TIP PROJECT: B–5845

CONTRACT: C204938

STRUCTURE

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

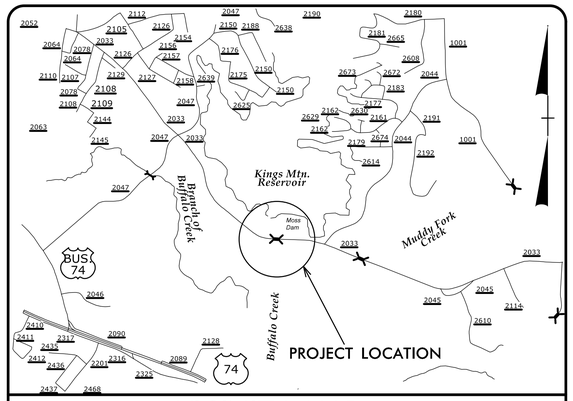
CLEVELAND COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B–5845		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
45798.1.1	N/A	PE
45798.2.1	N/A	ROW
45798.2.2	N/A	UTIL.
45798.3.1	N/A	CONST.
45798.4.1	N/A	MIT

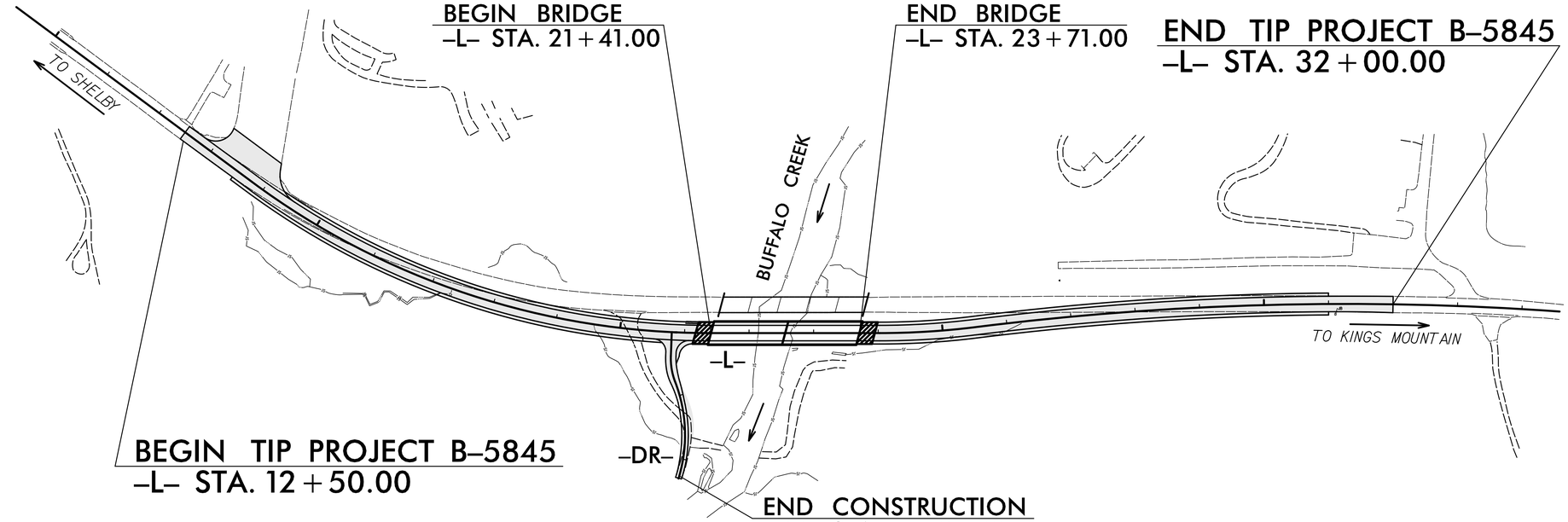
LOCATION: BRIDGE #220025 ON SR 2033 (OAK GROVE RD.) OVER BUFFALO CREEK

TYPE OF WORK: GRADING, PAVING, DRAINAGE, STRUCTURE, & UTILITIES



VICINITY MAP

NAD 83/2011



DESIGN DATA

ADT 2024 = 7,100
ADT 2040 = 7,800
K = 9 %
D = 55 %
T = 6 % *
V = 60 MPH
* TTST = 2% DUAL = 4%
FUNC. CLASS. =
RURAL COLLECTOR
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B–5845 = 0.325 MILES
LENGTH STRUCTURE TIP PROJECT B–5845 = 0.044 MILES
TOTAL LENGTH TIP PROJECT B–5845 = 0.369 MILES

NCDOT CONTACT: JOSHUA WHITE, PE

PLANS PREPARED BY:	*PLANS PREPARED FOR:*
TGS ENGINEERS 201 W. MARION ST STE 200 SHELBY, NC 28150 PH (704) 476-0003 CORP. LICENSE NO.: C-0275	NORTH CAROLINA DEPARTMENT OF TRANSPORATION DIVISION 12 1710 E. Marion St Shelby, NC 28150
LETTING DATE: MARCH 18, 2025	MARC G. CHEEK, PE *STRUCTURES DESIGN ENGINEER*
2024 STANDARD SPECIFICATIONS	

STRUCTURES ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, PE

VERTICAL GRADE DATA -L-

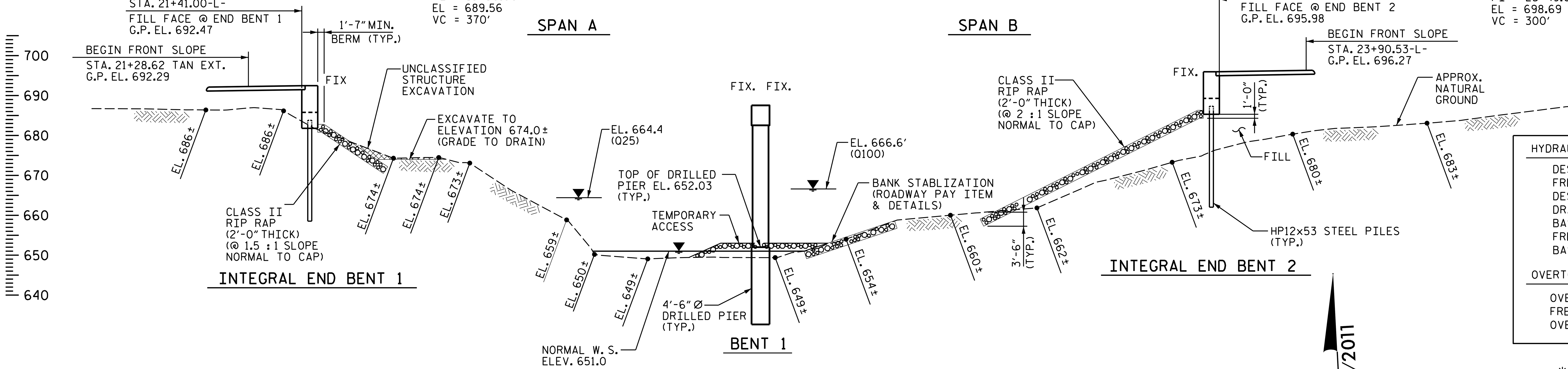
(-)5.9658% (+)1.5242%
PI = 19+50.00
EL = 689.56
VC = 370'

VERTICAL GRADE DATA -L-

(+)1.5242% (+)7.0000%
PI = 25+49.00
EL = 698.69
VC = 300'

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS.

SEAL



SECTION ALONG -L-

(SECTION THROUGH END BENTS AND BENT TAKEN AT RIGHT ANGLES)

NAD 83/2011

HYDRAULIC DATA:

DESIGN DISCHARGE	6900 CFS
FREQUENCY OF DESIGN FLOOD	25 YRS.
DESIGN HIGH WATER ELEVATION	664.4
DRAINAGE AREA	67.7 SQ. MI.
BASE DISCHARGE	9500 CFS
FREQUENCY OF BASE DISCHARGE	100 YRS.
BASE HIGH WATER ELEVATION	666.6

OVERTOPPING FLOOD DATA:

OVERTOPPING DISCHARGE	14400+ CFS *
FREQUENCY OF OVERTOPPING FLOOD	500+ YRS. *
OVERTOPPING FLOOD ELEVATION	692.6' **

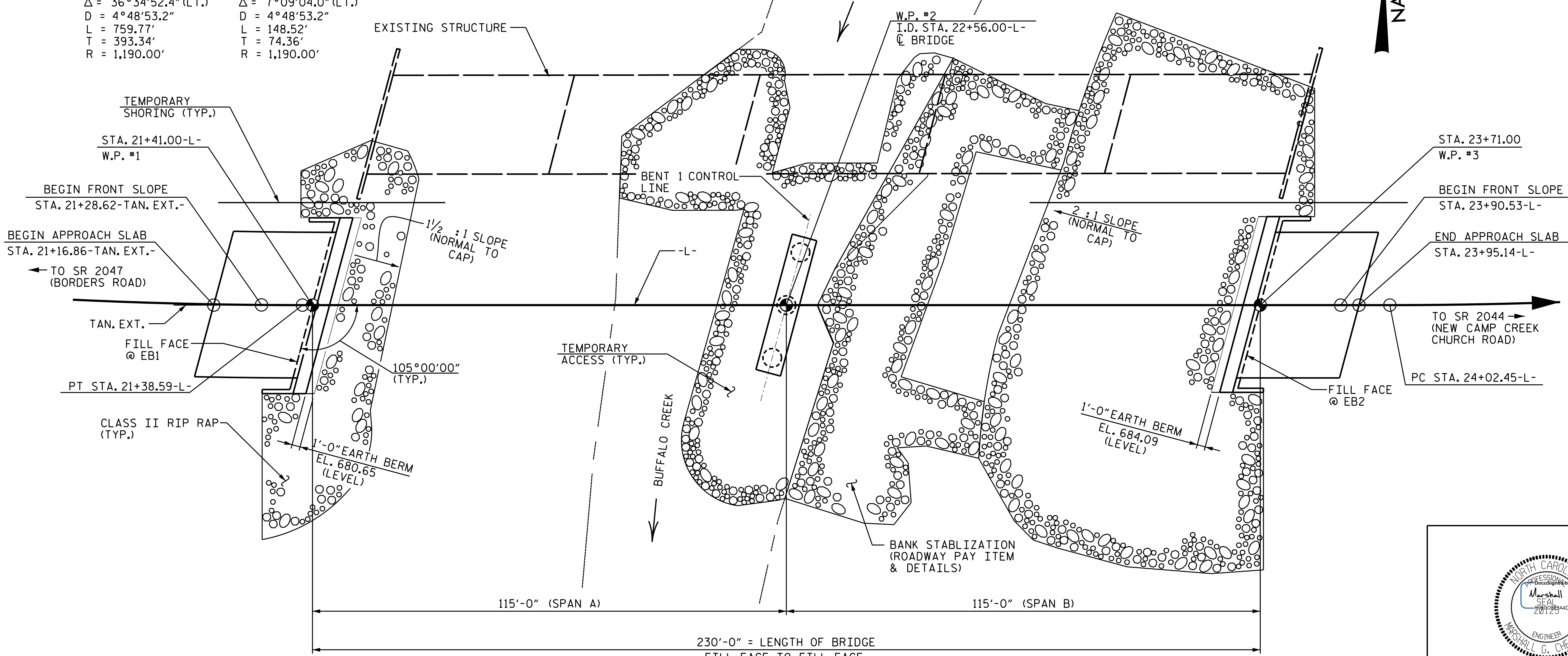
* OVERTOPPING EXCEEDS 500 YR EVENT.

** OVERTOPPING ELEVATION REPRESENTS LOWEST HIGH POINT ON DECK/ROADWAY IN HEC-RAS MODEL, WHICH OCCURS @ STA. 20+82.00-L-

LOW CHORD ELEVATION	
EB1 685.79	EB2 689.23'

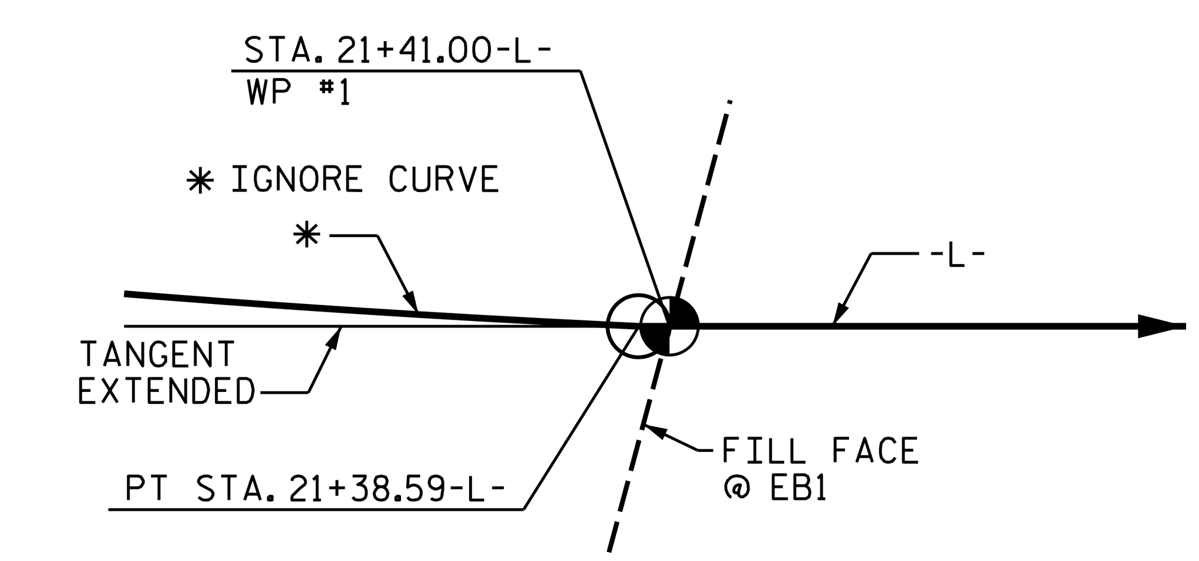
HORIZONTAL CURVE DATA -L-

PI = 17+72.16	PI = 24+76.81
Δ = 36°34'52.4" (LT.)	Δ = 7°09'04.0" (LT.)
D = 4°48'53.2"	D = 4°48'53.2"
L = 759.77'	L = 148.52'
T = 393.34'	T = 74.36'
R = 1,190.00'	R = 1,190.00'



PLAN

PILES NOT SHOWN IN PLAN VIEW.



WORKPOINT #1 DETAIL

THE CONTRACTOR SHALL USE THE TANGENT EXTENDED @ END BENT 1 FOR THE LAYOUT OF THE FOLLOWING:
1. LAYOUT OF APPROACH SLAB AT END BENT 1
2. COMPUTATIONS OF APPROACH SLAB ELEVATIONS

IN ADDITION, THE CONTRACTOR SHALL ASSUME THAT ALL STATIONING OCCURS ALONG THE TANGENT EXTENDED.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 1 OF 5 REPLACES BRIDGE 220025

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28129 MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

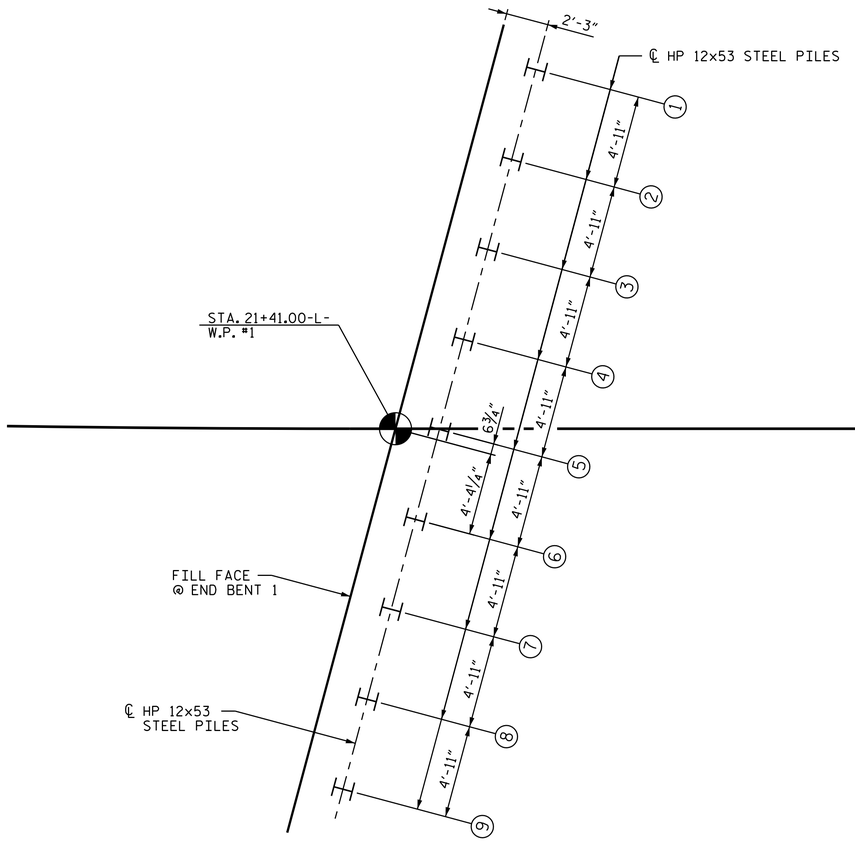
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

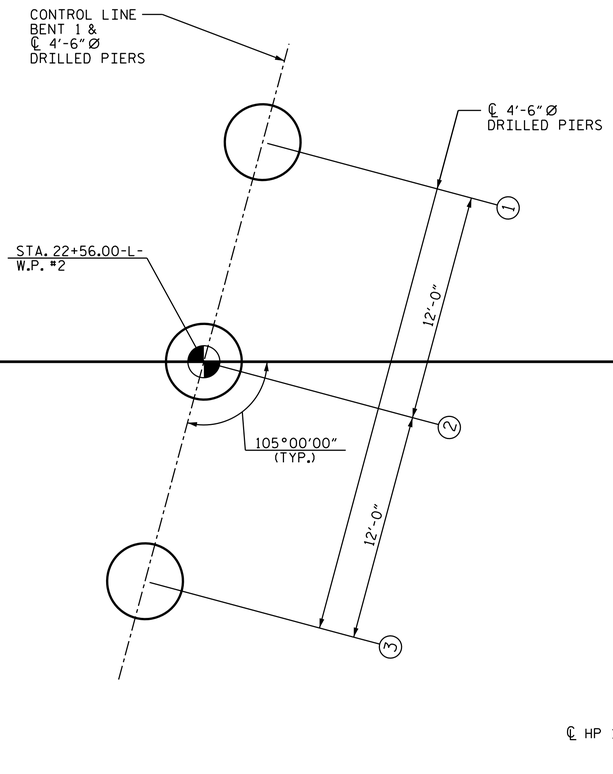
FOR BRIDGE OVER BUFFALO CREEK ON SR 2033 BETWEEN SR 2047 AND SR 2044

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-1
1			3				TOTAL SHEETS
2			4				40

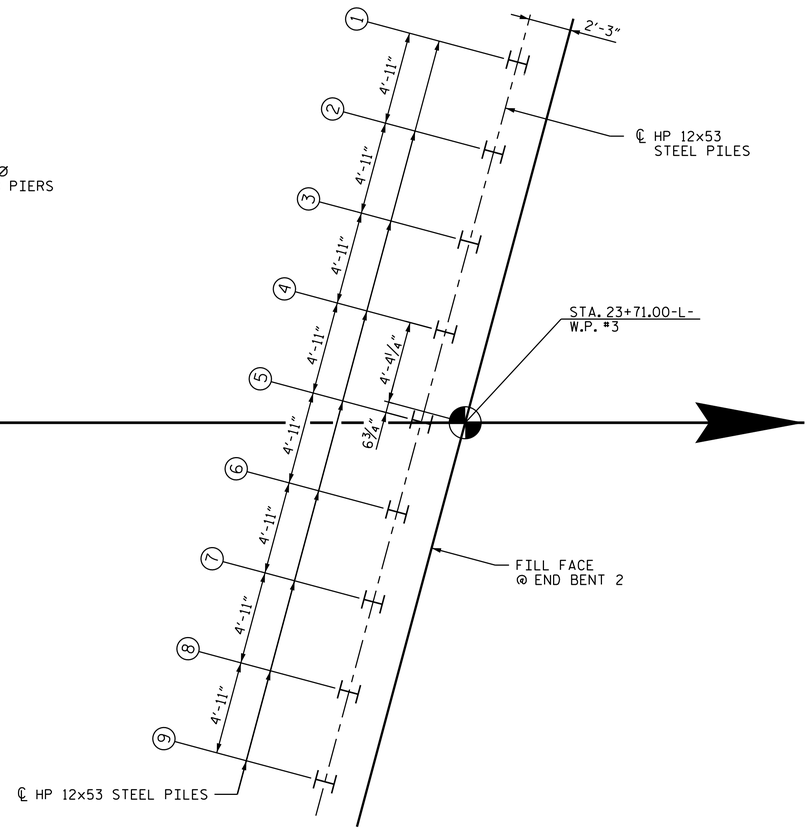
DRAWN BY :	NMW	DATE :	2/21
CHECKED BY :	MGC	DATE :	11/22



END BENT 1



BENT 1



END BENT 2

FOUNDATION LAYOUT PLAN

ALL PILES ARE HP12x53 STEEL PILES.
DIMENSIONS LOCATING PILES ARE SHOWN TO
THE CENTERLINE OF PILES.

PROJECT NO. B-5845

CLEVELAND **COUNTY**

STATION: 22+56.00-L-

SHEET 2 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CREEK, JR.
Marshall G. Creek Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER BUFFALO CREEK ON SR 2033 BETWEEN SR 2047 AND SR 2044

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			40

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	10/22

SUMMARY OF PILE INFORMATION/INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

					Driven Piles			Predrilling For Piles *			Drilled-in-Piles		
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	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 Predrill Below) FT	Maximum Predrilling Dia INCHES	Pile 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 1-5	115	683.65	35			195							
End Bent 1, Piles 6-9	115	683.65	25			195							
End Bent 2, Piles 1-4	115	687.09	15			195							
End Bent 2, Piles 5-9	115	687.09	20			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.

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

SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

End Bent/ Bent No. Piers) "-" (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, Pier 1	555	628.00	15	637.0	11.00		11.00	13.08	YES	639.00	13.03
Bent 1, Piers 2-3	550	618.00	25	637.0	19.00		22.90	11.18	YES	639.00	13.03

* 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.

NOTES:

1. The Pile and Drilled Pier Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Robert E. Kral, 042642) on 11/23/2022.
2. Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, ie., the number of piles with a Required Driving Resistance.
3. The Engineer will determine the need for Dynamic Pile Testing, Pipe Pile Plates, Permanent Steel Casings, SPTs, CSL Testing, SID Inspections and PITs when these items may be required.
4. For Piles, see Section 450 of the Standard Specifications.
5. It has been estimated that a pile driving hammer with a maximum energy range of 30,000 ft-lbs to 40,000 ft-lbs per blow will be required to drive piles at End Bent 1 and End Bent 2. This estimated energy range does not release the contractor from providing driving equipment in accordance with Subarticle 450-3(d)(2) of the Standard Specifications.
6. For Drilled Piers, see Section 411 of the Standard Specifications.
7. Install Permanent Steel Casing at Bent 1 by Vibrating, Screwing or Driving Permanent Casing before excavating or disturbing any material below Elevation 639.0 ft.
8. At the Contractor's option "Type A - Alternate Approach Fill" in lieu of the "Type 1 - Standard Approach Fill" may be constructed at no additional cost to the Department.

SUMMARY OF DPT / PILE ORDER LENGTHS

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

Dynamic Pile Testing (DPT)				Pile Order Lengths	
End Bent/ Bent No.	DPT Required? YES or MAYBE	DPT Pile Length FT	Total DPT Quantity EACH	End Bent/ Bent No(s)	Pile Order Length Basis * EST or DPT
End Bent 1, Piles 1-9	MAYBE		1		
End Bent 2, Piles 1-9	MAYBE				

* EST = Pile Order Lengths from estimated pile lengths; DPT = Pile order lengths based on Dynamic Pile Testing. For groups of end bents/bents with pile order lengths based on Dynamic Pile Testing, the first end bent/bent no. listed for each group is the representive end bent/bent with the DPT.

SUMMARY OF PILE ACCESSORIES

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

		Steel Pile Points			
End Bent/ Bent No. Pile(s) "-" (e.g., "Bent 1, Piles 1-5")	Pipe Pile Plates Required? YES or MAYBE	Pipe Pile Cutting Shoes Required? YES	Pipe Pile Conical Points Required? YES	H-Pile Points Required? YES	Steel Pile Tips Required? YES
End Bent 2, Piles 1-9				YES	
TOTAL QUANTITY:				9	

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, Pier 1		MAYBE	102.00		
Bent 1, Piers 2-3		MAYBE	142.00		
TOTAL QUANTITY:		1	386.00		

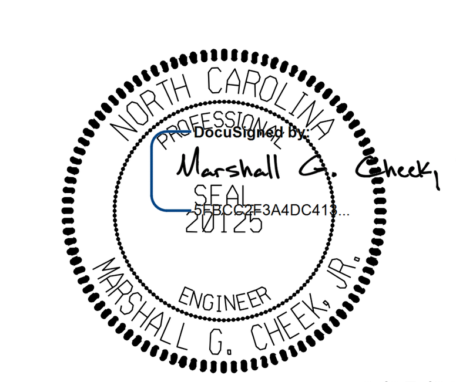
* CSL Tubes are required if CSL Testing is or may be required. The number of CSL Tubes per drilled pier is equal to one tube per foot of design pier diameter with at least 4 tubes per pier. The length of each CSL Tube is equal to the drilled pier length plus 1.5 ft.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 3 OF 5



6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE AND DRILLED PIER FOUNDATION TABLES

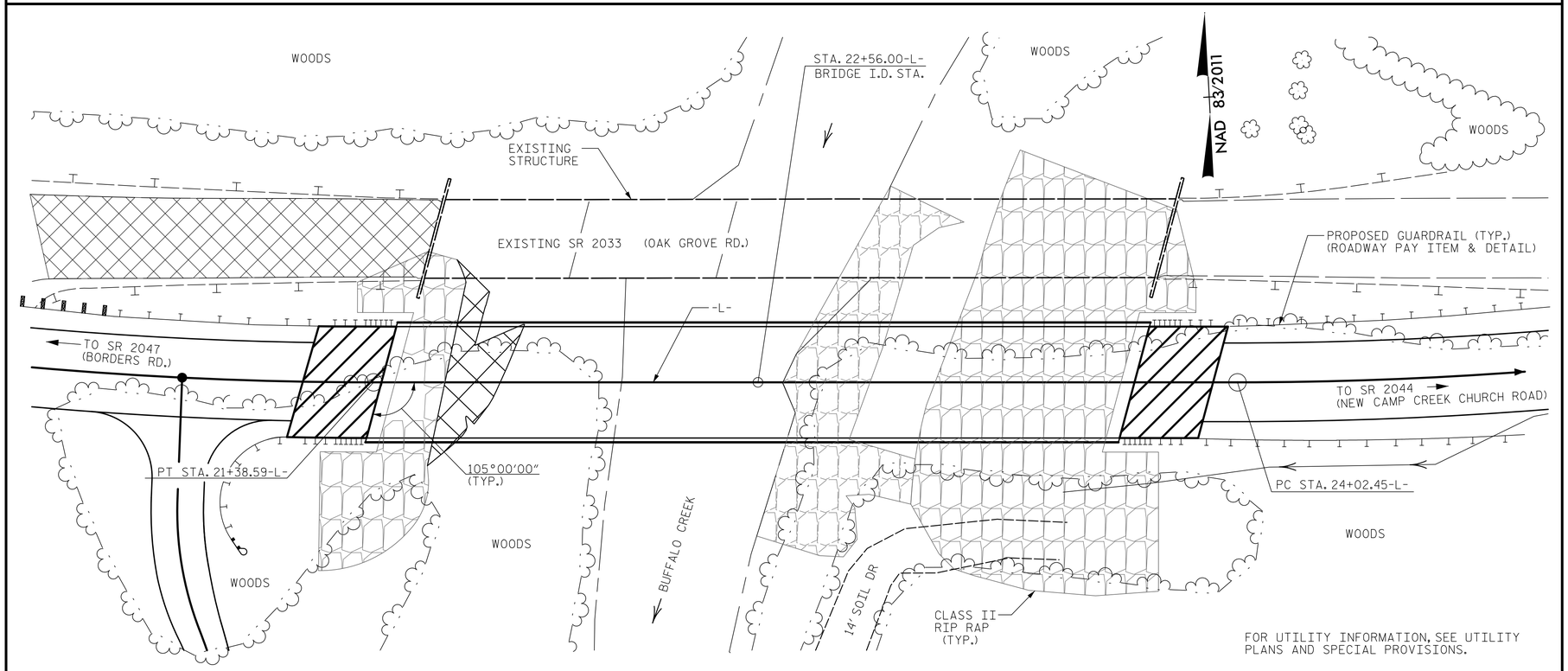
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-3

TOTAL SHEETS 40

DRAWN BY :	NMW	DATE :	11/22
CHECKED BY :	MGC	DATE :	12/22

BENCHMARK #2 : RR SPIKE IN BASE OF 20" WHITE OAK: 89 FT RIGHT OF STA 24+90.00 -L-; ELEV. 701.53



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

THE EXISTING 5 SPAN (5 @ 45'-0") STRUCTURE, CONSISTING OF A REINFORCED CONCRETE DECK ON STEEL I-BEAMS WITH A CLEAR ROADWAY WIDTH OF 24'-0" AND A SUBSTRUCTURE CONSISTING OF REINFORCED CONCRETE SPILL THRU ABUTMENTS AT THE END BENTS AND REINFORCED CONCRETE POST AND BEAM INTERIOR BENTS, AND LOCATED UPSTREAM FROM THE PROPOSED BRIDGE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING THE CONSTRUCTION OF PROPOSED BRIDGE, THE POSTED LOAD LIMIT MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA (SEE SHEET 1 OF 5) SHALL BE EXCAVATED FOR THE DISTANCE OF 40 FT. LEFT AND 25 FT. RIGHT AT END BENT 1 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 SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. 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.

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR ASBESTOS ASSESMENT, SEE SPECIAL PROVISIONS.

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS, REMOVE A TEMPORARY ACCESS FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE. FOR CONSTRUCTION MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

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 22+56.00-L-."

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATION.

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

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.

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

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 STA. 22+56.00-L-

DRAWN BY :	NMW	DATE :	2/21
CHECKED BY :	MGC	DATE :	2/21
DESIGN ENGINEER OF RECORD :	MGC	DATE :	3/23

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 4 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER BUFFALO CREEK ON SR 2033 BETWEEN SR 2047 AND SR 2044

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

SHEET NO. S-4

TOTAL SHEETS 40

TOTAL BILL OF MATERIAL

ITEM	CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	4'-6" Ø DRILLED PIERS IN SOIL	4'-6" Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIERS	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS
	LUMP SUM	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EA.	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM
SUPERSTRUCTURE	LUMP SUM	LUMP SUM	LUMP SUM						8,351	8,564		LUMP SUM
END BENT 1								LUMP SUM			38.6	
BENT 1				35.44	56.80	39.09					74.1	
END BENT 2											38.5	
TOTALS	LUMP SUM	LUMP SUM	LUMP SUM	35.44	56.80	39.09	1	LUMP SUM	8,351	8,564	151.2	LUMP SUM

TOTAL BILL OF MATERIAL

ITEM	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 63" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12 x 53 STEEL PILES	HP 12 x 53 STEEL PILES		STEEL PILE POINTS	DYNAMIC PILE TESTING	TWO BAR METAL RAIL	1'-2" x 2'-6" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	EA.	EA.	LIN. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE			8	905.67						440.92	456.55			LUMP SUM
END BENT 1	4,665				9	9	275					410	455	
BENT 1	17,790	5497												
END BENT 2	4,662				9	9	160	9				1,510	1,680	
TOTALS	27,117	5497	8	905.67	18	18	435	9	1	440.92	456.55	1,920	2,135	LUMP SUM

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 5 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER BUFFALO CREEK ON SR 2033 BETWEEN SR 2047 AND SR 2044

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			40

DRAWN BY : JLA DATE : 4/22
CHECKED BY : MGC DATE : 12/22

LOAD AND RESISTANCE FACTOR RATING (LRFR) 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						
							LIVE-LOAD FACTORS (γ_{LL})	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)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.12	--	1.75	0.929	1.41	A	EXT	55.90	0.962	1.24	A	INT	101.14	0.80	0.929	1.12	A	EXT	55.90	
		HL-93 (OPERATING)	N/A		1.64	--	1.35	0.929	1.83	A	EXT	55.90	0.962	1.64	A	INT	101.14	N/A	--	--	--		--	
		HS-20 (INVENTORY)	36.000	2	1.61	57.96	1.75	0.929	2.04	A	EXT	55.90	0.962	1.75	A	INT	101.14	0.80	0.929	1.61	A	EXT	55.90	
		HS-20 (OPERATING)	36.000		2.30	82.80	1.35	0.929	2.64	A	EXT	55.90	0.962	2.30	A	INT	101.14	N/A	--	--	--		--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.92	52.92	1.40	0.929	6.19	A	EXT	55.90	0.962	5.69	A	INT	101.14	0.80	0.929	3.92	A	EXT	55.90	
		SNGARBS2	20.000		2.79	55.80	1.40	0.929	4.41	A	EXT	55.90	0.962	3.93	A	INT	101.14	0.80	0.929	2.79	A	EXT	55.90	
		SNAGRIS2	22.000		2.59	56.98	1.40	0.929	4.08	A	EXT	55.90	0.962	3.61	A	INT	101.14	0.80	0.929	2.59	A	EXT	55.90	
		SNCOTTS3	27.250		1.93	52.59	1.40	0.929	3.05	A	EXT	55.90	0.962	2.77	A	INT	101.14	0.80	0.929	1.93	A	EXT	55.90	
		SNAGGRS4	34.925		1.57	54.83	1.40	0.929	2.48	A	EXT	55.90	0.962	2.22	A	INT	101.14	0.80	0.929	1.57	A	EXT	55.90	
		SNS5A	35.550		1.54	54.75	1.40	0.929	2.43	A	EXT	55.90	0.962	2.23	A	INT	101.14	0.80	0.929	1.54	A	EXT	55.90	
		SNS6A	39.950		1.40	55.93	1.40	0.929	2.21	A	EXT	55.90	0.962	2.00	A	INT	101.14	0.80	0.929	1.40	A	EXT	55.90	
		SNS7B	42.000		1.33	55.86	1.40	0.929	2.10	A	EXT	55.90	0.962	1.93	A	INT	101.14	0.80	0.929	1.33	A	EXT	55.90	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.70	56.10	1.40	0.929	2.69	A	EXT	55.90	0.962	2.42	A	INT	101.14	0.80	0.929	1.70	A	EXT	55.90	
		TNT4A	33.075		1.70	56.23	1.40	0.929	2.69	A	EXT	55.90	0.962	2.38	A	INT	101.14	0.80	0.929	1.70	A	EXT	55.90	
		TNT6A	41.600		1.37	56.99	1.40	0.929	2.16	A	EXT	55.90	0.962	2.02	A	INT	101.14	0.80	0.929	1.37	A	EXT	55.90	
		TNT7A	42.000		1.37	57.54	1.40	0.929	2.17	A	EXT	55.90	0.962	1.99	A	INT	101.14	0.80	0.929	1.37	A	EXT	55.90	
		TNT7B	42.000		1.40	58.80	1.40	0.929	2.20	A	EXT	55.90	0.962	1.91	A	INT	101.14	0.80	0.929	1.40	A	EXT	55.90	
		TNAGRIT4	43.000		1.34	57.62	1.40	0.929	2.12	A	EXT	55.90	0.962	1.85	A	INT	101.14	0.80	0.929	1.34	A	EXT	55.90	
		TNAGT5A	45.000		1.27	57.15	1.40	0.929	2.01	A	EXT	55.90	0.962	1.81	A	INT	101.14	0.80	0.929	1.27	A	EXT	55.90	
		TNAGT5B	45.000	3	1.27	57.15	1.40	0.929	2.00	A	EXT	55.90	0.962	1.76	A	INT	101.14	0.80	0.929	1.27	A	EXT	55.90	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.96	56.35	1.30	0.929	3.34	A	EXT	55.90	0.962	3.20	A	INT	101.14	0.80	0.929	1.96	A	EXT	55.90	
		EV3	43.000	4	1.29	55.47	1.30	0.929	2.20	A	EXT	55.90	0.962	2.01	A	INT	101.14	0.80	0.929	1.29	A	EXT	55.90	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{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.

COMMENTS:

1.
2.
3.
4.

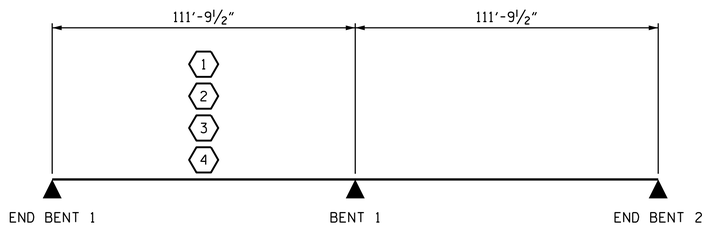
(#) CONTROLLING LOAD RATING

1. DESIGN LOAD RATING (HL-93)
2. DESIGN LOAD RATING (HS-20)
3. LEGAL LOAD RATING **
4. EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

DIMENSIONS SHOWN ARE BEARING TO BEARING.

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. ENGINEER
Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

(NON-INTERSTATE TRAFFIC)

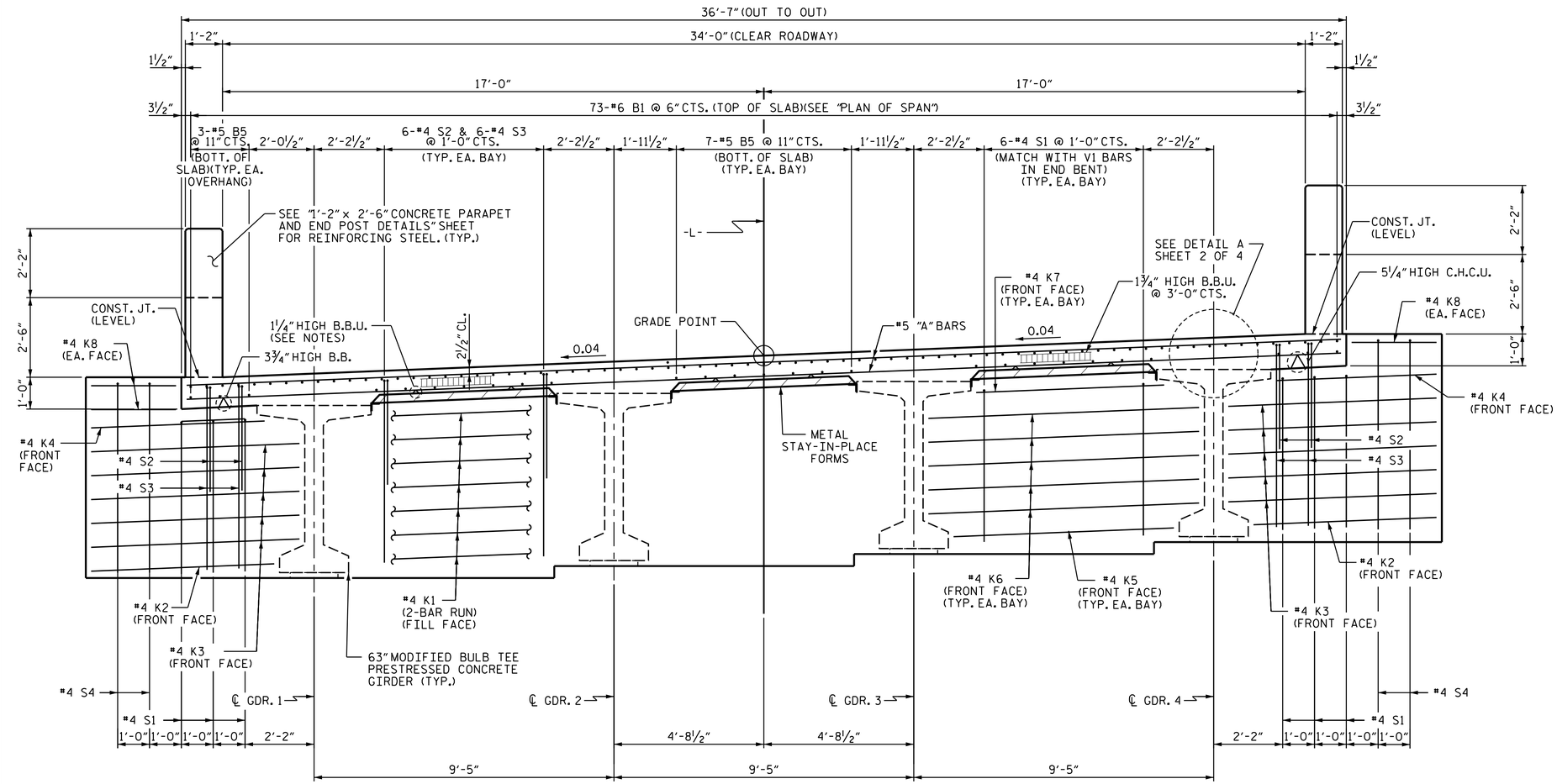
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY : ZCS	DATE : 7/23		
CHECKED BY : MGC	DATE : 7/23		
DRAWN BY : MAA 1/08	REV. 11/12/08RR	MAA/GM	
CHECKED BY : GM/DI 2/08	REV. 10/1/11	MAA/GM	
	REV. 04/23	BNB/AAH	

8-20-09

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

STD. NO. LRFR1



TYPICAL SECTION AT INTEGRAL END BENT

NOTES

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

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. A TOP 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 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

CONCRETE PARAPET IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO THE GIRDER FLANGES IN THE REGION OF THE LINK SLAB.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 1 OF 4

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DESIGN ENGINEER OF RECORD :	MGC	DATE :	8/22

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 DocuSigned by: Marshall G. Cheek, Jr. 2A4DC413... MARSHALL G. CHEEK, JR.

6/27/2024

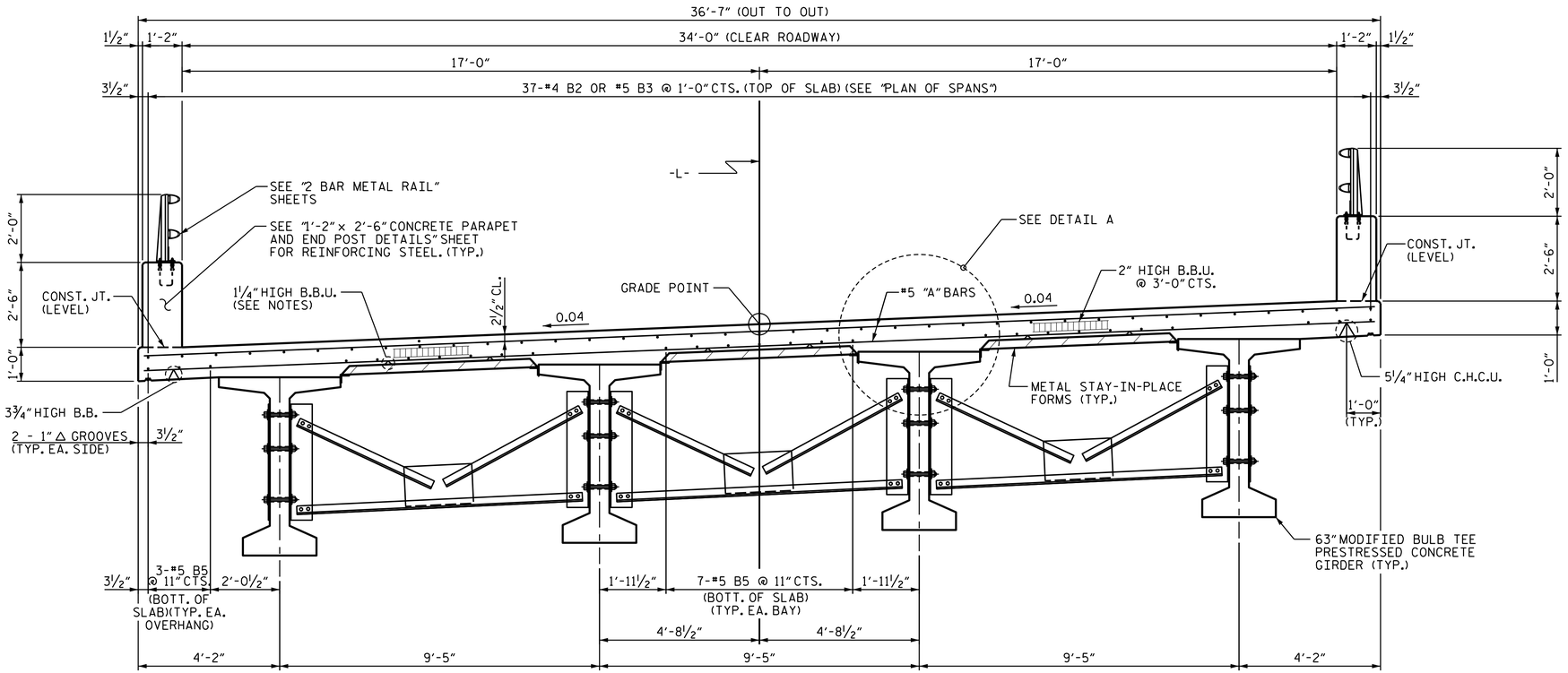
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

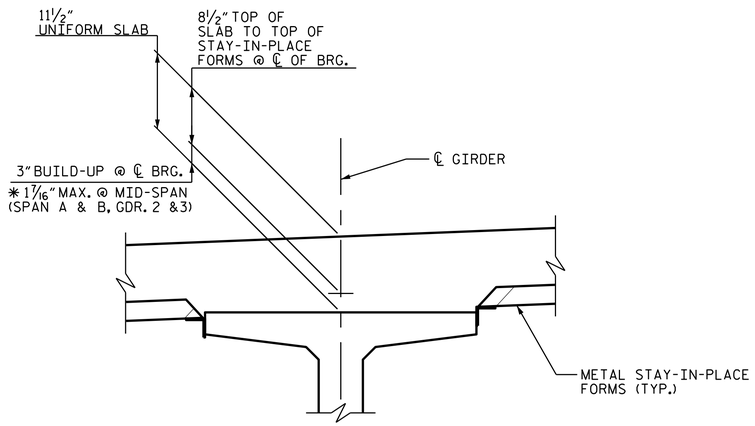
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			40



TYPICAL SECTION AT INTERMEDIATE DIAPHRAGMS



DETAIL A

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

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. ENGINEER

Marshall G. Cheek Jr.

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

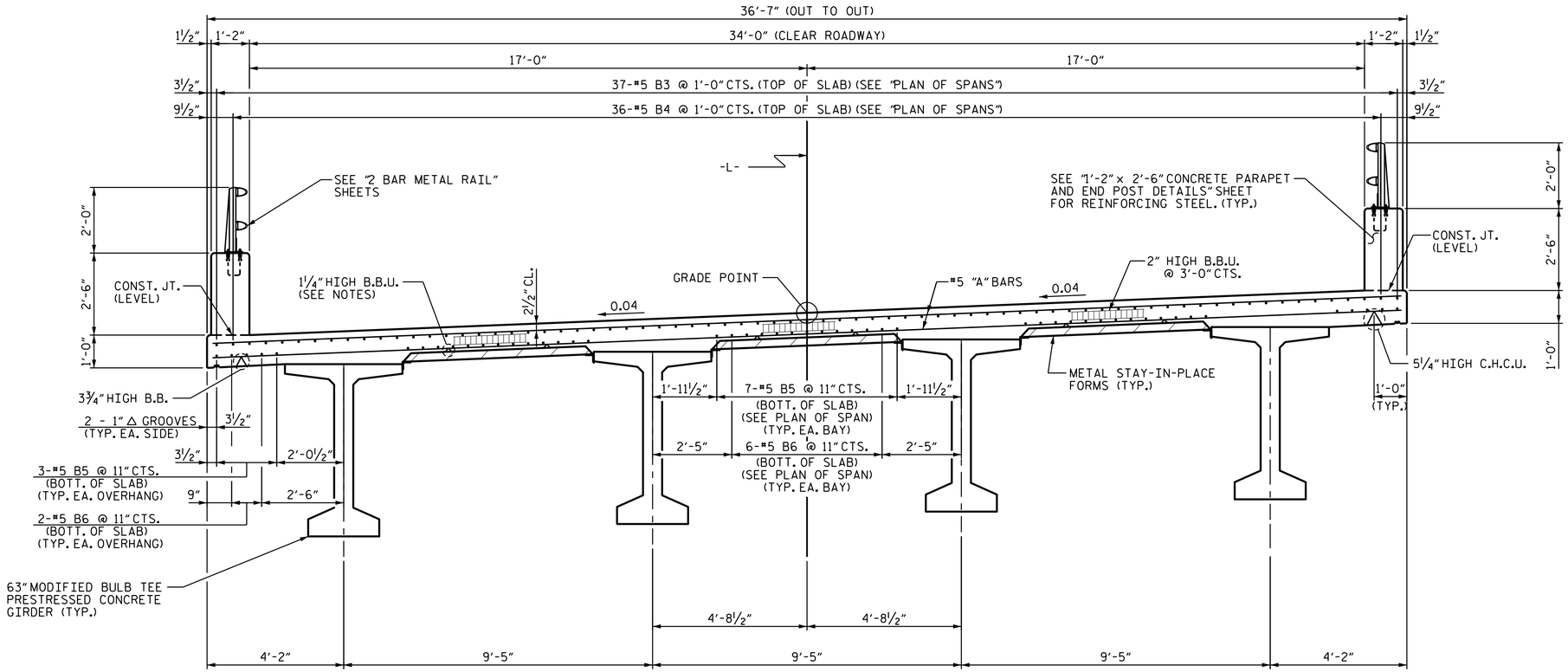
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			40

DRAWN BY :	JLA	DATE : 4/22
CHECKED BY :	MGC	DATE : 4/22
DESIGN ENGINEER OF RECORD :	MGC	DATE : 8/22



TYPICAL SECTION AT LINK SLAB AT BENT

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. Marshall G. Cheek Jr. 6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

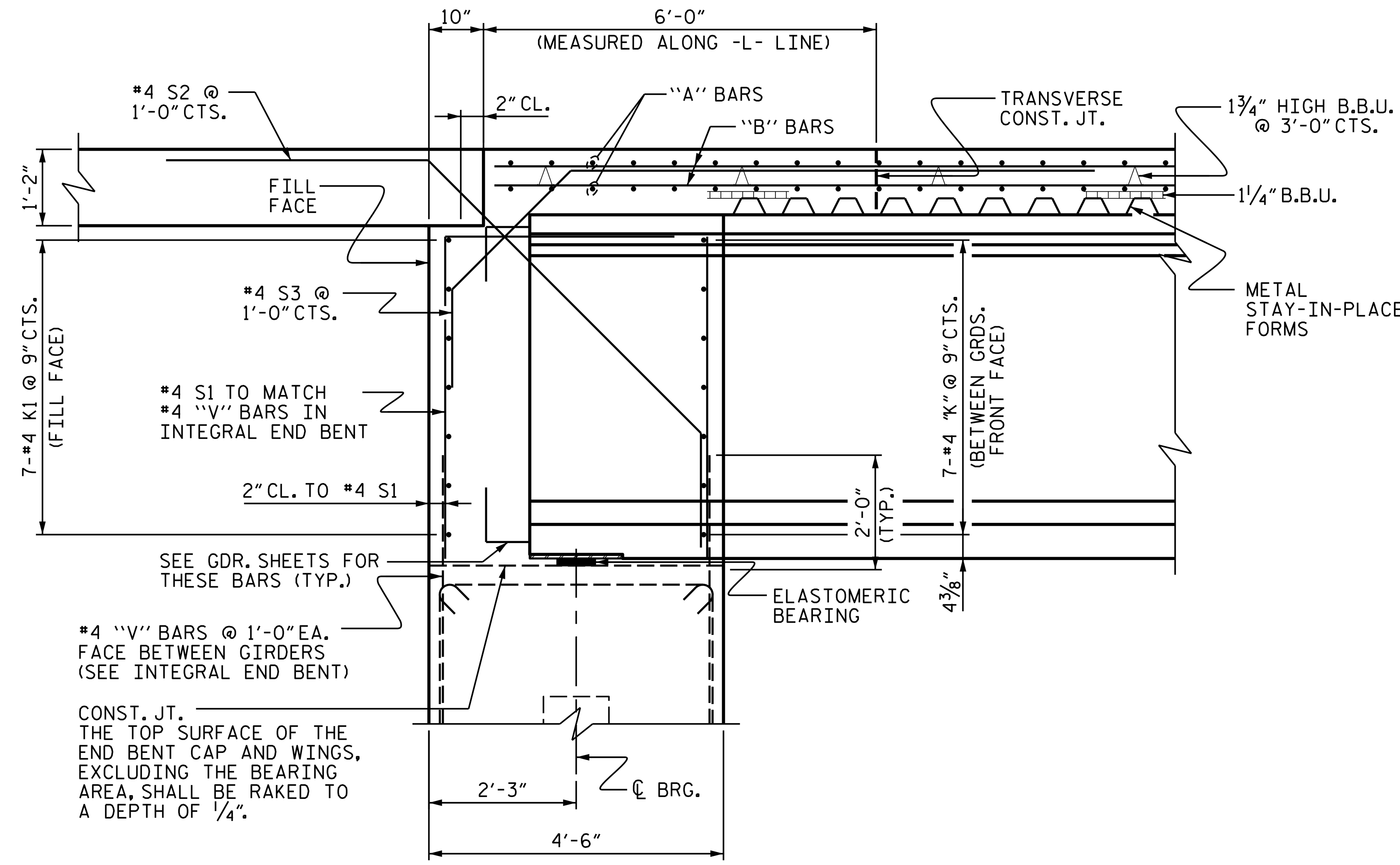
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

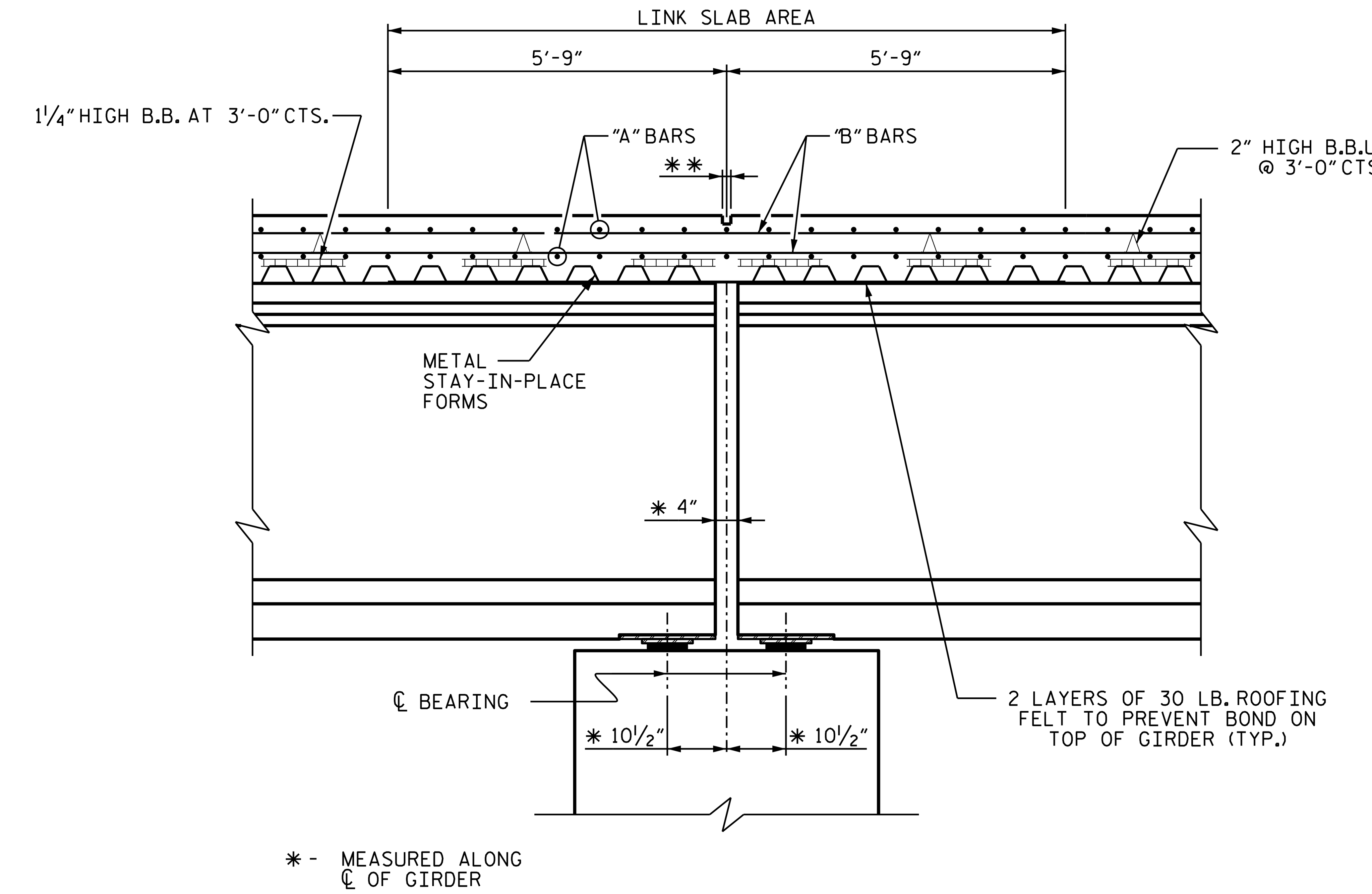
TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			40

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DESIGN ENGINEER OF RECORD :	MGC	DATE :	8/22



SECTION THRU INTEGRAL END BENT

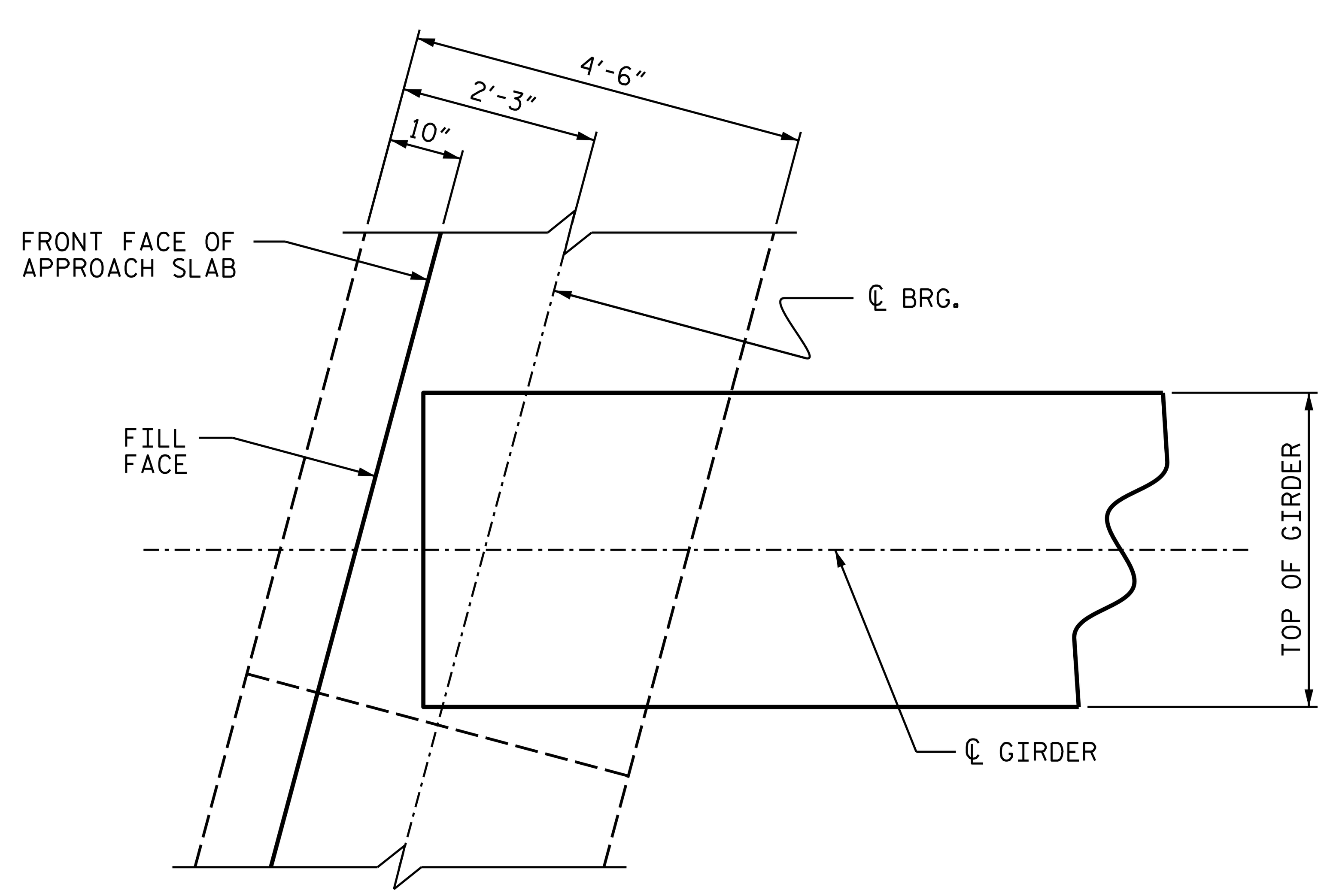


* - MEASURED ALONG ℄ OF GIRDER

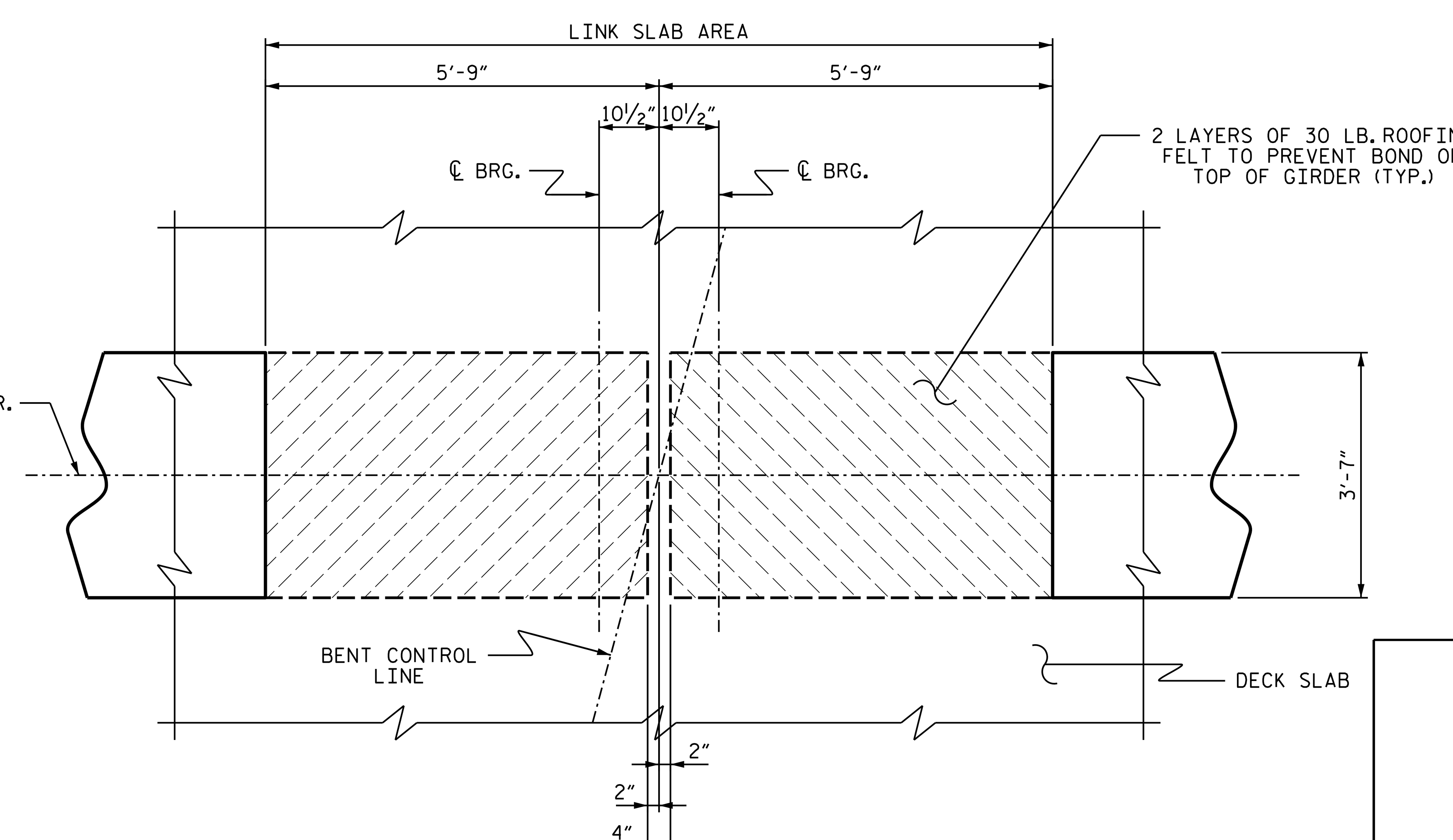
SECTION THRU LINK SLAB

** A 1½" DEEP, ⅜" WIDE CONTRACTION JOINT SHALL BE SAWN WITHIN 24 HOURS OF POURING THE DECK. THE JOINT SHALL BE FILLED WITH JOINT SEALER MATERIAL. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

NOTE: THE TOP OF THE GIRDER IN THE REGION OF THE LINK SLAB SHALL BE SMOOTH (NOT RAKED) AND FREE OF STIRRUPS, DECK FORMWORK ATTACHMENTS AND OVERHANG FALSEWORK/FORMWORK ATTACHMENTS.



PLAN OF GIRDER AT INTEGRAL END BENT



PLAN OF GIRDER AT BENT

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 4 OF 4

6/27/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

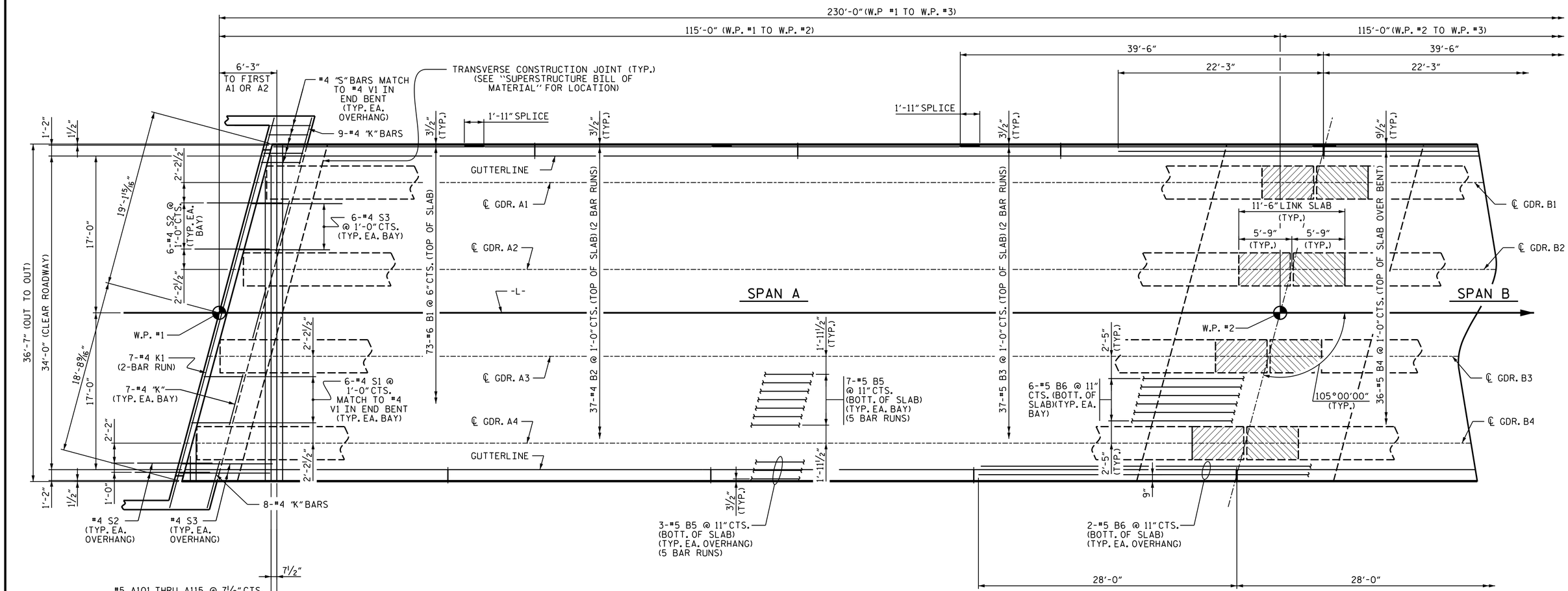
TYPICAL SECTION DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-10
1			3				TOTAL SHEETS
2			4				40

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DESIGN ENGINEER OF RECORD :	MGC	DATE :	8/22



PLAN OF SPAN A

FOR ADDITIONAL REINFORCING STEEL IN CONCRETE PARAPET & END POST, SEE "1'-2" x 2'-6" CONCRETE PARAPET AND END POST DETAILS" SHEETS.

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DESIGN ENGINEER OF RECORD :	MGC	DATE :	8/22

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

6/27/2024

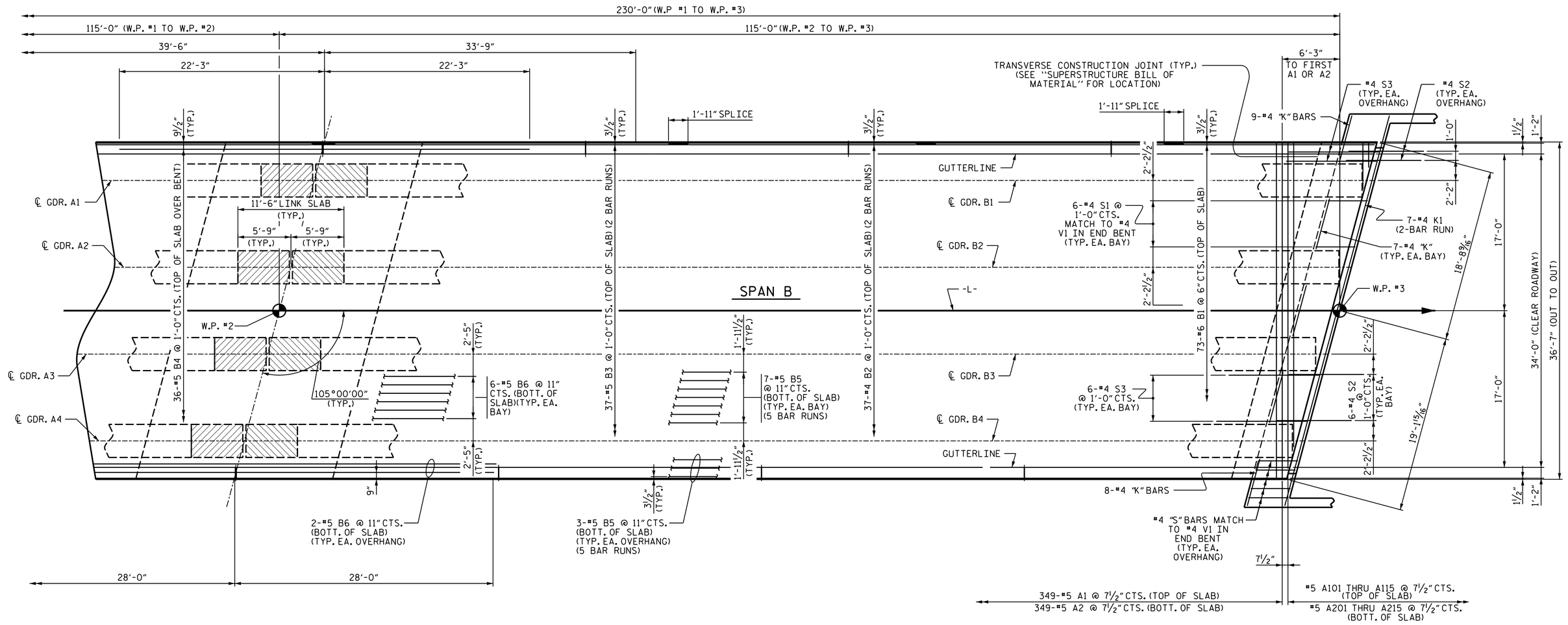
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			40



PLAN OF SPAN B

FOR ADDITIONAL REINFORCING STEEL IN CONCRETE PARAPET & END POST, SEE "1'-2" x 2'-6" CONCRETE PARAPET AND END POST DETAILS" SHEETS.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 2 OF 4

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DESIGN ENGINEER OF RECORD :	MGC	DATE :	8/22

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28125 — Marshall G. Checkley Jr. — MARSHALL G. CHECKLEY JR. ENGINEER

6/27/2024

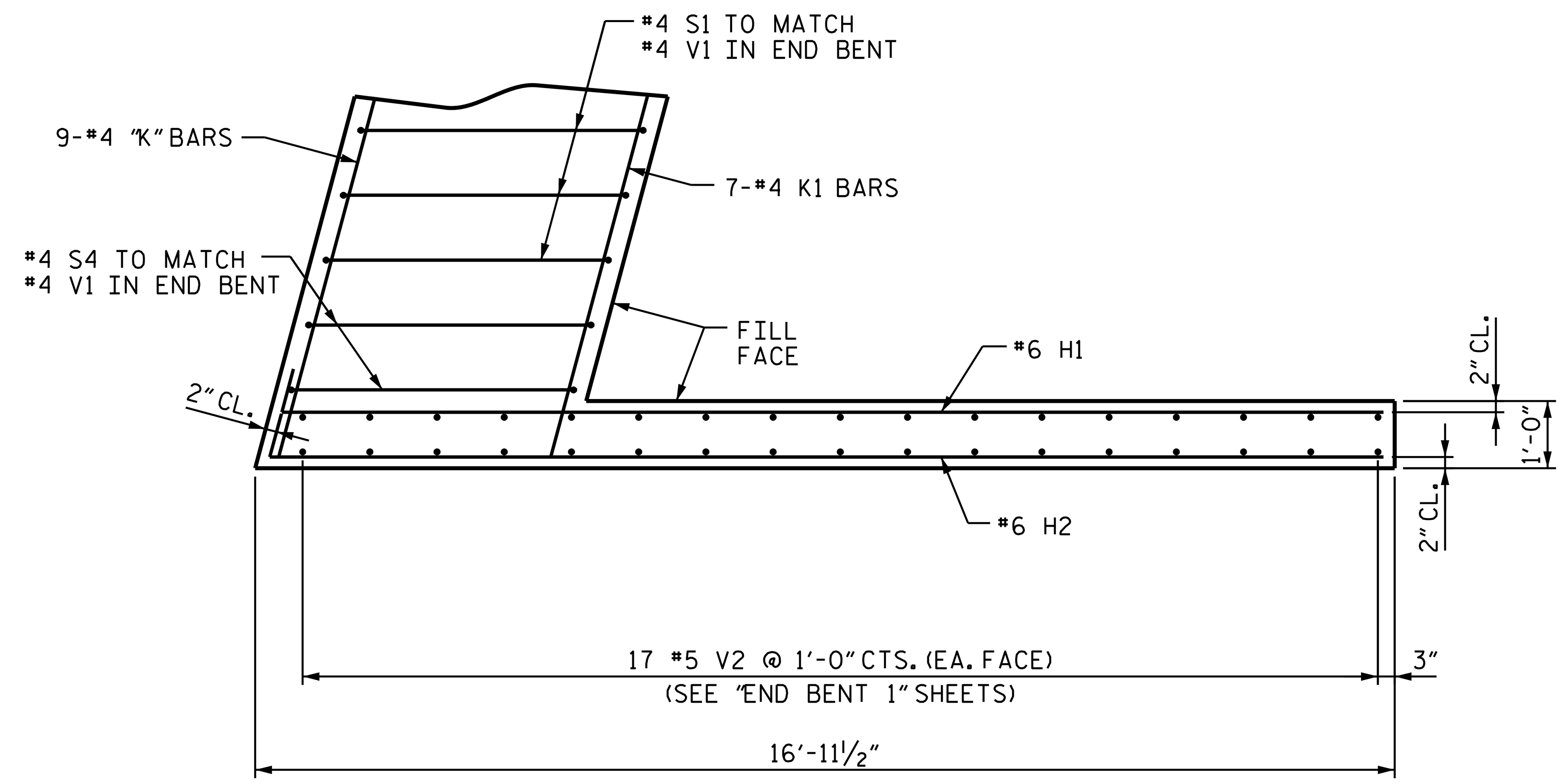
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

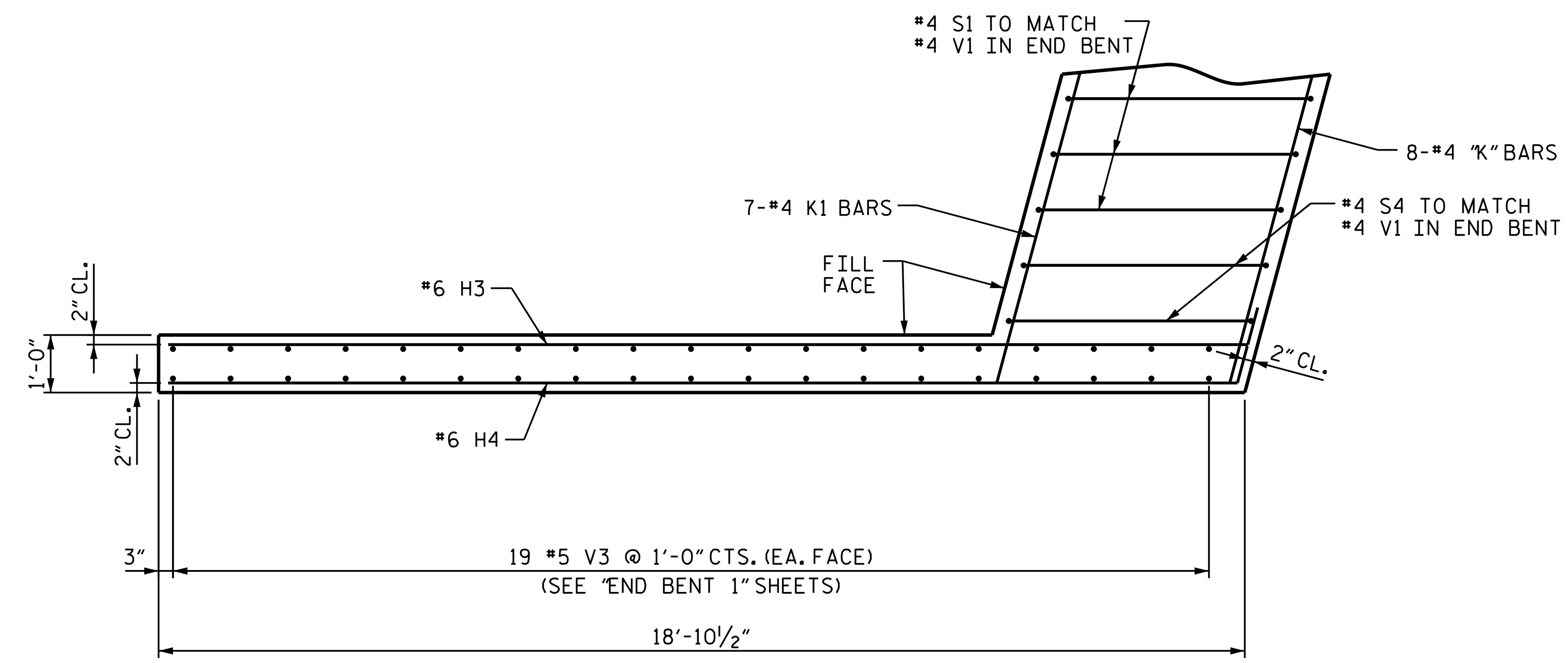
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPAN B

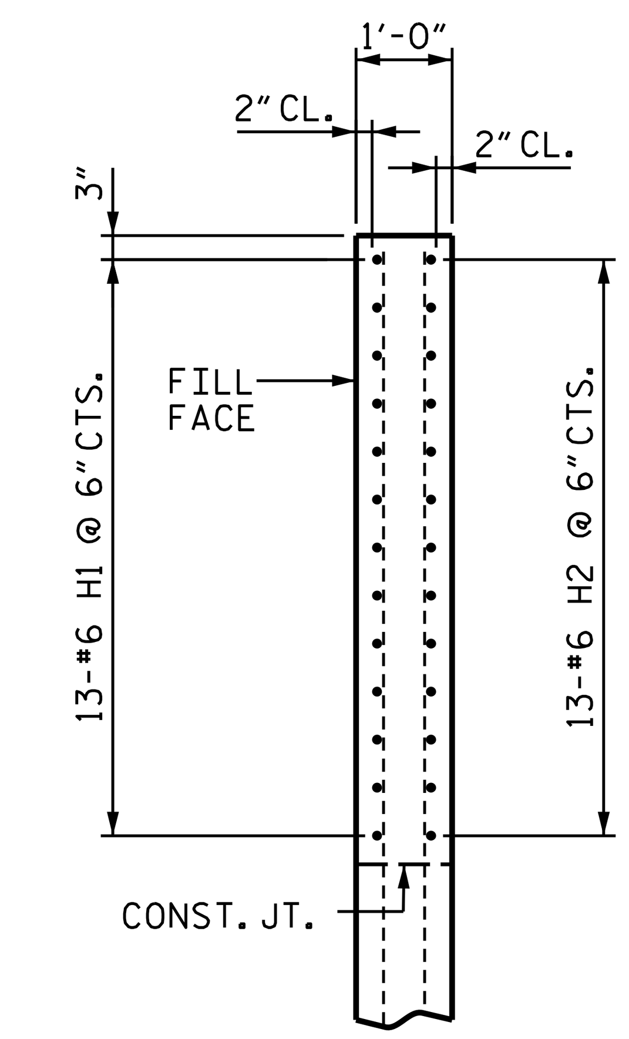
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			40



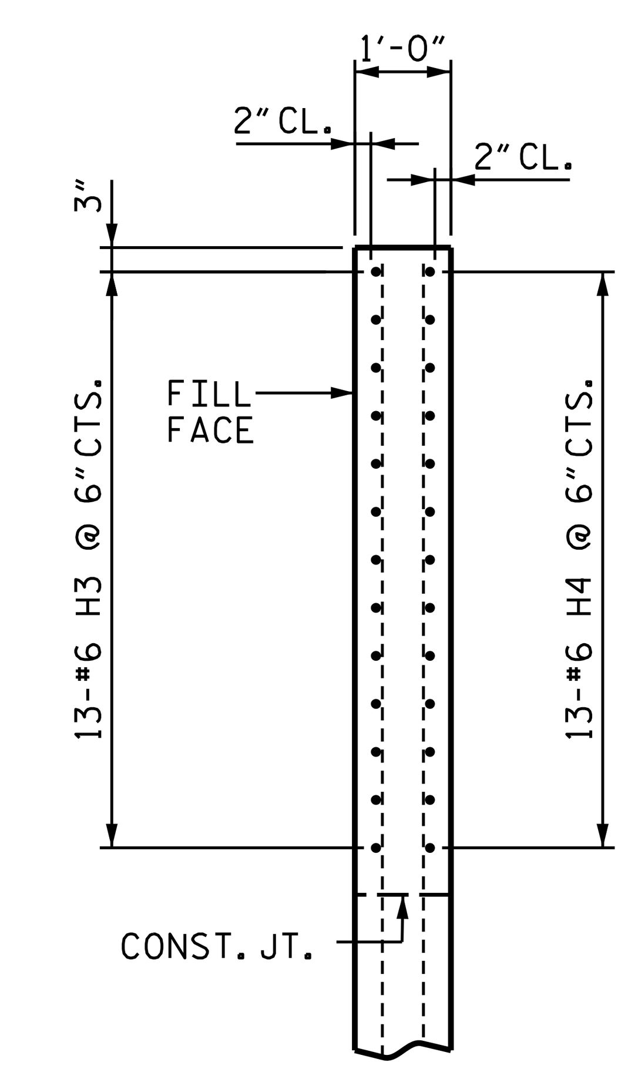
PLAN - "W1" AT END BENT 1



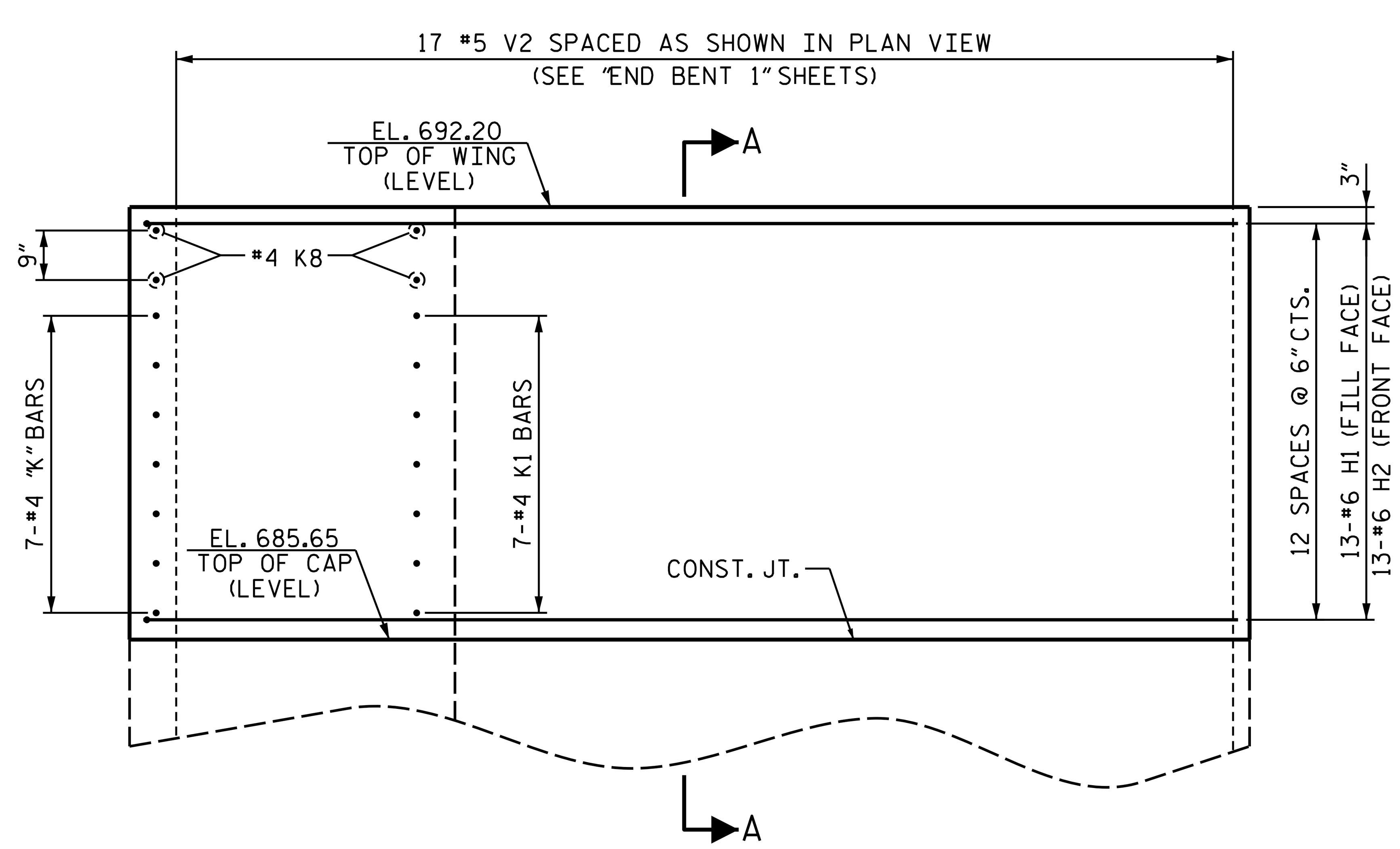
PLAN - "W2" AT END BENT 1



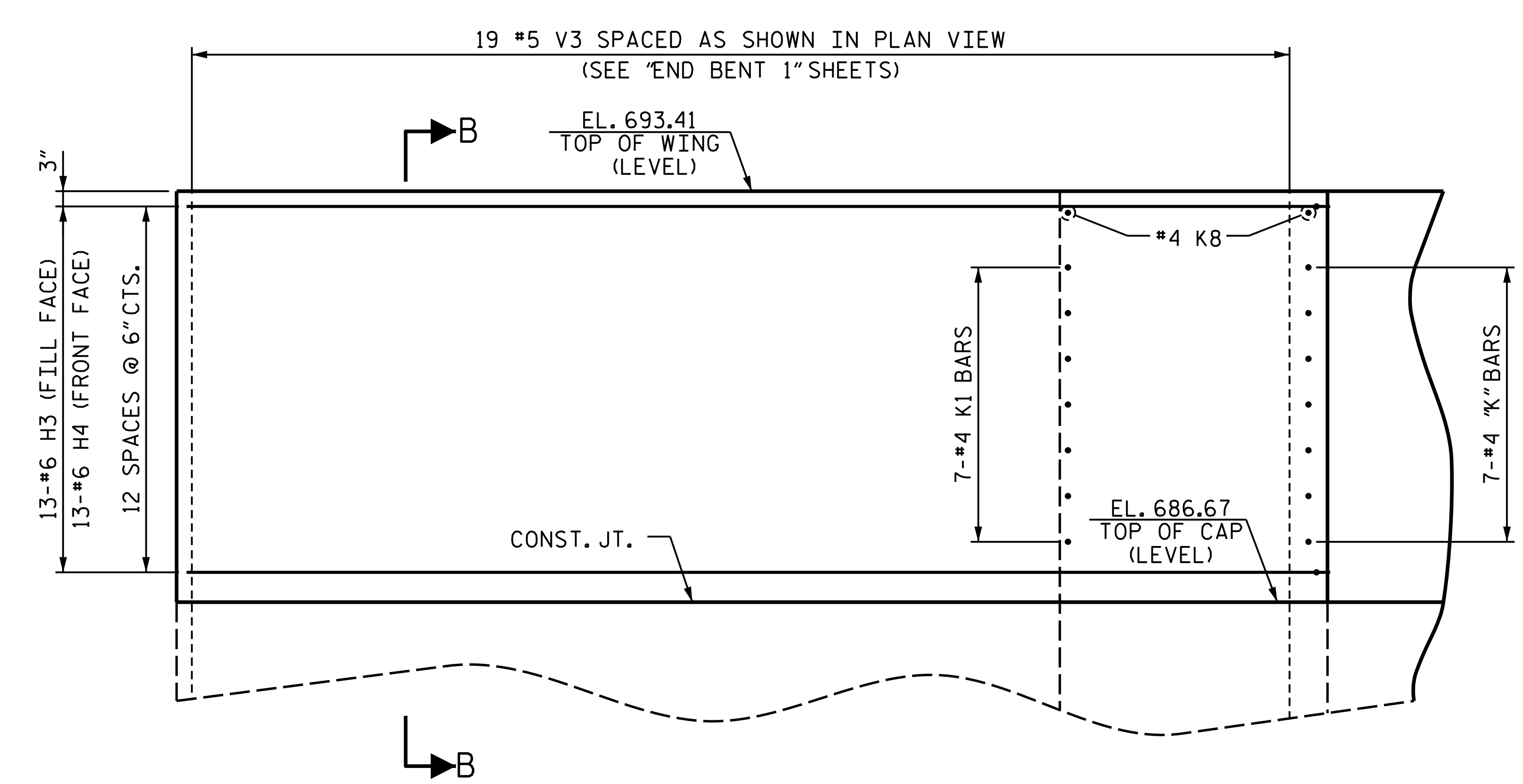
SECTION A-A



SECTION B-B



ELEVATION - "W1" AT END BENT 1
(FOR THE LOWER PART OF WING DETAIL AND
REINFORCING STEEL, SEE "END BENT 1" SHEETS)



ELEVATION - "W2" AT END BENT 1
(FOR THE LOWER PART OF WING DETAIL AND
REINFORCING STEEL, SEE "END BENT 1" SHEETS)

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek Jr.
6/27/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

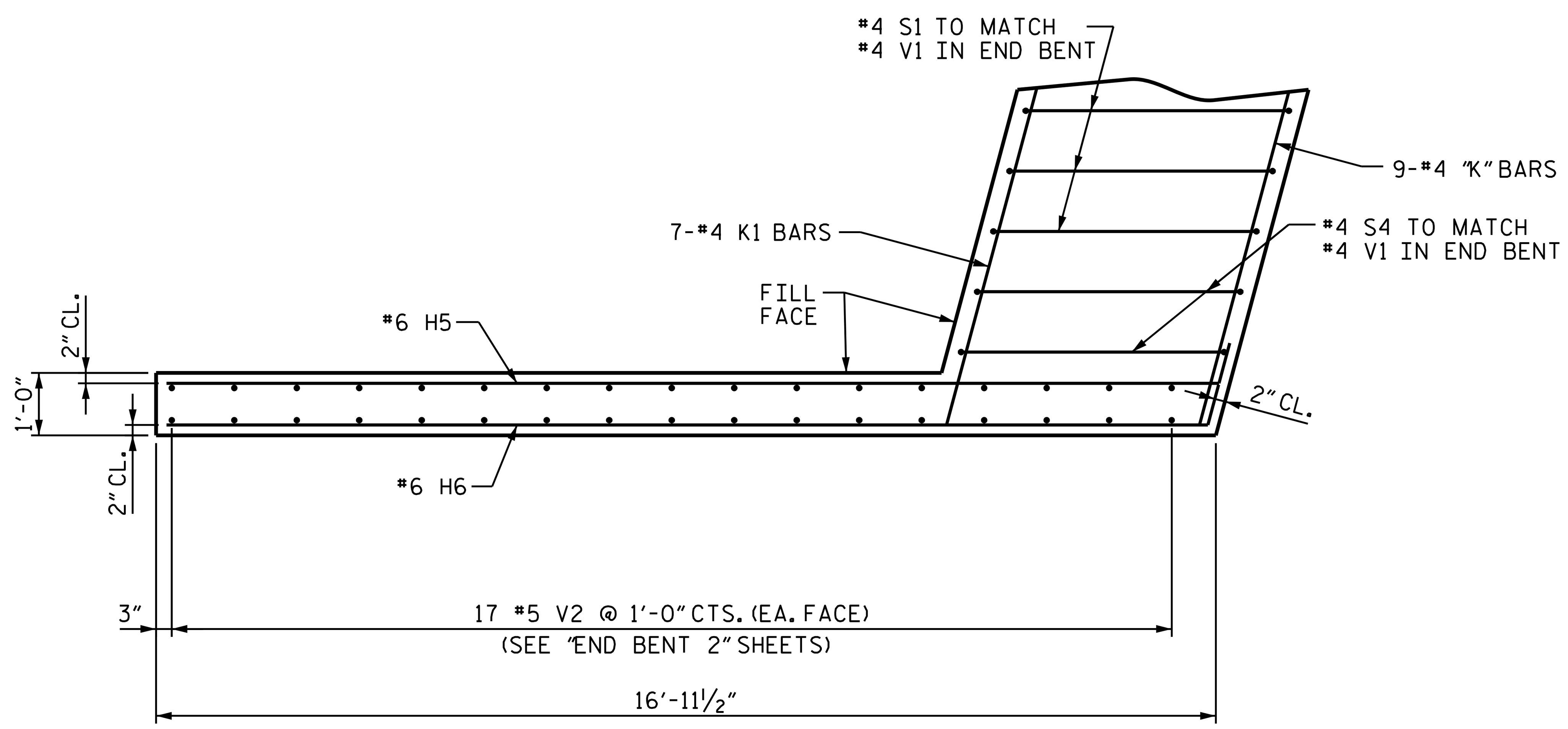
PLAN OF SPANS DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

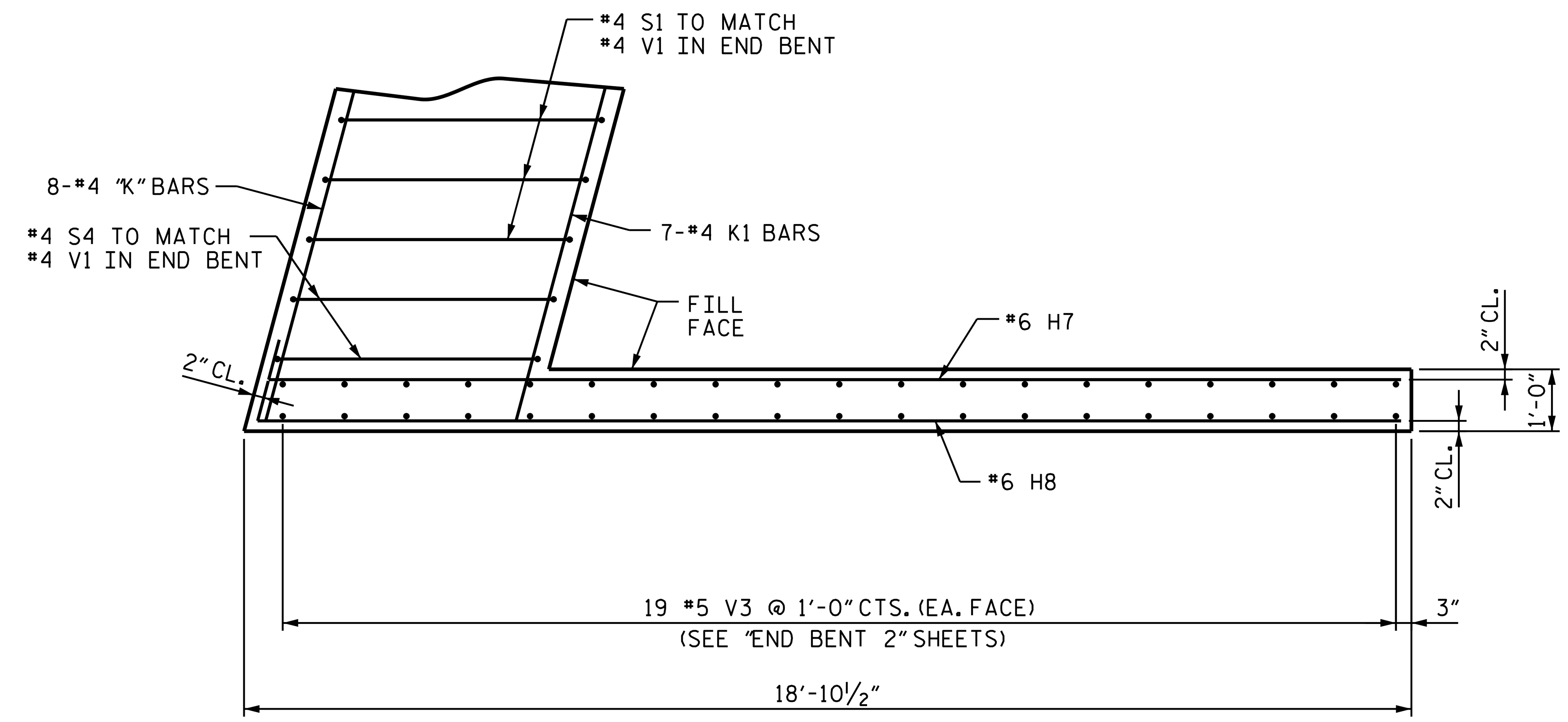
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			40

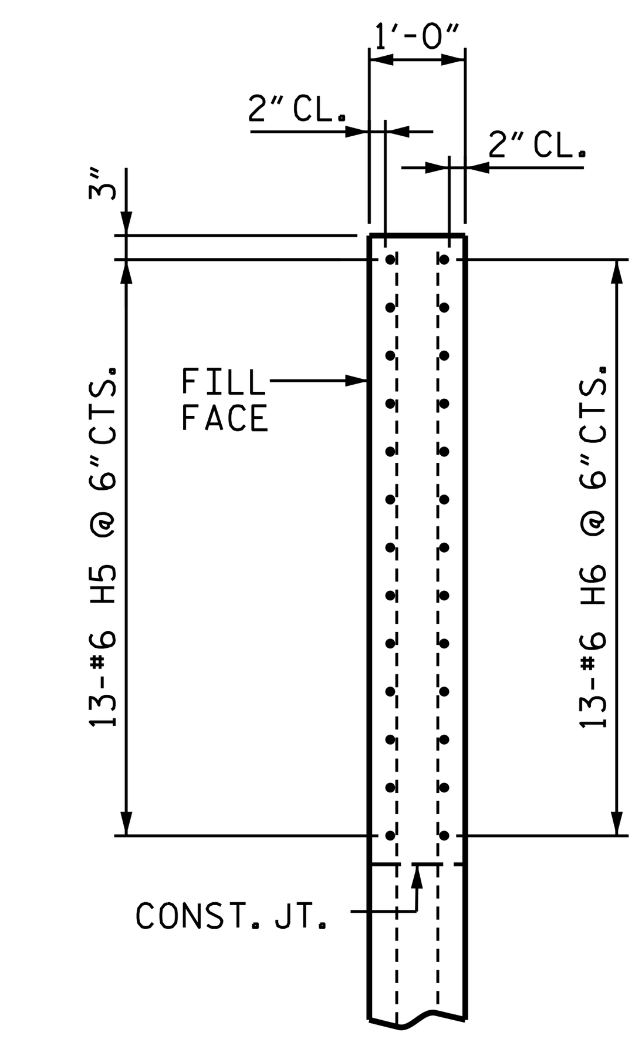
DRAWN BY :	JLA	DATE :	4/23
CHECKED BY :	MGC	DATE :	4/23
DESIGN ENGINEER OF RECORD :	MGC	DATE :	4/23



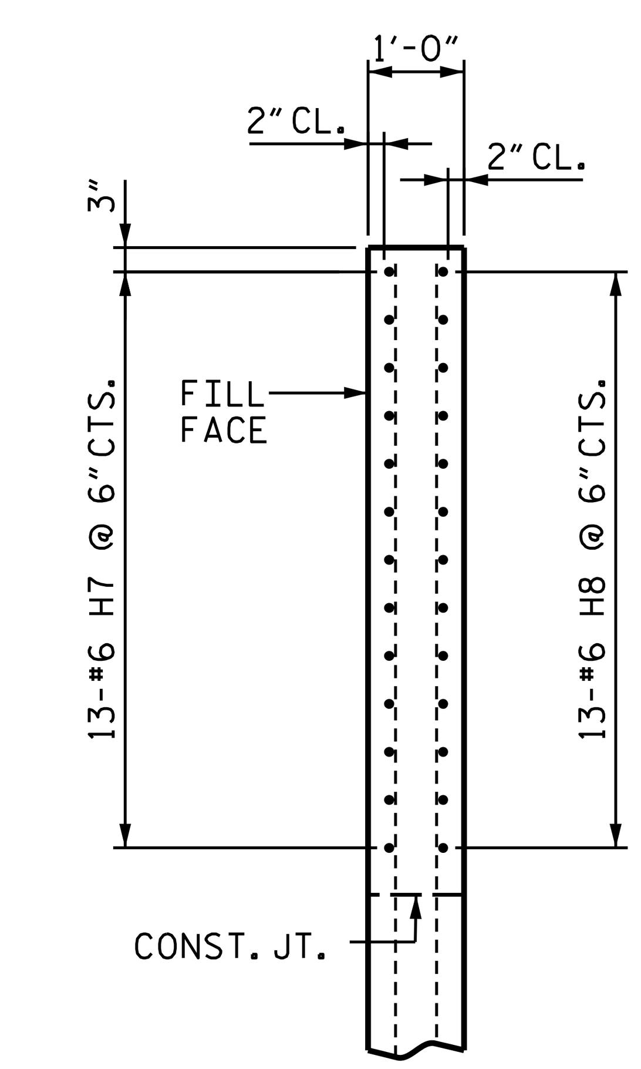
PLAN - "W3" AT END BENT 2



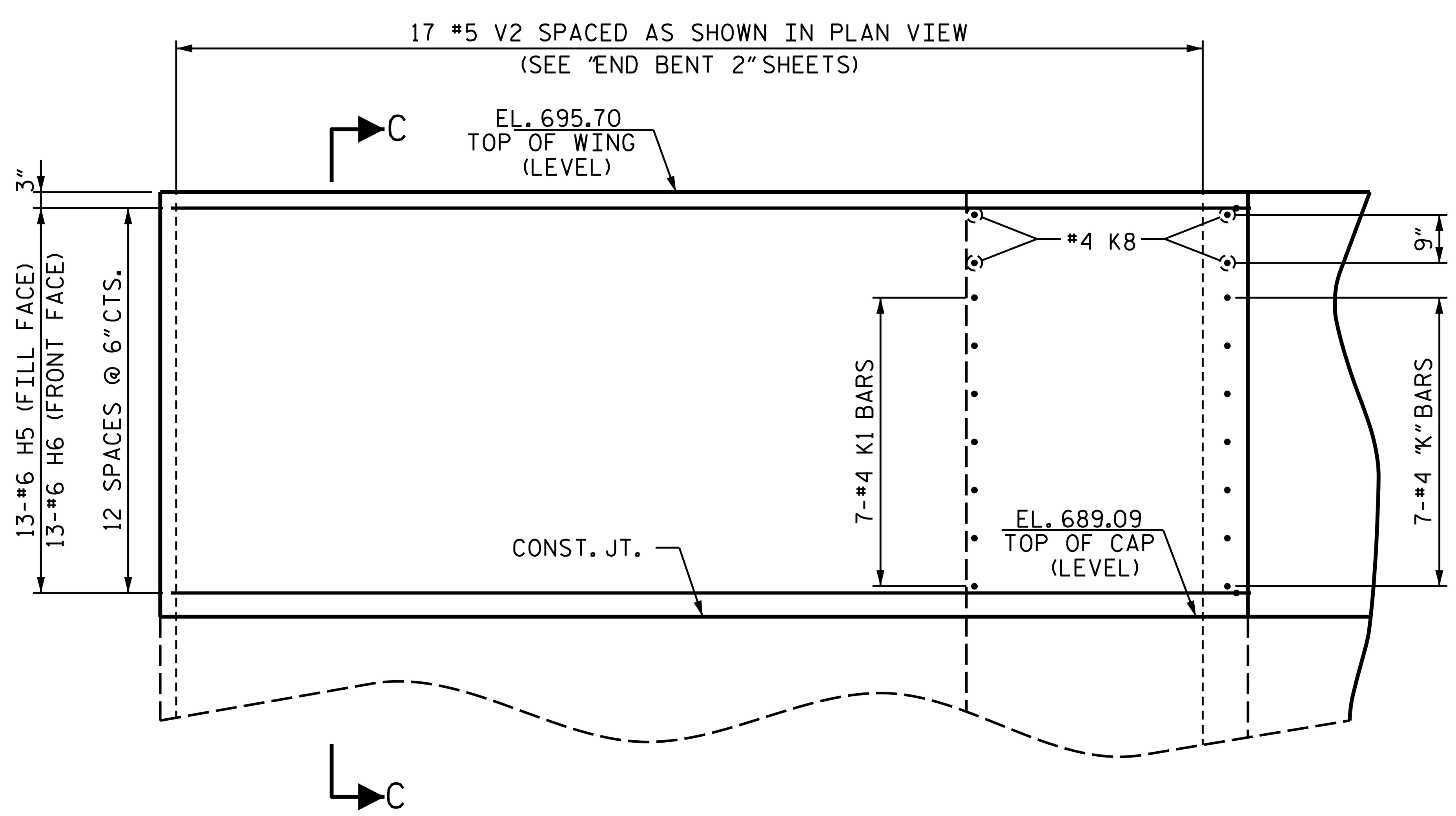
PLAN - "W4" AT END BENT 2



SECTION C-C

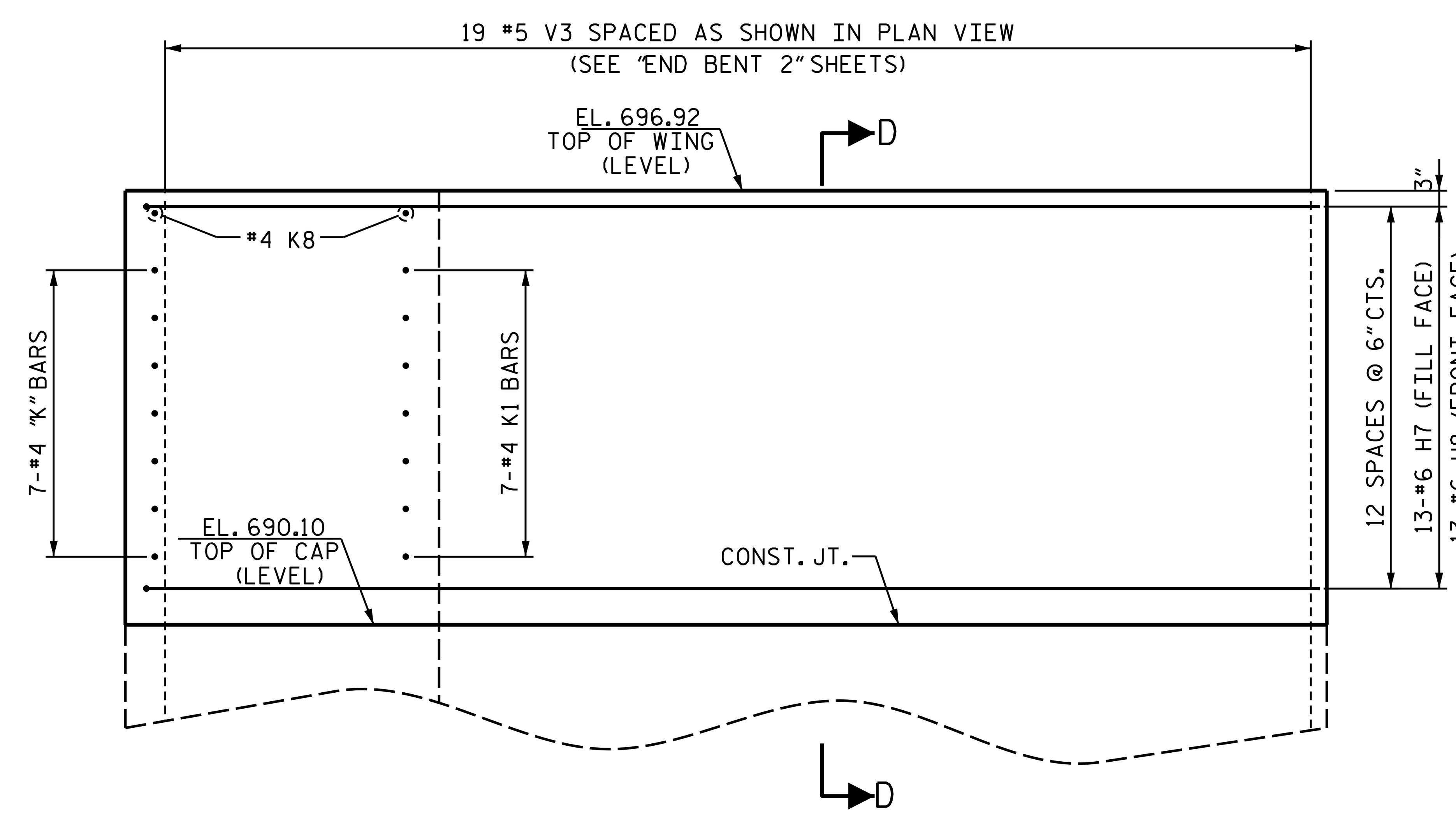


SECTION D-D



ELEVATION - "W3" AT END BENT 2

(FOR THE LOWER PART OF WING DETAIL AND REINFORCING STEEL, SEE "END BENT 2" SHEETS)



ELEVATION - "W4" AT END BENT 2

(FOR THE LOWER PART OF WING DETAIL AND REINFORCING STEEL, SEE "END BENT 2" SHEETS)

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

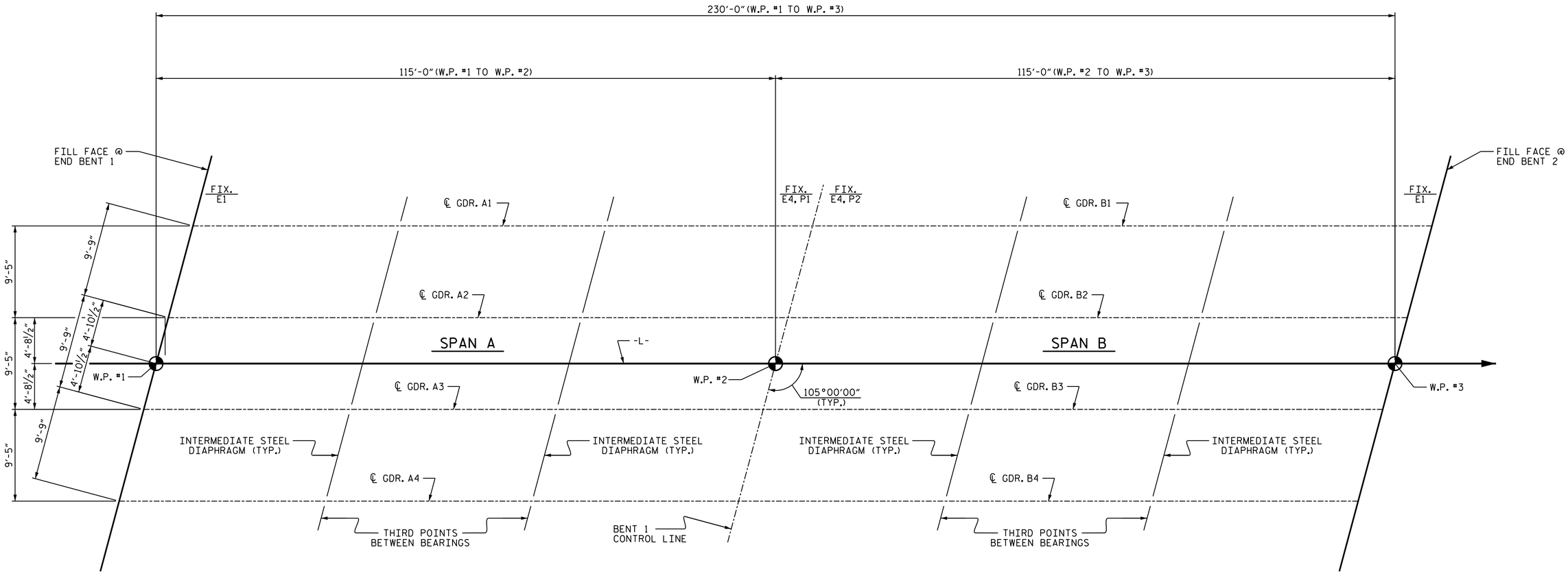
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS DETAILS

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-14
1			3				TOTAL SHEETS
2			4				40

DRAWN BY :	JLA	DATE :	4/23
CHECKED BY :	MGC	DATE :	4/23
DESIGN ENGINEER OF RECORD :	MGC	DATE :	4/23



FRAMING PLAN

FOR SOLE PLATES, SEE "ELASTOMERIC BEARINGS" SHEET.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

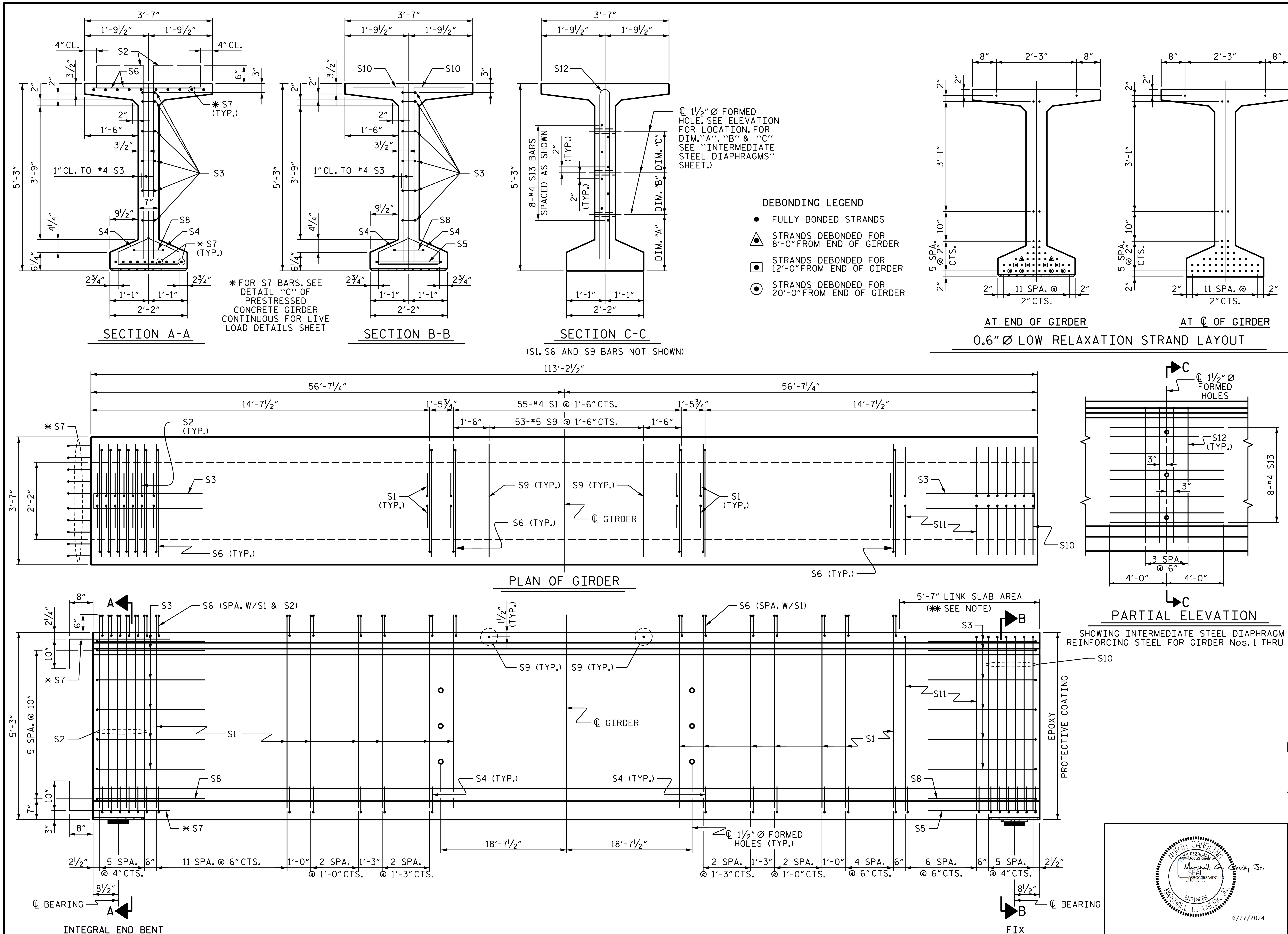
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			40

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DESIGN ENGINEER OF RECORD :	MGC	DATE :	8/22



** DO NOT RAKE TOP OF GIRDER IN THIS AREA.

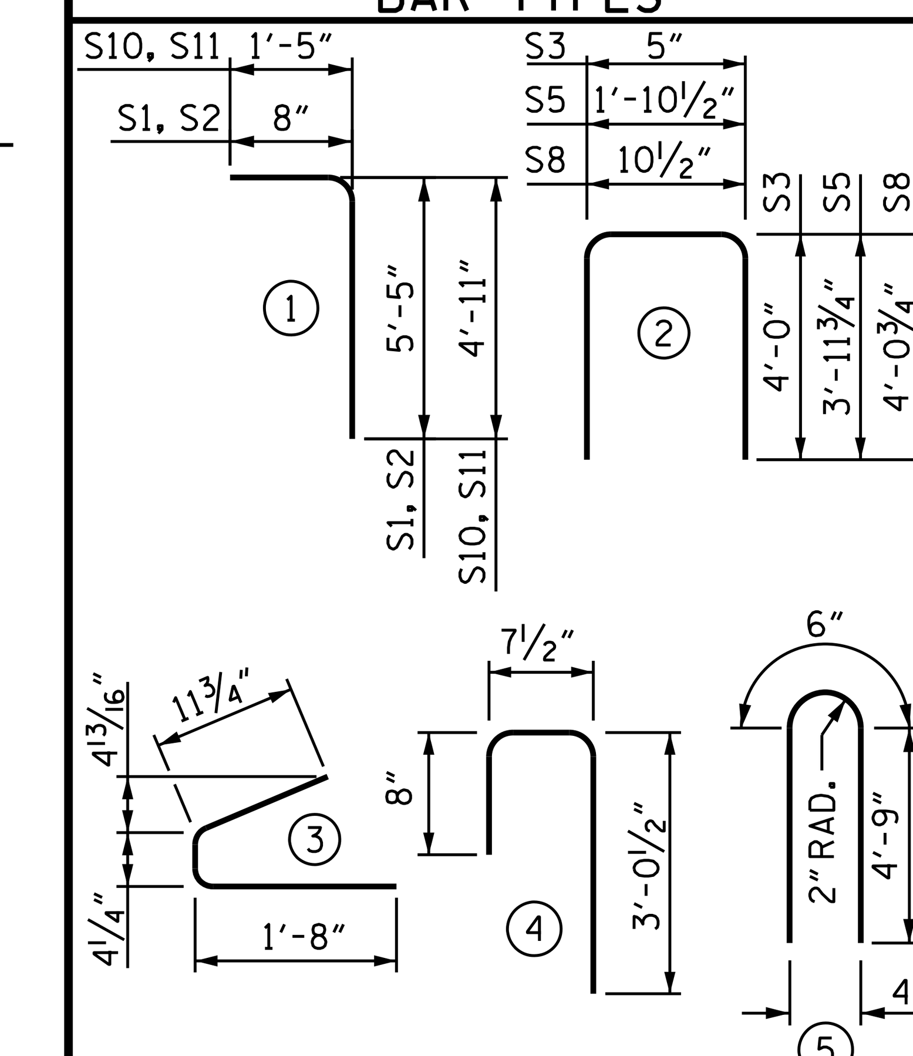
0.6" Ø L.R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	168	#4	1	6'-1"	683
S2	12	#5	1	6'-1"	76
S3	12	#4	2	8'-5"	67
S4	96	#4	3	3'-0"	192
S5	1	#5	2	9'-10"	10
S6	180	#5	4	4'-4"	814
* S7	20	#5	STR	3'-8"	76
S8	2	#5	2	9'-0"	19
S9	53	#5	STR	3'-3"	180
S10	12	#5	1	6'-4"	79
S11	14	#4	1	6'-4"	59
S12	8	#5	5	10'-0"	83
S13	16	#4	STR	8'-0"	86

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9,500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDERS 1-4	2,424	22.4	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	113'-2½"	452'-10"

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 1 OF 4

Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
63" PRESTRESSED CONCRETE MODIFED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A

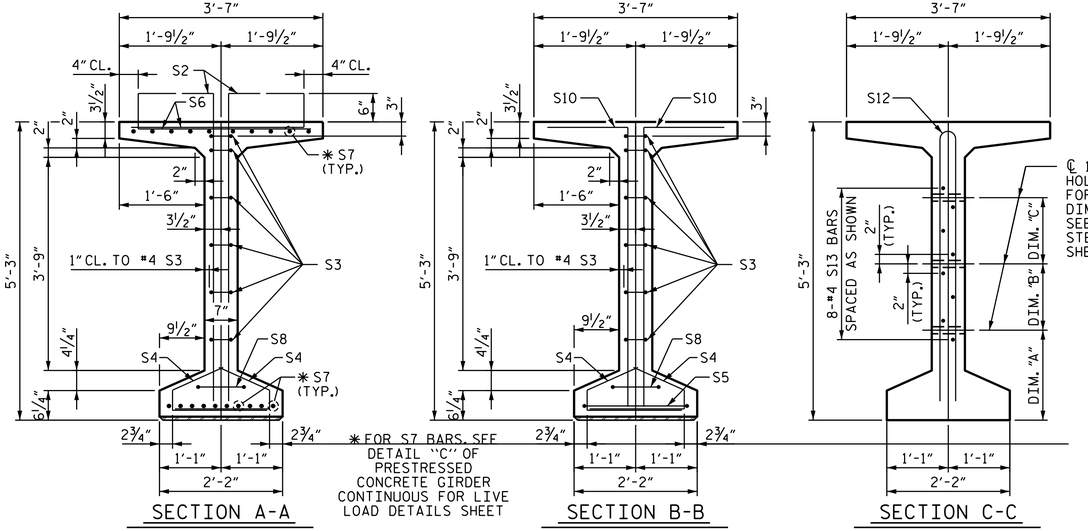
ASSEMBLED BY : JLA	DATE : 4/22
CHECKED BY : MGC	DATE : 04/24
DESIGN ENGINEER OF RECORD : STM	DATE : 04/24
DRAWN BY : EEM 2/6/97	REV. 6/13 MAA/THC
CHECKED BY : VAP 2/6/97	REV. 1/15 MAA/THC
	REV. 12/17 MAA/THC

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

SHEET NO. S-16

TOTAL SHEETS 40

STD. NO. PCG7



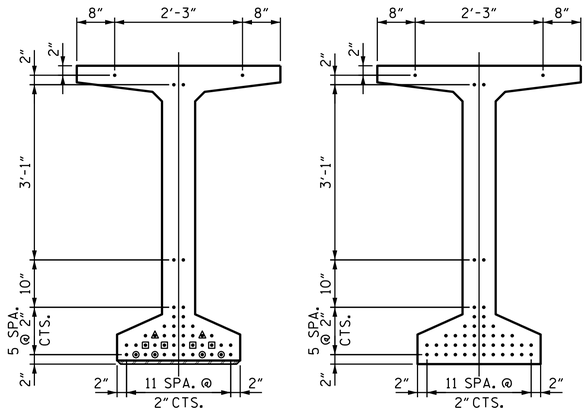
✱ FOR S7 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

SECTION A-A | SECTION B-B | SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

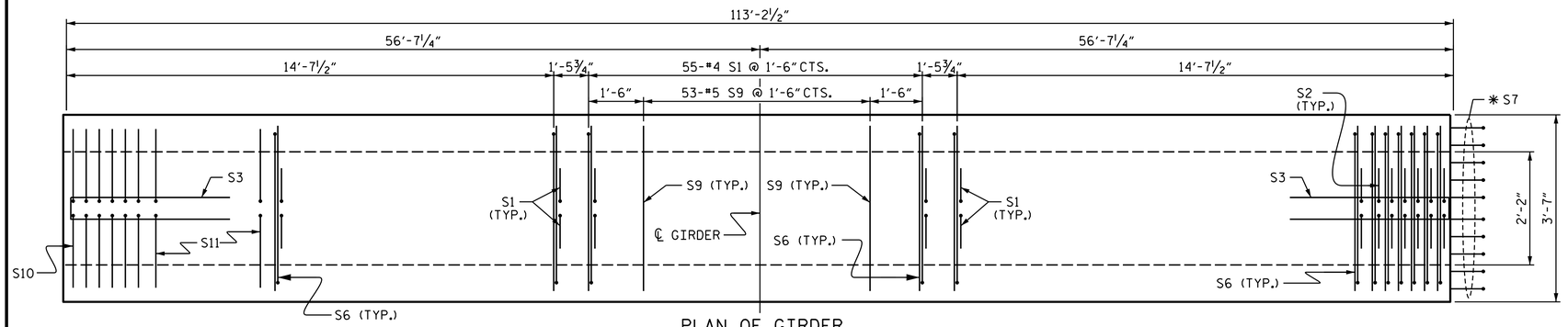
DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ▣ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 20'-0" FROM END OF GIRDER

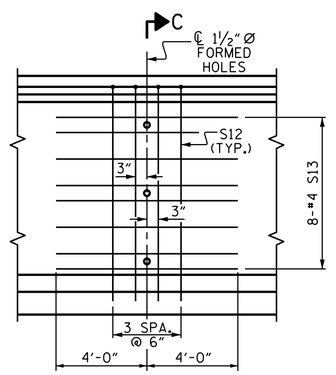


AT END OF GIRDER | AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

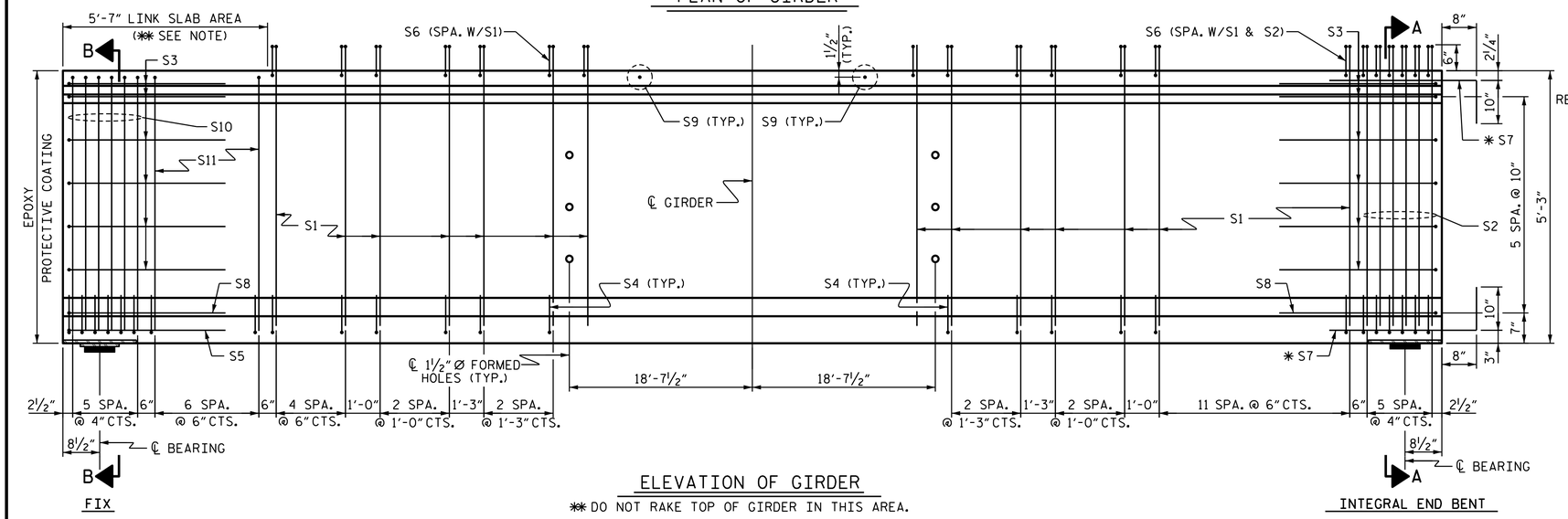


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 4



FIX

ELEVATION OF GIRDER

✱✱ DO NOT RAKE TOP OF GIRDER IN THIS AREA.

INTEGRAL END BENT

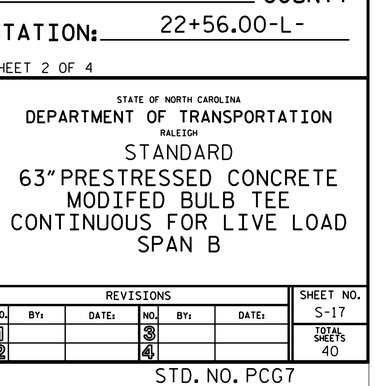
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	168	#4	1	6'-1"	683
S2	12	#5	1	6'-1"	76
S3	12	#4	2	8'-5"	67
S4	96	#4	3	3'-0"	192
S5	1	#5	2	9'-10"	10
S6	180	#5	4	4'-4"	814
✱ S7	20	#5	STR	3'-8"	76
S8	2	#5	2	9'-0"	19
S9	53	#5	STR	3'-3"	180
S10	12	#5	1	6'-4"	79
S11	14	#4	1	6'-4"	59
S12	8	#5	5	10'-0"	83
S13	16	#4	STR	8'-0"	86

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9,500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDERS 1-4	2,424	22.4	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	113'-2½"	452'-10"

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 2 OF 4

ASSEMBLED BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	04/24
DESIGN ENGINEER OF RECORD :	STM	DATE :	04/24
DRAWN BY : EEM	2/6/97	REV. 6/13	MAA/THC
CHECKED BY : VAP	2/6/97	REV. 1/15	MAA/THC
		REV. 12/17	MAA/THC

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28125 MARSHALL G. CHEEK, JR. ENGINEER — Marshall G. Cheek Jr.

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

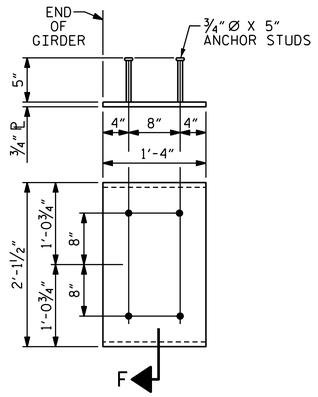
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
63" PRESTRESSED CONCRETE MODIFED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN B

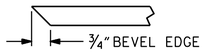
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			40

STD. NO. PCG7



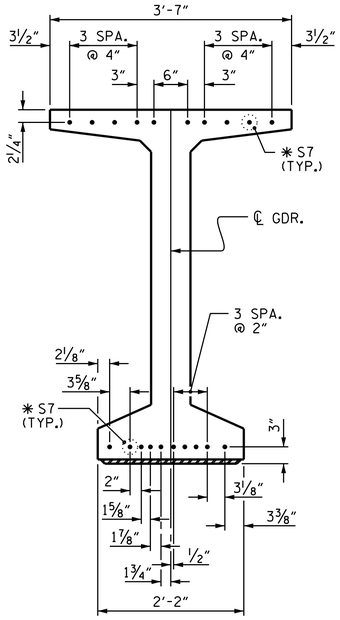
EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE IV GIRDER AND 63″MODIFIED BULB TEES

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)



DETAIL "C"

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 7,500 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″, EXCEPT AS NOTED IN THE LINK SLAB AREA.

A 2″ x 2″ CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 63″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.

THE TOP OF THE GIRDER IN THE REGION OF THE LINK SLAB SHALL BE SMOOTH (NOT RAKED) AND FREE OF STIRRUPS, DECK FORMWORK ATTACHMENTS AND OVERHANG FALSEWORK/FORMWORK ATTACHMENTS.

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″LOW RELAXATION STRANDS		SPAN A & B GIRDER 1 & 4																																								
FORTIETH POINTS		℄ BRG.	.025	.050	.075	.100	.125	.150	.175	.200	.225	.250	.275	.300	.325	.350	.375	.400	.425	.450	.475	.500	.525	.550	.575	.600	.625	.650	.675	.700	.725	.750	.775	.800	.825	.850	.875	.900	.925	.950	.975	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.025	0.049	0.073	0.096	0.119	0.141	0.162	0.181	0.201	0.219	0.235	0.250	0.263	0.275	0.284	0.292	0.299	0.303	0.306	0.307	0.306	0.303	0.299	0.292	0.284	0.275	0.263	0.250	0.235	0.219	0.201	0.181	0.162	0.141	0.119	0.096	0.073	0.049	0.025	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.015	0.029	0.043	0.058	0.072	0.086	0.099	0.112	0.124	0.135	0.145	0.155	0.163	0.170	0.177	0.182	0.186	0.189	0.191	0.191	0.191	0.189	0.186	0.182	0.177	0.170	0.163	0.155	0.145	0.135	0.124	0.112	0.099	0.086	0.072	0.058	0.043	0.029	0.015	0.000
FINAL CAMBER	↑	0	1/8″	1/4″	3/8″	7/16″	9/16″	11/16″	3/4″	13/16″	15/16″	1″	1 1/16″	1 1/8″	1 3/16″	1 1/4″	1 5/16″	1 5/16″	1 3/8″	1 3/8″	1 3/8″	1 3/8″	1 3/8″	1 3/8″	1 3/8″	1 5/16″	1 5/16″	1 1/4″	1 3/16″	1 1/8″	1 1/16″	1″	15/16″	13/16″	3/4″	11/16″	9/16″	7/16″	3/8″	1/4″	1/8″	0

✱ INCLUDES FUTURE WEARING SURFACE
VALUES SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS SHOWN IN INCHES (FRACTION FORM).

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″LOW RELAXATION STRANDS		SPAN A & B GIRDER 2 & 3																																								
FORTIETH POINTS		℄ BRG.	.025	.050	.075	.100	.125	.150	.175	.200	.225	.250	.275	.300	.325	.350	.375	.400	.425	.450	.475	.500	.525	.550	.575	.600	.625	.650	.675	.700	.725	.750	.775	.800	.825	.850	.875	.900	.925	.950	.975	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.025	0.049	0.073	0.096	0.119	0.141	0.162	0.181	0.201	0.219	0.235	0.250	0.263	0.275	0.284	0.292	0.299	0.303	0.306	0.307	0.306	0.303	0.298	0.292	0.284	0.275	0.263	0.250	0.235	0.219	0.201	0.181	0.162	0.141	0.119	0.096	0.073	0.049	0.025	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.015	0.030	0.045	0.060	0.075	0.090	0.104	0.117	0.130	0.141	0.152	0.161	0.170	0.178	0.185	0.190	0.194	0.197	0.199	0.200	0.199	0.197	0.194	0.190	0.185	0.178	0.170	0.161	0.152	0.141	0.130	0.117	0.104	0.090	0.075	0.060	0.045	0.030	0.015	0.000
FINAL CAMBER	↑	0	1/8″	1/4″	5/16″	7/16″	1/2″	5/8″	11/16″	3/4″	7/8″	15/16″	1″	1 1/16″	1 1/8″	1 3/16″	1 3/16″	1 1/4″	1 1/4″	1 1/4″	1 5/16″	1 5/16″	1 5/16″	1 1/4″	1 1/4″	1 1/4″	1 3/16″	1 1/8″	1 1/8″	1 1/16″	1″	15/16″	7/8″	3/4″	11/16″	5/8″	1/2″	7/16″	5/16″	1/4″	1/8″	0

✱ INCLUDES FUTURE WEARING SURFACE
VALUES SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS SHOWN IN INCHES (FRACTION FORM).

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-

SHEET 3 OF 4

DocuSigned by:
Marshall G. Cheek, Jr.
5FBCC2F3A4DC413...
SEAL 20125
6/27/2024

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

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

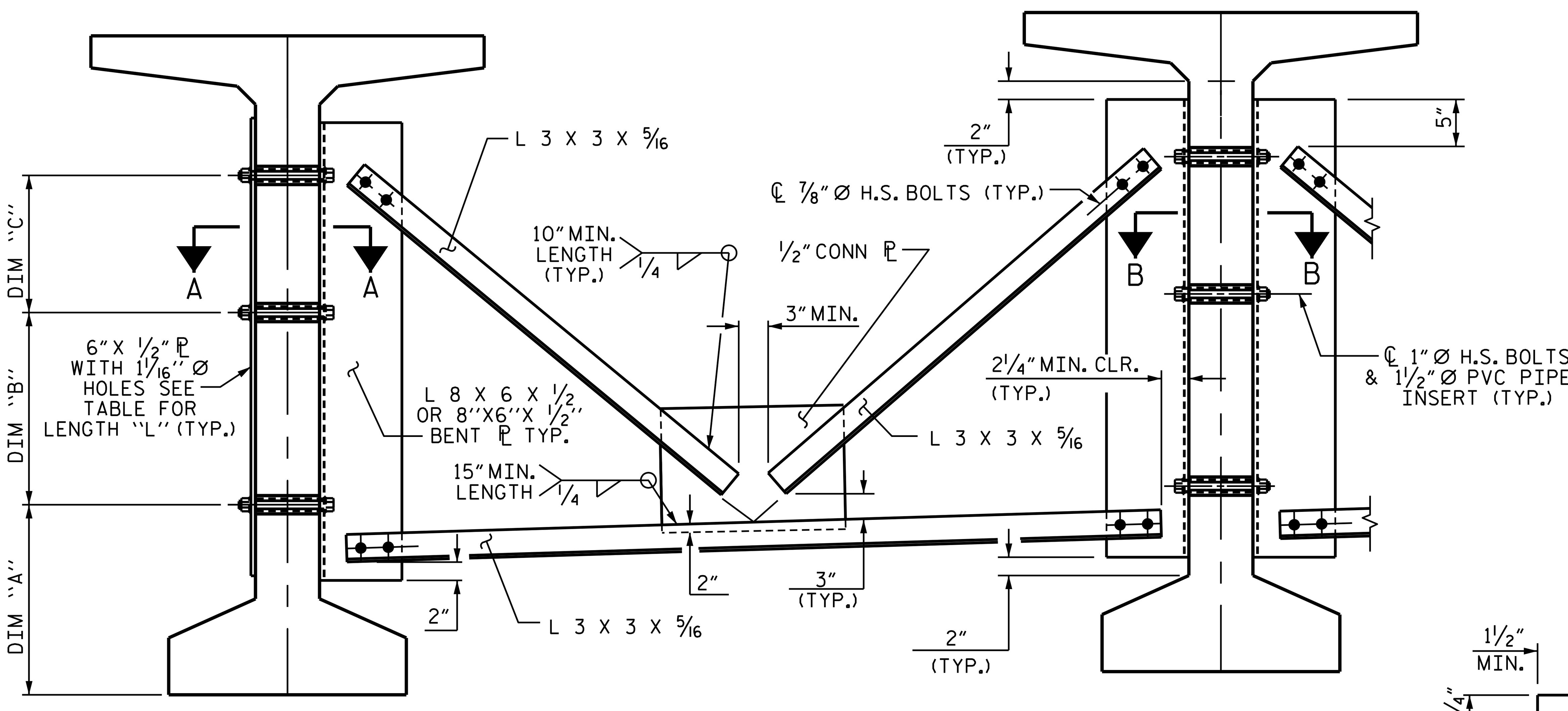
SHEET NO.
S-18
TOTAL SHEETS
40

ASSEMBLED BY : JLA DATE : 4/22
CHECKED BY : MGC DATE : 5/22
DESIGN ENGINEER OF RECORD : ZCS DATE : 8/22

DRAWN BY : ELR 11/91
CHECKED BY : GRP 11/91

REV. 1/15 MAA/TMG
REV. 2/15 MAA/TMG
REV. 12/17 MAA/THC

STD. NO. PCG9

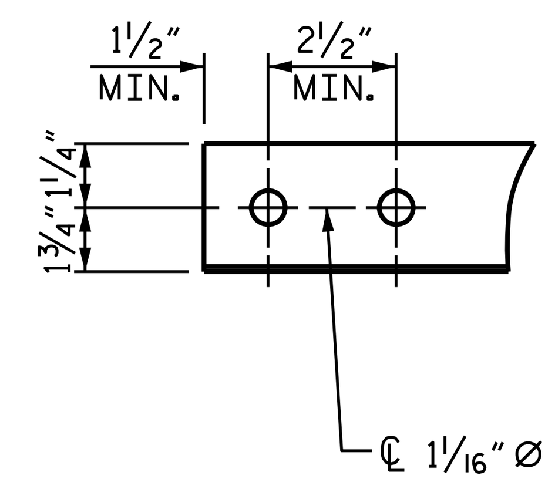


EXTERIOR GIRDER

INTERIOR GIRDER

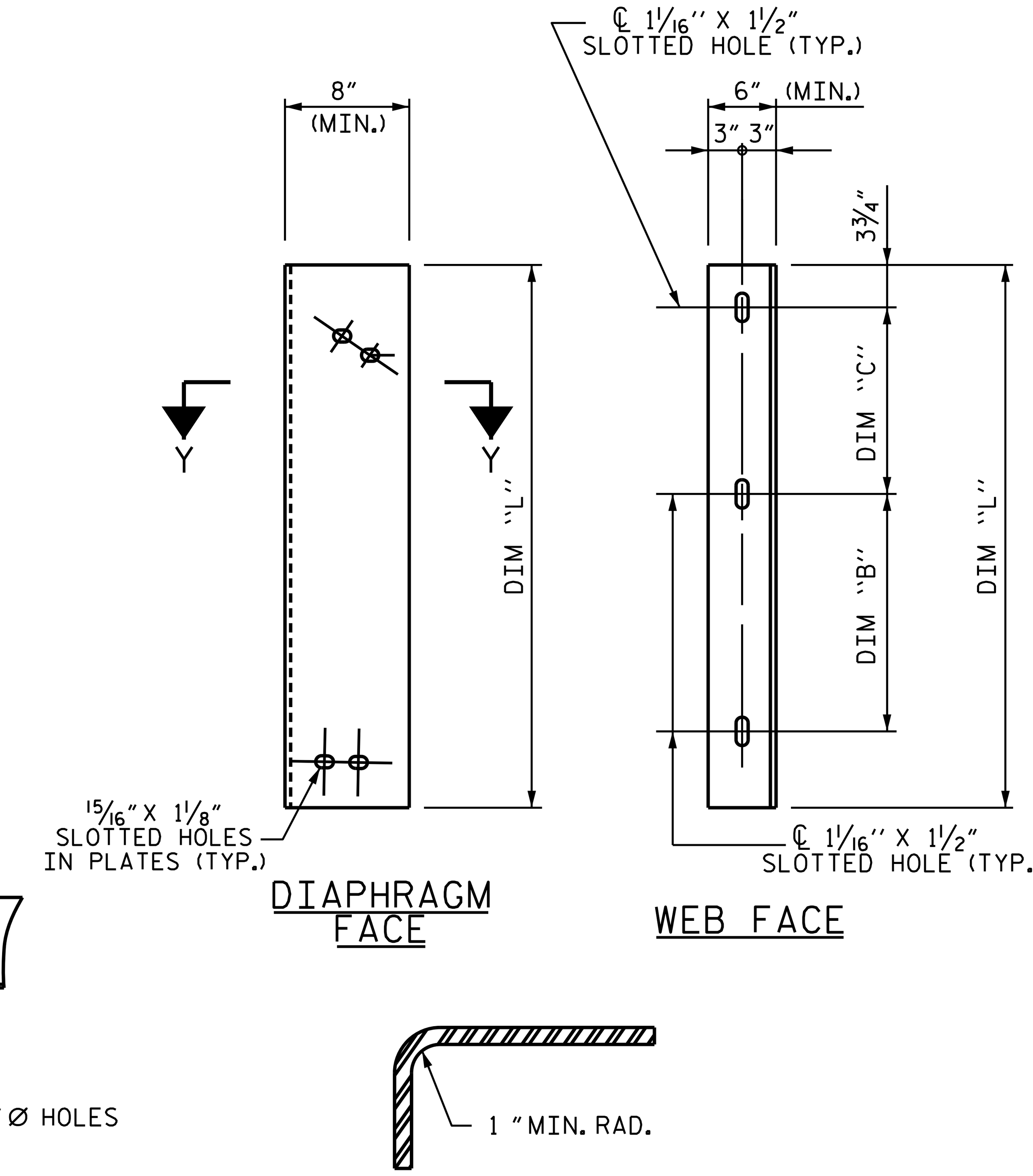
PART SECTION AT INTERMEDIATE DIAPHRAGM

(63" BULB TEE GIRDER SHOWN)



ANGLE END

(L 3 X 3 X 5/16)



DIAPHRAGM FACE

WEB FACE

SECTION Y-Y

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 DEPARTMENTS 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.

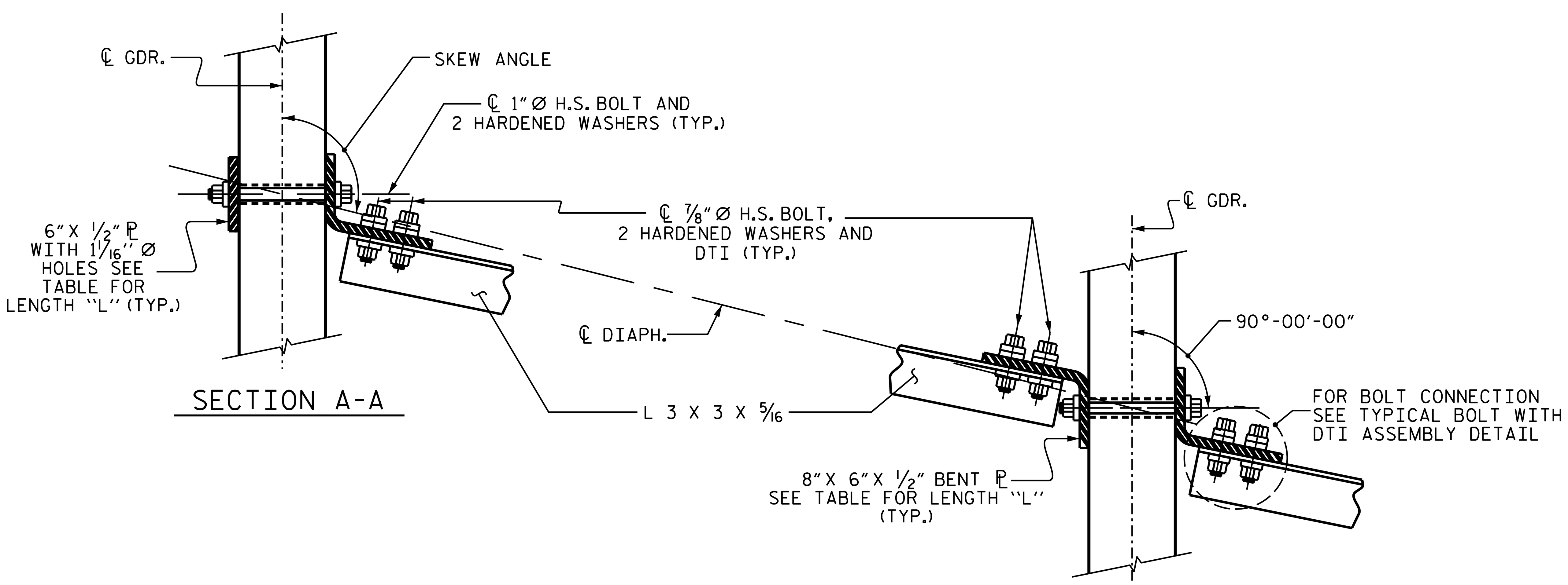
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

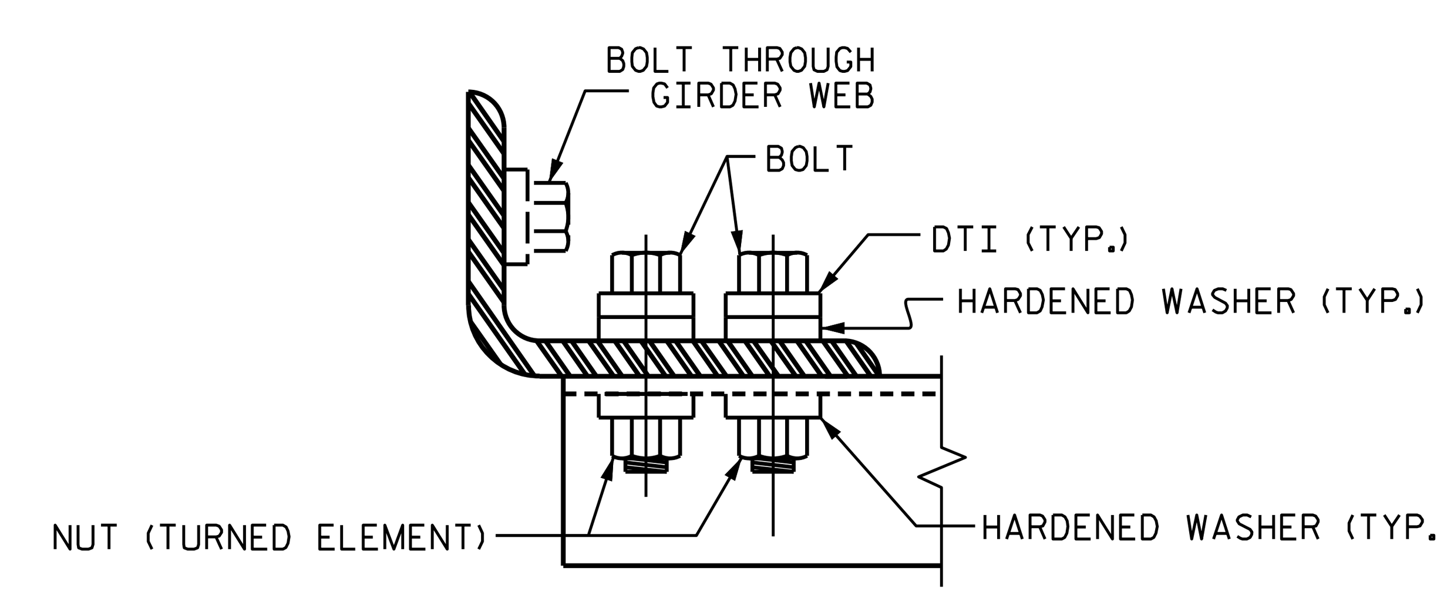
GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
63" BULB TEE	1'-7"	1'-2"	1'-2"	3'-5"



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 028126 ENGINEER MARSHALL G. CHEEK, JR. — DocuSigned by: Marshall G. Cheek Jr. — 6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

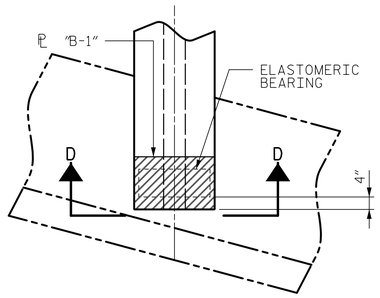
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD INTERMEDIATE STEEL DIAPHRAGMS FOR 63" & 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

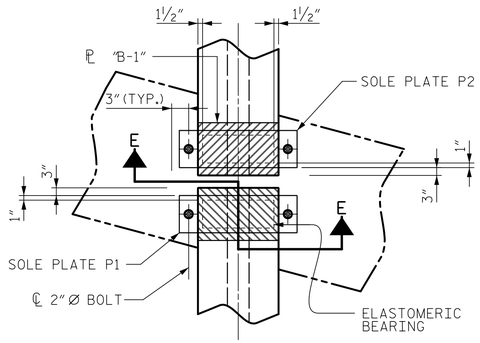
REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-19
1			3					TOTAL SHEETS
2			4					40

ASSEMBLED BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	5/22
DRAWN BY : RWW 11/09	REV. 10/1/11	MAA/GM	
CHECKED BY : GM 11/09	REV. 12/17	MAA/THC	

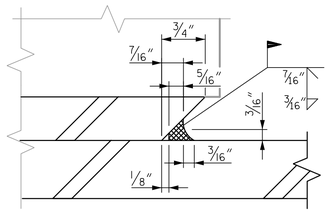
STD. NO. PCG11



PLAN OF GIRDER @ INTEGRAL END BENT



TYPICAL BENT PLAN



DETAIL "A"

NOTES

AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF ½" TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.

STEEL SOLE PLATES, ANCHOR BOLTS AND NUTS 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 AND NUTS SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

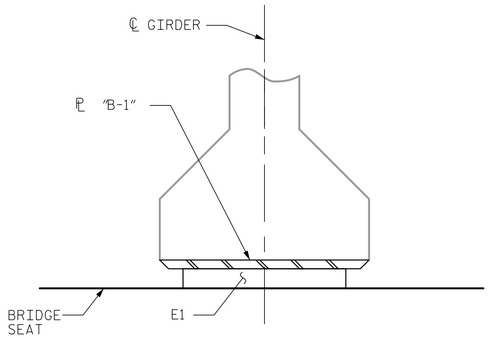
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT AND NUTS . SHOP INSPECTION IS REQUIRED.

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.

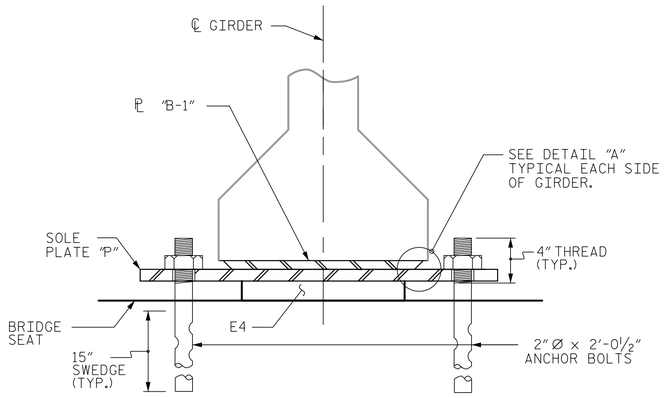
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE STANDARD SPECIFICATION.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



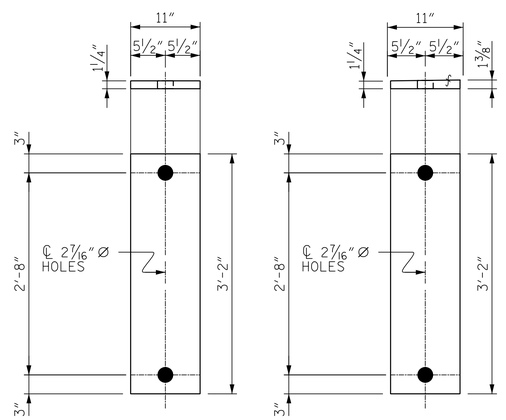
FIXED

SECTION D-D



FIXED

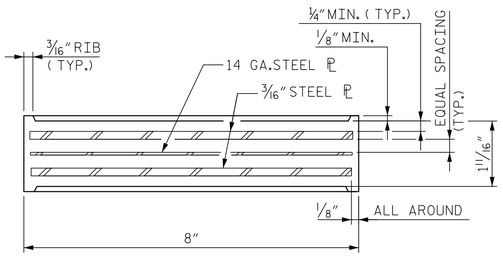
SECTION E-E



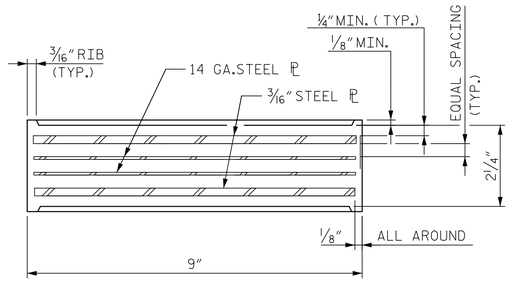
P1
(FIXED)
(4 REQ'D)

P2
(FIXED)
(4 REQ'D)

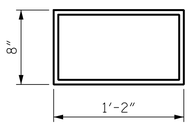
SOLE PLATE DETAILS ("P")



TYPICAL SECTION OF ELASTOMERIC BEARINGS



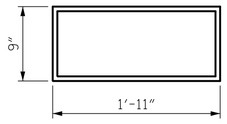
TYPICAL SECTION OF ELASTOMERIC BEARINGS



PLAN VIEW OF ELASTOMERIC BEARING

TYPE II

E1 (8 REQ'D) @ END BENT 1 & 2



PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

E4 (8 REQ'D) @ BENT 1

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE II	145 k
TYPE V	365 k

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr. 20125534ADC413...

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (04) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY :	JLA	DATE :	2/24
CHECKED BY :	MGC	DATE :	2/24
DRAWN BY : WJH	8/89	REV. 12/17	MAA/THC
CHECKED BY : CRK	8/89	REV. 10/21	BNB/AAI
		REV. 10/23	BNB/SNM

STD. NO. EB4

PLAN OF CONCRETE PARAPET

NOTES

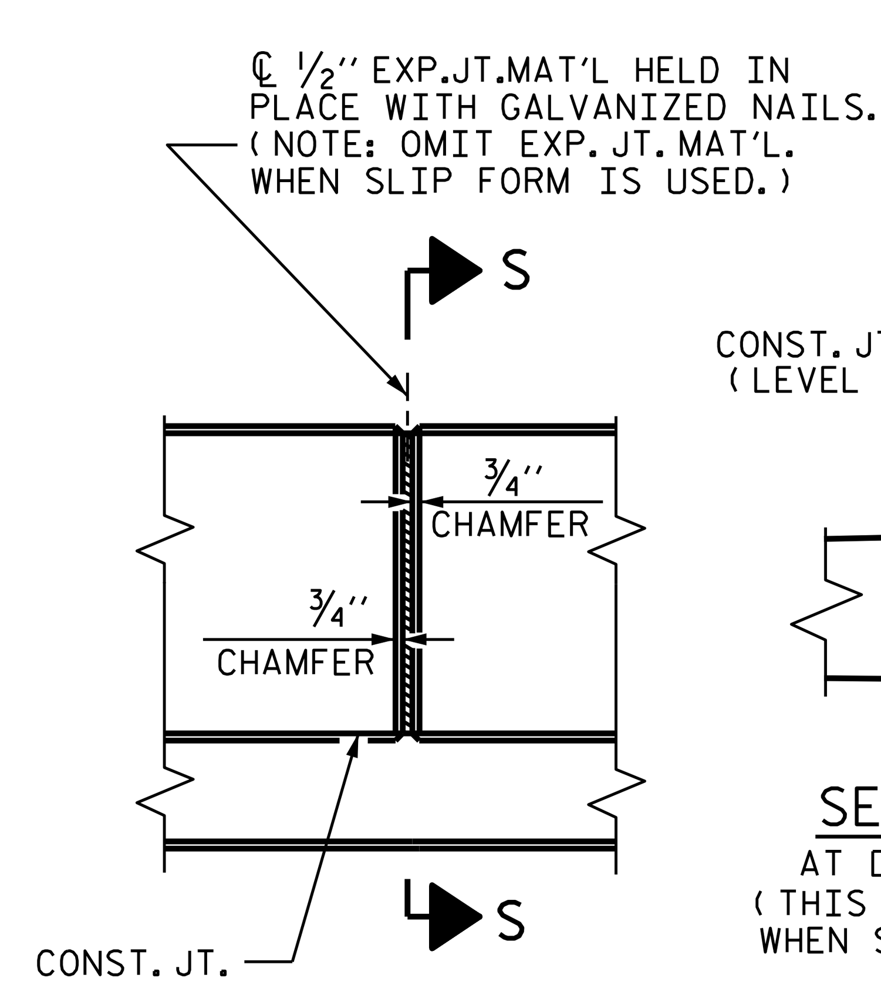
THE PARAPET IN THE CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN PARAPET SHALL BE EPOXY COATED.

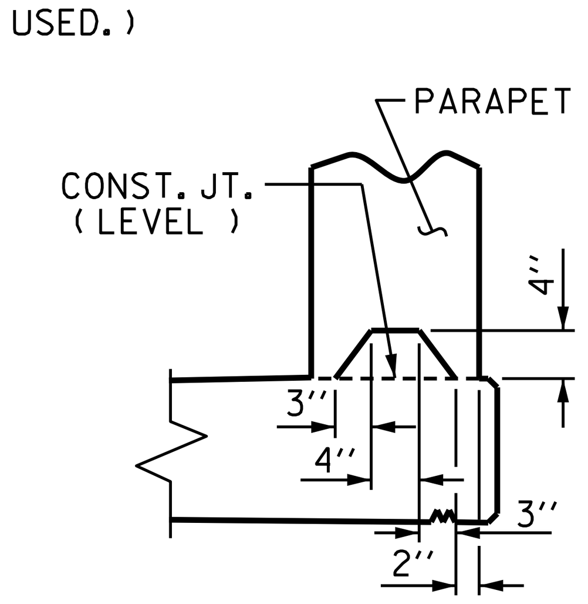
THE #5 "S" BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2" MINIMUM CLEARANCE TO THE 1/2" EXPANSION JOINT MATERIAL IN PARAPET.

FOR DETAILS OF GUARDRAIL ANCHOR ASSEMBLIES, SEE "GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS" SHEETS.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPETS IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8FT. TO 10FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.



ELEVATION AT EXPANSION JOINTS

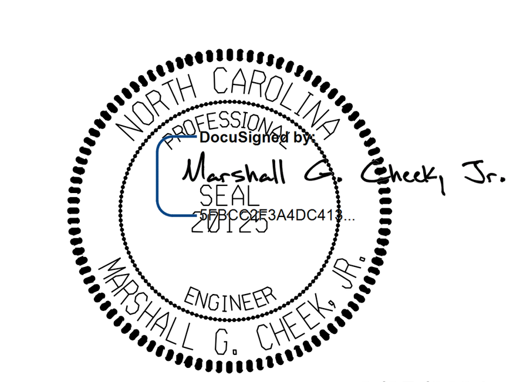


SECTION S-S

AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-

SHEET 1 OF 2



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

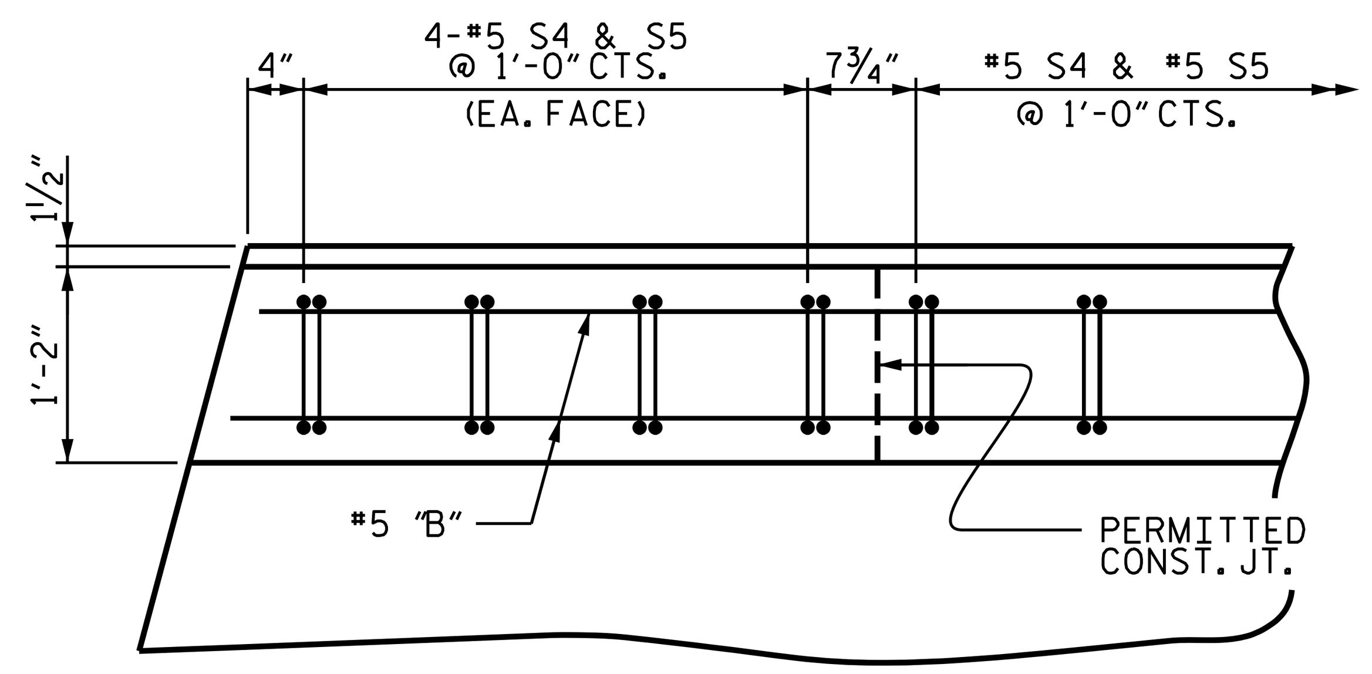
PLAN OF PARAPET FOR 2 BAR METAL RAIL

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

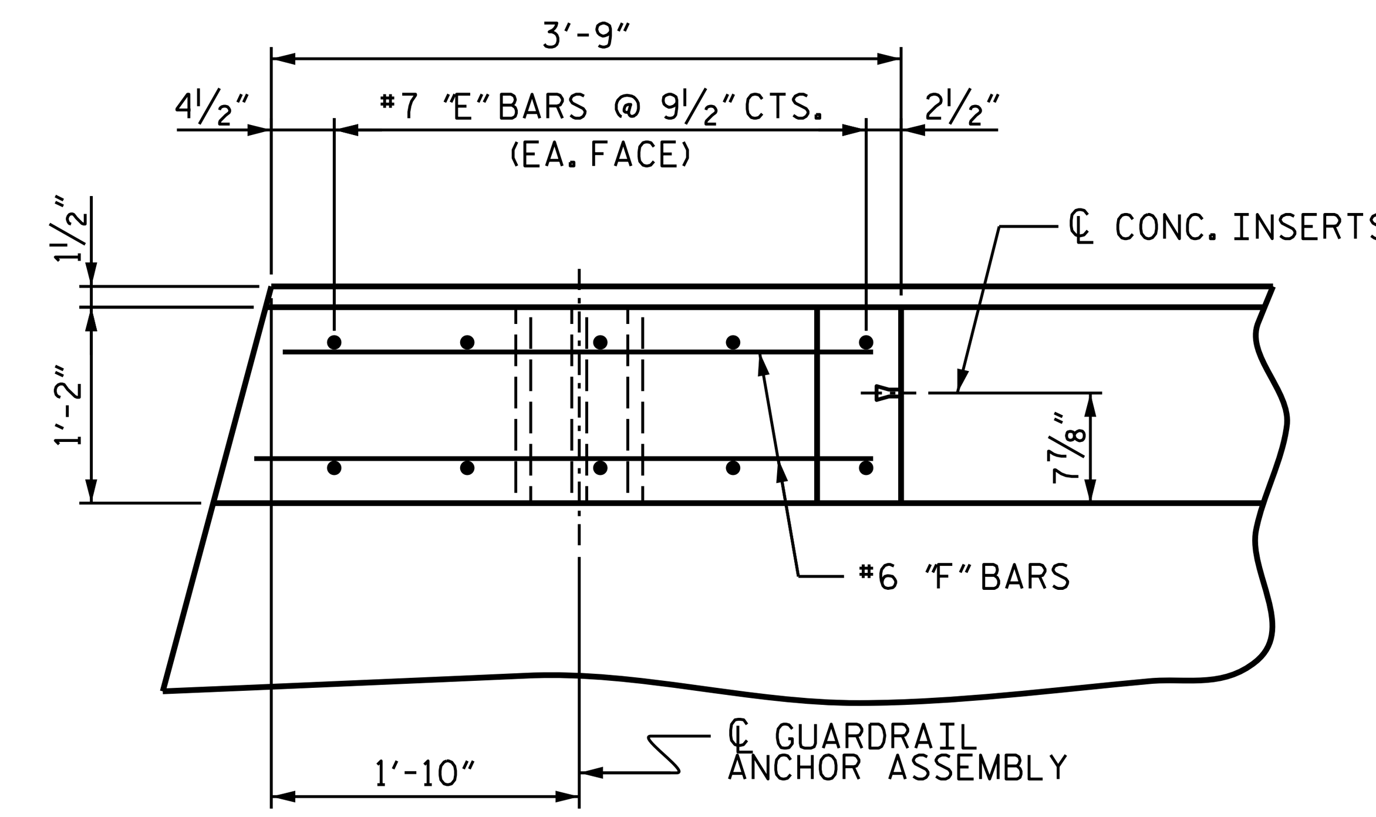
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			40

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	5/22

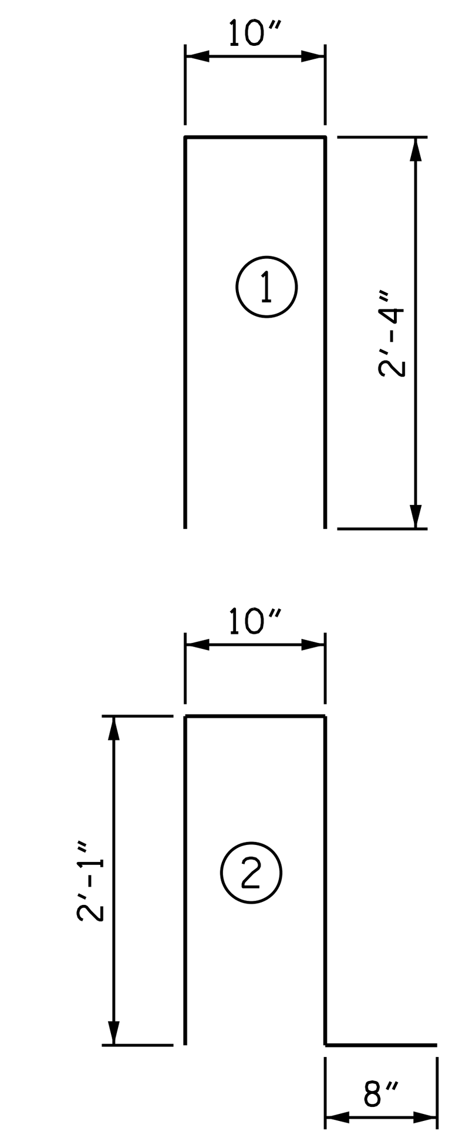


PLAN OF PARAPET



PLAN OF END POST

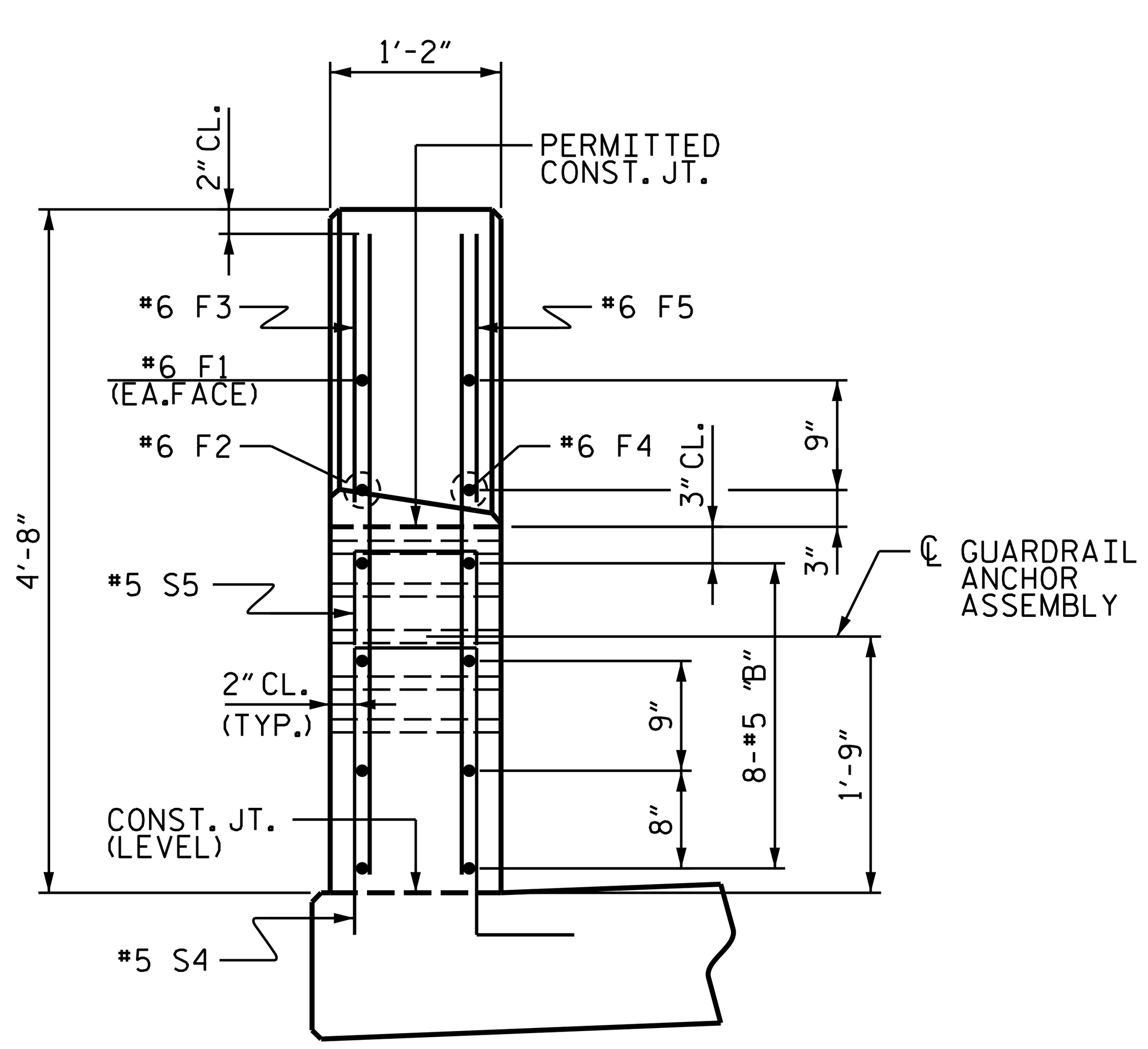
BAR TYPES



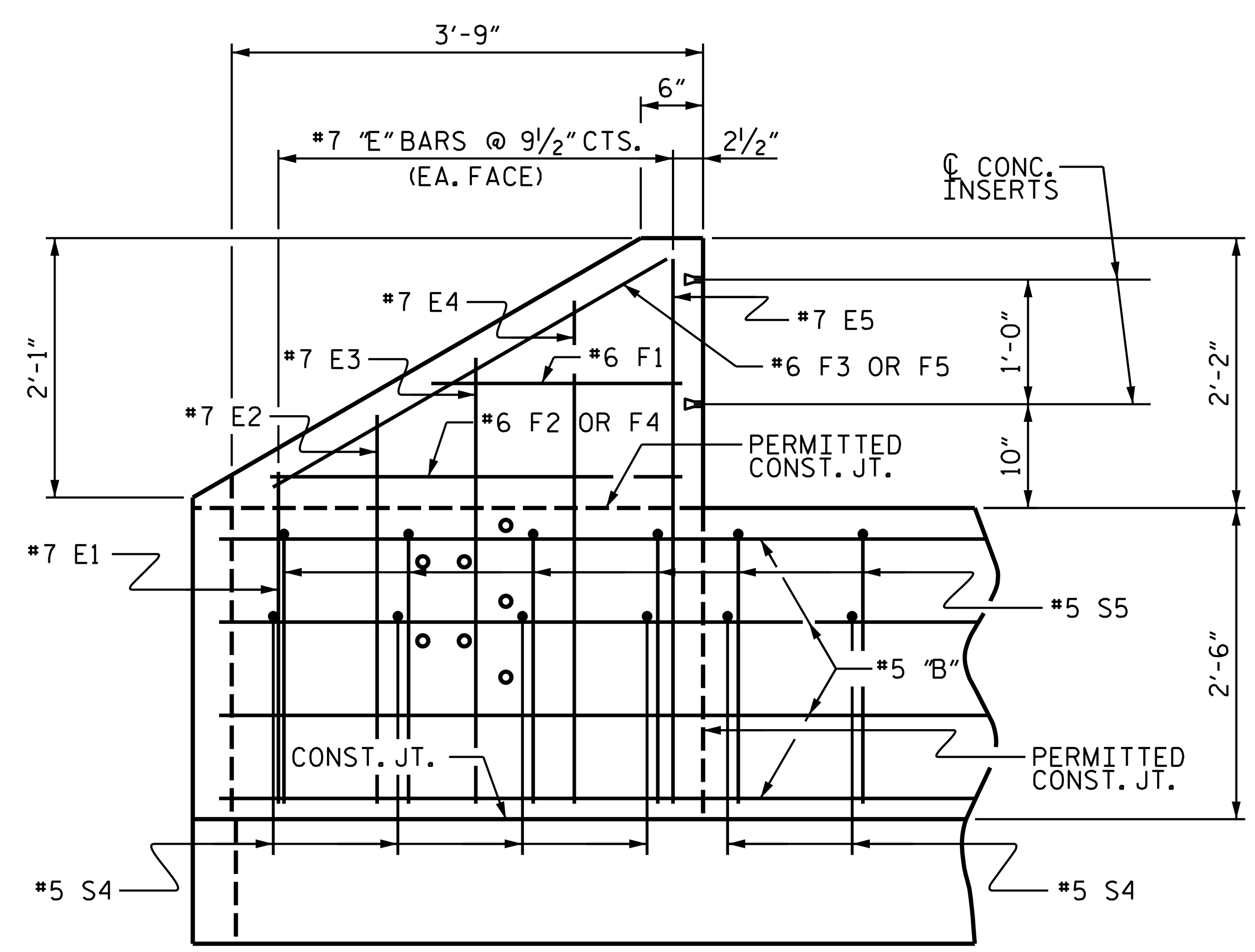
BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR PARAPETS @ SPANS A, B, C & FOUR END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	128	#5	STR.	22'-7"	3,015
* B2	64	#5	STR.	12'-8"	846
* E1	8	#7	STR.	2'-6"	41
* E2	8	#7	STR.	3'-0"	49
* E3	8	#7	STR.	3'-6"	57
* E4	8	#7	STR.	4'-0"	65
* E5	8	#7	STR.	4'-4"	71
* F1	8	#6	STR.	1'-11"	23
* F2	4	#6	STR.	3'-1"	19
* F3	4	#6	STR.	3'-6"	21
* F4	4	#6	STR.	3'-3"	20
* F5	4	#6	STR.	3'-8"	22
* S4	458	#5	2	5'-8"	2,707
* S5	458	#5	1	5'-6"	2,627
* EPOXY COATED REINFORCING STEEL					9,583 LBS.
CLASS "AA" CONCRETE					50.1 C.Y.
1'-2" x 2'-6" CONCRETE PARAPET					456.55 L.F.



END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR METAL RAIL

END BENT 1 SHOWN; END BENT 2 SIMILAR

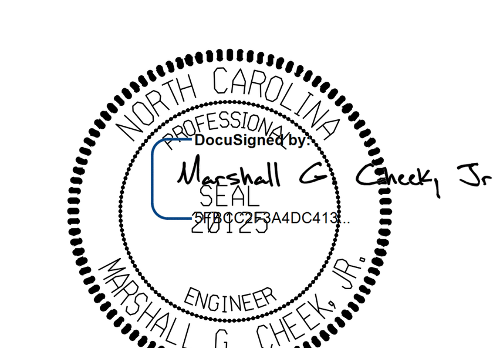
DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	5/22

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 2 OF 2



6/27/2024

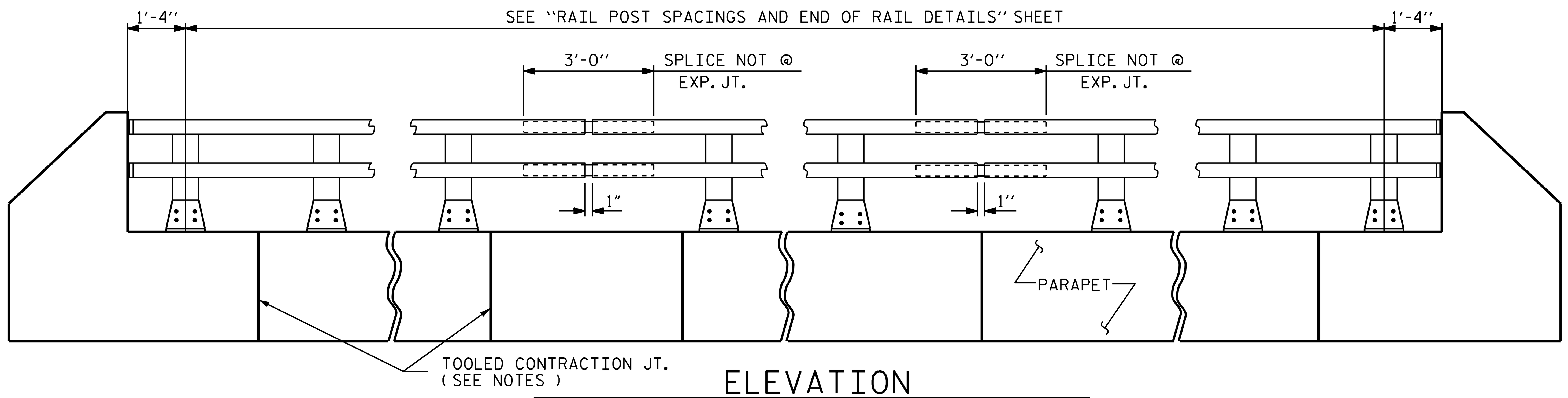
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

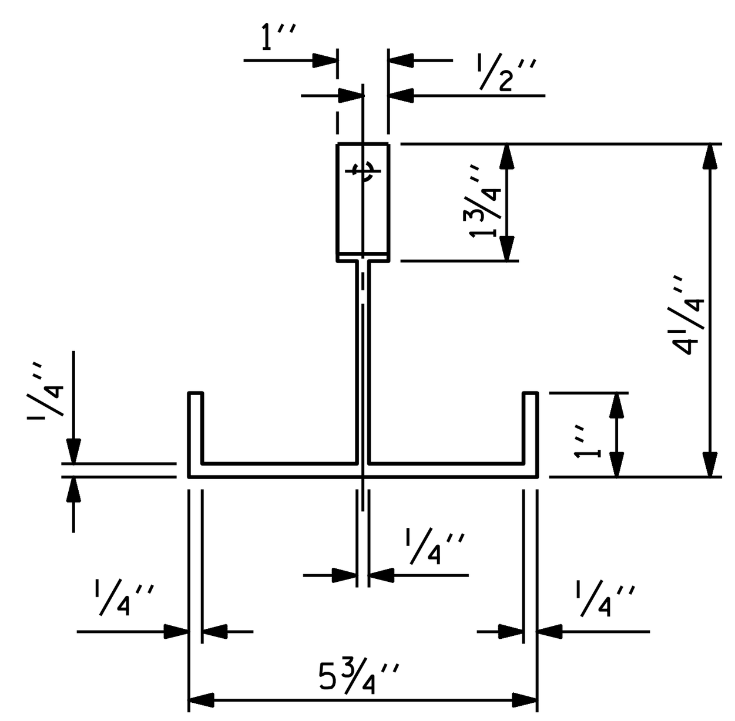
1'-2" x 2'-6" CONCRETE PARAPET AND END POST DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			40

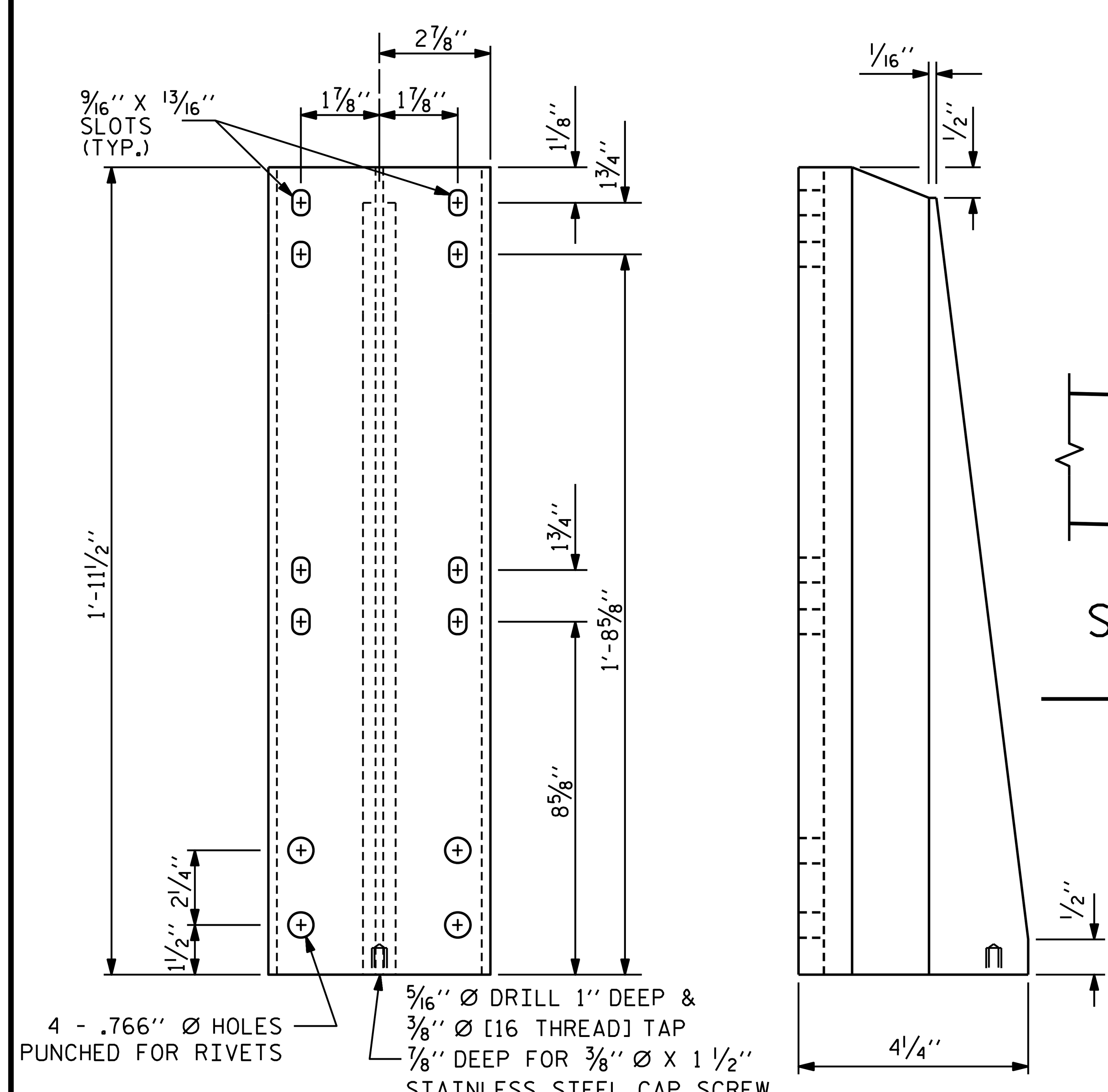


ELEVATION

NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR2.



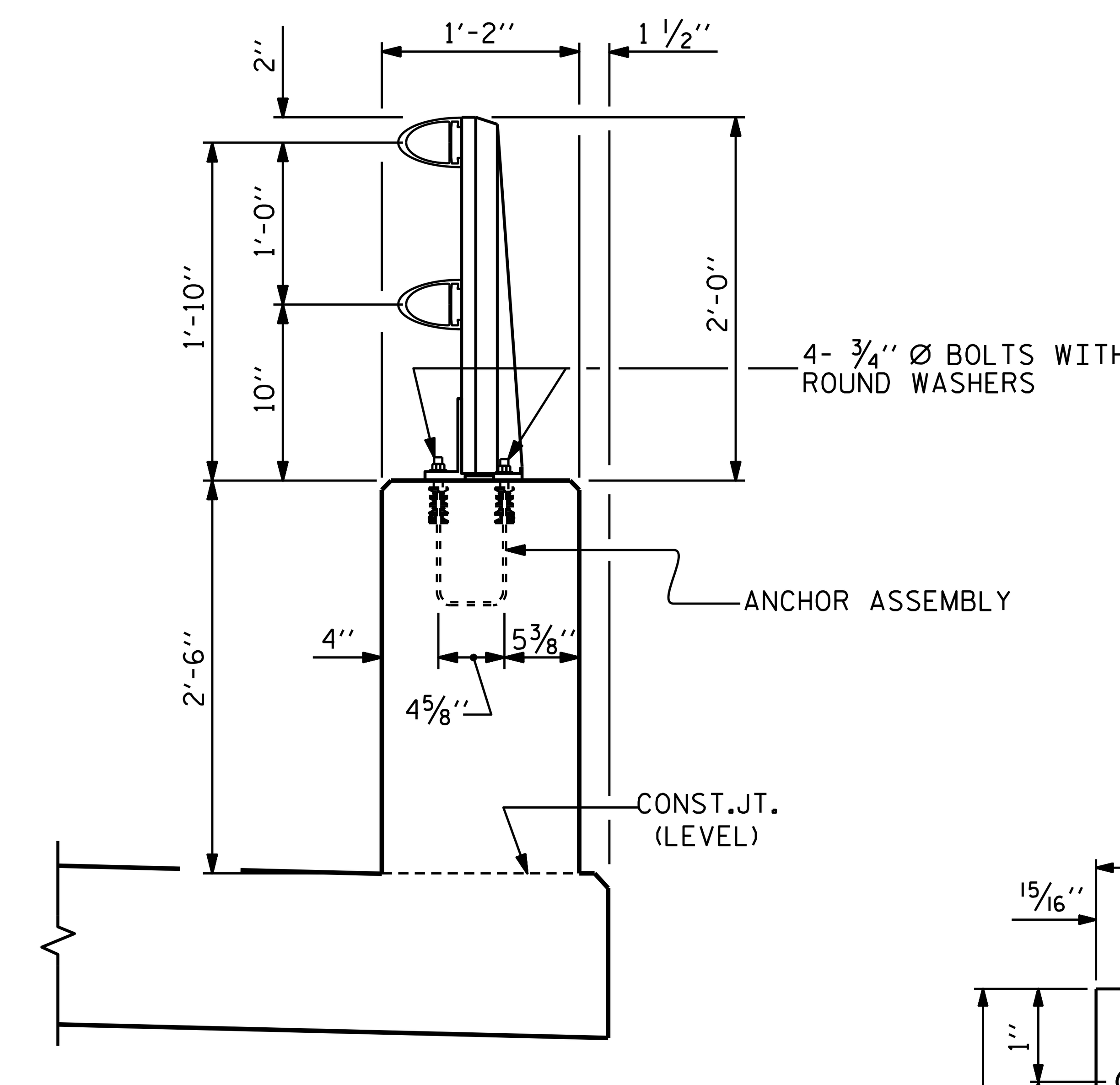
PLAN



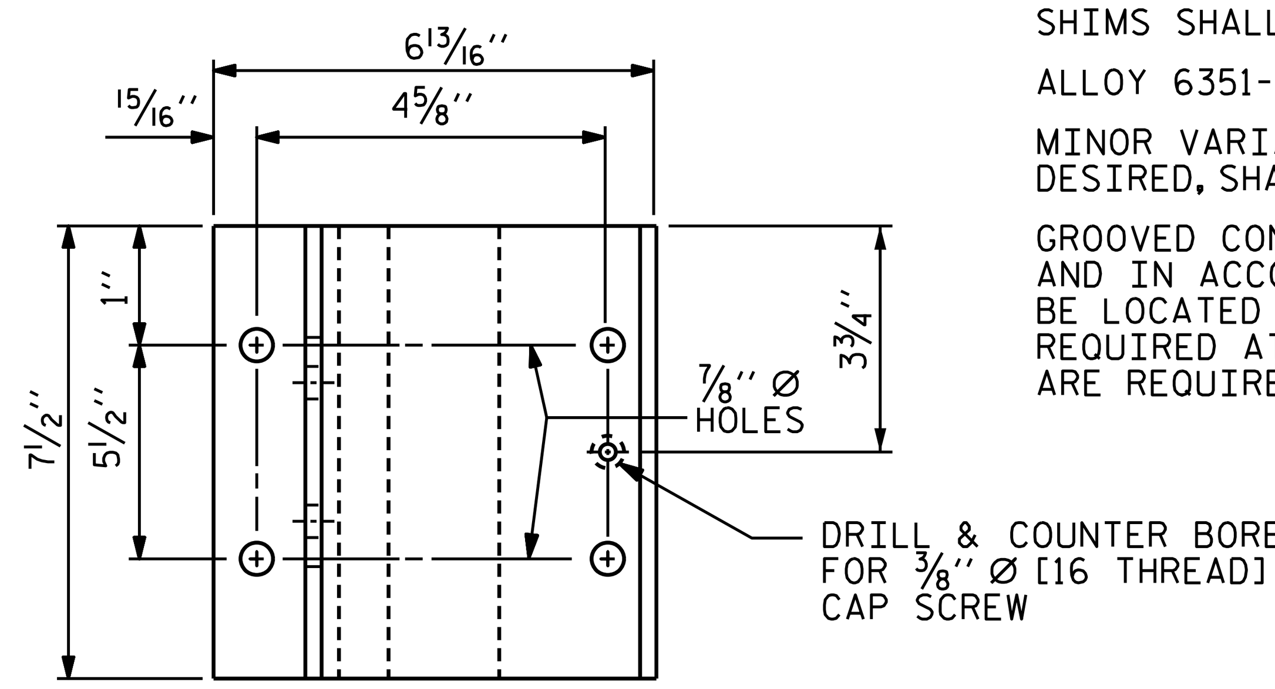
FRONT ELEVATION

SIDE ELEVATION

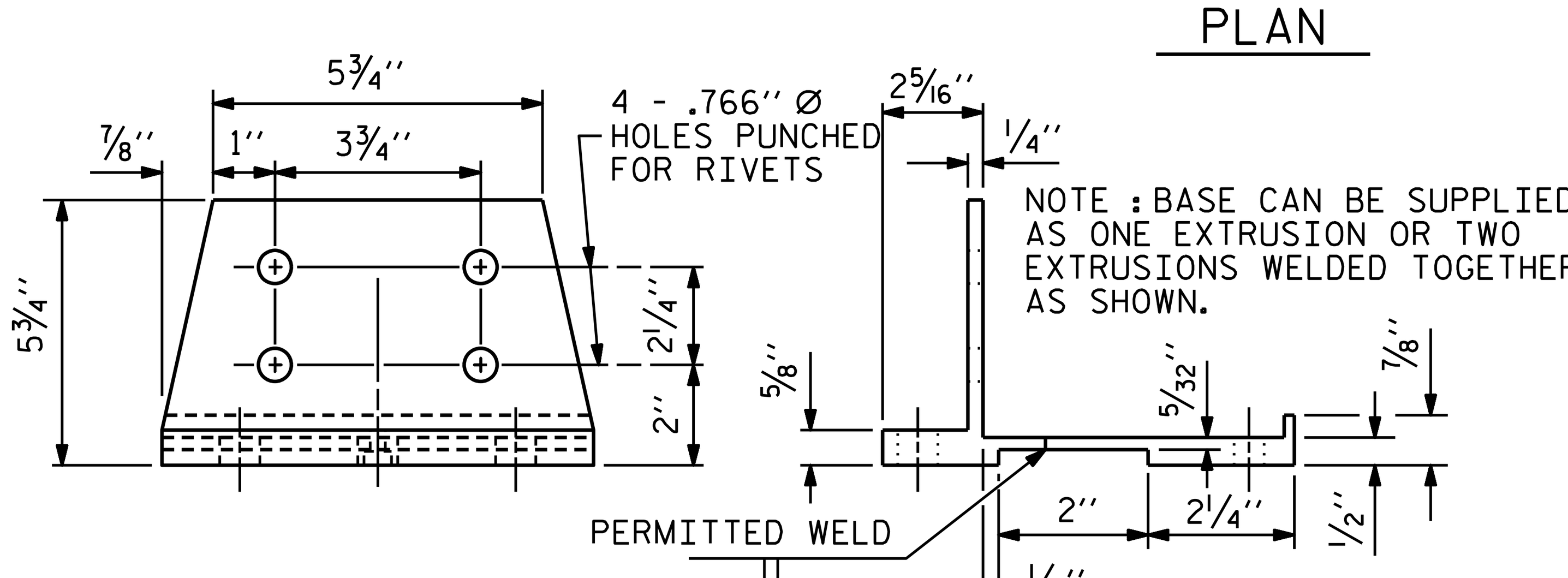
DETAILS OF POST



SECTION THRU PARAPET AND RAIL



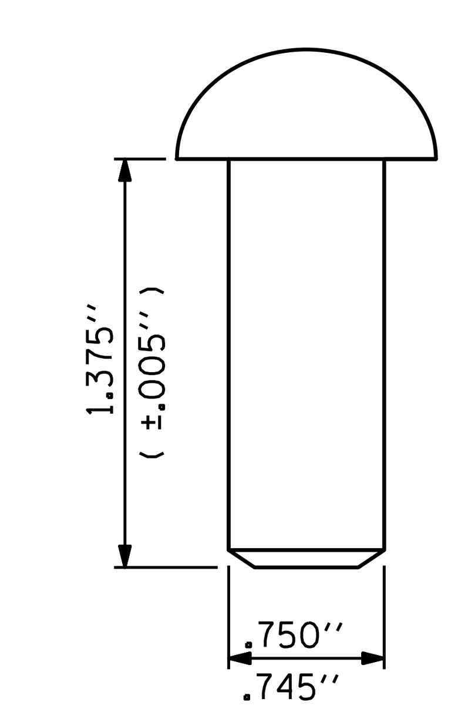
PLAN



FRONT ELEVATION

SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

NOTES

AT THE CONTRACTOR'S OPTION, METAL RAIL MAY BE EITHER ALUMINUM OR GALVANIZED STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS FOR THE ALTERNATE MATERIALS; HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO USE THE SAME RAIL MATERIAL ON ALL STRUCTURES ON THE PROJECT FOR WHICH METAL RAIL IS DESIGNATED.

UNLESS OTHERWISE REQUIRED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR HAS THE OPTION TO USE AN ALTERNATE TO THE 2 BAR METAL RAIL. THE ALTERNATE RAIL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFDBRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6.

MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

THE BASE OF RAIL POSTS, OR ANY OTHER ALUMINUM SURFACE IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.

MATERIAL FOR SHIMS TO BE ASTM B209 ALLOY 6061-T6.

GALVANIZED STEEL RAILS

MATERIALS AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: ASTM A36 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO ASTM A123.

RIVETS: RIVETS SHALL MEET THE REQUIREMENTS OF ASTM A502 FOR GRADE 1 RIVETS.

THE CUT ENDS OF GALVANIZED STEEL RAILING, AFTER GRINDING SMOOTH SHALL BE GIVEN TWO COATS OF ZINC RICH PAINT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION MIL-P-26915 USAF TYPE 1, OR OF FEDERAL SPECIFICATIONS TT-P-641.

SHIMS: SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A1011 FOR GRADE 36, 40, 45 OR ASTM A1008 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A1011 FOR GRADE 36, 40, 45 OR ASTM A1008 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

GENERAL NOTES

RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR2.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAILS AND POSTS. SHOP INSPECTION IS NOT REQUIRED.

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

METHOD OF MEASUREMENT FOR METAL RAILS: FOR LENGTH OF METAL RAILS TO BE PAID FOR, SEE THE STANDARD SPECIFICATIONS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE THE CONTRACTOR MAY, AT HIS OPTION, HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT, THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAINS VISIBLE AFTER RAIL PLACEMENT.

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

MINOR VARIATIONS IN DETAILS OF METAL RAIL WILL BE CONSIDERED. DETAILS OF SUCH VARIATIONS, IF DESIRED, SHALL BE SUBMITTED FOR APPROVAL.

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

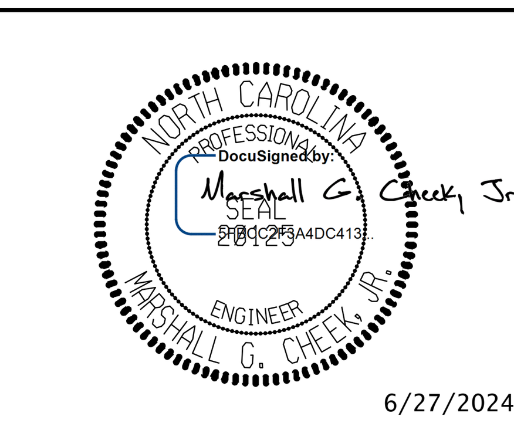
PAY LENGTH = 440.92 LIN. FT.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 1 OF 3



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

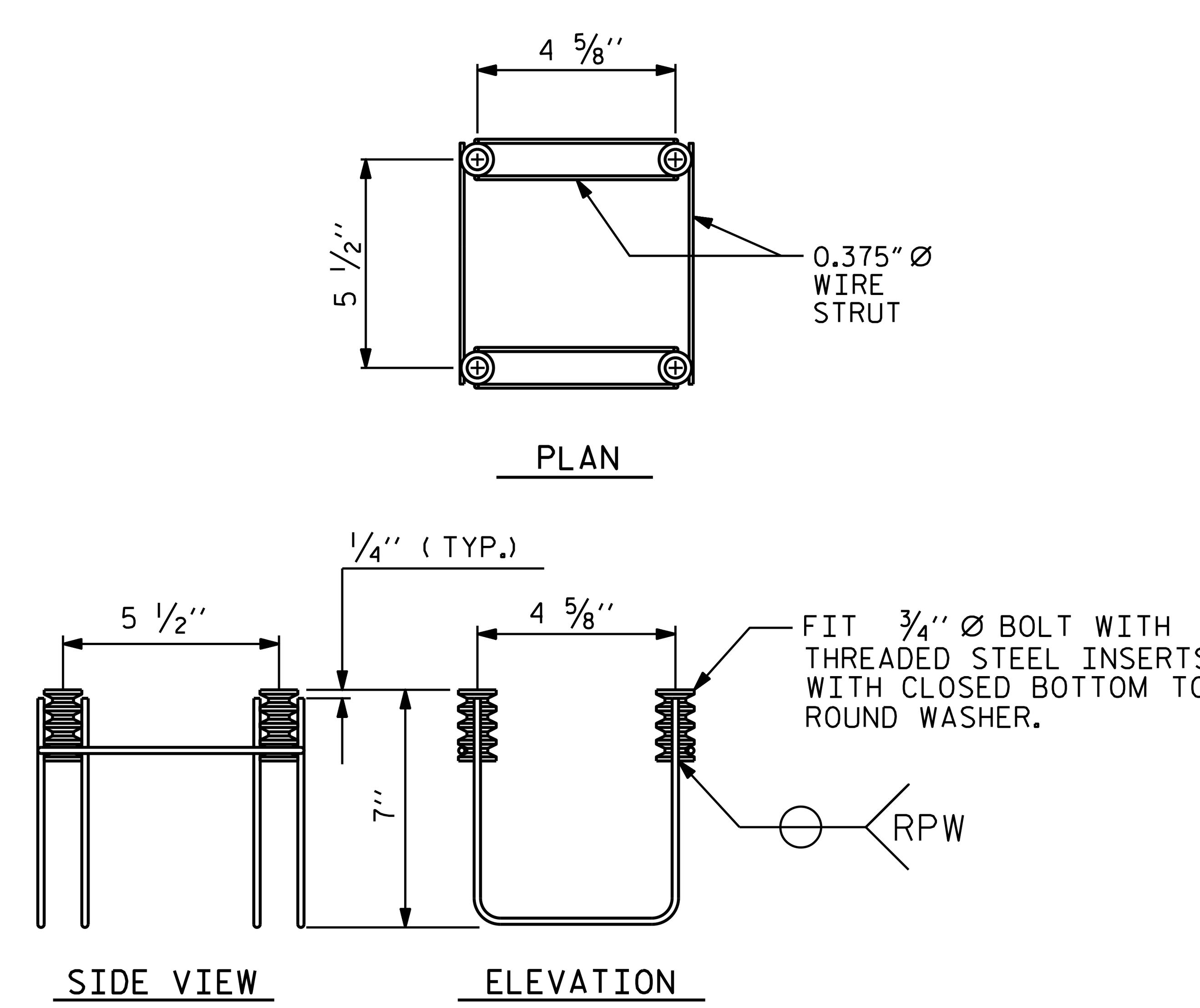
STANDARD

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY :	JLA	DATE :	2/24
CHECKED BY :	MGC	DATE :	2/24
DRAWN BY : EEM	6/94	REV. 6/13	MAA/GM
CHECKED BY : RGW	6/94	REV. 12/17	MAA/THC
		REV. 10/23	BNB/SNM

STD. NO. BMR3



4-BOLT METAL RAIL ANCHOR ASSEMBLY

(76 ASSEMBLIES REQUIRED)

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

THE STRUCTURAL CONCRETE ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.

B. 4 - 3/4" Ø x 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø x 2 1/2" GALVANIZED BOLTS 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.

C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

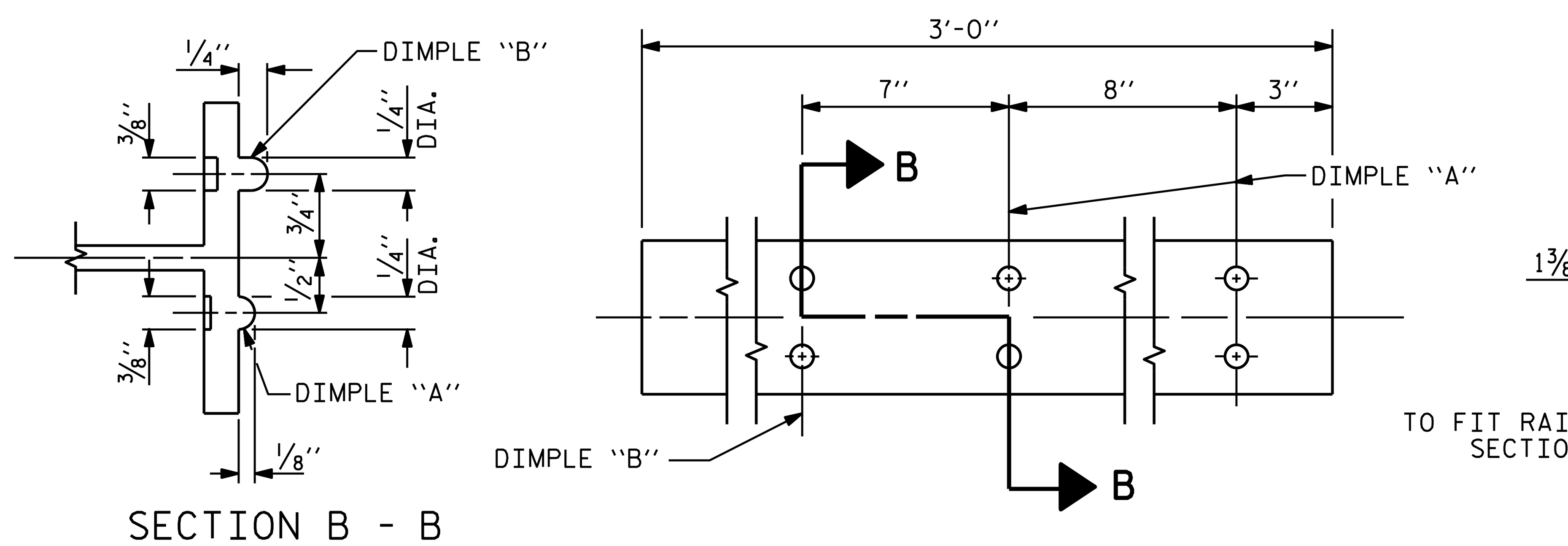
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF ASTM A123.

E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.

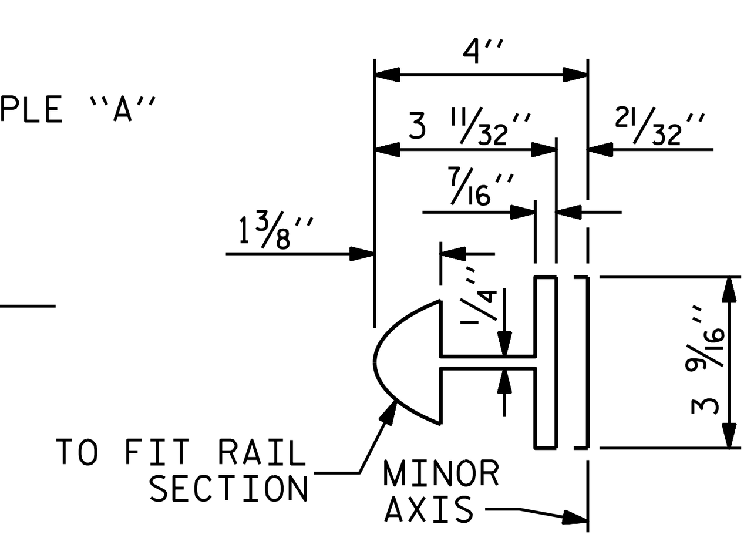
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

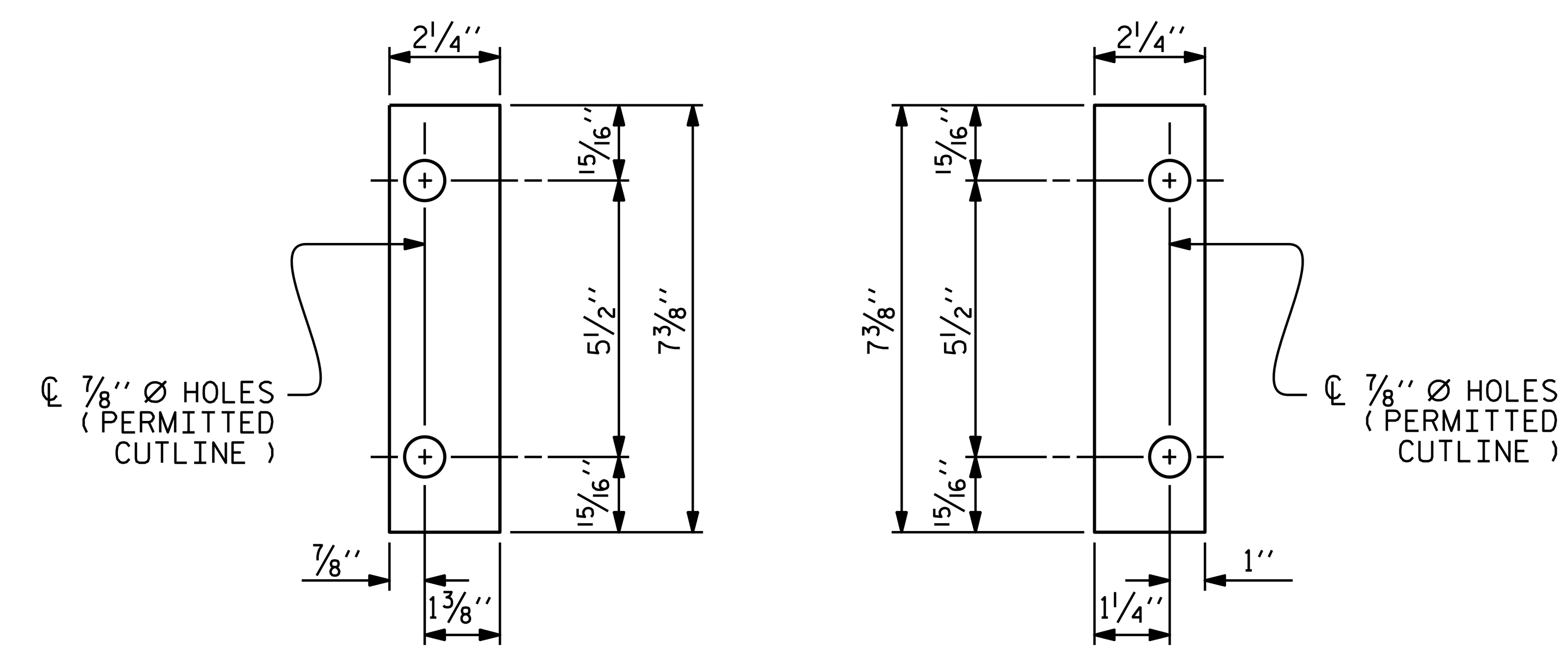
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.



EXPANSION BAR DETAILS

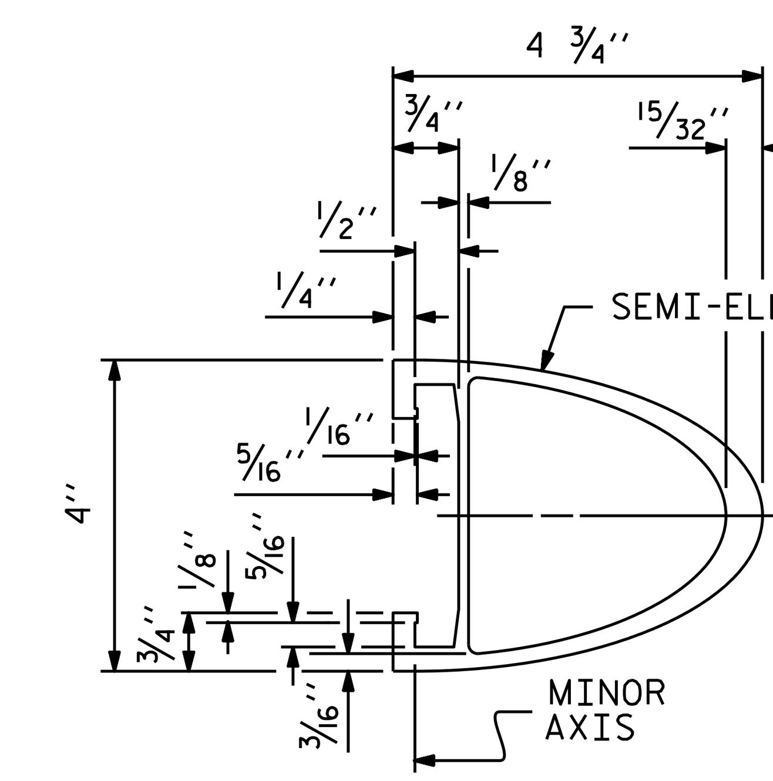


BAR SECTION

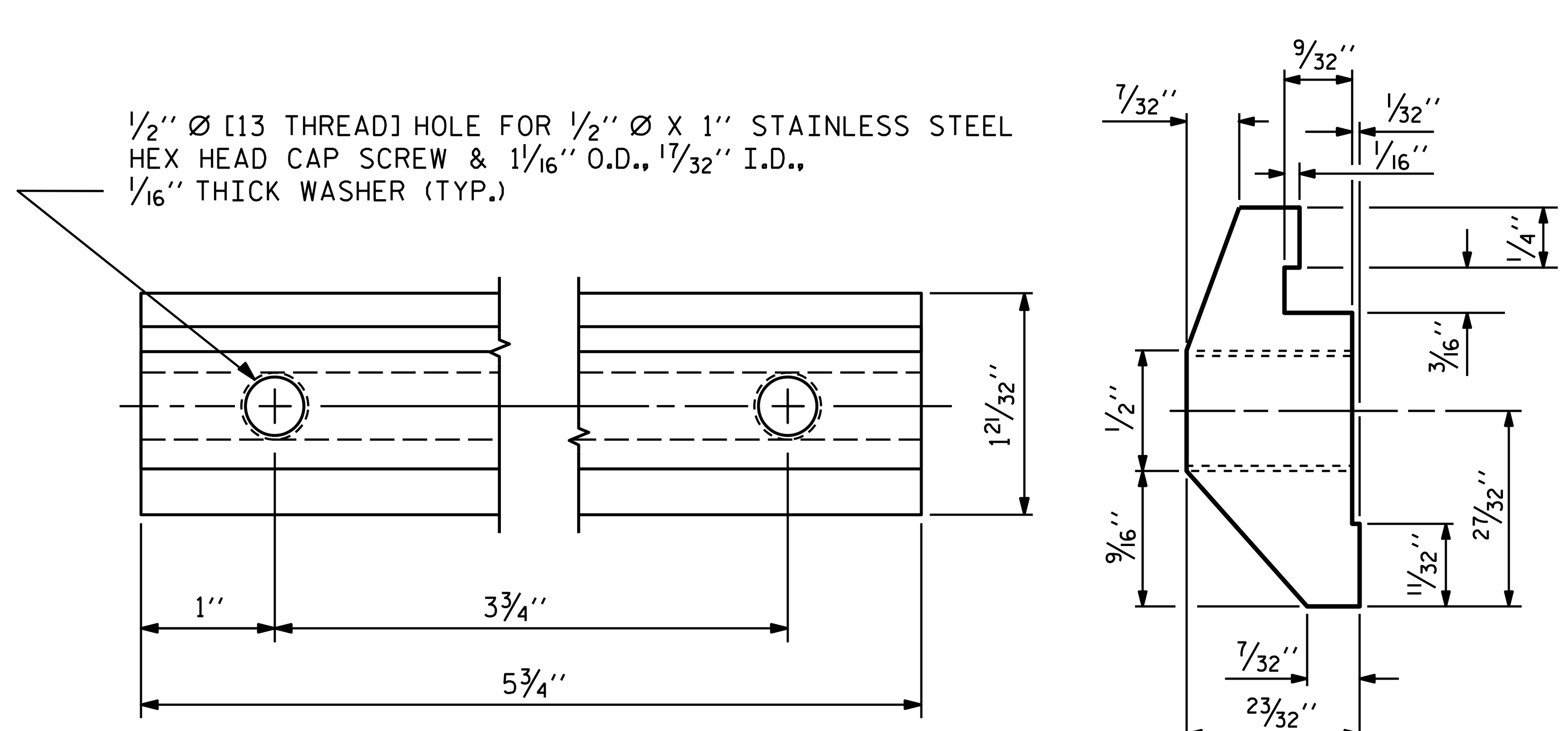


SHIM DETAILS

NOTE :
SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.

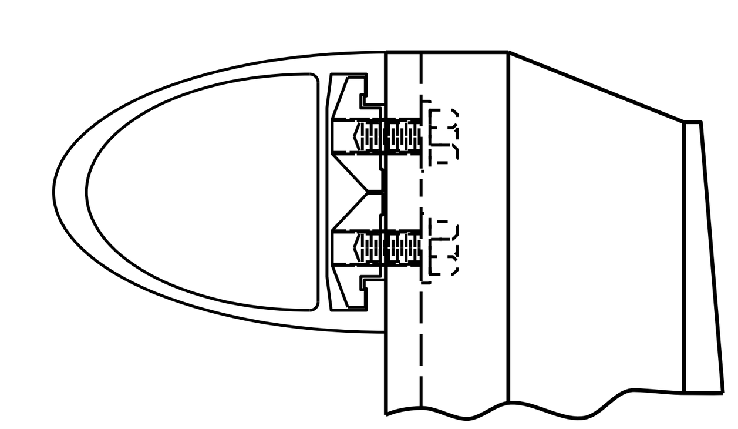


RAIL SECTION

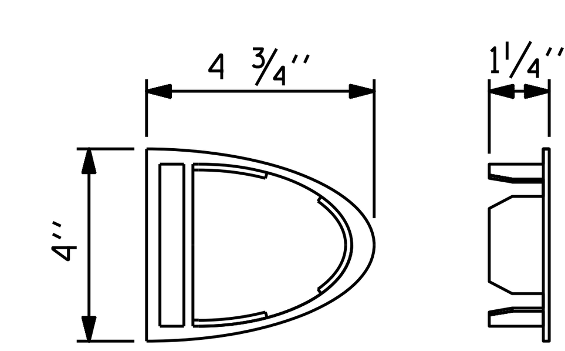


CLAMP BAR DETAIL

(4 REQUIRED PER POST)

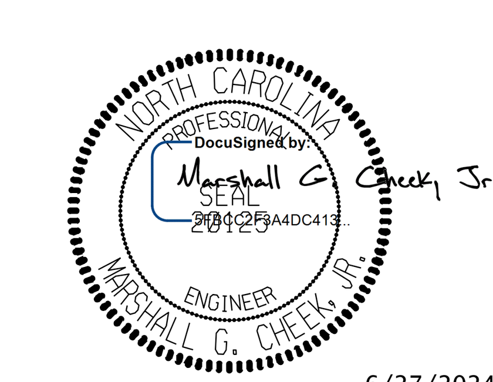


CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-
SHEET 2 OF 3



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

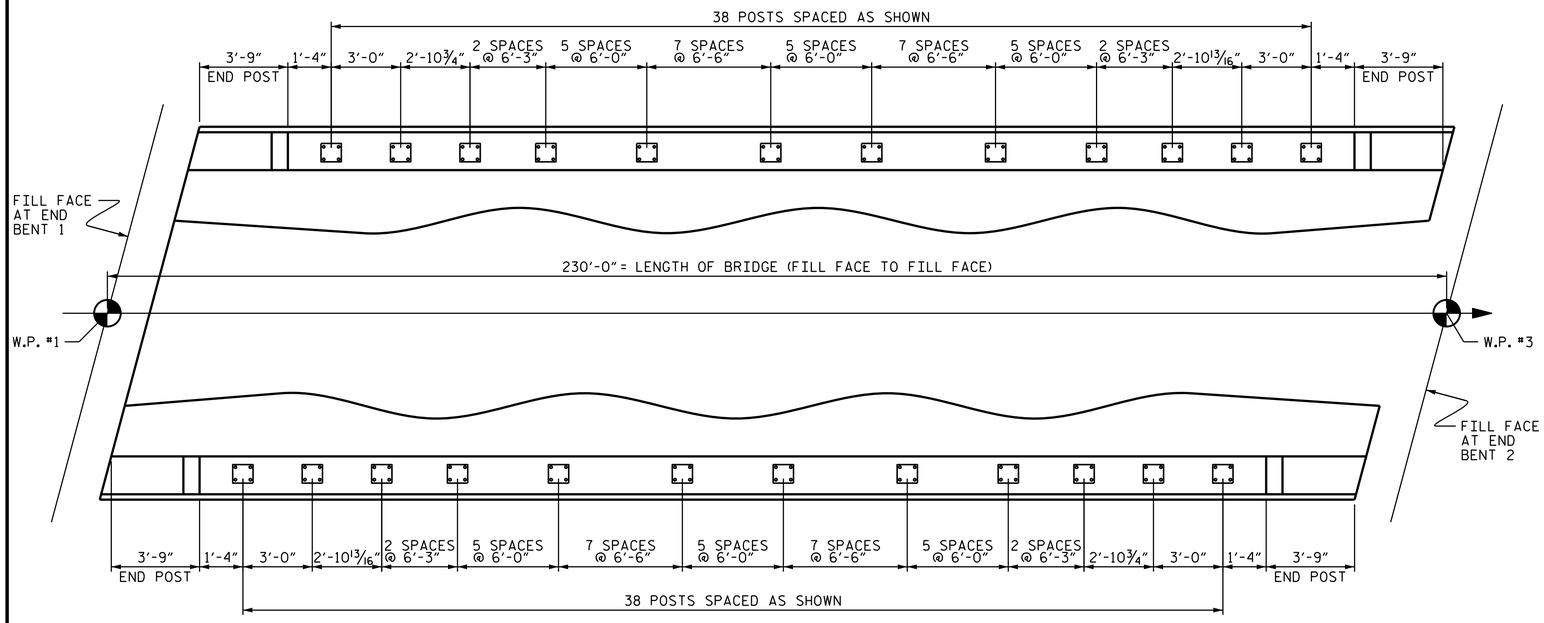
ASSEMBLED BY :	JLA	DATE :	2/24
CHECKED BY :	MGC	DATE :	2/24

DRAWN BY : EEM	6/94	REV. 10/11	MAA/GM
CHECKED BY : RGW	6/94	REV. 12/17	MAA/THC
		REV. 10/23	BNB/SNM

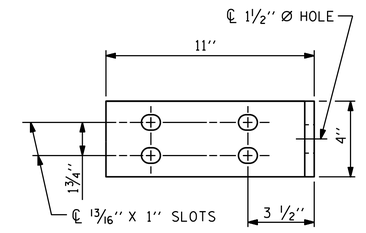
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-24
TOTAL SHEETS 40

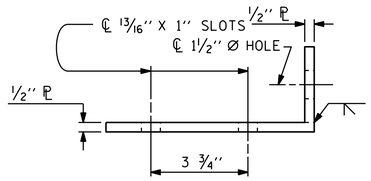
STD. NO. BMR4



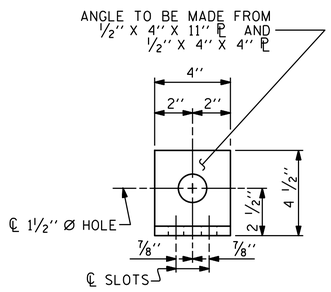
PLAN OF RAIL POST SPACINGS



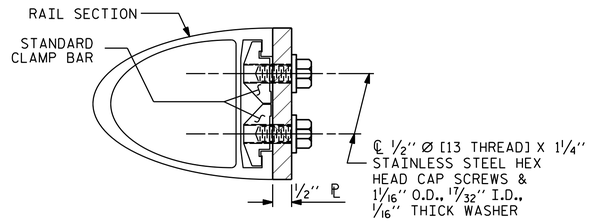
ELEVATION



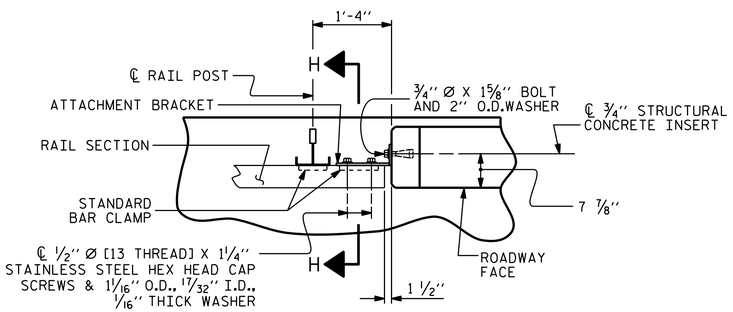
TOP VIEW



END VIEW (FIX)



SECTION H-H (FIX)



PLAN - RAIL AND END POST

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST

NOTES

STRUCTURAL CONCRETE INSERT

THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1½''.

B. 1 - ¾'' Ø X 1⅝'' BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE ¾'' Ø X 1⅝'' GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7⁄16'' Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. ½'' PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. ¾'' STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A ¾''Ø X 1⅝'' BOLT WITH 2'' O.D. WASHER IN PLACE. THE ¾''Ø X 1⅝'' BOLT SHALL HAVE N. C. THREADS.

C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.

D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).

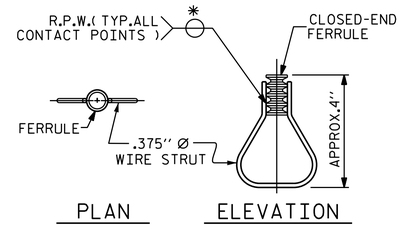
E. ½'' Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 1 OR 2 BAR METAL RAILS.

THE ¾'' STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE ¾'' STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE ½'' PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾'' Ø X 1⅝'' BOLT WITH WASHER SHALL BE REPLACED WITH A ¾''Ø X 6½'' BOLT AND 2'' O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE ¾'' Ø X 1⅝'' BOLT SHALL APPLY TO THE ¾''Ø X 6 ½'' BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



STRUCTURAL CONCRETE INSERT

* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 3 OF 3

ASSEMBLED BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DRAWN BY : FCJ	1/88	REV. 5/1/06	TLA/GM
CHECKED BY : CRK	3/89	REV. 10/1/11	MAA/GM
		REV. 12/17	MAA/THC

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek Jr. 20125A4DC412...
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS
FOR TWO BAR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			40

STD. NO. BMR2

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" Ø BOLTS WITH NUTS AND WASHERS.

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.

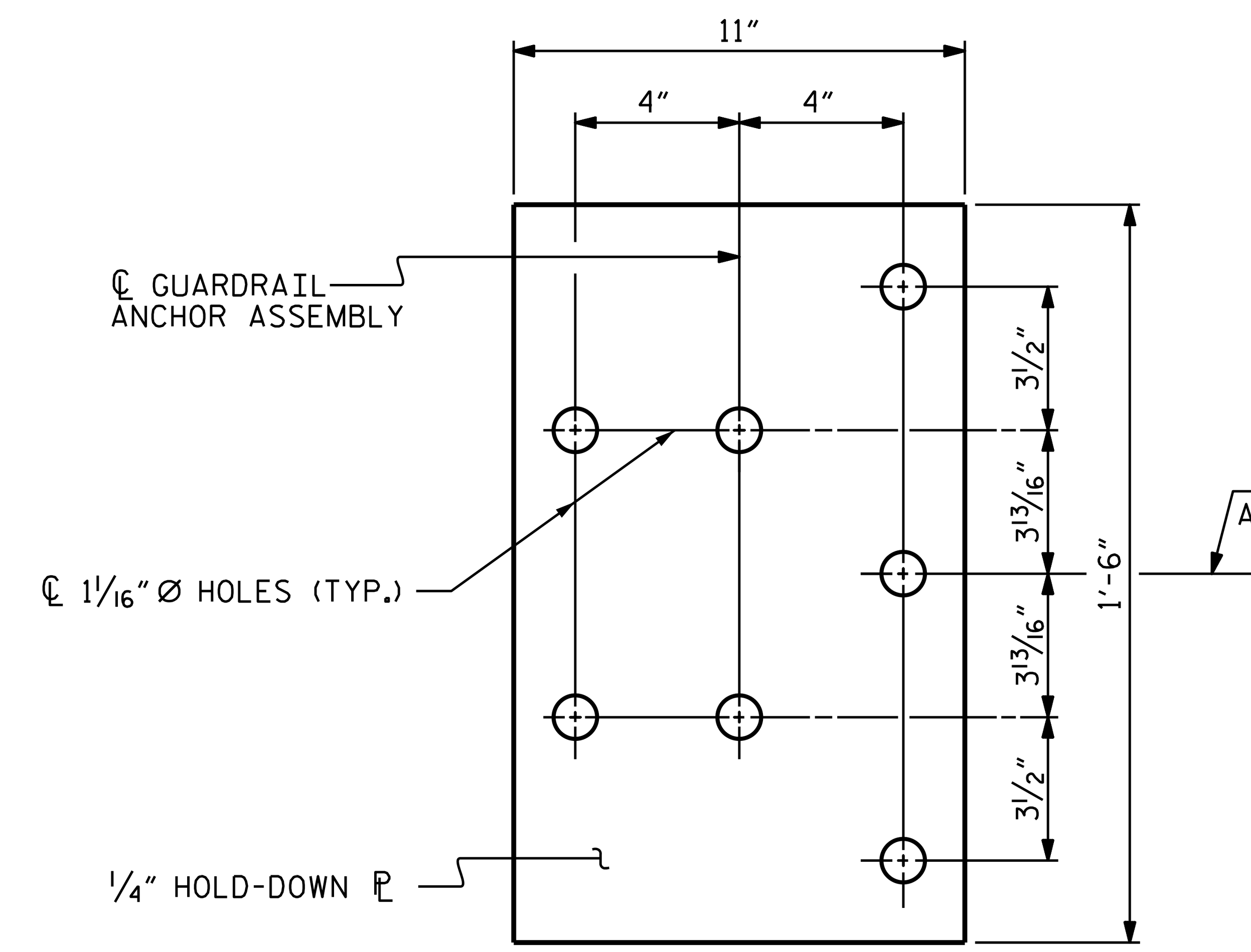
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

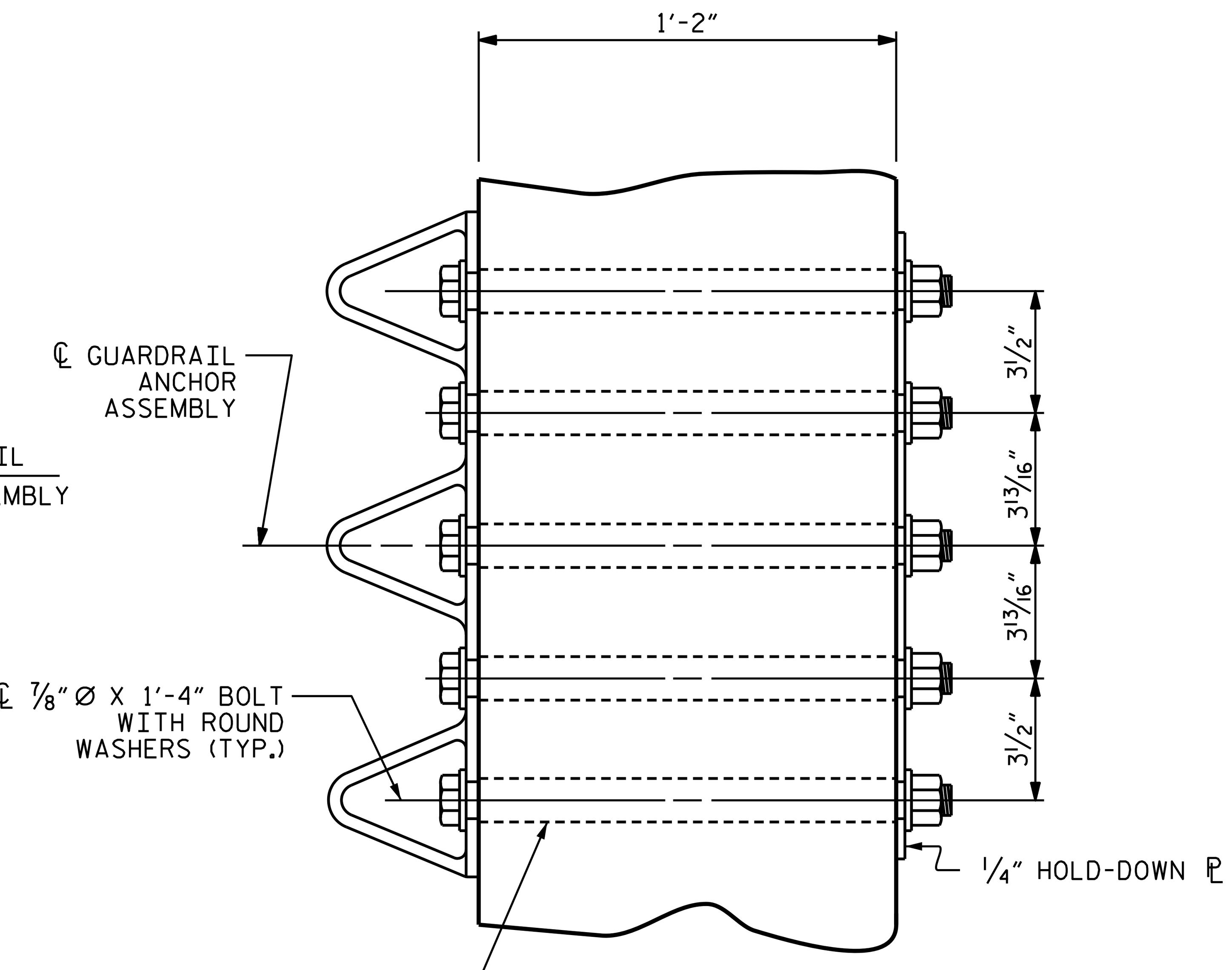
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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.



PLAN

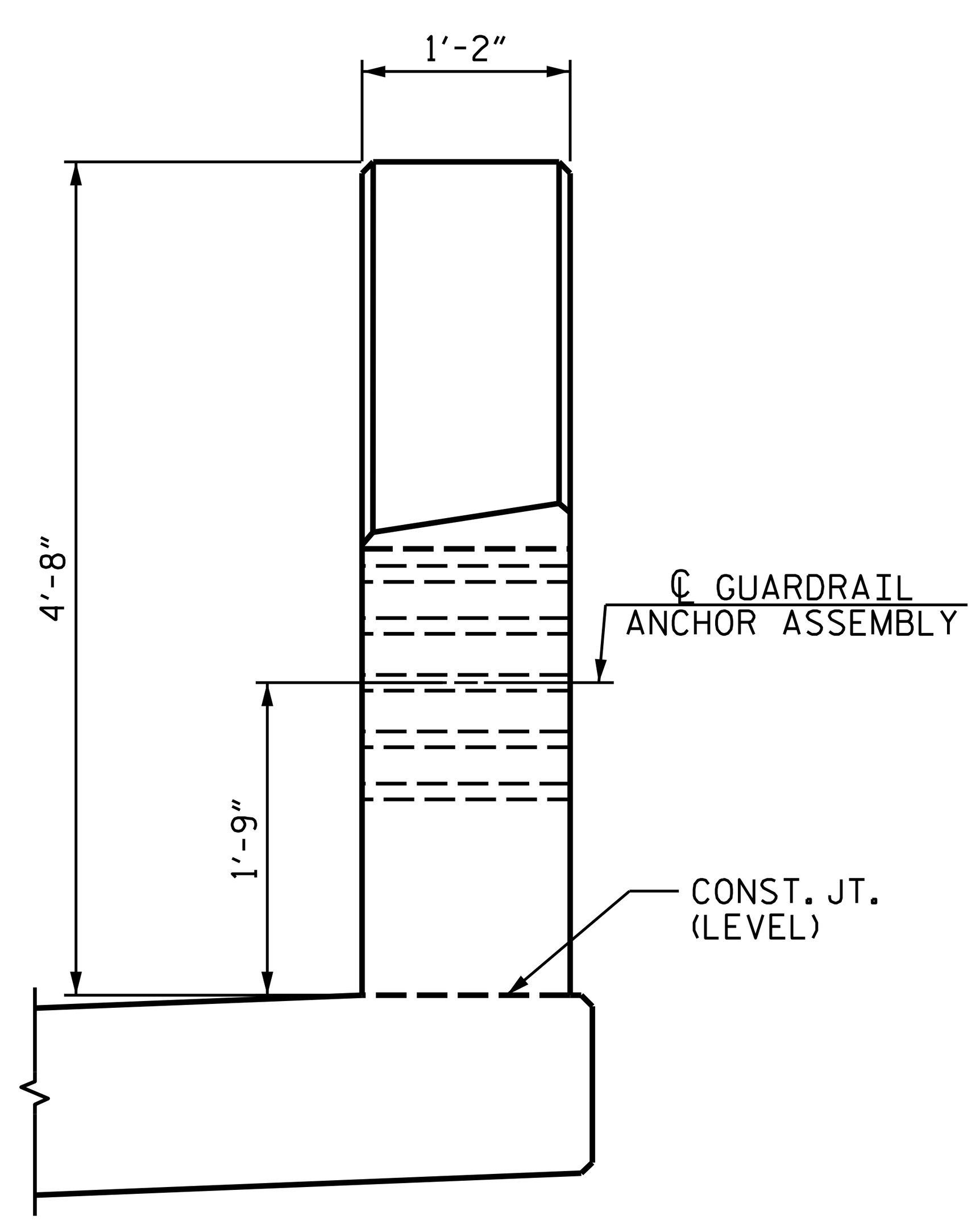


END VIEW

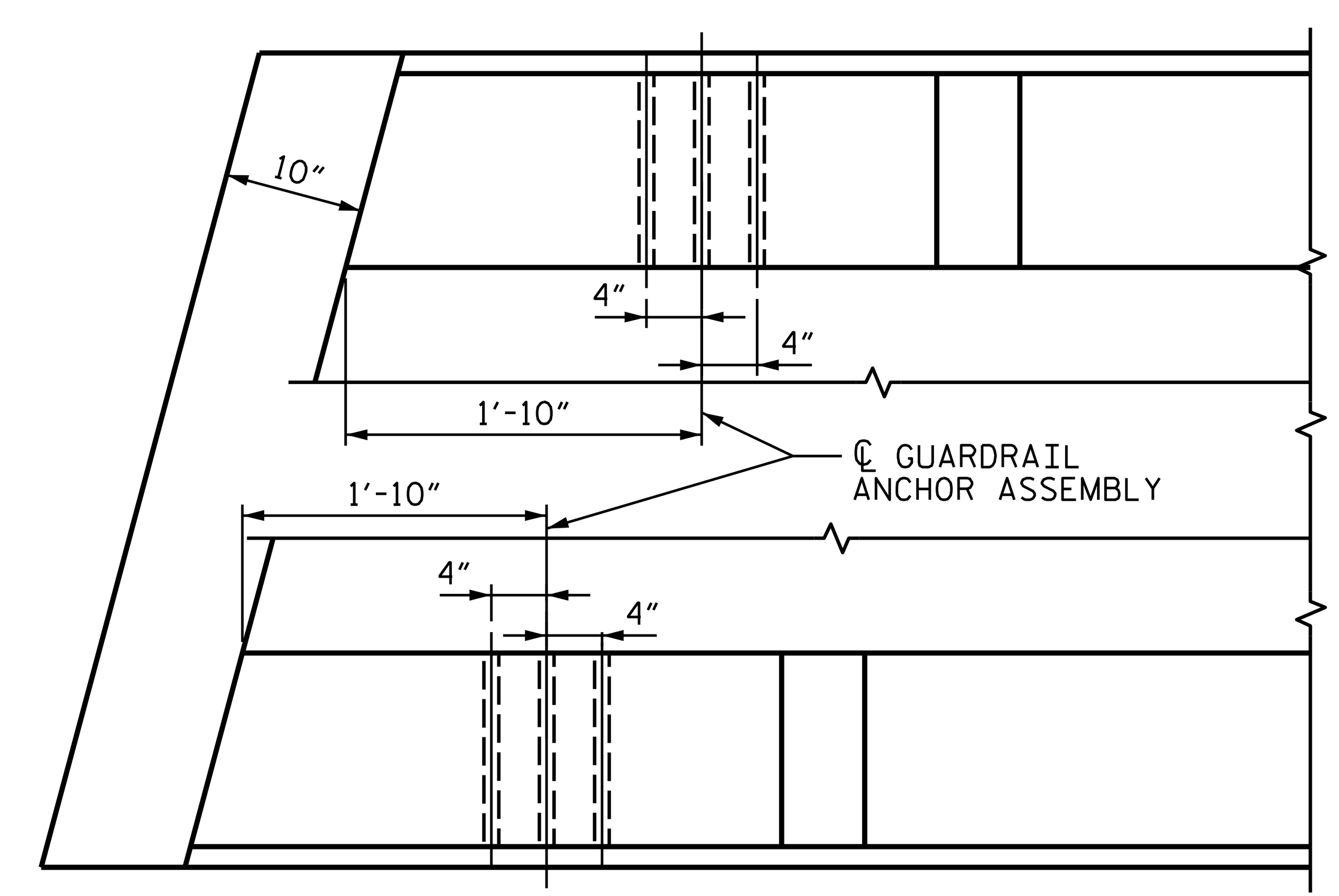
GUARDRAIL ANCHOR ASSEMBLY DETAILS

SKETCH SHOWING POINTS OF ATTACHMENT

✳ LOCATION OF GUARDRAIL ATTACHMENT



END VIEW



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

END BENT 1 SHOWN; END BENT 2 SIMILAR.

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

ASSEMBLED BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	4/22
DRAWN BY : MAA	5/10	REV. 1/15	MAA/TMG
CHECKED BY : GM	5/10	REV. 12/17	MAA/THC
		REV. 5/18	MAA/THC

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek Jr.

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

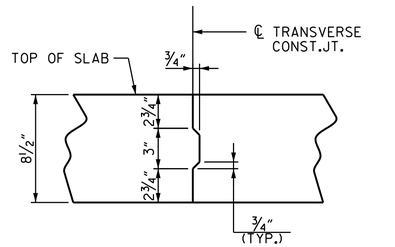
GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS
2			4			40

STD. NO. GRA3

SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	1'-11"	1'-7"	1'-11"	1'-7"	2'-6"
#5	2'-5"	2'-0"	2'-5"	2'-0"	3'-1"
#6	2'-10"	2'-5"	3'-7"	2'-5"	3'-8"
#7	4'-2"	2'-9"	——	——	——
#8	4'-9"	3'-2"	——	——	——



TRANSVERSE CONSTRUCTION JOINT DETAIL

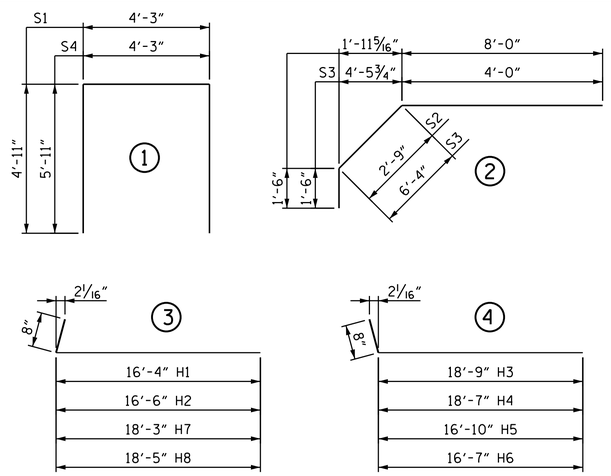
NOTE: REINFORCING STEEL IN SLAB NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT.

REINFORCING BAR SCHEDULE SPANS A & B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	349	#5	STR.	36'-3"	13,195	A201	2	#5	STR.	2'-7"	5	H1	13	#6	3	17'-0"	332
A2	349	#5	STR.	36'-3"	13,195	A202	2	#5	STR.	4'-11"	10	H2	13	#6	3	17'-2"	335
						A203	2	#5	STR.	7'-3"	15	H3	13	#6	4	19'-5"	379
✳ A101	2	#5	STR.	2'-7"	5	A204	2	#5	STR.	9'-7"	20	H4	13	#6	4	19'-3"	376
✳ A102	2	#5	STR.	4'-11"	10	A205	2	#5	STR.	11'-11"	25	H5	13	#6	4	17'-5"	340
✳ A103	2	#5	STR.	7'-3"	15	A206	2	#5	STR.	14'-3"	30	H6	13	#6	4	17'-3"	337
✳ A104	2	#5	STR.	9'-7"	20	A207	2	#5	STR.	16'-7"	35	H7	13	#6	3	18'-11"	369
✳ A105	2	#5	STR.	11'-11"	25	A208	2	#5	STR.	18'-11"	39	H8	13	#6	3	19'-1"	373
✳ A106	2	#5	STR.	14'-3"	30	A209	2	#5	STR.	21'-3"	44						
✳ A107	2	#5	STR.	16'-7"	35	A210	2	#5	STR.	23'-7"	49	K1	28	#4	STR.	22'-10"	427
✳ A108	2	#5	STR.	18'-11"	39	A211	2	#5	STR.	25'-11"	54	K2	4	#4	STR.	6'-2"	16
✳ A109	2	#5	STR.	21'-3"	44	A212	2	#5	STR.	28'-3"	59	K3	20	#4	STR.	6'-11"	92
✳ A110	2	#5	STR.	23'-7"	49	A213	2	#5	STR.	30'-7"	64	K4	4	#4	STR.	5'-5"	14
✳ A111	2	#5	STR.	25'-11"	54	A214	2	#5	STR.	32'-11"	69	K5	6	#4	STR.	7'-2"	29
✳ A112	2	#5	STR.	28'-3"	59	A215	2	#5	STR.	35'-3"	74	K6	30	#4	STR.	8'-9"	175
✳ A113	2	#5	STR.	30'-7"	64							K7	6	#4	STR.	5'-8"	23
✳ A114	2	#5	STR.	32'-11"	69	✳ B1	146	#6	STR.	22'-10"	5,007	K8	12	#4	STR.	2'-9"	22
✳ A115	2	#5	STR.	35'-3"	74	✳ B2	148	#4	STR.	29'-0"	2,867						
						✳ B3	74	#5	STR.	40'-9"	3,145	S1	48	#4	1	14'-1"	452
						✳ B4	36	#5	STR.	44'-6"	1,671	✳ S2	44	#4	2	12'-3"	360
						B5	135	#5	STR.	47'-3"	6,653	✳ S3	44	#4	2	11'-10"	348
						B6	22	#5	STR.	56'-0"	1,285	S4	8	#4	1	16'-1"	86

✳ EPOXY COATED REINFORCING STEEL	27,185 LBS.
REINFORCING STEEL	25,902 LBS.

BAR TYPES

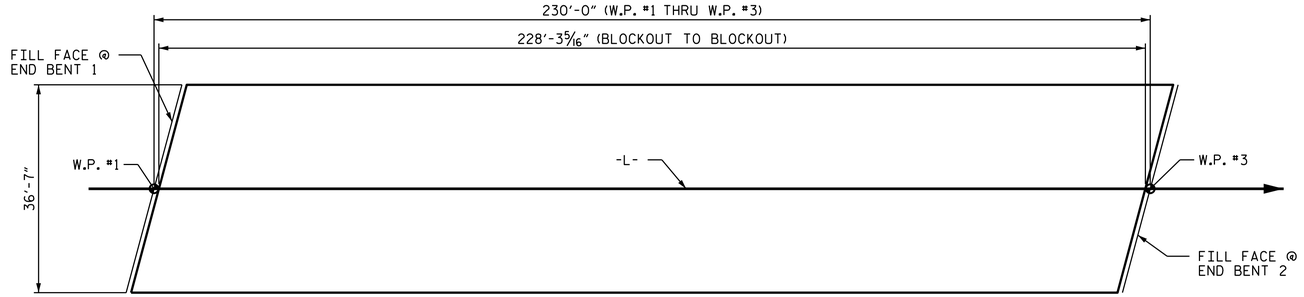


SUPERSTRUCTURE BILL OF MATERIAL

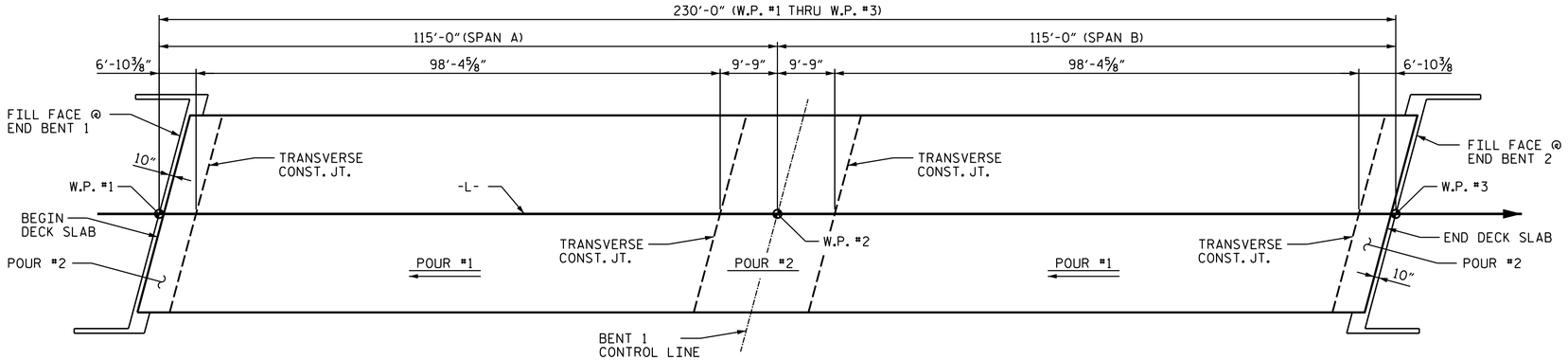
	CLASS AA CONCRETE		REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
		(CU. YDS.)	(LBS.)	(LBS.)
SPANS A & B	POUR #1	235.0	25,902	27,185
	POUR #2	134.8		
TOTALS ✳✳		369.8	25,902	27,185

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,498	SQ. FT.
BRIDGE DECK	7,066	SQ. FT.
TOTALS	8,564	SQ. FT.



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 8,351)



POUR SEQUENCE

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28125 MARSHALL C. CHEEK, JR. — DocuSigned by: Marshall C. Cheek Jr. 6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

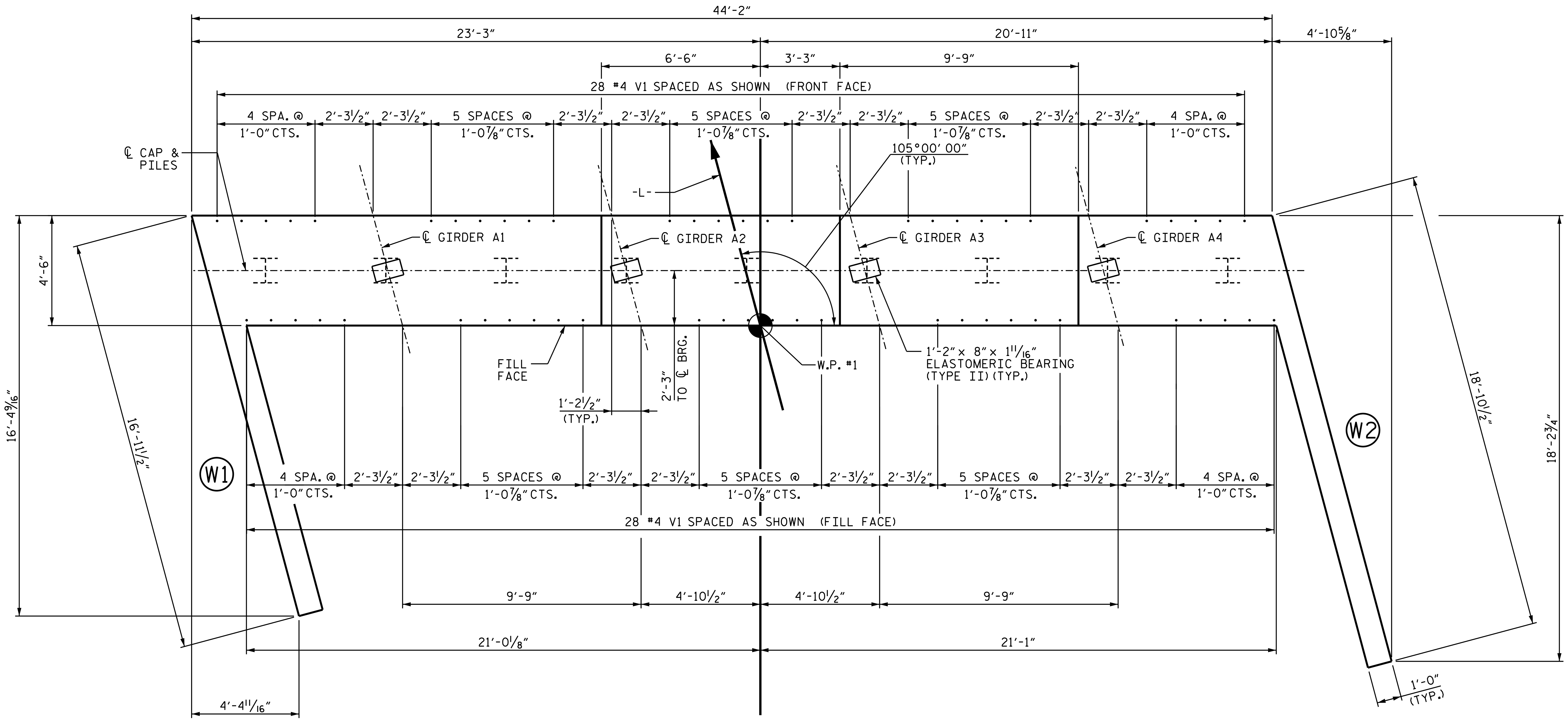
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

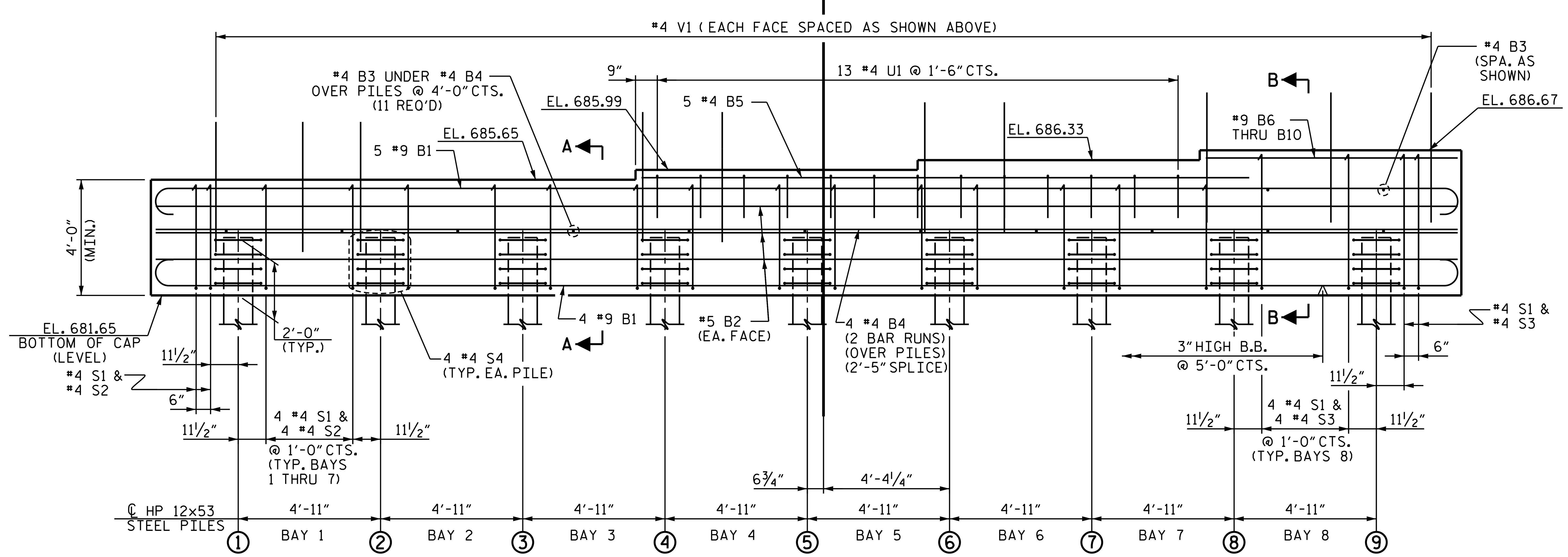
SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			40

DRAWN BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	5/22



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A & SECTION B-B, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

THE TOP SURFACE OF THE END BENT CAP AND WINGS, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

FOR TEMPORARY DRAINAGE FOR END BENTS, SEE SHEET 4 OF 4 OF INTEGRAL END BENT 1.

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 1

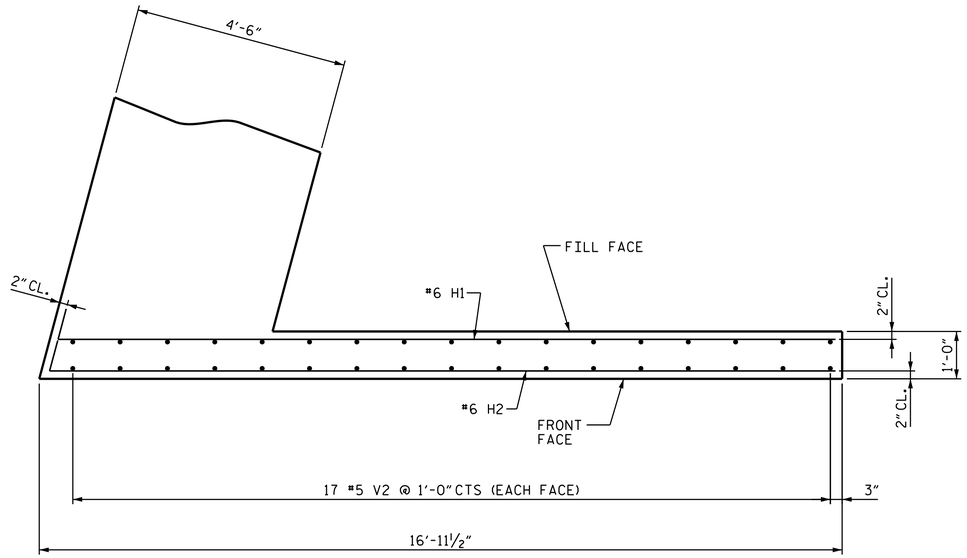
NORTH CAROLINA PROFESSIONAL SEAL 20528 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

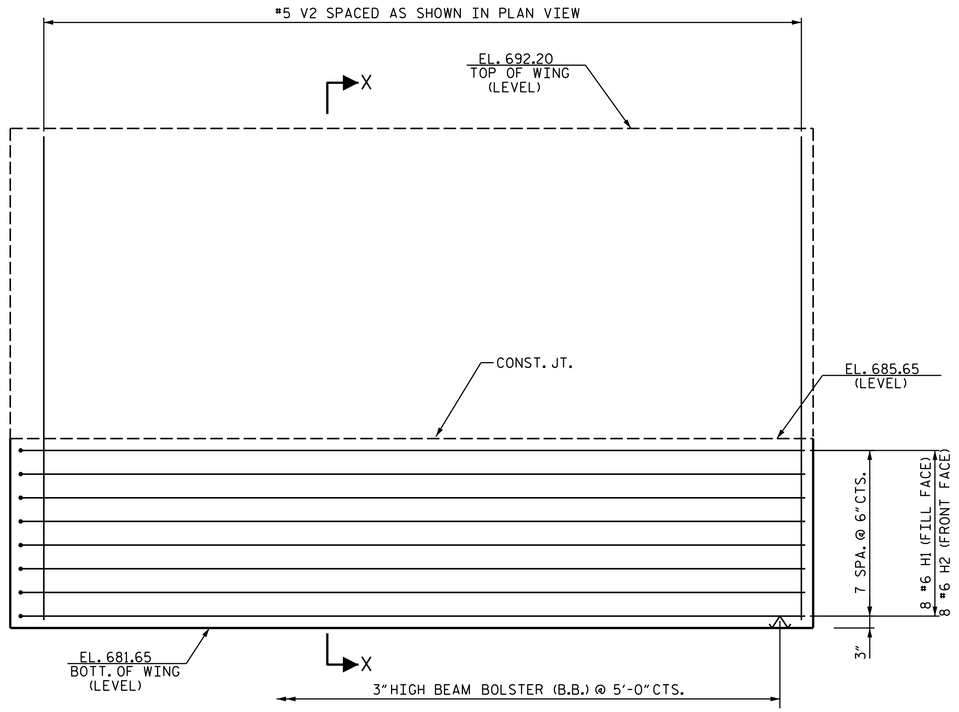
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			40

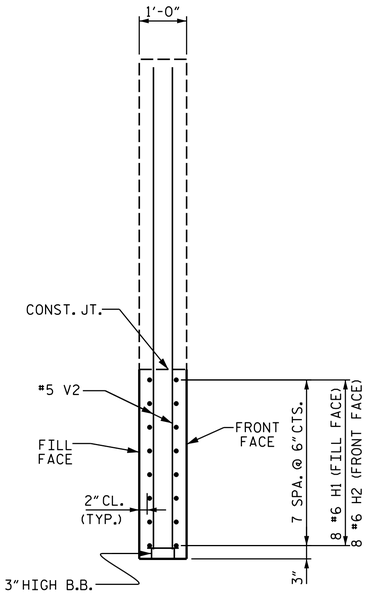
DRAWN BY :	NMW	DATE :	8/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23



PLAN OF WING (W1)



ELEVATION OF WING (W1)



SECTION X-X

NOTE: FOR UPPER PART OF WING DETAILS AND REINFORCING STEEL, SEE "SUPERSTRUCTURE PLAN OF SPANS DETAILS".

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 Marshall G. Creekmore Jr. MARSHALL G. CREEKMORE JR. ENGINEER

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

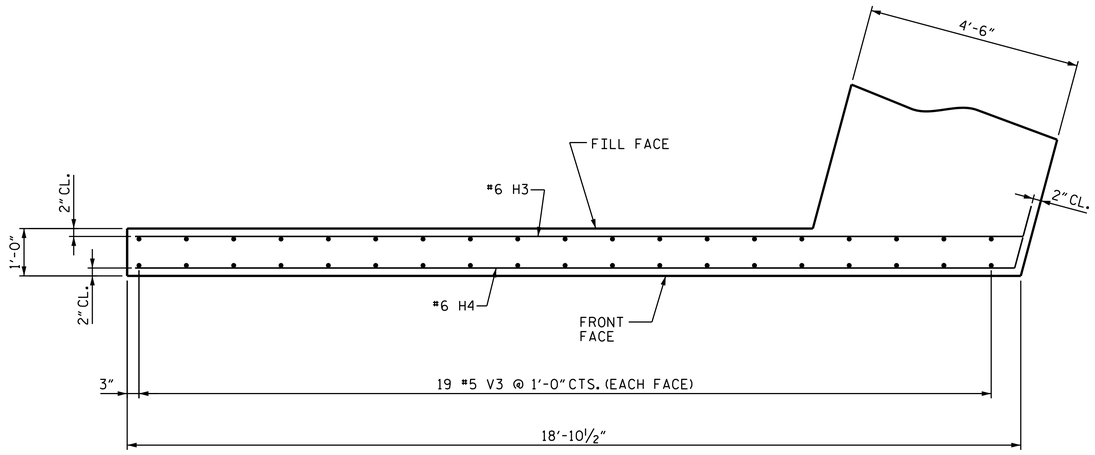
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

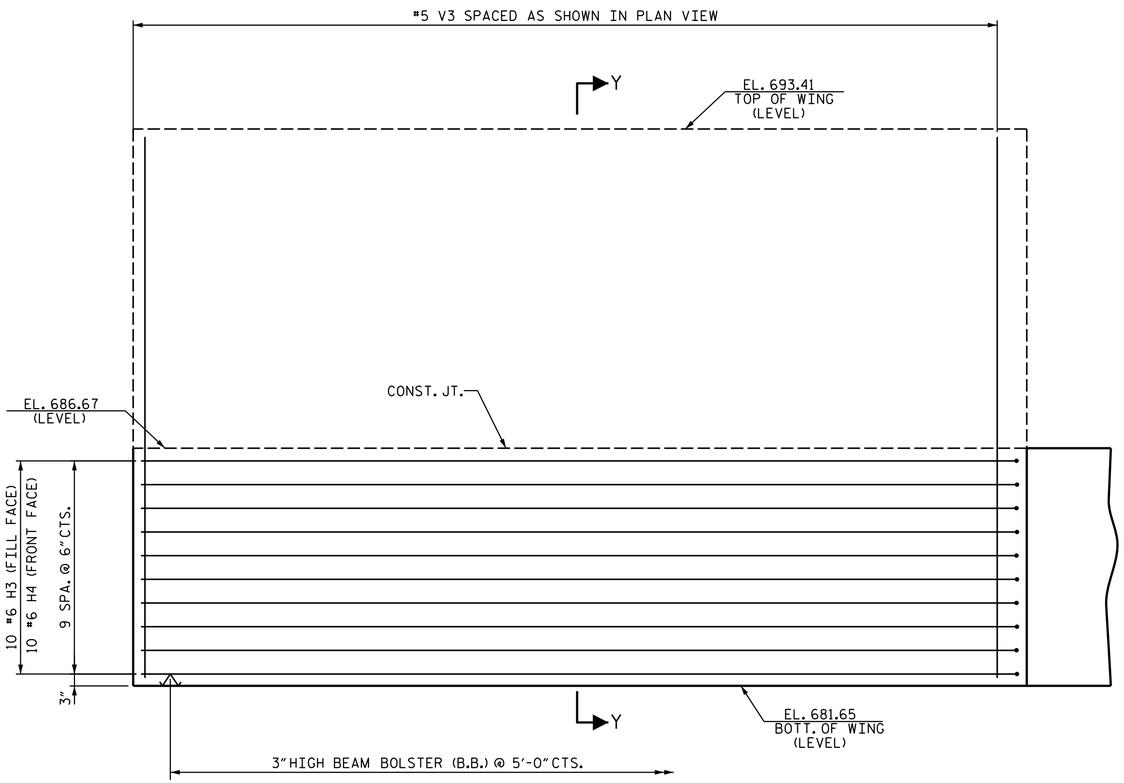
INTEGRAL
END BENT 1
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-29
1			3			TOTAL SHEETS
2			4			40

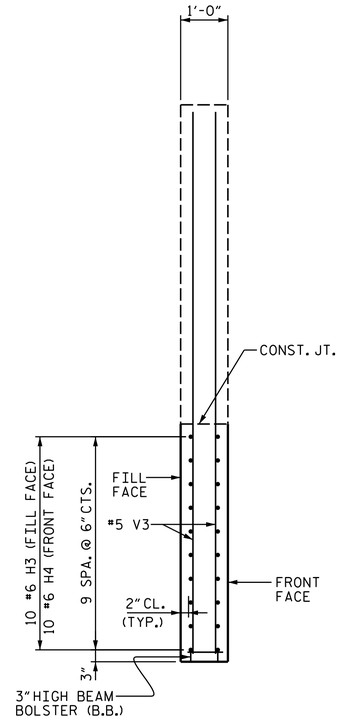
DRAWN BY :	NMW	DATE :	8/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23



PLAN OF WING (W2)



ELEVATION OF WING (W2)



SECTION Y-Y

NOTE: FOR UPPER PART OF WING DETAILS AND REINFORCING STEEL, SEE "SUPERSTRUCTURE PLAN OF SPANS DETAILS".

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28125 — DocuSigned by: Marshall G. Checky Jr. — MARSHALL G. CHECK, JR. — 6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

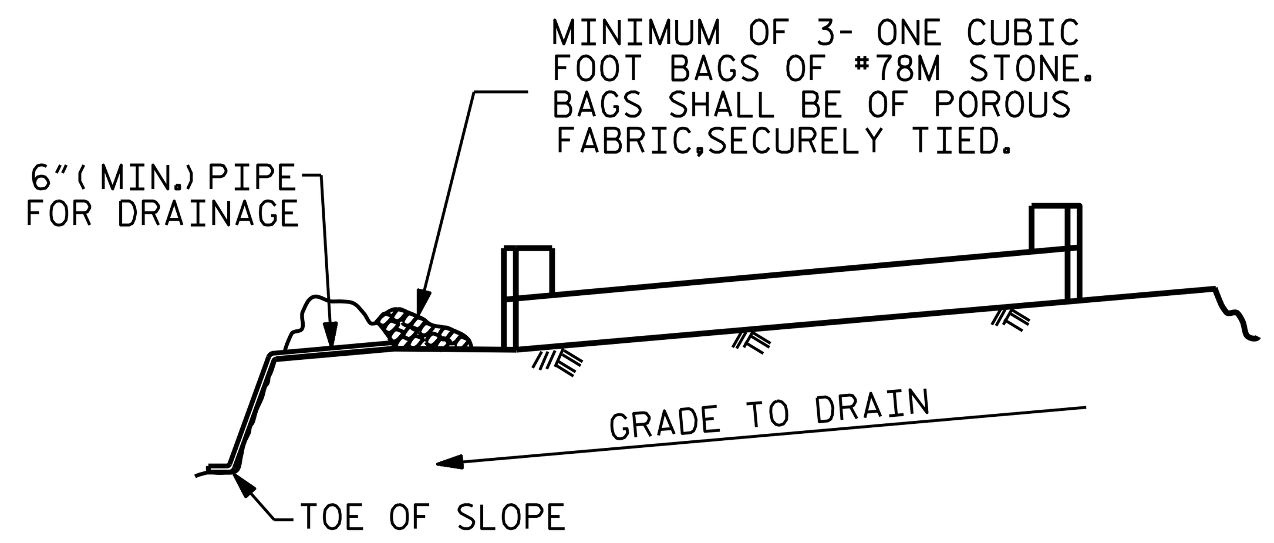
INTEGRAL END BENT 1 WING DETAILS

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

SHEET NO. S-30

TOTAL SHEETS 40

DRAWN BY :	NMW	DATE :	8/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23

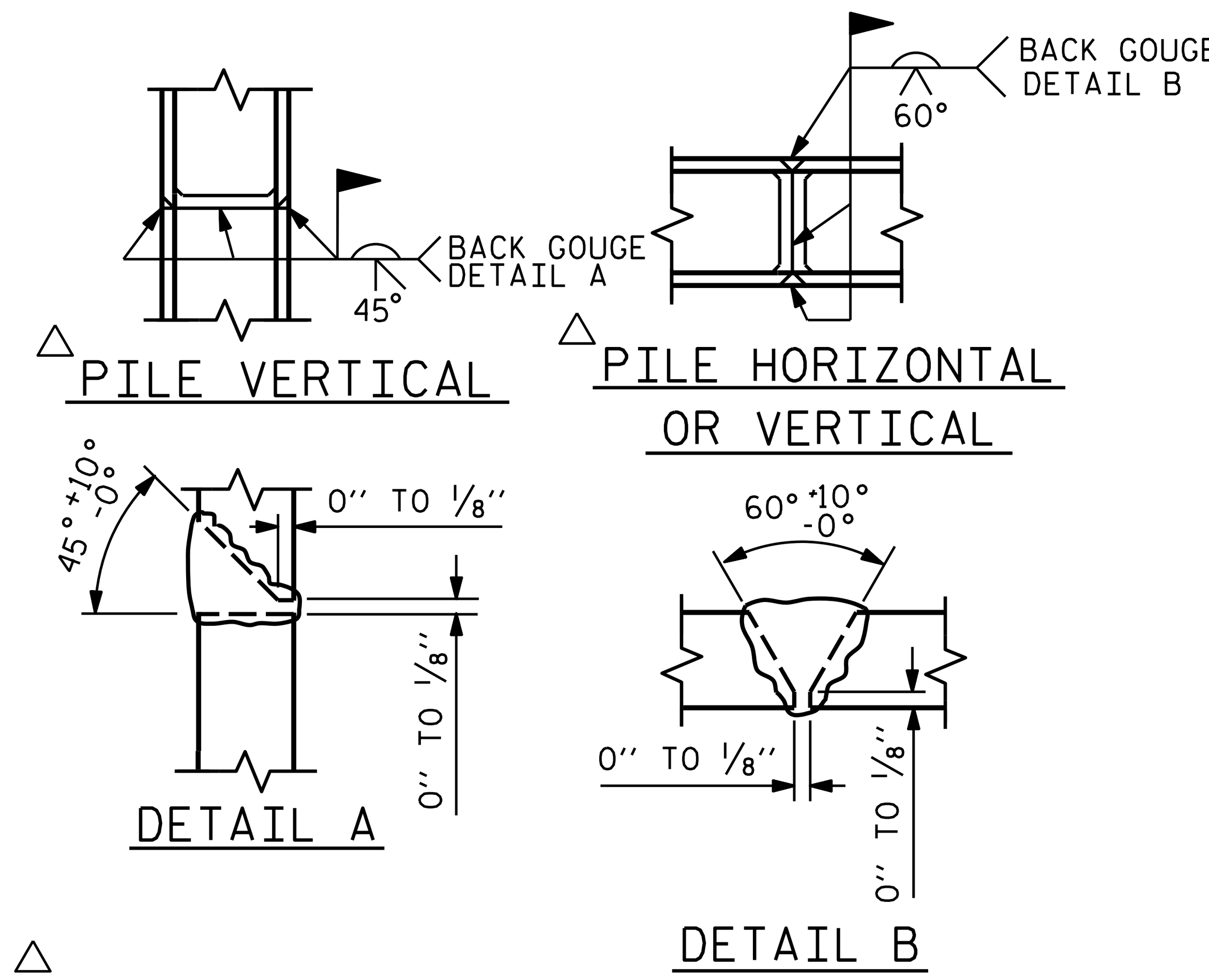


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

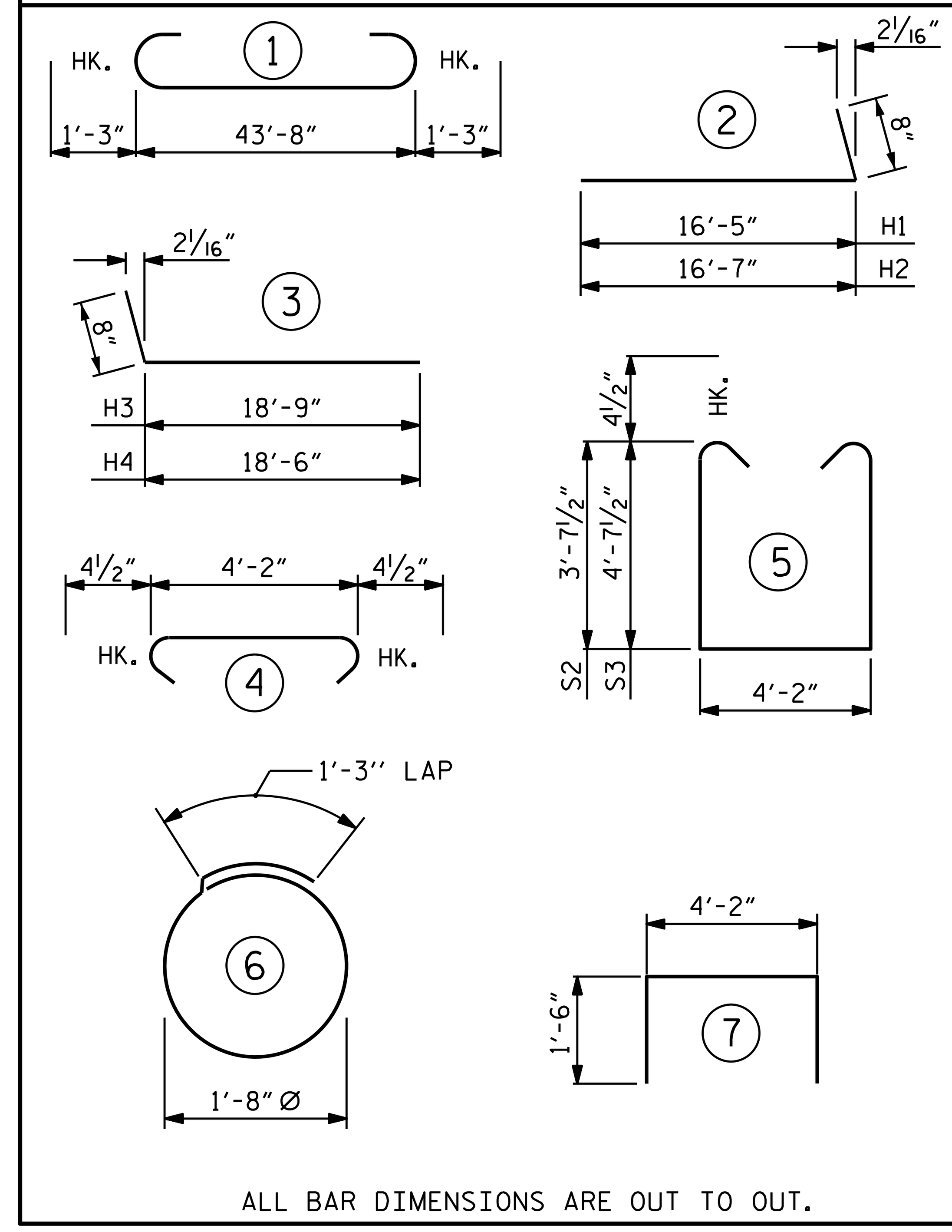
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

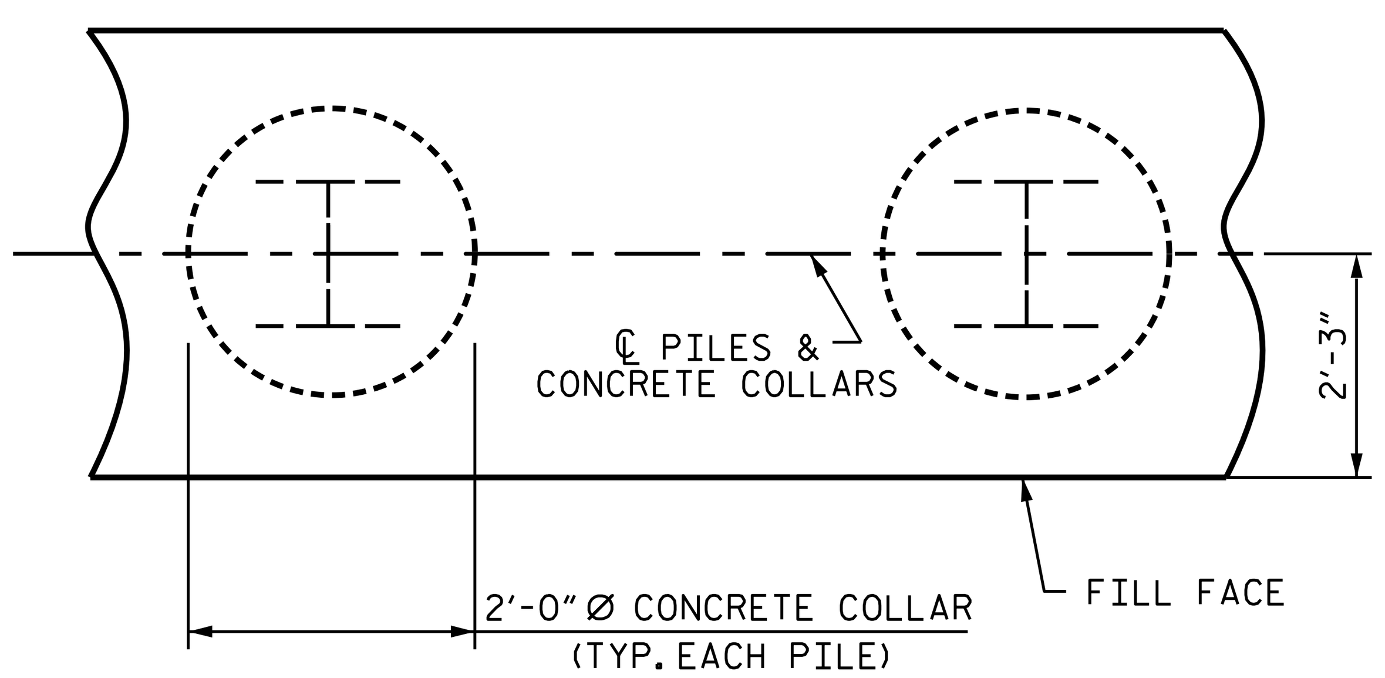
PILE SPLICE DETAILS

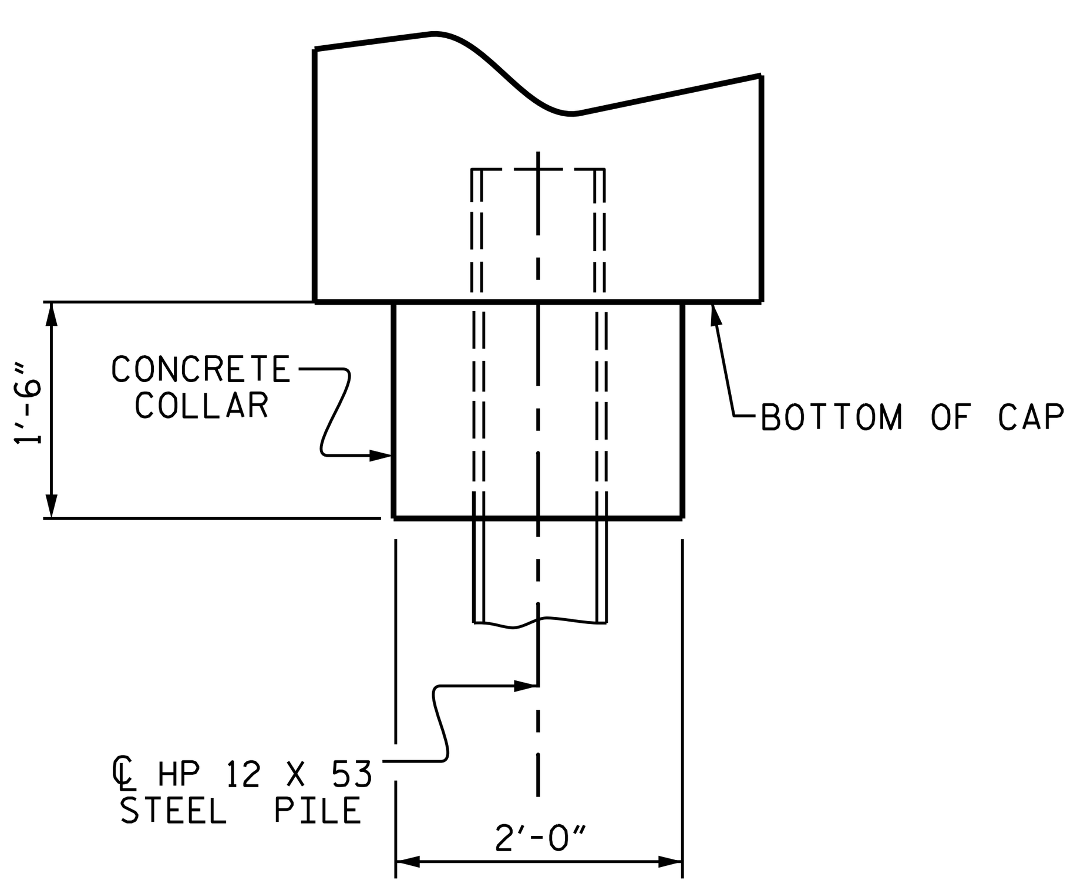


BILL OF MATERIAL FOR END BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#9	1	46'-2"	1,413
B2	6	#5	STR	43'-9"	274
B3	13	#4	STR	4'-2"	36
B4	8	#4	STR	23'-1"	123
B5	5	#4	STR	21'-0"	70
B6	1	#9	STR	8'-8"	29
B7	1	#9	STR	8'-5"	29
B8	1	#9	STR	8'-2"	28
B9	1	#9	STR	7'-10"	27
B10	1	#9	STR	7'-7"	26
H1	8	#6	2	17'-1"	205
H2	8	#6	2	17'-3"	207
H3	10	#6	3	19'-5"	292
H4	10	#6	3	19'-2"	288
S1	36	#4	4	4'-11"	118
S2	30	#4	5	12'-2"	244
S3	6	#4	5	14'-2"	57
S4	36	#4	6	6'-6"	156
U1	13	#4	7	7'-2"	62
V1	56	#4	STR	4'-6"	168
V2	34	#5	STR	10'-2"	361
V3	38	#5	STR	11'-5"	452
REINFORCING STEEL					4665 LBS.

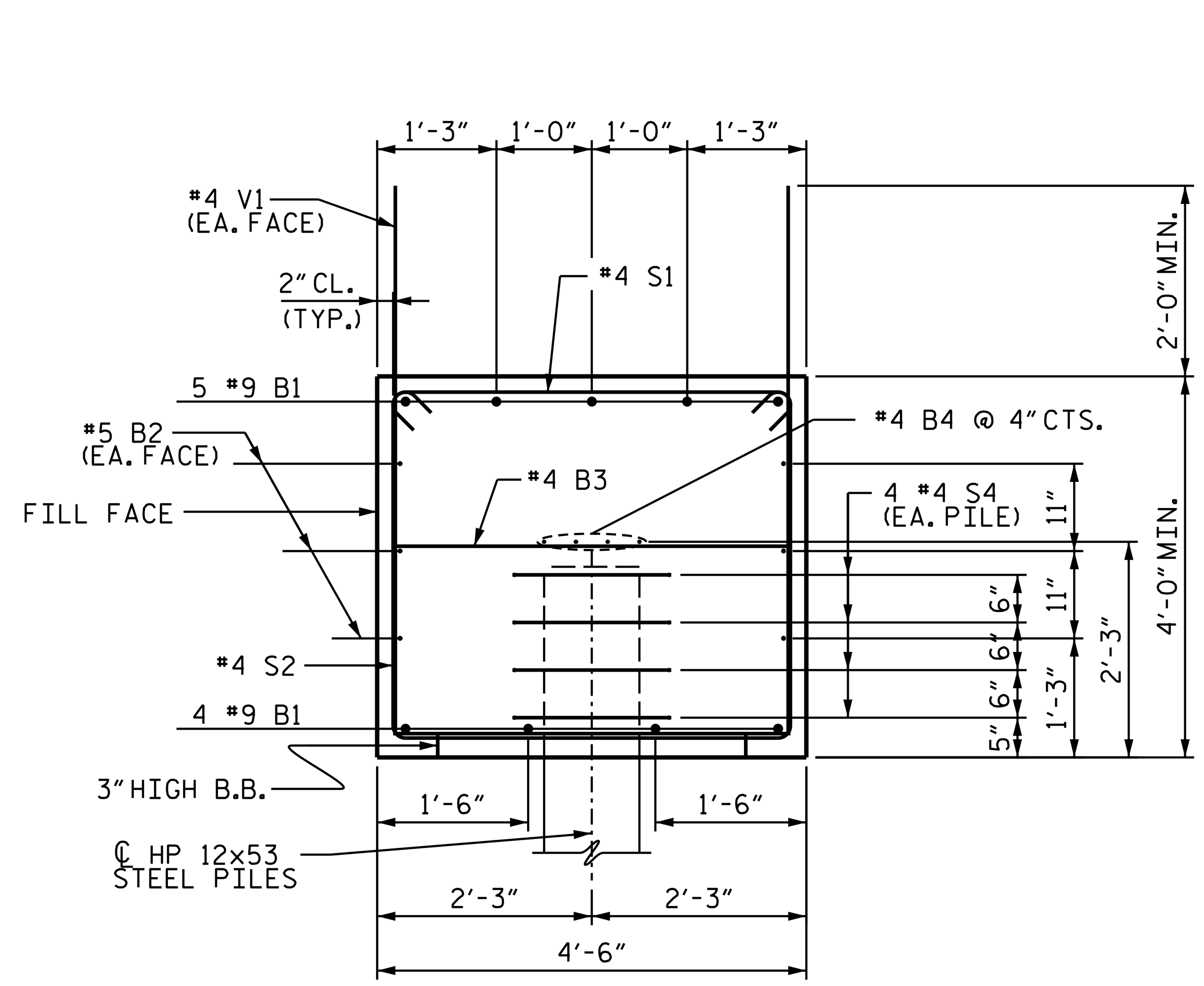
CLASS A CONCRETE BREAKDOWN

CAP, LOWER PART OF WINGS & COLLARS 38.6 C.Y.



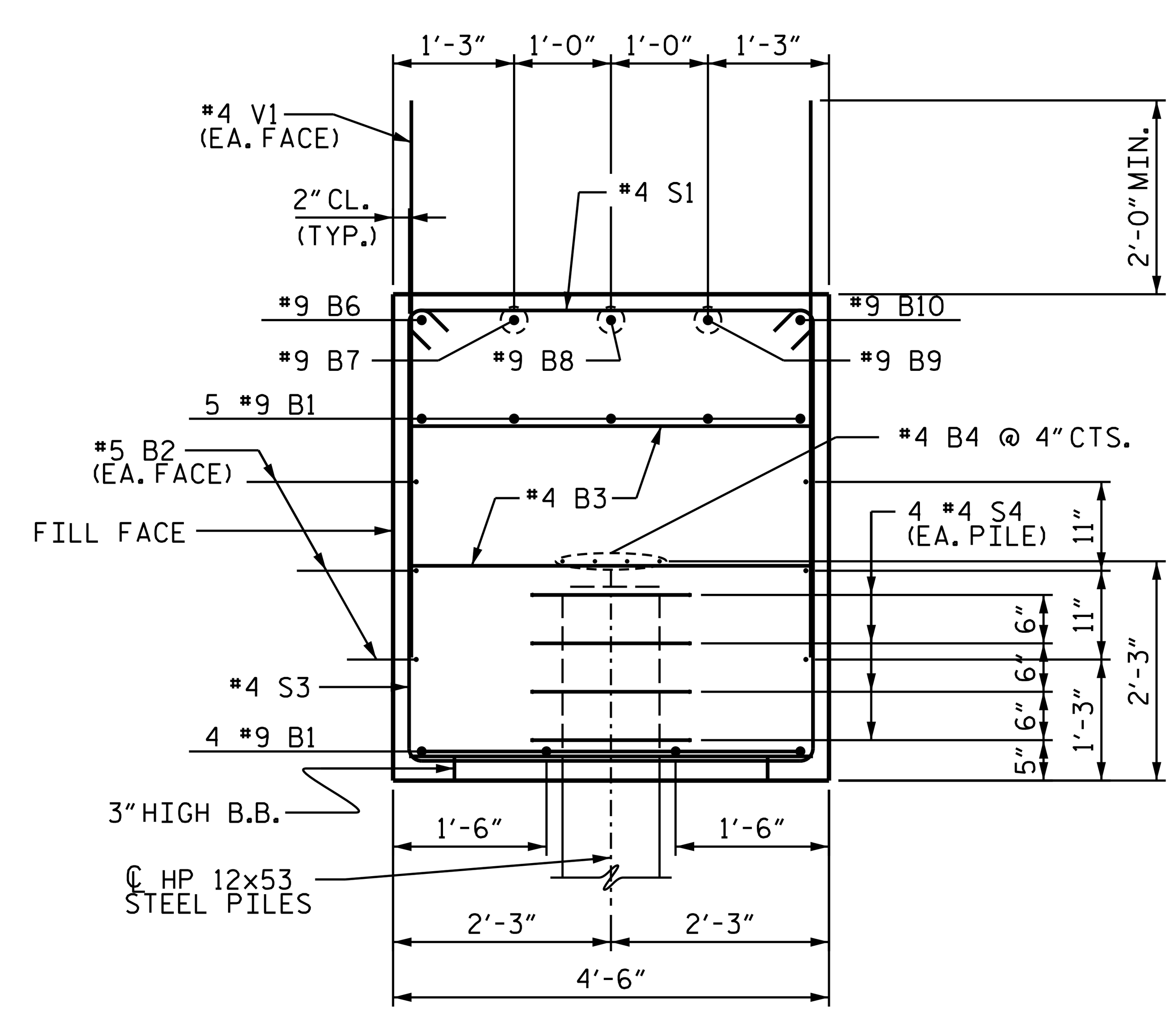


CORROSION PROTECTION FOR STEEL PILES DETAIL



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")



SECTION B-B

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

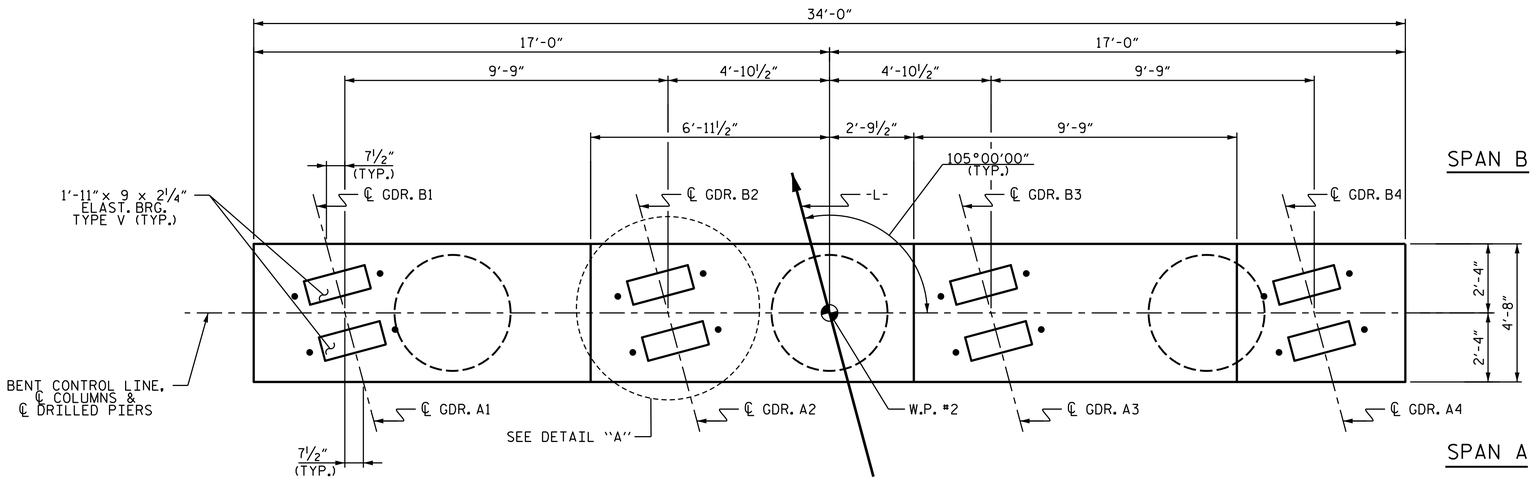
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

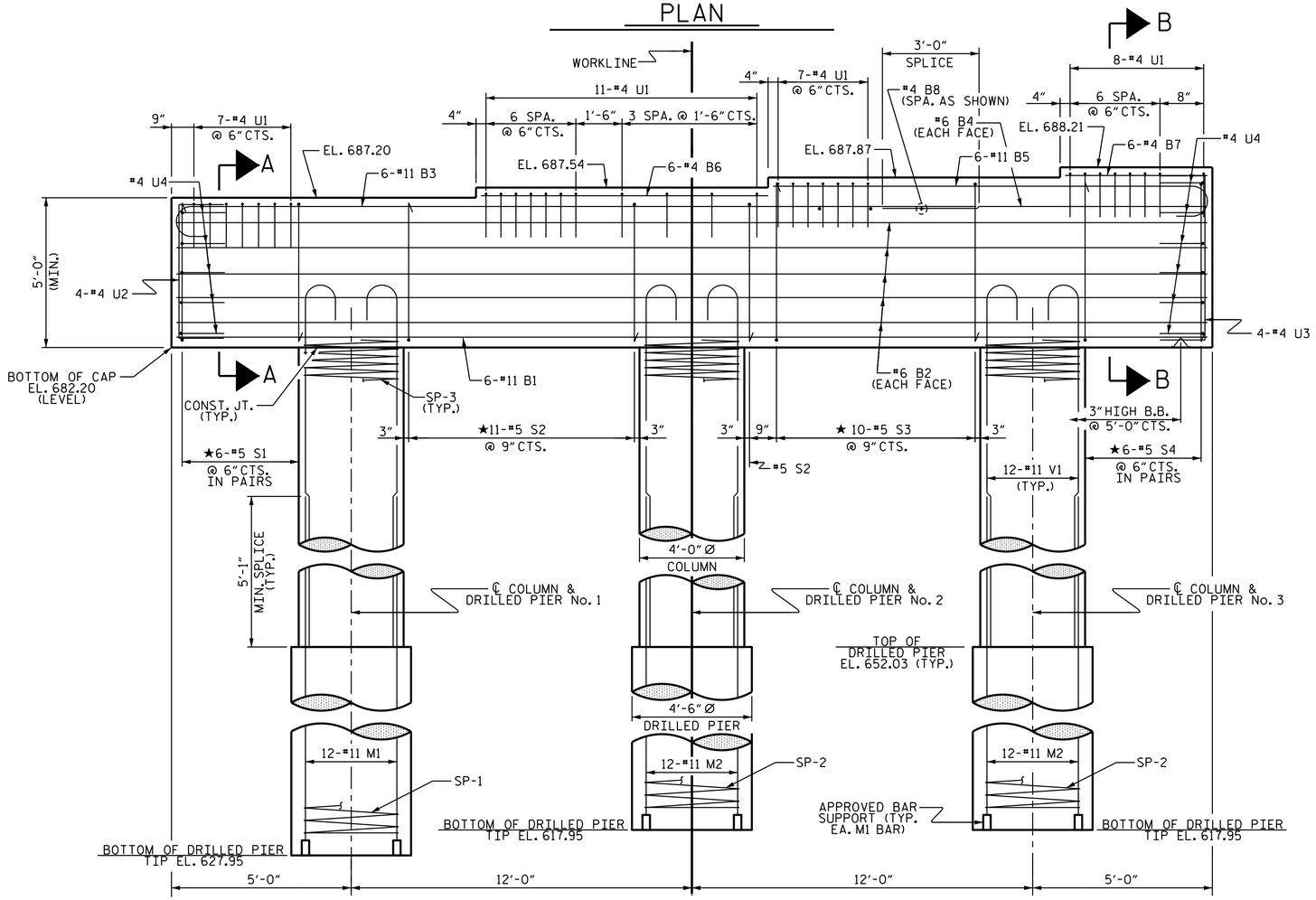
INTEGRAL END BENT 1 DETAILS

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-31
1			3					TOTAL SHEETS
2			4					40

DRAWN BY :	NMW	DATE :	8/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23



PLAN



ELEVATION

DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

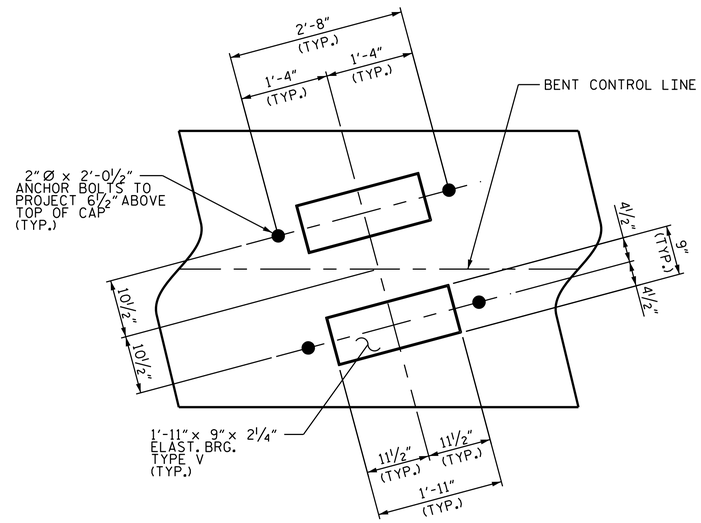
FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE STIRRUPS.

DRILLED PIERS SHALL BE TERMINATED ONE FOOT ± ABOVE NORMAL WATER SURFACE ELEVATION FOR SHAFTS LOCATED IN WATER.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00 -L-

SHEET 1 OF 2

DRAWN BY : ZCS DATE : 12/22
CHECKED BY : MGC DATE : 12/22
DESIGN ENGINEER OF RECORD : ZCS DATE : 12/22

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR. ENGINEER
Marshall G. Cheek Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

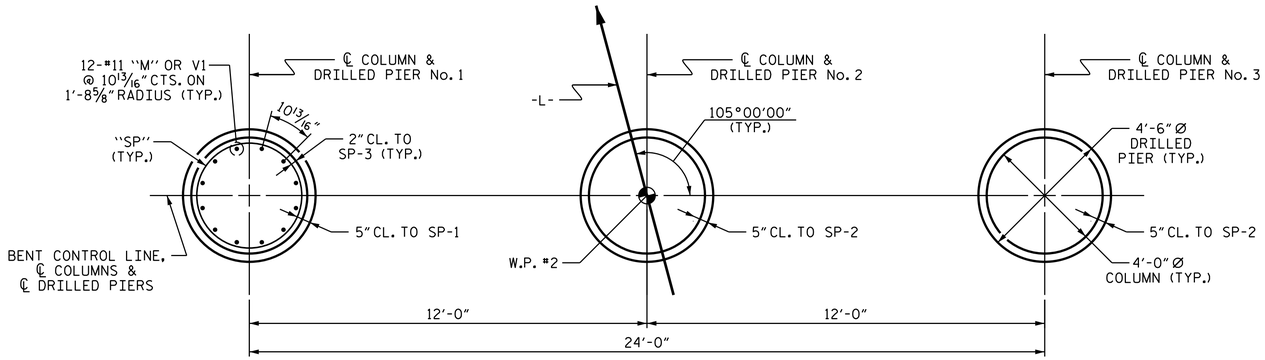
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

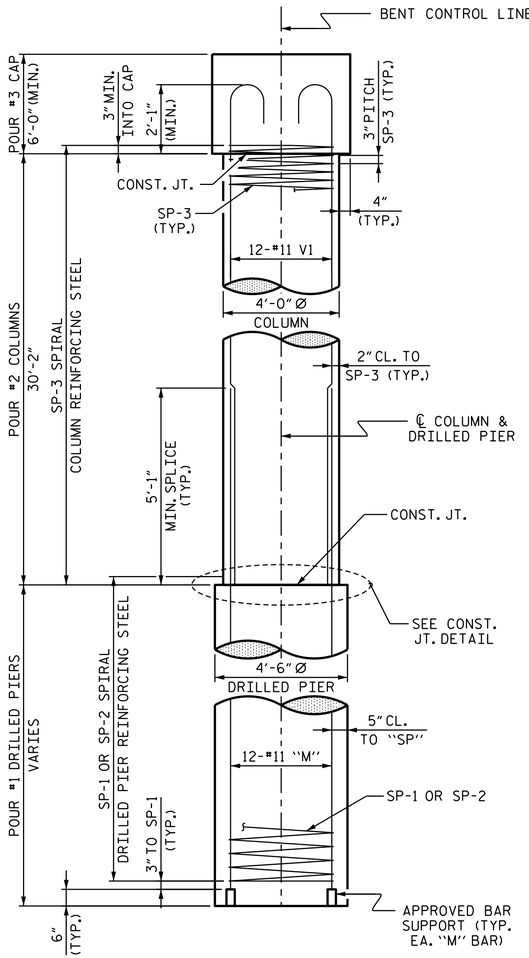
SUBSTRUCTURE

BENT 1

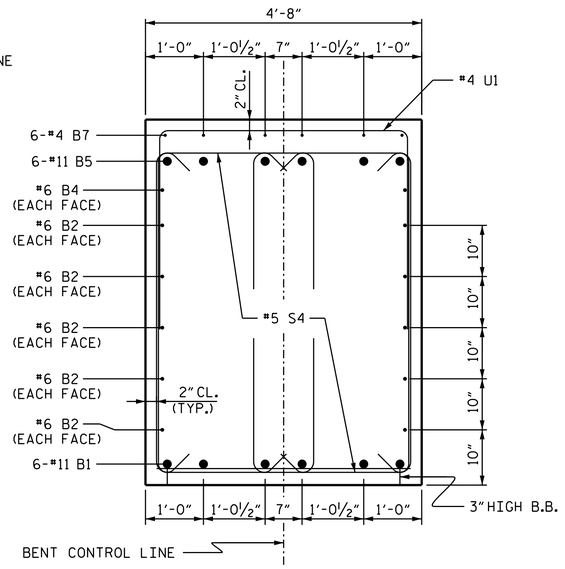
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
1			3			TOTAL SHEETS
2			4			40



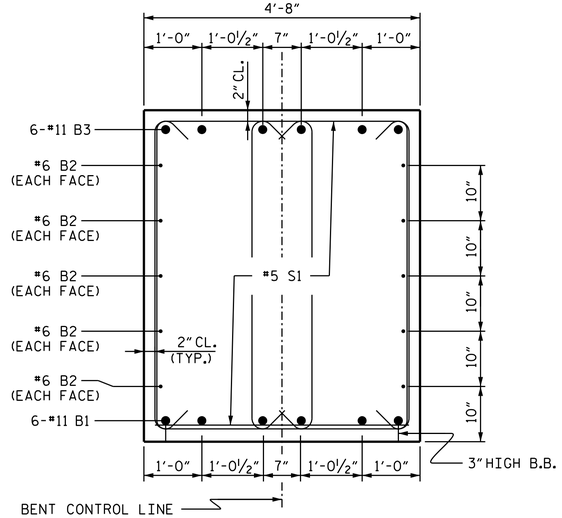
PLAN OF DRILLED PIERS & COLUMNS



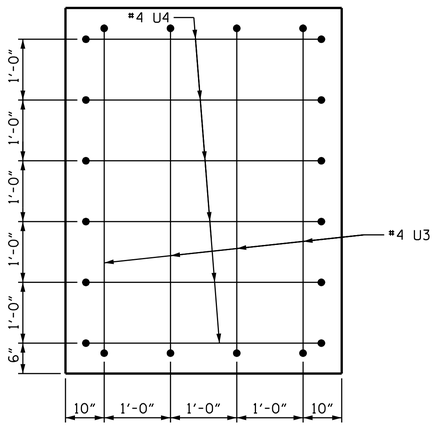
END ELEVATION



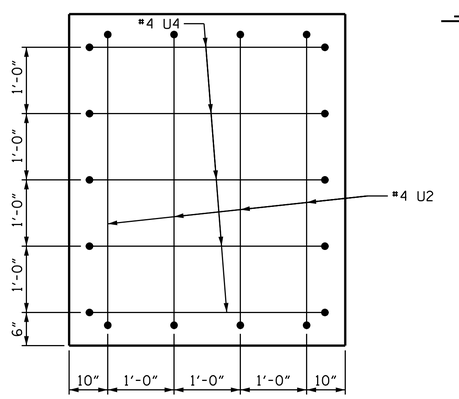
SECTION B-B



SECTION A-A

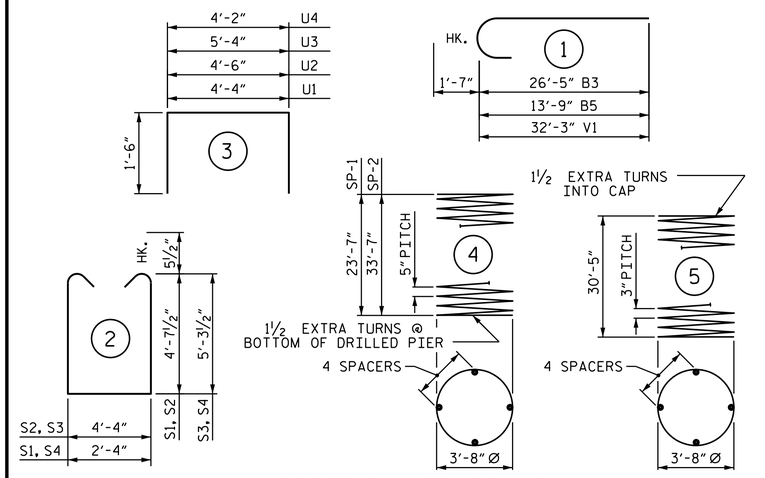


RIGHT END OF CAP VIEW



LEFT END OF CAP VIEW

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#11	STR	33'-8"	1073
B2	10	#6	STR	33'-8"	506
B3	6	#11	1	28'-0"	893
B4	2	#6	STR	10'-3"	31
B5	6	#11	1	15'-4"	489
B6	6	#4	STR	9'-6"	38
B7	6	#4	STR	4'-1"	16
B8	3	#4	STR	4'-4"	9
M1	12	#11	STR	31'-8"	2019
M2	24	#11	STR	41'-8"	5313
S1	12	#5	2	12'-6"	156
S2	12	#5	2	14'-6"	181
S3	10	#5	2	15'-10"	165
S4	12	#5	2	13'-10"	173
U1	33	#4	3	7'-4"	162
U2	4	#4	3	7'-6"	20
U3	4	#4	3	8'-4"	22
U4	11	#4	3	7'-2"	53
V1	36	#11	1	33'-10"	6471

REINFORCING STEEL 17,790 LBS.

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
SP-1	1	*	4	670'-6"	699
SP-2	2	*	4	943'-2"	1,967
SP-3	3	**	5	1412'-6"	2,831

SPIRAL COLUMN REINFORCING STEEL 5,497 LBS.

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

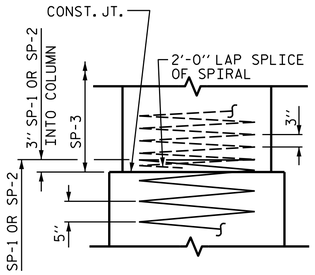
** THE SP-3 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN

POUR #2 (COLUMNS)	42.1 C.Y.
POUR #3 (CAP)	32.0 C.Y.
TOTAL CLASS A CONCRETE	74.1 C.Y.

DRILLED PIERS:

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	54.3 C.Y.



CONSTRUCTION JOINT DETAIL

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00 -L-

SHEET 2 OF 2

DRAWN BY :	ZCS	DATE :	12/22
CHECKED BY :	MGC	DATE :	12/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	12/22

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 Marshall G. Check, Jr. ENGINEER

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

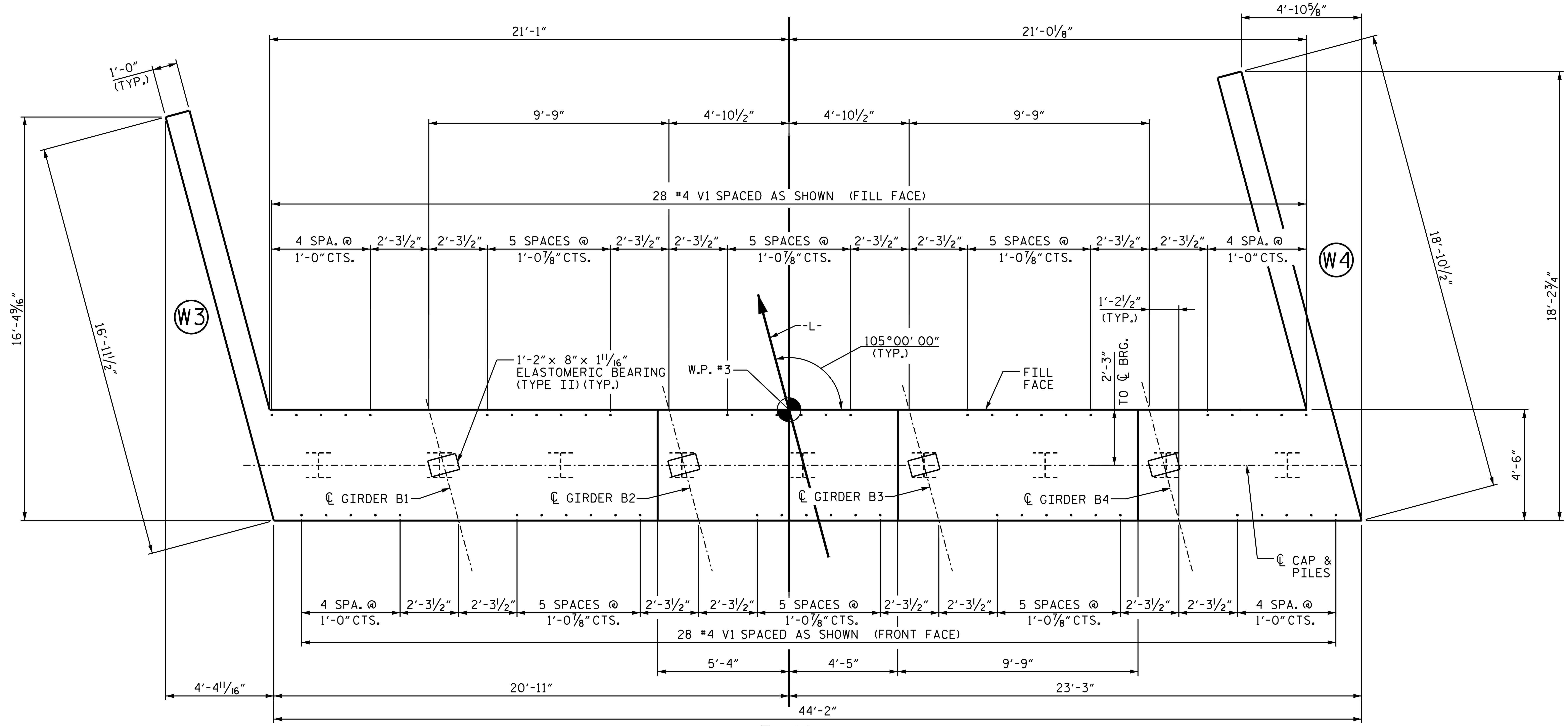
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-33
1			3			TOTAL SHEETS
2			4			40

NOTES

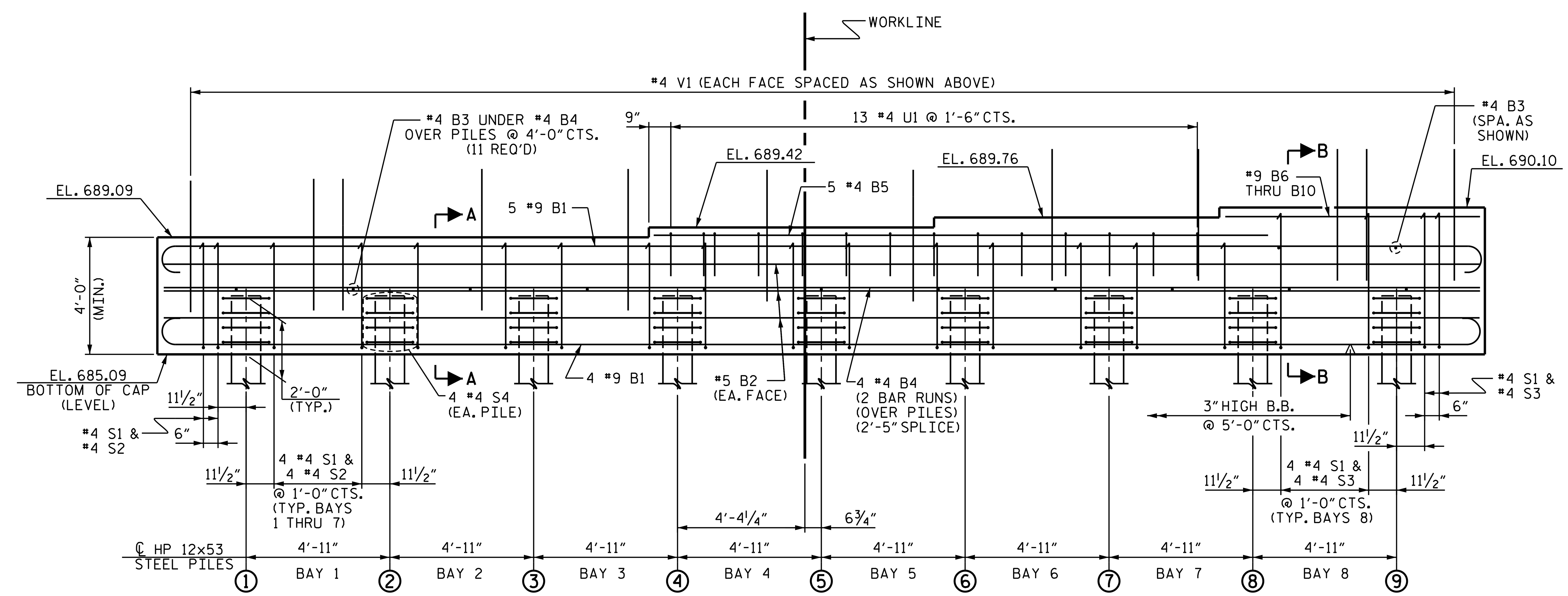
SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

THE TOP SURFACE OF THE END BENT CAP AND WINGS, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

FOR TEMPORARY DRAINAGE FOR END BENTS, SEE SHEET 4 OF 4 OF INTEGRAL END BENT 2.



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A & SECTION B-B, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

DRAWN BY :	NMW	DATE :	9/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-
SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
6/27/2024

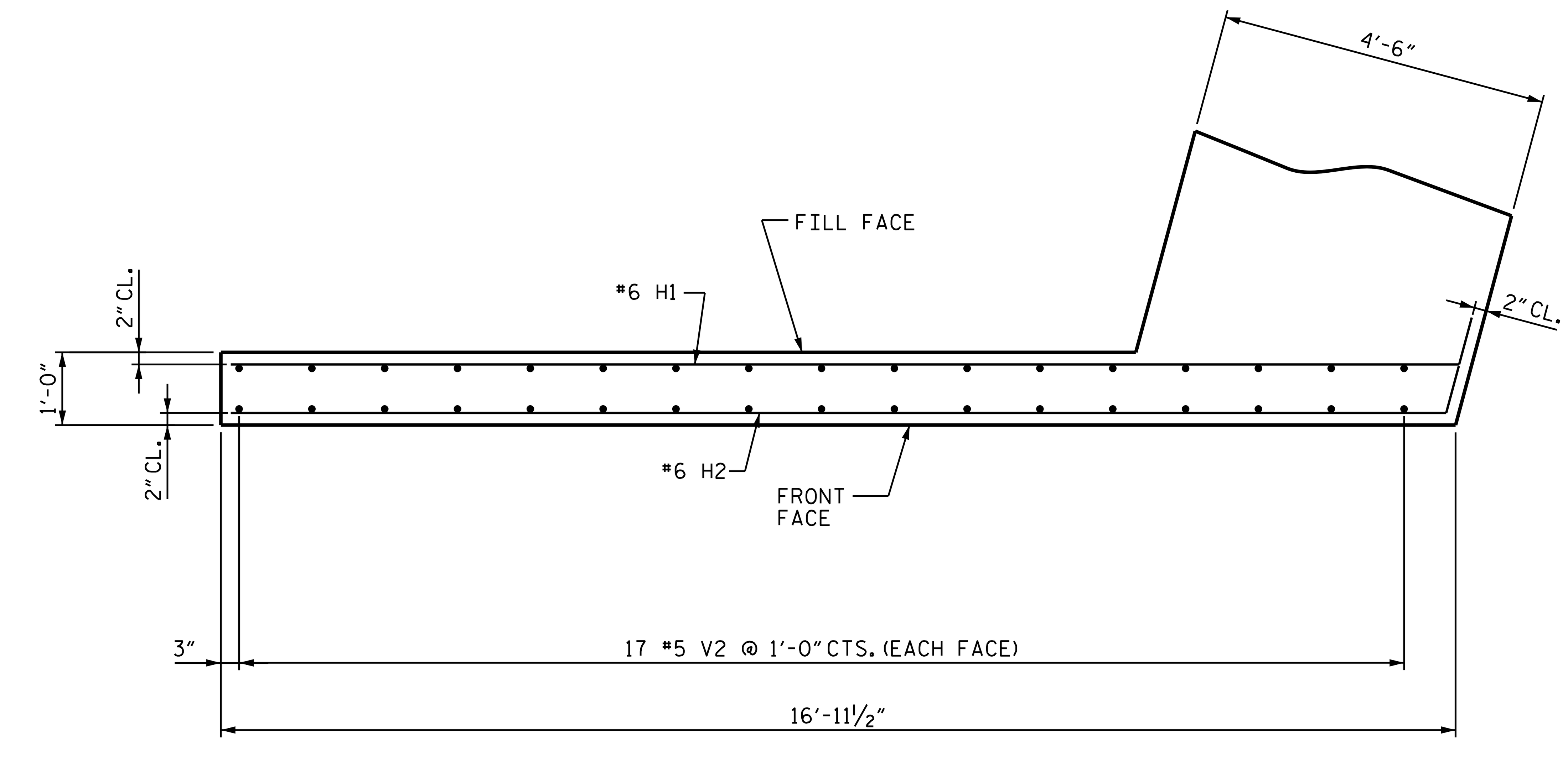
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

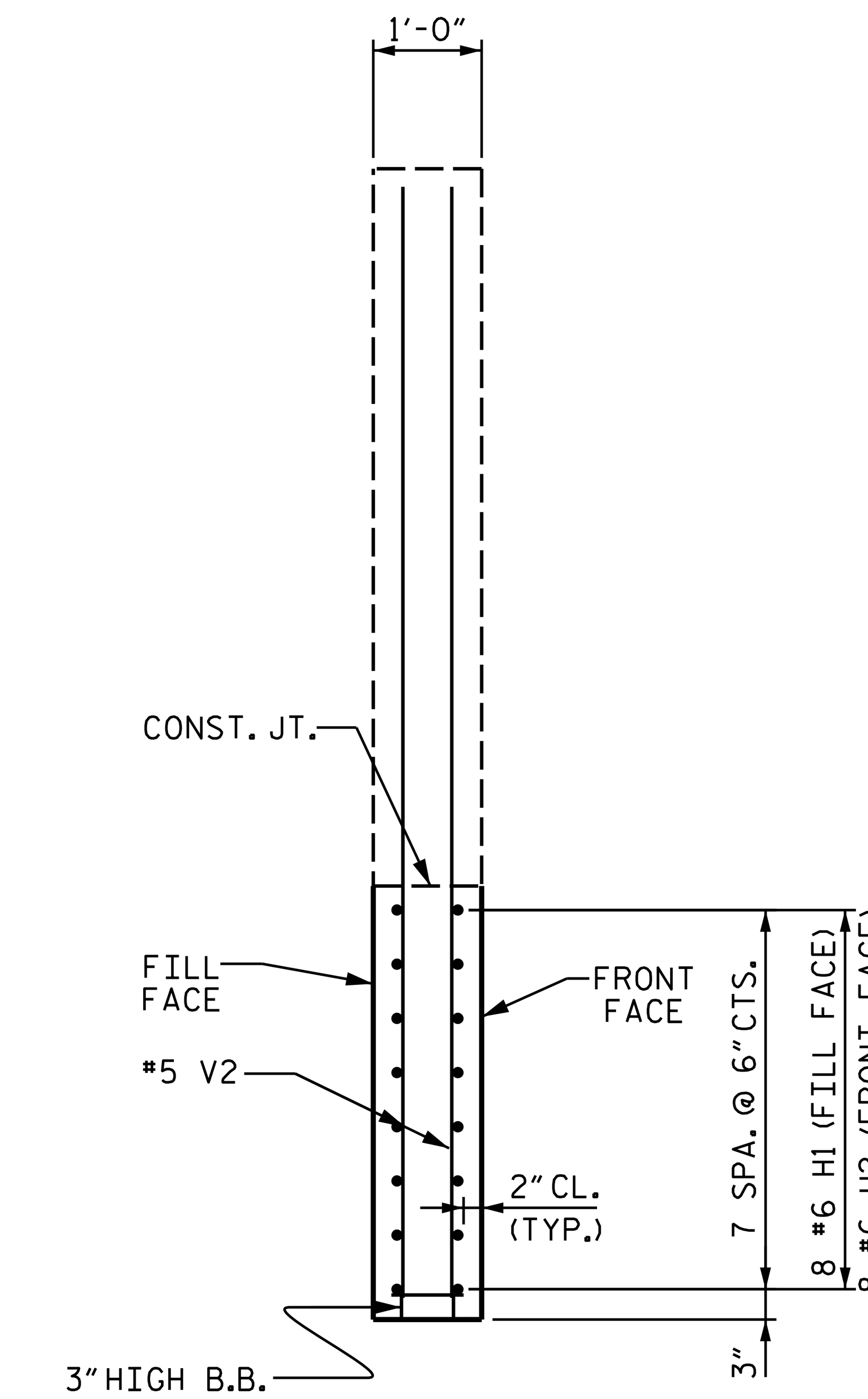
REVISIONS

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

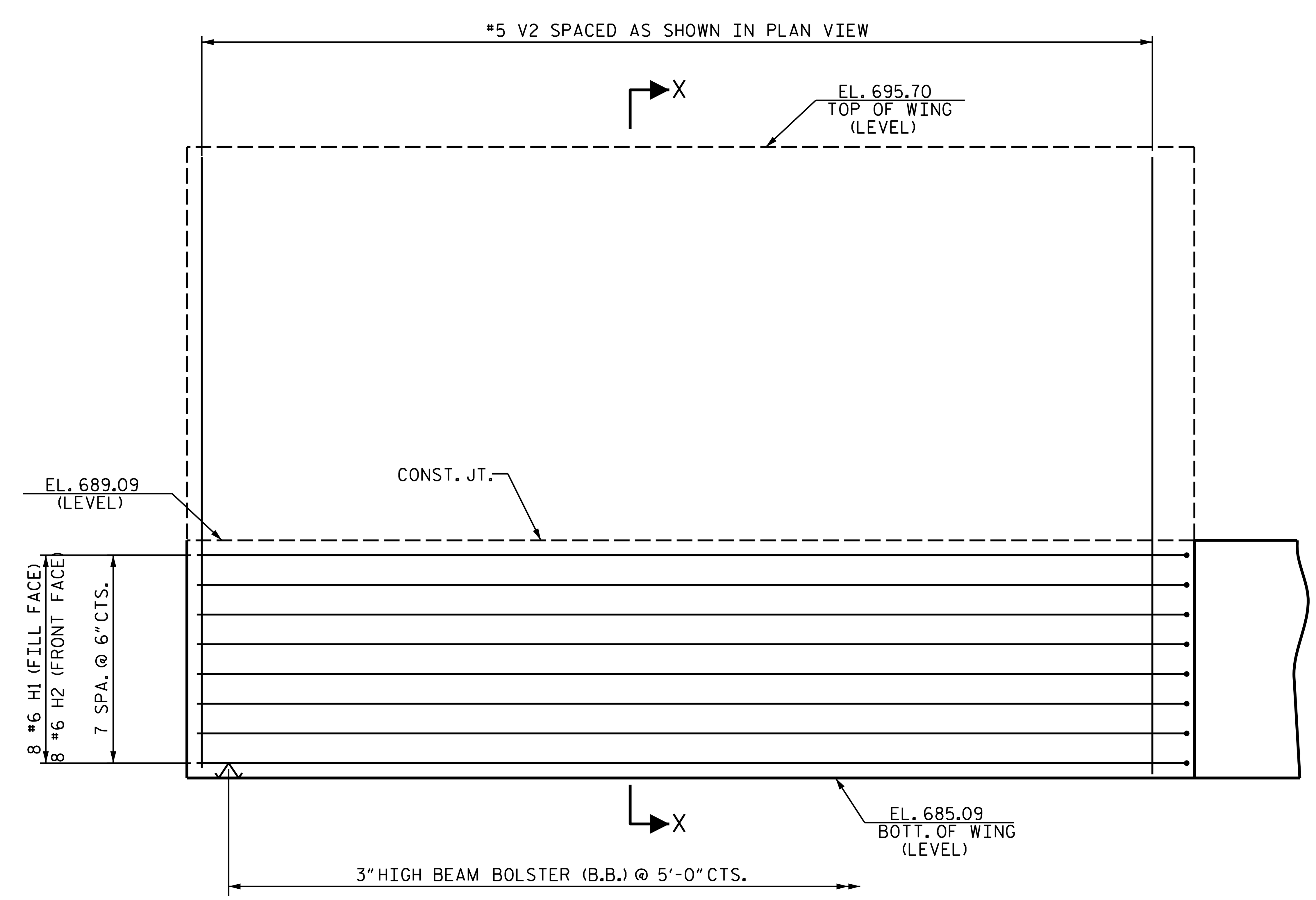
SHEET NO. S-34
TOTAL SHEETS 40



PLAN OF WING (W3)



SECTION X-X



ELEVATION OF WING (W3)

NOTE: FOR UPPER PART OF WING DETAILS AND REINFORCING STEEL, SEE "SUPERSTRUCTURE PLAN OF SPANS DETAILS".

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL
END BENT 2
WING DETAILS

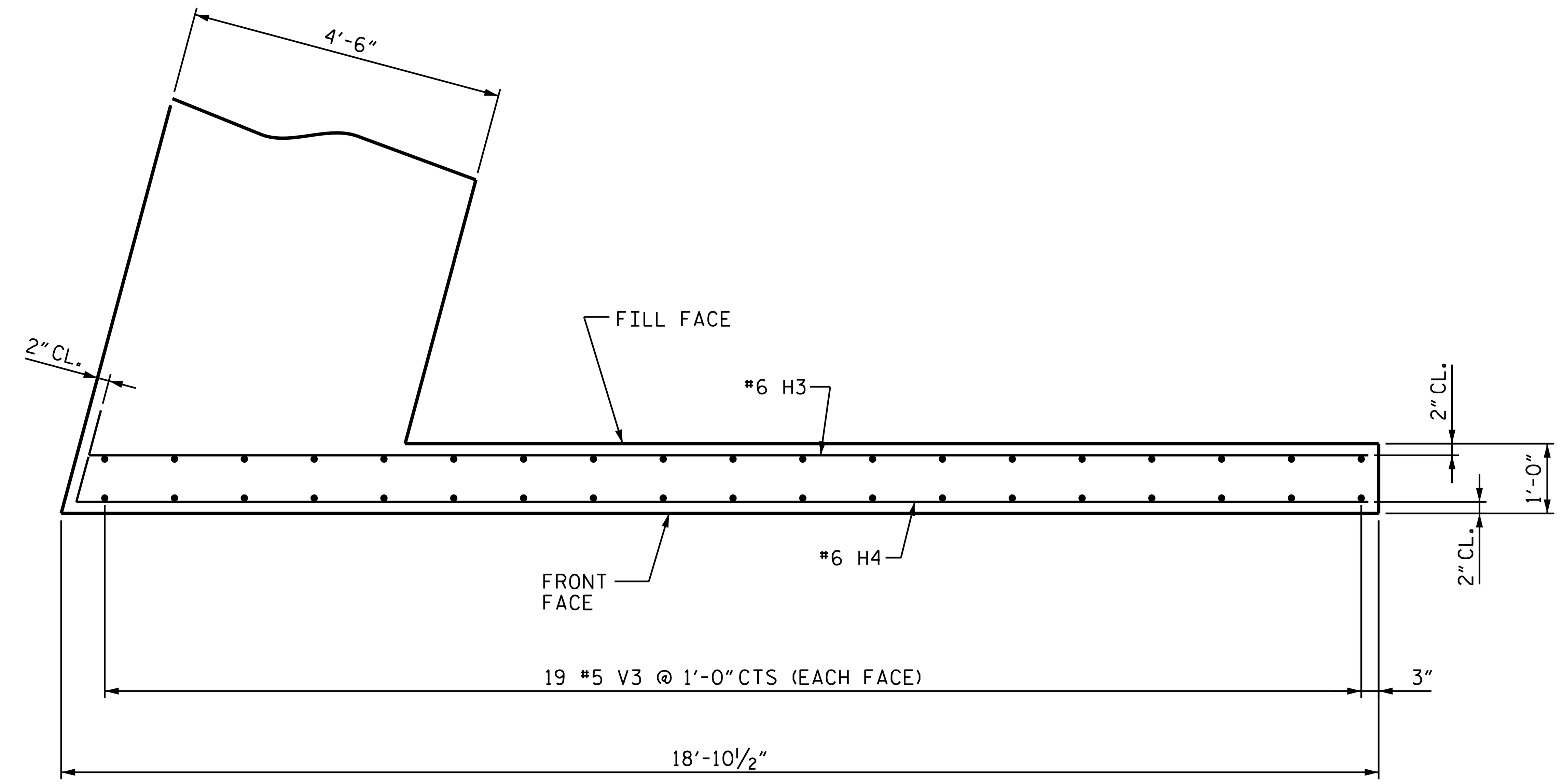
NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

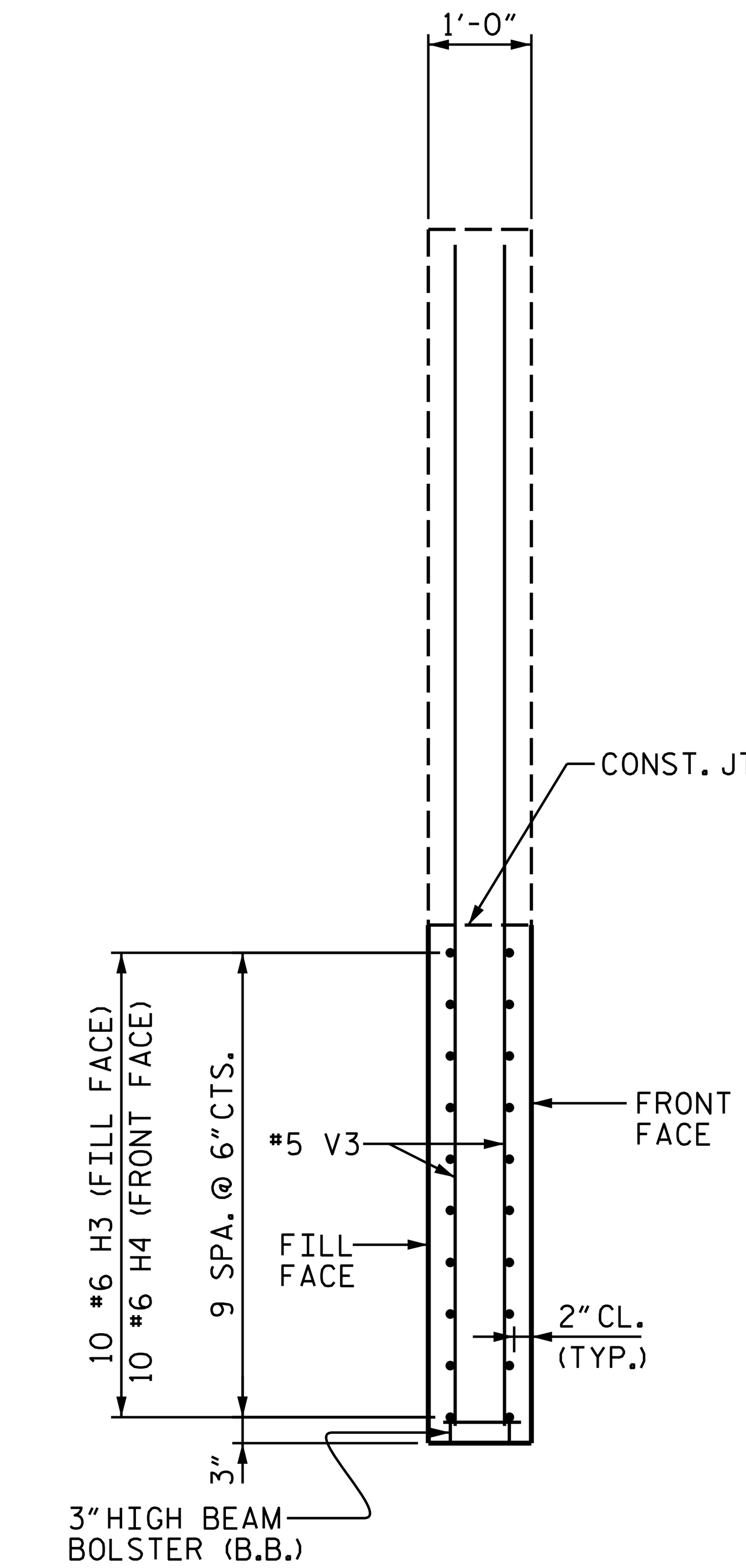
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35
1			3			TOTAL SHEETS
2			4			40

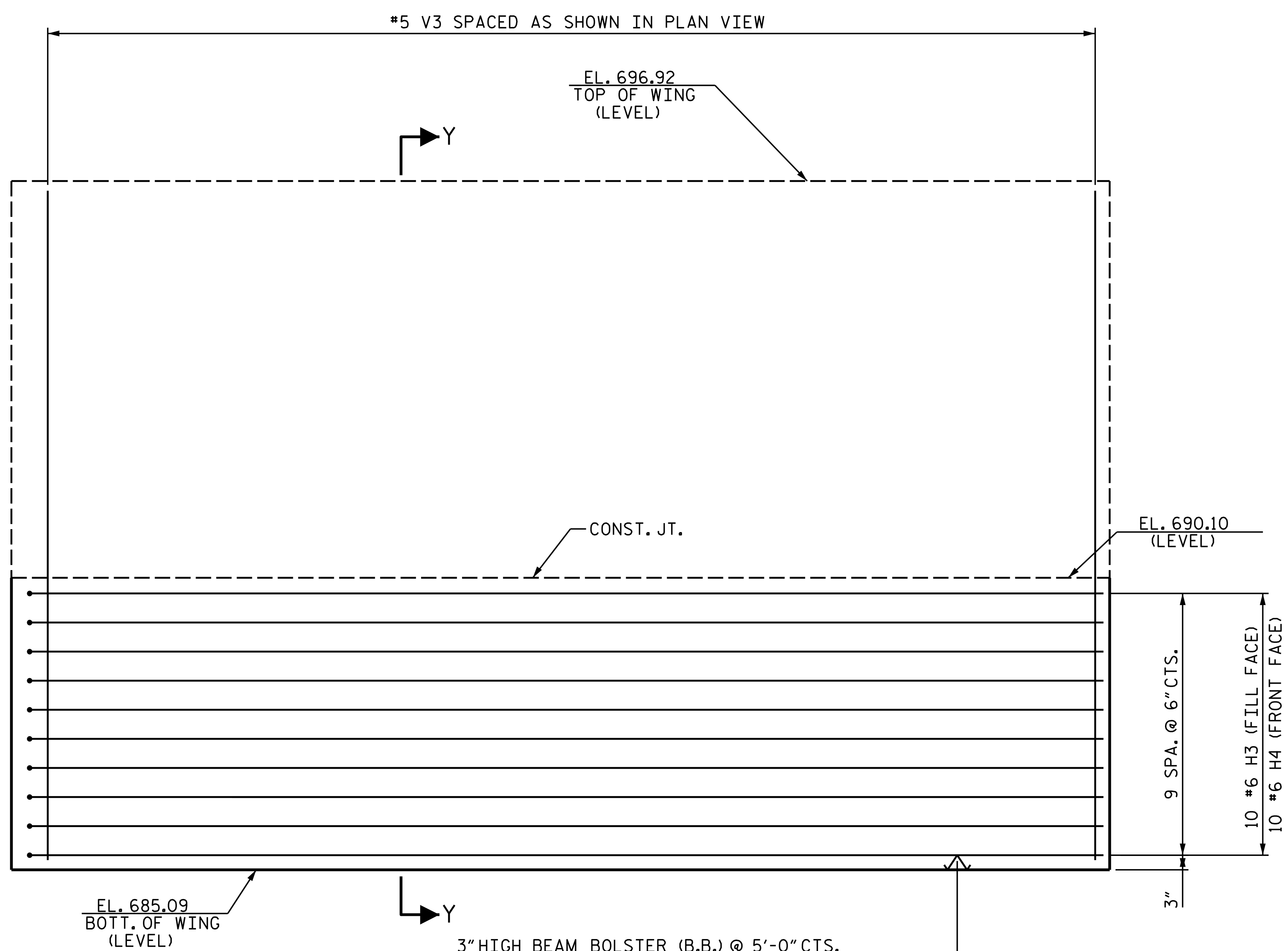
DRAWN BY :	NMW	DATE :	9/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23



PLAN OF WING (W4)



SECTION Y-Y



ELEVATION OF WING (W4)

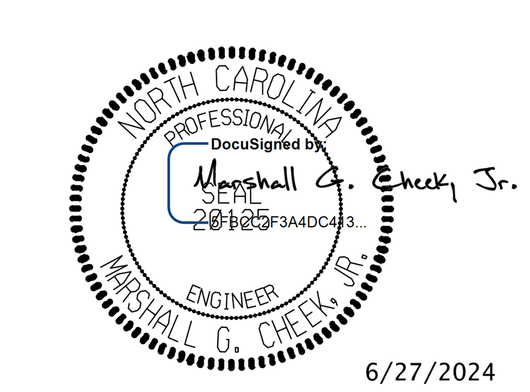
NOTE: FOR UPPER PART OF WING DETAILS AND REINFORCING STEEL, SEE "SUPERSTRUCTURE PLAN OF SPANS DETAILS".

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 3 OF 4



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

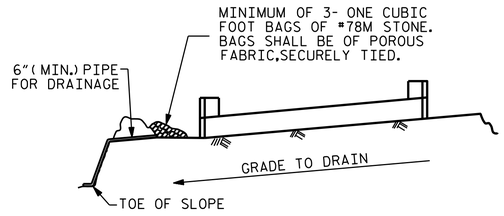
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL
END BENT 2
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-36
1			3			TOTAL SHEETS
2			4			40

DRAWN BY :	NMW	DATE :	9/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23

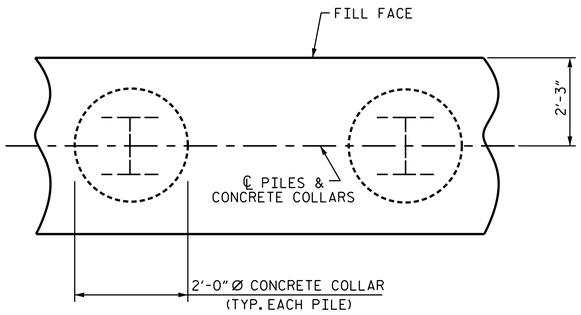


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

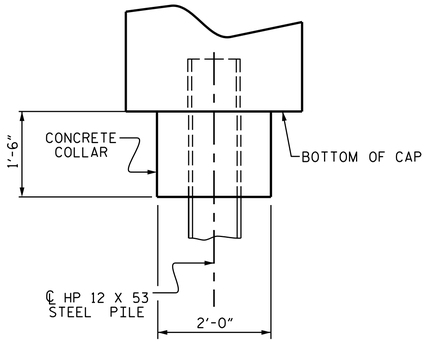
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

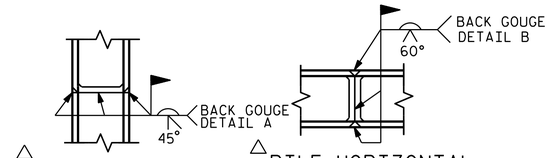
TEMPORARY DRAINAGE AT END BENT

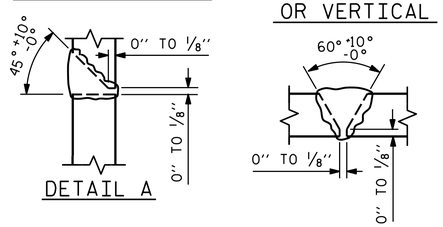


PLAN



ELEVATION

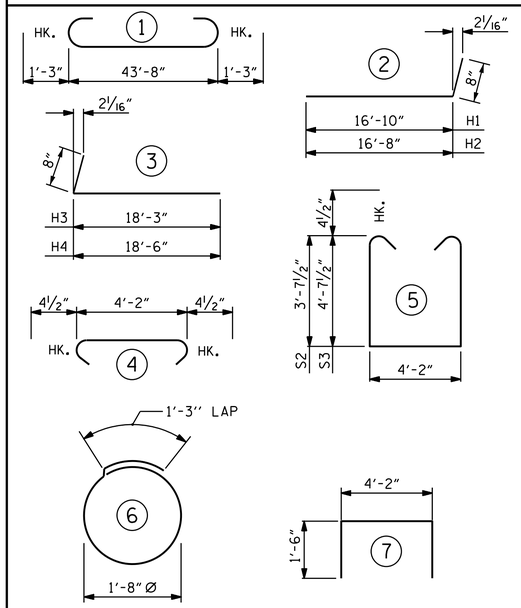




△POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
FOR END BENT 2

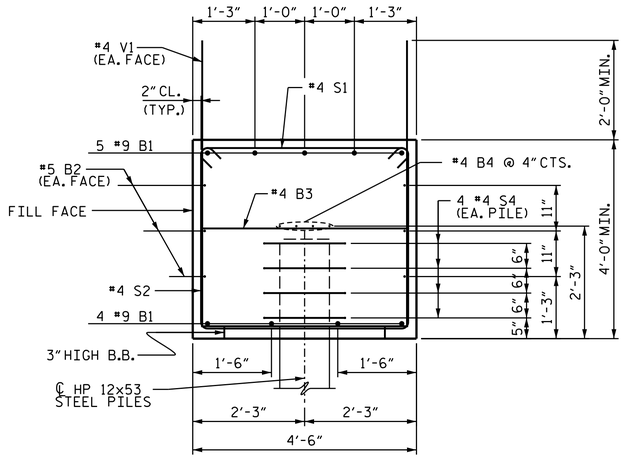
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#9	1	46'-2"	1,413
B2	6	#5	STR	43'-9"	274
B3	13	#4	STR	4'-2"	36
B4	8	#4	STR	23'-1"	123
B5	5	#4	STR	21'-0"	70
B6	1	#9	STR	8'-8"	29
B7	1	#9	STR	8'-5"	29
B8	1	#9	STR	8'-1"	27
B9	1	#9	STR	7'-10"	27
B10	1	#9	STR	7'-7"	26
H1	8	#6	2	17'-6"	210
H2	8	#6	2	17'-4"	208
H3	10	#6	3	18'-11"	284
H4	10	#6	3	19'-2"	288
S1	36	#4	4	4'-11"	118
S2	30	#4	5	12'-2"	244
S3	6	#4	5	14'-2"	57
S4	36	#4	6	6'-6"	156
U1	13	#4	7	7'-2"	62
V1	56	#4	STR	4'-6"	168
V2	34	#5	STR	10'-2"	361
V3	38	#5	STR	11'-5"	452

REINFORCING STEEL 4662 LBS.

CLASS A CONCRETE BREAKDOWN

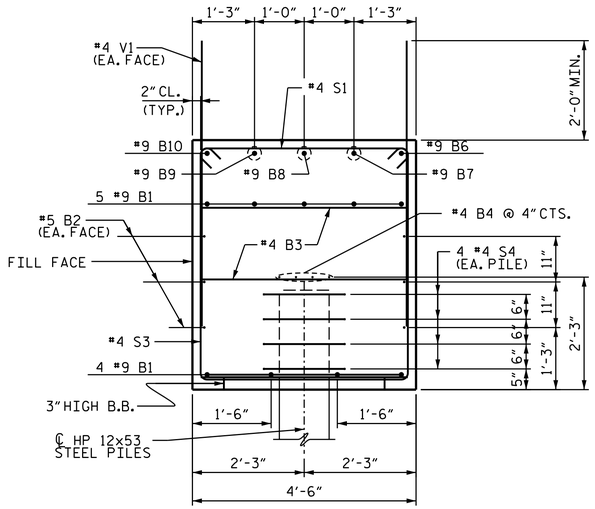
CAP, LOWER PART OF WINGS & COLLARS 38.5 C.Y.

CORROSION PROTECTION FOR STEEL PILES DETAIL



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")



SECTION B-B

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

DRAWN BY :	NMW	DATE :	9/21
CHECKED BY :	MGC	DATE :	5/22
DESIGN ENGINEER OF RECORD :	ZCS	DATE :	3/23

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 — MARSHALL G. CREEK, JR. — Marshall G. Creek Jr. — 6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

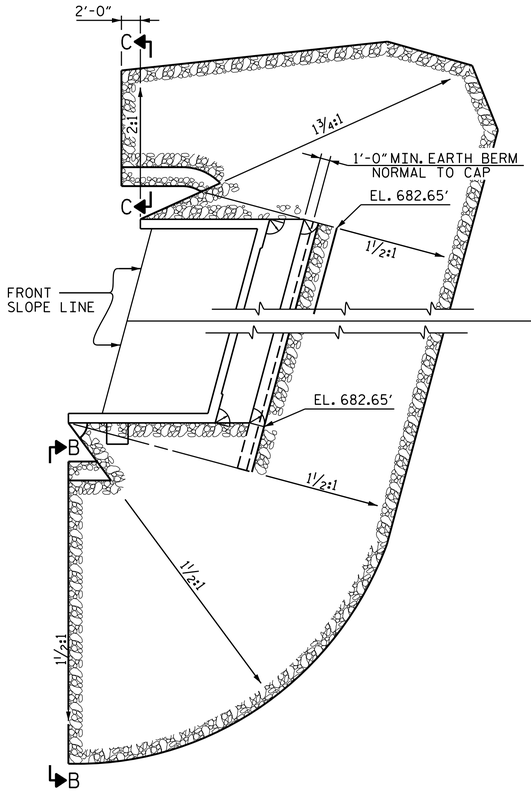
SUBSTRUCTURE

INTEGRAL END BENT 2 DETAILS

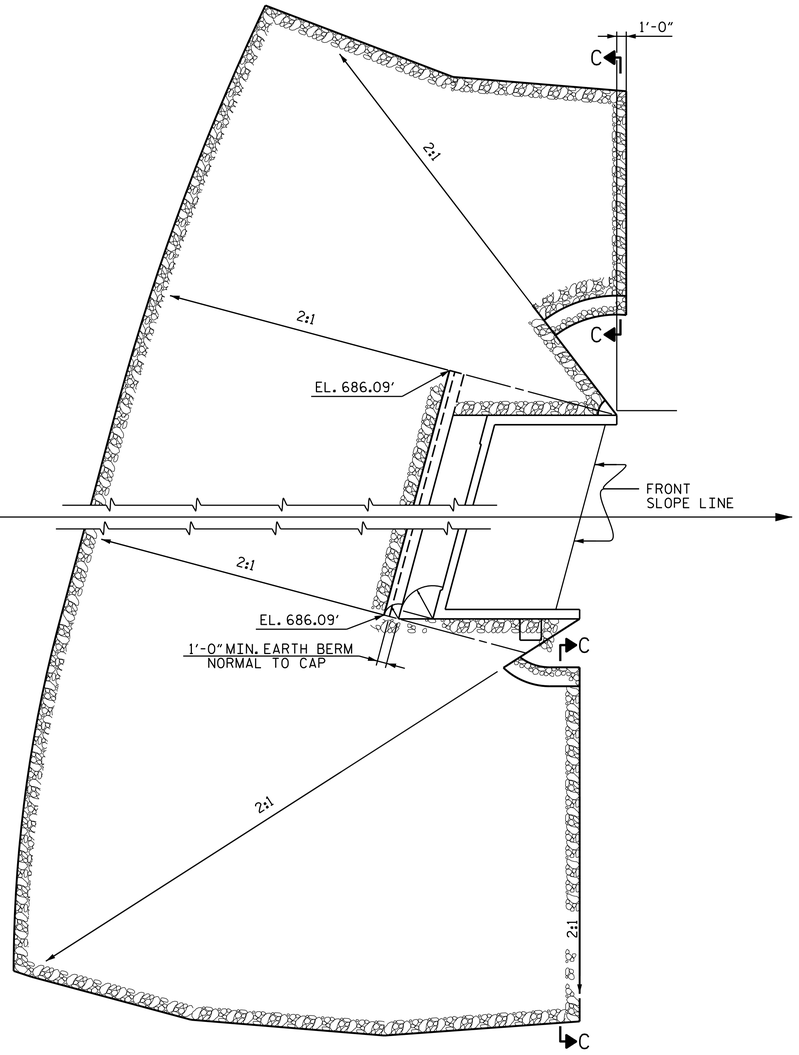
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-37
1			3			TOTAL SHEETS
2			4			40

NOTES :

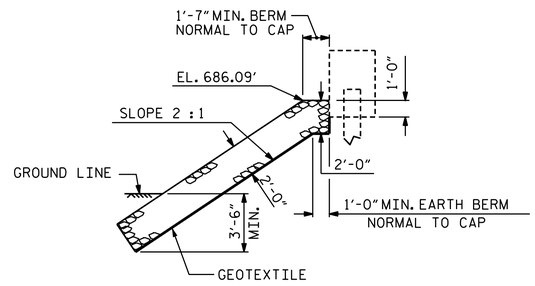
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



END BENT 1



END BENT 2

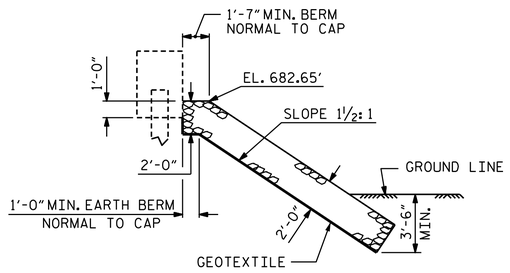


℄ SECTION @ EB 2

BERM RIP RAPPED

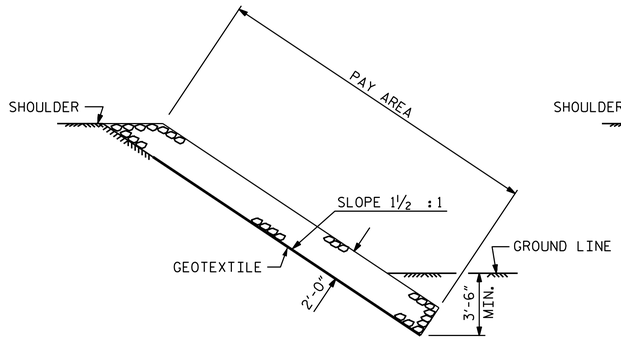
ESTIMATED QUANTITIES		
BRIDGE @ STA. 22+56.00-L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	410	455
END BENT 2	1,510	1,680

PLAN

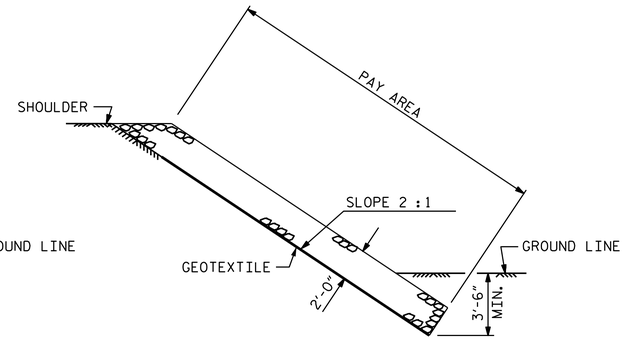


℄ SECTION @ EB 1

BERM RIP RAPPED



SECTION B-B



SECTION C-C

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20129 MARSHALL G. CHEEK, JR.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

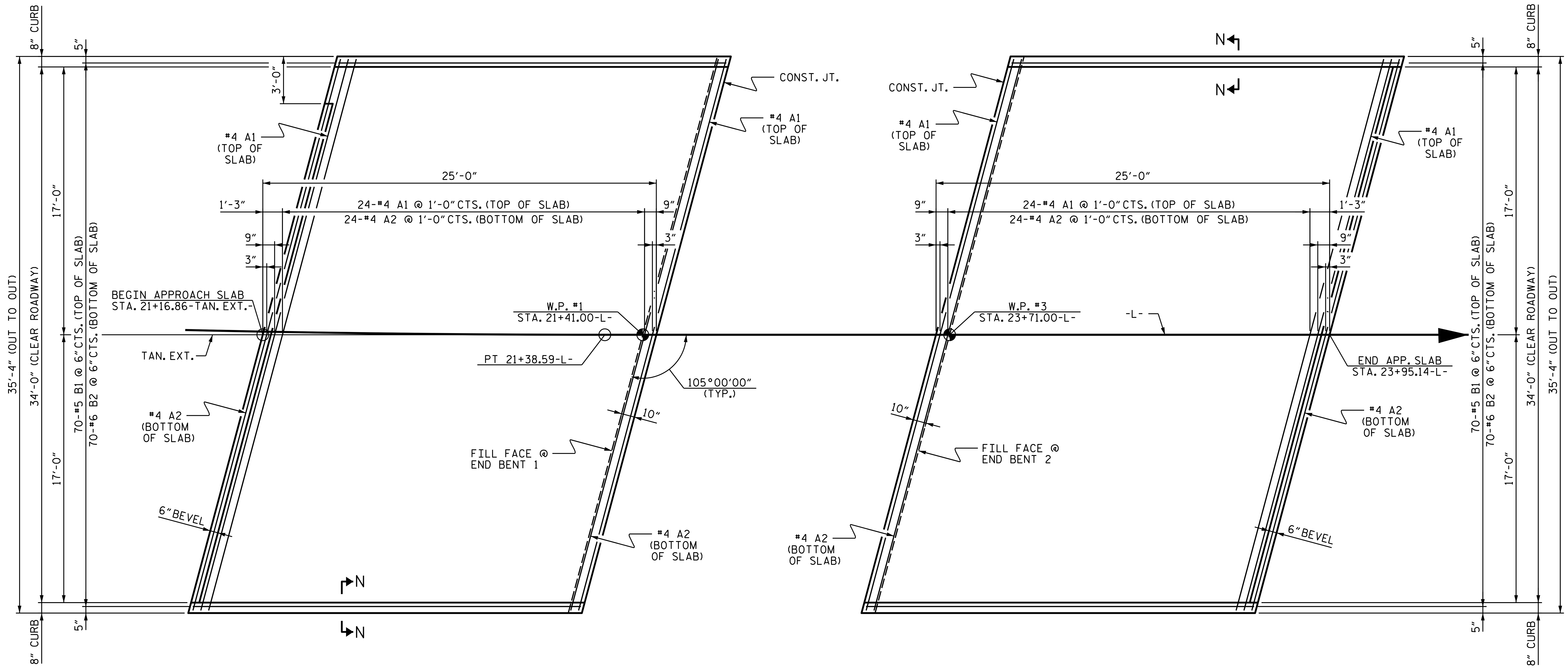
TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-38
1			3			TOTAL SHEETS
2			4			40

DRAWN BY : JLA DATE : 4/22
CHECKED BY : MGC DATE : 5/22



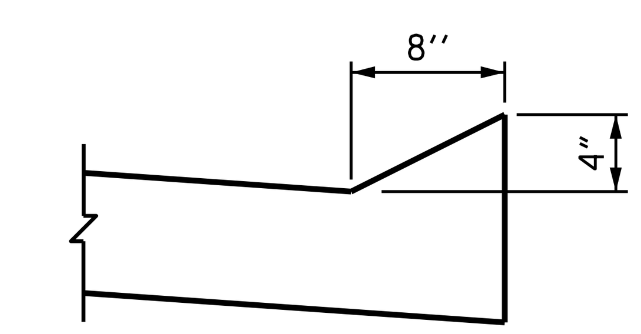
PLAN @ END BENT 1

PLAN @ END BENT 2

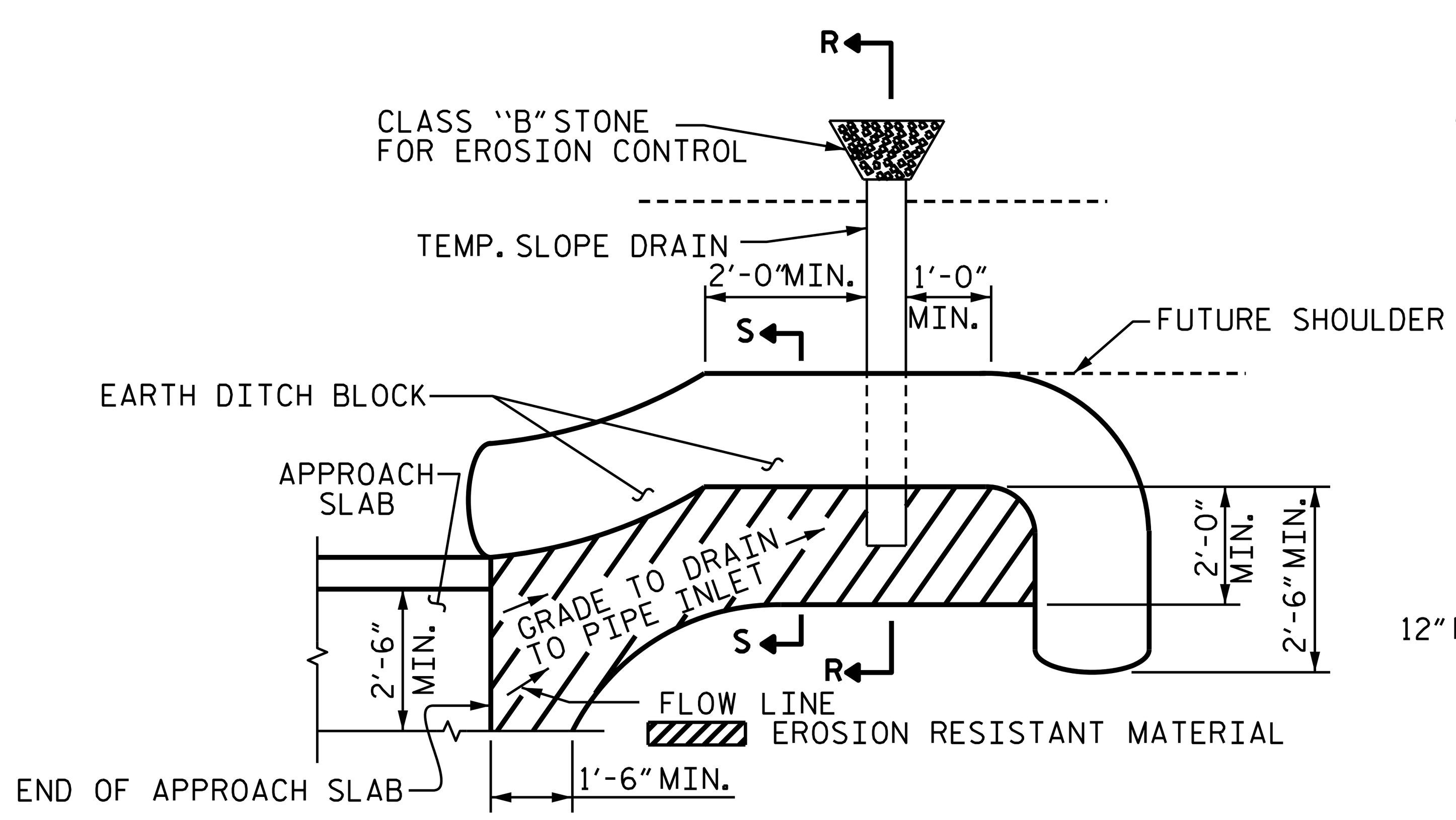
DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

BILL OF MATERIAL					
FOR ONE APPROACH SLAB (2 REQ'D)					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	26	#4	STR	36'-2"	628
A2	26	#4	STR	36'-2"	628
* B1	70	#5	STR	24'-3"	1,770
B2	70	#6	STR	24'-8"	2,593
REINFORCING STEEL					3,221 LBS.
* EPOXY COATED REINFORCING STEEL					2,398 LBS.
CLASS AA CONCRETE					38.2 C.Y.

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

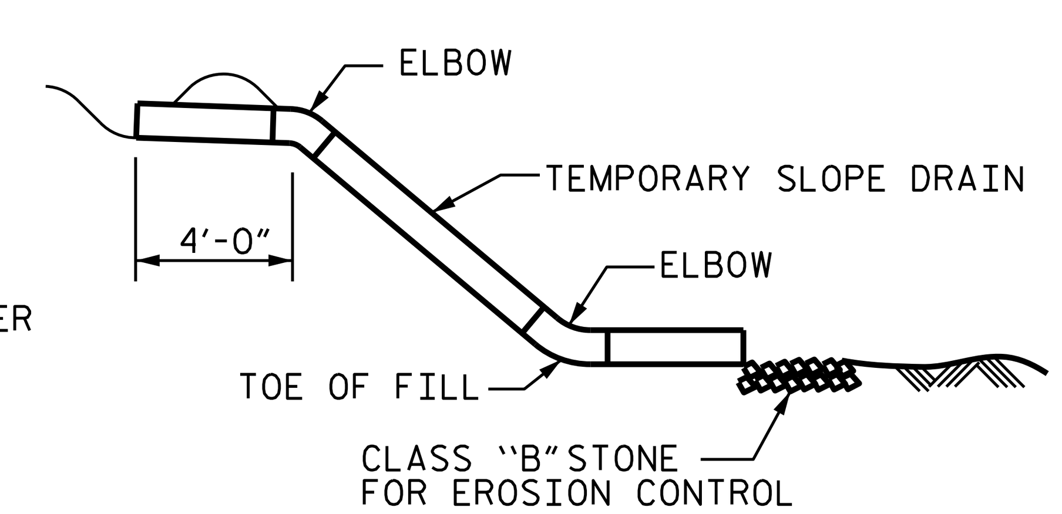


SECTION N-N

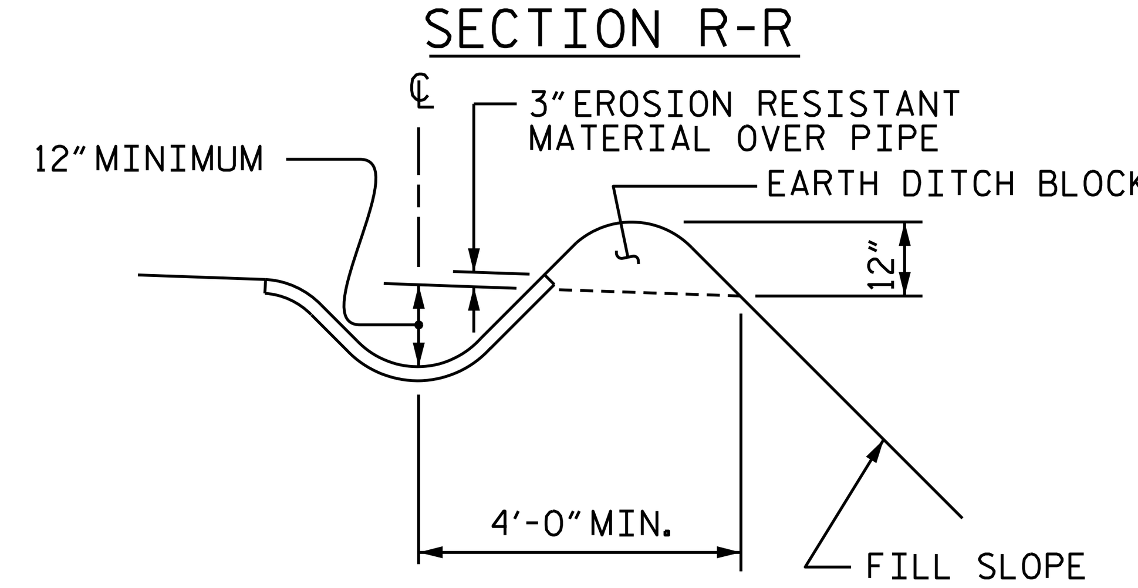


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 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.

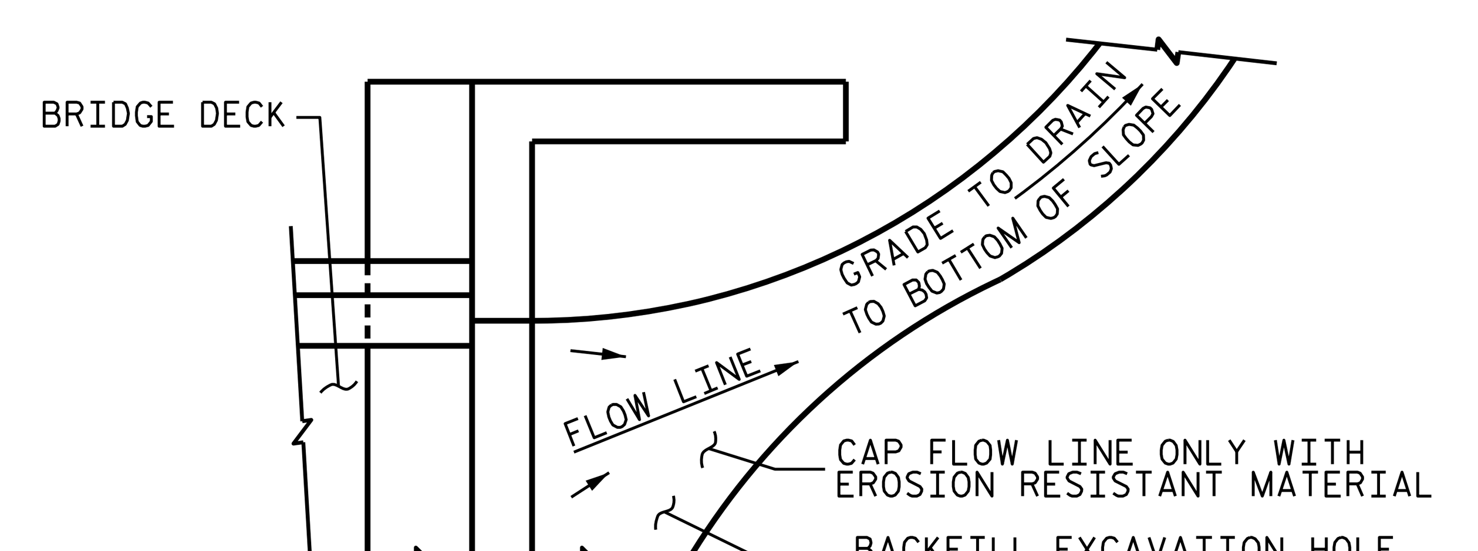
PLAN VIEW



SECTION R-R



SECTION S-S



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

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. B-5845

CLEVELAND COUNTY

STATION: 22+56.00-L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20129 MARSHALL G. CHEEK, JR.

6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT

ASSEMBLED BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	5/22
DRAWN BY : TLA	10/05	REV. 12/17	MAA/THC
CHECKED BY : GM	5/06	REV. 06/19	BNB/THC
		REV. 07/23	BNB/SNM

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

SHEET NO. S-39

TOTAL SHEETS 40

STD. NO. BAS5

NOTES

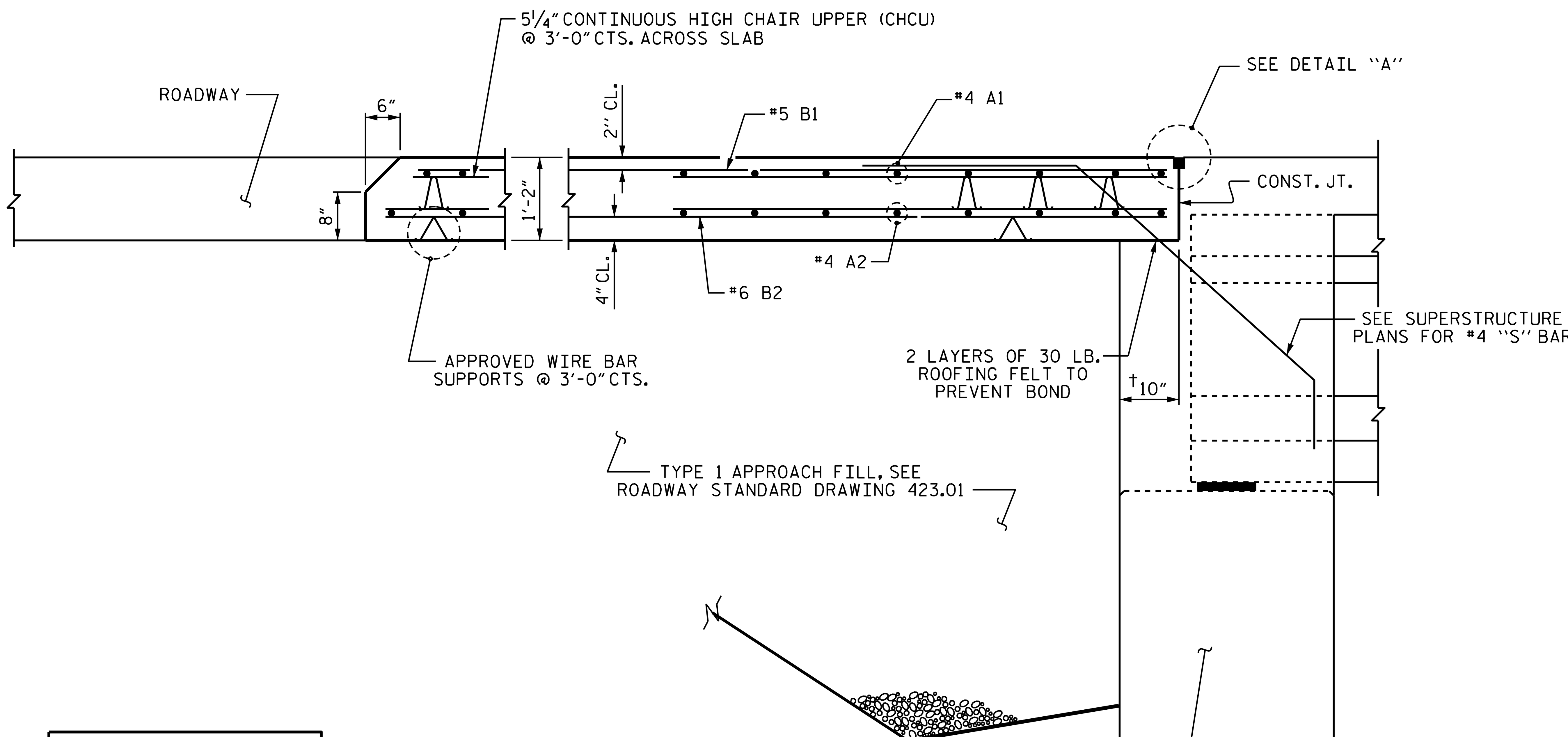
FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

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

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.

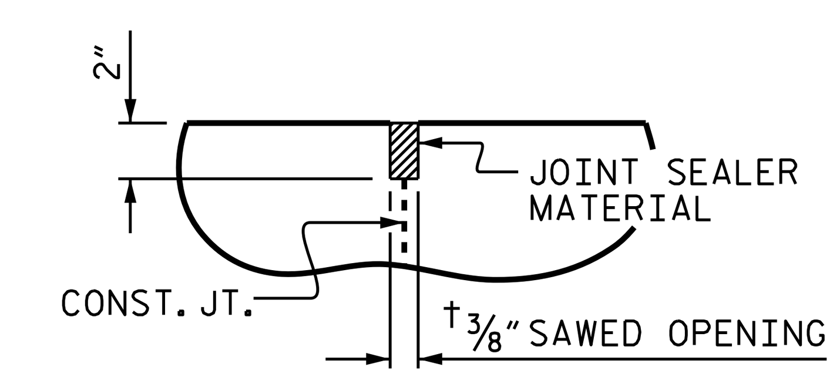
THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION "TYPE 1A - ALTERNATE APPROACH FILL" (ROADWAY STD. 423.02) MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT IN LIEU OF "TYPE 1 - APPROACH FILL".



† NORMAL TO END BENT

SECTION THRU SLAB



DETAIL "A"

PROJECT NO. B-5845
CLEVELAND COUNTY
STATION: 22+56.00-L-
SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20125 MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
6/27/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TGS ENGINEERS
201 W. MARION ST STE 200
SHELBY, NC 28150
PH (704) 476-0003
CORP. LICENSE NO.: C-0275

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-40
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY :	JLA	DATE :	4/22
CHECKED BY :	MGC	DATE :	5/22
DRAWN BY : TLA	10/05	REV. 12/17	MAA/GM
CHECKED BY : GM	5/06	REV. 6/19	BNB/THC
		REV. 7/23	BNB/SNM

STD. NO. BAS5

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	AASHTO (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE AASHTO
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 AASHTO
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 2024 "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 ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" 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 ¼" 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 ⅞" ∅ SHEAR STUDS FOR THE ¾" ∅ STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" ∅ STUDS FOR 4 - ¾" ∅ STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" ∅ STUDS ALONG THE BEAM AS SHOWN FOR ¾" ∅ STUDS BASED ON THE RATIO OF 3 - ⅞"∅ STUDS FOR 4 - ¾" ∅ 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 5/16" 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 1/16" 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. FINS 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.