09/08/99

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

TIP PROJECT: R–2707D

CONTRACT: C204851

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CLEVELAND COUNTY

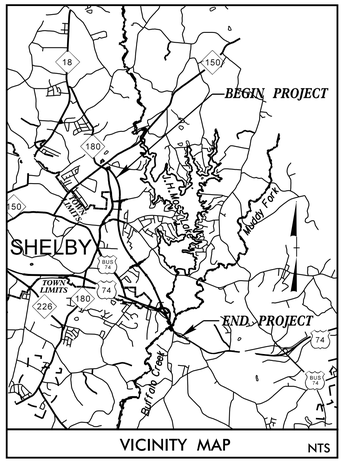
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2707D	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34497.1.FS6	NHS–0074(164)	P.E.
34497.2.13	N/A	R/W & UTIL.
34497.3.12	N/A	CONST.

PART 1

LOCATION: US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74, WEST OF SR 2238 (LONG BRANCH ROAD)

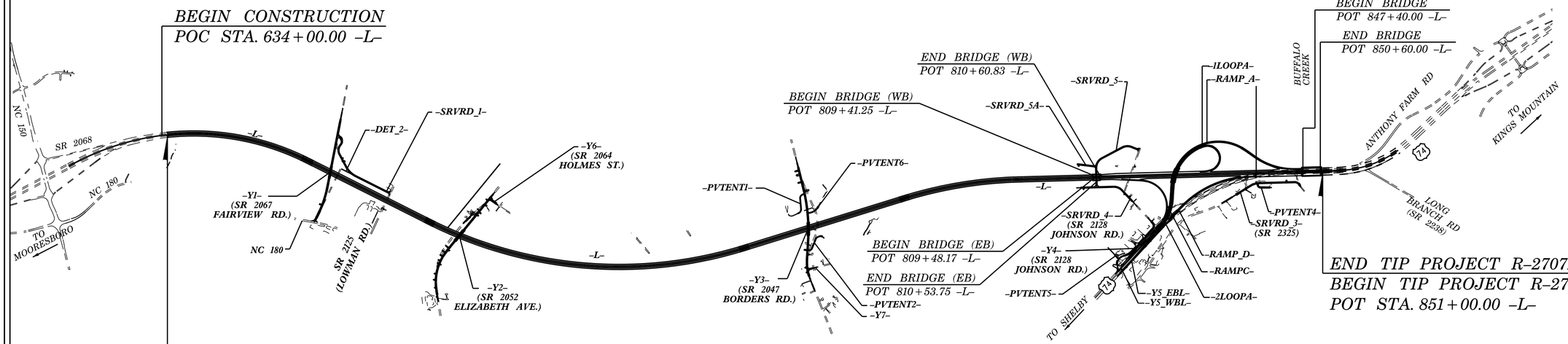
TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, SIGNING, RETAINING WALL, & NOISE WALL



VICINITY MAP NTS

NAD 83/ 95

BEGIN CONSTRUCTION
POC STA. 634 + 00.00 –L–



END TIP PROJECT R–2707C
BEGIN TIP PROJECT R–2707D
POC STA. 635 + 00.00 –L–

END TIP PROJECT R–2707D
BEGIN TIP PROJECT R–2707E
POT STA. 851 + 00.00 –L–

STRUCTURES

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES

DESIGN DATA

ADT 2019 = 41,600
ADT 2043 = 61,700
K = 11 %
D = 55 %
T = 15 % *
V = 70 MPH
* TTST = 10% DUAL 5%

FUNC CLASS = FREEWAY
STATEWIDE TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT R–2707D	= *4.008 MI.*
LENGTH OF STRUCTURE TIP PROJECT R–2707D	= *0.083 MI.*
TOTAL LENGTH OF TIP PROJECT R–2707D	= *4.091 MI.*

STRUCTURE LENGTHS BASED ON WB LANES

PREPARED IN THE OFFICE OF:
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Raleigh, NC 27606 License No. F-0672

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: 01 /10 /2019

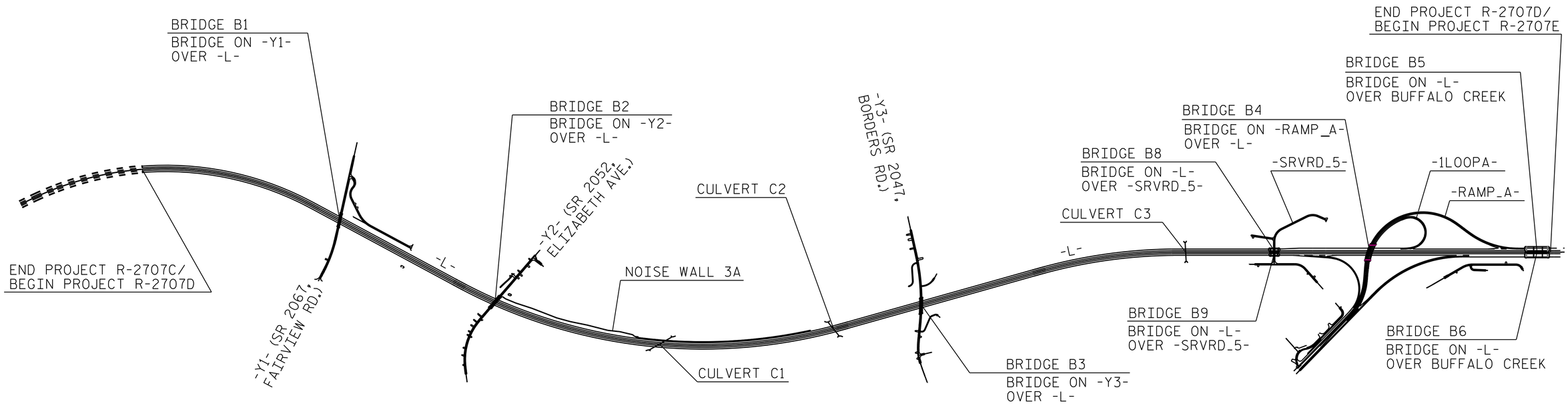
LETTING DATE: 07 /18 /2023

JOSEPH T. KELVINGTON, P.E.
PROJECT ENGINEER

BRYAN SOWELL, P.E.
NCDOT DIVISON 12

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

STRUCTURE INDEX



STRUCTURE I.D. NO.	MAIN LINE STATION	INTERSECTION FEATURE/STATION	SHEET NO.
BRIDGE B1 (220488)	665+78.41 -L-	19+82.46 -Y1-	S1-01 THRU S1-32
BRIDGE B2 (220489)	691+83.46 -L-	20+16.72 -Y2-	S2-01 THRU S2-35
NOISE WALL NW3A	692+50.00 -L-	NOISE WALL ALONG LEFT SIDE OF MAINLINE -L-	SW3A-1 THRU SW3A-4
CULVERT C1	717+50.00 -L-	TRIBUTARY TO BUFFALO CREEK - 1 @ 7' x 7' RCBC	C1-01 THRU C1-05
CULVERT C2	743+20.00 -L-	TRIBUTARY TO BUFFALO CREEK - 2 @ 8' x 8' RCBC	C2-01 THRU C2-05
BRIDGE B3 (220490)	756+67.45 -L-	23+21.80 -Y3-	S3-01 THRU S3-36
CULVERT C3	796+87.00 -L-	STREAM - 1 @ 12' x 7' RCBC	C3-01 THRU C3-05
BRIDGE B8 (220492)	810+00.00 -L-	12+03.00 -SRVRD_5-	S8-01 THRU S8-30
BRIDGE B9 (220493)	810+00.00 -L-	11+57.00 -SRVRD_5-	S9-01 THRU S9-30
BRIDGE B4 (220491)	823+96.61 -L-	36+78.38 -RAMP_A-	S4-01 THRU S4-43
BRIDGE B5 (REPLACES BRIDGE 220102)	849+00.00 -L-	BUFFALO CREEK	S5-01 THRU S5-56
BRIDGE B6 (REPLACES BRIDGE 220101)	849+00.00 -L-	BUFFALO CREEK	S6-01 THRU S6-56

PROJECT NO. R-2707D

CLEVELAND COUNTY

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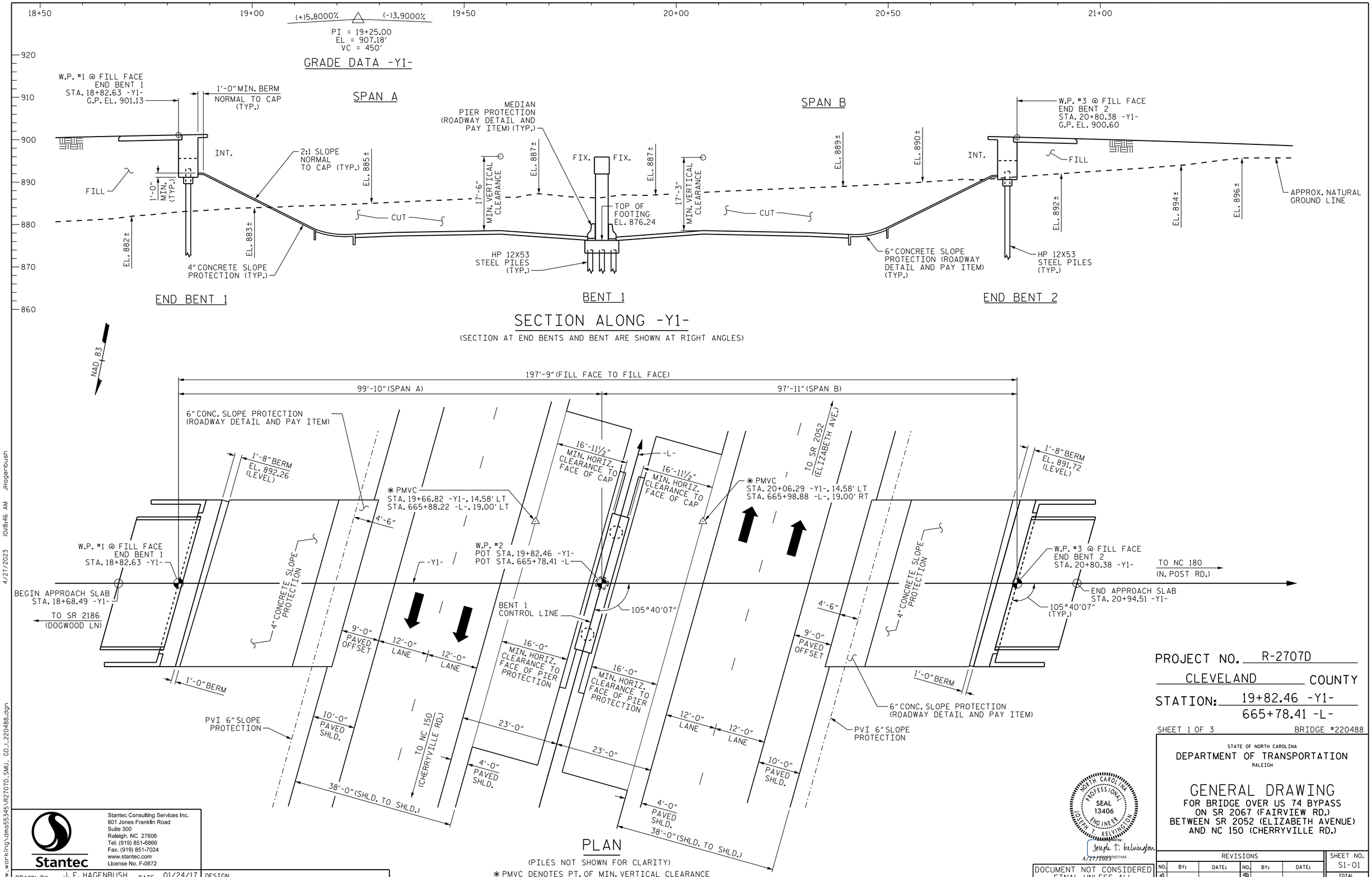
DRAWN BY : V. E. FRAGA DATE : 01/10/18
CHECKED BY : S. S. POOLE DATE : 12/22/22
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : XX/XX/XX

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STRUCTURE INDEX

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-00
1			3			TOTAL SHEETS
2			4			



SECTION ALONG -Y1-

(SECTION AT END BENTS AND BENT ARE SHOWN AT RIGHT ANGLES)

PLAN

(PILES NOT SHOWN FOR CLARITY)

✱ PMVC DENOTES PT. OF MIN. VERTICAL CLEARANCE

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DRAWN BY : J. E. HAGENBUSH DATE : 01/24/17
CHECKED BY : N. D'AIUTO DATE : 01/26/18

DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-
665+78.41 -L-

SHEET 1 OF 3 BRIDGE #220488

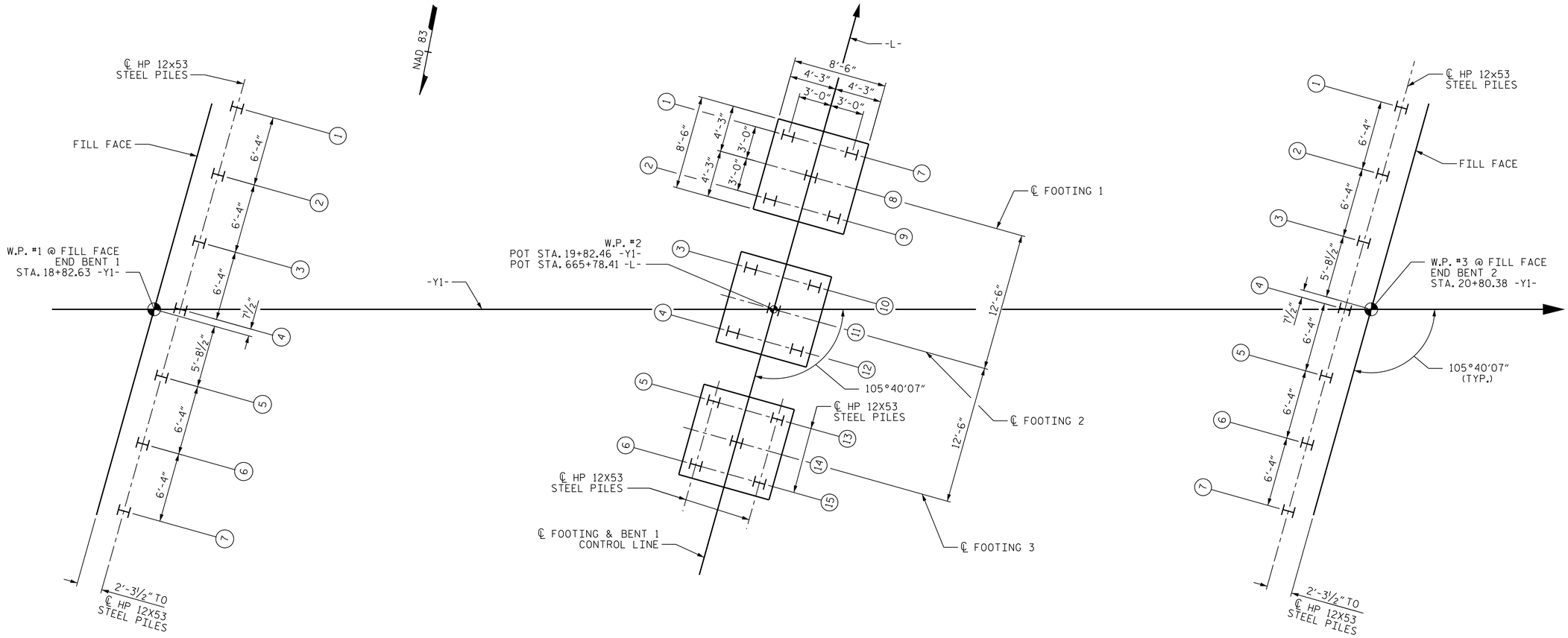
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2067 (FAIRVIEW RD.)
BETWEEN SR 2052 (ELIZABETH AVENUE)
AND NC 150 (CHERRYVILLE RD.)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-01
1			3			TOTAL SHEETS
2			4			32

c:\pw_working\dms55345\R2707D_SMU_ GD_I_220488.dgn 4/27/2023 10:18:46 AM JHagenbush



FOUNDATION LAYOUT

ALL SUBSTRUCTURE WORK LINES PASS THROUGH WORK POINTS.

DIMENSIONS & PILE LAYOUTS AT BENT 1 ARE TYPICAL FOR EACH FOOTING.

(#) - DENOTES PILE NUMBER.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2067 (FAIRVIEW RD.)
BETWEEN SR 2052 (ELIZABETH AVENUE)
AND NC 150 (CHERRYVILLE RD.)

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-02
1			3			TOTAL SHEETS
2			4			32

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DRAWN BY : J. E. HAGENBUSH DATE : 01/25/18
CHECKED BY : N. D'AIUTO DATE : 01/28/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

SUMMARY OF PILE INFORMATION/ INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., "BENT 1, PILES 1-5")	FACTORED RESISTANCE PER PILE TONS	PILE CUT-OFF (TOP OF PILE) ELEVATION FT	ESTIMATED PILE LENGTH PER PILE FT	SCOUR CRITICAL ELEVATION FT	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 1-7	110	893.25	50			185							
BENT 1, PILES 1-15	120	873.49	30			200							
END BENT 2, PILES 1-7	110	892.72	50			185							

* PREDRILLING FOR PILES IS REQUIRED FOR END BENTS/ BENT WITH A PREDRILLING LENGTH AND AT THE CONTRACTOR'S OPTION FOR END BENTS/ BENTS WITH PREDRILLING INFORMATION BUT NO PREDRILLING LENGTH.

** $RDR = \frac{\text{FACTORED RESISTANCE + FACTORED DOWNDRAY LOAD + FACTORED DEAD LOAD}}{\text{DYNAMIC RESISTANCE FACTOR}} + \text{NORMAL DOWNDRAG RESISTANCE} + \frac{\text{NORMAL SCOUR RESISTANCE}}{\text{SCOUR RESISTANCE FACTOR}}$

SUMMARY OF PDA/ PILE ORDER LENGTHS

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

PILE DRIVING ANALYZER (PDA)				PILE ORDER LENGTHS	
END BENT/ BENT NO.	PDA TESTING REQUIRED? YES OR MAYBE	PDA TEST PILE LENGTH FT	TOTAL PDA TESTING QUANTITY EACH	END BENT/ BENT NO(s)	PILE ORDER LENGTH BASIS* EST OR PDA
END BENT 1	MAYBE	55	1		
BENT 1	MAYBE	35			
END BENT 2	MAYBE	55			

* EST=PILE ORDER LENGTHS FROM ESTIMATED PILE LENGTHS; PDA=PILE ORDER LENGTHS BASED ON PDA TESTING. FOR GROUPS OF END BENTS/BENTS WITH PILE ORDER LENGHTS BASED ON PDA TESTING, THE FIRST END BENT/ BENT NO. LISTED FOR EACH GROUP IS THE REPRESENTATIVE END BENT/ BENT WITH THE PDA.

FOUNDATION NOTES:

FOR PILES, SEE PILES PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

OBSERVE A 1 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 1. FOR BRIDGE WAITING PERIODS, FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

TESTING PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING WHEN PDA MAY BE REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

SUMMARY OF PILE INFORMATION/ INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., "BENT 1, PILES 1-5")	FACTORED AXIAL LOAD PER PILE TONS	FACTORED DOWNDRAG LOAD PER PILE FT	FACTORED DEAD LOAD* PER PILE TONS	DRYAMIC RESISTANCE FACTOR	NOMINAL DOWNDRAG RESISTANCE PER PILE TONS	NOMINAL SCOUR RESISTANCE PER PILE TONS	SCOUR RESISTANCE FACTOR (DEFAULT=1.00)
END BENT 1, PILES 1-7	110			0.60			
BENT 1, PILES 1-15	120			0.60			
END BENT 2, PILES 1-7	110			0.60			

* FACTORED DEAD LOAD IS FACTORED WEIGHT OF PILE ABOVE THE GROUND LINE.

SUMMARY OF PILE ACCESSORIES

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., "BENT 1, PILES 1-5")	PIPE PILE PLATES REQUIRED YES OR MAYBE	STEEL PILE POINTS			STEEL PILE TIPS REQUIRED? YES
		PIPE PILE CUTTING SHOES REQUIRED? YES	PIPE PILE CONICAL POINTS REQUIRED? YES	H-PILE POINTS REQUIRED? YES	
END BENT 1, PILES 1-7					
BENT 1, PILES 1-15					
END BENT 2, PILES 1-7				YES	
TOTAL QTY.				7	

NOTES:

1. THE PILE FOUNDATION TABLES ARE BASED ON THE BRIDGE SUBSTRUCTURE DESIGN AND FOUNDATION RECOMMENDATIONS SEALED BY A NORTH CAROLINA PROFESSIONAL ENGINEER (STEPHEN C. CROCKETT, 048207) ON 06-14-2022.
2. TOTAL PILE DRIVING EQUIPMENT SETUP QUANTITY (NOT SHOWN IN PILE FOUNDATION TABLES) EQUALS THE NUMBER OF DRIVEN PILES, I.E., THE NUMBER OF PILES WITH A REQUIRED DRIVING RESISTANCE.

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DRAWN BY : J.E.HAGENBUSH DATE : 05/17/22
CHECKED BY : J. KELVINGTON DATE : 11/09/22
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

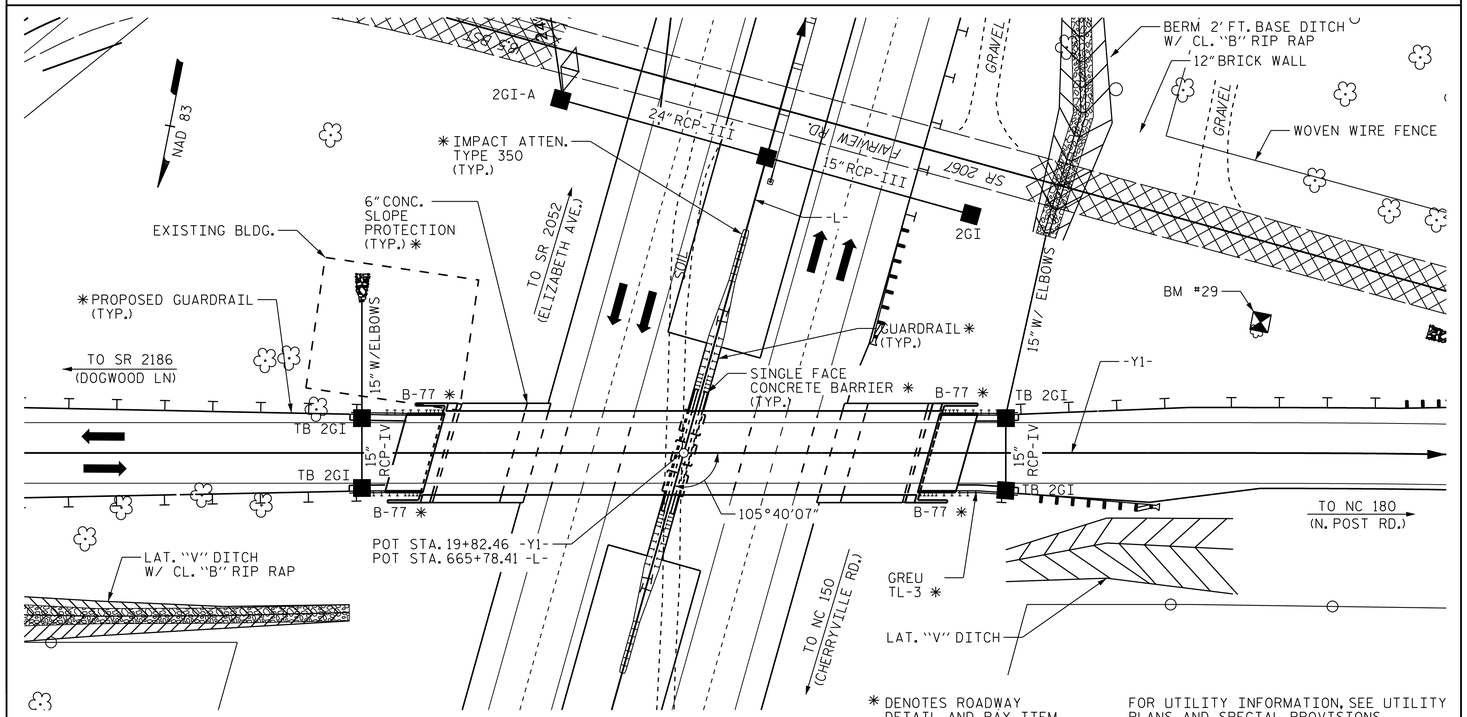
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 19+82.46 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE
PILE FOUNDATION TABLES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-03
1			3			TOTAL SHEETS
2			4			32

BM #29: NAIL IN BASE OF 8" CEDAR. N573591 E1259149, STA. 666+89.97 -L-, 205.93' RT. EL. 892.51



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ASSHTO LRFD BRIDGE DESIGN SPECIFICATION.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

WORK SHALL NOT BE STARTED ON THE BRIDGE (OR SPECIFIC PARTS OF THE BRIDGE) UNTIL ROADWAY SECTION HAS BEEN EXCAVATED.

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.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT 1	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12X53 STEEL PILES		STEEL PILE POINTS	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	MODIFIED 54" PRESTRESSED CONCRETE GIRDERS	
	LUMP SUM	EA.	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	EA.	NO.	LIN.FT.	EA.	LIN.FT.	SQ.YDS.	LUMP SUM	NO.	LIN.FT.
SUPERSTRUCTURE			6,575	6,095		LUMP SUM							392.0		LUMP SUM	8	774.33
END BENT 1					39.8		6,265		7	7	350			139			
BENT 1	LUMP SUM				60.9		11,273	1,102	15	15	450						
END BENT 2					39.5		6,162		7	7	350	7		132			
TOTAL	LUMP SUM	1	6,575	6,095	140.2	LUMP SUM	23,700	1,102	29	29	1,150	7	392.0	271	LUMP SUM	8	774.33

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2067 (FAIRVIEW RD.)
BETWEEN SR 2052 (ELIZABETH AVENUE)
AND NC 150 (CHERRYVILLE RD.)

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Signed by: Joseph T. Kelvington
4/27/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-04
1			3			TOTAL SHEETS
2			4			32

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DRAWN BY : J. E. HAGENBUSH DATE : 01/25/18
CHECKED BY : N. D'AIUTO DATE : 01/29/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

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	1.16	--	1.75	0.767	1.38	A	EL	48.20	0.802	1.69	B	I	85.50	0.80	0.767	1.16	A	I	48.20	
		HL-93 (OPERATING)	N/A		1.78	--	1.35	0.767	1.78	A	EL	48.20	0.802	2.23	B	I	85.50	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.61	58.0	1.75	0.767	1.91	A	EL	48.20	0.802	2.28	B	I	85.50	0.80	0.767	1.61	A	I	48.20	
		HS-20 (OPERATING)	36.000		2.48	89.3	1.35	0.767	2.48	A	EL	48.20	0.802	2.99	B	I	85.50	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.55	20.9	1.40	0.767	2.30	A	EL	48.20	0.802	2.87	B	I	85.50	0.80	0.767	1.55	A	I	48.20	
		SNGARBS2	20.000		1.38	27.6	1.40	0.767	2.05	A	EL	48.20	0.802	2.60	B	I	85.50	0.80	0.767	1.38	A	I	48.20	
		SNAGRIS2	22.000		2.76	60.7	1.40	0.767	4.10	A	EL	48.20	0.802	5.03	B	I	85.50	0.80	0.767	2.76	A	I	48.20	
		SNCOTTS3	27.250		1.52	41.4	1.40	0.767	2.25	A	EL	48.20	0.802	2.88	B	I	85.50	0.80	0.767	1.52	A	I	48.20	
		SNAGGRS4	34.925		1.89	66.0	1.40	0.767	2.80	A	EL	48.20	0.802	3.54	B	I	85.50	0.80	0.767	1.89	A	I	48.20	
		SNS5A	35.550		1.31	46.6	1.40	0.767	1.95	A	EL	48.20	0.802	2.52	B	I	85.50	0.80	0.767	1.31	A	I	48.20	
		SNS6A	39.950		3.82	152.6	1.40	0.767	5.68	A	EL	48.20	0.802	7.21	B	I	85.50	0.80	0.767	3.82	A	I	48.20	
		SNS7B	42.000		2.57	107.9	1.40	0.767	3.82	A	EL	48.20	0.802	4.63	B	I	85.50	0.80	0.767	2.57	A	I	48.20	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.68	55.4	1.40	0.767	2.49	A	EL	48.20	0.802	3.13	B	I	85.50	0.80	0.767	1.68	A	I	48.20	
		TNT4A	33.075		1.68	55.6	1.40	0.767	2.50	A	EL	48.20	0.802	3.07	B	I	85.50	0.80	0.767	1.68	A	I	48.20	
		TNT6A	41.600		1.36	56.6	1.40	0.767	2.02	A	EL	48.20	0.802	2.66	B	I	85.50	0.80	0.767	1.36	A	I	48.20	
		TNT7A	42.000		1.37	57.5	1.40	0.767	2.03	A	EL	48.20	0.802	2.61	B	I	85.50	0.80	0.767	1.37	A	I	48.20	
		TNT7B	42.000		1.39	58.4	1.40	0.767	2.07	A	EL	48.20	0.802	2.49	B	I	85.50	0.80	0.767	1.39	A	I	48.20	
		TNAGRIT4	43.000		1.34	57.6	1.40	0.767	1.99	A	EL	48.20	0.802	2.41	B	I	85.50	0.80	0.767	1.34	A	I	48.20	
		TNAGT5A	45.000		1.27	57.2	1.40	0.767	1.88	A	EL	48.20	0.802	2.37	B	I	85.50	0.80	0.767	1.27	A	I	48.20	
		TNAGT5B	45.000	3	1.26	56.7	1.40	0.767	1.87	A	EL	48.20	0.802	2.29	B	I	85.50	0.80	0.767	1.26	A	I	48.20	

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.

SPANS SHOWN CORRESPOND TO COMPOSITE DEAD LOAD & LIVE LOAD MODEL USED FOR ANALYSIS.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

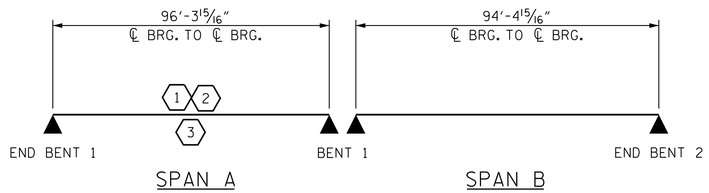
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

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CHECKED BY : N. D'AIUTO DATE : 01/25/18

DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/19/23

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-05
1			3			TOTAL SHEETS
2			4			32

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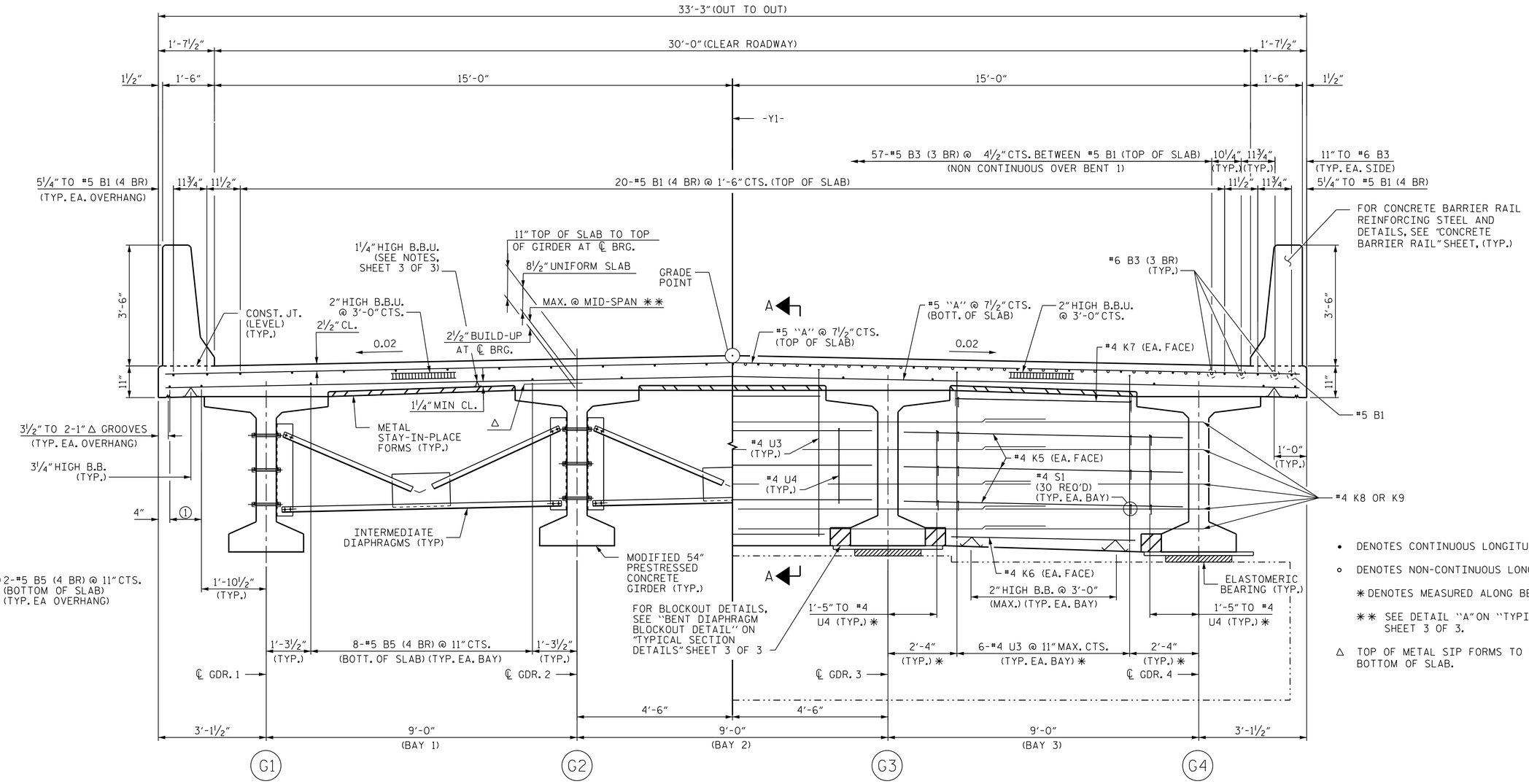

- • DENOTES CONTINUOUS LONGITUDINAL REINF.
- ○ DENOTES NON-CONTINUOUS LONGITUDINAL REINF.
- * DENOTES MEASURED ALONG BENT 1 CONTROL LINE
- ** SEE DETAIL "A" ON "TYPICAL SECTION DETAILS", SHEET 3 OF 3.
- Δ TOP OF METAL SIP FORMS TO MATCH REQUIRED BOTTOM OF SLAB.

HALF SECTION AT INTERMEDIATE DIAPHRAGMS

HALF SECTION AT INTERIOR BENT

TYPICAL SECTION

SEE "TYPICAL SECTION DETAILS", SHEET 3 OF 3 FOR NOTES.

SEE SECTION A-A ON SHEET 3 OF 3 FOR SECTION THROUGH BENT DIAPHRAGM

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

TYPICAL SECTION

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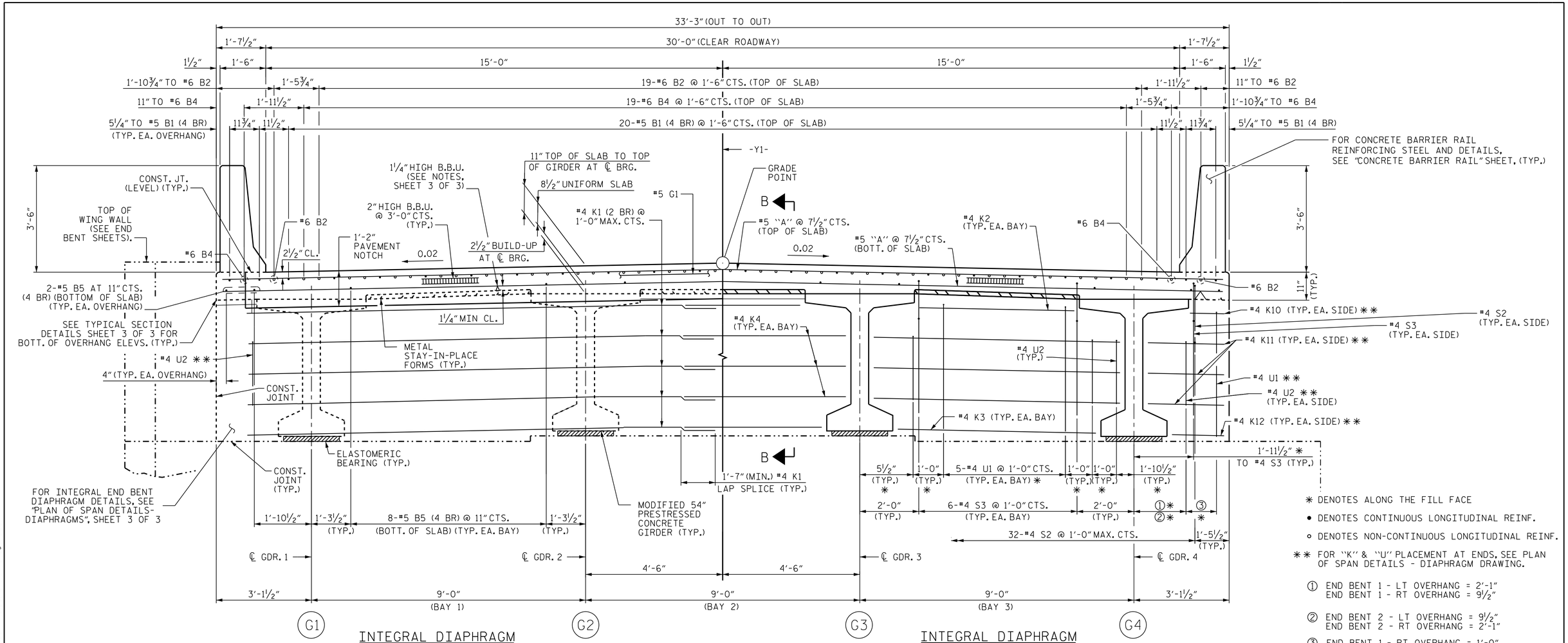


* DENOTES ALONG THE FILL FACE

• DENOTES CONTINUOUS LONGITUDINAL REINF.

○ DENOTES NON-CONTINUOUS LONGITUDINAL REINF.

** FOR "K" & "U" PLACEMENT AT ENDS, SEE PLAN OF SPAN DETAILS - DIAPHRAGM DRAWING.

① END BENT 1 - LT OVERHANG = 2'-1"
END BENT 1 - RT OVERHANG = 9½"

② END BENT 2 - LT OVERHANG = 9½"
END BENT 2 - RT OVERHANG = 2'-1"

③ END BENT 1 - RT OVERHANG = 1'-0"
END BENT 2 - LT OVERHANG = 1'-0"

INTEGRAL DIAPHRAGM HALF-SECTION REINFORCEMENT AT FILL FACE

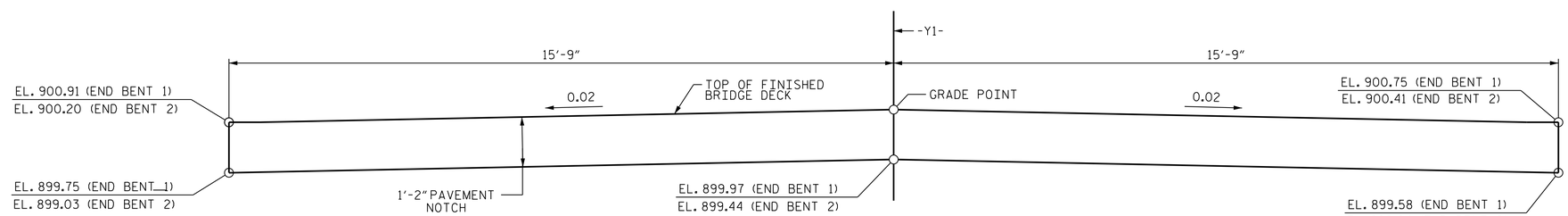
INTEGRAL DIAPHRAGM HALF-SECTION REINFORCEMENT AT FRONT FACE

TYPICAL SECTION

END BENT 1 SHOWN, END BENT 2 REINFORCEMENT IN DECK SIMILAR BY ROTATION

SEE "TYPICAL SECTION DETAILS", SHEET 3 OF 3 FOR NOTES

SEE SECTION B-B ON SHEET 3 OF 3 FOR SECTION THROUGH END BENT DIAPHRAGM



APPROACH SLAB PAVEMENT NOTCH DETAIL

ELEVATIONS ARE ALONG FILL FACE OF END BENT
DIMENSIONS ARE NORMAL TO -Y1-

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2			4			32

PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 19+82.46 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

NOTES

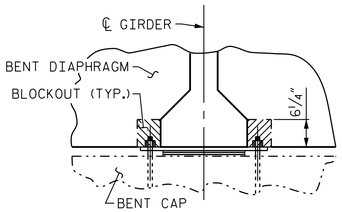
PROVIDE 1¼"HIGH BEAM BOLSTERS UPPER AT 4'-0"CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0"CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

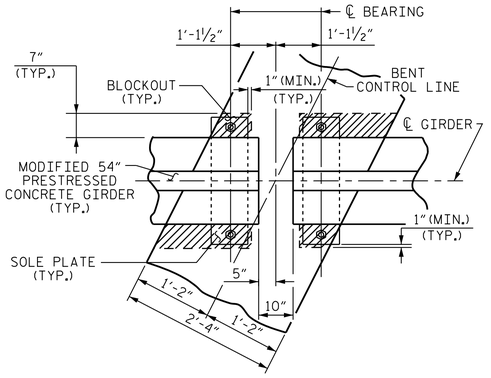
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

NO CHAMFER IS REQUIRED ON CORNERS OF GIRDER BUILDUPS.

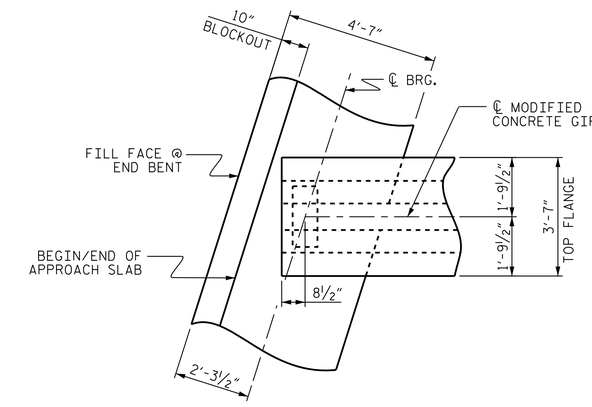
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

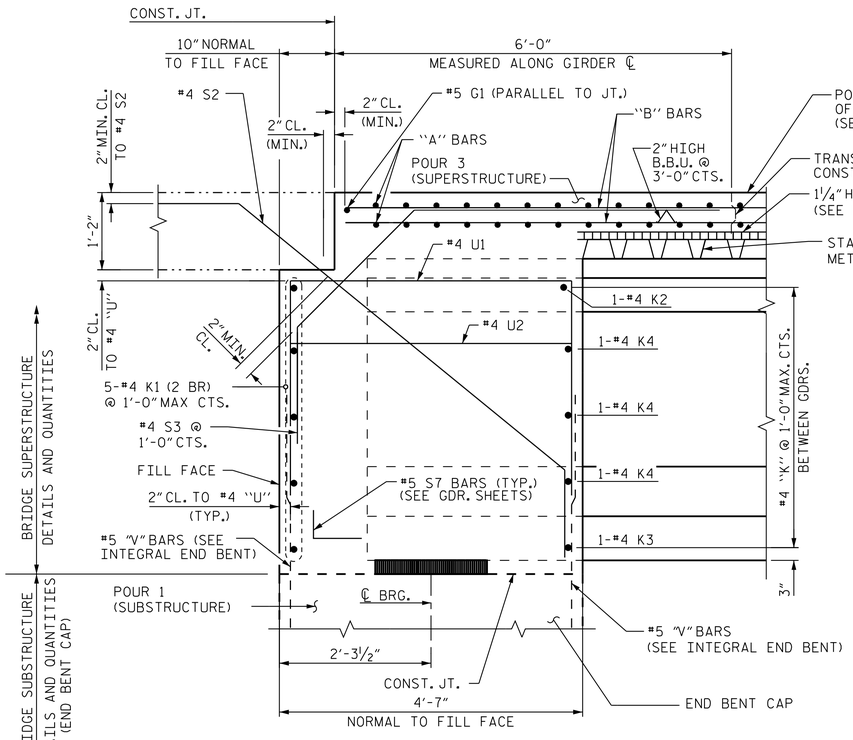
#5 G1 BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.





BENT DIAPHRAGM BLOCKOUT DETAIL

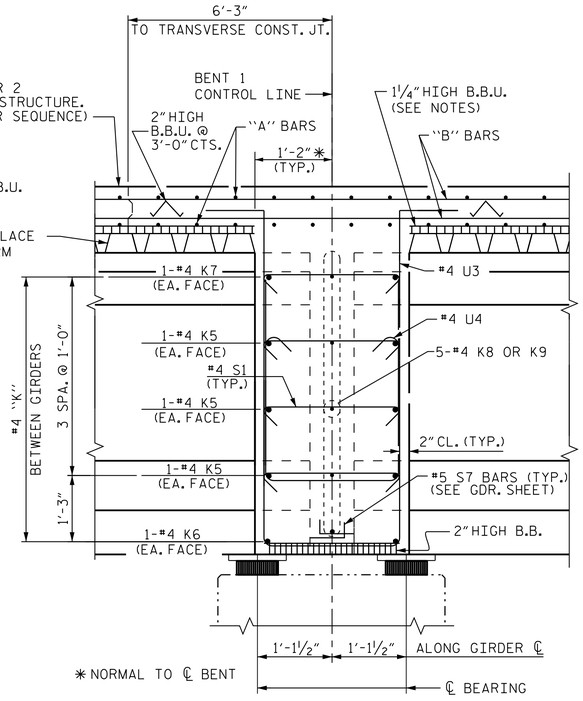




SECTION B-B

SECTION THRU INTEGRAL END BENT DIAPHRAGM.
SEE "PLAN OF SPANS DETAILS - DIAPHRAGMS", SHEET 3 OF 3

#4 S2 MAY BE REPOSITIONED AS NECESSARY TO CLEAR DECK REINFORCING STEEL AND GIRDER.



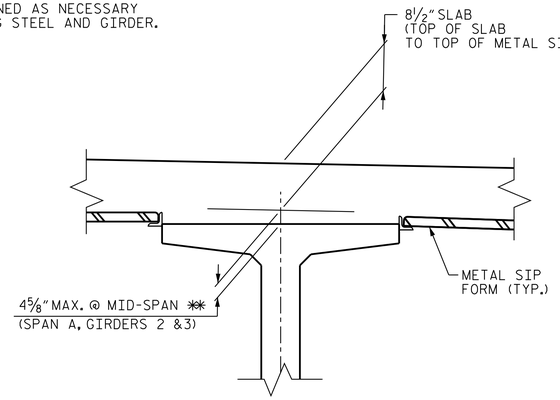
SECTION A-A

SECTION THRU DIAPHRAGM @ INTERIOR BENT.
SEE "PLAN OF SPANS DETAILS - DIAPHRAGMS", SHEET 3 OF 3

PLAN OF INTEGRAL END BENT

S7 BARS IN GIRDER MAY BE FIELD BENT TO CLEAR APPROACH SLAB NOTCH

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



DETAIL "A"

BOTTOM OF OVERHANG ELEVS. @ OUTSIDE EDGE OF SUPERSTR.

OVERHANG △	END BENT	ELEV.
LEFT SIDE	1	900.01
RIGHT SIDE	1	899.83
LEFT SIDE	2	899.29
RIGHT SIDE	2	899.51

△ ELEVATIONS ARE TAKEN AT OUTSIDE EDGE OF SUPERSTRUCTURE AND EXPOSED FACE OF INTEGRAL DIAPHRAGM.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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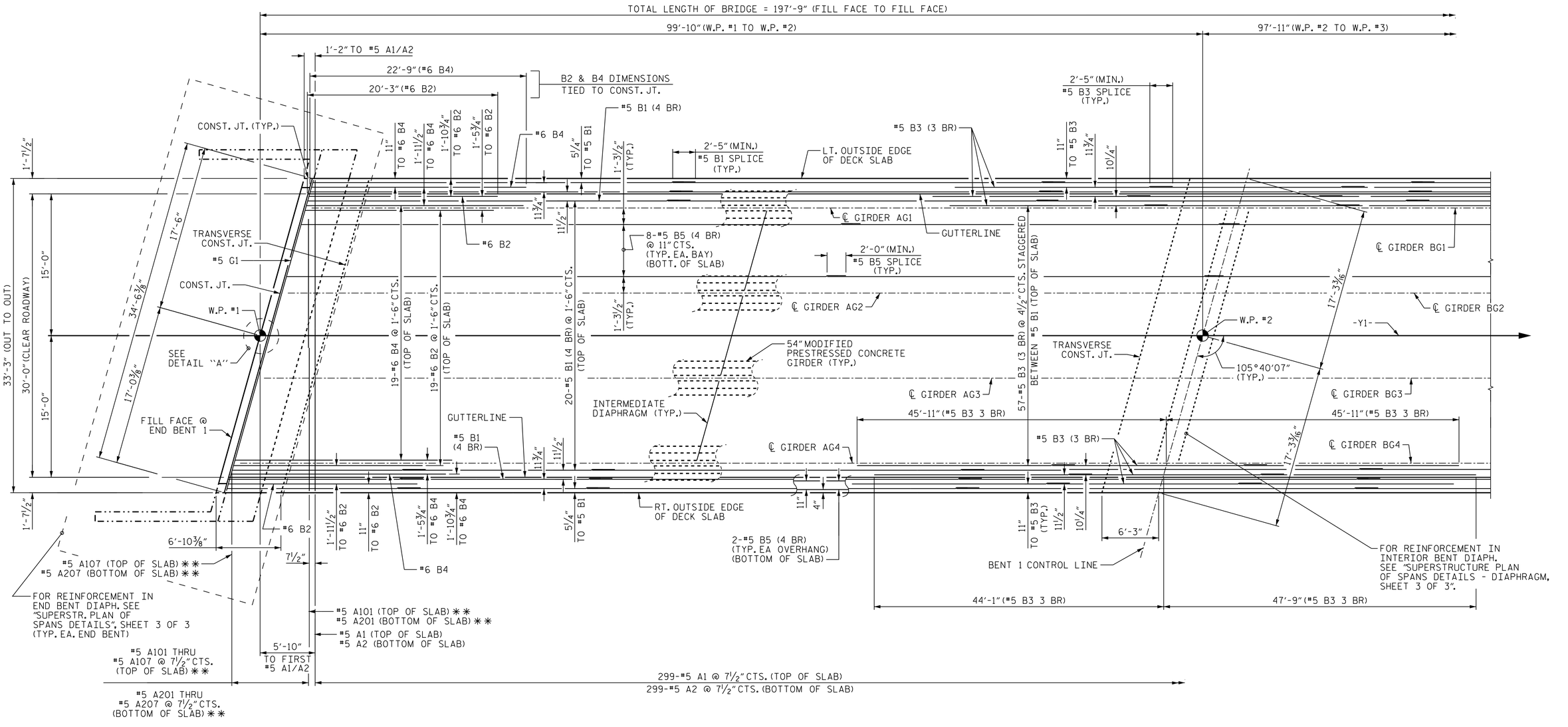

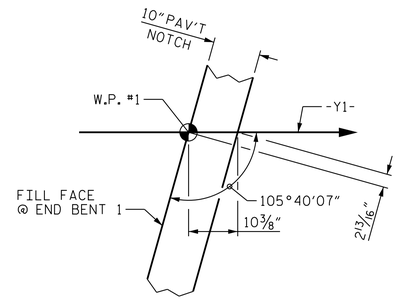

DETAIL "A"

PLAN OF SPANS (SPAN A & PARTIAL SPAN B)

NOTE: (2BR) DENOTES 2 BAR RUN
(3BR) DENOTES 3 BAR RUN
(4BR) DENOTES 4 BAR RUN

** - DENOTES 2 BARS PER MARK

FOR BARRIER RAIL DETAILS AND REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

FOR TRANSVERSE CONSTRUCTION JOINT DETAIL, SEE "PLAN OF SPANS, SHEET 2 OF 3".

FOR POUR SEQUENCE, SEE SHEET "BILL OF MATERIALS"

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDER" SHEET.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS (SPAN A & PARTIAL SPAN B)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-09
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NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T KELVINGTON
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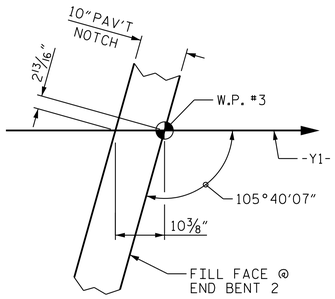
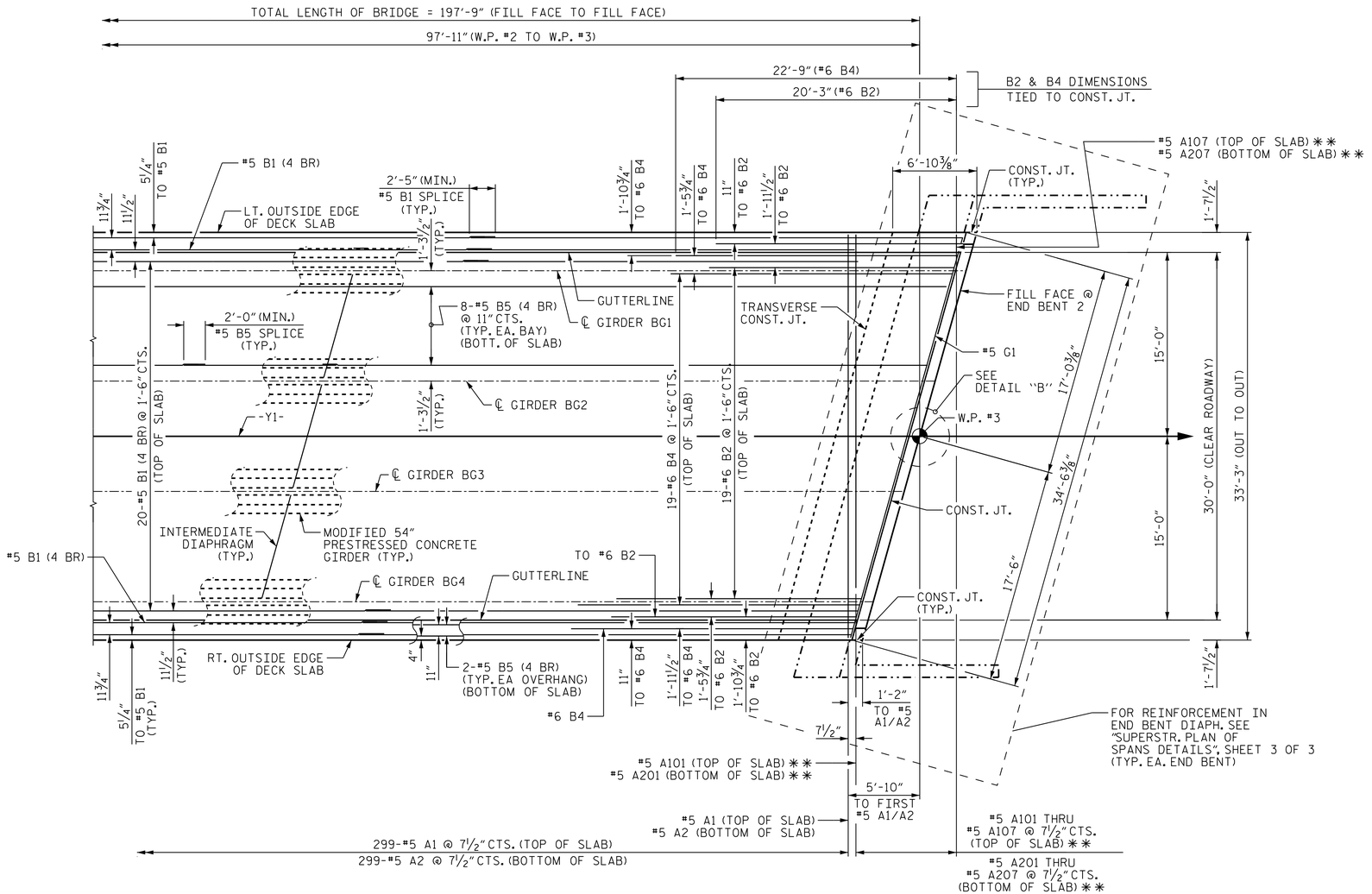
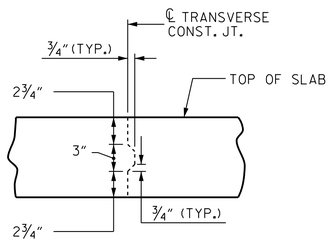


DETAIL "B"





TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PLAN OF SPANS (PART SPAN B)

NOTE: (2BR) DENOTES 2 BAR RUN
(4BR) DENOTES 4 BAR RUN

** - DENOTES 2 BARS PER MARK

FOR BARRIER RAIL DETAILS AND REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

FOR POUR SEQUENCE, SEE SHEET "BILL OF MATERIALS"

FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDER" SHEET.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS (PARTIAL SPAN B)

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T KELVINGTON
Joseph T. Kelvington
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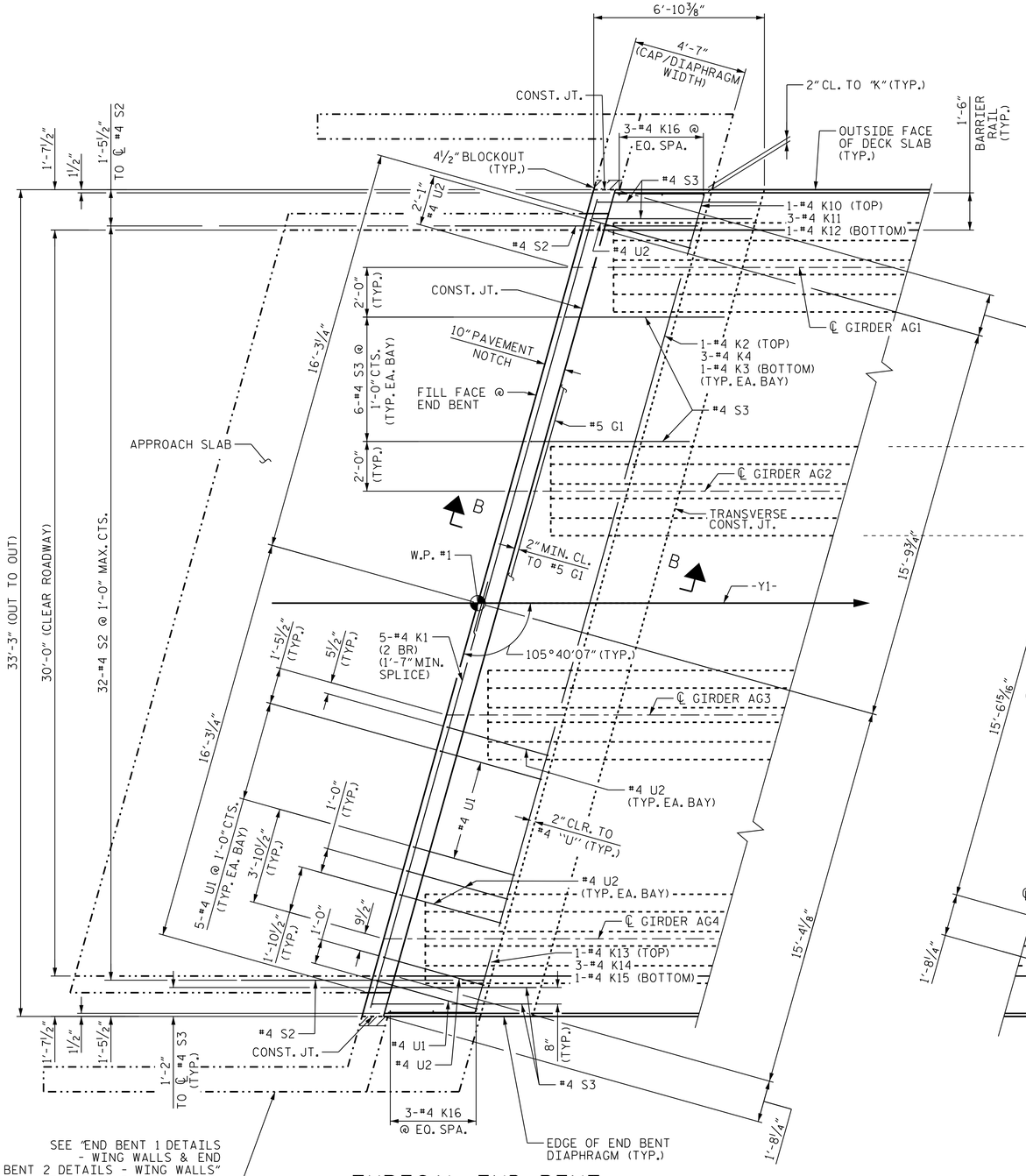
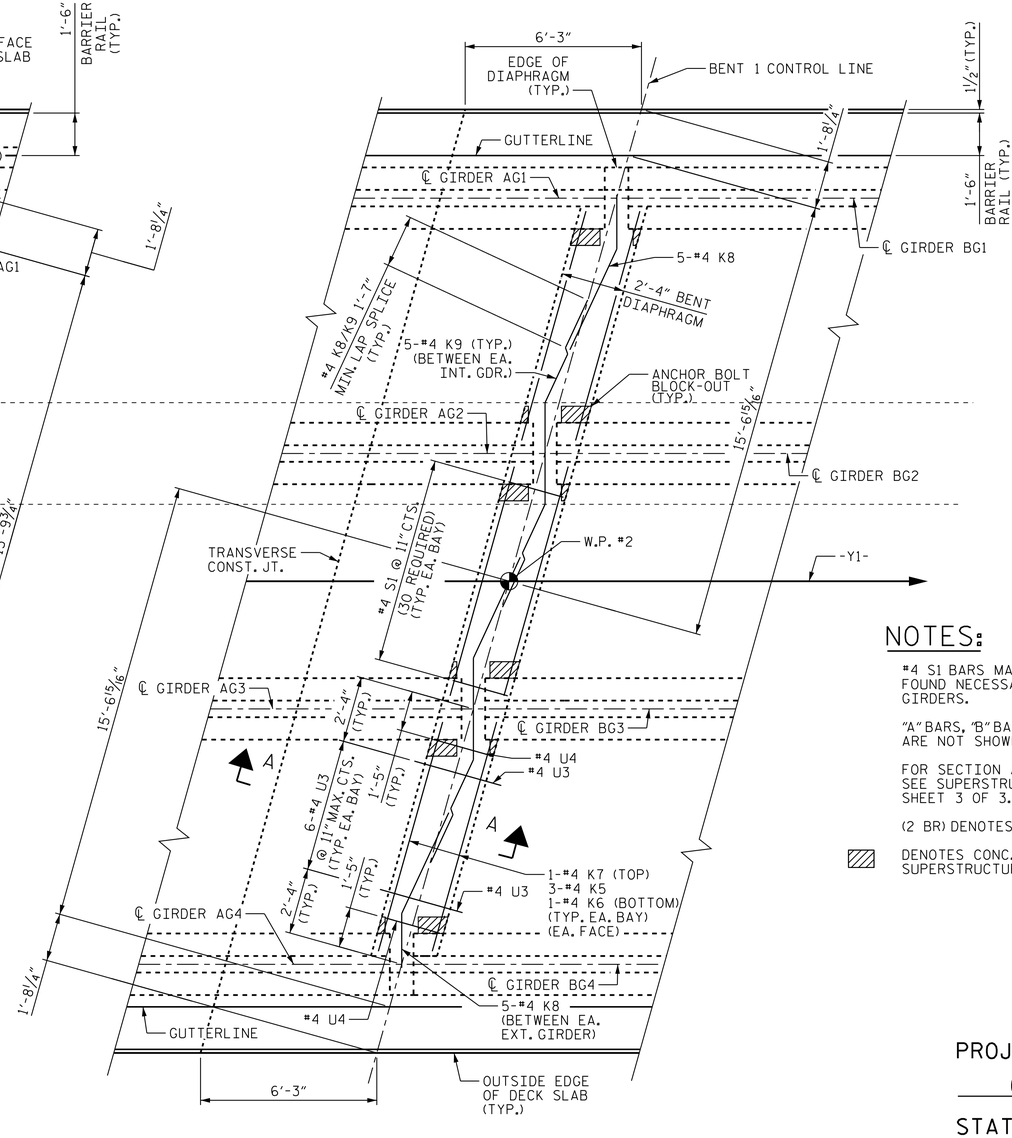


TYPICAL END BENT DIAPHRAGM REINFORCING DETAIL

DETAIL AT END BENT 1 SHOWN.
END BENT 2 SIMILAR BY ROTATION.

S2 & S3 BARS MAY BE REPOSITIONED AS NECESSARY TO CLEAR GIRDERS AND OTHER REINFORCING BAR CONFLICTS.



BENT DIAPHRAGM REINFORCING DETAIL

NOTES:

#4 S1 BARS MAY BE REPOSITIONED AS FOUND NECESSARY TO CLEAR PRESTRESSED GIRDERS.

"A" BARS, "B" BARS & BARRIER RAIL REINF. ARE NOT SHOWN IN DECK SLAB FOR CLARITY.

FOR SECTION A-A, SECTION B-B, SEE SUPERSTRUCTURE "TYPICAL SECTION DETAILS", SHEET 3 OF 3.

(2 BR) DENOTES 2 BAR RUN.

▨ DENOTES CONC. BLOCKOUT. SEE END BENT SHTS. AND SUPERSTRUCTURE TYPICAL SECTION DETAILS.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS DETAILS - DIAPHRAGMS

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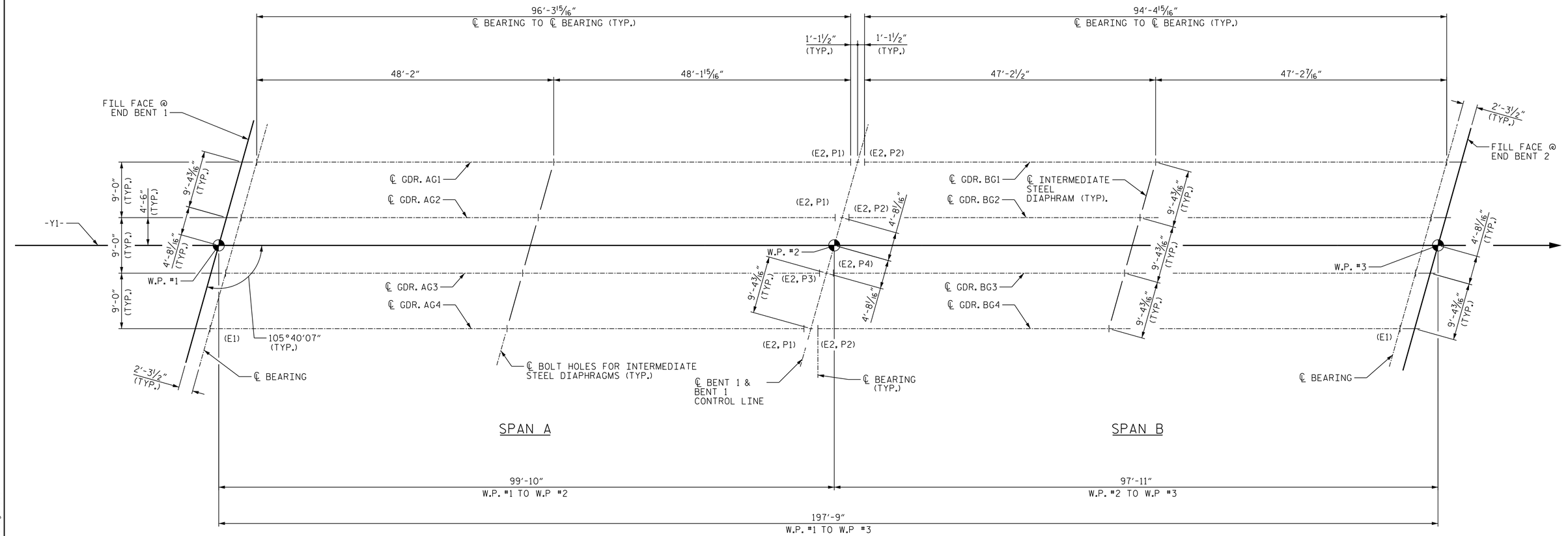

FRAMING PLAN

NOTES:

(E1, E2, AND P1) DENOTES ELASTOMERIC BEARING OR SOLE PLATE. SEE "ELASTOMERIC BEARING DETAILS".

SEE TYPICAL SECTION FOR END BENT DIAPHRAGM AND INTERIOR BENT DIAPHRAGM DETAILS.

REFER TO "PLAN OF SPAN DETAILS-DIAPHRAGMS" FOR BENT & END BENT DIAPHRAGMS.

ALL DIMENSIONS ARE HORIZONTAL OR VERTICAL UNLESS NOTED.

PROJECT NO. R-2707D

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Digitally signed by: Joseph T. Kelvington
4/27/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
FRAMING PLAN

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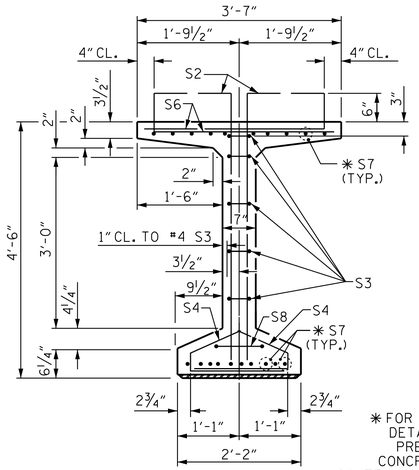
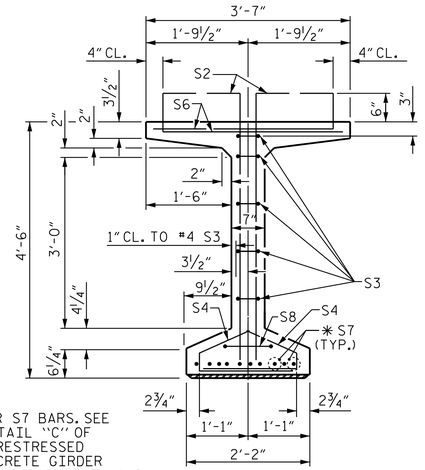
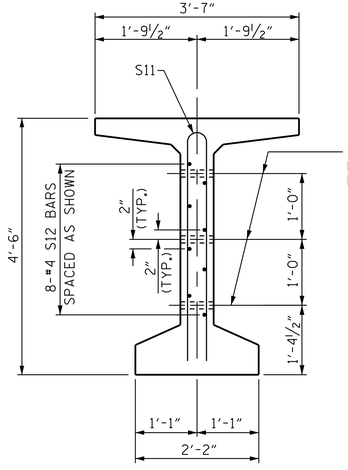


SECTION A-A



SECTION B-B

✱ FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS, SHEET 3 OF 4.



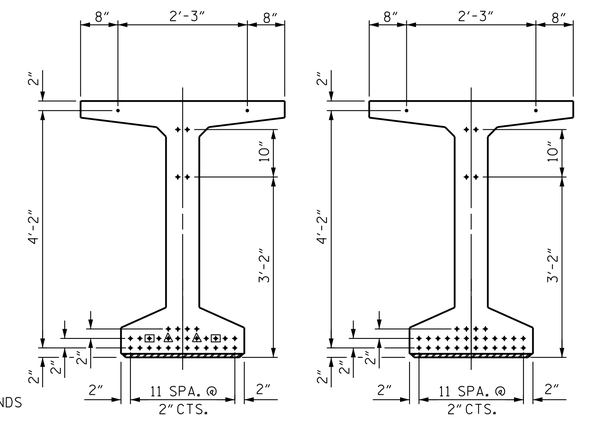
℄ 1½" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION.

SECTION C-C

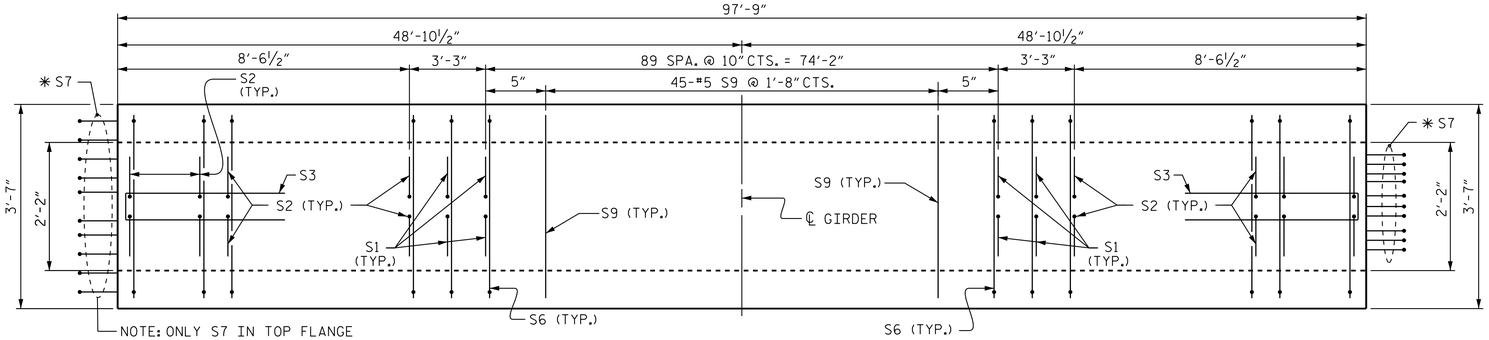
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

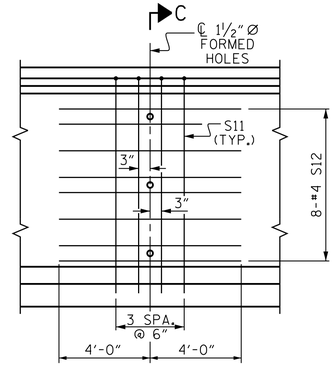
- ● FULLY BONDED STRANDS
- ⊡ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- △ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT

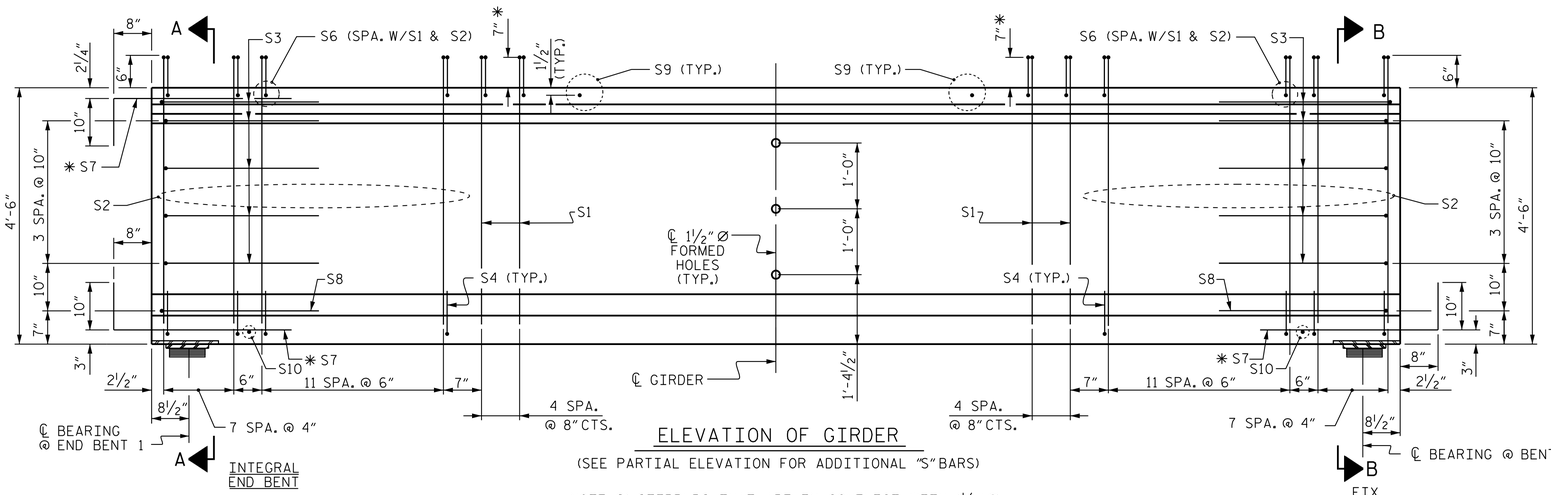


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

NOTE: S1 STIRRUPS THAT ARE IN CONFLICT WITH 1½" Ø FORMED HOLES MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR HOLES AND S11 BARS.

✱ SET 90 S1 & S6 BAR PAIRS 7" ABOVE TOP OF GIRDER AS SHOWN. PROVIDE 6" PROJECTION ABOVE GIRDER AT ALL OTHER LOCATIONS.

0.6" Ø L. R. GRADE 270 STRANDS

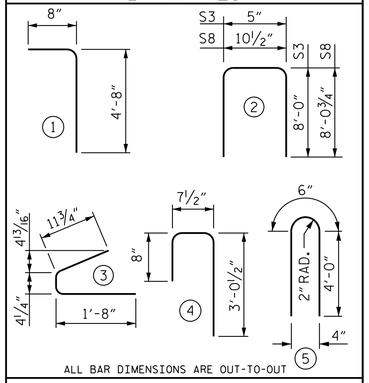
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	196	#5	1	5'-4"	1090
S2	80	#6	1	5'-4"	641
S3	10	#4	2	16'-5"	110
S4	80	#4	3	3'-0"	160
S6	276	#5	4	4'-4"	1247
✱ S7	30	#5	STR	3'-8"	115
S8	2	#5	2	17'-0"	35
S9	45	#5	STR	3'-3"	153
S10	2	#3	STR	1'-10"	1
S11	4	#5	5	8'-6"	35
S12	8	#4	STR	8'-0"	43

✱ 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	8,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3,630	17.8	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	97'-9"	391'-0"

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE MODIFIED 54" PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD

SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER J. KELVINGTON

Digitally signed by: Joseph T. Kelvington
DocuSigned by: Joseph T. Kelvington
4/27/2023
DocuSign Envelope ID: C671D102-8ED1-428A-A1D3-11A9F1F5492A

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2			4			32

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www.stantec.com
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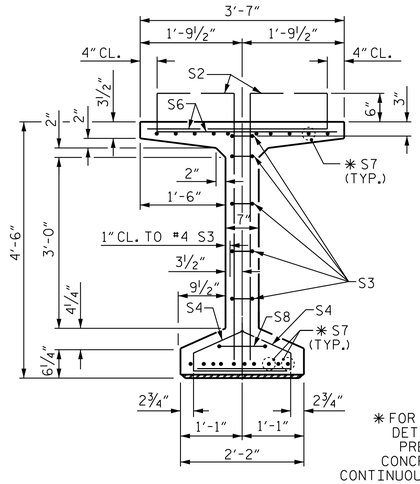
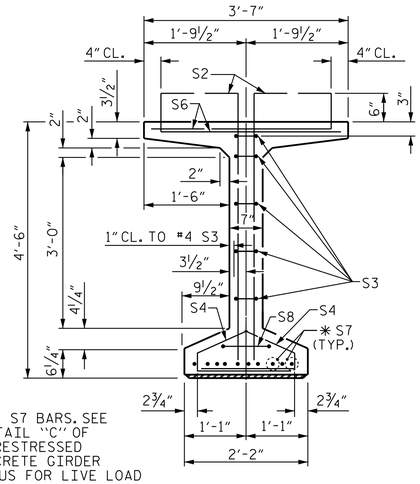
DRAWN BY : J. E. HAGENBUSH DATE : 01/22/18
CHECKED BY : N.D'AIUTO DATE : 01/29/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

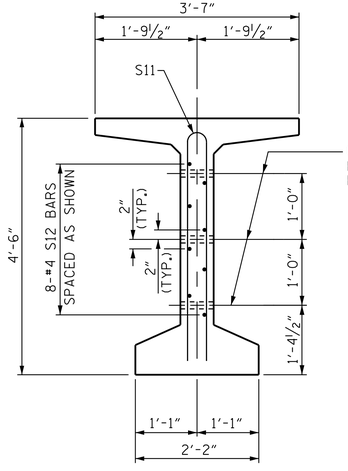


SECTION A-A



SECTION B-B

✱ FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET 3 OF 4.

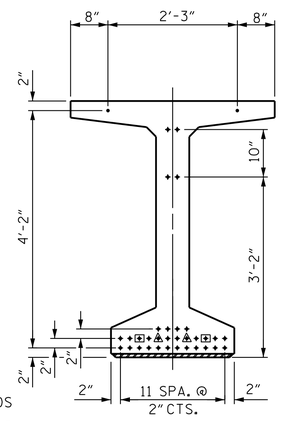


SECTION C-C

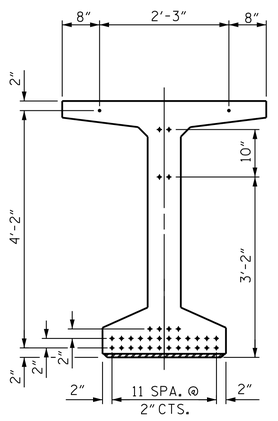
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ⊡ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ⧋ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

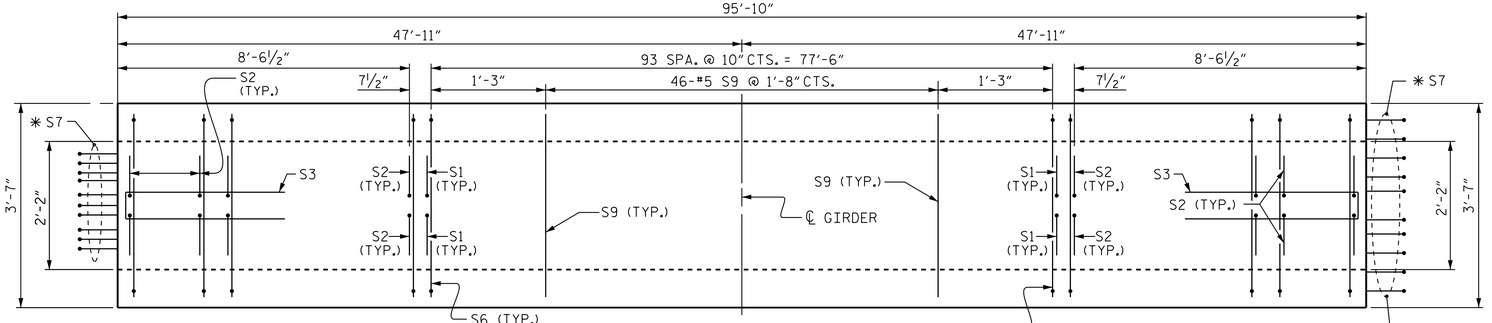


AT END OF GIRDER

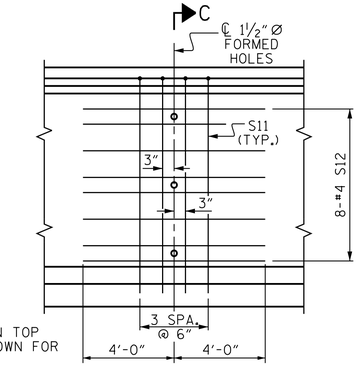


AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

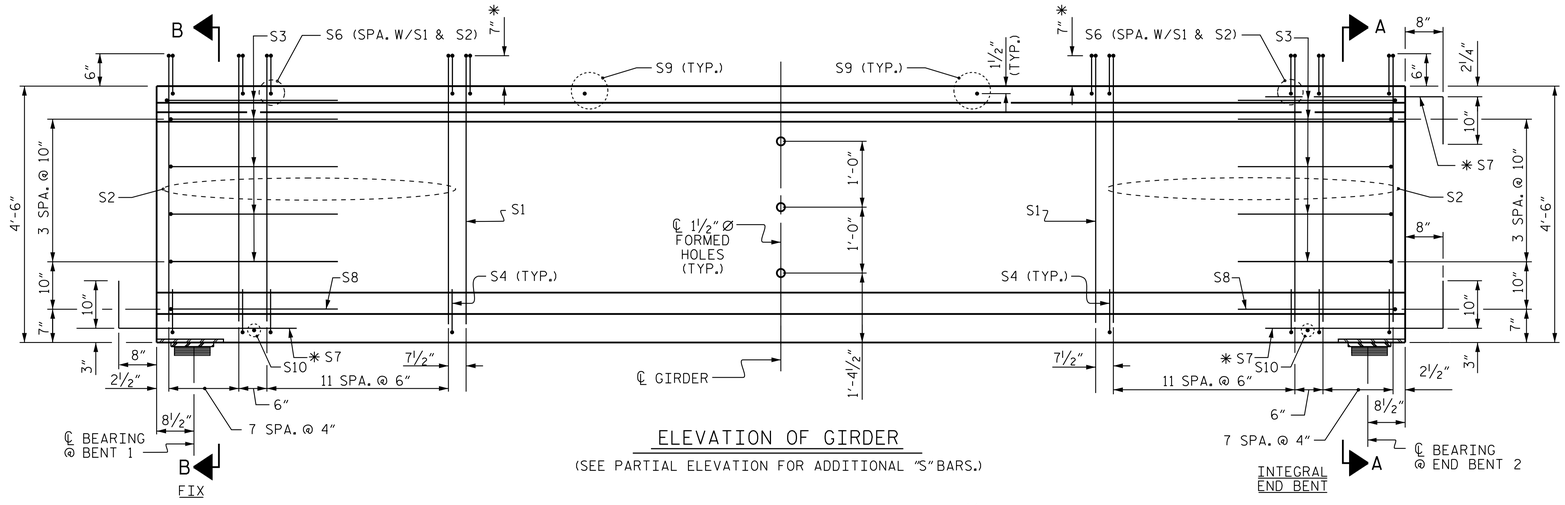


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS.)

NOTE: S1 STIRRUPS THAT ARE IN CONFLICT WITH 1½" Ø FORMED HOLES MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR HOLES AND S11 BARS.

✱ SET 94 S1 & S6 BAR PAIRS 7" ABOVE TOP OF GIRDER AS SHOWN. PROVIDE 6" PROJECTION ABOVE GIRDER AT ALL OTHER LOCATIONS.

0.6" Ø L. R. GRADE 270 STRANDS

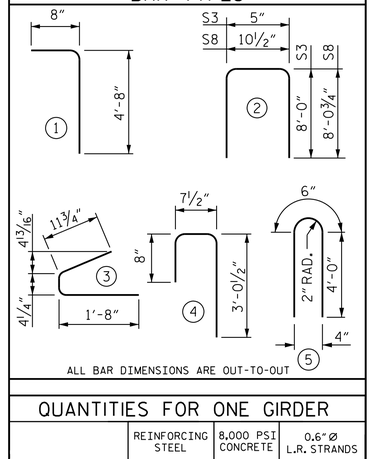
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	188	#4	1	5'-4"	670
S2	80	#6	1	5'-4"	641
S3	10	#4	2	16'-5"	110
S4	80	#4	3	3'-0"	160
S6	268	#5	4	4'-4"	1211
✱ S7	30	#5	STR	3'-8"	115
S8	2	#5	2	17'-0"	35
S9	46	#5	STR	3'-3"	163
S10	2	#3	STR	1'-10"	1
S11	4	#5	5	8'-6"	35
S12	8	#4	STR	8'-0"	43

✱ 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	8,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3,184	17.4	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	95'-10"	383'-4"

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE MODIFIED 54" PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD

SPAN B

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DRAWN BY : J. E. HAGENBUSH DATE : 01/22/18
CHECKED BY : N.D'AIUTO DATE : 01/30/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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2			4			32

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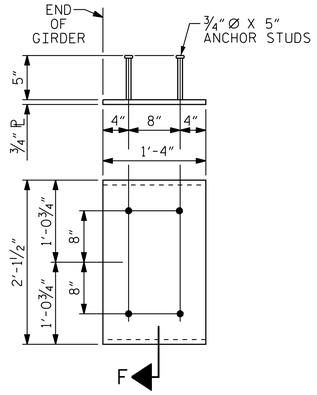
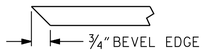


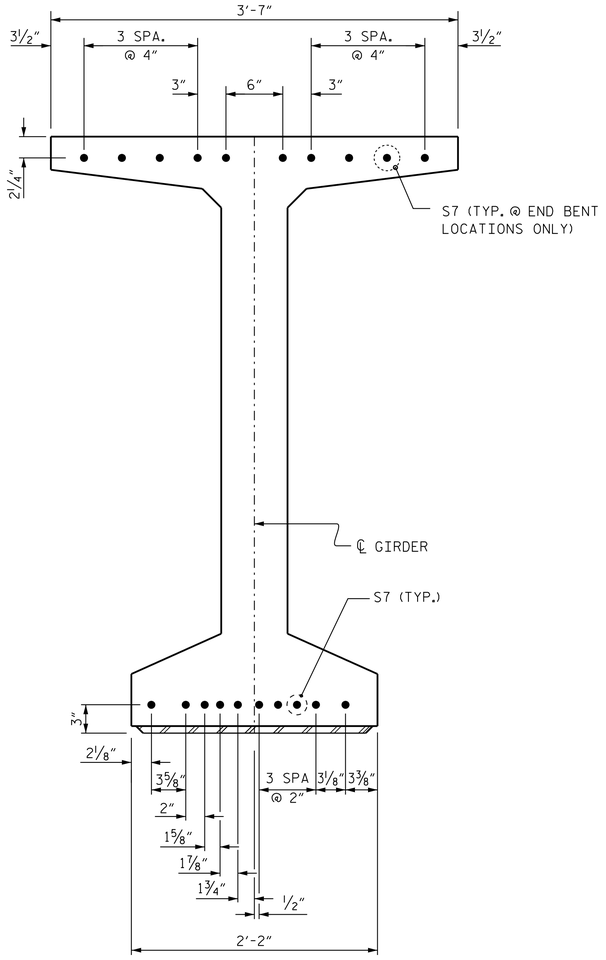
EMBEDDED PLATE "B-1" DETAILS FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDER

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)



DETAIL "C"

(FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDER)

S7 BARS IN BOTTOM FLANGE MAY BE ADJUSTED SLIGHTLY AS NECESSARY TO CLEAR ¾" × 5" ANCHOR STUDS MOUNTED ON EMBEDDED PLATE "B-1".

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.

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 6,000 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 ¼".

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

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ASSEMBLED BY : J. E. HAGENBUSH DATE : 01/22/18
CHECKED BY : N. D'AIUTO DATE : 01/30/18

DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE MODIFIED 54" PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T KELVINGTON

Joseph T. Kelvington
4/27/2023

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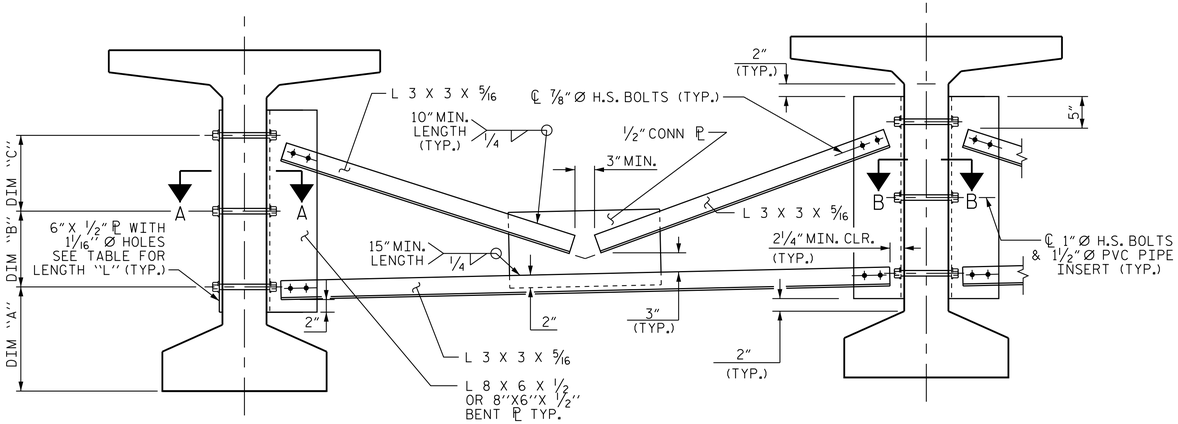
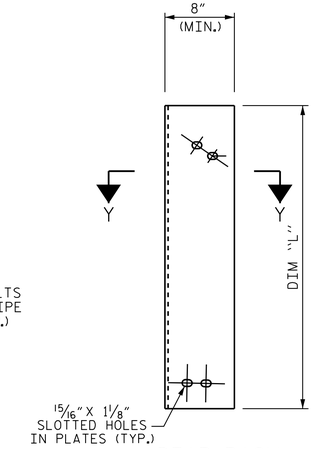


EXTERIOR GIRDER

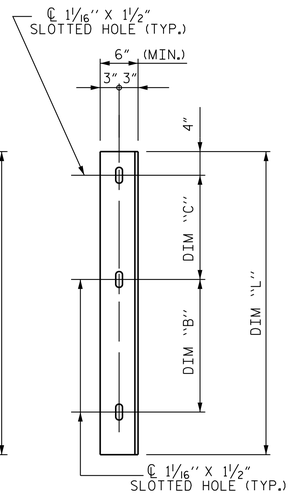
INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

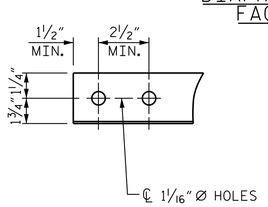
(MODIFIED 54" PRESTRESSED CONC. GIRDER SHOWN)



DIAPHRAGM FACE

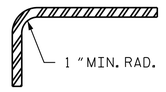


WEB FACE



ANGLE END

(L 3 X 3 X 5/16)



SECTION Y-Y

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.

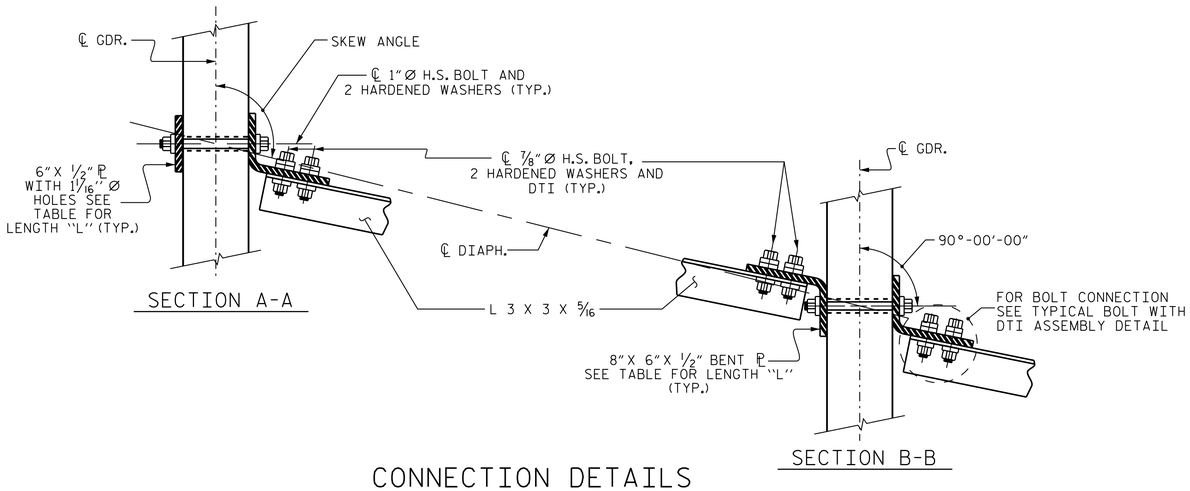
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

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

CONNECTOR PLATE DETAIL

TABLE

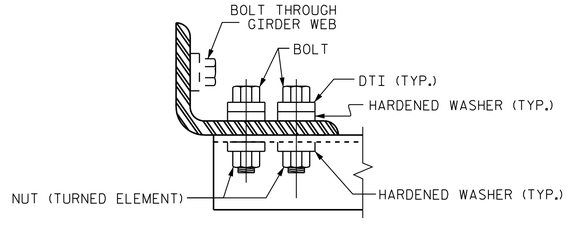
GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
MODIFIED 54" PRESTRESSED CONCRETE GIRDER	1'-4 1/2"	1'-0"	1'-0"	2'-8"



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDERS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Signed by: Joseph T. Kelvington
4/27/2023

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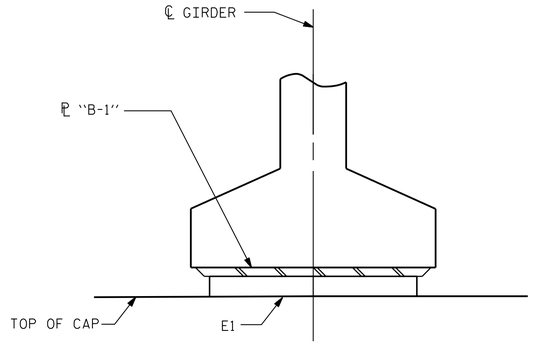
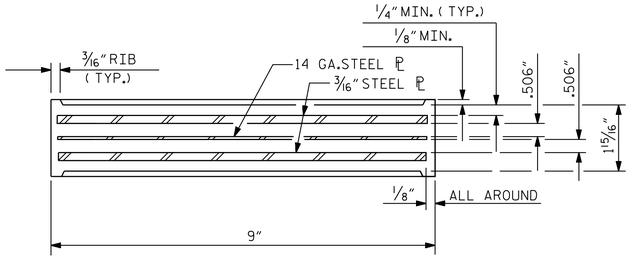
CHECKED BY : N. D'AIUTO DATE : 01/30/18

DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

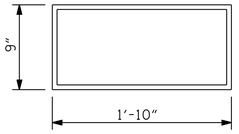


INTEGRAL

SECTION E-E



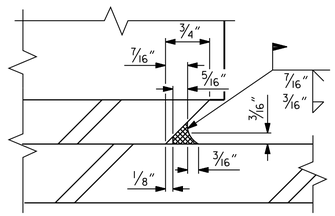
TYPICAL SECTION OF ELASTOMERIC BEARINGS



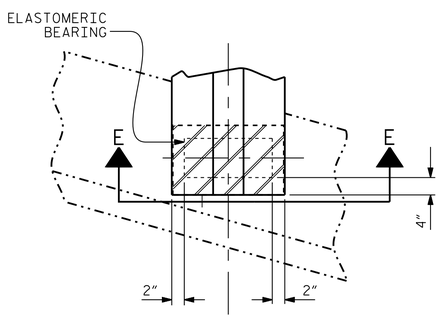
E1 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV

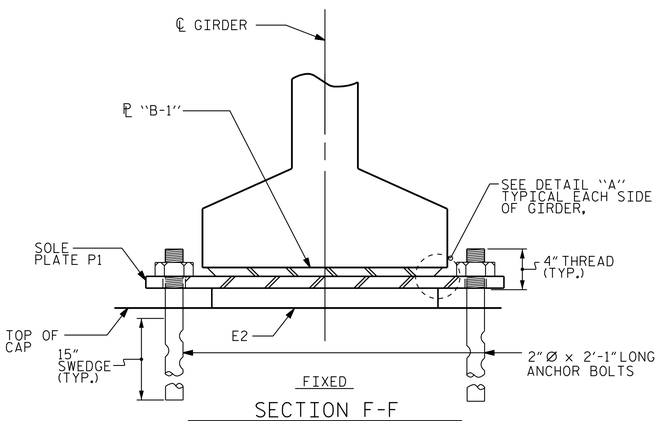


DETAIL "A"



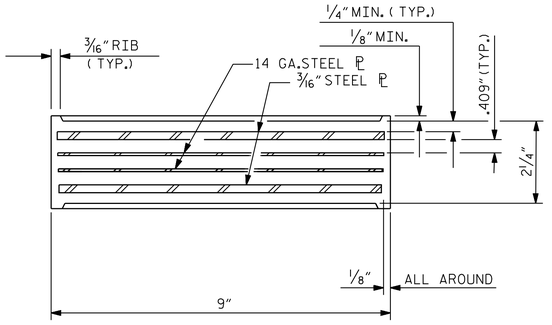
TYPICAL PLAN

(SHOWING BOTTOM FLANGE @ INTEGRAL END BENT)

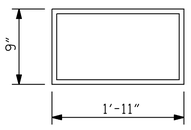


FIXED

SECTION F-F



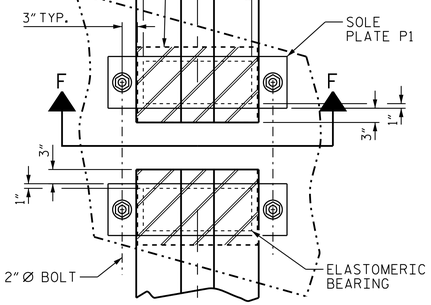
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E2 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

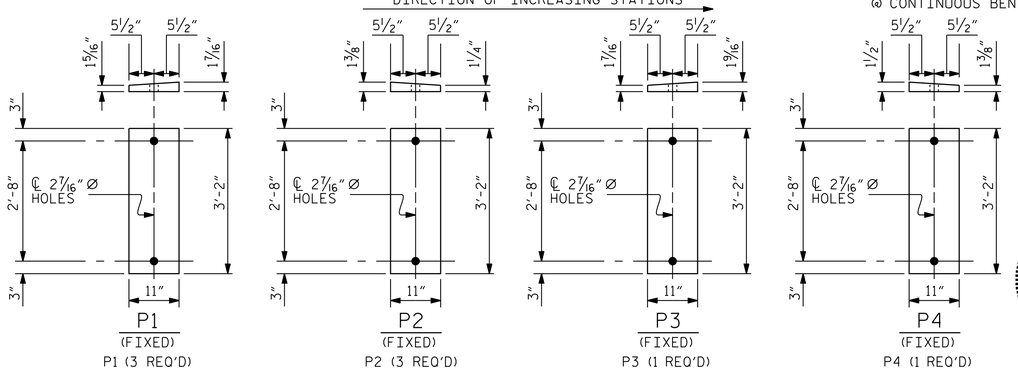
TYPE V



TYPICAL PLAN

(SHOWING BOTTOM FLANGE @ CONTINUOUS BENT)

DIRECTION OF INCREASING STATIONS



SOLE PLATE DETAILS (P1)

NOTES

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

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. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE V	365 k

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

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DRAWN BY : J. E. HAGENBUSH DATE : 01/23/18
CHECKED BY : N. D'AIUTO DATE : 01/30/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington 4/27/2023

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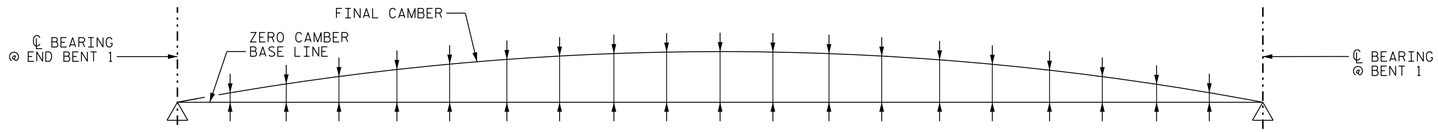
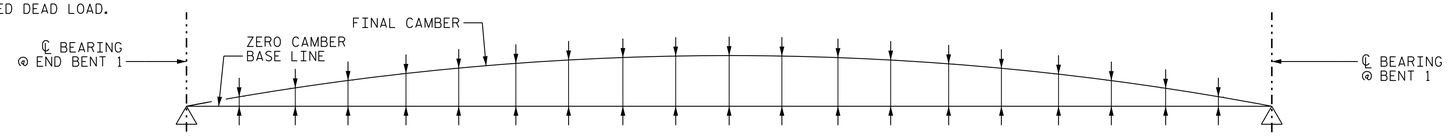
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-17
1			3			TOTAL SHEETS
2			4			32



GIRDERS 1 & 4 - SPAN A

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.034	0.067	0.099	0.128	0.153	0.175	0.192	0.204	0.212	0.215	0.212	0.204	0.192	0.175	0.153	0.128	0.099	0.067	0.034	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✱✱ ↓	0.000	0.020	0.037	0.057	0.073	0.088	0.101	0.110	0.118	0.122	0.123	0.122	0.118	0.110	0.101	0.088	0.073	0.057	0.037	0.020	0.000
FINAL CAMBER ↑	0"	3/16"	3/8"	1/2"	11/16"	3/4"	7/8"	1"	1 1/16"	1 1/16"	1 1/8"	1 1/16"	1 1/16"	1"	7/8"	3/4"	11/16"	1/2"	3/8"	3/16"	0"

✱✱ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

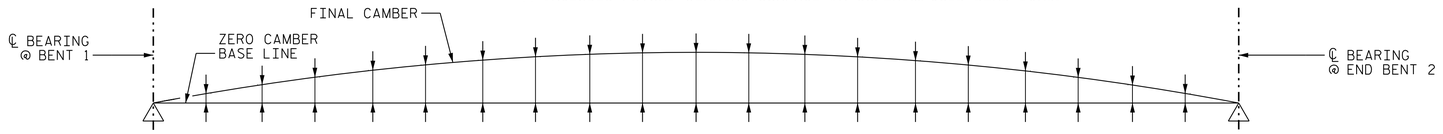


SPAN A

GIRDERS 2 & 3 - SPAN A

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.034	0.067	0.099	0.128	0.153	0.175	0.192	0.204	0.212	0.215	0.212	0.204	0.192	0.175	0.153	0.128	0.099	0.067	0.034	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✱✱ ↓	0.000	0.023	0.044	0.066	0.085	0.103	0.118	0.129	0.138	0.143	0.144	0.143	0.138	0.129	0.118	0.103	0.085	0.066	0.044	0.023	0.000
FINAL CAMBER ↑	0"	1/8"	1/4"	3/8"	1/2"	5/8"	11/16"	3/4"	13/16"	13/16"	7/8"	13/16"	13/16"	3/4"	11/16"	5/8"	1/2"	3/8"	1/4"	1/8"	0"

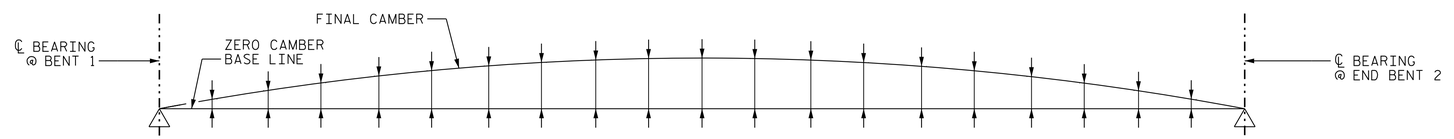
✱✱ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.



GIRDERS 1 & 4 - SPAN B

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.034	0.066	0.097	0.126	0.151	0.172	0.189	0.201	0.209	0.211	0.209	0.201	0.189	0.172	0.151	0.126	0.097	0.066	0.034	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✱✱ ↓	0.000	0.018	0.032	0.052	0.064	0.081	0.090	0.101	0.107	0.112	0.113	0.112	0.107	0.101	0.090	0.081	0.064	0.052	0.032	0.018	0.000
FINAL CAMBER ↑	0"	3/16"	7/16"	9/16"	3/4"	13/16"	1"	1 1/16"	1 1/8"	1 3/16"	1 3/16"	1 3/16"	1 1/8"	1 1/16"	1"	13/16"	3/4"	9/16"	7/16"	3/16"	0"

✱✱ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.



SPAN B

GIRDERS 2 & 3 - SPAN B

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.034	0.066	0.097	0.126	0.151	0.172	0.189	0.201	0.209	0.211	0.209	0.201	0.189	0.172	0.151	0.126	0.097	0.066	0.034	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✱✱ ↓	0.000	0.021	0.041	0.061	0.075	0.094	0.105	0.118	0.125	0.131	0.133	0.131	0.125	0.118	0.105	0.094	0.075	0.061	0.041	0.021	0.000
FINAL CAMBER ↑	0"	1/8"	5/16"	7/16"	5/8"	11/16"	13/16"	7/8"	15/16"	15/16"	15/16"	15/16"	15/16"	7/8"	13/16"	11/16"	5/8"	7/16"	5/16"	1/8"	0"

✱✱ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

SCHEMATIC CAMBER ORDINATES

ALL VALUES ARE SHOWN IN DECIMALS OF A FOOT EXCEPT "FINAL CAMBER" WHICH IS SHOWN IN INCHES.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DEAD LOAD DEFLECTIONS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Digitally signed by: Joseph T. Kelvington
4/27/2023

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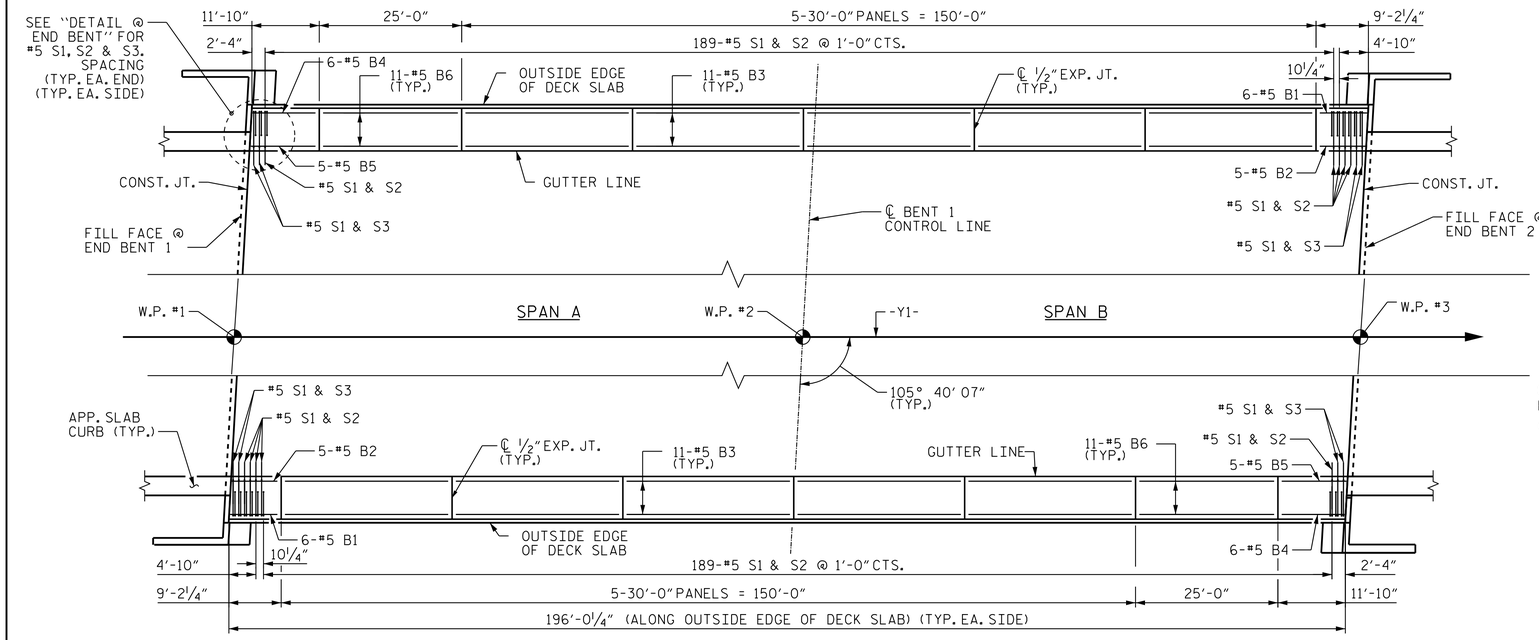
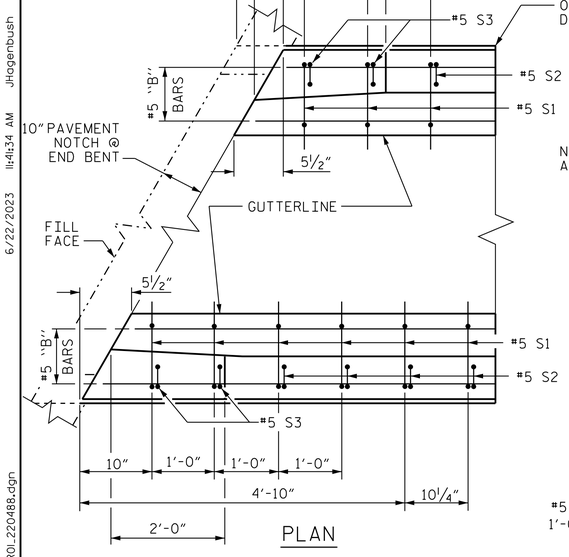
DRAWN BY : J. E. HAGENBUSH DATE : 01/23/18
CHECKED BY : N.D'AIUTO DATE : 01/30/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/19/23



BARRIER RAIL PLAN

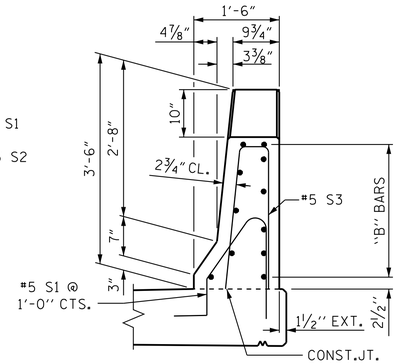


PLAN

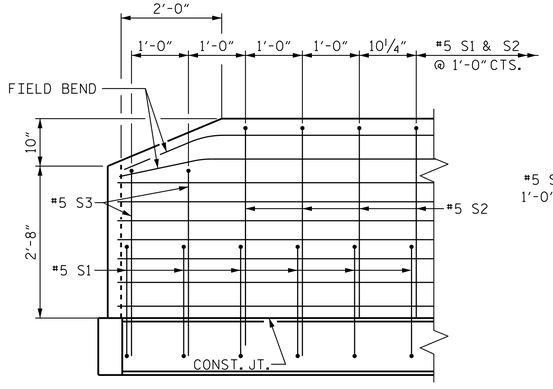
DETAIL @ END BENT

END BENT 1 SHOWN END BENT 2 TYP. BY ROTATION

NOTE: ALL HORIZONTAL DIMENSIONS SHOWN ARE ALONG THE OUTSIDE EDGE OF DECK SLAB.



END VIEW



SIDE VIEW

END OF RAIL DETAILS

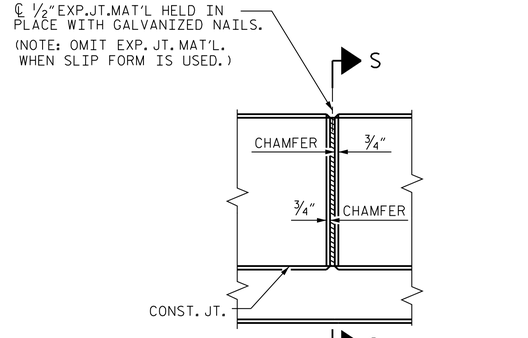
NOTES

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

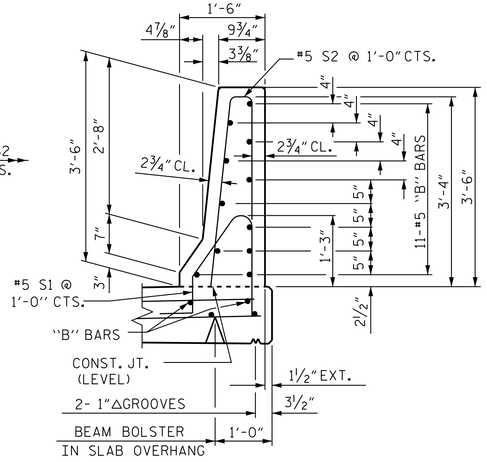
GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

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



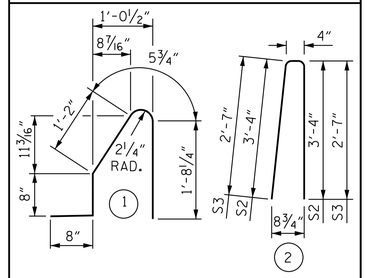
ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS



SECTION THRU RAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	12	#5	STR	8'-8"	108
✳ B2	10	#5	STR	8'-4"	87
✳ B3	110	#5	STR	29'-6"	3385
✳ B4	12	#5	STR	11'-5"	143
✳ B5	10	#5	STR	11'-9"	123
✳ B6	22	#5	STR	24'-6"	562
✳ S1	392	#5	1	4'-8"	1908
✳ S2	384	#5	2	7'-0"	2804
✳ S3	8	#5	2	5'-6"	46

✳ EPOXY COATED REINFORCING STEEL	9,166 LBS.
CLASS AA CONCRETE	53.2 CU. YDS.
CONCRETE BARRIER RAIL	392.0 LIN. FT.

SECTION S-S

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

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

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ASSEMBLED BY : J. E. HAGENBUSH DATE : 01/23/18
CHECKED BY : N. D'AIUTO DATE : 01/30/18

DRAWN BY : ARB 5/87
CHECKED BY : SJD 9/87

REV.		
REV. 7/12	MAA/GM	DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 06/22/23
REV. 6/13	MAA/GM	
REV. 12/17	MAA/GM	

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
6/22/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

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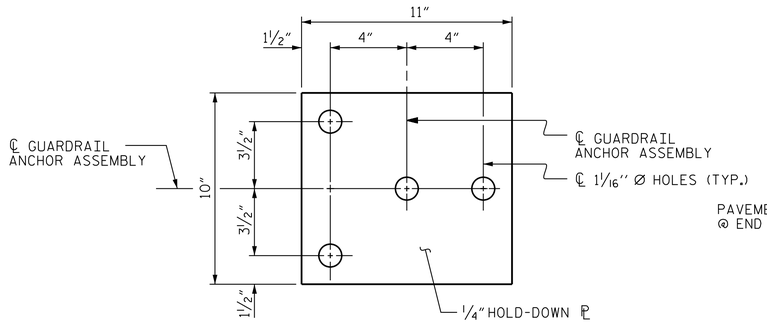
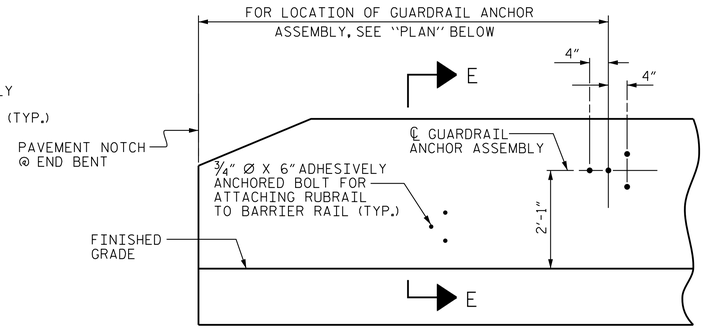
1			3			TOTAL SHEETS
2			4			32

STD. NO. CBR1



PLAN



ELEVATION

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼" HOLD-DOWN PLATE AND 4 - ⅞" Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

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

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE ⅞" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

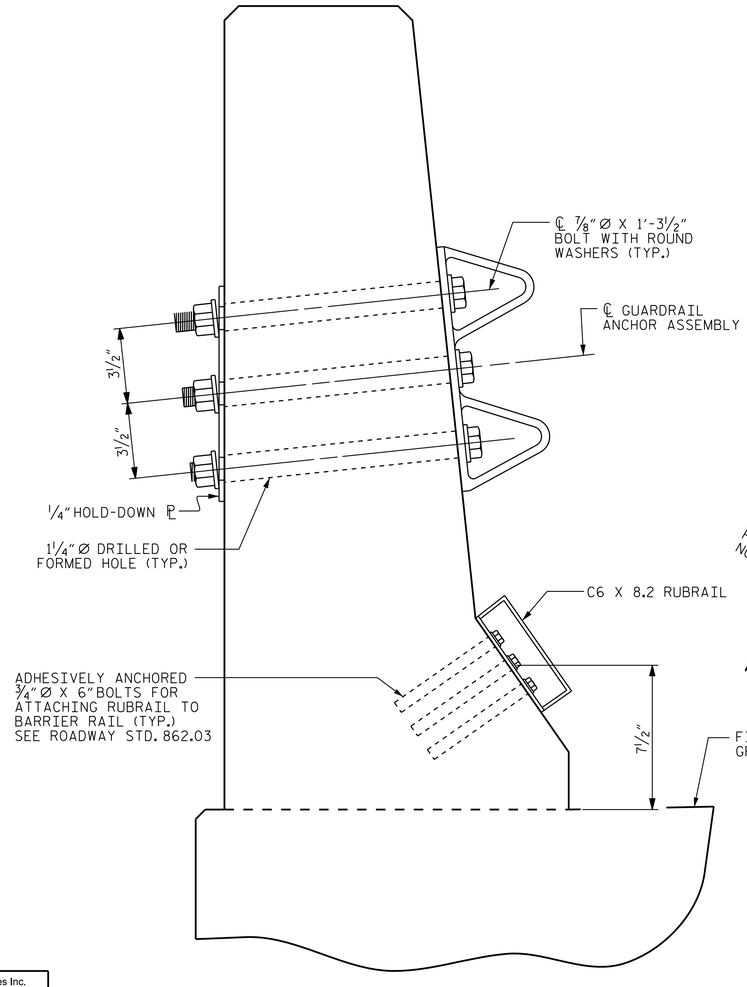
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

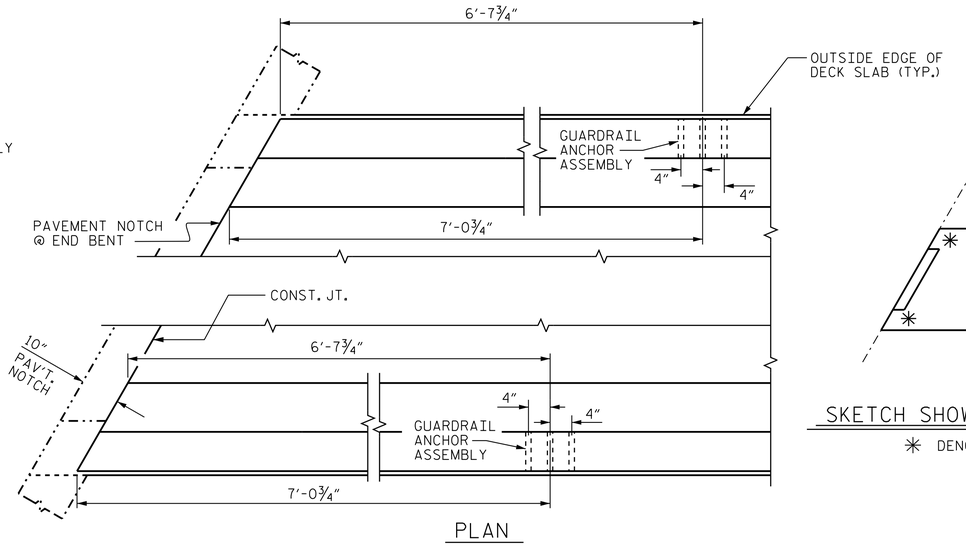
THE 1 ¼" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE ¾" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SECTION E-E

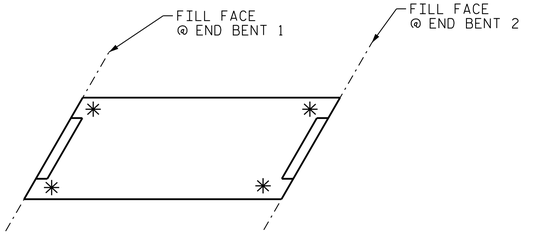
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington by: [illegible]
4/27/2023

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STD. NO. GRA2

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ASSEMBLED BY : J. E. HAGENBUSH	DATE : 01/23/18		
CHECKED BY : N. D'AIUTO	DATE : 01/30/18		
DRAWN BY : TLA 5/06	REV. 7/12	MAA/GM	DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23
CHECKED BY : GM 5/06	REV. 6/13	MAA/GM	
	REV. 12/17	MAA/THC	

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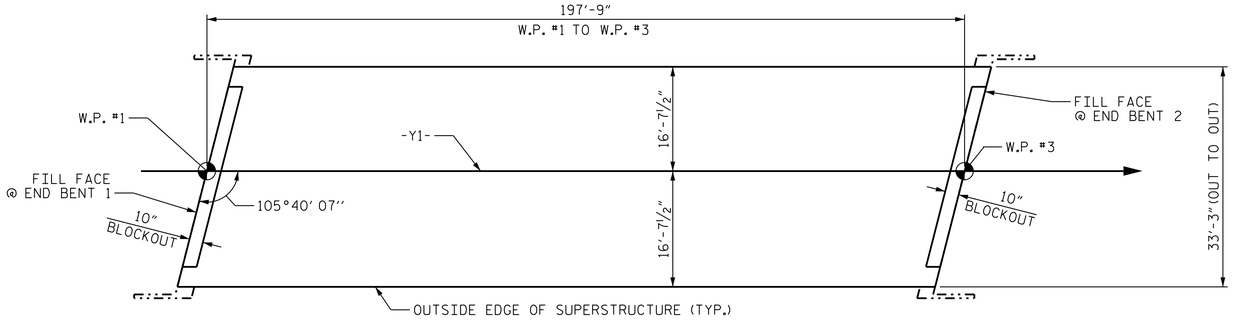
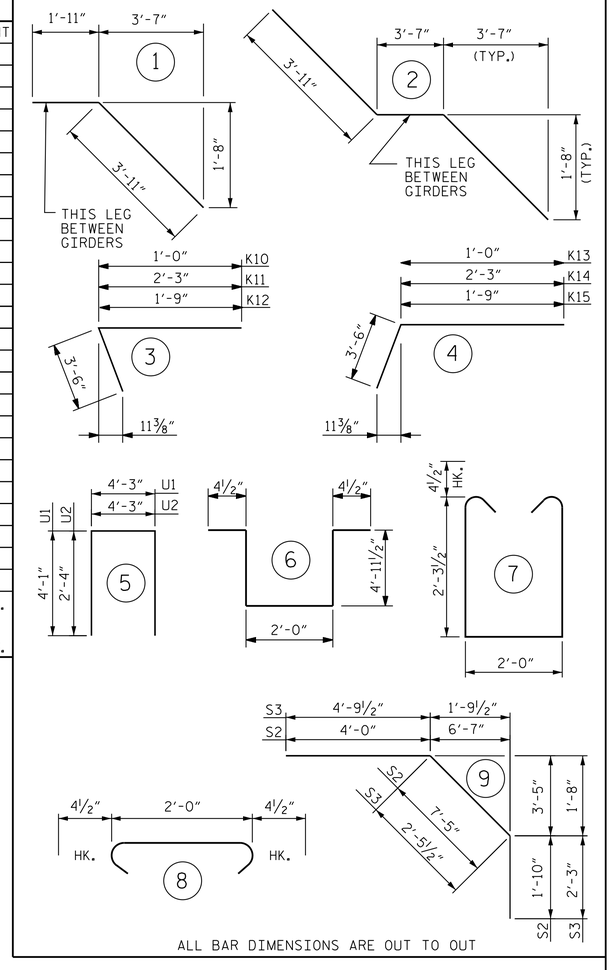


LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 6,575)

REINFORCING BAR SCHEDULE SPANS A & B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	299	#5	STR	32'-9"	10213	K1	20	#4	STR	17'-1"	228
A2	299	#5	STR	32'-9"	10213	K2	6	#4	STR	5'-3"	21
						K3	6	#4	STR	5'-6"	22
✱A101	4	#5	STR	28'-10"	120	K4	18	#4	STR	7'-9"	93
✱A102	4	#5	STR	24'-5"	102	K5	18	#4	STR	8'-4"	100
✱A103	4	#5	STR	19'-11"	83	K6	6	#4	STR	6'-1"	24
✱A104	4	#5	STR	15'-6"	65	K7	6	#4	STR	5'-2"	21
✱A105	4	#5	STR	11'-1"	46	K8	10	#4	1	5'-10"	39
✱A106	4	#5	STR	6'-7"	27	K9	10	#4	2	11'-9"	78
✱A107	4	#5	STR	2'-2"	9	K10	2	#4	3	4'-6"	6
						K11	4	#4	3	5'-9"	15
A201	4	#5	STR	28'-10"	120	K12	2	#4	3	5'-3"	7
A202	4	#5	STR	24'-4"	102	K13	18	#4	4	4'-6"	54
A203	4	#5	STR	19'-11"	83	K14	4	#4	4	5'-9"	15
A204	4	#5	STR	15'-5"	64	K15	2	#4	4	5'-3"	7
A205	4	#5	STR	11'-0"	46	K16	12	#4	STR	5'-1"	41
A206	4	#5	STR	6'-6"	27						
A207	4	#5	STR	2'-1"	9	U1	32	#4	5	12'-5"	265
						U2	22	#4	5	8'-11"	131
✱ B1	96	#5	STR	50'-9"	5081	U3	18	#4	6	12'-8"	152
✱ B2	42	#6	STR	20'-6"	1293	U4	6	#4	7	7'-4"	29
✱ B3	183	#5	STR	32'-3"	6156						
✱ B4	42	#6	STR	23'-0"	1451	S1	90	#4	8	2'-9"	165
B5	112	#5	STR	50'-5"	5889	✱ S2	64	#4	9	13'-3"	566
						✱ S3	44	#4	9	9'-6"	279
✱ G1	2	#5	STR	33'-11"	71	REINFORCING STEEL 18,066 LBS.					
						EPOXY COATED REINFORCING STEEL 25,562 LBS.					

BAR TYPES

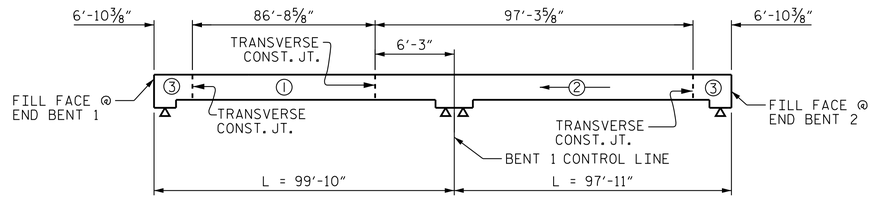


ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR #1	88.2		
POUR #2	109.4		
POUR #3	63.8		
TOTALS✱✱	261.4	18,066	25,562

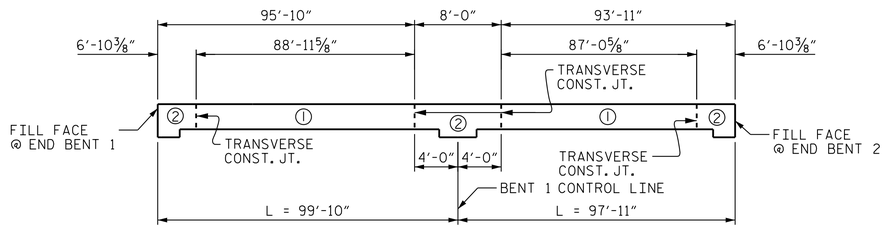
✱✱QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED



POURING SEQUENCE

ALONG -Y1-

← (#) = INDICATES POUR NUMBER AND DIRECTION OF POUR



OPTIONAL POURING SEQUENCE

POUR ② CAN NOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MINIMUM OF 3,000 PSI

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"			

GROOVING BRIDGE FLOORS

APPROACH SLABS	765 SQ.FT.
BRIDGE DECK	5,330 SQ.FT.
TOTAL	6,095 SQ.FT.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

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CHECKED BY : N. D'AIUTO DATE : 01/25/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 06/22/23

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
6/22/2023

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STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE BILL OF MATERIAL

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1			3			TOTAL SHEETS
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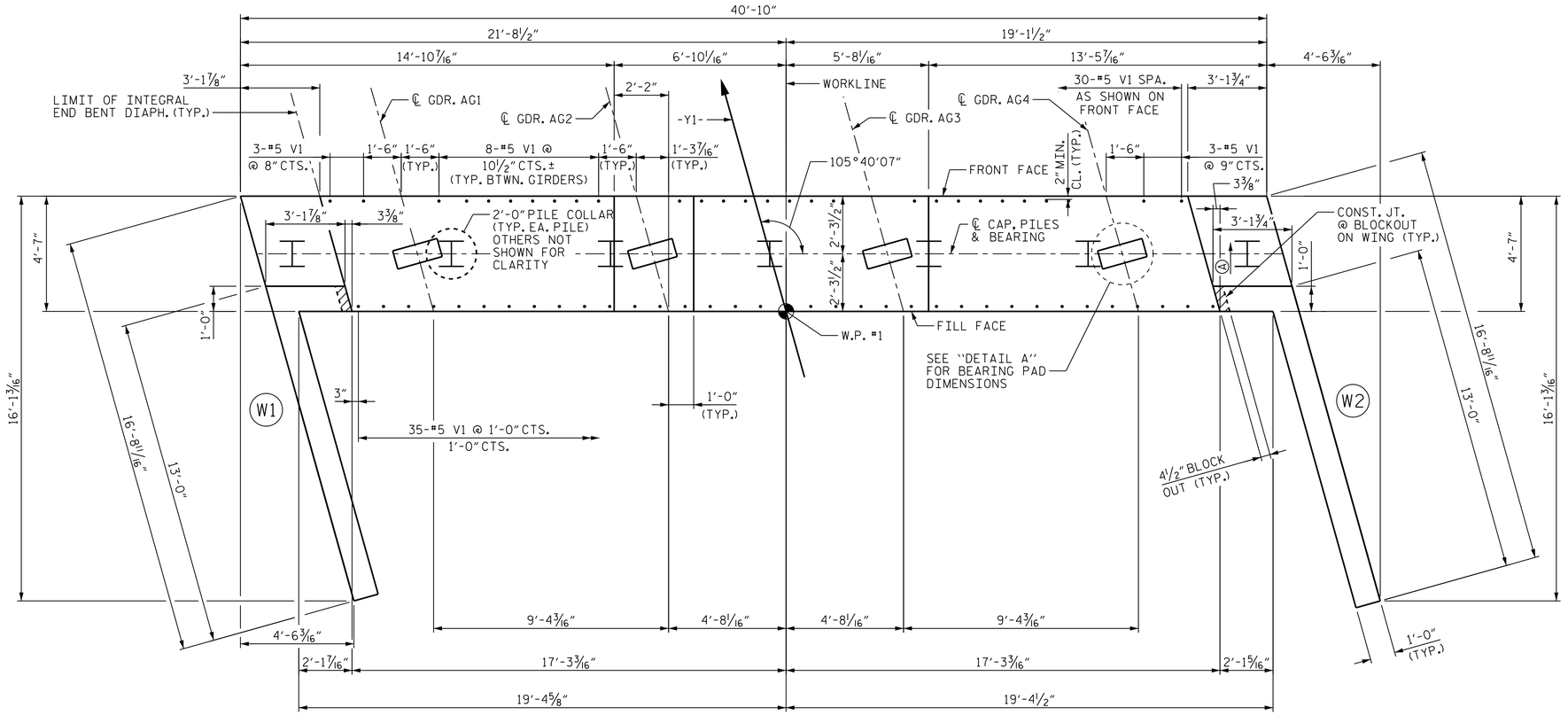
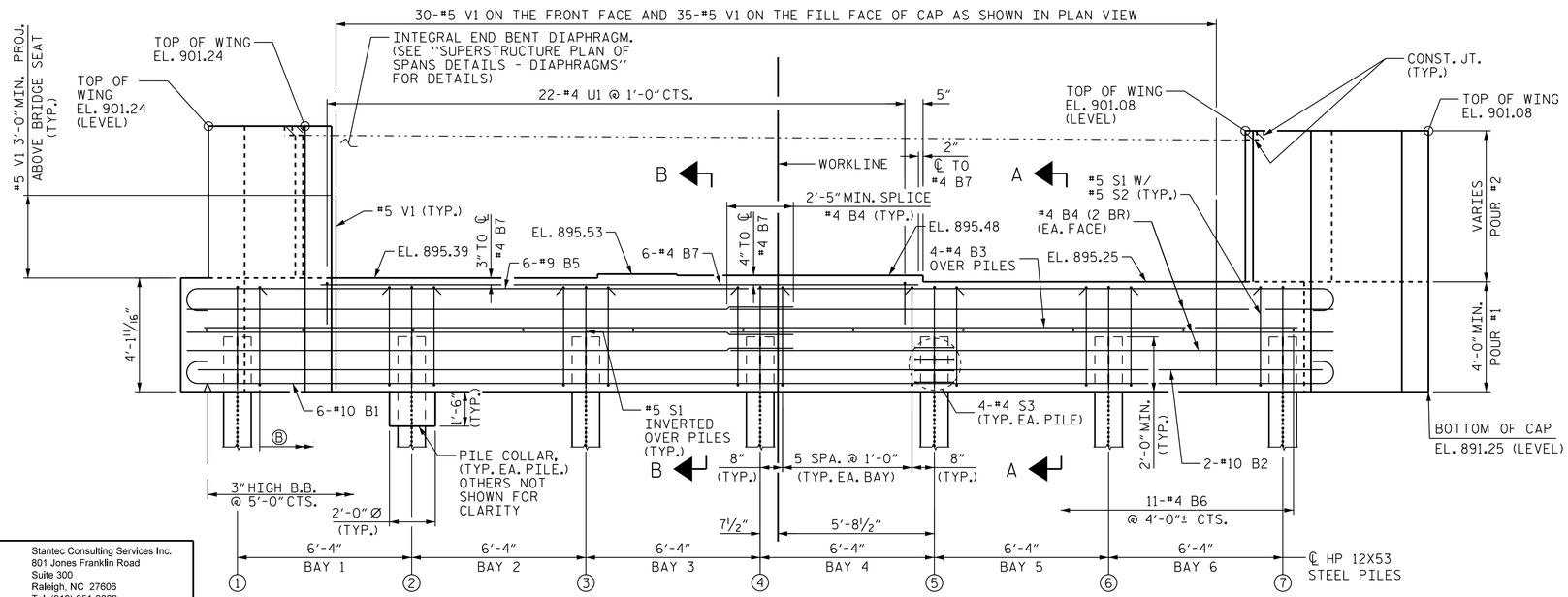


PLAN



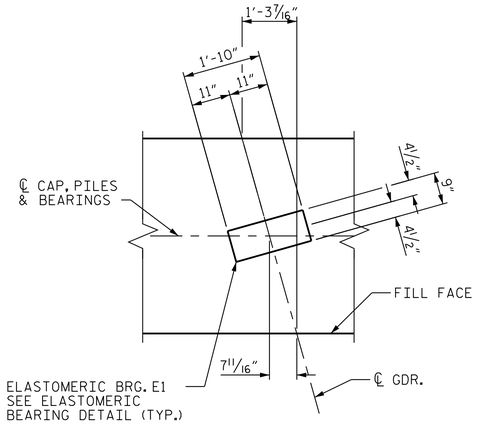
ELEVATION

NOTES

FOR WING WALL DETAILS, SEE "END BENT 1, DETAILS - WING WALLS" SHT. 2 OF 3.

(2 BR) DENOTES 2 BAR RUN.

CHAMFERS ARE NOT REQUIRED EXCEPT AS NOTED.



DETAIL A

DIMENSIONS TYPICAL FOR EACH BEARING

Ⓐ SLOPED CAP SURFACE BEYOND LIMIT OF INTEGRAL DIAPH. SEE END BENT 1 WING WALL DETAILS, SHT. 2 OF 3.

Ⓑ 43-#5 S1 & 36-#5 S2 SPA. AS SHOWN.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUBSTRUCTURE

END BENT 1

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DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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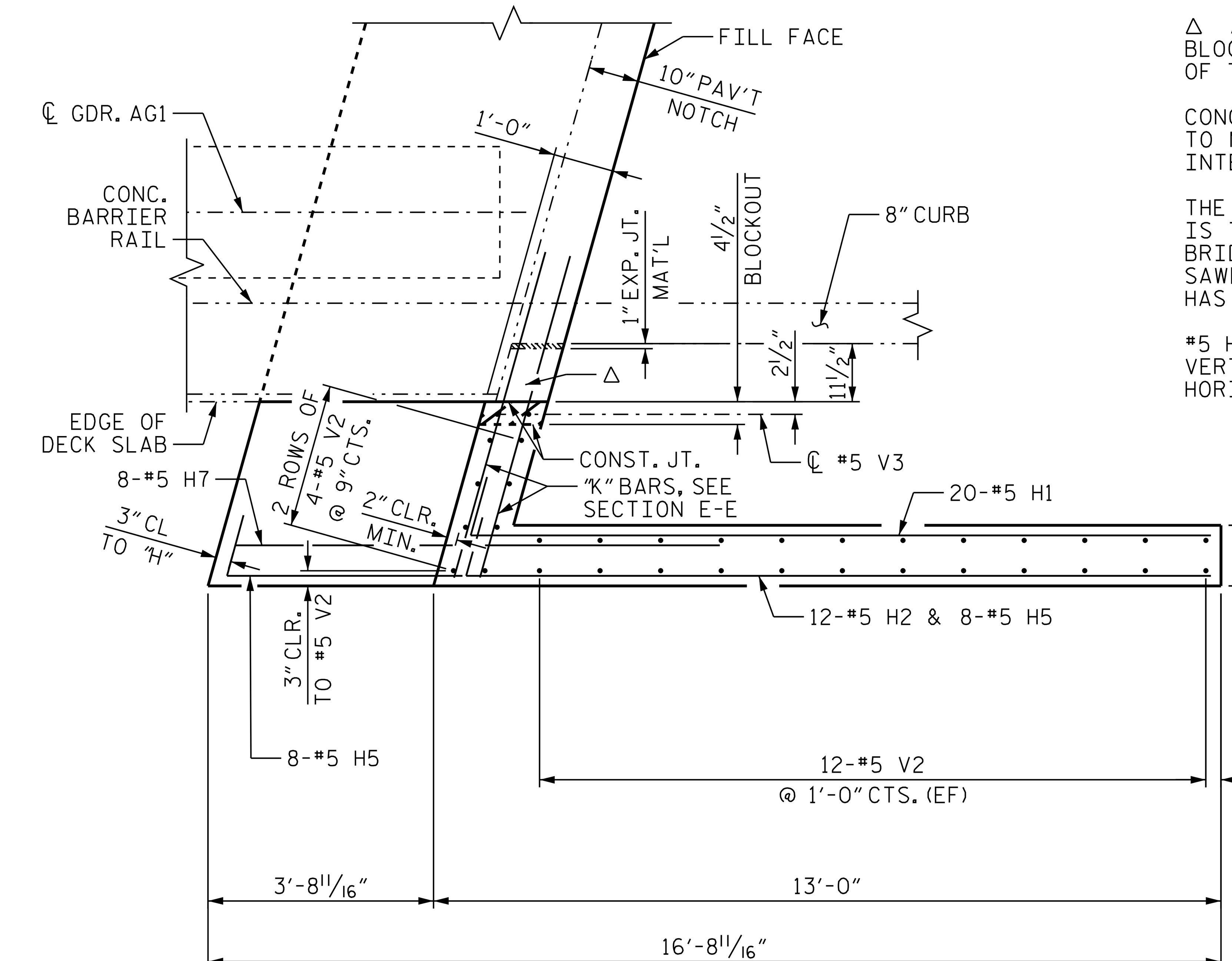
NOTES:

△ AREA BETWEEN APPROACH SLAB CURB AND BLOCKOUT SHALL MATCH THE FINISHED SURFACE OF THE BRIDGE DECK.

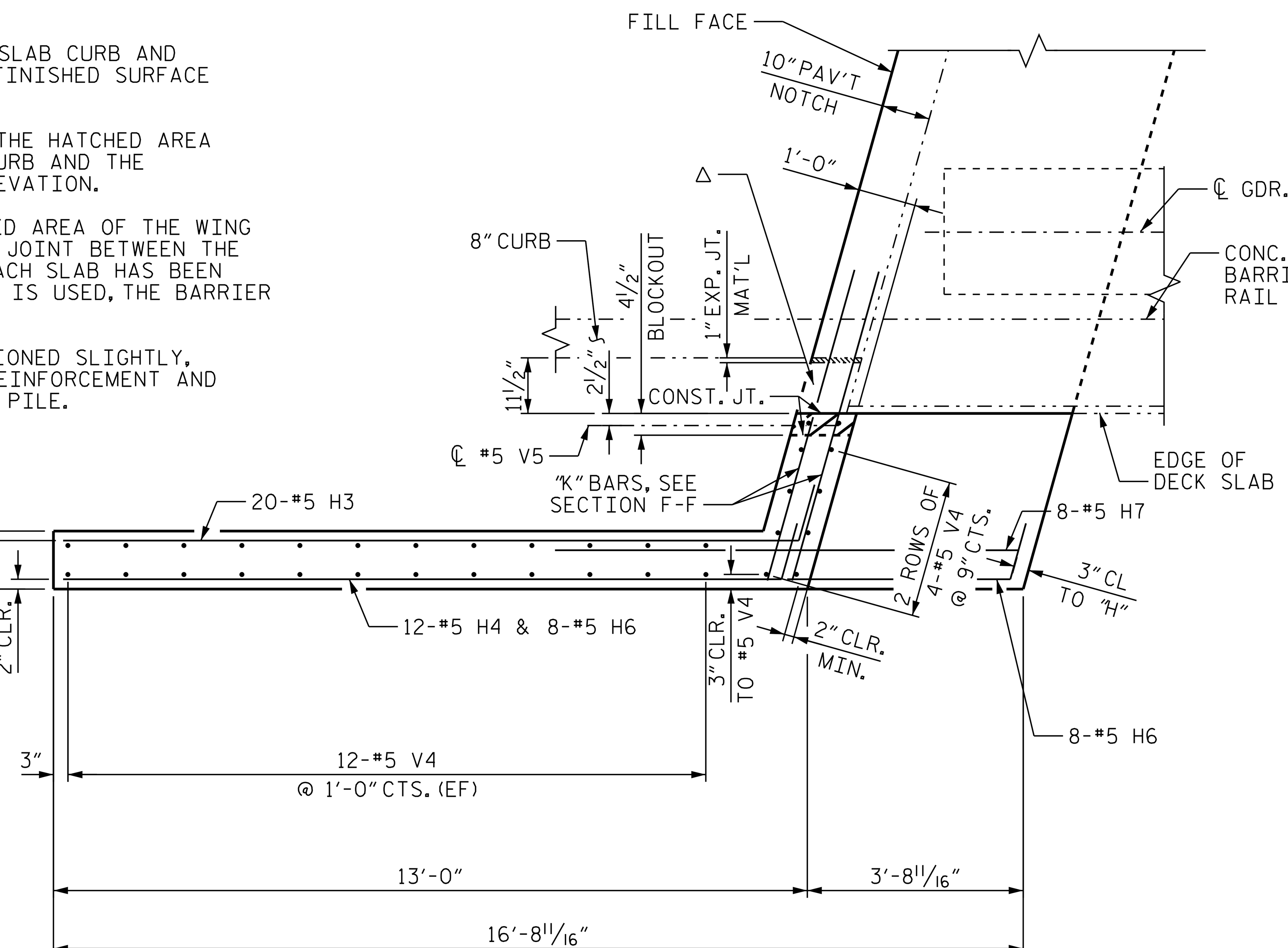
CONCRETE TO BE POURED IN THE HATCHED AREA TO MATCH THE TOP OF THE CURB AND THE INTEGRAL END BENT WING ELEVATION.

THE CONCRETE IN THE HATCHED AREA OF THE WING IS TO BE POURED AFTER THE JOINT BETWEEN THE BRIDGE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND IF SLIP FORMING IS USED, THE BARRIER HAS BEEN CAST.

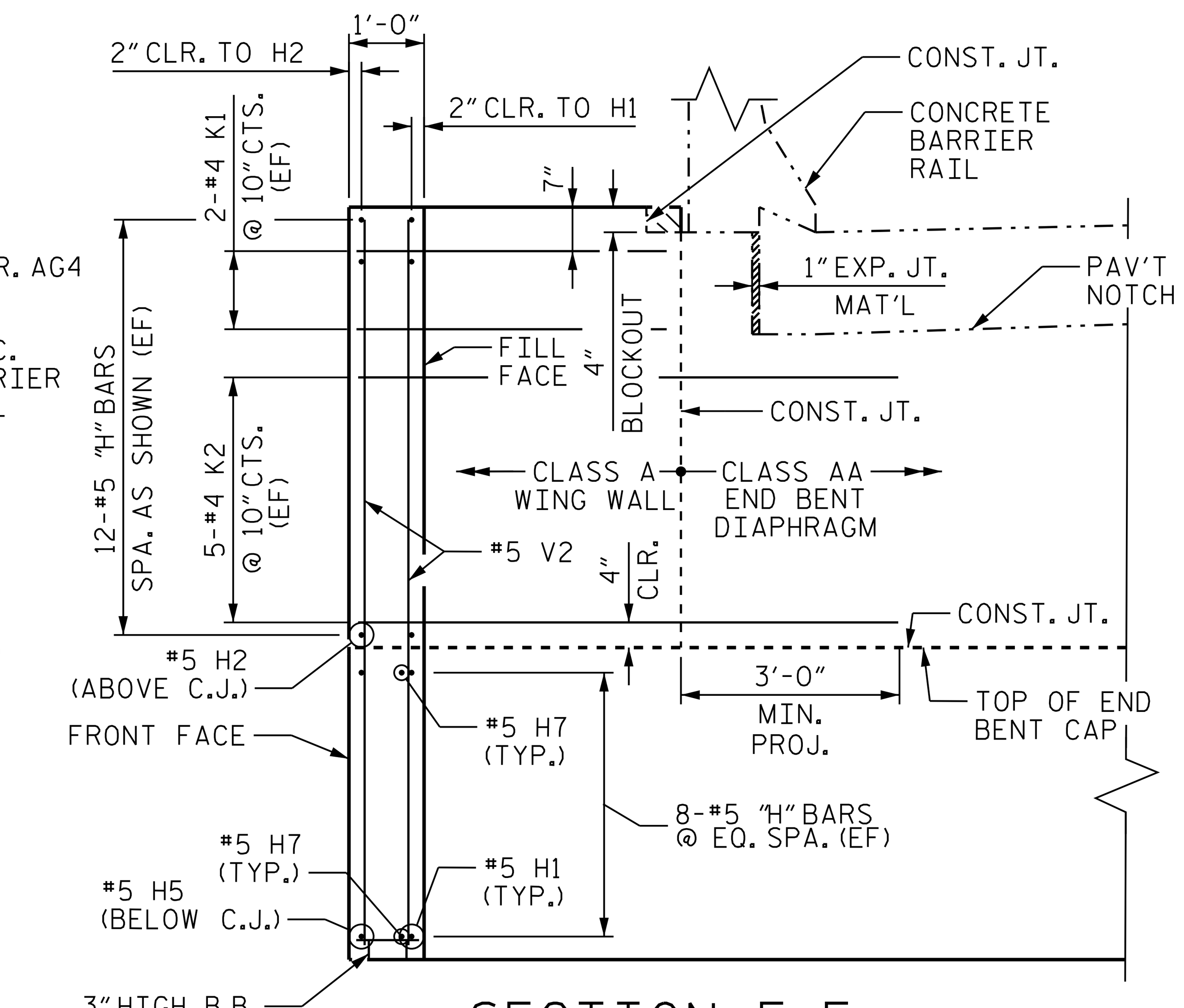
#5 H7 BARS MAY BE REPOSITIONED SLIGHTLY, VERTICALLY TO CLEAR CAP REINFORCEMENT AND HORIZONTALLY TO CLEAR THE PILE.



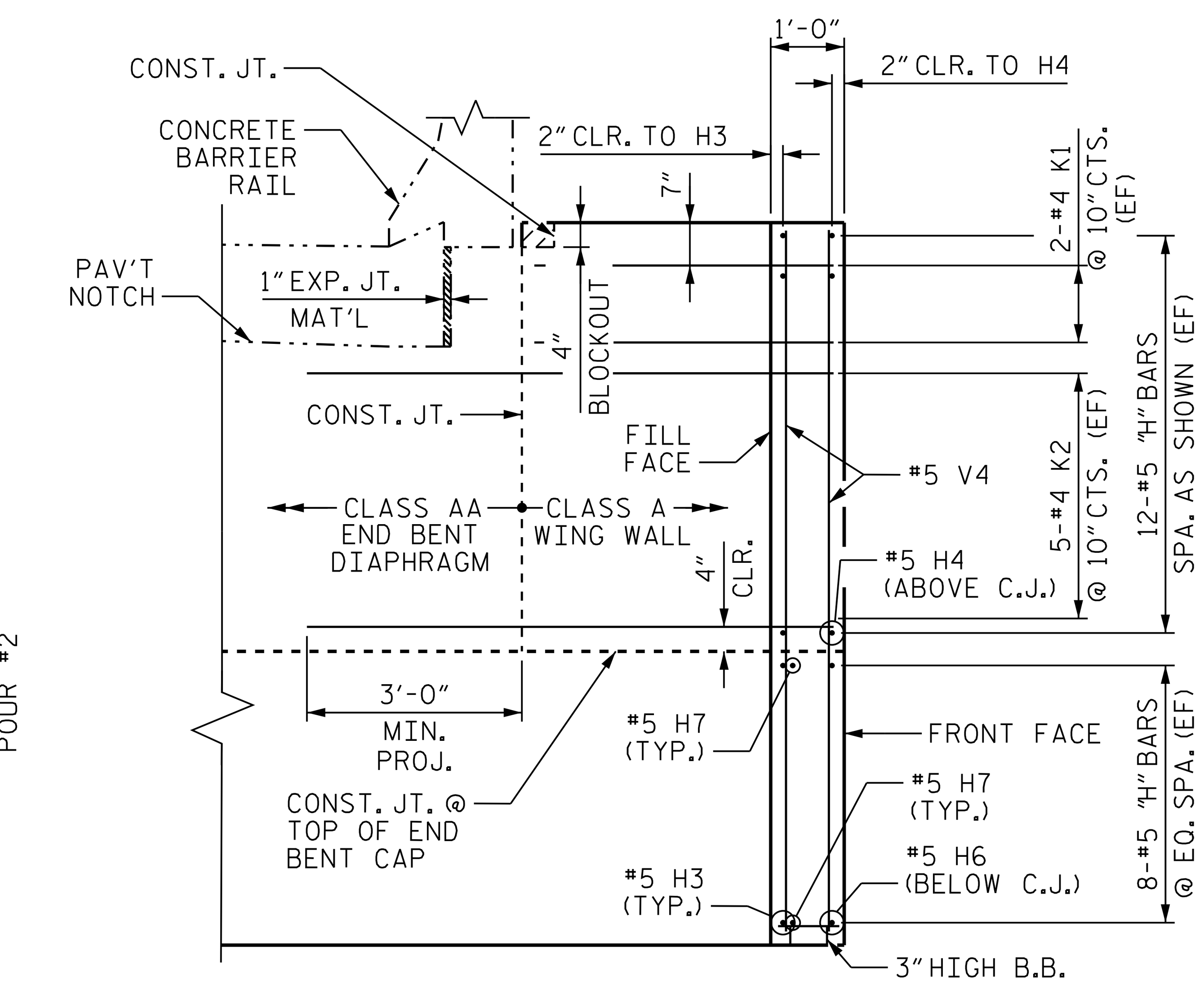
PLAN OF LEFT WING (W1)



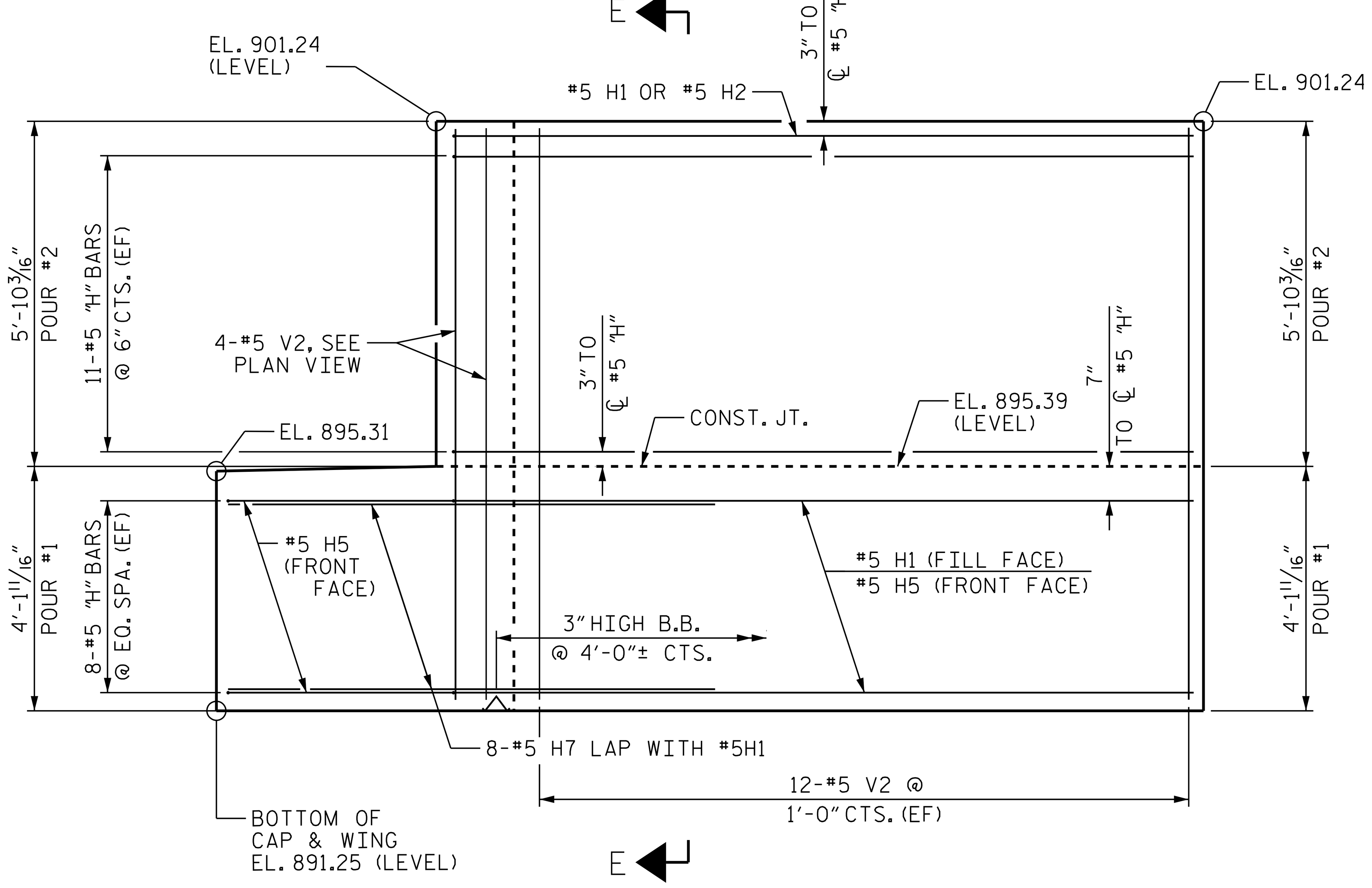
PLAN OF RIGHT WING (W2)



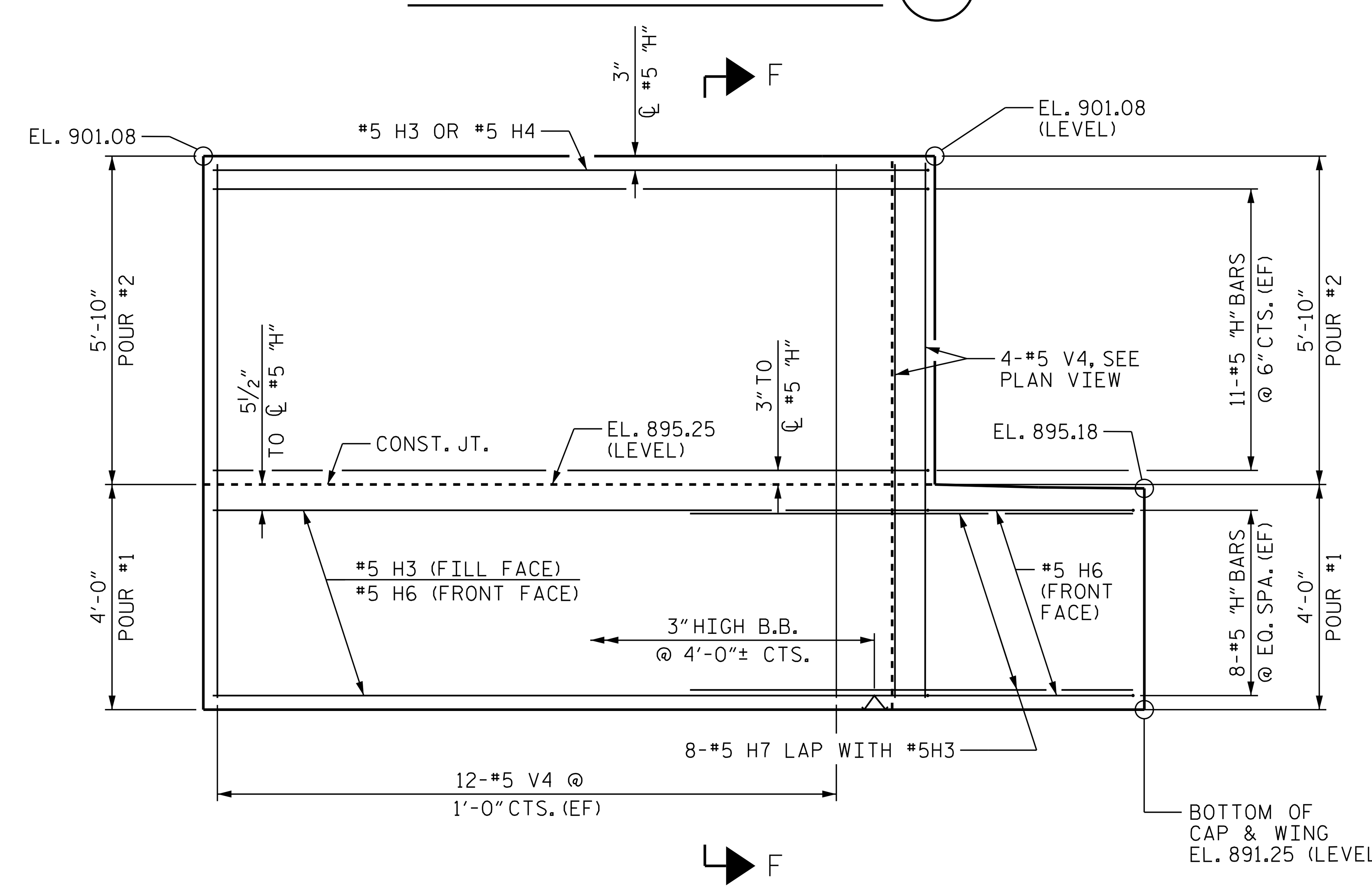
SECTION E-E



SECTION F-F



ELEVATION OF LEFT WING (W1)



ELEVATION OF RIGHT WING (W2)

NOTE: TOP SURFACE OF END BENT CAP BETWEEN EDGE OF DECK SLAB AND END OF CAP SHALL BE SLOPED TRANSVERSELY FROM EXPOSED FACE OF THE WING TO FRONT FACE AT A RATE OF 1/4"/FT.

(EF) DENOTES EACH FACE.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

END BENT 1 WING DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 13406 JOSEPH T. KELVINGTON

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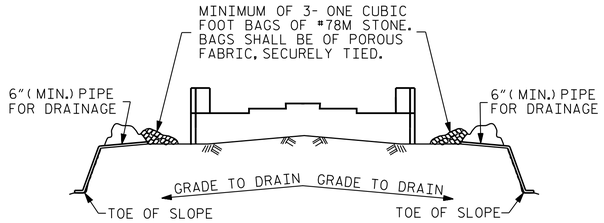
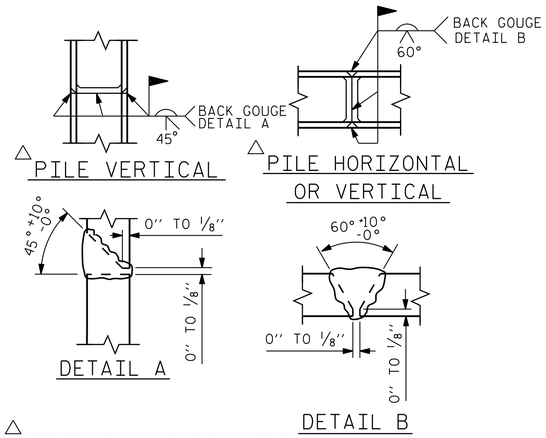


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

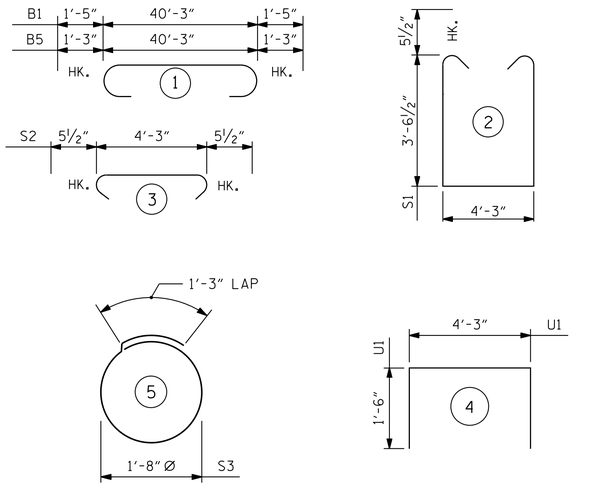
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



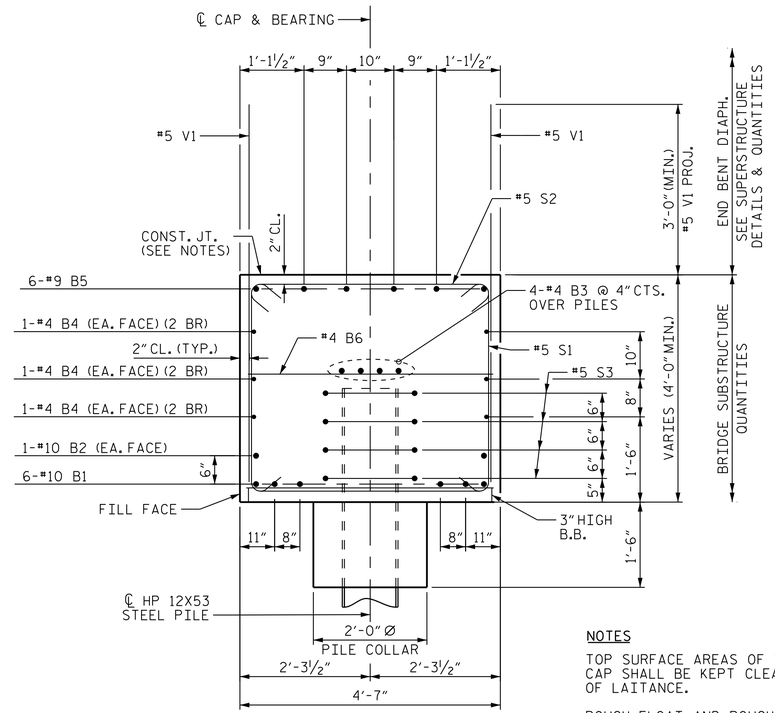
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

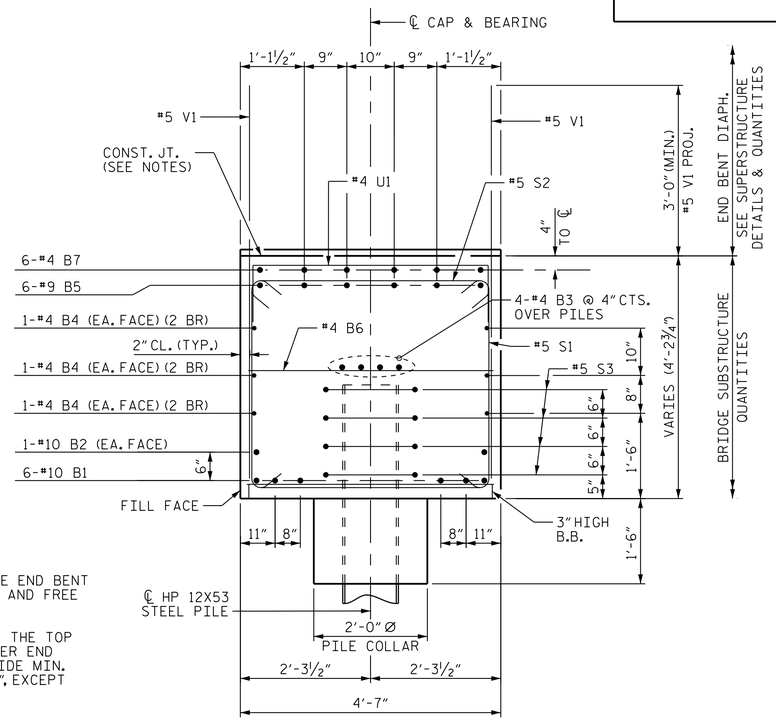
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	43'-1"	1112
B2	2	#10	STR	39'-9"	342
B3	4	#4	STR	39'-9"	106
B4	12	#4	STR	21'-6"	172
B5	6	#9	1	42'-9"	872
B6	11	#4	STR	4'-3"	31
B7	6	#4	STR	21'-8"	87
H1	20	#5	6	13'-4"	278
H2	12	#5	6	13'-6"	169
H3	20	#5	7	13'-9"	287
H4	12	#5	7	13'-7"	170
H5	8	#5	6	17'-3"	144
H6	8	#5	7	17'-4"	145
H7	16	#5	STR	8'-0"	134
K1	8	#4	STR	2'-4"	12
K2	20	#4	STR	6'-0"	80
S1	43	#5	2	12'-3"	549
S2	36	#5	3	5'-2"	194
S3	28	#4	5	6'-6"	122
U1	22	#4	4	7'-3"	107
V1	65	#5	STR	7'-1"	480
V2	32	#5	STR	9'-7"	320
V3	2	#5	STR	9'-3"	19
V4	32	#5	STR	9'-5"	314
V5	2	#5	STR	9'-1"	19
REINFORCING STEEL					LBS. 6,265

CLASS A CONCRETE BREAKDOWN:	
POUR#1: CAP,COLLARS,LWR. WINGS	C.Y. 33.3
POUR#2: WING WALLS, UPPER WINGS	C.Y. 6.5
CLASS A CONCRETE TOTAL	C.Y. 39.8



SECTION A-A

SEE "END BENT 1", SHEET 1 OF 3.



SECTION B-B

SEE "END BENT 1", SHEET 1 OF 3.

NOTES

TOP SURFACE AREAS OF THE END BENT CAP SHALL BE KEPT CLEAN AND FREE OF LAITANCE.

ROUGH FLOAT AND ROUGHEN THE TOP OF THE END BENT CAP UNDER END BENT DIAPHRAGM TO PROVIDE MIN. SURFACE AMPLITUDE OF ¼", EXCEPT UNDER BEARING AREAS.

2 BR DENOTES 2 BAR RUN.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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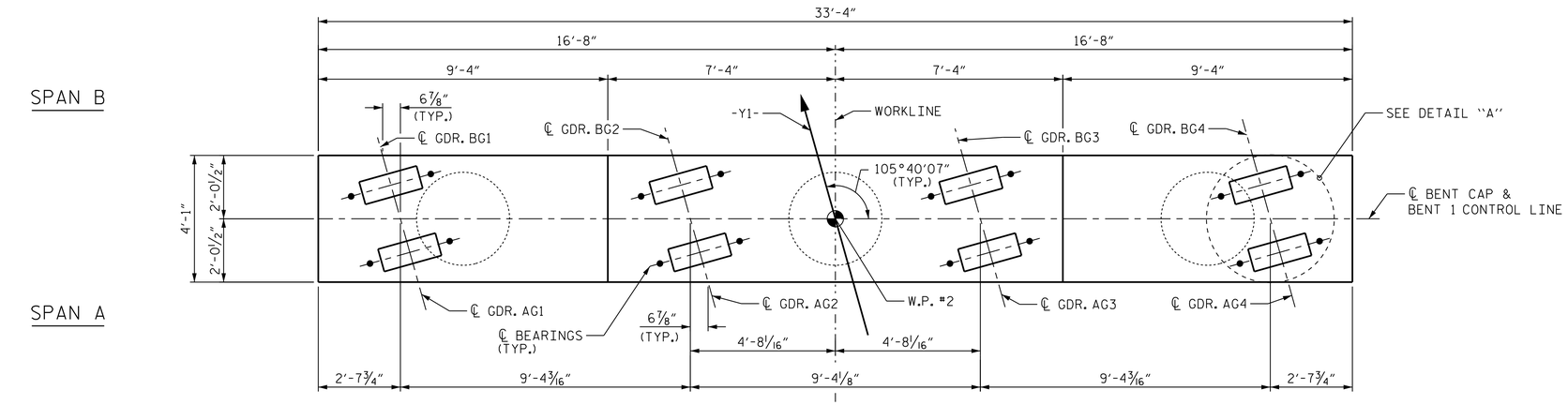
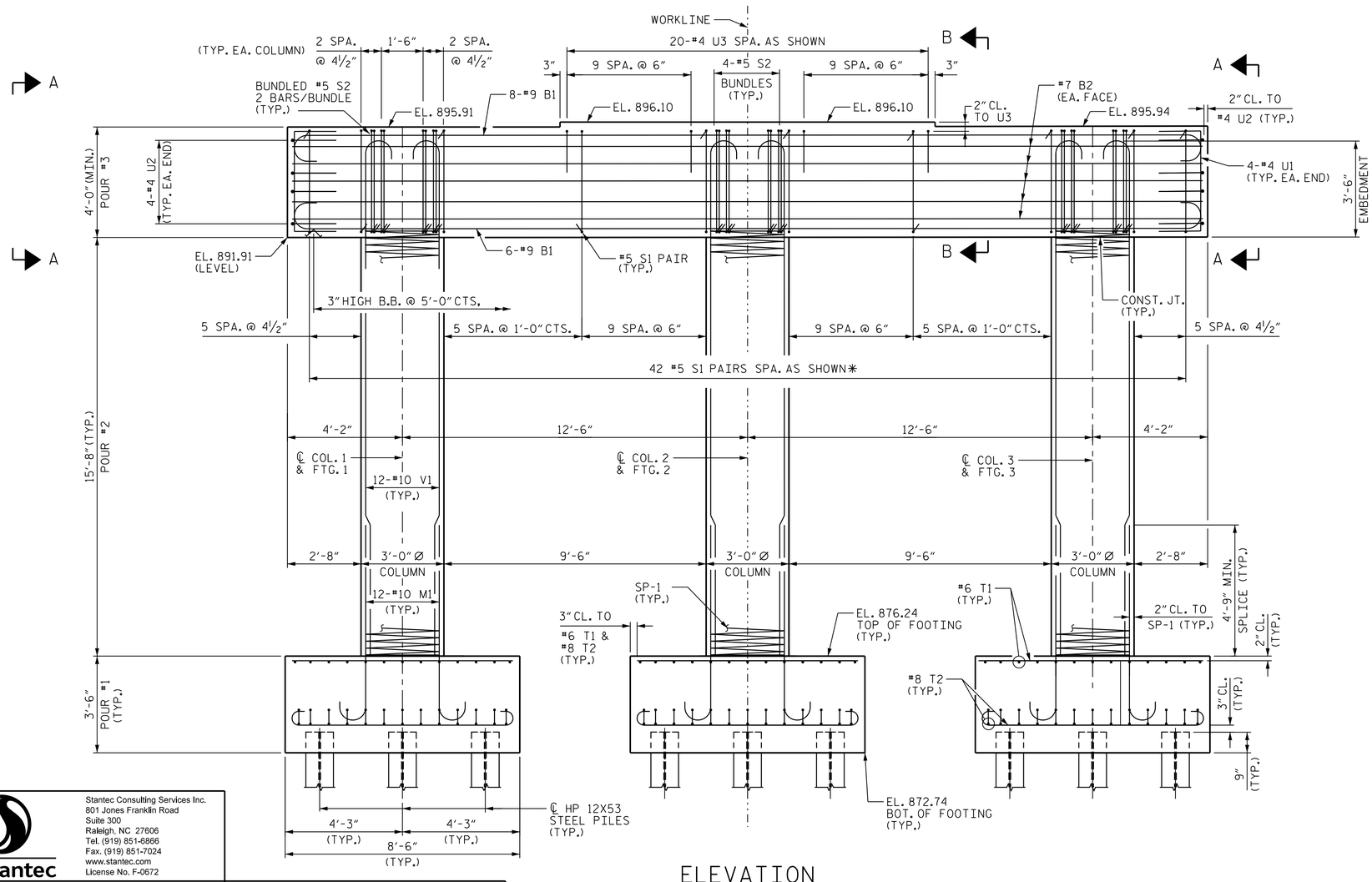
DRAWN BY :	J. B. GEILE	DATE : 01/10/18	DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23
CHECKED BY :	N. D'AIUTO	DATE : 02/13/18	



PLAN



ELEVATION

NOTES

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

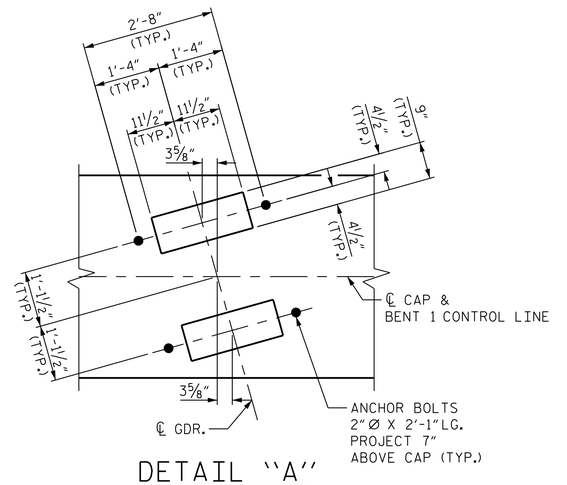
HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

FOR VIEW A-A, SEE "BENT 1 DETAILS", SHEET 2 OF 2.

FOR PILE SPLICE DETAILS, SEE "END BENT 1 DETAILS", SHEET 3 OF 3.

FOR SECTION B-B, SEE "BENT 1 DETAILS", SHEET 2 OF 2.

✳ INVERT ALTERNATE STIRRUPS



DETAIL "A"

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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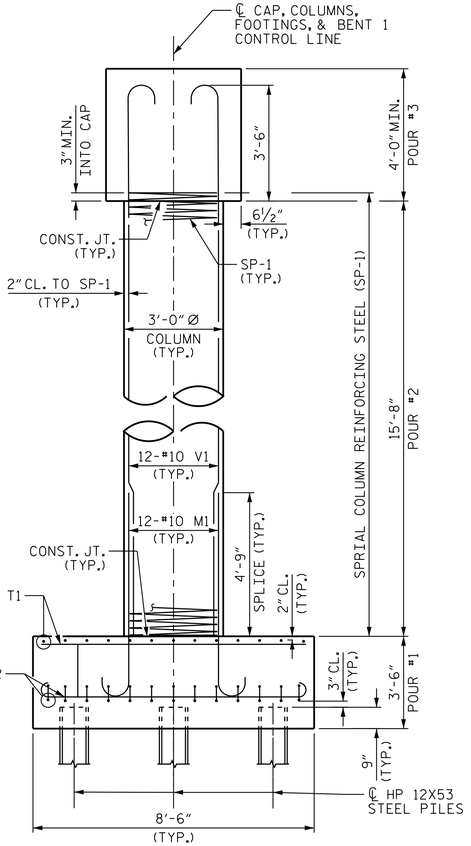
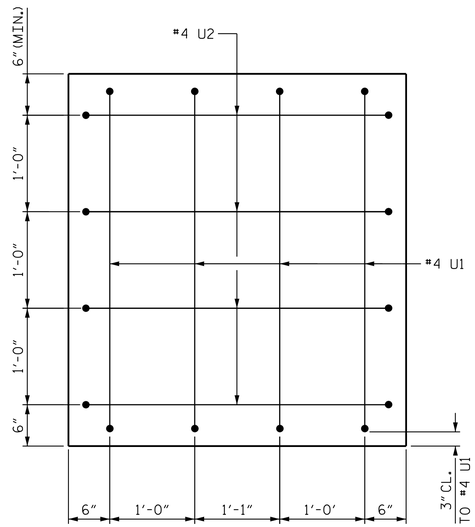
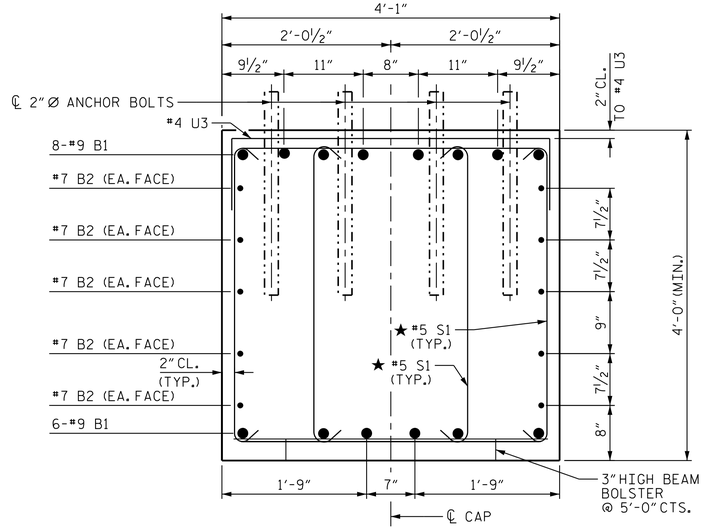
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23



END VIEW



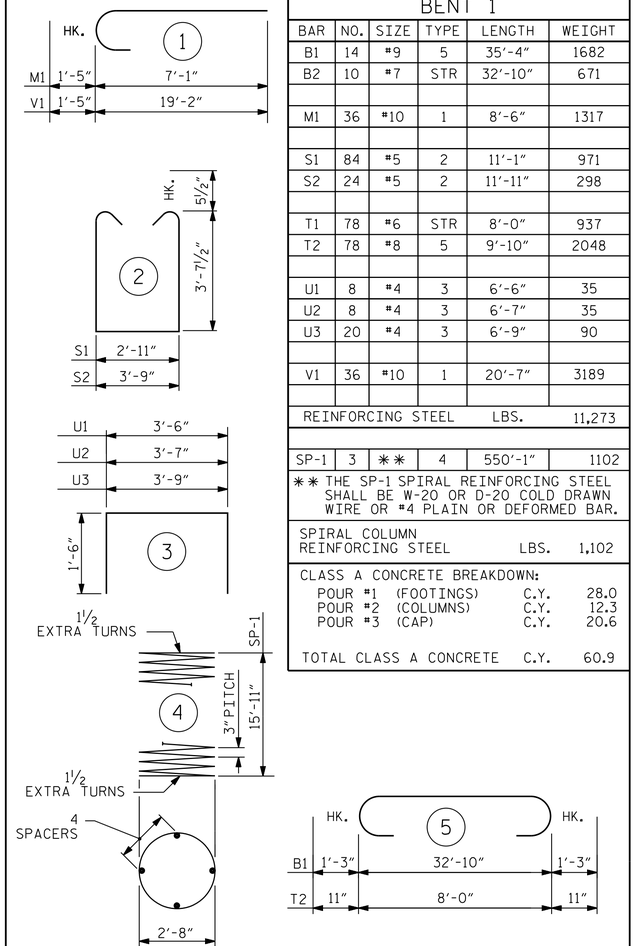
VIEW A-A



SECTION B-B

★INVERT ALTERNATE STIRRUPS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 1

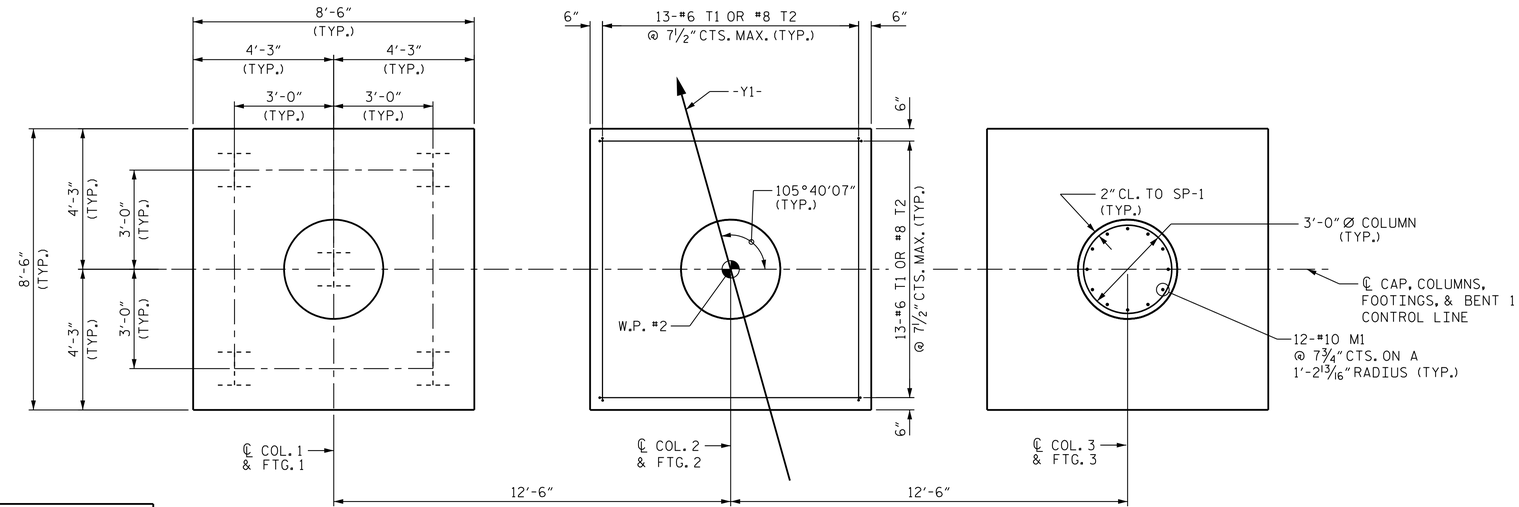
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#9	5	35'-4"	1682
B2	10	#7	STR	32'-10"	671
M1	36	#10	1	8'-6"	1317
S1	84	#5	2	11'-1"	971
S2	24	#5	2	11'-11"	298
T1	78	#6	STR	8'-0"	937
T2	78	#8	5	9'-10"	2048
U1	8	#4	3	6'-6"	35
U2	8	#4	3	6'-7"	35
U3	20	#4	3	6'-9"	90
V1	36	#10	1	20'-7"	3189
REINFORCING STEEL			LBS.		11,273
SP-1	3	**	4	550'-1"	1102

** THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W-20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

SPIRAL COLUMN REINFORCING STEEL	LBS.	1,102

CLASS A CONCRETE BREAKDOWN:

POUR #1	(FOOTINGS)	C.Y.	28.0
POUR #2	(COLUMNS)	C.Y.	12.3
POUR #3	(CAP)	C.Y.	20.6
TOTAL CLASS A CONCRETE		C.Y.	60.9



PLAN OF FOOTING AND COLUMNS

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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NOTES

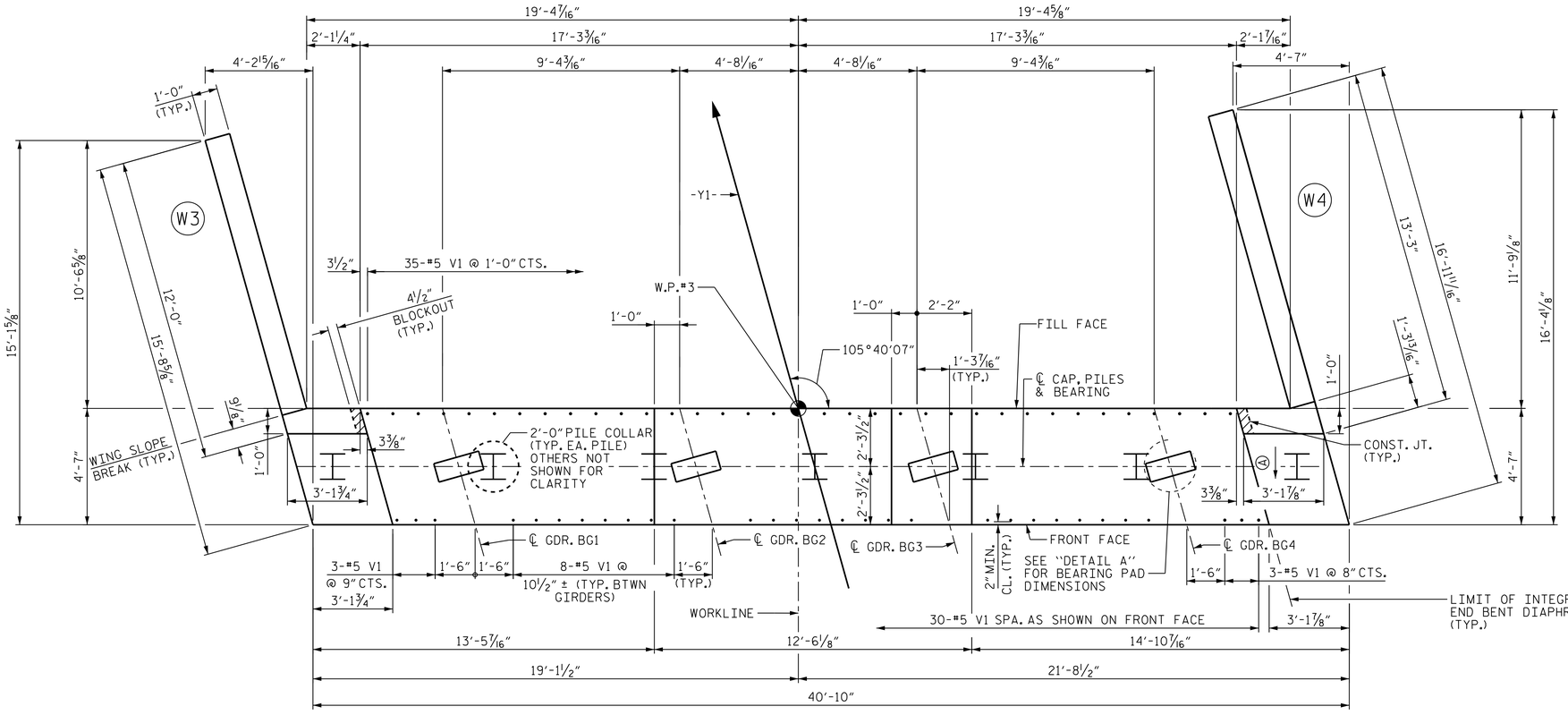
FOR WING WALL DETAILS, SEE "END BENT 2 DETAILS - WING WALLS" SHT. 2 OF 3.

2 BR DENOTES 2 BAR RUN.

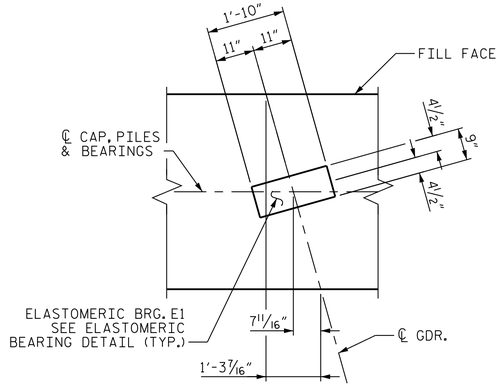
CHAMFERS ARE NOT REQUIRED EXCEPT AS NOTED.

Ⓐ SLOPE CAP SURFACE BEYOND LIMIT OF INTEGRAL DIAPH. SEE END BENT 2 WING WALL DETAILS, SHT. 2 OF 3.

✱ PLACE 1" EXP. JT. MAT'L. IN APPROACH SLAB PAV'T. NOTCH.

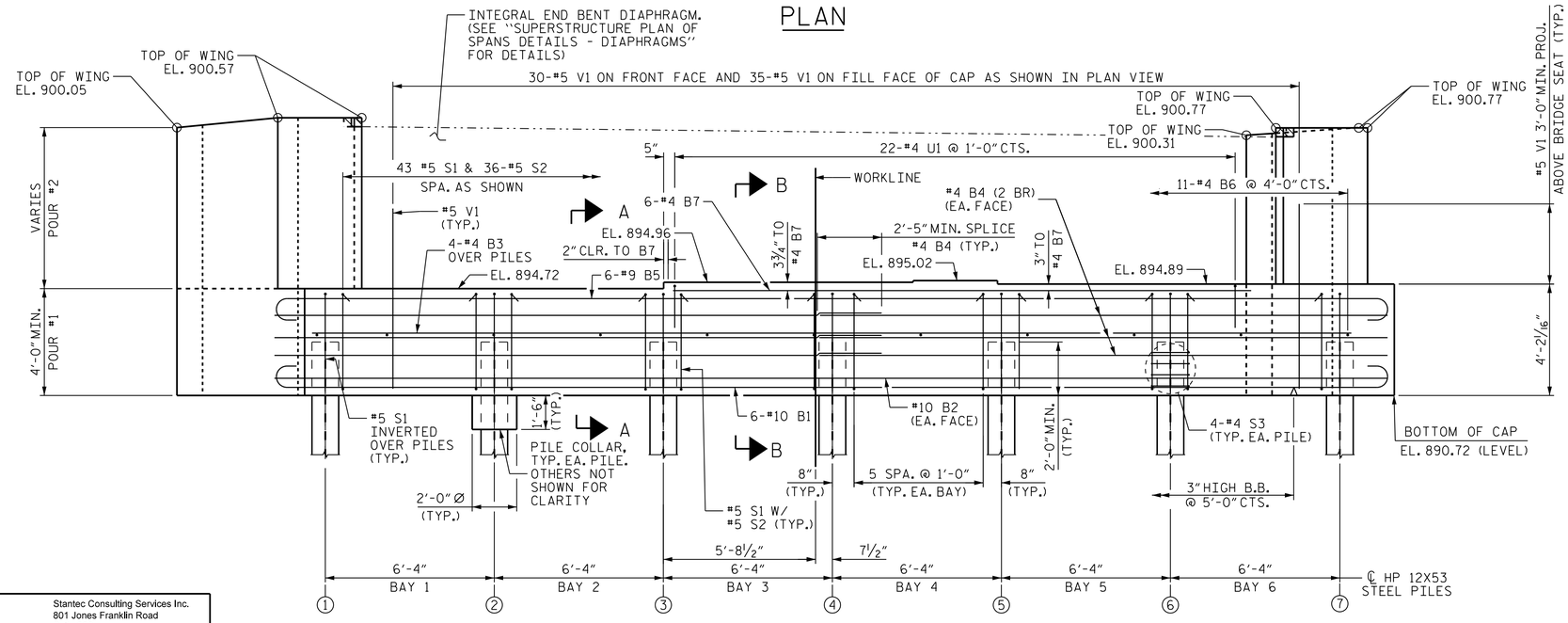


PLAN



DETAIL A

DIMENSIONS TYPICAL FOR EACH BEARING



ELEVATION

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

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NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Digitally signed by: Joseph T. Kelvington
4/27/2023

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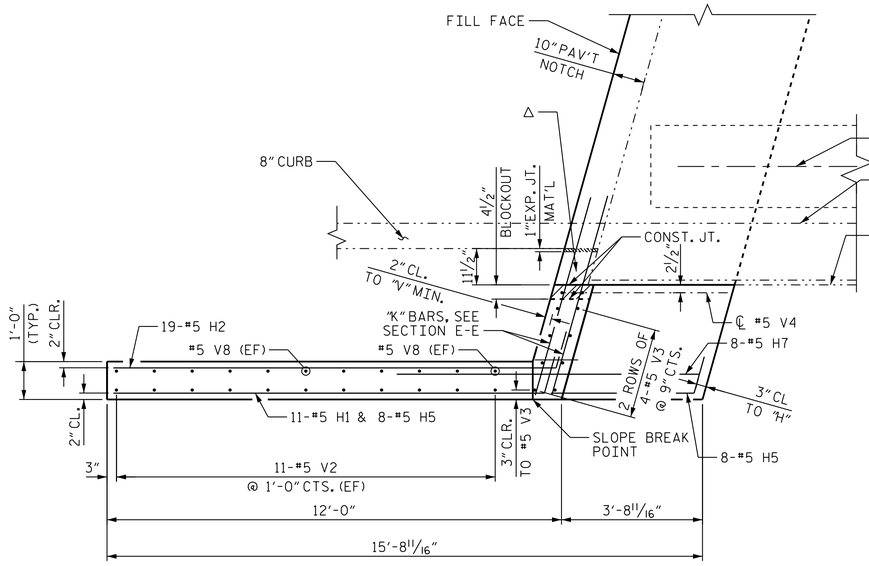
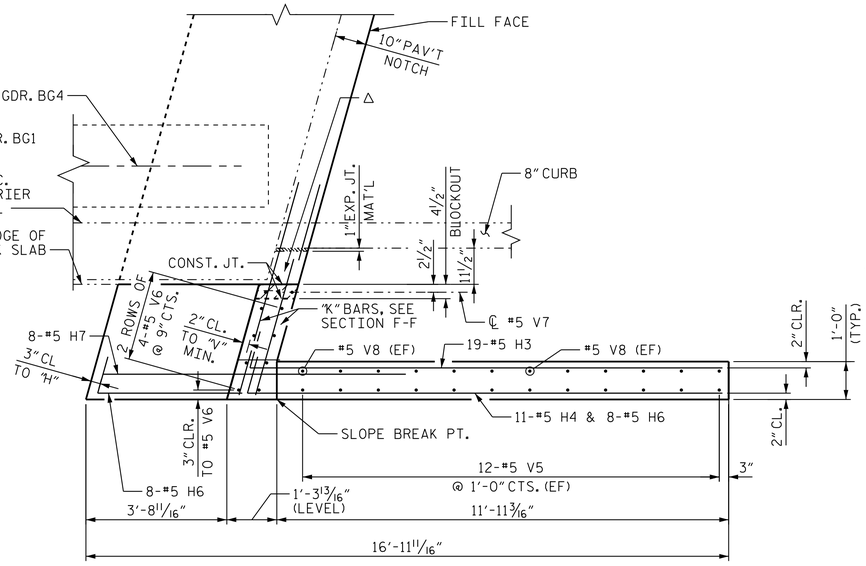
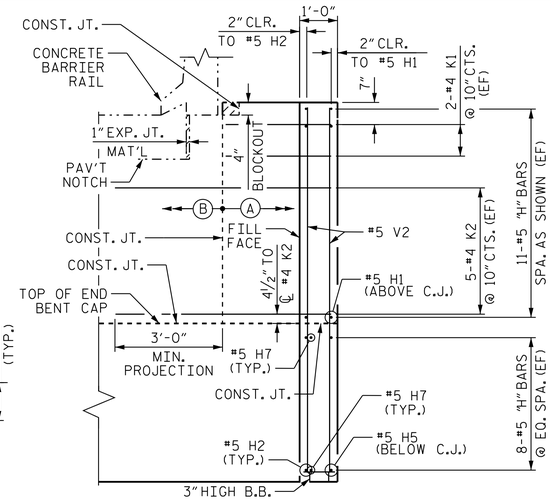
SHEET NO. S1-27
TOTAL SHEETS 32



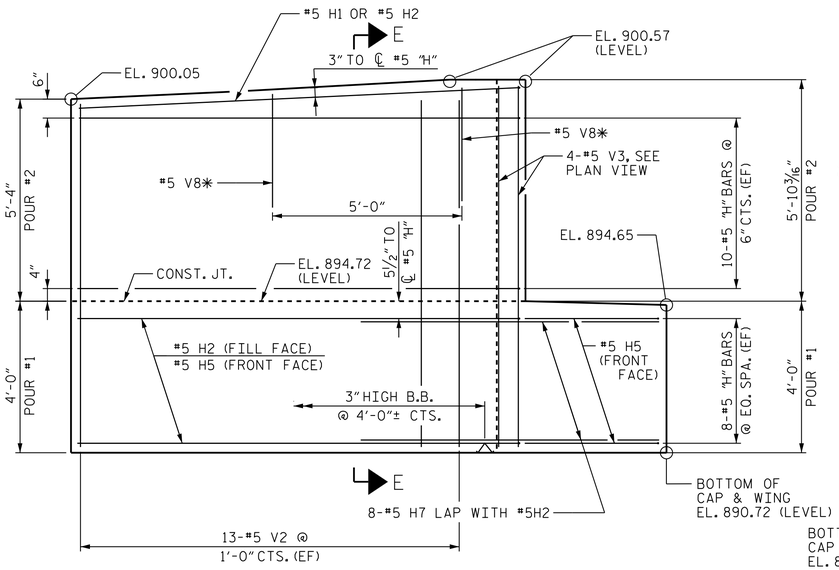
PLAN OF LEFT WING (W3)



PLAN OF RIGHT WING (W4)

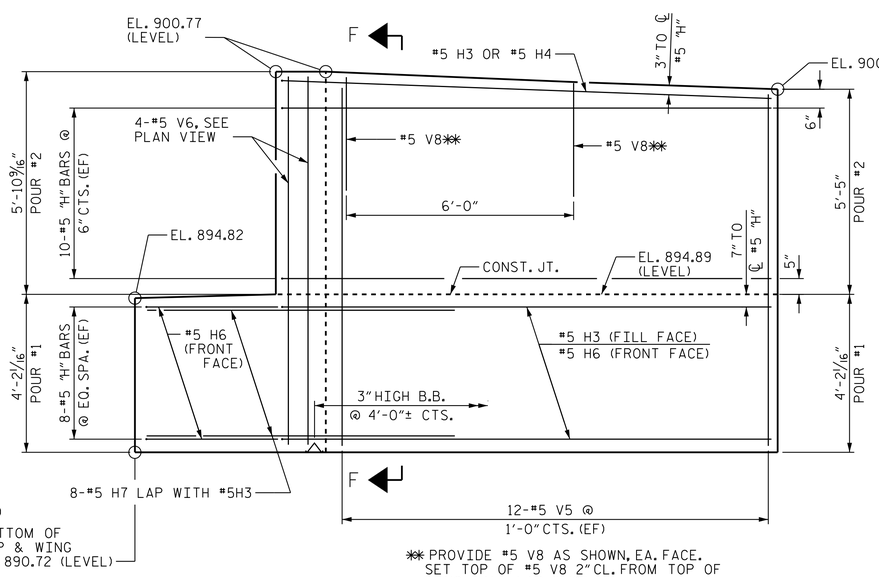


SECTION E-E



ELEVATION OF LEFT WING (W3)

✳ PROVIDE #5 V8 AS SHOWN, EA. FACE. SET TOP OF #5 V8 2" CL. FROM TOP OF WING WALL. LAP W/ #5 V2.



ELEVATION OF RIGHT WING (W4)

✳✳ PROVIDE #5 V8 AS SHOWN, EA. FACE. SET TOP OF #5 V8 2" CL. FROM TOP OF WING WALL. LAP W/ #5 V5.

NOTE: TOP SURFACE OF END BENT CAP BETWEEN EDGE OF DECK SLAB AND END OF CAP SHALL BE SLOPED TRANSVERSELY FROM EXPOSED FACE OF THE WING TO FRONT FACE AT A RATE OF 1/4"/FT.

(EF) DENOTES EACH FACE.

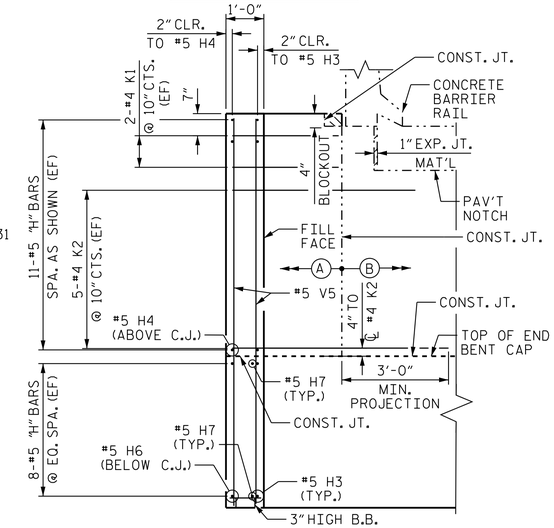
NOTES:

△ AREA BETWEEN APPROACH SLAB CURB AND BLOCKOUT SHALL MATCH THE FINISHED SURFACE OF THE BRIDGE DECK.

CONCRETE TO BE POURED IN THE HATCHED AREA TO MATCH THE TOP OF THE CURB AND THE INTEGRAL END BENT WING ELEVATION.

THE CONCRETE IN THE HATCHED AREA OF THE WING IS TO BE POURED AFTER THE JOINT BETWEEN THE BRIDGE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND IF SLIP FORMING IS USED, THE BARRIER HAS BEEN CAST.

#5 H7 BARS MAY BE REPOSITIONED SLIGHTLY, VERTICALLY TO CLEAR CAP REINFORCEMENT AND HORIZONTALLY TO CLEAR THE PILE.



SECTION F-F

(A) CLASS A CONC. WING WALL

(B) CLASS AA CONC. END BENT DIAPHRAGM

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 WING DETAILS

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NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH KELVINGTON
Joseph T. Kelvington
4/27/2023

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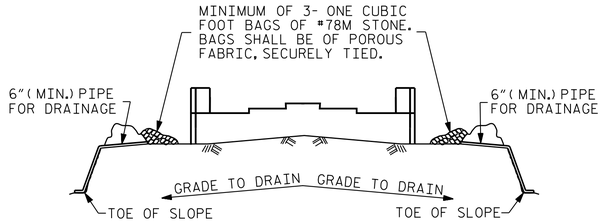
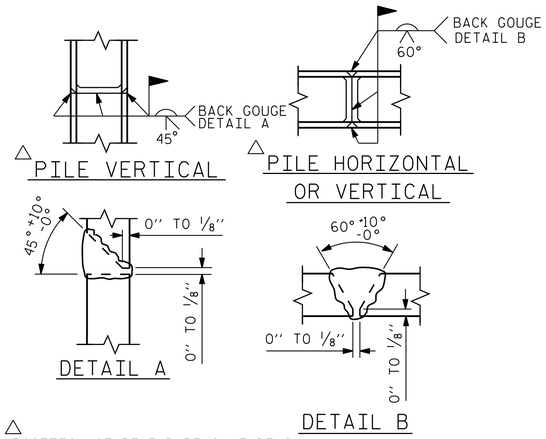


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

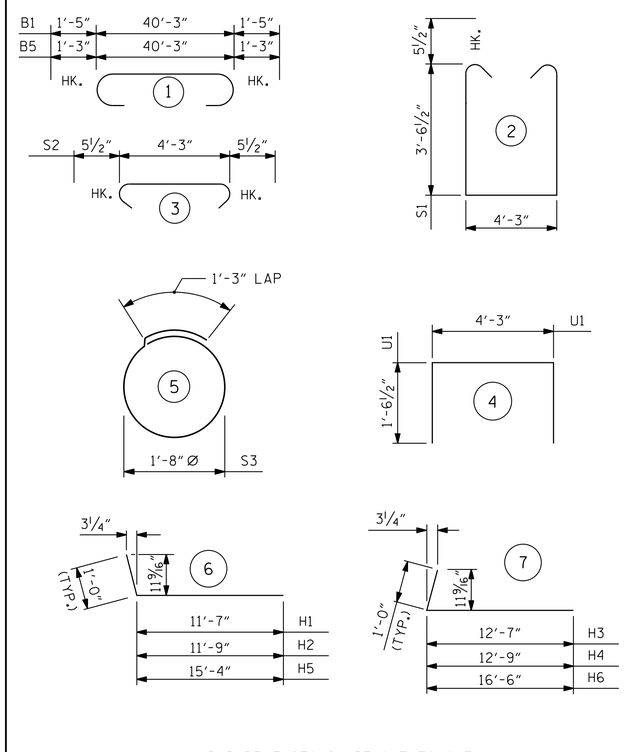
TEMPORARY DRAINAGE AT END BENT



△POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	43'-1"	1112
B2	2	#10	STR	39'-9"	342
B3	4	#4	STR	39'-9"	106
B4	12	#4	STR	21'-6"	172
B5	6	#9	1	42'-9"	872
B6	11	#4	STR	4'-3"	31
B7	6	#4	STR	21'-8"	87
H1	11	#5	6	12'-7"	144
H2	19	#5	6	12'-9"	253
H3	19	#5	7	13'-7"	269
H4	11	#5	7	13'-9"	158
H5	8	#5	6	16'-4"	136
H6	8	#5	7	17'-6"	146
H7	16	#5	STR	8'-0"	134
K1	8	#4	STR	2'-4"	12
K2	20	#4	STR	6'-0"	80
S1	43	#5	2	12'-3"	549
S2	36	#5	3	5'-2"	194
S3	28	#4	5	6'-6"	122
U1	22	#4	4	7'-4"	108
V1	65	#5	STR	7'-0"	475
V2	22	#5	STR	8'-11"	205
V3	8	#5	STR	9'-6"	79
V4	2	#5	STR	9'-2"	19
V5	24	#5	STR	9'-3"	232
V6	8	#5	STR	9'-8"	81
V7	2	#5	STR	9'-4"	19
V8	8	#5	STR	3'-0"	25

REINFORCING STEEL	LBS. 6,162
CLASS A CONCRETE BREAKDOWN:	
POUR #1: CAP, COLLARS, LWR. WINGS	C.Y. 33.3
POUR #2: BACKWALL, UPPER WINGS	C.Y. 6.2
CLASS A CONCRETE TOTAL	C.Y. 39.5

SECTION A-A

SEE "END BENT 2", SHEET 1 OF 3.

SECTION B-B

SEE "END BENT 2", SHEET 1 OF 3.

NOTES

TOP SURFACE AREAS OF THE END BENT CAP SHALL BE KEPT CLEAN AND FREE OF LAITANCE.

ROUGH FLOAT AND ROUGHEN THE TOP OF THE END BENT CAP UNDER END BENT DIAPHRAGM TO PROVIDE MIN. SURFACE AMPLITUDE OF ¼", EXCEPT UNDER BEARING AREAS.

2 BR DENOTES 2 BAR RUN.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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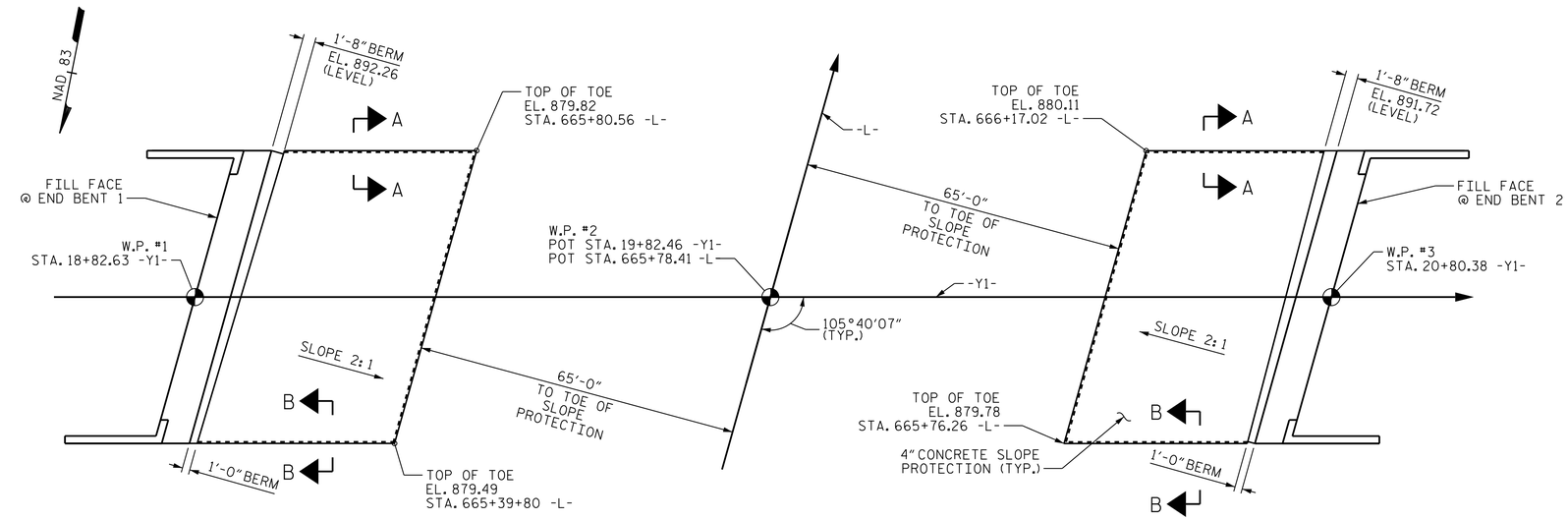
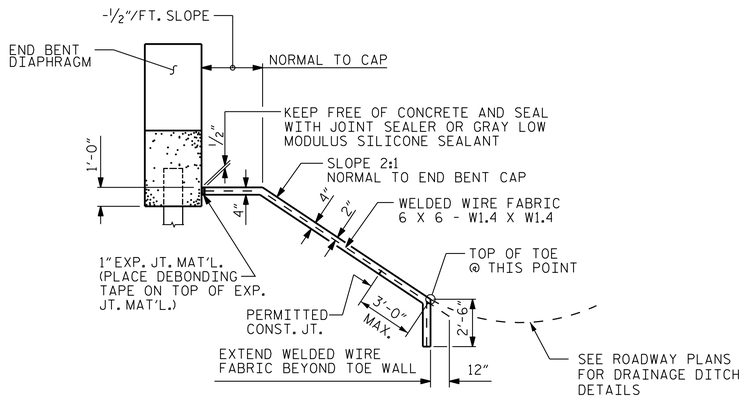
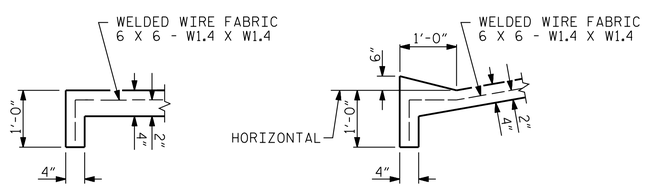


END BENT 1 END BENT 2



SECTION ALONG ℄ OF ROADWAY



SECTION A-A SECTION B-B

DETAILS FOR ALTERNATE ''A''

GENERAL NOTES

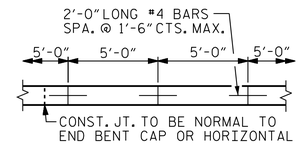
SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. THE CONTRACTOR, AT HIS OPTION, MAY USE ALTERNATE "B" ONLY FOR HIGHWAY OVER HIGHWAY GRADE SEPARATIONS WITH 2:1 END BENT SLOPE IN RURAL, UNPOPULATED AREAS. STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING.

ALTERNATE ''A''

ALTERNATE ''A'' SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

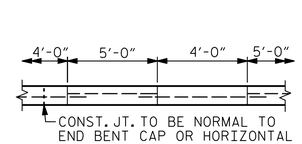
BRIDGE @ STA. 19+82.46 -Y1-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	139	278
END BENT 2	132	264

✳ QUANTITY SHOWN IS BASED ON 5' POURS.



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



POUR A 4'-0'' STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

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NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T KELVINGTON
Joseph T. Kelvington
4/27/2023

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RALEIGH

SLOPE PROTECTION DETAILS

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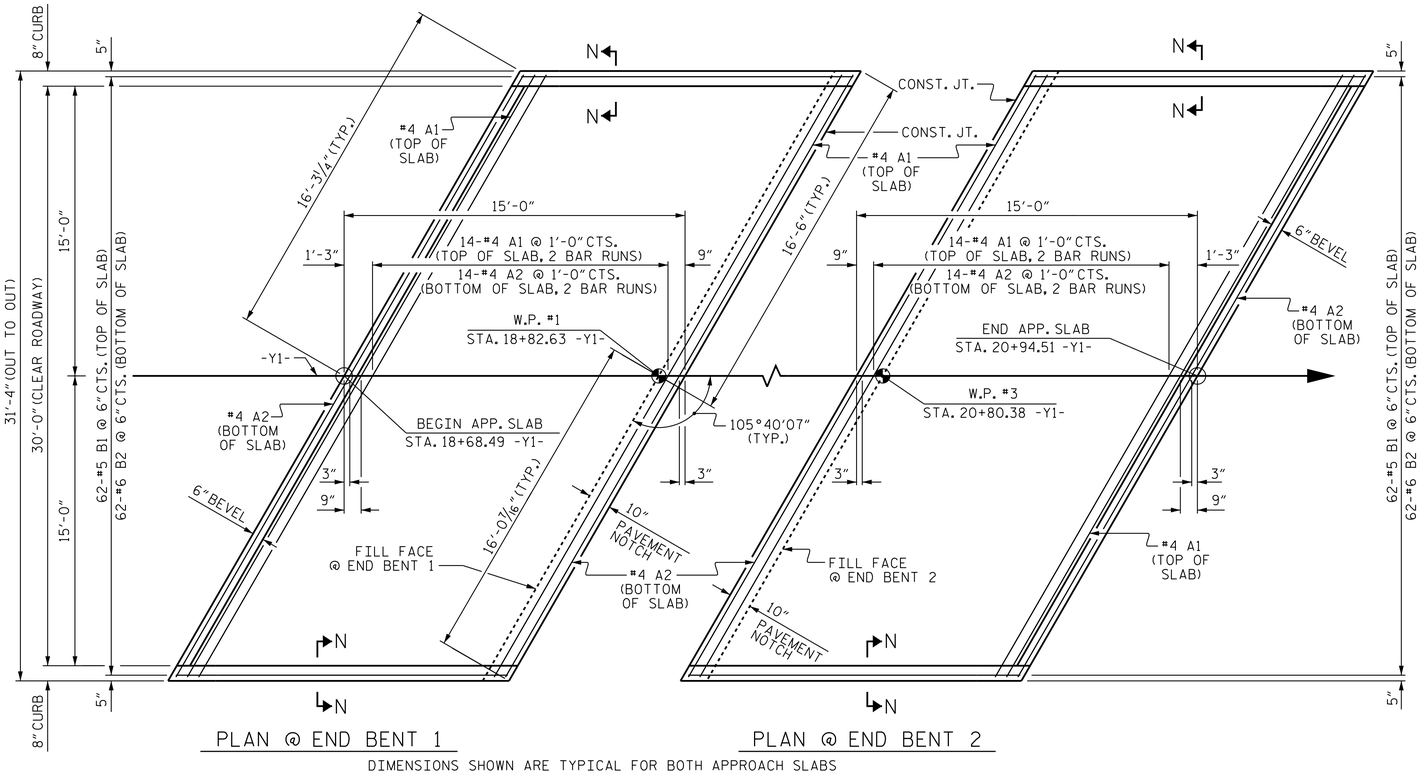


NOTES

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

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

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.

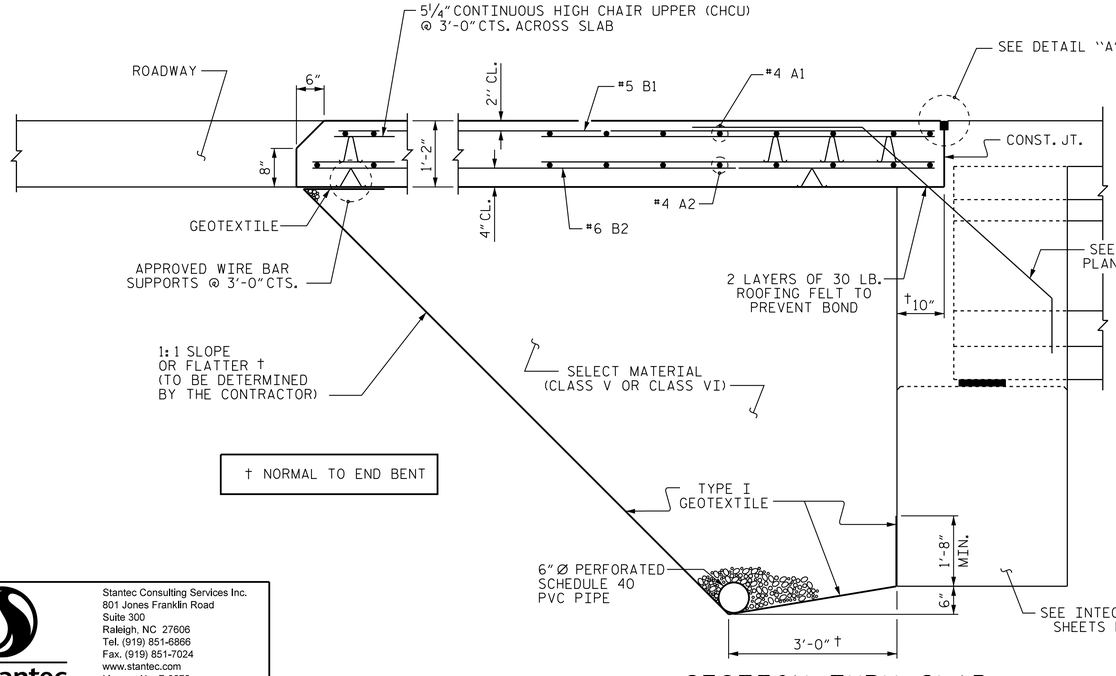
BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	32	#4	STR	17'-1"	365
A2	32	#4	STR	16'-11"	362
✳ B1	62	#5	STR	14'-2"	916
B2	62	#6	STR	14'-8"	1366
REINFORCING STEEL				LBS.	1,728
✳ EPOXY COATED REINFORCING STEEL				LBS.	1,281
CLASS AA CONCRETE				C.Y.	20.3

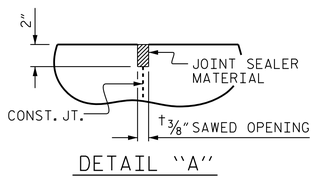
SPLICE LENGTHS

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

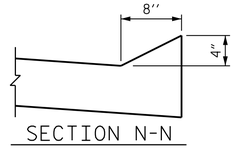


SECTION THRU SLAB

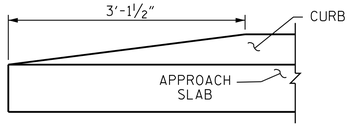
(TYPE II - MODIFIED APPROACH FILL)



DETAIL "A"



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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TOTAL SHEETS 32

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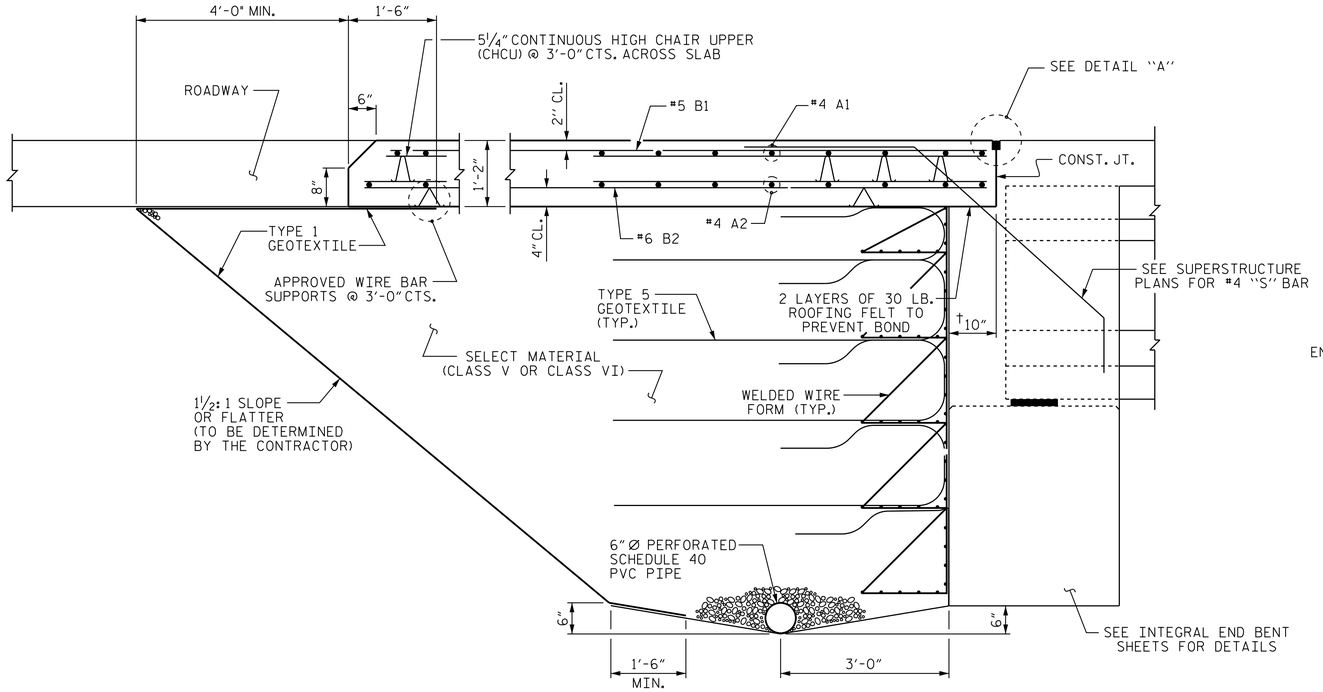
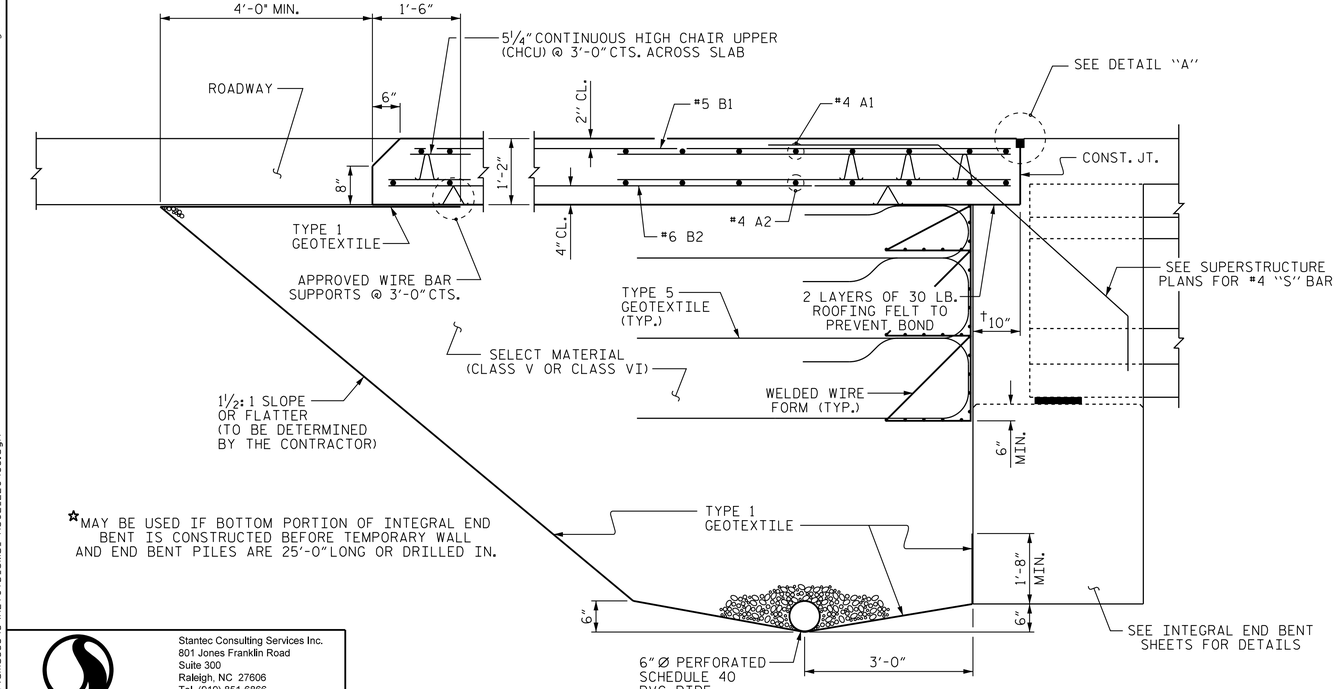
DRAWN BY : J. F. KENNEDY DATE : 01/24/18
CHECKED BY : N. D'AIUTO DATE : 01/25/18
DESIGN ENGINEER OF RECORD: J. KELVINGTON DATE : 04/27/23



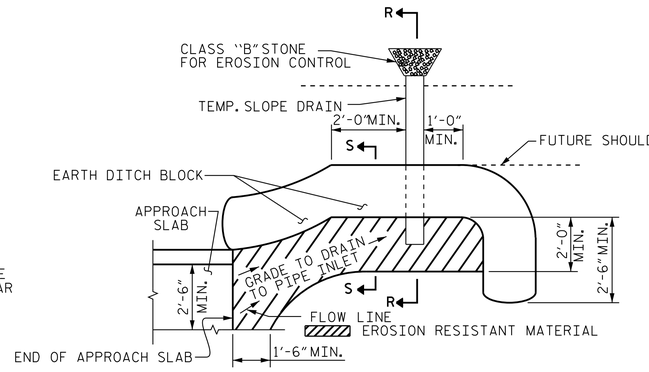
SECTION THRU SLAB

(TYPE A - ALTERNATE APPROACH FILL)



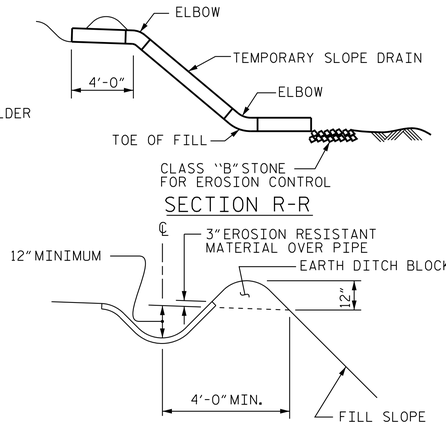
SECTION THRU SLAB

☆(TYPE A - ALTERNATE APPROACH FILL)



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.

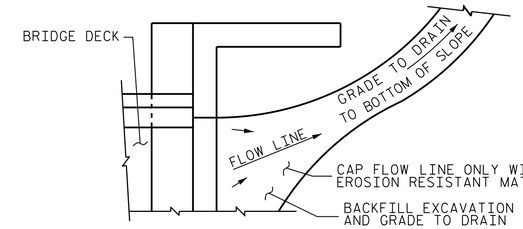
PLAN VIEW



SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

NOTES (TYPE A ALTERNATE)

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

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

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.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 19+82.46 -Y1-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH KELVINGTON

DocuSigned by: Joseph T. Kelvington 4/27/2023

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CHECKED BY :	N. D'AIUTO	DATE :	01/25/18

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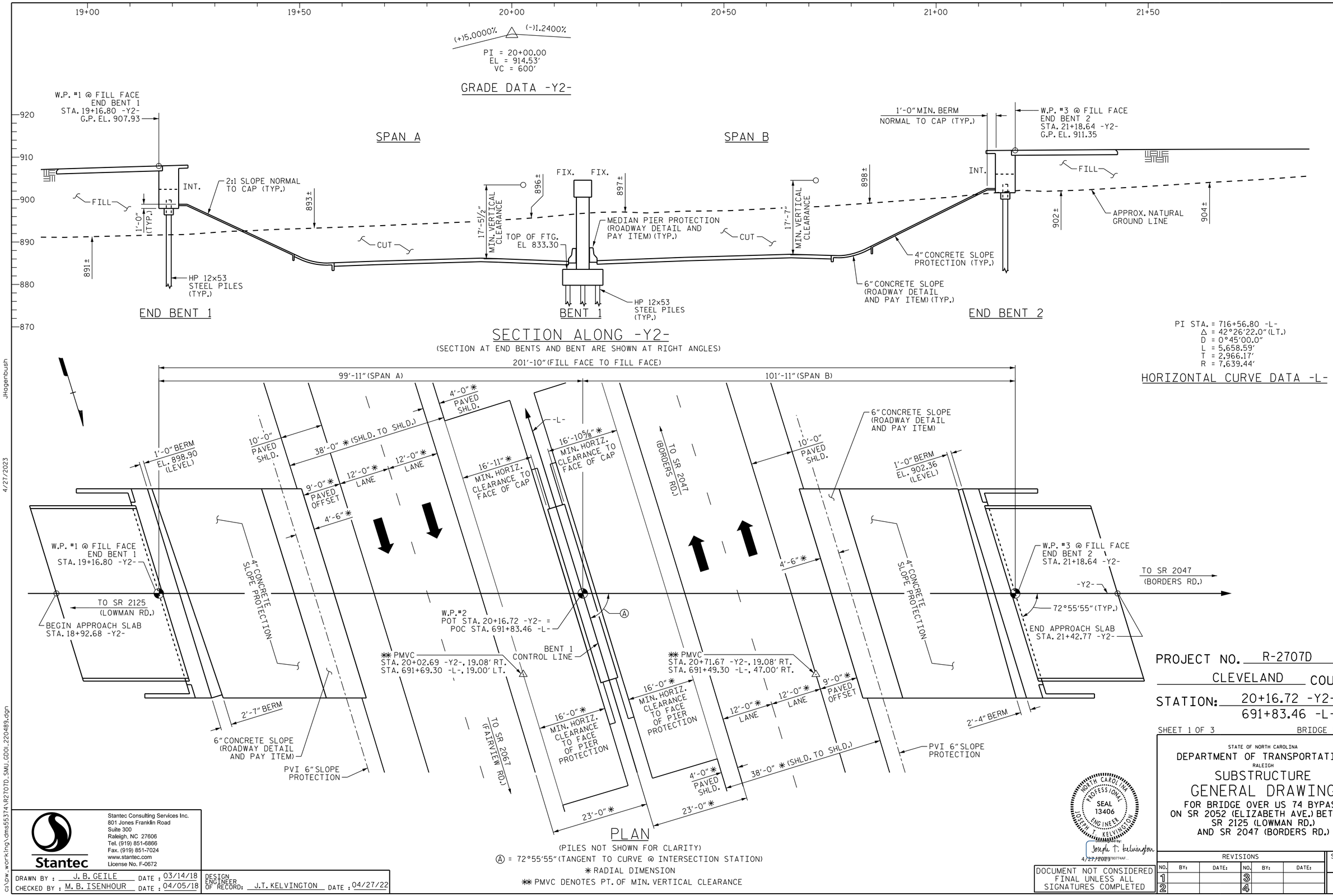

SECTION ALONG -Y2-

(SECTION AT END BENTS AND BENT ARE SHOWN AT RIGHT ANGLES)

PLAN

(PILES NOT SHOWN FOR CLARITY)

Ⓐ = 72°55'55" (TANGENT TO CURVE @ INTERSECTION STATION)

* RADIAL DIMENSION

** PMVC DENOTES PT. OF MIN. VERTICAL CLEARANCE

PI STA. = 716+56.80 -L-
Δ = 42°26'22.0" (LT.)
D = 0°45'00.0"
L = 5,658.59'
T = 2,966.17'
R = 7,639.44'

HORIZONTAL CURVE DATA -L-

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-
691+83.46 -L-

SHEET 1 OF 3 BRIDGE #220489

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2052 (ELIZABETH AVE.) BETWEEN
SR 2125 (LOWMAN RD.)
AND SR 2047 (BORDERS RD.)

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Signed by: Joseph T. Kelvington
4/27/2023

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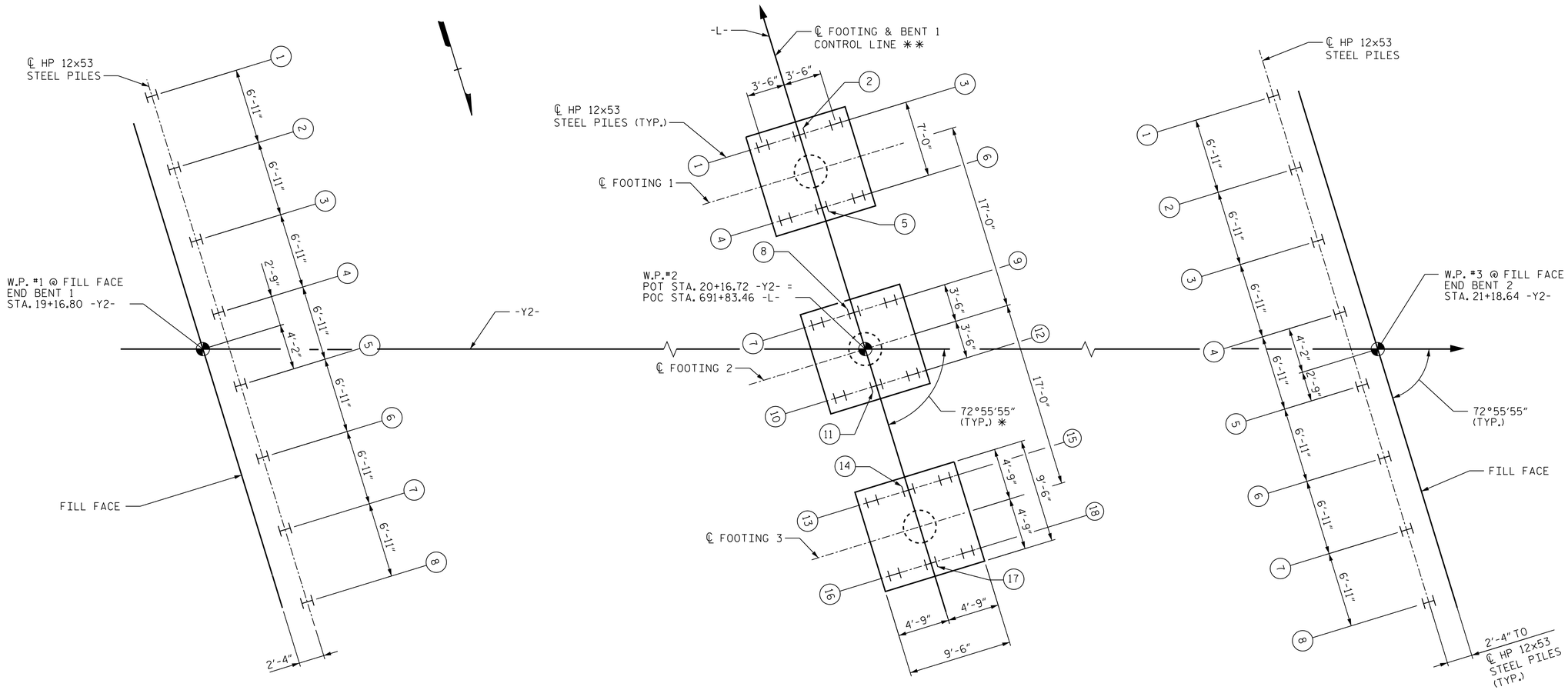
DRAWN BY : J. B. GEILE DATE : 03/14/18
CHECKED BY : M. B. ISENHOUR DATE : 04/05/18

DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22



END BENT 1 | BENT 1 | END BENT 2

* ANGLE @ W.P. #2 MEASURED TO
TANGENT TO CURVE AT -L- STA. 691+83.46

FOUNDATION LAYOUT

NOTE: ALL SUBSTRUCTURE WORK LINES PASS THROUGH WORK POINTS.

(#) -DENOTES PILE NUMBER.

DIMENSIONS AND PILE LAYOUTS AT BENT 1
ARE TYPICAL FOR EACH FOOTING.

** ON TANGENT TO CURVE @ -L- INTERSECTION
STATION 691+83.46.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 OF 3

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CHECKED BY : M. B. ISENHOUR DATE : 04/05/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Signed by: Joseph T. Kelvington
4/27/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE
FOUNDATION LAYOUT
FOR BRIDGE OVER US 74 BYPASS
ON SR 2052 (ELIZABETH AVE.) BETWEEN
SR 2125 (LOWMAN RD.)
AND SR 2047 (BORDERS RD.)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-02
1			3			TOTAL SHEETS
2			4			35

4/27/2023
JHagenbush
c:\pw_working\dms55374\R2707D_SMU_FL_220489.dgn

SUMMARY OF PILE INFORMATION/ INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., "BENT 1, PILES 1-5")	FACTORED RESISTANCE PER PILE TONS	PILE CUT-OFF (TOP OF PILE) ELEVATION FT	ESTIMATED PILE LENGTH PER PILE FT	SCOUR CRITICAL ELEVATION FT	DRIVEN PILES			PREDRILLING FOR PILES ✳			DRILLED-IN PILES		
					MIN. PILE TIP (TIP NO HIGHER THAN) ELEV FT	REQUIRED DRIVING RESISTANCE (RDR)✳✳ PER PILE TONS	TOTAL PILE REDRIVES QUANTITY EACH	PREDRILLING LENGTH PER PILE LIN FT	PREDRILLING ELEVATION (ELEV NOT TO 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 1-4	120	899.90	70			200							
END BENT 1, PILES 5-8	120	899.90	55			200							
END BENT 2, PILES 1-8	120	903.36	50			200							
BENT 1, PILES 1-9	130	880.30	35			220							
BENT 1, PILES 10-18	130	880.30	30			220							

✳ PREDRILLING FOR PILES IS REQUIRED FOR END BENTS/ BENT WITH A PREDRILLING LENGTH AND AT THE CONTRACTOR'S OPTION FOR END BENTS/ BENTS WITH PREDRILLING INFORMATION BUT NO PREDRILLING LENGTH.

✳✳ $RDR = \frac{\text{FACTORED RESISTANCE + FACTORED DOWNDRAG LOAD + FACTORED DEAD LOAD}}{\text{DYNAMIC RESISTANCE FACTOR}} + \text{NORMAL DOWNDRAG RESISTANCE} + \frac{\text{NORMAL SCOUR RESISTANCE}}{\text{SCOUR RESISTANCE FACTOR}}$

SUMMARY OF PDA/ PILE ORDER LENGTHS

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

PILE DRIVING ANALYZER (PDA)			PILE ORDER LENGTHS		
END BENT/ BENT NO	PDA TESTING REQUIRED? YES OR MAYBE	PDA TEST PILE LENGTH FT	TOTAL PDA TESTING QUANTITY EACH	END BENT/ BENT NO(s)	PILE ORDER LENGTH BASIS✳ EST OR PDA
END BENT 1, PILES 1-4	MAYBE	75			
END BENT 1, PILES 5-8	MAYBE	60			
END BENT 2, PILES 1-8	MAYBE	55	1		
BENT 1, PILES 1-9	MAYBE	40			
BENT 1, PILES 10-18	MAYBE	35			

✳ EST = PILE ORDER LENGTHS FROM ESTIMATED PILE LENGTHS; PDA = PILE ORDER LENGTHS BASED ON PDA TESTING. FOR GROUPS OF END BENTS/ BENTS WITH PILE ORDER LENGTHS BASED ON PDA TESTING, THE FIRST END BENT/ BENT NO. LISTED FOR EACH GROUP IS THE REPRESENTATIVE END BENT/ BENT WITH THE PDA.

SUMMARY OF PILE INFORMATION/ INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., "BENT 1, PILES 1-5")	FACTORED AXIAL LOAD PER PILE TONS	FACTORED DOWNDRAG LOAD PER PILE TONS	FACTORED DEAD LOAD✳ PER PILE TONS	DYNAMIC RESISTANCE FACTOR	NOMINAL DOWNDRAG RESISTANCE PER PILE TONS	NOMINAL SCOUR RESISTANCE PER PILE TONS	SCOUR RESISTANCE FACTOR (DEFAULT=1.00)
END BENT 1, PILES 1-8	120			0.60			
END BENT 1, PILES 1-8	120			0.60			
BENT 1, PILES 1-18	130			0.60			

✳ FACTORED DEAD LOAD IS FACTORED WEIGHT OF PILE ABOVE THE GROUND LINE.

FOUNDATION NOTES:

FOR PILES, SEE PILES PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 50-80 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENTS NO. 1 AND NO. 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.

NOTES:

1. THE PILE FOUNDATION TABLES ARE BASED ON THE BRIDGE SUBSTRUCTURE DESIGN AND FOUNDATION RECOMMENDATIONS SEALED BY A NORTH CAROLINA PROFESSIONAL ENGINEER (STEPHEN C. CROCKETT, 048207) ON 10/27/22.
2. TOTAL PILE DRIVING EQUIPMENT SETUP QUANTITY (NOT SHOWN IN PILE FOUNDATION TABLES) EQUALS THE NUMBER OF DRIVEN PILES, I.E., THE NUMBER OF PILES WITH A REQUIRED DRIVING RESISTANCE.
3. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING WHEN PDAs MAY BE REQUIRED.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington

4/27/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

PILE FOUNDATION TABLES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-03
1			3			TOTAL SHEETS
2			4			35

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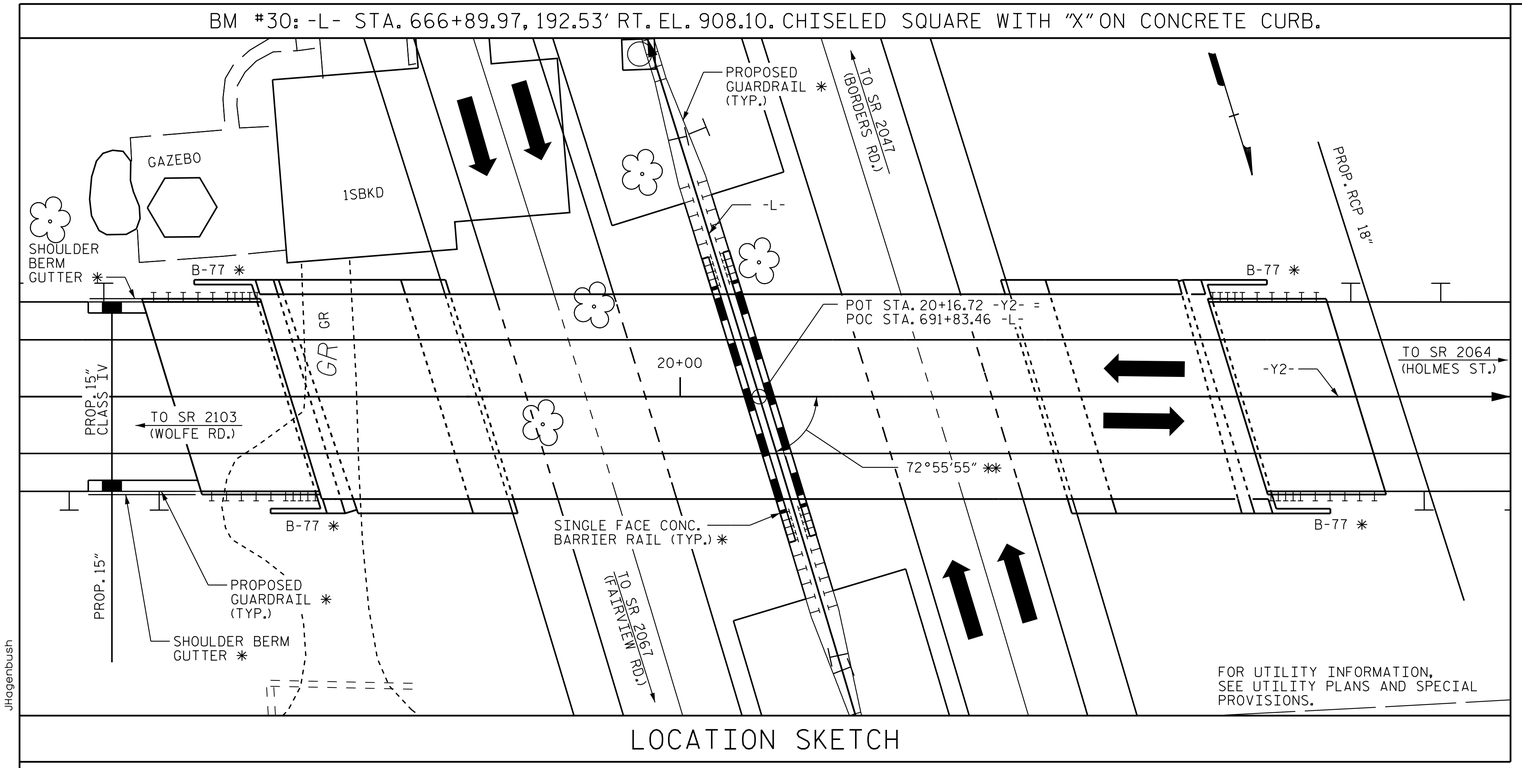
DRAWN BY : J. E. HAGENBUSH DATE : 05/17/22
CHECKED BY : J. T. KELVINGTON DATE : 11/09/22

DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22



LOCATION SKETCH

** ANGLE MEASURED TO TANGENT TO CURVE @ -L- STA. 691+83.46

* DENOTES ROADWAY DETAIL AND PAY ITEM

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

WORK SHALL NOT BE STARTED ON THIS BRIDGE OR SPECIFIC PARTS OF BRIDGE UNTIL ROADWAY SECTION HAS BEEN EXCAVATED.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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.

FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT 1	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12X53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	MODIFIED 54" PRESTRESSED CONCRETE GIRDERS	
	LUMP SUM	EA.	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	EA.	NO.	LIN.FT.	LIN.FT.	SQ.YDS.	LUMP SUM	NO.	LIN.FT.
SUPERSTRUCTURE			8,729	9,189		LUMP SUM						400.2		LUMP SUM	10	987.81
END BENT 1					48.9		7,461		8	8	500		164			
BENT 1	LUMP SUM				78.5		13,990	1,168	18	18	585					
END BENT 2					48.5		7,290		8	8	400		178			
TOTAL	LUMP SUM	1	8,729	9,189	175.9	LUMP SUM	28,741	1,168	34	34	1,485	400.2	342	LUMP SUM	10	987.81

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2052 (ELIZABETH AVE.) BETWEEN
SR 2125 (LOWMAN RD.)
AND SR 2047 (BORDERS RD.)

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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DRAWN BY : M. B. ISENHOUR DATE : 10/11/18
CHECKED BY : V. E. FRAGA DATE : 11/21/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

JHaggenbush
4/27/2023
c:\pw_working\dms55374\R2707D_SMU_G002_220489.dgn

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	1.22	--	1.75	0.800	1.34	A	EL	48.2	.841	1.70	A	I	9.10	0.80	.800	1.22	A	EL	48.2	
		HL-93 (OPERATING)	N/A		1.74	--	1.35	0.800	1.74	A	EL	48.2	.841	2.23	A	I	9.10	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.69	60.8	1.75	0.800	1.87	A	EL	48.2	.841	2.29	A	I	9.10	0.80	.800	1.69	A	EL	48.2	
		HS-20 (OPERATING)	36.000		2.42	87.1	1.35	0.800	2.42	A	EL	48.2	.841	3.00	A	I	9.10	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.63	22.0	1.40	0.800	2.25	A	EL	48.2	.841	2.89	A	I	9.10	0.80	.800	1.63	A	EL	48.2	
		SNGARBS2	20.000		1.45	29.0	1.40	0.800	2.00	A	EL	48.2	.841	2.62	A	I	9.10	0.80	.800	1.45	A	EL	48.2	
		SNAGRIS2	22.000		2.91	64.0	1.40	0.800	4.01	A	EL	48.2	.841	5.06	A	I	9.10	0.80	.800	2.91	A	EL	48.2	
		SNCOTTS3	27.250		1.60	43.6	1.40	0.800	2.20	A	EL	48.2	.841	2.90	A	I	9.10	0.80	.800	1.60	A	EL	48.2	
		SNAGGRS4	34.925		1.99	69.5	1.40	0.800	2.74	A	EL	48.2	.841	3.56	A	I	9.10	0.80	.800	1.99	A	EL	48.2	
		SNS5A	35.550		1.38	49.1	1.40	0.800	1.90	A	EL	48.2	.841	2.53	A	I	9.10	0.80	.800	1.38	A	EL	48.2	
		SNS6A	39.950		4.03	161.0	1.40	0.800	5.55	A	EL	48.2	.841	7.27	A	I	9.10	0.80	.800	4.03	A	EL	48.2	
		SNS7B	42.000		2.71	113.8	1.40	0.800	3.73	A	EL	48.2	.841	4.66	A	I	9.10	0.80	.800	2.71	A	EL	48.2	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.77	58.4	1.40	0.800	2.44	A	EL	48.2	.841	3.15	A	I	9.10	0.80	.800	1.77	A	EL	48.2	
		TNT4A	33.075		1.77	58.5	1.40	0.800	2.44	A	EL	48.2	.841	3.09	A	I	9.10	0.80	.800	1.77	A	EL	48.2	
		TNT6A	41.600		1.43	59.5	1.40	0.800	1.98	A	EL	48.2	.841	2.67	A	I	9.10	0.80	.800	1.43	A	EL	48.2	
		TNT7A	42.000		1.44	60.5	1.40	0.800	1.98	A	EL	48.2	.841	2.63	A	I	9.10	0.80	.800	1.44	A	EL	48.2	
		TNT7B	42.000		1.47	61.7	1.40	0.800	2.02	A	EL	48.2	.841	2.50	A	I	9.10	0.80	.800	1.47	A	EL	48.2	
		TNAGRIT4	43.000		1.41	60.6	1.40	0.800	1.94	A	EL	48.2	.841	2.42	A	I	9.10	0.80	.800	1.41	A	EL	48.2	
		TNAGT5A	45.000		1.33	59.9	1.40	0.800	1.84	A	EL	48.2	.841	2.38	A	I	9.10	0.80	.800	1.33	A	EL	48.2	
		TNAGT5B	45.000	3	1.32	59.4	1.40	0.800	1.83	A	EL	48.2	.841	2.30	A	I	9.10	0.80	.800	1.32	A	EL	48.2	

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.

SPAN LENGTHS IN LRFR SUMMARY SKETCH BELOW ARE THOSE USED IN ANALYSIS MODEL FOR COMPOSITE DL. AND LIVE LOAD.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

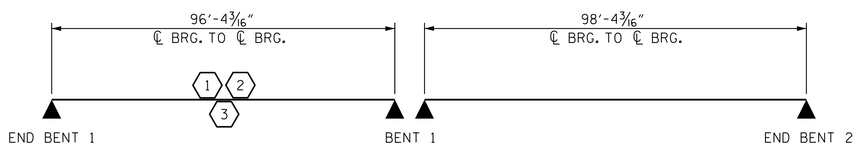
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



SPAN A SPAN B

LRFR SUMMARY

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

Stantec Consulting Services Inc.
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ASSEMBLED BY : M. B. ISENHOUR DATE : 6/2/18
CHECKED BY : V. E. FRAGA DATE : 10/24/18

DRAWN BY : MAA 1/08
CHECKED BY : GM/DI 2/08

REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM
REV. 12/17 MAA/THC

DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington 4/27/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

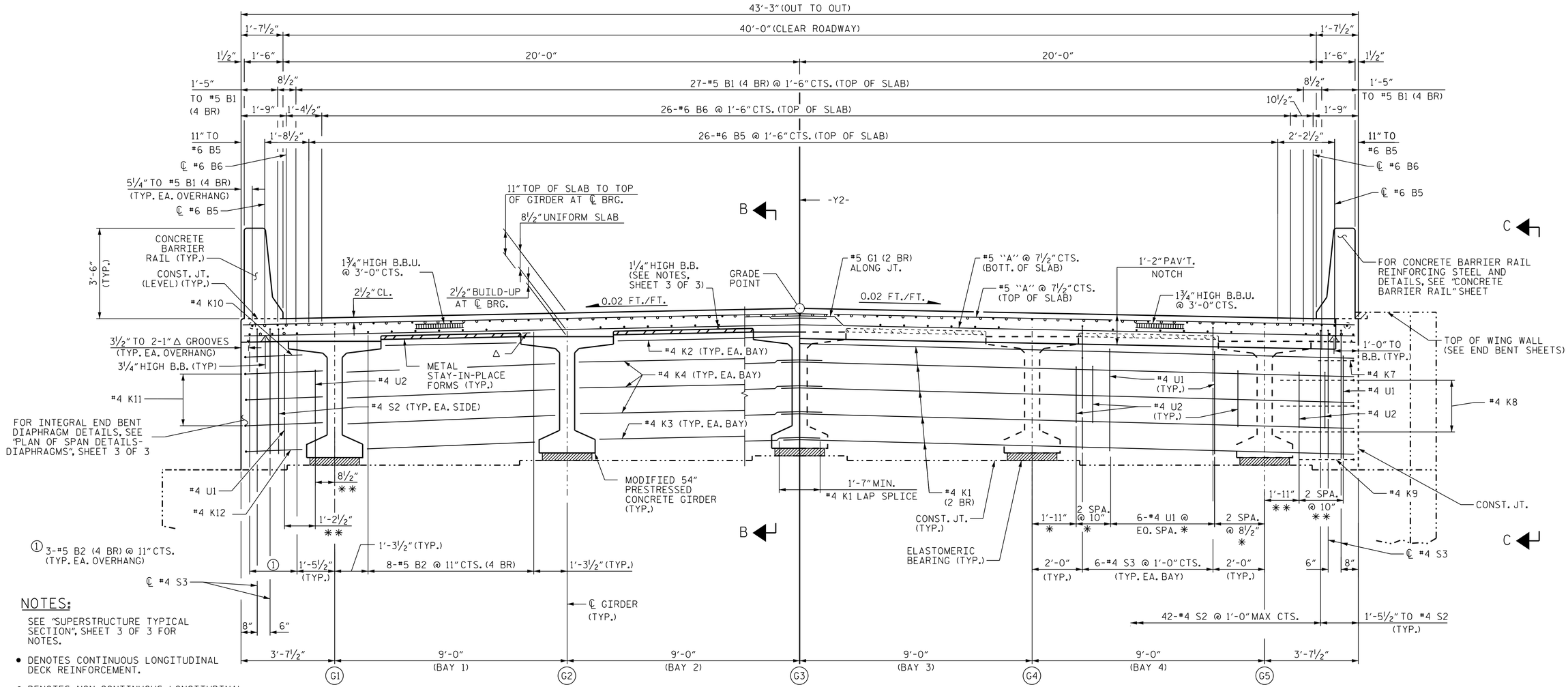
STANDARD

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-05
1			3			TOTAL SHEETS
2			4			35

STD. NO. LRFR1

c:\pw_working\dms55374\R2707D_SMU_LRFR_220489.dgn JHaggenbush 4/21/2023



SEE SECTION B-B & C-C ON SHT. 3 OF 3 FOR SECTION THROUGH AND END VIEW OF END BENT DIAPHRAGM.

NOTES:

SEE "SUPERSTRUCTURE TYPICAL SECTION", SHEET 3 OF 3 FOR NOTES.

- DENOTES CONTINUOUS LONGITUDINAL DECK REINFORCEMENT.
- o DENOTES NON-CONTINUOUS LONGITUDINAL DECK REINFORCEMENT.

2 BR DENOTES 2 BAR RUN.
4 BR DENOTES 4 BAR RUN.

Δ TOP OF METAL SIP FORM TO MATCH REQUIRED BOTT. OF SLAB.

* DENOTES ALONG THE FILL FACE. "U" BAR SPACING IS TYPICAL EACH INTERIOR BAY.

** DENOTES ALONG THE FILL FACE.

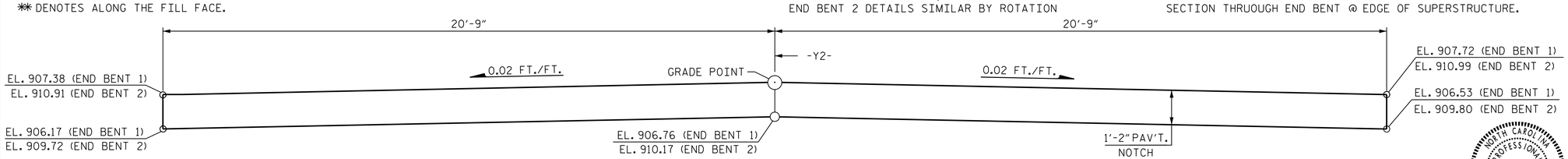
INTEGRAL DIAPHRAGMS HALF SECTION REINFORCEMENT AT FRONT FACE

INTEGRAL DIAPHRAGMS HALF SECTION REINFORCEMENT AT FILL FACE

TYPICAL SECTION @ END BENT

(AS VIEWED AT END BENT 1, LOOKING UP-STATION)
END BENT 2 DETAILS SIMILAR BY ROTATION

SEE SECTION C-C ON SHT. 3 OF 3 FOR SECTION THRUOUGH END BENT @ EDGE OF SUPERSTRUCTURE.



APPROACH SLAB PAVEMENT NOTCH DETAIL

ELEVATIONS ARE ALONG FILL FACE OF END BENT
DIMENSIONS ARE NORMAL TO -Y2-

PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 20+16.72 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
SIGNED BY: Joseph T. Kelvington
4/27/2023 | 780774AF...

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-06
1			3			TOTAL SHEETS
2			4			35

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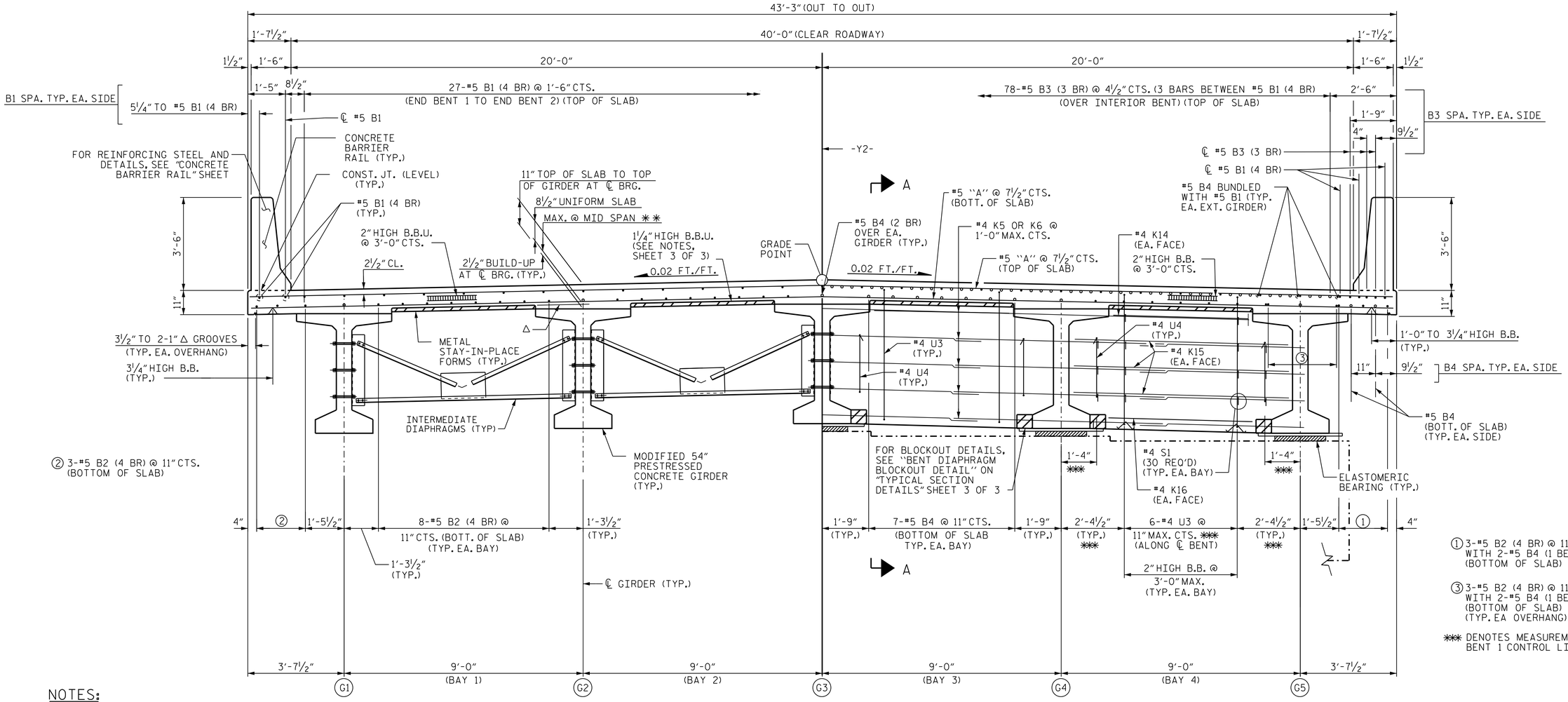
DRAWN BY : J. B. GEILE DATE : 02/21/18
CHECKED BY : M. B. ISENHOUR DATE : 04/09/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22



① 3-#5 B2 (4 BR) @ 11" CTS. WITH 2-#5 B4 (1 BETWEEN EA. B2) (BOTTOM OF SLAB)

③ 3-#5 B2 (4 BR) @ 11" CTS. WITH 2-#5 B4 (1 BETWEEN EA. B2) (BOTTOM OF SLAB) (TYP. EA OVERHANG)

*** DENOTES MEASUREMENT ALONG BENT 1 CONTROL LINE

NOTES:

SEE "SUPERSTRUCTURE TYPICAL SECTION", SHEET 3 OF 3 FOR NOTES.

SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDERS" FOR INTERMEDIATE DIAPHRAGM DETAILS AND DIMENSIONS.

- • DENOTES CONTINUOUS LONGITUDINAL DECK REINFORCEMENT.
- o DENOTES NON-CONTINUOUS LONGITUDINAL DECK REINFORCEMENT.
- * FOR BAR DETAILS SEE "PLAN OF SPANS", SHEET 1 OF 2.

  3 BR DENOTES 3 BAR RUN.
  4 BR DENOTES 4 BAR RUN.
- ** SEE DETAIL "A" ON "TYPICAL SECTION DETAILS", SHT. 3 OF 3.
- Δ TOP OF METAL SIP FORM TO MATCH REQUIRED BOTT. OF SLAB.

HALF SECTION AT INTERMEDIATE DIAPHRAGMS

HALF SECTION AT INTERIOR BENT

TYPICAL SECTION

SEE SECTION A-A ON SHEET 3 OF 3 FOR SECTION THROUGH BENT DIAPHRAGM

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

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DRAWN BY : J. B. GEILE DATE : 02/21/18
CHECKED BY : M. B. ISENHOUR DATE : 04/09/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Digitally signed by: Joseph T. Kelvington
4/27/2023

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2			4			35

JHaggenbush
4/27/2023
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NOTES:

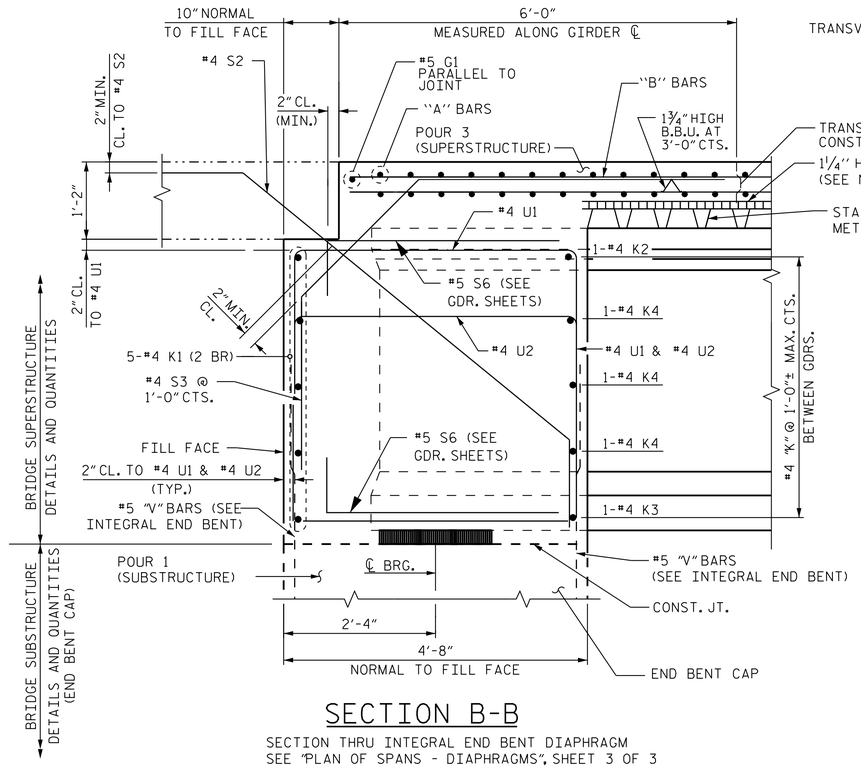
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

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

NO CHAMFER IS REQUIRED ON CORNERS OF GIRDER BUILDUPS.

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

#5 G1 BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY TO CLEAR REINFORCING STEEL AND STIRRUPS.

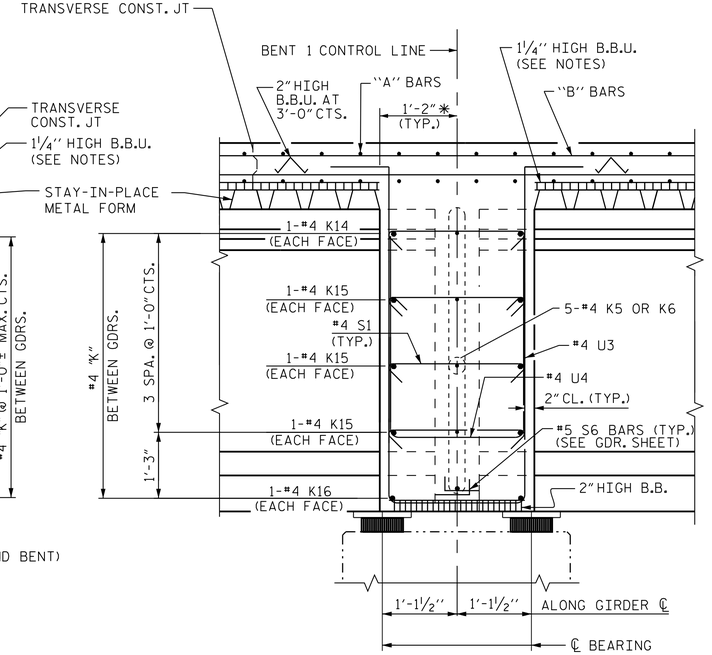


SECTION B-B

SECTION THRU INTEGRAL END BENT DIAPHRAGM
SEE "PLAN OF SPANS - DIAPHRAGMS", SHEET 3 OF 3

#4 S2 & S3 BARS MAY BE REPOSITIONED AS NECESSARY TO CLEAR SLAB REINFORCING STEEL AND GIRDERS.

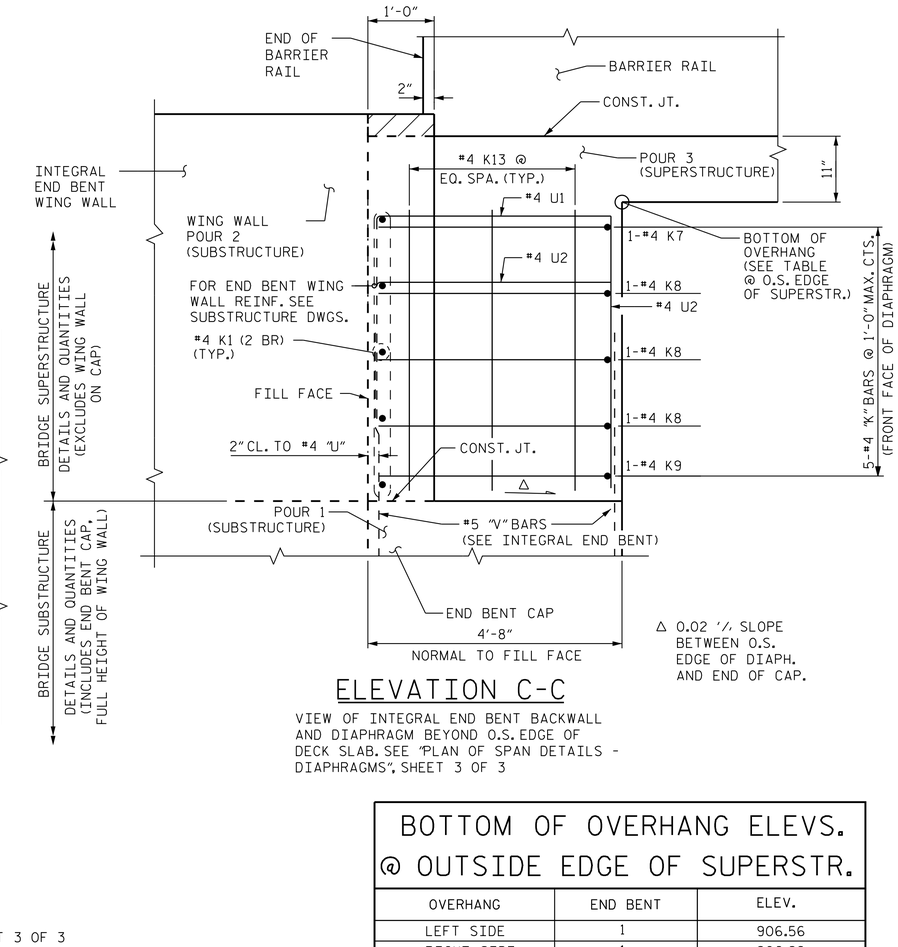
NOTE: 2 BR DENOTES 2 BAR RUN



SECTION A-A

SECTION THRU DIAPHRAGM @ INTERIOR BENT
SEE "PLAN OF SPANS DETAILS - DIAPHRAGMS", SHEET 3 OF 3

* NORMAL TO ℄ BENT

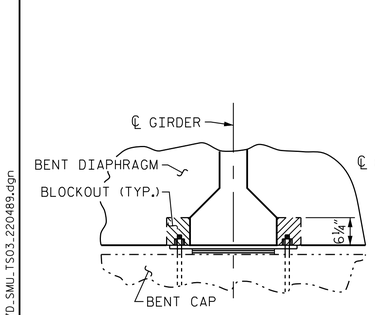


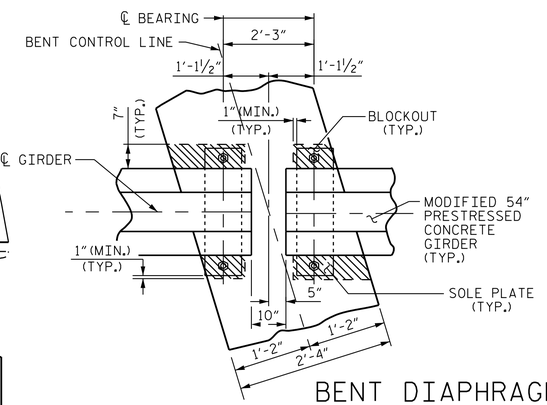
ELEVATION C-C

VIEW OF INTEGRAL END BENT BACKWALL AND DIAPHRAGM BEYOND O.S. EDGE OF DECK SLAB. SEE "PLAN OF SPAN DETAILS - DIAPHRAGMS", SHEET 3 OF 3

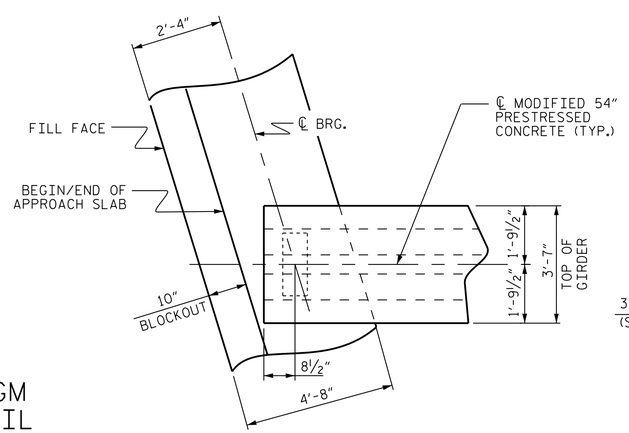
BOTTOM OF OVERHANG ELEVS. @ OUTSIDE EDGE OF SUPERSTR.

OVERHANG	END BENT	ELEV.
LEFT SIDE	1	906.56
RIGHT SIDE	1	906.92
LEFT SIDE	2	909.95
RIGHT SIDE	2	910.04



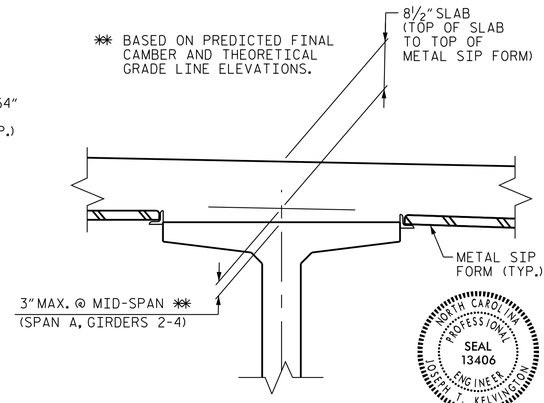


BENT DIAPHRAGM BLOCKOUT DETAIL



PLAN OF INTEGRAL END BENT

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



DETAIL "A"

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION (DETAILS)

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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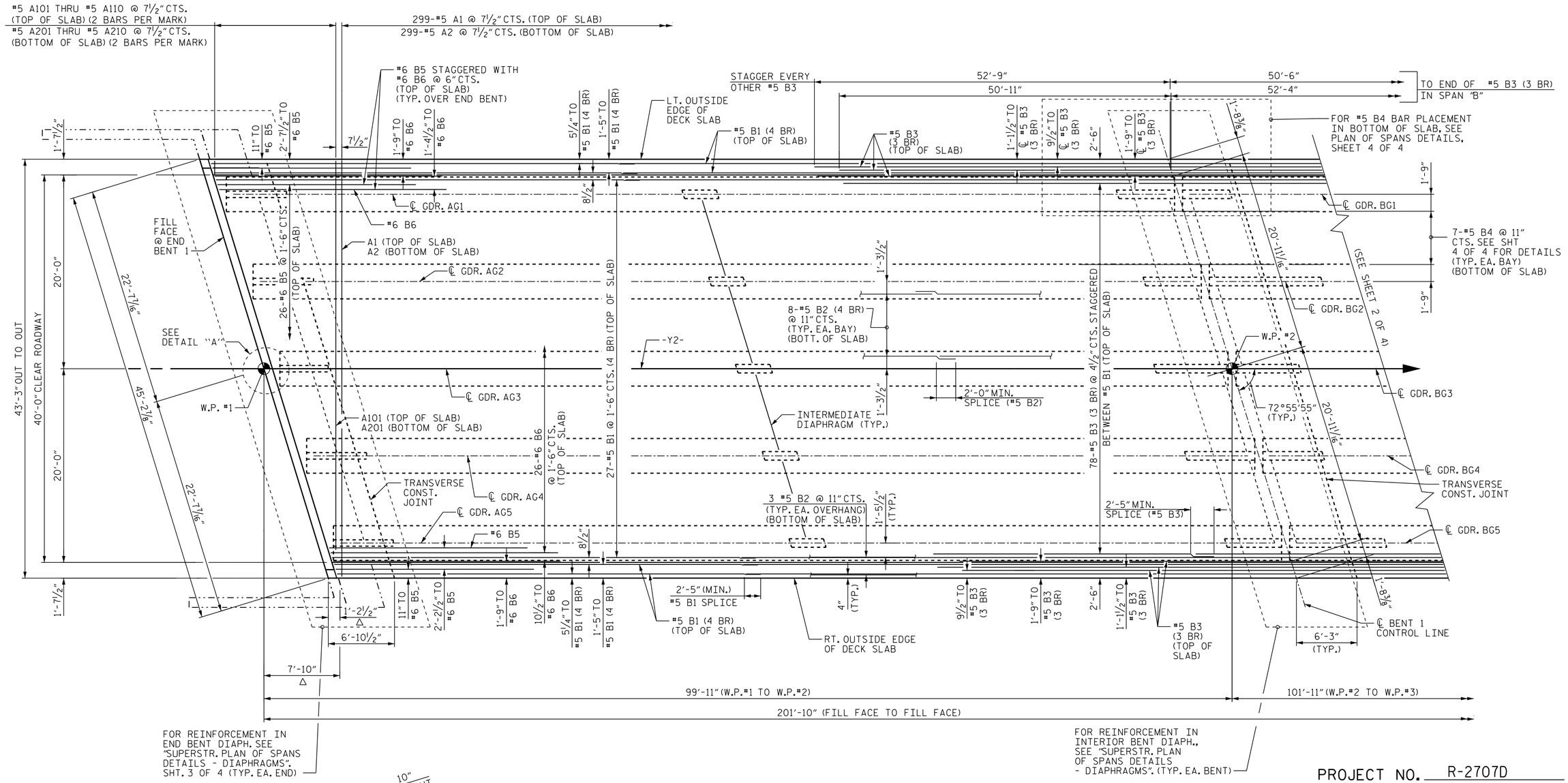
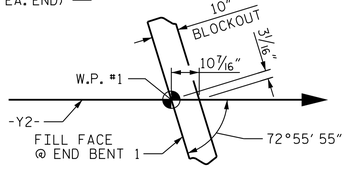


△ DIMENSION TO 1ST MAIN BAR



DETAIL "A"

PLAN OF SPANS
(SPAN A AND PART OF SPAN B)

FOR BARRIER RAIL DETAILS AND REINFORCING STEEL. SEE "CONCRETE BARRIER RAIL", SHEET S2-21.

FOR POUR SEQUENCE SEE SHEET "BILL OF MATERIALS" SHEET S2-23.

FOR TRANSVERSE CONSTRUCTION JOINT DETAIL, SEE "PLAN OF SPANS SHEET 2 OF 4", SHEET S2-10.

(2 BR) DENOTES 2 BAR RUN.
(3 BR) DENOTES 3 BAR RUN.
(4 BR) DENOTES 4 BAR RUN.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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2			4			35

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4/27/2023
JHaggenbush
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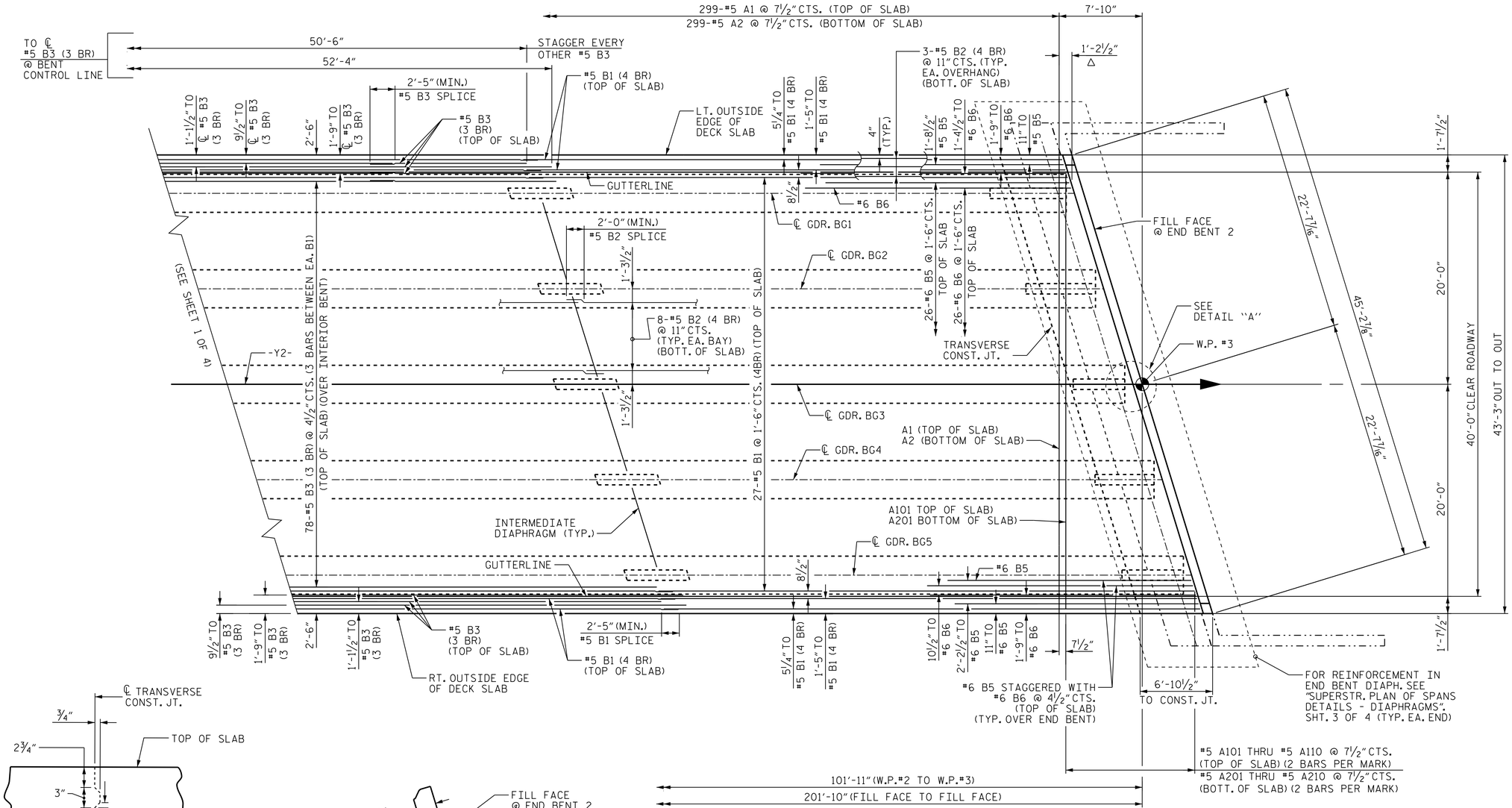


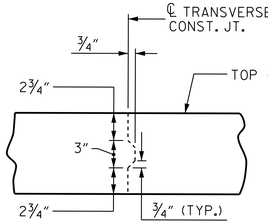
PLAN OF SPAN (PART OF SPAN B)

FOR BARRIER RAIL DETAILS AND REINFORCING STEEL. SEE "CONCRETE BARRIER RAIL", SHEET S2-21.

FOR POUR SEQUENCE SEE SHEET "BILL OF MATERIALS" SHEET S2-23.

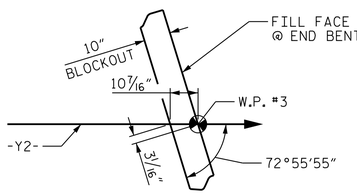
(2 BR) DENOTES 2 BAR RUN.
(3 BR) DENOTES 3 BAR RUN.
(4 BR) DENOTES 4 BAR RUN.

△ DIMENSION TO 1ST MAIN BAR.



TRANSVERSE CONSTRUCTION JOINT DETAIL

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



DETAIL "A"

PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 20+16.72 -Y2-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-10
1			3			TOTAL SHEETS
2			4			35

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CHECKED BY : M. B. ISENHOUR DATE : 04/20/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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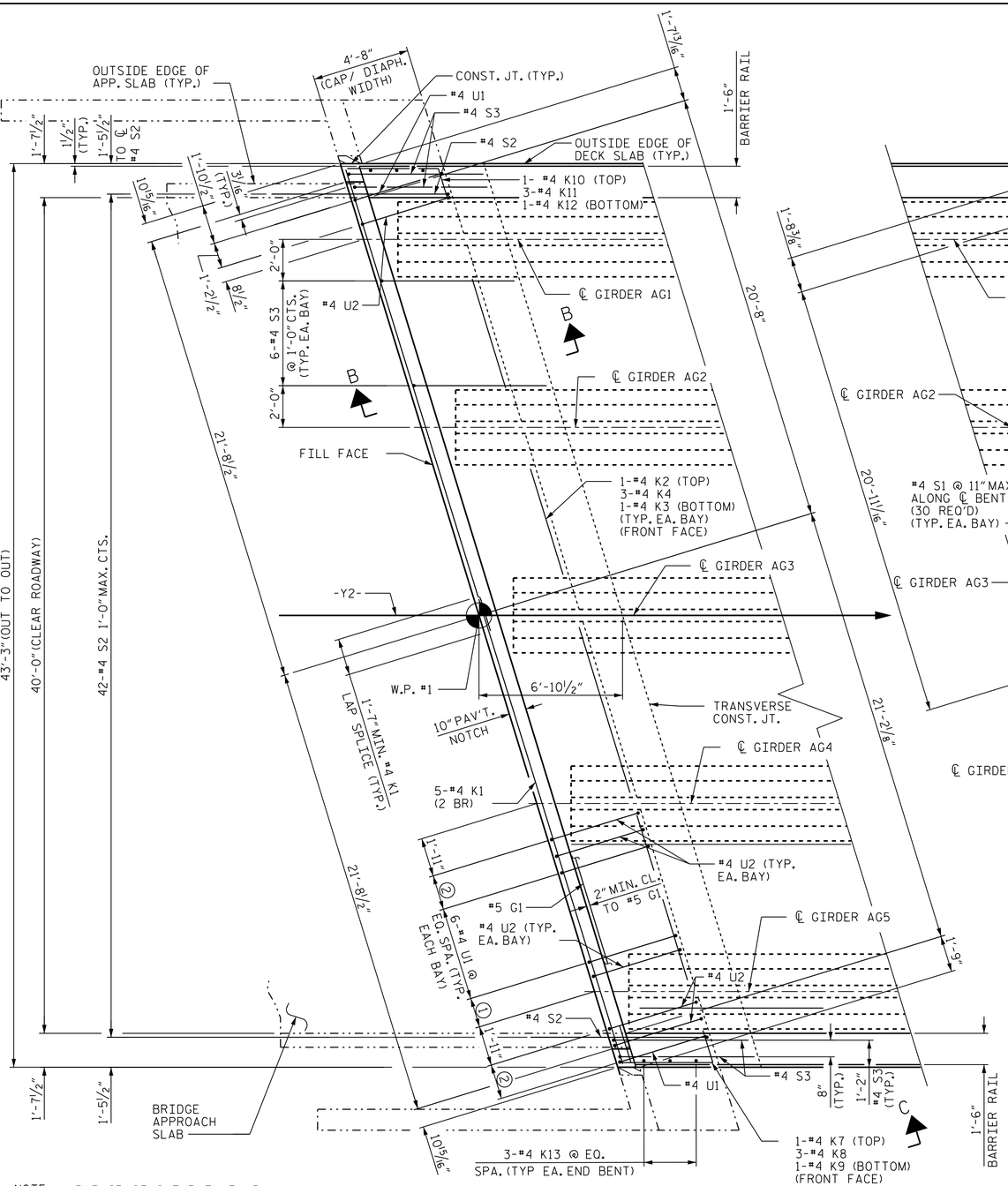


NOTE: "U" BAR SPACING TYP. IN EA. BAY

① 2 SPA. @ 8½"

② 2 SPA. @ 10"

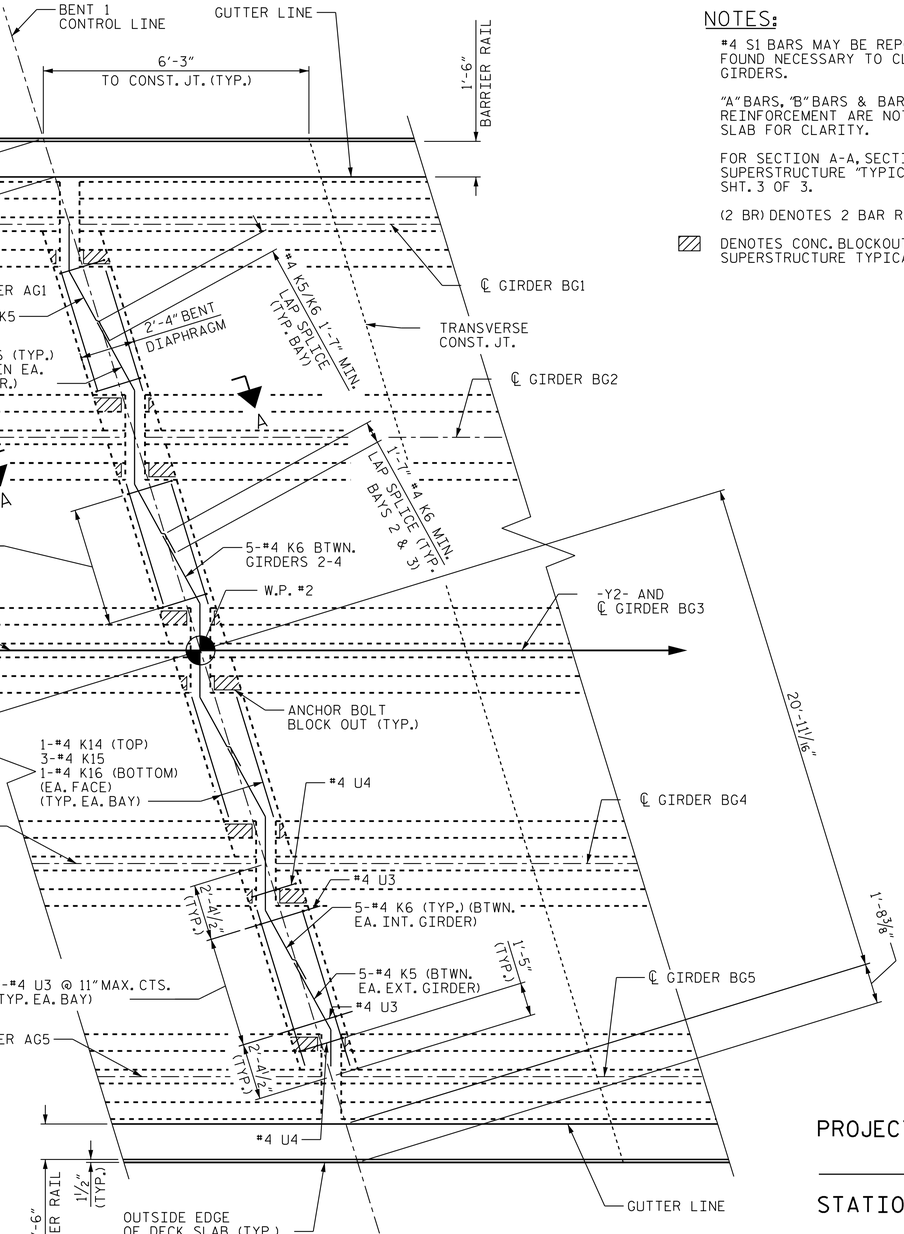
S2 AND S3 BARS MAY BE REPOSITIONED AS NECESSARY TO CLEAR PRESTRESSED GIRDERS AND OTHER REINFORCING BAR CONFLICTS.

SEE "END BENT 1 DETAILS - WING WALLS" AND "END BENT 2 DETAILS - WING WALLS" FOR REINFORCMENT IN WINGS.

TYPICAL END BENT DIAPHRAGM REINFORCING DETAIL

DETAILS AT END BENT 1 SHOWN.

DETAILS AT END BENT 2 ARE SIMILAR BY ROTATION.



NOTE: DECK "B" AND "A" DECK REINFORCING NOT SHOWN FOR CLARITY.

BENT 1 DIAPHRAGM REINFORCING DETAIL

NOTES:

#4 S1 BARS MAY BE REPOSITIONED AS FOUND NECESSARY TO CLEAR PRESTRESSED GIRDERS.

"A" BARS, "B" BARS & BARRIER RAIL REINFORCEMENT ARE NOT SHOWN IN DECK SLAB FOR CLARITY.

FOR SECTION A-A, SECTION B-B, & ELEVATION C-C, SEE SUPERSTRUCTURE "TYPICAL SECTION (DETAILS)", SHT. 3 OF 3.

(2 BR) DENOTES 2 BAR RUN.

▨ DENOTES CONC. BLOCKOUT. SEE END BENT SHTS. AND SUPERSTRUCTURE TYPICAL SECTION DETAILS.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS DETAILS- DIAPHRAGMS

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CHECKED BY : M. B. ISENHOUR DATE : 05/01/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH KELVINGTON
DocuSigned by: Joseph T. Kelvington
4/27/2023

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1			3			TOTAL SHEETS
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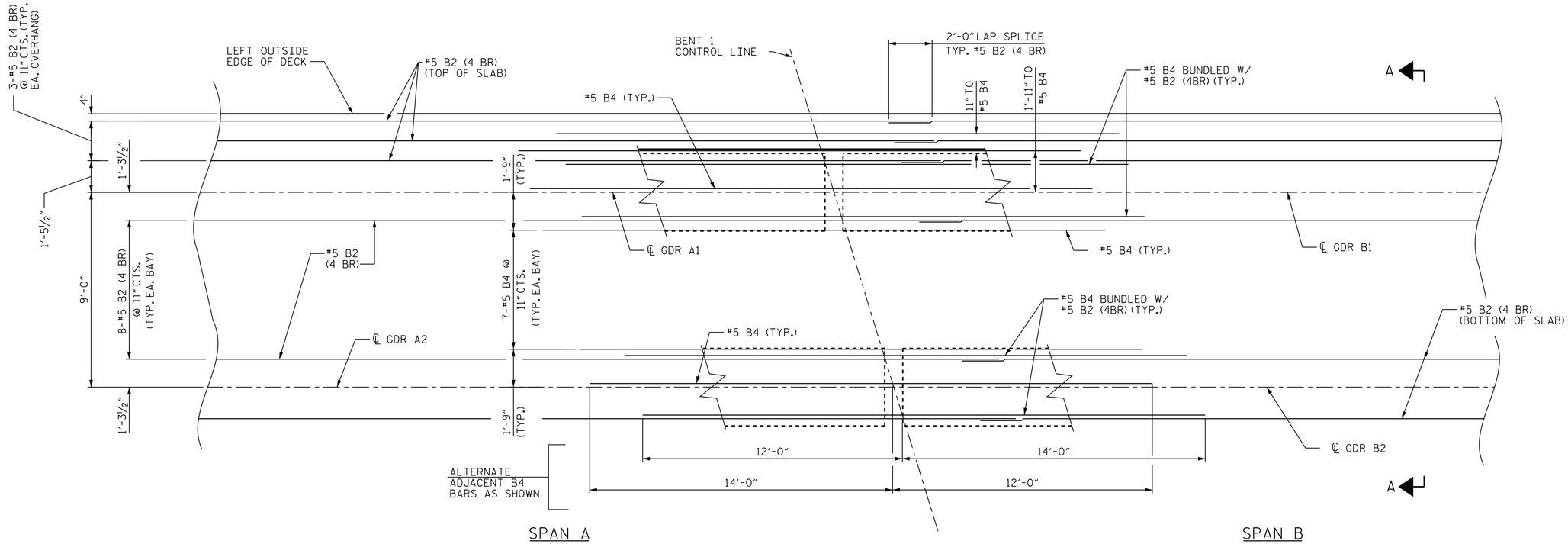
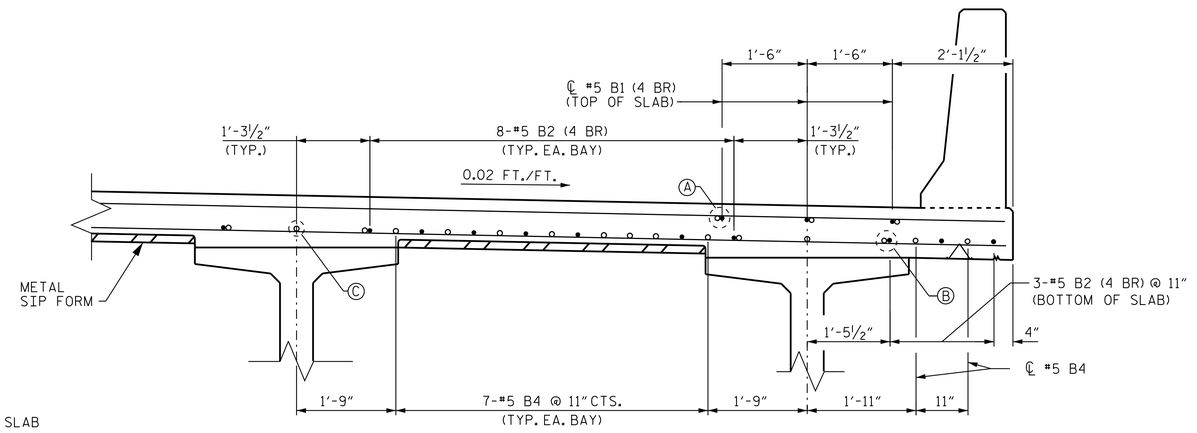


B2 AND B4 PLACEMENT @ INTERIOR BENT

BOTTOM MAT OF DECK REINFORCEMENT



SECTION A-A

Ⓐ #5 B4 BUNDLED W/ B1 (4 BR) TOP OF SLAB OVER EXTERIOR GIRDERS ONLY.

Ⓑ #5 B4 BUNDLED W/ #5 B2 (4 BR) BOTTOM OF SLAB TYP. EA. GIRDER.

Ⓒ #5 B4 ON ℄ GIRDER (TYP. EA. GIRDER)

• DENOTES CONTINUOUS REINFORCING BAR.

○ DENOTES NON-CONTINUOUS B4 BAR.

PLACEMENT OF #5 B4 NEGATIVE MOMENT REINFORCEMENT

(4 BR) DENOTES FOUR BAR RUN

REINFORCEMENT SHOWN IN THE SLAB OVERHANG IS TYPICAL ON EACH SIDE OF THE BRIDGE.

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PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 20+16.72 -Y2-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
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PLAN OF SPANS
DETAILS -
NON-CONTINUOUS B4
REINFORCEMENT

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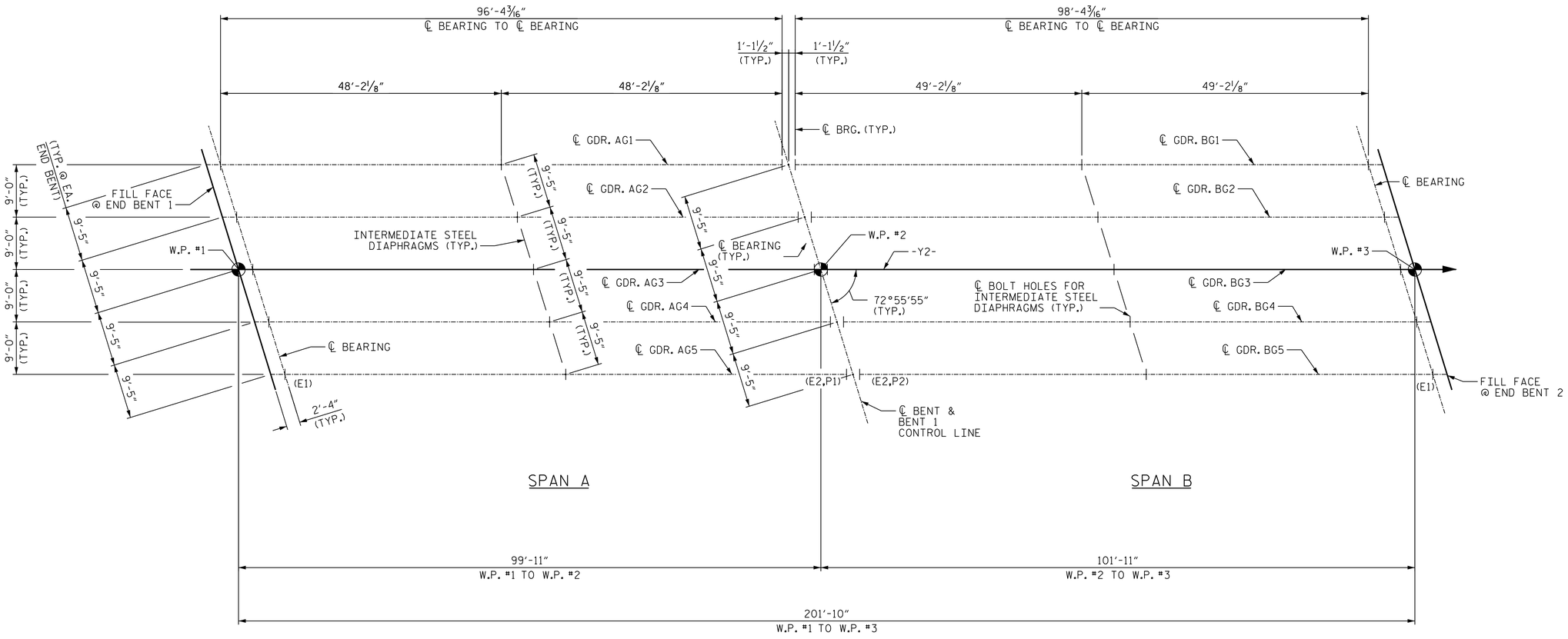

FRAMING PLAN

NOTES:

(E1, E2, P1 & P2) DENOTES ELASTOMERIC BEARING OR SOLE PLATE. SEE "ELASTOMERIC BEARING DETAILS".

SEE TYPICAL SECTION DRAWINGS FOR END BENT DIAPHRAGM AND INTERIOR BENT DIAPHRAGM DETAILS.

ALL DIMENSIONS SHOWN ARE HORIZONTAL.

PROJECT NO. R-2707D

CLEVELAND COUNTY

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FRAMING PLAN

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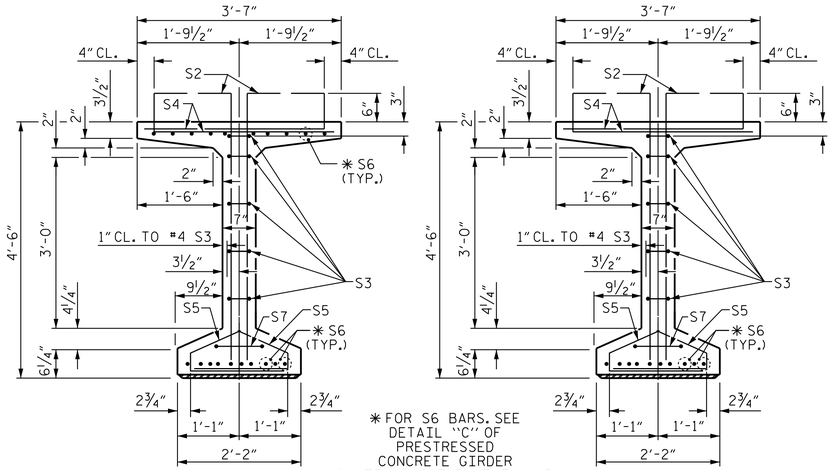
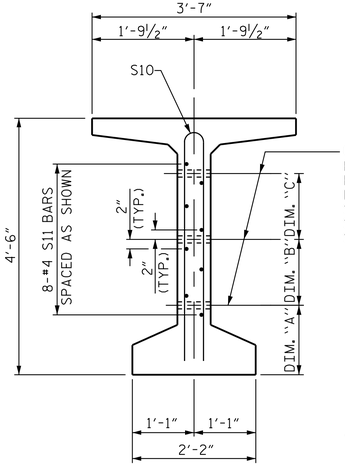


✱ FOR S6 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS, SHEET 3 OF 4.

SECTION A-A

SECTION B-B

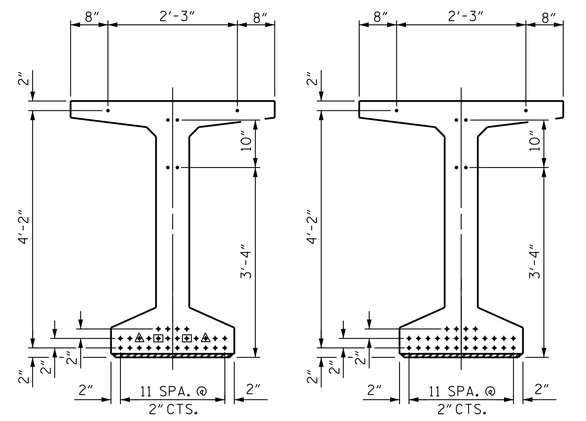


SECTION C-C

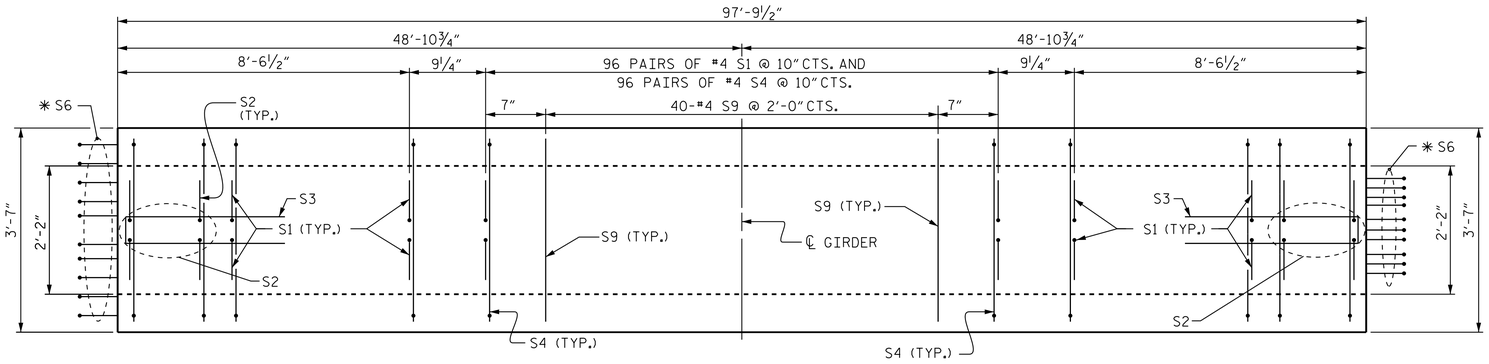
(S1, S4 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

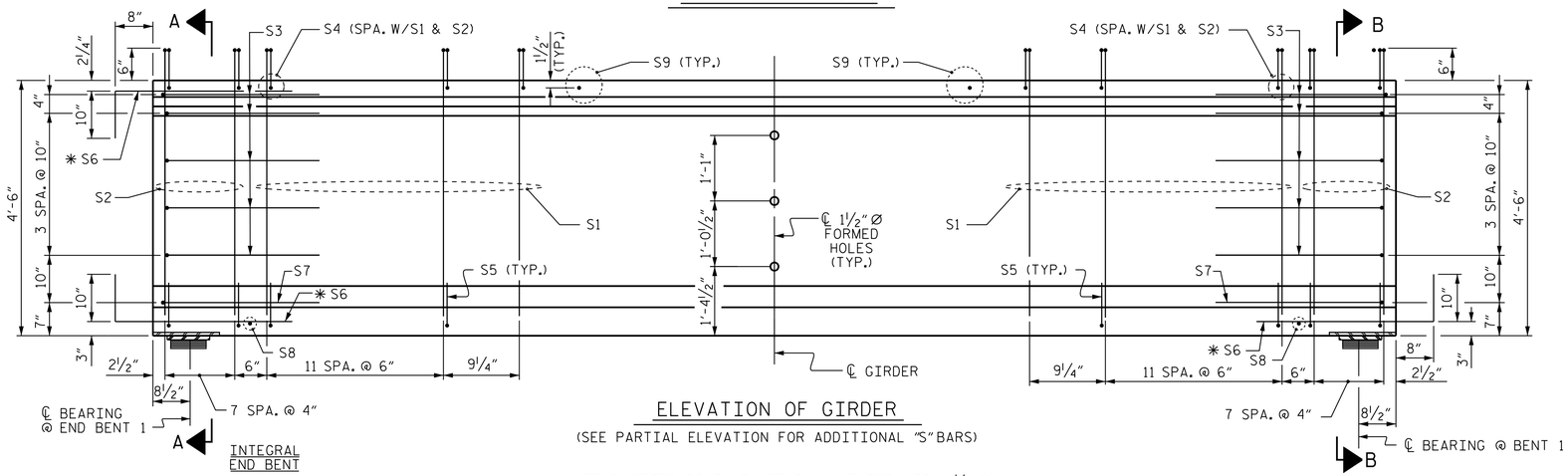
- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ▣ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT



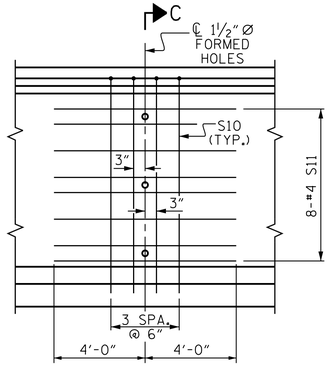
PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

NOTE: S1 STIRRUPS THAT ARE IN CONFLICT WITH 1½" Ø FORMED HOLES MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR HOLES AND S11 BARS.



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

0.6" Ø L. R. GRADE 270 STRANDS

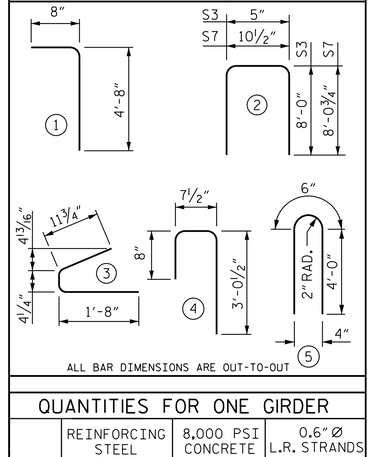
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	240	#4	1	5'-4"	856
S2	32	#6	1	5'-4"	257
S3	10	#4	2	16'-5"	110
S4	272	#5	4	4'-4"	1230
S5	80	#4	3	3'-0"	161
✱ S6	30	#5	STR	3'-8"	115
S7	2	#5	2	17'-0"	36
S8	2	#3	STR	1'-10"	2
S9	40	#4	STR	3'-3"	87
S10	4	#5	5	8'-6"	36
S11	8	#4	STR	8'-0"	43

✱ NOTE: S6 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	8,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	2,933	17.8	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	97'-9½"	488'-11½"

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
54" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD

SPAN A

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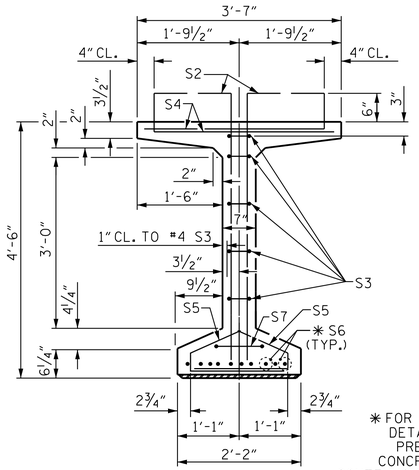
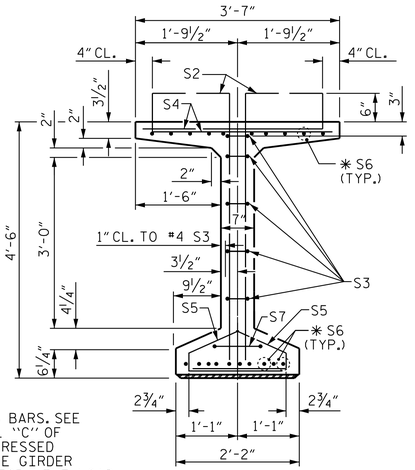
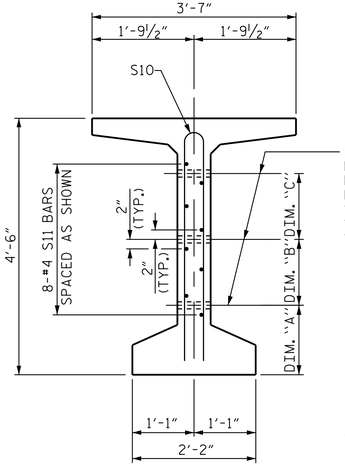


SECTION A-A



SECTION B-B

✱FOR S6 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS, SHEET 3 OF 4.



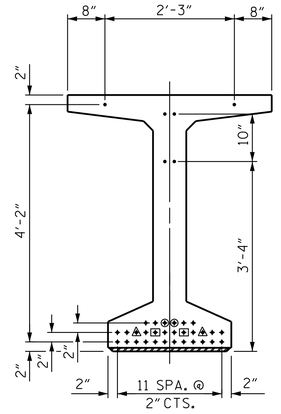
SECTION C-C

(S1, S4 AND S9 BARS NOT SHOWN)

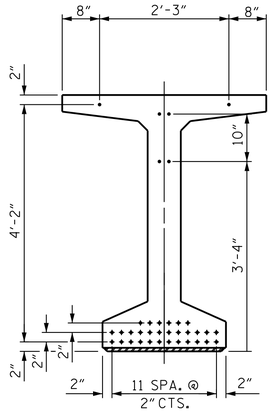
℄ 1½" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM. "A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ▣ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 28'-0" FROM END OF GIRDER

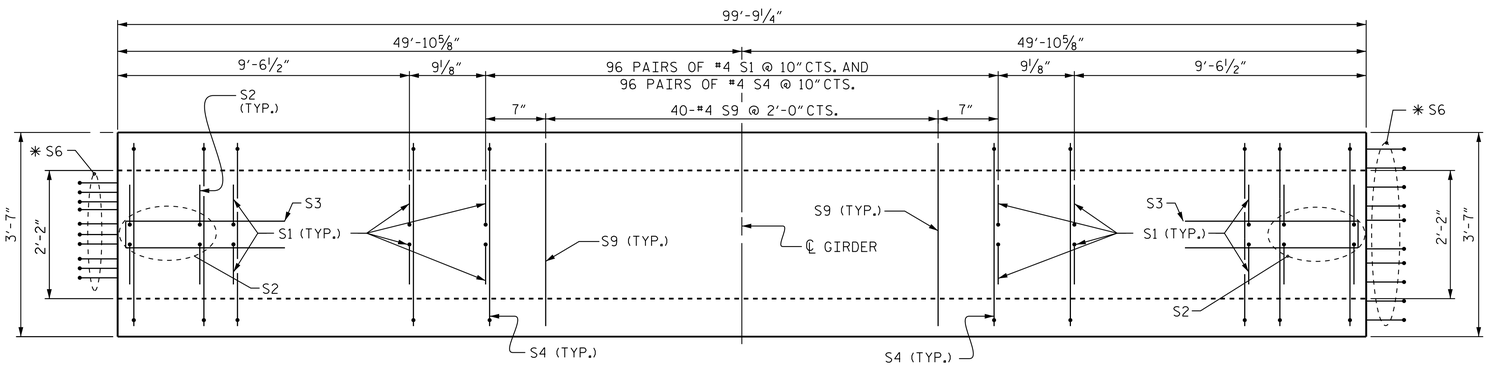


AT END OF GIRDER

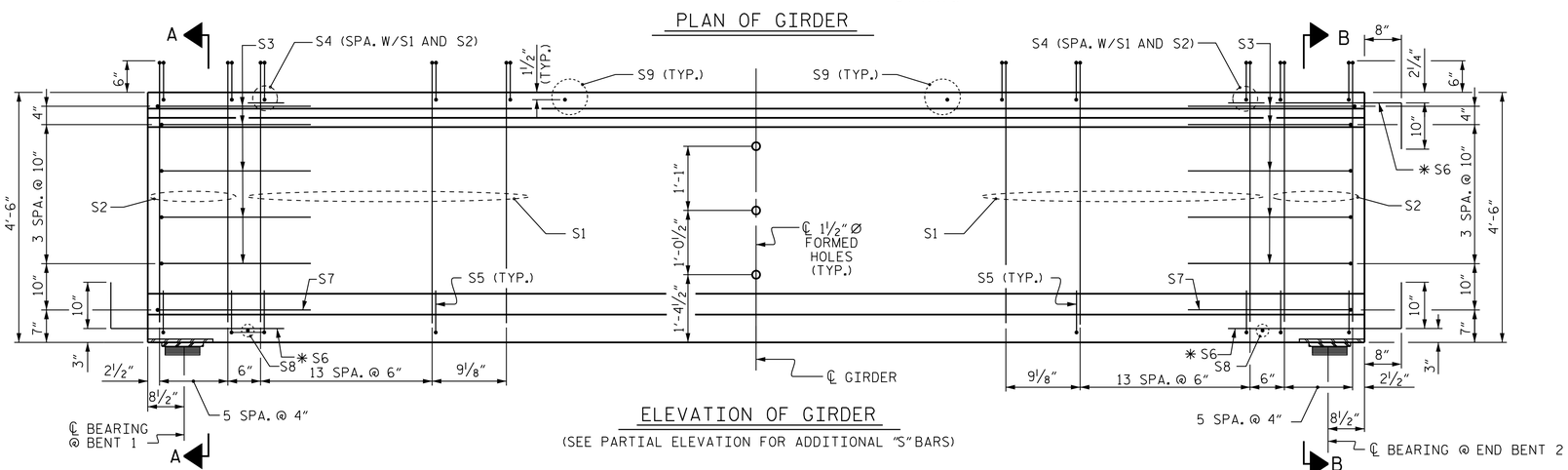


AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



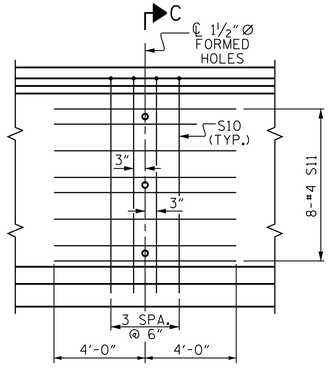
PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

NOTE: S1 STIRRUPS THAT ARE IN CONFLICT WITH 1½" Ø FORMED HOLES MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR HOLES AND S11 BARS.



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

0.6" Ø L. R. GRADE 270 STRANDS

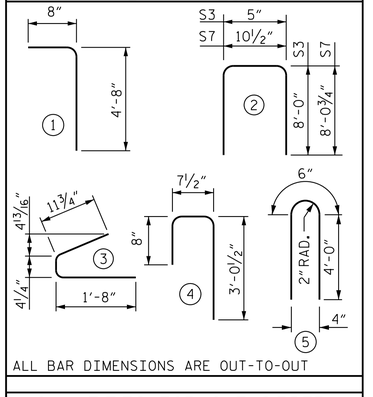
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	248	#4	1	5'-4"	884
S2	32	#6	1	5'-4"	257
S3	10	#4	2	16'-5"	110
S4	280	#5	4	4'-4"	1266
S5	88	#4	3	3'-0"	177
✱S6	30	#5	STR	3'-8"	115
S7	2	#5	2	17'-0"	36
S8	2	#3	STR	1'-10"	2
S9	40	#4	STR	3'-3"	87
S10	4	#5	5	8'-6"	36
S11	8	#4	STR	8'-0"	43

✱NOTE: S6 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	8,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3,013	18.1	36

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	99'-9¼"	498'-10¼"

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
54" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD

SPAN B

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

DocuSigned by: Joseph T. Kelvington 4/27/2022

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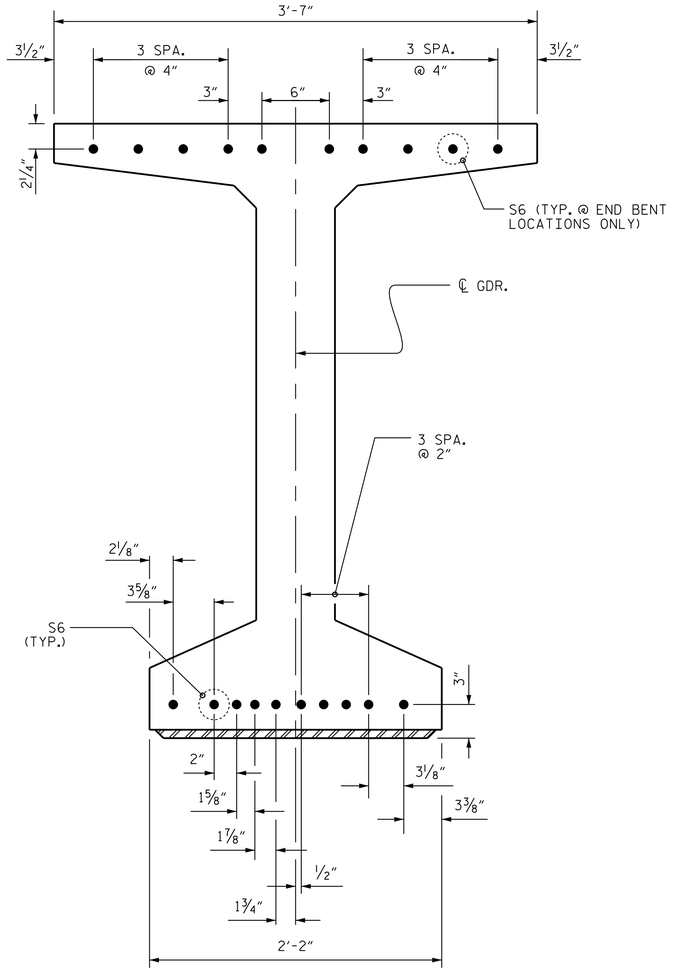
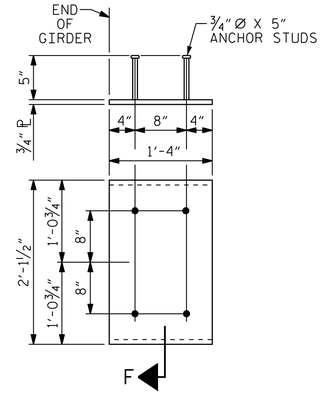


DETAIL "C"

(FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDER)

S6 BARS IN BOTTOM FLANGE MAY BE ADJUSTED SLIGHTLY AS NECESSARY TO CLEAR ¾"X5" ANCHOR STUDS MOUNTED ON EMBEDDED PLATE B-1.



EMBEDDED PLATE "B-1" DETAILS FOR MODIFIED 54" PRESTRESSED CONCRETE GIRDER

(2 REQ'D PER GIRDER)

SECTION "F"

(SEE NOTES)

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.

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 6,000 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 ¼".

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

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CLEVELAND COUNTY
STATION: 20+16.72 -Y2-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

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2			4			35

4/21/2023 JHagenbush
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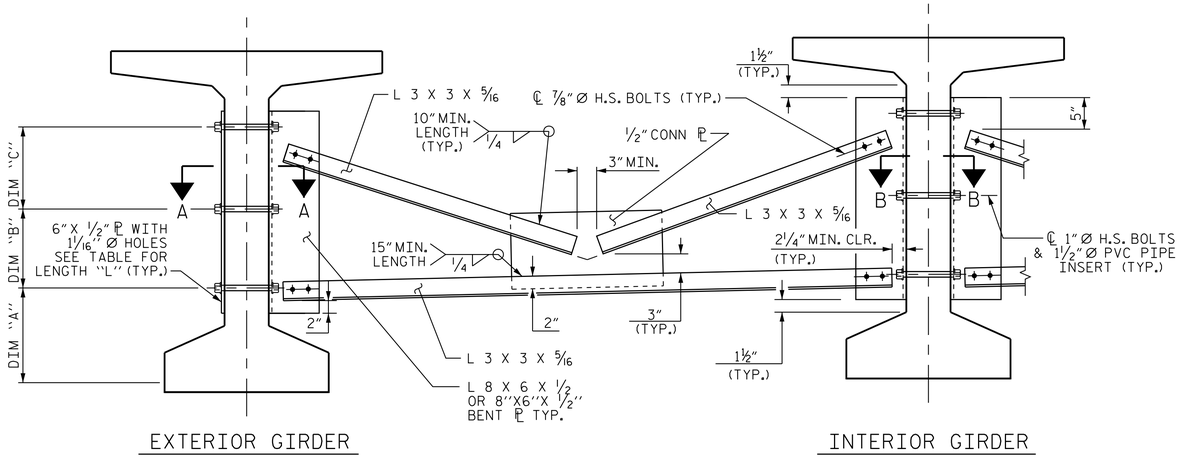
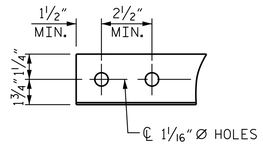


EXTERIOR GIRDER

INTERIOR GIRDER

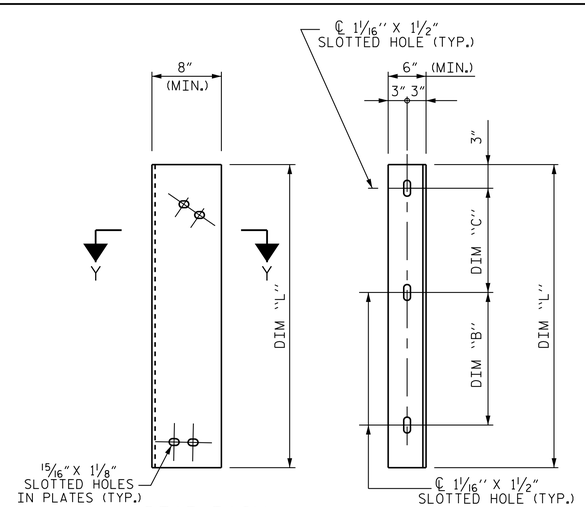
PART SECTION AT INTERMEDIATE DIAPHRAGM

(MODIFIED 54" PRESTRESSED CONC. GIRDER SHOWN)



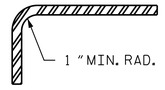
ANGLE END

(L 3 X 3 X 5/16)



DIAPHRAGM FACE

WEB FACE



SECTION Y-Y

CONNECTION 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.

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.

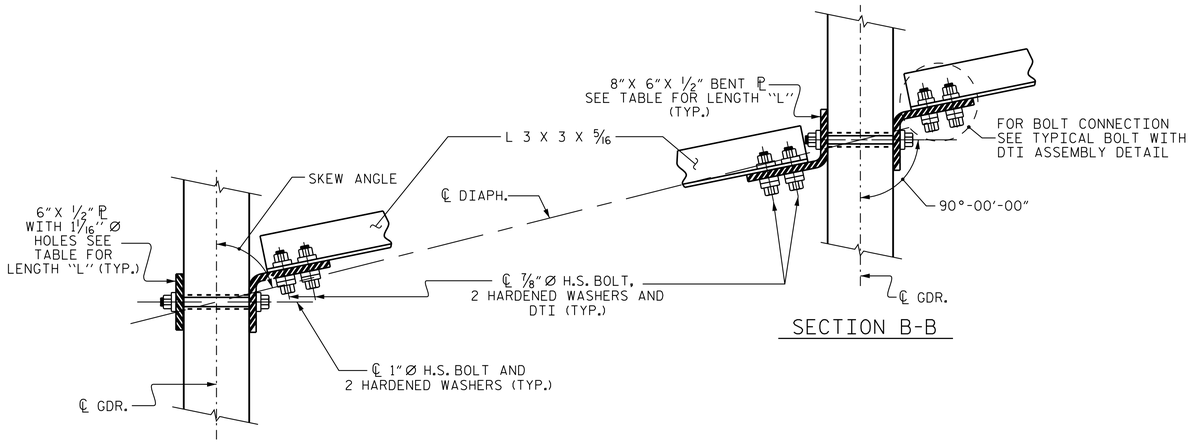
IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

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

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

TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
MODIFIED 54" PRESTRESSED CONCRETE GIRDER	1'-4½"	1'-0½"	1'-1"	2'-9"

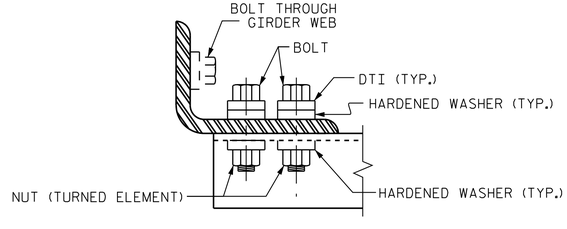


SECTION B-B

SECTION A-A

CONNECTION DETAILS

(70°≤ SKEW < 90°)



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

INTERMEDIATE STEEL DIAPHRAGMS FOR 54" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T KELVINGTON

Joseph T. Kelvington
4/27/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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DRAWN BY : J. B. GEILE DATE : 03/01/18
CHECKED BY : M. B. ISENHOUR DATE : 05/29/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

JHagenbush
4/27/2023
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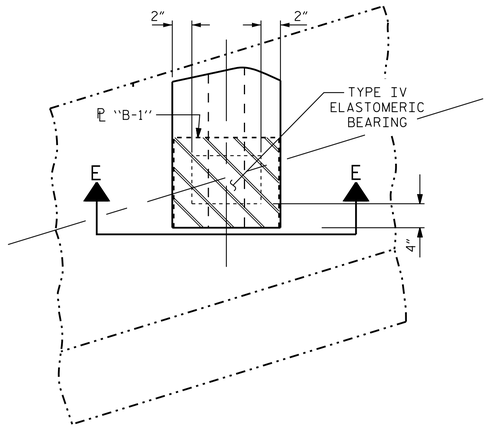
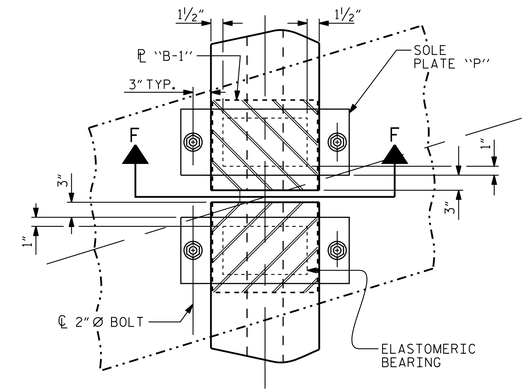


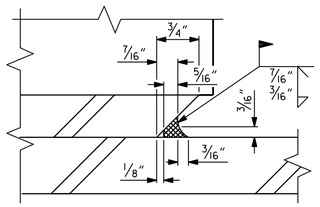
TYPICAL BEARING PLAN @ INTETRAL END BENT

(SHOWING BOTTOM FLANGE)



TYPICAL BEARING PLAN @ INTERIOR BENT 1

(SHOWING BOTTOM FLANGE)



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.

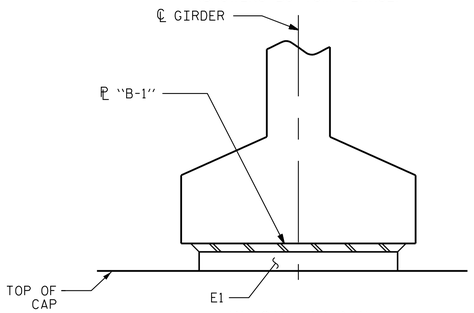
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

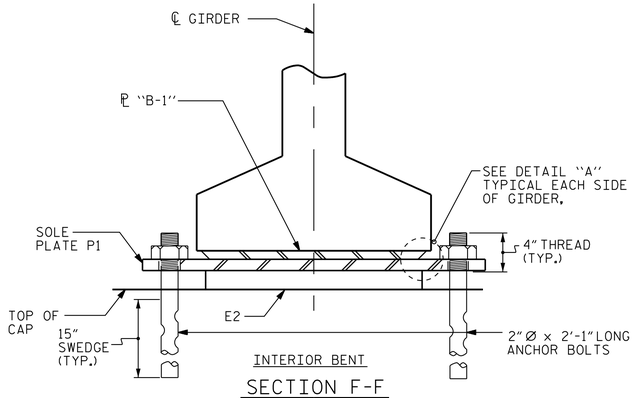
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



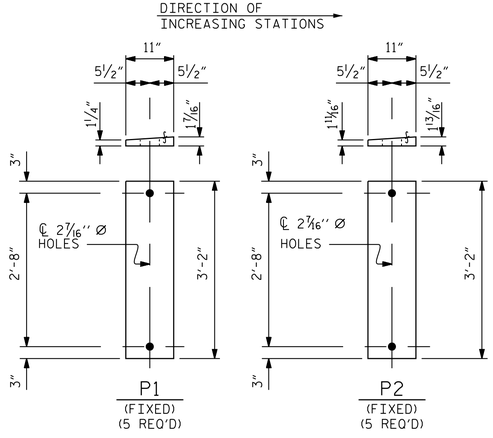
INTEGRAL END BENT

SECTION E-E



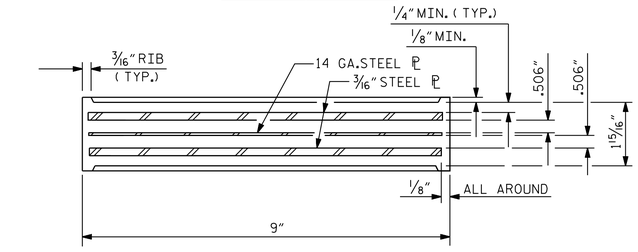
INTERIOR BENT

SECTION F-F

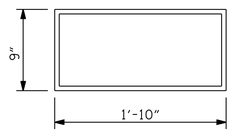


SOLE PLATE DETAILS ("P")

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE V	320 k



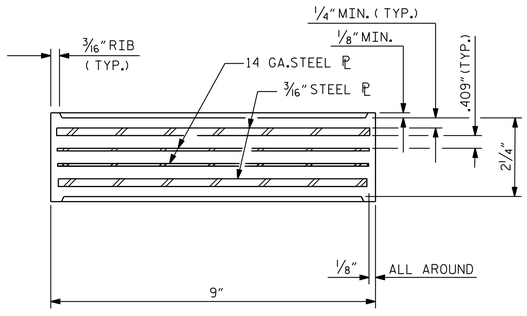
TYPICAL SECTION OF ELASTOMERIC BEARINGS



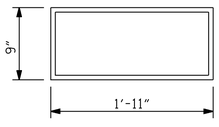
E1 (10 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV



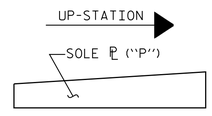
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E2 (10 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



SOLE ℄ PLACEMENT DETAIL

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-18
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2			4			35

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DRAWN BY : J. B. GEILE DATE : 03/20/18
CHECKED BY : M. B. ISENHOUR DATE : 09/06/18

DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH KELVINGTON

DocuSigned by: Joseph T. Kelvington 4/27/2023

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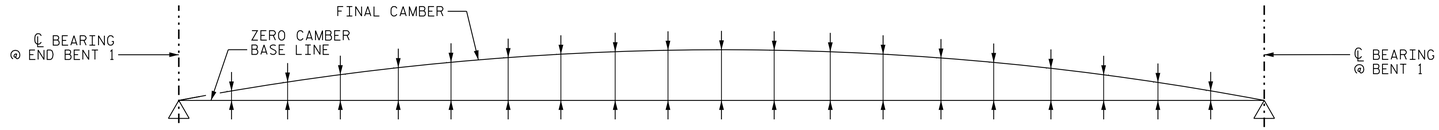
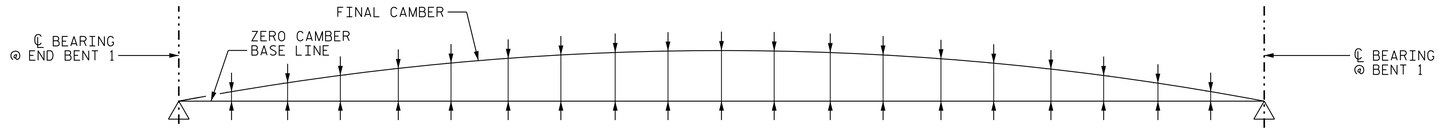


GIRDER 1 - SPAN A

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.034	0.067	0.098	0.126	0.151	0.173	0.190	0.202	0.210	0.213	0.210	0.202	0.190	0.173	0.151	0.126	0.098	0.067	0.034	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✻✻ ↓	0.000	0.020	0.037	0.056	0.073	0.087	0.100	0.110	0.117	0.121	0.123	0.121	0.117	0.110	0.100	0.087	0.073	0.056	0.037	0.020	0.000
FINAL CAMBER ↑	0''	3/16''	3/8''	1/2''	5/8''	3/4''	7/8''	15/16''	1''	1 1/16''	1 1/16''	1 1/16''	1''	15/16''	7/8''	3/4''	5/8''	1/2''	3/8''	3/16''	0''

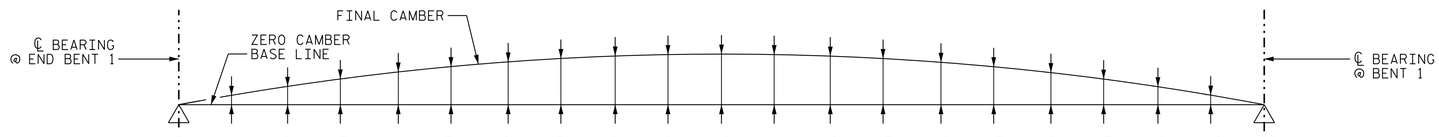
✻✻ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.



GIRDERS 2 - 4 - SPAN A

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.034	0.067	0.098	0.126	0.151	0.173	0.190	0.202	0.210	0.213	0.210	0.202	0.190	0.173	0.151	0.126	0.098	0.067	0.034	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✻✻ ↓	0.000	0.021	0.041	0.062	0.079	0.096	0.109	0.120	0.129	0.133	0.134	0.133	0.129	0.120	0.109	0.096	0.079	0.062	0.041	0.021	0.000
FINAL CAMBER ↑	0''	1/8''	5/16''	7/16''	9/16''	11/16''	3/4''	13/16''	7/8''	15/16''	15/16''	15/16''	7/8''	13/16''	3/4''	11/16''	9/16''	7/16''	5/16''	1/8''	0''

✻✻ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.



GIRDER 5 - SPAN A

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.034	0.067	0.098	0.126	0.151	0.173	0.190	0.202	0.210	0.213	0.210	0.202	0.190	0.173	0.151	0.126	0.098	0.067	0.034	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✻✻ ↓	0.000	0.020	0.037	0.056	0.073	0.087	0.100	0.110	0.117	0.121	0.123	0.121	0.117	0.110	0.100	0.087	0.073	0.056	0.037	0.020	0.000
FINAL CAMBER ↑	0''	3/16''	3/8''	1/2''	5/8''	3/4''	7/8''	15/16''	1''	1 1/16''	1 1/16''	1 1/16''	1''	15/16''	7/8''	3/4''	5/8''	1/2''	3/8''	3/16''	0''

✻✻ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

SCHEMATIC CAMBER ORDINATES SPAN A

ALL VALUES ARE SHOWN IN DECIMALS OF A FOOT EXCEPT "FINAL CAMBER" WHICH IS SHOWN IN INCHES.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS
SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Digitally signed by: Joseph T. Kelvington
4/27/2023

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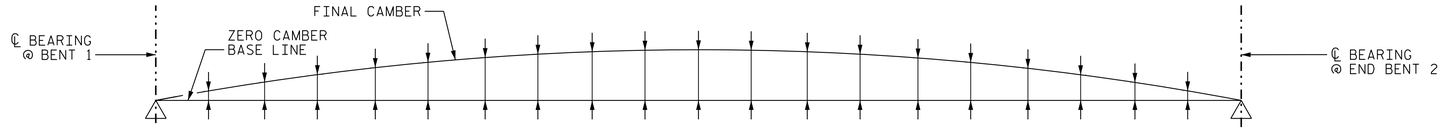
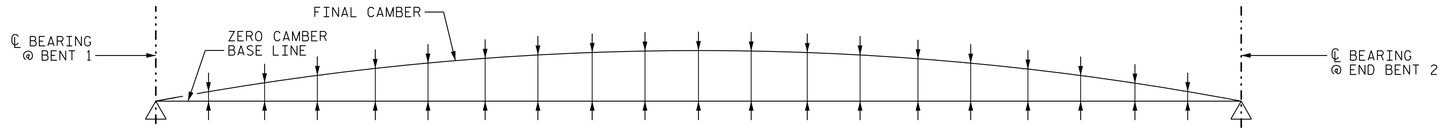
DRAWN BY : M. B. ISENHOUR DATE : 09/06/18
CHECKED BY : V. E. FRAGA DATE : 10/24/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22



GIRDER 1 - SPAN B

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.036	0.072	0.105	0.135	0.162	0.185	0.204	0.217	0.225	0.228	0.225	0.217	0.204	0.185	0.162	0.135	0.105	0.072	0.036	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✻✻ ↓	0.000	0.021	0.038	0.061	0.076	0.095	0.106	0.119	0.126	0.132	0.133	0.132	0.126	0.119	0.106	0.095	0.076	0.061	0.038	0.021	0.000
FINAL CAMBER ↑	0″	3/16″	7/16″	1/2″	11/16″	13/16″	15/16″	1″	1 1/16″	1 1/8″	1 1/8″	1 1/8″	1 1/16″	1″	15/16″	13/16″	11/16″	1/2″	7/16″	3/16″	0″

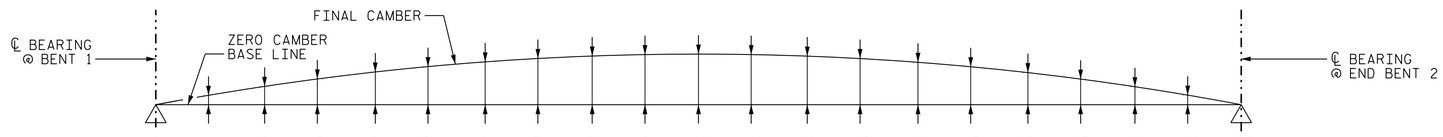
✻✻ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.



GIRDERS 2 - 4 - SPAN B

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.036	0.072	0.105	0.135	0.162	0.185	0.204	0.217	0.225	0.228	0.225	0.217	0.204	0.185	0.162	0.135	0.105	0.072	0.036	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✻✻ ↓	0.000	0.023	0.042	0.067	0.083	0.104	0.116	0.130	0.138	0.144	0.146	0.144	0.138	0.130	0.116	0.104	0.083	0.067	0.042	0.023	0.000
FINAL CAMBER ↑	0″	1/8″	3/8″	7/16″	5/8″	11/16″	13/16″	7/8″	15/16″	1″	1″	1″	15/16″	7/8″	13/16″	11/16″	5/8″	7/16″	3/8″	1/8″	0″

✻✻ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.



GIRDER 5 - SPAN B

TWENTIETH PTS. BTWN. BRGS.	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.036	0.072	0.105	0.135	0.162	0.185	0.204	0.217	0.225	0.228	0.225	0.217	0.204	0.185	0.162	0.135	0.105	0.072	0.036	0.000
DEFLEC. DUE TO SUPERIMPOSED DL ✻✻ ↓	0.000	0.021	0.038	0.061	0.076	0.095	0.106	0.119	0.126	0.132	0.133	0.132	0.126	0.119	0.106	0.095	0.076	0.061	0.038	0.021	0.000
FINAL CAMBER ↑	0″	3/16″	7/16″	1/2″	11/16″	13/16″	15/16″	1″	1 1/16″	1 1/8″	1 1/8″	1 1/8″	1 1/16″	1″	15/16″	13/16″	11/16″	1/2″	7/16″	3/16″	0″

✻✻ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

SCHEMATIC CAMBER ORDINATES SPAN B

ALL VALUES ARE SHOWN IN DECIMALS OF A FOOT EXCEPT "FINAL CAMBER" WHICH IS SHOWN IN INCHES.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS
SPAN B

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

DocuSigned by: Joseph T. Kelvington 4/27/2023

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DRAWN BY : M. B. ISENHOUR DATE : 09/06/18
CHECKED BY : V. E. FRAGA DATE : 10/24/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

JHaggenbush
4/27/2023
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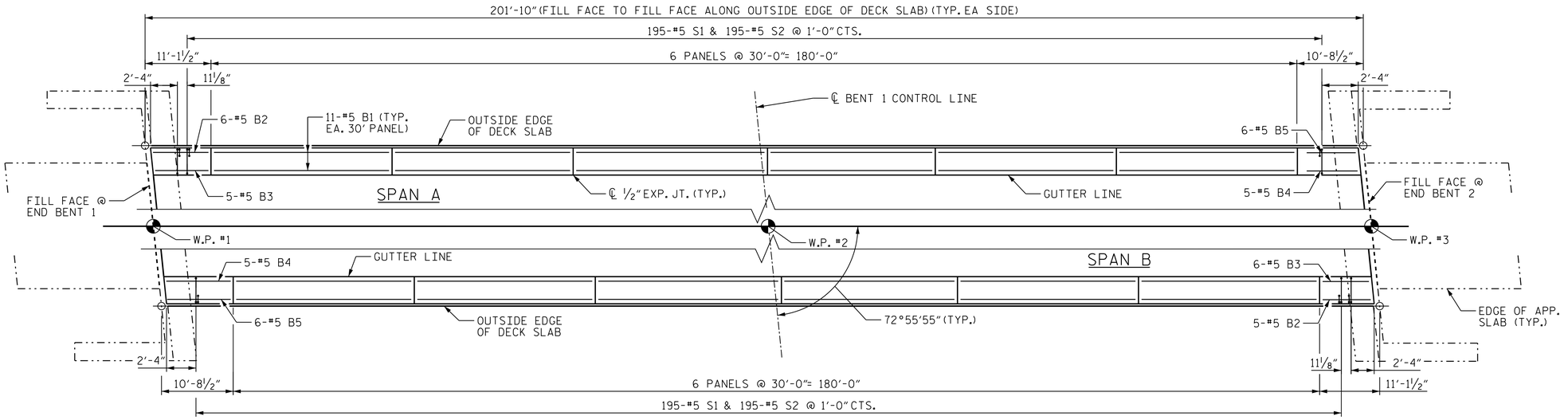


BARRIER RAIL PLAN

NOTES

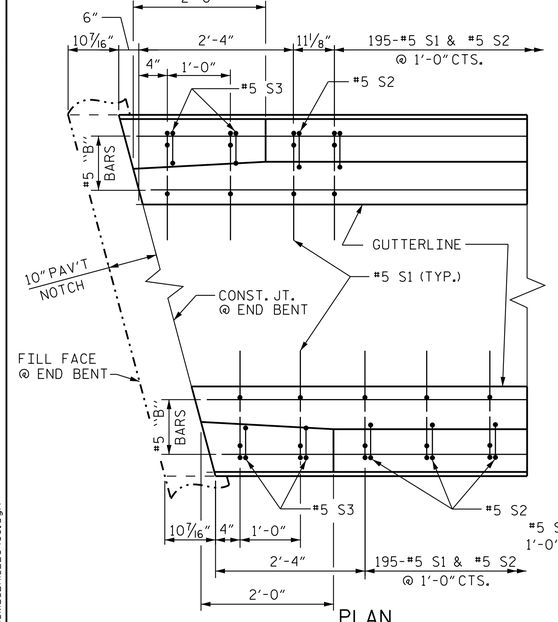
THE BARRIER RAIL IN THE CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN ALL SPANS HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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

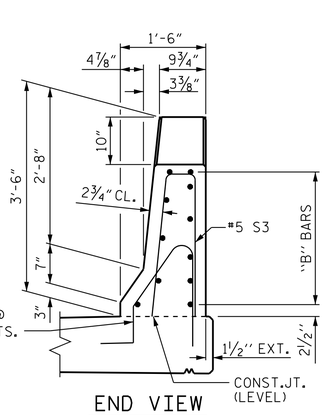
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

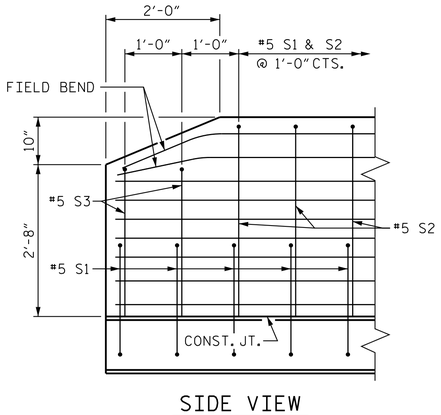
NOTE: ALL HORIZONTAL DIMENSIONS SHOWN ARE ALONG OUTSIDE EDGE OF DECK SLAB



PLAN



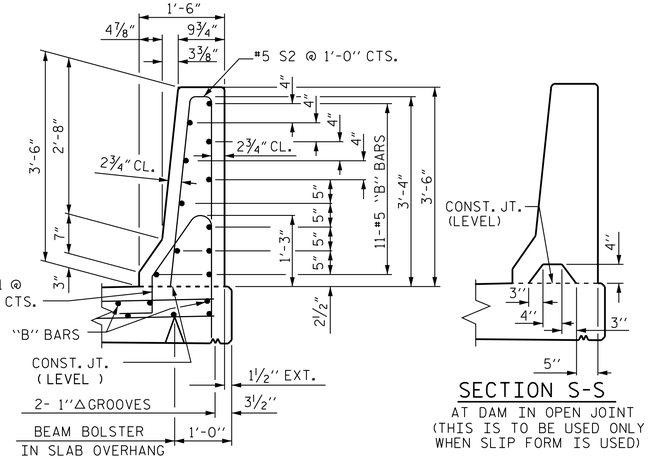
END VIEW



SIDE VIEW

END OF RAIL DETAILS

END BENT 1 SHOWN, END BENT 2 TYP. BY ROTATION

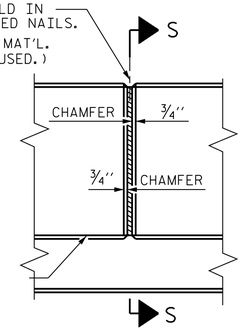


SECTION THRU RAIL

SECTION S-S

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

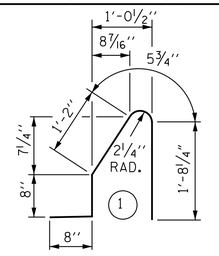
℄ ½" EXP.JT.MAT'L HELD IN PLACE WITH GALVANIZED NAILS.
(NOTE: OMIT EXP. JT. MAT'L. WHEN SLIP FORM IS USED.)

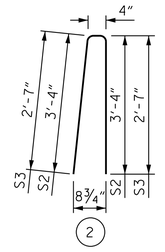


ELEVATION AT JOINTS

BARRIER RAIL DETAILS

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ B1	132	#5	STR	29'-6"	4061
✱ B2	12	#5	STR	9'-8"	121
✱ B3	10	#5	STR	9'-5"	98
✱ B4	10	#5	STR	9'-10"	103
✱ B5	12	#5	STR	9'-7"	120
✱ S1	400	#5	1	4'-8"	1947
✱ S2	392	#5	2	7'-0"	2862
✱ S3	8	#5	2	5'-6"	46

✱ EPOXY COATED REINFORCING STEEL	9,358 LBS.
CLASS AA CONCRETE	54.3 CU. YDS.
CONCRETE BARRIER RAIL	400.2 LIN. FT.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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CHECKED BY : V. E. FRAGA DATE : 11/19/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

JHaggenbush
4/27/2023
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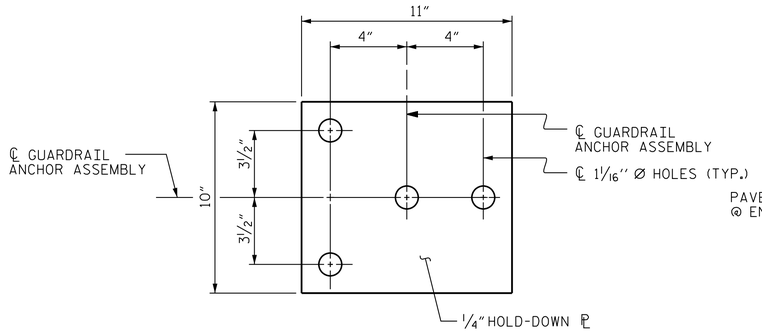
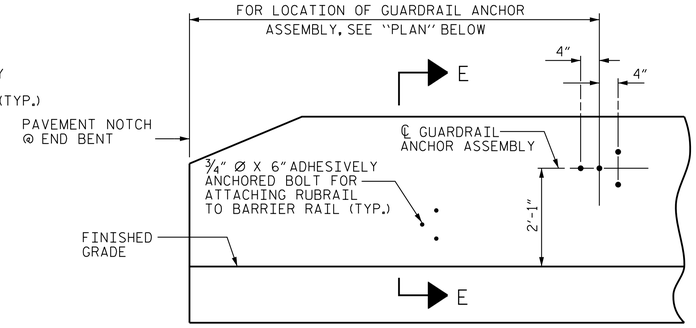
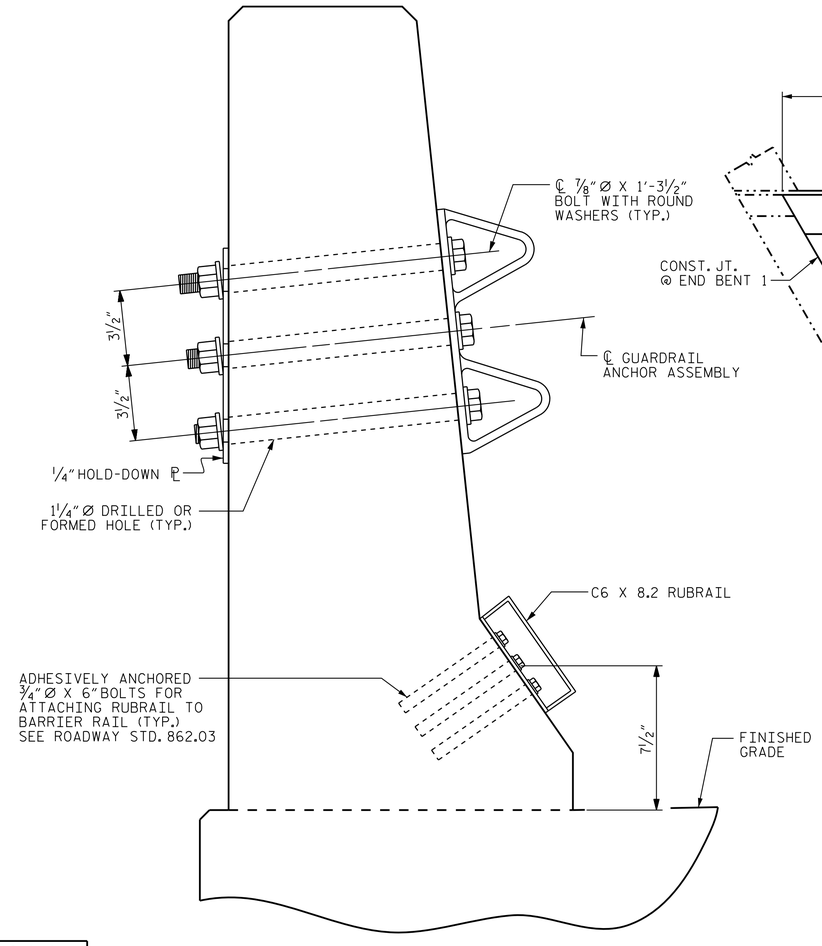


PLAN

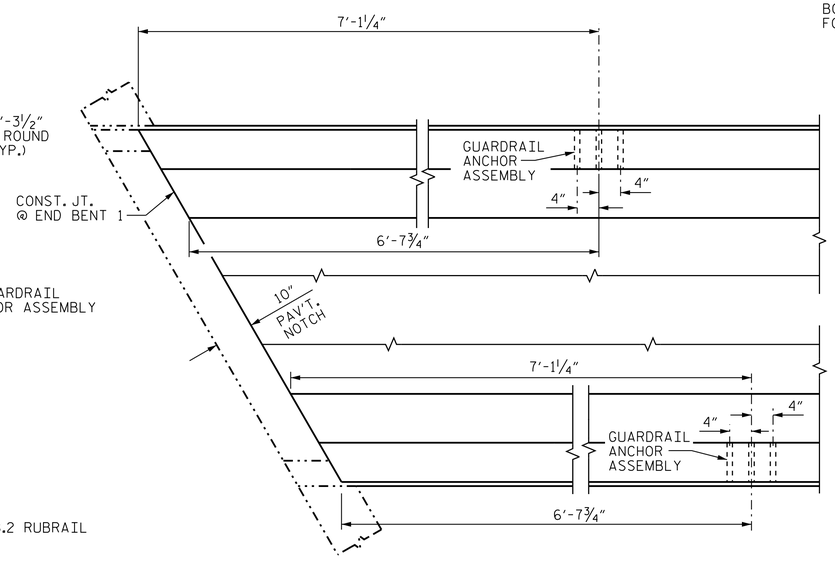


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #1 SHOWN, END BENT #2 SIMILAR.

NOTES

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

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

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

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

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

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

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

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

SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

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ASSEMBLED BY : J. B. GEILE DATE : 03/07/18
CHECKED BY : M. B. ISENHOUR DATE : 05/29/18

DRAWN BY : TLA 5/06
CHECKED BY : GM 5/06

REV. 7/12 MAA/GM
REV. 6/13 MAA/GM
REV. 12/17 MAA/THC

DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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

REVISIONS						SHEET NO.
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2			4			35

STD. NO. GRA2

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4/27/2023
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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″			

CLASS AA CONC. BREAKDOWN

POUR #1	115.8 C.Y.
POUR #2	146.8 C.Y.
POUR #3	84.1 C.Y.
TOTAL CLASS AA CONC.	346.6 CY

GROOVING BRIDGE FLOORS

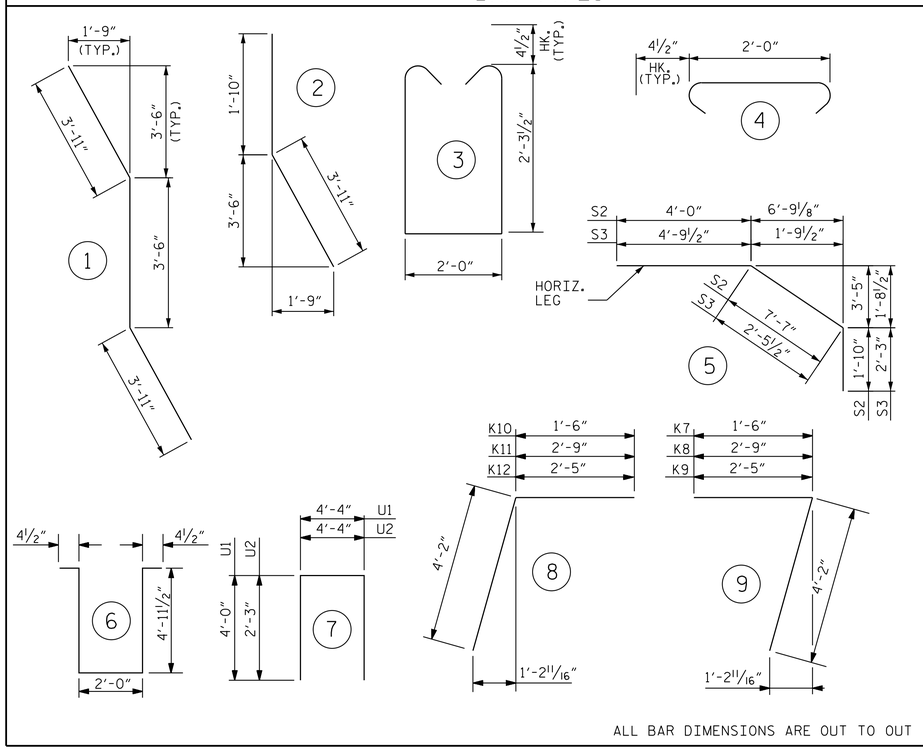
APPROACH SLABS	1,747 SQ.FT.
BRIDGE DECK	7,442 SQ.FT.
TOTAL	9,189 SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
TOTALS **	336.1	24,405	36,793

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

BAR TYPES



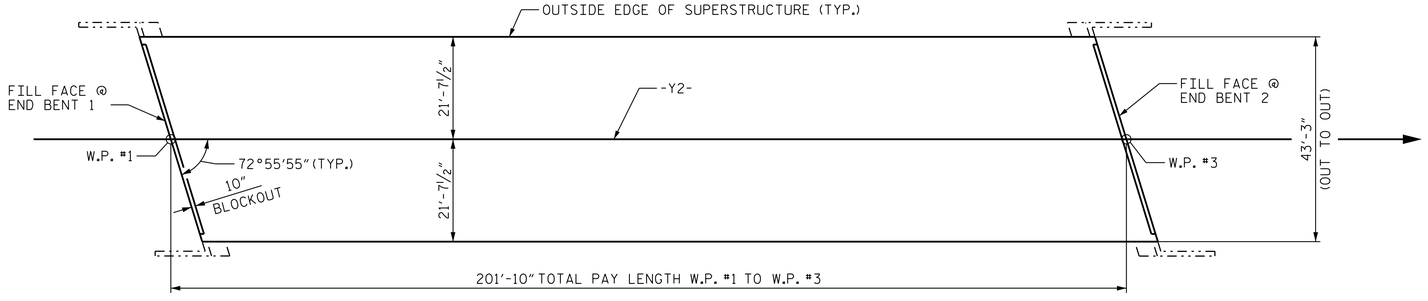
ALL BAR DIMENSIONS ARE OUT TO OUT

REINFORCING BAR SCHEDULE (DECK & DIAPHRAGM)

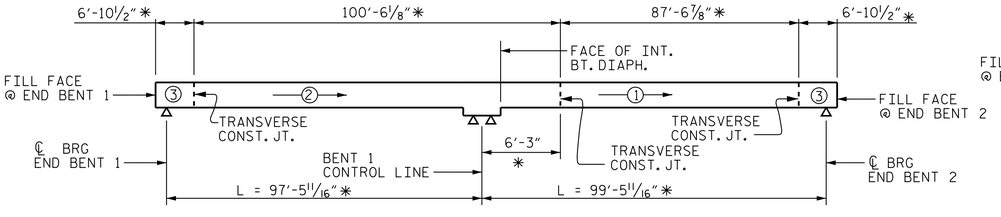
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	299	#5	STR	42′-9″	13332
A2	299	#5	STR	42′-9″	13332
* A101	4	#5	STR	39′-3″	164
* A102	4	#5	STR	35′-2″	147
* A103	4	#5	STR	31′-2″	130
* A104	4	#5	STR	27′-1″	113
* A105	4	#5	STR	23′-0″	96
* A106	4	#5	STR	18′-11″	79
* A107	4	#5	STR	14′-10″	62
* A108	4	#5	STR	10′-9″	45
* A109	4	#5	STR	6′-8″	28
* A110	4	#5	STR	2′-8″	11
A201	4	#5	STR	39′-2″	163
A202	4	#5	STR	35′-1″	146
A203	4	#5	STR	31′-0″	129
A204	4	#5	STR	27′-0″	113
A205	4	#5	STR	22′-11″	96
A206	4	#5	STR	18′-10″	79
A207	4	#5	STR	14′-9″	62
A208	4	#5	STR	10′-8″	45
A209	4	#5	STR	6′-7″	27
A210	4	#5	STR	2′-6″	10
* B1	124	#5	STR	51′-9″	6693
B2	152	#5	STR	51′-6″	8165
* B3	252	#5	STR	36′-1″	9484
* B4	53	#5	STR	26′-0″	1437
* B5	56	#6	STR	21′-0″	1766
* B6	56	#6	STR	23′-10″	2005
* G1	2	#5	STR	44′-8″	93

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
K1	20	#4	STR	23′-1″	308
K2	8	#4	STR	5′-3″	28
K3	8	#4	STR	6′-9″	36
K4	24	#4	STR	7′-9″	124
K5	10	#4	2	5′-9″	38
K6	15	#4	1	11′-4″	114
K7	2	#4	9	5′-8″	8
K8	6	#4	9	6′-11″	28
K9	2	#4	9	6′-5″	9
K10	2	#4	8	5′-8″	8
K11	6	#4	8	6′-11″	28
K12	2	#4	8	6′-5″	9
K13	12	#4	STR	5′-2″	41
K14	8	#4	STR	5′-3″	28
K15	24	#4	STR	8′-5″	135
K16	8	#4	STR	5′-6″	29
S1	120	#4	4	2′-9″	220
* S2	84	#4	5	13′-5″	753
* S3	56	#4	5	9′-6″	355
U1	52	#4	7	12′-4″	428
U2	30	#4	7	8′-10″	177
U3	24	#4	6	12′-8″	203
U4	8	#4	3	7′-4″	39

REINFORCING STEEL	24,405 LBS.
* EPOXY COATED REINFORCING STEEL	36,793 LBS.



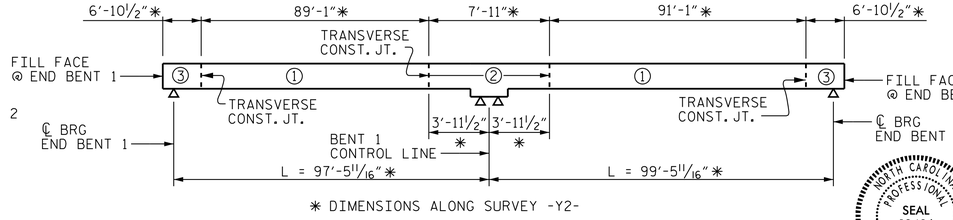
LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ.FT. = 8,729)



* DIMENSIONS ALONG SURVEY -Y2-

POURING SEQUENCE

→(#)← = INDICATES POUR NUMBER AND DIRECTION OF POUR



* DIMENSIONS ALONG SURVEY -Y2-

OPTIONAL POURING SEQUENCE

NOTE:
POUR ② & ③ CAN NOT BE STARTED UNTIL BOTH ADJACENT POURS REACH A MINIMUM COMP. STRENGTH OF 3000 PSI.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE BILL OF MATERIALS

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NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
6/22/2023

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DRAWN BY : M. B. ISENHOUR DATE : 10/08/18
CHECKED BY : V. E. FRAGA DATE : 10/18/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 06/22/23

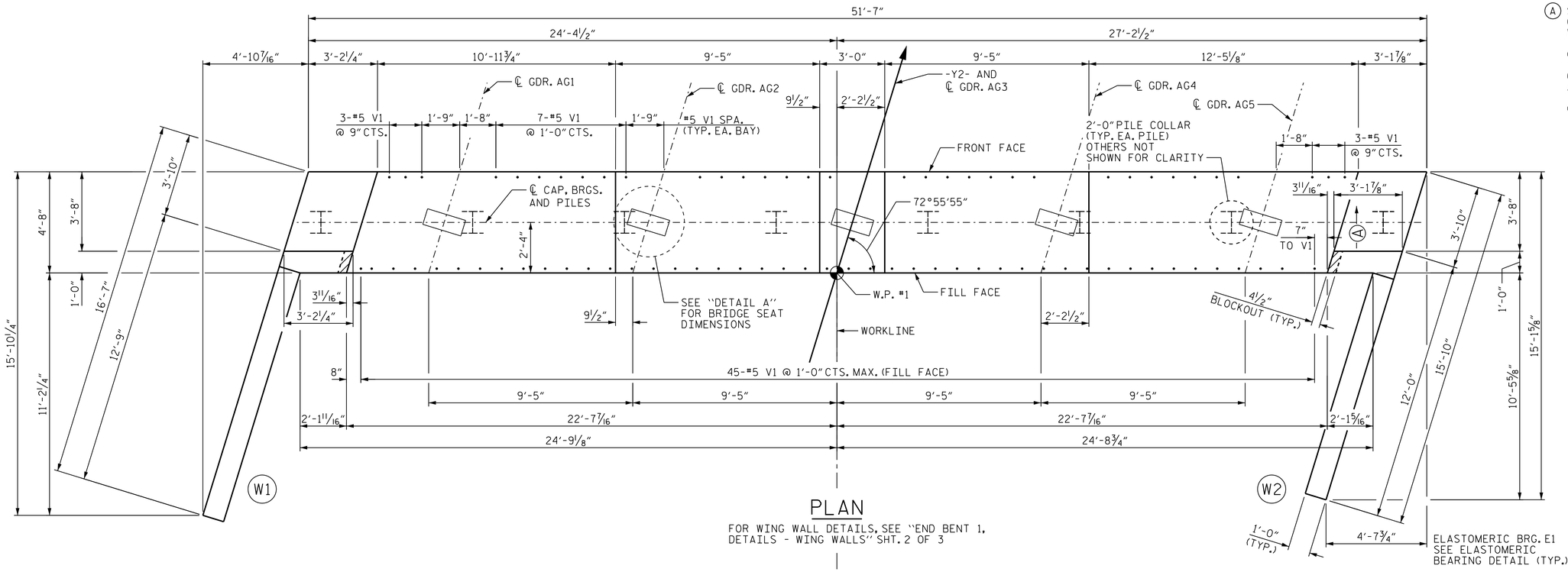
NOTES

(A) SLOPED CAP SURFACE BEYOND LIMIT OF INTEGRAL DIAPH. SEE END BENT 1 WING WALL DETAILS, SHT. 2 OF 3.

(EF) - DENOTES EACH FACE

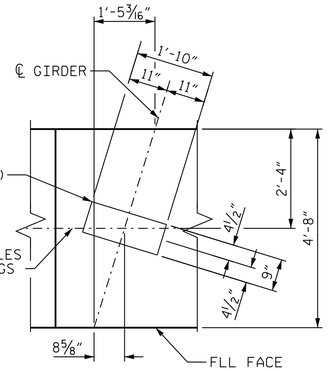
CHAMFERS ARE NOT REQUIRED EXCEPT AS NOTED.

(2 BR) DENOTES 2 BAR RUN.



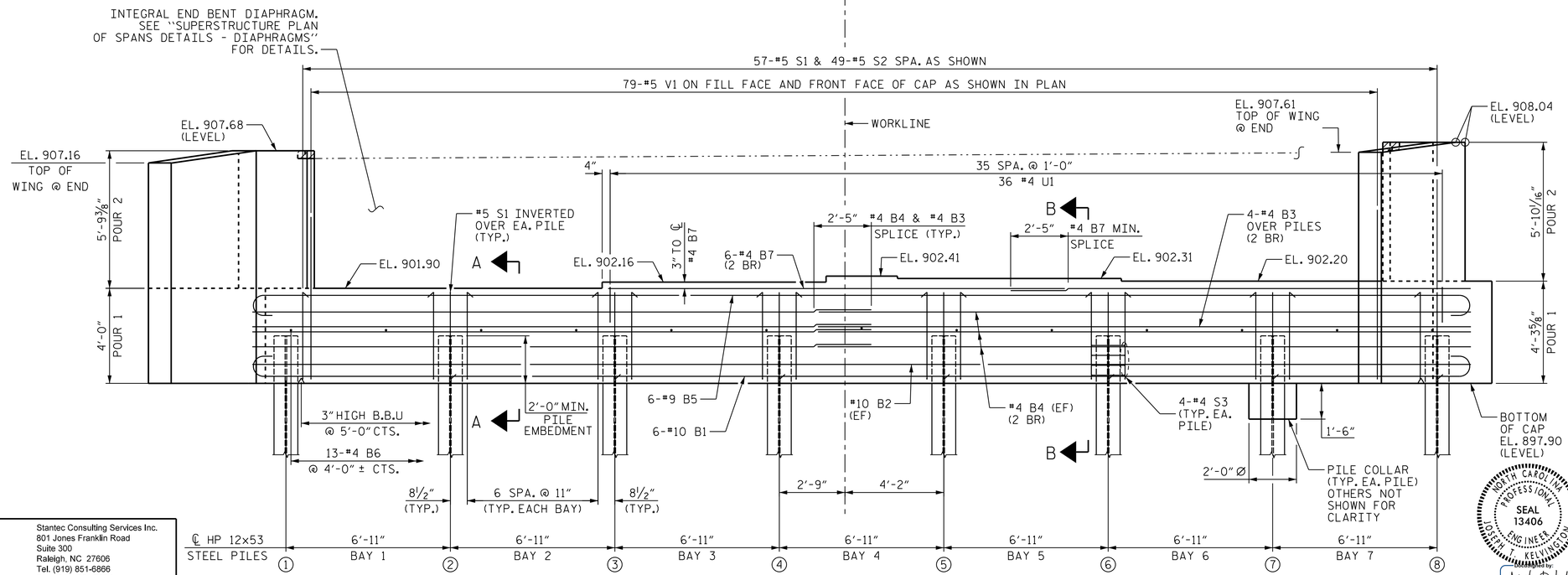
PLAN

FOR WING WALL DETAILS, SEE "END BENT 1, DETAILS - WING WALLS" SHT. 2 OF 3



DETAIL A

DIMENSIONS TYPICAL FOR EACH BEARING



ELEVATION

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

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NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington 4/27/2023

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4/27/2023

JHaggenbush

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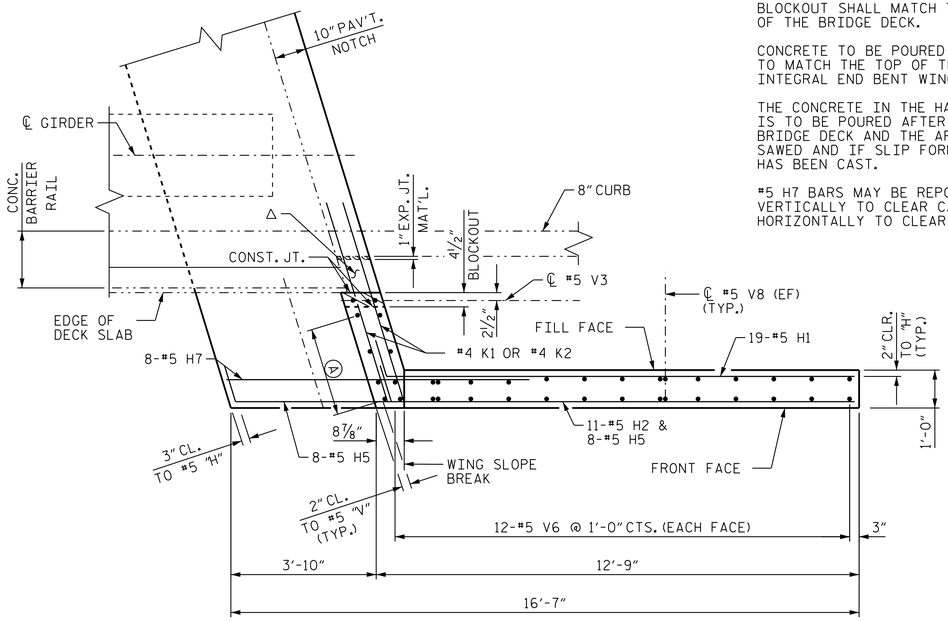
NOTES:

△ AREA BETWEEN APPROACH SLAB CURB AND BLOCKOUT SHALL MATCH THE FINISHED SURFACE OF THE BRIDGE DECK.

CONCRETE TO BE POURED IN THE HATCHED AREA TO MATCH THE TOP OF THE CURB AND THE INTEGRAL END BENT WING ELEVATION.

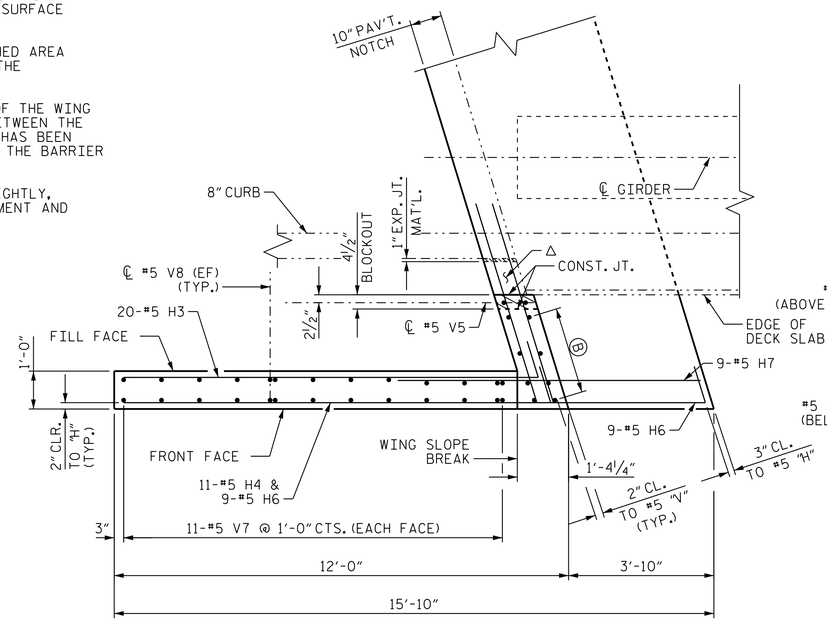
THE CONCRETE IN THE HATCHED AREA OF THE WING IS TO BE POURED AFTER THE JOINT BETWEEN THE BRIDGE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND IF SLIP FORMING IS USED, THE BARRIER HAS BEEN CAST.

#5 H7 BARS MAY BE REPOSITIONED SLIGHTLY, VERTICALLY TO CLEAR CAP REINFORCEMENT AND HORIZONTALLY TO CLEAR THE PILE.



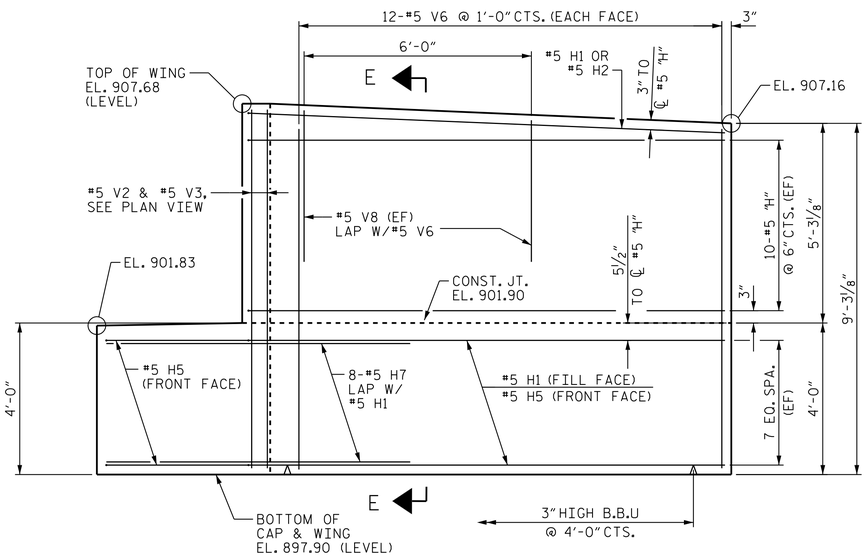
Ⓐ 8-#5 V2 @ 9" MAX. SPA., 4 ON EA. FACE (SPA. AS SHOWN)

PLAN OF LEFT WING (W1)

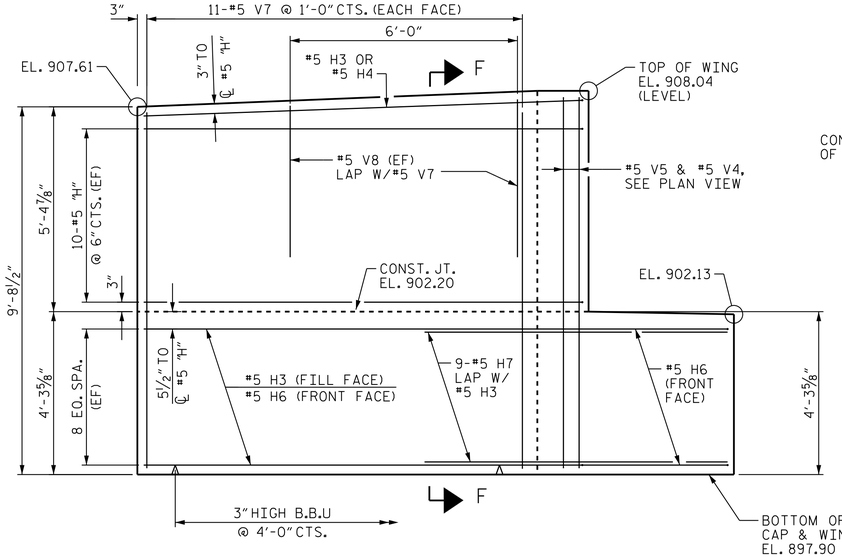


Ⓑ 2-#5 V4 @ 9" MAX. SPA., 4 ON EACH FACE (SPA. AS SHOWN)

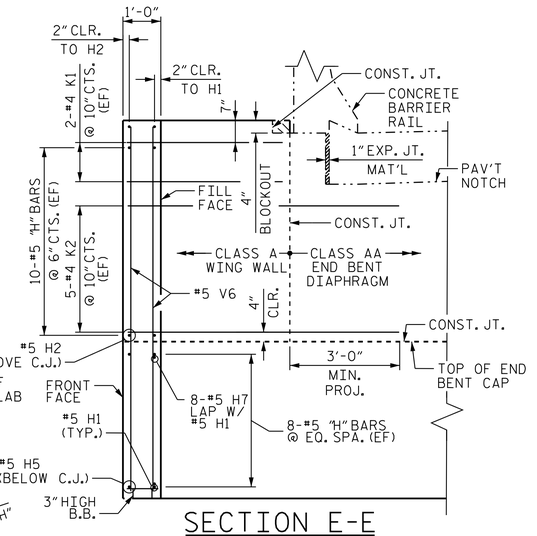
PLAN OF RIGHT WING (W2)



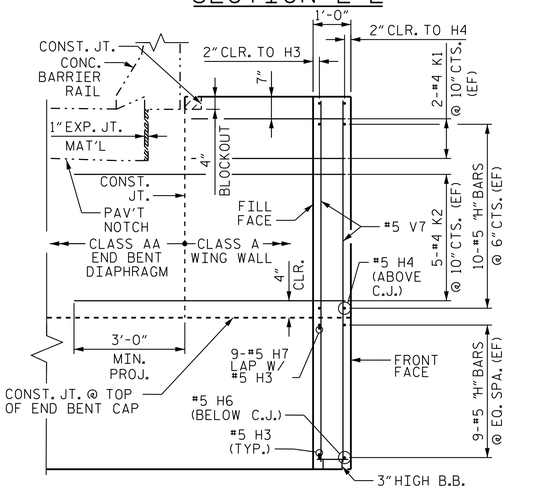
ELEVATION OF LEFT WING (W1)



ELEVATION OF RIGHT WING (W2)



SECTION E-E



SECTION F-F

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS WING WALLS

NOTE: TOP SURFACE OF END BENT CAP BETWEEN EDGE OF DECK SLAB AND END OF CAP SHALL BE SLOPED TRANSVERSELY FROM EXPOSED FACE OF THE WING TO FRONT FACE AT A RATE OF 1/4"/FT.

(EF) DENOTES EACH FACE.

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Signed by: Joseph T. Kelvington
4/27/2023 [illegible]

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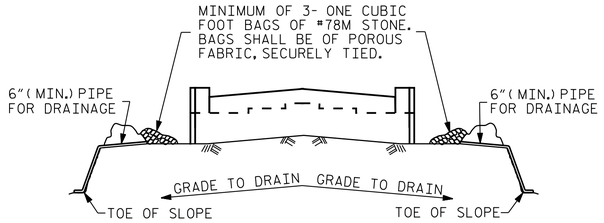
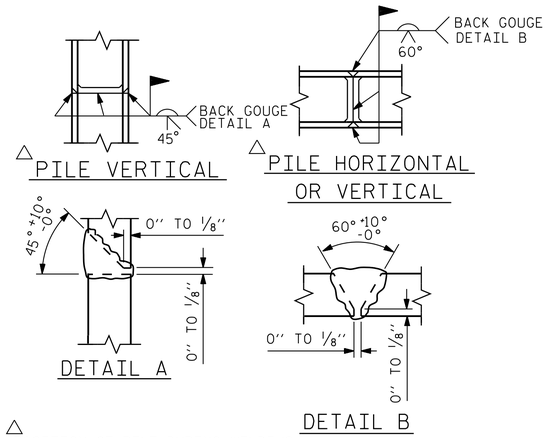


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

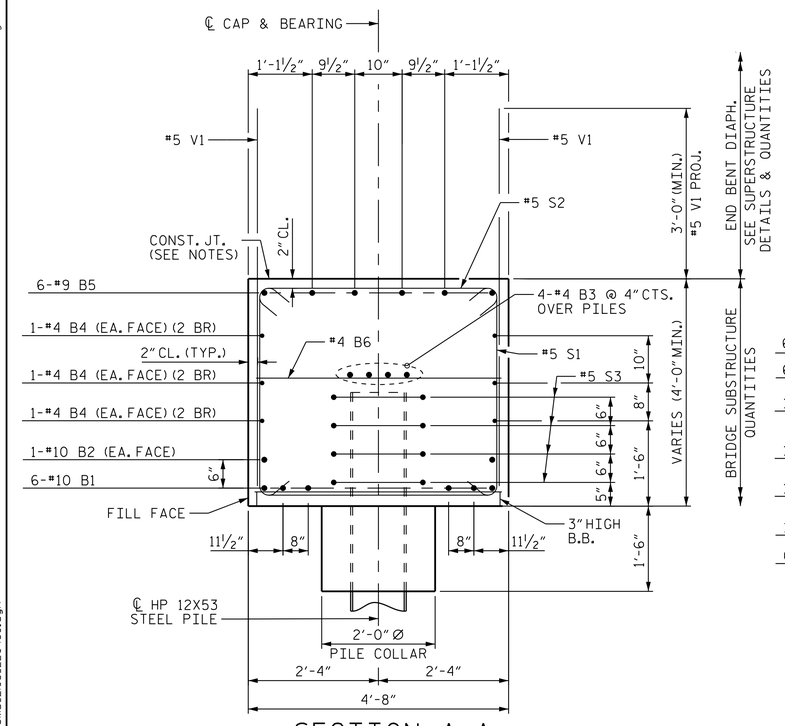
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



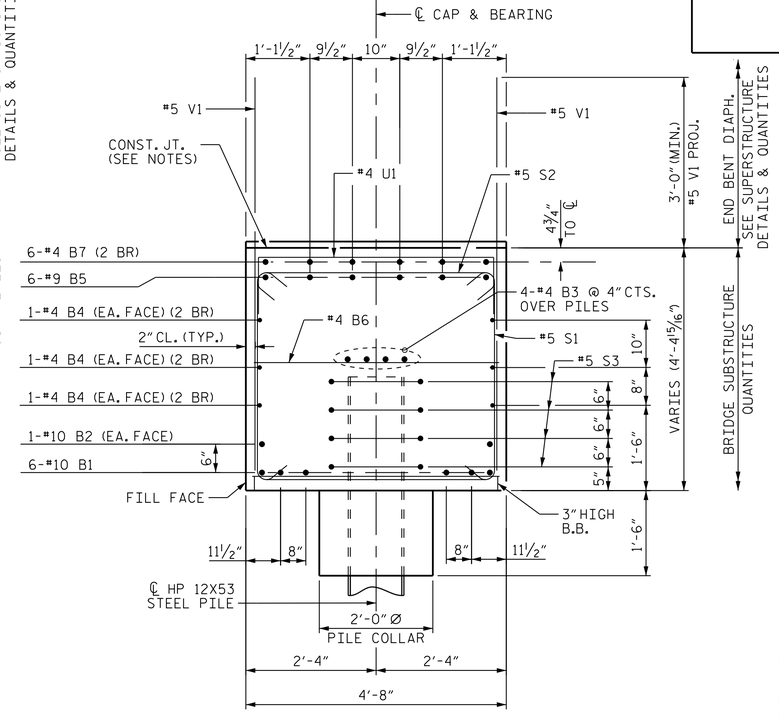
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION A-A

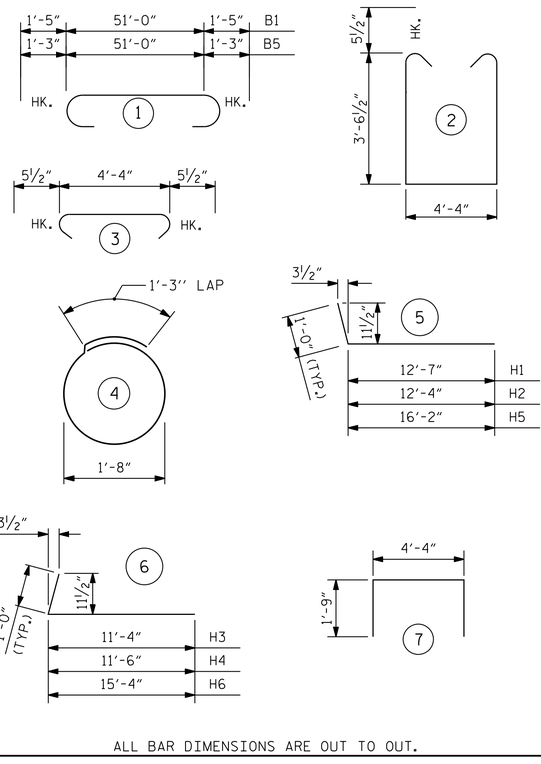
SEE "END BENT 1", SHEET 1 OF 3.



SECTION B-B

SEE "END BENT 1", SHEET 1 OF 3.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	53'-10"	1390
B2	2	#10	STR	50'-6"	435
B3	8	#4	STR	26'-6"	142
B4	12	#4	STR	26'-10"	215
B5	6	#9	1	53'-6"	1091
B6	13	#4	STR	4'-4"	38
B7	12	#4	STR	24'-5"	196
H1	19	#5	5	13'-7"	269
H2	11	#5	5	13'-4"	153
H3	20	#5	6	12'-4"	257
H4	11	#5	6	12'-6"	143
H5	8	#5	5	17'-2"	143
H6	9	#5	6	16'-4"	153
H7	17	#5	STR	8'-0"	142
K1	8	#4	STR	2'-4"	12
K2	20	#4	STR	6'-1"	81
S1	57	#5	2	12'-4"	733
S2	49	#5	3	5'-3"	268
S3	32	#4	4	6'-6"	139
U1	36	#4	7	7'-10"	188
V1	79	#5	STR	7'-4"	604
V2	8	#5	STR	9'-5"	79
V3	2	#5	STR	9'-1"	19
V4	8	#5	STR	9'-9"	81
V5	2	#5	STR	9'-5"	20
V6	24	#5	STR	8'-11"	223
V7	22	#5	STR	9'-4"	214
V8	8	#5	STR	4'-0"	33
REINFORCING STEEL					7,461
CLASS A CONCRETE BREAKDOWN:					
POUR #1: CAP, COLLARS, ETC.					C.Y. 42.5
POUR #2: UPPER WINGS					C.Y. 6.4
CLASS A CONCRETE TOTAL					C.Y. 48.9

NOTES:

TOP SURFACE AREAS OF THE END BENT CAP SHALL BE KEPT CLEAN AND FREE OF LAITANCE.

ROUGH FLOAT AND ROUGHEN THE TOP OF THE END BENT CAP UNDER END BENT DIAPHRAGM TO PROVIDE MIN. SURFACE AMPLITUDE OF 1/4", EXCEPT UNDER BEARING AREAS.

2 BR DENOTES 2 BAR RUN.

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

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CHECKED BY : V. E. FRAGA DATE : 10/23/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

JHaggenbush
4/27/2023
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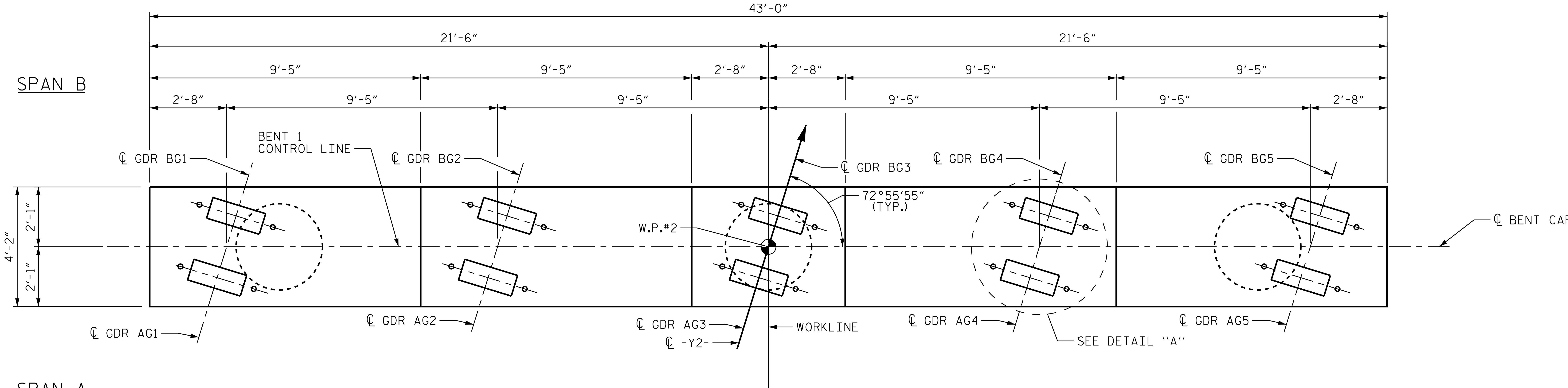
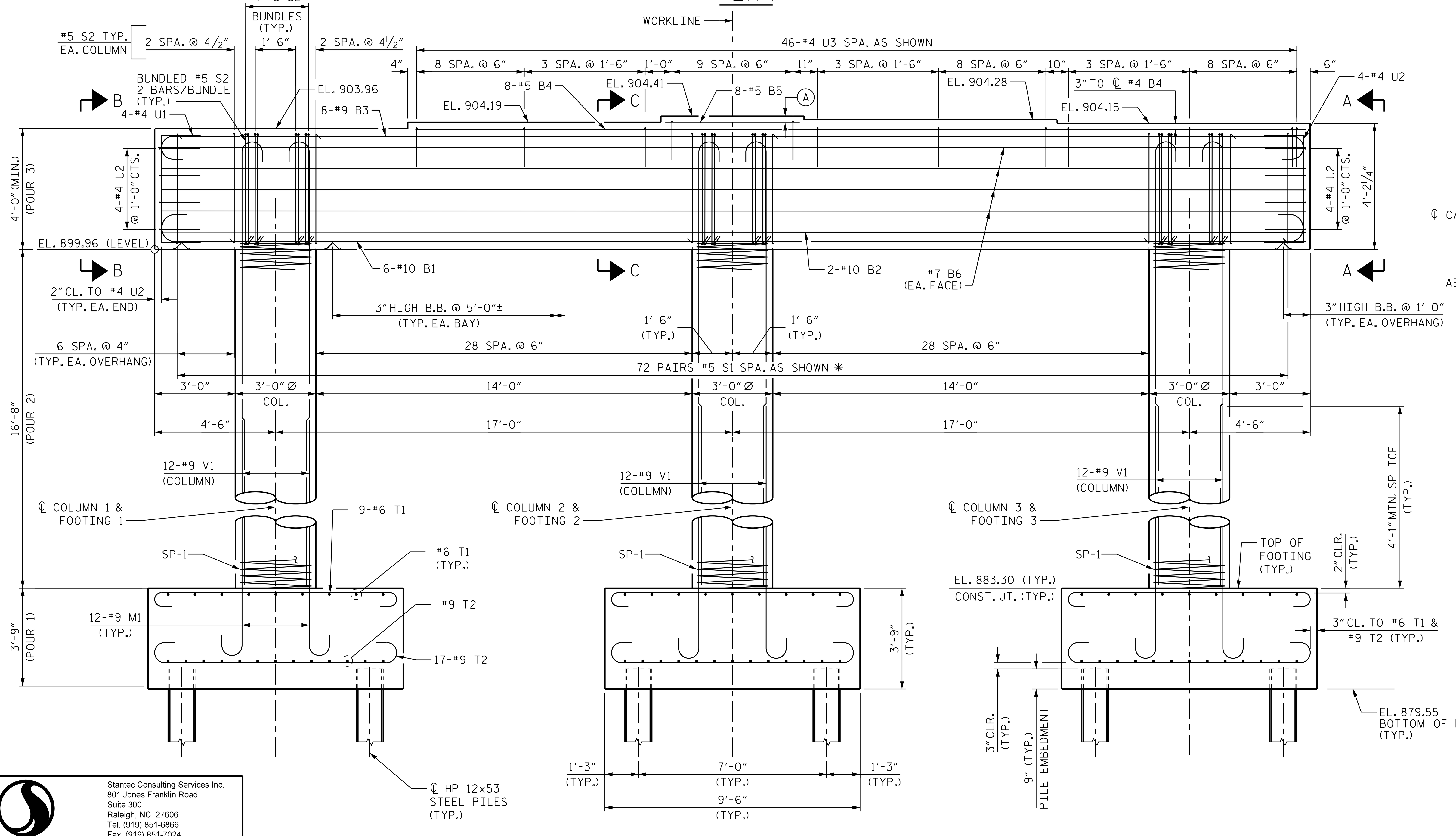


PLAN



ELEVATION

✱ INVERT ALTERNATE STIRRUP PAIRS

✱ INVERT ALTERNATE STIRRUPS

NOTES:

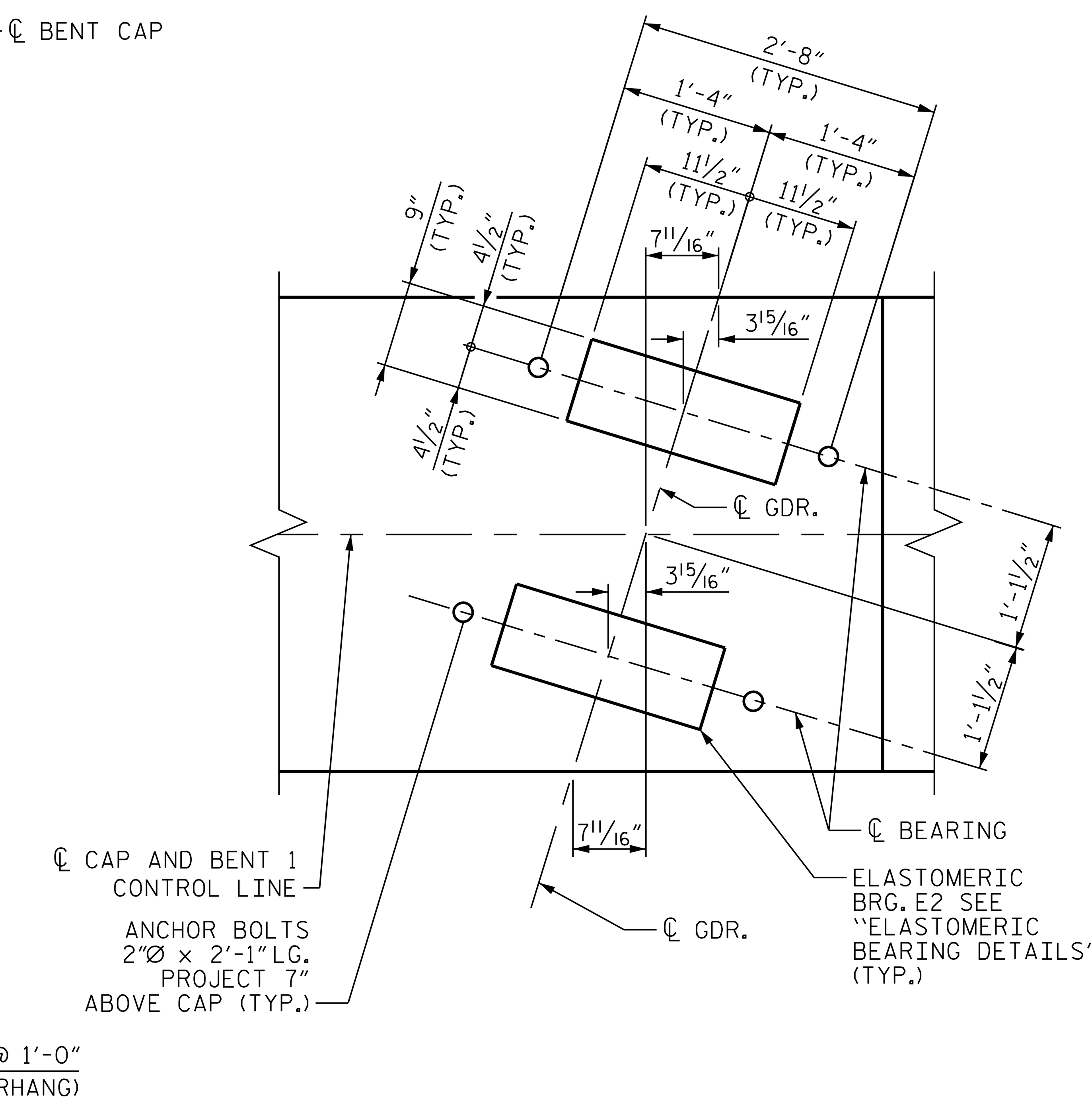
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS AND COLUMN REINFORCEMENT.

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

FOR VIEW A-A, VIEW B-B, AND SECTION C-C, SEE BENT 1 SHEET 3 OF 3.

(2BR) - DENOTES 2 BAR RUN.

(A) 3" TO ℄ #5 B5



DETAIL A

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 13406 JOSEPH T. KELVINGTON

Joseph T. Kelvington 4/27/2023

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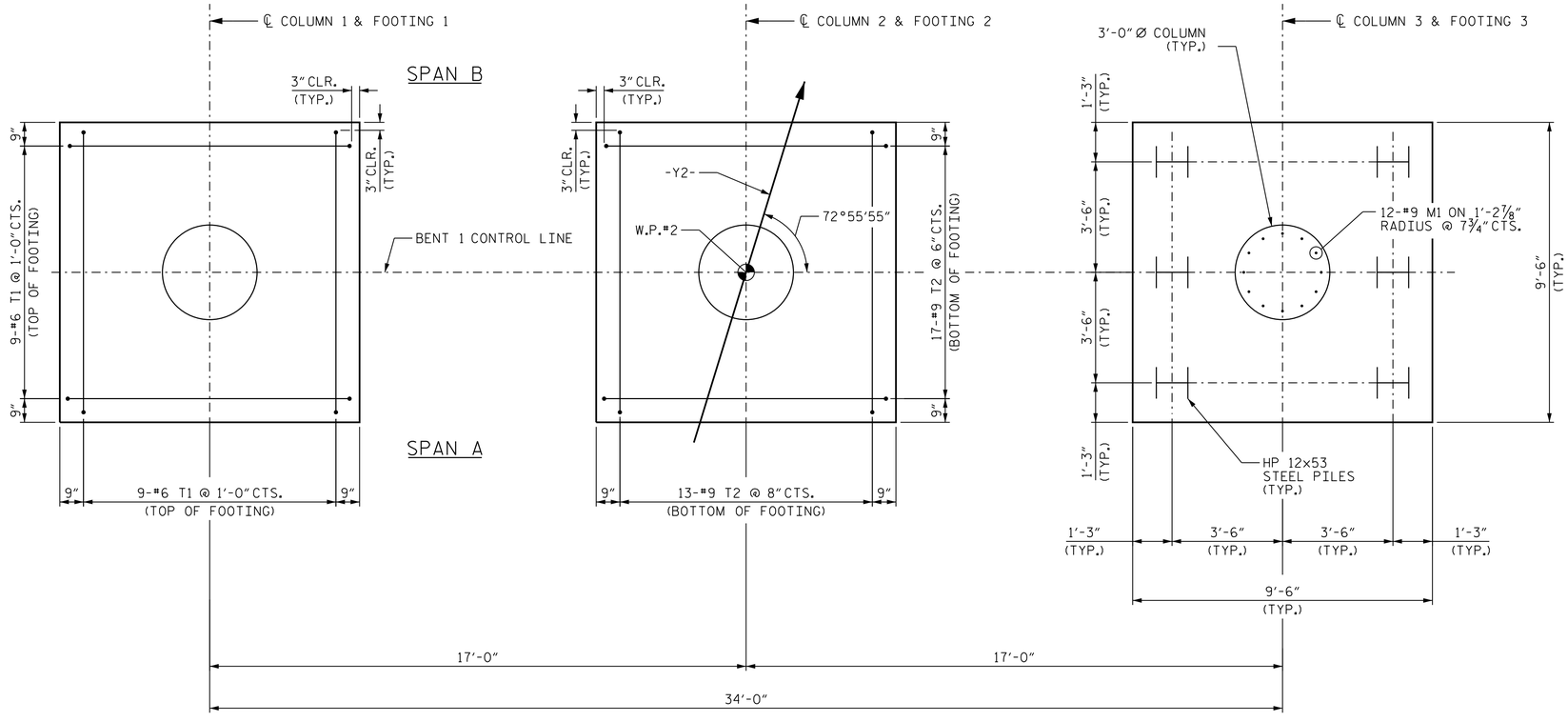
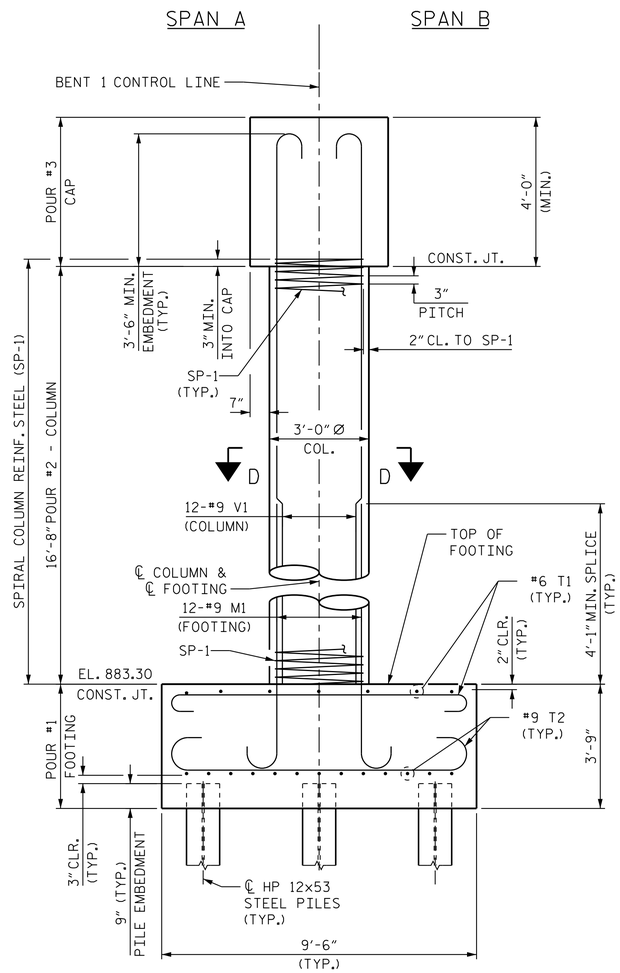
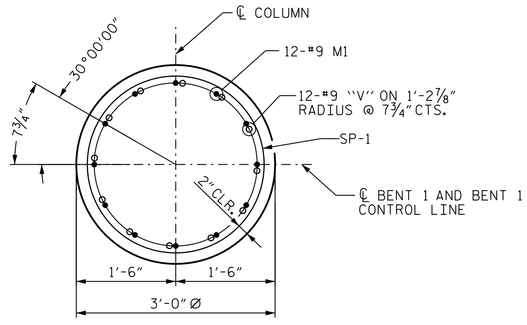


PLAN OF FOOTINGS

ALL DIMENSIONS AND DETAILS SHOWN FOR FOOTINGS ARE TYPICAL FOR EACH FOOTING UNLESS NOTED OTHERWISE.



END ELEVATION



SECTION D-D

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT #1 DETAILS

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DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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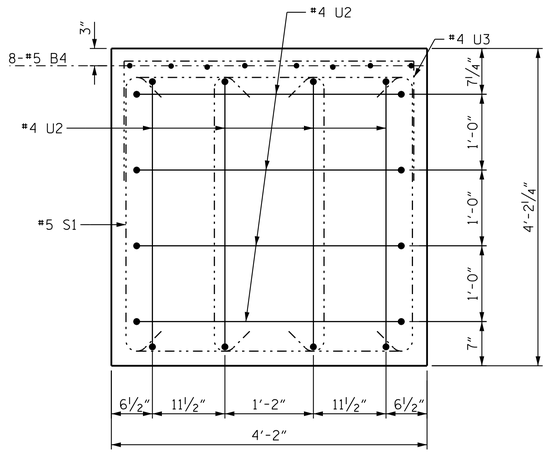
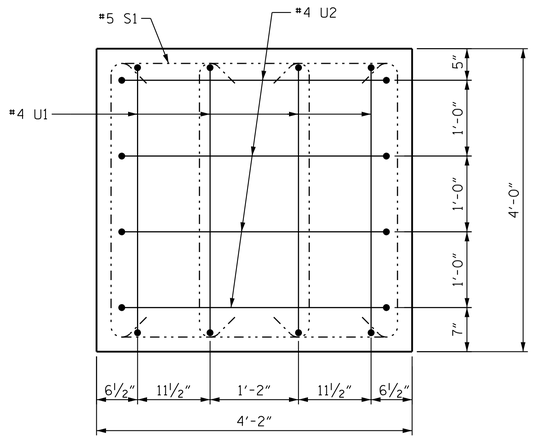
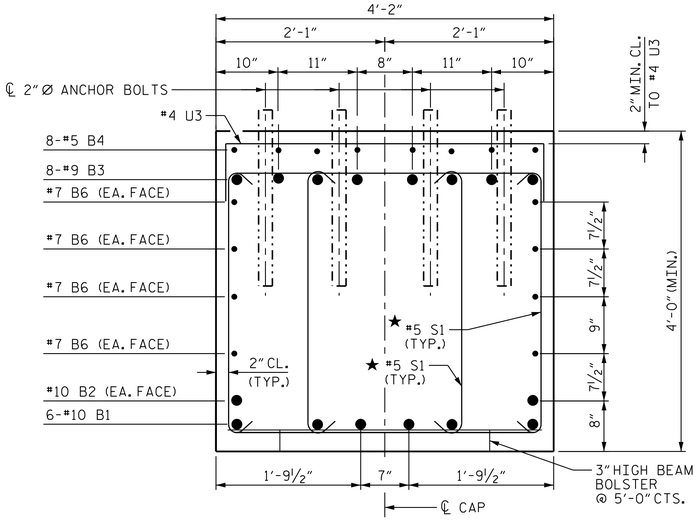


VIEW A-A



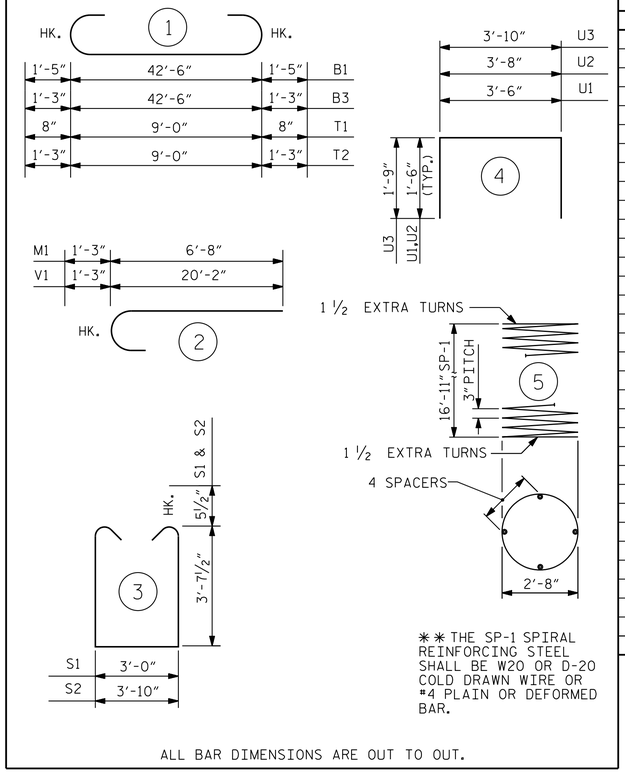
VIEW B-B



SECTION C-C

★ INVERT ALTERNATE STIRRUPS

BAR TYPES



✱✱ THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	45'-4"	1170
B2	2	#10	STR	42'-2"	363
B3	8	#9	1	45'-0"	1224
B4	8	#5	STR	33'-2"	277
B5	8	#5	STR	5'-0"	42
B6	8	#7	STR	42'-6"	695
M1	36	#9	2	7'-11"	969
S1	144	#5	3	11'-2"	1677
S2	24	#5	3	12'-0"	300
T1	54	#6	1	10'-4"	838
T2	90	#9	1	11'-6"	3519
U1	4	#4	4	6'-6"	17
U2	12	#4	4	6'-8"	53
U3	46	#4	4	7'-4"	225
V1	36	#9	2	21'-5"	2621
REINFORCING STEEL				LBS.	13,990
SP-1	3	✱✱	5	582'-9"	1,168
SPIRAL COLUMN REINFORCING STEEL				LBS.	1,168
CLASS A CONCRETE BREAKDOWN					
POUR #1 FOOTINGS				C.Y.	37.6
POUR #2 COLUMNS				C.Y.	13.0
POUR #3 CAP				C.Y.	27.9
TOTAL CLASS A CONC.				C.Y.	78.5

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. Kelvington
4/27/2023

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4/27/2023

JHagenbush

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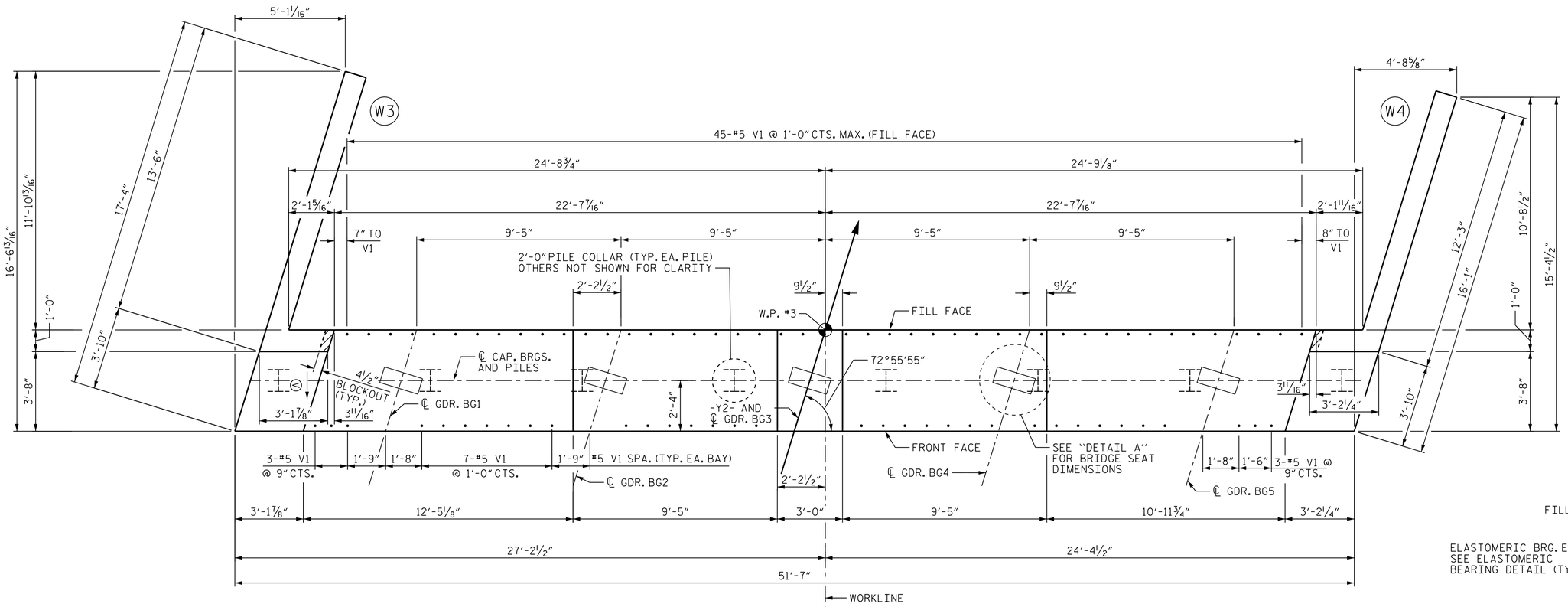
NOTES

(A) SLOPED CAP SURFACE BEYOND LIMIT OF INTEGRAL DIAPH. SEE END BENT 2 WING WALL DETAILS, SHT. 2 OF 3.

(EF) - DENOTES EACH FACE

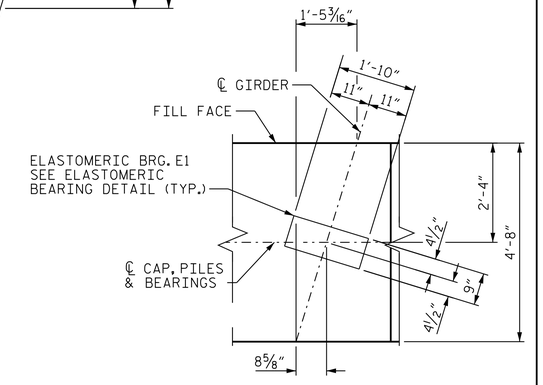
CHAMFERS ARE NOT REQUIRED EXCEPT AS NOTED.

(2 BR) DENOTES 2 BAR RUN.



PLAN

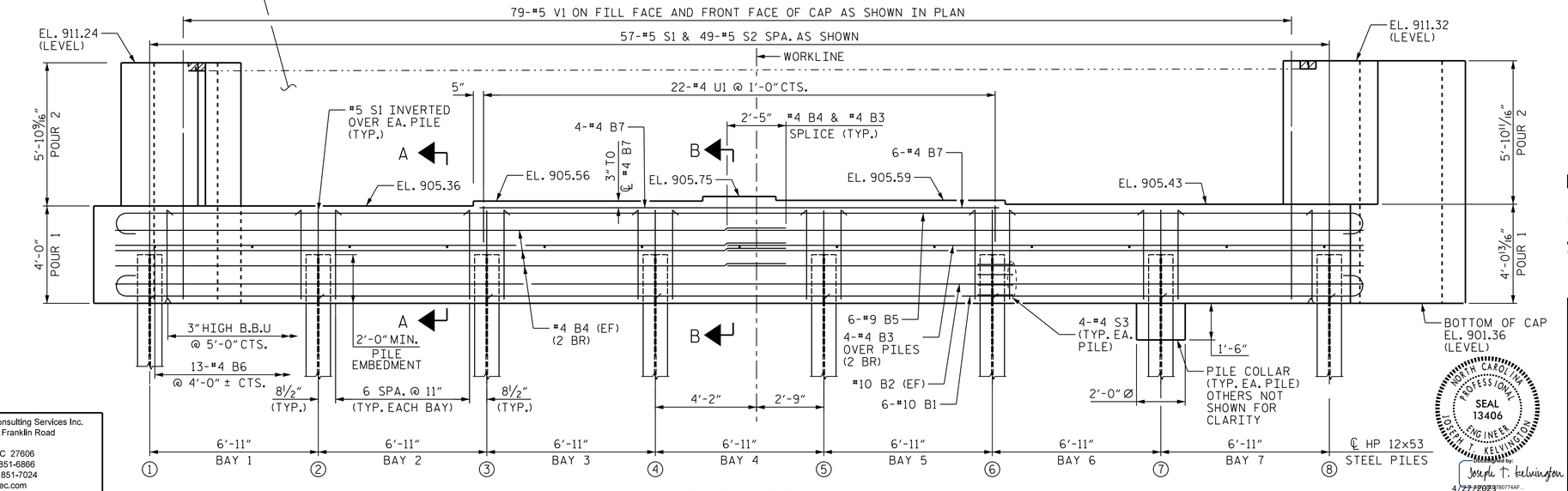
FOR WING WALL DETAILS, SEE "END BENT 2, DETAILS - WING WALLS" SHT. 2 OF 3



DETAIL A

DIMENSIONS TYPICAL FOR EACH BEARING

INTEGRAL END BENT DIAPHRAGM. SEE "SUPERSTRUCTURE PLAN OF SPANS DETAILS - DIAPHRAGMS" FOR DETAILS.



ELEVATION

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
Joseph T. Kelvington
4/27/2023

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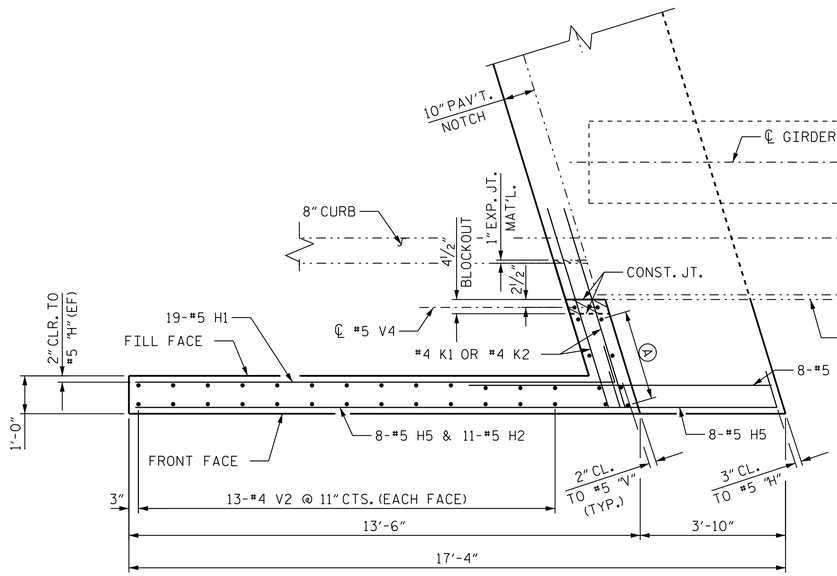
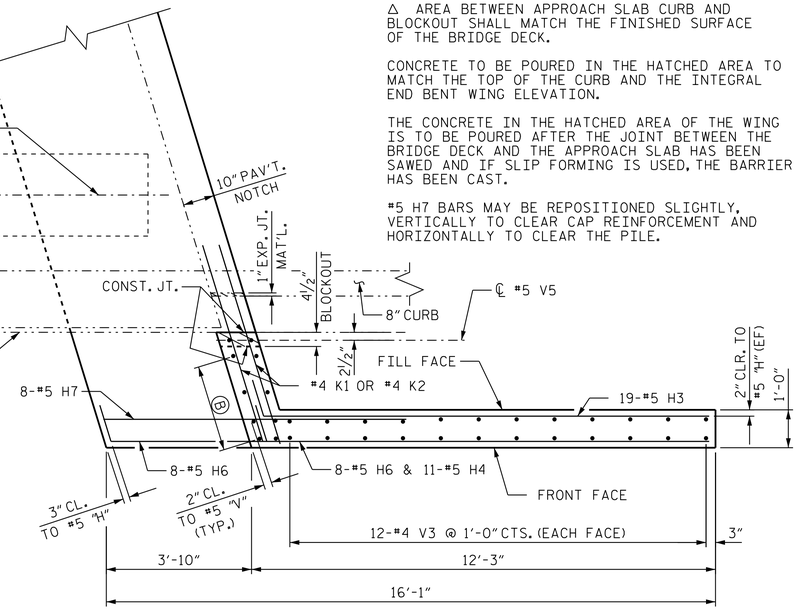


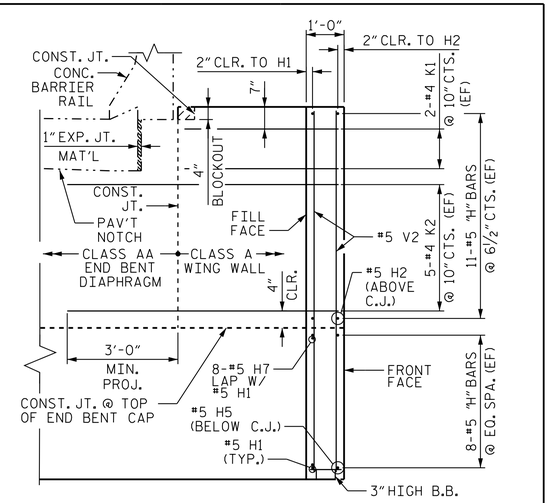
Ⓐ 8-#5 V2 @ 9" MAX. SPA., 4 ON EA. FACE (SPA. AS SHOWN)

PLAN OF LEFT WING (W3)

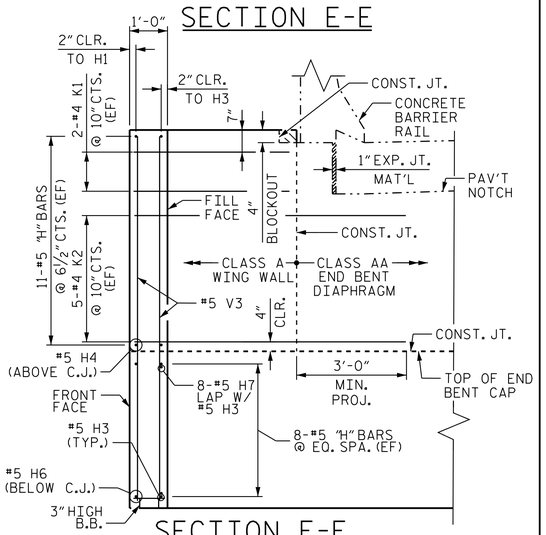


Ⓑ 2-#5 V3 @ 9" MAX. SPA., 4 ON EA. FACE (SPACE AS SHOWN)

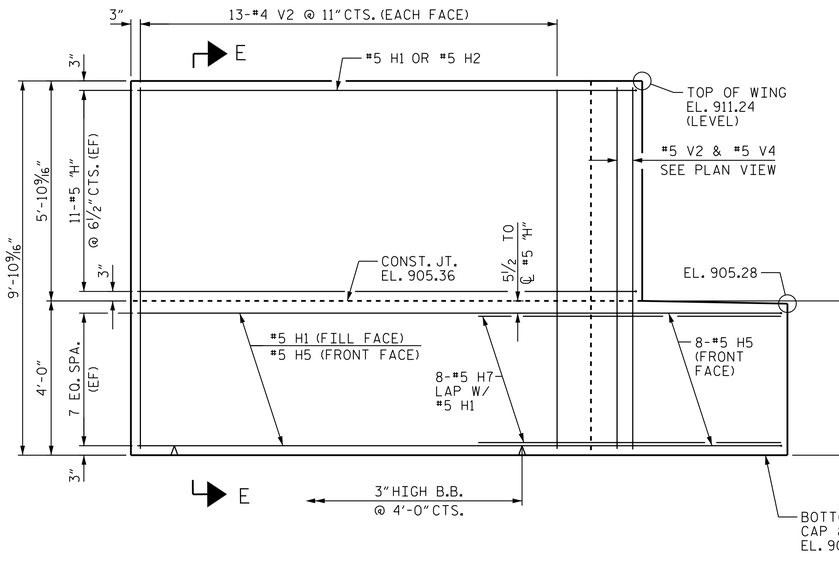
PLAN OF RIGHT WING (W4)



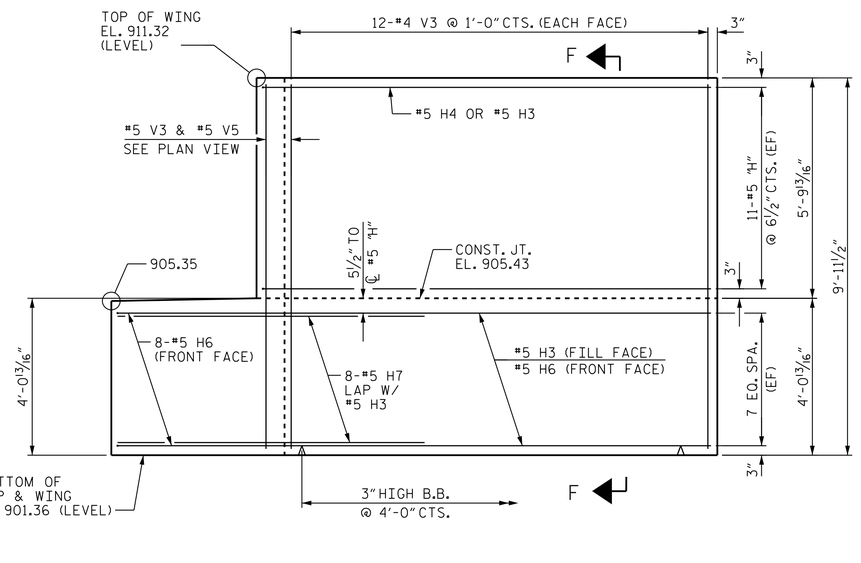
SECTION E-E



SECTION F-F



ELEVATION OF LEFT WING (W3)



ELEVATION OF RIGHT WING (W4)

NOTE: TOP SURFACE OF END BENT CAP BETWEEN EDGE OF DECK SLAB AND END OF CAP SHALL BE SLOPED TRANSVERSELY FROM EXPOSED FACE OF THE WING TO FRONT FACE AT A RATE OF ¼"/FT.

(EF) DENOTES EACH FACE.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 of 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

END BENT 2 DETAILS WING WALLS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-31
1			3			TOTAL SHEETS
2			4			35

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
DocuSigned by: Joseph T. Kelvington 4/27/2023
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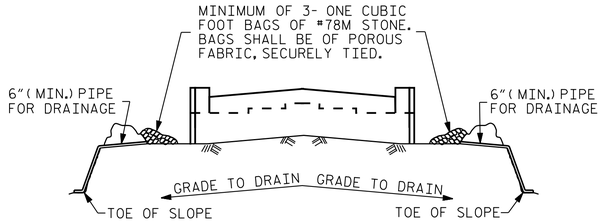
DRAWN BY : J. B. GEILE DATE : 04/19/18
CHECKED BY : M. B. ISENHOUR DATE : 08/06/18
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

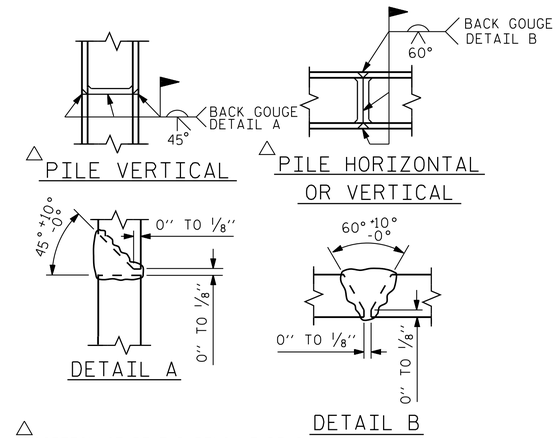


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

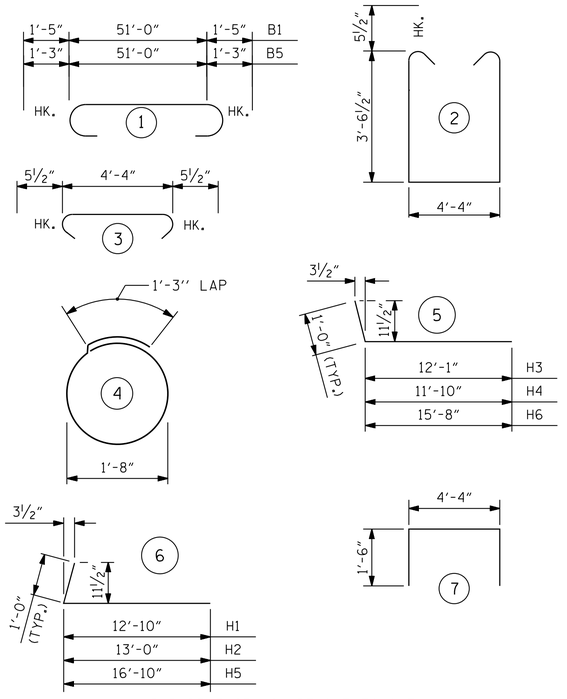
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



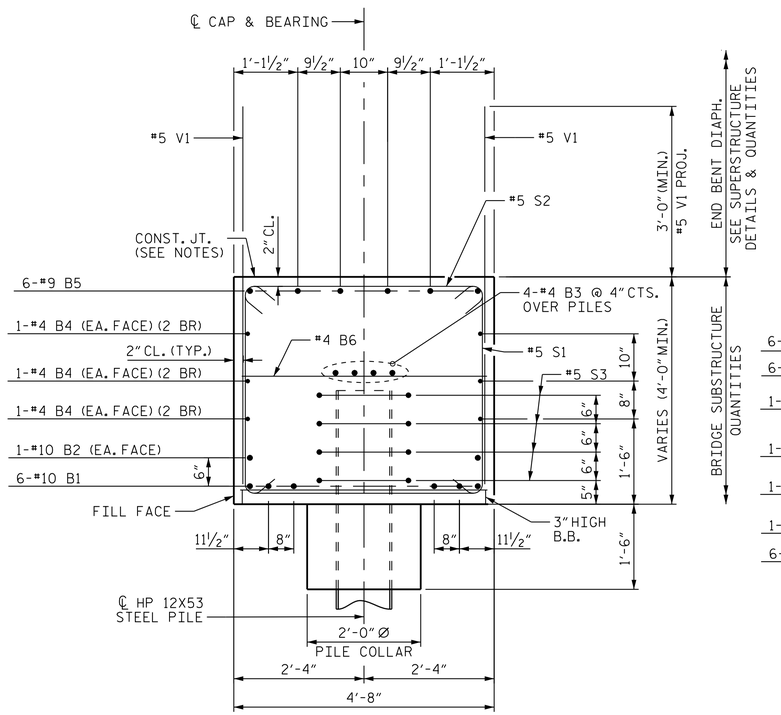
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

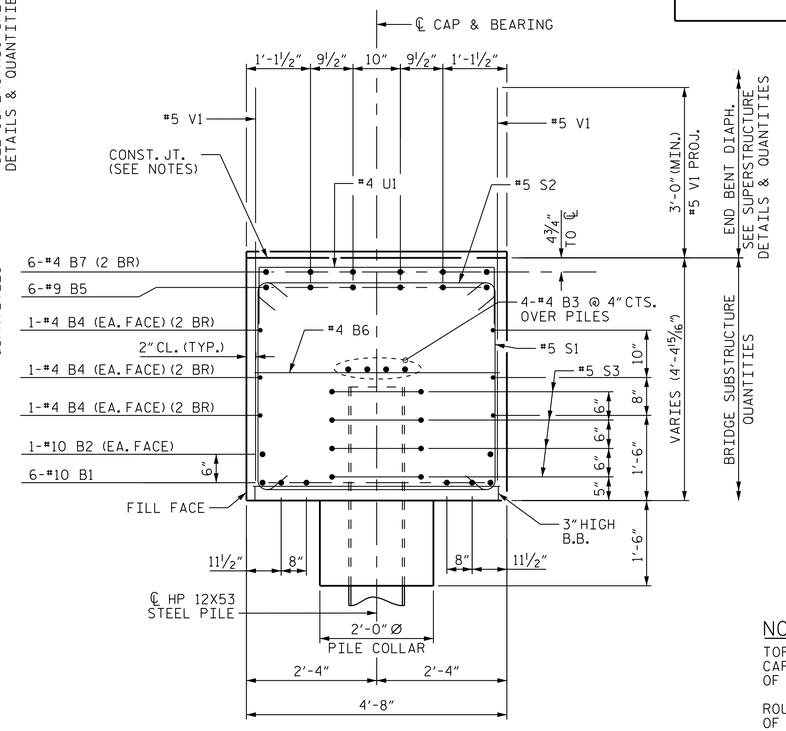
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	53'-10"	1390
B2	2	#10	STR	50'-6"	435
B3	8	#4	STR	26'-6"	142
B4	12	#4	STR	26'-10"	215
B5	6	#9	1	53'-6"	1091
B6	13	#4	STR	4'-4"	38
B7	6	#4	STR	21'-5"	86
H1	19	#5	6	13'-10"	274
H2	11	#5	6	14'-0"	161
H3	19	#5	5	13'-1"	259
H4	11	#5	5	12'-10"	147
H5	8	#5	6	17'-10"	149
H6	8	#5	5	16'-8"	139
H7	16	#5	STR	8'-0"	134
K1	8	#4	STR	2'-4"	12
K2	20	#4	STR	6'-1"	81
S1	57	#5	2	12'-4"	733
S2	49	#5	3	5'-3"	268
S3	32	#4	4	6'-6"	139
U1	22	#4	7	7'-7"	111
V1	79	#5	STR	7'-2"	591
V2	34	#5	STR	9'-6"	337
V3	32	#5	STR	9'-7"	320
V4	2	#5	STR	9'-2"	19
V5	2	#5	STR	9'-3"	19

REINFORCING STEEL	LBS. 7,290
CLASS A CONCRETE BREAKDOWN:	
POUR #1: CAP, COLLARS, ETC.	C.Y. 41.6
POUR #2: UPPER WINGS	C.Y. 6.9
CLASS A CONCRETE TOTAL	C.Y. 48.5



SECTION A-A

SEE "END BENT 1", SHEET 1 OF 3.



SECTION B-B

SEE "END BENT 1", SHEET 1 OF 3.

NOTES:

TOP SURFACE AREAS OF THE END BENT CAP SHALL BE KEPT CLEAN AND FREE OF LAITANCE.

ROUGH FLOAT AND ROUGHEN THE TOP OF THE END BENT CAP UNDER END BENT DIAPHRAGM TO PROVIDE MIN. SURFACE AMPLITUDE OF ¼", EXCEPT UNDER BEARING AREAS.

2 BR DENOTES 2 BAR RUN.

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON
DocuSigned by: Joseph T. Kelvington
4/27/2023

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PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			35

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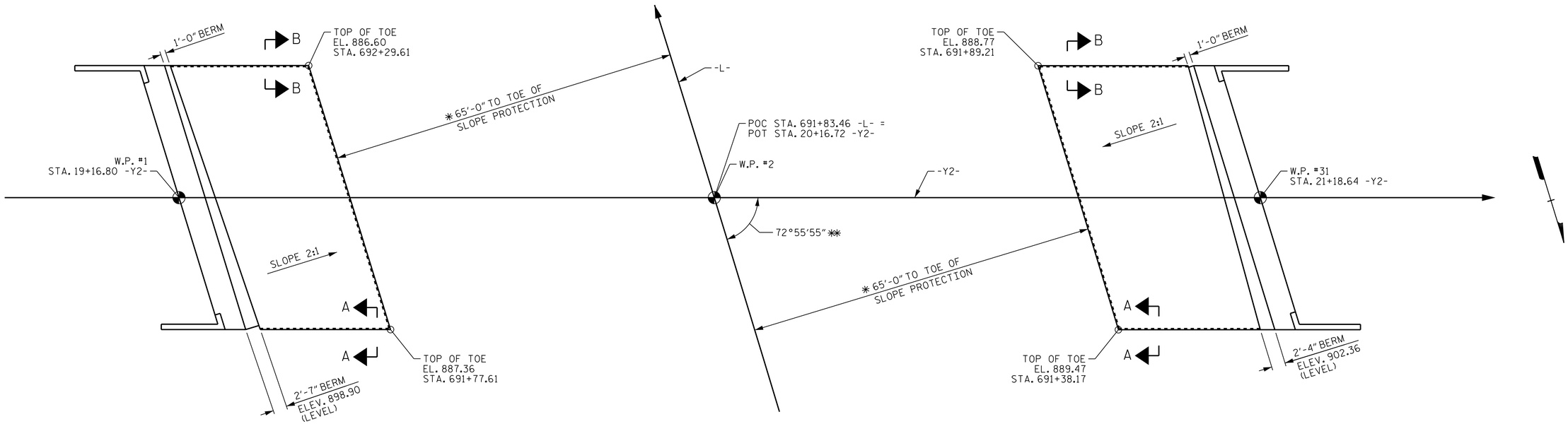
DRAWN BY :	M. B. ISENHOUR	DATE :	08/20/18
CHECKED BY :	V. E. FRAGA	DATE :	10/23/18
DESIGN ENGINEER OF RECORD:	J.T. KELVINGTON	DATE :	04/27/22



END BENT 1

END BENT 2

* RADIAL DIMENSIONS TO -L-

** TO TANGENT ON CURVE @ -L- INTERSECITON STATON

GENERAL NOTES

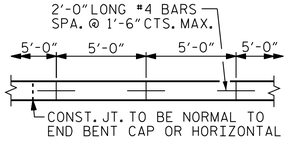
SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. THE CONTRACTOR, AT HIS OPTION, MAY USE ALTERNATE "B" ONLY FOR HIGHWAY OVER HIGHWAY GRADE SEPARATIONS WITH 2:1 END BENT SLOPE IN RURAL, UNPOPULATED AREAS. STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING.

ALTERNATE "A"

ALTERNATE "A" SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

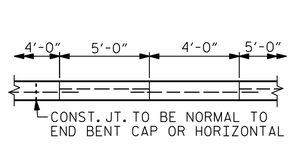
BRIDGE @ STA. 20+16.72 -Y2-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	164	296
END BENT 2	178	321
TOTAL	342	617

* QUANTITY SHOWN IS BASED ON 5' POURS.



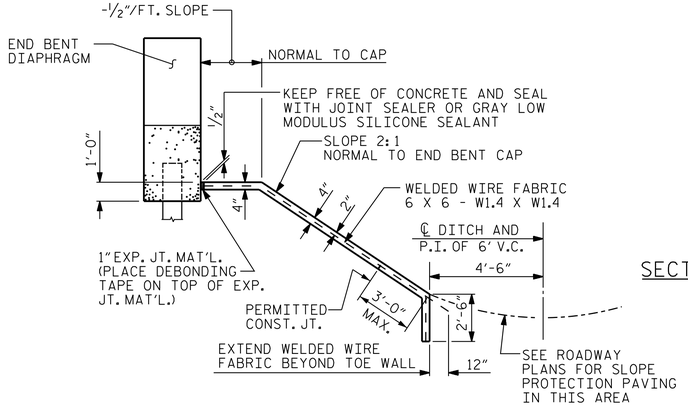
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

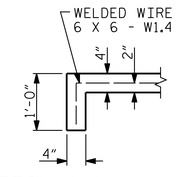


POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

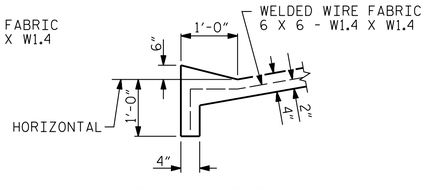
OPTIONAL POURING DETAIL



SECTION ALONG ℄ SURVEY
WHEN FILL CATCHES IN DITCH



SECTION A-A



SECTION B-B

DETAILS FOR ALTERNATE "A"

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

SLOPE PROTECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Joseph T. kelvington
4/27/2023

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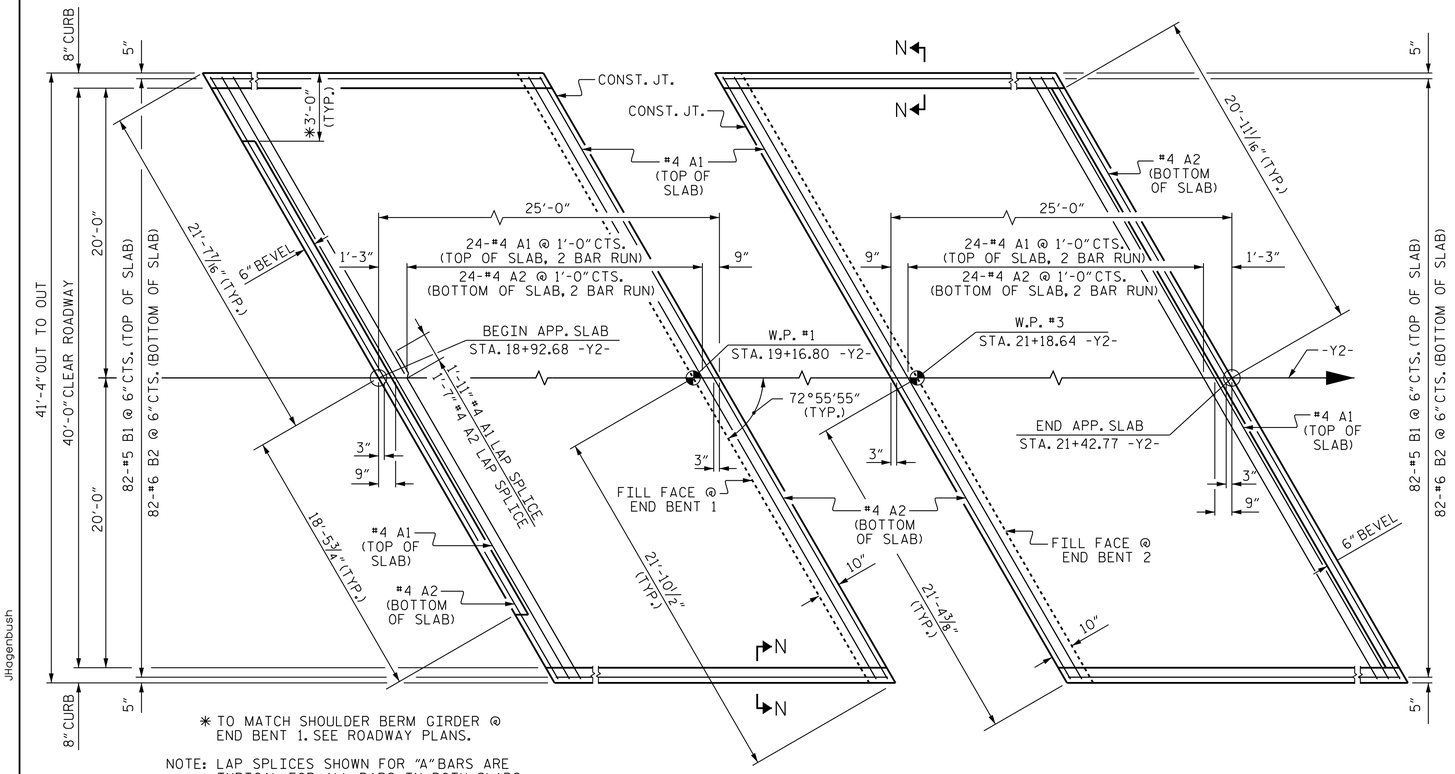
DRAWN BY : J. B. GEILE DATE : 03/09/18
CHECKED BY : M. B. ISENHOUR DATE : 10/11/18

DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

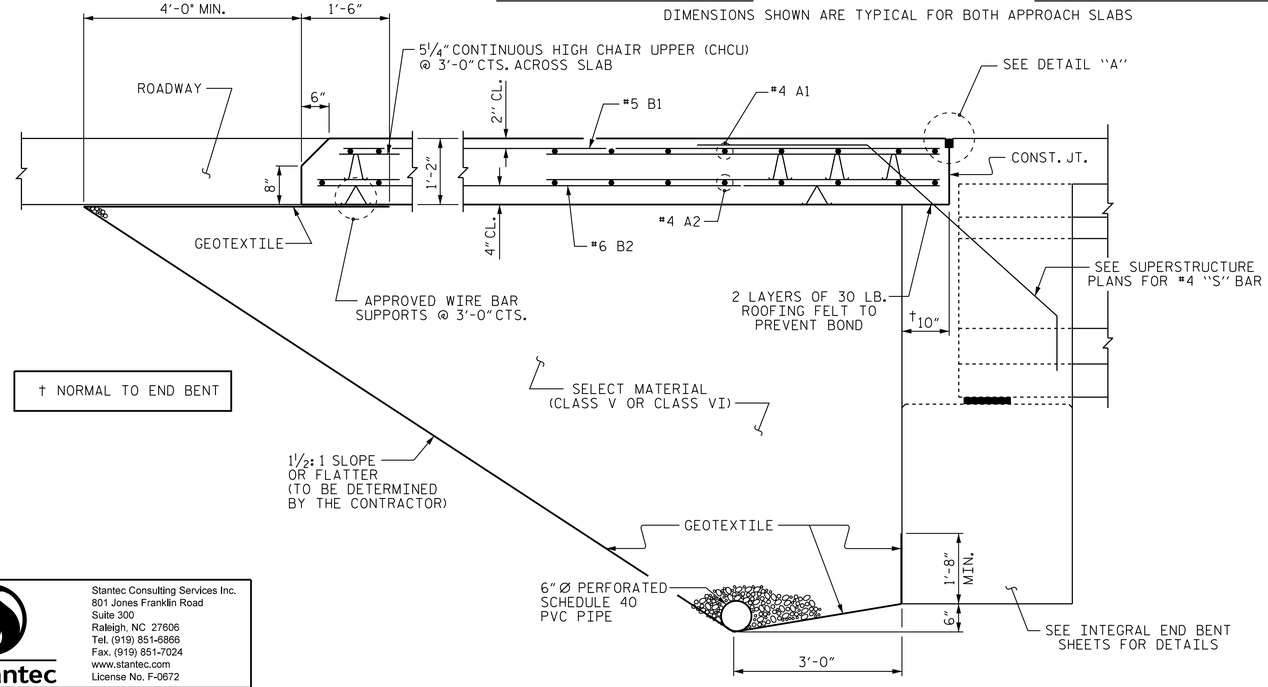


NOTE: LAP SPLICES SHOWN FOR "A" BARS ARE TYPICAL FOR ALL BARS IN BOTH SLABS.

PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES

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

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

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 A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

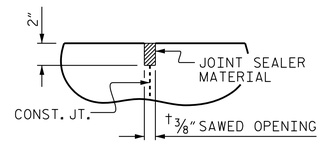
BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

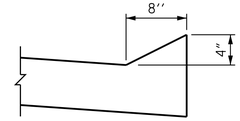
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	52	#4	STR	22'-5"	779
A2	52	#4	STR	22'-3"	773
* B1	82	#5	STR	24'-2"	2067
B2	82	#6	STR	24'-7"	3028
REINFORCING STEEL				LBS.	3801
* EPOXY COATED REINFORCING STEEL				LBS.	2846
CLASS AA CONCRETE				C.Y.	44.7

SPLICE LENGTHS

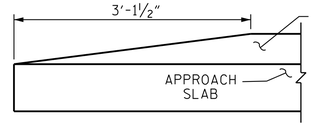
BAR SIZE	EPOXY COATED	UNCOATED
#4	1'-11"	1'-7"
#5	2'-5"	2'-0"
#6	3'-7"	2'-5"



DETAIL "A"



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

Digitally signed by: Joseph T. Kelvington
4/27/2023 [illegible]

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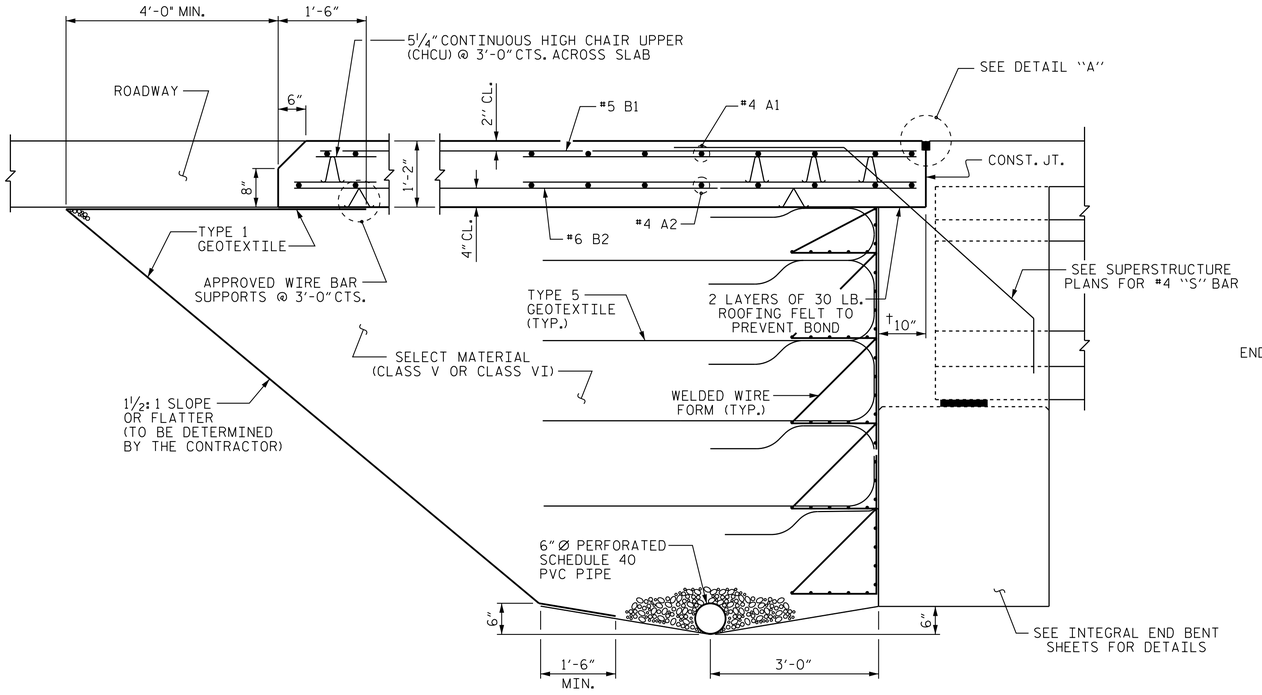
ASSEMBLED BY : J. B. GEILE	DATE : 03/09/18	
CHECKED BY : M. B. ISENHOUR	DATE : 06/11/18	
DRAWN BY : TLA 10/05	REV. 12/21/11	MAA/GM
CHECKED BY : GM 5/06	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

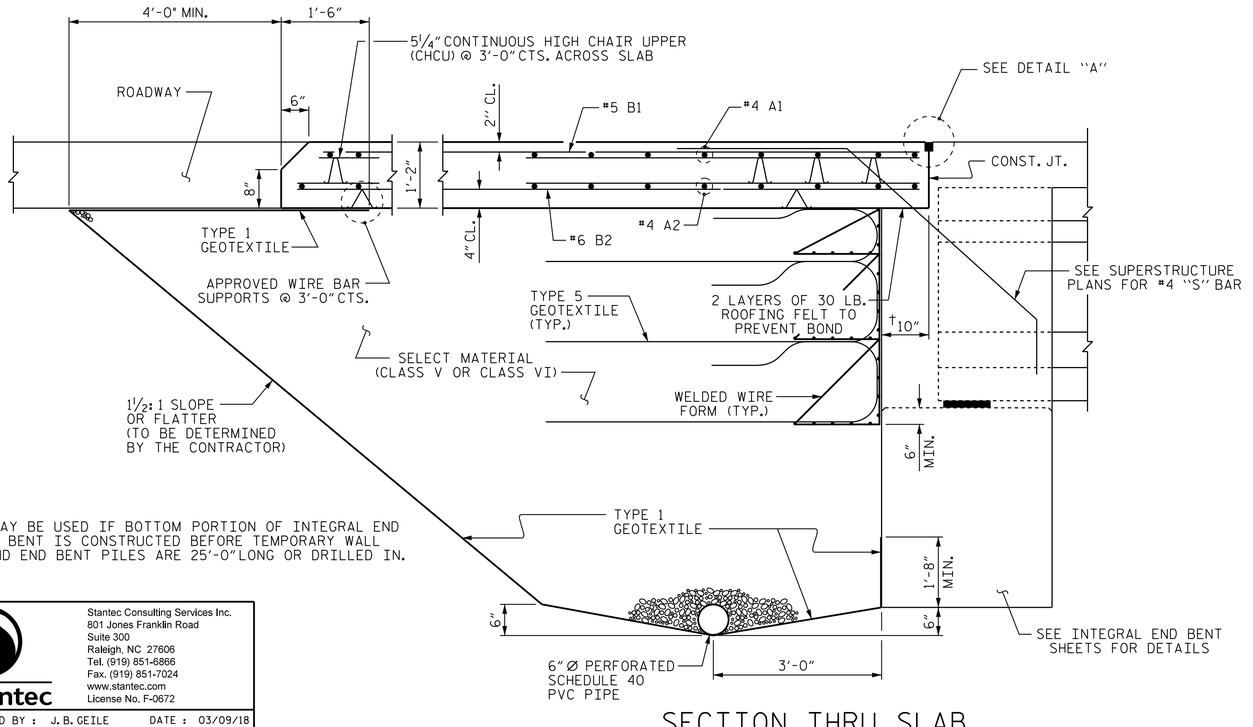
DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22

STD. NO. BAS5 (SHT 1a)



SECTION THRU SLAB

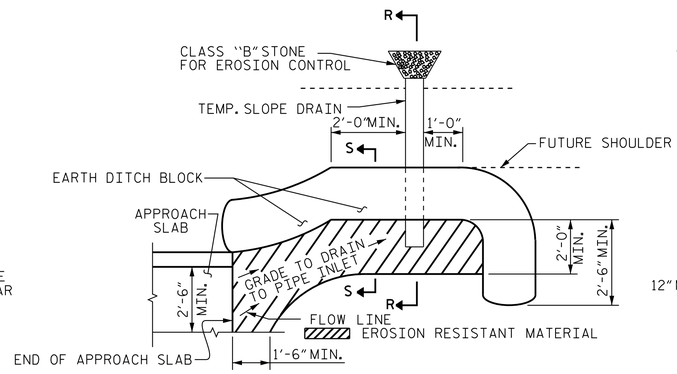
(TYPE A - ALTERNATE APPROACH FILL)



SECTION THRU SLAB

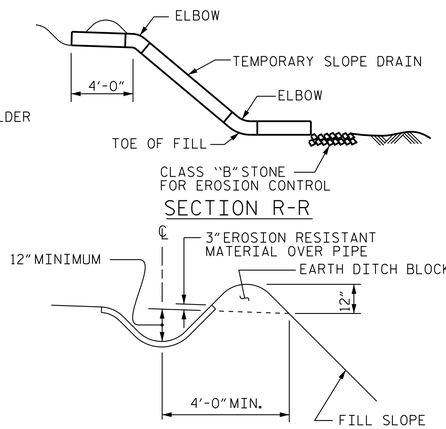
☆(TYPE A - ALTERNATE APPROACH FILL)

☆MAY BE USED IF BOTTOM PORTION OF INTEGRAL END BENT IS CONSTRUCTED BEFORE TEMPORARY WALL AND END BENT PILES ARE 25'-0" LONG OR DRILLED IN.



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.

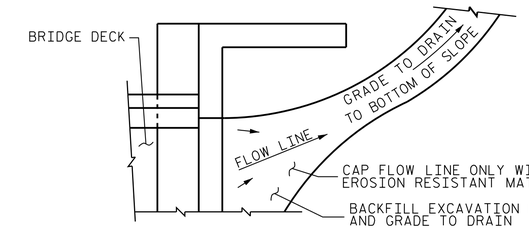
PLAN VIEW



SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

NOTES (TYPE A ALTERNATE)

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

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

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.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 20+16.72 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
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License No. F-0672

ASSEMBLED BY : J. B. GEILE	DATE : 03/09/18		
CHECKED BY : M. B. ISENHOUR	DATE : 06/11/18		
DRAWN BY : TLA 10/05	REV. 12/21/11	MAA/GM	DESIGN ENGINEER OF RECORD: J.T. KELVINGTON DATE : 04/27/22
CHECKED BY : GM 5/06	REV. 6/13	MAA/GM	
	REV. 12/17	MAA/THC	

NORTH CAROLINA PROFESSIONAL SEAL 13406 ENGINEER JOSEPH T. KELVINGTON

DocuSigned by: Joseph T. Kelvington
4/27/2023

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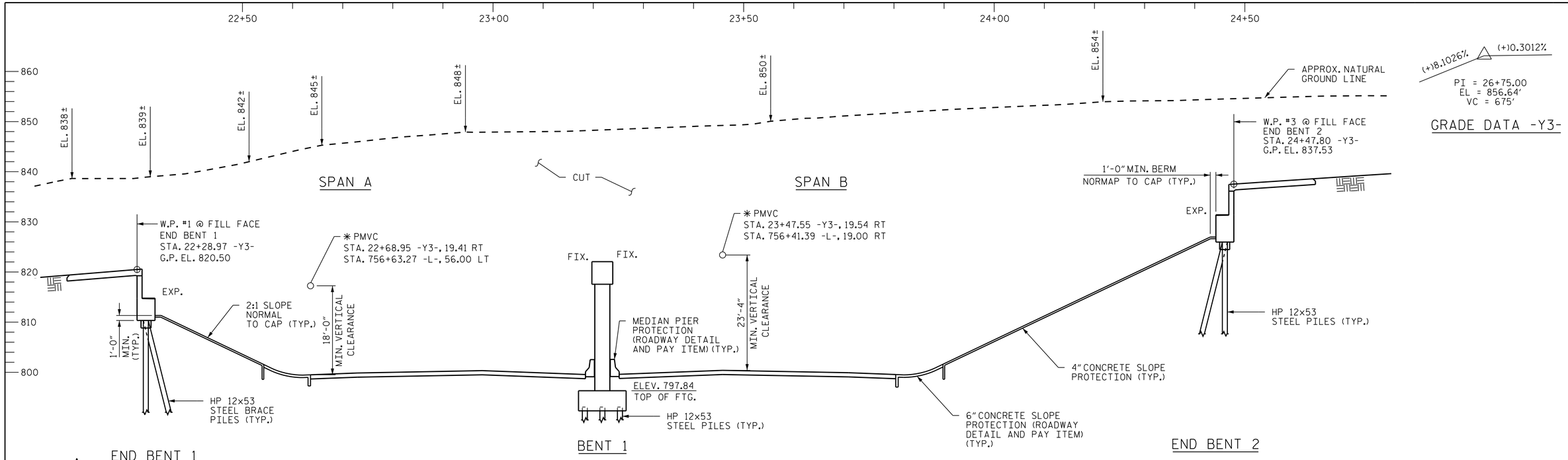
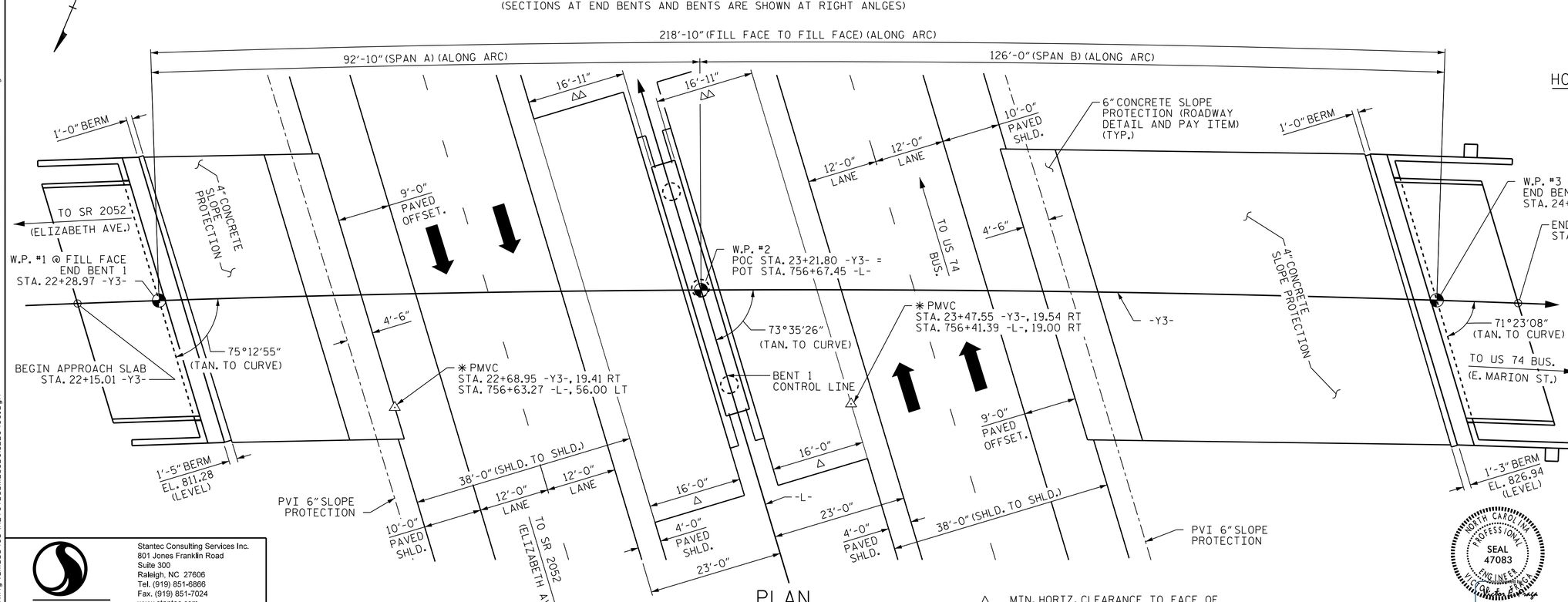
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-35
1			3			TOTAL SHEETS
2			4			35

STD. NO. BAS5



SECTION ALONG -Y3-

(SECTIONS AT END BENTS AND BENTS ARE SHOWN AT RIGHT ANLGES)



PLAN

(PILES NOT SHOWN FOR CLARITY)

✳ PMVC DENOTES PT. OF MIN. VERTICAL CLEARANCE

△ MIN. HORIZ. CLEARANCE TO FACE OF MEDIAN PIER PROTECTION

△△ MIN. HORIZ. CLEARANCE TO FACE OF CAP

PI STA. = 20+76.29
Δ = 15°00'18.8" (RT.)
D = 1°45'00.0"
L = 857.44'
T = 431.19'
R = 3,274.04'

HORIZONTAL CURVE DATA -Y3-

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-
756+67.45 -L-

SHEET 1 OF 6 BRIDGE NO. 220490

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2047 BORDERS RD.
BETWEEN SR 2052 (ELIZABETH AVE.) AND
US 74 BUS. (E MARION ST.)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-01
1			3			TOTAL SHEETS
2			4			36

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DRAWN BY : J. F. KENNEDY DATE : 02/16/18
CHECKED BY : V. E. FRAGA DATE : 05/15/23

DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR EDWARD FRAGA
5/16/2023

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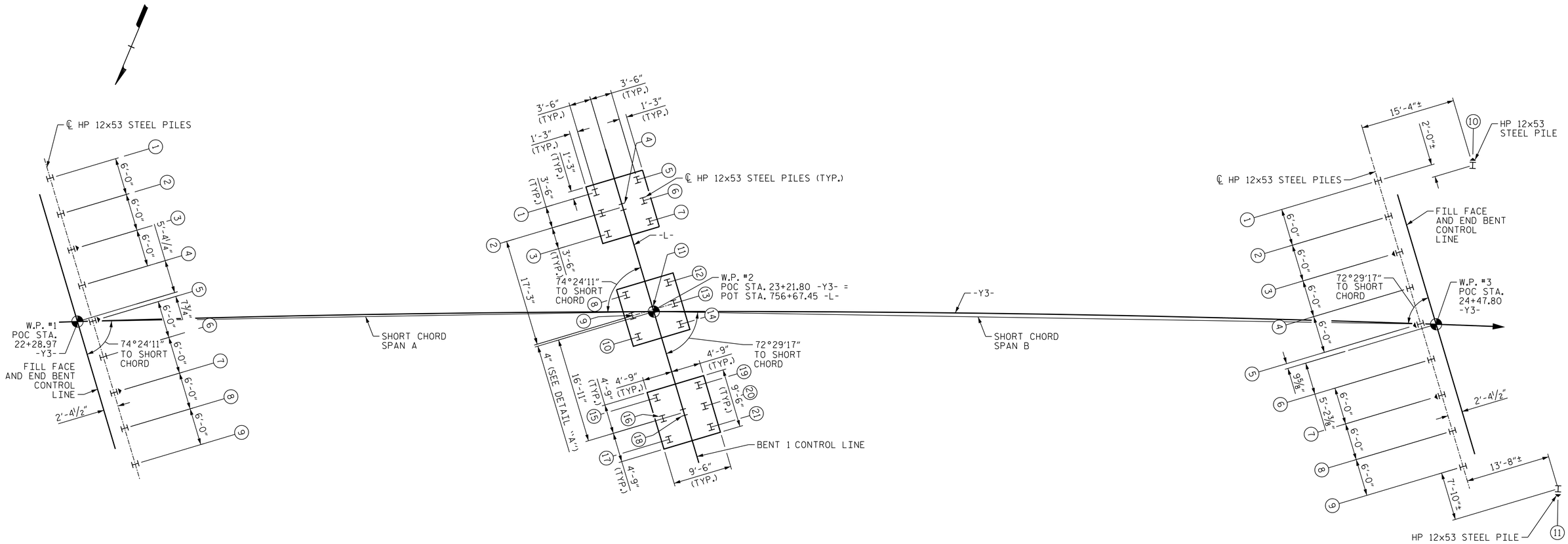
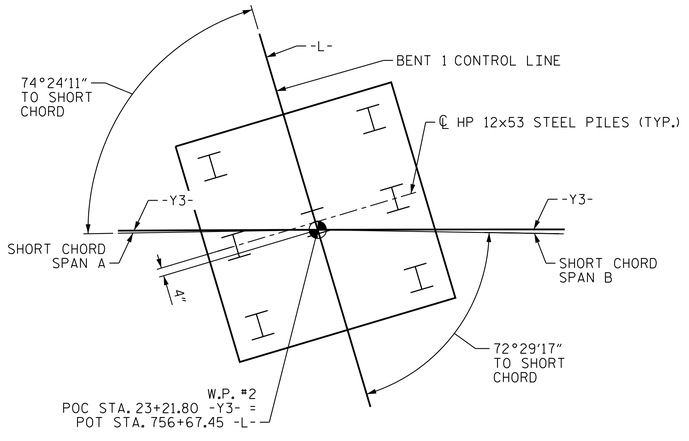


END BENT 1

BENT 1

DIMENSIONS SHOWN ARE
TYPICAL FOR EA. FOOTING

END BENT 2



DETAIL ''A''

FOUNDATION LAYOUT

↥ INDICATES DIRECTION OF BATTER

FOR FOUNDATION NOTES, SEE PILE FOUNDATION TABLES, SHEET S3-03.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2047 BORDERS RD.
BETWEEN SR 2052 (ELIZABETH AVE.) AND
US 74 BUS. (E MARION ST.)

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DRAWN BY : J. B. GEILE DATE : 03/26/18
CHECKED BY : V. E. FRAGA DATE : 05/05/23
DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-02
1			3			TOTAL SHEETS
2			4			36

SUMMARY OF PILE INFORMATION/INSTALLATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., "BENT 1, PILES 1-5")	FACTORED RESISTANCE PER PILE TONS	PILE CUT-OFF (TOP OF PILE) ELEVATION FT	ESTIMATED PILE LENGTH PER PILE FT	SCOUR CRITICAL ELEVATION FT	DRIVEN PILES			PREDRILLING FOR PILES ✳			DRILLED-IN PILES		
					MIN. PILE TIP (TIP NO HIGHER THAN) ELEV FT	REQUIRED DRIVING RESISTANCE (RDR)✳✳ PER PILE TONS	TOTAL PILE REDRIVES QUANTITY EACH	PREDRILLING LENGTH PER PILE LIN FT	PREDRILLING ELEVATION (ELEV NOT TO 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 1-9	115	812.30	45			195							
END BENT 2, PILES 1-9	145	827.96	60			245							
END BENT 2, PILES 10-11	35	SEE SUBSTRUCTURE PLANS	60			60							
BENT 1, PILES 1-21	95	794.59	40			160		5.0	783.8	14			

✳ PREDRILLING FOR PILES IS REQUIRED FOR END BENTS/ BENT WITH A PREDRILLING LENGTH AND AT THE CONTRACTOR'S OPTION FOR END BENTS/ BENTS WITH PREDRILLING INFORMATION BUT NO PREDRILLING LENGTH.

✳✳ $RDR = \frac{\text{FACTORED RESISTANCE + FACTORED DOWNDRAG LOAD + FACTORED DEAD LOAD}}{\text{DYNAMIC RESISTANCE FACTOR}} + \text{NOMINAL DOWNDRAG RESISTANCE} + \frac{\text{NOMINAL SCOUR RESISTANCE}}{\text{SCOUR RESISTANCE FACTOR}}$

SUMMARY OF PDA/ PILE ORDER LENGTHS

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

PILE DRIVING ANALYZER (PDA)				PILE ORDER LENGTHS	
END BENT/ BENT NO.	PDA TESTING REQUIRED? YES OR MAYBE	PDA TEST PILE LENGTH FT	TOTAL PDA TESTING QUANTITY EACH	END BENT/ BENT NO(s)	PILE ORDER LENGTH BASIS✳ EST OR PDA
END BENT 1	MAYBE	50	1		
END BENT 2	MAYBE	65			
BENT 1	MAYBE	45			

✳ EST=PILE ORDER LENGTHS FROM ESTIMATED PILE LENGTHS; PDA=PILE ORDER LENGTHS BASED ON PDA TESTING. FOR GROUPS OF END BENTS/BENTS WITH PILE ORDER LENGTHS BASED ON PDA TESTING, THE FIRST END BENT/ BENT NO. LISTED FOR EACH GROUP IS THE REPRESENTATIVE END BENT/ BENT WITH THE PDA.

PILE DESIGN INFORMATION

(BLANK ENTRIES INDICATE ITEM IS NOT APPLICABLE TO STRUCTURE)

END BENT/ BENT NO. PILE (s) #-# (e.g., "BENT 1, PILES 1-5")	FACTORED AXIAL LOAD PER PILE TONS	FACTORED DOWNDRAG LOAD PER PILE TONS	FACTORED DEAD LOAD✳ PER PILE TONS	DYNAMIC RESISTANCE FACTOR	NOMINAL DOWNDRAG RESISTANCE PER PILE TONS	NOMINAL SCOUR RESISTANCE PER PILE TONS	SCOUR RESISTANCE FACTOR (DEFAULT=1.00)
END BENT 1, PILES 1-9	113.5			0.60			
END BENT 2, PILES 1-9	145.0			0.60			
END BENT 2, PILES 10-11	33.5			0.60			
BENT 1, PILES 1-21	92.5			0.60			

✳ FACTORED DEAD LOAD IS FACTORED WEIGHT OF PILE ABOVE THE GROUND LINE.

FOUNDATION NOTES:

1. FOR PILES, SEE PILES PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 45 TO 75 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 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.

NOTES:

1. THE PILE FOUNDATION TABLES ARE BASED ON THE BRIDGE SUBSTRUCTURE DESIGN AND FOUNDATION RECOMMENDATIONS SEALED BY A NORTH CAROLINA PROFESSIONAL ENGINEER (STEPHEN C. CROCKETT, 048207) ON 5/2/23.
2. TOTAL PILE DRIVING EQUIPMENT SETUP QUANTITY (NOT SHOWN IN PILE FOUNDATION TABLES) EQUALS THE NUMBER OF DRIVEN PILES, I.E., THE NUMBER OF PILES WITH A REQUIRED DRIVING RESISTANCE.
3. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING WHEN PDAs MAY BE REQUIRED.

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DRAWN BY : V. E. FRAGA DATE : 12/09/22
CHECKED BY : M. B. ISENHOUR DATE : 05/05/23
DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTORIA E. FRAGA
5/16/2023

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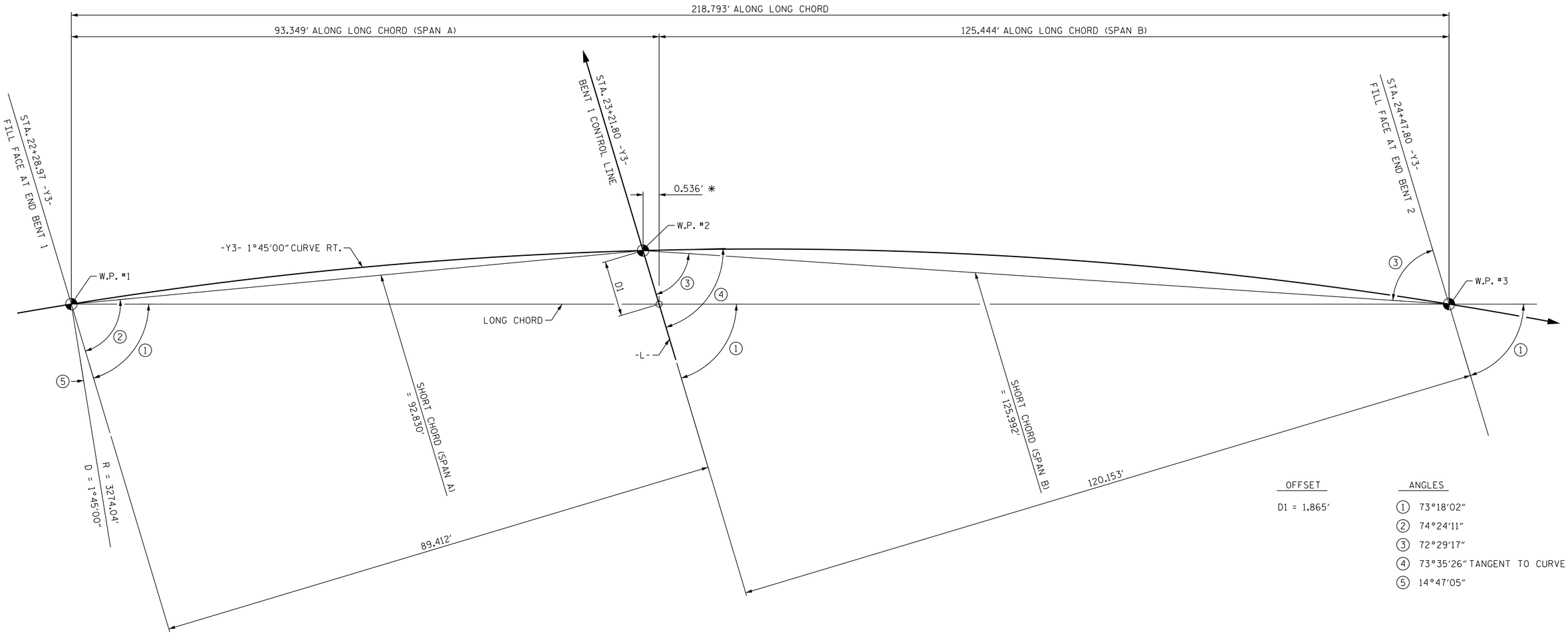
PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 23+21.80 -Y3-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
PILE FOUNDATION TABLES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-03
1			3			TOTAL SHEETS
2			4			36



OFFSET	ANGLES	
D1 = 1.865'	1	73°18'02"
	2	74°24'11"
	3	72°29'17"
	4	73°35'26" TANGENT TO CURVE
	5	14°47'05"

LONG CHORD LAYOUT

NOTES:

ALL BENTS ARE PARALLEL.

BRIDGE DECK AND APPROACH SLABS ARE SET CONCENTRIC WITH -Y3-.

GIRDERS ARE SET PARALLEL TO SHORT CHORDS.

* WORK POINT PROJECTED ON LONG CHORD.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 4 OF 6

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DRAWN BY : V. E. FRAGA DATE : 05/29/18
CHECKED BY : T. N. ENNIS DATE : 08/14/18

DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

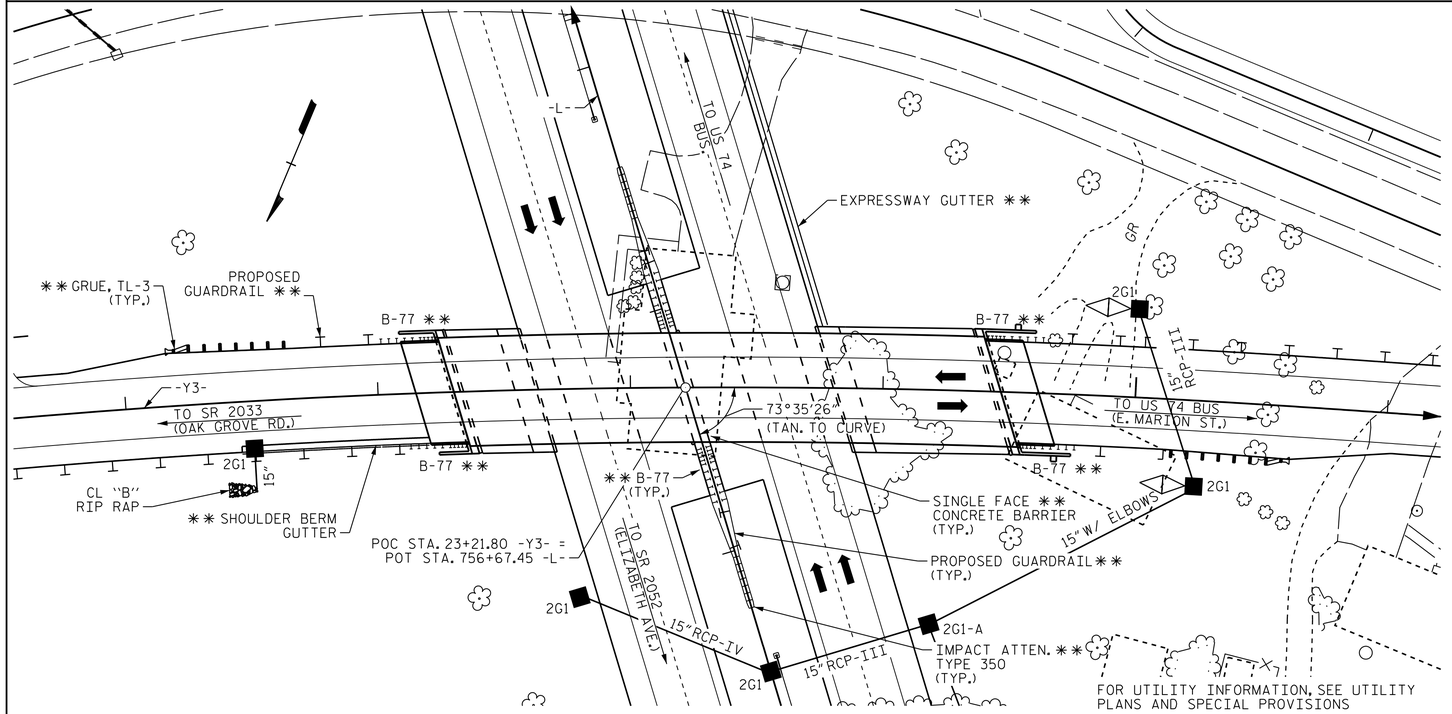
GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS
ON SR 2047 BORDERS RD.
BETWEEN SR 2052 (ELIZABETH AVE.) AND
US 74 BUS. (E MARION ST.)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-04
1			3			TOTAL SHEETS
2			4			36

c:\pw_working\dms55403\R2707D_SMU_LCOL_220490.dgn 5/16/2023 11:32:30 AM JHagenbush

BM #33: 8 INCH NAIL IN BASE OF 8 INCH RED OAK. N566299 E1261016, STA. 709+29.00 -BL-, 3' LT. EL. 784.14



LOCATION SKETCH

** DENOTES ROADWAY DETAIL AND PAY ITEM

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT 1	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		PREDRILLING FOR PILES	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS	54" PRESTRESSED CONCRETE FLORIDA I-BEAMS	
	LUMP SUM	EA.	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	EA.	NO.	LIN. FT	LIN. FT	LIN. FT	SQ. YDS	LUMP SUM	LUMP SUM	NO.	LIN. FT
SUPERSTRUCTURE			9,367	9,046		LUMP SUM							433.32		LUMP SUM	LUMP SUM	10	1,072.4
END BENT 1					52.0		8,297		9	9	405			132				
BENT 1	LUMP SUM				86.0		14,042	1,403	21	21	840	105						
END BENT 2					71.0		8,835		11	11	660			333				
TOTAL	LUMP SUM	1	9,367	9,046	209.0	LUMP SUM	31,174	1,403	41	41	1,905	105	433.32	465	LUMP SUM	LUMP SUM	10	1,072.4

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATION.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

WORK SHALL NOT BE STARTED ON THE BRIDGE UNTIL ROADWAY SECTION HAS BEEN EXCAVATED.

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.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR 54" PRESTRESSED CONCRETE FLORIDA I-BEAMS, SEE SPECIAL PROVISIONS.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER US 74 BYPASS ON SR 2047 BORDERS RD. BETWEEN SR 2052 (ELIZABETH AVE.) AND US 74 BUS. (E MARION ST.)

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DRAWN BY : J. F. KENNEDY DATE : 02/16/18
CHECKED BY : V. E. FRAGA DATE : 05/05/23

DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-05
1			3			TOTAL SHEETS
2			4			36

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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⟩	1.21	--	1.75	0.722	1.43	A	I	44.50	0.717	1.23	B	I	98.00	0.80	0.722	1.21	A	I	44.50	
		HL-93 (OPERATING)	N/A		1.65	--	1.35	0.722	1.85	A	I	44.50	0.717	1.65	B	I	98.00	N/A	--	--	-	--	--	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.65	59.4	1.75	0.722	1.95	A	I	44.50	0.717	1.75	B	I	98.00	0.80	0.722	1.65	A	I	44.50	
		HS-20 (OPERATING)	36.000		2.32	83.5	1.35	0.722	2.53	A	I	44.50	0.717	2.32	B	I	98.00	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.88	52.4	1.40	0.722	5.74	A	I	44.50	0.717	5.86	B	I	98.00	0.80	0.722	3.88	A	I	44.50	
		SNGARBS2	20.000		1.58	31.6	1.40	0.722	2.34	A	I	44.50	0.717	2.24	B	I	98.00	0.80	0.722	1.58	A	I	44.50	
		SNAGRIS2	22.000		1.41	31.0	1.40	0.722	2.09	A	I	44.50	0.717	2.01	B	I	98.00	0.80	0.722	1.41	A	I	44.50	
		SNCOTTS3	27.250		1.55	42.2	1.40	0.722	2.29	A	I	44.50	0.717	2.24	B	I	98.00	0.80	0.722	1.55	A	I	44.50	
		SNAGGRS4	34.925		1.34	46.8	1.40	0.722	1.99	A	I	44.50	0.717	1.94	B	I	98.00	0.80	0.722	1.34	A	I	44.50	
		SNS5A	35.550		1.92	68.3	1.40	0.722	2.85	A	I	44.50	0.717	2.81	B	I	98.00	0.80	0.722	1.92	A	I	44.50	
		SNS6A	39.950		2.64	105.5	1.40	0.722	3.91	A	I	44.50	0.717	3.69	B	I	98.00	0.80	0.722	2.64	A	I	44.50	
		SNS7B	42.000		2.82	118.4	1.40	0.722	4.18	A	I	44.50	0.717	4.02	B	I	98.00	0.80	0.722	2.82	A	I	44.50	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.72	56.8	1.40	0.722	2.55	A	I	44.50	0.717	2.45	B	I	98.00	0.80	0.722	1.72	A	I	44.50	
		TNT4A	33.075		1.44	47.6	1.40	0.722	2.13	A	I	44.50	0.717	1.91	B	I	98.00	0.80	0.722	1.44	A	I	44.50	
		TNT6A	41.600		1.38	57.4	1.40	0.722	2.04	A	I	44.50	0.717	1.85	B	I	98.00	0.80	0.722	1.38	A	I	44.50	
		TNT7A	42.000		1.30	54.6	1.40	0.722	1.93	A	I	44.50	0.717	1.81	B	I	98.00	0.80	0.722	1.30	A	I	44.50	
		TNT7B	42.000	⟨3⟩	1.29	54.2	1.40	0.722	1.91	A	I	44.50	0.717	1.75	B	I	98.00	0.80	0.722	1.29	A	I	44.50	
		TNAGRIT4	43.000		1.72	74.0	1.40	0.722	2.55	A	I	44.50	0.717	2.40	B	I	98.00	0.80	0.722	1.72	A	I	44.50	
		TNAGT5A	45.000		1.40	63.0	1.40	0.722	2.07	A	I	44.50	0.717	2.03	B	I	98.00	0.80	0.722	1.40	A	I	44.50	
		TNAGT5B	45.000		1.40	63.0	1.40	0.722	2.08	A	I	44.50	0.717	2.00	B	I	98.00	0.80	0.722	1.40	A	I	44.50	

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.

SPAN LENGTHS IN LRFR SUMMARY SKETCH BELOW ARE THOSE USED IN ANALYSIS MODEL AND REPRESENT PLAN VIEW SPAN LENGTHS FROM ℄ BEARING TO ℄ BEARING.

LOAD RATING BASED ON SIMPLY SUPPORTED SPAN ANALYSIS.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

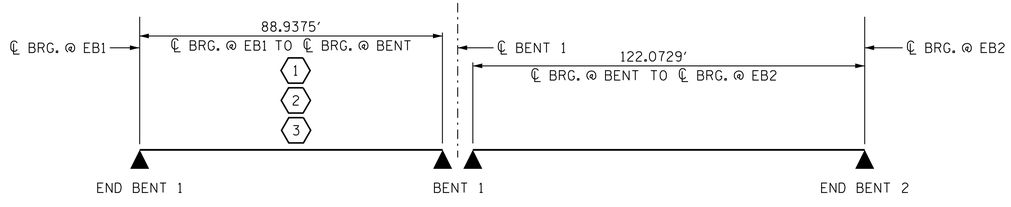
⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

GIRDER

54" PRESTRESSED CONCRETE FLORIDA I-BEAM GIRDER

AREA = 933 SQ. IN.
WEIGHT = 972 LB/FT.
Y_{BOTTOM} = 24.04 IN.
Y_{TOP} = 29.96 IN.
Ixx = 359,929 IN.^{4}
Iyy = 81,584 IN.^{4}
V/S = 3.84 IN.

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ASSEMBLED BY : J.E. HAGENBUSH DATE : 5/4/23
CHECKED BY : V.E. FRAGA DATE : 5/5/23

DRAWN BY : MAA 1/08
CHECKED BY : GM/DI 2/08

REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM
REV. 12/17 MAA/THC

DESIGN ENGINEER OF RECORD: V.E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

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PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 23+21.80 -Y3-

SHEET 6 OF 6

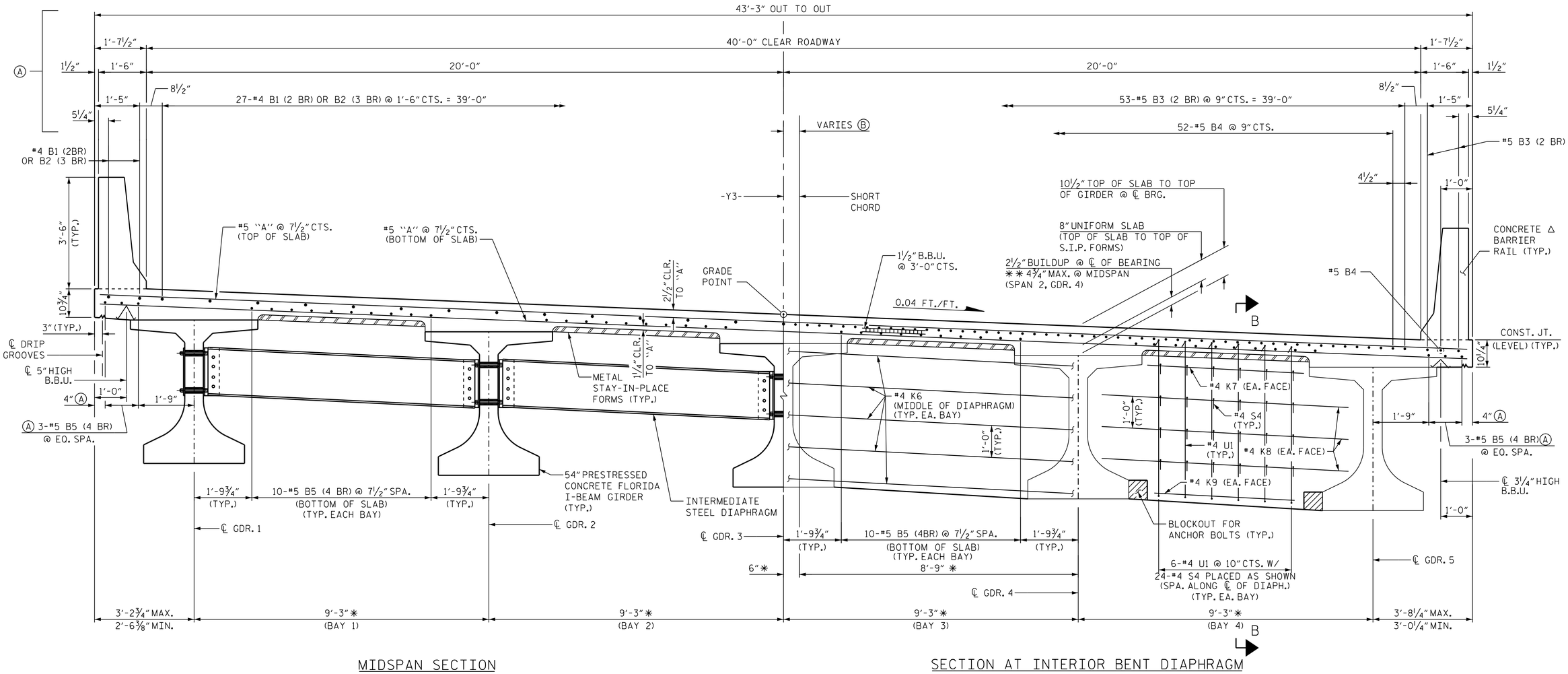
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-06
1			3			TOTAL SHEETS
2			4			36

STD. NO. LRFR1



MIDSPAN SECTION

SECTION AT INTERIOR BENT DIAPHRAGM

NOTES

SEE "SUPERSTRUCTURE TYPICAL SECTION", SHEET 3 OF 3, FOR NOTES.

△ FOR CONCRETE BARRIER DETAILS, SEE "CONCRETE BARRIER RAIL" SHEET.

(2 BR) DENOTES 2 BAR RUN.

(3 BR) DENOTES 3 BAR RUN.

(4 BR) DENOTES 4 BAR RUN.

GIRDERS ARE PARALLEL TO THE SHORT CHORD IN EA. SPAN

TYPICAL SECTION - SPAN A OR SPAN B

✱ NORMAL TO SHORT CHORD IN EA. SPAN

Ⓐ RADIAL DIMENSIONS

Ⓑ 0" TYPICAL AT END BENTS AND INTERIOR BENT
3 13/16" MAX. SPAN A
7 5/16" MAX. SPAN B

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

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

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NO.	BY:	DATE:	NO.	BY:	DATE:	S3-07
1			3			TOTAL SHEETS
2			4			36

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5/16/2023

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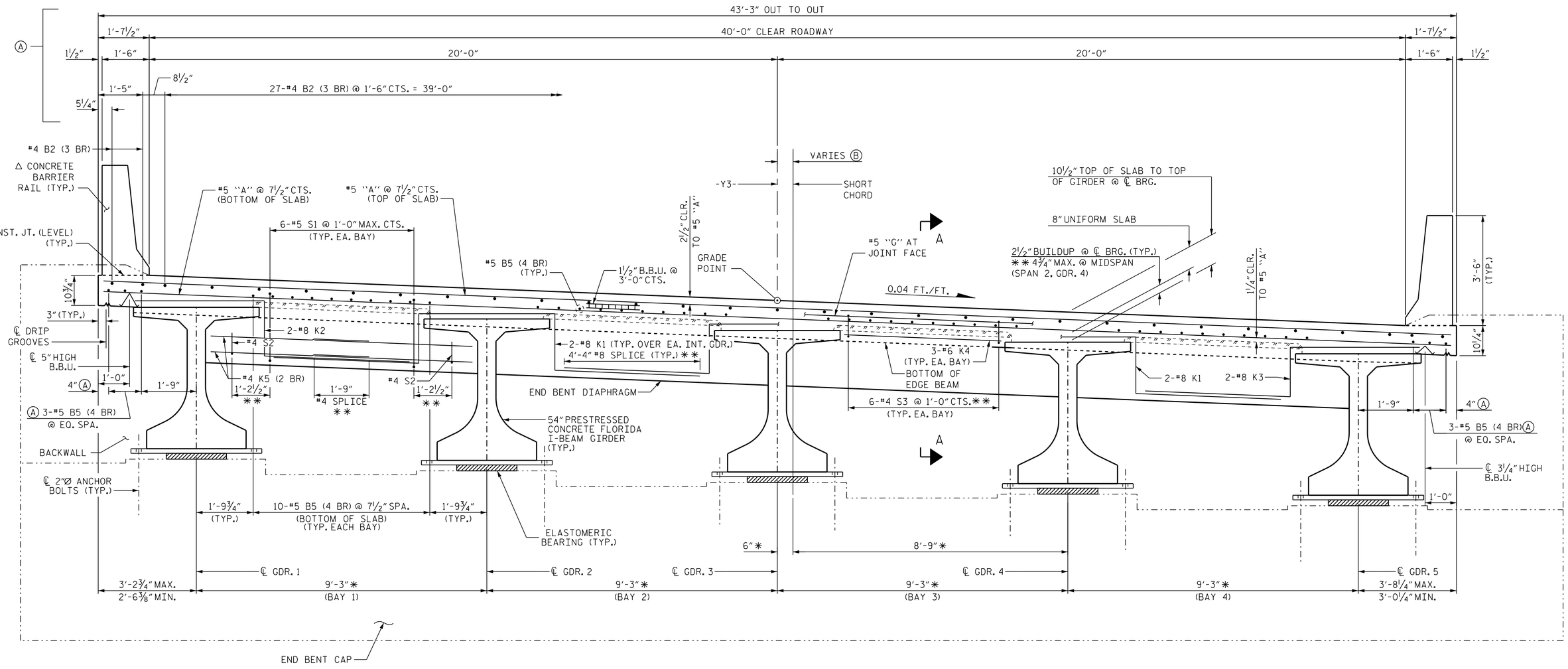

TYPICAL SECTION - AT END BENT DIAPHRAGM

SECTION @ END BENT 2, END BENT 1 SECTION SIMILAR

NOTES

* NORMAL TO SHORT CHORD IN EA. SPAN

** DIMENSION IS MEASURED ALONG ℄ OF BENT.

SEE "SUPERSTRUCTURE TYPICAL SECTION", SHEET 3 OF 3, FOR NOTES.

Δ FOR CONCRETE BARRIER RAIL, SEE "CONCRETE BARRIER RAIL" SHEET.

(3 BR) DENOTES 3 BAR RUN.

(4 BR) DENOTES 4 BAR RUN.

Ⓐ RADIAL DIMENSIONS

Ⓑ 0" TYPICAL AT END BENTS AND INTERIOR BENT
3 13/16" MAX. SPAN A
7 5/16" MAX. SPAN B

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

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5/16/2023

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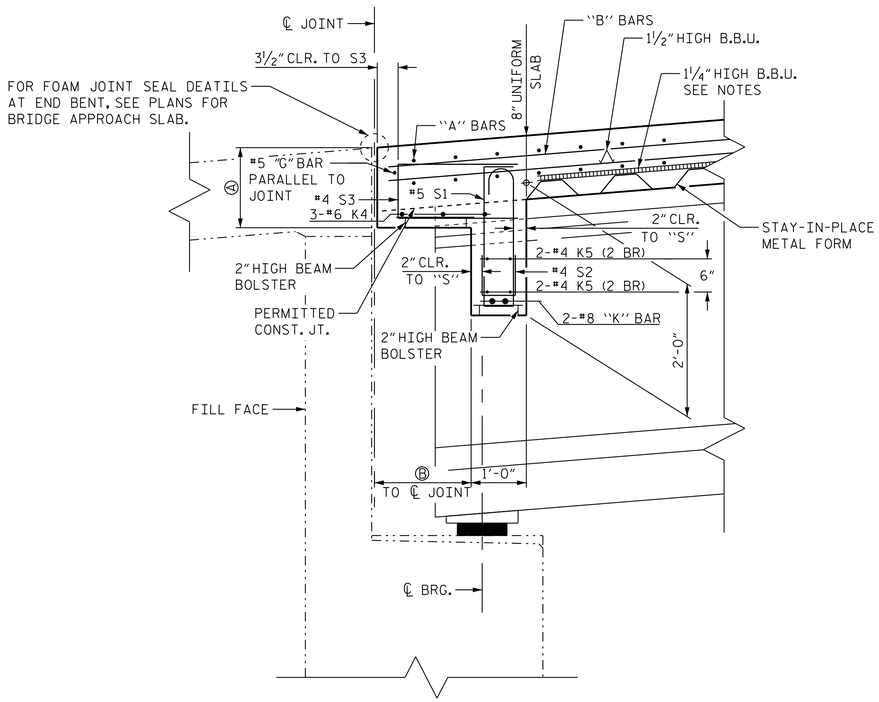
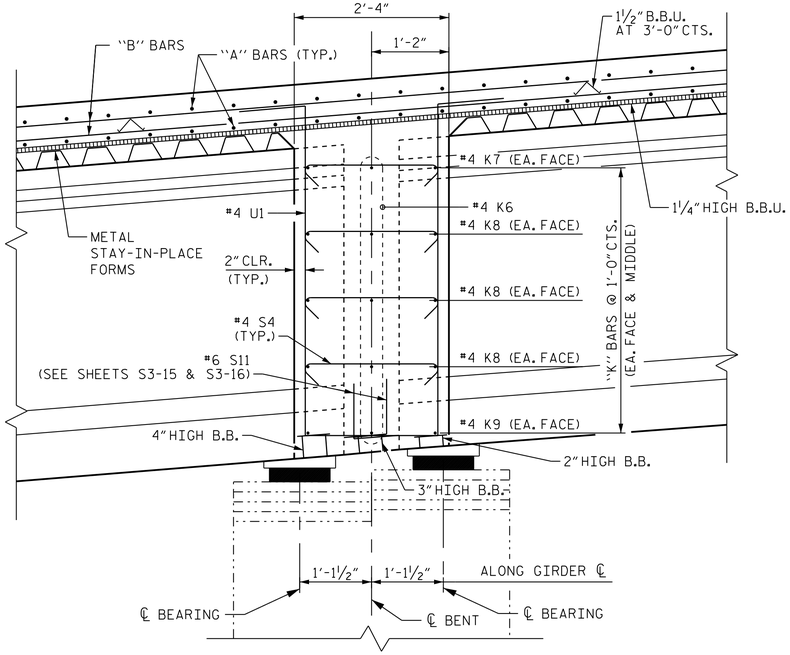


Ⓐ : 1'-2" @ END BENT 1; 1'-3½" @ END BENT 2
Ⓑ : 1'-10" @ END BENT 1; 1'-10" @ END BENT 2

SECTION A-A

SECTION THROUGH END BENT DIAPHRAGM 1 SHOWN.
SECTION THROUGH END BENT DIAPHRAGM 2 SIMILAR.



SECTION B-B

SECTION THROUGH INTERIOR BENT DIAPHRAGM

NOTES

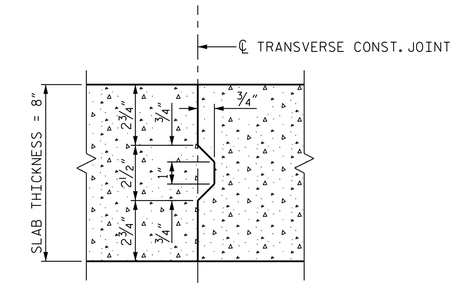
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

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

NO CHAMFER IS REQUIRED ON CORNERS OF GIRDER BUILDUPS.

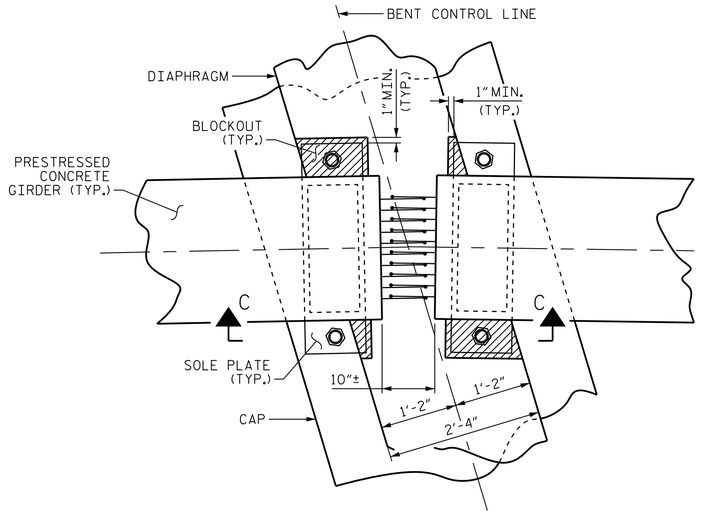
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

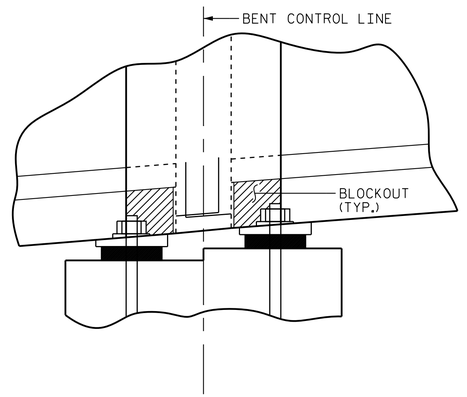
#5 G1 BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.



TRANSVERSE CONST. JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN.
LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINT.





SECTION C-C

BENT DIAPHRAGM BLOCK-OUT DETAIL

PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 23+21.80 -Y3-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION (DETAILS)

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5/16/2023

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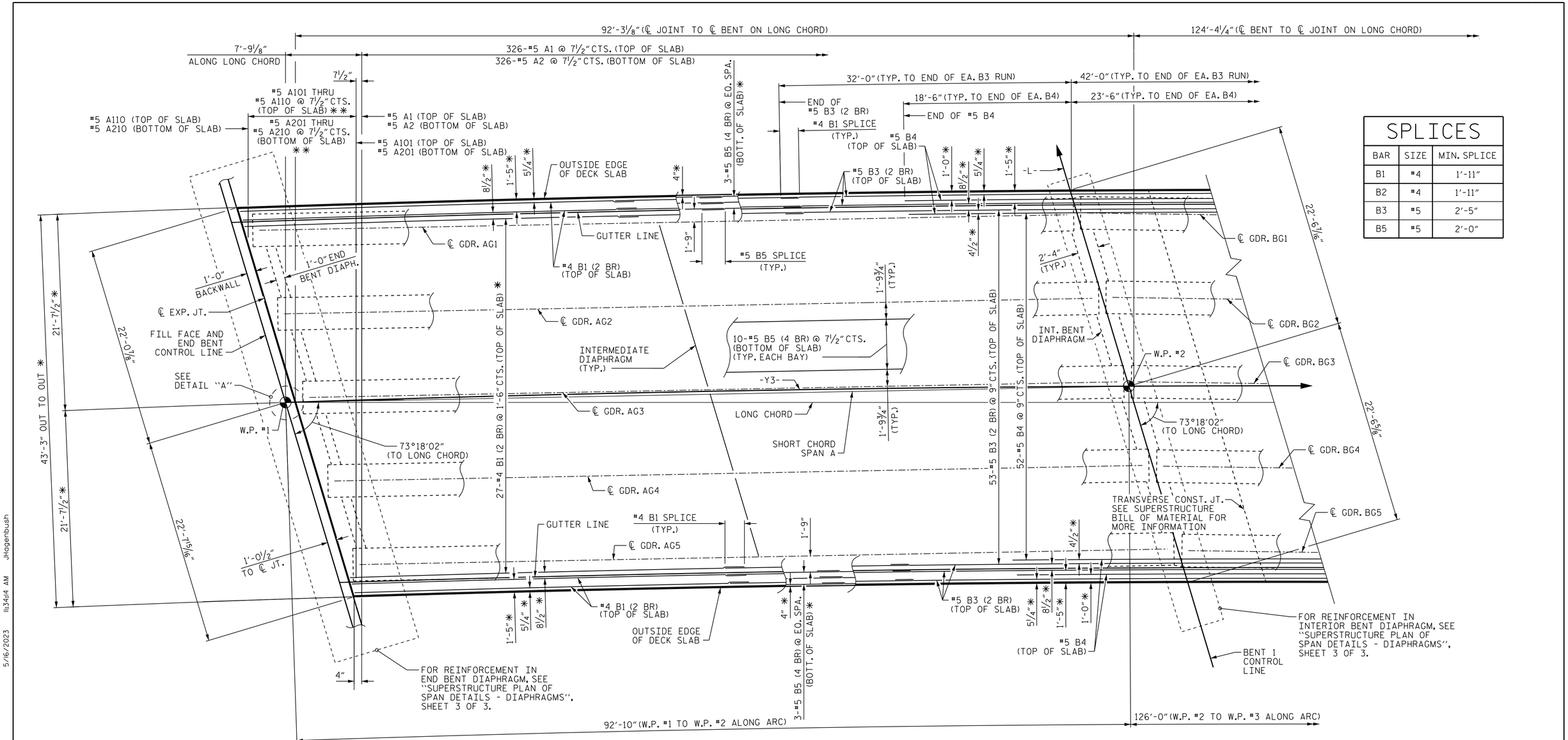
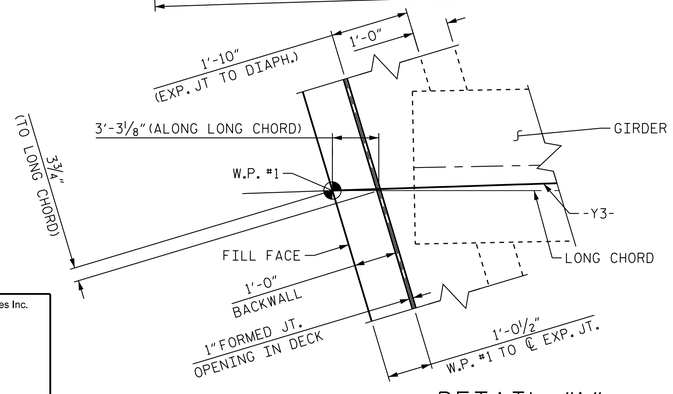


SPLICES		
BAR	SIZE	MIN. SPLICE
B1	#4	1'-11"
B2	#4	1'-11"
B3	#5	2'-5"
B5	#5	2'-0"

SPAN A

PART PLAN OF SPAN B



DETAIL "A"

PLAN OF SPANS

NOTES:

(2 BR) DENOTES TWO BAR RUN

(4 BR) DENOTES FOUR BAR RUN

* - RADIAL DIMENSION
** - TWO BARS PER MARK

"A" BARS PLACED PERPENDICULAR TO LONG CHORD.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

PLAN OF SPAN (SPAN A & PART OF SPAN B)

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2			4		

SHEET NO. S3-10

TOTAL SHEETS 36

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DRAWN BY : J. B. GEILE DATE : 04/04/18
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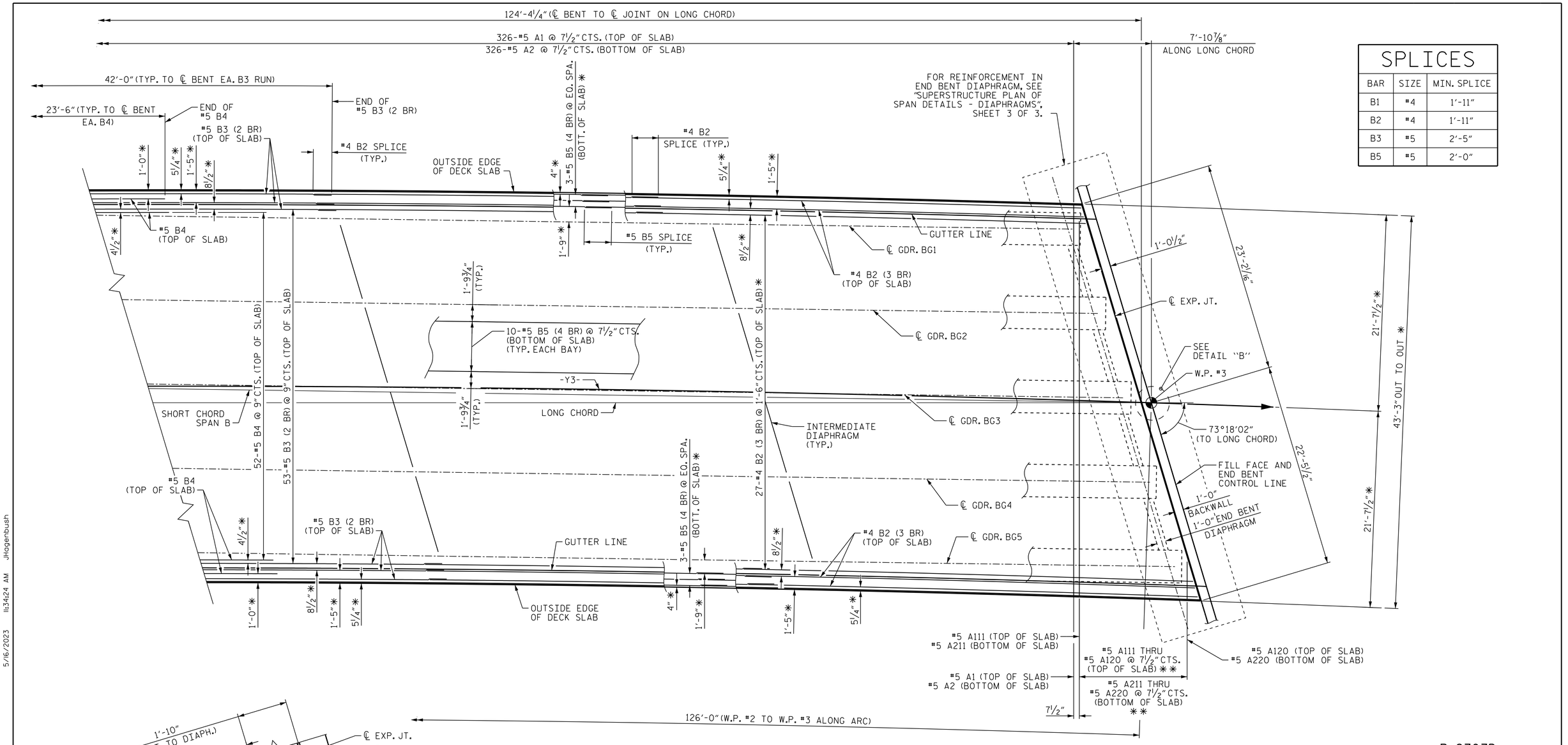
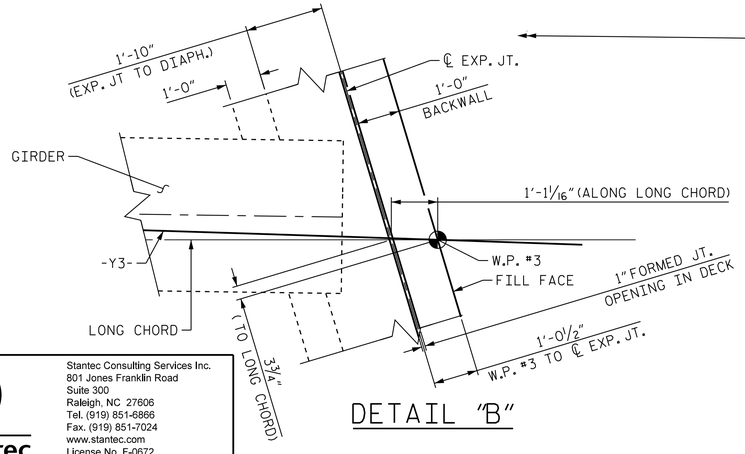


SPLICES		
BAR	SIZE	MIN. SPLICE
B1	#4	1'-11"
B2	#4	1'-11"
B3	#5	2'-5"
B5	#5	2'-0"



DETAIL "B"

PART PLAN OF SPAN B

PLAN OF SPANS

NOTES:

(2 BR) DENOTES TWO BAR RUN

(3 BR) DENOTES THREE BAR RUN

(4 BR) DENOTES FOUR BAR RUN

* - RADIAL DIMENSION

** - TWO BARS PER MARK

"A" BARS PLACED PERPENDICULAR TO LONG CHORD.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

PLAN OF SPAN (PART OF SPAN B)

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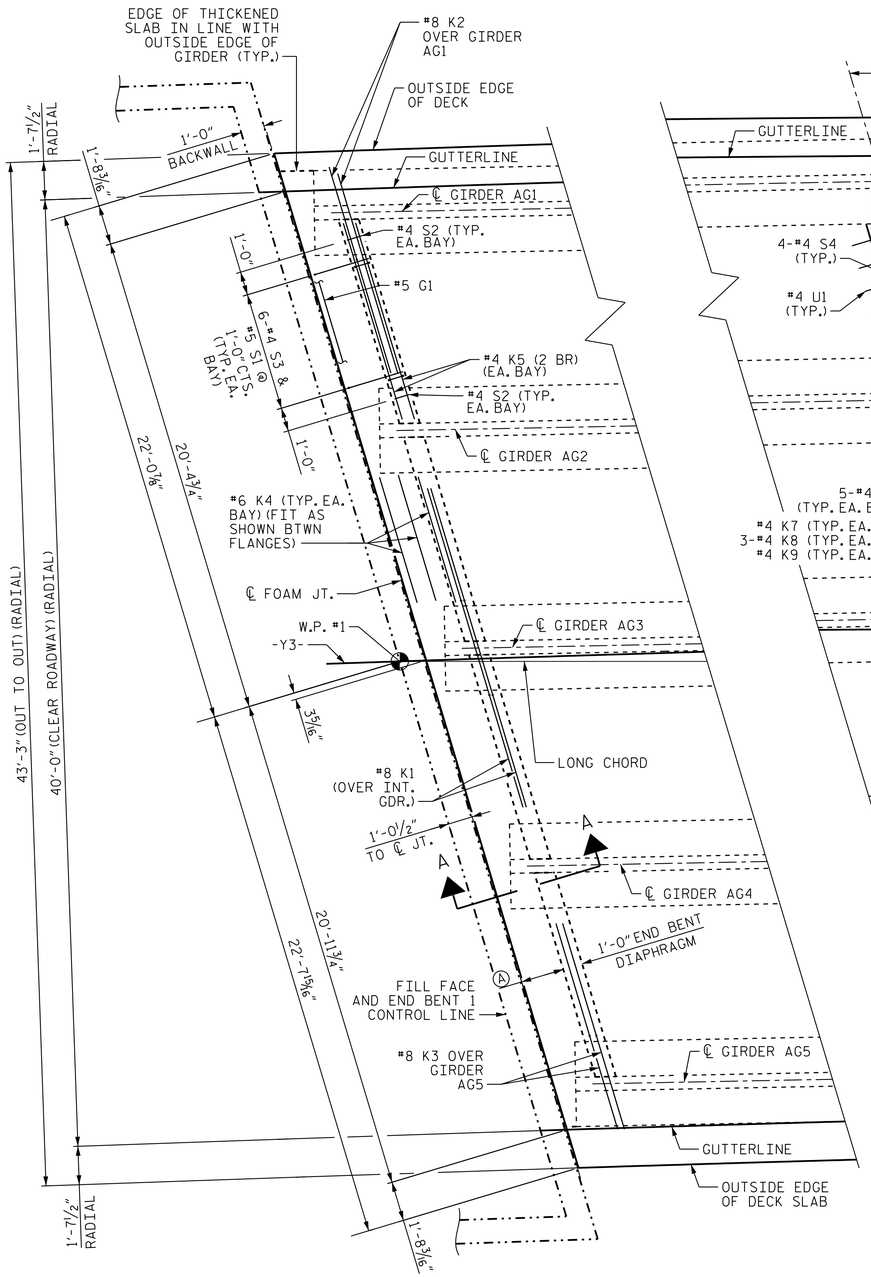
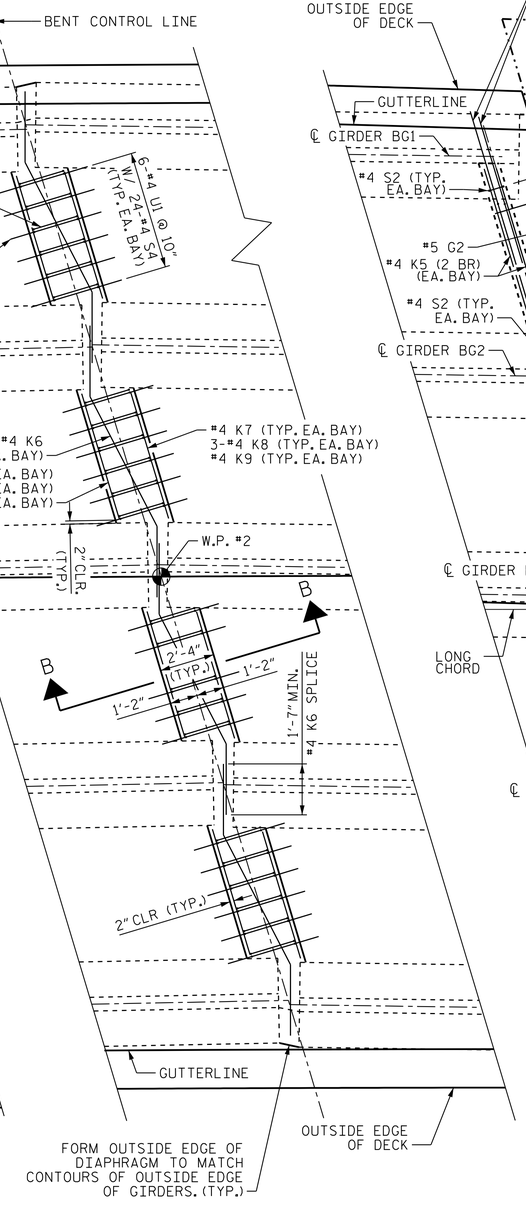
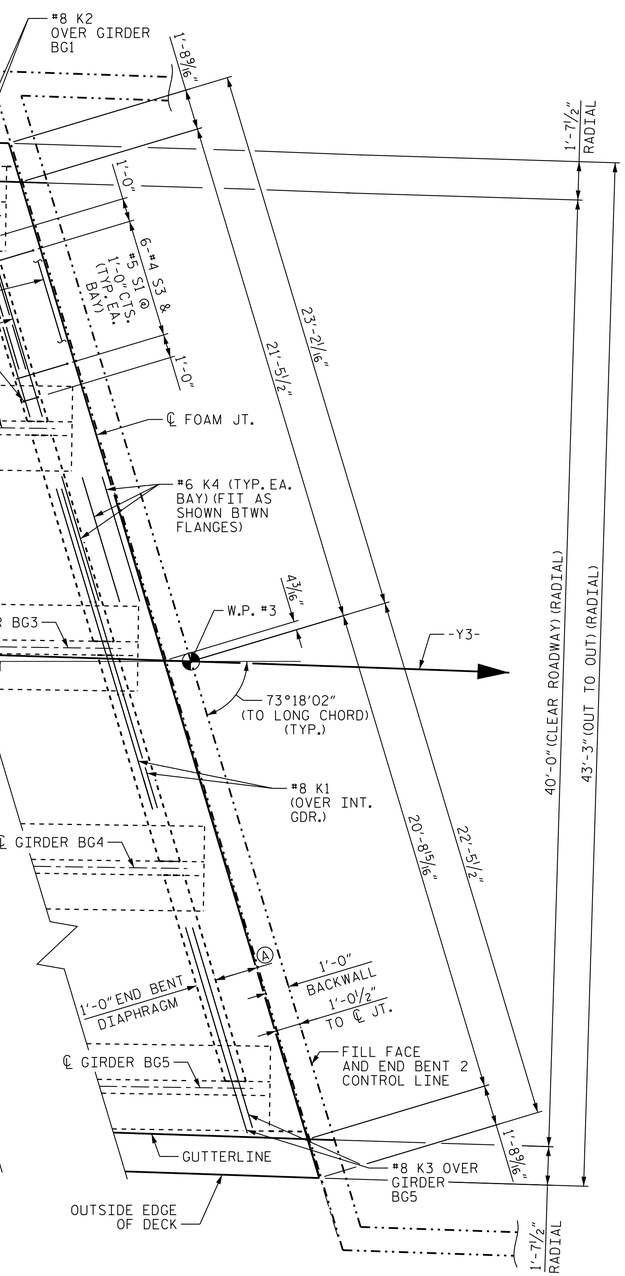
1			3			TOTAL SHEETS
2			4			36



END BENT 1 DIAPHRAGM REINFORCING DETAIL



INTERIOR BENT 1 DIAPHRAGM REINFORCING DETAIL



END BENT 2 DIAPHRAGM REINFORCING DETAIL

NOTES

REINFORCEMENT IN DECK AND BARRIER RAIL NOT SHOWN FOR CLARITY.

FOR SECTION A-A, SEE SUPERSTRUCTURE "TYPICAL SECTION (DETAILS)", SHEET 3 OF 3.

(2 BR) DENOTES TWO BAR RUN

Ⓐ - 1'-10" FROM ℄ JOINT TO FACE OF DIAPHRAGM.

SHIFT "U" AND "S" BARS AS NECESSARY TO PROVIDE 2" CLEARANCE TO TOP FLANGE.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

PLAN OF SPANS
DETAILS - DIAPHRAGMS

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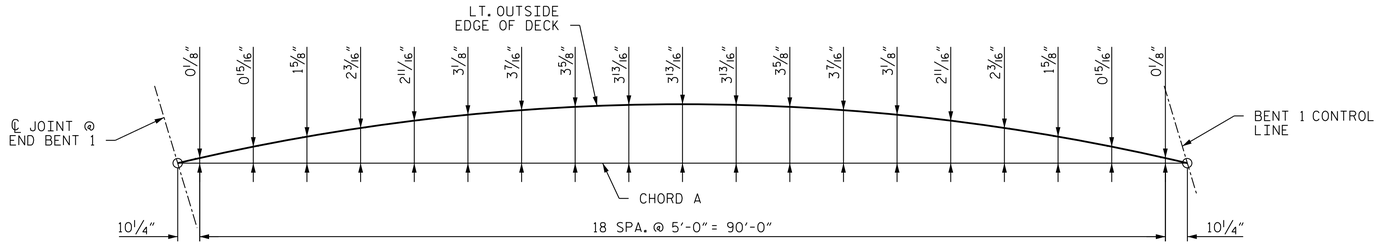
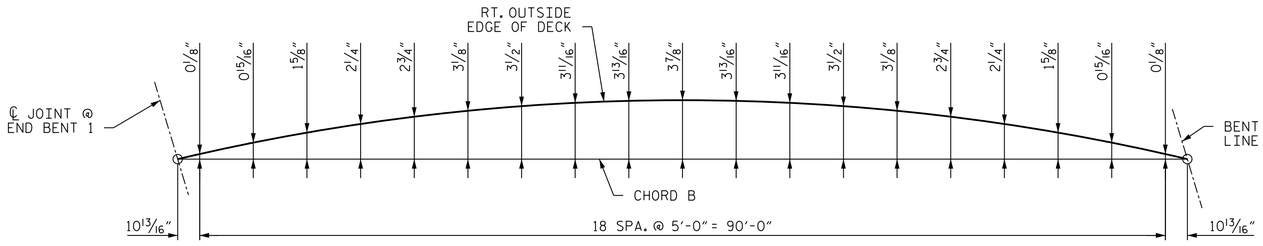
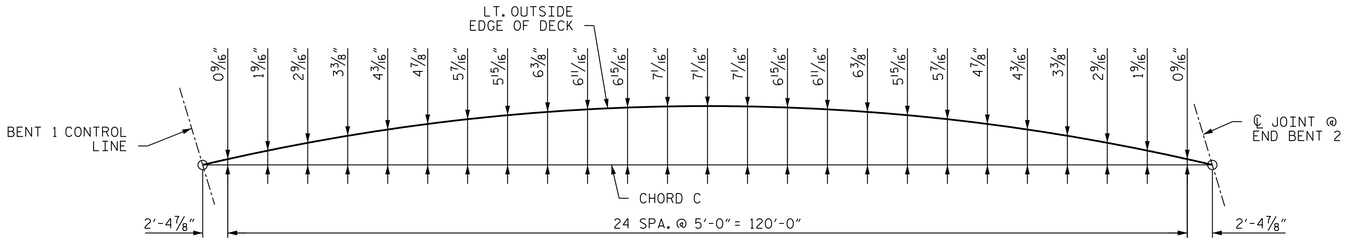


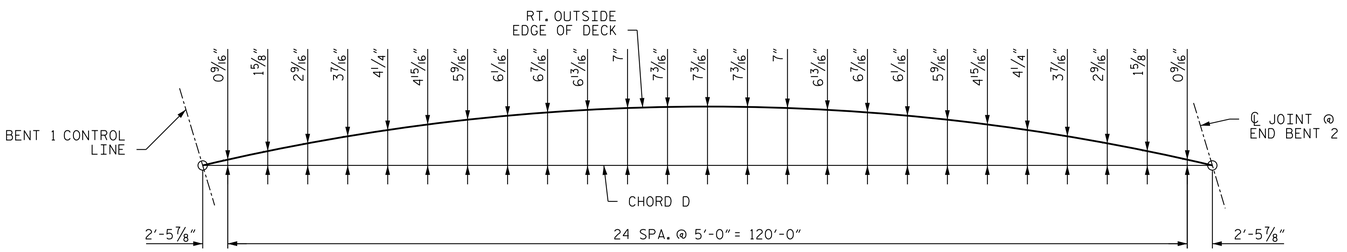
CHORD TO ARC OFFSET - CHORD A



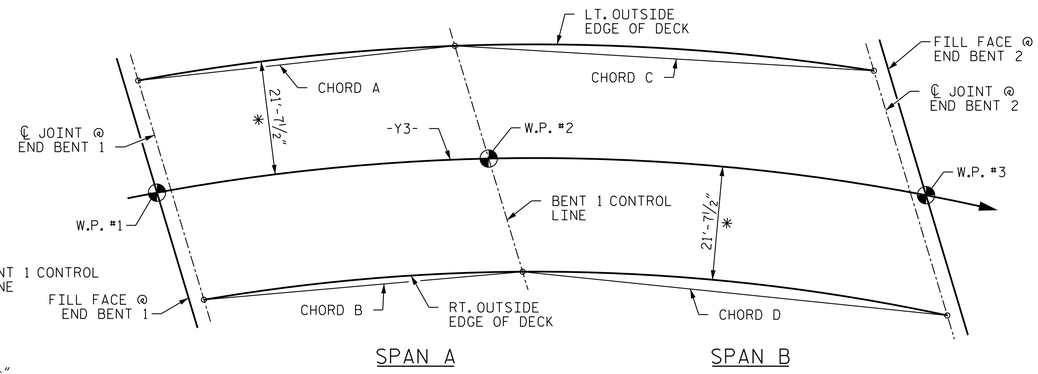
CHORD TO ARC OFFSET - CHORD B



CHORD TO ARC OFFSET - CHORD C



CHORD TO ARC OFFSET - CHORD D



PLAN OF CHORDS KEY

* RADIAL DIMENSION

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

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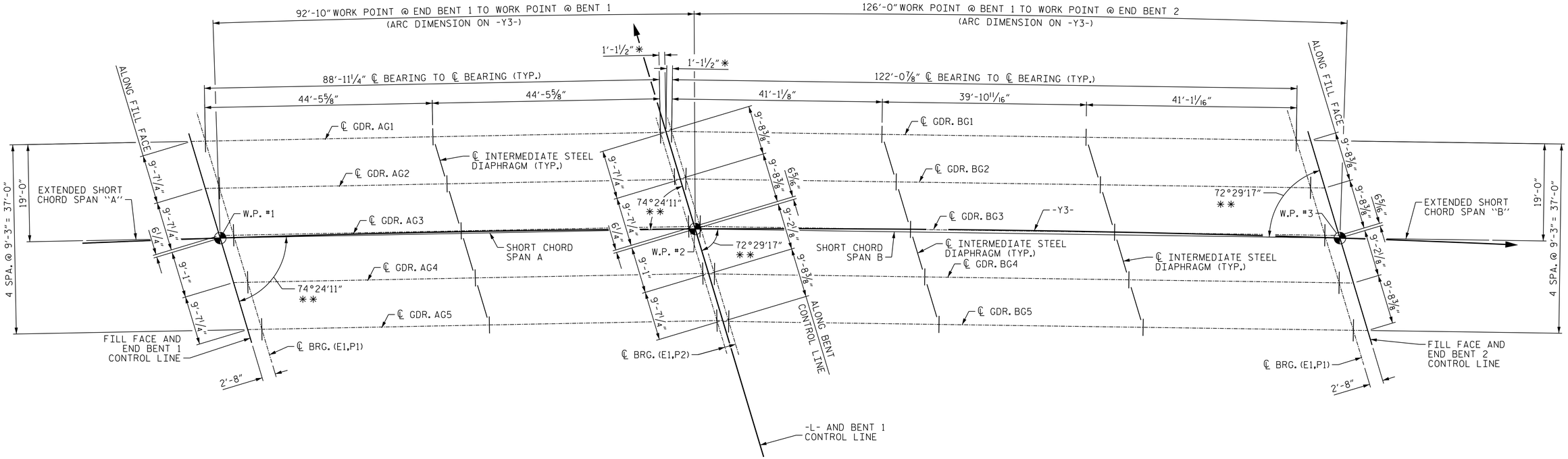
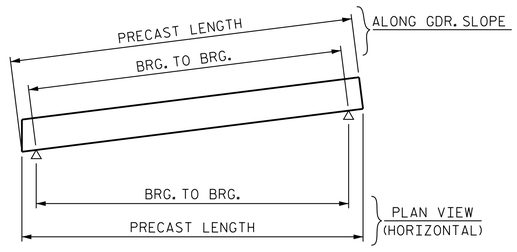
RALEIGH
SUPERSTRUCTURE

DECK SLAB CHORD TO ARC OFFSETS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-13
1			3			TOTAL SHEETS
2			4			36





GIRDER DIMENSIONS

SPAN A	PLAN VIEW	ALONG GDR. SLOPE
BRG. TO BRG.	88'-11¼"	89'-2¾"
PRECAST LENGTH	90'-4¼"	90'-7¾"
SPAN B	**PLAN VIEW**	**ALONG GDR. SLOPE**
BRG. TO BRG.	122'-0⅞"	122'-5"
PRECAST LENGTH	123'-5⅞"	123'-10"

ALL DIMENSIONS SHOWN IN FRAMING PLAN ARE HORIZONTAL.

FRAMING PLAN

NOTES:

(E1) DENOTES ELASTOMERIC BEARING, SEE SHEET "ELASTOMERIC BEARING DETAILS".

ALL GIRDERS WITHIN A SPAN ARE PARALLEL TO THE SPAN SHORT CHORD.

** SHORT CHORD TO BENT ANGLE.

* ℄ BRG. TO BENT 1 CONTROL LINE ON ℄ GIRDER.

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DRAWN BY : J. B. GEILE DATE : 03/19/18
CHECKED BY : V. E. FRAGA DATE : 05/30/18
DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

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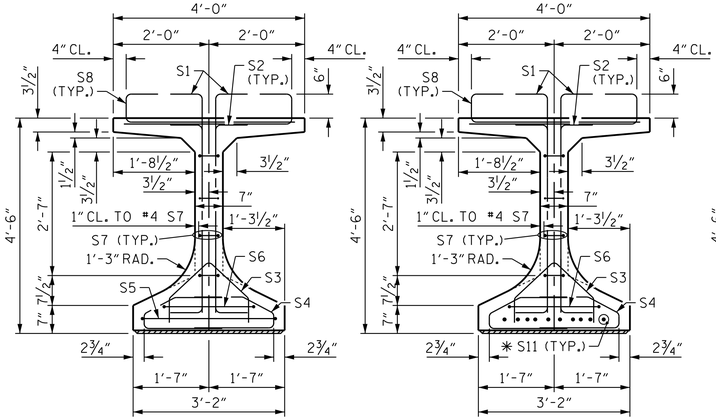
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

FRAMING PLAN

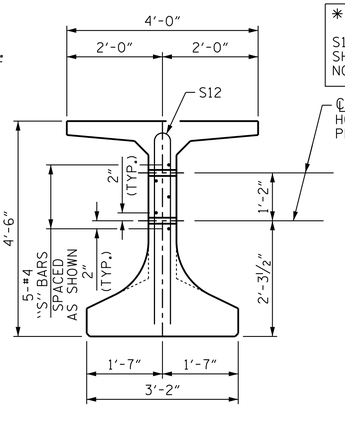
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-14
1			3			TOTAL SHEETS
2			4			36



SECTION A-A

SECTION B-B

* FOR S11 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET.



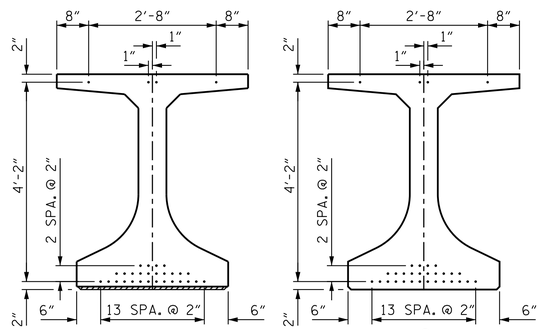
SECTION C-C

(S8, S1, AND S10 BARS NOT SHOWN)

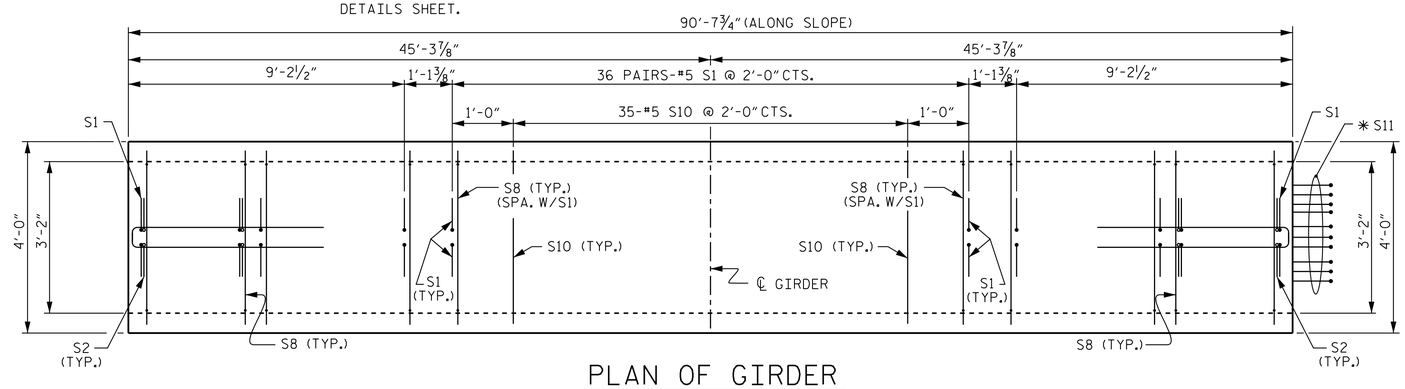
* NOTE:

S11 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

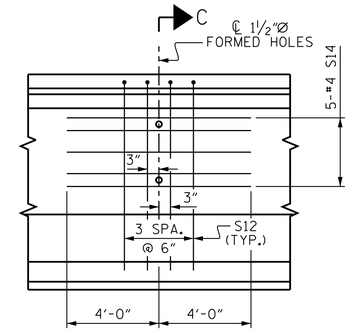
℄ 1½" Ø FORMED HOLE. (SEE FRAMING PLAN FOR LOCATION)



0.6"Ø LOW RELAXATION STAND LAYOUT

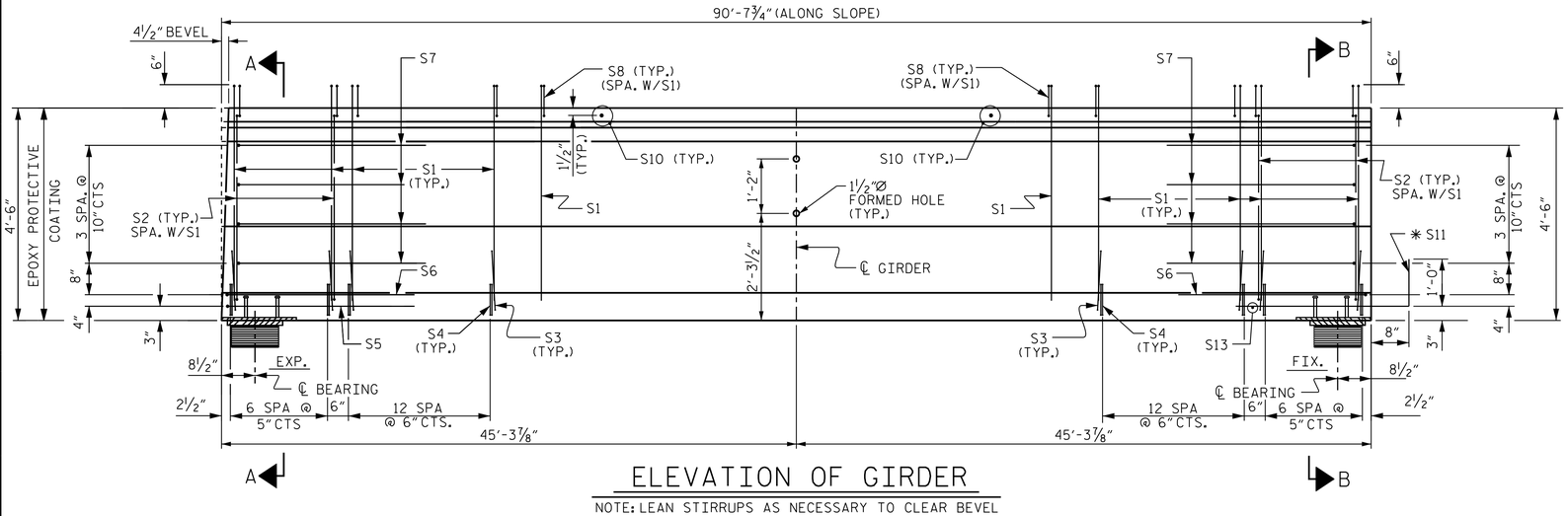


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. AG1-AG5



ELEVATION OF GIRDER

NOTE: LEAN STIRRUPS AS NECESSARY TO CLEAR BEVEL

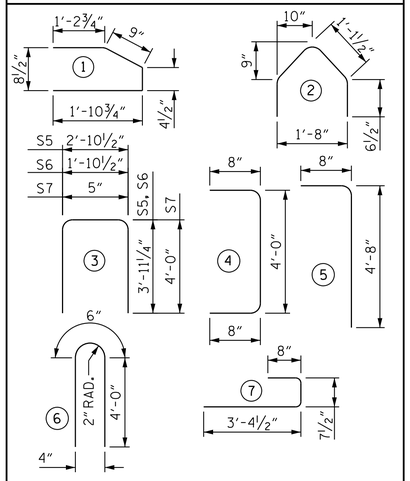
0.6"Ø L. R. GRADE 270 STRANDS

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	152	#5	5	5'-4"	846
S2	28	#5	4	5'-4"	156
S3	40	#3	2	3'-4"	50
S4	80	#3	1	4'-3"	128
S5	1	#5	3	10'-9"	11
S6	2	#5	3	9'-9"	20
S7	8	#4	3	8'-5"	45
S8	152	#5	7	4'-8"	740
S10	35	#5	STR	3'-8"	134
* S11	10	#6	STR	4'-8"	70
S12	4	#5	6	8'-6"	35
S13	1	#3	STR	2'-10"	1
S14	5	#4	STR	8'-0"	27

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

REINFORCING STEEL	5,500 PSI CONCRETE	0.6"Ø L.R. STRANDS
LB.	AVERAGE C.Y.	No.
2,263	21.8	32

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	90'-7¾"	453.2

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

54" PRESTRESSED CONCRETE FLORIDA I-BEAM GIRDER CONTINUOUS FOR LIVE LOAD

(SPAN A)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-15
1			3			TOTAL SHEETS
2			4			36

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

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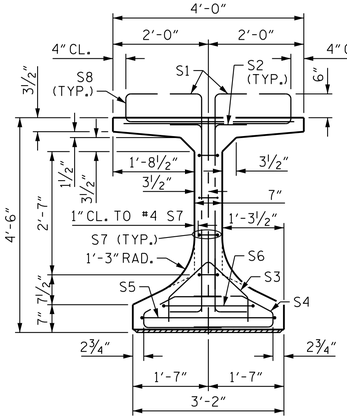
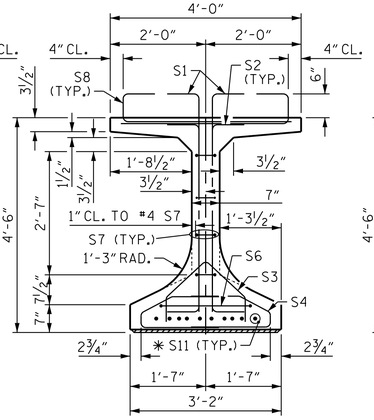
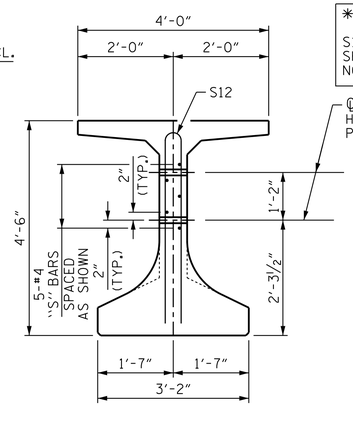


SECTION A-A



SECTION B-B

✱ FOR S11 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET.



SECTION C-C

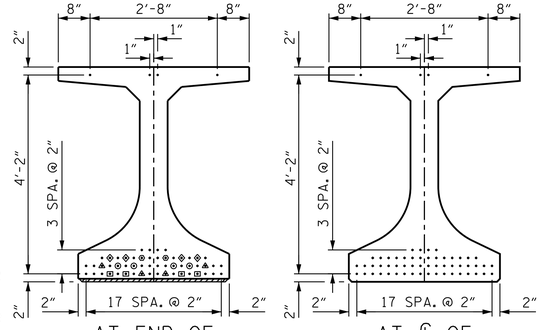
(S8, S1, AND S10 BARS NOT SHOWN)

✱ NOTE:

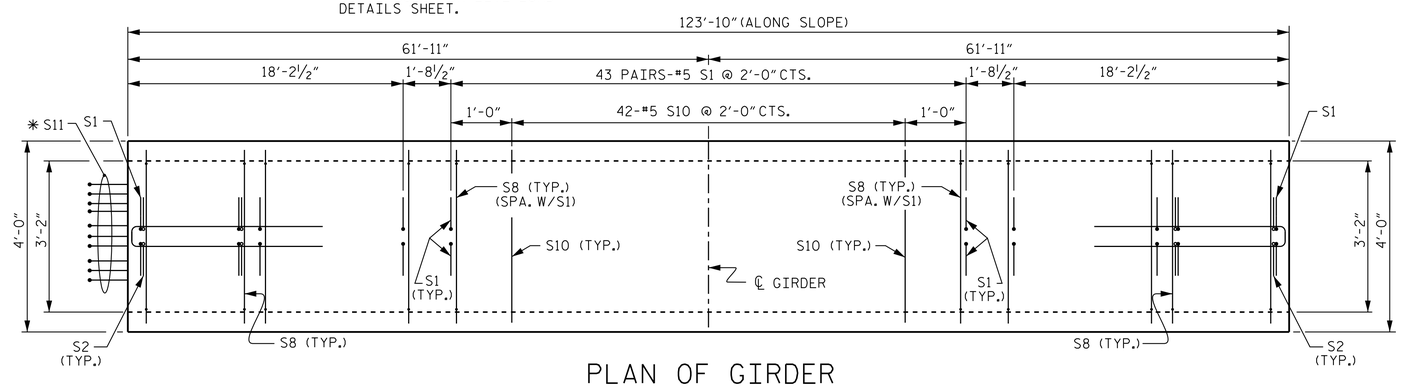
S11 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

DEBONDING LEGEND

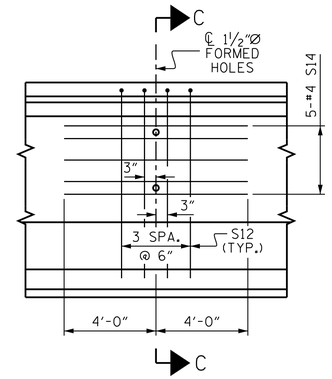
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 3'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 9'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 15'-0" FROM END OF GIRDER



0.6"Ø LOW RELAXATION STAND LAYOUT

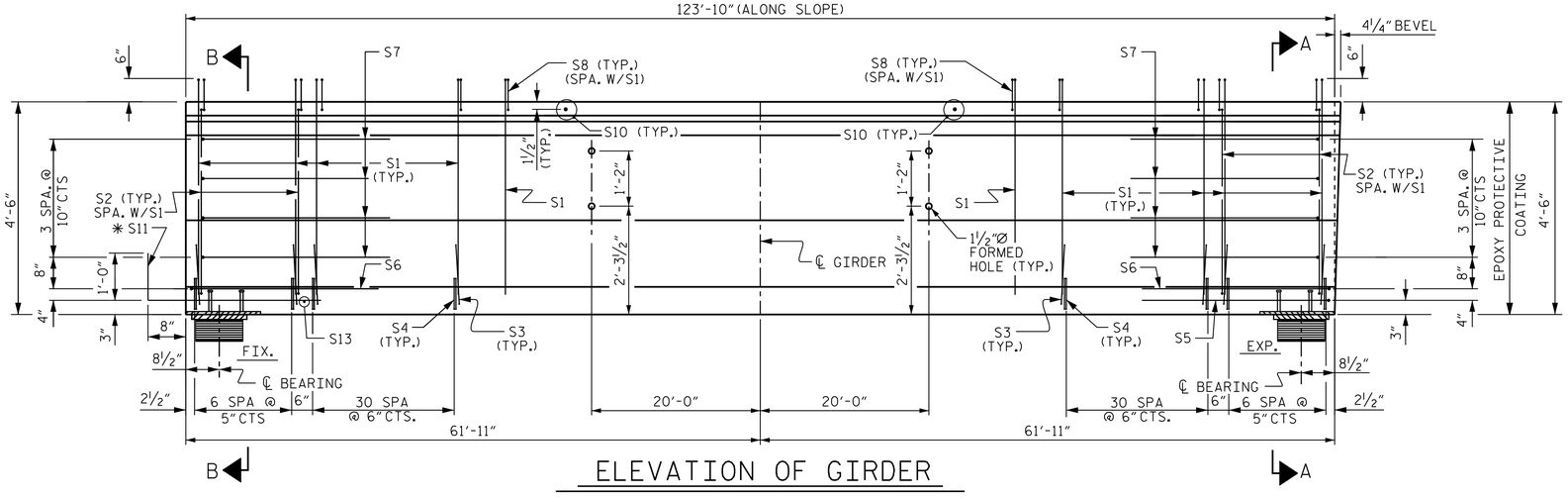


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. BG1-BG5



ELEVATION OF GIRDER

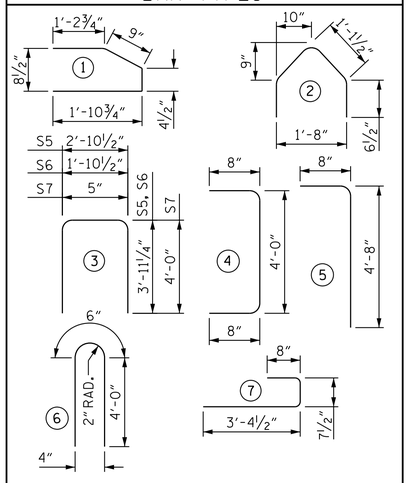
0.6"Ø L. R. GRADE 270 STRANDS

AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	238	#5	5	5'-4"	1,324
S2	28	#5	4	5'-4"	156
S3	76	#3	2	3'-4"	95
S4	152	#3	1	4'-3"	243
S5	1	#5	3	10'-9"	11
S6	2	#5	3	9'-9"	20
S7	8	#4	3	8'-5"	45
S8	238	#5	7	4'-8"	1,158
S10	42	#5	STR	3'-8"	161
✱ S11	10	#6	STR	4'-8"	70
S12	8	#5	6	8'-6"	71
S13	1	#3	STR	2'-10"	1
S14	10	#4	STR	8'-0"	53

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

REINFORCING STEEL	10,000 PSI CONCRETE	0.6"Ø L.R. STRANDS
LB.	AVERAGE C.Y.	No.
3,408	29.7	58

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	123'-10"	619.2

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

54" PRESTRESSED CONCRETE FLORIDA I-BEAM GIRDER CONTINUOUS FOR LIVE LOAD

(SPAN B)

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-16
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : J. B. GEILE DATE : 03/20/18
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DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

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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.

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.

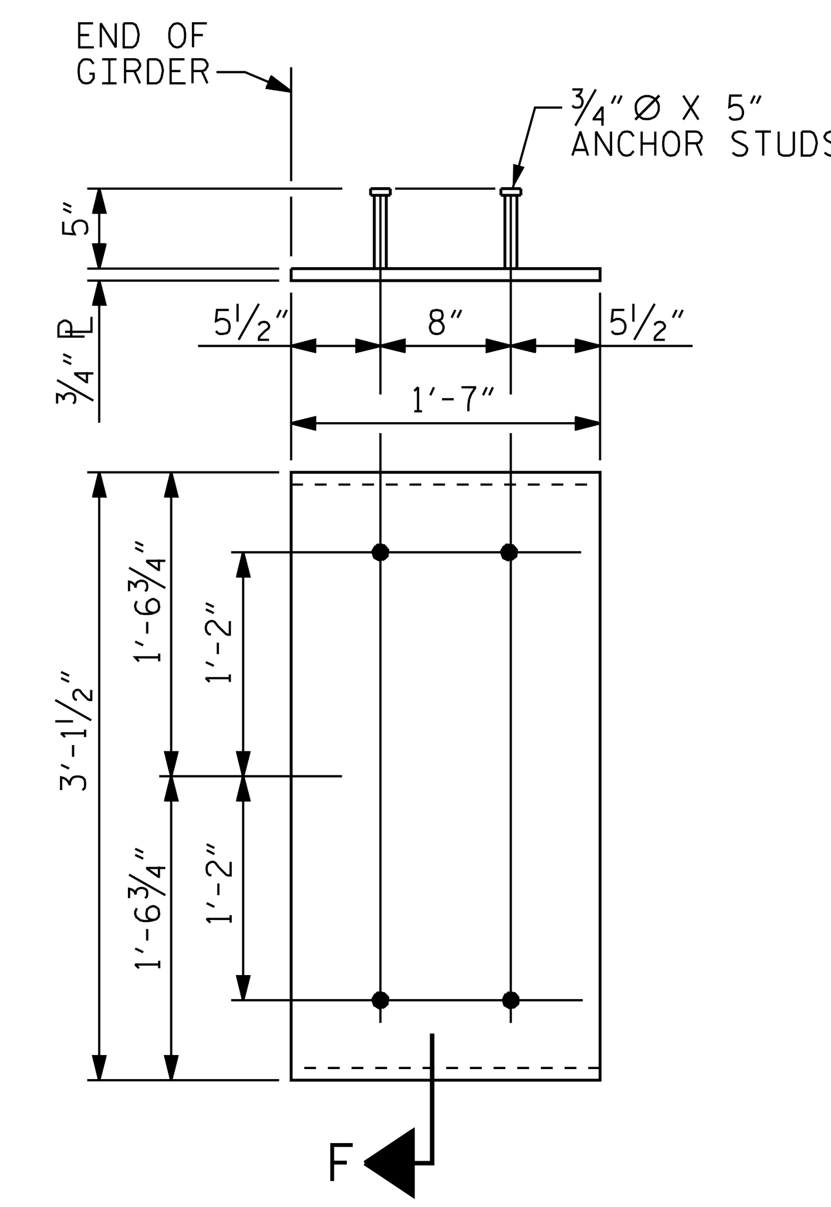
AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,000 PSI FOR GIRDERS IN SPAN A, AND 8,000 PSI FOR GIRDERS IN SPAN B.

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

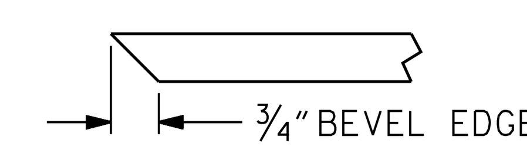
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

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



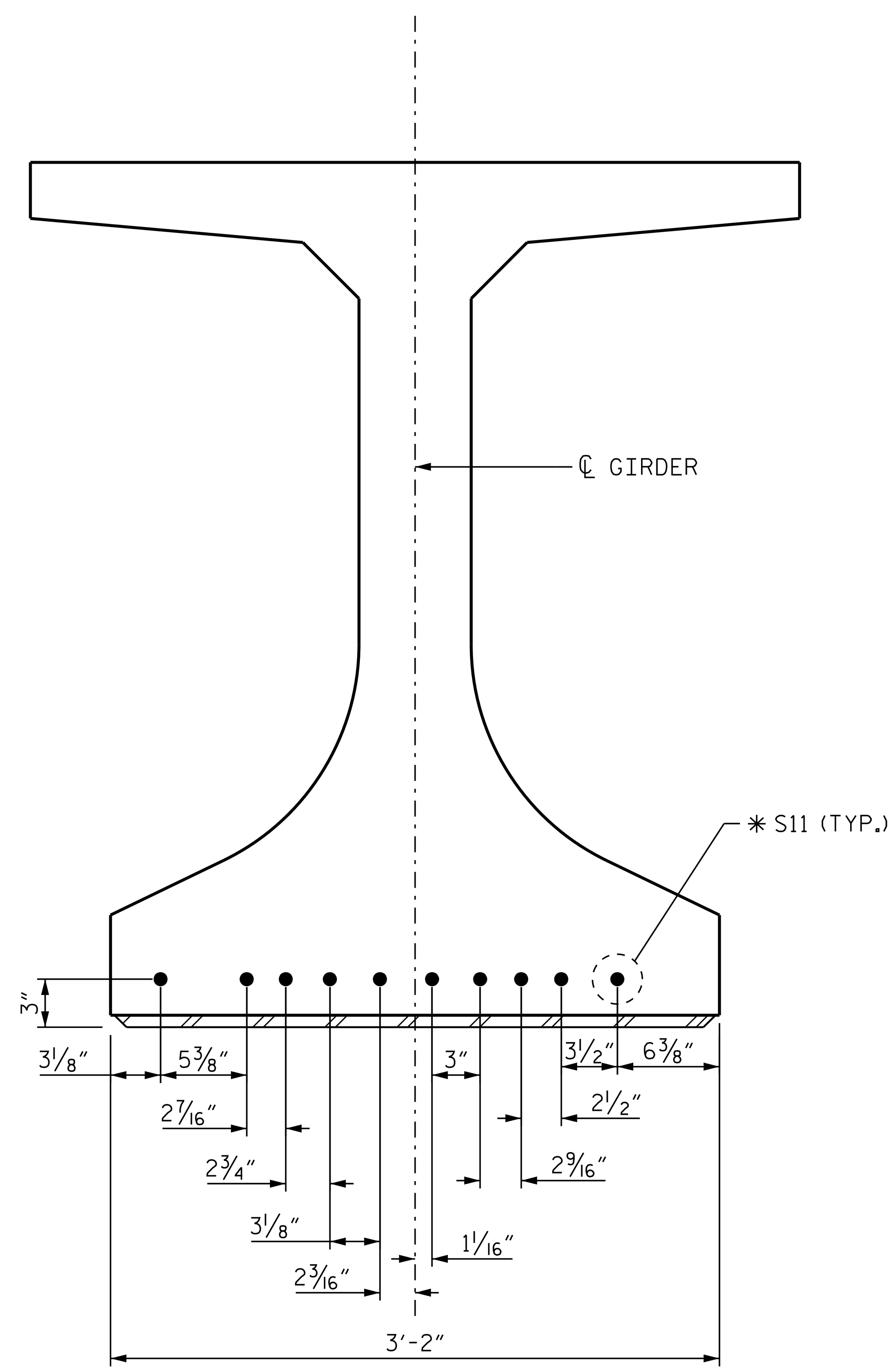
EMBEDDED PLATE "B-1" DETAILS FOR FIB GIRDER

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)



DETAIL "C"

✱ S11 BARS IN BOTTOM FLANGE MAY BE ADJUSTED SLIGHTLY AS NECESSARY TO CLEAR 3/4" x 5" ANCHOR STUDS MOUNTED ON EMBEDDED PLATE "B-1".

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

54" PRESTRESSED CONCRETE FLORIDA I-BEAM GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER
5/16/2023

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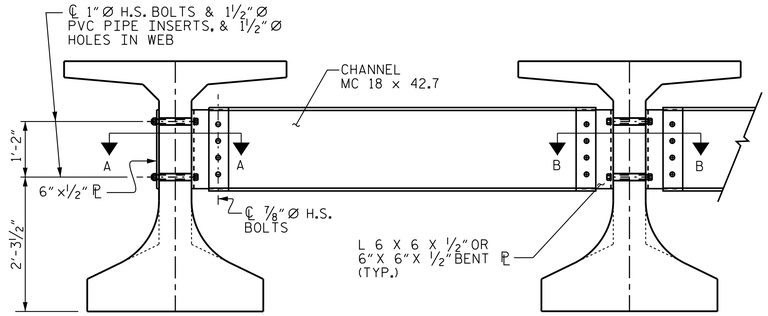
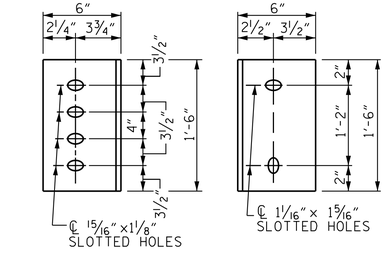


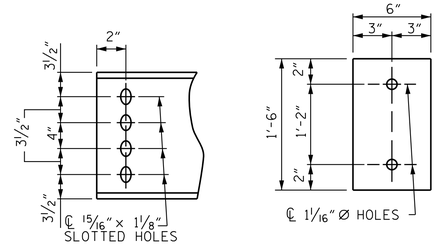
EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

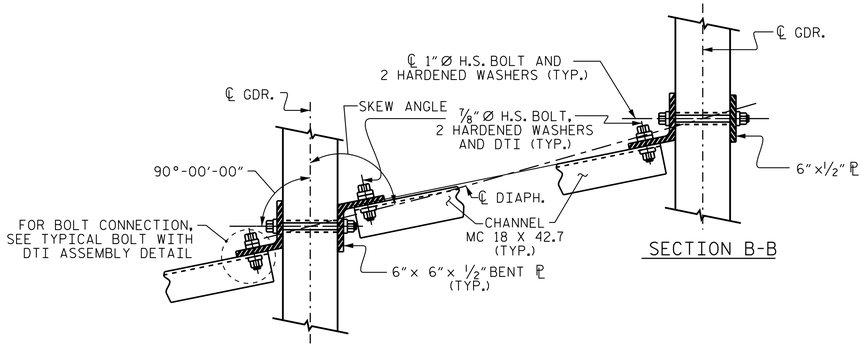


DIAPHRAGM FACE WEB FACE

CONNECTOR PLATE DETAILS

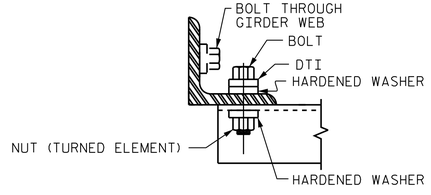


CHANNEL END PLATE DETAILS



SECTION A-A SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY 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 ¼ 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 ¼" 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.

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PROJECT NO. R-2707D
CLEVELAND COUNTY
STATION: 23+21.80 -Y3-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
INTERMEDIATE STEEL DIAPHRAGMS FOR 54" PRESTRESSED CONCRETE FLORIDA I-BEAM GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-18
1			3			TOTAL SHEETS
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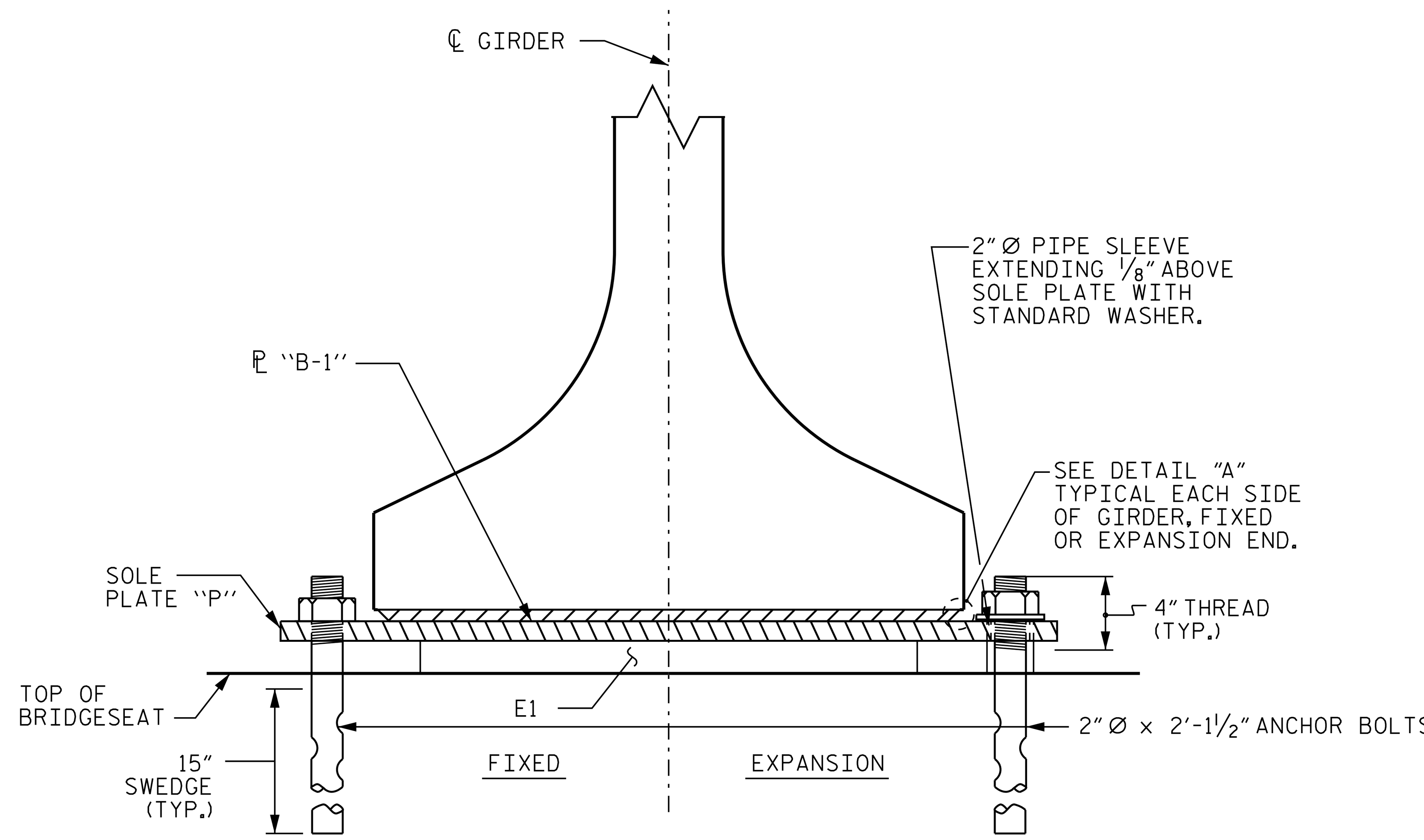
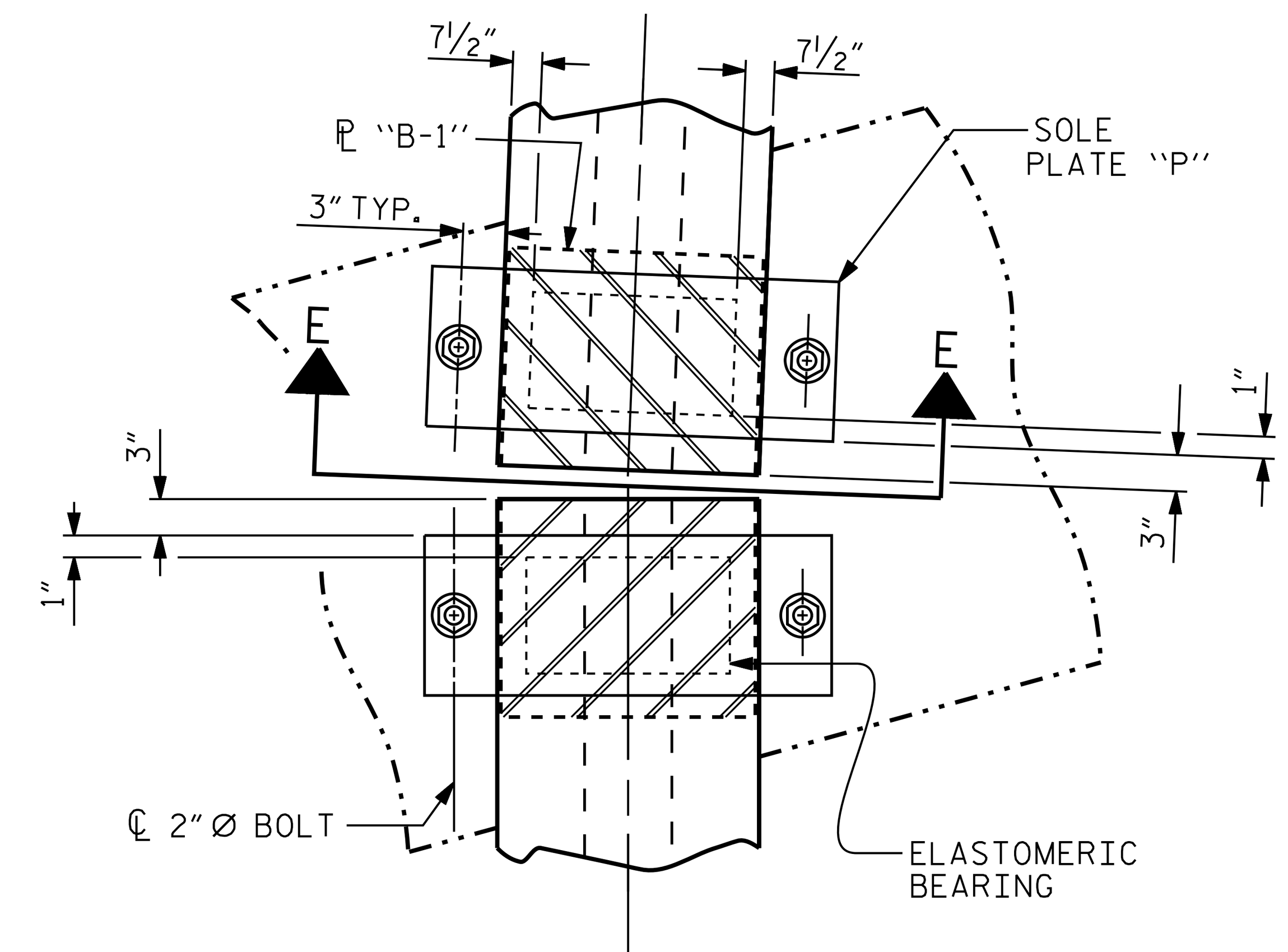


SECTION E-E



TYPICAL PLAN

(SHOWING FIXED INTERIOR BENT)

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.

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

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

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

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

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

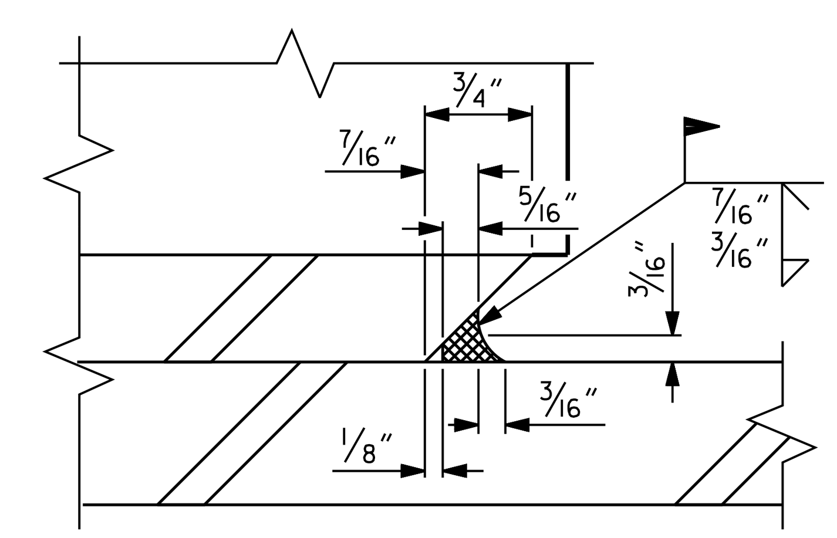
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

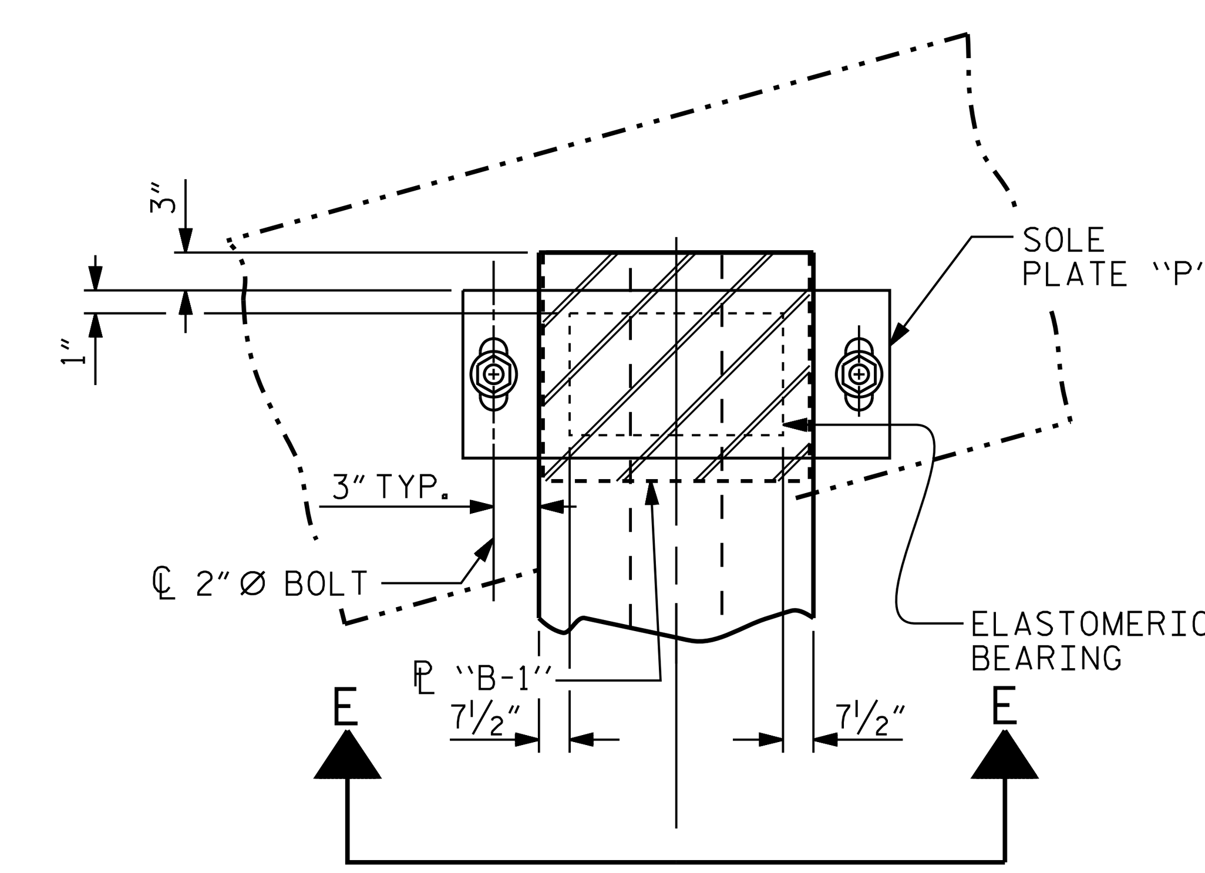
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



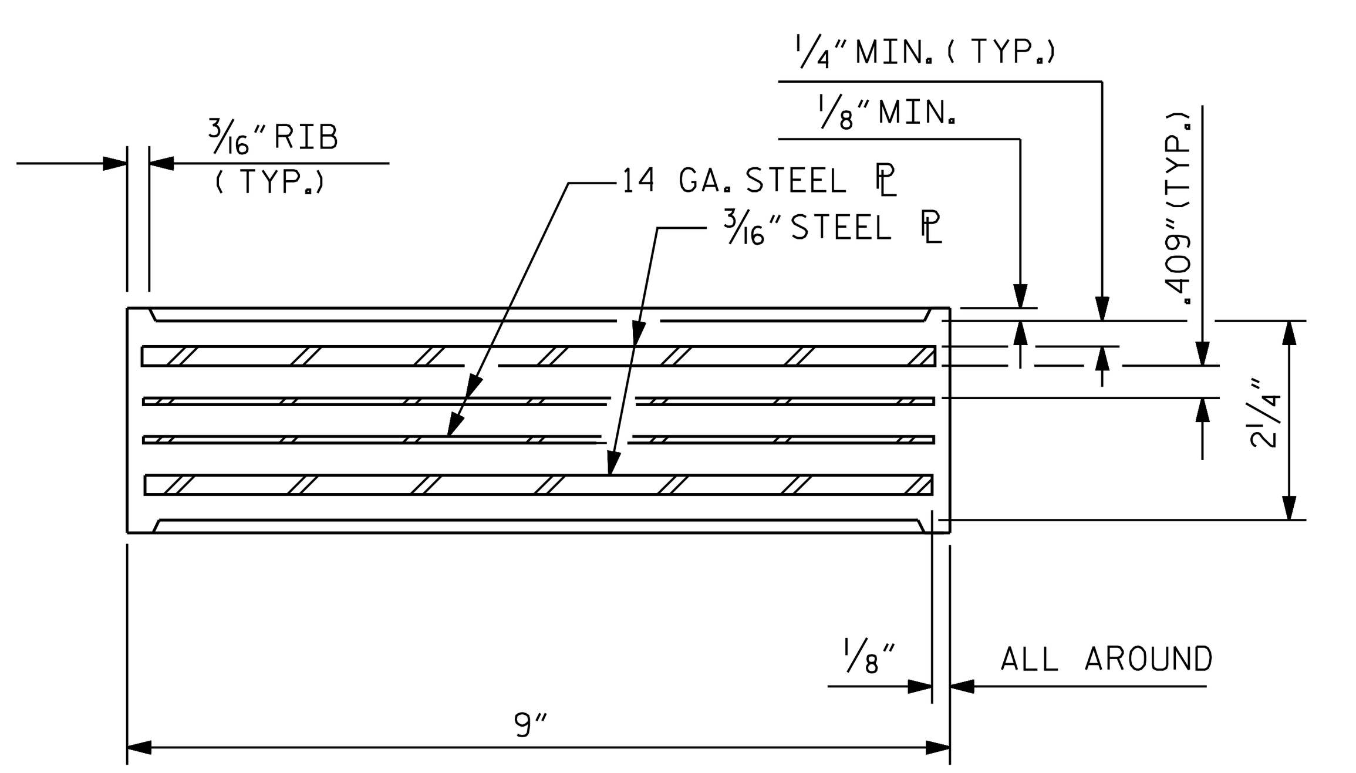
DETAIL "A"



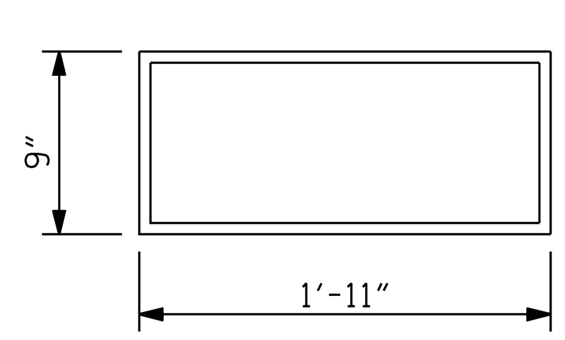
TYPICAL PLAN

(SHOWING EXPANSION END BENT)

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



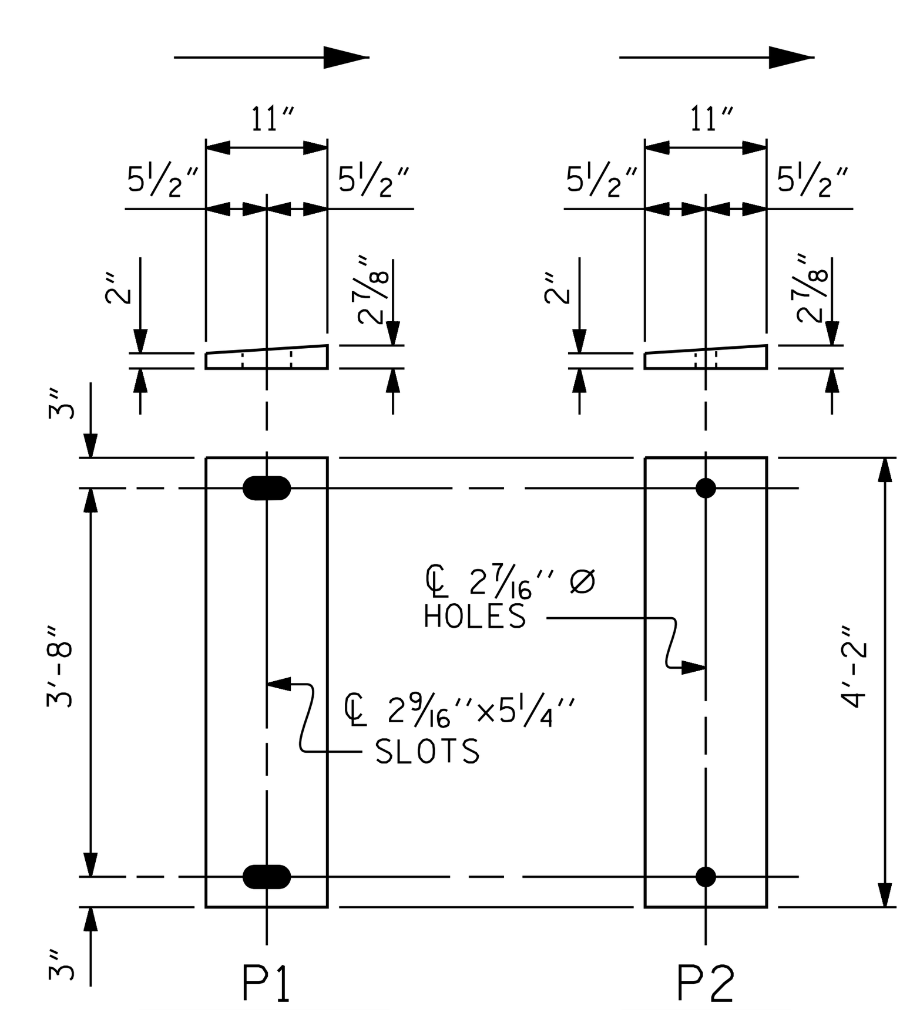
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (20 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

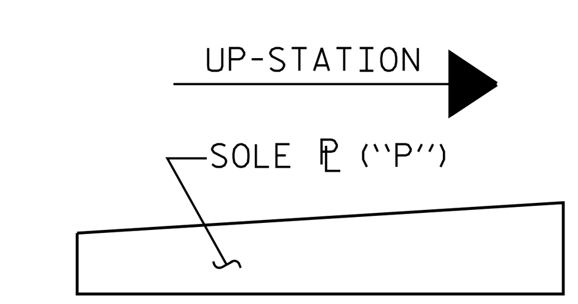


P1 (EXPANSION) (10 REQ'D)

P2 (FIXED) (10 REQ'D)

SOLE PLATE DETAILS ("P")

DIRECTION ——► OF INCREASING STATIONS



SOLE ℞ PLACEMENT DETAIL

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

DRAWN BY : J. B. GEILE	DATE : 03/20/18	DESIGN ENGINEER OF RECORD: V. E. FRAGA	DATE : 05/16/23
CHECKED BY : V. E. FRAGA	DATE : 05/05/23		

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER
5/16/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-19
1			3			TOTAL SHEETS
2			4			36

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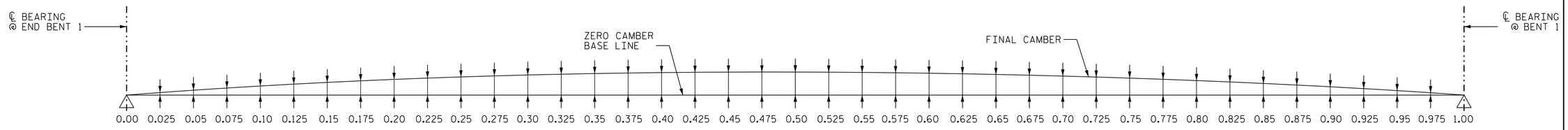

GIRDER 1

	0.000	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.014	0.027	0.039	0.050	0.060	0.069	0.078	0.085	0.092	0.098	0.103	0.108	0.112	0.116	0.119	0.121	0.123	0.124	0.125	0.126	0.125	0.124	0.123	0.121	0.119	0.116	0.112	0.108	0.103	0.098	0.092	0.085	0.078	0.069	0.060	0.050	0.039	0.027	0.014	0.000
DEFL. DUE TO SUPERIMPOSED DL ** ↓	0.000	-0.006	-0.012	-0.018	-0.024	-0.030	-0.036	-0.042	-0.048	-0.053	-0.057	-0.062	-0.067	-0.070	-0.073	-0.076	-0.079	-0.080	-0.081	-0.082	-0.083	-0.082	-0.081	-0.080	-0.079	-0.076	-0.073	-0.070	-0.067	-0.062	-0.058	-0.053	-0.048	-0.042	-0.036	-0.031	-0.025	-0.019	-0.012	-0.006	0.000
FINAL CAMBER ↑	0"	1/8"	3/16"	1/4"	5/16"	3/8"	3/8"	7/16"	7/16"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	7/16"	7/16"	7/16"	3/8"	3/8"	5/16"	1/4"	3/16"	1/8"	0"

** INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

GIRDER 2-4

	0.000	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.014	0.027	0.039	0.050	0.060	0.069	0.078	0.085	0.092	0.098	0.103	0.108	0.112	0.116	0.119	0.121	0.123	0.124	0.125	0.126	0.125	0.124	0.123	0.121	0.119	0.116	0.112	0.108	0.103	0.098	0.092	0.085	0.078	0.069	0.060	0.050	0.039	0.027	0.014	0.000
DEFL. DUE TO SUPERIMPOSED DL ** ↓	0.000	-0.007	-0.014	-0.021	-0.028	-0.035	-0.042	-0.049	-0.056	-0.061	-0.067	-0.072	-0.078	-0.081	-0.084	-0.088	-0.091	-0.092	-0.094	-0.095	-0.096	-0.095	-0.094	-0.092	-0.091	-0.088	-0.084	-0.081	-0.078	-0.072	-0.067	-0.061	-0.056	-0.049	-0.042	-0.035	-0.028	-0.021	-0.014	-0.007	0.000
FINAL CAMBER ↑	0"	1/16"	1/8"	3/16"	1/4"	5/16"	5/16"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	5/16"	5/16"	5/16"	1/4"	3/16"	1/8"	1/16"	0"

** INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

GIRDER 5

	0.000	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.014	0.027	0.039	0.050	0.060	0.069	0.078	0.085	0.092	0.098	0.103	0.108	0.112	0.116	0.119	0.121	0.123	0.124	0.125	0.126	0.125	0.124	0.123	0.121	0.119	0.116	0.112	0.108	0.103	0.098	0.092	0.085	0.078	0.069	0.060	0.050	0.039	0.027	0.014	0.000
DEFL. DUE TO SUPERIMPOSED DL ** ↓	0.000	-0.006	-0.013	-0.019	-0.026	-0.032	-0.038	-0.044	-0.050	-0.055	-0.060	-0.065	-0.070	-0.073	-0.076	-0.079	-0.083	-0.084	-0.085	-0.086	-0.087	-0.086	-0.085	-0.084	-0.083	-0.080	-0.076	-0.073	-0.056	-0.070	-0.065	-0.056	-0.051	-0.044	-0.038	-0.032	-0.026	-0.019	-0.013	-0.006	0.000
FINAL CAMBER ↑	0"	1/16"	3/16"	1/4"	5/16"	5/16"	3/8"	3/8"	7/16"	7/16"	7/16"	7/16"	7/16"	1/2"	1/2"	1/2"	7/16"	1/2"	1/2"	1/2"	7/16"	1/2"	1/2"	1/2"	7/16"	1/2"	1/2"	7/16"	7/16"	7/16"	7/16"	7/16"	7/16"	7/16"	3/8"	3/8"	5/16"	5/16"	1/4"	3/16"	1/16"	0"

** INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

SCHEMATIC CAMBER ORDINATES SPAN A

ALL VALUES ARE SHOWN IN DECIMALS OF A FOOT EXCEPT
"FINAL CAMBER" WHICH IS SHOWN IN INCHES.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS
SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-20
1			3			TOTAL SHEETS
2			4			36

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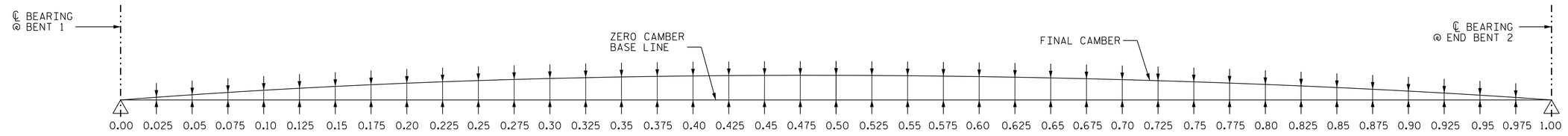
License No. F-0672

DRAWN BY : J. E. HAGENBUSH DATE : 05/03/23
CHECKED BY : V. E. FRAGA DATE : 05/04/23
DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



GIRDER 1

	0.000	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.031	0.060	0.087	0.112	0.136	0.157	0.177	0.196	0.212	0.228	0.241	0.254	0.264	0.274	0.282	0.289	0.294	0.298	0.300	0.301	0.300	0.298	0.294	0.289	0.282	0.274	0.264	0.254	0.241	0.228	0.212	0.196	0.177	0.157	0.136	0.112	0.087	0.060	0.031	0.000
DEFL. DUE TO SUPERIMPOSED DL **	0.000	-0.019	-0.039	-0.058	-0.077	-0.095	-0.113	-0.131	-0.149	-0.164	-0.178	-0.192	-0.206	-0.215	-0.224	-0.233	-0.242	-0.246	-0.249	-0.252	-0.255	-0.252	-0.249	-0.246	-0.243	-0.233	-0.224	-0.215	-0.206	-0.192	-0.178	-0.164	-0.149	-0.131	-0.113	-0.095	-0.077	-0.058	-0.038	-0.019	0.000
FINAL CAMBER	0"	1/8"	1/4"	3/8"	7/16"	1/2"	1/2"	9/16"	9/16"	9/16"	5/8"	9/16"	9/16"	9/16"	5/8"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	5/8"	9/16"	9/16"	9/16"	5/8"	9/16"	9/16"	9/16"	1/2"	1/2"	7/16"	3/8"	1/4"	1/8"	0"

** INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

GIRDER(S) 2-4

	0.000	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.031	0.060	0.087	0.112	0.136	0.157	0.177	0.196	0.212	0.228	0.241	0.254	0.264	0.274	0.282	0.289	0.294	0.298	0.300	0.301	0.300	0.298	0.294	0.289	0.282	0.274	0.264	0.254	0.241	0.228	0.212	0.196	0.177	0.157	0.136	0.112	0.087	0.060	0.031	0.000
DEFL. DUE TO SUPERIMPOSED DL **	0.000	-0.022	-0.043	-0.065	-0.087	-0.107	-0.128	-0.148	-0.169	-0.185	-0.201	-0.217	-0.233	-0.243	-0.253	-0.264	-0.274	-0.277	-0.281	-0.284	-0.288	-0.284	-0.281	-0.277	-0.274	-0.264	-0.253	-0.243	-0.233	-0.217	-0.201	-0.184	-0.168	-0.148	-0.127	-0.107	-0.087	-0.065	-0.043	-0.022	0.000
FINAL CAMBER	0"	1/8"	3/16"	1/4"	5/16"	5/16"	3/8"	3/8"	5/16"	5/16"	5/16"	5/16"	1/4"	1/4"	1/4"	1/4"	3/16"	3/16"	3/16"	3/16"	1/8"	3/16"	3/16"	3/16"	3/16"	1/4"	1/4"	1/4"	1/4"	5/16"	5/16"	5/16"	5/16"	3/8"	3/8"	3/8"	5/16"	1/4"	3/16"	1/8"	0"

** INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

GIRDER 5

	0.000	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.031	0.060	0.087	0.112	0.136	0.157	0.177	0.196	0.212	0.228	0.241	0.254	0.264	0.274	0.282	0.289	0.294	0.298	0.300	0.301	0.300	0.298	0.294	0.289	0.282	0.274	0.264	0.254	0.241	0.228	0.212	0.196	0.177	0.157	0.136	0.112	0.087	0.060	0.031	0.000
DEFL. DUE TO SUPERIMPOSED DL **	0.000	-0.019	-0.039	-0.058	-0.078	-0.096	-0.114	-0.133	-0.151	-0.165	-0.180	-0.194	-0.209	-0.218	-0.227	-0.236	-0.245	-0.248	-0.251	-0.254	-0.258	-0.254	-0.251	-0.248	-0.245	-0.236	-0.227	-0.217	-0.208	-0.194	-0.179	-0.165	-0.150	-0.132	-0.114	-0.096	-0.077	-0.058	-0.039	-0.019	0.000
FINAL CAMBER	0"	1/8"	1/4"	3/8"	7/16"	1/2"	1/2"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	1/2"	9/16"	9/16"	9/16"	1/2"	9/16"	9/16"	9/16"	1/2"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	1/2"	1/2"	7/16"	3/8"	1/4"	1/8"	0"

** INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD.

SCHEMATIC CAMBER ORDINATES SPAN B

ALL VALUES ARE SHOWN IN DECIMALS OF A FOOT EXCEPT
"FINAL CAMBER" WHICH IS SHOWN IN INCHES.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS
SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-21
1			3			TOTAL SHEETS
2			4			36

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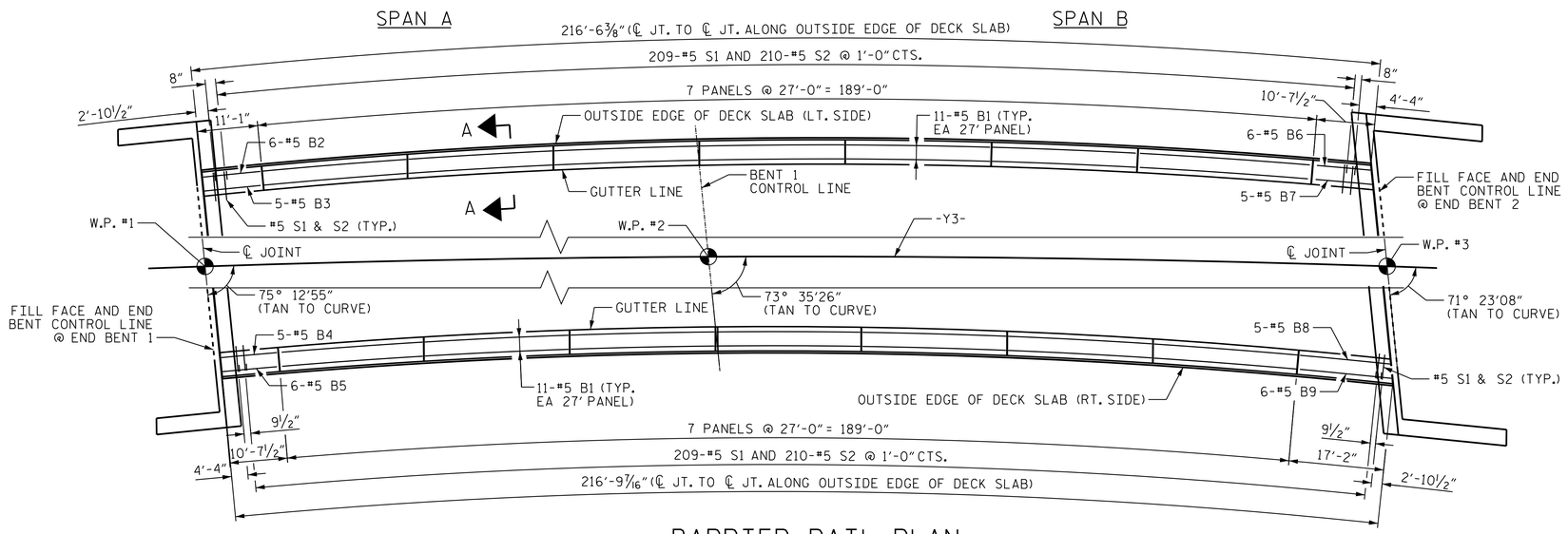
DRAWN BY : J. E. HAGENBUSH DATE : 05/03/23
CHECKED BY : V. E. FRAGA DATE : 05/04/23
DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



NOTES

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

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

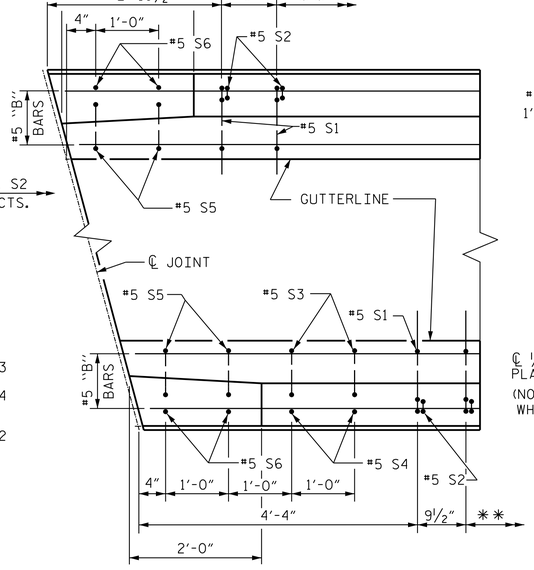
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

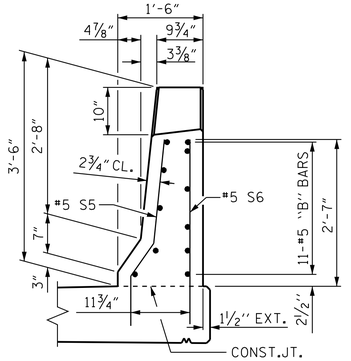
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS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

BARRIER RAIL PLAN

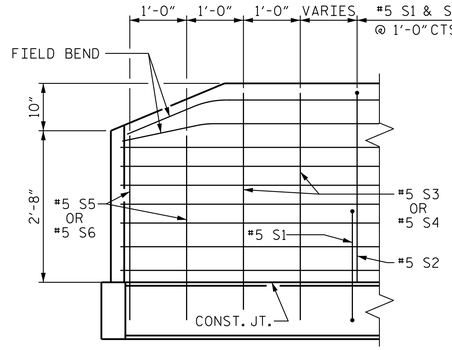
NOTE: ALL DIMENSIONS SHOWN ARE HORIZONTAL



PLAN



END VIEW



SIDE VIEW

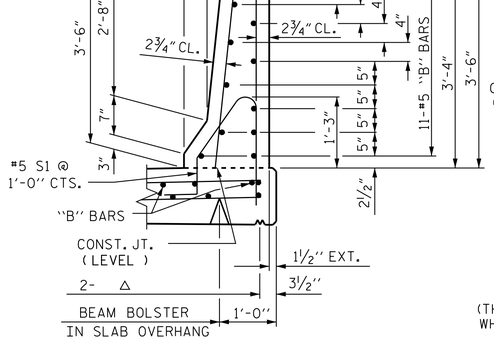
END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

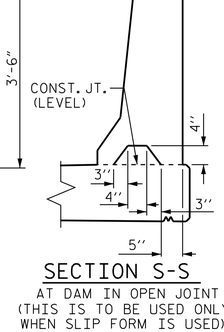
DETAIL @ END BENT

** #5 S1 & S2 @ 1'-0" CTS.

END BENT 1 SHOWN. END BENT 2 SIMILAR BY ROTATION.



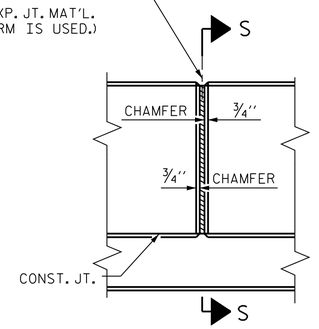
SECTION A-A



SECTION S-S

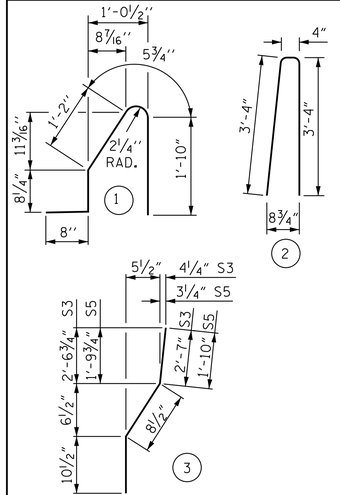
AT DAM IN OPEN JOINT (THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)

℄ 1/2" EXP.JT.MAT'L HELD IN PLACE WITH GALVANIZED NAILS.
(NOTE: OMIT EXP. JT. MAT'L. WHEN SLIP FORM IS USED.)



ELEVATION AT EXPANSION JOINTS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR BOTH CONCRETE BARRIER RAILS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	154	#5	STR	26'-7"	4,270
* B2	6	#5	STR	10'-7"	66
* B3	5	#5	STR	10'-3"	53
* B4	5	#5	STR	10'-3"	53
* B5	6	#5	STR	10'-1"	63
* B6	6	#5	STR	16'-0"	100
* B7	5	#5	STR	16'-4"	85
* B8	5	#5	STR	16'-8"	87
* B9	6	#5	STR	16'-11"	106
* S1	422	#5	1	4'-10"	2,127
* S2	422	#5	2	7'-0"	3,081
* S3	4	#5	3	4'-2"	17
* S4	4	#5	STR	4'-0"	17
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27

* EPOXY COATED REINFORCING STEEL	10,181 LBS.
CLASS AA CONCRETE	59.0 CU. YDS.
CONCRETE BARRIER RAIL	433.32 LIN. FT.

PROJECT NO. R-2707D

CLEVELAND COUNTY

STATION: 23+21.80 -Y3-

Stantec
Stantec Consulting Services Inc.
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www.stantec.com
License No. F-0672

DRAWN BY : J. B. GEILE DATE : 04/10/18
CHECKED BY : V. E. FRAGA DATE : 06/04/18
DESIGN ENGINEER OF RECORD: V. E. FRAGA DATE : 05/16/23

NORTH CAROLINA PROFESSIONAL SEAL 47083 ENGINEER VICTOR E. FRAGA
5/16/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-22
1			3			TOTAL SHEETS
2			4			36

BARRIER RAIL DETAILS