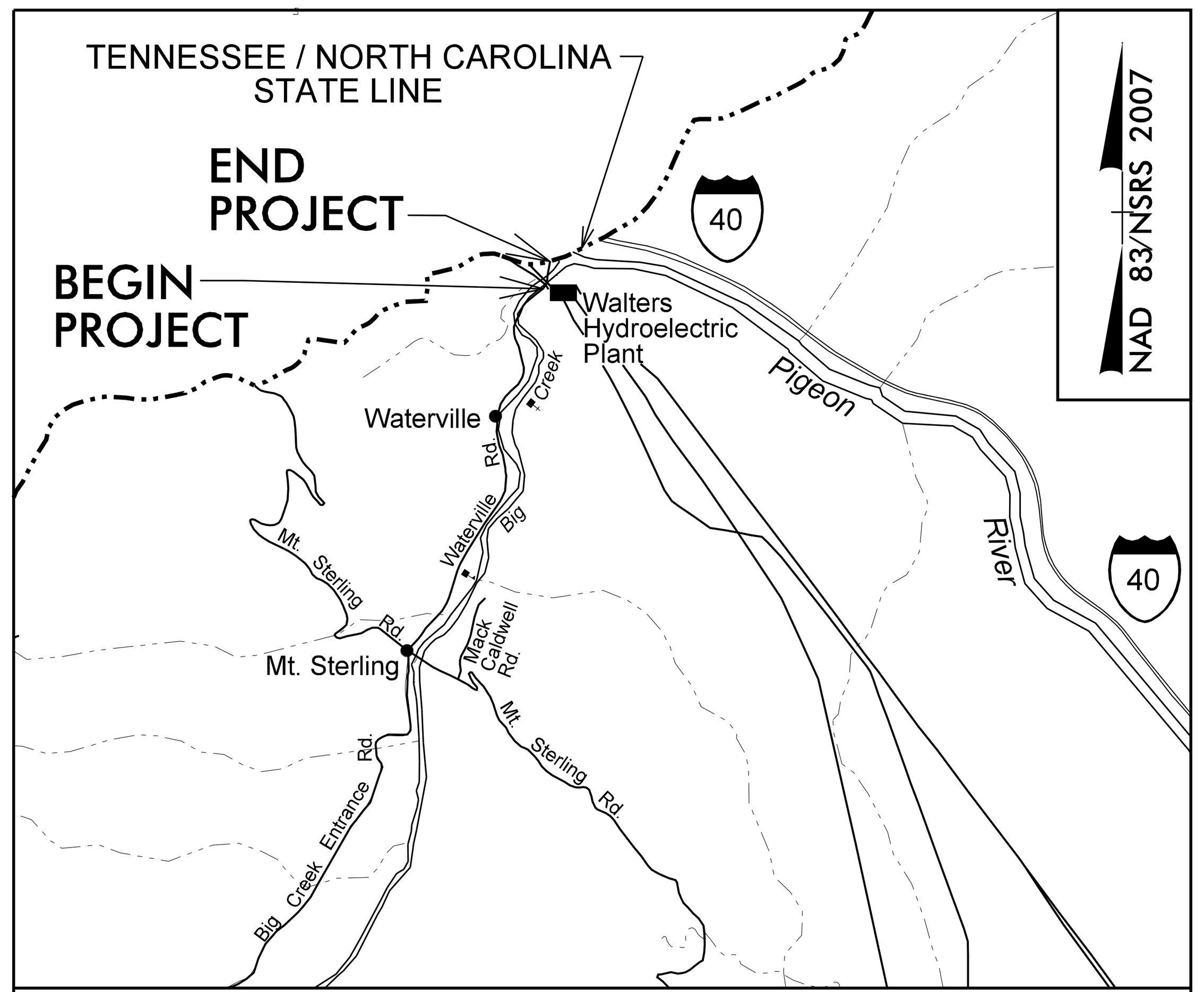
CONTRACT: C204411 PROJECT NO.: 14SP.20441.1 – 14SP.20441.2

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

HAYWOOD COUNTY

STATE	STATE PROJECT REFERENCE NO.		
N.C.	14SP.20441.1 14SP.20441.2		
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
14SP.20441.1	N/A	P.E.	
14SP.20441.1	N/A	R/W	
14SP.20441.1	N/A	CONST.	
14SP.20441.2	N/A	P.E.	
14SP.20441.2	N/A	R/W	
14SP.20441.2	N/A	CONST.	

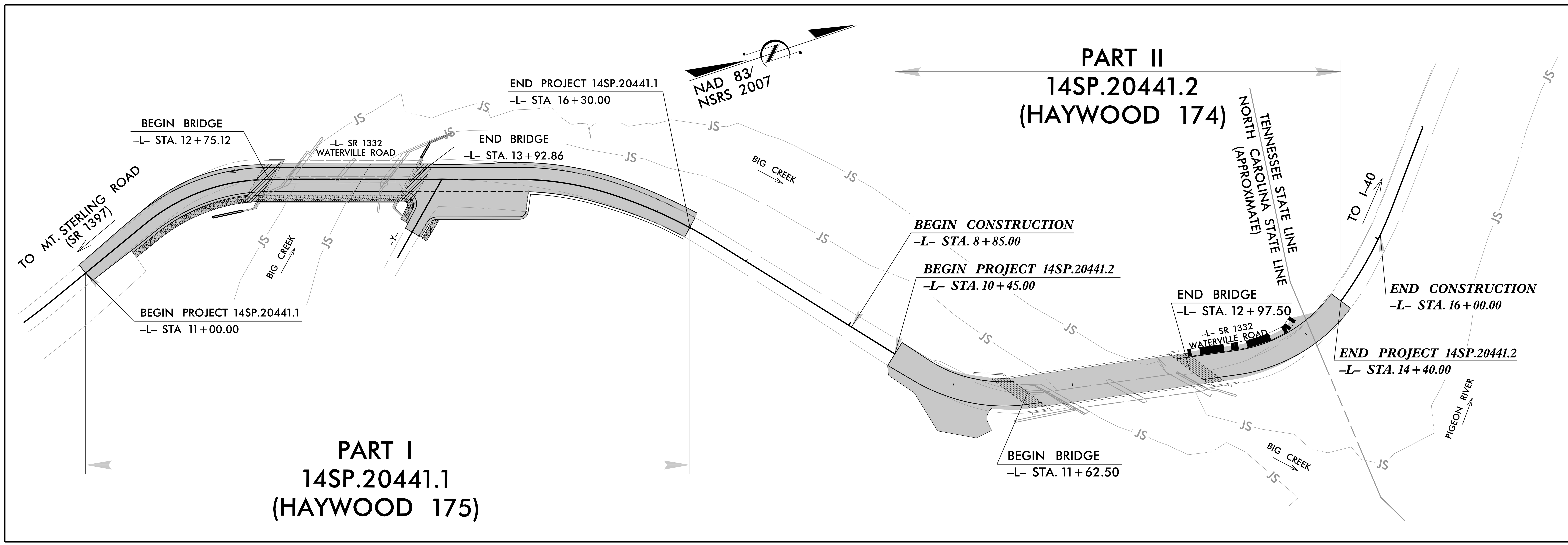


VICINITY MAP

LOCATION: BRIDGE NO. 430175 OVER BIG CREEK ON SR 1332 (WATERVILLE ROAD) AND BRIDGE NO. 430174 OVER BIG CREEK ON SR 1332 (WATERVILLE ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

STRUCTURES



PROJECT LENGTH

LENGTH ROADWAY PROJECT 14SP.20441.1 = 0.078 MI.
LENGTH STRUCTURE PROJECT 14SP.20441.1 = 0.022 MI.
TOTAL LENGTH OF PROJECT 14SP.20441.1 = 0.100 MI.

LENGTH ROADWAY PROJECT 14SP.20441.2 = 0.049 MI.
LENGTH STRUCTURE PROJECT 14SP.20441.2 = 0.026 MI.
TOTAL LENGTH OF PROJECT 14SP.20441.2 = 0.075 MI.

JMT Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

Prepared in the Office of:
VAUGHN & MELTON
1318-F PATTON AVE.
ASHEVILLE NC, 28806
FOR THE NORTH CAROLINA DIVISION OF HIGHWAYS

2024 STANDARD SPECIFICATIONS

LETTING DATE:
MAY 28, 2024

HARDY WILLIS, PE
PROJECT ENGINEER

CHRISTOPHER CORDELL, PE
PROJECT DESIGN ENGINEER

RYAN SHIPMAN, PE
PROJECT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL HARDY L. WILLIS
3/13/2024

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048056 RYAN TYLER SHIPMAN
3/6/2024

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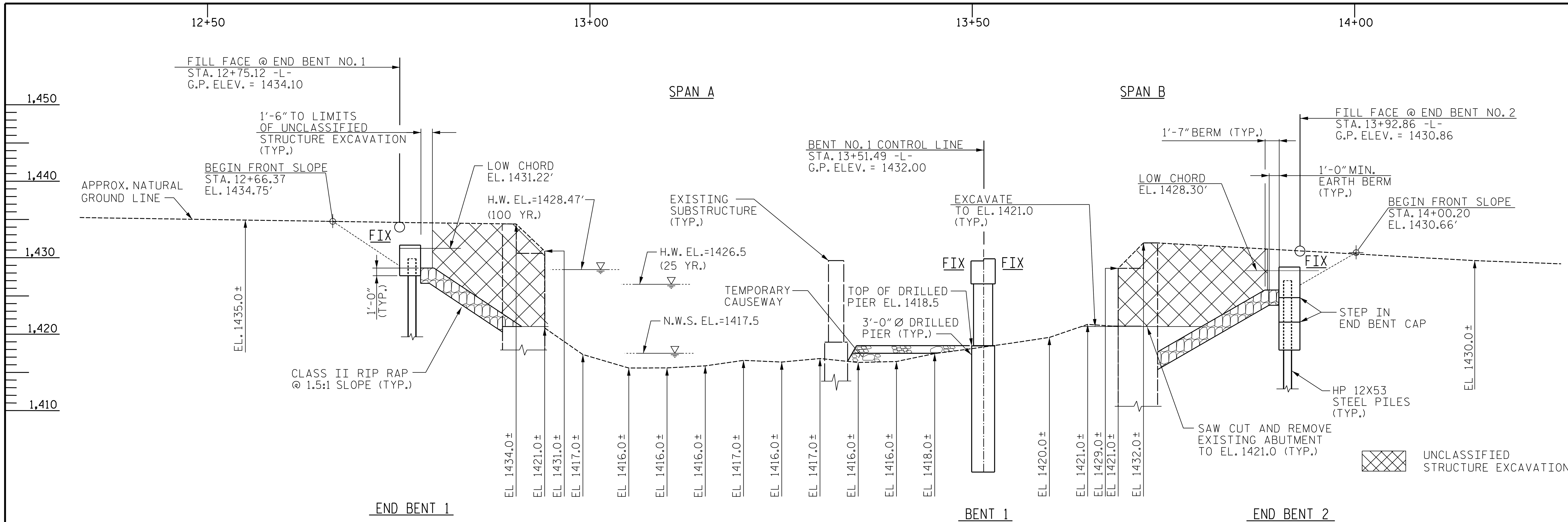
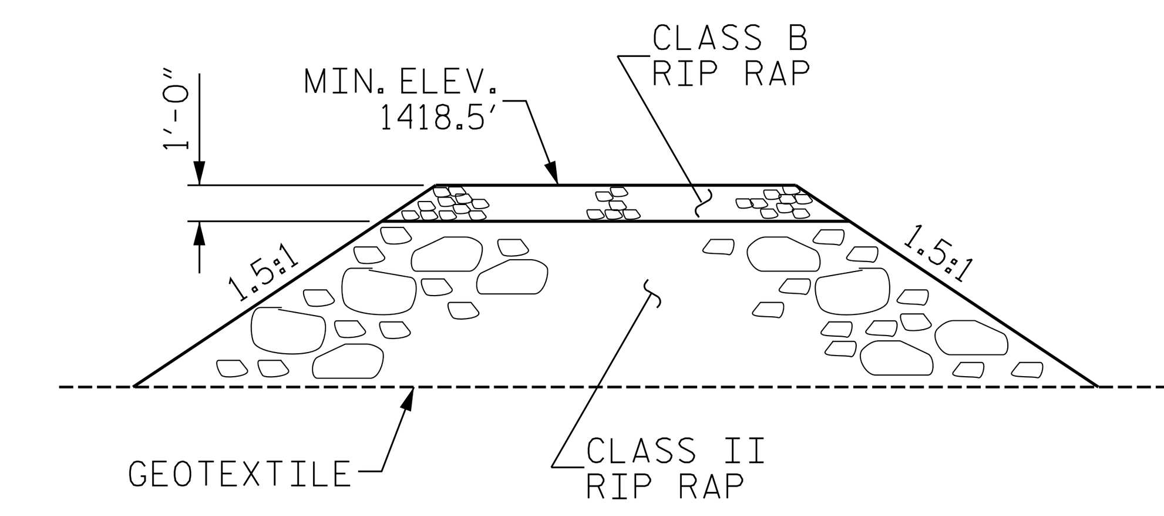
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION



SECTION ALONG ℄ SURVEY -L-

SECTIONS ALONG END BENTS AND BENT ARE AT RIGHT ANGLES.



TEMPORARY CAUSEWAY DETAIL

(-)3.3713%
(-)2.7500%
(-)3.4500%

PI = 11+15.00
EL = 1,438.50'
VC = 30'

PI = 14+30.00
EL = 1,429.84'
VC = 50'

VERTICAL GRADE DATA -L-

PI Sta 12+21.55
Δ = 39° 25' 46.1" (RT)
D = 35° 48' 35.5"
L = 110.11'
T = 57.33'
R = 160.00'

HORIZONTAL CURVE DATA -L-

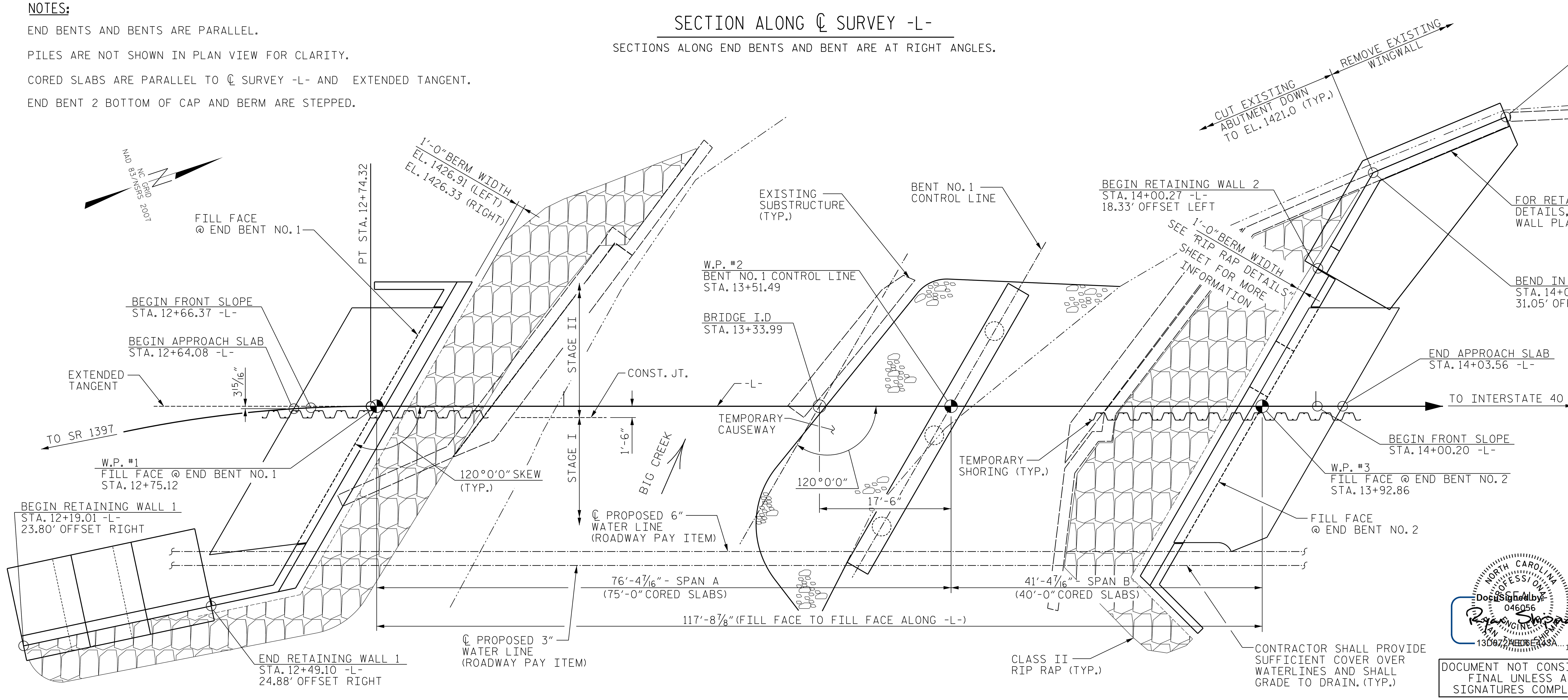
NOTES:

END BENTS AND BENTS ARE PARALLEL.

PILES ARE NOT SHOWN IN PLAN VIEW FOR CLARITY.

CORED SLABS ARE PARALLEL TO ℄ SURVEY -L- AND EXTENDED TANGENT.

END BENT 2 BOTTOM OF CAP AND BERM ARE STEPPED.



PLAN ALONG ℄ SURVEY -L-

SEE RETAINING WALL #1 PLANS

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

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

SHEET 1 OF 3 REPLACES BRIDGE 430175

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1332 (WATERVILLE ROAD) OVER BIG CREEK BETWEEN SR 1397 AND INTERSTATE 40

NORTH CAROLINA PROFESSIONAL ENGINEER 046056 — DocuSigned by: 13D67A4E68E943A — 12/15/2023

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1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

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CHKD. BY: HLW	DATE: 02/18
DES. EGR. OF RECORD: RTS	DATE: 02/18

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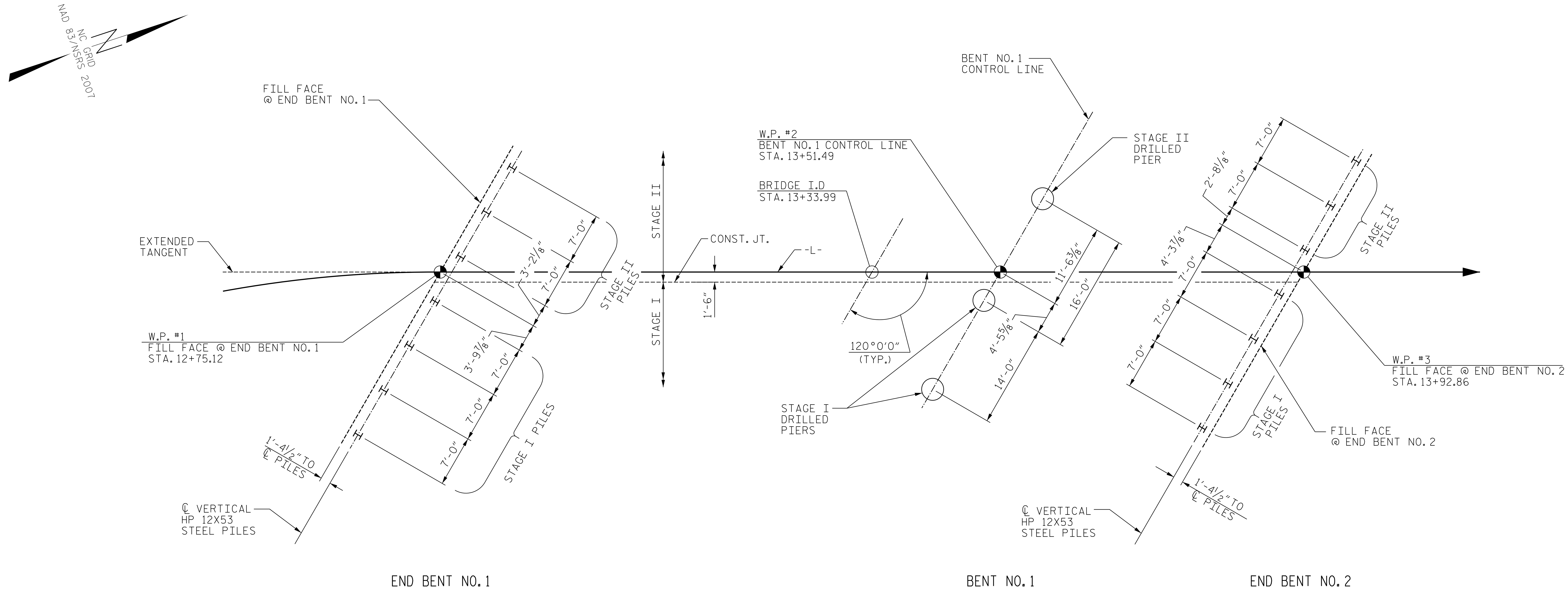
2			4		

SHEET NO. S1-1
TOTAL SHEETS 40



FOUNDATION LAYOUT

LEGEND	
(pile symbol)	HP 12X53 VERTICAL STEEL PILES
(circle symbol)	3'-0" Ø CONC. DRILLED PIER

FOUNDATION RECOMMENDATION NOTES:

FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.

DRIVE PLIES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

DRILLED-IN PLIES ARE REQUIRED FOR END BENT NO. 1. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 1,411.5 FT. FILL THE HOLES FOR PILE EXCAVATION WITH CLASS II OR III SELECT MATERIALS THAT MEET SECTION 1016 OF THE STANDARD SPECIFICATIONS. FOR PILE EXCAVATION, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.

DRIVE PLIES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 105 TONS PER PILE.

DRILLED-IN PILES ARE REQUIRED FOR END BENT NO. 2. EXCAVATE HOLES AT END BENT NO. 2 PILE LOCATIONS TO ELEVATION 1,409 FT. FILL THE BOTTOM 3 FT. OF HOLES FOR PILE EXCAVATIONS WITH CONCRETE OR GROUT AND THE REST OF THE HOLES WITH CLASS II OR III SELECT MATERIALS THAT MEET SECTION 1016 OF THE STANDARD SPECIFICATIONS. FOR PILE EXCAVATION, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

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

DRILLED PIERS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 355 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 5 TSF.

INSTALL DRILLED PIERS AT BENT NO. 1 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 1,401.4 FT AND WITH THE REQUIRED TIP RESISTANCE AND PENETRATION OF AT LEAST 7 FT. INTO ROCK AS DEFINED BY ARTICLE 411 OF THE STANDARD SPECIFICATIONS.

CSL TUBES AND TESTING ARE REQUIRED FOR DRILLED PIERS AT BENT NO. 1. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 IS ELEVATION 1,407.0 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056
DocuSigned by:
12/15/2023

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PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-
SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FOUNDATION LAYOUT

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1318-F Patton Ave.
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CHKD. BY: HLW	DATE: 02/18
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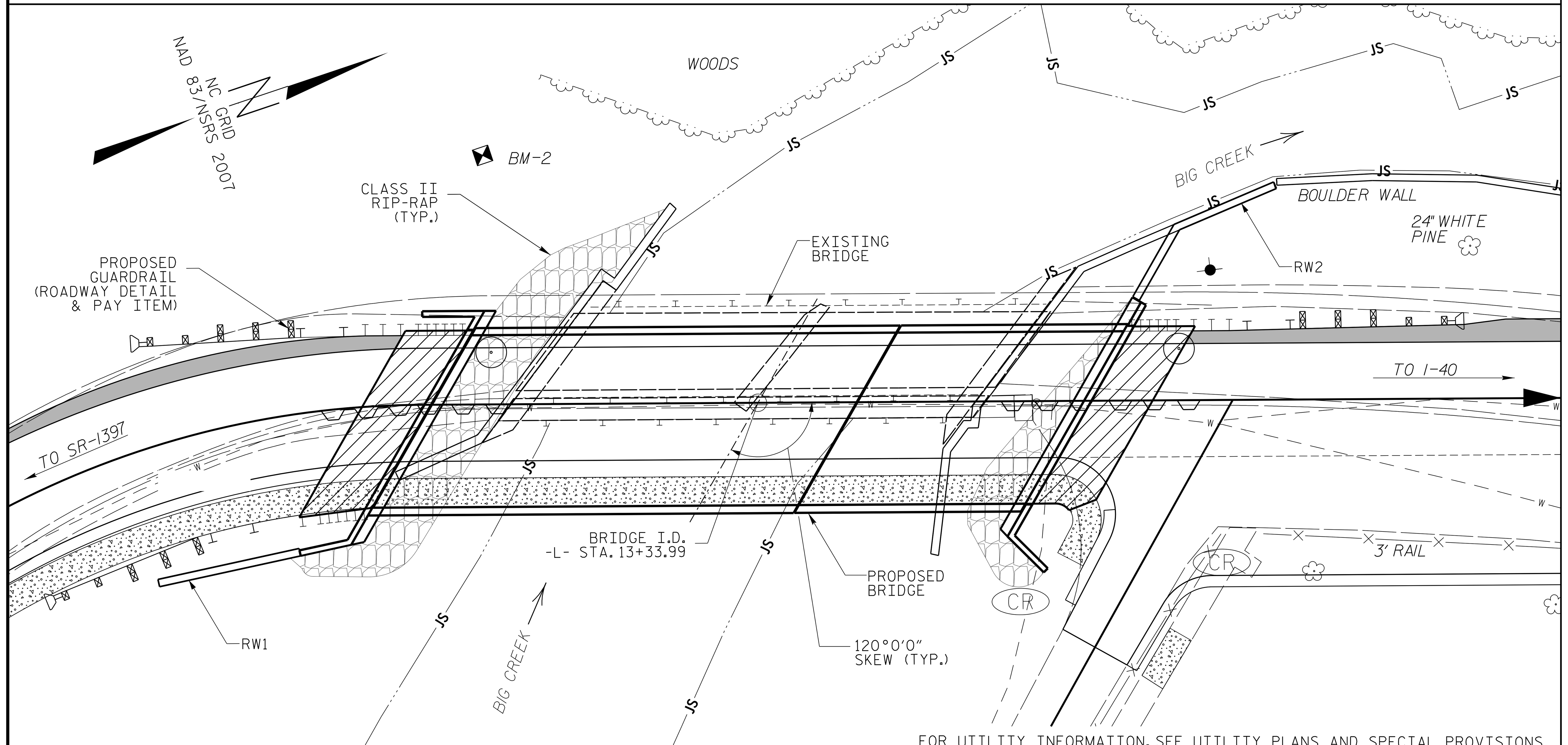
1			3		
2			4		

SHEET NO. S1-2
TOTAL SHEETS 40

BM #2 - STA 12+85.65 -L- , 44.00 LT., ELEV. 1436.84, RAILROAD SPIKE IN 36" SYCAMORE.



LOCATION SKETCH

GENERAL 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 EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE EXISTING STRUCTURE, CONSISTING OF TWO 42.33 FOOT LONG SPANS WITH TIMBER DECK ON CONTINUOUS THRU STEEL PLATE GIRDERS, 14.33 FT. WIDE, ON REINFORCED CONCRETE ABUTMENTS AND STEEL BENT, AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

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

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

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.

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

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 25 FT. EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRANSPORTATION MANAGEMENT PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFIC, SEE ROADWAY PLANS.

FOR WATER LINE HANGERS, SEE SPECIAL PROVISIONS.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 13+33.99 -L-."

FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

AT THE CONTARCTOR'S OPTION, AND UPON REMOVAL OF THE CAUSEWAY, THE CLASS II RIP RAP MAY BE PLACED AS RIP RAP SLOPE PROTECTION. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENACE, AND REMOVAL OF TEMPORARY ACCESS AT STATION 13+33.99 -L-.

HYDRAULIC DATA

DESIGN DISCHARGE	= 5300	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 1426.5	FT
BASE DISCHARGE	= 7000	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 1428.47	FT

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 8000	CFS
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING ELEVATION	= 1430.1	FT
DRAINAGE AREA	= 36.1	SQ. MI.

TOTAL BILL OF MATERIAL

	CONST. MAINT. & REMOVAL OF TEMP. ACCESS	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	PILE EXCAVATION IN SOIL	PILE EXCAVATION NOT IN SOIL	3'-0" Ø DRILLED PIERS IN SOIL	3'-0" Ø DRILLED PIERS NOT IN SOIL	CSL TESTING	SID INSPECTIONS	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS AA CONCRETE	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL
	LUMP SUM	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	EACH	EACH	LUMP SUM	CU. YARDS	CU. YARDS	LUMP SUM	LBS.	LBS.	LBS.
SUPERSTRUCTURE			LUMP SUM								20.8		LUMP SUM		870	
END BENT 1				35	45					LUMP SUM		25.9		3,107		
BENT 1						28.5	22	1	1			20.1		8,729		1301
END BENT 2				0	90					LUMP SUM		33.2		4,781		
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	35	135	28.5	22	1	1	LUMP SUM	20.8	79.2	LUMP SUM	16,617	870	1301

TOTAL BILL OF MATERIAL (CONT.)

	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		ANODIZED TWO BAR METAL RAIL	1'-2" X 2'-9½" CONCRETE PARAPET	1'-2" X 3'-6½" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 1'-9" PRESTRESSED CONCRETE CORED SLABS		3'-0" x 2'-0" PRESTRESSED CONCRETE CORED SLABS		WATER LINE HANGERS
	EACH	NO.	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	TONS	SQ. YARDS	LUMP SUM	NO.	LIN. FT.	NO.	LIN. FT.	LUMP SUM
SUPERSTRUCTURE				214.0	106.83	106.83			LUMP SUM	11	440.0	11	825.0	LUMP SUM
END BENT 1	7	7	154.0				92	102						
BENT 1														
END BENT 2	7	7	125.0				74	82						
TOTAL	14	14	279.0	214.0	106.83	106.83	166	184	LUMP SUM	11	440.0	11	825.0	LUMP SUM

NORTH CAROLINA PROFESSIONAL SEAL 046056 ENGINEER
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12/15/2023

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Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
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CHKD. BY: HLW DATE: 02/18
DES. EGR. OF RECORD: RTS DATE: 02/18

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1332 (WATERVILLE ROAD) OVER BIG CREEK BETWEEN SR 1397 AND INTERSTATE 40

REVISIONS							
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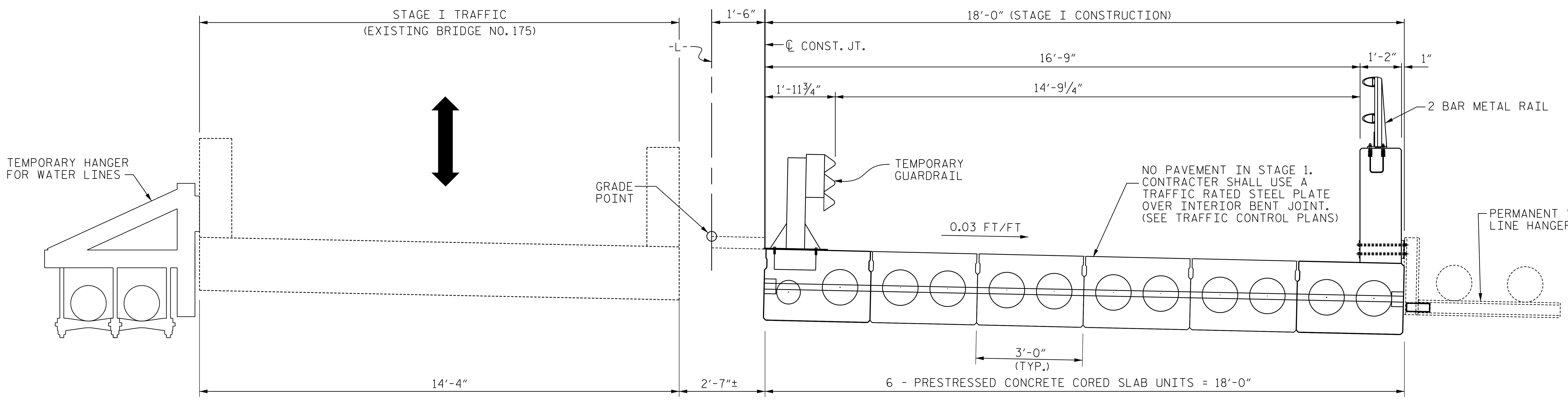
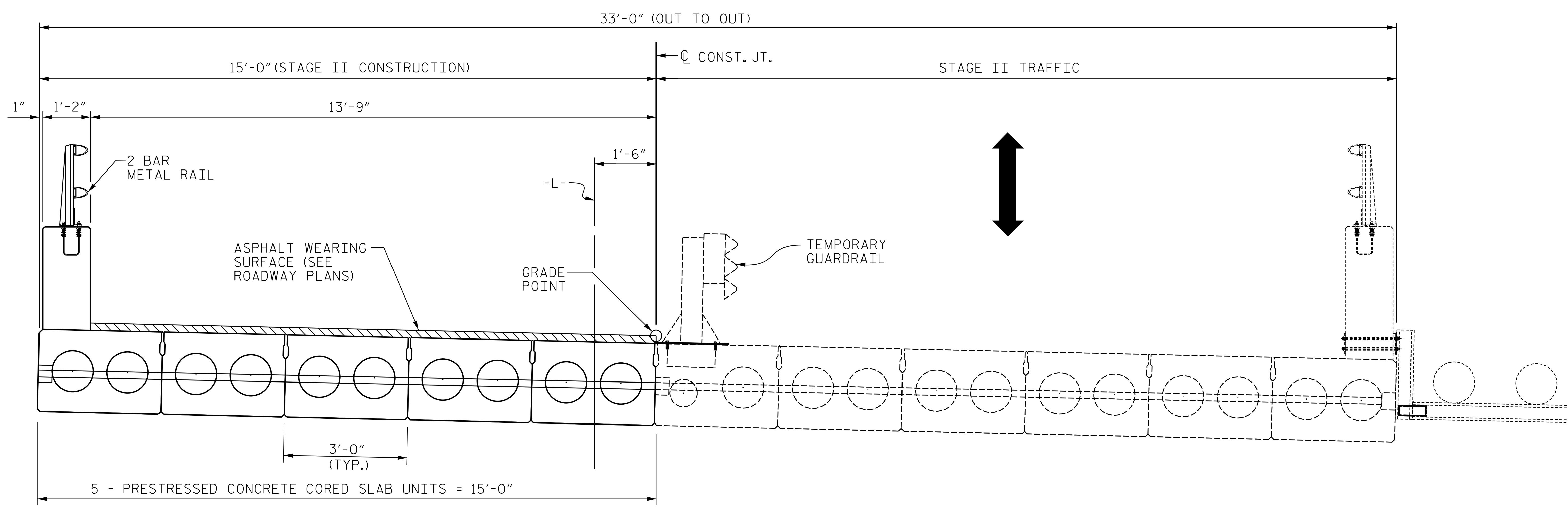
SHEET NO. S1-3

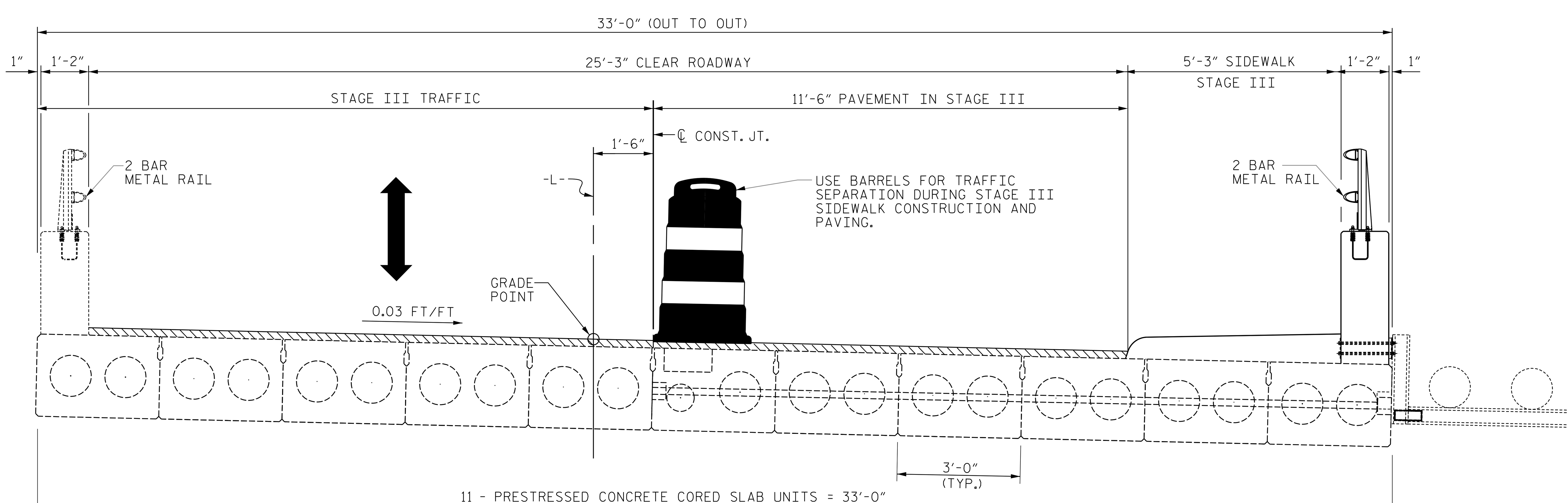
TOTAL SHEETS 40



STAGE I



STAGE II



STAGE III

STAGING SEQUENCE

NOTES:

FOR TEMPORARY GUARDRAIL DETAILS, SEE "ANCHORAGE DETAILS FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY FOR TYPE IV CORED SLAB UNIT" SHEET.

FOR PHASING OF TRAFFIC AND OTHER DETAILS, SEE TRAFFIC MANAGEMENT PLANS.

CONTRACTOR IS RESPONSIBLE FOR TEMPORARY GUARDRAILS. SUBMIT TO THE ENGINEER FOR APPROVAL.

CONTRACTOR IS RESPONSIBLE FOR TRAFFIC RATED STEEL PLATE, SUBMIT TO ENGINEER FOR APPROVAL.

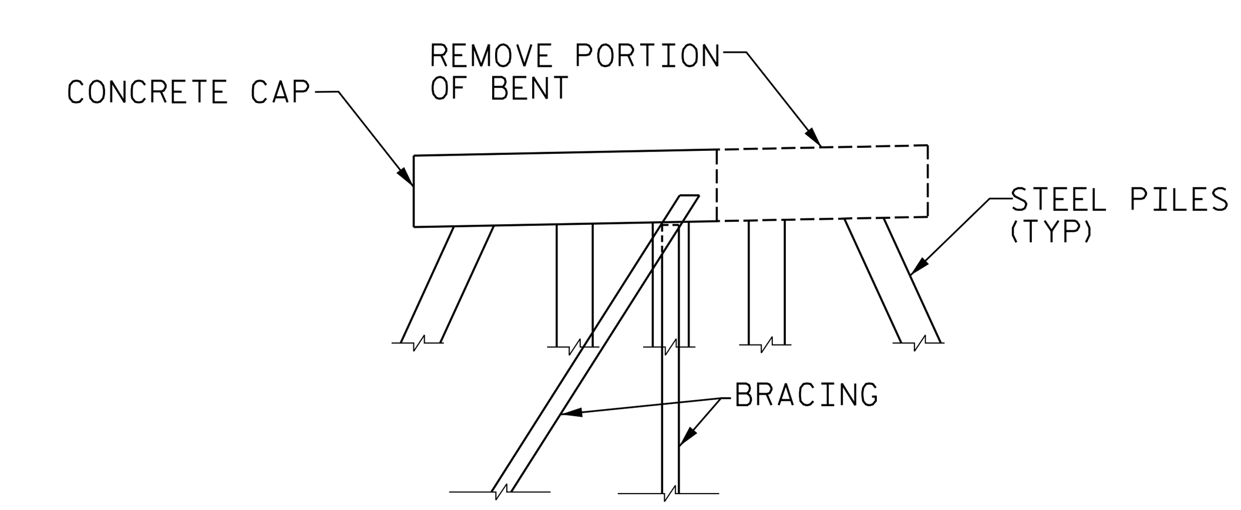
CONTRACTOR SHALL NOT CUT ANY PORTION OF THE EXISTING SUPERSTRUCTURE EXCEPT THE SIDEWALK AND/OR SIDEWALK BRACKETS DURING STAGE I.

CONTRACTOR SHALL PROVIDE A TEMPORARY HANGER SYSTEM FOR WATER LINE ON LEFT SIDE OF THE EXISTING BRIDGE DURING STAGE I.

CONTRACTOR SHALL SUBMIT TEMPORARY HANGER PLANS TO THE ENGINEER FOR APPROVAL.

STAGING SEQUENCE

1. INSTALL THE TEMPORARY HANGER ASSEMBLY FOR TEMPORARY WATER LINE.
2. INSTALL TEMPORARY WATER LINE.
3. SAW CUT AND REMOVE EXISTING SIDEWALK HANGERS ON RIGHT SIDE
4. CONSTRUCT STAGE I OF PROPOSED BRIDGE.
5. INSTALL PERMANENT HANGER ASSEMBLY FOR WATER LINE.
6. INSTALL PERMANENT WATER LINE.
7. SHIFT TRAFFIC TO STAGE I OF PROPOSED BRIDGE.
8. REMOVE REMAINING PORTION OF EXISTING BRIDGE.
9. CONSTRUCT STAGE II OF PROPOSED BRIDGE.
10. SHIFT TRAFFIC TO STAGE II OF PROPOSED BRIDGE.
11. CONSTRUCT STAGE III OF PROPOSED BRIDGE.
12. OPEN PROPOSED BRIDGE FOR TRAFFIC.



EXISTING INTERIOR BENT DETAIL

AFTER CUTTING AND REMOVING THE RIGHT HAND PORTION OF THE EXISTING INTERIOR BENT FOR STAGE I CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE ADEQUATE SHORING TO STABILIZE THE REMAINING BENT. PROVIDE BRACING PLANS AND LOAD STUDIES TO THE ENGINEER FOR APPROVAL BEFORE CUTTING.

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

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SHEET NO. S1-4
TOTAL SHEETS 40

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
							LIVELOAD FACTORS	MOMENT					SHEAR					LIVELOAD FACTORS	MOMENT					
								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)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	**1.16**	--	1.75	0.253	1.25	75′	E	37.00	0.657	1.70	75′	E	1.77	0.80	0.253	**1.16**	75′	E	**37.00**	
		HL-93(Opr)	N/A	--	1.62	--	1.35	0.253	1.62	75′	E	37.00	0.657	2.21	75′	E	1.77	N/A	--	--	--	--	--	
		HS-20(Inv)	36.00	2	**1.52**	54.707	1.75	0.253	1.64	75′	E	37.00	0.657	2.03	75′	E	1.77	0.80	0.253	**1.52**	75′	E	**37.00**	
		HS-20(Opr)	36.00	--	2.13	76.537	1.35	0.253	2.13	75′	E	37.00	0.657	2.63	75′	E	1.77	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.50	--	3.44	46.485	1.40	0.253	4.65	75′	E	37.00	0.657	4.60	75′	E	1.77	0.80	0.253	3.44	75′	E	37.00	
	SV	SNGARBS2	20.00	--	2.56	51.219	1.40	0.253	3.46	75′	E	37.00	0.657	3.56	75′	E	1.77	0.80	0.253	2.56	75′	E	37.00	
	SV	SNAGRIS2	22.00	--	2.42	53.297	1.40	0.253	3.27	75′	E	37.00	0.657	3.38	75′	E	1.77	0.80	0.253	2.42	75′	E	37.00	
	SV	SNCOTTS3	27.25	--	1.71	46.654	1.40	0.253	2.31	75′	E	37.00	0.657	2.83	75′	E	1.77	0.80	0.253	1.71	75′	E	37.00	
	SV	SNAGGRS4	34.93	--	1.43	49.898	1.40	0.253	1.93	75′	E	37.00	0.657	2.52	75′	E	1.77	0.80	0.253	1.43	75′	E	37.00	
	SV	SNS5A	35.55	--	1.40	49.671	1.40	0.253	1.89	75′	E	37.00	0.657	2.53	75′	E	1.77	0.80	0.253	1.40	75′	E	37.00	
	SV	SNS6A	39.95	--	1.29	51.550	1.40	0.253	1.74	75′	E	37.00	0.657	2.41	75′	E	1.77	0.80	0.253	1.29	75′	E	37.00	
	SV	SNS7B	42.00	--	1.22	51.246	1.40	0.253	1.65	75′	E	37.00	0.657	2.35	75′	E	1.77	0.80	0.253	1.22	75′	E	37.00	
	TTST	TNAGRIT3	33.00	--	1.56	51.554	1.40	0.253	2.11	75′	E	37.00	0.657	2.65	75′	E	1.77	0.80	0.253	1.56	75′	E	37.00	
	TTST	TNT4A	33.08	--	1.57	51.891	1.40	0.253	2.12	75′	E	37.00	0.657	2.62	75′	E	1.77	0.80	0.253	1.57	75′	E	37.00	
	TTST	TNT6A	41.60	--	1.28	53.342	1.40	0.253	1.73	75′	E	37.00	0.657	2.45	75′	E	1.77	0.80	0.253	1.28	75′	E	37.00	
	TTST	TNT7A	42.00	--	1.29	54.119	1.40	0.253	1.74	75′	E	37.00	0.657	2.42	75′	E	1.77	0.80	0.253	1.29	75′	E	37.00	
	TTST	TNT7B	42.00	--	1.33	55.921	1.40	0.253	1.80	75′	E	37.00	0.657	2.31	75′	E	1.77	0.80	0.253	1.33	75′	E	37.00	
	TTST	TNAGRIT4	43.00	--	1.27	54.491	1.40	0.253	1.71	75′	E	37.00	0.657	2.25	75′	E	1.77	0.80	0.253	1.27	75′	E	37.00	
	TTST	TNAGT5A	45.00	--	1.20	53.800	1.40	0.253	1.61	75′	E	37.00	0.657	2.24	75′	E	1.77	0.80	0.253	1.20	75′	E	37.00	
	TTST	TNAGT5B	45.00	3	**1.18**	53.143	1.40	0.253	1.60	75′	E	37.00	0.657	2.17	75′	E	1.77	0.80	0.253	**1.18**	75′	E	**37.00**	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.81	52.038	1.30	0.253	2.63	75'	E	37.00	0.657	2.73	75'	E	1.77	0.80	0.253	1.81	75'	E	37.00	
		EV3	43.000	4	1.18	50.74	1.30	0.253	1.72	75'	E	37.00	0.657	2.34	75'	E	1.77	0.80	0.253	1.18	75'	E	37.00	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

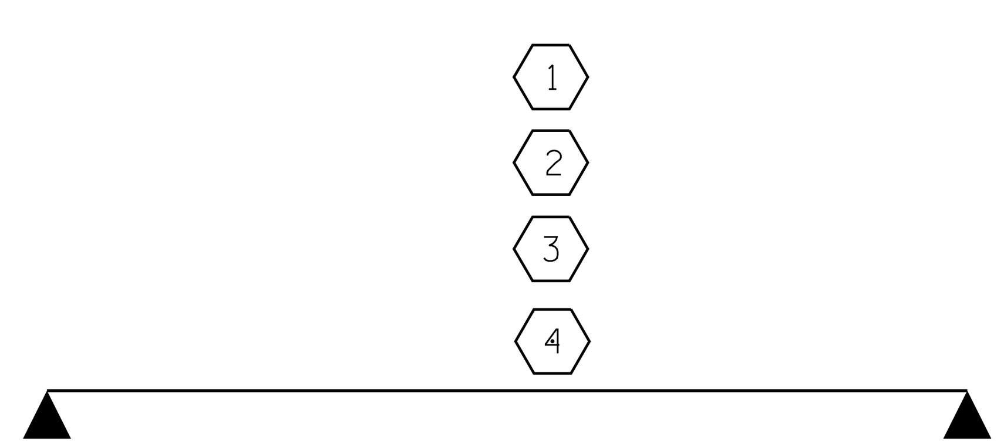
CONTROLLING LOAD RATING

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

✱✱ SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR GIRDER



LRFR SUMMARY
FOR SPAN 'A'

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

DocuSigned by: 046056 12/15/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC. 28806
License No: C-3097

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR 75′ CORED SLAB UNIT 120° SKEW (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-5
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : HLW DATE : 02/18

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

REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM
REV. 04/23 BNB/AAI

STD. NO. LRFR1

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						
							LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	--	1	**1.46**	--	1.75	0.256	1.82	40′	E	19.5	0.651	**1.46**	40′	E	**1.77**	0.80	0.256	1.67	40′	E	19.5	
		HL-93(Opr)	--	--	1.89	--	1.35	0.256	2.36	40′	E	19.5	0.651	1.89	40′	E	1.77	N/A	--	--	--	--	--	
		HS-20(Inv)	36.00	2	**1.57**	56.464	1.75	0.256	2.28	40′	E	19.5	0.651	**1.57**	40′	E	**1.77**	0.80	0.256	2.09	40′	E	19.5	
		HS-20(Opr)	36.00	--	2.03	73.193	1.35	0.256	2.95	40′	E	19.5	0.651	2.03	40′	E	1.77	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.50	--	3.31	44.733	1.40	0.256	5.25	40′	E	19.5	0.651	3.31	40′	E	1.77	0.80	0.256	3.86	40′	E	19.5	
		SNGARBS2	20.00	--	2.74	54.873	1.40	0.256	4.40	40′	E	19.5	0.651	2.74	40′	E	1.77	0.80	0.256	3.21	40′	E	19.5	
		SNAGRIS2	22.00	--	2.65	58.251	1.40	0.256	4.36	40′	E	19.5	0.651	2.65	40′	E	1.77	0.80	0.256	3.21	40′	E	19.5	
		SNCOTTS3	27.25	--	1.93	52.655	1.40	0.256	2.64	40′	E	19.5	0.651	2.05	40′	E	1.77	0.80	0.256	1.93	40′	E	19.5	
		SNAGGRS4	34.93	--	1.74	60.737	1.40	0.256	2.37	40′	E	19.5	0.651	1.91	40′	E	1.77	0.80	0.256	1.74	40′	E	19.5	
		SNS5A	35.55	--	1.69	60.169	1.40	0.256	2.30	40′	E	19.5	0.651	1.94	40′	E	1.77	0.80	0.256	1.69	40′	E	19.5	
		SNS6A	39.95	--	1.62	64.704	1.40	0.256	2.21	40′	E	19.5	0.651	1.89	40′	E	1.77	0.80	0.256	1.62	40′	E	19.5	
		SNS7B	42.00	3	**1.54**	64.495	1.40	0.256	2.09	40′	E	19.5	0.651	1.90	40′	E	1.77	0.80	0.256	**1.54**	40′	E	**19.5**	
	TTST	TNAGRIT3	33.00	--	1.98	65.308	1.40	0.256	2.69	40′	E	19.5	0.651	2.05	40′	E	1.77	0.80	0.256	1.98	40′	E	19.5	
		TNT4A	33.08	--	1.99	65.703	1.40	0.256	2.73	40′	E	19.5	0.651	1.99	40′	E	1.77	0.80	0.256	2.00	40′	E	19.5	
		TNT6A	41.60	--	1.70	70.753	1.40	0.256	2.31	40′	E	19.5	0.651	1.96	40′	E	1.77	0.80	0.256	1.70	40′	E	19.5	
		TNT7A	42.00	--	1.74	73.224	1.40	0.256	2.38	40′	E	19.5	0.651	1.89	40′	E	1.77	0.80	0.256	1.74	40′	E	19.5	
		TNT7B	42.00	--	1.78	74.913	1.40	0.256	2.44	40′	E	19.5	0.651	1.86	40′	E	1.77	0.80	0.256	1.78	40′	E	19.5	
		TNAGRIT4	43.00	--	1.73	74.593	1.40	0.256	2.37	40′	E	19.5	0.651	1.82	40′	E	1.77	0.80	0.256	1.73	40′	E	19.5	
		TNAGT5A	45.00	--	1.60	72.210	1.40	0.256	2.19	40′	E	19.5	0.651	1.85	40′	E	1.77	0.80	0.256	1.60	40′	E	19.5	
		TNAGT5B	45.00	--	1.56	70.186	1.40	0.256	2.13	40′	E	19.5	0.651	1.78	40′	E	1.77	0.80	0.256	1.56	40′	E	19.5	
EMERGENCY VEHICLE (EV)		EV2	28.75		2.29	65.838	1.30	0.256	3.39	40′	E	19.5	0.651	2.29	40′	E	1.77	0.80	0.256	2.32	40′	E	19.5	
		EV3	43.00	4	**1.48**	63.64	1.30	0.256	2.17	40′	E	19.5	0.651	1.89	40′	E	1.77	0.80	0.256	**1.48**	40′	E	19.5	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

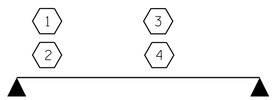
(#) CONTROLLING LOAD RATING

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

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR GIRDER



LRFR SUMMARY
FOR SPAN 'B'

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046956 RYAN SKIPPER
Digitally signed by Ryan Skipper
12/15/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC. 28806
License No: C-3097

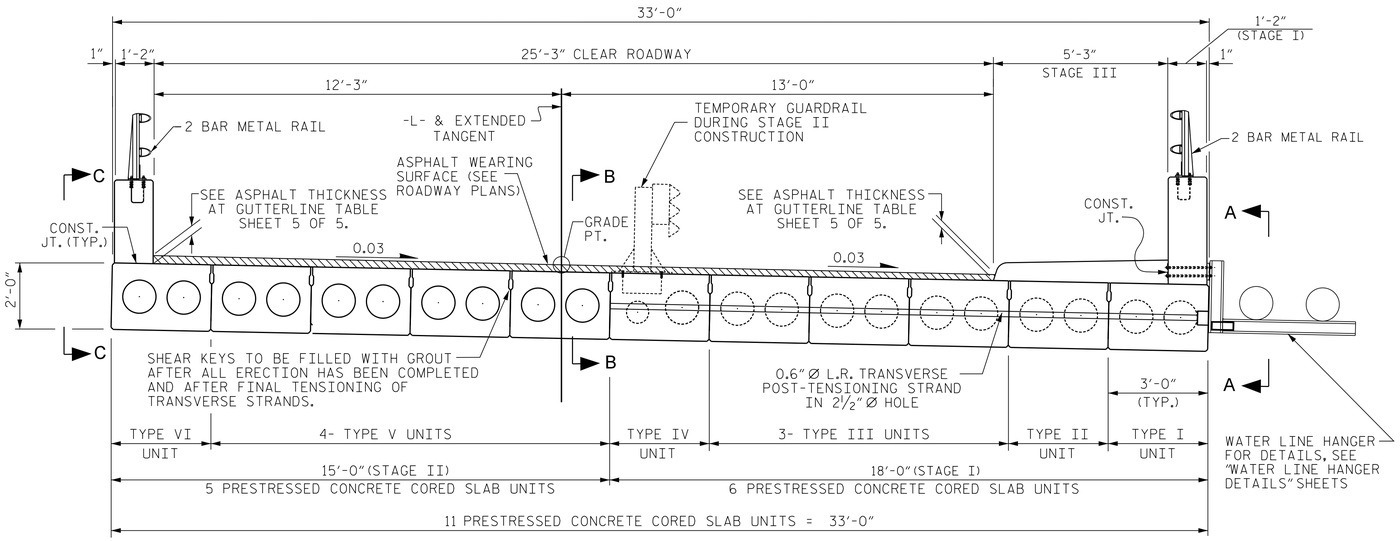
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR 40′ CORED SLAB UNIT 120° SKEW
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-6
1			3			TOTAL SHEETS
2			4			40

STD. NO. LRFR1

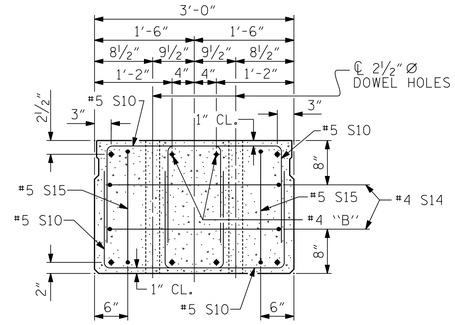
ASSEMBLED BY : AW		DATE : 02/18	
CHECKED BY : HLW		DATE : 02/18	
DRAWN BY : MAA 1/08	REV. 11/12/08RR		MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11		MAA/GM
	REV. 04/23		BNB/AAI



HALF SECTION
THROUGH VOIDS

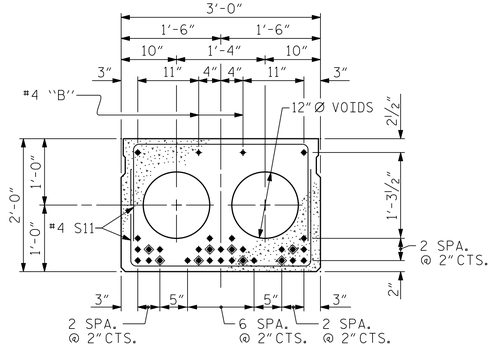
TYPICAL SECTION

HALF SECTION
AT INTERMEDIATE DIAPHRAGMS



END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.



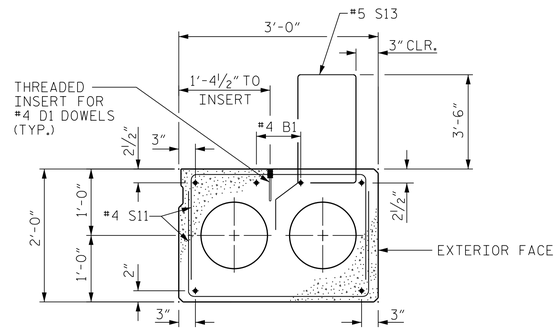
INTERIOR SLAB SECTION (75' UNIT)

TYPE III & V (30 STRANDS REQUIRED)

0.6'' Ø LOW RELAXATION STRAND LAYOUT

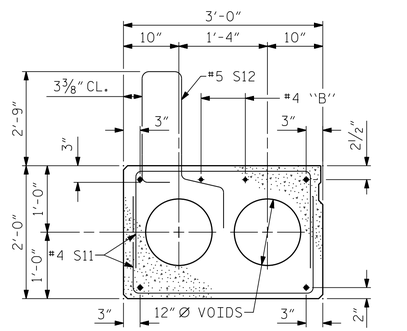
◈ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 12'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND



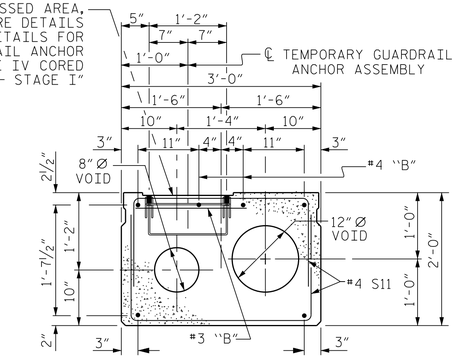
EXTERIOR SLAB SIDEWALK SECTION

TYPE I
(FOR PRESTRESSED STRAND LAYOUT, SEE "INTERIOR SLAB SECTION".)



EXTERIOR SLAB SECTION

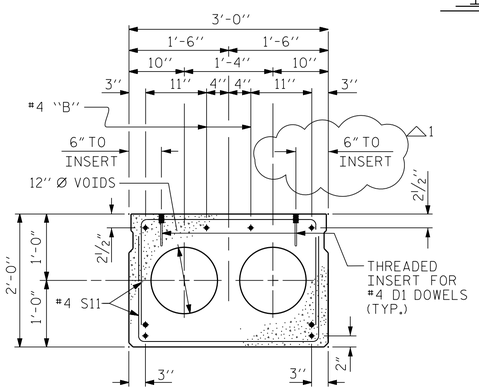
TYPE VI
(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)



INTERIOR SLAB SECTION

TYPE IV
(FOR PRESTRESSED STRAND LAYOUT, SEE "INTERIOR SLAB SECTION"

FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY LOCATION, SEE SECTION OF ANCHOR ASSEMBLY LOCATION ON "ANCHORAGE DETAILS FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY FOR TYPE IV CORED SLAB UNIT" SHEET.



INTERIOR SLAB SIDEWALK SECTION

TYPE II
(FOR PRESTRESSED STRAND LAYOUT, SEE "INTERIOR SLAB SECTION".)

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0'' X 2'-0'' PRESTRESSED CONCRETE CORED SLAB UNIT

120° SKEW SPAN 'A'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 RYAN TYLER SHIPMAN
5/8/2024

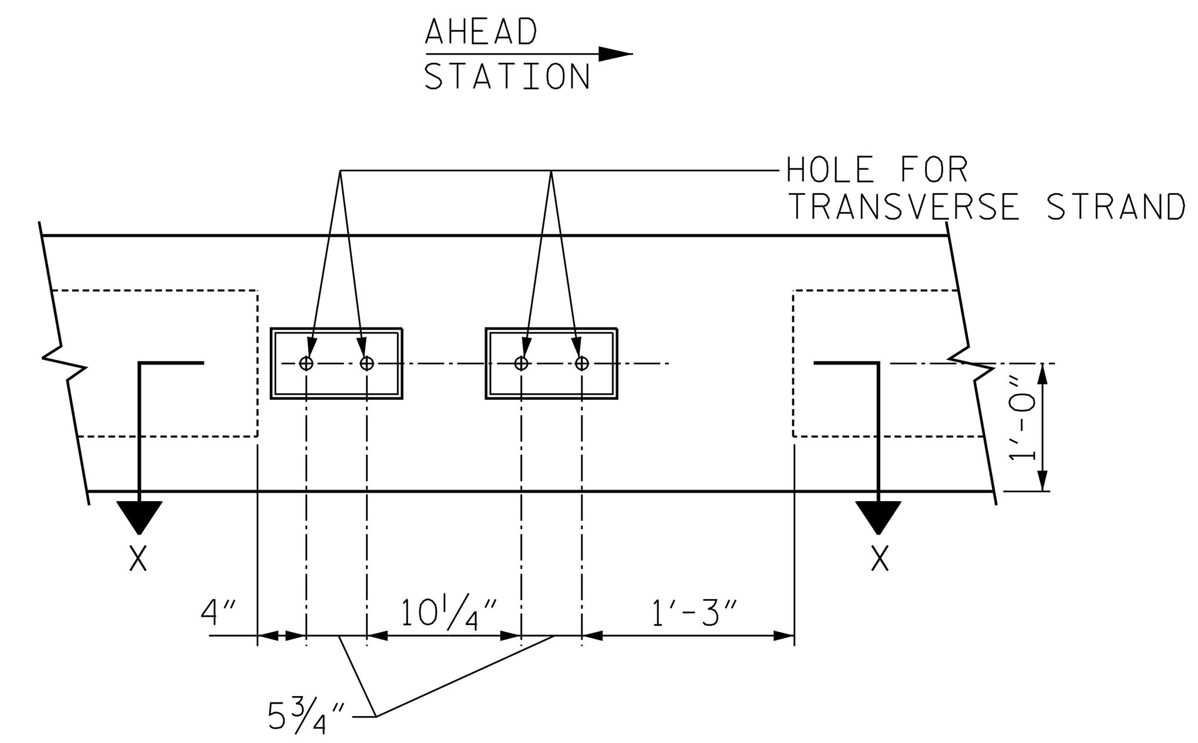
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DES. EGR. OF RECORD: RTS DATE: 06/17

ASSEMBLED BY :	MAF	DATE :	06/17
CHECKED BY :	HLW	DATE :	06/17

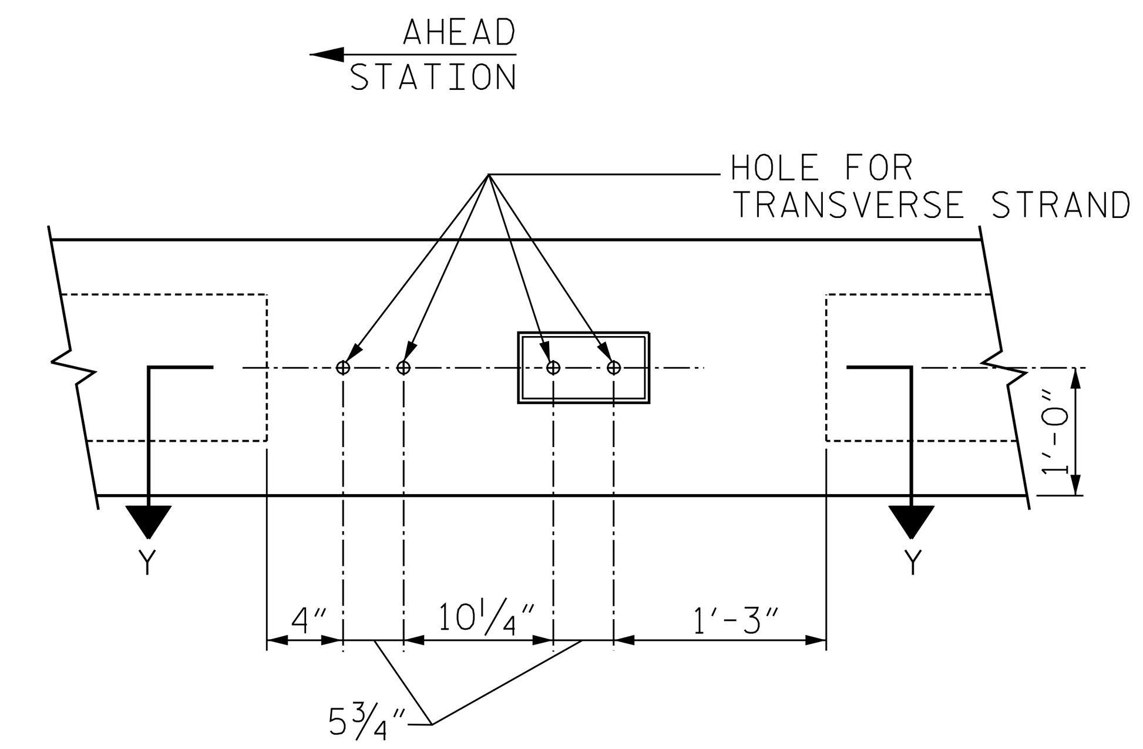
Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-7
1	SDR	5/7/2024	3			TOTAL SHEETS
2			4			40



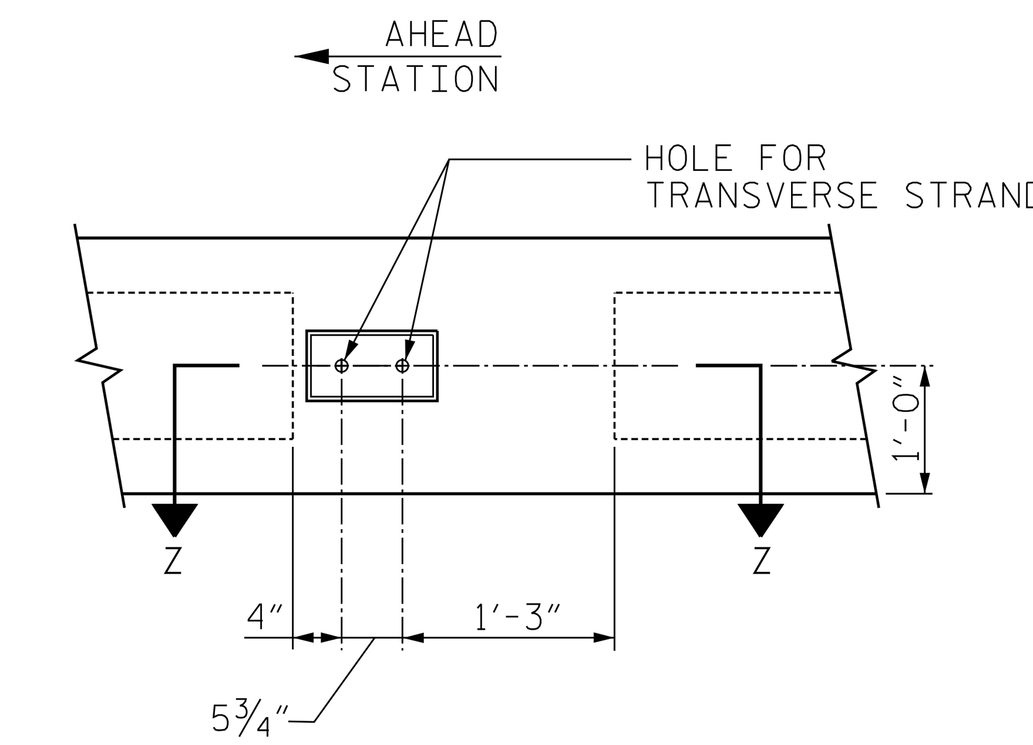
VIEW A-A

SEE SHEET 1 OF 5



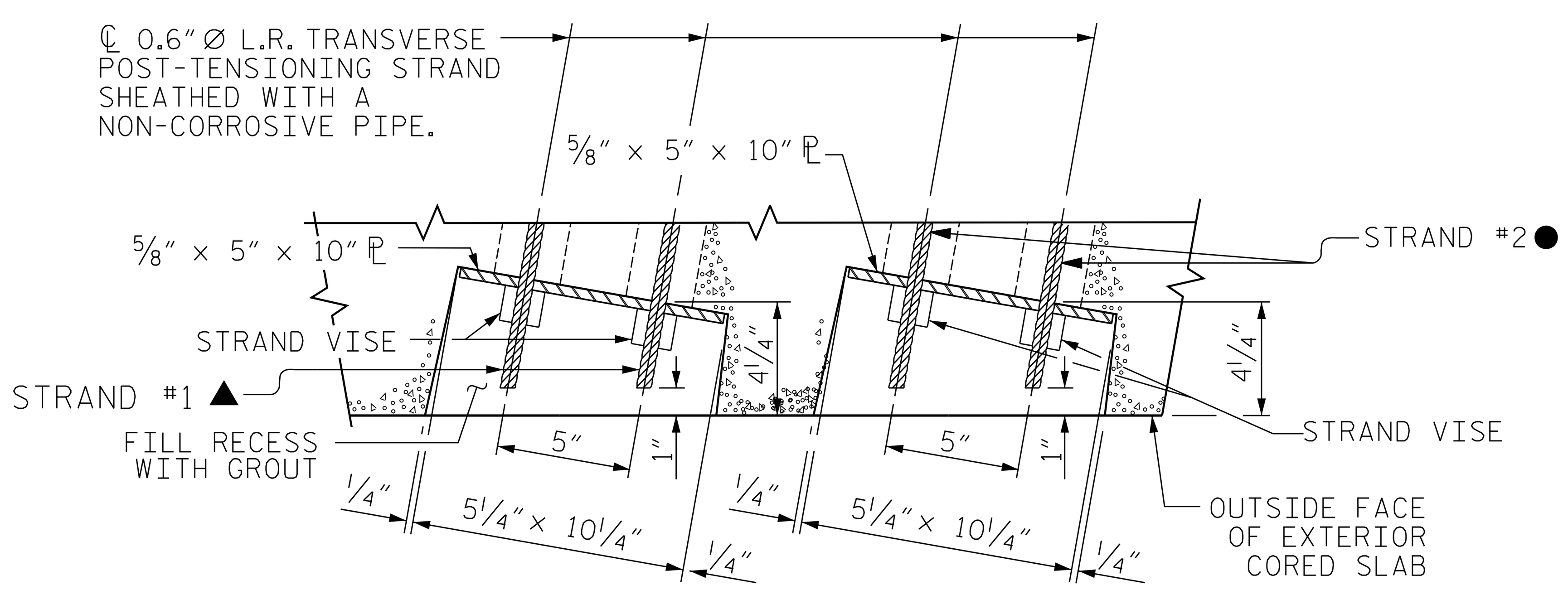
VIEW B-B

SEE SHEET 1 OF 5



VIEW C-C

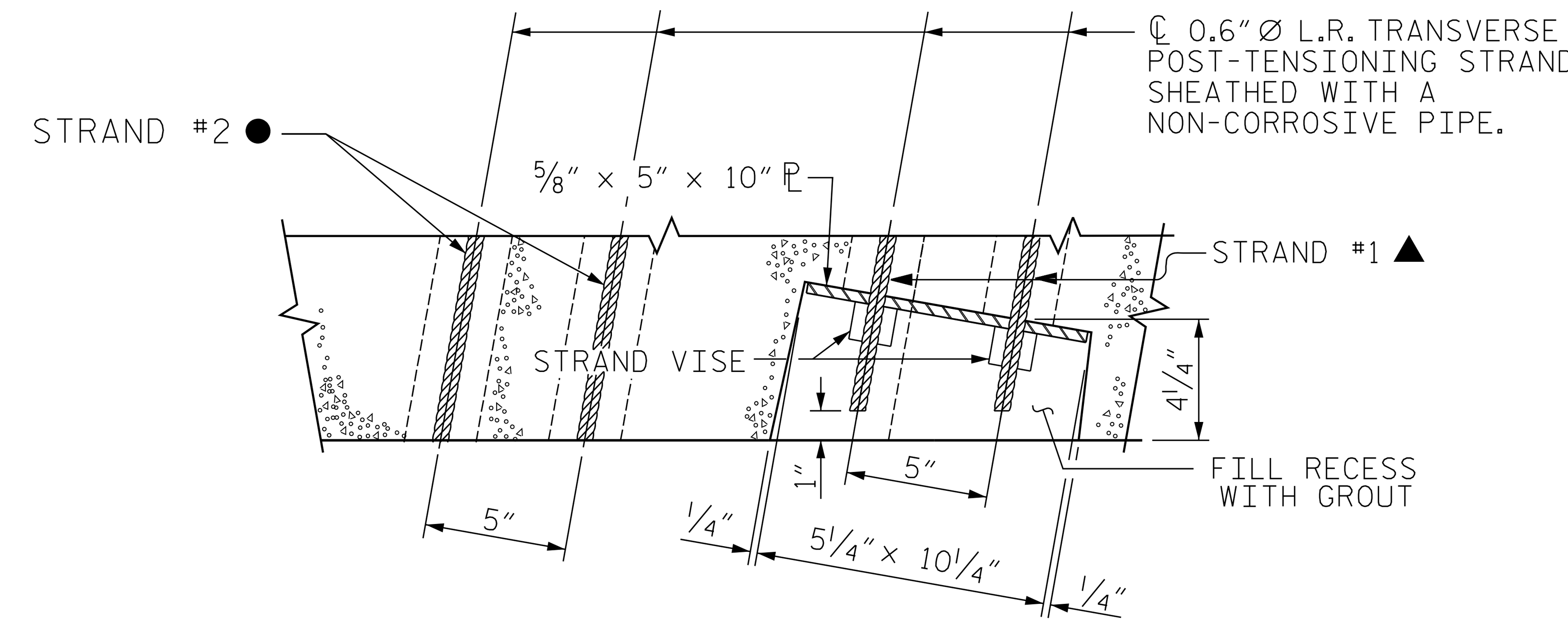
SEE SHEET 1 OF 5



SECTION X-X

(TYPE I UNIT)

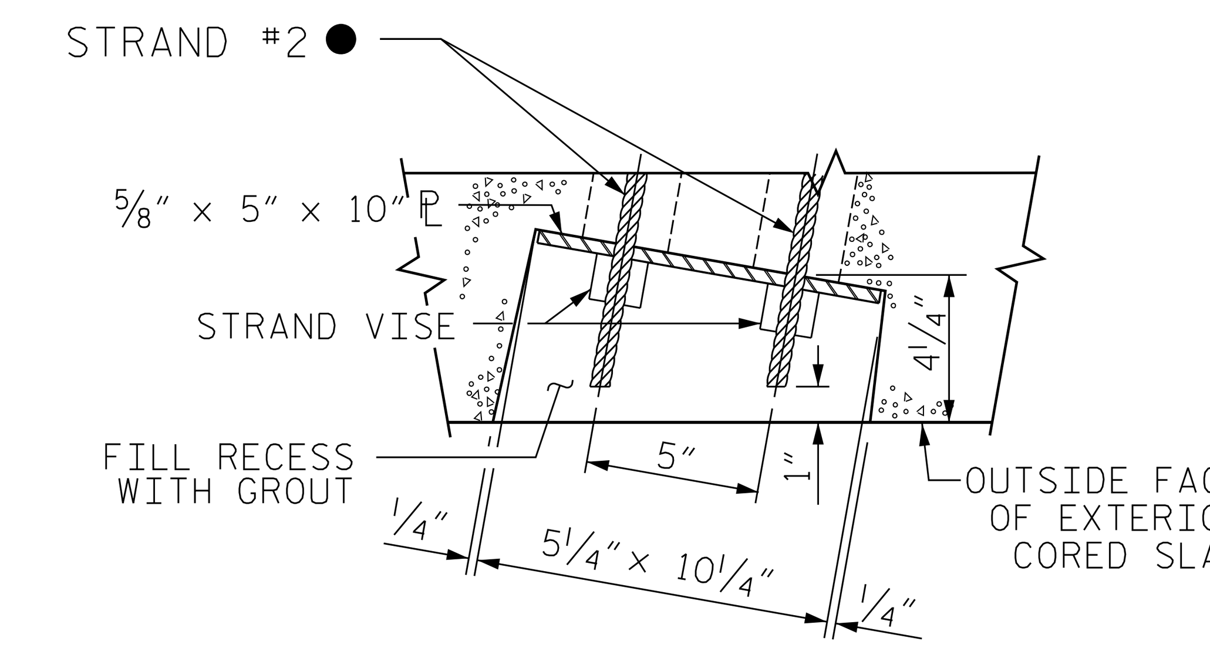
(FAR END SHOWN)



SECTION Y-Y

(TYPE IV UNIT)

(FAR END SHOWN)



SECTION Z-Z

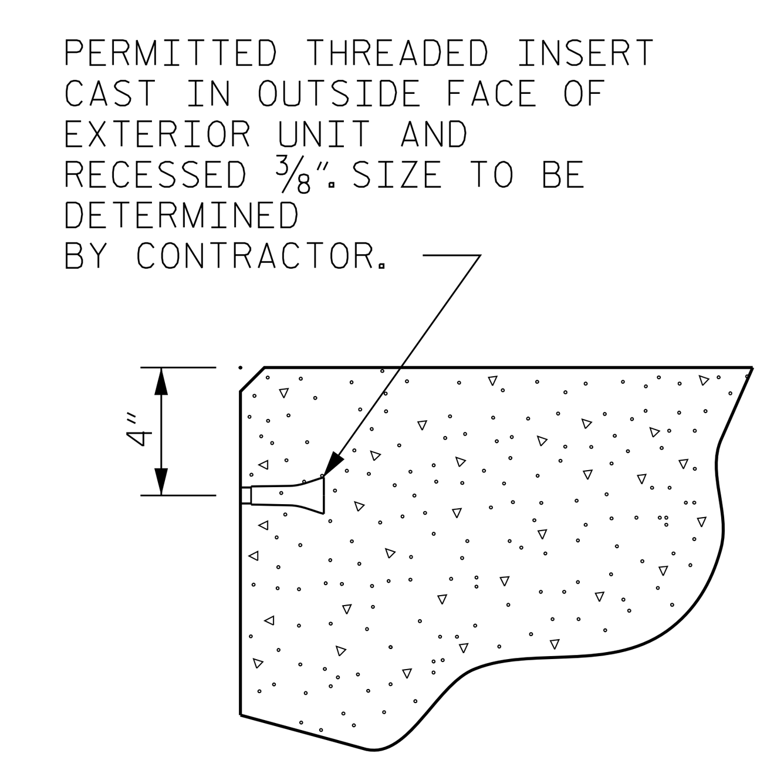
(TYPE VI UNIT)

(FAR END SHOWN)

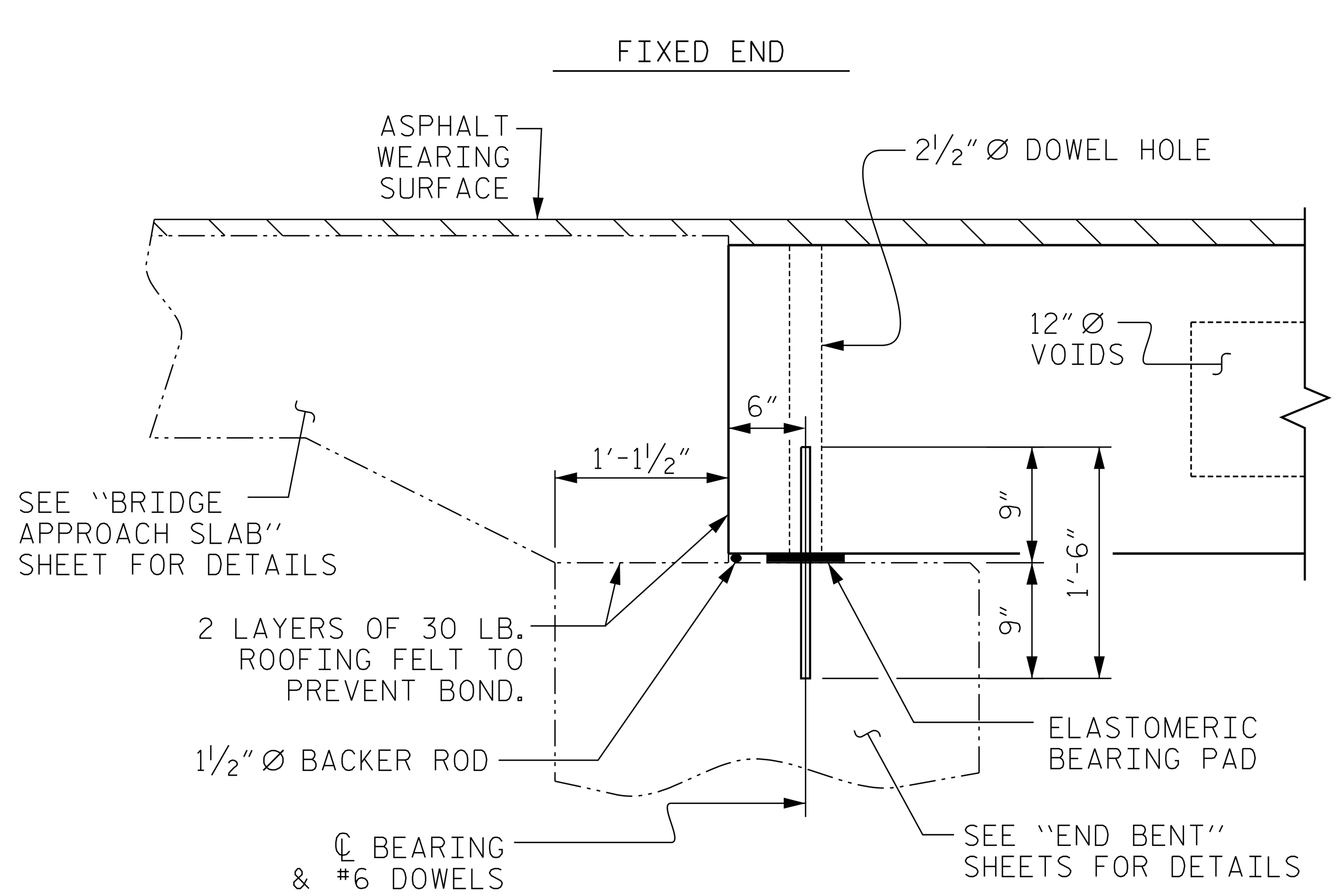
▲ STRANDS #1 GO THROUGH 6 CORED SLAB UNITS (TO BE TENSIONED DURING STAGE I CONSTRUCTION).

● STRANDS #2 GO THROUGH ALL 11 CORED SLAB UNITS (TO BE TENSIONED DURING STAGE II CONSTRUCTION).

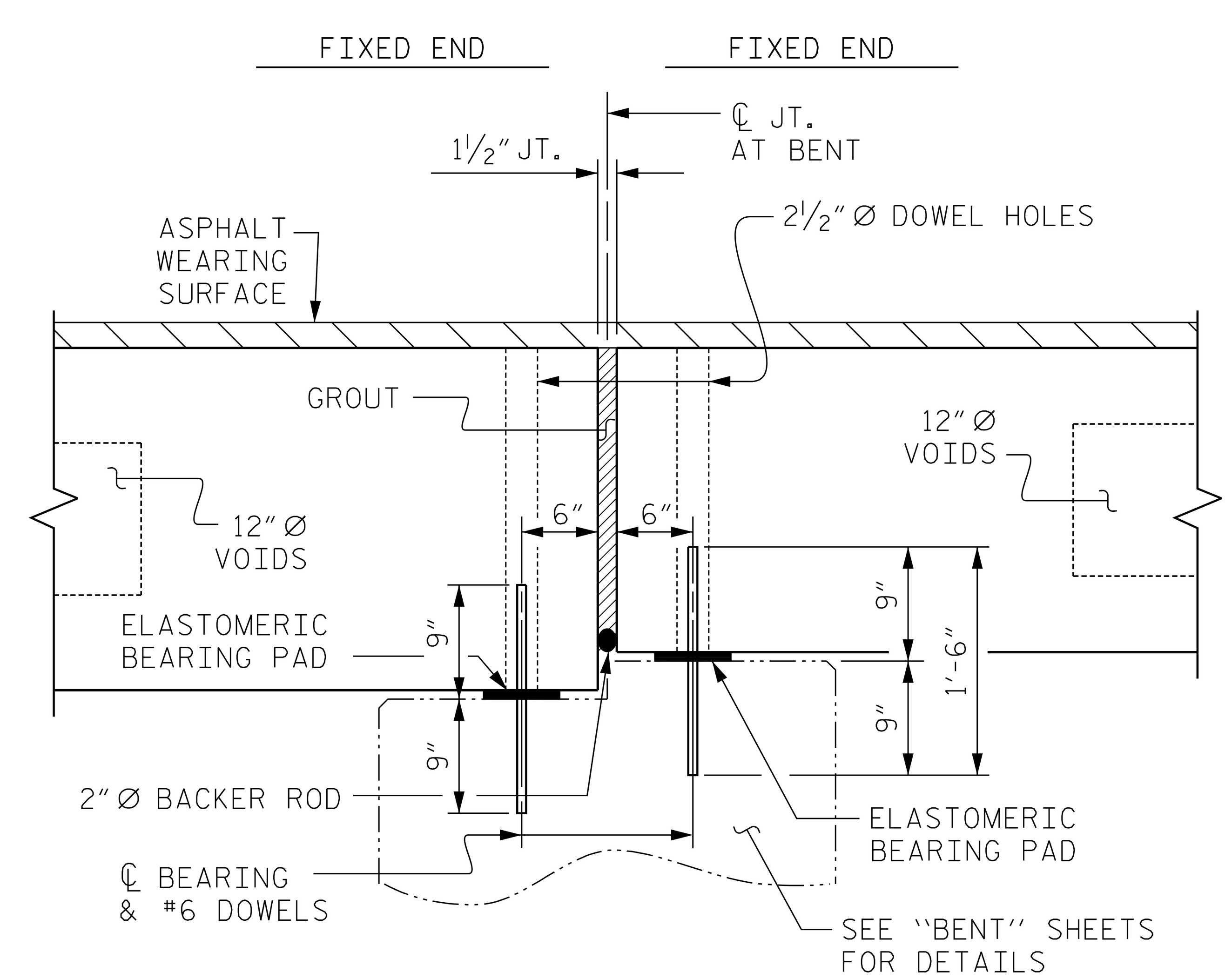
GROUTED RECESS AT END OF POST-TENSIONED STRAND



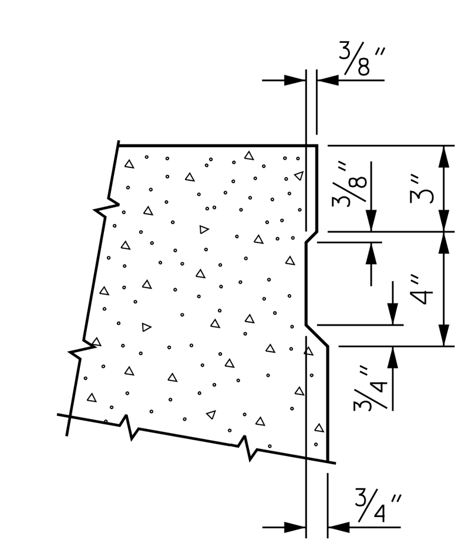
THREADED INSERT DETAIL



SECTION AT END BENT



SECTION AT BENT



SHEAR KEY DETAIL

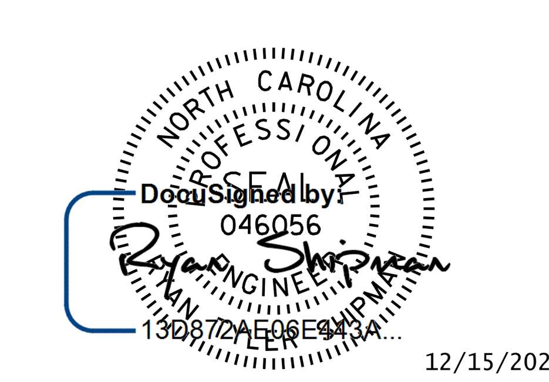
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 2 OF 5



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

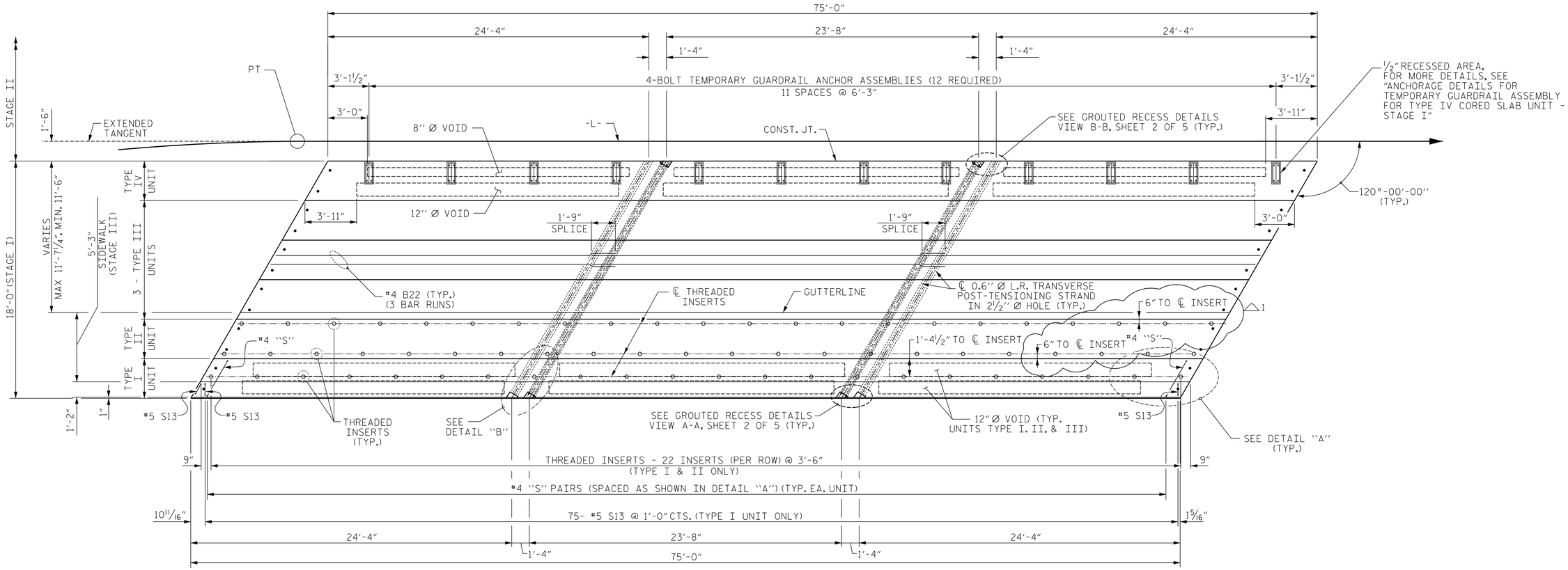
3'-0" X 2'-0" PRESTRESSED CONCRETE CORED SLAB UNIT

120° SKEW SPAN 'A'

Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

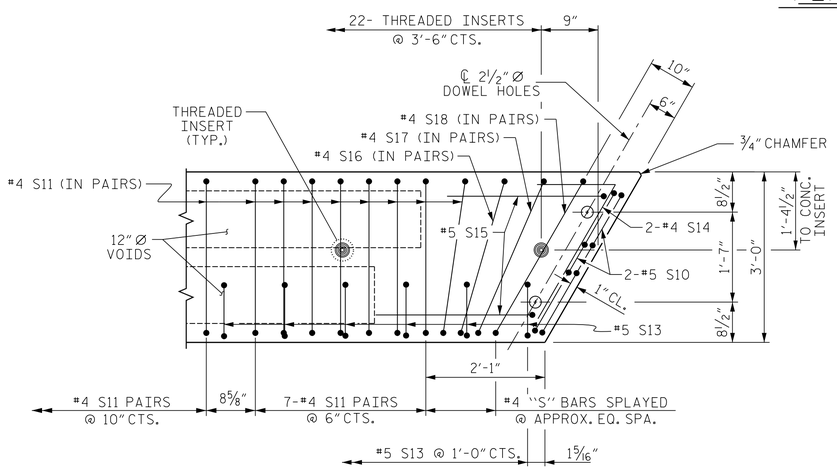
DWN. BY: AW DATE: 02/18
CHKD. BY: HLW DATE: 02/18
DES. EGR. OF RECORD: RTS DATE: 02/18

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S1-8
1			3			TOTAL SHEETS	40
2			4				



PLAN OF SPAN A

(STAGE I)



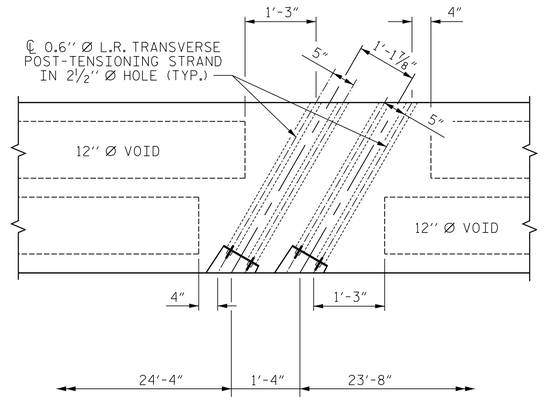
DETAIL "A"

(SIMILAR EACH END OF UNIT)

TYPE I UNIT SHOWN- OTHER UNITS SIMILAR EXCEPT OMIT #5 S13 BARS FOR TYPE II THRU TYPE IV UNITS.

1 ROW OF STRUCTURAL CONCRETE INSERTS FOR TYPE I ONLY.

2 ROWS OF STRUCTURAL CONCRETE INSERTS FOR TYPE II ONLY.



DETAIL "B"

#4 S11 BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1" CLEAR TO GROUTED RECESS AND 2½" Ø TRANSVERSE POST-TENSIONING STRAND HOLES.

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY :	MAF	DATE : 02/18
CHECKED BY :	HLW	DATE : 02/18

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 — Digitally signed by Ryan Tyler Shipman — 13D872AE06E443A... — RYAN TYLER SHIPMAN — 5/8/2024

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Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

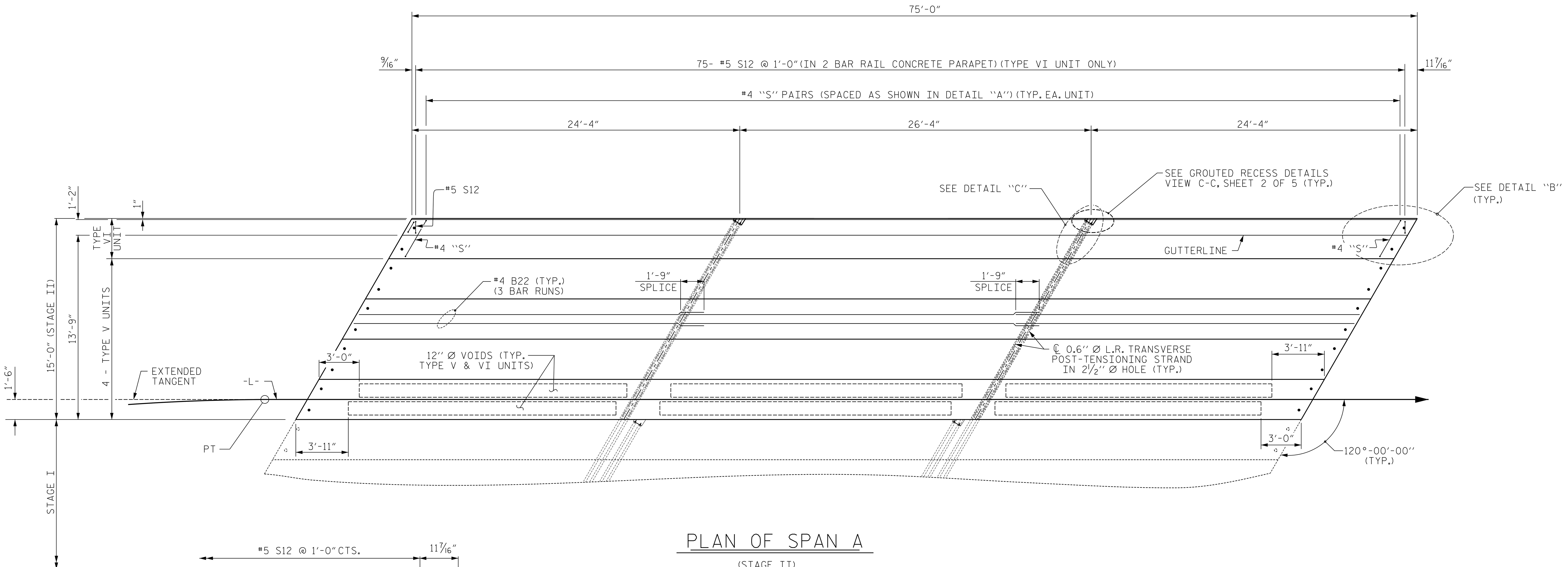
SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 75' UNIT 120° SKEW

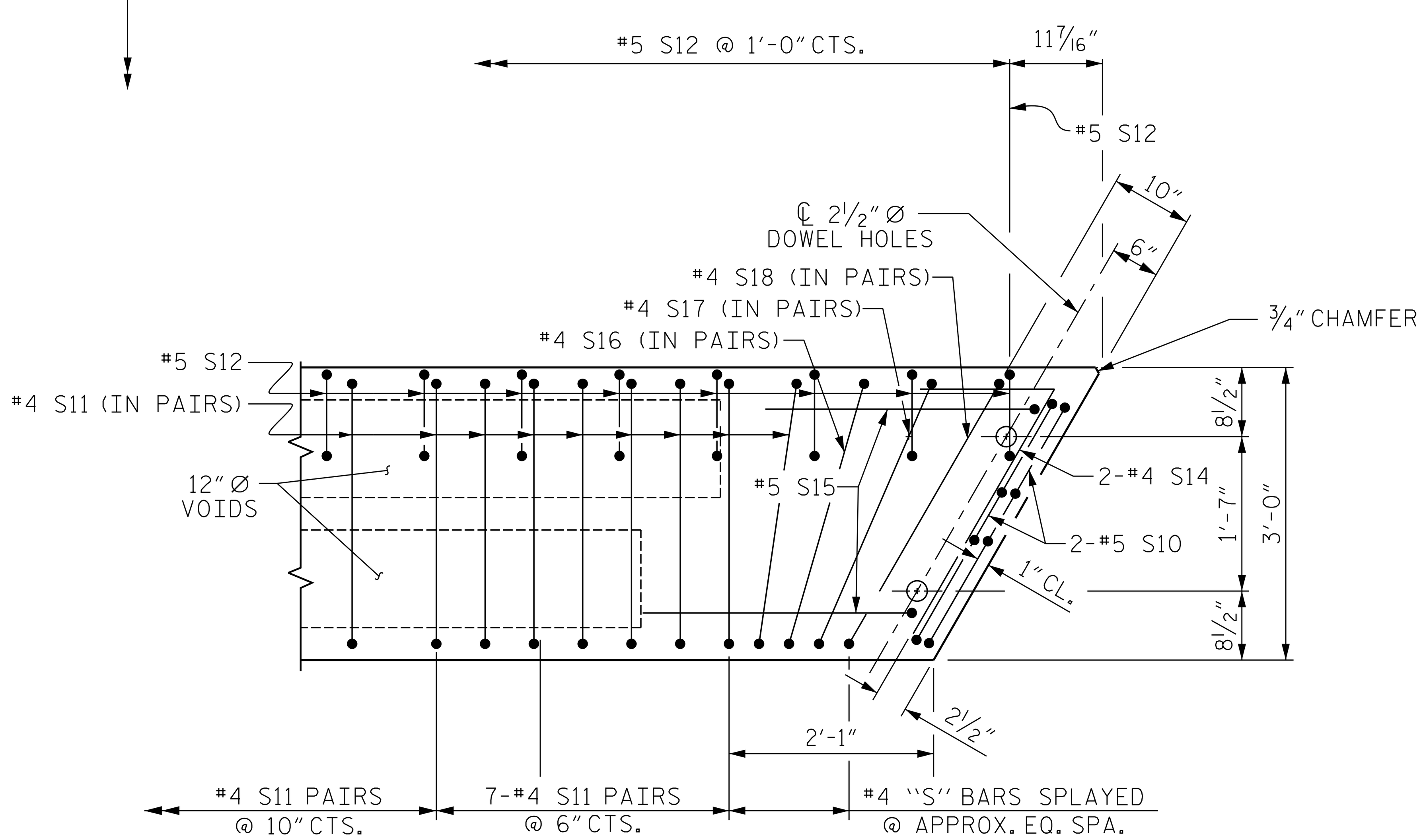
(STAGE I) SPAN 'A'

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-9
1	SDR	5/7/2024	3			TOTAL SHEETS
2			4			40



PLAN OF SPAN A

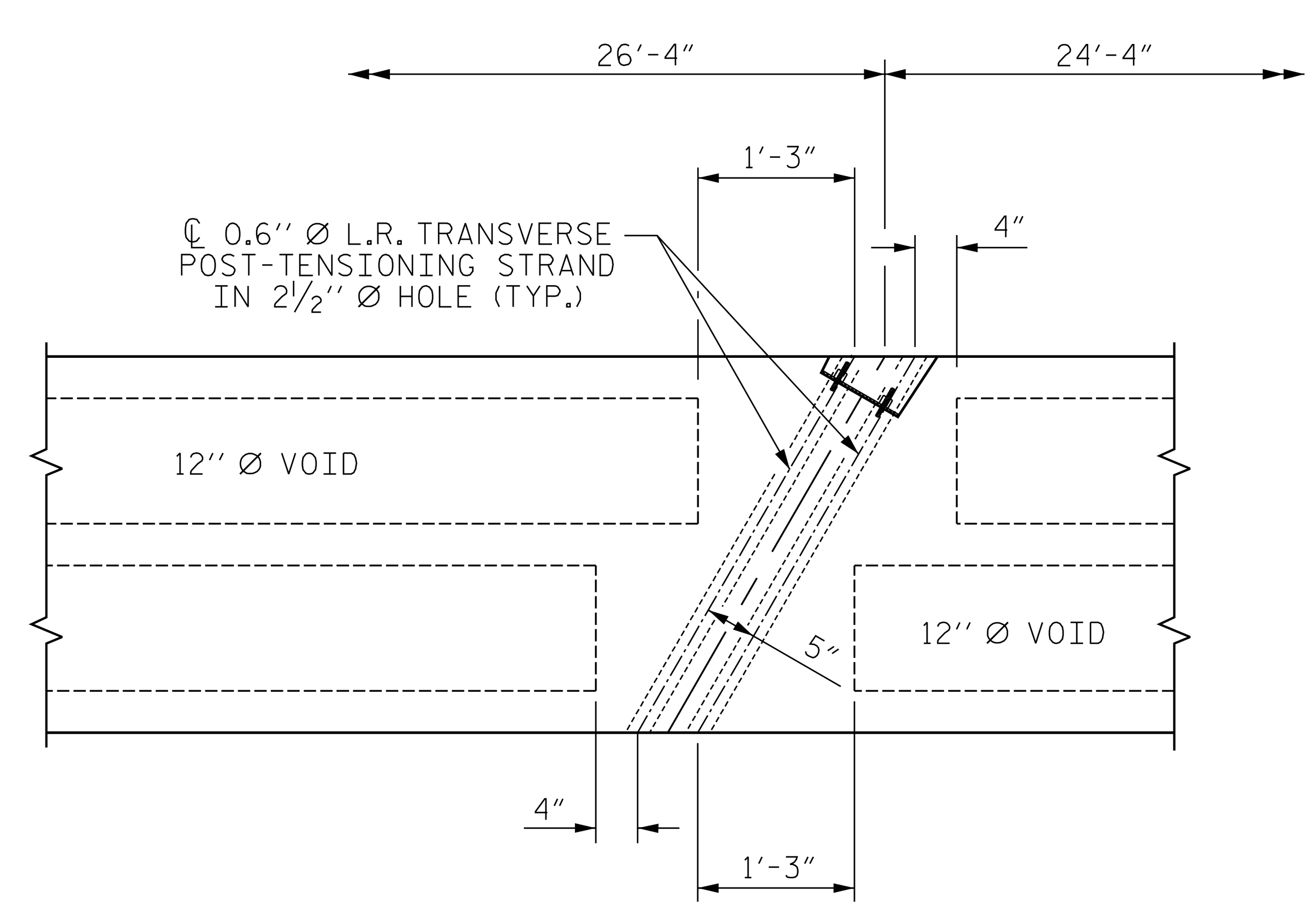
(STAGE II)



DETAIL "B"

(SIMILAR EACH END OF UNIT)

TYPE VI UNIT SHOWN- OTHER UNITS SIMILAR EXCEPT OMIT #5 S12 BARS FOR TYPE V UNITS.



DETAIL "C"

#4 S11 BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1" CLEAR TO GROUTED RECESS AND 2 1/2" Ø TRANSVERSE POST-TENSIONING STRAND HOLES.

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 75' UNIT 120° SKEW

(STAGE II) SPAN 'A'

NORTH CAROLINA PROFESSIONAL SEAL 046056 ENGINEER RYAN TYLER SHIRAH

DocuSigned by: 13D872AEF6E443A... 12/15/2023

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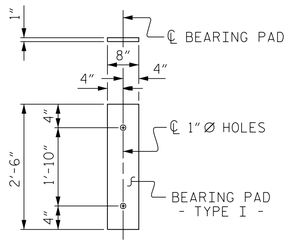
REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S1-10
1			3					TOTAL SHEETS
2			4					40

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY :	MAF	DATE :	02/18
CHECKED BY :	HLW	DATE :	02/18



FIXED END
(TYPE I - 44 REQ'D)

NOTE: QUANTITY INCLUDES SPAN 'A' AND SPAN 'B'.

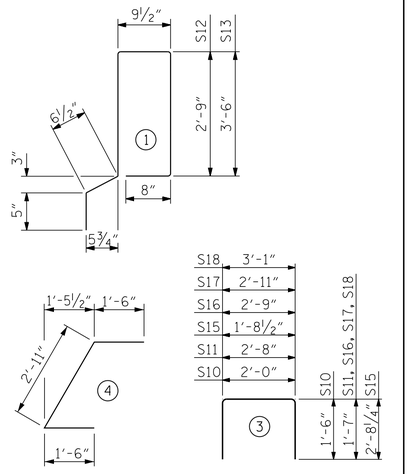
ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

CORED SLABS REQUIRED
(75' UNIT)

UNIT	NUMBER	LENGTH	TOTAL LENGTH
TYPE I	1	75'-0"	75'-0"
TYPE II	1	75'-0"	75'-0"
TYPE III	3	75'-0"	225'-0"
TYPE IV	1	75'-0"	75'-0"
TYPE V	4	75'-0"	300'-0"
TYPE VI	1	75'-0"	75'-0"
TOTAL	11		825'-0"

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

DEAD LOAD DEFLECTION AND CAMBER

	3'-0" x 2'-0"
75' CORED SLAB UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2½" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD **	1 1/16" ↓
FINAL CAMBER	1 7/16" ↑

** INCLUDES FUTURE WEARING SURFACE

GUTTERLINE ASPHALT THICKNESS

	ASPHALT OVERLAY THICKNESS	
	LEFT GUTTERLINE	RIGHT GUTTERLINE
℄ BRG. @ END BENT #1	3½"	3 11/16"
MIDSPAN	2 1/16"	2 3/16"
℄ BRG. @ BENT #1	3½"	3½"

BILL OF MATERIAL FOR ONE 75' CORED SLAB UNIT

				TYPE I UNIT		TYPE II- V UNITS		TYPE VI UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
B22	6	#4	STR	26'-1"	105	26'-1"	105	26'-1"	105
S10	8	#5	3	5'-0"	42	5'-0"	42	5'-0"	42
S11	182	#4	3	5'-10"	709	5'-10"	709	5'-10"	709
✳S12	76	#5	1					7'-11"	628
✳S13	76	#5	1	9'-5"	746				
S14	4	#4	4	5'-11"	16	5'-11"	16	5'-11"	16
S15	4	#5	3	7'-1"	30	7'-1"	30	7'-1"	30
S16	4	#4	3	5'-11"	16	5'-11"	16	5'-11"	16
S17	4	#4	3	6'-1"	16	6'-1"	16	6'-1"	16
S18	4	#4	3	6'-3"	17	6'-3"	17	6'-3"	17
REINFORCING STEEL LBS.					951		951		951
✳EPOXY COATED REINFORCING STEEL LBS.					746				628
9500 P.S.I. CONCRETE CU. YDS.					12.7		12.7		13.8
0.6" Ø L.R. STRANDS No.					30		30		30

CONCRETE RELEASE STRENGTH

UNIT	PSI
75' UNITS	6000

GRADE 270 STRANDS

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

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 CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2½"Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

MAINTAIN A SYMMETRIC TENSION FORCE BETWEEN EACH PAIR OF TRANSVERSE POST TENSIONING STRANDS IN THE DIAPHRAGM.

THE #4 S11 STIRRUPS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 1" CLEAR TO THE GROUTED RECESS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

1 THE CONTRACTOR MAY USE SLEEVE INSERTS IN LIEU OF THREADED INSERTS FOR THE #4 DOWELS IN THE TYPE I AND TYPE 11 PRECAST CORED SLABS. IF USED, THESE INSERTS SHALL HAVE ¾" INSIDE DIAMETER, SEALED TO PREVENT CONCRETE FILLING DURING FABRICATION, AND SHALL BE 4" LONG. THE #4 DOWELS IN THE SIDEWALK ARE TO BE INSERTED INTO THESE SLEEVES DURING STAGE III. THE DOWELS SHALL BE GROUTED IN USING NON-SHRINK EPOXY GROUT. THE COST OF THE INSERTS AND GROUT ARE TO BE INCIDENTAL TO THE COST OF THE CORED SLABS.

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 5 OF 5

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY :	MAF	DATE :	02/18
CHECKED BY :	HLW	DATE :	02/18
DRAWN BY : MAA	6/10	REV. 5/18	MAA/THC
CHECKED BY : MKT	7/10		

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 RYAN TYLER SHIRMAN 5/8/2024

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1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 2'-0"
PRESTRESSED CONCRETE
CORED SLAB UNIT

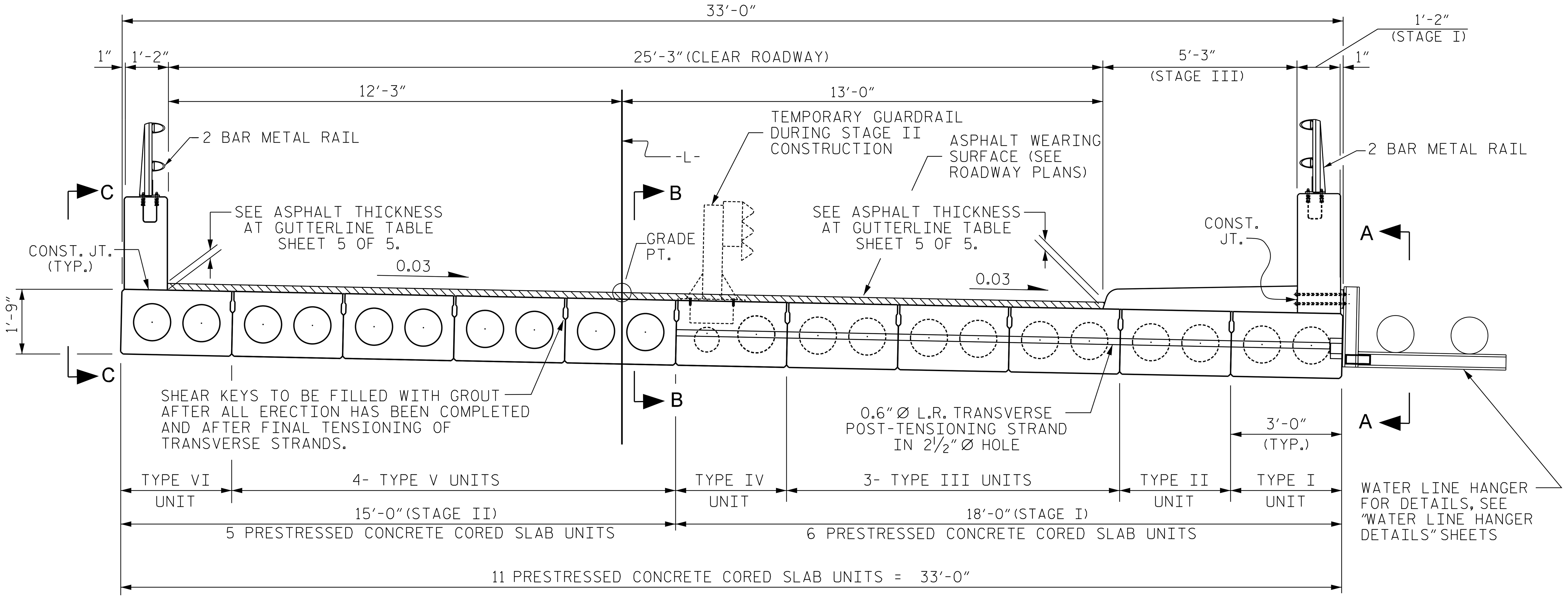
120° SKEW SPAN 'A'

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1	SDR	5/7/2024	3		
2			4		

SHEET NO. S1-11

TOTAL SHEETS 40

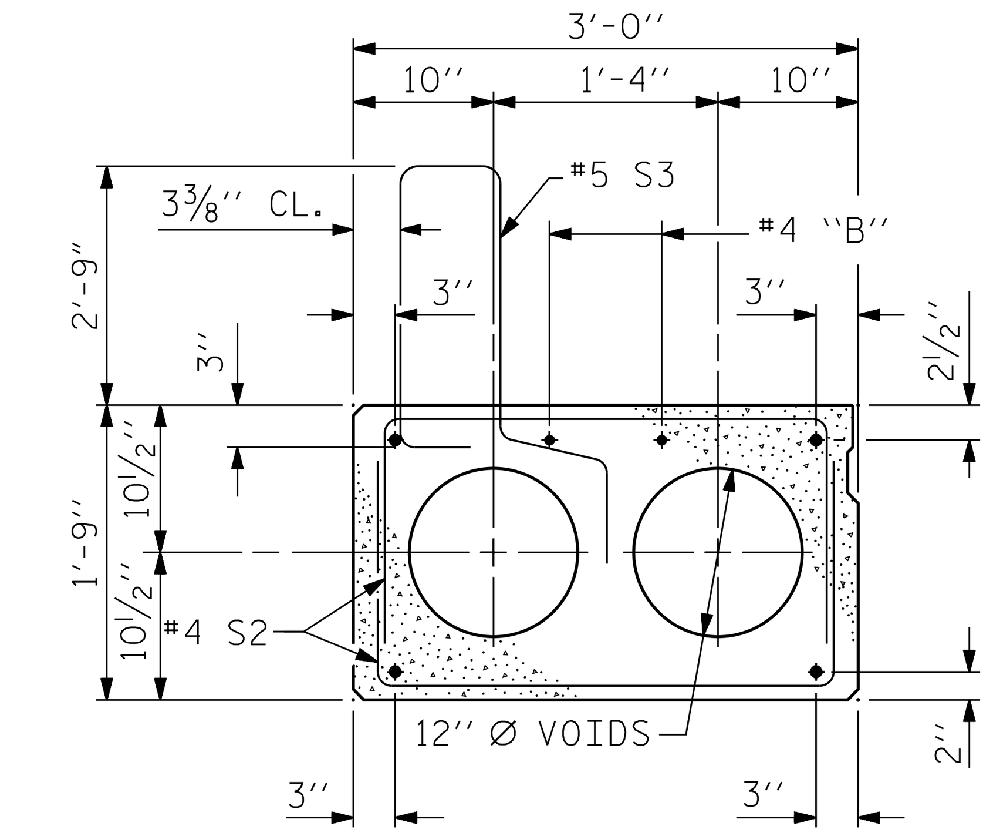
STD. NO. 24PCS3_33_60&120S



HALF SECTION
THROUGH VOIDS

HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

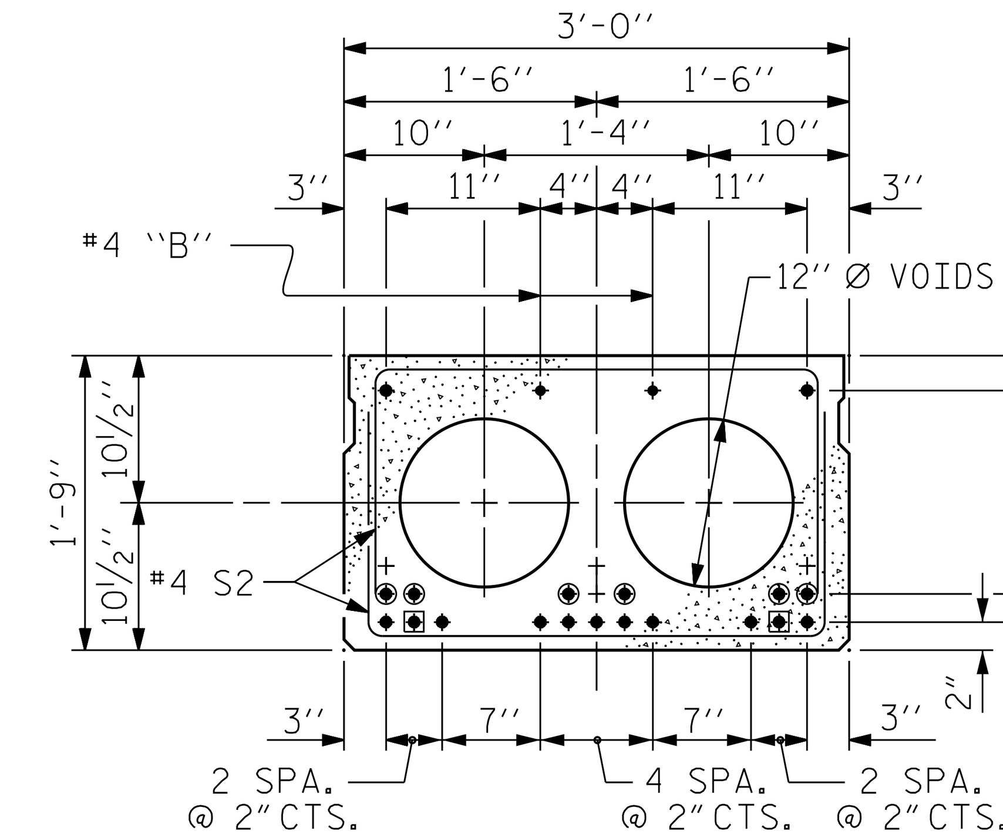
TYPICAL SECTION



EXTERIOR SLAB SECTION

TYPE VI
(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTION.)

0.6" Ø LOW RELAXATION STRAND LAYOUT



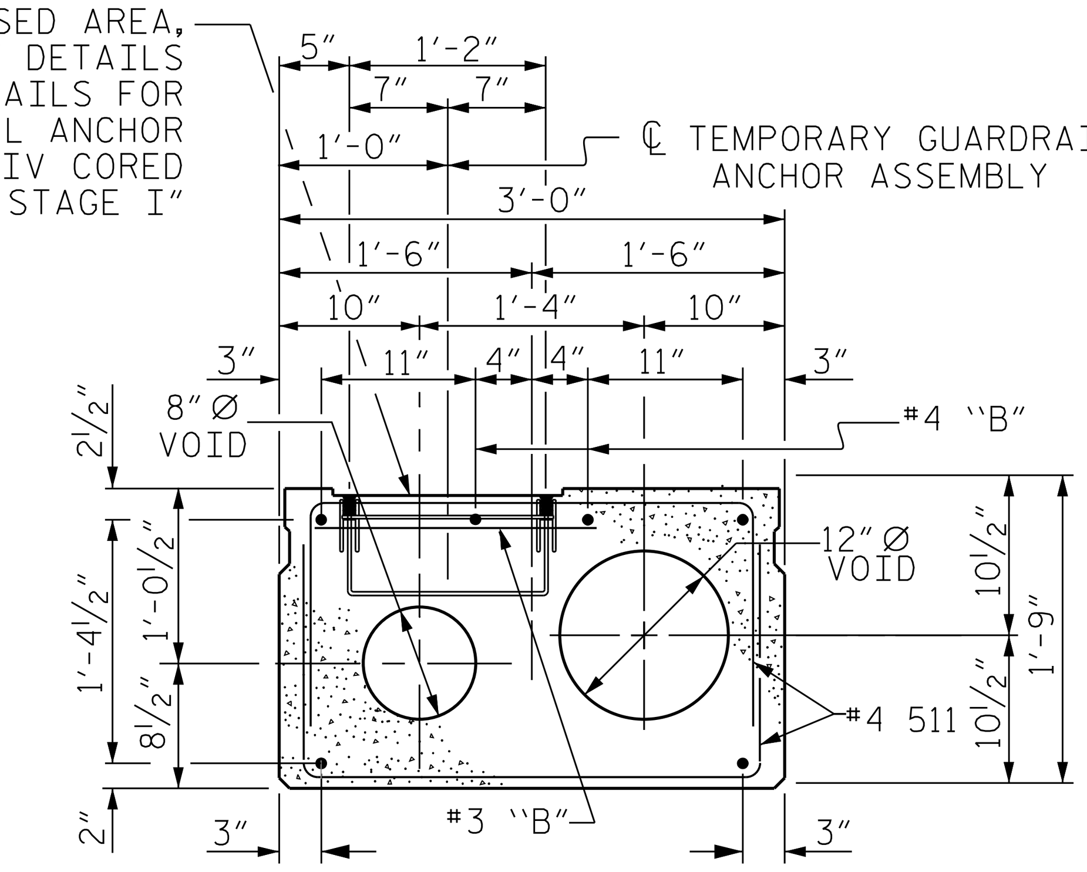
INTERIOR SLAB SECTION (40' UNIT)

TYPE III & V (13 STRANDS REQUIRED)

◙ BOND SHALL BE BROKEN ON THESE STRANDS FOR A DISTANCE OF 2'-0" FROM END OF CORED SLAB UNIT. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

◉ OPTIONAL FULL LENGTH DEBONDED STRANDS. THESE STRANDS ARE NOT REQUIRED. IF THE FABRICATOR CHOOSES TO INCLUDE THESE STRANDS IN THE CORED SLAB UNIT, THE STRANDS SHALL BE DEBONDED FOR THE FULL LENGTH OF THE UNIT AT NO ADDITIONAL COST. SEE STANDARD SPECIFICATIONS, ARTICLE 1078-7.

DEBONDING LEGEND

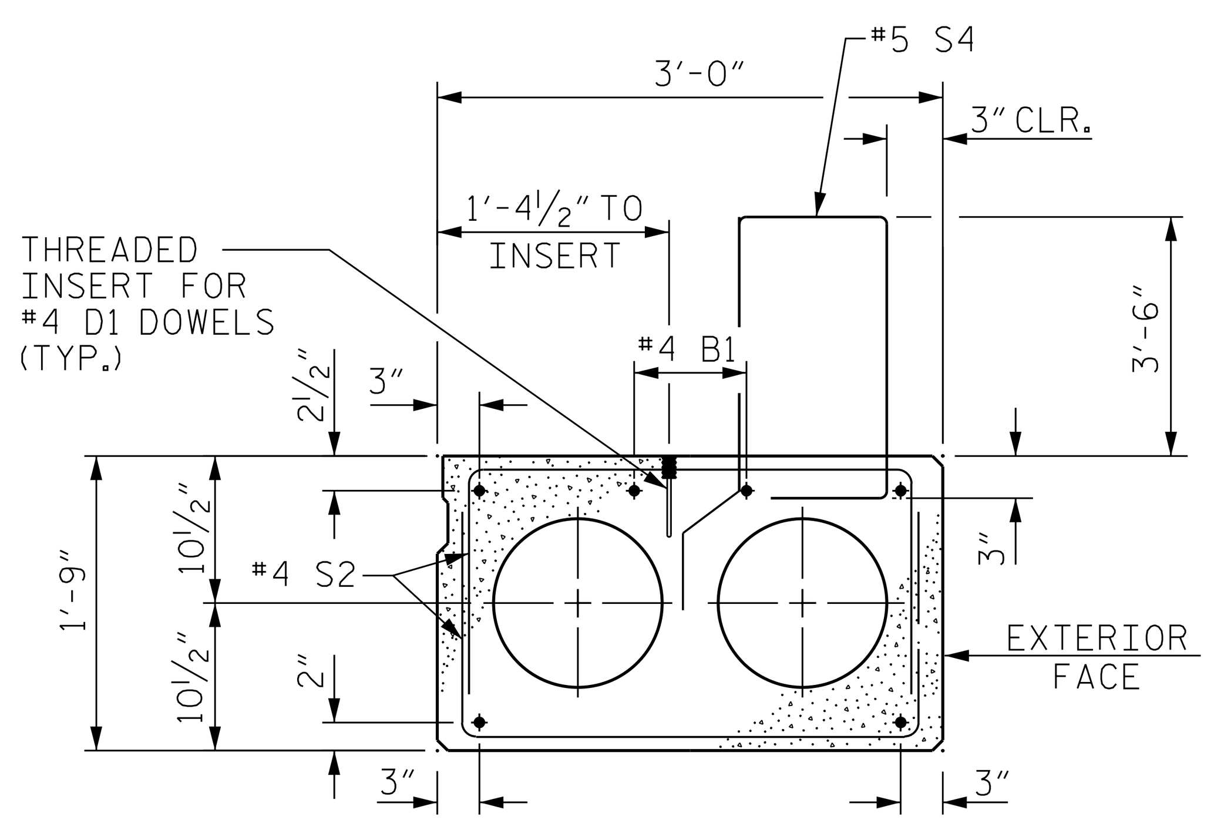


INTERIOR SLAB SECTION

TYPE IV

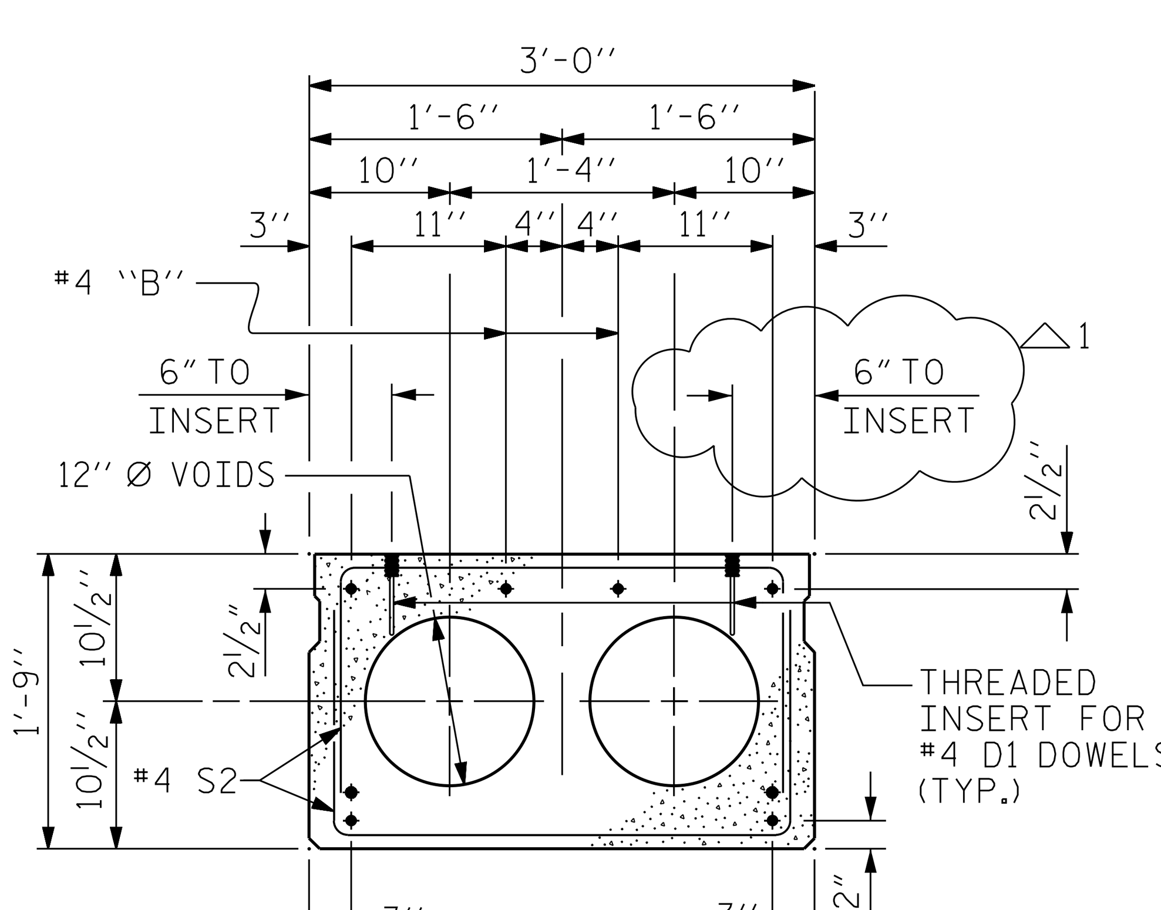
(FOR PRESTRESSED STRAND LAYOUT, SEE "INTERIOR SLAB SECTION")

FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY LOCATION, SEE SECTION OF ANCHOR ASSEMBLY LOCATION ON "ANCHORAGE DETAILS FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY FOR TYPE IV CORED SLAB UNIT" SHEET.



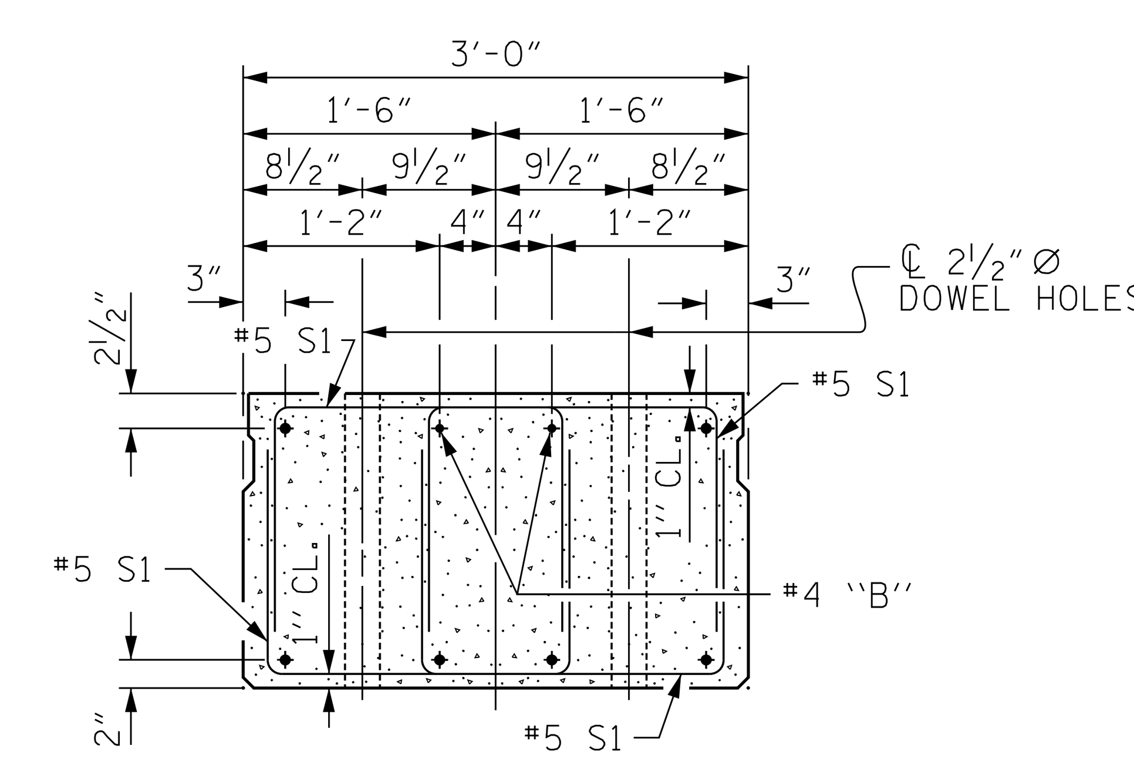
EXTERIOR SLAB SIDEWALK SECTION

TYPE I
(FOR PRESTRESSED STRAND LAYOUT, SEE "INTERIOR SLAB SECTION".)



INTERIOR SLAB SIDEWALK SECTION

TYPE II
(FOR PRESTRESSED STRAND LAYOUT, SEE "INTERIOR SLAB SECTION".)



END ELEVATION

SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWEL HOLES. (STRAND LAYOUT NOT SHOWN.)
INTERIOR SLAB UNIT SHOWN-EXTERIOR SLAB UNIT SIMILAR EXCEPT SHEAR KEY LOCATION.

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 1'-9"
PRESTRESSED CONCRETE CORED SLAB UNIT
120° SKEW SPAN 'B'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 RYAN TYLER SHIPMAN
DocuSigned by: Ryan Shipman
5/8/2024

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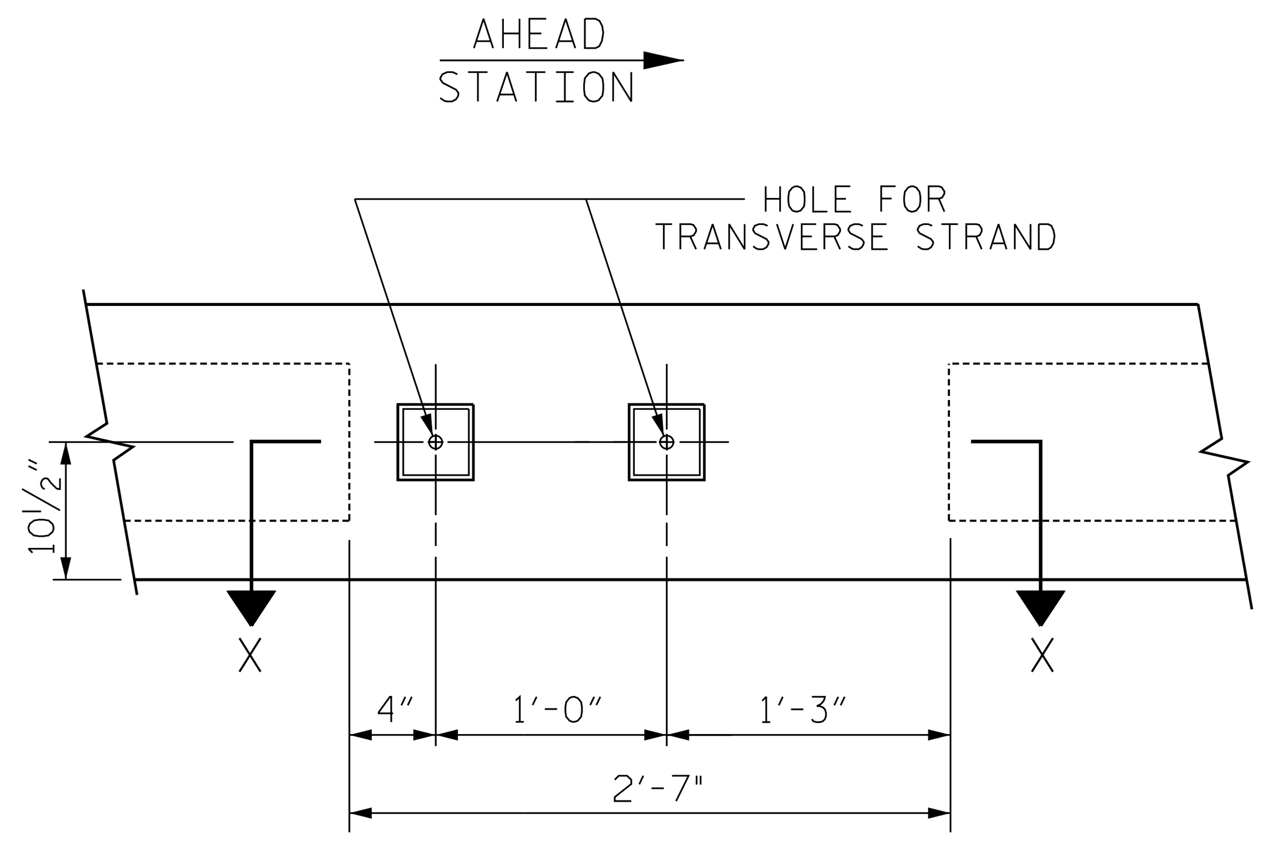
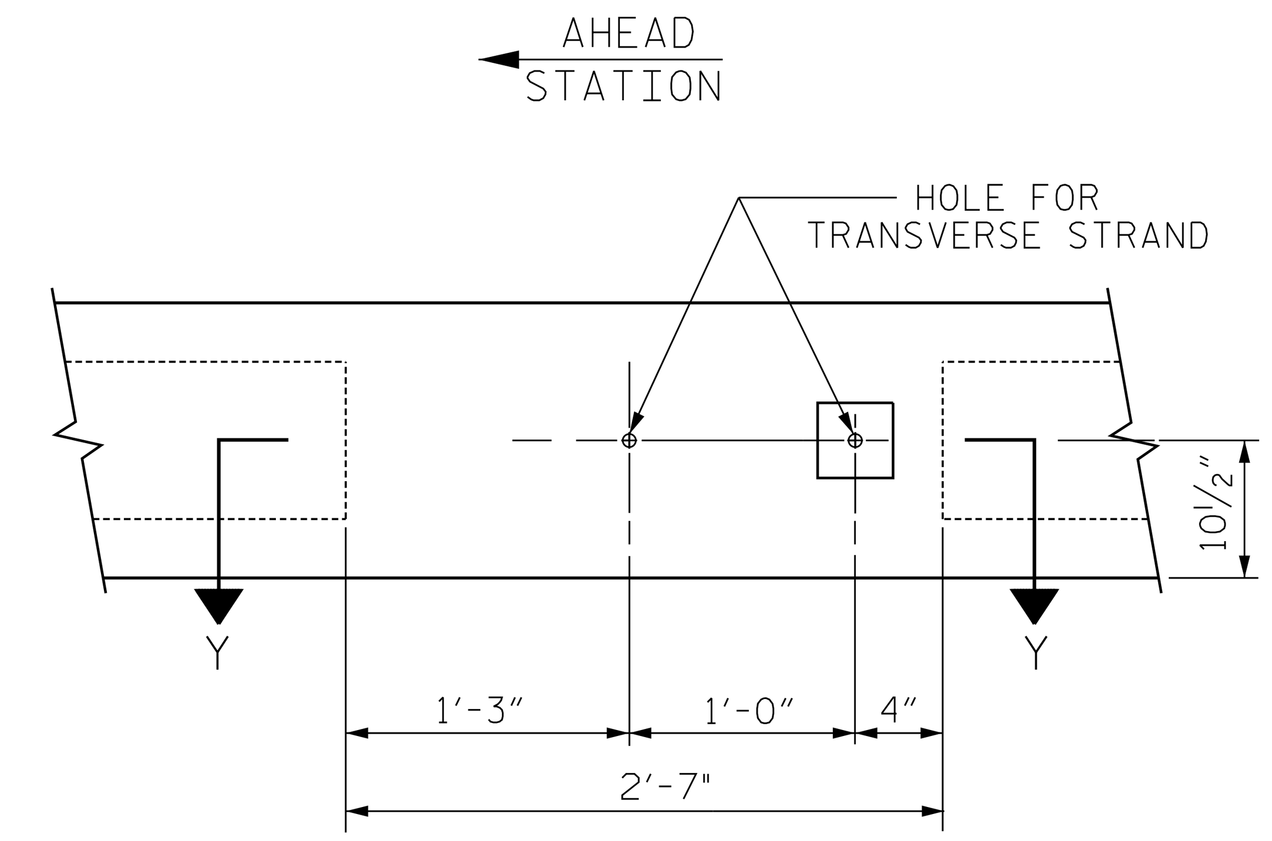
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-12
1	SDR	5/7/2024	3			TOTAL SHEETS
2			4			40

DES. EGR. OF RECORD: RTS DATE: 02/18

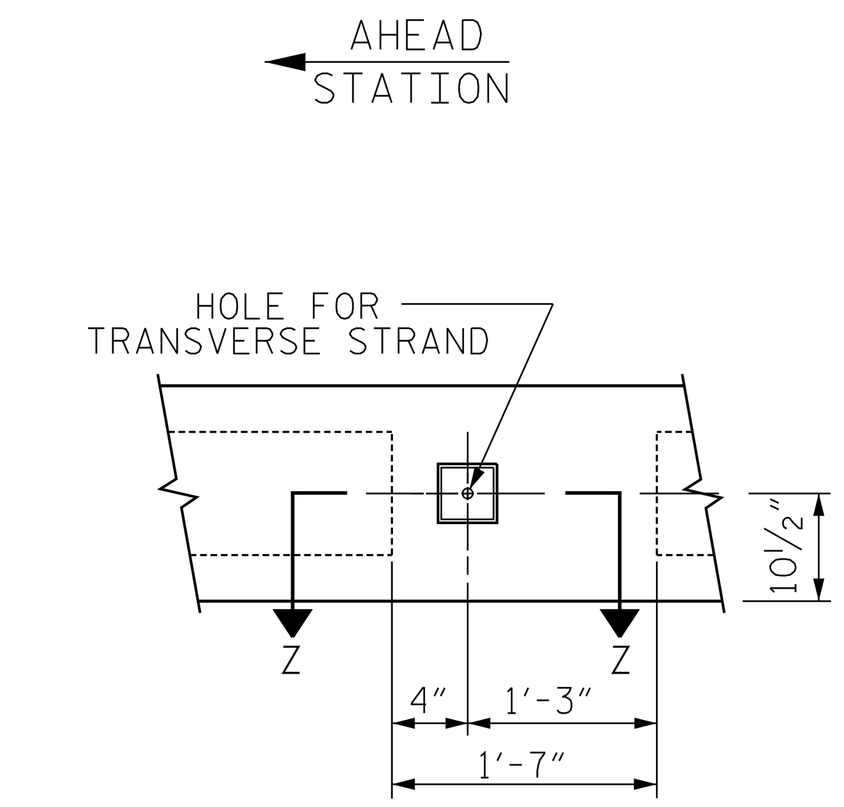
ASSEMBLED BY : MAF DATE : 02/18
CHECKED BY : HLW DATE : 02/18



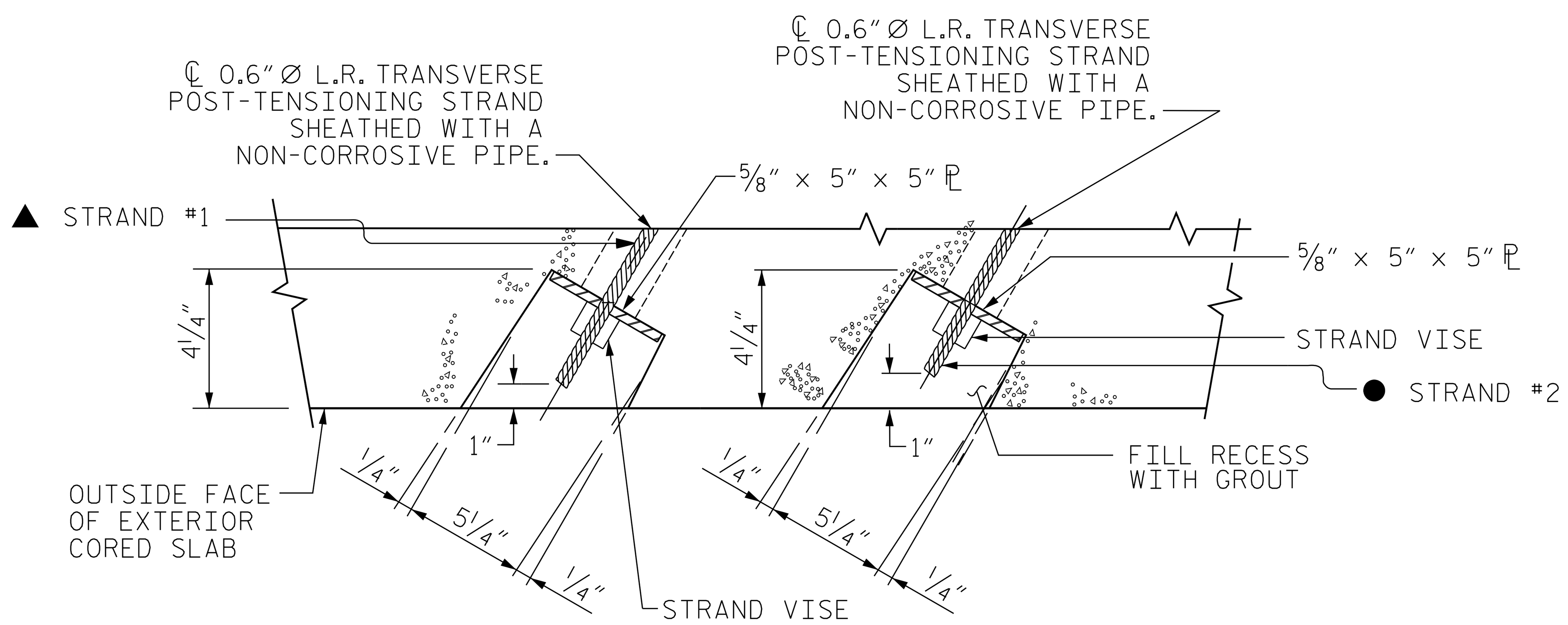
VIEW A-A
SEE SHEET 1 OF 5



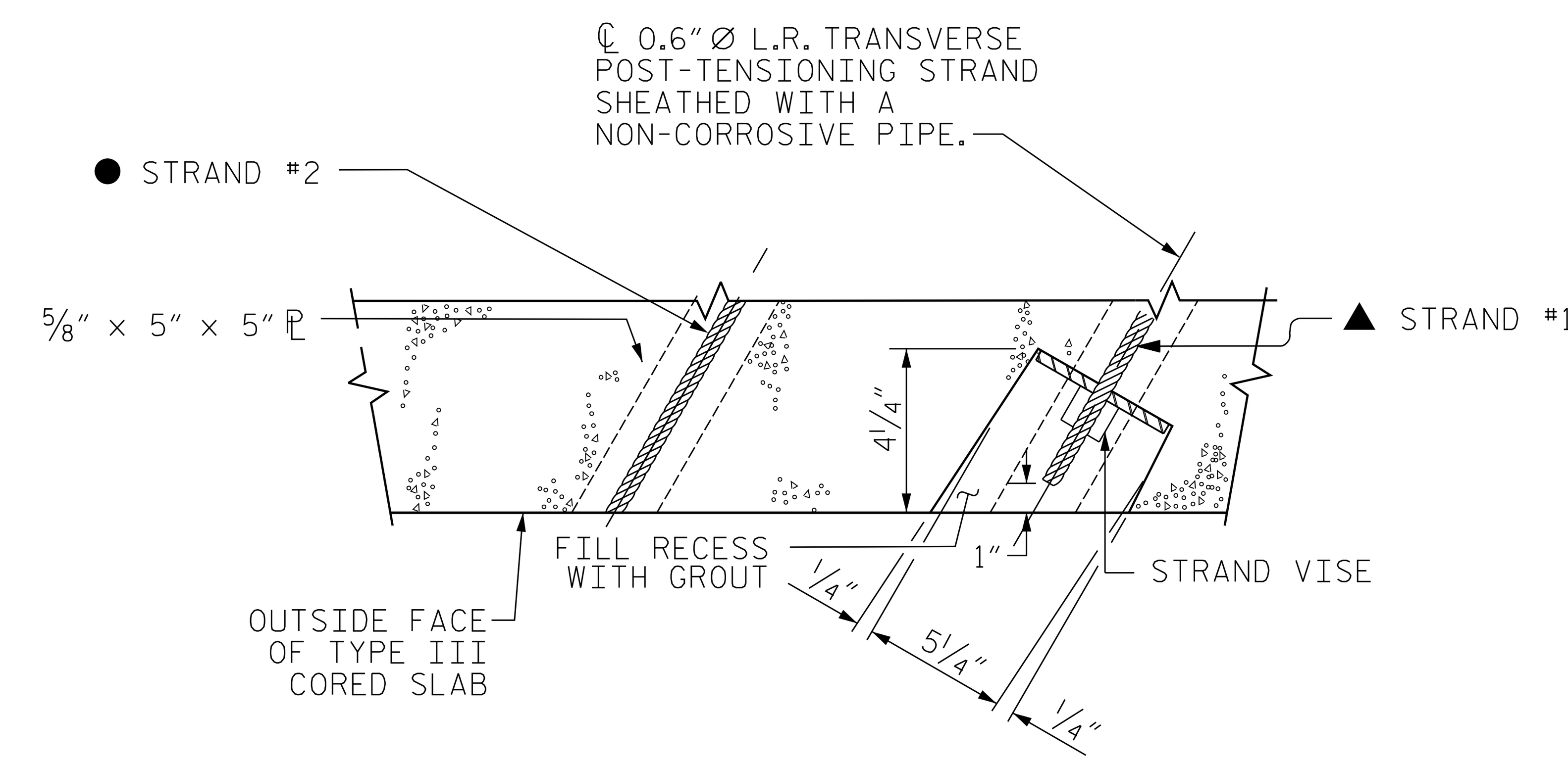
VIEW B-B
SEE SHEET 1 OF 5



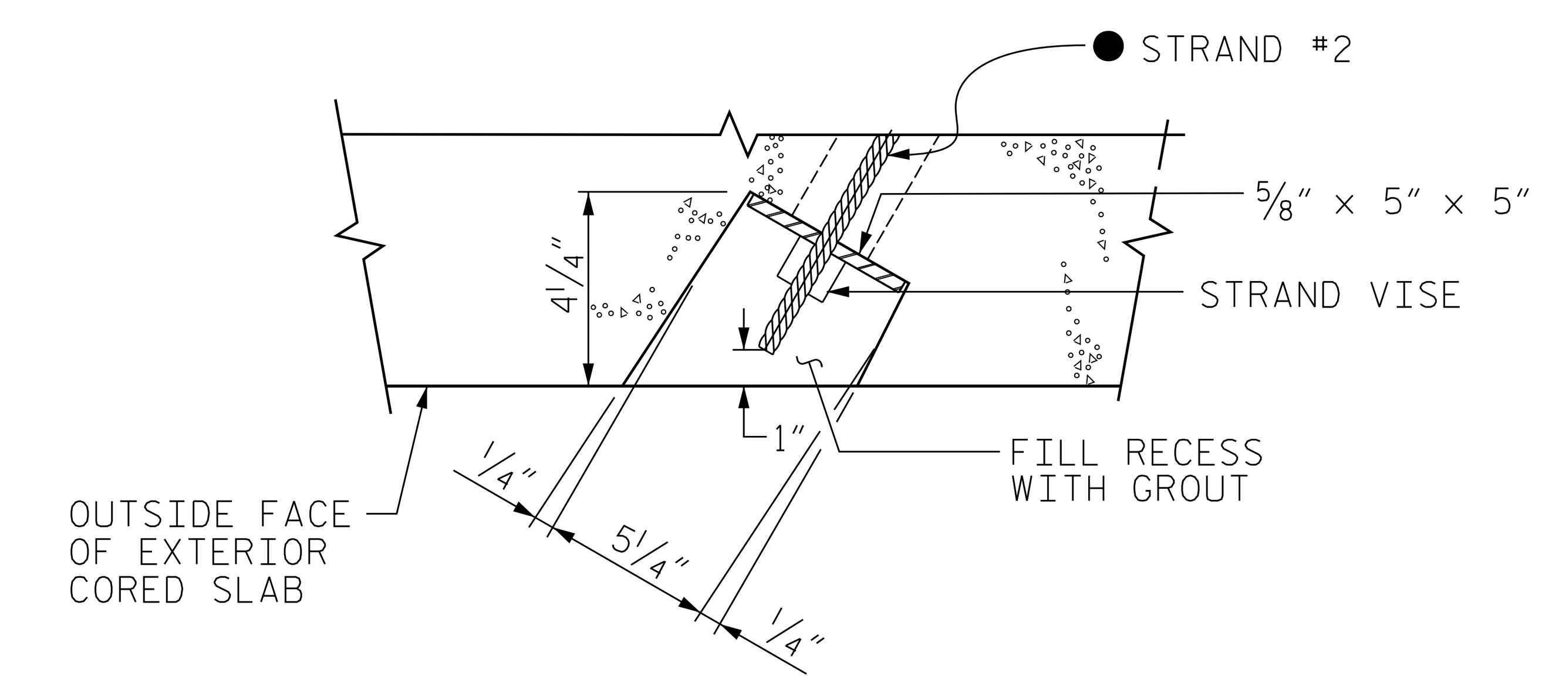
VIEW C-C
SEE SHEET 1 OF 5



SECTION X-X
(TYPE I UNIT)



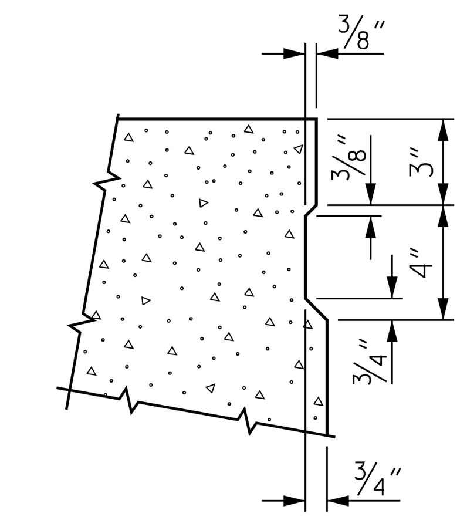
SECTION Y-Y
(TYPE IV UNIT)



SECTION Z-Z
(TYPE VI UNIT)

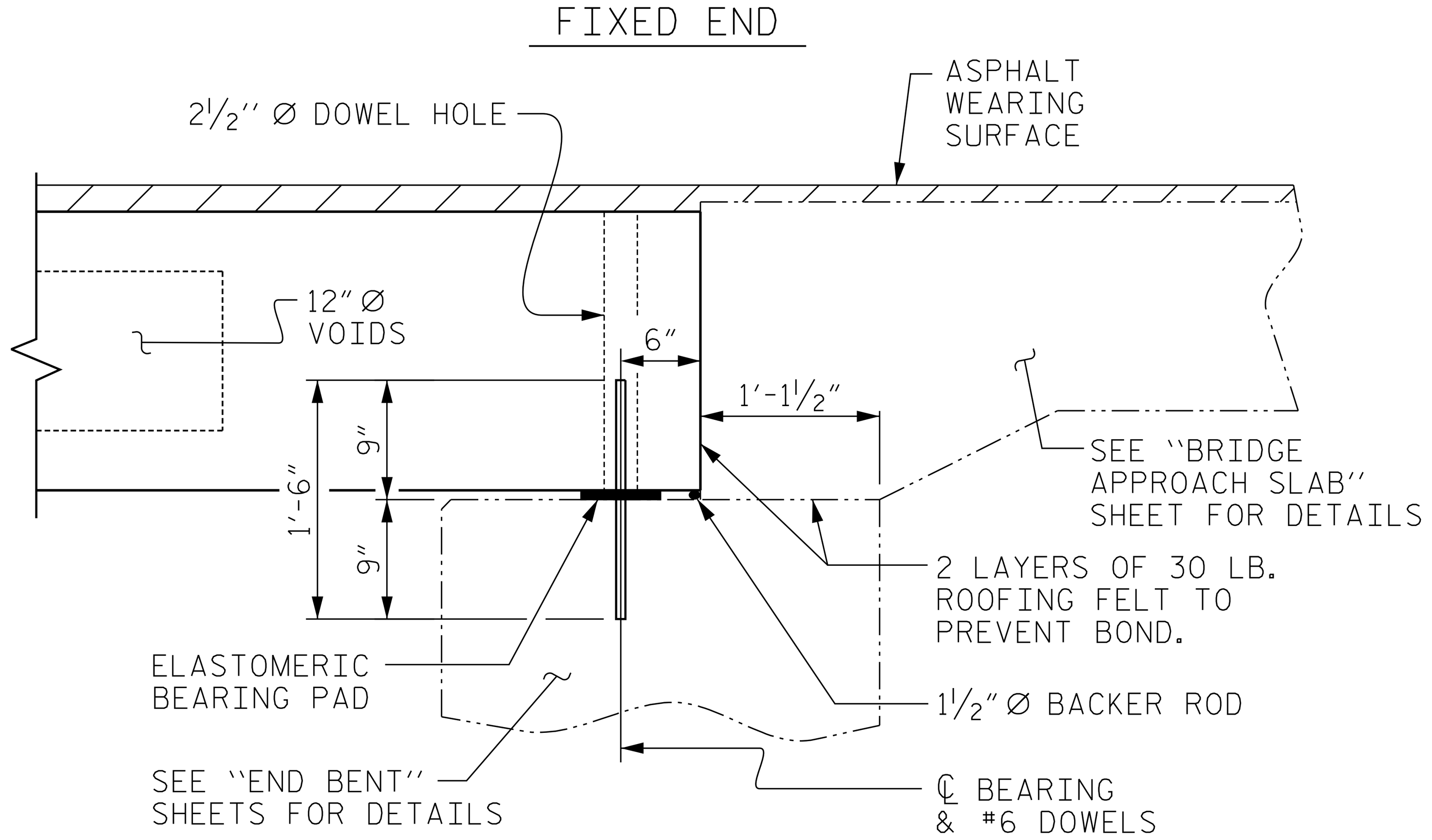
▲ STRAND #1 GOES THROUGH 6 CORED SLAB UNITS (TO BE TENSIONED DURING STAGE I CONSTRUCTION).	● STRAND #2 GOES THROUGH ALL 11 CORED SLAB UNITS (TO BE TENSIONED DURING STAGE II CONSTRUCTION).

GROUTED RECESS AT END OF POST-TENSIONED STRAND



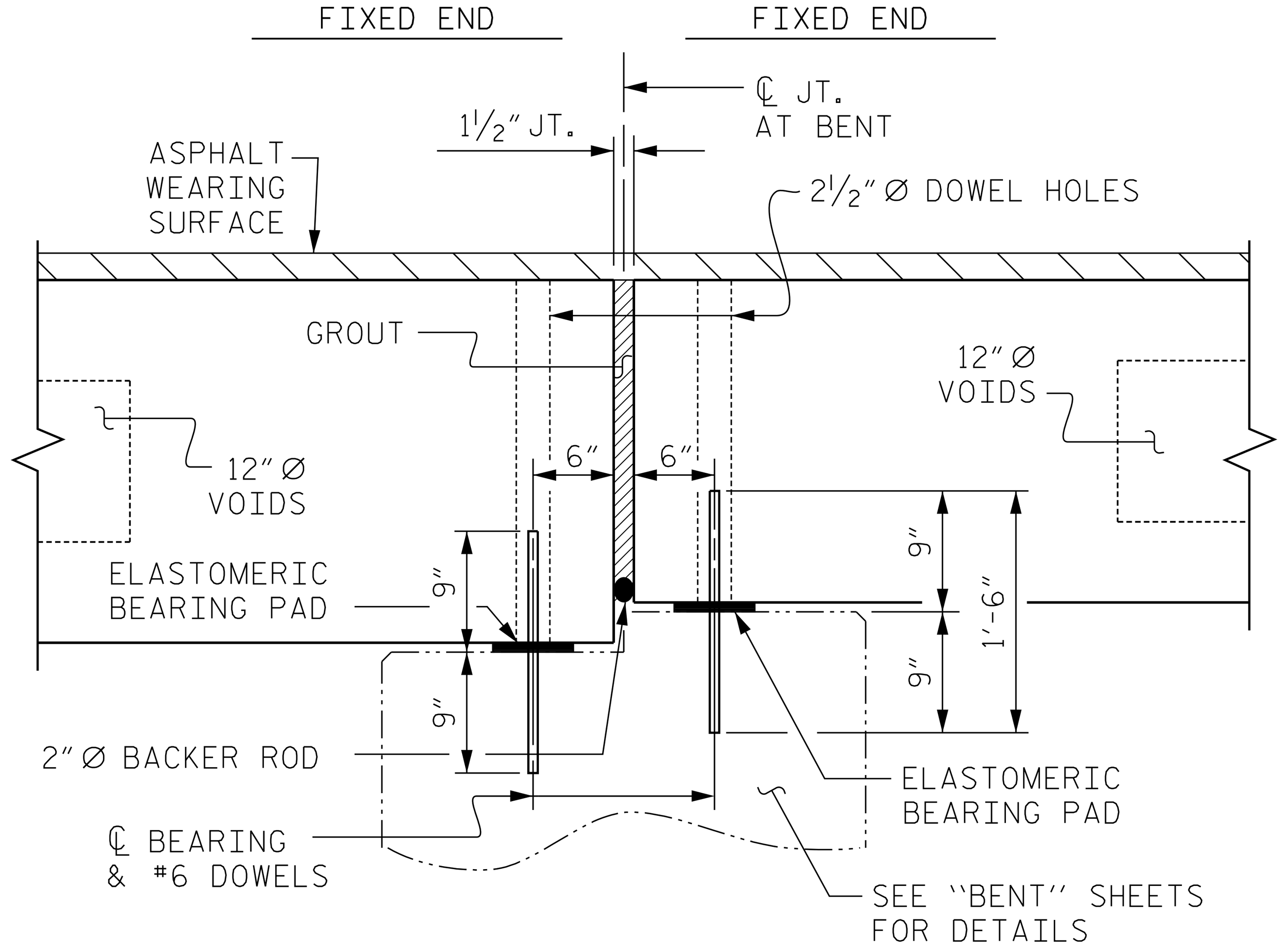
SHEAR KEY DETAIL
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.

FIXED END

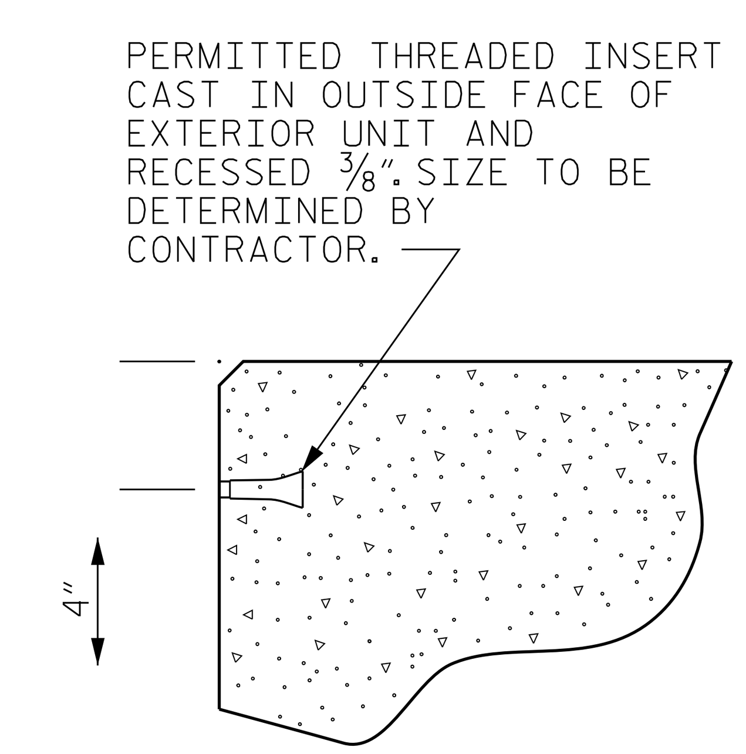


SECTION AT END BENT

FIXED END　FIXED END



SECTION AT BENT



THREADED INSERT DETAIL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 — DocuSigned by: [signature] 12/15/2023

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PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-
SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 1'-9"
PRESTRESSED CONCRETE
CORED SLAB UNIT

120° SKEW　SPAN 'B'

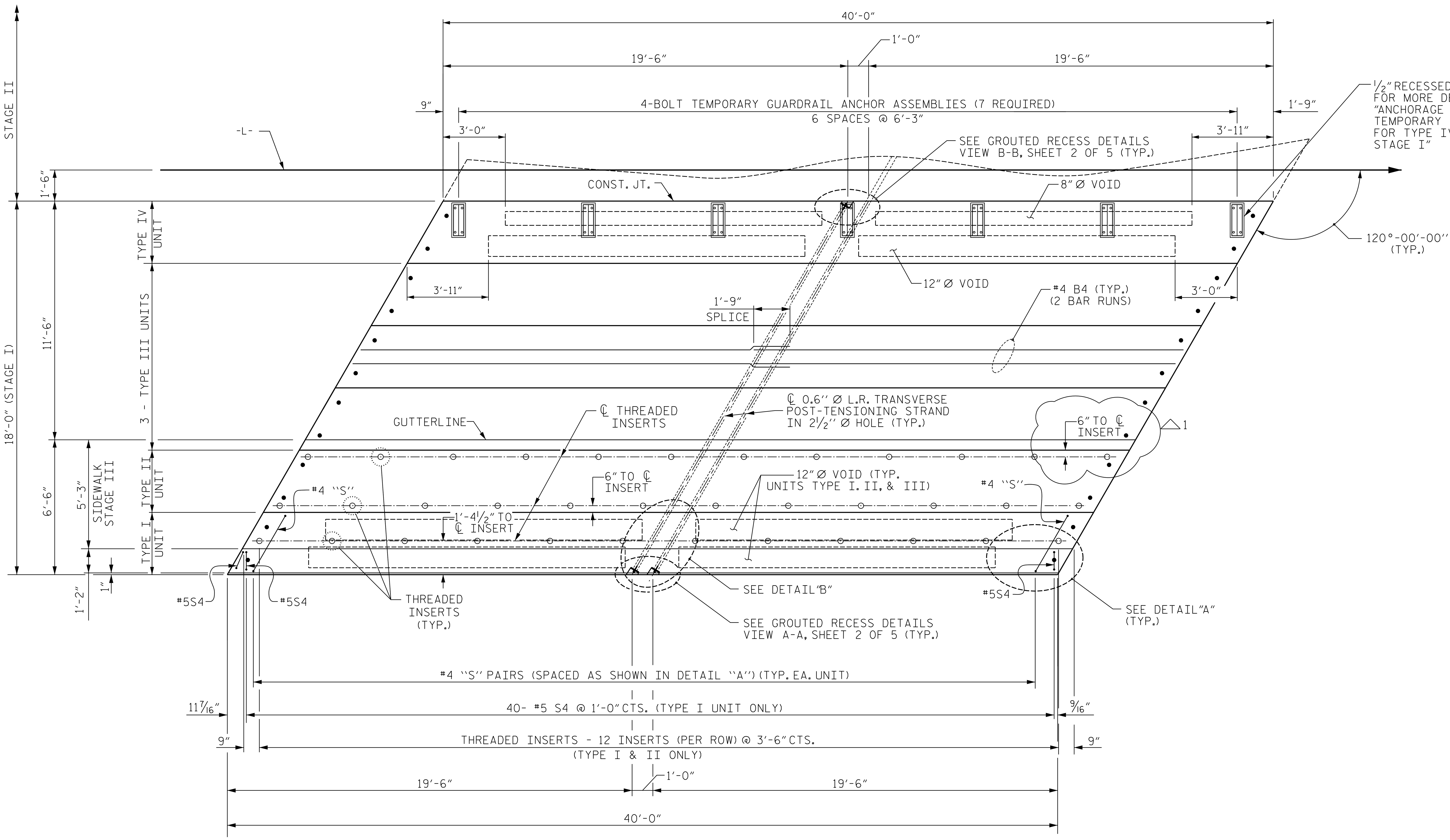
Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

DWN. BY: AW	DATE: 02/18
CHKD. BY: HLW	DATE: 02/18
DES. EGR. OF RECORD: RTS	DATE: 02/18

REVISIONS

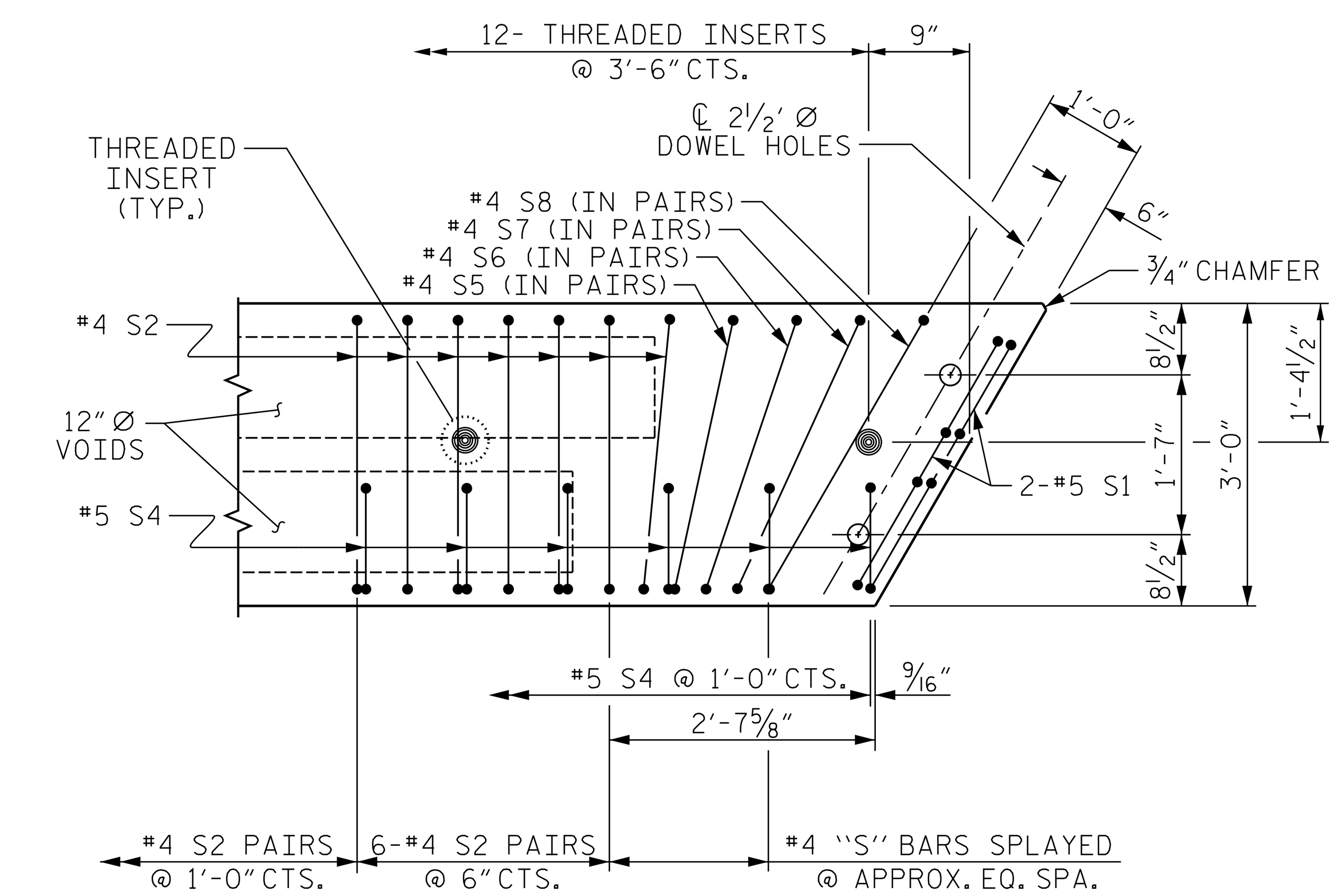
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S1-13
TOTAL SHEETS 40



PLAN OF SPAN 'B'

(STAGE I)



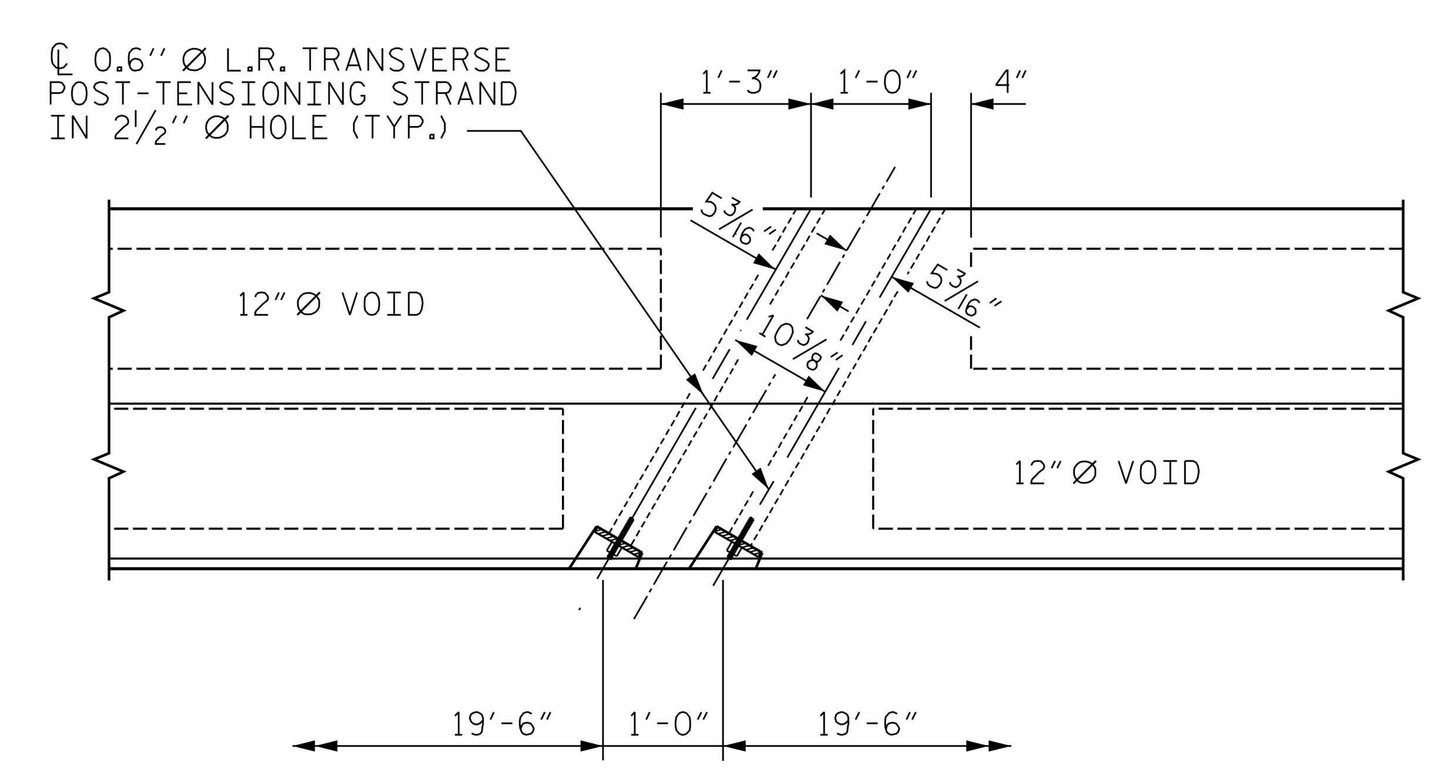
DETAIL "A"

(SIMILAR EACH END OF UNIT)

TYPE I UNIT SHOWN- OTHER UNITS SIMILAR EXCEPT OMIT #5 S4 BARS FOR TYPE II THRU TYPE IV UNITS.

1 ROW OF STRUCTURAL CONCRETE INSERTS FOR TYPE I ONLY.

2 ROWS OF STRUCTURAL CONCRETE INSERTS FOR TYPE II ONLY.



DETAIL "B"

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 40' UNIT
30'-10" CLEAR ROADWAY
120° SKEW

(STAGE I) SPAN "B"

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 RYAN TYLER SHIPMAN — DocuSigned by: 5/8/2024

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-14
1	SDR	5/7/2024	3			TOTAL SHEETS
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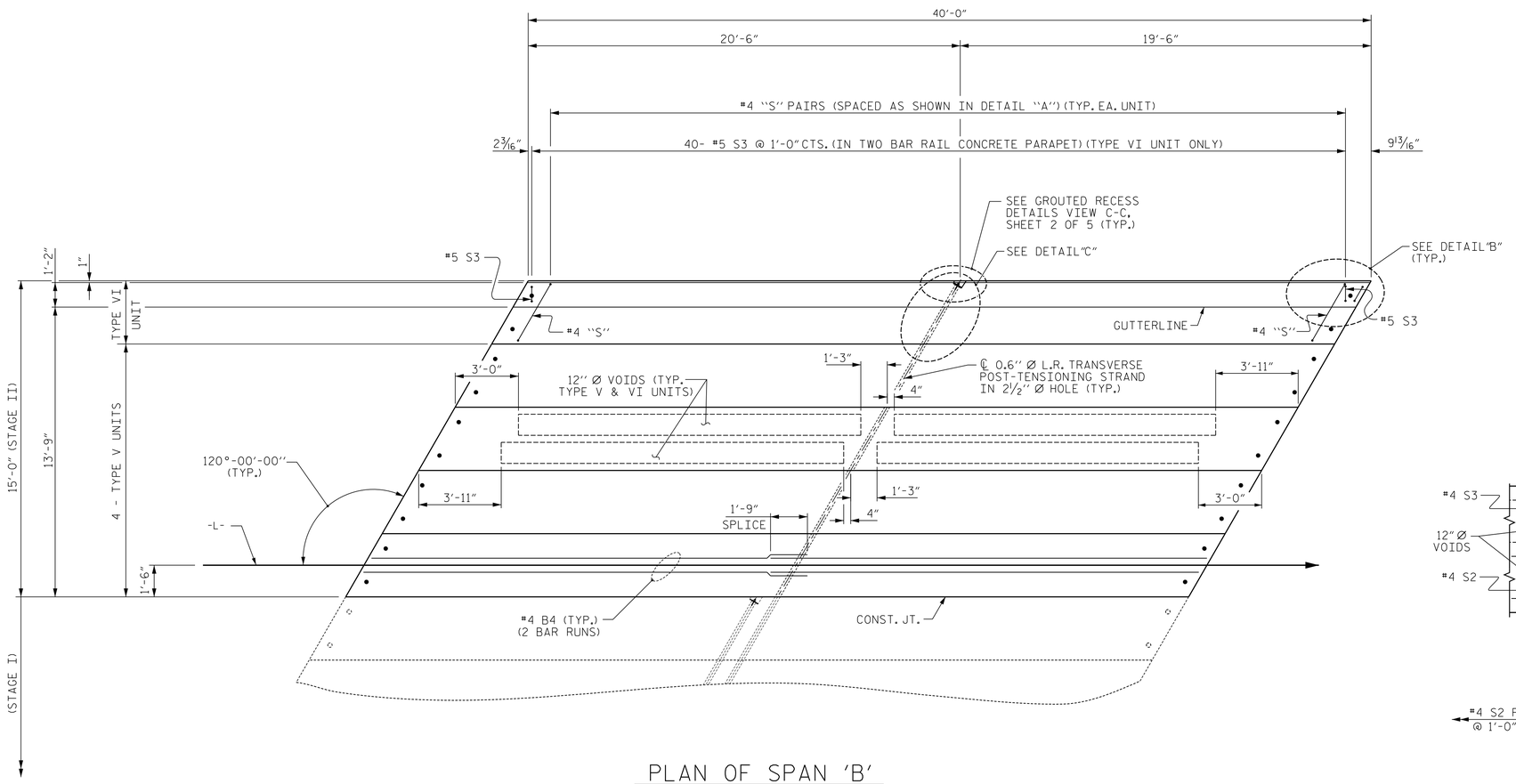
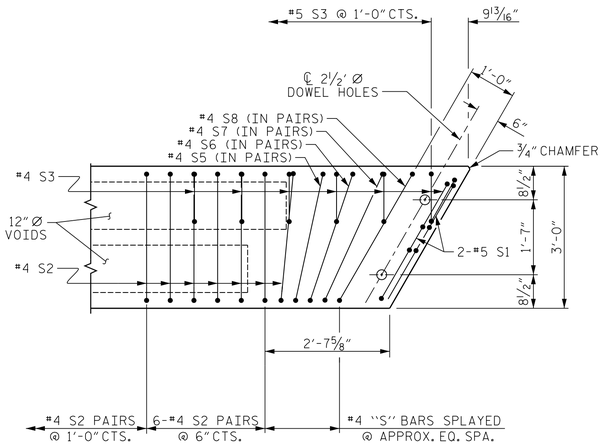
ASSEMBLED BY :	MAF	DATE :	02/18
CHECKED BY :	HLW	DATE :	02/18



PLAN OF SPAN 'B'

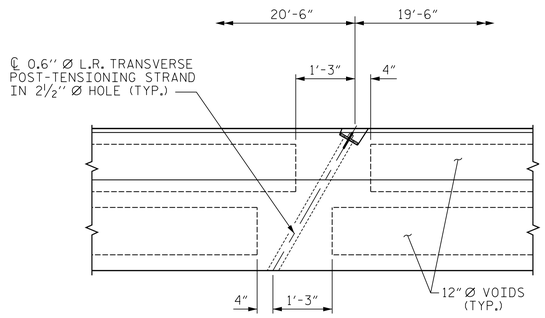
(STAGE II)



DETAIL "B"

(SIMILAR EACH END OF UNIT)

TYPE VI UNIT SHOWN- OTHER UNITS SIMILAR
EXCEPT OMIT #5 S3 BARS FOR TYPE V UNITS.



DETAIL "C"

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 40' UNIT 120° SKEW

(STAGE II) SPAN "B"

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 TYLER SHARMAN
DocuSigned by: Tyler Sharman 13D8...
12/15/2023

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-15
1			3			TOTAL SHEETS
2			4			40

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY :	MAF	DATE : 02/18
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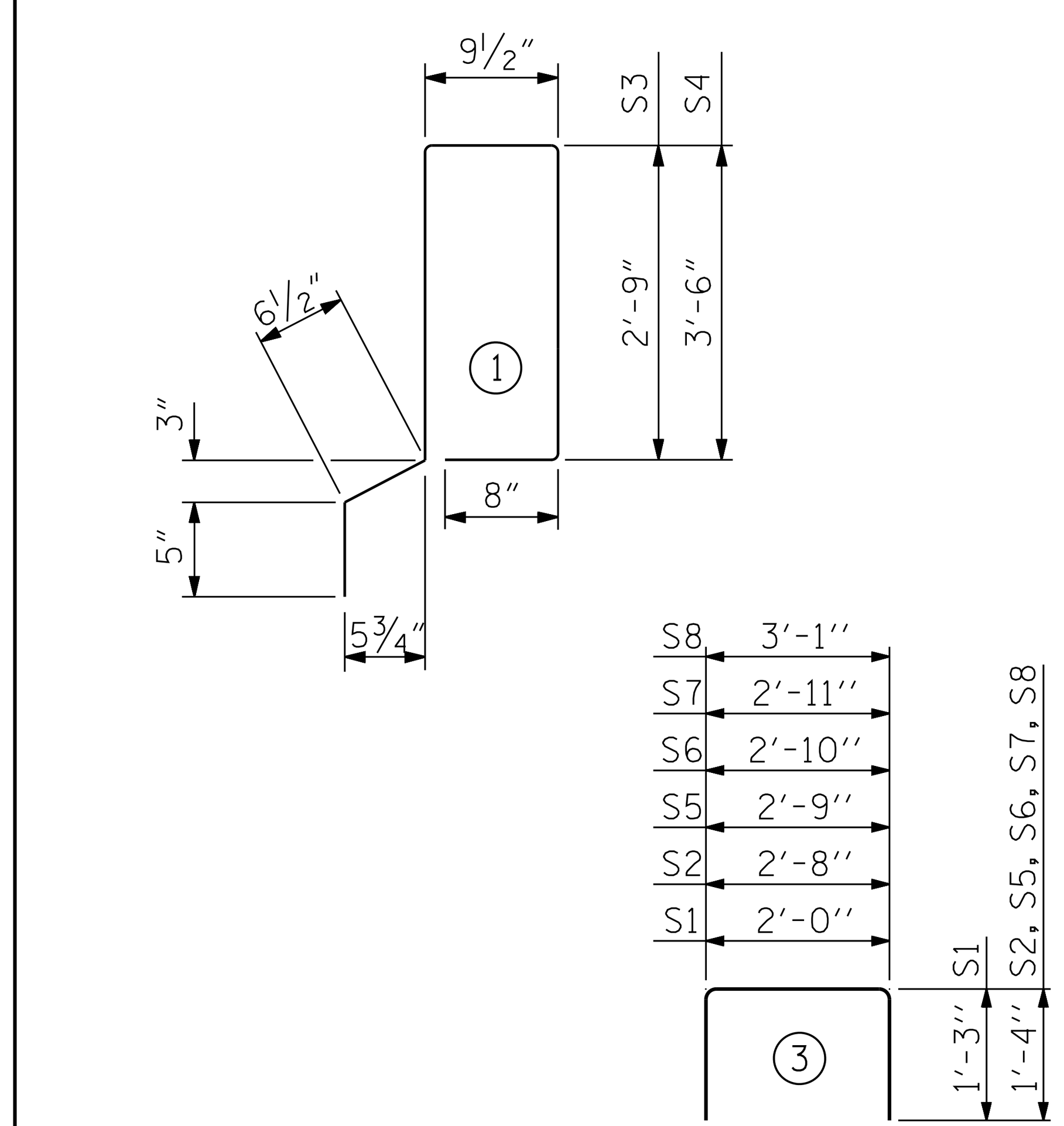
CORED SLABS REQUIRED
(40' UNIT)

UNIT	NUMBER	LENGTH	TOTAL LENGTH
TYPE I	1	40'-0"	40'-0"
TYPE II	1	40'-0"	40'-0"
TYPE III	3	40'-0"	120'-0"
TYPE IV	1	40'-0"	40'-0"
TYPE V	4	40'-0"	160'-0"
TYPE VI	1	40'-0"	40'-0"
TOTAL	11		440'-0"

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

DEAD LOAD DEFLECTION AND CAMBER

	3'-0" x 1'-9"
40' CORED SLAB UNIT	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	13/16" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD **	3/16" ↓
FINAL CAMBER	5/8" ↑

** INCLUDES FUTURE WEARING SURFACE

BILL OF MATERIAL FOR ONE 40' CORED SLAB UNIT

				TYPE I UNIT		TYPE II-V UNITS		TYPE VI UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
B4	4	#4	STR	20'-9"	55	20'-9"	55	20'-9"	55
S1	8	#5	3	4'-6"	38	4'-6"	38	4'-6"	38
S2	82	#4	3	5'-4"	292	5'-4"	292	5'-4"	292
* S3	41	#5	1					7'-11"	339
* S4	41	#5	1	9'-5"	403				
S5	4	#4	3	5'-5"	14	5'-5"	14	5'-5"	14
S6	4	#4	3	5'-6"	15	5'-6"	15	5'-6"	15
S7	4	#4	3	5'-7"	15	5'-7"	15	5'-7"	15
S8	4	#4	3	5'-9"	15	5'-9"	15	5'-9"	15
REINFORCING STEEL LBS.					444		444		444
* EPOXY COATED REINFORCING STEEL LBS.					403				339
5000 P.S.I. CONCRETE CU. YDS.					5.9		5.9		6.4
0.6" Ø L.R. STRANDS No.					13		13		13

CONCRETE RELEASE STRENGTH

UNIT	PSI
40' UNITS	4000

GRADE 270 STRANDS

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

GUTTERLINE ASPHALT THICKNESS

	ASPHALT OVERLAY THICKNESS	
	LEFT GUTTERLINE	RIGHT GUTTERLINE
℄ BRG. @ BENT #1	3½"	3½"
MIDSPAN	2⅞"	2⅞"
℄ BRG. @ END BENT #2	3½"	3½"

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 CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2½" Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FROM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN THE REQUIRED STRENGTH SHOWN IN THE "CONCRETE RELEASE STRENGTH" TABLE.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

1△ THE CONTRACTOR MAY USE SLEEVE INSERTS IN LIEU OF THREADED INSERTS FOR THE #4 DOWELS IN THE TYPE I AND TYPE II PRECAST CORED SLABS. IF USED, THESE INSERTS SHALL HAVE ¾" INSIDE DIAMETER, SEALED TO PREVENT CONCRETE FILLING DURING FABRICATION, AND SHALL BE 4" LONG. THE #4 DOWELS IN THE SIDEWALK ARE TO BE INSERTED INTO THESE SLEEVES DURING STAGE III. THE DOWELS SHALL BE GROUTED IN USING NON-SHRINK EPOXY GROUT. THE COST OF THE INSERTS AND GROUT ARE TO BE INCIDENTAL TO THE COST OF THE CORED SLABS.

PROJECT NO. 14SP.2044.1

HAYWOOD COUNTY

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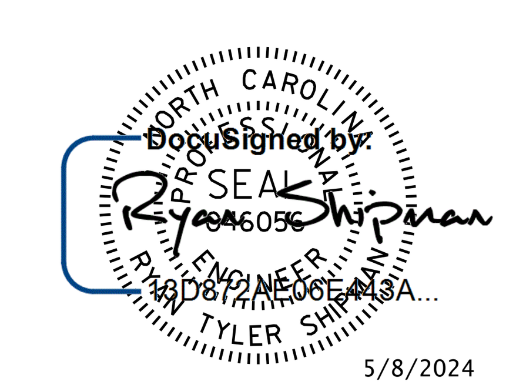
SHEET 5 OF 5



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 1'-9"
PRESTRESSED CONCRETE
CORED SLAB UNIT

120° SKEW — SPAN 'B'

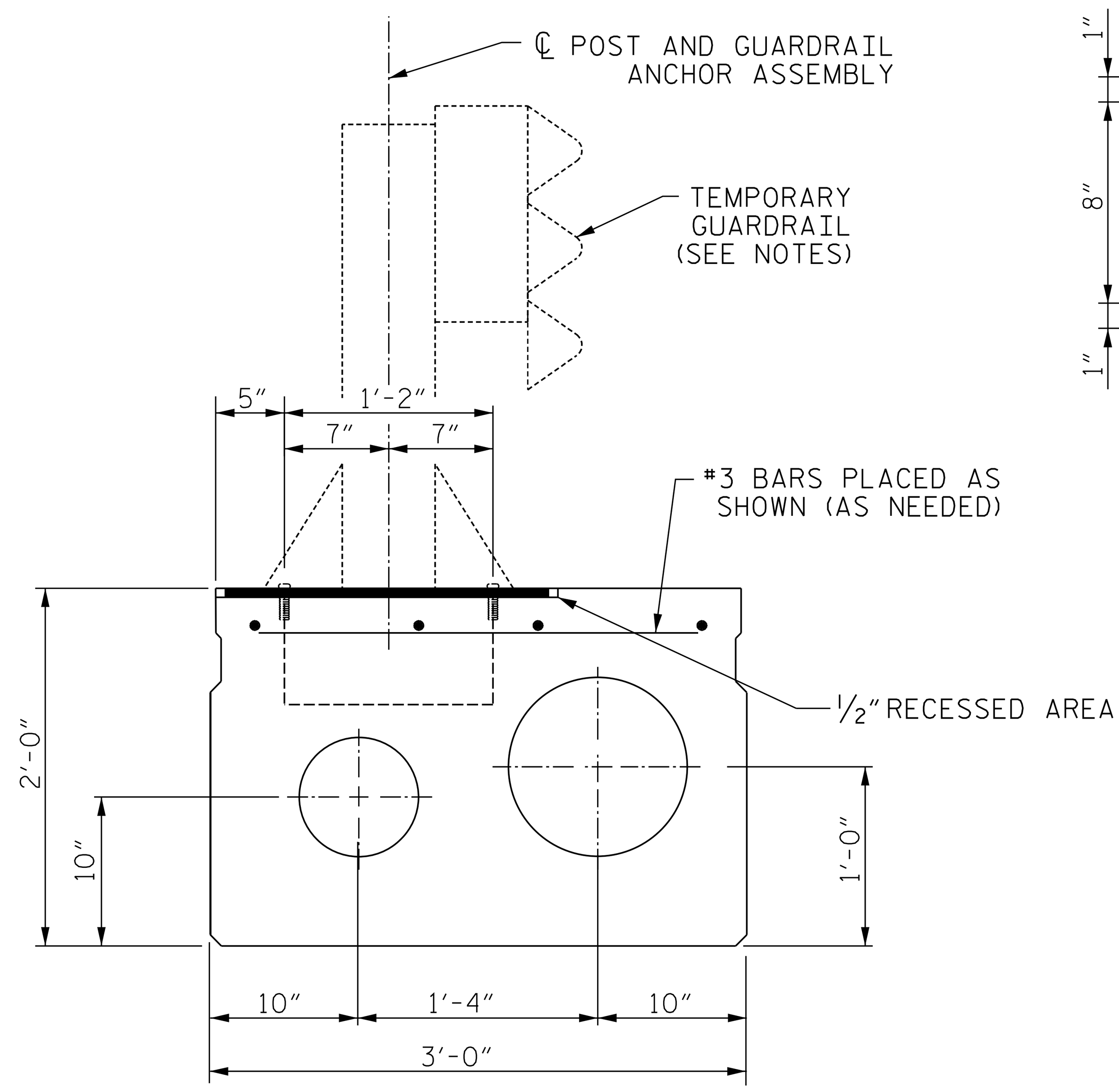
REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S1-16
1	SDR	5/7/2024	3				TOTAL SHEETS
2			4				40

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY: MAF	DATE: 02/18	
CHECKED BY: HLW	DATE: 02/18	
DRAWN BY: DGE 5/09 CHECKED BY: BCH 6/09	REV. 5/18	MAA/THC

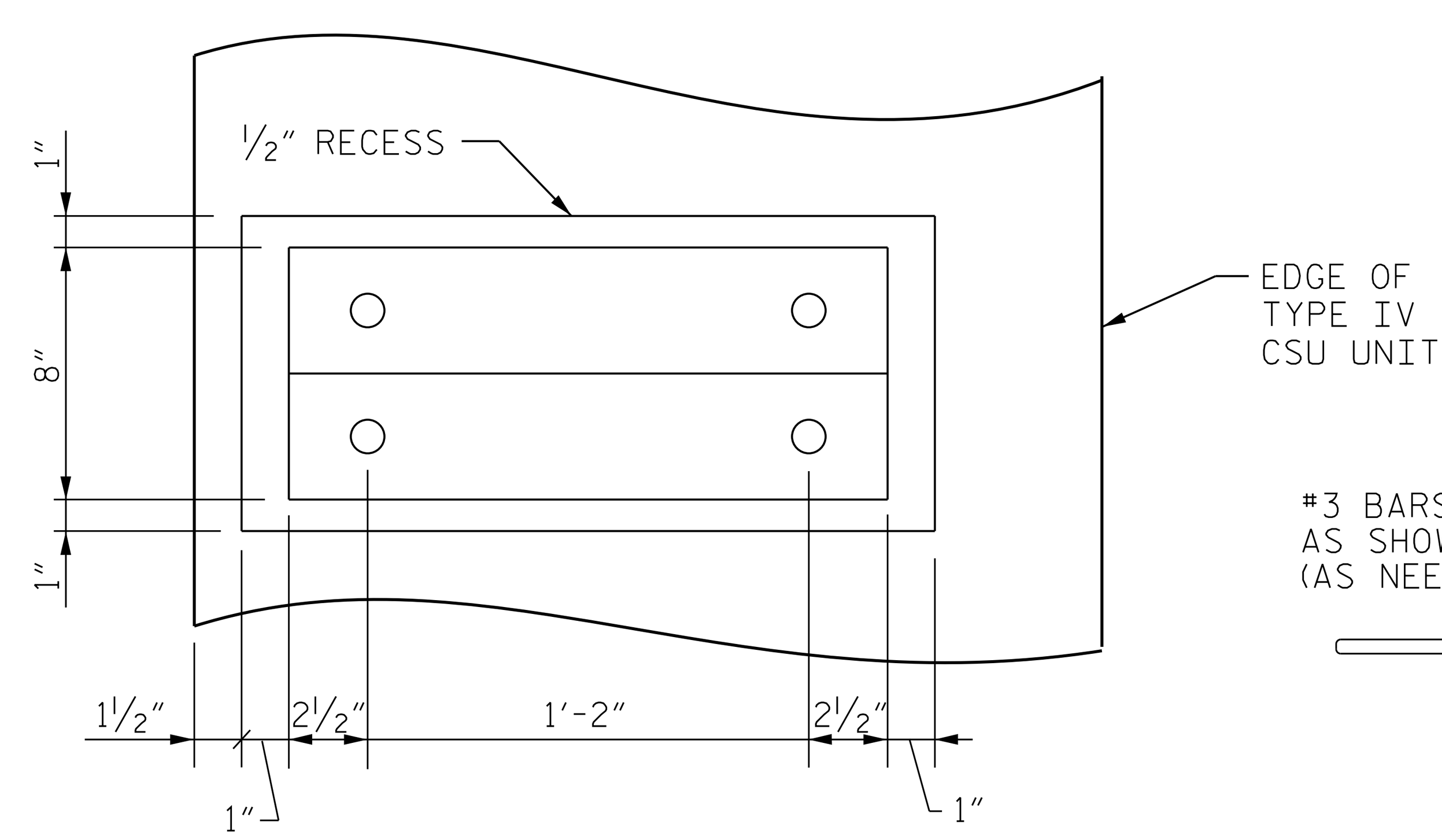
STD. NO. 21" PCS3_33_120S

RAIL POST SPACING FOR TEMPORARY GUARDRAIL - STAGE I

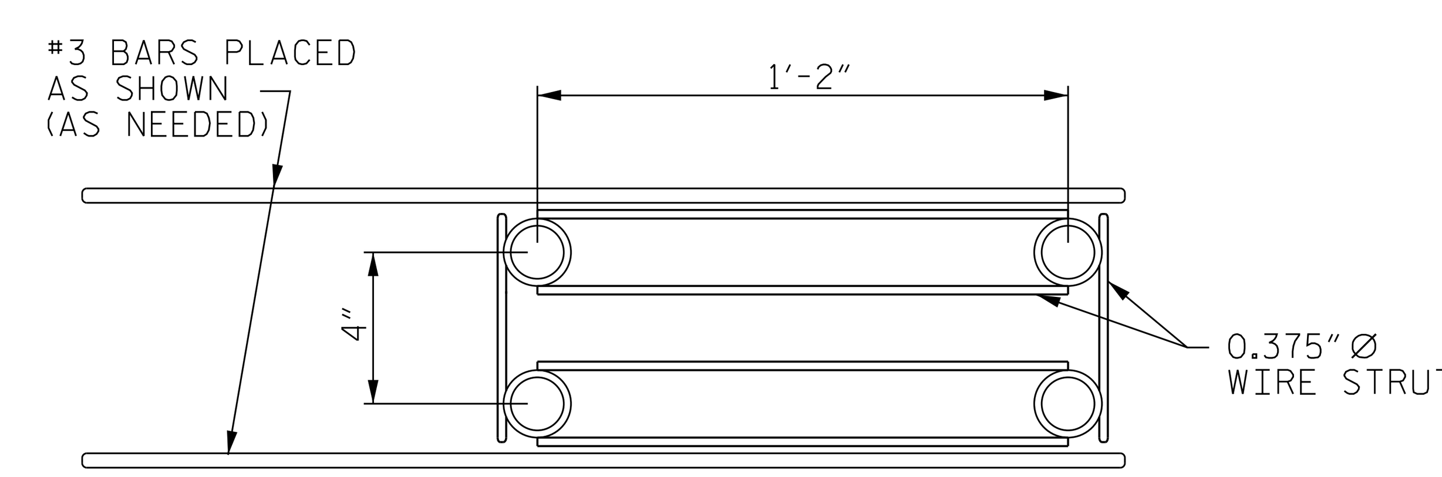


SECTION OF ANCHOR ASSEMBLY LOCATION

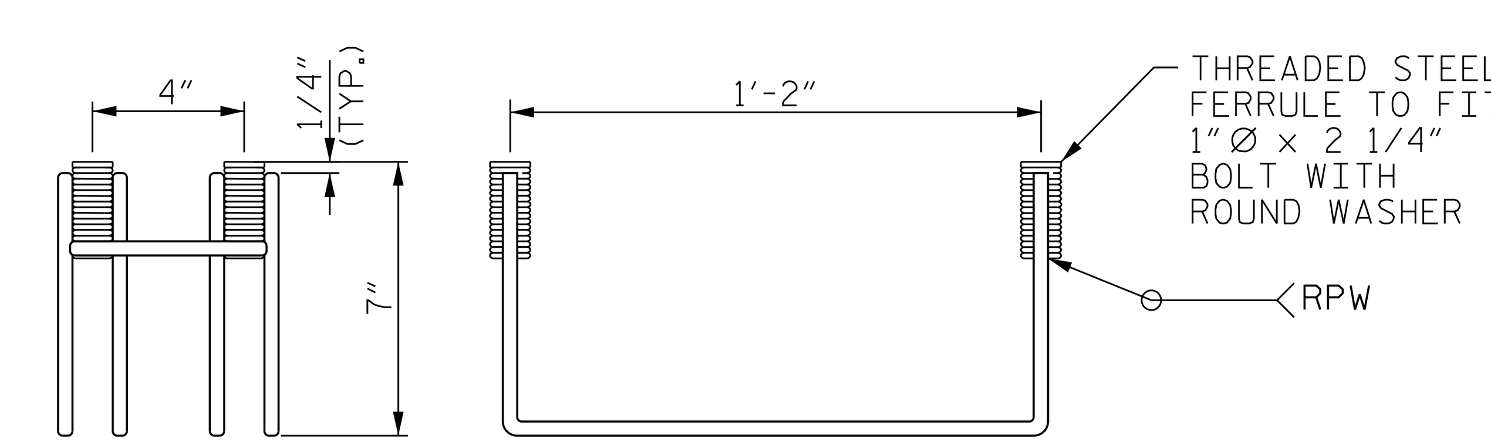
(TYPE IV UNIT - STAGE I) (2'-0" CSU SHOWN, 1'-9" CSU SIMILAR)
THE #3 BARS ARE INCIDENTAL AND THEIR COST SHALL BE INCLUDED IN THE PRICE BID FOR THE PRESTRESSED CONCRETE CORED SLABS.



PLAN OF RECESSED AREA



PLAN



SIDE VIEW ELEVATION

MINIMUM LENGTH OF THREADS IN INSERT (FERRULE): 2 1/2"

TEMPORARY GUARDRAIL ANCHOR ASSEMBLY

(19 ASSEMBLIES REQUIRED IN THE TYPE IV CORED SLAB UNITS)
(6 ASSEMBLIES REQUIRED IN THE APPROACH SLABS)

NOTES

THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2 1/2".

B. 4 - 1" Ø X 2 1/4" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2 1/4" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY DETAIL ARE THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI.

TEMPORARY GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO ENSURE FIT.

THE COST OF THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY COMPLETE IN PLACE SHALL BE INCLUDED, AS APPLICABLE, IN THE UNIT CONTRACT PRICE BID FOR 3'-0" X 1'-9" OR 3'-0" X 2'-0" PRESTRESSED CONCRETE CORED SLAB OR LUMP SUM PRICE BID FOR APPROACH SLABS.

FERRULES SHALL BE PLUGGED DURING CASTING OF THE CORED SLAB UNITS OR POURING OF APPROACH SLAB AS RECOMMENDED BY THE MANUFACTURER.

ONCE THE TEMPORARY GUARDRAIL HAS BEEN REMOVED, THE 1/2" RECESS SHALL BE FILLED WITH GROUT.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

PAYMENT FOR TEMPORARY GUARDRAIL, AND POST IS INCLUDED IN ROADWAY PAY ITEMS. THE POST BASE PLATES SHALL BE INCLUDED IN THE PAY ITEM FOR THE ANCHOR ASSEMBLIES.

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056
DocuSigned by: 13D84...43A...
12/15/2023

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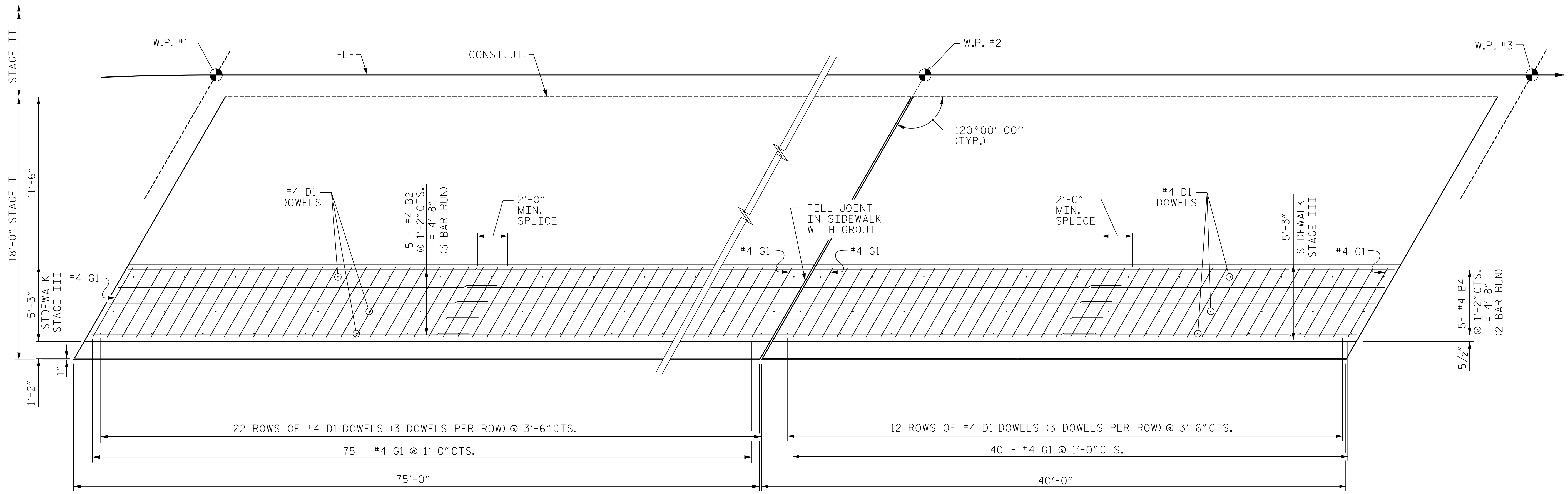
DEPARTMENT OF TRANSPORTATION
RALEIGH

ANCHORAGE DETAILS FOR TEMPORARY GUARDRAIL ANCHOR ASSEMBLY FOR TYPE IV CORED SLAB UNIT - STAGE I

DWN. BY: AW	DATE: 02/18	NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO. S1-17
CHKD. BY: HLW	DATE: 02/18	1			3			TOTAL SHEETS
DES. EGR. OF RECORD: RTS	DATE: 02/18	2			4			40

REVISIONS



PLAN OF UNIT - SPAN "A"

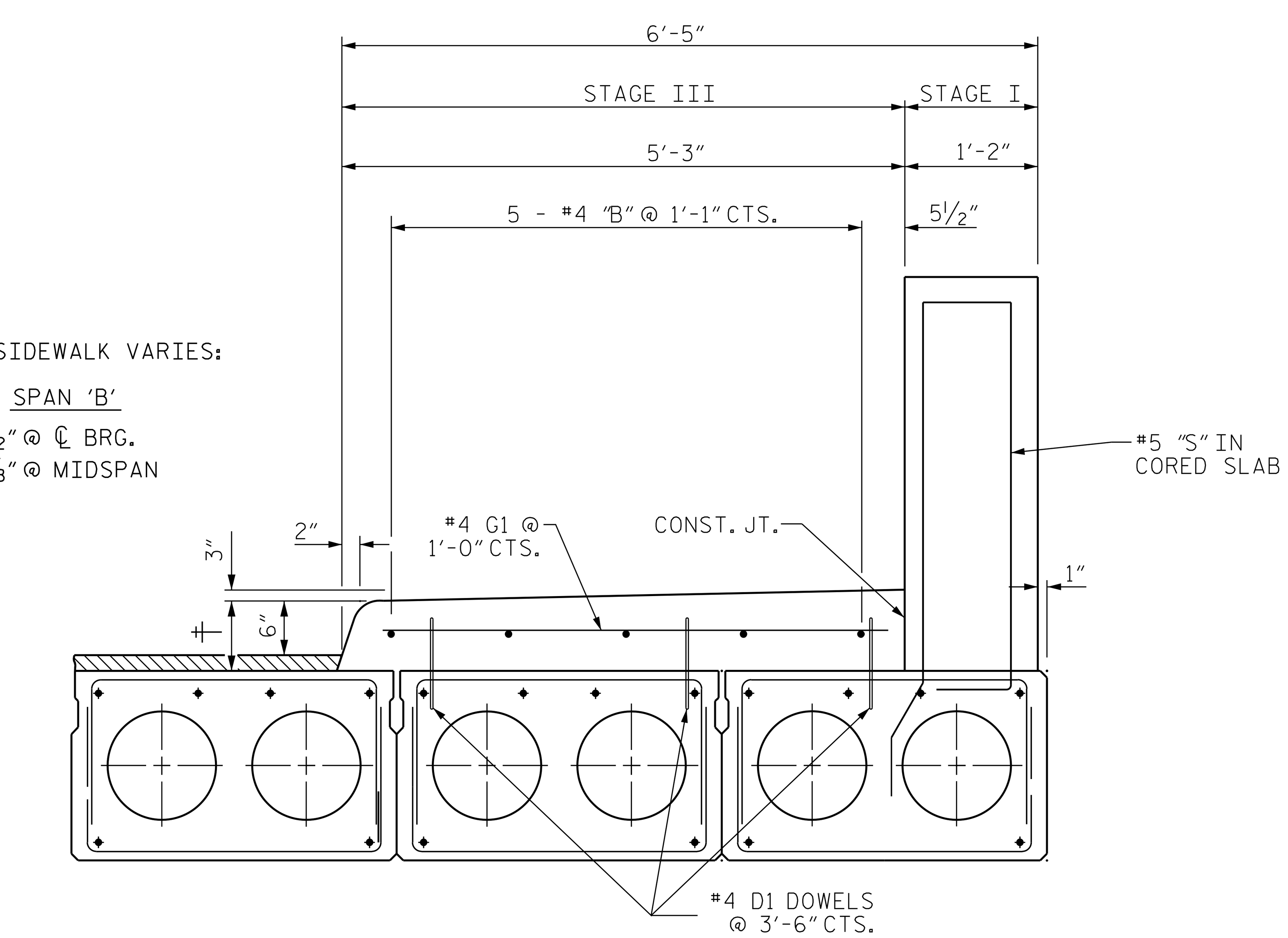
PLAN OF UNIT - SPAN "B"

BILL OF MATERIAL					
SIDEWALK					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B2	15	#4	STR	26′-3″	263
B4	10	#4	STR	20′-10″	139
D1	102	#4	STR	8″	45
G1	115	#4	STR	5′-6″	423
EPOXY COATED REINFORCING STEEL				LBS.	870
CLASS AA CONCRETE				C. Y.	20.8
ALL BAR DIMENSIONS ARE OUT TO OUT					

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2′-0″	1′-9″
#5	2′-6″	2′-2″
#6	3′-10″	2′-7″

† OVERALL HEIGHT OF TOE OF SIDEWALK VARIES:

SPAN 'A'	SPAN 'B'
9¹¹⁄₁₆″ @ ℄ BRG. END BENT NO. 1	9½″ @ ℄ BRG.
8¹⁄₁₆″ @ MIDSPAN	8⅞″ @ MIDSPAN
9½″ @ ℄ BRG. BENT NO. 1	



SECTION THRU SIDEWALK

NOTES:

GROOVED CONTRACTION JOINTS ½″ IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF SIDEWALK IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FT. IN LENGTH.

ALL REINFORCING STEEL IN SIDEWALK SHALL BE EPOXY COATED.

PAYMENT FOR SIDEWALK, SHALL BE INCLUDED IN THE PAY ITEMS FOR "CLASS AA CONCRETE", AND "EPOXY COATED REINFORCING STEEL".

FOR TWO BAR RAIL END POST DETAILS, SEE "END OF RAIL DETAILS" SHEET.

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

DocuSigned by: 13D67AC6CE443A... 12/15/2023

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SIDEWALK DETAILS

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2			4			40

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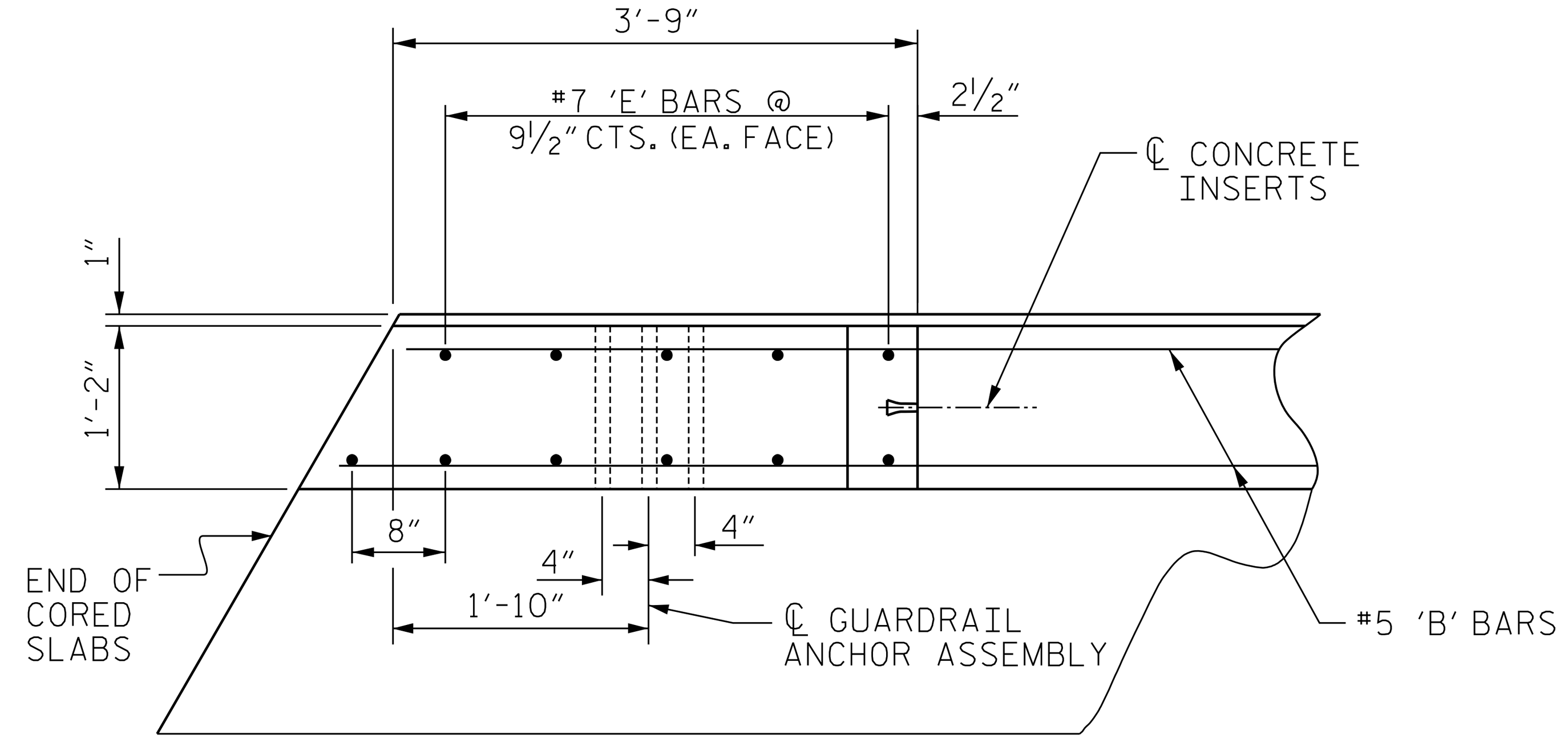
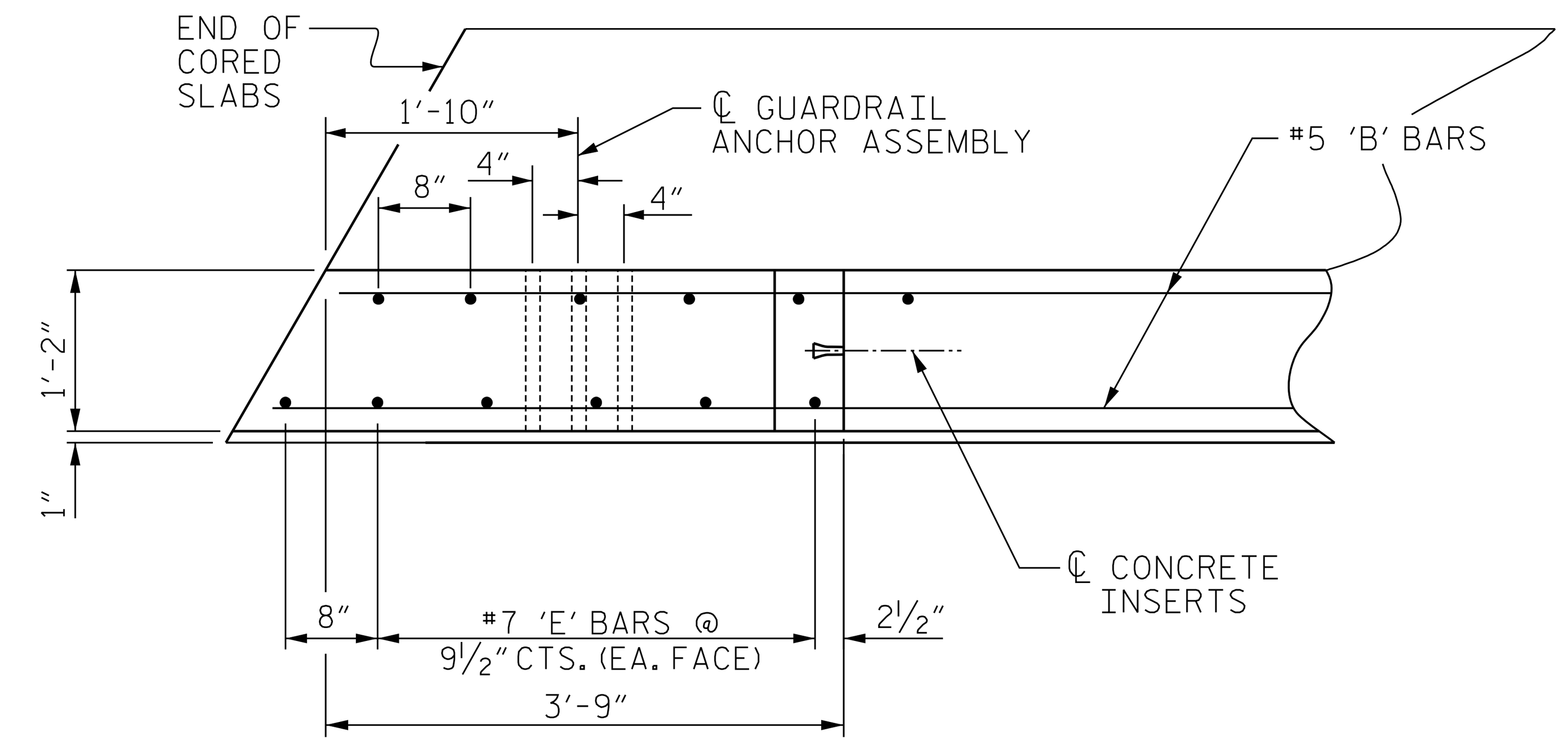
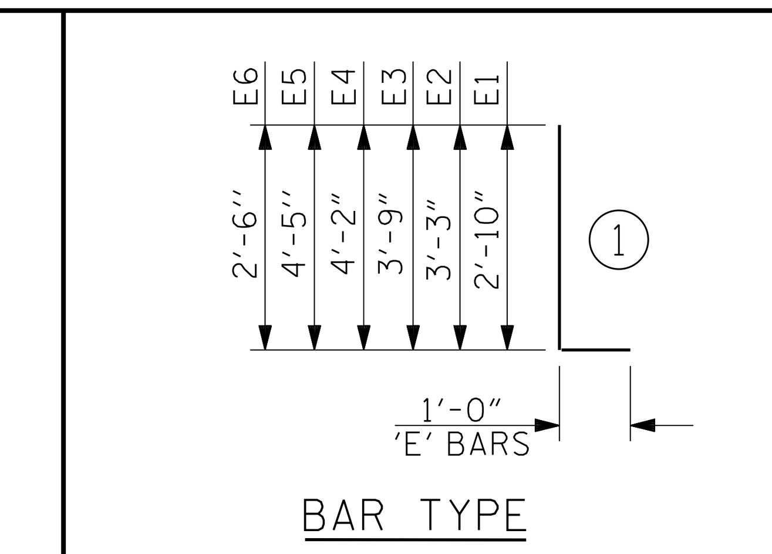


PLAN OF END POST



PLAN OF END POST



BAR TYPE

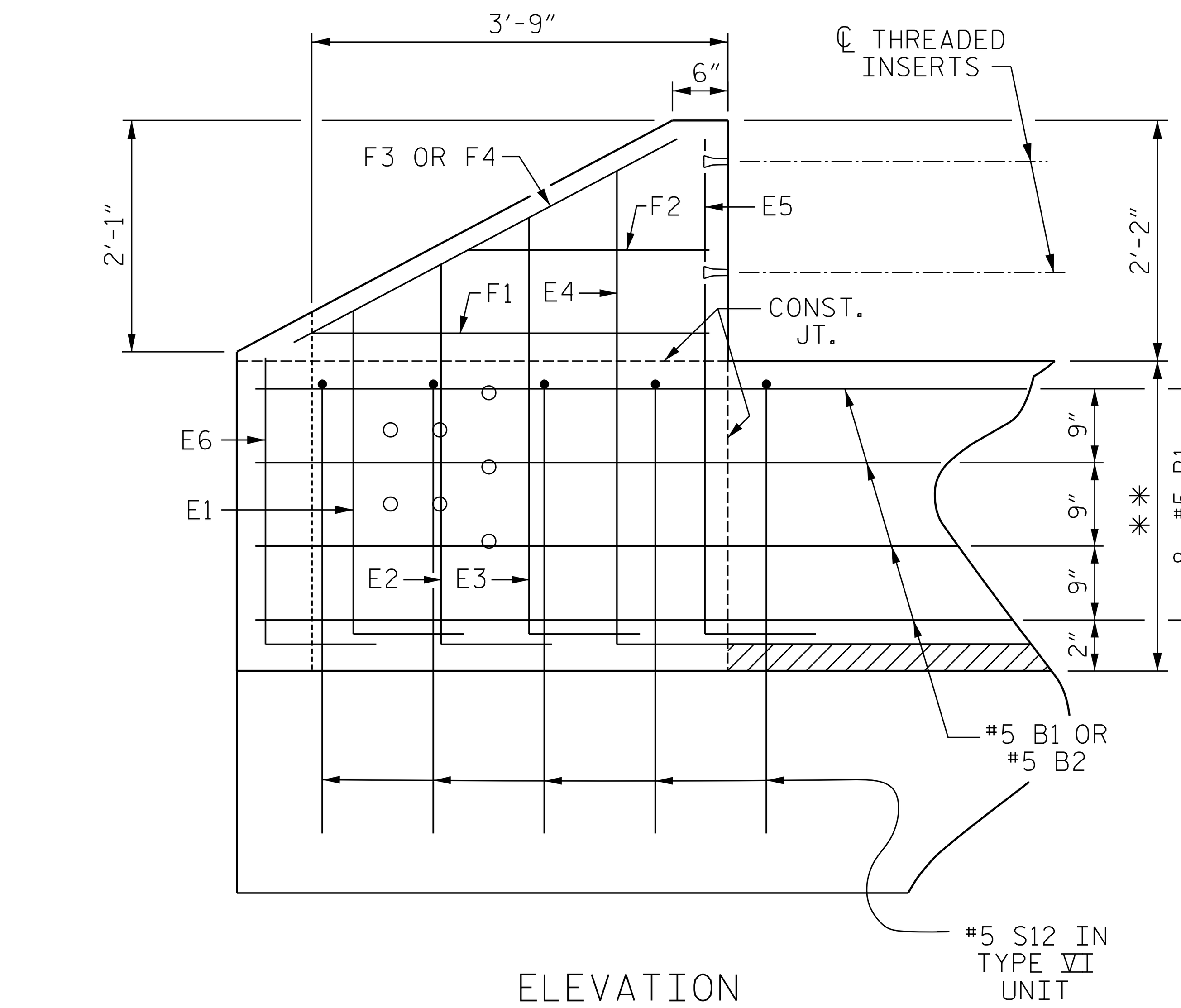
ALL BAR DIMENSIONS ARE OUT TO OUT.

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

BILL OF MATERIAL LEFT SIDE ONLY

PARAPET & 2 END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	16	#5	STR	38'-7"	644
B2	8	#5	STR	39'-7"	330
E1	4	#7	1	3'-10"	31
E2	4	#7	1	4'-3"	35
E3	4	#7	1	4'-9"	39
E4	4	#7	1	5'-2"	42
E5	4	#7	1	5'-5"	44
E6	2	#7	1	3'-6"	14
F1	4	#6	STR	3'-7"	22
F2	4	#6	STR	2'-2"	13
F3	2	#6	STR	3'-11"	12
F4	2	#6	STR	3'-7"	11
EPOXY COATED REINFORCING STEEL				LBS.	1,237
CLASS AA CONCRETE				C. Y.	14.0
1'-2" X 2'-9½" CONCRETE PAPAPET					106.83 LIN. FT



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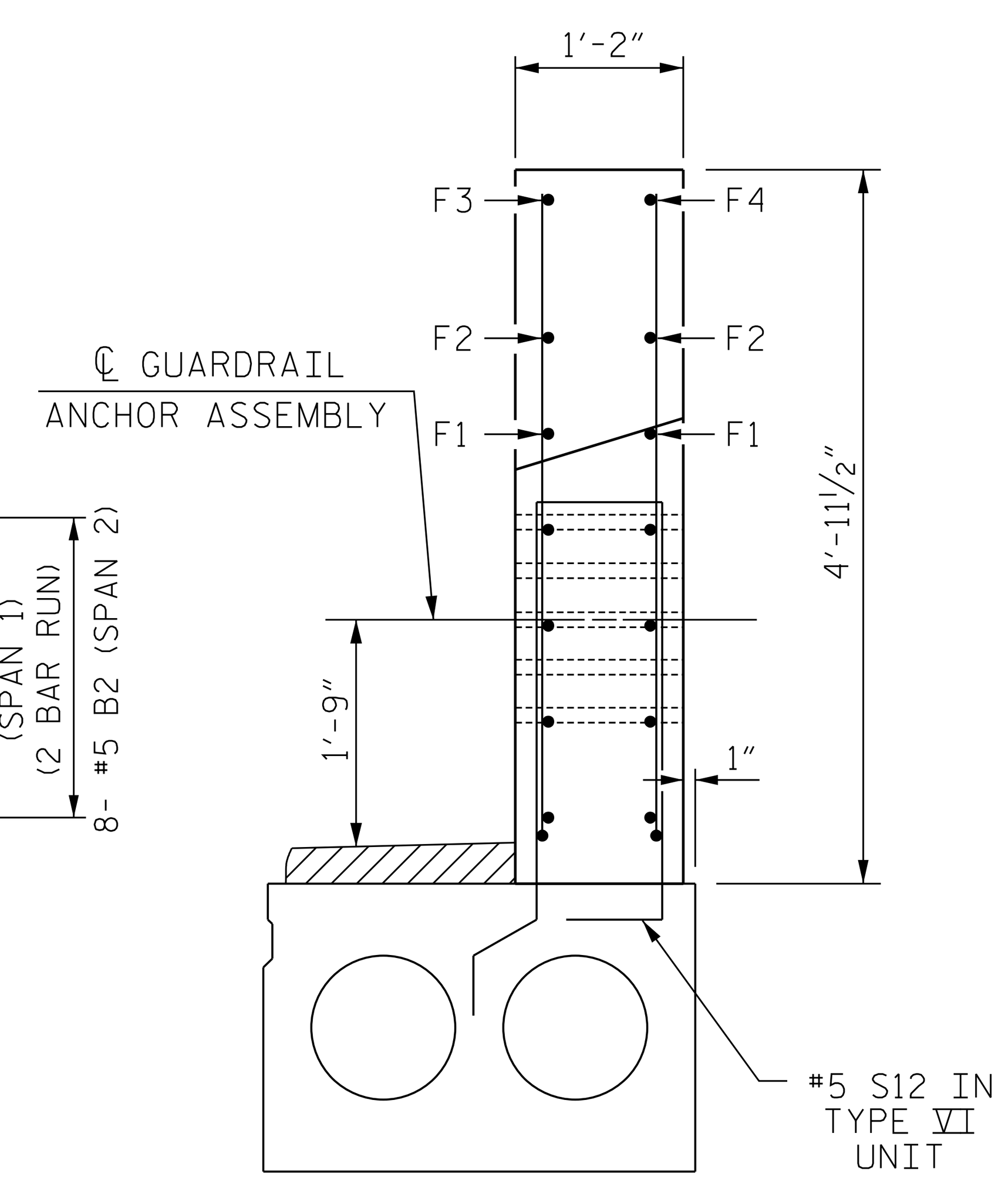
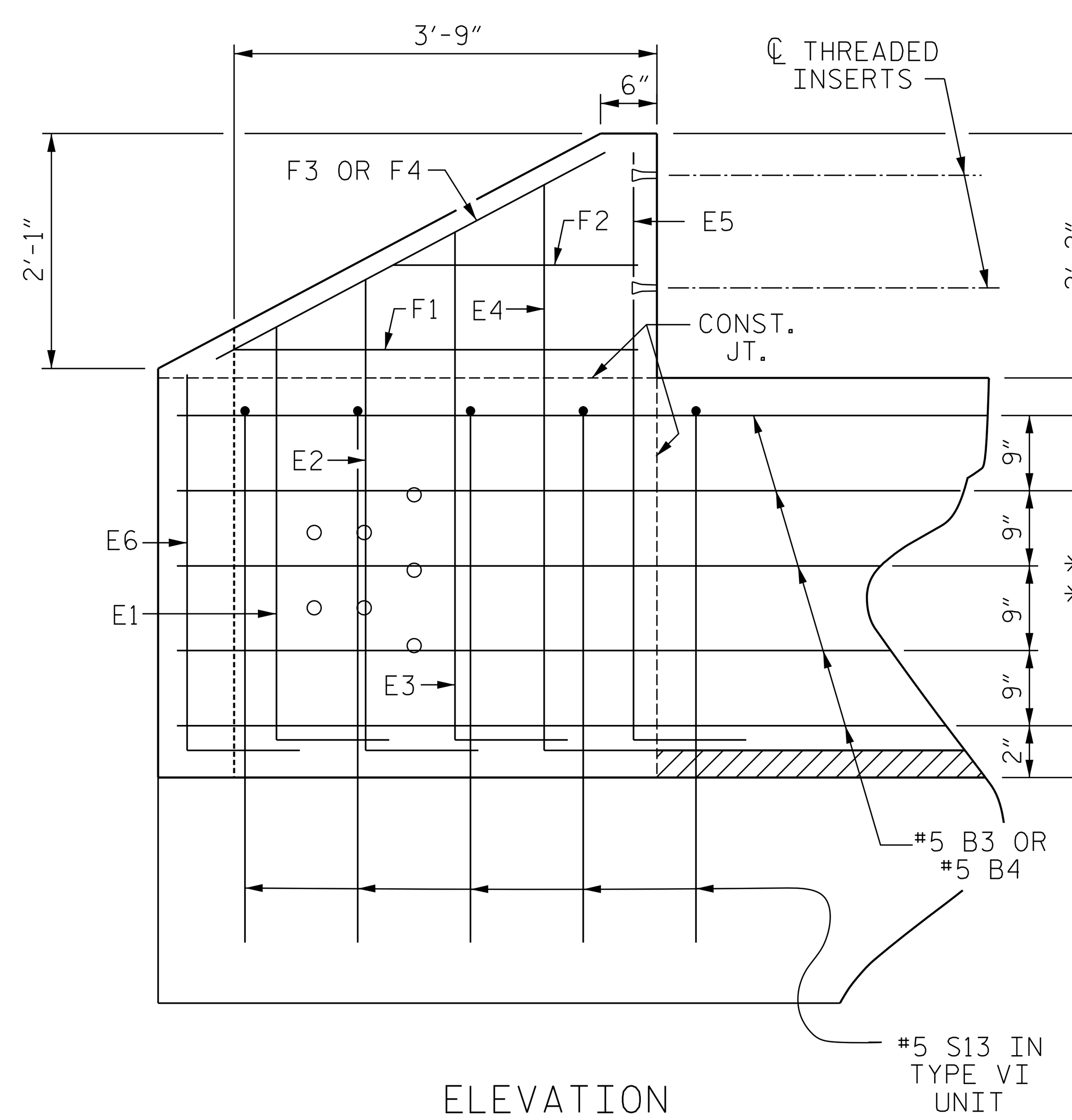


END VIEW



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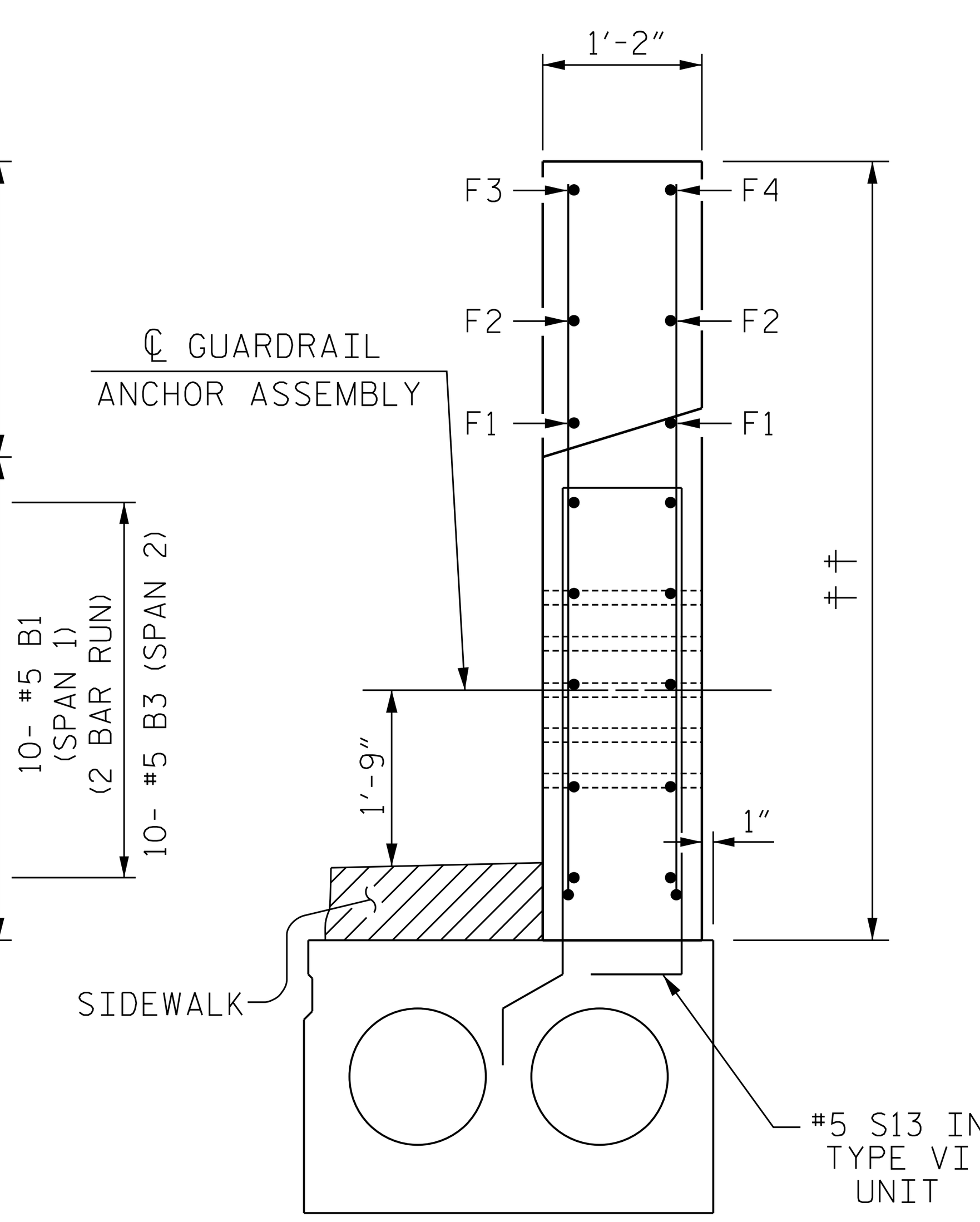

END VIEW

BILL OF MATERIAL RIGHT SIDE ONLY

PARAPET & 2 END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B3	20	#5	STR	38'-7"	805
B4	10	#5	STR	39'-7"	413
E1	4	#7	1	4'-8"	38
E2	4	#7	1	5'-1"	42
E3	4	#7	1	5'-6"	45
E4	4	#7	1	5'-11"	48
E5	4	#7	1	6'-2"	50
E6	2	#7	1	4'-4"	18
F1	4	#6	STR	3'-7"	22
F2	4	#6	STR	1'-11"	12
F3	2	#6	STR	3'-7"	11
F4	2	#6	STR	3'-11"	12
EPOXY COATED REINFORCING STEEL				LBS.	1,516
CLASS AA CONCRETE				C. Y.	17.8
1'-2" X 3'-6½" CONCRETE PAPAPET					106.83 LIN. FT

PARAPET AND END POST DETAILS FOR TWO BAR RAIL - LEFT SIDE

BEGIN BRIDGE SHOWN, END BRIDGE SIMILAR.
(FOR LEFT SIDE BILL OF MATERIAL, SEE THIS SHEET.)

✱✱ PARAPET HEIGHT VARIES

SPAN 'A'	SPAN 'B'
2'-9½" @ ℄ BRG.	2'-9½" @ ℄ BRG.
2'-8¹/₁₆" @ MIDSPAN	2'-8⅞" @ MIDSPAN

PARAPET AND END POST DETAILS FOR TWO BAR RAIL - RIGHT SIDE

BEGIN BRIDGE SHOWN, END BRIDGE SIMILAR.
(FOR RIGHT SIDE BILL OF MATERIAL, SEE SHEET S1-18.)

✱✱ PARAPET HEIGHT VARIES

SPAN 'A'	SPAN 'B'
3'-6¹¹/₁₆" @ ℄ BRG. END BENT NO. 1	3'-6½" @ ℄ BRG.
3'-5⁵/₁₆" @ MIDSPAN	3'-5⅞" @ MIDSPAN
3'-6½" @ ℄ BRG. BENT NO. 1	

†† END POST HEIGHT VARIES

BEGIN BRIDGE = 5'-8¹¹/₁₆"
END BRIDGE = 5'-8½"

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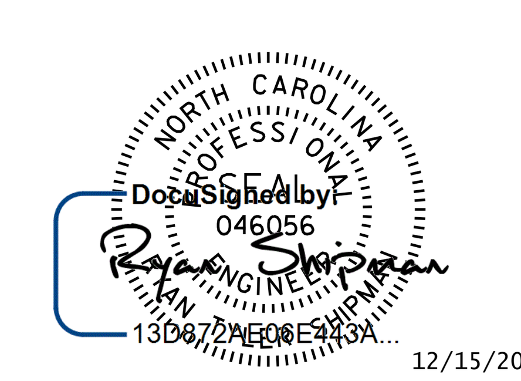
HAYWOOD COUNTY
STATION: 13+33.99 -L-



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

END OF RAIL DETAILS

FOR TWO BAR METAL RAILS

Johnson, Mirmiran, & Thompson Inc.
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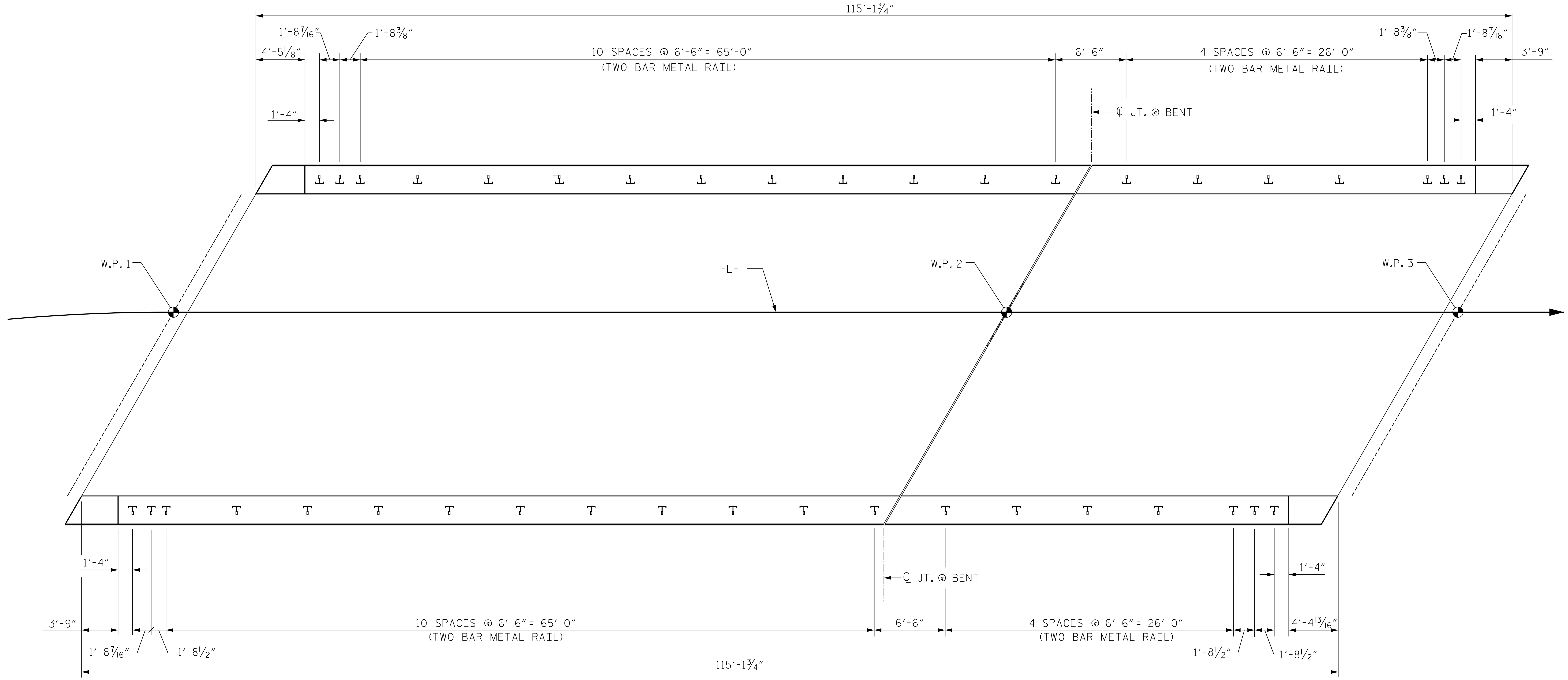
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-19
1			3			TOTAL SHEETS
2			4			40

DES. EGR. OF RECORD: RTS DATE: 02/18
ASSEMBLED BY : MAF DATE : 02/18
CHECKED BY : HLW DATE : 02/18



PLAN OF RAIL POST SPACINGS

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

DocuSigned by: 13D872AE06E443A... 12/15/2023

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 RYAN TYLER SHIPMAN

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RAIL POST SPACINGS

FOR TWO BAR METAL RAILS

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S1-20
1			3				TOTAL SHEETS
2			4				40

Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : MAF DATE : 02/18
CHECKED BY : HLW DATE : 02/18

NOTES

STRUCTURAL CONCRETE INSERT

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

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

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

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

NOTES

METAL RAIL TO END POST CONNECTION

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

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

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

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

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

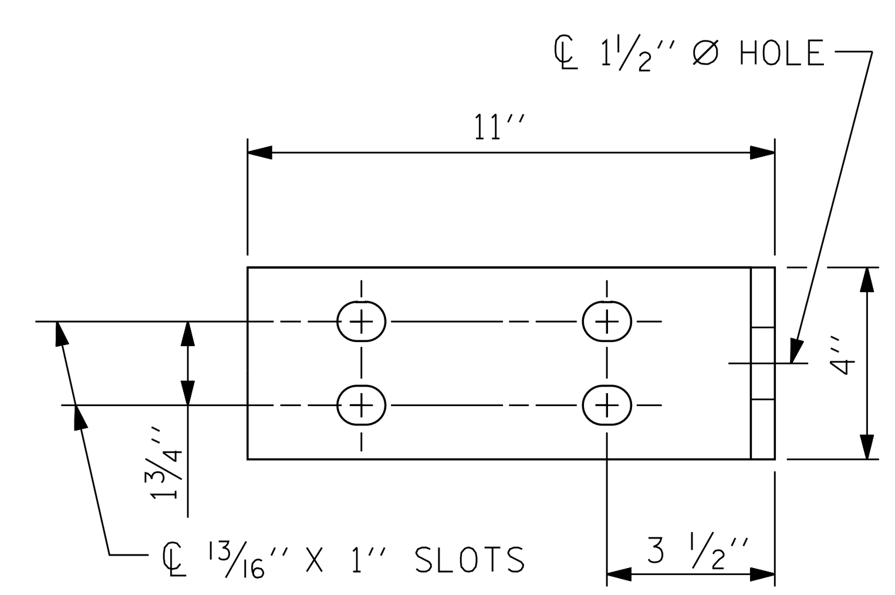
E. ½″ Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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

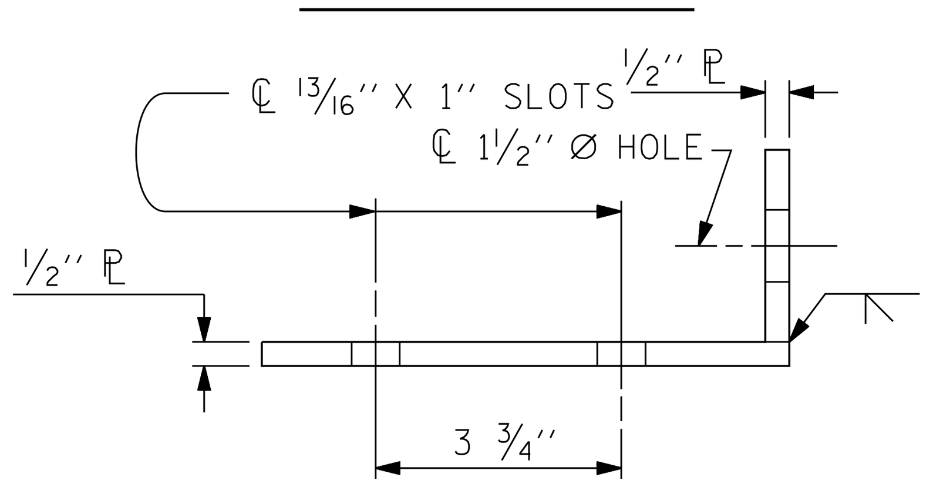
THE ¾″ STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

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

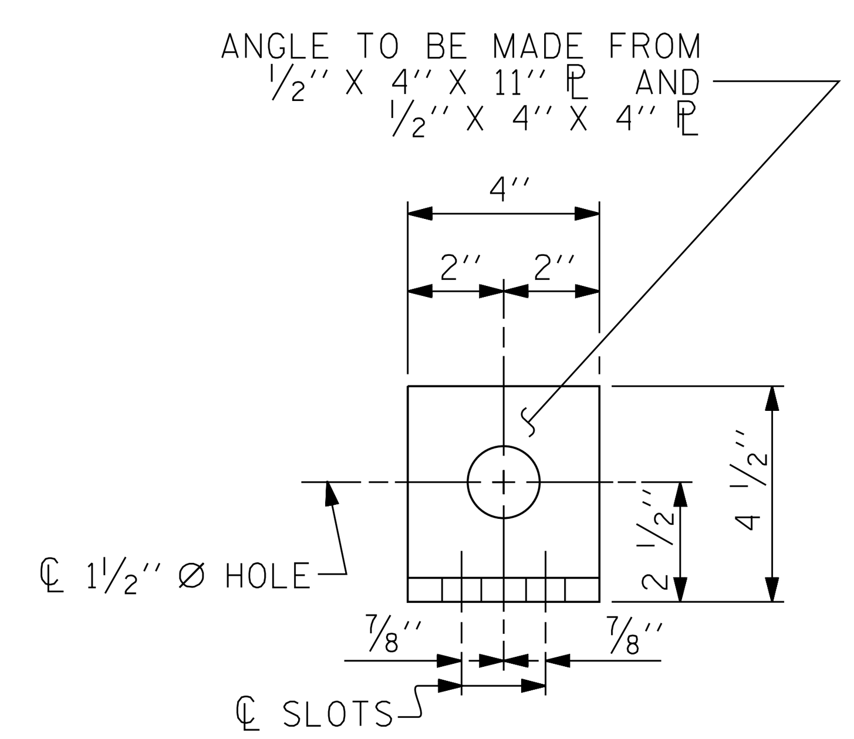
THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾″ Ø X 1⅝″ BOLT WITH WASHER SHALL BE REPLACED WITH A ¾″Ø X 6½″ BOLT AND 2″ O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE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



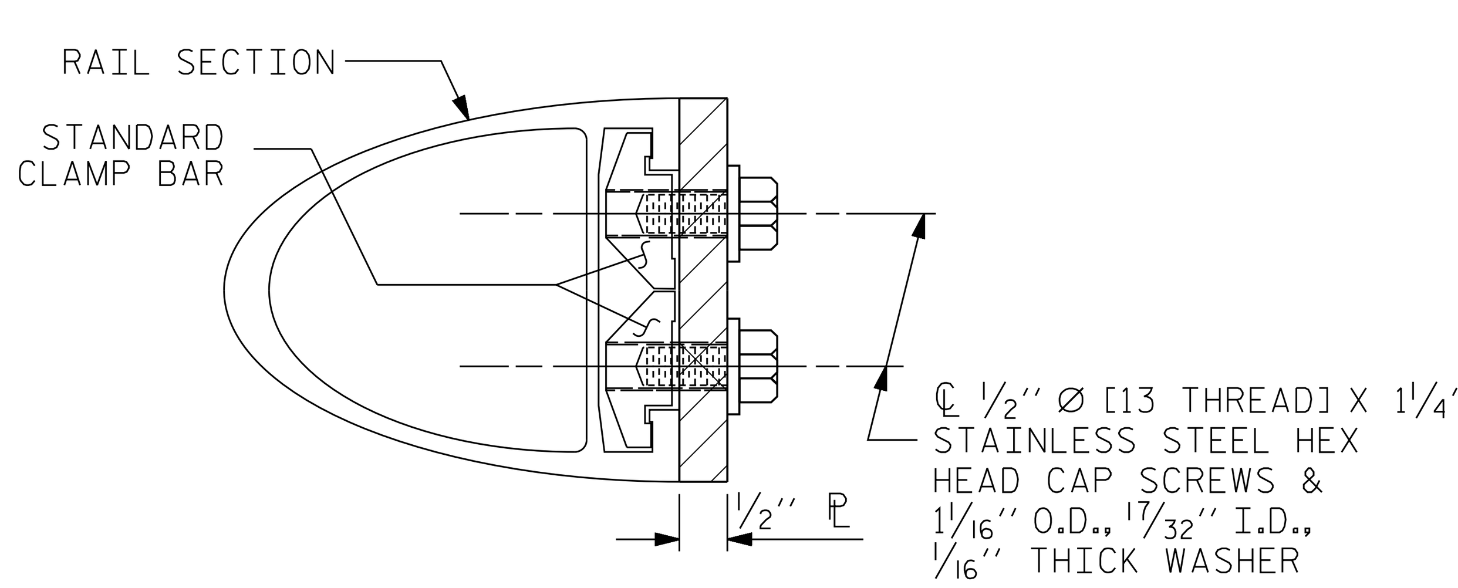
ELEVATION



TOP VIEW

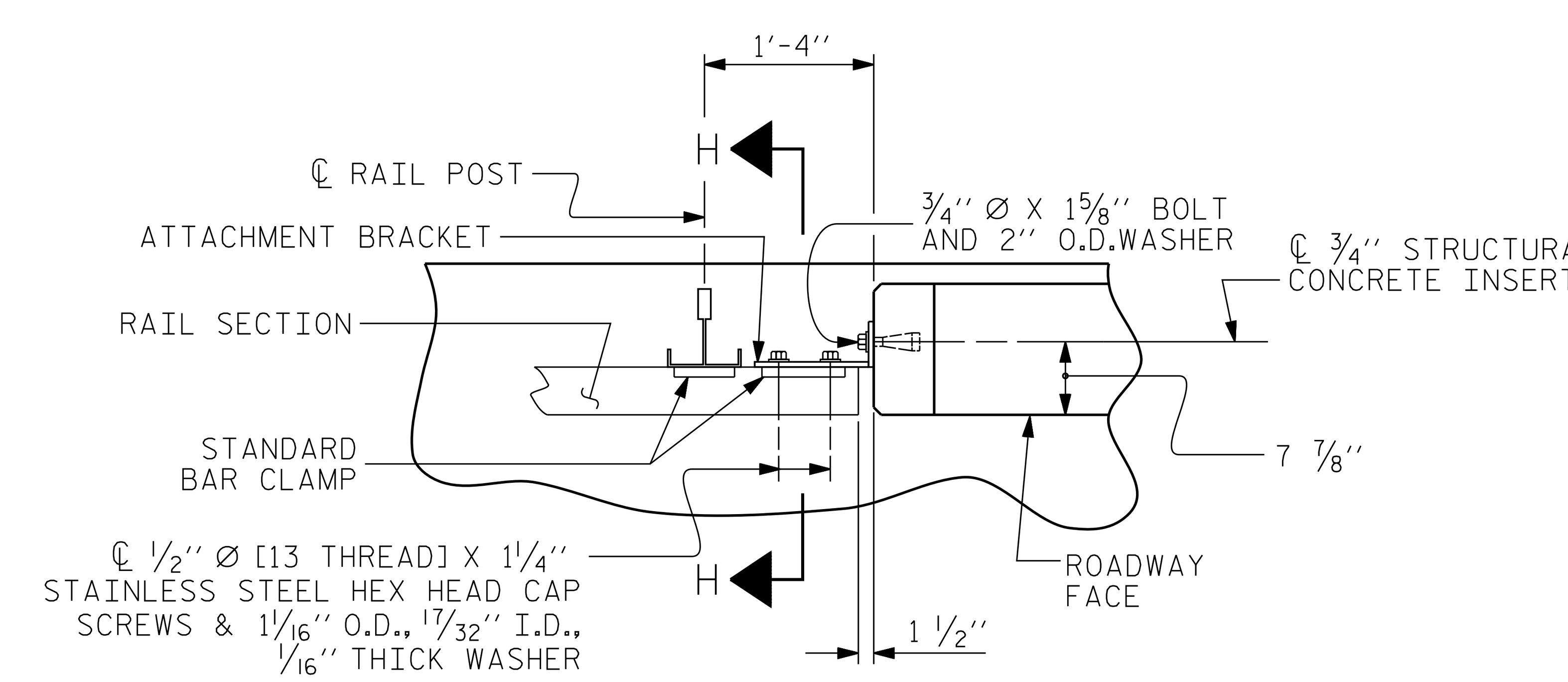


END VIEW (FIX AND EXP.)

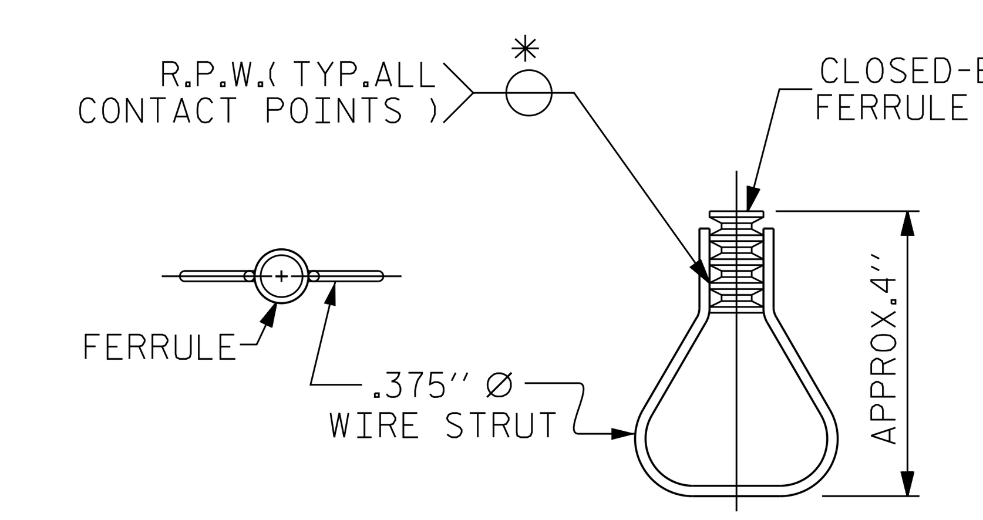


SECTION H-H (FIX)

FIXED



PLAN - RAIL AND END POST



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS

FOR ONE OR TWO BAR METAL RAILS

DocuSigned by:
13D8... 12/15/2023

NORTH CAROLINA PROFESSIONAL ENGINEER 046056

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1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

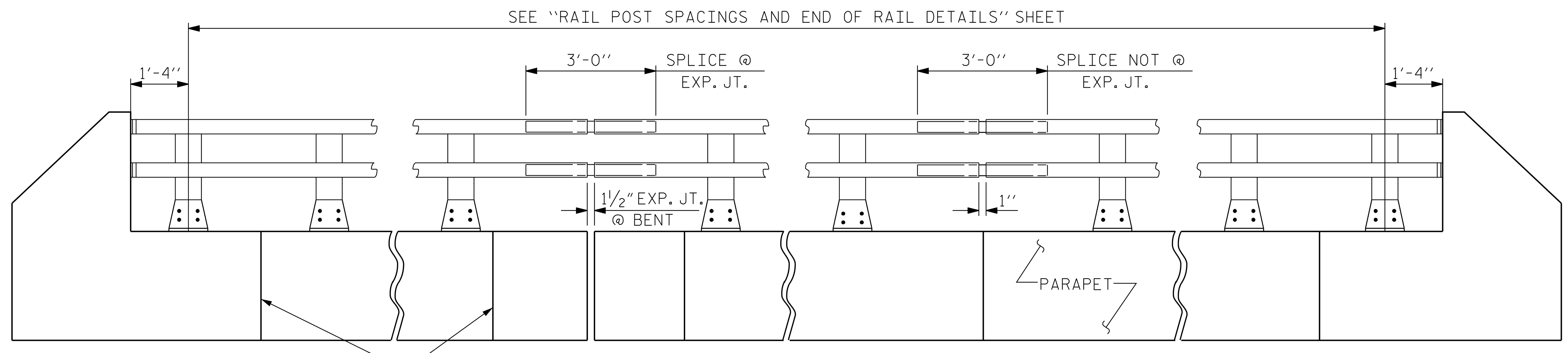
DETAILS FOR ATTACHING METAL RAIL TO END POST

ASSEMBLED BY : NCW	DATE : 6/21
CHECKED BY : XXX	DATE : 6/21

DRAWN BY : FCJ 1/88	REV. 5/1/06 TLA/GM
CHECKED BY : CRK 3/89	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

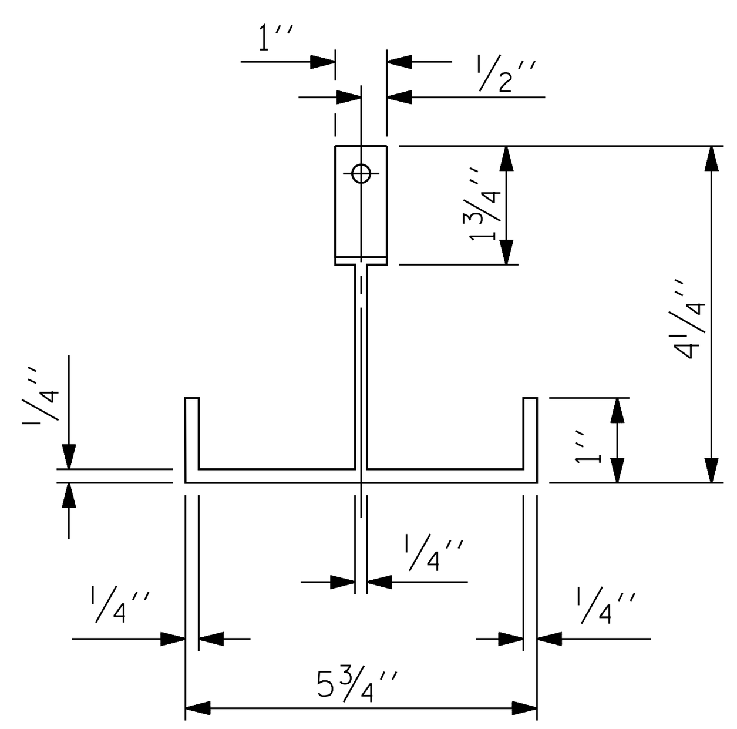
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-21
1			3			TOTAL SHEETS
2			4			40

STD. NO. BMR2

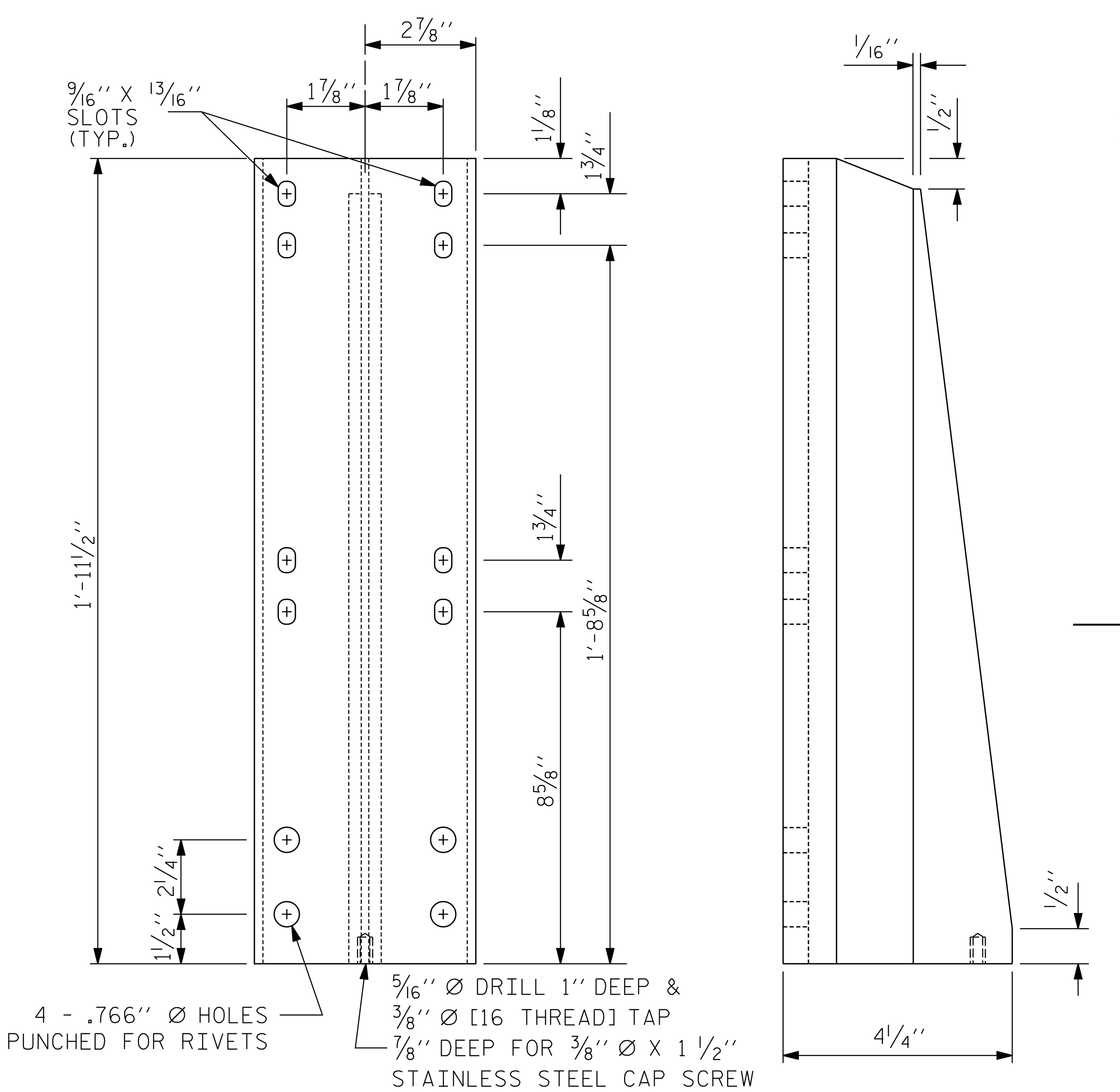


ELEVATION

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

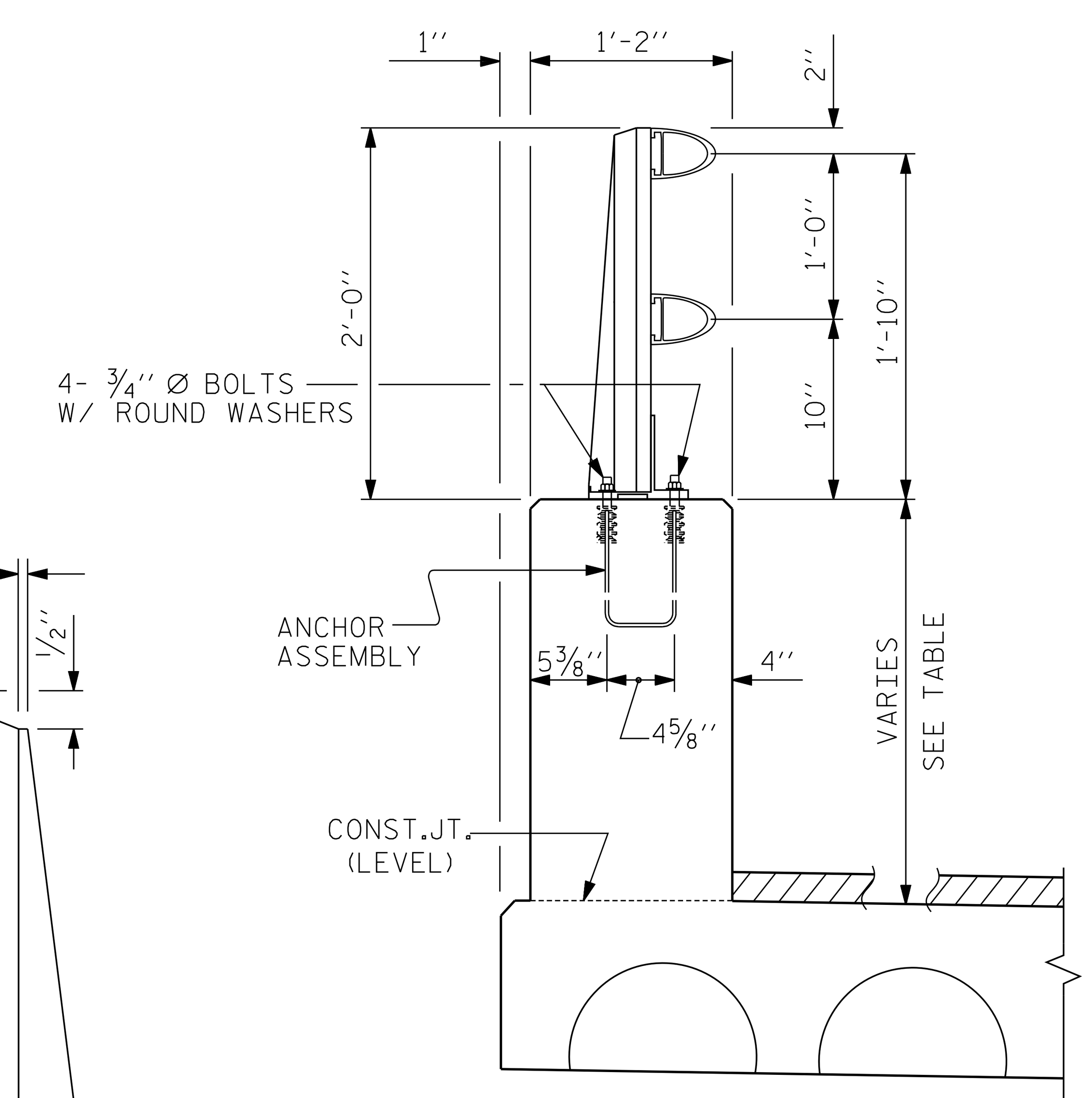


PLAN



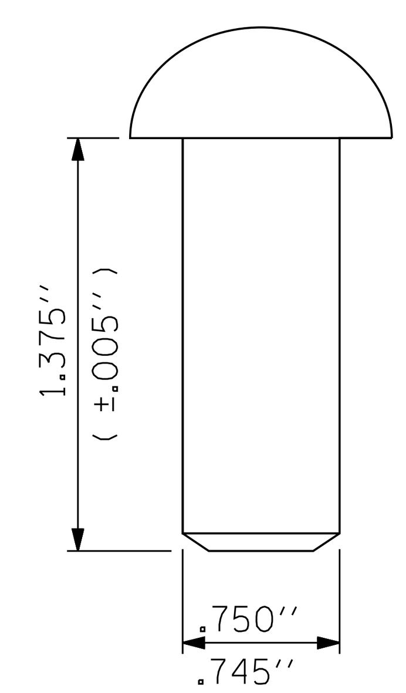
FRONT ELEVATION SIDE ELEVATION

DETAILS OF POST

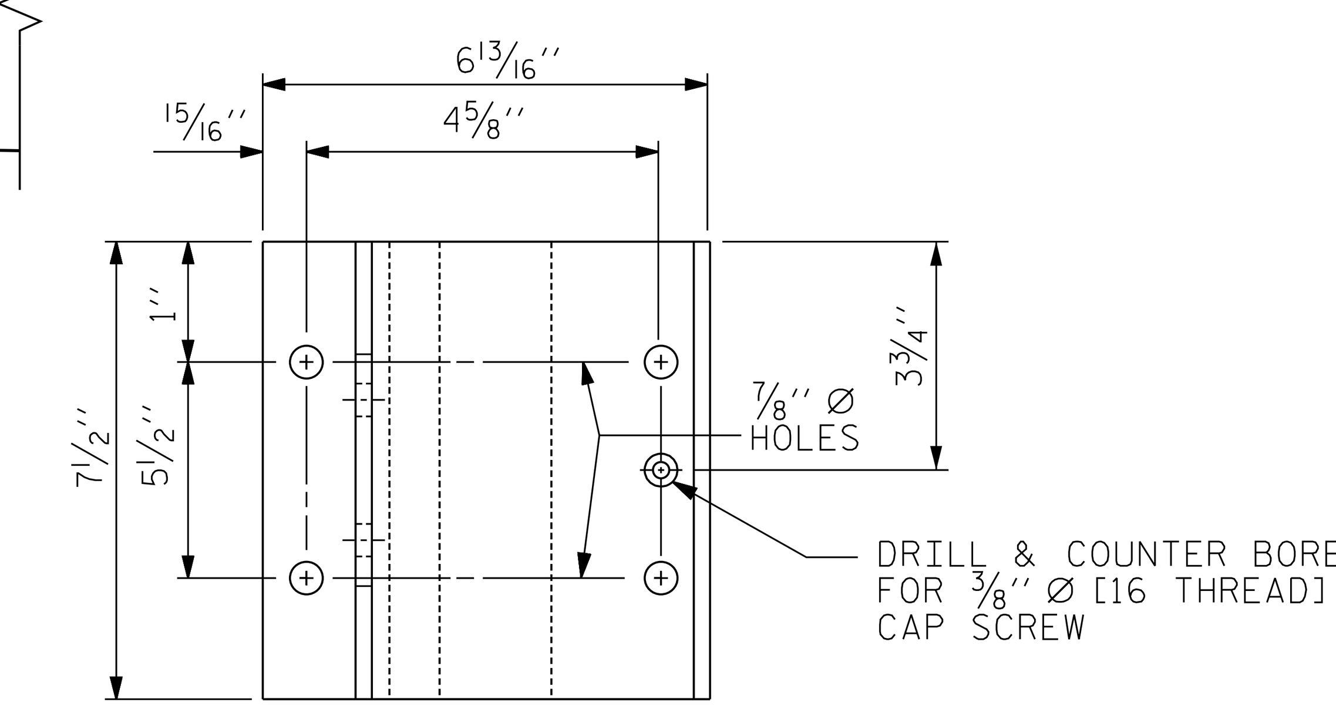


SECTION THRU PARAPET AND RAIL

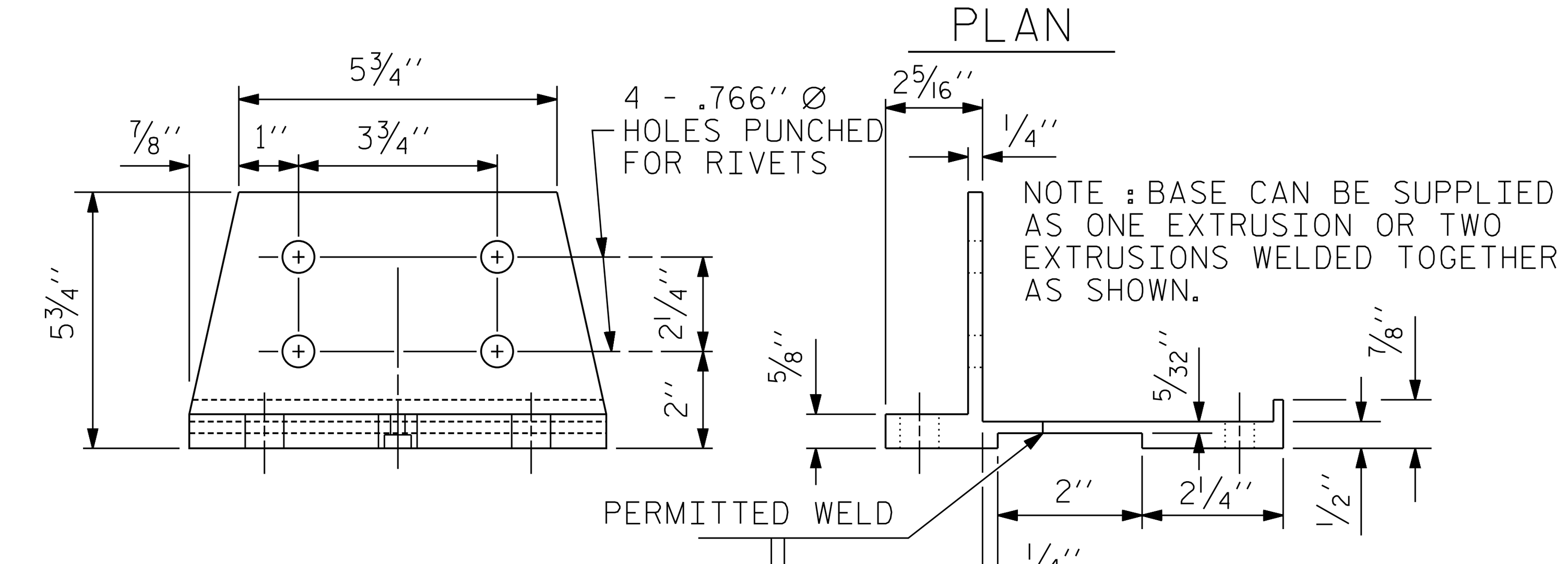
LEFT SIDE SHOWN, RIGHT SIDE SIMILAR.



RIVET DETAIL



PLAN



FRONT ELEVATION SIDE ELEVATION

POST BASE DETAILS

NOTES

METAL RAIL SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 460 OF THE STANDARD SPECIFICATIONS AND METAL RAIL COMPONENTS SHALL MEET THE REQUIREMENTS OF ARTICLE 1074-5 OF THE STANDARD SPECIFICATIONS.

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. CONTRACTION JOINTS SHALL BE LOCATED 9 FEET ON EACH SIDE OF PARAPET EXPANSION JOINTS WITH NO MORE THAN 12 FEET BETWEEN CONTRACTION JOINTS.

ANODIZING

FOR ANODIZED 2 BAR METAL RAIL, SEE SPECIAL PROVISIONS.

ALUMINUM FOR POSTS, BASES, RAILS, EXPANSION BARS, RIVETS, CAPS, AND SHIMS SHALL BE ANODIZED. THE CONTRACTOR SHALL SUBMIT THREE SETS OF ASTM B-21 6061-T6 ALUMINUM SAMPLES ANODIZED MEDIUM BRONZE, DARK BRONZE, AND EXTRA DARK BRONZE TO THE ENGINEER. THE ENGINEER SHALL SELECT THE COLOR FROM THE SAMPLES FURNISHED BY THE CONTRACTOR.

AFTER A SHADE OF BRONZE HAS BEEN SELECTED FOR THE RAILING, THE CONTRACTOR SHALL SUBMIT A SAMPLE OF COMPATIBLE EXTERIOR ACRYLIC HOUSE PAINT TO THE ENGINEER. THIS PAINT SHALL MATCH THE ANODIZED RAIL COLOR AS CLOSELY AS POSSIBLE. AFTER ERECTION OF THE ANODIZED ALUMINUM RAILING, ALL EXPOSED ANCHOR BOLTS, NUTS, WASHERS, MACHINE SCREWS, CAP SCREWS, BOLTS, ATTACHMENT BRACKETS, HOLD-DOWN PLATES, AND BUILT UP ANGLES SHALL BE COATED WITH TWO COATS OF THIS ACTYLIC PAINT.

ANY DAMAGE TO THE ANODIZED SURFACES OF THE RAIL OR COMPONENTS DURING THE CONSTRUCTION SHALL BE REPAIRED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS AT THE DIRECTION OF THE ENGINEER AND AT THE CONTRACTOR'S EXPENSE.

PAY LENGTH = 214.0 LIN. FT.

PARAPET HEIGHT TABLE			
		LEFT SIDE	RIGHT SIDE
SPAN A	CL BRG @ EB 1	2'-9½"	3'-6 11/16"
	MIDSPAN	2'-8 1/16"	3'-5 5/16"
	CL BRG @ BENT 1	2'-9½"	3'-6½"
SPAN B	CL BRG @ BENT 1	2'-9½"	3'-6½"
	MIDSPAN	2'-8⅞"	3'-5⅞"
	CL BRG @ EB 2	2'-9½"	3'-6½"

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 2 OF 3

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

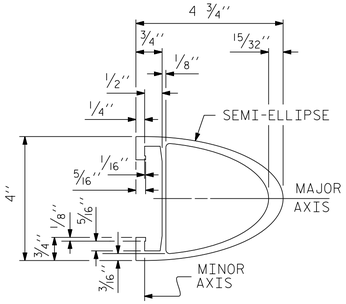
ANODIZED 2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-22
1			3			TOTAL SHEETS
2			4			40

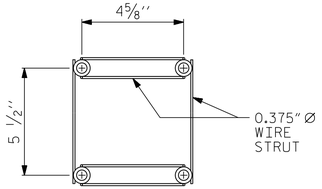
DES. EGR. OF RECORD: RTS DATE: 06/17

ASSEMBLED BY : MAF		DATE : 06/17
CHECKED BY : HLW		DATE : 06/17
DRAWN BY : EEM 6/94	REV. 10/1/11	MAA/GM
CHECKED BY : RGW 6/94	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

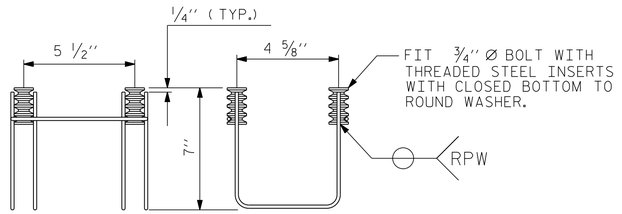
STD. NO. BMR3



RAIL SECTION



PLAN



SIDE VIEW ELEVATION

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

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

B. 4 - 3/4'' Ø X 2 1/2'' BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4'' Ø X 2 1/2'' GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

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

D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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

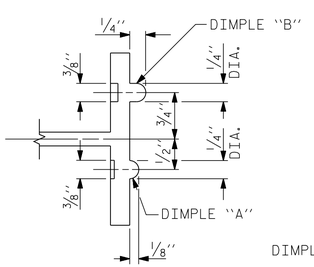
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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

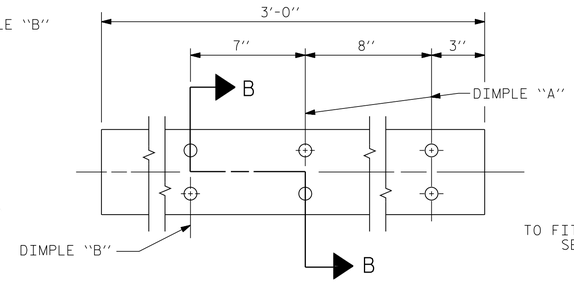
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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

4-BOLT METAL RAIL ANCHOR ASSEMBLY

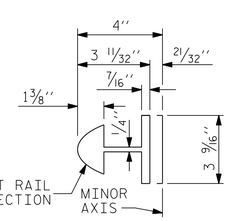
(40 ASSEMBLIES REQUIRED)



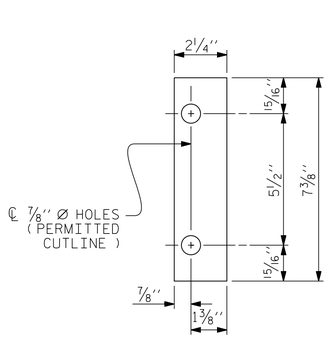
SECTION B - B



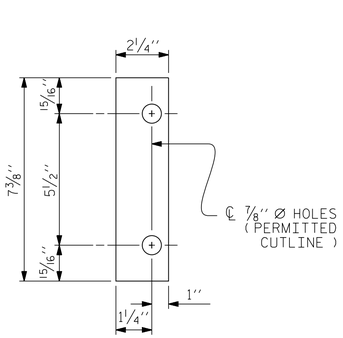
EXPANSION BAR DETAILS



BAR SECTION



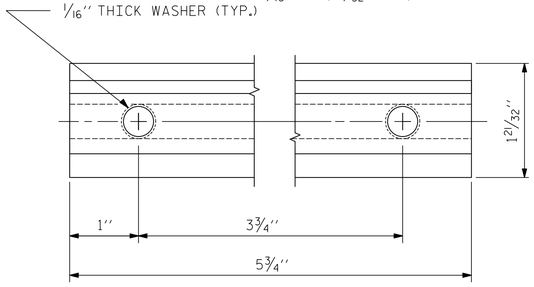
FRONT PLATE

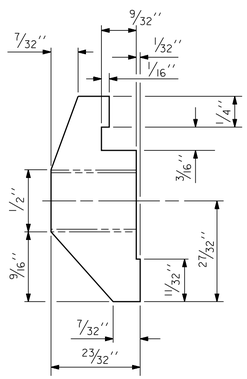


REAR PLATE

SHIM DETAILS

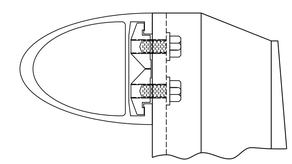
NOTE :
SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



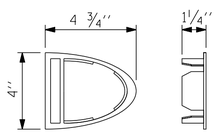


CLAMP BAR DETAIL

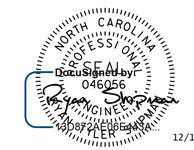
(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP



PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ANODIZED 2 BAR METAL RAIL

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : MAF	DATE : 02/18
CHECKED BY : HLW	DATE : 02/18
DRAWN BY : EEM 6/94	REV. 5/1/06R KMM/GM
CHECKED BY : RGW 6/94	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-23
1			3			TOTAL SHEETS
2			4			40

STD. NO. BMR4

NOTES

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

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

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

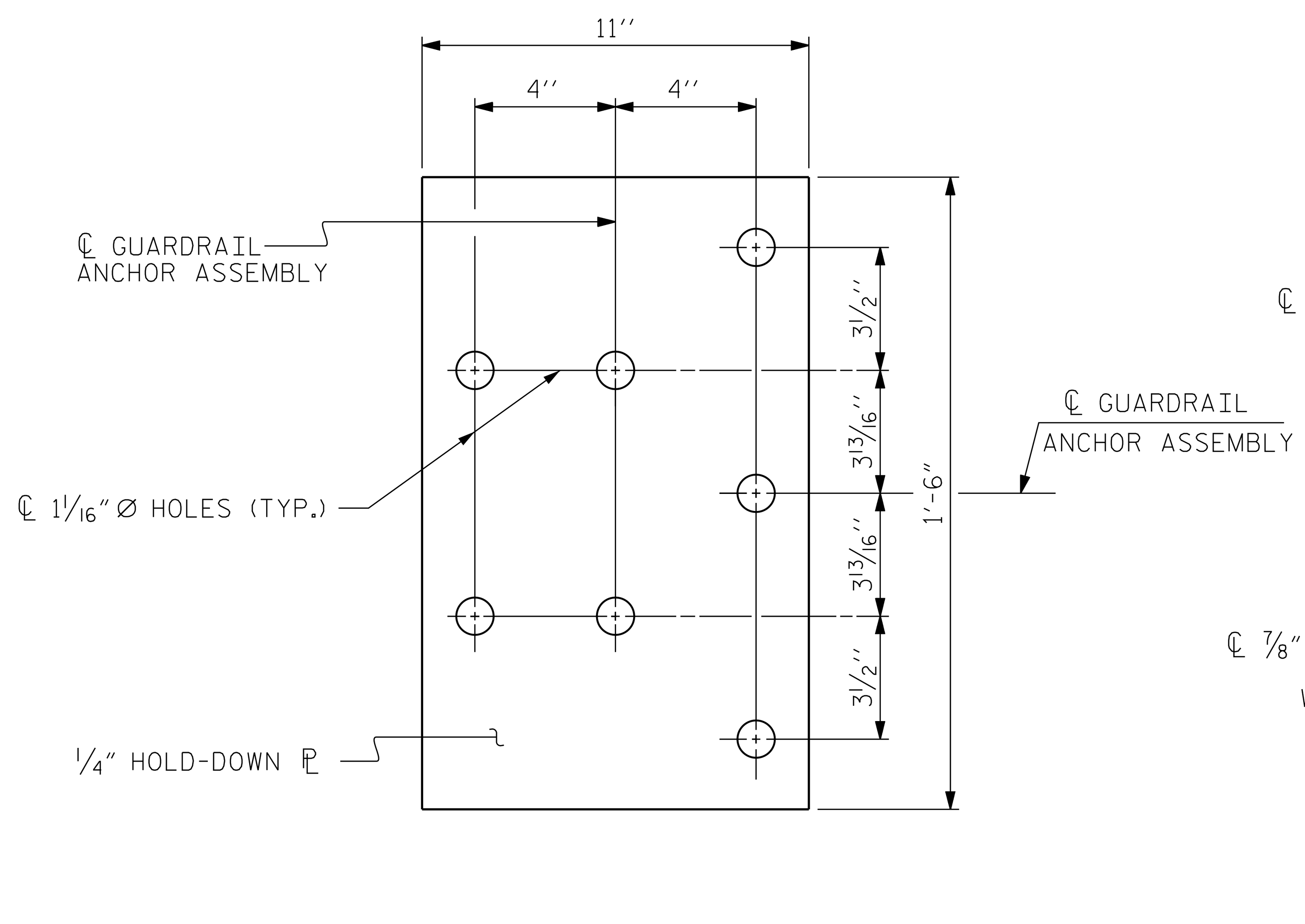
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

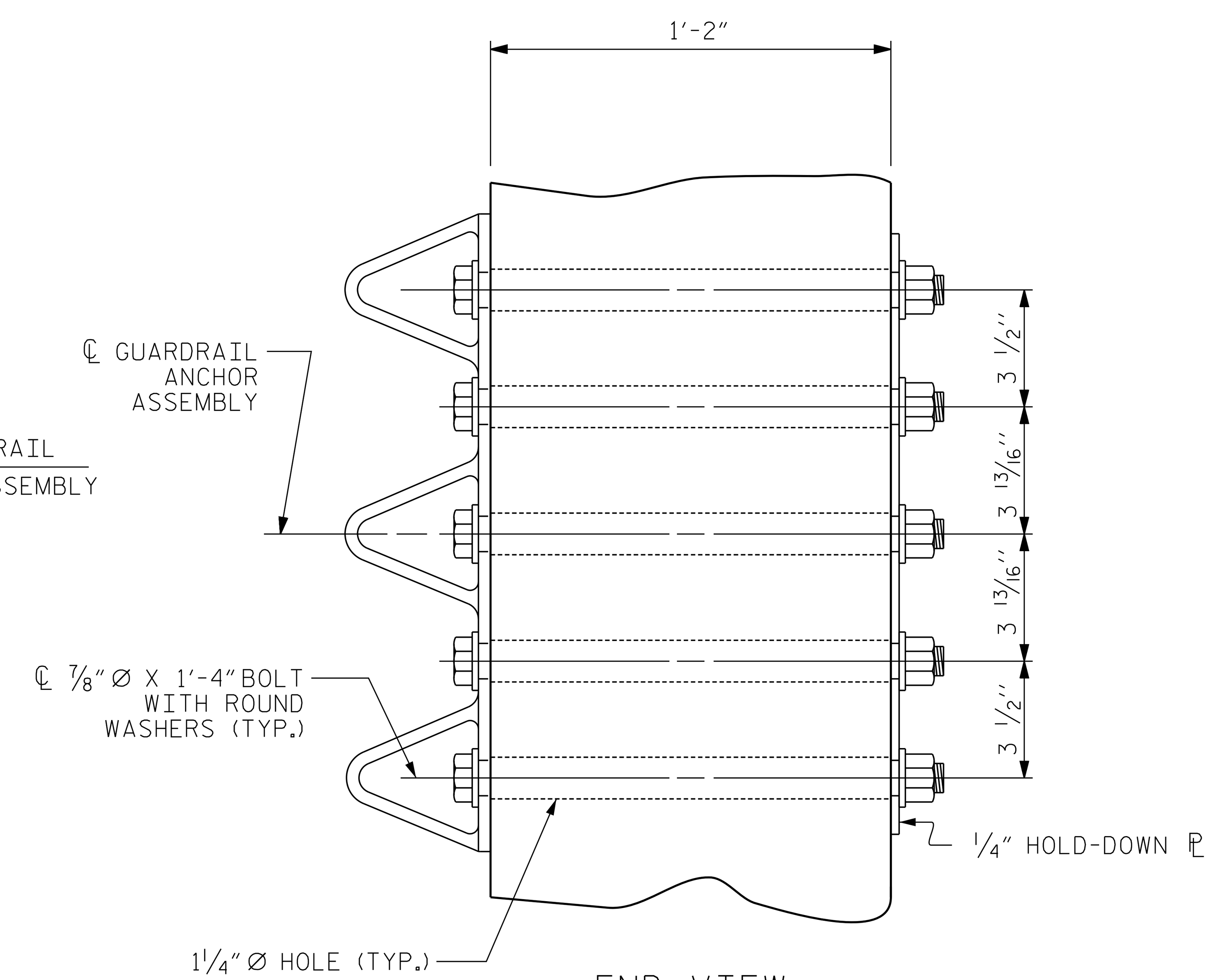
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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

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

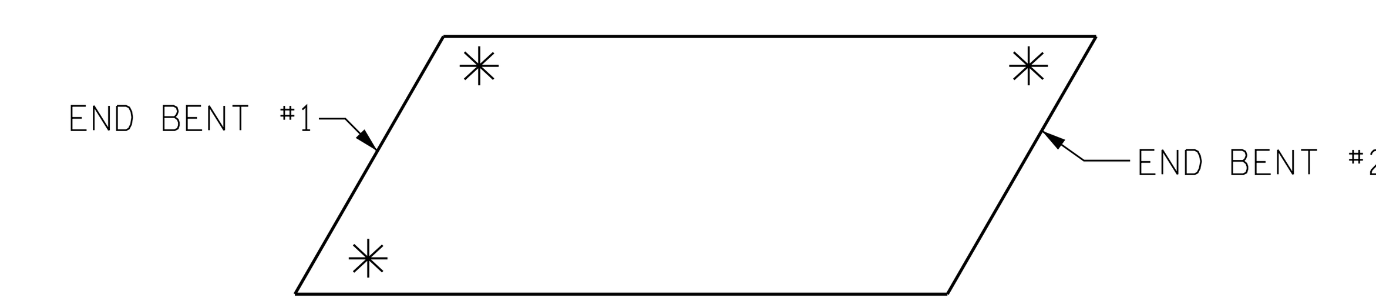


PLAN



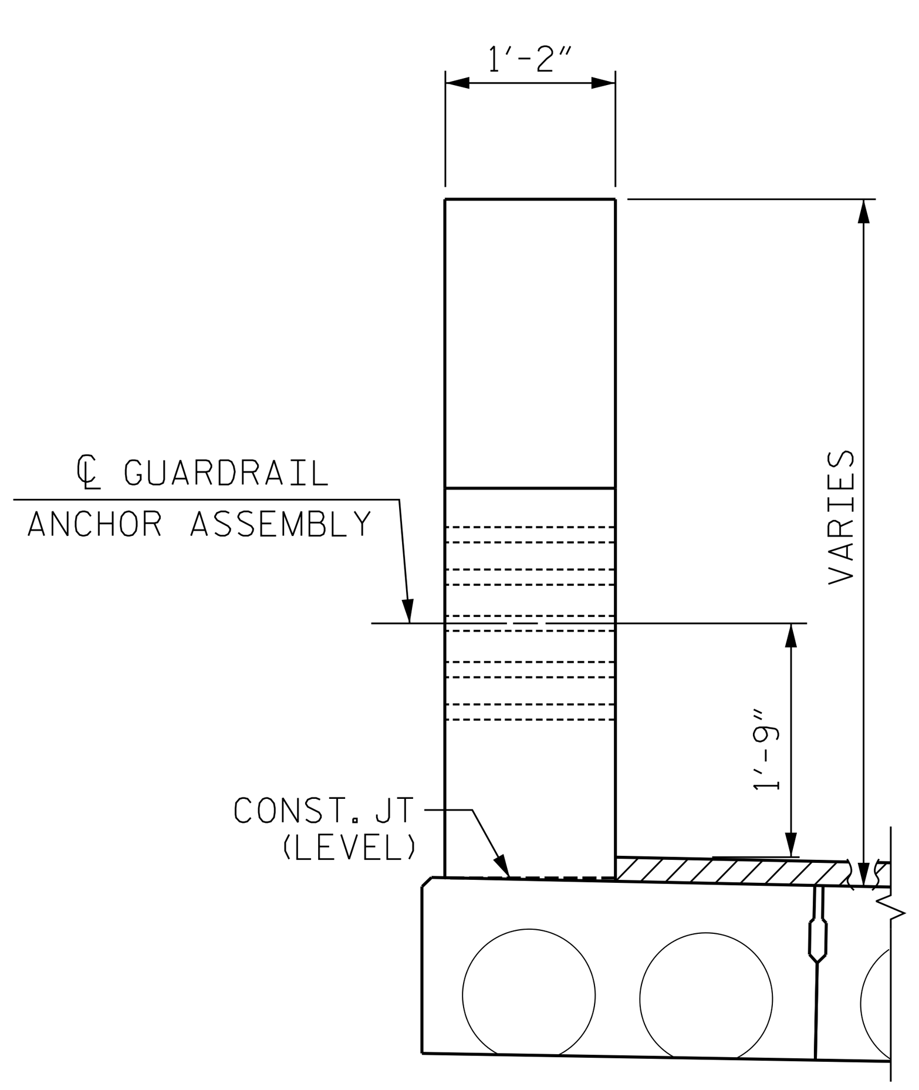
END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

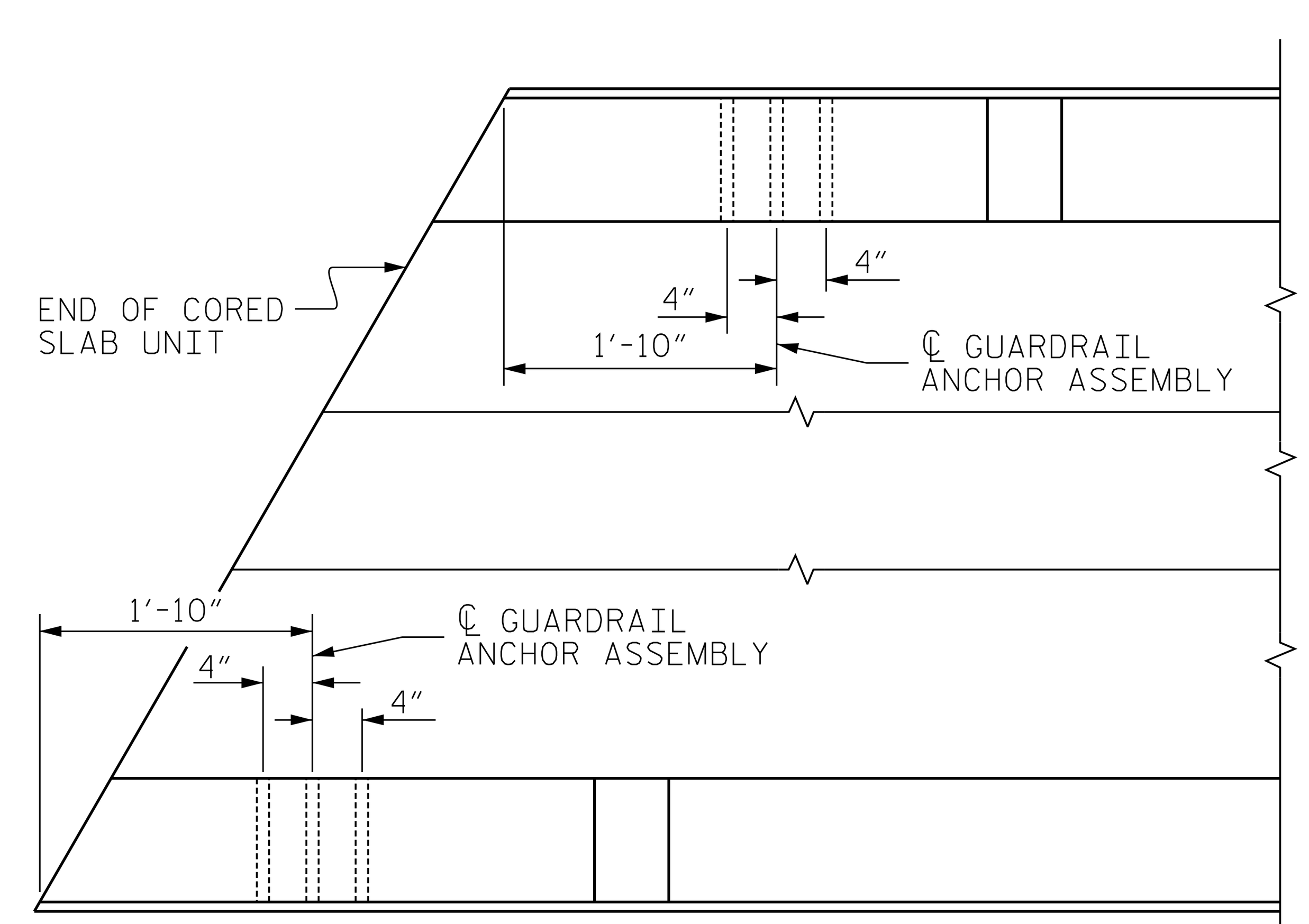


SKETCH SHOWING POINTS OF ATTACHMENT

✱ LOCATION OF GUARDRAIL ATTACHMENT



END VIEW
(TWO BAR METAL RAIL)



PLAN
(END BENT NO. 1 SHOWN, END BENT NO. 2 SIMILAR.)

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

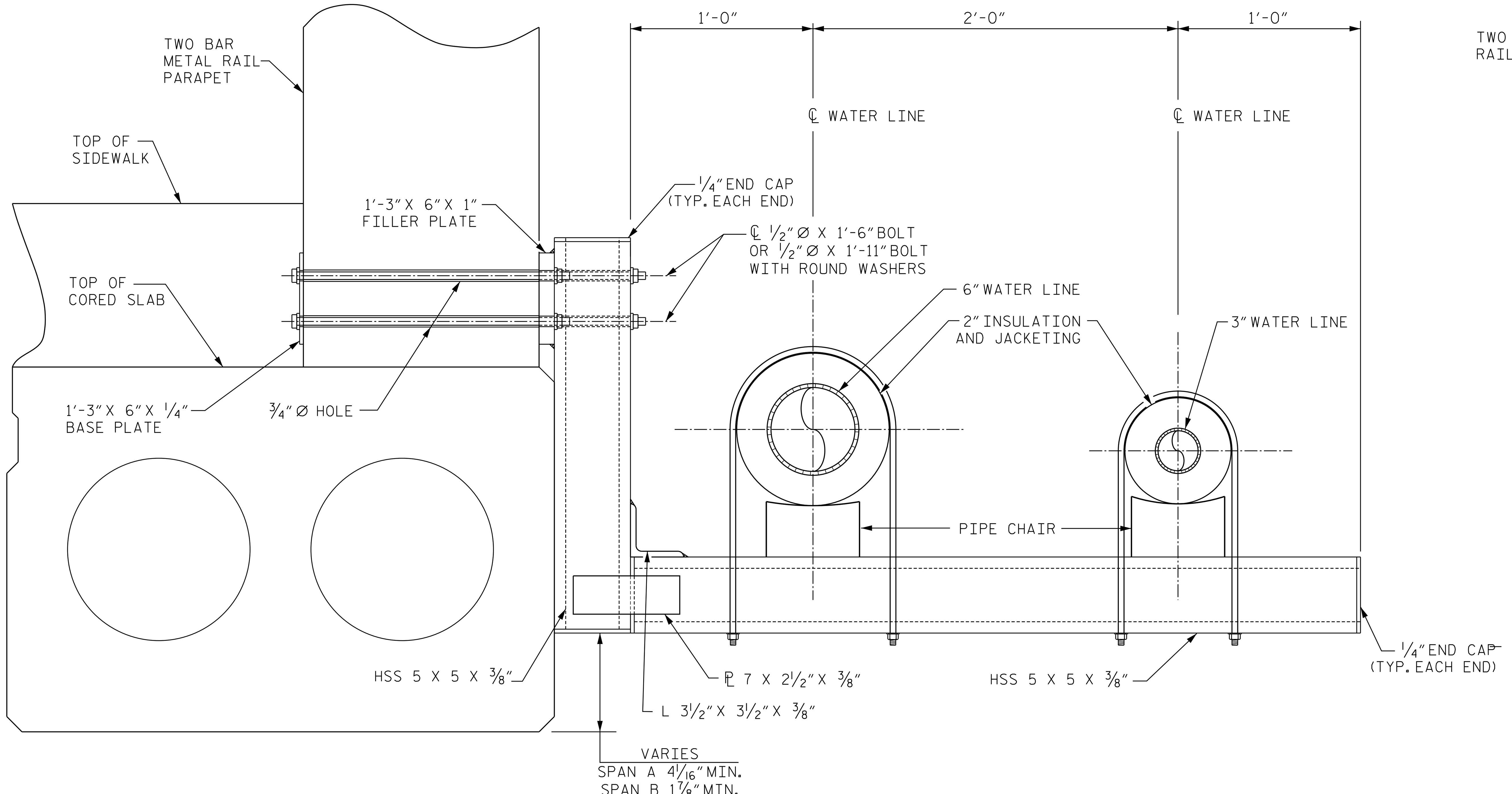
Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S1-24
1				3				TOTAL SHEETS
2				4				40

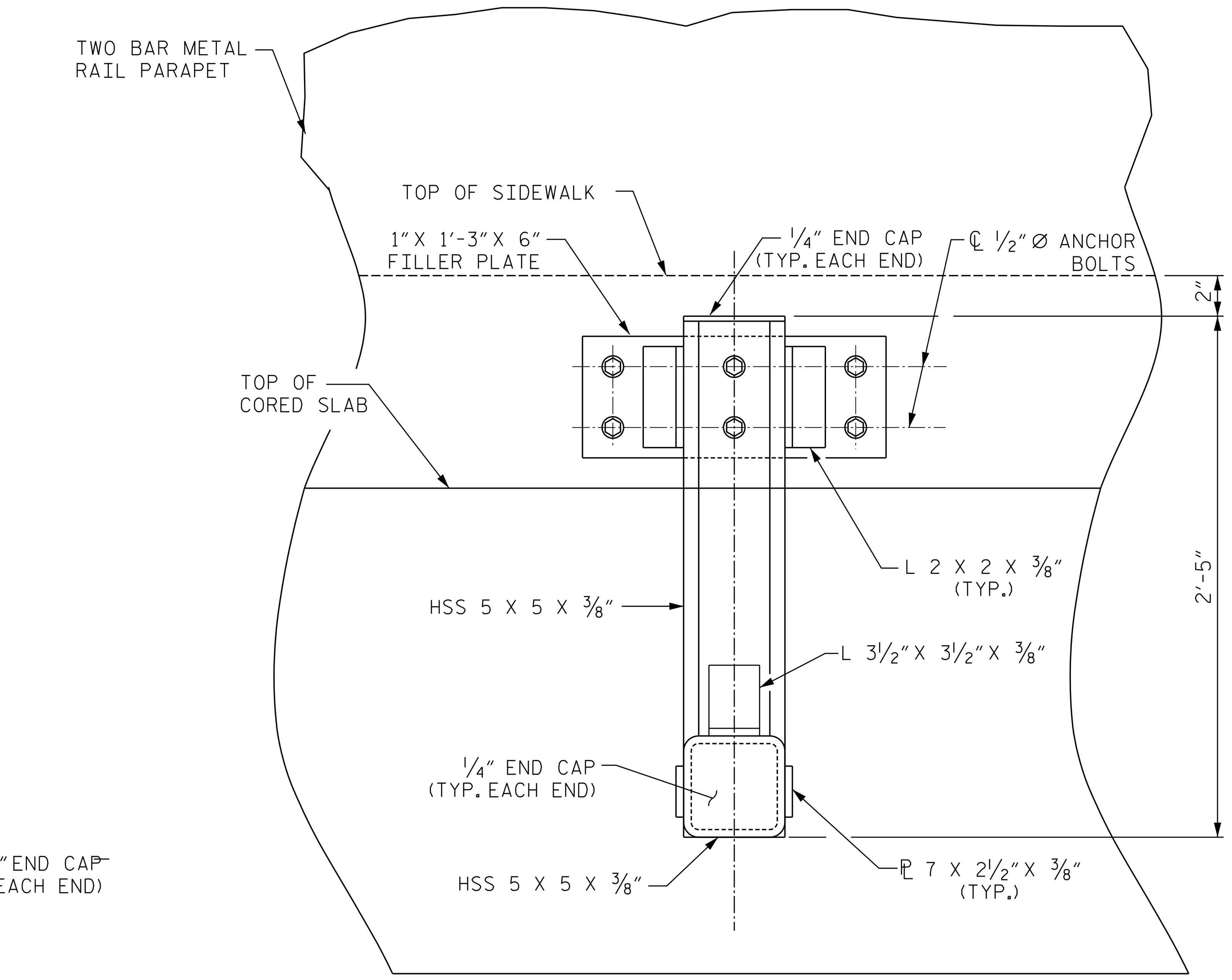
DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : MAF		DATE : 02/18
CHECKED BY : HLW		DATE : 02/18
DRAWN BY : MAA 5/10	REV. 1/15	MAA/TMG
CHECKED BY : GM 5/10	REV. 12/17	MAA/THC
	REV. 5/18	MAA/THC

STD. NO. GRA3



SECTION



SIDE VIEW

WATER LINE HANGER DETAIL

(PIPE CHAIR SUPPORT SHOWN, PIPE ROLLER SUPPORT SIMILAR.

NOTES:

ALL STRUCTURAL STEEL SHALL CONFORM TO AASHTO M270 GRADE 50, AND SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

WELDS SHALL BE MADE USING SMAW PROCESS, USING E70XX ELECTRODES.

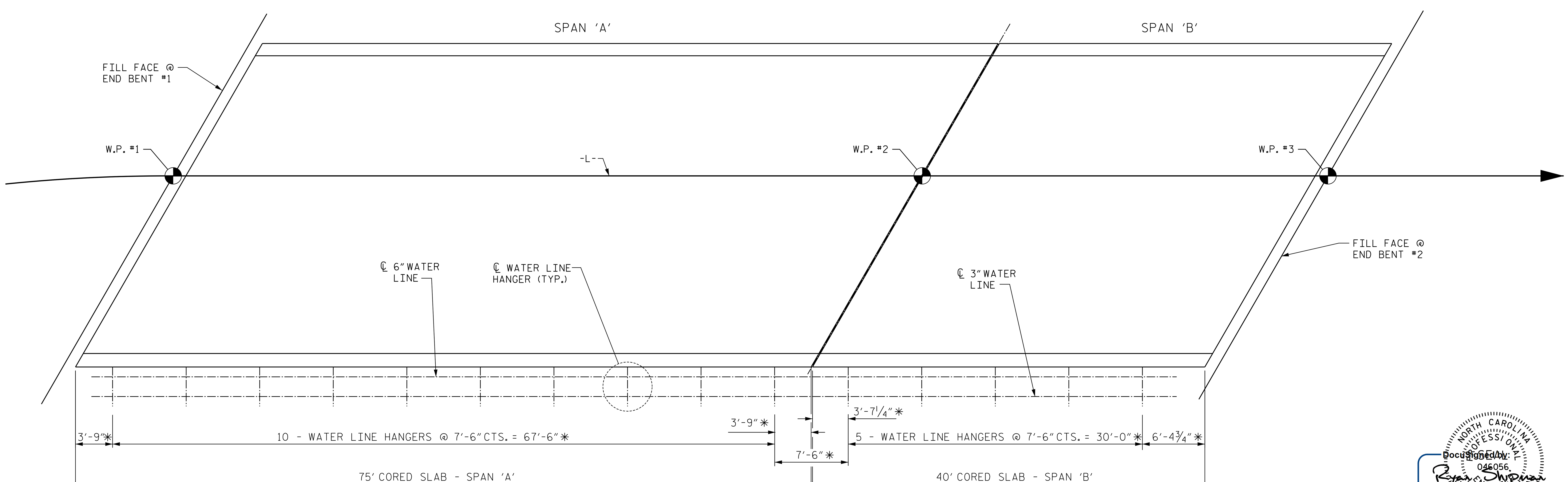
THE 3/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

FOR MORE DETAILS, SEE UTILITY CONSTRUCTION PLANS.

AT CONTRACTOR'S OPTION ADHESIVE ANCHORS ARE PERMITTED INSTEAD OF THRU ANCHOR BOLTS. CONTRACTOR SHALL SUBMIT PLANS TO THE ENGINEER FOR APPROVAL.

WATER LINE HANGERS SHALL BE PAID FOR AS A LUMP SUM.

FOR WATER LINE HANGERS, SEE SPECIAL PROVISION.



WATER LINE HANGERS PLAN VIEW

* DIMENSIONS MEASURED ALONG THE OUTSIDE FACE OF PARAPET

(FOR THE LOCATIONS OF THE ROLLER SUPPORTS & PIPE CHAIR SUPPORT SEE UTILITY SHEETS.)

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
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RALEIGH

WATER LINE HANGER DETAILS

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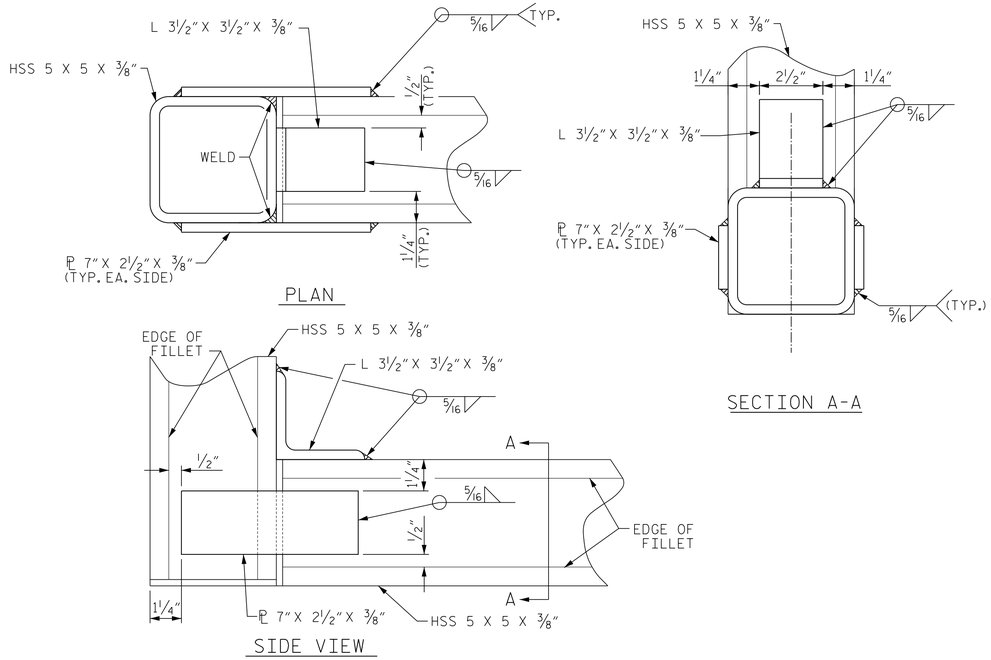
Asheville, NC, 28806
License No: C-3097

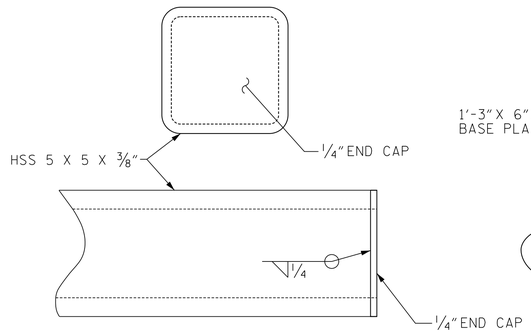
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-25
1			3			TOTAL SHEETS
2			4			40

DES. EGR. OF RECORD: RTS DATE: 02/18

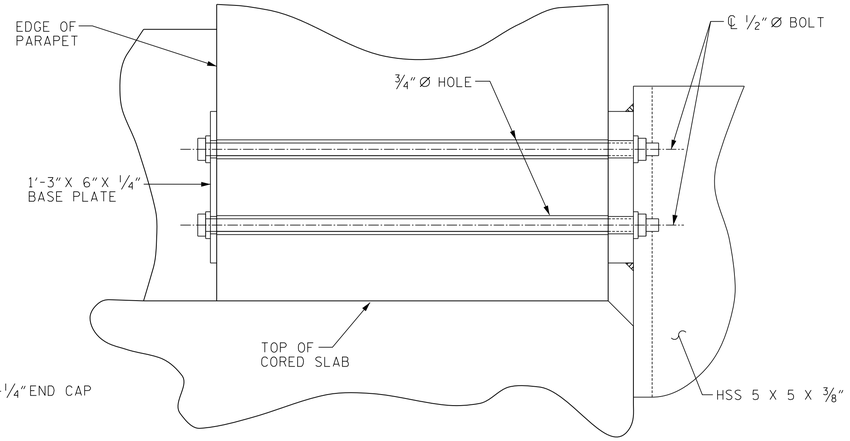
ASSEMBLED BY :	RWW	DATE :	02/18
CHECKED BY :	HLW	DATE :	02/18



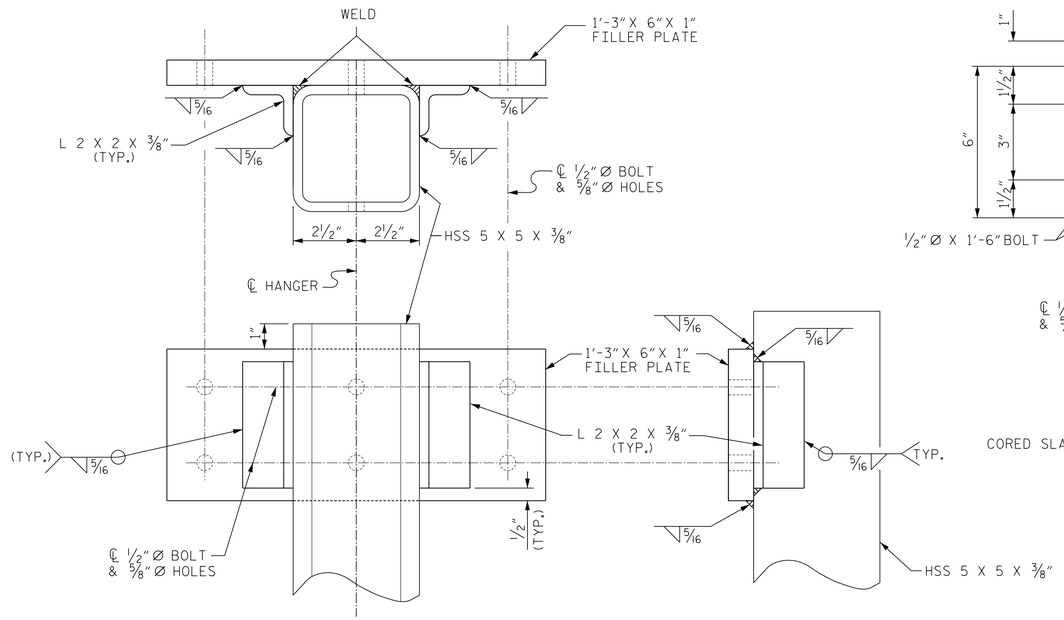
LOWER PORTION OF ASSEMBLY



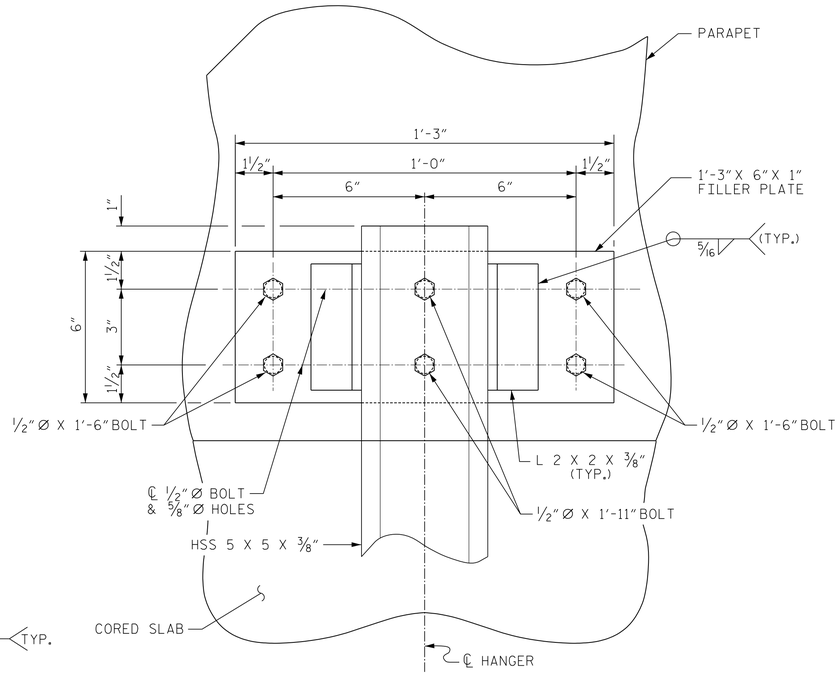
END CAP DETAIL



THRU-BOLT DETAIL



ANGLE ATTACHMENT DETAIL



PARAPET ATTACHMENT

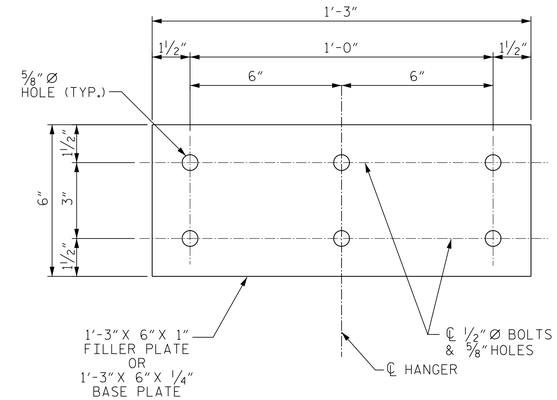


PLATE PLAN

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 2 OF 2

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY :	RWW	DATE : 02/18
CHECKED BY :	HLW	DATE : 02/18

DocuSigned by: 046056 — SEAL — NORTH CAROLINA PROFESSIONAL ENGINEER — 13D872AHHHH43A... 12/15/2023

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DEPARTMENT OF TRANSPORTATION
RALEIGH

WATER LINE HANGER DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-26
1			3			TOTAL SHEETS
2			4			40

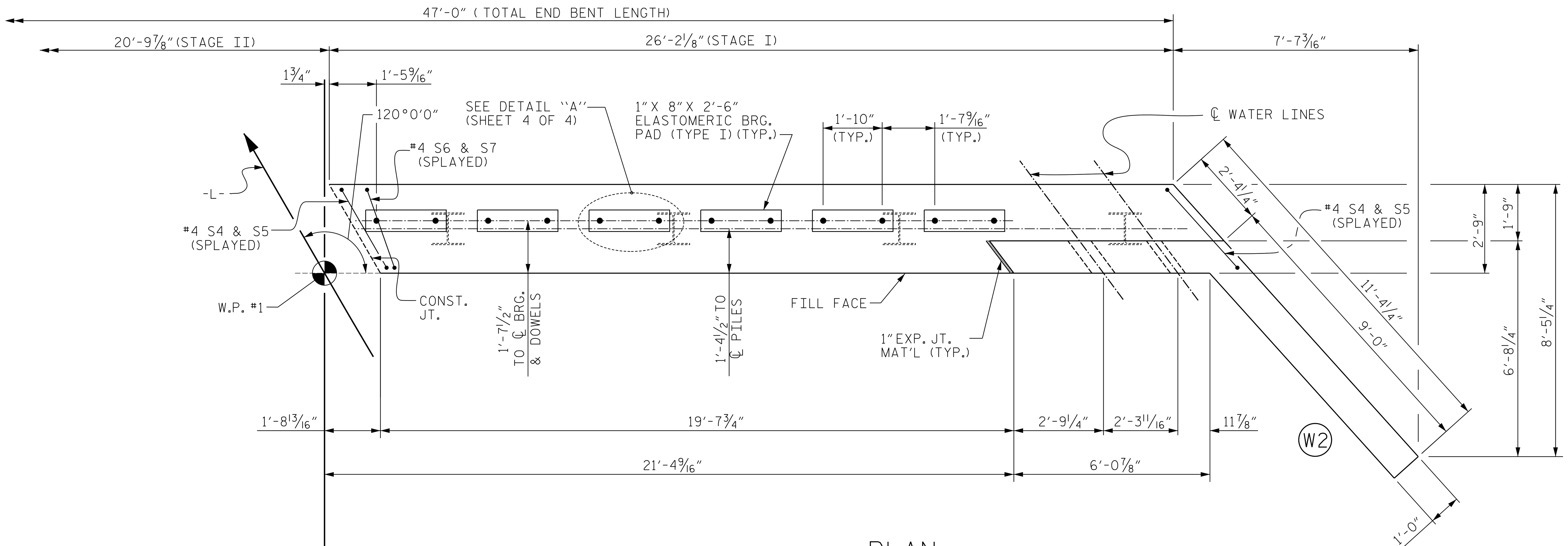
NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

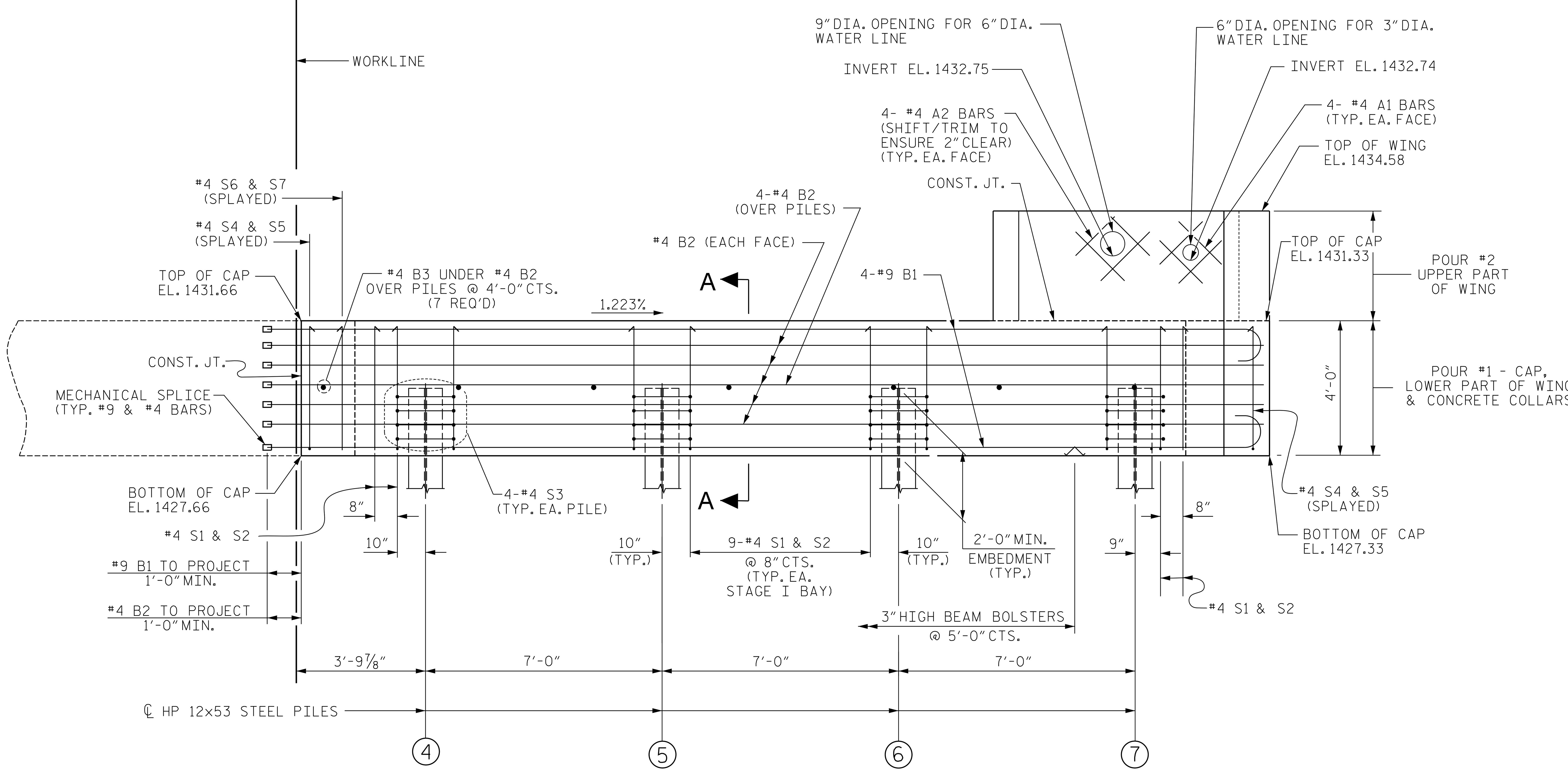
FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

CONTRACTOR SHALL VERIFY WATER LINE OPENING LOCATION AND INVERT ELEVATIONS BEFORE POURING CONCRETE IN POUR #2.



PLAN



ELEVATION

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

TOP OF PILE ELEVATIONS	
4	1429.62
5	1429.53
6	1429.45
7	1429.36

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1

(STAGE I)

NORTH CAROLINA PROFESSIONAL SEAL 046056 ENGINEER
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REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S1-27
			3			TOTAL SHEETS	39
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DES. EGR. OF RECORD: RTS DATE: 02/18

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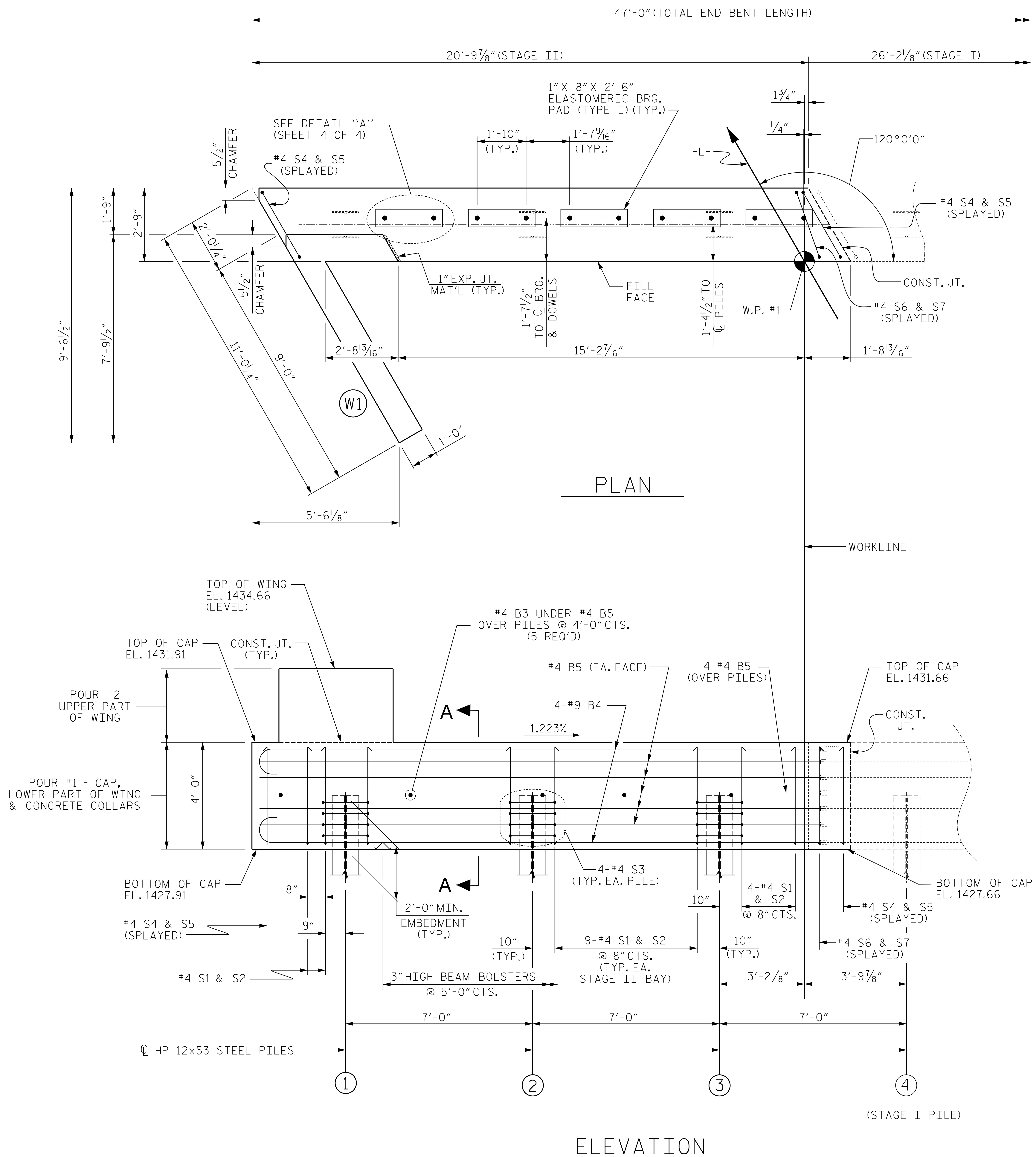
CHECKED BY :	HLW	DATE :	02/18



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

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

TOP OF PILE ELEVATIONS	
1	1429.87
2	1429.79
3	1429.70

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1

(STAGE II)

DocuSigned by: 13D872... 12/15/2023

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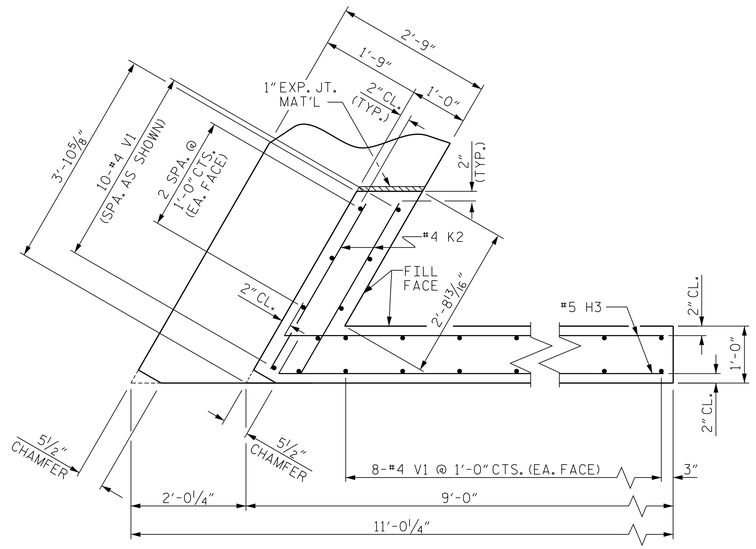
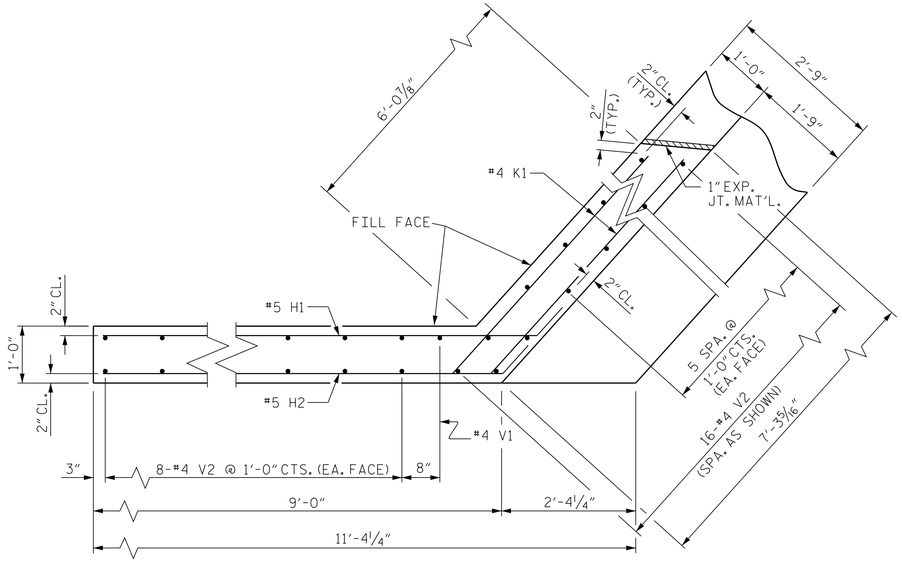
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-28
			3			TOTAL SHEETS
			4			40

DES. EGR. OF RECORD: RTS DATE: 02/18
ASSEMBLED BY: AW DATE: 02/18
CHECKED BY: HLW DATE: 02/18



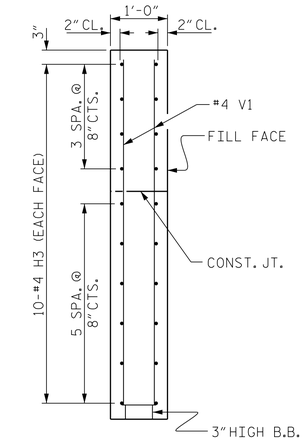
PLAN OF WING (W1)



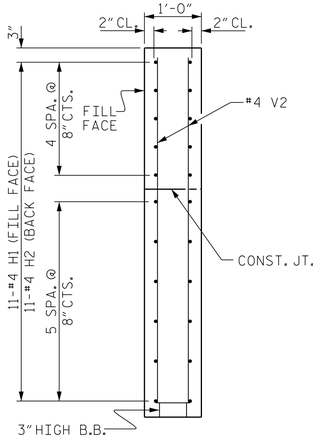
PLAN OF WING (W2)

PIPE OPENINGS NOT SHOWN FOR CLARITY.

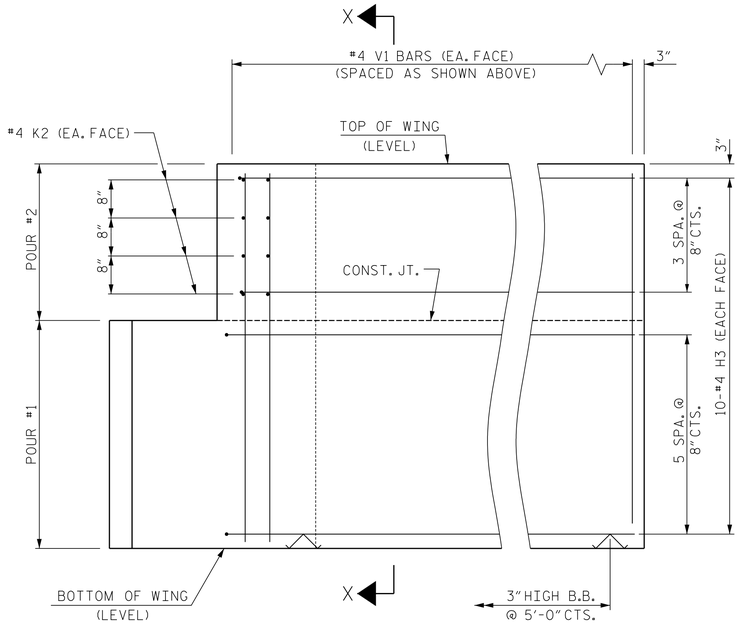
SHIFT VERTICAL V2 BARS AS NECESSARY TO ENSURE 2" CLEAR AT PIPE OPENINGS. TRIM HORIZONTAL K1 BARS AS NECESSARY TO ENSURE 2" CLEAR AT PIPE OPENINGS.



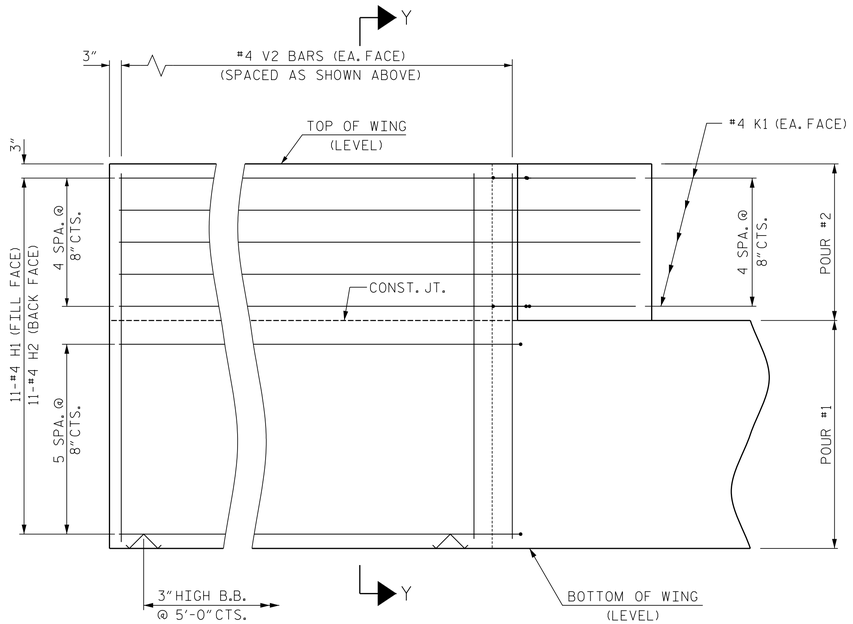
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 3 OF 4

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : AW DATE : 02/18

CHECKED BY : RTS DATE : 02/18

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 KEVIN TYLER SHIPMAN

DocuSigned by: 13D872AE60E2443A...

12/15/2023

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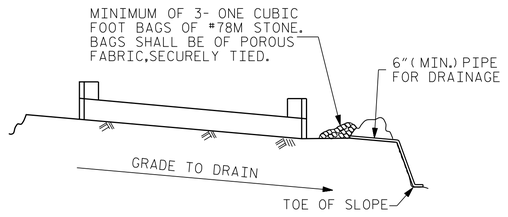
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-29
1			3			TOTAL SHEETS
2			4			40

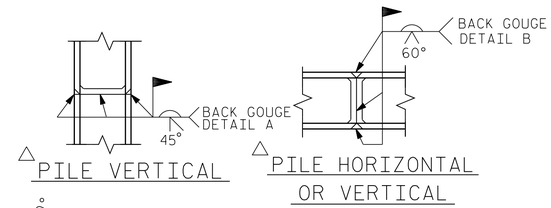


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

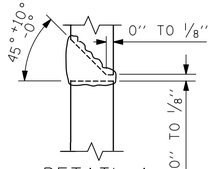
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

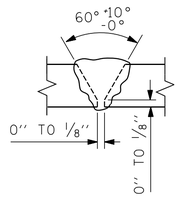


△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL



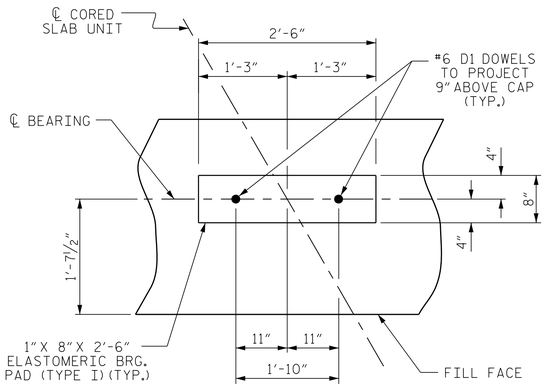
DETAIL A



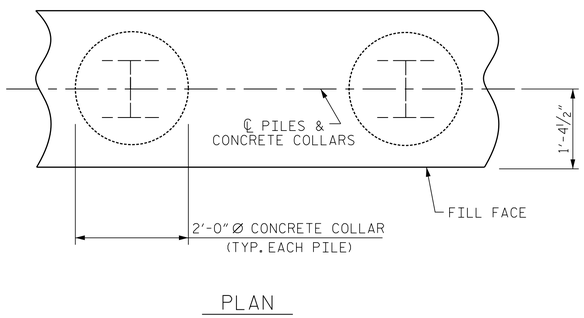
DETAIL B

△ POSITION OF PILE DURING WELDING.

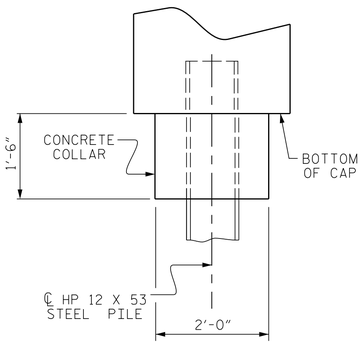
PILE SPLICE DETAILS



DETAIL ''A''

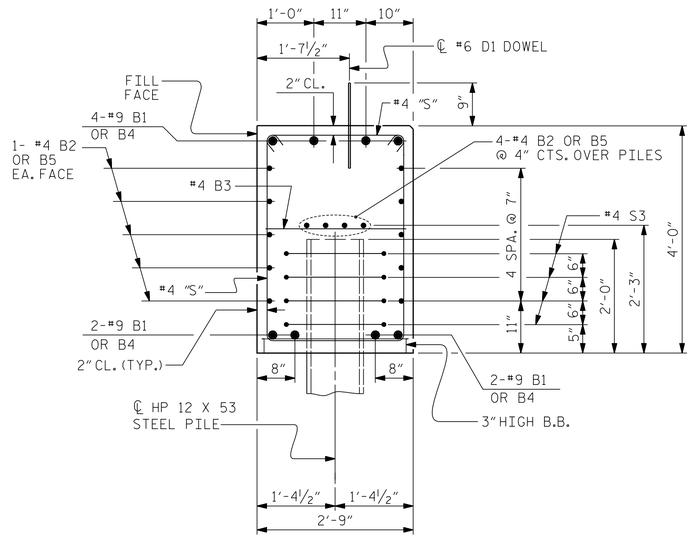


PLAN



ELEVATION

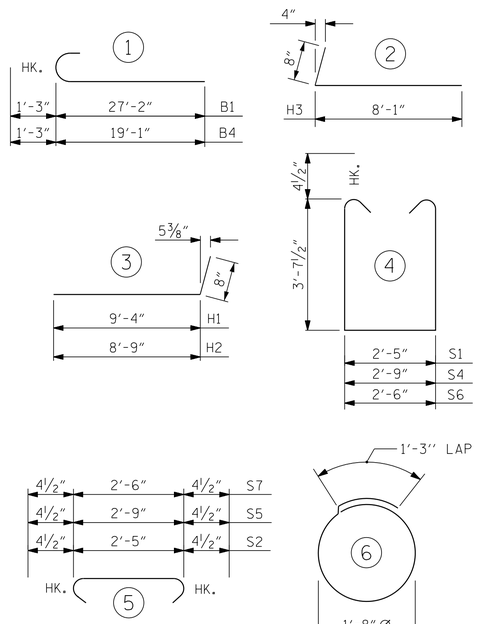
CORROSION PROTECTION FOR STEEL PILES DETAIL



SECTION A-A

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR END BENT NO. 1

STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	8	#4	STR	1'-10"	10
A2	8	#4	STR	2'-0"	11
B1	8	#9	1	28'-5"	773
B2	14	#4	STR	27'-2"	254
B3	7	#4	STR	2'-5"	11
D1	12	#6	STR	1'-6"	27
H1	11	#4	3	10'-0"	73
H2	11	#4	3	9'-5"	69
K1	10	#4	STR	6'-10"	46
S1	31	#4	4	10'-5"	216
S2	31	#4	5	3'-2"	66
S3	16	#4	6	6'-6"	69
S4	2	#4	4	10'-9"	14
S5	2	#4	5	3'-6"	5
S6	1	#4	4	10'-6"	7
S7	1	#4	5	3'-3"	2
V2	33	#4	STR	6'-10"	151

REINFORCING STEEL (FOR STAGE I) 1804 LBS.

CLASS A CONCRETE BREAKDOWN (FOR STAGE I)

POUR #1	CAP, LOWER PART OF WING & COLLARS	12.7 C.Y.
POUR #2	UPPER PART OF WING	1.9 C.Y.
TOTAL CLASS A CONCRETE		14.6 C.Y.

STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B3	5	#4	STR	2'-5"	8
B4	8	#9	1	20'-4"	553
B5	14	#4	STR	19'-1"	178
D1	10	#6	STR	1'-6"	23
H3	20	#4	2	8'-9"	117
K2	8	#4	STR	3'-1"	16
S1	24	#4	4	10'-5"	167
S2	24	#4	5	3'-2"	51
S3	12	#4	6	6'-6"	52
S4	2	#4	4	10'-9"	14
S5	2	#4	5	3'-6"	5
S6	1	#4	4	10'-6"	7
S7	1	#4	5	3'-3"	2
V1	26	#4	STR	6'-4"	110

REINFORCING STEEL (FOR STAGE II) 1303 LBS.

CLASS A CONCRETE BREAKDOWN (FOR STAGE II)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	10.1 C.Y.
POUR #2	UPPER PART OF WING	1.2 C.Y.
TOTAL CLASS A CONCRETE		11.3 C.Y.

TOTAL BILL OF MATERIAL

	CLASS A CONCRETE	REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	HP 12X53 STEEL PILES		PILE EXCAVATION IN SOIL	PILE EXCAVATION NOT IN SOIL
END BENT No. 1	CU. YDS.	LBS.	NO.		LIN. FT.	LIN. FT.	LIN. FT.
	25.9	3,107	7		154.0	35.0	68.0

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : RTS DATE : 02/18

DocuSigned by: 046056 Ryan Thompson NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 12/15/2023

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PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

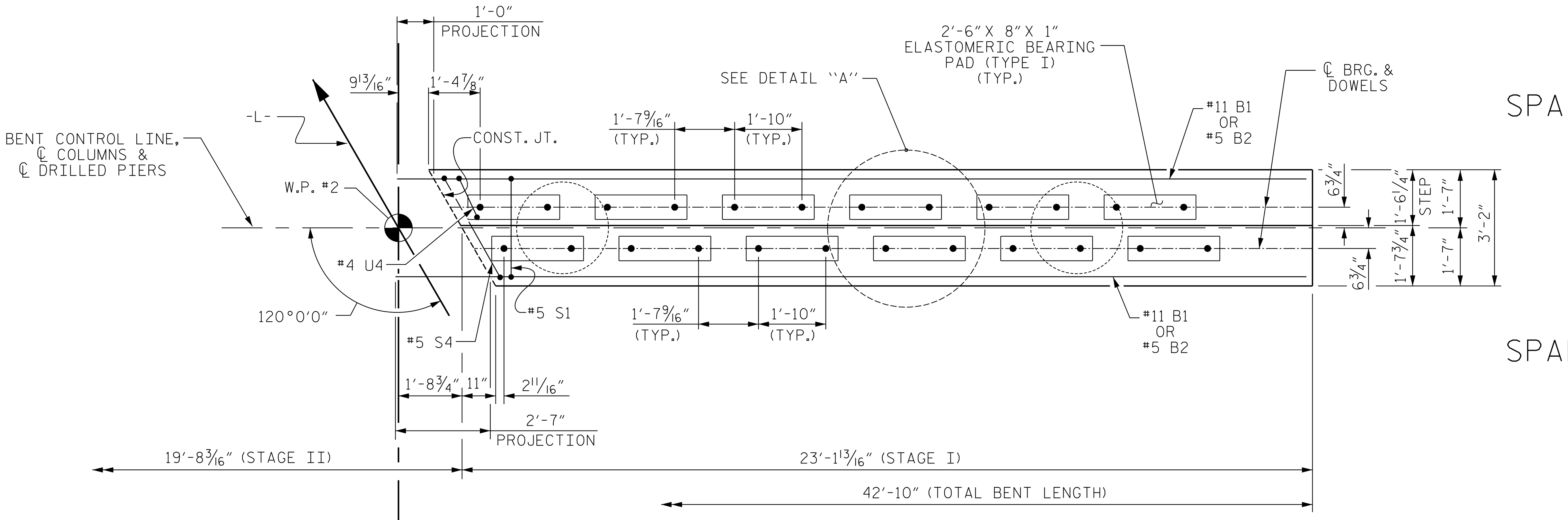
SHEET 4 OF 4

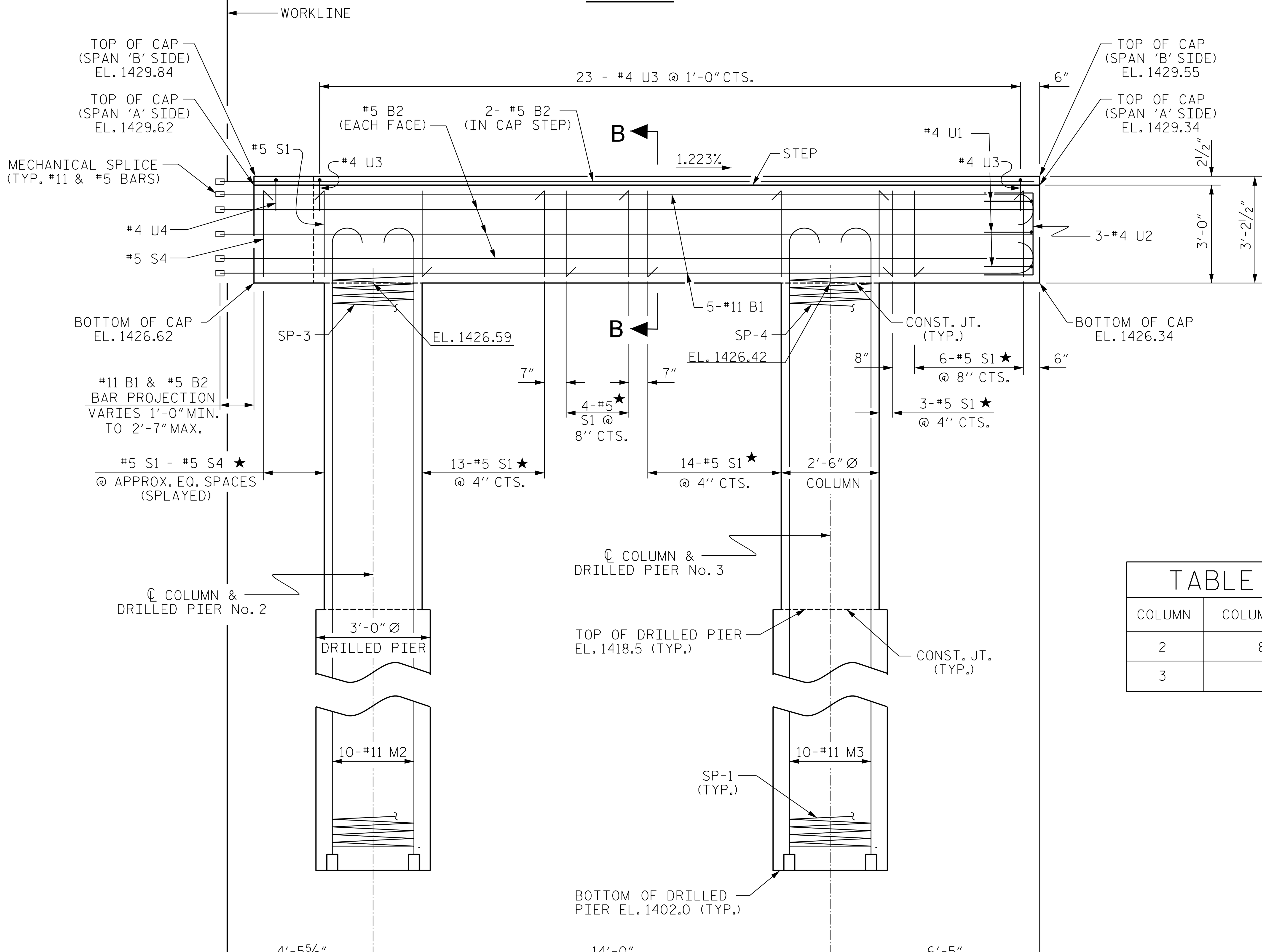
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1 DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-30
1			3			TOTAL SHEETS
2			4			40





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

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

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

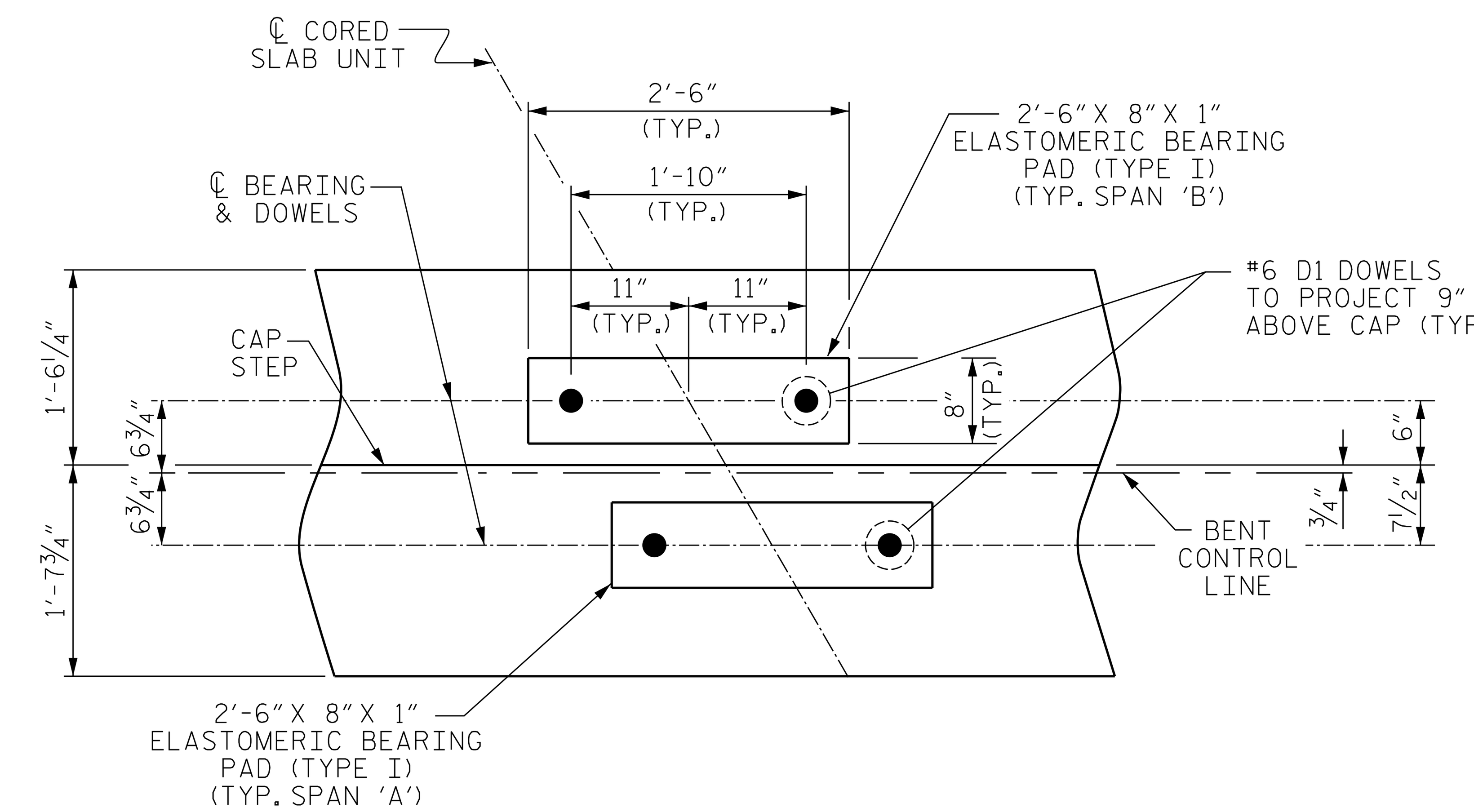
FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

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

★ INVERT ALTERNATE STIRRUPS.

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

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



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

TABLE OF DIMENSIONS

COLUMN	COLUMN HEIGHTS	DRILLED PIER MIN. HEIGHT
2	8'-1 1/16"	16'-6"
3	7'-11"	16'-6"

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 1

(STAGE I)

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056
DocuSigned by: 13DB7... 12/15/2023

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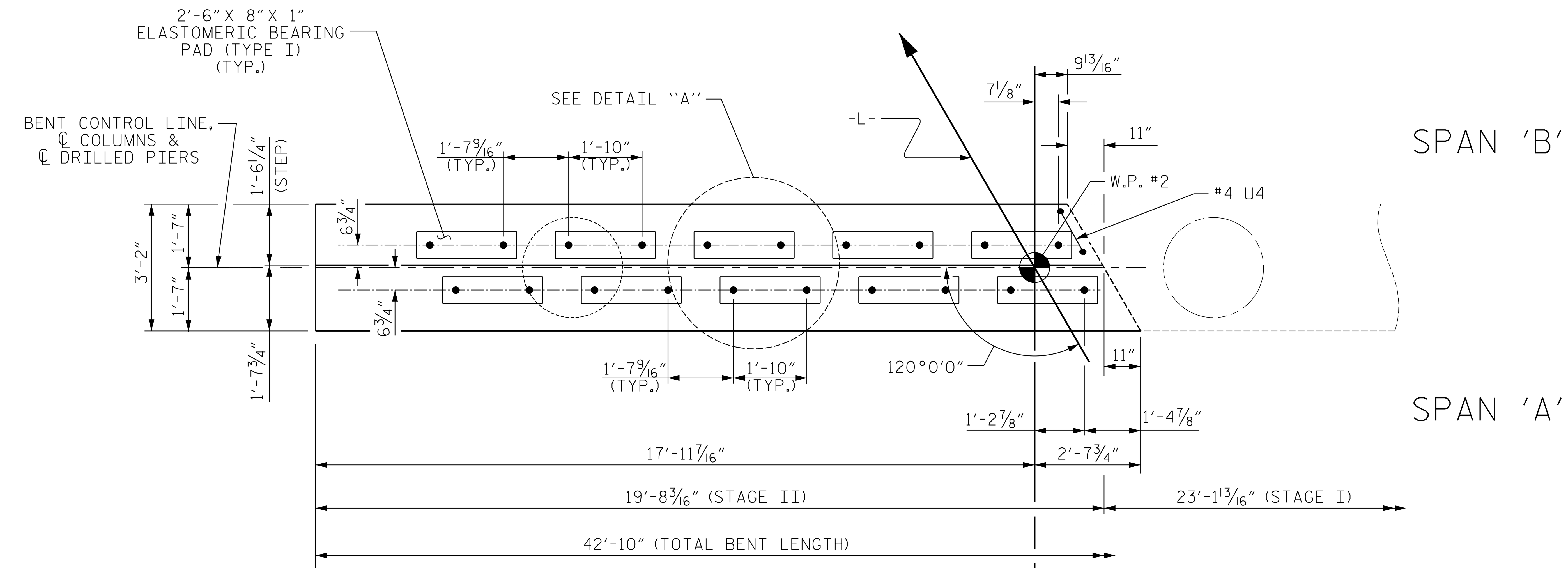
Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

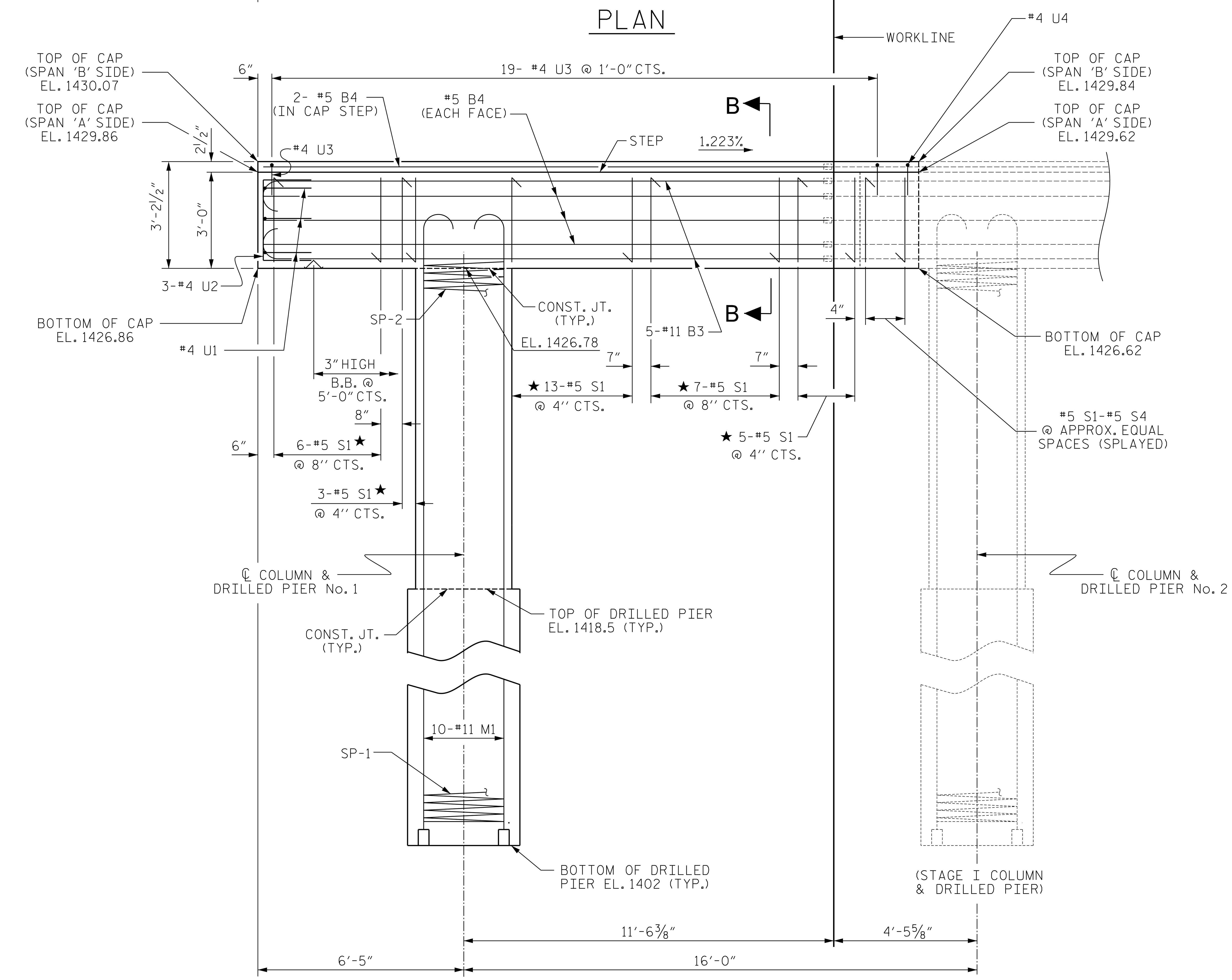
REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S1-31
1			3					TOTAL SHEETS
2			4					40

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : RTS DATE : 02/18



PLAN



ELEVATION

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

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

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

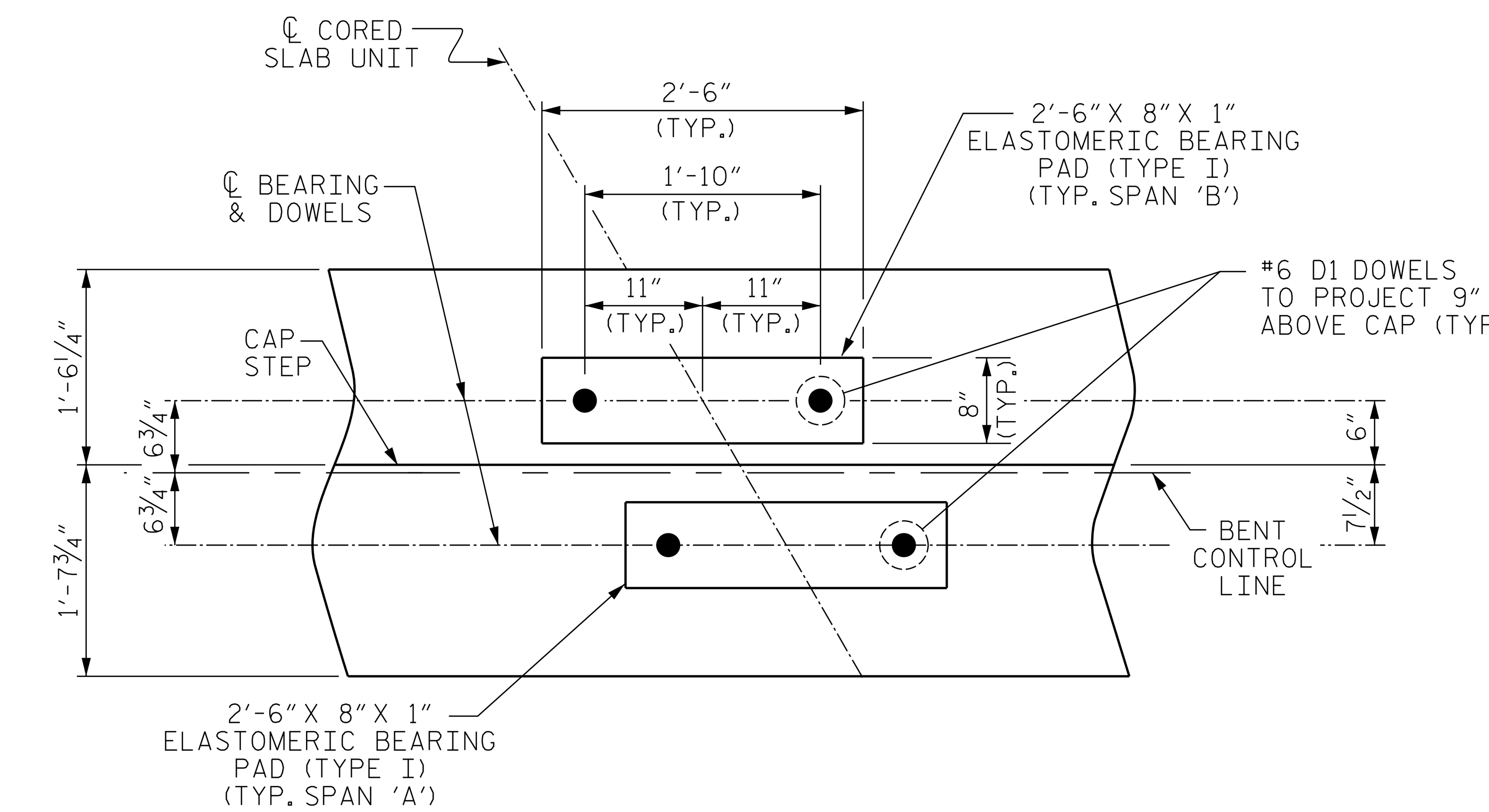
FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

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

★ INVERT ALTERNATE STIRRUPS.

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

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



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

TABLE OF DIMENSIONS

COLUMN	COLUMN HEIGHTS	DRILLED PIER MIN. HEIGHT
1	8'-3 3/8"	16'-6"

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 1

(STAGE II)

NORTH CAROLINA PROFESSIONAL ENGINEER 046056 — DocuSigned by: 13D87AE86E443A... 12/15/2023

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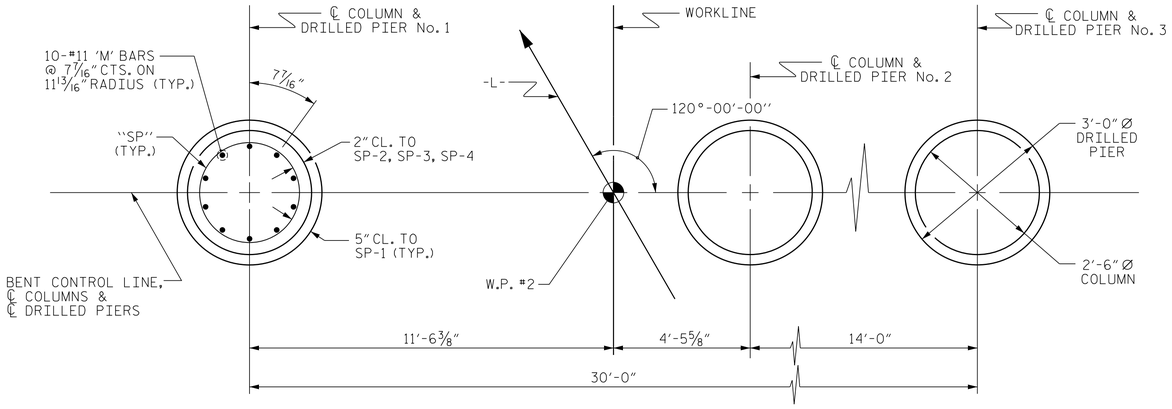
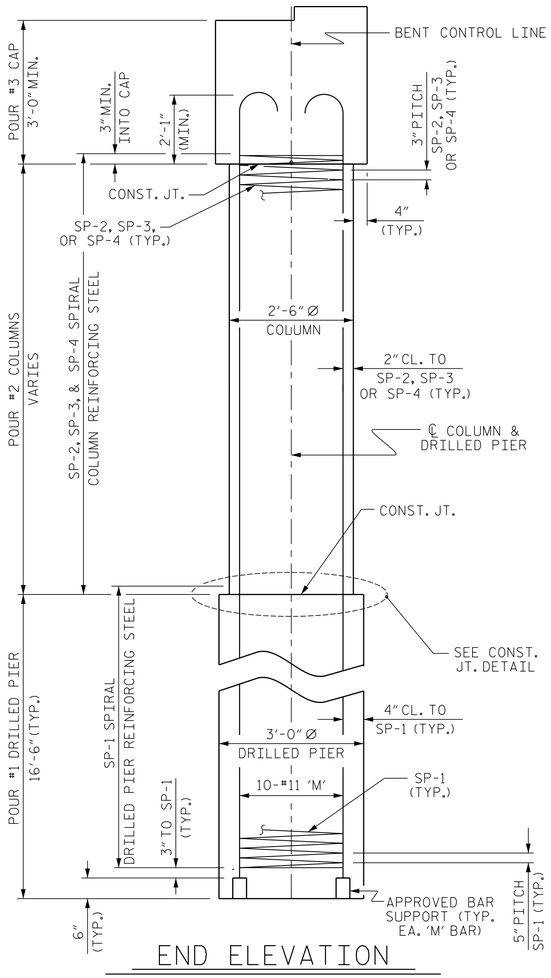
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S1-32
1			3			TOTAL SHEETS	40
2			4				

DES. EGR. OF RECORD: RTS DATE: 02/18

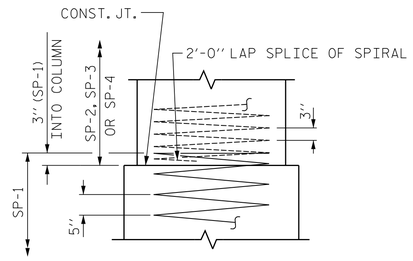
ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : TS DATE : 02/18



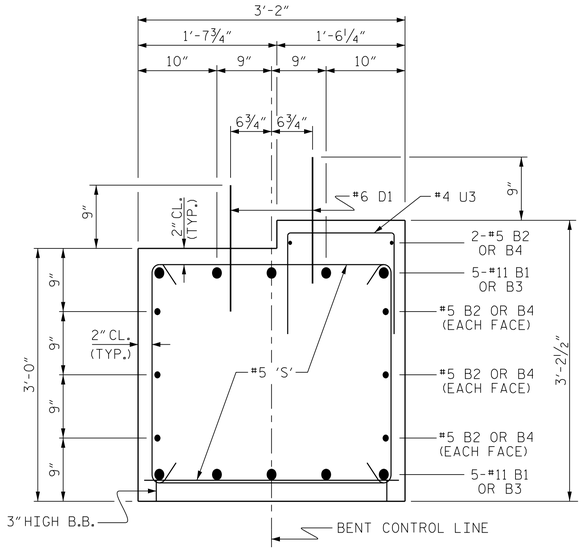
PLAN OF DRILLED PIERS & COLUMNS



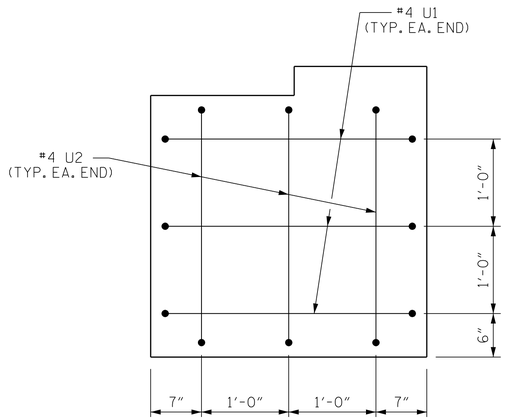
END ELEVATION



CONSTRUCTION JOINT DETAIL



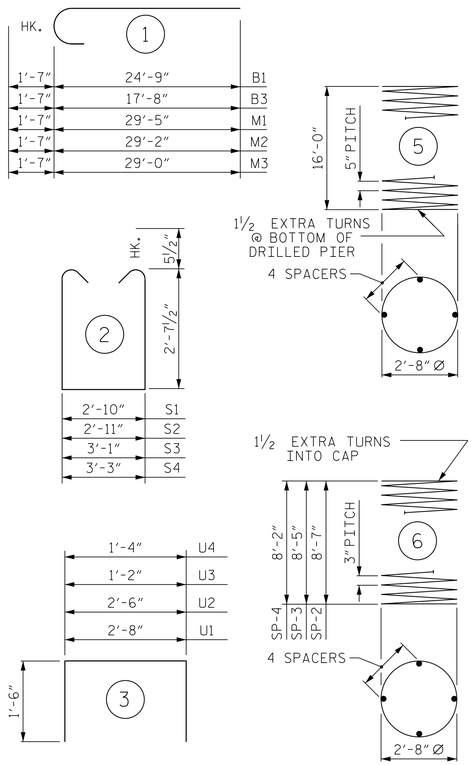
SECTION 'B-B'



END OF CAP VIEW

(TYPICAL BOTH ENDS)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	26'-4"	1399
B2	8	#5	STR	24'-9"	207
D1	24	#6	STR	1'-6"	54
M2	10	#11	1	30'-9"	1634
M3	10	#11	1	30'-7"	1625
S1	42	#5	2	9'-0"	394
S2	1	#5	2	9'-1"	9
S3	1	#5	2	9'-3"	10
S4	1	#5	2	9'-5"	10
U1	3	#4	3	5'-8"	11
U2	3	#4	3	5'-6"	11
U3	23	#4	3	4'-2"	64
U4	1	#4	3	4'-4"	3

REINFORCING STEEL 5,431 LBS.

SP-1	2	*	5	265'-7"	554
SP-3	1	**	6	235'-2"	157
SP-4	1	**	6	228'-6"	153

SPIRAL COLUMN REINF. STEEL 864 LBS.

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

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

CLASS A CONCRETE BREAKDOWN (STAGE I)

POUR #2 (COLUMNS)	2.9 C.Y.
POUR #3 (CAP)	8.5 C.Y.
TOTAL CLASS A CONCRETE	11.4 C.Y.

DRILLED PIERS: (STAGE I)

DRILLED PIER CONCRETE	
POUR #1 (DRILLED PIERS)	8.6 C.Y.

STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B3	10	#11	1	19'-3"	1023
B4	8	#5	STR	17'-8"	147
D1	20	#6	STR	1'-6"	45
M1	10	#11	STR	31'-0"	1647
S1	35	#5	2	9'-0"	329
S2	1	#5	2	9'-1"	9
S3	1	#5	2	9'-3"	10
S4	1	#5	2	9'-5"	10
U1	3	#4	3	5'-8"	11
U2	3	#4	3	5'-6"	11
U3	19	#4	3	4'-2"	53
U4	1	#4	3	4'-4"	3

REINFORCING STEEL 3,298 LBS.

SP-1	1	*	5	265'-7"	277
SP-2	1	**	6	239'-2"	160

SPIRAL COLUMN REINF. STEEL 437 LBS.

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

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

CLASS A CONCRETE BREAKDOWN (STAGE II)

POUR #2 (COLUMN)	1.5 C.Y.
POUR #3 (CAP)	7.2 C.Y.
TOTAL CLASS A CONCRETE	8.7 C.Y.

DRILLED PIERS: (STAGE II)

DRILLED PIER CONCRETE	
POUR #1 (DRILLED PIER)	4.3 C.Y.

TOTAL BILL OF MATERIAL FOR BENT NO. 1

3'-0" Ø DRILLED PIER IN SOIL	3'-0" Ø DRILLED PIER NOT IN SOIL	CLASS A CONC.	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	CSL TUBES	SID INSPECTIONS
LIN. FT.	LIN. FT.	C.Y.	LBS.	LBS.	LIN. FT.	EACH
28.5	21.0	20.1	8,729	1301	216.0	1

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056 DocuSigned by: 12/15/2023

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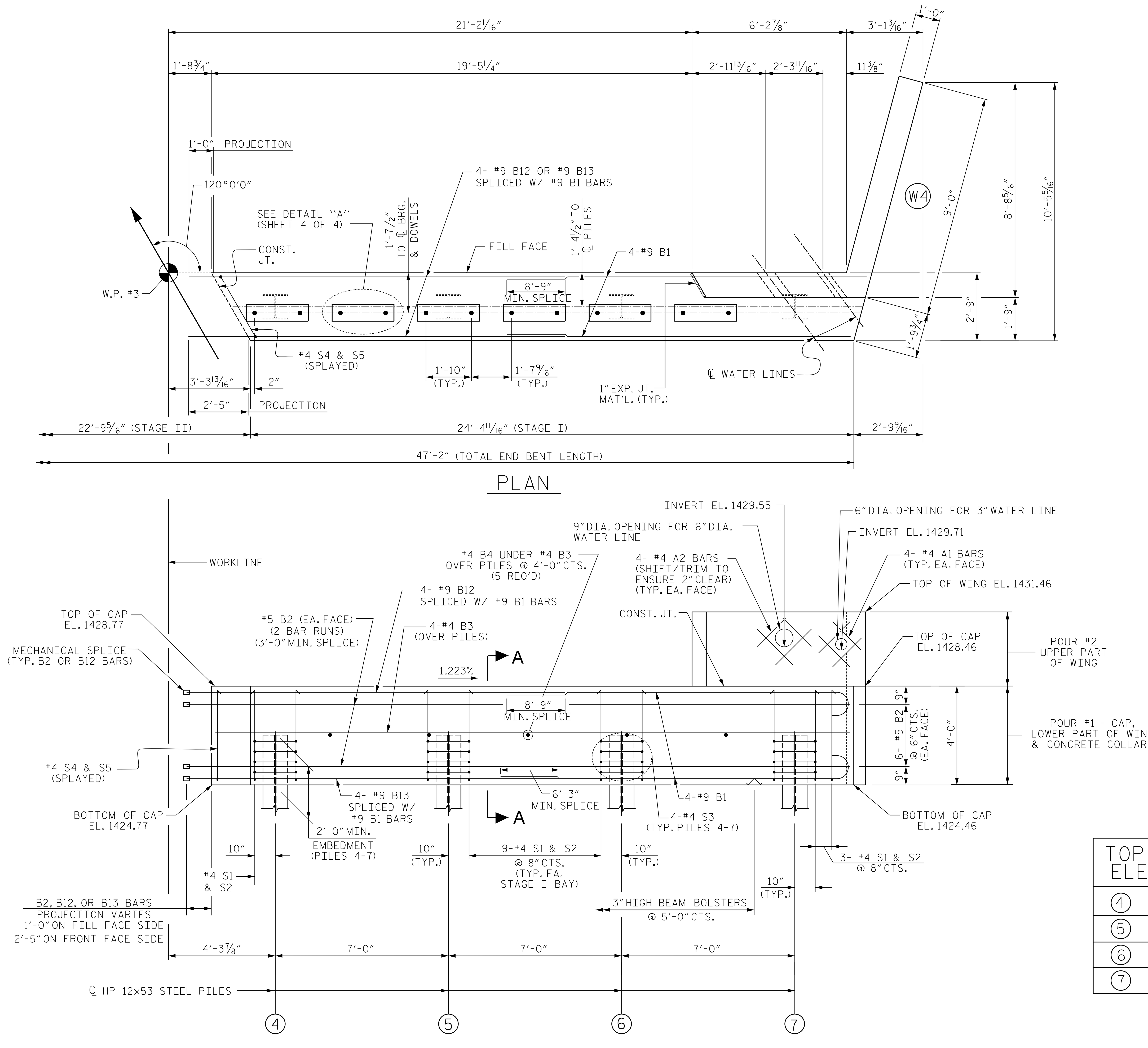
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-33
1			3			TOTAL SHEETS
2			4			40

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : RTS DATE : 02/18



ELEVATION

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

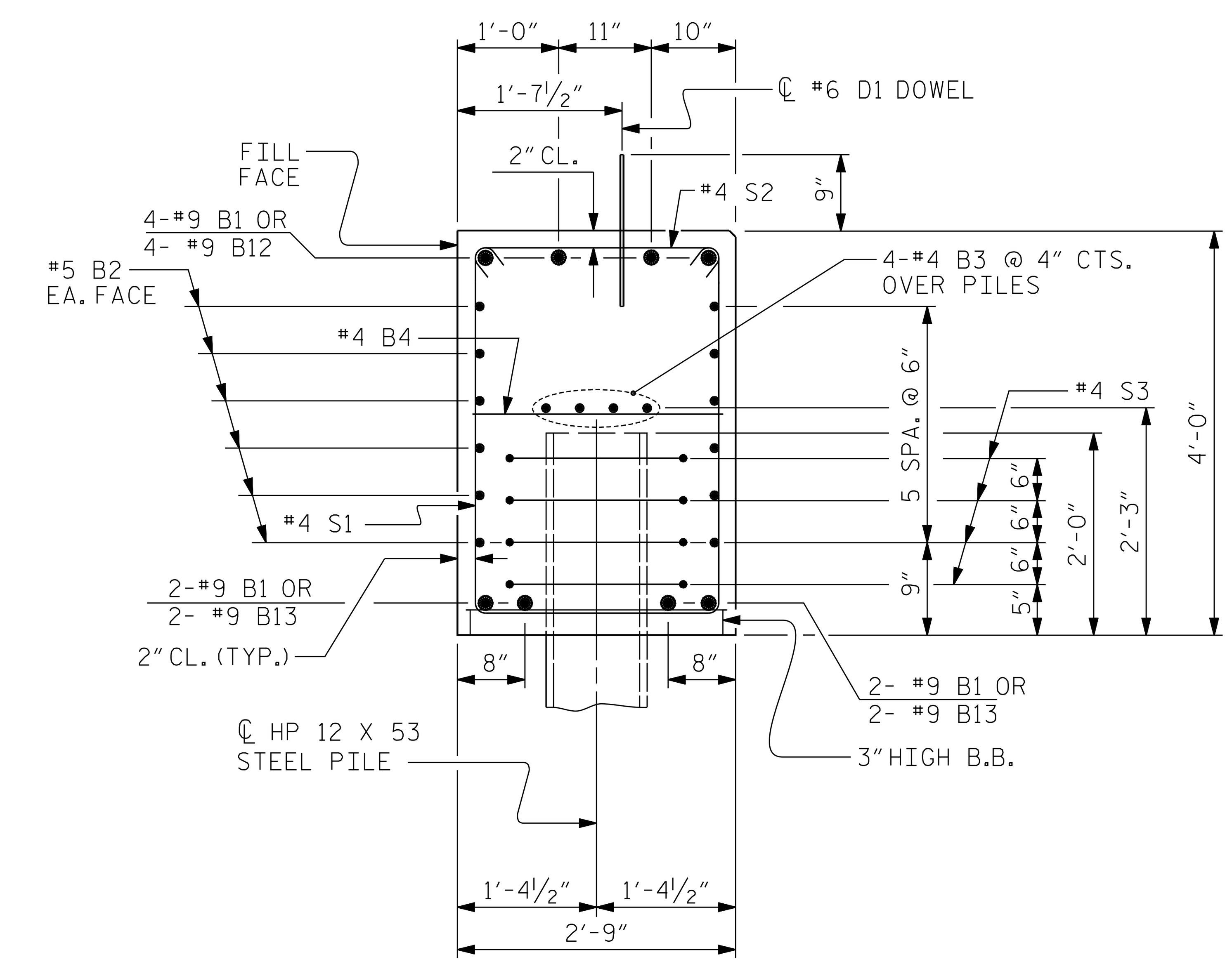
NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

CONTRACTOR SHALL VERIFY WATER LINE OPENING LOCATION AND INVERT ELEVATIONS BEFORE POURING CONCRETE IN POUR #2.



SECTION A-A

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

TOP OF PILE ELEVATIONS	
4	1426.75
5	1426.66
6	1426.58
7	1426.49

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 2

(STAGE I)

NORTH CAROLINA PROFESSIONAL SEAL 046056 ENGINEER
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12/15/2023

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REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S1-34
			3					TOTAL SHEETS
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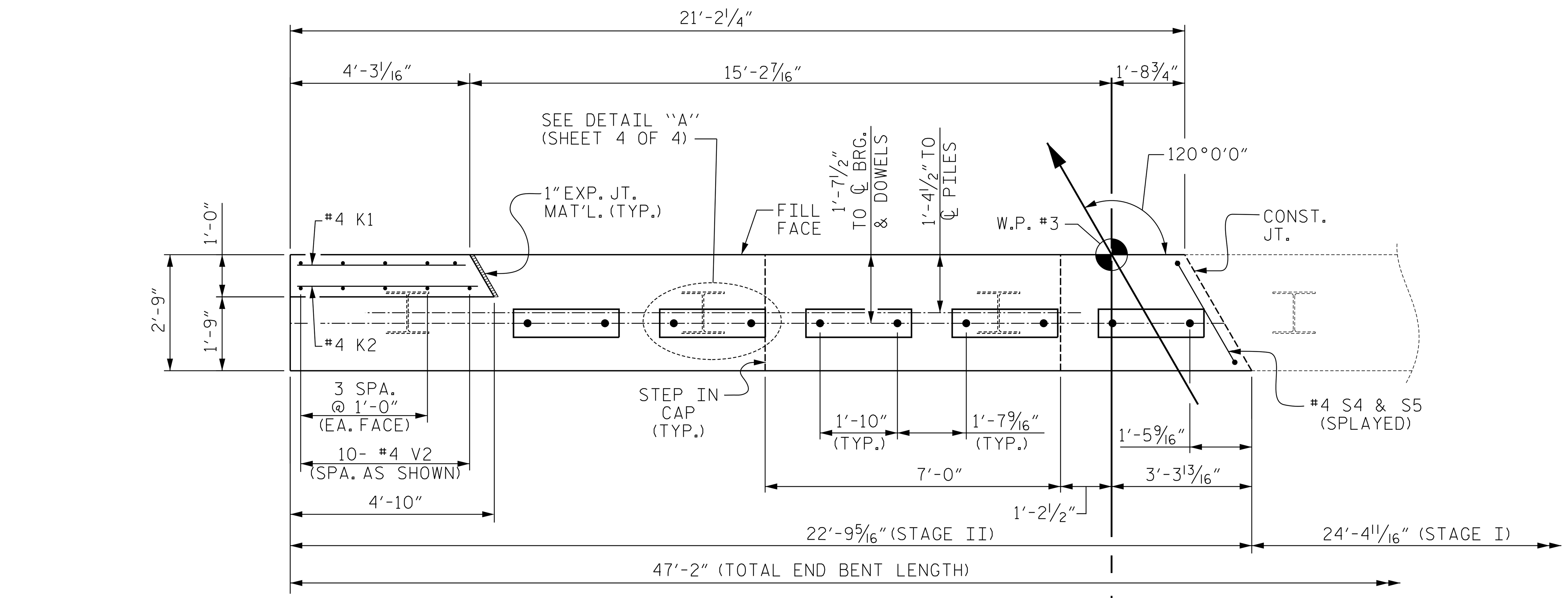
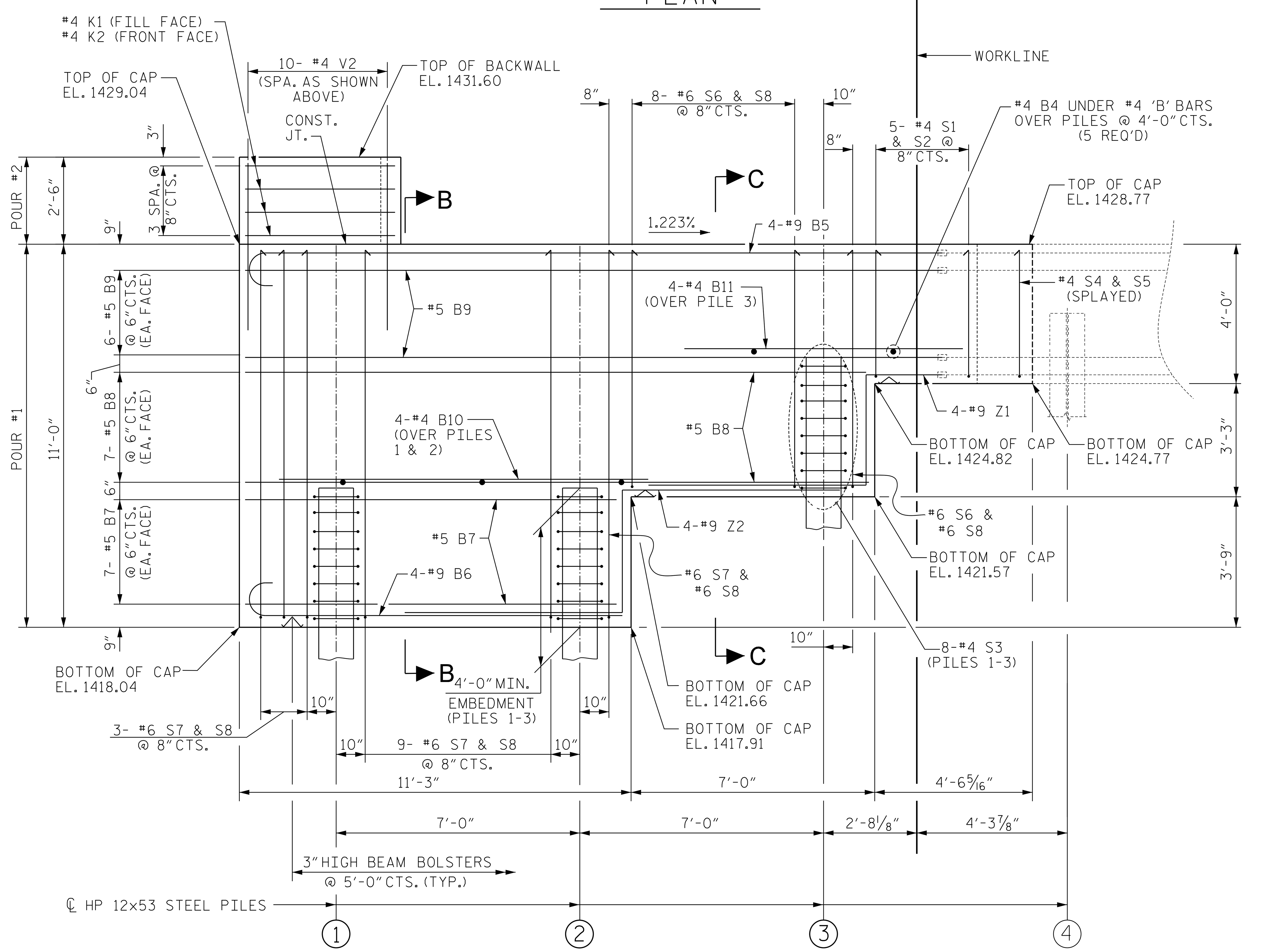
ASSEMBLED BY :	AW	DATE :	02/18
CHECKED BY :	HLW	DATE :	02/18

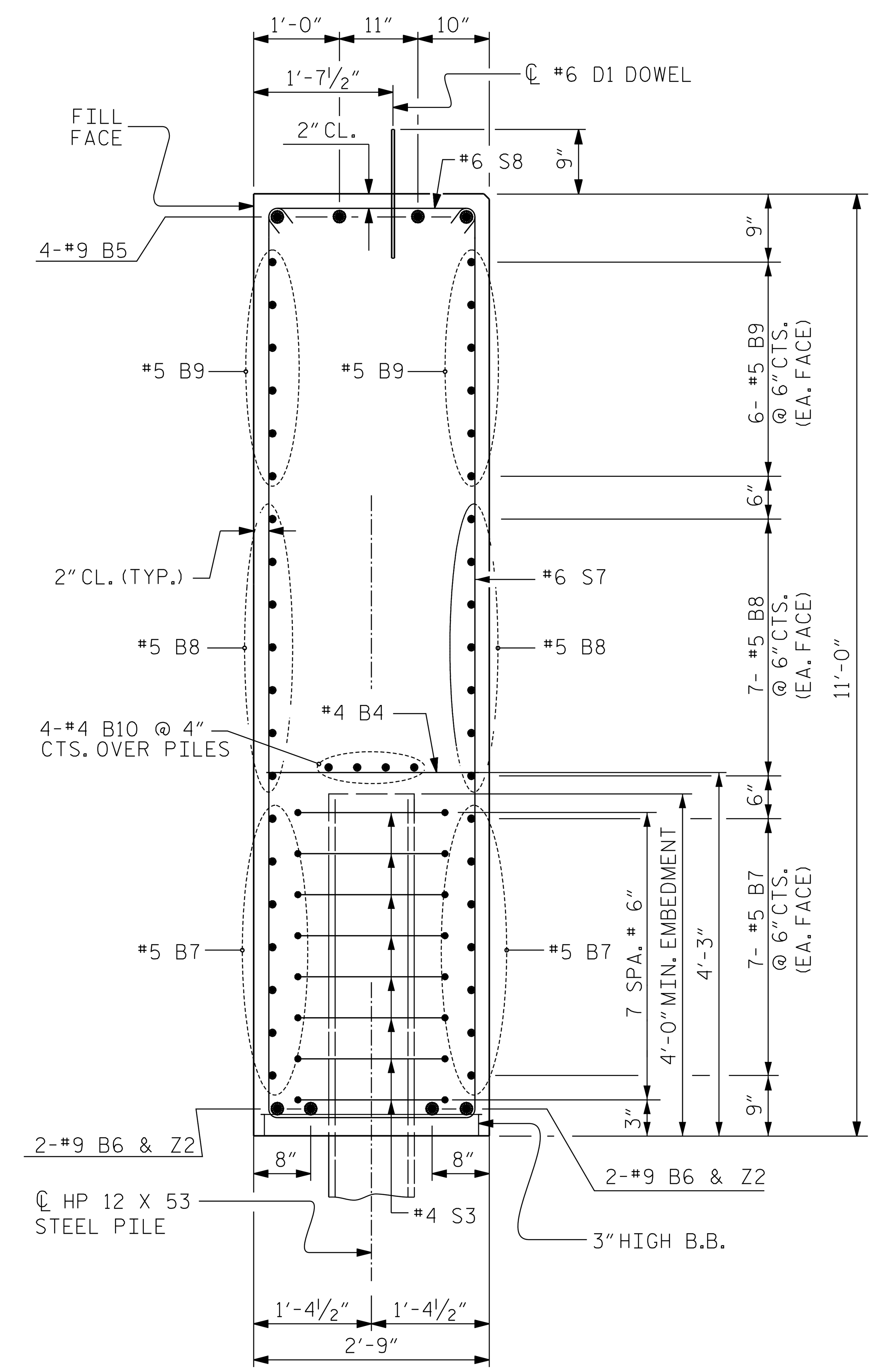


PLAN



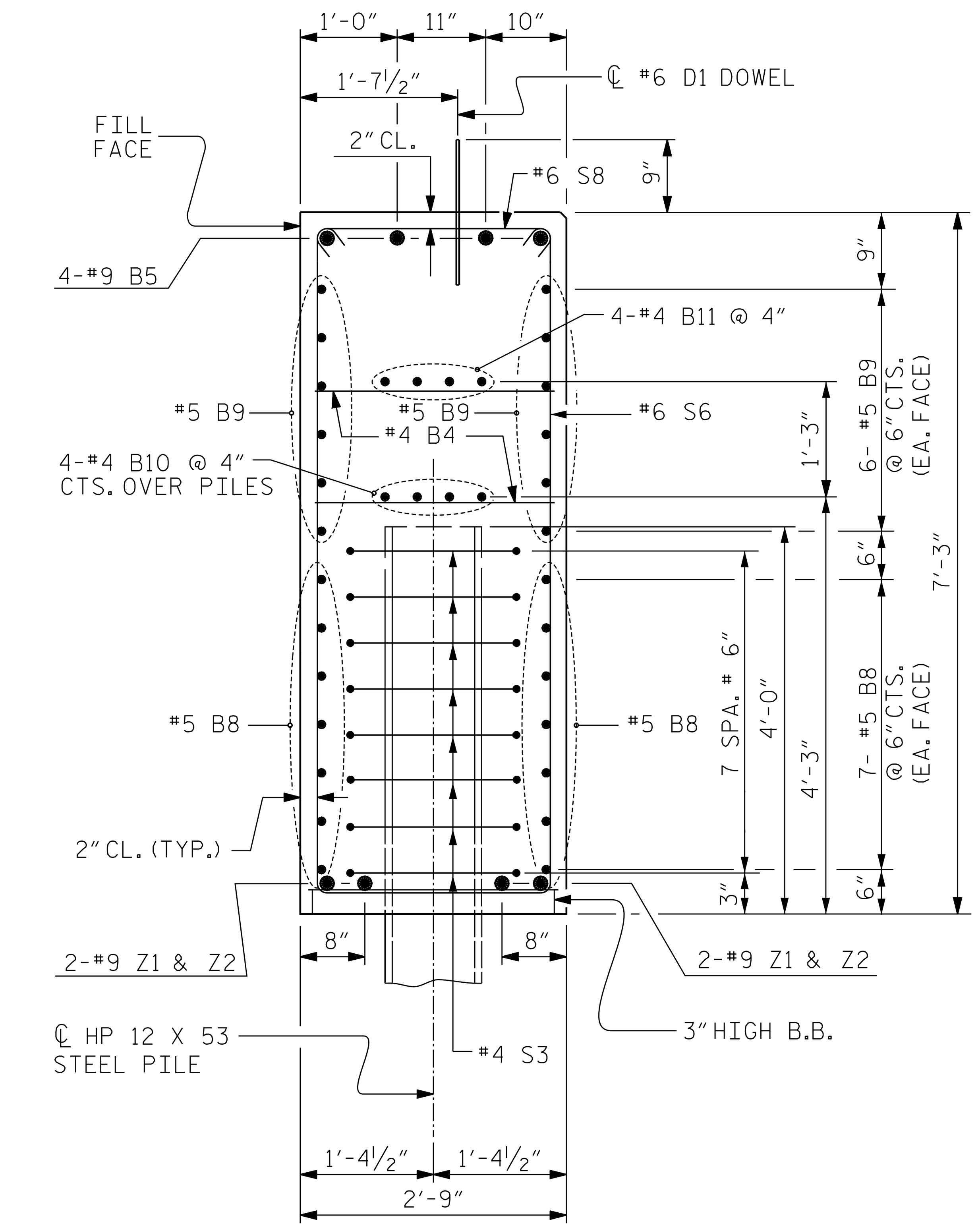
ELEVATION

CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN & ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.



SECTION B-B

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



SECTION C-C

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

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

TOP OF PILE ELEVATIONS	
1	1422.01
2	1421.93
3	1425.59

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT No. 2
(STAGE II)

NORTH CAROLINA PROFESSIONAL SEAL 046056 ENGINEER
DocuSigned by: 13D870AE8E443A...
12/15/2023

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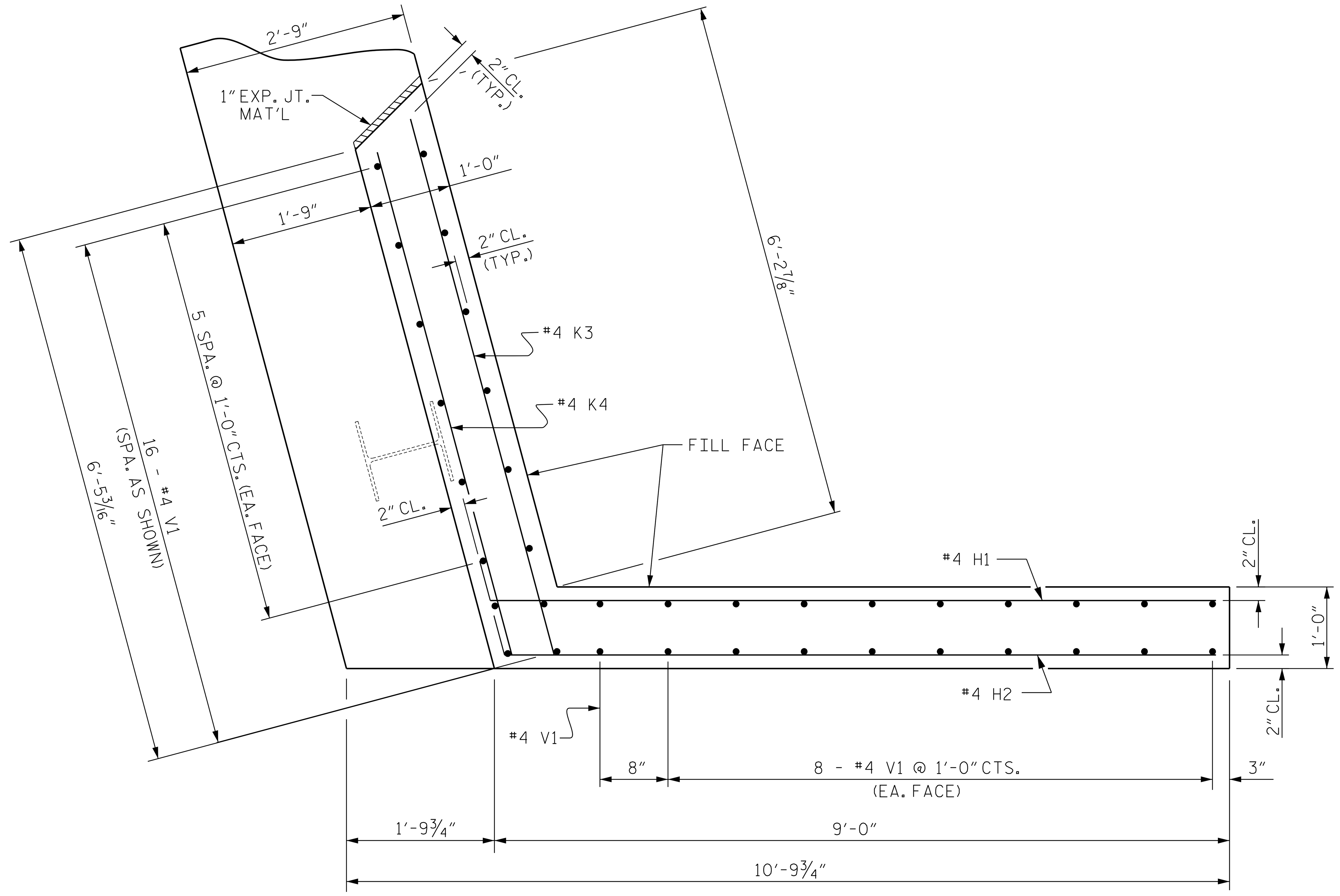
REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S1-35
1			3					TOTAL SHEETS
2			4					40

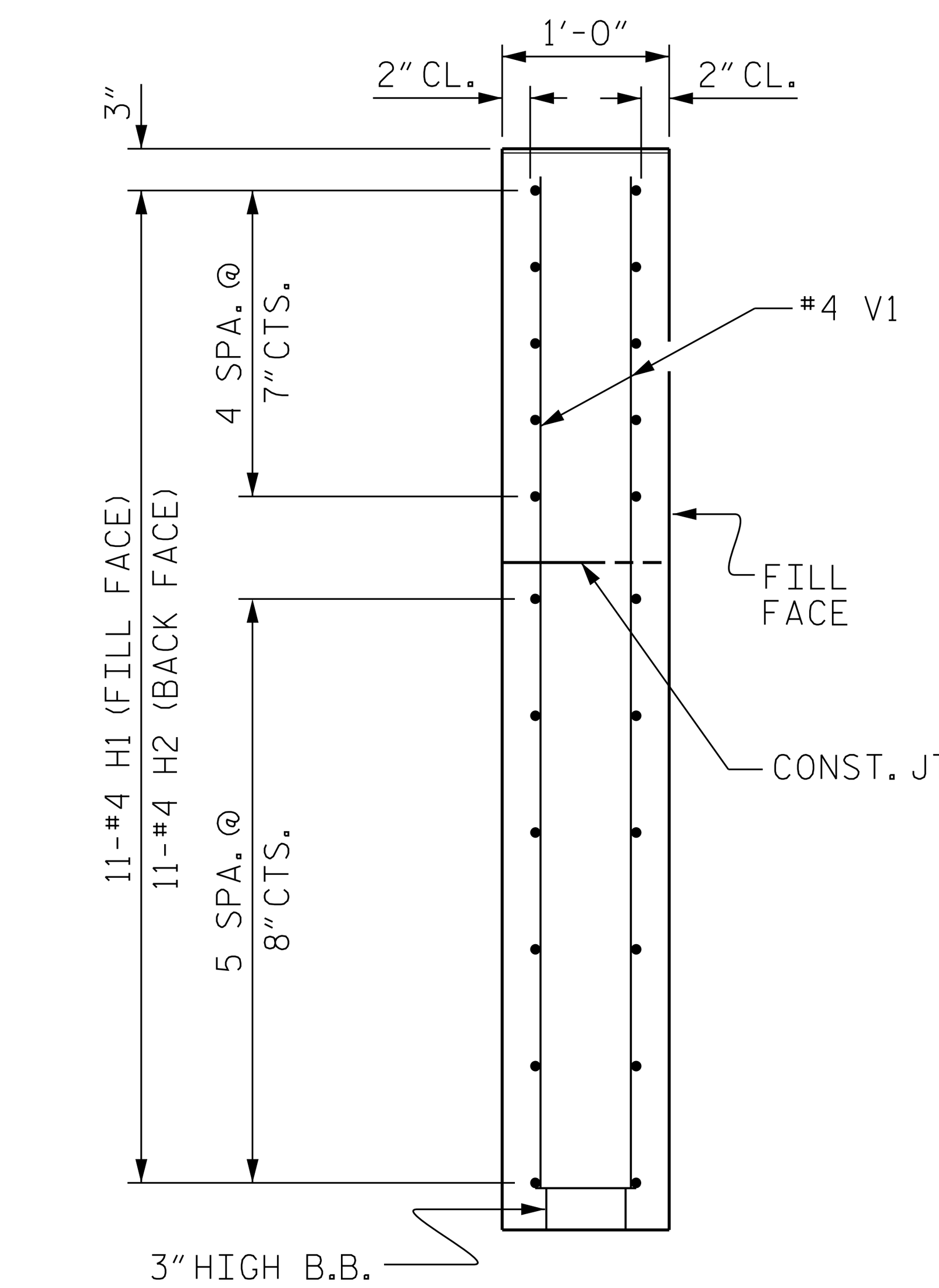
DES. EGR. OF RECORD: RTS DATE: 02/18
ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : HLW DATE : 02/18



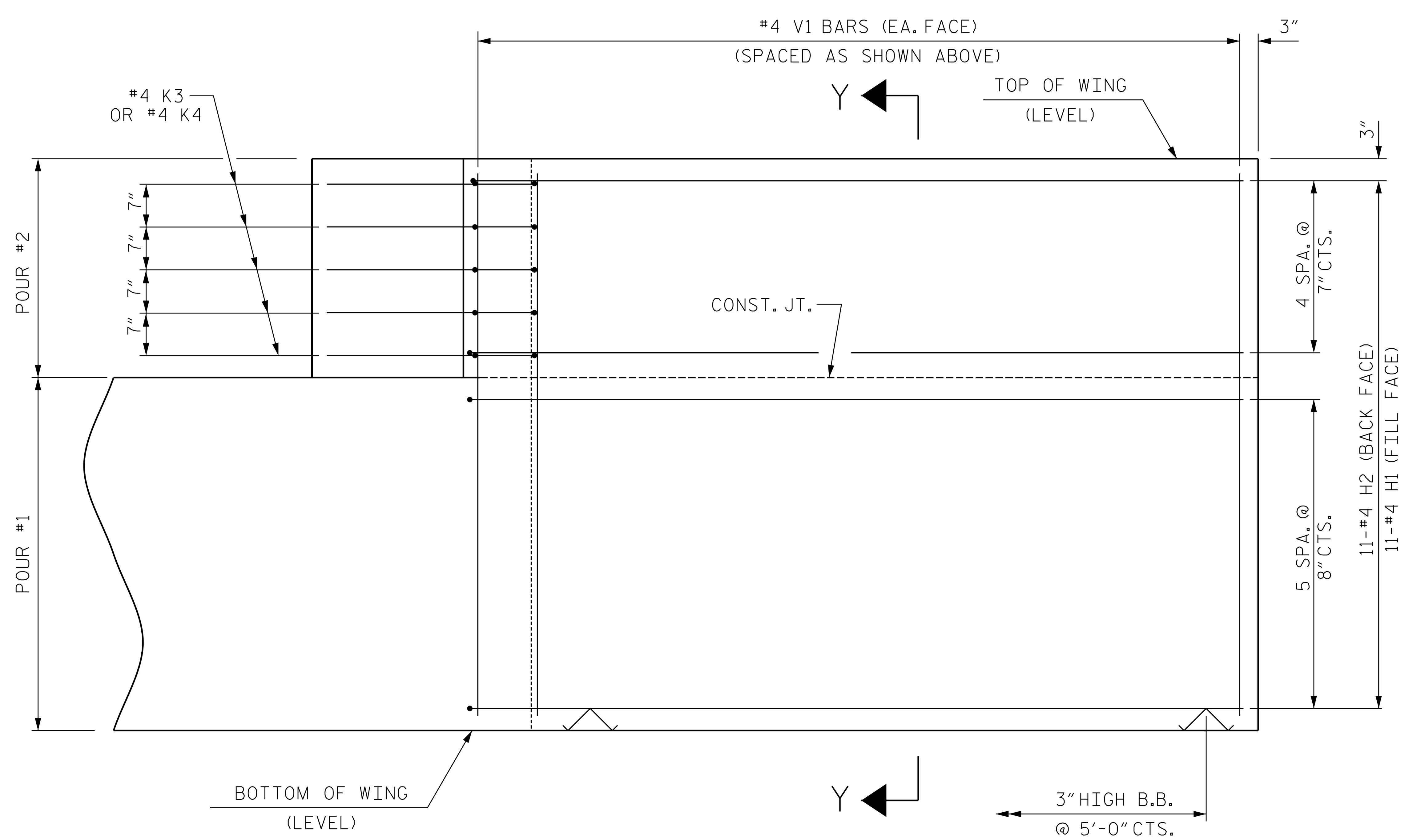
PLAN OF WING (W4)

PIPE OPENINGS NOT SHOWN FOR CLARITY.

SHIFT VERTICAL V1 BARS AS NECESSARY TO ENSURE 2" CLEAR AT PIPE OPENINGS. TRIM HORIZONTAL "K" BARS AS NECESSARY TO ENSURE 2" CLEAR AT PIPE OPENINGS.



SECTION Y-Y



ELEVATION OF WING (W4)

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT
WING DETAILS

DocuSigned by:
NORTH CAROLINA PROFESSIONAL ENGINEER 046056
13D07... 443A...
12/15/2023

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NO.	BY:	DATE:	NO.	BY:	DATE:	S1-36
1			3			TOTAL SHEETS
2			4			40

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : AW DATE : 02/18
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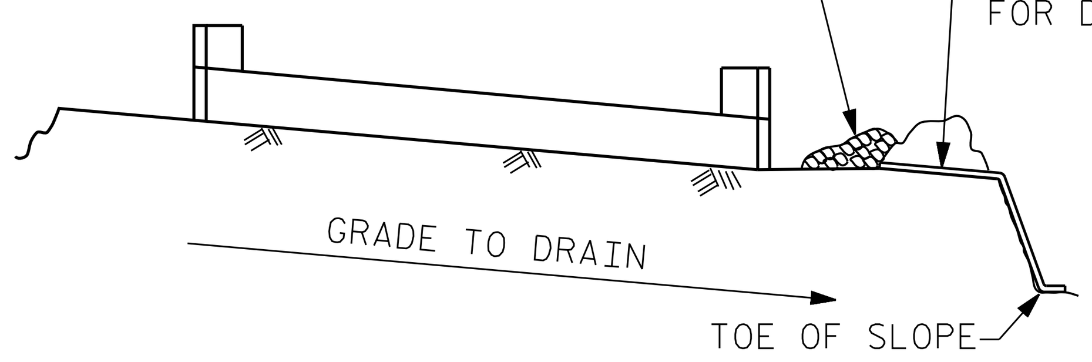
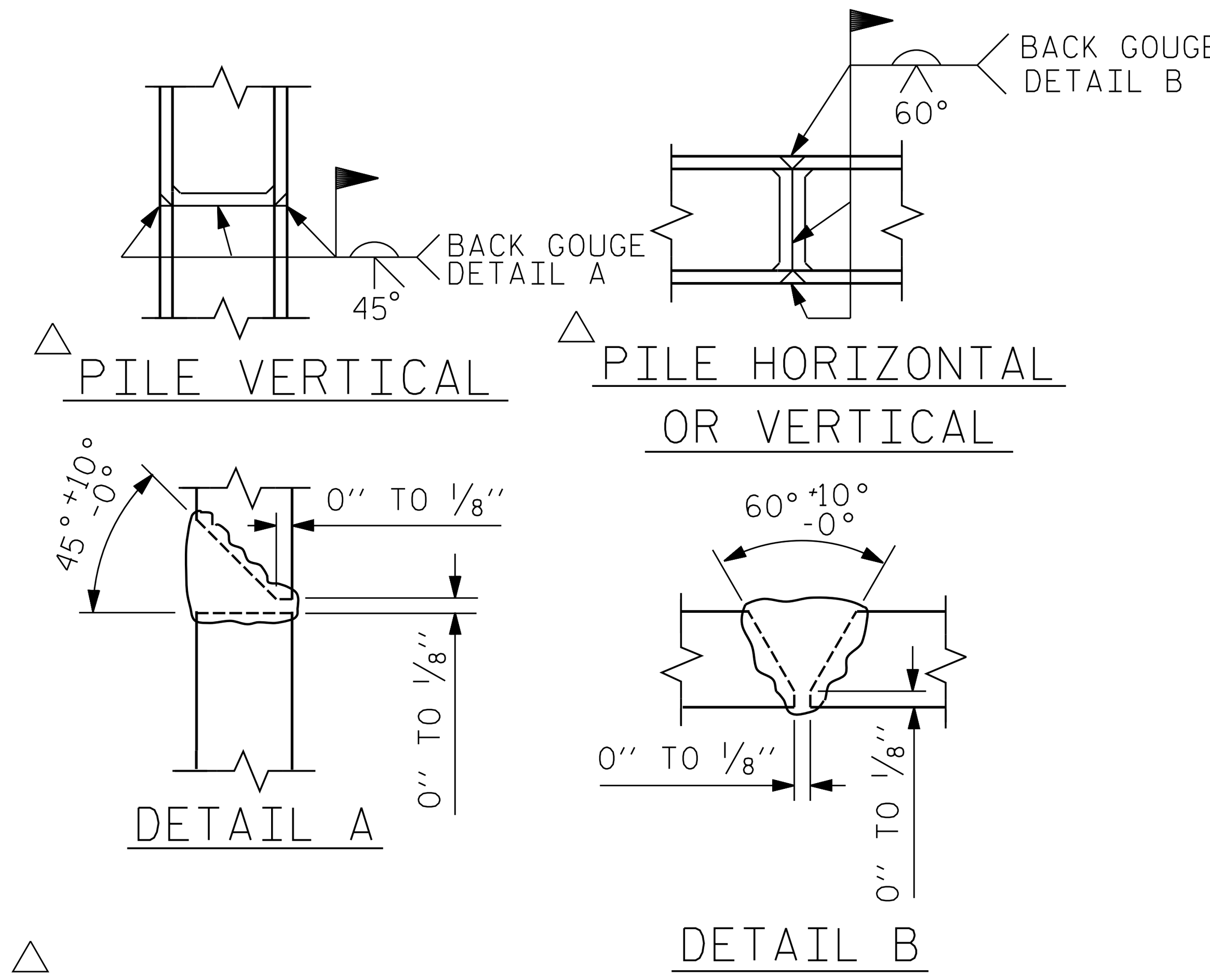


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

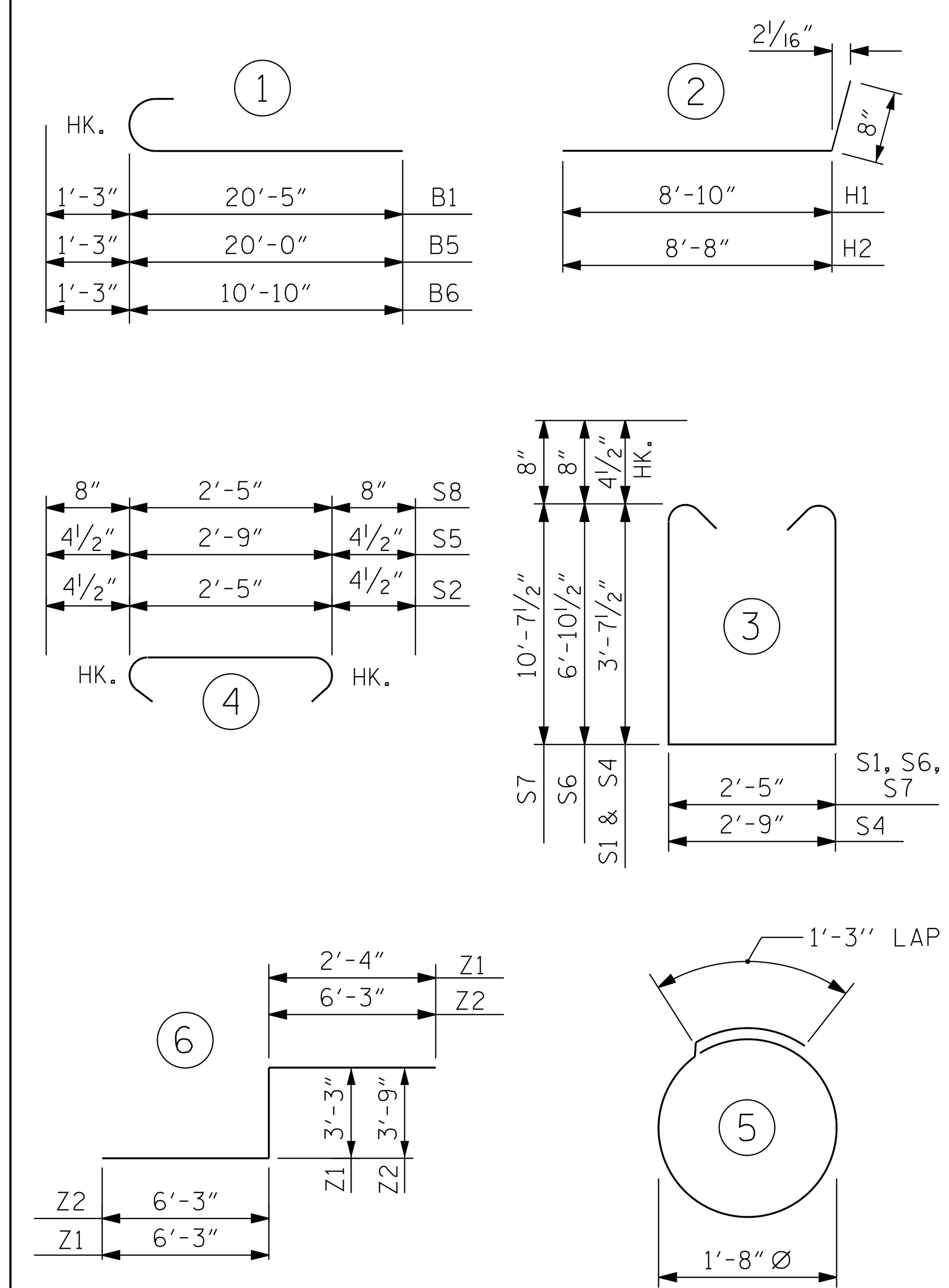
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR END BENT NO. 2

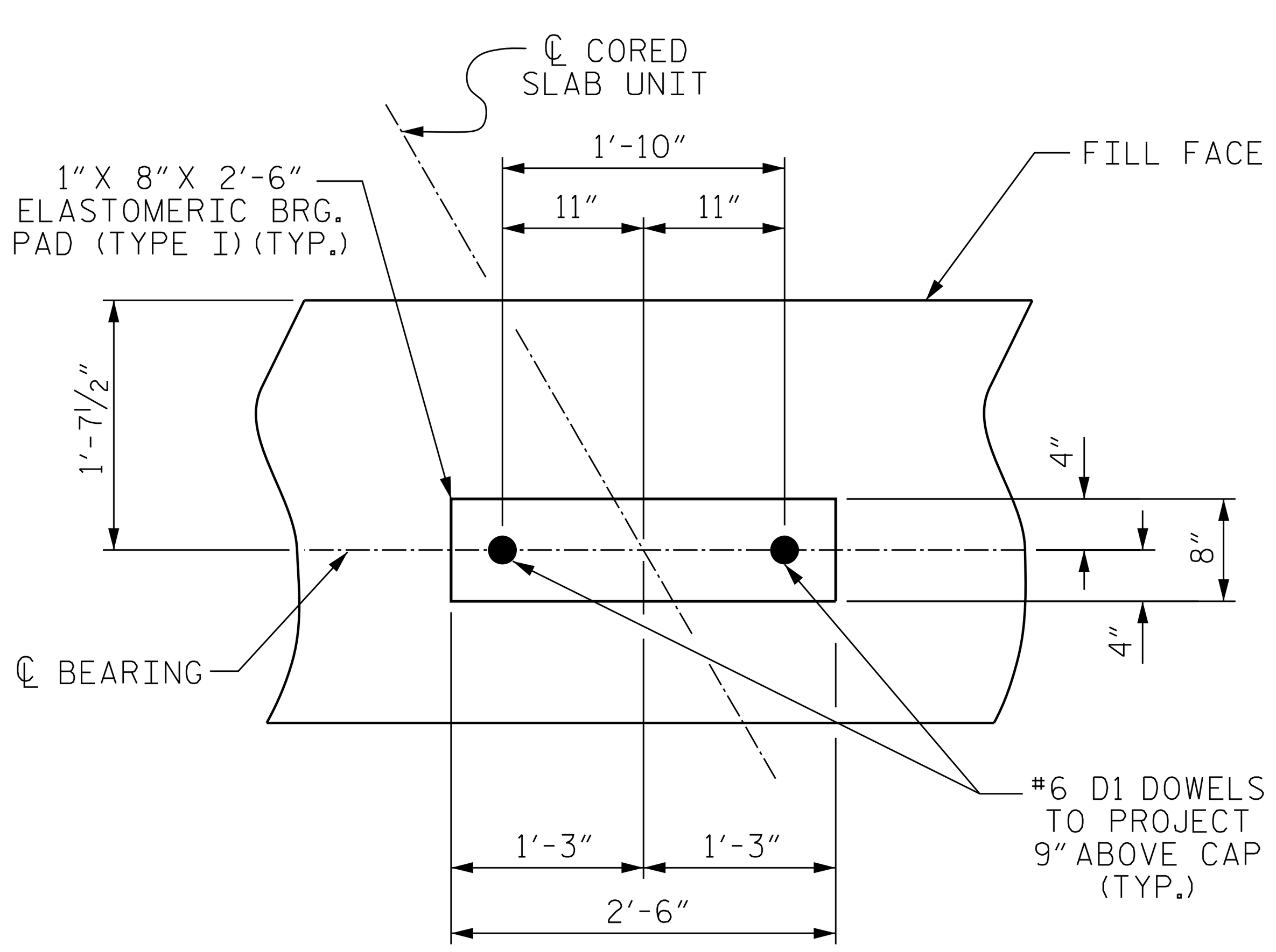
STAGE I						STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	8	#4	STR	1'-10"	10	B4	5	#4	STR	2'-5"	8
A2	8	#4	STR	2'-0"	11	B5	4	#9	1	21'-3"	289
						B6	4	#9	1	12'-1"	164
B1	8	#9	1	21'-8"	589	B7	14	#5	STR	10'-10"	158
B2	12	#5	STR	26'-10"	336	B8	14	#5	STR	17'-10"	260
B3	4	#4	STR	25'-0"	67	B9	12	#5	STR	20'-0"	250
B4	5	#4	STR	2'-5"	8	B10	4	#4	STR	11'-1"	30
B12	4	#9	STR	15'-10"	215	B11	4	#4	STR	6'-0"	16
B13	4	#9	STR	13'-10"	188						
						D1	10	#6	STR	1'-6"	23
D1	12	#6	STR	1'-6"	27						
						K1	4	#4	STR	3'-11"	10
H1	11	#4	2	9'-6"	70	K2	4	#4	STR	4'-3"	11
H2	11	#4	2	9'-4"	69						
						S1	5	#4	3	10'-5"	35
K3	5	#4	STR	6'-9"	23	S2	5	#4	4	3'-2"	11
K4	5	#4	STR	6'-2"	21	S3	24	#4	5	6'-6"	104
						S4	1	#4	3	10'-9"	7
S1	31	#4	3	10'-5"	216	S5	1	#4	4	3'-6"	2
S2	31	#4	4	3'-2"	66	S6	9	#6	3	17'-6"	237
S3	16	#4	5	6'-6"	69	S7	13	#6	3	25'-0"	488
S4	1	#4	3	10'-9"	7	S8	22	#6	4	3'-9"	124
S5	1	#4	4	3'-6"	2						
						V2	10	#4	STR	4'-3"	28
V1	34	#4	STR	6'-7"	150						
						Z1	4	#9	6	11'-10"	161
						Z2	4	#9	6	16'-3"	221

STAGE I		STAGE II	
REINFORCING STEEL (FOR STAGE I)	2144 LBS.	REINFORCING STEEL (FOR STAGE II)	2637 LBS.
CLASS A CONCRETE BREAKDOWN (FOR STAGE I)		CLASS A CONCRETE BREAKDOWN (FOR STAGE II)	
POUR #1 CAP, LOWER PART OF WING & COLLARS	12.3 C.Y.	POUR #1 CAP, & COLLARS	19.8 C.Y.
POUR #2 UPPER PART OF WING	1.7 C.Y.	POUR #2 BACKWALL	0.4 C.Y.
TOTAL CLASS A CONCRETE	13.0 C.Y	TOTAL CLASS A CONCRETE	20.2 C.Y.

TOTAL BILL OF MATERIAL

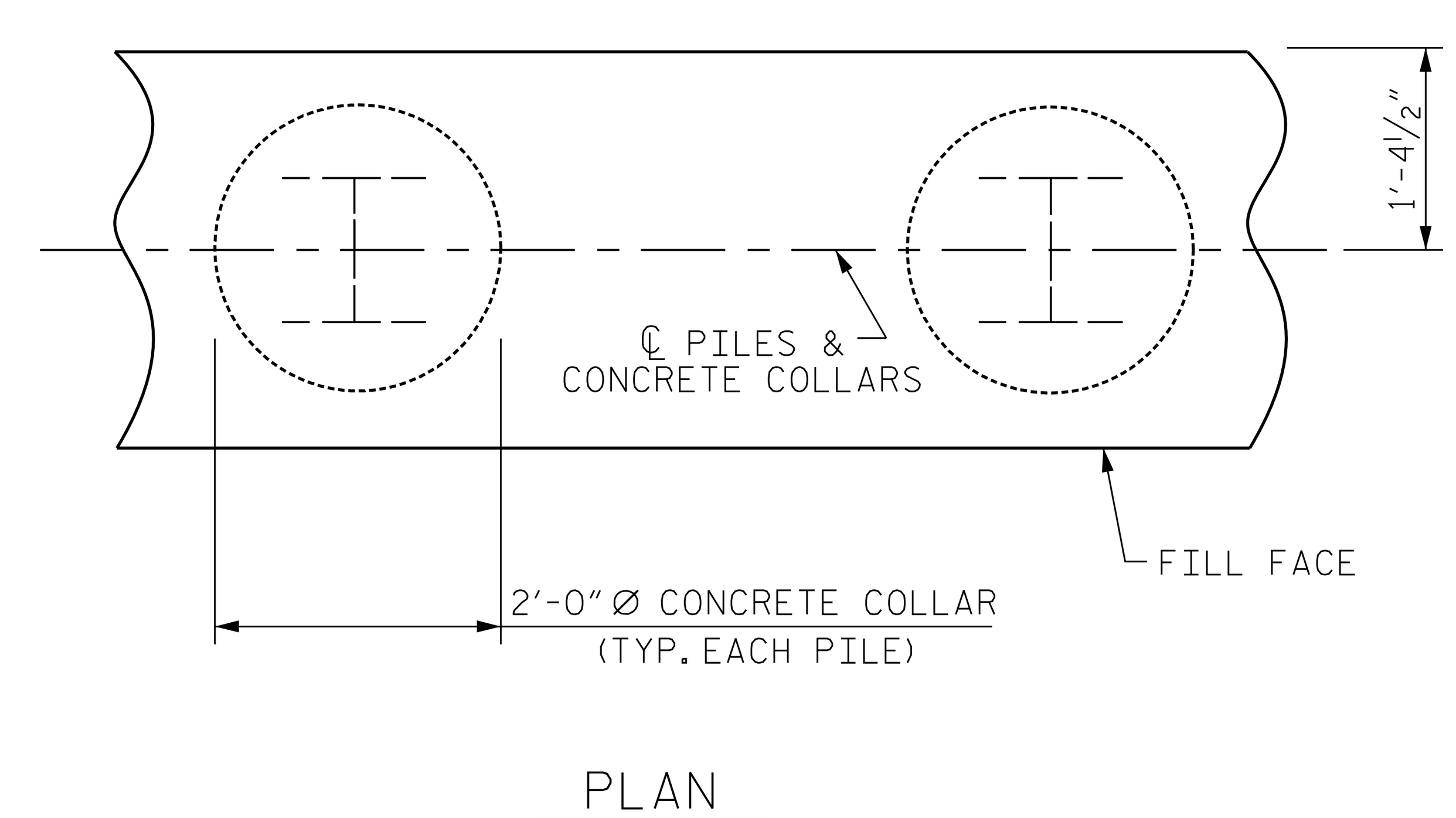
	CLASS A CONCRETE	REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	HP 12X53 STEEL PILES		PILE EXCAVATION IN SOIL	PILE EXCAVATION NOT IN SOIL
END BENT No. 2	CU. YDS.	LBS.	NO.	NO.	LIN. FT.	LIN. FT.	LIN. FT.
	33.2	4,781	7	7	125 ✱	0	90.0

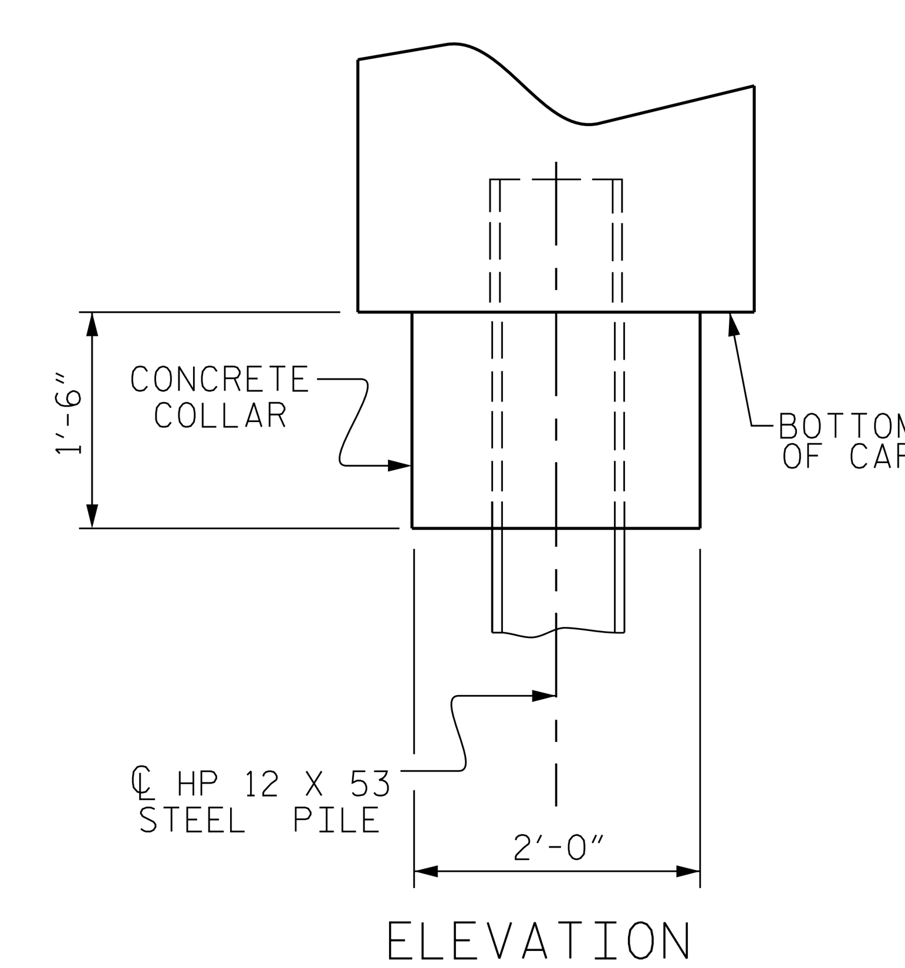
✱ NOTE: ESTIMATED PILE LENGTHS ARE 10 FT. LEFT, AND 20 FT. RIGHT.



DETAIL "A"

(END BENT No. 2 ONLY.)





CORROSION PROTECTION FOR STEEL PILES DETAIL

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 2 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056
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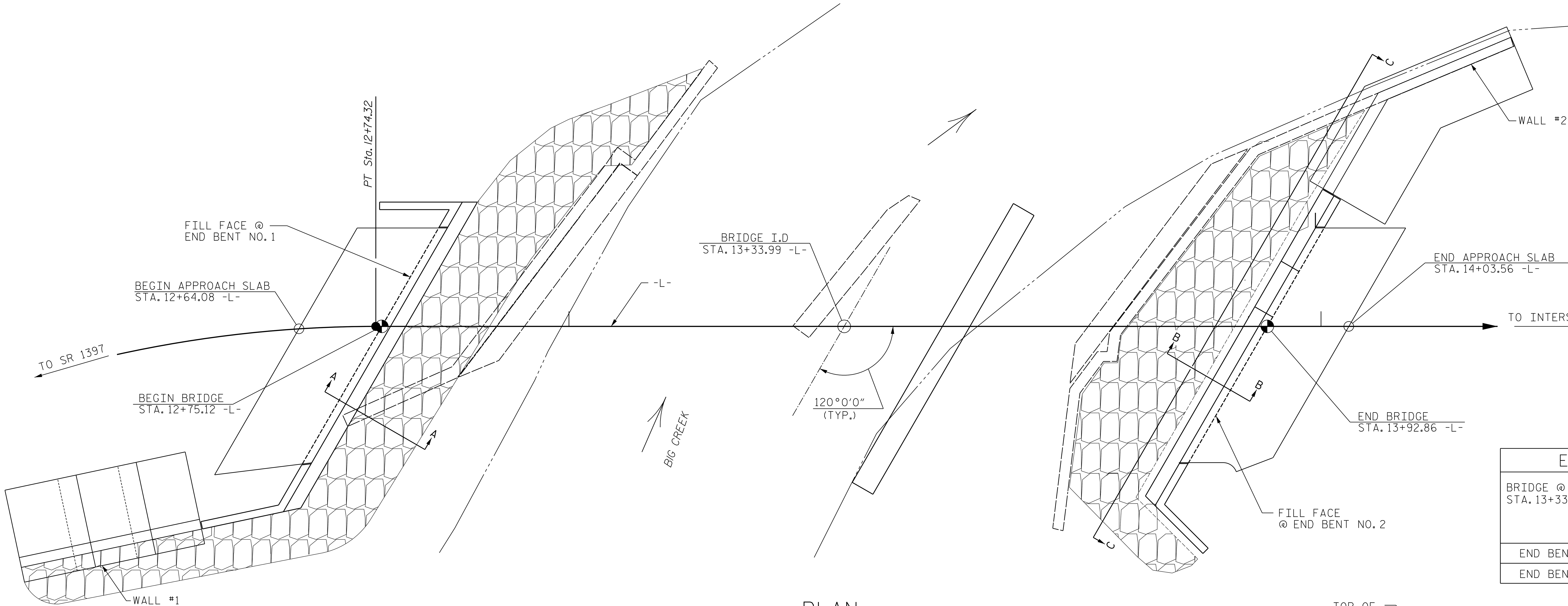
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-37
1			3			TOTAL SHEETS
2			4			40

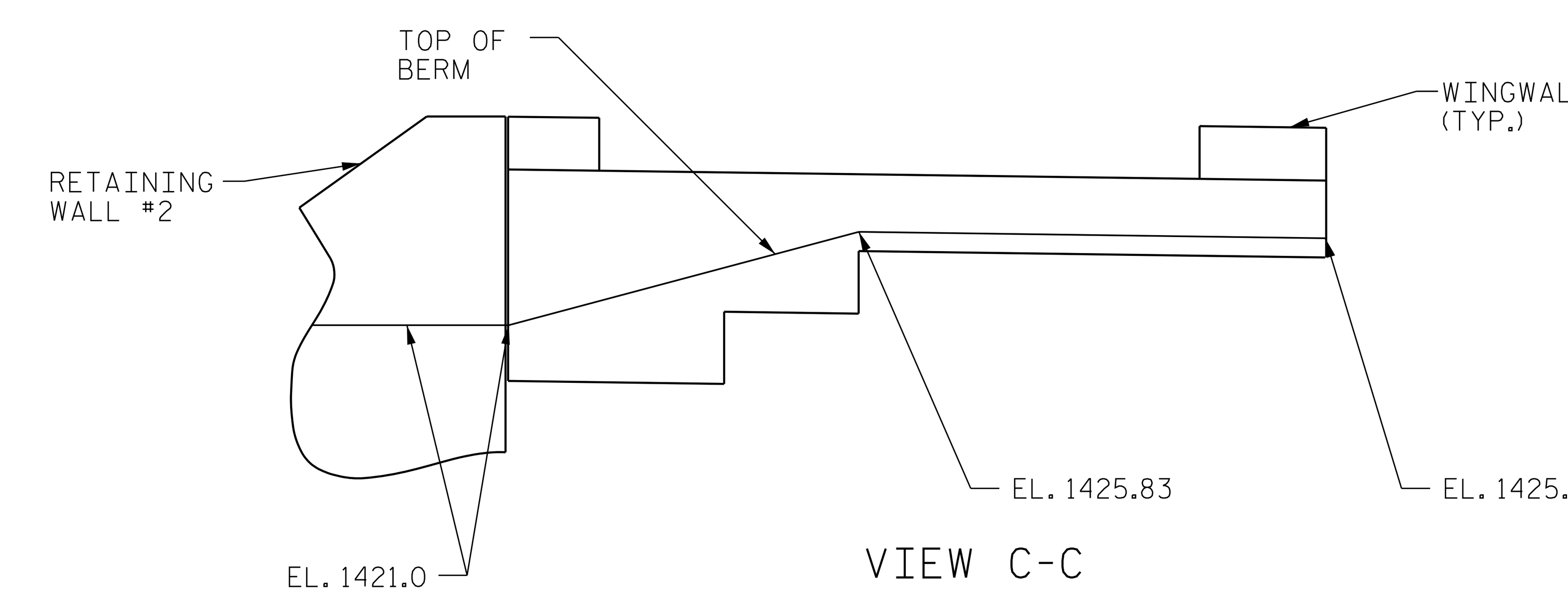
DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY :	AW	DATE :	02/18
CHECKED BY :	HLW	DATE :	02/18



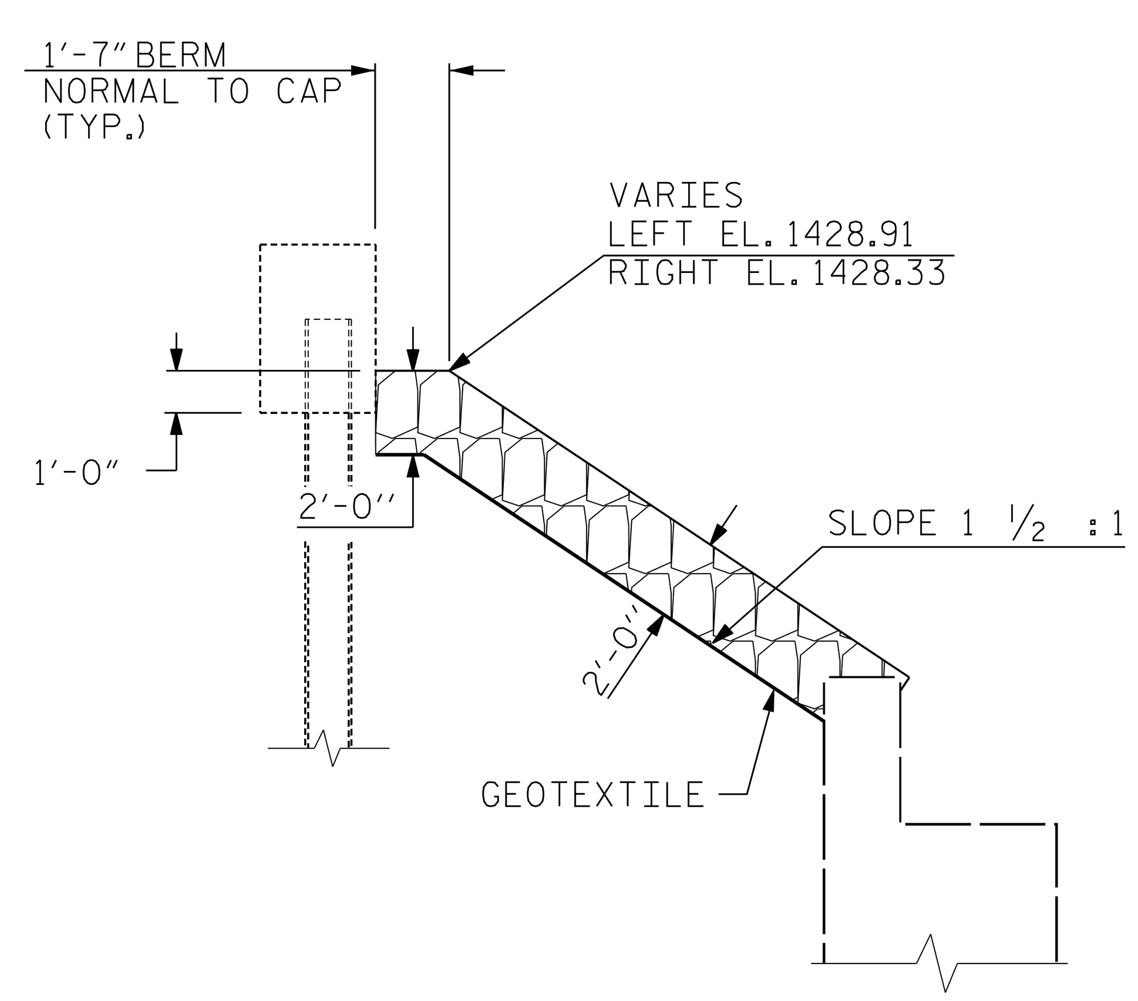
PLAN

ESTIMATED QUANTITIES		
BRIDGE @ STA. 13+33.99 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	92	102
END BENT 2	74	82

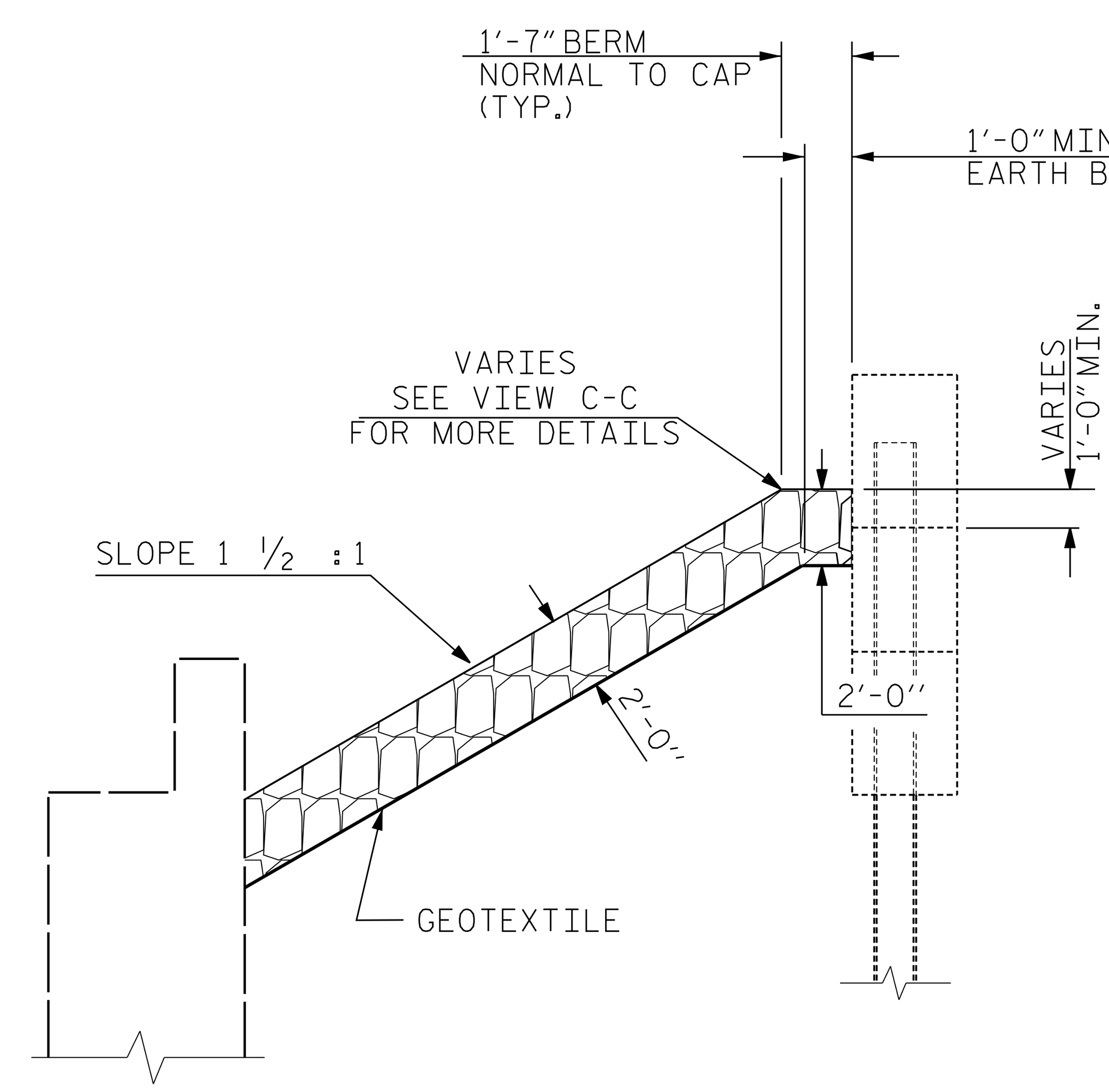


VIEW C-C

(SHOWING TOP OF BERM ELEVATIONS AT END BENT NO. 2)



SECTION A-A



SECTION B-B

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

DocuSigned by: 13D87726E0C443A... 12/15/2023

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046056

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

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1			3			TOTAL SHEETS
2			4			40

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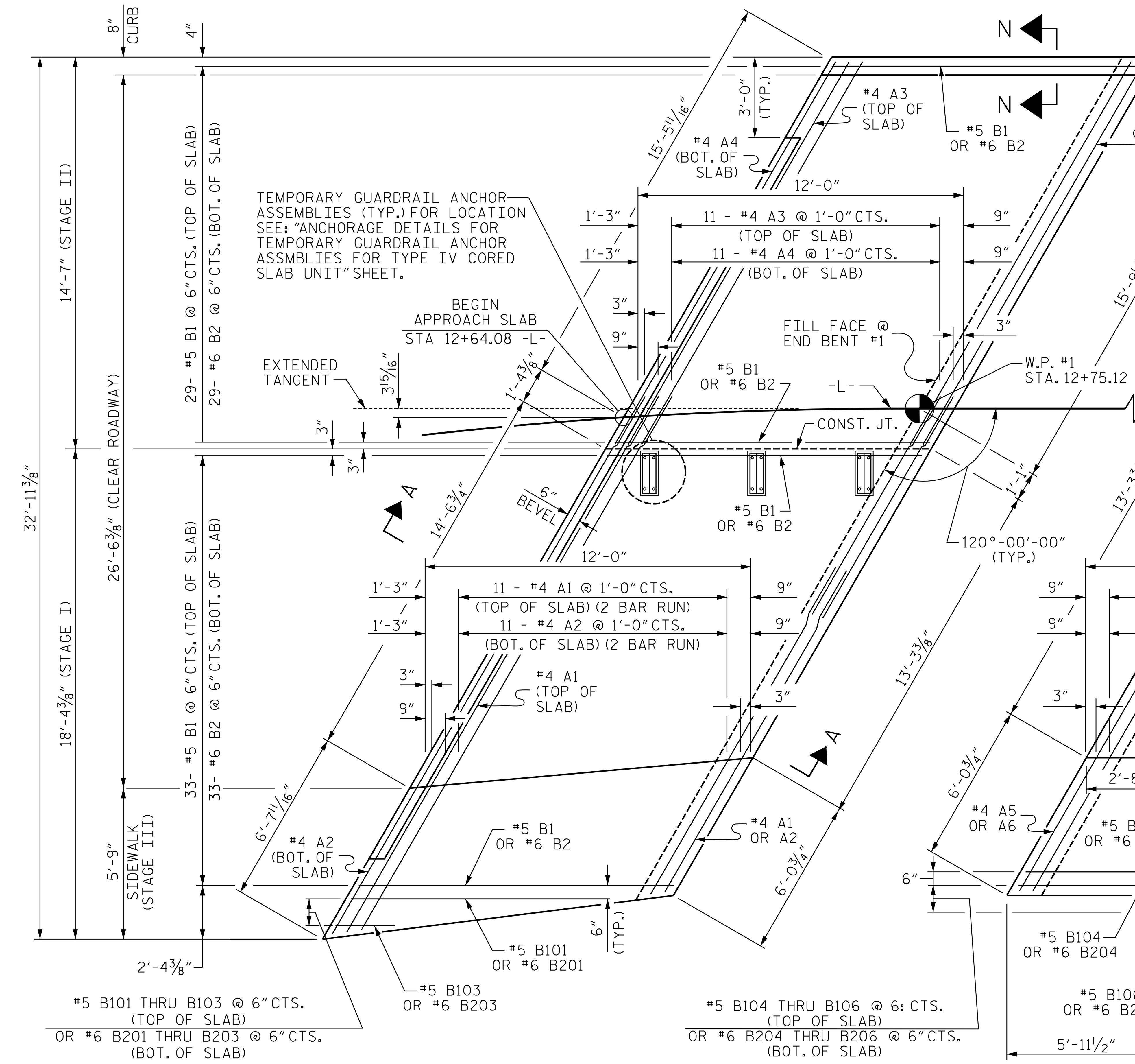
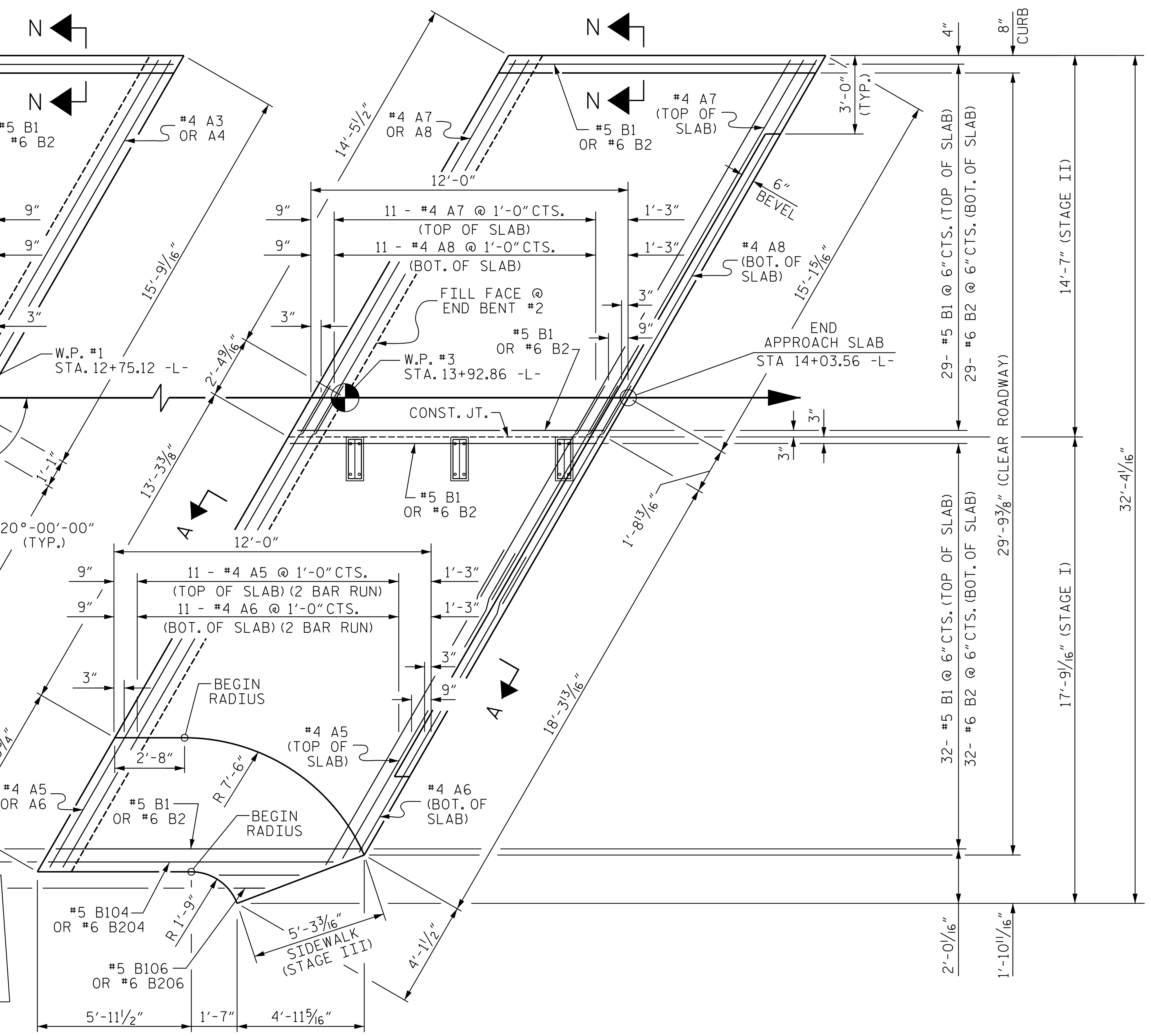
ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : HLW DATE : 02/18

(Sht 2)



PLAN @ END BENT #1



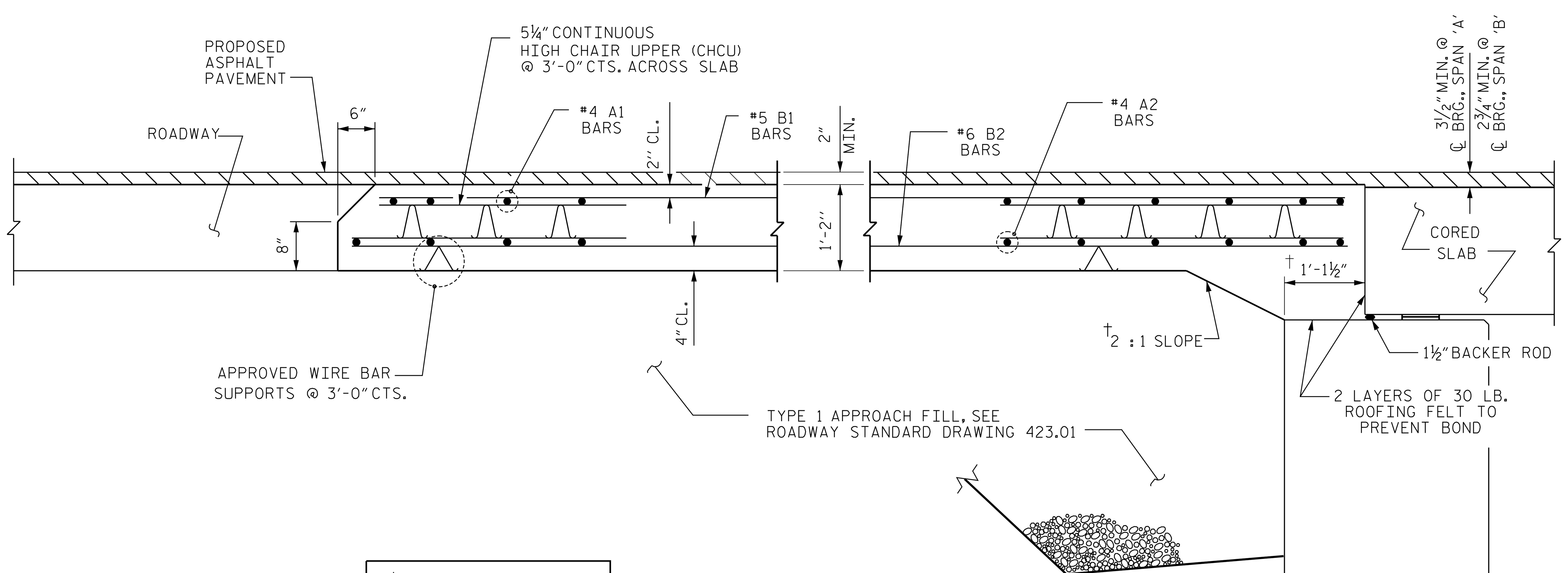
PLAN @ END BENT #2

BILL OF MATERIAL					
APPROACH SLAB AT EB #1 STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗A1	26	#4	STR	12'-6"	217
A2	26	#4	STR	12'-6"	217
∗B1	33	#5	STR	11'-0"	378
B2	33	#6	STR	11'-7"	574
∗B101	1	#5	STR	10'-5"	11
∗B102	1	#5	STR	6'-8"	7
∗B103	1	#5	STR	3'-0"	3
B201	1	#6	STR	10'-5"	16
B202	1	#6	STR	6'-8"	10
B203	1	#6	STR	3'-0"	5
REINFORCING STEEL				LBS.	822
∗EPOXY COATED REINFORCING STEEL				LBS.	616
CLASS AA CONCRETE				C.Y.	10.6
APPROACH SLAB AT EB #1 STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗A3	13	#4	STR	16'-5"	143
A4	13	#4	STR	16'-5"	143
∗B1	29	#5	STR	11'-0"	332
B2	29	#6	STR	11'-7"	505
REINFORCING STEEL				LBS.	648
∗EPOXY COATED REINFORCING STEEL				LBS.	475
CLASS AA CONCRETE				C.Y.	8.9
SIDEWALK AT EB #1 STAGE III					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗B3	5	#4	STR	12'-5"	41
∗D1	20	#4	STR	1'-0"	13
∗G1	13	#4	STR	5'-7"	48
∗EPOXY COATED REINFORCING STEEL				LBS.	102
CLASS AA CONCRETE				C.Y.	1.9

BILL OF MATERIAL					
APPROACH SLAB AT EB #2 STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗A5	26	#4	STR	12'-0"	208
A6	26	#4	STR	12'-0"	208
∗B1	32	#5	STR	11'-0"	367
B2	32	#6	STR	11'-7"	557
∗B104	1	#5	STR	10'-6"	11
∗B105	1	#5	STR	2'-11"	3
∗B106	1	#5	STR	11"	1
B204	1	#6	STR	10'-6"	16
B205	1	#6	STR	2'-11"	4
B206	1	#6	STR	11"	1
REINFORCING STEEL				LBS.	786
∗EPOXY COATED REINFORCING STEEL				LBS.	590
CLASS AA CONCRETE				C.Y.	9.8
APPROACH SLAB AT EB #2 STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗A7	13	#4	STR	16'-5"	143
A8	13	#4	STR	16'-5"	143
∗B1	29	#5	STR	11'-0"	332
B2	29	#6	STR	11'-7"	505
REINFORCING STEEL				LBS.	648
∗EPOXY COATED REINFORCING STEEL				LBS.	475
CLASS AA CONCRETE				C.Y.	8.5
SIDEWALK AT EB #2 STAGE III					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗B4	1	#4	STR	4'-10"	3
∗B5	1	#4	STR	7'-8"	5
∗B6	1	#4	STR	9'-6"	6
∗B7	1	#4	STR	10'-11"	7
∗B8	1	#4	STR	10'-5"	7
∗D1	13	#4	STR	1'-0"	9
∗G2	4	#4	STR	5'-5"	14
∗G3	1	#4	STR	5'-4"	4
∗G4	3	#4	STR	4'-10"	10
∗G5	1	#4	STR	4'-0"	3
∗G6	1	#4	STR	2'-8"	2
∗G7	1	#4	STR	1'-3"	1
∗EPOXY COATED REINFORCING STEEL				LBS.	71
CLASS AA CONCRETE				C.Y.	1.5

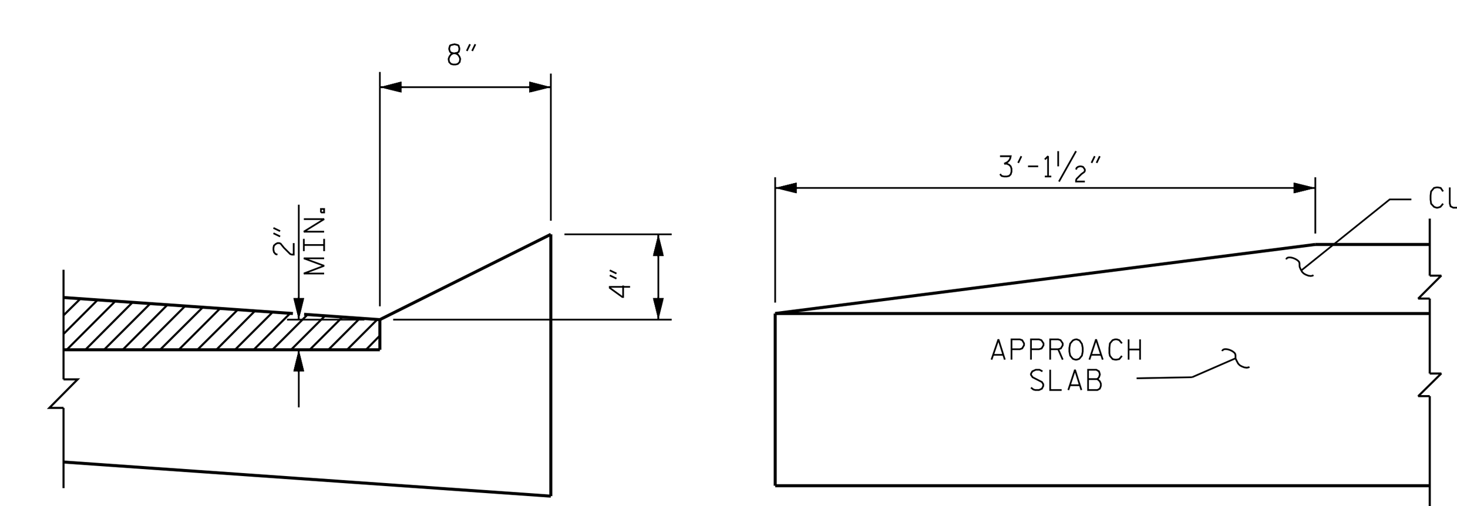
SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	1'-11"	1'-7"
#5	2'-5"	2'-0"
#6	3'-7"	2'-5"

NOTE:
"A" BARS FROM STAGE I EXTEND ONE SPLICE LENGTH INTO STAGE II.



† NORMAL TO END BENT

SECTION THRU SLAB
(TYPE I - APPROACH FILL)



SECTION N-N

END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

PROJECT NO. 14SP.20441.1
HAYWOOD COUNTY
STATION: 13+33.99 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB
FOR PRESTRESSED CONCRETE
CORED SLAB UNIT
(SUB-REGIONAL TIER)
120° SKEW

NORTH CAROLINA PROFESSIONAL ENGINEER 046056 — DocuSigned by: Ryan Sherman — 13D872AE6E443A... 12/15/2023

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1			3			
2			4			

SHEET NO. S1-39
TOTAL SHEETS 40

DES. EGR. OF RECORD: RTS DATE: 02/18
ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : HLW DATE : 02/18

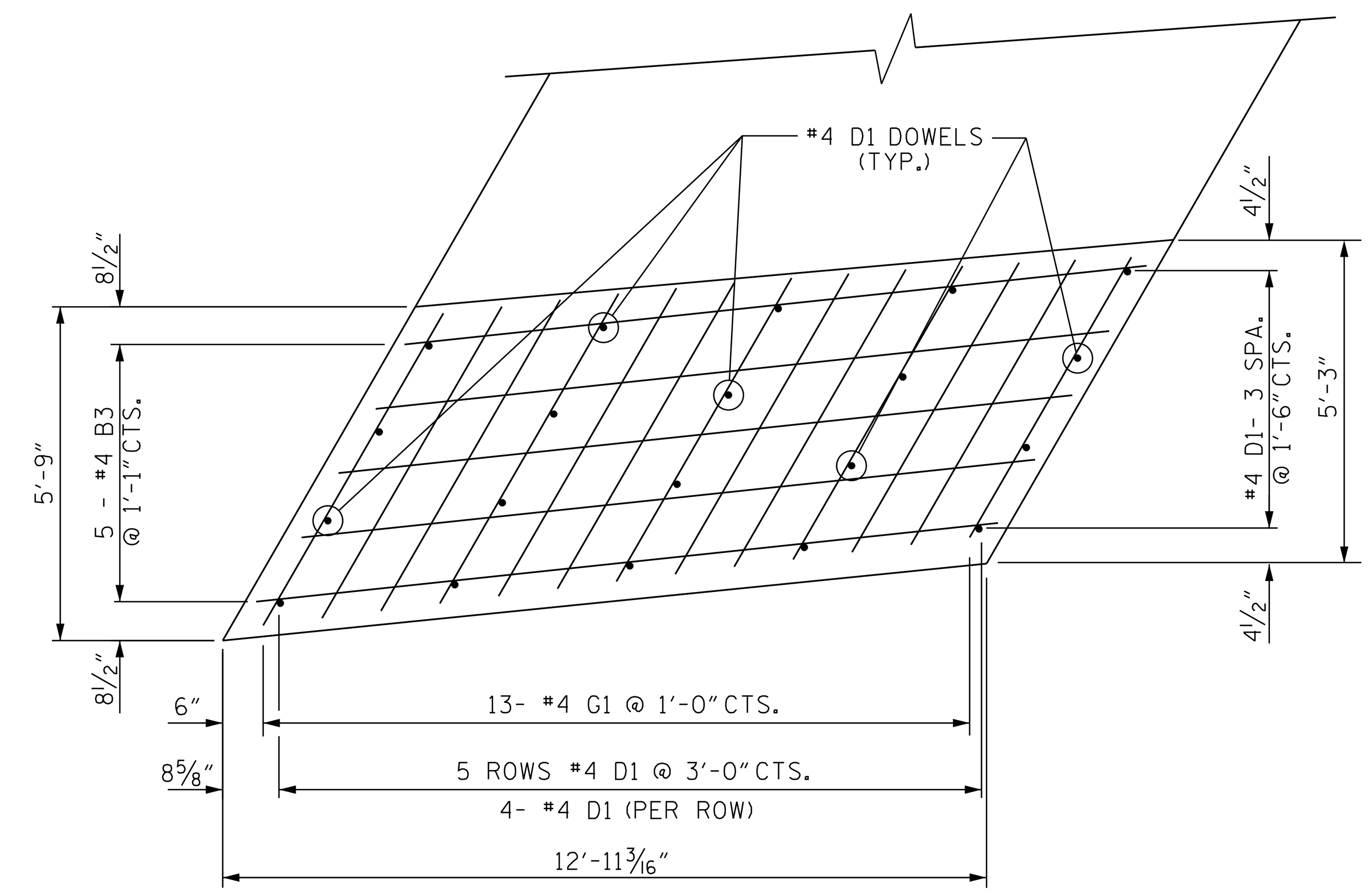
NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

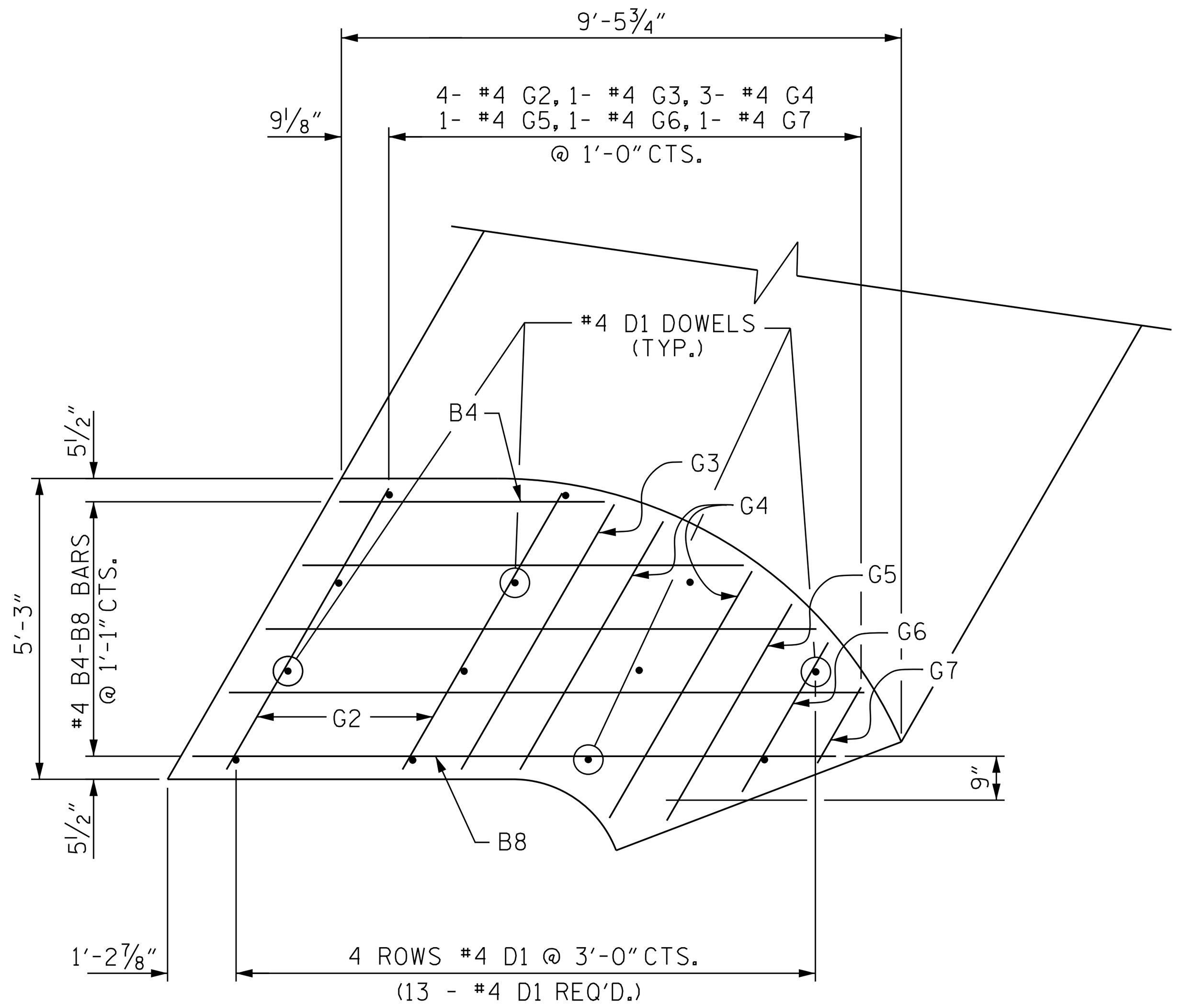
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

APPROACH SLAB GROOVING IS NOT REQUIRED.

PAYMENT FOR SIDEWALK SHALL BE INCLUDED WITH THE LUMP SUM PAYMENT FOR "BRIDGE APPROACH SLAB".

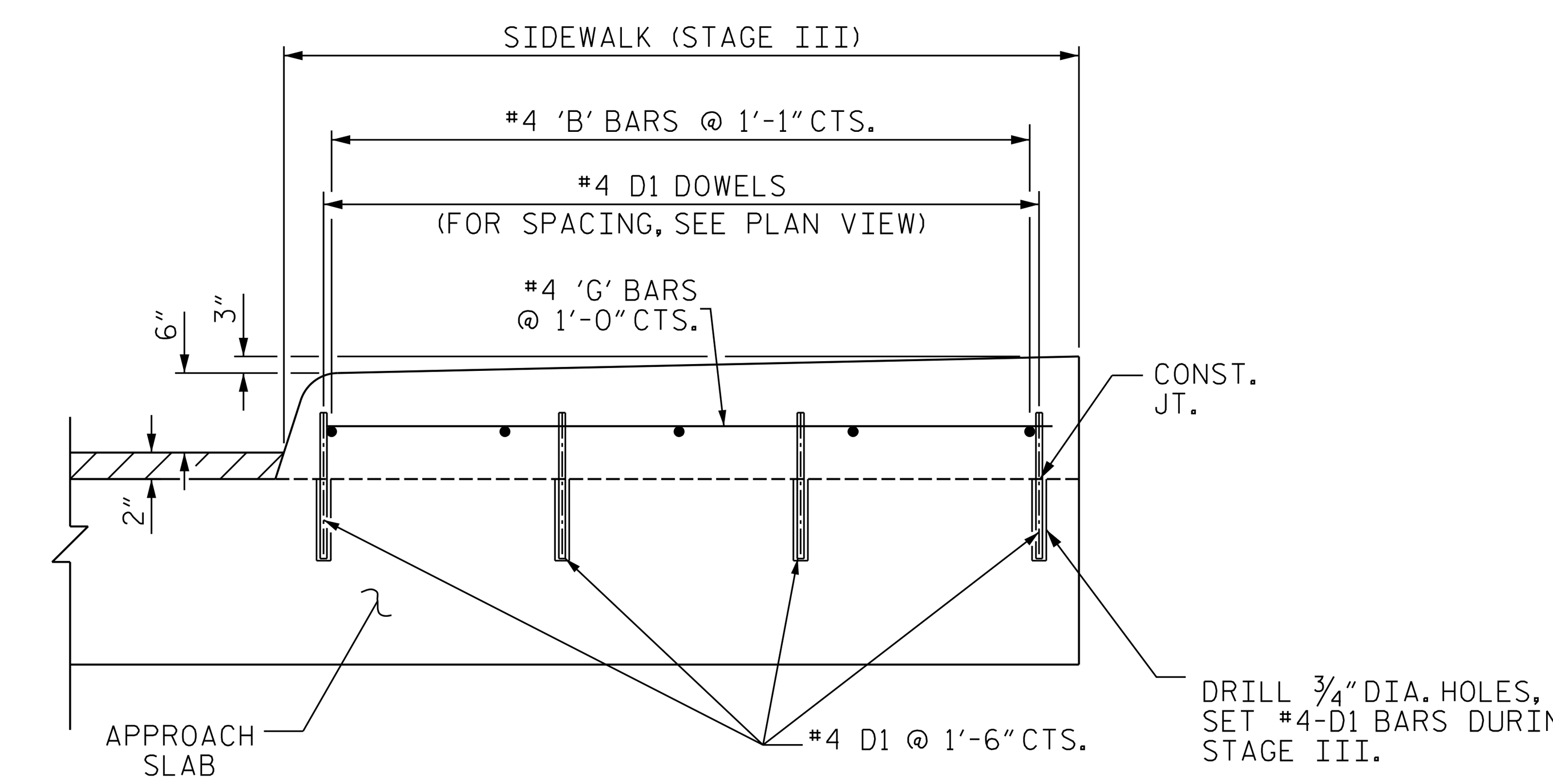


APPROACH SLAB #1

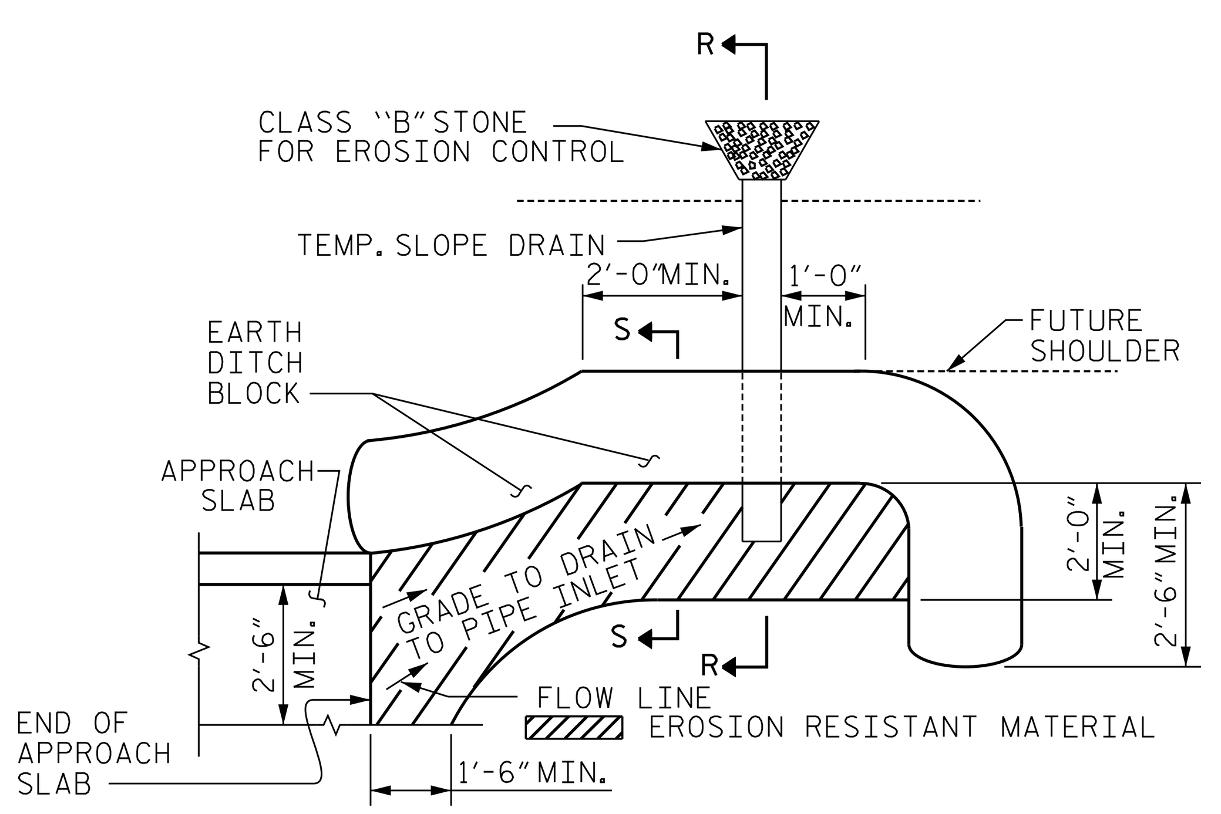


APPROACH SLAB #2

PLAN OF SIDEWALK ON APPROACH SLABS

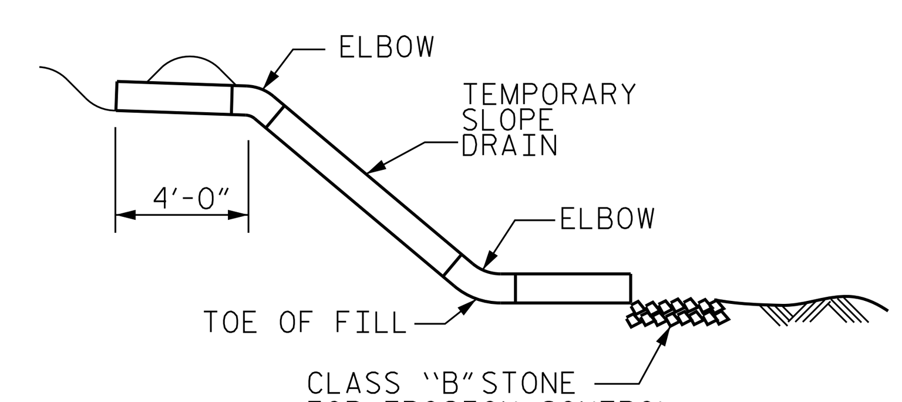


SECTION THROUGH SIDEWALK ON APPROACH SLABS

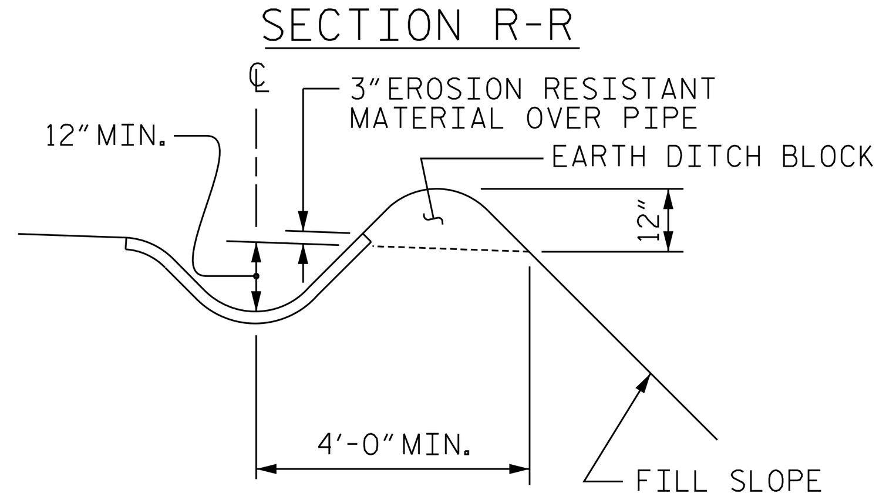


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

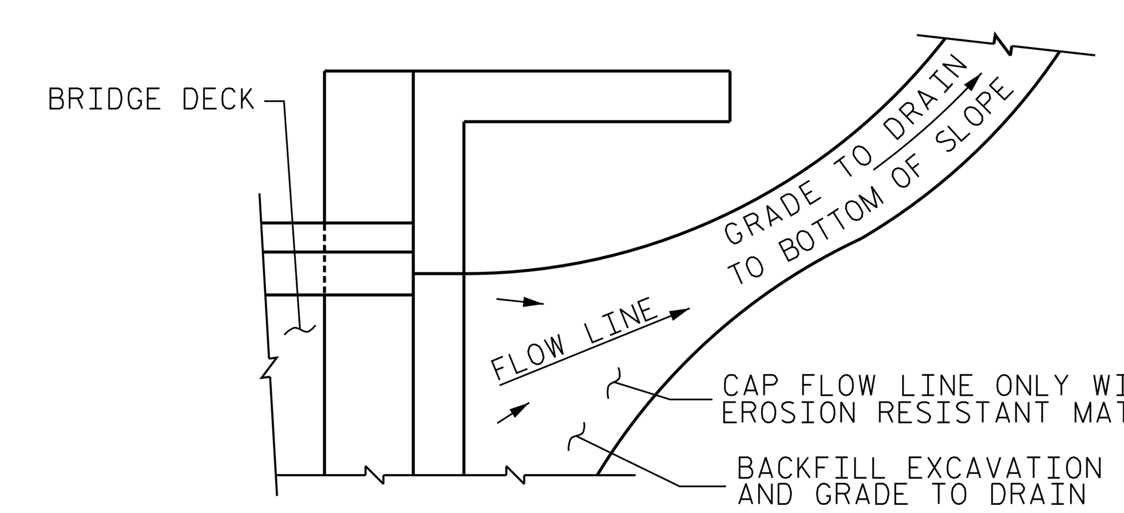
PLAN VIEW



SECTION R-R



SECTION S-S



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

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. 14SP.20441.1

HAYWOOD COUNTY

STATION: 13+33.99 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 046056 ENGINEER
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
BRIDGE APPROACH SLAB
FOR PRESTRESSED CONCRETE
CORED SLAB UNIT
(SUB-REGIONAL TIER)
120° SKEW

Johnson, Mirmiran, & Thompson Inc.
1318-F Patton Ave.
Asheville, NC, 28806
License No: C-3097

REVISIONS							SHEET NO.
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1			3				TOTAL SHEETS
2			4				40

DES. EGR. OF RECORD: RTS DATE: 02/18

ASSEMBLED BY : AW DATE : 02/18
CHECKED BY : HLW DATE : 02/18

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A ¼" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95	EEM	(/) RGW	REV. 5-7-03	RWW	(/) JTE	REV. 10-1-11	MAA	(/) GM
REV. 8-16-99	RWW	(/) LES	REV. 5-1-06	TLA	(/) GM	REV. 12-17	MAA	(/) THC

NOTES:

END BENTS ARE PARALLEL.

MICROPILES NOT SHOWN IN PLAN VIEW FOR CLARITY.

PLAN ALONG C/L SURVEY -L-

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

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 3 REPLACES BRIDGE NO. 430174

DocuSigned by: Hardy Willis 12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER BIG CREEK ON SR 1332 (WATERVILLE RD.) BETWEEN SR 1397 AND I-40

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC. 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-1
1			3			TOTAL SHEETS	40
2			4				

END BENT NO. 1

END BENT NO. 2

FOUNDATION LAYOUT

DIMENSIONS LOCATING MICROPILES ARE TO CENTERLINES.
BRACE MICROPILES SHALL BE BATTERED AT 3:12.

FOUNDATION NOTES

FOR MICROPILES, SEE MICROPILES SPECIAL PROVISION

DESIGN BOND LENGTH FOR MICROPILES AT END BENT NO. 1 FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.

USE REINFORCING CASINGS WITH YIELD STRENGTHS OF AT LEAST 50 KSI FOR MICROPILES AT END BENT NO. 1.

INSTALL REINFORCING CASINGS FOR MICROPILES AT END BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 1,380 FT (LT), 1,382 FT (RT) AND WITH A PENETRATION OF AT LEAST 10 FT INTO ROCK.

DESIGN BOND LENGTH FOR MICROPILES AT END BENT NO. 2 FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.

USE REINFORCING CASINGS WITH YIELD STRENGTHS OF AT LEAST 50 KSI FOR MICROPILES AT END BENT NO. 2.

INSTALL REINFORCING CASINGS FOR MICROPILES AT END BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 1,390 FT (LT), 1,396 FT (RT) AND WITH A PENETRATION OF AT LEAST 10 FT INTO ROCK.

MICROPILES AT END BENT NO. 1 & END BENT NO. 2 ARE DESIGNED FOR A FACTORED SHEAR LOAD OF 6 KIPS.

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

SHEET 2 OF 3

DocuSigned by: Hardy Willis
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FOUNDATION LAYOUT
FOR BRIDGE OVER BIG CREEK ON SR 1332 (WATERVILLE RD.) BETWEEN SR 1397 AND I-40

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
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License No: C-3097

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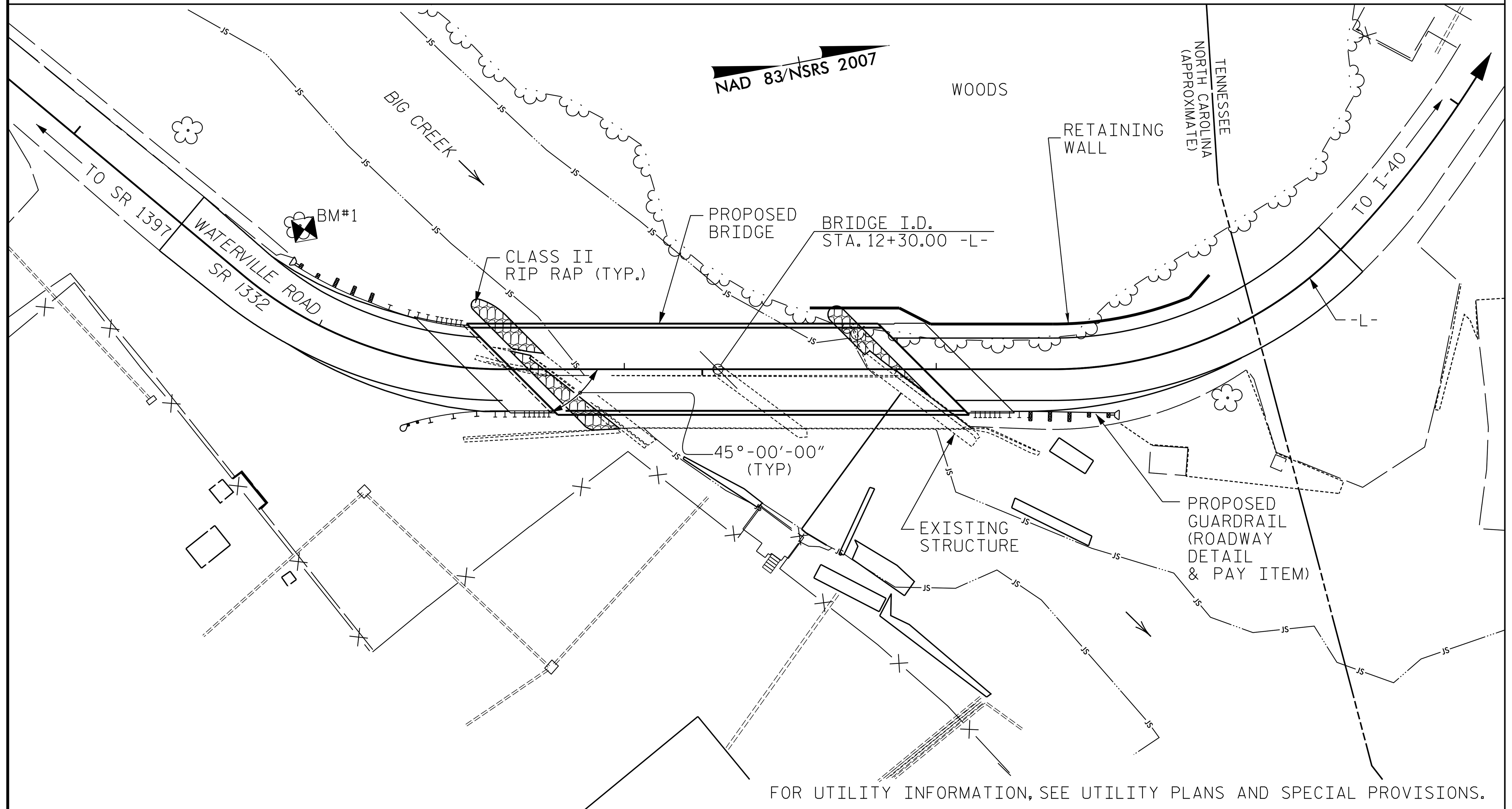
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

SHEET NO. S2-2
TOTAL SHEETS 40

BM#1 N 761788 E 784091 STA. 10+79.17 -L- 22.8' (LT) ELEV.=1417.45' RAILROAD SPIKE IN 24" HEMLOCK



LOCATION SKETCH

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL USE A MINIMUM OF ONE TEMPORARY BENT FOR EACH STAGE FOR THE ERECTION OF STEEL PLATE GIRDERS. SEE "GIRDER ERECTION DETAILS" SHEET.

FOR TEMPORARY BENT, SEE SPECIAL PROVISIONS. PAYMENT FOR THE TEMPORARY BENT SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR STRUCTURAL STEEL.

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.

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 5 OR SYSTEM 6 OF THE STRUCTURAL STEEL SHOP COATINGS PROGRAM AND SECTION 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 12+30.00 -L-."

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

FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

AT THE CONTRACTOR'S OPTION, AND UPON REMOVAL OF THE CAUSEWAY, THE CLASS II RIP RAP USED IN THE CAUSEWAY MAY BE PLACED AS RIP RAP SLOPE PROTECTION. SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 12+30.00 -L-.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE OF 25 FT. EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRANSPORTATION MANAGEMENT PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFIC, SEE ROADWAY PLANS.

AFTER SERVING AS TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF 2 SPANS; 1 @ 59' AND 1 @ 56'-6", 17.25 FT. WIDE, 116 FT. TIMBER DECK ON STEEL GIRDERS ON REINFORCED CONCRETE END BENTS AND BENT, AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH ''HEC 18- EVALUATING SCOUR AT BRIDGE.''

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 5300	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 1414.4	FT
BASE DISCHARGE	= 7000	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 1415.9	FT

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 9900	CFS
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING ELEVATION	= 1416.6	FT
DRAINAGE AREA	= 36.2	SQ. MI.

DocuSigned by: Hardy Willis

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER HARDY L. WILLIS

12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TOTAL BILL OF MATERIAL

	CONST, MAINT, & REMOVAL OF TEMP. ACCESS	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESSMENT	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	APPROX. 215,000 LBS. STRUCTURAL STEEL	ANODIZED 2-BAR METAL RAIL	1'-2" X 2'-6" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	FOAM JOINT SEALS	10¾" DIA. MICROPILES
	LUMP SUM	LUMP SUM	LUMP SUM	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LUMP SUM	LIN. FT.	LIN. FT.	TONS	SQ. YDS	LUMP SUM	LUMP SUM	EACH
SUPERSTRUCTURE		LUMP SUM			3,863	3,809				LUMP SUM	246.67	279.10					
END BENT 1							74.4		7,562				309	343			10
END BENT 2							66.5		6,336				138	153			9
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	LUMP SUM	3,863	3,809	140.9	LUMP SUM	13,898	LUMP SUM	246.67	279.10	447	496	LUMP SUM	LUMP SUM	19

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER BIG CREEK ON SR 1332 (WATERVILLE RD.) BETWEEN SR 1397 AND I-40

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
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License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

REVISIONS

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

SHEET NO. S2-3

TOTAL SHEETS 40

PHASE I - GIRDER ERECTION

SECTIONS AT END BENTS ARE AT RIGHT ANGLES

PHASE II - GIRDER ERECTION

SECTIONS AT END BENTS ARE AT RIGHT ANGLES

GIRDER ERECTION NOTES

FOR TEMPORARY BENTS, SEE SPECIAL PROVISIONS.

CONSTRUCT A SEPARATE TEMPORARY BENT FOR EACH STAGE OF CONSTRUCTION (SEE "CONSTRUCTION SEQUENCE", SHEET S2-6).

ERECT A MINIMUM OF TWO GIRDERS WITH ALL DIAPHRAGMS/CROSSFRAMES BETWEEN THE GIRDERS IN PLACE AND THE BOLTS TIGHTENED PRIOR TO RELEASING THE GIRDERS.

ERECT EACH SUBSEQUENT GIRDER WITH DIAPHRAGMS/CROSSFRAMES CONNECTING TO THE ADJACENT PREVIOUSLY ERECTED GIRDER AND TIGHTEN ALL BOLTS BEFORE RELEASING THE GIRDERS.

THE STRUCTURAL STEEL SHALL BE SUPPORTED DURING ERECTION IN ITS CAMBERED POSITION. A MINIMUM OF ONE TEMPORARY BENT SHALL BE USED IN THE SPAN FOR EACH STAGE OF CONSTRUCTION.

THE TEMPORARY BENT SHALL REMAIN IN PLACE UNTIL ALL GIRDERS, DIAPHRAGMS, AND CROSSFRAMES ARE IN PLACE FOR THAT STAGE, AND ALL HIGH STRENGTH BOLTS ARE TIGHTENED.

THE TEMPORARY BENT SHALL PROVIDE BEARING AT CONNECTOR PLATE LOCATIONS. WHEN CONNECTOR PLATES ARE USED AS TEMPORARY BEARING STIFFENERS, DIAPHRAGMS MUST BE ATTACHED.

THE CONTRACTOR'S ERECTION PLANS SHALL INCLUDE A METHOD OF TEMPORARY BENT REMOVAL THAT WILL UNIFORMLY TRANSFER THE STRUCTURAL WEIGHT TO THE DIAPHRAMS/CROSSFRAMES SUCH THAT THE GIRDERS WILL REMAIN IN THE CAMBERED POSITIONS.

PLANS FOR TEMPORARY BENT ERECTION AND REMOVAL SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.

THE CONTRACTOR IS RESPONSIBLE FOR DESIGNING THE TEMPORARY BENT. THE DESIGNS SHALL BE COMPLETED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA. THE CONTRACTOR SHALL SUBMIT SIGNED AND SEALED WORKING DRAWINGS AND CALCULATIONS FOR APPROVAL BY THE ENGINEER.

DURING THE GIRDER ERECTION PROCEDURE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY LATERAL BRACING AND OTHER MEANS OF SUPPORT, AS REQUIRED, TO ENSURE STABILITY OF THE GIRDERS, AVOID UPLIFT OF THE GIRDERS AT THE TEMPORARY BENT, AND TO ENSURE PLUMBNESS OF THE GIRDERS IN THE FINAL CONDITION.

NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE FOR PROVIDING THE TEMPORARY BENT. THE COST FOR ALL MATERIALS, EQUIPMENT, TOOLS, LABOR, AND ANY INCIDENTALS NECESSARY TO PROVIDE THE TEMPORARY BENT SHALL BE CONSIDERED INCIDENTAL TO THE LUMP SUM BID PRICE FOR STRUCTURAL STEEL.

THE CONTRACTOR MAY SUBMIT AN ALTERNATE ERECTION METHOD TO THE ENGINEER FOR REVIEW AND APPROVAL.

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

DocuSigned by: Hardy Willis
12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GIRDER ERECTION DETAILS

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

SHEET NO. S2-4
TOTAL SHEETS 40

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR STEEL GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	(#) CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE: LIVE-LOAD FACTORS (γ_{LL})	MOMENT: DISTRIBUTION FACTORS (DF)	MOMENT: RATING FACTOR	MOMENT: SPAN	MOMENT: GIRDER LOCATION	MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	SHEAR: DISTRIBUTION FACTORS (DF)	SHEAR: RATING FACTOR	SHEAR: SPAN	SHEAR: GIRDER LOCATION	SHEAR: DISTANCE FROM LEFT END OF SPAN (ft)	SERVICE II LIMIT STATE: LIVE-LOAD FACTORS (γ_{LL})	MOMENT: DISTRIBUTION FACTORS (DF)	MOMENT: RATING FACTOR	MOMENT: SPAN	MOMENT: GIRDER LOCATION	MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.01	--	1.75	0.661	1.22	A	E	63.96	0.798	4.79	A	I	0	1.30	0.661	**1.01**	A	E	63.96	
		HL-93 (OPERATING)	N/A		1.31	--	1.35	0.661	1.59	A	E	63.96	0.798	6.20	A	I	0	1.00	0.661	1.31	A	E	63.96	
		HS-20 (INVENTORY)	36.00	(2)	1.50	53.97	1.75	0.661	1.82	A	E	63.96	0.798	6.99	A	I	0	1.30	0.661	**1.50**	A	E	63.96	
		HS-20 (OPERATING)	36.00		1.95	70.15	1.35	0.661	2.36	A	E	63.96	0.798	9.07	A	I	0	1.00	0.661	1.95	A	E	63.96	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.66	49.45	1.40	0.661	5.55	A	E	63.96	0.798	22.06	A	I	0	1.30	0.661	3.66	A	E	63.96	
		SNGARBS2	20.000		2.61	52.13	1.40	0.661	3.95	A	E	63.96	0.798	15.27	A	I	0	1.30	0.661	2.61	A	E	63.96	
		SNAGRIS2	22.000		2.42	53.24	1.40	0.661	3.69	A	E	63.96	0.798	14.02	A	I	0	1.30	0.661	2.42	A	E	63.96	
		SNCOTTS3	27.250		1.82	49.54	1.40	0.661	2.76	A	E	63.96	0.798	10.97	A	I	0	1.30	0.661	1.82	A	E	63.96	
		SNAGGRS4	34.925		1.47	51.42	1.40	0.661	2.23	A	E	63.96	0.798	8.82	A	I	0	1.30	0.661	1.47	A	E	63.96	
		SNS5A	35.550		1.44	51.29	1.40	0.661	2.19	A	E	63.96	0.798	8.79	A	I	0	1.30	0.661	1.44	A	E	63.96	
		SNS6A	39.950		1.30	52.10	1.40	0.661	1.98	A	E	63.96	0.798	7.92	A	I	0	1.30	0.661	1.30	A	E	63.96	
		SNS7B	42.000	(3)	1.24	52.13	1.40	0.661	1.88	A	E	63.96	0.798	7.64	A	I	0	1.30	0.661	**1.24**	A	E	63.96	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.59	52.33	1.40	0.661	2.40	A	E	63.96	0.798	9.51	A	I	0	1.30	0.661	1.59	A	E	63.96	
		TNT4A	33.075		1.59	52.50	1.40	0.661	2.41	A	E	63.96	0.798	9.38	A	I	0	1.30	0.661	1.59	A	E	63.96	
		TNT6A	41.600		1.42	59.12	1.40	0.661	2.16	A	E	63.96	0.798	8.84	A	I	0	1.30	0.661	1.42	A	E	63.96	
		TNT7A	42.000		1.42	59.45	1.40	0.661	2.15	A	E	63.96	0.798	8.71	A	I	0	1.30	0.661	1.42	A	E	63.96	
		TNT7B	42.000		1.41	59.11	1.40	0.661	2.13	A	E	63.96	0.798	8.26	A	I	0	1.30	0.661	1.41	A	E	63.96	
		TNAGRIT4	43.000		1.25	53.88	1.40	0.661	1.90	A	E	63.96	0.798	7.35	A	I	0	1.30	0.661	1.25	A	E	63.96	
		TNAGT5A	45.000		1.31	59.04	1.40	0.661	1.99	A	E	63.96	0.798	7.93	A	I	0	1.30	0.661	1.31	A	E	63.96	
		TNAGT5B	45.000		1.47	66.19	1.40	0.661	2.23	A	E	63.96	0.798	9.04	A	I	0	1.30	0.661	1.47	A	E	63.96	
FATIGUE		HL-93 (INVENTORY)	γ_{LL}=0.75	--	--	--	--																	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.477	71.226	1.30	0.591	2.724	A	E	38.317	0.799	12.448	A	I	0	1.30	0.591	2.477	A	E	63.96	
		EV3	43.000	(4)	1.635	70.321	1.30	0.591	1.821	A	E	38.317	0.799	7.939	A	I	0	1.30	0.591	1.635	A	E	63.96	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE II	1.00	1.00

NOTES:

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

ALLOWABLE STRESS FOR SERVICE II LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93) ✱✱

(2) DESIGN LOAD RATING (HS-20) ✱✱

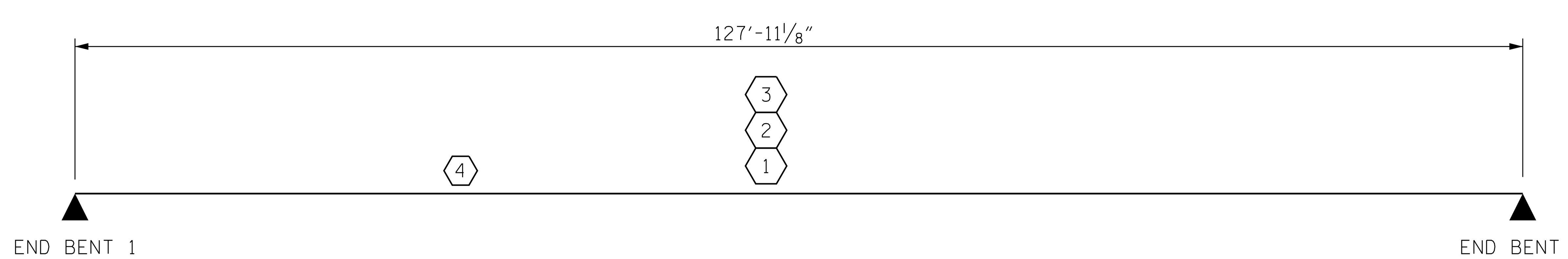
(3) LEGAL LOAD RATING ✱✱

(4) EMERGENCY VEHICLE LOAD RATING

✱✱ SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

DocuSigned by: Hardy Wills
SEAL 028764 ...C223461...
12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

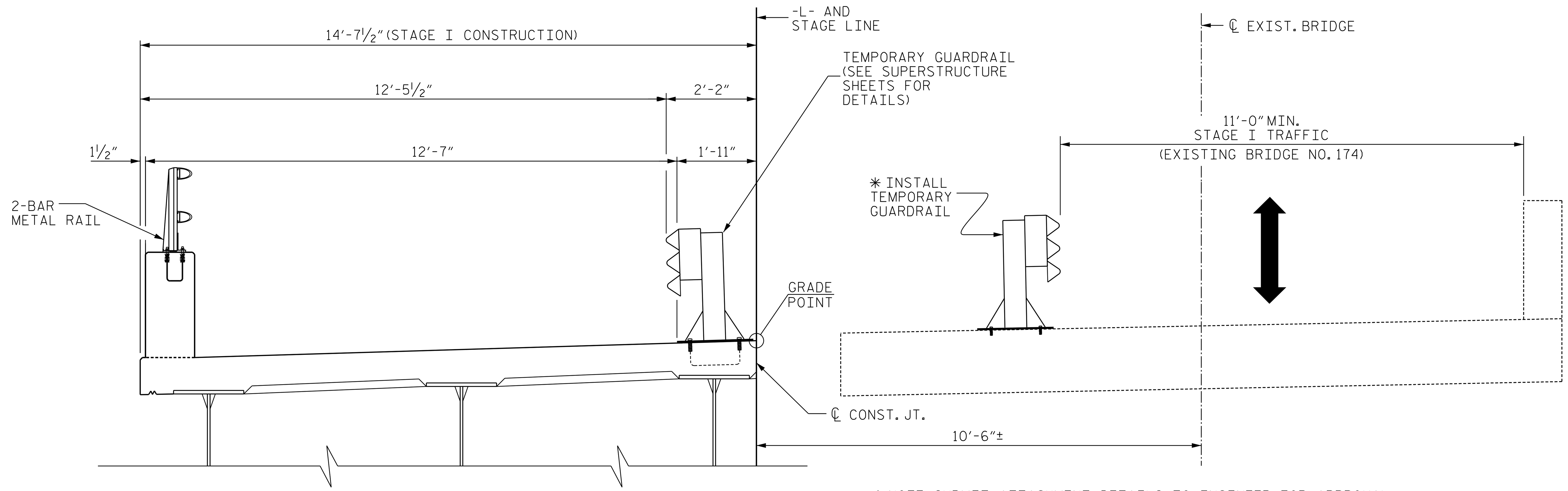
STANDARD
LRFR SUMMARY FOR STEEL GIRDERS
(NON-INTERSTATE TRAFFIC)

JMT Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-5
1			3			TOTAL SHEETS
2			4			40

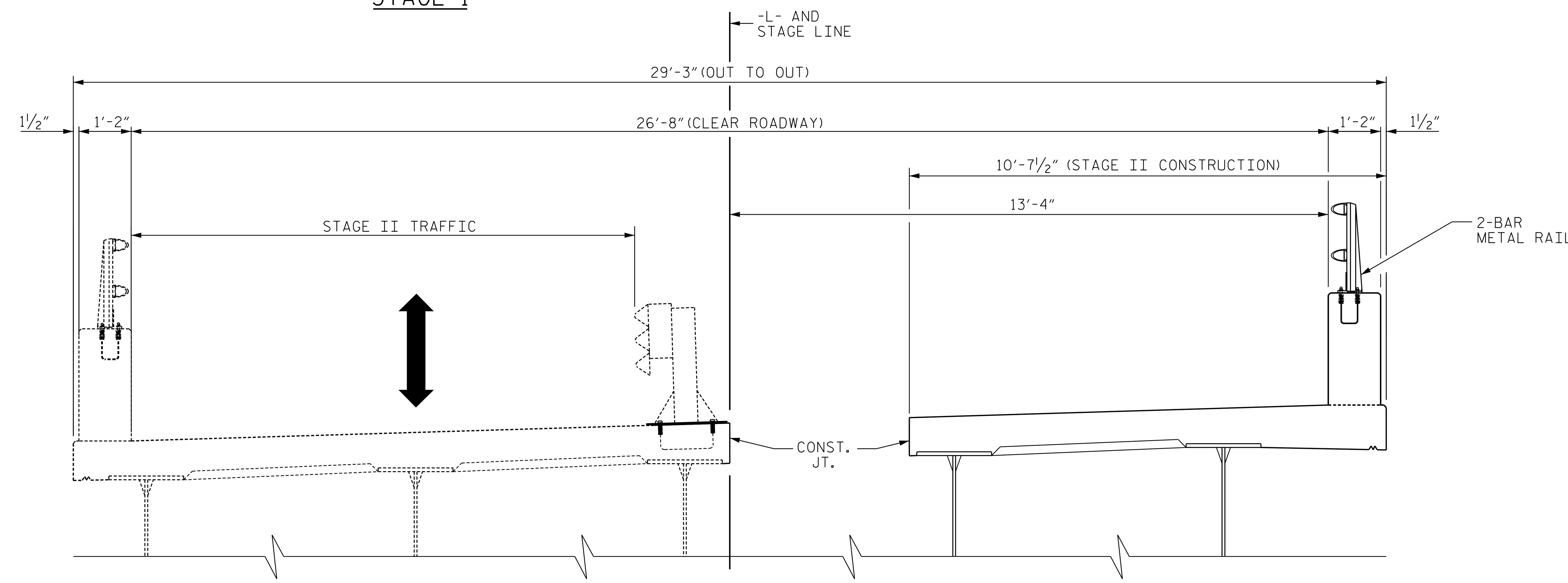
ASSEMBLED BY : MAF	DATE : 03/18
CHECKED BY : CC	DATE : 03/18
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM
	REV. 04/23 BNB/AAI

STD. NO. LRFR3

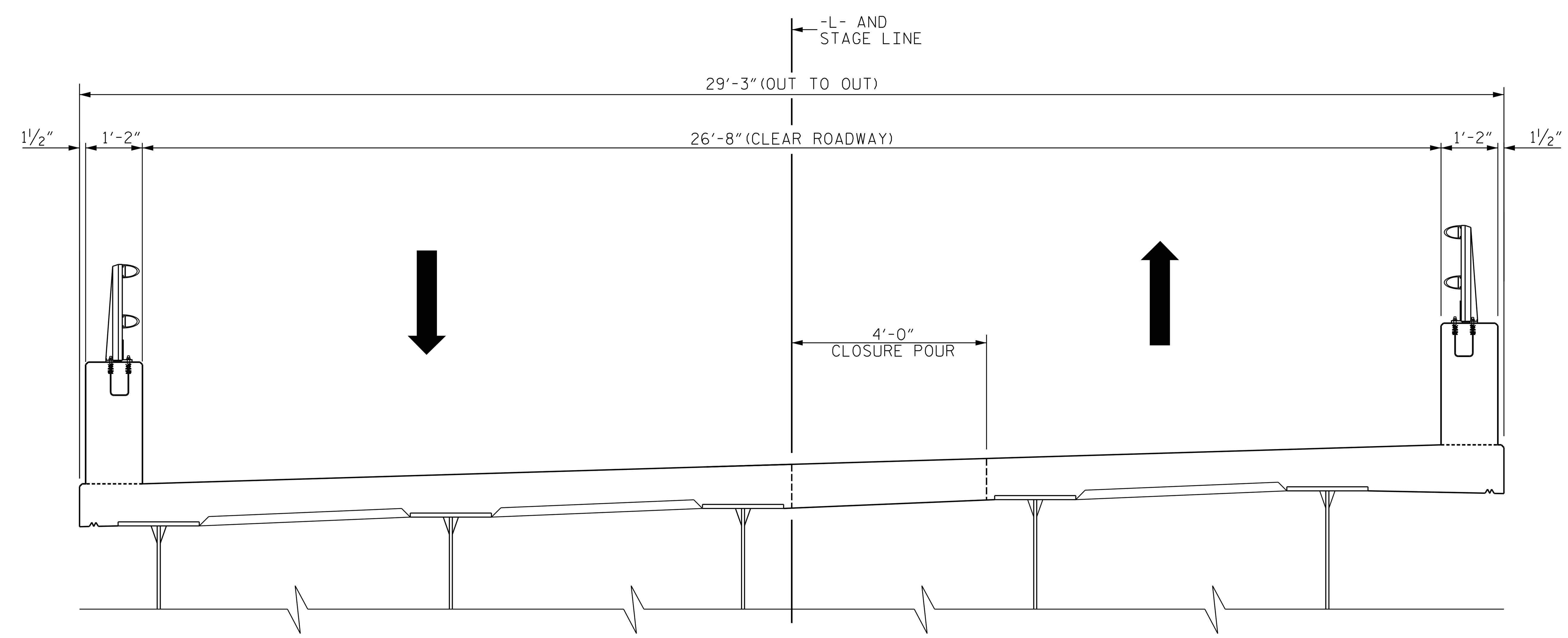


STAGE 1

* NOTE: SUBMIT ATTACHMENT DETAILS TO ENGINEER FOR APPROVAL.



STAGE II



CLOSURE POUR

STAGING SEQUENCE

NOTES

FOR PHASING OF TRAFFIC AND OTHER DETAILS, SEE TRAFFIC MANAGEMENT PLANS.

CONSTRUCTION SEQUENCE

1. REMOVE EXISTING BRIDGE RAIL (LEFT SIDE) ON BRIDGE 174, AND INSTALL TEMPORARY RAIL
2. SAWCUT AND REMOVE PORTIONS OF EXISTING END BENTS, AS NEEDED. THE CONTRACTOR SHALL ENSURE STABILITY OF EXISTING STRUCTURES AT ALL TIMES.
3. MAINTAINING TRAFFIC ON THE EXISTING BRIDGE, CONSTRUCT STAGE I OF EACH END BENT.
4. CONSTRUCT CAUSEWAY (SEE SHEET S2-1)
5. CONSTRUCT TEMPORARY BENT FOR STAGE I GIRDER ERECTION (SEE SHEET S2-4).
6. ERECT GIRDERS 1 THRU 3 IN ACCORDANCE WITH THE GIRDER ERECTION DETAILS, SHEET S2-4.
7. REMOVE TEMPORARY BENT FOR STAGE I.
8. CONSTRUCT REMAINDER OF SUPERSTRUCTURE FOR STAGE I.
9. CONSTRUCT STAGE I OF EACH APPROACH SLAB.
10. SHIFT TRAFFIC TO STAGE I STRUCTURE.
11. REMOVE EXISTING BRIDGE. (INCLUDING EXISTING PIERWALL)
12. CONSTRUCT STAGE II OF EACH END BENT.
13. CONSTRUCT TEMPORARY BENT FOR STAGE II GIRDER ERECTION (SEE SHEET S2-4).
14. ERECT GIRDERS 4 AND 5 IN ACCORDANCE WITH THE GIRDER ERECTION DETAILS, SHEET S2-4.
15. REMOVE TEMPORARY BENT FOR STAGE II.
16. REMOVE CAUSEWAY
17. CONSTRUCT REMAINDER OF SUPERSTRUCTURE FOR STAGE II.
18. CONSTRUCT SUPERSTRUCTURE CLOSURE POUR.
19. CONSTRUCT STAGE II OF EACH APPROACH SLAB.
20. OPEN ENTIRE BRIDGE TO TRAFFIC.

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL HARDY L. WILLIS
DocuSigned by: Hardy Willis
12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONSTRUCTION SEQUENCE

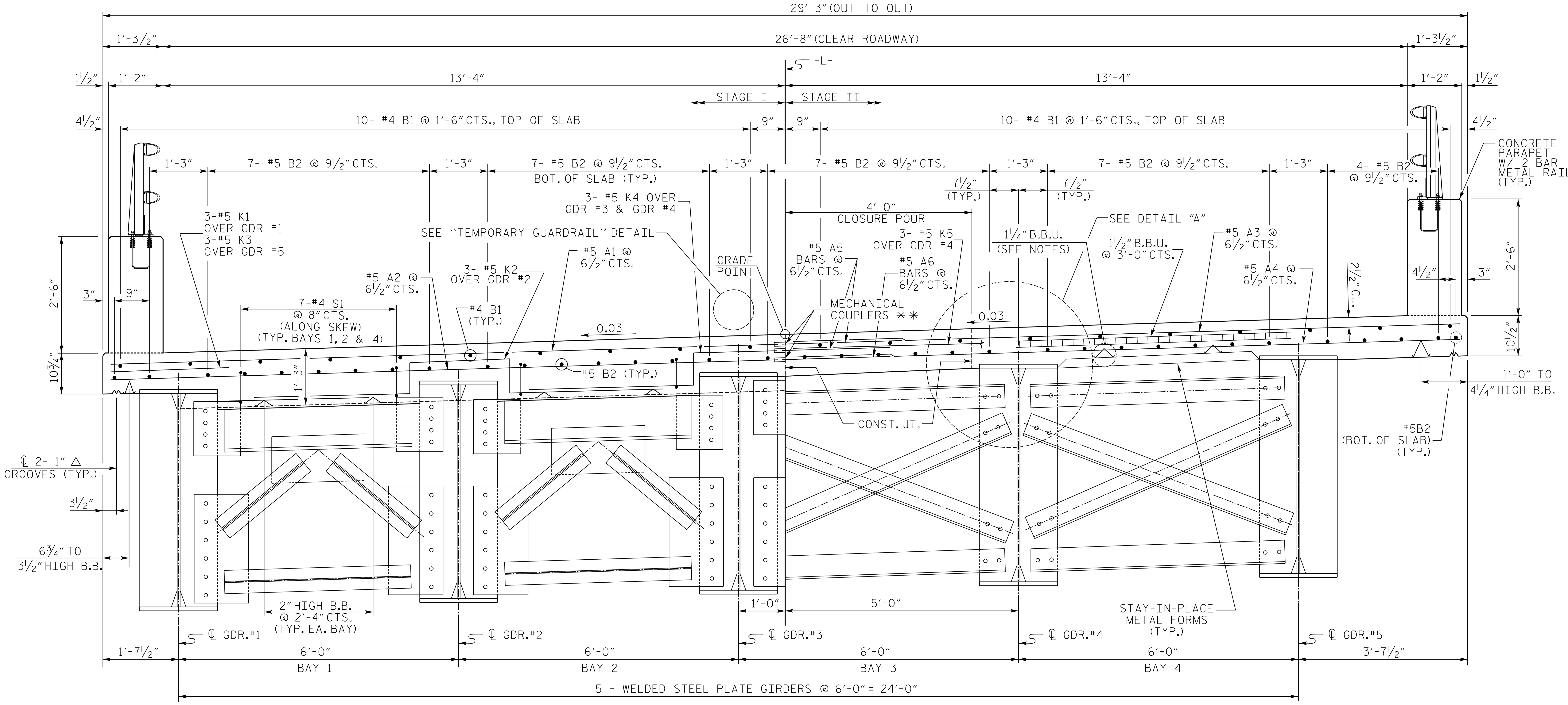
JMT Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

REVISIONS

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

SHEET NO. S2-6
TOTAL SHEETS 40



HALF-SECTION @ END BENT DIAPHRAGMS

HALF-SECTION @ INTERMEDIATE DIAPHRAGMS

TYPICAL SECTION

SINGLE SPAN, SIMPLY LOADED FOR DEAD LOAD AND LIVE LOAD, WITH COMPOSITE DECK ON WELDED STEEL PLATE GIRDERS.

GIRDERS ARE PARALLEL TO -L-.

NOTES

PROVIDE 1¼"HIGH BEAM BOLSTERS UPPER AT 4'-0"CTS. ATOP THE STAY-IN-PLACE METAL 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.

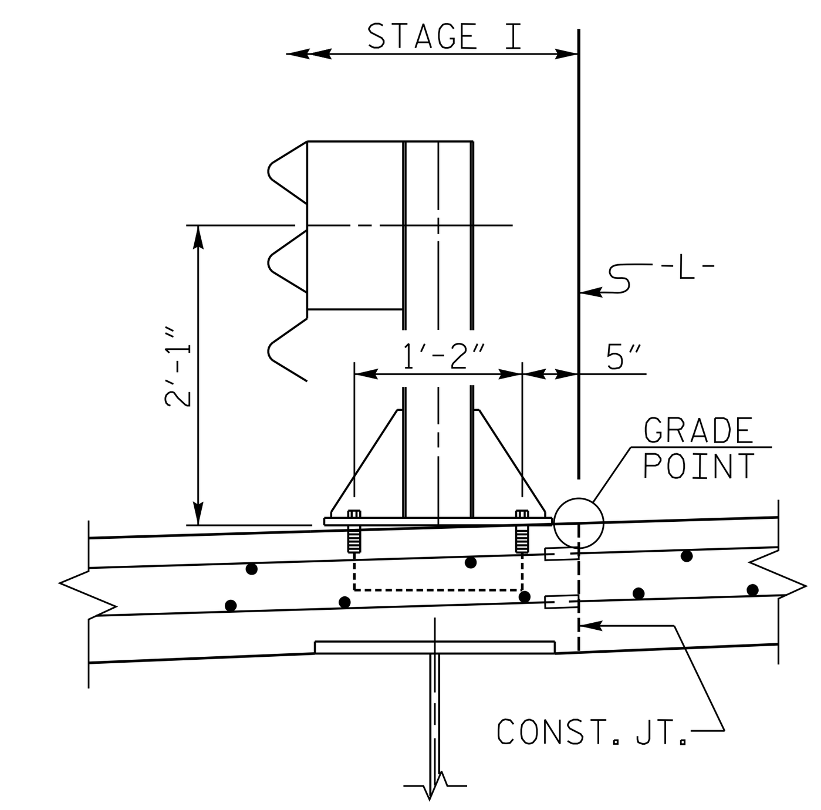
THE CONTRACTOR MAY, WHEN NECESSARY, PROPOSE A SCHEME FOR AVOIDING INTERFERENCE BETWEEN STAY-IN-PLACE METAL FORM SUPPORTS OR FORMS AND GIRDER STIFFENERS OR CONNECTOR PLATES. THE PROPOSAL SHALL BE INDICATED, AS APPROPRIATE, ON EITHER THE STEEL WORKING DRAWINGS OR THE STAY-IN-PLACE METAL FORM WORKING DRAWINGS.

STRUCTURAL STEEL ERECTION SHALL BE COMPLETE BEFORE FALSEWORK OR FORMS ARE PLACED ON THE UNIT.

DOWELS SHALL BE PLACED IN THE SAME HORIZONTAL PLANE AS THE TOP AND BOTTOM SLAB REINFORCING STEEL.

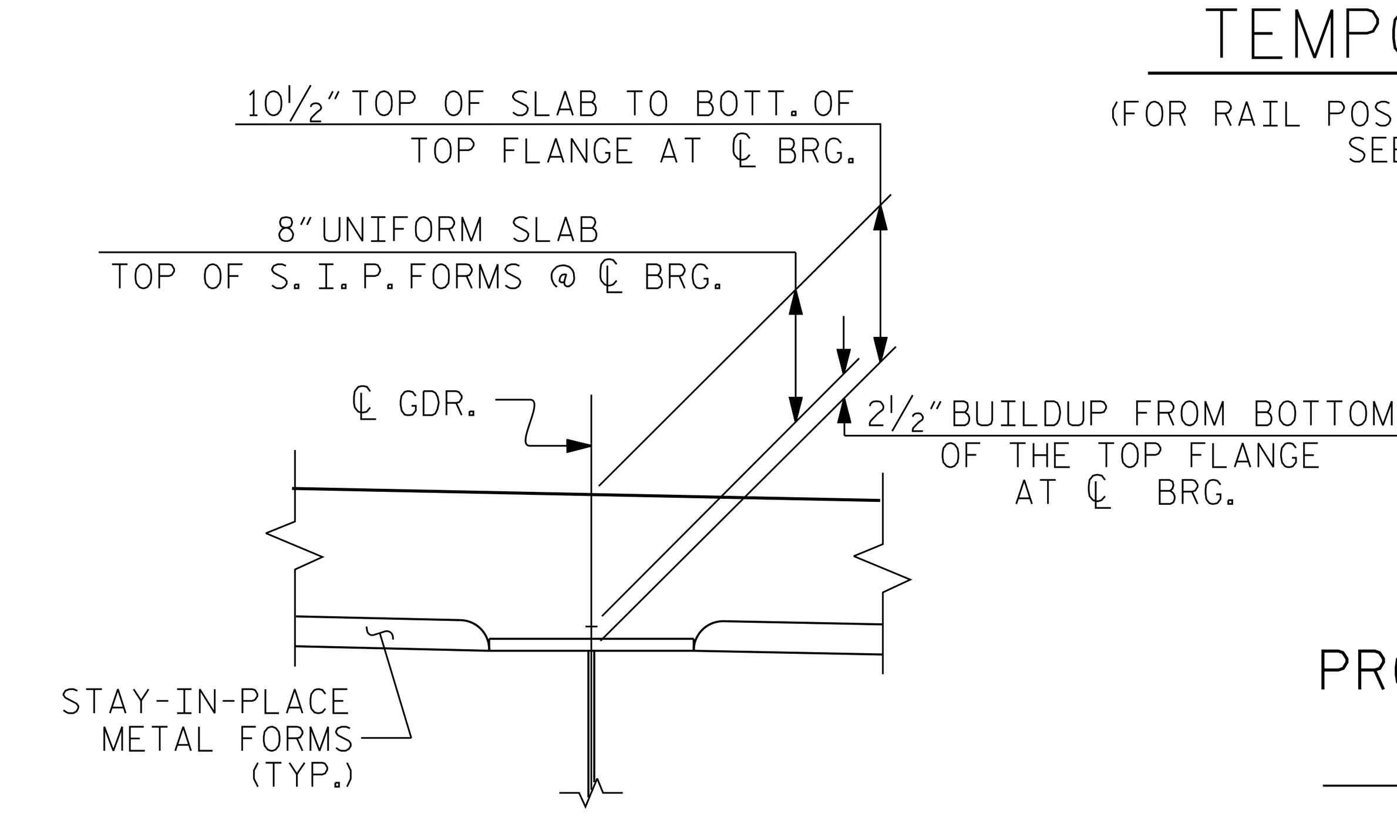
PREVIOUSLY CAST CONCRETE IN THE SPAN SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE SPAN.

✱✱ SCREW-IN TYPE MECHANICAL COUPLERS SHALL BE FLUSH WITH CONST. JT. #5A5 & A6 BARS TO BE SECURED IN COUPLER DURING STAGE II CONST. AND SPLICED WITH "A", "K", AND "G" BARS.

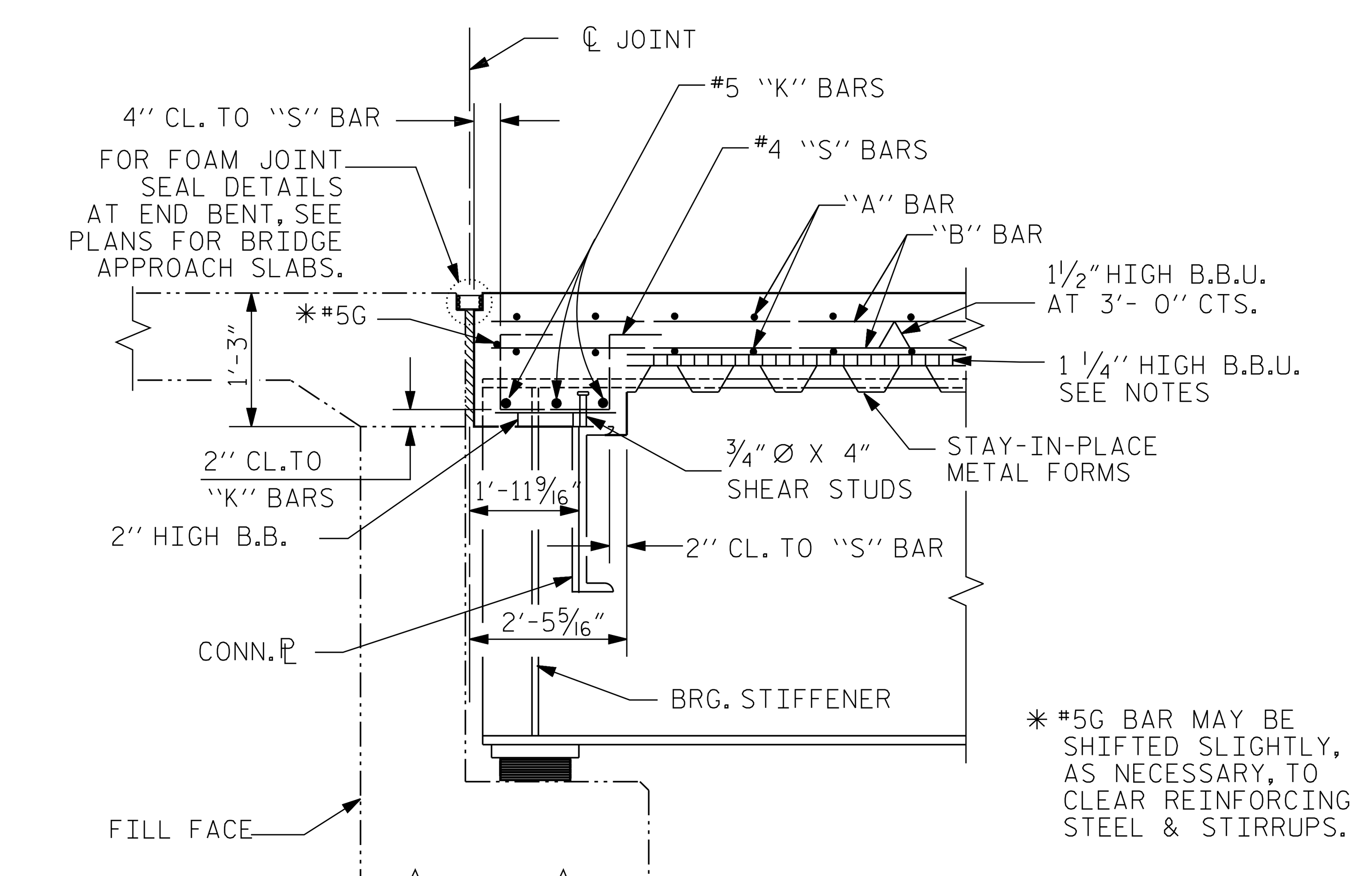


TEMPORARY GUARDRAIL

(FOR RAIL POSTS SPACING AND GUARDRAIL DETAILS, SEE SHEETS S2-9 AND S2-18)

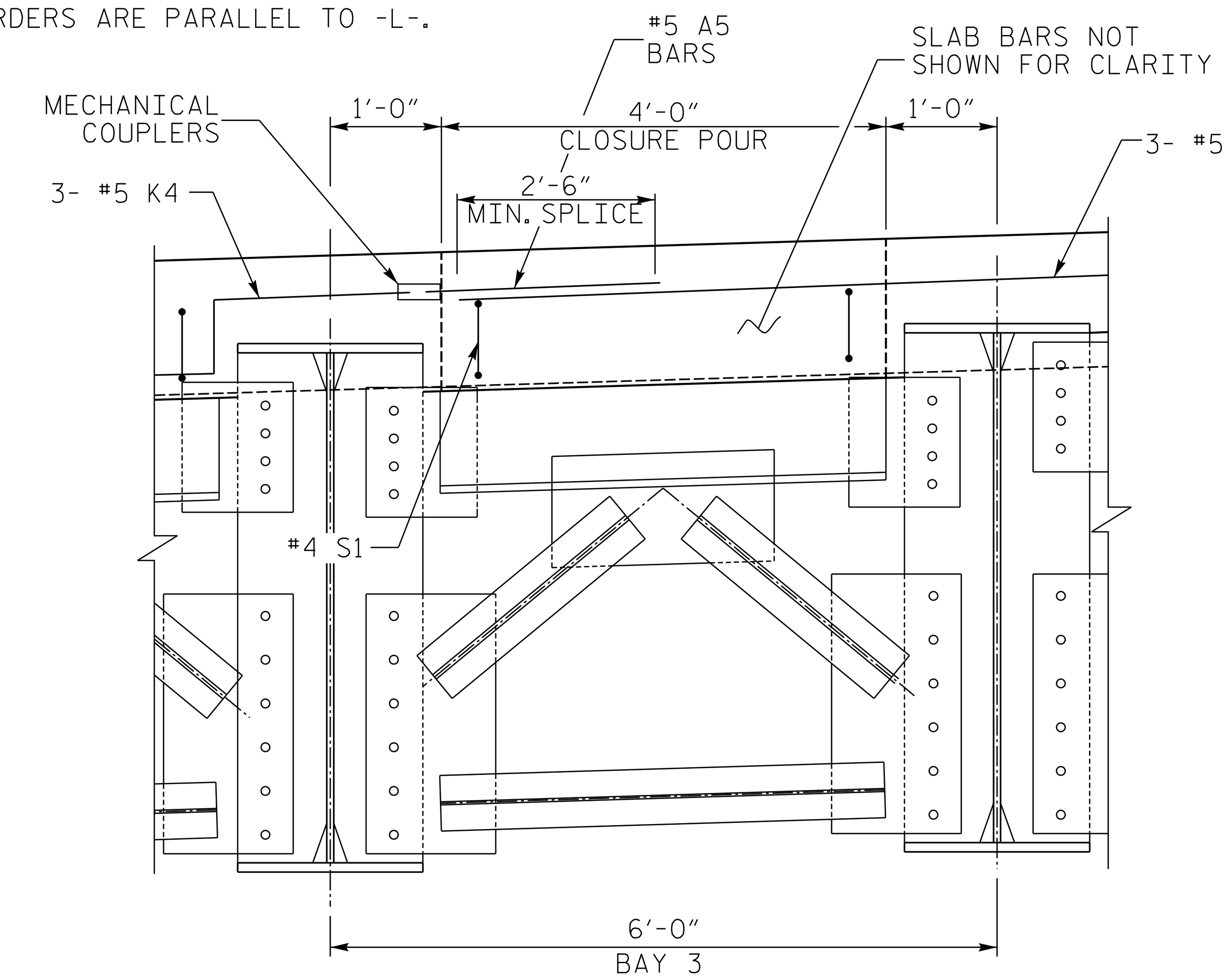


DETAIL "A"



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

END OF GIRDER DETAIL AT END BENT



CLOSURE BAY AT END BENT DIAPHRAGMS

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PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

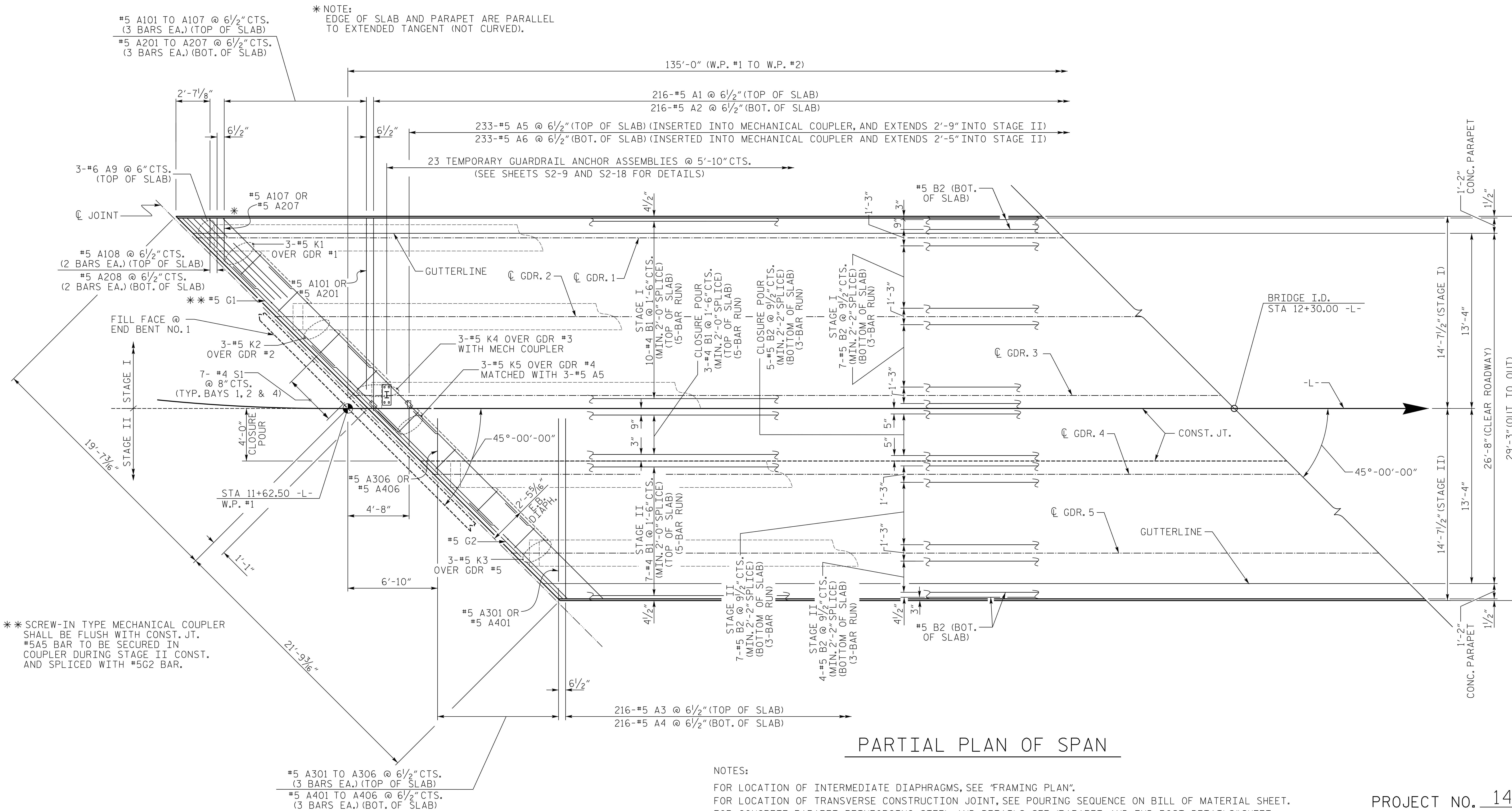
TYPICAL SECTION

JMT Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DocuSigned by: Hardy Willis ... 12/13/2023

DWN. BY: RWW	DATE: 03/18	
CHKD. BY: HLW	DATE: 03/18	
DES. EGR. OF RECORD: CBC	DATE: 03/18	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-7
1			3			TOTAL SHEETS
2			4			40



PARTIAL PLAN OF SPAN

NOTES:

FOR LOCATION OF INTERMEDIATE DIAPHRAGMS, SEE "FRAMING PLAN".
FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINT, SEE POURING SEQUENCE ON BILL OF MATERIAL SHEET.
FOR CONCRETE PARAPET REINFORCING STEEL AND DETAILS, SEE "PARAPET AND END POST DETAILS" SHEET.

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

SHEET 1 OF 2

DocuSigned by: Hardy Willis — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL HARDY L. WILLIS — 12/13/2023

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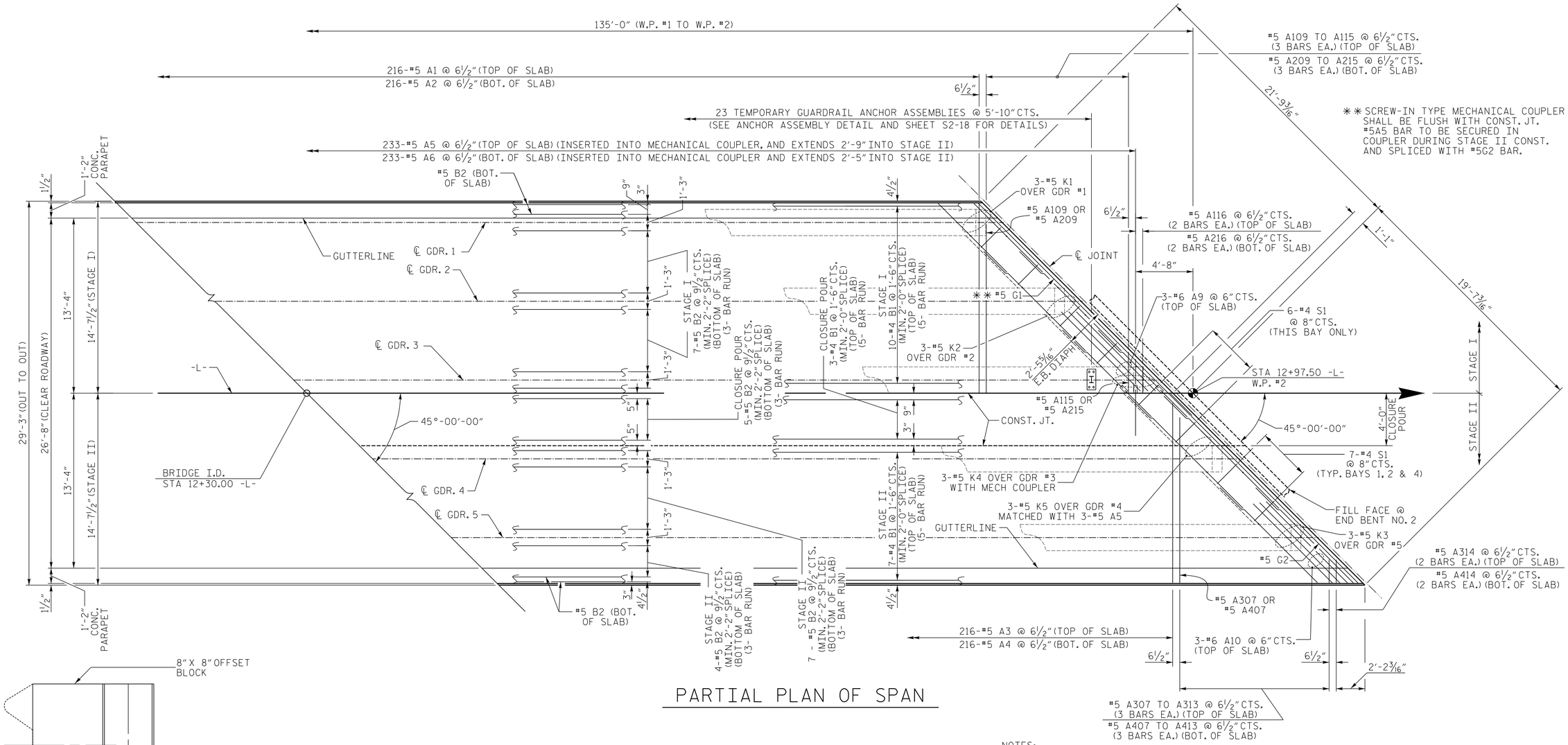
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF SPAN

JMT Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

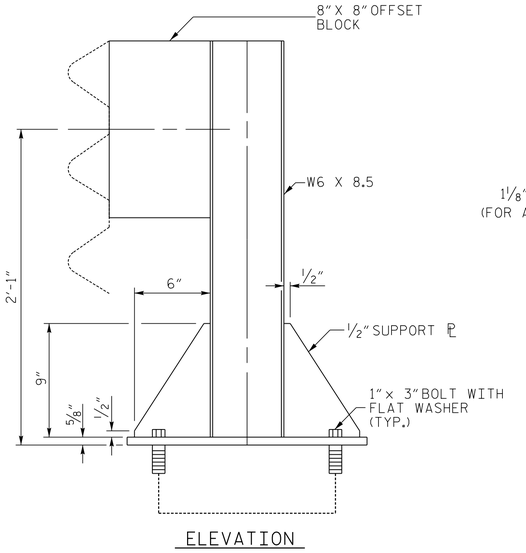
DWN. BY: RWW DATE: 03/18
CHKD. BY: HLW DATE: 03/18
DES. EGR. OF RECORD: CBC DATE: 03/18

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-8
1			3			TOTAL SHEETS	38
2			4				

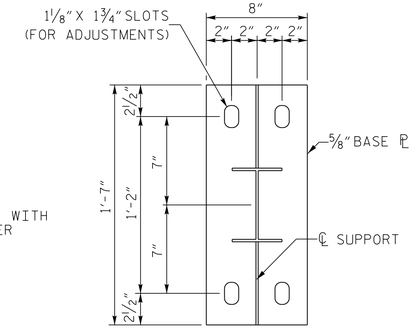


PARTIAL PLAN OF SPAN

NOTES:
FOR LOCATION OF INTERMEDIATE DIAPHRAGMS, SEE "FRAMING PLAN".
FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINT, SEE POURING SEQUENCE ON BILL OF MATERIAL SHEET.
FOR CONCRETE PARAPET REINFORCING STEEL AND DETAILS, SEE "PARAPET AND END POST DETAILS" SHEET.

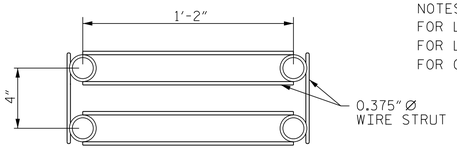


ELEVATION

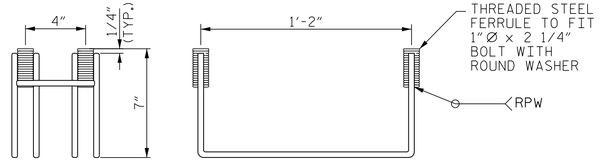


PLAN

TEMPORARY GUARDRAIL DETAILS



PLAN



SIDE VIEW ELEVATION

TEMPORARY GUARDRAIL ANCHOR ASSEMBLY

MINIMUM LENGTH OF THREADS IN INSERT (FERRULE): 2 1/2"

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER HARDY L. WILLIS
DocuSigned by: HardyWillis
C6287FCF0223461...
12/13/2023

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License No: C-3097

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DES. EGR. OF RECORD: CBC DATE: 03/18

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF SPAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-9
1			3			TOTAL SHEETS
2			4			40

FRAMING PLAN

FOR DIMENSIONS ALONG GIRDER SEE "STRUCTURAL STEEL DETAILS" SHEET 1 OF 5.

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

DocuSigned by: Hardy Willis

12/13/2023

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STATE OF NORTH CAROLINA
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FRAMING PLAN

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

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CHKD. BY: HLW	DATE: 03/18
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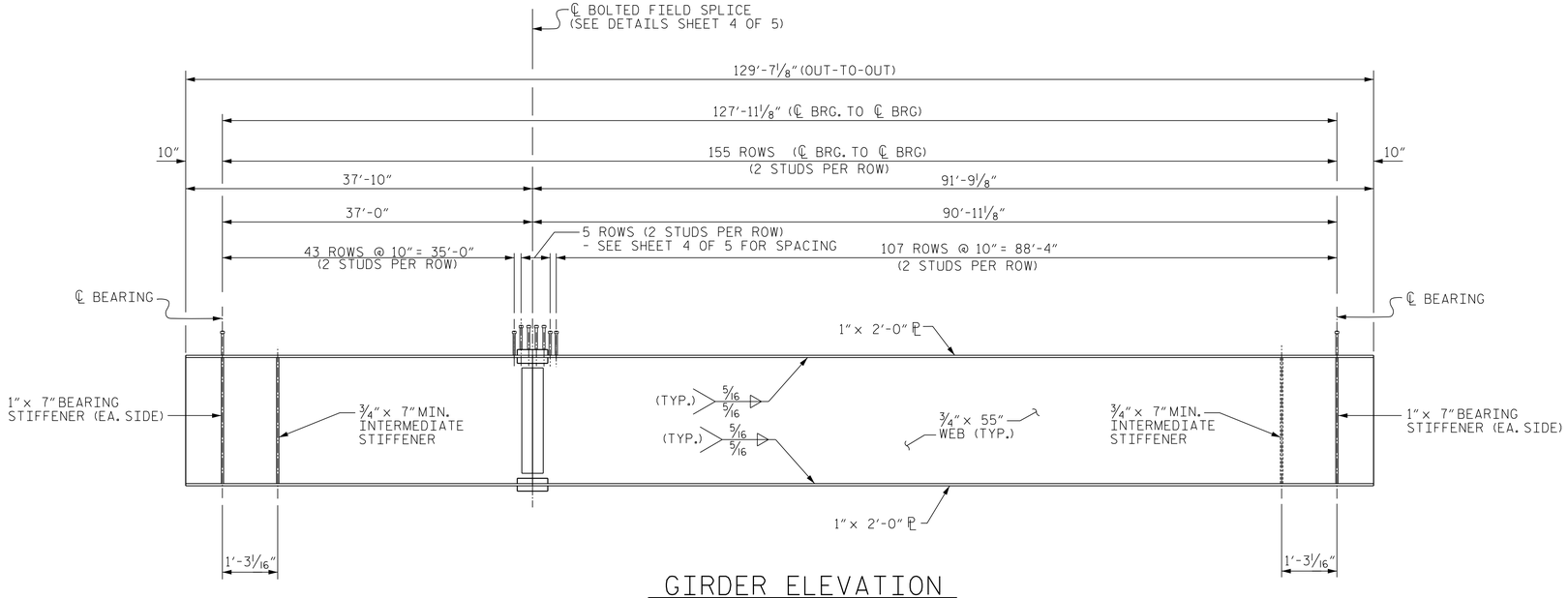
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

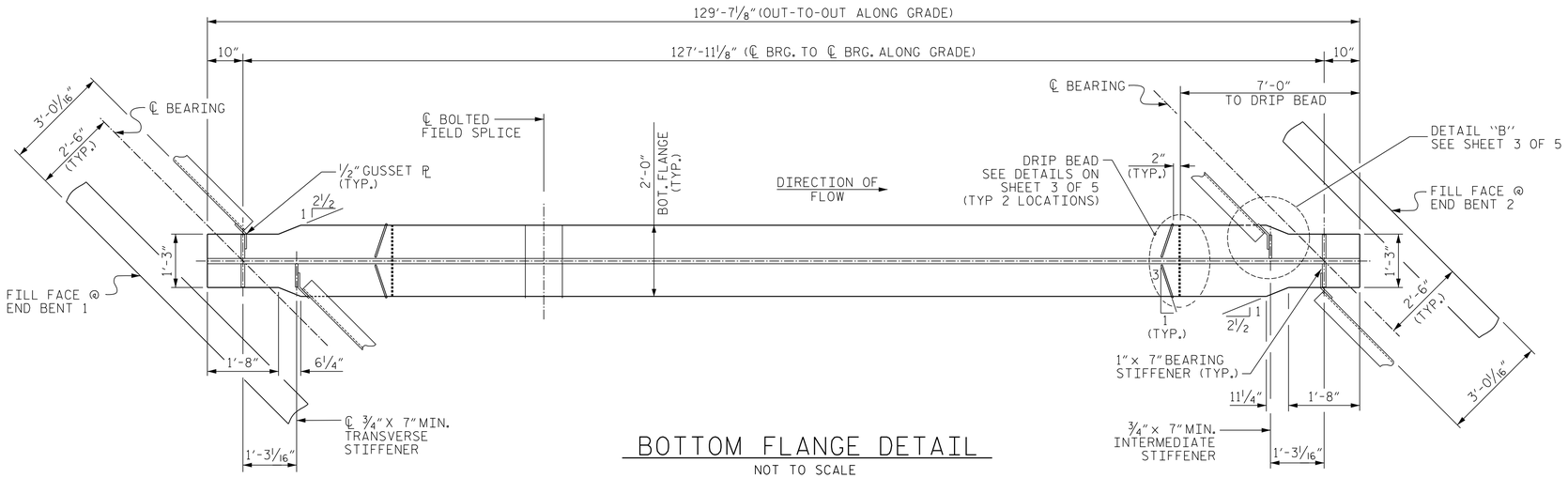
SHEET NO. S2-10

TOTAL SHEETS 40



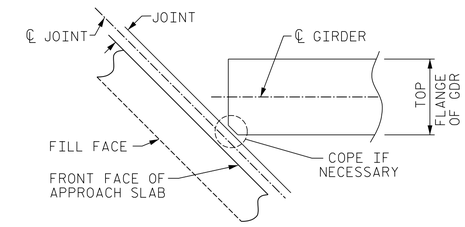
GIRDER ELEVATION

NOT TO SCALE



BOTTOM FLANGE DETAIL

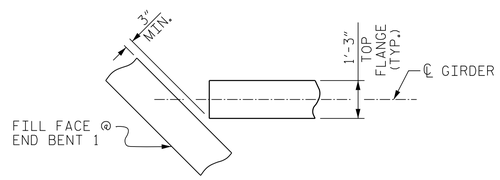
NOT TO SCALE



FLANGE CLIPPING DETAIL

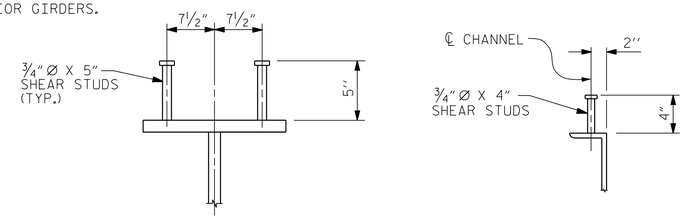
(END BENT 2 SIMILAR)

NOTE: TRANSVERSE STIFFENERS SHALL BE ONLY ON INTERIOR SIDE OF WEB FOR EXTERIOR GIRDERS.



END OF GIRDER DETAIL

(END BENT 2 SIMILAR)



@ EACH GIRDER

@ END BENT DIAPHRAGM

SHEAR STUD DETAIL

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STRUCTURAL STEEL DETAILS

NORTH CAROLINA PROFESSIONAL SEAL L-5287 ENGINEER HARDY L. WILLS

DocuSigned by: Hardy Wills
C0287FCA0233461...
12/13/2023

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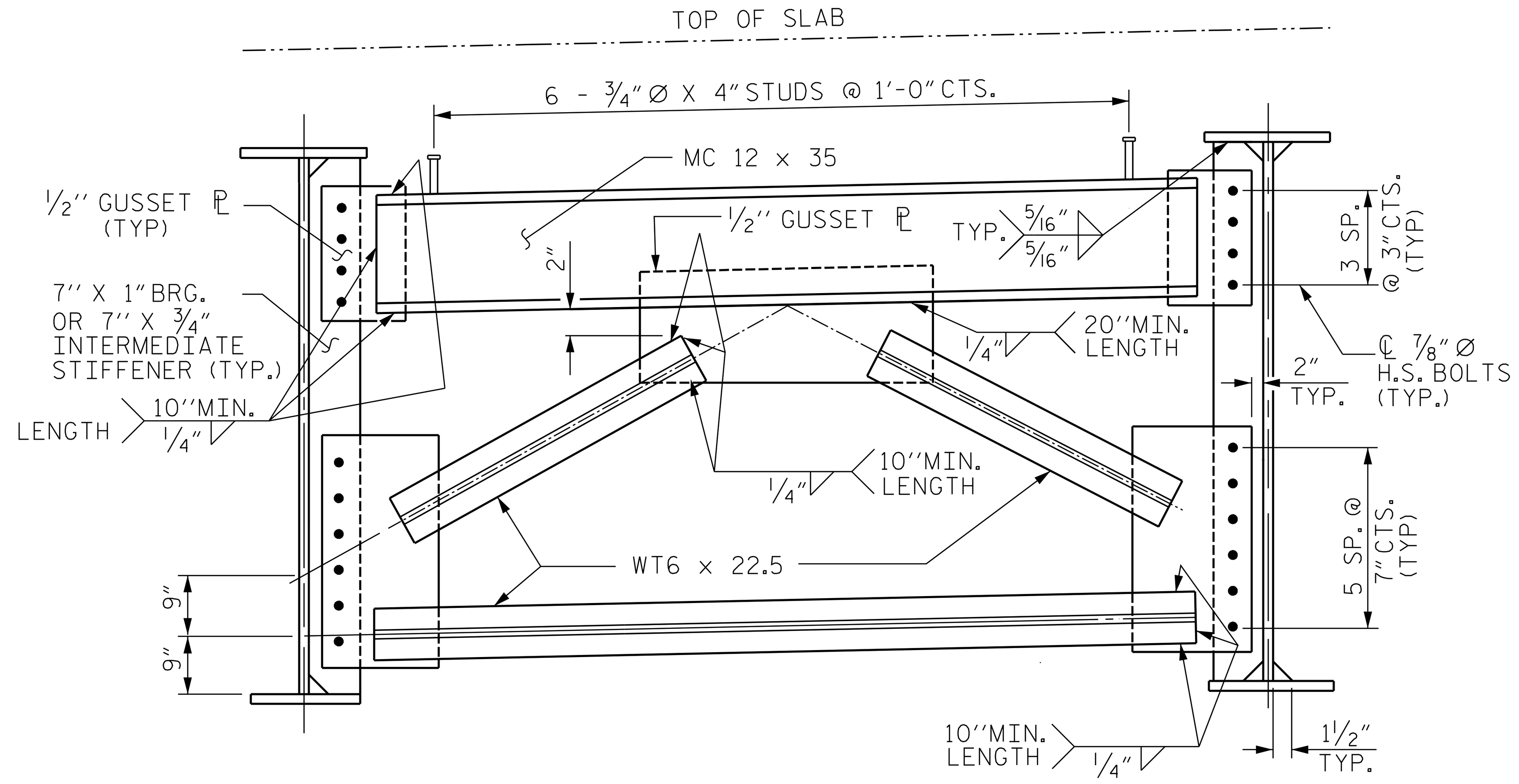
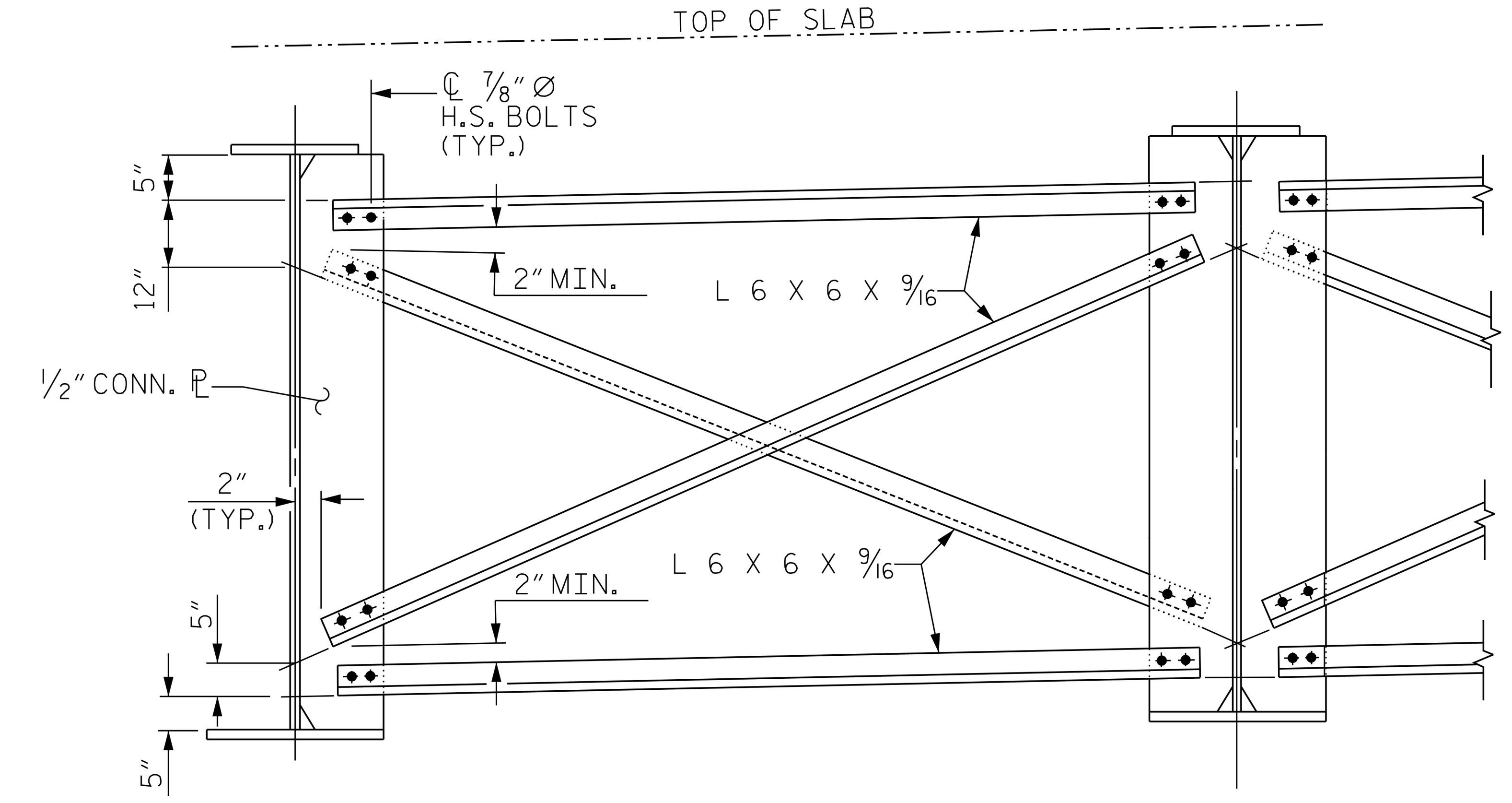
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW DATE: 03/18
CHKD. BY: HLW DATE: 03/18
DES. EGR. OF RECORD: CBC DATE: 03/18

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-11
1			3			TOTAL SHEETS
2			4			40



END BENT DIAPHRAGMS (D1)



TYPICAL INTERMEDIATE CROSSFRAME (D2)

NOTES

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 5 OR SYSTEM 6 OF THE STRUCTURAL STEEL SHOP COATINGS PROGRAM AND SECTION 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL, UNLESS OTHERWISE NOTED.

ALL FIELD CONNECTIONS TO BE ⅞" DIA. HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

BEARING STIFFENERS ARE TO BE PLACED NORMAL TO THE WEB OF THE GIRDER AND SHALL BE PLUMB.

A CHARPY V-NOTCH TEST IS REQUIRED FOR WEB PLATES, BOTTOM FLANGE PLATES, BOTTOM FLANGE SPLICE PLATES, AND WEB SPLICE PLATES FOR ALL GIRDERS AND IN ACCORDANCE WITH ARTICLE 1072-7 OF THE STANDARD SPECIFICATIONS.

PERMITTED FLANGE AND WEB SHOP SPLICES SHALL NOT BE LOCATED WITHIN 15 FEET OF MAXIMUM DEAD LOAD DEFLECTION. KEEP 2 FEET MINIMUM BETWEEN WEB AND FLANGE SHOP SPLICES. KEEP 6" MINIMUM BETWEEN CONNECTOR PLATE OR TRANSVERSE STIFFENER WELDS AND WEB OR FLANGE SHOP SPLICES.

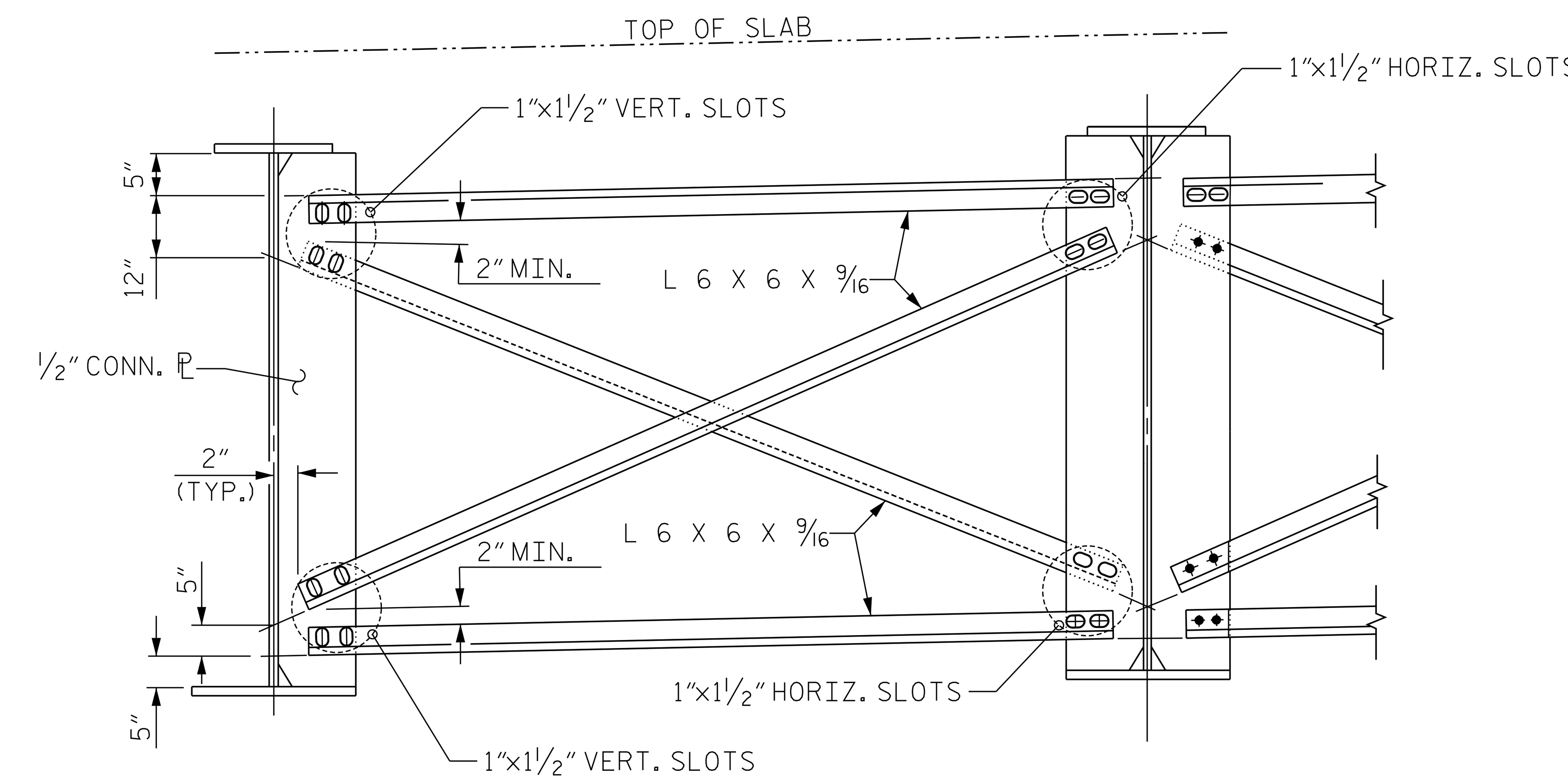
STUDS ON GIRDERS MAY BE SHIFTED UP TO 1" IF NECESSARY TO CLEAR FLANGE SPLICE WELD.

TENSION ON THE ASTM A325 BOLTS SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH ARTICLE 440-8 OF THE STANDARD SPECIFICATIONS.

END OF GIRDERS SHALL BE PLUMB.

BEARING STIFFENER MAY REQUIRE COPING IF WIDER THAN BOTTOM FLANGE.

FABRICATORS SHALL DETAIL DIAPHRAGM MEMBERS AND CONNECTIONS FOR FULL DEAD LOAD FIT UP. GIRDERS SHALL BE PLUMB AFTER THE FULL AMOUNT OF DEAD LOAD IS APPLIED.



TYPICAL INTERMEDIATE CROSSFRAME (D3)
FOR CLOSURE BAY

NUTS ON BOLTS FOR CONNECTING DIAPHRAGM TO CONNECTOR PLATE SHALL BE LEFT LOOSE FOR PURPOSE OF ADJUSTMENT UNTIL BOTH SIDES OF SLAB HAVE BEEN POURED.

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 2 OF 5

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — DocuSigned by: Hardy Willis — 12/13/2023

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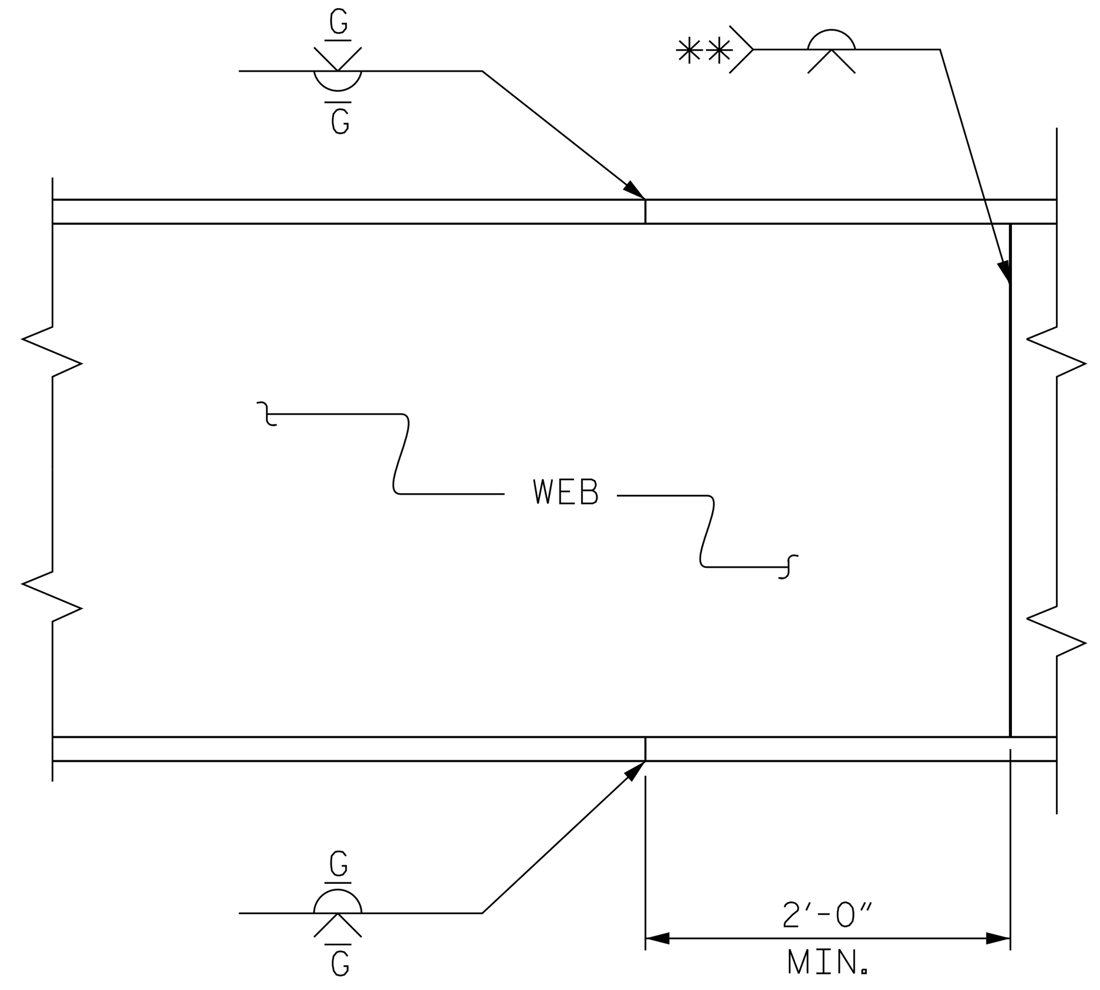
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

STRUCTURAL STEEL DETAILS

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: MAF DATE: 03/18
CHKD. BY: HLW DATE: 03/18
DES. EGR. OF RECORD: CBC DATE: 03/18

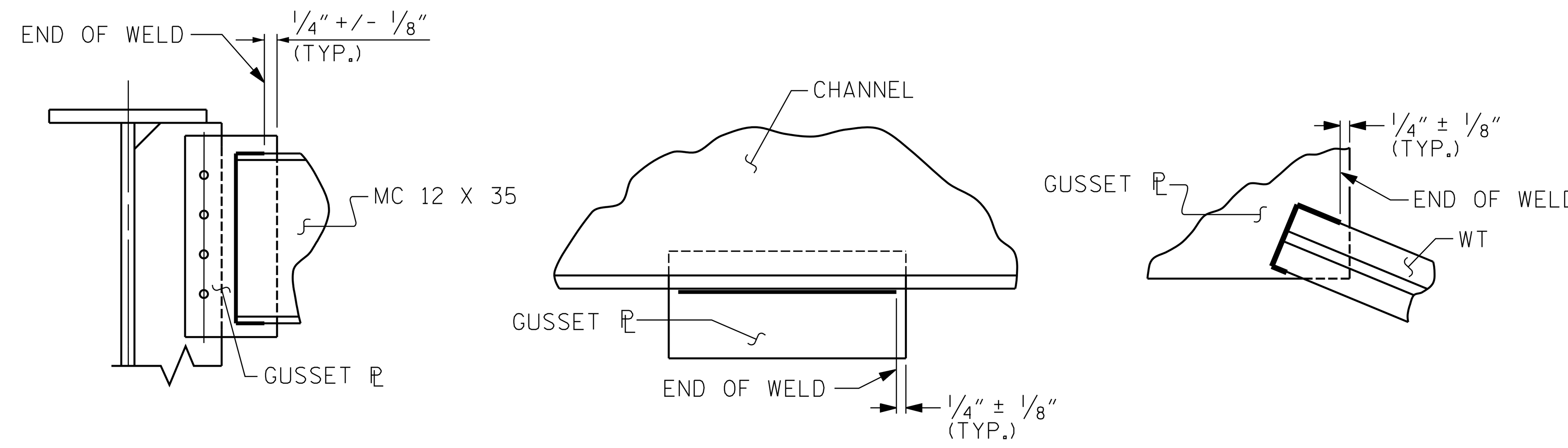
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-12
1			3			TOTAL SHEETS
2			4			40



ELEVATION

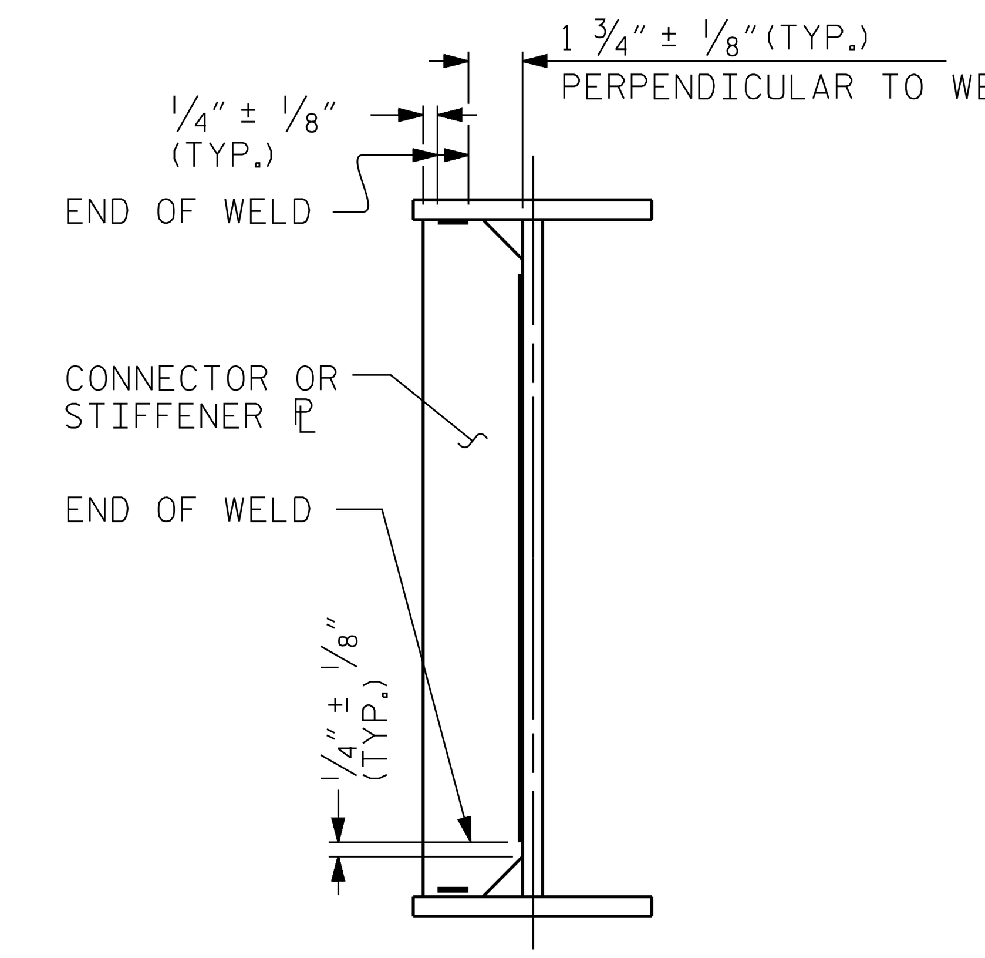
TYPICAL FLANGE & WEB BUTT JOINT

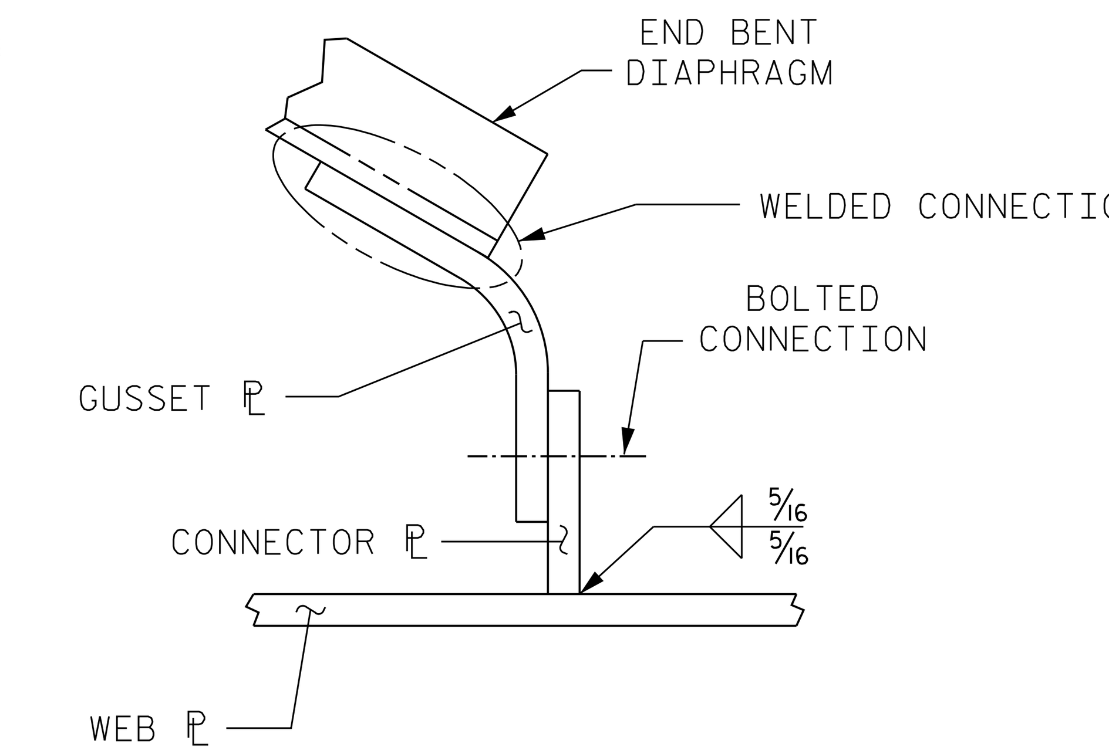
** GRIND SMOOTH AND FLUSH ON OUTER FACE OF EXTERIOR GIRDERS



TYPICAL GUSSET PLATE CONNECTIONS

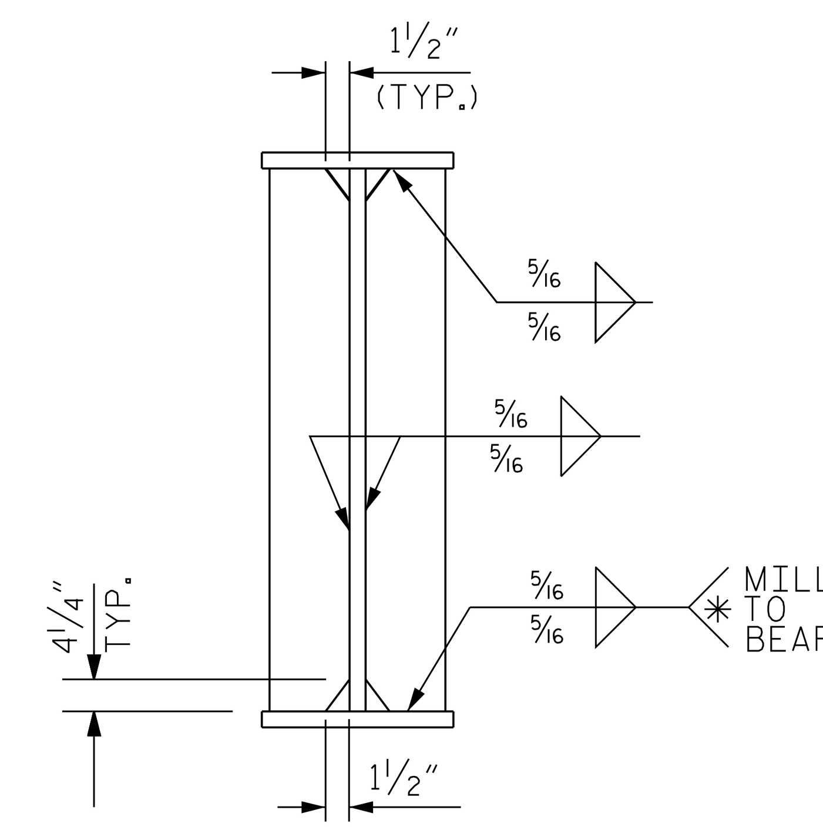
WELD TERMINATION DETAILS





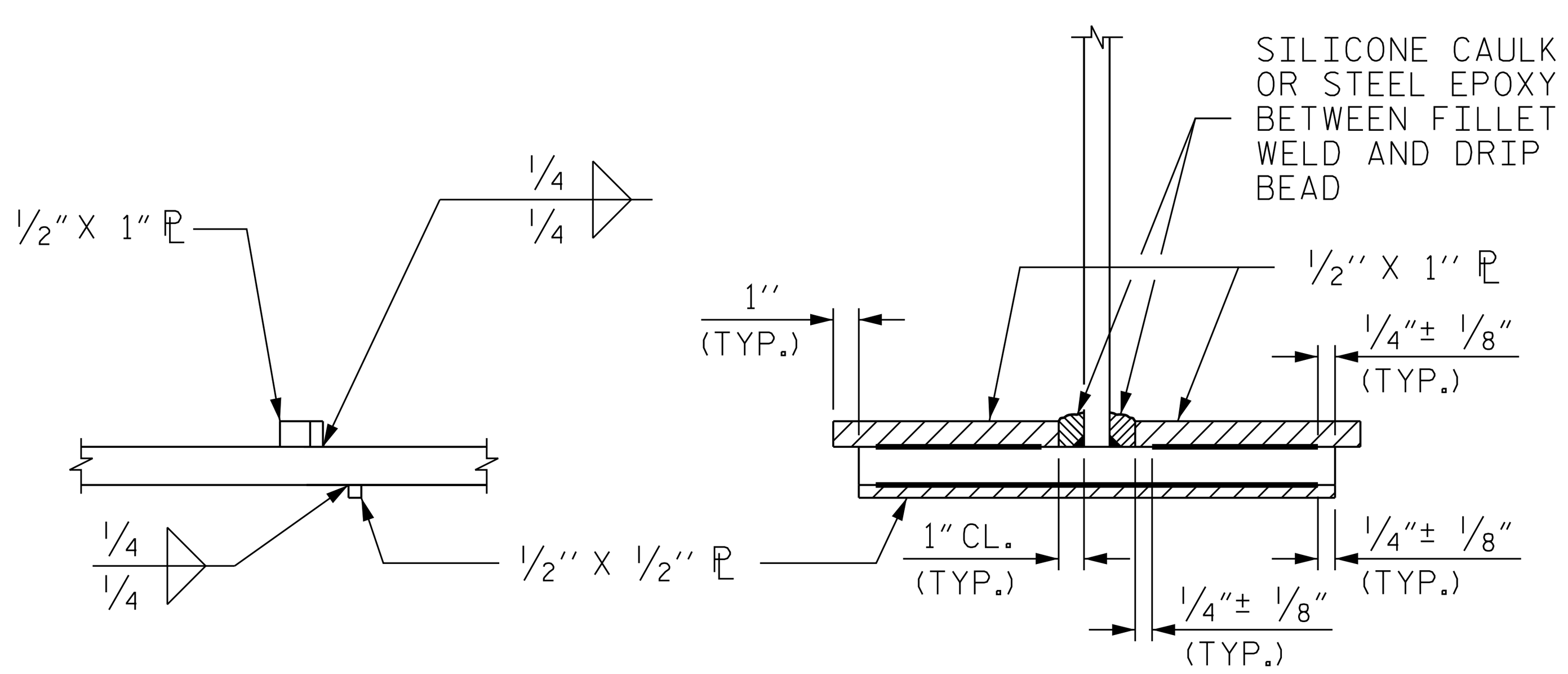
DETAIL "B"

WELD TERMINATION DETAIL AT STIFFENER OR CONNECTOR PLATE



BEARING STIFFENER/ CONNECTOR PLATE

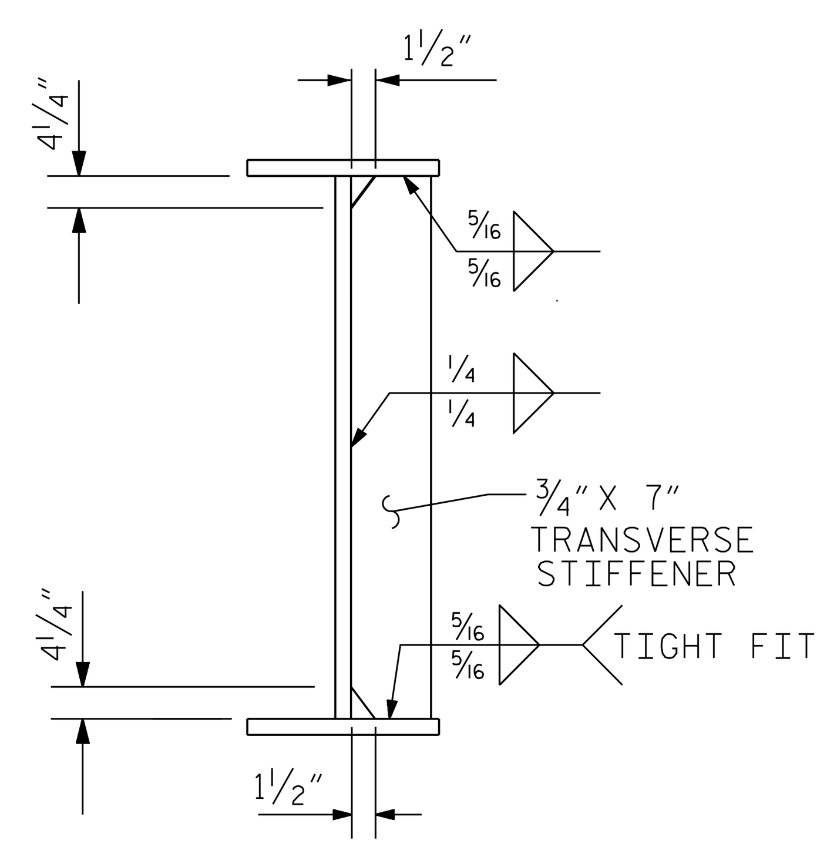
NOTE: DO NOT CLIP PLATE AT TOP OUTSIDE CORNER OF STIFFENER PLATE.
* WELD TO BOTTOM FLANGE IS ONLY REQUIRED WHEN BEARING STIFFENER IS ALSO CONNECTOR PLATE



SIDE VIEW

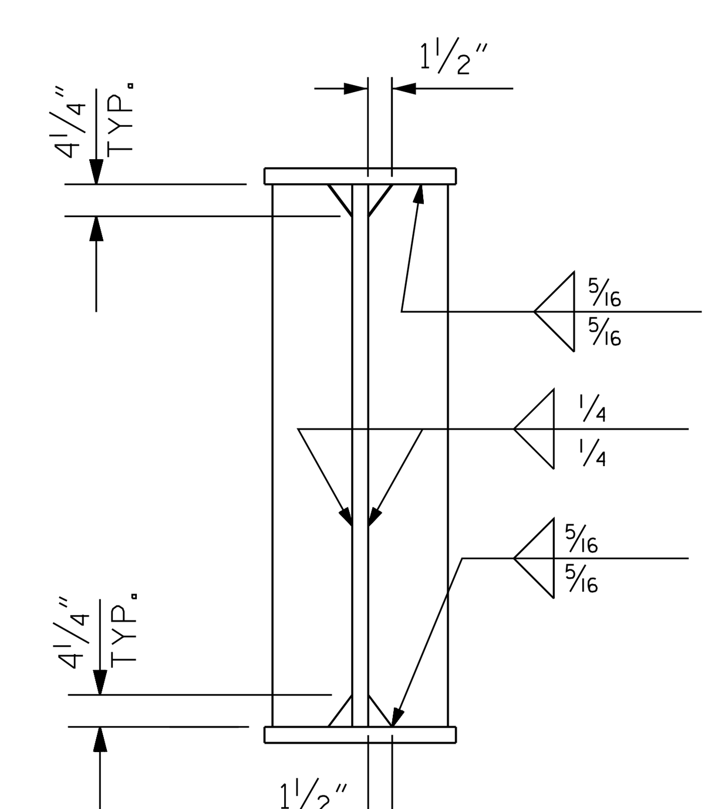
SECTION

DRIP BEAD DETAILS



TRANSVERSE STIFFENER

SEE FRAMING PLAN FOR LOCATIONS.



CONNECTOR PLATE

AT INTERMEDIATE DIAPHRAGM

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 3 OF 5

DocuSigned by: Hardy Wills
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028761 HARDY L. WILLS
12/13/2023

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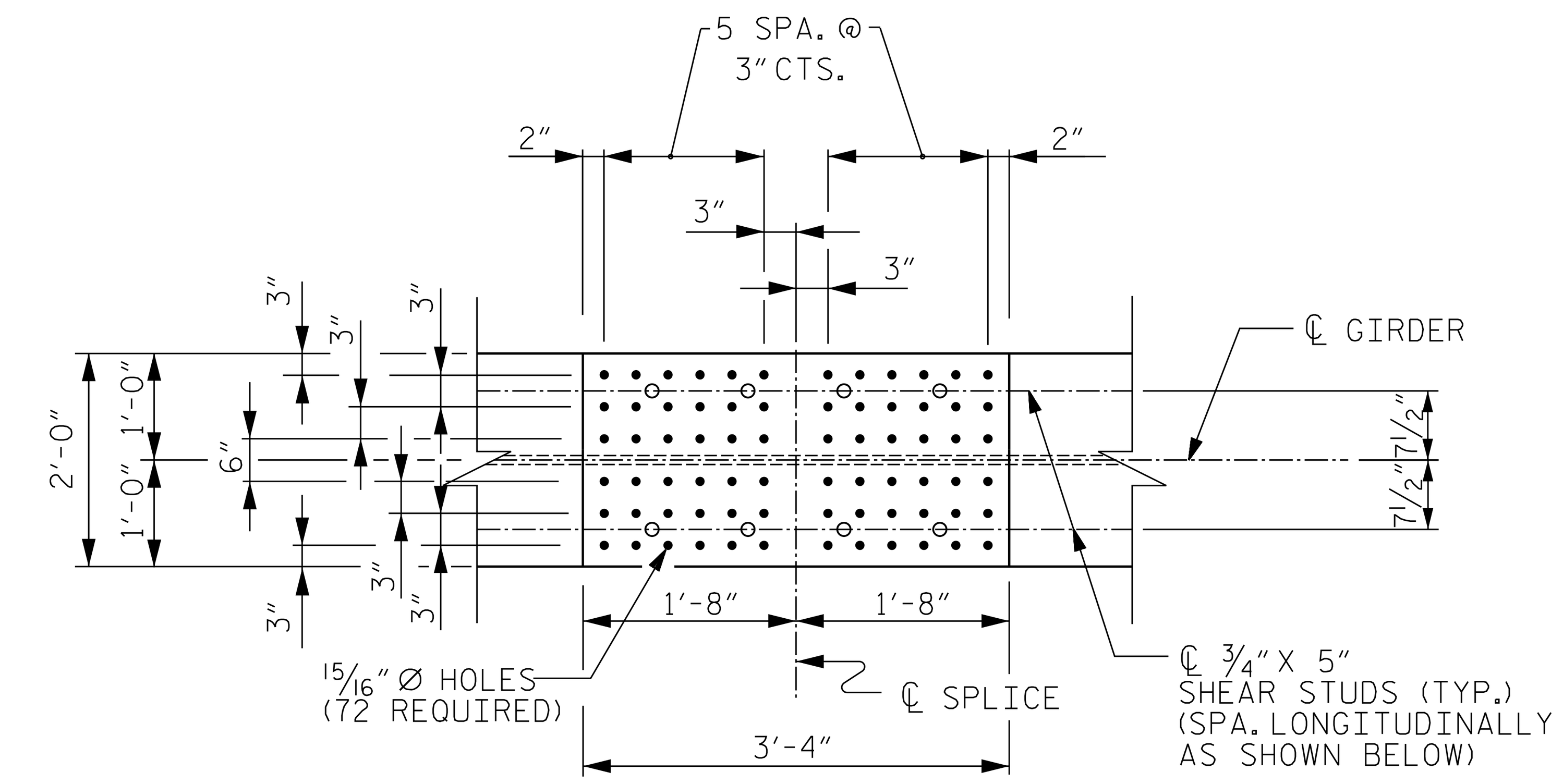
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

STRUCTURAL STEEL DETAILS

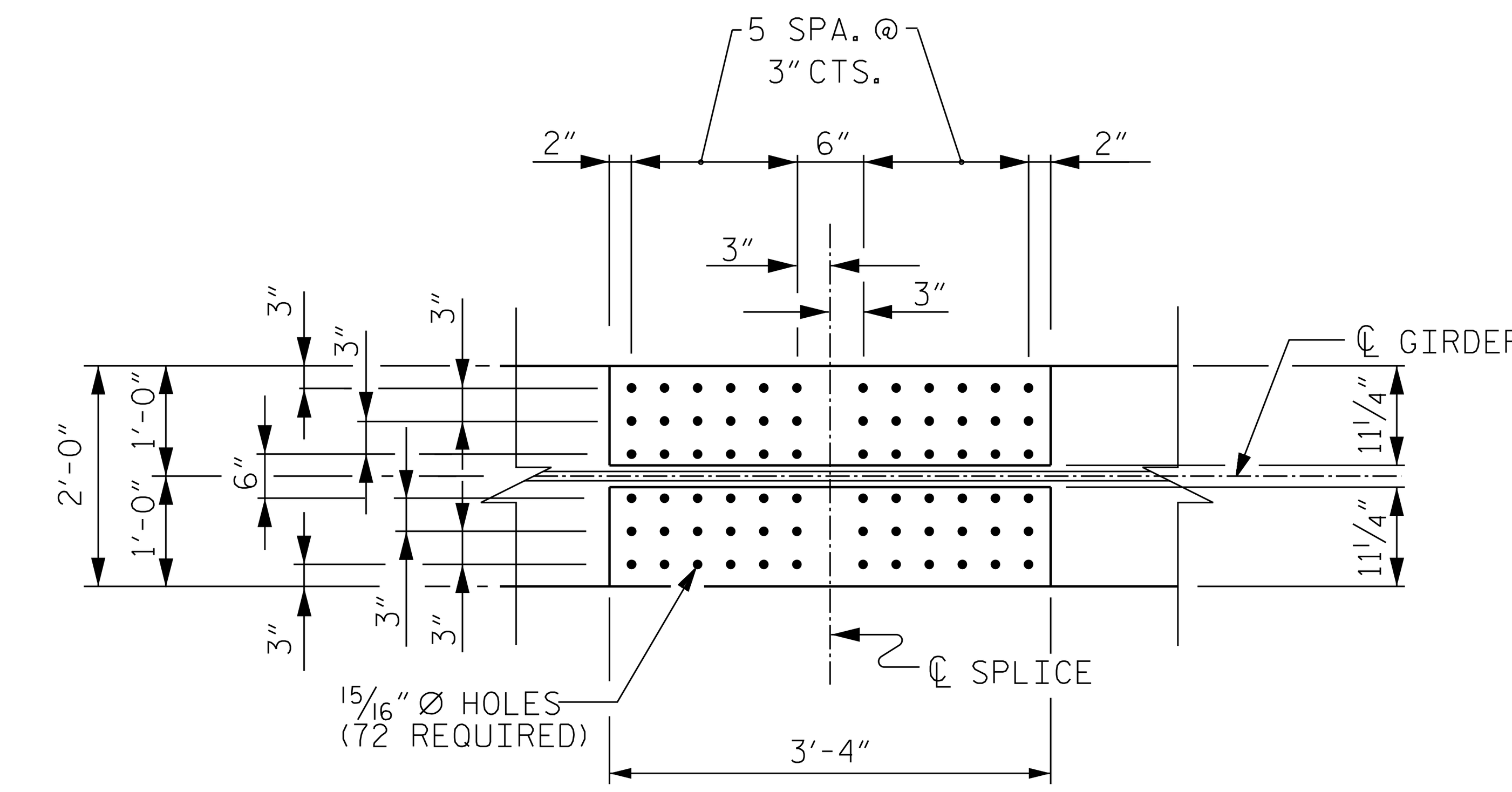
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

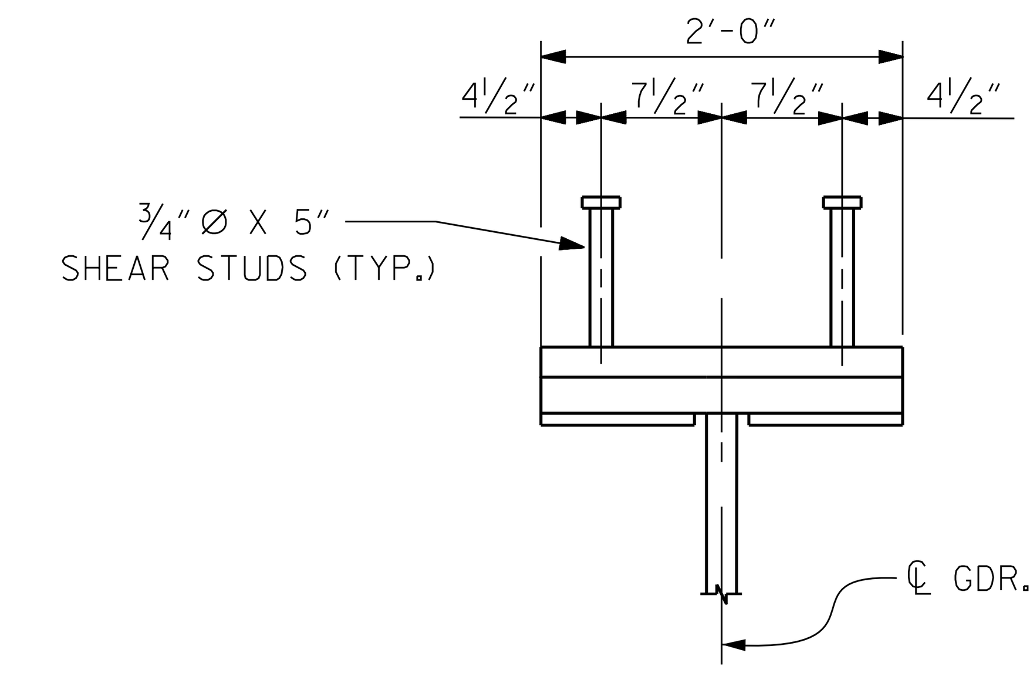
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-13
1			3			TOTAL SHEETS
2			4			40



PLAN (TOP OF TOP FLANGE)

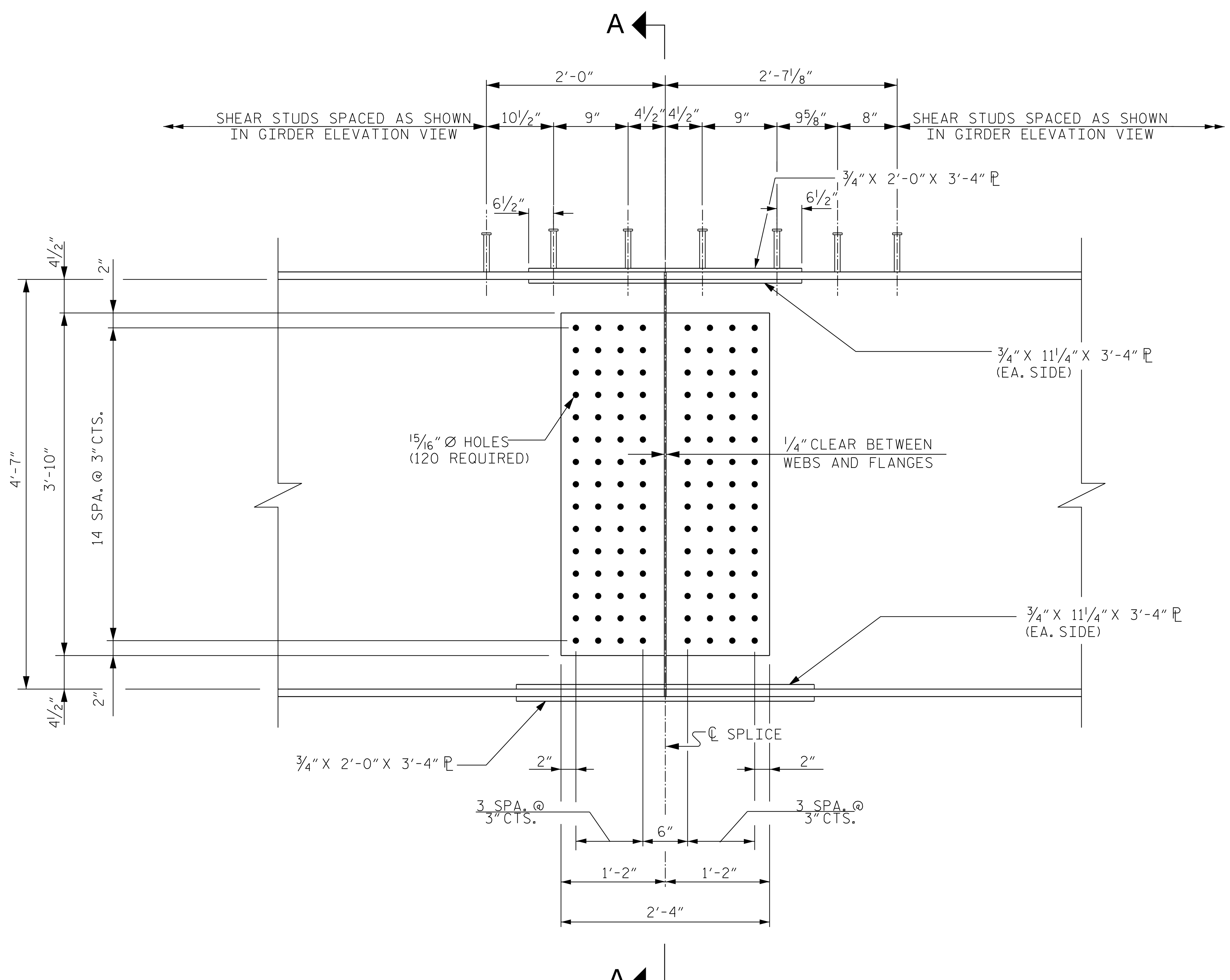


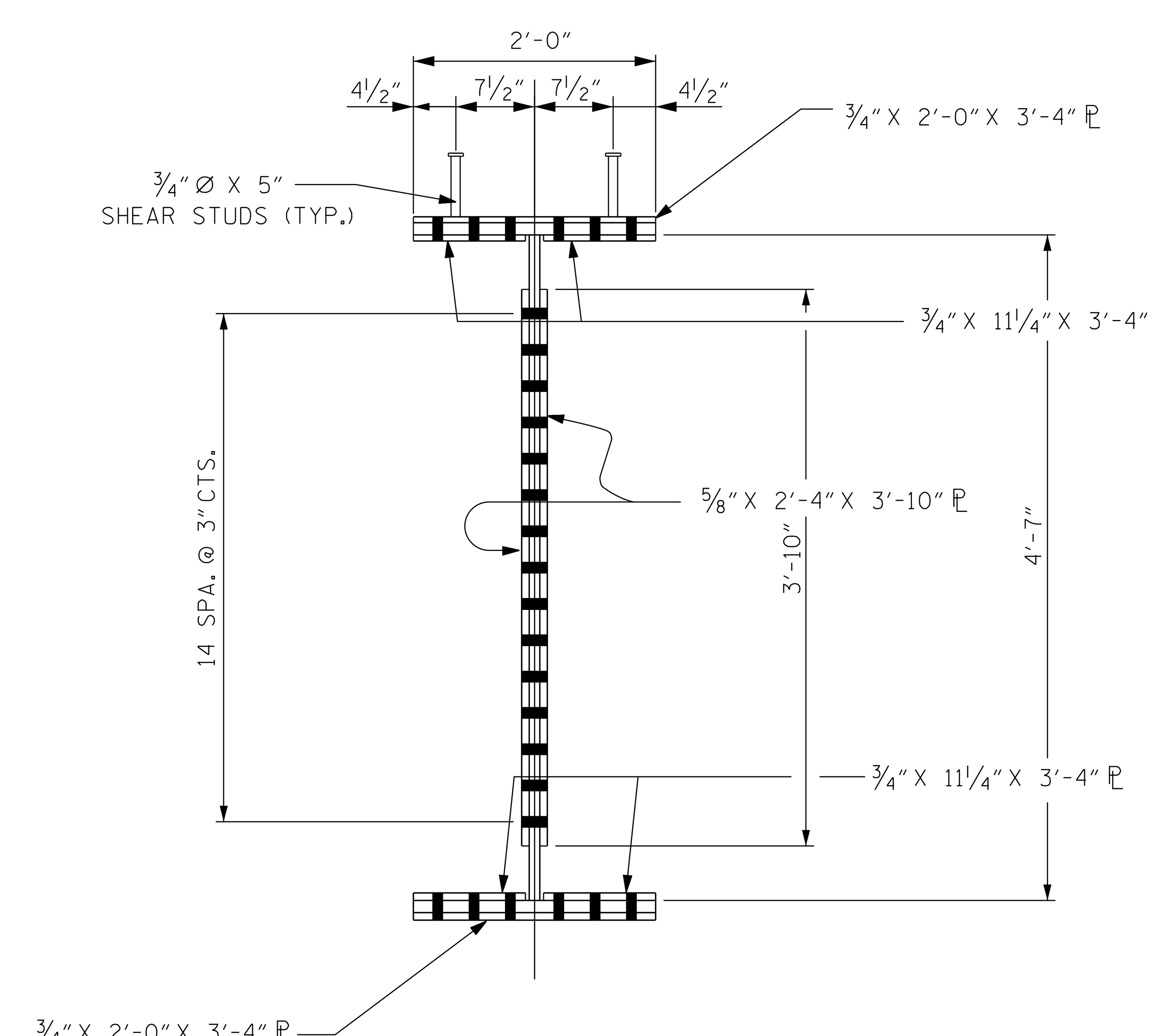
PLAN (TOP OF BOTTOM FLANGE)



SHEAR STUD DETAIL FOR TOP FLANGE SPLICE PLATE

SHEAR STUDS ARE TO BE SHOP WELDED ON TOP OF PLATE BEFORE FIELD ASSEMBLY.





SECTION A-A

BOLTED FIELD SPLICE DETAILS

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STRUCTURAL STEEL DETAILS

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER
DocuSigned by: Hardy Willis
...61...
12/13/2023

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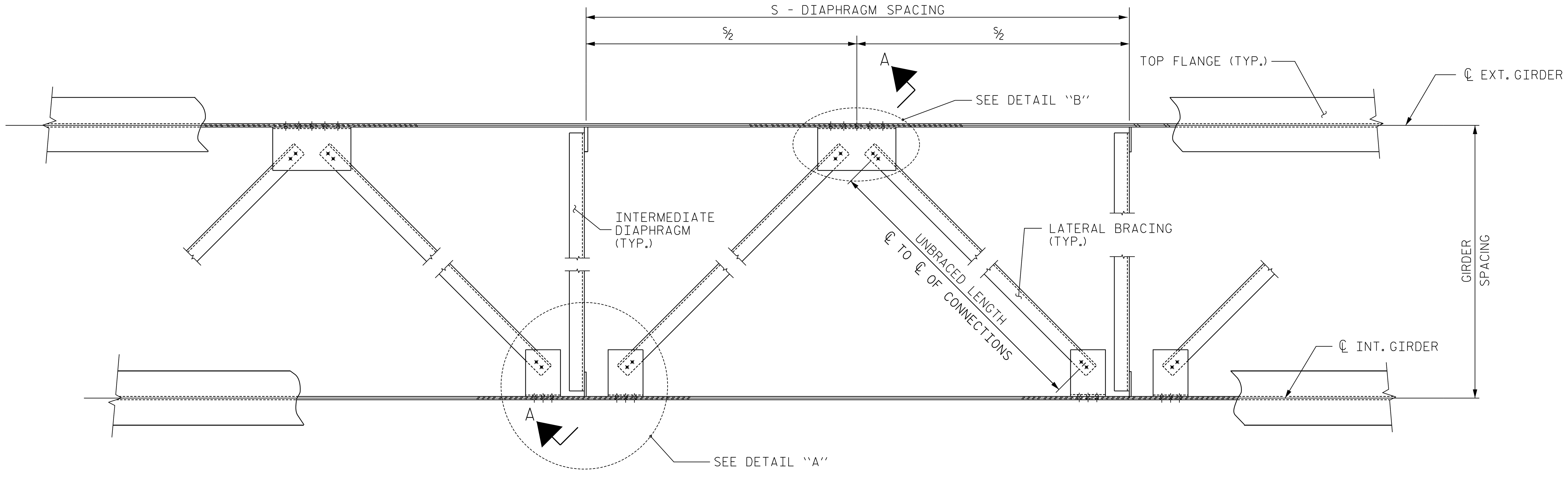
JMT Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

SHEET NO. S2-14

TOTAL SHEETS 40



PART PLAN - NEAR TOP FLANGE LATERAL BRACING

(THROUGHOUT EXTERIOR BAYS ONLY)

NOTES

LATERAL BRACING ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W OR APPROVED EQUAL.

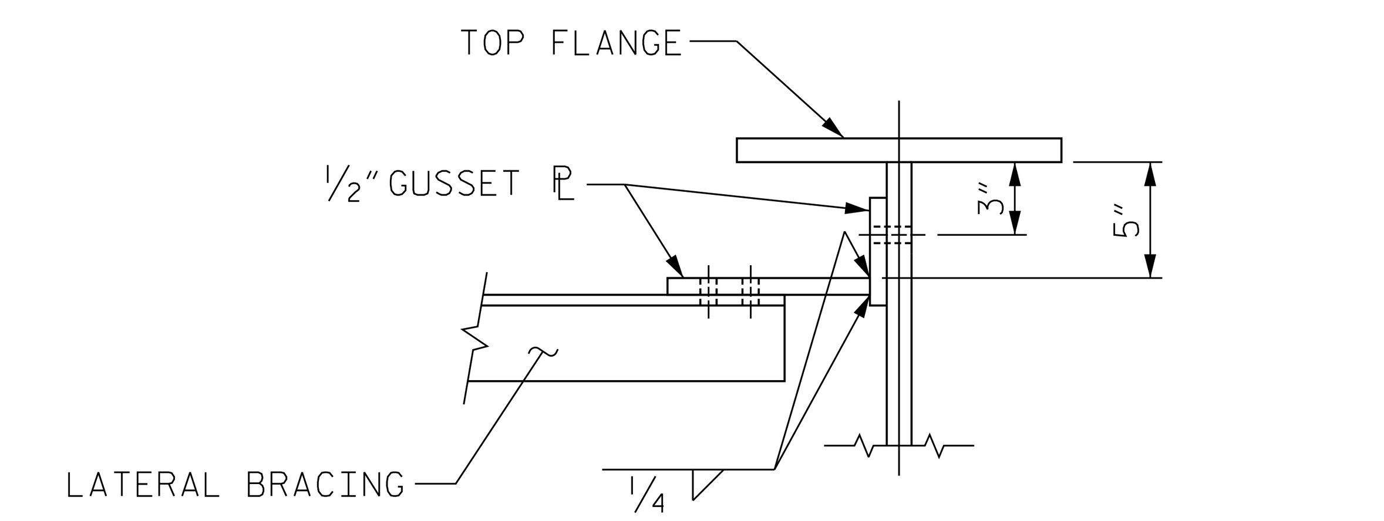
TENSION ON THE ASTM A325 BOLTS SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL BOLTED CONNECTIONS SHALL BE 7/8"Ø HIGH STRENGTH BOLTS.

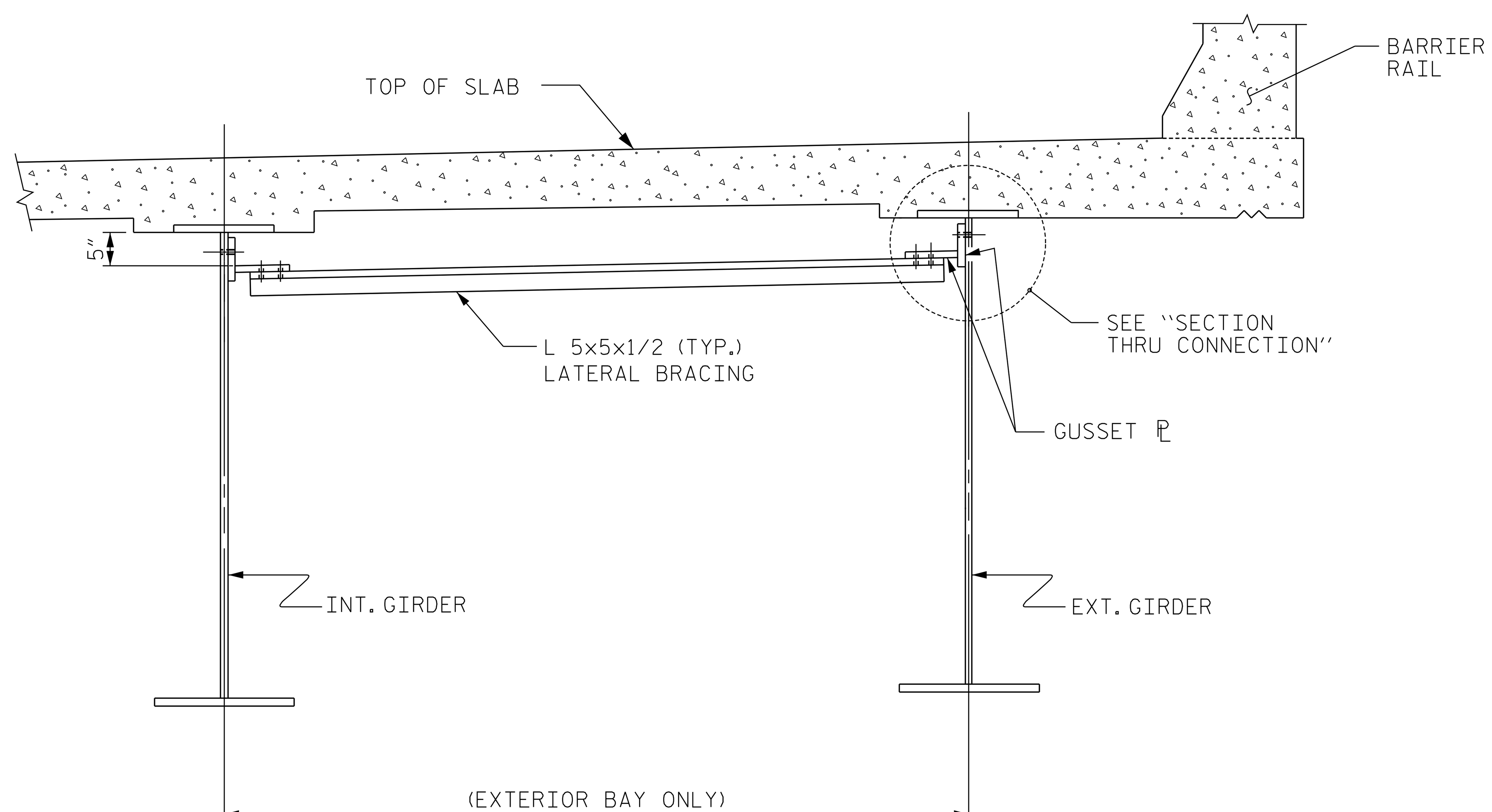
THE CONTRACTOR HAS THE OPTION TO CLIP THE PROTRUDING CORNERS OF THE GUSSET PLATES, AT NO ADDITIONAL COST TO THE DEPARTMENT.

BENT GUSSET PLATES OR ROLLED ANGLE SHAPES MAY BE SUBSTITUTED FOR THE WELDED GUSSET PLATES DETAILED IF APPROVED BY THE ENGINEER, AT NO ADDITIONAL COST TO THE DEPARTMENT.

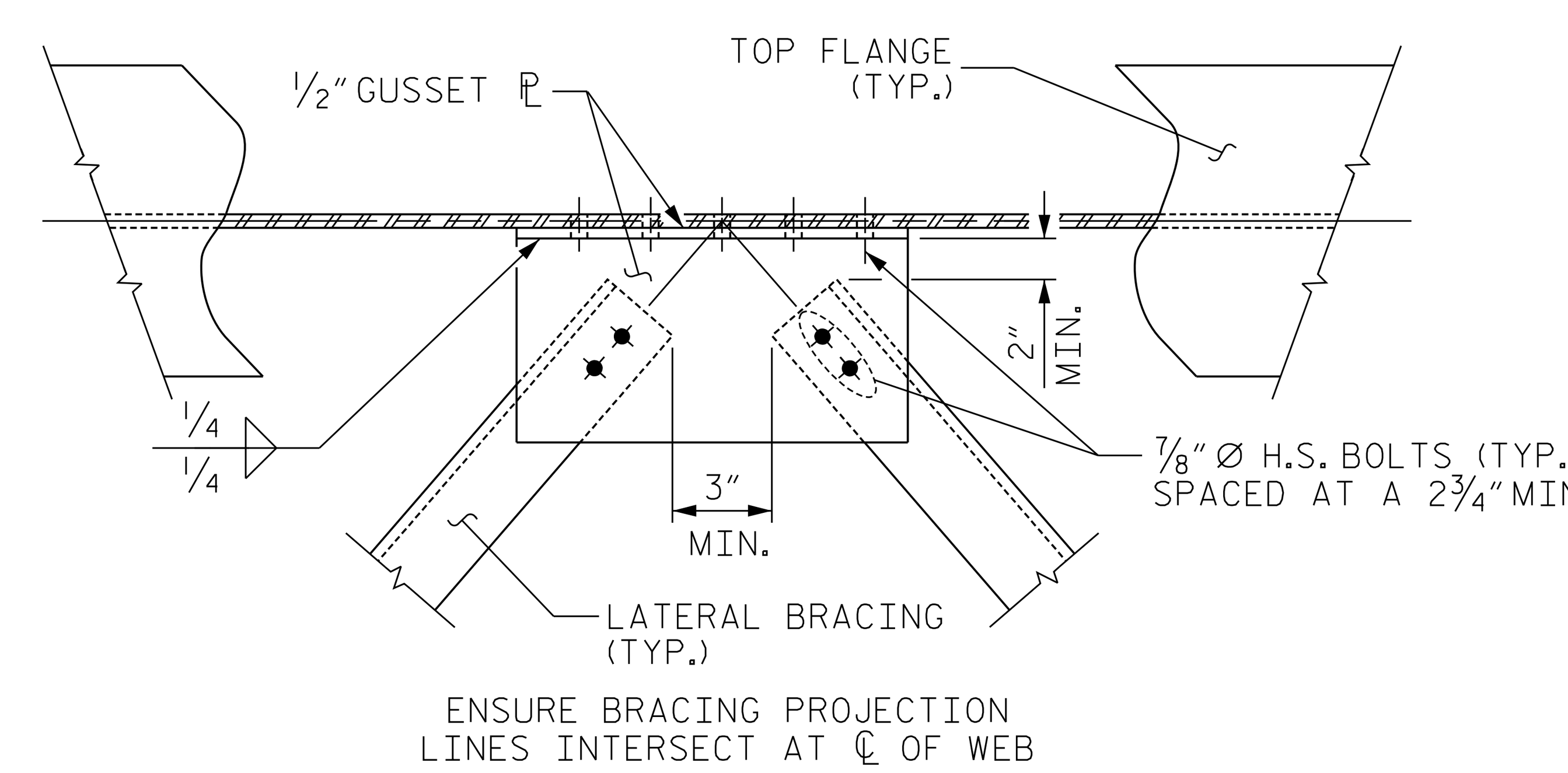
INSTALL THE LATERAL BRACING AFTER ERECTING THE EXTERIOR GIRDER AND THE ADJACENT INTERIOR GIRDER AND INSTALLING THE INTERMEDIATE DIAPHRAGMS.



SECTION THRU CONNECTION



SECTION A-A



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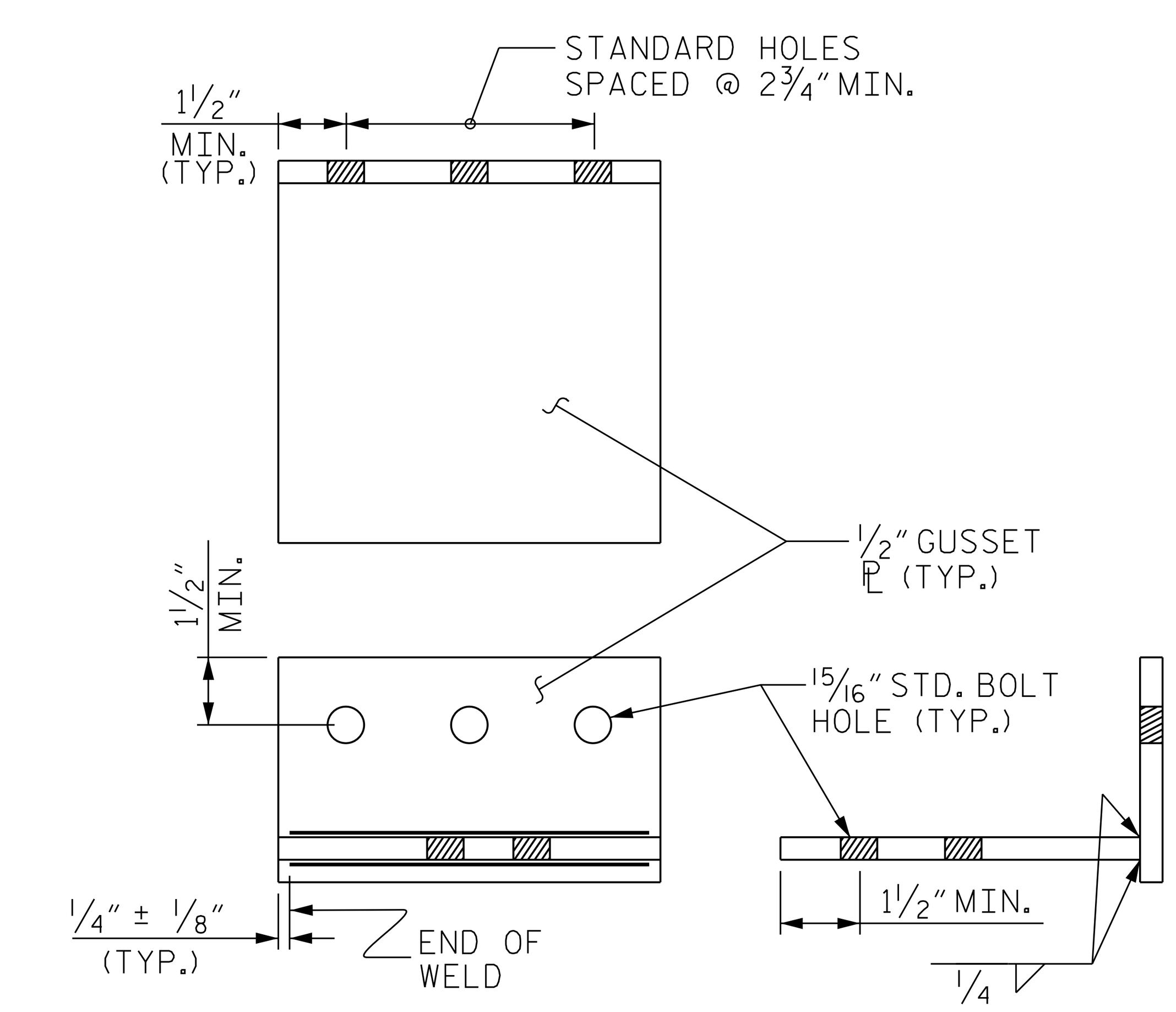
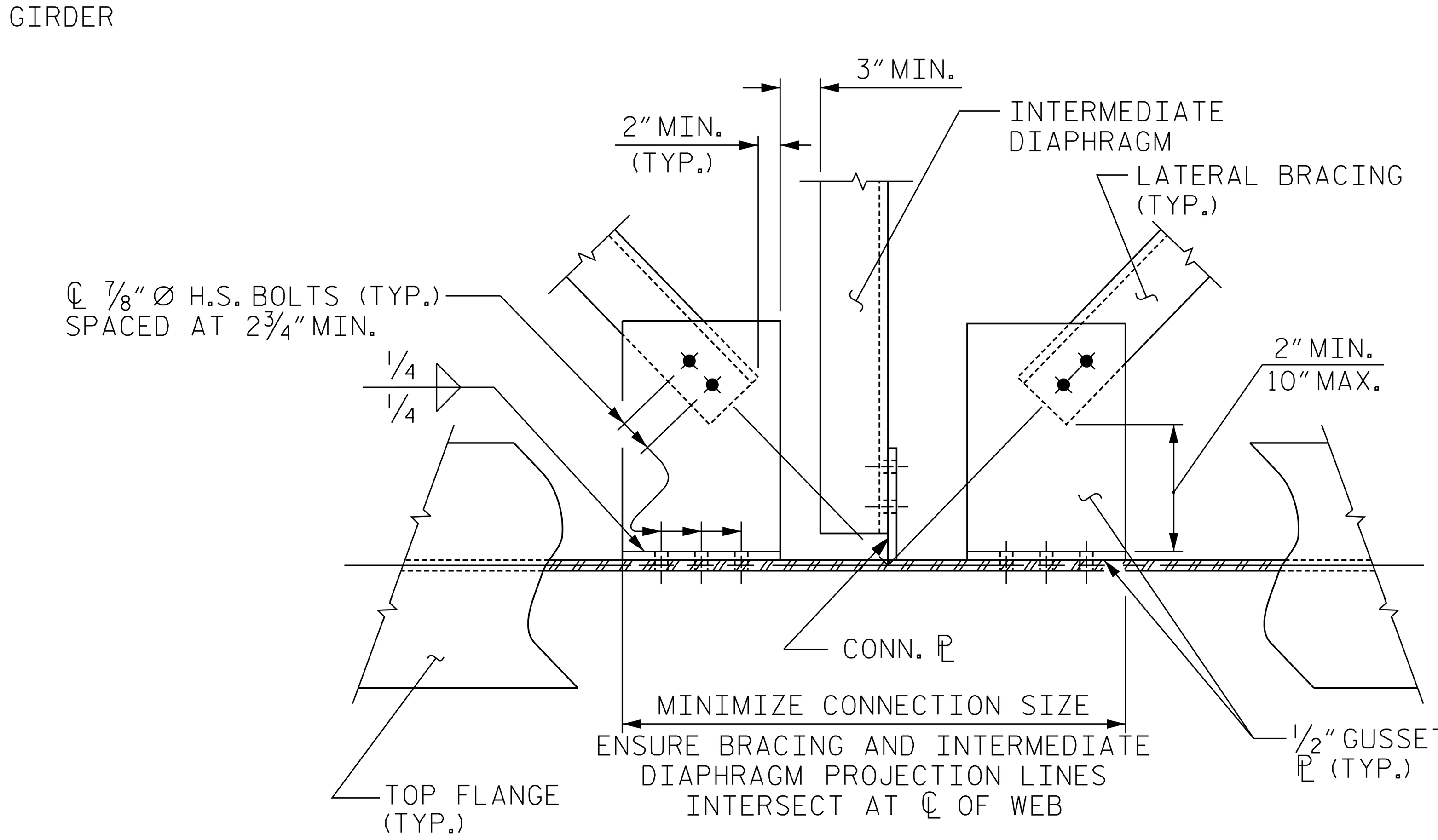


CONNECTION DETAIL



DETAIL "A"

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 5 OF 5

DocuSigned by: Hardy Willis
...23461...
12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

LATERAL BRACING

ASSEMBLED BY: MAF	DATE: 03/18
CHECKED BY : HLW	DATE: 03/18
DRAWN BY : WMC 6/11	REV. 12/17 MAA/THC
CHECKED BY : GM 6/11	

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License No: C-3097

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-15
1			3			TOTAL SHEETS
2			4			40

STD. NO. LB1

GIRDER NO. 1

	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
DEFLECTION DUE TO WEIGHT OF GIRDER (FT.) ↓	0	0.015	0.032	0.049	0.065	0.078	0.090	0.100	0.107	0.111	0.113	0.111	0.107	0.100	0.090	0.078	0.065	0.049	0.032	0.015	0
DEFLECTION DUE TO WEIGHT OF SLAB (FT.) * ↓	0	0.000	0.000	0.007	0.033	0.057	0.077	0.093	0.104	0.112	0.115	0.112	0.104	0.093	0.077	0.057	0.033	0.007	0.000	0.000	0
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL (FT.) ↓	0	0.001	0.001	0.002	0.003	0.003	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.003	0.003	0.002	0.001	0.001	0
TOTAL DEAD LOAD DEFLECTION (FT.) ↓	0	0.016	0.033	0.058	0.101	0.138	0.171	0.197	0.215	0.227	0.233	0.227	0.215	0.197	0.171	0.138	0.101	0.058	0.033	0.016	0
REQUIRED CAMBER (IN.) ↑	0	3/16	3/8	11/16	1 3/16	1 5/8	2 1/16	2 3/8	2 9/16	2 3/4	2 13/16	2 3/4	2 9/16	2 3/8	2 1/16	1 5/8	1 3/16	11/16	3/8	3/16	0

GIRDER NO. 2

	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
DEFLECTION DUE TO WEIGHT OF GIRDER (FT.) ↓	0	0.015	0.034	0.051	0.068	0.082	0.094	0.104	0.112	0.116	0.118	0.116	0.112	0.104	0.094	0.082	0.068	0.051	0.034	0.015	0
DEFLECTION DUE TO WEIGHT OF SLAB (FT.) * ↓	0	0.000	0.004	0.034	0.061	0.085	0.106	0.123	0.135	0.143	0.146	0.143	0.135	0.123	0.106	0.085	0.061	0.034	0.004	0.000	0
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL (FT.) ↓	0	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0
TOTAL DEAD LOAD DEFLECTION (FT.) ↓	0	0.016	0.039	0.087	0.131	0.170	0.203	0.231	0.251	0.263	0.268	0.263	0.251	0.231	0.203	0.170	0.131	0.087	0.039	0.016	0
REQUIRED CAMBER (IN.) ↑	0	3/16	1/2	1 1/16	1 9/16	2 1/16	2 7/16	2 3/4	3	3 1/8	3 3/16	3 1/8	3	2 3/4	2 7/16	2 1/16	1 9/16	1 1/16	1/2	3/16	0

GIRDER NO. 3

	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
DEFLECTION DUE TO WEIGHT OF GIRDER (FT.) ↓	0	0.015	0.034	0.051	0.068	0.082	0.094	0.104	0.112	0.116	0.118	0.116	0.112	0.104	0.094	0.082	0.068	0.051	0.034	0.015	0
DEFLECTION DUE TO WEIGHT OF SLAB (FT.) * ↓	0	0.000	0.030	0.061	0.089	0.114	0.136	0.153	0.166	0.174	0.177	0.174	0.166	0.153	0.136	0.114	0.089	0.061	0.030	0.000	0
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL (FT.) ↓	0	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0
TOTAL DEAD LOAD DEFLECTION (FT.) ↓	0	0.016	0.065	0.114	0.159	0.199	0.233	0.261	0.282	0.294	0.299	0.294	0.282	0.261	0.233	0.199	0.159	0.114	0.065	0.016	0
REQUIRED CAMBER (IN.) ↑	0	3/16	3/4	1 3/8	1 7/8	2 3/8	2 13/16	3 1/8	3 3/8	3 1/2	3 9/16	3 1/2	3 3/8	3 1/8	2 13/16	2 3/8	1 7/8	1 3/8	3/4	3/16	0

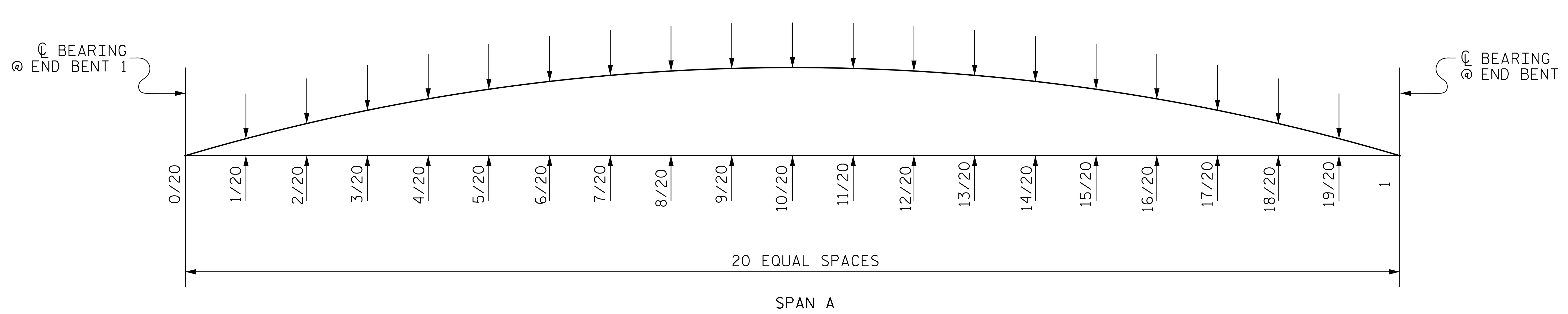
GIRDER NO. 4

	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
DEFLECTION DUE TO WEIGHT OF GIRDER (FT.) ↓	0	0.015	0.034	0.051	0.068	0.082	0.094	0.104	0.112	0.116	0.118	0.116	0.112	0.104	0.094	0.082	0.068	0.051	0.034	0.015	0
DEFLECTION DUE TO WEIGHT OF SLAB (FT.) * ↓	0	0.022	0.056	0.087	0.117	0.143	0.165	0.183	0.196	0.205	0.208	0.205	0.196	0.183	0.165	0.143	0.117	0.087	0.056	0.022	0
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL (FT.) ↓	0	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0
TOTAL DEAD LOAD DEFLECTION (FT.) ↓	0	0.038	0.091	0.140	0.187	0.228	0.262	0.291	0.312	0.325	0.330	0.325	0.312	0.291	0.262	0.228	0.187	0.140	0.091	0.038	0
REQUIRED CAMBER (IN.) ↑	0	7/16	1 1/16	1 11/16	2 1/4	2 3/4	3 1/8	3 1/2	3 3/4	3 7/8	3 15/16	3 7/8	3 3/4	3 1/2	3 1/8	2 3/4	2 1/4	1 11/16	1 1/16	7/16	0

GIRDER NO. 5

	0	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1
DEFLECTION DUE TO WEIGHT OF GIRDER (FT.) ↓	0	0.015	0.032	0.049	0.065	0.078	0.090	0.100	0.107	0.111	0.113	0.111	0.107	0.100	0.090	0.078	0.065	0.049	0.032	0.015	0
DEFLECTION DUE TO WEIGHT OF SLAB (FT.) * ↓	0	0.047	0.081	0.114	0.145	0.172	0.195	0.213	0.227	0.236	0.239	0.236	0.227	0.213	0.195	0.172	0.145	0.114	0.081	0.047	0
DEFLECTION DUE TO WEIGHT OF BARRIER RAIL (FT.) ↓	0	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.003	0.002	0.002	0.001	0.001	0
TOTAL DEAD LOAD DEFLECTION (FT.) ↓	0	0.063	0.114	0.165	0.212	0.253	0.288	0.317	0.338	0.351	0.356	0.351	0.338	0.317	0.288	0.253	0.212	0.165	0.114	0.063	0
REQUIRED CAMBER (IN.) ↑	0	3/4	1 3/8	2	2 9/16	3	3 7/16	3 13/16	4 1/16	4 3/16	4 3/8	4 3/16	4 1/16	3 13/16	3 7/16	3	2 9/16	2	1 3/8	3/4	0

* INCLUDES SLABS, BUILDUPS, AND STAY-IN-PLACE FORMS



SCHEMATIC OF CAMBER ORDINATES

FOR CAMBER VALUES AT EACH GIRDER TWENTIETH POINTS, SEE TABLE ABOVE.

DocuSigned by: Hardy Willis
SEAL 028??? — NORTH CAROLINA PROFESSIONAL ENGINEER — HARDY L. WILLIS
12/13/2023

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PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DEAD LOAD DEFLECTIONS

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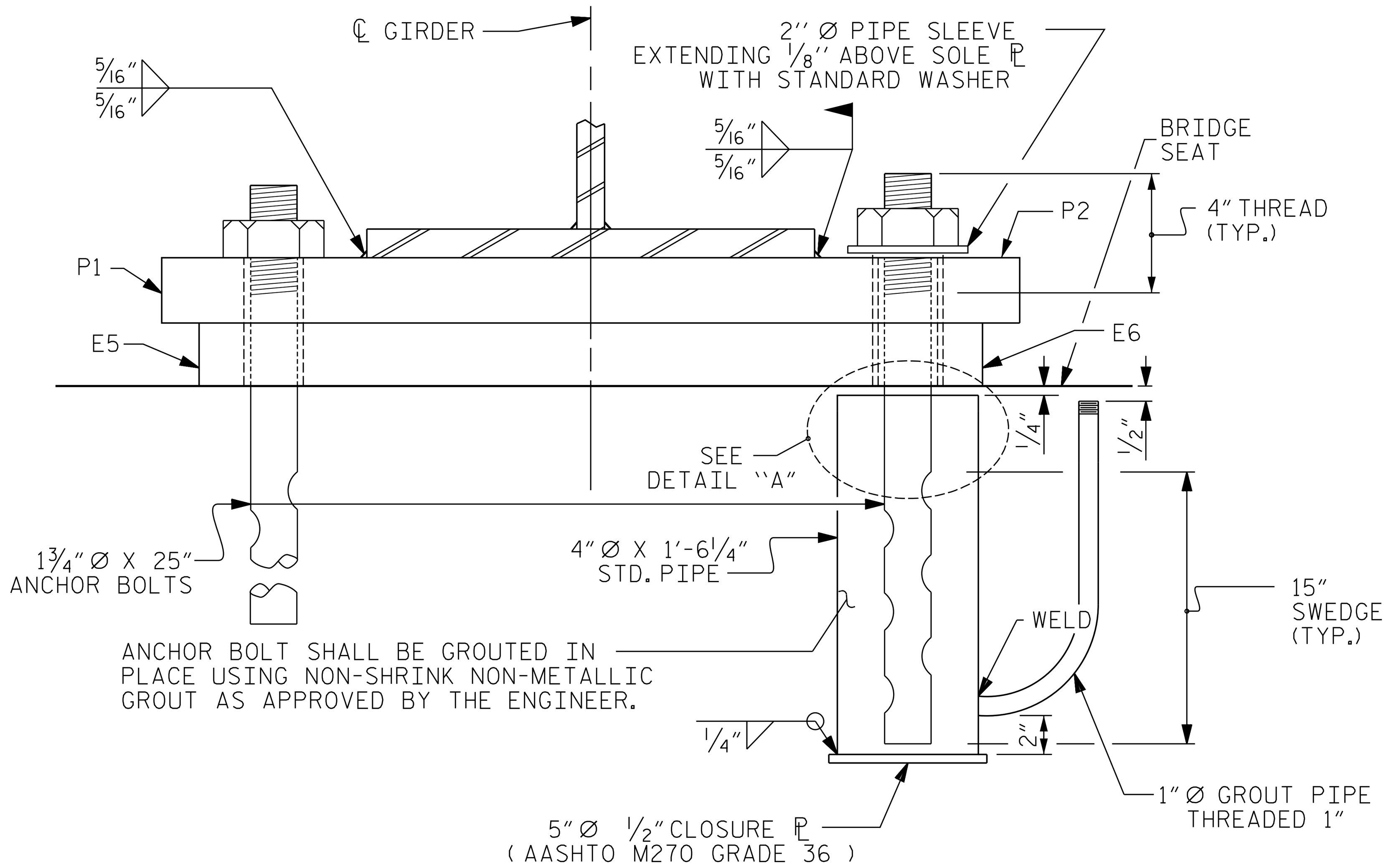
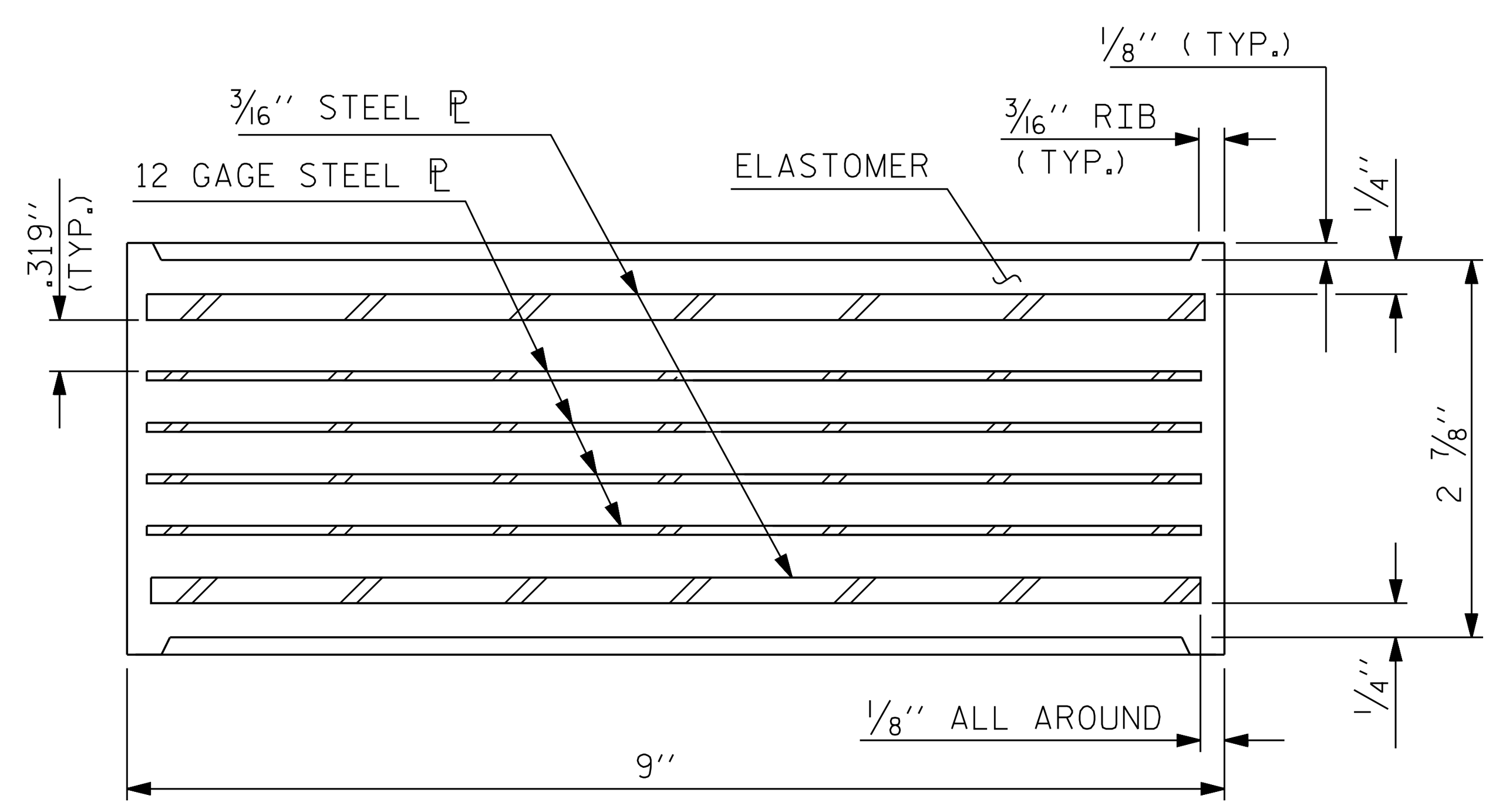
License No: C-3097

DWN. BY: RWW — DATE: 03/18
CHKD. BY: HLW — DATE: 03/18
DES. EGR. OF RECORD: CBC — DATE: 03/18

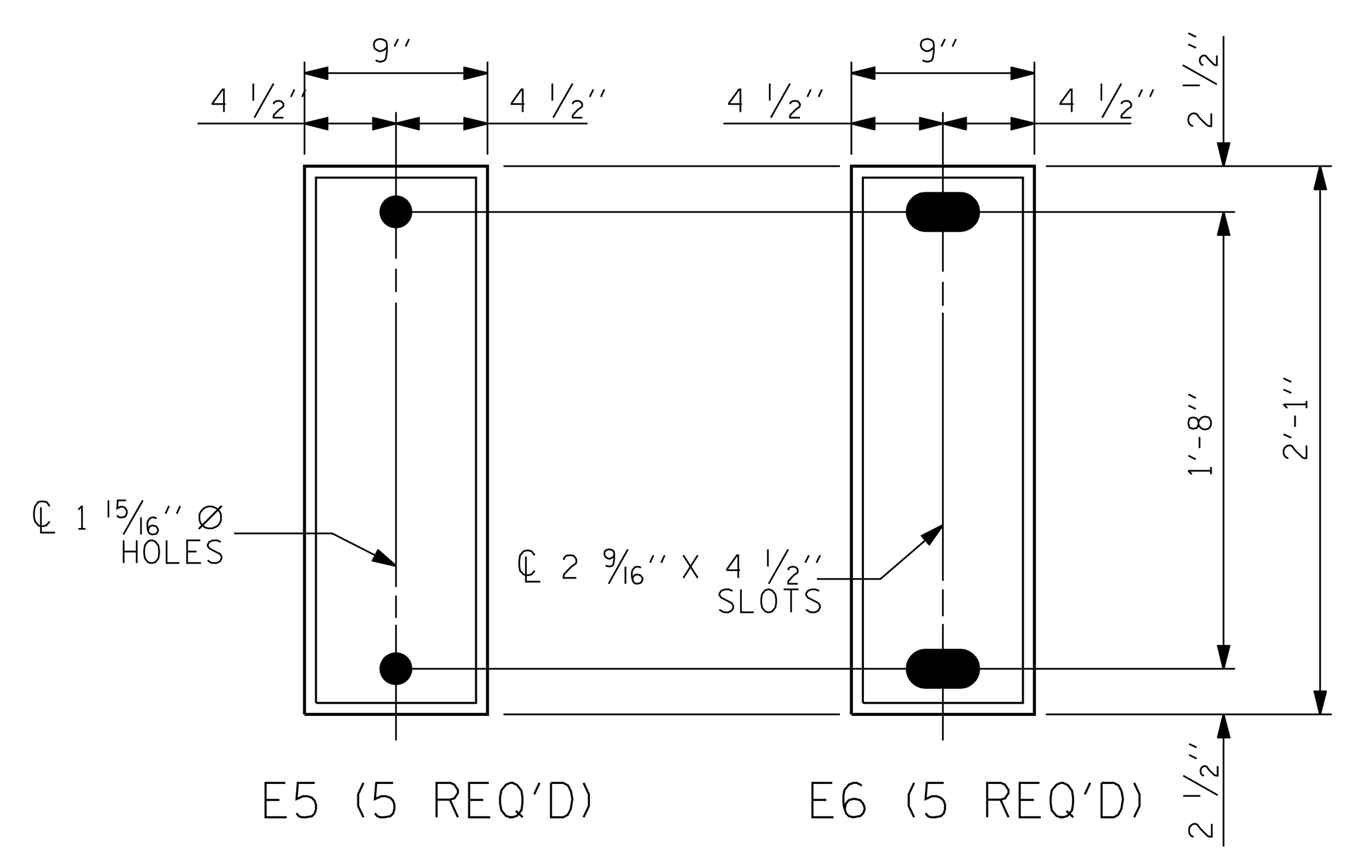
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-16
1			3			TOTAL SHEETS	40
2			4				



END VIEW

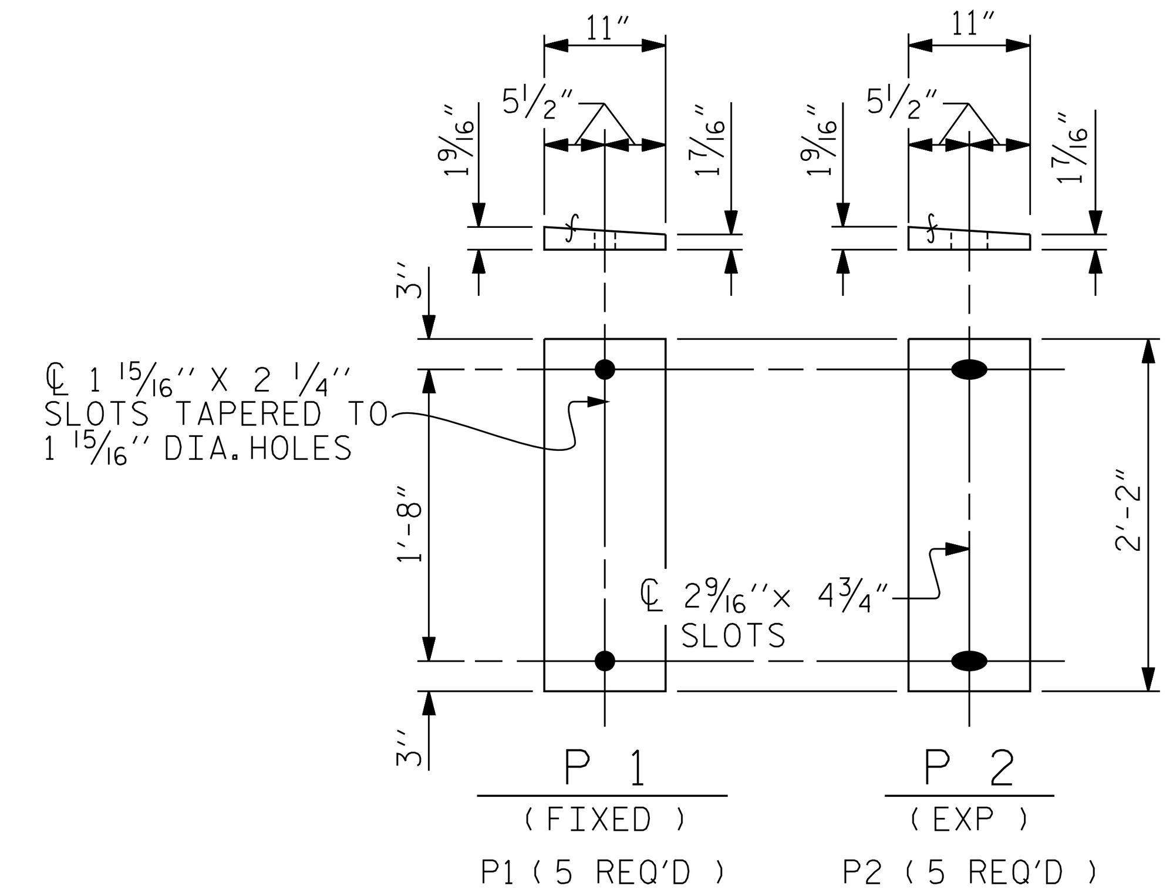


TYPICAL SECTION OF ELASTOMERIC BEARINGS

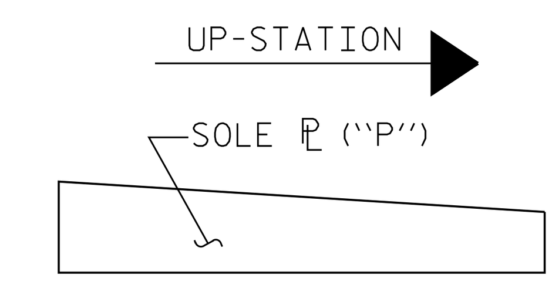


PLAN VIEW OF ELASTOMERIC BEARING

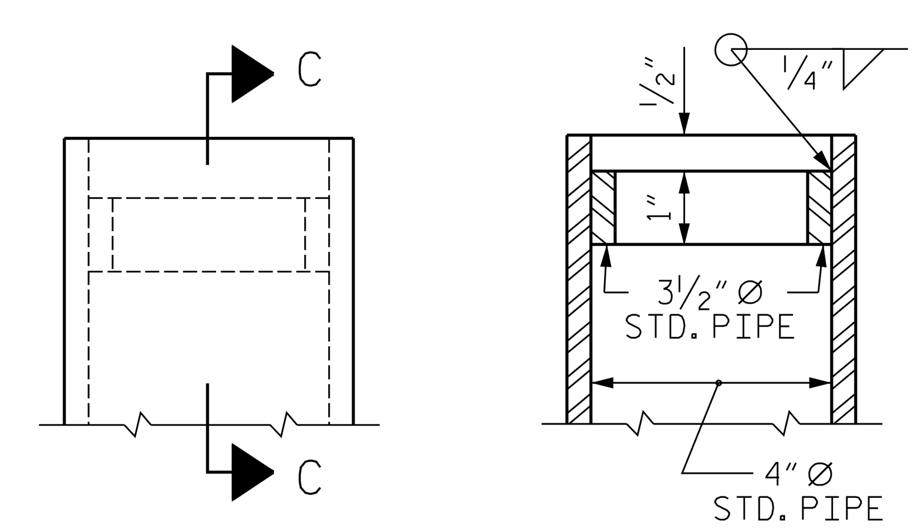
TYPE III



SOLE PLATE DETAILS ("P")



SOLE ℙ PLACEMENT DETAIL



DETAIL "A"

NOTES

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

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

THE PAYMENT FOR THE PIPE SLEEVES SHALL BE INCLUDED IN THE SEVERAL PAY ITEMS.

FOR PAINTED STRUCTURAL STEEL (EXCLUDING AASHTO M270 GRADE 50W), SOLE PLATES, ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

FOR AASHTO M270 GRADE 50W STRUCTURAL STEEL, SOLE PLATE SHALL BE AASHTO M270 GRADE 50W AND SHALL NOT BE GALVANIZED. ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

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 BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

WHEN FIELD WELDING THE SOLE PLATE TO THE GIRDER FLANGE, 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.

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.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FOLLOWING PROCEDURE, WHICH MAY BE REQUIRED BY THE ENGINEER, TO RESET ELASTOMERIC BEARINGS DUE TO GIRDER TRANSLATION AND END ROTATION:

1. ONCE THE DECK HAS CURED, THE GIRDERS SHALL BE JACKED THEN THE ANCHOR BOLTS AND ELASTOMERIC BEARING SLOTS CENTERED AS NEARLY AS PRACTICAL ABOUT THE BEARING STIFFENER. THIS OPERATION SHALL BE PERFORMED AT APPROXIMATELY 60°F.

THE CONTRACTOR MAY PROPOSE ALTERNATE METHODS, PROVIDED DETAILS ARE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE III	255 K

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

DocuSigned by: Hardy Willis

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL HARDY L. WILLIS

C28AFCD223461...

12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

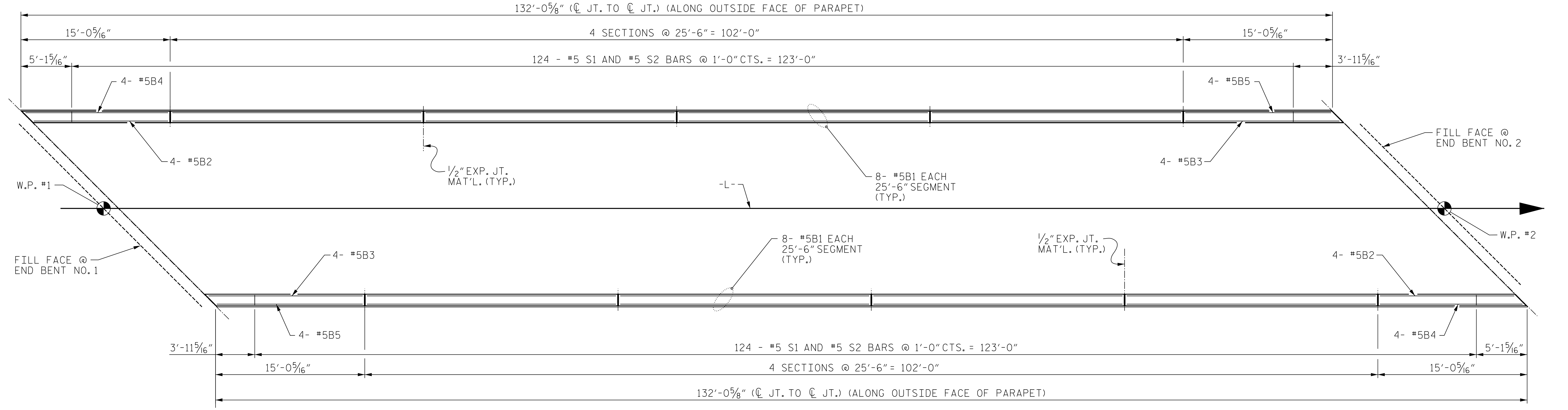
ELASTOMERIC BEARING DETAILS

STEEL SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-17
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY : MAF	DATE : 03/18	
CHECKED BY : HLW	DATE : 03/18	
DRAWN BY : EEM 2/97	REV. 10/1/11	MAA/GM
CHECKED BY : VAP 2/97	REV. 6/13	AAC/MAA
	REV. 04/23	MAA/THC

STD. NO. EB1



PLAN OF CONCRETE PARAPET

TEMPORARY GUARDRAIL POST SPACING

(FOR POST LOCATIONS ON APPROACH SLABS, SEE APPROACH SLAB SHEETS)

TEMPORARY GUARDRAIL NOTES

THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½".

B. 4 - 1"Ø X 2¼" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1"Ø X 2¼" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE TEMPORARY GUARDRAIL ANCHOR ASSEMBLY DETAIL ARE THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI.

TEMPORARY GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO ENSURE FIT.

THE COST OF THE TEMPORARY GUARDRAIL AND ANCHOR ASSEMBLY, COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR REINFORCED CONCRETE DECK SLAB AND LUMP SUM PRICE BID FOR APPROACH SLABS.

FERRULES SHALL BE PLUGGED DURING POURING OF STAGE I BRIDGE DECK AND APPROACH SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

TEMOPORARY GUARDRAIL ASSEMBLY ANCHORS ARE SPACED TO CLEAR GIRDER SHEAR STUDS.

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER HARDY L. WILLIS
DocuSigned by: Hardy Willis
AC287ECF6223461...
12/13/2023

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PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE PARAPET AND TEMPORARY GUARDRAIL DETAILS

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S2-18
1			3				TOTAL SHEETS
2			4				40

JMT
Johnson, Mirmiran, & Thompson Inc.
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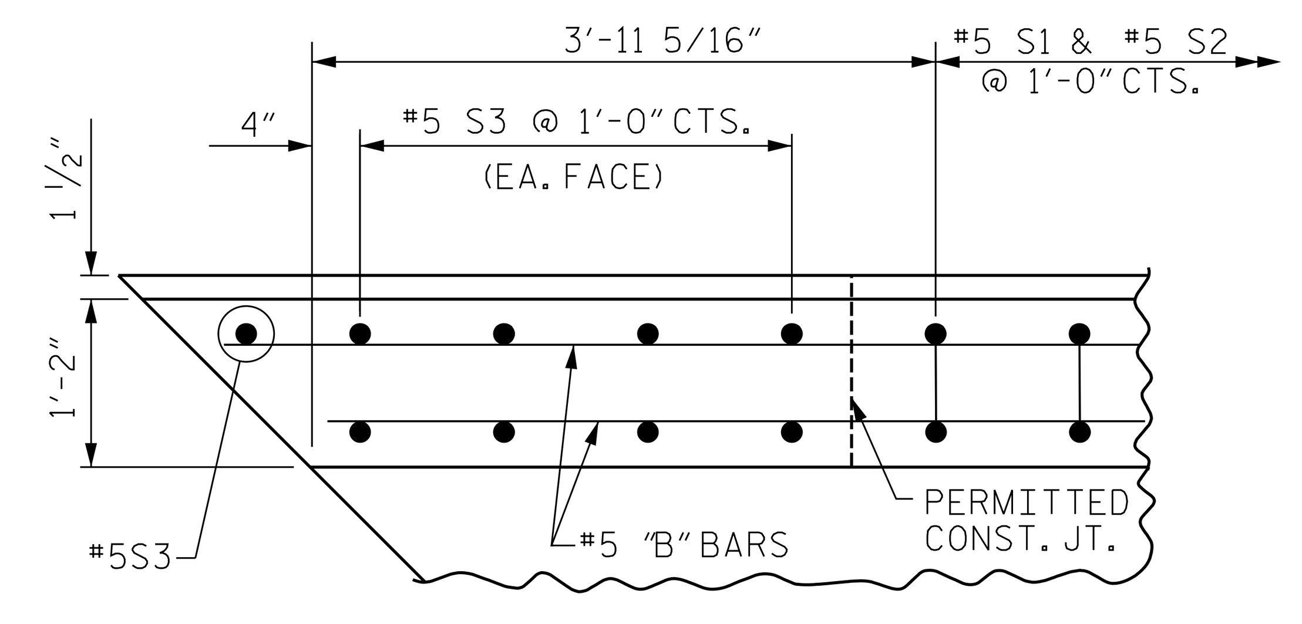
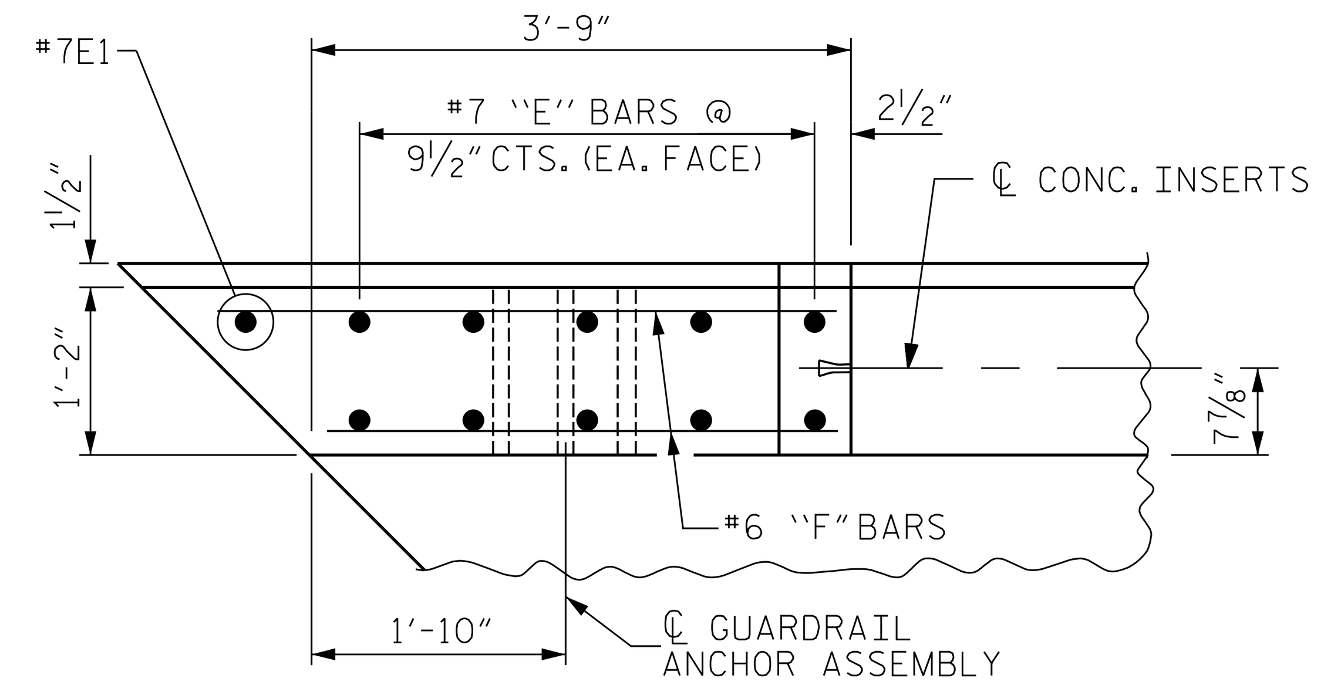
Asheville, NC, 28806
License No: C-3097

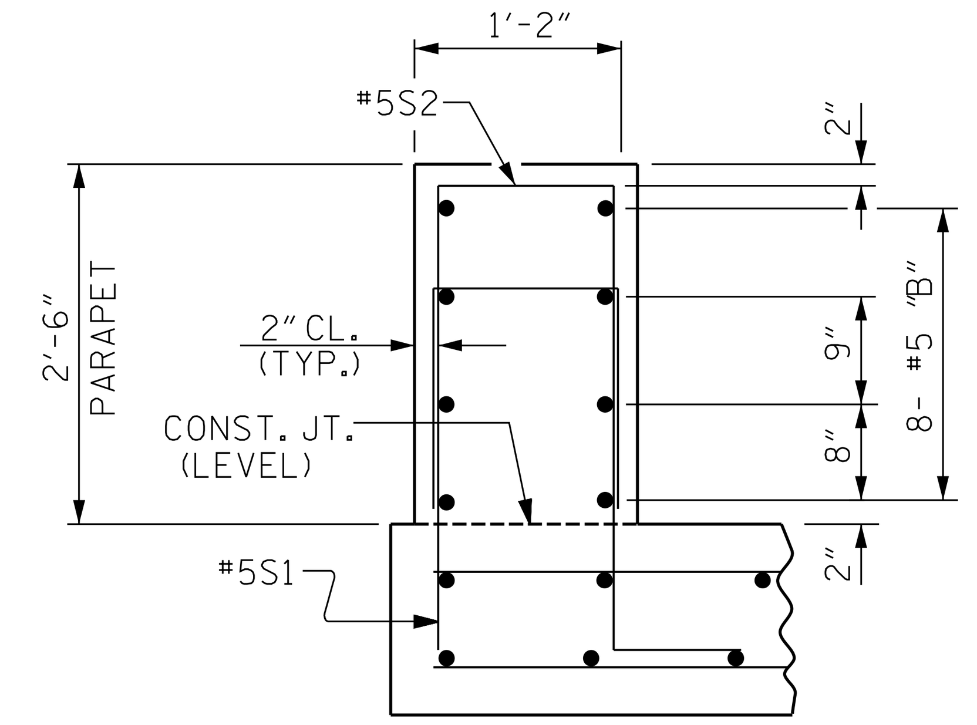
DRAWN BY : MAF	DATE: 03/18
CHECKED BY : HLW	DATE: 03/18



PLAN OF PARAPET

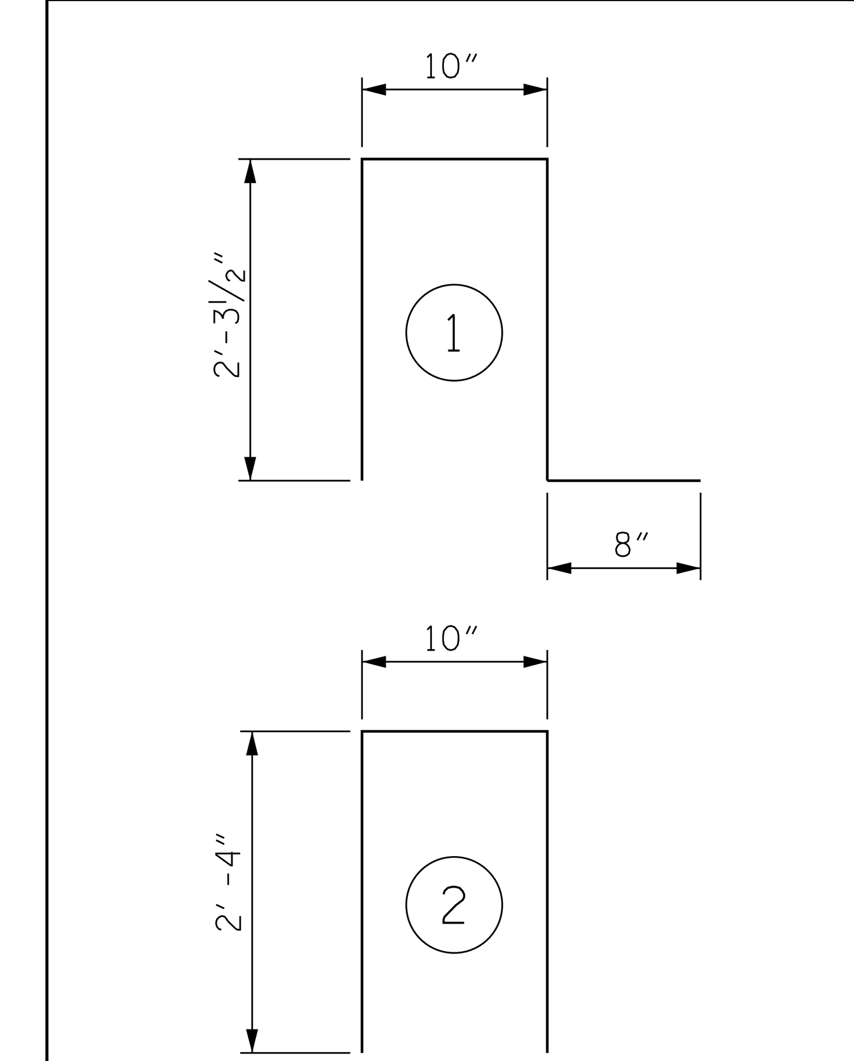


PLAN OF END POST



SECTION THRU PARAPET

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

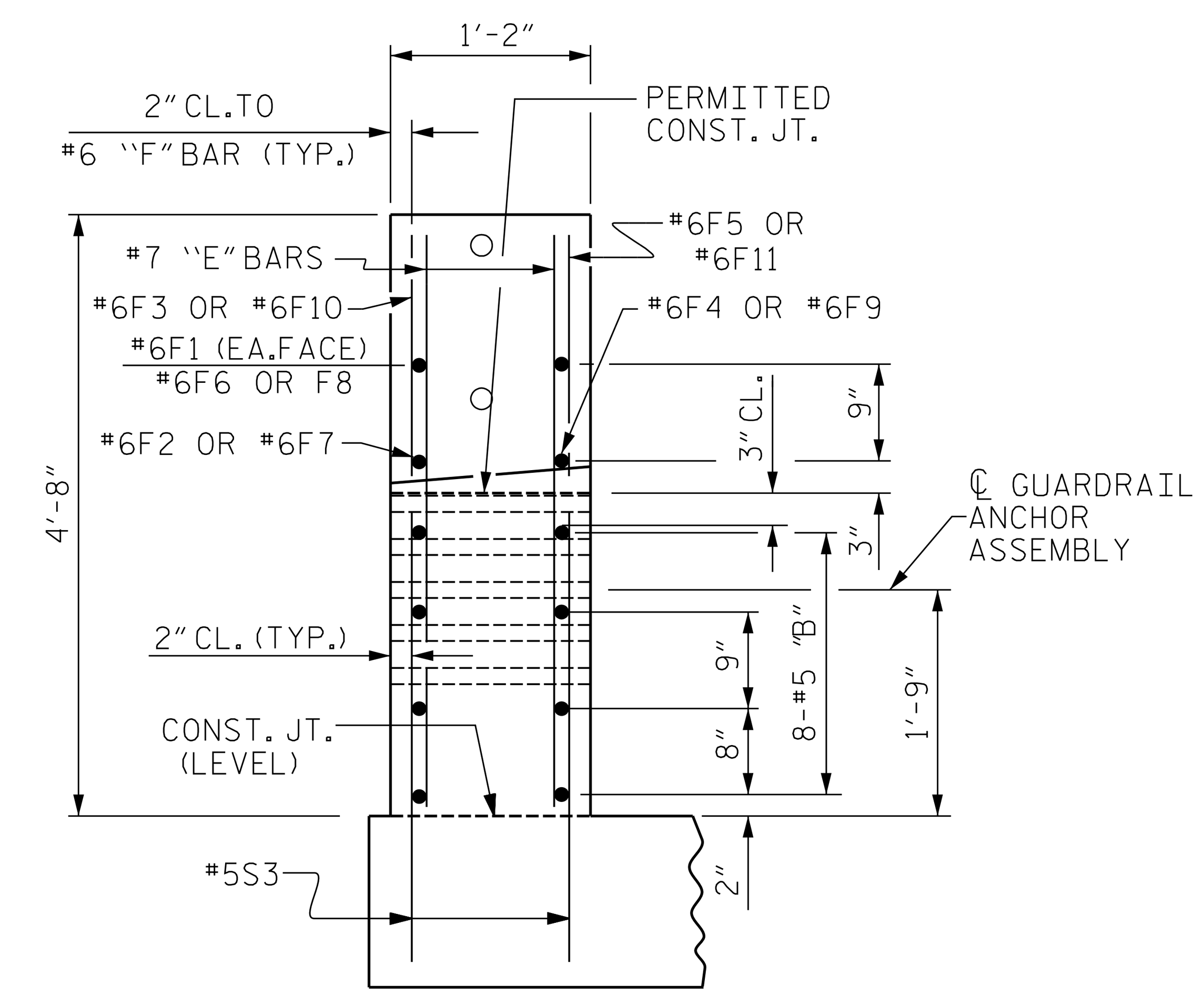
BILL OF MATERIAL

FOR 2 PARAPETS AND 4 END POSTS

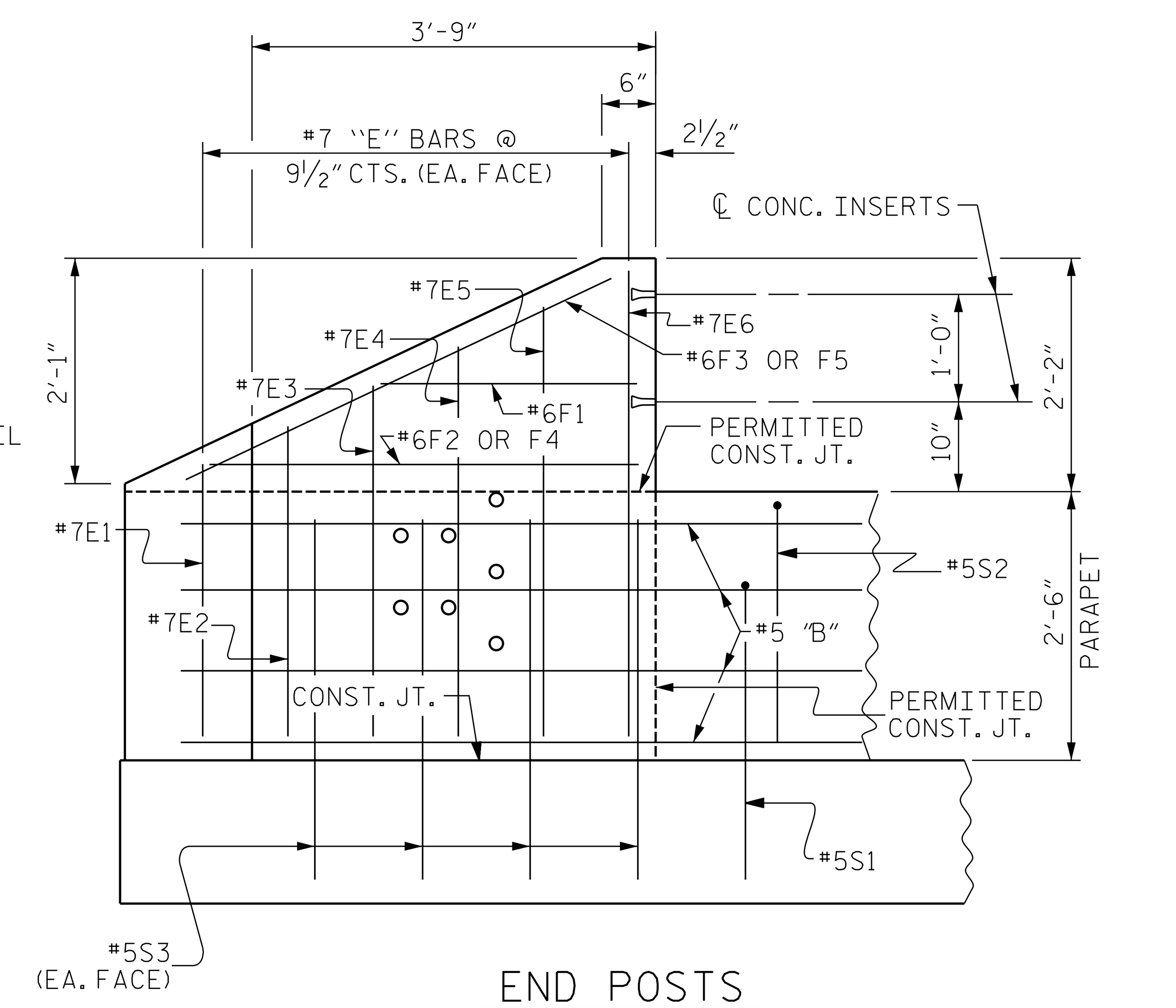
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
∗ B1	64	#5	STR	25'-1"	1674
∗ B2	8	#5	STR	13'-6"	113
∗ B3	8	#5	STR	15'-6"	129
∗ B4	8	#5	STR	14'-4"	120
∗ B5	8	#5	STR	14'-8"	122
∗ E1	3	#7	STR	2'-7"	16
∗ E2	6	#7	STR	2'-11"	36
∗ E3	6	#7	STR	3'-4"	41
∗ E4	6	#7	STR	3'-8"	45
∗ E5	6	#7	STR	4'-0"	49
∗ E6	6	#7	STR	4'-4"	53
∗ E7	1	#7	STR	3'-3"	7
∗ E8	2	#7	STR	3'-6"	14
∗ E9	2	#7	STR	3'-8"	15
∗ E10	2	#7	STR	3'-11"	16
∗ E11	2	#7	STR	4'-2"	17
∗ E12	2	#7	STR	4'-4"	18
∗ F1	6	#6	STR	2'-5"	22
∗ F2	3	#6	STR	3'-5"	15
∗ F3	3	#6	STR	3'-8"	17
∗ F4	3	#6	STR	4'-0"	18
∗ F5	3	#6	STR	4'-11"	22
∗ F6	1	#6	STR	3'-5"	5
∗ F7	1	#6	STR	3'-5"	5
∗ F8	1	#6	STR	3'-10"	6
∗ F9	1	#6	STR	4'-7"	7
∗ F10	1	#6	STR	3'-3"	5
∗ F11	1	#6	STR	4'-9"	7
∗ S1	248	#5	1	6'-1"	1573
∗ S2	248	#5	2	5'-6"	1423
∗ S3	36	#5	STR	3'-4"	125

∗∗	∗ EPOXY COATED REINFORCING STEEL	5,285	LBS.
∗∗	CLASS AA CONCRETE	29.6	CU. YDS.
∗∗	1'-2" x 2'-6" CONCRETE PARAPET	264.10	LIN. FT.

∗∗ CONCRETE PARAPET ON APPROACH SLAB IS NOT INCLUDED. SEE BRIDGE APPPROACH SLAB SHEETS.

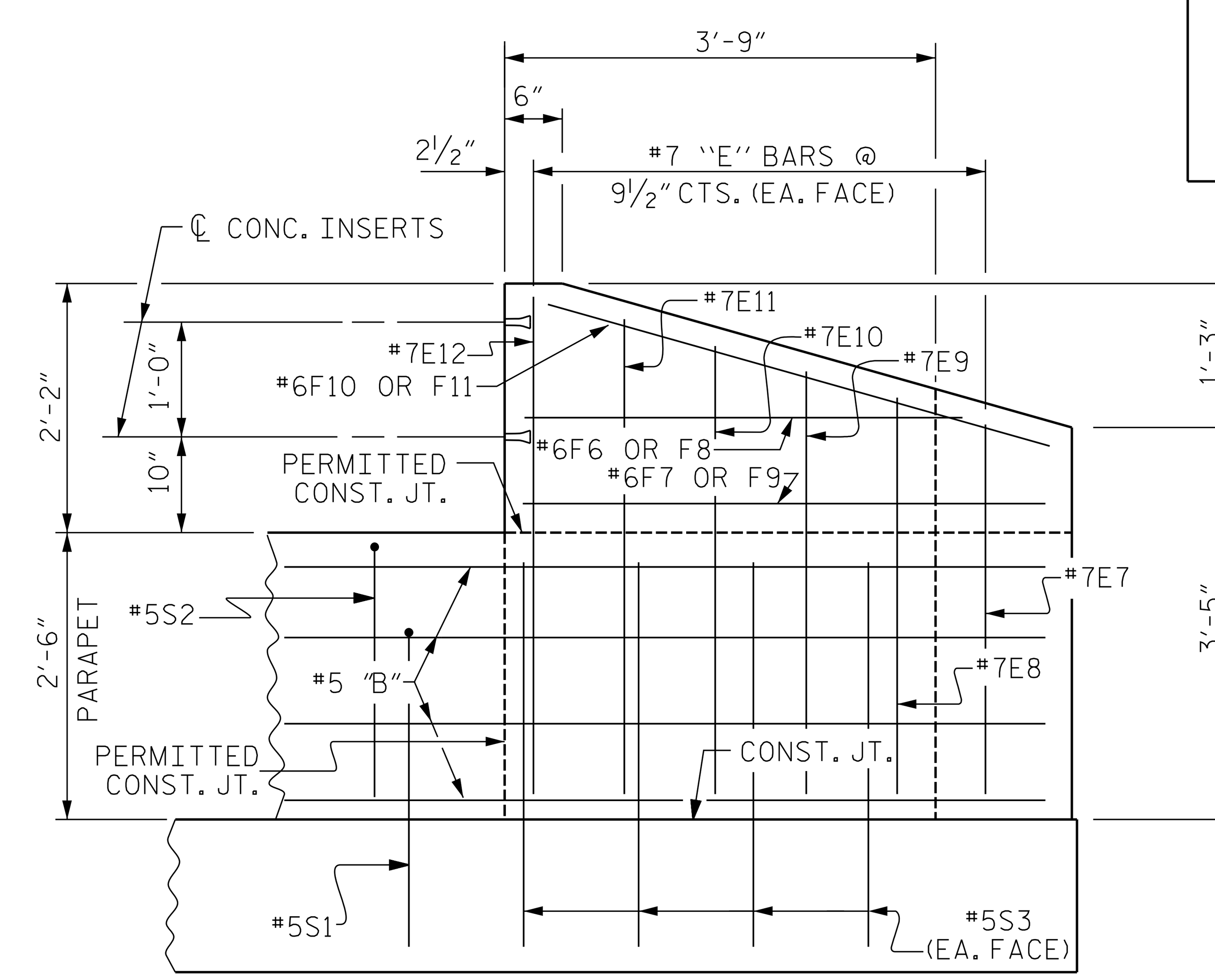


END VIEW



END POSTS

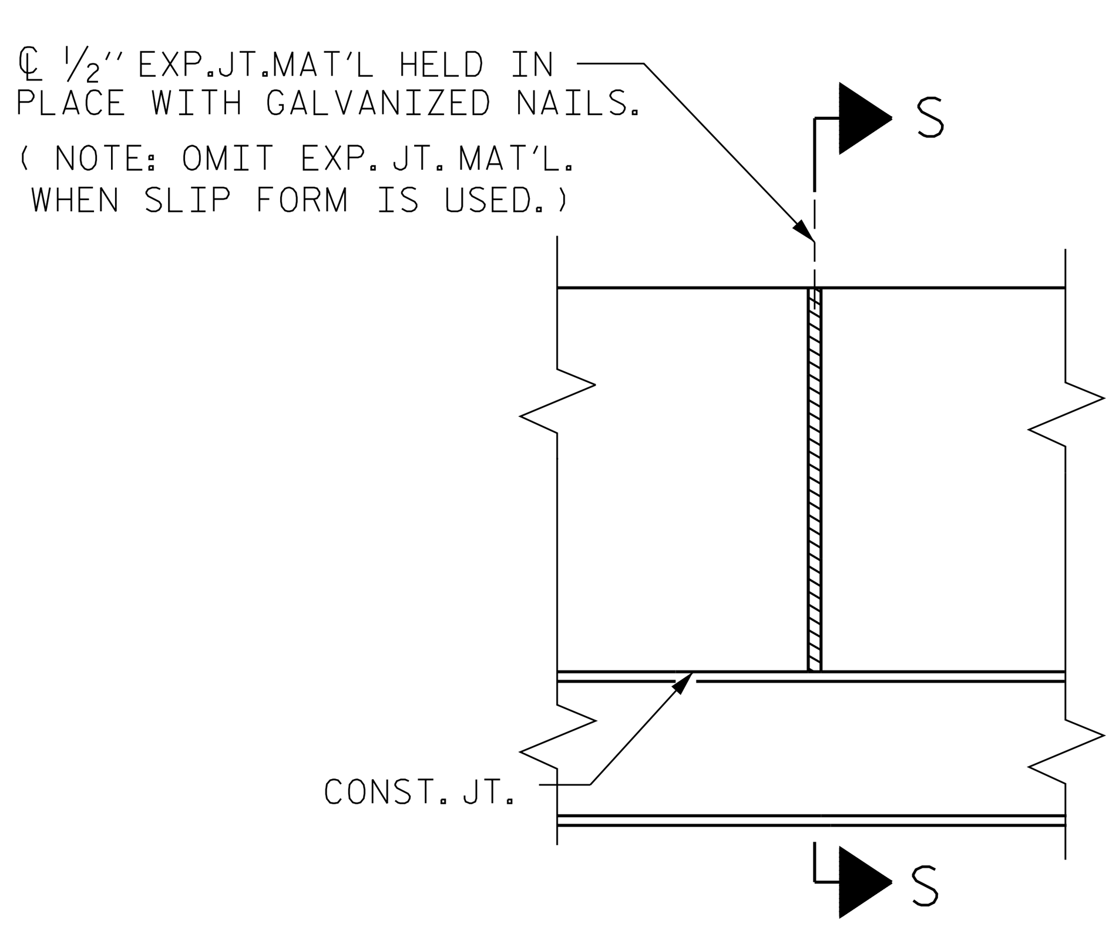
(3 RED'Q)



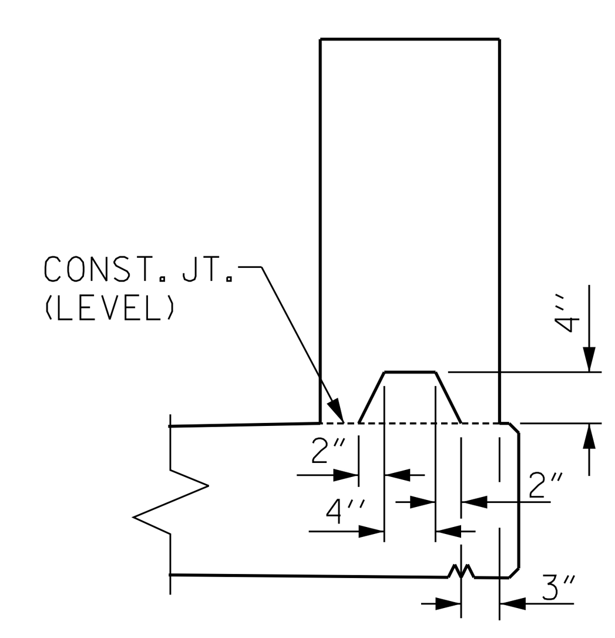
END POST @ END BENT #2, LEFT

(1 RED'Q)

PARAPET AND END POST FOR TWO BAR RAIL



ELEVATION AT EXPANSION JOINTS



SECTION S-S

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

CONCRETE PARAPET DETAILS

NOTES

ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

FOR DETAIL OF CONCRETE INSERT AND GUARDRAIL ANCHOR ASSEMBLY, SEE "RAIL POST SPACINGS AND END OF RAIL DETAIL" SHEET.

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

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

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

DocuSigned by: Hardy Willis
NORTH CAROLINA PROFESSIONAL ENGINEER — HARDY L. WILLIS
12/13/2023

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PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE PARAPET AND END POST DETAILS

2 BAR METAL RAIL

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-19
1			3			TOTAL SHEETS	40
2			4				

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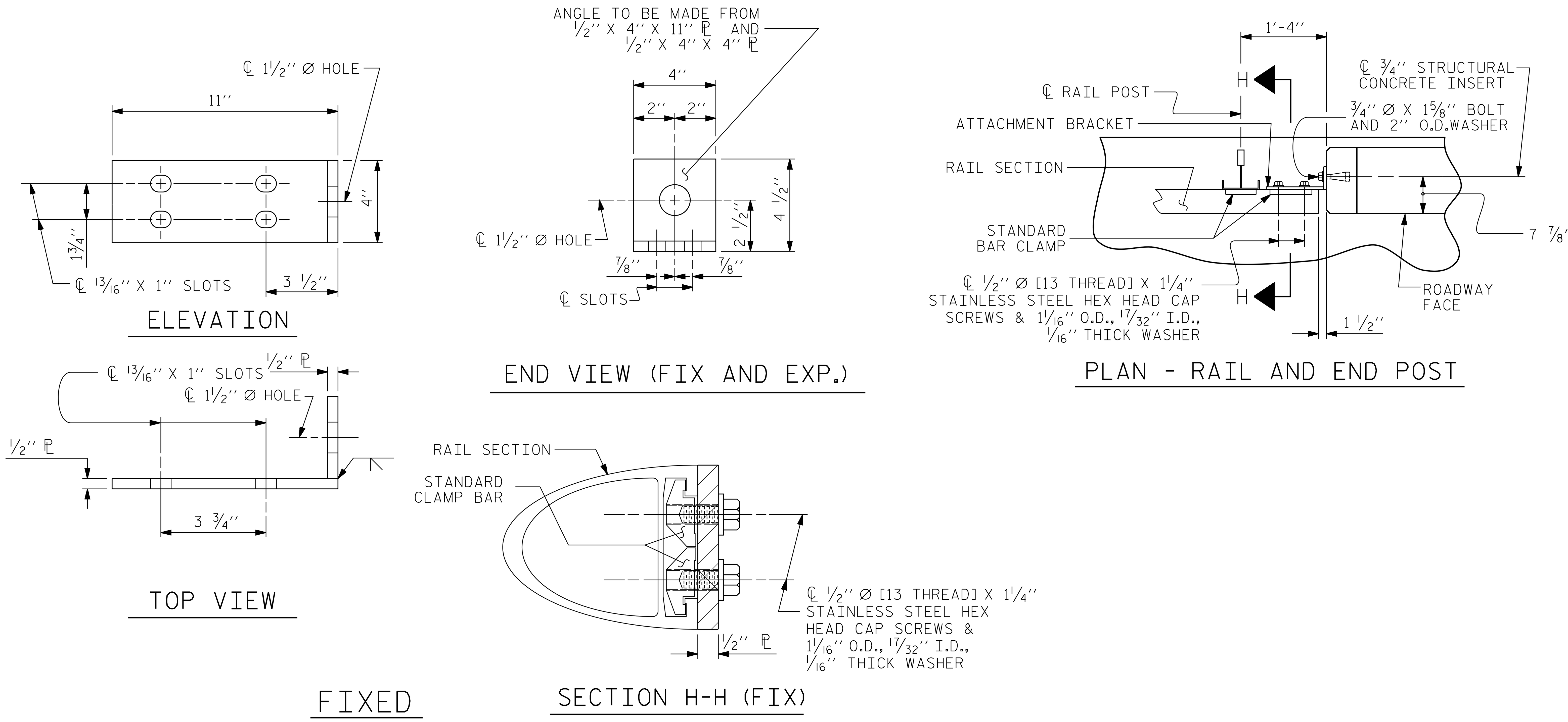
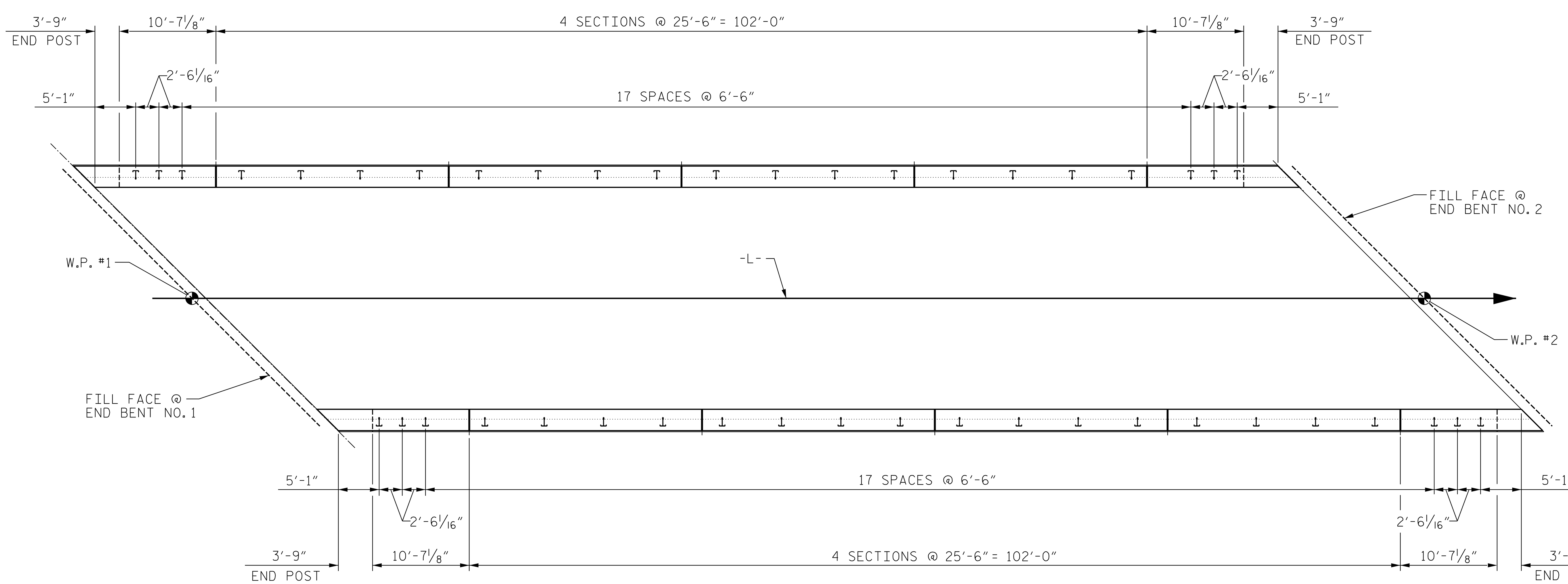
DRAWN BY : MAF DATE: 03/18
CHECKED BY : HLW DATE: 03/18



DETAILS FOR ATTACHING METAL RAIL TO END POST



PLAN OF RAIL POST SPACINGS

NOTES

STRUCTURAL CONCRETE INSERT

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1 1/2″.

B. 1 - 3/4″ Ø X 1 5/8″ BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE 3/4″ Ø X 1 5/8″ GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

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

NOTES

METAL RAIL TO END POST CONNECTION

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

A. 1/2″ PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. 3/4″ STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4″Ø X 1 5/8″ BOLT WITH 2″ O.D. WASHER IN PLACE. THE 3/4″Ø X 1 5/8″ BOLT SHALL HAVE N. C. THREADS.

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

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

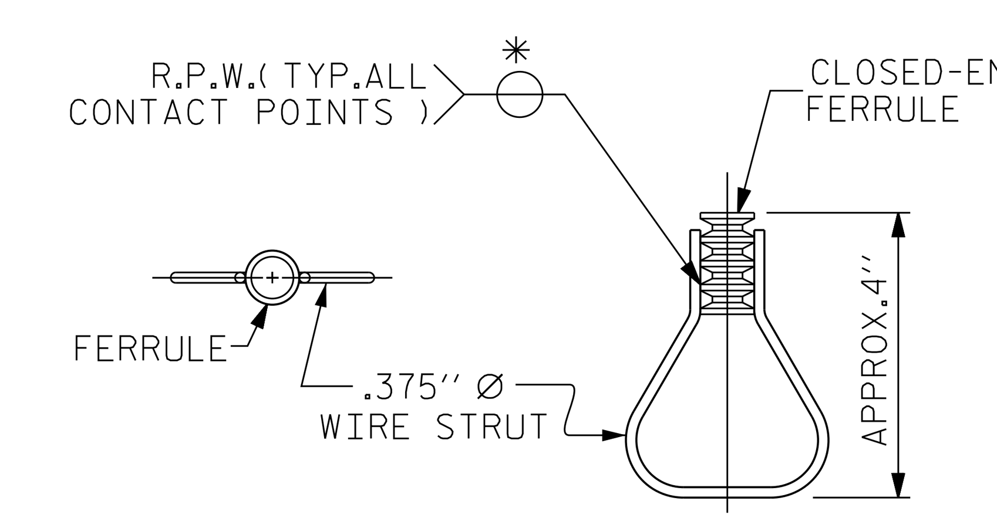
E. 1/2″ Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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

THE 3/4″ STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE 3/4″ STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2″ PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE 3/4″ Ø X 1 5/8″ BOLT WITH WASHER SHALL BE REPLACED WITH A 3/4″Ø X 6 1/2″ BOLT AND 2″ O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE 3/4″ Ø X 1 5/8″ BOLT SHALL APPLY TO THE 3/4″Ø X 6 1/2″ BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



STRUCTURAL CONCRETE INSERT

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

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS

FOR ONE OR TWO BAR METAL RAILS

DocuSigned by: Hardy L. Willis 12/13/2023

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ASSEMBLED BY : MAF	DATE : 03/18
CHECKED BY : HLW	DATE : 03/18

DRAWN BY : FCJ 1/88	REV. 5/1/06 TLA/GM
CHECKED BY : CRK 3/89	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

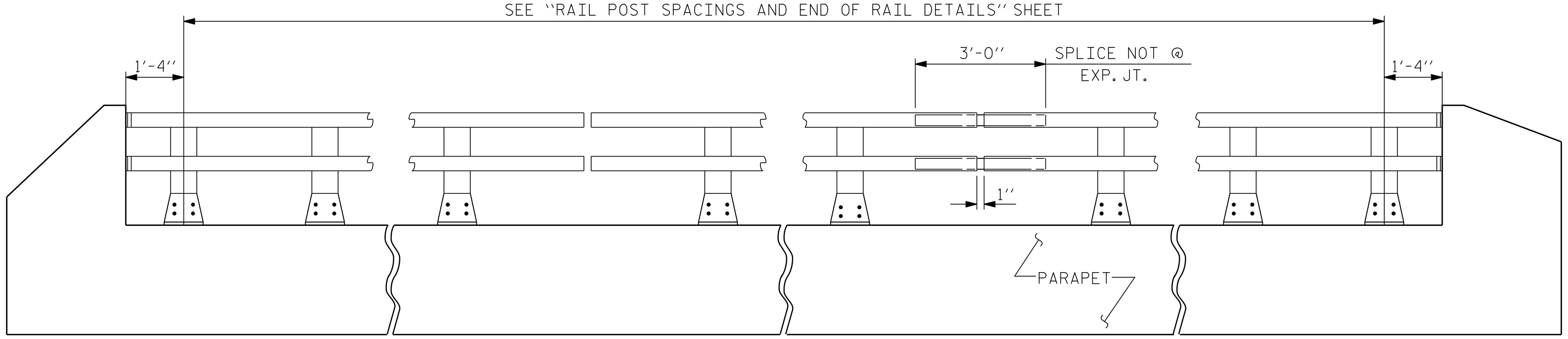
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

REVISIONS

SHEET NO. S2-20

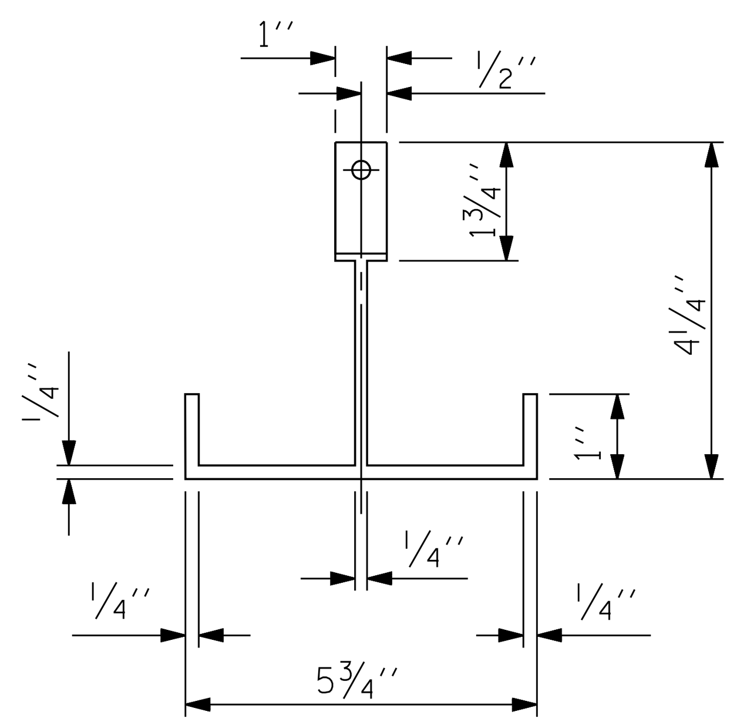
TOTAL SHEETS 40

STD. NO. BMR2

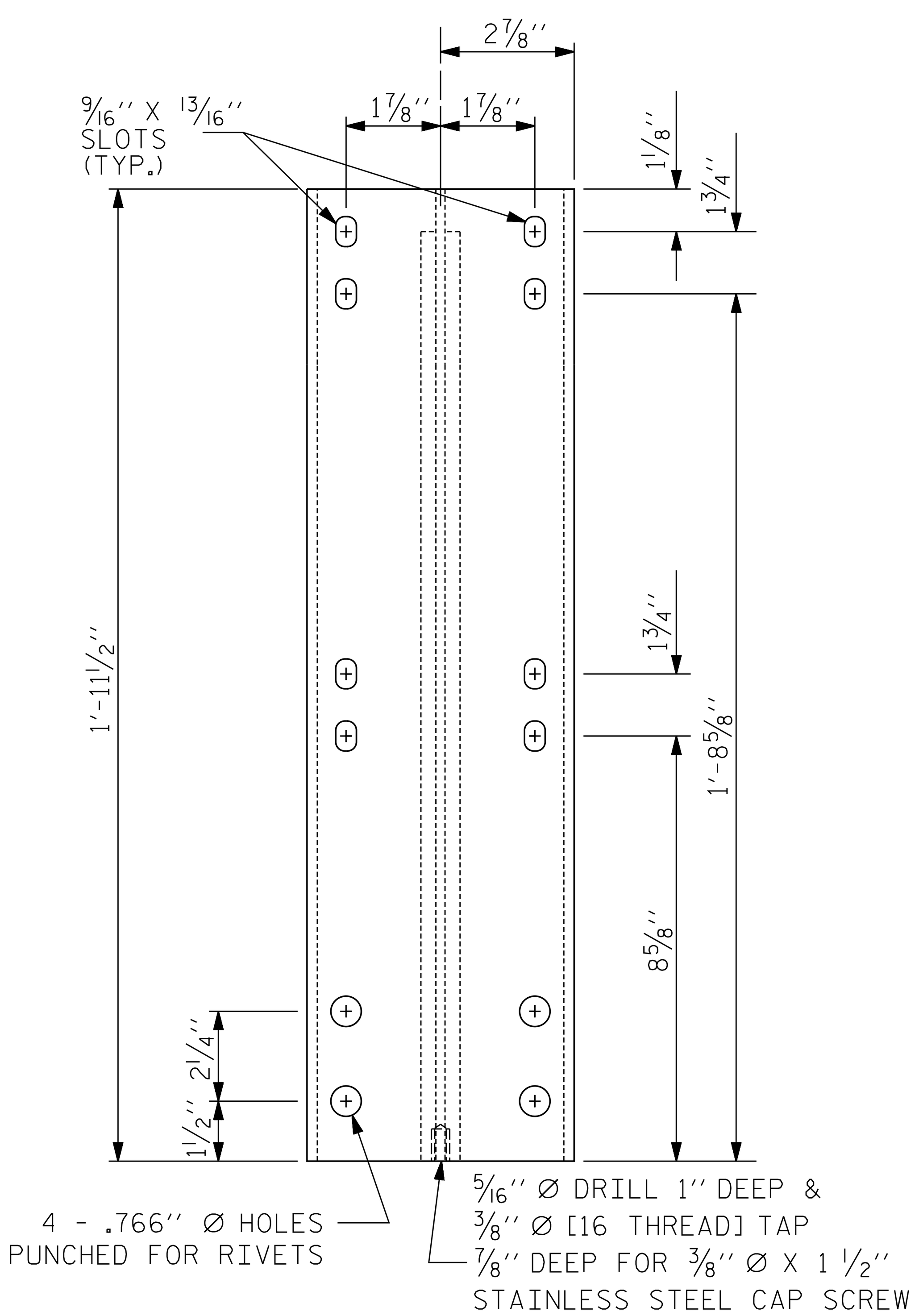


ELEVATION

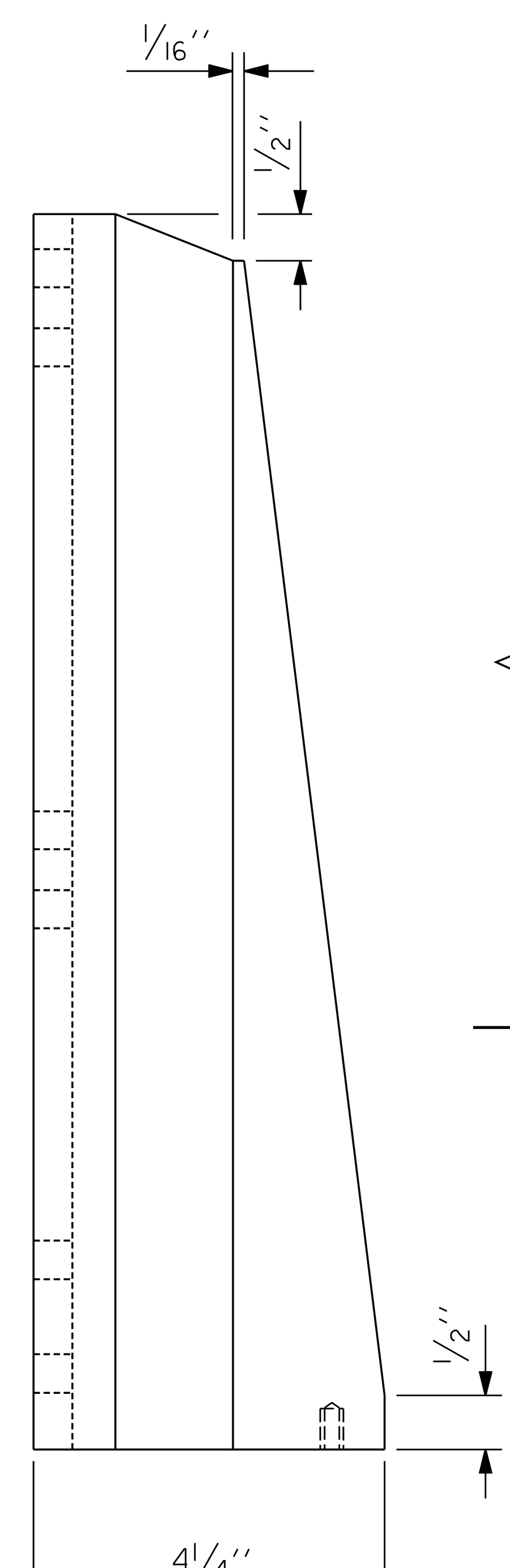
NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR2.



PLAN

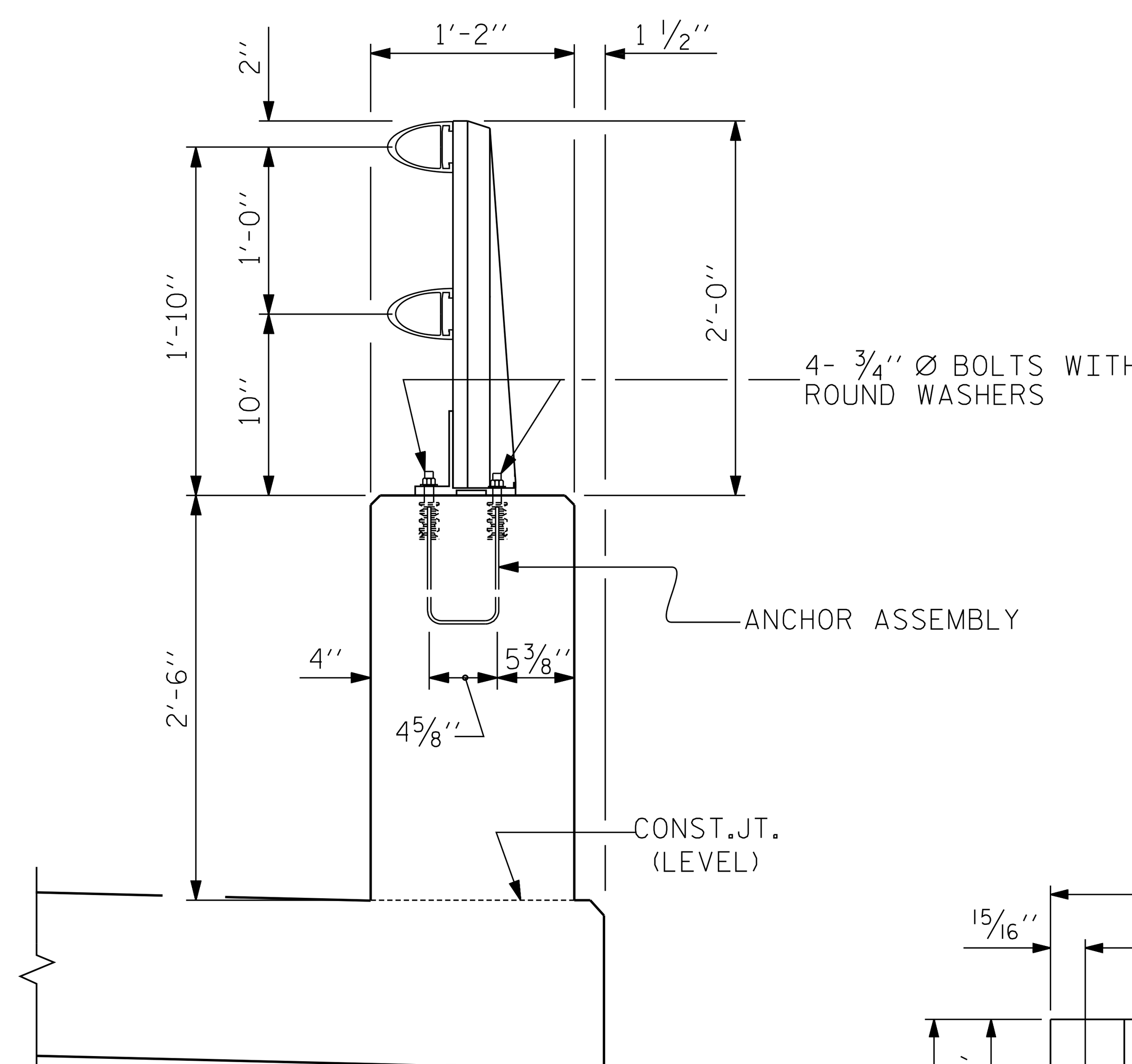


FRONT ELEVATION

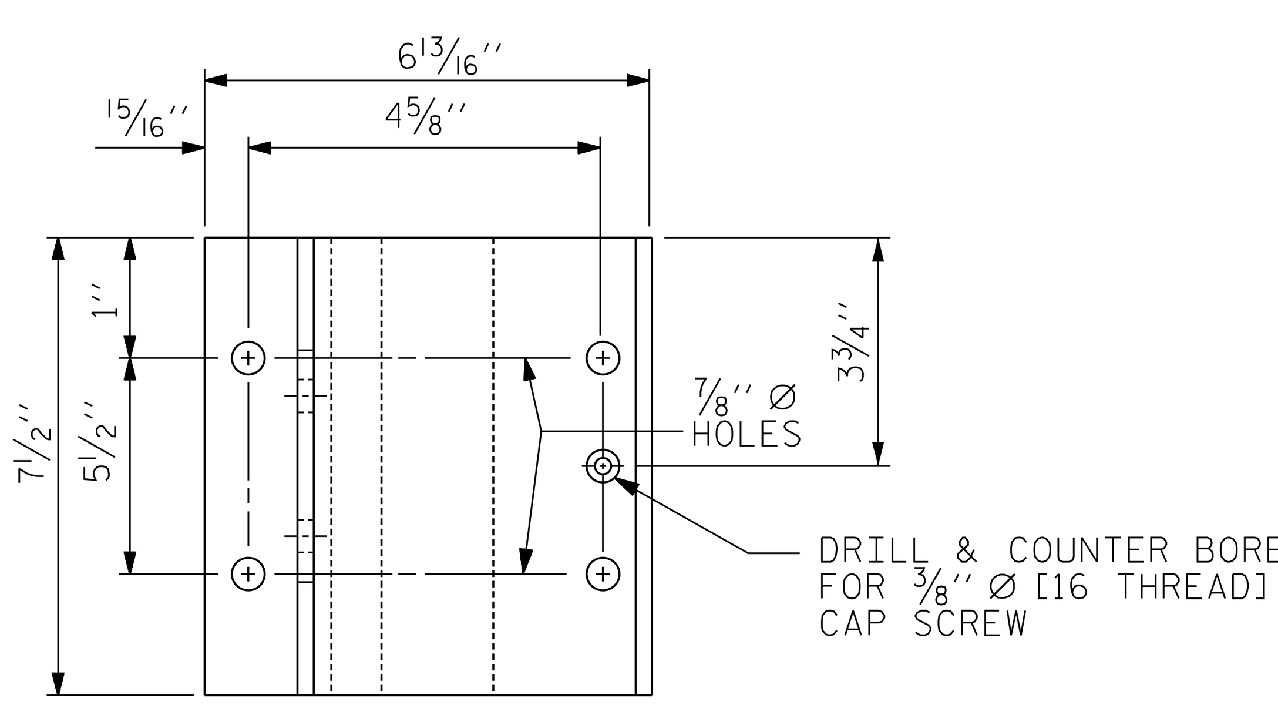


SIDE ELEVATION

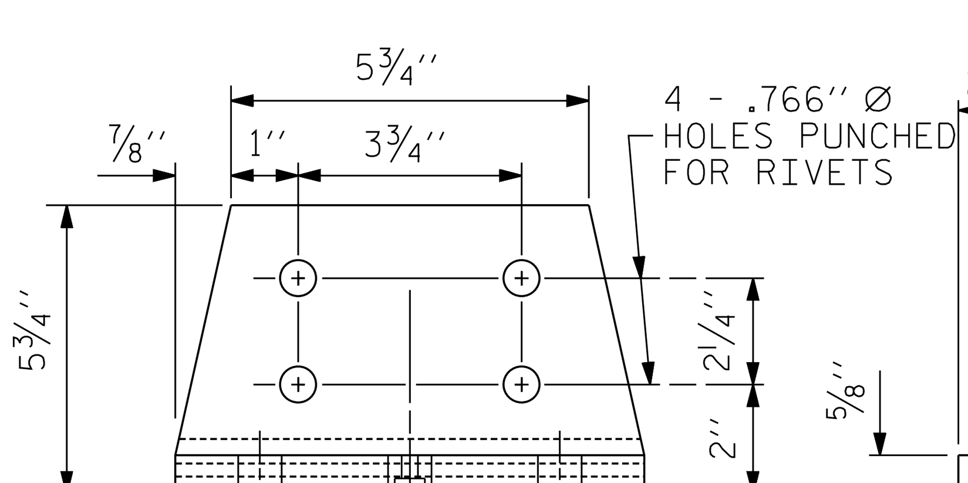
DETAILS OF POST



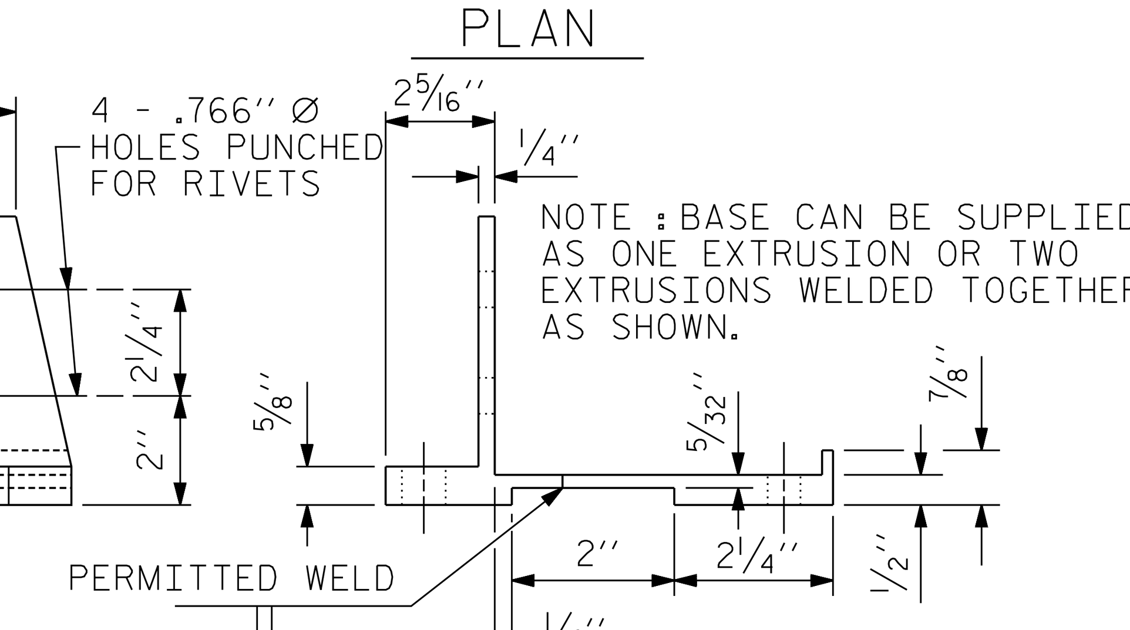
SECTION THRU PARAPET AND RAIL



PLAN

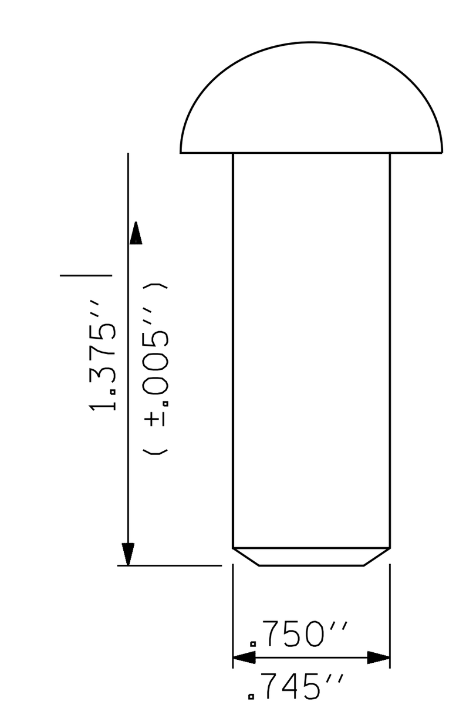


FRONT ELEVATION



SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

PAY LENGTH = 246.67 LIN.FT.

NOTES

METAL RAIL SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 460 OF THE STANDARD SPECIFICATIONS AND METAL RAIL COMPONENTS SHALL MEET THE REQUIREMENTS OF ARTICLE 1074-5 OF THE STANDARD SPECIFICATIONS.

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

ALLOY 6351-15 MAY BE SUBSTITUTED FOR ALLOY 6061-16 WHERE APPLICABLE.

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

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. CONTRACTION JOINTS SHALL BE LOCATED 9 FEET ON EACH SIDE OF PARAPET EXPANSION JOINTS WITH NO MORE THAN 12 FEET BETWEEN CONTRACTION JOINTS.

ANODIZING

FOR ANODIZED 2 BAR METAL RAIL, SEE SPECIAL PROVISIONS.

ALUMINUM FOR POSTS, BASES, RAILS, EXPANSION BARS, RIVETS, CAPS, AND SHIMS SHALL BE ANODIZED. THE CONTRACTOR SHALL SUBMIT THREE SETS OF ASTM B-21 6061-T6 ALUMINUM SAMPLES ANODIZED MEDIUM BRONZE, DARK BRONZE, AND EXTRA DARK BRONZE TO THE ENGINEER. THE ENGINEER SHALL SELECT THE COLOR FROM THE SAMPLES FURNISHED BY THE CONTRACTOR.

AFTER A SHADE OF BRONZE HAS BEEN SELECTED FOR THE RAILING, THE CONTRACTOR SHALL SUBMIT A SAMPLE OF COMPATIBLE EXTERIOR ACRYLIC HOUSE PAINT TO THE ENGINEER. THIS PAINT SHALL MATCH THE ANODIZED RAIL COLOR AS CLOSELY AS POSSIBLE. AFTER ERECTION OF THE ANODIZED ALUMINUM RAILING, ALL EXPOSED ANCHOR BOLTS, NUTS, WASHERS, MACHINE SCREWS, CAP SCREWS, BOLTS, ATTACHMENT BRACKETS, HOLD-DOWN PLATES, AND BUILT UP ANGLES SHALL BE COATED WITH TWO COATS OF THIS ACTYLIC PAINT.

ANY DAMAGE TO THE ANODIZED SURFACES OF THE RAIL OR COMPONENTS DURING THE CONSTRUCTION SHALL BE REPAIRED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS AT THE DIRECTION OF THE ENGINEER AND AT THE CONTRACTOR'S EXPENSE.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — HARDY L. WILLIS — DocuSigned by: Hardy Willis — 12/13/2023

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PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ANODIZED 2 BAR METAL RAIL

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S2-21
1			3					TOTAL SHEETS
2			4					40

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ASSEMBLED BY : MAF	DATE : 03/18
CHECKED BY : HLW	DATE : 03/18
DRAWN BY : EEM 6/94	REV. 5/1/06 TLA/GM
CHECKED BY : RGW 6/94	REV. 10/1/11 MAA/GM
	REV. 6/13 MAA/GM

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2″ FOR ¾″ FERRULES.

B. 4 - ¾″ Ø X 2½″ BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE ¾″ Ø X 2½″ GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

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

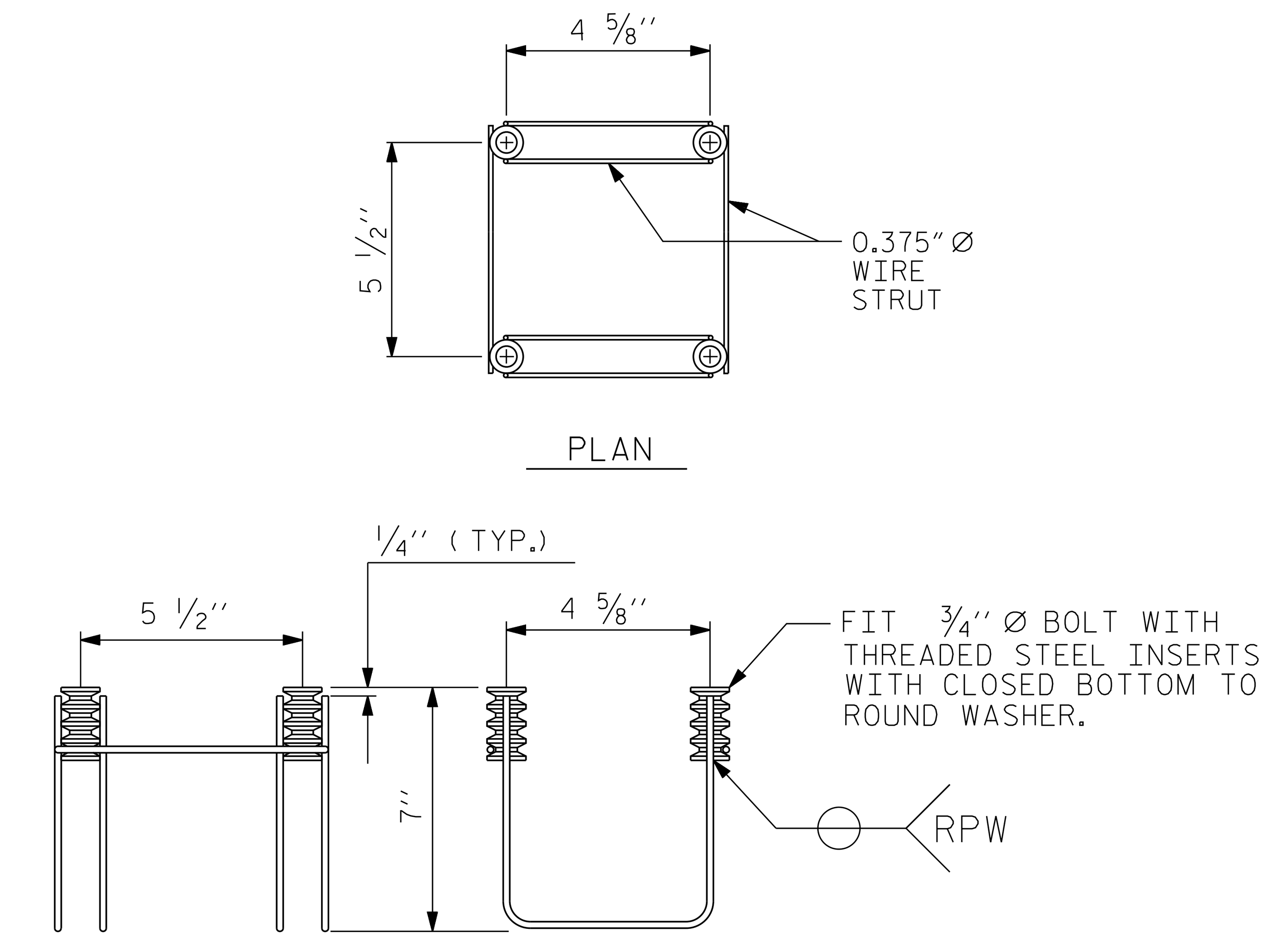
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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

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

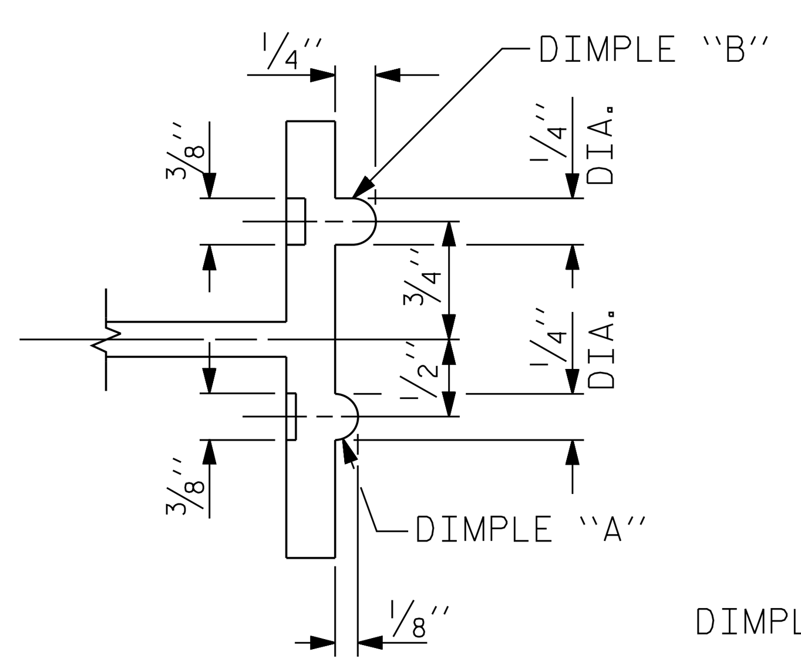
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾″ Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

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

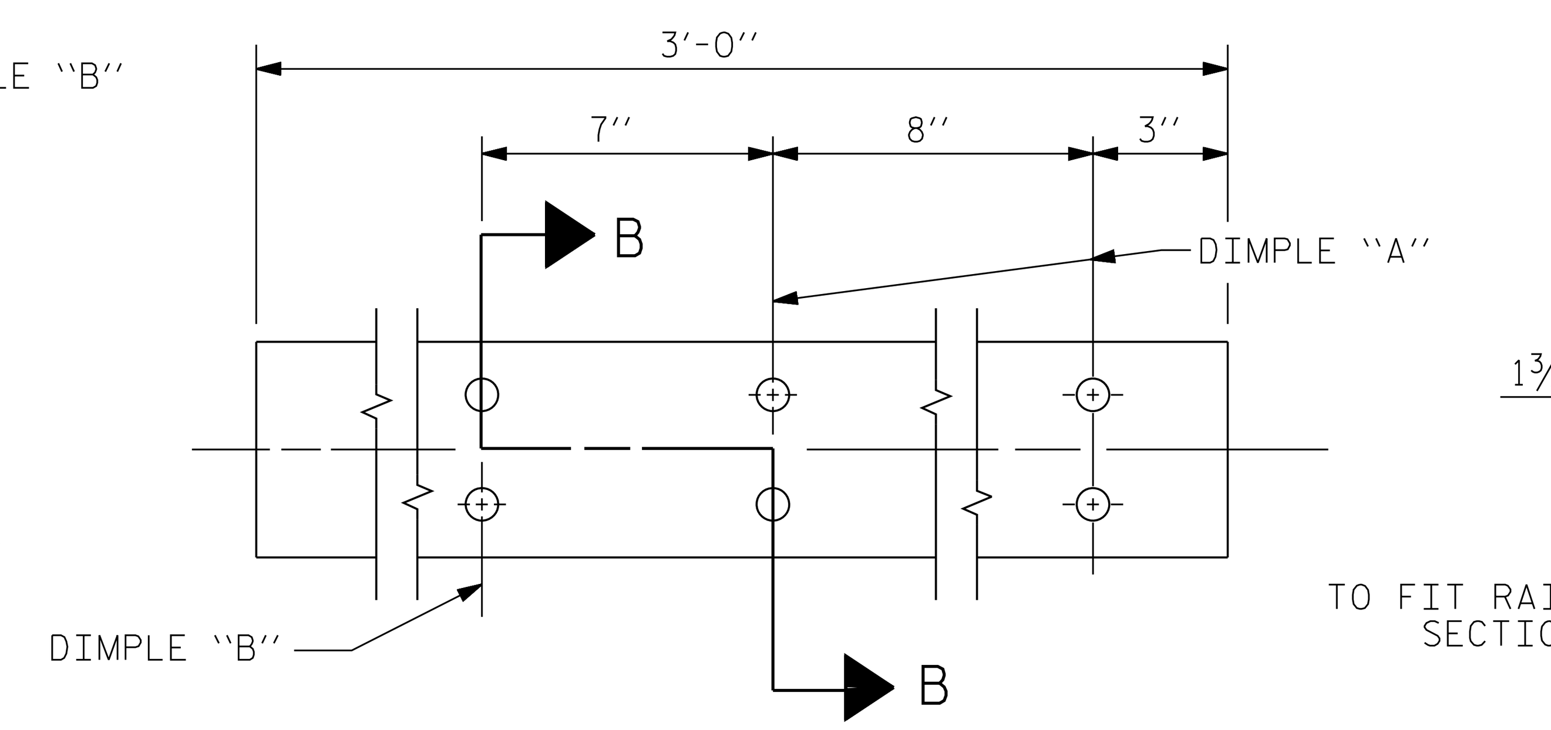


4-BOLT METAL RAIL ANCHOR ASSEMBLY

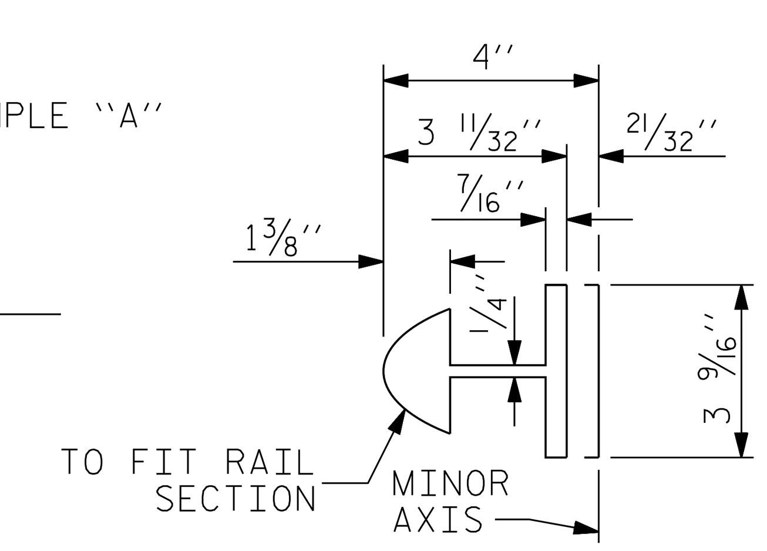
(44 ASSEMBLIES REQUIRED)



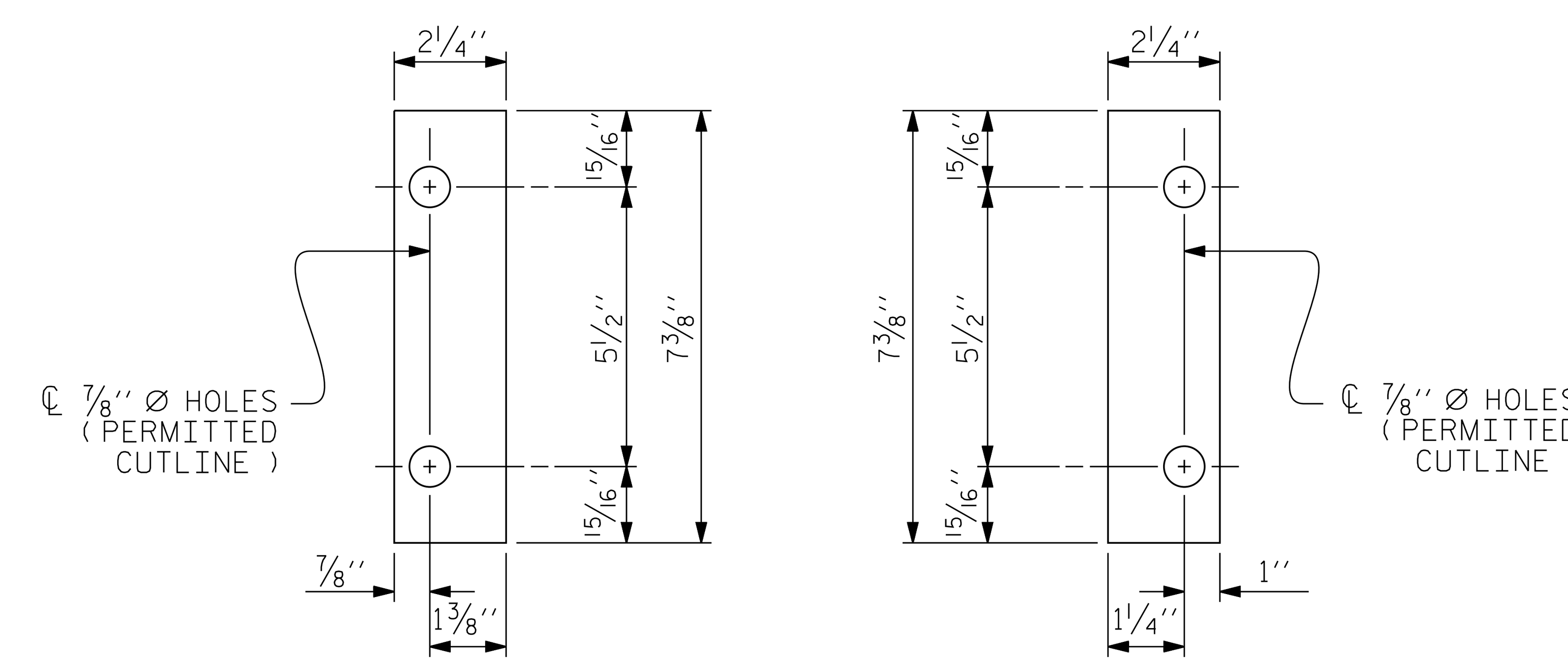
SECTION B - B



EXPANSION BAR DETAILS

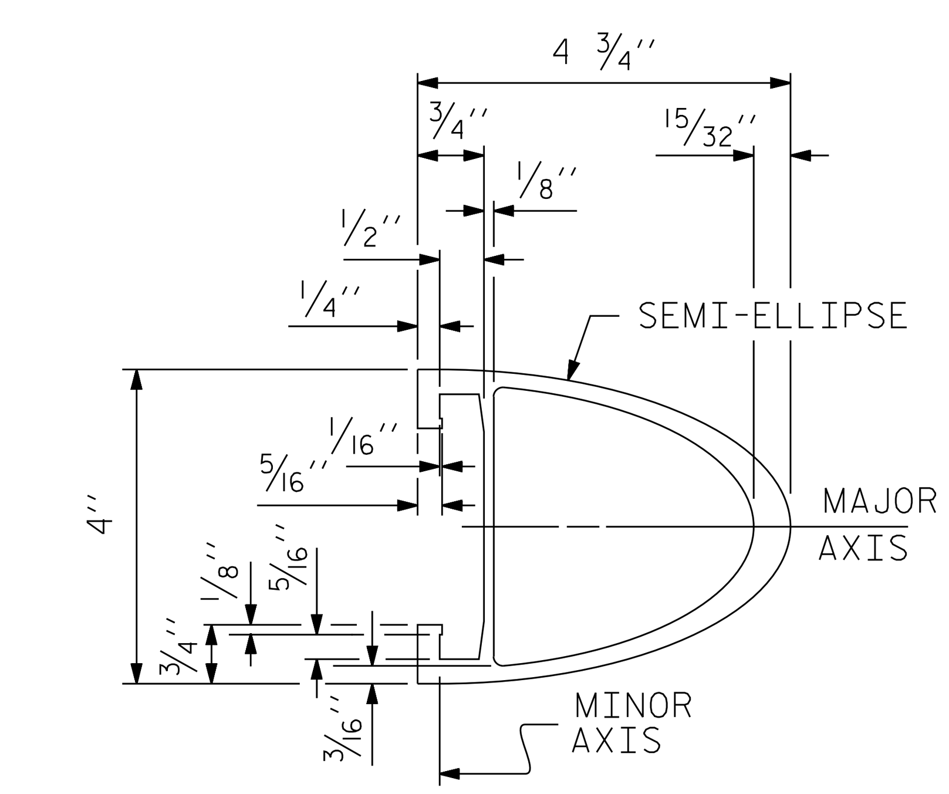


BAR SECTION

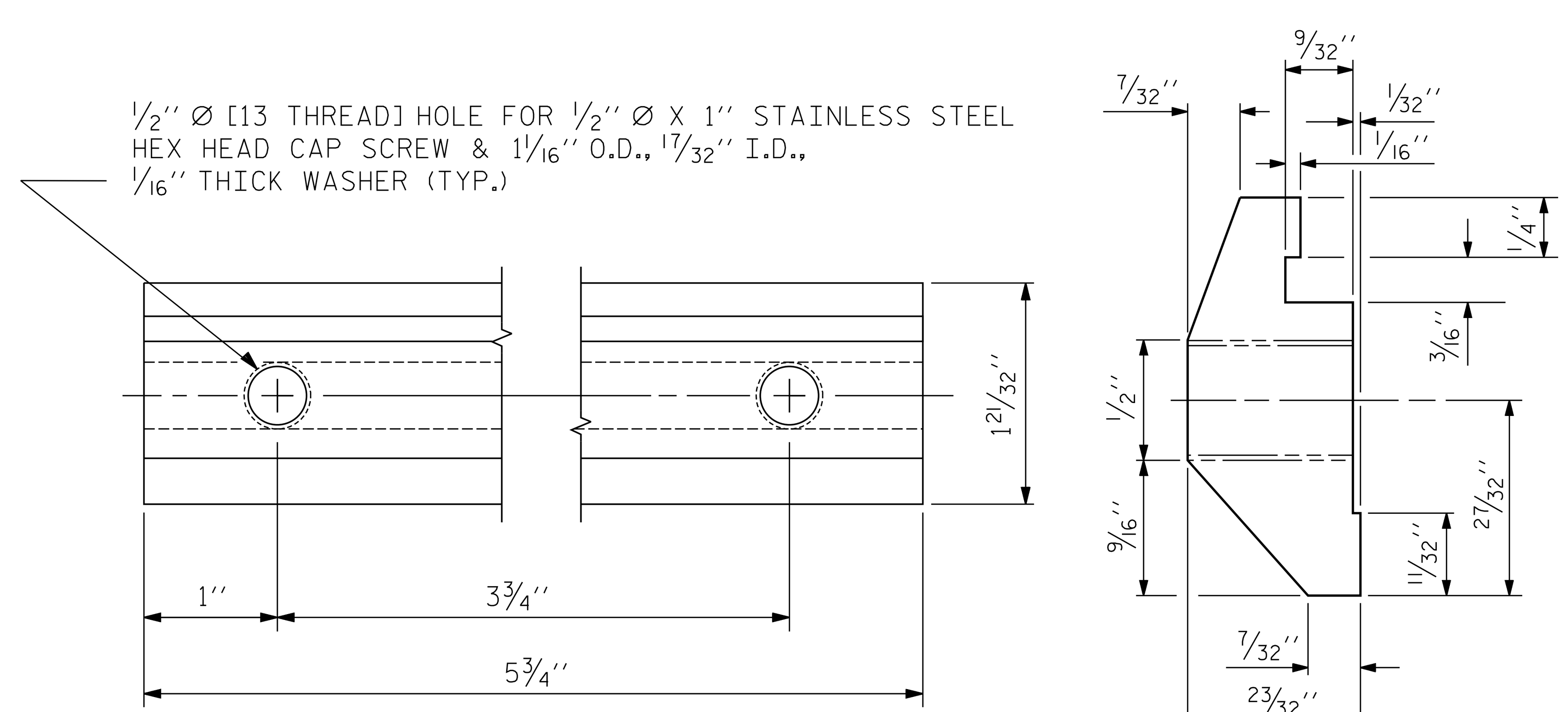


SHIM DETAILS

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

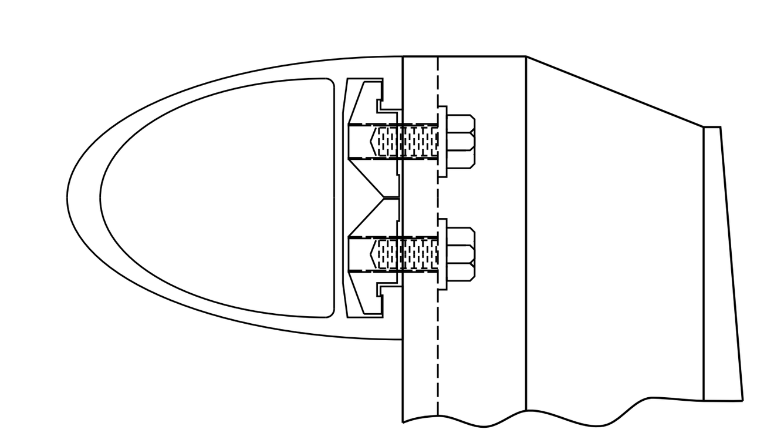


RAIL SECTION

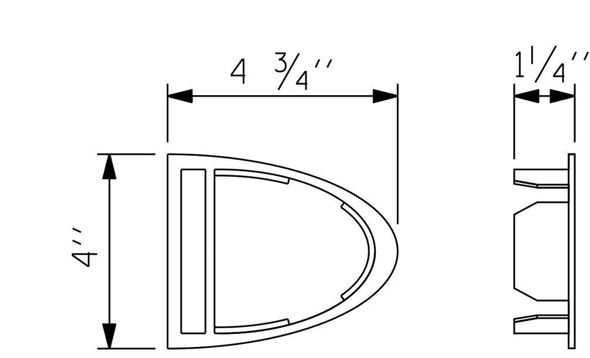


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-
SHEET 3 OF 3

DocuSigned by: Hardy Willis
12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

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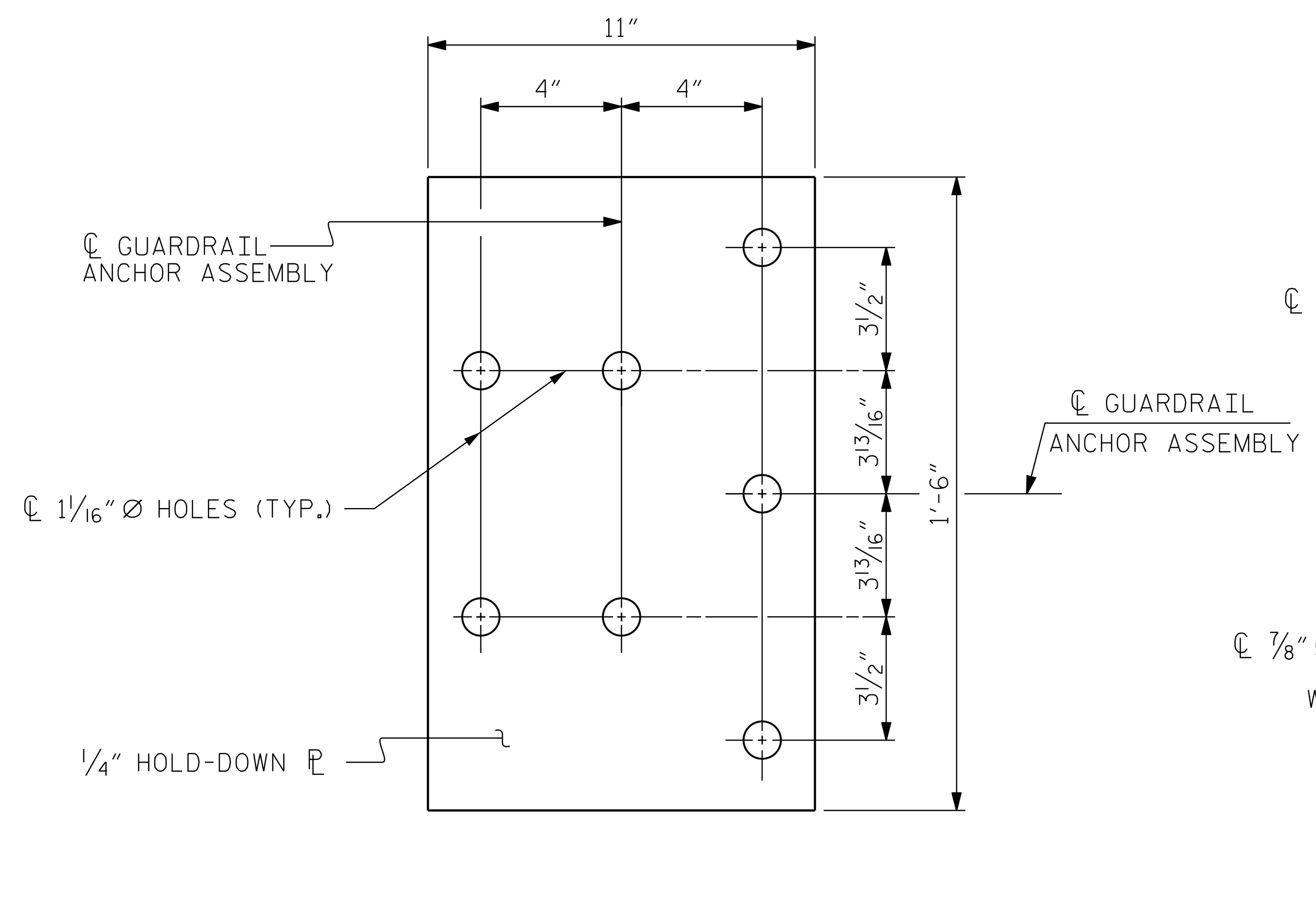
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

ASSEMBLED BY : MAF	DATE : 03/18
CHECKED BY : HLW	DATE : 03/18

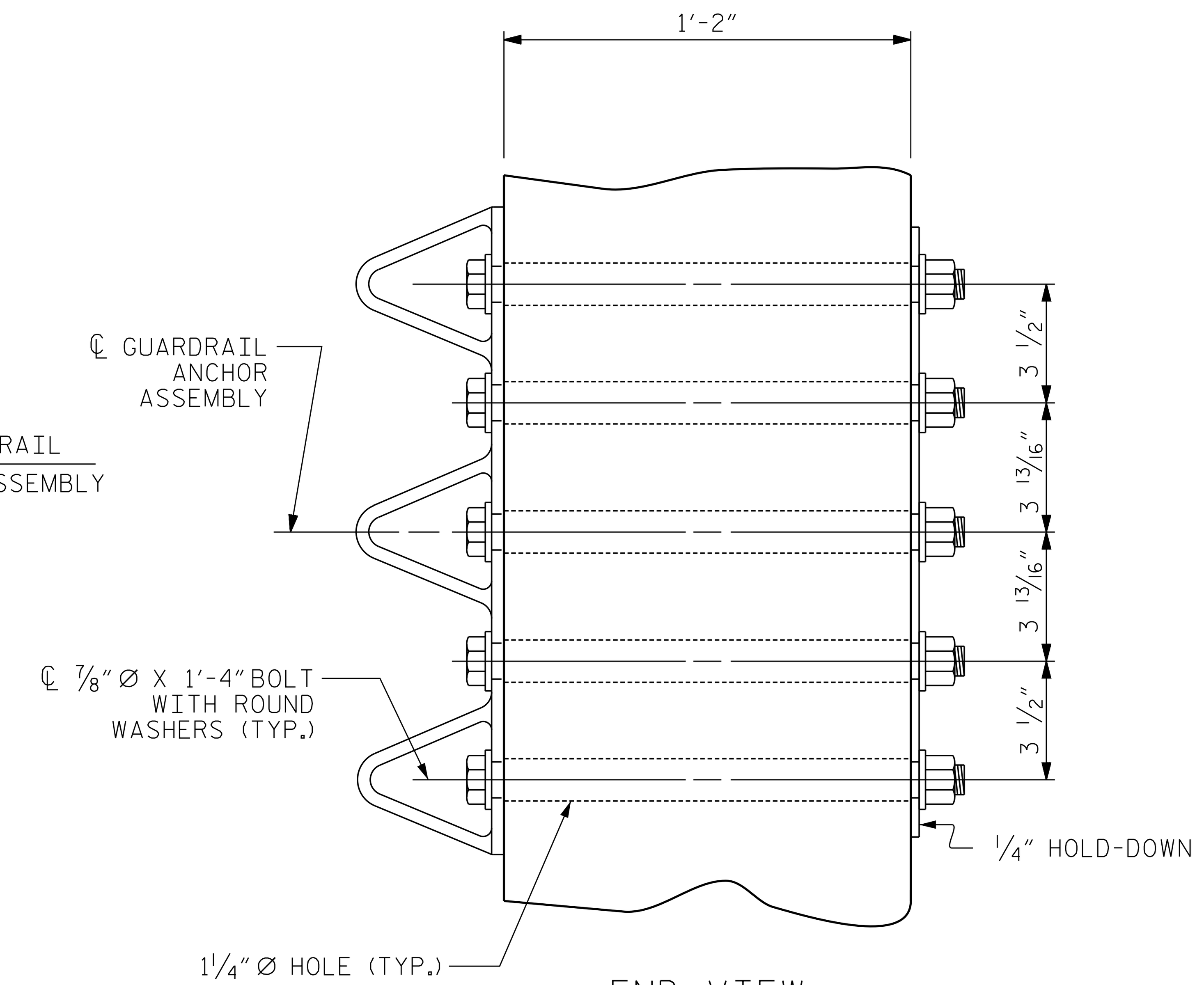
DRAWN BY : EEM 6/94	REV. 5/1/06R	KMM/GM
CHECKED BY : RGW 6/94	REV. 10/1/11	MAA/GM
	REV. 12/17	MAA/THC

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-22
1			3			TOTAL SHEETS	40
2			4				

STD. NO. BMR4



PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼" HOLD DOWN PLATE AND 7 - ⅞" Ø BOLTS WITH NUTS AND WASHERS.

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

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 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.

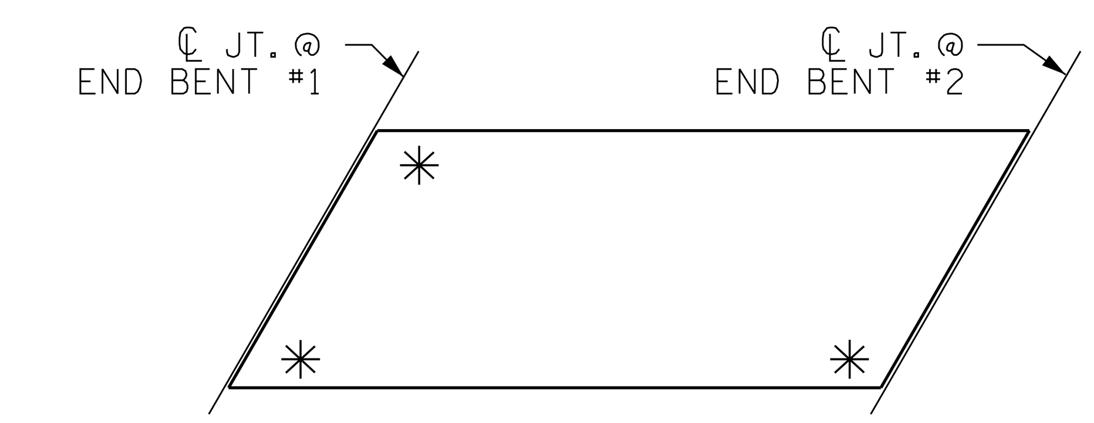
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

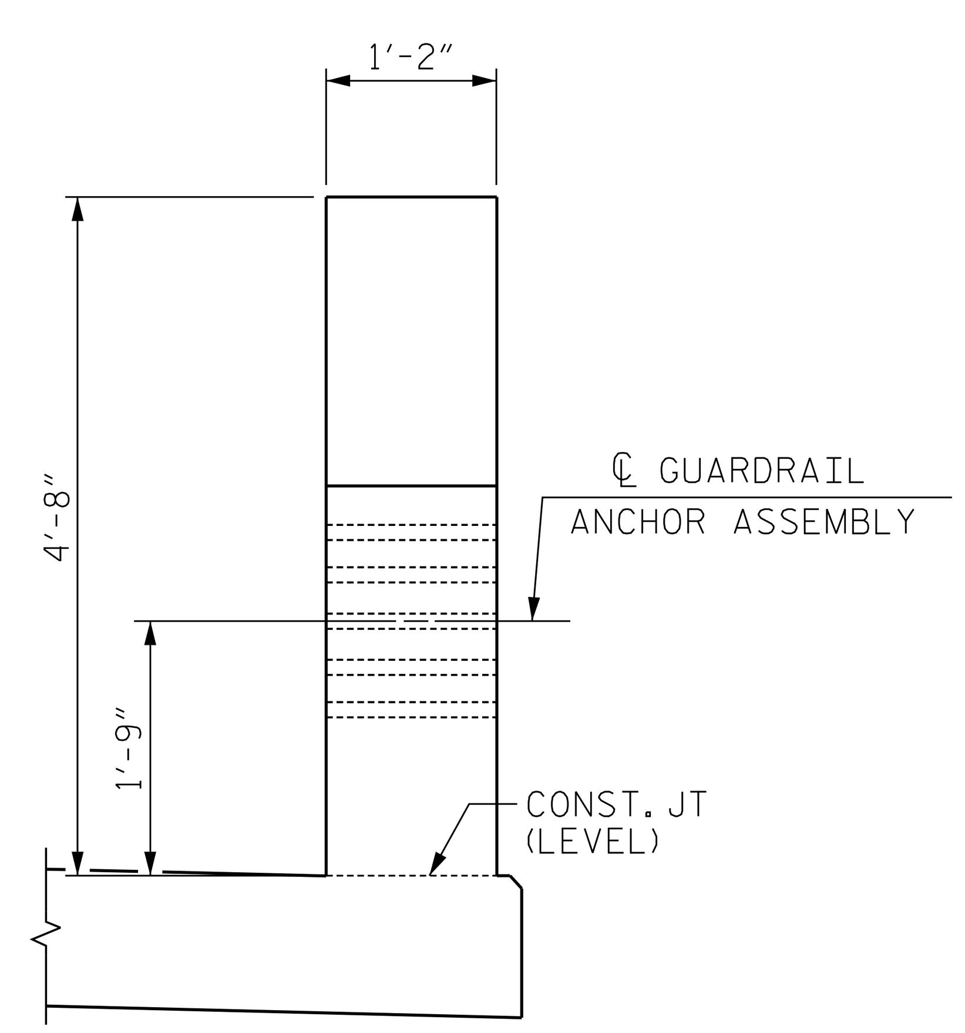
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

THE 1 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.

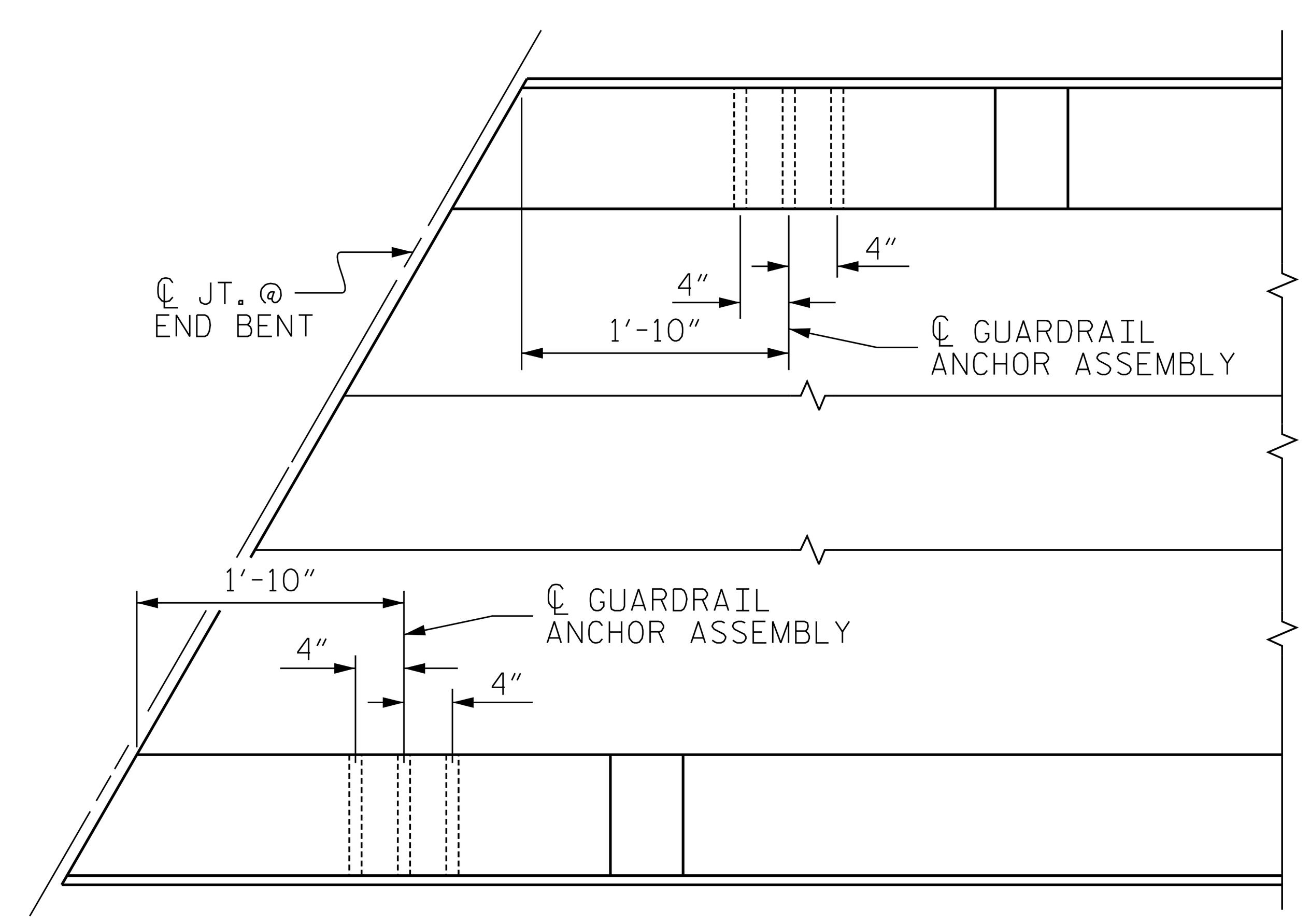


SKETCH SHOWING POINTS OF ATTACHMENT

* LOCATION OF GUARDRAIL ATTACHMENT



END VIEW
(TWO BAR METAL RAIL)



PLAN
(END BENT 1 SHOWN, END BENT 2 SIMILAR ON RIGHT SIDE.)

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

DocuSigned by: Hardy Willis
12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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1318 Patton Ave., Suite F,
Asheville, NC 28806
License No: C-3097

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

ASSEMBLED BY : MAF	DATE : 03/18
CHECKED BY : HLW	DATE : 03/18

DRAWN BY : MAA 5/10	REV. 1/15	MAA/TMG
CHECKED BY : GM 5/10	REV. 12/17	MAA/THC
	REV. 5/18	MAA/THC

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-23
1			3			TOTAL SHEETS
2			4			40

STD. NO. GRA3

BILL OF MATERIAL

STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	216	#5	STR	14'-3"	3210
A2	216	#5	STR	14'-3"	3210
* A9	6	#6	STR	11'-3"	51
* A101	3	#5	STR	13'-0"	41
* A102	3	#5	STR	11'-4"	35
* A103	3	#5	STR	9'-9"	31
* A104	3	#5	STR	8'-1"	25
* A105	3	#5	STR	6'-6"	20
* A106	3	#5	STR	4'-10"	15
* A107	3	#5	STR	3'-3"	10
* A108	2	#5	STR	2'-2"	5
* A109	3	#5	STR	13'-2"	41
* A110	3	#5	STR	11'-6"	36
* A111	3	#5	STR	9'-11"	31
* A112	3	#5	STR	8'-3"	26
* A113	3	#5	STR	6'-8"	21
* A114	3	#5	STR	5'-0"	16
* A115	3	#5	STR	3'-5"	11
* A116	2	#5	STR	2'-4"	5
A201	3	#5	STR	13'-0"	41
A202	3	#5	STR	11'-4"	35
A203	3	#5	STR	9'-9"	31
A204	3	#5	STR	8'-1"	25
A205	3	#5	STR	6'-6"	20
A206	3	#5	STR	4'-10"	15
A207	3	#5	STR	3'-3"	10
A208	2	#5	STR	2'-2"	5
A209	3	#5	STR	13'-2"	41
A210	3	#5	STR	11'-6"	36
A211	3	#5	STR	9'-11"	31
A212	3	#5	STR	8'-3"	26
A213	3	#5	STR	6'-8"	21
A214	3	#5	STR	5'-0"	16
A215	3	#5	STR	3'-5"	11
A216	2	#5	STR	2'-4"	5
* B1	50	#4	STR	27'-11"	932
B2	51	#5	STR	45'-4"	2411
* G1	2	#5	STR	20'-5"	43
* K1	6	#5	1	8'-5"	53
* K2	6	#5	2	12'-8"	80
* K4	6	#5	1	7'-6"	47
* S1	28	#4	3	4'-4"	81

* EPOXY-COATED

STAGE II

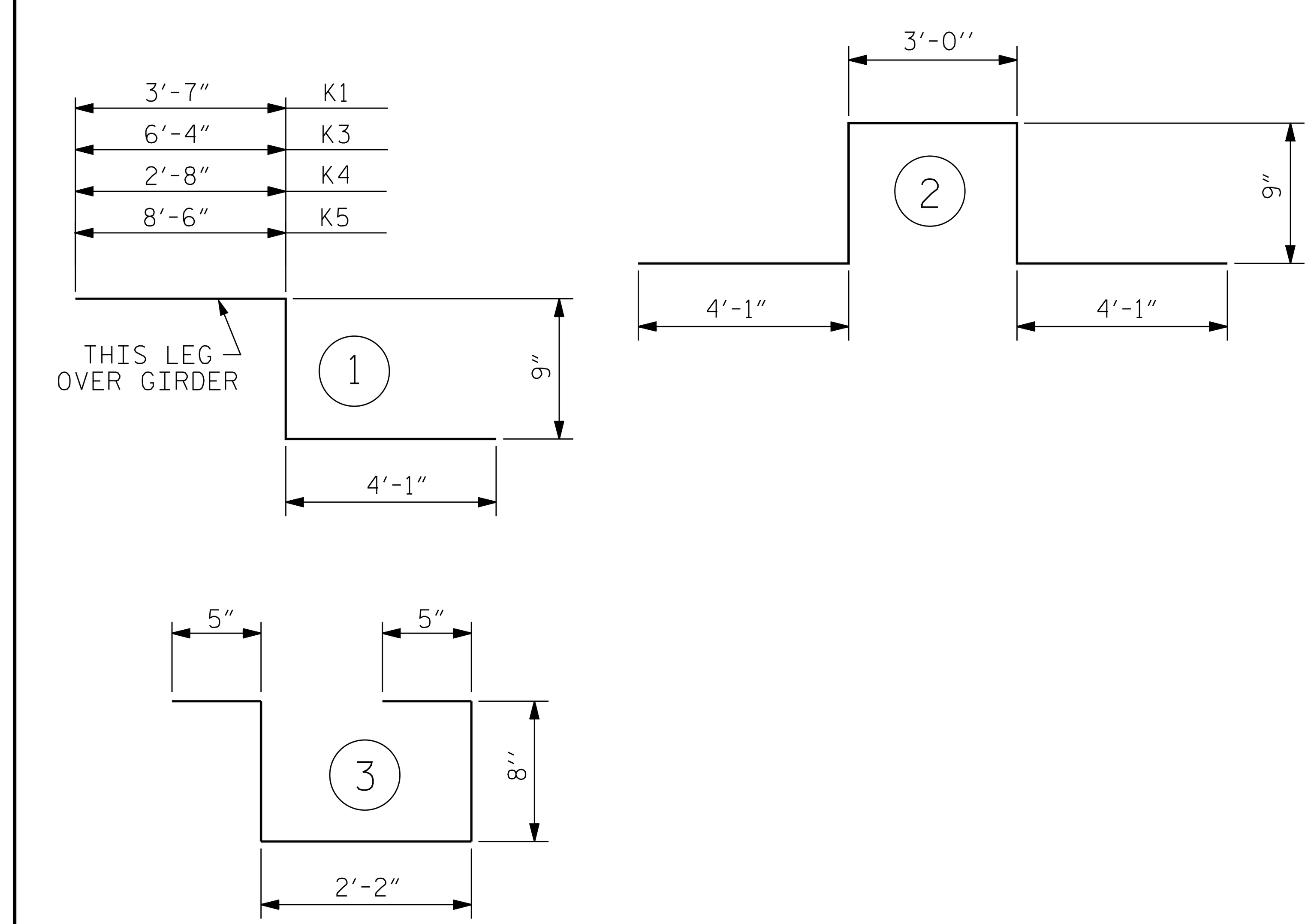
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	216	#5	STR	14'-3"	3210
A4	216	#5	STR	14'-3"	3210
* A10	6	#6	STR	14'-2"	128
* A301	3	#5	STR	13'-2"	42
* A302	3	#5	STR	11'-6"	36
* A303	3	#5	STR	9'-11"	31
* A304	3	#5	STR	8'-3"	26
* A305	3	#5	STR	6'-8"	21
* A306	3	#5	STR	5'-0"	16
* A307	3	#5	STR	13'-0"	41
* A308	3	#5	STR	11'-4"	35
* A309	3	#5	STR	9'-9"	31
* A310	3	#5	STR	8'-1"	25
* A311	3	#5	STR	6'-6"	20
* A312	3	#5	STR	4'-10"	15
* A313	3	#5	STR	3'-3"	10
* A314	2	#5	STR	2'-2"	5
A401	3	#5	STR	13'-2"	42
A402	3	#5	STR	11'-6"	36
A403	3	#5	STR	9'-11"	31
A404	3	#5	STR	8'-3"	26
A405	3	#5	STR	6'-8"	21
A406	3	#5	STR	5'-0"	16
A407	3	#5	STR	13'-0"	41
A408	3	#5	STR	11'-4"	35
A409	3	#5	STR	9'-9"	31
A410	3	#5	STR	8'-1"	25
A411	3	#5	STR	6'-6"	20
A412	3	#5	STR	4'-10"	15
A413	3	#5	STR	3'-3"	10
A414	2	#5	STR	2'-2"	5
* B1	35	#4	STR	27'-11"	653
B2	39	#5	STR	45'-4"	1844
* G2	2	#5	STR	20'-5"	43
* K3	6	#5	1	11'-2"	83
* K5	6	#5	1	13'-4"	82
* S1	27	#4	3	4'-4"	78

CLOSURE POUR

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A5	241	#5	STR	2'-10"	712
A6	233	#5	STR	2'-6"	608
* B1	15	#4	STR	27'-11"	280
B2	15	#5	STR	45'-4"	709

* EPOXY-COATED

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	* EPOXY COATED REINFORCING STEEL
SPAN "A"	(CU.YDS.)	(LBS.)	(LBS.)
STAGE I	52.7	5,990	4,866
STAGE II	40.0	5,408	4,631
CLOSURE POUR	17.7	1,317	992
TOTALS**	110.4	12,715	10,489

** QUANTITIES FOR CONCRETE PARAPET ARE NOT INCLUDED.

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F.
Asheville, NC. 28806
License No: C-3097

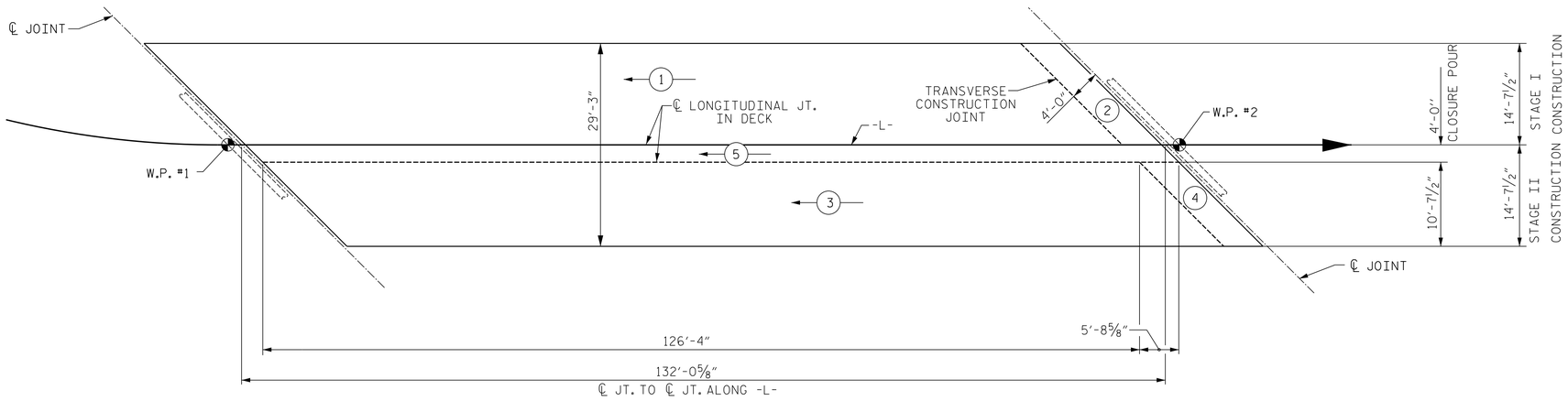
REVISIONS						
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

SHEET NO. S2-24

TOTAL SHEETS 40

ASSEMBLED BY : MAF	DATE : 03/18
CHECKED BY : HLW	DATE : 03/18
DRAWN BY : JMB 5/87	REV. 8/16/99 RWW/LES
CHECKED BY : SJD 9/87	REV. 5/1/06 TLA/GM
	REV. 10/1/11 MAA/GM

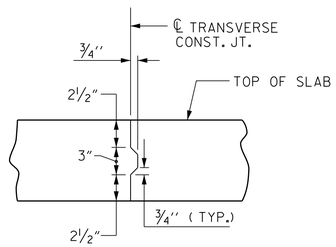
STD. NO. BOM1



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 3,863)

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		
STAGE I	354	SQ.FT.
STAGE II	343	SQ.FT.
BRIDGE DECK		
STAGE I	1556	SQ.FT.
STAGE II	1556	SQ.FT.
TOTAL	3809	SQ.FT.



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 2 OF 2

DocuSigned by: Harry Willis
12/13/2023

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Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-25
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY : MAF		DATE : 03/18
CHECKED BY : HLW		DATE : 03/18
DRAWN BY : JMB 5/87	REV. 8/16/99	RWW/LES
CHECKED BY : SJD 9/87	REV. 5/1/06	TLA/GM
	REV. 10/1/11	MAA/GM

STD. NO. BOM1

NOTES:

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

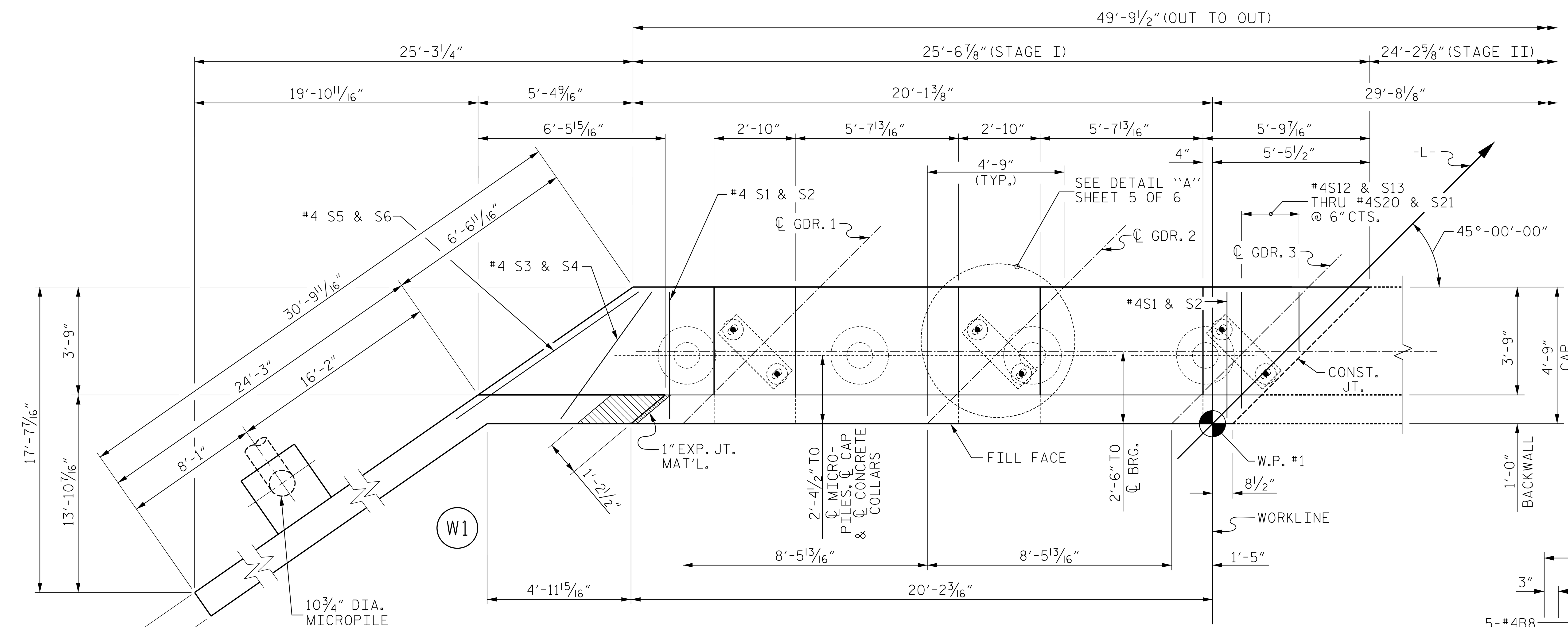
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANCE CURING COMPOUND METHOD SHALL NOT BE USED.

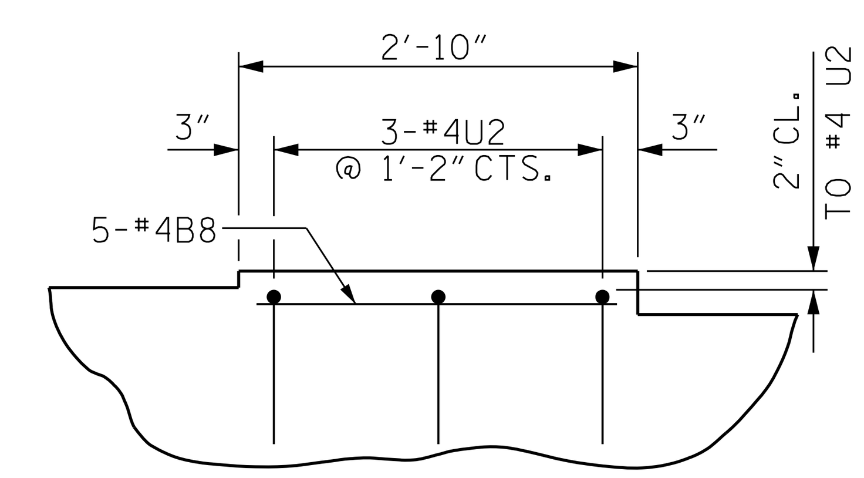
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND APPROACH SLAB HAS BEEN SAWED AND THE PARAPET IS CAST IF SLIP FORMING IS USED.

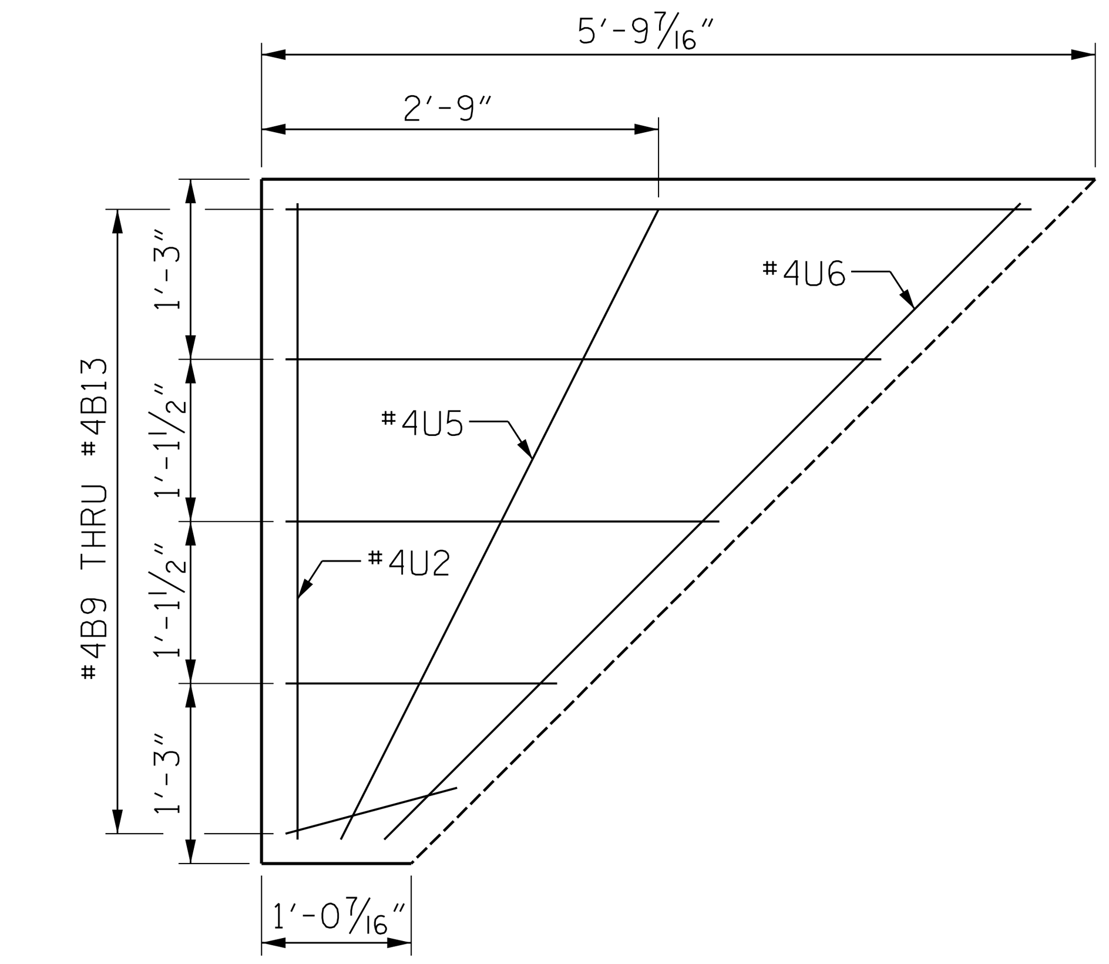
EPOXY COAT THE END BENT CAP AFTER ADJUSTMENTS ARE MADE TO BEARINGS AND ANCHOR BOLTS ARE GROUTED.



PLAN

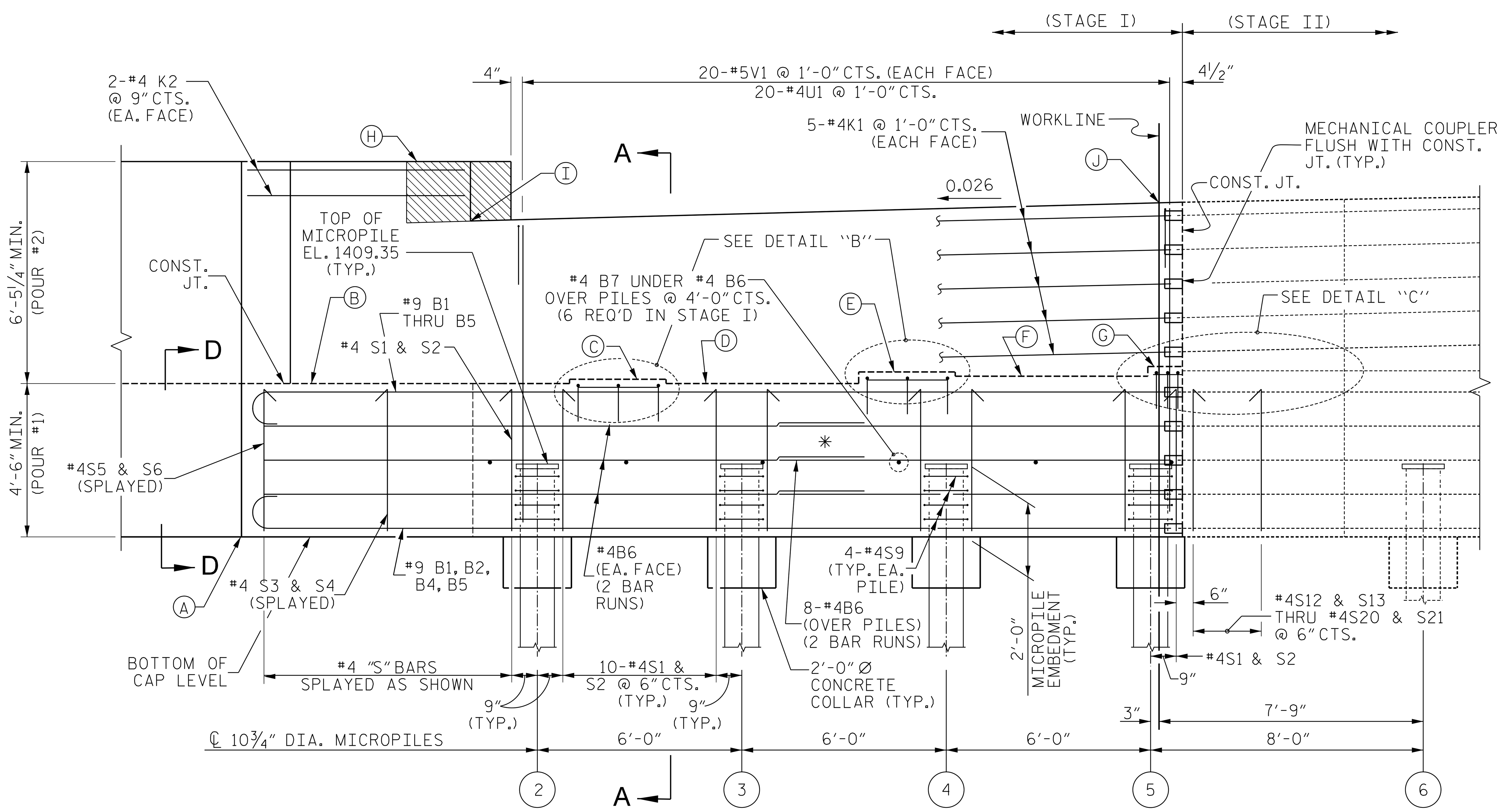


DETAIL "B"



DETAIL "C"

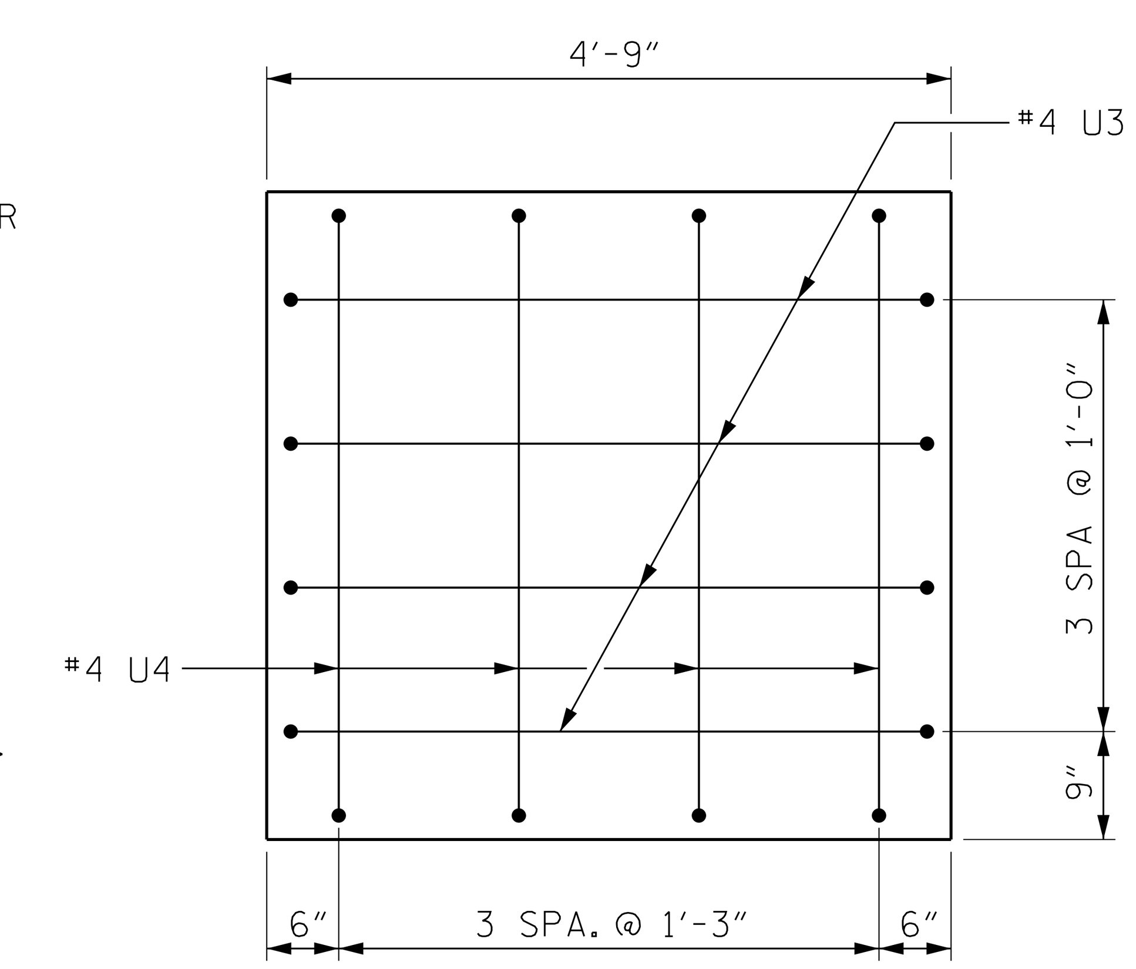
ELEVATIONS	
LOCATION	ELEV.
Ⓐ	1407.35
Ⓑ	1411.85
Ⓒ	1411.97
Ⓓ	1411.85
Ⓔ	1412.19
Ⓕ	1412.07
Ⓖ	1412.35
Ⓗ	1418.13
Ⓘ	1416.46
Ⓙ	1416.99



ELEVATION

WING NOT SHOWN FOR CLARITY.
(SEE SHEET 5 OF 6 FOR MICROPILE CONCRETE COLLARS)

✱ - 2'-5" SPLICE FOR #4 BARS



VIEW D-D

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 1
STAGE I

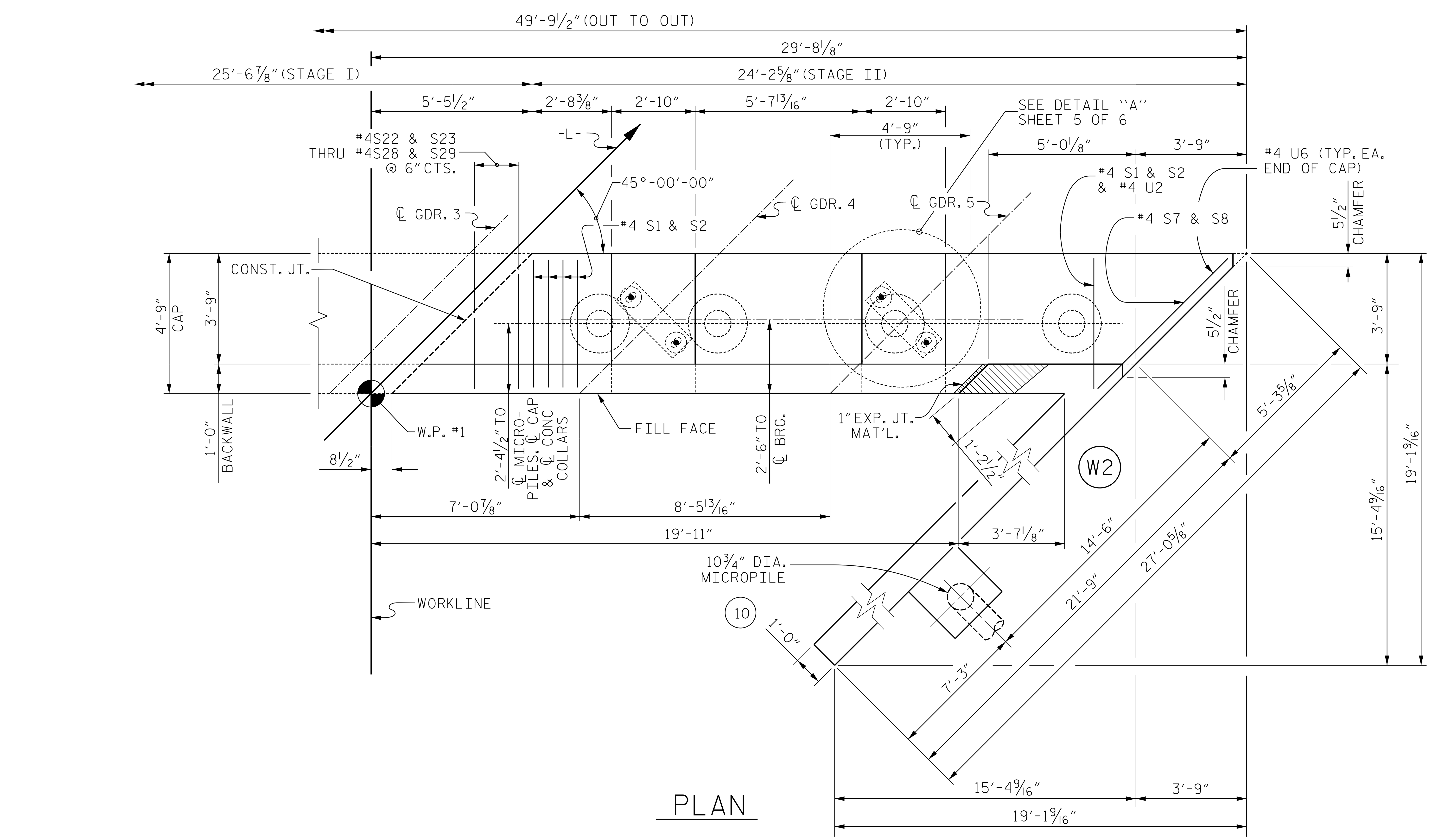
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW	DATE: 01/18
CHKD. BY: HLW	DATE: 01/18
DES. EGR. OF RECORD: CBC	DATE: 01/18

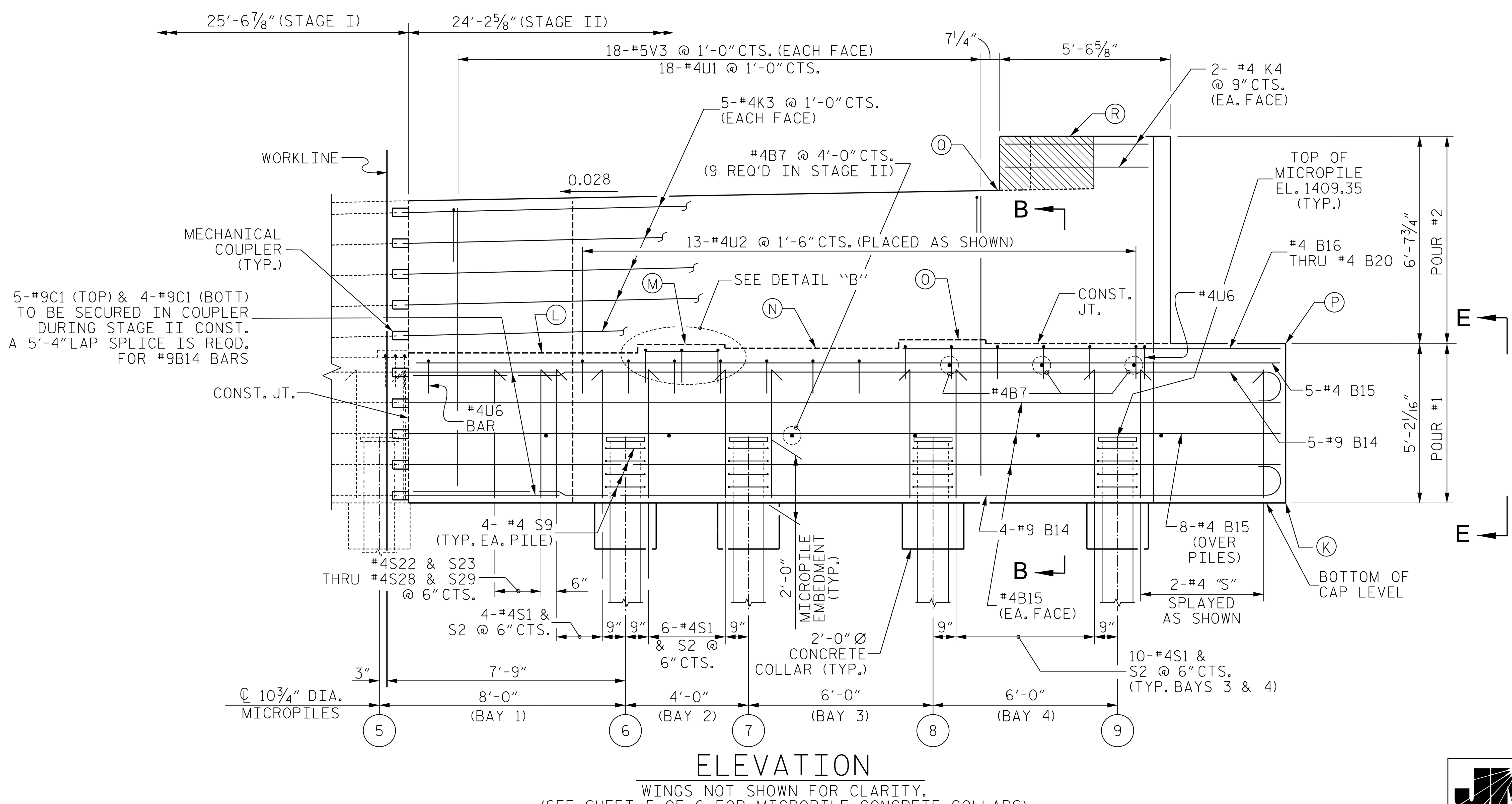
REVISIONS							
NO.	BY:	DATE:		NO.	BY:	DATE:	
1				3			
2				4			

SHEET NO. S2-26

TOTAL SHEETS 40



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
(SEE SHEET 5 OF 6 FOR MICROPILE CONCRETE COLLARS)

NOTES:

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

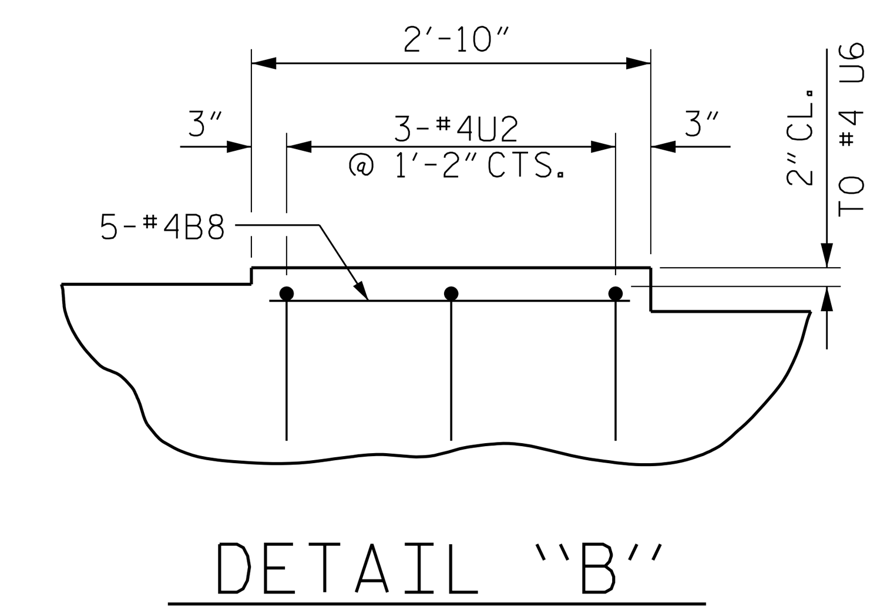
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE TOP SURFACE OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANCE CURING COMPOUND METHOD SHALL NOT BE USED.

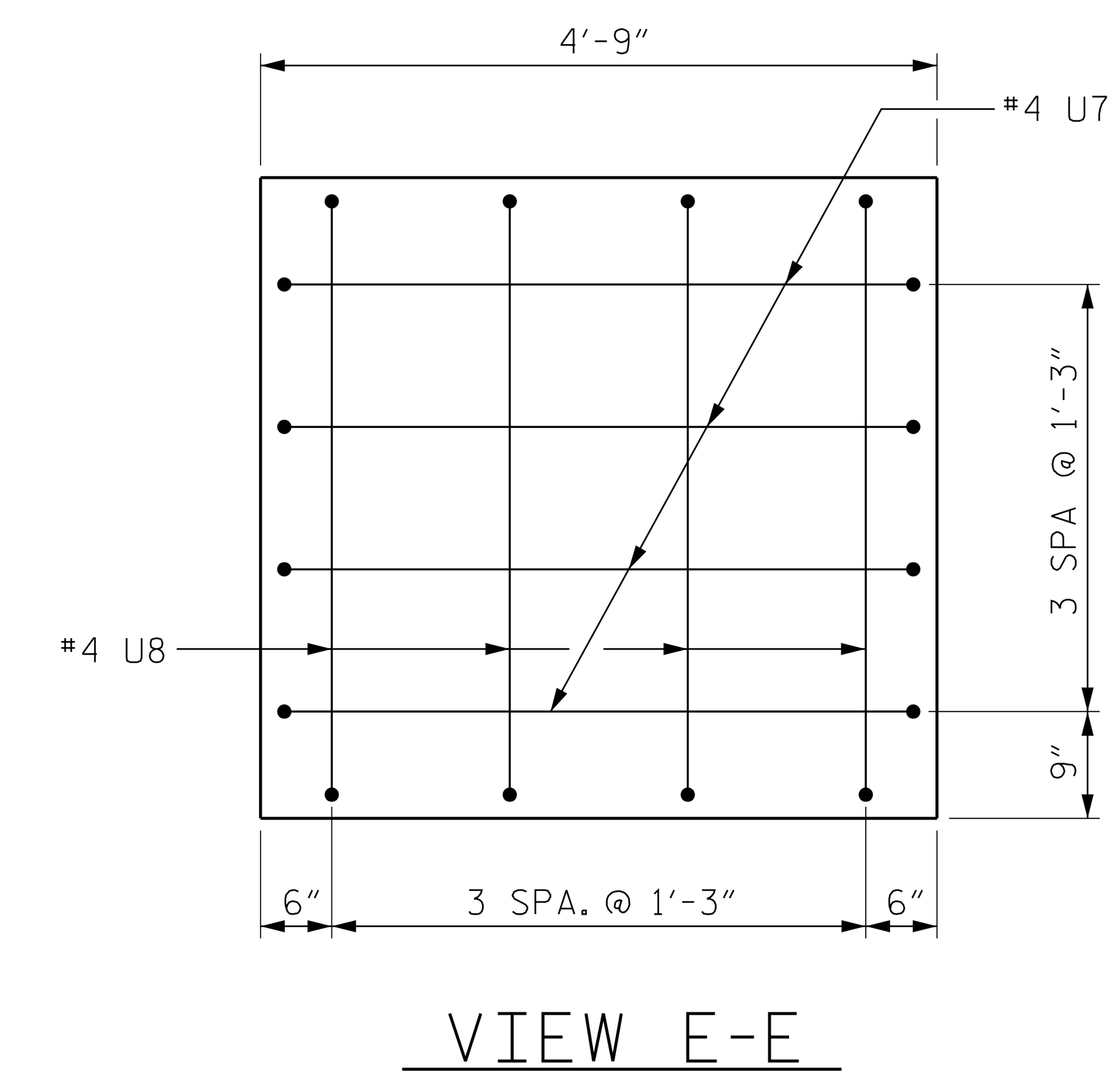
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND APPROACH SLAB HAS BEEN SAWED AND THE PARAPET IS CAST IF SLIP FORMING IS USED.

EPOXY COAT THE END BENT CAP AFTER ADJUSTMENTS ARE MADE TO BEARINGS AND ANCHOR BOLTS ARE GROUTED.



DETAIL "B"



VIEW E-E

ELEVATIONS	
LOCATION	ELEV.
(K)	1407.35
(L)	1412.23
(M)	1412.50
(N)	1412.38
(O)	1412.65
(P)	1412.53
(Q)	1417.55
(R)	1419.22

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

SHEET 2 OF 6

DocuSigned by: Hardy Willis — 12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

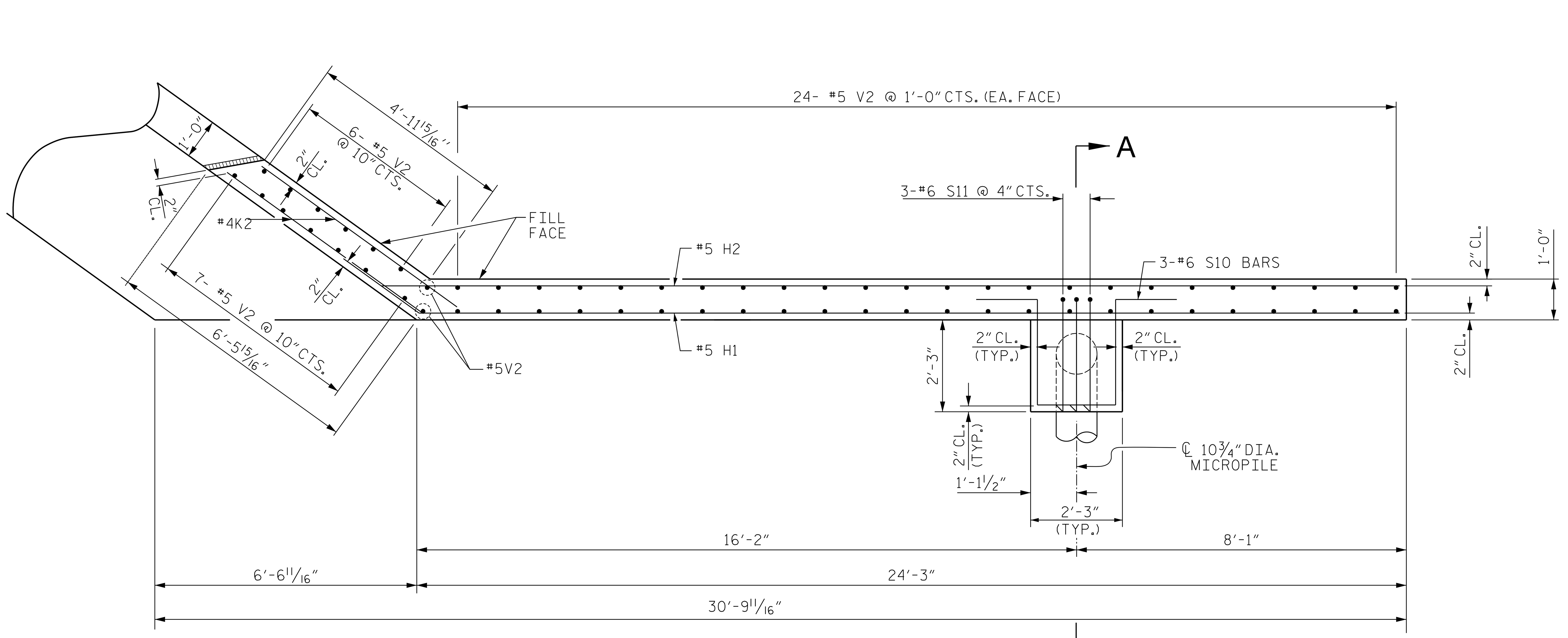
END BENT NO. 1
STAGE II

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F.
Asheville, NC. 28806
License No: C-3097

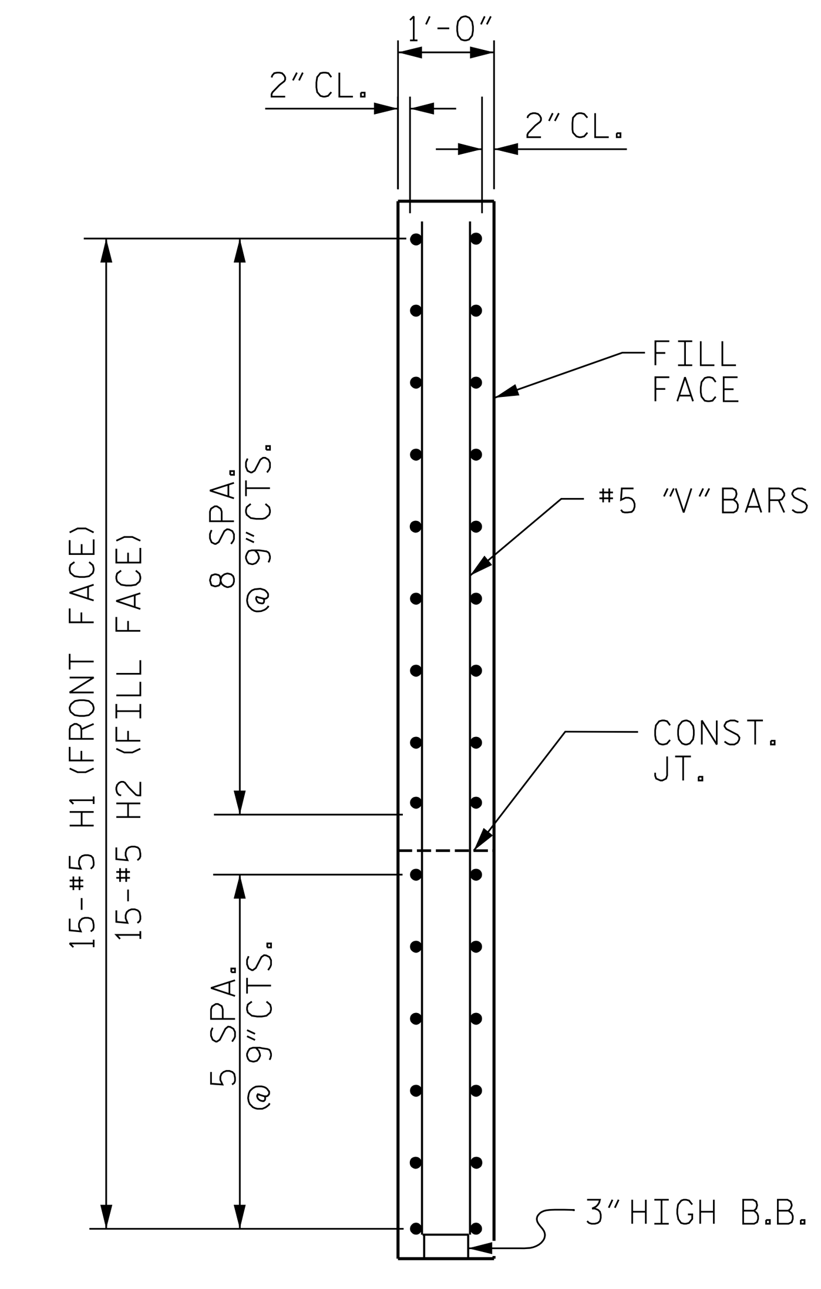
DWN. BY: RWW DATE: 03/18
CHKD. BY: HLW DATE: 03/18
DES. EGR. OF RECORD: CBC DATE: 03/18

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

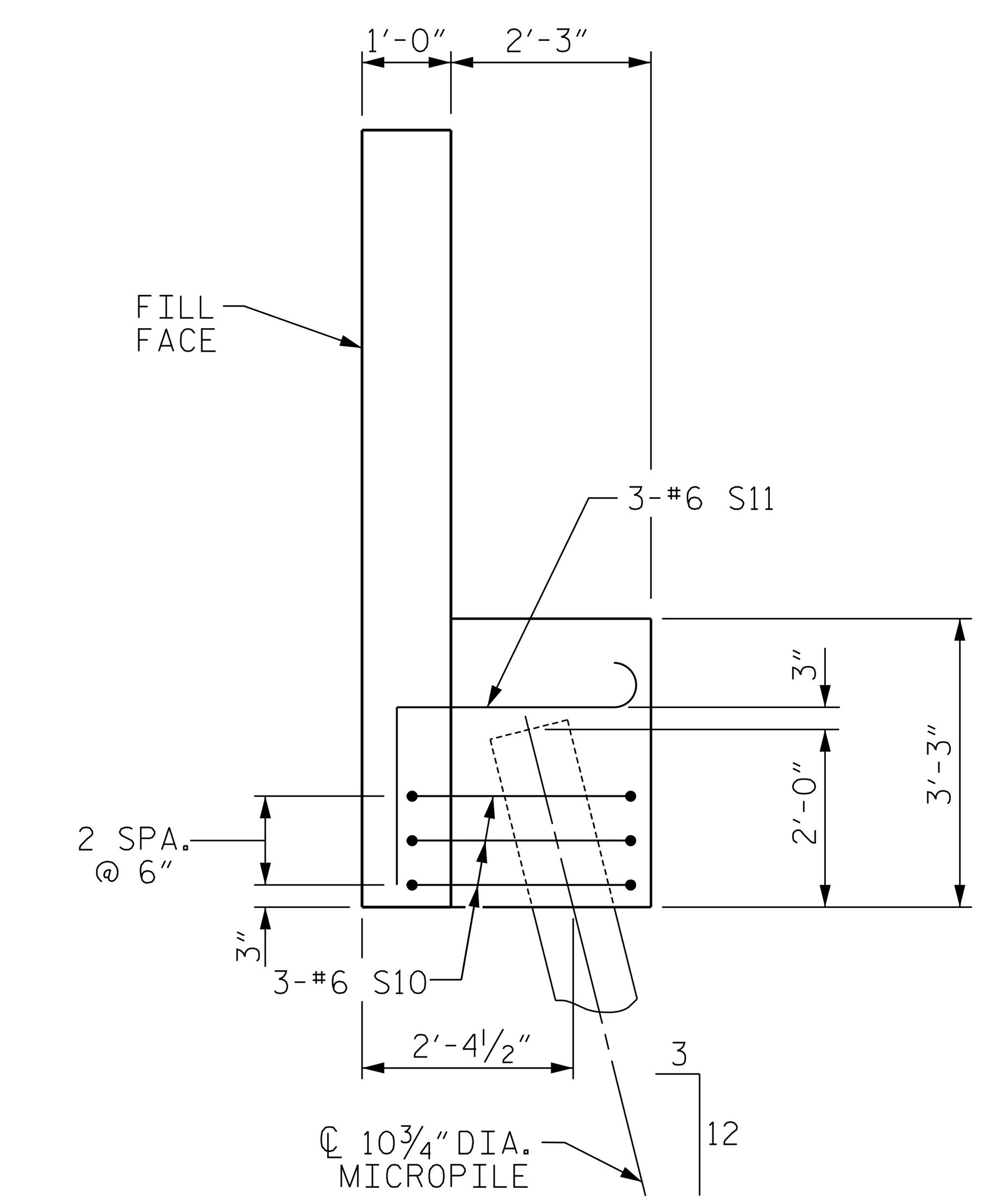
SHEET NO. S2-27
TOTAL SHEETS 40



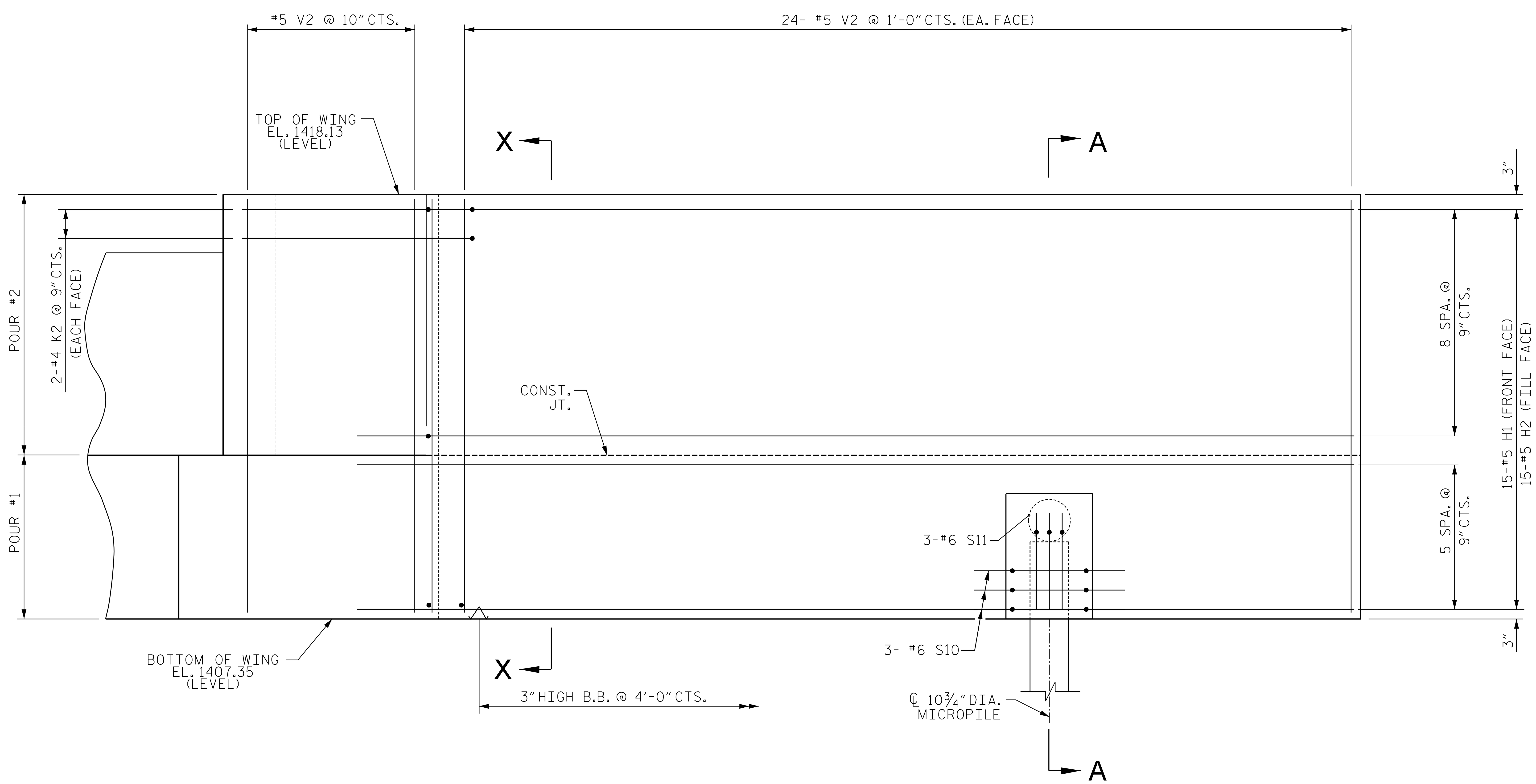
PLAN - WING (W1)



SECTION X-X



SECTION A-A



ELEVATION - WING (W1)

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 3 OF 6

DocuSigned by: Hardy Willis
12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

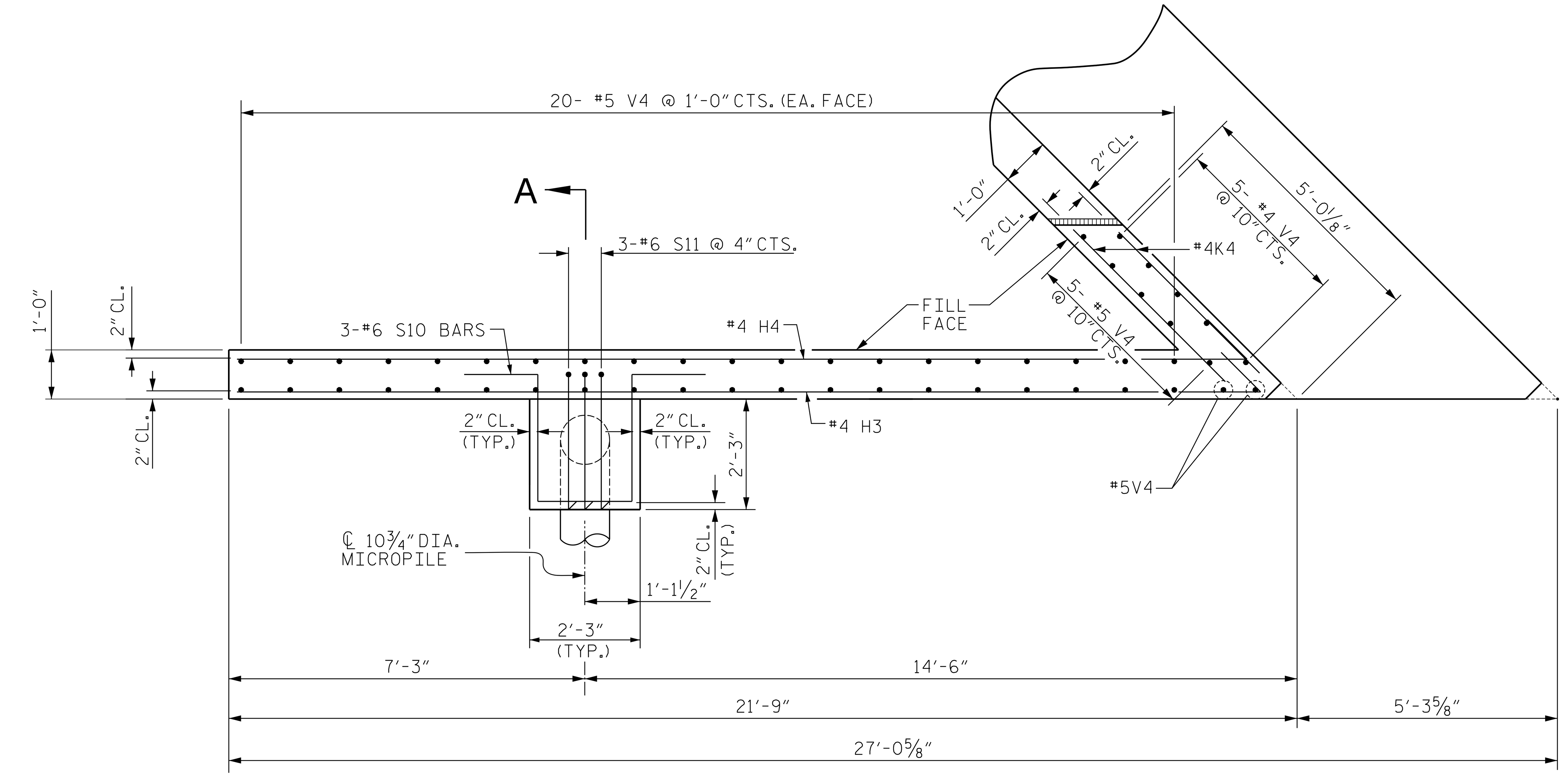
END BENT NO. 1
STAGE I
WING DETAILS

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

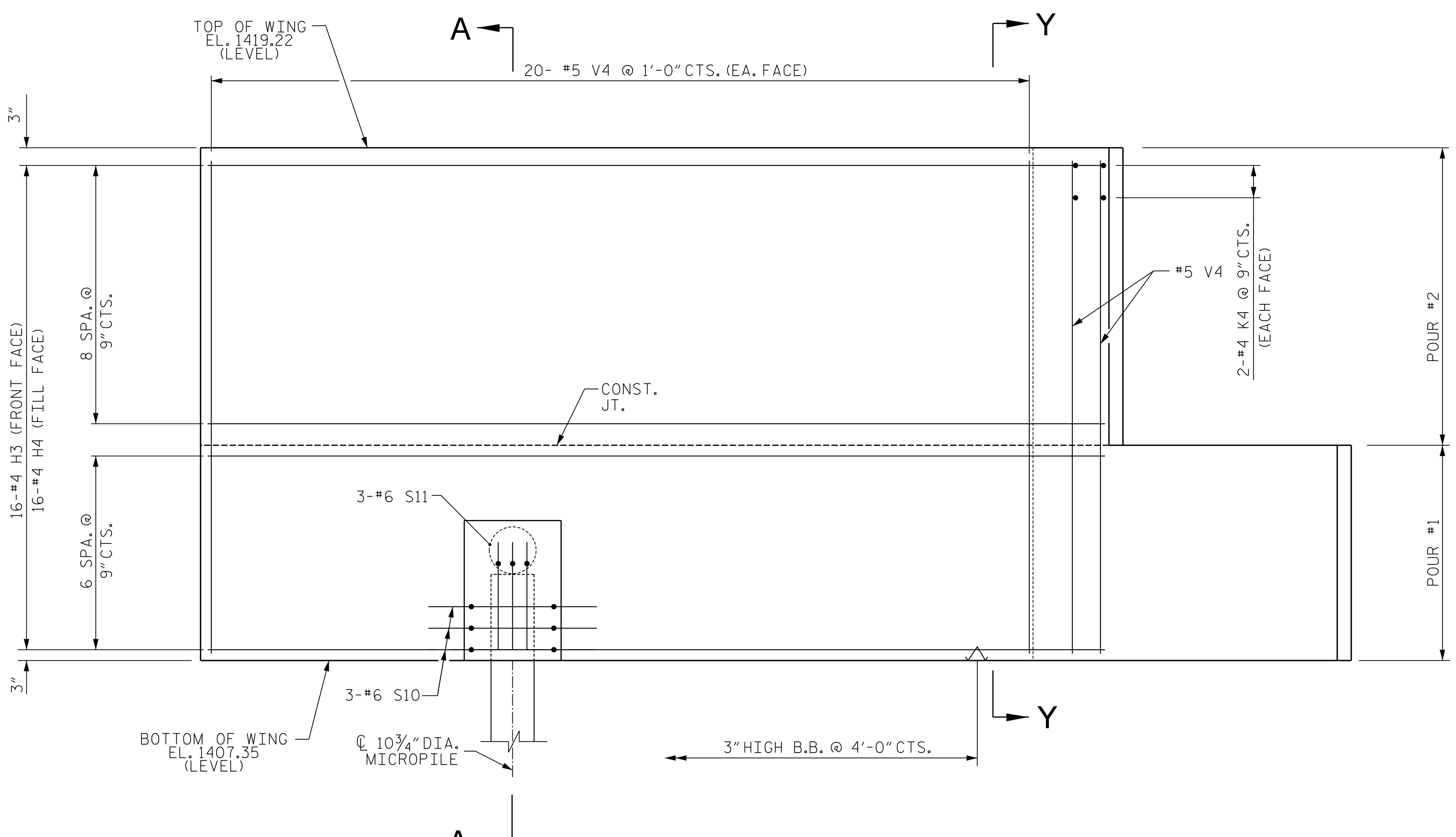
DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

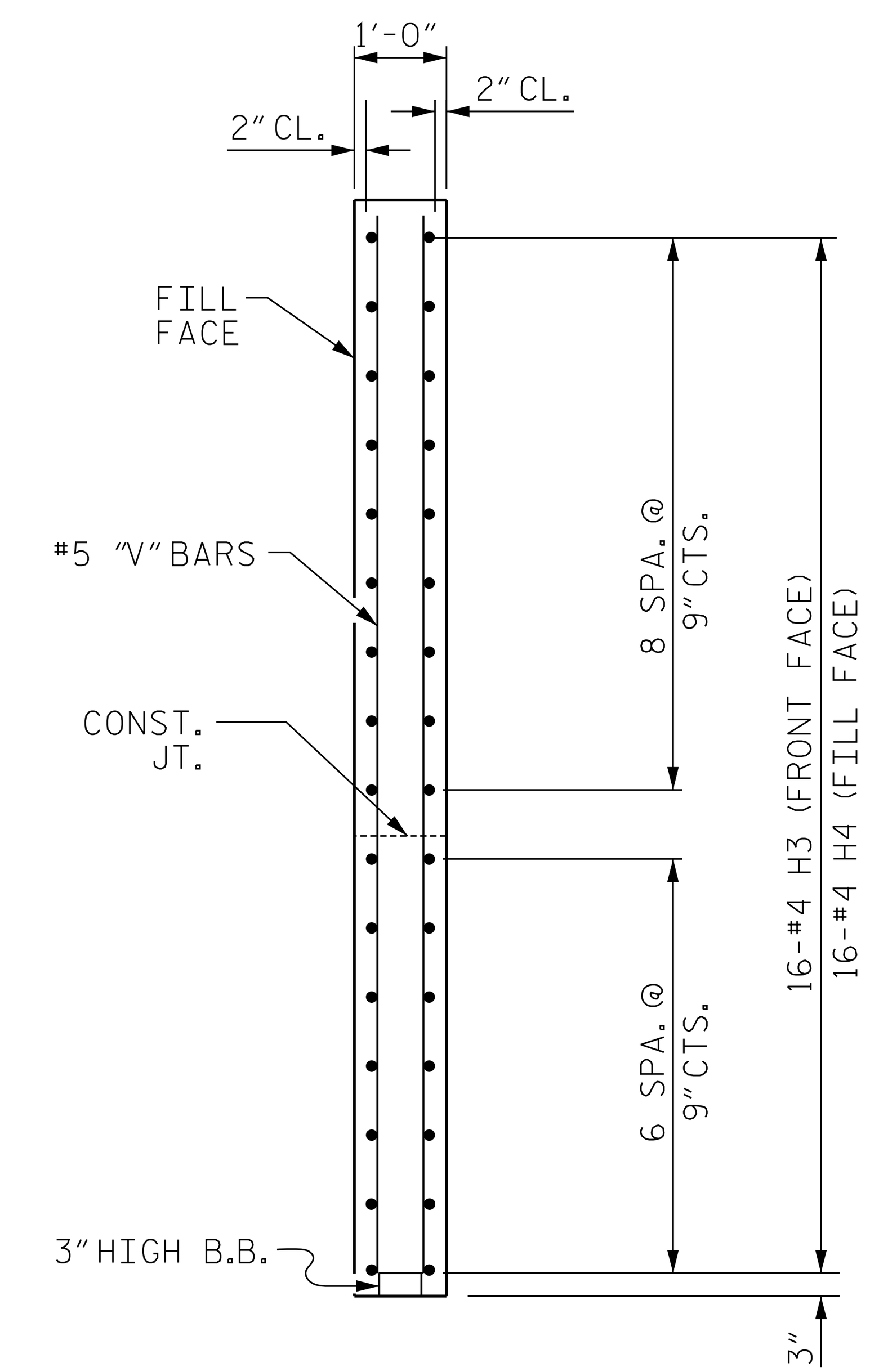
SHEET NO. S2-28
TOTAL SHEETS 40



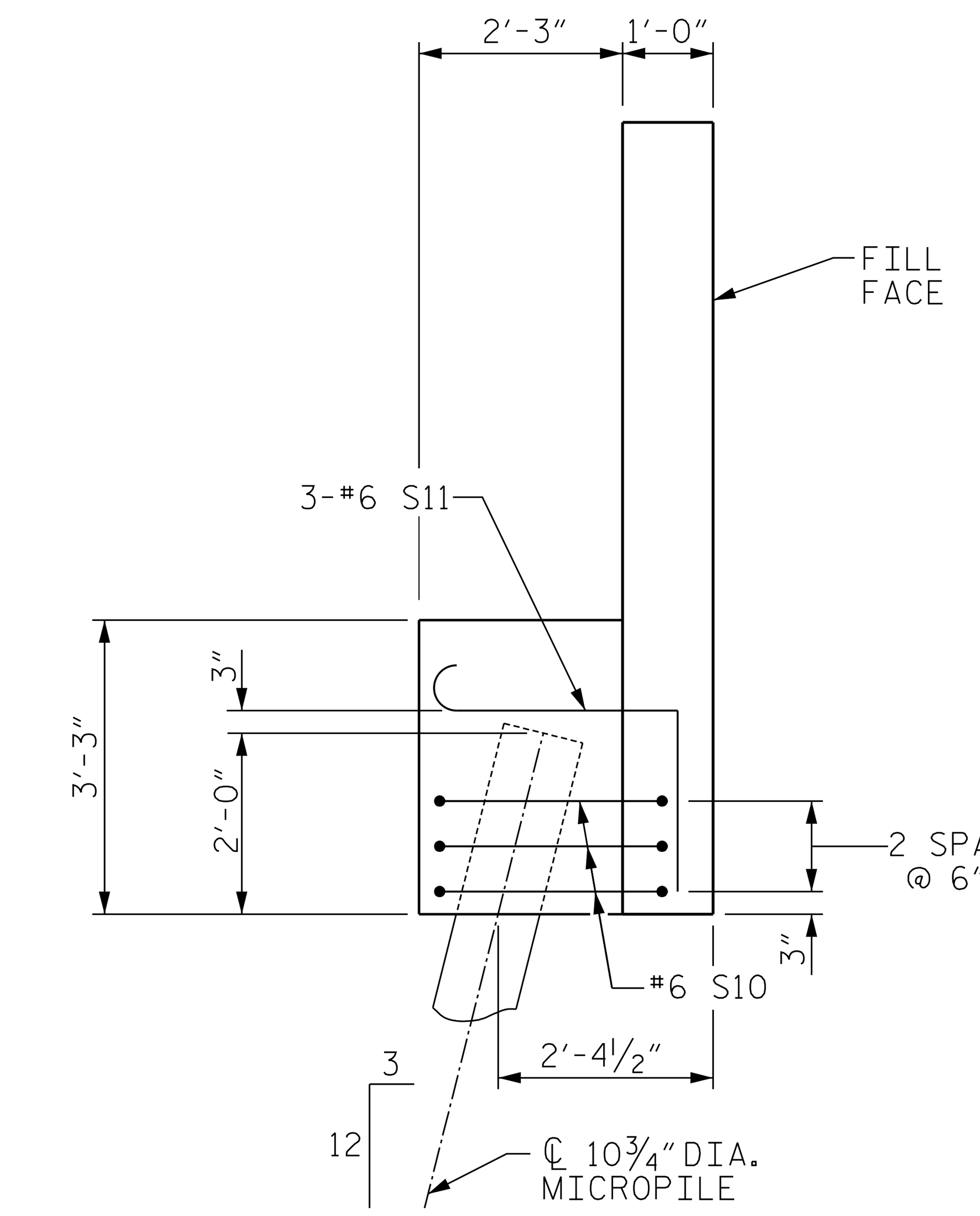
PLAN - WING (W2)



ELEVATION - WING (W2)



SECTION Y-Y



SECTION A-A

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 4 OF 6

DocuSigned by: [signature] 12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 1
STAGE II
WING DETAILS

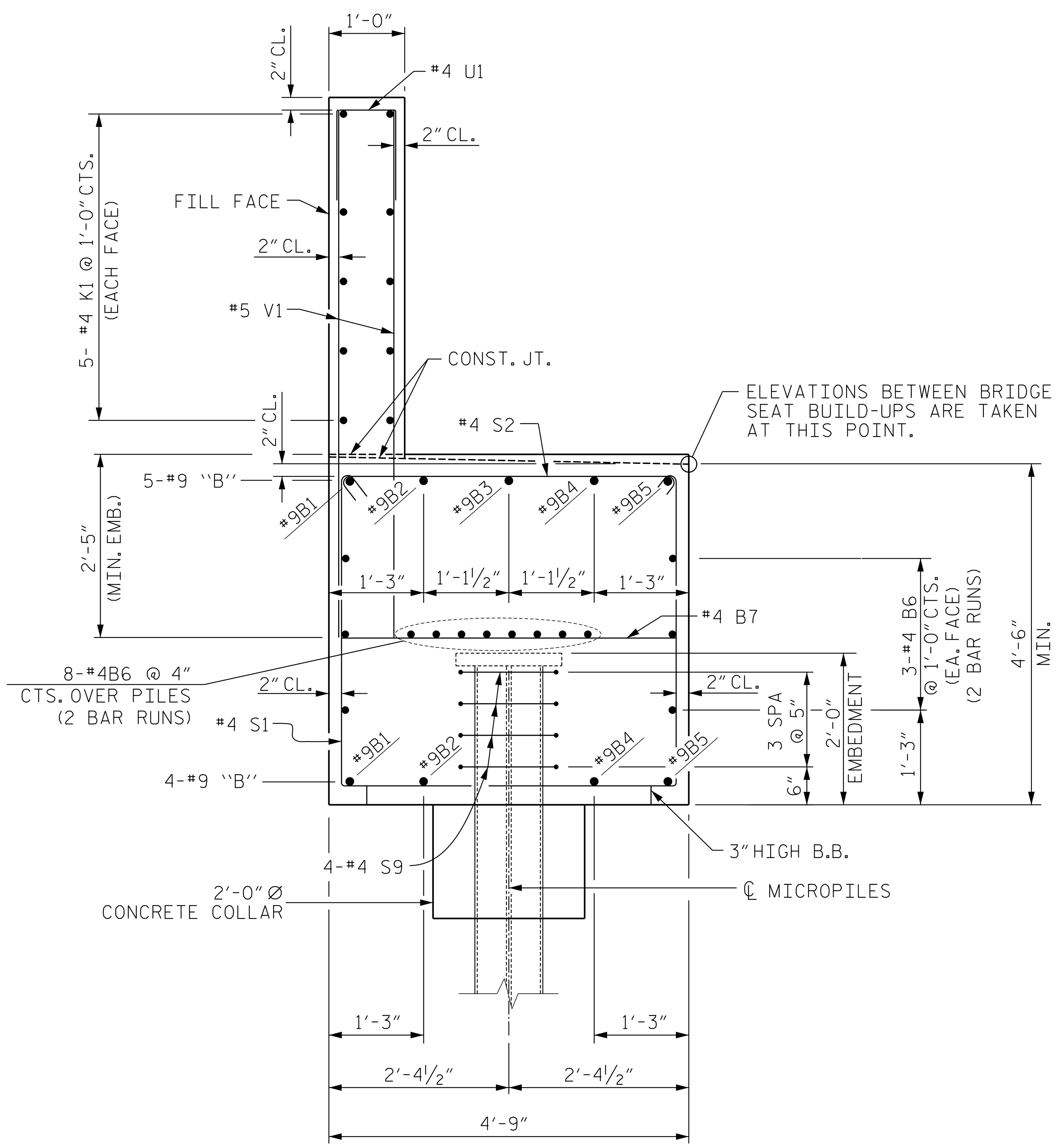
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC. 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

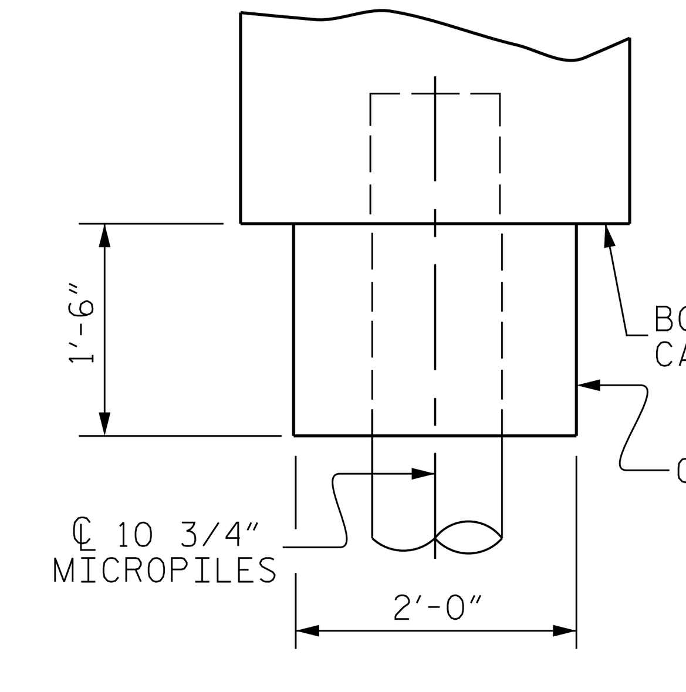
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S2-29

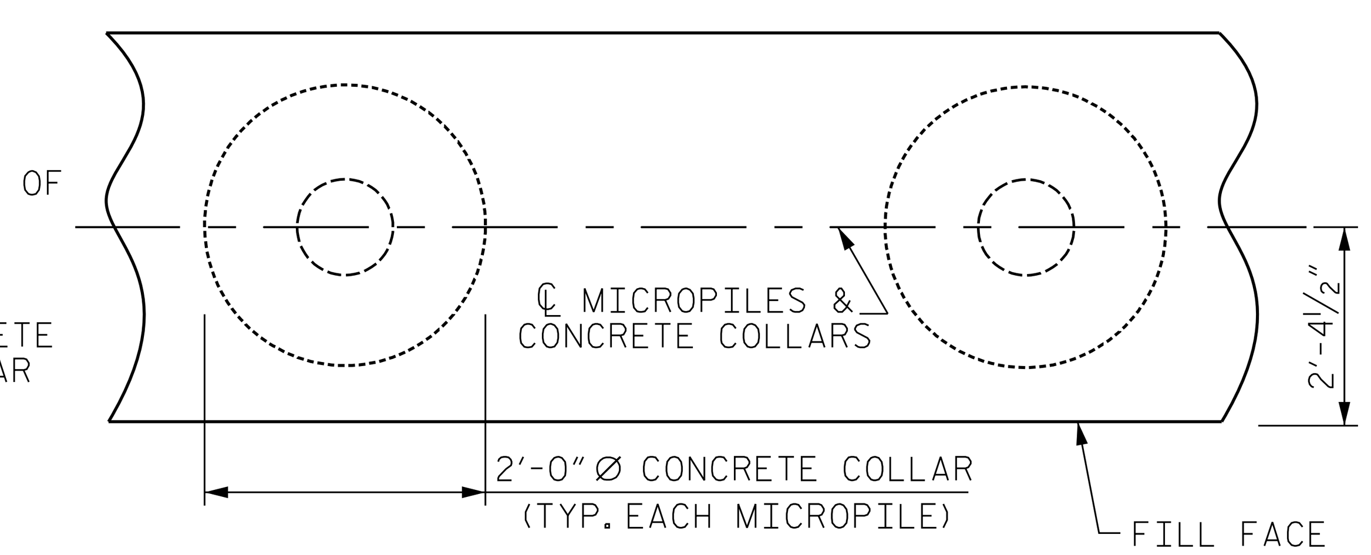
TOTAL SHEETS 40



SECTION A-A



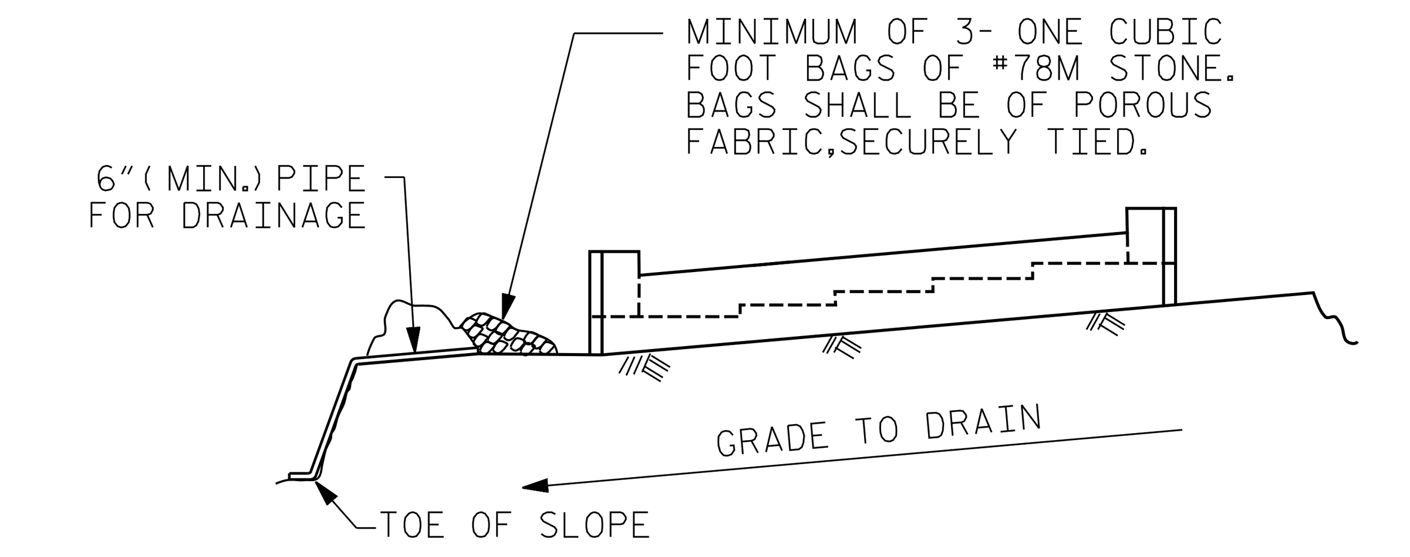
ELEVATION



PLAN

CORROSION PROTECTION FOR STEEL PILES DETAIL

(COLLAR NOT REQUIRED FOR WING BRACE PILE)

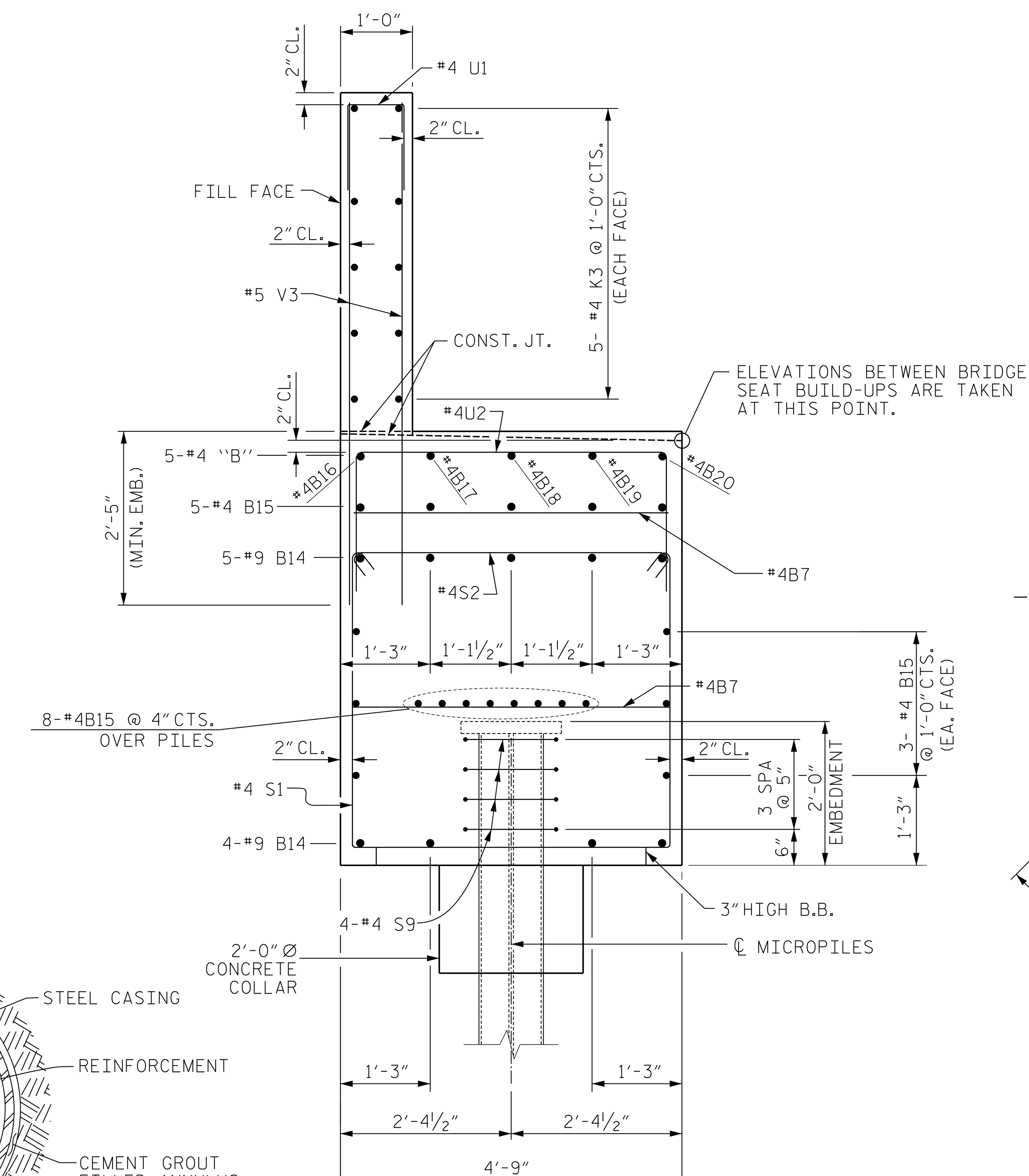


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

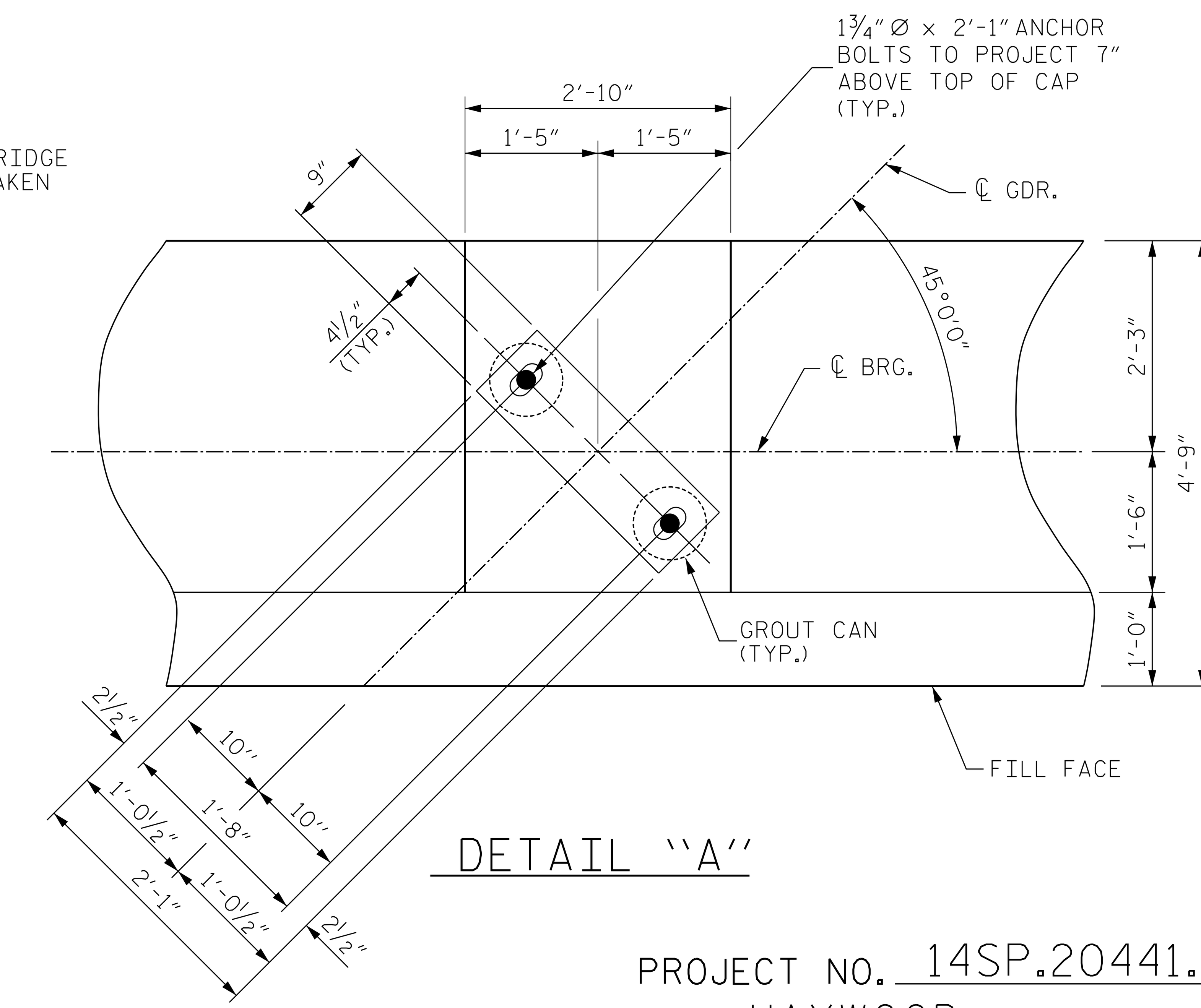
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

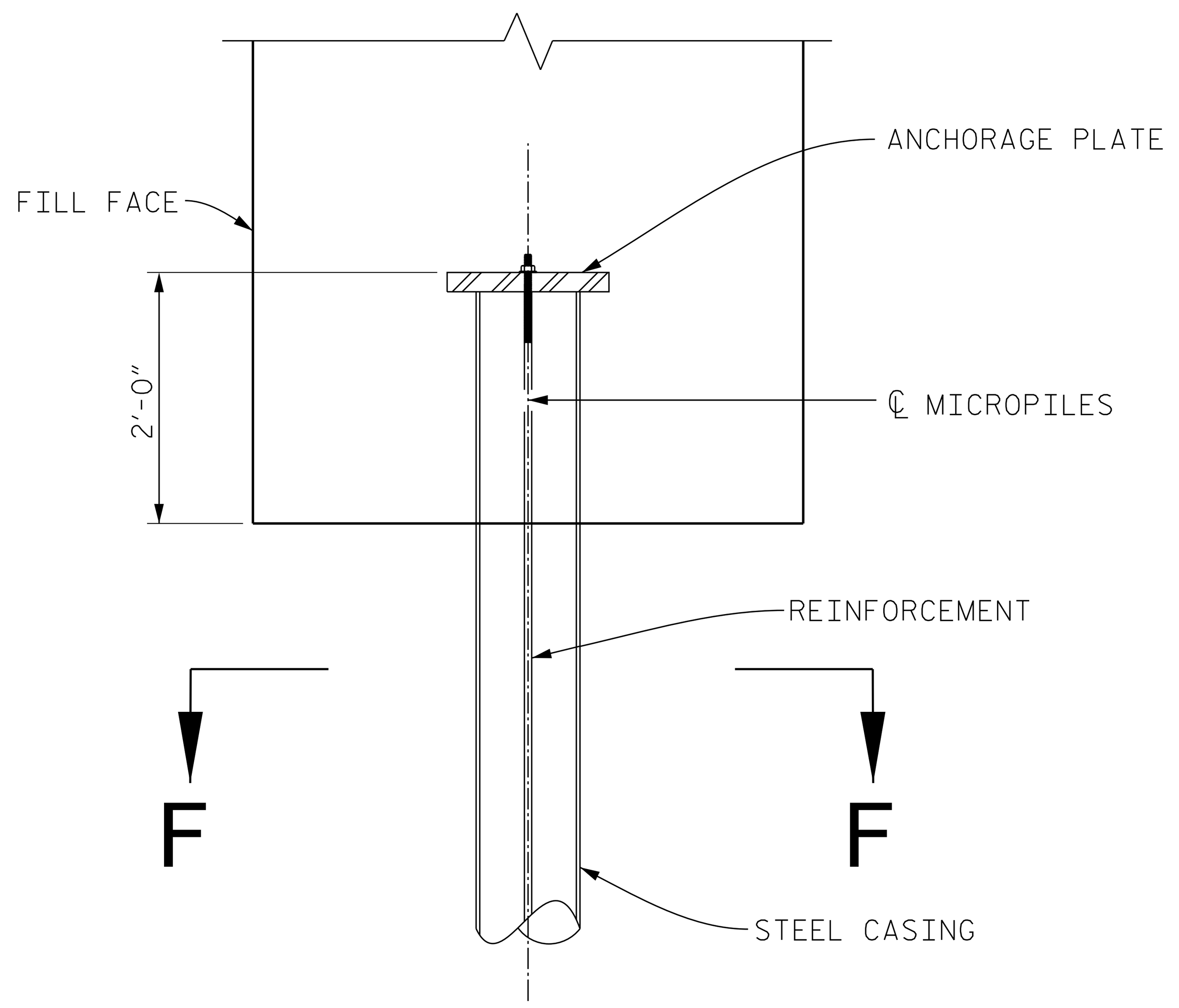


SECTION B-B

(C1 BARS NOT SHOWN FOR CLARITY)

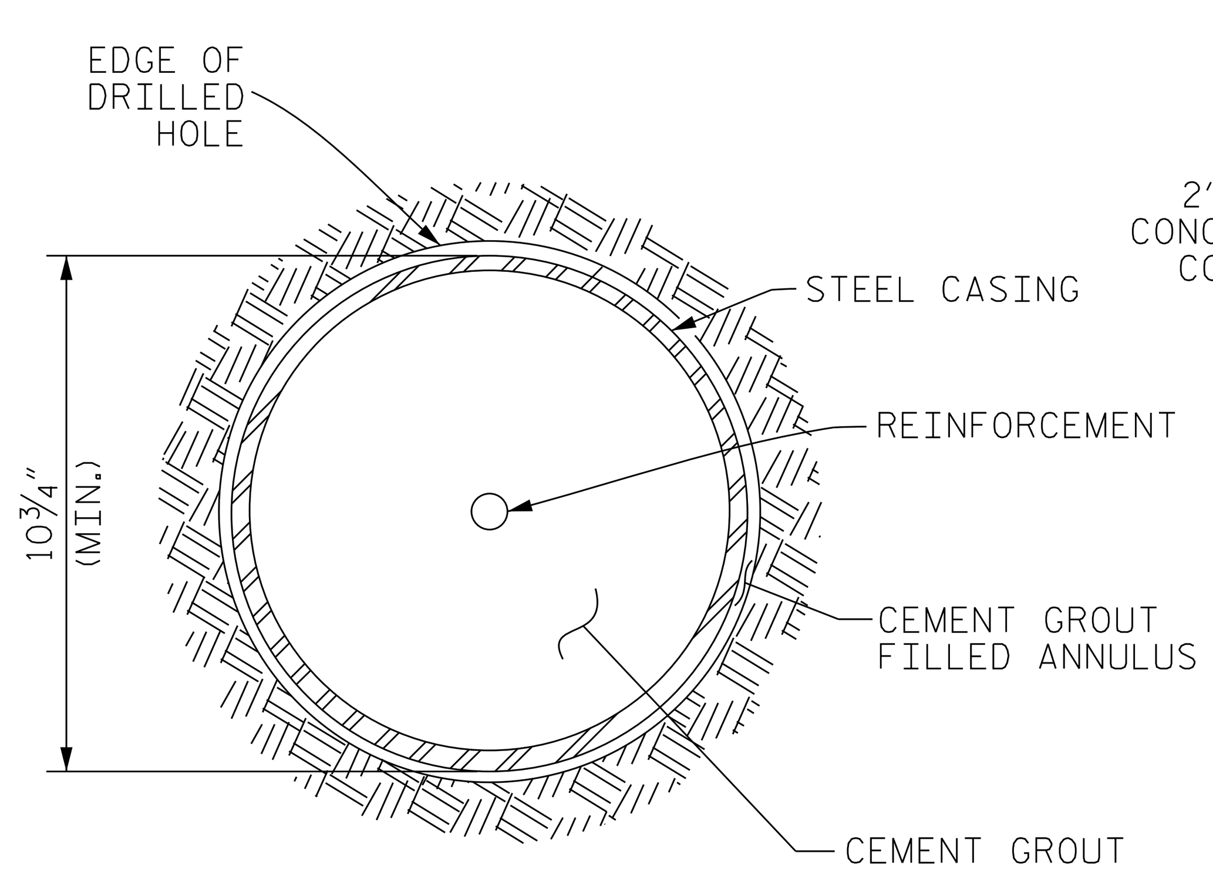


DETAIL "A"



MICROPILE DETAIL

(TYP. EACH MICROPILE)



SECTION F-F

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 5 OF 6

DocuSigned by: Hardy Willis

12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 1 DETAILS

JMT Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC. 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

SHEET NO. S2-30

TOTAL SHEETS 40

BILL OF MATERIAL FOR END BENT NO. 1

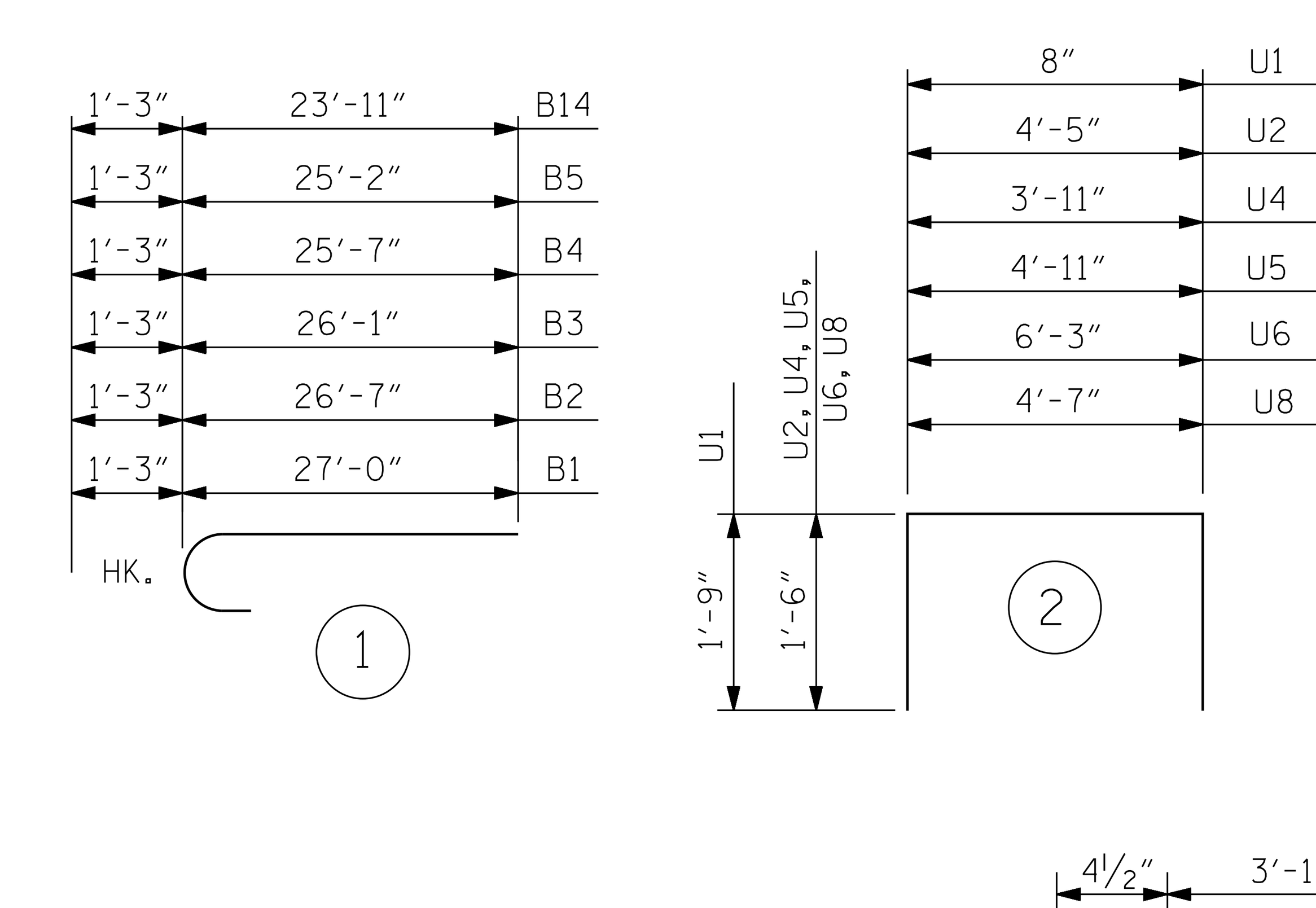
STAGE I

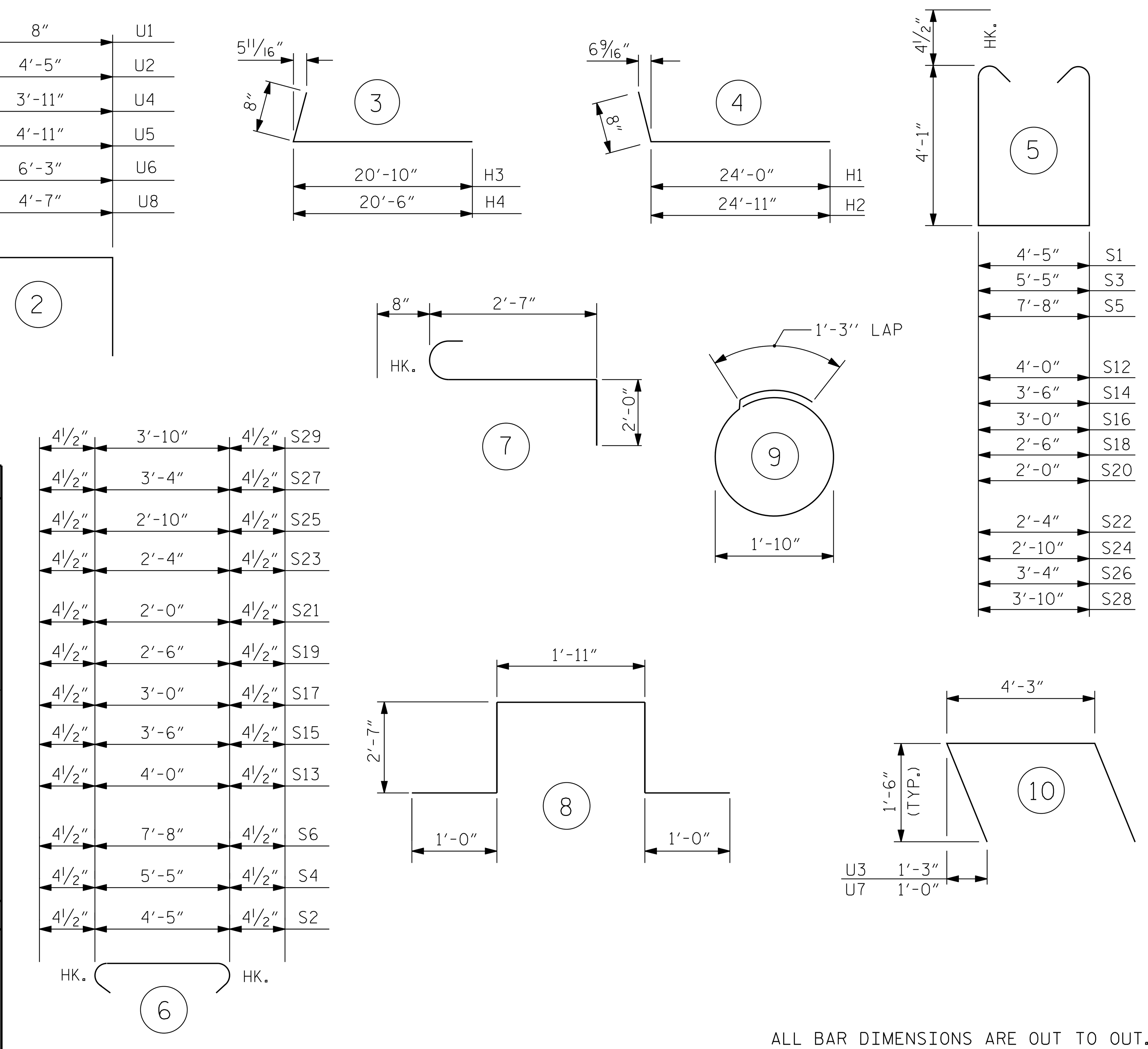
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	2	#9	1	28'-3"	192
B2	2	#9	1	27'-10"	189
B3	1	#9	1	27'-4"	93
B4	2	#9	1	26'-10"	182
B5	2	#9	1	26'-5"	180
B6	28	#4	STR	14'-9"	276
B7	6	#4	STR	4'-5"	18
B8	10	#4	STR	2'-6"	17
B9	1	#4	STR	1'-0"	1
B10	1	#4	STR	1'-10"	1
B11	1	#4	STR	3'-0"	2
B12	1	#4	STR	4'-1"	3
B13	1	#4	STR	5'-2"	3
H1	15	#5	4	24'-8"	386
H2	15	#5	4	25'-7"	402
K1	10	#4	STR	26'-10"	179
K2	4	#4	STR	6'-1"	16
S1	32	#4	5	13'-4"	285
S2	32	#4	6	5'-2"	110
S3	1	#4	5	14'-4"	10
S4	1	#4	6	6'-2"	4
S5	1	#4	5	16'-7"	11
S6	1	#4	6	8'-5"	6
S9	16	#4	9	7'-0"	75
S10	3	#6	8	9'-1"	41
S11	3	#6	7	5'-3"	24
S12	1	#4	5	12'-11'	8
S13	1	#4	6	4'-9"	3
S14	1	#4	5	12'-5"	8
S15	1	#4	6	4'-3"	3
S16	1	#4	5	11'-11"	8
S17	1	#4	6	3'-9"	3
S18	1	#4	5	11'-5"	7
S19	1	#4	6	3'-3"	2
S20	1	#4	5	10'-11"	7
S21	1	#4	6	2'-9"	2
U1	20	#4	2	4'-2"	56
U2	7	#4	2	7'-5"	35
U3	4	#4	10	7'-3"	19
U4	4	#4	2	6'-11"	18
U5	1	#4	2	7'-11"	5
U6	1	#4	2	9'-3"	6
V1	40	#5	STR	7'-3"	302
V2	63	#5	STR	11'-7"	761
REINFORCING STEEL STAGE I					3,959 LBS.

STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B7	9	#4	STR	4'-5"	27
B8	5	#4	STR	2'-6"	8
B14	9	#9	1	25'-2"	770
B15	19	#4	STR	24'-1"	306
B16	1	#4	STR	8'-0"	5
B17	1	#4	STR	9'-1"	6
B18	1	#4	STR	10'-3"	7
B19	1	#4	STR	11'-4"	8
B20	1	#4	STR	12'-3"	8
C1	9	#9	STR	5'-6"	168
H3	16	#4	3	21'-6"	230
H4	16	#4	3	21'-2"	226
K3	10	#4	STR	24'-1"	161
K4	4	#4	STR	4'-2"	11
S1	31	#4	5	13'-4"	276
S2	31	#4	6	5'-2"	107
S7	1	#4	5	15'-2"	10
S8	1	#4	6	7'-0"	5
S9	16	#4	9	7'-0"	75
S10	3	#6	8	9'-1"	41
S11	3	#6	7	5'-3"	24
S22	1	#4	5	11'-3"	8
S23	1	#4	6	3'-1"	2
S24	1	#4	5	11'-9"	8
S25	1	#4	6	3'-7"	2
S26	1	#4	5	12'-3"	8
S27	1	#4	6	4'-1"	3
S28	1	#4	5	12'-9"	9
S29	1	#4	6	4'-7"	3
U1	18	#4	2	4'-2"	50
U2	16	#4	2	7'-5"	79
U6	2	#4	2	9'-3"	12
U7	4	#4	10	7'-3"	19
U8	4	#4	2	7'-7"	20
V3	36	#5	STR	7'-6"	282
V4	52	#5	STR	11'-5"	619
REINFORCING STEEL STAGE II					3,603 LBS.

BAR TYPES





CLASS A CONCRETE BREAKDOWN

STAGE I		
POUR #1	CAP, LOWER PART OF WING, AND CONCRETE COLLARS	27.4 C.Y.
POUR #2	BACKWALL AND UPPER PART OF WING	10.8 C.Y.
STAGE I CLASS A CONCRETE		38.2 C.Y.
STAGE II		
POUR #1	CAP, LOWER PART OF WING, AND CONCRETE COLLARS	26.5 C.Y.
POUR #2	BACKWALL AND UPPER PART OF WING	9.7 C.Y.
STAGE II CLASS A CONCRETE		36.2 C.Y.

10¾" DIA. MICROPILES

STAGE I	STAGE II
* NO.: 5	* NO.: 5

*INCLUDES WINGWALL MICROPILES

TOTAL QUANTITIES FOR END BENT 1

REINFORCING STEEL	7,562 LBS.
CLASS A CONCRETE	74.4 C.Y.
10¾" DIA. MICROPILES	NO. 10

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 6 OF 6

DocuSigned by: Hardy Willis

12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 1
BILL OF MATERIAL

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

REVISIONS

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

SHEET NO. S2-31

TOTAL SHEETS 40

NOTES:

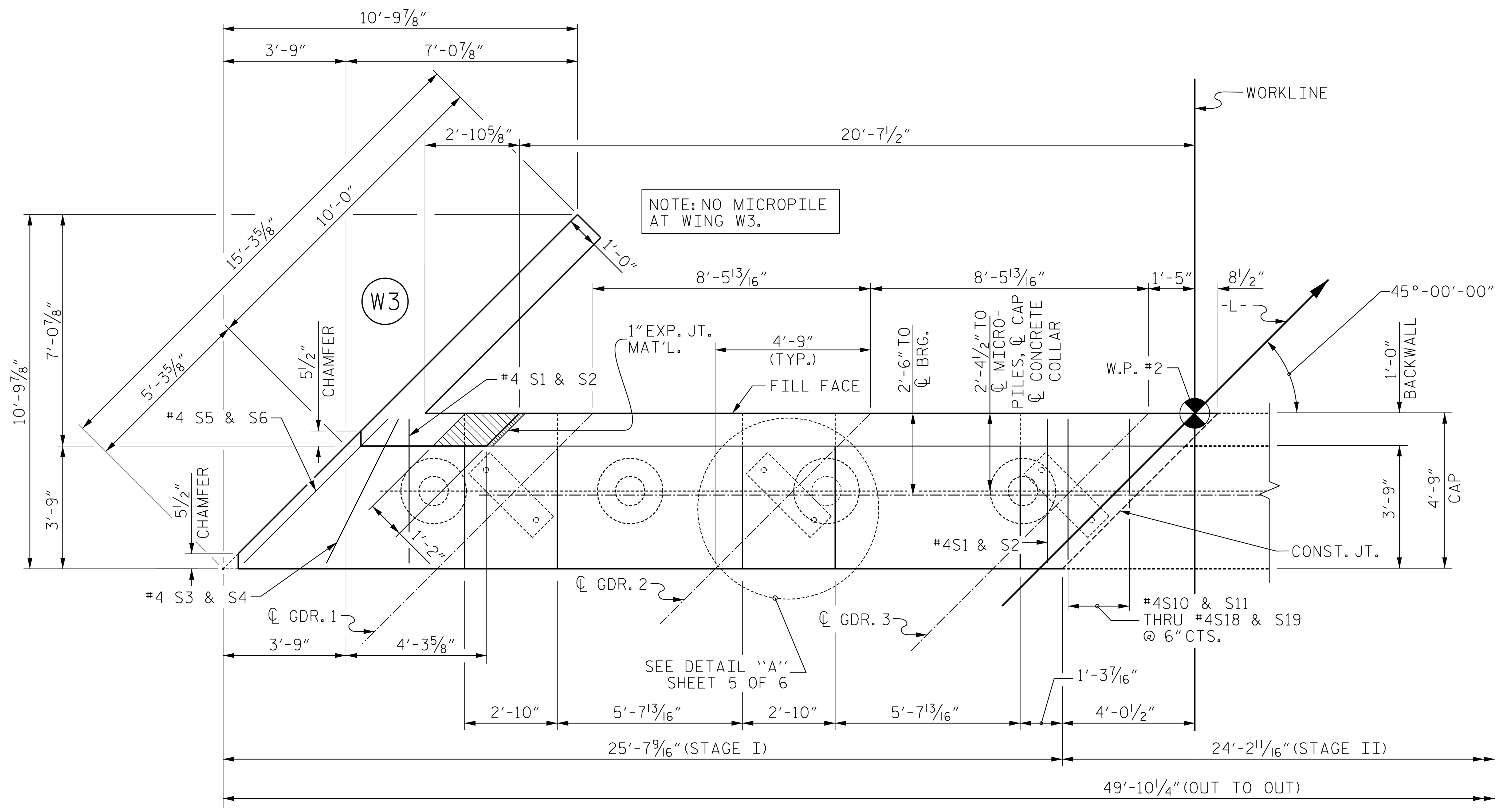
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

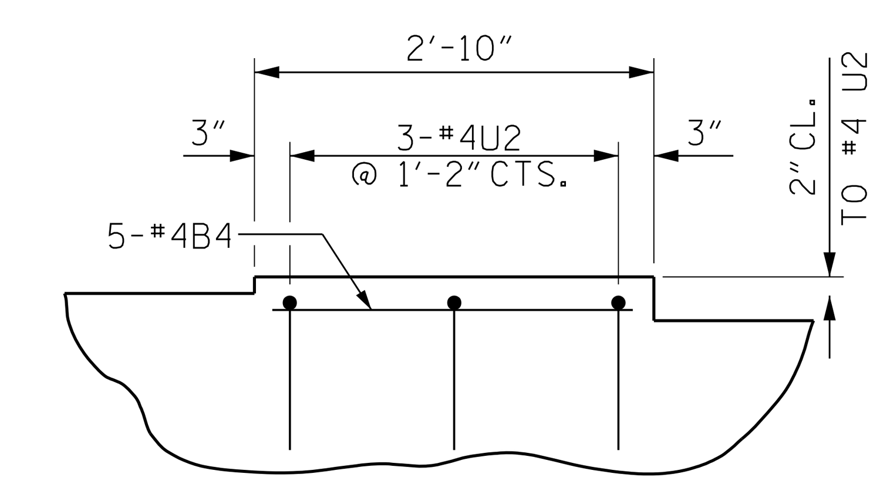
THE TOP SURFACE OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANCE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

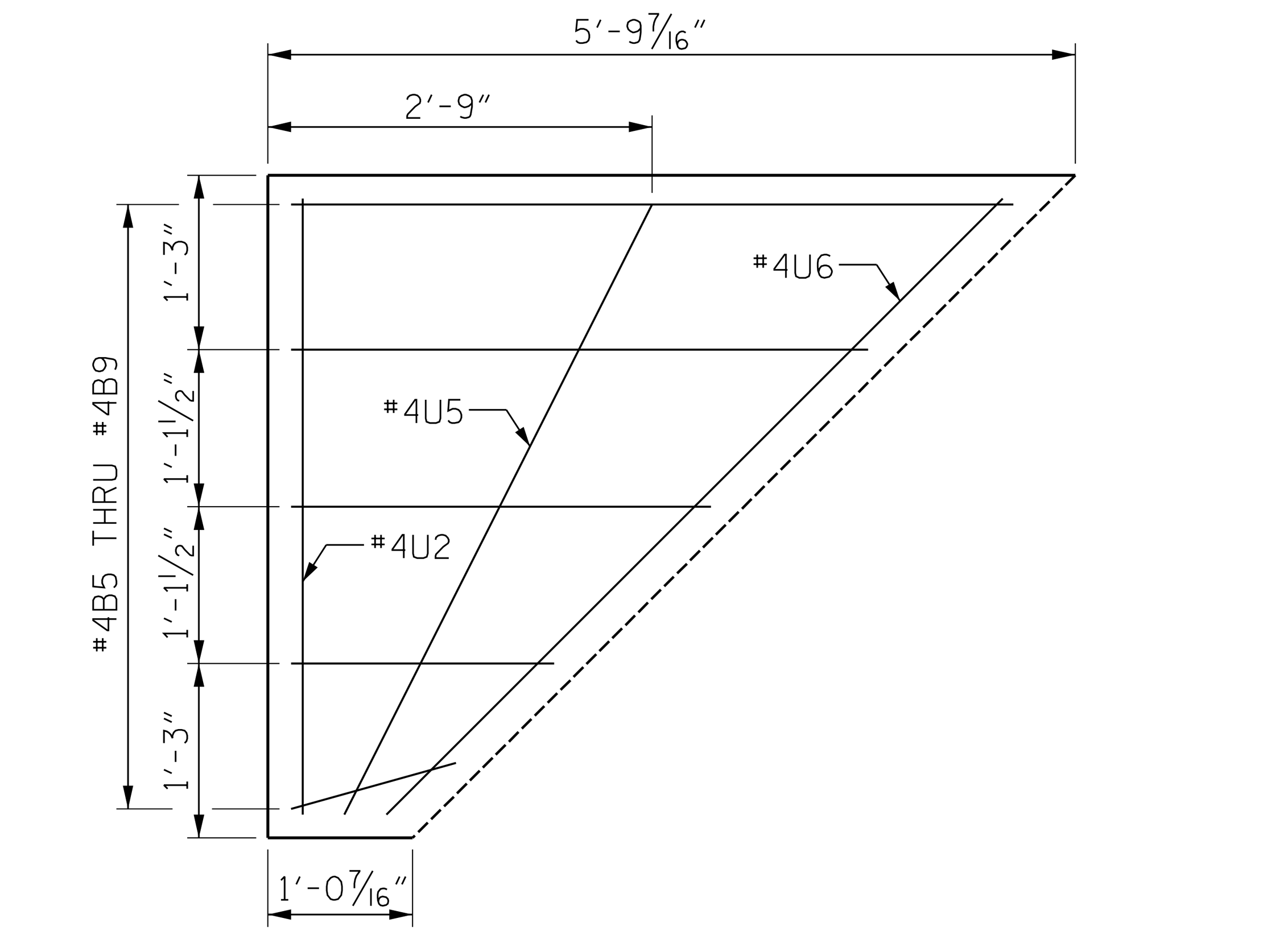
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND APPROACH SLAB HAS BEEN SAWED AND THE PARAPET IS CAST IF SLIP FORMING IS USED.



PLAN

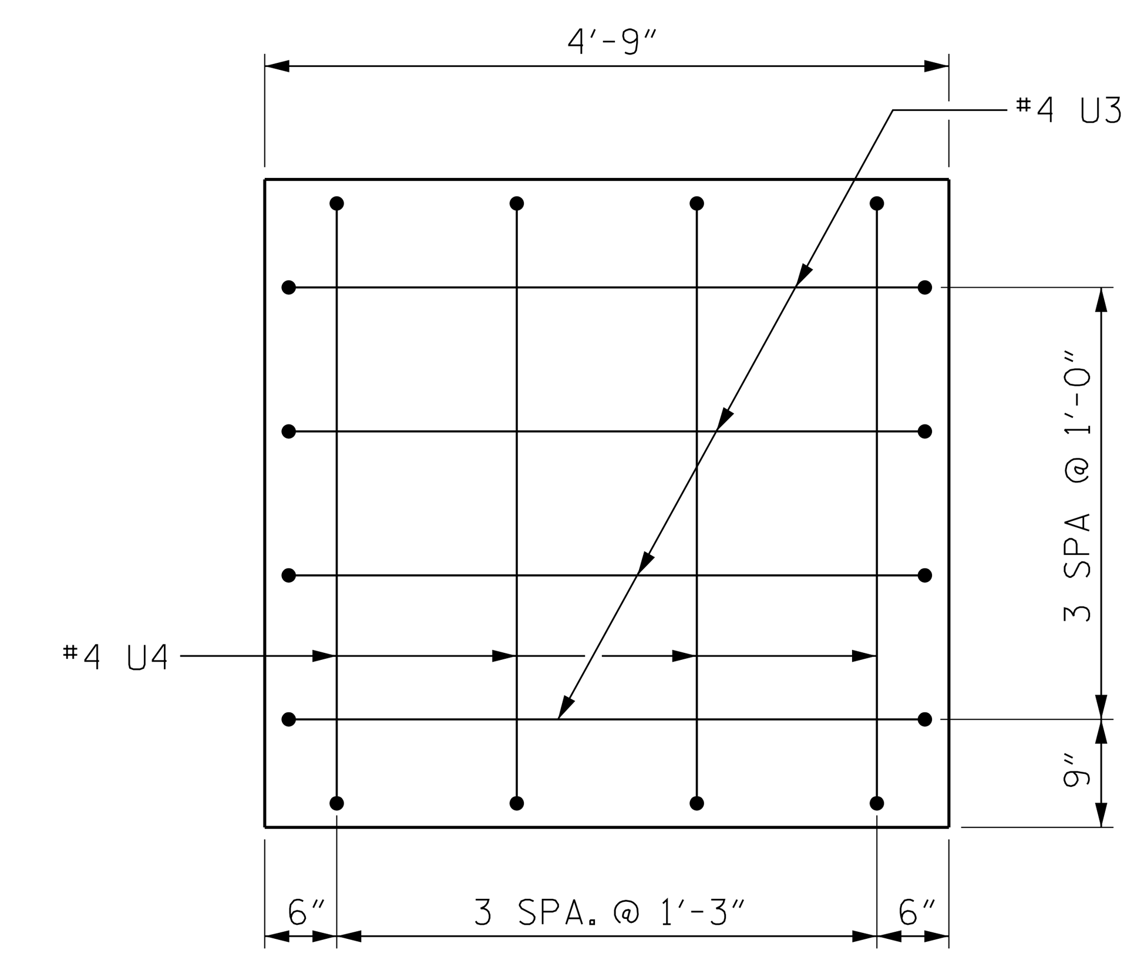


DETAIL "B"

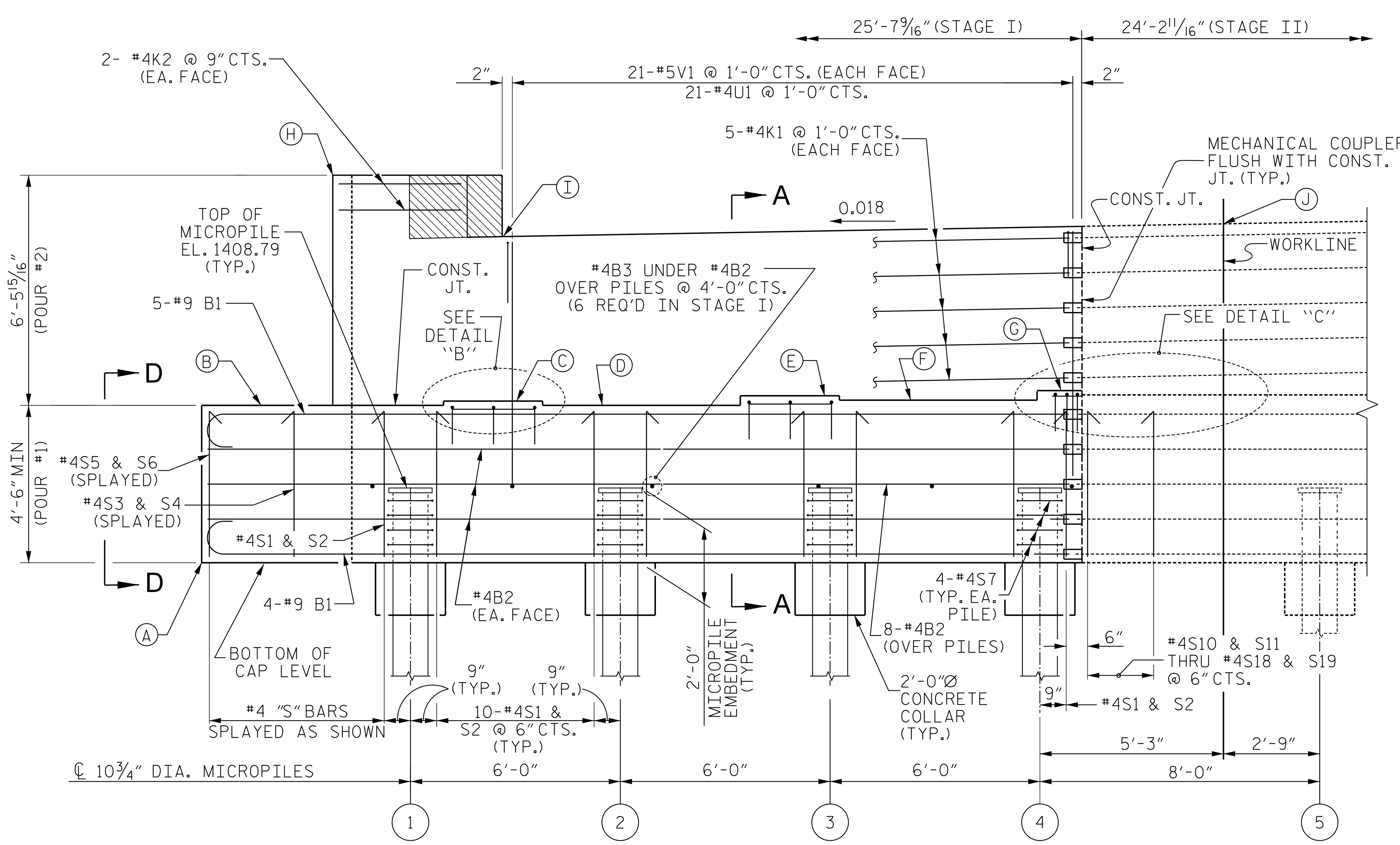


DETAIL "C"

ELEVATIONS	
LOCATION	ELEV.
A	1406.79
B	1411.29
C	1411.41
D	1411.29
E	1411.56
F	1411.44
G	1411.71
H	1417.61
I	1415.94
J	1416.31



VIEW D-D



ELEVATION

WING NOT SHOWN FOR CLARITY.
(SEE SHEET 5 OF 6 FOR MICROPILE CONCRETE COLLARS)

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 6

DocuSigned by: Hardy L. Willis — NORTH CAROLINA PROFESSIONAL ENGINEER — 12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 2
STAGE I

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

SHEET NO. S2-32
TOTAL SHEETS 40

NOTES:

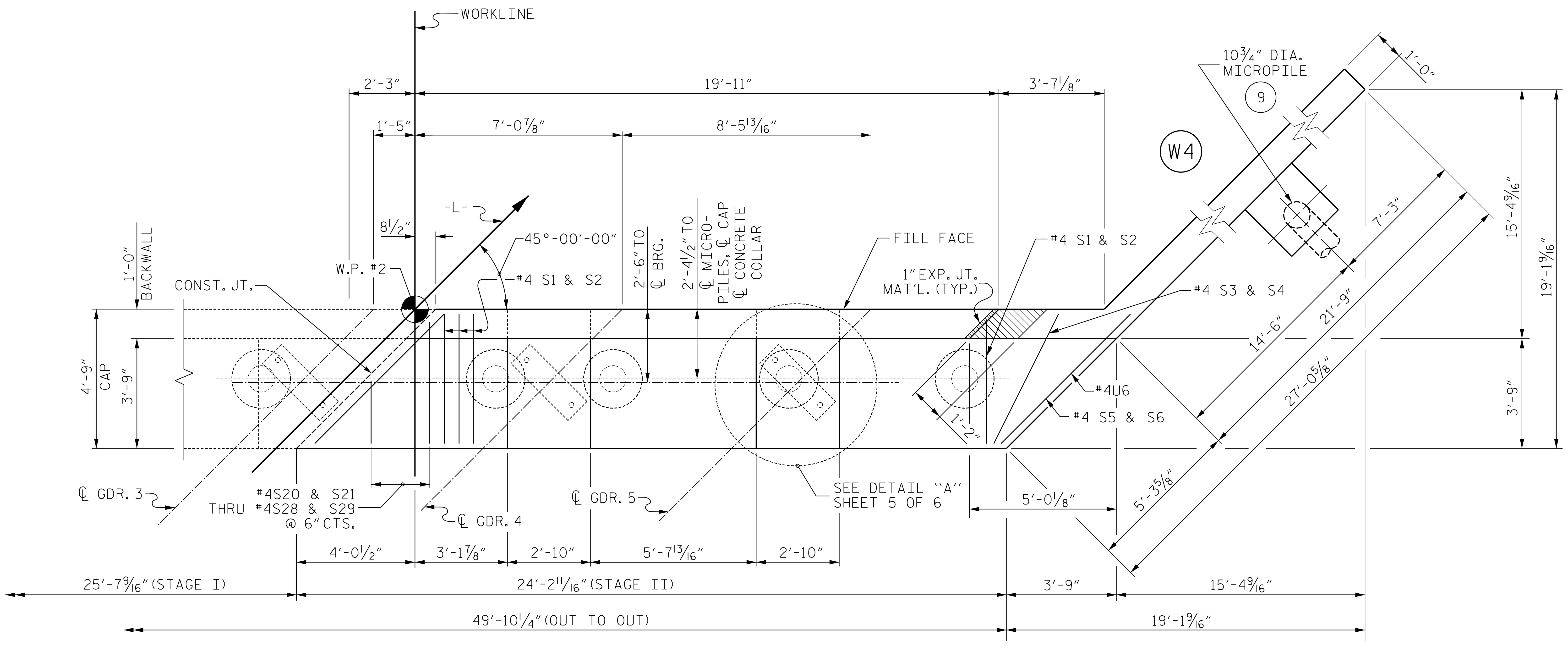
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

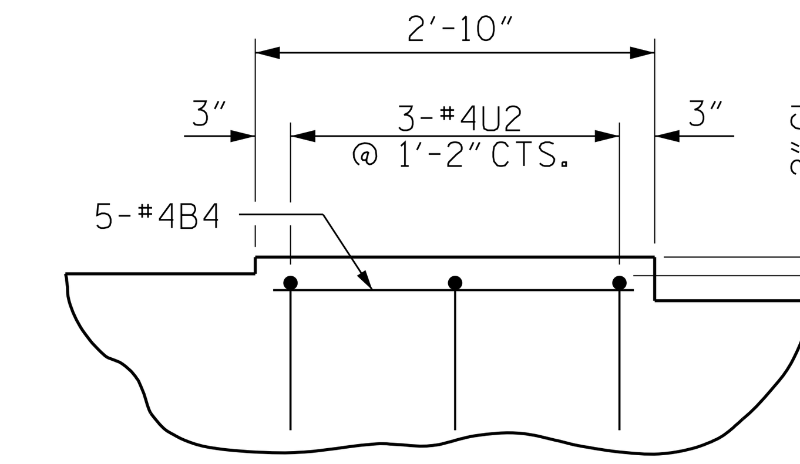
THE TOP SURFACE OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANCE CURING COMPOUND METHOD SHALL NOT BE USED.

THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

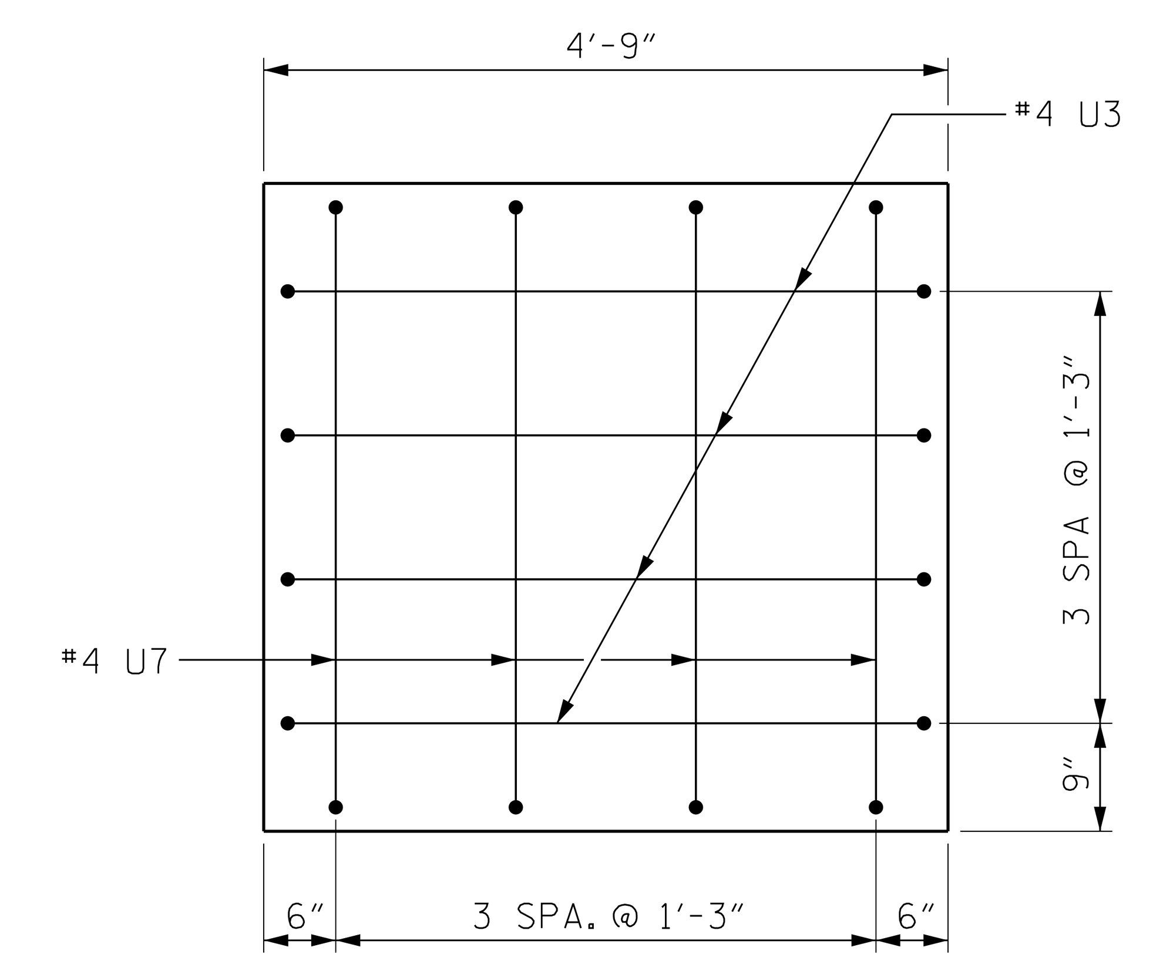
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND APPROACH SLAB HAS BEEN SAWED AND THE PARAPET IS CAST IF SLIP FORMING IS USED.



PLAN

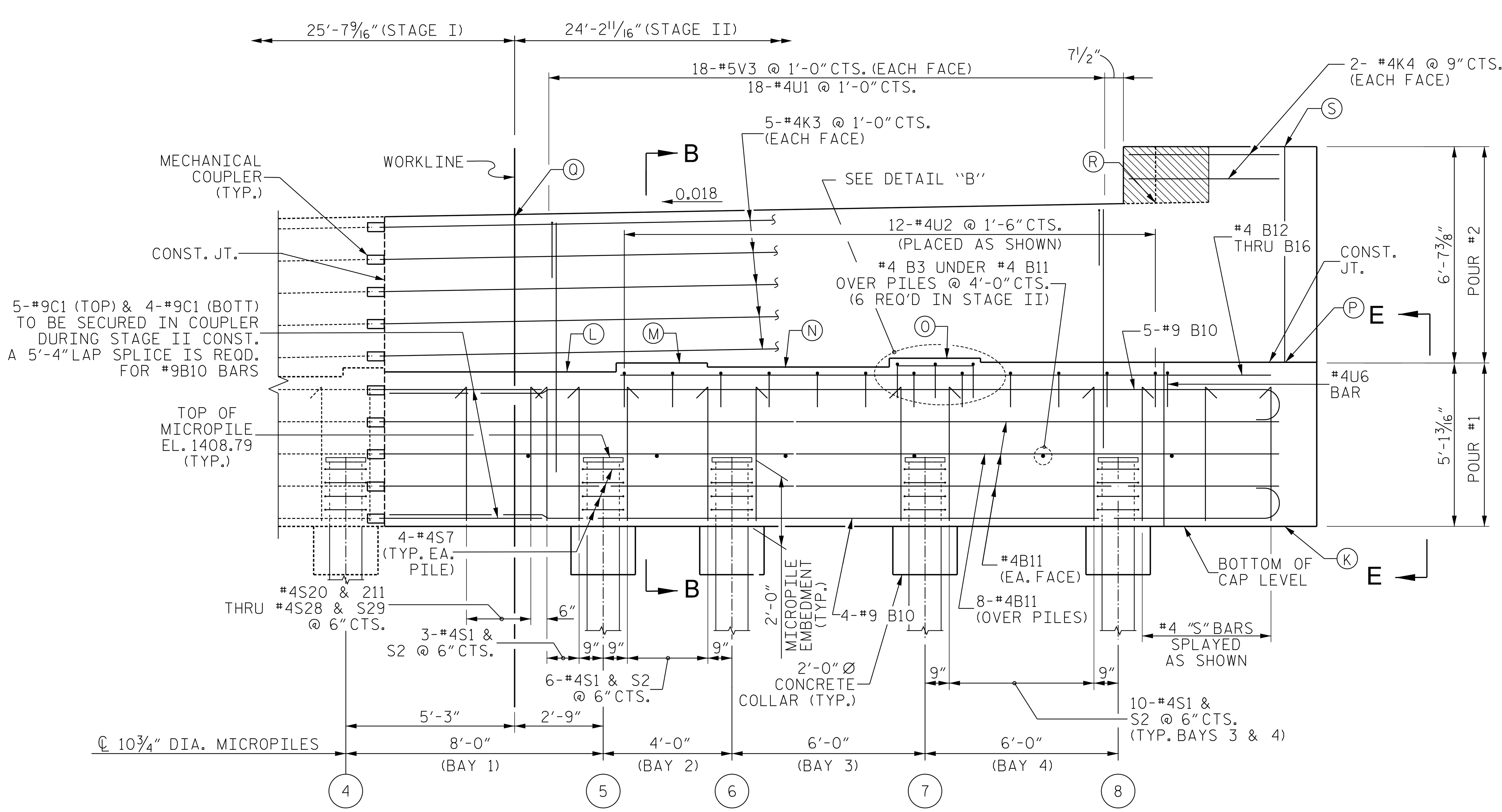


DETAIL "B"



VIEW E-E

ELEVATIONS	
LOCATION	ELEV.
K	1406.79
L	1411.59
M	1411.86
N	1411.74
O	1412.01
P	1411.89
Q	1416.31
R	1416.67
S	1418.34



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
(SEE SHEET 5 OF 6 FOR MICROPILE CONCRETE COLLARS)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: Hardy Willis
12/13/2023

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

SHEET 2 OF 6

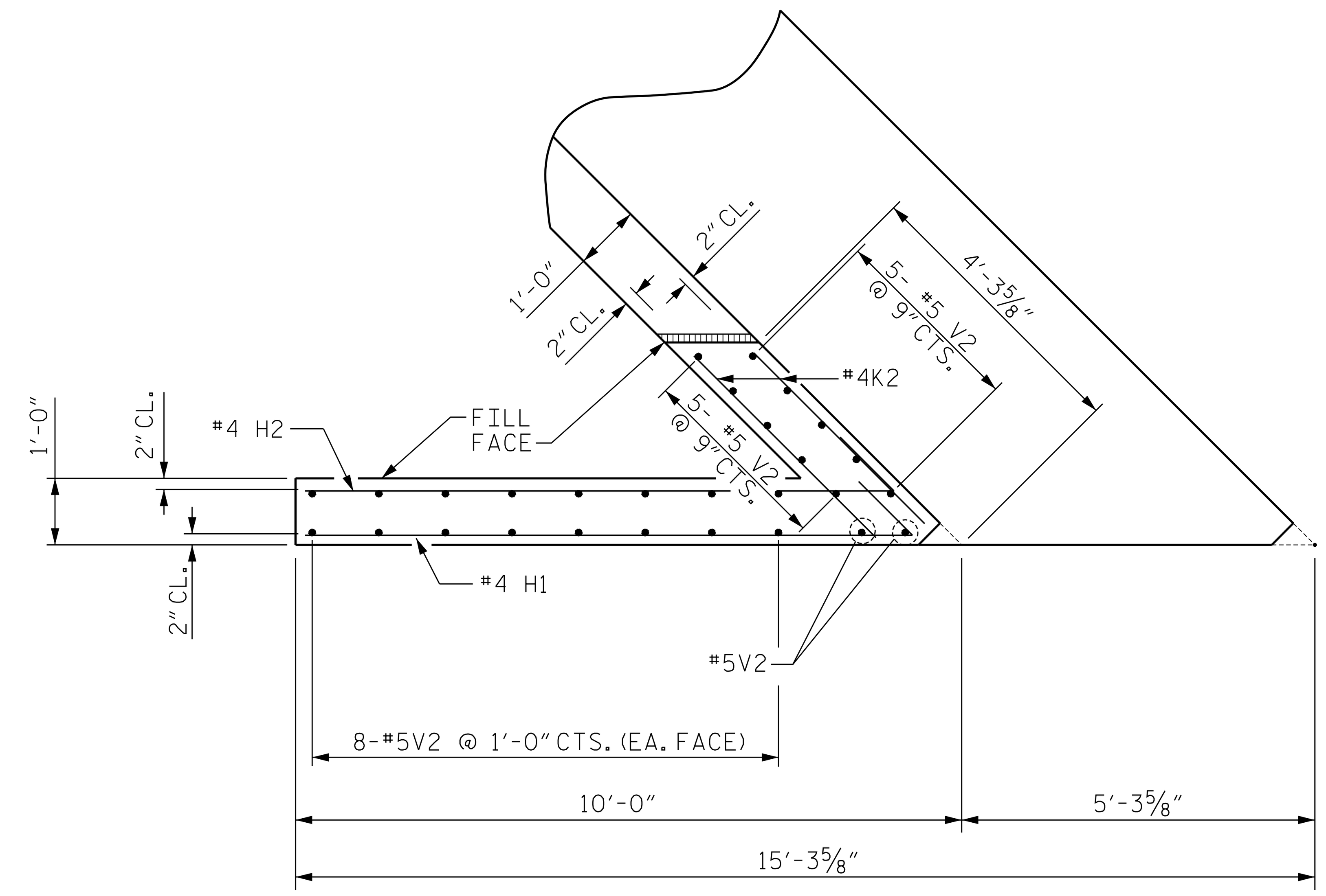
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 2
STAGE II

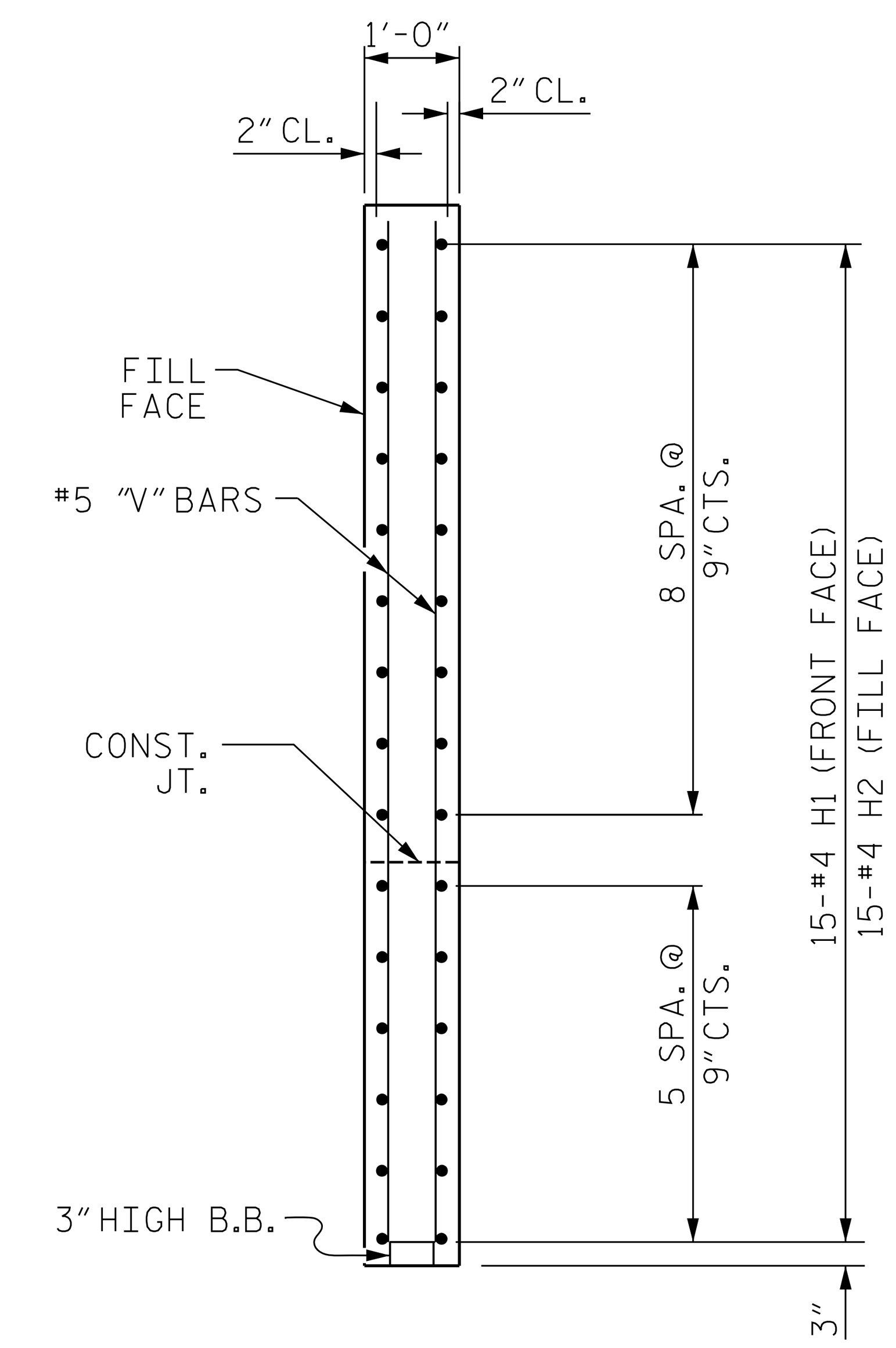
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW DATE: 03/18
CHKD. BY: HLW DATE: 03/18
DES. EGR. OF RECORD: CBC DATE: 03/18

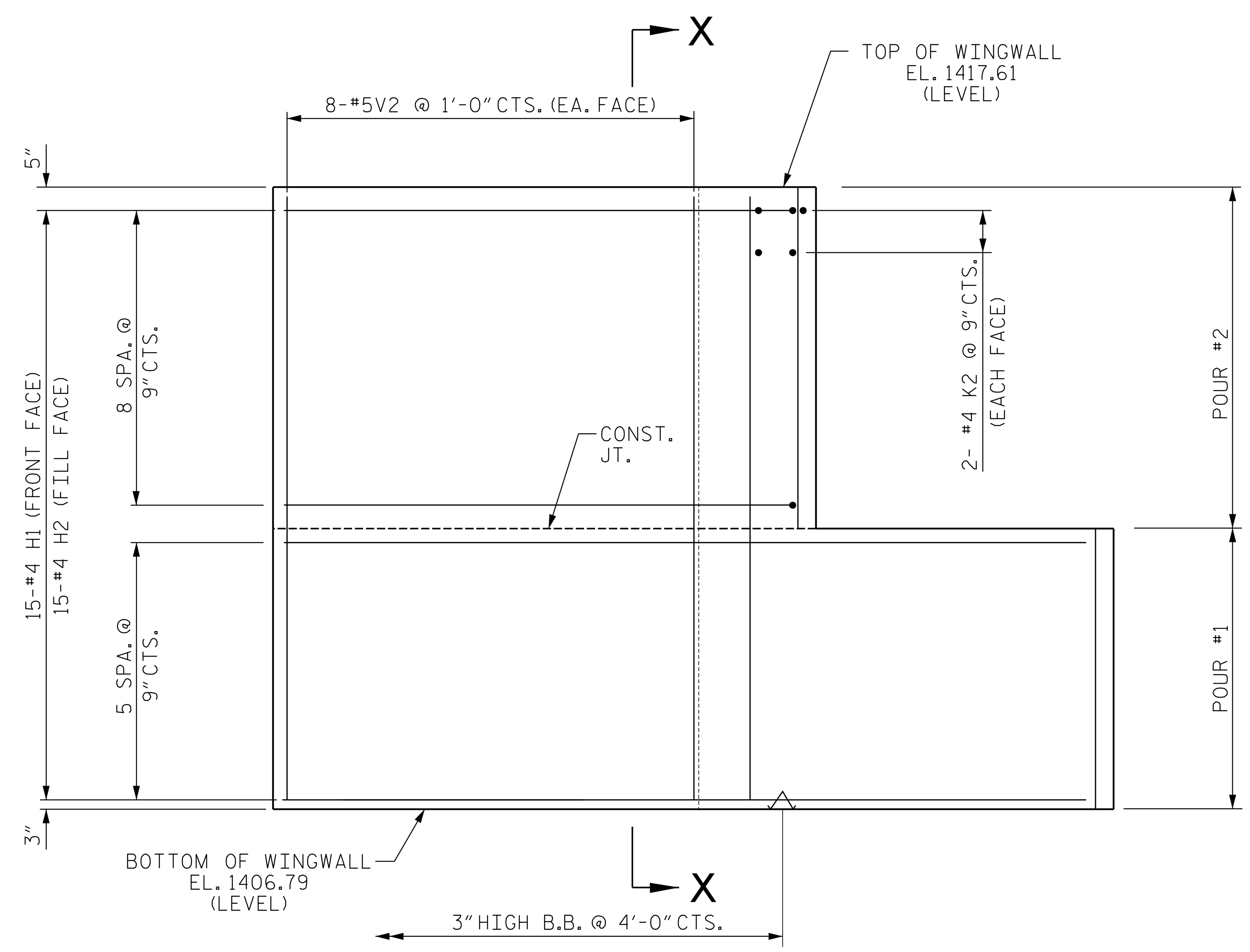
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-33
1			3			TOTAL SHEETS	40
2			4				



PLAN - WING (W3)



SECTION X-X



ELEVATION - WING (W3)

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 2
STAGE I
WING DETAILS

DocuSigned by: Hardy Willis — SEAL — NORTH CAROLINA PROFESSIONAL ENGINEER — HARDY L. WILLIS
12/13/2023

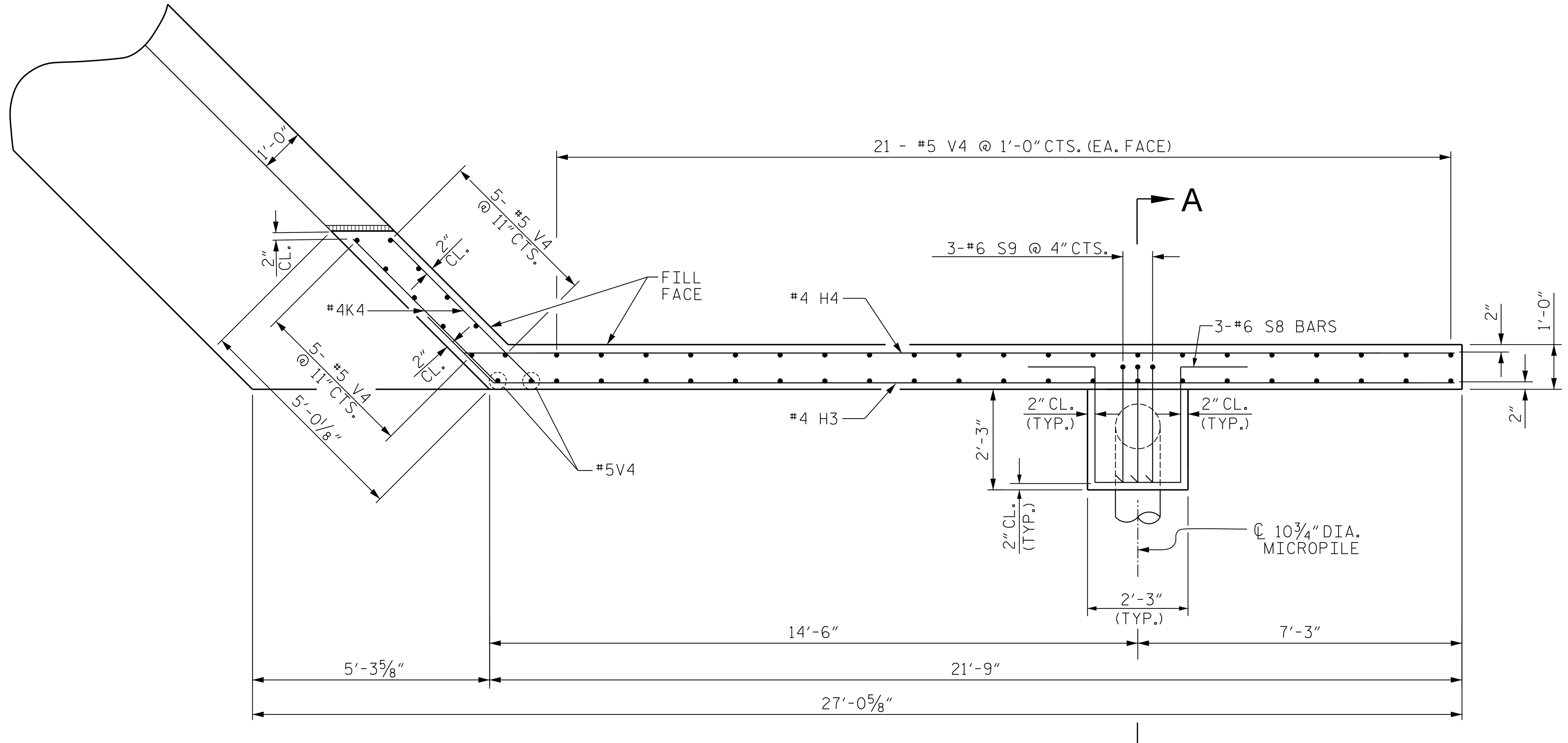
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

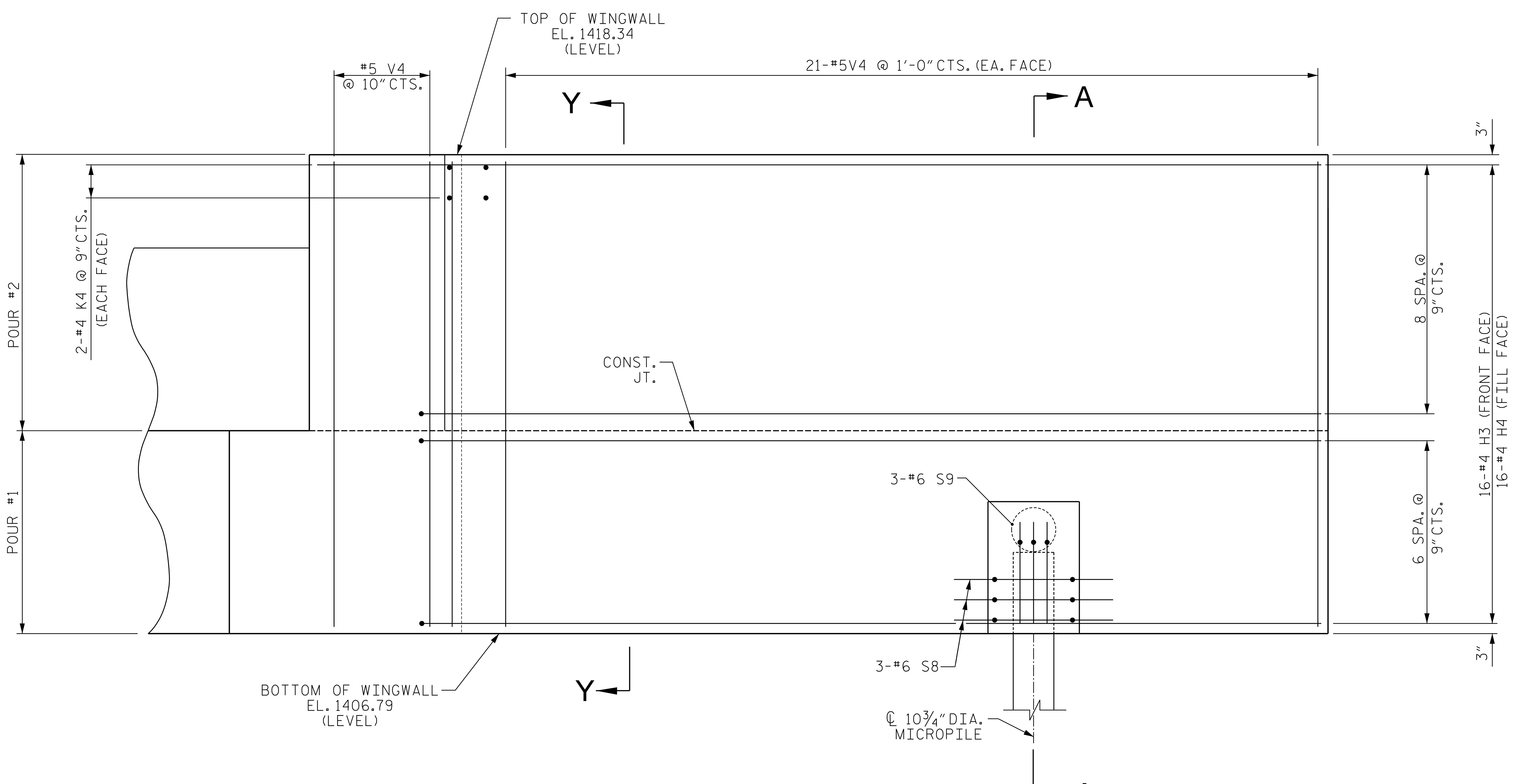
DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

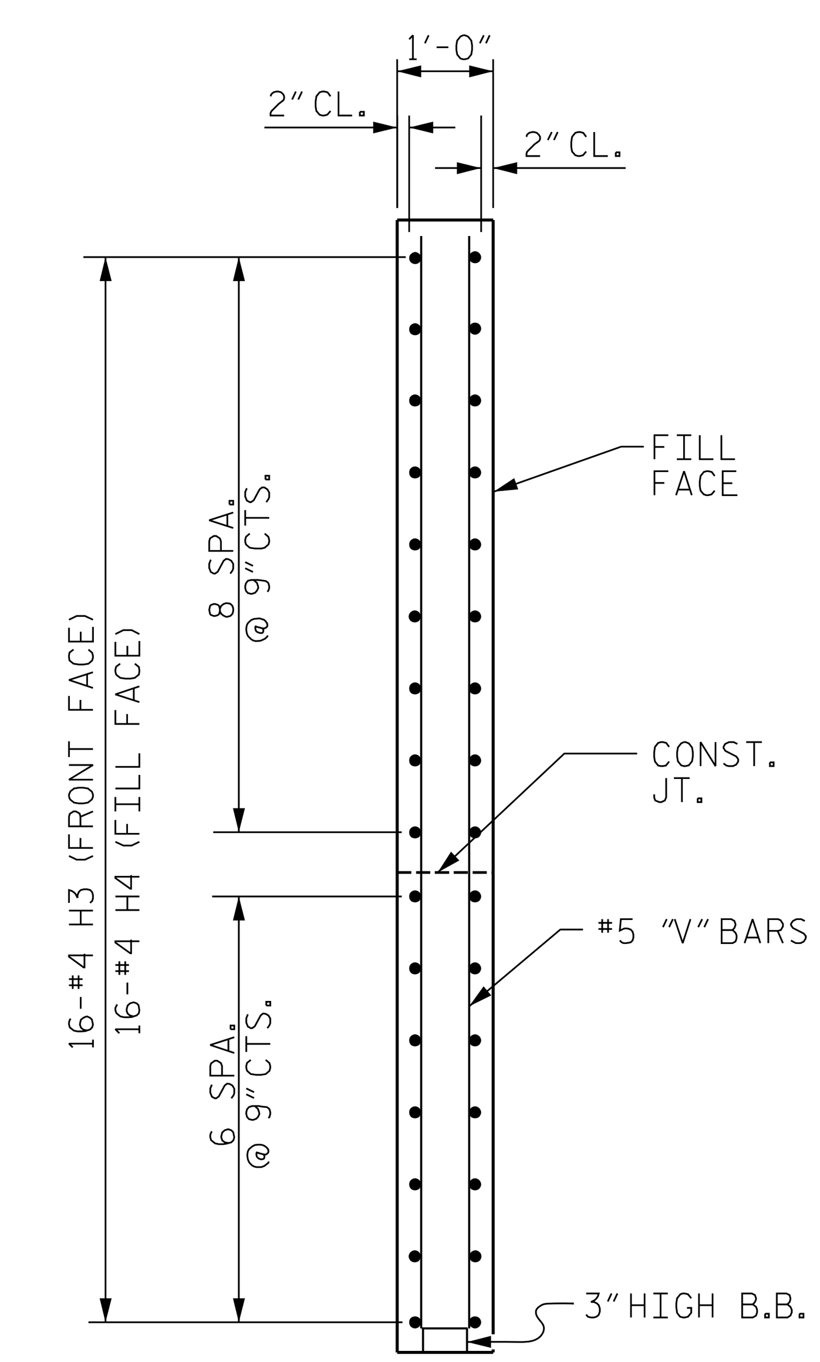
SHEET NO. S2-34
TOTAL SHEETS 40



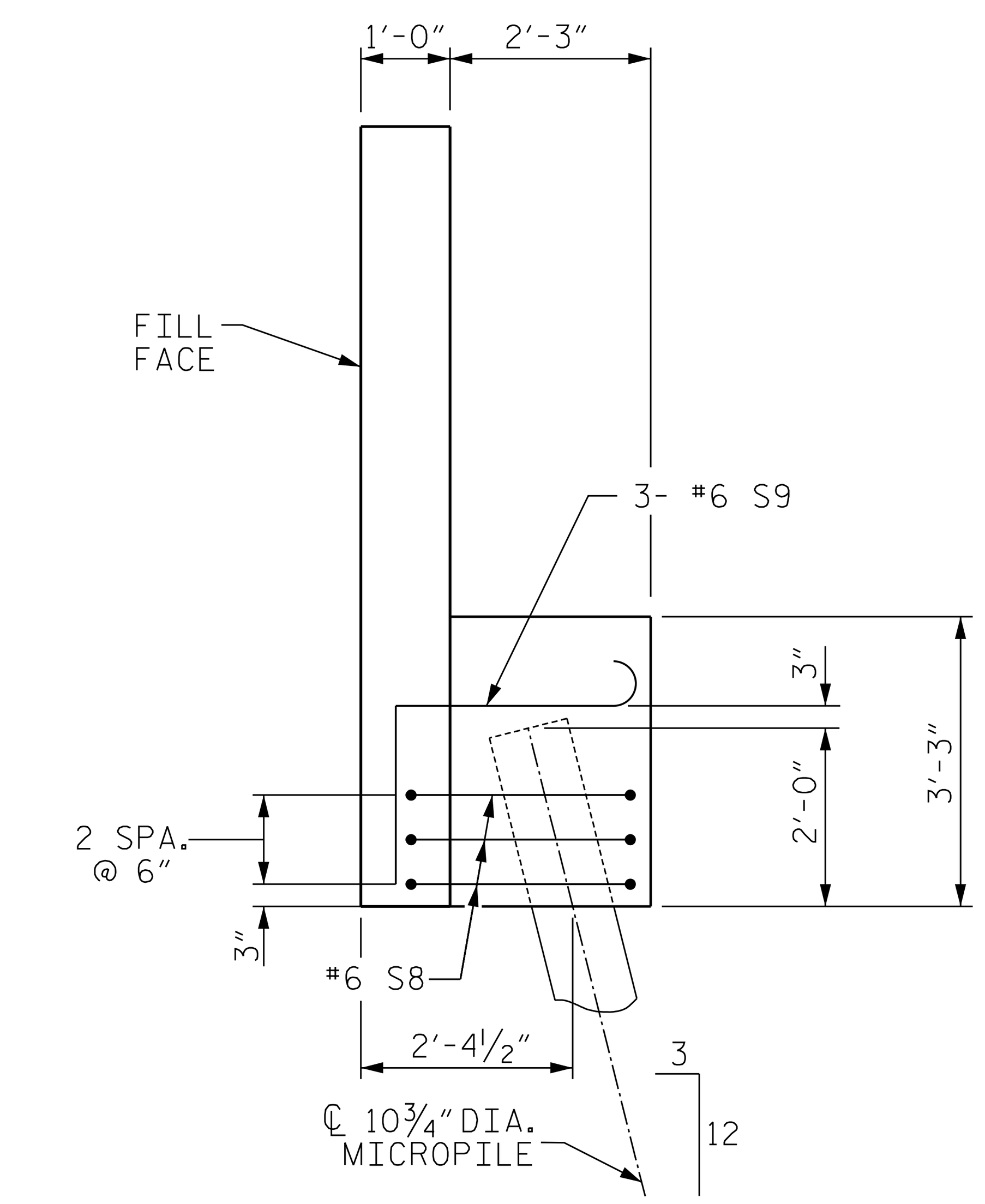
PLAN - WING W4



ELEVATION - WING W4



SECTION Y-Y



SECTION A-A

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 4 OF 6

DocuSigned by: Hardy Willis
SEAL 12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 2 STAGE II WING DETAILS

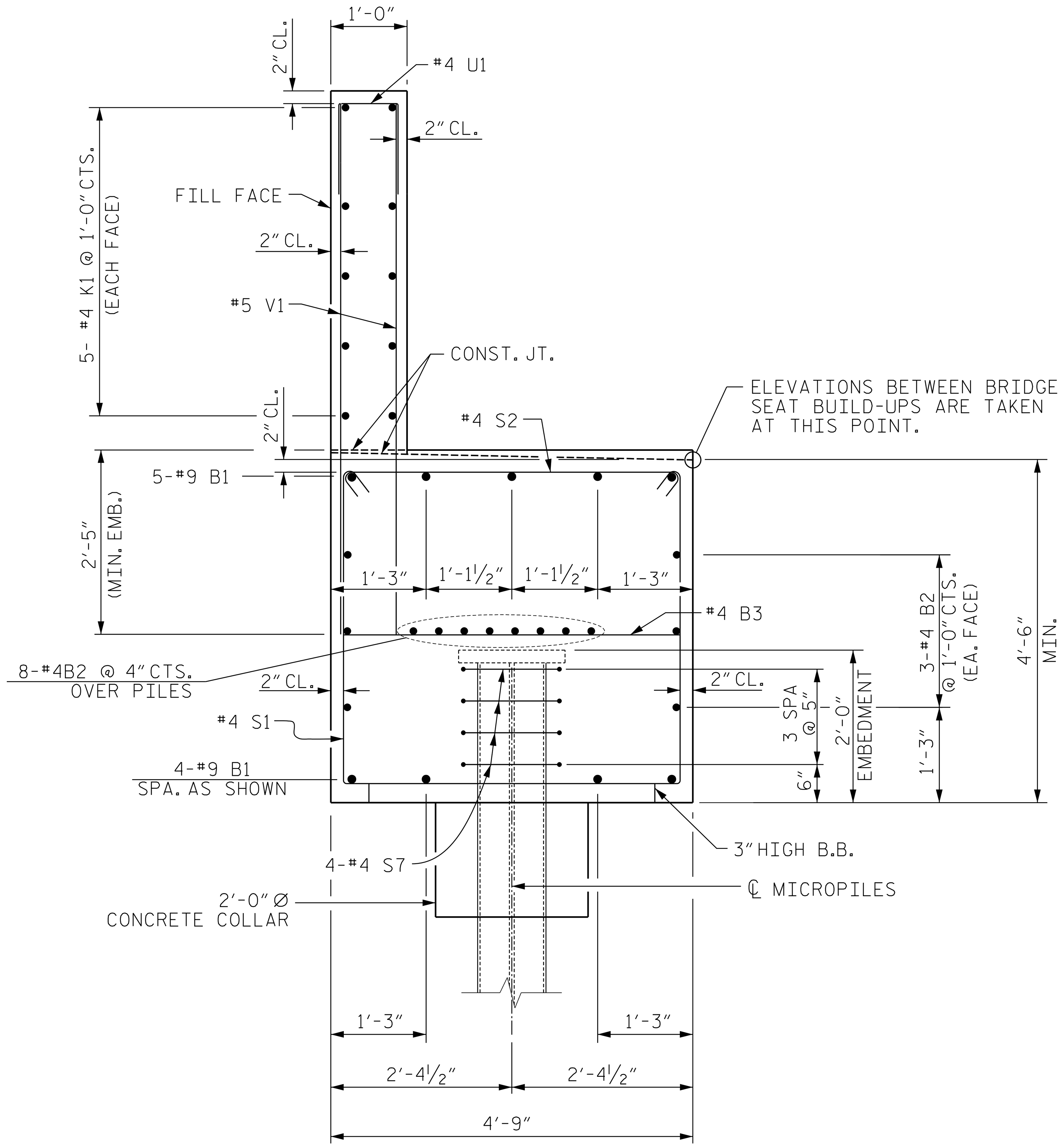
JMT Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC. 28806
License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

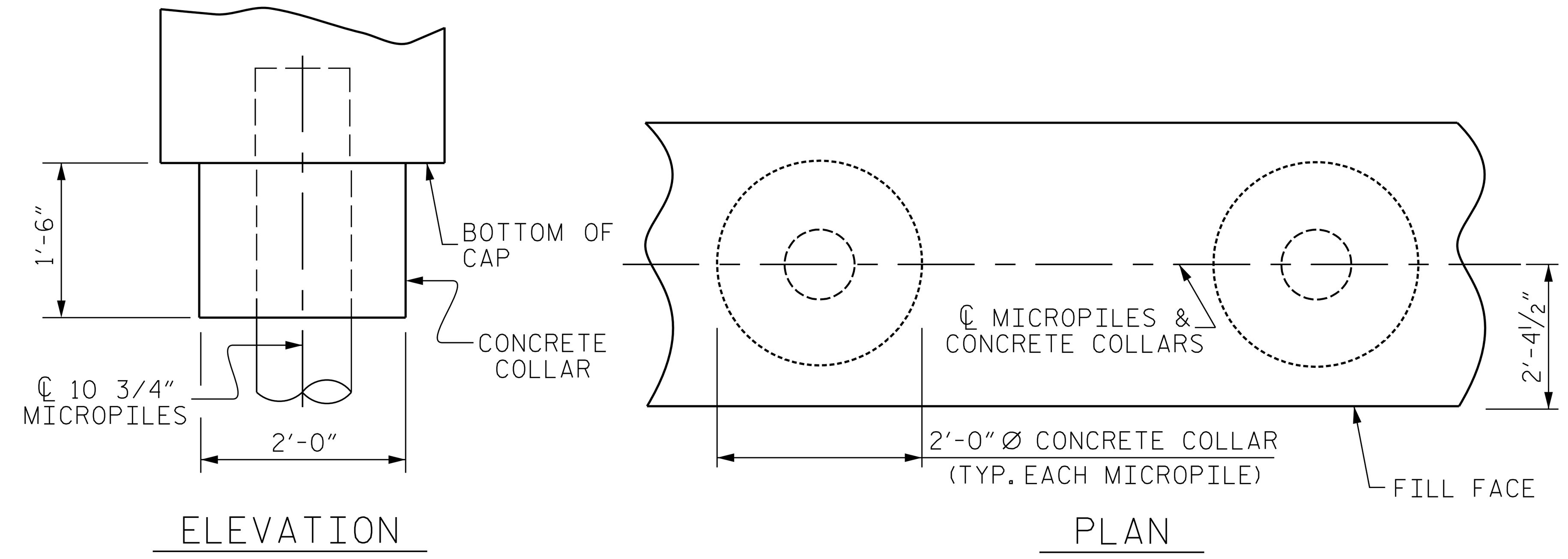
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:		
1			3				
2			4				

SHEET NO. S2-35

TOTAL SHEETS 40

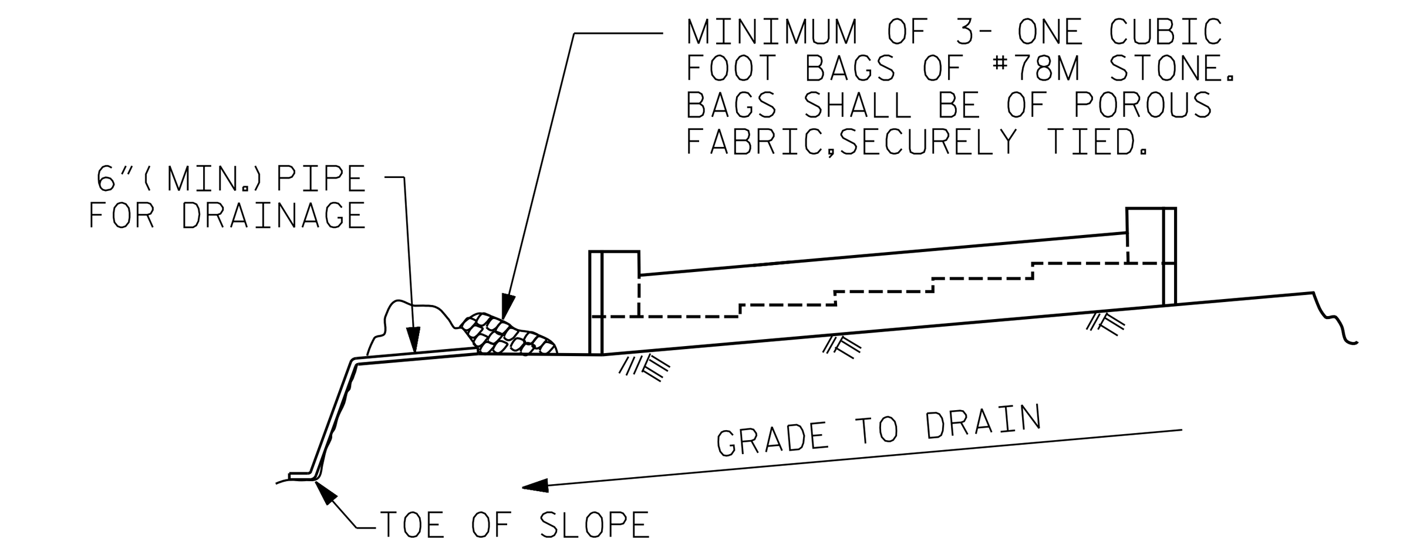


SECTION A-A



CORROSION PROTECTION FOR STEEL PILES DETAIL

(COLLAR NOT REQUIRED FOR WING BRACE PILE)

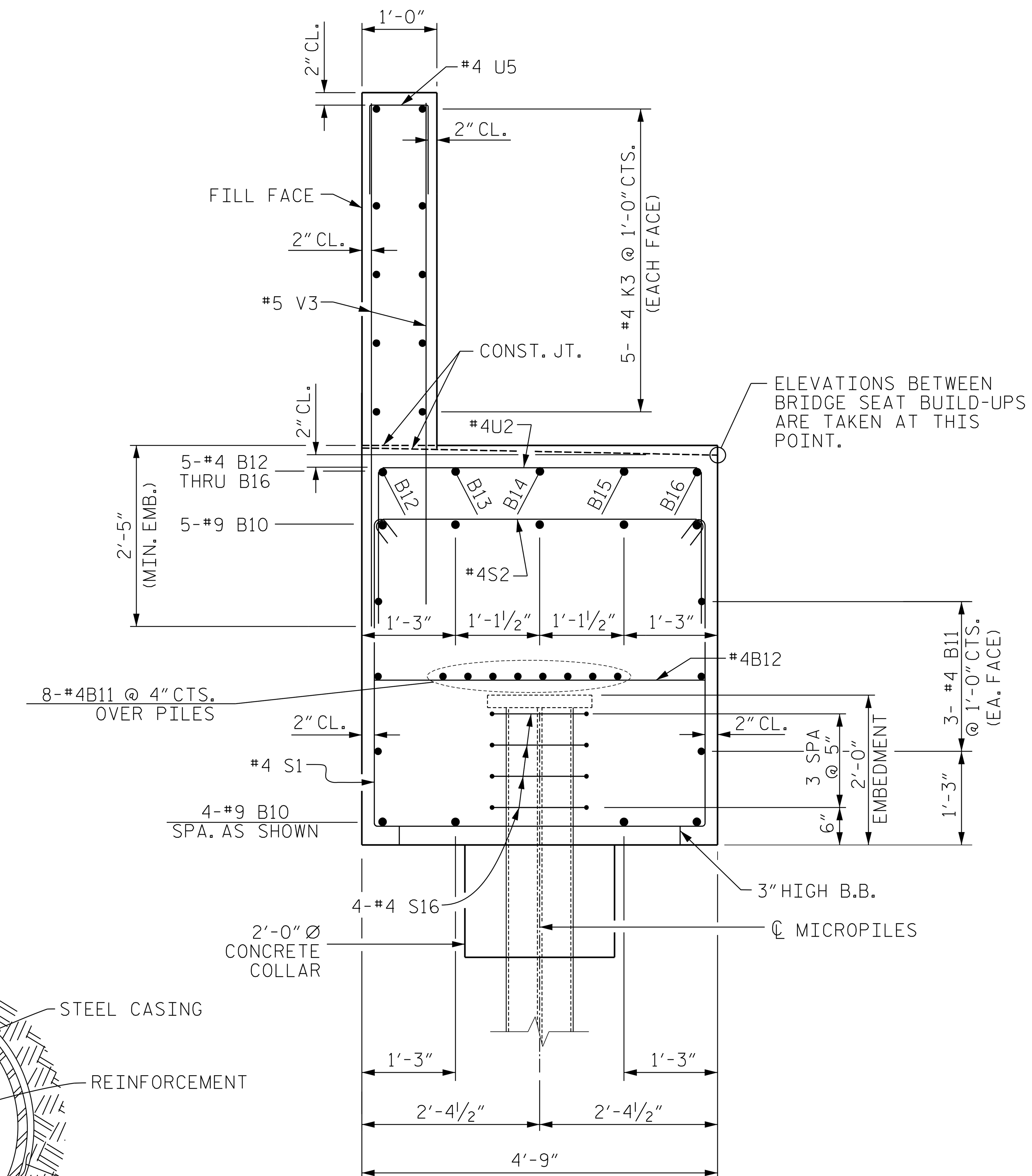


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

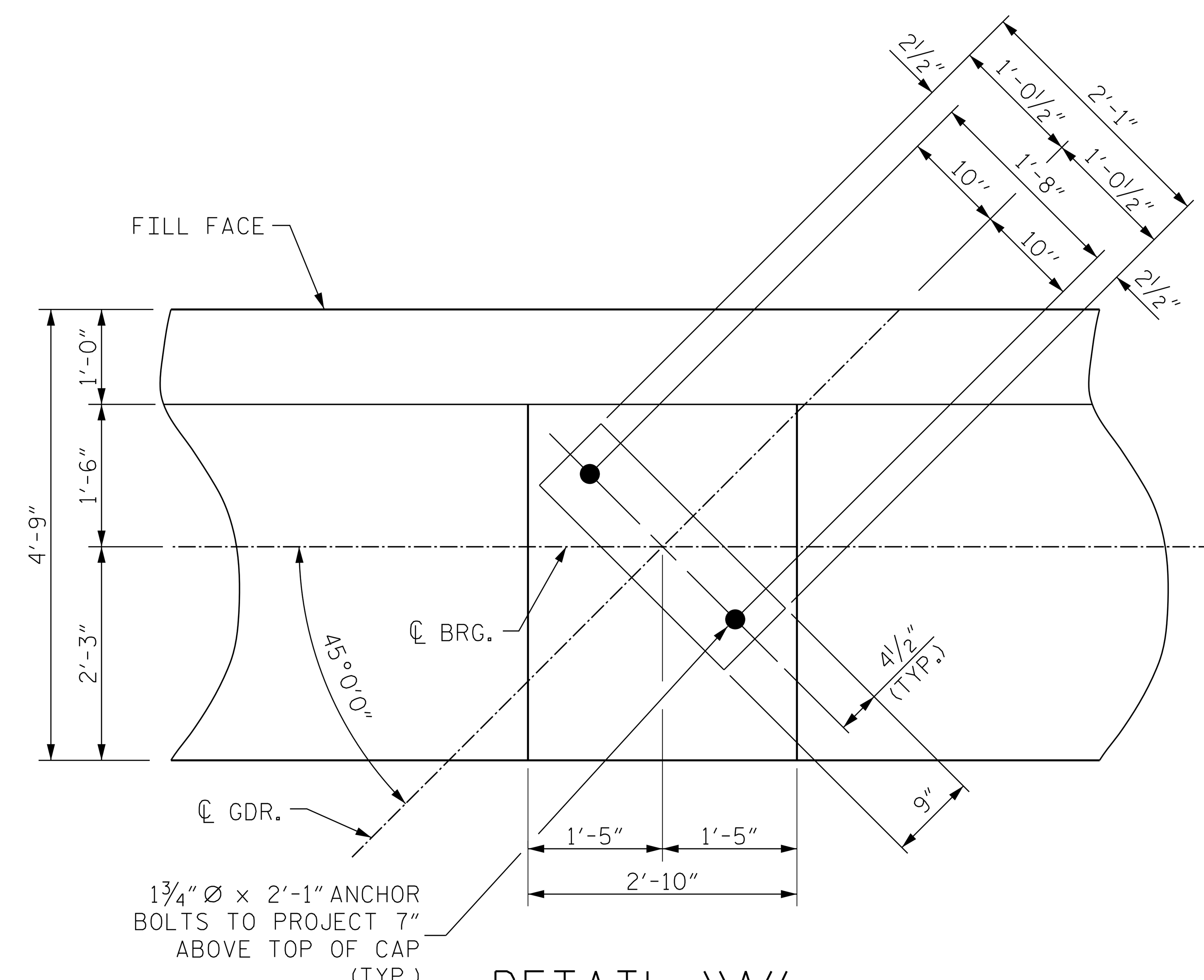
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

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

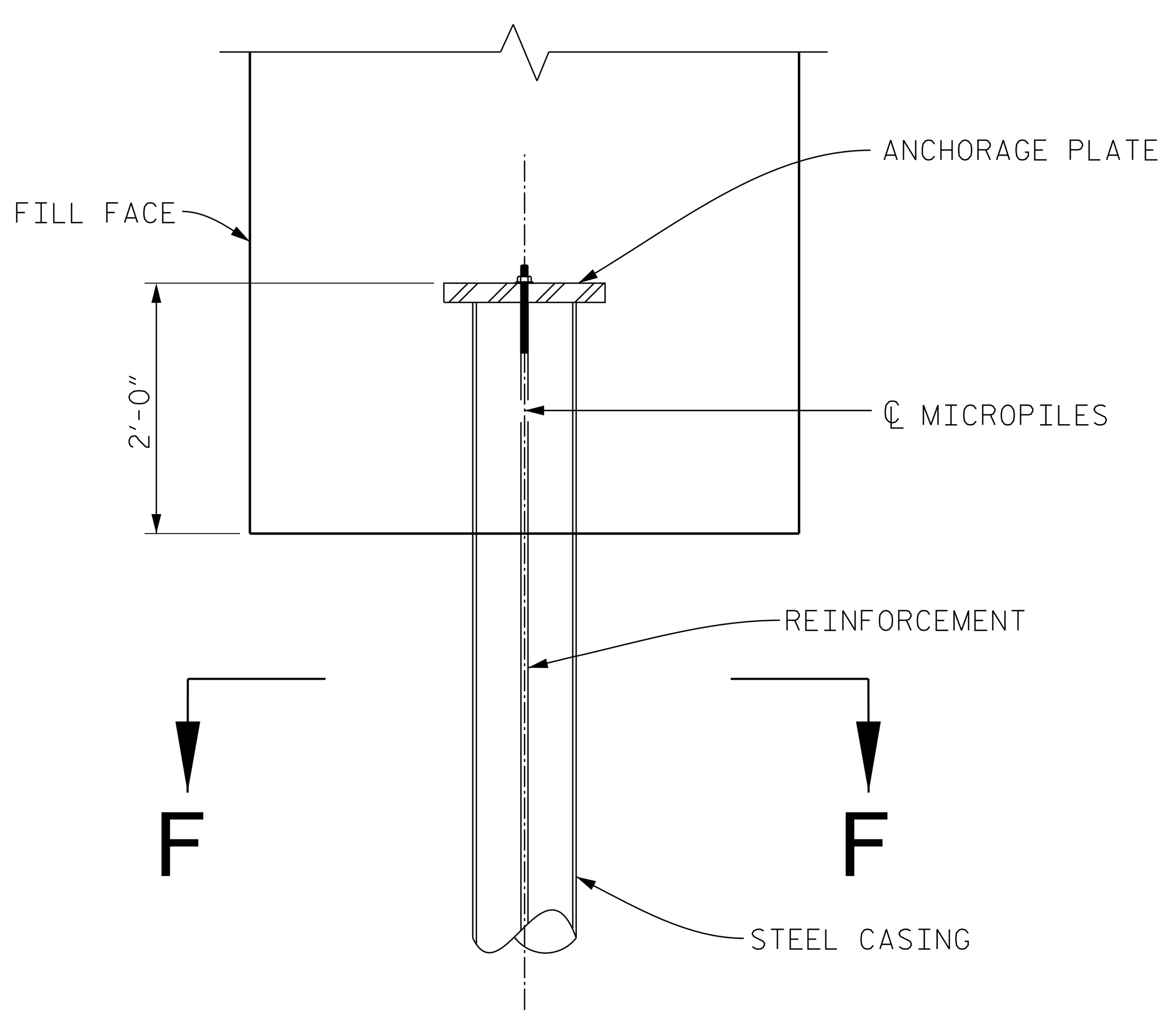
TEMPORARY DRAINAGE AT END BENT



SECTION B-B

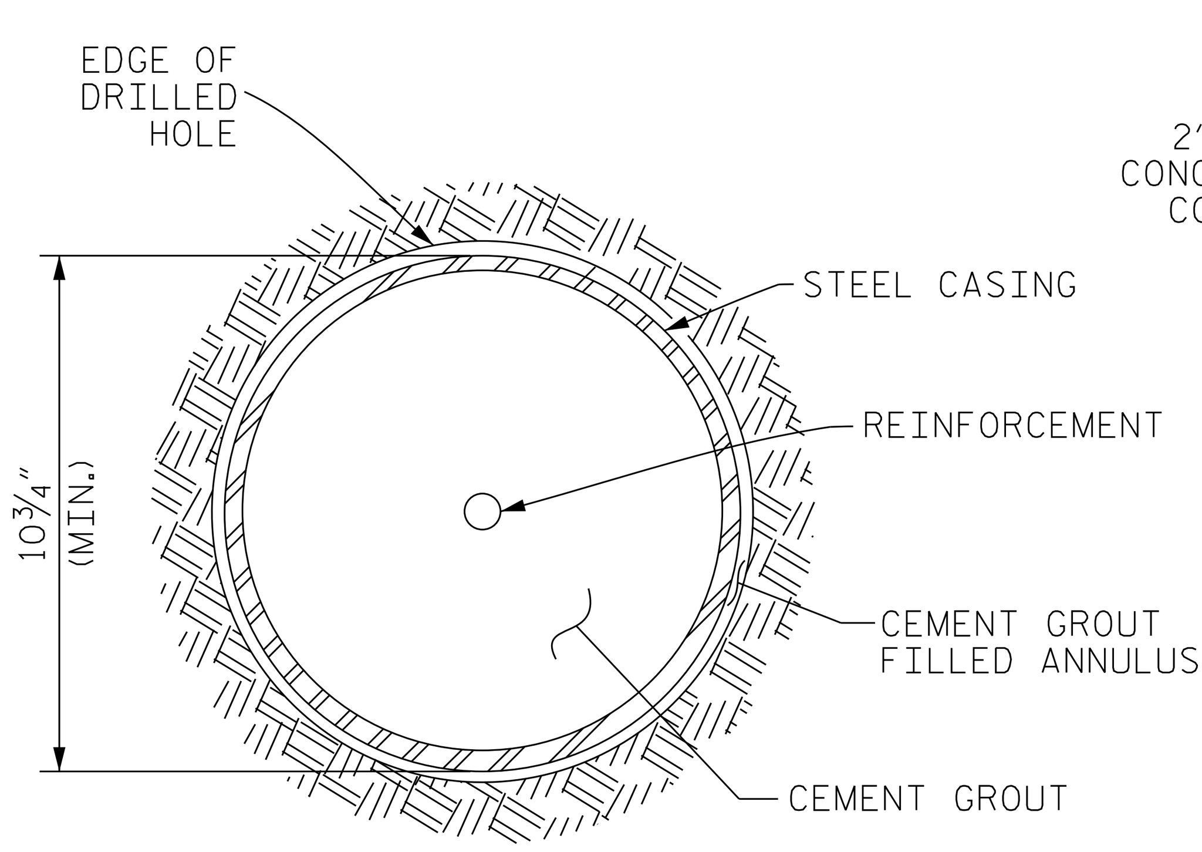


DETAIL "A"



MICROPILE DETAIL

(TYP. EACH MICROPILE)



SECTION F-F

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 5 OF 6

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER HARDY L. WILLIS — DocuSigned by: Hardy Willis — 12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 2 DETAILS

JMT Johnson, Mirmiran, & Thompson Inc. 1318 Patton Ave., Suite F, Asheville, NC, 28806 License No: C-3097

DWN. BY: RWW	DATE: 03/18
CHKD. BY: HLW	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

SHEET NO. S2-36

TOTAL SHEETS 40

BILL OF MATERIAL FOR END BENT NO. 2

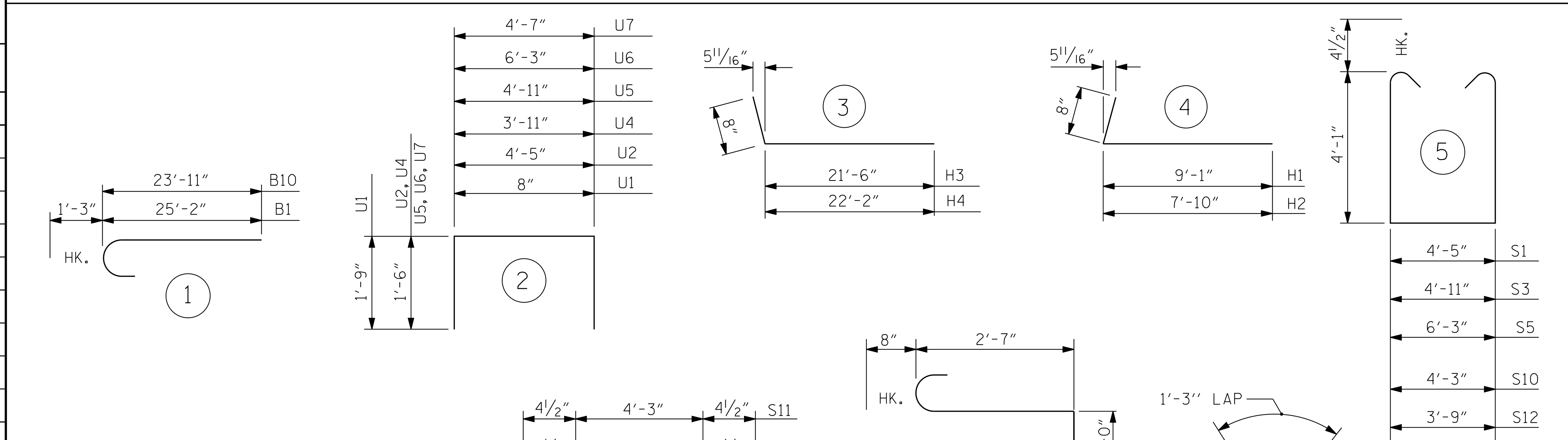
STAGE I

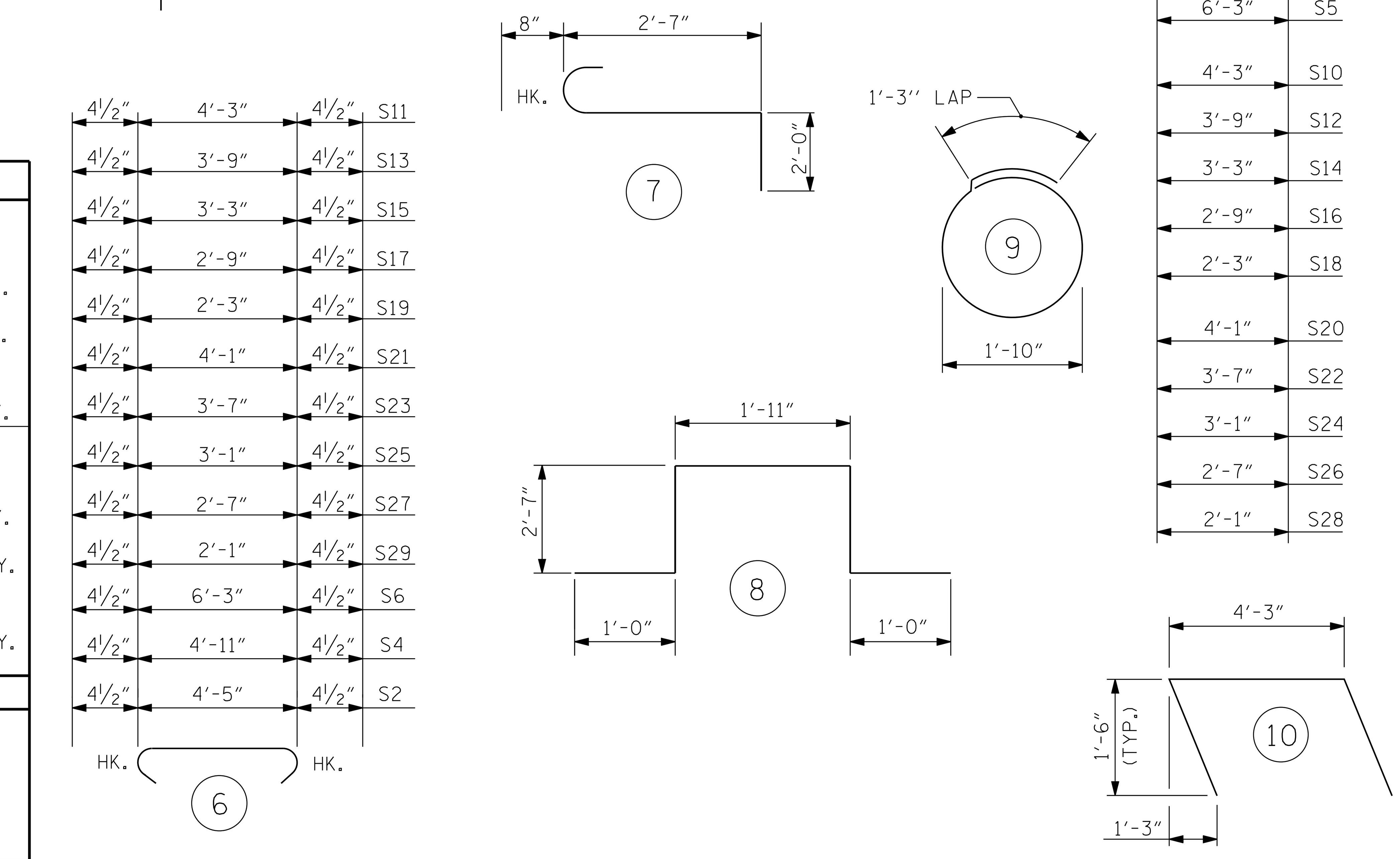
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#9	(1)	26′-5″	808
B2	14	#4	STR	25′-2″	235
B3	6	#4	STR	4′-5″	18
B4	10	#4	STR	2′-6″	17
B5	1	#4	STR	1′-0″	1
B6	1	#4	STR	1′-10″	1
B7	1	#4	STR	3′-0″	2
B8	1	#4	STR	4′-1″	3
B9	1	#4	STR	5′-2″	3
H1	15	#4	(4)	9′-9″	98
H2	15	#4	(4)	8′-6″	85
K1	10	#4	STR	25′-2″	168
K2	4	#4	STR	3′-6″	9
S1	32	#4	(5)	13′-4″	285
S2	32	#4	(6)	5′-2″	110
S3	1	#4	(5)	14′-4″	10
S4	1	#4	(6)	6′-2″	4
S5	1	#4	(5)	16′-7″	11
S6	1	#4	(6)	8′-5″	6
S7	16	#4	(9)	7′-0″	75
S10	1	#4	(5)	13′-2″	9
S11	1	#4	(6)	5′-0″	3
S12	1	#4	(5)	12′-8″	8
S13	1	#4	(6)	4′-6″	3
S14	1	#4	(5)	12′-2″	8
S15	1	#4	(6)	4′-0″	3
S16	1	#4	(5)	11′-8″	8
S17	1	#4	(6)	3′-6″	2
S18	1	#4	(5)	11′-2″	7
S19	1	#4	(6)	3′-0″	2
U1	21	#4	(2)	4′-2″	58
U2	7	#4	(2)	7′-5″	35
U3	4	#4	(10)	7′-3″	19
U4	4	#4	(2)	6′-11″	18
U5	1	#4	(2)	7′-11″	5
U6	1	#4	(2)	9′-3″	6
V1	42	#5	STR	7′-3″	318
V2	28	#5	STR	10′-6″	307
REINFORCING STEEL STAGE I					2,768 LBS.

STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B3	6	#4	STR	4′-5″	18
B4	5	#4	STR	2′-6″	8
B10	9	#9	(1)	25′-2″	770
B11	14	#4	STR	24′-1″	225
B12	1	#4	STR	21′-2″	14
B13	1	#4	STR	20′-1″	13
B14	1	#4	STR	19′-0″	13
B15	1	#4	STR	17′-10″	12
B16	1	#4	STR	16′-9″	11
C1	9	#9	STR	5′-6″	168
H3	16	#4	(3)	22′-2″	237
H4	16	#4	(3)	22′-10″	244
K3	10	#4	STR	24′-1″	161
K4	4	#4	STR	4′-8″	12
S1	30	#4	(5)	13′-4″	267
S2	30	#4	(6)	5′-2″	104
S3	1	#4	(5)	14′-4″	10
S4	1	#4	(6)	6′-2″	4
S5	1	#4	(5)	16′-7″	11
S6	1	#4	(6)	8′-5″	6
S7	16	#4	(9)	7′-0″	75
S8	3	#6	(8)	9′-1″	41
S9	3	#6	(7)	5′-3″	24
S20	1	#4	(5)	13′-0″	9
S21	1	#4	(6)	4′-10″	3
S22	1	#4	(5)	12′-6″	8
S23	1	#4	(6)	4′-4″	3
S24	1	#4	(5)	12′-0″	8
S25	1	#4	(6)	3′-10″	3
S26	1	#4	(5)	11′-6″	8
S27	1	#4	(6)	3′-4″	2
S28	1	#4	(5)	11′-0″	7
S29	1	#4	(6)	2′-10″	2
U1	18	#4	(2)	4′-2″	50
U2	15	#4	(2)	7′-5″	74
U3	4	#4	(10)	7′-3″	19
U6	1	#4	(2)	9′-3″	6
U7	4	#4	(2)	7′-7″	20
V3	36	#5	STR	7′-2″	269
V4	54	#5	STR	11′-2″	629
REINFORCING STEEL STAGE II					3,568 LBS.

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT.

CLASS A CONCRETE BREAKDOWN

STAGE I	
POUR #1 CAP, LOWER PART OF WING, AND CONCRETE COLLARS	22.7 C.Y.
POUR #2 BACKWALL AND UPPER PART OF WING	6.1 C.Y.
STAGE I CLASS A CONCRETE	28.8 C.Y.
STAGE II	
POUR #1 CAP, LOWER PART OF WING, AND CONCRETE COLLARS	27.0 C.Y.
POUR #2 BACKWALL AND UPPER PART OF WING	10.7 C.Y.
STAGE II CLASS A CONCRETE	37.7 C.Y.

10¾″ DIA. MICROPILES

STAGE I	STAGE II
NO.: 4	* NO.: 5

*INCLUDES WINGWALL MICROPILES

TOTAL QUANTITIES FOR END BENT 2

REINFORCING STEEL	6,336 LBS.
CLASS A CONCRETE	66.5 C.Y.
10¾″ DIA. MICROPILES	NO. 9

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END BENT NO. 2
BILL OF MATERIAL

DocuSigned by: Hardy Willis
12/13/2023

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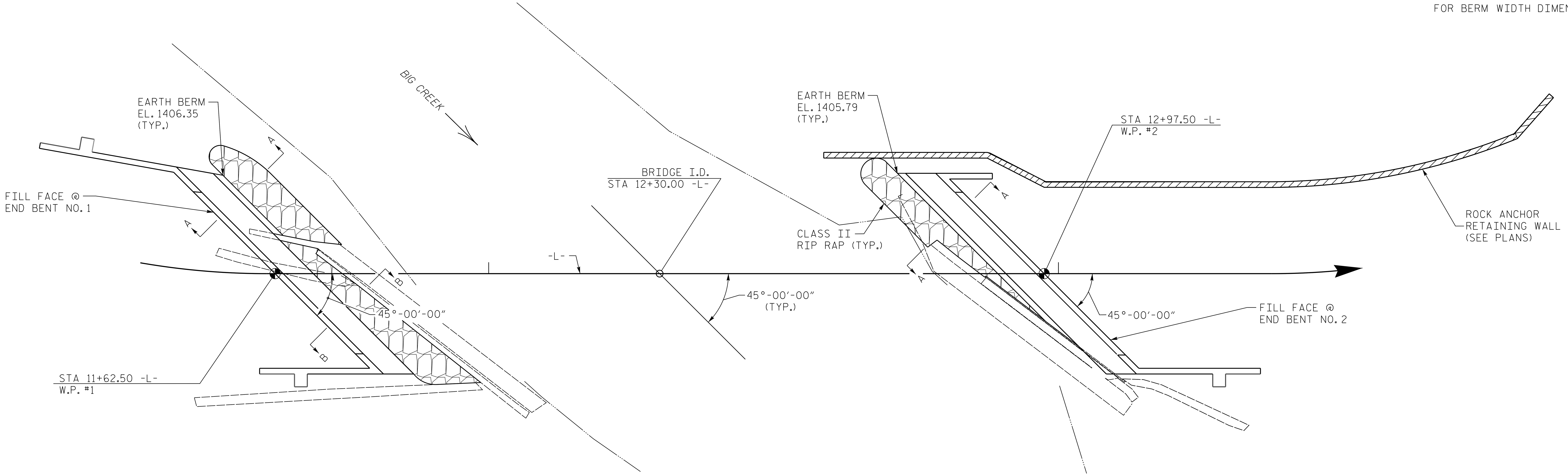
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC. 28806
License No: C-3097

DWN. BY: RWW DATE: 03/18
CHKD. BY: HLW DATE: 03/18
DES. EGR. OF RECORD: CBC DATE: 03/18

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-37
1			3			TOTAL SHEETS	40
2			4				

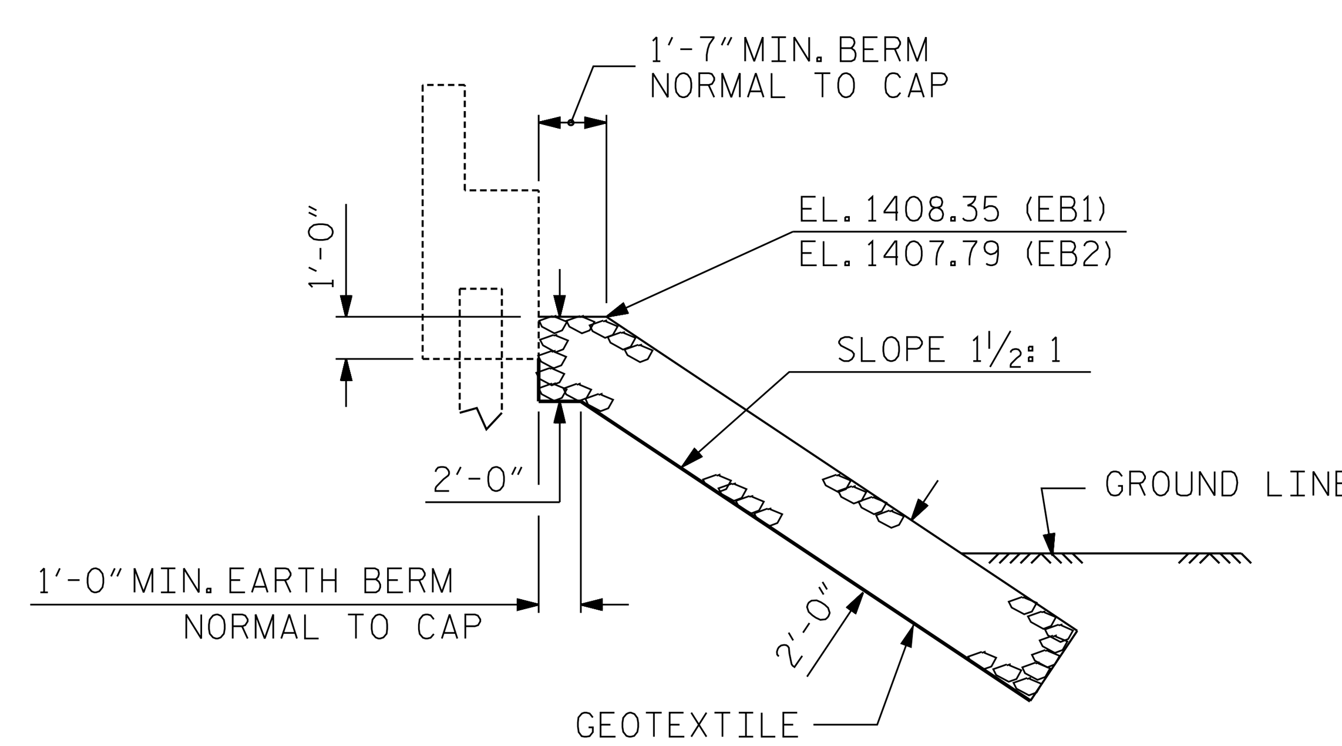
NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



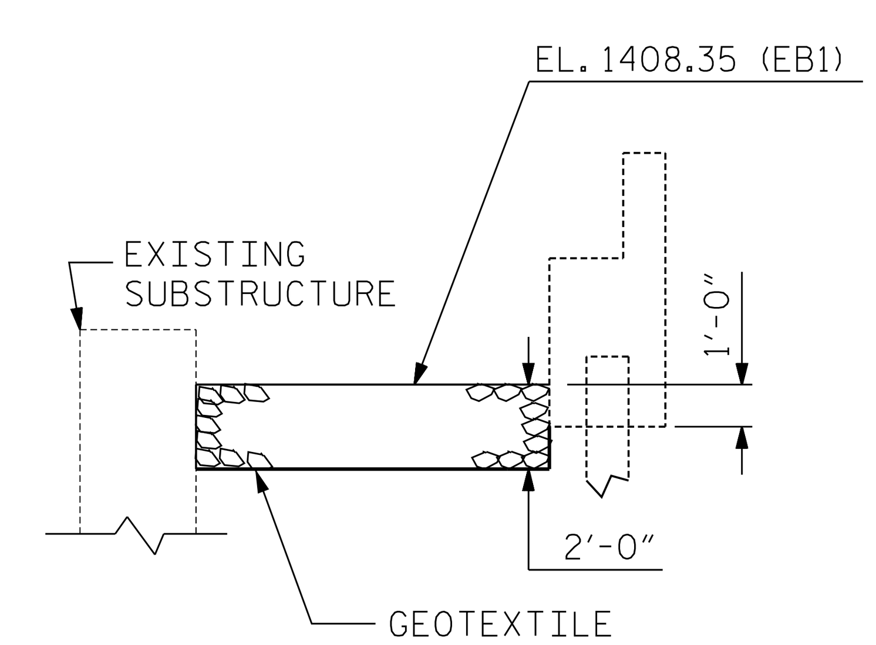
PLAN @ END BENT 1

PLAN @ END BENT 2



SECTION A-A

BERM RIP RAPPED



SECTION B-B

ESTIMATED QUANTITIES		
BRIDGE @ STA. 12+30.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	309	343
END BENT 2	138	153

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

DocuSigned by: Hardy Willis
C6284n6P023461...
12/13/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP

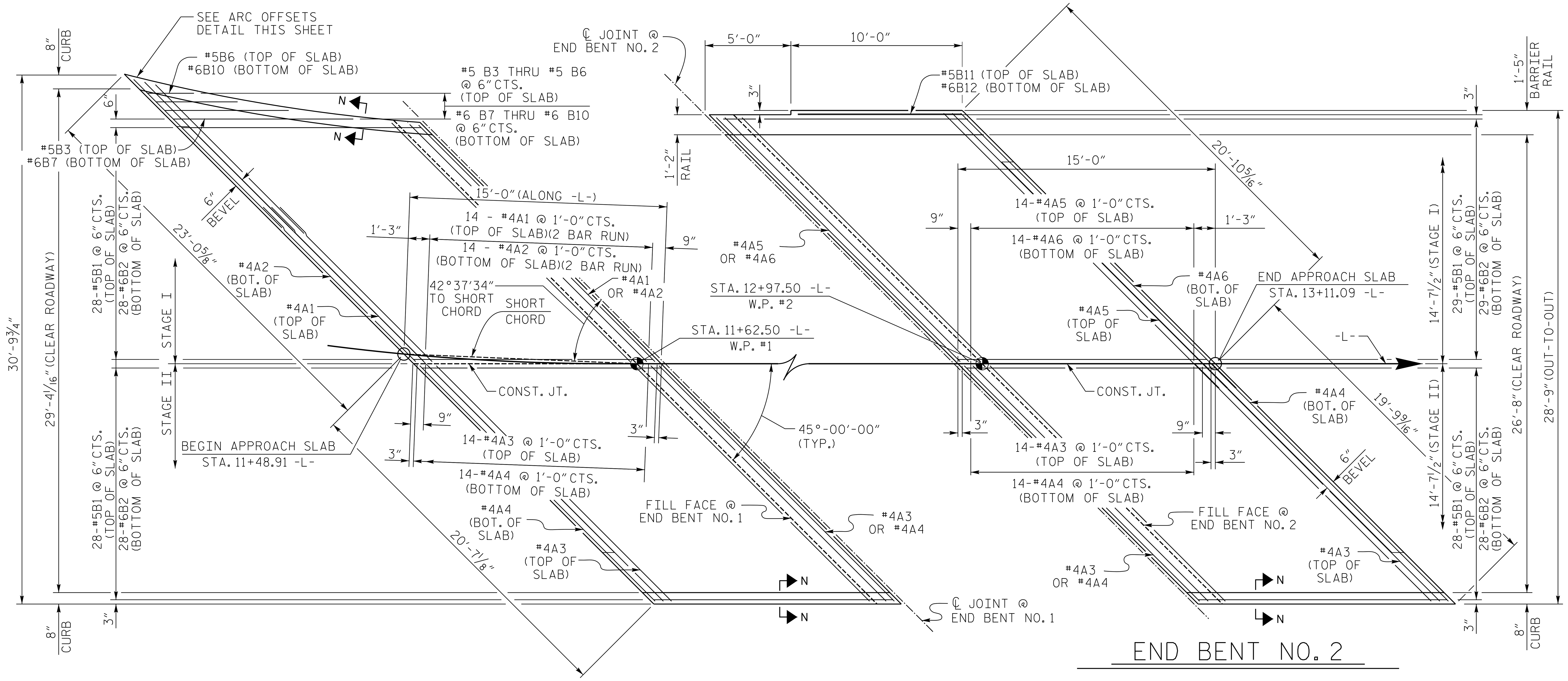
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: RWW DATE: 03/18
CHKD. BY: HLW DATE: 03/18
DES. EGR. OF RECORD: CBC DATE: 03/18

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

SHEET NO. S2-38

TOTAL SHEETS 40

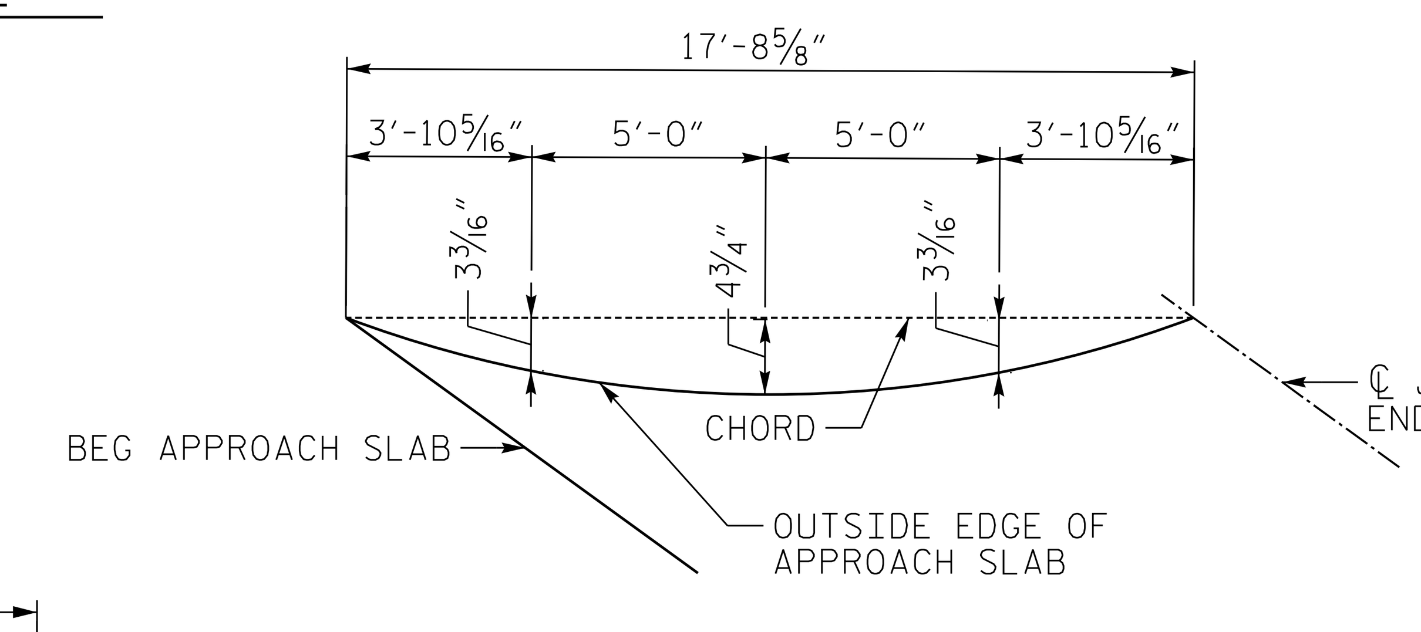


END BENT NO. 1

END BENT NO. 2

BILL OF MATERIAL					
APPROACH SLAB AT EB #1					
STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	30	#4	STR	12'-8"	254
A2	32	#4	STR	12'-7"	269
* B1	28	#5	STR	13'-11"	406
B2	28	#6	STR	13'-11"	585
* B3	1	#5	STR	11'-5"	12
* B4	1	#5	STR	7'-10"	8
* B5	1	#5	STR	5'-3"	5
* B6	1	#5	STR	3'-1"	3
B7	1	#6	STR	11'-5"	17
B8	1	#6	STR	7'-10"	12
B9	1	#6	STR	5'-3"	8
B10	1	#6	STR	3'-1"	5
REINFORCING STEEL					896 LBS.
* EPOXY COATED REINFORCING STEEL					688 LBS.
CLASS AA CONCRETE					10.6 C.Y.
STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	15	#4	STR	19'-9"	198
A4	16	#4	STR	19'-9"	211
* B1	28	#5	STR	13'-11"	406
B2	28	#6	STR	13'-11"	585
REINFORCING STEEL					796 LBS.
* EPOXY COATED REINFORCING STEEL					604 LBS.
CLASS AA CONCRETE					9.0 C.Y.

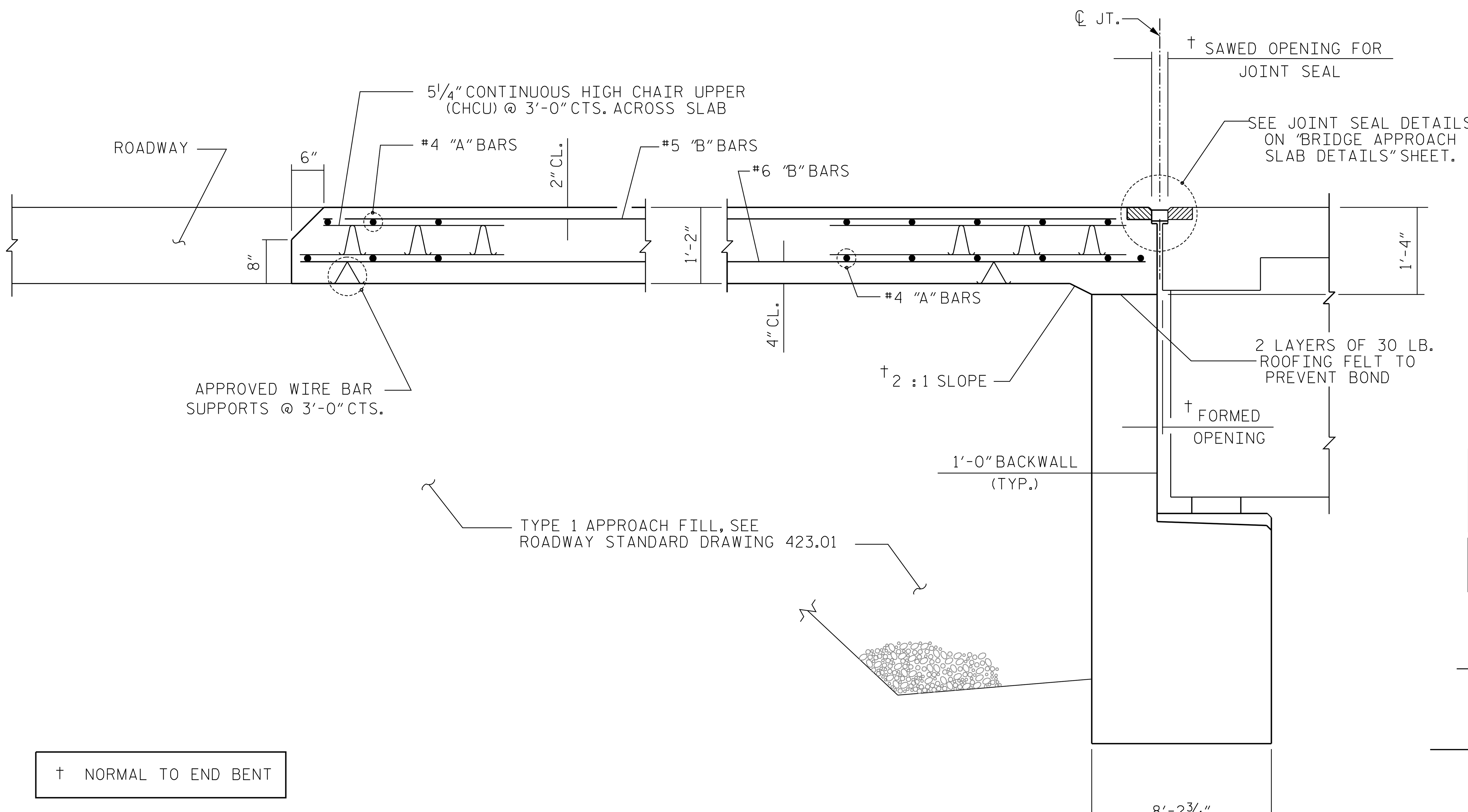
BILL OF MATERIAL					
APPROACH SLAB AT EB #2					
STAGE I					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A5	15	#4	STR	22'-11"	230
A6	16	#4	STR	22'-8"	242
* B1	28	#5	STR	14'-6"	423
B2	28	#6	STR	14'-6"	610
* B11	1	#5	STR	9'-9"	10
B12	1	#6	STR	9'-9"	15
* B13	5	#5	2	6'-10"	36
* B14	5	#5	STR	9'-9"	51
* B15	5	#5	STR	14'-6"	76
* S1	22	#5	STR	3'-11"	90
* S2	16	#6	1	4'-10"	116
REINFORCING STEEL					852 LBS.
* EPOXY COATED REINFORCING STEEL					1032 LBS.
CLASS AA CONCRETE					
SLAB					9.3 C.Y.
BARRIER RAIL					1.7 C.Y.
TOTAL					11.0 C.Y.
STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	15	#4	STR	19'-9"	198
A4	16	#4	STR	19'-9"	211
* B1	28	#5	STR	14'-6"	423
B2	28	#6	STR	14'-6"	610
REINFORCING STEEL					821 LBS.
* EPOXY COATED REINFORCING STEEL					621 LBS.
CLASS AA CONCRETE					9.0 C.Y.



ARC OFFSETS DETAIL

END BENT #1, LEFT SIDE

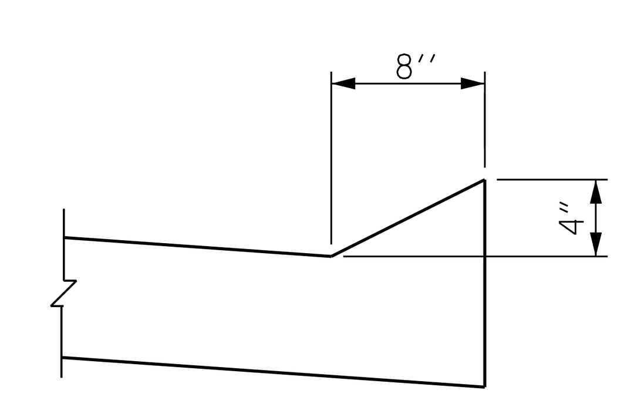
SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	1'-11"	1'-7"
#5	2'-5"	2'-0"
#6	3'-7"	2'-5"



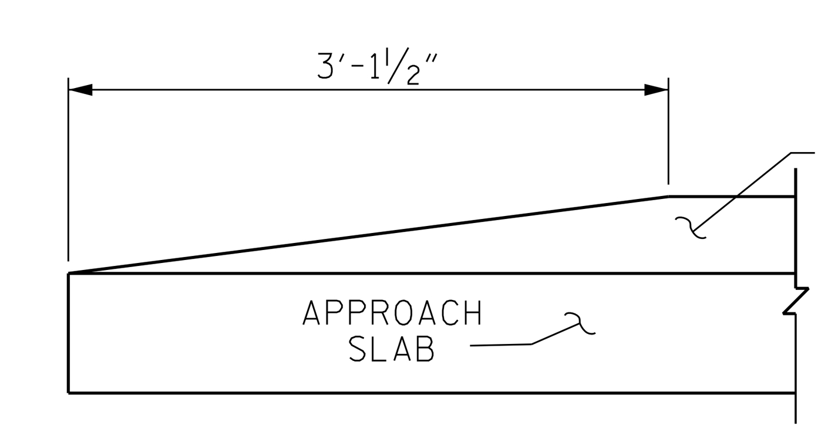
† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE I - APPROACH FILL)



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER 20777 HARDY L. WILLIS
DocuSigned by:
CC2B2F0F0223461...
12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. 14SP.20441.2

HAYWOOD COUNTY

STATION: 12+30.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

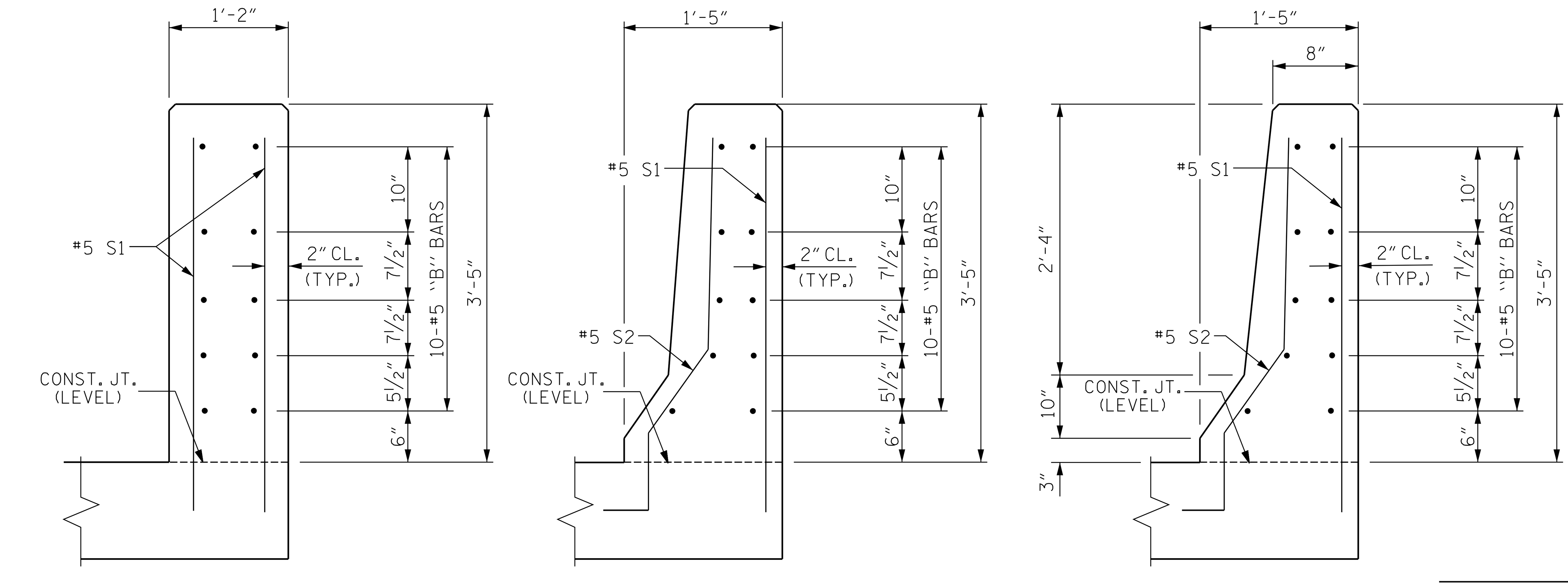
Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: MAF	DATE: 03/18
CHKD. BY: CBC	DATE: 03/18
DES. EGR. OF RECORD: CBC	DATE: 03/18

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

SHEET NO. S2-39

TOTAL SHEETS 40



RAIL NOTES

THE BARRIER RAIL ON THE APPROACH SLAB SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE 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.

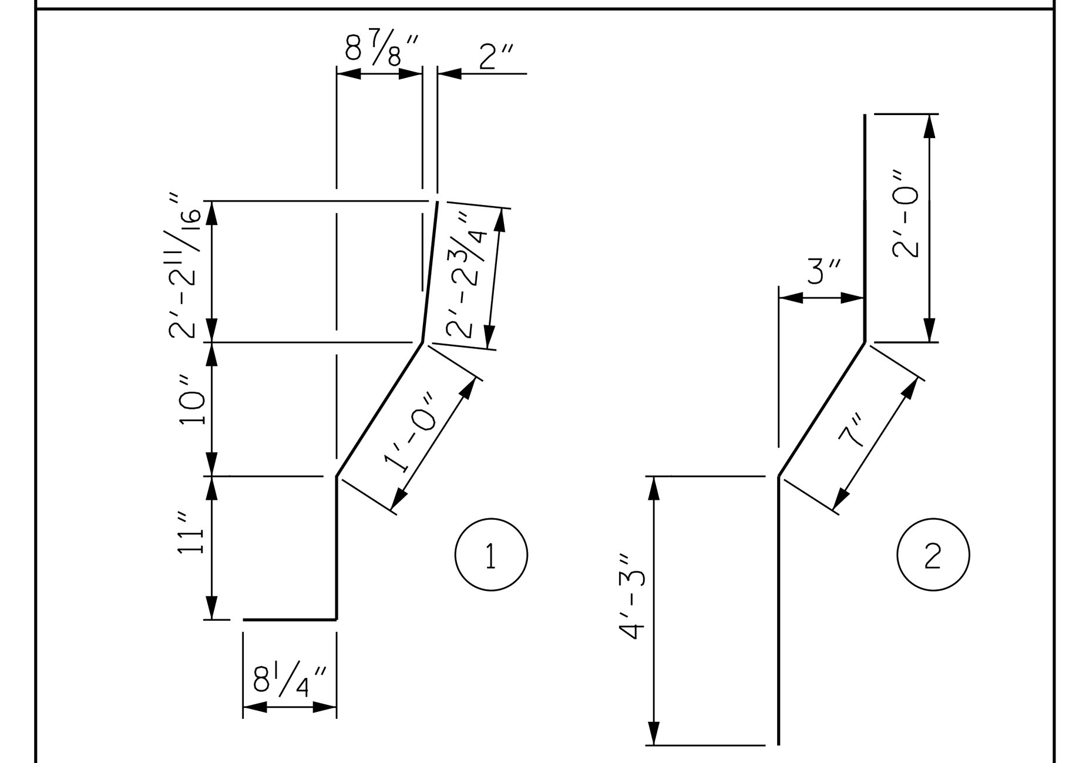
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

*THESE S1 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE S1 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.

THE COST OF THE PARAPET TO BARRIER RAIL TRANSITION ON THE LEFT SIDE OF THE END APPROACH SLAB SHALL BE INCLUDED IN THE UNIT PRICE BID FOR 1'-2" X 2'-6" CONCRETE PARAPET.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

GENERAL NOTES

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

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

SELECT MATERIAL BACKFILL (CLASS V 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.

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

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

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

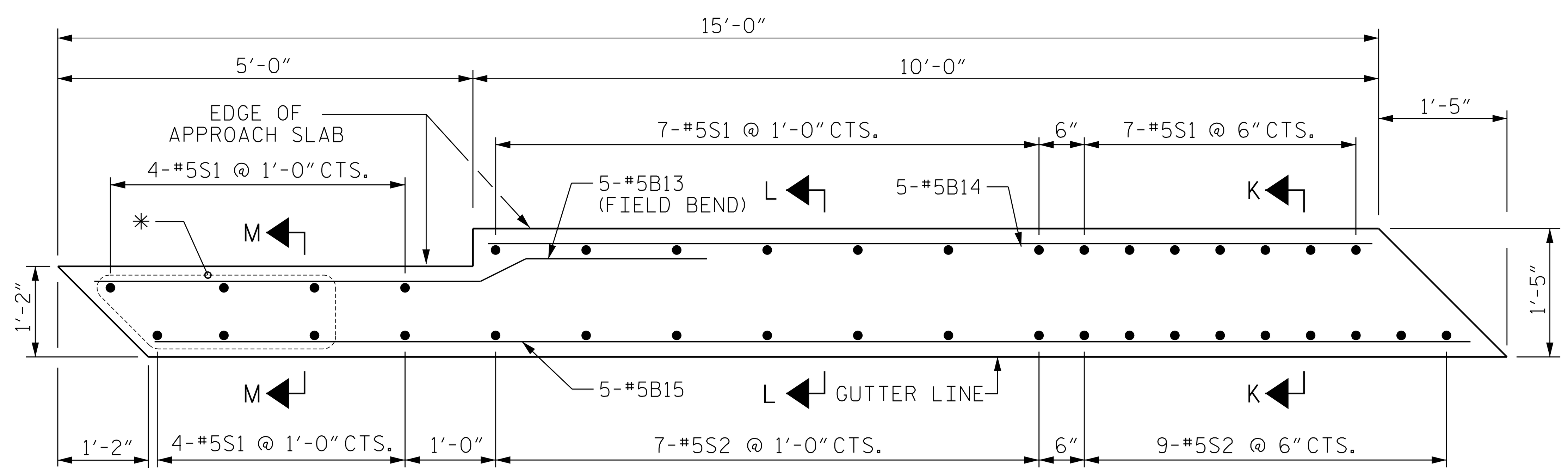
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

WITH FOAM JOINT SEAL

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

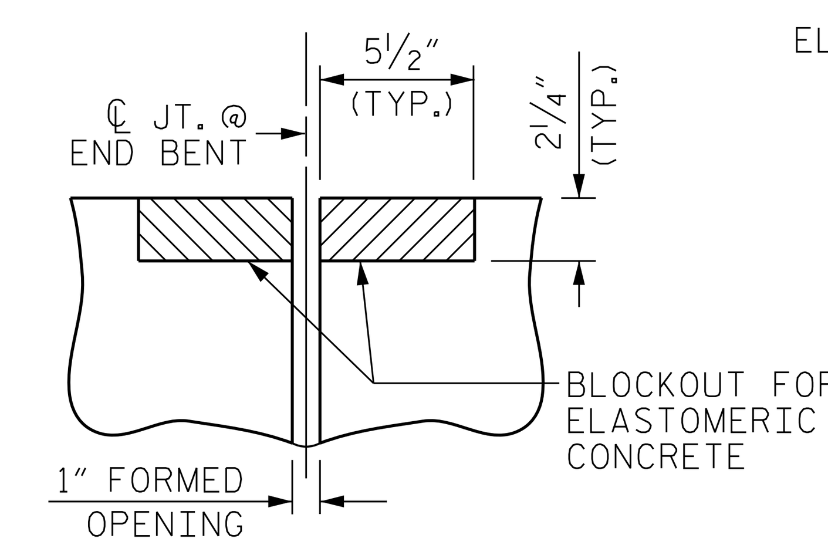
THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2".

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

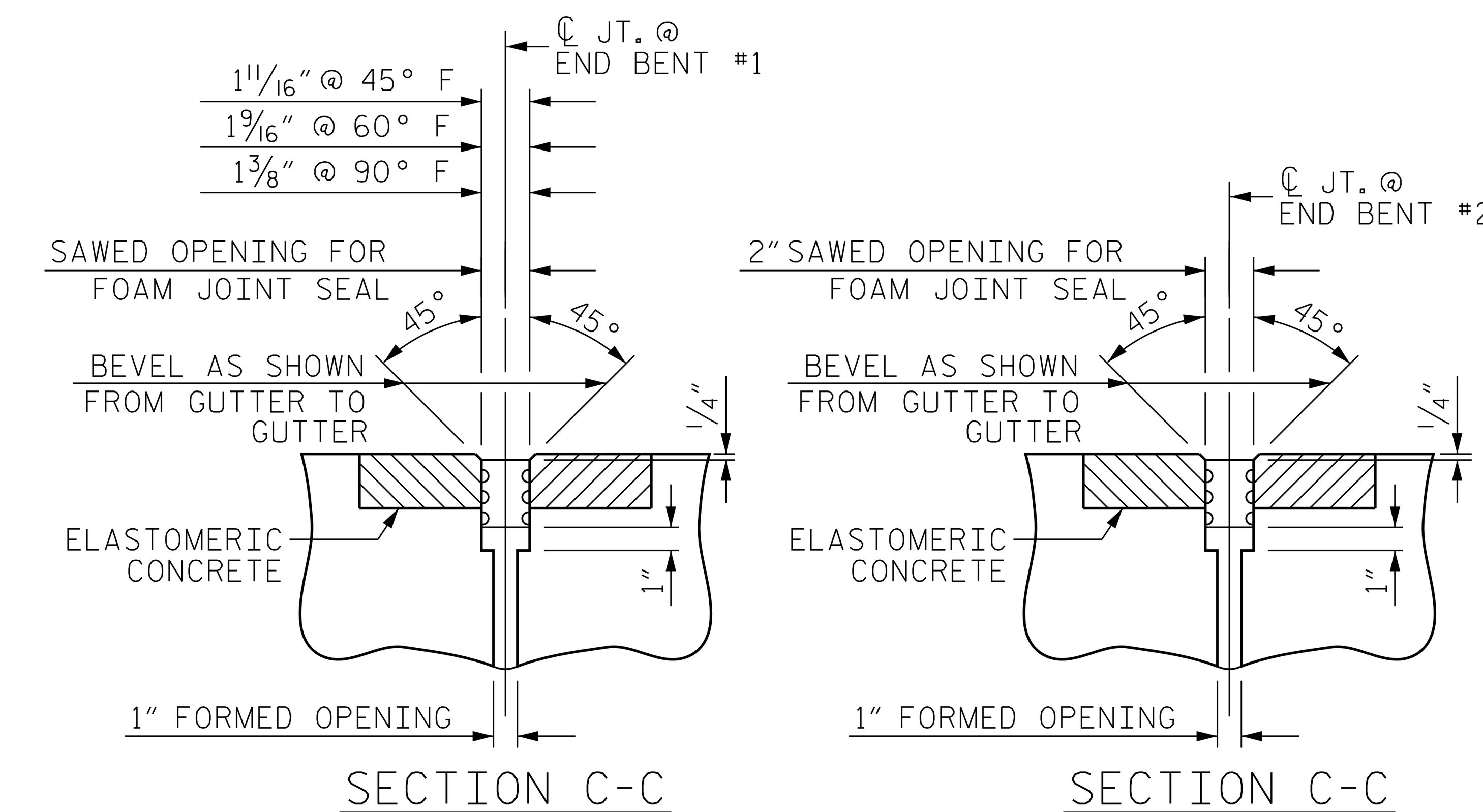


PLAN OF BARRIER RAIL TRANSITION - LEFT SIDE

(S2 BARS SHALL BE FIELD BENT TO MAINTAIN 2" CLEAR OF TRANSITION FACE)



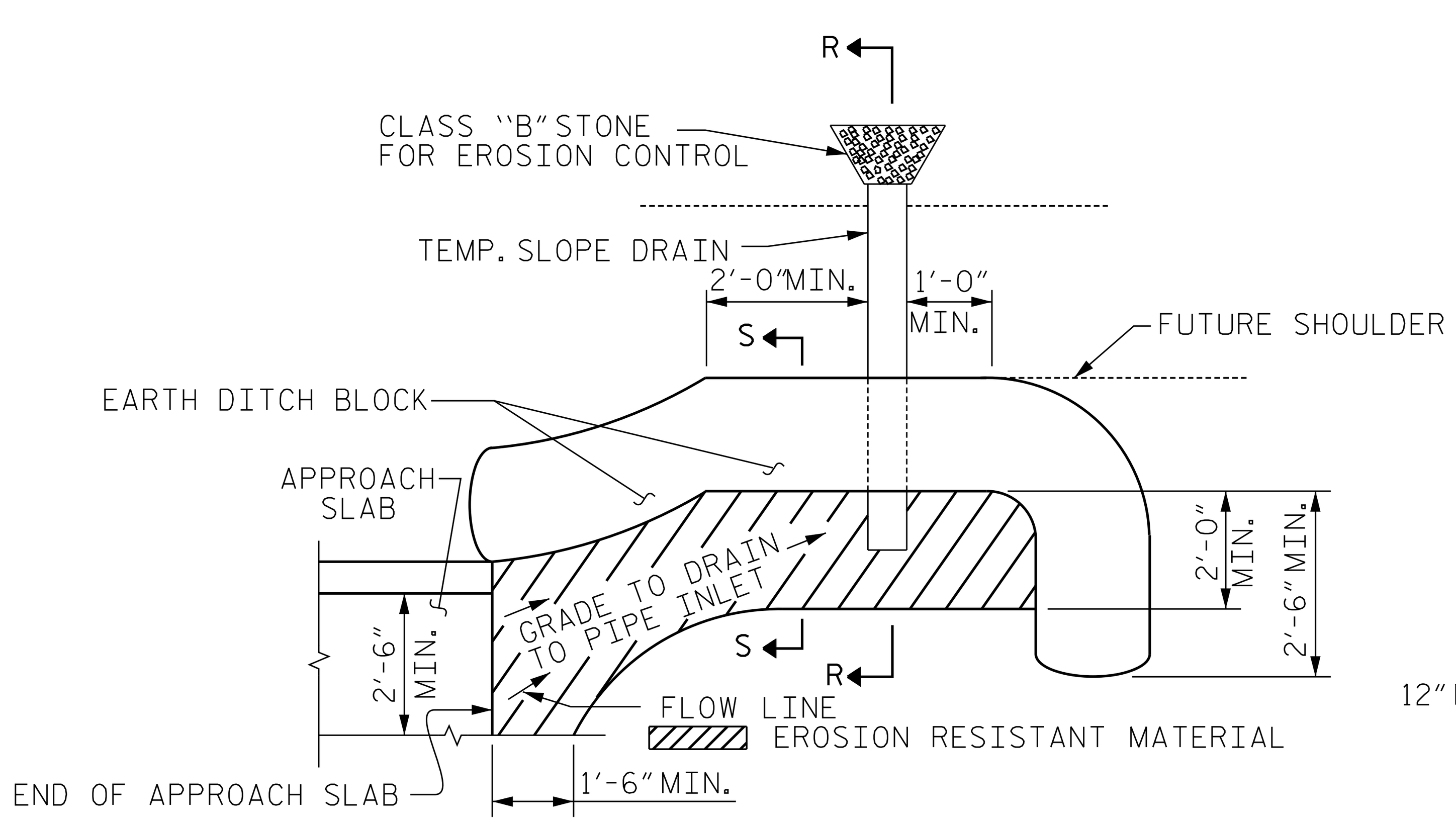
SECTION C-C
FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC CONCRETE DIMENSIONS)



SECTION C-C FOAM JOINT SEAL (EXPANSION) — SECTION C-C FOAM JOINT SEAL (FIXED)

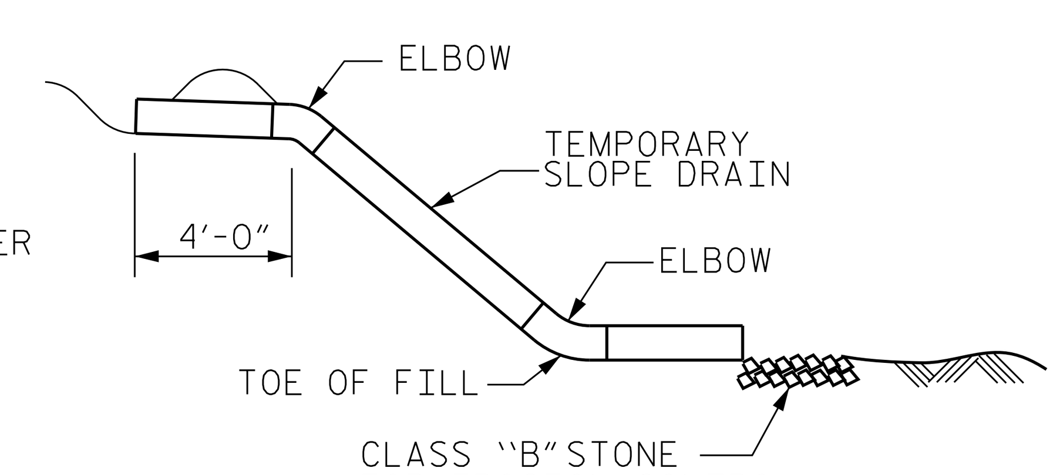
ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	6.9
2	6.9
TOTAL	13.8

* BASED ON THE MINIMUM BLOCKOUT SHOWN.

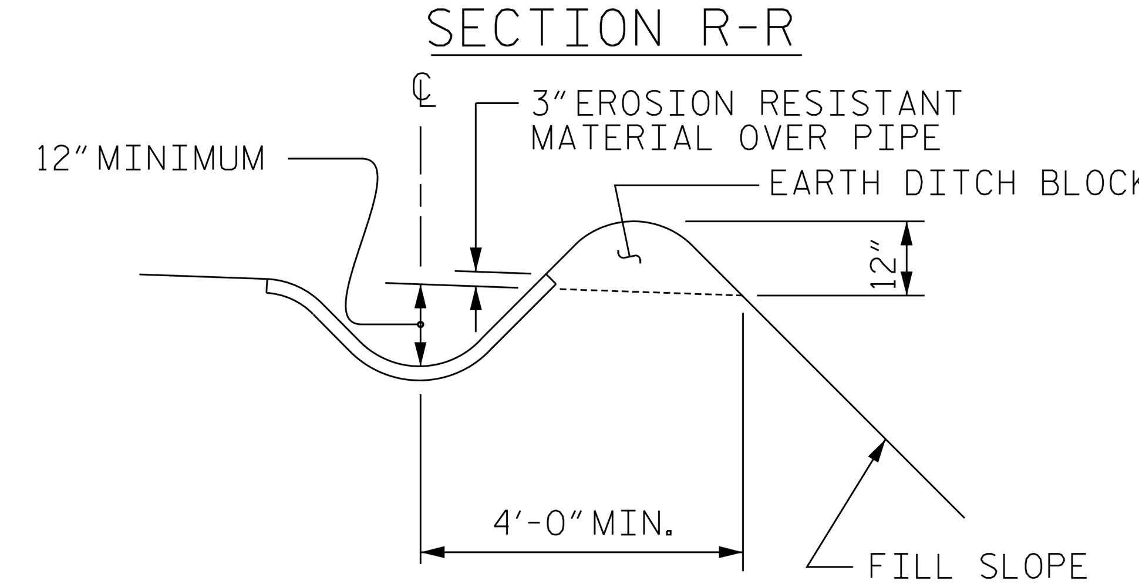


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

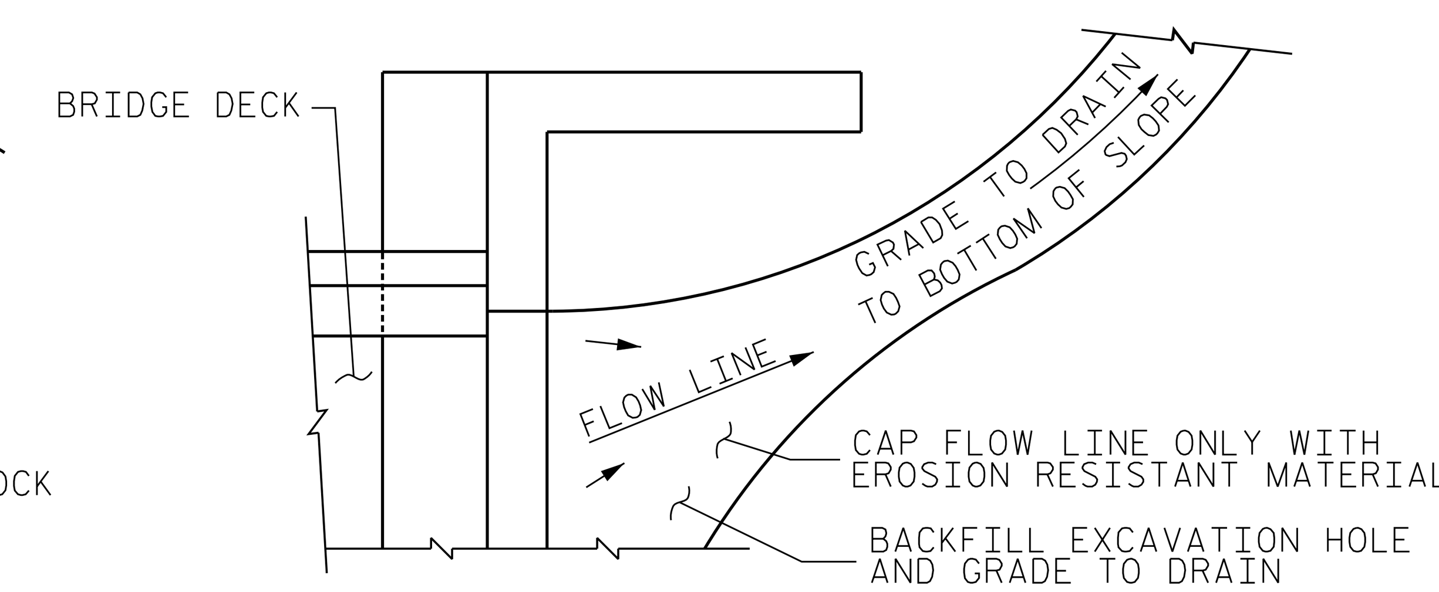
PLAN VIEW



SECTION R-R



SECTION S-S

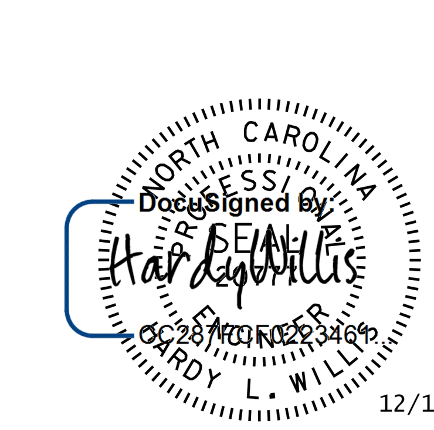


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



12/13/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. 14SP.20441.2
HAYWOOD COUNTY
STATION: 12+30.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

Johnson, Mirmiran, & Thompson Inc.
1318 Patton Ave., Suite F,
Asheville, NC, 28806
License No: C-3097

DWN. BY: MAF	DATE: 03/18		
CHKD. BY: CBC	DATE: 03/18		
DES. EGR. OF RECORD: CBC	DATE: 03/18		

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-40
1			3			TOTAL SHEETS
2			4			40

ASSEMBLED BY : MAF	DATE : 11/2014		
CHECKED BY : CC	DATE : 11/2014		
DRAWN BY : FCJ 11/88	REV. 6/13	MAA/GM	
CHECKED BY : ARB 11/88	REV. 12/17	MAA/THC	
	REV. 5/18	MAA/THC	

STD. NO. BAS4 (SHT 3a)

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A ¼" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (/) RGW
REV. 8-16-99 RWW (/) LES
REV. 5-7-03 RWW (/) JTE
REV. 5-1-06 TLA (/) GM
REV. 10-1-11 MAA (/) GM
REV. 12-17 MAA (/) THC