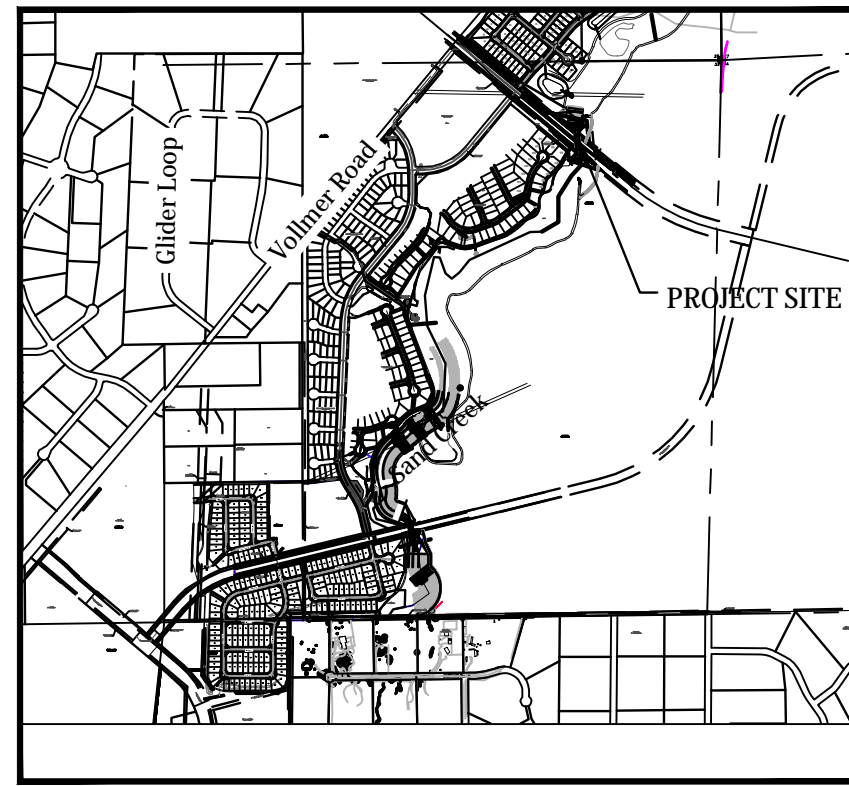


# STERLING RANCH DEVELOPMENT BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS

## EL PASO COUNTY, COLORADO

Kiowa Project No. 19032  
7/14/2022



VICINITY MAP  
SCALE: N.T.S.



### 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, Corey Morrison 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.

APPROVED  
Engineering Department  
EPC Planning & Community Development  
County Engineer / ECM Administrator Date



Know what's below.  
Call before you dig.

### 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
CL = CENTERLINE	PVT = POINT OF VERTICAL TANGENCY
DIP = DUCTILE IRON PIPE	RCE = REINFORCED CONCRETE BOX
EL = ELEVATION	RCP = REINFORCED CONCRETE PIPE
ESMT = EASEMENT	ROW = RIGHT OF WAY
EX. = EXISTING	RT = RIGHT
FC = FACE OF CURB	SHT = SHEET
FES = FLARED END SECTION	SS = SANITARY SEWER
FLG = FLANGE	STA = STATION
FL = FLOWLINE	STD = STANDARD
GB = GRADE BREAK	TA = TOP OF ASPHALT
HP = HIGH POINT	TC = TOP OF CURB
HORIZ = HORIZONTAL	TOP = TOP OF FOOTER
HYD = HYDRANT	TOP = TOP OF PIPE
I.D. = INSIDE DIAMETER	TOR = TOP OF ROCK
LT = LEFT	TYP = TYPICAL
LF = LINEAR FEET	VC = VERTICAL CURVE
LP = LOW POINT	VERT = VERTICAL
MAX = MAXIMUM	
MH = MANHOLE	

### 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

(38 sheets total)

**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: 7/14/2022

Design: TAC

Drawn: PAV

Check:

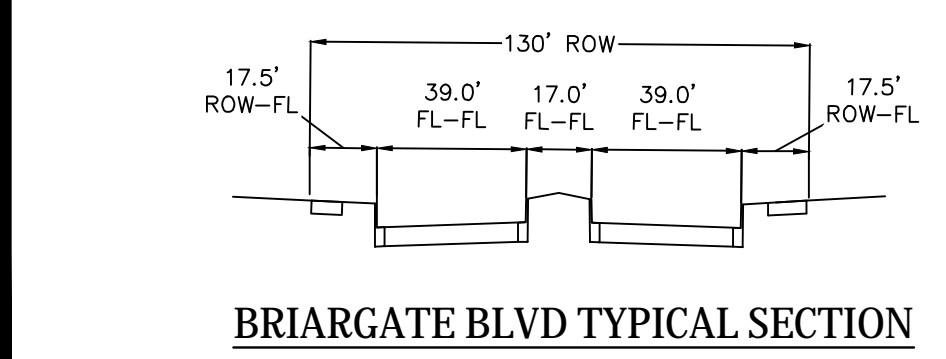
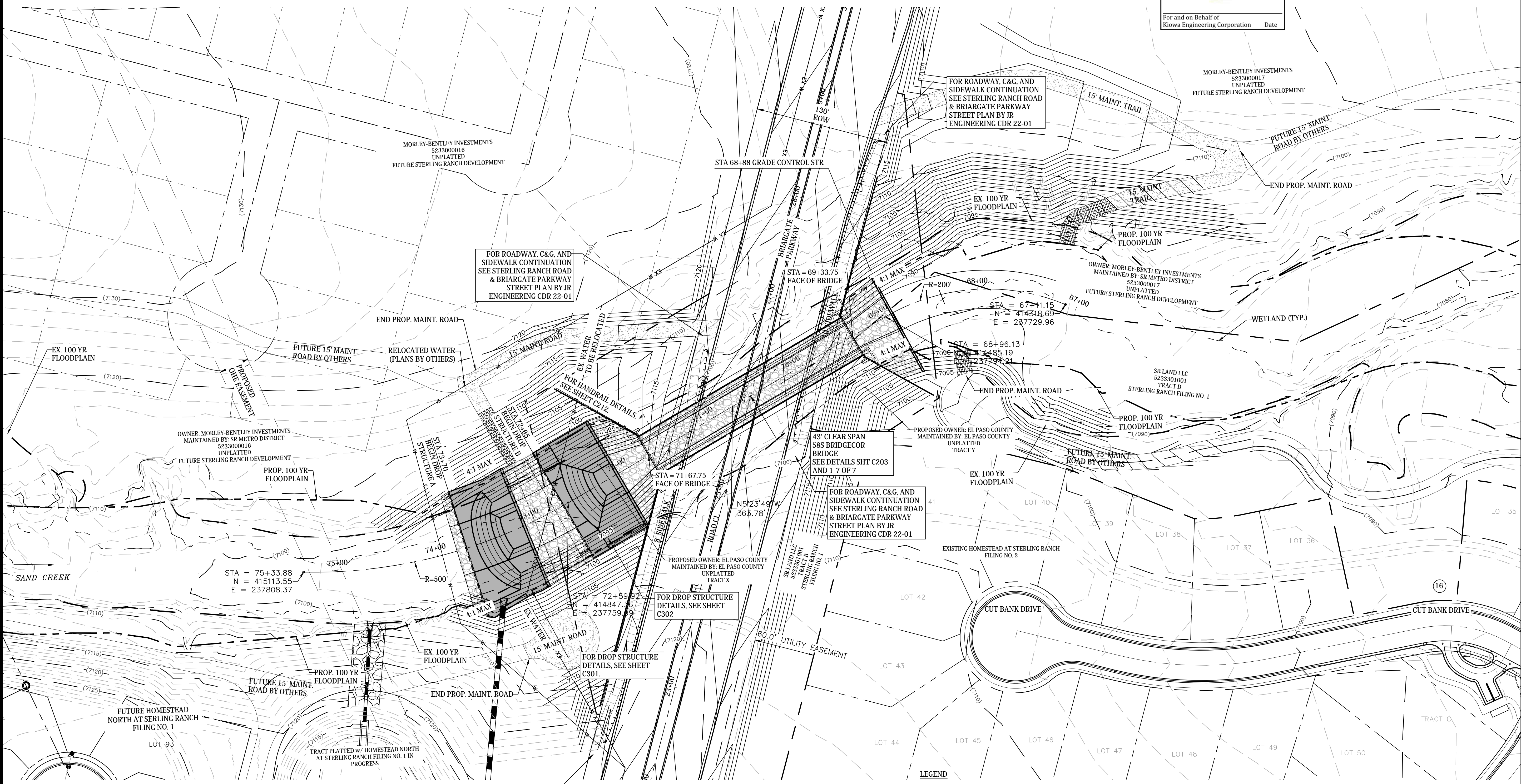
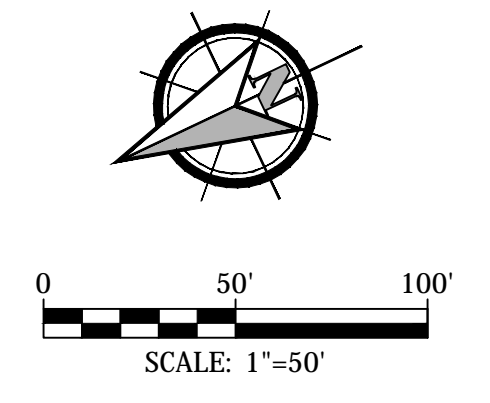
Revisions:

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.



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

EPC 8/9/22

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

**Kiowa**  
 Engineering Corporation  
 1604 South 21st Street  
 Colorado Springs, Colorado 80904  
 (719) 630-7342

Project No.:	19032
Date:	7/14/2022
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C101**

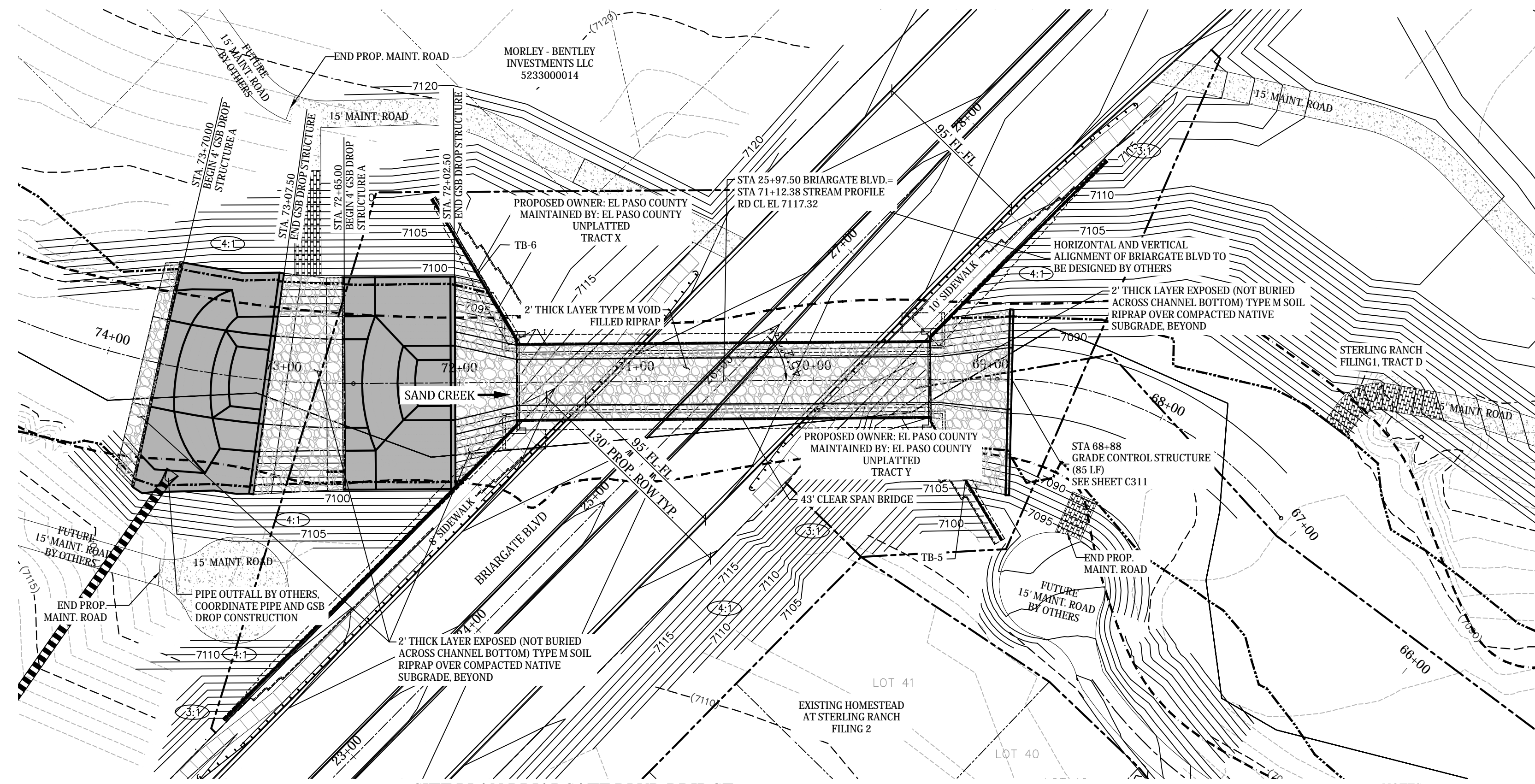


TEST BORING NO. 5				TEST BORING NO. 6			
DATE DRILLED 7/13/2021				DATE DRILLED 7/13/2021			
JOB # 211647				CLIENT C&C LAND			
LOCATION BHIARGATE BRIDGE				LOCATION BHIARGATE BRIDGE			
REMARKS				REMARKS			
SURFACE ELEV. = 7096.5				SURFACE ELEV. = 7105.5			
WATER @ 1.5', 7/20/21				WATER @ 3.5', 7/20/21			
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		50	11.5	10		50	14.3
15		50	16.0	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, VERY MOIST				SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST			

**ENTECH ENGINEERING, INC.**  
555 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

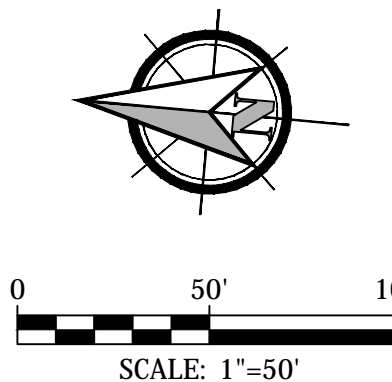
**TEST BORING LOG**

JOB NO. 211647  
DATE: 7/23/21  
CHECKED: [Signature]  
SCALE: A-1



**SITE PLAN BRIARGATE BLVD BRIDGE**  
1" = 50'

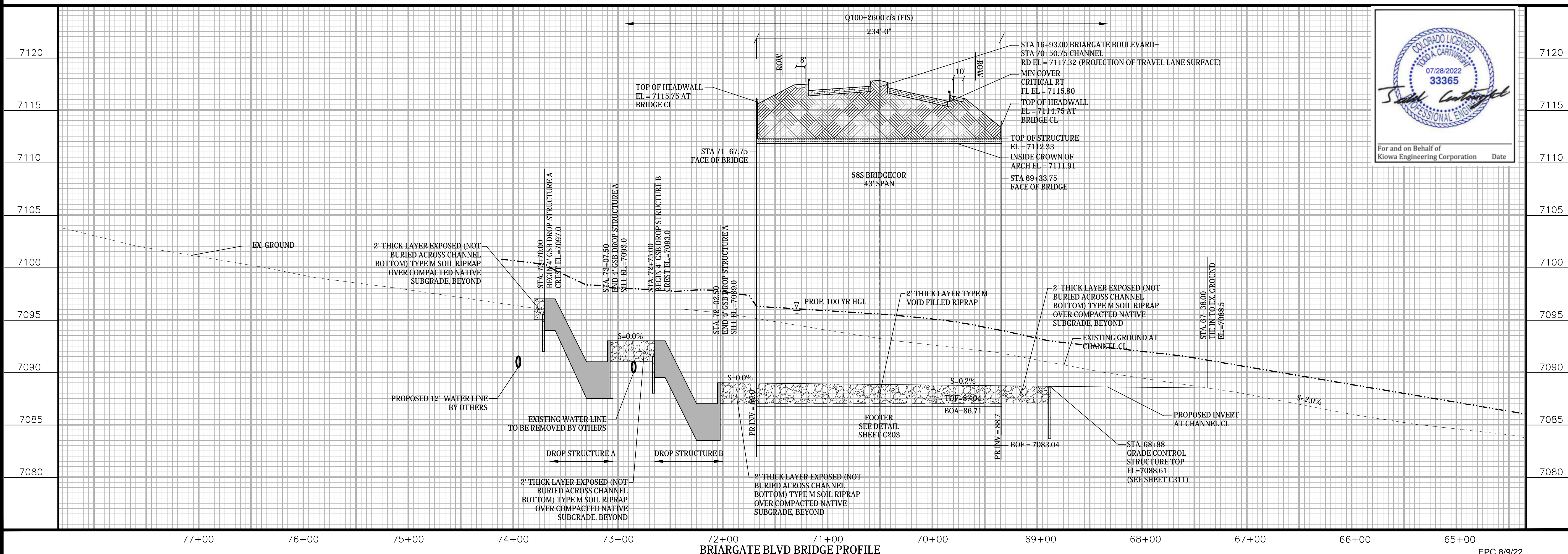
**CAUTION!!!**  
EXISTING UTILITIES TO BE PROTECTED FROM DISTURBANCE WHEN INSTALLING BRIDGE AND INFRASTRUCTURE.



**PROFILE LEGEND**

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

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



**BRIARGATE BLVD BRIDGE PROFILE**

**PROFESSIONAL ENGINEER**  
SOUTH CAROLINA  
07/28/2022  
33365  
For and on Behalf of  
Kiowa Engineering Corporation Date

**Kiowa Engineering Corporation**  
1604 South 21st Street  
Colorado Springs, Colorado 80904  
(719) 630-7342

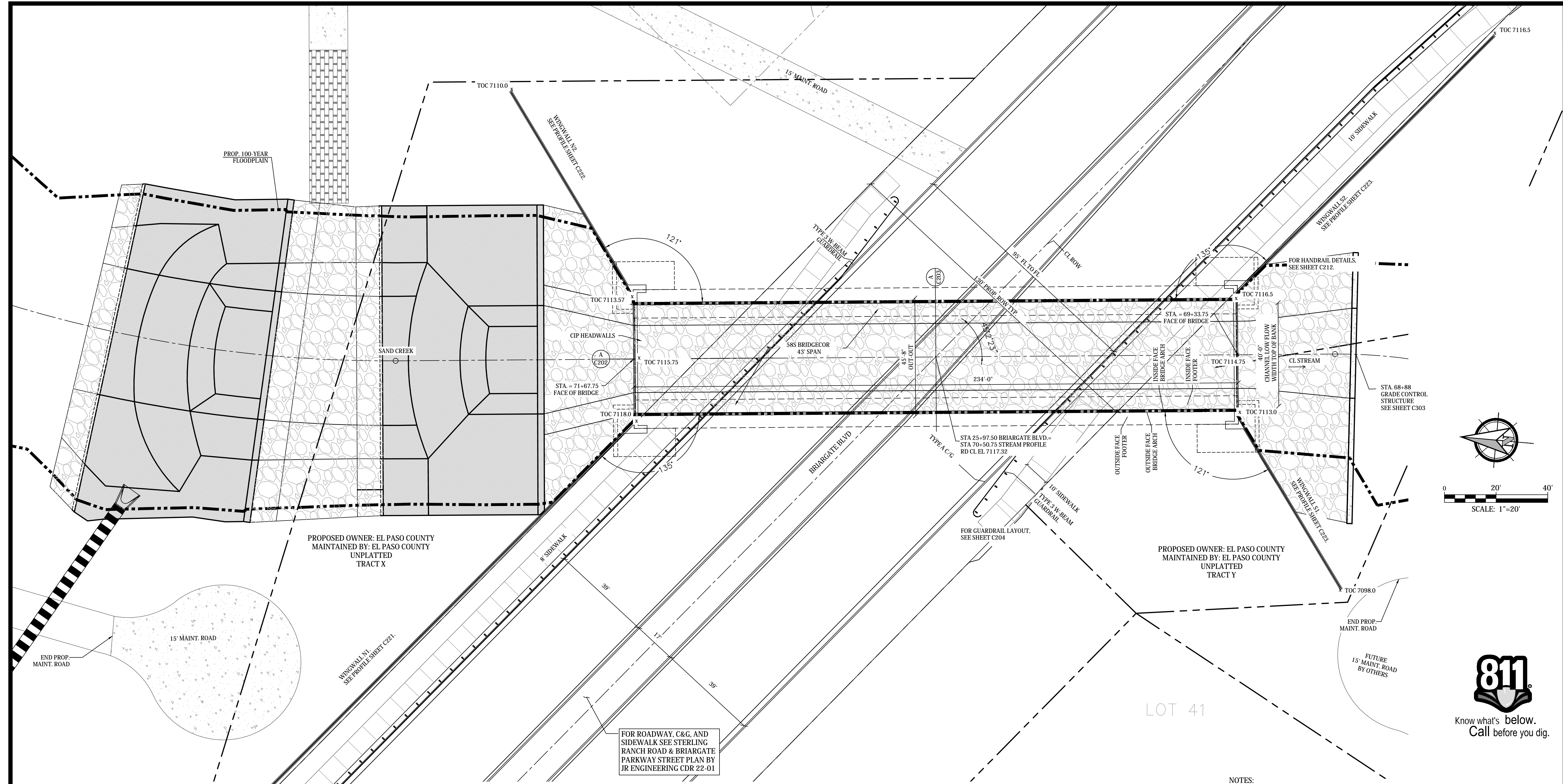
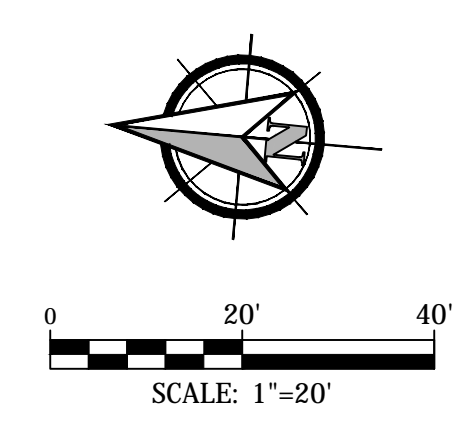
**STERLING RANCH DEVELOPMENT**  
**BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS**  
**PLAN AND PROFILE**  
EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C201**



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



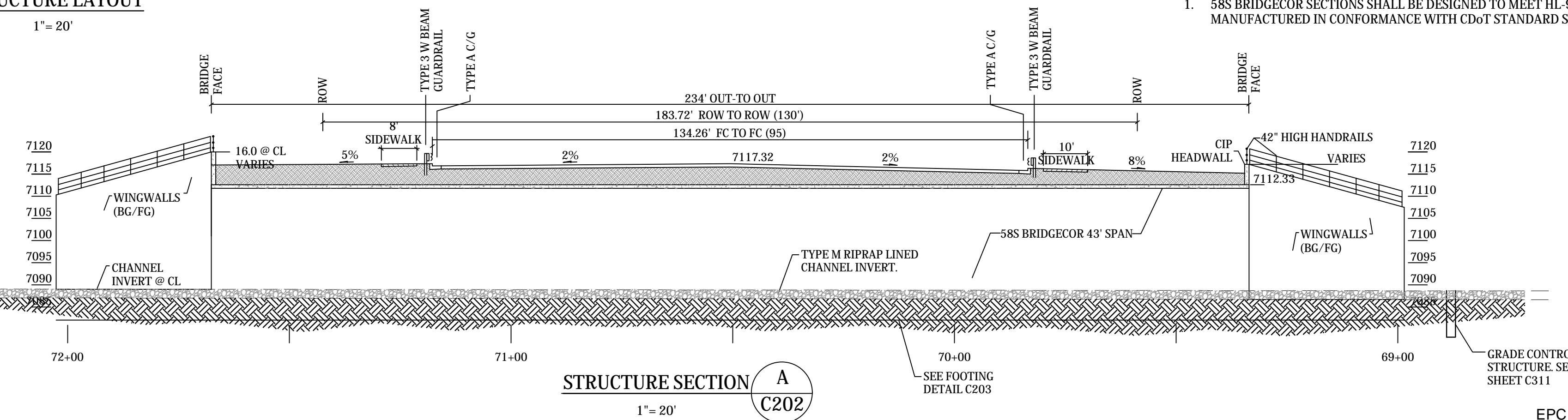
PROPOSED OWNER: EL PASO COUNTY  
MAINTAINED BY: EL PASO COUNTY  
UNPLATTED TRACT X

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

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

- 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**  
C202  
1" = 20'



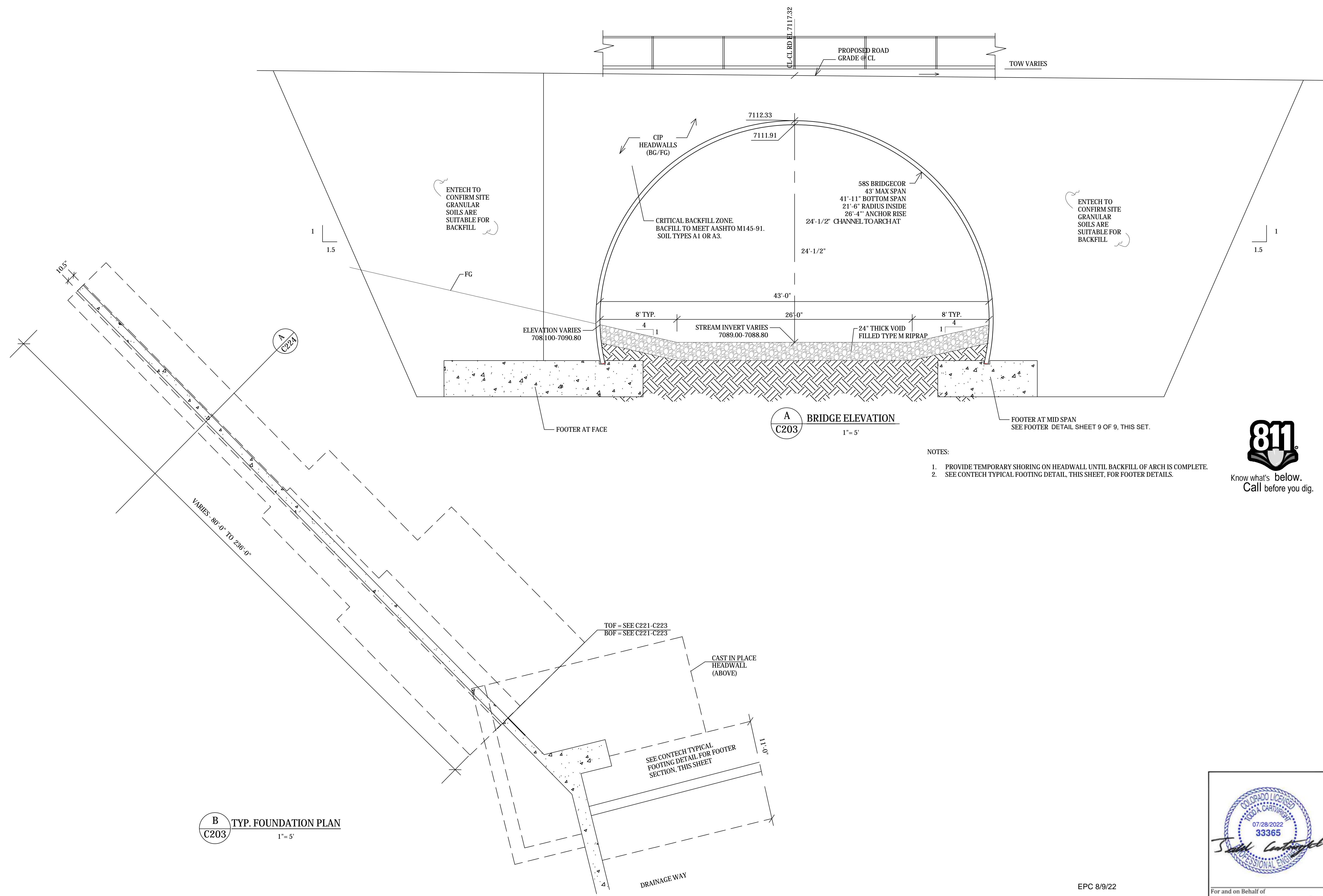
EPC 8/9/22

Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C202**



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



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



Know what's below.  
Call before you dig.

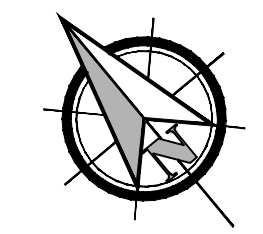


Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C203**

EPC 8/9/22





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

NOTES:  
1. FOR GUARDRAIL DETAILS SEE SHEET C211



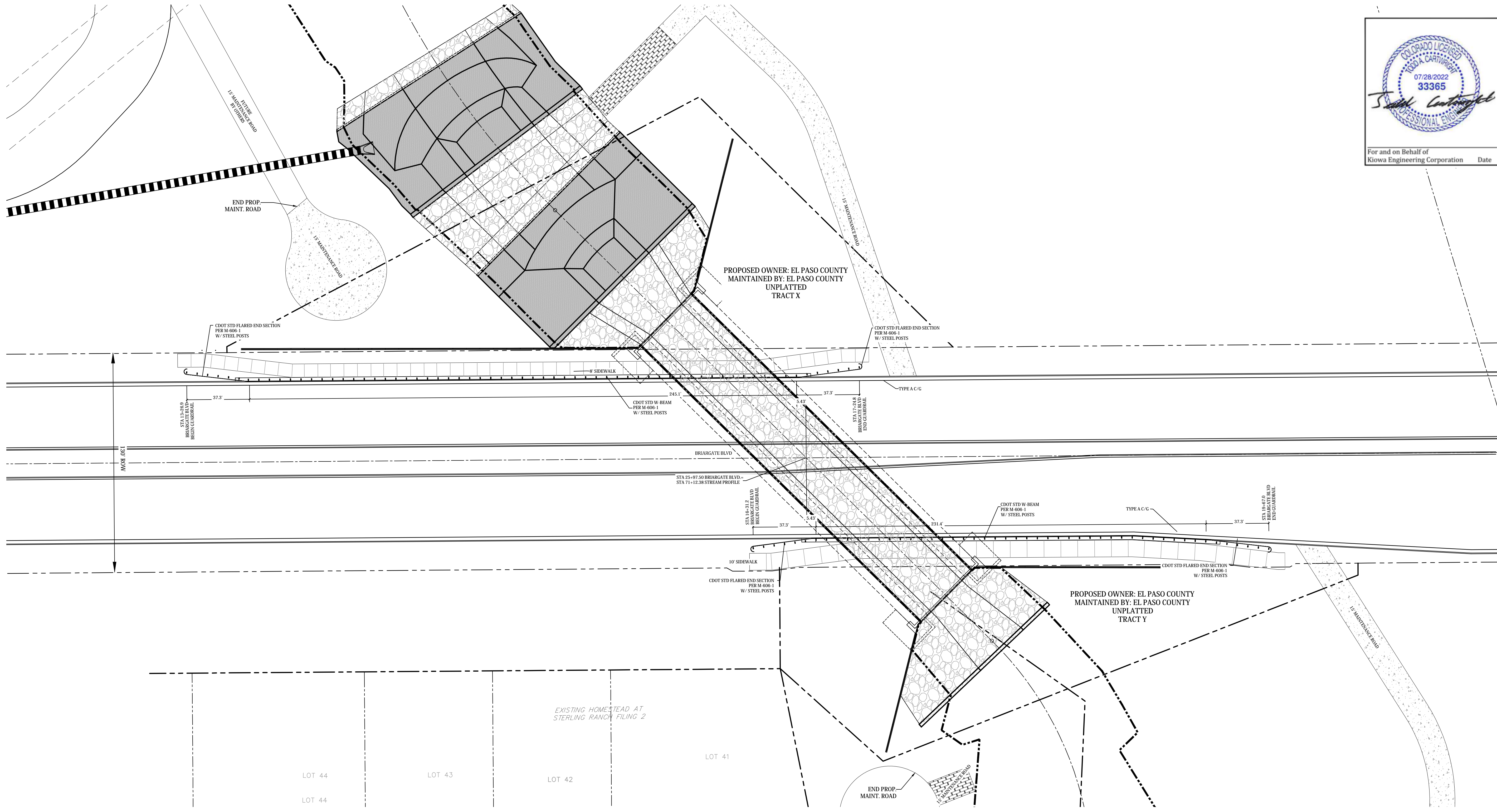
For and on Behalf of  
Kiowa Engineering Corporation Date

**Kiowa**  
Engineering Corporation  
1604 South 21st Street  
Colorado Springs, Colorado 80904  
(719) 630-7342

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

Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C204**

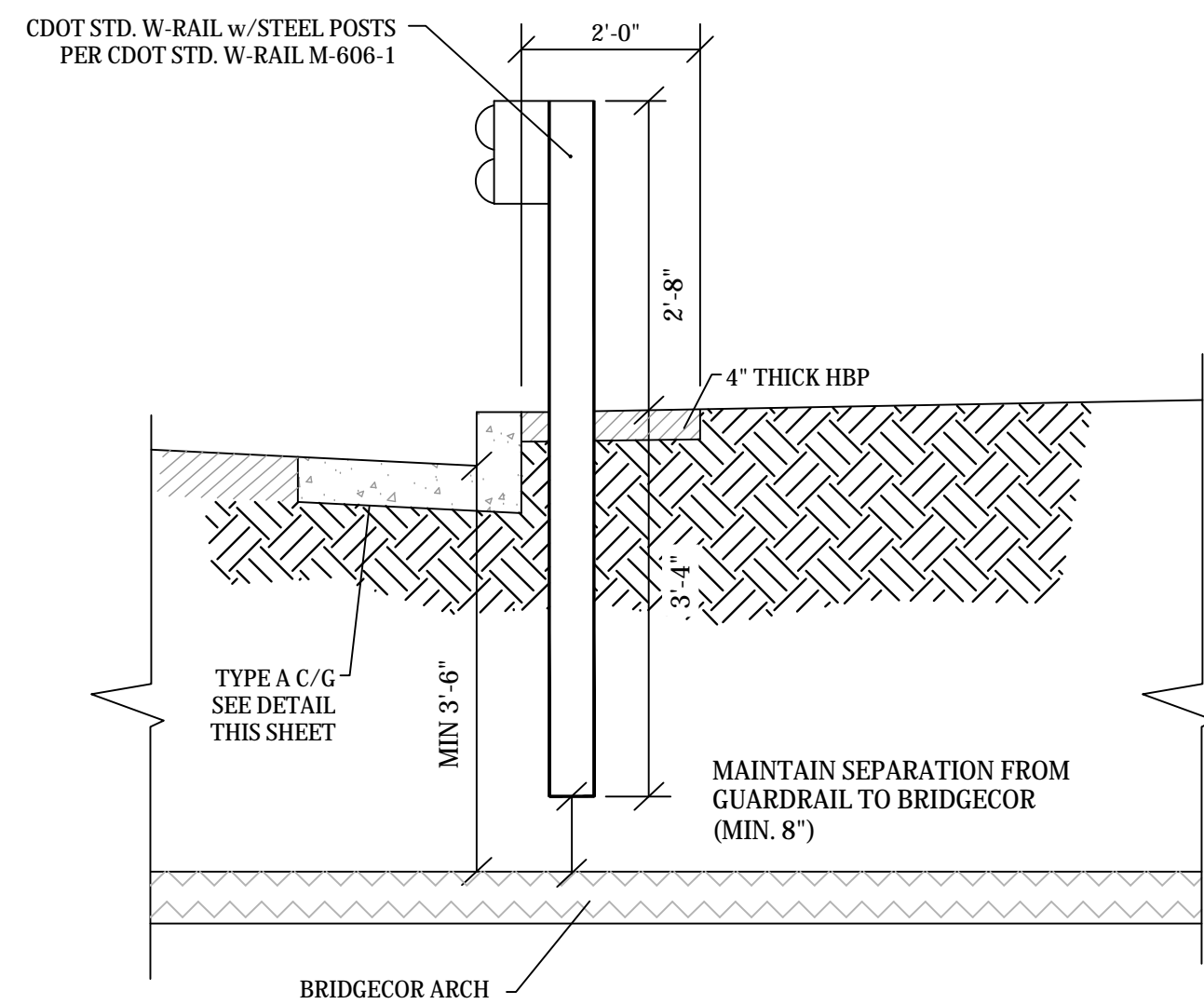


**GUARDRAIL LAYOUT**  
1"=20'

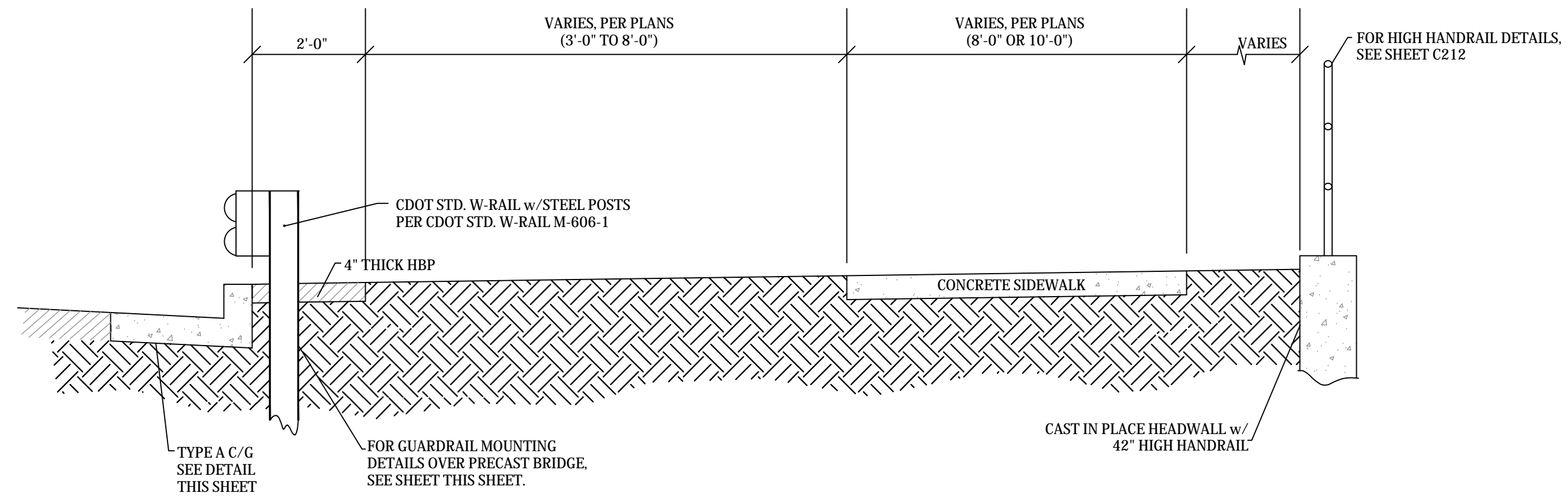


Know what's below.  
Call before you dig. EPC 8/9/22

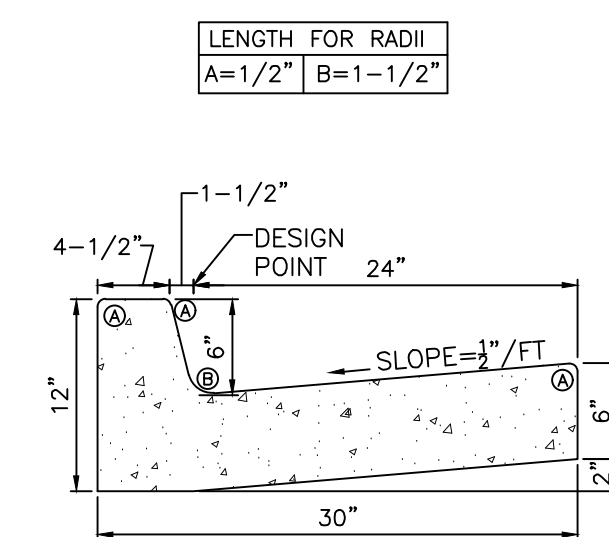




**A** GUARDRAIL MOUNTING DETAILS  
C211 NTS



**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.



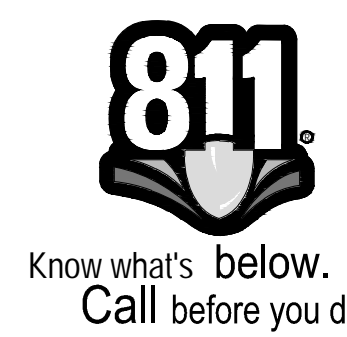
For and on Behalf of  
Kiowa Engineering Corporation Date

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

Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C211**

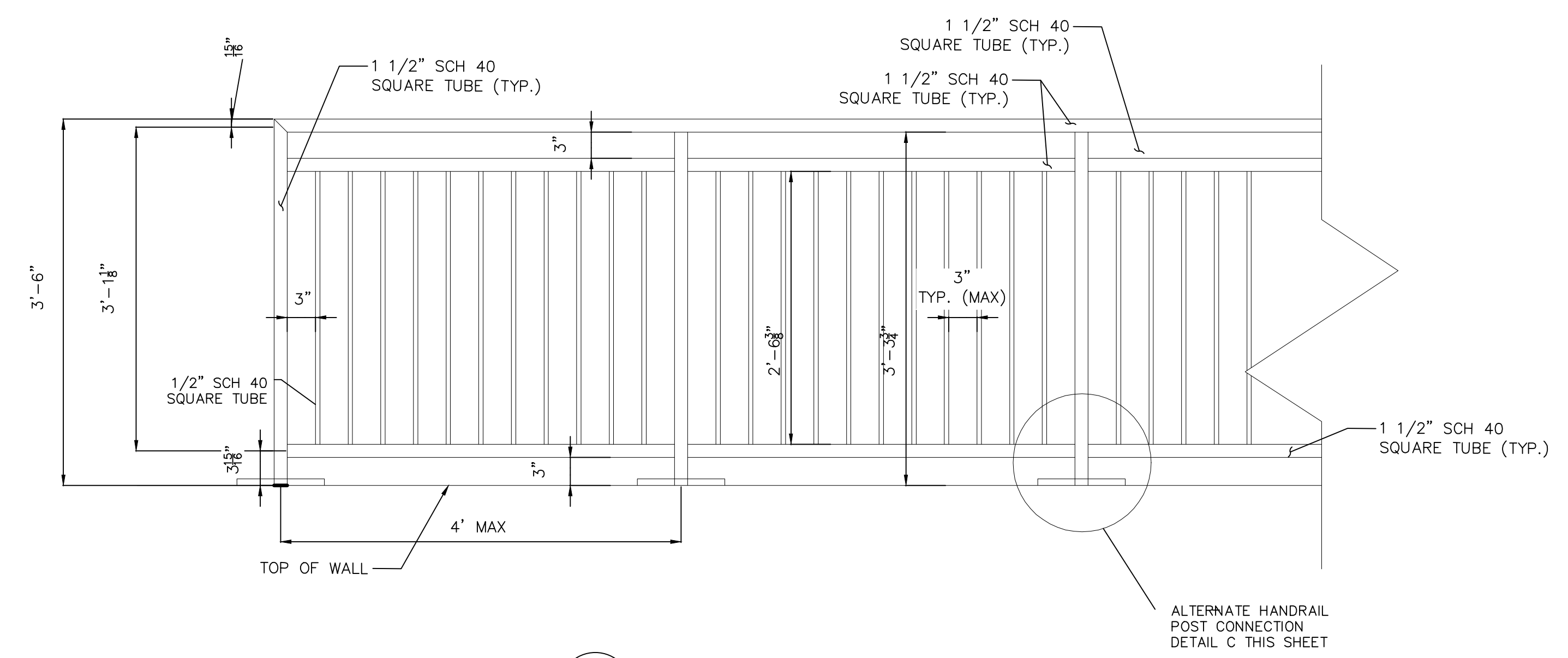
EPC 8/9/22



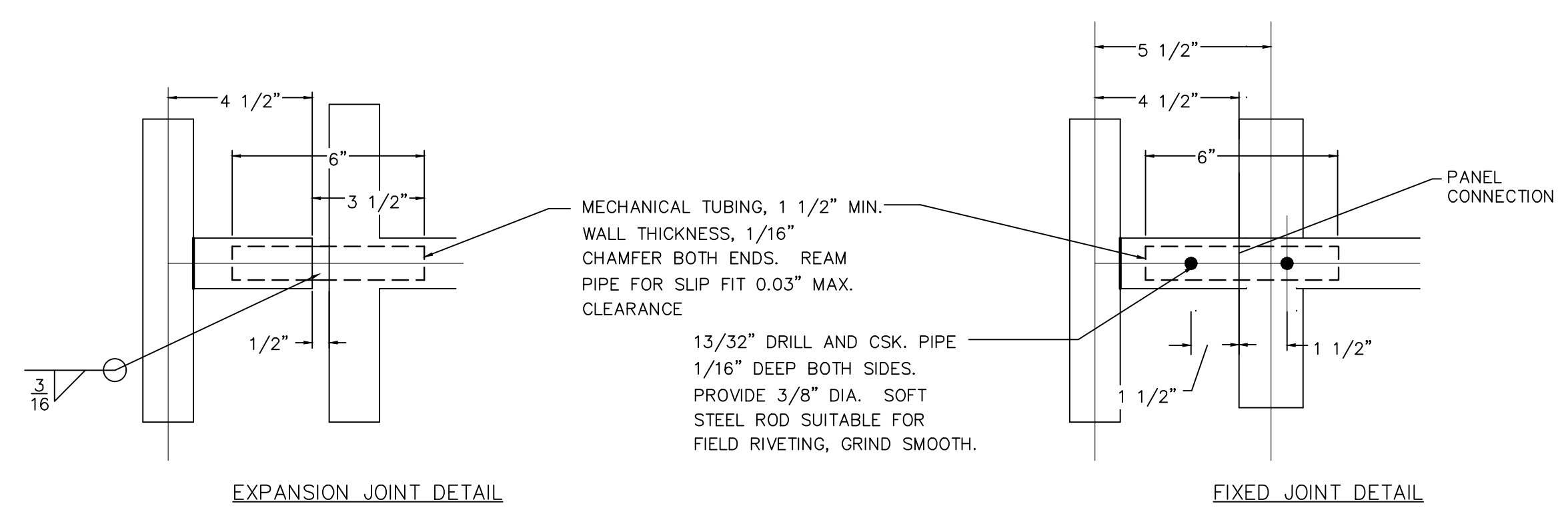


HANDRAIL PAINT NOTE:  
 HANDRAIL FINISH SHALL BE ONE COAT METAL PRIMER AND TWO COATS SHERWIN WILLIAMS "BRIDGE GREEN" COLOR, ACRYLON 218 HS ACRYLIC POLYURETHANE, SEMI-GLOSS. COLOR SHALL BE VERIFIED BY THE ENGINEER.

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		

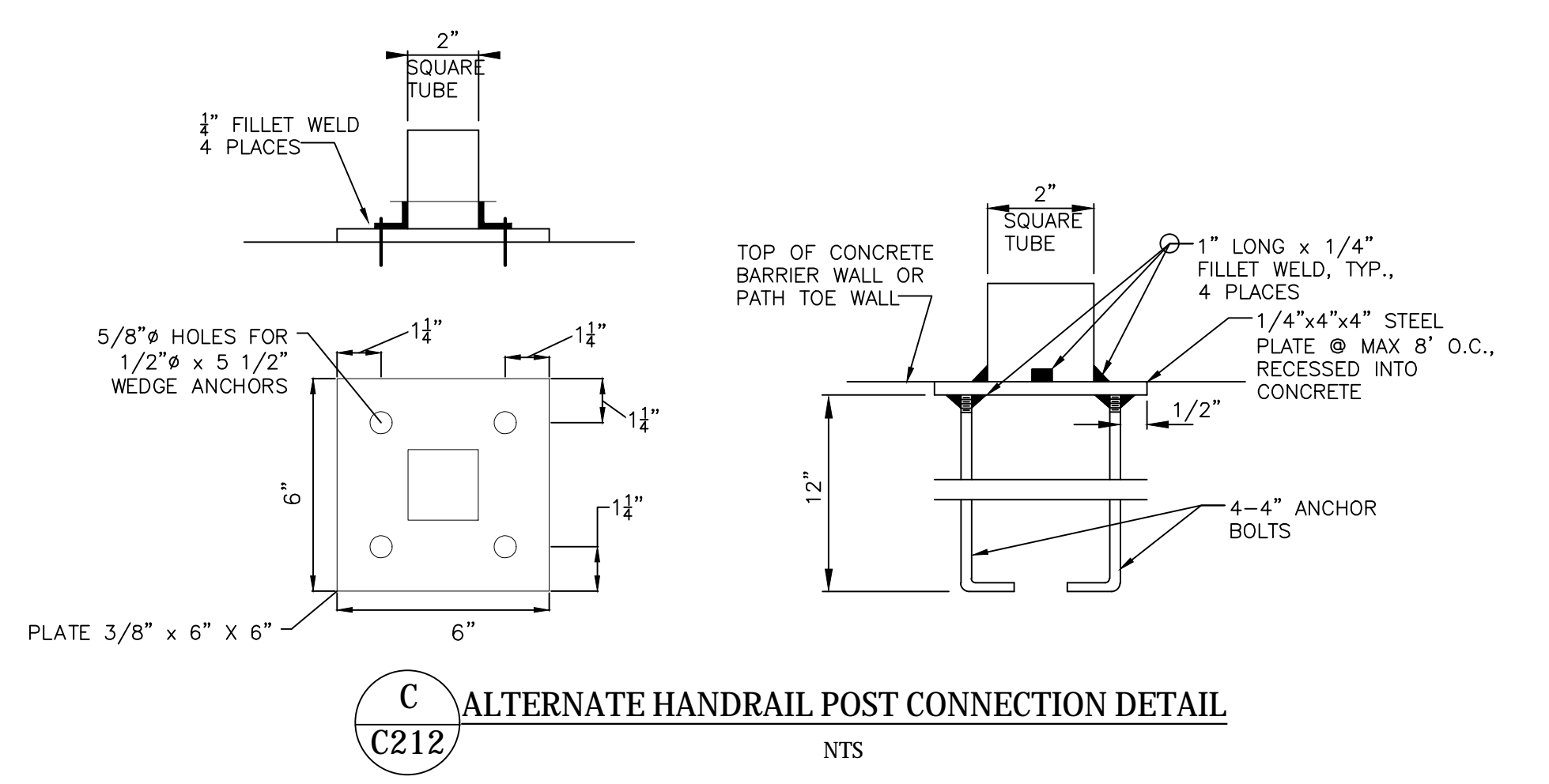


**A** HANDRAIL DETAIL  
 C212 NTS



**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



For and on Behalf of  
 Kiowa Engineering Corporation Date



EPC 8/9/22

Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

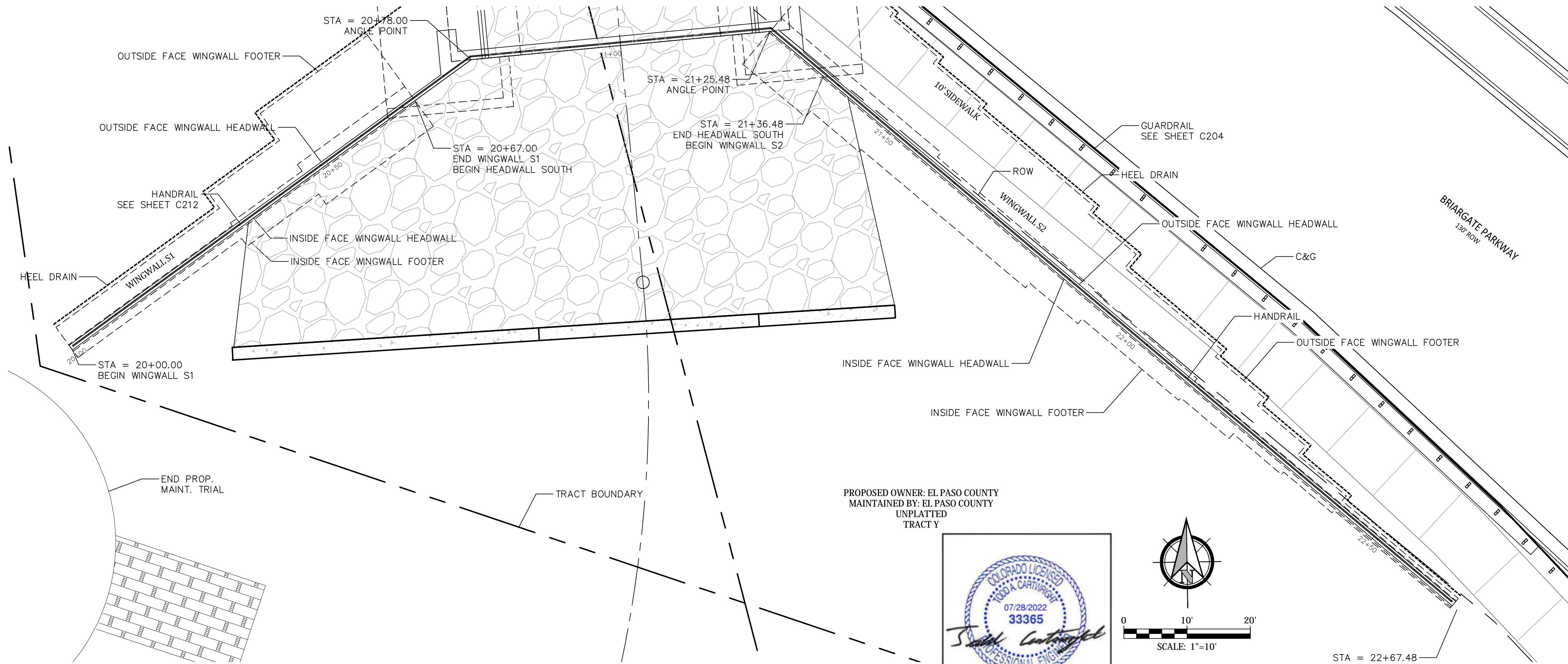






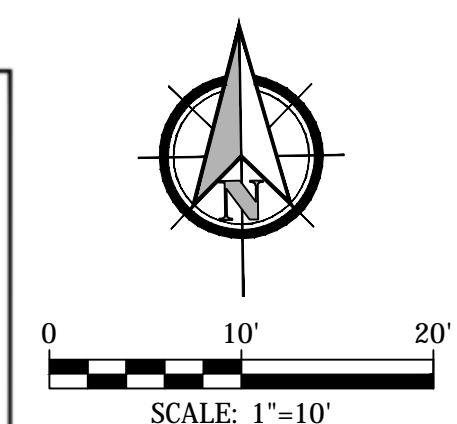






WINGWALL S1 & S2 PLAN  
1"=10'

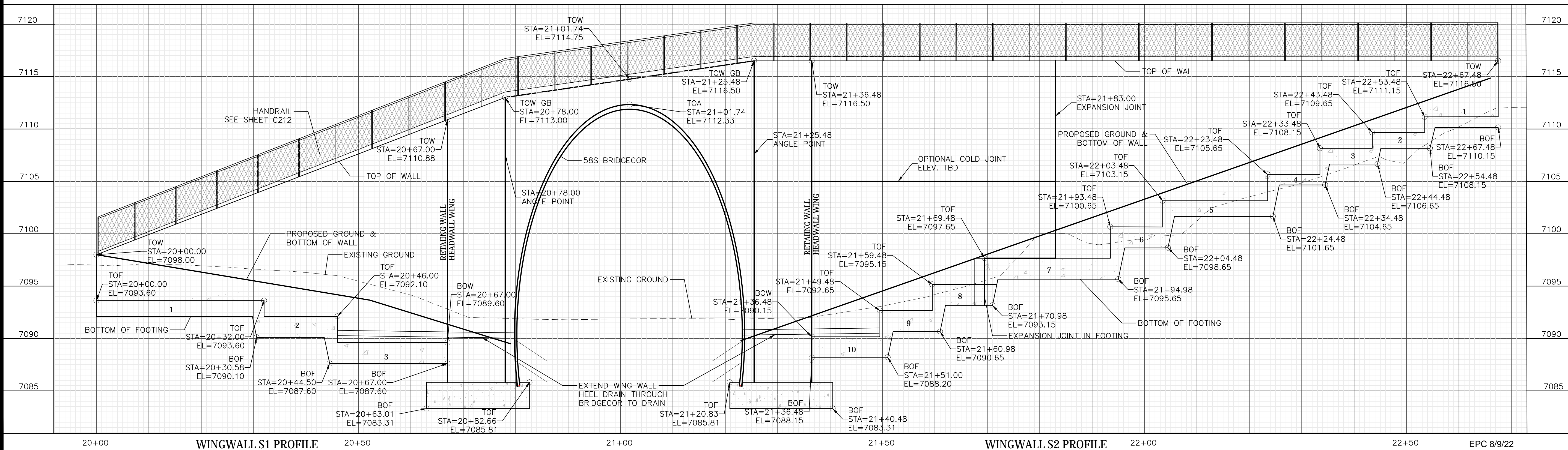
PROPOSED OWNER: EL PASO COUNTY  
MAINTAINED BY: EL PASO COUNTY  
UNPLATTED  
TRACT Y



NOTES:

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

Know what's below.  
Call before you dig.



WINGWALL S1 PROFILE

WINGWALL S2 PROFILE

EPC 8/9/22

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

Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

C223







RETAINING WALL PARAMETERS & REINFORCING SCHEDULE FOR WING WALL N1

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	B	STA. 10+00 7119.50	STA. 10+10 7119.44	ELEV. =7115.64	3.81'	2'-0"	1'-0"	0'-6"	1'-0"	0'-6"								CONT. #4's @ 18" O.C.				CONT. #4's @ 18" O.C.			
2	C	STA. 10+10 7119.44	STA. 10+20 7119.37	ELEV. =7114.64	5.21'	3'-6"	1'-0"	1'-2"	1'-0"	1'-6"								CONT. #4's @ 18" O.C.				CONT. #4's @ 18" O.C.			
3	D	STA. 10+20 7119.37	STA. 10+30 7119.31	ELEV. =7111.64	8.60'	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 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	E	STA. 10+30 7119.31	STA. 10+40 7119.25	ELEV. =7110.14	9.00'	8'-6"	1'-0"	2'-6"	1'-0"	5'-0"								CONT. #4's @ 15" O.C.	CONT. #5's @ 15" O.C.	#5's @ 12" O.C.	#5's @ 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	F	STA. 10+40 7119.25	STA. 10+55 7119.15	ELEV. =7107.64	11.56'	10'-6"	1'-4"	3'-0"	1'-6"	6'-0"	1'-6"	1'-6"	1'-0" 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 @ 10" O.C.	#4's @ 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	G	STA. 10+55 7119.15	STA. 11+00 7118.86	ELEV. =7105.14	13.87'	10'-6"	1'-4"	3'-0"	1'-6"	6'-0"	1'-6"	1'-6"	1'-0" 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 @ 10" O.C.	#4's @ 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.	
7	H	STA. 11+00 7118.86	STA. 11+60 7118.48	ELEV. =7102.14	16.53'	14'-0"	1'-6"	4'-0"	1'-6"	8'-6"	1'-6"	1'-6"	1'-0" 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 @ 8" O.C.	#4's @ 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.	
8	I	STA. 11+60 7118.48	STA. 11+70 7118.42	ELEV. =7099.64	18.13'	16'-10"	1'-6"	5'-0"	1'-10"	10'-0"	1'-6"	1'-6"	1'-0" 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 @ 8" O.C.	#4's @ 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.	
9	J	STA. 11+70 7118.42	STA. 11+90 7118.26	ELEV. =7097.14	20.5'	17'-9"	1'-9"	5'-0"	2'-9"	10'-0"	2'-0"	2'-0"	1'-0" 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 @ 8" O.C.	#5's @ 12" O.C.	ABOVE SPLICE #8's MATCH FULL HEIGHT #5's @ 12" O.C.	BELOW SPLICE EPOXY COATED #9's MATCH	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.	
10	K	STA. 11+90 7118.26	STA. 12+04 7118.20	ELEV. =7094.64	23.61'	19'-6"	2'-0"	5'-6"	2'-9"	11'-3"	2'-0"	2'-0"	1'-0" 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 @ 8" O.C.	#5's @ 12" O.C.	ABOVE SPLICE #9's @ MATCH FULL HEIGHT #5's @ 12" O.C.	BELOW SPLICE EPOXY COATED #9's MATCH	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.	
11	L	STA. 12+04 7118.20	STA. 12+14 7118.13	ELEV. =7092.14	26.04'	21'-6"	2'-0"	6'-9"	2'-9"	12'-0"	2'-0"	3'-0"	1'-0" 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 @ 10" O.C.	#5's @ 12" O.C.	ABOVE SPLICE #10's MATCH FULL HEIGHT #5's @ 12" O.C.	BELOW SPLICE EPOXY COATED #11's MATCH	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.	
12	M	STA. 12+14 7118.13	STA. 12+24 7118.00	ELEV. =7089.64	28.44'	23'-9"	2'-9"	8'-0"	2'-9"	13'-0"	2'-0"	3'-0"	1'-0" 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 @ 8" O.C.	#11's @ 8" O.C.	#5's @ 12" O.C.	ABOVE SPLICE #11's MATCH FULL HEIGHT #5's @ 12" O.C.	BELOW SPLICE EPOXY COATED #11's MATCH	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.	



Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C225**



Know what's below.  
Call before you dig.

EPC 8/9/22



RETAINING WALL PARAMETERS & REINFORCING SCHEDULE FOR WING WALL N2

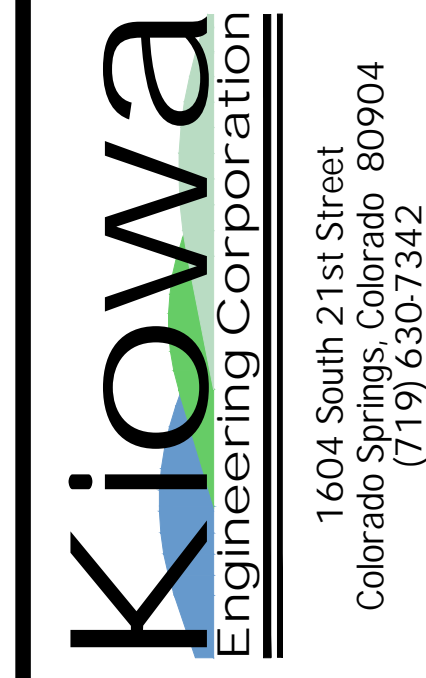
READ TABLE ALONG w/ DETAIL										SHEAR KEY		FOOTING REINFORCEMENT				WALL REINFORCEMENT								
GEOMETRY/ELEVATION AT RETAINING WALL STEPS										DIMENSIONS		REINFORCEMENT		CONT. LONG. FT'G REINF'G. (S&T)		TRANSVERSE REINF'G.		VERTICAL DOWELS		VERTICAL REINFORCING		HORIZ. REINFORCING		
TYPE	STATIONS/ 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. 13+70.48 7110.19	STA. 13+75.48 7110.00	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.		
2	B	STA. 13+58.48 7110.64	STA. 13+70.48 7110.19	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.	
3	C	STA. 13+48.48 7111.00	STA. 13+58.48 7110.64	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.	
4	D	STA. 13+38.48 7111.39	STA. 13+48.48 7111.00	ELEV. =7099.10	12.24'	10'-6"	1'-4"	3'-0"	1'-6"	6'-0"	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.
5	E	STA. 13+22.48 7111.99	STA. 13+38.48 7111.39	ELEV. =7096.60	15.22'	14'-0"	1'-6"	4'-0"	1'-10"	8'-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.
6	F	STA. 13+12.48 7112.37	STA. 13+22.48 7111.99	ELEV. =7094.08	18.21'	16'-10"	1'-6"	5'-0"	1'-10"	10'-0"	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.
7	G	STA. 13+02.48 7112.75	STA. 13+12.48 7112.37	ELEV. =7091.58	20.98'	17'-9"	1'-9"	5'-0"	2'-9"	10'-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 BELOW SPLICE EPOXY COATED #9's MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.
8	H	STA. 12+93.48 7113.09	STA. 13+02.48 7113.50	ELEV. =7089.08	23.84'	19'-6"	2'-0"	5'-6"	2'-9"	11'-3"	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 BELOW SPLICE EPOXY COATED #9's MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.



RETAINING WALL PARAMETERS & REINFORCING SCHEDULE FOR WING WALL S1

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. 20+00 7098.00	STA. 20+32 7104.00	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.	
2	B	STA. 20+32 7104.00	STA. 20+46 7106.63	ELEV. =7092.10	13.21'	10'-6"	1'-4"	3'-0"	1'-6"	6'-0"	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.
3	C	STA. 20+46 7106.63	STA. 20+67 7113.00	ELEV. =7089.60	20.21'	17'-9"	1'-9"	5'-0"	2'-9"	10'-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 BELOW SPLICE EPOXY COATED #9's MATCH	FULL HEIGHT #5's @ 12" O.C.	CONT. #5's @ 15" O.C.	CONT. #5's @ 15" O.C.

EPC 8/9/22



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

Project No.:	19032
Date:	7/14/22
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.



Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

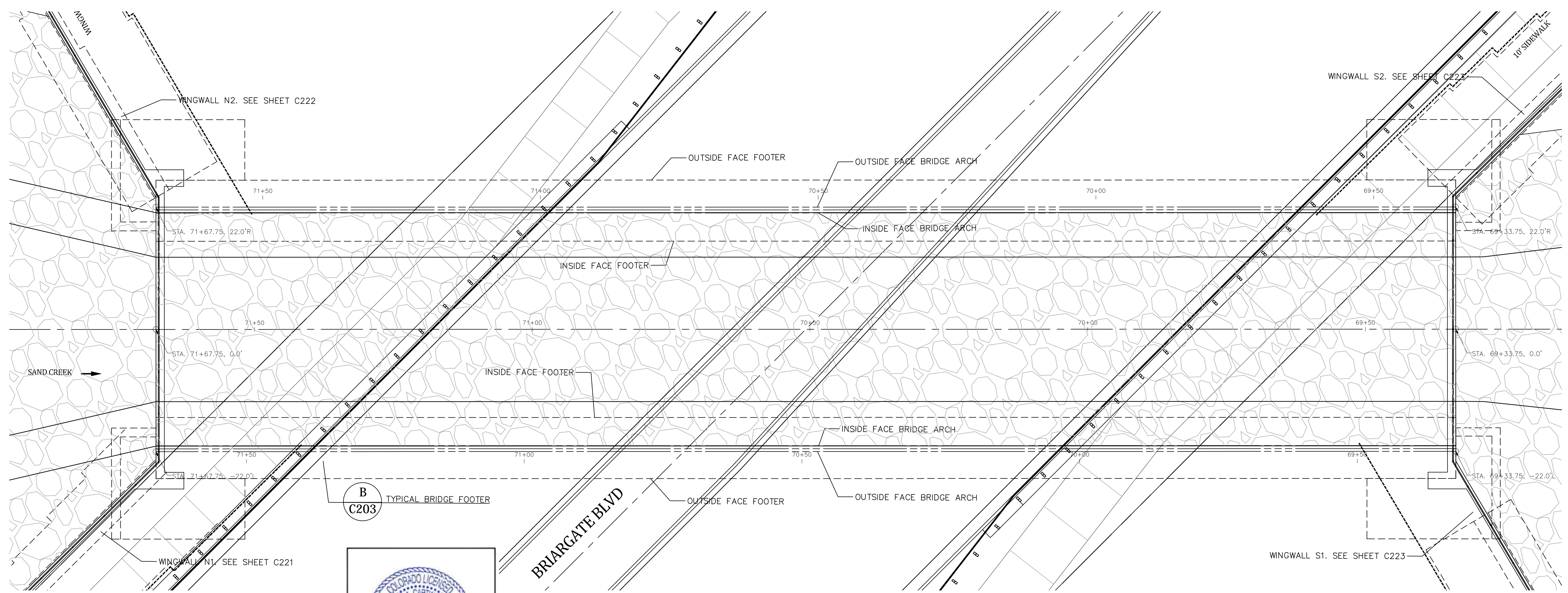
**C227**



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

Project No.: 19032  
Date: 7/14/22  
Design: TAC  
Drawn: PAV  
Check:  
Revisions:

**C231**

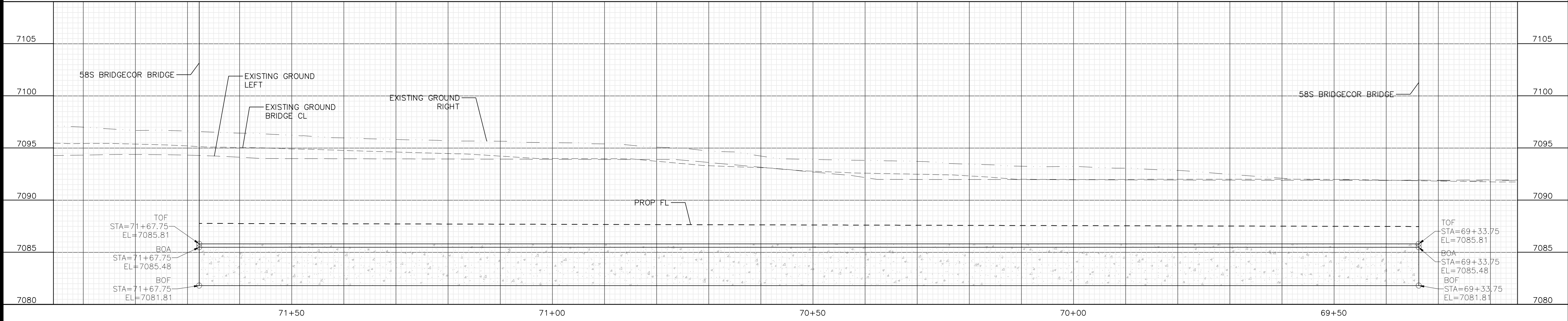
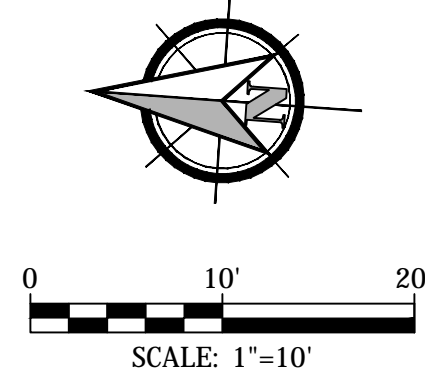


**B**  
**C203**  
TYPICAL BRIDGE FOOTER



**BRIDGE PLAN**  
1"=10'

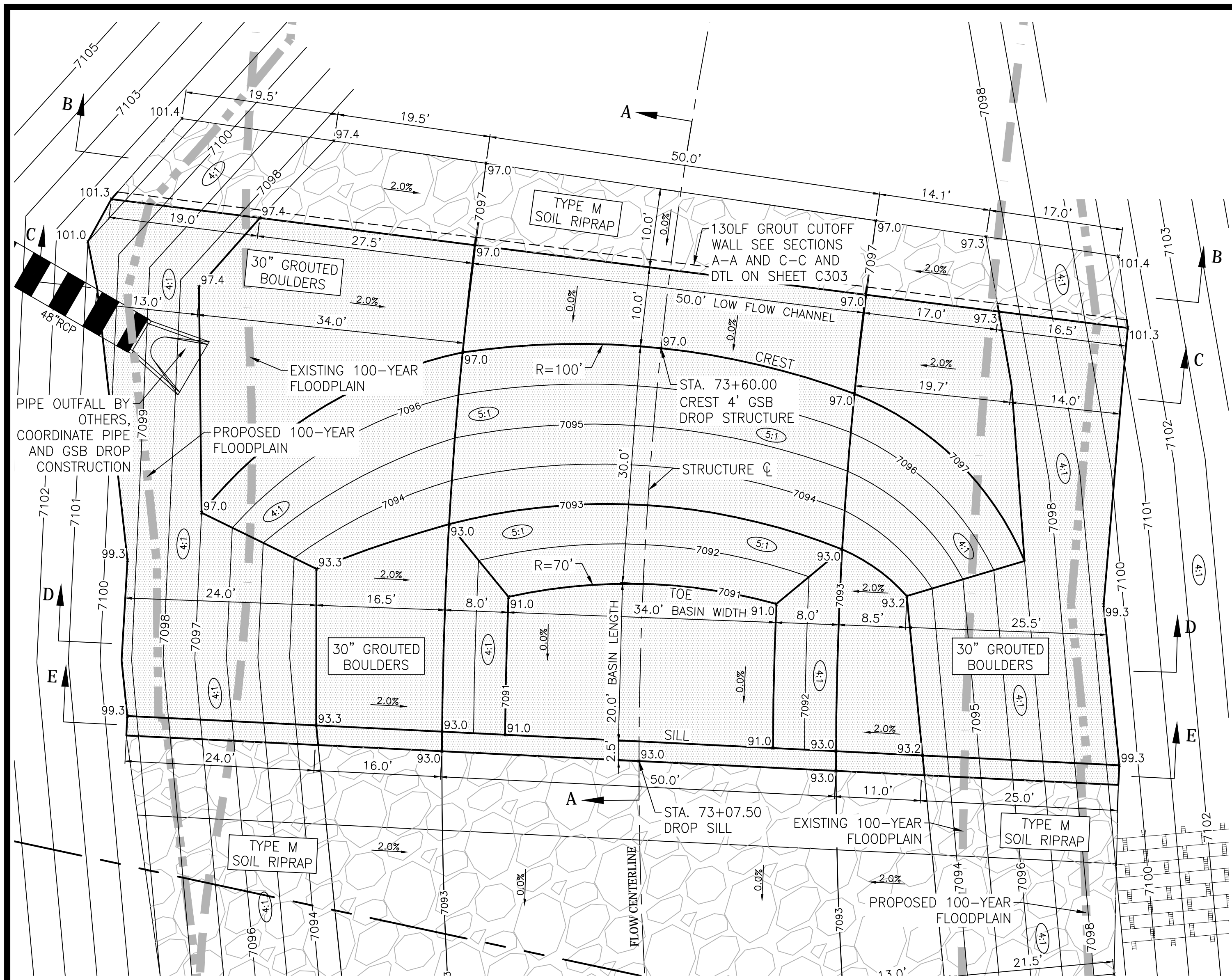
NOTES:  
1. THE FOOTINGS ARE DESIGNED FOR A FACTORED BEARING RESISTANCE OF 8,700 PSF (ULTIMATE BEARING RESISTANCE OF 14,500 PSF) BASED ON A 0.60 RESISTANCE FACTOR IN ACCORDANCE WITH THE UPDATED RECOMMENDATION BY ENTECH ENGINEERING, INC FOR A MINIMUM PERMANENT FOOTING EMBEDMENT DEPTH OF 5- FEET. A FRICTION 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.



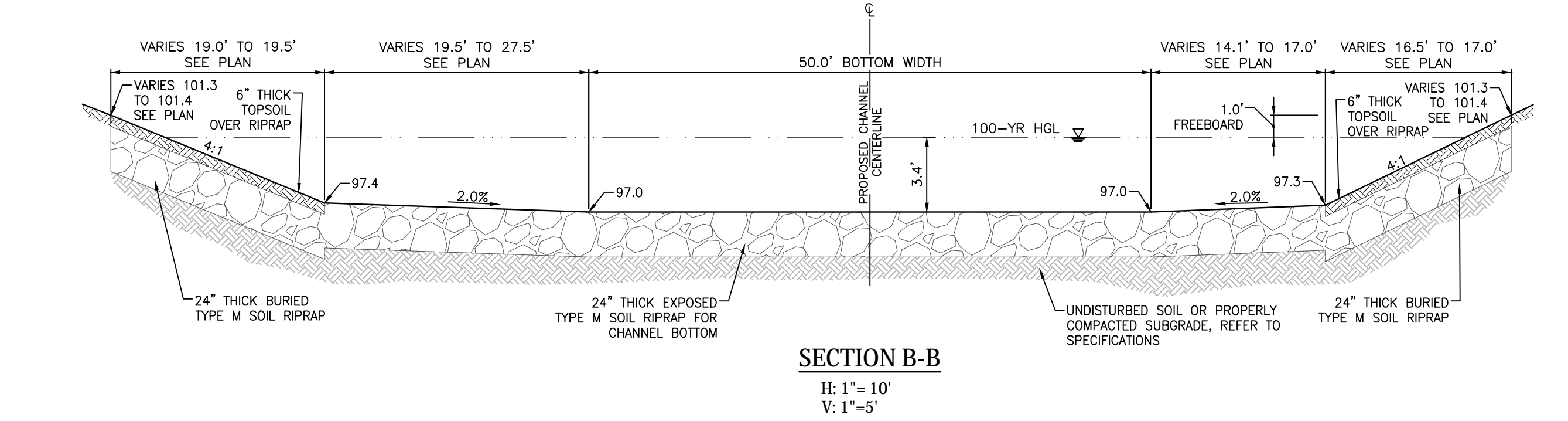
**BRIDGE FOOTER PROFILE**

EPC 8/9/22

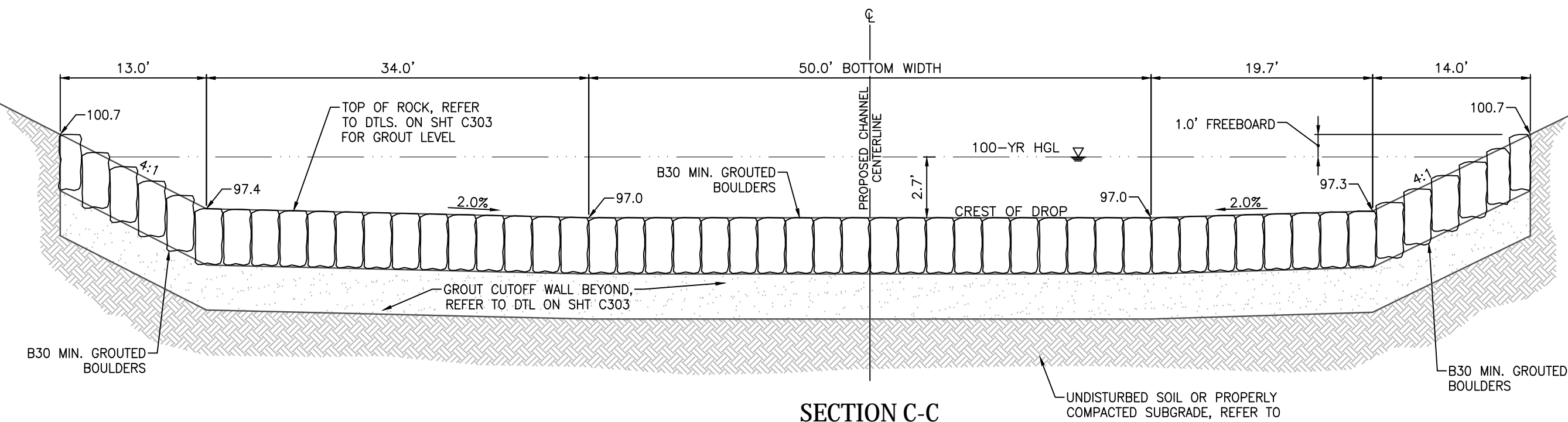




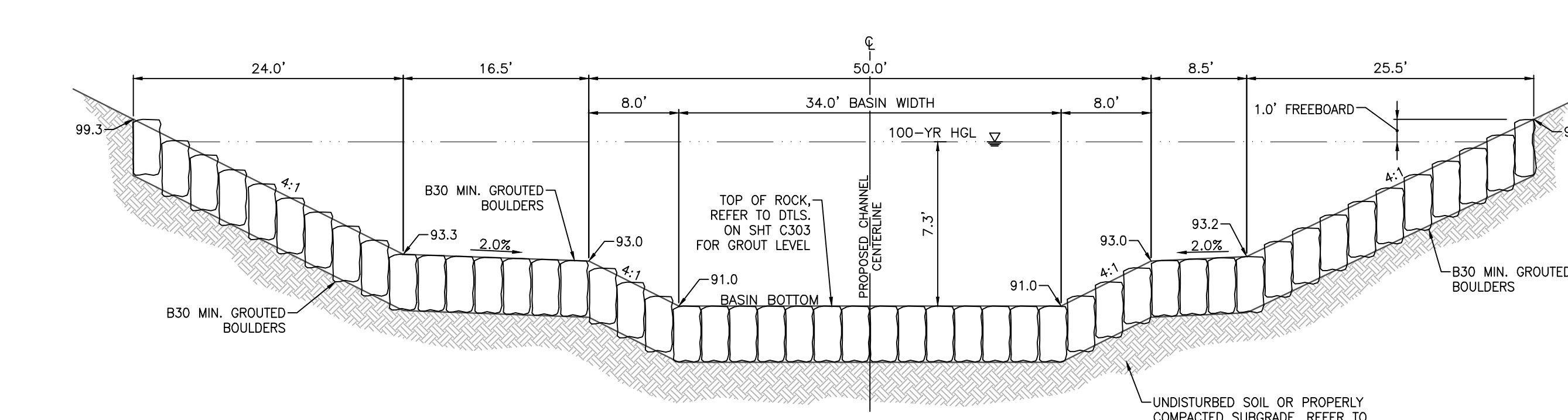
**DROP STRUCTURE A PLAN**  
1" = 10'



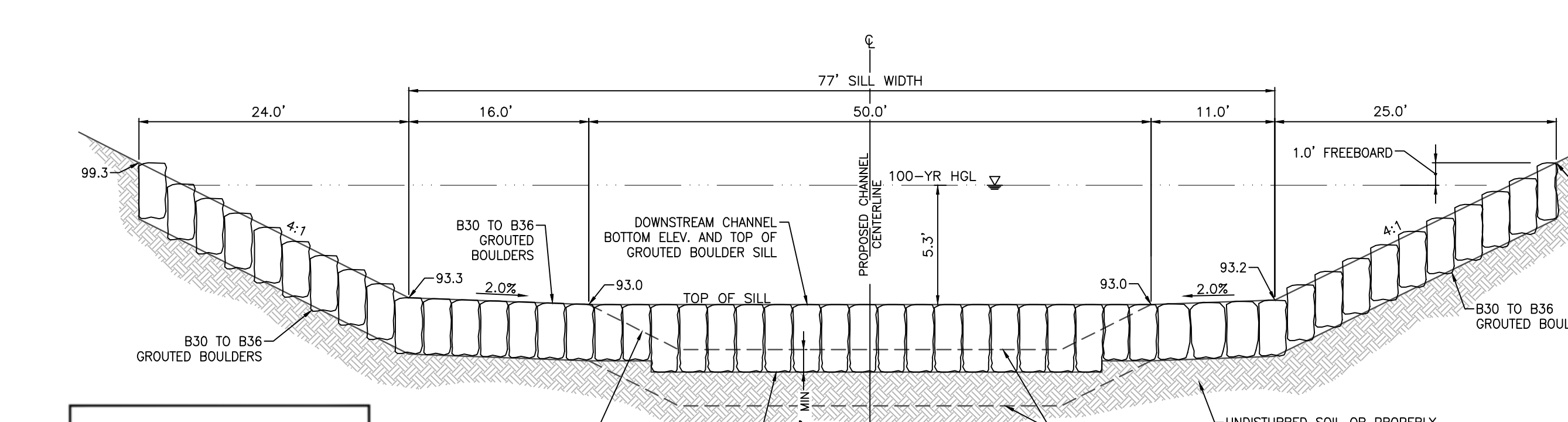
**SECTION B-B**  
H: 1" = 10'  
V: 1" = 5'



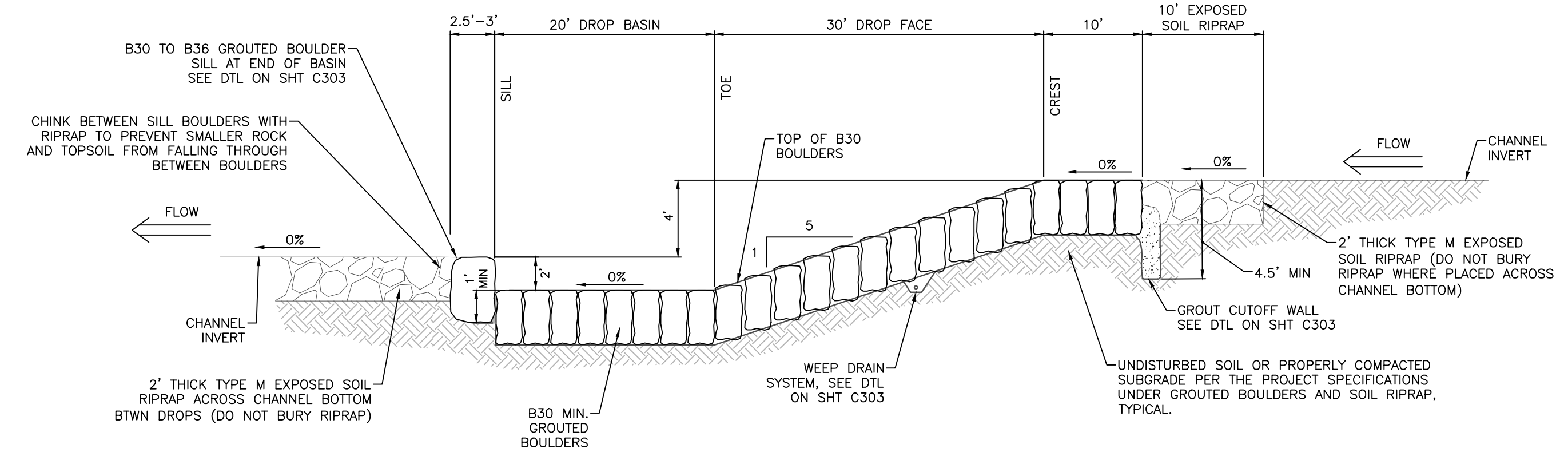
**SECTION C-C**  
H: 1" = 10'  
V: 1" = 5'



**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.



EPC 8/9/22

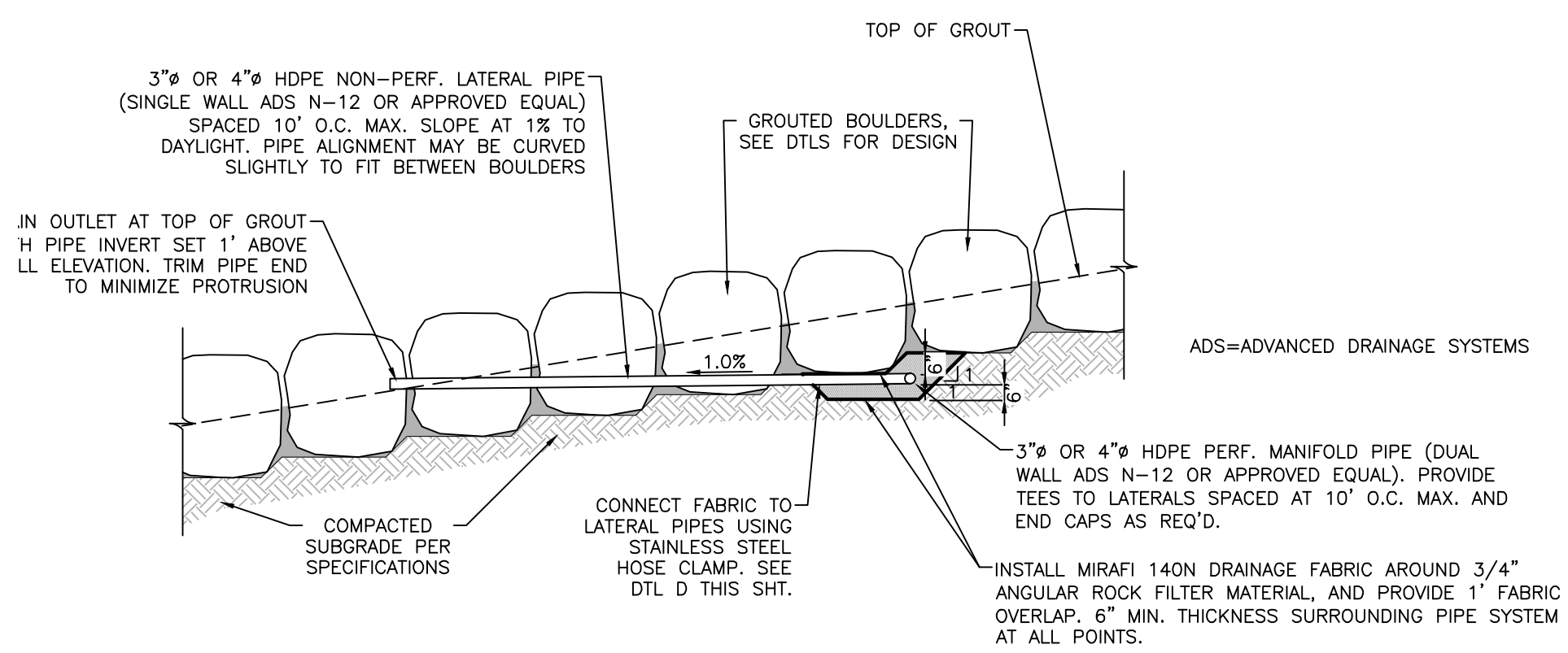
Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C301**

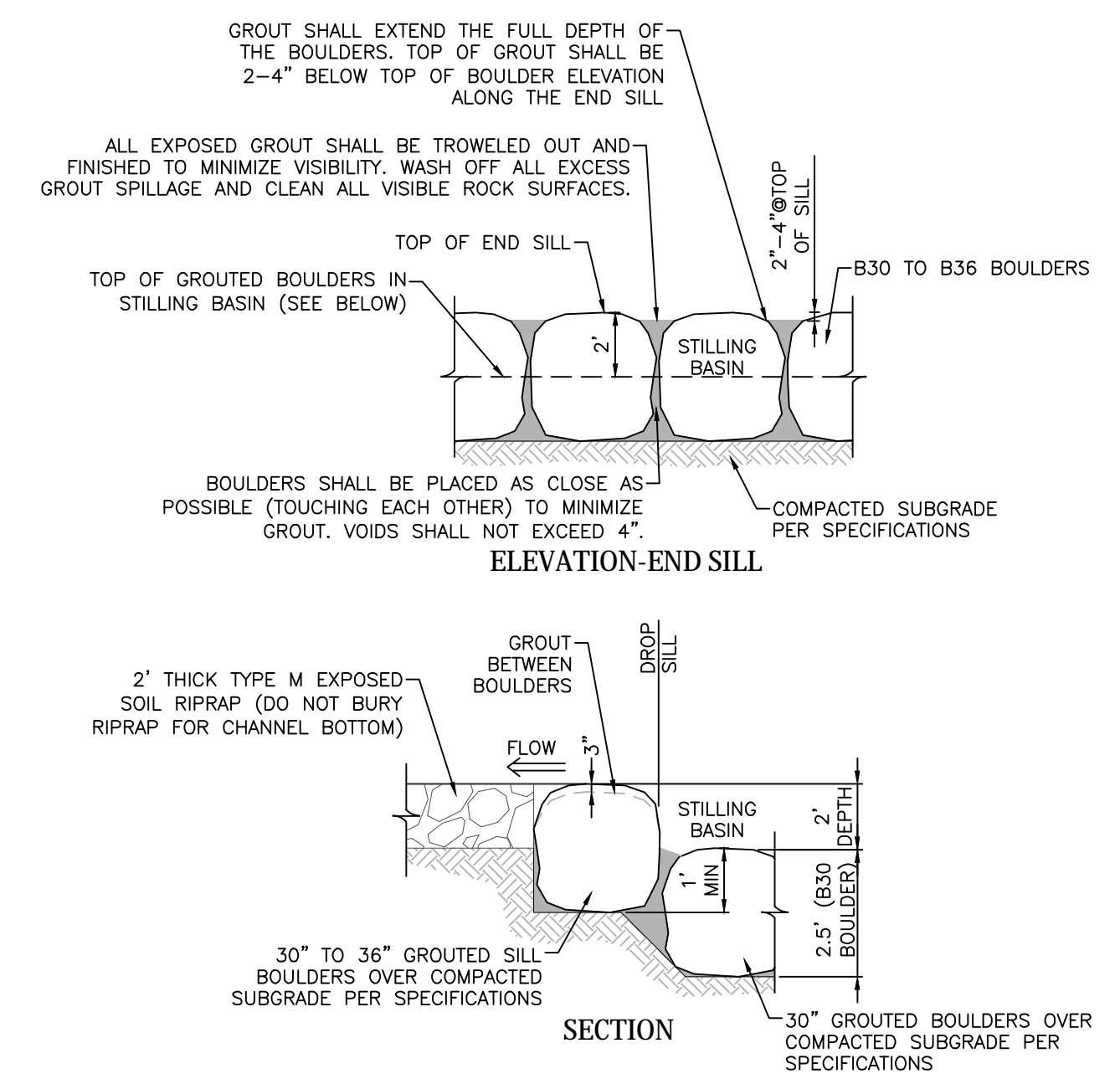








**A**  
**303** **WEEP DRAIN SYSTEM DETAIL**  
SCALE: NTS



**B**  
**303** **GRouted BOULDER END SILL DETAIL**  
SCALE: NTS

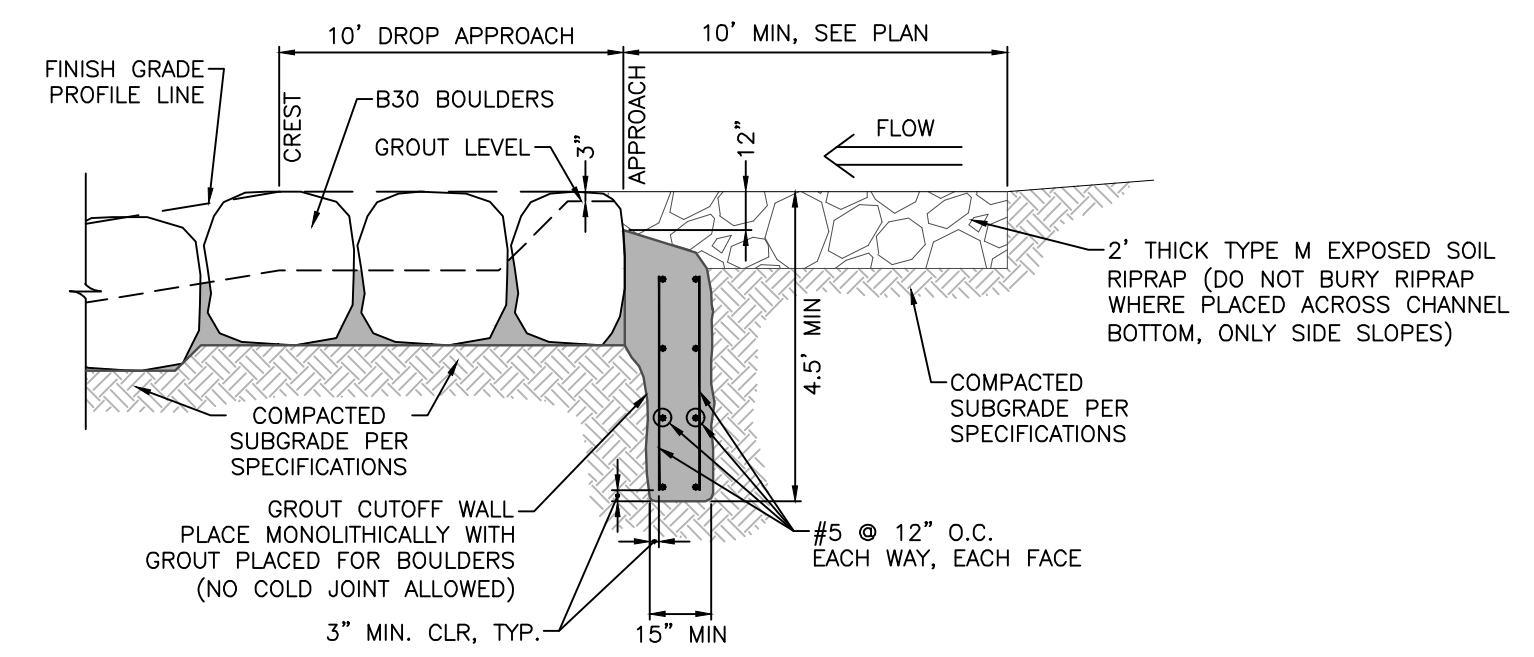
- GENERAL NOTES:**
1. CONTRACTOR TO CONTACT ENGINEER TO REVIEW REPRESENTATIVE BOULDERS AND RIPRAP FOR APPROVAL PRIOR TO DELIVERY TO SITE.
  2. ENGINEER SHALL BE CONTACTED TO OBSERVE SUBGRADE PRIOR TO PLACEMENT OF RIPRAP AND BOULDERS.
  3. ENGINEER SHALL BE CONTACTED TO REVIEW BOULDER PLACEMENT PRIOR 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.]

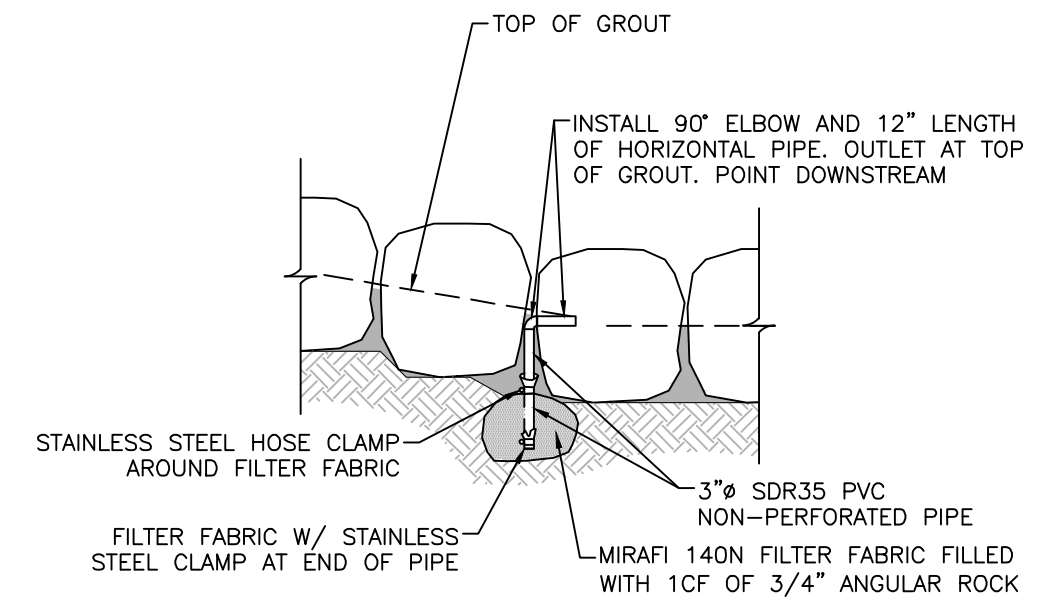
(TABLE 2: BOULDER PROPERTIES. MHFD SPECIFICATION SECTION 31 37 00)

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	

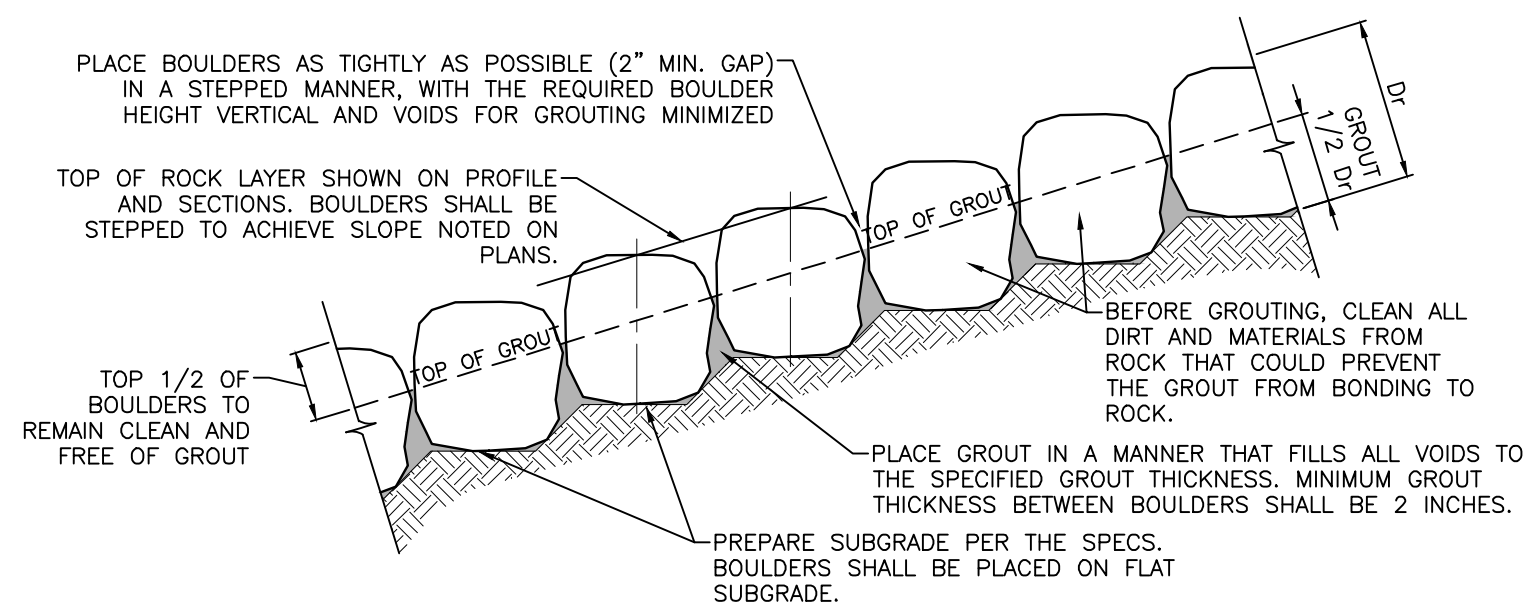
\* d50=MEAN PARTICLE SIZE (INTERMEDIATE DIMENSION) BY WEIGHT.  
\*\* MIX VL, L AND M RIPRAP WITH 35% TOPSOIL (BY VOLUME) AND BURY WITH 4-6 INCHES OF TOPSOIL, ALL VIBRATION COMPACTED & REVEGETATE.  
(TABLE 1: RIPRAP GRADATION. MHFD SPECIFICATION SECTION 31 37 00)



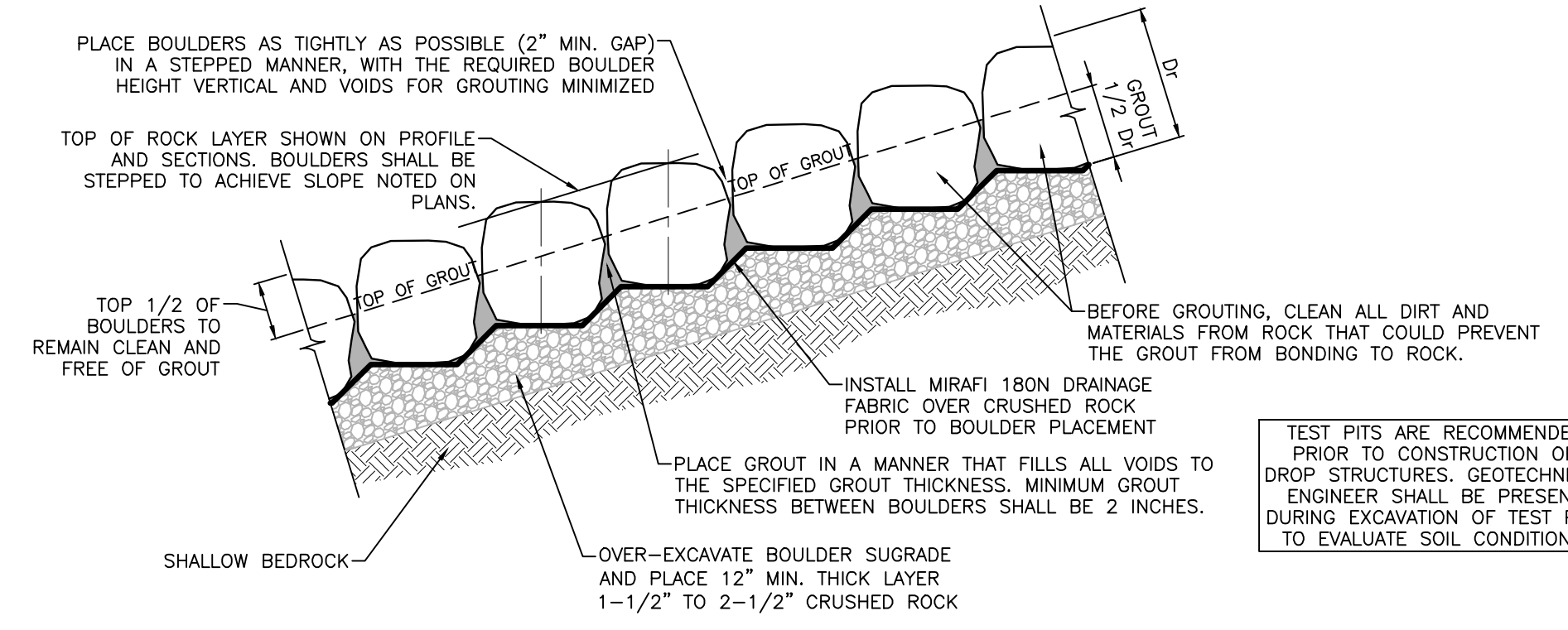
**C**  
**303** **SEEPAGE CUTOFF DETAIL**  
SCALE: NTS



**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

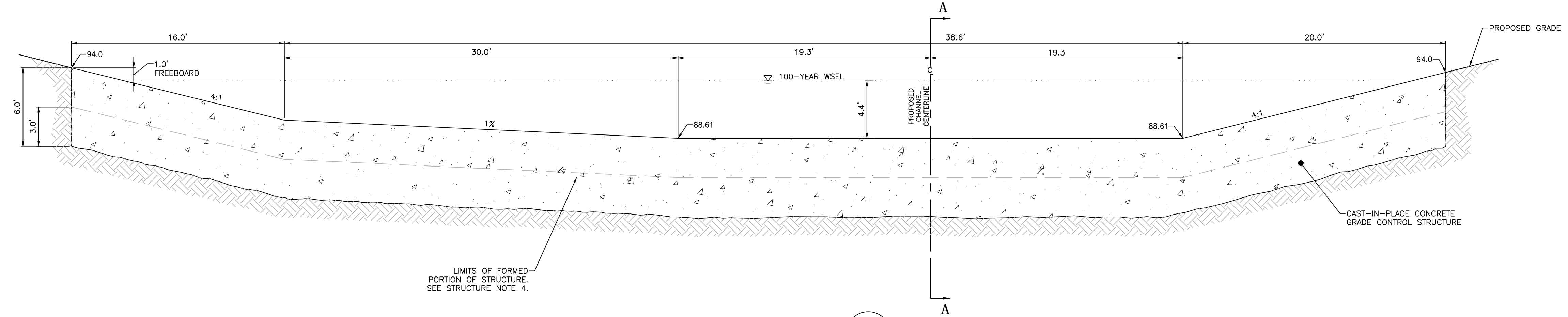


Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

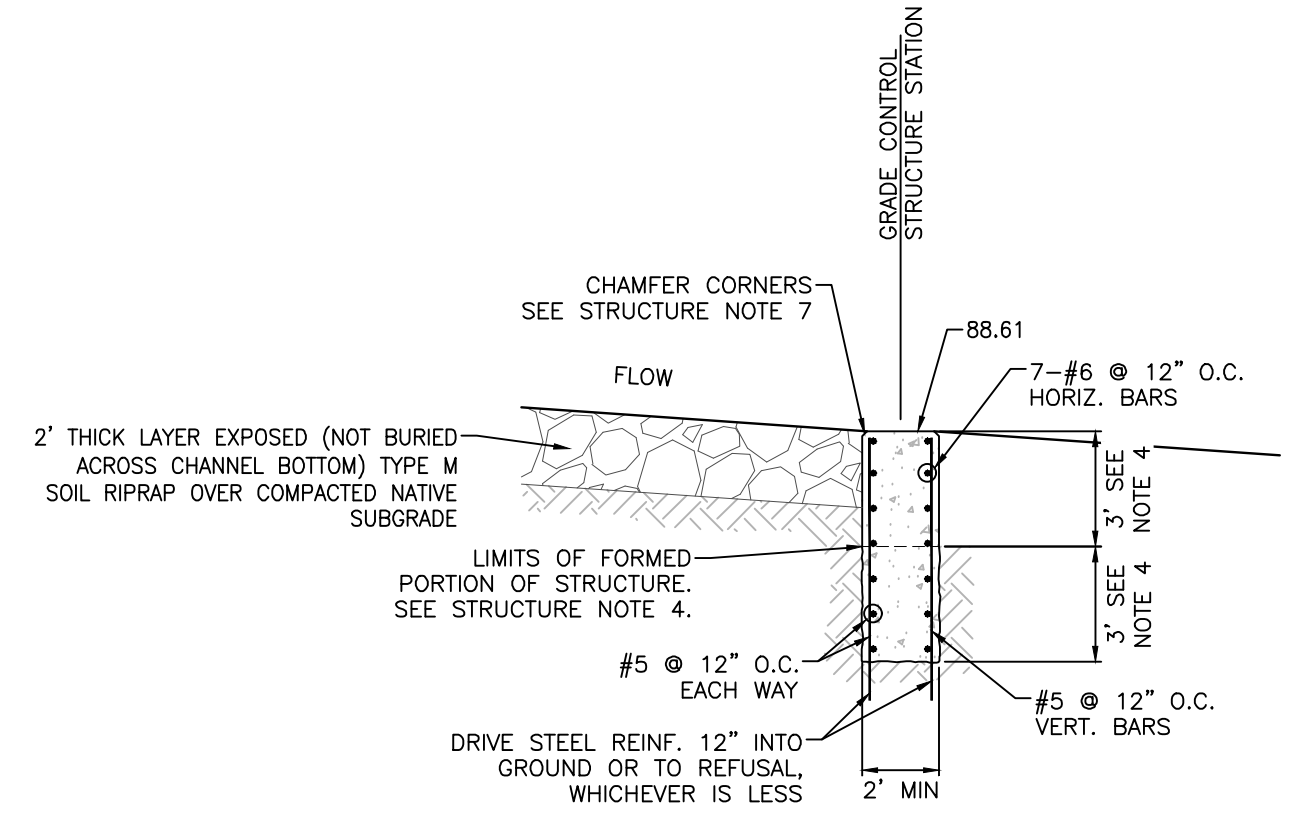
**C303**

EPC 8/9/22





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



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

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



EPC 8/9/22

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

Project No.:	19032
Date:	7/14/22
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C311**









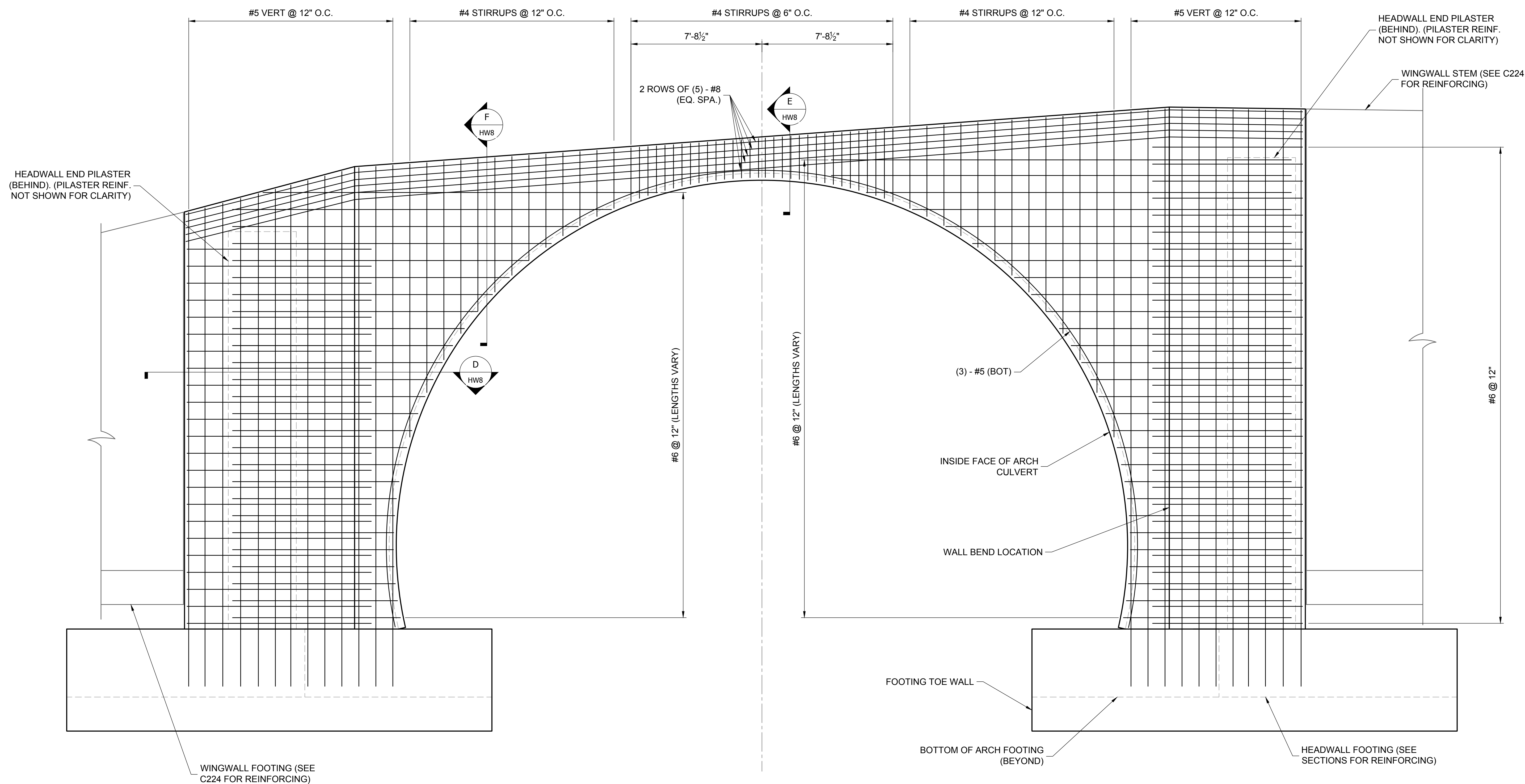












2 TYPICAL FRONT FACE REINFORCING ELEVATION  
N.T.S.



EPC 8/9/22

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 HW5 OF HW9  
JOB NO. 19032

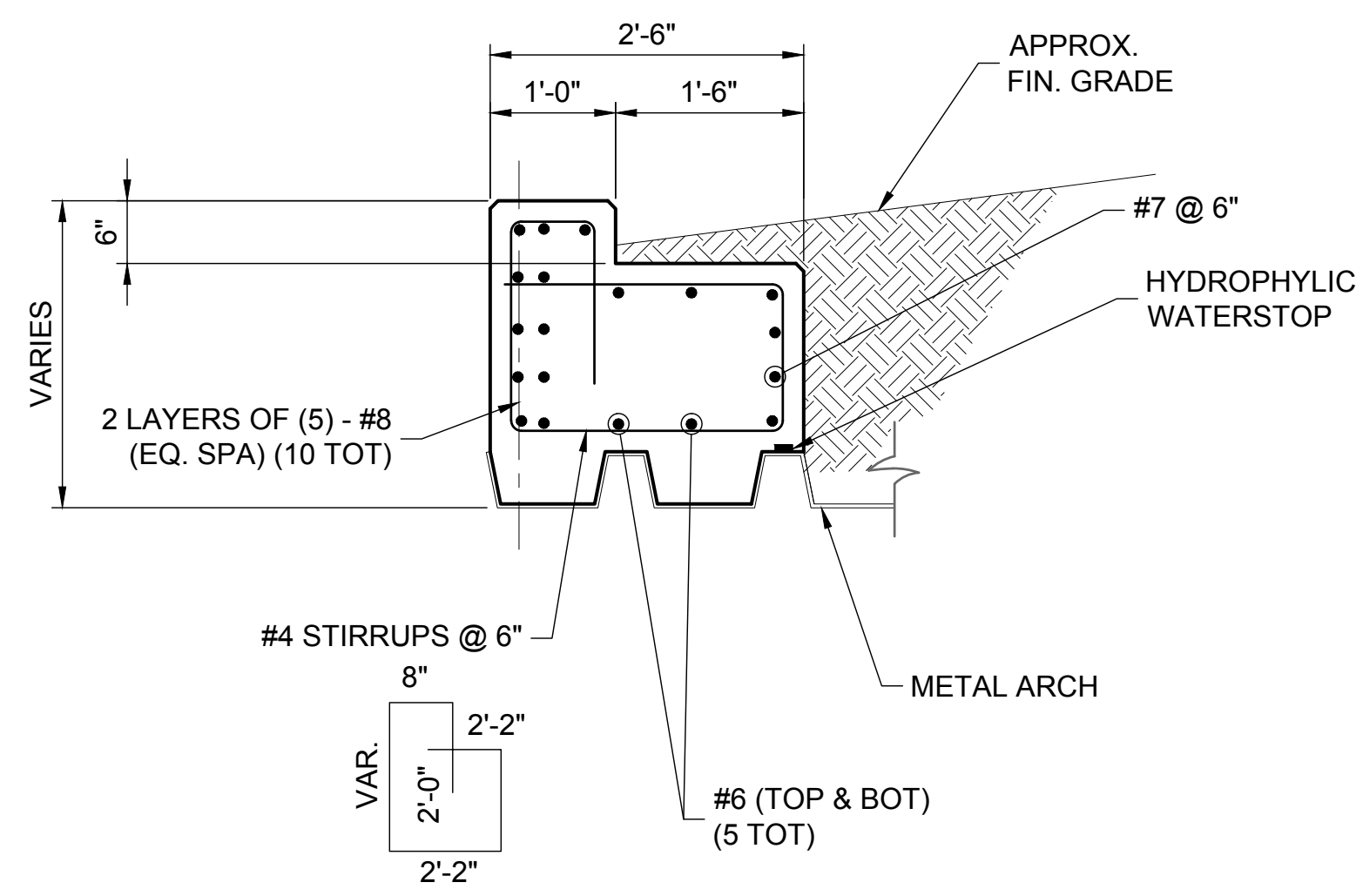




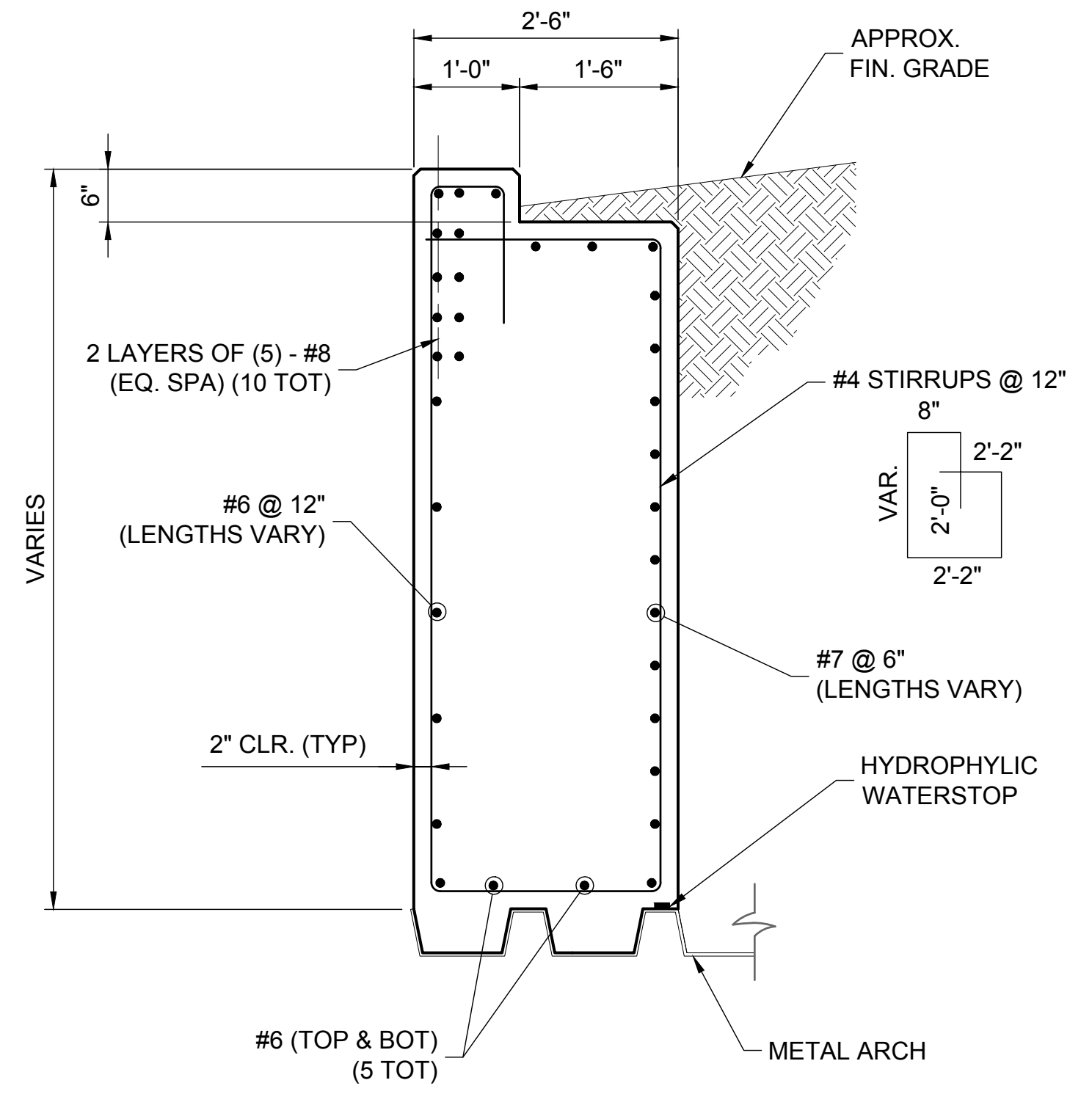




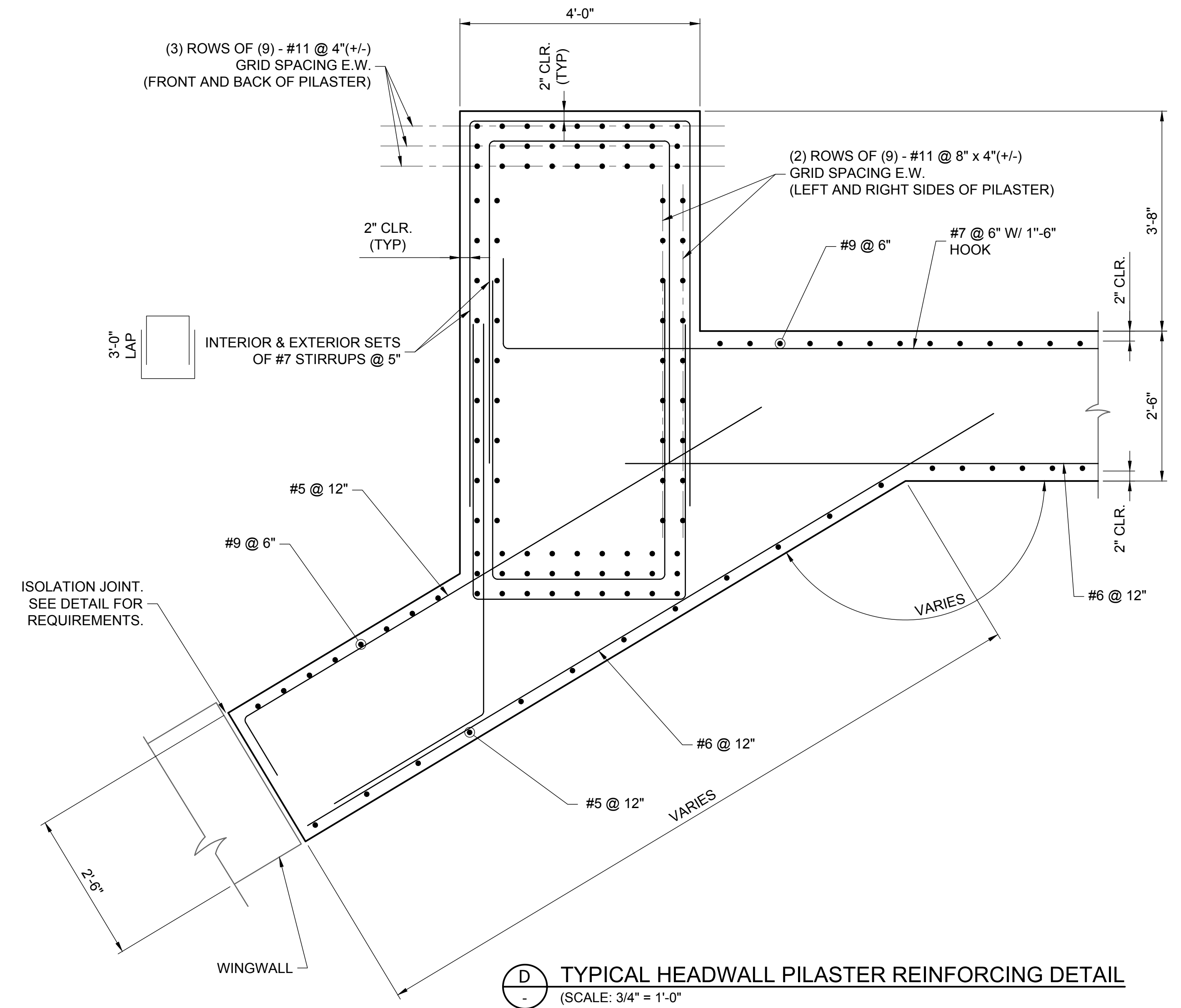




**E HEADWALL REINFORCING SECTION**  
SCALE: 3/4" = 1'-0"



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



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

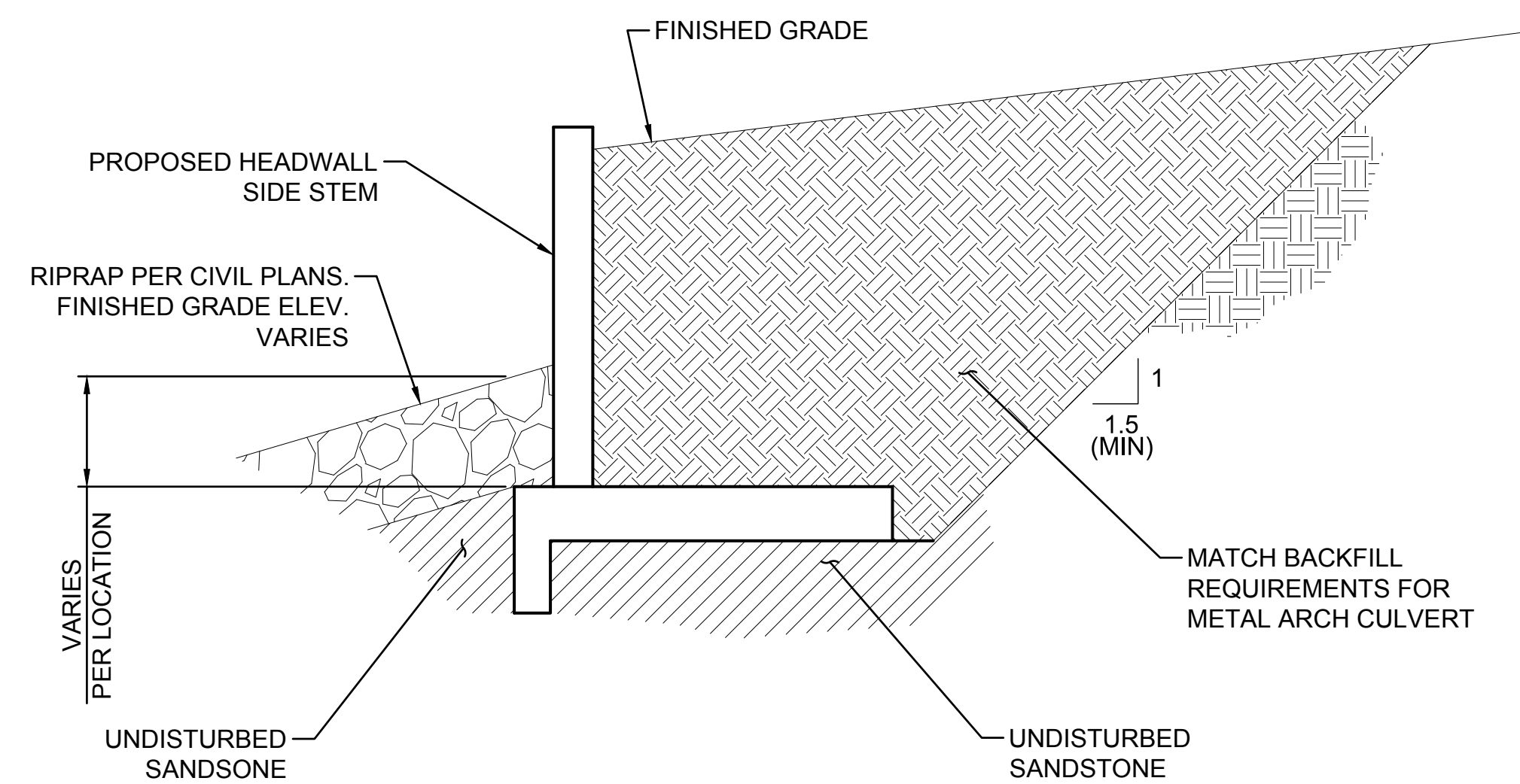


EPC 8/9/22

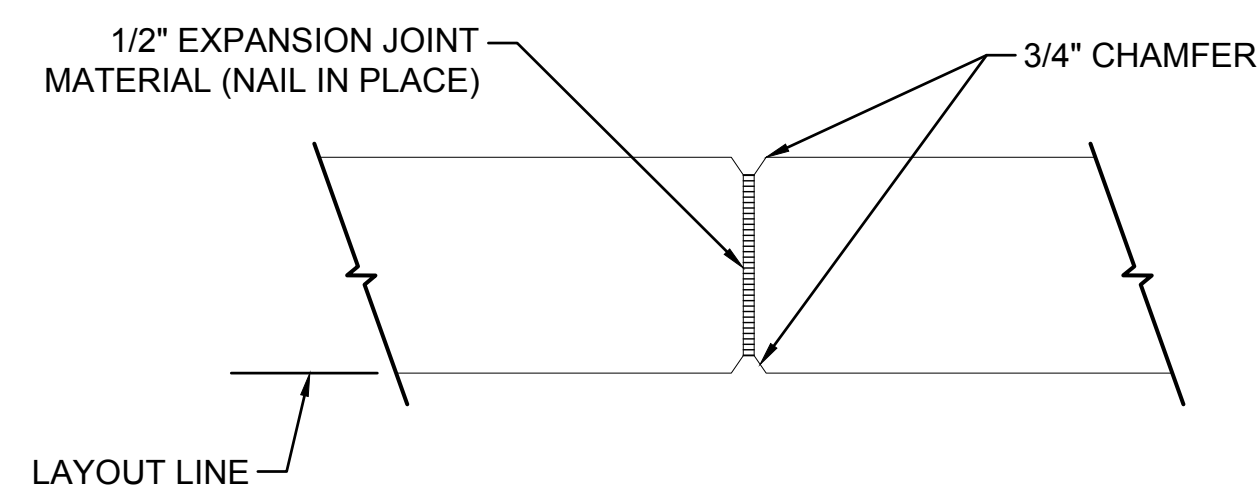
H-SCALE	V-SCALE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY
AS SHOWN	AS SHOWN	8/14/22	HWB	JJM	JJM
BY	DATE				
No.	REVISION				

SHEET OF HW9  
JOB NO. 19032

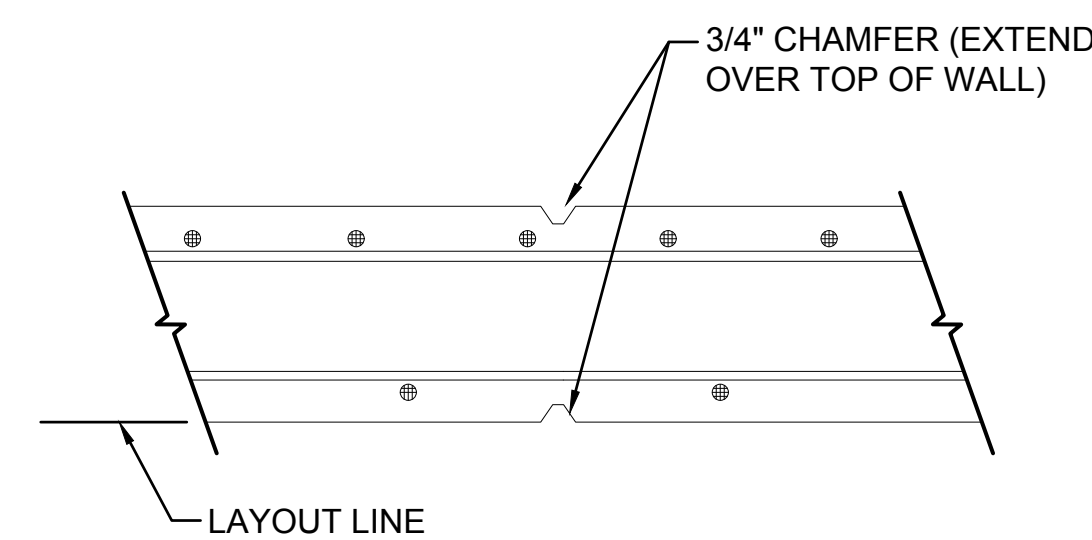




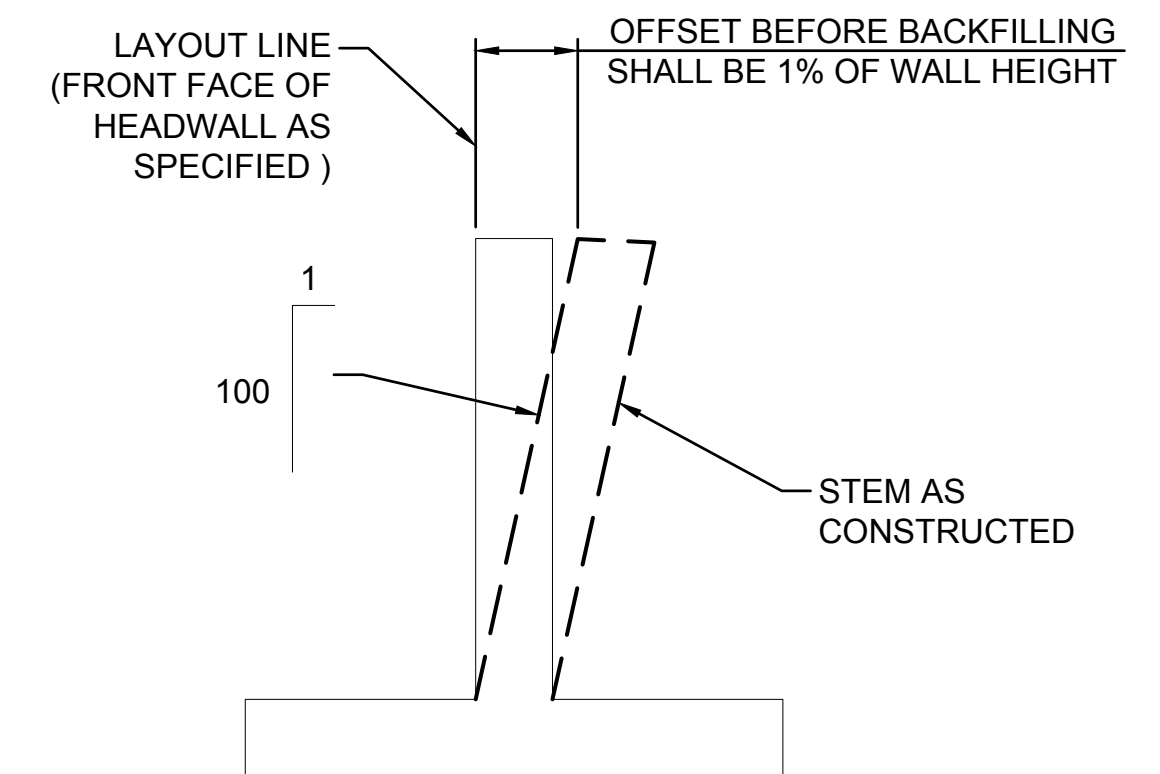
**HEADWALL SUBGRADE AND BACKFILL REQUIREMENTS**  
NOT TO SCALE



**WALL ISOLATION JOINT SECTION**  
NOT TO SCALE (WHERE SHOWN IN PLANS)



**WALL CONTROL JOINT SECTION**  
NOT TO SCALE (WHERE SHOWN IN PLANS)



**WINGWALL FACE BATTER**  
NOT TO SCALE

**SUBGRADE AND BACKFILL REQUIREMENTS**

1. EXPOSED SUBGRADE FOR ALL FOOTINGS AND BOTTOM SLABS SHALL BE OBSERVED BY THE GEOTECHNICAL ENGINEER UPON EXCAVATION.
2. HEADWALL FOOTINGS SHALL BE VERIFIED PRIOR TO CONCRETE AND REINFORCEMENT PLACEMENT, TO BEAR ON SANDSTONE MATERIAL. IF ADDITIONAL DEPTH OF EXCAVATION IS REQUIRED TO REACH SANDSTONE MATERIAL, LEAN CONCRETE SHALL BE USED TO BRING SUBGRADE UP FROM SANDSTONE LEVEL TO SPECIFIED BOTTOM OF FOOTING.
3. FRONT OF FOOTING TOE WALLS SHALL BE PLACED DIRECTLY AGAINST SANDSTONE MATERIAL. LEAN CONCRETE SHALL FILL ANY SPACE BETWEEN ACTUAL EXCAVATION FACE AT SANDSTONE AND THE SPECIFIED FRONT FACE OF TOE WALL.
4. FOLLOW RECOMMENDATIONS IN THE PROJECT GEOTECHNICAL REPORT FOR SUBGRADE PREPARATION AND PROTECTION, AND TEMPORARY EXCAVATION SLOPE STABILITY.



For and on Behalf of  
Kiowa Engineering Corporation Date

EPC 8/9/22

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



**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: 3.0'  
 MAXIMUM COVER: 7.0'  
 UNIT WEIGHT OF ENGINEERED BACKFILL = 120 LBS/FT<sup>3</sup>.
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

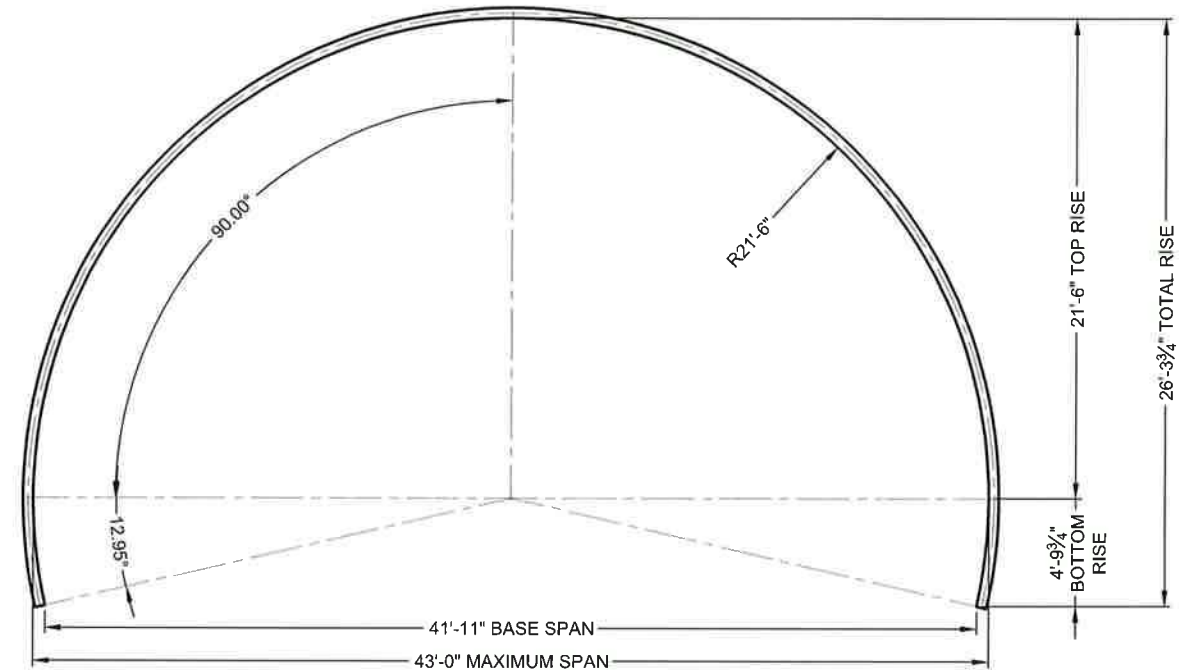


PLATE MAKE UP: 2 @ 11 S, 3 @ 12 S

**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 ft<sup>2</sup>  
TOTAL S = 58

**STRUCTURE CROSS-SECTION**



EPC 8/9/22

FOR APPROVAL

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

**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 9		

I:\MERLIN\PROJECTS\ACTIVE\635632\020-BRIDGECOR\DRAWINGS\CONTRACT\PRE-635632-020-BCSRA-CONC-DWG 7/21/2022 6:48 PM



**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<sub>u</sub> GREATER THAN OR EQUAL TO 3 AND C<sub>c</sub> BETWEEN 0.7 AND 3, WHERE C<sub>u</sub> = COEFFICIENT OF UNIFORMITY = D<sub>60</sub>/D<sub>10</sub> AND C<sub>c</sub> = COEFFICIENT OF CURVATURE = (D<sub>30</sub>)<sup>2</sup>/(D<sub>60</sub>X D<sub>10</sub>). D<sub>XX</sub> IS THE PARTICLE SIZE CORRESPONDING TO XX% FINER ON THE CUMULATIVE PARTICLE SIZE DISTRIBUTION CURVE (ASTM D2487).  
  
C<sub>u</sub> REQUIREMENTS ARE WAIVED FOR CRUSHER RUN SCREENED AGGREGATES. C<sub>c</sub> 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 NCSPA DESIGN MANUAL:
  - PH = 6 TO 10
  - RESISTIVITY = 2,000 TO 10,000 OHM-CM
  - WATER HARDNESS > 50 PPM CaCO<sub>3</sub>
- 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.



EPC 8/9/22

FOR APPROVAL

**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.:	2		OF	9	

I:\MERLIN\PROJECTS\ACT\VE\635632\020-BRIDGECOR\DRAWINGS\CONTRACT\PRE-635632-020-BR-COR-CON-C-DWG 7/21/2022 6:48 PM  
 If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC



I:\MERLIN\PROJECTS\VEIS56006\563163632-20-BRIDGE\CDRAWINGS\CONTRACT\PRE-635632-020-BCSRA-CON-C.DWG 7/21/2022 6:48 PM

CAST IN PLACE WINGWALLS (DESIGN BY OTHERS-TYP.)

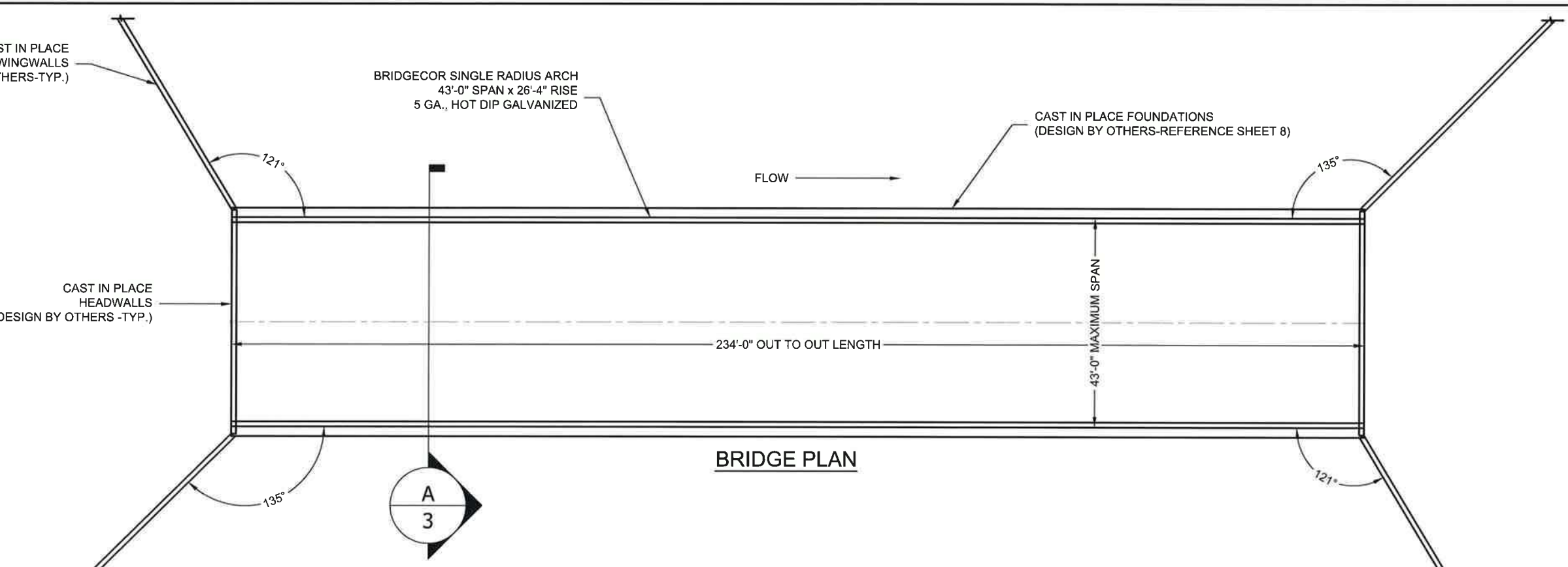
BRIDGECOR SINGLE RADIUS ARCH  
43'-0" SPAN x 26'-4" RISE  
5 GA., HOT DIP GALVANIZED

CAST IN PLACE FOUNDATIONS (DESIGN BY OTHERS-REFERENCE SHEET 8)

CAST IN PLACE HEADWALLS (DESIGN BY OTHERS-TYP.)

FLOW →

**BRIDGE PLAN**



4.5"-5" ASPHALT PAVEMENT

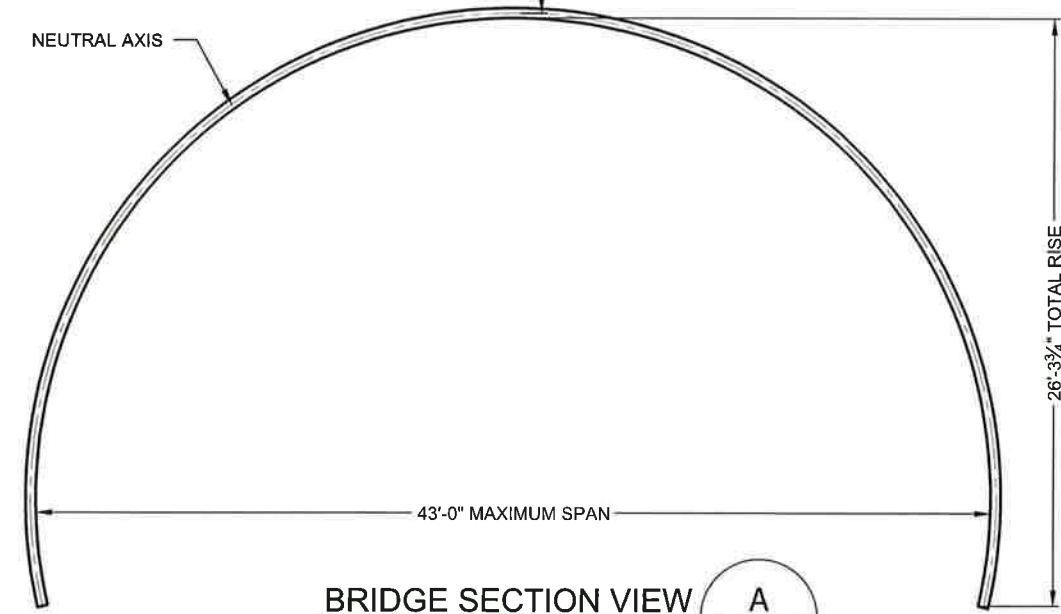
3' min cover and 7' max

NEUTRAL AXIS

26'-3/4" TOTAL RISE

43'-0" MAXIMUM SPAN

**BRIDGE SECTION VIEW**



\*COVER IS MEASURED FROM NEUTRAL AXIS OF THE CORRUGATION TO THE BOTTOM OF FLEXIBLE PAVEMENT(ASPHALT)



EPC 8/9/22

FOR APPROVAL

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered in site work progress, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

**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

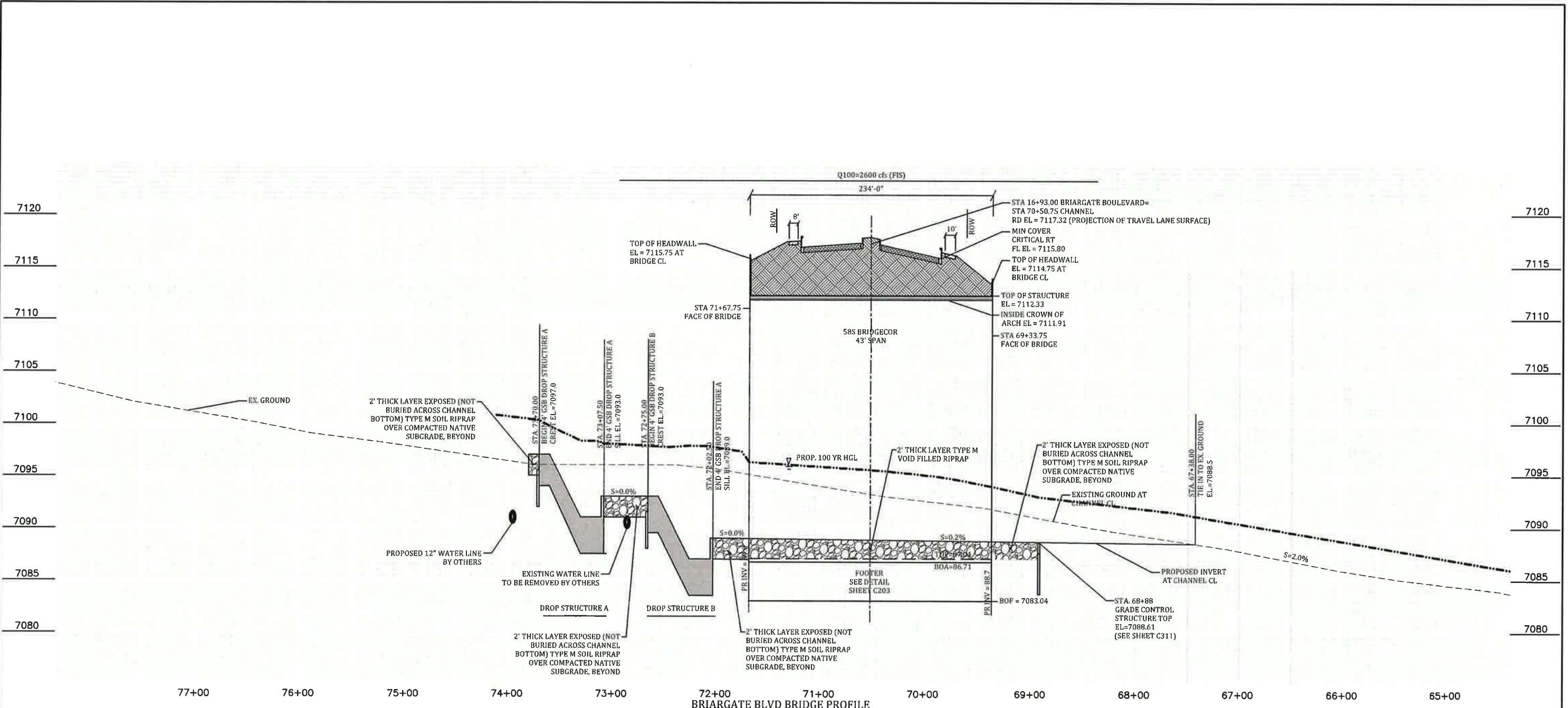
**BridgeCor**  
CONTECH CONTRACT DRAWING

**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.: 3 OF 9		



I:\MEL\PROJECTS\ACTIVE\63560\635632-20-BRIDGECOR\DRAWINGS\CONTRACT\PRE-635632-020-BCSRA-CON-C.DWG 7/21/2022 6:48 PM



FOR APPROVAL



EPC 8/9/22

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

**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

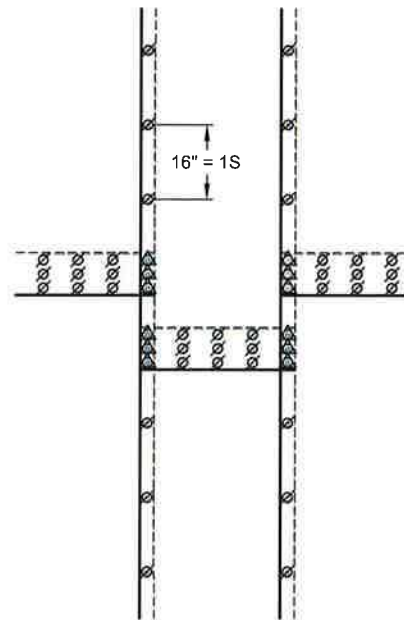
BRIDGECOR SINGLE RADIUS ARCH  
43'-0" MAX. SPAN X 26'-4" RISE  
STERLING RANCH COLORADO SPRINGS  
COLORADO SPRINGS, CO

PROJECT No.: 635632	SEQ. No.: 020	DATE: 2/28/2022
DESIGNED: XXX	DRAWN: SCC	
CHECKED: EDE	APPROVED: XXX	
SHEET NO: 4 OF 9		



**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.



**DETAIL A**

SCALE: N.T.S.

**LEGEND**

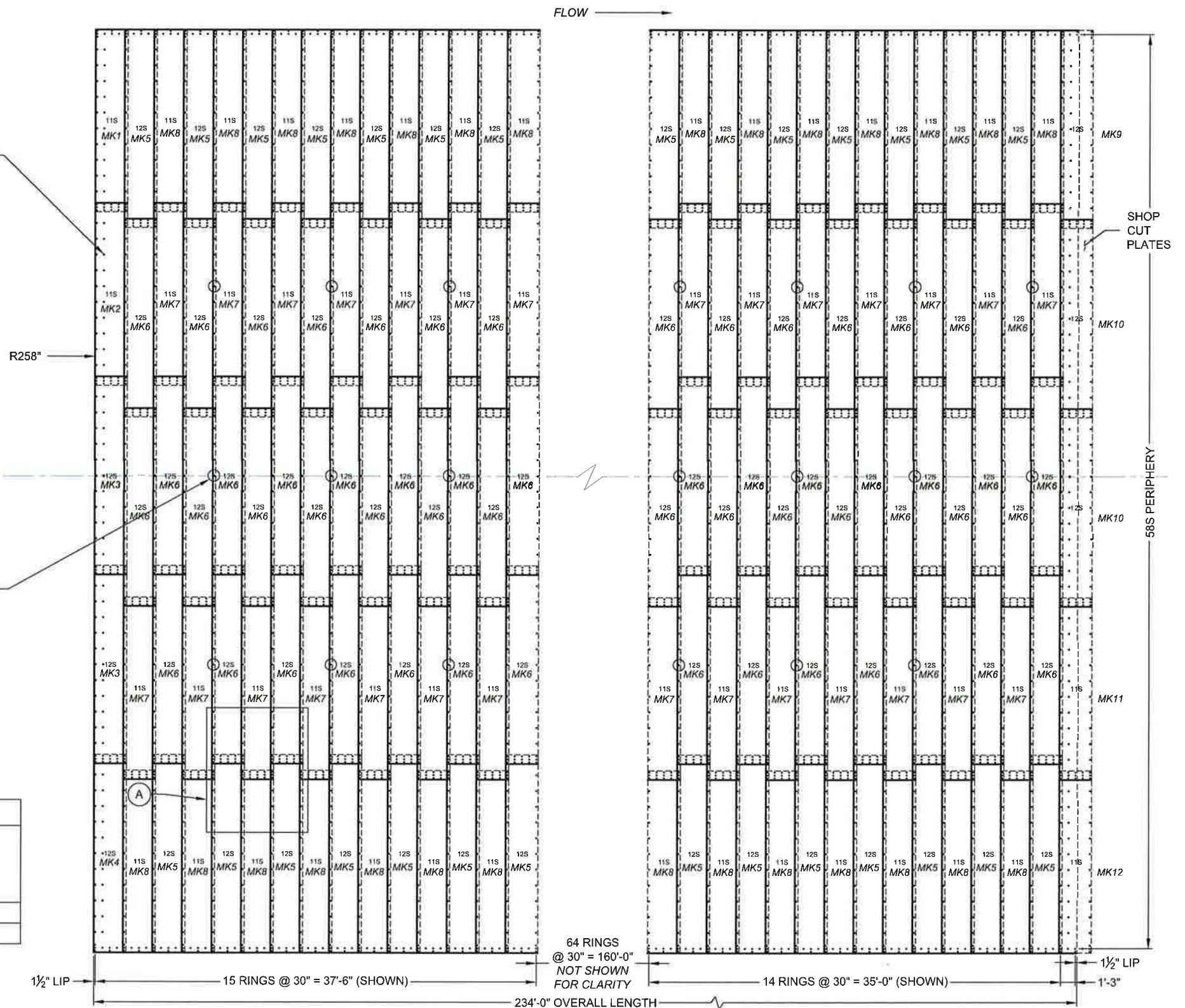
- Ø 2 PLATE LAP SEAMS
- △ 3-PLATE SEAM

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



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

EPC 8/9/22

I:\MERLIN\PROJECTS\BRIDGECOR\DRAWINGS\CONTRACT\FRE-635632-020-BGSR-CON-C.DWG 7/21/2022 6:48 PM

This design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

**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

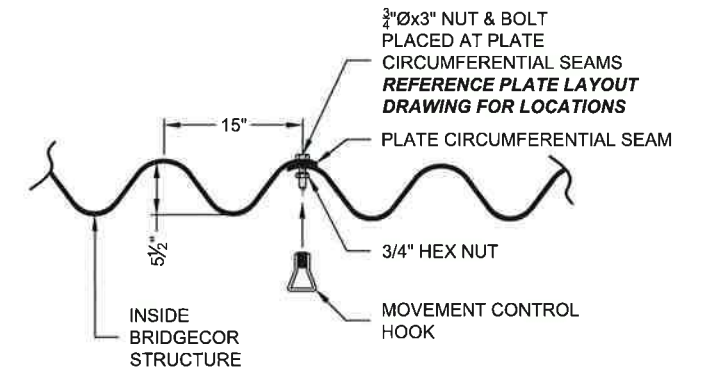
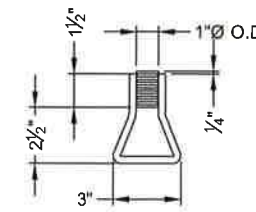
BRIDGECOR SINGLE RADIUS ARCH  
43'-0" MAX. SPAN X 26'-4" RISE  
STERLING RANCH COLORADO SPRINGS  
COLORADO SPRINGS, CO

PROJECT No: 635632	SEQ. No.: 020	DATE: 2/28/2022
DESIGNED: XXX	DRAWN: SCC	
CHECKED: EDE	APPROVED: XXX	
SHEET NO.: 5 of 9		

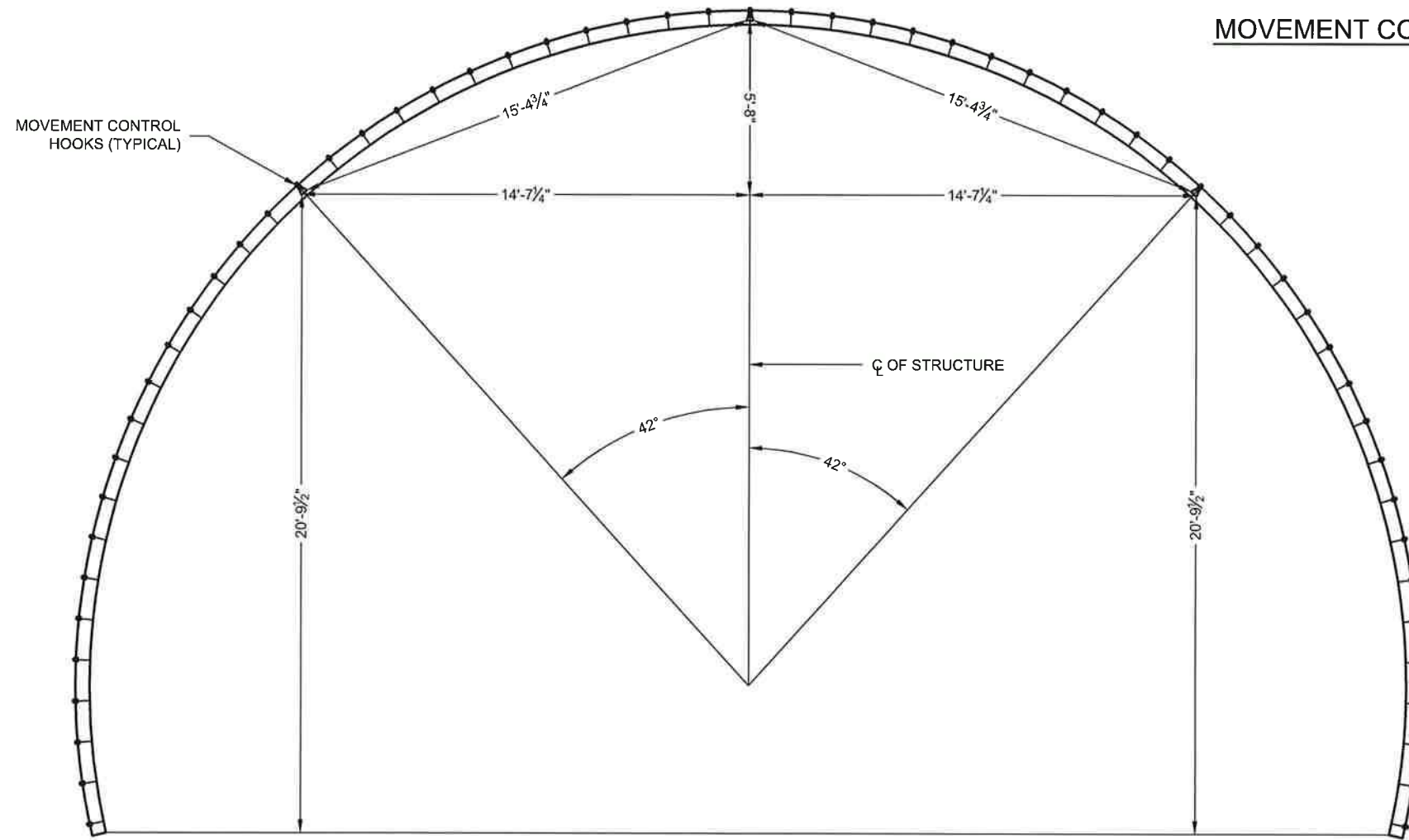


**NOTES:**

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



**MOVEMENT CONTROL HOOK DETAIL**



**MOVEMENT CONTROL HOOK PLACEMENT DETAIL**



EPC 8/9/22

FOR APPROVAL

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered at any time during the construction process, the contractor shall immediately notify Contech in writing. Contech shall not be responsible for any delays or costs incurred by the contractor as a result of such discrepancies.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

**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

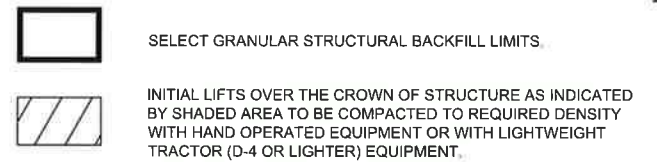
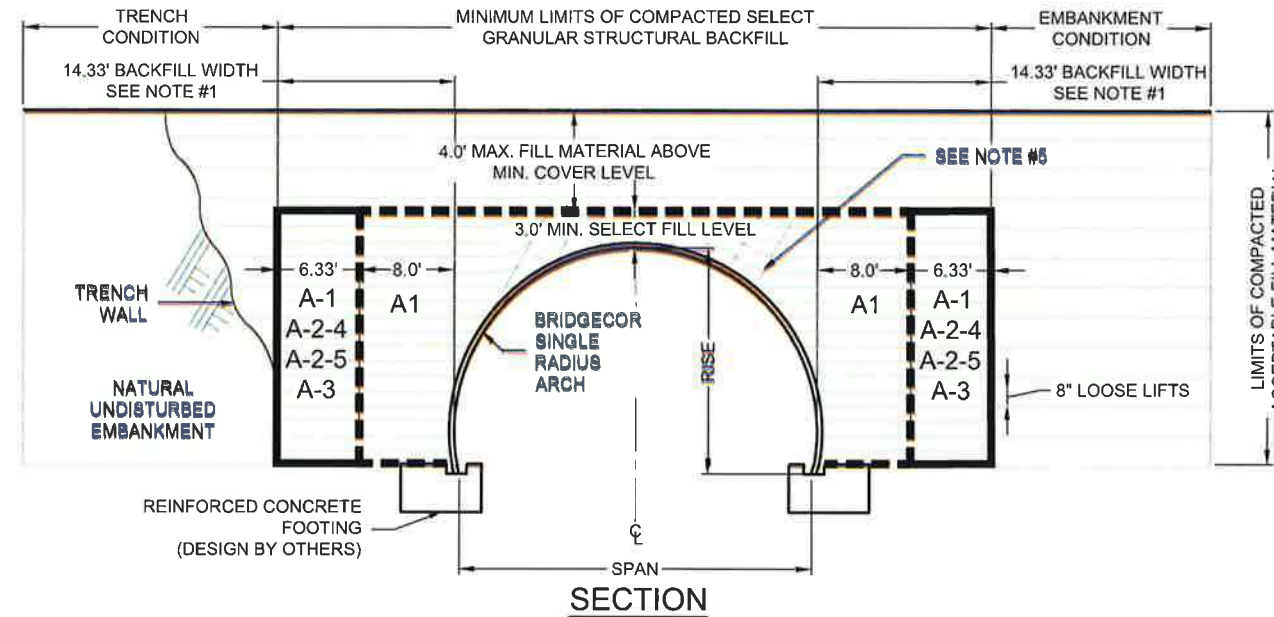
**BridgeCor**  
CONTECH CONTRACT DRAWING

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: 6 OF 9		

I:\MERLIN\PROJECTS\635632\BRIDGECOR\DRAWINGS\CONTRACT\TYPE-635632-020-BCSRA-CON-C.DWG 7/21/2022 6:48 PM





**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.



FOR APPROVAL

EPC 8/9/22

I:\MERLIN\PROJECTS\ACTIVE\635600\635632-20-BRIDGE\DRAWINGS\CONTRACT\PRE-635632-20-BCSRA-CON-C.DWG 7/21/2022 6:48 PM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

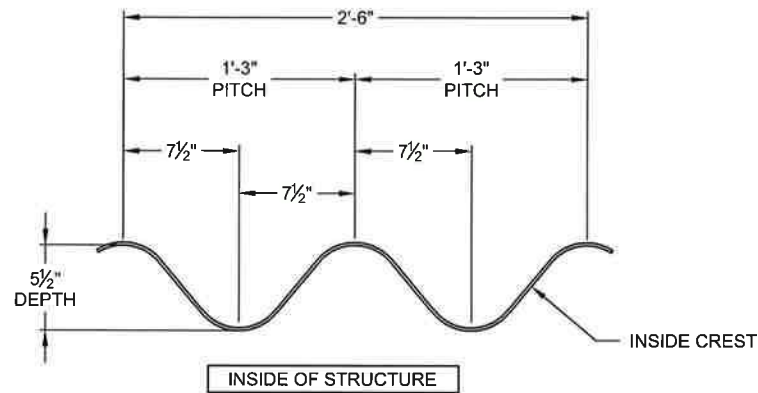
**CONTECH**  
ENGINEERED SOLUTIONS LLC  
www.ContechES.com  
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069  
800-338-1122 513-645-7000 513-645-7993 FAX

**BridgeCor**  
CONTECH CONTRACT DRAWING

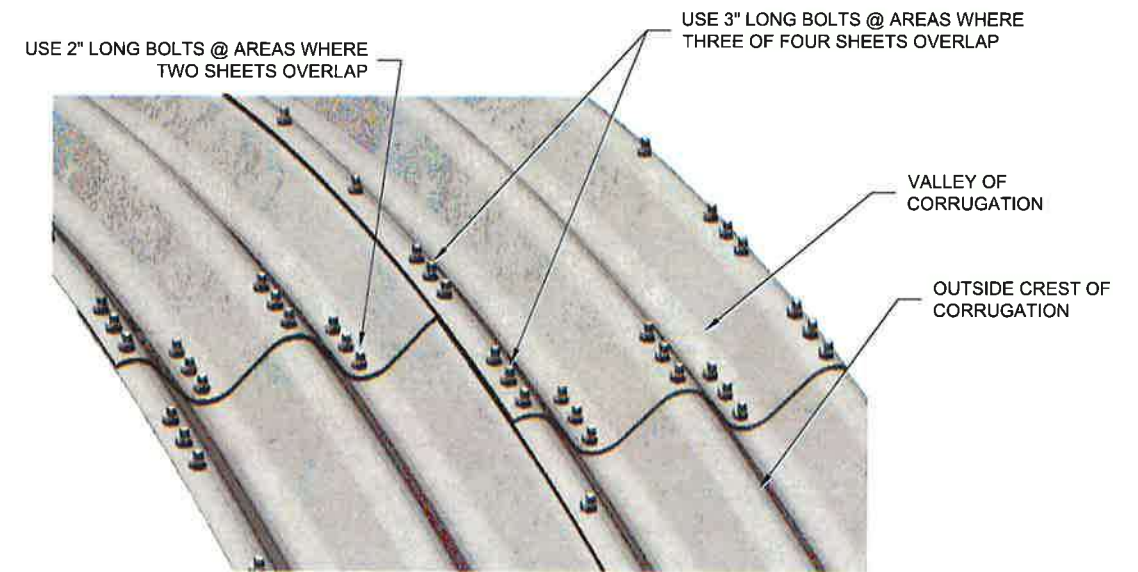
BRIDGECOR SINGLE RADIUS ARCH  
43'-0" MAX. SPAN X 26'-4" RISE  
STERLING RANCH COLORADO SPRINGS  
COLORADO SPRINGS, CO

PROJECT No.: 635632	SEQ. No.: 020	DATE: 2/28/2022
DESIGNED: XXX	DRAWN: SCC	
CHECKED: EDE	APPROVED: XXX	
SHEET No.: 7 of 9		

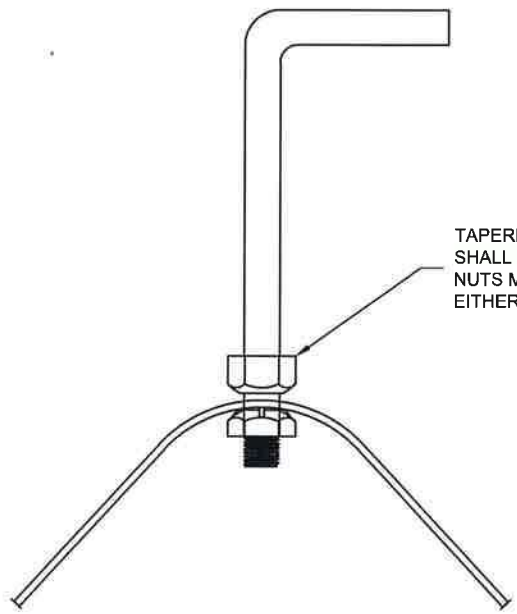




**BRIDGECOR CORRUGATION PROFILE**

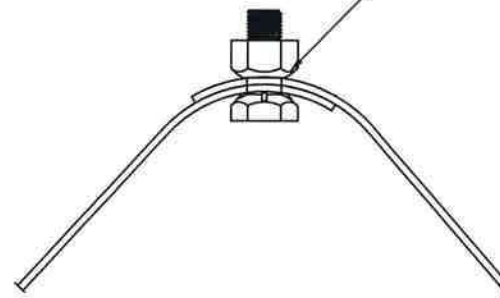


**PLATE LAP DETAIL**



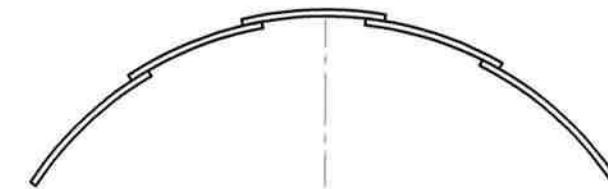
**ANCHOR BOLT BOLTING DETAIL**

TAPERED SIDE OF NUT SHALL CONTACT STRUCTURE. NUTS MAY BE PLACED AGAINST EITHER SIDE OF THE STRUCTURE.



**TYPICAL BOLTING DETAIL**

TAPERED SIDE OF NUT SHALL CONTACT STRUCTURE. NUTS MAY BE PLACED AGAINST EITHER SIDE OF THE STRUCTURE.



**PLATE LAPPING DETAIL (LOOKING DOWNSTREAM)**



FOR APPROVAL

EPC 8/9/22

I:\MERLIN\PROJECTS\63560\63560-20-BRIDGECOR\DRAWINGS\CONTRACT\PRE-635632-020-BCSRA-CON-C.DWG 7/21/2022 6:48 PM  
 The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.  
 If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

**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

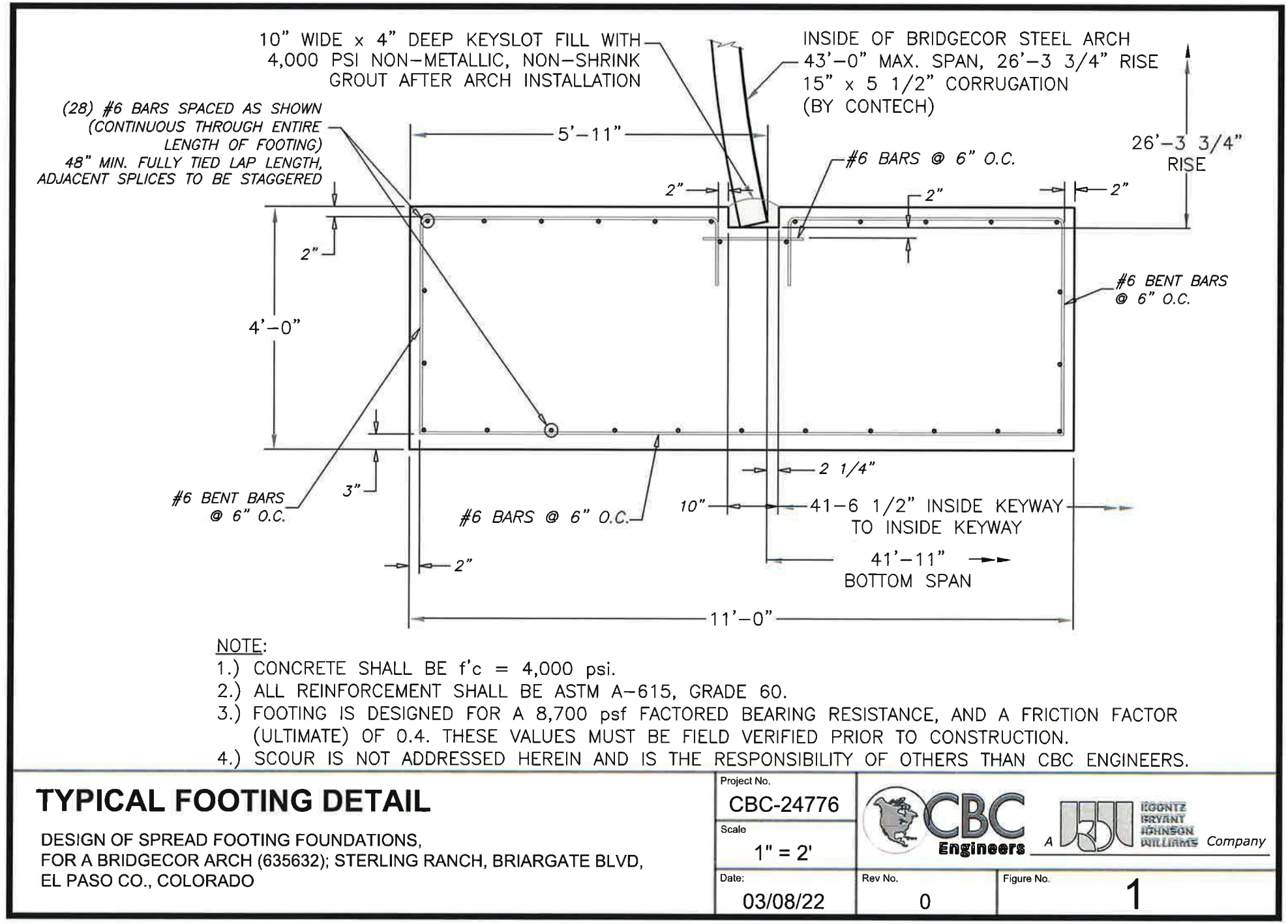
**BridgeCor**  
 CONTECH  
 CONTRACT  
 DRAWING

**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.:	8		OF		9



I:\MERLIN\PROJECTS\635632\20-BRIDGE\DRAWINGS\CONTRACT\PRE-635632-020-BCSRA-CON-C DWG 7/21/2022 6:48 PM



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

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



7/22/22

EPC 8/9/22

FOR APPROVAL

MARK	DATE	REVISION DESCRIPTION	BY
2	7/21/2022	REVISED PER REVIEWER COMMENTS	SCC
1	5/3/2022	REVISED PER REVIEWER COMMENTS	SCC

**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.: 9 of 9		