

**TIP PROJECT: B-5721**

**CONTRACT: C204763**

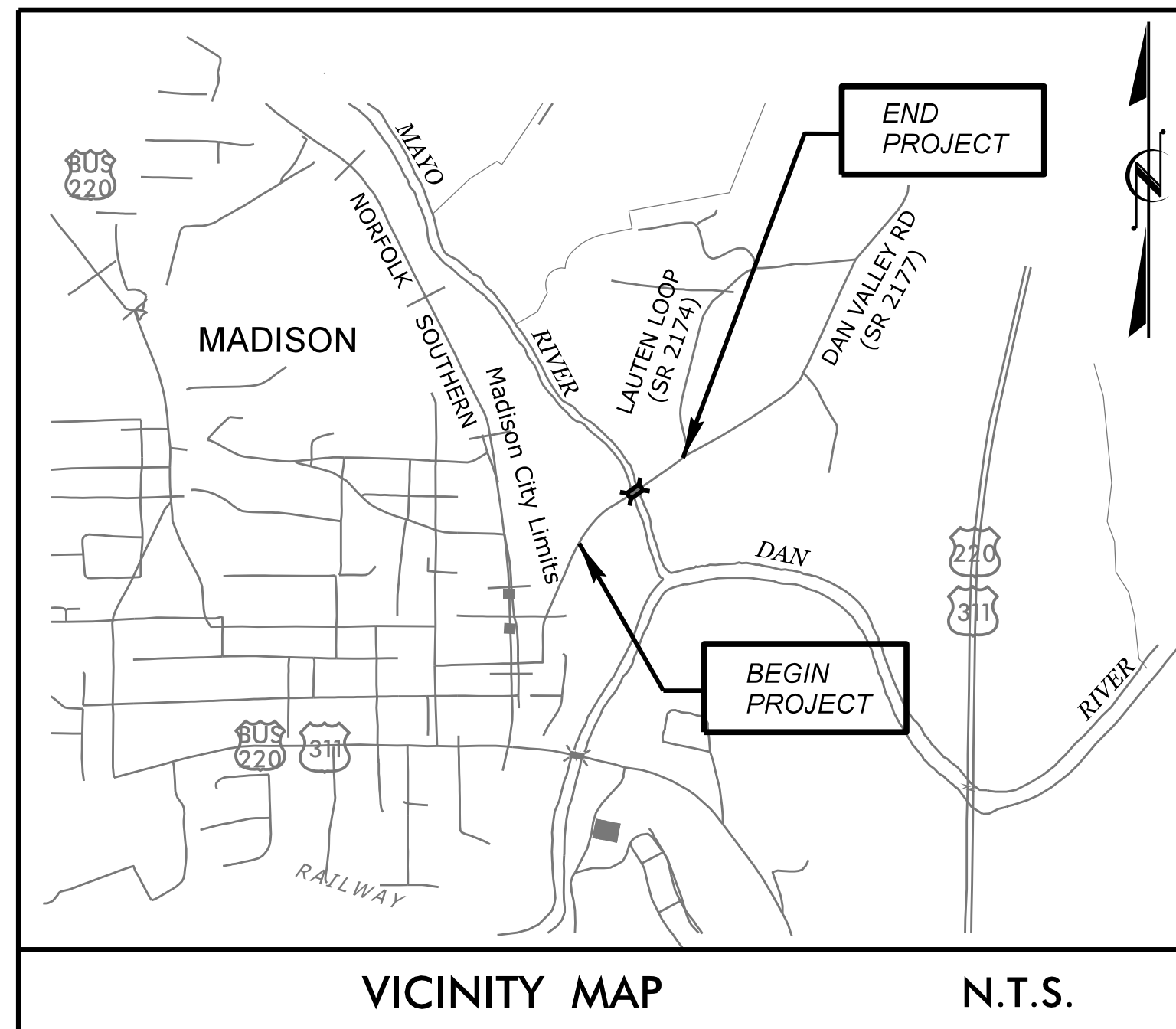
STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

**ROCKINGHAM COUNTY**

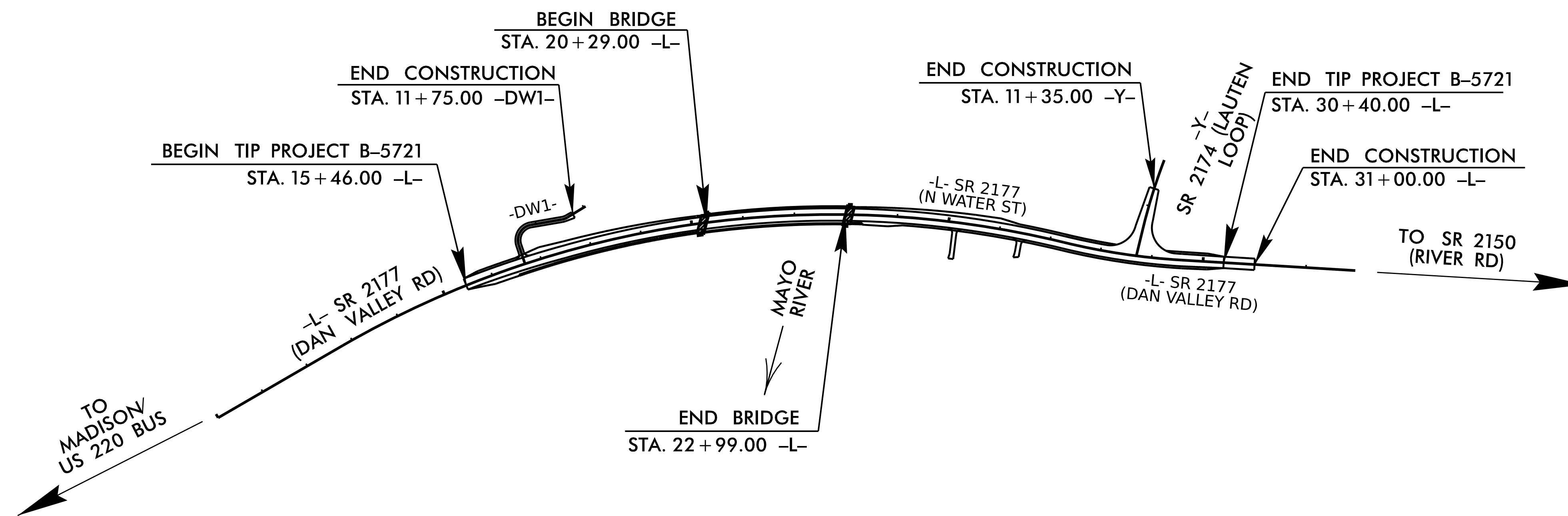
**LOCATION: BRIDGE 780124 ON SR 2177 (DAN VALLEY RD) OVER THE MAYO RIVER**  
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5721		
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
45677.1.1	BRZ-2177 (001)	P.E.	
45677.2.1	BRZ-2177 (001)	RW & UTILITIES	
45677.3.1	BRZ-2177 (001)	CONST.	



VICINITY MAP

N.T.S.



**STRUCTURES**



**DESIGN DATA**

ADT (2022) = 4,277  
 ADT (2041) = 6,096  
 K = 10 %  
 D = 55 %  
 T = 8 % \*  
 V = 50 MPH  
 \* (TTST 1 %, DUAL 7 %)  
 FUNC CLASS = LOCAL  
 SUB-REGIONAL TIER

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-5721 = 0.232 MILES  
 LENGTH STRUCTURE TIP PROJECT B-5721 = 0.051 MILES  


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 TOTAL LENGTH TIP PROJECT B-5721 = 0.283 MILES

Prepared In the Office of:  
**DIVISION OF HIGHWAYS**  
 STRUCTURES MANAGEMENT UNIT  
 1000 BIRCH RIDGE DR.  
 RALEIGH, N.C. 27610

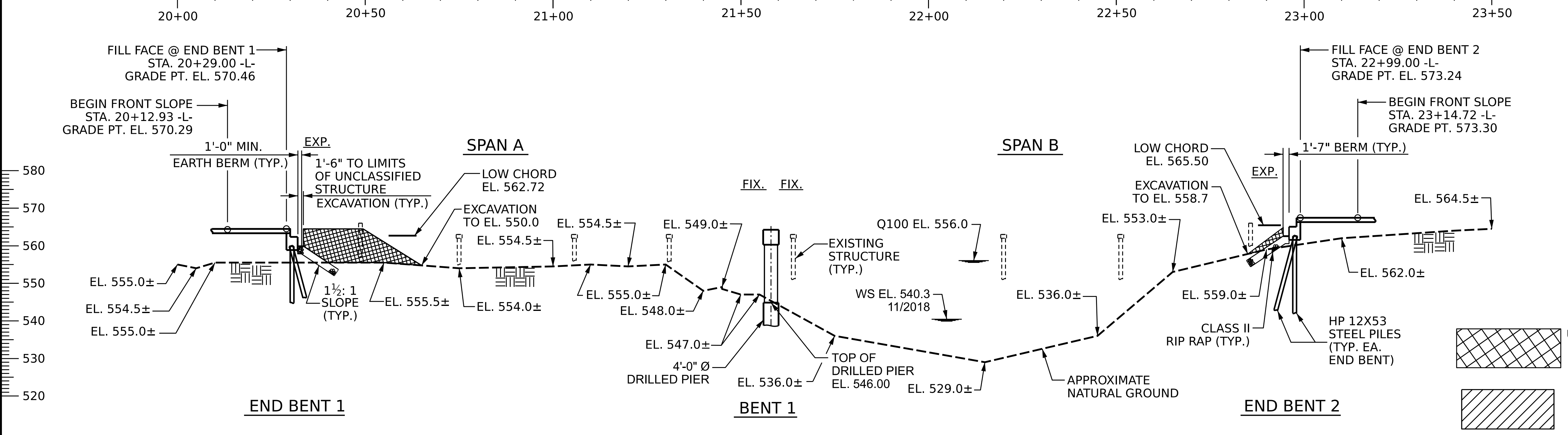
2018 STANDARD SPECIFICATIONS

LETTING DATE :

MAY 16, 2023

**KRISTY W. ALFORD, PE**  
 PROJECT ENGINEER

**FRANCESCA LEA, PE**  
 PROJECT DESIGN ENGINEER



**GRADE DATA**

(+)1.0923% Δ (-)2.2157%

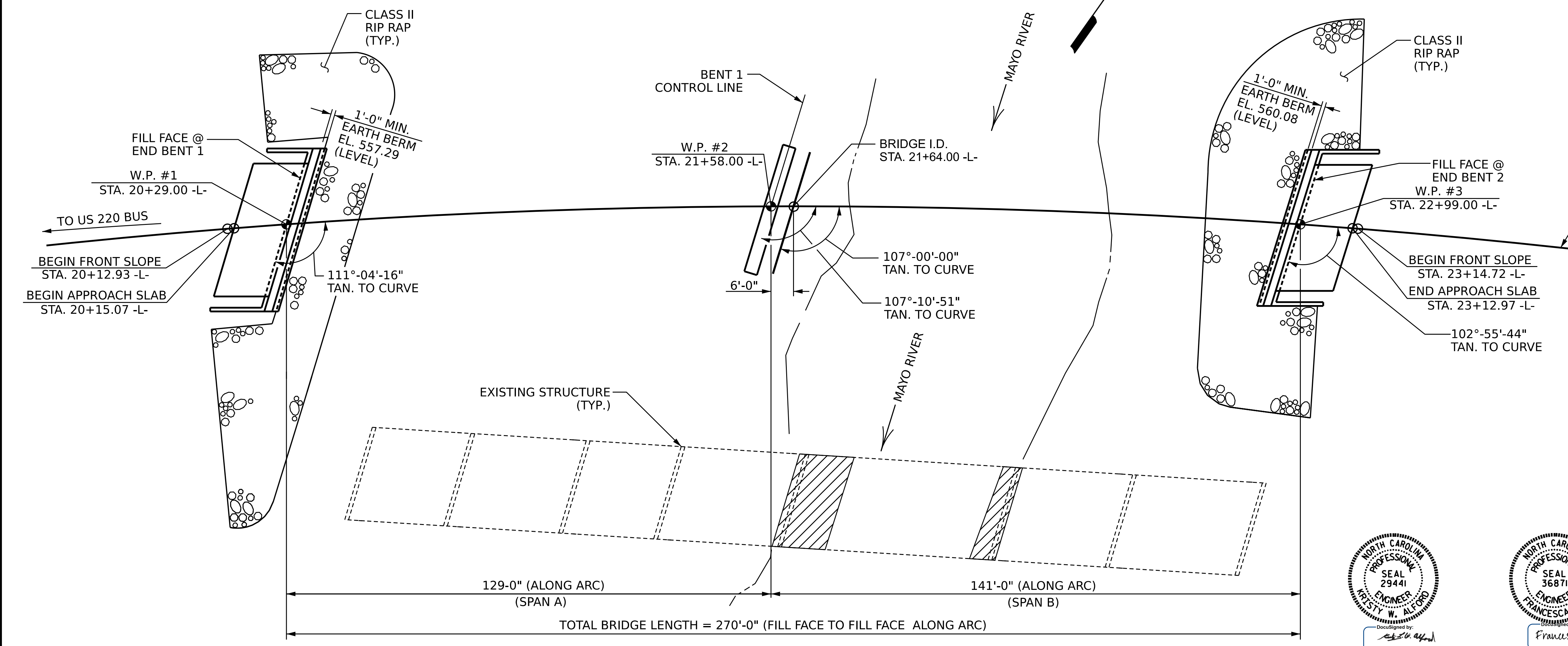
PI = 23+85.00 -L-  
EL. 574.35'  
VC = 280'

**HORIZONTAL CURVE DATA**

P.I. STA. = 20+39.80 -L-  
Δ = 43°-38'-07" (RT)  
D = 3°-00'-56" (RT)  
L = 1,447.00'  
T = 760.62'  
R = 1,900.00'

**SECTION ALONG -L-**  
(SECTION AT END BENTS AND BENT ARE AT RIGHT ANGLES)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



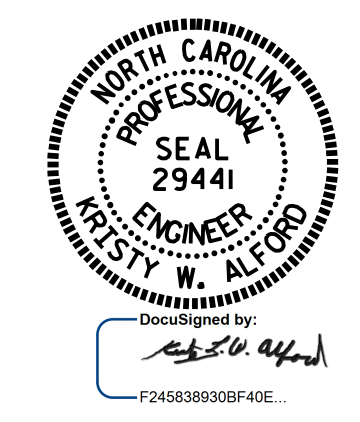
**PLAN**  
(PILES NOT SHOWN FOR CLARITY)

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
STATION: 21+64.00 -L-

SHEET 1 OF 5 REPLACES BRIDGE #780124

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**GENERAL DRAWING**  
FOR BRIDGE OVER MAYO RIVER  
ON SR 2177 (DAN VALLEY RD)  
BETWEEN SR 2174 (LAUTEN LOOP)  
AND US 220 BUS



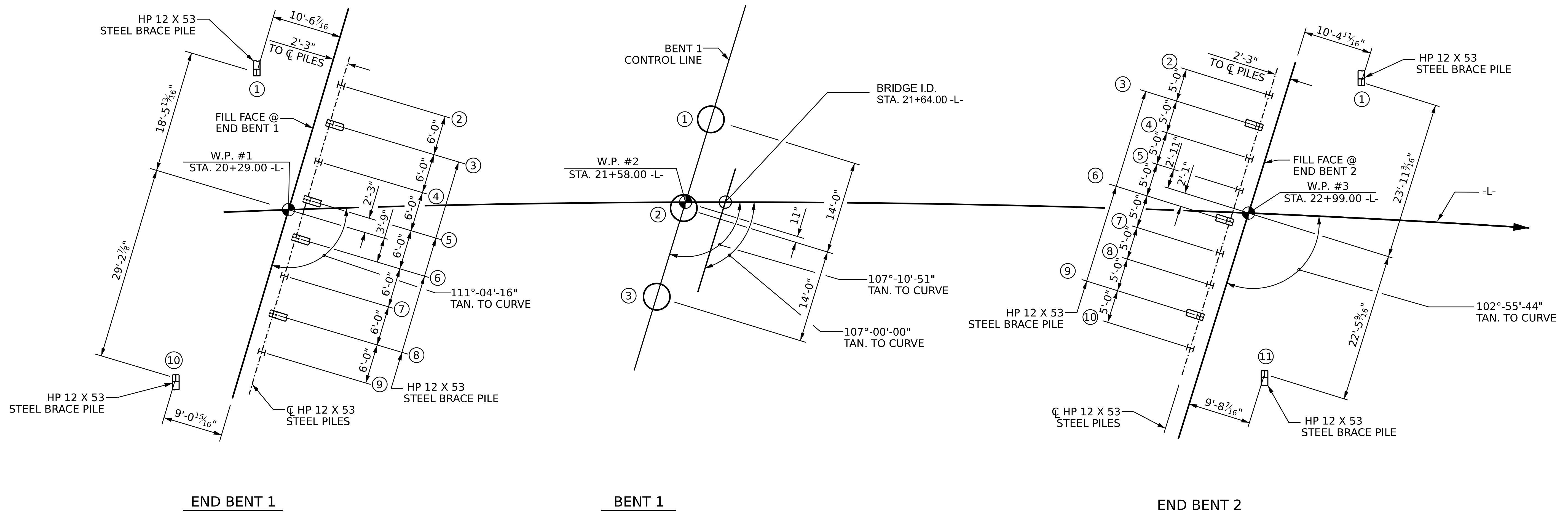
03/23/2023

03/23/2023

DRAWN BY: Q. T. NGUYEN DATE: 07/2022  
CHECKED BY: F. LEA DATE: 01/2023  
DESIGN ENGINEER OF RECORD: F. LEA DATE: 01/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO	BY	DATE	NO	BY	DATE	S-01
1			3			TOTAL SHEETS
2			4			31



**FOUNDATION LAYOUT**

DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO THE CENTERLINE OF PILES AND DRILLED PIERS

**NOTES**

- FOR PILES, SEE PILES PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
- DO NOT BEGIN WORK AT END BENT NO. 1 AND END BENT NO. 2 UNTIL FILL HAS BEEN PLACED.
- FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
- SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS FOR THE SETTLEMENT GAUGES REQUIRED AT END BENT NO. 1 AND END BENT NO. 2.
- OBSERVE A 2 WEEKS WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO THE BOTTOM OF CAP ELEVATION BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT NO. 1 AND END BENT NO. 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.
- TERMINATION OF THE WAITING PERIODS FOR END BENT NO. 1 AND END BENT NO. 2 SHALL BE DETERMINED BY THE GEOTECHNICAL ENGINEER OF RECORD BASED ON SETTLEMENT GAUGE MONITORING DATA.

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-

SHEET 2 OF 5



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER MAYO RIVER  
 ON SR 2177 (DAN VALLEY RD)  
 BETWEEN SR 2174 (LAUTEN LOOP)  
 AND US 220 BUS

REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TOTAL SHEETS	31
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DRAWN BY : Q. T. NGUYEN DATE : 11/2022  
 CHECKED BY : F. LEA DATE : 01/2023  
 DESIGN ENGINEER OF RECORD: F. LEA DATE : 04/2022

**SUMMARY OF PILE INFORMATION/INSTALLATION**

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Factored Resistance per Pile TONS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Length per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles*			Drilled-In Piles		
					Min Pile Tip (Tip No Higher Than) Elev FT	Required Driving Resistance (RDR)** per Pile TONS	Total Pile Redrives Quantity EACH	Predrilling Length per Pile Lin FT	Predrilling Elevation (Elev Not To Pre-drill Below) FT	Maximum Predrilling Dia INCHES	Pile Exc Excavation (Bottom of Hole) Elev FT	Pile Exc Not In Soil per Pile Lin FT	Pile Exc In Soil per Pile Lin FT
End Bent 1, Piles 1-10	125	560.4	35			210							
End Bent 2, Piles 1-11	115	563.2	25			195							

\*Predrilling for Piles is required for end bents/bents with a predrilling length and at the Contractor's option for end bents/bents with predrilling information but no predrilling length.

$$**RDR = \frac{\text{Factored Resistance} + \text{Factored Downdrag Load} + \text{Factored Dead Load}}{\text{Dynamic Resistance Factor}} + \frac{\text{Nominal Scour Resistance}}{\text{Nominal Downdrag Resistance} + \text{Scour Resistance Factor}}$$

**PILE DESIGN INFORMATION**

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile TONS	Factored Downdrag Load per Pile TONS	Factored Dead Load* per Pile TONS	Dynamic Resistance Factor	Nominal Downdrag Resistance per Pile TONS	Nominal Scour Resistance per Pile TONS	Scour Resistance Factor (Default = 1.00)
End Bent 1, Piles 1-10	125			0.60			
End Bent 2, Piles 1-11	115			0.60			

\*Factored Dead Load is factored weight of pile above the ground line.

**SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION**

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pier(s) #-# (e.g., "Bent 1, Piers 1-3")	Factored Resistance per Pier TONS	Minimum Pier Tip (Tip No Higher Than) Elevation FT	Required Tip Resistance per Pier TSF	Scour Critical Elevation FT	Minimum Drilled Pier Penetration Into Rock per Pier Lin FT	Drilled Pier Length per Pier Lin FT	Drilled Pier Length Not In Soil per Pier Lin FT	Drilled Pier Length In Soil per Pier Lin FT	Permanent Steel Casing Required? YES or MAYBE	Permanent Steel Casing Tip Elevation (Elev Not To Extend Casing Below) FT	Permanent Steel Casing Length* per Pier Lin FT
Bent 1, Piers 1-3	655	507.0	30	523.5		70.0	60.0		YES	528.0	20.0

\*Permanent Steel Casing Length equals the difference between the ground line or top of drilled pier elevation, whichever is higher, and the permanent casing tip elevation.

**SUMMARY OF PDA/PILE ORDER LENGTHS**

(Blank entries indicate item is not applicable to structure)

Pile Driving Analyzer (PDA)				Pile Order Lengths	
End Bent/ Bent No	PDA Testing Required? YES or MAYBE	PDA Test Pile Length FT	Total PDA Testing Quantity EACH	End Bent/ Bent No(s)	Pile Order Length Basis* EST or PDA
End Bent 1, Piles 1-10	MAYBE		1		
End Bent 2, Piles 1-11	MAYBE				

\*EST = Pile order lengths from estimated pile lengths; PDA = Pile order lengths based on PDA testing. For groups of end bents/bents with pile order lengths based on PDA testing, the first end bent/bent no. listed for each group is the representative end bent/bent with the PDA.

**SUMMARY OF PILE ACCESSORIES**

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Pipe Pile Plates Required? YES or MAYBE	Steel Pile Points			Steel Pile Tips Required? YES
		Pipe Pile Cutting Shoes Required? YES	Pipe Pile Conical Points Required? YES	H-Pile Points Required? YES	
End Bent 1, Piles 1-10				YES	
End Bent 2, Piles 1-11				YES	
<b>TOTAL QTY:</b>				21	

**SUMMARY OF DRILLED PIER TESTING**

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pier(s) #-# (e.g., "Bent 1, Piers 1-3")	Standard Penetration Test (SPT) Required? YES or MAYBE	Crosshole Sonic Logging (CSL) Required? YES or MAYBE	Total CSL Tube Length (For All Tubes) per Pier Lin FT	Shaft Inspection Device (SID) Required? YES or MAYBE	Pile Integrity Test (PIT) Required? MAYBE
Bent 1, Piers 1-3		MAYBE	162	Yes	
<b>TOTAL QTY:</b>		1	486	3	

\*CSL Tubes are required if CSL Testing is or may be required. The number of CSL Tubes per drilled pier is equal to one tube per foot of design pier diameter with at least 4 tubes per pier. The length of each CSL Tube is equal to the drilled pier length plus 1.5 ft.

PROJECT NO. B-5721


ROCKINGHAM COUNTY

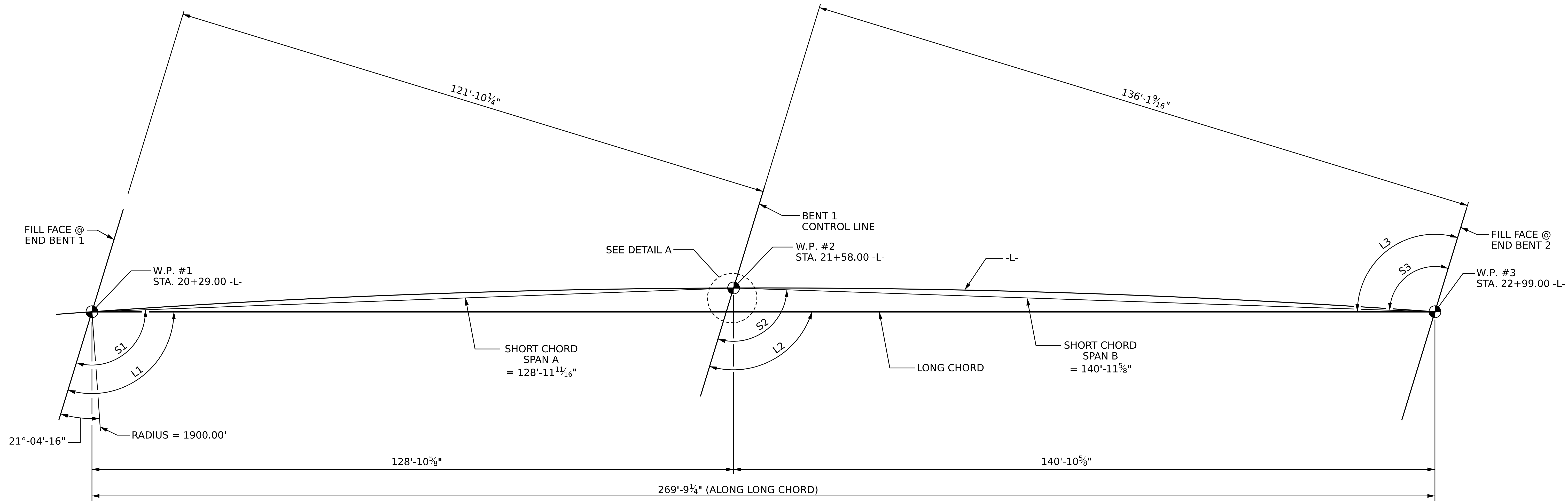
STATION: 21+64.00 -L-

SHEET 3 OF 5

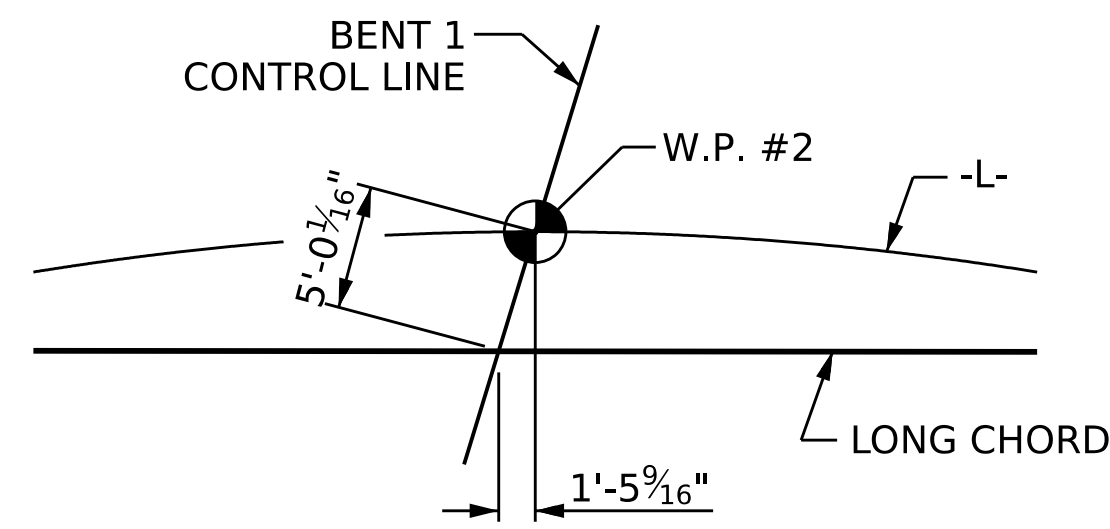
**NOTES:**

- The Pile and Drilled Pier Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Chien-Ting Tang, 047389) on 3-28-2022.
- Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
- The Engineer will determine the need for PDA Testing, Permanent Steel Casing, SPTs, CSL Testing, SID Inspections and PITs when these items may be required.

 Signed by: Francesca Lea B79DADB65D584EF... 03/23/2025	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH		<b>PILE AND DRILLED PIER FOUNDATION TABLES</b>	SHEET NO. S-03 TOTAL SHEETS 31
	REVISIONS			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	NO. 1	BY: DATE:	NO. 3	DATE:
	2		4	



**LONG CHORD LAYOUT**  
(END BENTS AND BENT ARE PARALLEL)

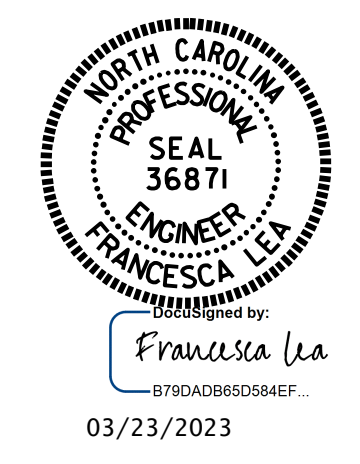


**DETAIL A**

ANGLES				HORIZONTAL CURVE DATA
LONG CHORD		SHORT CHORD		
L1	107°-00'-00"	S1	109°-07'-34"	PI STA. 20+39.80 -L- $\Delta = 43^\circ-38'-07''$ (RT) $D = 3^\circ-00'-56''$ $L = 1,447.00'$ $T = 760.62'$ $R = 1,900.00'$
L2	107°-00'-00"	S2	105°-03'-18"	
L3	107°-00'-00"	S3	105°-03'-18"	

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-

SHEET 4 OF 5



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR BRIDGE OVER MAYO RIVER  
 ON SR 2177 (DAN VALLEY RD)  
 BETWEEN SR 2174 (LAUTEN LOOP)  
 AND US 220 BUS

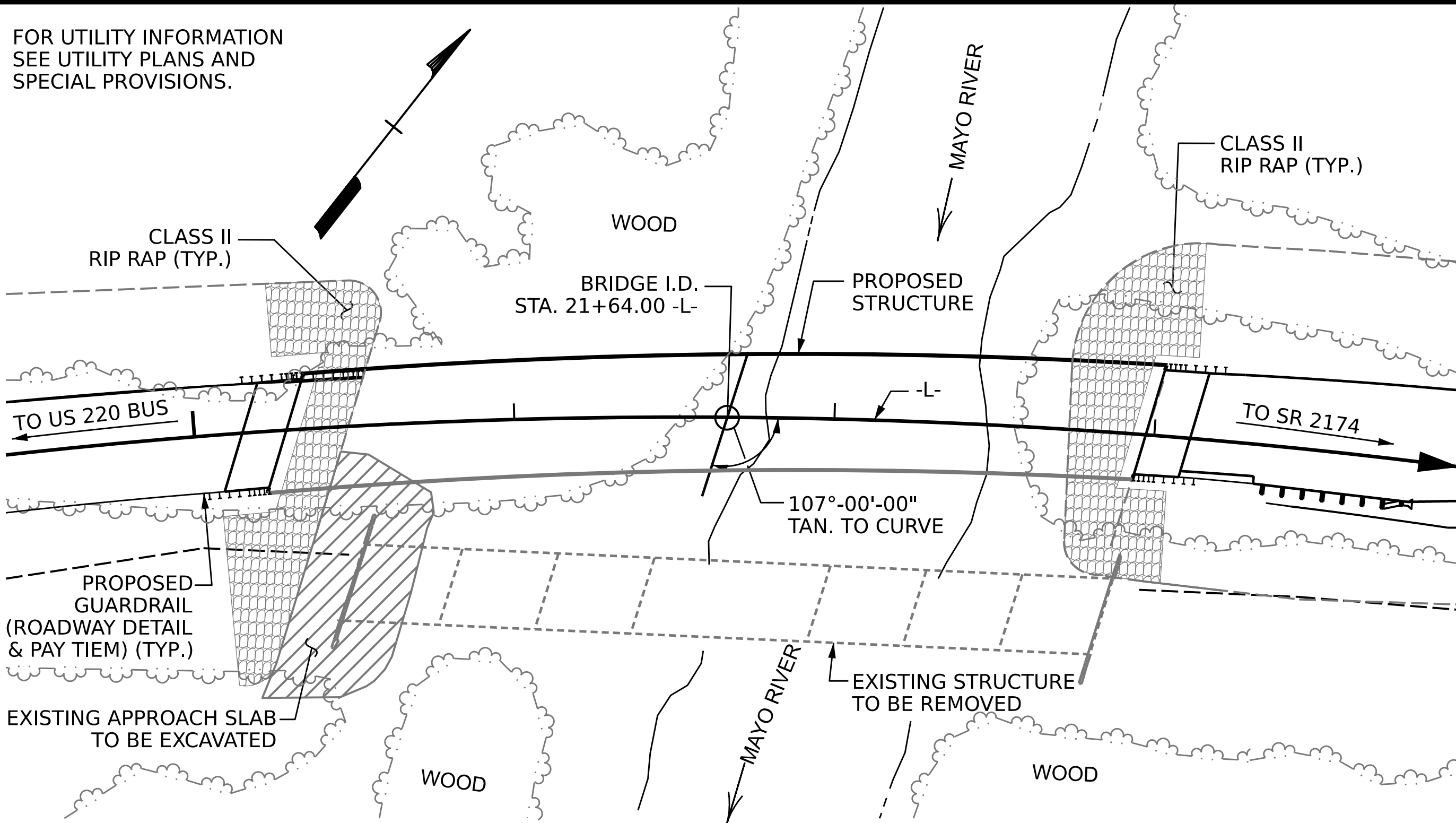
DRAWN BY : Q. T. NGUYEN DATE : 9/2022  
 CHECKED BY : Z. MALIK DATE : 10/2022  
 DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 10/2022

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-04
1			3			TOTAL SHEETS
2			4			31

**BM #1: STA. 21+12.83 -L-, 25.04' LEFT, SPIKE IN 20" MAPLE, EL. 556.55**

FOR UTILITY INFORMATION  
SEE UTILITY PLANS AND  
SPECIAL PROVISIONS.



**LOCATION SKETCH**

**NOTES**

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTOR'S OPTION, AND UPON REMOVAL OF THE CAUSEWAY, THE CLASS II RIP RAP USED IN THE CAUSEWAY MAY BE PLACED AS RIP RAP SLOPE PROTECTION. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 21+64.00 -L-.

NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 21+64.00-L-."

THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-01 SHALL BE EXCAVATED FOR A DISTANCE OF 82 FT ON RIGHT OF -L- AT END BENT 1 AND 5 FT EACH SIDE OF CENTERLINE ROADWAY AT END BENT 2 AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

THE EXISTING STRUCTURE CONSISTING OF REINFORCED CONCRETE DECK ON I-BEAMS WITH SPAN LENGTH OF 4 @ 30 FT, 1 @ 55 FT AND 2 @ 30 FT, WITH A CLEAR ROADWAY WIDTH OF 24 FT ON A REINFORCED CONCRETE CAP ON PPC PILE END BENTS AND REINFORCED CONCRETE CAP ON POST AND BEAM BENT SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT.

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

ALL METALIZED SURFACES SHALL RECEIVE A SEAL COATING AS SPECIFIED IN TABLE 2 OF THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM. FOR THERMAL SPRAYED COATINGS, SEE SPECIAL PROVISIONS.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 IS ELEVATION 523.5 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

WHEN REMOVING EXISTING PILES NO MORE THAN 50% OF STREAM CAN BE BLOCKED BY CAUSEWAY.

CUT BENT 4 AND 5 EXISTING PILES ONE FOOT BELOW RIVERBED.

FOR REMOVAL OF EXISTING STRUCTURE AT STA. 21+64.00 -L-, SEE SPECIAL PROVISIONS.

FOR MODIFIED 74" PRESTRESSED CONCRETE GIRDER, SEE SPECIAL PROVISIONS.

**TOTAL BILL OF MATERIAL**

	CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS	REMOVAL OF EXISTING STRUCTURE AT STA. 21+64.00 -L-	ASBESTOS ASSESSMENT	UNCLASSIFIED STRUCTURE EXCAVATION	4'-0" DIA. DRILLED PIER IN SOIL	4'-0" DIA. DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 4'-0" DIA. DRILLED PIER	PDA TESTING	SID INSPECTION	CSL TESTING	STEEL PILE POINTS	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS
	LUMP SUM	LUMP SUM	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EA.	EA.	EA.	EA.	SQ. FT.	SQ. FT.
SUPERSTRUCTURE												9,707	8,874
END BENT 1													
BENT 1					180	210	60				21		
END BENT 2													
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	LUMP SUM	180	210	60	1	3	1	21	9,707	8,874

**HYDRAULIC DATA**

DESIGN DISCHARGE	= 20,600 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YRS.
DESIGN HIGH WATER ELEVATION	= 553.4 FT.
DRAINAGE AREA	= 314 SQ.MI.
BASE DISCHARGE (Q100)	= 28,800 CFS.
BASE HIGH WATER ELEVATION	= 555.9 FT.

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE	= 16,600 CFS.
FREQUENCY OF OVERTOPPING FLOOD	= 10+ YRS.
OVERTOPPING FLOOD ELEVATION	= 551.0 FT. *

\* OVERTOPPING AT APPROXIMATELY STATION 13+00.00 -L-

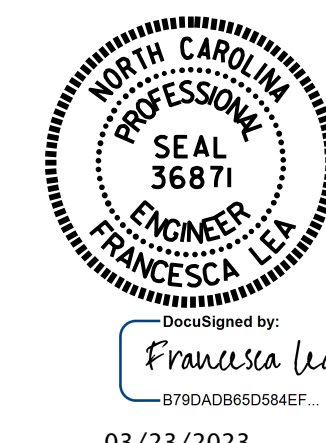
**TOTAL BILL OF MATERIAL**

	CLASS A CONCRETE	BRIDGE APPROACH SLABS STA. 21+64.00 -L-	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 74" PRESTRESSED CONCRETE GIRDER	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	FOAM JOINT SEALS		
	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE					10	1,327.4								
END BENT 1	56.7		6,167				10	10	350		395	435		
BENT 1	41.4		14,662	3,983										
END BENT 2	54.9		6,035				11	11	275		295	330		
TOTAL	153.0	LUMP SUM	26,864	3,983	10	1,327.4	21	21	625	535.68	690	765	LUMP SUM	LUMP SUM

**SAMPLE BAR REPLACEMENT**

SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE:  
SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND fy = 60ksi.



PROJECT NO. B-5721  
ROCKINGHAM COUNTY

STATION: 21+64.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
**GENERAL DRAWING**  
FOR BRIDGE OVER MAYO RIVER  
ON SR 2177 (DAN VALLEY RD)  
BETWEEN SR 2174 (LAUTEN LOOP)  
AND US 220 BUS

DRAWN BY: Q. T. NGUYEN DATE: 01/2023  
CHECKED BY: F. LEA DATE: 01/2023  
DESIGN ENGINEER OF RECORD: Z. MALIK DATE: 06/2022

DOCUMENT NOT CONSIDERED  
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-05
1			3			TOTAL SHEETS
2			4			31

## LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						MOMENT					SHEAR					MOMENT								
						LIVELOAD FACTORS (VLL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS (VLL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.13	--	1.75	0.807	1.20	A	5	62.709	0.845	1.19	B	5	127.131	0.80	0.807	1.13	A	5	62.709		
	HL-93(Opr)	N/A	--	1.54	--	1.35	0.807	1.55	A	5	62.709	0.845	1.54	B	5	127.131	N/A	--	--	--	--	--		
	HS-20(Inv)	36.00	2	1.67	59.95	1.75	0.807	1.77	A	5	62.709	0.845	1.74	B	5	127.131	0.80	0.807	1.67	A	5	62.709		
	HS-20(Opr)	36.00	--	2.26	81.25	1.35	0.807	2.30	A	5	62.709	0.845	2.26	B	5	127.131	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.50	--	4.06	54.78	1.40	0.807	5.40	A	5	62.709	0.845	5.49	B	5	127.131	0.80	0.807	4.06	A	5	62.709	
		SNGARBS2	20.00	--	2.89	57.84	1.40	0.807	3.85	A	5	62.709	0.845	3.80	B	5	127.131	0.80	0.807	2.89	A	5	62.709	
		SNAGRIS2	22.00	--	2.69	59.11	1.40	0.807	3.57	A	5	62.709	0.845	3.49	B	5	127.131	0.80	0.807	2.69	A	5	62.709	
		SNCOTTS3	27.25	--	2.02	54.92	1.40	0.807	2.68	A	5	62.709	0.845	2.73	B	5	127.131	0.80	0.807	2.02	A	5	62.709	
		SNAGGRS4	34.93	--	1.63	57.04	1.40	0.807	2.17	A	5	62.709	0.845	2.20	B	5	127.131	0.80	0.807	1.63	A	5	62.709	
		SNS5A	35.55	--	1.60	56.89	1.40	0.807	2.13	A	5	62.709	0.845	2.19	B	5	127.131	0.80	0.807	1.60	A	5	62.709	
		SNS6A	39.95	--	1.45	57.84	1.40	0.807	1.93	A	5	62.709	0.845	1.97	B	5	127.131	0.80	0.807	1.45	A	5	62.709	
	SNS7B	42.00	--	1.38	57.88	1.40	0.807	1.83	A	5	62.709	0.845	1.90	B	5	127.131	0.80	0.807	1.38	A	5	62.709		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.00	--	1.76	58.07	1.40	0.807	2.34	A	5	62.709	0.845	2.37	B	5	127.131	0.80	0.807	1.76	A	5	62.709	
		TNT4A	33.08	--	1.76	58.28	1.40	0.807	2.34	A	5	62.709	0.845	2.34	B	5	127.131	0.80	0.807	1.76	A	5	62.709	
		TNT6A	41.60	--	1.42	59.15	1.40	0.807	1.89	A	5	62.709	0.845	1.97	B	5	127.131	0.80	0.807	1.42	A	5	62.709	
		TNT7A	42.00	--	1.42	59.60	1.40	0.807	1.89	A	5	62.709	0.845	1.94	B	5	127.131	0.80	0.807	1.42	A	5	62.709	
		TNT7B	42.00	--	1.44	60.66	1.40	0.807	1.92	A	5	62.709	0.845	1.88	B	5	127.131	0.80	0.807	1.44	A	5	62.709	
		TNAGRIT4	43.00	--	1.39	59.84	1.40	0.807	1.85	A	5	62.709	0.845	1.83	B	5	127.131	0.80	0.807	1.39	A	5	62.709	
TNAGT5A		45.00	--	1.32	59.42	1.40	0.807	1.76	A	5	62.709	0.845	1.78	B	5	127.131	0.80	0.807	1.32	A	5	62.709		
TNAGT5B	45.00	3	1.31	59.04	1.40	0.807	1.75	A	5	62.709	0.845	1.75	B	5	127.131	0.80	0.807	1.31	A	5	62.709			
EV LOAD RATING	EV2	28.75	--	2.03	58.34	1.30	0.807	2.91	A	5	62.709	0.845	2.86	B	5	127.131	0.80	0.807	2.03	A	5	62.709		
	EV3	43.00	--	1.34	57.69	1.30	0.807	1.92	A	5	62.709	0.845	1.92	B	5	127.131	0.80	0.807	1.34	A	5	62.709		

### LOAD FACTORS:

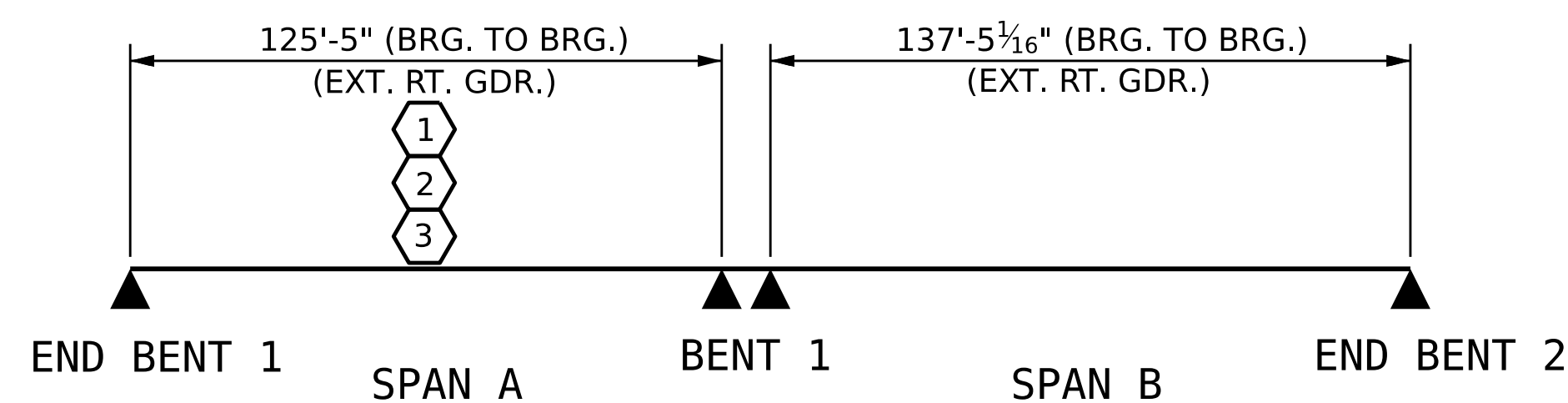
DESIGN LOAD RATING FACTORS	LIMIT STATE	$\gamma_{DC}$	$\gamma_{DW}$
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

### NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

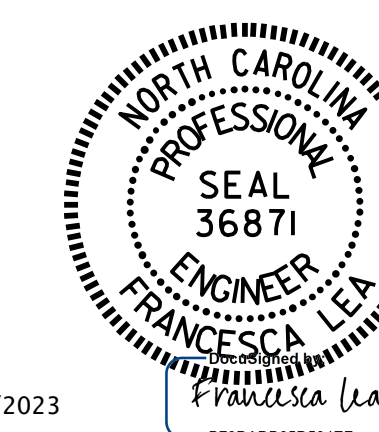
ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

<b>#</b>	<b>CONTROLLING LOAD RATING</b>
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	
<b>GIRDER LOCATION</b>	
1	- INTERIOR GIRDER
1	- EXTERIOR LEFT GIRDER
5	- EXTERIOR RIGHT GIRDER



### LRFR SUMMARY

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 LRFR SUMMARY FOR  
 PRESTRESSED  
 CONCRETE GIRDERS  
 (NON-INTERSTATE TRAFFIC)

ASSEMBLED BY: ZMALIK	DATE: 12/2022
CHECKED BY: F. LEA	DATE: 12/2022
DRAWN BY: MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY: GM/DI 2/08	REV. 10/1/11 MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-06
1			3			TOTAL SHEETS
2			4			31

**NOTES**

PROVIDE 1 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

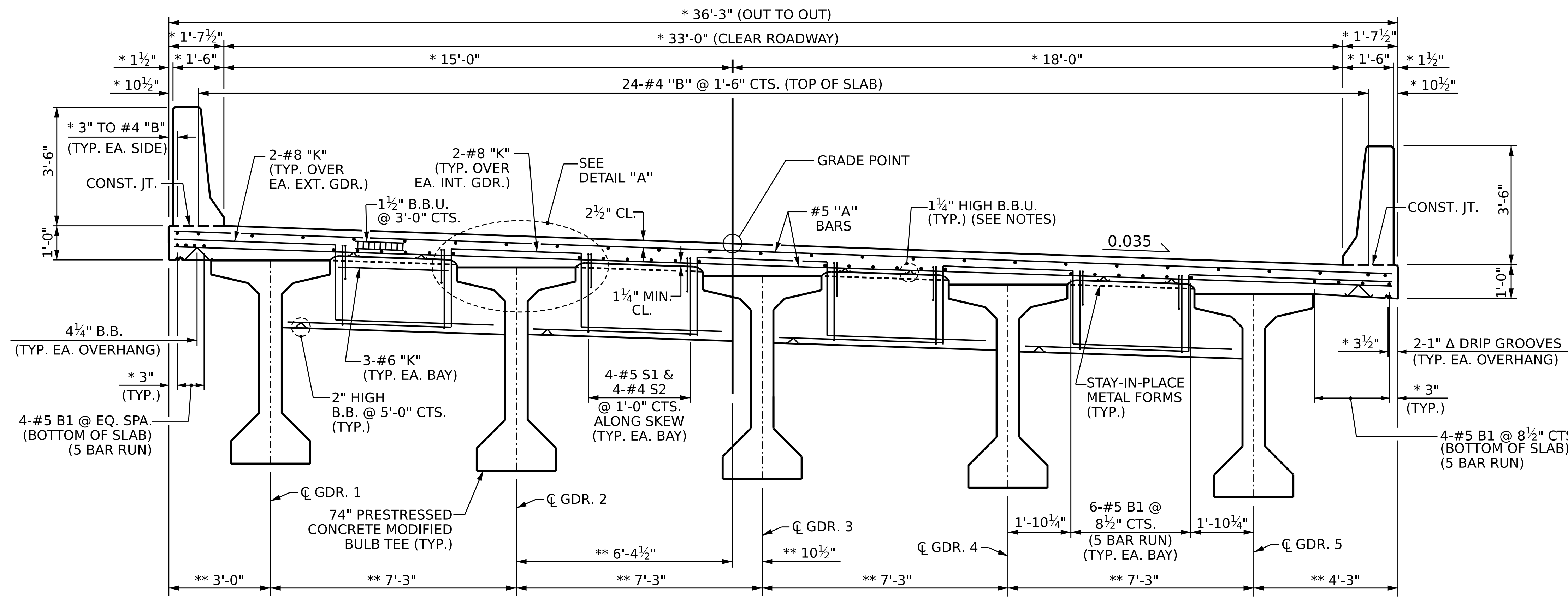
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

BARRIER RAIL IN EACH CONTINUOUS UNIT SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

#5 "G" BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.

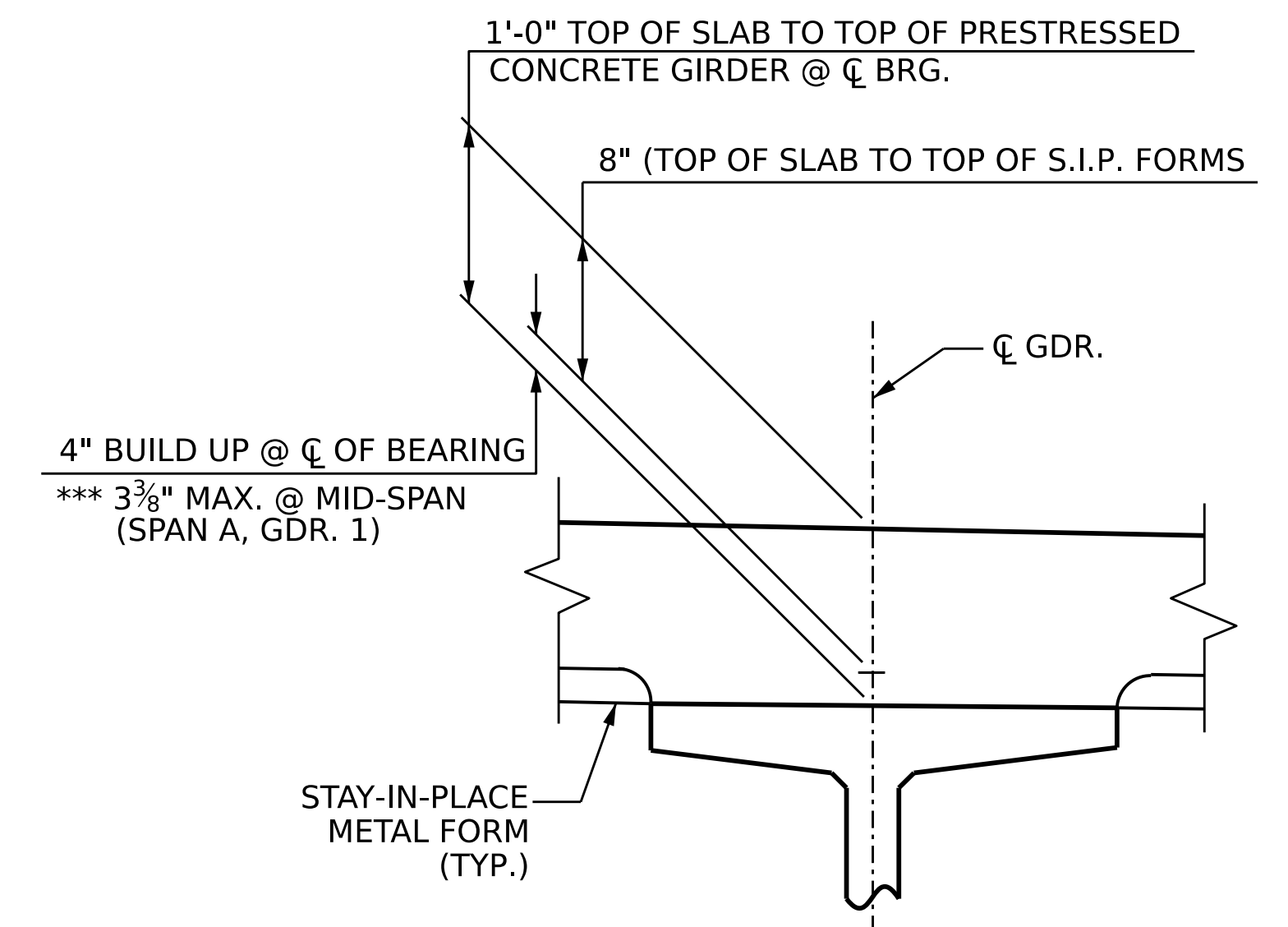
THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2" AT END BENT 1 AND END BENT 2.

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.



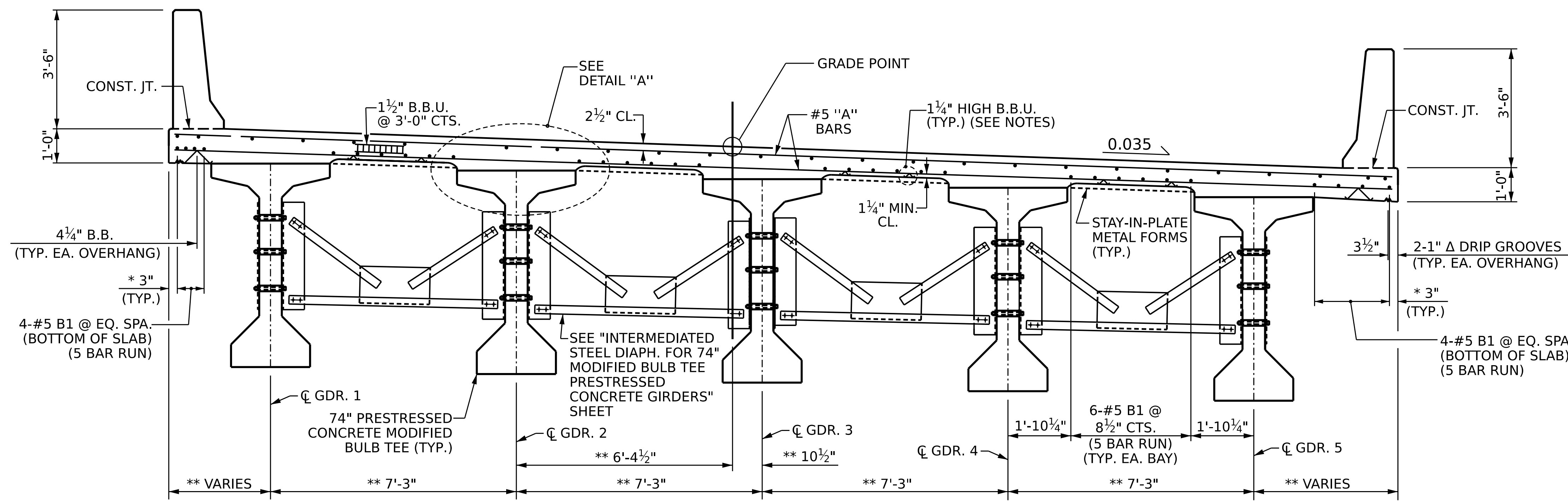
**TYPICAL SECTION - END BENT DIAPHRAM**

\* RADIAL DIMENSION  
\*\* RADIAL THRU WORKPOINT



**DETAIL "A"**

\*\*\* BASED ON PREDICTED FINAL CAMBER AND THEORETICAL GRADE LINE ELEVATIONS.



**TYPICAL SECTION - INTERMEDIATE DIAPHRAM**

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE**  
**TYPICAL SECTION**



03/23/2023

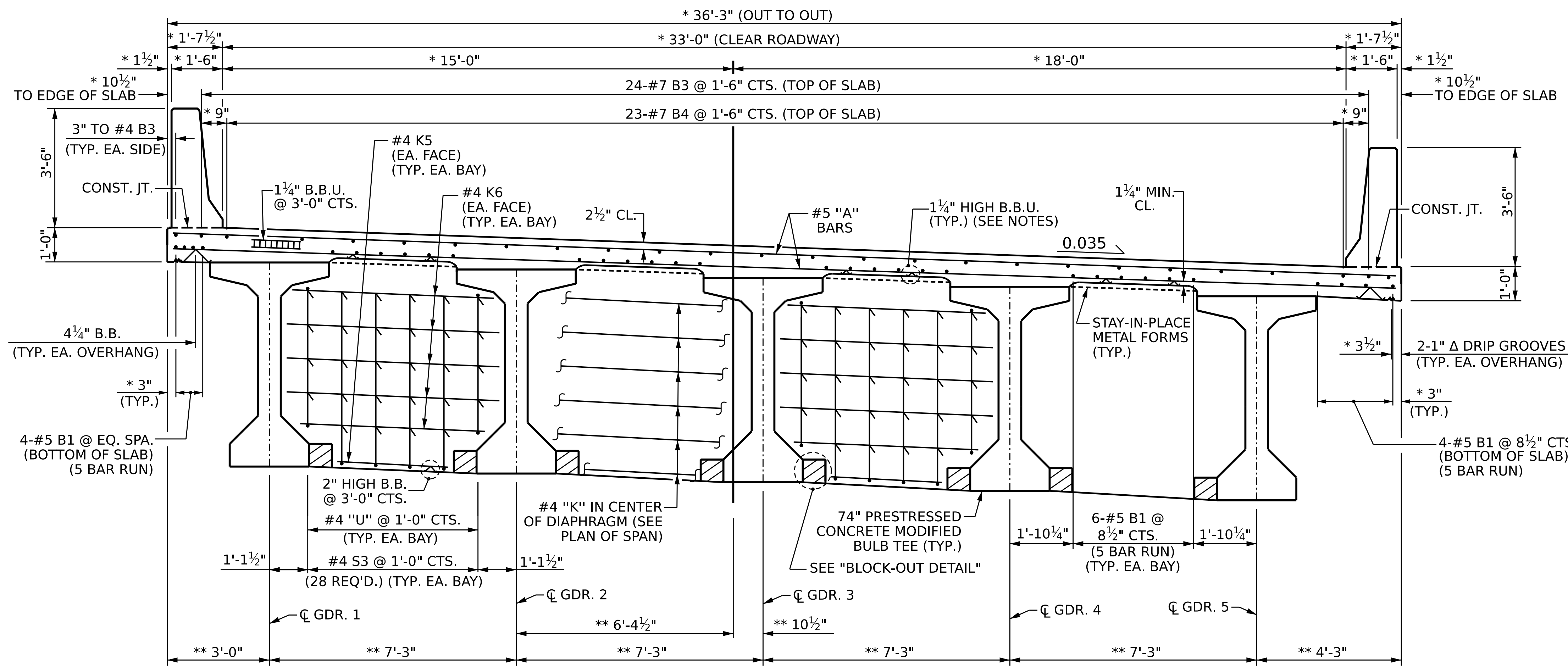
DRAWN BY : Q. T. NGUYEN DATE : 12/2022  
 CHECKED BY : F. LEA DATE : 12/2022  
 DESIGN ENGINEER OF RECORD : Z. MALIK DATE : 05/2022

REVISIONS		SHEET NO.	
NO.	BY:	DATE:	NO.
1			3
2			4

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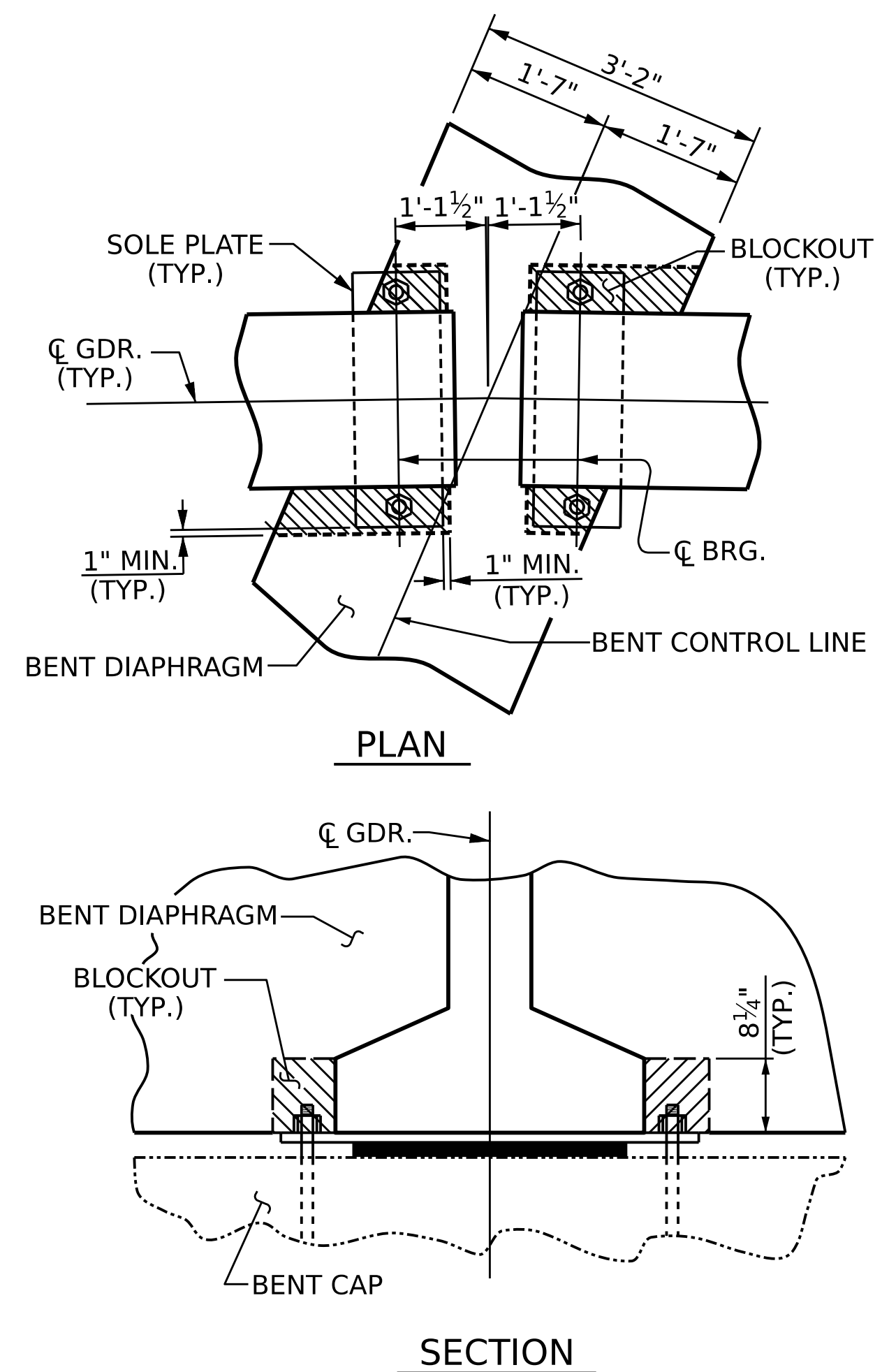
TOTAL SHEETS: 31



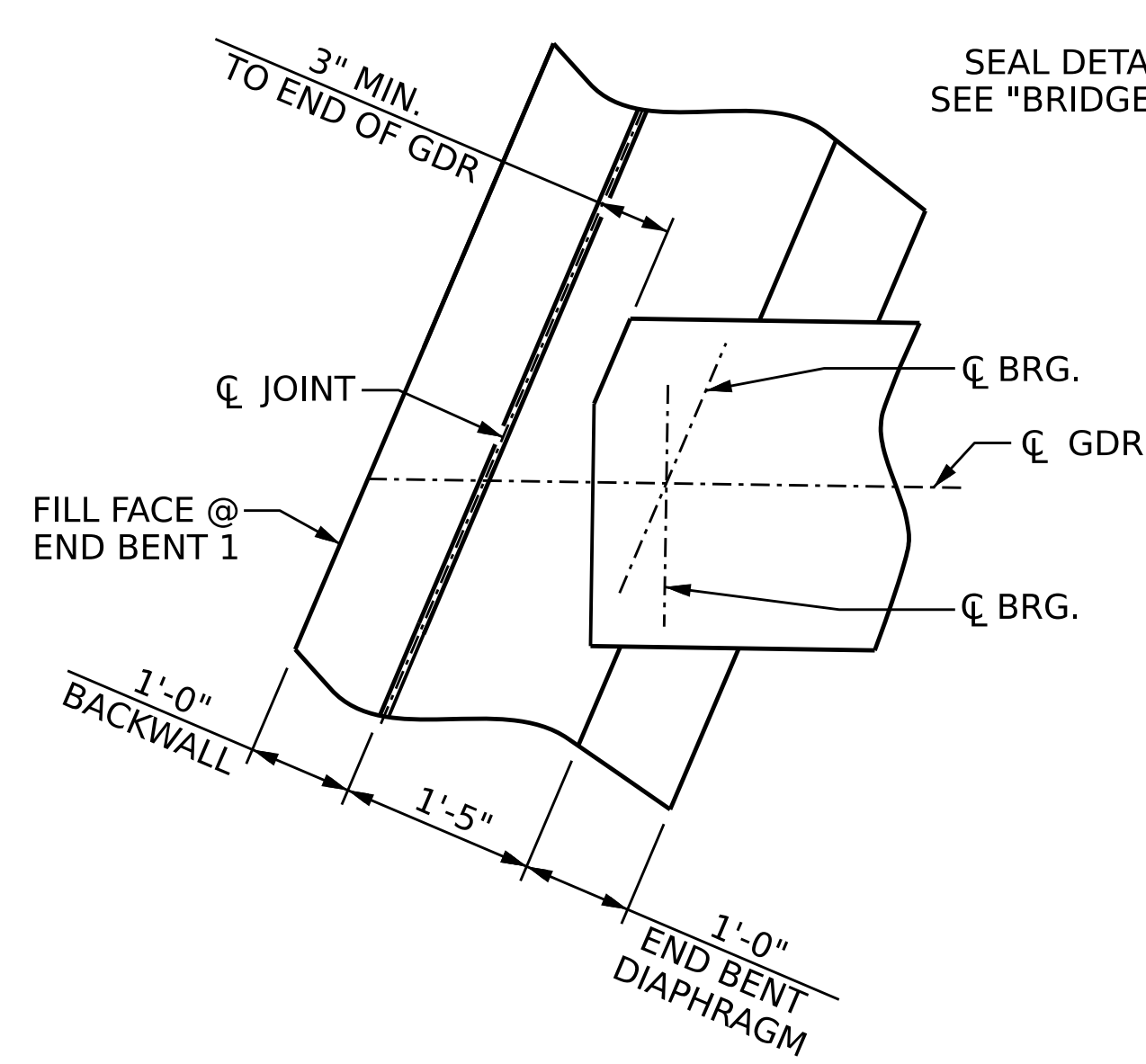


TYPICAL SECTION - BENT DIAPHRAGM

\* RADIAL DIMENSION  
\*\* RADIAL THRU WORKPOINT

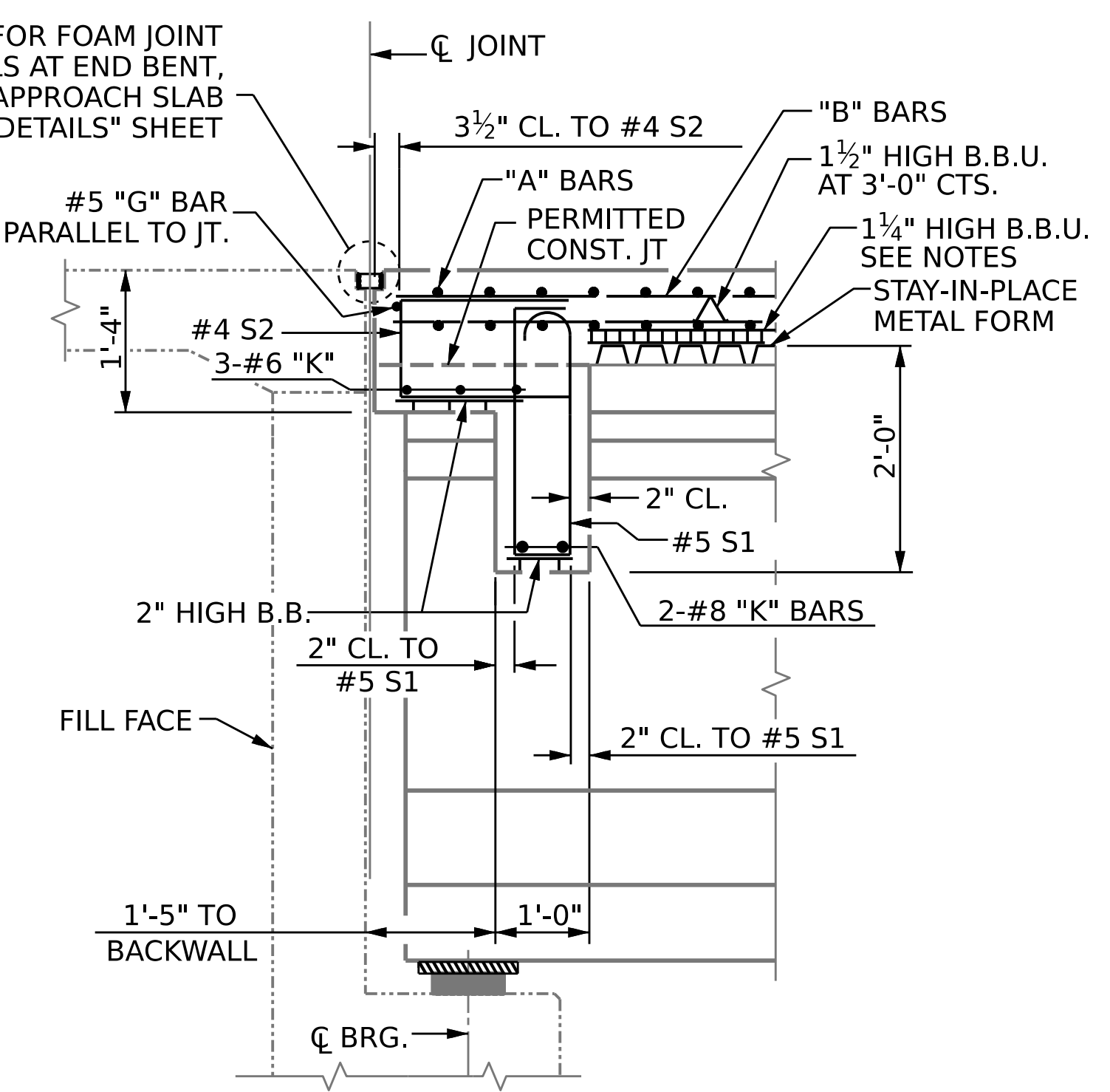


BENT DIAPHRAGM BLOCK-OUT DETAIL



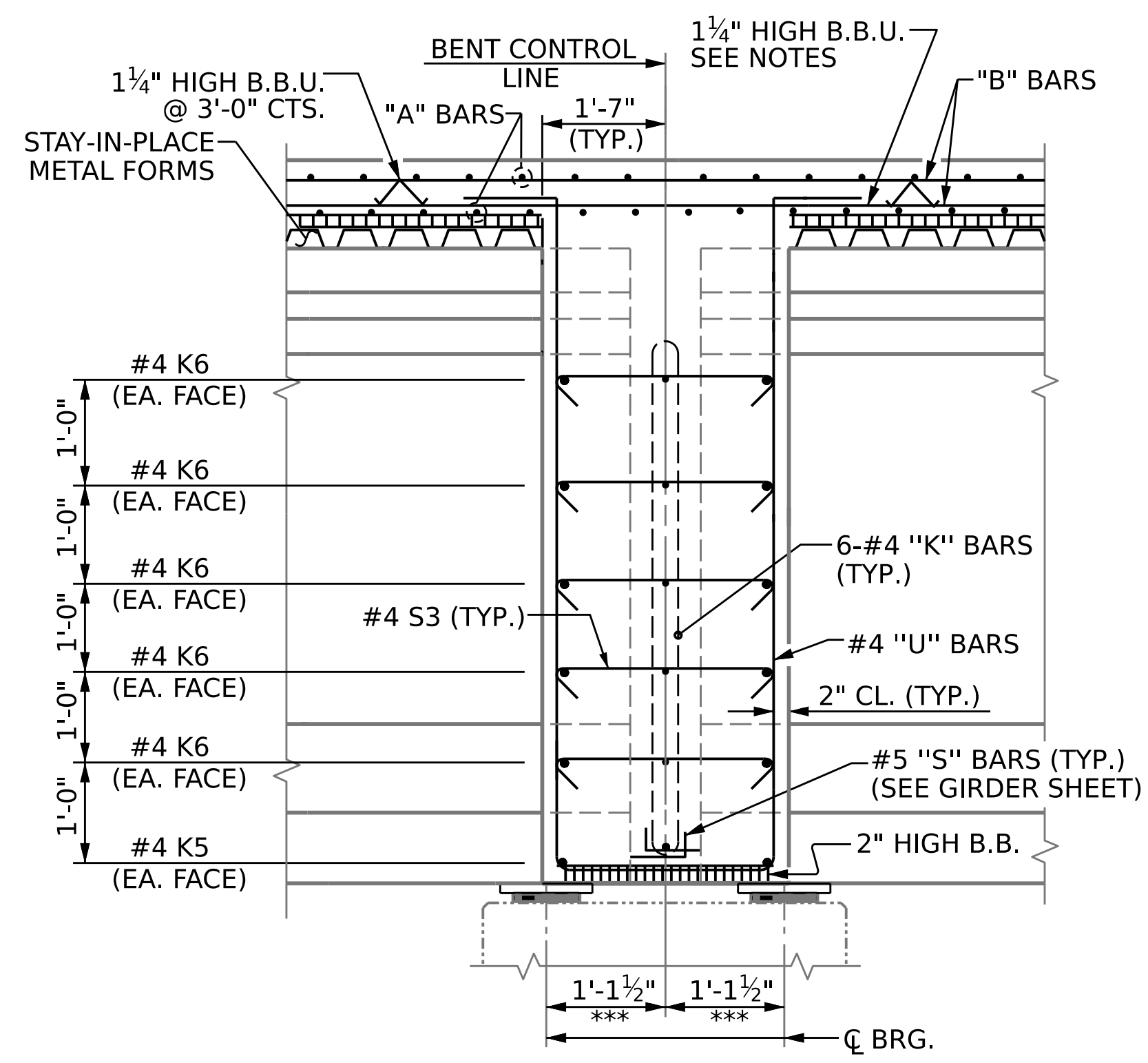
END BENT DIAPHRAGM

END BENT 1 SHOWN, END BENT 2 SIMILAR FOR TOP FLANGE CLIP DETAILS, SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET



SECTION THRU END BENT DIAPHRAGM

#5 "G" BARS MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.



SECTION THRU BENT DIAPHRAGM

\*\*\* MEASURED ALONG C GIRDER

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-  
 SHEET 2 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

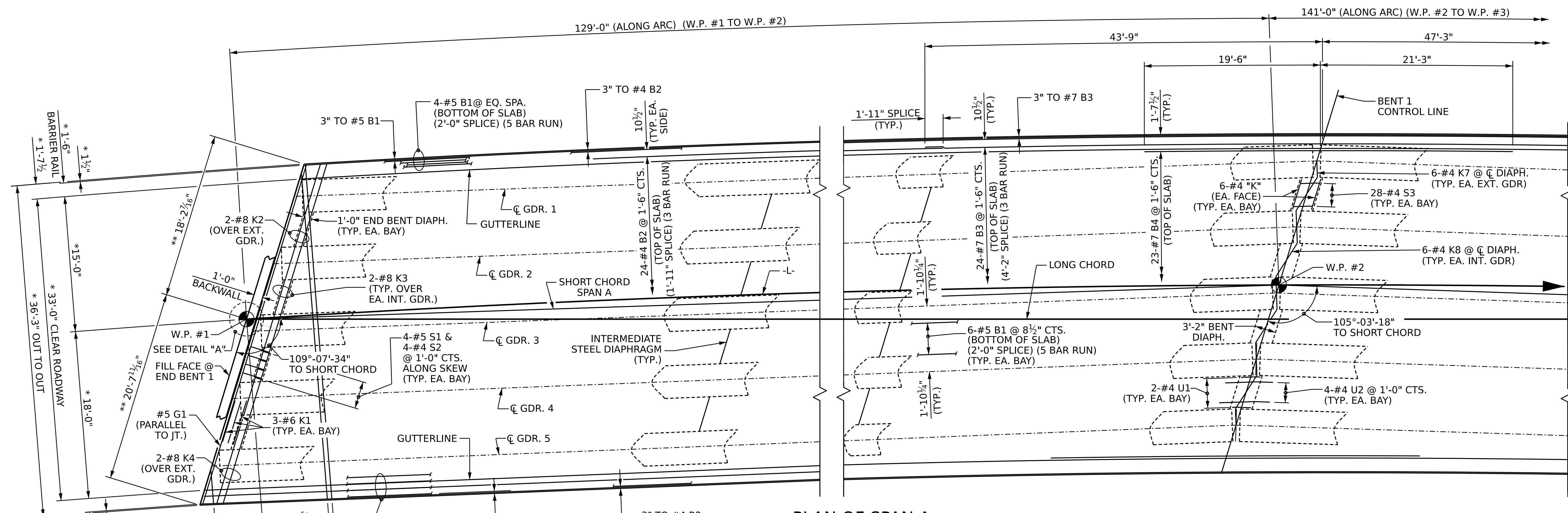
**SUPERSTRUCTURE**

**TYPICAL SECTION**

DRAWN BY: Q. T. NGUYEN DATE: 12/2022  
 CHECKED BY: F. LEA DATE: 12/2022  
 DESIGN ENGINEER OF RECORD: Z. MALIK DATE: 06/2022

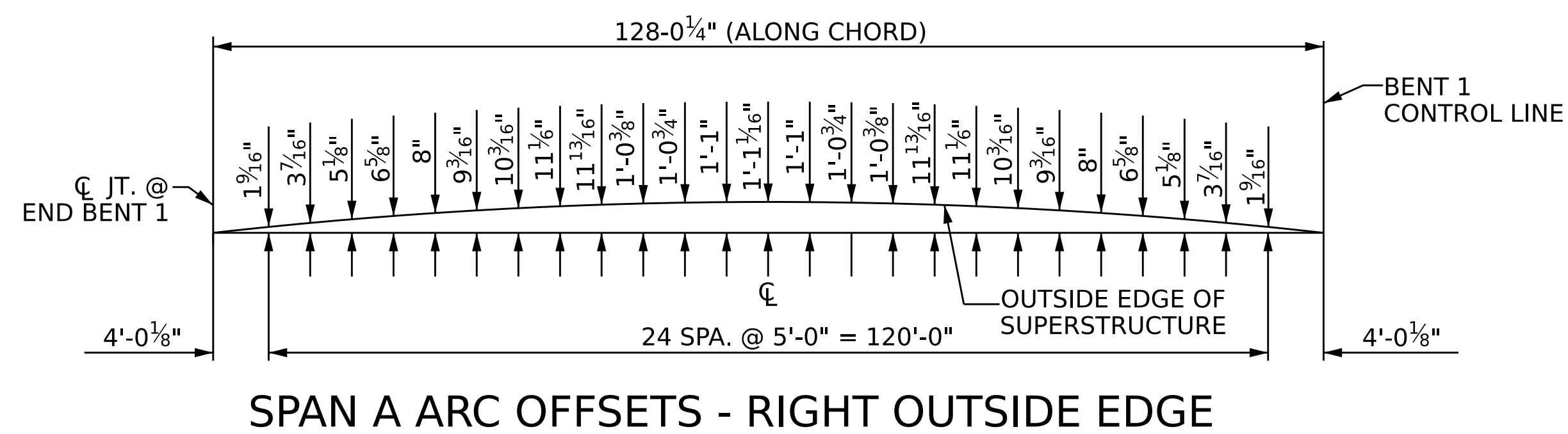
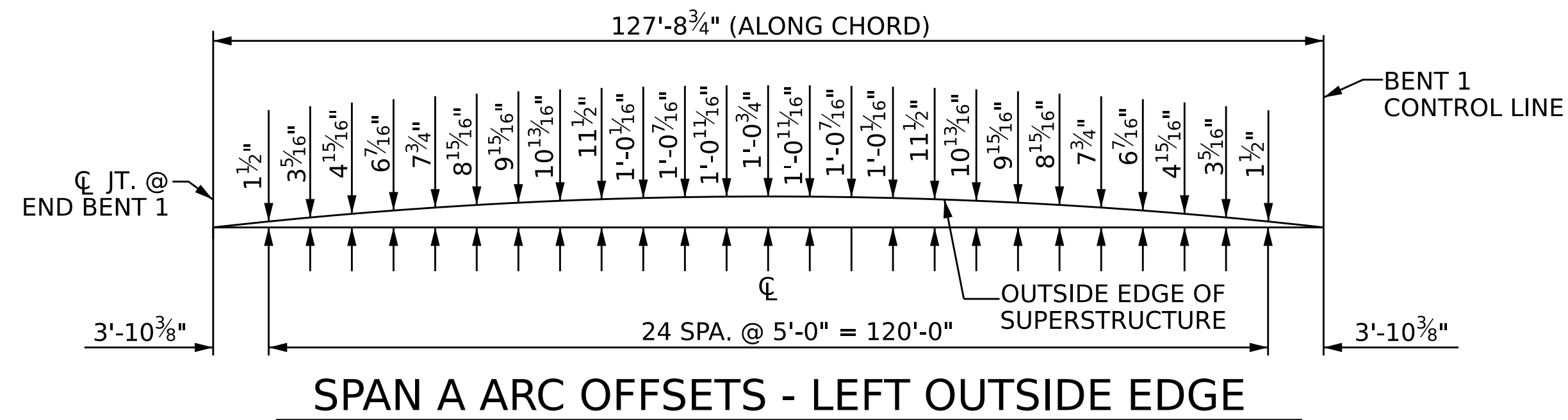
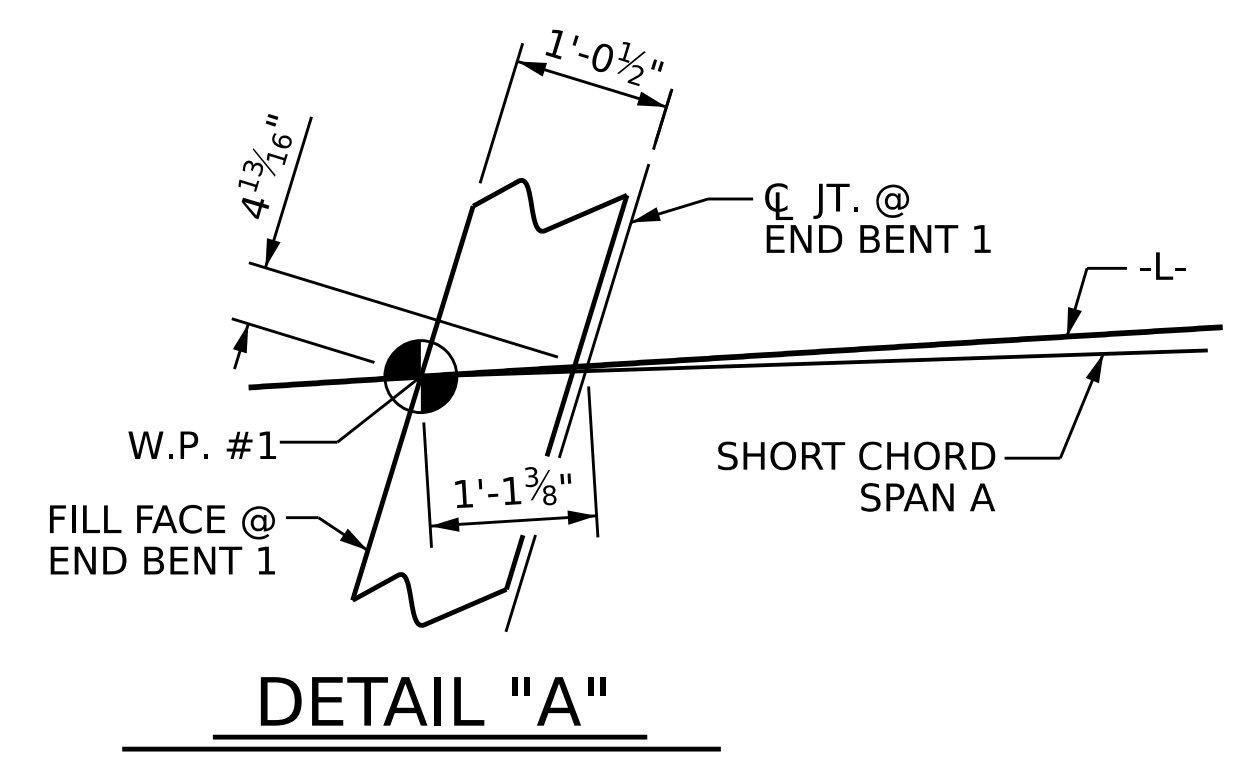
REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

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**PLAN OF SPAN A**

\* RADIAL DIMENSION  
 \*\* MEASURED ALONG  $\phi$  JOINT  
 ▲ THESE #5 "A" BARS ARE TO BE PLACED PERPENDICULAR TO LONG CHORD  
 FOR POUR SEQUENCE AND LOCATION OF CONSTRUCTION JOINT, SEE SUPERSTRUCTURE "BILL OF MATERIAL" SHEET.

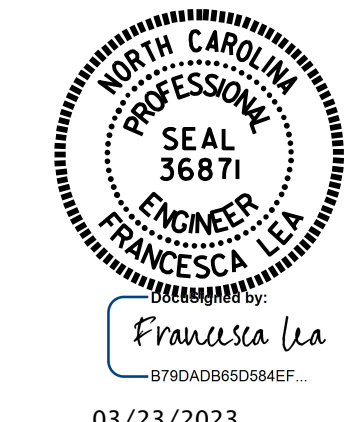


DRAWN BY : Q. T. NGUYEN DATE : 07/2022  
 CHECKED BY : F. LEA DATE : 12/2022  
 DESIGN ENGINEER OF RECORD : Z. MALIK DATE : 06/2022

1/4/2023 R:\Structures\Plans\401.015.B5721.SMU.PS.S09.780124.dgn fleo

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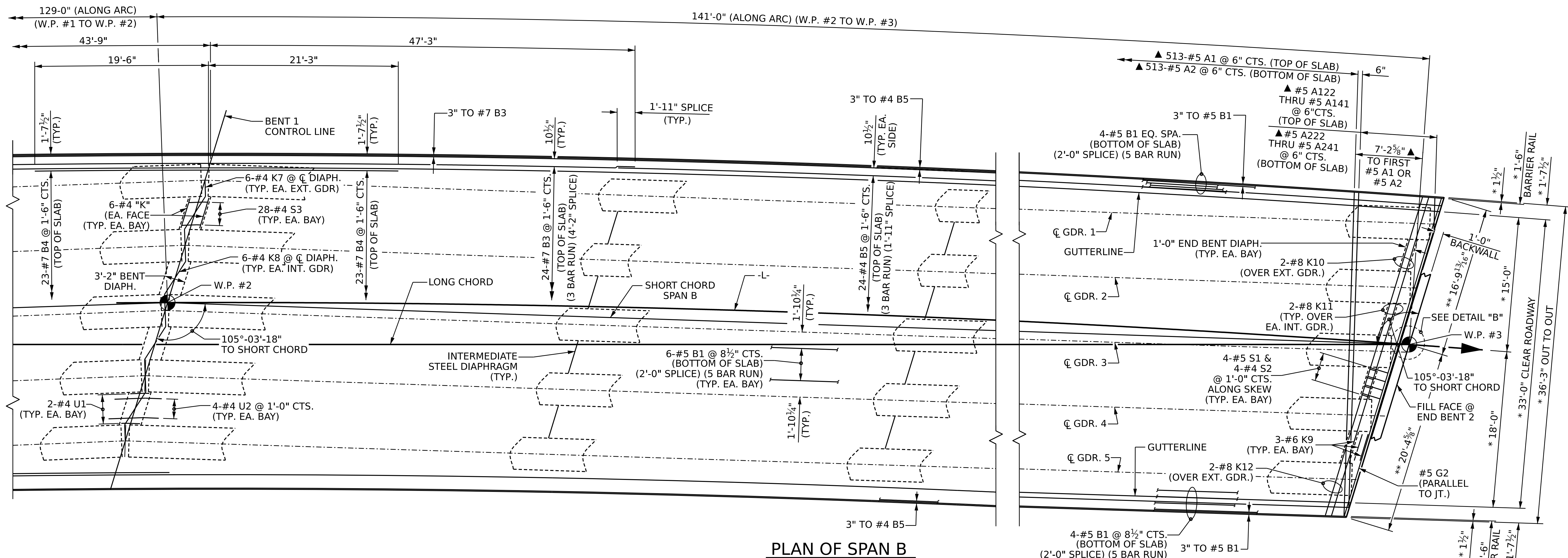
PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-  
 SHEET 1 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE**  
**PLAN OF SPAN A**

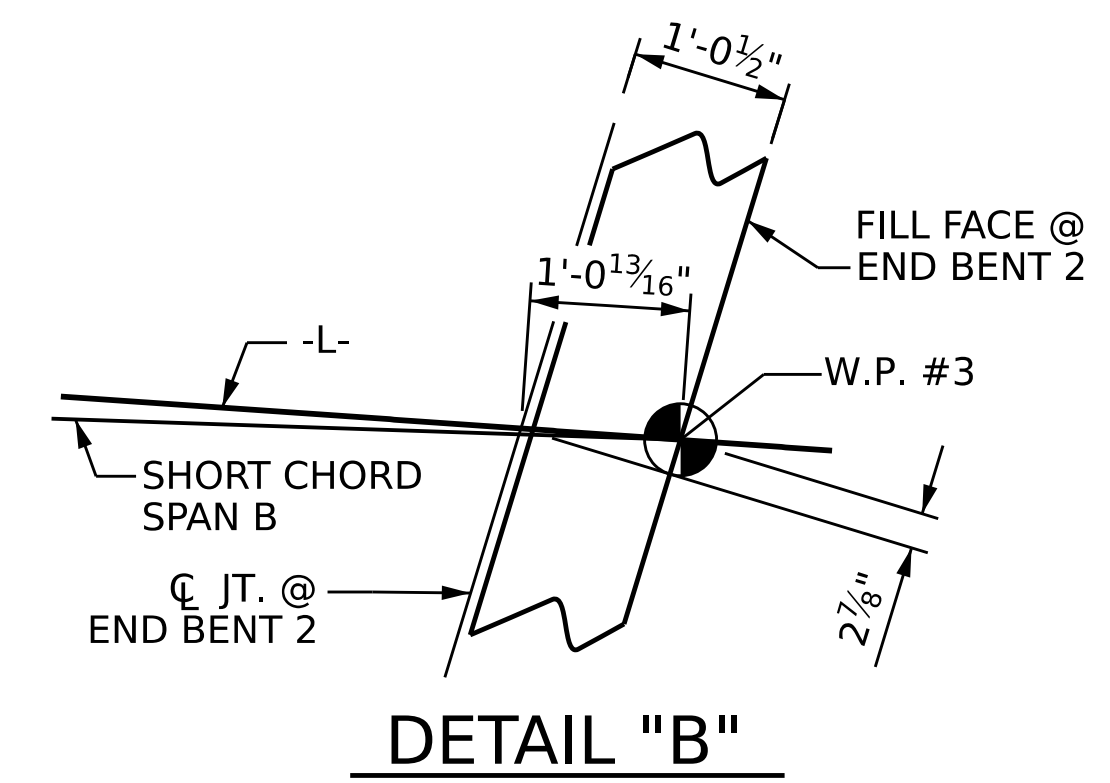
REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

S-09  
 TOTAL SHEETS  
 S-31

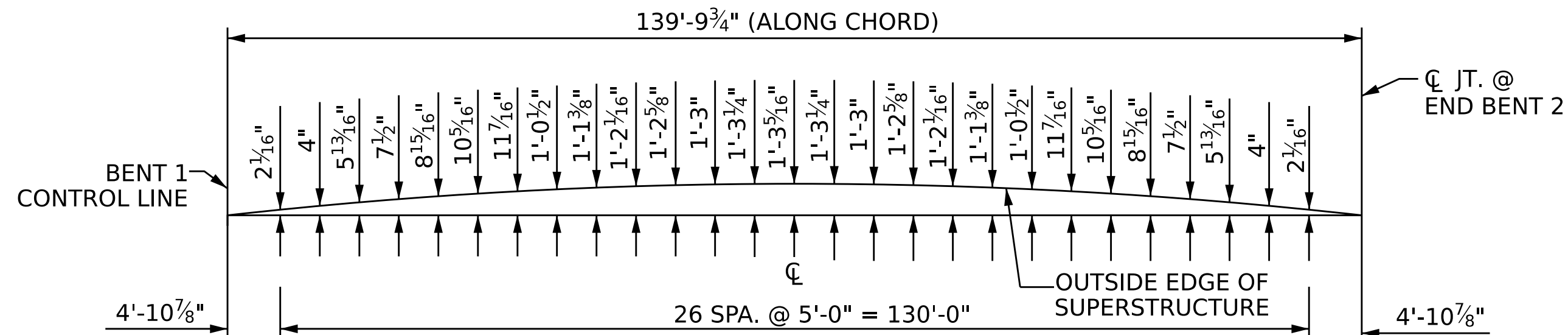


**PLAN OF SPAN B**

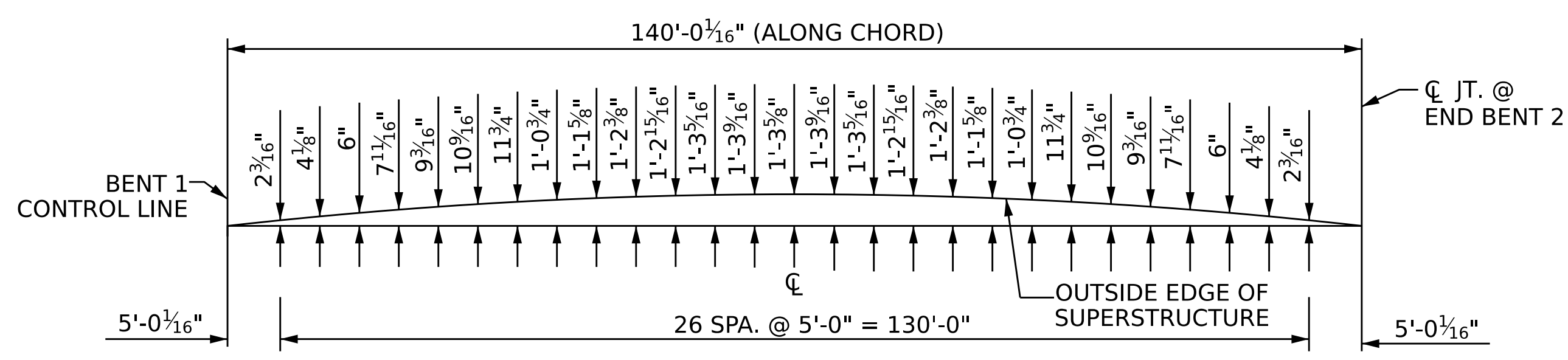
\* RADIAL DIMENSION  
 \*\* MEASURED ALONG C JOINT  
 ▲ THESE #5 "A" BARS ARE TO BE PLACED PERPENDICULAR TO LONG CHORD  
 FOR POUR SEQUENCE AND LOCATION OF CONSTRUCTION JOINT, SEE SUPERSTRUCTURE "BILL OF MATERIAL" SHEET.



**DETAIL "B"**



**SPAN B ARC OFFSETS - LEFT OUTSIDE EDGE**



**SPAN B ARC OFFSETS - RIGHT OUTSIDE EDGE**

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-

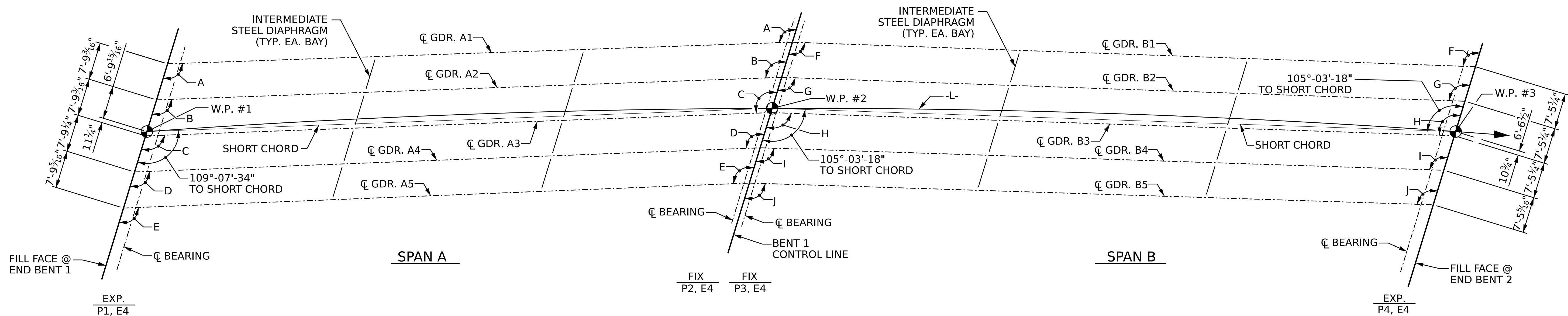
SHEET 2 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPAN B

DRAWN BY : Q.T. NGUYEN DATE : 07/2022  
 CHECKED BY : F. LEA DATE : 12/2022  
 DESIGN ENGINEER OF RECORD : Z. MALIK DATE : 06/2022

REVISIONS		SHEET NO.	
NO.	BY:	DATE:	NO.
1			S-10
2			TOTAL SHEETS
			31



### GIRDER LAYOUT

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGM FOR 74" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.

### ANGLES

A	108°-59'-04"	F	104°-56'-42"
B	109°-03'-34"	G	105°-00'-12"
C	109°-08'-07"	H	105°-03'-43"
D	109°-12'-41"	I	105°-07'-16"
E	109°-17'-18"	J	105°-10'-51"

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-



Documented by:  
 Francesca Lea  
 8790AD665D584EF...  
 03/23/2023

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

### SUPERSTRUCTURE FRAMING PLAN

#### REVISIONS

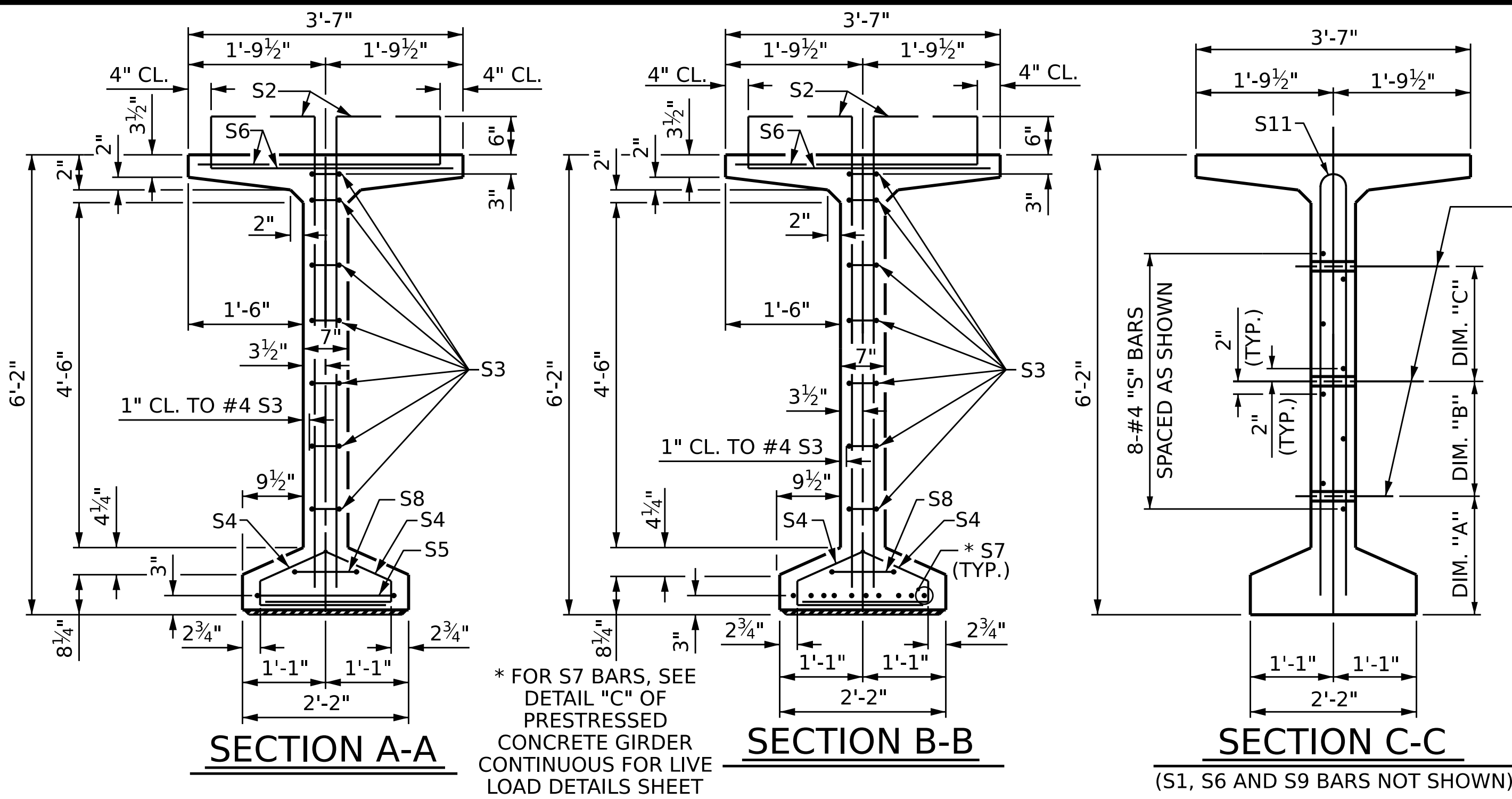
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SHEET NO.  
 S-11  
 TOTAL SHEETS  
 31

DRAWN BY: Q. T. NGUYEN DATE: 11/2022  
 CHECKED BY: F. LEA DATE: 12/2022  
 DESIGN ENGINEER OF RECORD: F. LEA DATE: 12/2022

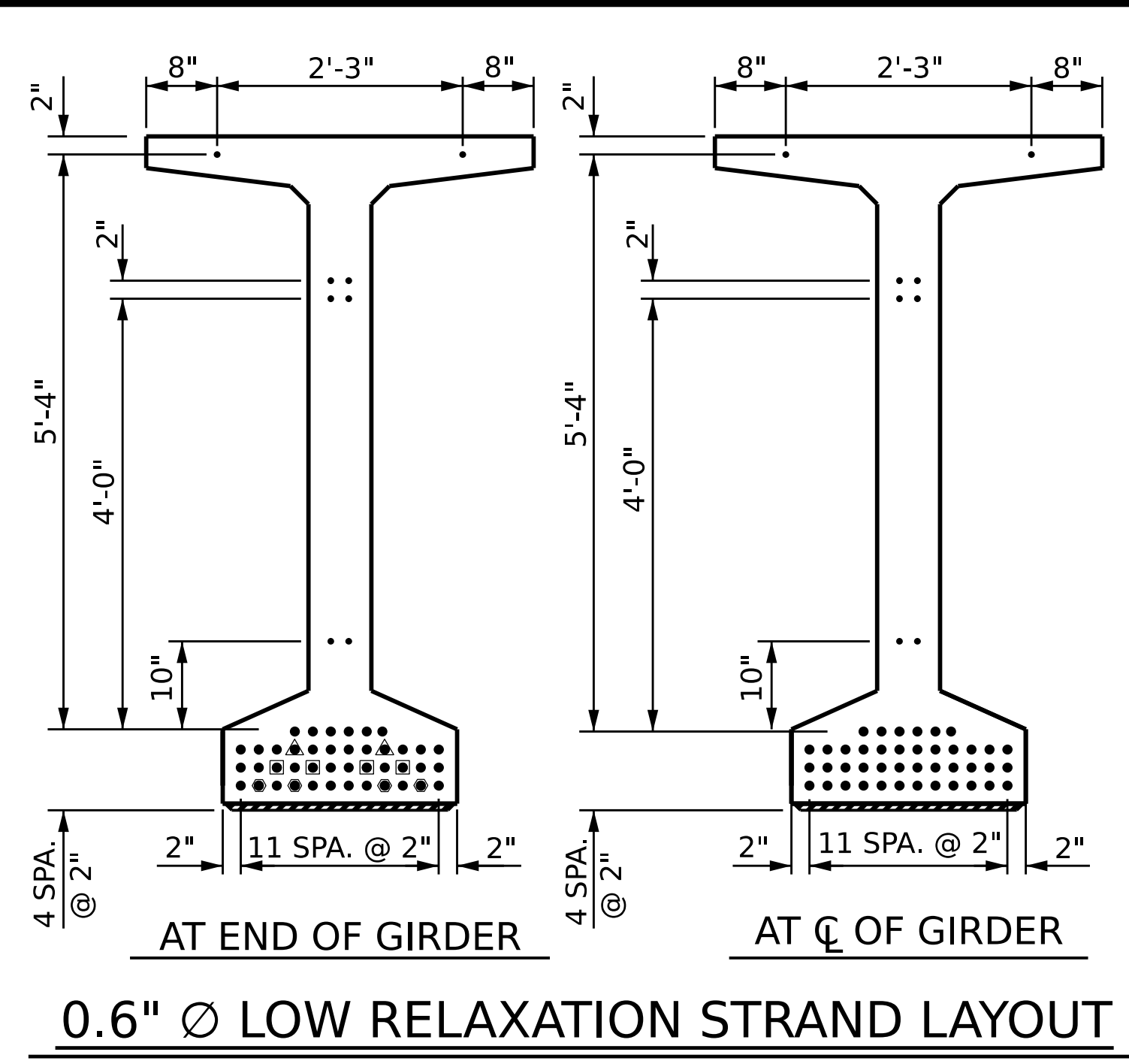
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 SIGNATURES COMPLETED





1 1/2" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM. "A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

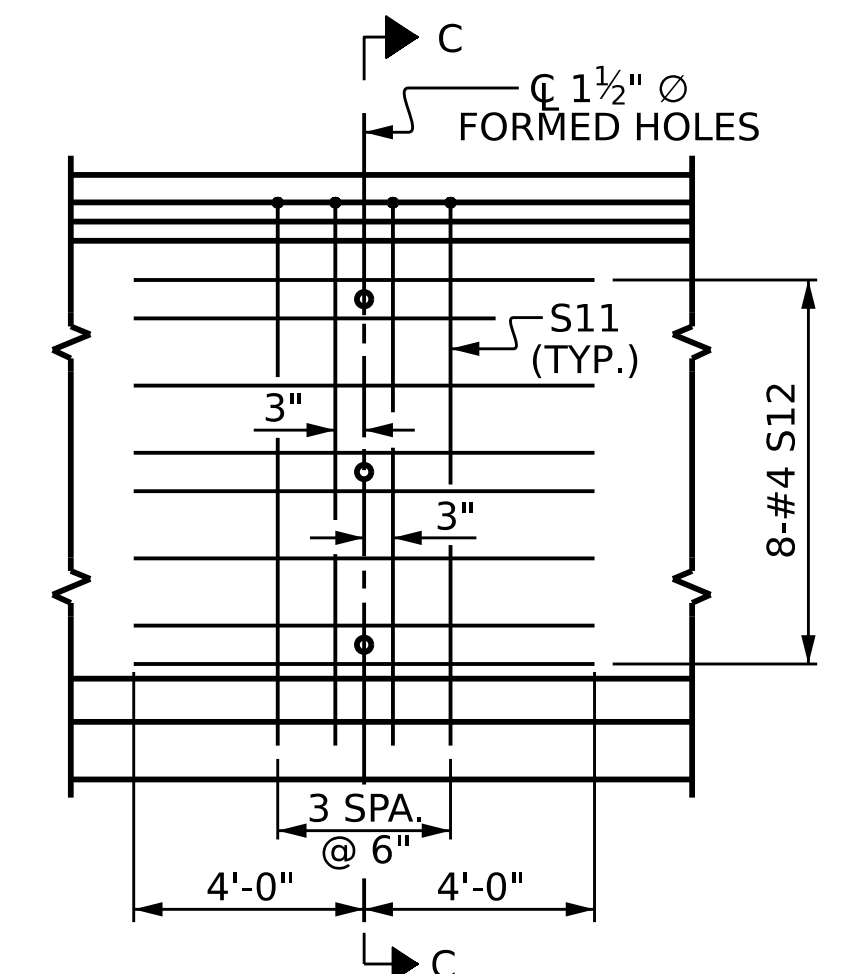
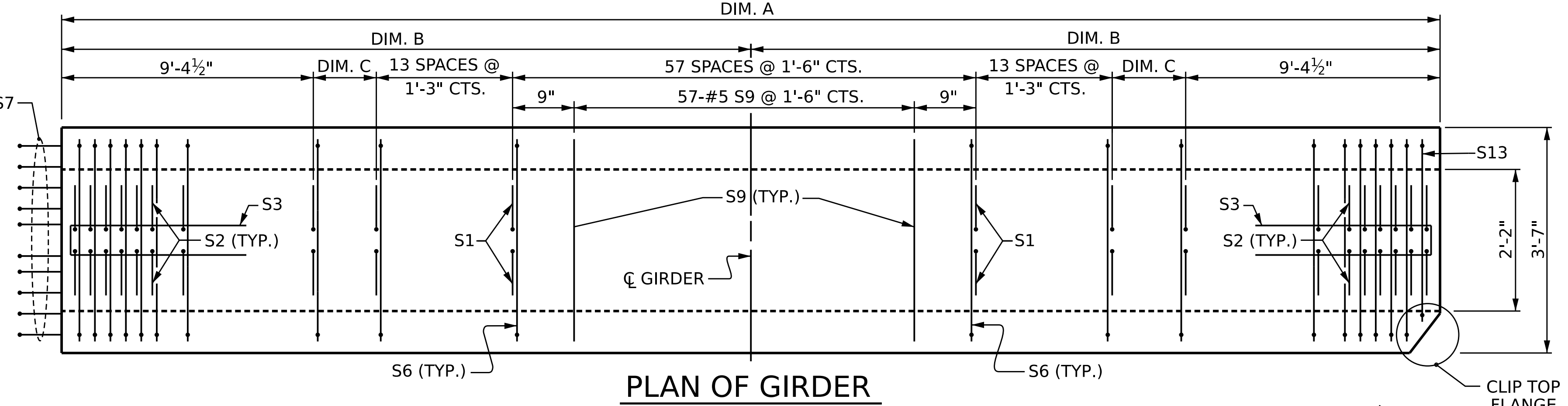
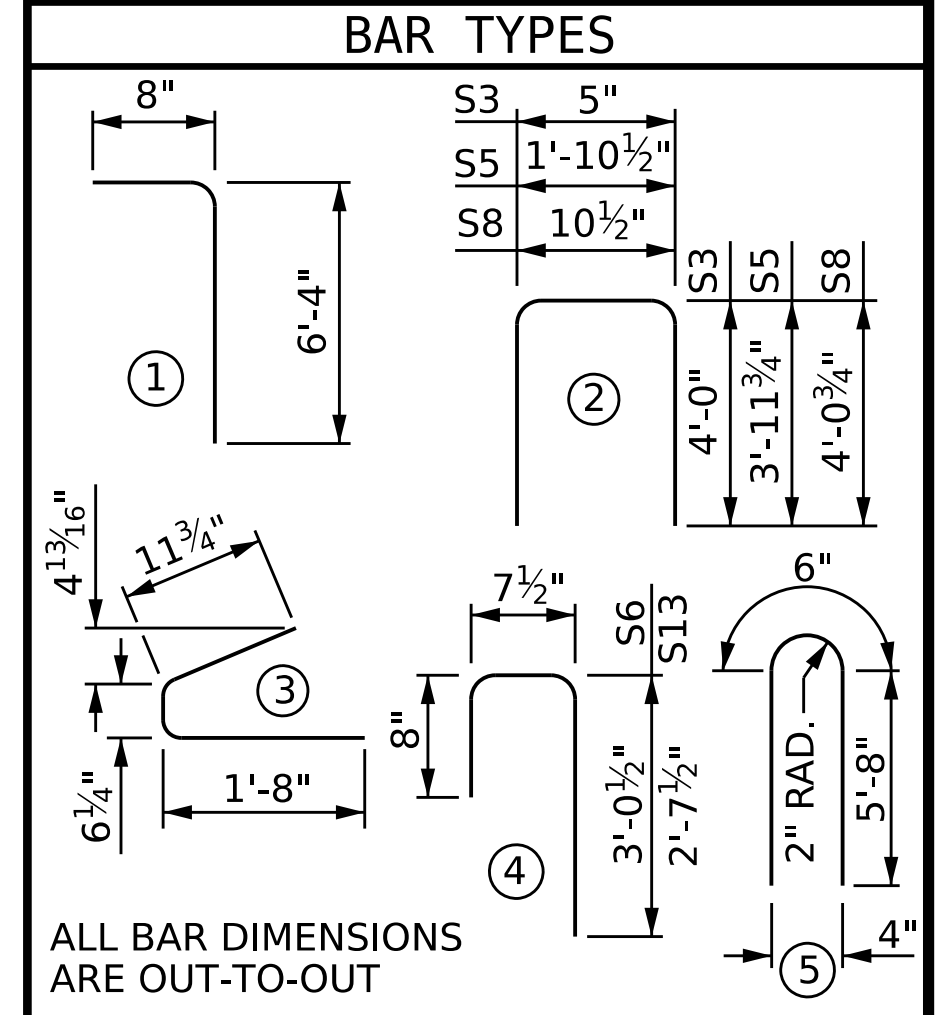
- DEBONDING LEGEND**
- FULLY BONDED STRANDS
  - STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
  - STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
  - STRANDS DEBONDED FOR 18'-0" FROM END OF GIRDER



0.6" Ø L.R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR					
BAR NUMBER	SIZE	TYPE	LENGTH	WEIGHT	
S1	230	#4	1	7'-0"	1076
S2	24	#5	1	7'-0"	175
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	1	#5	2	9'-10"	10
S6	254	#5	4	4'-4"	1148
* S7	10	#5	STR	3'-8"	38
S8	2	#5	2	9'-0"	19
S9	57	#5	STR	3'-3"	193
S10	1	#3	STR	1'-10"	1
S11	8	#3	5	11'-10"	99
S12	16	#4	STR	8'-0"	86
S13	2	#5	4	3'-11"	8

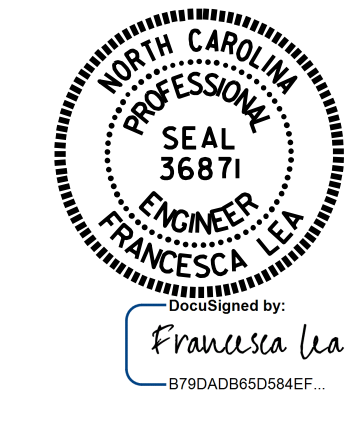
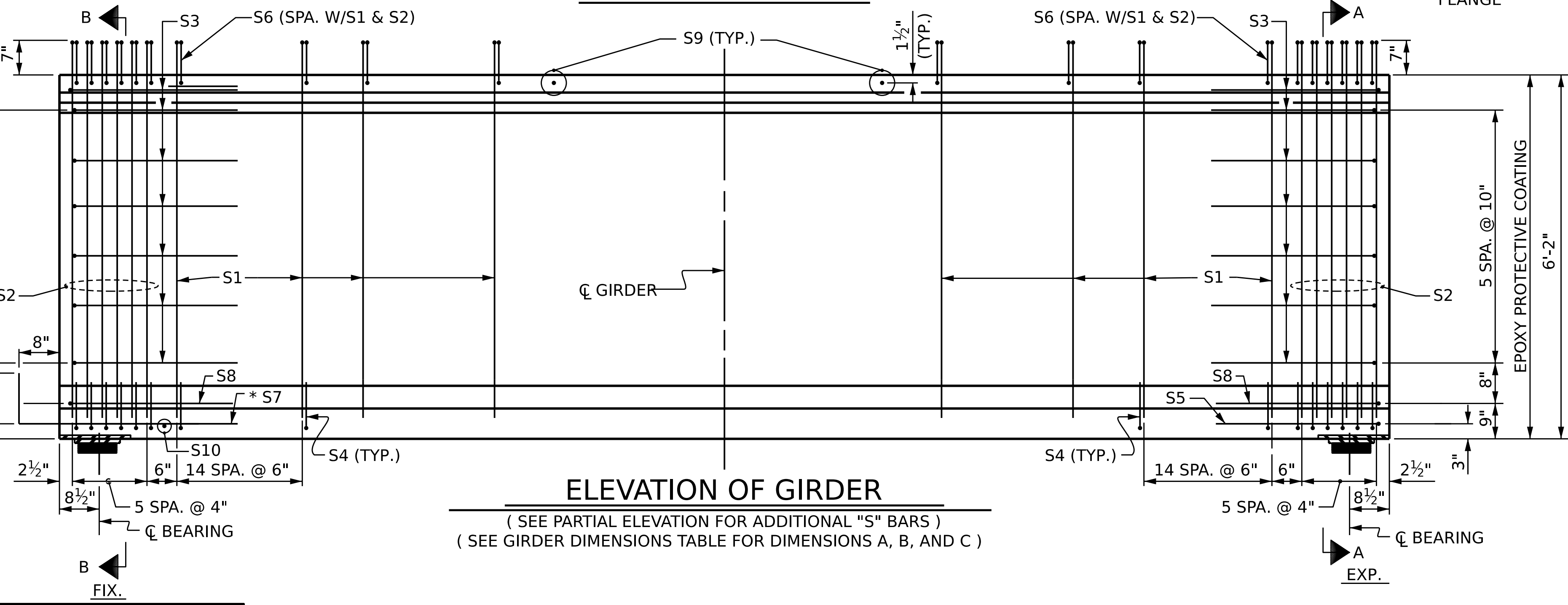
\* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.



QUANTITIES FOR ONE GIRDER			
GIRDERS INT. & EXT.	REINFORCING STEEL	9,500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3110	31.6	50

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
5	DIM. A	693.81'

GIRDER DIMENSION TABLE			
GIRDER #	DIM. A	DIM. B	DIM. C
1	138'-8 1/4"	69'-4 1/8"	11 5/8"
2	138'-8 1/16"	69'-4 5/16"	11 13/16"
3	138'-9 1/8"	69'-4 9/16"	1'-0 1/16"
4	138'-9 5/8"	69'-4 13/16"	1'-0 5/16"
5	138'-10 1/16"	69'-5 1/16"	1'-0 9/16"



PROJECT NO. **B-5721**  
**ROCKINGHAM** COUNTY  
 STATION: **21+64.00 -L-**

SHEET 2 OF 4

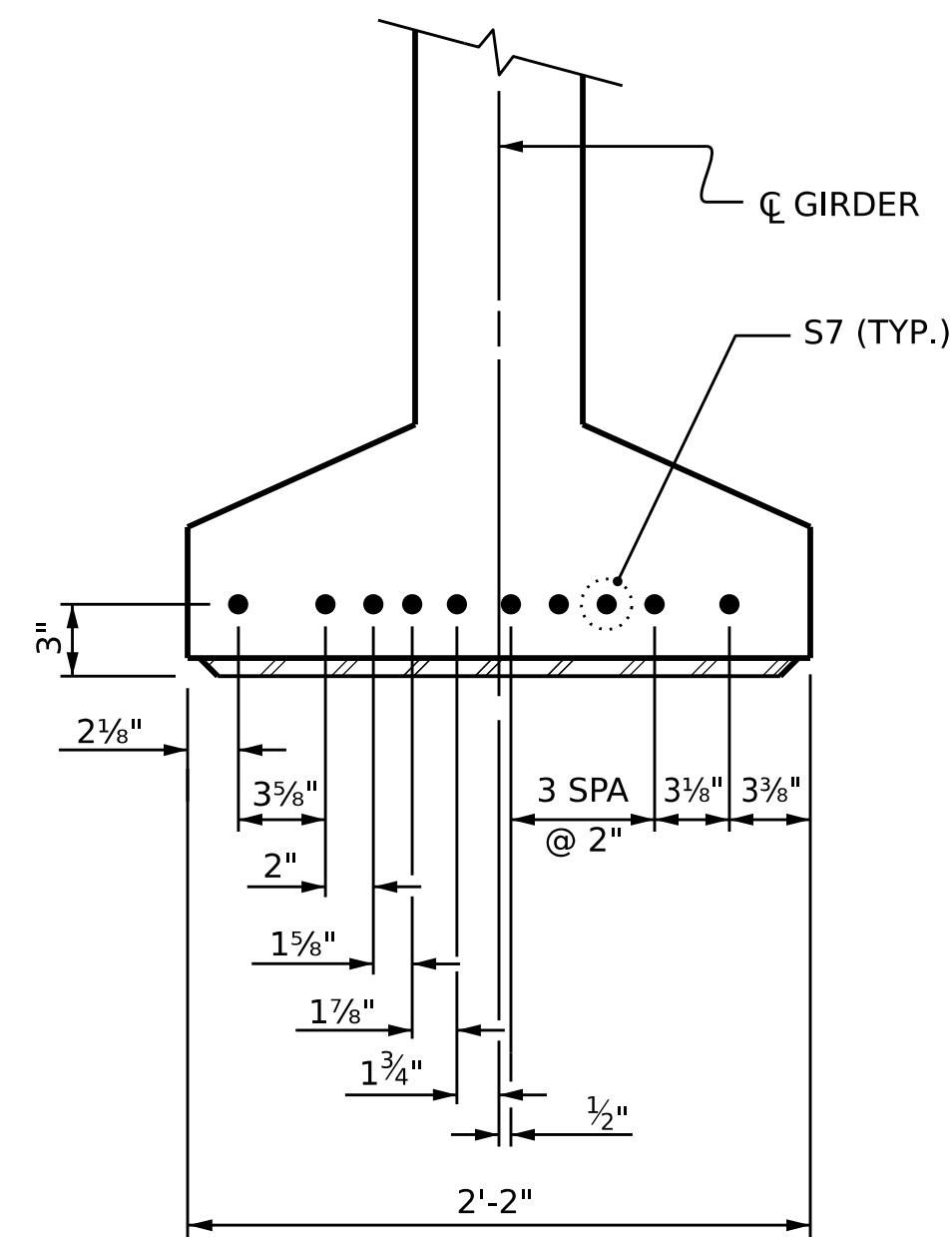
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
**74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD - SPAN B**

ASSEMBLED BY: Q.T. NGUYEN DATE: 11/2022  
 CHECKED BY: F. LEA DATE: 12/2022

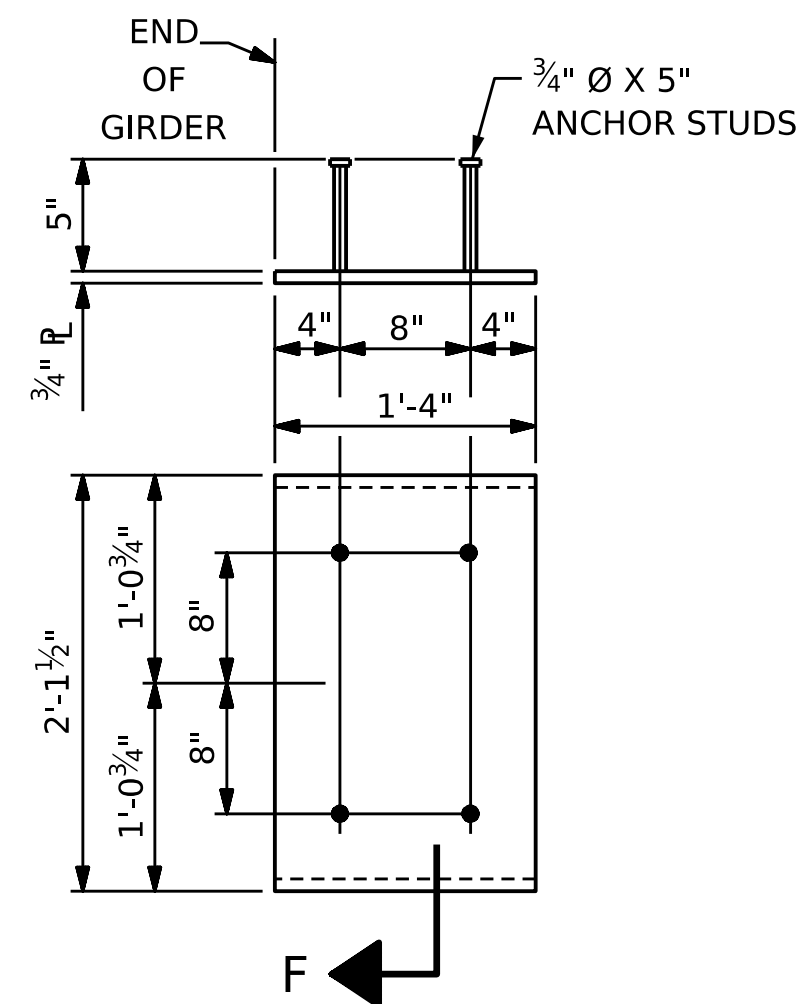
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 REV. 11/21 BNB/AAI

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REVISIONS					SHEET NO. S-13
NO.	BY:	DATE:	NO.	DATE:	
1			3		TOTAL SHEETS 31
2			4		

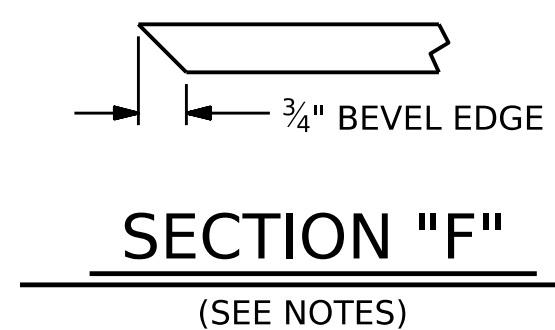


DETAIL "C"



EMBEDDED PLATE "B-1" DETAILS FOR 74" MODIFIED BULB TEES

(2 REQ'D PER GIRDER)



NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW-RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL SHALL BE GRADE 60.

APPLY EPOXY PROTECTIVE COATING TO END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE "B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

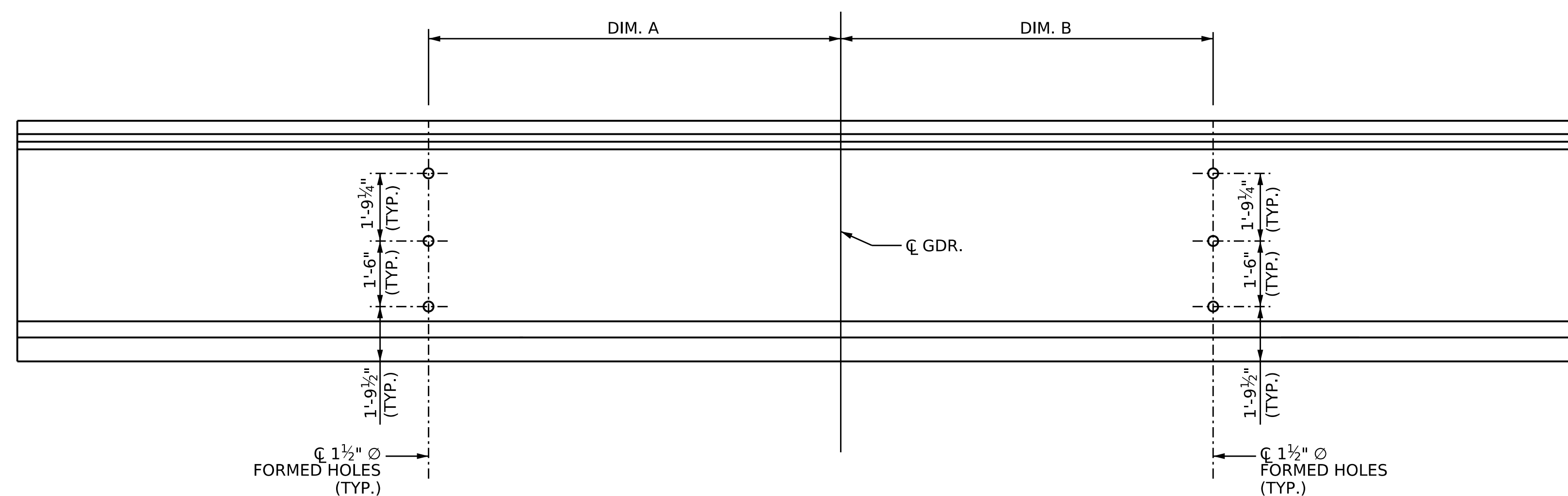
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7200 PSI.

DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

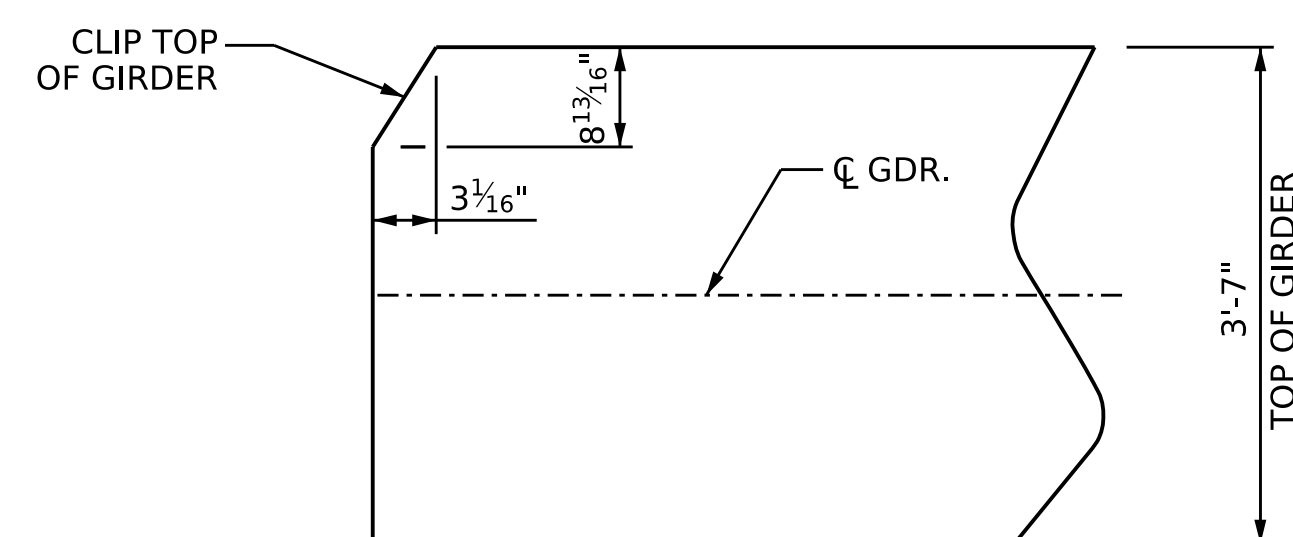
A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 74" MODIFIED BULB TEES ONLY.

THE CONTRACTOR HAS THE OPTION TO PROVIDE, AT NO ADDITIONAL COST TO THE DEPARTMENT, 2 ADDITIONAL STRANDS AT THE TOP OF THE GIRDER TO FACILITATE TYING OF THE REINFORCING STEEL. THESE STRANDS SHALL BE PULLED TO A LOAD OF 4500 lbs.



LOCATION OF 1 1/2" Ø FORMED HOLE FOR TYPICAL INTERMEDIATE DIAPHRAGMS

DIAPHRAGM FORMED HOLE PLACEMENT TABLE			
	GIRDER	DIM. A	DIM. B
SPAN A	1	20'-10 3/8"	20'-10 3/8"
SPAN A	2	20'-10 1/2"	20'-10 1/2"
SPAN A	3	20'-10 3/8"	20'-10 3/8"
SPAN A	4	20'-10 11/16"	20'-10 11/16"
SPAN A	5	20'-10 13/16"	20'-10 13/16"
SPAN B	1	23'-1 3/8"	23'-1 3/8"
SPAN B	2	23'-1 7/16"	23'-1 7/16"
SPAN B	3	23'-1 1/2"	23'-1 1/2"
SPAN B	4	23'-1 5/8"	23'-1 5/8"
SPAN B	5	23'-1 11/16"	23'-1 11/16"



TOP FLANGE CLIP DETAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR BY ROTATION

ASSEMBLED BY :	Q. T. NGUYEN	DATE :	07/2022
CHECKED BY :	F. LEA	DATE :	12/2022
DRAWN BY :	ELR 11/91	REV. 1/15	MAA/TMG
CHECKED BY :	GRP 11/91	REV. 2/15	MAA/TMG
		REV. 12/17	MAA/THC



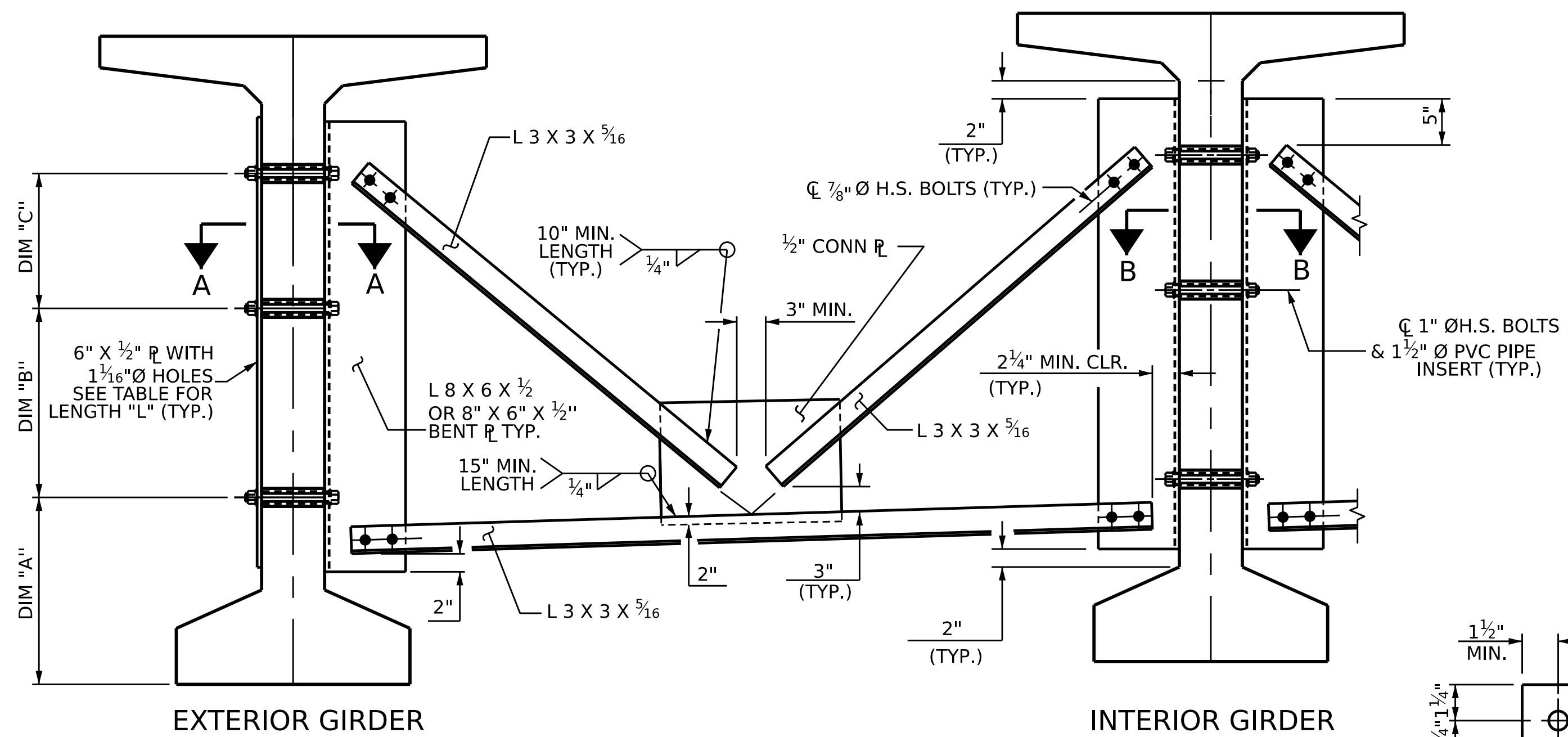
03/23/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

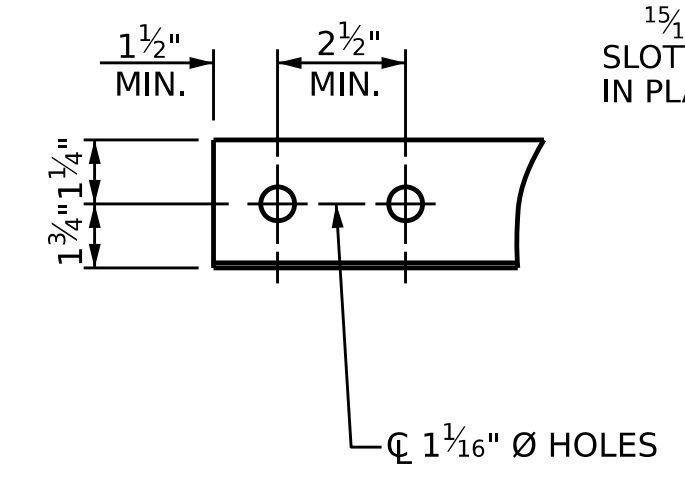
PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-

SHEET 3 OF 4  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 PRESTRESSED CONCRETE GIRDER  
 CONTINUOUS FOR LIVE LOAD  
 DETAILS

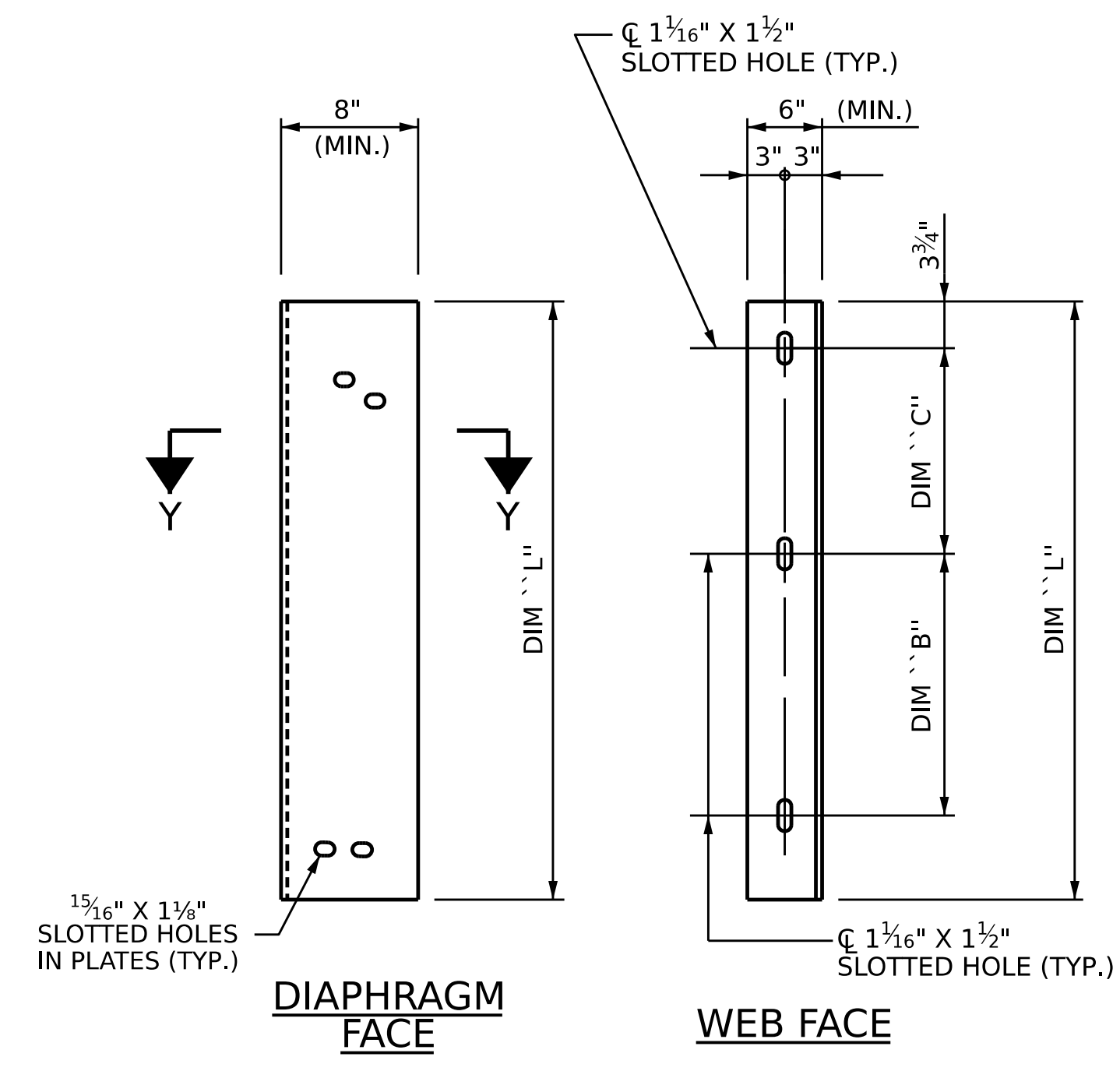
REVISIONS						SHEET NO.
NO	BY:	DATE:	NO	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			S-31



**PART SECTION AT INTERMEDIATE DIAPHRAGM**



**ANGLE END**  
(L 3 X 3 X 5/16)



**CONNECTOR PLATE DETAIL**

**STRUCTURAL STEEL NOTES**

ALL INTERMEDIATE DIAPHRAGM STEEL AND CONNECTOR PLATES SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.

TENSION ON THE ASTM A325 BOLTS THROUGH THE ANGLE MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

THE PLATES, BENT PLATES, AND ANGLES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENT'S THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM, THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

GALVANIZE THE HIGH STRENGTH BOLTS, NUTS, WASHERS AND DIRECT TENSION INDICATORS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

USE AN ASTM F436 HARDENED WASHER WITH STANDARD AND SLOTTED HOLES UNDER EACH BOLT HEAD AND NUT.

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

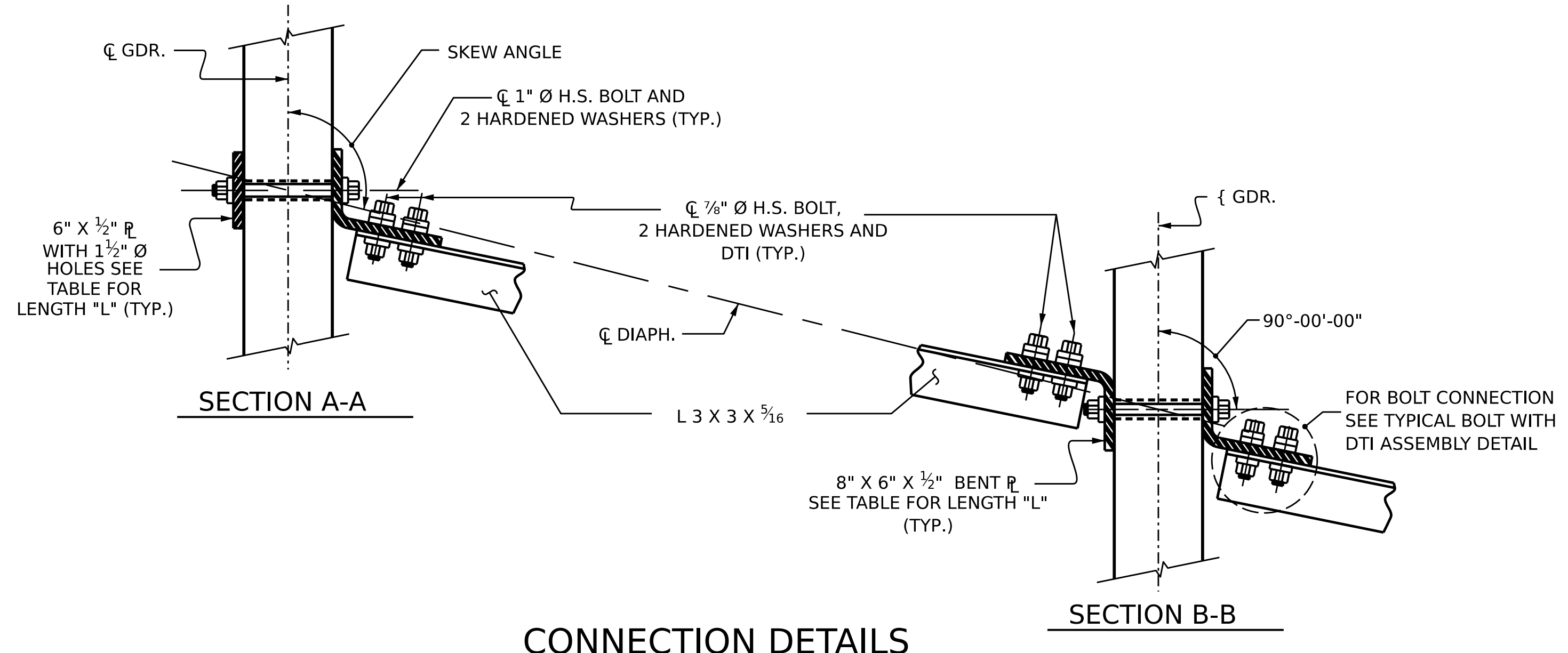
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

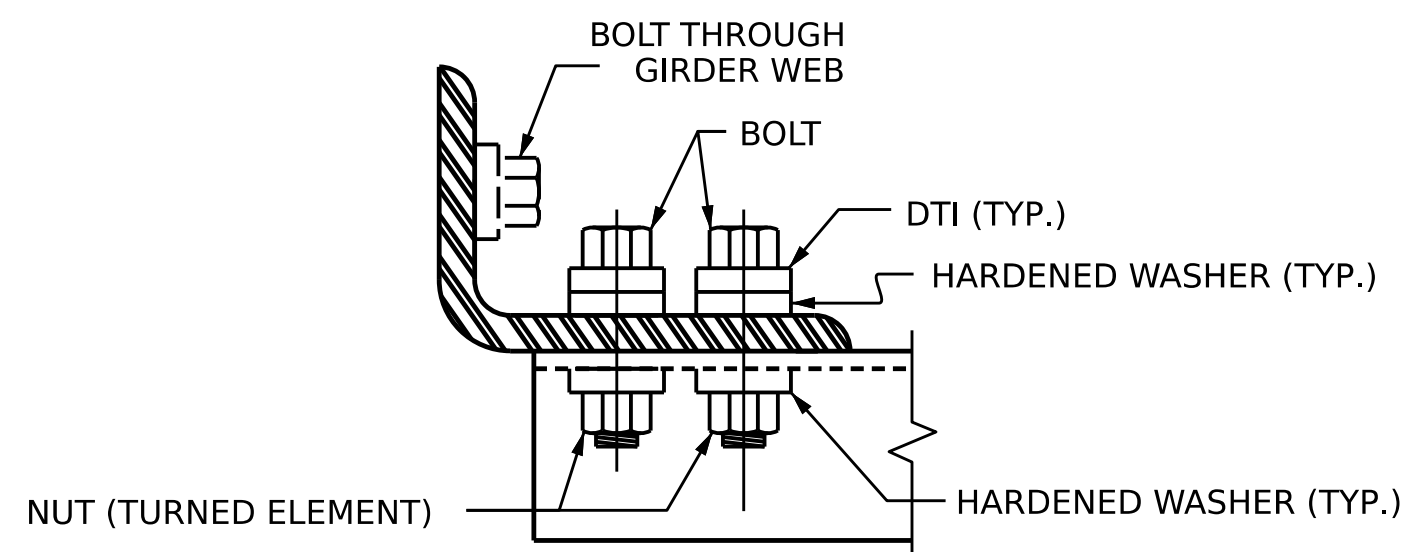
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

**TABLE**

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
74" BULB TEE	1'-9 1/2"	1'-6"	1'-9 1/4"	4'-2"



**CONNECTION DETAILS**



**BOLT WITH DTI ASSEMBLY DETAIL**

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-

SHEET 4 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD**  
**INTERMEDIATE**  
**STEEL DIAPHRAGMS**  
**FOR 74" MODIFIED BULB TEE**  
**PRESTRESSED CONCRETE**  
**GIRDERS**

ASSEMBLED BY: Q. T. NGUYEN DATE: 07/2022  
 CHECKED BY: F. LEA DATE: 12/2022  
 DRAWN BY: RWW 11/09 REV. 10/1/11 MAA/GM  
 CHECKED BY: GM 11/09 REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO	BY:	DATE:	NO	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			31



**NOTES**

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

THE 2" Ø PIPE SLEEVE SHALL BE CUT FROM SCHEDULE 40 PVC PLASTIC PIPE. THE PVC PLASTIC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D1785.

STEEL SOLE PLATES, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

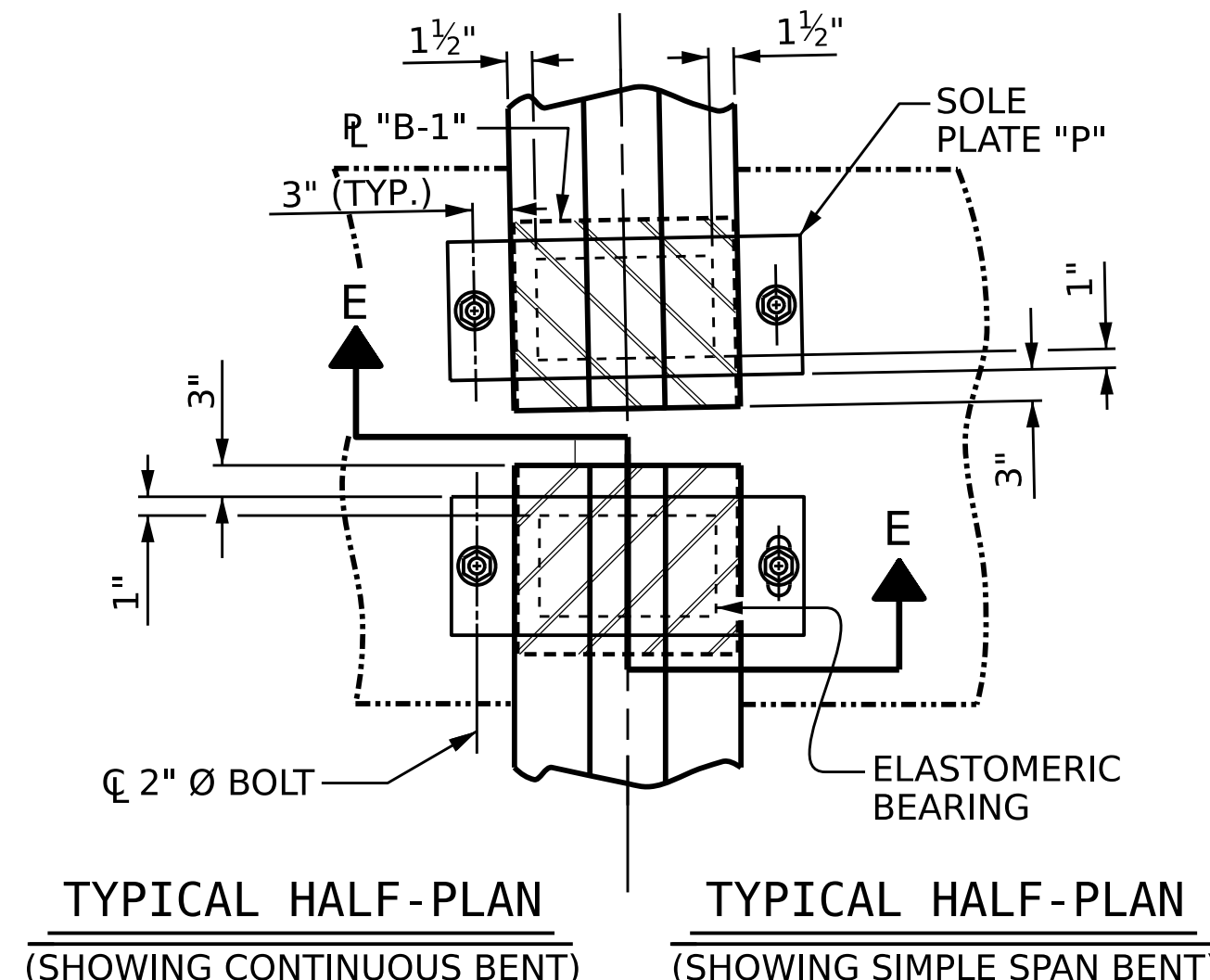
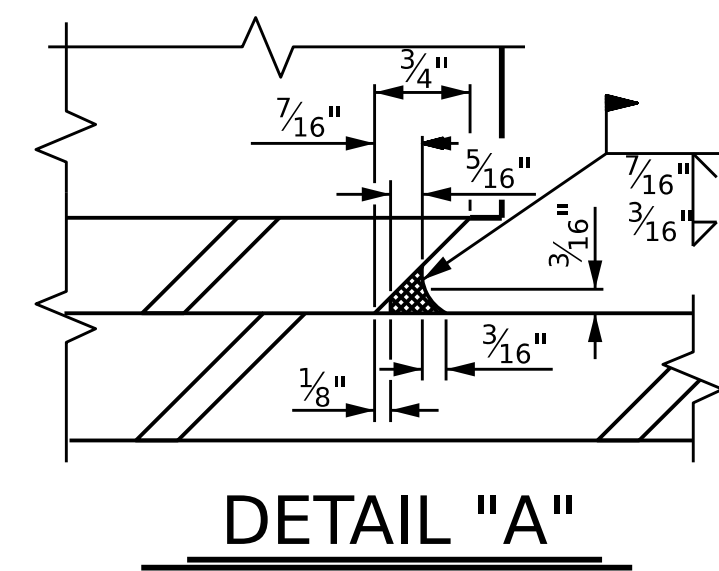
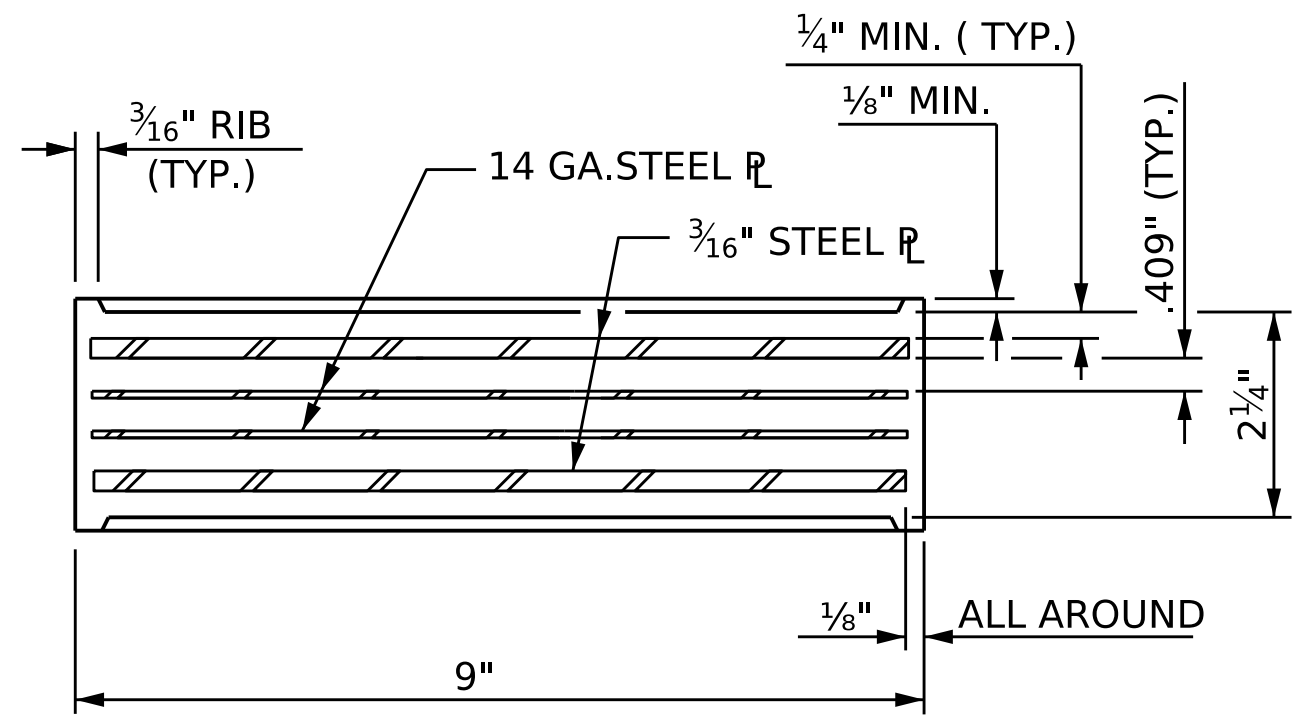
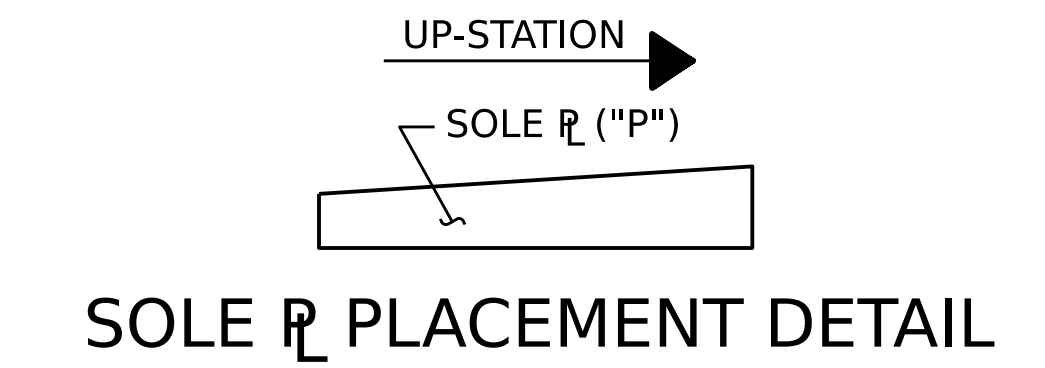
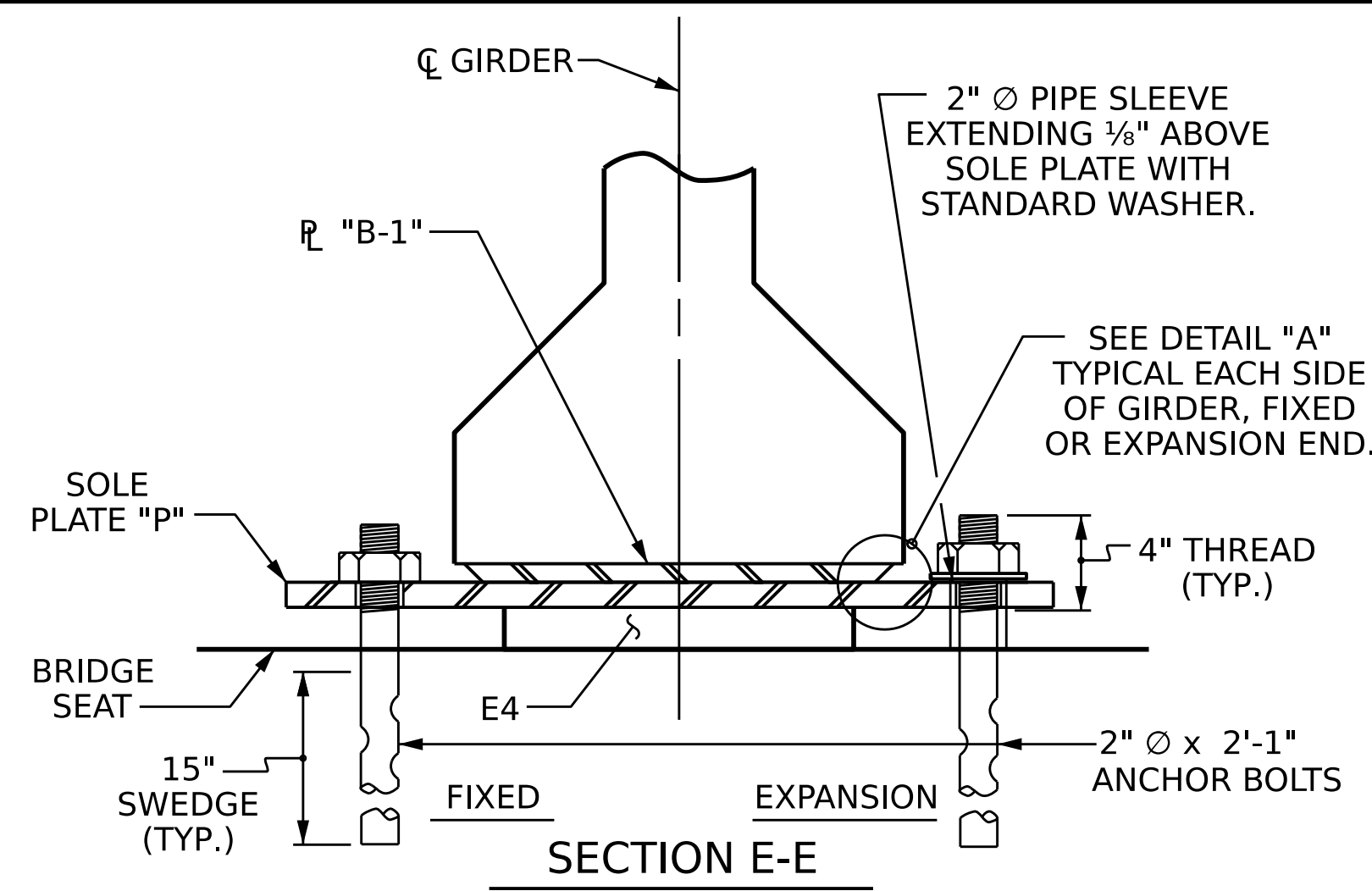
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

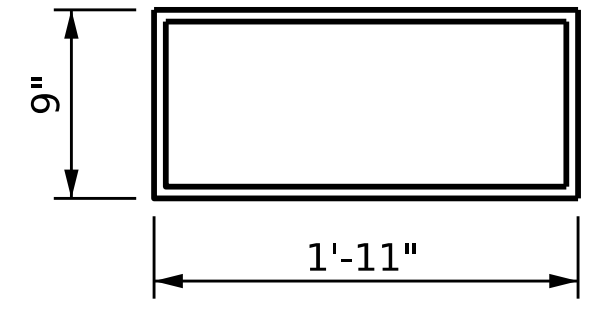
ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



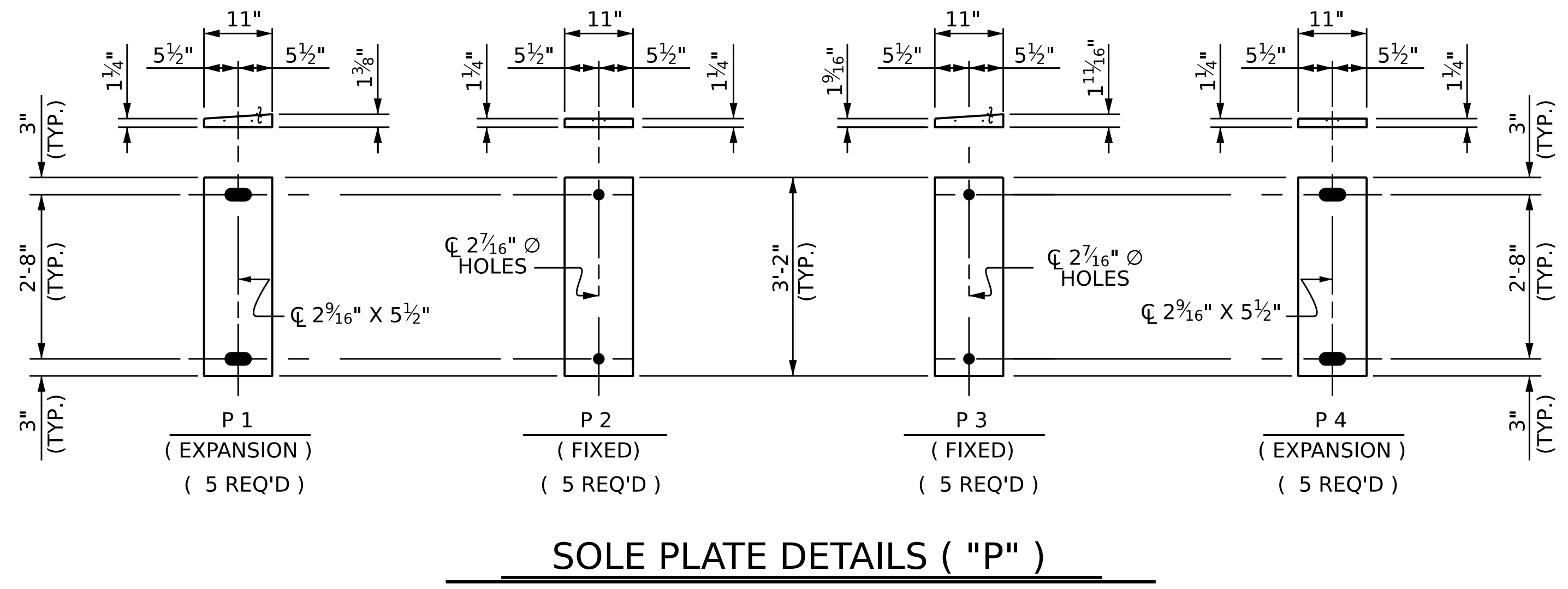
TYPICAL SECTION OF ELASTOMERIC BEARINGS

DETAIL "A"

TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT) TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)



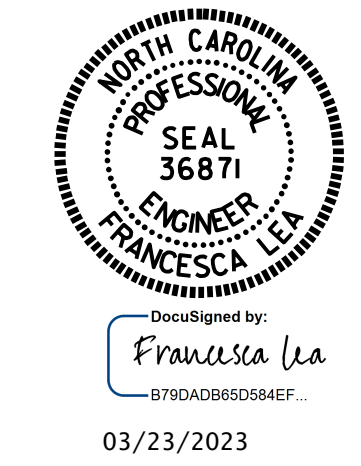
E4 (20 REQ'D)  
PLAN VIEW OF ELASTOMERIC BEARING  
TYPE V



SOLE PLATE DETAILS ( "P" )

MAXIMUM ALLOWABLE SERVICE LOADS
D.L.+L.L. (NO IMPACT)
TYPE V   365 k

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
STATION: 21+64.00 -L-



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
ELASTOMERIC BEARING  
DETAILS  
PRESTRESSED CONCRETE GIRDER  
SUPERSTRUCTURE

ASSEMBLED BY : Q. T. NGUYEN	DATE : 07/2022
CHECKED BY : F. LEA	DATE : 12/2022
DRAWN BY : WJH 8/89	REV. 1/15 MAA/TMC
CHECKED BY : CRK 8/89	REV. 12/17 MAA/THC
	REV. 10/21 BNB/AAI

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REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	
TOTAL SHEETS				31

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

		SPAN A																																							
		GIRDERS 1 AND 5																																							
FORTIETH POINTS	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.203	0.404	0.602	0.796	0.985	1.167	1.341	1.507	1.663	1.808	1.941	2.063	2.172	2.267	2.349	2.416	2.469	2.507	2.53	2.537	2.53	2.507	2.469	2.416	2.349	2.267	2.172	2.063	1.941	1.808	1.663	1.507	1.341	1.167	0.985	0.796	0.602	0.404	0.203	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.149	0.297	0.444	0.587	0.725	0.86	0.988	1.11	1.224	1.331	1.43	1.519	1.599	1.67	1.73	1.779	1.818	1.846	1.863	1.868	1.863	1.846	1.818	1.779	1.73	1.67	1.599	1.519	1.43	1.331	1.224	1.11	0.988	0.86	0.725	0.587	0.444	0.297	0.149	0
FINAL CAMBER ↑	0	1/16"	1/8"	3/16"	3/16"	1/4"	5/16"	3/8"	3/8"	7/16"	1/2"	1/2"	9/16"	9/16"	5/8"	5/8"	5/8"	5/8"	11/16"	11/16"	11/16"	11/16"	11/16"	5/8"	5/8"	5/8"	5/8"	9/16"	9/16"	1/2"	1/2"	7/16"	3/8"	3/8"	5/16"	1/4"	3/16"	3/16"	1/8"	1/16"	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

		SPAN A																																							
		GIRDERS 2 THRU 4																																							
FORTIETH POINTS	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.202	0.402	0.599	0.792	0.98	1.161	1.334	1.499	1.654	1.798	1.931	2.052	2.16	2.255	2.336	2.403	2.456	2.493	2.516	2.524	2.516	2.493	2.456	2.403	2.336	2.255	2.16	2.052	1.931	1.798	1.654	1.499	1.334	1.161	0.98	0.792	0.599	0.402	0.202	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.144	0.287	0.428	0.566	0.70	0.829	0.953	1.07	1.181	1.284	1.379	1.465	1.543	1.61	1.668	1.716	1.754	1.781	1.797	1.802	1.797	1.781	1.754	1.716	1.668	1.61	1.543	1.465	1.379	1.284	1.181	1.07	0.953	0.829	0.7	0.566	0.428	0.287	0.144	0
FINAL CAMBER ↑	0	1/16"	1/8"	3/16"	1/4"	1/4"	5/16"	3/8"	7/16"	1/2"	1/2"	9/16"	9/16"	5/8"	5/8"	11/16"	11/16"	11/16"	11/16"	3/4"	3/4"	3/4"	11/16"	11/16"	11/16"	11/16"	5/8"	5/8"	9/16"	9/16"	1/2"	1/2"	7/16"	3/8"	5/16"	1/4"	1/4"	3/16"	1/8"	1/16"	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

		SPAN B																																								
		GIRDERS 1 AND 5																																								
FORTIETH POINTS	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0	
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.295	0.588	0.877	1.16	1.434	1.699	1.953	2.194	2.421	2.632	2.827	3.004	3.162	3.301	3.42	3.518	3.595	3.65	3.683	3.694	3.683	3.65	3.595	3.518	3.42	3.301	3.162	3.004	2.827	2.632	2.421	2.194	1.953	1.699	1.434	1.16	0.877	0.588	0.295	0	
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.218	0.434	0.647	0.855	1.058	1.253	1.44	1.618	1.785	1.941	2.085	2.215	2.332	2.435	2.522	2.595	2.651	2.692	2.716	2.725	2.716	2.692	2.651	2.595	2.522	2.435	2.332	2.215	2.085	1.941	1.785	1.618	1.44	1.253	1.058	0.855	0.647	0.434	0.218	0	
FINAL CAMBER ↑	0	1/16"	1/8"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	13/16"	7/8"	7/8"	15/16"	15/16"	15/16"	15/16"	1"	15/16"	15/16"	15/16"	15/16"	7/8"	7/8"	13/16"	13/16"	3/4"	11/16"	5/8"	9/16"	1/2"	7/16"	3/8"	5/16"	1/4"	3/16"	1/8"	1/16"	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

		SPAN B																																							
		GIRDERS 2 THRU 4																																							
FORTIETH POINTS	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.294	0.585	0.872	1.154	1.427	1.69	1.943	2.183	2.408	2.618	2.812	2.988	3.146	3.284	3.402	3.5	3.576	3.631	3.664	3.675	3.664	3.631	3.576	3.5	3.402	3.284	3.146	2.988	2.812	2.618	2.408	2.183	1.943	1.69	1.427	1.154	0.872	0.585	0.294	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.214	0.426	0.635	0.84	1.039	1.231	1.415	1.589	1.754	1.907	2.048	2.176	2.291	2.392	2.478	2.549	2.604	2.644	2.668	2.676	2.668	2.644	2.604	2.549	2.478	2.392	2.291	2.176	2.048	1.907	1.754	1.589	1.415	1.231	1.039	0.84	0.635	0.426	0.214	0
FINAL CAMBER ↑	0	1/16"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	7/8"	15/16"	15/16"	1"	1"	1"	1"	1"	1"	1"	15/16"	15/16"	7/8"	7/8"	13/16"	3/4"	11/16"	5/8"	9/16"	1/2"	7/16"	3/8"	5/16"	1/4"	3/16"	1/16"	0

\* INCLUDES FUTURE WEARING SURFACE  
 ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM),  
 EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-



DocuSigned by:  
 Francesca Lea  
 8790AD865D84EF  
 03/23/2023

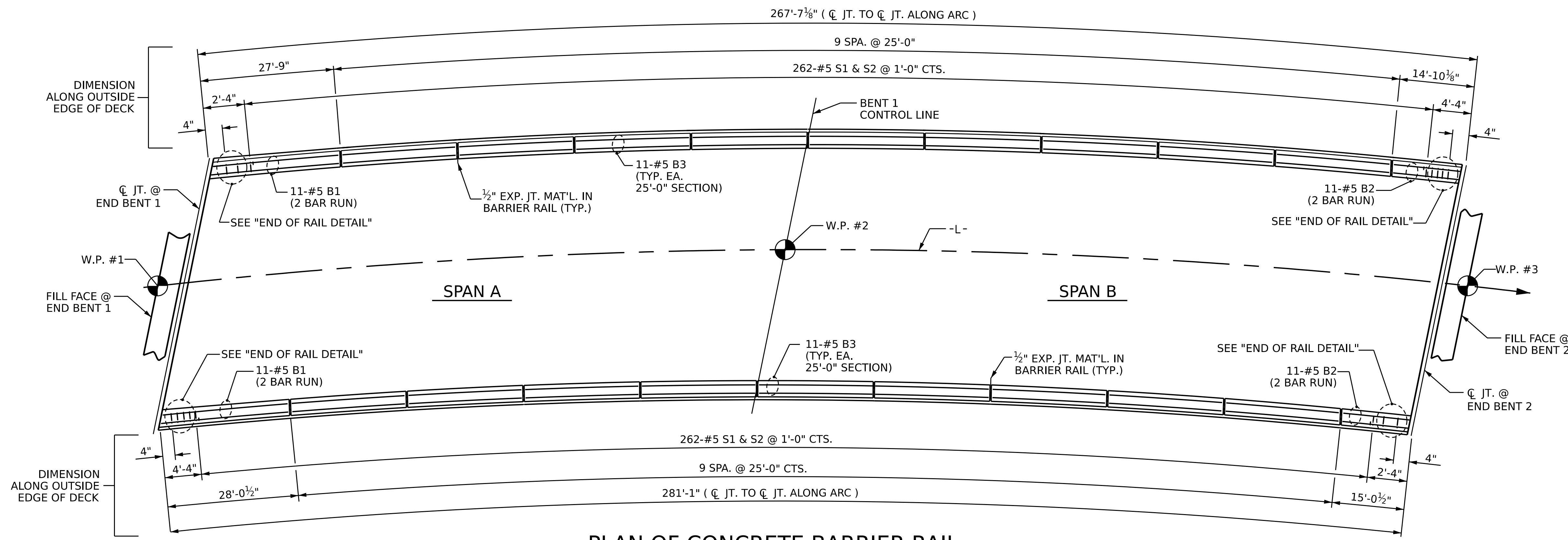
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 DEAD LOAD DEFLECTIONS  
 SPAN A & B

DRAWN BY : Z. MALIK DATE : 01/23  
 CHECKED BY : F. LEA DATE : 01/23  
 DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 05/22

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

S-17  
TOTAL SHEETS  
31



**PLAN OF CONCRETE BARRIER RAIL**

**NOTES**

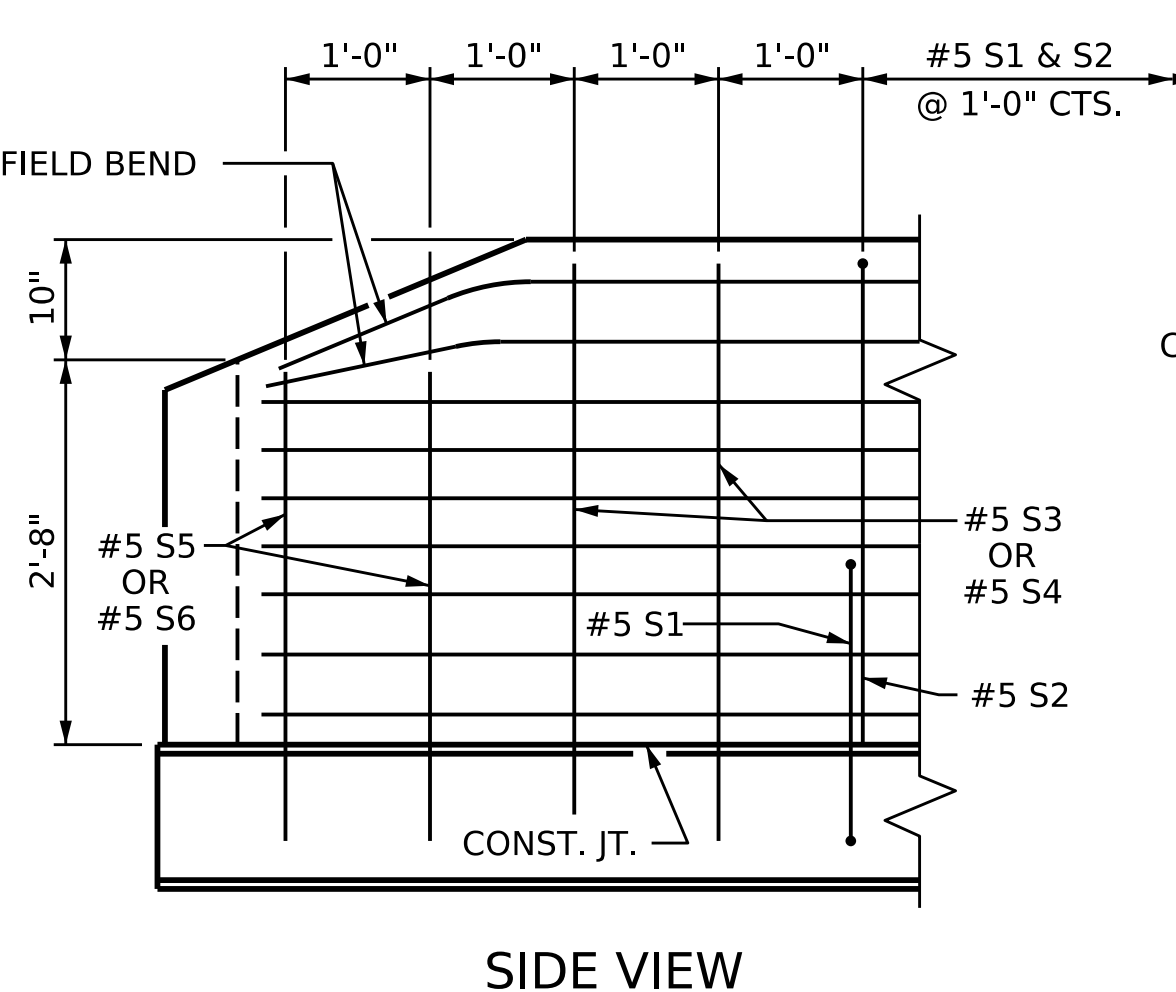
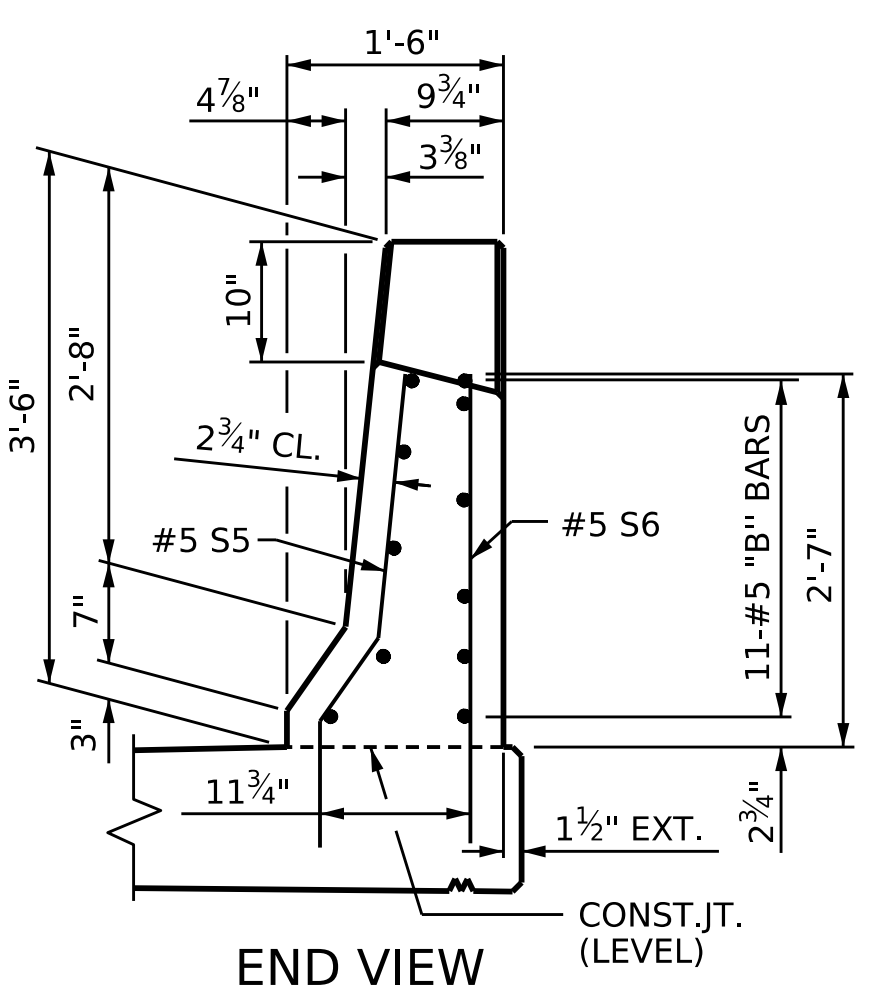
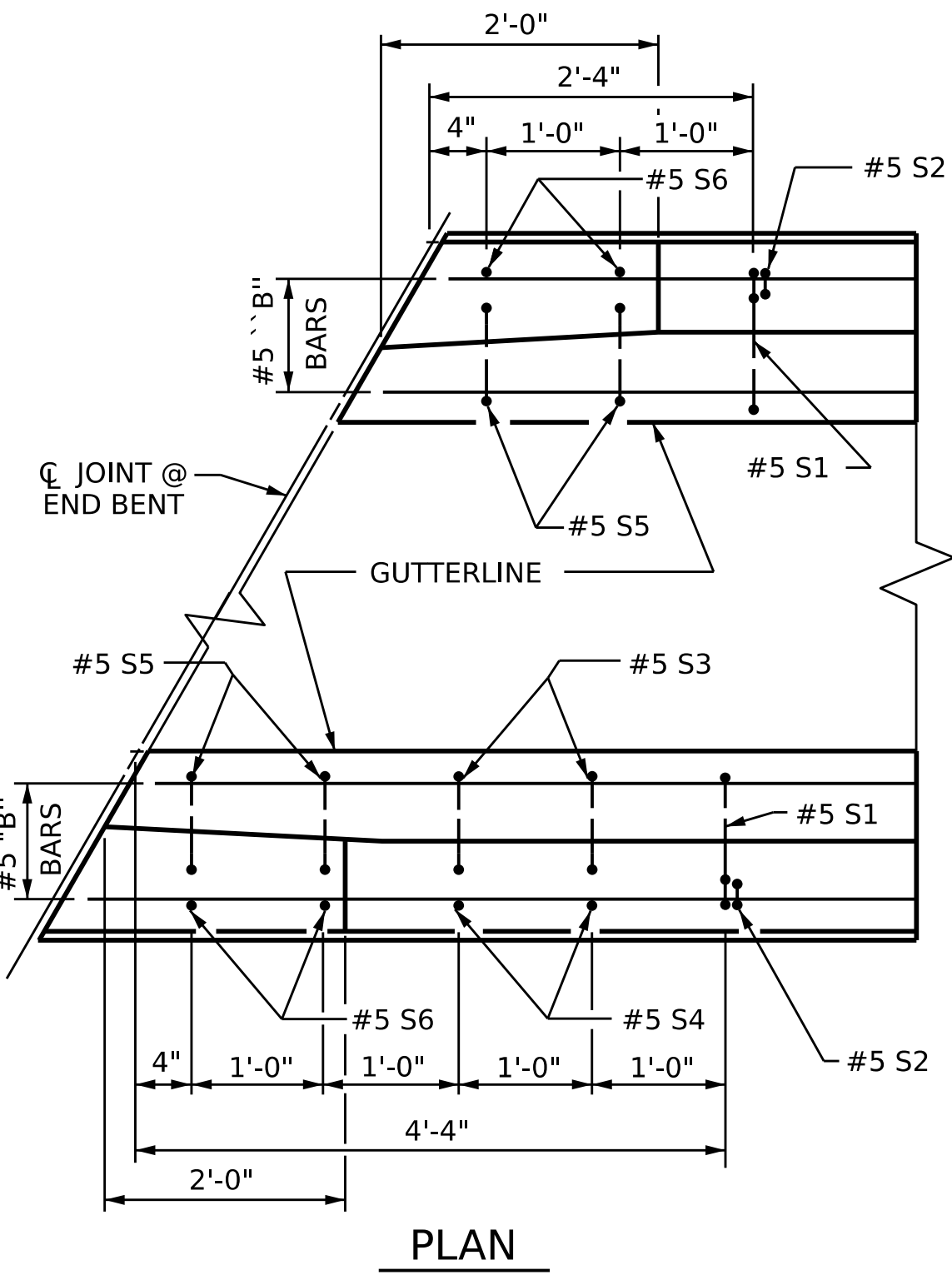
THE BARRIER RAIL IN EACH CONTINUOUS UNIT SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL.

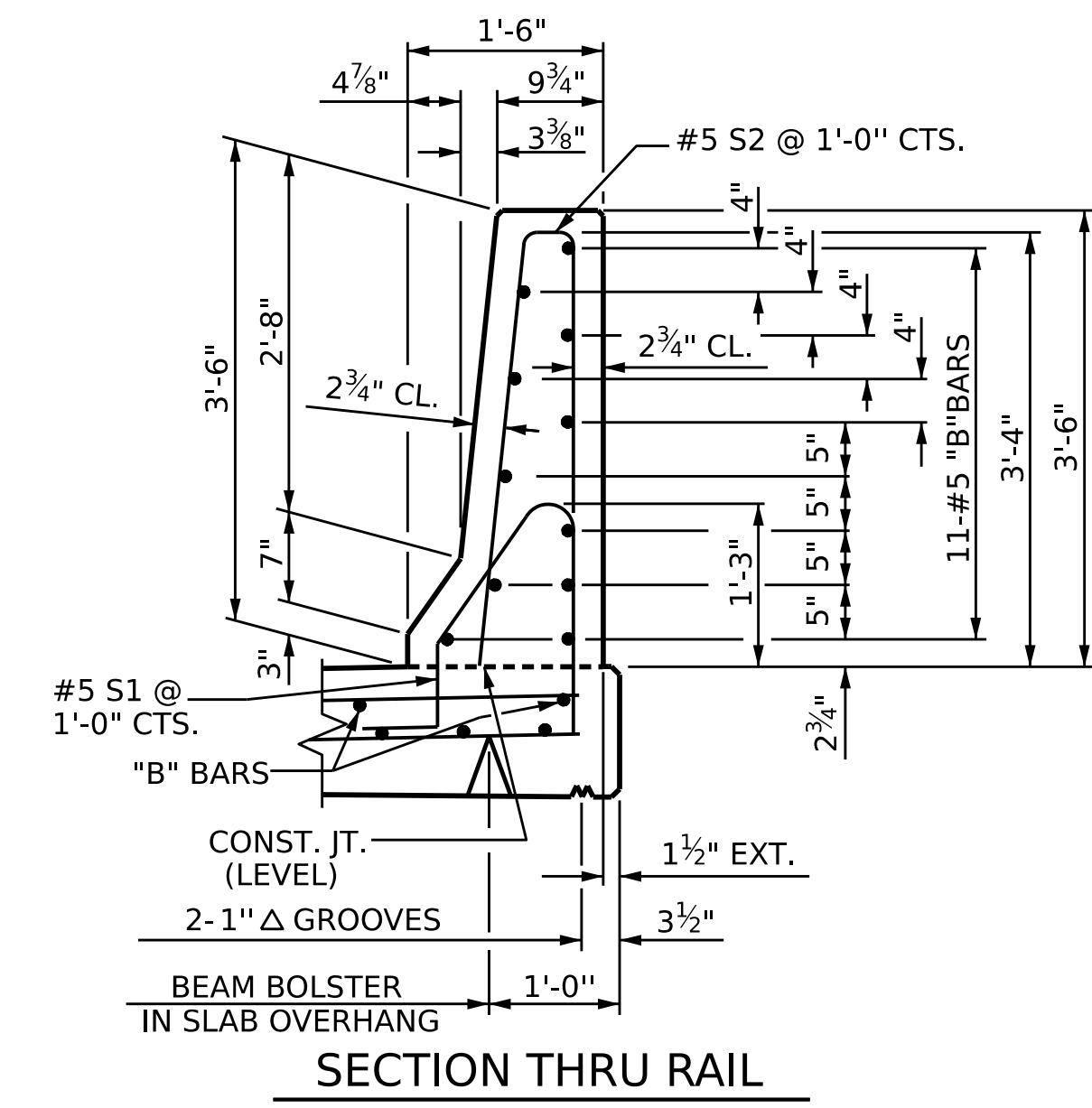
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5 S3, S4, S5 AND S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3, S4, S5 AND S6 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

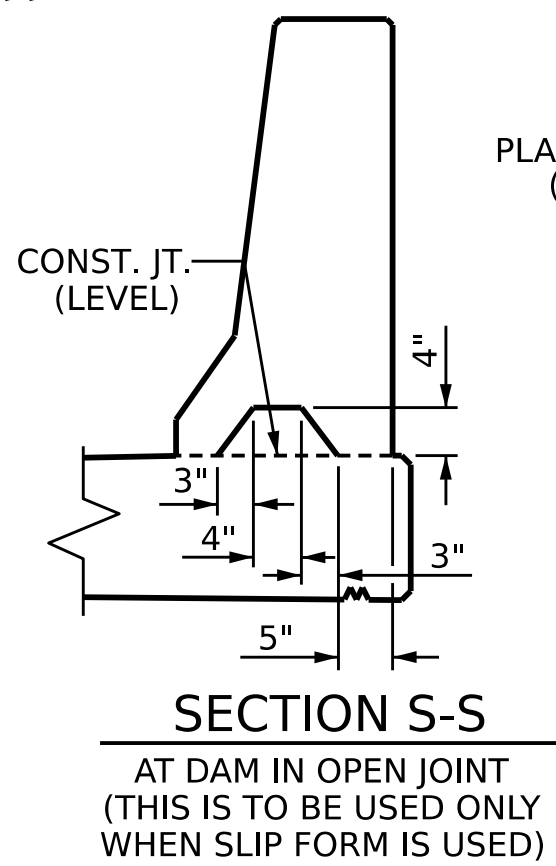
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.



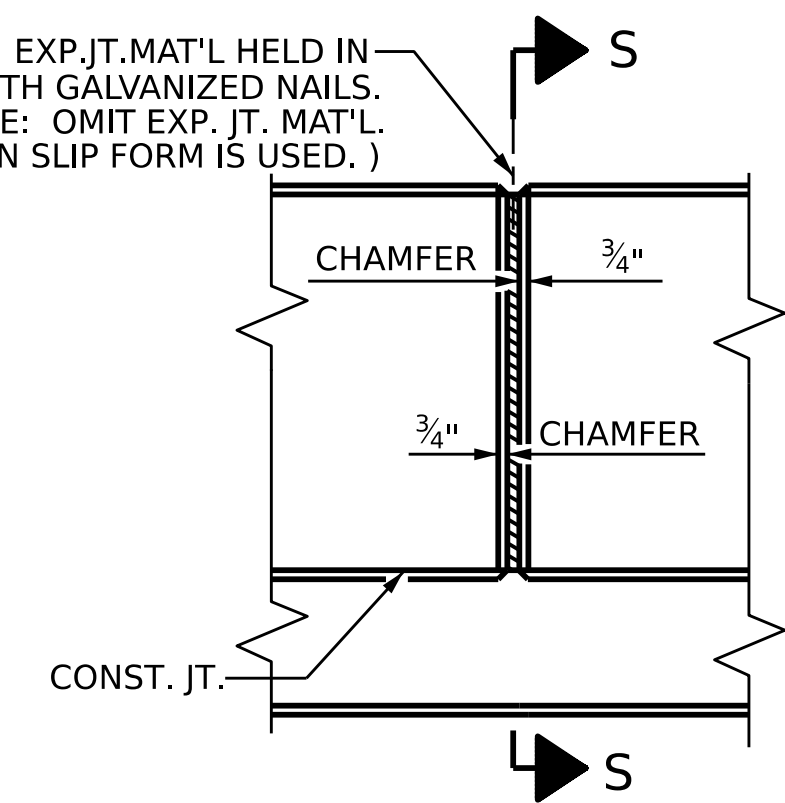
**END OF RAIL DETAILS**  
FOR ADHESIVE ANCHORING AT SAWED JOINTS



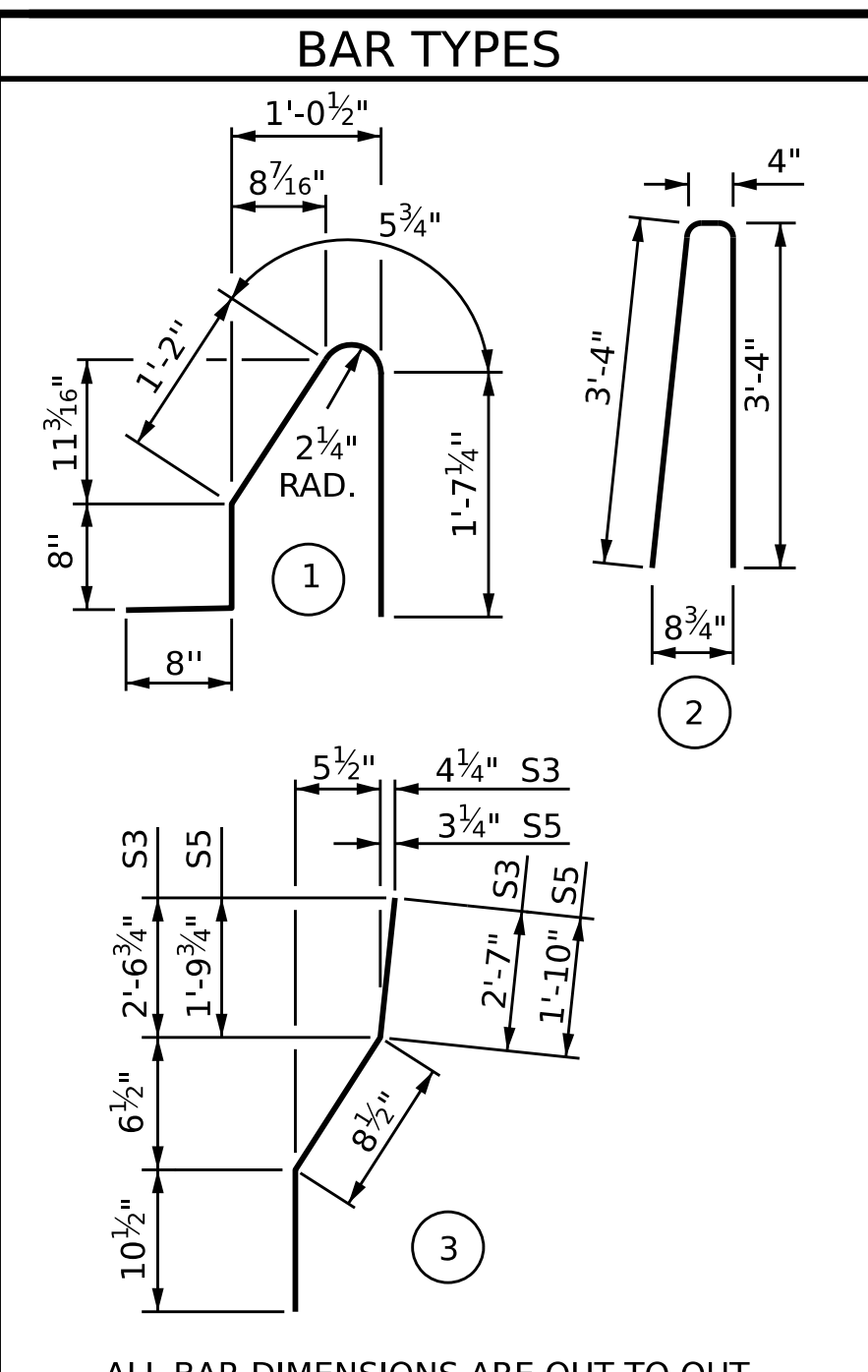
**SECTION THRU RAIL**



**ELEVATION AT EXPANSION JOINTS**



**BARRIER RAIL DETAILS**



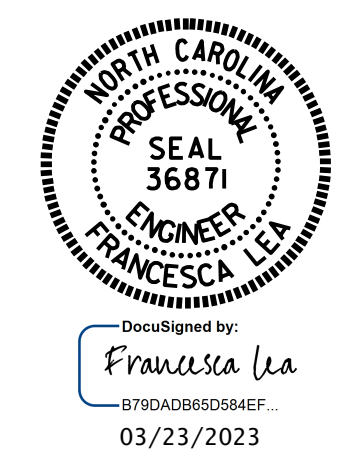
ALL BAR DIMENSIONS ARE OUT TO OUT

**BILL OF MATERIAL**  
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	44	#5	STR	15'-6"	711
* B2	44	#5	STR	9'-1"	417
* B3	198	#5	STR	24'-8"	5094
* S1	524	#5	1	4'-7"	2505
* S2	524	#5	2	7'-0"	3826
* S3	4	#5	3	4'-2"	17
* S4	4	#5	STR	4'-0"	17
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27

* EPOXY COATED REINFORCING STEEL	12,643	LBS.
CLASS AA CONCRETE	72.9	CU. YDS.
CONCRETE BARRIER RAIL	535.68	LIN. FT.

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**STANDARD  
 CONCRETE  
 BARRIER RAIL**

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			31

ASSEMBLED BY: Q. T. NGUYEN	DATE: 07/2022
CHECKED BY: F. LEA	DATE: 12/2022
DRAWN BY: ARB 5/87	MAA/GM
CHECKED BY: SJD 9/87	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

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 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

**NOTES**

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 3/4" HOLD-DOWN PLATE AND 4- 7/8" Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

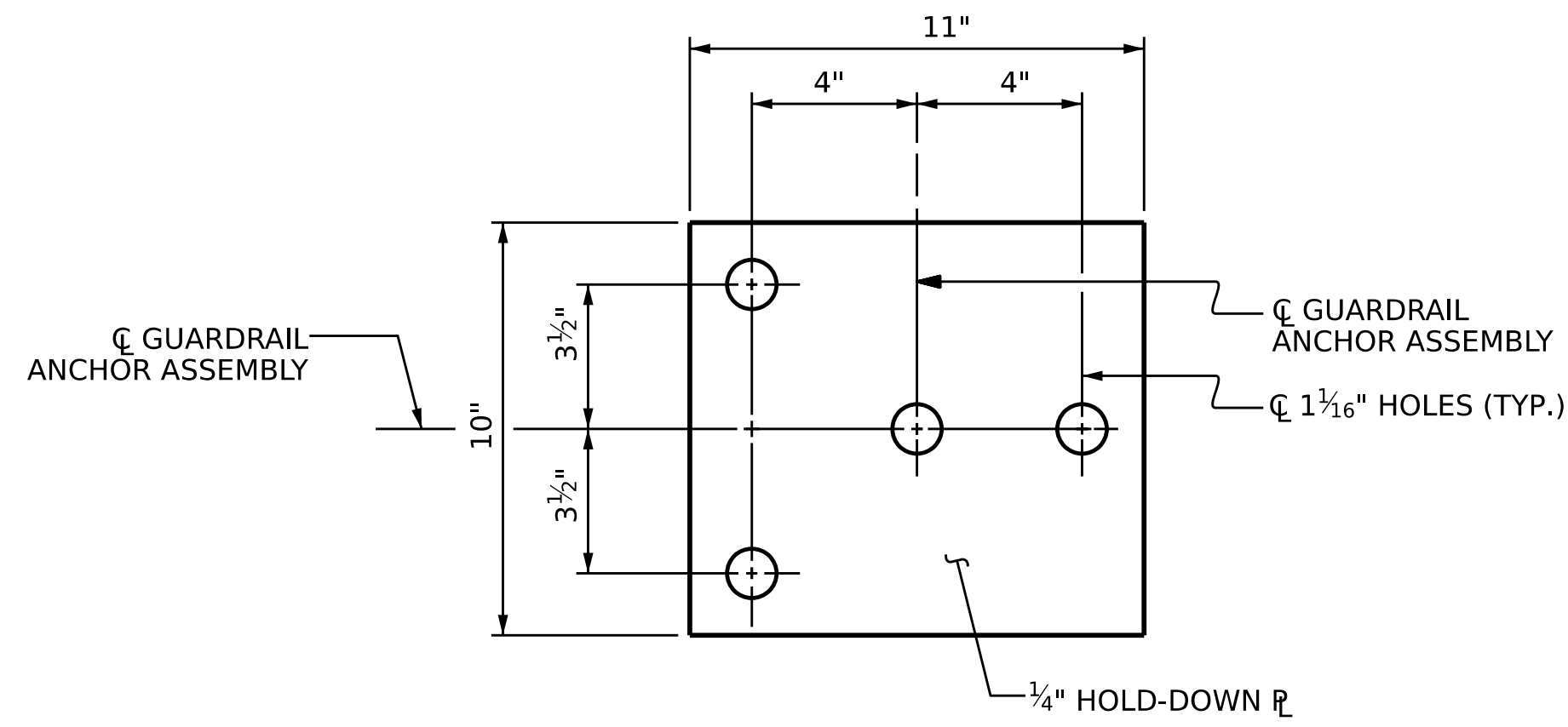
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

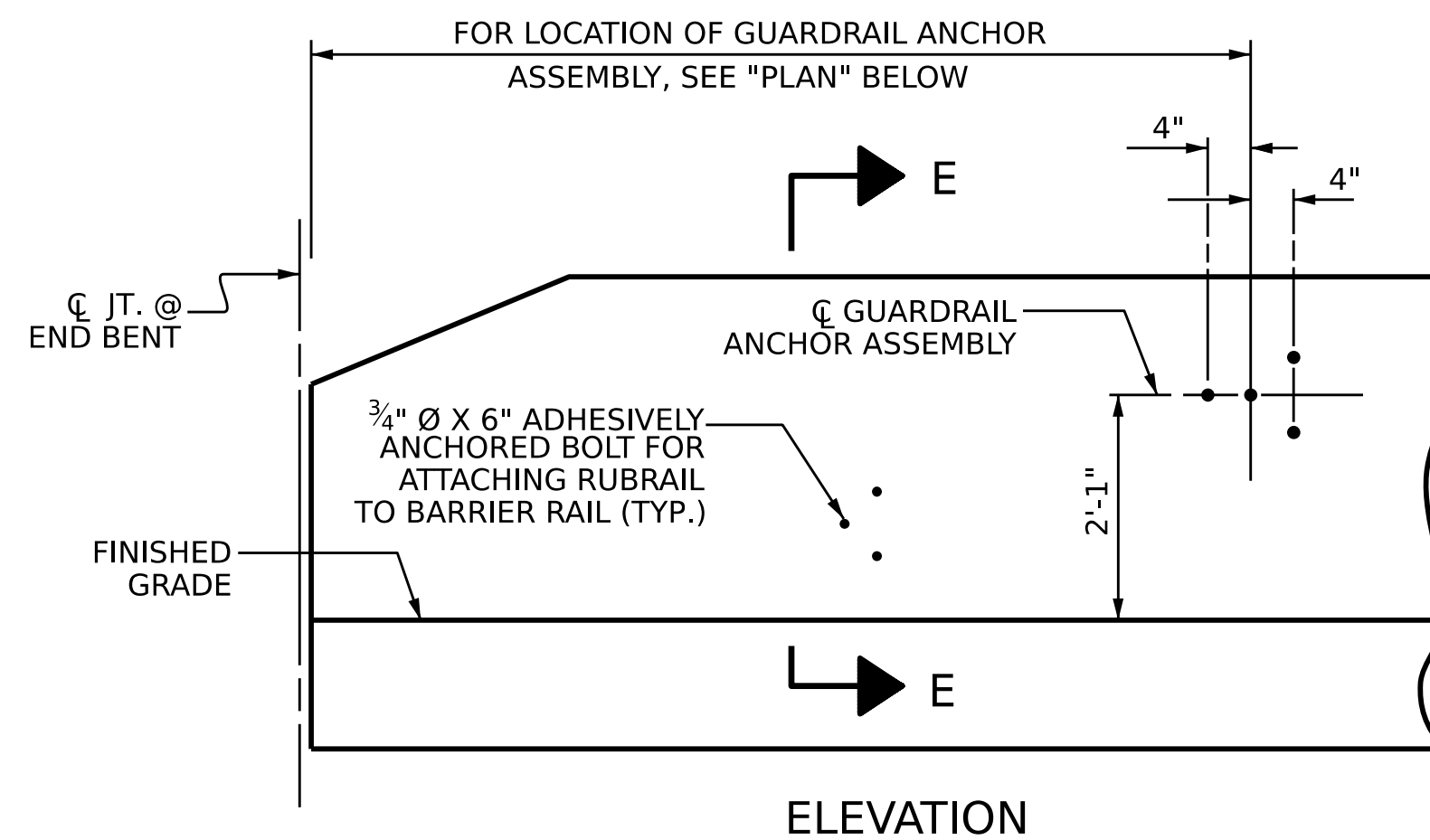
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

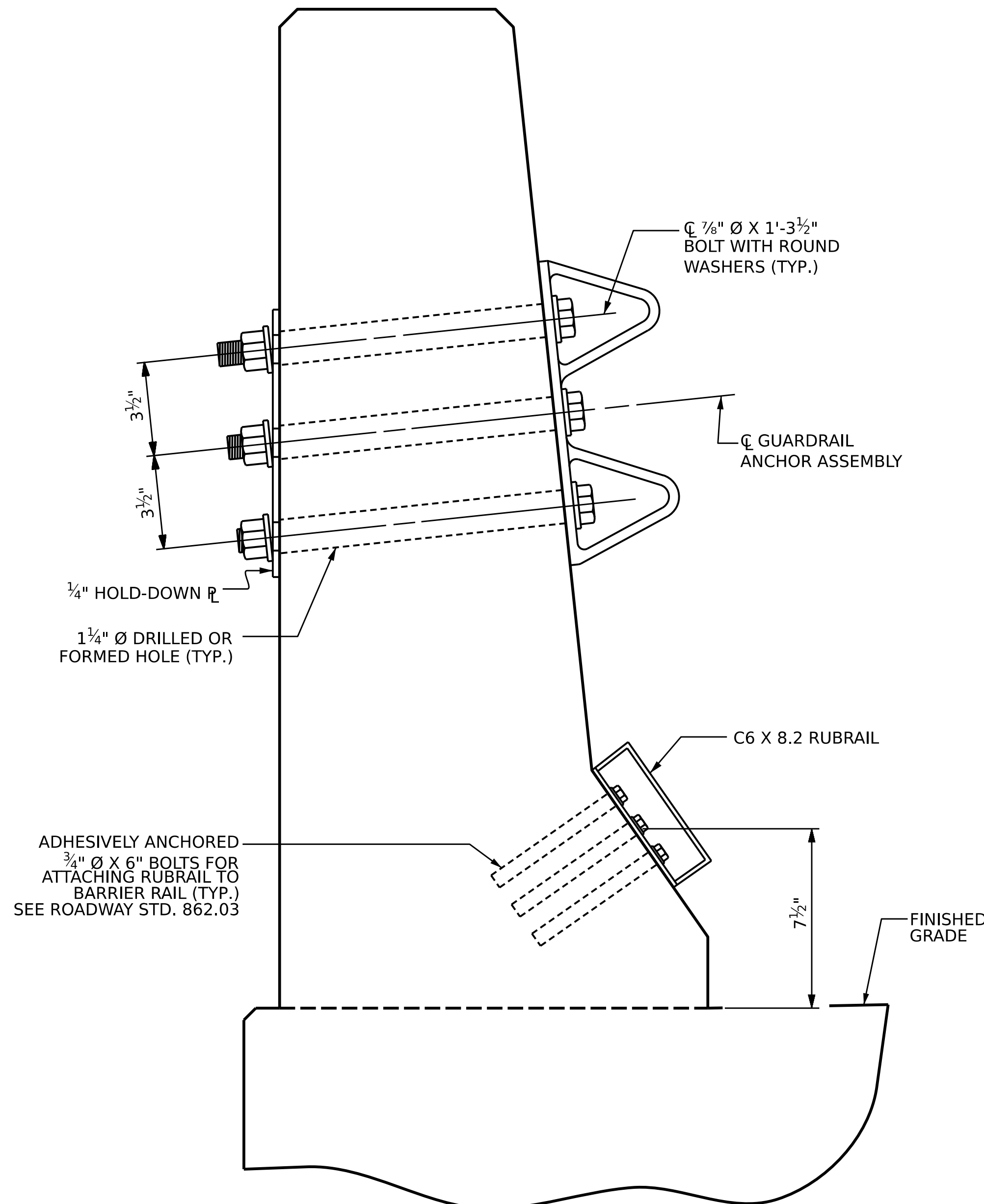
THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



**PLAN**

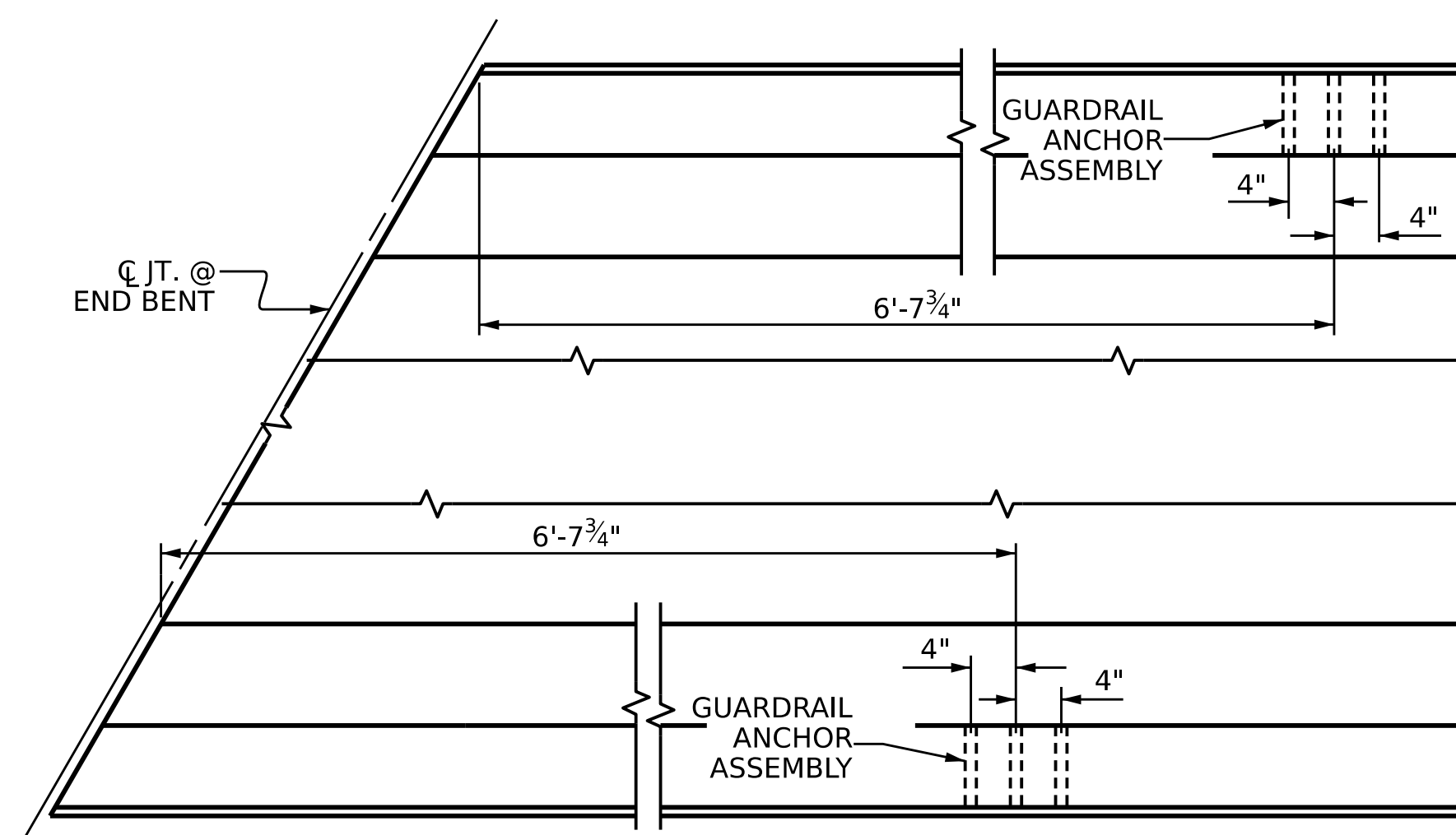


**ELEVATION**



**SECTION E-E**

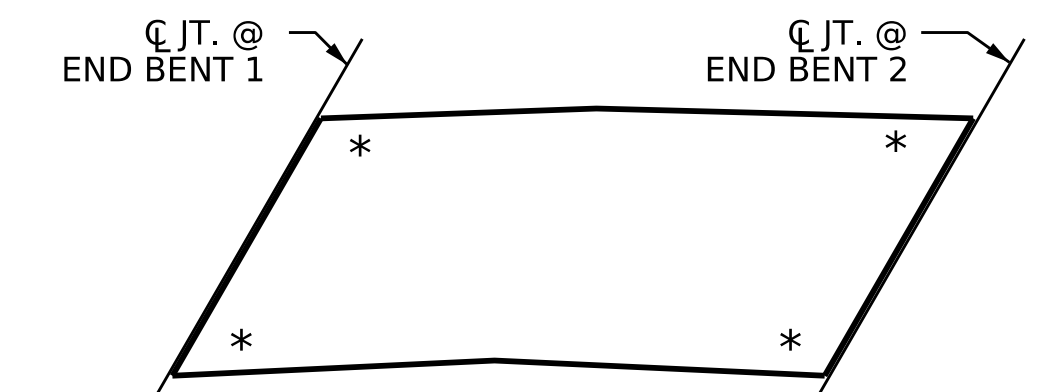
**GUARDRAIL ANCHOR ASSEMBLY DETAILS**



**PLAN**

**LOCATION OF ANCHORS FOR GUARDRAIL**

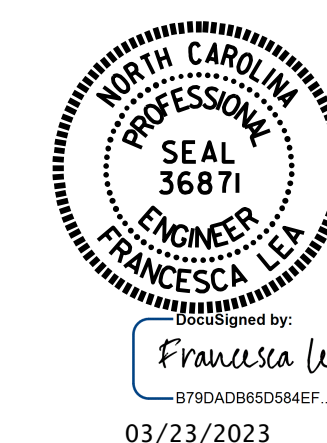
END BENT 1 SHOWN, END BENT 2 SIMILAR.



**SKETCH SHOWING POINTS OF ATTACHMENTS**

\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD  
 GUARDRAIL ANCHORAGE  
 FOR BARRIER RAIL**

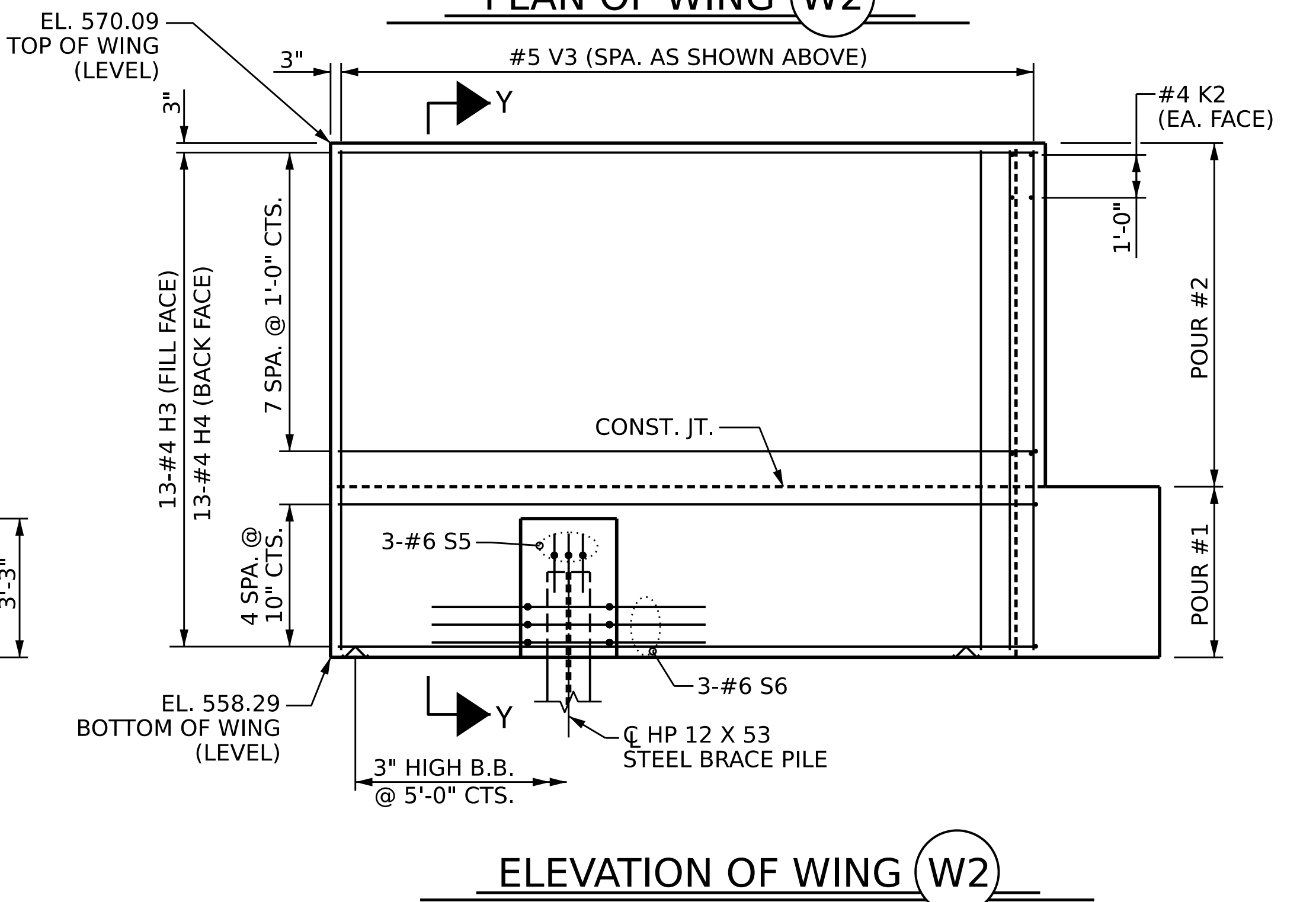
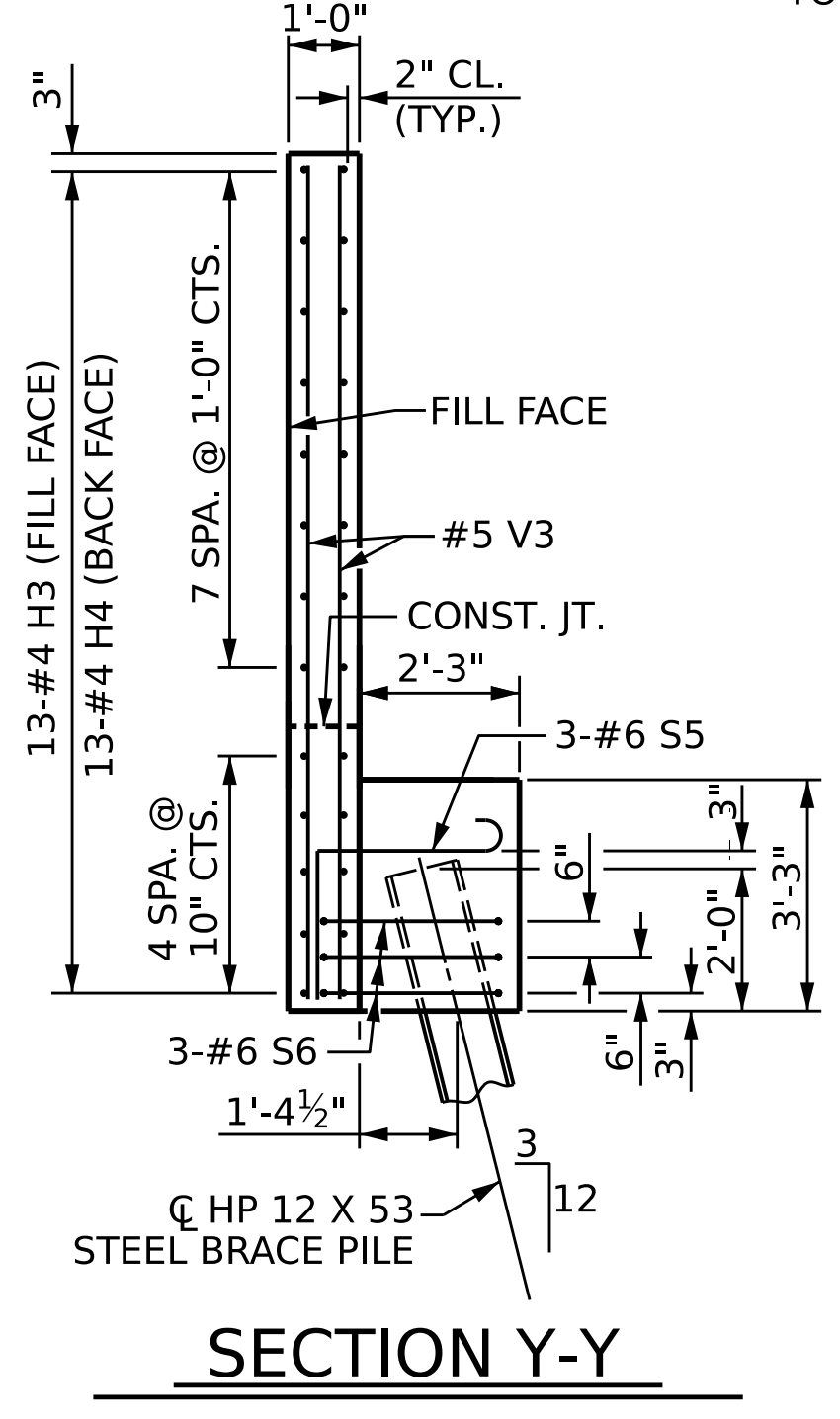
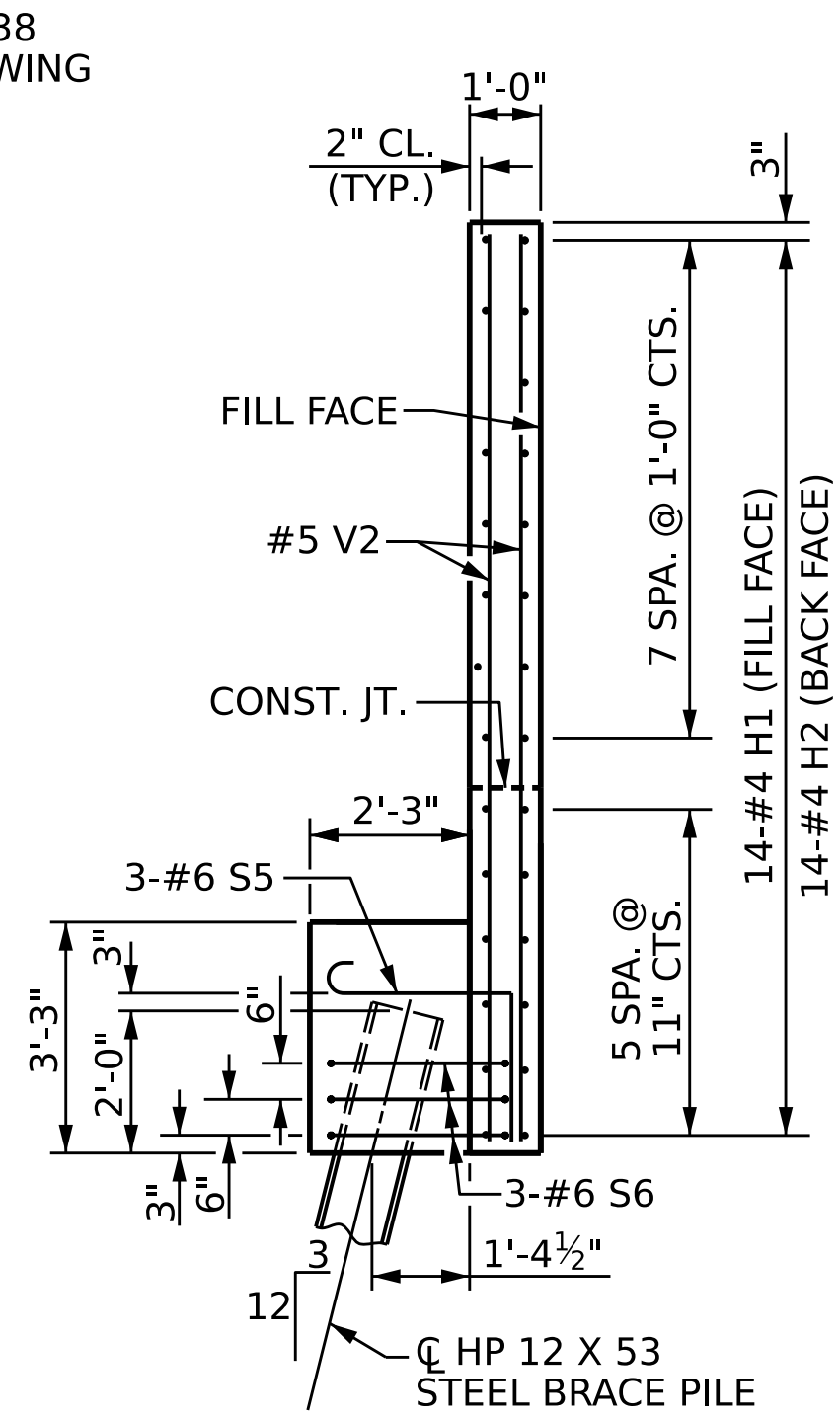
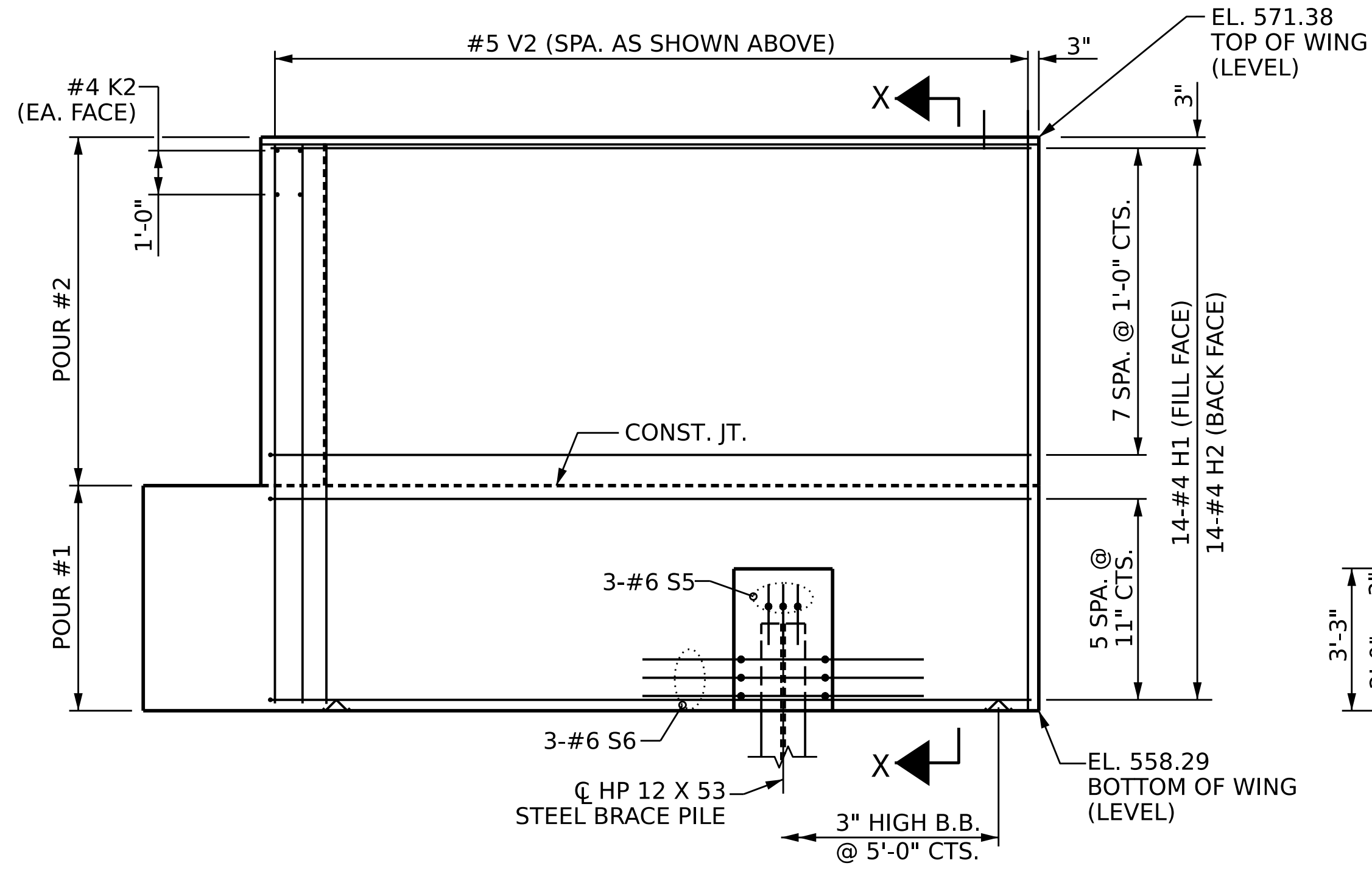
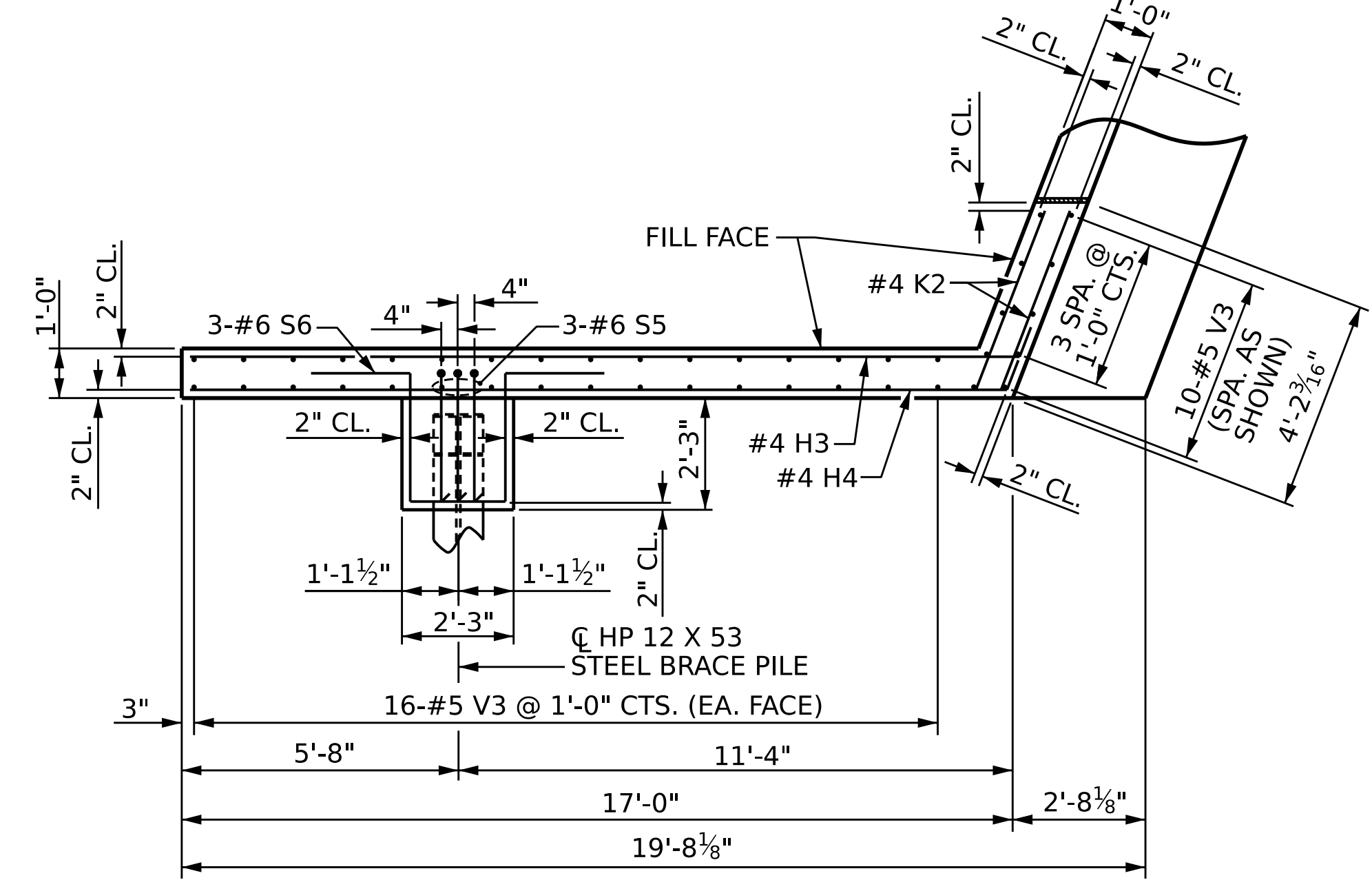
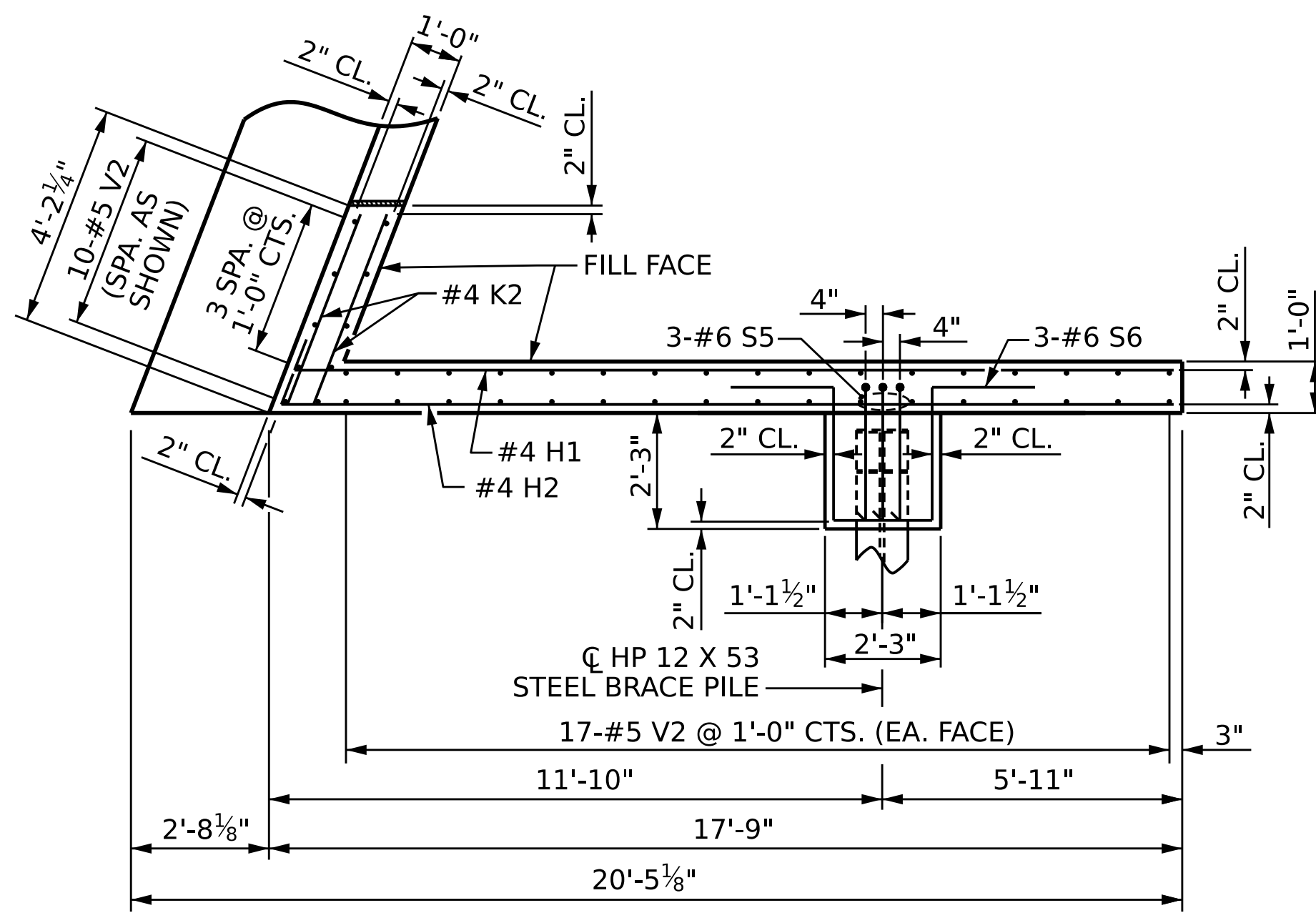
ASSEMBLED BY : Q. T. NGUYEN	DATE : 07/2022
CHECKED BY : F. LEA	DATE : 12/2022
DRAWN BY : TLA 5/06	REV. 7/12 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			5-19
2			4			31







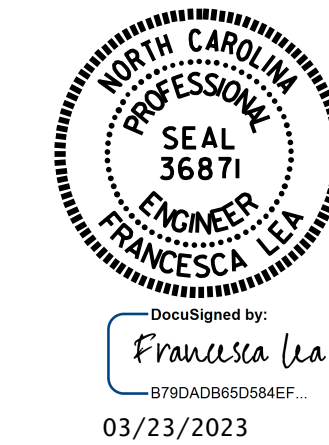
ELEVATION OF WING (W1)

SECTION X-X

SECTION Y-Y

ELEVATION OF WING (W2)

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-  
 SHEET 2 OF 3



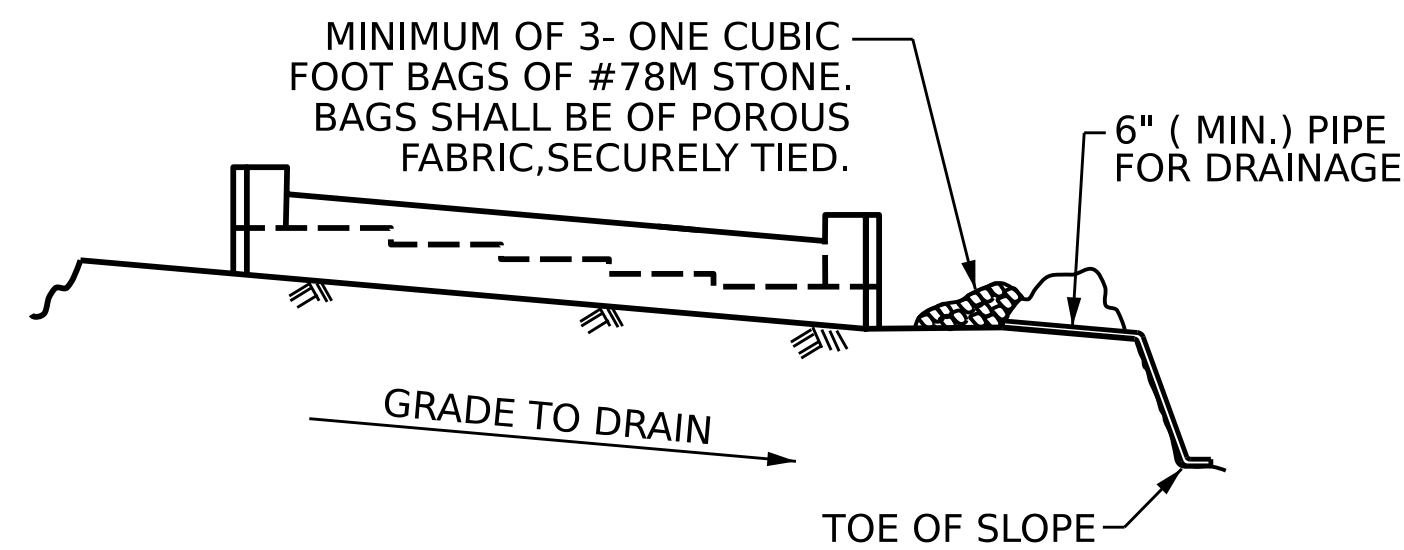
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1

DRAWN BY : Q. T. NGUYEN DATE : 05/2022  
 CHECKED BY : F. LEA DATE : 11/2022  
 DESIGN ENGINEER OF RECORD : F. LEA DATE : 03/2022

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS		SHEET NO.	
NO.	BY:	DATE:	NO.
1			5-22
2			TOTAL SHEETS
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1/11/2023  
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 ttnguyen1

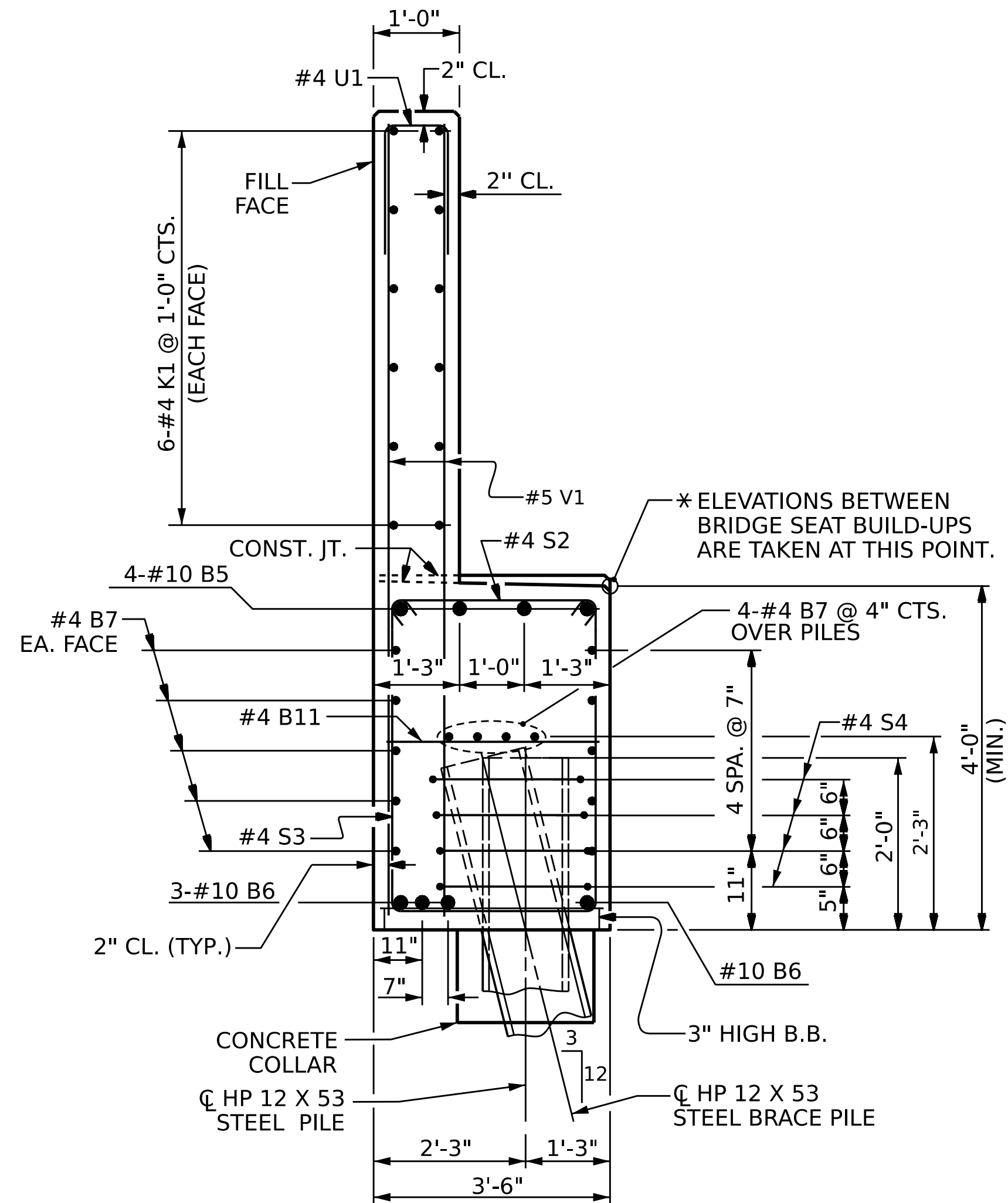


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

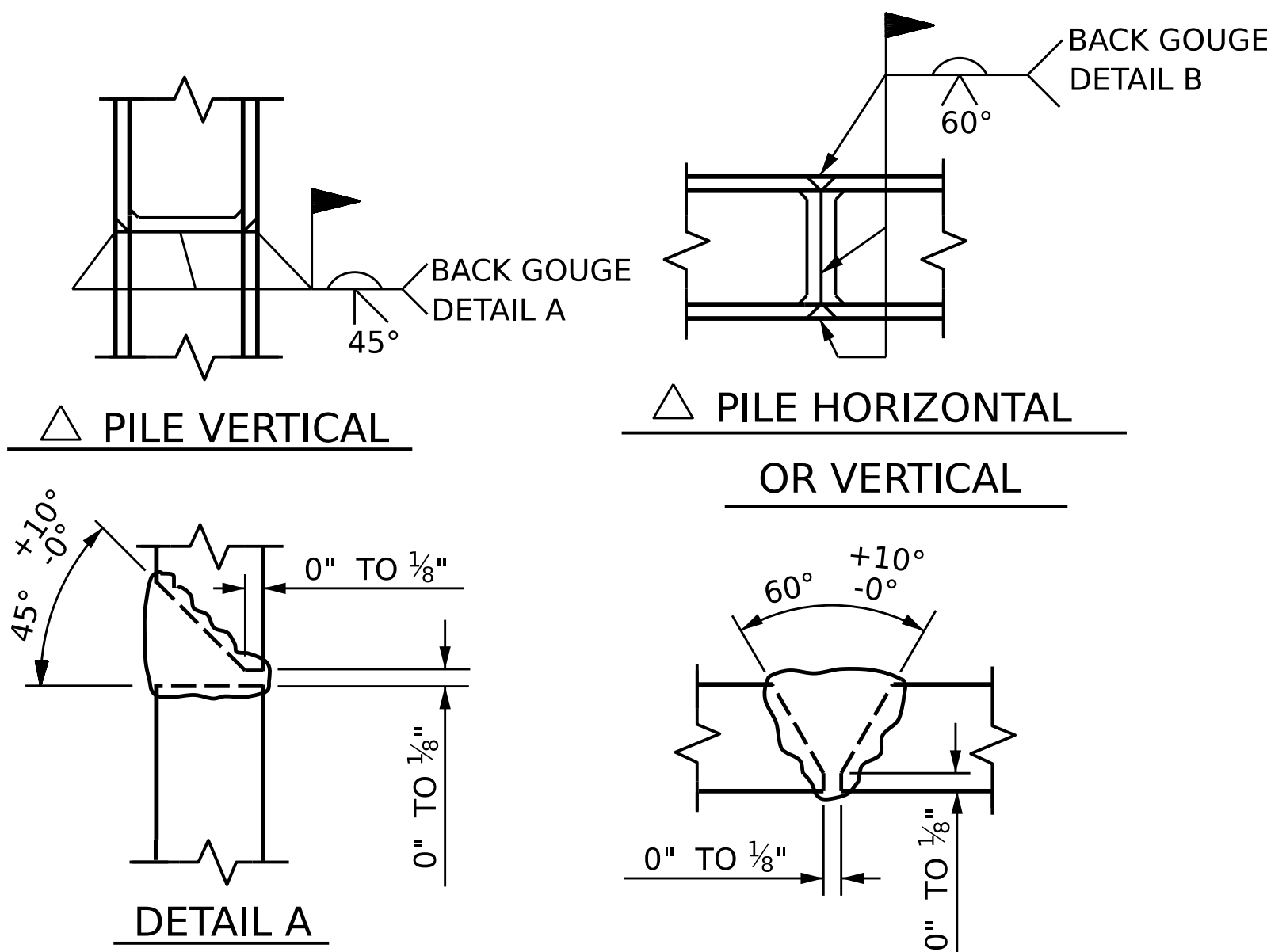
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT

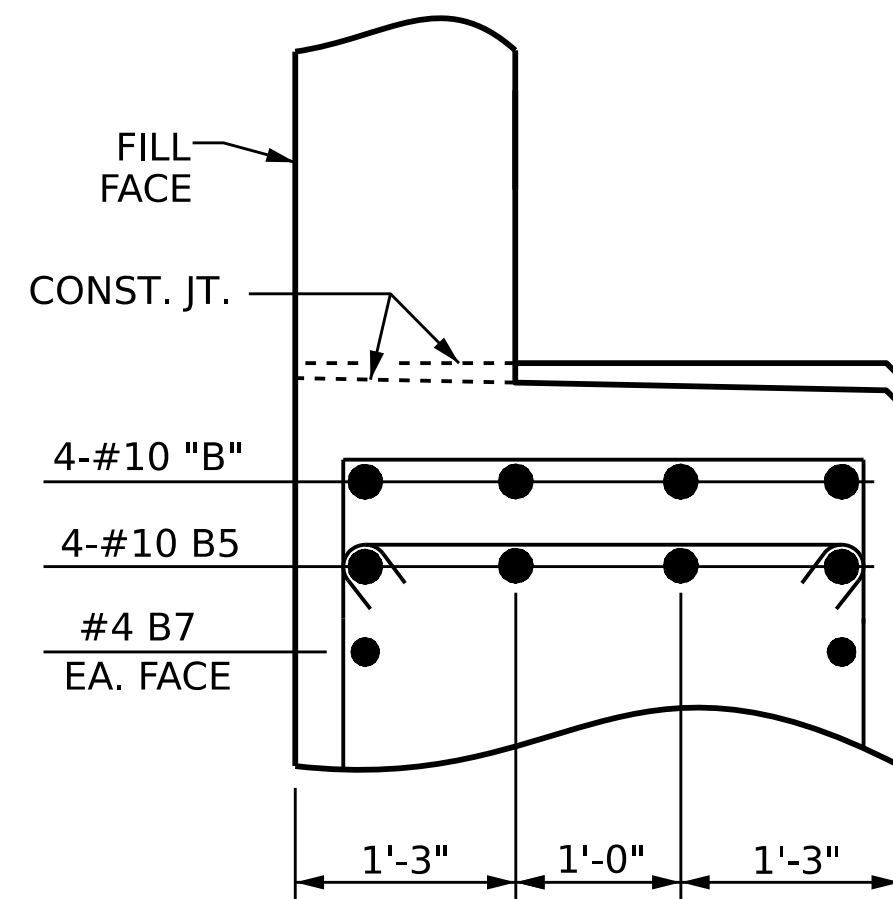


SECTION A-A

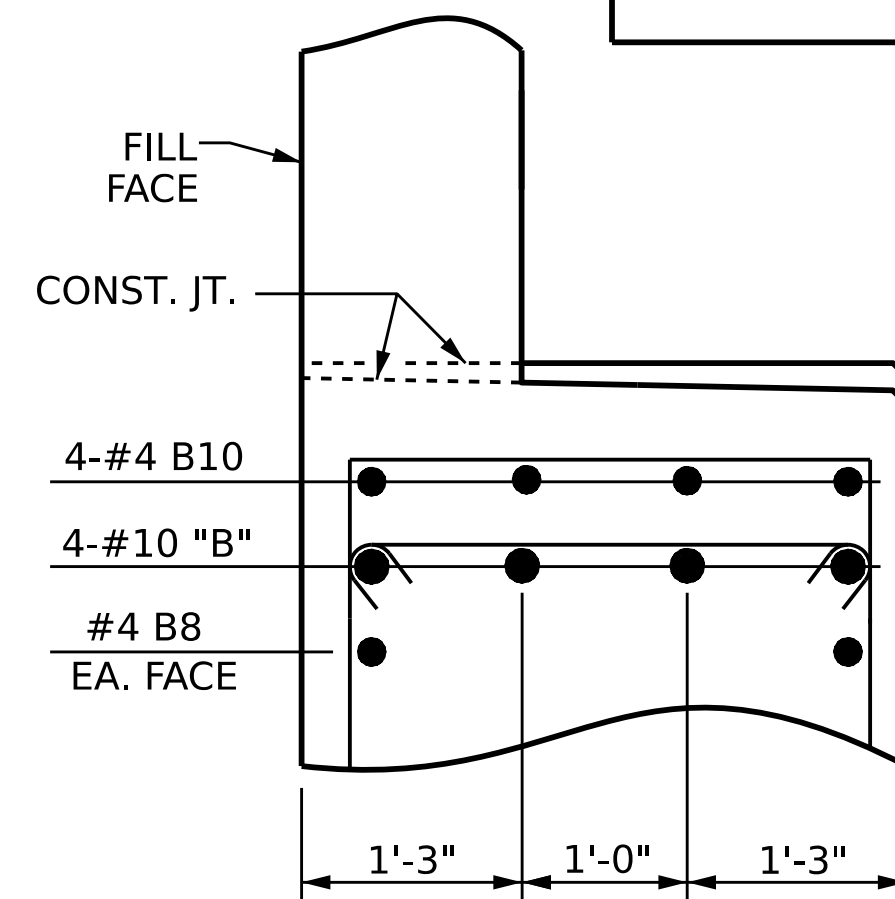


△ POSITION OF PILE DURING WELDING.

### PILE SPLICE DETAILS

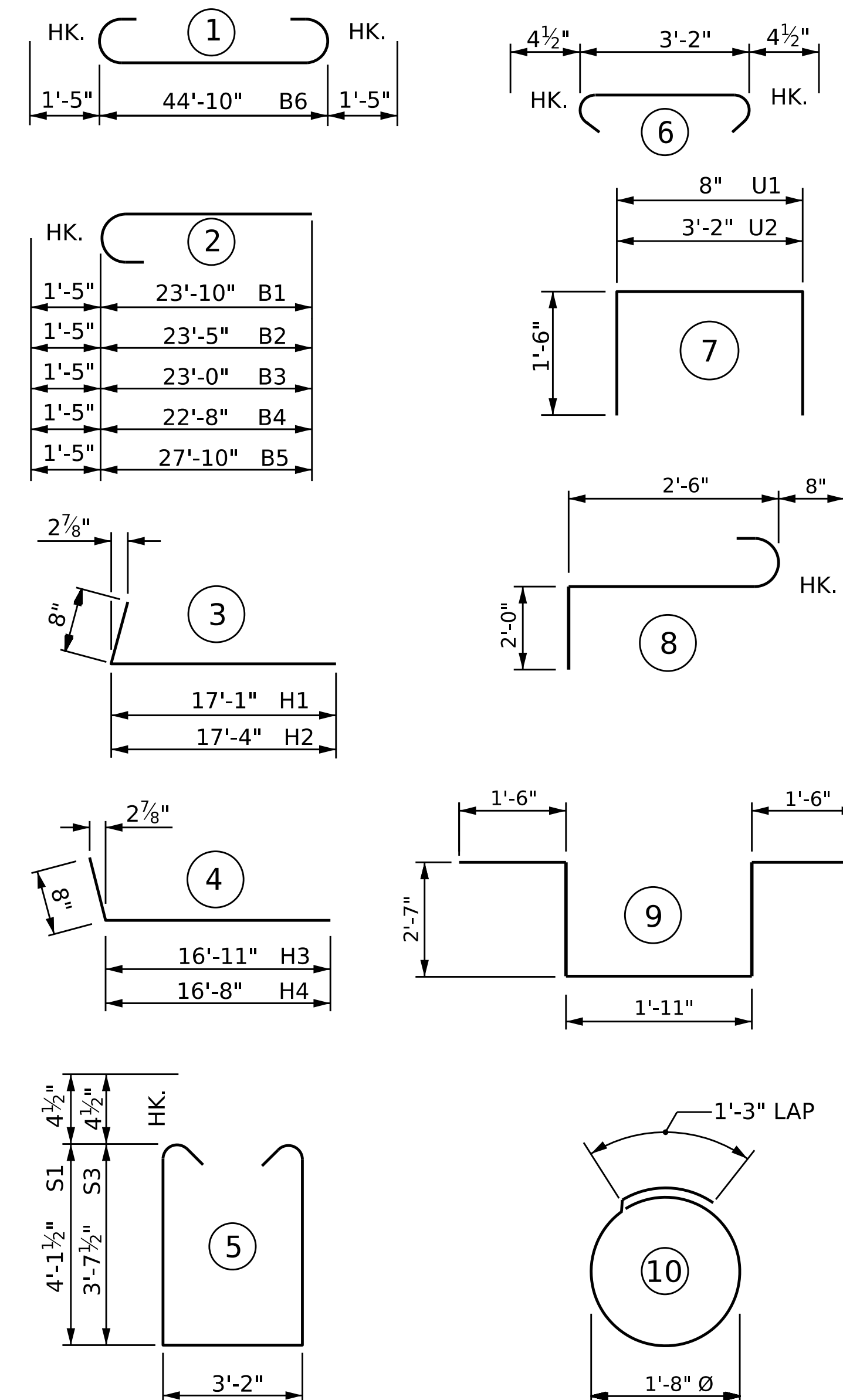


PARTIAL SECTION B-B



PARTIAL SECTION C-C

### BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

### BILL OF MATERIAL

END BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	1	#10	2	25'-3"	109
B2	1	#10	2	24'-10"	107
B3	1	#10	2	24'-5"	105
B4	1	#10	2	24'-1"	104
B5	4	#10	2	29'-3"	503
B6	4	#10	1	47'-8"	820
B7	28	#4	STR	23'-9"	444
B8	2	#4	STR	20'-4"	27
B9	4	#4	STR	8'-4"	22
B10	8	#4	STR	7'-5"	40
B11	11	#4	STR	3'-2"	23
H1	14	#4	3	17'-9"	166
H2	14	#4	3	18'-0"	168
H3	13	#4	4	17'-7"	153
H4	13	#4	4	17'-4"	151
K1	24	#4	STR	23'-8"	379
K2	8	#4	STR	3'-10"	20
S1	22	#5	5	12'-2"	179
S2	51	#5	6	3'-11"	133
S3	29	#5	5	11'-2"	216
S4	32	#4	10	6'-6"	139
S5	6	#6	8	5'-2"	47
S6	6	#6	9	10'-1"	91
U1	37	#4	7	3'-8"	91
U2	19	#4	7	6'-2"	78
V1	74	#5	STR	9'-11"	765
V2	44	#5	STR	12'-9"	585
V3	42	#5	STR	11'-5"	500

REINFORCING STEEL LBS. 6,167

CLASS A CONCRETE		
POUR #1 (CAP, LOWER WINGS, & COLLARS)	CU. YDS.	36.3
POUR #2 (UPPER WINGS & BACKWALL)	CU. YDS.	20.4
TOTAL	CU. YDS.	56.7

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-  
 SHEET 3 OF 3



DocuSigned by:  
 Francesca Lea  
 B79DADB85084EF  
 03/23/2023

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1

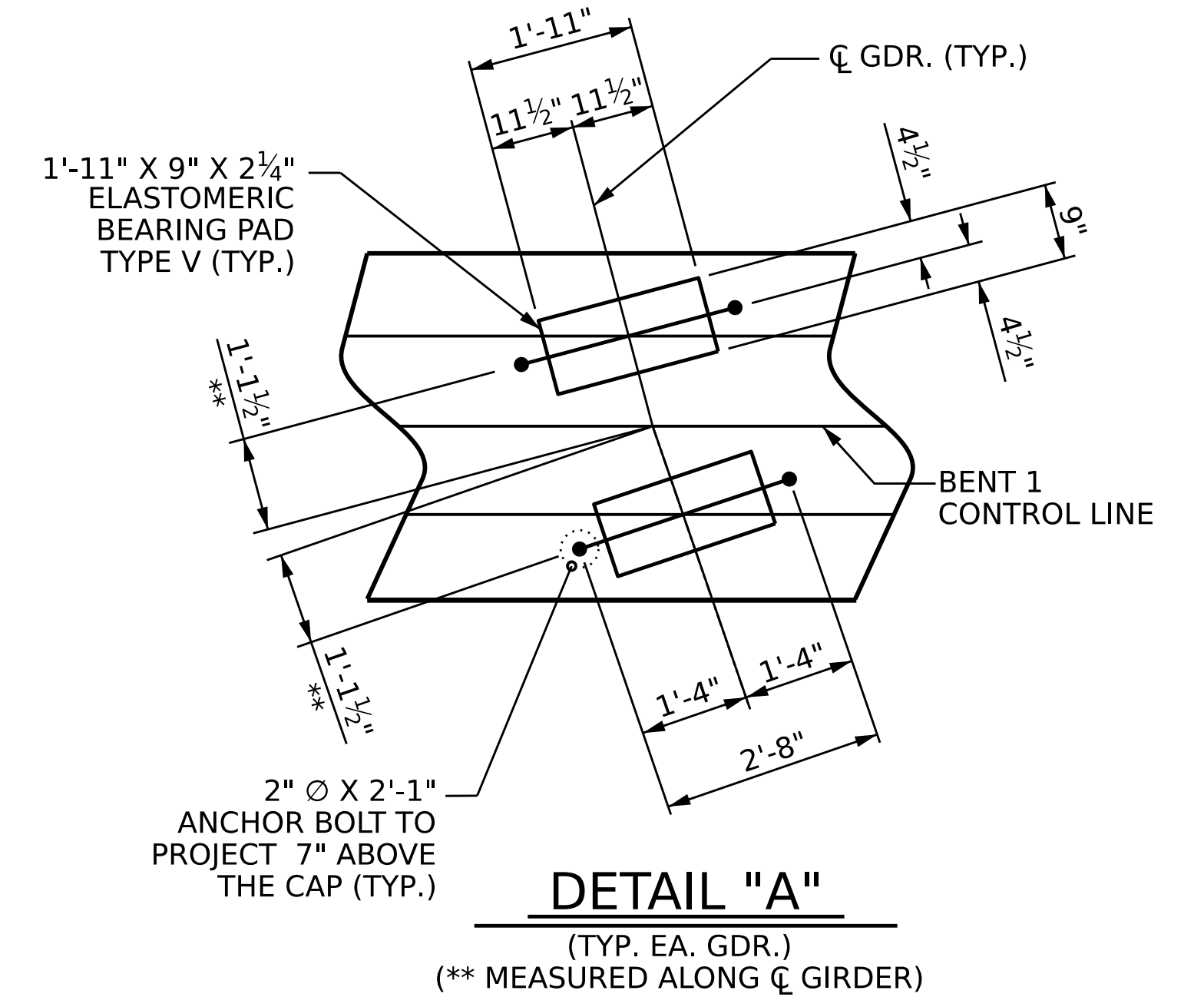
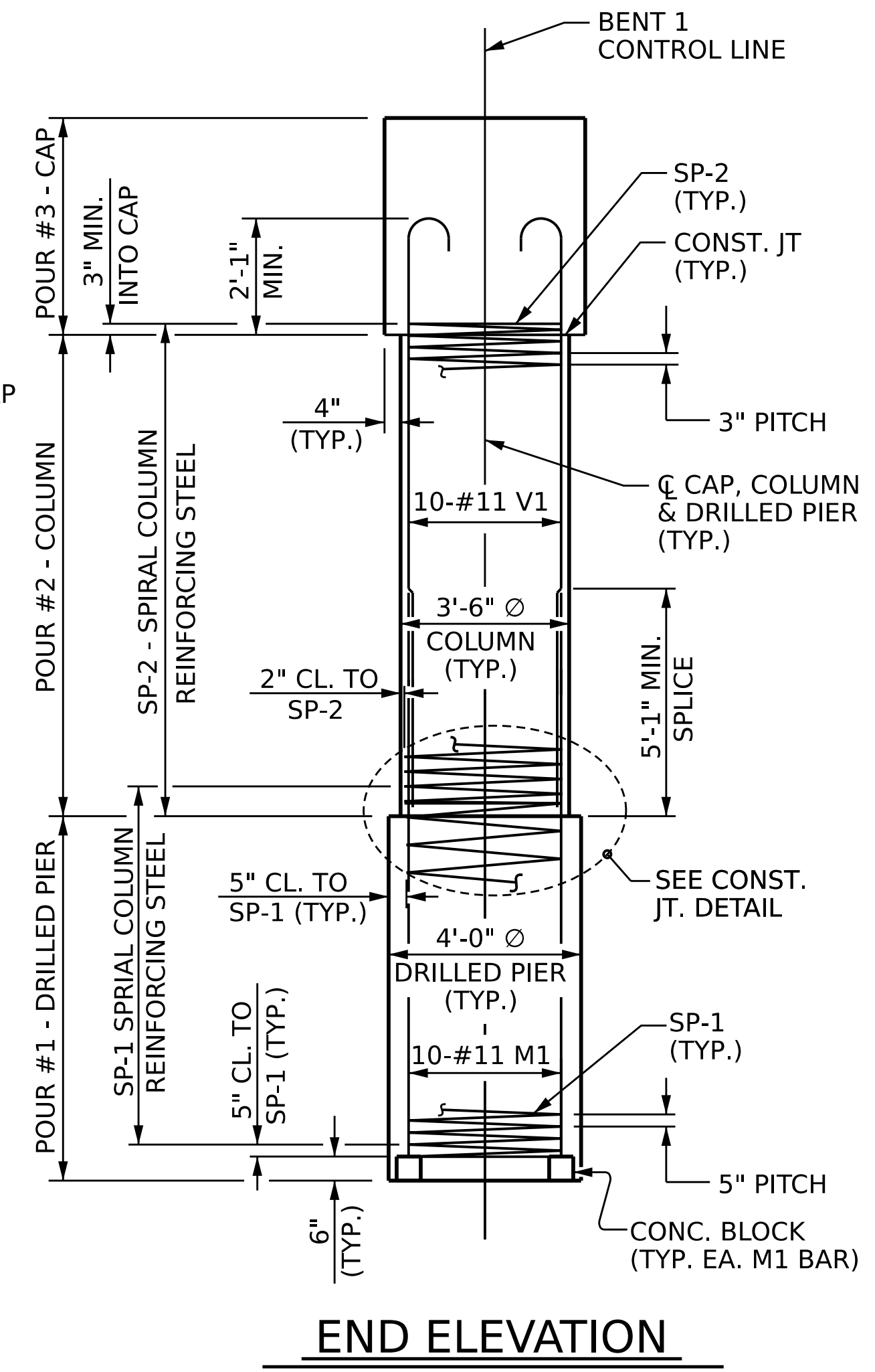
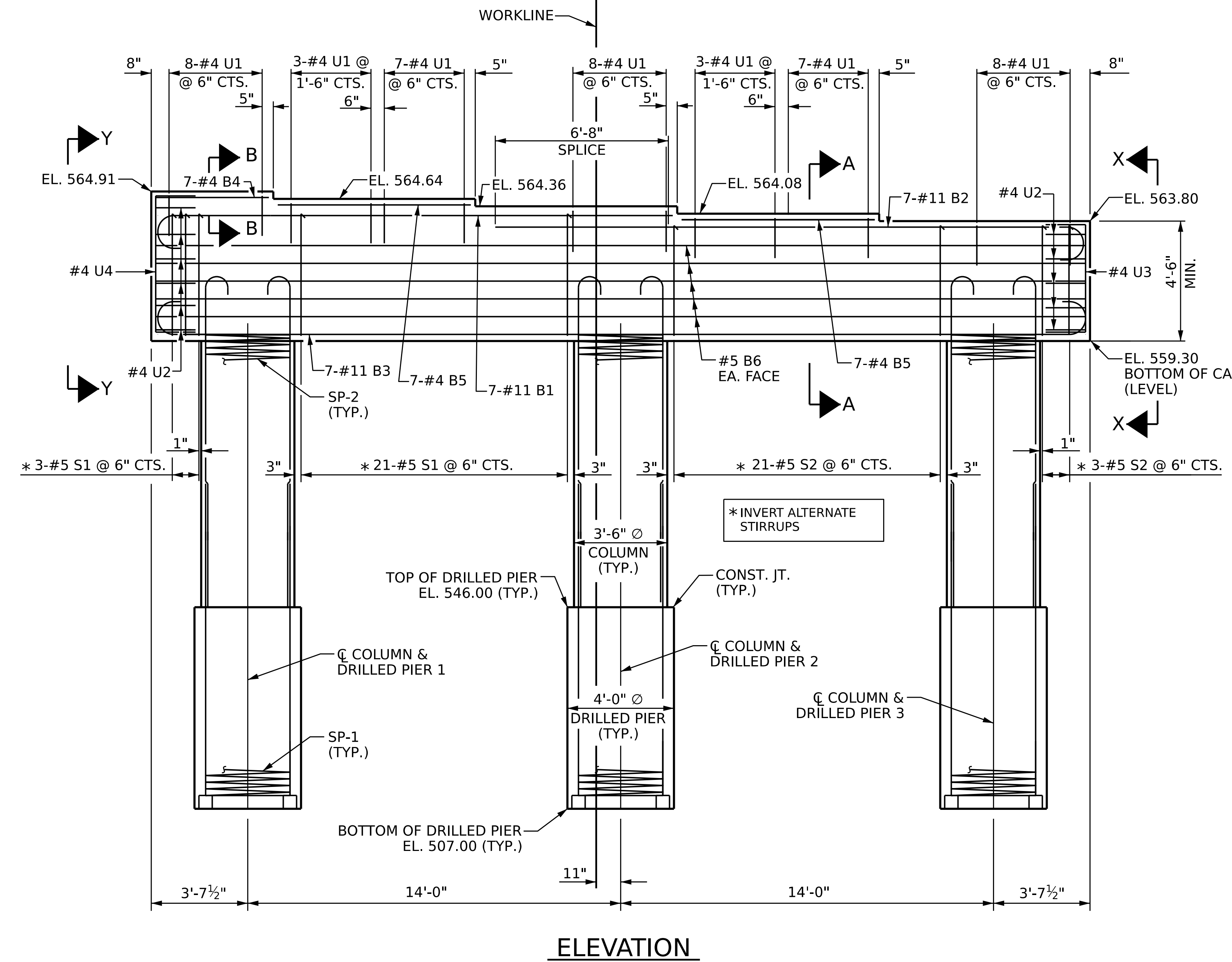
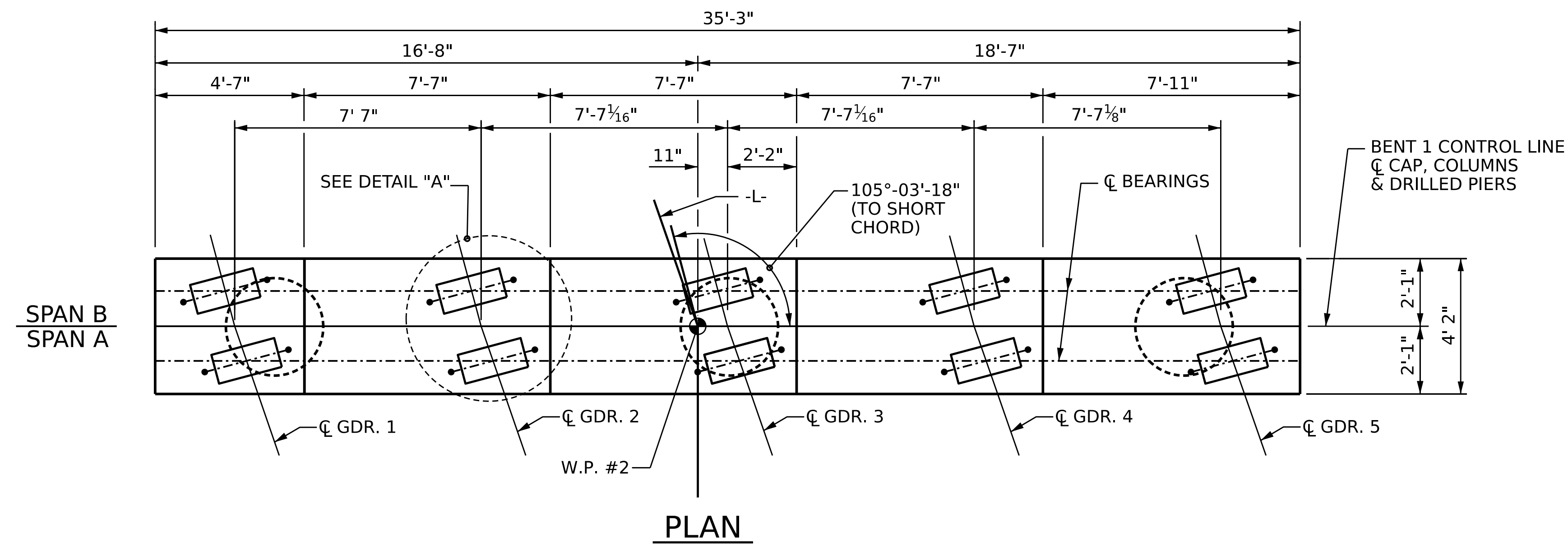
DRAWN BY : Q. T. NGUYEN DATE : 05/2022  
 CHECKED BY : F. LEA DATE : 11/2022  
 DESIGN ENGINEER OF RECORD : F. LEA DATE : 04/2022

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

TOTAL SHEETS 31





**NOTES:**

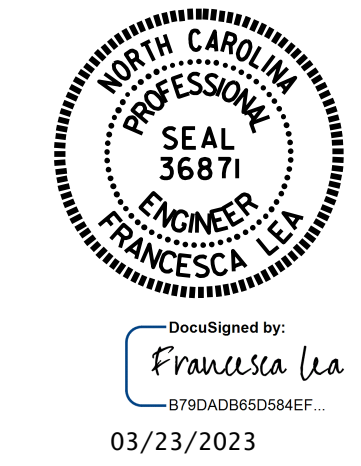
- STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
- HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
- ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL" OR "EPOXY COATED SPIRAL COLUMN REINFORCING STEEL".
- THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.
- SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIER WILL NOT BE PERMITTED.
- THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.
- NO SEPARATE PAYMENT SHALL BE MADE FOR ANY ADDITIONAL STEEL REQUIRED IN CONSTRUCTION OF DRILLED PIER AS THIS IS CONSIDERED INCIDENTAL TO THE LINEAR FOOT PRICE FOR DRILLED PIER.

DRAWN BY : Q. T. NGUYEN DATE : 04/2022  
 CHECKED BY : F. LEA DATE : 12/2022  
 DESIGN ENGINEER OF RECORD : F. LEA DATE : 08/2022

2/14/2023  
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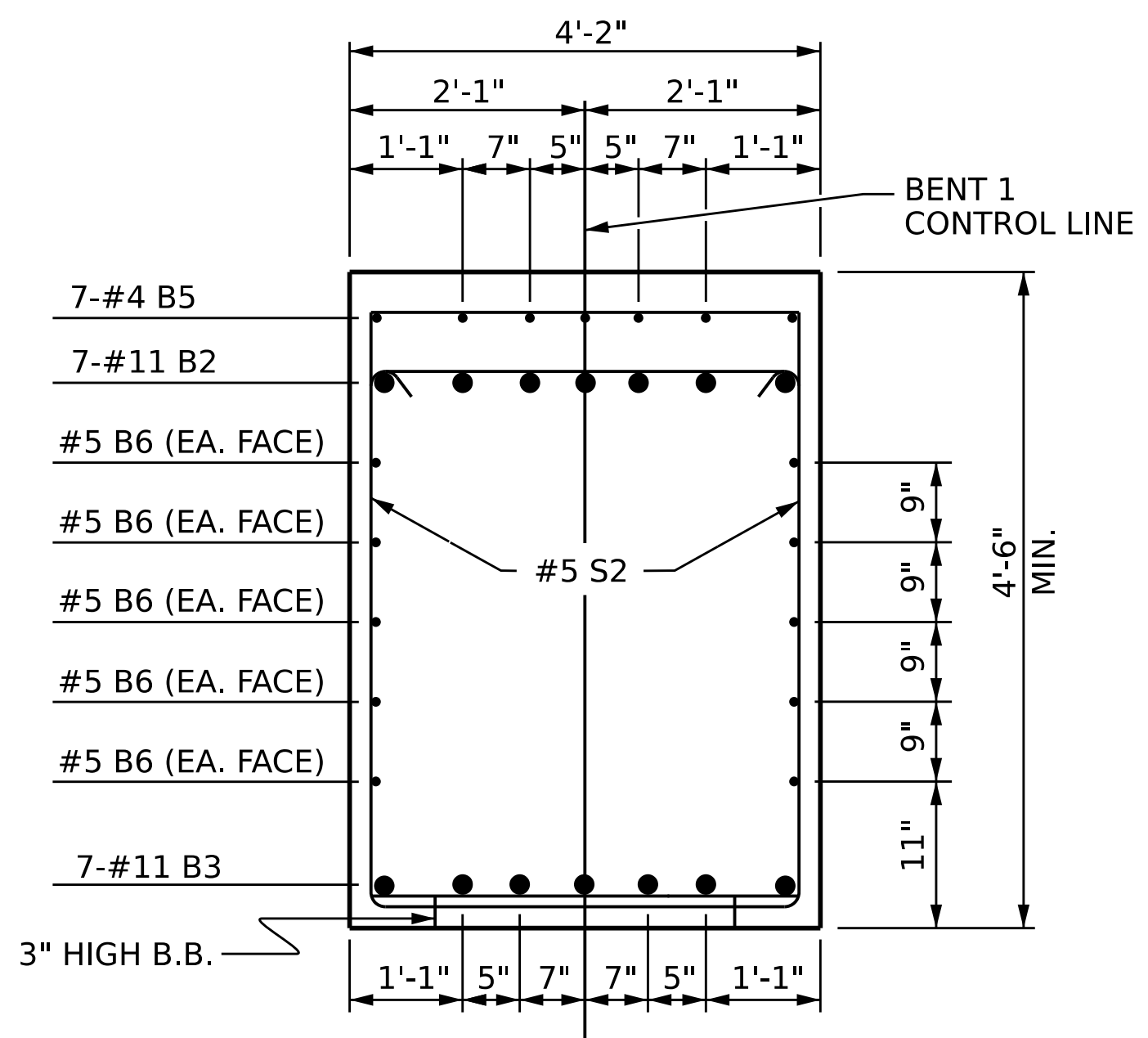
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-  
 SHEET 1 OF 2

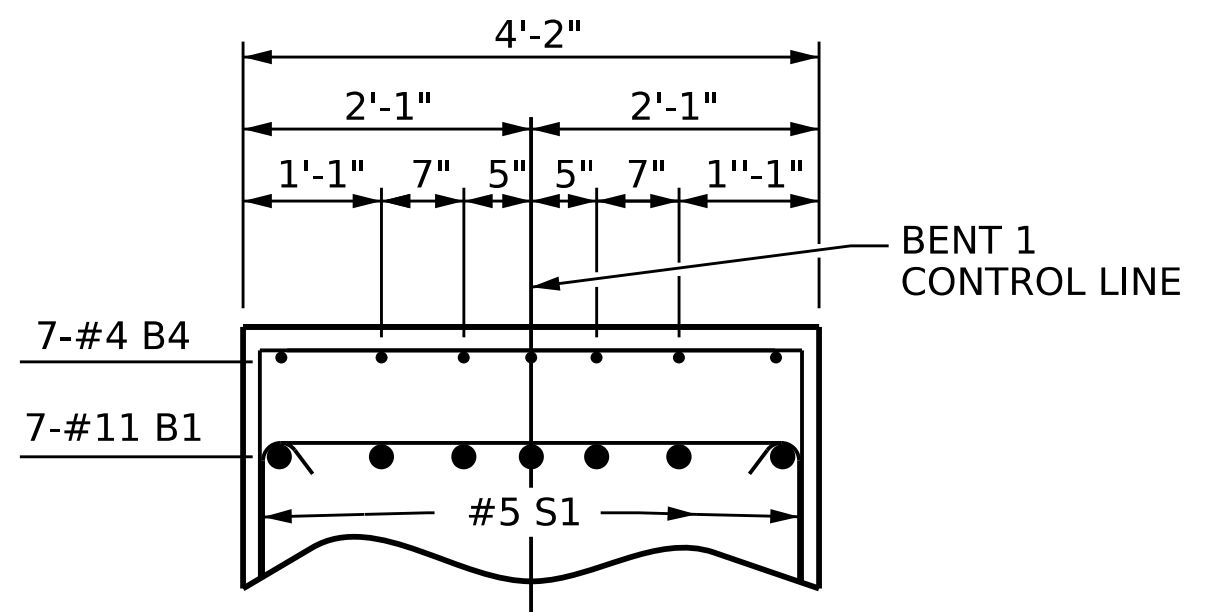


STATE OF NORTH CAROLINA		DEPARTMENT OF TRANSPORTATION		RALEIGH	
SUBSTRUCTURE					
BENT 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

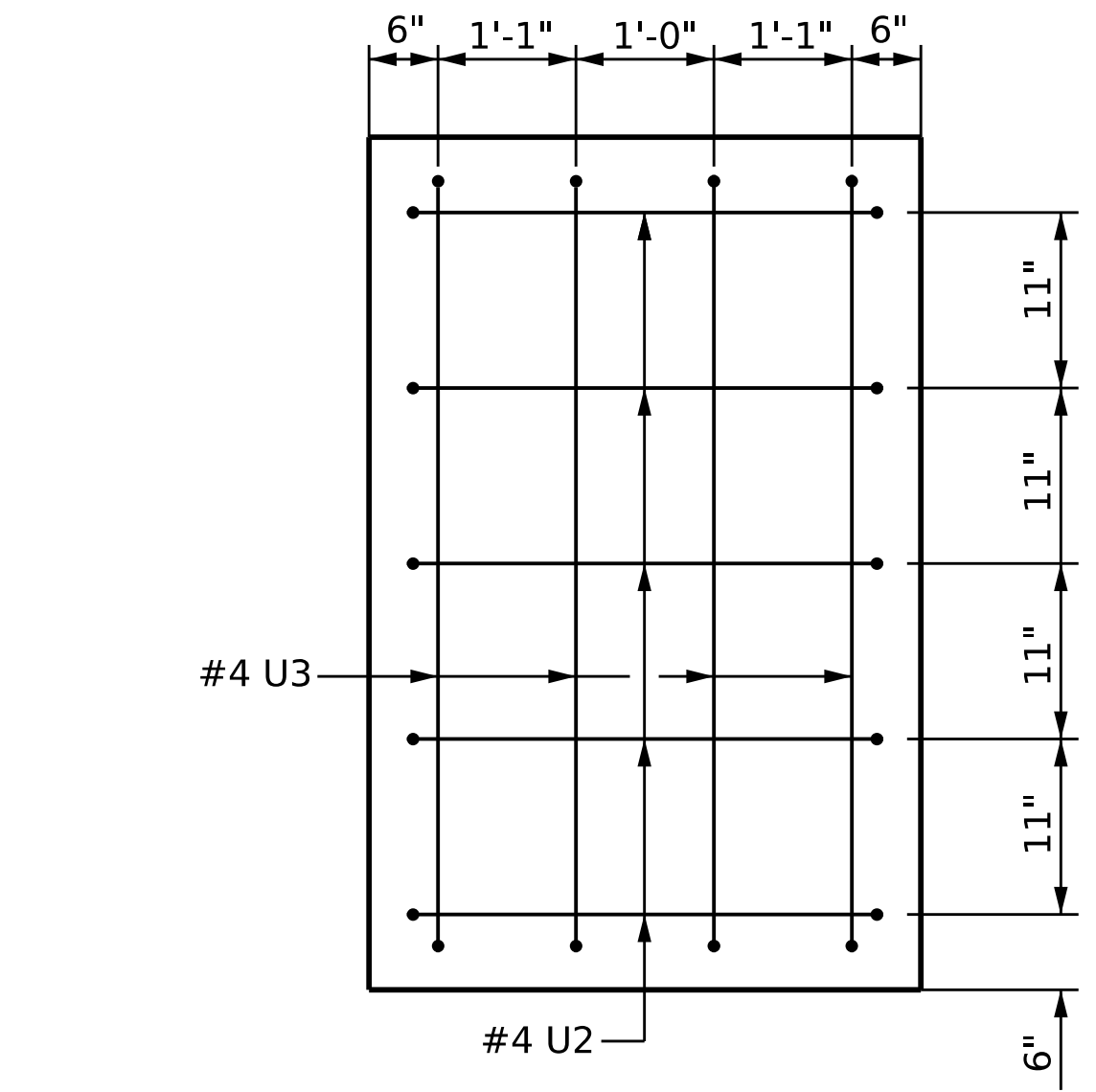
SHEET NO. S-24  
 TOTAL SHEETS 31



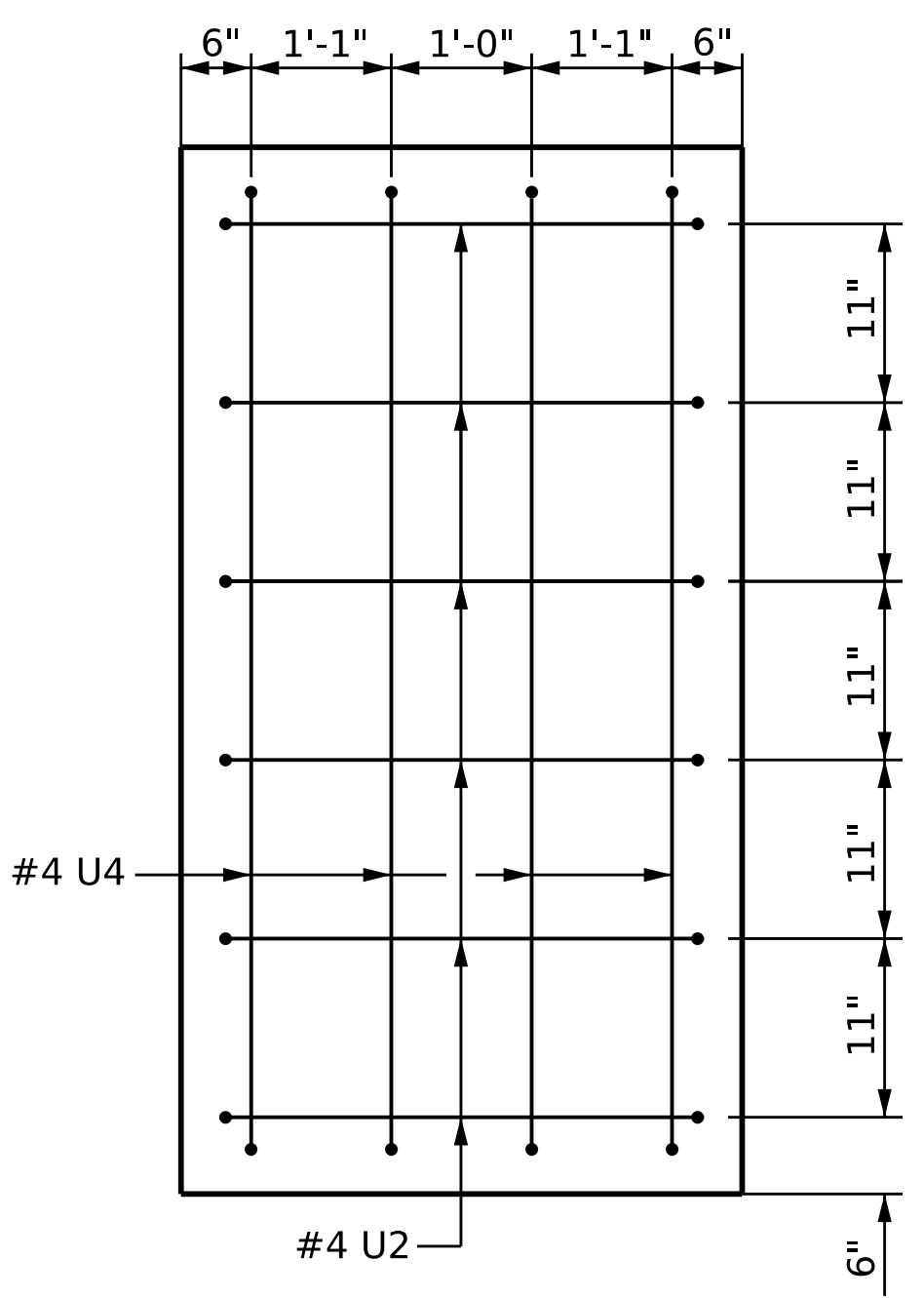
**SECTION A-A**



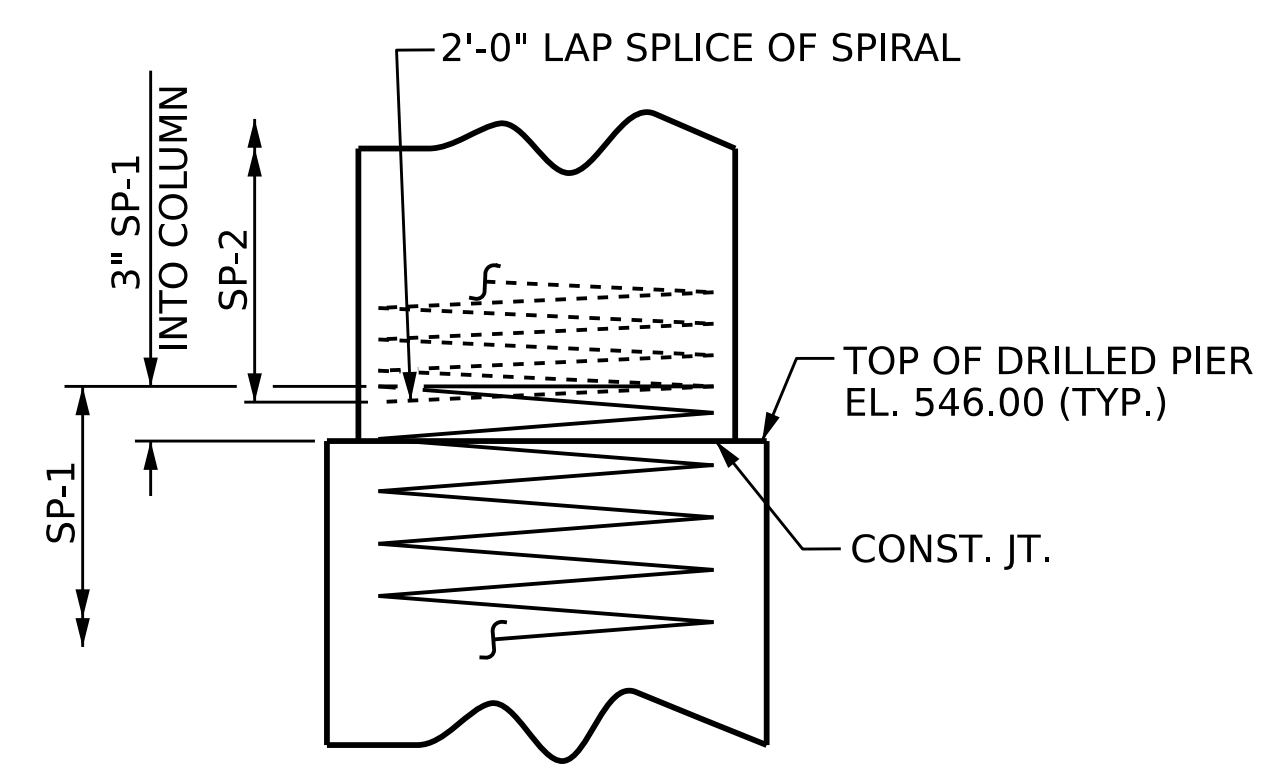
**PARTIAL SECTION B-B**



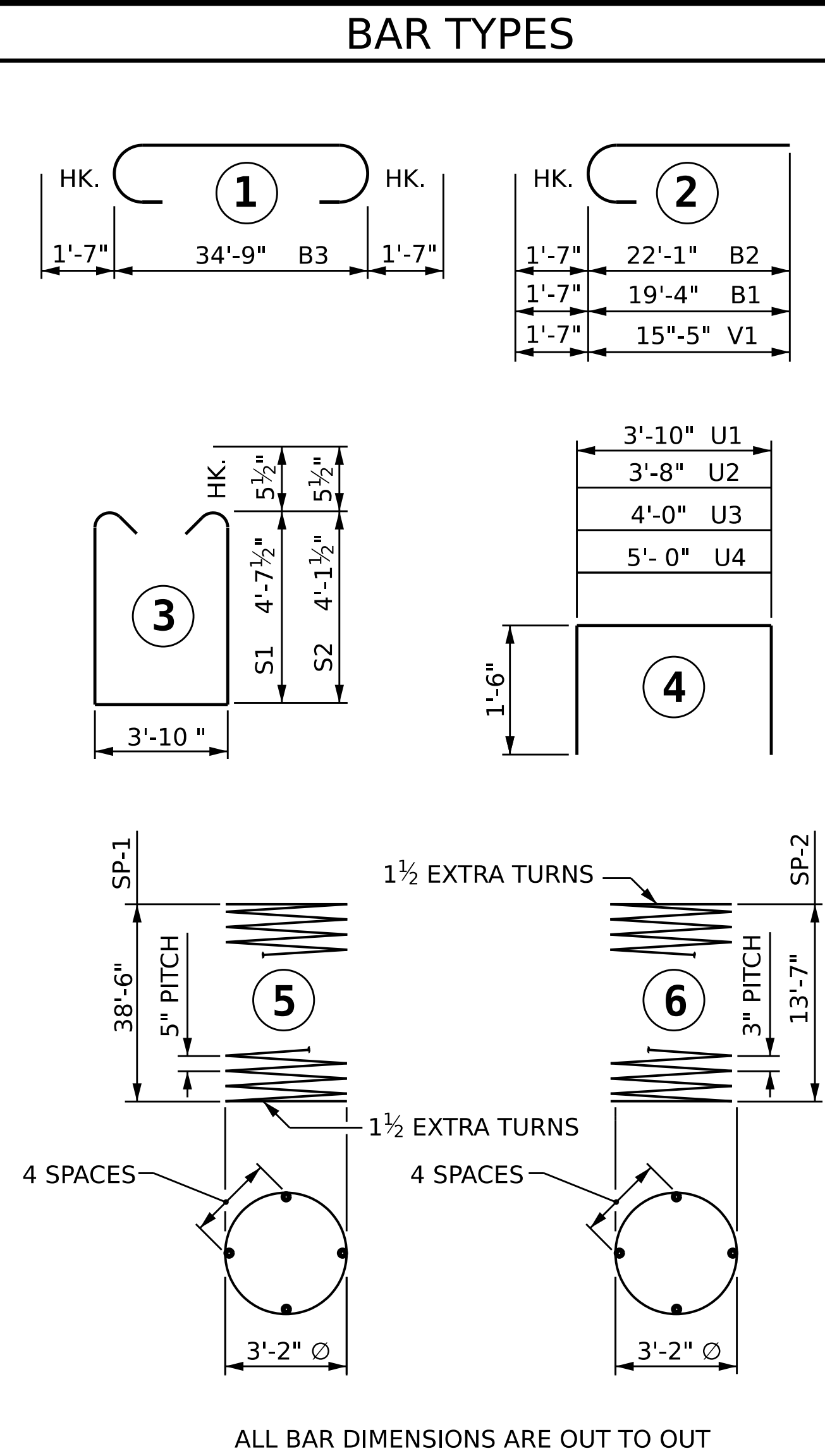
**SECTION X-X**



**SECTION Y-Y**



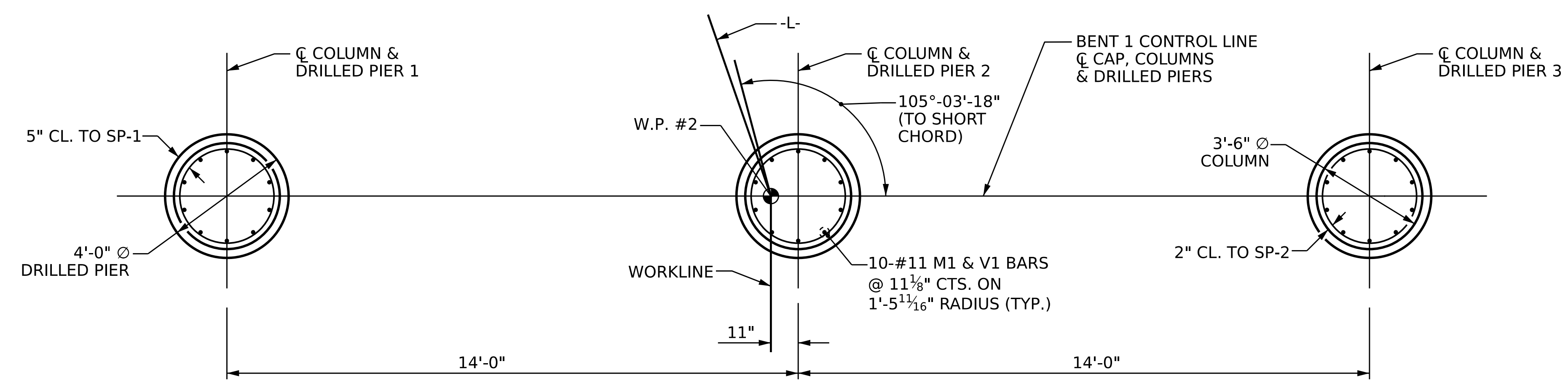
**CONSTRUCTION JOINT DETAIL**



ALL BAR DIMENSIONS ARE OUT TO OUT

\* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.  
 \*\* THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

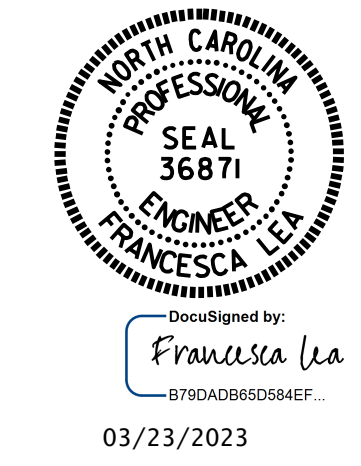
BILL OF MATERIAL					
BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	7	#11	2	20'-11"	778
B2	7	#11	2	23'-8"	880
B3	7	#11	1	37'-11"	1410
B4	7	#4	STR	4'-3"	20
B5	14	#4	STR	7'-5"	69
B6	10	#5	STR	34'-11"	364
M1	30	#11	STR	46'-10"	7465
S1	24	#5	3	13'-0"	325
S2	24	#5	3	14'-0"	350
U1	44	#4	4	6'-10"	201
U2	11	#4	4	6'-8"	49
U3	4	#4	4	7'-0"	19
U4	4	#4	4	8'-0"	21
V1	30	#11	2	17'-0"	2710
REINFORCING STEEL				LBS.	14,662
SP-1	3	*	5	920'-8"	2881
SP-2	3	**	6	550'-0"	1102
SPIRAL COLUMN REINFORCING STEEL				LBS.	3,983
CLASS A CONCRETE					
POUR #2 - COLUMN				CU. YDS.	14.2
POUR #3 - CAP				CU. YDS.	27.2
TOTAL				CU. YDS.	41.4
DRILLED PIER CONCRETE					
POUR #1 - DRILLED PIERS				CU. YDS.	54.5



**PLAN OF DRILLED PIERS AND COLUMNS**

(REINFORCING STEEL AND DIMENSIONS ARE TYPICAL FOR EACH DRILLED PIER AND COLUMN)

PROJECT NO. **B-5721**  
**ROCKINGHAM COUNTY**  
 STATION: **21+64.00 -L-**  
 SHEET 2 OF 2

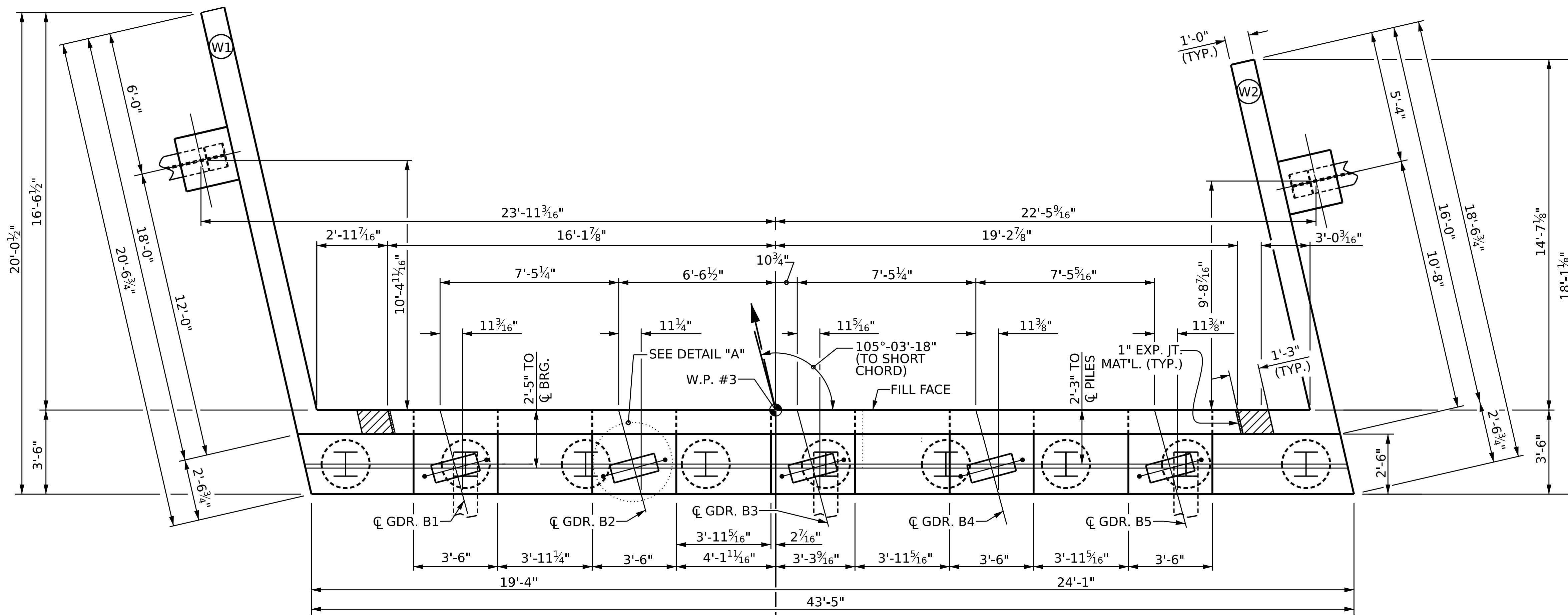


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUBSTRUCTURE**  
**BENT 1**

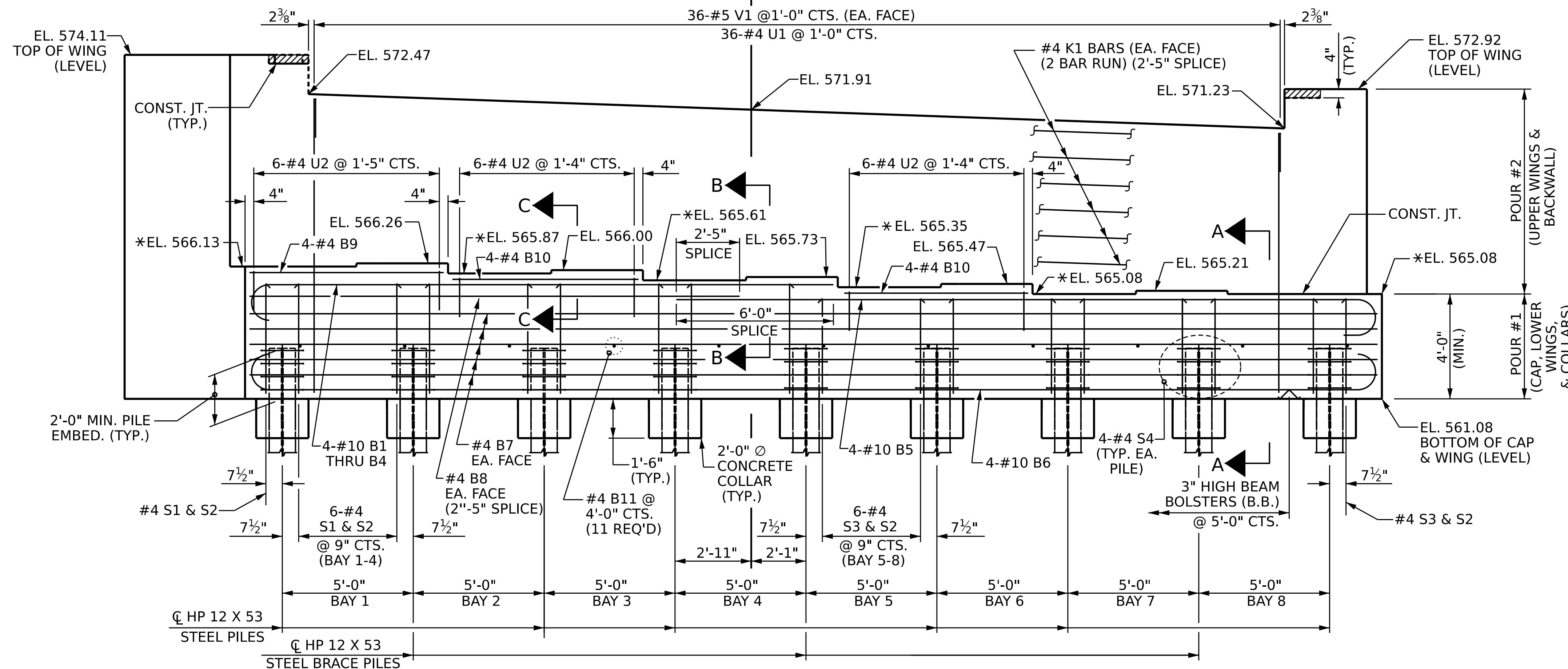
DRAWN BY: **Q. T. NGUYEN** DATE: **04/2022**  
 CHECKED BY: **F. LEA** DATE: **12/2022**  
 DESIGN ENGINEER OF RECORD: **F. LEA** DATE: **04/2022**

REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

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**PLAN**

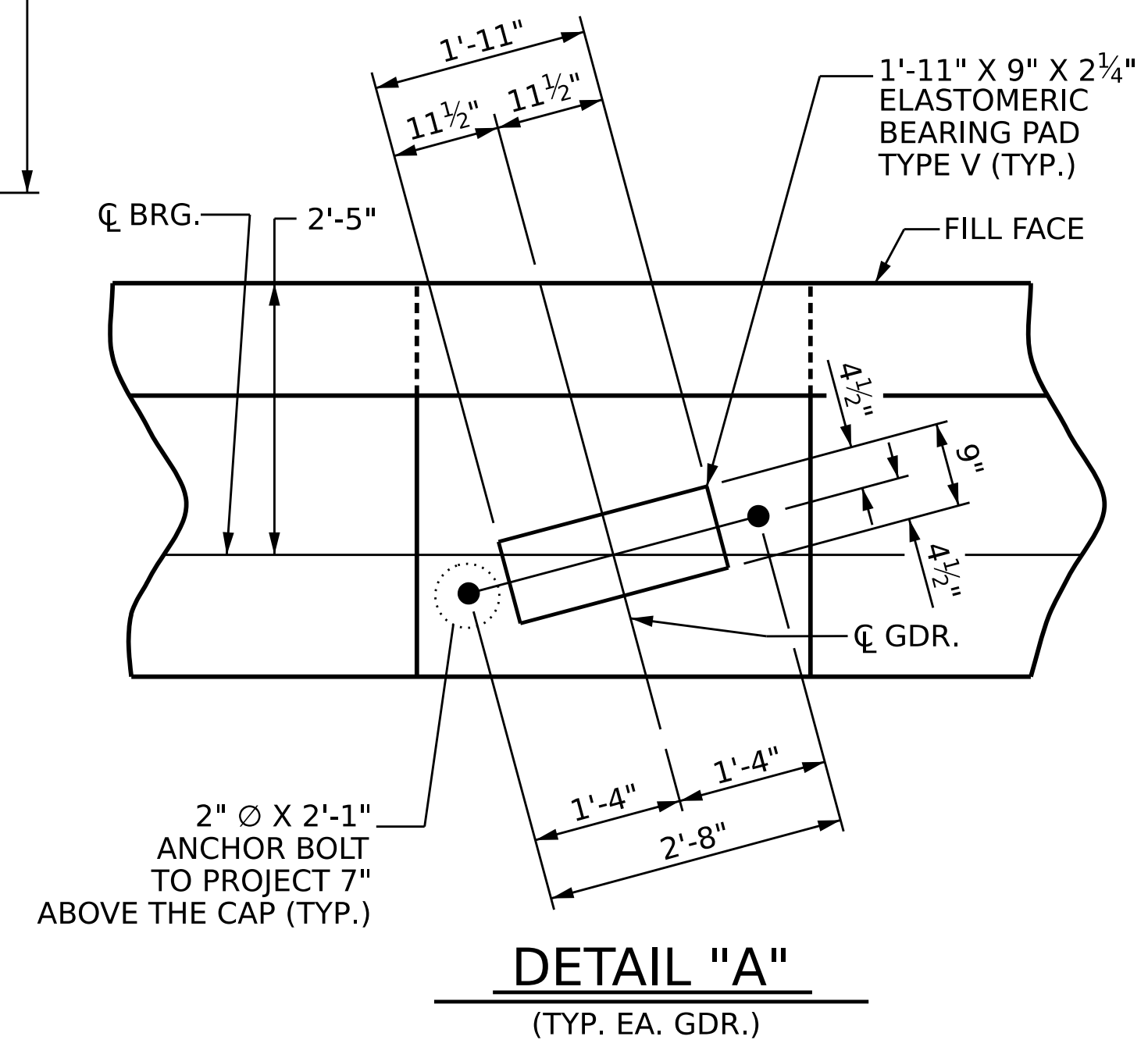


**ELEVATION**

(BRACE PILE IN WINGS NOT SHOWN FOR CLARITY)

**NOTES**

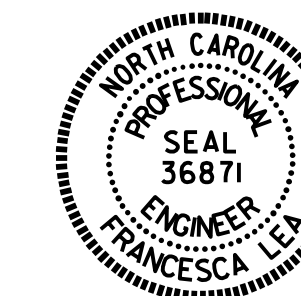
- \* FOR LOCATION OF ELEVATION BETWEEN BRIDGE SEAT BUILDUPS, SEE SECTION A-A ON SHEET 3 OF 3.
- STIRRUPS AND U2 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
- FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.
- BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.
- THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.
- THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.
- THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAIL ARE CAST IF SLIP FORMING IS USED.



**DETAIL "A"**

(TYP. EA. GDR.)

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-  
 SHEET 1 OF 3



DocuSigned by:  
 Francesca Lea  
 8790AD865084EF  
 03/23/2023

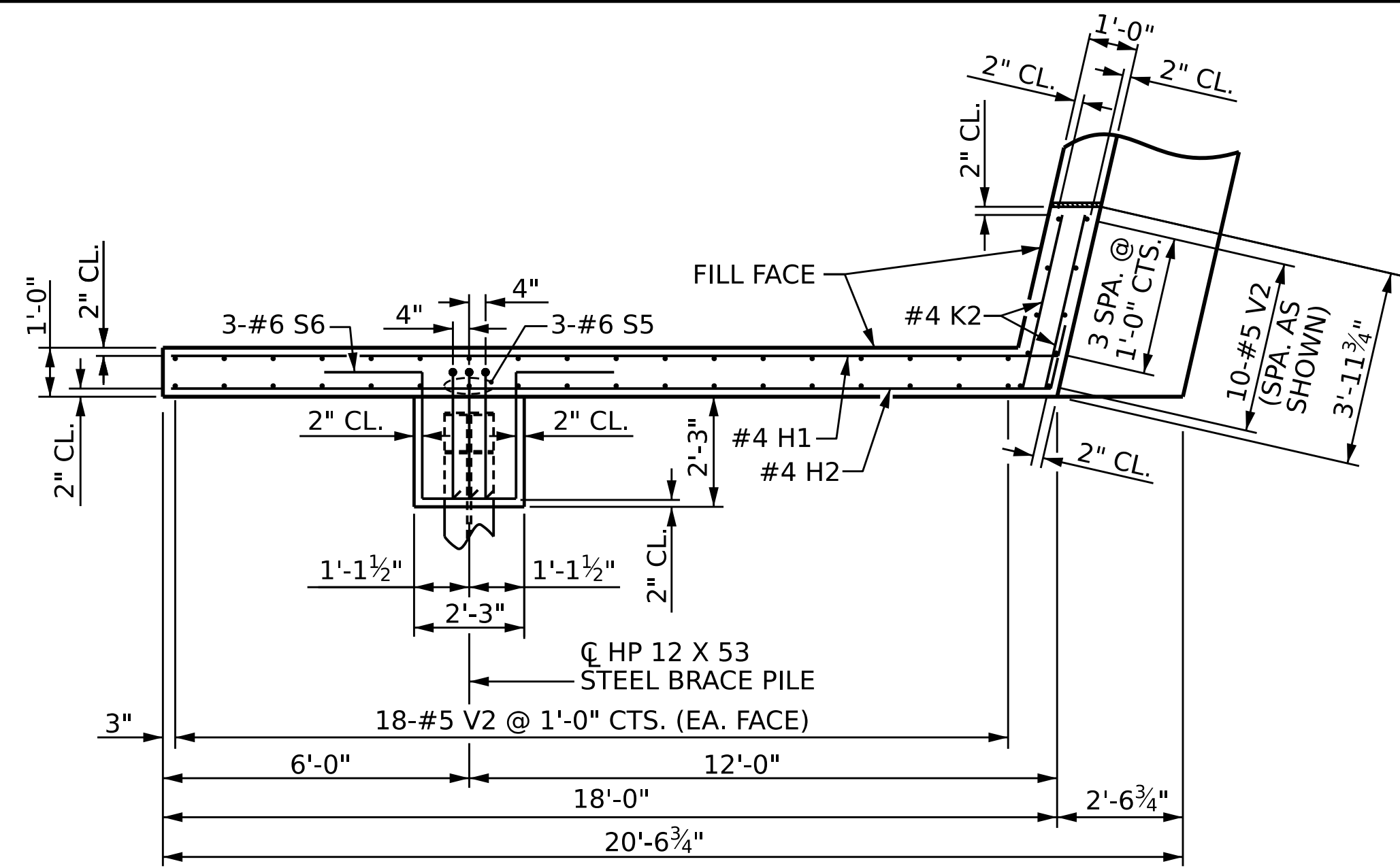
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUBSTRUCTURE**  
**END BENT 2**

REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

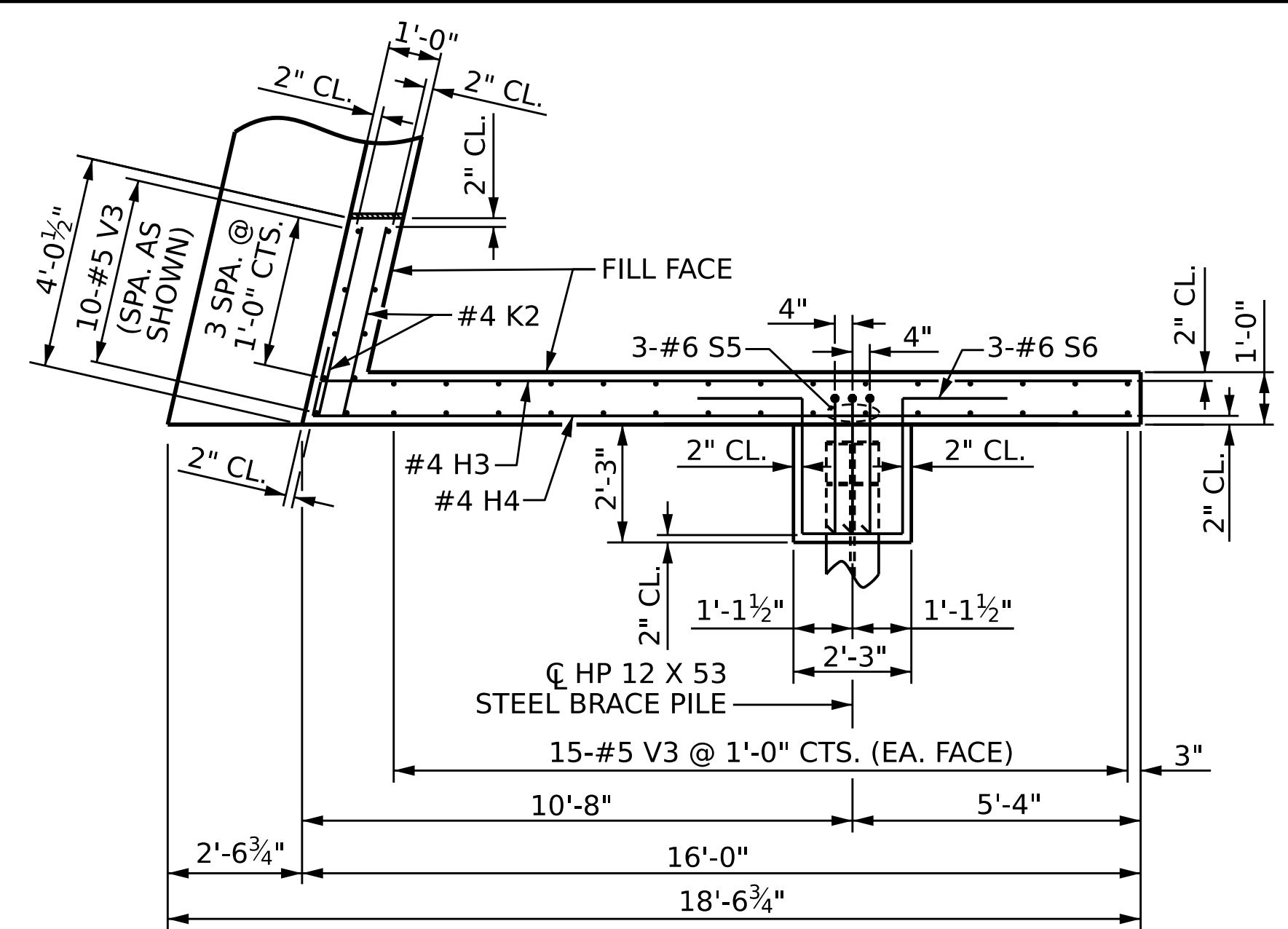
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : Q. T. NGUYEN DATE : 05/2022  
 CHECKED BY : F. LEA DATE : 12/2022  
 DESIGN ENGINEER OF RECORD : F. LEA DATE : 04/2022

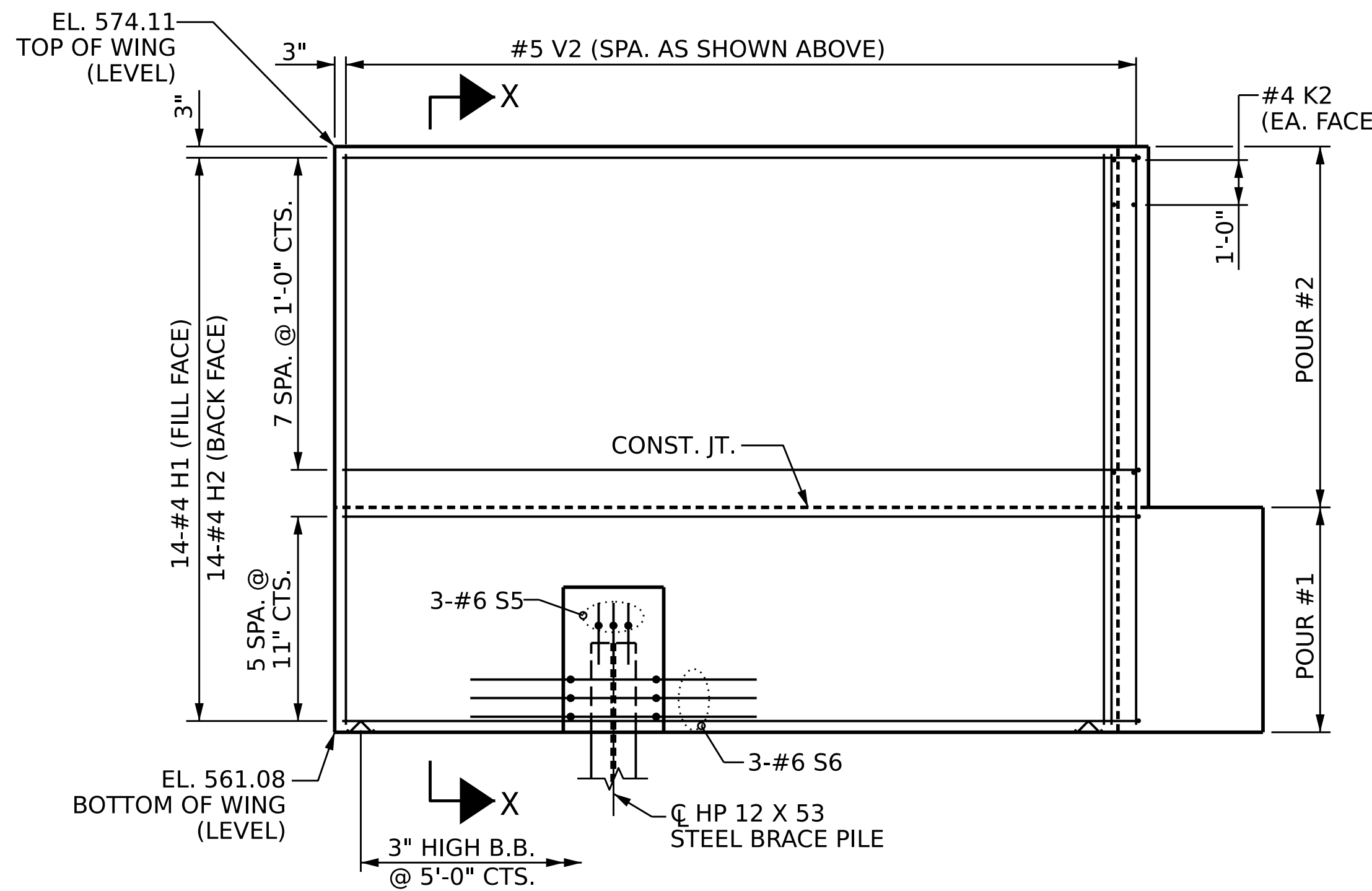
2/14/2023  
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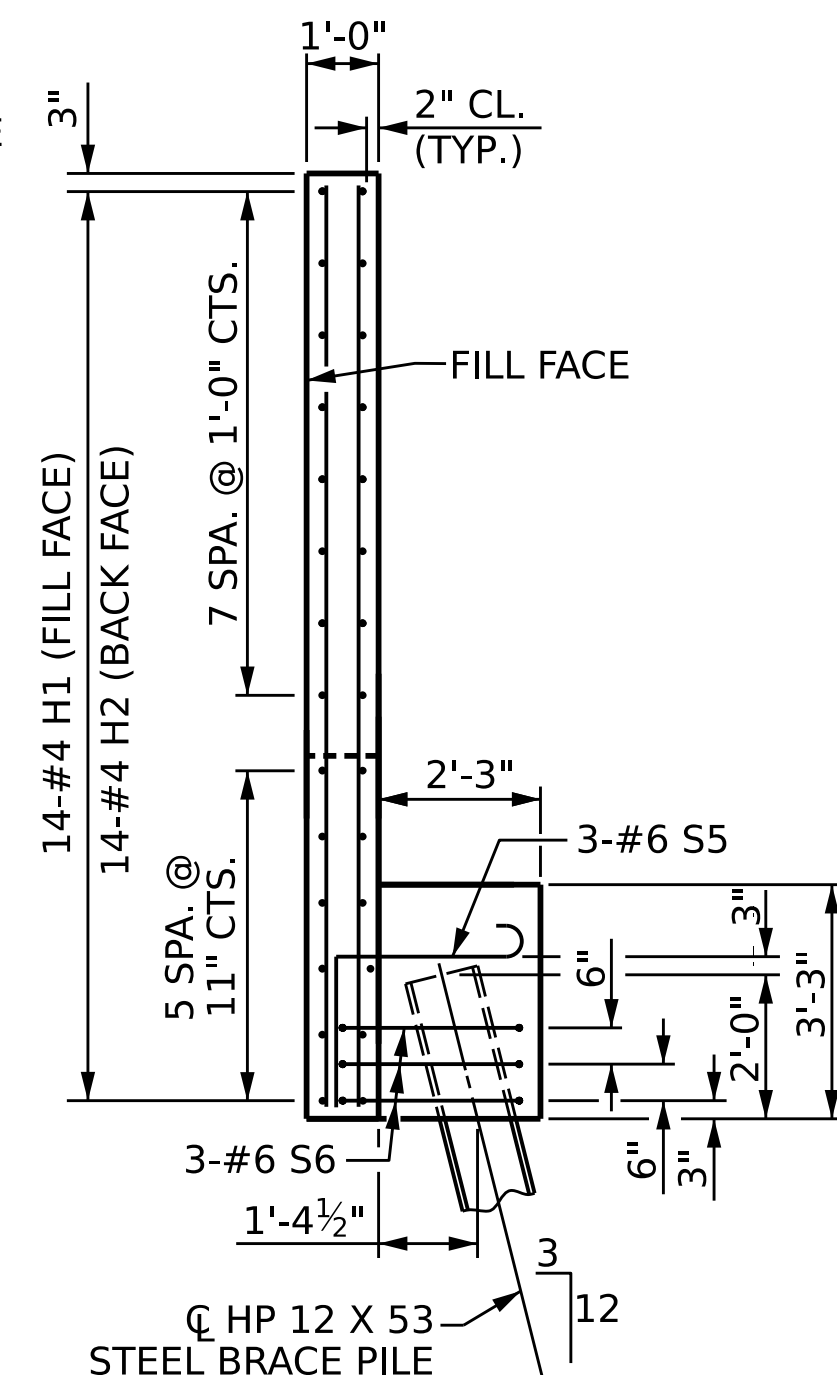
PLAN OF WING (W1)



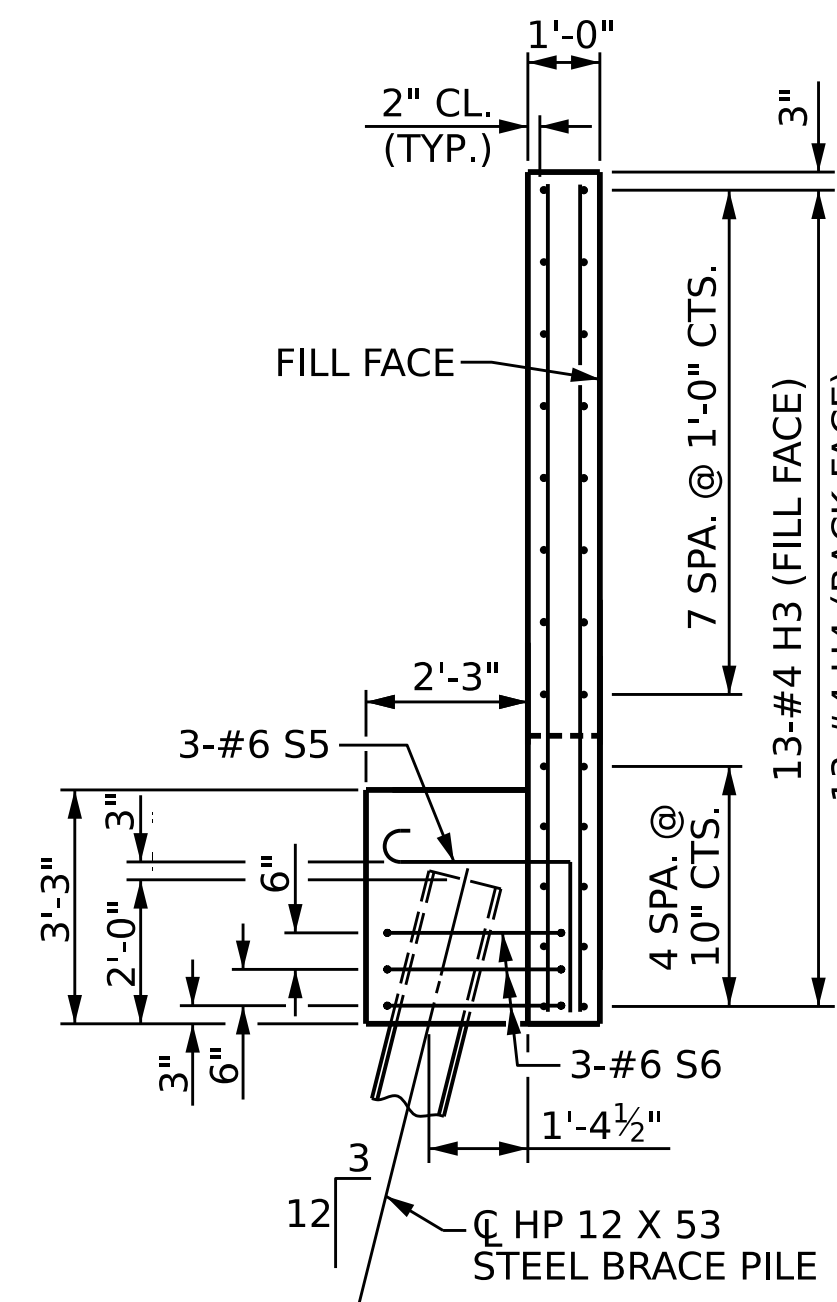
PLAN OF WING (W2)



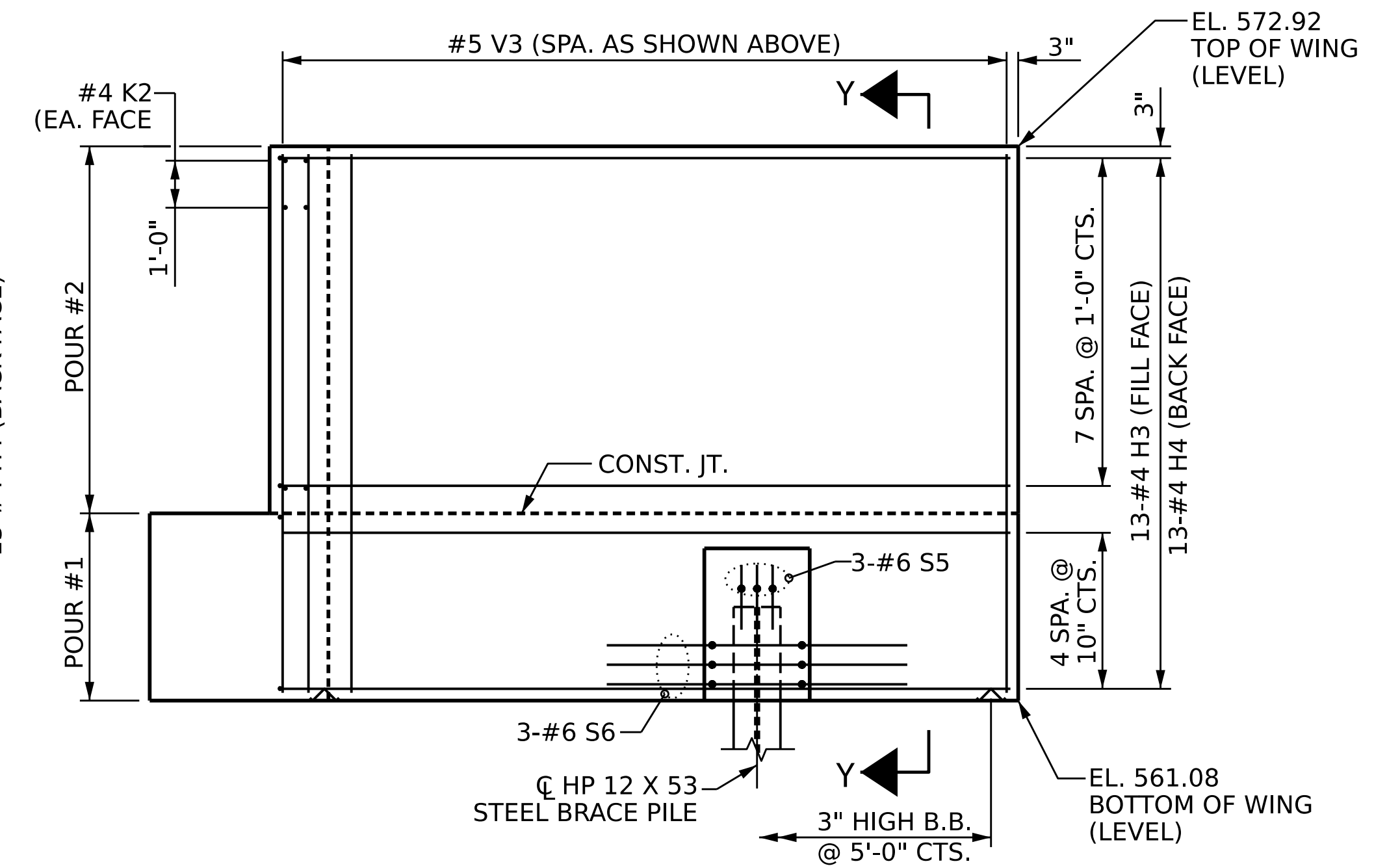
ELEVATION OF WING (W1)



SECTION X-X

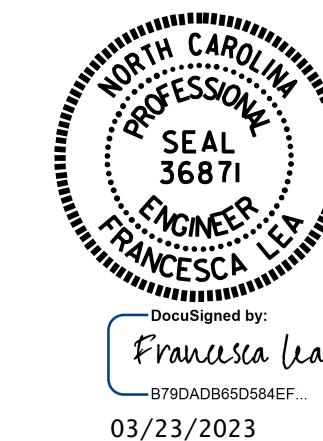


SECTION Y-Y



ELEVATION OF WING (W2)

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
 STATION: 21+64.00 -L-  
 SHEET 2 OF 3

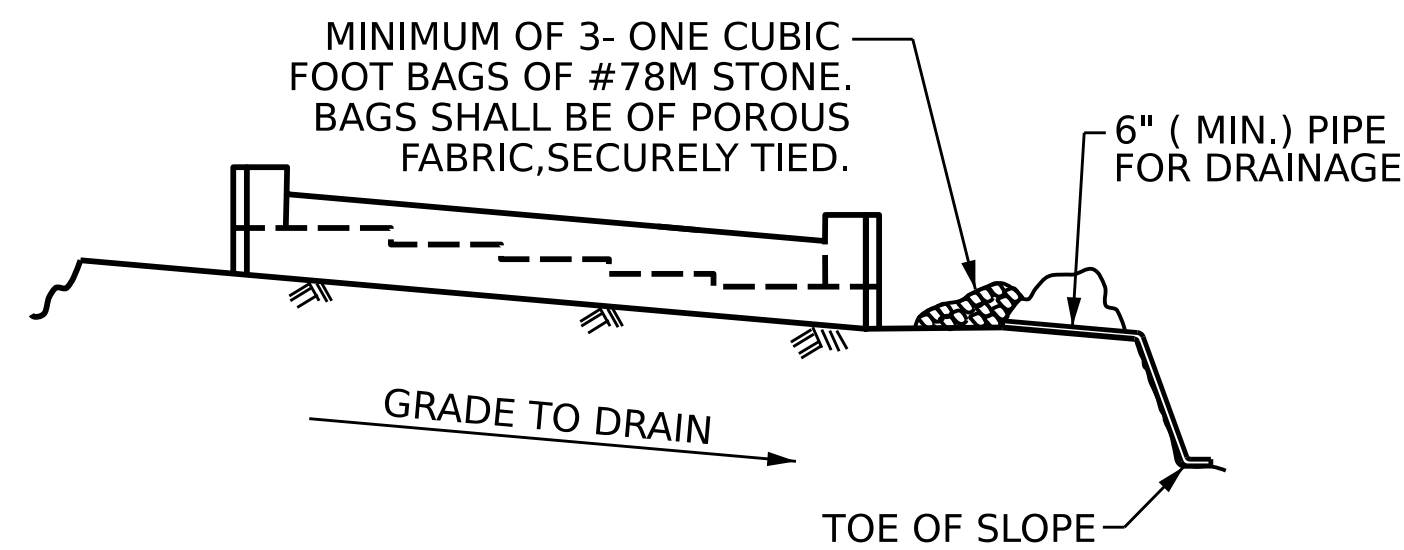


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2

DRAWN BY : Q. T. NGUYEN DATE : 05/2022  
 CHECKED BY : F. LEA DATE : 12/2022  
 DESIGN ENGINEER OF RECORD : F. LEA DATE : 04/2022

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 SIGNATURES COMPLETED

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1			S-27
2			TOTAL SHEETS
			31

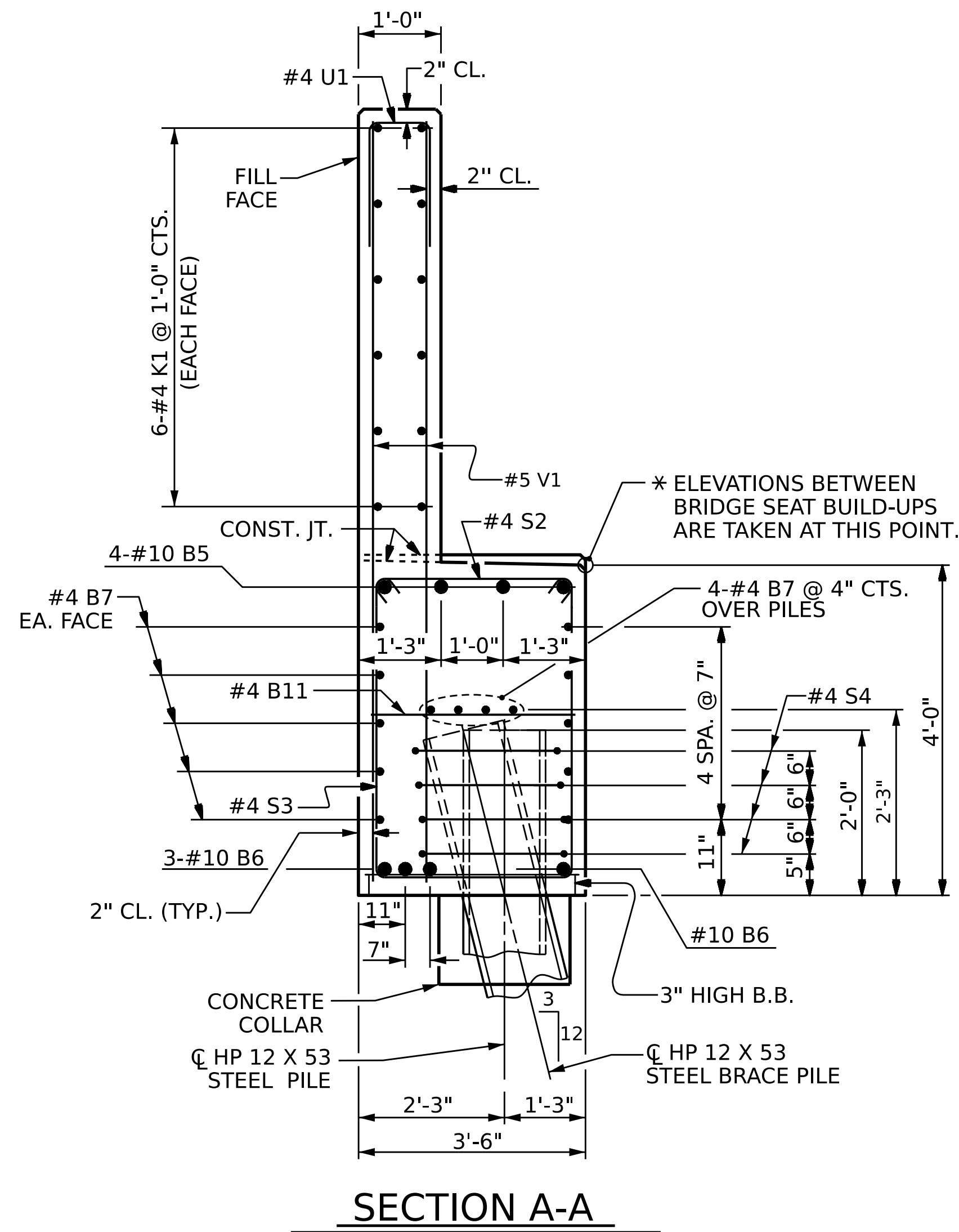


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

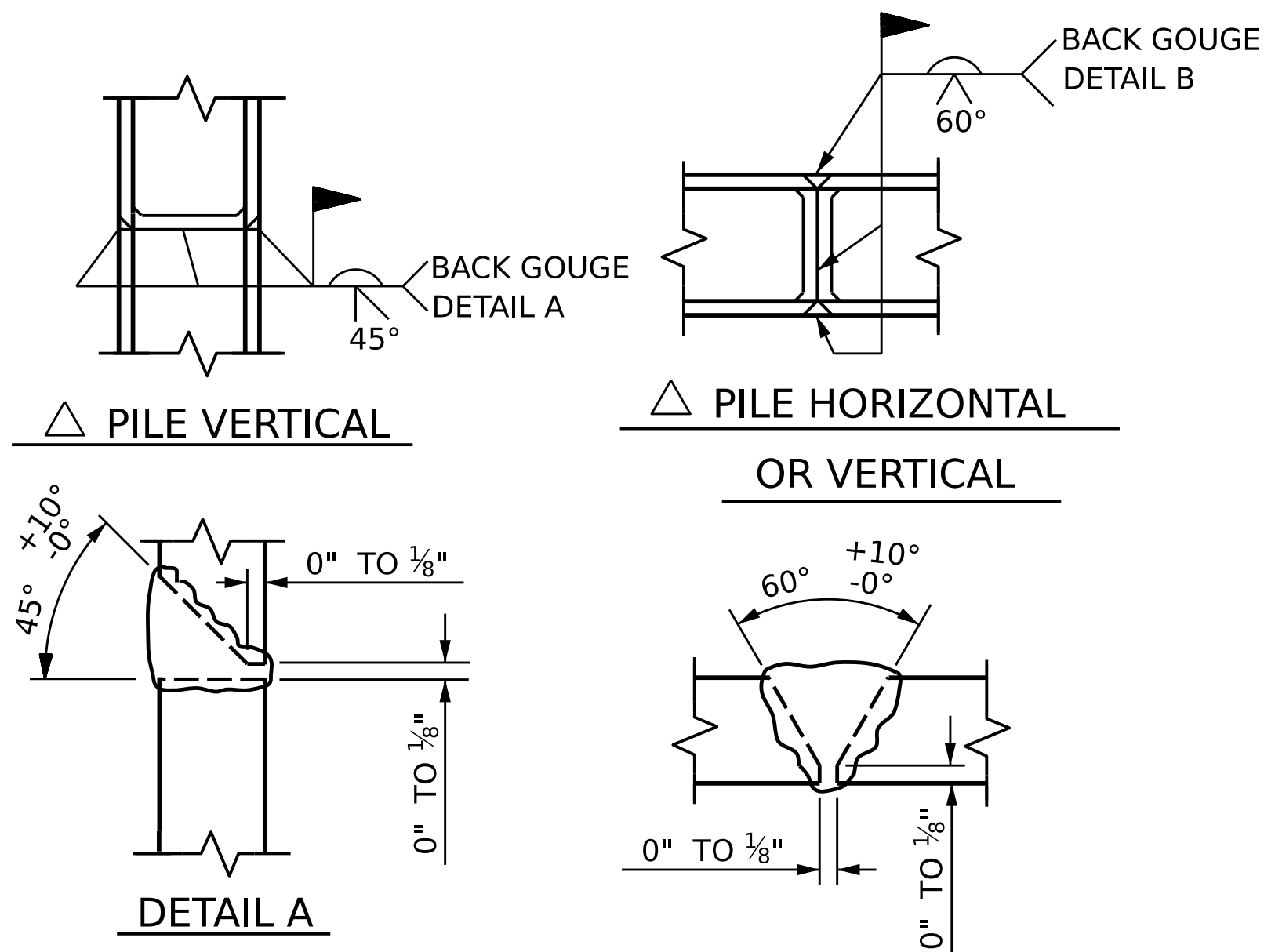
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT

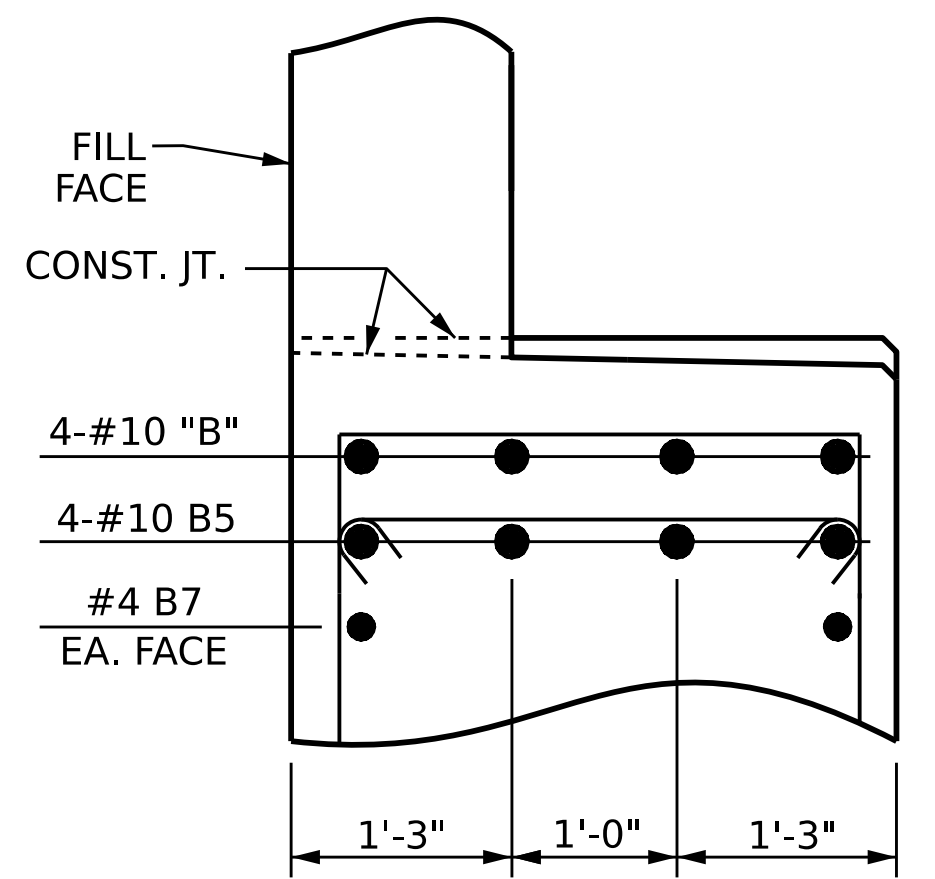


SECTION A-A

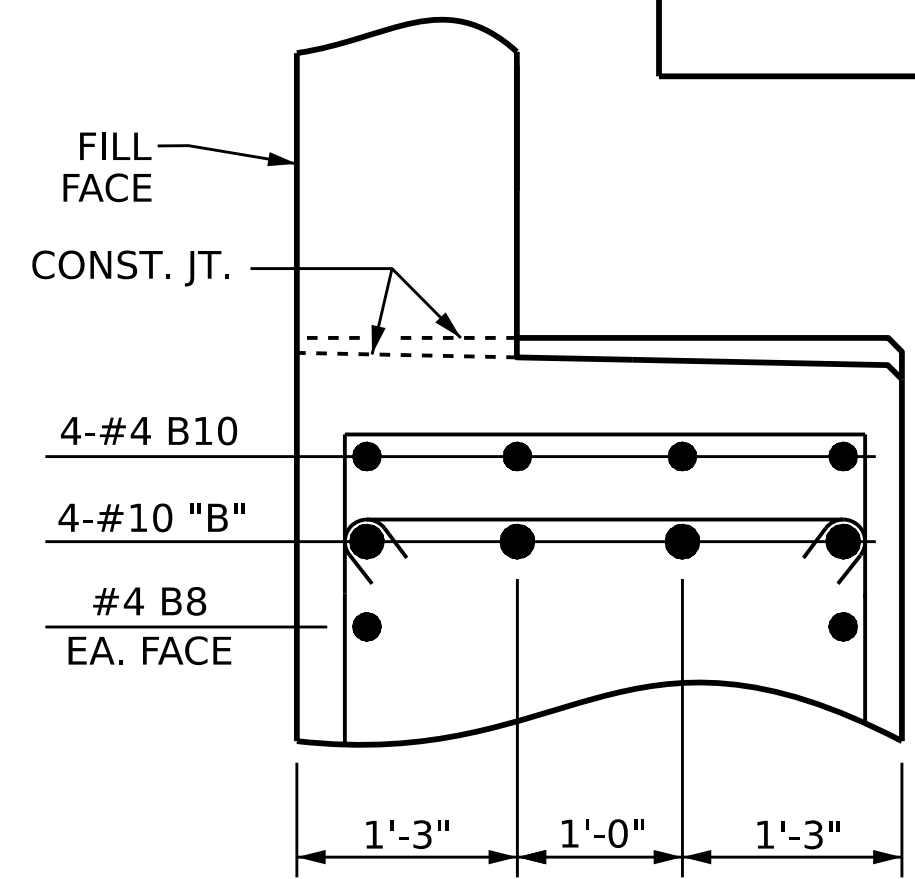


△ POSITION OF PILE DURING WELDING.

### PILE SPLICE DETAILS

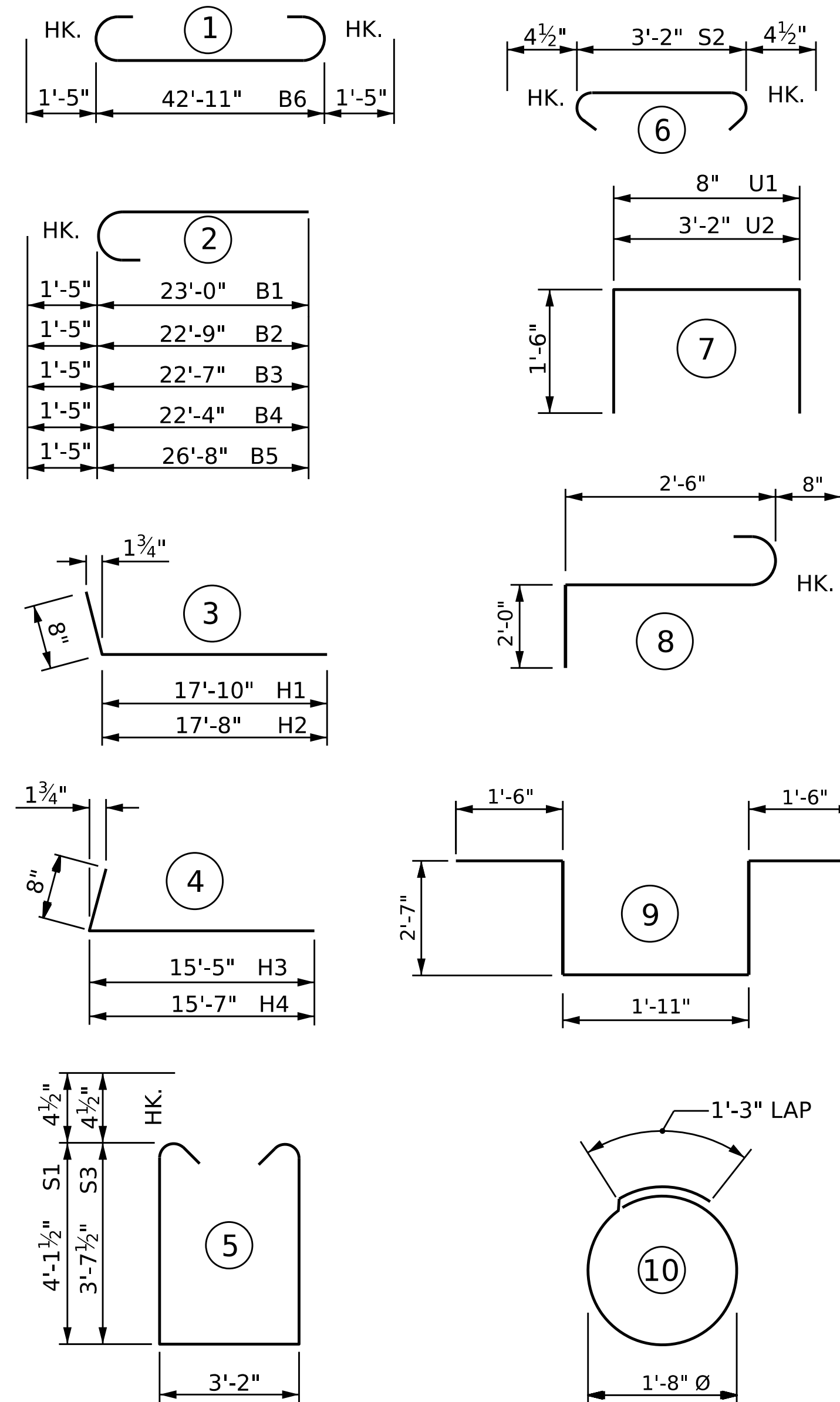


PARTIAL SECTION B-B



PARTIAL SECTION C-C

### BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

### BILL OF MATERIAL

#### END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	1	#10	2	24'-5"	105
B2	1	#10	2	24'-2"	104
B3	1	#10	2	24'-0"	103
B4	1	#10	2	23'-9"	102
B5	4	#10	2	28'-1"	483
B6	4	#10	1	45'-9"	787
B7	28	#4	STR	22'-9"	426
B8	2	#4	STR	18'-9"	25
B9	4	#4	STR	7'-5"	20
B10	8	#4	STR	7'-1"	38
B11	11	#4	STR	3'-2"	23
H1	14	#4	3	18'-5"	173
H2	14	#4	3	18'-10"	171
H3	13	#4	4	16'-1"	140
H4	13	#4	4	16'-3"	141
K1	24	#4	STR	22'-9"	365
K2	8	#4	STR	3'-7"	19
S1	22	#5	5	12'-2"	203
S2	51	#5	6	3'-11"	131
S3	29	#5	5	11'-2"	187
S4	32	#4	10	6'-6"	156
S5	6	#6	8	5'-2"	47
S6	6	#6	9	10'-1"	91
U1	37	#4	7	3'-8"	88
U2	18	#4	7	6'-2"	74
V1	74	#5	STR	9'-11"	745
V2	46	#5	STR	12'-8"	608
V3	42	#5	STR	11'-6"	480

REINFORCING STEEL LBS. 6,035

#### CLASS A CONCRETE

POUR #1 CU. YDS. 35.0  
(CAP, LOWER WINGS, & COLLARS)

POUR #2 CU. YDS. 19.9  
(UPPER WINGS & BACKWALL)

TOTAL CU. YDS. 54.9

PROJECT NO. B-5721

ROCKINGHAM COUNTY

STATION: 21+64.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE

END BENT 2



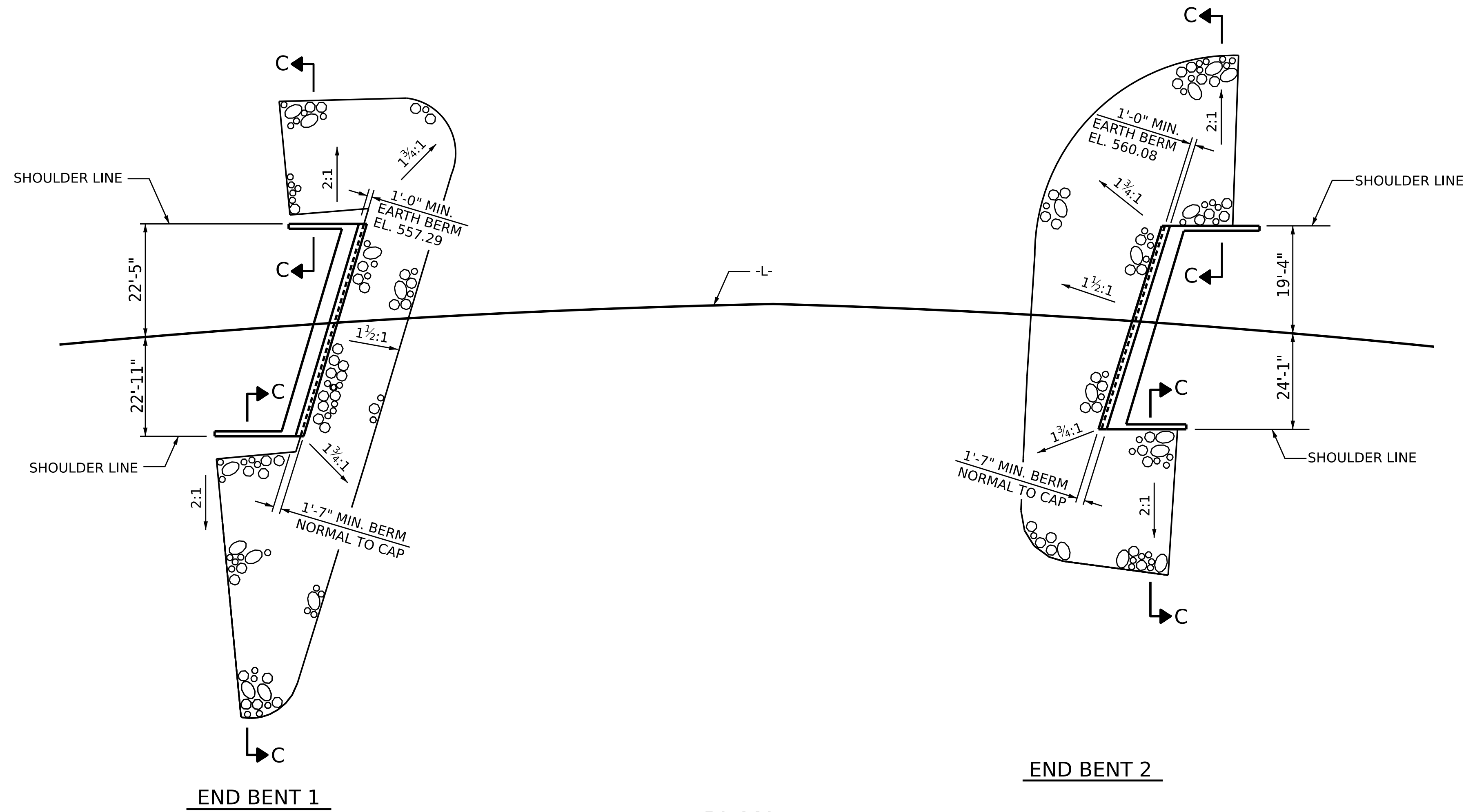
DocuSigned by:  
Francesca Lea  
03/23/2023

DRAWN BY : Q. T. NGUYEN DATE : 05/2022  
CHECKED BY : F. LEA DATE : 12/2022  
DESIGN ENGINEER OF RECORD : F. LEA DATE : 04/2022

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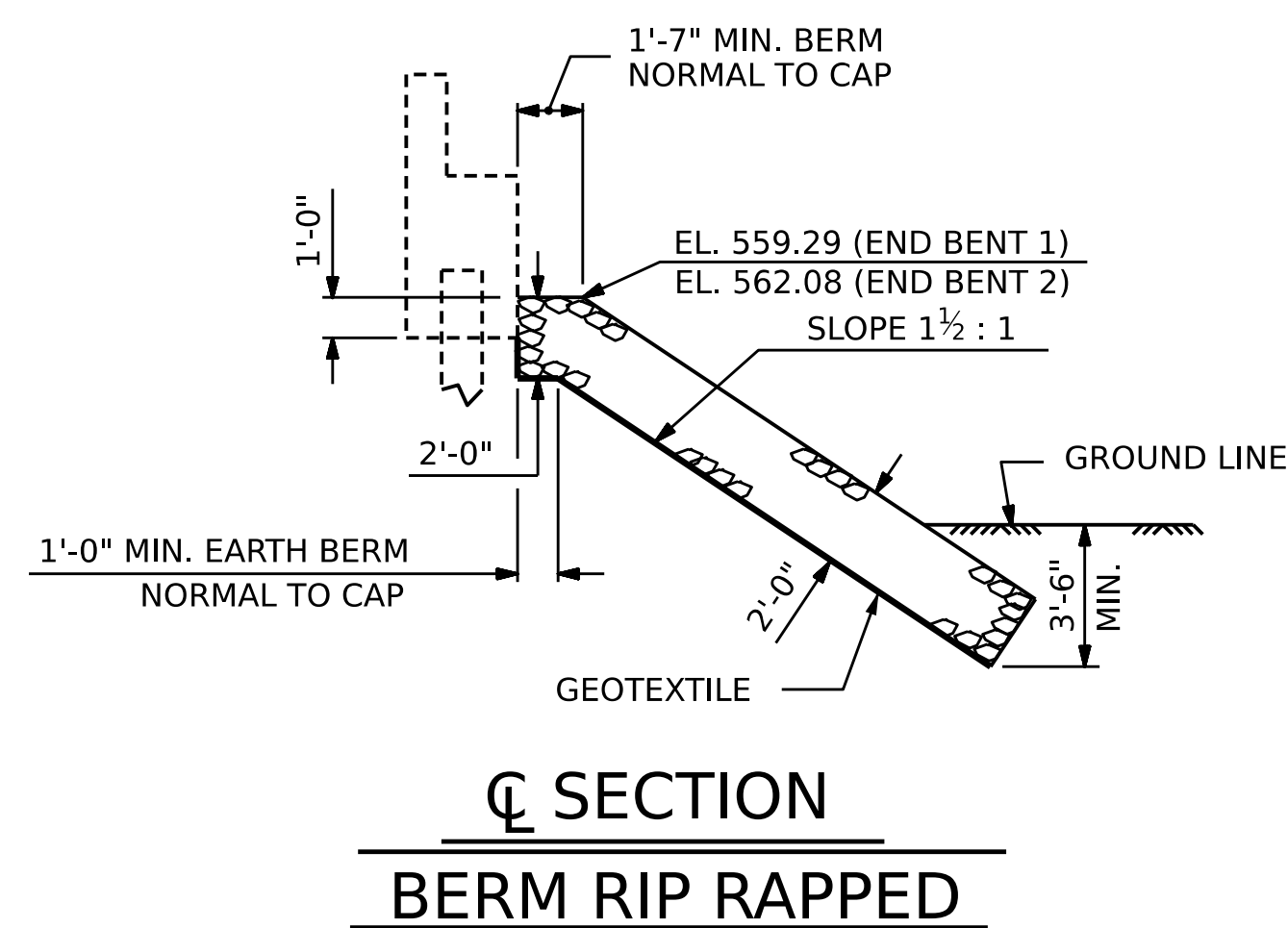
REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	S-28
1			3	TOTAL SHEETS
2			4	31

NOTES :  
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

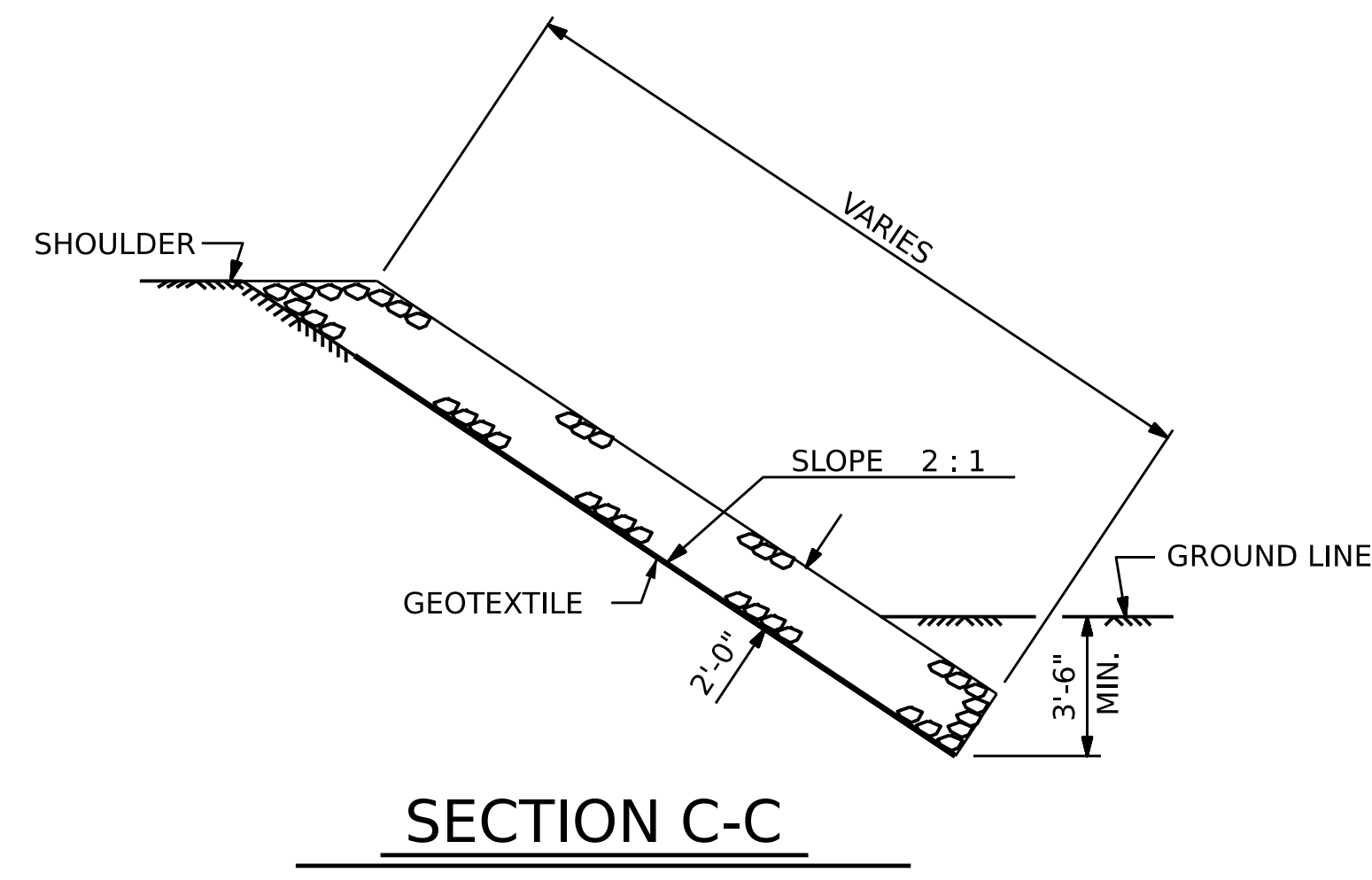


PLAN

ESTIMATED QUANTITIES		
BRIDGE @ STA. 21+64.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	395	435
END BENT 2	295	330

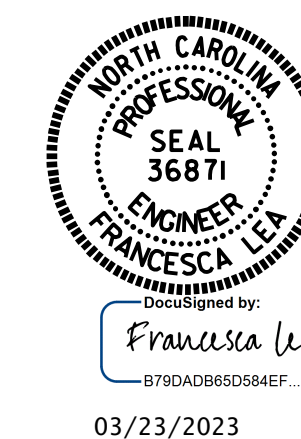


Q SECTION  
BERM RIP RAPPED



SECTION C-C

PROJECT NO. B-5721  
RORCKINGHAM COUNTY  
STATION: 21+64.00 -L-

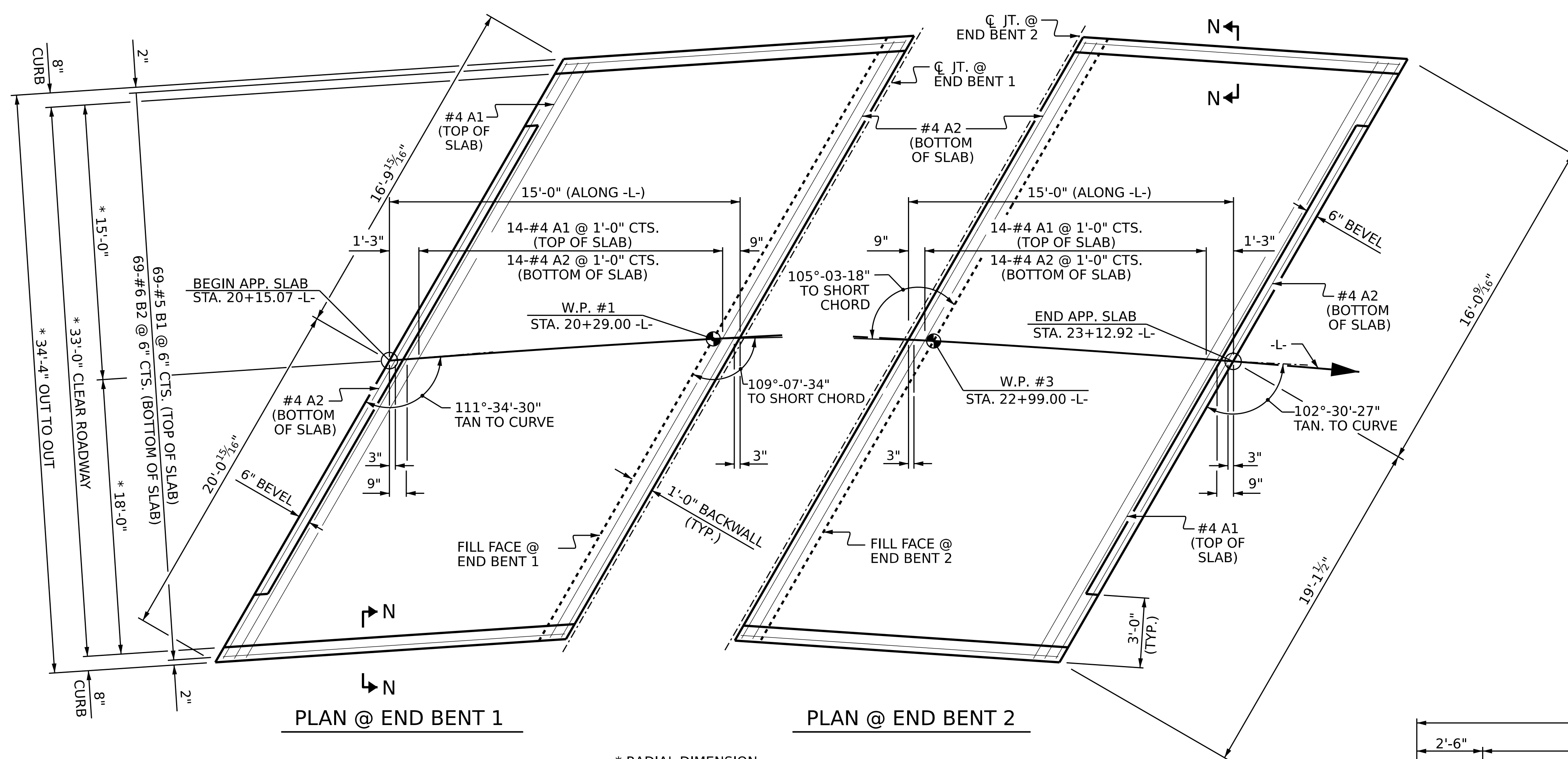


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
RIP RAP DETAILS

ASSEMBLED BY : Q. T. NGUYEN	DATE : 01/2022
CHECKED BY : F. LEA	DATE : 01/2022
DRAWN BY : REK 1/84	REV. 10/1/11 MAA/GM
CHECKED BY : RDU 1/84	REV. 12/21/11 MAA/GM
	REV. 12/17 MAA/THC

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NO	BY:	DATE:	NO	BY:	DATE:	TOTAL SHEETS
1			3			31
2			4			31



PLAN @ END BENT 1

PLAN @ END BENT 2

\* RADIAL DIMENSION  
NOTE: "A" BARS ARE PLACED PARALLEL TO THE FILL FACE  
"B" BARS ARE PLACED PARALLEL TO THE APPROACH SLAB CHORD

**NOTES**

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2".

**BILL OF MATERIAL**  
**APPROACH SLAB AT BENT 1**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	15	#4	STR	36'-5"	365
A2	16	#4	STR	36'-5"	389
* B1	69	#5	STR	14'-2"	1020
B2	69	#6	STR	14'-6"	1503

REINFORCING STEEL	LBS.	1892
* EPOXY COATED REINFORCING STEEL	LBS.	1385
CLASS AA CONCRETE	C. Y.	22.30

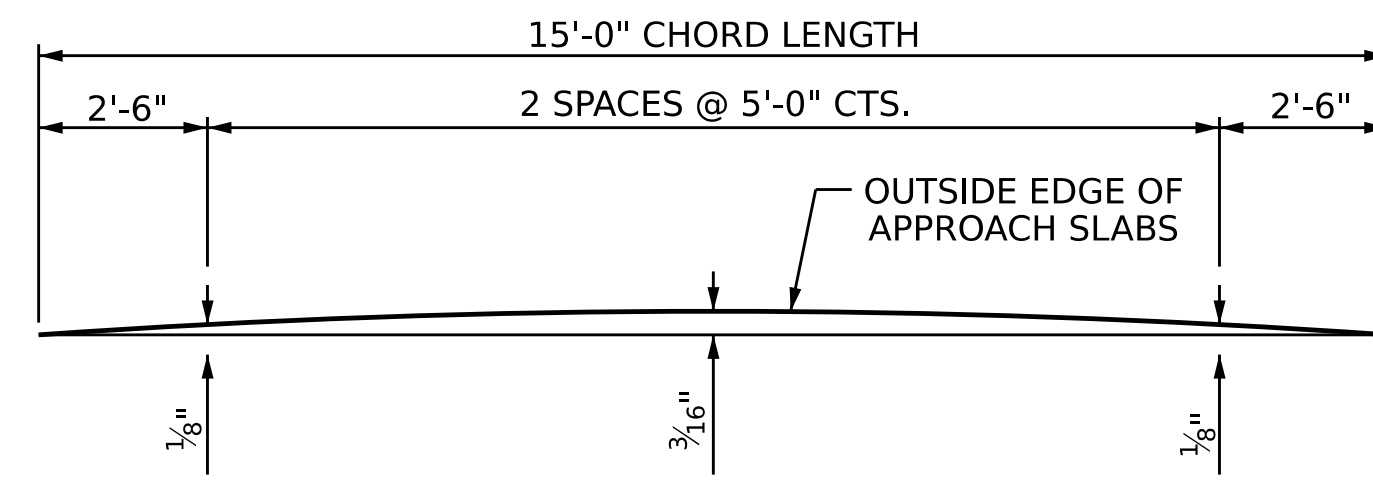
**APPROACH SLAB AT BENT 2**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	15	#4	STR	34'-10"	349
A4	16	#4	STR	34'-10"	372
* B1	69	#5	STR	14'-2"	1020
B2	69	#6	STR	14'-6"	1503

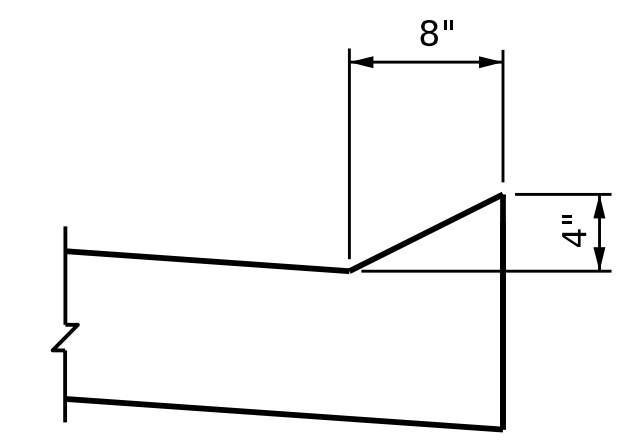
REINFORCING STEEL	LBS.	1875
* EPOXY COATED REINFORCING STEEL	LBS.	1369
CLASS AA CONCRETE	C. Y.	22.30

**SPLICE LENGTHS**

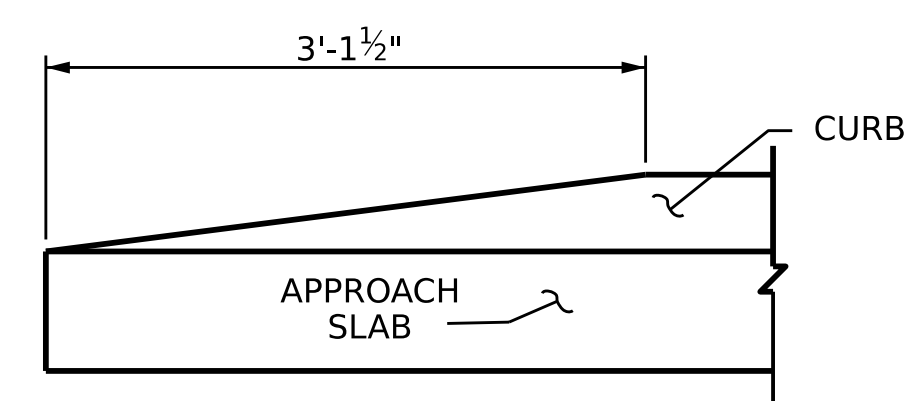
BAR SIZE	EPOXY COATED	UNCOATED
#4	1'-11"	1'-7"
#5	2'-5"	2'-0"
#6	3'-7"	2'-5"



CHORD-ARC ORDINATES (TYPICAL)

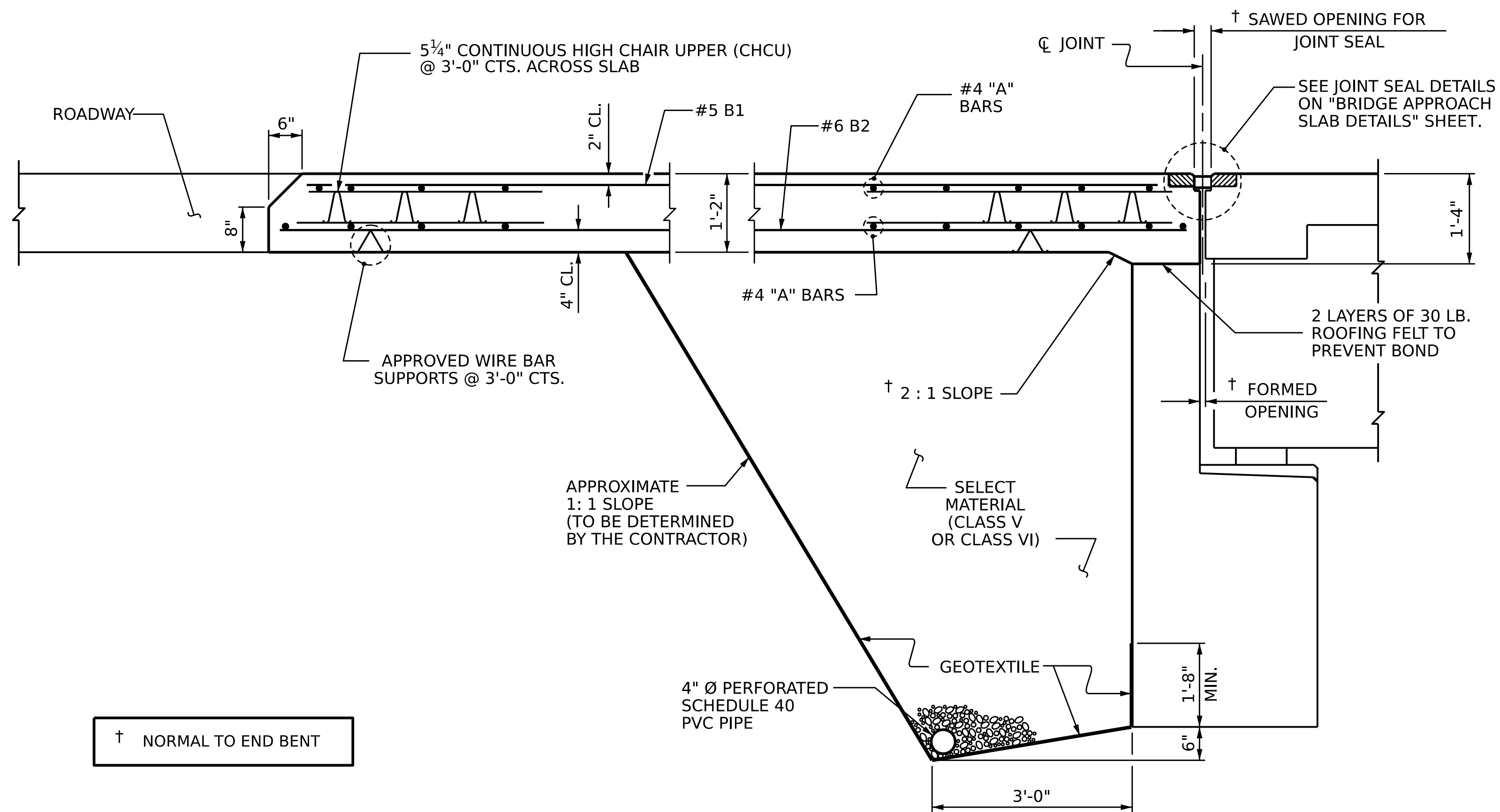


SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS



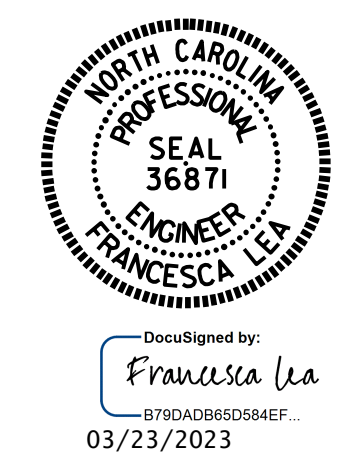
SECTION THRU SLAB

(TYPE II - MODIFIED APPROACH FILL)

PROJECT NO. B-5721  
ROCKINGHAM COUNTY  
STATION: 21+64.00 -L-

SHEET 1 OF 2

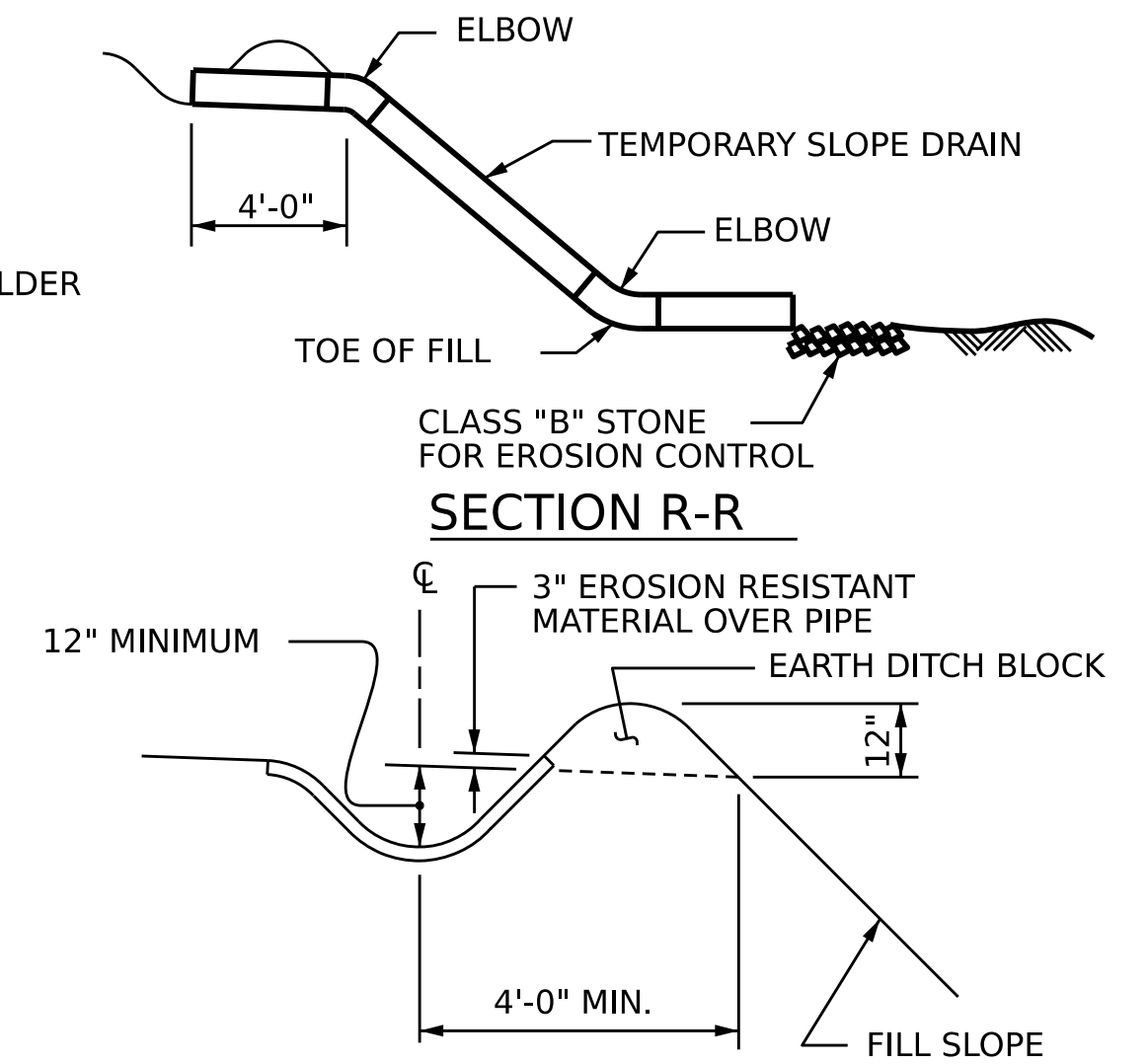
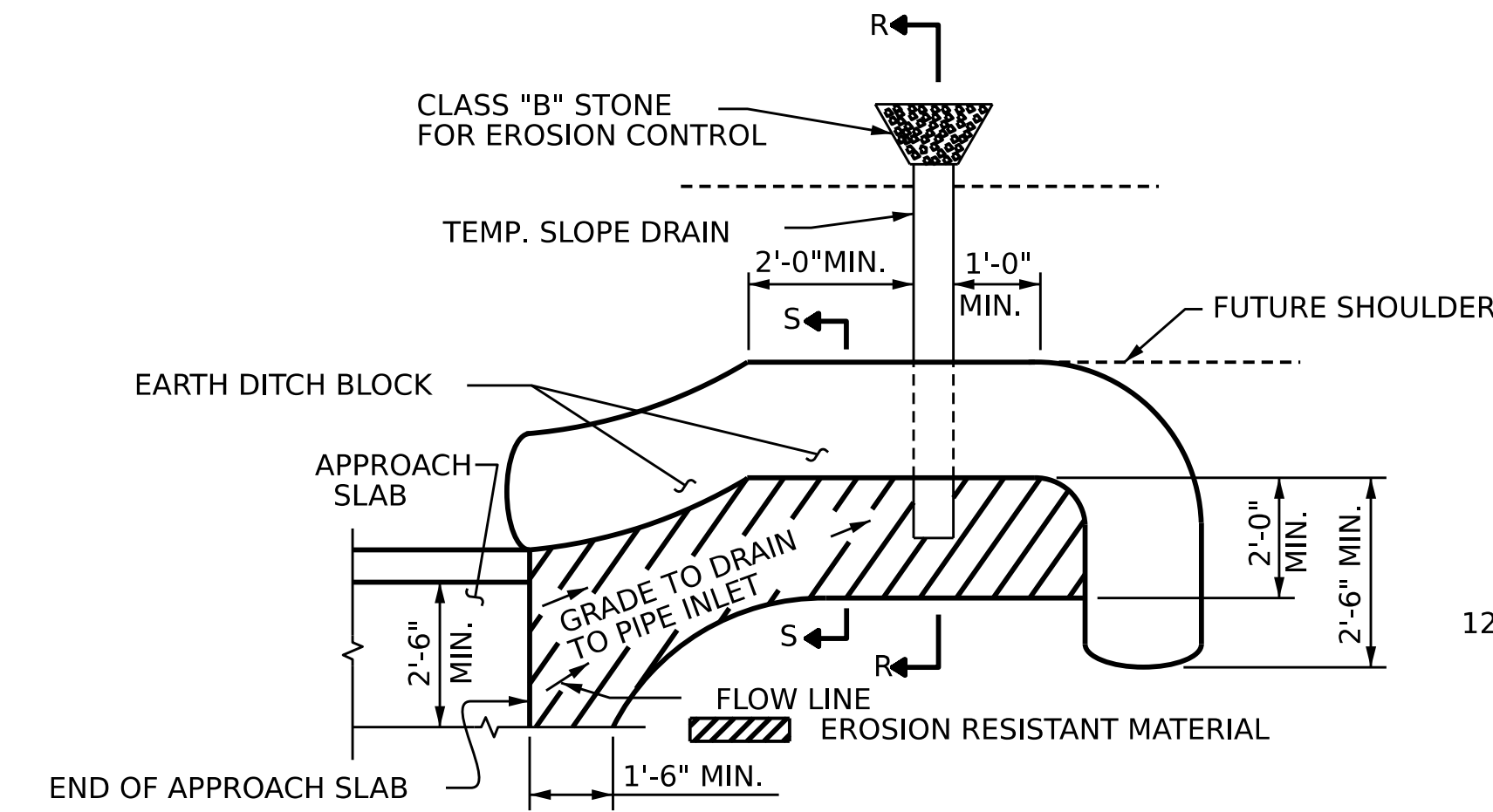
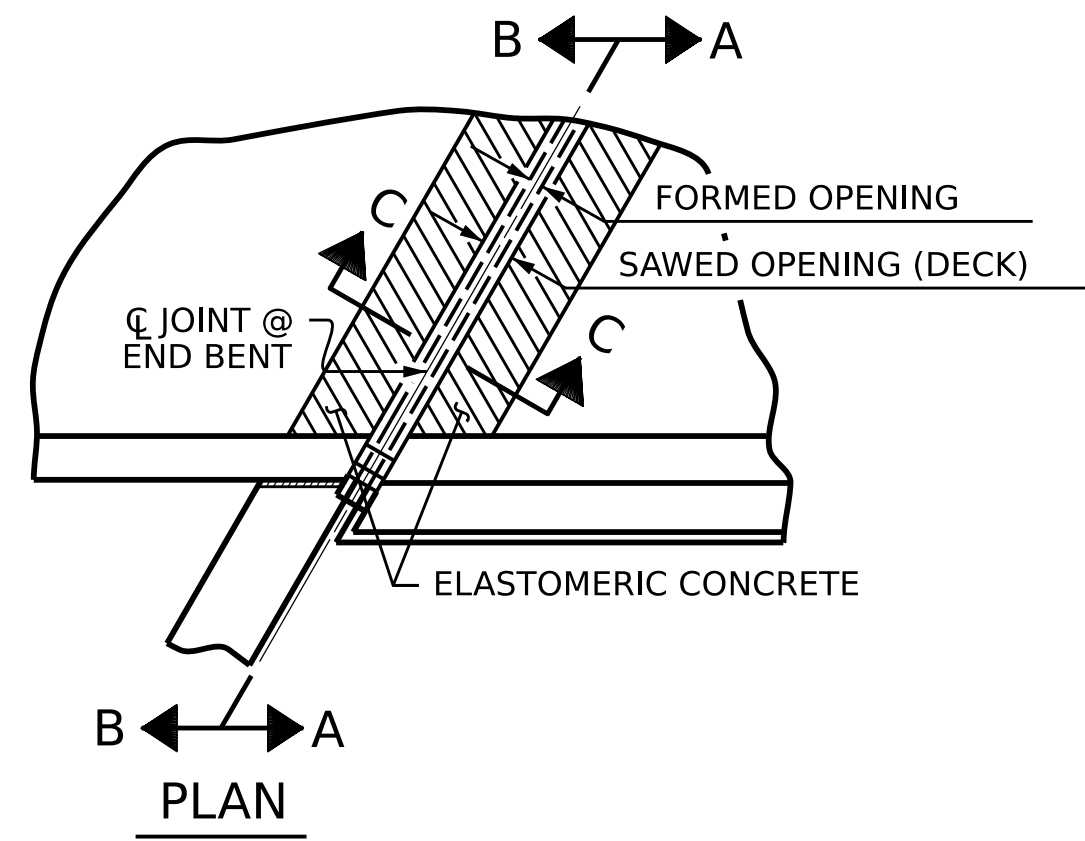
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
BRIDGE APPROACH SLAB  
FOR FLEXIBLE PAVEMENT



REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			31

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ASSEMBLED BY: Q. T. NGUYEN	DATE: 01/2023
CHECKED BY: Z. MALIK	DATE: 01/2023
DRAWN BY: EEM 3/95	REV. 6/13 MAA/GM
CHECKED BY: VAP 3/95	REV. 12/17 MAA/THC
	REV. 06/19 BNB/THC

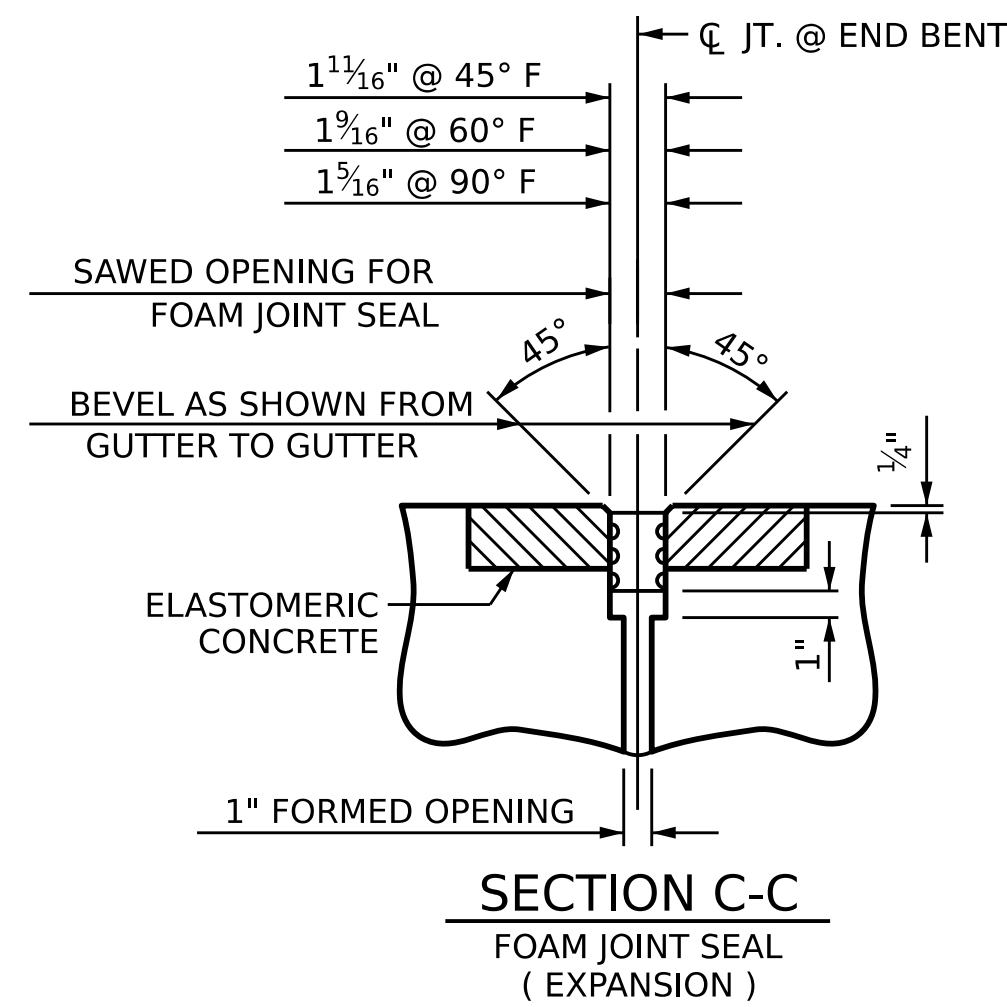


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

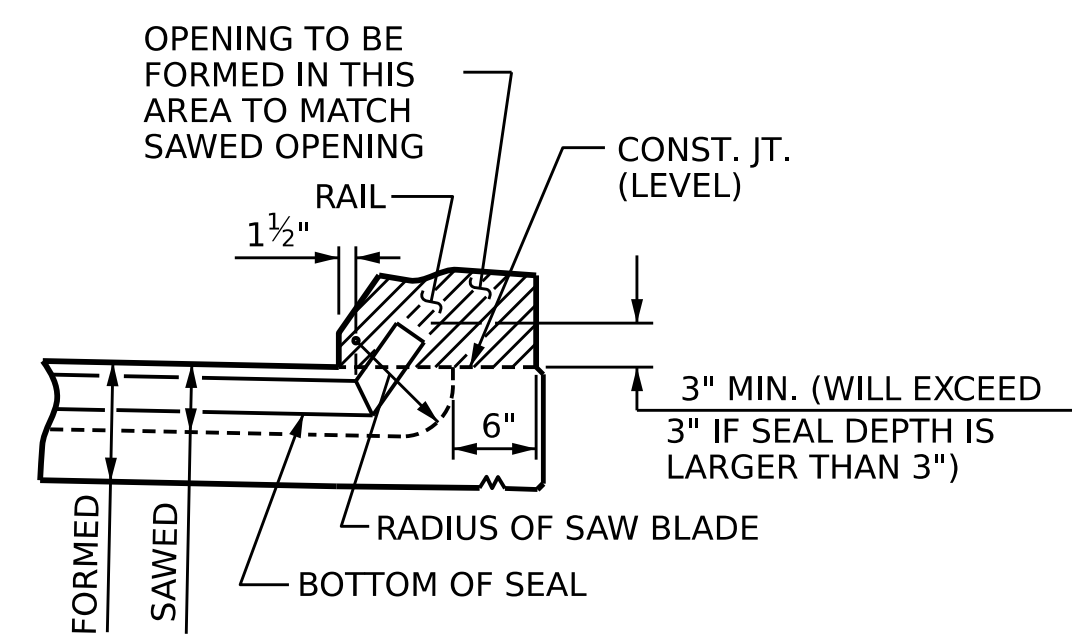
PLAN VIEW

**TEMPORARY BERM AND SLOPE DRAIN DETAILS**

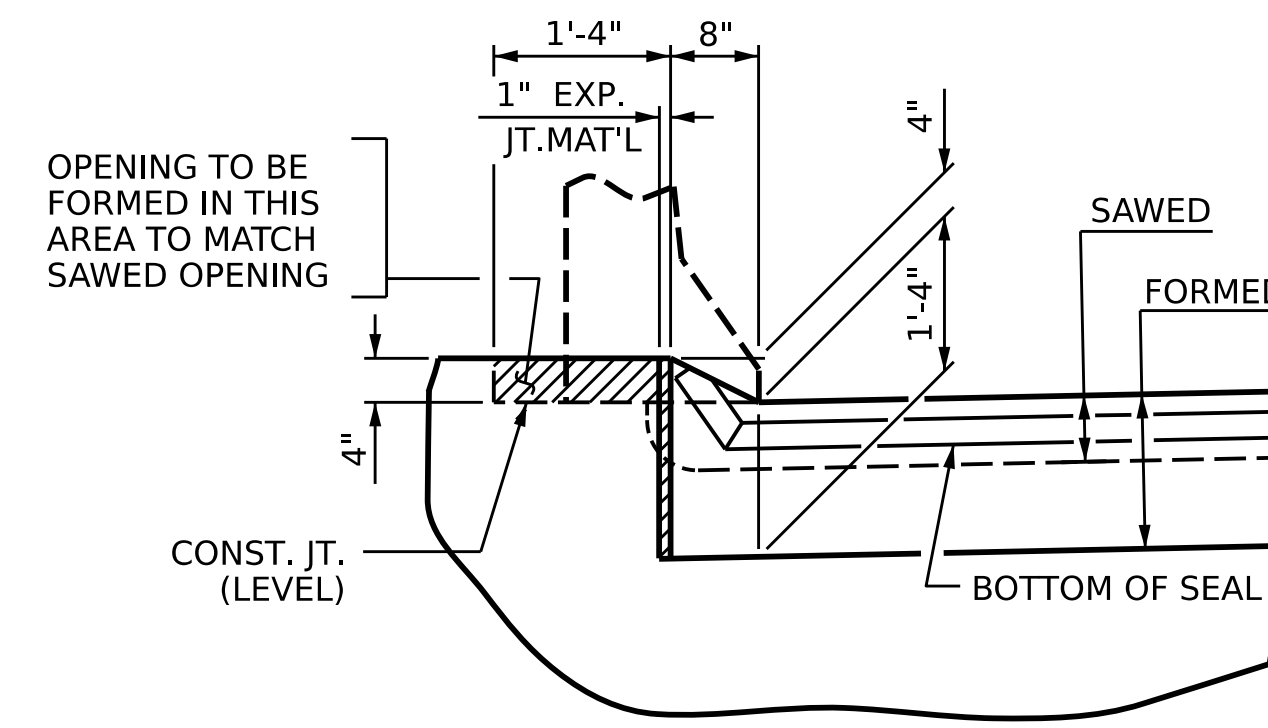
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



SECTION C-C  
FOAM JOINT SEAL  
( EXPANSION )



SECTION A-A

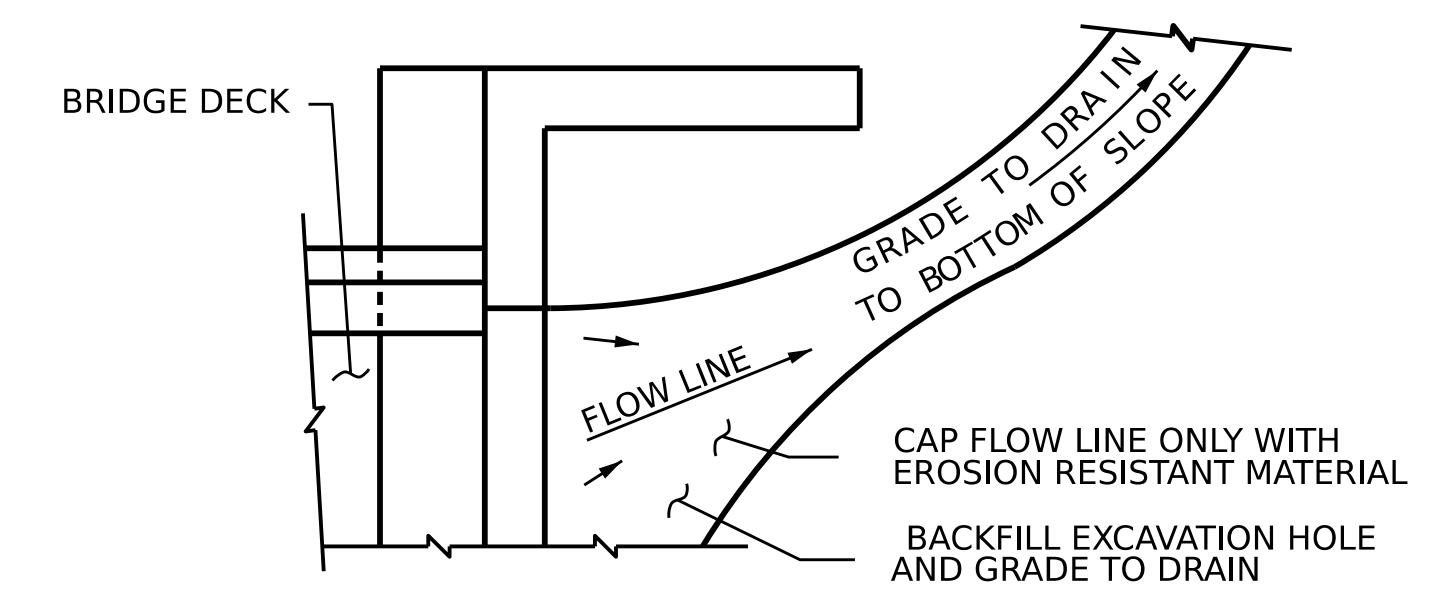


SECTION B-B

**JOINT SEAL DETAILS @ END BENT**

FOAM JOINT SEAL TO BE CUT, HEAT WELDED AND TURNED UP PARALLEL TO SLOPED FACE OF THE BARRIER RAIL.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL.



NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

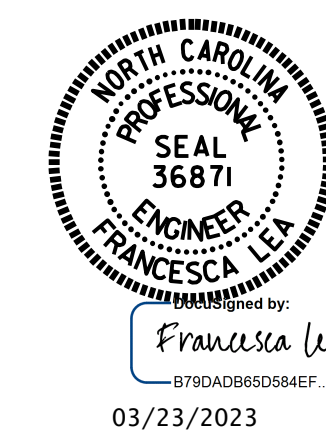
TEMPORARY DRAINAGE DETAIL

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	6.7
2	6.4
TOTAL	13.1

\* BASED ON THE MINIMUM BLOCKOUT SHOWN.

PROJECT NO. **B-5721**  
**ROCKINGHAM** COUNTY  
 STATION: **21+64.00 -L-**

SHEET 2 OF 2



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD BRIDGE APPROACH SLAB DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-31	TOTAL SHEETS 31
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ASSEMBLED BY: Q. T. NGUYEN DATE: 01/2023  
 CHECKED BY: Z. MALIK DATE: 01/2023

DRAWN BY: FCJ 11/88 REV. 6/13 MAA/GM  
 CHECKED BY: ARB 11/88 REV. 12/17 MAA/THC  
 REV. 5/18 MAA/THC

2/15/2023  
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 flca

STD. NO. BAS4 (SHT 1b)



## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	--	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	--	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	--	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	---	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	---	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	-----	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	-----	30 LBS. PER CU. FT. (MINIMUM)

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

### CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

### CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED  $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO  $1\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A  $\frac{1}{4}$ " FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A  $\frac{1}{4}$ " RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

### DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

### ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

### REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

### STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE  $\frac{7}{8}$ " Ø SHEAR STUDS FOR THE  $\frac{3}{4}$ " Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{7}{8}$ " Ø STUDS FOR 4 -  $\frac{3}{4}$ " Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{7}{8}$ " Ø STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ " Ø STUDS BASED ON THE RATIO OF 3 -  $\frac{7}{8}$ " Ø STUDS FOR 4 -  $\frac{3}{4}$ " Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST  $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS " BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY  $\frac{1}{4}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

### SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

# ENGLISH

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