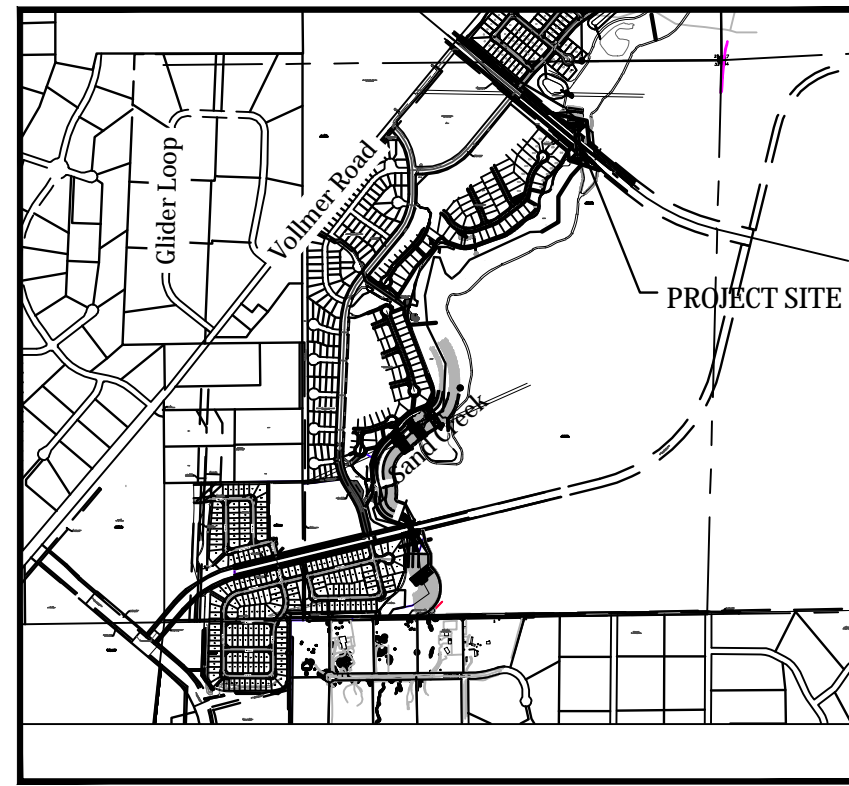


STERLING RANCH DEVELOPMENT BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS

EL PASO COUNTY, COLORADO

Kiowa Project No. 19032
5/2/2022



VICINITY MAP
SCALE: N.T.S.



GENERAL NOTES

- Profile design lines are based on centerline, as shown, unless otherwise noted.
- All new construction to conform to the specifications of El Paso County Department of Public Works. Any asphalt removed is to be replaced to meet the specifications of the El Paso County Public Works Department.
- For pavement design, curb and gutter, and sidewalks see individual plan and profile sheets. Pavement design to be based on Resistance Value 'R' derived from Hveem tests and are to be approved by the Engineering Division of the El Paso County Planning and Community Development prior to work above subgrade.
- At intersections, all curb returns will have 20-foot radius unless otherwise noted.
- All existing utilities have been shown according to the best available information. The contractor is responsible for field location and verification prior to beginning work. If it appears that there could be a conflict with any utilities, whether indicated on the plans or not, the contractor is to notify the engineer and owner immediately. The contractor is responsible for the protection and repair (if necessary) of all utilities.
- A Pre-Construction meeting shall be held with the El Paso County Planning and Community Development prior to any construction.
- Approved plans, Engineering Criteria Manual, etc. is required to be on-site at all times during construction.
- All necessary permits, such as SWMP, ESQCP, Fugitive Dust, Access, C.O.E. 404, etc. shall be obtained prior to construction.
- All handicap ramps to be per El Paso County Standard SD 2-40.
- The contractor shall coordinate locations and layout with the El Paso County Planning and Community Development on the placement of any pedestrian ramps prior to construction of the curb.
- Where appropriate, neatly saw cut all existing concrete and asphalt. Repair/replace all disturbed existing items with like materials and thicknesses.
- All disturbed areas shall be revegetated with native grasses within 21 days of excavation per Erosion Control Plan.
- The prepared Erosion/Sediment Control Plan is to be considered a part of these plans and its requirements adhered to during the construction of this project.
- All storm and sanitary sewer pipe lengths and slopes are figured from center of manhole or bend. Pipe lengths are given as a horizontal length.
- All storm sewer bedding to be per CDoT Standards.
- All storm sewer pipe shall be Class III B Wall unless otherwise shown on the storm sewer plan and profile sheets.
- All wyes and bends used in construction of storm sewer facilities shall be factory fabricated, unless approved by the El Paso County Planning and Community Development.
- Construction and materials used in all storm and sanitary sewer manholes shall be per specifications. Storm sewer radial deflections to be grouted or installed per manufacturer's recommendations.
- Storm sewer manholes sizes as follows unless otherwise shown:
18" thru 36" use 48" I.D. manhole
42" thru 48" use 60" I.D. manhole
54" thru 60" use 72" I.D. manhole
NOTE: Manhole sizes tabulated here shall be increased, if necessary, to accommodate incoming laterals.
- All horizontal stationing is based on the 'Face of Curb', unless otherwise shown.
- All vertical design and top of curb are based on the design point shown in the typical cross section.
- The curb line design point is located at the intersection of the face and top of curb for the Type III Standard 6-inch vertical curb. See typical street section for design point locations.
- Vertical curb to be used between curb returns (CR) and at curb inlets. Transitions from ramp to vertical curb shall be 10-feet unless otherwise approved by the El Paso County Department of Public Works. All other curb & gutter to be ramp curb & gutter.
- Cross pans to be per El Paso County Standard Detail SD 2-26.
- Curb returns shall be straight graded from CR to CR unless otherwise noted.
- Inlets are Type 'R' inlets (CDoT STD M-604-12) unless otherwise noted.

BENCHMARK:
THE TOP OF AN ALUMINUM SURVEYORS CAP, STAMPED "8953"
NORTHING = 411416.273
EASTING = 235167.071
ELEVATION = 7023.42

THE TOP OF RED PLASTIC SURVEYORS CAP, ILLEGIBLE
NORTHING = 410095.404
EASTING = 235052.131
ELEVATION = 7000.40

THE TOP OF RED PLASTIC SURVEYORS CAP, STAMPED "38141"
NORTHING = 411399.962
EASTING = 233849.817
ELEVATION = 7030.82

BASIS OF BEARING
THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW $\frac{1}{4}$) OF SECTION 34, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AS MONUMENTED AT THE SOUTHWEST CORNER OF SAID SOUTHWEST QUARTER (SW $\frac{1}{4}$) BY A 2-1/2" ALUMINUM CAP STAMPED "LS 11624" AND AT THE SOUTHEAST CORNER OF SAID SOUTHWEST QUARTER (SW $\frac{1}{4}$) BY A 2-1/2" ALUMINUM CAP STAMPED "LS 11624", SAID LINE BEARS N 89°14'14" E, A DISTANCE OF 2,722.56 FEET.

ABBREVIATIONS

ASSY = ASSEMBLY	MIN. = MINIMUM
BNDRY = BOUNDARY	NTS = NOT TO SCALE
BOA = BOTTOM OF ARCH	OD = OUTSIDE DIAMETER
BOF = BOTTOM OF FOOTER	PC = POINT OF HORIZONTAL CURVATURE
BOP = BOTTOM OF PIPE	PP = PROPOSED
CL = CENTERLINE	PT = POINT OF HORIZONTAL TANGENCY
CRA = CONCRETE REVERSE ANCHOR	PVC = POLY VINYL CHLORIDE PIPE
CTRB = CONCRETE THRUST BLOCK	PCV = POINT OF VERTICAL CURVATURE
CR = POINT OF CURB RETURN	PVI = POINT OF VERTICAL INTERSECTION
DIP = DUCTILE IRON PIPE	PVT = POINT OF VERTICAL TANGENCY
EL = ELEVATION	RCB = REINFORCED CONCRETE BOX
ESMT = EASEMENT	RCP = REINFORCED CONCRETE PIPE
EX. = EXISTING	ROW = RIGHT OF WAY
FC = FACE OF CURB	RT = RIGHT
FES = FLARED END SECTION	SHT = SHEET
FLG = FLANGE	SS = SANITARY SEWER
FL = FLOWLINE	STA = STATION
GB = GRADE BREAK	STD = STANDARD
HP = HIGH POINT	TA = TOP OF ASPHALT
HORIZ = HORIZONTAL	TC = TOP OF CURB
HYD = HYDRANT	TOP = TOP OF FOOTER
I.D. = INSIDE DIAMETER	TOP = TOP OF PIPE
LT = LEFT	TOR = TOP OF ROCK
LF = LINEAR FEET	TYP = TYPICAL
LP = LOW POINT	VC = VERTICAL CURVE
MAX = MAXIMUM	VERT = VERTICAL
MH = MANHOLE	

STATEMENTS

Design Engineer's Statement:

These detailed plans and specifications were prepared under my direction and supervision. Said plans and specifications have been prepared according to the criteria established by the County for detailed roadway, drainage, grading and erosion control plans and specifications, and said plans and specifications are in conformity with applicable master drainage plans and master transportation plans. Said plans and specifications meet the purposes for which the particular roadway and drainage facilities are designed and are correct to the best of my knowledge and belief. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of these detailed plans and specifications.

Todd Cartwright, P.E. #33365 Date
For and on behalf of Kiowa Engineering Corp.

Owner/Developer's Statement:

I, the owner/developer have read and will comply with of the requirements of the Grading and Erosion Control Plans and all of the requirements specified in these detailed plans and specifications.

James Morley Date
Sterling Ranch Metropolitan District SR LAND, LLC

El Paso County:

County plan review is provided only for general conformance with County Design Criteria. The County is not responsible for the accuracy and adequacy of the design, dimensions, and/or elevations which shall be confirmed at the job site. The County through the approval of this document assumes no responsibility for completeness and/or accuracy of this document.

Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual Volumes 1 and 2, and Engineering Criteria Manual as amended.

In accordance with ECM Section 1.12, these construction documents will be valid for construction for a period of 2 years from the date signed by the El Paso County Engineer. If construction has not started within those 2 years the plans will need to be resubmitted for approval, including payment of review fees at the Planning and Community Development Directors discretion.

Jennifer Irvine, P.E. Date
County Engineer / ECM Administrator



Know what's below.
Call before you dig.

EL PASO COUNTY STANDARD NOTES

- All drainage and roadway construction shall meet the standards and specifications of the City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2, and the El Paso County Engineering Criteria Manual.
- Contractor shall be responsible for the notification and field notification of all existing utilities, whether shown on the plans or not, before beginning construction. Location of existing utilities shall be verified by the contractor prior to construction. Call 811 to contact the Utility Notification Center of Colorado (UNCC).
- Contractor shall keep a copy of these approved plans, the Grading and Erosion Control Plan, the Stormwater Management Plan (SWMP), the soils and geotechnical report, and the appropriate design and construction standards and specifications at the job site at all times, including the following:
 - El Paso County Engineering Criteria Manual (ECM)
 - City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2
 - Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction 2021
 - CDoT M & S Standards 2019
- Notwithstanding anything depicted in these plans in words or graphic representation, all design and construction related to roads, storm drainage and erosion control shall conform to the standards and requirements of the most recent version of the relevant adopted El Paso County standards, including the Land Development Code, the Engineering Criteria Manual, the Drainage Criteria Manual, and the Drainage Criteria Manual Volume 2. Any deviations from regulations and standards must be requested, and approved, in writing. Any modifications necessary to meet criteria after-the-fact will be entirely the developer's responsibility to rectify.
- It is the design engineer's responsibility to accurately show existing conditions, both onsite and offsite, on the construction plans. Any modifications necessary due to conflicts, omissions, or changed conditions will be entirely the developer's responsibility to rectify.
- Contractor shall schedule a pre-construction meeting with El Paso County Planning and Community Development (PCD) - Inspections, prior to starting construction.
- It is the contractor's responsibility to understand the requirements of all jurisdictional agencies and to obtain all required permits, including but not limited to El Paso County Erosion and Stormwater Quality Control Permit (ESQCP), Regional Building Floodplain Development Permit, U.S. Army Corps of Engineers-issued 401 and/or 404 permits, and county and state fugitive dust permits.
- Contractor shall not deviate from the plans without first obtaining written approval from the design engineer and PCD. Contractor shall notify the design engineer immediately upon discovery of any errors or inconsistencies.
- All storm drain pipe shall be Class III RCP unless otherwise noted and approved by PCD.
- Contractor shall coordinate geotechnical testing per ECM standards. Pavement design shall be approved by El Paso County PCD prior to placement of curb and gutter and pavement.
- All construction traffic must enter/exit the site at approved construction access points.
- Sight visibility triangles as identified in the plans shall be provided at all intersections. Obstructions greater than 18 inches above flowline are not allowed within sight triangles.
- Signing and striping shall comply with El Paso County Department of Public Works and MUTCD criteria. [If applicable, additional signing and striping notes will be provided.]
- Contractor shall obtain any permits required by El Paso County Department of Public Works, including Work Within the Right-of-Way and Special Transport permits.
- The limits of construction shall remain within the property line unless otherwise noted. The owner/developer shall obtain written permission and easements, where required, from adjoining property owner(s) prior to any off-site disturbance, grading, or construction.

INDEX OF SHEETS

C001	COVER SHEET
C101	SITE PLAN
C201	BRIARGATE BOULEVARD BRIDGE PLAN & PROFILE
C202	BRIARGATE BOULEVARD BRIDGE STRUCTURE LAYOUT
C203	BRIARGATE BOULEVARD BRIDGE DETAILS
C204	BRIARGATE BOULEVARD BRIDGE GUARDRAIL PLAN
C211	BRIARGATE BOULEVARD BRIDGE GUARDRAIL DETAILS
C212	BRIARGATE BOULEVARD BRIDGE HANDRAIL DETAILS
C221	WINGWALL PROFILES
C222	WINGWALL PROFILES
C223	WINGWALL PROFILES
C224	WINGWALL DETAILS
C225	WINGWALL TABLES
C226	WINGWALL TABLES
C227	WINGWALL TABLES
C231	BRIDGE FOOTER PROFILE
C301	DROP STRUCTURE A DETAILS
C302	DROP STRUCTURE B DETAILS
C303	DROP STRUCTURE DETAILS
C311	GRADE CONTROL STRUCTURE DETAILS
HW1	HEADWALL GENERAL INFORMATION
HW2	HEADWALL PLAN AND ELEVATION
HW3	HEADWALL TOP PLAN & SHORING REQ'S
HW4	BACK FACE REINFORCING ELEVATION
HW5	FRONT FACE REINFORCING ELEVATION
HW6	HEADWALL REINFORCING DETAILS
HW7	HEADWALL REINFORCING DETAILS
HW8	HEADWALL REINFORCING DETAILS
HW9	MISCELLANEOUS HEADWALL DETAILS
1	BRIDGECOR SINGLE RADIUS ARCH
2	BRIDGECOR SINGLE RADIUS ARCH
3	BRIDGECOR SINGLE RADIUS ARCH
4	BRIDGECOR SINGLE RADIUS ARCH
5	BRIDGECOR SINGLE RADIUS ARCH
6	BRIDGECOR SINGLE RADIUS ARCH
7	BRIDGECOR SINGLE RADIUS ARCH

Kiowa
Engineering Corporation

1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
COVER SHEET
EL PASO COUNTY, COLORADO

Project No.: 19032

Date: 5/2/2022

Design: TAC

Drawn: PAV

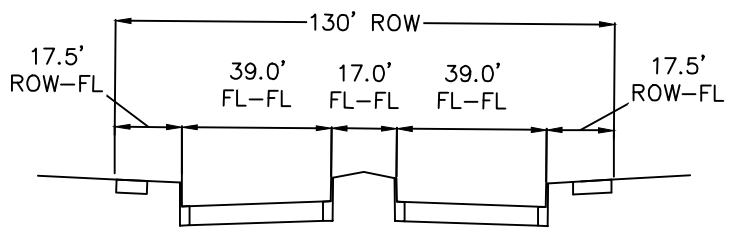
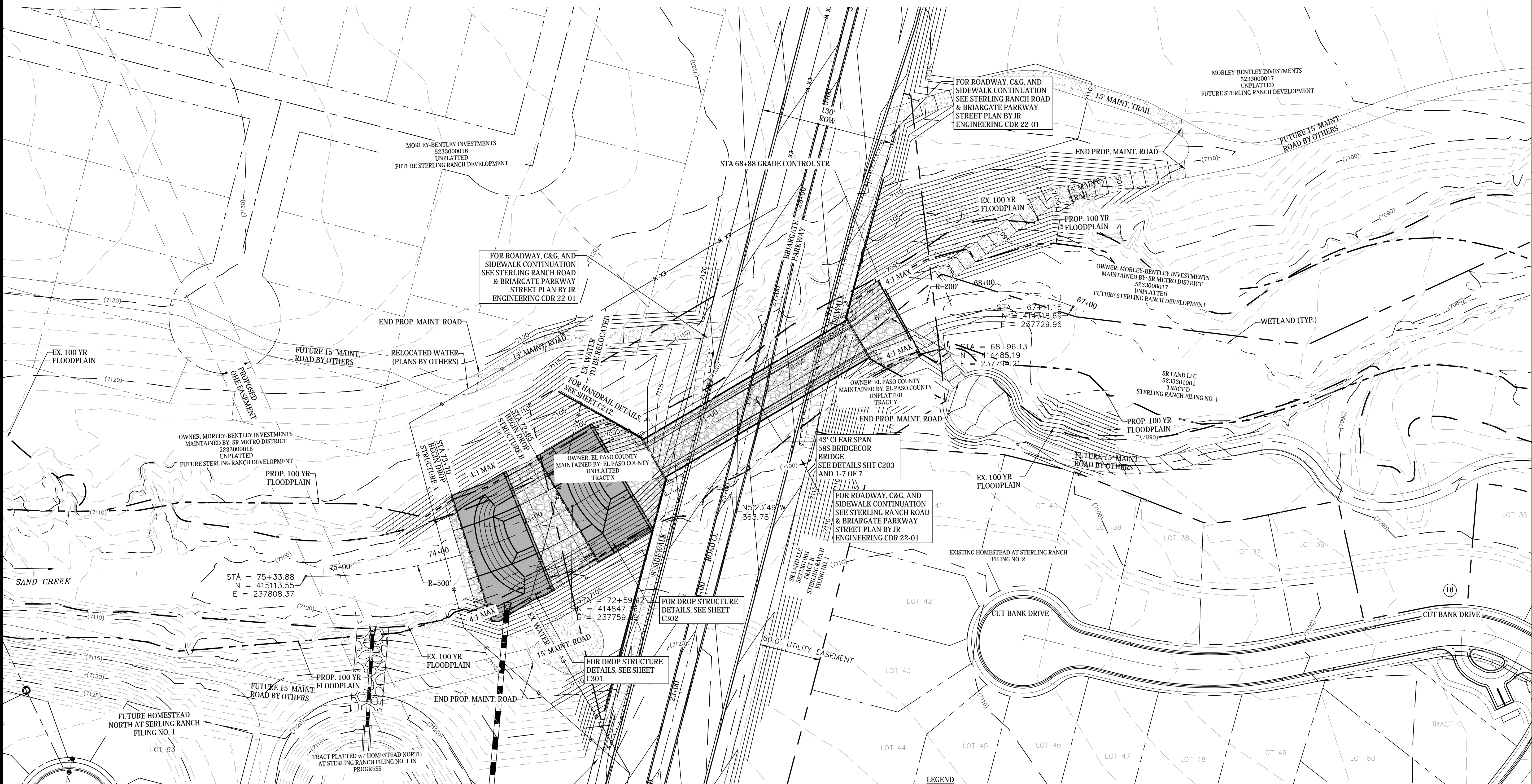
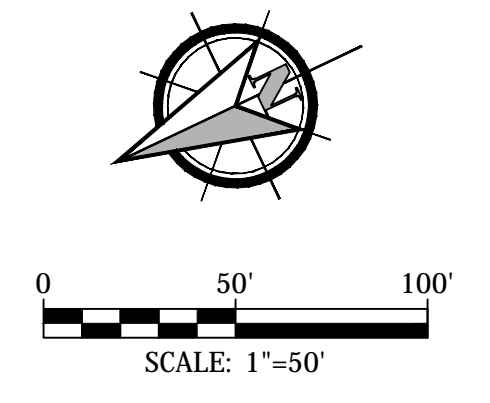
Check:

Revisions:

C001

WETLAND DISTURBANCE AREA: 0.74 AC. (0.74 AC. MAX.)
 LENGTH CHANNEL DISTURBANCE: 630 LF. (635 LF MAX.)

CAUTION!!!
 EXISTING UTILITIES TO BE PROTECTED FROM DISTURBANCE WHEN INSTALLING ALL DRAINAGE INFRASTRUCTURE.



BRIARGATE BLVD TYPICAL SECTION

FOR ROADWAY, C&G, AND SIDEWALK CONTINUATION SEE STERLING RANCH ROAD & BRIARGATE PARKWAY STREET PLAN BY JR ENGINEERING CDR 22-01

- LEGEND**
- EXISTING FEMA 100 YEAR FLOODPLAIN
 - PROPOSED FEMA 100 YEAR FLOODPLAIN
 - 10+00 PROFILE CENTERLINE
 - PROPERTY LINE
 - PROPOSED CONTOUR
 - EXISTING CONTOUR
 - FENCE

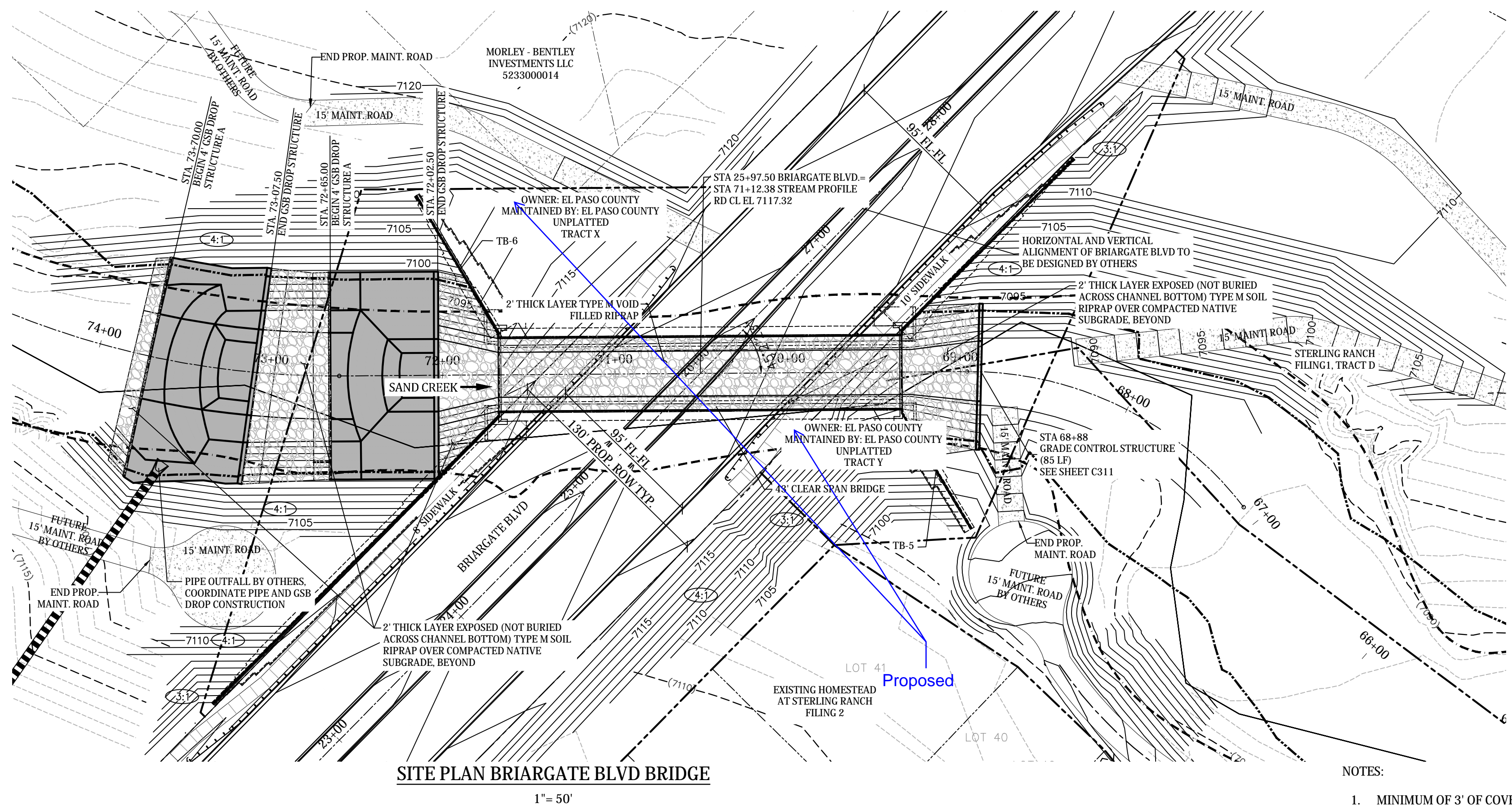
- HATCH LEGEND**
- GROUTED BOULDER
 - TYPE M SOIL RIPRAP D50=12"
 - TYPE L SOIL RIPRAP D50=9"
 - ACCESS ROAD/TRAIL

STERLING RANCH DEVELOPMENT
 BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
 SITE PLAN
 EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	5/2/2022
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C101

TEST BORING NO. 5				TEST BORING NO. 6			
DATE DRILLED 7/13/2021				DATE DRILLED 7/13/2021			
JOB # 211647				CLIENT C&C LAND			
LOCATION BRIARGATE BRIDGE				LOCATION BRIARGATE BRIDGE			
REMARKS				REMARKS			
SURFACE ELEV. = 7096.5				SURFACE ELEV. = 7105.5			
WATER @ 1.5', 7/20/21				WATER @ 3.5', 7/20/21			
SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE, VERY MOIST				SAND, SILTY, BROWN			
Depth (ft)	Symbol	Blows per foot	Watercontent %	Depth (ft)	Symbol	Blows per foot	Watercontent %
5		47	16.5	5		50	13.2
10		11.5	2	10		50	14.3
15		16.0	3	15		50	16.6
20		50	5	20		50	10.8
SOIL TYPE				SOIL TYPE			
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE TO VERY DENSE, VERY MOIST				SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST			
SILTSTONE, SANDY, GRAY BROWN, HARD, MOIST				SILTSTONE, SANDY, GRAY BROWN, HARD, MOIST			
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE TO VERY DENSE, VERY MOIST				SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST			



CAUTION!!!
EXISTING UTILITIES TO BE PROTECTED FROM DISTURBANCE WHEN INSTALLING BRIDGE AND INFRASTRUCTURE.

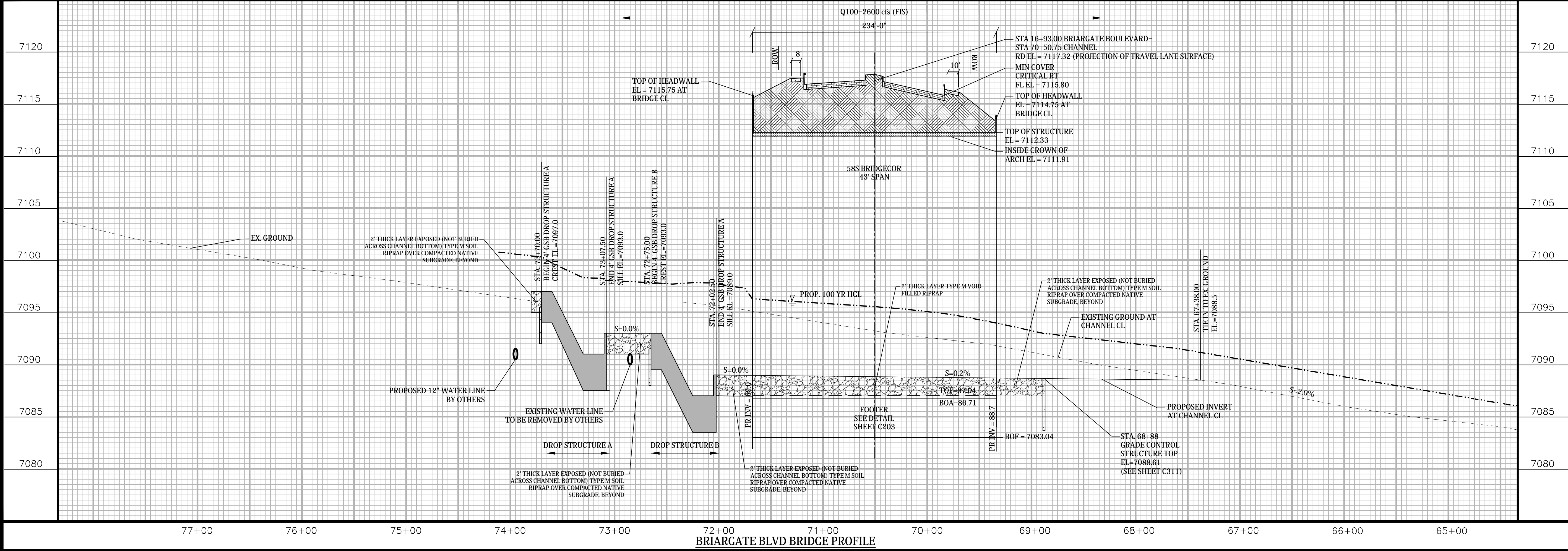
SCALE: 1"=50'

811
Know what's below. Call before you dig.

PROFILE LEGEND

- 100-YEAR HGL
- - - EXISTING INVERT
- PROPERTY BOUNDARY

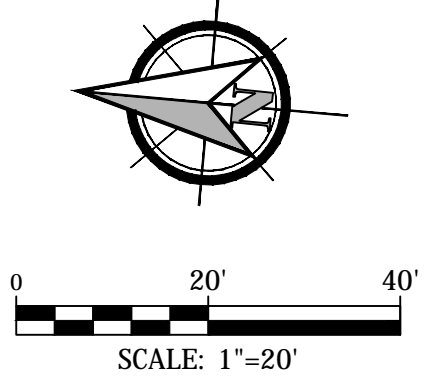
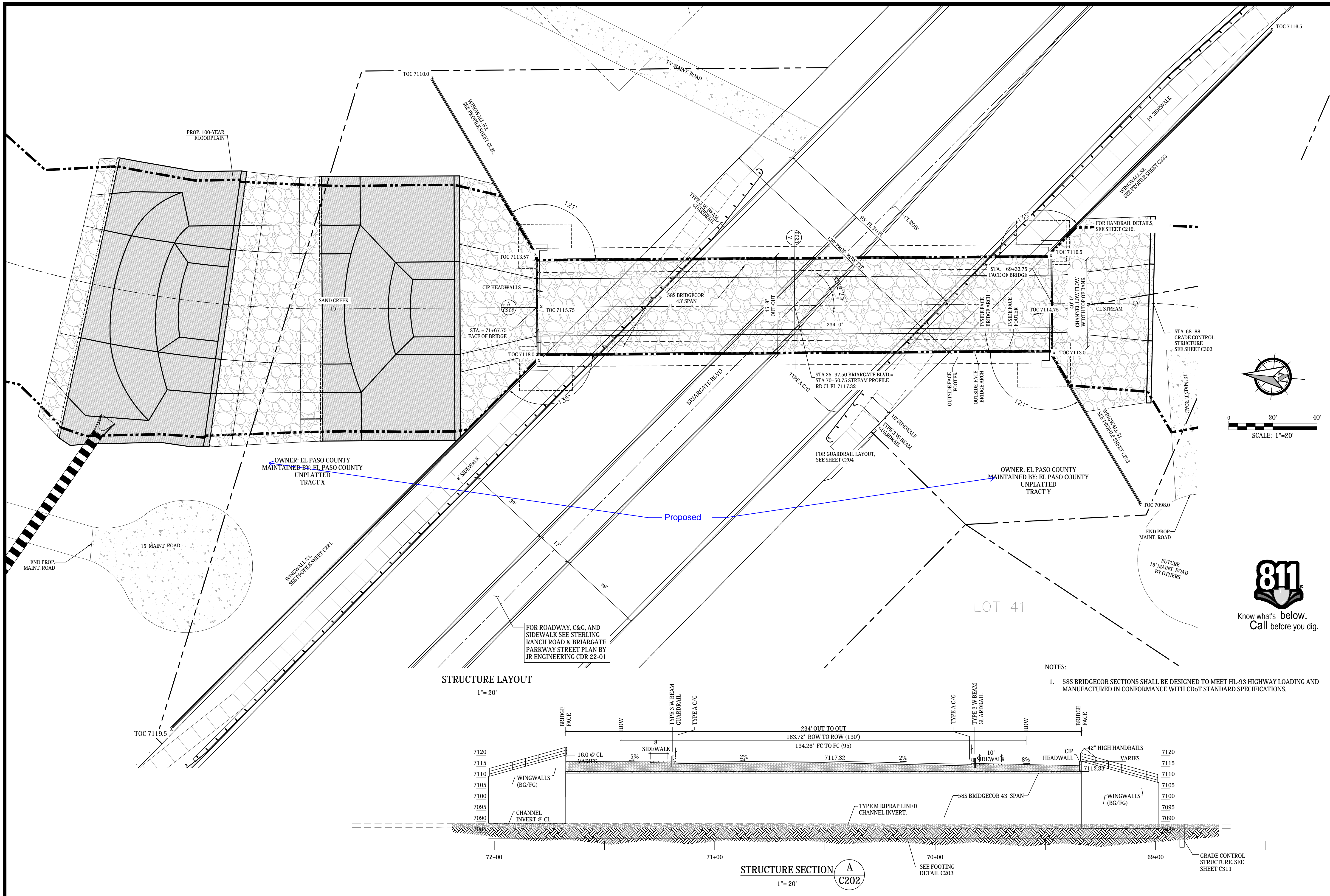
NOTES:
1. MINIMUM OF 3' OF COVER OVER BRIDGE CORE FOR CONSTRUCTION TRAFFIC.



Project No.:	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C201

**STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
STRUCTURE LAYOUT**
EL PASO COUNTY, COLORADO

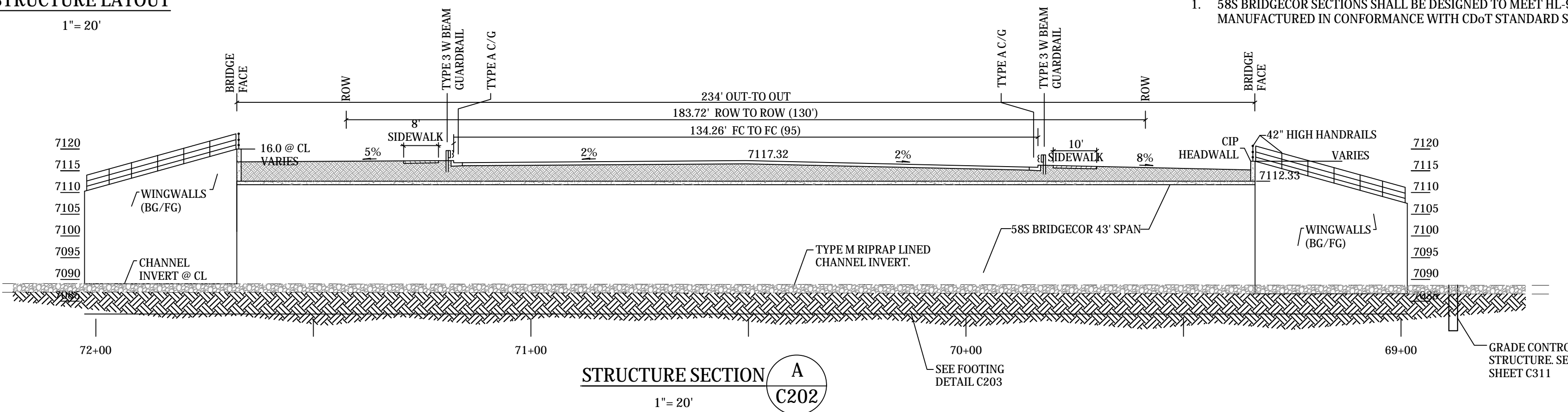


FOR ROADWAY, C&G, AND SIDEWALK SEE STERLING RANCH ROAD & BRIARGATE PARKWAY STREET PLAN BY JR ENGINEERING CDR 22-01

LOT 41

- NOTES:
- 58S BRIDGECOR SECTIONS SHALL BE DESIGNED TO MEET HL-93 HIGHWAY LOADING AND MANUFACTURED IN CONFORMANCE WITH CDOT STANDARD SPECIFICATIONS.

STRUCTURE LAYOUT
1" = 20'

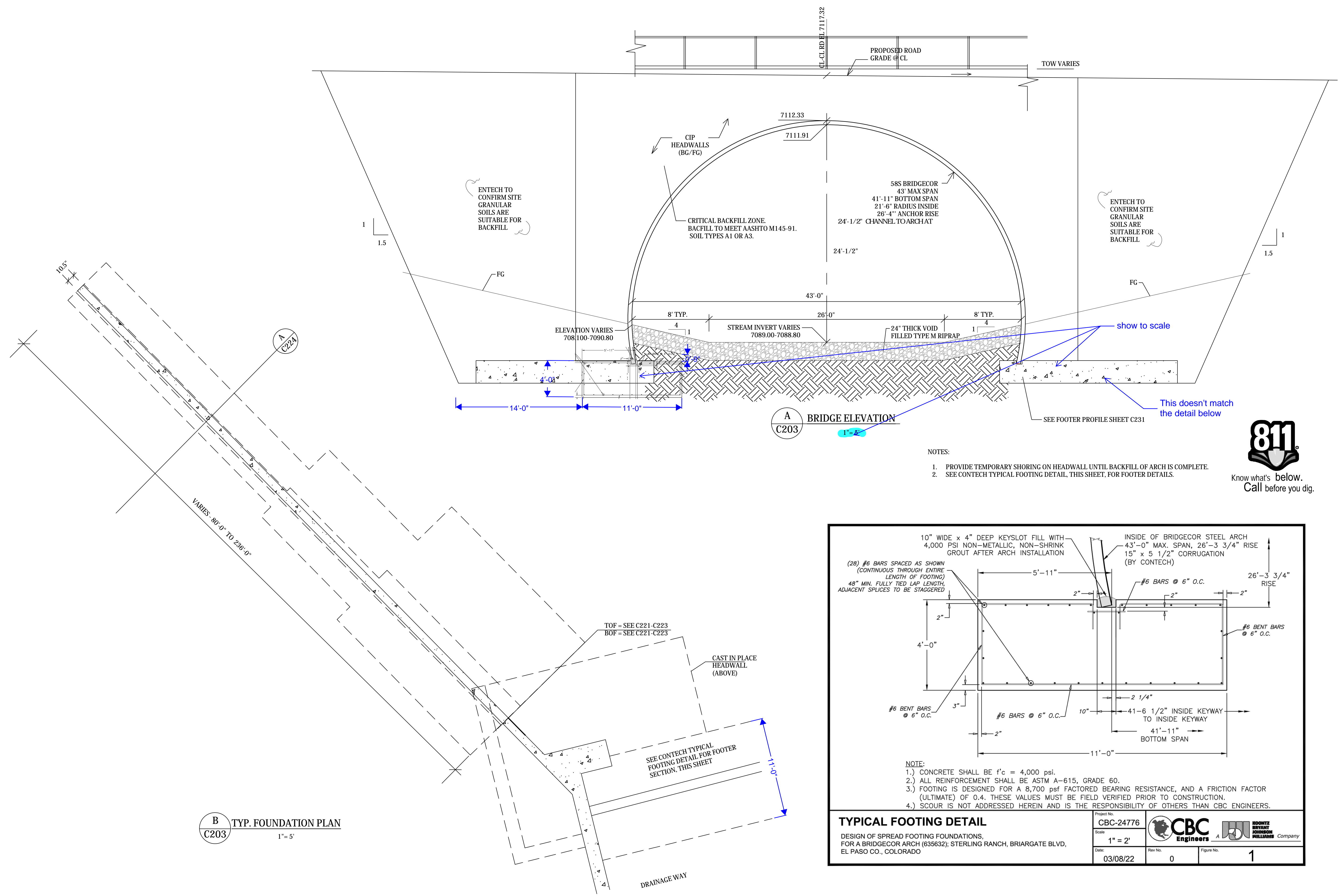


STRUCTURE SECTION A
1" = 20'
C202

Project No.:	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C202

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
BRIDGE DETAILS
EL PASO COUNTY, COLORADO



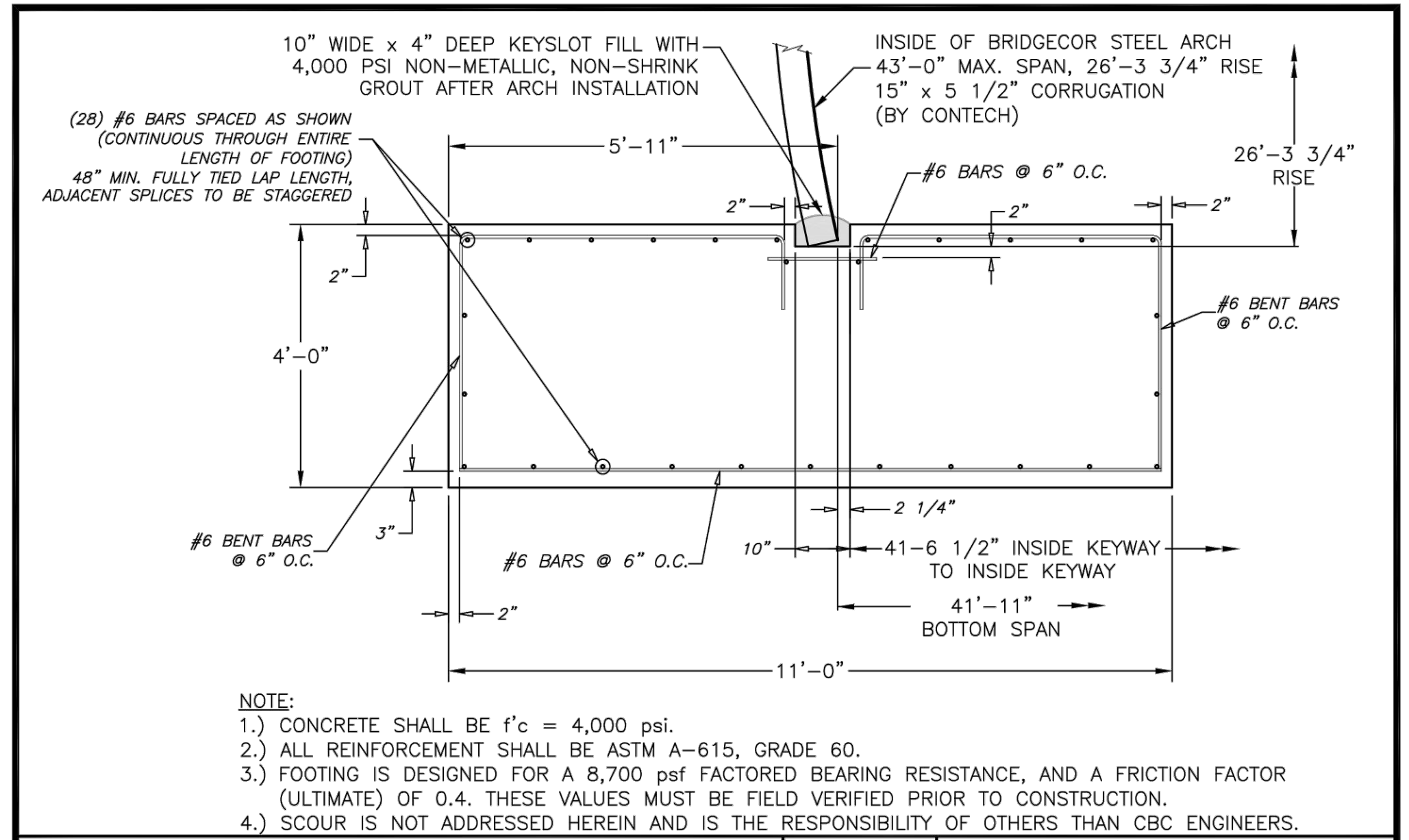
A
BRIDGE ELEVATION
1" = 8'

B
TYP. FOUNDATION PLAN
C203
1" = 5'

- NOTES:
1. PROVIDE TEMPORARY SHORING ON HEADWALL UNTIL BACKFILL OF ARCH IS COMPLETE.
 2. SEE CONTECH TYPICAL FOOTING DETAIL, THIS SHEET, FOR FOOTER DETAILS.



Know what's below.
Call before you dig.

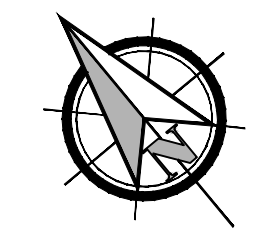


TYPICAL FOOTING DETAIL
DESIGN OF SPREAD FOOTING FOUNDATIONS,
FOR A BRIDGECOR ARCH (635632); STERLING RANCH, BRIARGATE BLVD,
EL PASO CO., COLORADO

Project No.	CBC-24776		
Scale	1" = 2'		
Date	03/08/22	Rev No.	0
		Figure No.	1

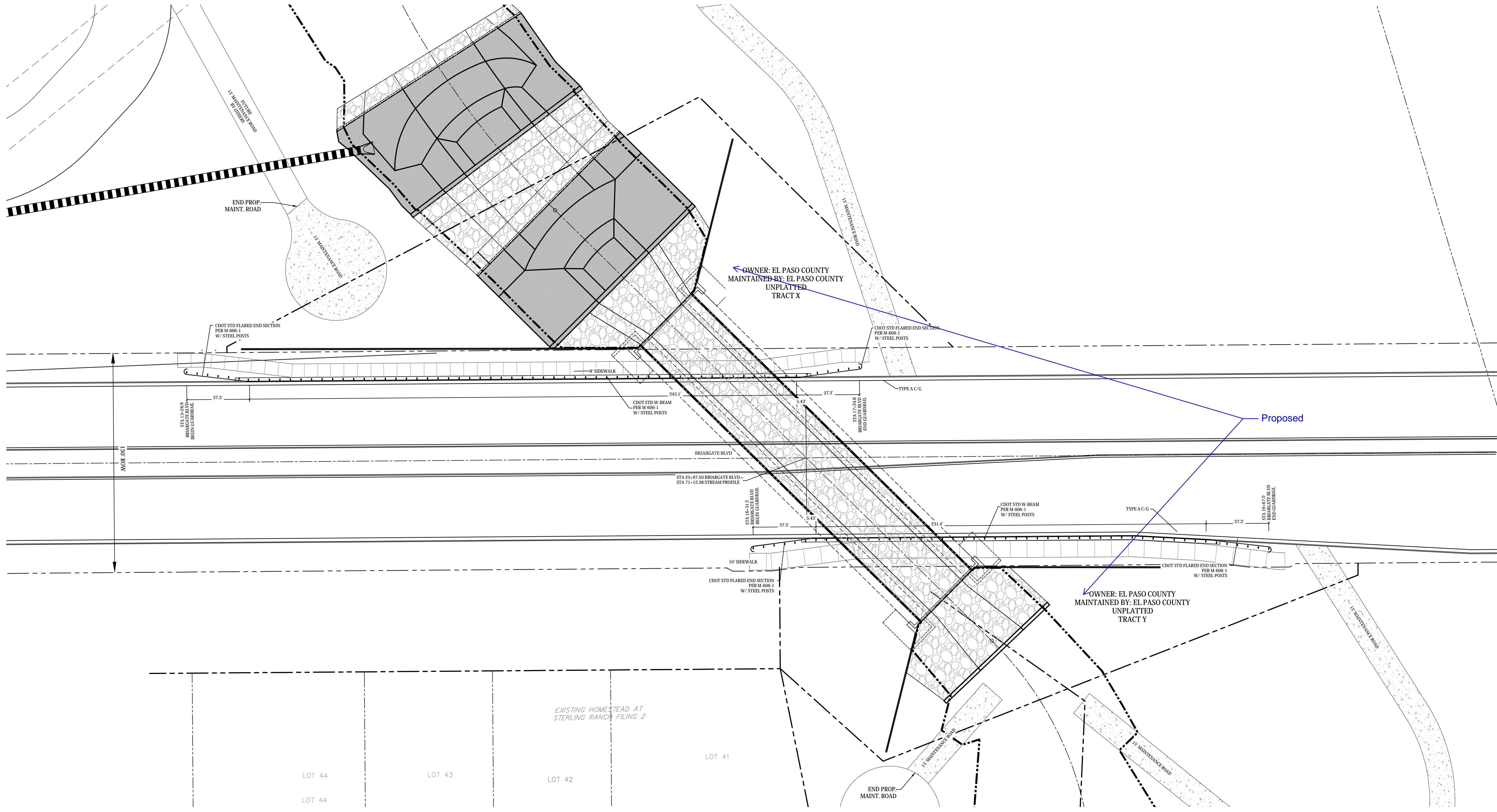
Project No.	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C203



0 30' 60'
SCALE: 1"=30'

NOTES:
1. FOR GUARDRAIL DETAILS SEE SHEET C211



OWNER: EL PASO COUNTY
MAINTAINED BY: EL PASO COUNTY
UNPLATTED
TRACT X

OWNER: EL PASO COUNTY
MAINTAINED BY: EL PASO COUNTY
UNPLATTED
TRACT Y

Proposed

LOT 44
LOT 44

LOT 43

LOT 42

LOT 41

EXISTING HOMESTEAD AT
STERLING RANCH FILING 2

GUARDRAIL LAYOUT
1"=20'



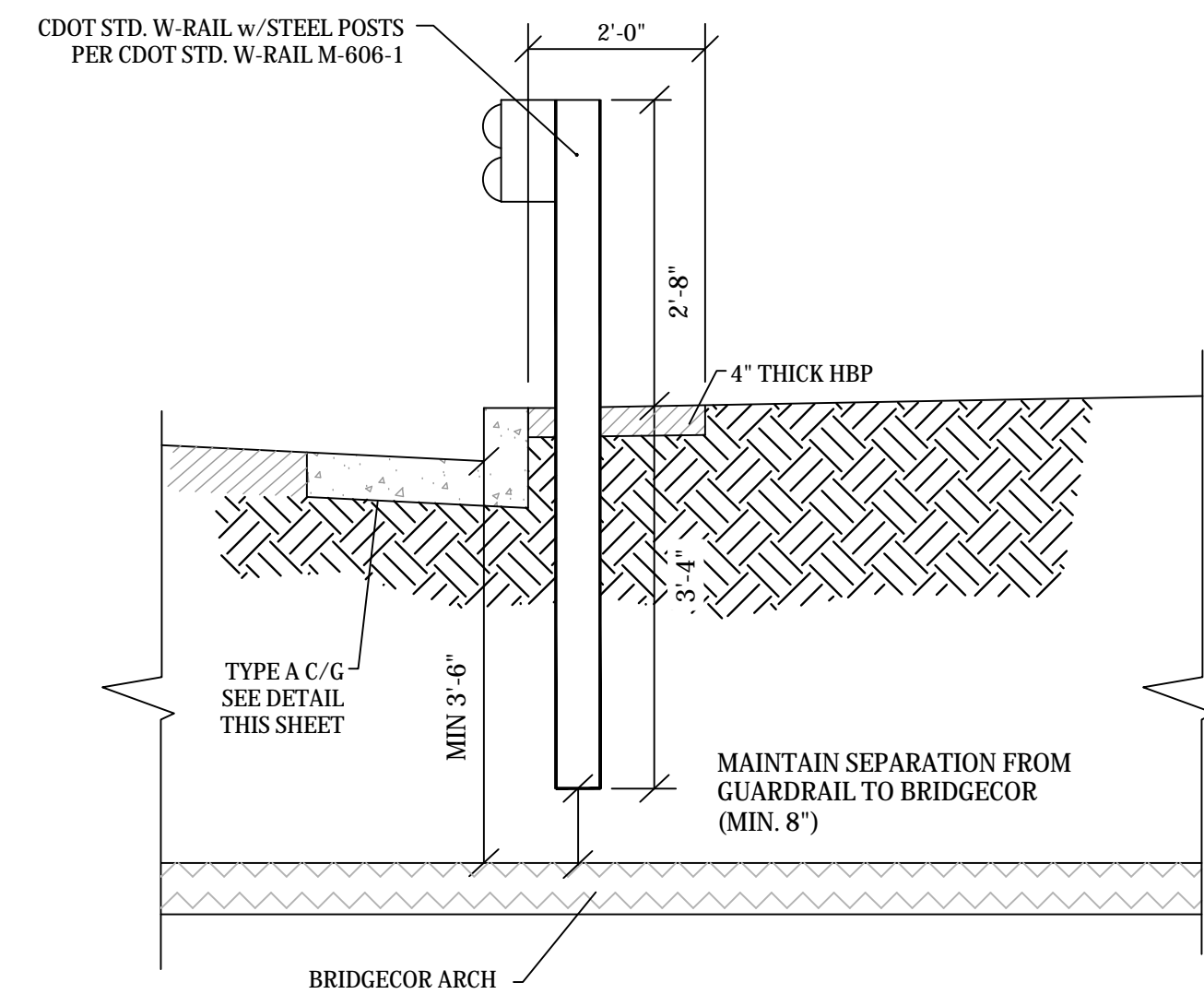
Know what's below.
Call before you dig.

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
GUARDRAIL PLAN
EL PASO COUNTY, COLORADO

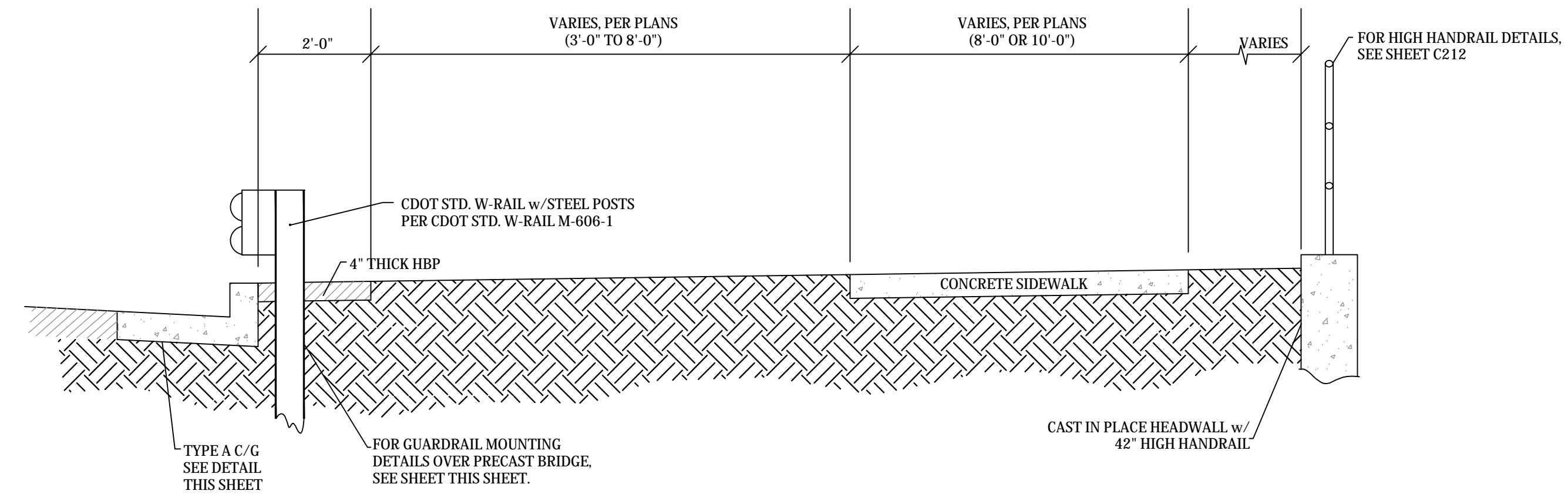
Project No.:	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C204

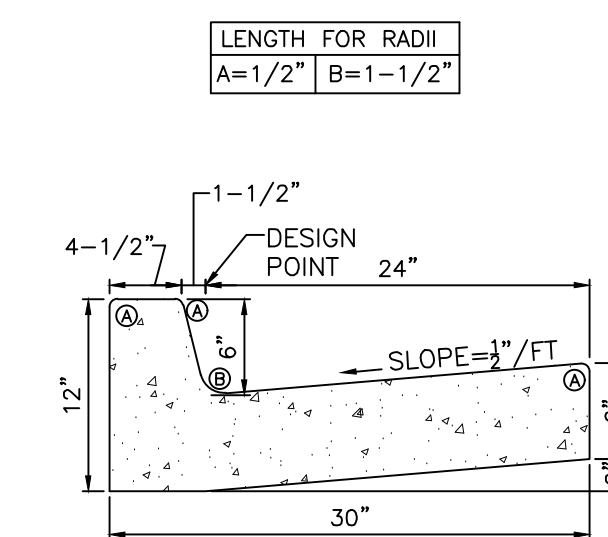
STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
GUARDRAIL DETAILS
EL PASO COUNTY, COLORADO



A GUARDRAIL MOUNTING DETAILS
C211 NTS



B TYPICAL GUARDRAIL LAYOUT BRIARGATE BLVD
C211 1" = 2'



C EPC TYPE A VERTICAL CURB AND GUTTER
C211 NTS
EPC STD. SD. 2-20

NOTES:

1. GUARDRAIL POST SPACING OVER THE ARCH SECTIONS SHALL BE IN CONFORMANCE WITH CDOT M-606-1.
2. EXPANSION JOINTS SHALL BE PLACED IN THE SIDEWALK AT INTERVALS OF NOT MORE THAN 100 FEET.

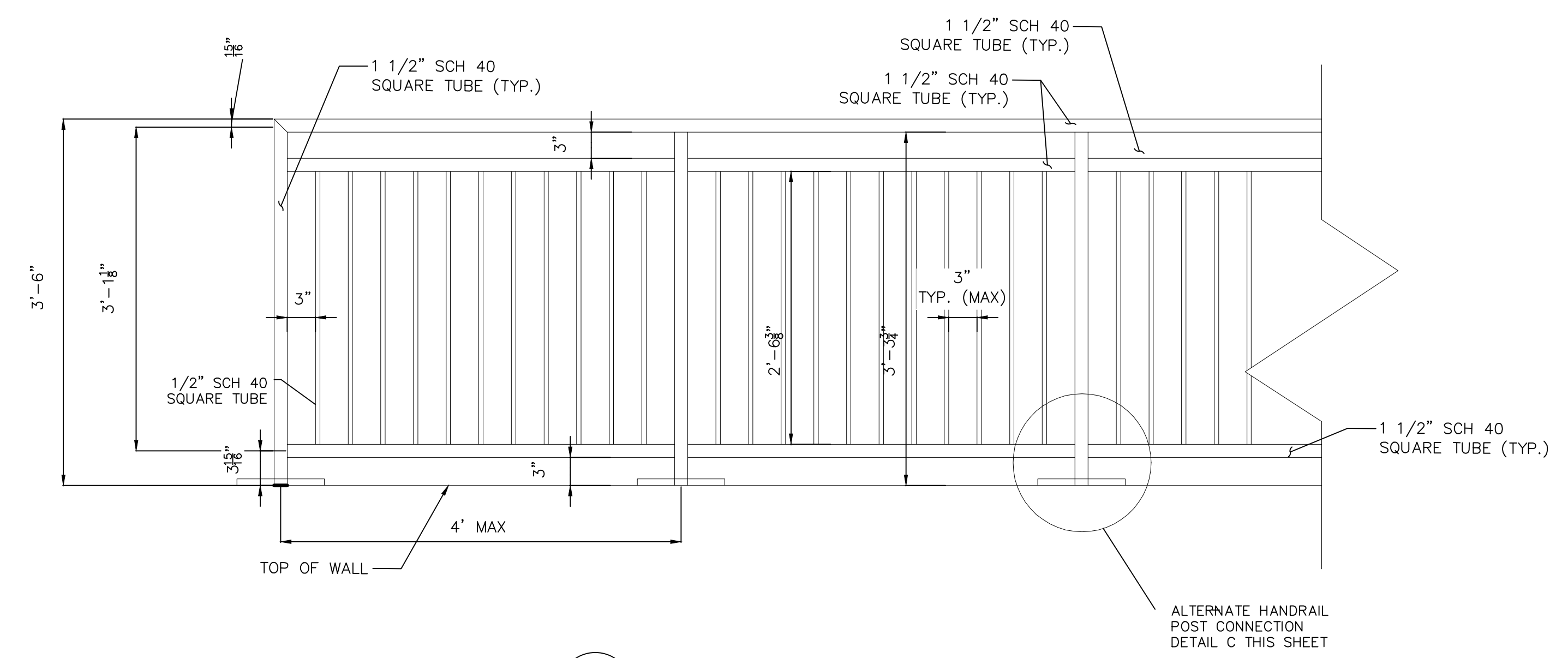


Know what's below.
Call before you dig.

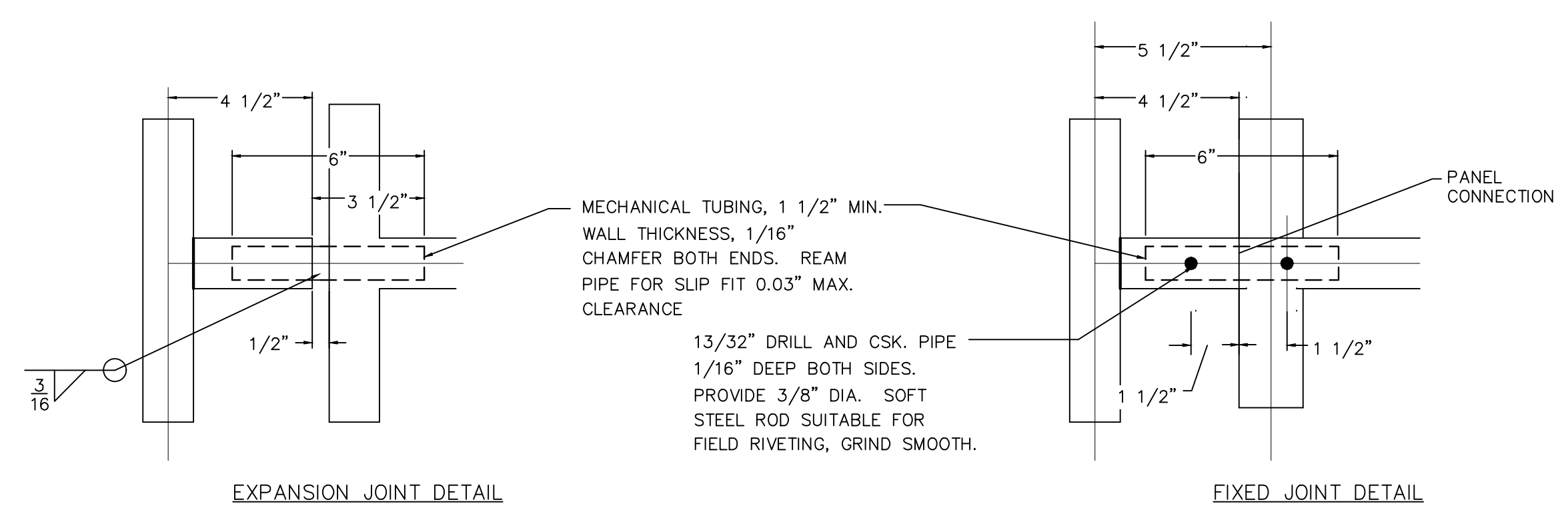
C211

HANDRAIL PAINT NOTE:
 HANDRAIL FINISH SHALL BE ONE COAT METAL PRIMER AND TWO COATS SHERWIN WILLIAMS "BRIDGE GREEN" COLOR, ACROLON 218 HS ACRYLIC POLYURETHANE, SEMI-GLOSS. COLOR SHALL BE VERIFIED BY THE ENGINEER.

BRIDGE GREEN CUSTOM	MANUAL MATCH			
844 COLORANT	OZ	32	64	128
LB-LAMP BLACK	2	16	-	-
PG-PHTH GREEN	10	-	-	-
TW-WHITE	2	46	-	-
YO-YELLOW OX	-	50	-	-
PB-PHTH	-	50	-	-
4 GALLON KIT		ULTRADEEP		
B65T00654		640335618		

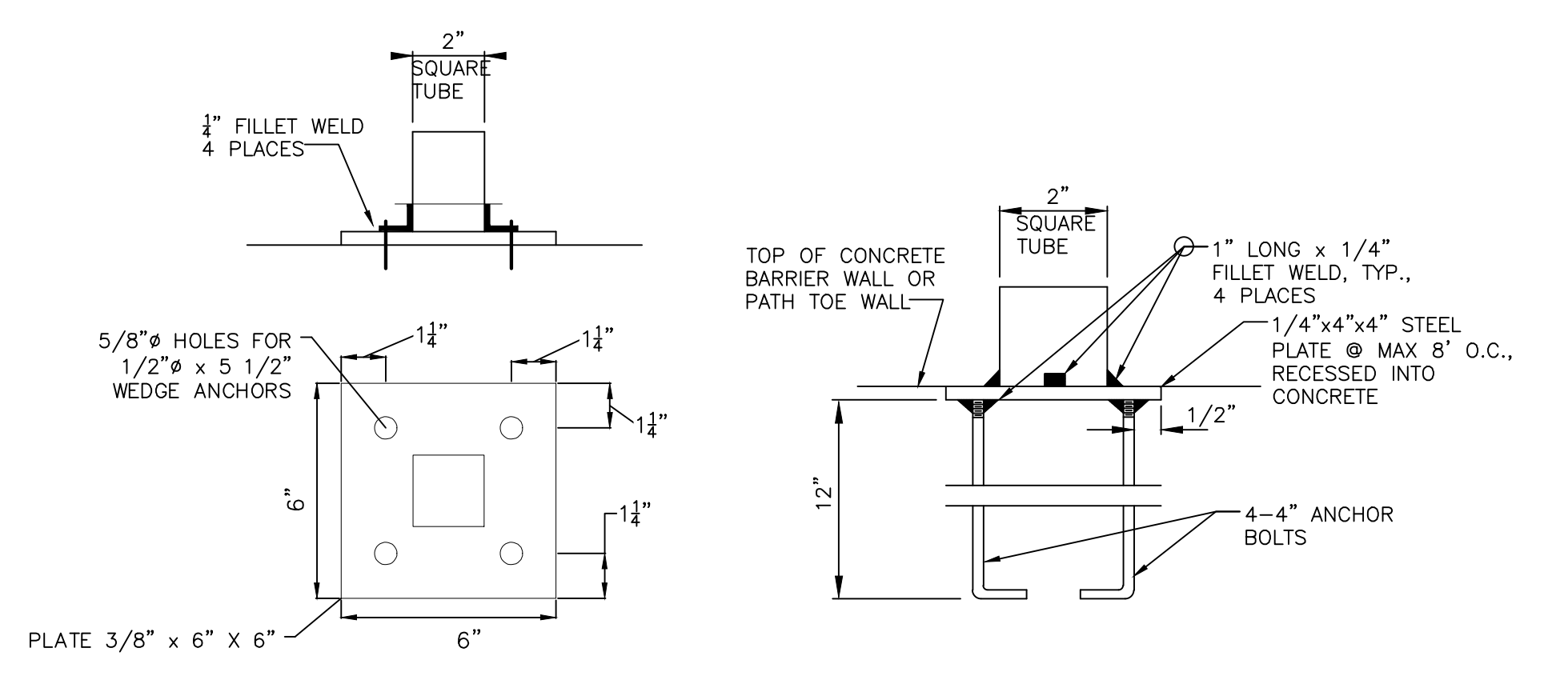


A HANDRAIL DETAIL
 C212 NTS

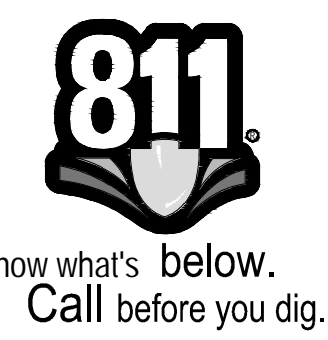


B HANDRAIL JOINT DETAIL
 C212 NTS

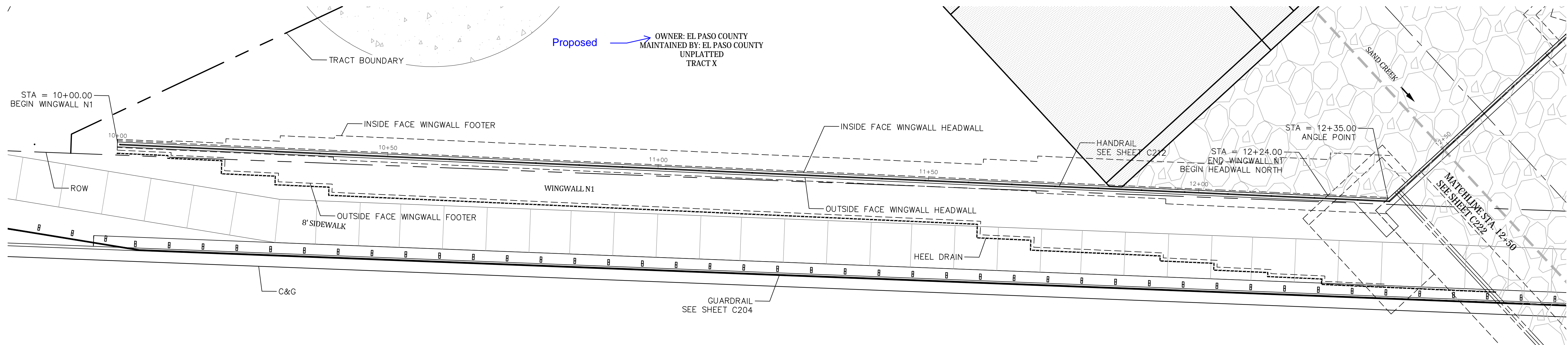
NOTE:
 1. INSTALL EXPANSION JOINTS AT A MAXIMUM OF 80' INTERVALS.



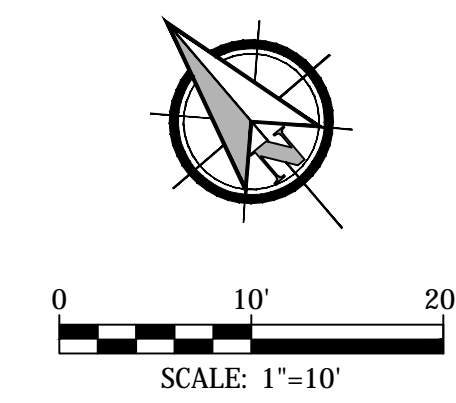
C ALTERNATE HANDRAIL POST CONNECTION DETAIL
 C212 NTS



Project No.	19032
Date	5/2/22
Design	TAC
Drawn	PAV
Check	
Revisions	

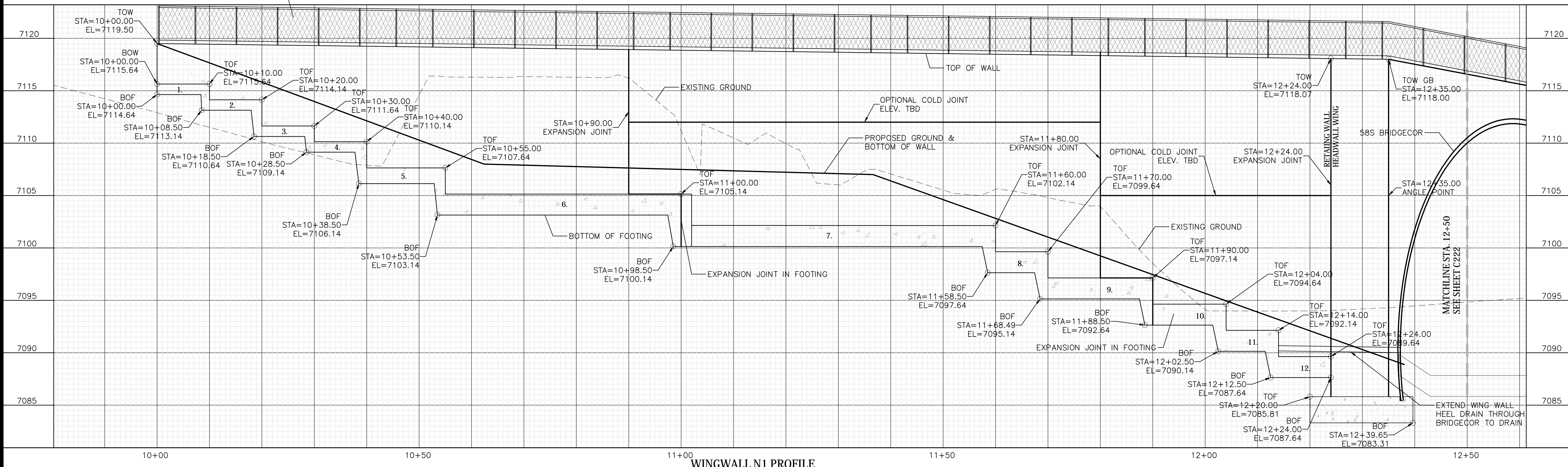


WINGWALL N1 PLAN
1"=10'



NOTES:

1. MINIMUM OF 3' OF COVER OVER BRIDGE CORE FOR CONSTRUCTION TRAFFIC.
2. ALL JOINTS ARE EXPANSION JOINTS. HEAD WALL AND RETAINING WALL ARE INDEPENDENT STRUCTURES.

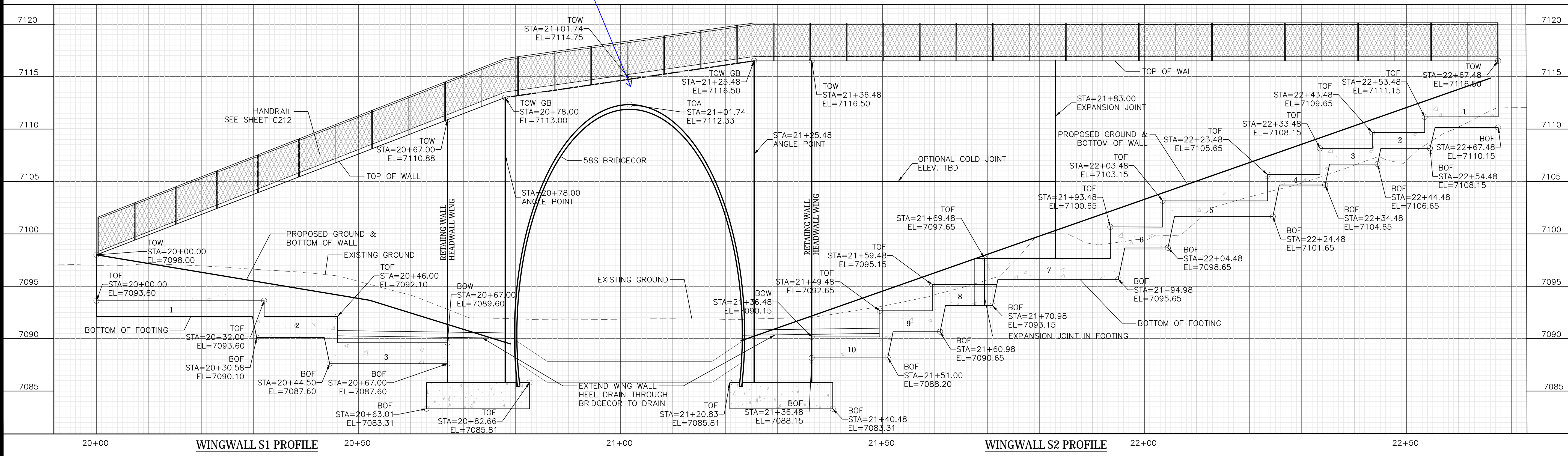
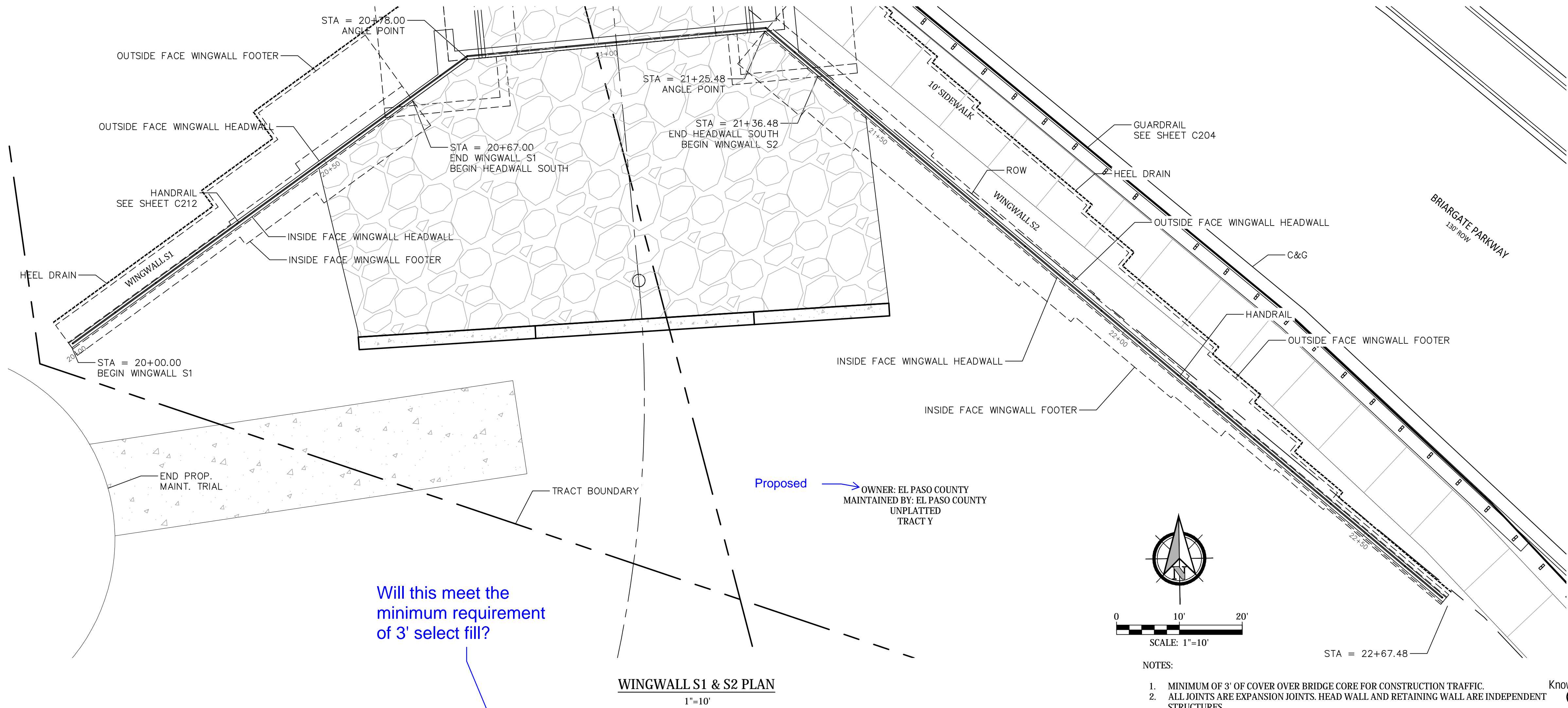


WINGWALL N1 PROFILE

Project No.:	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C221

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
WINGWALL PROFILES
EL PASO COUNTY, COLORADO



Project No.:	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C223

GENERAL NOTES:

DESIGN CRITERIA

- ALL MATERIALS, WORKMANSHIP, DESIGN, AND CONSTRUCTION SHALL CONFORM TO THE DRAWINGS, SPECIFICATIONS, AND THE 2015 EDITION OF THE INTERNATIONAL BUILDING CODE (IBC), AS ADOPTED AND AMENDED BY THE AUTHORITY HAVING JURISDICTION.
- DESIGN MINIMUM LOADING CRITERIA

SNOW LOADS:

GROUND SNOW LOAD, P _g	20 p.s.f.
EXPOSURE FACTOR, C _e	1.0
IMPORTANCE FACTOR, I _s	1.0
THERMAL FACTOR, C _t	1.2

SEISMIC LOADS:

RISK CATEGORY	II
IMPORTANCE FACTOR, C _e	1.0

MAPPED SPECTRAL RESPONSE ACCELERATIONS (USGS MAPS):

S ₁	0.173
S _{0.1}	0.059

DESIGN SPECTRAL RESPONSE ACCELERATIONS:

S ₁	0.139
S _{0.1}	0.066

SEISMIC DESIGN CATEGORY: **A**
 BASIC SEISMIC FORCE-RESISTING SYSTEM(S): ORDINARY REINFORCED CONCRETE SHEAR WALLS & FLAT BOTTOM GROUND - SUPPORTED

RESPONSE MODIFICATION FACTOR, R 4.0
 ANALYSIS PROCEDURE: DEFAULT VALUES PER AASHTO 7-14:3.10.9.2

WIND LOADS:

ULTIMATE DESIGN WIND SPEED (3 SECOND GUST), V _{ult}	120 m.p.h.
WIND EXPOSURE	C
IMPORTANCE FACTOR, I _w	1.0
INTERNAL PRESSURE COEFFICIENT, GC _{pi}	0.0±

FLOOD LOADS:

DIVERSION STRUCTURE FLOODPLAIN ELEVATION	7110.0
100 YEAR WSE	

- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE THE LOCATION OF DRAINS, INSERTS, DEPRESSIONS, BURIED PIPES, AND UTILITIES, ETC. WITH CIVIL AND STRUCTURAL DRAWINGS.
- VERIFY ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS, NOTIFY ARCHITECT/ENGINEER OF DISCREPANCIES. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS

SOIL AND FOUNDATIONS

- FOUNDATION DESIGN IS IN ACCORDANCE WITH THE SOIL REPORT BY ENTECH ENGINEERING, INC. NUMBER 211647, DATED JULY 29, 2021.
- DESIGN OF FOOTINGS AND WALLS IS BASED ON THE FOLLOWING CRITERIA:

MAXIMUM ULTIMATE BEARING PRESSURE (LRFD)	4000 PSF (2400 ASD) FOR NATIVE SANDS
	5000 PSF (3000 ASD) FOR RE-COMPACTED SANDS OR IMPORTED FILL
	5800 PSF (3500 ASD) FOR UNDISTURBED SANDSTONE
RESISTING FACTOR (LRFD)	0.45 FOR NATIVE SANDS
	0.45 FOR RE-COMPACTED SANDS
	0.6 FOR UNDISTURBED SANDSTONE

SOIL PROPERTIES:

EQUIVALENT FLUID PRESSURE FOR RETAINING:	
ACTIVE	45 p.c.f.
AT-REST	60 p.c.f.
PASSIVE	300 p.c.f.
COEFFICIENT OF FRICTION FOR SLIDING	0.35

- SOIL BENEATH FOOTINGS SHALL BE STABILIZED PER GEOTECHNICAL RECOMMENDATIONS. PRIOR TO PLACEMENT OF CONCRETE SUBSTRATE SHALL BE FREE OF FROST, WATER AND FOREIGN DEBRIS, CONDITIONED AND COMPACTED WITH APPROVED STRUCTURAL FILL IN ACCORDANCE WITH SOILS REPORT AND SPECIFICATIONS HAVING THE REQUIRED MINIMUM DENSITY AS FOLLOWS:

FOUNDATION SUB-GRADE 95% OF STANDARD PROCTOR, ASTM D1557.

- A REPRESENTATIVE OF THE SOIL ENGINEER SHALL INSPECT THE OPEN EXCAVATION TO DETERMINE THAT THE SOIL TYPE AND CONDITIONS ARE CONSISTENT WITH DESIGN CRITERIA OF THE SOIL REPORT. IF THE SOIL PROPERTIES ARE FOUND TO BE DIFFERENT FROM THIS CRITERIA, THEN THE ENGINEER SHALL BE PROMPTLY NOTIFIED SO THAT THE FOUNDATION DESIGN MAY BE REVIEWED.

CONCRETE:

- ALL CONCRETE DESIGN, MATERIAL AND CONSTRUCTION SHALL CONFORM TO ACI 318-14 STANDARD, THE INTERNATIONAL BUILDING CODE, 2018 EDITION, THE CRSI MANUAL OF STANDARD PRACTICE (CURRENT EDITION), AND THE PROJECT SPECIFICATIONS.

- MATERIAL SPECIFICATIONS:
- | | |
|------------------|-------------------|
| REINFORCING BARS | ASTM A615, GR. 60 |
|------------------|-------------------|

- CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:
- | | |
|------------------|--------------------------------|
| FOOTINGS & WALLS | 4500 p.s.i. CEMENT TYPE I/II |
| | CORROSIVITY = CLASS 0 EXPOSURE |

- REINFORCEMENT SHALL BE DETAILED IN ACCORDANCE WITH THE ACI DETAILING MANUAL, LATEST EDITION. FORMWORK SHALL BE DESIGNED, ERECTED AND REMOVED IN ACCORDANCE WITH A.C.I. SPECIFICATIONS.

- REINFORCEMENT SHALL BE PLACED SO THAT THE FOLLOWING MINIMUM CONCRETE PROTECTION IS PROVIDED, UNLESS NOTED OTHERWISE:
- | | |
|--|--------------|
| CONCRETE SURFACES POURED AGAINST GROUND | 3" CLEAR |
| FORMED SURFACES EXPOSED TO GROUND OR WEATHER | 2" CLEAR |
| BAR #6 AND LARGER | 1-1/2" CLEAR |
| BAR #5 AND SMALLER | 1-1/2" CLEAR |

- REINFORCEMENT SHALL BE SECURELY TIED AND SHALL BE SUPPORTED WITH METAL CHAIRS OR HUNG FROM FORMS.
- CONTINUOUS HORIZONTAL BARS AND CORNER BARS IN FOOTINGS AND STEM WALLS SHALL BE LAPPED AS FOLLOWS AT SPLICES. SPLICE LOCATION SHALL BE STAGGERED WHERE POSSIBLE.

COMPRESSIVE STRENGTH	No. 6 BAR & SMALLER	No. 7 BAR & LARGER
4500 p.s.i.	35 d _b	45 d _b
	(WHERE d _b = BAR DIAMETERS)	

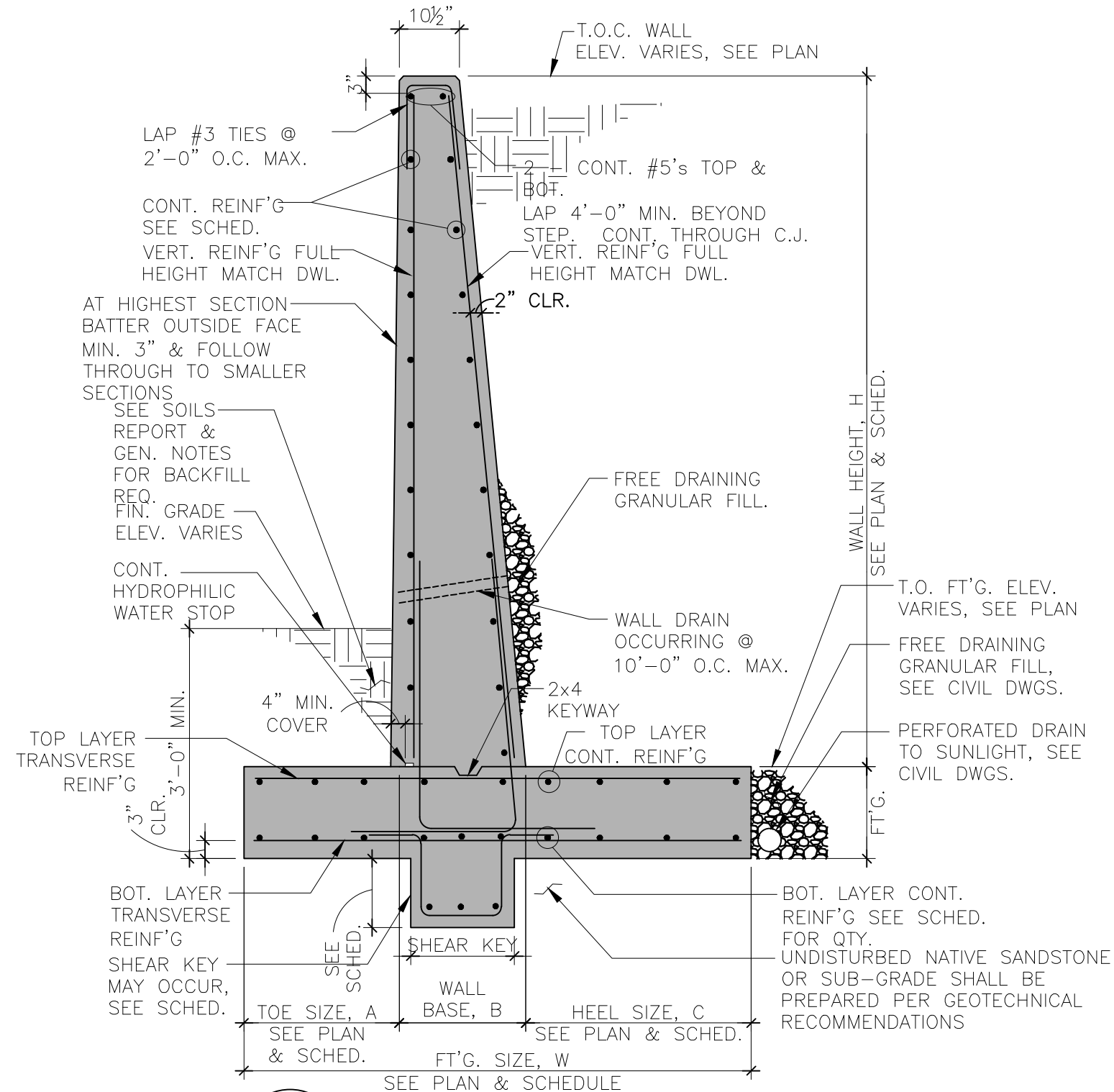
- VERTICAL DOWEL BARS IN WALLS SHALL BE LAPPED A MINIMUM OF 46 BAR DIAMETERS, UNLESS NOTED OTHERWISE ON THE DRAWINGS.

- ADDITIONAL (2) #5 BARS (ONE AT EACH FACE) WITH A 2'-0" PROJECTION SHALL BE PLACED DIAGONALLY ACROSS THE CORNERS OF ALL OPENINGS AND VERTICAL STEPS IN WALLS.

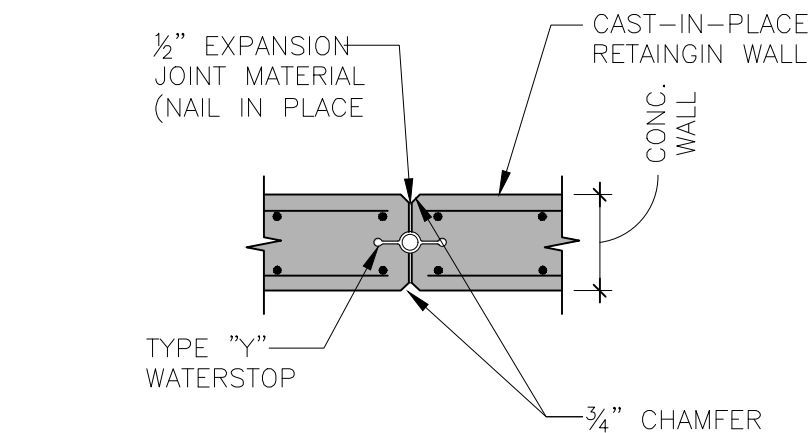
- RETAINING WALLS BELOW GRADE ARE NOT DESIGNED SPECIFICALLY FOR TEMPORARY CONDITIONS & LOADING. THE STRUCTURE IS DESIGNED TO BE STABLE AND SELF SUPPORTING AT THE COMPLETION OF CONSTRUCTION. TEMPORARY BRACES, GUYS, SHORING, ETC. DURING CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. BACKFILLING SHALL NOT BE ALLOWED UNTIL CONCRETE HAS CURED FOR 7 DAYS AND/OR 85% OF CONCRETE STRENGTH IS ACHIEVED. BACKFILL INSTALLATION, LIFTS, COMPACTION & OPTIMUM MOISTURE SHALL BE IN ACCORDANCE WITH ALL CRITERIA PER GEOTECHNICAL INVESTIGATION INCLUDING FIELD CONFIRMATION OF INITIAL FINDINGS.

- CONSTRUCTION JOINTS SHALL BE PROVIDED IN WALLS WHICH ARE OVER 90 FEET IN A STRAIGHT RUN. WATERSTOPS AND KEYWAYS SHALL BE PROVIDED AT ALL CONSTRUCTION JOINTS WHERE JOINTS OCCUR BELOW GRADE. ALL CONSTRUCTION JOINTS SHALL BE APPROVED BY ENGINEER.

NOTE:
 1. SEE SHEETS C225-C227 FOR DIMENSION SCHEDULE.

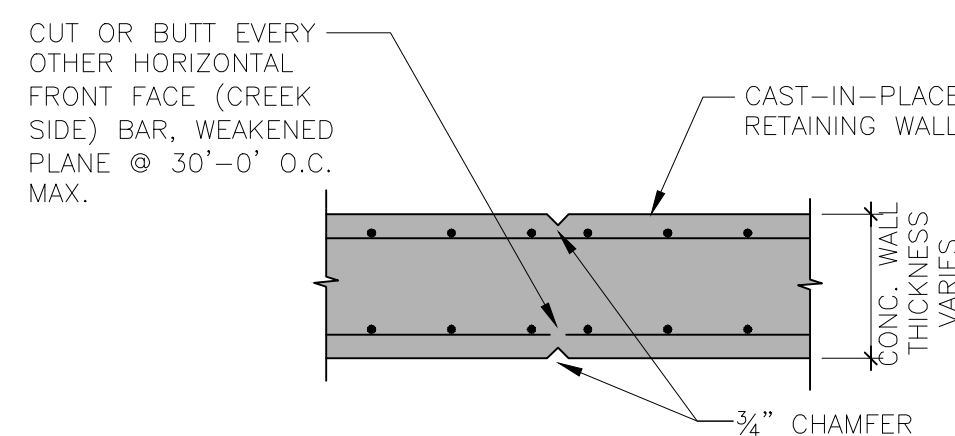


A TYPICAL WINGWALL SECTION A
 C224 SCALE: 1/2" = 1'-0"



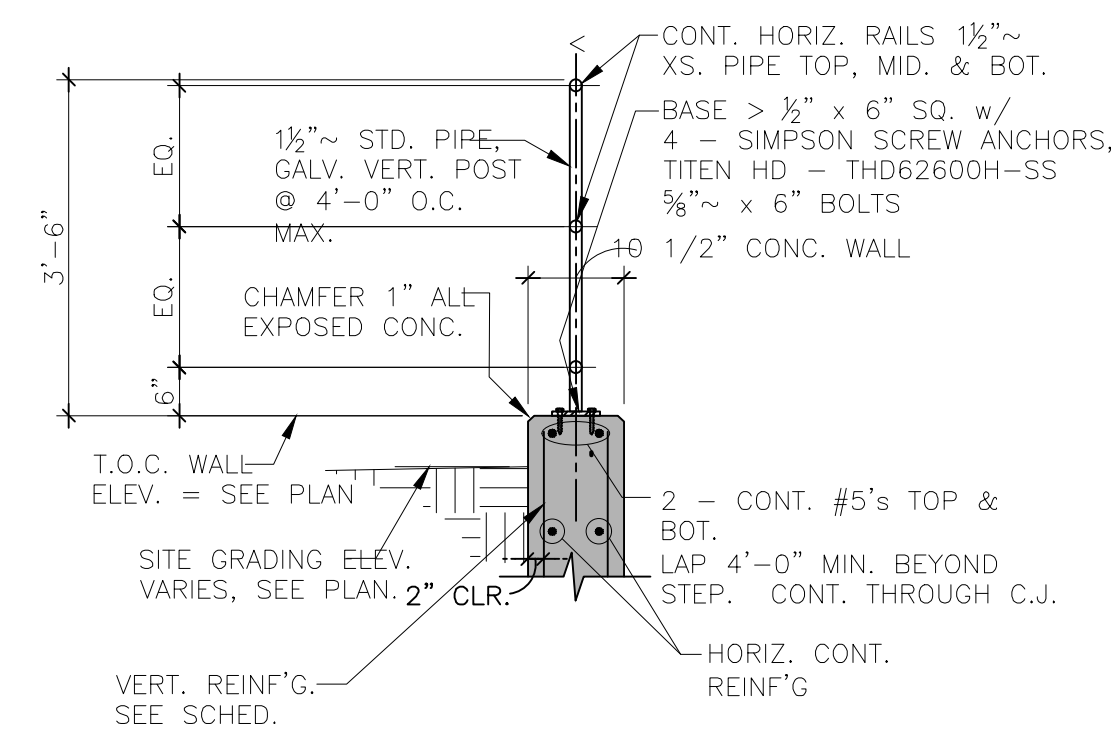
D TYPICAL WALL EXPANSION JOINT
 C224 SCALE: 1/2" = 1'-0"

NOTES:
 1. PROVIDE EXPANSION JOINT EVERY 90 FT. MAXIMUM.

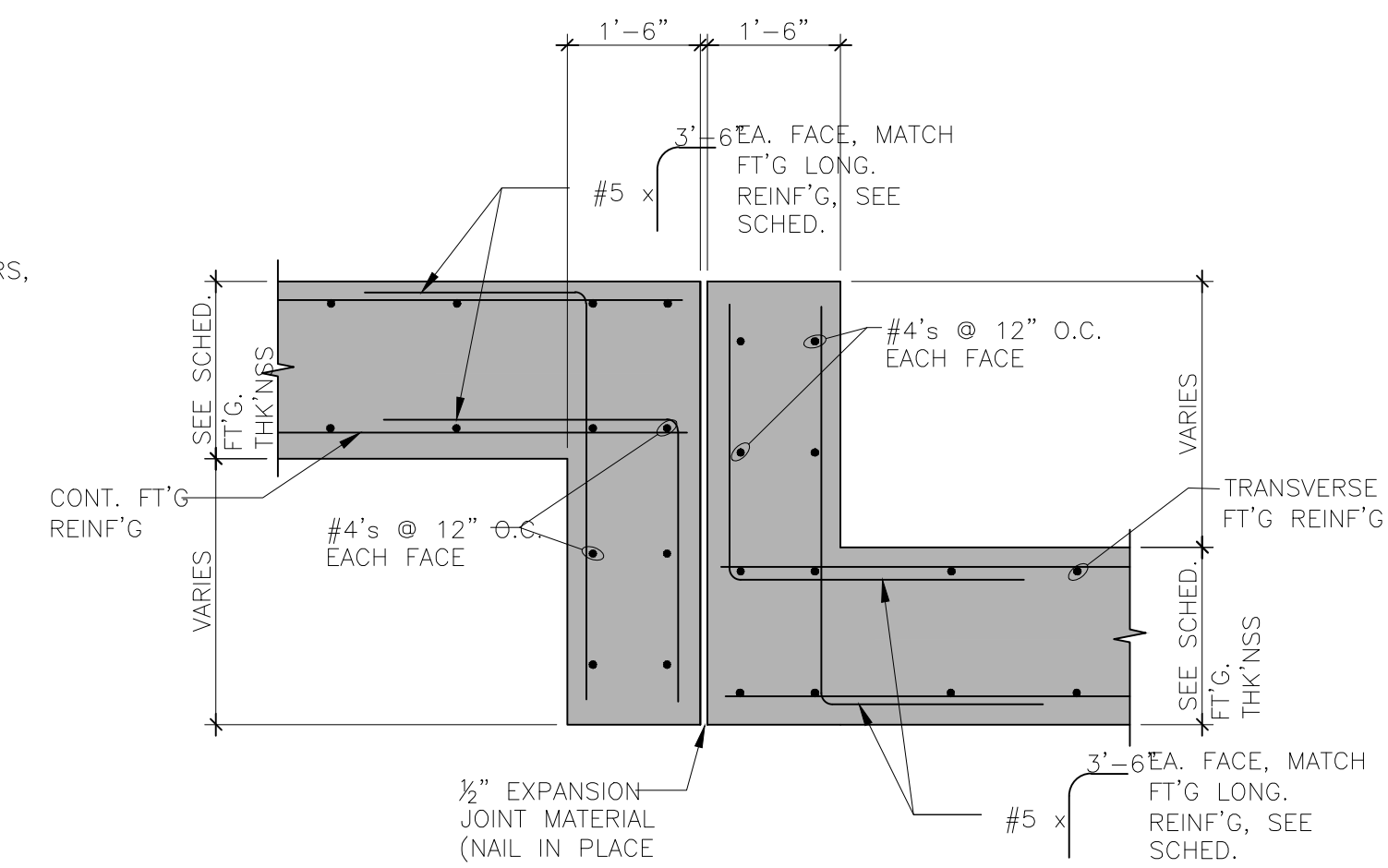


E TYPICAL CONTROL JOINT
 C224 SCALE: N.T.S.

NOTES:
 1. PROVIDE CONTROL JOINT EVERY 30 FT. MAXIMUM.
 2. AT CONSTRUCTION JOINTS RUN HORIZONTAL EPOXY COATED REBAR CENTERED ON JOINT WITH ADJUSTED LAP LENGTHS PER ACI.
 3. DO NOT EXTEND JOINTS THROUGH FOOTING.

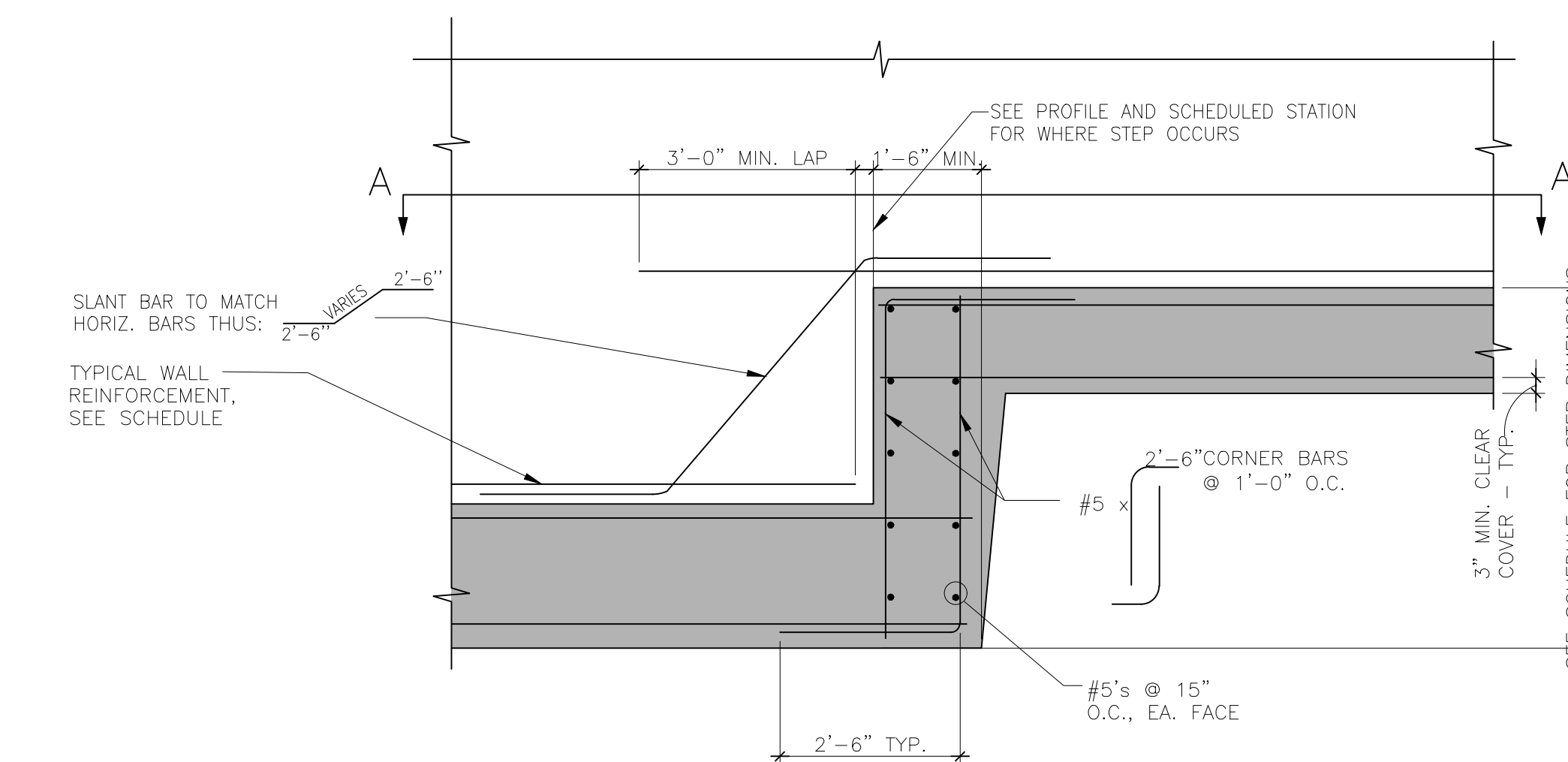


B TYPICAL HANDRAIL ATTACHMENT
 C224 SCALE: 1/2" = 1'-0"



C TYPICAL FOOTING EXPANSION JOINT @ STEP
 C224 SCALE: 1/2" = 1'-0"

NOTES:
 1. PROVIDE EXPANSION JOINT EVERY 90 FT. MAXIMUM.
 2. OFFSET WALL EXPANSION JOINTS FROM FOOTING JOINTS BY ONE-THIRD OF THE WALL HEIGHT, MINIMUM.



F TYPICAL MONOLITHIC STEP ELEV. & PLAN A-A
 C224 SCALE: N.T.S.

NOTES:
 1. AT CONSTRUCTION JOINTS RUN HORIZONTAL EPOXY COATED REBAR CENTERED ON JOINT WITH ADJUSTED LAP LENGTHS PER ACI.
 2. PROVIDE VERTICAL DOWEL THROUGH STEP AS SCHEDULED.



Know what's below.
 Call before you dig.

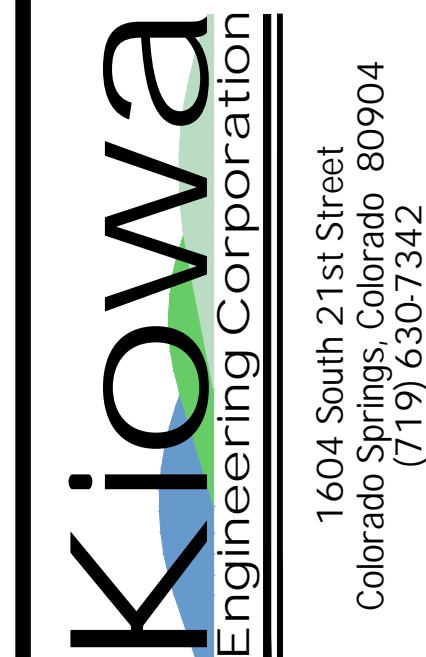
Project No.:	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

RETAINING WALL PARAMETERS & REINFORCING SCHEDULE FOR WING WALL N2

READ TABLE ALONG w/ DETAIL																								
GEOMETRY/ELEVATION AT RETAINING WALL STEPS										SHEAR KEY		FOOTING REINFORCEMENT				WALL REINFORCEMENT								
TYPE	STATIONS/ TOP OF WALL ELEV.		TOP OF FOOTING ELEV.	AVERAGE HEIGHT, H'	FT'G. SIZE W	FOOTING THICKNESS, D	TOE SIZE A	BASE DIM. B	HEEL SIZE C	DIMENSIONS		REINFORCEMENT		CONT. LONG. FT'G REINF'G. (S&T)		TRANSVERSE REINF'G.		VERTICAL DOWELS		VERTICAL REINFORCING		HORIZ. REINFORCING		
										WIDTH	DEPTH	LONG.	SHEAR REINF'G	TOP LAYER	BOT. LAYER	TOP LAYER (HEEL)	BOT. LAYER (TOE)	EARTH SIDE	CREEK SIDE	EARTH SIDE	CREEK SIDE	EARTH SIDE	CREEK SIDE	
1	STA. 13+70.48	STA. 13+75.48	ELEV. =7106.60	3.63'	2'-6"	1'-0"	0'-8"	1'-0"	1'-0"					CONT. 3 - #5's				#4's X1'-4" @ 15" O.C.			CONT. #4's @ 18" O.C.			
	7110.19	7110.00																						
2	STA. 13+58.48	STA. 13+70.48	ELEV. =7104.11	6.46'	6'-0"	1'-0"	1'-6"	1'-0"	3'-5"					CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.	#5's @ 15" O.C.	#5's @ 15" O.C.	#5's X1'-6" @ 15" O.C.	#4's X1'-4" @ 15" O.C.	#5's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.	
	7110.64	7110.19																						
3	STA. 13+48.48	STA. 13+58.48	ELEV. =7101.60	9.38'	8'-6"	1'-0"	2'-6"	1'-0"	5'-0"					CONT. #4's @ 15" O.C.	CONT. #5's @ 15" O.C.	#5's @ 9" O.C.	#5's @ 12" O.C.	#5's X1'-6" @ 9" O.C.	#4's X1'-4" @ 12" O.C.	#5's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.	
	7111.00	7110.64																						
4	STA. 13+38.48	STA. 13+48.48	ELEV. =7099.10	12.24'	10'-6"	1'-4"	3'-0"	1'-6"	6'-0"	1'-6"	1'-6"	1'-6"	1'-6"	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 12" O.C.	CONT. #5's @ 12" O.C.	#6's @ 12" O.C.	#5's @ 12" O.C.	#6's X1'-6" @ 8" O.C.	#4's X1'-4" @ 12" O.C.	#6's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 15" O.C.	CONT. #4's @ 15" O.C.
	7111.39	7111.00																						
5	STA. 13+22.48	STA. 13+38.48	ELEV. =7096.60	15.22'	14'-0"	1'-6"	4'-0"	1'-10"	8'-6"	1'-6"	1'-6"	1'-6"	1'-6"	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#6's @ 8" O.C.	#6's @ 10" O.C.	#7's X1'-6" @ 8" O.C.	#4's X1'-4" @ 12" O.C.	#7's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 15" O.C.	CONT. #4's @ 15" O.C.
	7111.99	7111.39																						
6	STA. 13+12.48	STA. 13+22.48	ELEV. =7094.08	18.21'	16'-10"	1'-6"	5'-0"	1'-10"	10'-0"	1'-6"	1'-6"	1'-6"	1'-6"	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#7's @ 8" O.C.	#7's @ 10" O.C.	#9's X1'-6" @ 8" O.C.	#4's X1'-4" @ 12" O.C.	#9's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 15" O.C.	CONT. #4's @ 15" O.C.
	7112.37	7111.99																						
7	STA. 13+02.48	STA. 13+12.48	ELEV. =7091.58	20.98'	17'-9"	1'-9"	5'-0"	2'-9"	10'-0"	2'-0"	2'-0"	2'-0"	2'-0"	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#8's @ 8" O.C.	#9's @ 10" O.C.	#9's X2'-0" @ 8" O.C.	#5's X1'-0" @ 12" O.C.	ABOVE SPLICE #8's MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.
	7112.75	7112.37																						
8	STA. 12+93.48	STA. 13+02.48	ELEV. =7089.08	23.84'	19'-6"	2'-0"	5'-6"	2'-9"	11'-3"	2'-0"	2'-0"	2'-0"	2'-0"	CONT. 3 - #5 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#9's @ 8" O.C.	#9's @ 10" O.C.	#9's X2'-0" @ 8" O.C.	#5's X1'-0" @ 12" O.C.	ABOVE SPLICE #9's @ MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.
	7113.09	7113.50																						

RETAINING WALL PARAMETERS & REINFORCING SCHEDULE FOR WING WALL S1

READ TABLE ALONG w/ DETAIL																								
GEOMETRY/ELEVATION AT RETAINING WALL STEPS										SHEAR KEY		FOOTING REINFORCEMENT				WALL REINFORCEMENT								
TYPE	STATIONS/ TOP OF WALL ELEV.		TOP OF FOOTING ELEV.	AVERAGE HEIGHT, H'	FT'G. SIZE W	FOOTING THICKNESS, D	TOE SIZE A	BASE DIM. B	HEEL SIZE C	DIMENSIONS		REINFORCEMENT		CONT. LONG. FT'G REINF'G. (S&T)		TRANSVERSE REINF'G.		VERTICAL DOWELS		VERTICAL REINFORCING		HORIZ. REINFORCING		
										WIDTH	DEPTH	LONG.	SHEAR REINF'G	TOP LAYER	BOT. LAYER	TOP LAYER (HEEL)	BOT. LAYER (TOE)	EARTH SIDE	CREEK SIDE	EARTH SIDE	CREEK SIDE	EARTH SIDE	CREEK SIDE	
1	STA. 20+00	STA. 20+32	ELEV. =7093.60	6.92'	6'-0"	1'-0"	1'-6"	1'-0"	3'-5"					CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.	#5's @ 15" O.C.	#5's @ 15" O.C.	#5's X1'-6" @ 15" O.C.	#4's X1'-4" @ 15" O.C.	#5's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.	
	7098.00	7104.00																						
2	STA. 20+32	STA. 20+46	ELEV. =7092.10	13.21'	10'-6"	1'-4"	3'-0"	1'-6"	6'-0"	1'-6"	1'-6"	1'-6"	1'-6"	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 12" O.C.	CONT. #5's @ 12" O.C.	#6's @ 12" O.C.	#5's @ 12" O.C.	#6's X1'-6" @ 8" O.C.	#4's X1'-4" @ 12" O.C.	#6's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 15" O.C.	CONT. #4's @ 15" O.C.
	7104.00	7106.63																						
3	STA. 20+46	STA. 20+67	ELEV. =7089.60	20.21'	17'-9"	1'-9"	5'-0"	2'-9"	10'-0"	2'-0"	2'-0"	2'-0"	2'-0"	CONT. 3 - #5 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#8's @ 8" O.C.	#9's @ 10" O.C.	#9's X2'-0" @ 8" O.C.	#5's X1'-0" @ 12" O.C.	ABOVE SPLICE #8's MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.
	7106.63	7113.00																						



1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
WINGWALL TABLE
EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	5/2/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C226

**STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
WINGWALL TABLE
EL PASO COUNTY, COLORADO**

RETAINING WALL PARAMETERS & REINFORCING SCHEDULE FOR WING WALL S2																							
READ TABLE ALONG w/ DETAIL										SHEAR KEY				FOOTING REINFORCEMENT				WALL REINFORCEMENT					
GEOMETRY/ELEVATION AT RETAINING WALL STEPS										DIMENSIONS		REINFORCEMENT		CONT. LONG. FT'G REINF'G. (S&T)		TRANSVERSE REINF'G.		VERTICAL DOWELS		VERTICAL REINFORCING		HORIZ. REINFORCING	
TYPE	STATIONS/ TOP OF WALL ELEV.		TOP OF FOOTING ELEV.	AVERAGE HEIGHT, H'	FT'G. SIZE W	FOOTING THICKNESS, D	TOE SIZE A	BASE DIM. B	HEEL SIZE C	WIDTH	DEPTH	LONG.	SHEAR REINF'G	TOP LAYER	BOT. LAYER	TOP LAYER (HEEL)	BOT. LAYER (TOE)	EARTH SIDE	CREEK SIDE	EARTH SIDE	CREEK SIDE	EARTH SIDE	CREEK SIDE
1	A	STA. 22+53.48 7116.5	STA. 22+67.48 7116.5	ELEV. =7111.15 4.44'	2'-0"	1'-0"	0'-6"	1'-0"	0'-6"						CONT. 3 - #5's			#4's x1'-2" @ 15" O.C.	CONT. #4's @ 18" O.C.			CONT. #4's @ 18" O.C.	
2	B	STA. 22+43.48 7116.5	STA. 22+53.48 7116.5	ELEV. =7109.65 6.00'	3'-6"	1'-0"	1'-0"	1'-0"	1'-6"						CONT. 3 - #5's			#4's x1'-2" @ 15" O.C.	CONT. #4's @ 18" O.C.			CONT. #4's @ 18" O.C.	
3	C	STA. 22+33.48 7116.5	STA. 22+43.48 7116.5	ELEV. =7108.14 7.61'	6'-0"	1'-0"	1'-6"	1'-0"	3'-5"					CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.	#5's @ 15" O.C.	#5's @ 15" O.C.	#5's x1'-6" @ 15" O.C.	#4's x1'-4" @ 15" O.C.	#5's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.
4	D	STA. 22+23.48 7116.5	STA. 22+33.48 7116.5	ELEV. =7105.64 10.21'	8'-6"	1'-0"	2'-6"	1'-0"	5'-0"					CONT. #4's @ 15" O.C.	CONT. #5's @ 15" O.C.	#5's @ 9" O.C.	#5's @ 12" O.C.	#5's x1'-6" @ 9" O.C.	#4's x1'-4" @ 12" O.C.	#5's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 18" O.C.	CONT. #4's @ 18" O.C.
5	E	STA. 22+03.48 7116.5	STA. 22+23.48 7116.5	ELEV. =7103.13 12.82'	10'-6"	1'-4"	3'-0"	1'-6"	6'-0"	1'-6"	1'-6"	#5 x1'-4" U-DWLS @ 16" O.C.	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 12" O.C.	CONT. #5's @ 12" O.C.	#6's @ 12" O.C.	#5's @ 12" O.C.	#6's x1'-6" @ 8" O.C.	#4's x1'-4" @ 12" O.C.	#6's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 15" O.C.	CONT. #4's @ 15" O.C.
6	F	STA. 21+93.48 7116.5	STA. 22+03.48 7116.5	ELEV. =7100.63 15.39'	14'-0"	1'-6"	4'-0"	1'-10"	8'-6"	1'-6"	1'-6"	#5 x1'-4" U-DWLS @ 16" O.C.	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#6's @ 8" O.C.	#6's @ 10" O.C.	#7's x1'-6" @ 8" O.C.	#4's x1'-4" @ 12" O.C.	#7's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 15" O.C.	CONT. #4's @ 15" O.C.
7	G	STA. 21+69.48 7116.5	STA. 21+93.48 7116.5	ELEV. =7097.64 18.49	16'-10"	1'-6"	5'-0"	1'-10"	10'-0"	1'-6"	1'-6"	#5 x1'-4" U-DWLS @ 16" O.C.	CONT. 3 - #4 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#7's @ 8" O.C.	#7's @ 10" O.C.	#9's x1'-6" @ 8" O.C.	#4's x1'-4" @ 12" O.C.	#9's FULL HT. MATCH DOWEL SPACING	#4's FULL HT. MATCH DOWEL SPACING	CONT. #4's @ 15" O.C.	CONT. #4's @ 15" O.C.
8	H	STA. 21+59.48 7116.5	STA. 21+69.48 7116.5	ELEV. =7095.14 21.10'	17'-9"	1'-9"	5'-0"	2'-9"	10'-0"	2'-0"	2'-0"	#5 x1'-8" U-DWLS @ 16" O.C.	CONT. 3 - #5 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#8's @ 8" O.C.	#9's @ 10" O.C.	#9's x2'-0" @ 8" O.C.	#5's x1'-0" @ 12" O.C.	ABOVE SPLICE #8's MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.
9	J	STA. 21+49.48 7116.5	STA. 21+59.48 7116.5	ELEV. =7092.64 23.66'	19'-6"	2'-0"	5'-6"	2'-9"	11'-3"	2'-0"	2'-0"	#5 x1'-8" U-DWLS @ 16" O.C.	CONT. 3 - #5 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#9's @ 8" O.C.	#9's @ 10" O.C.	#9's x2'-0" @ 8" O.C.	#5's x1'-0" @ 12" O.C.	ABOVE SPLICE #9's @ MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.
10	K	STA. 21+36.48 7116.5	STA. 21+49.48 7116.5	ELEV. =7090.15 26.28	21'-6"	2'-0"	6'-9"	2'-9"	12'-0"	2'-0"	3'-0"	#5 x1'-8" U-DWLS @ 16" O.C.	CONT. 3 - #5 TOP & BOT.	CONT. #5's @ 10" O.C.	CONT. #5's @ 10" O.C.	#9's @ 10" O.C.	#9's @ 10" O.C.	#11's x2'-0" @ 10" O.C.	#5's x1'-0" @ 12" O.C.	ABOVE SPLICE #10's MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.



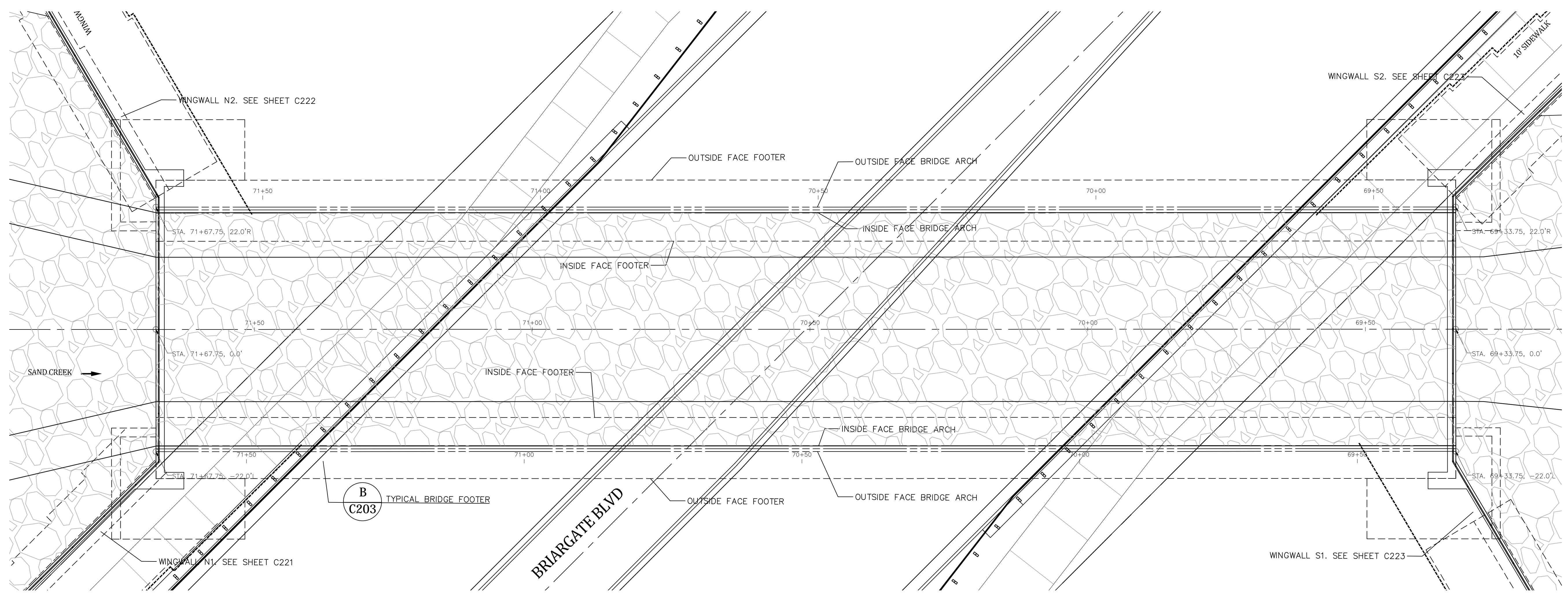
Know what's below.
Call before you dig.

C227

**STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS
BRIDGE FOOTING PROFILE
EL PASO COUNTY, COLORADO**

Project No.: 19032
Date: 5/2/22
Design: TAC
Drawn: PAV
Check:
Revisions:

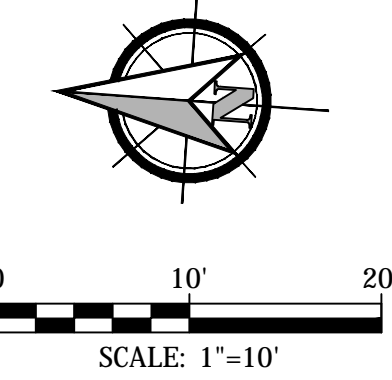
C231



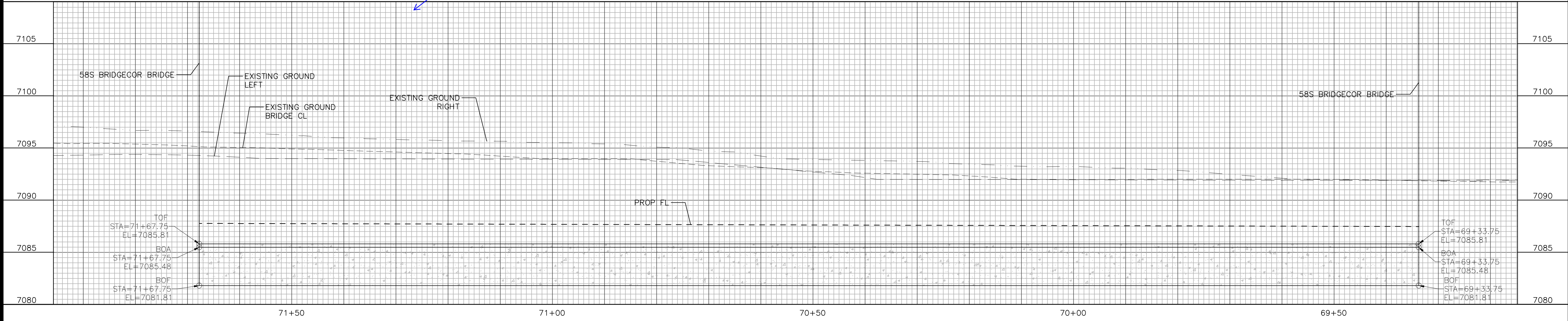
BRIDGE PLAN
1"=10'

NOTES:

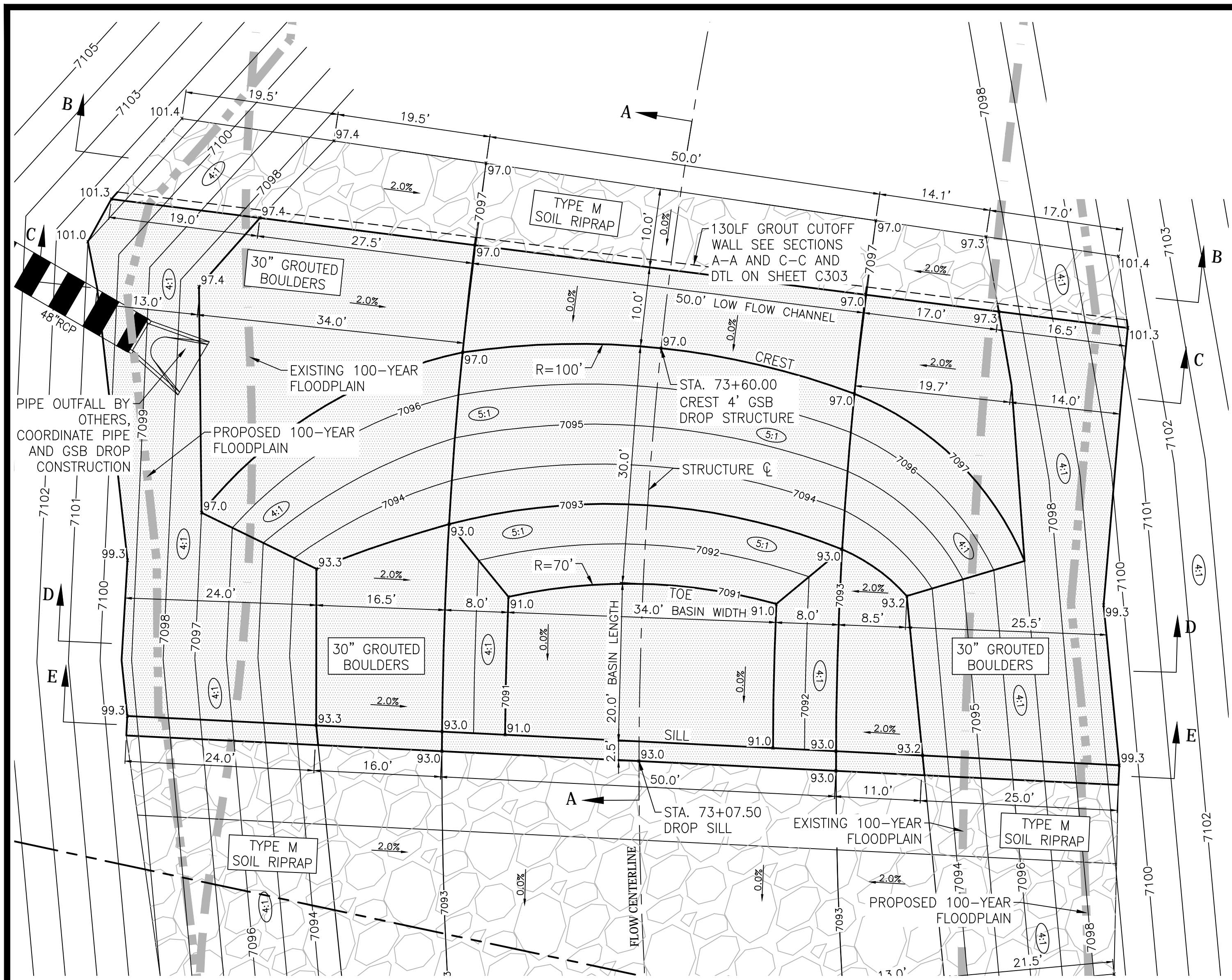
1. THE FOOTINGS ARE DESIGNED FOR A FACTORED BEARING RESISTANCE OF 8,700 PSF (ULTIMATE BEARING RESISTANCE OF 14,500 PSF) BASED ON A 0.60 RESISTANCE FACTOR IN ACCORDANCE WITH THE UPDATED RECOMMENDATION BY ENTECH ENGINEERING, INC FOR A MINIMUM PERMANENT FOOTING EMBEDMENT DEPTH OF 5- FEET. A FRICTION FACTOR OF 0.34 HAS ALSO BEEN UTILIZED BASED ON AN ULTIMATE FRICTION COEFFICIENT OF 0.40 AND THE RECOMMENDED SLIDING RESISTANCE FACTOR OF 0.85. THESE SHALL BE VERIFIED IN THE FIELD BEFORE CONSTRUCTION. THE EVALUATION AND DESIGN OF ANY REQUIRED FOUNDATION IMPROVEMENT TO ACHIEVE THE RECOMMENDED FACTORED BEARING RESISTANCE AND FRICTION FACTOR, AND TO PROTECT AGAINST FROST AND SCOUR AND SETTLEMENT, IS THE RESPONSIBILITY OF OTHERS THAN KBW. ALL RECOMMENDATIONS IN THE PROJECT GEOTECHNICAL REPORT SHALL BE FOLLOWED DURING CONSTRUCTION.



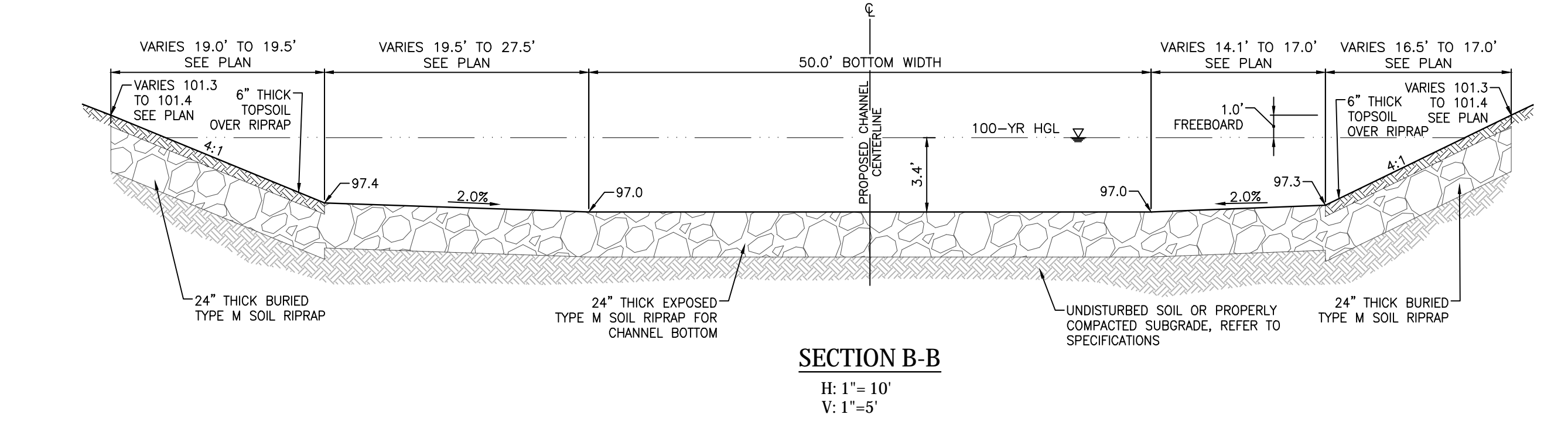
Please lighten the grid



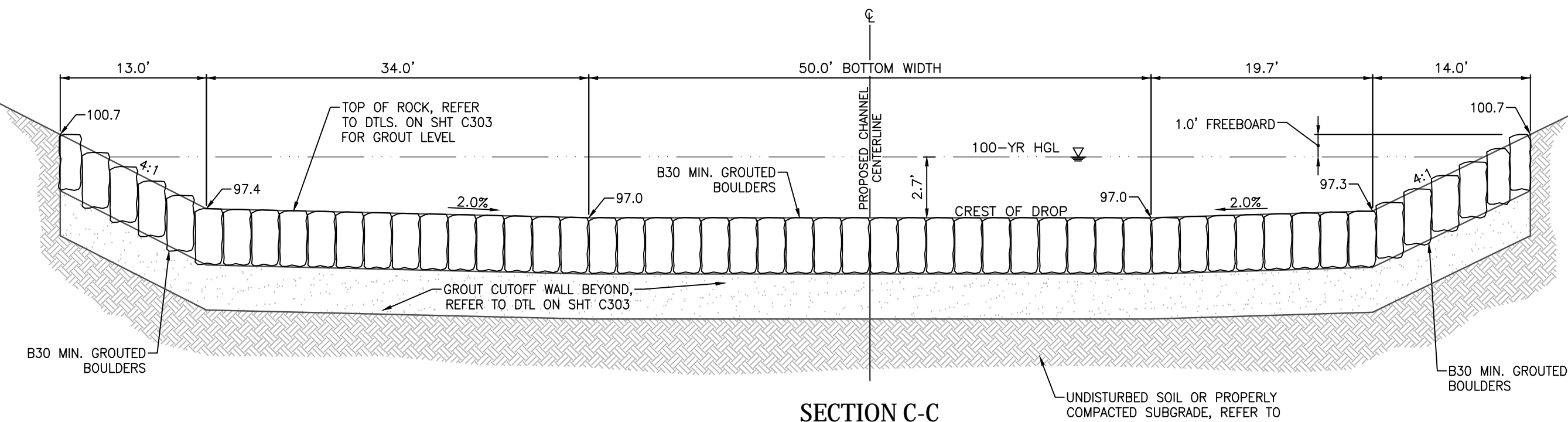
BRIDGE FOOTER PROFILE



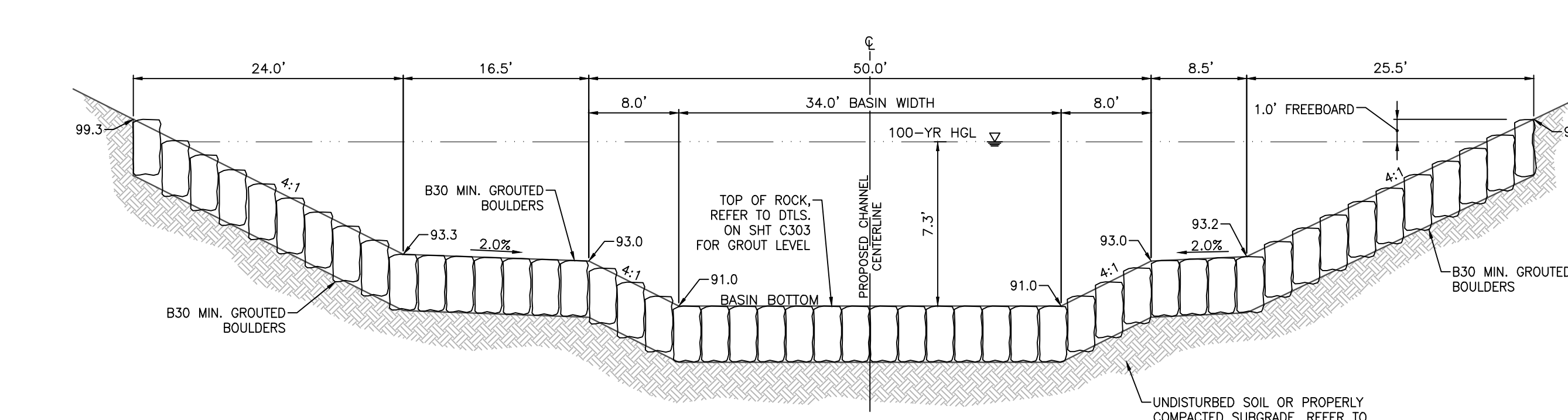
DROP STRUCTURE A PLAN
1" = 10'



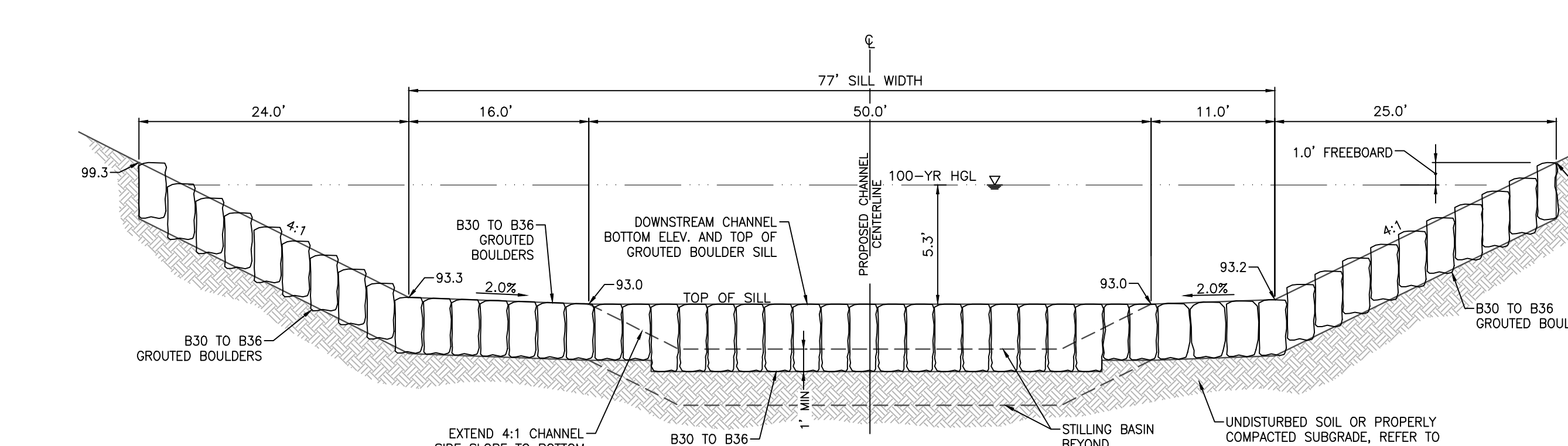
SECTION B-B
H: 1" = 10'
V: 1" = 5'



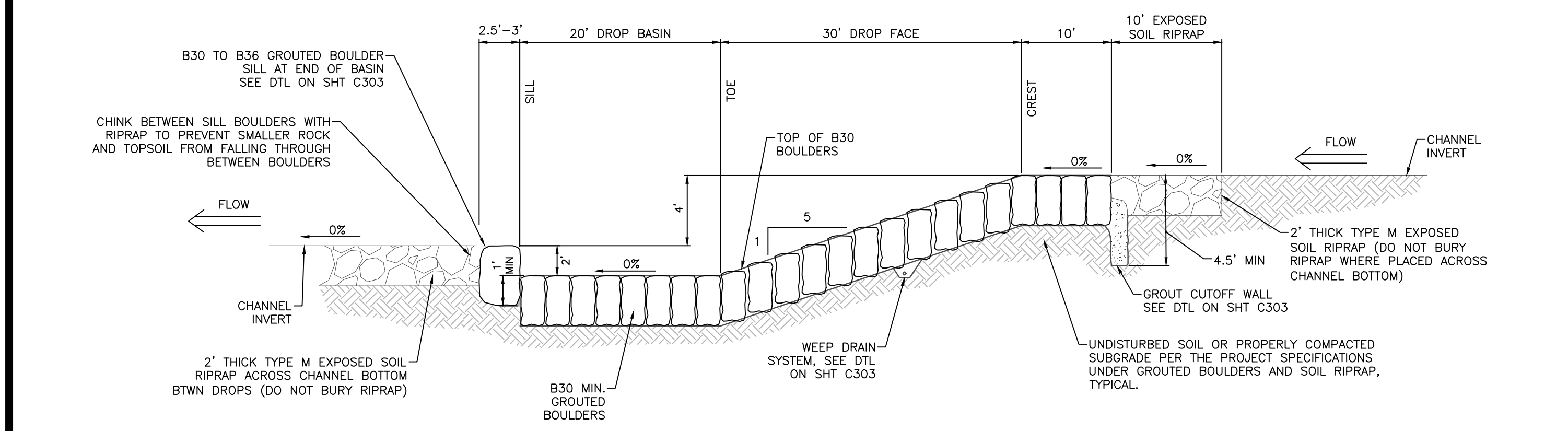
SECTION C-C
H: 1" = 10'
V: 1" = 5'



SECTION D-D
H: 1" = 10'
V: 1" = 5'



SECTION E-E
H: 1" = 10'
V: 1" = 5'



SECTION A-A
H: 1" = 10'
V: 1" = 5'

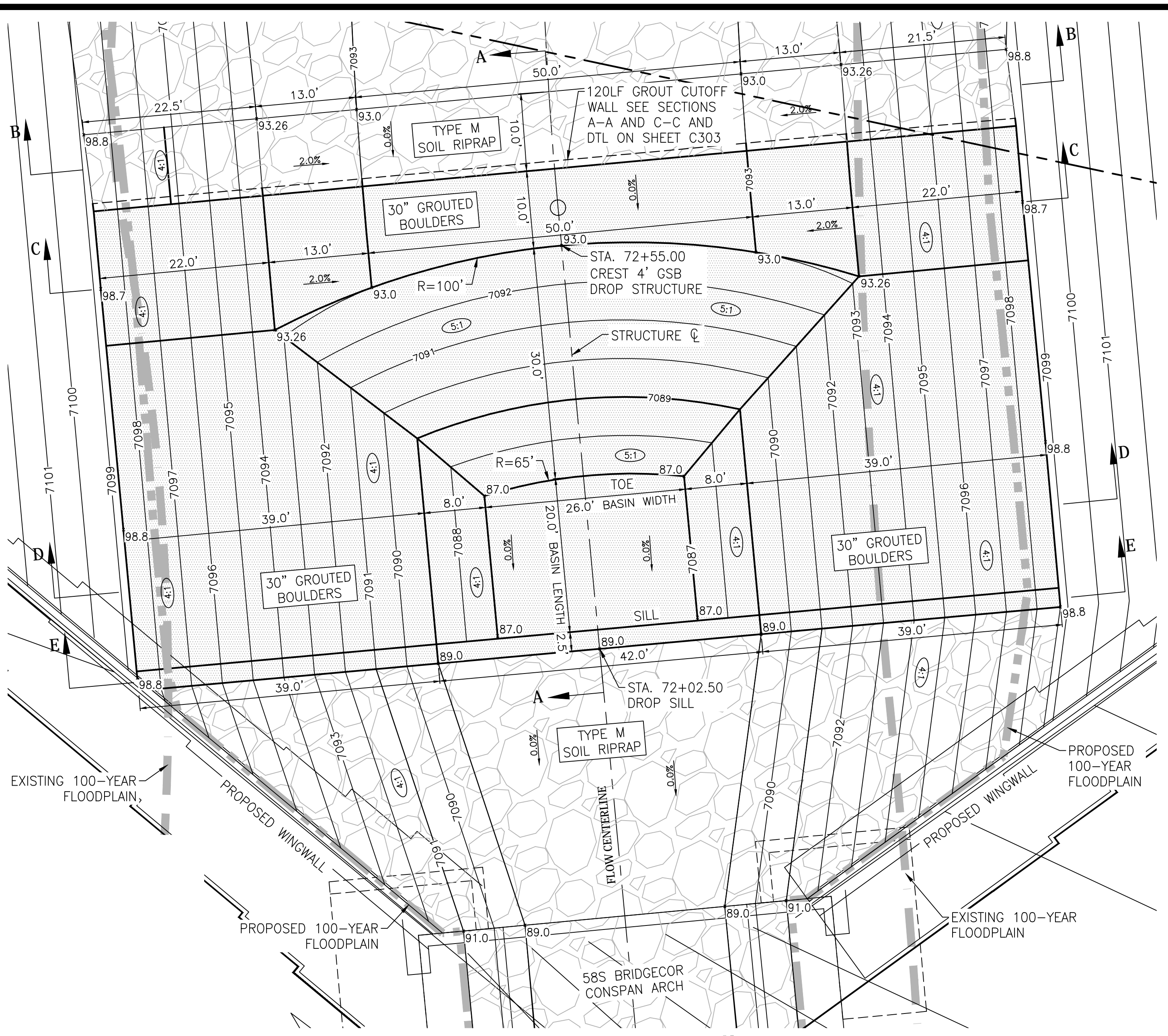
REFER TO OPTIONAL GROUDED BOULDER PLACEMENT DETAIL F ON SHT C303 FOR AREAS WHERE SHALLOW BEDROCK IS ENCOUNTERED.

Project No.:	19032
Date:	4/28/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

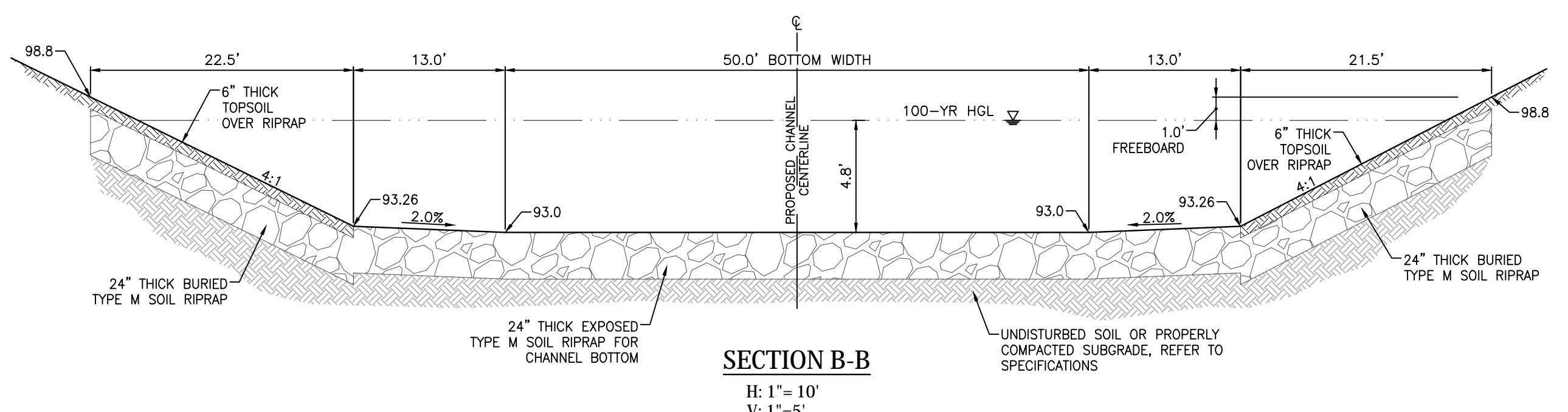
C301

Project No.:	19032
Date:	4/28/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

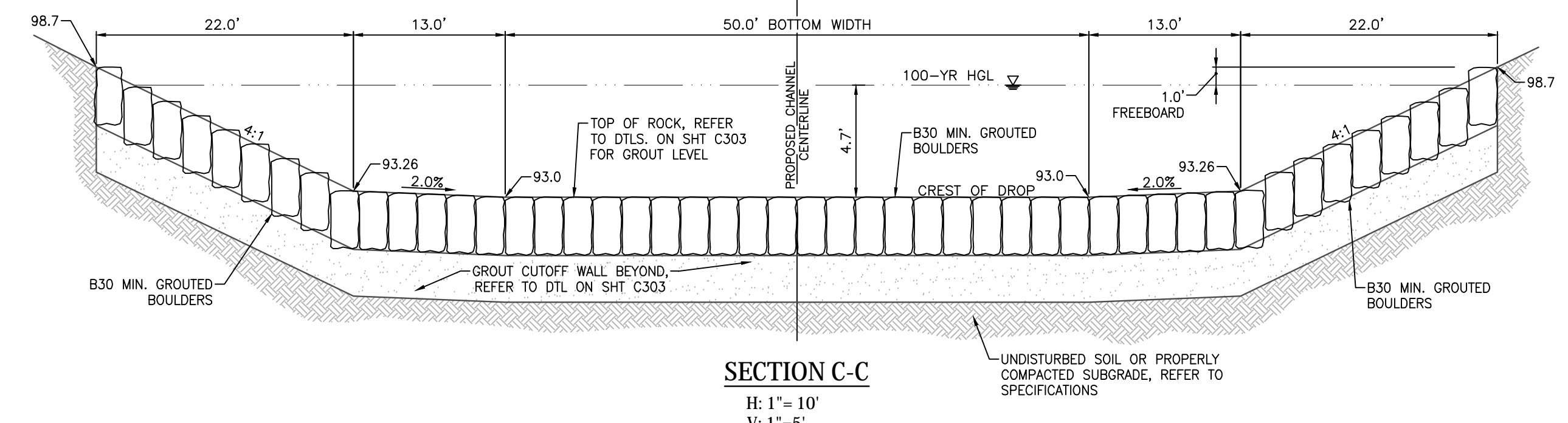
C302



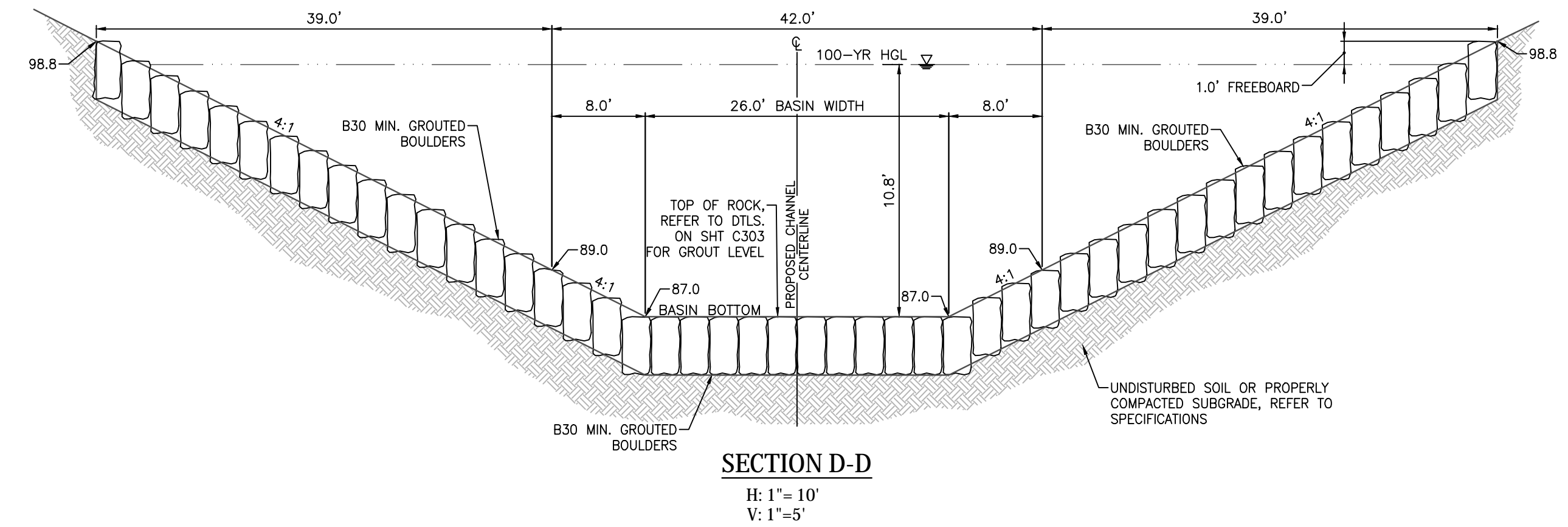
DROP STRUCTURE B PLAN
1"=10"



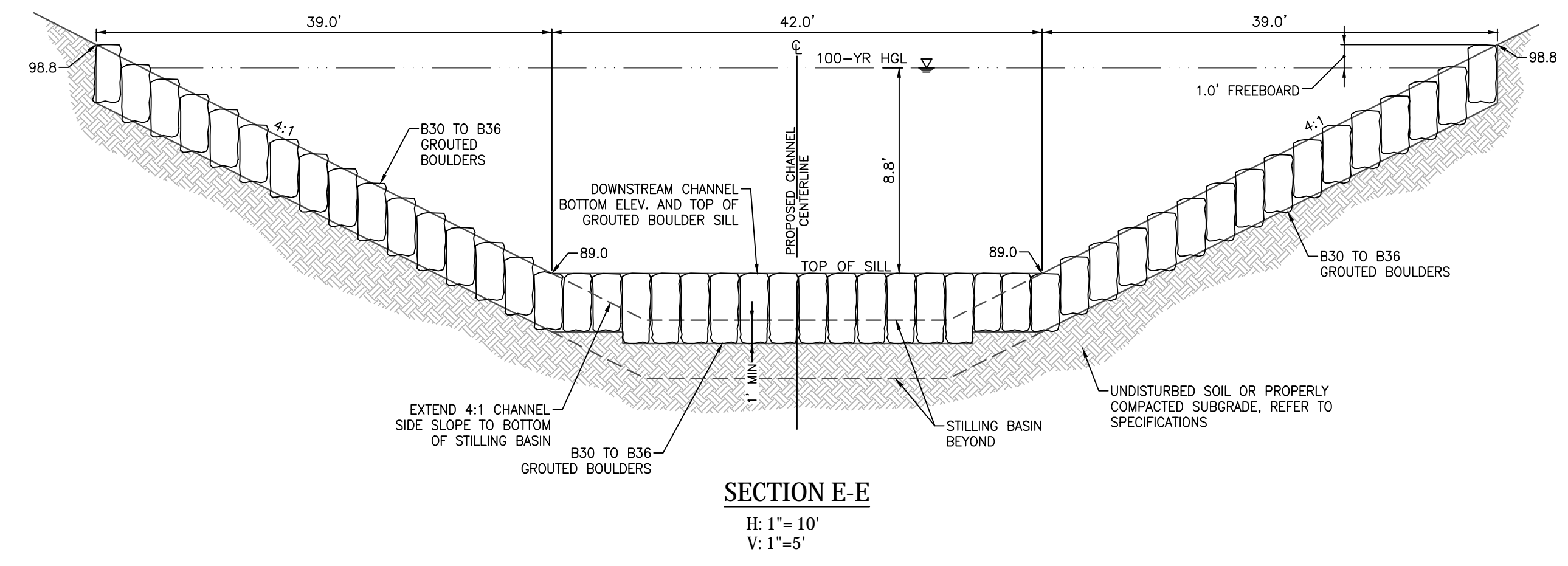
SECTION B-B
H: 1"=10"
V: 1"=5"



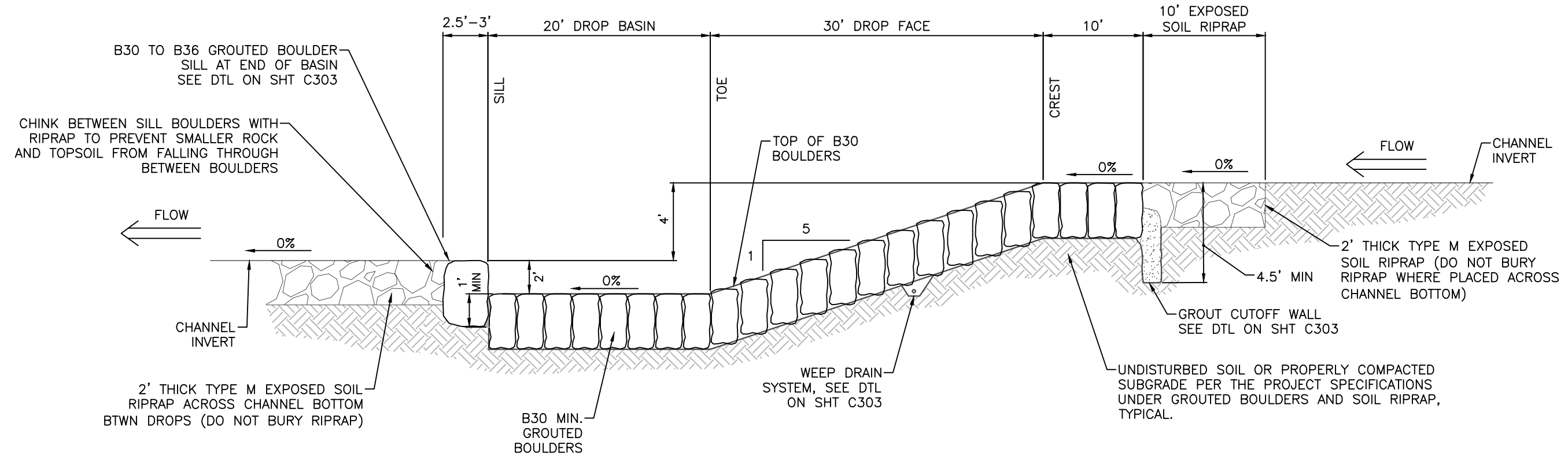
SECTION C-C
H: 1"=10"
V: 1"=5"



SECTION D-D
H: 1"=10"
V: 1"=5"



SECTION E-E
H: 1"=10"
V: 1"=5"

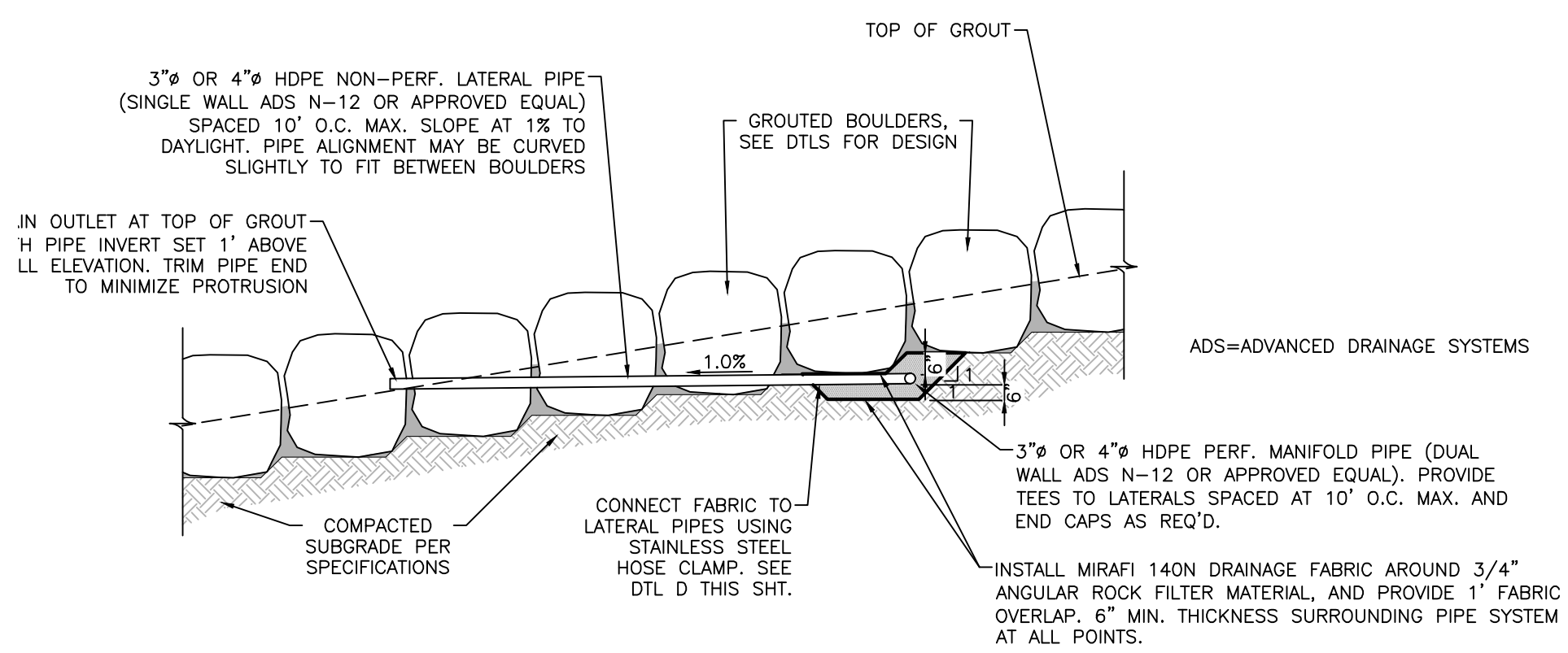


SECTION A-A
H: 1"=10"
V: 1"=5"

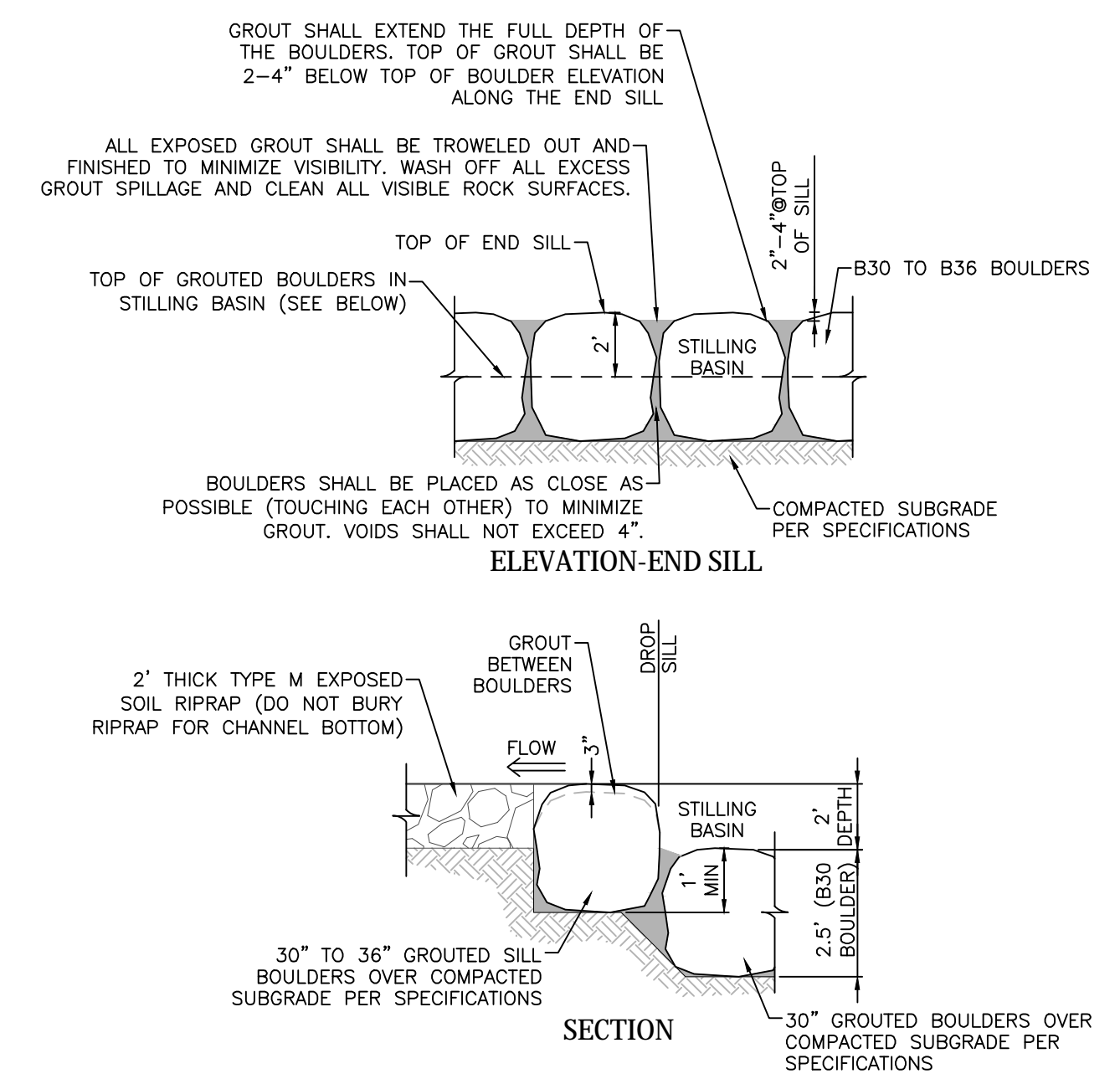
REFER TO OPTIONAL GROUDED BOULDER PLACEMENT DETAIL F ON SHT C303 FOR AREAS WHERE SHALLOW BEDROCK IS ENCOUNTERED.

Project No.:	19032
Date:	4/28/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C303



A
303
WEEP DRAIN SYSTEM DETAIL
SCALE: NTS



B
303
GRouted BOULDER END SILL DETAIL
SCALE: NTS

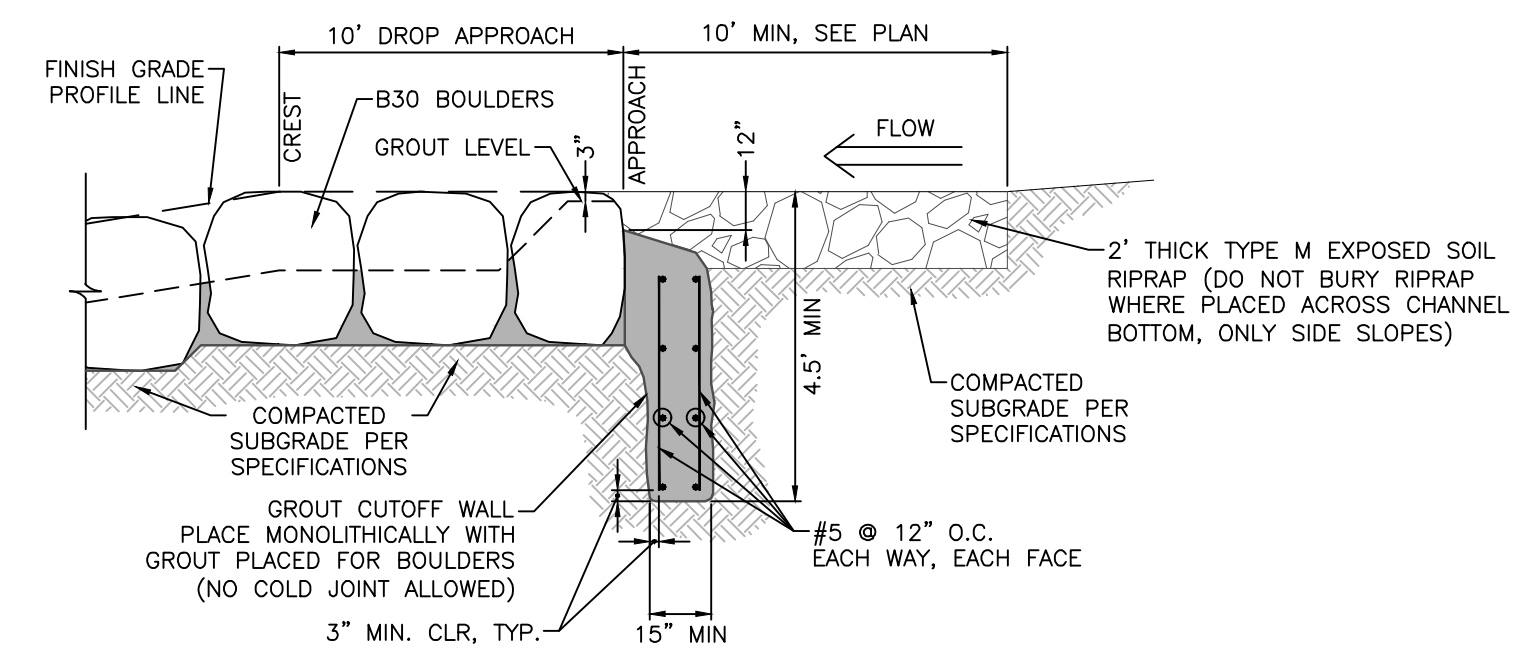
- GENERAL NOTES:**
1. CONTRACTOR TO CONTACT ENGINEER TO REVIEW REPRESENTATIVE BOULDERS AND RIPRAP FOR APPROVAL PRIOR TO DELIVERY TO SITE.
 2. ENGINEER SHALL BE CONTACTED TO OBSERVE SUBGRADE PRIOR TO PLACEMENT OF RIPRAP AND BOULDERS.
 3. ENGINEER SHALL BE CONTACTED TO REVIEW BOULDER PLACEMENT PRIOR TO GROUT PLACEMENT.
 4. ALTHOUGH THE COUNTY OR ENGINEER SHALL PROVIDE FIELD OBSERVATION, CONTRACTOR HAS FULL RESPONSIBILITY OF CONFORMING WITH THE PROJECT DRAWINGS AND SPECIFICATIONS. ANY REWORK COST SHALL BE BORNE BY THE CONTRACTOR.
- GROUT MATERIAL SPECIFICATIONS:**
1. ALL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH EQUAL TO 3200 PSI.
 2. ONE CUBIC YARD OF GROUT SHALL HAVE A MINIMUM OF SIX (6) SACKS OF TYPE II PORTLAND CEMENT.
 3. A MAXIMUM OF 25% TYPE F FLY ASH MAY BE SUBSTITUTED FOR THE PORTLAND CEMENT.
 4. THE AGGREGATE SHALL BE COMPRISED OF 70% FINE AGGREGATE (NATURAL SAND) AND 30% COARSE AGGREGATE (3/8-INCH MAXIMUM ROCK).
 5. THE GROUT SLUMP SHALL BE 4-INCHES TO 6-INCHES.
 6. AIR ENTRAINMENT SHALL BE 5.5%-7.5%.
 7. TO CONTROL SHRINKAGE AND CRACKING, 1.5 POUNDS OF FIBERMESH, OR EQUIVALENT, SHALL BE USED PER CUBIC YARD OF GROUT.
 8. COLOR ADDITIVE IN REQUIRED AMOUNTS SHALL BE USED WHEN SPECIFIED BY CONTRACT.
- GROUT PLACEMENT SPECIFICATIONS:**
1. CLEAN BOULDERS BY BRUSHING AND WASHING BEFORE GROUTING TO IMPROVE THE BOND BETWEEN THE GROUT AND BOULDERS.
 2. GROUT SHALL BE DELIVERED BY MEANS OF A LOW PRESSURE (LESS THAN 10 PSI) CONCRETE PUMP USING A 2-INCH DIAMETER NOZZLE.
 3. FULL DEPTH PENETRATION OF THE GROUT INTO THE BOULDER VOIDS SHALL BE ACHIEVED BY INJECTING GROUT STARTING WITH THE NOZZLE NEAR THE BOTTOM AND RAISING IT AS GROUT FILLS, WHILE VIBRATING GROUT INTO PLACE USING A PENCIL VIBRATOR.
 4. AFTER GROUT PLACEMENT, EXPOSED BOULDER FACES SHALL BE CLEANED WITH A WET BROOM.
 - 4.1. REMOVE ALL GROUT SPLATTER FROM EXPOSED FACES OF ROCK IMMEDIATELY DURING OR FOLLOWING GROUTING OPERATIONS.
 - 4.2. NO GROUT WILL BE ALLOWED TO REMAIN ON THE EXPOSED BOULDER FACES. SANDBLASTING MAY BE REQUIRED TO REMOVE GROUT SPLATTER OR SPILLS THAT ARE ALLOWED TO DRY AND HARDEN ON THE BOULDER FACES.
 5. ALL GROUT BETWEEN BOULDERS SHALL BE TREATED WITH A BROOM FINISH.
 6. ALL FINISHED GROUT SURFACES SHALL BE SPRAYED WITH A CLEAR LIQUID MEMBRANE CURING COMPOUND AS SPECIFIED IN ASTM C-309.
 7. SPECIAL PROCEDURES SHALL BE REQUIRED FOR GROUT PLACEMENT WHEN THE AIR TEMPERATURES ARE LESS THAN 40°F OR GREATER THAN 90°F. CONTRACTOR SHALL OBTAIN PRIOR APPROVAL FROM THE DESIGN ENGINEER OF THE PROCEDURES TO BE USED FOR PROTECTING THE GROUT.

BOULDER PROPERTIES		
BOULDER CLASSIFICATION	NOMINAL SIZE AND RANGE IN SMALLEST DIMENSION OF INDIVIDUAL ROCK (INCHES)	MAXIMUM RATIO OF LARGEST TO SMALLEST ROCK DIMENSION OF INDIVIDUAL BOULDERS
B24	24 [20-28]	1.50 [30"-42" MAX.]
B30	30 [26-34]	1.50 [39"-51" MAX.]
B36	36 [32-40]	1.50 [48"-60" MAX.]
B42	42 [38-46]	1.50 [57"-69" MAX.]
B48	48 [44-52]	1.50 [66"-78" MAX.]

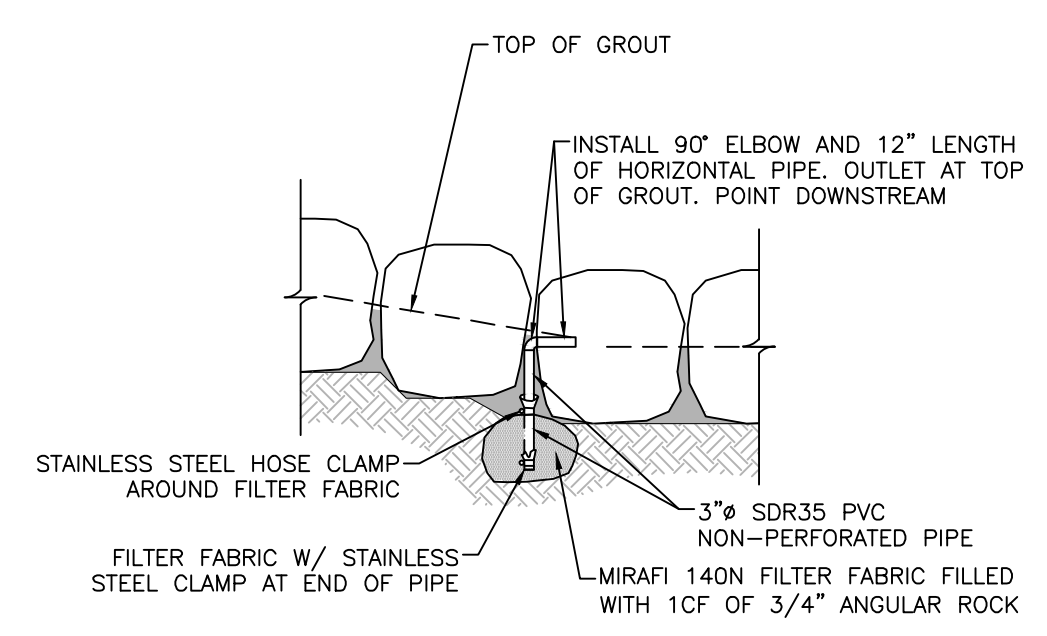
(TABLE 2: BOULDER PROPERTIES. MHFD SPECIFICATION SECTION 31 37 00)

RIPRAP GRADATION			
RIPRAP DESIGNATION	% SMALLER THAN SIZE	INTERMEDIATE ROCK DIMENSION (INCHES)	d50* (INCHES)
TYPE VL	70-100	12	6**
	50-70	9	
	35-50	6	
TYPE L	70-100	15	9**
	50-70	12	
	35-50	9	
TYPE M	70-100	21	12**
	50-70	18	
	35-50	12	
TYPE H	70-100	30	18
	50-70	24	
	35-50	18	
TYPE VH	70-100	41	24
	50-70	33	
	35-50	24	

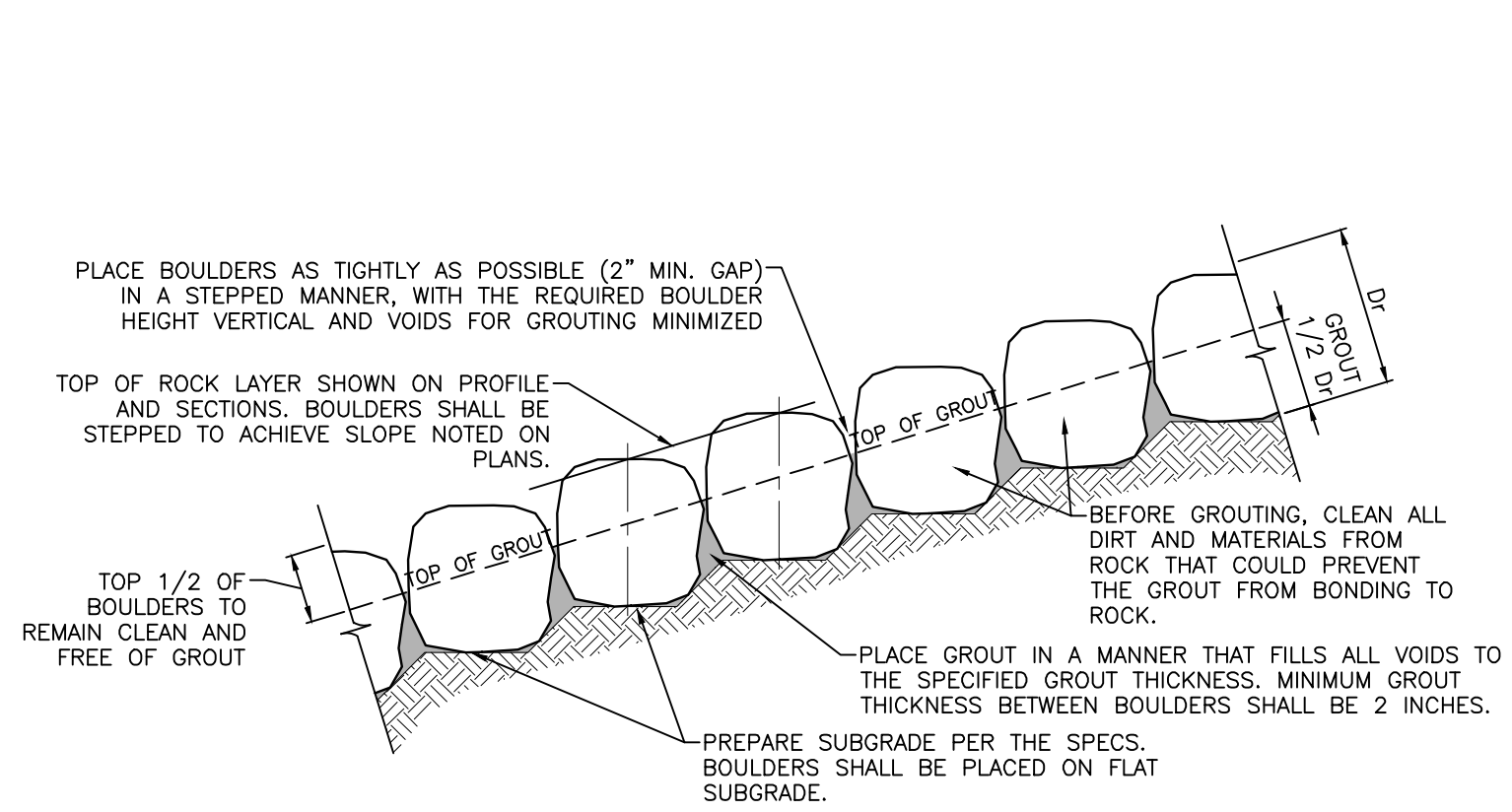
* d50=MEAN PARTICLE SIZE (INTERMEDIATE DIMENSION) BY WEIGHT.
** MIX VL, L AND M RIPRAP WITH 35% TOPSOIL (BY VOLUME) AND BURY WITH 4-6 INCHES OF TOPSOIL, ALL VIBRATION COMPACTED & REVEGETATE.
(TABLE 1: RIPRAP GRADATION. MHFD SPECIFICATION SECTION 31 37 00)



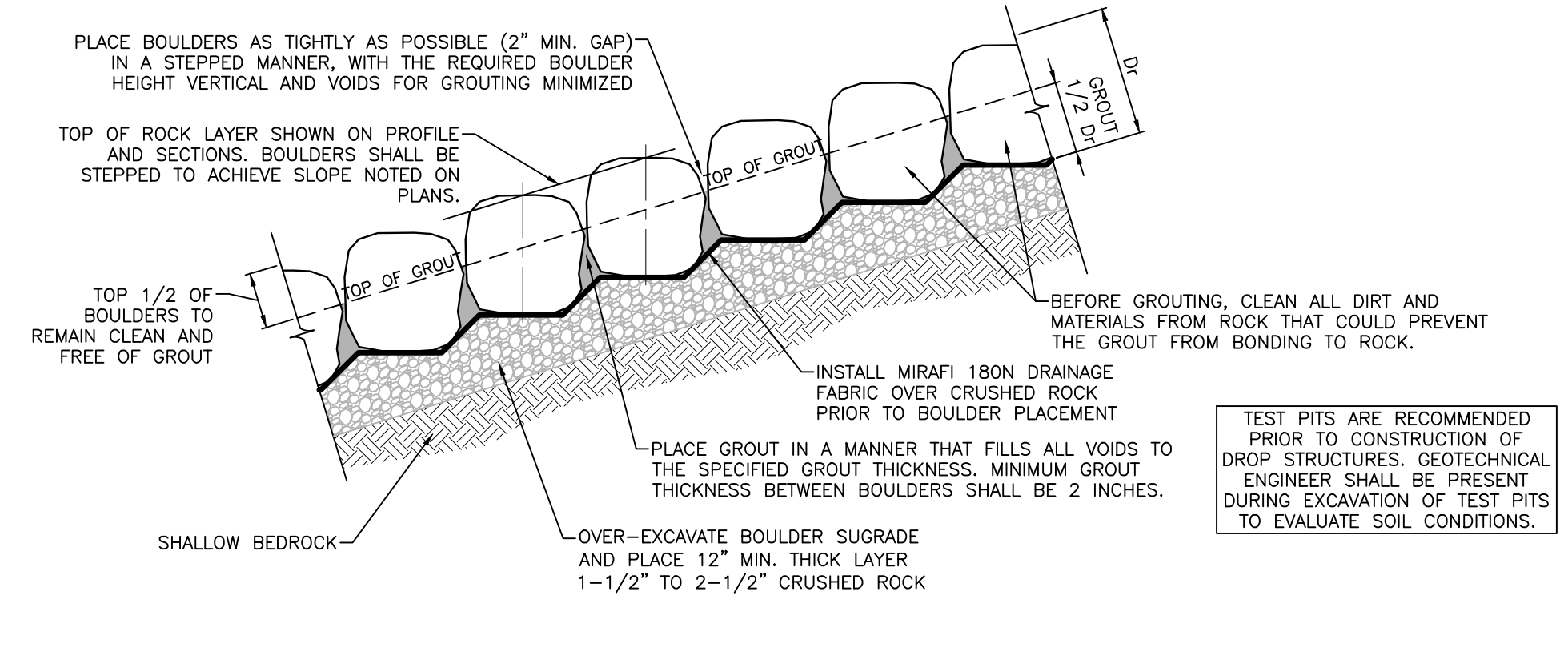
C
303
SEEPAGE CUTOFF DETAIL
SCALE: NTS



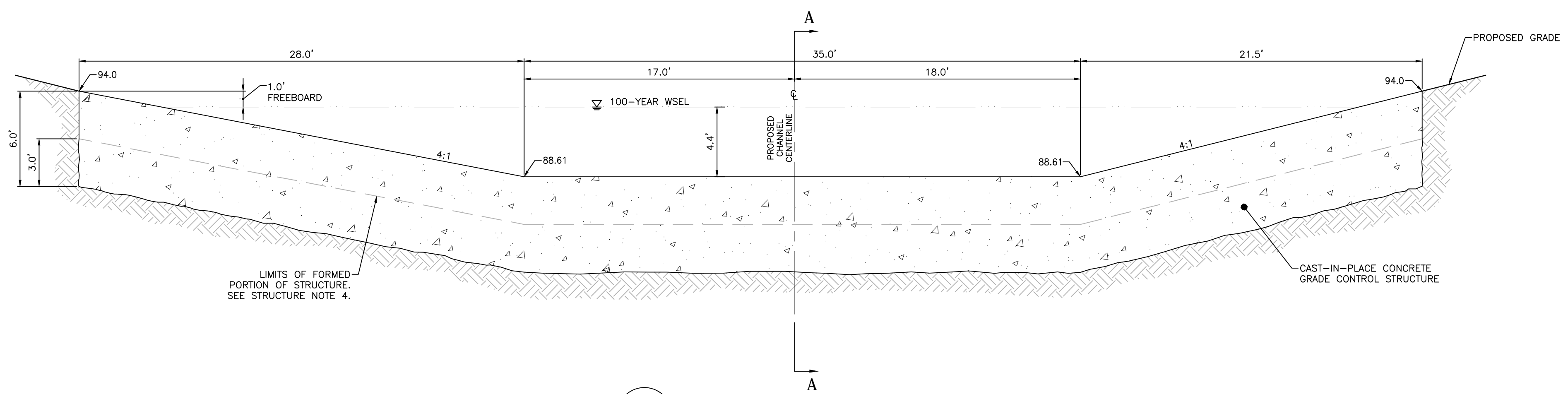
D
303
SINGLE WEEP DRAIN DETAIL
SCALE: NTS



E
303
GRouted BOULDER PLACEMENT DETAIL
SCALE: NTS

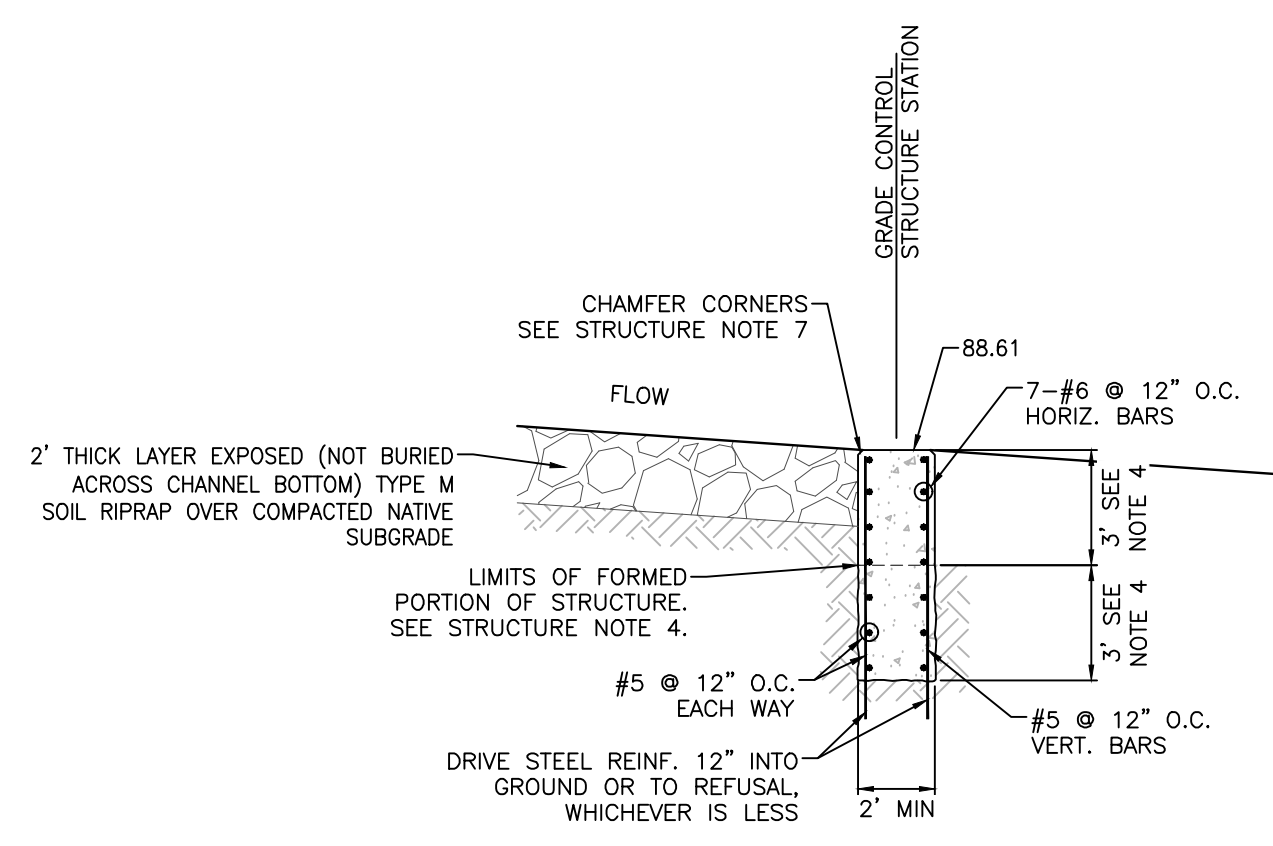


F
303
OPTIONAL GRouted BOULDER PLACEMENT DETAIL FOR SHALLOW BEDROCK CONDITIONS
SCALE: NTS



A
C311 GRADE CONTROL STRUCTURE SECTION
H: 1"=5'
V: 1"=5'

- STRUCTURE NOTES:**
- TOP OF STRUCTURE SHALL MATCH PROPOSED GRADE ON THE SIDE SLOPES.
 - BACKFILLING AGAINST WALL SHALL NOT COMMENCE UNTIL CONCRETE HAS OBTAINED ITS FULL SEVEN DAY STRENGTH.
 - BACKFILL MATERIAL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY PER ASTM M698.
 - THE TOP 3 FEET MINIMUM OF STRUCTURE SHALL BE FORMED CONCRETE, AND THE BOTTOM 3 FEET CAN BE PLACED AGAINST UNDISTURBED SOIL.
 - REINFORCING STEEL SHALL BE GRADE 60 AND EPOXY COATED. SEE TABLE FOR THE MINIMUM LAP SPLICE LENGTH FOR REINFORCING BARS. ALL REINFORCING STEEL SHALL HAVE 2-INCH MINIMUM CLEARANCE FROM EDGE OF CONCRETE AND 3-INCH MIN CLEARANCE TO EDGE OF CONCRETE PLACED AGAINST SOIL, UNLESS OTHERWISE NOTED.
- | BAR SIZE | #4 | #5 | #6 |
|--------------------|-------|-------|-------|
| MIN. SPLICE LENGTH | 1'-3" | 1'-7" | 2'-0" |
- CONCRETE FOR GRADE CONTROL STRUCTURE SHALL BE 4,500 PSI CDOT CLASS D CONCRETE.
 - ALL EXPOSED CONCRETE CORNERS SHALL HAVE A 3/4-INCH CHAMFER UNLESS OTHERWISE NOTED.



B
C311 SECTION A-A
H: 1"=5'
V: 1"=5'

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION PLANS
GRADE CONTROL STRUCTURE DETAILS
EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	4/28/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C311

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH COLORADO DEPARTMENT OF TRANSPORTATION STANDARD CONSTRUCTION SPECIFICATIONS, 2021 EDITION, APPLICABLE TO THIS PROJECT.

STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH DETAILS SHOWN IN THESE PLANS AND SECTION 206 OF THE CDOT STANDARD SPECIFICATIONS, UNLESS SPECIFIED OTHERWISE IN THESE PLANS OR OTHER PROJECT STRUCTURAL PLANS.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213.

THE FINAL FINISH FOR ALL EXPOSED CONCRETE SURFACES SHALL BE CLASS 2 TO 1'-0" BELOW FINISHED GRADE, UNLESS NOTED OTHERWISE.

GRADE 60 REINFORCING STEEL IS REQUIRED.

ALL CAST-IN-PLACE CONCRETE SHALL BE CLASS D UNLESS NOTED OTHERWISE.

ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 INCH, UNLESS NOTED OTHERWISE IN PLANS.

PROVIDE 2 INCH CLEAR COVER TO ALL REINFORCING, UNLESS SHOWN OR NOTED OTHERWISE.

ALL REINFORCING STEEL SHALL BE NON-EPOXY COATED UNLESS NOTED OTHERWISE.

ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS PLACED.

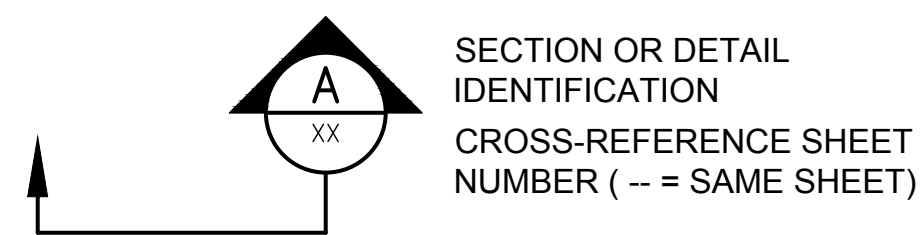
THE CONTRACTOR SHALL NOT BACKFILL STRUCTURES UNTIL RETAINING WALLS HAVE REACHED 80% OF DESIGN STRENGTH.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURES DURING CONSTRUCTION.

E.F. = EACH FACE O.F. = OUTSIDE FACE
 F.F. = FAR FACE T.&B. = TOP AND BOTTOM
 N.F. = NEAR FACE T.F. = TOP FACE
 I.F. = INSIDE FACE B.F. = BOTTOM FACE
 O.C. = ON CENTER

STATIONS, ELEVATIONS, AND DIMENSIONS CONTAINED IN THESE PLANS ARE CALCULATED FROM CIVIL PLAN SET. THE CONTRACTOR SHALL VERIFY ALL DEPENDENT DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 1-800-922-1987 AT LEAST 2 DAYS (NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.



STRUCTURE DESCRIPTIONS AND STRUCTURAL SCOPE OF WORK NARRATIVE

REINFORCED CONCRETE CANTILEVER HEADWALLS ON SPREAD FOOTINGS SPANNING Laterally across ARCH CULVERT TO END PILASTERS. MAX FOOTING-TO-TOP HEIGHT = 31'-2". PILASTER-TO-PILASTER CLEAR SPAN = 54'-9".

HEADWALLS ARE DESIGNED TO BE SELF-SUPPORTING AND CARRY ALL LATERAL EARTH LOADS AND LIVE LOAD SURCHARGE WITHOUT ASSISTANCE OF THE METAL ARCH STRUCTURE (SEE SEPARATE ARCH CONSTRUCTION DRAWINGS).

HEADWALLS ARE DESIGNED TO BE STRUCTURALLY ISOLATED FROM WINGWALLS (SEE SEPARATE WINGWALL CONSTRUCTION DRAWINGS).

PROVIDE 3" CLEARANCE TO REBAR FOR ALL CONCRETE CAST AGAINST SOIL. EITHER MENTION HERE OR ADD TO ALL FOOTING DETAILS.

DESIGN DATA

AASHTO, 9th EDITION LRFD

DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN.

REINFORCED CONCRETE:
 CLASS D CONCRETE: $f_c = 4,500$ psi
 REINFORCING STEEL: $f_y = 60,000$ psi

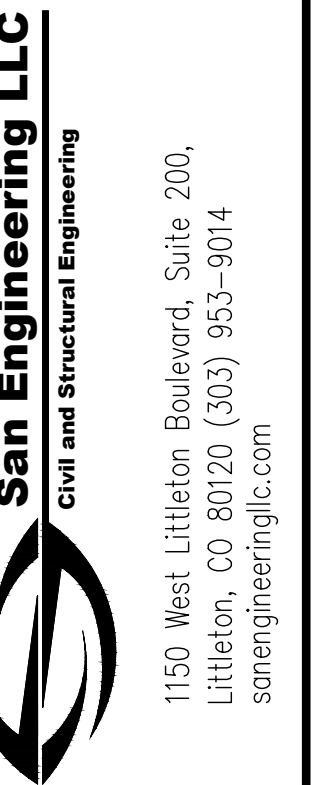
DESIGN LOADS (NATIVE SOIL)
 INTERNAL FRICTION ANGLE: 34 DEGREES
 UNIT WEIGHT: 125 PCF
 AT-REST EQUIVALENT FLUID PRESSURE: 60 PCF
 PASSIVE EQUIVALENT FLUID PRESSURE: 300 PCF
 LIVE LOAD SURCHARGE: 2 FEET OF EARTH

FOUNDATION SOILS:
 ULTIMATE BEARING OF SANDSTONE: 14,500 PSF
 RESISTING FACTOR: 0.6
 SLIDING FRICTION FACTOR: 0.35

REFER TO THE GEOTECHNICAL REPORT NO 211647 BY ENTECH ENGINEERING, INC, DATED FEBRUARY 18, 2022, AND ANY ADDENDA THERETO, FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

HEADWALL STRUCTURAL DRAWING INDEX

HW1	HEADWALL GENERAL INFORMATION
HW2	HEADWALL PLAN AND ELEVATION
HW3	HEADWALL TOP PLAN & SHORING REQUIREMENTS
HW4	BACK FACE REINFORCING ELEVATION
HW5	FRONT FACE REINFORCING ELEVATION
HW6	HEADWALL REINFORCING DETAILS
HW7	HEADWALL REINFORCING DETAILS
HW8	HEADWALL REINFORCING DETAILS
HW9	MISCELLANEOUS HEADWALL DETAILS

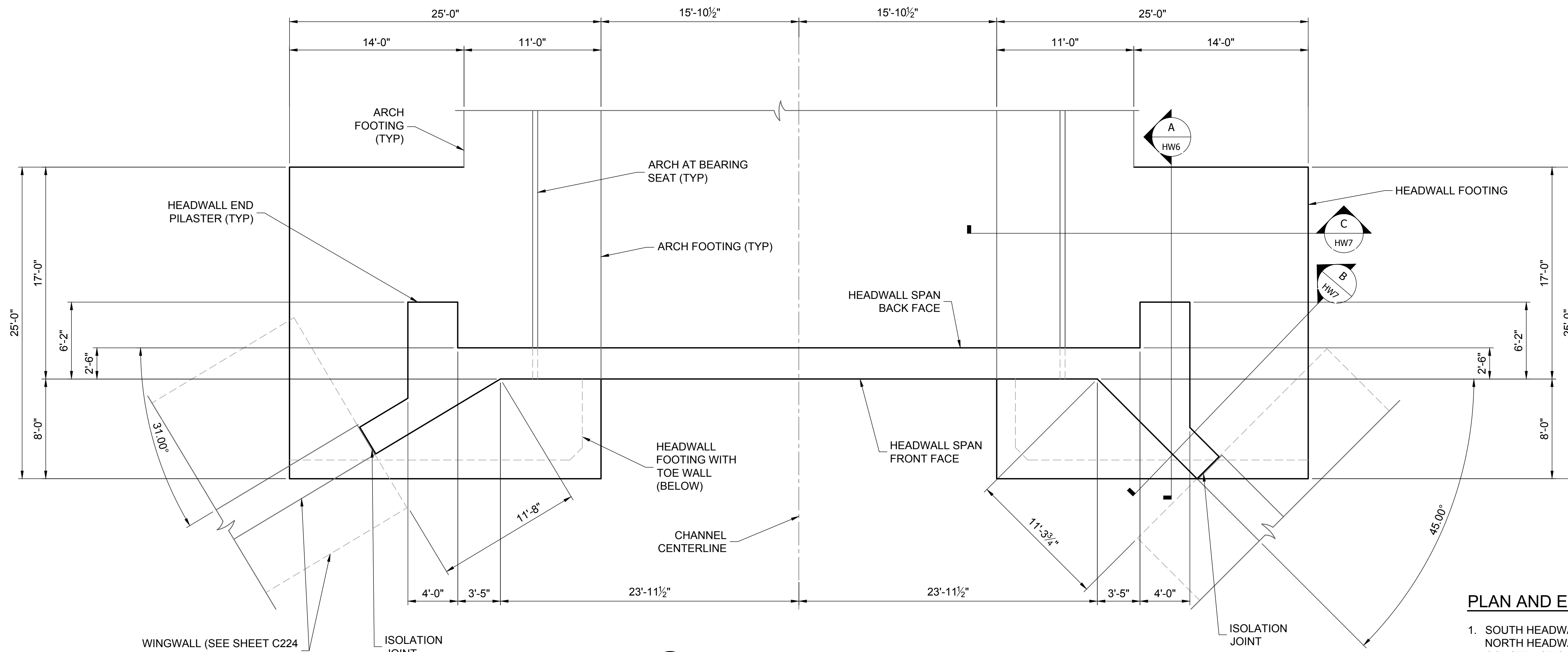
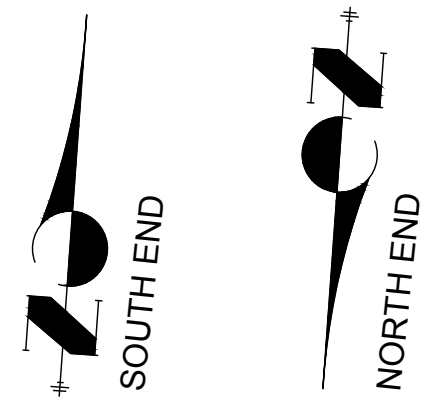


STERLING RANCH DEVELOPMENT
 BRIARGATE BOULEVARD BRIDGE OVER SAND CREEK
 HEADWALL STRUCTURES
 HEADWALL GENERAL INFORMATION

BY	DATE	REVISION	AS SHOWN	AS SHOWN	DATE	DESIGNED BY	DRAWN BY	CHECKED BY
					03/14/22	JIM	JIM	JIM

SHEET HW1 OF HW9
 JOB NO. 19032

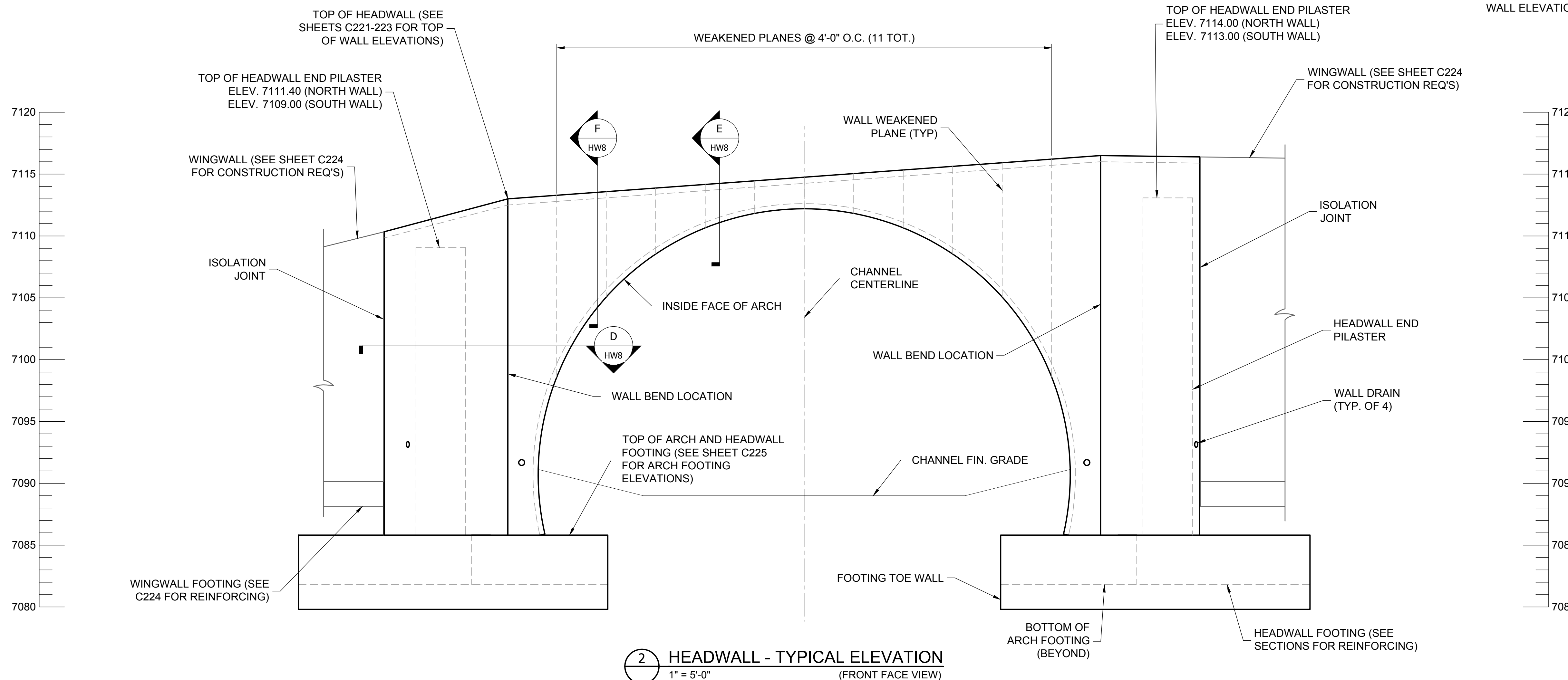




1 HEADWALL - TYPICAL PLAN
1" = 5'-0" (AT BOTTOM OF WALL)

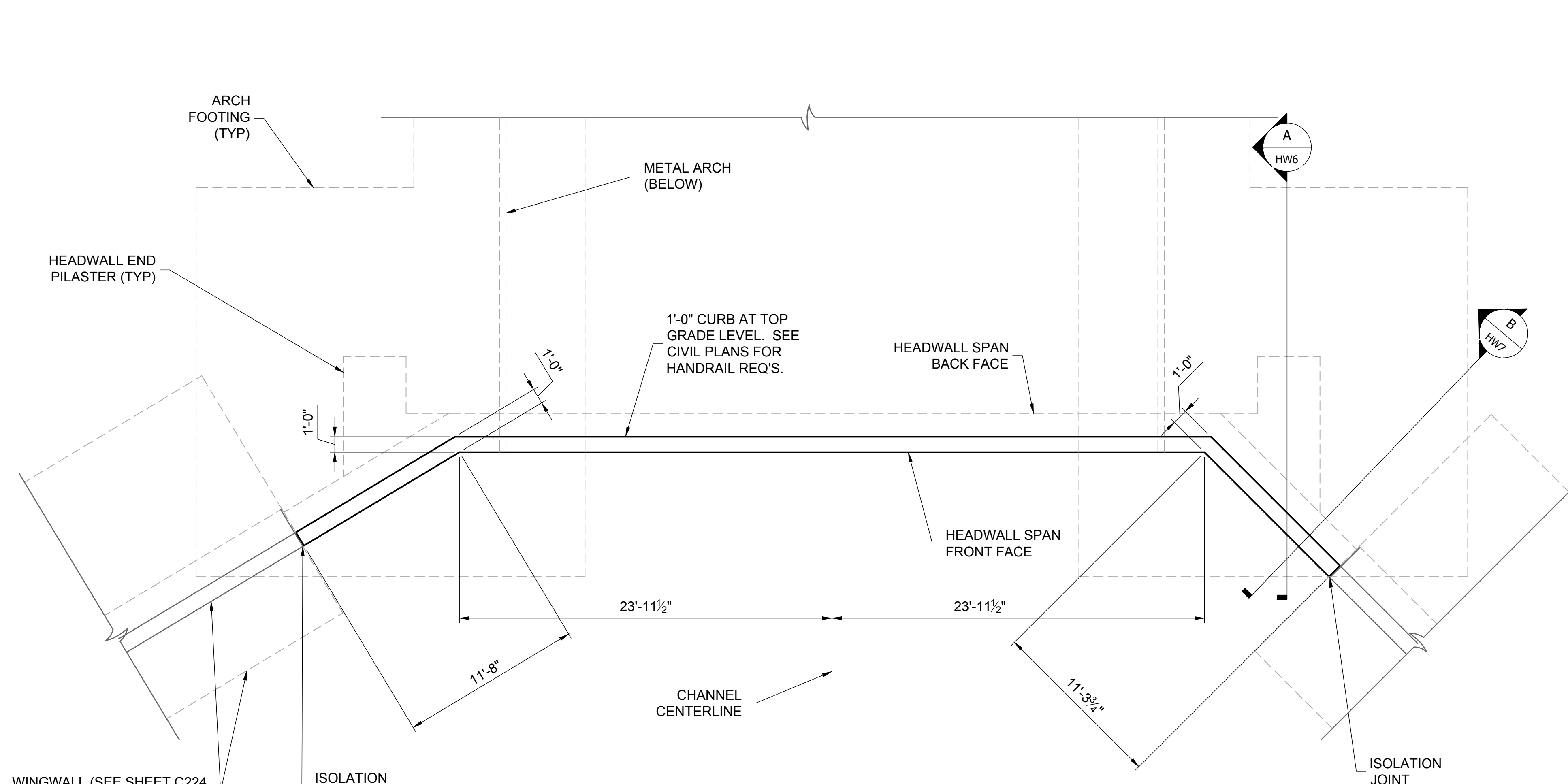
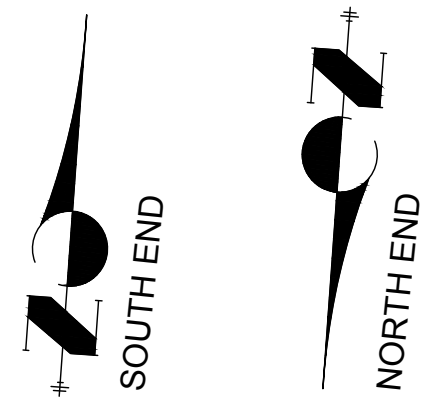
PLAN AND ELEVATION NOTES

1. SOUTH HEADWALL IS SHOWN IN ELEVATION. NORTH HEADWALL SHALL BE SIMILAR CONSTRUCTION EXCEPT AS NOTED IN CIVIL AND STRUCTURAL CONSTRUCTION PLANS.
2. REFER TO SHEETS C221 TO C223 FOR TOP OF WALL ELEVATIONS.

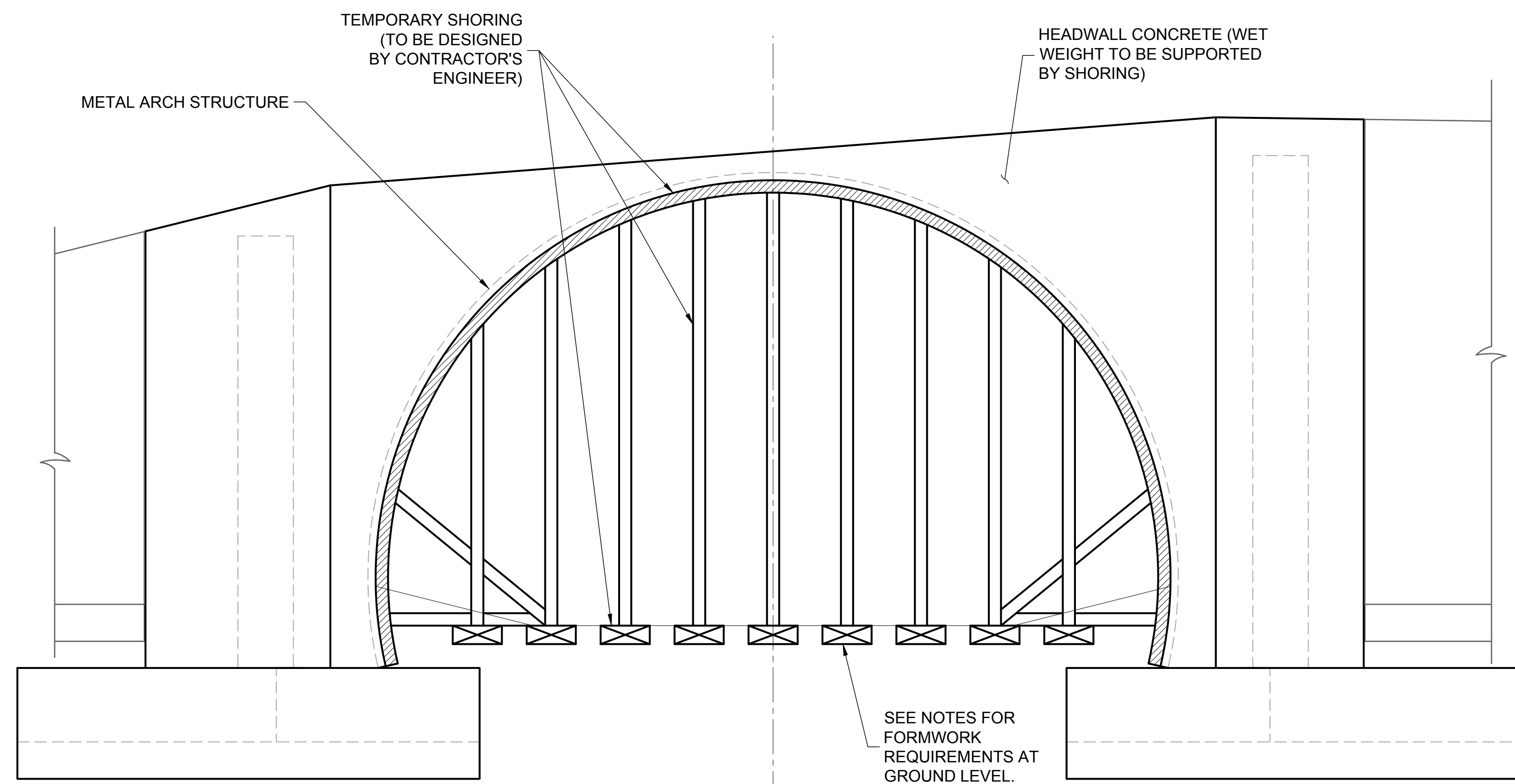


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AS SHOWN	AS SHOWN	03/14/22	JUM	JUM	JUM	
BY	DATE	REVISION	No.			

SHEET HW2 OF HW9
JOB NO. 19032



1 HEADWALL - TYPICAL PLAN
1" = 5'-0" (AT TOP OF WALL)

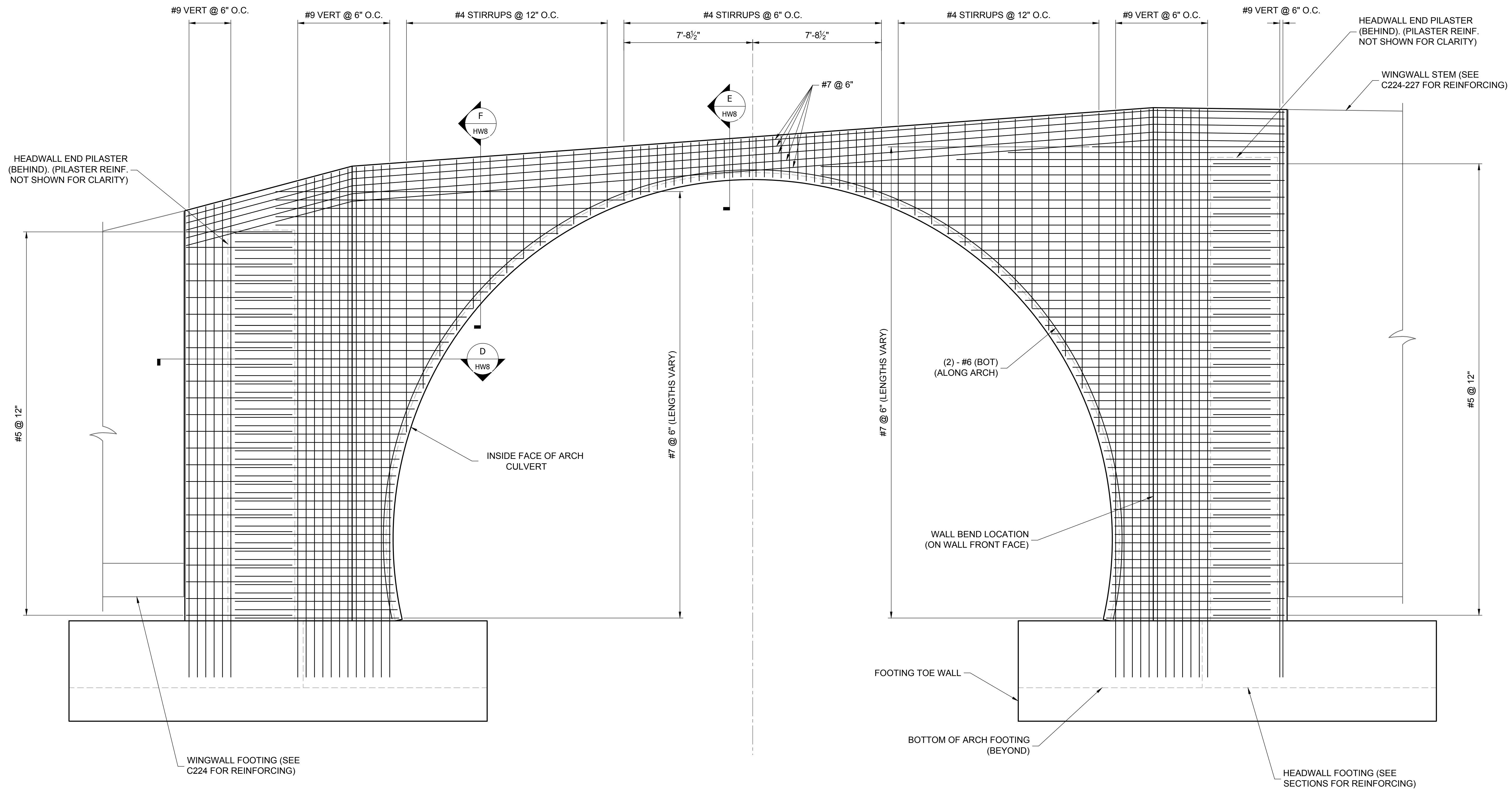


2 HEADWALL SHORING SCHEMATIC DIAGRAM
1" = 5'-0"

TEMPORARY SHORING REQUIREMENTS

1. THE METAL ARCH IS NOT DESIGNED TO SUPPORT THE WEIGHT AND HYDROSTATIC PRESSURE OF WET CONCRETE. TEMPORARY SHORING SHALL PROVIDED TO SUPPORT ALL VERTICAL AND LATERAL LOADS OF WET CONCRETE ON THE INTERIOR OF THE ARCH.
2. TEMPORARY FOOTINGS OR FOUNDATIONS FOR SHORING AT GROUND LEVEL SHALL BE DESIGNED TO THE POTENTIAL FOR UNINTENDED SETTLEMENT OF UNDERLYING SOILS UNDER THE WEIGHT OF WET CONCRETE.
3. SHOP DRAWINGS ACCOMPANIED BY SUPPORTING STRUCTURAL CALCULATIONS FOR THE TEMPORARY SHORING SHALL BE PROVIDED FOR REVIEW PRIOR TO CONSTRUCTION. CALCULATIONS SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF COLORADO.
4. PARTIAL-HEIGHT CONSTRUCTION JOINTS IN THE HEADWALL WILL BE CONSIDERED. ANY PROPOSED CONSTRUCTION JOINT LOCATIONS AND DETAILS THEREOF SHALL BE CLEARLY INDICATED IN THE SUBMITTED SHOP DRAWINGS.
5. FORMWORK FOR THE HEADWALL, PILASTERS AND FOOTINGS IS ALSO THE RESPONSIBILITY OF THE CONTRACTOR, BUT IS NOT SUBJECT TO THE SUBMITTAL OF SHOP DRAWINGS OR CALCULATIONS.

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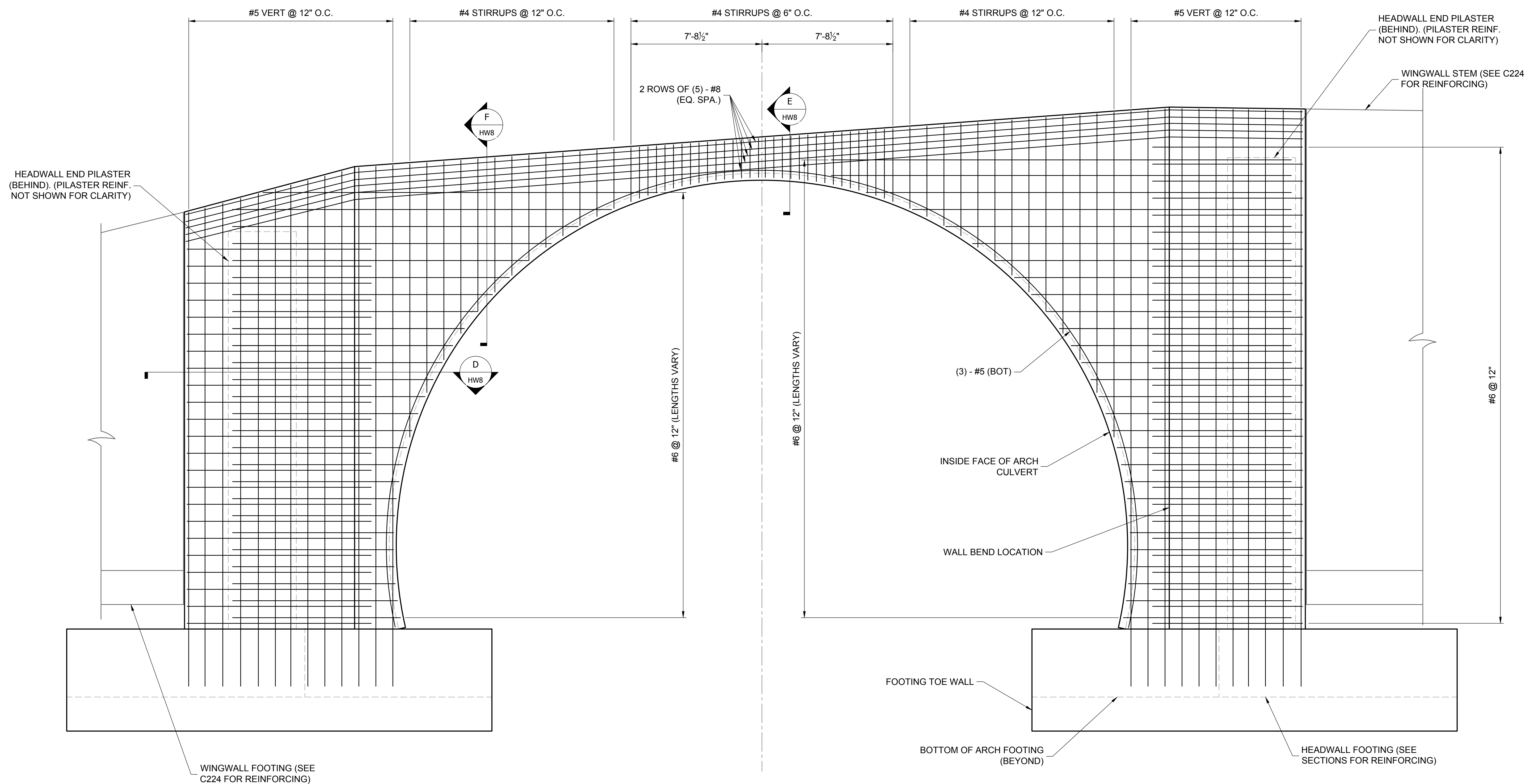
1 TYPICAL BACK FACE REINFORCING ELEVATION
N.T.S.

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE OVER SAND CREEK
HEADWALL STRUCTURES
BACK FACE REINFORCING ELEVATION

H-SCALE	V-SCALE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY
AS SHOWN	AS SHOWN	03/14/22	JUM	JUM	JUM

BY	DATE	REVISION

SHEET HW4 OF HW9
JOB NO. 19032

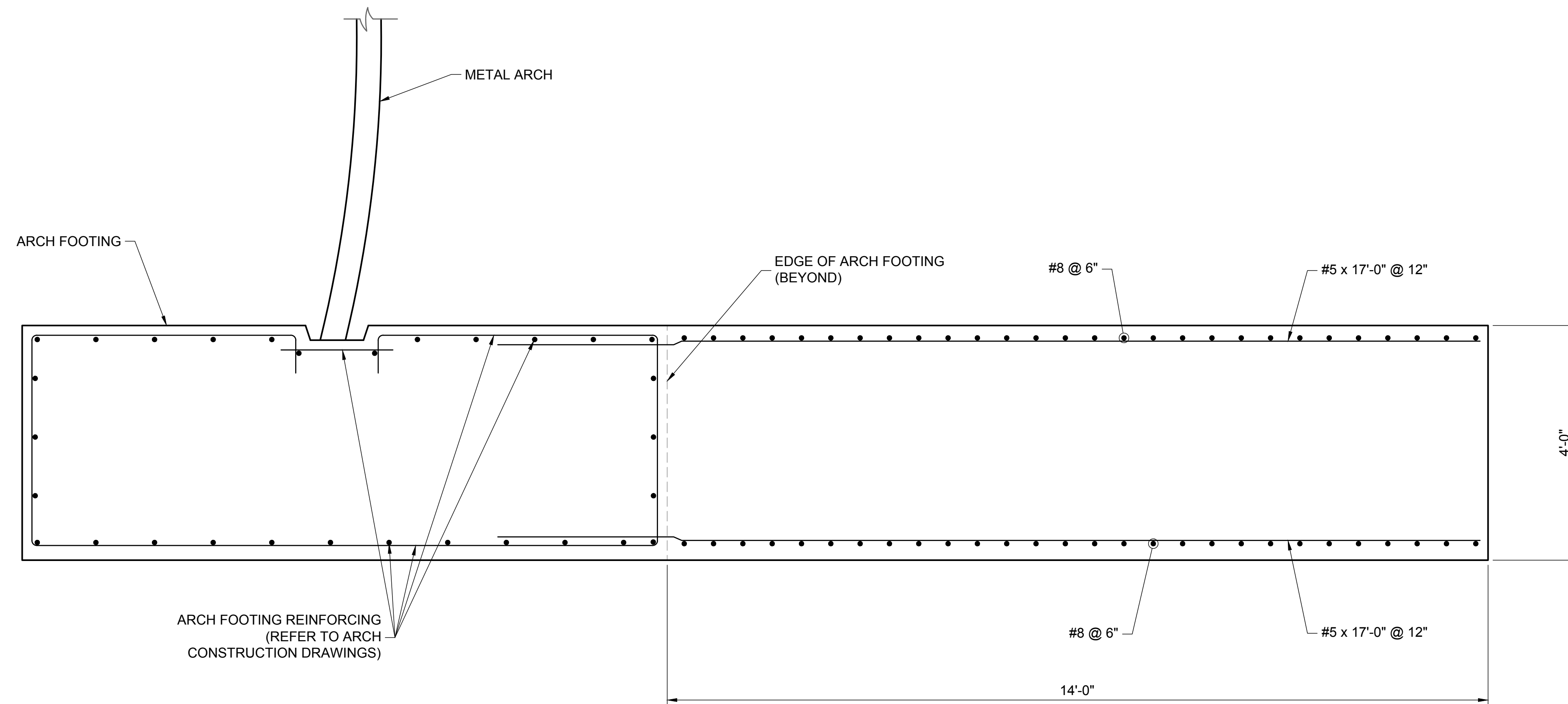


2 TYPICAL FRONT FACE REINFORCING ELEVATION
N.T.S.

STERLING RANCH DEVELOPMENT
BRIARGATE BOULEVARD BRIDGE OVER SAND CREEK
HEADWALL STRUCTURES
FRONT FACE REINFORCING ELEVATION

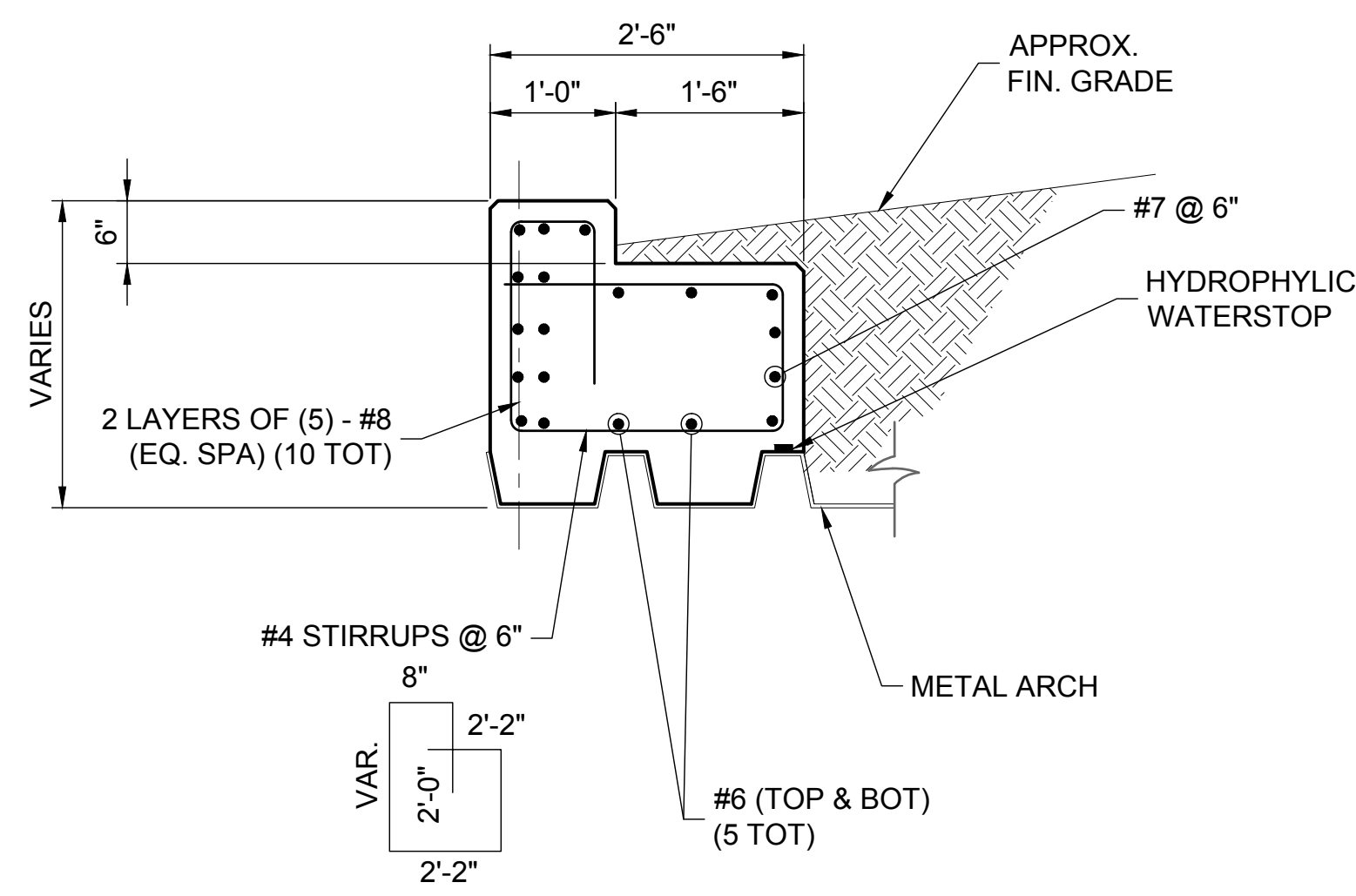
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BY	DATE	REVISION

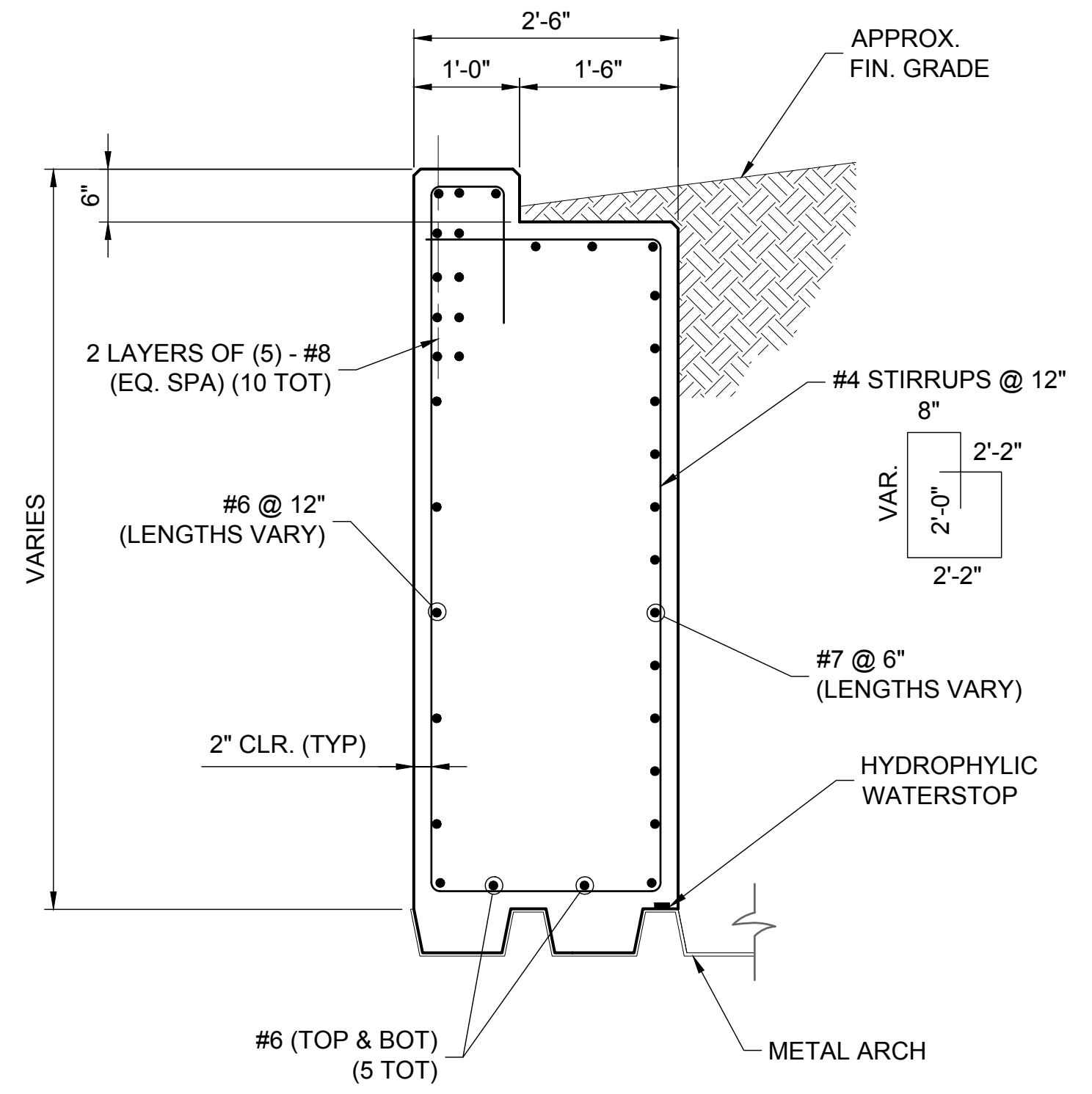


C TYPICAL HEADWALL FOOTING REINFORCING SECTION AT ARCH
 (SCALE: 3/4" = 1'-0")

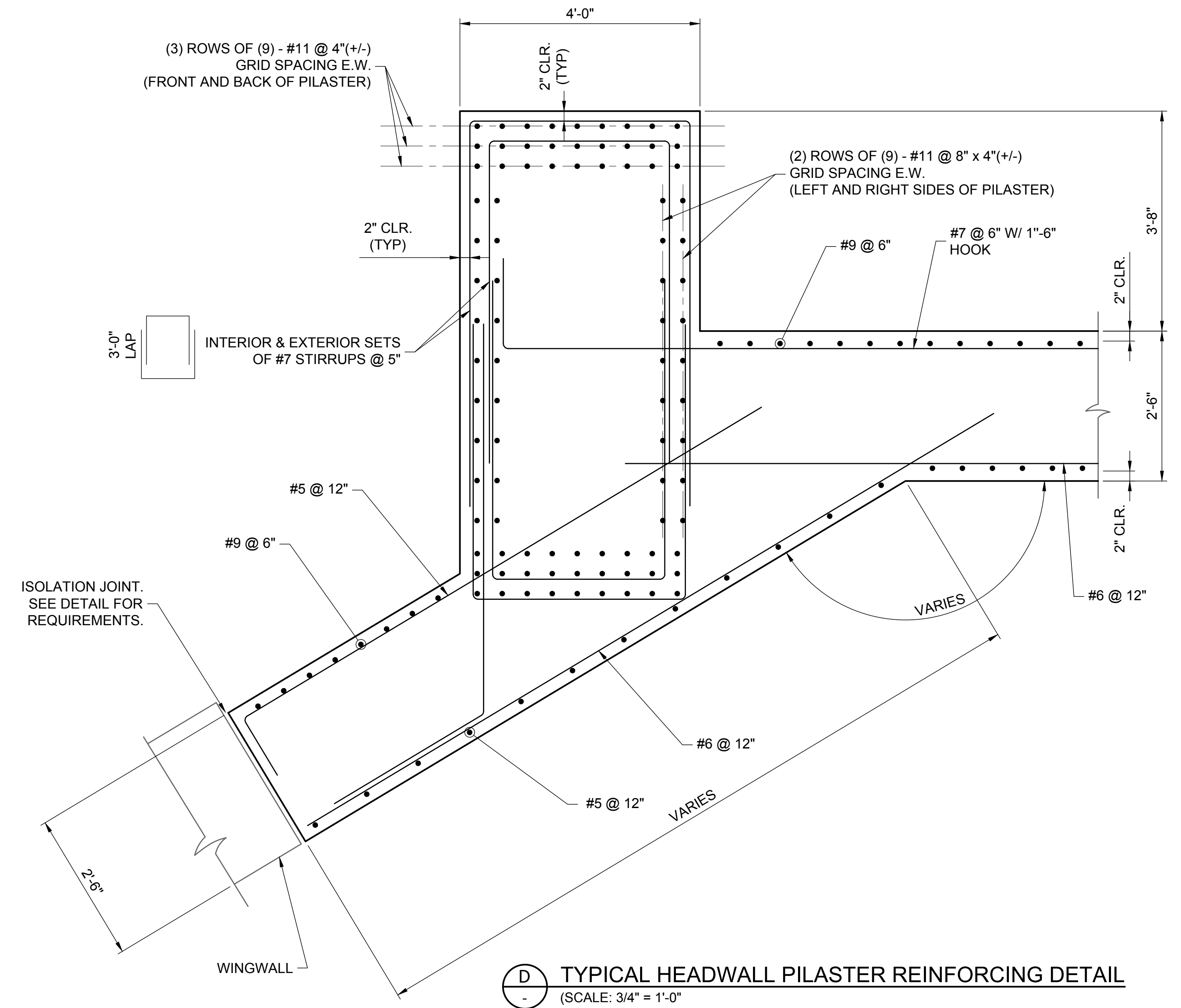
H-SCALE	V-SCALE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	NO.	REVISION	BY	DATE
AS SHOWN	AS SHOWN	03/14/22	JIM	JIM	JIM				



E HEADWALL REINFORCING SECTION
SCALE: 3/4" = 1'-0"



F HEADWALL REINFORCING SECTION
SCALE: 3/4" = 1'-0"



D TYPICAL HEADWALL PILASTER REINFORCING DETAIL
(SCALE: 3/4" = 1'-0")

H-SCALE	V-SCALE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY
AS SHOWN	AS SHOWN	11/14/22	HWB	JJM	JJM

GENERAL NOTES:

1. THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE GALVANIZED STEEL DEEP CORRUGATED ARCH STRUCTURE (BRIDGECOR®) AS DETAILED IN THE PLANS. ANY INSTALLATION INFORMATION PROVIDED HEREIN SHALL BE REVIEWED AND APPROVED BY THE ENGINEER. CHANGES AND DISCREPANCIES MUST BE FORWARDED TO THE MANUFACTURER TO BE INCORPORATED IN A REVISED DRAWING SET.
2. THE ENGINEER SHALL VERIFY THAT THE PROPOSED STRUCTURE IS APPROPRIATE FOR THE SITE CONDITIONS AND THE DESIGN PARAMETERS ARE CONSISTENT WITH THE PROJECT REQUIREMENTS. ALL ASPECTS OF THE STRUCTURE DESIGN AND SITE LAYOUT NOT EXPLICITLY INCLUDED IN THESE DRAWINGS SHALL BE PROVIDED OR COORDINATED BY THE ENGINEER. THIS MAY INCLUDE BUT IS NOT LIMITED TO: FOUNDATIONS, BACKFILL, END TREATMENTS, HYDRAULIC ANALYSIS AND SCOUR ANALYSIS AS REQUIRED.
3. CONTECH PRODUCT DRAWINGS MAY NOT BE USED, REPRODUCED, COPIED, OR ISSUED TO A THIRD PARTY WITHOUT THE PRIOR WRITTEN PERMISSION OF CONTECH ENGINEERED SOLUTIONS.
4. ALL DIMENSIONS ARE TO THE INSIDE CREST OF THE CORRUGATION PROFILE UNLESS NOTED OTHERWISE AND ARE SUBJECT TO MANUFACTURING TOLERANCES.
5. THE STRUCTURE GEOMETRY, DESIGN, AND MATERIALS AS SHOWN IN THESE DRAWINGS ONLY APPLY FOR BRIDGECOR®, DESIGNED AND FABRICATED BY CONTECH ENGINEERED SOLUTIONS (CONTECH). ALTERNATIVE SYSTEMS SHALL BE FULLY DESIGNED AND APPROVED PRIOR TO BIDDING, WITH SEALED DRAWINGS AND CALCULATIONS PROVIDED TO DEMONSTRATE COMPLIANCE WITH THE SAME GEOMETRY, DESIGN, AND MATERIAL REQUIREMENTS AS SHOWN HEREIN.
6. CIRCUMFERENTIAL PLATE LENGTHS ARE IN TERMS OF S = 16 INCHES.
7. FOR WATER CONVEYANCE APPLICATIONS THE STRUCTURE MUST MEET HYDRAULIC REQUIREMENTS OF THE SITE AS DETERMINED BY THE ENGINEER. SHEET PILING, INLET AND OUTLET APRONS, CUTOFF WALLS, RIP RAP, AND/OR OTHER MEASURES SHALL BE INSTALLED AS NECESSARY TO PREVENT LOSS OF ENGINEERED BACKFILL AND/OR FOUNDATION SOILS DUE TO SCOUR. THE EXTENT, SIZE, AND LOCATION OF SCOUR PROTECTION SHALL BE DETERMINED BY THE ENGINEER.
8. PERIMETER DRAINAGE, SURFACE DRAINAGE, AND GRADING AROUND THE STRUCTURE SHALL BE DESIGNED, SPECIFIED, SUPPLIED, AND INSTALLED BY OTHERS.

DESIGN PARAMETERS

1. DESIGN BY CONTECH ENGINEERED SOLUTIONS IS BASED ON THE FOLLOWING DESIGN CRITERIA:
 VEHICLE LIVE LOAD: HL-93
 MINIMUM COVER: 5.0'
 MAXIMUM COVER: 7.0'
 UNIT WEIGHT OF ENGINEERED BACKFILL = 120 LBS/FT³.
2. ENGINEERED BACKFILL MATERIAL SHALL COMPLY WITH THE ENGINEERED BACKFILL MATERIAL REQUIREMENTS SHOWN IN THESE DRAWINGS.
3. DESIGN COVER AND LATERAL EXTENT OF ENGINEERED BACKFILL ZONE SHALL BE AS SHOWN IN THESE DRAWINGS AND REQUIRED BY THE DESIGN STANDARDS REFERENCED IN THESE NOTES.
4. REFERENCE AASHTO LRFD SECTION 12.6.1 FOR SEISMIC DESIGN CONSIDERATIONS.
5. STRUCTURE DESIGN BASED ON SITE SOIL INFORMATION PROVIDED IN CONTRACT DOCUMENTS. IF UNEXPECTED SITE SOIL CONDITIONS ARE ENCOUNTERED, CONTECH MUST BE NOTIFIED TO DETERMINE IF DESIGN CHANGES ARE NEEDED.
6. TEMPORARY CONSTRUCTION VEHICLE LOADING HEAVIER THAN THE DESIGN VEHICLE LIVE LOAD SHALL NOT BE PERMITTED TO CROSS OVER THE STRUCTURE WITHOUT THE APPROVAL OF CONTECH. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY CONTECH OF THE SIZE, TYPE AND WEIGHT OF ANY CONSTRUCTION VEHICLES INTENDED TO CROSS OVER THE STRUCTURE.

BRIDGECOR SINGLE RADIUS ARCH STERLING RANCH COLORADO SPRINGS COLORADO SPRINGS, CO

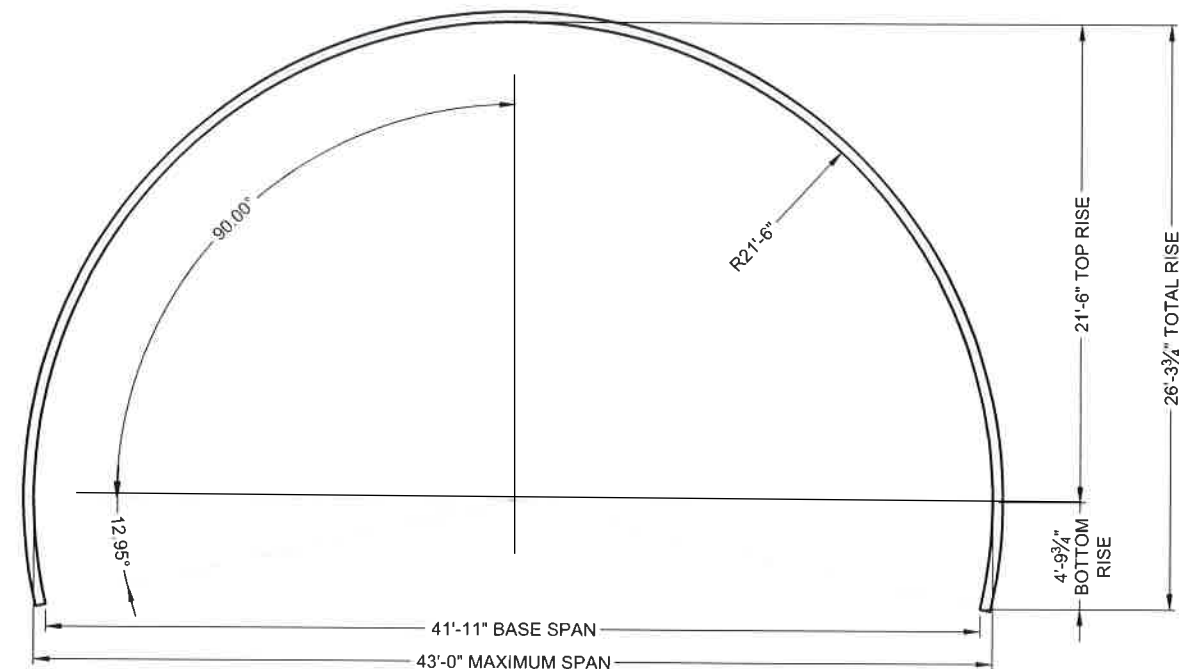


PLATE MAKE UP: 2 @ 11 S, 3 @ 12 S

NOTES:

- 1) MEASUREMENTS ARE TO THE INSIDE CRESTS OF THE CORRUGATIONS.
- 2) DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
- 3) CIRCUMFERENTIAL PLATE LENGTHS ARE IN TERMS OF S = 16 INCHES.

BRIDGECOR SINGLE RADIUS ARCH
INSIDE END AREA = 932 ft²
TOTAL S = 58

STRUCTURE CROSS-SECTION



FOR APPROVAL

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CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

BridgeCor

CONTECH
CONTRACT
DRAWING

BRIDGECOR SINGLE RADIUS ARCH
43'-0" MAX. SPAN X 26'-4" RISE
STERLING RANCH COLORADO SPRINGS
COLORADO SPRINGS, CO

PROJECT No.: 635632	SEQ. No.: 020	DATE: 2/28/2022
DESIGNED: XXX	DRAWN: SCC	
CHECKED: EDE	APPROVED: XXX	
SHEET NO.: 1 OF 7		

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1. DESIGN AND MANUFACTURING STANDARDS

- 1.1 ALL STANDARDS REFER TO THE CURRENT ASTM/AASHTO EDITION UNLESS OTHERWISE NOTED
- 1.2 AASHTO M111 - STANDARD SPECIFICATION FOR ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS
- 1.3 AASHTO M232 - STANDARD SPECIFICATION FOR ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE
- 1.4 AASHTO M 167 - STANDARD SPECIFICATION FOR CORRUGATED STEEL STRUCTURAL PLATE, ZINC COATED, FOR FIELD-BOLTED PIPE, PIPE-ARCHES AND ARCHES
- 1.5 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS - SECTION 12
- 1.6 AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS - SECTION 26
- 1.7 ASTM A761 - STANDARD SPECIFICATION FOR CORRUGATED STEEL STRUCTURAL PLATE, ZINC COATED, FOR FIELD-BOLTED PIPE, PIPE-ARCHES AND ARCHES
- 1.8 ASTM A796 - STANDARD PRACTICE FOR STRUCTURAL DESIGN OF CORRUGATED STEEL PIPE, PIPE-ARCHES, AND ARCHES FOR STORM AND SANITARY SEWERS AND OTHER BURIED APPLICATIONS
- 1.9 ASTM A807 - STANDARD PRACTICE FOR INSTALLING CORRUGATED STEEL STRUCTURAL PLATE PIPE FOR SEWERS AND OTHER APPLICATIONS
- 1.10 ASTM A449 - STANDARD SPECIFICATION FOR HEX CAP SCREWS, BOLTS AND STUDS, HEAT TREATED, 120/105/90 KSI MINIMUM TENSILE STRENGTH, GENERAL USE
- 1.11 ASTM A123 - STANDARD SPECIFICATION FOR ZINC (HOT DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS
- 1.12 ASTM A153 - STANDARD SPECIFICATION FOR ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE

2. DEFINITIONS

- 2.1 ENGINEER - IN THESE NOTES THE WORD "ENGINEER" SHALL MEAN THE ENGINEER OF RECORD OR OWNER'S DESIGNATED ENGINEERING REPRESENTATIVE.
- 2.2 MANUFACTURER - IN THESE NOTES THE WORD "MANUFACTURER" SHALL MEAN THE MANUFACTURER OF THE DEEP CORRUGATED ARCH PLATES, CONTECH ENGINEERED SOLUTIONS @ PHONE 800/338-1122.
- 2.3 CONTRACTOR - IN THESE NOTES THE WORD "CONTRACTOR" SHALL MEAN THE FIRM OR CORPORATION UNDERTAKING THE EXECUTION OF ANY INSTALLATION WORK UNDER THE TERMS OF THESE SPECIFICATIONS.

3. BRIDGECOR® STRUCTURE ASSEMBLY

- 3.1 ASSEMBLY OF THE BRIDGECOR® STRUCTURE SHALL BE IN ACCORDANCE WITH SECTION 26 OF AASHTO LRFD CONSTRUCTION SPECIFICATIONS (LATEST EDITION, WITH INTERIMS) AND ANY SUPPLEMENTAL RECOMMENDATIONS PROVIDED BY THE MANUFACTURER.
- 3.2 ALL PLATES SHALL BE UNLOADED AND HANDLED WITH REASONABLE CARE. PLATES SHALL NOT BE ROLLED OR DRAGGED OVER GRAVEL ROCK AND SHALL BE PREVENTED FROM STRIKING ROCK OR OTHER HARD OBJECTS DURING PLACEMENT IN TRENCH OR ON BEDDING.

GALVANIZED COATINGS THAT HAVE BEEN COMPROMISED SHALL BE RESTORED WITH A MINIMUM OF TWO COATS OF COLD GALVANIZING COMPOUND (SPRAY OR PAINT) IN ACCORDANCE WITH ASTM A761, SECTION 7 OR OTHER MEASURES AS DESCRIBED IN ASTM A780.
- 3.3 FOR STRUCTURES SET ON FOOTINGS, PLATE ASSEMBLY CAN BEGIN AFTER PLACEMENT OF STRUCTURE FOOTINGS HAS BEEN APPROVED BY THE ENGINEER. VERIFICATION OF PROPER SPACING, ALIGNMENT, AND ORIENTATION OF THE FOUNDATIONS IS STRONGLY RECOMMENDED PRIOR TO BEGINNING PLATE ASSEMBLY. ANY MODIFICATIONS TO THE FOUNDATIONS SHALL BE MADE PRIOR TO BEGINNING PLATE ASSEMBLY.

BEDDING PREPARATION FOR ROUND AND ELLIPTICAL SHAPES SHOULD BE APPROVED BY THE ENGINEER PRIOR TO ASSEMBLY. THE BED SHOULD BE CONSTRUCTED TO UNIFORM LINE AND GRADE. IT SHOULD BE FREE OF ROCK FORMATIONS, PROTRUDING STONES, FROZEN LUMPS, ROOTS AND OTHER FOREIGN MATTER.
- 3.4 THE SPAN AND RISE OF THE STRUCTURE SHOULD BE CHECKED FREQUENTLY DURING THE EARLY STAGES OF ASSEMBLY TO VERIFY THAT ASSEMBLY TOLERANCES ARE BEING ACHIEVED AND TO ALLOW FOR ADJUSTMENTS TO PROCEDURES, IF NECESSARY, BEFORE ASSEMBLY IS COMPLETE.
- 3.5 CUT PLATES FOR SKEWED OR BEVELED ENDS SHOULD BE ATTACHED AFTER THE MAIN BARREL OF A STRUCTURE HAS BEEN ASSEMBLED. WHEN CAST-IN-PLACE CONCRETE COLLARS OR HEADWALLS ARE TO BE CONSTRUCTED, THE CONTRACTOR MUST ALLOW FOR FORMWORK TO BE ERECTED ON THE END OF THE STRUCTURE. FORMING AGAINST A SKEWED CORRUGATION PROFILE IS COMPLEX AND SHOULD BE ACCOUNTED FOR BY THE FORMING CONTRACTOR WHEN PLANNING PROCEDURES AND METHODS FOR FORMWORK CONSTRUCTION. IN SOME CASES, FIELD TRIMMING OF THE STRUCTURE MAY BE NECESSARY. SPECIAL

BRACING AND/OR SCAFFOLDING (DESIGN BY OTHERS) IS REQUIRED TO SUPPORT SKEWED ENDS UNTIL ADEQUATE COMPRESSIVE STRENGTH IS ACHIEVED AS REQUIRED BY THE COLLAR/HEADWALL DESIGNER.

- 3.6 NUTS SHALL BE PLACED WITH THE ROUNDED FACE IN CONTACT WITH THE PLATES UNLESS NOTED OTHERWISE. NUTS CAN BE ON EITHER THE INSIDE OR OUTSIDE OF THE STRUCTURE TO FACILITATE ASSEMBLY.
- 3.7 RECOMMENDED TORQUE RANGE ON THE BOLTS IS 150 TO 300 FT-LBS FOR 3/4" DIAMETER BOLTS AND 200-350 FT-LBS FOR 7/8" DIAMETER BOLTS.
- 3.8 INSIDE SPAN AND RISE OF THE ASSEMBLED STRUCTURE AFTER BOLTING SHALL BE WITHIN 2% (OR 5 INCHES, WHICHEVER IS LESS) OF THE PLAN DIMENSIONS. THE TOLERANCE ON STRUCTURE LENGTH IS ± 1/2" PER 10 FT OF STRUCTURE LENGTH
- 4. **ENGINEERED BACKFILL ENVELOPE**
 - 4.1 ENGINEERED BACKFILL MATERIAL SHALL BE PLACED WITHIN THE ENGINEERED BACKFILL ENVELOPE TO THE MINIMUM WIDTH AND WITHIN THE COVER LIMITS SHOWN ON THESE DRAWINGS. THE ENGINEERED BACKFILL ENVELOPE SHALL NOT BE ALTERED WITHOUT WRITTEN APPROVAL FROM CONTECH.
 - 4.2 IN-SITU SOILS BELOW AND ADJACENT TO THE ENGINEERED BACKFILL ENVELOPE SHALL PROVIDE A FIRM SURFACE AGAINST WHICH TO COMPACT THE ENGINEERED BACKFILL MATERIAL. THE GEOTECHNICAL ENGINEER SHALL EVALUATE THE IN-SITU SOILS AND DETERMINE THE TYPE AND DEGREE OF ANY SOIL IMPROVEMENTS REQUIRED. THESE MAY INCLUDE BENCHING OR SLOPING OF THE SIDE SOILS. BACKFILL PLACEMENT MAY NOT BEGIN UNTIL THE GEOTECHNICAL ENGINEER HAS APPROVED THE IN-SITU SOILS AND ANY REQUIRED IMPROVEMENTS.
 - 4.3 A DRAINED CONDITION WAS ASSUMED FOR THE ENGINEERED BACKFILL ENVELOPE. DESIGN AND SUPPLY OF A SUBSURFACE DRAINAGE SYSTEM (IF NEEDED) SHALL BE PROVIDED BY OTHERS.
 - 4.4 IF REQUIRED BY THE GEOTECHNICAL ENGINEER, A GEOTEXTILE OR GRADED SOIL FILTER MAY BE USED BETWEEN THE ENGINEERED BACKFILL AND IN-SITU SOIL TO PREVENT MIGRATION OF FINES AND POSSIBLE INTERNAL EROSION OF THE SOIL.
- 5. **ENGINEERED BACKFILL MATERIAL REQUIREMENTS**
 - 5.1 THE DESIGN OF BRIDGECOR® STRUCTURES RELIES ON COMPACTED SOIL PROPERTIES PROVIDED BY THE ENGINEERED BACKFILL MATERIALS. THE CORRECT SELECTION AND PLACEMENT OF COMPACTED ENGINEERED BACKFILL MATERIAL IS CRITICAL TO THE PERFORMANCE OF BRIDGECOR® STRUCTURES.
 - 5.2 THE ENGINEERED BACKFILL MATERIAL SHALL NOT BE ADVERSELY AFFECTED BY WETTING, DRYING, SATURATION, FREEZE/THAW, VIBRATIONS, OR FLOWING WATER.
 - 5.3 BACKFILL MATERIALS SHALL CONFORM TO PROPERTIES REFERENCED IN THE PROJECT SPECIFICATIONS OR THE PROPERTIES DESCRIBED HEREIN, WHICHEVER IS MORE STRINGENT.
 - 5.4 BACKFILL MATERIAL SHOULD CONSIST OF A WELL-GRADED, ANGULAR GRANULAR SOIL WITH A MAXIMUM PARTICLE SIZE OF 3 INCHES. OPEN GRADED OR GAP GRADED MATERIALS ARE NOT PREFERRED. THE BACKFILL MATERIAL SHOULD BE FREE OF FROZEN LUMPS, FOREIGN MATERIAL OR ORGANIC DECOMPOSABLE MATERIALS. FINE BEACH SANDS, WINDBLOWN SANDS, AND STREAM DEPOSITED SANDS ALL OF WHICH EXHIBIT FINE, ROUNDED PARTICLES AND TYPICALLY ARE CLASSIFIED BY AASHTO M 145 AS A-3 MATERIALS ARE NOT ALLOWED. WHEN USING A-2 MATERIALS, MOISTURE CONTENT MUST BE BETWEEN -3% AND +2% OPTIMUM AS DEFINED BY AASHTO T 180
 - 5.5 GRAIN SIZE DISTRIBUTION (GRADATION) OF THE ENGINEERED BACKFILL MATERIAL SHALL SATISFY: C_u GREATER THAN OR EQUAL TO 3 AND C_c BETWEEN 0.7 AND 3, WHERE C_u = COEFFICIENT OF UNIFORMITY = D₆₀/D₁₀ AND C_c = COEFFICIENT OF CURVATURE = (D₃₀)²/(D₆₀D₁₀). D_{XX} IS THE PARTICLE SIZE CORRESPONDING TO XX% FINER ON THE CUMULATIVE PARTICLE SIZE DISTRIBUTION CURVE (ASTM D2487).

C_u REQUIREMENTS ARE WAIVED FOR CRUSHER RUN SCREENED AGGREGATES. C_c REQUIREMENTS ARE WAIVED FOR BACKFILL MATERIAL CONTAINING MORE THAN 60% GRAVEL (> #4 SIEVE).
 - 5.6 ABRASION LOSS SHALL NOT EXCEED 45% AS DETERMINED BY THE LOS ANGELES ABRASION TEST (ASTM C131).
 - 5.7 HUMIC (DECAYING) ORGANIC MATTER SHALL NOT EXCEED 1.0% (DRY WEIGHT BASIS).
 - 5.8 ELECTROCHEMICAL REQUIREMENTS FOR SOIL AND WATER IN CONTACT WITH BOTH THE INSIDE AND OUTSIDE OF THE BRIDGECOR® STRUCTURE ARE AS FOLLOWS, PER THE NCSA DESIGN MANUAL:
 - PH = 6 TO 10
 - RESISTIVITY = 2,000 TO 10,000 OHM-CM
 - WATER HARDNESS > 50 PPM CaCO₃
 - 5.9 IF THE ELECTROCHEMICAL PROPERTIES OF THE BACKFILL OR WATER FALL OUTSIDE OF THE RECOMMENDED RANGE, A SECONDARY PROTECTION SYSTEM MAY BE NEEDED TO ACHIEVE THE DESIGN SERVICE LIFE. SECONDARY PROTECTION SYSTEMS (IF REQUIRED) SHALL BE DESIGNED AND PROVIDED BY OTHERS.
 - 5.10 THE SELECTION AND EVALUATION OF PROPOSED ENGINEERED BACKFILL MATERIAL

IS THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE CONTECH WITH DOCUMENTATION FROM A QUALIFIED GEOTECHNICAL ENGINEER THAT THE PROPOSED ENGINEERED BACKFILL MATERIAL MEETS OR EXCEEDS THE REQUIREMENTS.

6. ENGINEERED BACKFILL PLACEMENT PROCEDURE

- 6.1 A CONTECH REPRESENTATIVE WILL CONDUCT A PRECONSTRUCTION CONFERENCE PRIOR TO COMMENCEMENT OF WORK TO REVIEW AND DISCUSS THE RECOMMENDED PROCEDURES FOR BACKFILLING, AND STRUCTURE SHAPE MEASUREMENTS. ANY CONTRACTOR WITH RESPONSIBILITY FOR BACKFILLING OR CONSTRUCTION OF END TREATMENTS MUST BE REPRESENTED AT THIS MEETING. IT IS RECOMMENDED THAT THE ENGINEER AND ANY THIRD PARTY INVOLVED IN COMPACTION TESTING OR OTHER QUALITY CONTROL MEASURES ALSO ATTEND.
- 6.2 ANY IMPROVEMENT OF THE SUBGRADE AND EMBANKMENT SOILS REQUIRED BY THE GEOTECHNICAL ENGINEER SHALL BE COMPLETED AND APPROVED PRIOR TO BEGINNING PLACEMENT OF ENGINEERED BACKFILL MATERIAL.
- 6.3 THE ENGINEERED BACKFILL MATERIAL SHALL BE PLACED UNIFORMLY ON BOTH SIDES OF THE STRUCTURE IN LAYERS OF 8 INCHES OR LESS (BEFORE COMPACTION).
- 6.4 BACKFILL SHALL BE COMPACTED TO THE MINIMUM DENSITY INDICATED IN THESE DRAWINGS. DEPENDING ON THE COMPACTION EQUIPMENT AND ENGINEERED BACKFILL MATERIAL USED, IT MAY BE NECESSARY TO DECREASE THE LIFT THICKNESS AND/OR MOISTURE CONDITION THE LOOSE SOIL TO ACHIEVE THE SPECIFIED MINIMUM LEVEL OF COMPACTION.
- 6.5 IF THE ENGINEERED BACKFILL MATERIAL DOES NOT PRODUCE A PROCTOR CURVE AND/OR IS NOT CONDUCTIVE TO TRADITIONAL FIELD-TESTING METHODS, QUALITATIVE METHODS OF EVALUATING COMPACTION MAY BE USED. SUCH METHODS SHALL BE EVALUATED AND APPROVED BY THE GEOTECHNICAL ENGINEER AND A COPY OF THE METHOD BE PROVIDED TO THE DESIGNER.
- 6.6 THE DIFFERENCE IN BACKFILL LEVELS ON THE TWO SIDES OF THE STRUCTURE AT ANY TRANSVERSE SECTION SHALL NOT EXCEED 24 INCHES WITHOUT PRIOR APPROVAL FROM CONTECH.
- 6.7 CONSTRUCTION EQUIPMENT USED WITHIN 5 FEET LATERALLY OF THE WIDEST PART OF THE STRUCTURE, UP TO THE MINIMUM DESIGN COVER HEIGHT ABOVE THE STRUCTURE, SHALL HAVE A STATIC MASS OF 10 TONS OR LESS. IT MAY BE POSSIBLE TO USE HEAVIER EQUIPMENT IF IT CAN BE DEMONSTRATED THAT THE STRUCTURE SHAPE IS NOT ADVERSELY AFFECTED. ENGINEERED BACKFILL MATERIAL PLACED WITHIN 1 FOOT LATERALLY OF THE WIDEST PART OF THE STRUCTURE SHALL BE COMPACTED USING HAND OPERATED EQUIPMENT UNTIL THE MINIMUM COVER HEIGHT IS REACHED. OVER-COMPACTION OF ENGINEERED BACKFILL IN THIS ZONE SHOULD BE AVOIDED, AS THIS CAN CONTRIBUTE TO EXCESSIVE DEFLECTION OF SOME STRUCTURES. AREAS CLOSEST TO THE STRUCTURE SHALL BE COMPACTED RUNNING PARALLEL TO THE LENGTH OF THE STRUCTURE.
- 6.8 ONCE THE BACKFILL ELEVATION REACHES APPROXIMATELY ¾ OF THE STRUCTURE RISE (DEPENDING ON THE SHAPE OF THE STRUCTURE AND RELATIVE MOVEMENT DURING THE BACKFILL PROCESS), PLACE AND COMPACT ENGINEERED BACKFILL MATERIAL IN RADIAL LIFTS OVER THE TOP OF THE STRUCTURE USING EQUIPMENT AS DESCRIBED ABOVE. THE FIRST RADIAL LIFT SHOULD BE THICKER AND PROVIDE A MINIMUM 12 INCHES OF COVER BETWEEN THE STRUCTURE AND COMPACTION EQUIPMENT. EQUIPMENT SHOULD RUN PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE STRUCTURE. NO EQUIPMENT SHALL BE ALLOWED OVER THE STRUCTURE THAT WOULD EXCEED THE DESIGN LOAD AT THE MINIMUM DESIGN HEIGHT OF COVER. NO CONSTRUCTION EQUIPMENT SHALL BE ALLOWED TO PARK ON TOP OF A PARTIALLY BACKFILLED STRUCTURE.
- 6.9 AT NO TIME SHALL THE ENGINEERED BACKFILL MATERIAL BE DUMPED OR PUSHED AGAINST THE STRUCTURE WALL(S) SO AS TO CHANGE THE SHAPE OR ALIGNMENT OF THE STRUCTURE. MATERIAL SHALL NOT BE DUMPED ON TOP OF THE STRUCTURE AT ANY TIME. TRUCKS MAY UNLOAD IN ROUGH LAYERS NO CLOSER THAN 5 FEET FROM THE WIDEST PART OF THE STRUCTURE.
- 6.10 THE STRUCTURE SHALL BE CHECKED PERIODICALLY DURING BACKFILLING TO ENSURE THE SHAPE OF THE STRUCTURE MEETS DESIGN REQUIREMENTS AND IS CONSISTENT WITH THE ASSEMBLY TOLERANCES AS STATED IN THESE NOTES. IF DEFLECTION OF THE STRUCTURE IS GREATER THAN EXPECTED, BACKFILLING SHALL BE HALTED AND BACKFILL PLACEMENT AND COMPACTION PROCEDURES MODIFIED TO CORRECT THE STRUCTURE SHAPE. IT MAY BE NECESSARY TO REMOVE SOME OF THE BACKFILL TO CORRECT EXCESSIVE DEFLECTION. AFTER COMPLETION OF BACKFILL PLACEMENT, THE FINAL SHAPE OF THE STRUCTURE SHALL BE WITHIN 2% (OR 5 INCHES, WHICHEVER IS LESS) OF THE PLAN DIMENSIONS.
- 7. **CONSTRUCTION OBSERVATIONS AND TESTING**
 - 7.1 OBSERVATION AND TESTING SHALL BE PERFORMED DURING CONSTRUCTION TO VERIFY COMPLIANCE WITH THESE DRAWINGS, APPLICABLE PROJECT DOCUMENTS, AND STANDARDS REFERENCED IN THESE NOTES.

7.2 THE CONTRACTOR IS RESPONSIBLE FOR QUALITY CONTROL PROCEDURES, VERIFICATION MEASUREMENTS, ADEQUATE SUPERVISION, PROGRESS TESTING, EVALUATION OF PROPOSED ENGINEERED BACKFILL MATERIALS, AND/OR OTHER MEASURES AS NEEDED TO ENSURE THAT THE COMPLETED PROJECT COMPLIES WITH THESE DRAWINGS AND NOTES.

7.3 THE PROJECT OWNER (OR THEIR DESIGNATED REPRESENTATIVE) IS RESPONSIBLE FOR PROJECT OVERSIGHT AND FINAL ACCEPTANCE OF THE CONSTRUCTED STRUCTURE. THE OWNER MAY ACCEPT THE CONTRACTOR'S QUALITY CONTROL PROGRAM OR ADOPT AN INDEPENDENT QUALITY ASSURANCE PROGRAM TO VERIFY COMPLIANCE.

7.4 OBSERVATIONS AND TESTING PRIOR TO STRUCTURE ASSEMBLY & BACKFILL SHALL INCLUDE BUT NOT BE LIMITED TO:

- EVALUATION OF FOUNDATION SOILS BELOW FOOTINGS AND THE ENGINEERED BACKFILL ENVELOPE
- VERIFICATION OF PROPER ALIGNMENT, DIMENSIONS, AND PLACEMENT OF FOUNDATIONS
- VERIFICATION OF PROPER SHAPING, PLACEMENT, AND PREPARATION OF BEDDING SOILS (STRUCTURES WITH INVERTS)
- VERIFICATION OF PROPER PREPARATION OF EMBANKMENT SOILS ADJACENT TO THE ENGINEERED BACKFILL ENVELOPE
- EVALUATION AND APPROVAL OF ENGINEERED BACKFILL MATERIALS
- VERIFICATION OF PROPER PLACEMENT OF GEOTEXTILES (WHEN REQUIRED)
- 7.5 OBSERVATIONS AND TESTING DURING ASSEMBLY & BACKFILLING SHALL INCLUDE BUT NOT BE LIMITED TO:
 - STRUCTURE ALIGNMENT
 - PLATE TIGHTNESS OBSERVATIONS
 - BOLT TORQUE MEASUREMENTS
 - INITIAL STRUCTURE SHAPE MEASUREMENTS (PRIOR TO STARTING BACKFILLING)
 - PERIODIC STRUCTURE SHAPE MEASUREMENTS (DURING BACKFILLING)
 - ENGINEERED BACKFILL MATERIAL SAMPLING AND TESTING
 - OBSERVATIONS OF PROPER FILL PLACEMENT AND COMPACTION PROCEDURES.

7.6 CONTECH MAY REQUIRE ADDITIONAL OBSERVATIONS AND/OR TESTING WHICH MAY INCLUDE, BUT NOT BE LIMITED TO, FULL TIME SHAPE MONITORING, ADDITIONAL SOIL TESTING, AND SITE EVALUATIONS DEPENDING ON THE STRUCTURE GEOMETRY, DESIGN, AND/OR OTHER PROJECT SPECIFIC FACTORS.



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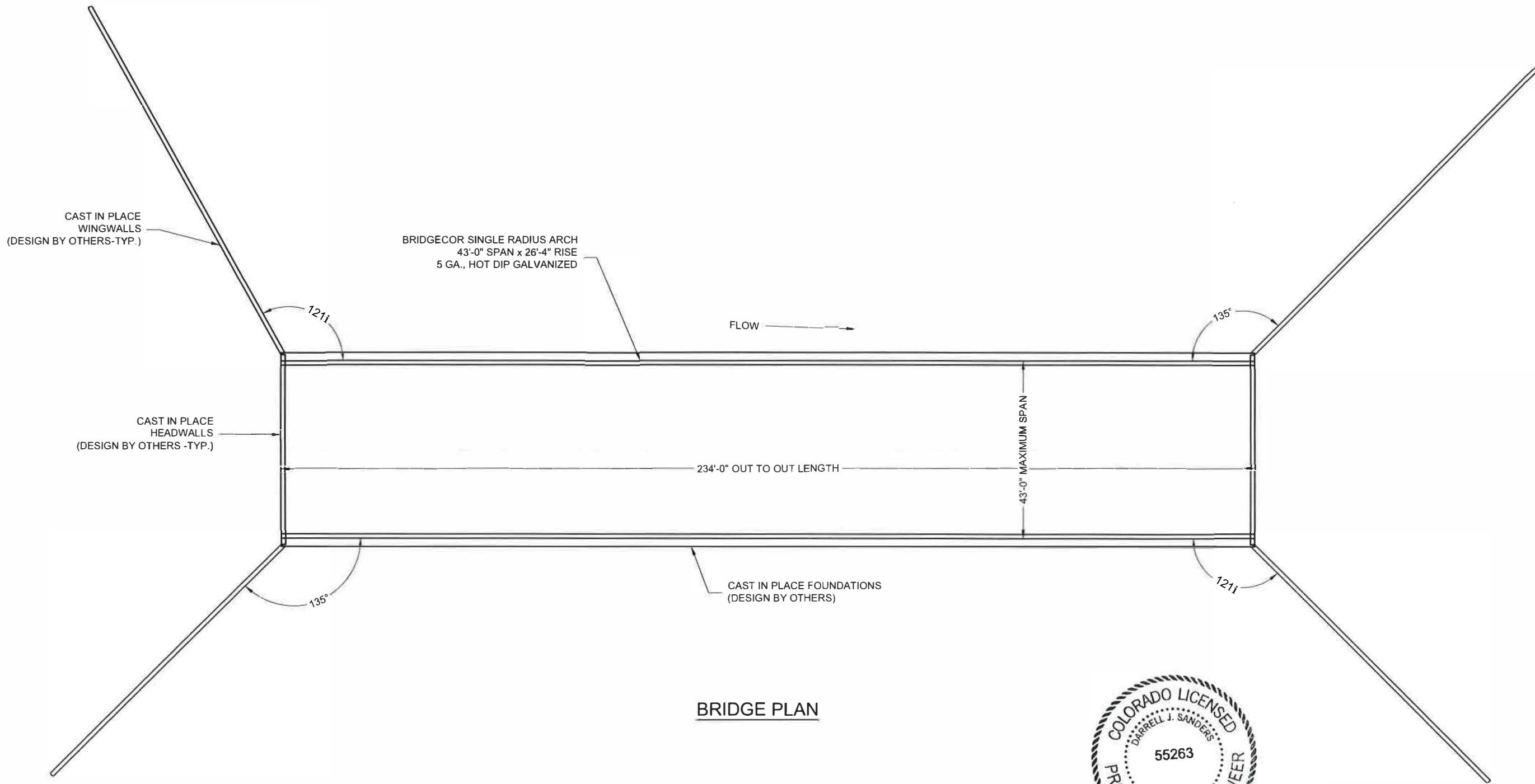
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DRAWING

BRIDGECOR SINGLE RADIUS ARCH
43'-0" MAX. SPAN X 26'-4" RISE
STERLING RANCH COLORADO SPRINGS
COLORADO SPRINGS, CO

PROJECT No: 635632	SEQ No: 020	DATE: 2/28/2022
DESIGNED: XXX	DRAWN: SCC	
CHECKED: EDE	APPROVED: XXX	
SHEET NO: 2 OF 7		

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BRIDGE PLAN



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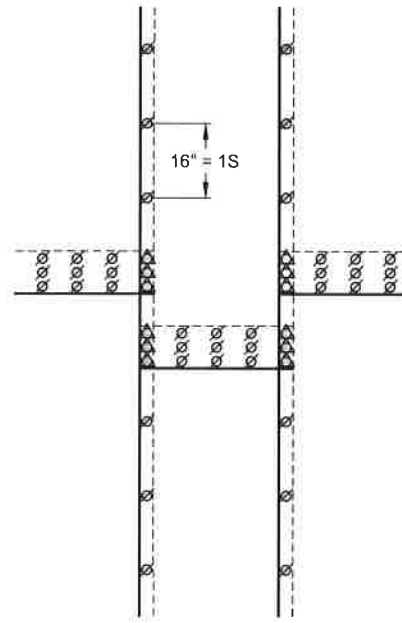
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BRIDGECOR SINGLE RADIUS ARCH
43'-0" MAX. SPAN X 26'-4" RISE
STERLING RANCH COLORADO SPRINGS
COLORADO SPRINGS, CO

PROJECT No. 635632	SEQ. No. 020	DATE: 2/28/2022
DESIGNED: XXX	DRAWN: SCC	
CHECKED: EDE	APPROVED: XXX	
SHEET NO: 3 of 7		

NOTES:

1. ALL COMPONENTS MUST BE ASSEMBLED AS SHOWN. PAY CLOSE ATTENTION TO MARK NUMBERS ON THE COMPONENTS.
2. MANUFACTURING FACILITY: MANSFIELD, TX.
3. REFERENCE FINAL SHEET FOR PLATE LAP DETAIL.



ANCHOR BOLTS PLACED 9" FROM PLATE EDGE @ 16" O.C. IN NEAREST CREST OR VALLEY AS SHOWN QTY OF (57x) (114x EACH SIDE)



DETAIL A

SCALE: N.T.S.

LEGEND

- ⊘ 2 PLATE LAP SEAMS
- △ 3-PLATE SEAM

MOVEMENT CONTROL HOOKS (QTY. OF 69) FOR SHAPE MONITORING PLACED AT EVERY FOURTH SEAM

BRIDGECOR PLATE DETAILS (30" LONG PLATES)						
PLATE WIDTH "S"	GAGE	PLATE QTY.	MK #	OVERALL WIDTH (INCHES)	NUMBER OF CIRCUMFERENTIAL BOLT HOLES AT 16" CENTERS	PLATE WEIGHT WITHOUT FASTENERS
11	5	188	1,2,7,8,11,12	185	12	486
12	5	282	3,4,5,6,9,10	201	13	528

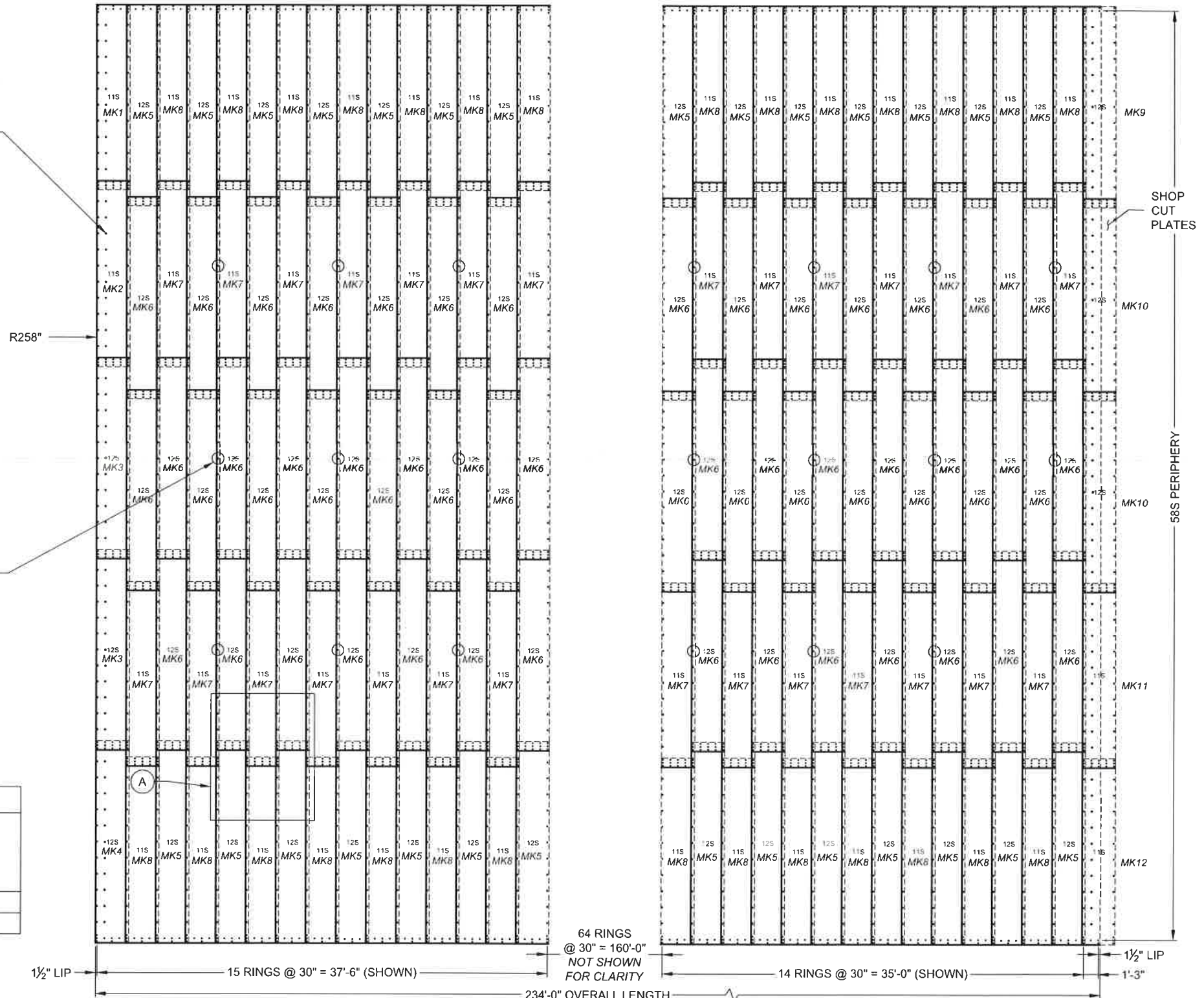


PLATE LAYOUT DRAWING
BRIDGECOR SINGLE RADIUS ARCH (OUTSIDE VIEW)
43'-0" MAX. SPAN x 26'-4" RISE

FOR APPROVAL

BRIDGECOR SINGLE RADIUS ARCH
43'-0" MAX. SPAN X 26'-4" RISE
STERLING RANCH COLORADO SPRINGS
COLORADO SPRINGS, CO

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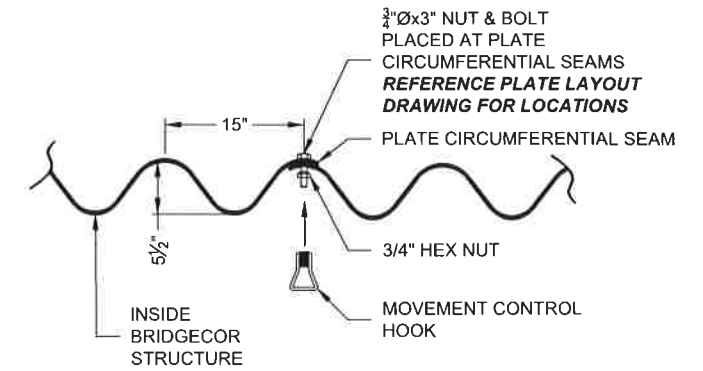
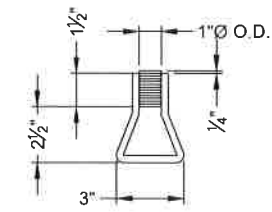
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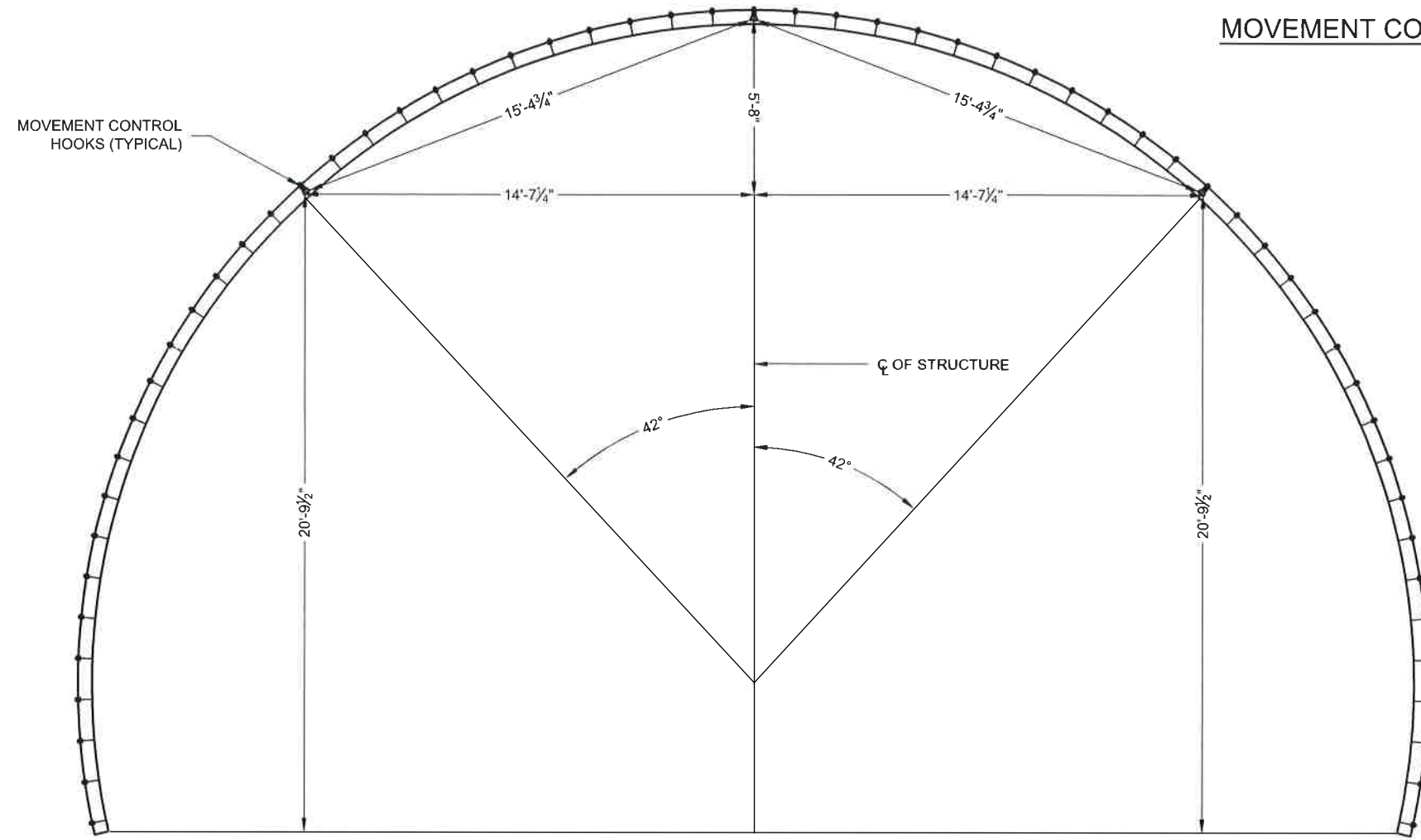
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NOTES:

1. REFERENCE PLATE LAYOUT DIAGRAM FOR MOVEMENT CONTROL HOOK LOCATIONS.



MOVEMENT CONTROL HOOK DETAIL



MOVEMENT CONTROL HOOK PLACEMENT DETAIL



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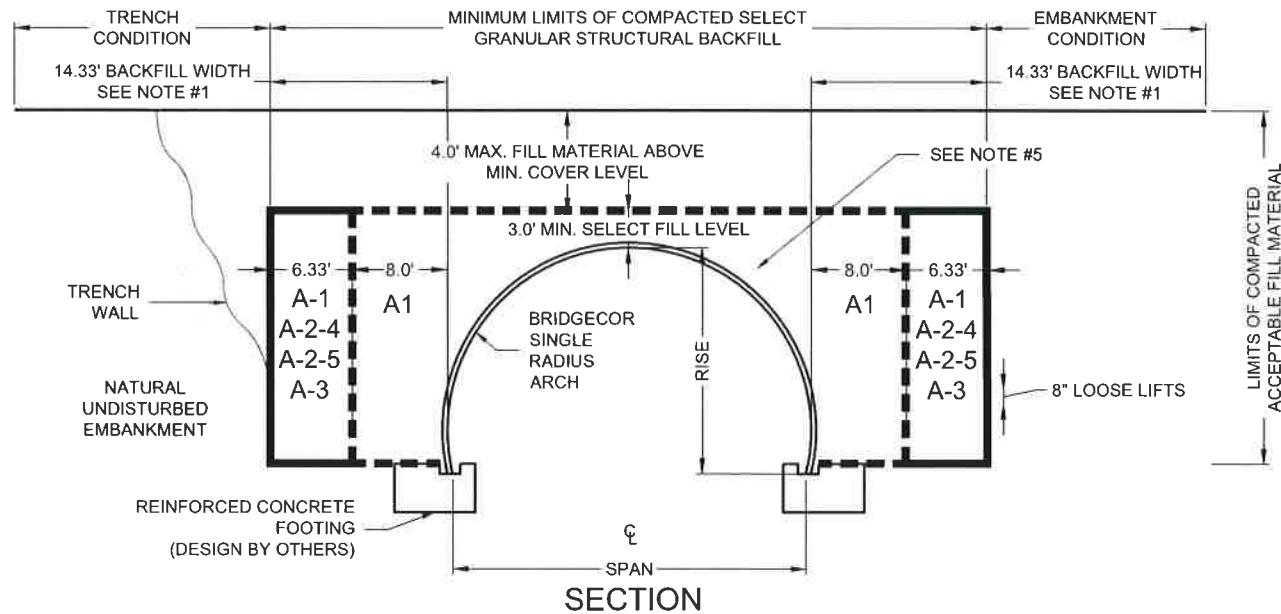
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BRIDGECOR SINGLE RADIUS ARCH
43'-0" MAX. SPAN X 26'-4" RISE
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SECTION



SELECT GRANULAR STRUCTURAL BACKFILL LIMITS



INITIAL LIFTS OVER THE CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH LIGHTWEIGHT TRACTOR (D-4 OR LIGHTER) EQUIPMENT.

NOTES:

1. MINIMUM SELECT GRANULAR STRUCTURAL BACKFILL WIDTH IS BASED ON AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12 AND/OR THE RESULTS OF THE PROJECT SPECIFIC FINITE ELEMENT ANALYSIS.
2. ALL SELECT GRANULAR STRUCTURAL BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
3. MONITORING OF THE SINGLE RADIUS ARCH STRUCTURE IS REQUIRED DURING THE BACKFILLING PROCESS. THE METHOD, FREQUENCY AND DURATION SHALL BE DETERMINED BASED ON THE SIZE AND SHAPE OF THE STRUCTURE.
4. PREVENT DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
5. PLACE SELECT GRANULAR STRUCTURAL BACKFILL IN RADIAL LIFTS AT APPROXIMATELY 75% OF THE RISE OF THE SINGLE RADIUS ARCH STRUCTURE.
6. BECAUSE OF THE FLEXING AND VIBRATION OF THE CROWN PLATES, THE FULL COMPACTION DENSITY LEVELS OFTEN CAN NOT BE ACHIEVED IN THE FIRST SEVERAL INCHES OF FILL OVER THE CROWN.

BASED ON A PROJECT SPECIFIC ANALYSIS GAGE TO BE 5 , BACKFILL MATERIAL TO BE A-1* , COMPACTED TO 90 % PER AASHTO T-180.

IF OTHER BACKFILL MATERIALS ARE TO BE EVALUATED, CONTACT YOUR LOCAL CONTECH REPRESENTATIVE.

*INITIAL BACKFILL WIDTH TO BE A-1 MATERIAL. THE REMAINING MATERIAL CAN BE A-2-4, A-2-5 OR A-3.

ADDITIONAL SELECT GRANULAR STRUCTURAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF THE PROJECT SPECIFIC ANALYSIS NOTED BELOW. REFERENCE THE STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION TABLE ON THIS SHEET. RECYCLED CONCRETE/SLAG ARE NOT RECOMMENDED FOR STRUCTURAL BACKFILL MATERIAL. BACKFILL MUST BE PLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 8" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 90% DENSITY PER AASHTO T-180.

A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION. IF THE PROPOSED BACKFILL IS NOT A WELL GRADED GRANULAR MATERIAL, A NON-WOVEN GEOTEXTILE FILTER FABRIC SHALL BE PLACED BETWEEN THE SELECT BACKFILL AND THE IN SITU MATERIAL.

DURING BACKFILL, ONLY LIGHTWEIGHT TRACKED VEHICLES (D-4 OR LIGHTER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE. THE ENGINEER AND CONTRACTOR ARE CAUTIONED THAT THE MINIMUM COVER MAY NEED TO BE INCREASED TO HANDLE TEMPORARY CONSTRUCTION VEHICLE LOADS (HEAVIER THAN D-4).

STRUCTURAL PLATE BACKFILL GROUP CLASSIFICATION, REFERENCE AASHTO M-145

GROUP CLASSIFICATION	A-1-a	A-1-b	A-2-4	A-2-5	A-3
Sieve Analysis Percent Passing					
No. 10 (2 000 mm)	50 max.	----	----	----	----
No. 40 (0 425 mm)	30 max.	50 max.	----	----	51 max.*
No. 200 (0 075 mm)	15 max.	25 max.	35 max.	35 max.	10 max.
Atterberg Limits for Fraction Passing No. 40 (0 425 mm)					
Liquid Limits	----	----	40 max.	41 min.	----
Plasticity Index	6 max.	6 max.	10 max.	10 max.	Non Plastic
Usual Materials	Stone Fragment, Gravel and Sand		Silty or Clayey Gravel and Sand		Coarse Sand

*Modified from AASHTO M-145

Fine beach sands, windblown sands, stream deposited sands, etc., exhibiting fine, rounded particles and typically classified by AASHTO M-145 as A-3 Materials should not be used.

If 95% compaction per AASHTO T-180 is specified, the backfill material shall be A-1-a

Reference the most current version of ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), for comparable soil groups.



3/7/22

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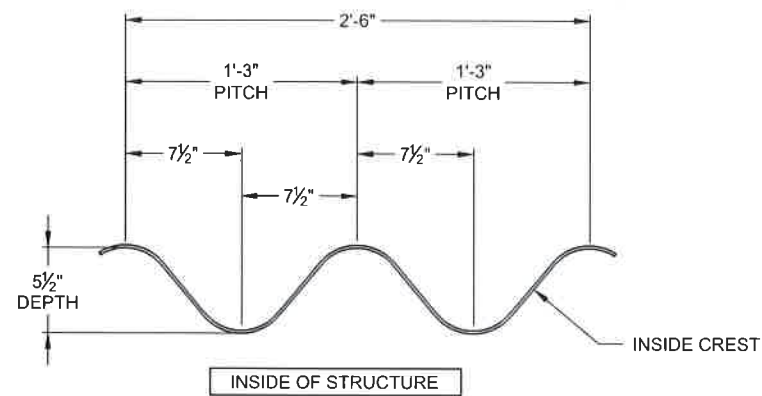
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43'-0" MAX. SPAN X 26'-4" RISE
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COLORADO SPRINGS, CO

PROJECT No : 635632	SEQ No : 020	DATE : 2/28/2022
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BRIDGECOR CORRUGATION PROFILE

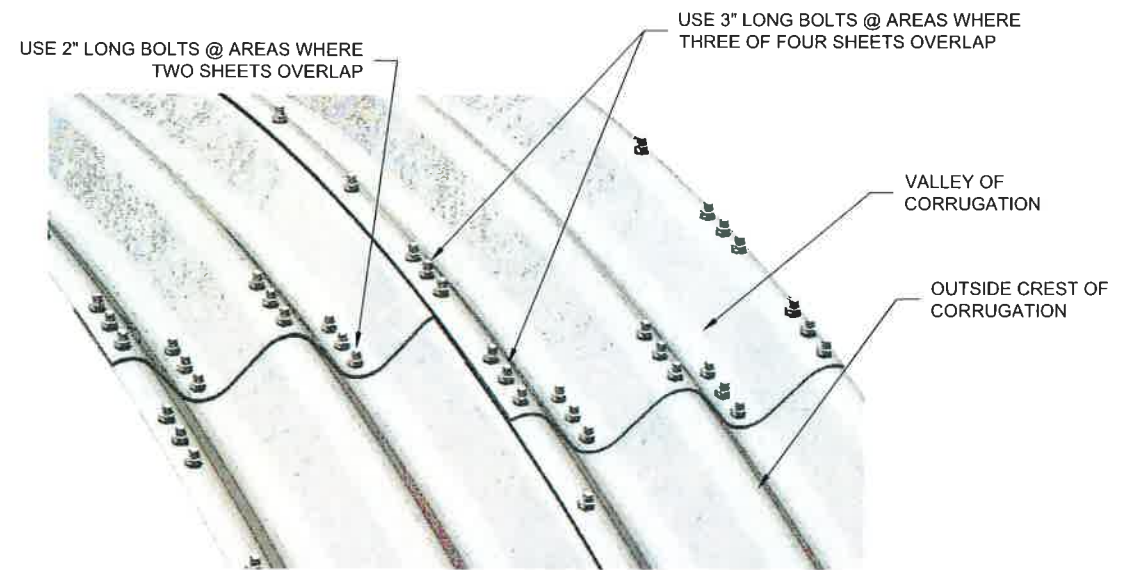
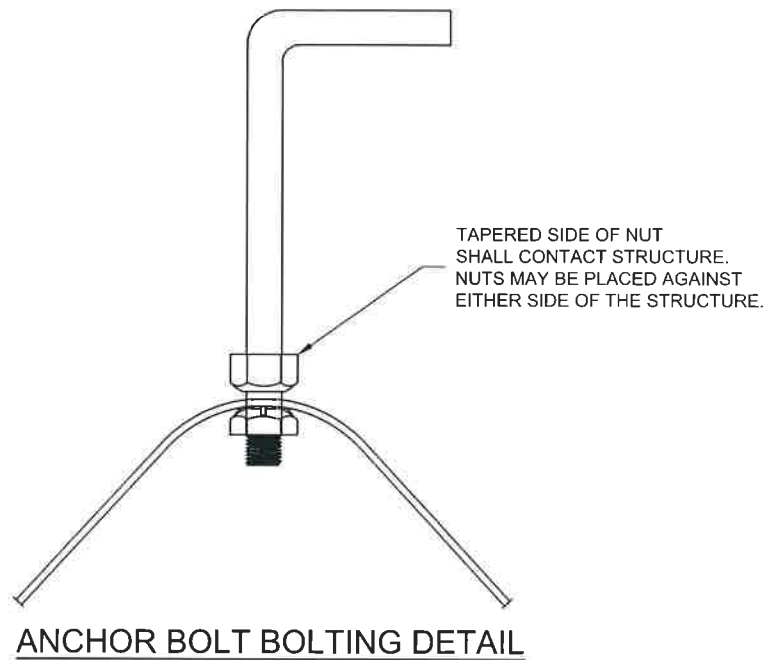
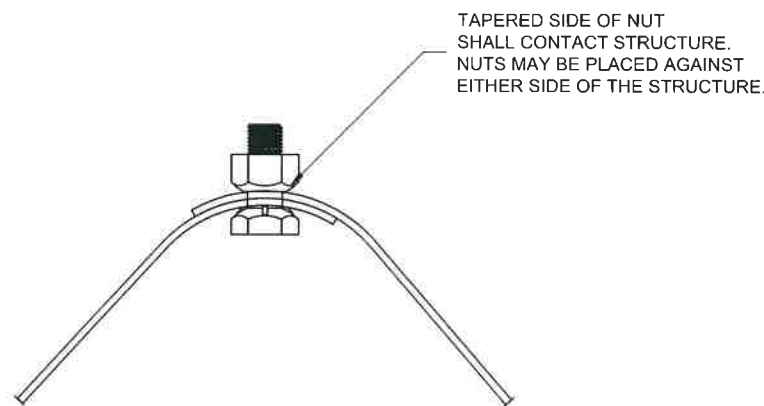


PLATE LAP DETAIL



ANCHOR BOLT BOLTING DETAIL



TYPICAL BOLTING DETAIL

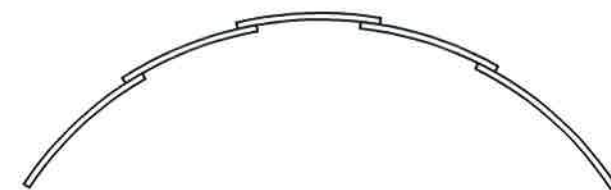
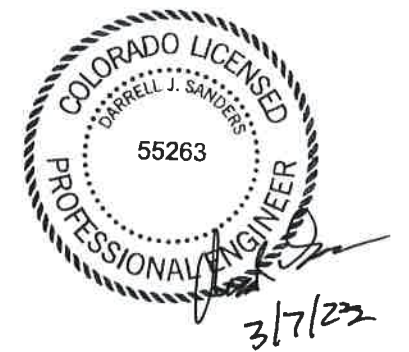


PLATE LAPPING DETAIL (LOOKING DOWNSTREAM)



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COLORADO SPRINGS, CO

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CHECKED:	APPROVED:	
EDE	XXX	
SHEET NO:	7 OF 7	