

GROUNDHOG DAM **INTAKE MODIFICATION PLANS** **DAM ID: 710107, Water Divison 7, District 71** **DOLORES COUNTY, COLORADO**

AUGUST, 2021

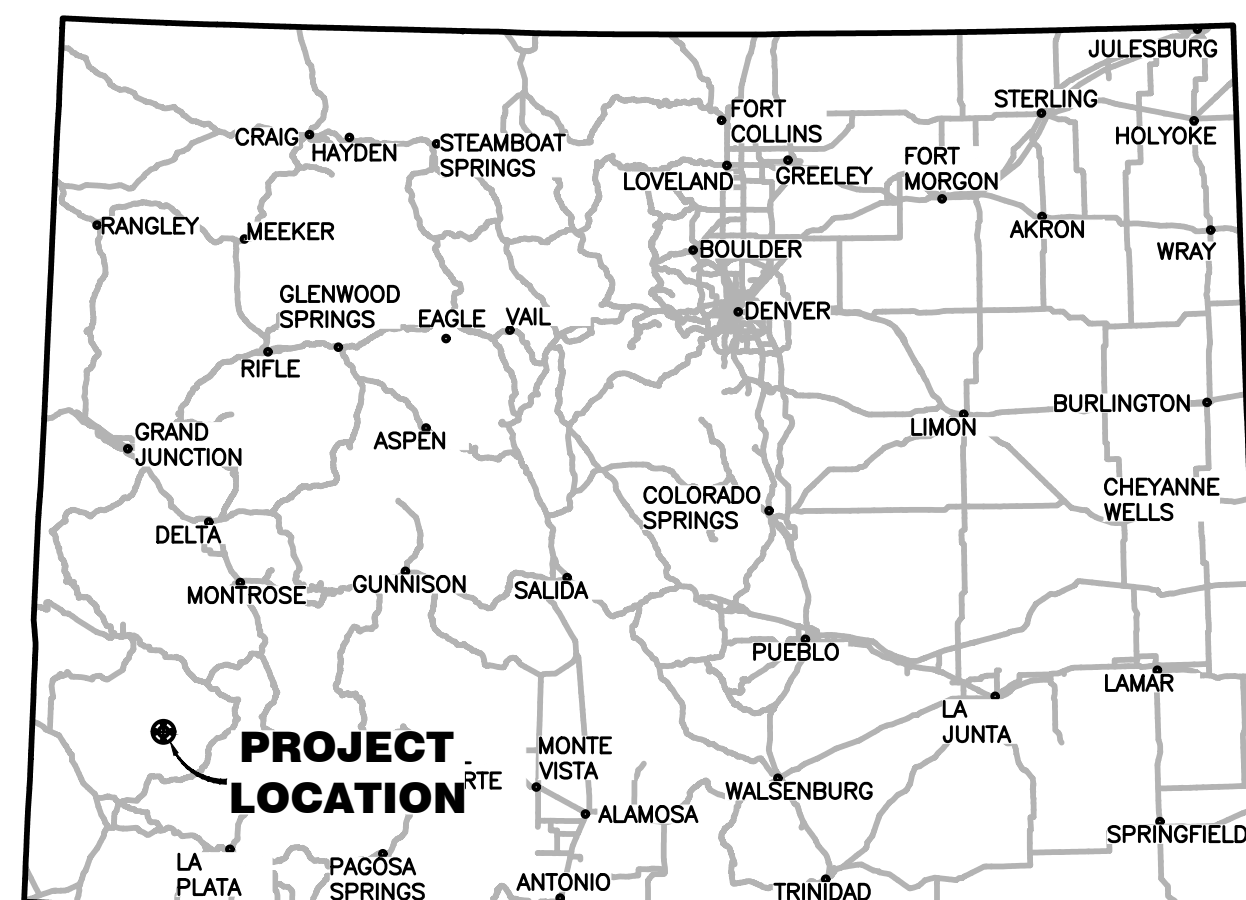
VICINITY MAP

SCALE 1" = 8 MILES

OWNER: Montezuma Valley Irrigation Company
P.O. Box 1056
Cortez, CO 81321

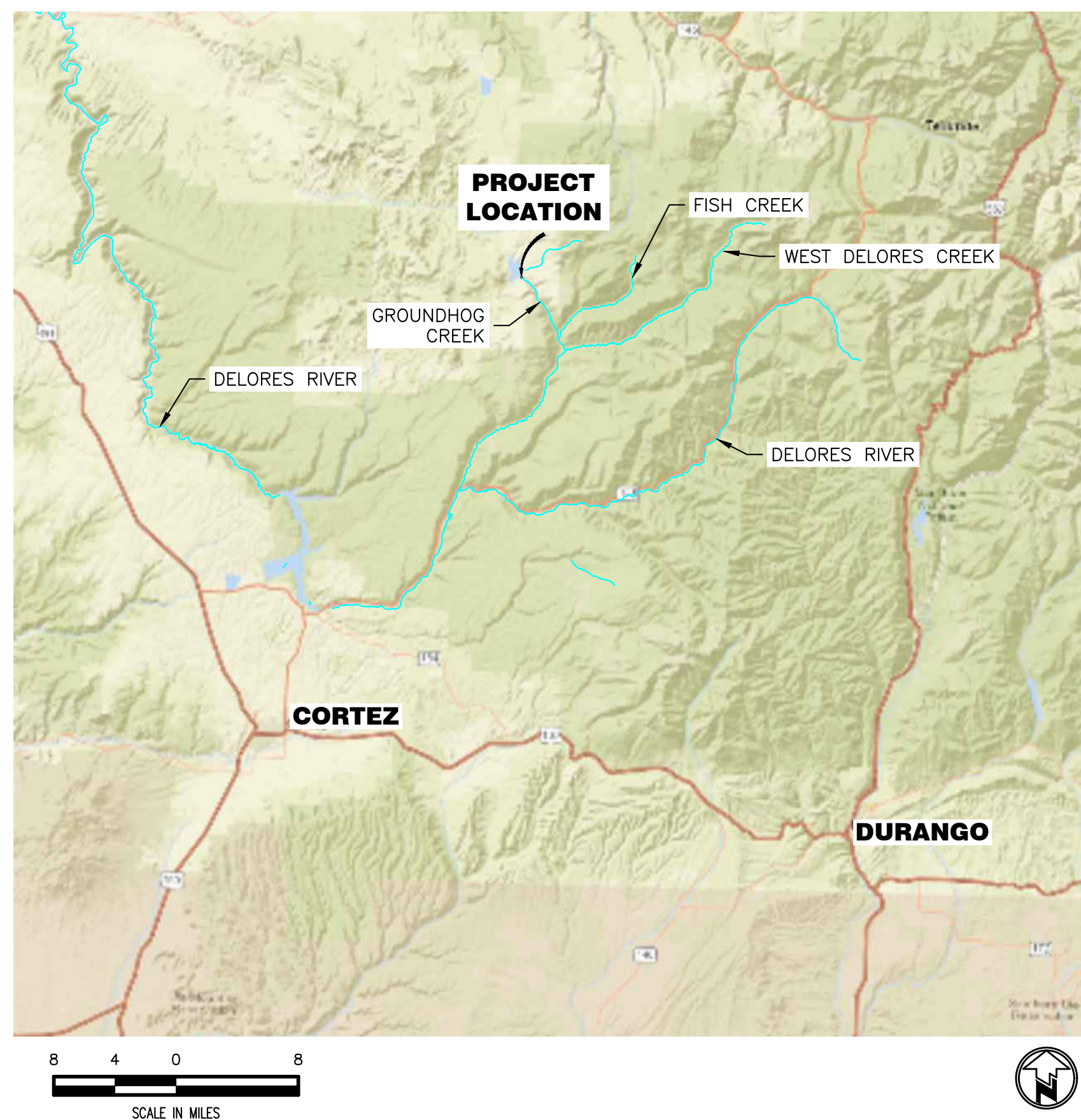
CIVIL ENGINEER: Applegate Group, Inc.
1490 W. 121st Ave. Suite 100
Denver, CO 80234

STRUCTURAL ENGINEER: SGM
118 W. 6th St. Suite 200
Glenwood Springs, CO 81601



LOCATION MAP

SCALE 1" = 60 MILES



These plans have been prepared by me or under my direct supervision.

Craig Ullmann
Colorado P.E. No. 38551

Approved on the ____ day of _____, 20____
State Engineer

By: _____
Bill McCormick, Chief, Colorado Dam Safety
Colorado P.E. 29127

These plans represent the AS-CONSTRUCTED conditions of _____ Dam to the best of my knowledge and judgment, based in part on information furnished by others, as of the _____ day of _____, 20__.

Craig Ullmann
Colorado P.E. No. 38551

Applegate Group, Inc.
Water Resource Advisors for the West
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Denver, CO 80234
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GROUNDHOG DAM INTAKE MODIFICATION PLANS

COVER SHEET

**MONTEZUMA VALLEY
IRRIGATION COMPANY**

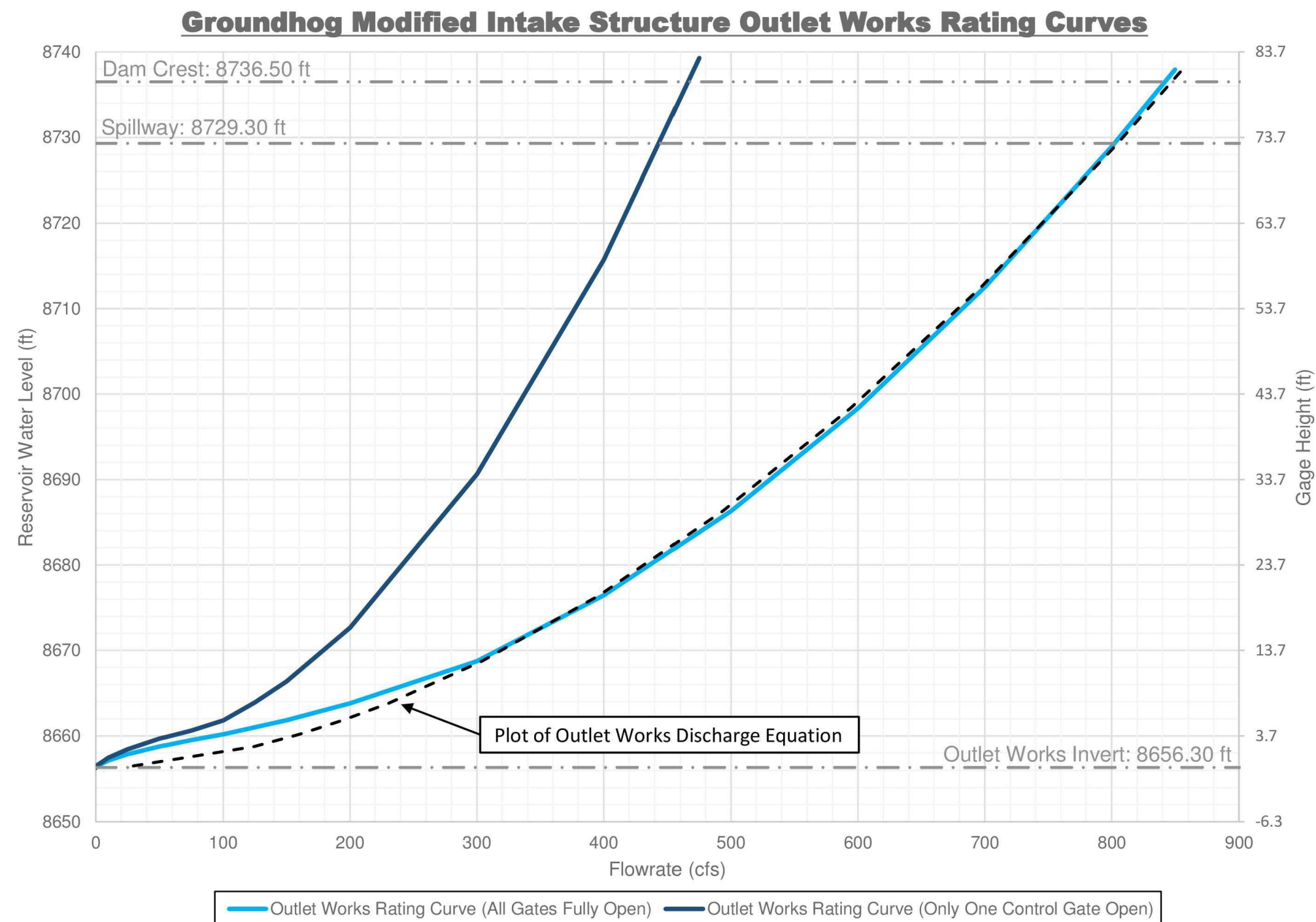
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Date:	Aug2021
Job No:	19-106
Drawn:	TH
Design:	TD
Checked:	TD
Scale:	As Noted

Sheet: **1**
Of: **12**

Filing No. C-0328B

Gage Height	Stage (ft)	Surface	Storage	Outlet Works
(ft)		Area (ac)	(ac-ft)	Discharge (cfs)
-27.3	8629	0.0	0.0	-
-26.3	8630	0.1	0.026	-
-24.3	8632	0.3	0.409	-
-22.3	8634	0.6	1.37	-
-20.3	8636	0.9	2.87	-
-18.3	8638	1.7	5.32	-
-16.3	8640	2.8	9.77	-
-14.3	8642	3.4	16.0	-
-12.3	8644	4.8	23.8	-
-10.3	8646	10.3	38.1	-
-8.3	8648	17.4	65.4	-
-6.3	8650	26.3	109	-
-4.3	8652	33.7	169	-
-2.3	8654	43.2	245	-
-0.3	8656	55.9	343	0.0
0.7	8657	64.7	404	62.5
1.7	8658	71.6	472	101.8
2.7	8659	78.7	547	131.2
3.7	8660	86.7	630	156.1
4.7	8661	94.1	720	178.0
5.7	8662	101	818	197.9
6.7	8663	108	922	216.3
7.7	8664	115	1030	233.6
8.7	8665	124	1150	249.8
9.7	8666	133	1280	265.2
10.7	8667	141	1420	279.9
11.7	8668	148	1560	294.0
12.7	8669	154	1710	307.5
13.7	8670	161	1870	320.6
14.7	8671	168	2040	333.3
15.7	8672	176	2210	345.6
16.7	8673	183	2390	357.5
17.7	8674	189	2570	369.1
18.7	8675	195	2760	380.5
27.7	8684	257	4780	472.3
28.7	8685	265	5050	481.6
29.7	8686	273	5310	490.7
30.7	8687	281	5590	499.7
31.7	8688	289	5880	508.6
32.7	8689	298	6170	517.4
33.7	8690	308	6470	526.0
34.7	8691	316	6790	534.6
35.7	8692	326	7110	543.0
36.7	8693	335	7440	551.3
37.7	8694	345	7780	559.5
38.7	8695	355	8130	567.6
39.7	8696	364	8490	575.6
40.7	8697	374	8850	583.6
41.7	8698	383	9230	591.4
42.7	8699	393	9620	599.2
43.7	8700	404	10000	606.8
44.7	8701	414	10400	614.4
45.7	8702	424	10800	622.0
46.7	8703	434	11300	629.4
47.7	8704	445	11700	636.8
48.7	8705	455	12200	644.1
49.7	8706	466	12600	651.3
50.7	8707	476	13100	658.5
51.7	8708	486	13600	665.6
52.7	8709	497	14100	672.7
53.7	8710	507	14600	679.7
54.7	8711	519	15100	686.6
55.7	8712	530	15600	693.5
56.7	8713	542	16100	700.3
57.7	8714	553	16700	707.1
58.7	8715	564	17300	713.8
59.7	8716	576	17800	720.4
60.7	8717	588	18400	727.1
61.7	8718	600	19000	733.6
62.7	8719	612	19600	740.1
63.7	8720	625	20200	746.6
64.7	8721	639	20900	753.0
65.7	8722	652	21500	759.4
66.7	8723	665	22200	765.7
67.7	8724	678	22800	772.0
68.7	8725	692	23500	778.3
69.7	8726	705	24200	784.5
70.7	8727	719	24900	790.7
71.7	8728	734	25700	796.8
72.7	8729	750	26400	802.9
73.7	8730	766	27200	808.9
74.7	8731	783	27900	815.0
75.7	8732	798	28700	820.9



Outlet Works Discharge Equation

$n = 0.55$

Outlet works rating curves shown in the chart displayed on the Outlet Works Rating Curve Chart were determined via a hydraulic model in lieu of traditional hydraulic equations. The equation shown above represents a simple discharge rating equation form fitted to the results of the hydraulic model ($R^2 = 0.99568521$). Discharge values derived from this equation are shown in the Hydraulics Table as well as in the Outlet Works Rating Curve Chart for comparison purposes. Discharge values derived from the actual hydraulic model shown in the Outlet Works Rating Curve Chart should be considered more accurate than those derived from the equation shown above.

Sheet: **2**
Of: **12**

NOTE: TOPOGRAPHY GENERATED FROM CONJUNCTION OF USGS NED 1/3 ARC-SECOND RESOLUTION DEM DATA (2017) MERGED WITH CONTOURS BELOW NORMAL RESERVOIR OPERATING LEVEL DIGITIZED FROM SEO CONSTRUCTION DOCUMENT C-328 (1938)

LEGEND:



DEWATERING PUMP



CONCRETE WASH AREA

— OHE — — — — —

EXISTING OVERHEAD POWERLINE

LIMITS OF DISTURBANCE

STOCKPILE/STAGING AREA

ACCESS ROUTE

EXISTING BUNKER FOR WEATHER STATION AND LEVEL SENSOR (TO REMAIN)

EXISTING GATE CONTROL HOUSE (TO REMAIN)

BENCHMARK
USGS CONTROL POINT (FND #4 BAR)
LAT: 37°47'29.3781"
LONG: 108°17'25.6390"
ELEV: 8747.91'

BENCHMARK
OPUS GPS BASE
LAT: 37°47'28.6704"
LONG: 108°17'25.6366"
ELEV: 8743.82'

EXISTING GATE HYDRAULIC LINES (TO BE REPLACED, SALVAGE STAINLESS STEEL LINES IF POSSIBLE)

EXISTING CONDUITS ON UPSTREAM DAM FACE (TO BE REMOVED)

EXISTING OUTLET CONDUIT (TO REMAIN)

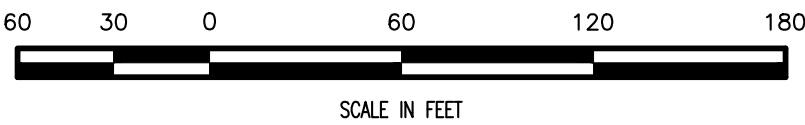
EXISTING OUTLET STRUCTURE TO REMAIN

EXISTING INTAKE STRUCTURE (TO BE MODIFIED)

MAINTAIN DAM CREST ALONG COUNTY ROAD H AND REPAIR ANY DAMAGE WHICH OCCURS DURING CONSTRUCTION



Scale 1" = 60'
1' CONTOUR INTERVAL



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GROUNDHOG DAM
INTAKE MODIFICATION PLANS

SITE PLAN

MONTEZUMA VALLEY
IRRIGATION COMPANY

REVISIONS				DESCRIPTION
NO	DATE	BY	CHK'D	

Date: Aug 2021
Job No: 19-106
Drawn: TH
Design: TD
Checked: TD
Scale: As Noted

Sheet: 3
Of: 12

Filing No. C-0328B

NOTE: GEOTECHNICAL INVESTIGATION OF PROJECT SITE
COMPLETED BY TRAUTNER GEOTECH LLC IN 2018

TROUTNER GEOTECH LLC		Field Engineer : J. Butler Drilling Method : 4" Solid/NWL wireline Date Drilled : 10/11/2018 Total Depth : 24 feet Location : 5' Upstream (North), : 4' West (right) of Northeast : corner of Intake Structure Elevation : ~Flowline of Intake Water Table : 6" above drill elevation		LOG OF BORING TB-1 Groundhog Reservoir Intake Bulkhead Structure (Intake structure for the Reservoir Outlet Tunnel) Dolores (area), Colorado Mr. Brandon Johnson, M.V.I. PN: 55415GE			
Depth in feet	Bag Sample Core Run Mod. California Sampler	USCS	GRAPHIC Samples	Run	Water Level	RECOVERY, R.Q.D.	
	DESCRIPTION						
0	POSSIBLE RIP-RAP MATERIAL, COBBLES, clayey, medium dense, wet, brown	GC				Water level at 6 inches above drill elevation	
2	DAKOTA AND BURRO CANYON FORMATION at 2 feet, Shale/Claystone with interbedded Sandstone lenses, hard to very hard, wet, brown/gray	Formation		20/6 37/6			
4				Run One		Run One 4.5 feet to 5.5 feet Recovery=83% R.Q.D.=0%	
5	Auger refusal at 4.5 feet, Sandstone and Shale, highly fractured, very hard, white to gray					Run Two 5.5 feet to 10.5 feet Recovery=88% R.Q.D.=20%	
6				Run Two			
8		Formation				Run Three 10.5 feet to 15.5 feet Recovery=100% R.Q.D.=32%	
10				Run Three			
11							
12							
13							
14				Run Four		Run Four 15.5 feet to 20 feet Recovery=100% R.Q.D.=85%	
16	Sandstone, moderate to low fracturing, very hard, gray to white	Formation					
17				Run Four			
18							
19	Coal Layer 19' to 20'	Formation					
20	Sandstone, moderate fracturing, very hard, gray to white			Run Five		Run Five 20 feet to 24 feet Recovery=97% R.Q.D.=73%	
21		Formation					
22				Run Five			
23							
24	Bottom of Test Core at 24 feet						
25							



			Field Engineer : J. Butler Drilling Method : 4" Solid Sampling Method : Mod. California Sampler Date Drilled : 10/12/2018 Total Depth : 17 feet Location : 40' Downstream : 10' East (left) from Southeast corner of Intake Structure Elevation : ~20' above Flowline			LOG OF BORING TB-2 Groundhog Reservoir Intake Bulkhead Structure (Intake structure for the Reservoir Outlet Tunnel) Dolores (area), Colorado Mr. Brandon Johnson, M.V.I. PN: 55415GE		
Depth in feet	Sample Type	Water Level	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
	 Mod. California Sampler  Bag Sample  Standard Spill Spoon	 Water Level During Drilling  Water Level After Drilling						
DESCRIPTION								
0	CLAY, sandy, very soft, wet, dark brown		CL					Possible Tunnel, (Man-placed back-fill material to 10.5 feet)
1								
2	CLAY, GRAVEL, sandy, cobbles, medium stiff, wet, dark brown		CL/GC					
3								
4								
5	CLAY, GRAVEL, sandy, cobbles, dense, wet, brown		CL/GC					
6								
7								
8								
9								
10								
11	DAKOTA AND BURRO CANYON FORMATION at 10.5 feet, Sandstone, Shale, with Claystone lenses, hard to very hard		Formation					
12								
13								
14								
15								
16	Sandstone 16'-17', very hard		Formation					
17	Auger refusal at 17 feet							
18								
19								
20								

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**GROUNDHOG DAM
INTAKE MODIFICATION PLANS**

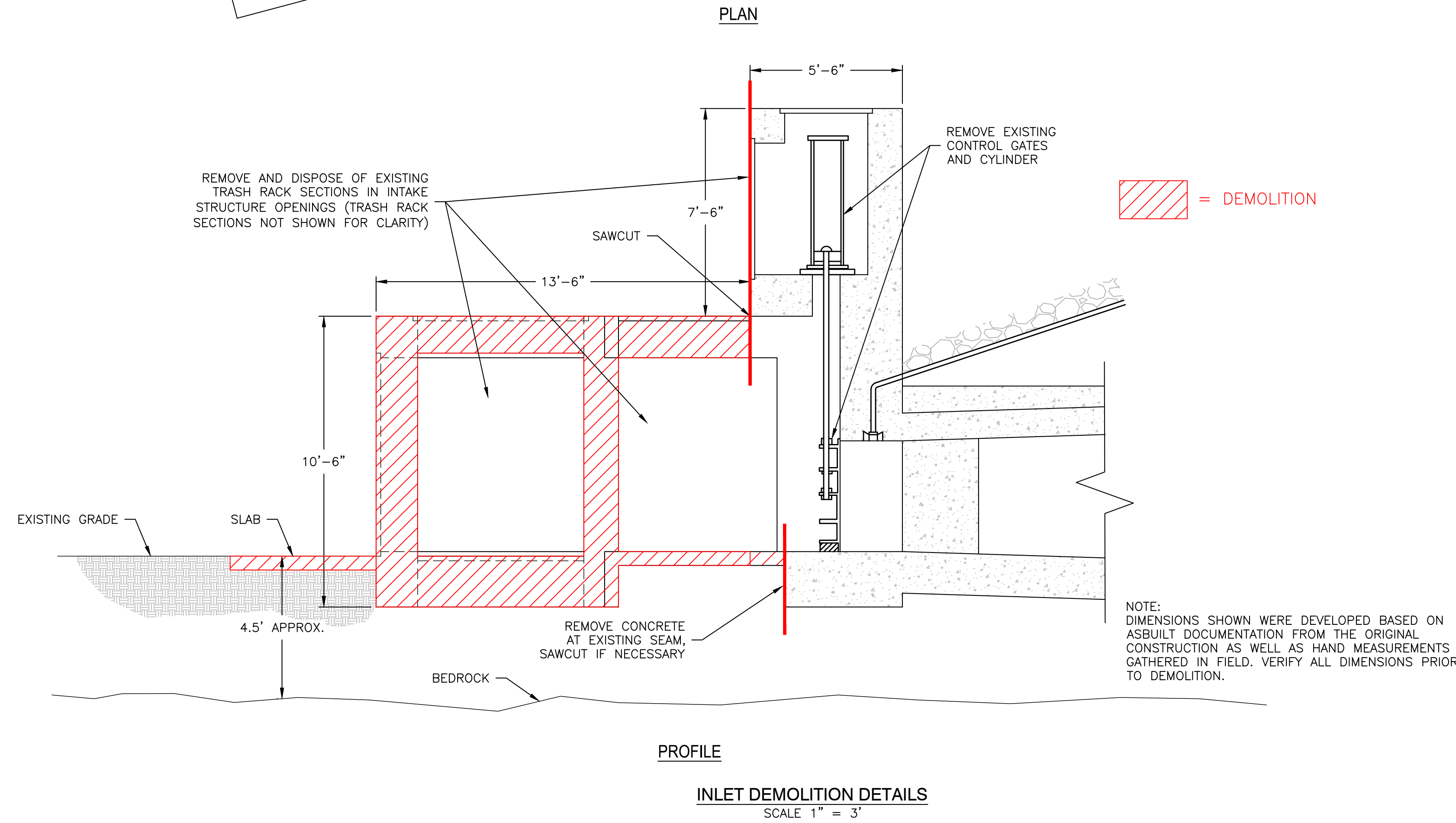
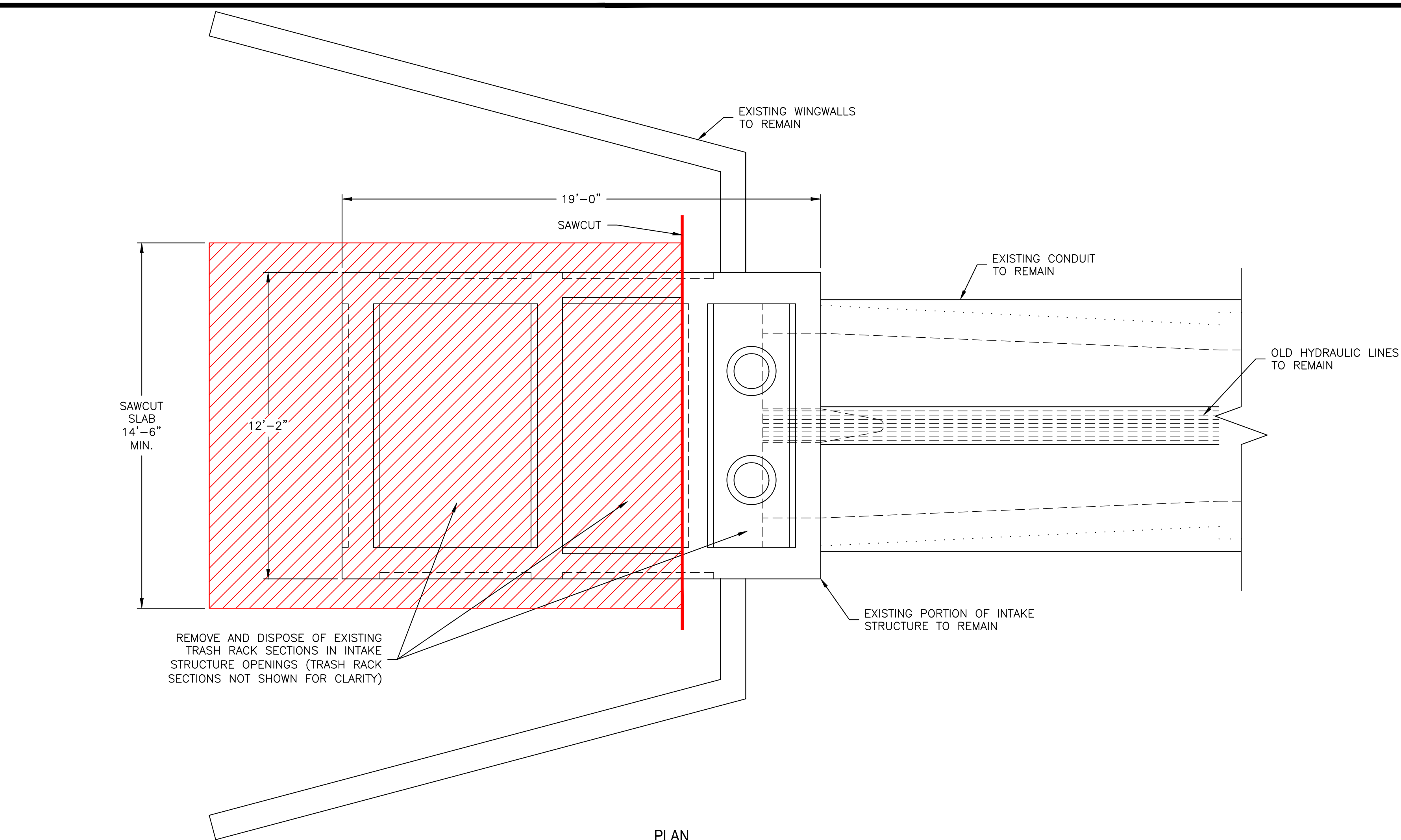
**MONTEZUMA VALLEY
BRIGATION COMPANY**

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Date:	Aug2021
Job No:	19-106
Drawn:	TH
Design:	TD
Checked:	TD
Scale:	As Noted

Sheet: **4**
OF **12**

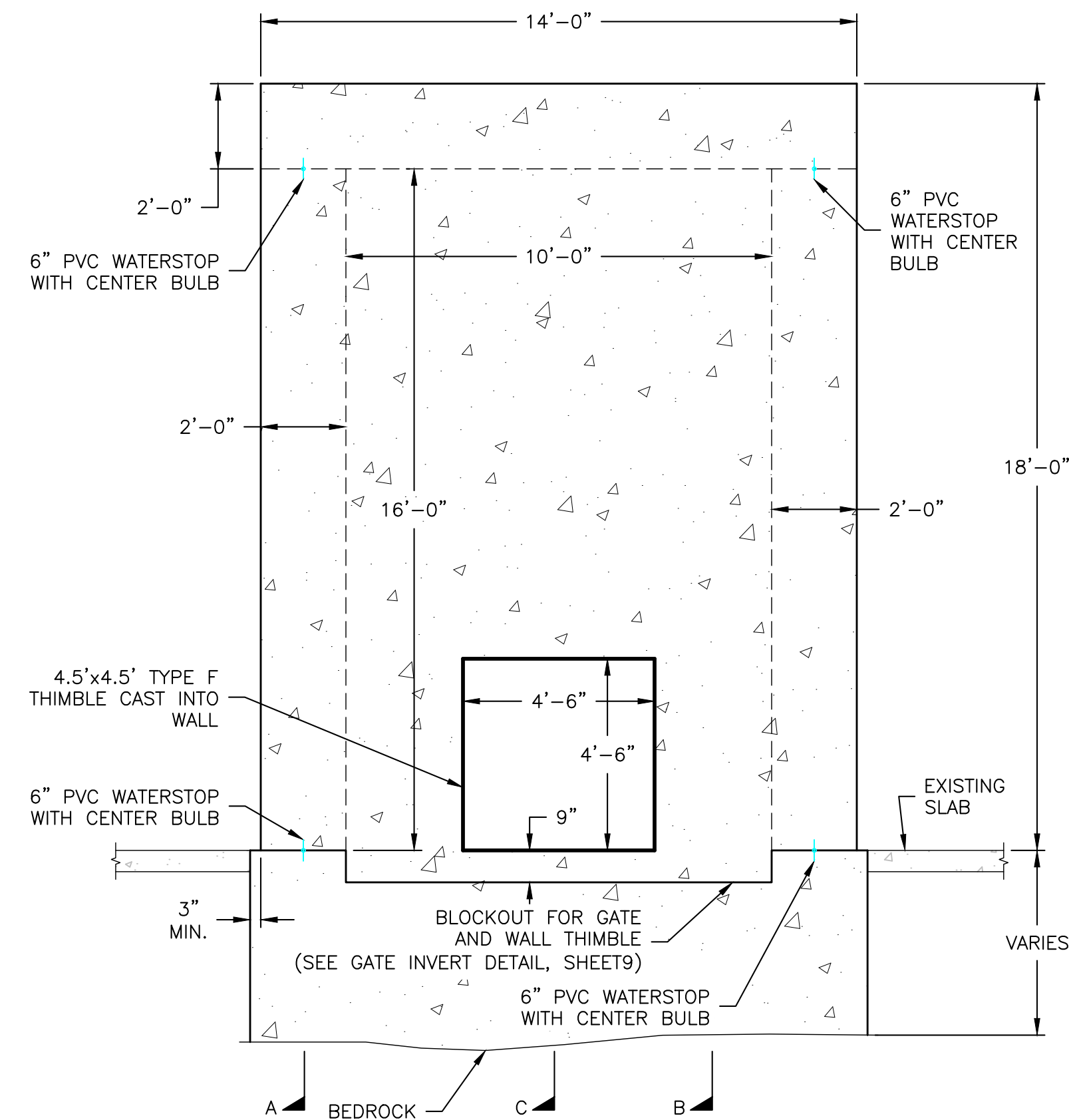
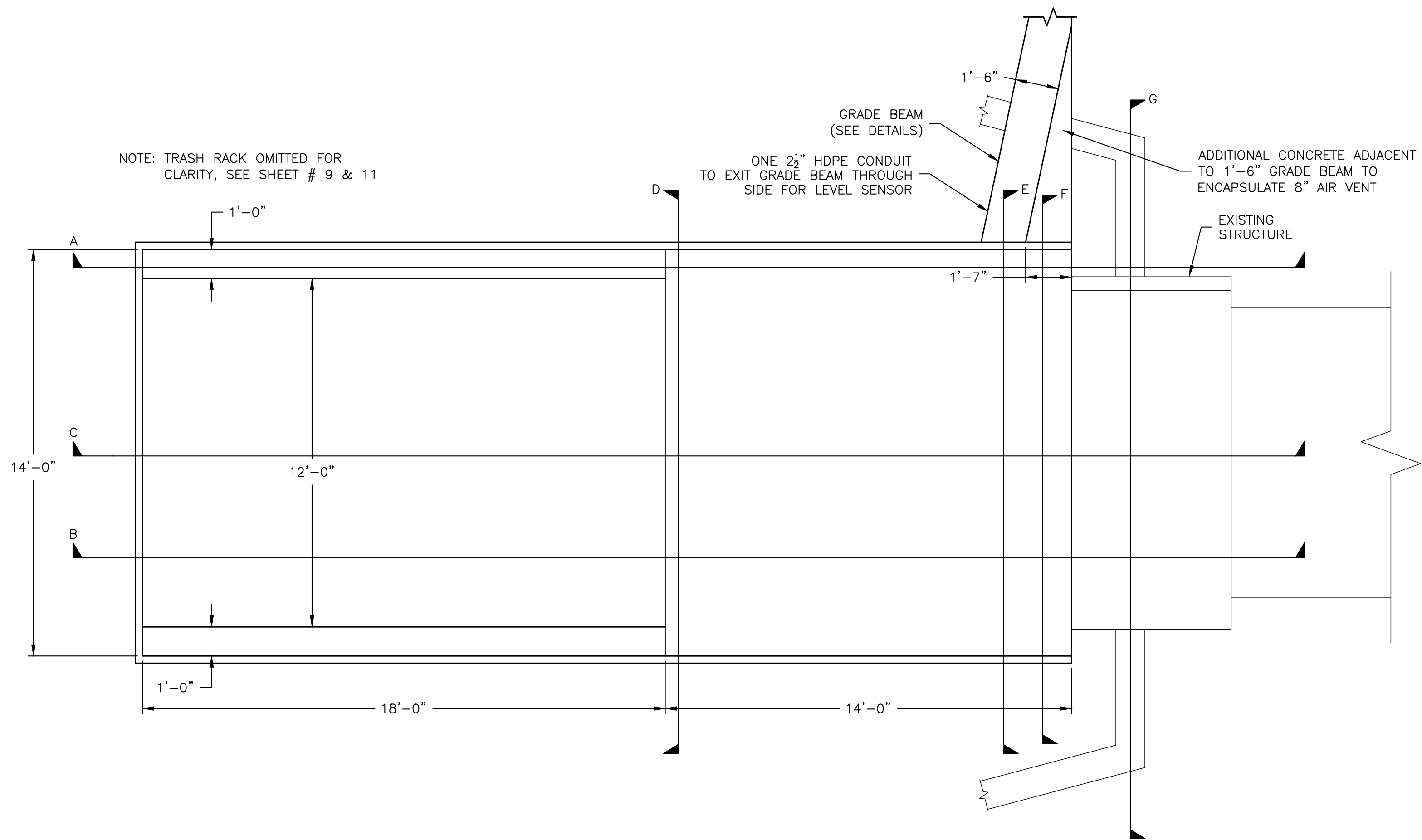
Filing No. C-0328B



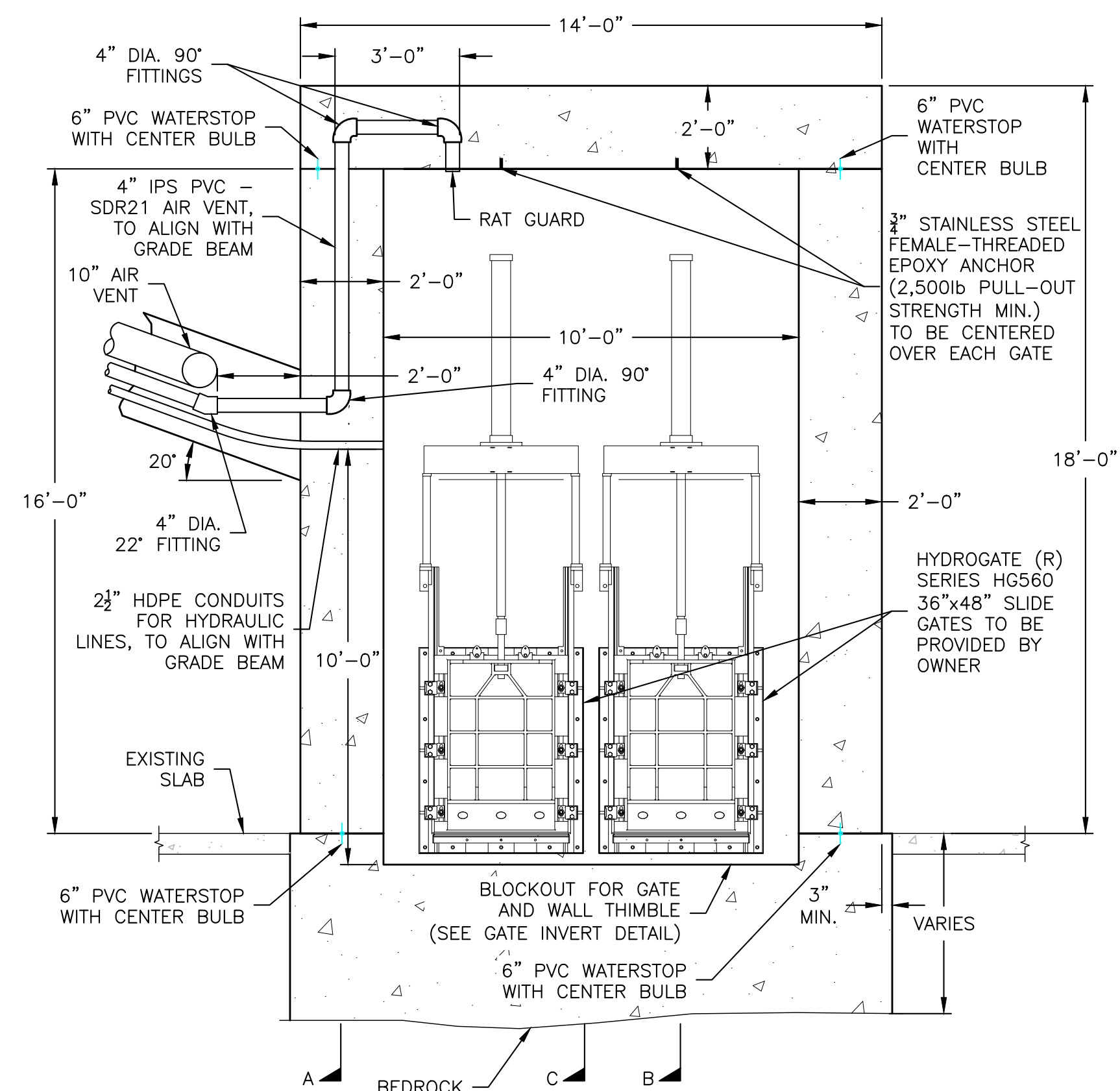
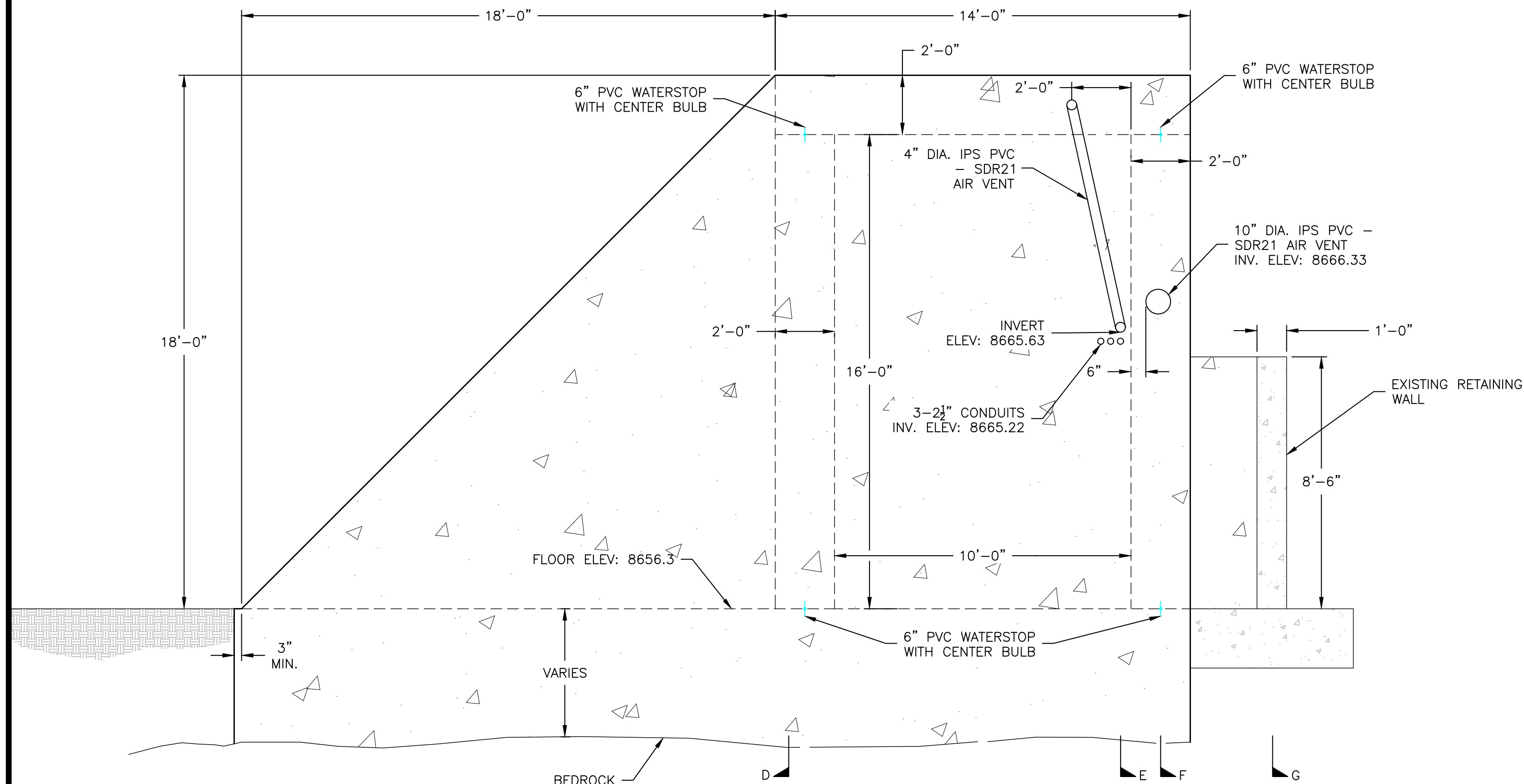
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NO	DATE	BY	CHK'D		

Date: Aug 2021
Job No: 19-106
Drawn: TH
Design: TD
Checked: TD
Scale: As Noted

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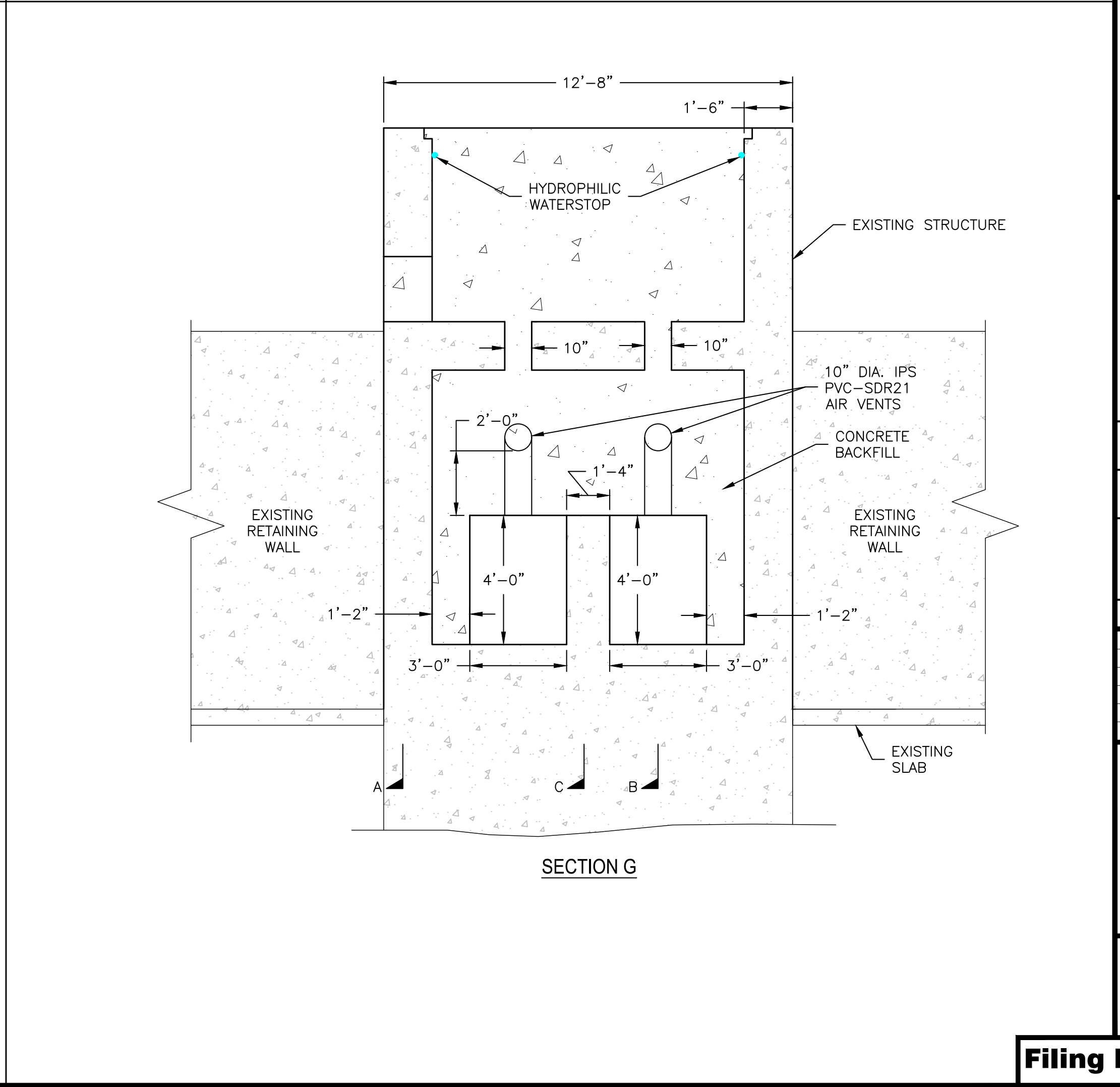
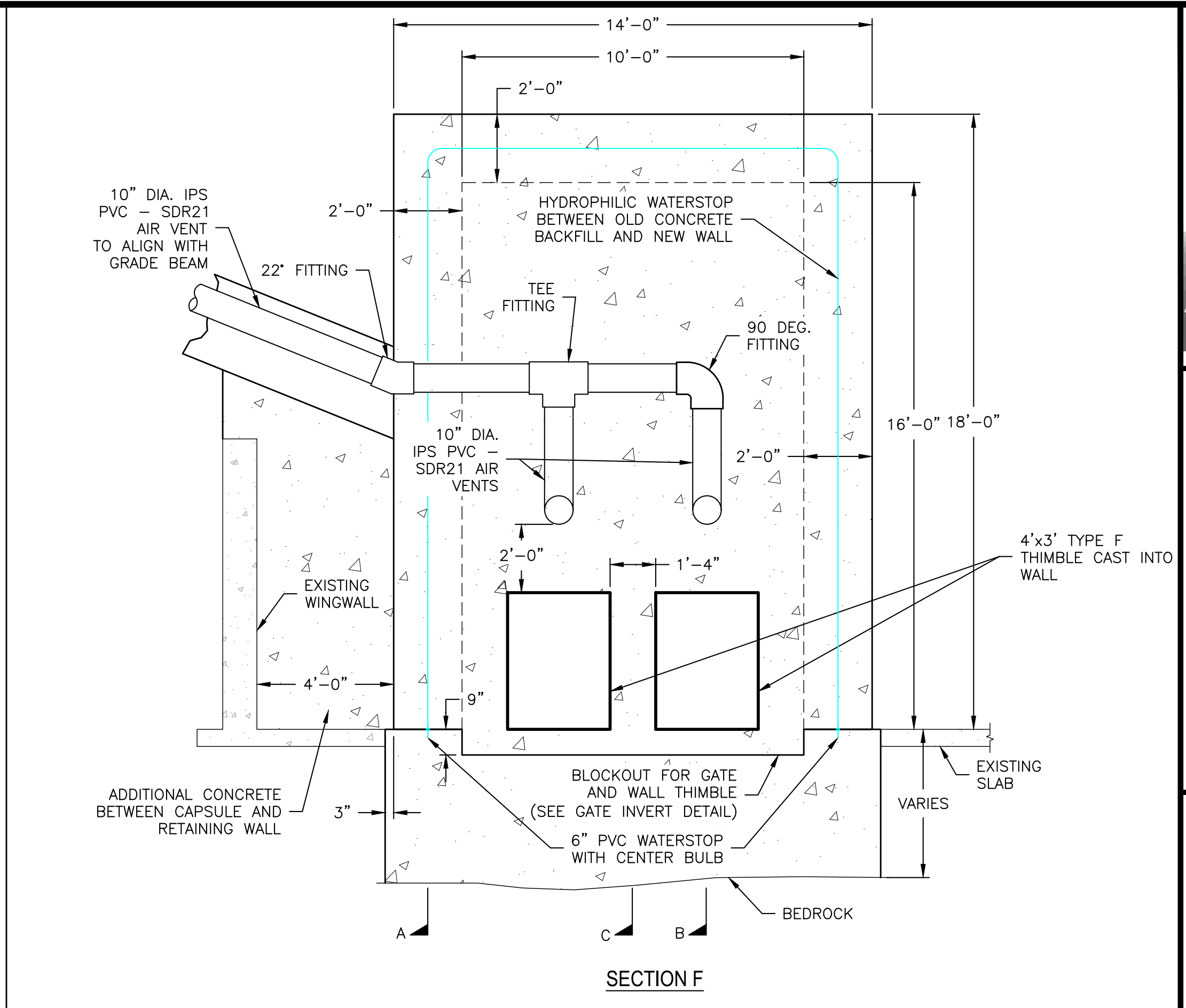
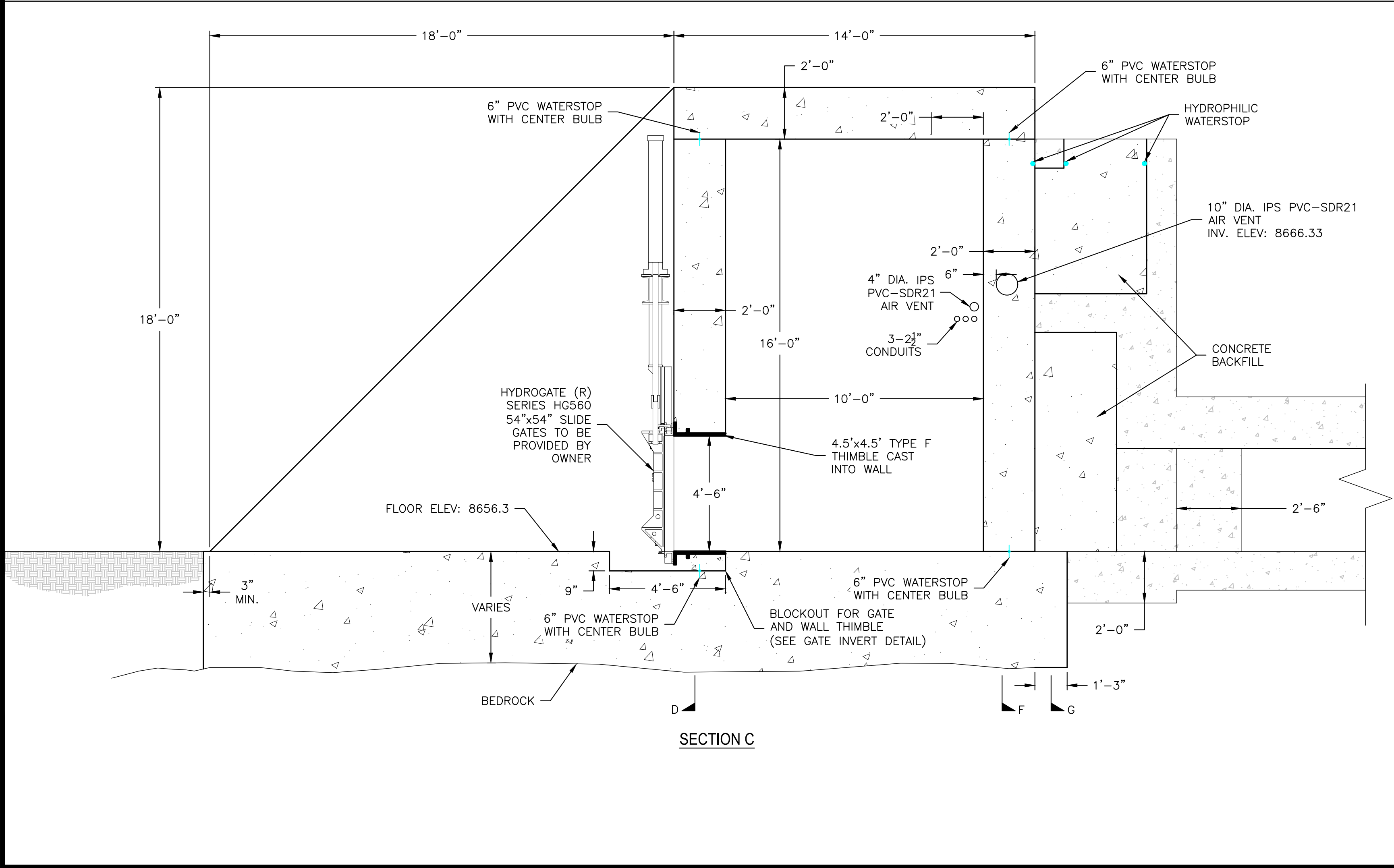
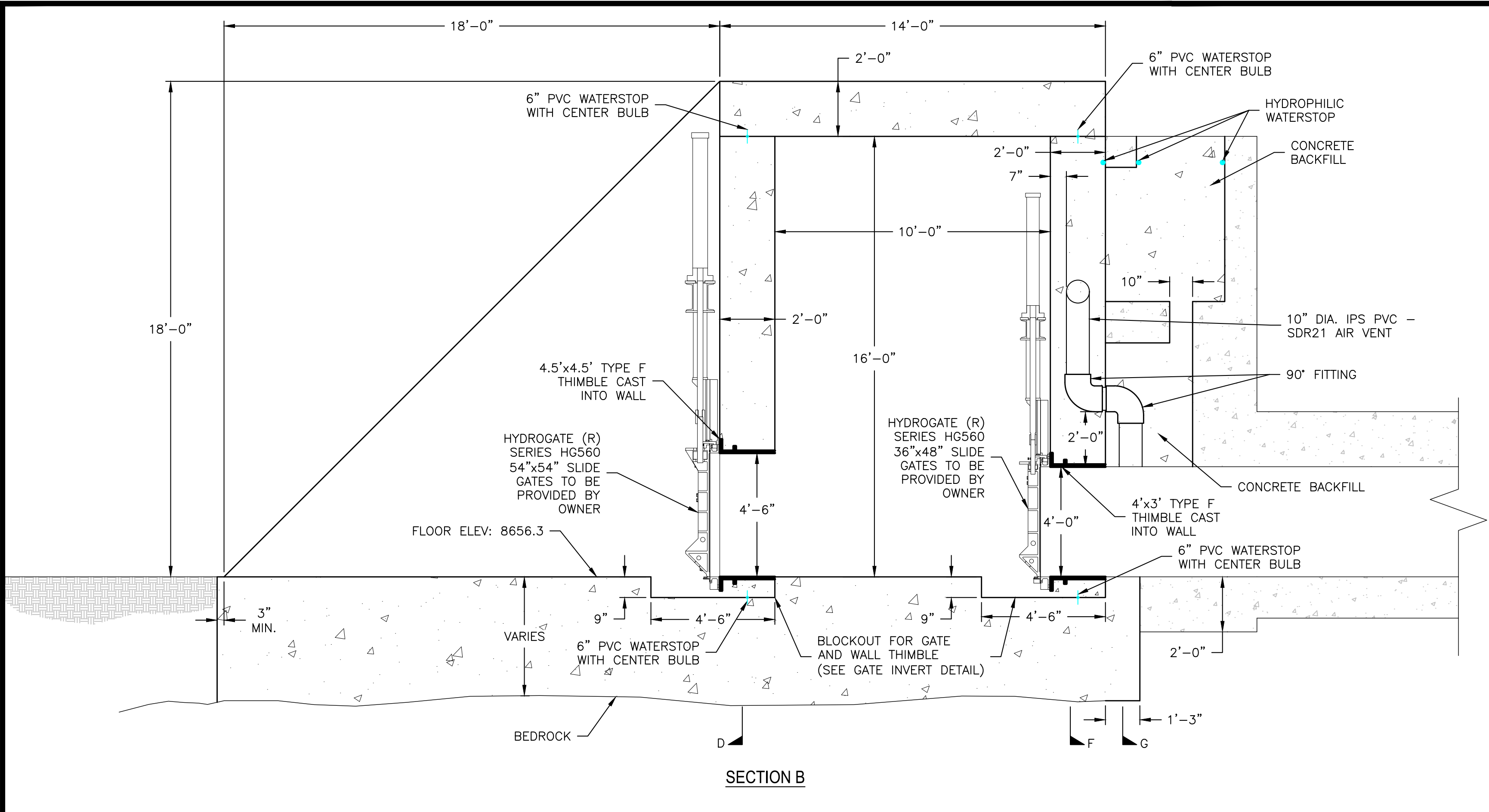


NOTE: BEDROCK FOUNDATION SHALL BE INSPECTED PRIOR TO PLACEMENT OF STRUCTURE SLAB OR INSTALLATION OF MICROPILES. SLUSH GROUT BEDROCK FOUNDATION AS DIRECTED BY ENGINEER.



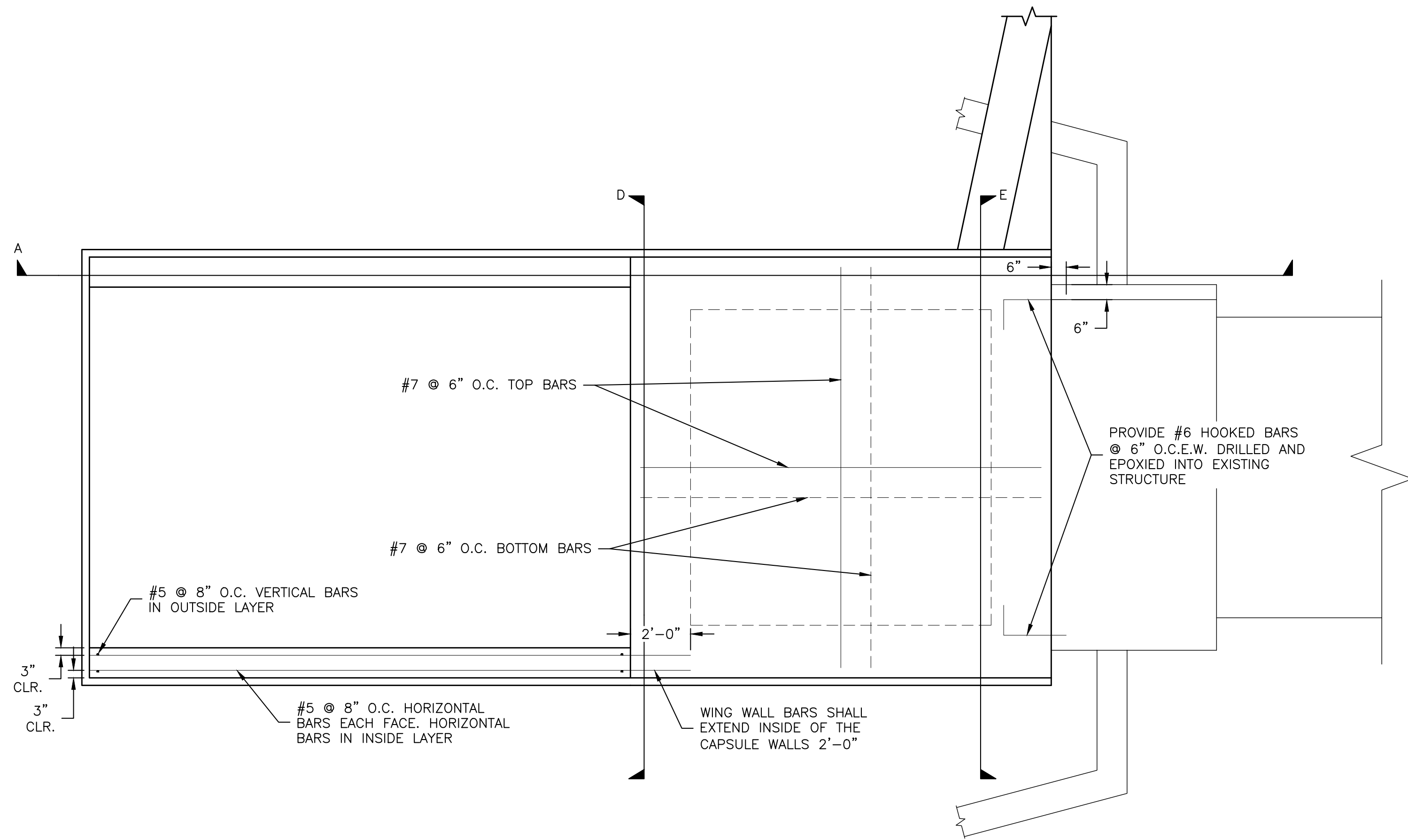
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Date: Aug 2021
Job No: 19-106
Drawn: TH
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Checked: TD
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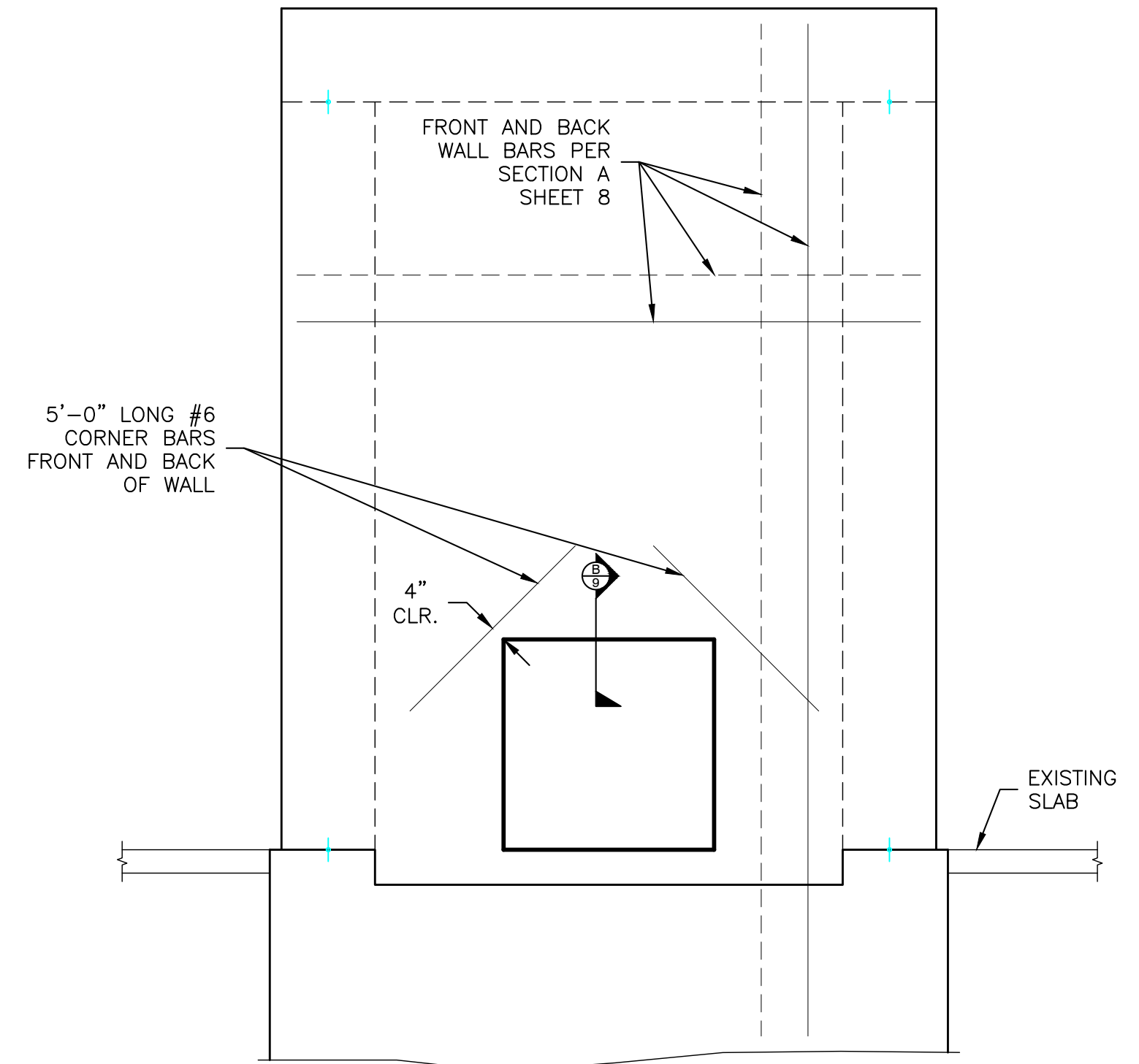


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NO	DATE	BY	CHK'D	

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Checked: TD
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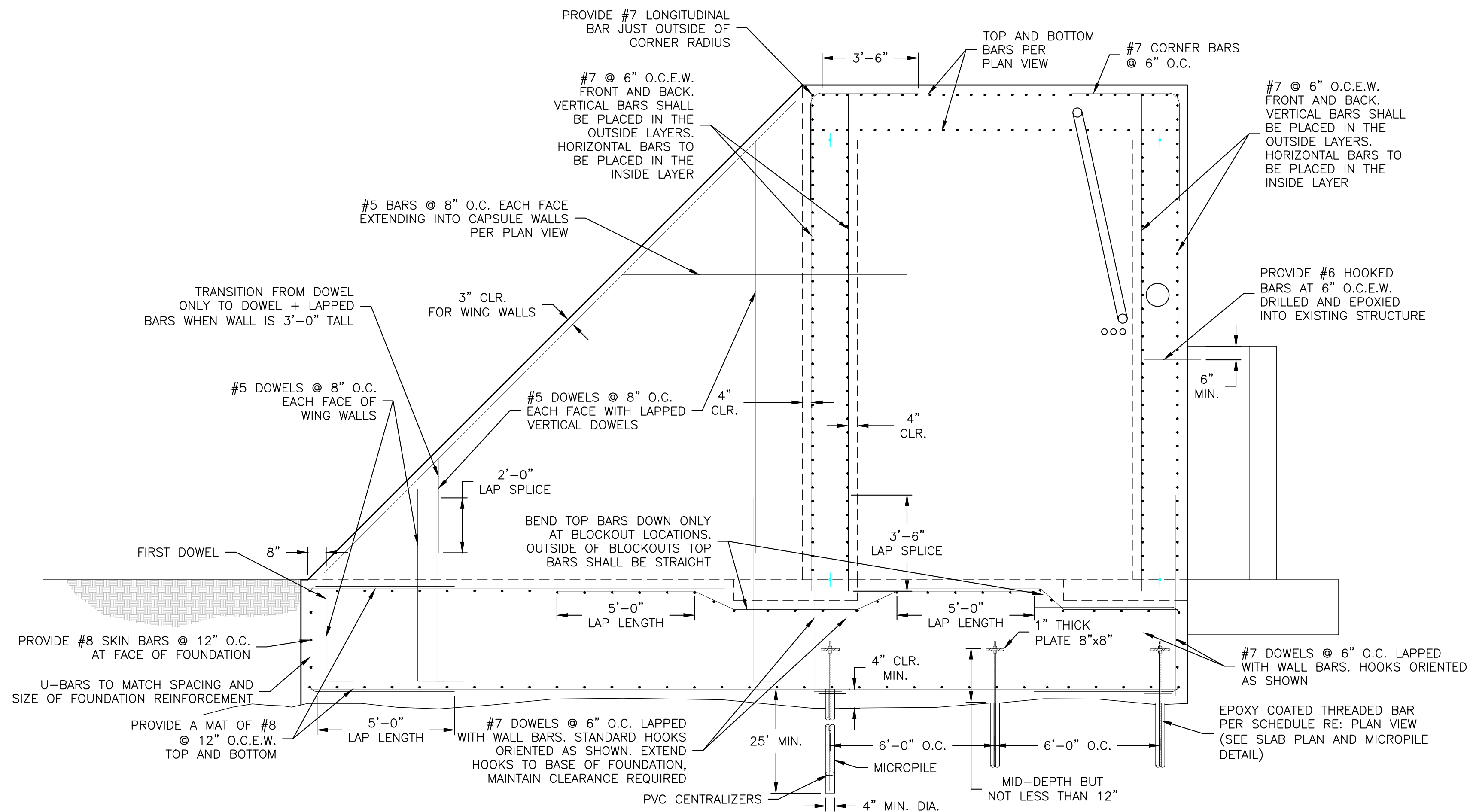


PLAN VIEW

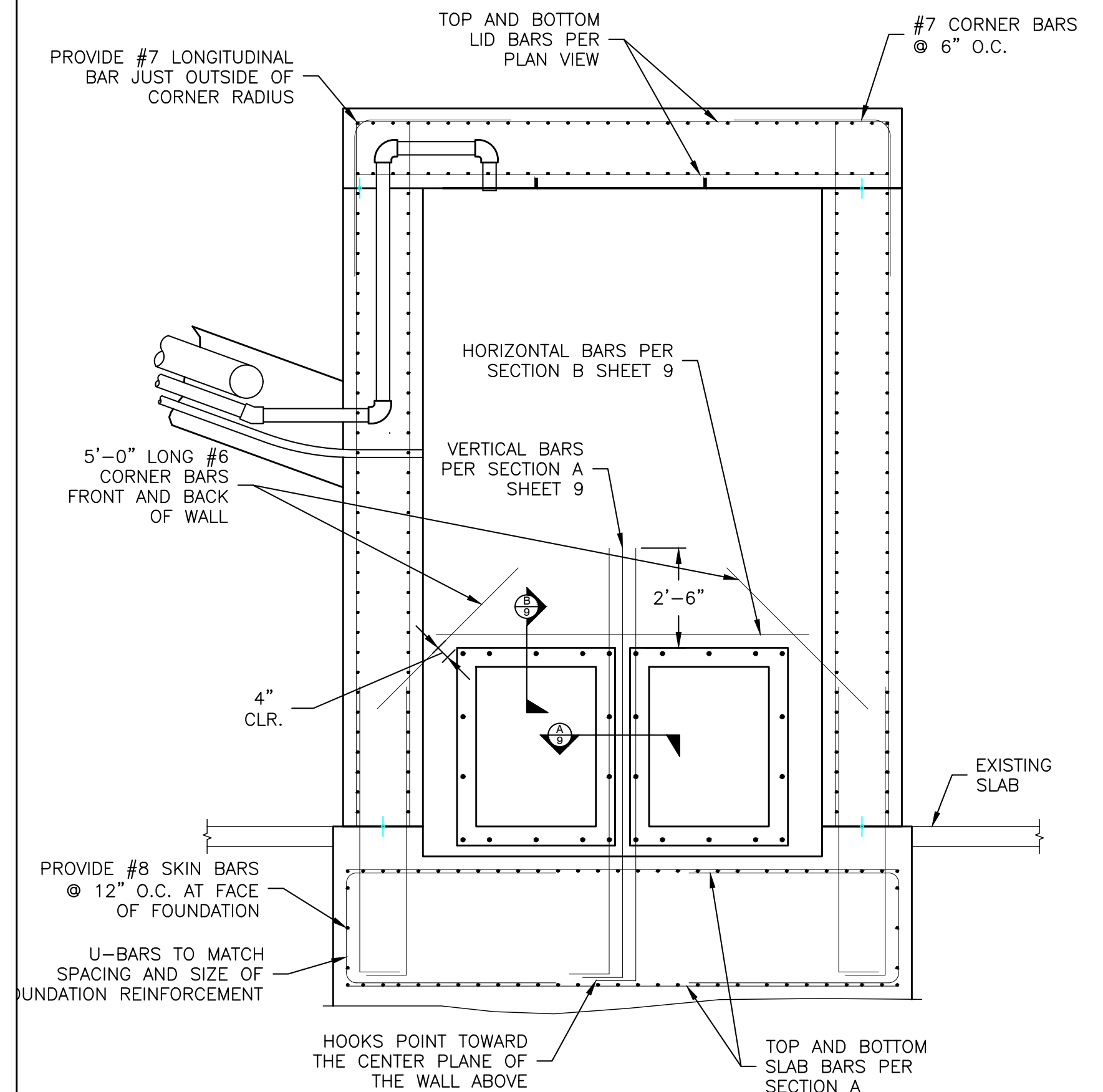


SECTION D

NOTE: GATES AND OTHER APPURTENANCES OMITTED FOR CLARITY.



SECTION A

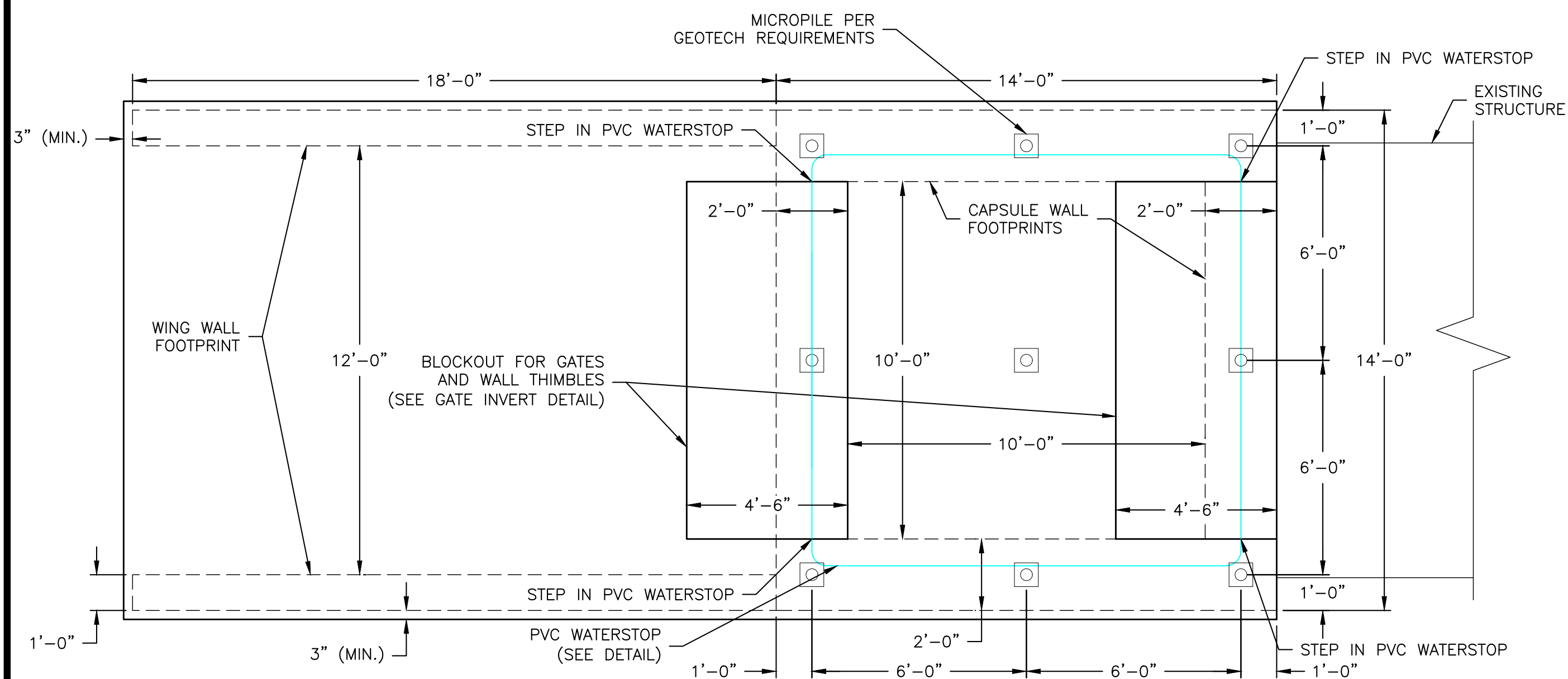


SECTION E

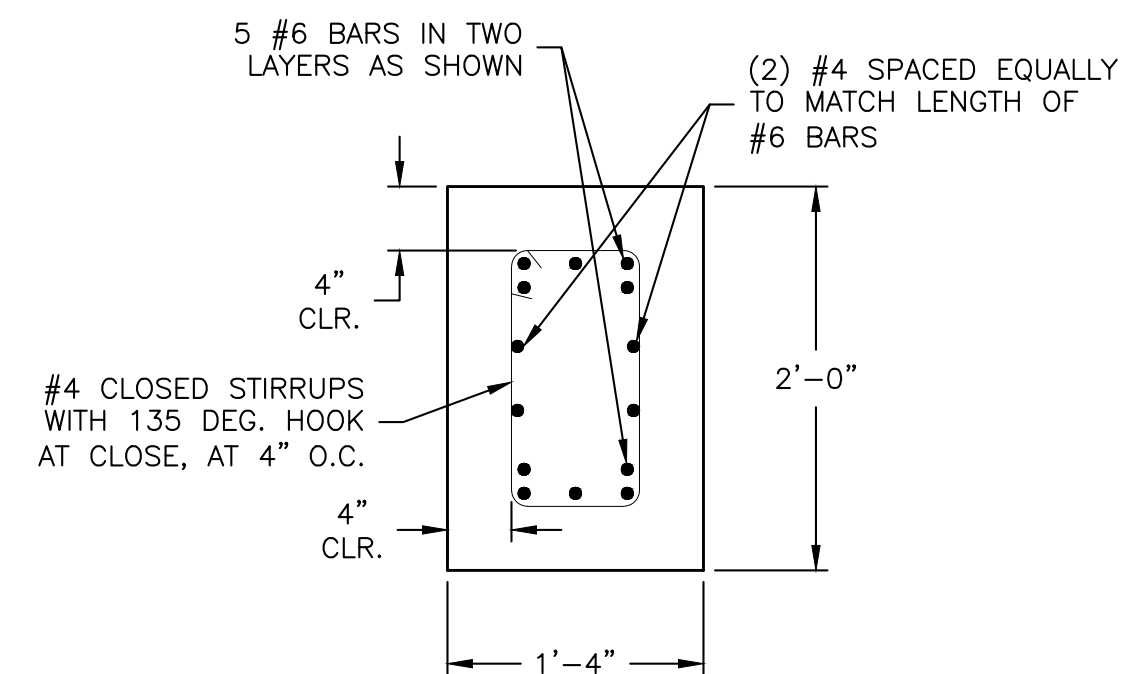
REVISIONS				DESCRIPTION
NO	DATE	BY	CHK'D	

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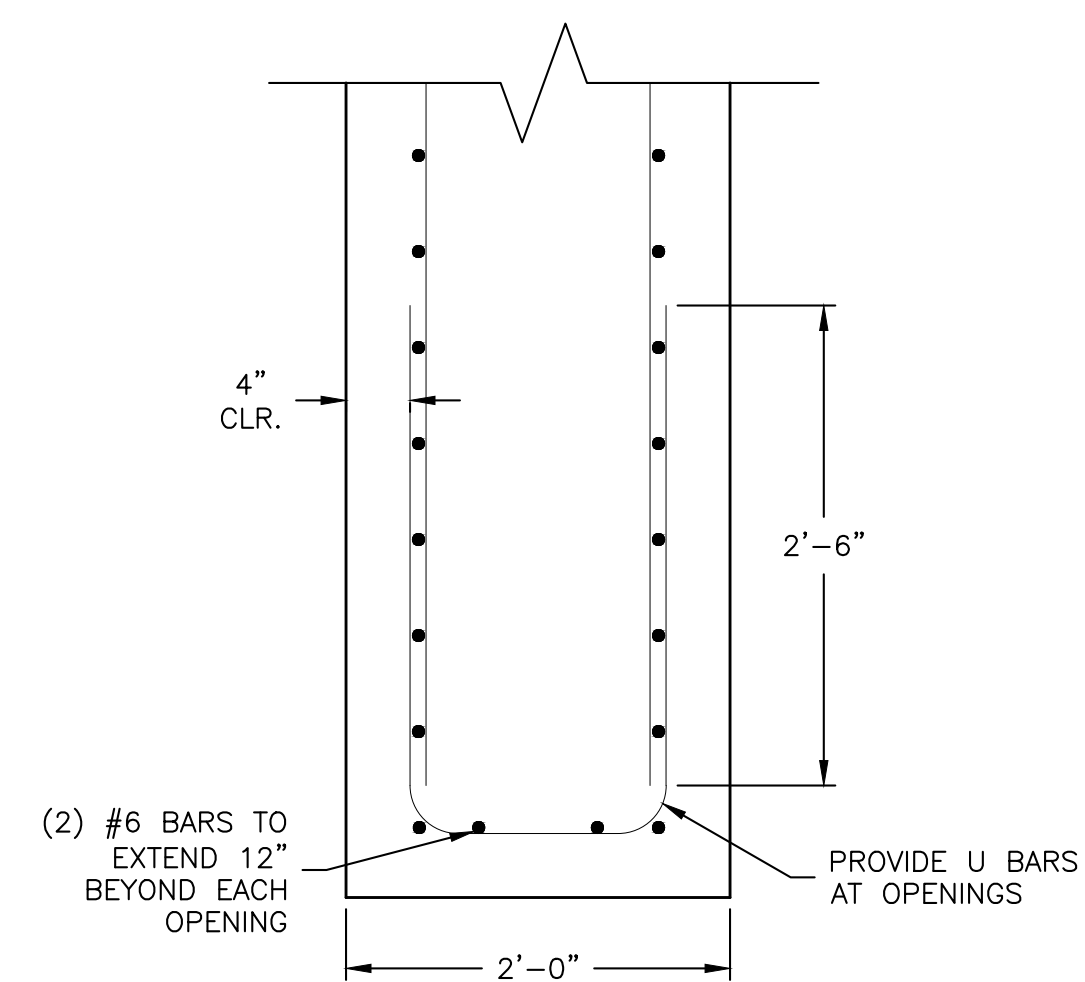
MICROPILE SCHEDULE			
OVERALL LENGTH	QUANTITY	CAPACITY	BAR SIZE
25 FEET	9	30 KIPS	#9



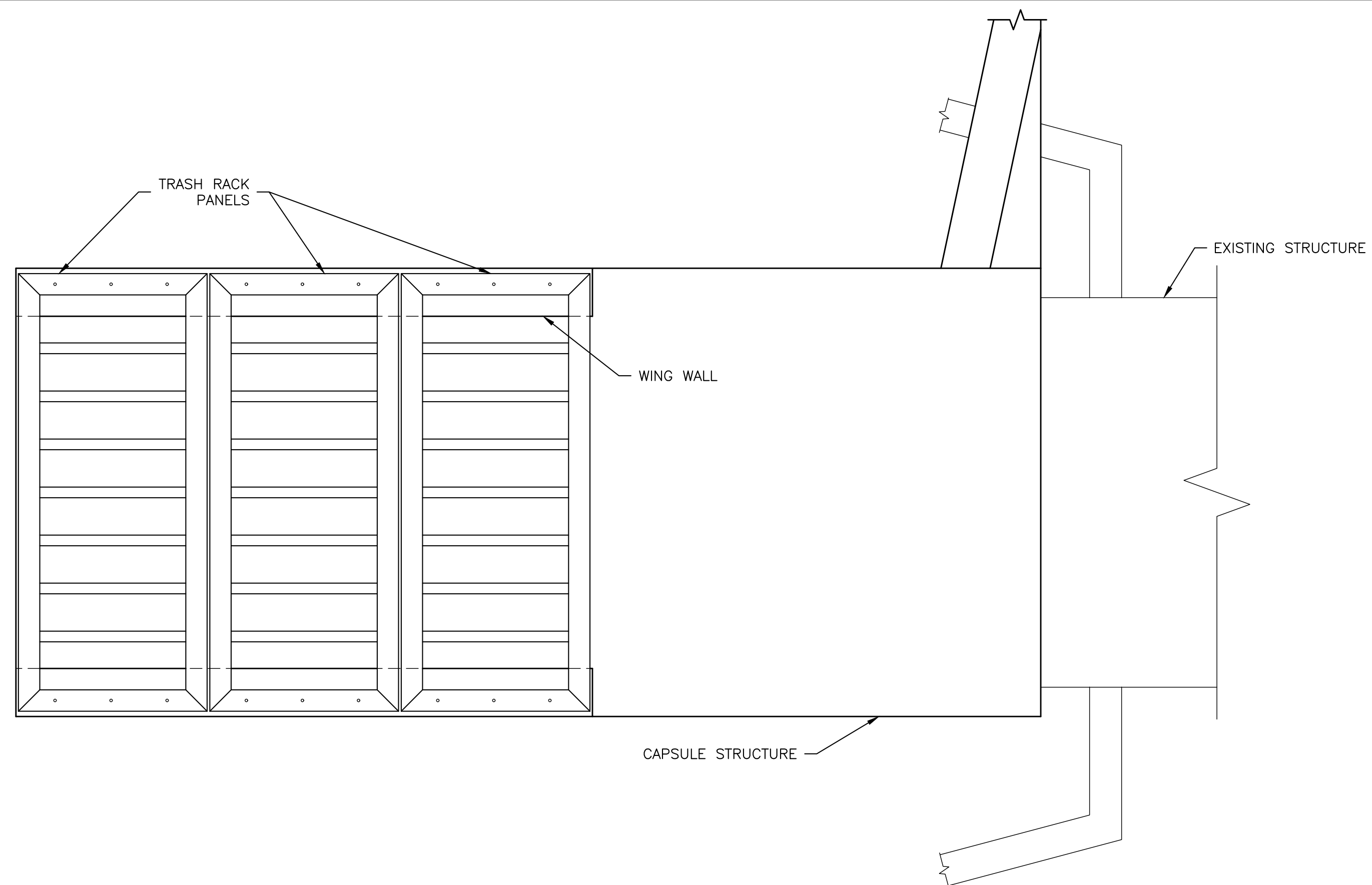
SLAB PLAN AND MICROPILE DETAIL
SCALE 1" = 3'



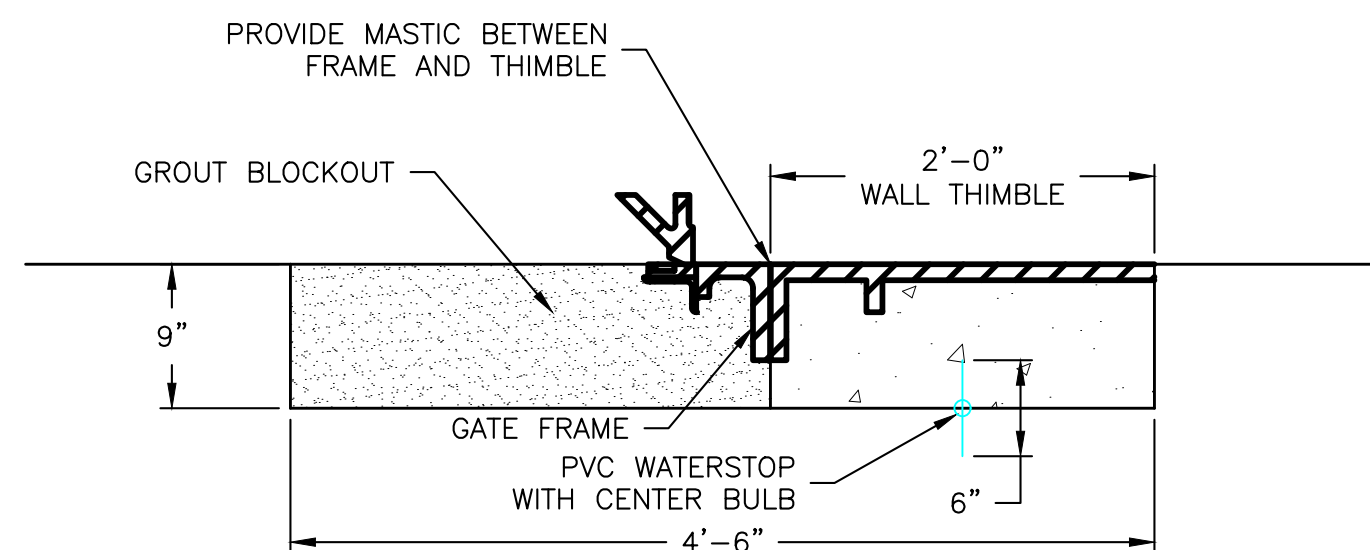
SECTION A (SEE SHEET 8, SECTION E)
1" = 1'



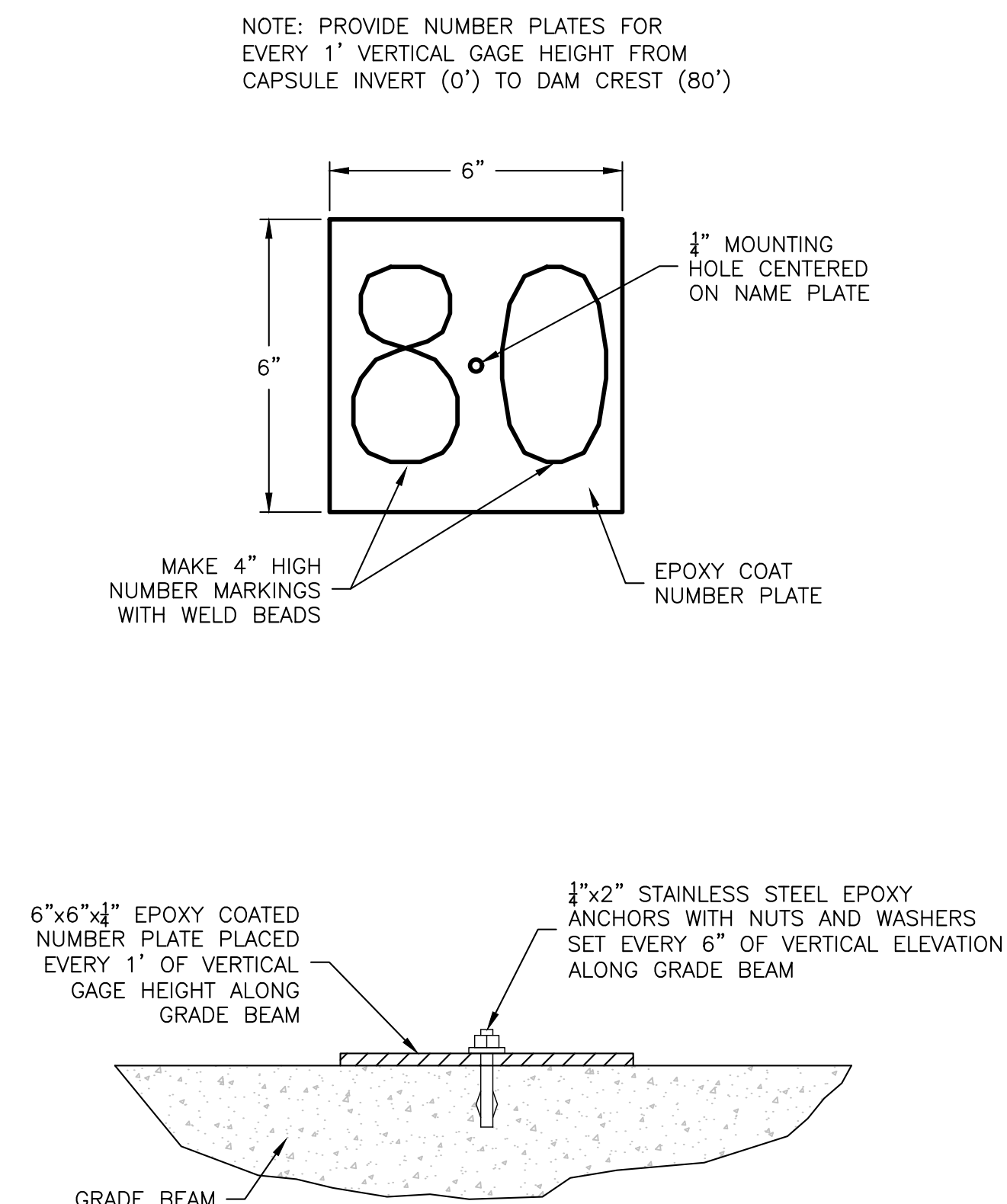
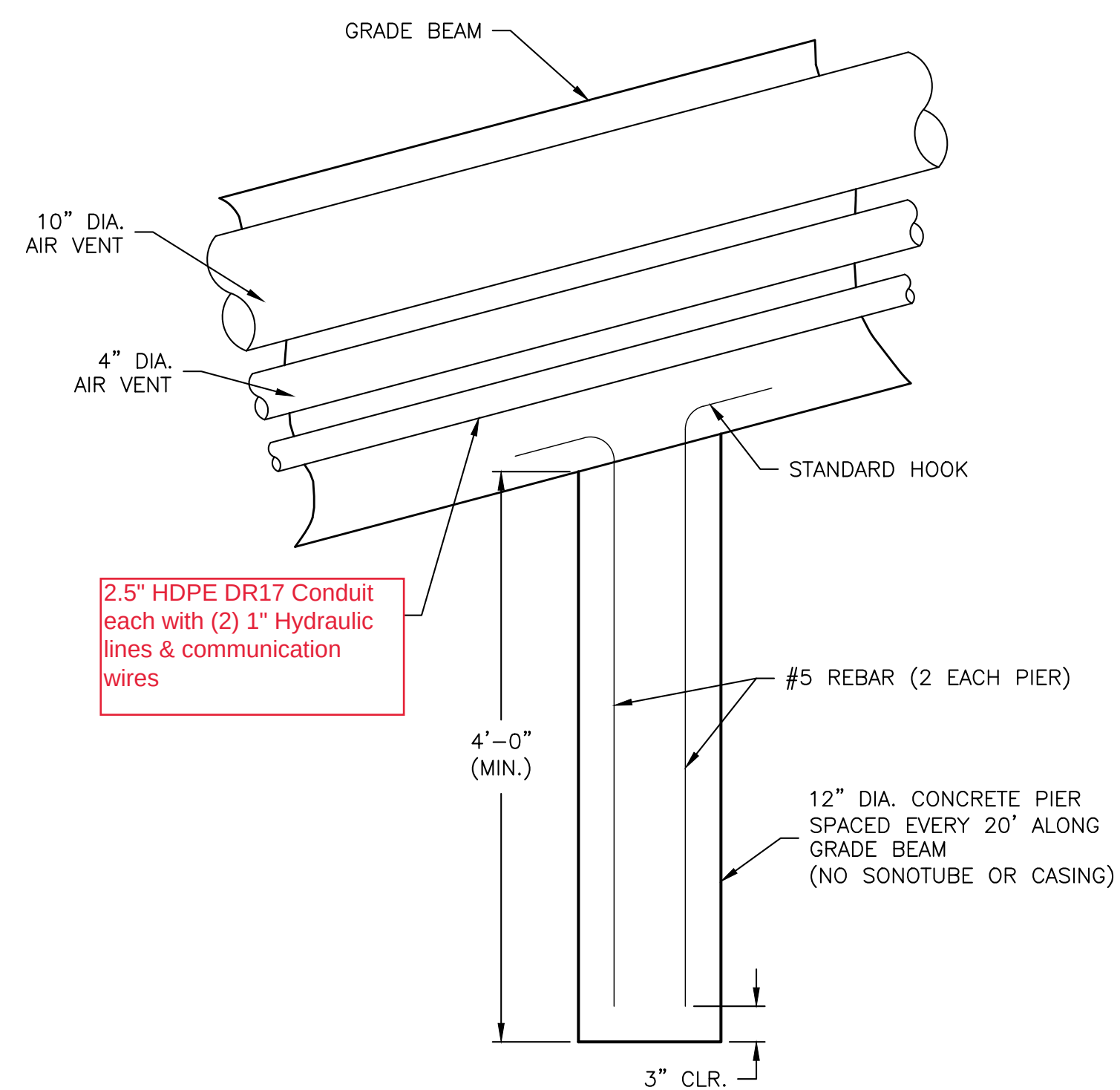
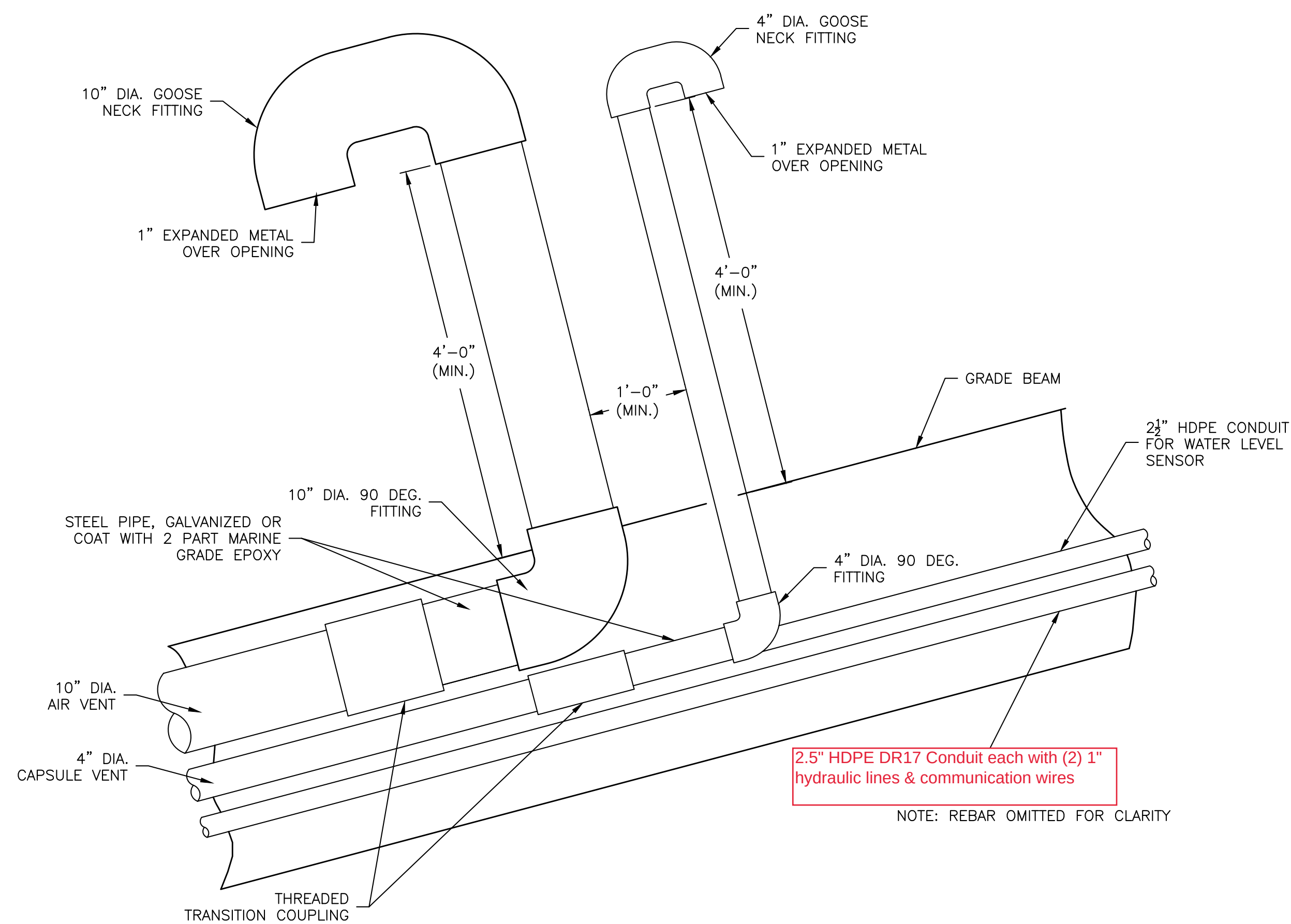
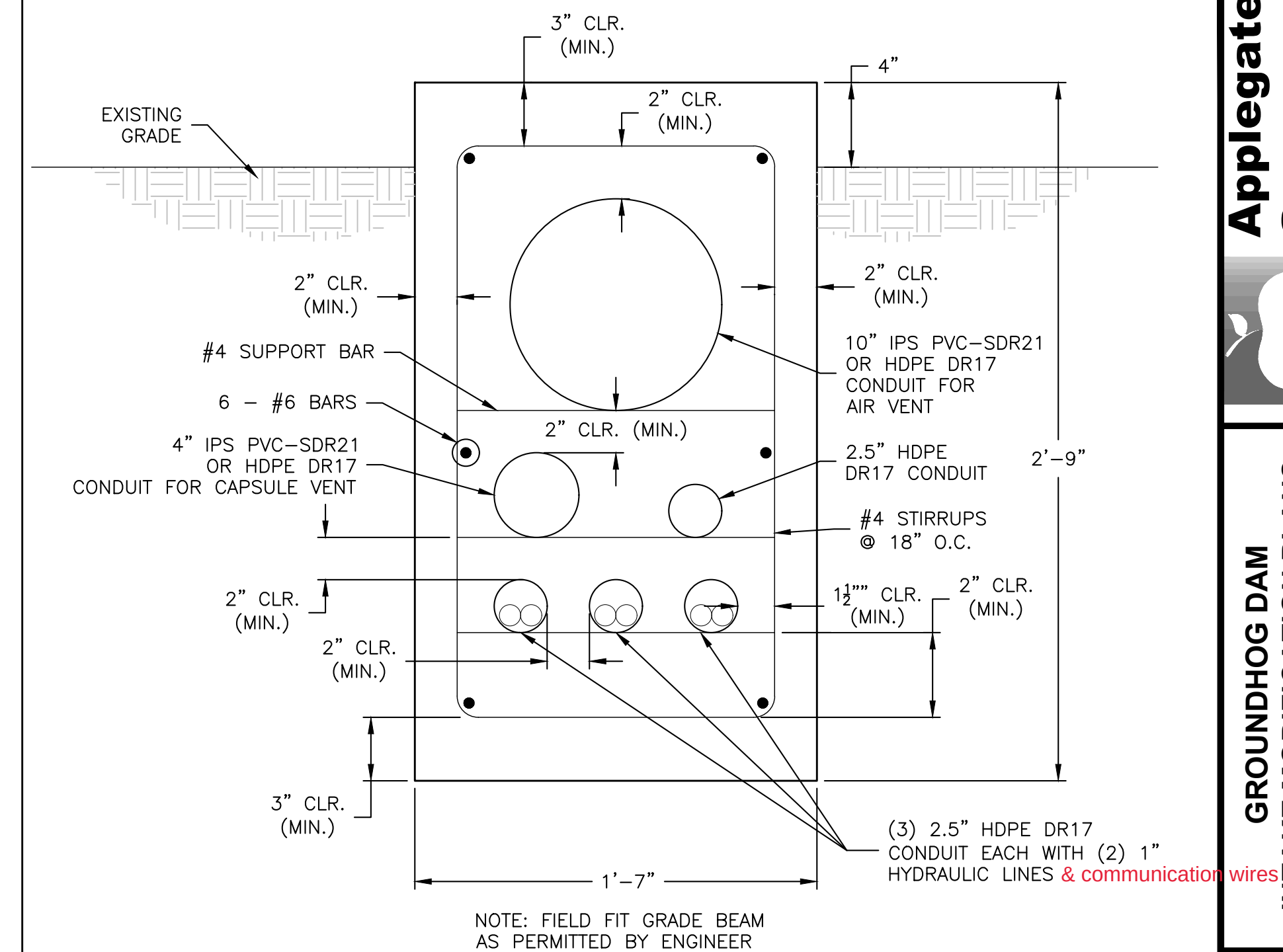
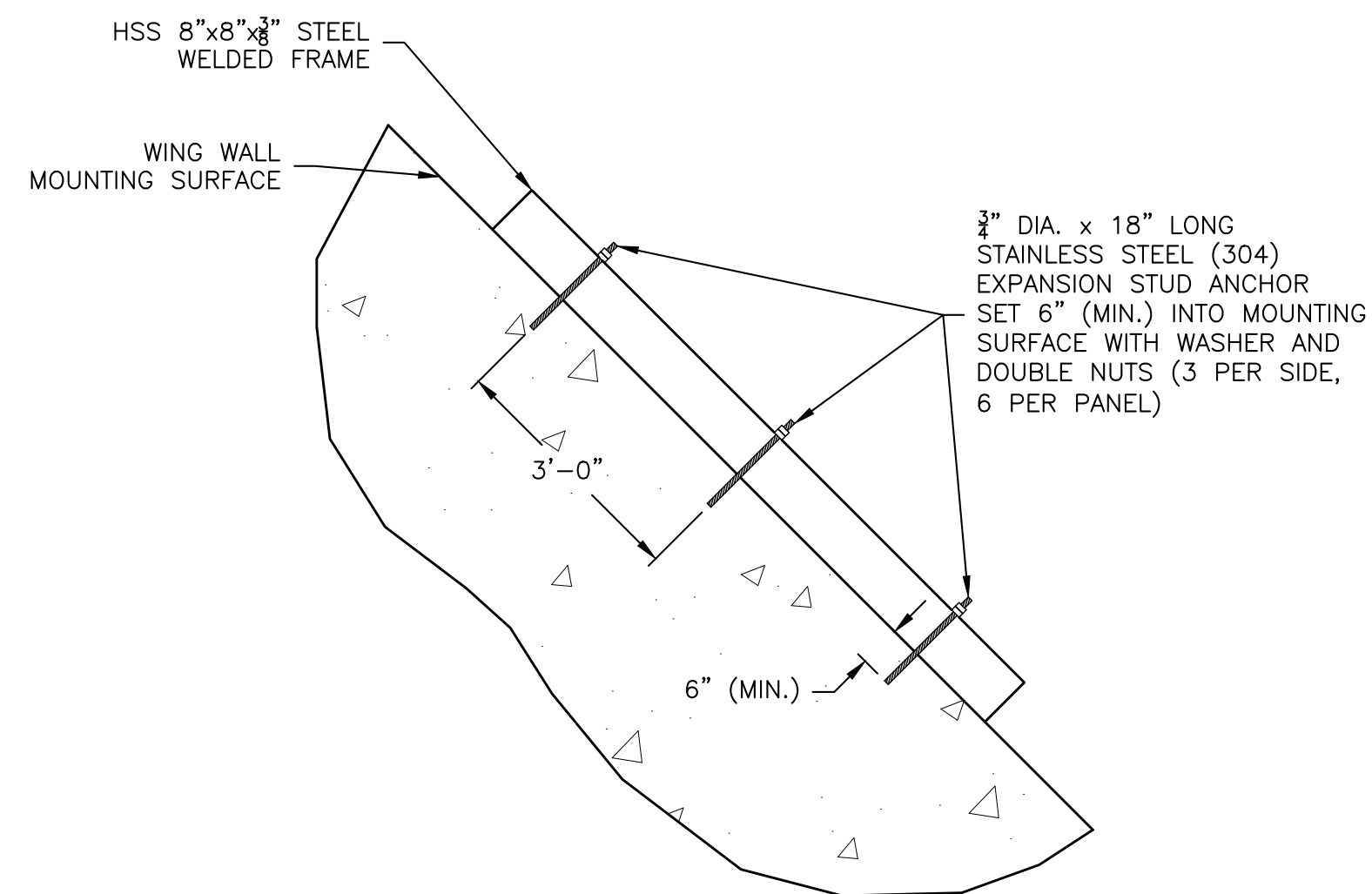
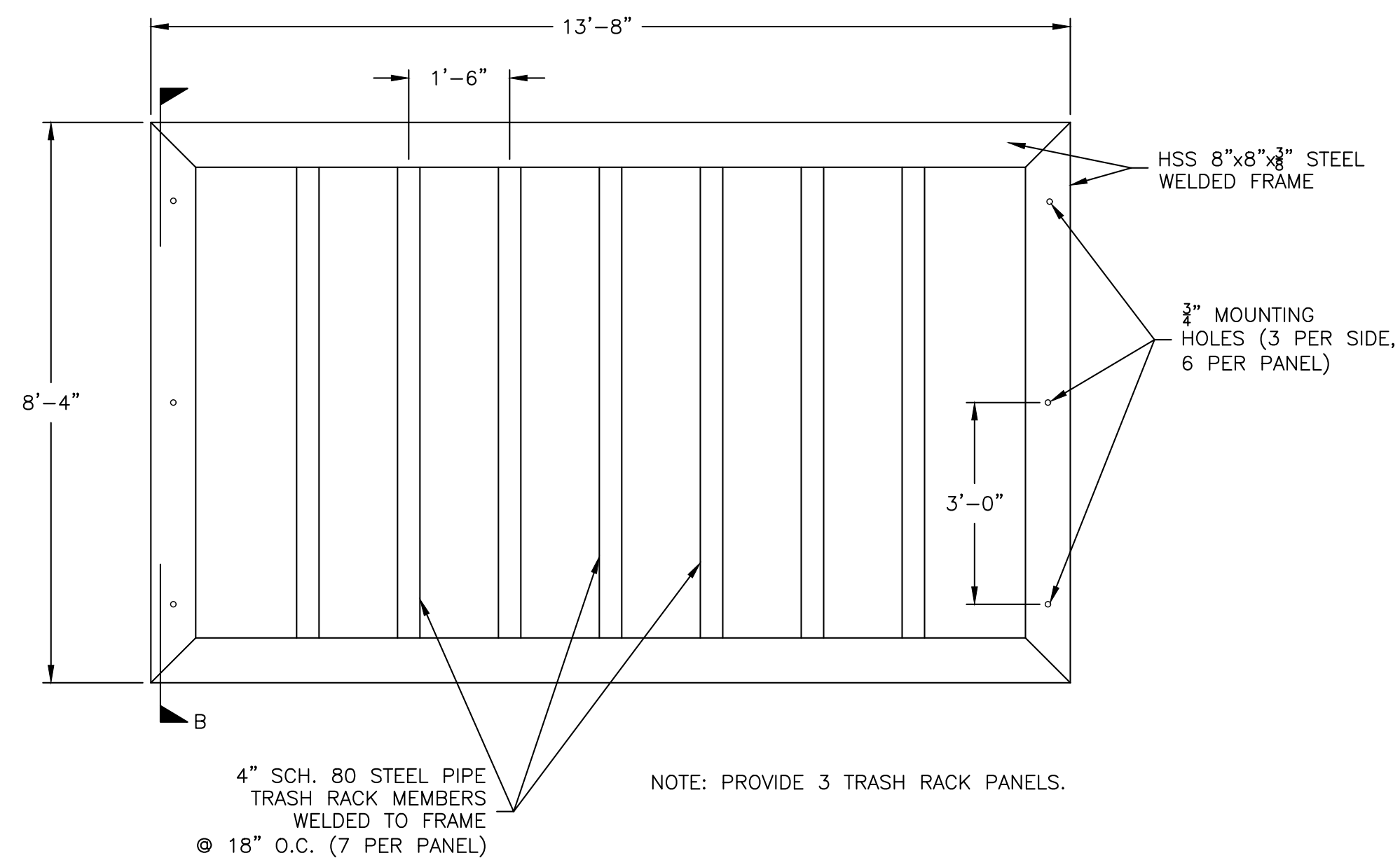
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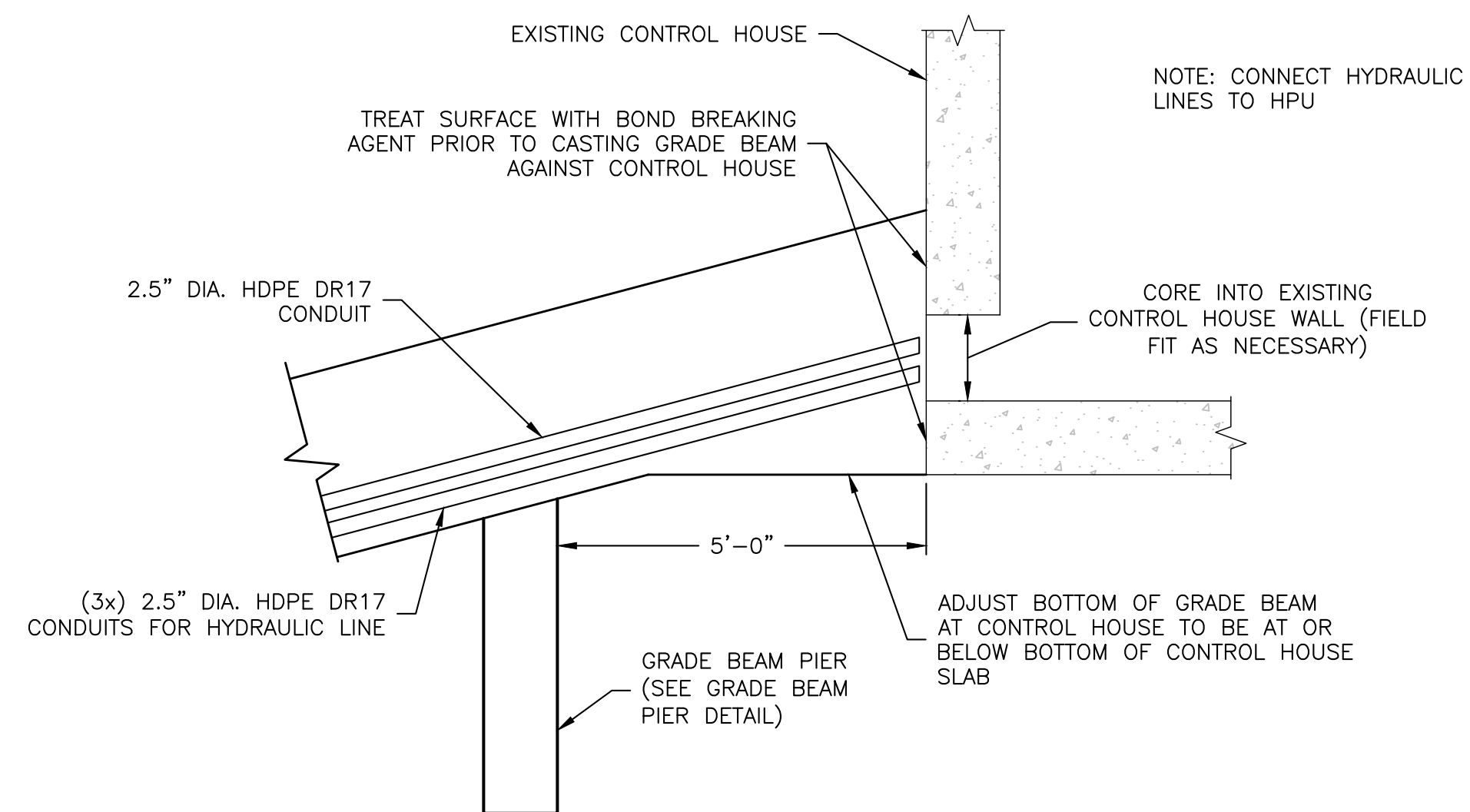


TRASH RACK PLAN VIEW
SCALE 1" = 3'

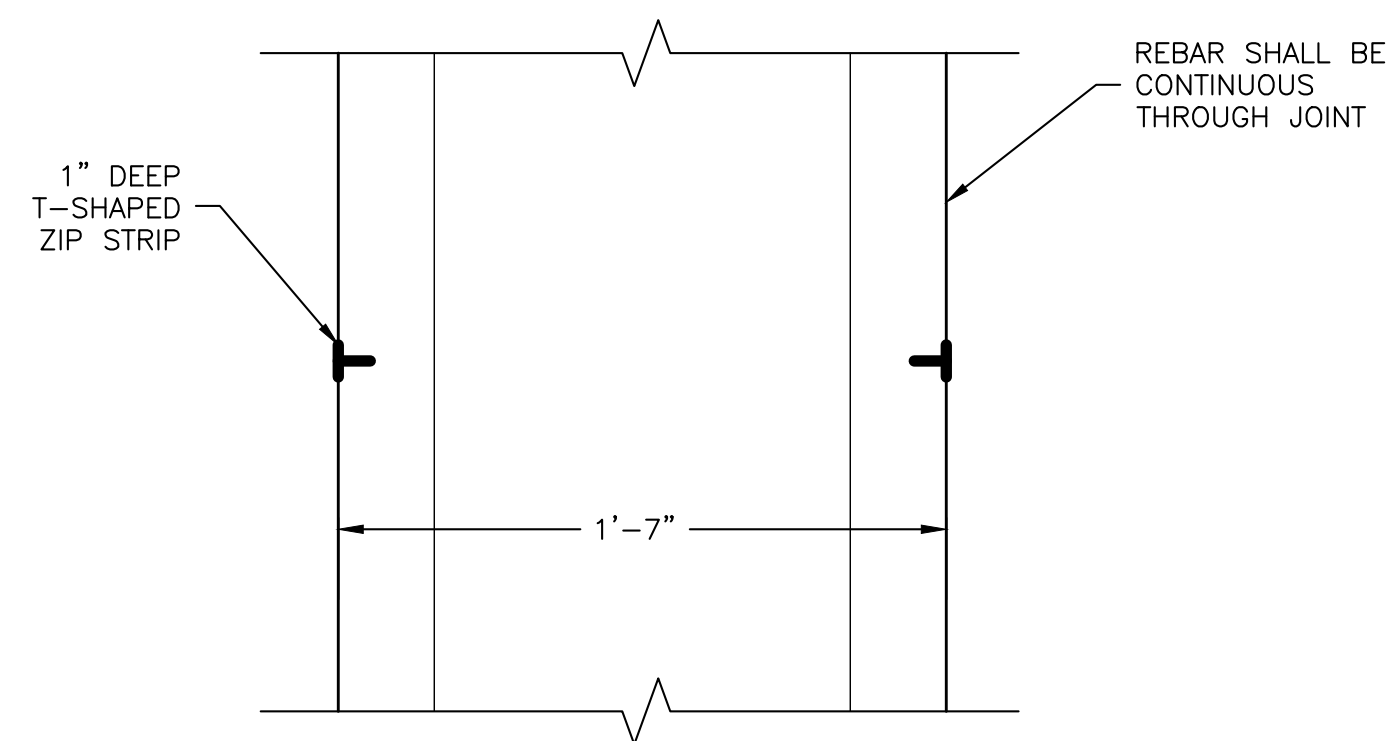


GATE INVERT DETAIL
SCALE 1" = 1'

[illegible]



CONTROL HOUSE CONNECTION DETAIL
SCALE 1" = 2'



CRACK CONTROL JOINT - PLAN VIEW
SCALE 1" = 6"

[illegible]

Date:	Aug2021
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