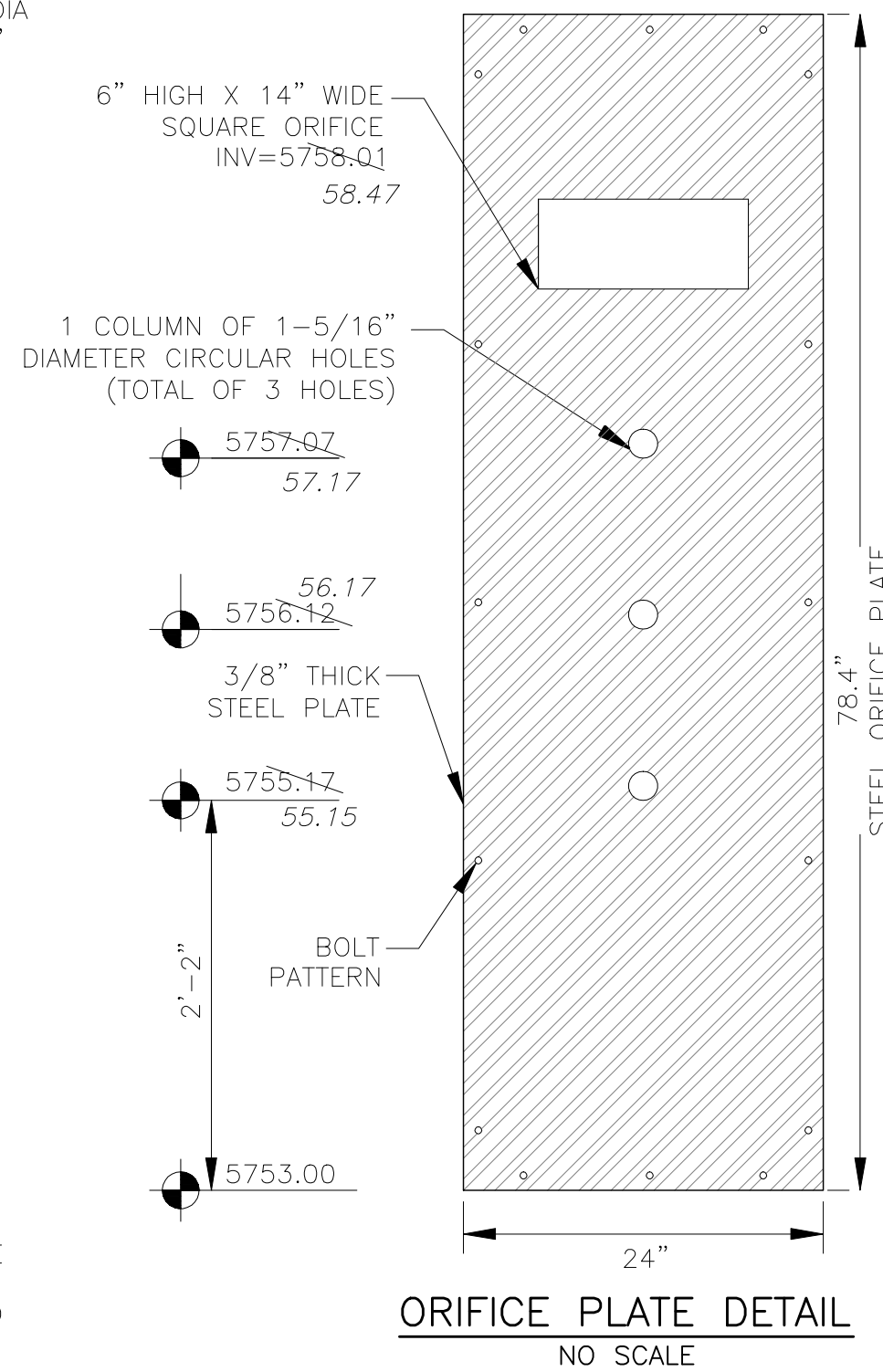
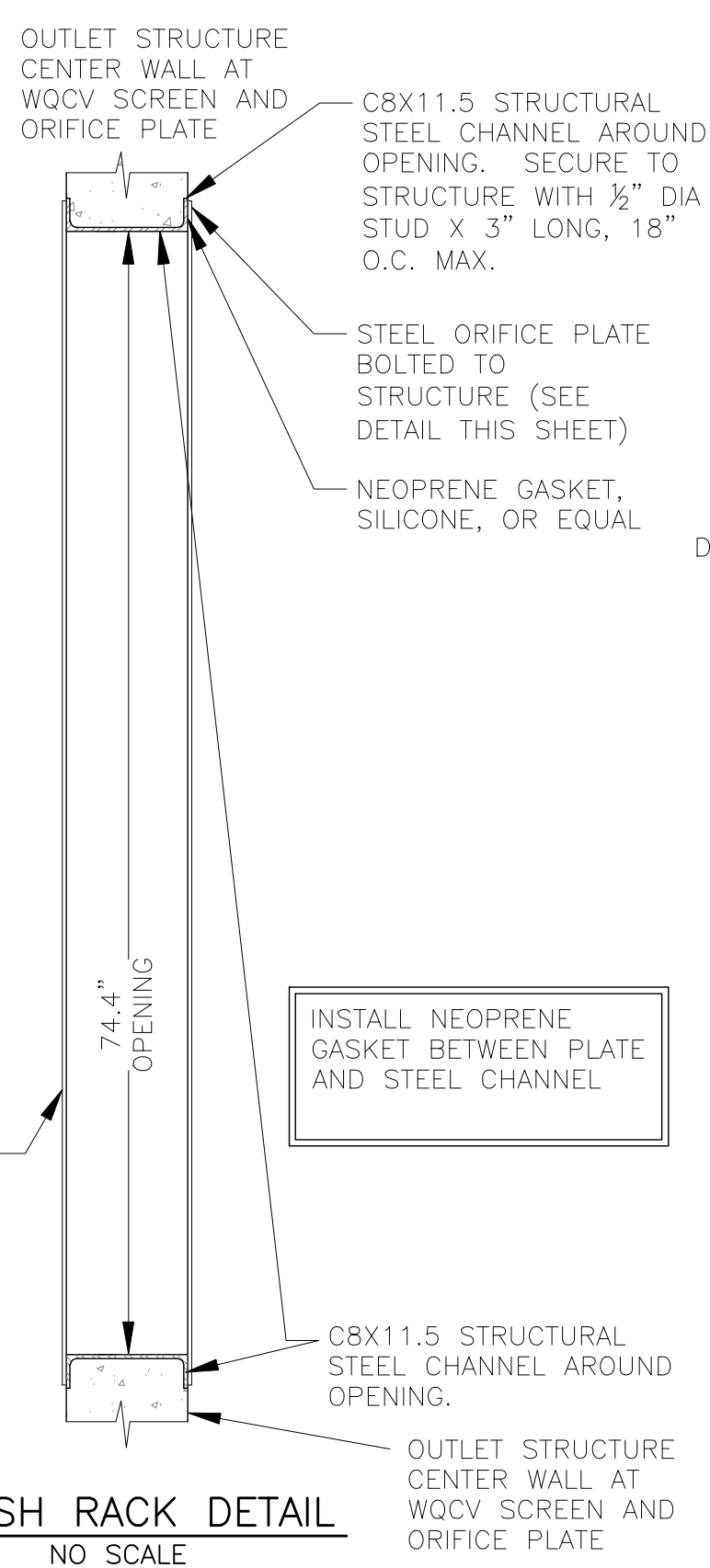
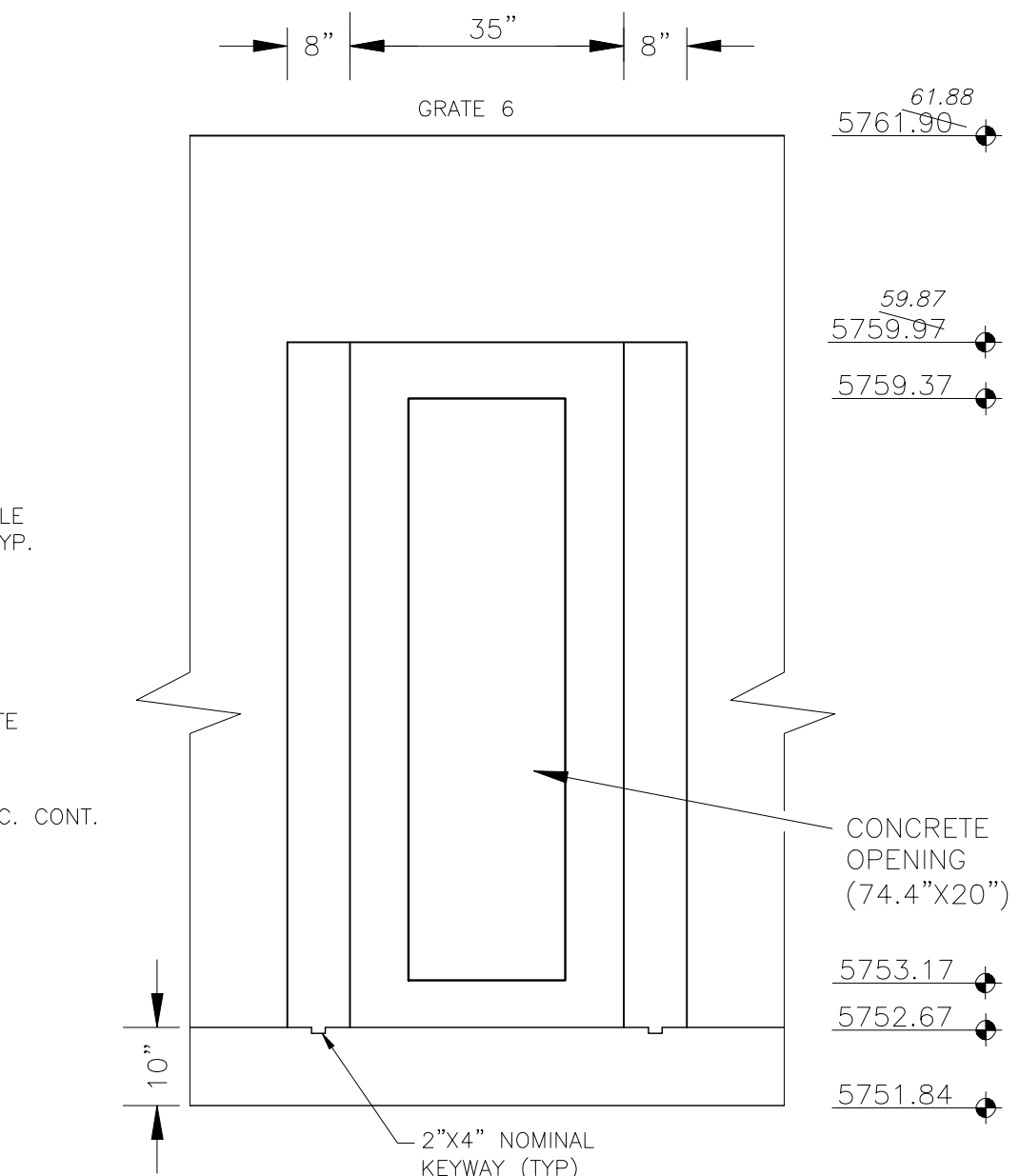
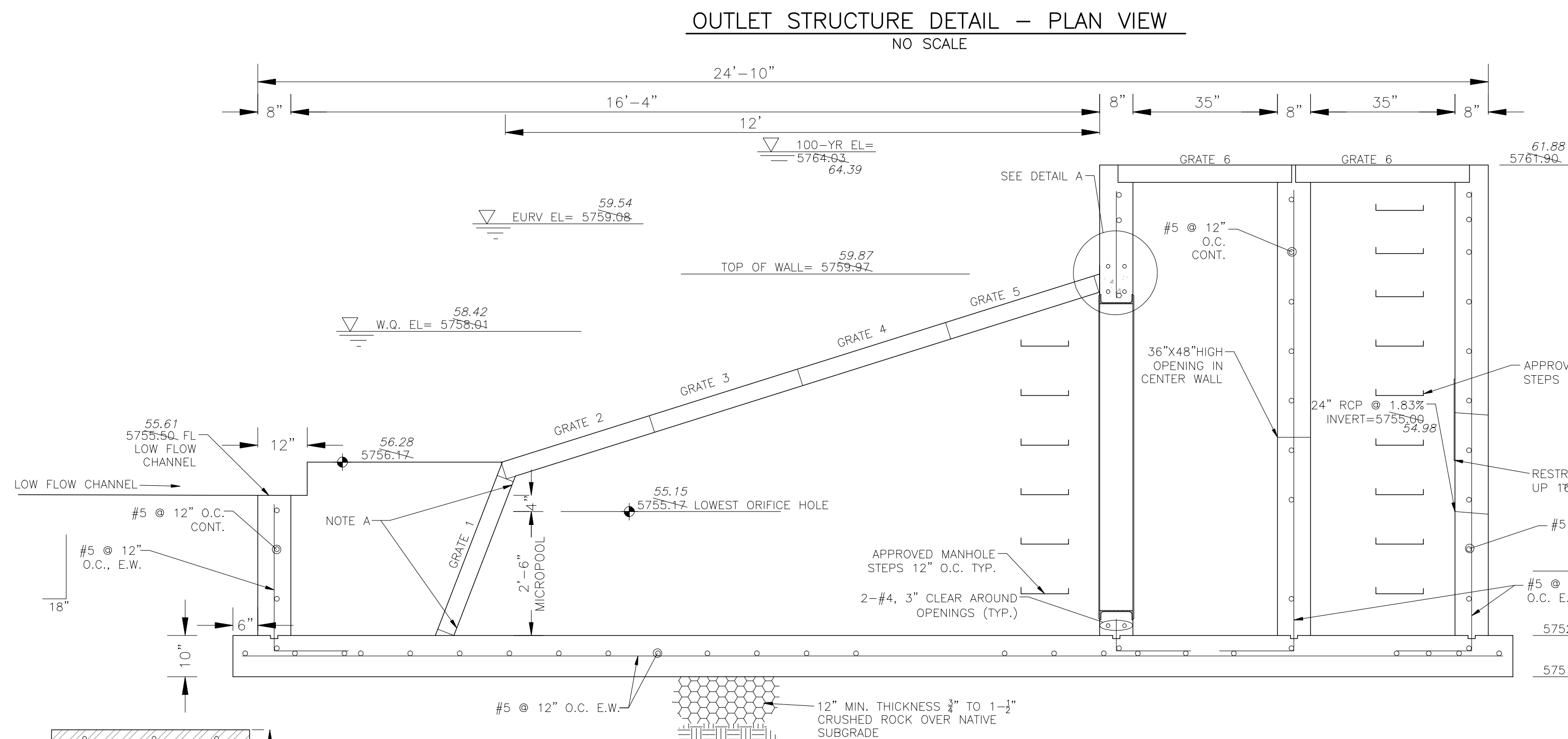
DATE: NOV 12, 2020  
PROJECT NO: 100.061  
SHEET NUMBER: C9.8  
TOTAL SHEETS: 58







NOTE: AFTER CONCRETE STRUCTURE HAS BEEN POURED ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED PRIOR TO GRATE CONSTRUCTION



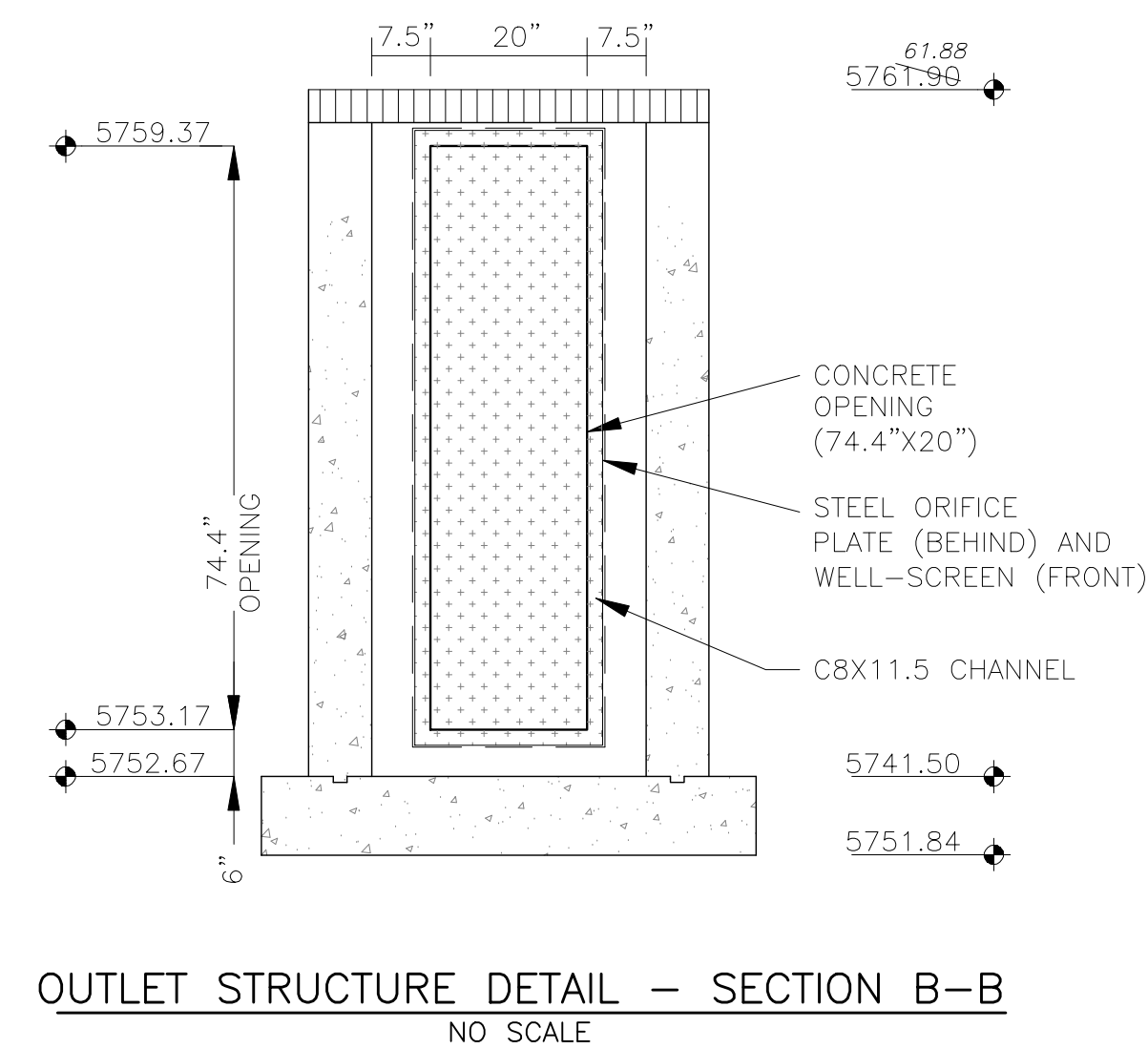
OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
  - GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- | BAR SIZE           | #4    | #5    | #6    |
|--------------------|-------|-------|-------|
| MIN. SPLICE LENGTH | 1'-3" | 1'-7" | 2'-0" |
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
  - CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE.
  - EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
  - ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
  - SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
  - REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
  - ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

WQCV WELL-SCREEN NOTES:

- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
- WQCV Well Screen
  - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
  - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
  - Type and Size of Support Rod: TE 0.074"x0.50"
  - Spacing of Support Rod (O.C.): 1.0 Inch
  - Total Screen Thickness: 0.655"
  - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle

AS-BUILT  
DATE: 09/30/2022



**CORE ENGINEERING GROUP**  
15004 1ST AVENUE S  
DENVER, CO 80206  
PHONE: 719.576.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cegi.com

DATE: \_\_\_\_\_  
DESCRIPTION: \_\_\_\_\_  
NO. \_\_\_\_\_  
PROJECT: THE HILLS COLLECTOR STREET CONSTRUCTION  
FOUNTAIN BLVD - GRAYLING DR  
LORSON BLVD - WALLEYE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO  
PREPARED FOR: LORSON, LLC  
212 N. WAHSATCH AVE SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

POND C3  
FULL SPECTRUM  
OUTLET STRUCTURE DETAILS



DATE: NOV 12, 2020

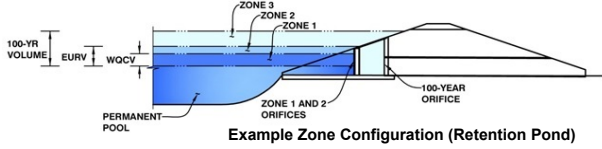
PROJECT NO. 100.061

SHEET NUMBER C9.15  
TOTAL SHEETS: 58

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.02 (February 2020)

**Project:** The Hills at Lorson Ranch  
**Basin ID:** Pond C4-asbuilt



	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.06	1.488	Orifice Plate
Zone 2 (EURV)	5.56	2.980	Rectangular Orifice
Z3 (100+1/2WQCV)	8.58	4.225	Weir&Pipe (Restrict)
<b>Total (all zones)</b>		<b>8.692</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 =  sq. inches (use rectangular openings)

**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	1.00	2.00					
Orifice Area (sq. inches)	4.68	4.68	4.68					

	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)

	Zone 2 Rectangular	Not Selected	
Invert of Vertical Orifice =	<input type="text" value="3.00"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	<input type="text" value="5.56"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height =	<input type="text" value="6.00"/>	<input type="text" value="N/A"/>	inches
Vertical Orifice Width =	<input type="text" value="16.39"/>	<input type="text" value="N/A"/>	inches

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

**User Input:** Overflow Weir (Dropbox with Flat or Sloped Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe).

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	<input type="text" value="5.51"/>	<input type="text" value="N/A"/>	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	<input type="text" value="6.00"/>	<input type="text" value="N/A"/>	feet
Overflow Weir Gate Slope =	<input type="text" value="0.00"/>	<input type="text" value="N/A"/>	H:V
Horiz. Length of Weir Sides =	<input type="text" value="6.00"/>	<input type="text" value="N/A"/>	feet
Overflow Gate Open Area % =	<input type="text" value="70%"/>	<input type="text" value="N/A"/>	% , gate open area/total area
Debris Clogging % =	<input type="text" value="50%"/>	<input type="text" value="N/A"/>	%

**Calculated Parameters for Overflow Weir**  
 Height of Gate Upper Edge, H<sub>t</sub> =  feet  
 Overflow Weir Slope Length =  feet  
 Gate Open Area / 100-yr Orifice Area =  N/A  
 Overflow Gate Open Area w/o Debris =  N/A  
 Overflow Gate Open Area w/ Debris =  N/A

**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 =	<input type="text" value="0.00"/>	<input type="text" value="N/A"/>	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	<input type="text" value="24.00"/>	<input type="text" value="N/A"/>	inches
Restrictor Plate Height Above Pipe Invert =	<input type="text" value="24.00"/>	<input type="text" value="N/A"/>	inches

**Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate**  
 Outlet Orifice Area =  ft<sup>2</sup>  
 Outlet Orifice Centroid =  feet  
 Half-Central Angle of Restrictor Plate on Pipe =  N/A

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

Spillway Invert Stage =	<input type="text" value="10.00"/>	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	<input type="text" value="30.00"/>	feet
Spillway End Slopes =	<input type="text" value="4.00"/>	H:V
Freeboard above Max Water Surface =	<input type="text" value="1.13"/>	feet

**Calculated Parameters for Spillway**  
 Spillway Design Flow Depth =  feet  
 Stage at Top of Freeboard =  feet  
 Basin Area at Top of Freeboard =  acres  
 Basin Volume at Top of Freeboard =  acre-ft

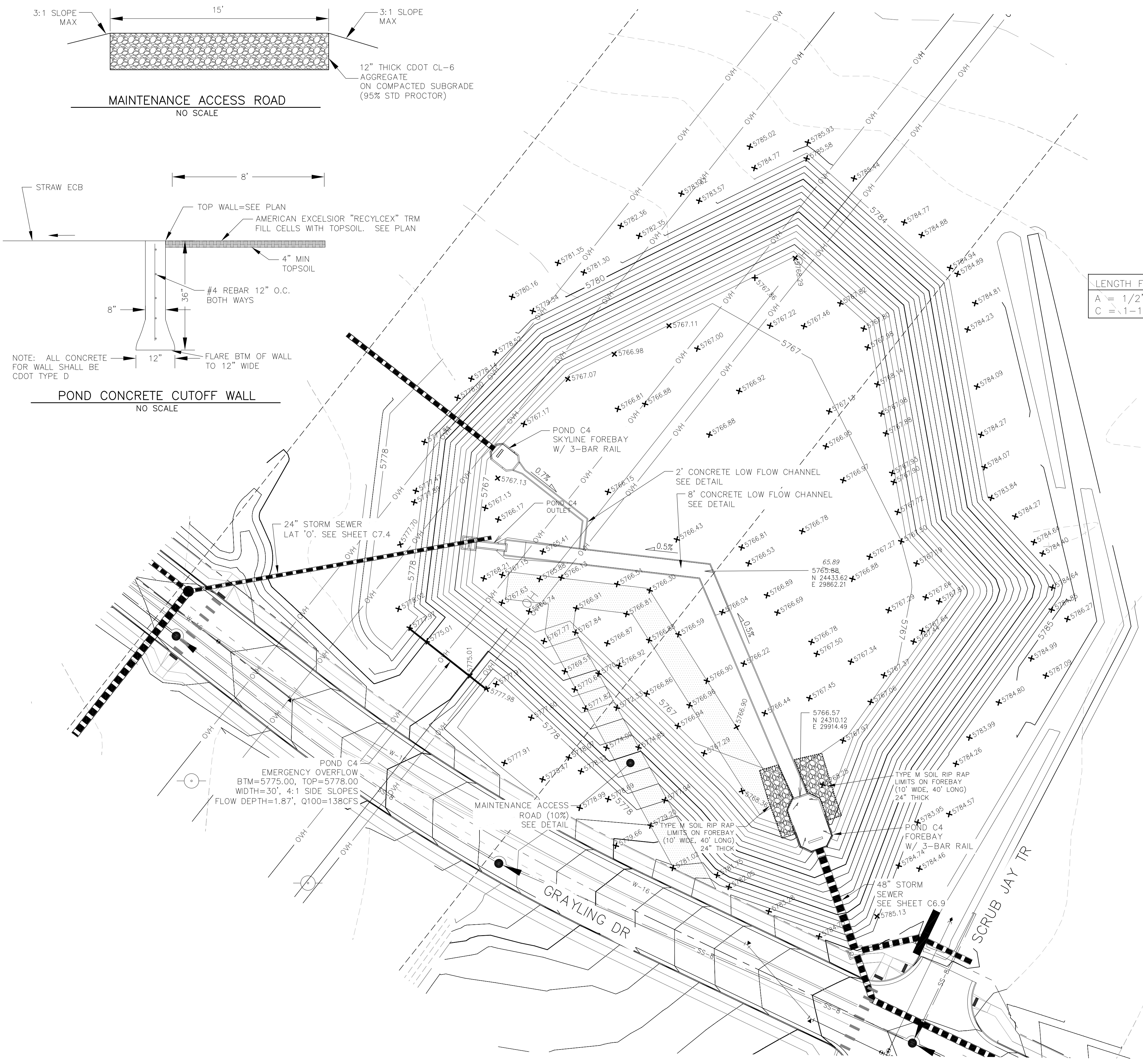
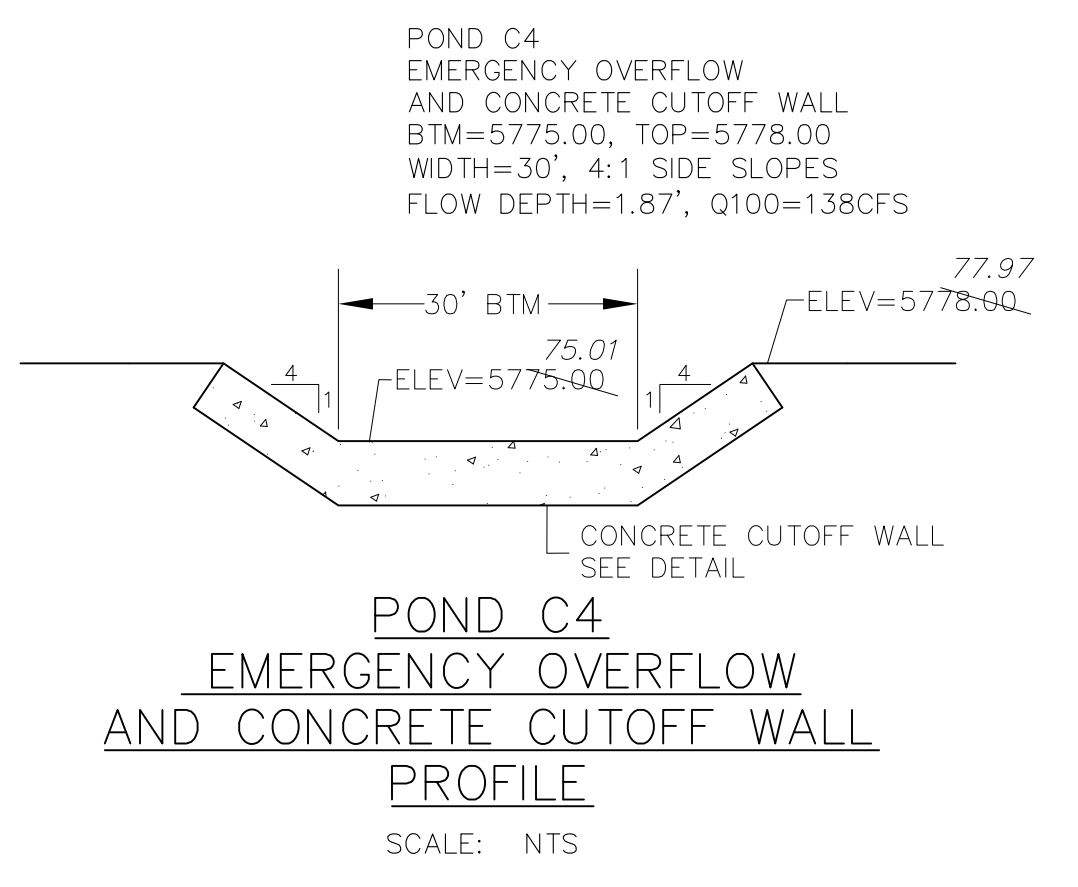
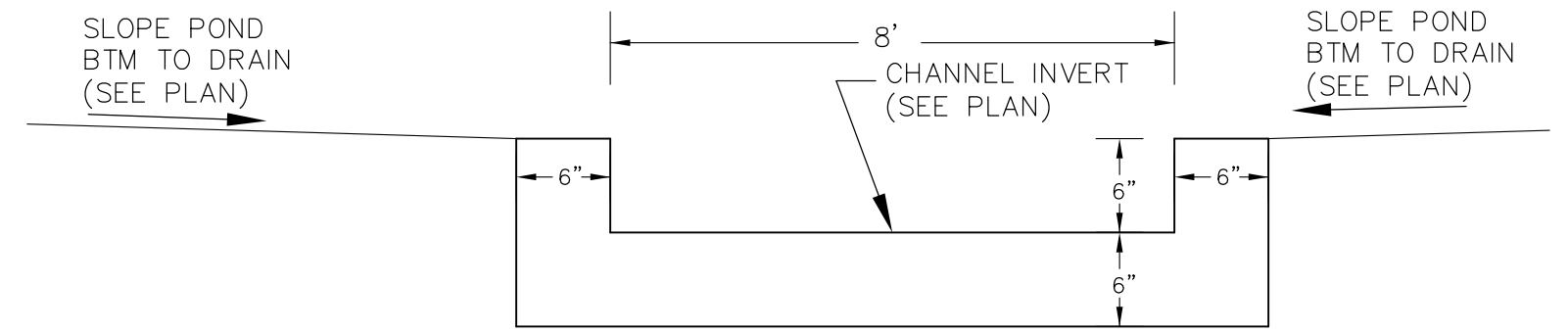
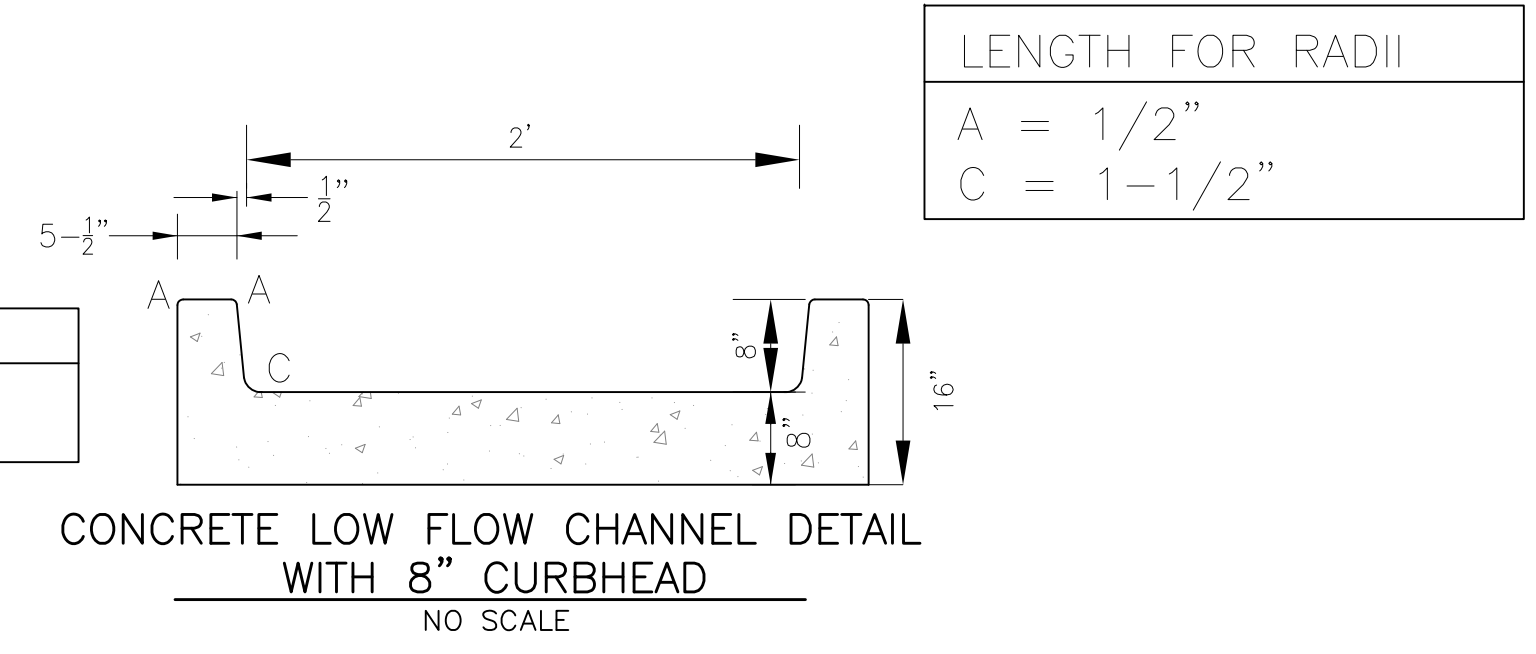
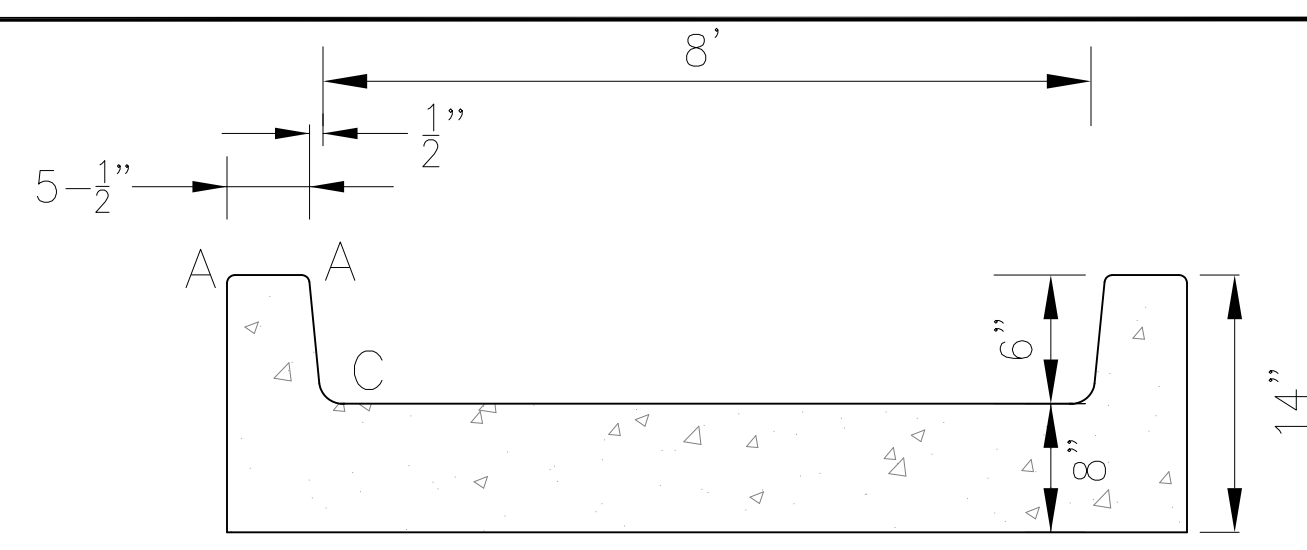
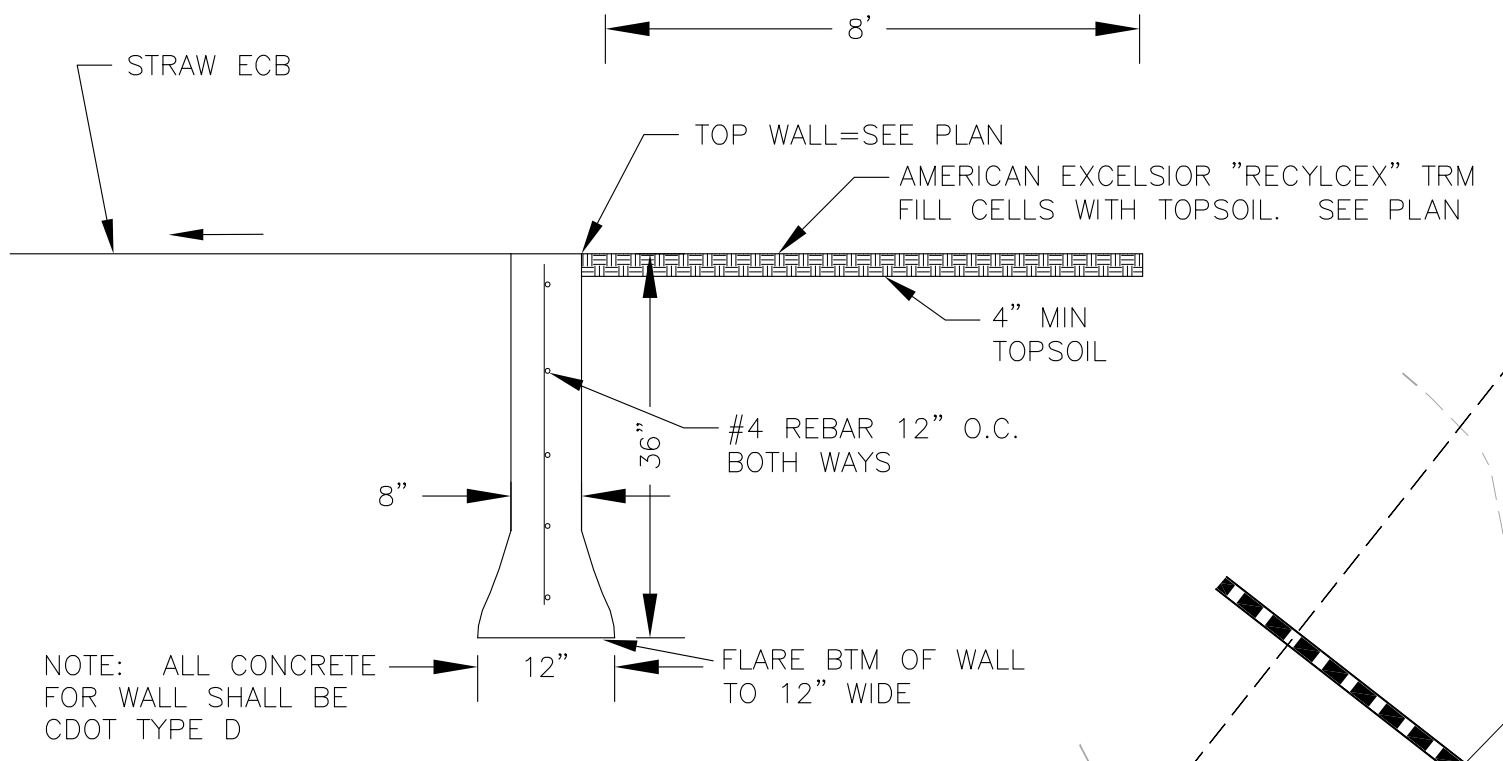
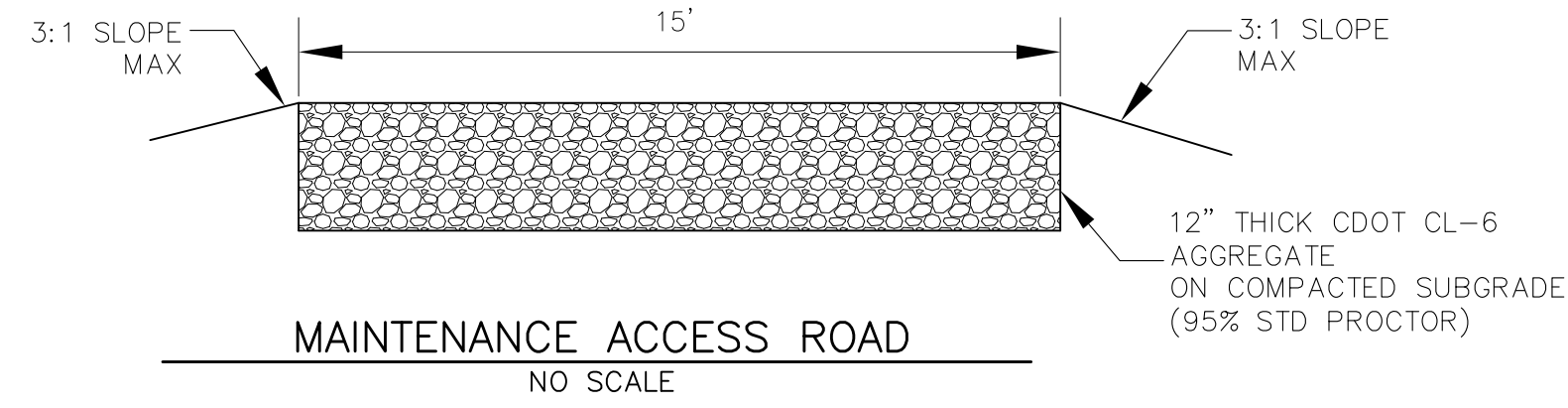
micropool = 0 = 5765

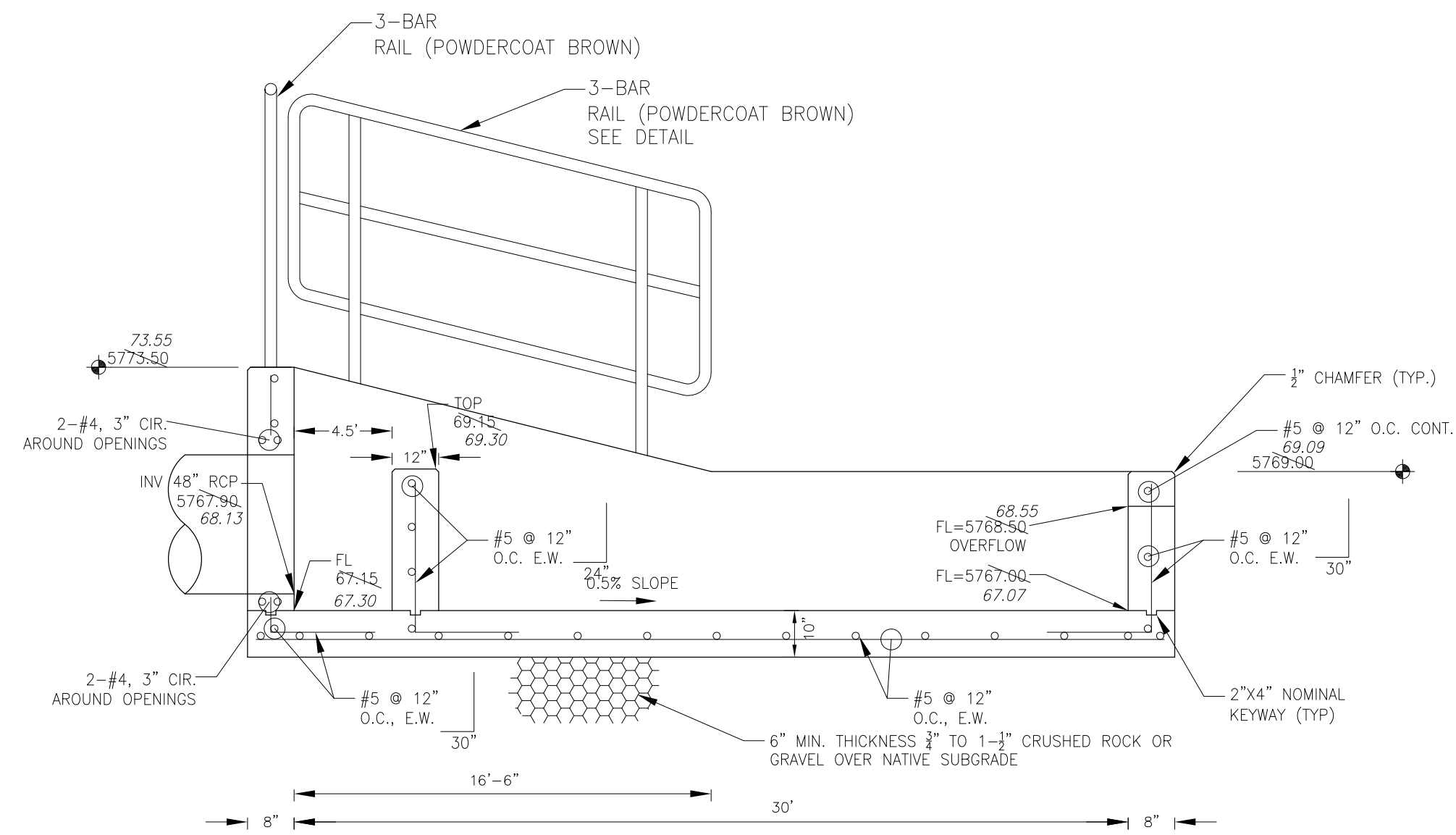
**Routed Hydrograph Results**

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

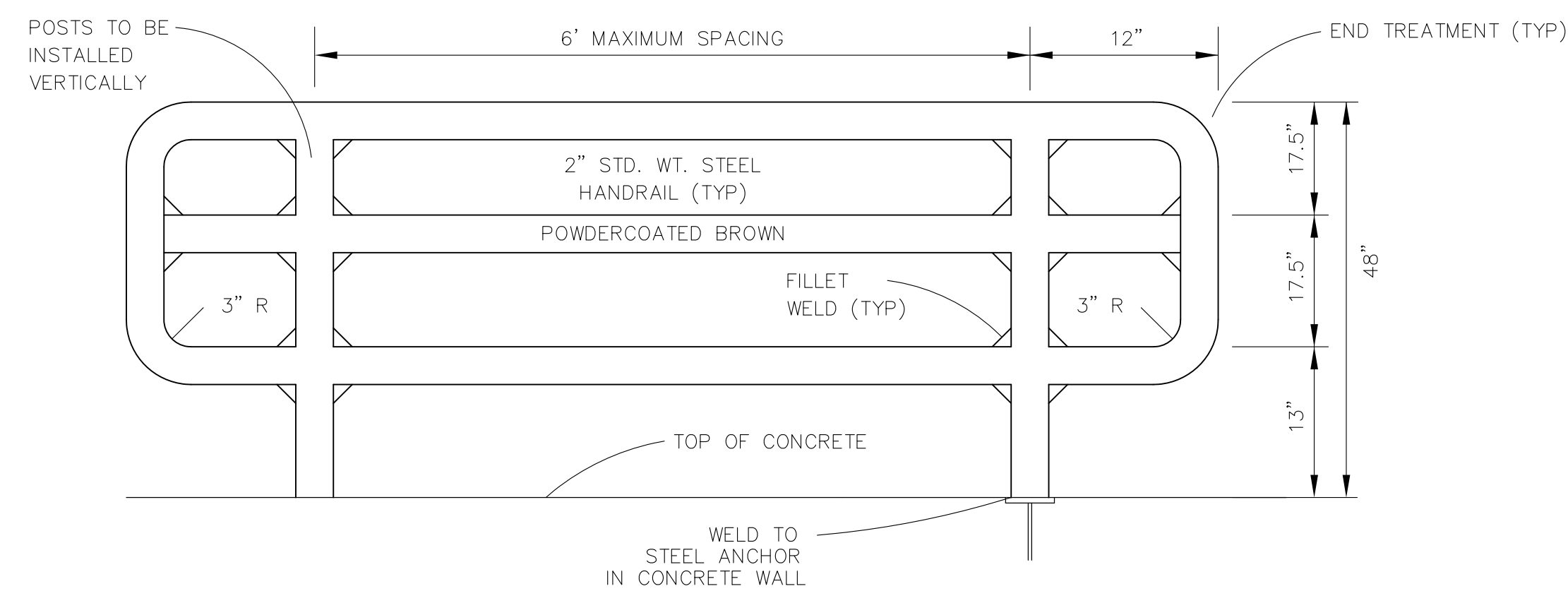
	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Design Storm Return Period =								
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52
CUHP Runoff Volume (acre-ft) =	1.488	4.468	4.607	6.475	8.109	10.045	11.748	13.830
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	4.607	6.475	8.109	10.045	11.748	13.830
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	17.5	39.6	56.8	90.6	111.9	138.5
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.22	0.49	0.70	1.12	1.38	1.71
Peak Inflow Q (cfs) =	N/A	N/A	93.5	131.6	158.6	200.0	232.9	277.2
Peak Outflow Q (cfs) =	0.7	6.2	5.5	18.5	34.6	38.4	40.9	44.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.5	0.6	0.4	0.4	0.3
Structure Controlling Flow =	Vertical Orifice 1	Overflow Weir 1	Vertical Orifice 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Gate 1 (fps) =	N/A	0.02	N/A	0.5	1.1	1.2	1.3	1.4
Max Velocity through Gate 2 (fps) =	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	46	47	47	45	43	42	40
Time to Drain 99% of Inflow Volume (hours) =	40	50	51	52	51	51	50	50
Maximum Ponding Depth (ft) =	3.06	5.56	5.13	5.89	6.24	7.45	8.30	9.48
Area at Maximum Ponding Depth (acres) =	1.10	1.28	1.25	1.31	1.33	1.42	1.49	1.59
Maximum Volume Stored (acre-ft) =	1.497	4.476	3.919	4.903	5.364	7.017	8.272	10.092



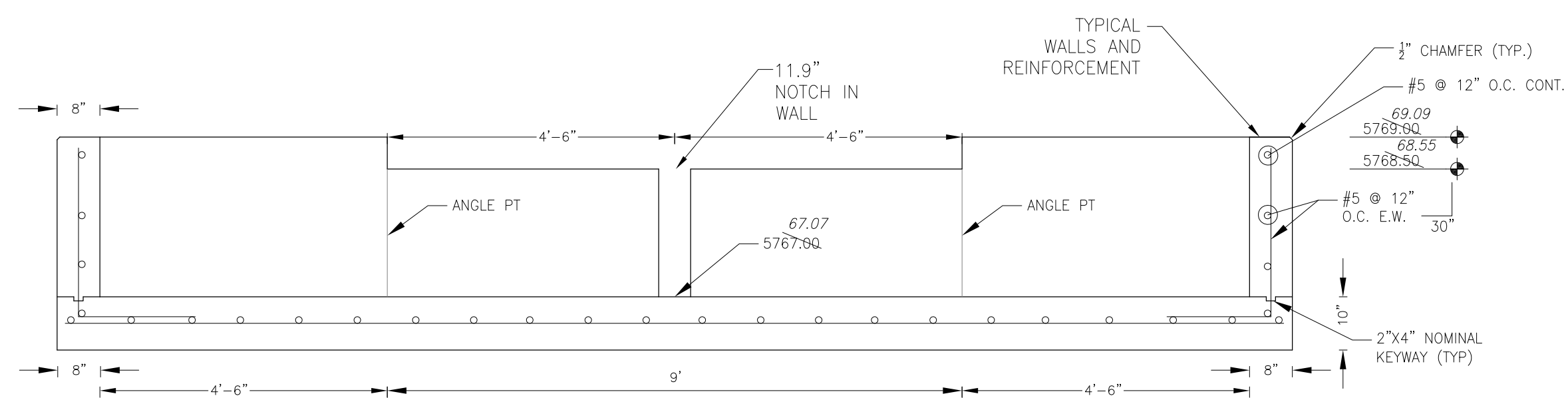




FOREBAY SECTION A-A  
NO SCALE

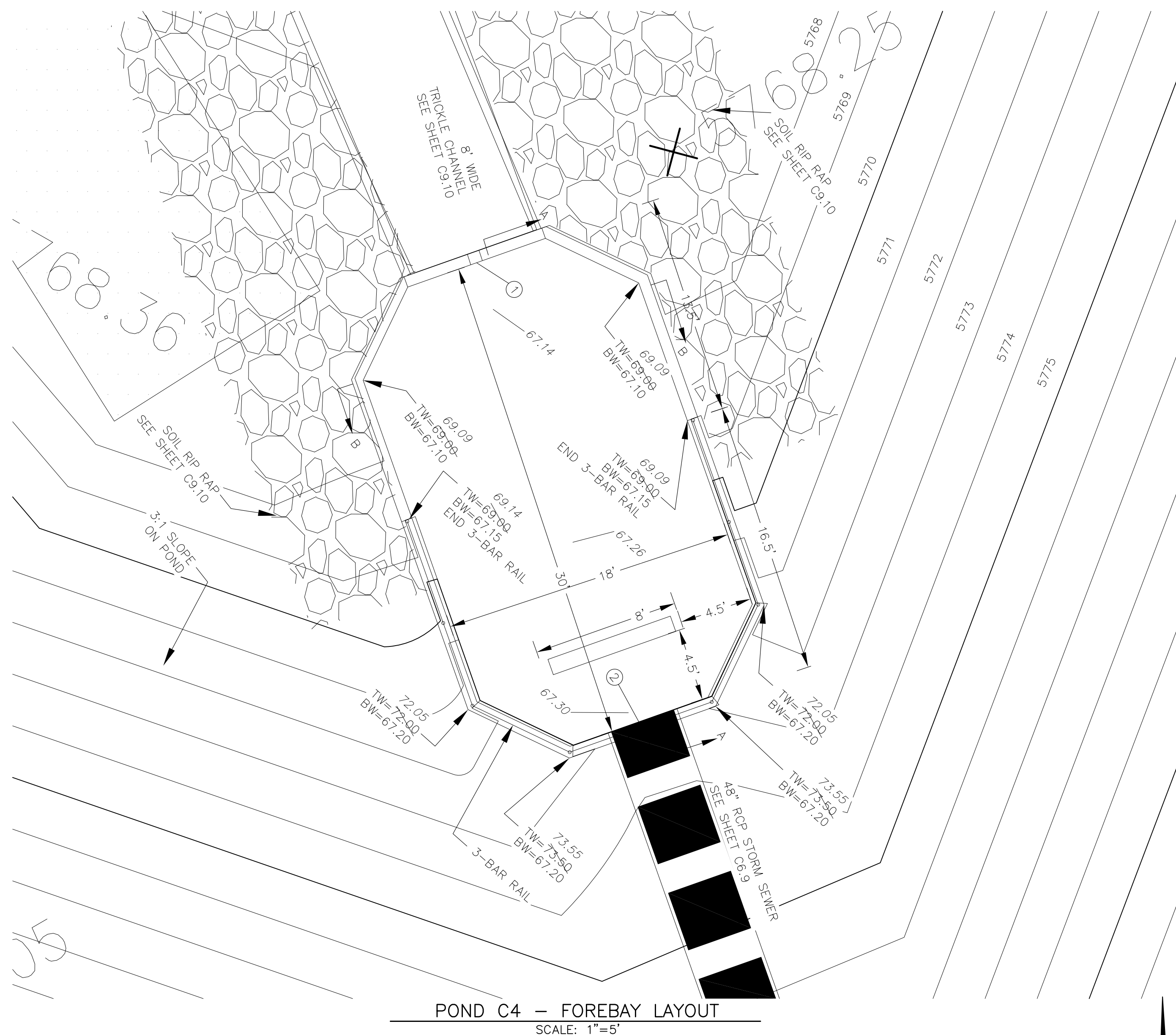


3-BAR RAIL DETAIL  
NO SCALE

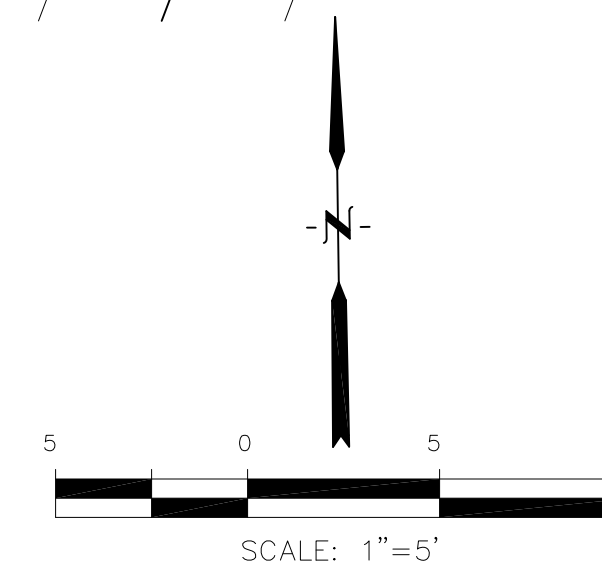


FOREBAY SECTION B-B  
NO SCALE

NOTE: ALL CONCRETE FOR FOREBAY SHALL BE CDOT TYPE D



POND C4 - FOREBAY LAYOUT  
SCALE: 1"=5'



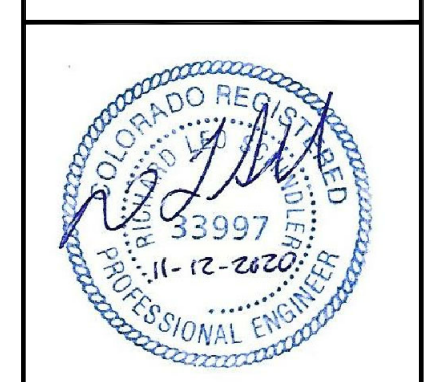
POINT TABLE (FOREBAY)				
NUMBER	NORTHING	EASTING	ELEVATION	NOTES
1	24309.51	29914.77	5767.00	FOREBAY BOTTOM
2	24281.30	29924.99	5767.15	FOREBAY BOTTOM, INV 48"=5767.90

**CORE ENGINEERING GROUP**  
15004 1ST AVENUE, S.  
DENVER, CO 80202  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@ceg1.com

DATE: JAN 12, 2021  
DESCRIPTION: RAISE SITE 1' EAST OF POWERLINES  
NO. 1  
PROJECT: THE HILLS COLLECTOR STREET CONSTRUCTION  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
LORSON, LLC  
LORSON BLVD - WALLEYE DR - LAMPREY DR  
COLORADO SPRINGS, COLORADO (719) 635-3200  
CONTACT: JEFF MARK

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

POND C4  
FOREBAY DETAILS

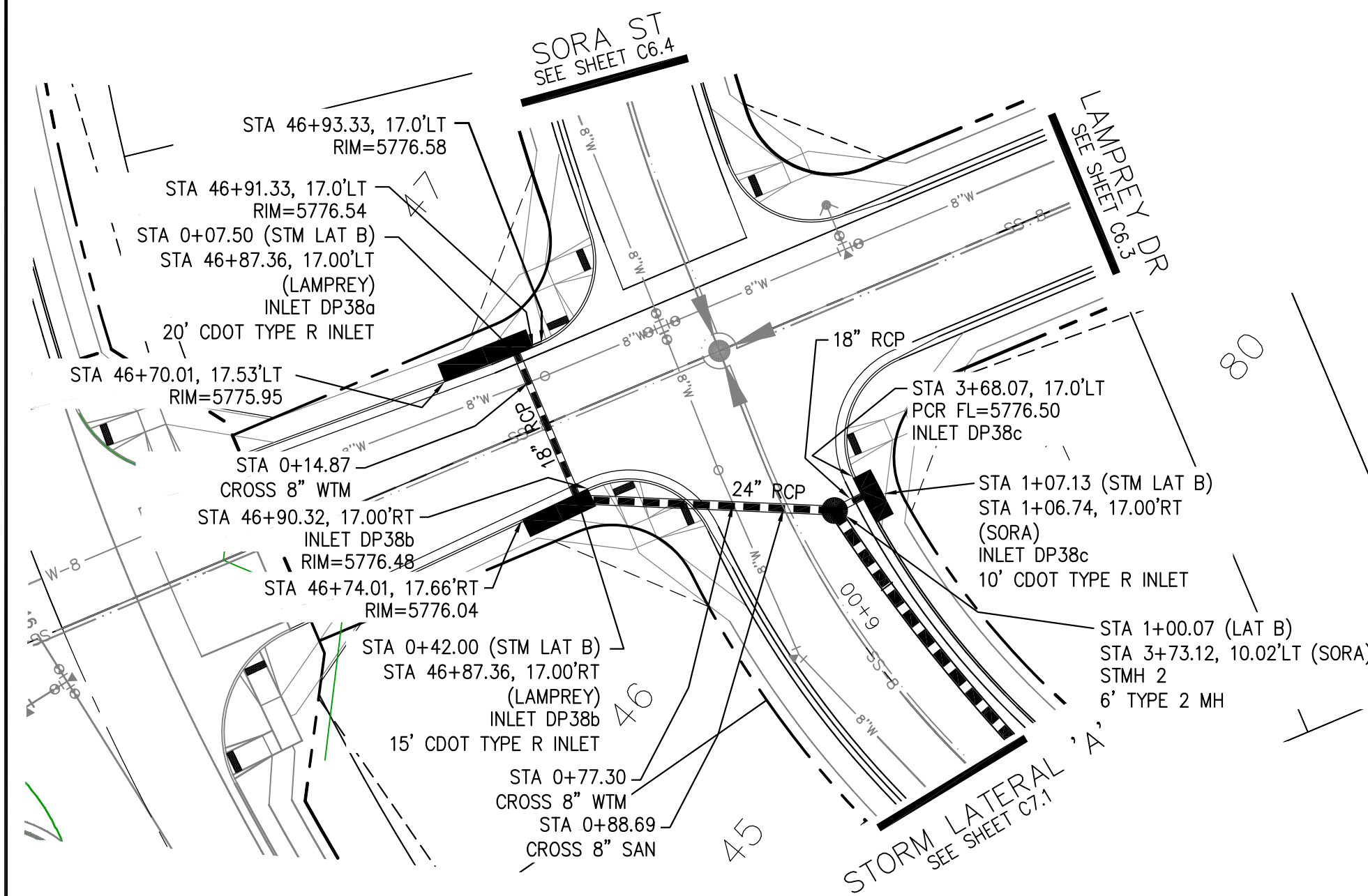
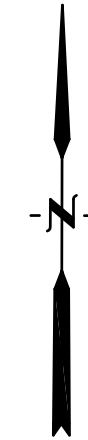
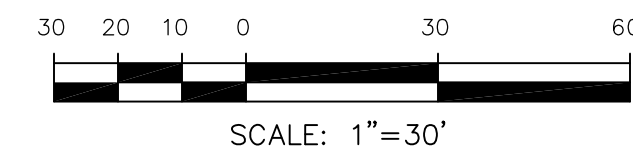


DATE: NOV 12, 2020  
PROJECT NO. 100.061  
SHEET NUMBER C9.11  
TOTAL SHEETS: 58

AS-BUILT  
DATE: 09/30/2022

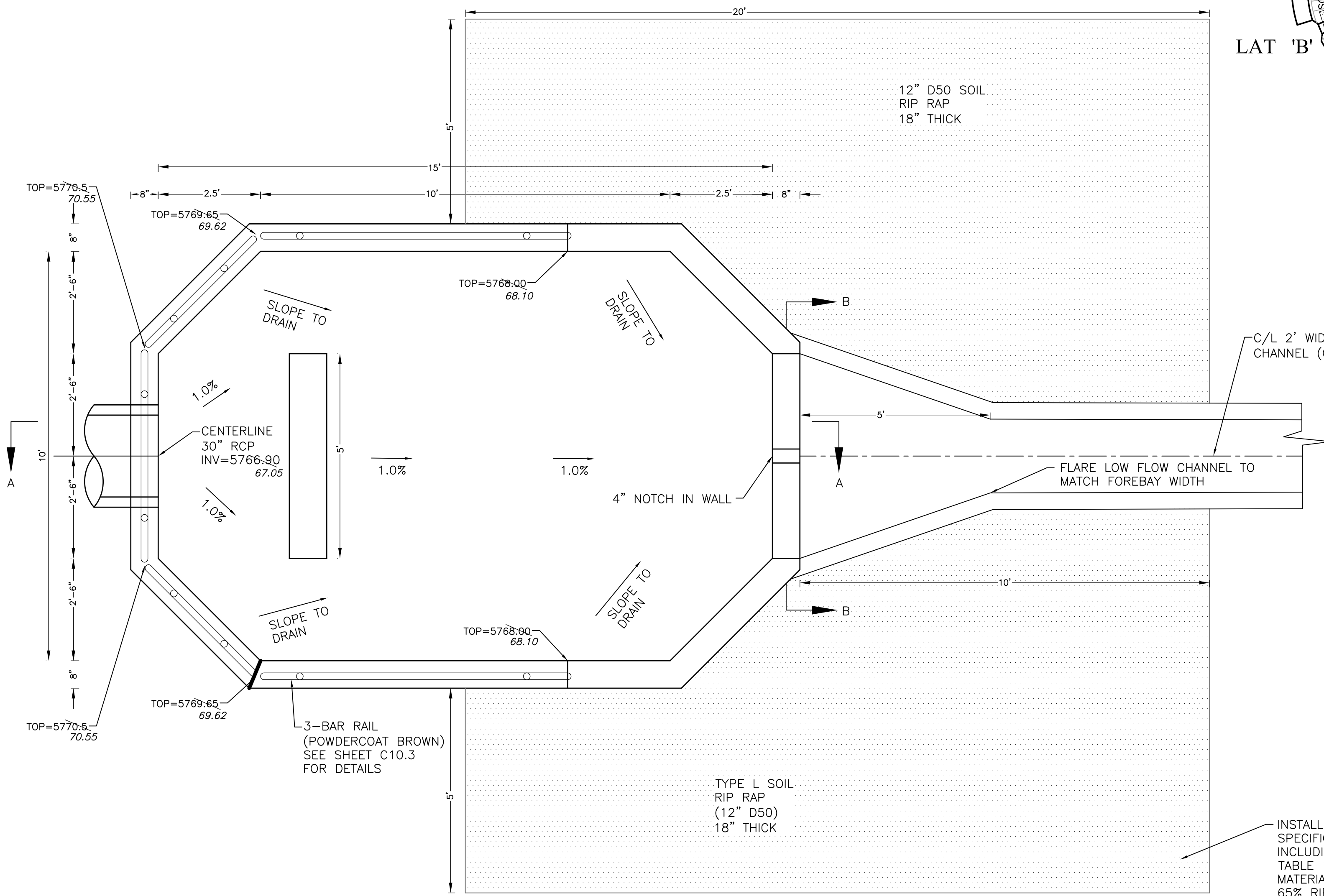
- NOTES**
1. ALL SPOT ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE NOTED.
  2. SEE GRADING PLAN FOR GRADING INFORMATION.
  3. ALL STORM SEWER SHALL BE CLASS III RCP.
  4. ALL MHS SHALL BE TYPE 1 UNLESS OTHERWISE NOTED.

- 1 CURVE DATA ID
- 2 CURB TRANSITIONS
- 3 PEDESTRIAN RAMP, SEE SHEET C10.1

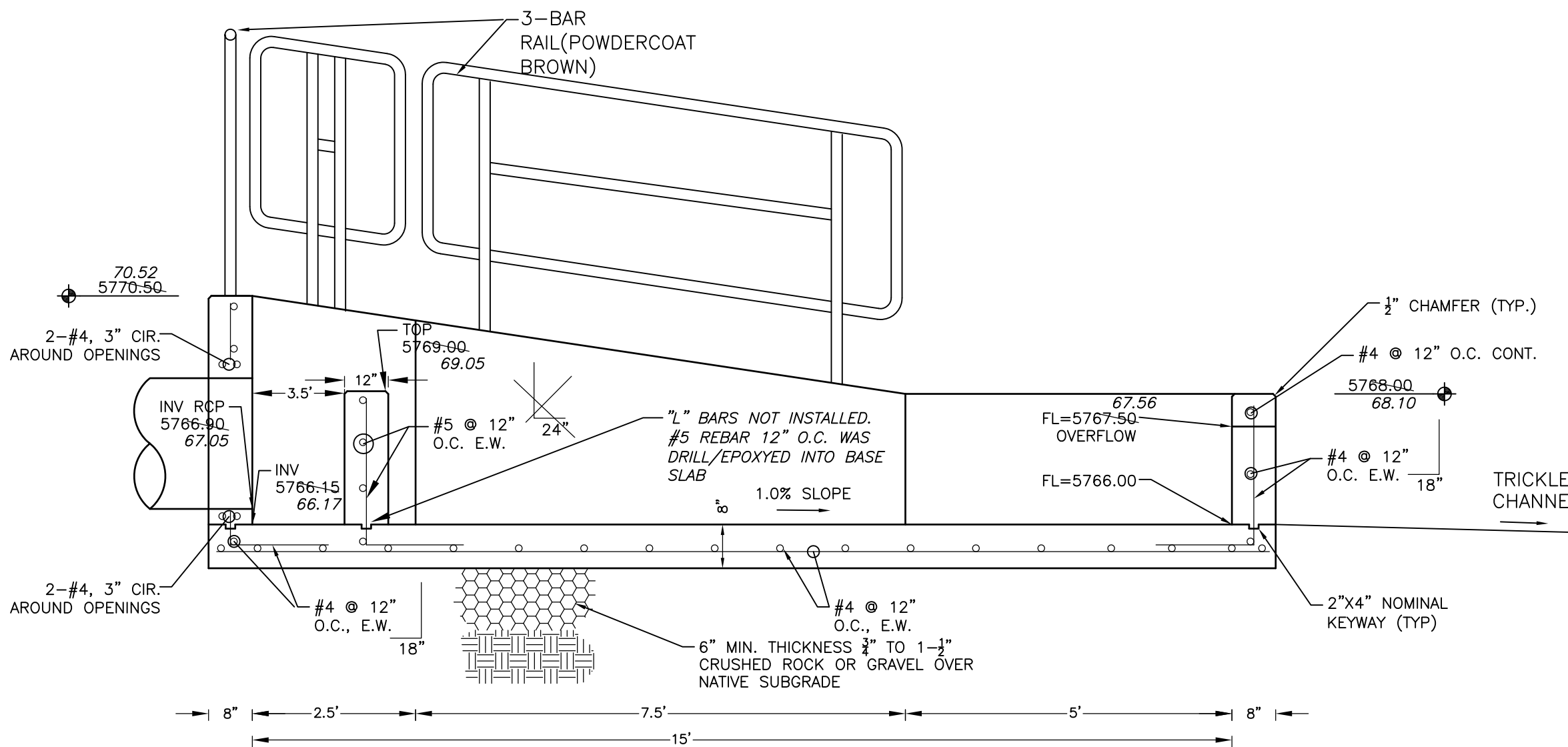


**STORM LATERAL 'B' (PUBLIC)**

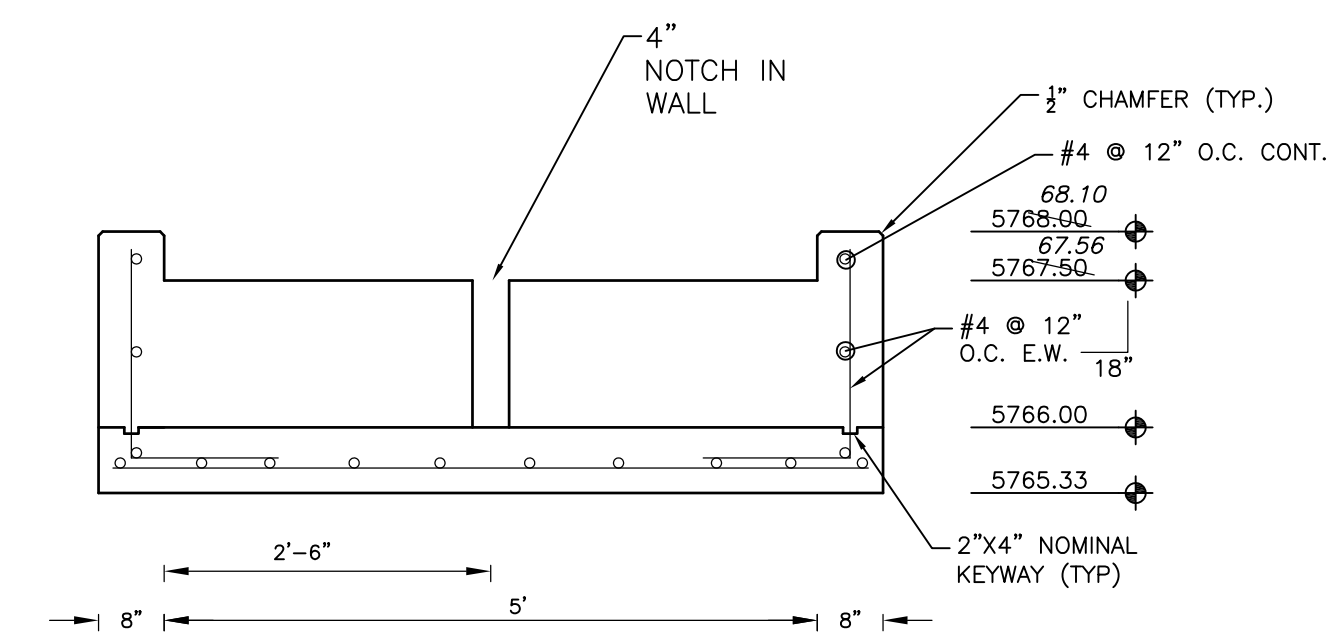
Station	Description	Invert	Flow
5795			
5790			
5785			
5780			
5775			
5770			
5765			
0+00			
1+00			
2+00			



**FOREBAY DETAIL**  
NO SCALE

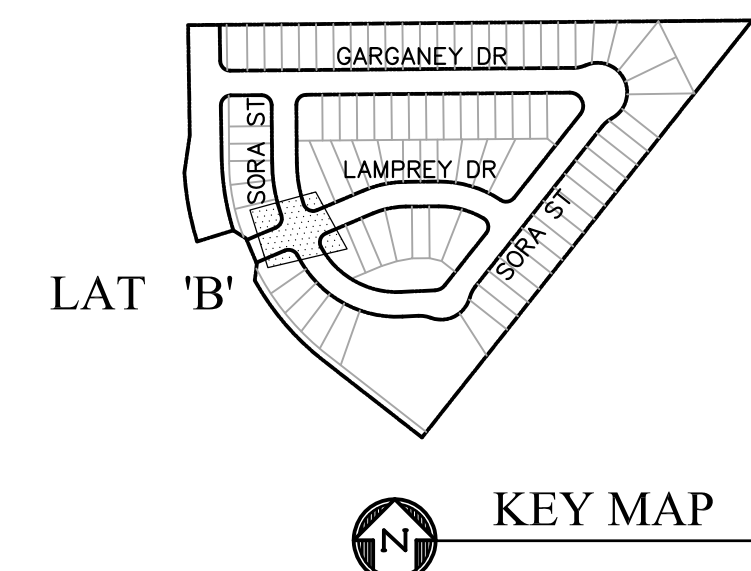


**FOREBAY SECTION A-A**  
NO SCALE



**FOREBAY SECTION B-B**  
NO SCALE

INSTALL SOIL RIP RAP PER MHFD SPECIFICATION SECTION 31-37-00 INCLUDING RIP RAP SPECIFICATIONS IN TABLE 1 OF SAID SPECIFICATIONS SOIL MATERIAL SHALL BE TOPSOIL MIXED WITH 65% RIP RAP AND 35% TOPSOIL BY VOLUME. ALL SOIL RIP RAP SHALL CONSIST OF A UNIFORM MIXTURE OF SOIL AND RIP RAP WITHOUT VOIDS.



**KEY MAP**

**CORE ENGINEERING GROUP**  
 15004 1ST AVENUE S, SUITE 301  
 BIRMGHAM, AL 35206  
 CONTACT: RICHARD L. SCHINDLER, P.E.  
 EMAIL: Rich@ceg1.com

DATE: \_\_\_\_\_

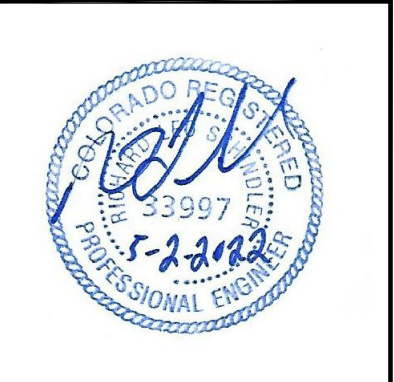
DESCRIPTION: \_\_\_\_\_

NO: \_\_\_\_\_

DRAWN: RLS  
 DESIGNED: RLS  
 CHECKED: RLS

PROJECT: SKYLINE AT LORSON RANCH  
 212 N. WAHSATCH AVE., SUITE 301  
 COLORADO SPRINGS, COLORADO 80903  
 (719) 635-3200  
 CONTACT: JEFF MARK

**STORM SEWER LATERAL 'B'**  
**STORM LATERAL 'B'**  
**AND SKYLINE POND C4 FOREBAY**



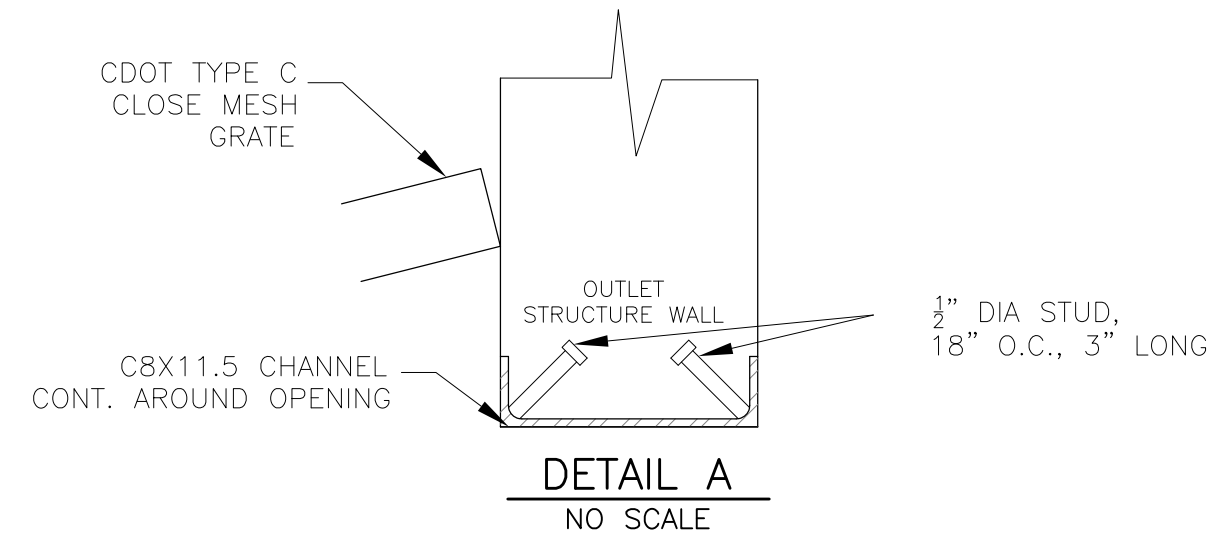
DATE: MAY 2, 2022

PROJECT NO. 100.063

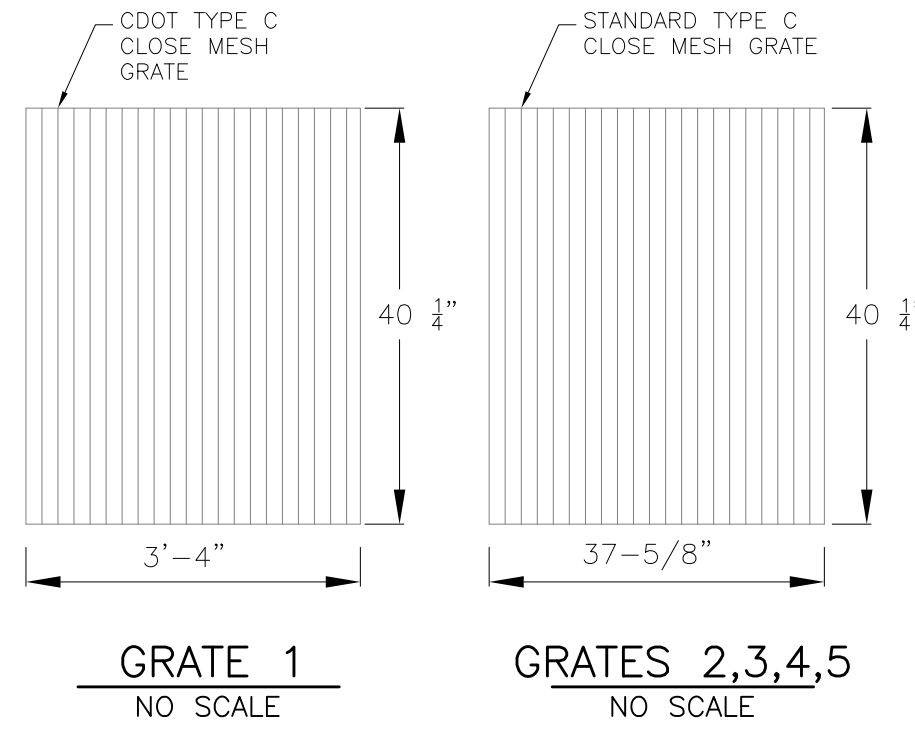
SHEET NUMBER C7.2

TOTAL SHEETS: 17

**AS-BUILT**  
 DATE: 11/03/2022

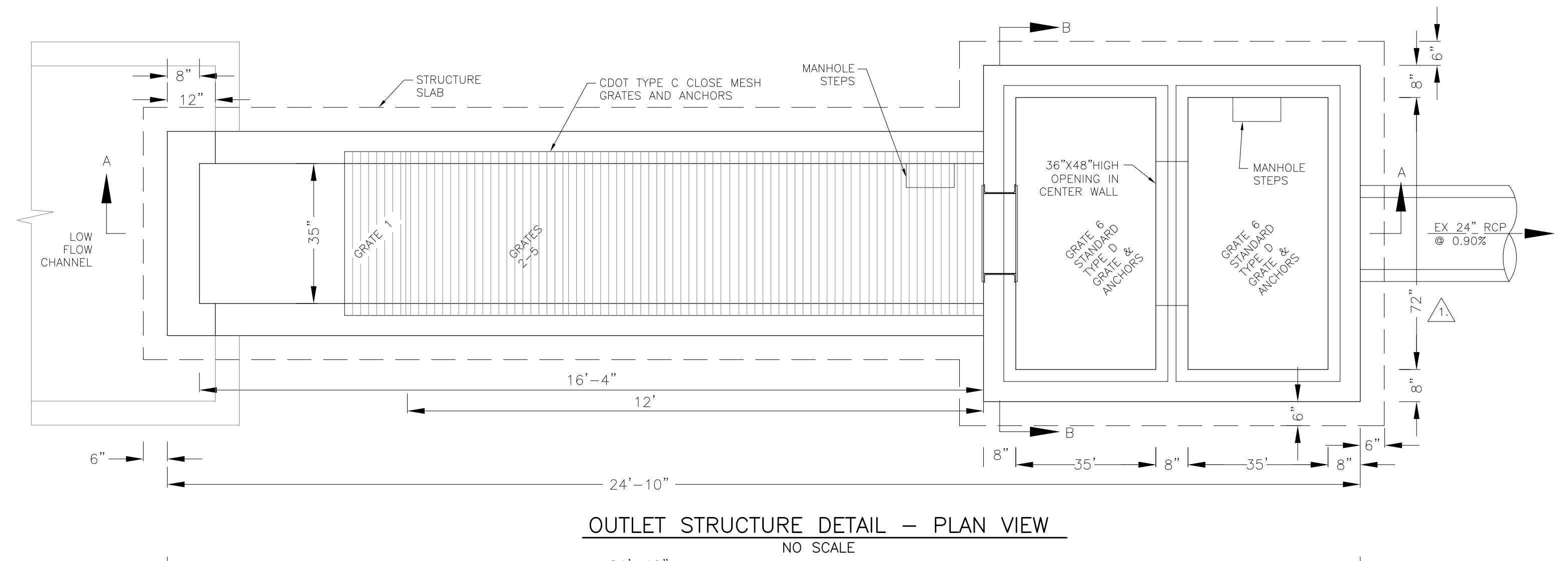


NOTE:  
AFTER CONCRETE STRUCTURE HAS BEEN POURED  
ALL GRATE DIMENSIONS SHALL BE FIELD VERIFIED  
PRIOR TO GRATE CONSTRUCTION

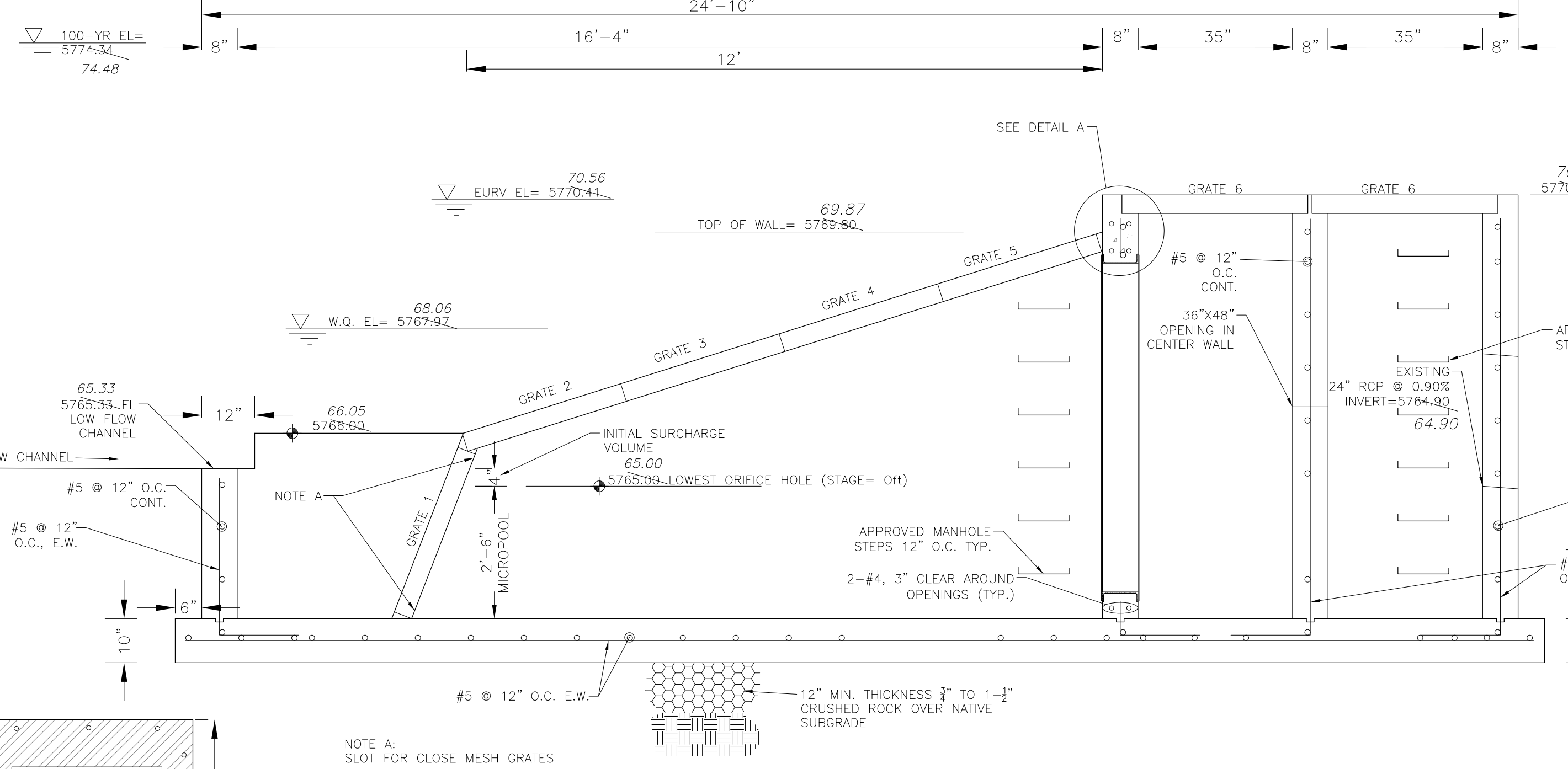


GRATE 1  
NO SCALE

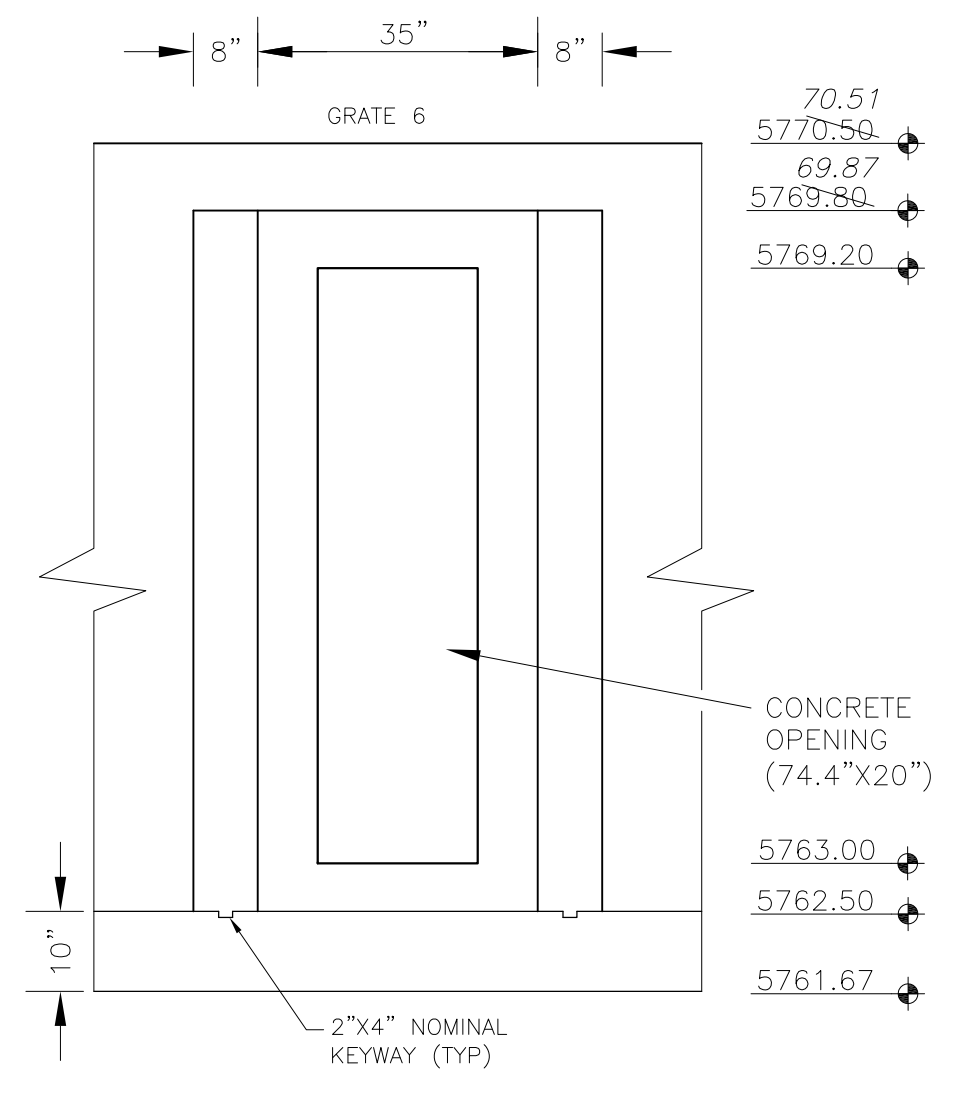
GRATES 2,3,4,5  
NO SCALE



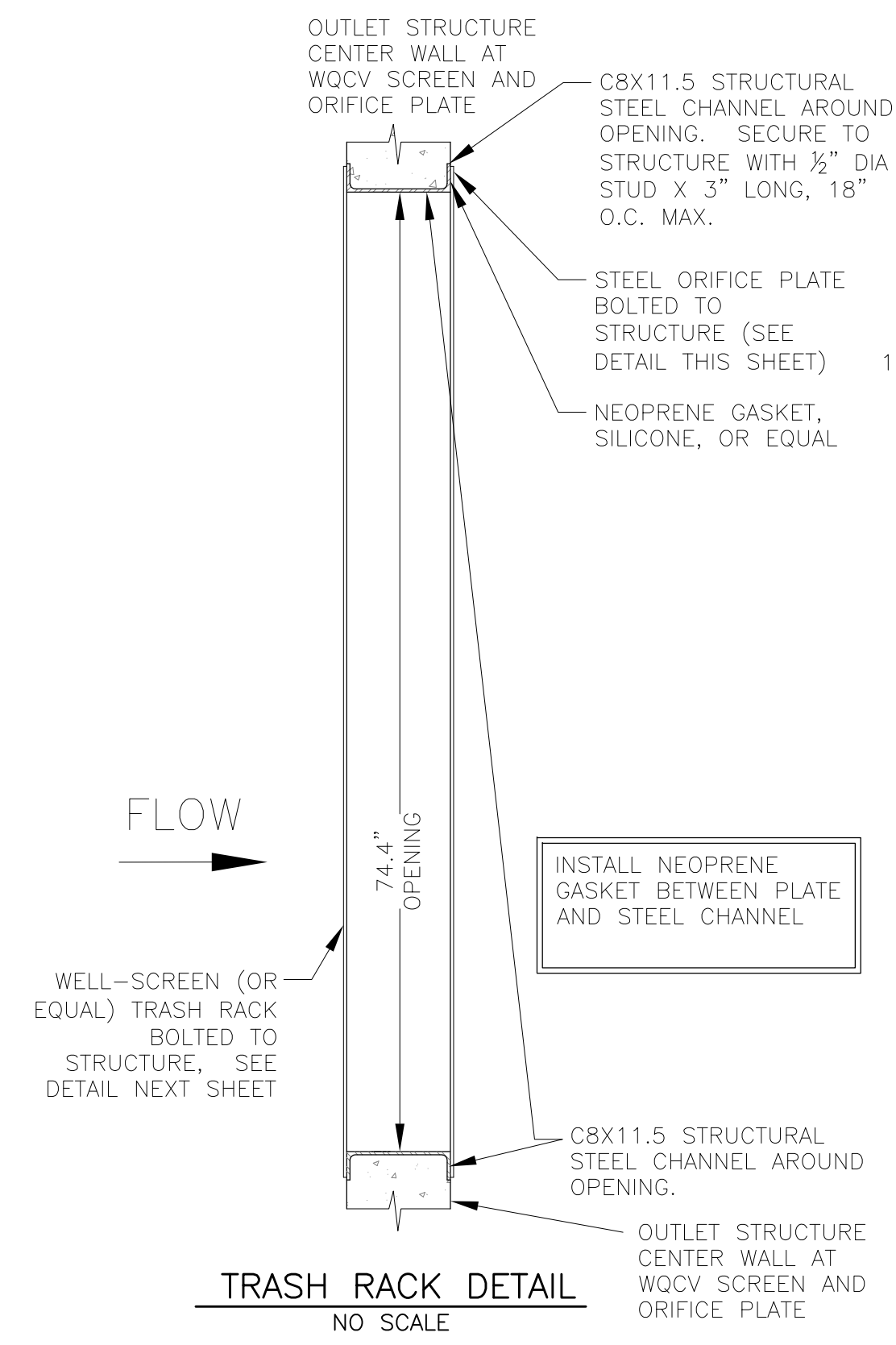
OUTLET STRUCTURE DETAIL - PLAN VIEW  
NO SCALE



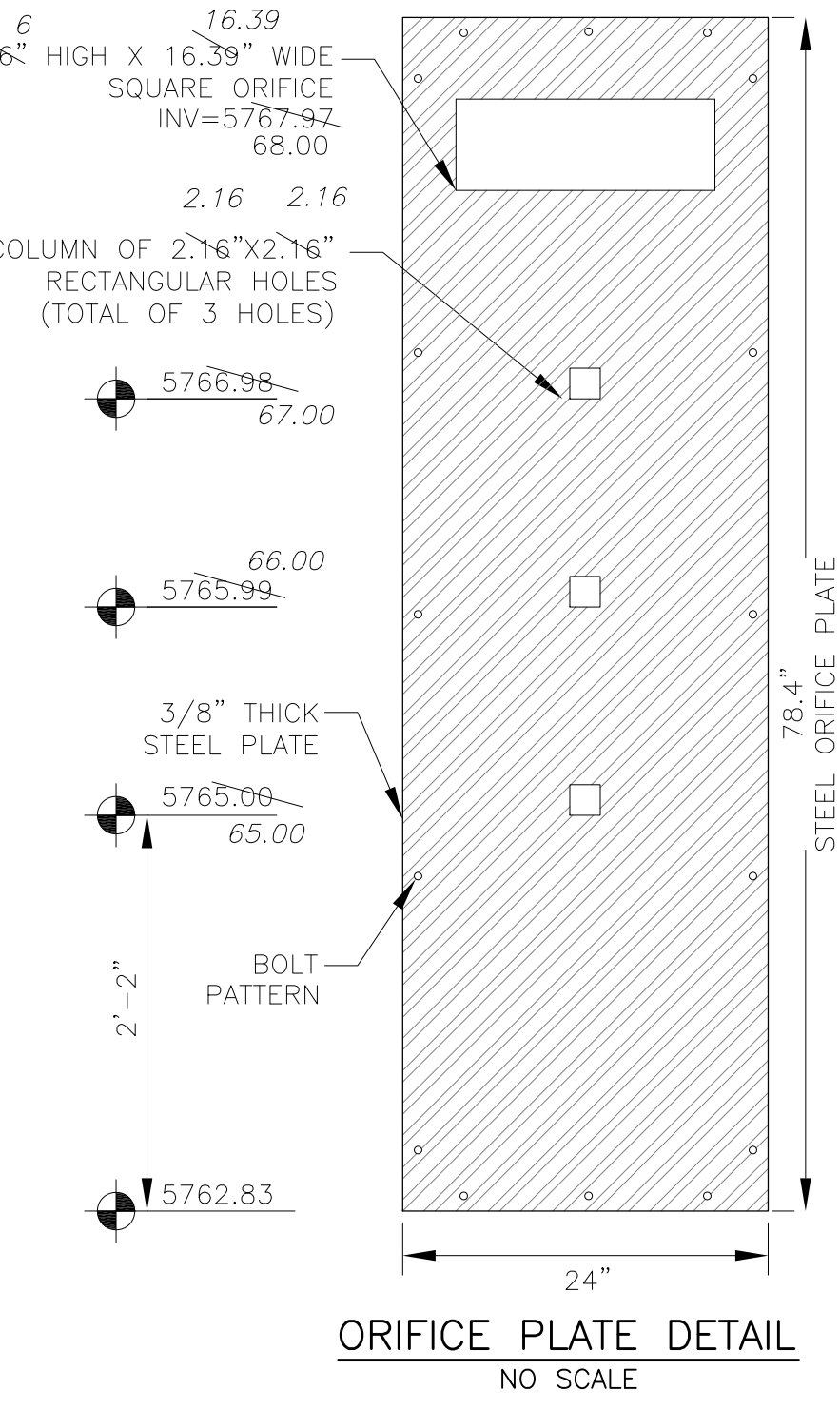
OUTLET STRUCTURE DETAIL - SECTION A-A  
NO SCALE



OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE



TRASH RACK DETAIL  
NO SCALE



ORIFICE PLATE DETAIL  
NO SCALE

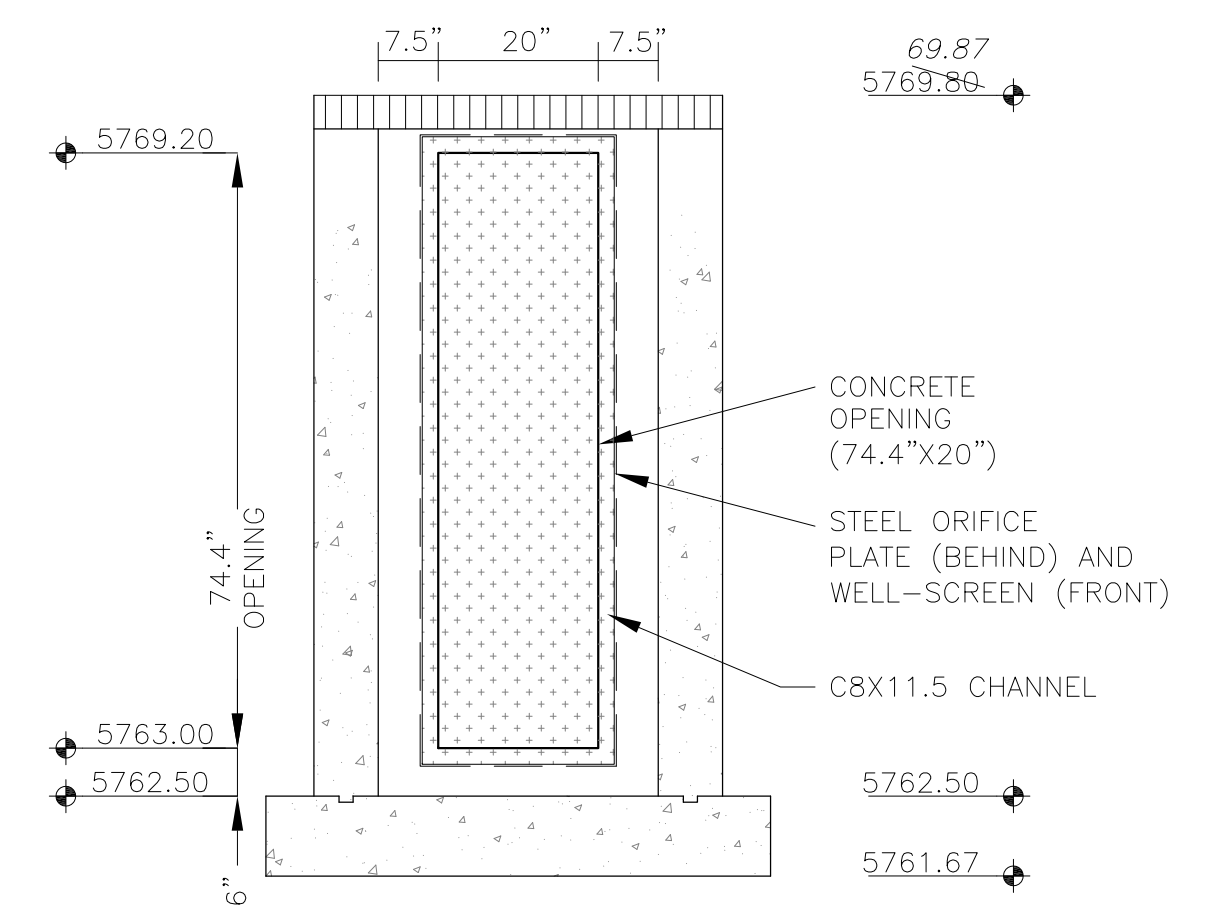
OUTLET STRUCTURE, FOREBAY, AND DRAIN CHANNEL NOTES:

- PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL COMPONENTS OF THE OUTLET STRUCTURE.
- GRADE 60 REINFORCING STEEL REQUIRED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE A TWO-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE, UNLESS OTHERWISE NOTED.
- CONCRETE FOR THE OUTLET STRUCTURE AND FOREBAY SHALL BE CDOT CLASS D CONCRETE.
- CONCRETE FOR DRAIN CHANNELS SHALL BE CDOT CLASS B CONCRETE.
- EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK, SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE AND THE JOINT SHALL BE SEALED, REFER TO DETAILS.
- ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/8" CHAMFER UNLESS OTHERWISE NOTED.
- SUBGRADE TO BE 12" THICK CLEAN FILL COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698 UNDER STRUCTURE.
- REFER TO POND DETAILS FOR PRESEDIMENTATION/FOREBAY DESIGN.
- ENGINEER SHALL BE NOTIFIED PRIOR TO BEGINNING CONSTRUCTION OF OUTLET STRUCTURE TO SCHEDULE OBSERVATION VISITS FOR STRUCTURES.

BAR SIZE	#4	#5	#6
MIN. SPLICE LENGTH	1'-3"	1'-7"	2'-0"

WQCV WELL-SCREEN NOTES:

- Well-Screen shall be stainless steel and attached by stainless steel bolts along edge of the mounting frame.
- WQCV Well Screen
  - Type of Screen: Stainless steel #93 Vee Wire (Johnson Vee Wire (tm) Stainless Steel Screen or equivalent with 60% open area)
  - Screen slot opening dimension: 0.139" (Screen #93 Vee Wire Slot Opening)
  - Type and Size of Support Rod: TE 0.074"x0.50"
  - Spacing of Support Rod (O.C.): 1.0 Inch
  - Total Screen Thickness: 0.655"
  - Carbon Steel Holding Frame Type: 3/4" x 1.0" angle



OUTLET STRUCTURE DETAIL - SECTION B-B  
NO SCALE

**CORE**  
**ENGINEERING GROUP**  
15004 1ST AVENUE S.  
DENVER, CO 80202  
PH: 719.570.1100  
CONTACT: RICHARD L. SCHINDLER, P.E.  
EMAIL: Rich@cog1.com

DATE: 3/7/2022  
DESCRIPTION: STRUCTURE WIDTH REVISED TO 72"  
PREPARED FOR: LORSON, LLC  
212 N. WAHSATCH AVE, SUITE 301  
COLORADO SPRINGS, COLORADO 80903  
(719) 635-3200  
CONTACT: JEFF MARK

PROJECT: THE RIDGE AT LORSON RANCH  
FONTAINE BLVD. - WALLEYE DR  
COLORADO SPRINGS, COLORADO

DRAWN: RLS  
DESIGNED: RLS  
CHECKED: RLS

POND C4  
FULL SPECTRUM  
OUTLET STRUCTURE DETAILS



DATE: NOV 5, 2021

PROJECT NO. 100.064

SHEET NUMBER C9.5

TOTAL SHEETS: 23

**AS-BUILT**  
DATE: 09/30/2022