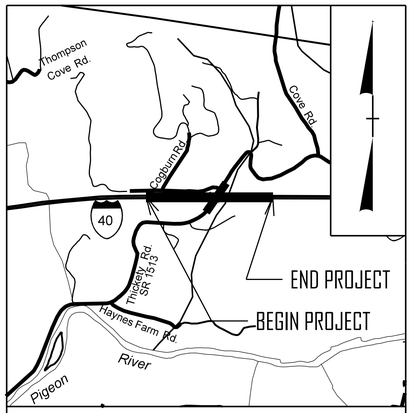
09/08/99

TIP PROJECT: B-5541

CONTRACT: C205015



VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

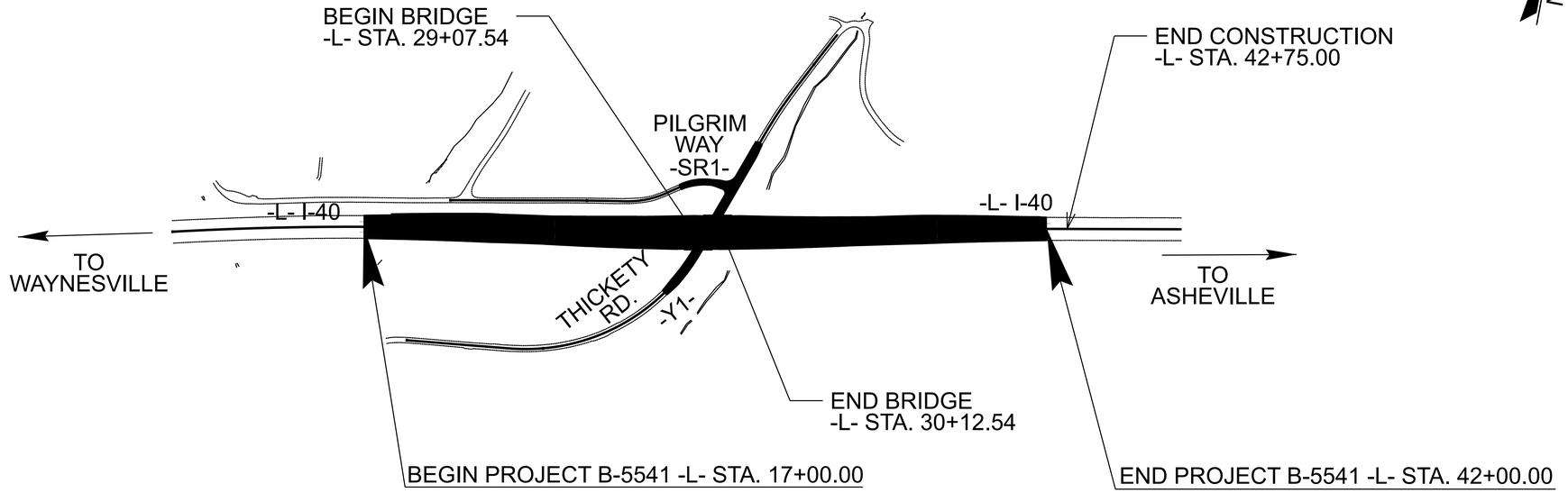
HAYWOOD COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5541	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
55041.1.1		P.E.
55041.2.1		ROW
55041.2.2		UTILITIES
55041.3.1		CONST.

LOCATION: *BRIDGE NO. 430236 OVER SR 1513 ON I-40*

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



STRUCTURES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2024 = 60000
ADT 2044 = 77500
K = 8 %
D = 55 %
T = 15 % *
V = 65 MPH
* TTST =12%DUAL 3%
FUNC CLASS =
INTERSTATE
STATE WIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5541 = 0.453 MILES

LENGTH STRUCTURE TIP PROJECT B-5541 = 0.020 MILES

TOTAL LENGTH TIP PROJECT B-5541 = 0.473 MILES

Prepared in the Office of:
NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
CARY, NC 27518
P: 919.851.1912 www.NV5.com
NC license # F-1333

2024 STANDARD SPECIFICATIONS

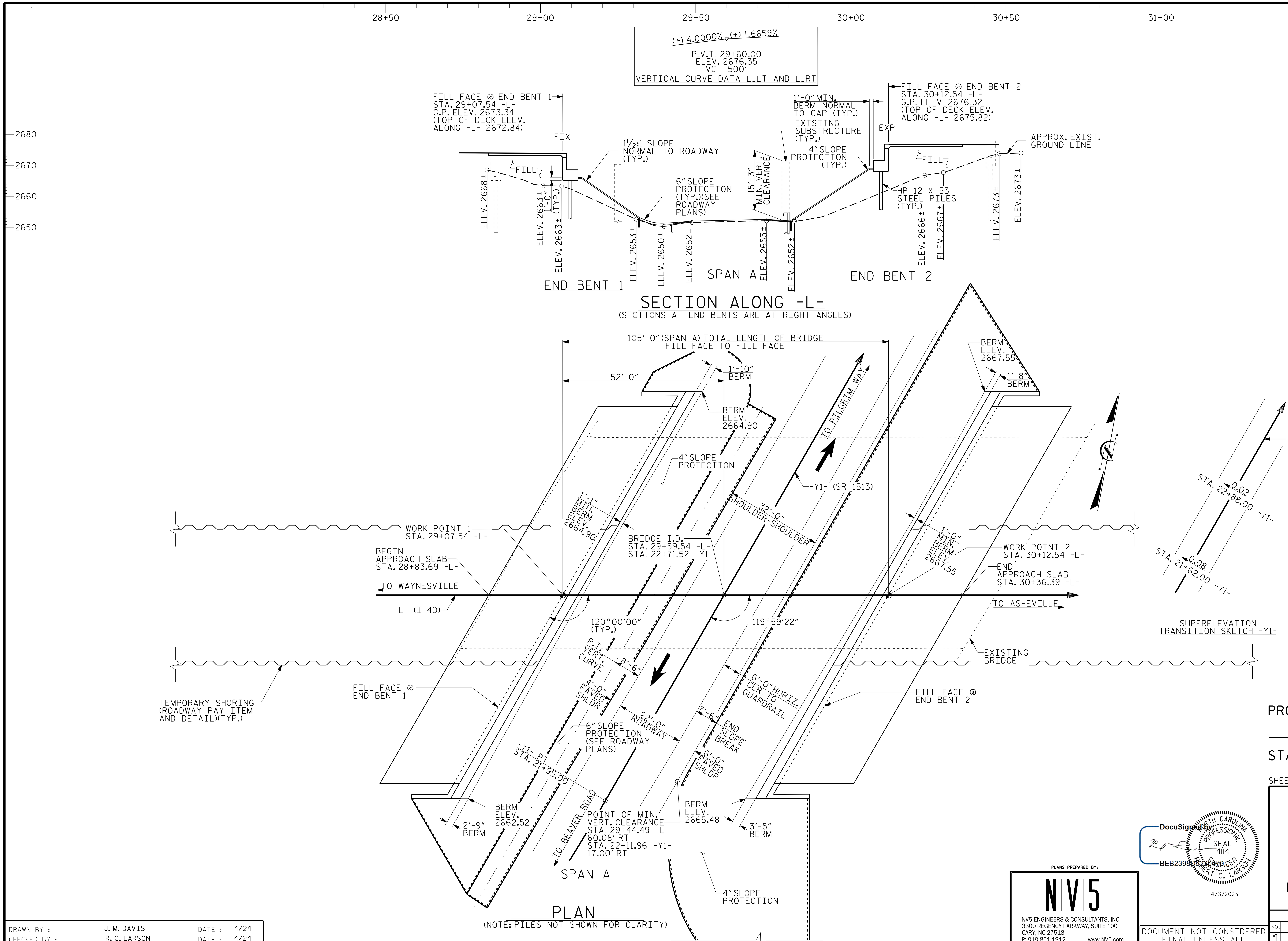
RIGHT OF WAY DATE:
OCTOBER 3, 2024

LETTING DATE:
JUNE 17, 2025

ELIZABETH R. PHIPPS, P.E.
PROJECT ENGINEER

ROBERT C. LARSON, P.E.
PROJECT DESIGN ENGINEER

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION



P.I. STA. 18+36.62
Δ = 64°24'41.0" (LT)
D = 07°54'10.3"
L = 815.04'
T = 456.66'
R = 725.00'
SE = 0.08
HORIZONTAL CURVE DATA -Y1-

(-) 0.5832% (+) 0.9420%
P.V.I. 22+30.00
ELEV. 2651.50
VC 140'
VERTICAL CURVE DATA -Y1-

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-
22+71.52 -Y1-
SHEET 1 OF 4 REPLACES BRIDGE NO. 430236

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON -L- (I-40) OVER -Y1- SR 1513 (THICKETY RD) BETWEEN WAYNESVILLE AND ASHEVILLE

DocuSigned by: BEB2398...
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
4/3/2025

PLANS PREPARED BY:
NV5
NV5 ENGINEERS & CONSULTANTS, INC.
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CARY, NC 27518
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NC License # F-1333

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REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-01
1			3					TOTAL SHEETS
2			4					45

DRAWN BY :	J. M. DAVIS	DATE :	4/24
CHECKED BY :	R. C. LARSON	DATE :	4/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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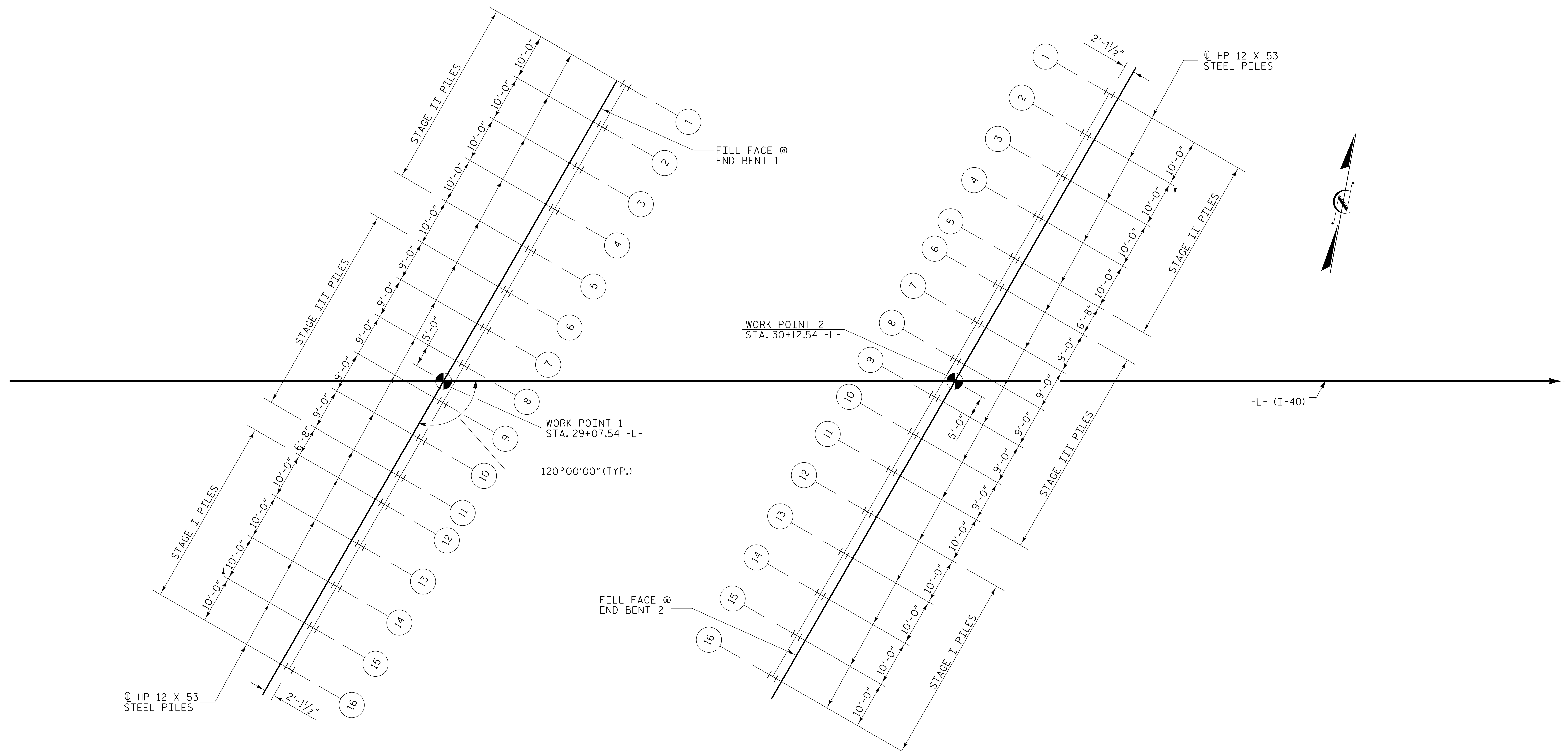
8/26/21



FOUNDATION LAYOUT

NOTES

ALL PILES ARE VERTICAL HP 12 X 53.

DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE AT THE BOTTOM OF THE CAP.

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 40,000-60,000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NOS. 1 & 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

OBSERVE A 1 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT, END BENT, AND REINFORCED BRIDGE APPROACH FILL, IF APPLICABLE, BEFORE BEGINNING APPROACH SLAB CONSTRUCTION AT END BENT NOS. 1 & 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

DRAWN BY : R. C. LARSON DATE : 05/22/24
CHECKED BY : C. E. LARSON DATE : 05/21/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 05/22/24

4/3/2025
$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$
3:19:49 PM

PLANS PREPARED BY:
NV5
NV5 ENGINEERS & CONSULTANTS, INC.
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CARY, NC 27518
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NC License # F-1333

DocuSigned by:
BEB2398D0E8D4C9...
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON
4/3/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON -L- (I-40) OVER -Y1- SR 1513 (THICKETY RD) BETWEEN WAYNESVILLE AND ASHEVILLE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-02
1			3			TOTAL SHEETS
2			4			45

SUMMARY OF PILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Resistance per Pile TONS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Length per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles*			Drilled-In Piles		
					Min Pile Tip (Tip No Higher Than) Elev FT	Required Driving Resistance (RDR)** per Pile TONS	Total Pile Redrives Quantity EACH	Predrilling Length per Pile Lin FT	Predrilling Elevation (Elev Not To Predrill Below) FT	Maximum Predrilling Dia INCHES	Pile Excavation (Bottom of Hole) Elev FT	Pile Exc Not In Soil per Pile Lin FT	Pile Exc In Soil per Pile Lin FT
End Bent No. 1, Piles 1-5	135	See Structure Drawings	55	NA		225							
End Bent No. 1, Piles 6-11	135		80	NA		225							
End Bent No. 1, Piles 12-16	135		80	NA		225							
End Bent No. 2, Piles 1-5	135		70	NA		225							
End Bent No. 2, Piles 6-11	135		95	NA		225							
End Bent No. 2, Piles 12-16	135		95	NA		225							

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

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

SUMMARY OF PDA/PILE ORDER LENGTHS

(Blank entries indicate item is not applicable to structure)

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

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

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile TONS	Factored Downdrag Load per Pile TONS	Factored Dead Load* per Pile TONS	Dynamic Resistance Factor	Nominal Downdrag Resistance per Pile TONS	Nominal Scour Resistance per Pile TONS	Scour Resistance Factor (Default = 1.00)
End Bent No. 1, Piles 1-16	135			0.60			1.00
End Bent No. 2, Piles 1-16	135			0.60			1.00

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

SUMMARY OF PILE ACCESSORIES

(Blank entries indicate item is not applicable to structure)

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

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer Shiping Yang, License #031361 on
2. Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
3. The Engineer will determine the need for PDA Testing and Pipe Pile Plates when PDAs or plates may be required.

PROJECT NO. B-5541

Haywood COUNTY

STATION: 29+59.54 -L-

Bridge #236

NORTH CAROLINA PROFESSIONAL SEAL PE # ENGINEER PE SEAL NAME

SIGNATURE DATE

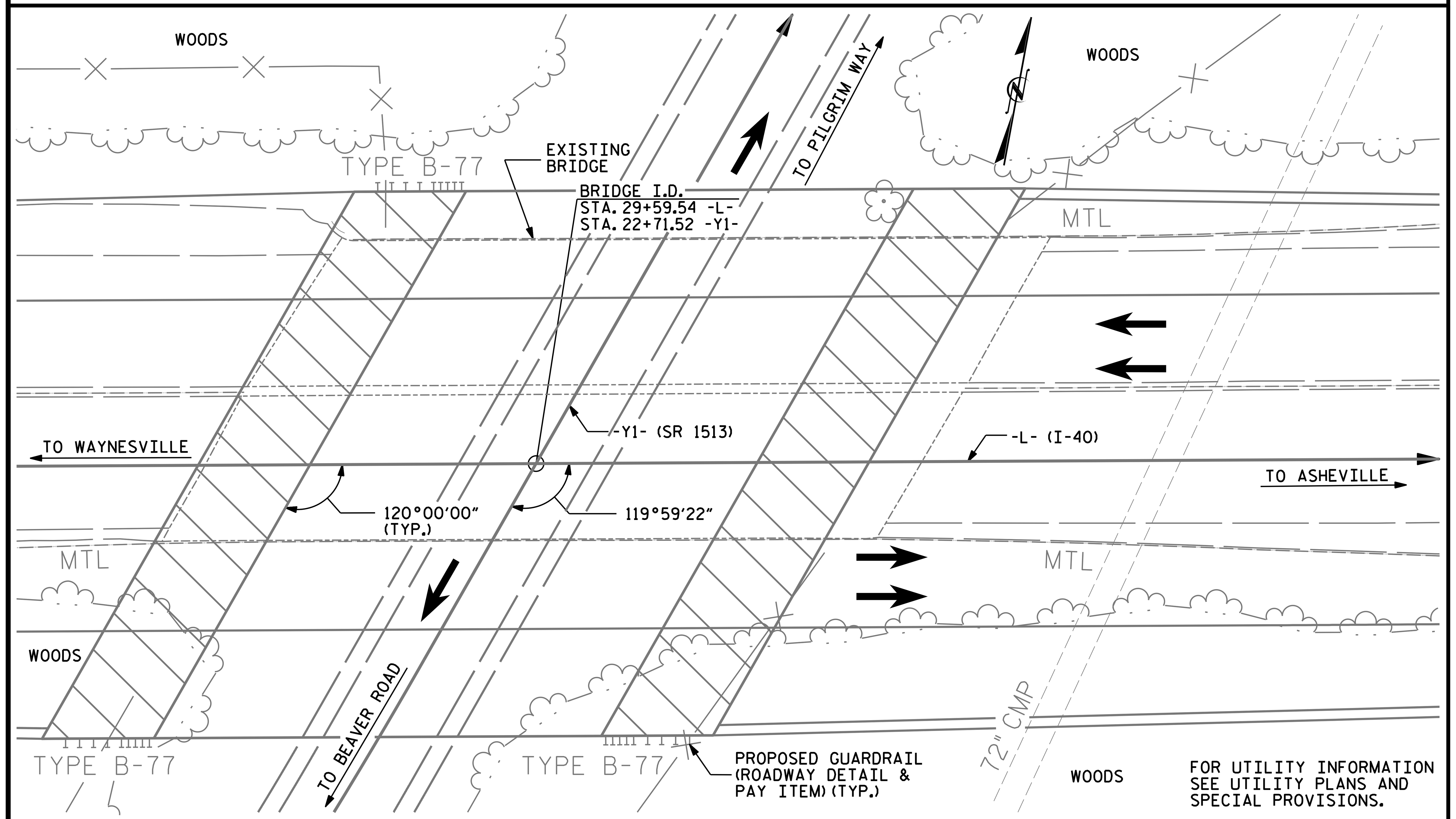
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-03
1			3			TOTAL SHEETS
2			4			45

BENCHMARK: BM #3: RR SPIKE FLUSH IN PAVEMENT; -BL- STA. 15+76.00 371' LT; ELEV. 2653.80 NAVD 88



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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 29+59.54 -L-."

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

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

AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING STRUCTURE CONSISTING OF 3 SPANS - 1 @ 41'-0", 1 @ 54'-0", 1 @ 51'-0"; 66'-0" CLEAR ROADWAY WIDTH AND REINFORCED CONCRETE FLOOR ON I-BEAMS 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.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STATION 29+59.54 -L-	ASBESTOS ASSESSMENT	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS AT STATION 29+59.54-L-	REINFORCING STEEL	FIB-54" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	CONCRETE MEDIAN BARRIER	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LUMP SUM	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	NO.	LIN. FT.	EACH	NO.	LIN. FT.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			12849	17033		LUMP SUM		13	1301.08				247.12	154.75		LUMP SUM	LUMP SUM
END BENT 1					130.0		16074			16	16	1155			500		
END BENT 2					132.2		16144			16	16	1395			930		
TOTAL	LUMP SUM	LUMP SUM	12849	17033	262.2	LUMP SUM	32218	13	1301.08	32	32	2550	247.12	154.75	1430	LUMP SUM	LUMP SUM

PROJECT NO. **B-5541**

HAYWOOD COUNTY

STATION: **29+59.54 -L-**

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON -L- (I-40)
OVER -Y1- SR 1513
(THICKETY RD)
BETWEEN WAYNESVILLE AND ASHEVILLE

DocuSigned by:
BEB2398D9220470...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/17/2025

PLANS PREPARED BY:

NV5 ENGINEERS & CONSULTANTS, INC.
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NC License # F-1333

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

SHEET NO. S-04
TOTAL SHEETS 45

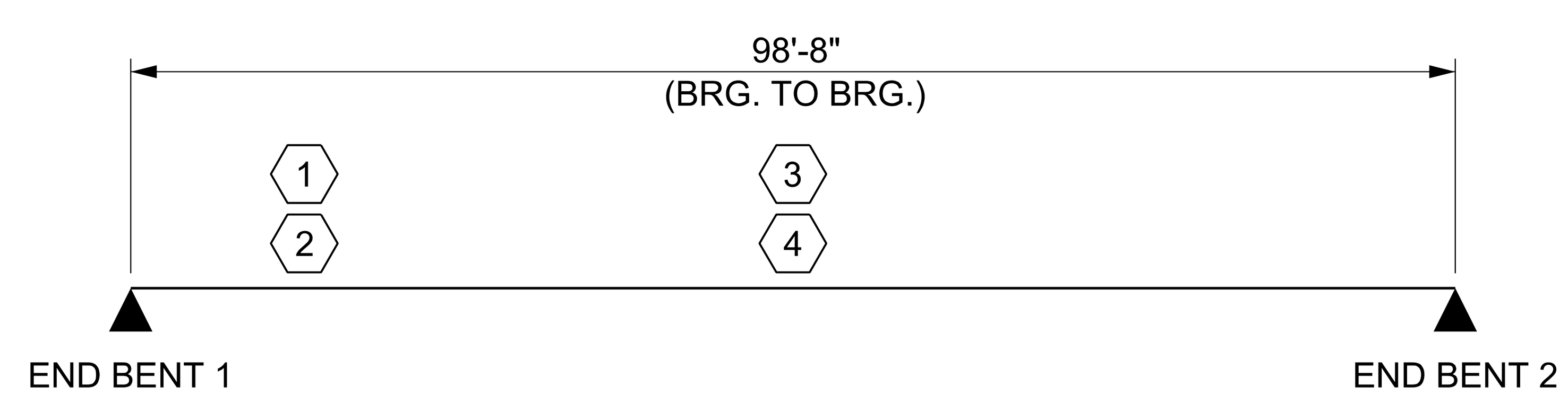
DRAWN BY : J. M. DAVIS DATE : 4/24
CHECKED BY : R. C. LARSON DATE : 4/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 4/24

4/17/2025
G:\Project\2015\2015103.29\CLIENT\Structures\SINGLE SPAN BRIDGE\DGN\401_007_B5541_SMU_GD_004_430236.dgn
amber.lee

8/26/21

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

LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE: LIVE-LOAD FACTORS (γ LL)	STRENGTH I MOMENT: DISTRIBUTION FACTORS (DF)	STRENGTH I MOMENT: RATING FACTOR	STRENGTH I MOMENT: SPAN	STRENGTH I MOMENT: GIRDER LOCATION	STRENGTH I MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	STRENGTH I SHEAR: DISTRIBUTION FACTORS (DF)	STRENGTH I SHEAR: RATING FACTOR	STRENGTH I SHEAR: SPAN	STRENGTH I SHEAR: GIRDER LOCATION	STRENGTH I SHEAR: DISTANCE FROM LEFT END OF SPAN (ft)	SERVICE III LIMIT STATE: LIVE-LOAD FACTORS (γ LL)	SERVICE III MOMENT: DISTRIBUTION FACTORS (DF)	SERVICE III MOMENT: RATING FACTOR	SERVICE III MOMENT: SPAN	SERVICE III MOMENT: GIRDER LOCATION	SERVICE III MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	COMMENT NUMBER
DESIGN LOAD		HL-93 (INVENTORY)	N/A	1	1.51	--	1.75	0.931	1.81	A	2	49.3	1.057	1.51	A	2	9.30	0.80	0.931	1.63	A	2	49.3	
		HL-93 (OPERATING)	N/A		1.98	--	1.35	0.931	2.35	A	2	49.3	1.057	1.98	A	2	9.30	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.22	43.92	1.75	0.931	1.49	A	EXT	49.3	1.057	1.22	A	EXT	9.30	0.80	0.931	1.35	A	EXT	49.3	
		HS-20 (OPERATING)	36.000		1.93	69.48	1.35	0.931	1.93	A	EXT	49.3	1.057	1.96	A	EXT	9.30	N/A	--	--	--	--	--	
LEGAL LOAD	SINGLE VEHICLE (SV)	SH	12.500		4.82	60.25	1.40	0.931	6.67	A	EXT	49.3	1.057	6.97	A	EXT	9.30	0.80	0.931	4.82	A	EXT	49.3	
		S3C	21.500		2.82	60.63	1.40	0.931	3.90	A	EXT	49.3	1.057	4.04	A	EXT	9.30	0.80	0.931	2.82	A	EXT	49.3	
		S3A	22.750		2.67	60.74	1.40	0.931	3.70	A	EXT	49.3	1.057	3.82	A	EXT	9.30	0.80	0.931	2.67	A	EXT	49.3	
		S4A	26.750		2.34	62.60	1.40	0.931	3.24	A	EXT	49.3	1.057	3.31	A	EXT	9.30	0.80	0.931	2.34	A	EXT	49.3	
		S5A	30.500		2.06	62.83	1.40	0.931	2.86	A	EXT	49.3	1.057	3.00	A	EXT	9.30	0.80	0.931	2.06	A	EXT	49.3	
		S6A	34.500		1.86	64.17	1.40	0.931	2.58	A	EXT	49.3	1.057	2.69	A	EXT	9.30	0.80	0.931	1.86	A	EXT	49.3	
		S7B	38.500		1.69	65.07	1.40	0.931	2.34	A	EXT	49.3	1.057	2.49	A	EXT	9.30	0.80	0.931	1.69	A	EXT	49.3	
		S7A	40.000	3	1.67	66.80	1.40	0.931	2.31	A	EXT	49.3	1.057	2.52	A	EXT	9.30	0.80	0.931	1.67	A	EXT	49.3	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		2.29	64.69	1.40	0.931	3.17	A	EXT	49.3	1.057	3.20	A	EXT	9.30	0.80	0.931	2.29	A	EXT	49.3	
		T5B	32.000		2.02	66.64	1.40	0.931	2.79	A	EXT	49.3	1.057	2.99	A	EXT	9.30	0.80	0.931	2.02	A	EXT	49.3	
		T6A	36.000		1.84	66.24	1.40	0.931	2.55	A	EXT	49.3	1.057	2.72	A	EXT	9.30	0.80	0.931	1.84	A	EXT	49.3	
		T7A	40.000		1.70	68.00	1.40	0.931	2.35	A	EXT	49.3	1.057	2.51	A	EXT	9.30	0.80	0.931	1.70	A	EXT	49.3	
		T7B	40.000		1.80	72.00	1.40	0.931	2.49	A	EXT	49.3	1.057	2.39	A	EXT	9.30	0.80	0.931	1.80	A	EXT	49.3	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.26	64.98	1.30	0.931	3.38	A	EXT	49.3	1.057	3.34	A	EXT	9.30	0.80	0.931	2.26	A	EXT	49.3	
		EV3	43.000	4	1.46	62.78	1.30	0.931	2.17	A	EXT	49.3	1.057	2.18	A	EXT	9.30	0.80	0.931	1.46	A	EXT	49.3	



LRFR SUMMARY

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γDC	γDW
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

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

* * SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

PROJECT NO. B-5541
HAYWOOD
STATION: 29+59.54 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(INTERSTATE TRAFFIC)

PLANS PREPARED BY:
NV5
NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
CARY, NC 27518
P: 919.851.1912 www.NV5.com
NC License # F-1333

DocuSigned by:
BEB2398D0230470...
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON
4/3/2025

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

SHEET NO. S-05
TOTAL SHEETS 45

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 5/24
ASSEMBLED BY: C. E. LARSON DATE : 5/24
CHECKED BY : J. M. DAVIS DATE : 5/24
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

4/3/2025
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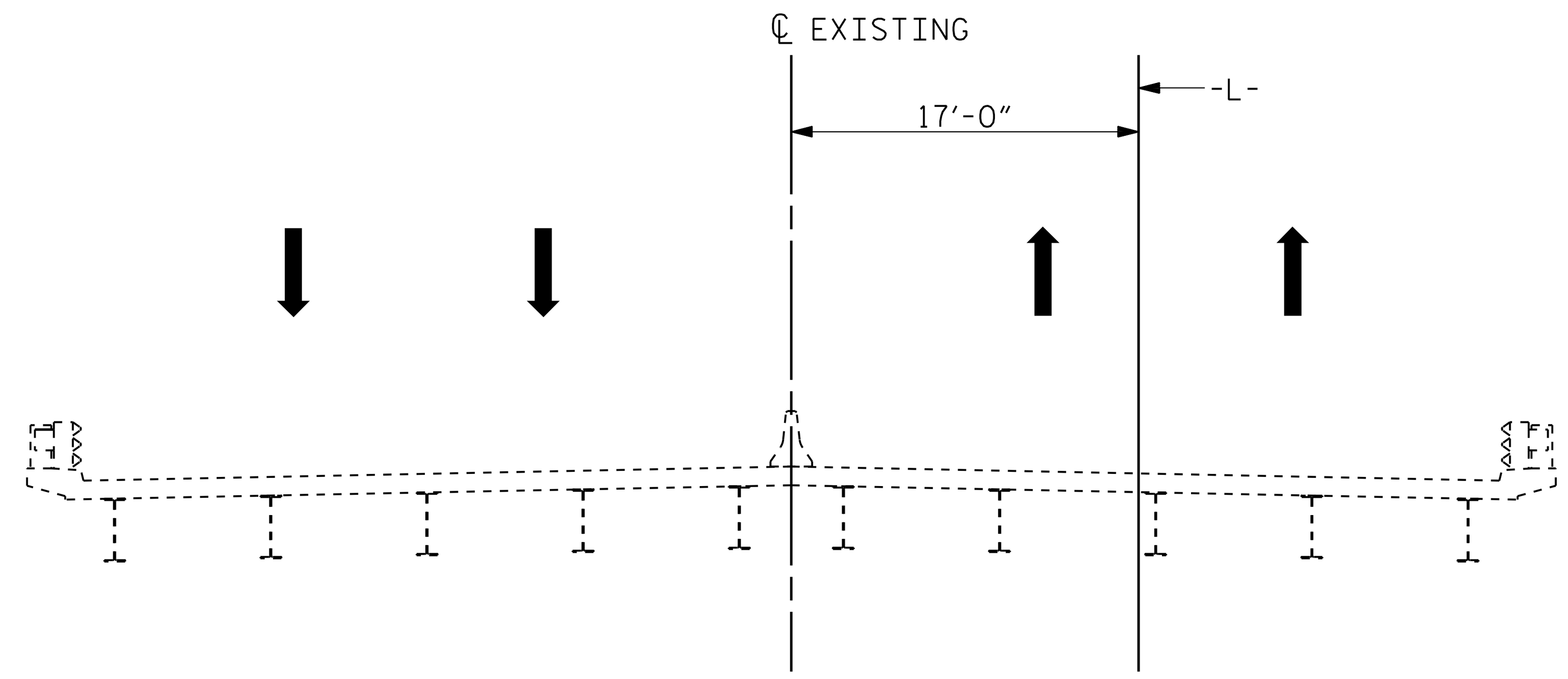
8/26/21



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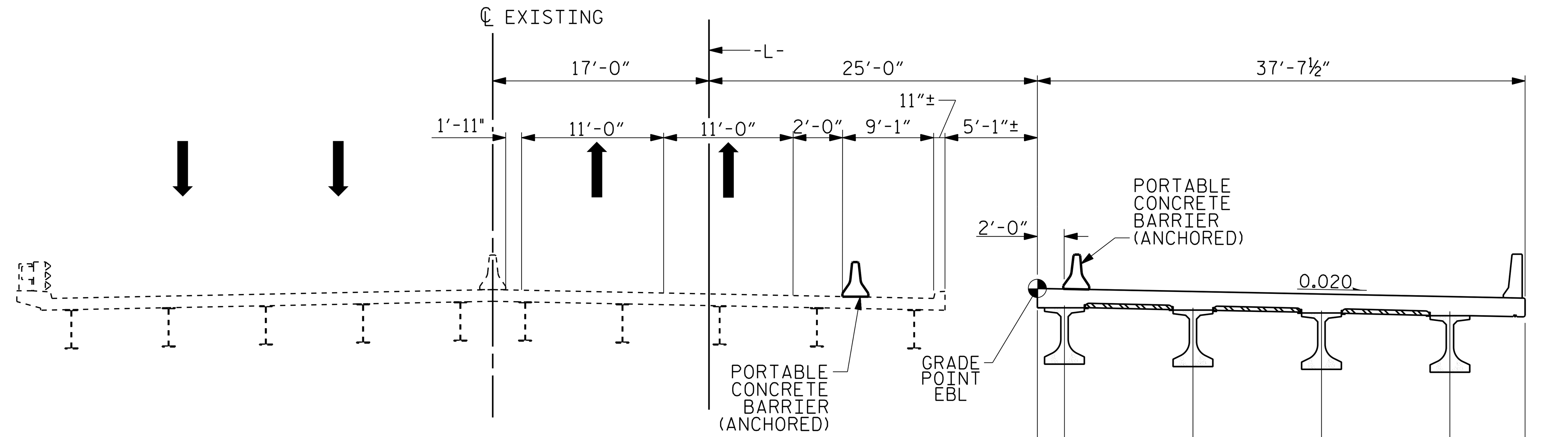
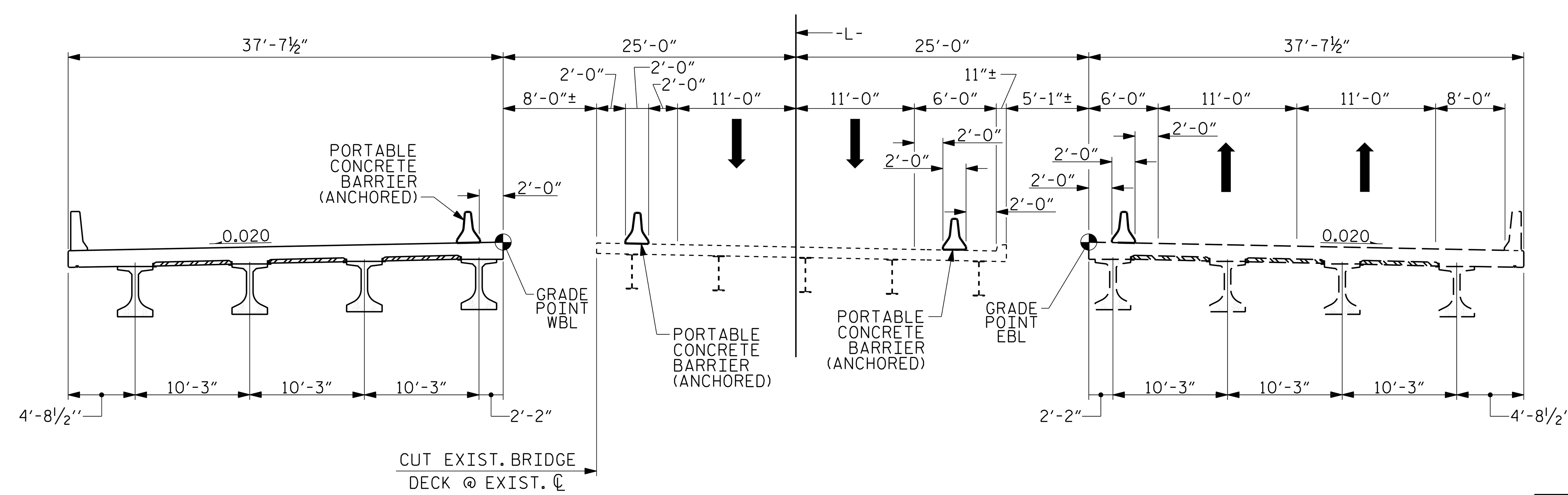


STAGE I CONSTRUCTION



STAGE II CONSTRUCTION

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONSTRUCTION STAGING SEQUENCE

DocuSigned by:
BEB2398D82204C9...

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

NV5

NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
CARY, NC 27518
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2			4			45

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CHECKED BY :	R. C. LARSON	DATE :	4/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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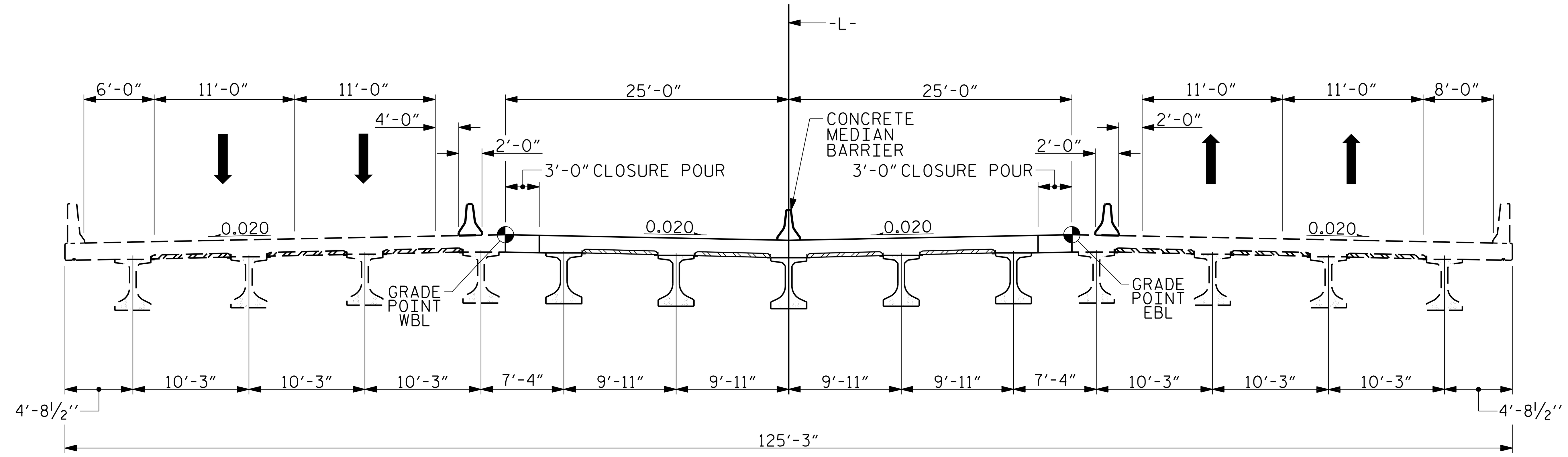
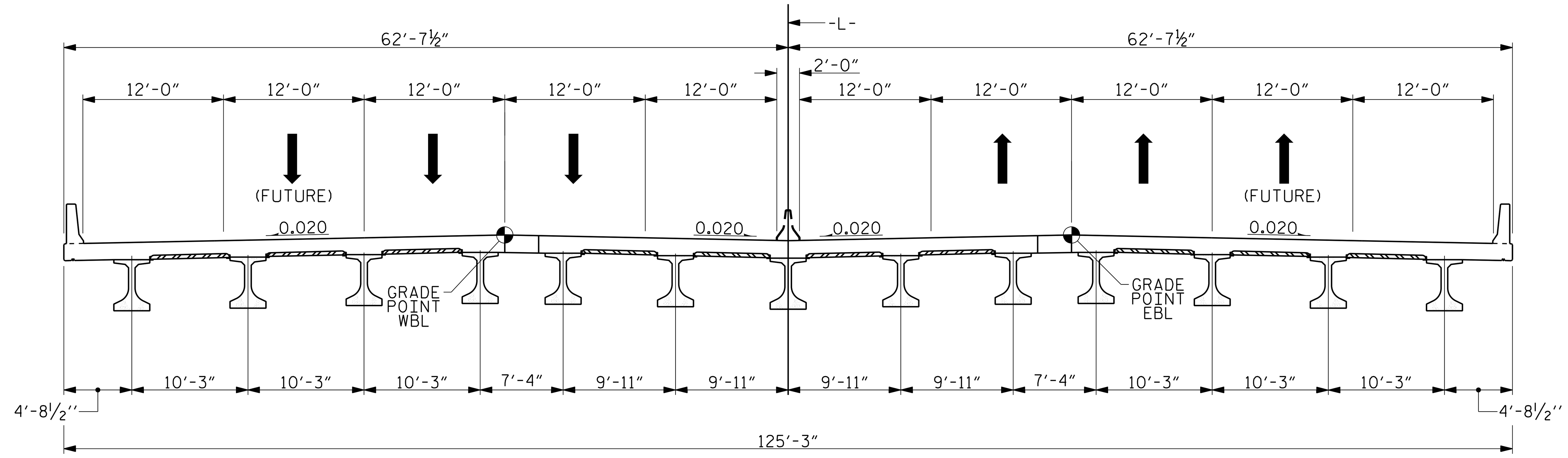


STAGE III CONSTRUCTION



FINAL

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONSTRUCTION STAGING SEQUENCE

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SEAL 14114 — NORTH CAROLINA PROFESSIONAL ENGINEER — ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

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SHEET NO. S-07

TOTAL SHEETS 45

DRAWN BY :	J. M. DAVIS	DATE :	4/24
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DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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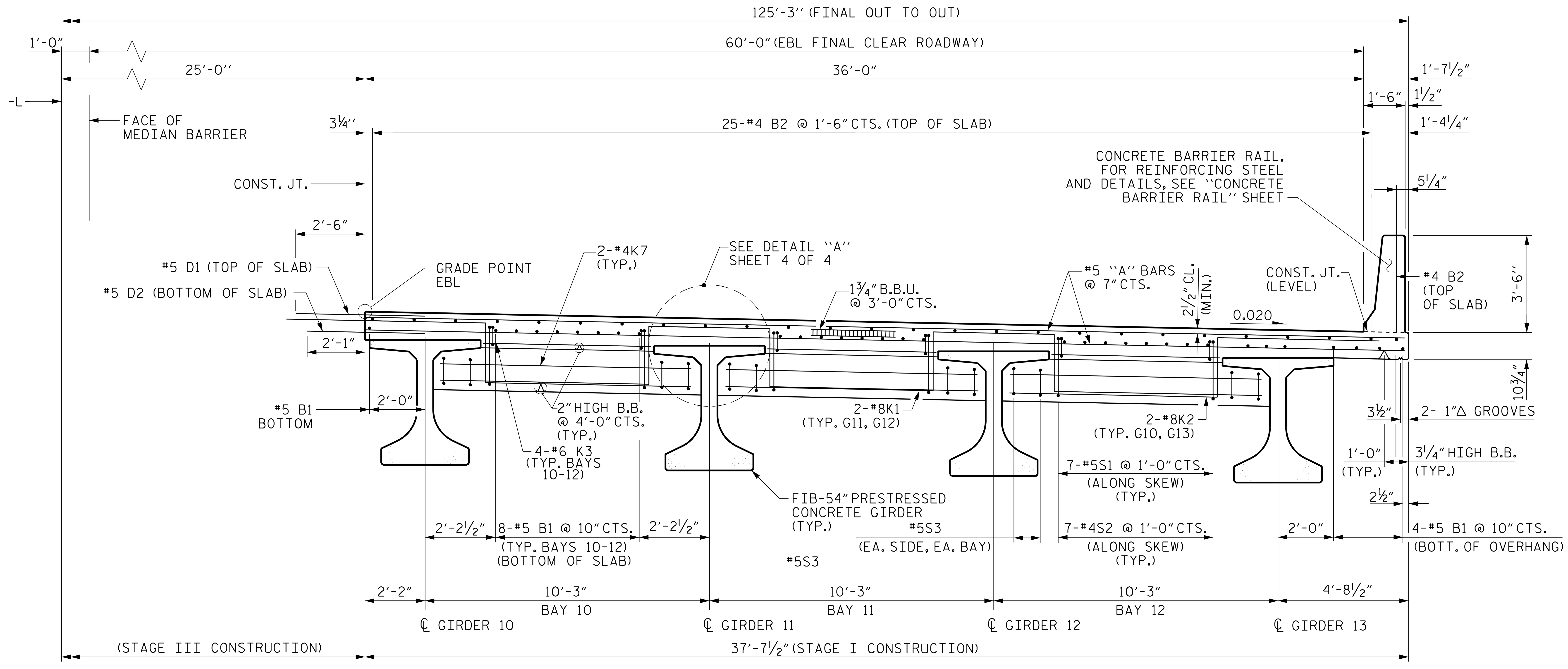
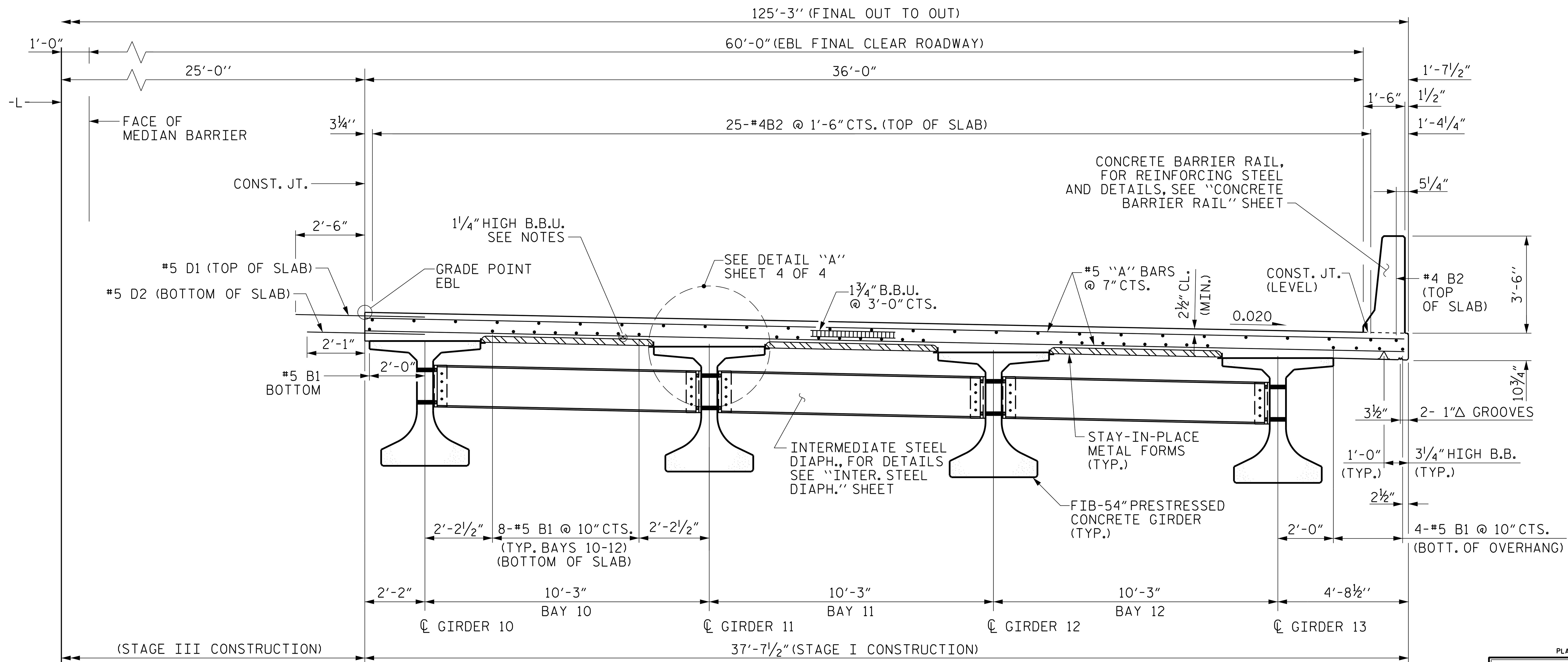


TYPICAL SECTION - STAGE I

SHOWING END BENT DIAPHRAGM



TYPICAL SECTION - STAGE I

SHOWING INTERMEDIATE STEEL DIAPHRAGM

NOTES

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

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

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

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION - STAGE I

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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1			3			TOTAL SHEETS
2			4			45

DRAWN BY :	E. M. AUNG	DATE :	3/24
CHECKED BY :	R. C. LARSON	DATE :	3/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

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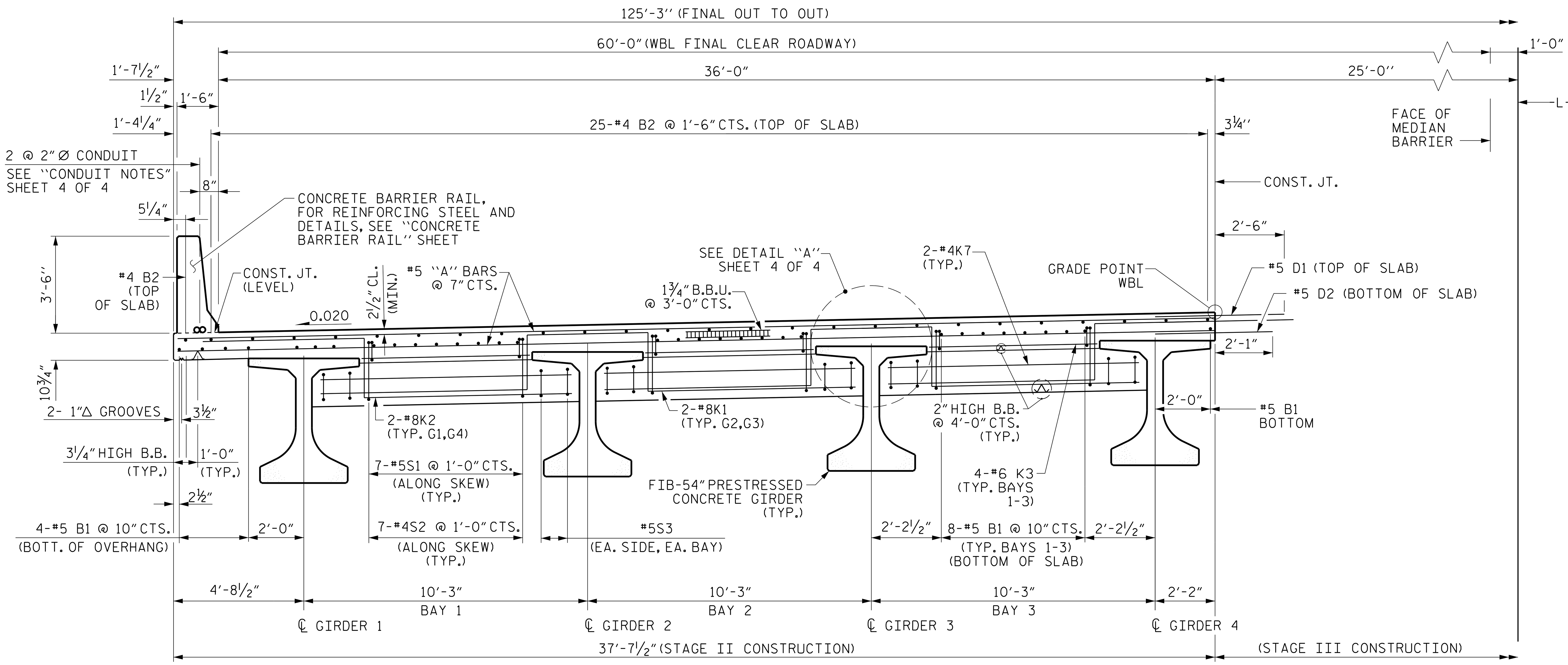
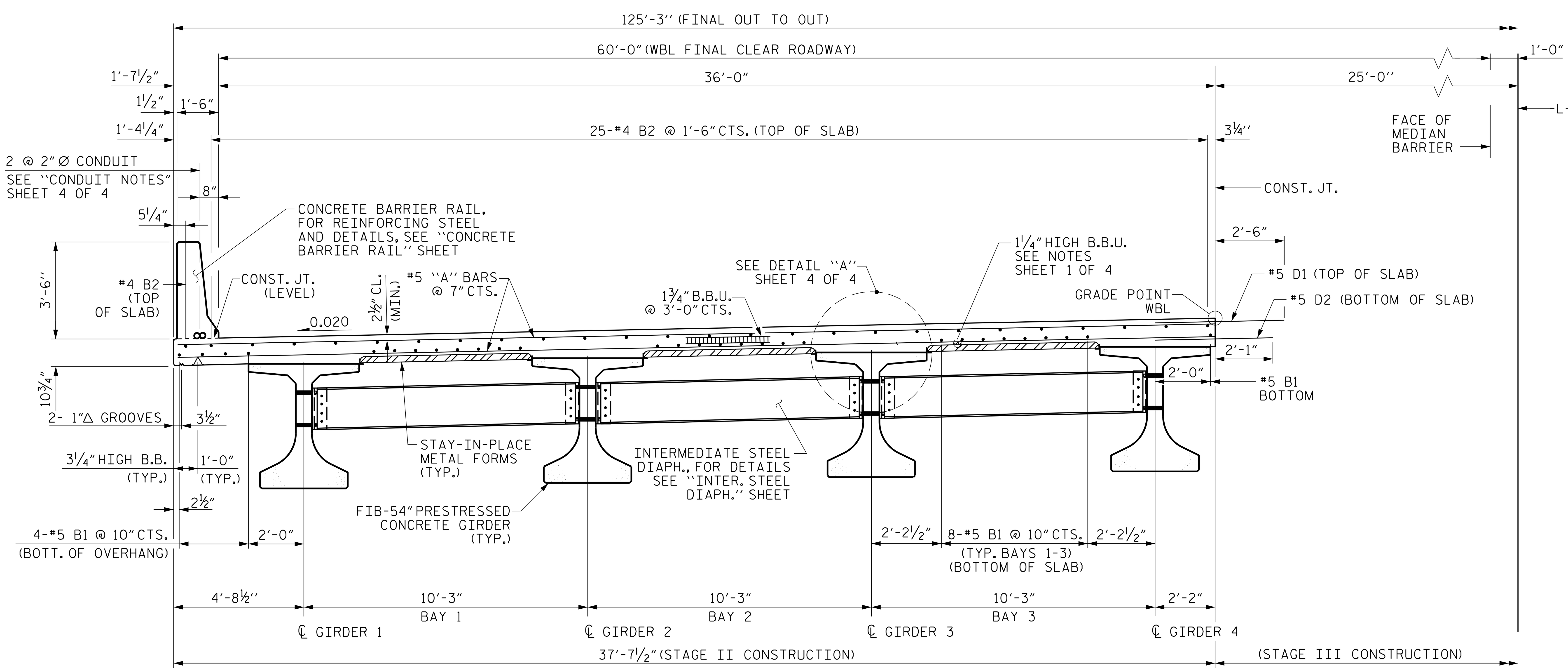


TYPICAL SECTION - STAGE II

SHOWING END BENT DIAPHRAGM



TYPICAL SECTION - STAGE II

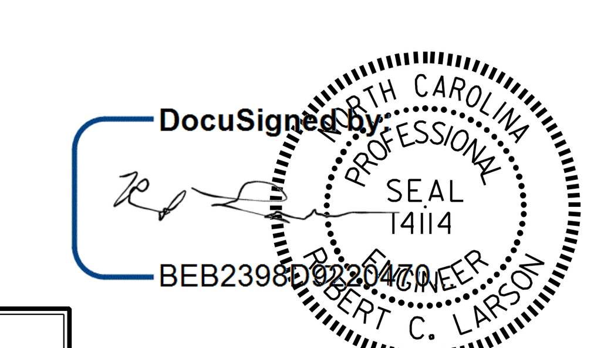
SHOWING INTERMEDIATE STEEL DIAPHRAGM

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 4



4/3/2025

STATE OF NORTH CAROLINA
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TYPICAL SECTION - STAGE II

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1			3				TOTAL SHEETS
2			4				45

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CHECKED BY :	R. C. LARSON	DATE :	3/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

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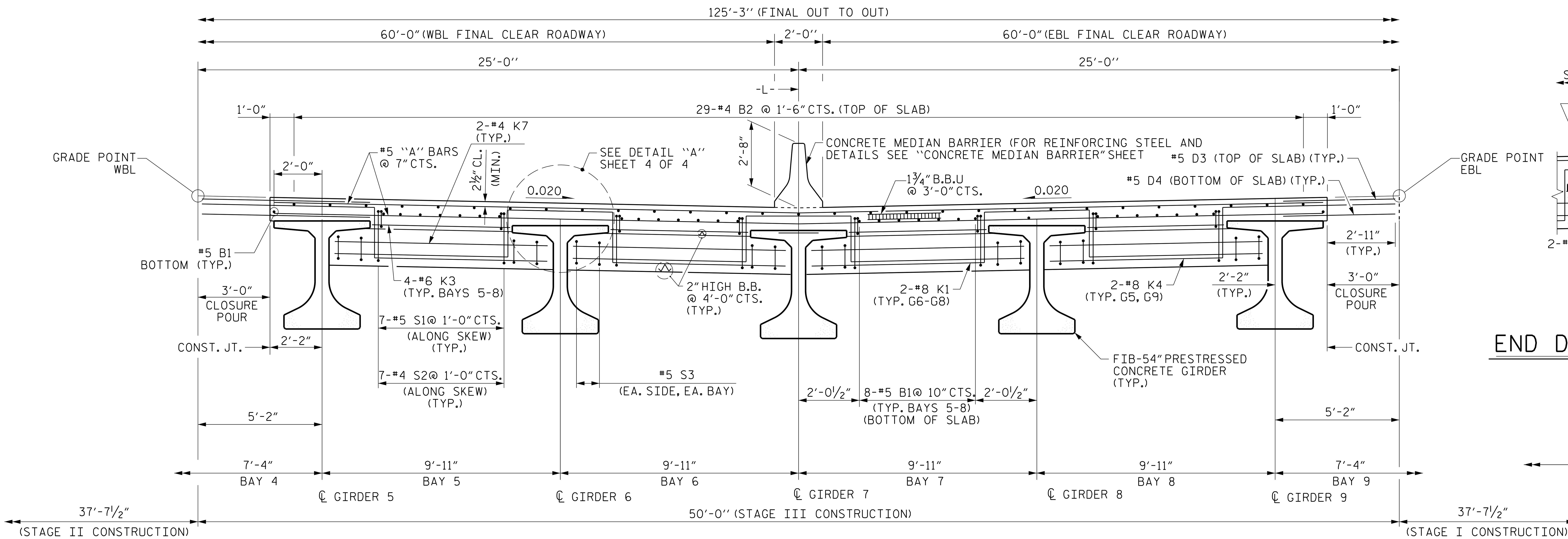
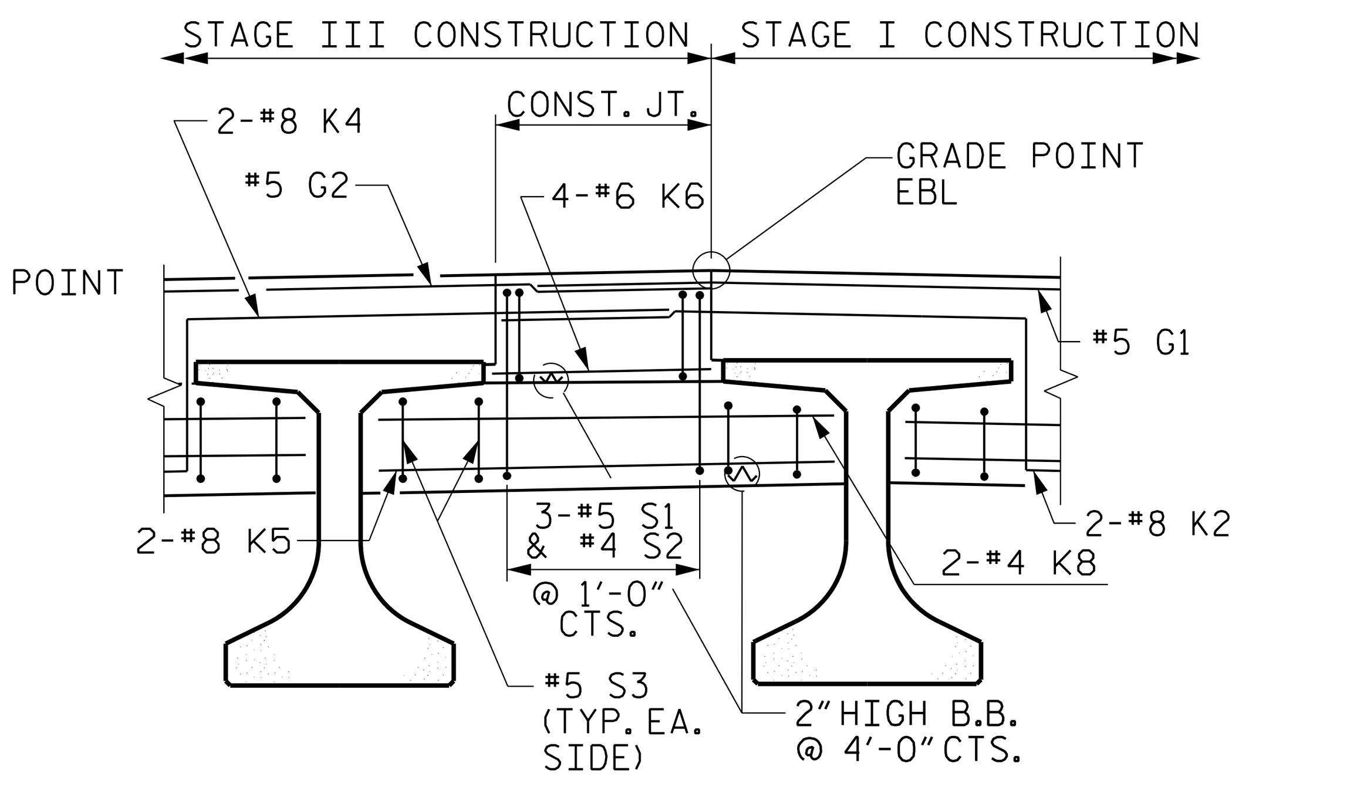


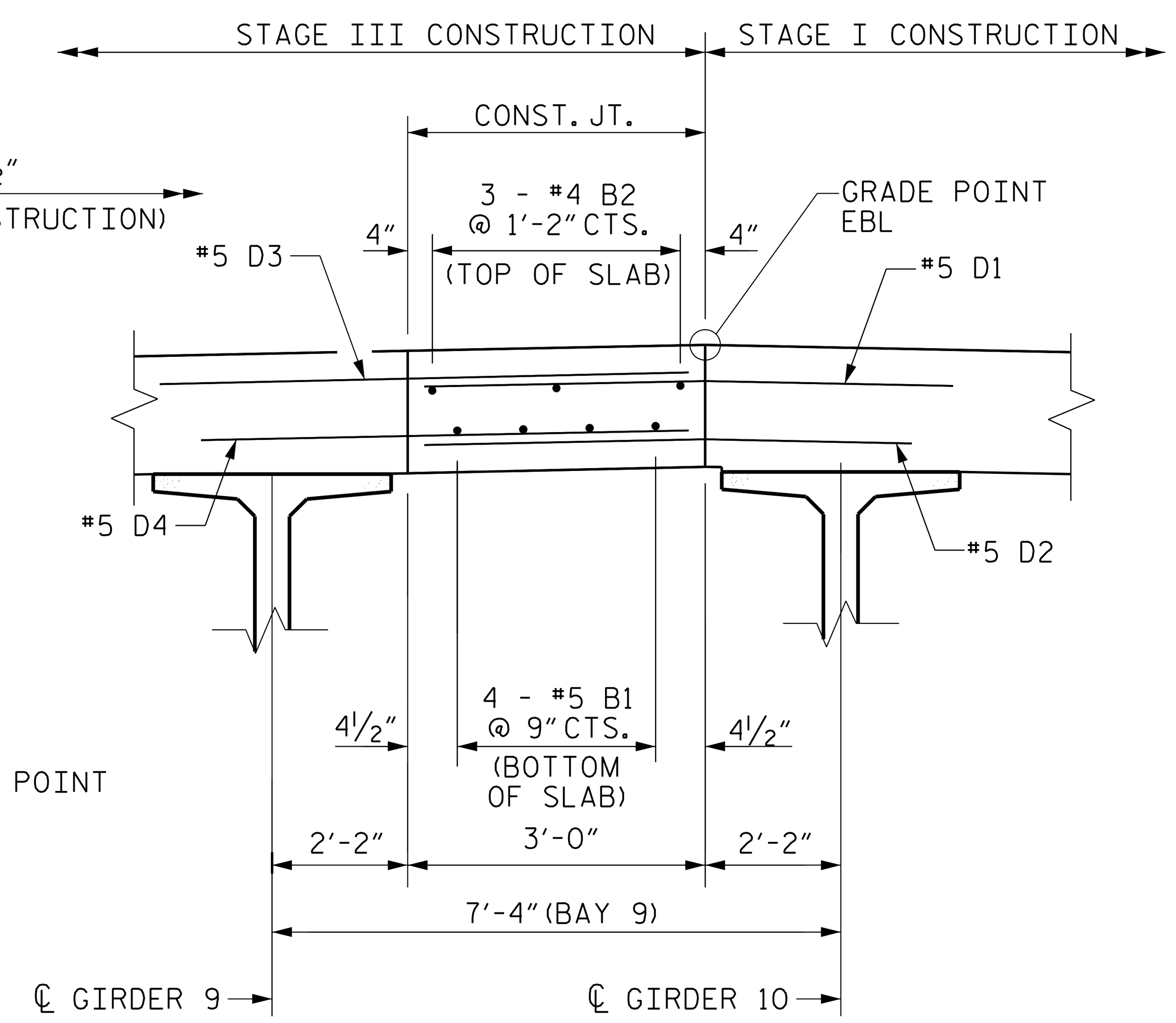
TYPICAL SECTION - STAGE III

SHOWING END BENT DIAPHRAGM



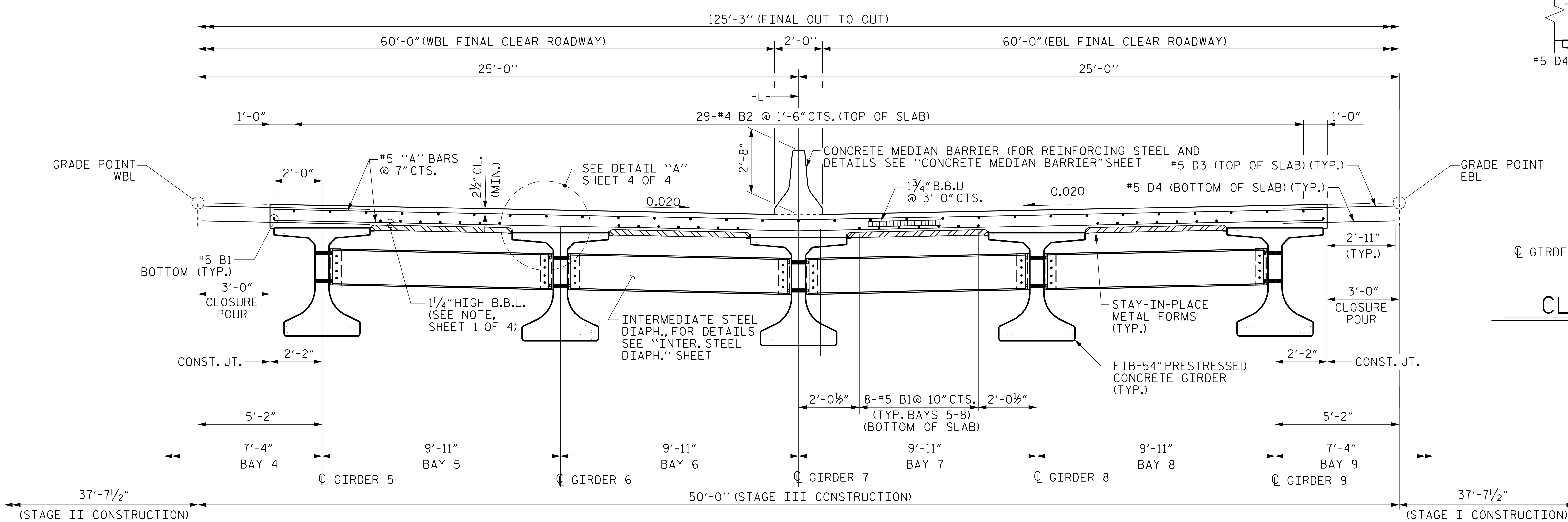
END DIAPHRAGM AT CLOSURE POUR

(BAY 9 SHOWN; BAY 4 SIMILAR)
END DIAPHRAGM TO BE PLACED WITH DECK CLOSURE POUR



CLOSURE POUR DETAIL

SEE PLAN OF SPANS, SHEET 3 OF 3 FOR ADDITIONAL INFORMATION
(BAY 9 SHOWN; BAY 4 SIMILAR)



TYPICAL SECTION - STAGE III

SHOWING INTERMEDIATE STEEL DIAPHRAGM

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION - STAGE III

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			45

DRAWN BY :	E. M. AUNG	DATE :	3/24
CHECKED BY :	R. C. LARSON	DATE :	3/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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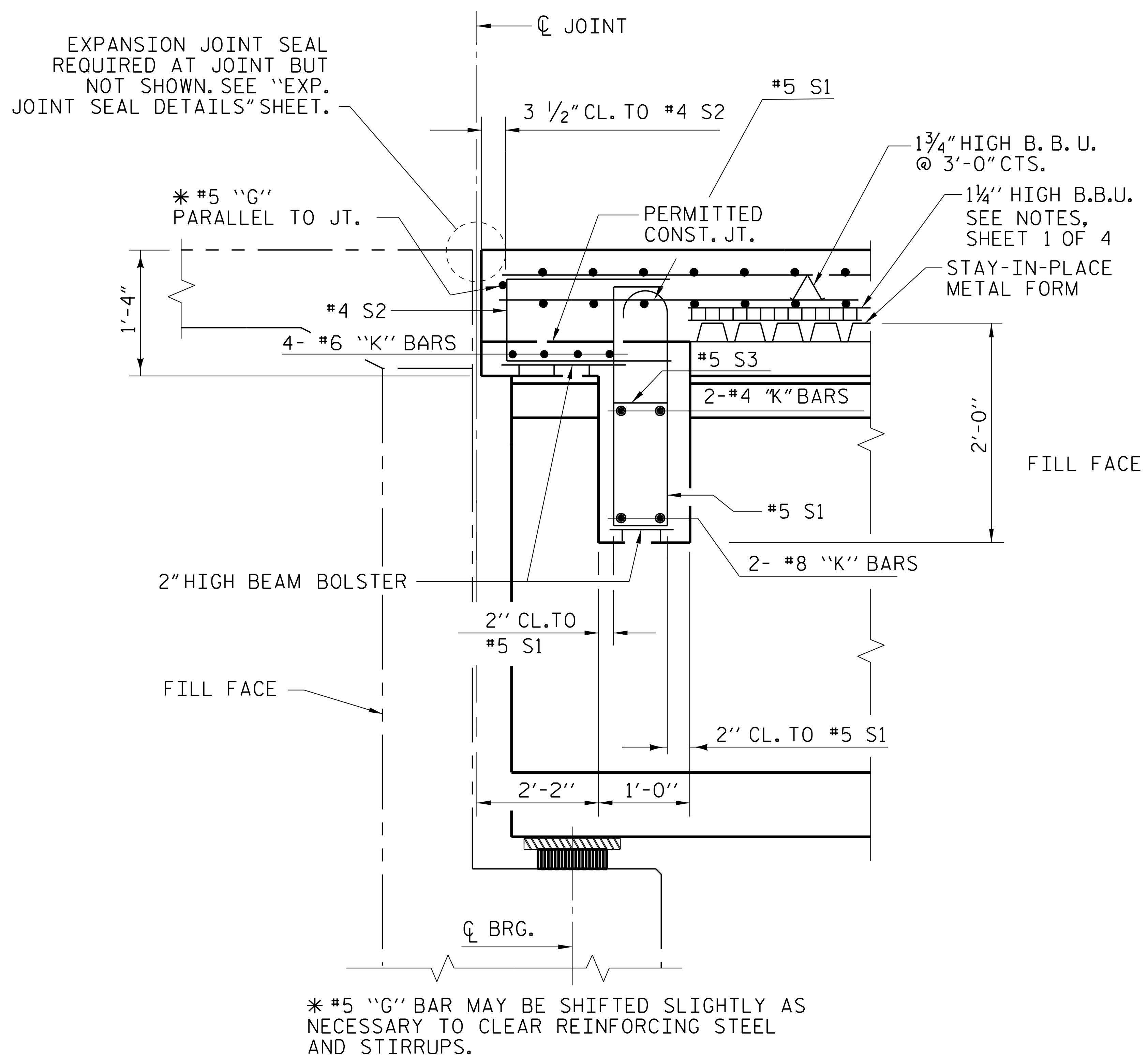
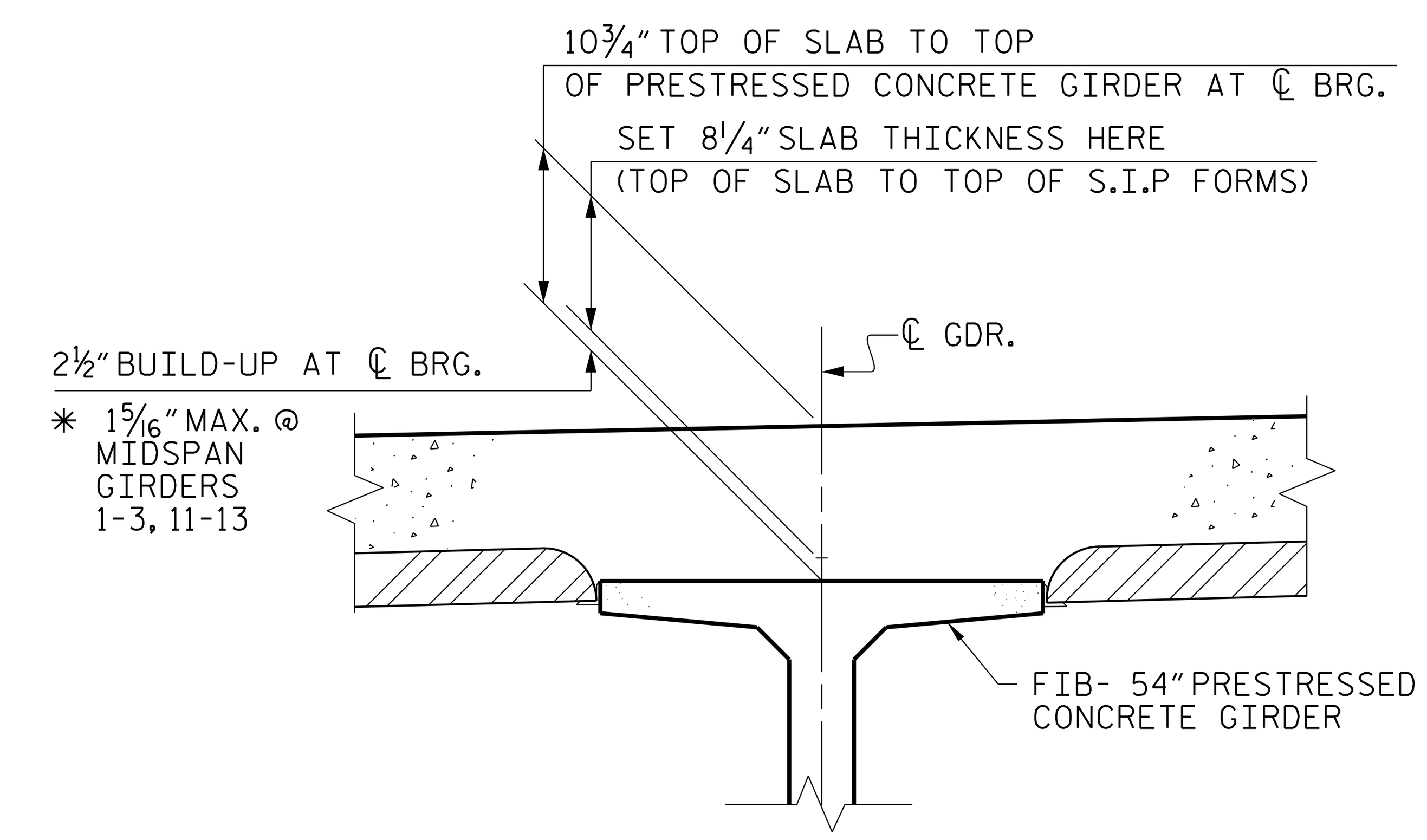


✱ #5 "G" BAR MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR REINFORCING STEEL AND STIRRUPS.

SECTION THRU END BENT DIAPHRAGMS

SECTION AT END BENT 1 SHOWN, END BENT 2 SIMILAR
(SEE SHEET 3 OF 4 FOR ADDITIONAL END BENT DIAPHRAGM DETAILS IN CLOSURE POUR)



DETAIL "A"

✱ BASED ON PREDICTED FINAL CAMBER AND THEORETICAL GRADE LINE ELEVATIONS

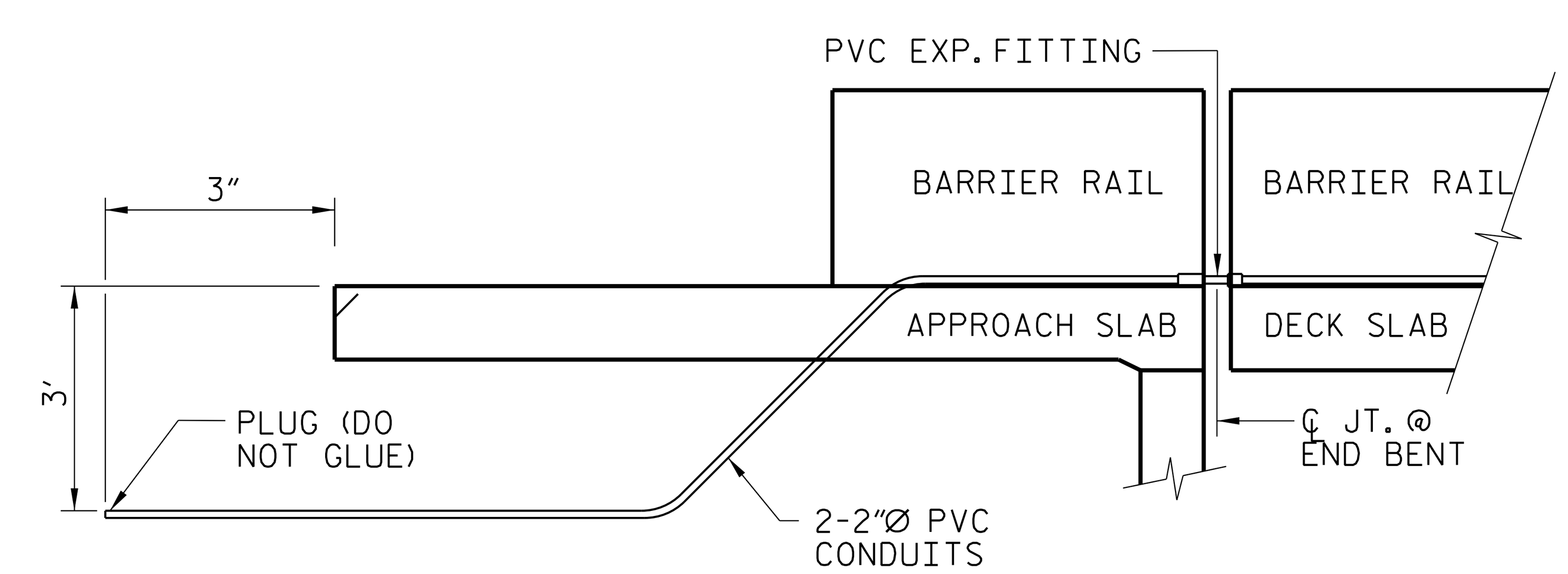
CONDUIT NOTES:

INSTALL CONDUIT IN LEFT RAIL, FULL LENGTH OF BRIDGE AND APPROACH SLAB. TERMINATE CONDUIT 3' BEYOND APPROACH SLAB AND PLUG 3' BELOW TOP OF SLAB. SEE "CONDUIT TERMINATION DETAIL".

CONDUIT TO BE SCHEDULE 40 PVC AND FASTENED SECURELY TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT. PROVIDE PULL STRING IN EACH CONDUIT. FULL LENGTH OF RUN AND ATTACH TO PLUG AT EACH END.

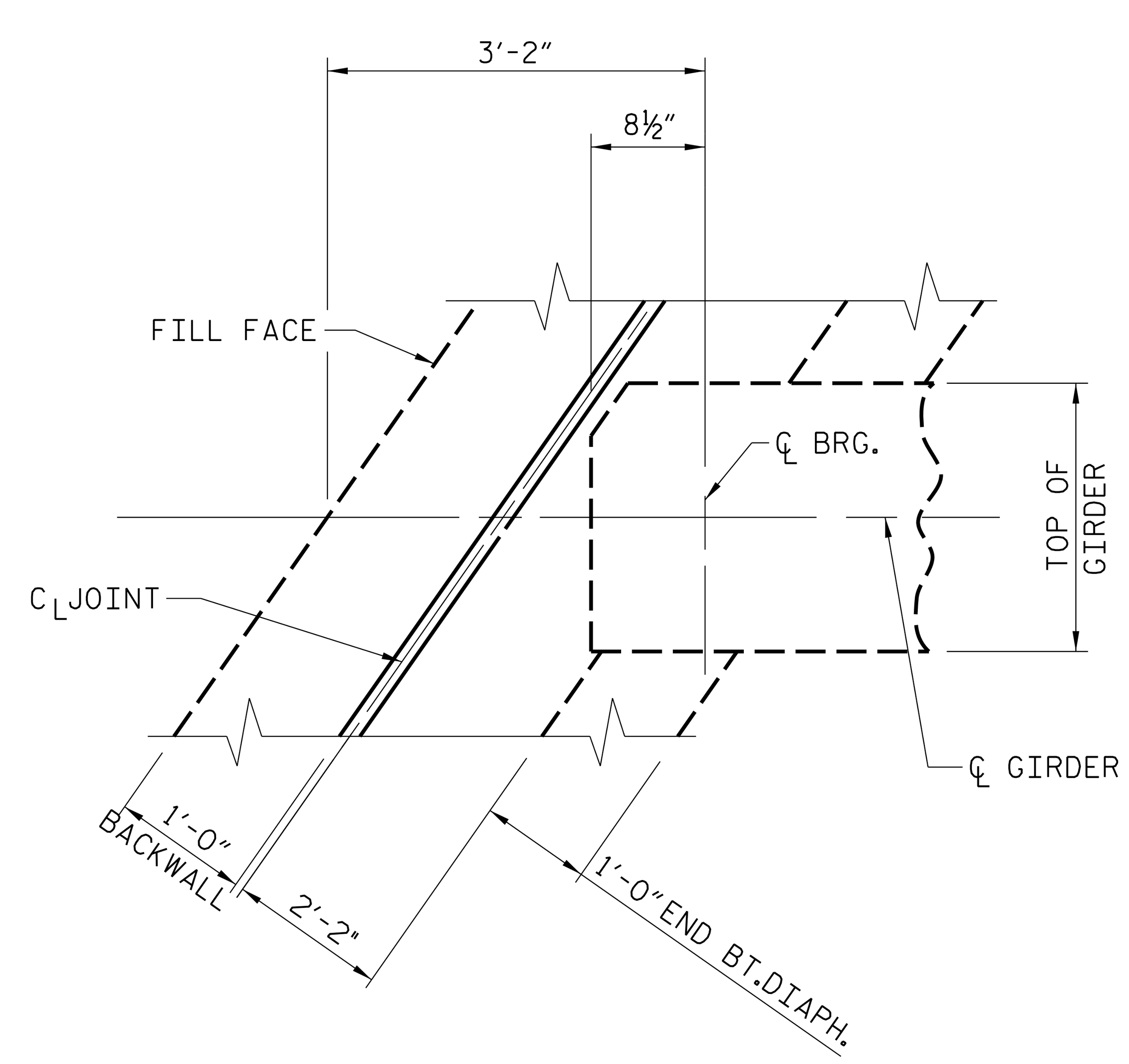
PROVIDE EXPANSION FITTING IN CONDUIT AT JOINT AT EACH END BENT.

NO SEPARATE PAYMENT WILL BE MADE FOR THE CONDUIT AS IT IS CONSIDERED INCIDENTAL TO THE DECK SLAB. INCLUDE ALL COSTS ASSOCIATED WITH THIS WORK IN THE PRICE FOR "REINFORCED CONCRETE DECK SLAB."

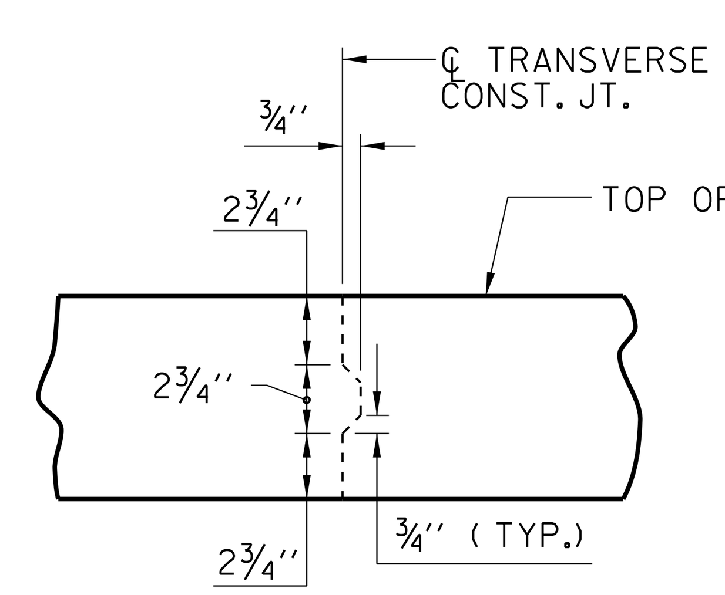


CONDUIT TERMINATION DETAIL

(ELEVATION VIEW AT APPROACH SLAB)



PLAN OF GIRDER AT END BENT



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-
SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION - DETAILS

DocuSigned by: BEB2398... NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON
4/3/2025

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2			4				

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DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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8/26/21

PLAN OF SPAN A

STAGE I CONSTRUCTION

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN

STAGE I

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON

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SHEET NO. S-12

TOTAL SHEETS 45

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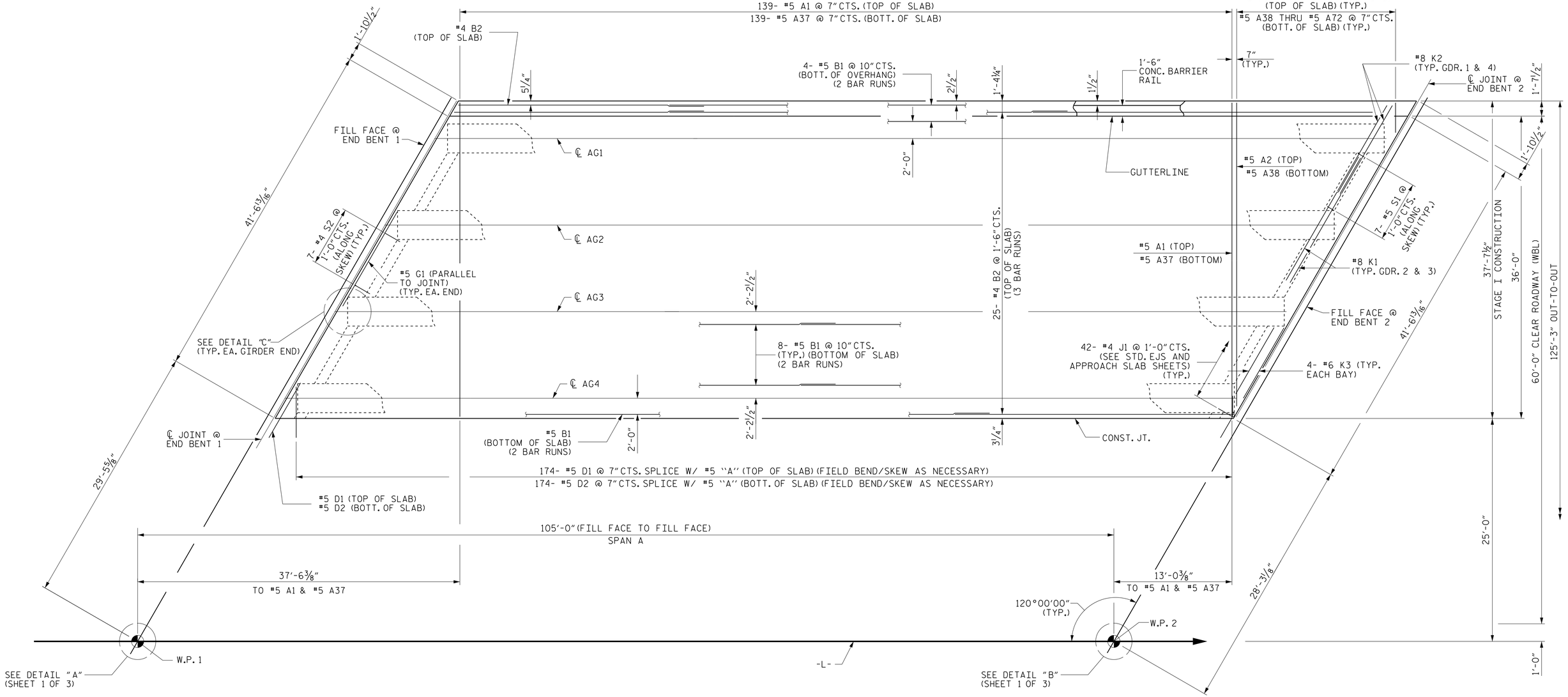

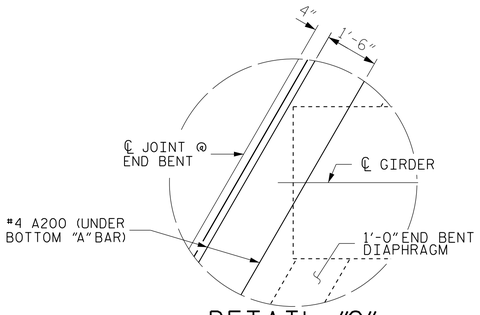

DETAIL "C"

SHOWING ADDITIONAL REINFORCING FOR BAR SUPPORT

PLAN OF SPAN A

STAGE II CONSTRUCTION

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 3

DRAWN BY :	J. M. DAVIS — DATE : 4/24
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4/3/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN

STAGE II

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			45

8/26/21

PLAN OF SPAN A

STAGE III CONSTRUCTION

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN
STAGE III

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1			3					TOTAL SHEETS
2			4					45

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CHECKED BY :	R. C. LARSON	DATE :	4/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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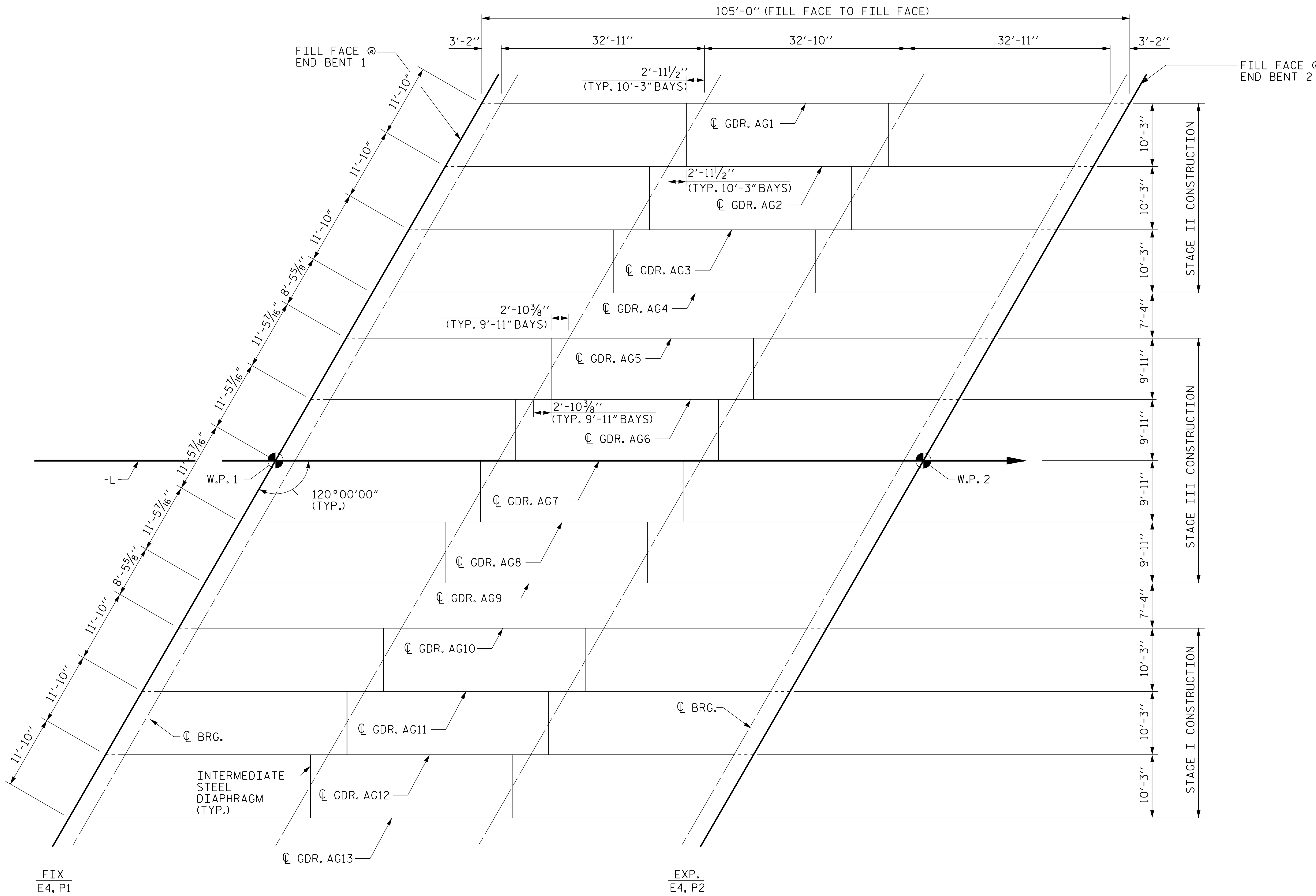
NOTES

FOR DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGM" SHEET.



FRAMING PLAN (SPAN A)

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

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SEAL 14114 NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT C. LARSON

4/3/2025

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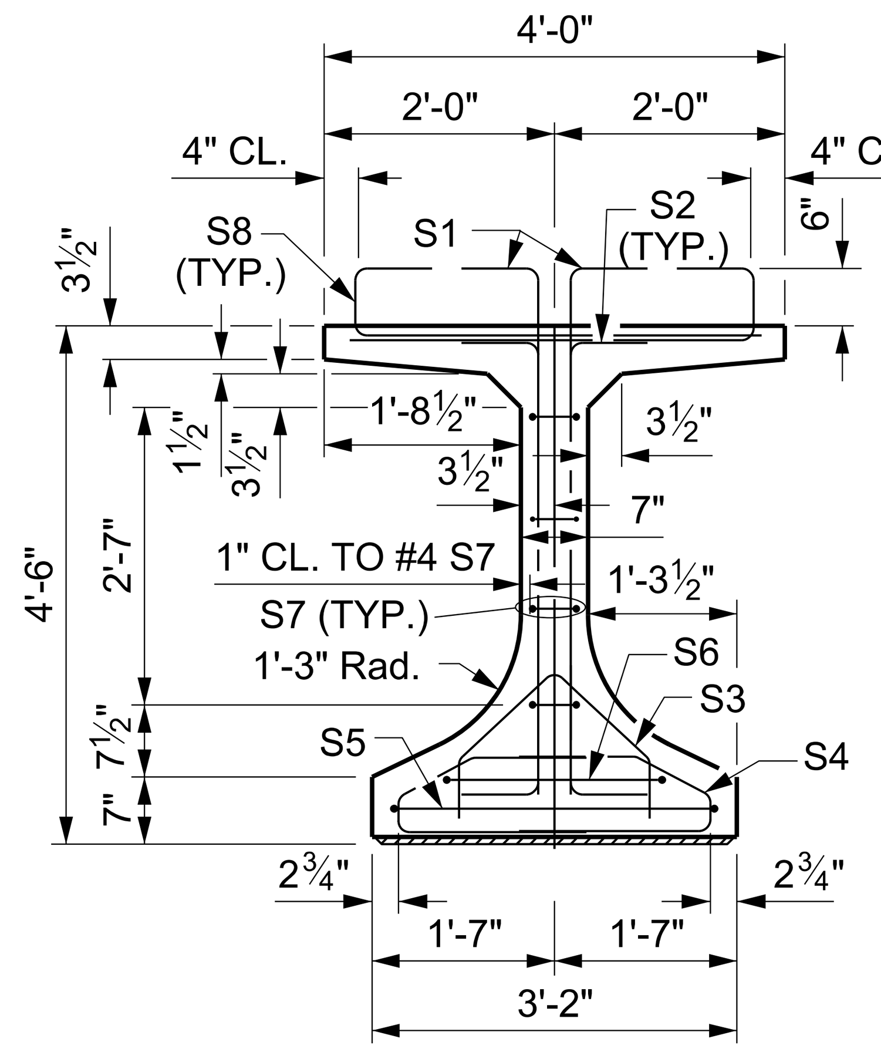
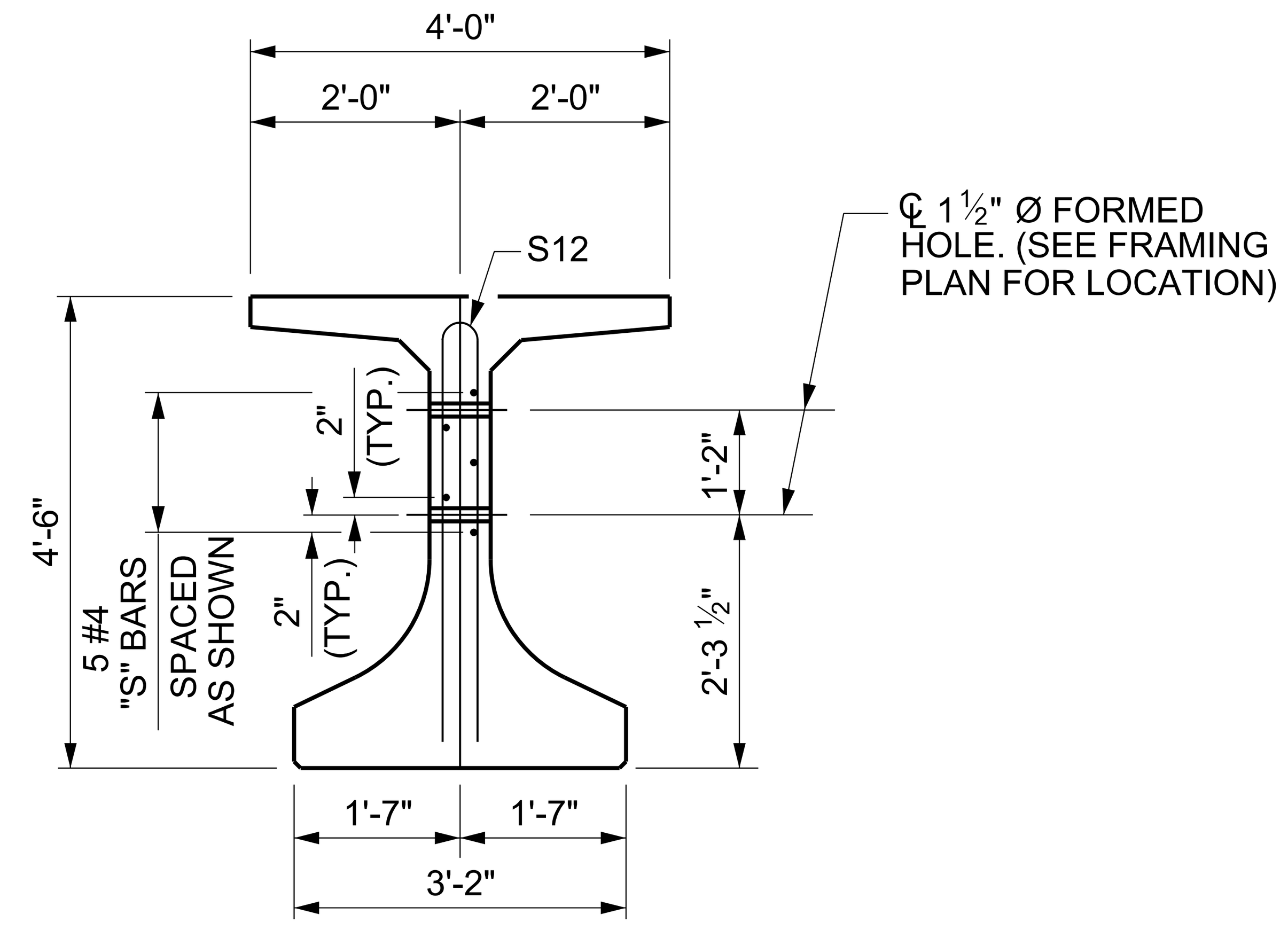
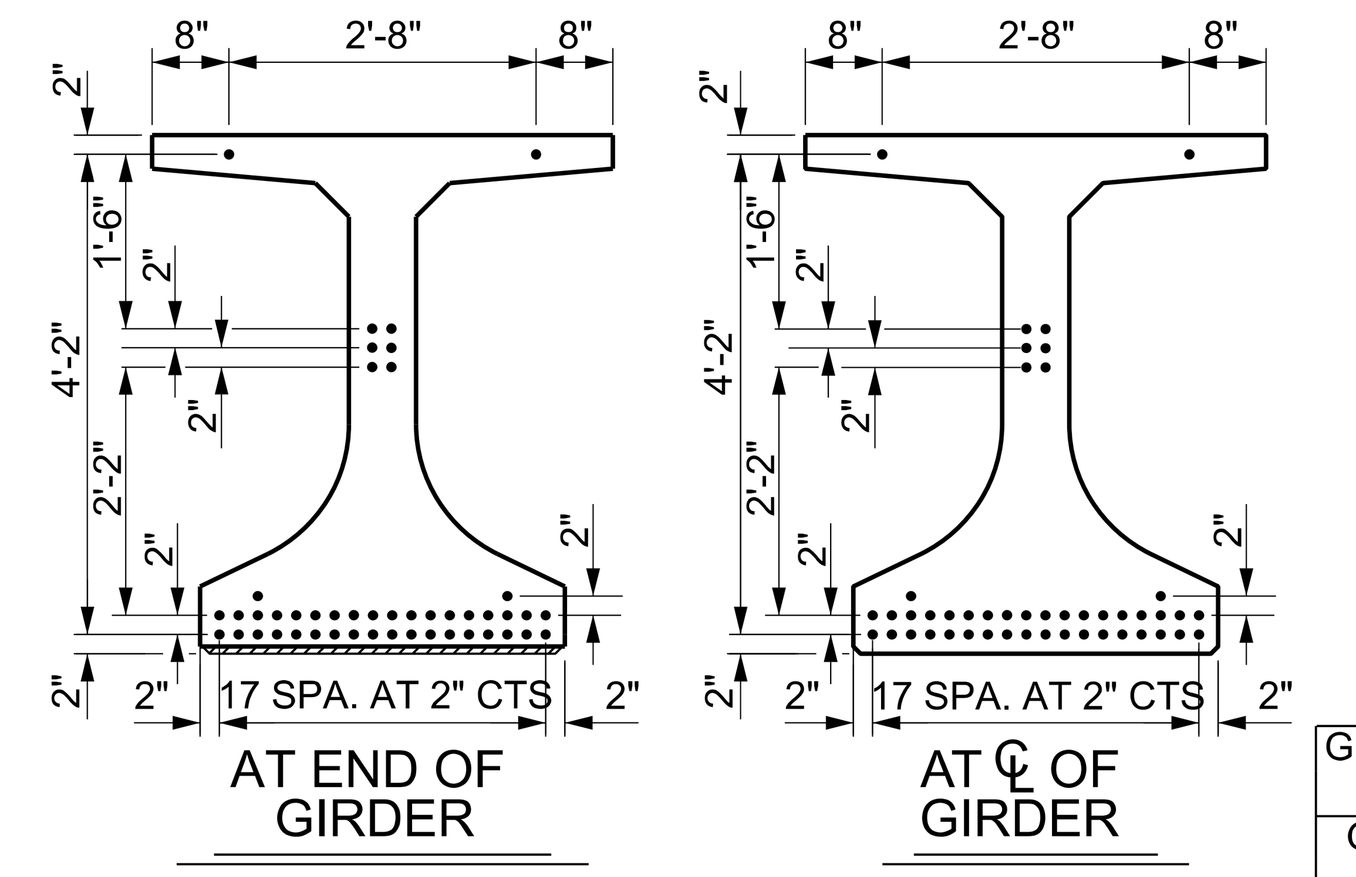


SECTION A-A



SECTION C-C

(S8 AND S9 BARS NOT SHOWN)



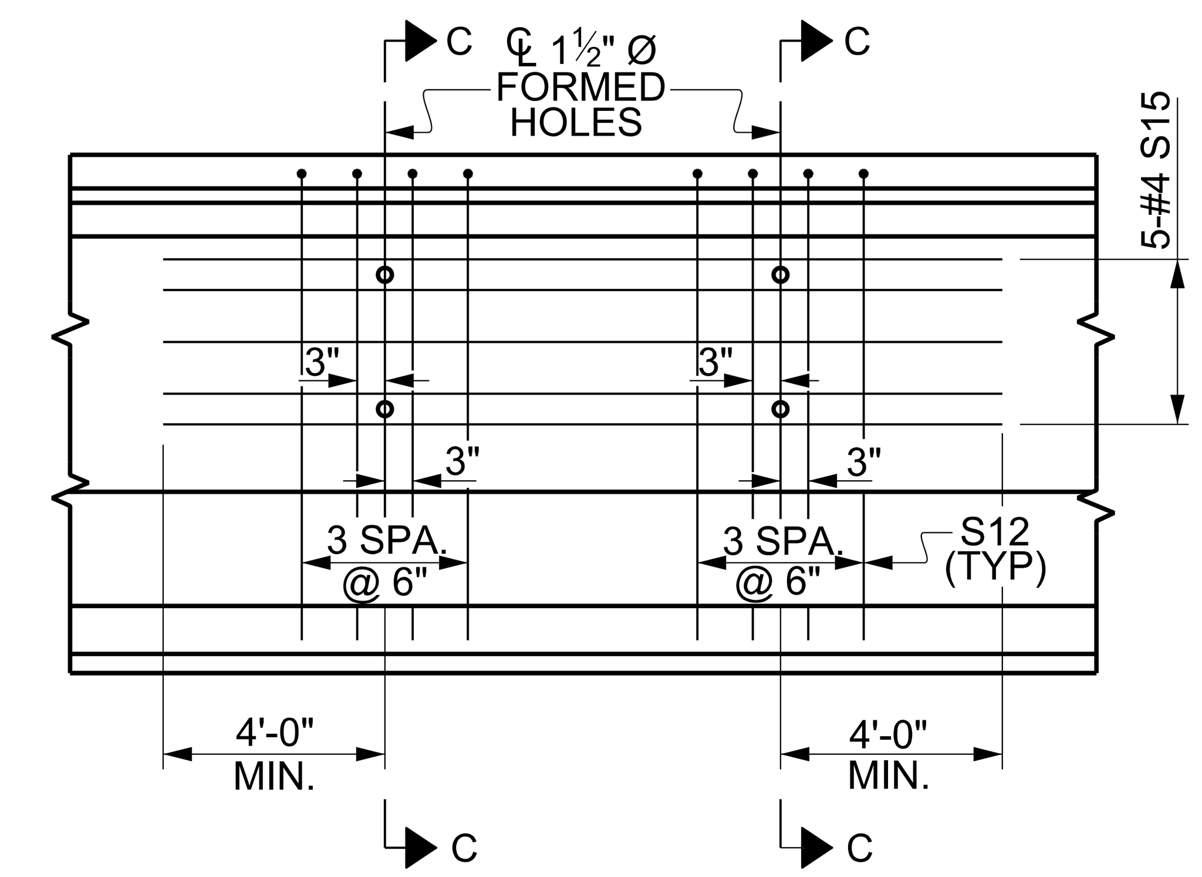
0.6" Ø LOW RELAXATION STRAND LAYOUT

NOTE: ALL STRANDS ARE FULLY BONDED

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

REINFORCING STEEL FOR ONE GDR

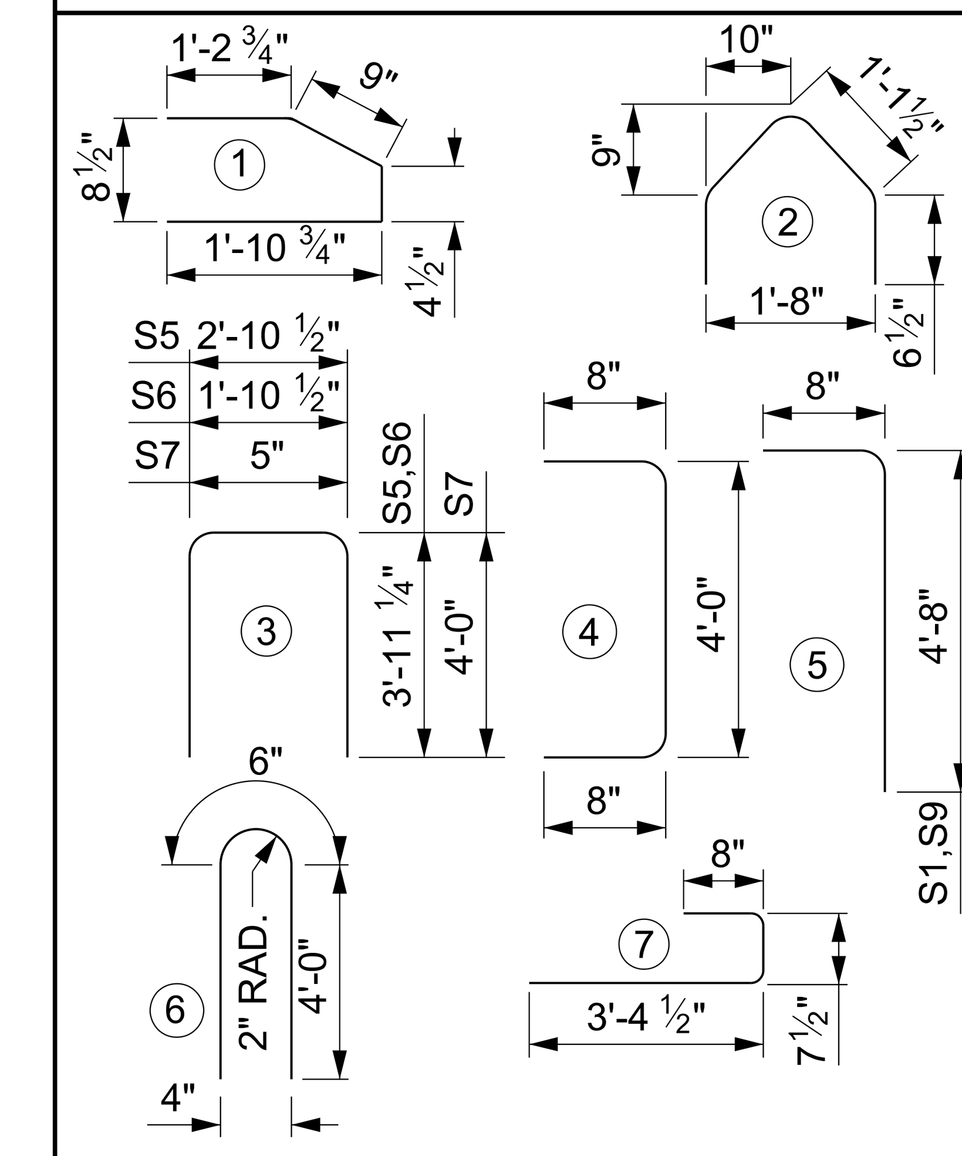
	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	72	#5	5	5'-4"	400
	S2	40	#5	4	5'-4"	222
	S3	36	#3	2	3'-4"	45
	S4	72	#3	1	4'-3"	115
	S5	2	#5	3	10'-9"	22
	S6	2	#5	3	9'-9"	20
	S7	8	#4	3	8'-5"	45
	S8	270	#5	7	4'-8"	1314
	S9	198	#5	5	5'-4"	705
GIRDERS 1, 4, 5 9, 10, 13	S12	4	#5	6	8'-6"	35
	S14	5	#4	STR	8'-0"	27
GIRDERS 2, 3 6-8, 11, 12	S12	8	#5	6	8'-6"	71
	S15	5	#4	STR	14'-0"	47



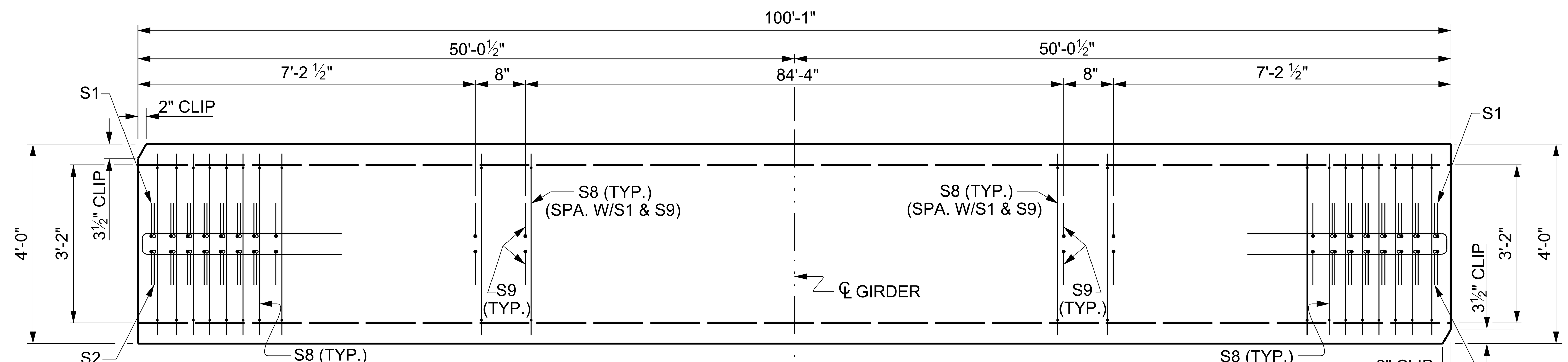
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 2,3,6-8,11,12

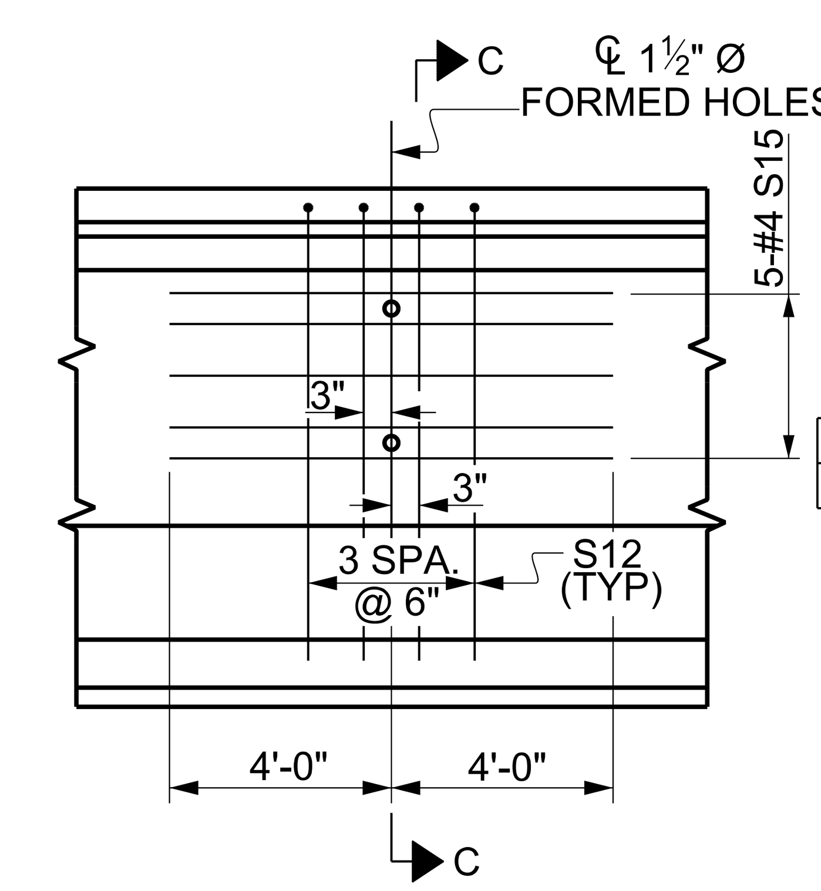
BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT



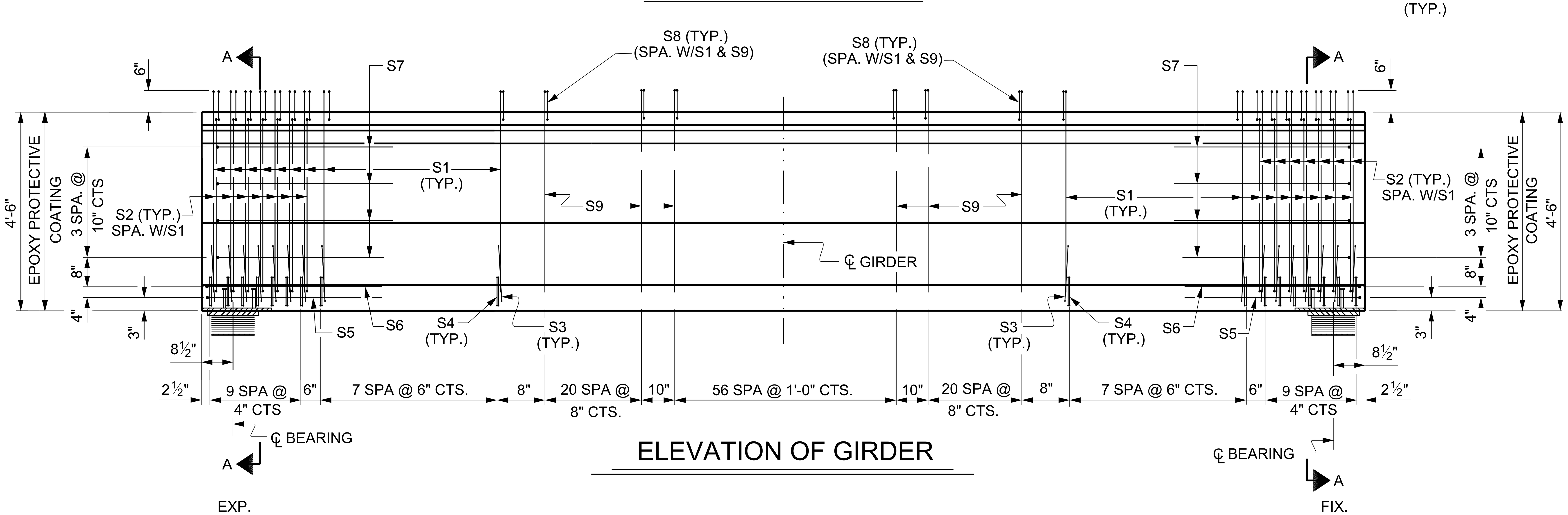
PLAN OF GIRDER



	REINFORCING STEEL	7500 PSI CONCRETE	0.6" Ø L.R. STRANDS
QUANTITIES FOR ONE GIRDER			
	LB.	C.Y.	No.
GDR 1,4,5,9,10,13	2950	24.0	46
GDR 2,3,6-8,11,12	3006	24.0	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
13	100' - 1"	1301' - 1"



ELEVATION OF GIRDER

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos.1,4,5,9,10,13

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 3

PLANS PREPARED BY:

NV5

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CARY, NC 27518
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NC License # F-1333

DocuSigned by:
BEB2398D0B264C9...

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON

4/3/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

54" FIB PRESTRESSED CONCRETE GIRDER

ASSEMBLED BY : D.E. HENNESSEE	DATE : 5/24
CHECKED BY : R.C. LARSON	DATE : 5/24
DESIGN ENGINEER OF RECORD : R.C. LARSON	DATE : 5/24
DRAWN BY : BNB 09/21	
CHECKED BY : AAI 09/22	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			45

4/3/2025
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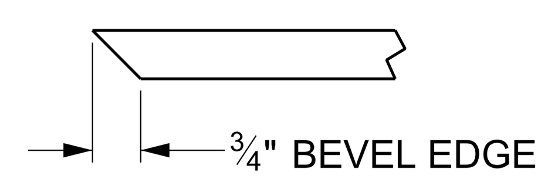
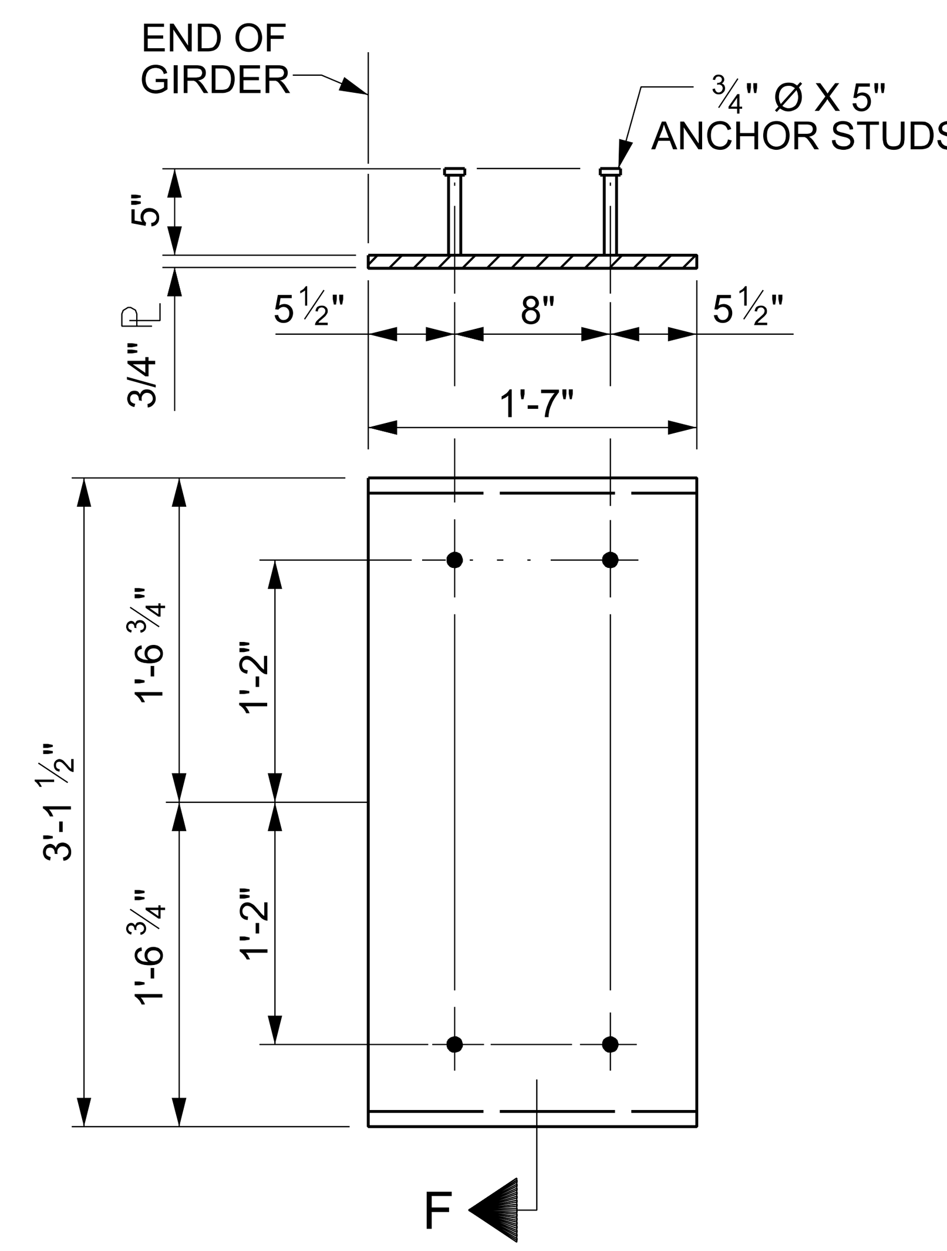
STD. NO. FIB54 (Sht. 3)

8/26/21



SECTION "F"

(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS FOR FIB GIRDER

(2 REQ'D PER GIRDER)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 0R APPROVED EQUAL, AND SHALL MEET THE TYPE ``B" REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6000 PSI.

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

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

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS - SPAN A

0.6″ Ø LOW RELAXATION	GIRDERS 1-3, 6-8, & 11-13																			
FORTIETH POINTS	0	.025	.05	.075	.1	.125	.15	.175	.2	.225	.25	.275	.3	.325	.35	.375	.4	.425	.45	.475
CAMBER (GIRDER ALONE IN PLACE) ↑	0.0	0.028	0.052	0.074	0.095	0.113	0.131	0.147	0.162	0.174	0.186	0.197	0.206	0.214	0.220	0.226	0.231	0.234	0.237	0.238
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.0	0.007	0.018	0.029	0.040	0.050	0.060	0.070	0.079	0.087	0.095	0.102	0.109	0.114	0.120	0.124	0.128	0.131	0.133	0.134
FINAL CAMBER ↑	0.0	1/4″	3/8″	9/16″	5/8″	3/4″	7/8″	15/16″	1″	1 1/16″	1 1/8″	1 1/8″	1 3/16″	1 3/16″	1 3/16″	1 1/4″	1 1/4″	1 1/4″	1 1/4″	1 1/4″
0.6″ Ø LOW RELAXATION	GIRDERS 4-5 & 9-10																			
FORTIETH POINTS	0	.025	.05	.075	.1	.125	.15	.175	.2	.225	.25	.275	.3	.325	.35	.375	.4	.425	.45	.475
CAMBER (GIRDER ALONE IN PLACE) ↑	0.0	0.028	0.052	0.074	0.095	0.113	0.131	0.147	0.162	0.174	0.186	0.197	0.206	0.214	0.220	0.226	0.231	0.234	0.237	0.238
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.0	0.006	0.016	0.025	0.034	0.043	0.052	0.060	0.067	0.074	0.081	0.087	0.093	0.098	0.102	0.106	0.109	0.112	0.114	0.115
FINAL CAMBER ↑	0.0	1/4″	7/16″	9/16″	3/4″	7/8″	15/16″	1 1/16″	1 1/8″	1 3/16″	1 1/4″	1 5/16″	1 3/8″	1 3/8″	1 7/16″	1 7/16″	1 7/16″	1 7/16″	1 1/2″	1 1/2″

0.6″ Ø LOW RELAXATION	GIRDERS 1-3, 6-8, & 11-13 (cont.)																				
FORTIETH POINTS	.5	.525	.55	.575	.6	.625	.65	.675	.7	.725	.75	.775	.8	.825	.85	.875	.9	.925	.95	.975	1.0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.239	0.238	0.237	0.234	0.231	0.226	0.220	0.214	0.206	0.197	0.186	0.174	0.162	0.147	0.131	0.113	0.095	0.074	0.052	0.028	0.0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.134	0.134	0.133	0.131	0.128	0.124	0.120	0.114	0.109	0.102	0.095	0.087	0.079	0.070	0.060	0.050	0.040	0.029	0.018	0.007	0.0
FINAL CAMBER ↑	1 1/4″	1 1/4″	1 1/4″	1 1/4″	1 1/4″	1 1/4″	1 3/16″	1 3/16″	1 3/16″	1 1/8″	1 1/8″	1 1/16″	1″	15/16″	7/8″	3/4″	5/8″	9/16″	3/8″	1/4″	0.0
0.6″ Ø LOW RELAXATION	GIRDERS 4-5 & 9-10 (cont.)																				
FORTIETH POINTS	.5	.525	.55	.575	.6	.625	.65	.675	.7	.725	.75	.775	.8	.825	.85	.875	.9	.925	.95	.975	1.0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.239	0.238	0.237	0.234	0.231	0.226	0.220	0.214	0.206	0.197	0.186	0.174	0.162	0.147	0.131	0.113	0.095	0.074	0.052	0.028	0.0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.115	0.115	0.114	0.112	0.109	0.106	0.102	0.098	0.093	0.087	0.081	0.074	0.067	0.060	0.052	0.043	0.034	0.025	0.016	0.006	0.0
FINAL CAMBER ↑	1 1/2″	1 1/2″	1 1/2″	1 7/16″	1 7/16″	1 7/16″	1 7/16″	1 3/8″	1 3/8″	1 5/16″	1 1/4″	1 3/16″	1 1/8″	1 1/16″	15/16″	7/8″	3/4″	9/16″	7/16″	1/4″	0.0

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

54" FIB PRESTRESSED CONCRETE GIRDER DETAILS

DocuSigned by:
BEB2398...

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

NV5

NV5 ENGINEERS & CONSULTANTS, INC.
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REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-17
1			3					TOTAL SHEETS
2			4					45

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 5/24

ASSEMBLED BY: C. E. LARSON DATE : 5/10/24
CHECKED BY : D. E. HENNESSEE DATE : 5/30/24

DRAWN BY : BNB 08/21
CHECKED BY : AAI 10/21
REV. --/-- ---/---
REV. --/-- ---/---
REV. --/-- ---/---

4/3/2025
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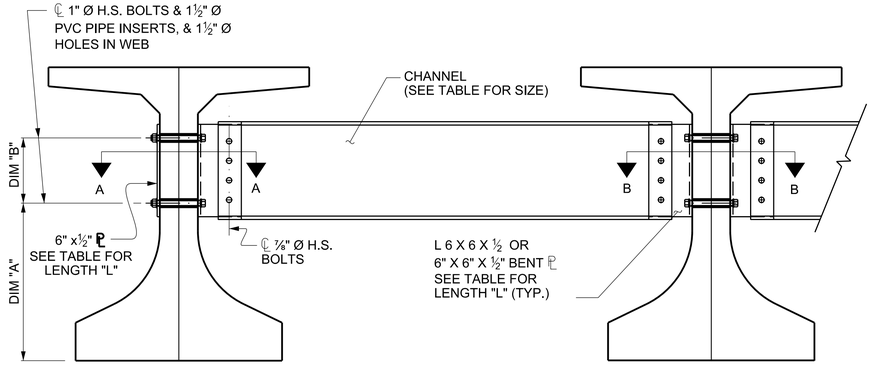
8/26/21

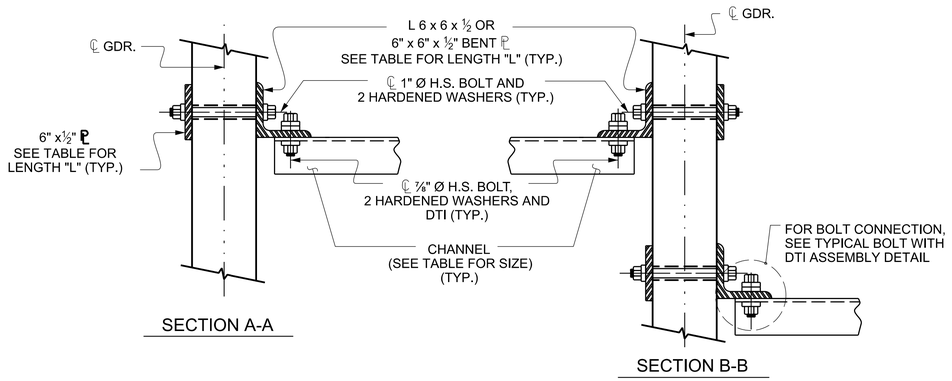


EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

(54" FIB SHOWN)

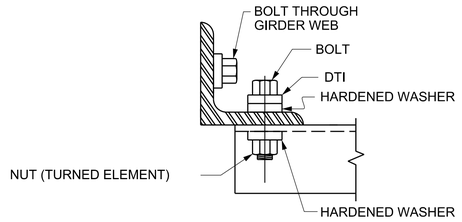


SECTION A-A

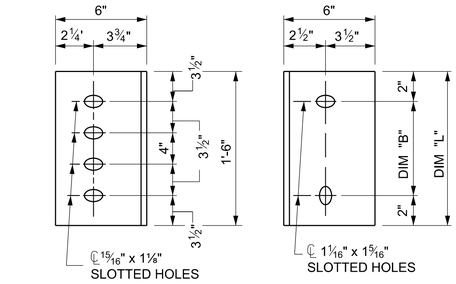
SECTION B-B

CONNECTION DETAILS

(SKEW > 110° SHOWN)



BOLT WITH DTI ASSEMBLY DETAIL

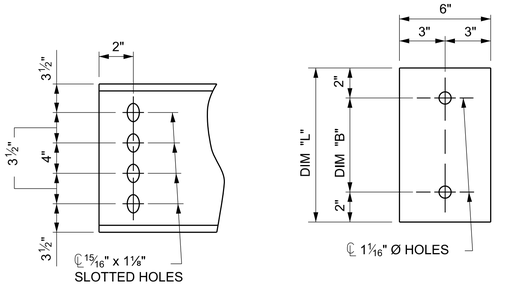


DIAPHRAGM FACE

(FIB 54)

WEB FACE

CONNECTOR PLATE DETAILS



CHANNEL END

(FIB 54)

PLATE DETAILS

STRUCTURAL STEEL NOTES

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

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

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL ¼ TURN.

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

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

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

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

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼" PROJECTION BEYOND THE NUT.

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

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

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

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

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
54" FIB	MC 18 x 42.7	2'-3 ½"	1'-2"	1'-6"

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

INTERMEDIATE
STEEL DIAPHRAGMS
FOR 54" FIB

DocuSigned by:
BEB2398[illegible]

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

NV5 ENGINEERS & CONSULTANTS, INC.
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CARY, NC 27518
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NC License # F-1333

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NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			45

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 5/24

ASSEMBLED BY : C. E. LARSON DATE : 5/30/24
CHECKED BY : R. C. LARSON DATE : 5/30/24

DRAWN BY : BNB 01/21 REV. --/--
CHECKED BY : AAI 01/21 REV. --/--

4/3/2025
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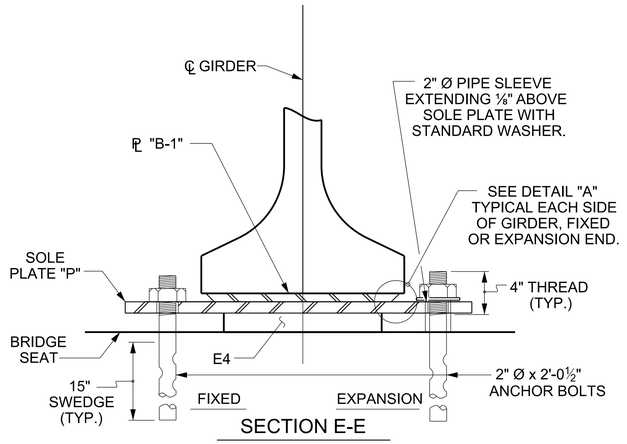
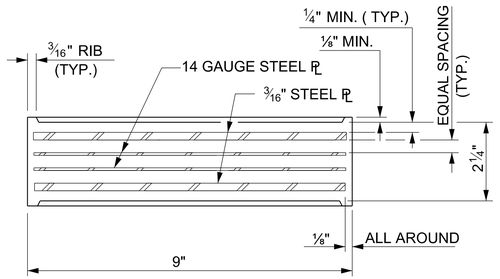
STD. NO. FIB45/54

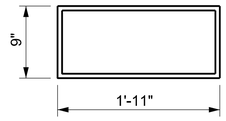
8/26/21



SECTION E-E



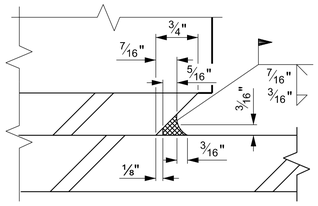
TYPICAL SECTION OF ELASTOMERIC BEARINGS



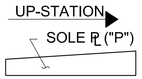
E4 (26 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

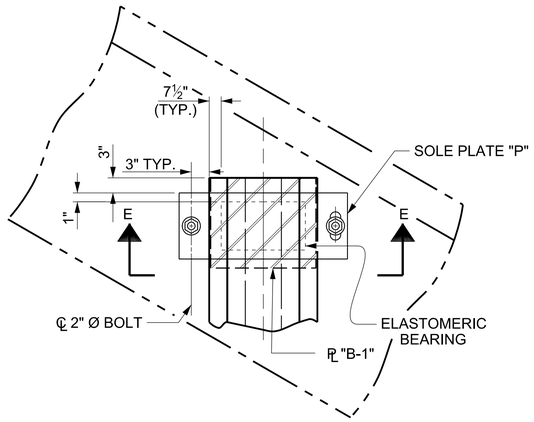
TYPE V



DETAIL "A"

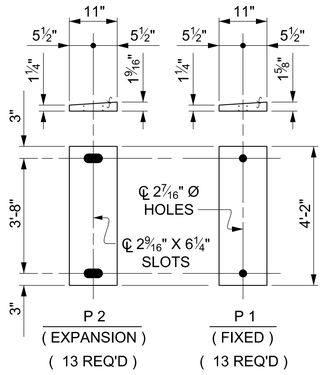


SOLE ℄ PLACEMENT DETAIL



TYPICAL HALF-PLAN (SHOWING FIXED END BENT)

TYPICAL HALF-PLAN (SHOWING EXP. END BENT)



SOLE PLATE DETAILS ("P")

NOTES

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

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

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

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

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

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE STANDARD SPECIFICATIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

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

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 5/24		
ASSEMBLED BY : C. E. LARSON	DATE : 5/24	
CHECKED BY : R. C. LARSON	DATE : 5/24	
DRAWN BY : WJH 8/89	REV. 12/17	MAA/THC
CHECKED BY : CRK 8/89	REV. 10/21	BNB/AAI
	REV. 10/23	BNB/SNM

4/3/2025
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3:20:03 PM

PLANS PREPARED BY:

NV5 ENGINEERS & CONSULTANTS, INC.
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NC License # F-1333

DocuSigned by:
BEB2398[illegible]

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

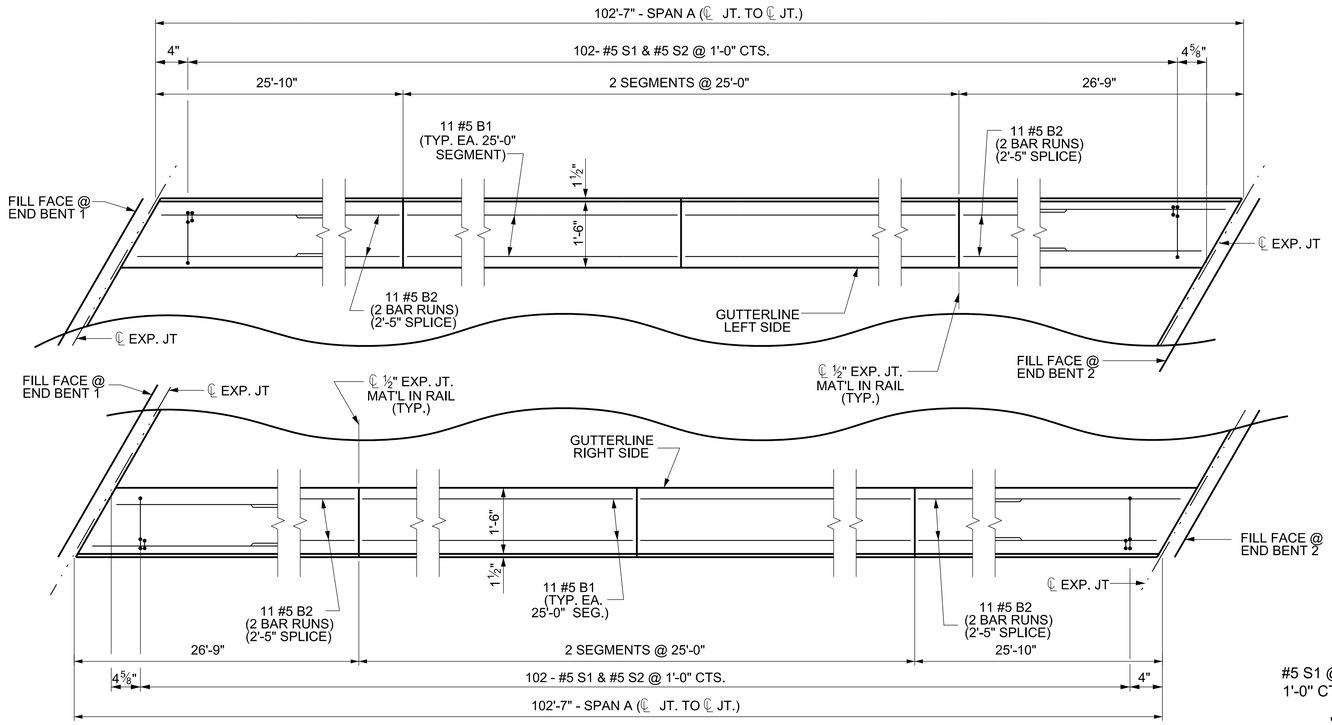
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-19

TOTAL SHEETS 45

STD. NO. EB4 (SHT. 1)

8/26/21



PLAN

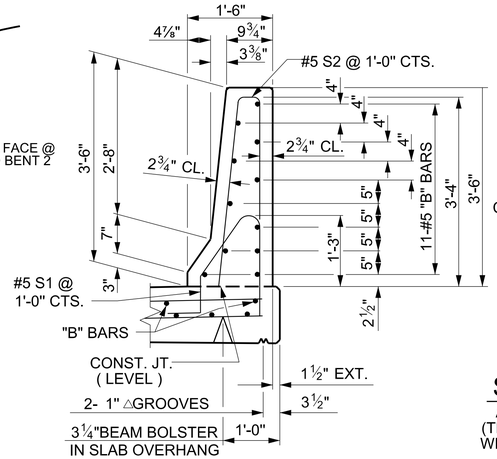
(DIMENSIONS ARE ALONG OUTSIDE FACE OF RAIL)

NOTES

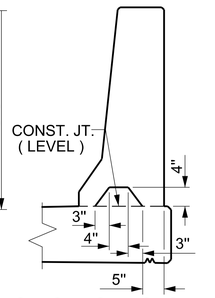
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

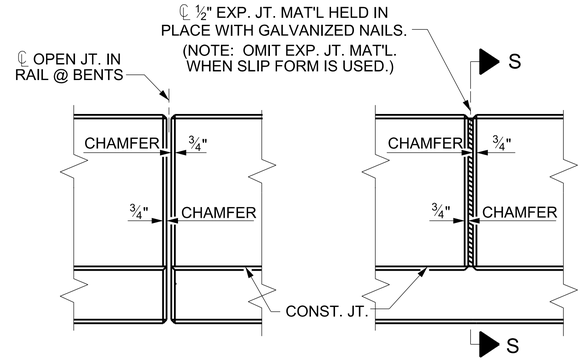


SECTION THRU RAIL



SECTION S-S

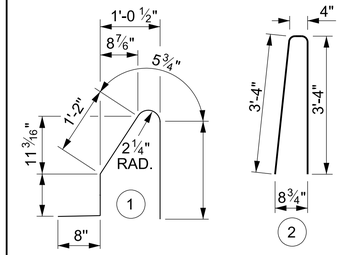
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY
WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	44	#5	STR	24'-7"	1128
* B2	88	#5	STR	14'-9"	1354
* S1	204	#5	1	4'-10"	1028
* S2	204	#5	2	7'-0"	1489

* EPOXY COATED REINFORCING STEEL	4999 LBS.
CLASS AA CONCRETE	27.9 CU. YDS.
CONCRETE BARRIER RAIL	205.17 LIN. FT.

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

DocuSigned by:
BEB2398[illegible]

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

NV5

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			45

STD. CBR1

DESIGN ENGINEER OF RECORD: R. C. LARSON		DATE : 5/24	
ASSEMBLED BY: C. E. LARSON		DATE : 4/4/24	
CHECKED BY : R. C. LARSON		DATE : 4/5/24	
DRAWN BY : ARB	5/87	REV. 7/12	MAA/GM
CHECKED BY : SJD	9/87	REV. 6/13	MAA/GM
		REV. 12/17	MAA/THC

4/3/2025
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8/26/21

NOTES

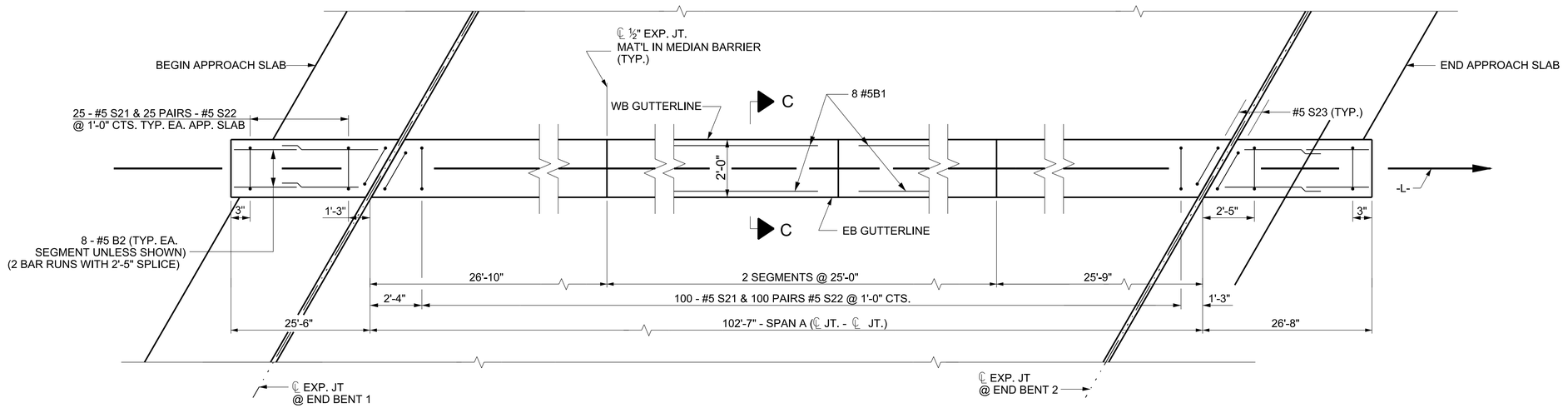
THE MEDIAN BARRIER IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN MEDIAN BARRIER SHALL BE EPOXY COATED.

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

NO SEPARATE PAYMENT WILL BE MADE FOR FURNISHING AND INSTALLING THE COVER PLATE. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR EXPANSION JOINT SEALS.

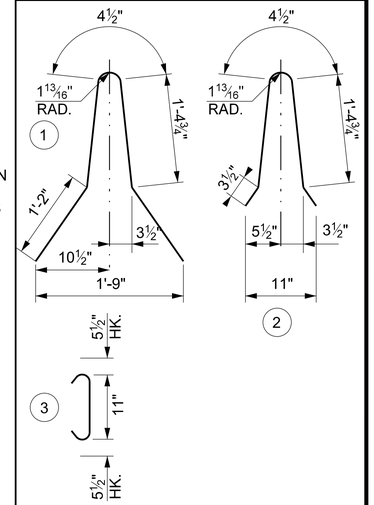
SEE SHEET 2 OF 2 FOR SECTION C-C AND ADDITIONAL DETAILS.



PLAN OF MEDIAN BARRIER

(DIMENSIONS ARE ALONG EB GUTTERLINE)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	16	#5	STR	24'-7"	410
* B2	64	#5	STR	14'-6"	968
* S21	150	#5	1	5'-6"	860
* S22	300	#5	3	1'-10"	574
* S23	4	#5	2	3'-9"	16

* EPOXY COATED REINFORCING STEEL 2828 LBS.

CLASS AA CONCRETE 15.7 CU. YDS.

CONCRETE MEDIAN BARRIER 154.75 LIN. FT.

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE MEDIAN BARRIER

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			45

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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ASSEMBLED BY: C. E. LARSON		DATE : 4/12/24	
CHECKED BY : R. C. LARSON		DATE : 5/28/24	
DRAWN BY : ARB	5/87	REV. 7/12	MAA/GM
CHECKED BY : SJD	9/87	REV. 6/13	MAA/GM
		REV. 12/17	MAA/THC

4/3/2025
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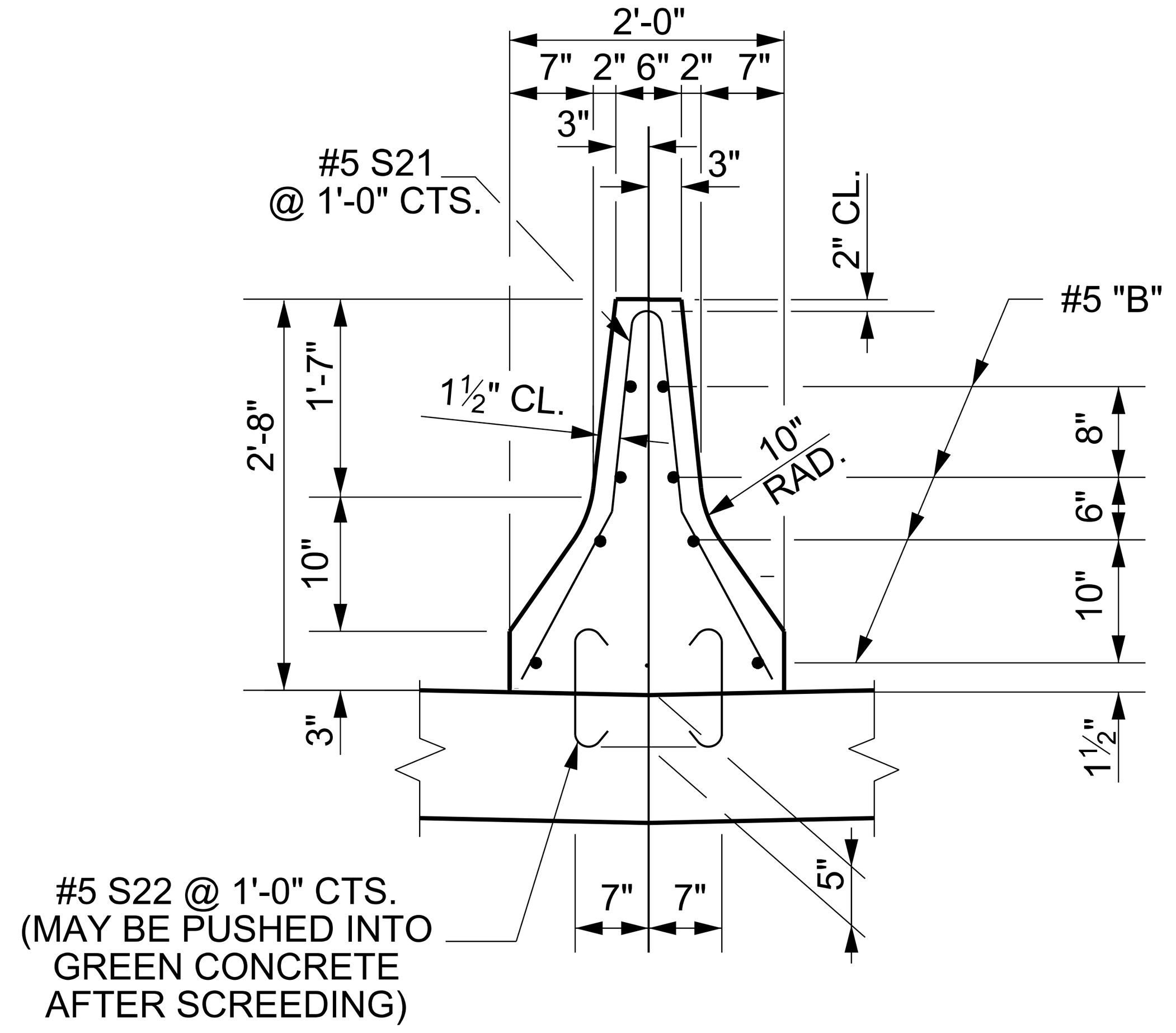
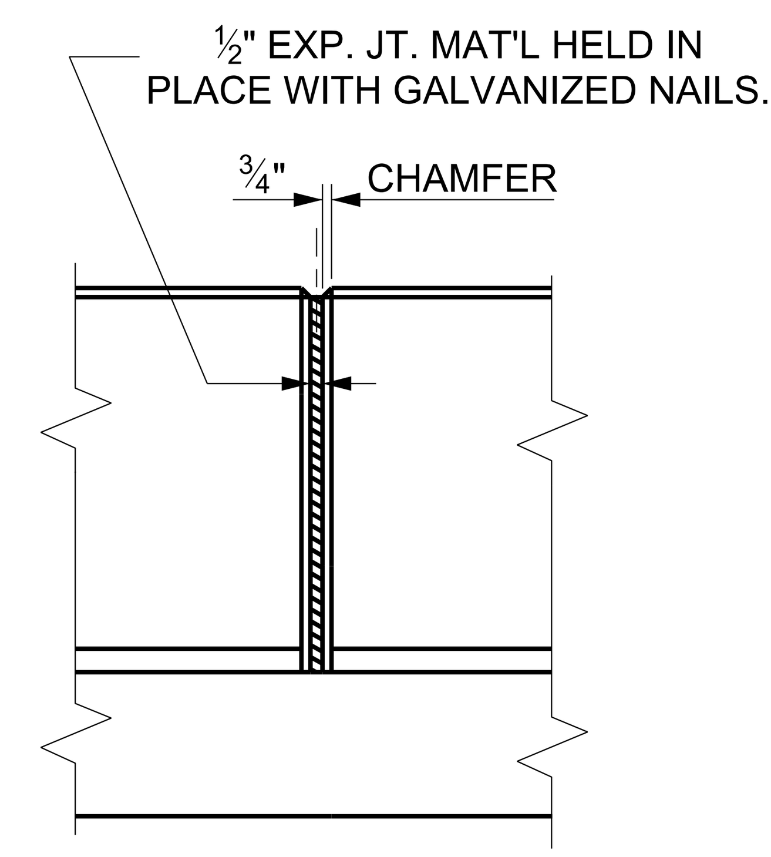
8/26/21

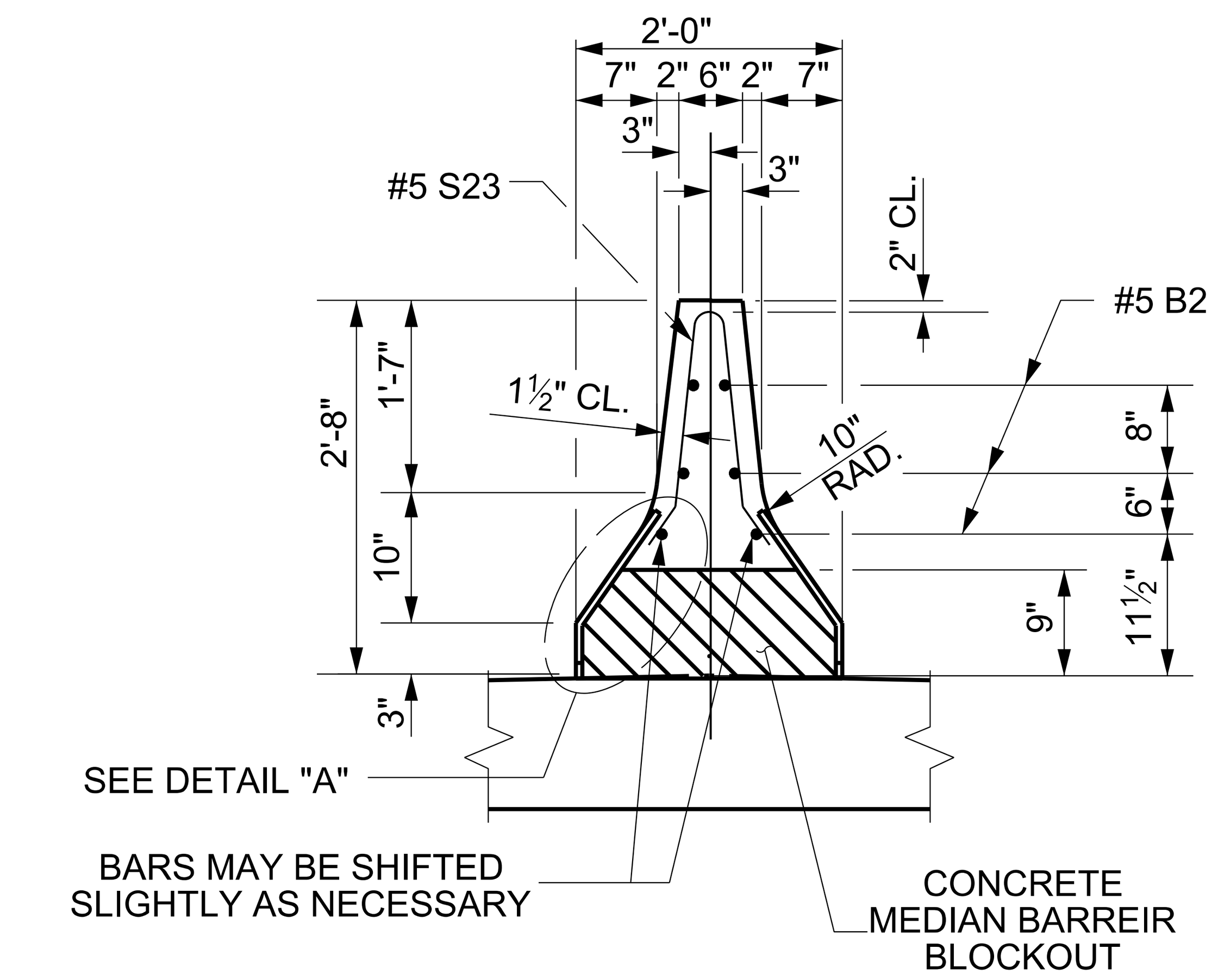
MEDIAN BARRIER DETAILS



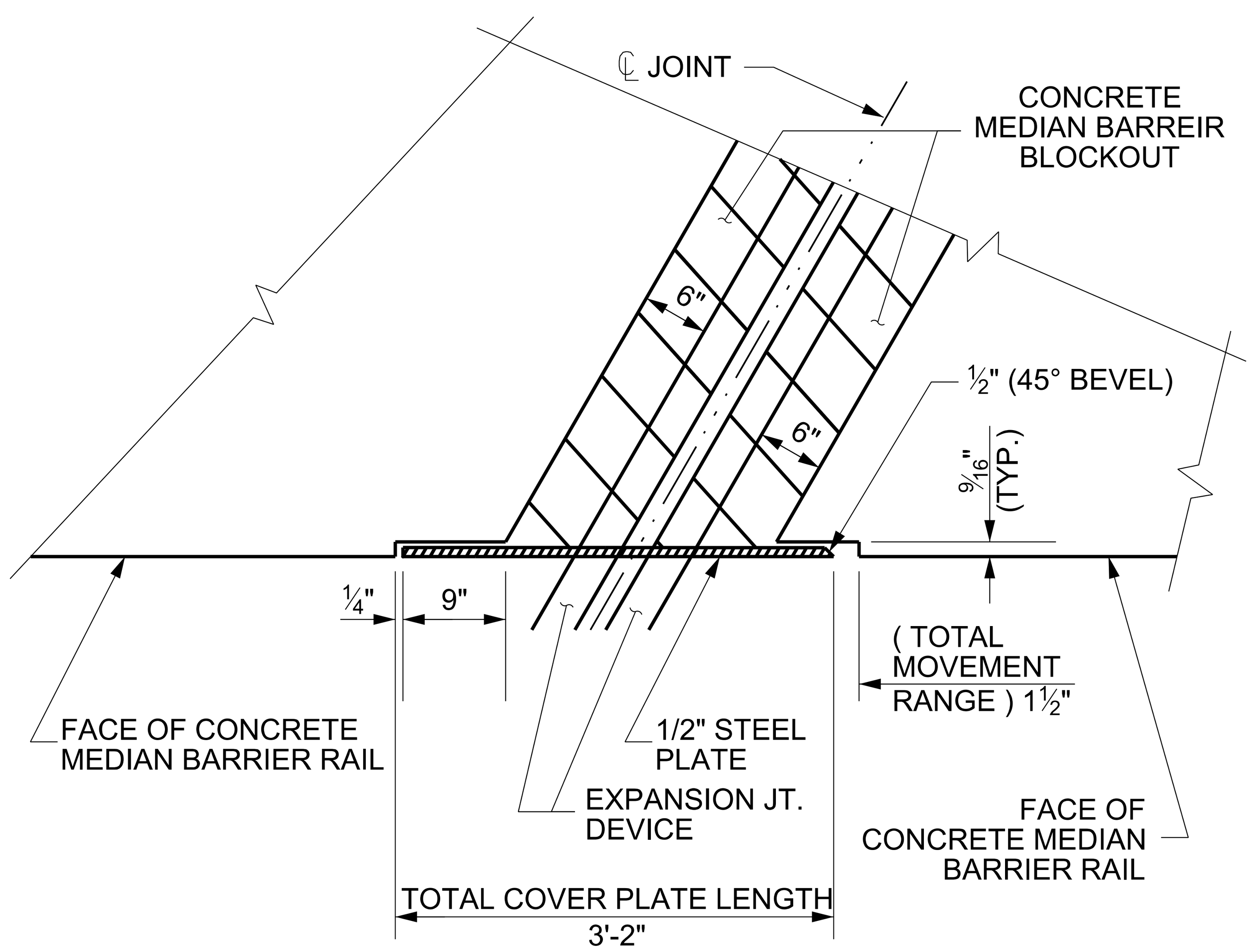
SECTION C-C



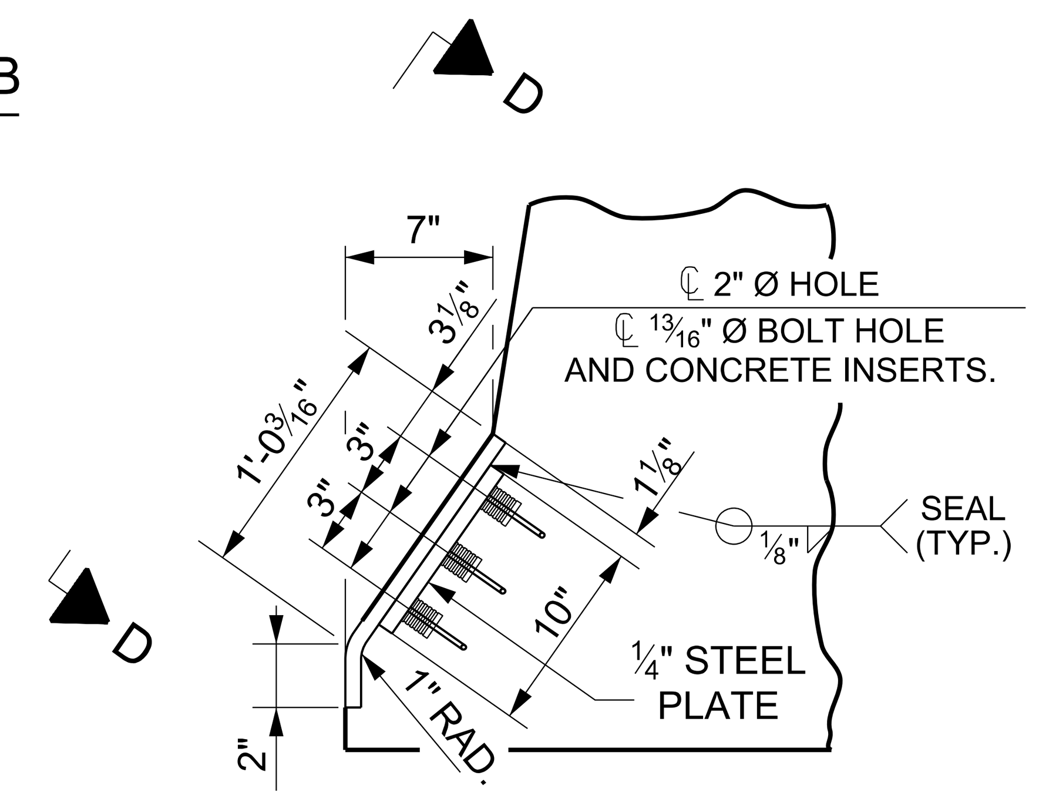
ELEVATION AT BARRIER EXP. JT.



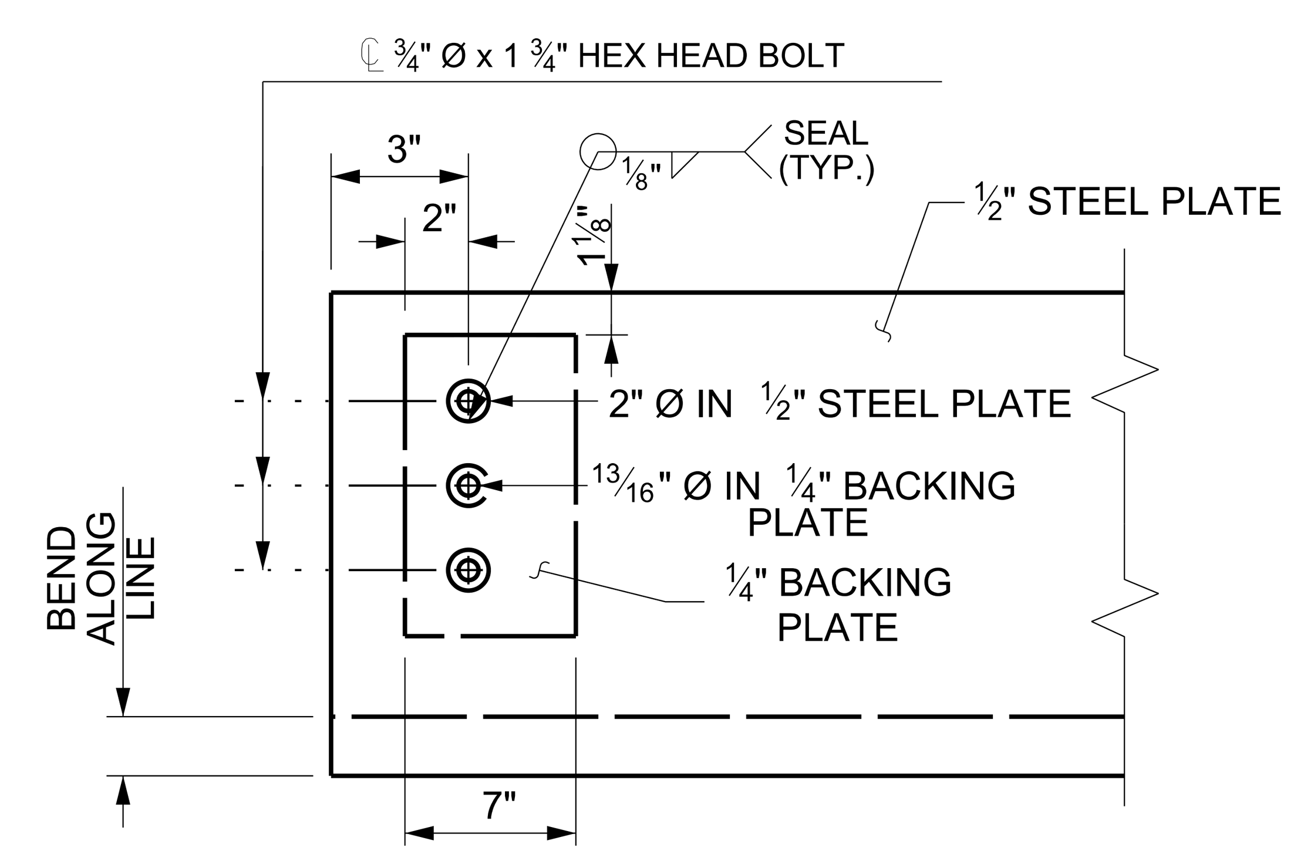
SECTION A-A THRU BLOCKOUT



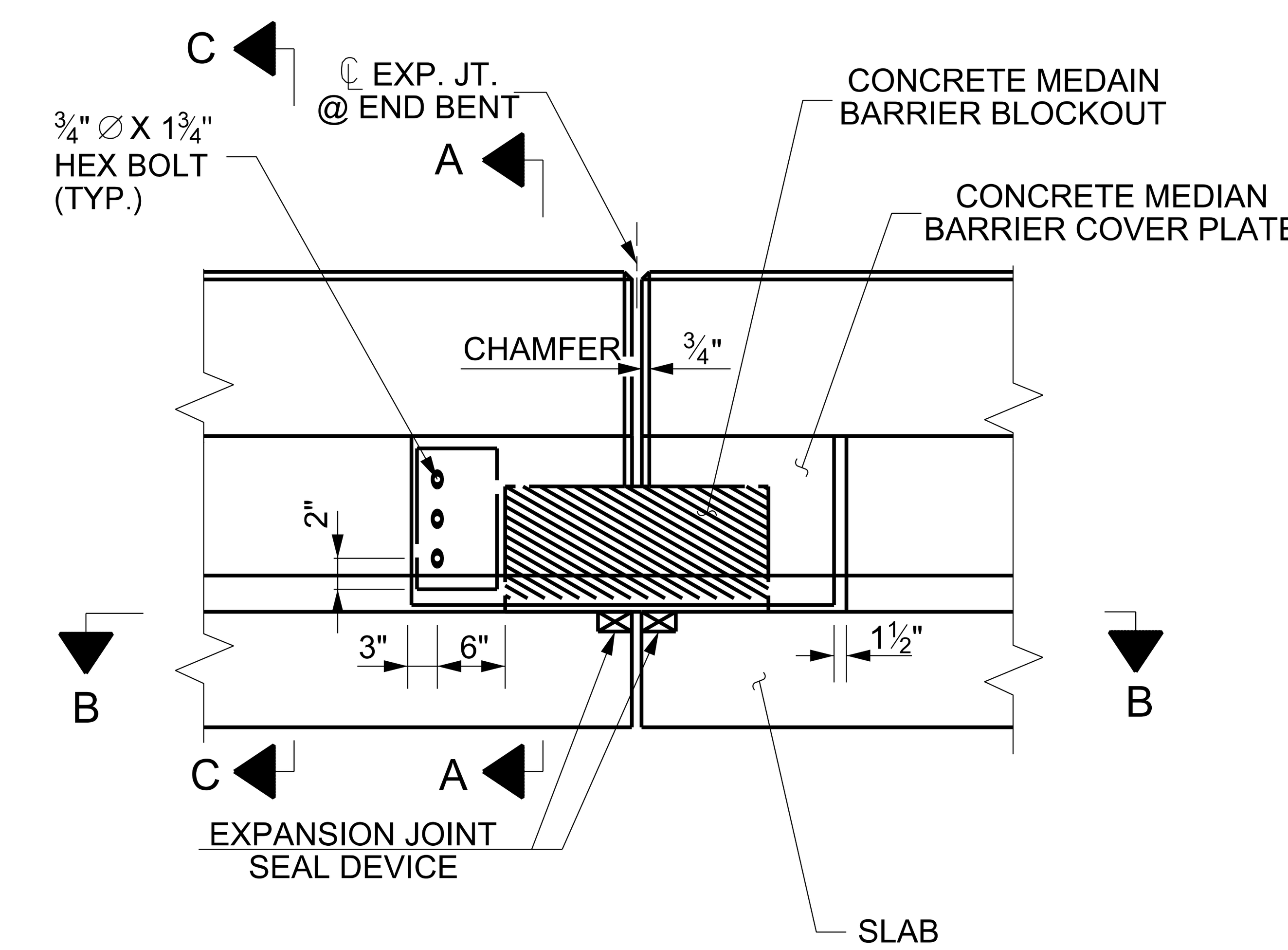
SECTION B-B



DETAIL "A"



VIEW D-D



ELEVATION AT EXPANSION JOINTS

MEDIAN BARRIER COVER PLATE DETAILS

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE MEDIAN BARRIER

PLANS PREPARED BY:

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SEAL 14114 NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT C. LARSON

4/3/2025

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

SHEET NO. S-22

TOTAL SHEETS 45

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 5/24

ASSEMBLED BY: C. E. LARSON DATE : 5/1/24

CHECKED BY : R. C. LARSON DATE : 5/28/24

DRAWN BY : ARB 5/87 REV. 7/12 MAA/GM

CHECKED BY : SJD 9/87 REV. 6/13 MAA/GM

REV. 12/17 MAA/THC

4/3/2025
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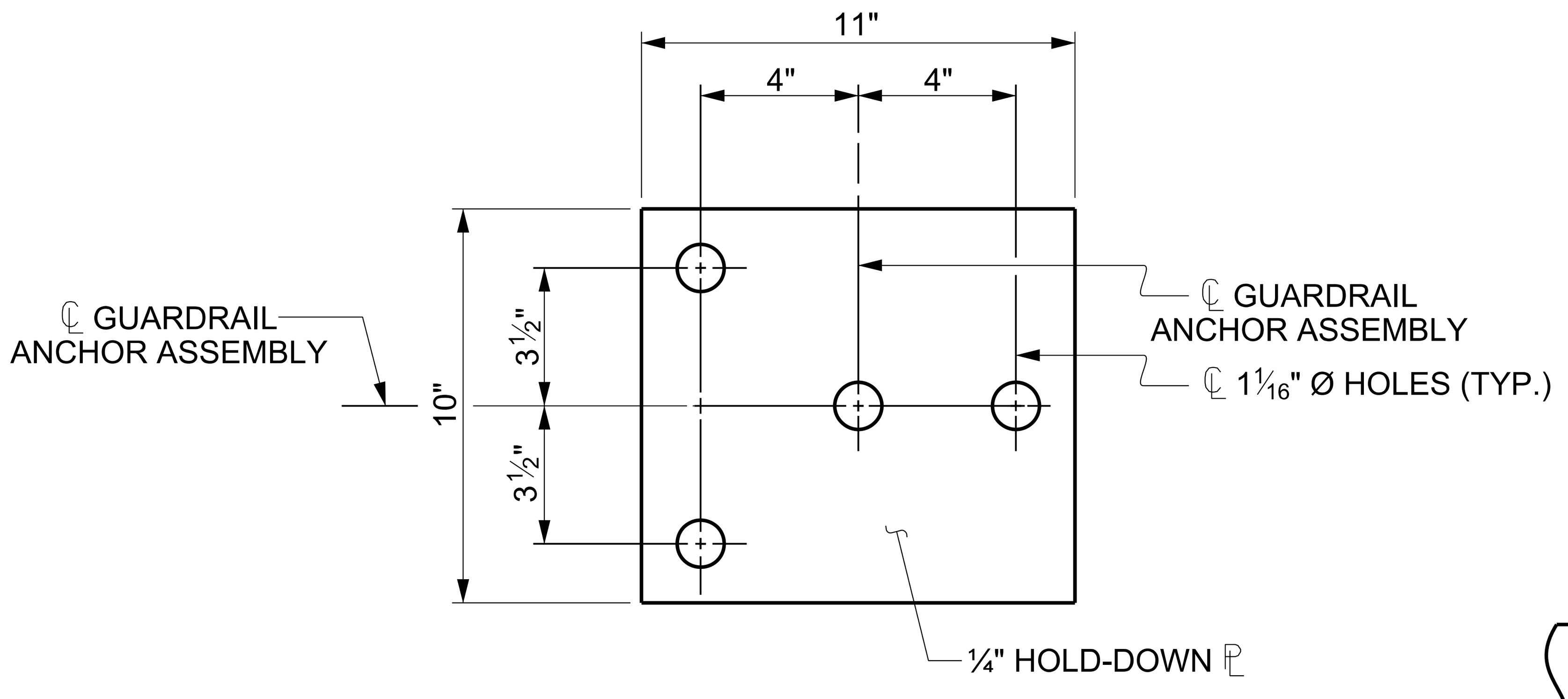
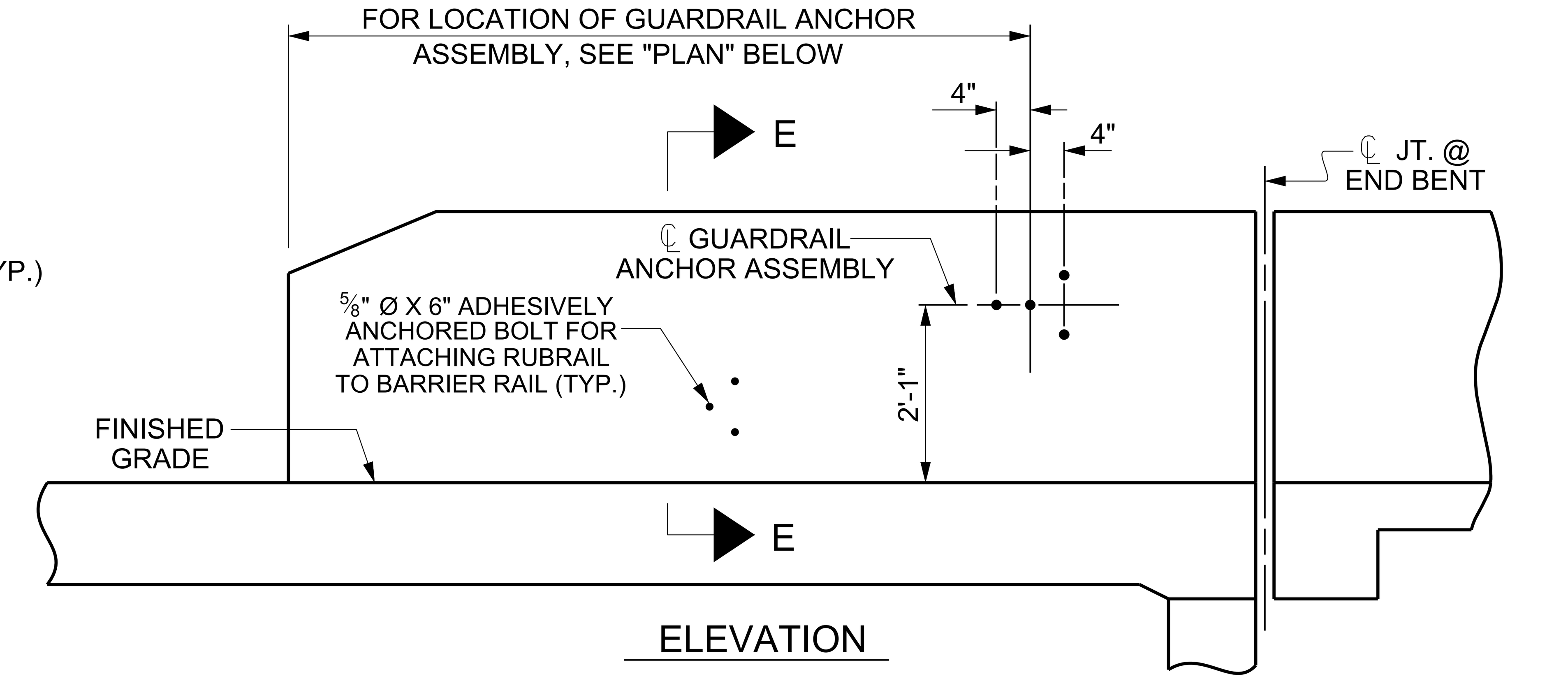
STD. CBR1 Sht.2



PLAN



ELEVATION

NOTES

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

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

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

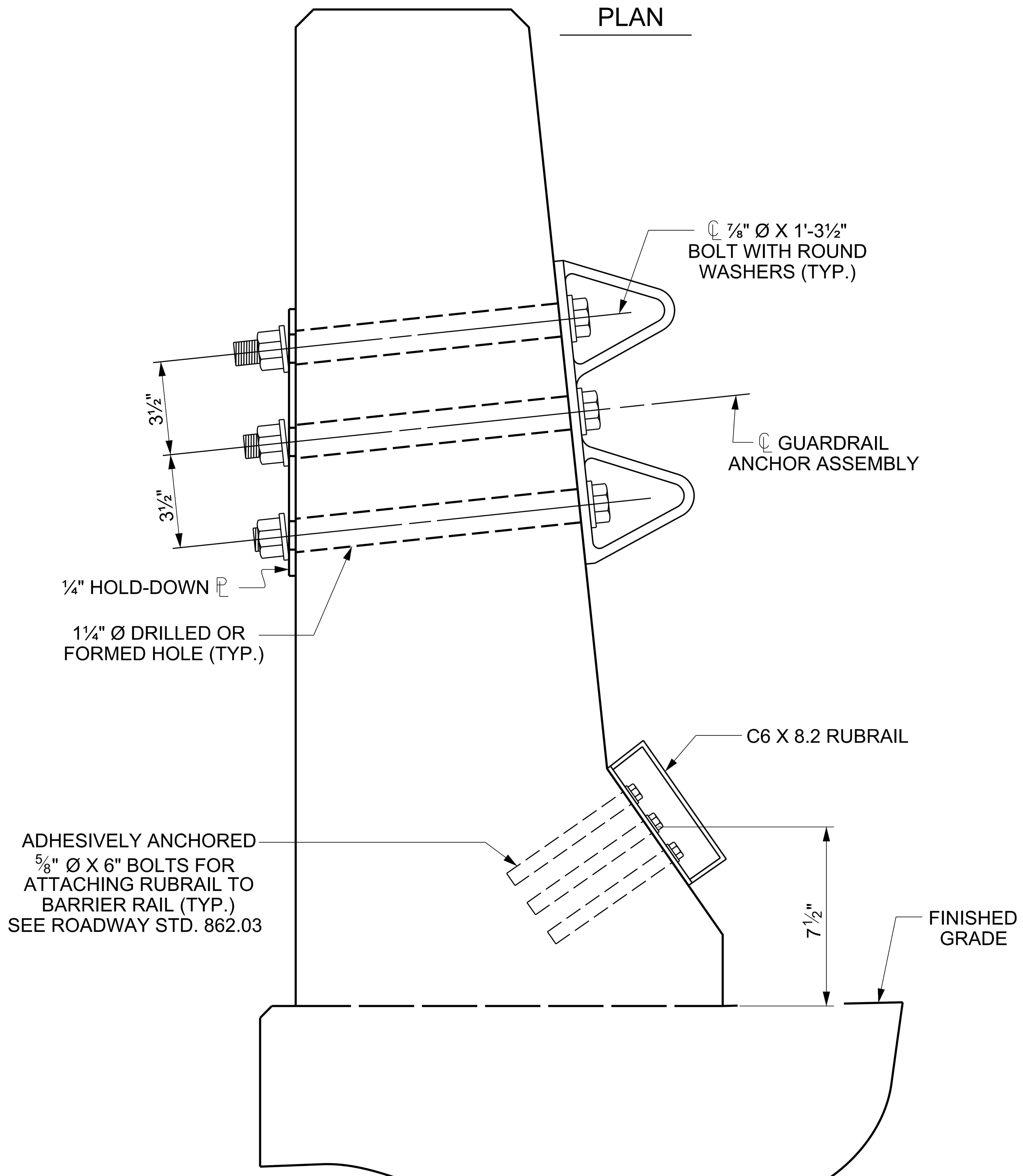
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

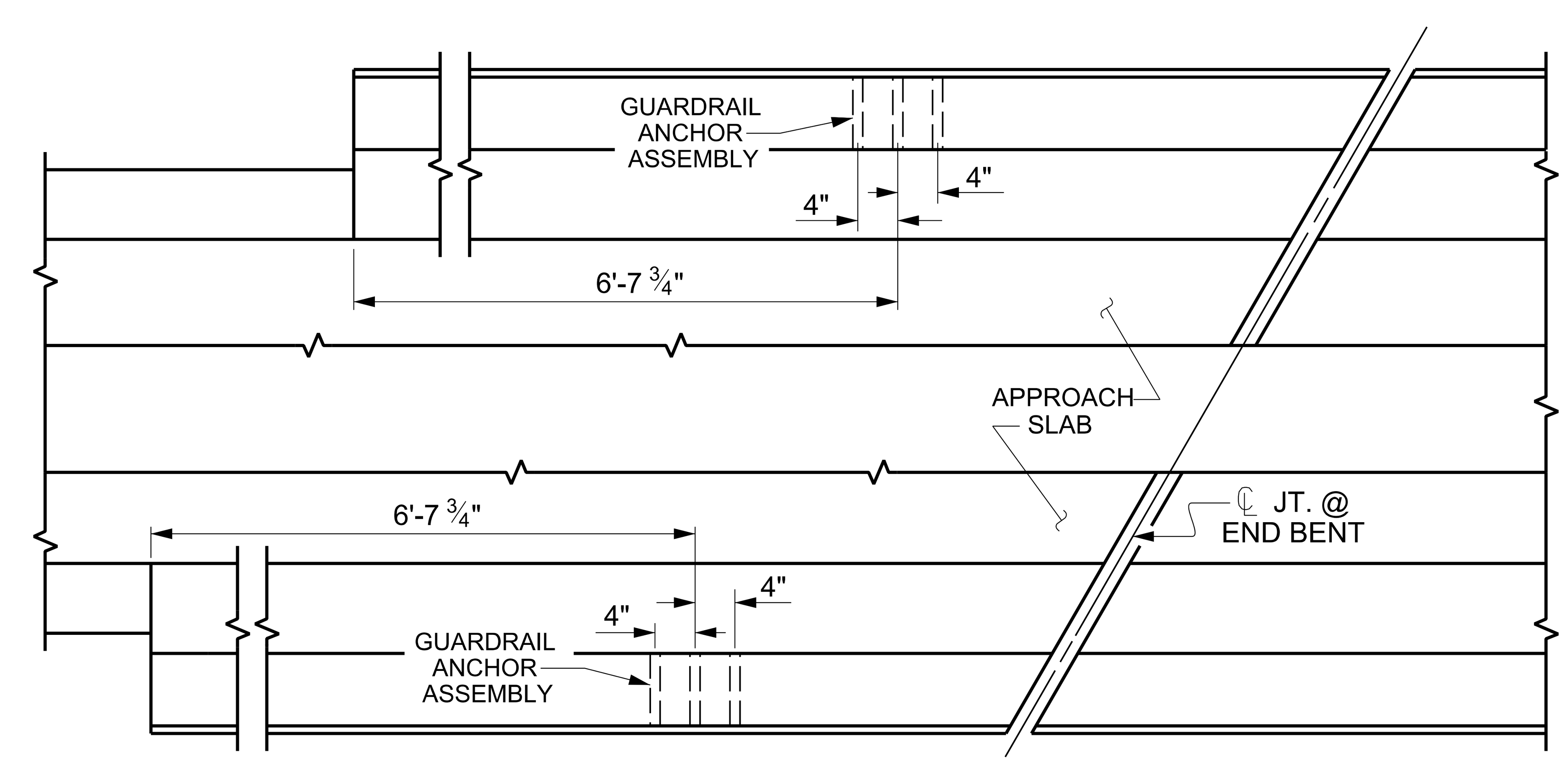
THE 1¼" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE ⅝" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SECTION E-E

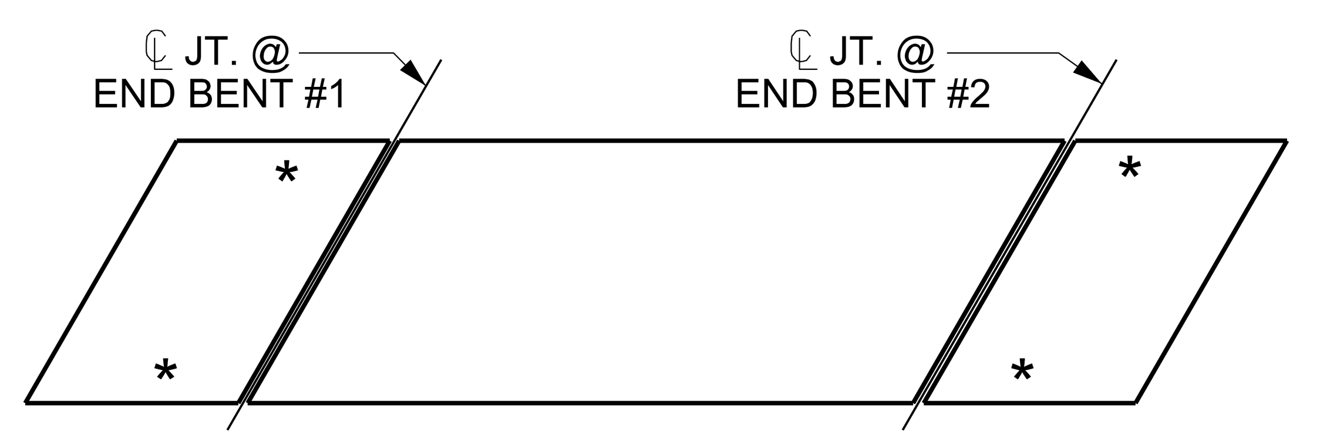
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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



SKETCH SHOWING POINTS OF ATTACHMENTS

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

DocuSigned by:
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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

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ASSEMBLED BY:	C. E. LARSON	DATE :	4/24
CHECKED BY :	R. C. LARSON	DATE :	4/24
DRAWN BY : TLA 5/06	REV. 6/13 REV. 12/17 REV. 6/22	MAA/THC BNB/AAI	
CHECKED BY : GM 5/06			

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			45

4/3/2025
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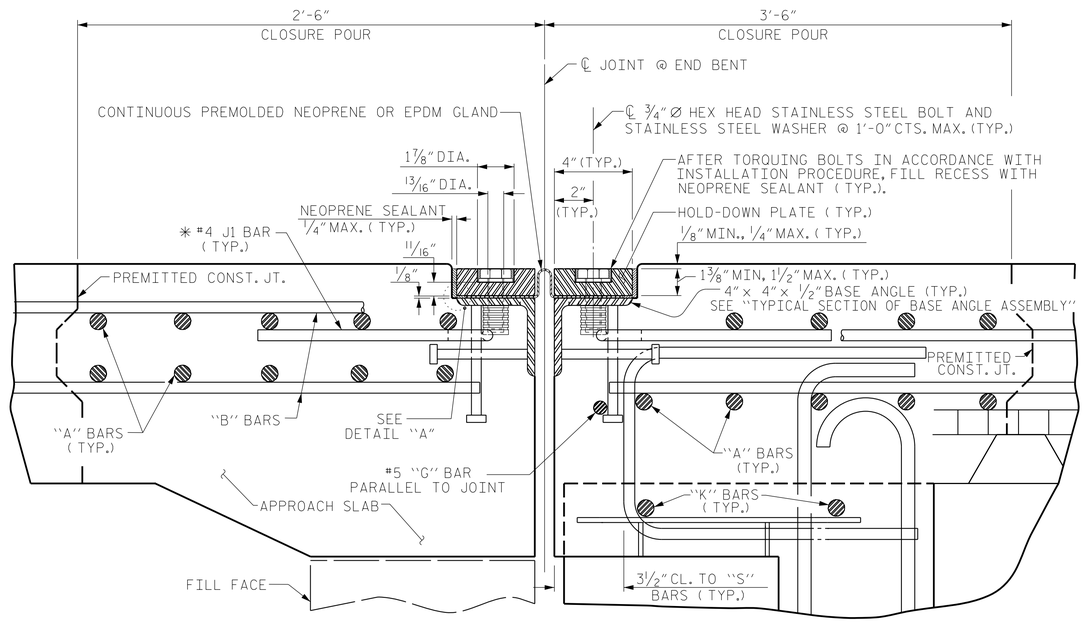
STD. NO. GRA2 Sht. 3b

8/26/21



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾" Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1" Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4" X 4" X ½" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.

AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).

LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅞" IN DIAMETER WITH A HAND PUNCH.

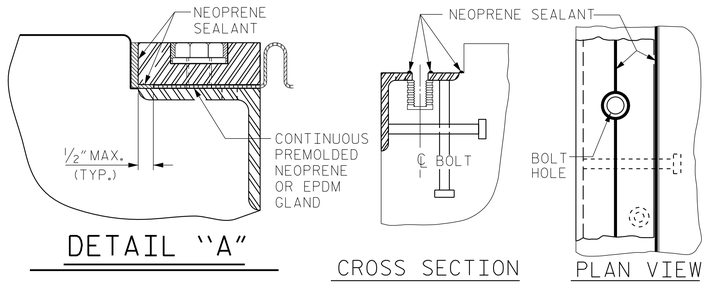
IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.

AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.

AFTER PROPER TORQUING, CLEAN THE BOLT HOLE RECESSES, THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, AND THE LIFTING HOLES IN THE HOLD-DOWN PLATE, AND COMPLETELY FILL THE RECESSES AND LIFTING HOLES WITH NEOPRENE SEALANT.

GENERAL NOTES

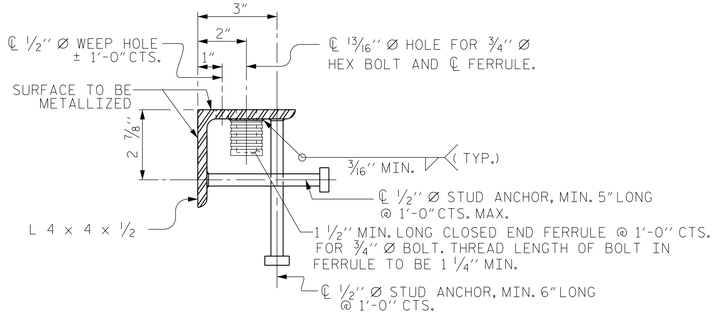
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169, GRADES 1010 THRU 1020 OR APPROVED EQUAL. ALL CONCRETE INSERTS SHALL BE CLOSED END AND SHALL CONFORM TO AASHTO M169, GRADE 12L14. TENSILE CAPACITY SHALL BE 3000 LBS. MINIMUM.
3. A PREMOLDED CORRUGATED OR NON-CORRUGATED GLAND SHALL BE USED FOR JOINTS SKEWED BETWEEN 50° THRU 130°. FOR JOINTS SKEWED LESS THAN 50° OR MORE THAN 130°, ONLY A CORRUGATED GLAND SHALL BE USED.
4. CLOSED END FERRULES AND STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.
5. SURFACES COMING IN CONTACT WITH NEOPRENE SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.
6. UPON COMPLETION OF SHOP FABRICATION, THE HOLD-DOWN PLATE AND BASE ANGLE ASSEMBLY, AS SHOWN IN THE "TYPICAL SECTION OF BASE ANGLE ASSEMBLY", SHALL BE METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
7. THE COVER PLATES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.
8. BASE ANGLE ASSEMBLY SHALL BE CONTINUOUS FOR THE LENGTH OF THE JOINT. AT CROWN BREAKS, THE ENDS OF THE BASE ANGLE ASSEMBLY SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE FOR SKEWS LESS THAN 80° AND GREATER THAN 100°. FINISHED WELD SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
9. FIELD SPLICES OF HOLD-DOWN PLATES SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. HOLD-DOWN PLATES SHALL NOT EXCEED 20' LENGTHS UNLESS APPROVED BY THE ENGINEER.
10. NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.
11. THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE ¾" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.
12. THE FABRICATOR SHALL PROVIDE ½" Ø THREADED HOLES IN THE HOLD-DOWN PLATES TO ASSIST IN LIFTING AND PLACING. THE HOLES SHALL BE ¾" DEEP AT 6'-0" MAXIMUM SPACING AND A MINIMUM OF TWO HOLES PER PLATE.



DETAIL "A" | CROSS SECTION | PLAN VIEW

INSTALLATION SKETCH

MOVEMENT AND SETTING AT JOINT					
BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
EB1	120°	0"	1"	1"	1"
EB2	120°	⅝"	1⅜"	1¼"	1⅛"



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

EXPANSION JOINT SEAL DETAILS

PLANS PREPARED BY:

NV5
NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
CARY, NC 27518
P: 919.851.1912 www.NV5.com
NC License # F-1333

DocuSigned by: BEB2398[illegible]
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
4/3/2025

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			45

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 4/24

ASSEMBLED BY: C. E. LARSON DATE : 4/24
CHECKED BY : R. C. LARSON DATE : 4/24

DRAWN BY : REK 9/87
CHECKED BY : CRK 10/87

REV. 10/1/11 MAA/GM
REV. 10/17 MAA/THC
REV. 6/18 MAA/THC

4/3/2025
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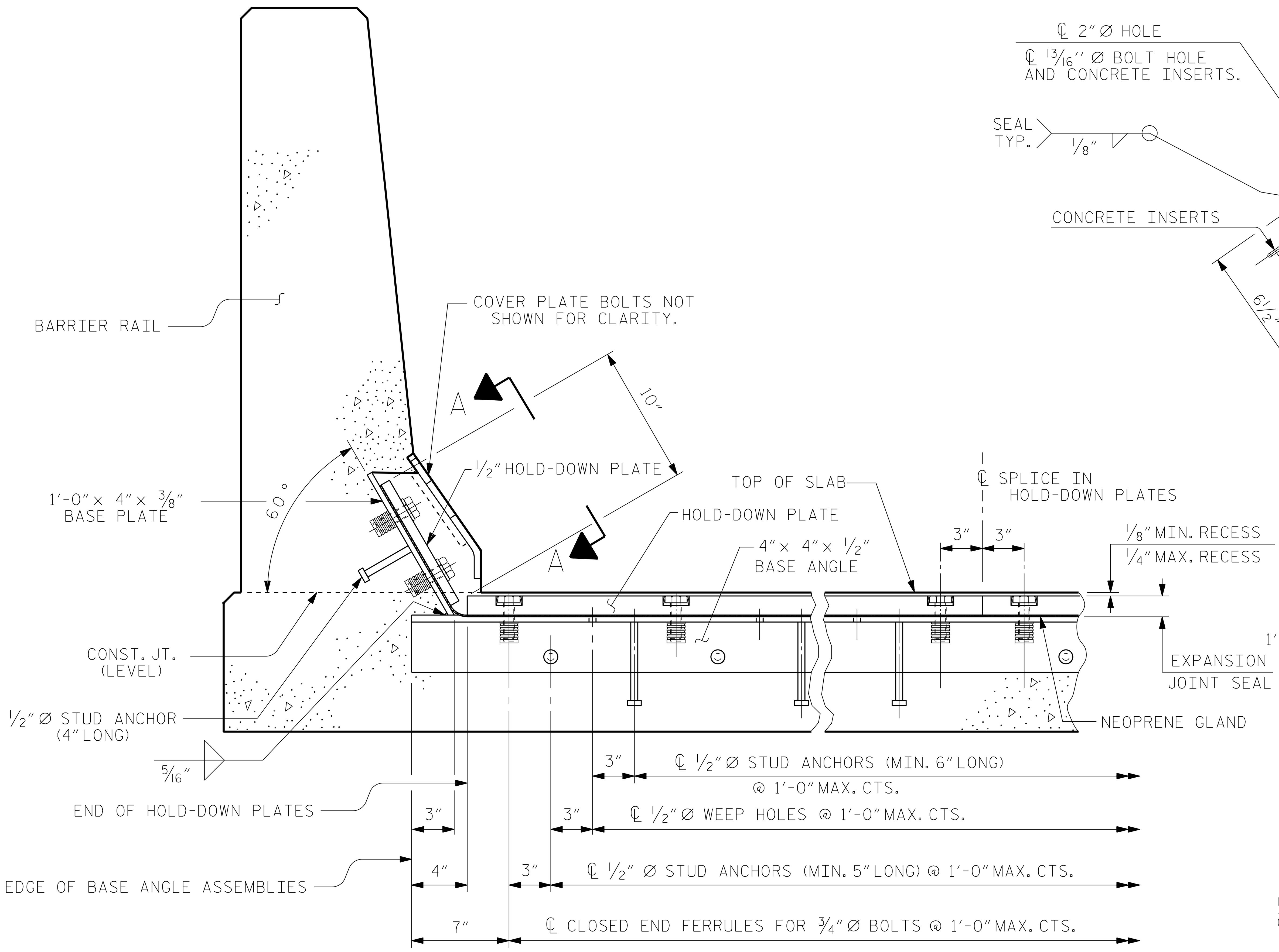
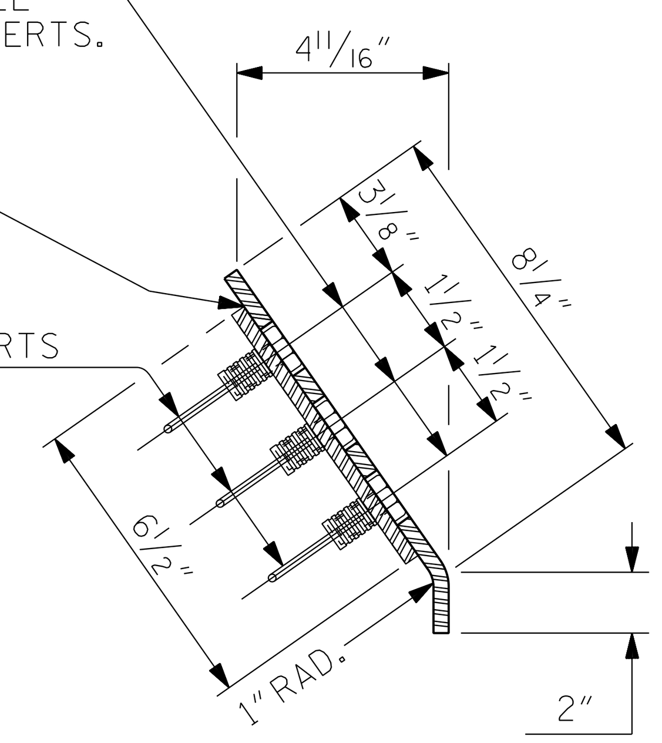
(SHT 1)

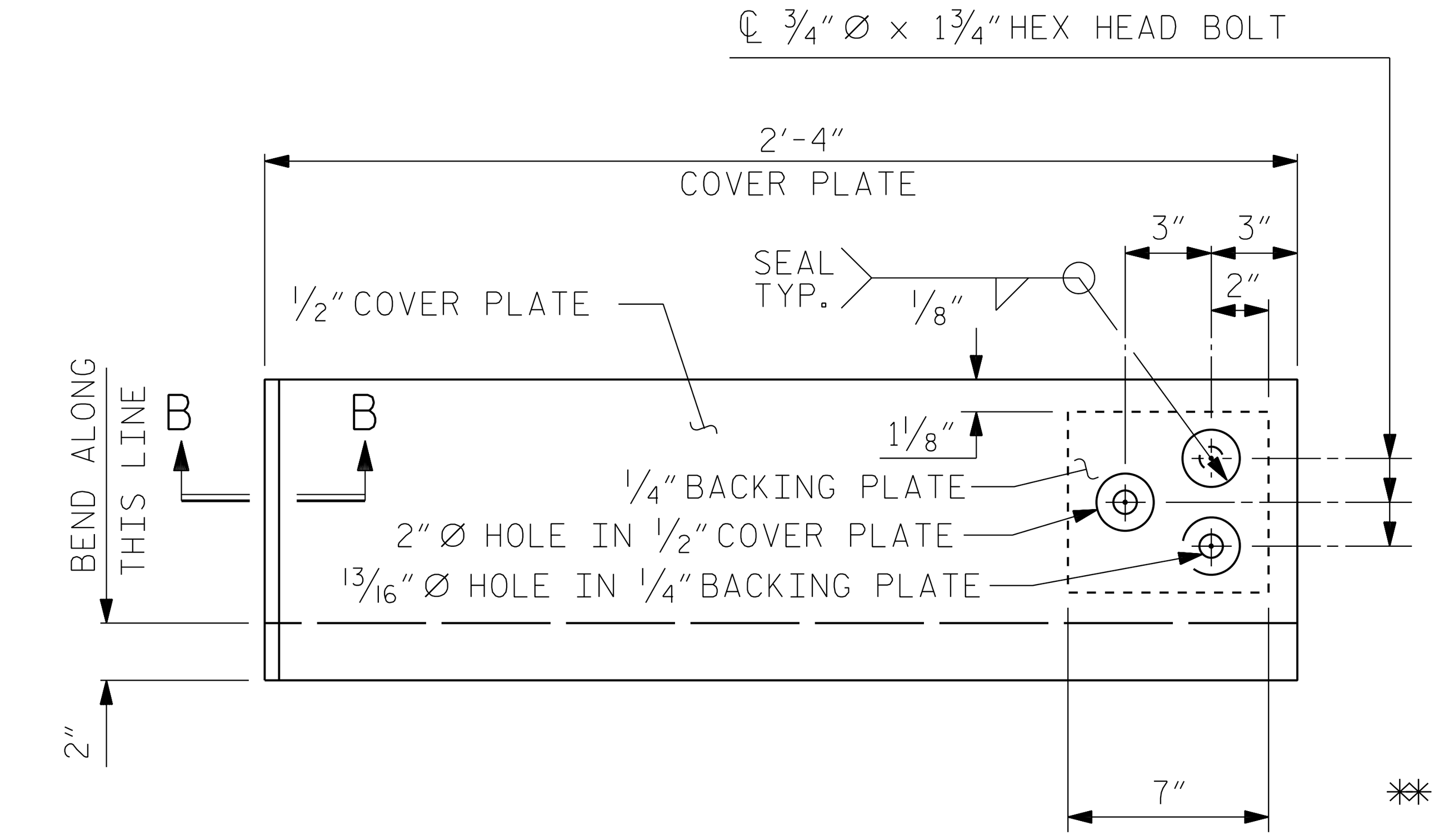
8/26/21



SECTION THRU RAIL NORMAL TO JOINT

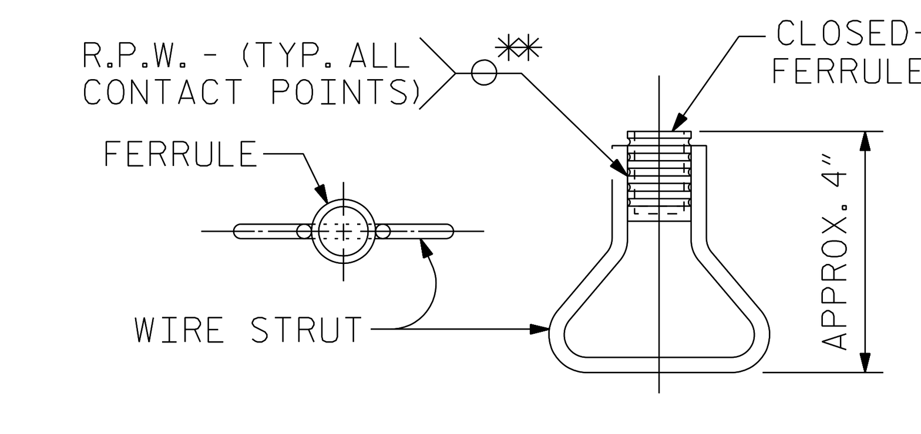


END VIEW



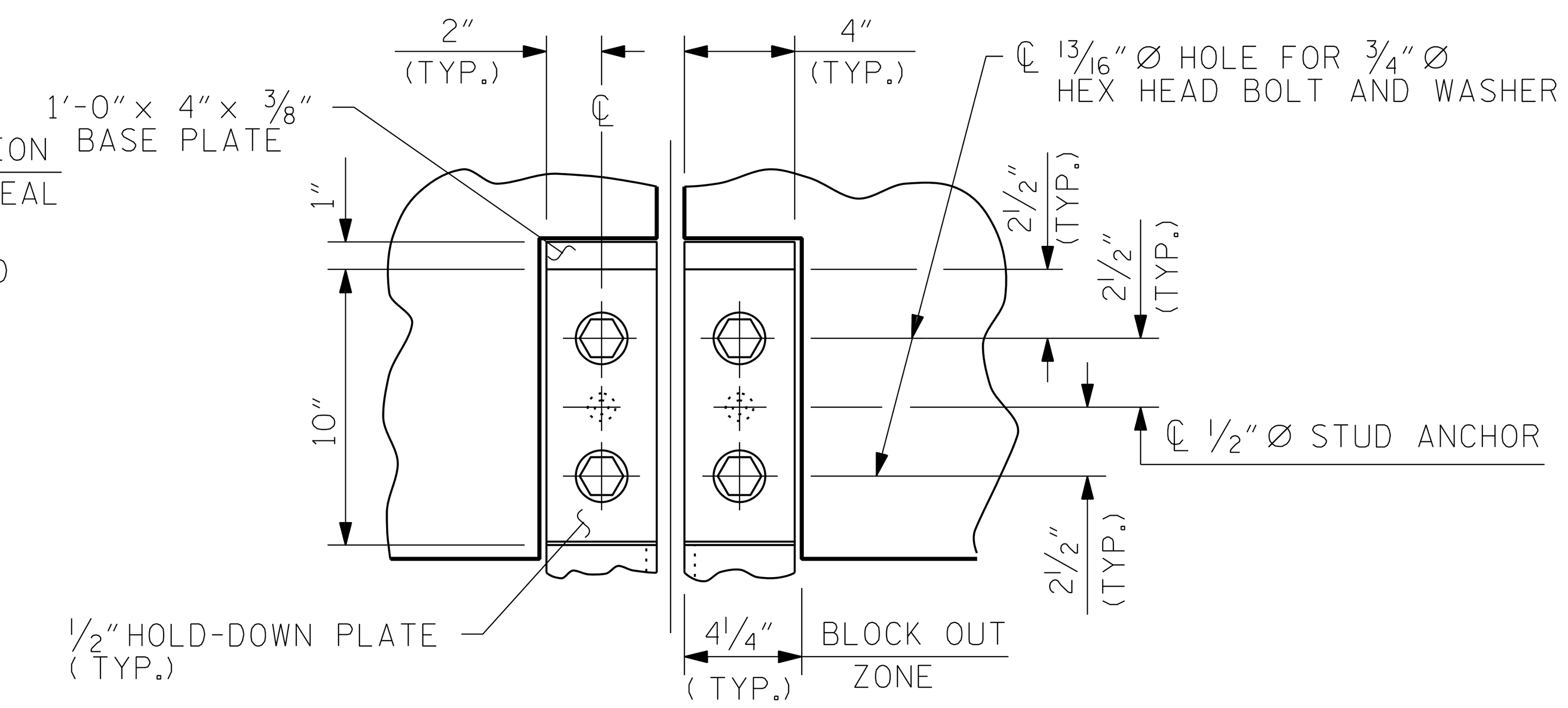
TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

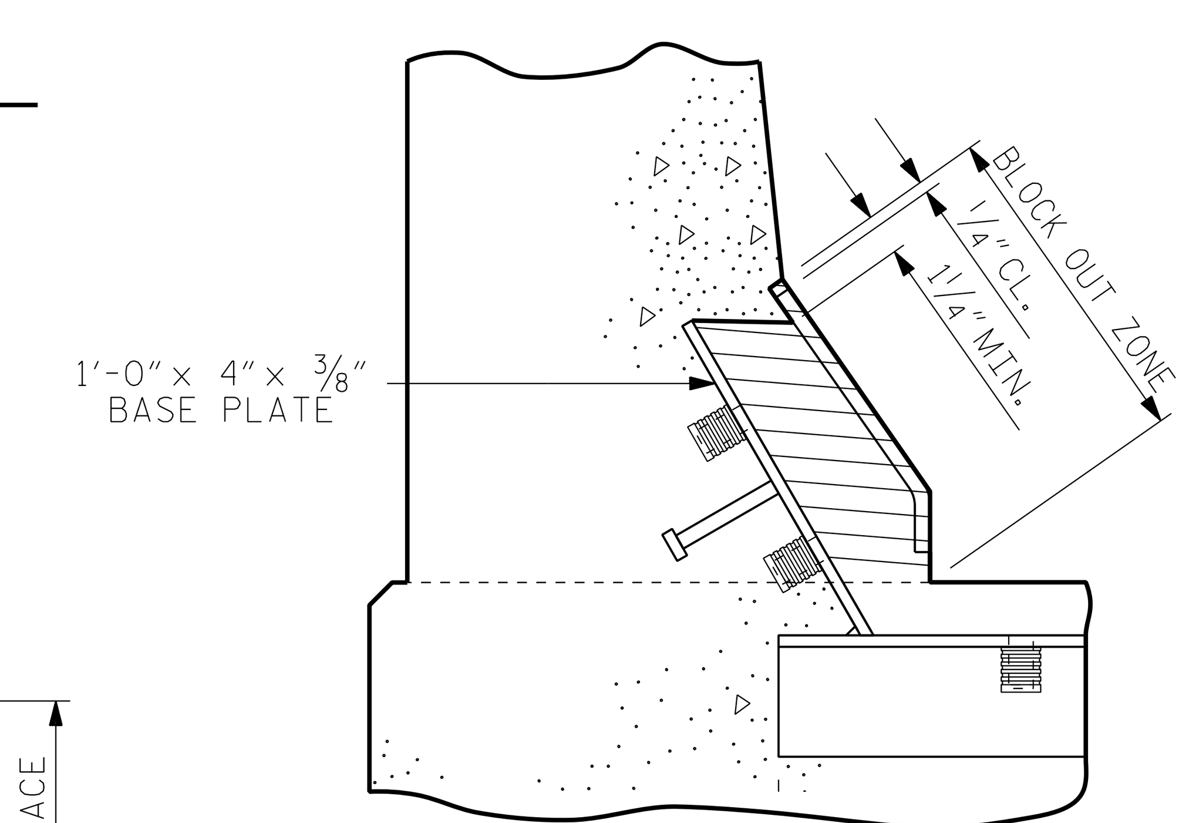


CONCRETE INSERT

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

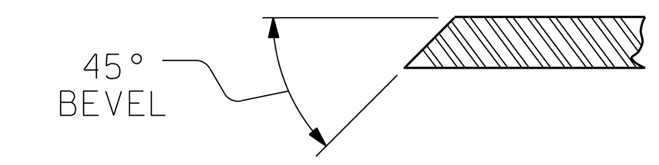


SECTION A - A

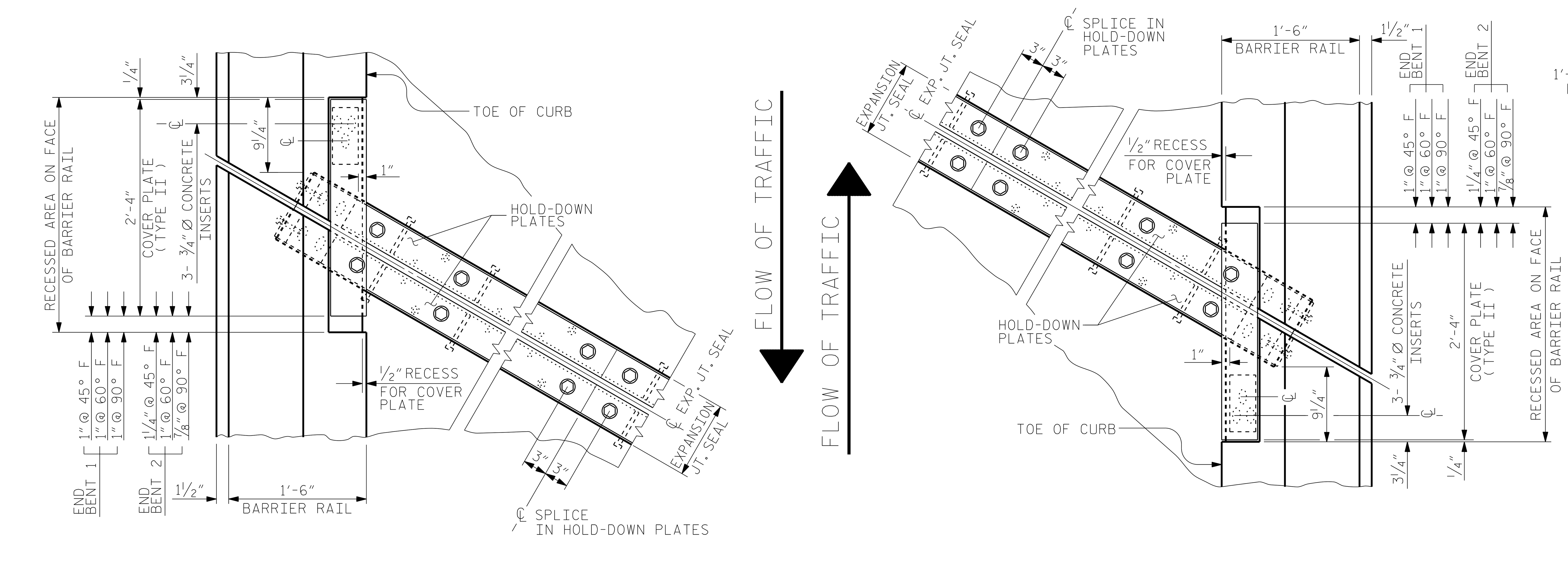


BLOCK OUT DETAIL

SEE "SECTION A - A" FOR OTHER DETAILS.



SECTION B - B



PLAN OF EXPANSION JOINT SEAL

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

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SEAL 14114 ROBERT C. LARSON PROFESSIONAL ENGINEER NORTH CAROLINA
4/3/2025

PLANS PREPARED BY:
NV5
NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
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P: 919.851.1912 www.NV5.com
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DESIGN ENGINEER OF RECORD: R. C. LARSON DATE: 4/24

ASSEMBLED BY: C. E. LARSON DATE: 4/24
CHECKED BY: R. C. LARSON DATE: 4/24

DRAWN BY: REK 9/87 REV. 7/12 MAA/GM
CHECKED BY: CRK 10/87 REV. 6/13 MAA/GM
REV. 12/17 MAA/THC

4/3/2025
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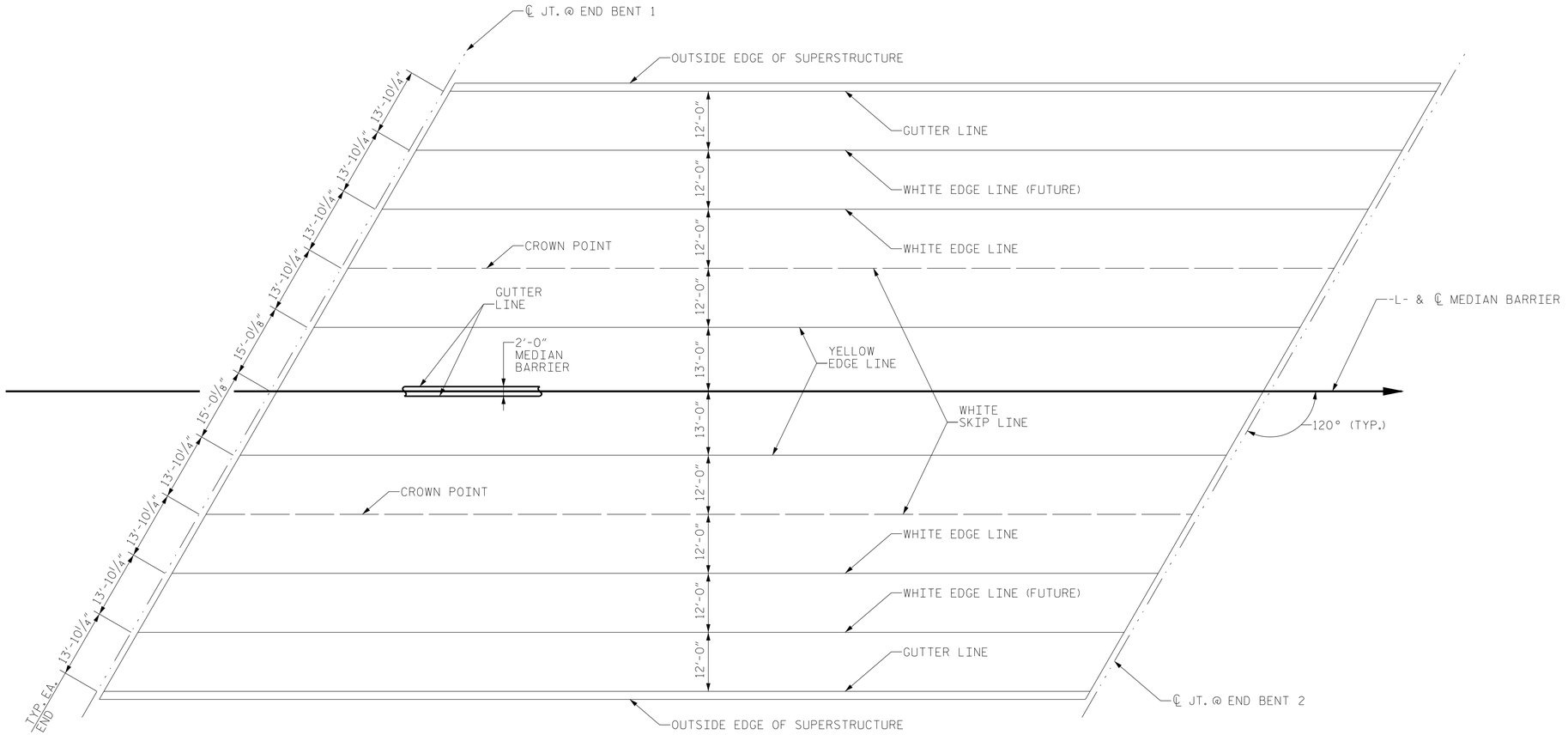
STD. NO. EJS2 SHT 2

8/26/21



PAVEMENT MARKING ALIGNMENT

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

EXPANSION JOINT SEAL DETAILS

DocuSigned by:
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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

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2			4			45

DRAWN BY : R. C. LARSON DATE : 4/24
CHECKED BY : C. E. LARSON DATE : 4/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 4/24

4/3/2025
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8/26/21

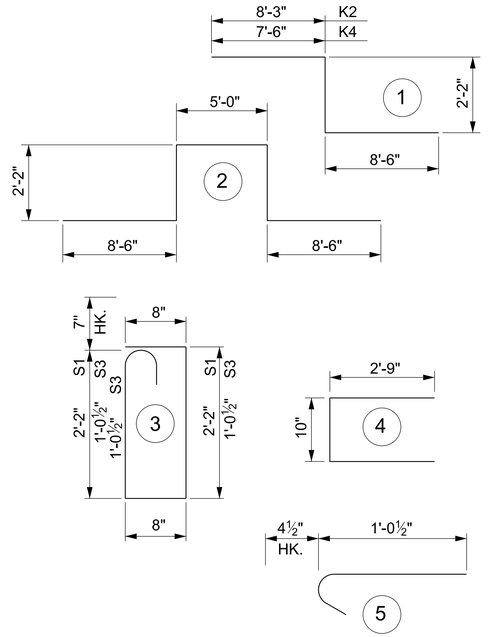
REINFORCING BAR SCHEDULE
STAGE I OR II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	139	5	STR.	37'-3"	5400	A51	2	5	STR.	23'-2"	48
*A2	2	5	STR.	36'-4"	76	A52	2	5	STR.	22'-2"	46
*A3	2	5	STR.	35'-4"	74	A53	2	5	STR.	21'-2"	44
*A4	2	5	STR.	34'-4"	72	A54	2	5	STR.	20'-2"	42
*A5	2	5	STR.	33'-4"	70	A55	2	5	STR.	19'-2"	40
*A6	2	5	STR.	32'-3"	67	A56	2	5	STR.	18'-2"	38
*A7	2	5	STR.	31'-3"	65	A57	2	5	STR.	17'-2"	36
*A8	2	5	STR.	30'-3"	63	A58	2	5	STR.	16'-1"	34
*A9	2	5	STR.	29'-3"	61	A59	2	5	STR.	15'-1"	31
*A10	2	5	STR.	28'-3"	59	A60	2	5	STR.	14'-1"	29
*A11	2	5	STR.	27'-3"	57	A61	2	5	STR.	13'-1"	27
*A12	2	5	STR.	26'-3"	55	A62	2	5	STR.	12'-1"	25
*A13	2	5	STR.	25'-3"	53	A63	2	5	STR.	11'-1"	23
*A14	2	5	STR.	24'-2"	50	A64	2	5	STR.	10'-1"	21
*A15	2	5	STR.	23'-2"	48	A65	2	5	STR.	9'-1"	19
*A16	2	5	STR.	22'-2"	46	A66	2	5	STR.	8'-0"	17
*A17	2	5	STR.	21'-2"	44	A67	2	5	STR.	7'-0"	15
*A18	2	5	STR.	20'-2"	42	A68	2	5	STR.	6'-0"	13
*A19	2	5	STR.	19'-2"	40	A69	2	5	STR.	5'-0"	10
*A20	2	5	STR.	18'-2"	38	A70	2	5	STR.	4'-0"	8
*A21	2	5	STR.	17'-2"	36	A71	2	5	STR.	3'-0"	6
*A22	2	5	STR.	16'-1"	34	A72	2	5	STR.	2'-0"	4
*A23	2	5	STR.	15'-1"	31	A200	16	4	STR.	7'-0"	75
*A24	2	5	STR.	14'-1"	29						
*A25	2	5	STR.	13'-1"	27	B1	58	5	STR.	52'-1"	3151
*A26	2	5	STR.	12'-1"	25	*B2	78	4	STR.	35'-4"	1841
*A27	2	5	STR.	11'-1"	23						
*A28	2	5	STR.	10'-1"	21	*D1	175	5	STR.	5'-1"	928
*A29	2	5	STR.	9'-1"	19	D2	175	5	STR.	4'-3"	776
*A30	2	5	STR.	8'-0"	17						
*A31	2	5	STR.	7'-0"	15	*G1	2	5	STR.	45'-9"	95
*A32	2	5	STR.	6'-0"	13						
*A33	2	5	STR.	5'-0"	10	*J1	84	4	5	1'-5"	79
*A34	2	5	STR.	4'-0"	8						
*A35	2	5	STR.	3'-0"	6	*S1	42	5	3	6'-3"	274
*A36	2	5	STR.	2'-0"	4	*S2	42	4	4	6'-3"	175
A37	139	5	STR.	37'-3"	5400	*S3	24	5	3	4'-0"	100
A38	2	5	STR.	36'-4"	76						
A39	2	5	STR.	35'-4"	74	*K1	8	8	2	26'-4"	562
A40	2	5	STR.	34'-4"	72	*K2	8	8	1	18'-11"	404
A41	2	5	STR.	33'-4"	70	*K3	24	6	STR.	6'-8"	240
A42	2	5	STR.	32'-3"	67	*K7	12	4	STR.	10'-6"	84
A43	2	5	STR.	31'-3"	65						
A44	2	5	STR.	30'-3"	63						
A45	2	5	STR.	29'-3"	61						
A46	2	5	STR.	28'-3"	59						
A47	2	5	STR.	27'-3"	57						
A48	2	5	STR.	26'-3"	55						
A49	2	5	STR.	25'-3"	53						
A50	2	5	STR.	24'-2"	50						

REINFORCING BAR SCHEDULE
STAGE III

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A73	132	5	STR.	43'-8"	6012	A126	2	5	STR.	32'-11"	69
*A74	2	5	STR.	43'-1"	90	A127	2	5	STR.	31'-11"	67
*A75	2	5	STR.	42'-1"	88	A128	2	5	STR.	30'-11"	64
*A76	2	5	STR.	41'-0"	86	A129	2	5	STR.	29'-11"	62
*A77	2	5	STR.	40'-0"	83	A130	2	5	STR.	28'-11"	60
*A78	2	5	STR.	39'-0"	81	A131	2	5	STR.	27'-11"	58
*A79	2	5	STR.	38'-0"	79	A132	2	5	STR.	26'-11"	56
*A80	2	5	STR.	37'-0"	77	A133	2	5	STR.	25'-11"	54
*A81	2	5	STR.	36'-0"	75	A134	2	5	STR.	24'-10"	52
*A82	2	5	STR.	35'-0"	73	A135	2	5	STR.	23'-10"	50
*A83	2	5	STR.	34'-0"	71	A136	2	5	STR.	22'-10"	48
*A84	2	5	STR.	32'-11"	69	A137	2	5	STR.	21'-10"	46
*A85	2	5	STR.	31'-11"	67	A138	2	5	STR.	20'-10"	43
*A86	2	5	STR.	30'-11"	64	A139	2	5	STR.	19'-10"	41
*A87	2	5	STR.	29'-11"	62	A140	2	5	STR.	18'-10"	39
*A88	2	5	STR.	28'-11"	60	A141	2	5	STR.	17'-10"	37
*A89	2	5	STR.	27'-11"	58	A142	2	5	STR.	16'-9"	35
*A90	2	5	STR.	26'-11	56	A143	2	5	STR.	15'-9"	33
*A91	2	5	STR.	25'-11"	54	A144	2	5	STR.	14'-9"	31
*A92	2	5	STR.	24'-10"	52	A145	2	5	STR.	13'-9"	29
*A93	2	5	STR.	23'-10"	50	A146	2	5	STR.	12'-9"	27
*A94	2	5	STR.	22'-10"	48	A147	2	5	STR.	11'-9"	25
*A95	2	5	STR.	21'-10"	46	A148	2	5	STR.	10'-9"	22
*A96	2	5	STR.	20'-10"	43	A149	2	5	STR.	9'-9"	20
*A97	2	5	STR.	19'-10"	41	A150	2	5	STR.	8'-8"	18
*A98	2	5	STR.	18'-10"	39	A151	2	5	STR.	7'-8"	16
*A99	2	5	STR.	17'-10"	37	A152	2	5	STR.	6'-8"	14
*A100	2	5	STR.	16'-9"	35	A153	2	5	STR.	5'-8"	12
*A101	2	5	STR.	15'-9"	33	A154	2	5	STR.	4'-8"	10
*A102	2	5	STR.	14'-9"	31	A155	2	5	STR.	3'-8"	8
*A103	2	5	STR.	13'-9"	29	A156	2	5	STR.	2'-8"	6
*A104	2	5	STR.	12'-9"	27	A200	20	4	STR.	7'-0"	94
*A105	2	5	STR.	11'-9"	25						
*A106	2	5	STR.	10'-9"	22	B1	84	5	STR.	52'-1"	4563
*A107	2	5	STR.	9'-9"	20	*B2	105	4	STR.	35'-4"	2478
*A108	2	5	STR.	8'-8"	18						
*A109	2	5	STR.	7'-8"	16	*D3	350	5	STR.	5'-6"	2008
*A110	2	5	STR.	6'-8"	14	D4	350	5	STR.	5'-1"	1856
*A111	2	5	STR.	5'-8"	12						
*A112	2	5	STR.	4'-8"	10	*G2	2	5	STR.	57'-6"	120
*A113	2	5	STR.	3'-8"	8						
*A114	2	5	STR.	2'-8"	6	*J1	116	4	5	1'-5"	110
A115	132	5	STR.	43'-8"	6012						
A116	2	5	STR.	43'-1"	90	*S1	68	5	3	6'-3"	443
A117	2	5	STR.	42'-1"	88	*S2	68	4	4	4'-6"	204
A118	2	5	STR.	41'-0"	86	*S3	48	5	3	4'-0"	200
A119	2	5	STR.	40'-0"	83						
A120	2	5	STR.	39'-0"	81	*K1	12	8	2	26'-4"	844
A121	2	5	STR.	38'-0"	79	*K3	32	6	STR.	6'-8"	320
A122	2	5	STR.	37'-0"	77	*K4	8	8	1	18'-2"	388
A123	2	5	STR.	36'-0"	75	*K5	8	8	STR.	7'-5"	158
A124	2	5	STR.	35'-0"	73	*K6	16	6	STR.	3'-7"	86
A125	2	5	STR.	34'-0"	71	*K7	16	4	STR.	10'-6"	112
						*K8	8	4	STR.	7'-6"	40

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU.YDS.)	(LBS.)	(LBS.)
STAGE I	126.3	10,800	11,580
STAGE II	126.3	10,800	11,580
STAGE III	168.0 †	14,480	15,558
TOTALS* *	420.6	36,080	38,718

* * QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

† INCLUDES 23.1 CU. YDS. FOR CLOSURE POURS

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SUPERSTRUCTURE BILL OF MATERIAL

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 5/24

ASSEMBLED BY: C. E. LARSON DATE : 5/24
CHECKED BY : R. C. LARSON DATE : 5/24

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

REV. 12/17	MAA/THC
REV. 06/19	BNB/THC
REV. 11/22	BNB/THC

4/3/2025
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PLANS PREPARED BY:

NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
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BEB2398[illegible]

NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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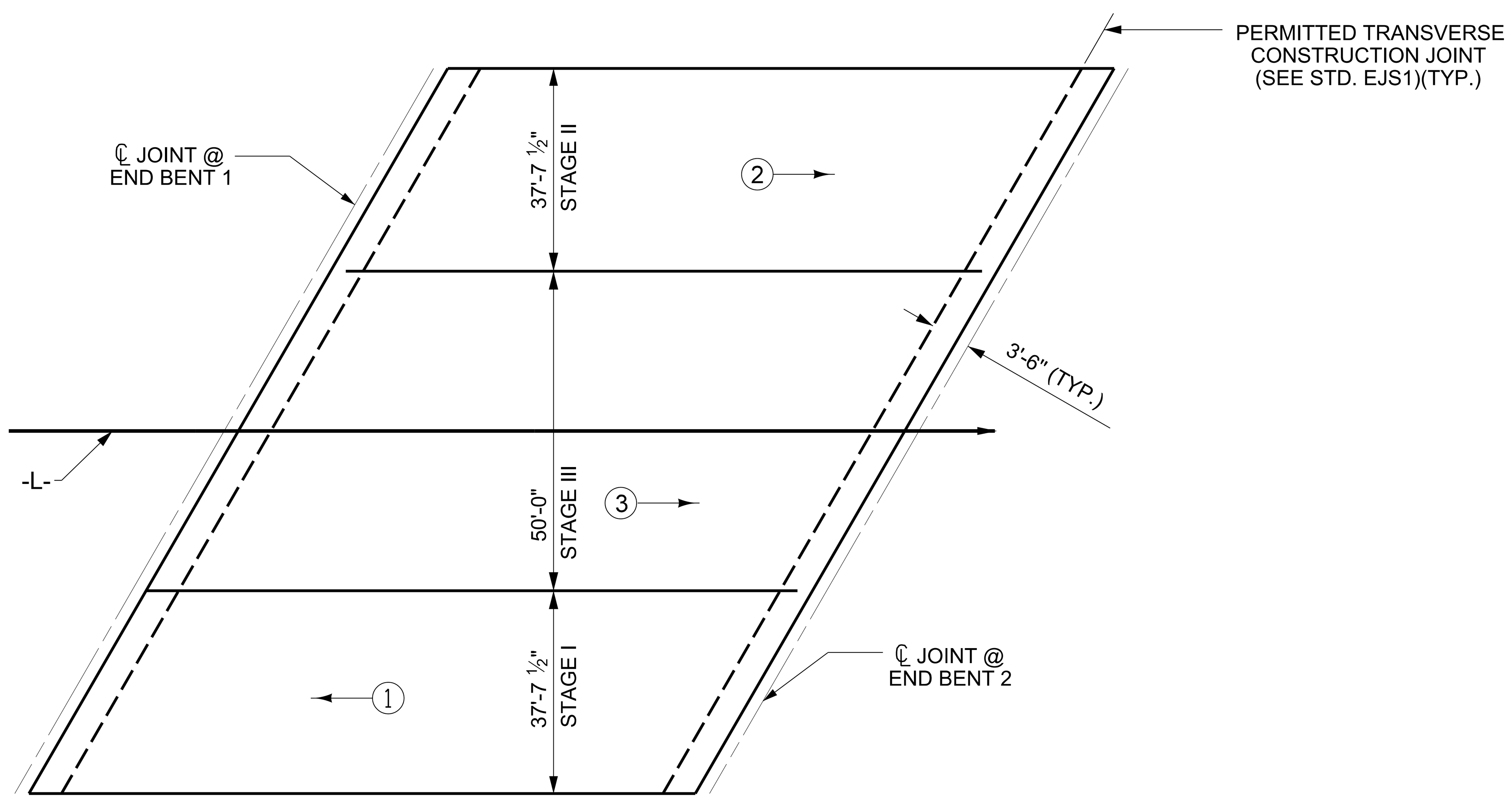
2			4			45

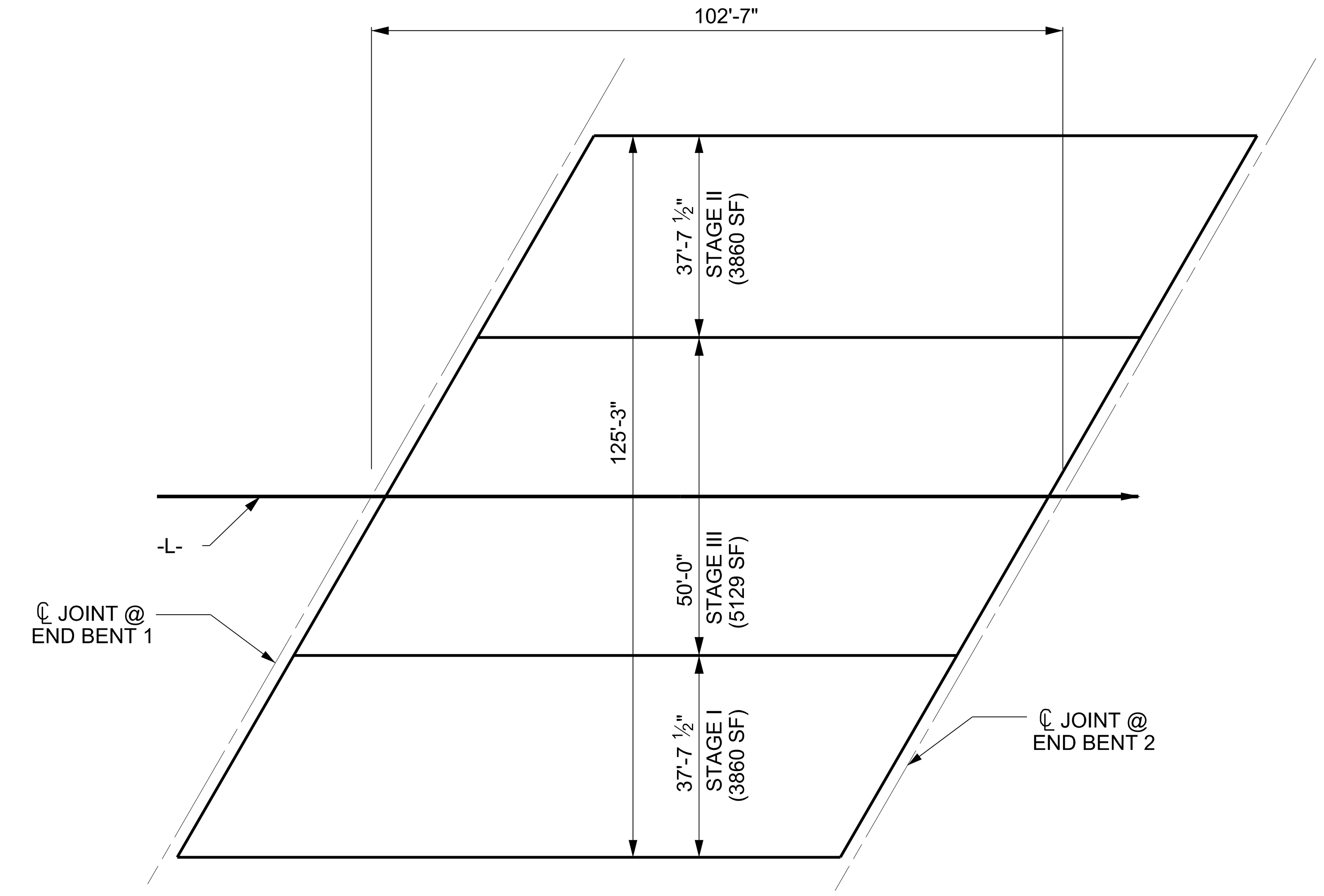
STD. NO. BOM2

8/26/21



POURING SEQUENCE SKETCH

(#) INDICATES POUR SEQUENCE NUMBER & DIRECTION



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 12,849)

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 (SQ. FT.)

	STAGE I	STAGE II	STAGE III	TOTAL
APPROACH SLABS	1632	1632	2128	5392
BRIDGE DECK	3496	3496	4649	11641
TOTAL	5128	5128	6777	17033

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-
SHEET 2 OF 2

DocuSigned by: BEB2398... SEAL 14114 NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT C. LARSON
4/3/2025

PLANS PREPARED BY:
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SUPERSTRUCTURE
BILL OF MATERIAL

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NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			45

DESIGN ENGINEER OF RECORD: R. C. LARSON	DATE :	4/24	
ASSEMBLED BY: C. E. LARSON	DATE :	4/24	
CHECKED BY : R. C. LARSON	DATE :	4/24	
DRAWN BY : JMB 5/87	REV. 12/17	MAA/THC	
CHECKED BY : SJD 9/87	REV. 06/19	BNB/THC	
	REV. 11/22	BNB/THC	

4/3/2025
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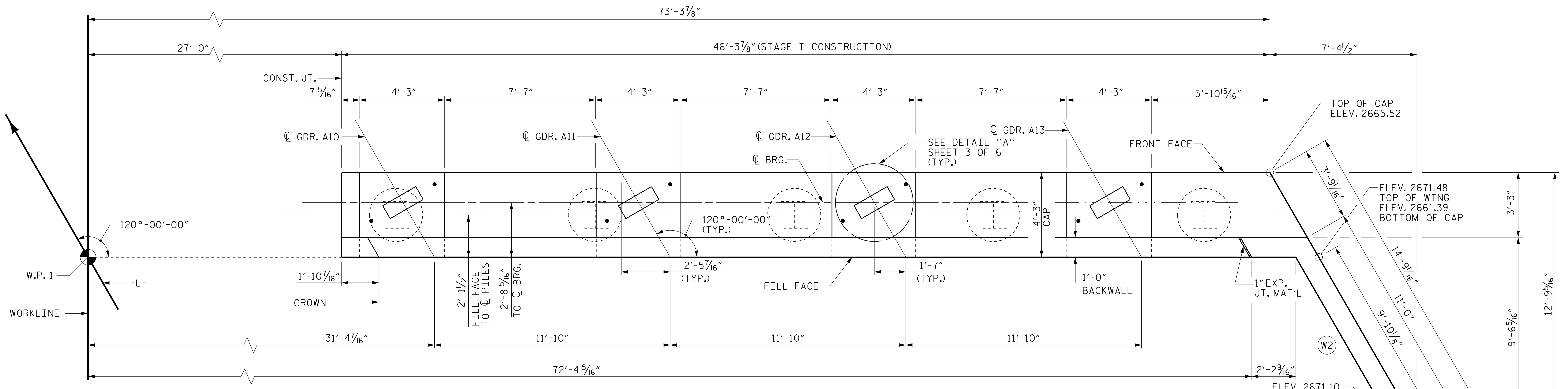
STD. NO. BOM2

8/26/21



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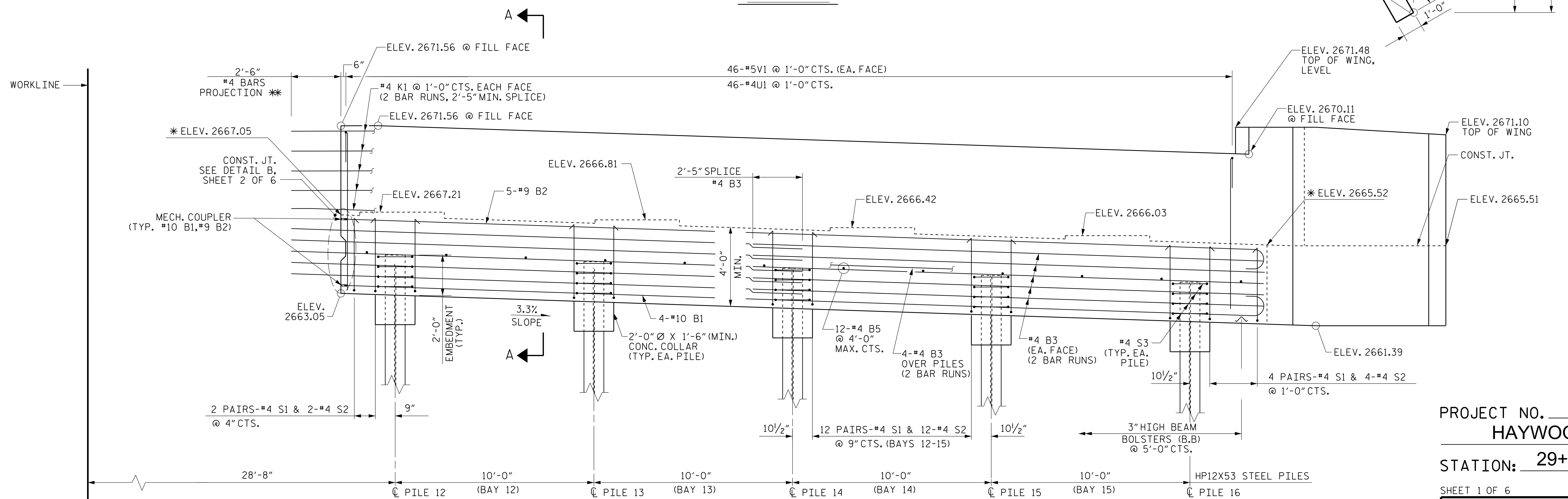

✻ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS. SEE SECTION A-A SHEET 5 OF 6.

✻✻ #4 BARS MAY BE BENT TO CLEAR TEMPORARY SHORING. STRAIGHTEN TO INCORPORATE INTO STAGE III CONSTRUCTION.

ELEVATION

(FOR SECTIONS A-A AND B-B, SEE SHEET 5 OF 6)

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 - STAGE I

DocuSigned by:
BEB2398D8226409...

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

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CARY, NC 27518
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2			4				

DRAWN BY : E. M. AUNG DATE : 4/24
CHECKED BY : R. C. LARSON DATE : 4/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 4/24

4/3/2025
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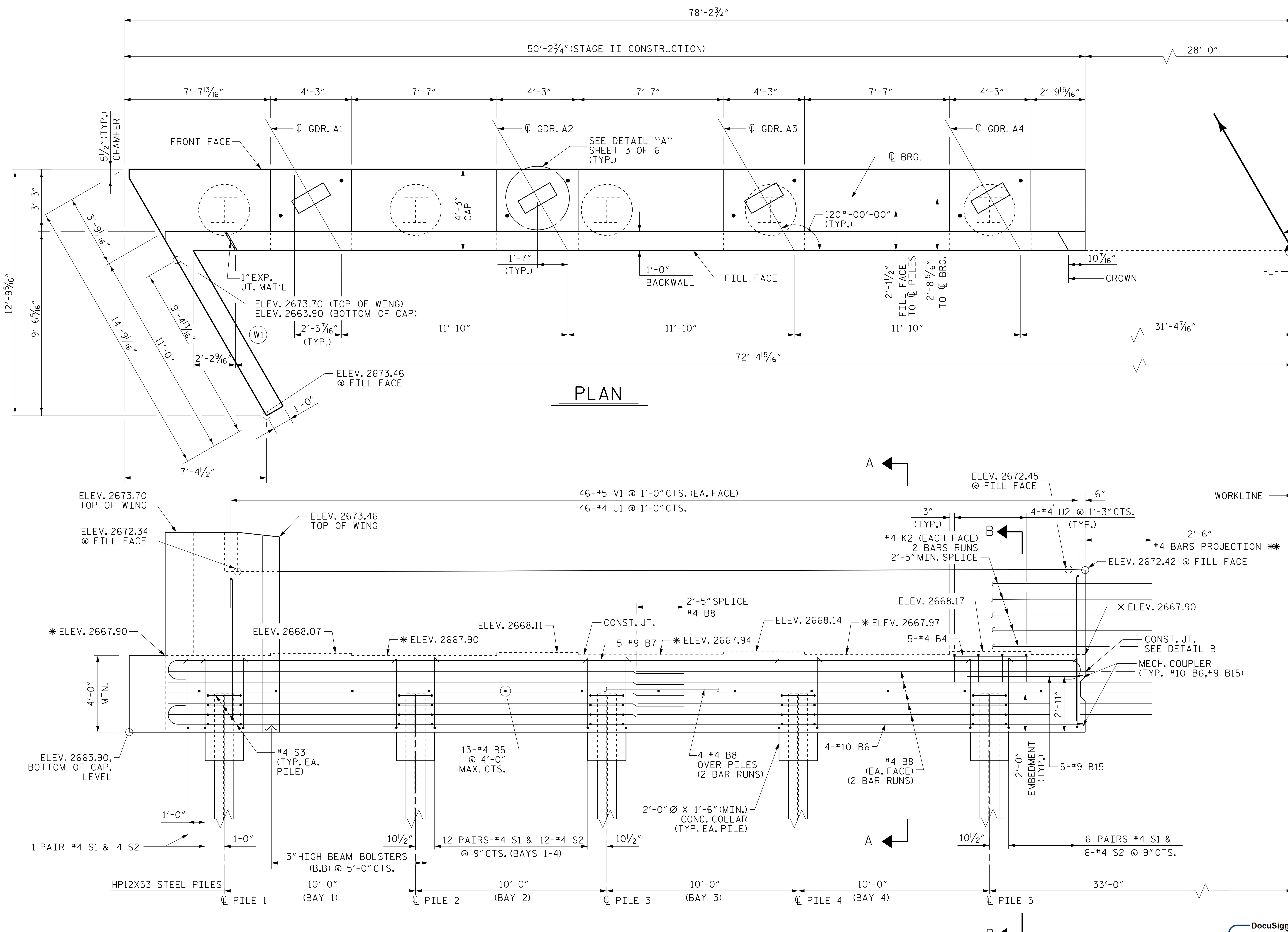
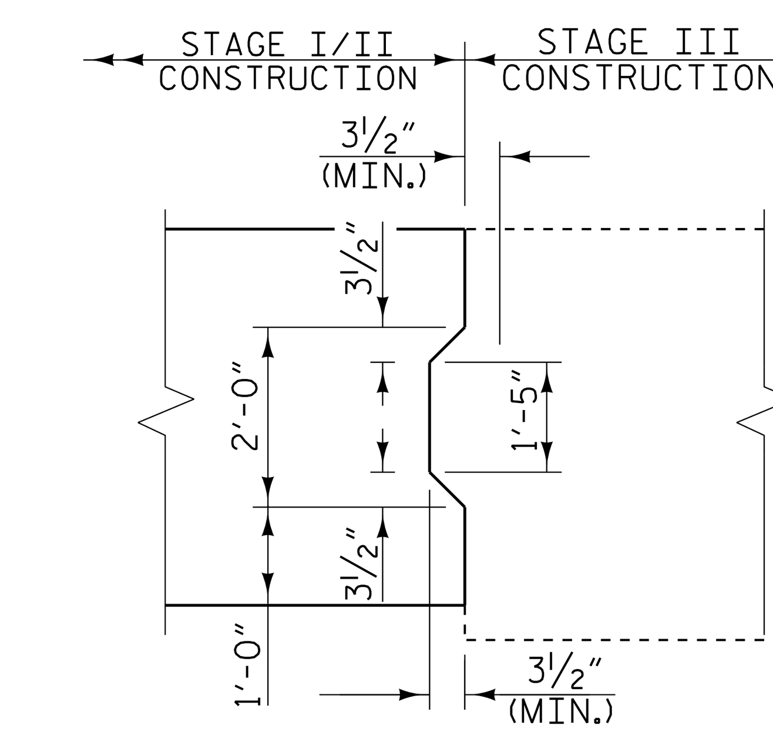
8/26/21



ELEVATION

(FOR SECTIONS A-A AND B-B, SEE SHEET 5 OF 6)



DETAIL "B"

✱ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS. SEE SECTION A-A SHEET 5 OF 6.

✱✱ #4 BARS MAY BE BENT TO CLEAR TEMPORARY SHORING. STRAIGHTEN TO INCORPORATE INTO STAGE III CONSTRUCTION.

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

END BENT 1 - STAGE II

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-30
1			3					TOTAL SHEETS
2			4					45

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	5/24

4/3/2025
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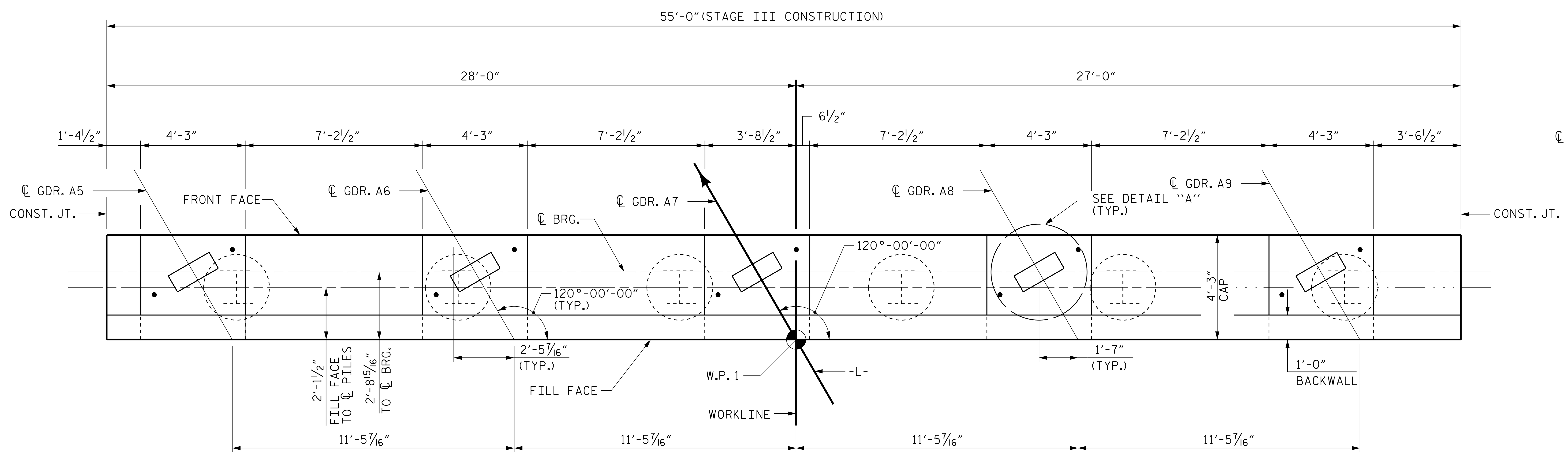

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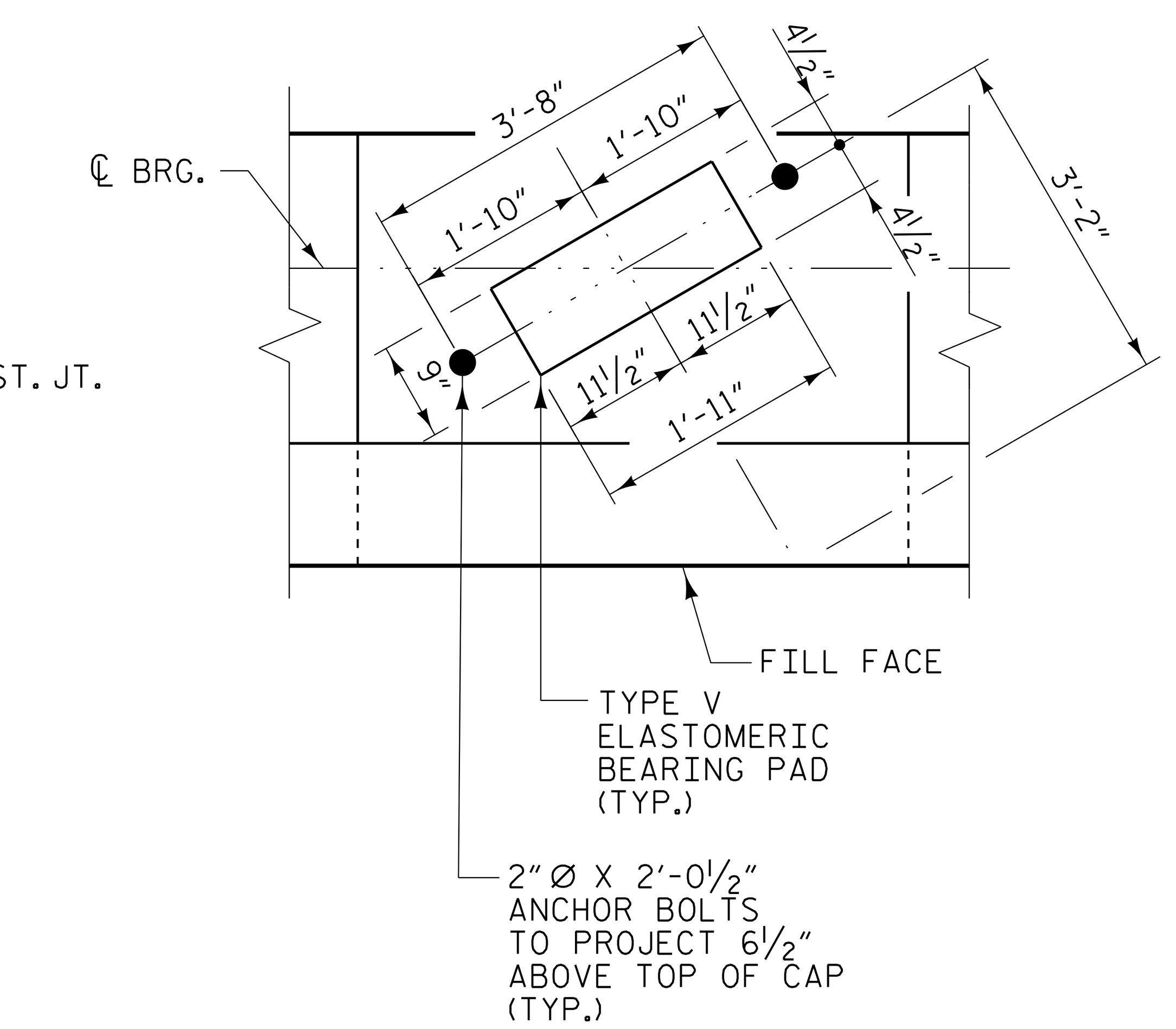


DETAIL "A"

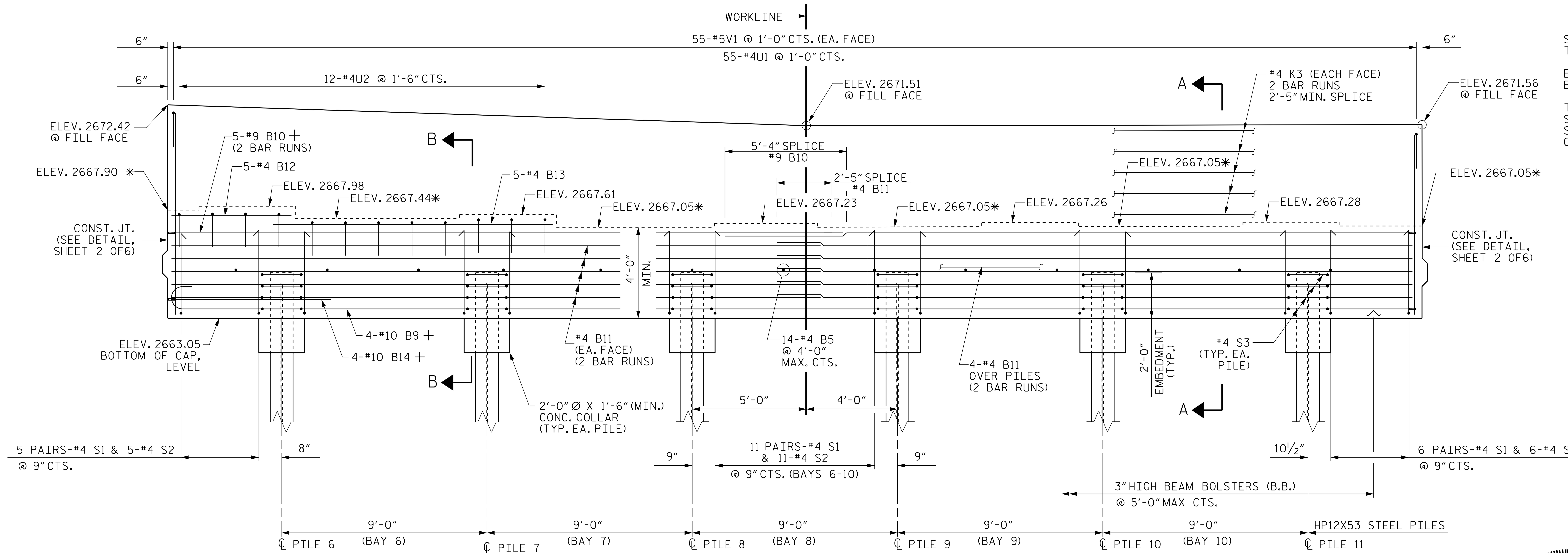
(TYP. EACH GIRDER)

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



ELEVATION

(FOR SECTIONS A-A AND B-B, SEE SHEET 5 OF 6)

* FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTION A-A, SHEET 5 OF 6.

+ ATTACH TO EXISTING MECHANICAL COUPLER IN EARLIER STAGE:
5-#9 B10 COUPLE WITH 5-#9 B15 (STAGE II) AND 5-#9 B2 (STAGE I)
4-#10 B14 COUPLE WITH 4-#10 B6 (STAGE II)
4-#10 B9 COUPLE WITH 4-#10 B6 (STAGE I)

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

END BENT 1 - STAGE III

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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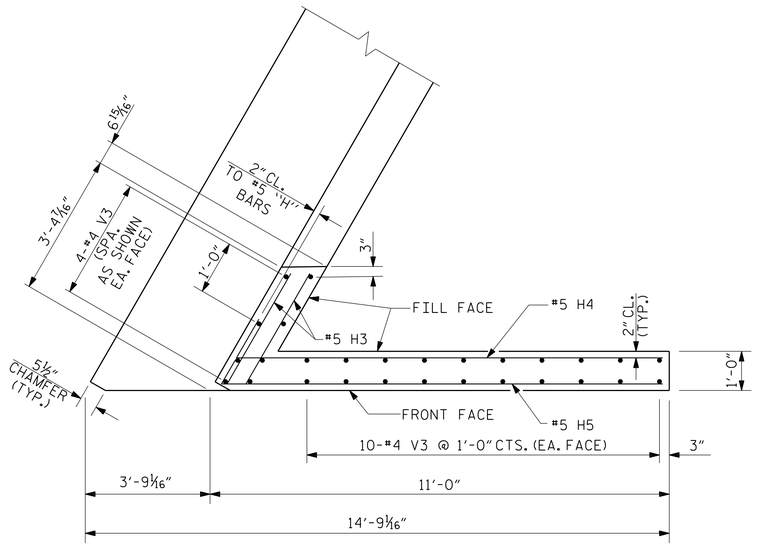
1			3			TOTAL SHEETS
2			4			45

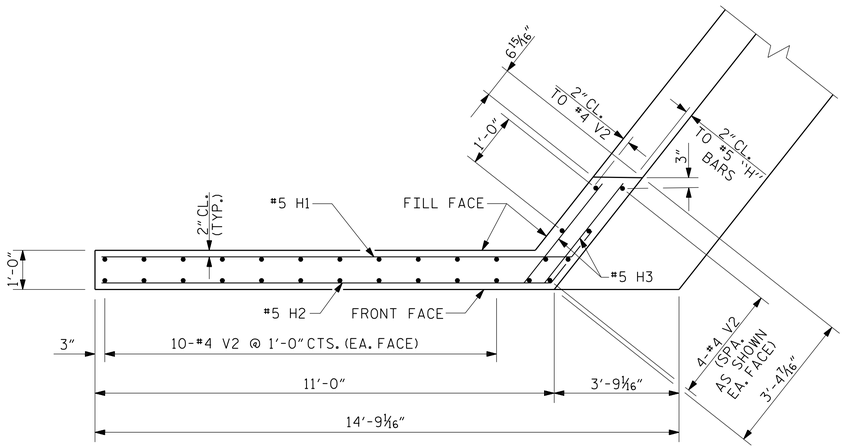
DRAWN BY :	E. M. AUNG	DATE :	4/24
CHECKED BY :	R. C. LARSON	DATE :	5/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	5/24

8/26/21



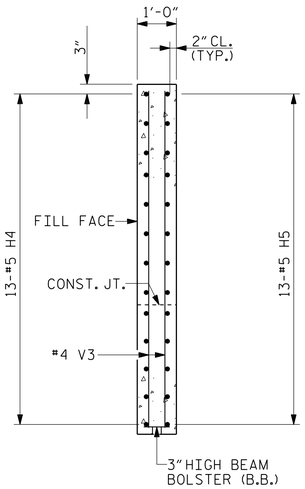
PLAN OF LEFT WING - W1

(STAGE II CONSTRUCTION)

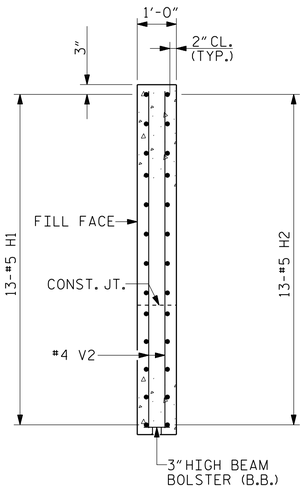


PLAN OF RIGHT WING - W2

(STAGE I CONSTRUCTION)



SECTION X-X



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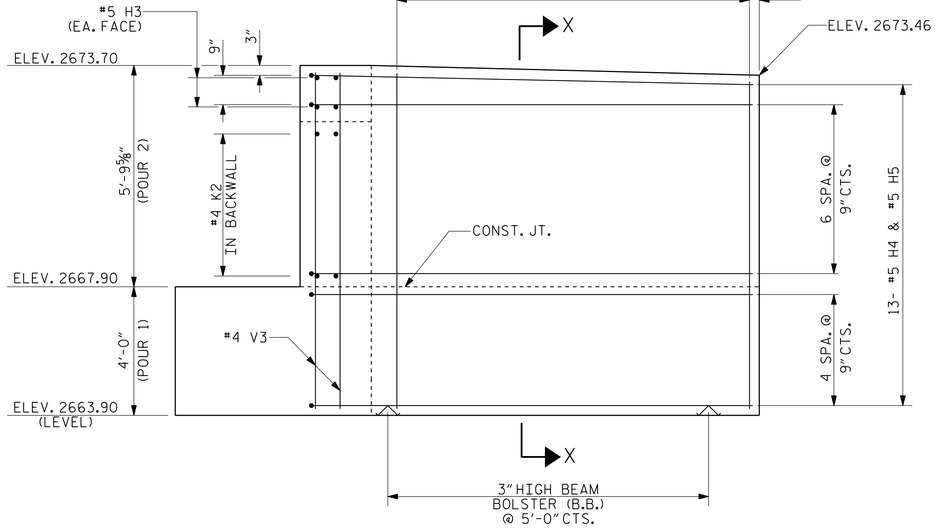
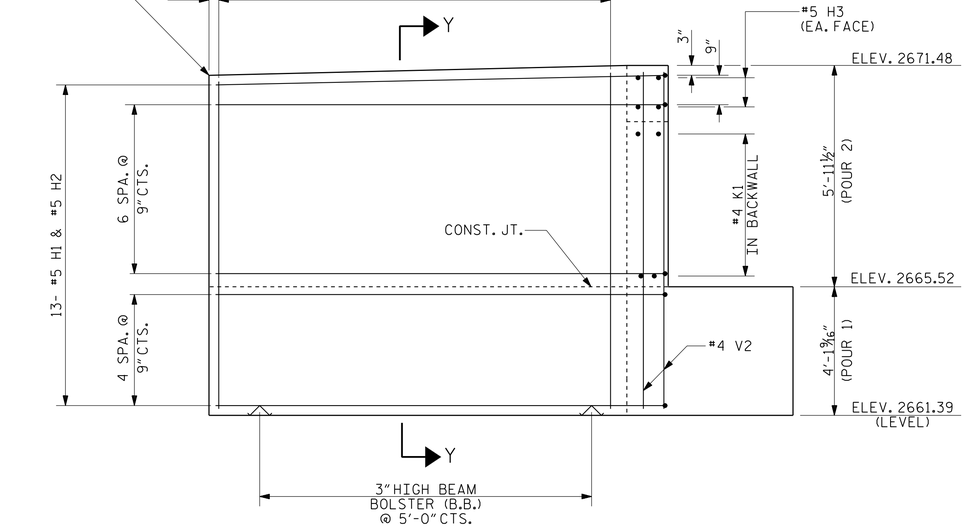


ELEVATION OF LEFT WING - W1

(STAGE II CONSTRUCTION)



ELEVATION OF RIGHT WING - W2

(STAGE I CONSTRUCTION)

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 WING DETAILS

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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DRAWN BY :	J. M. DAVIS	DATE :	4/24
CHECKED BY :	R. C. LARSON	DATE :	4/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
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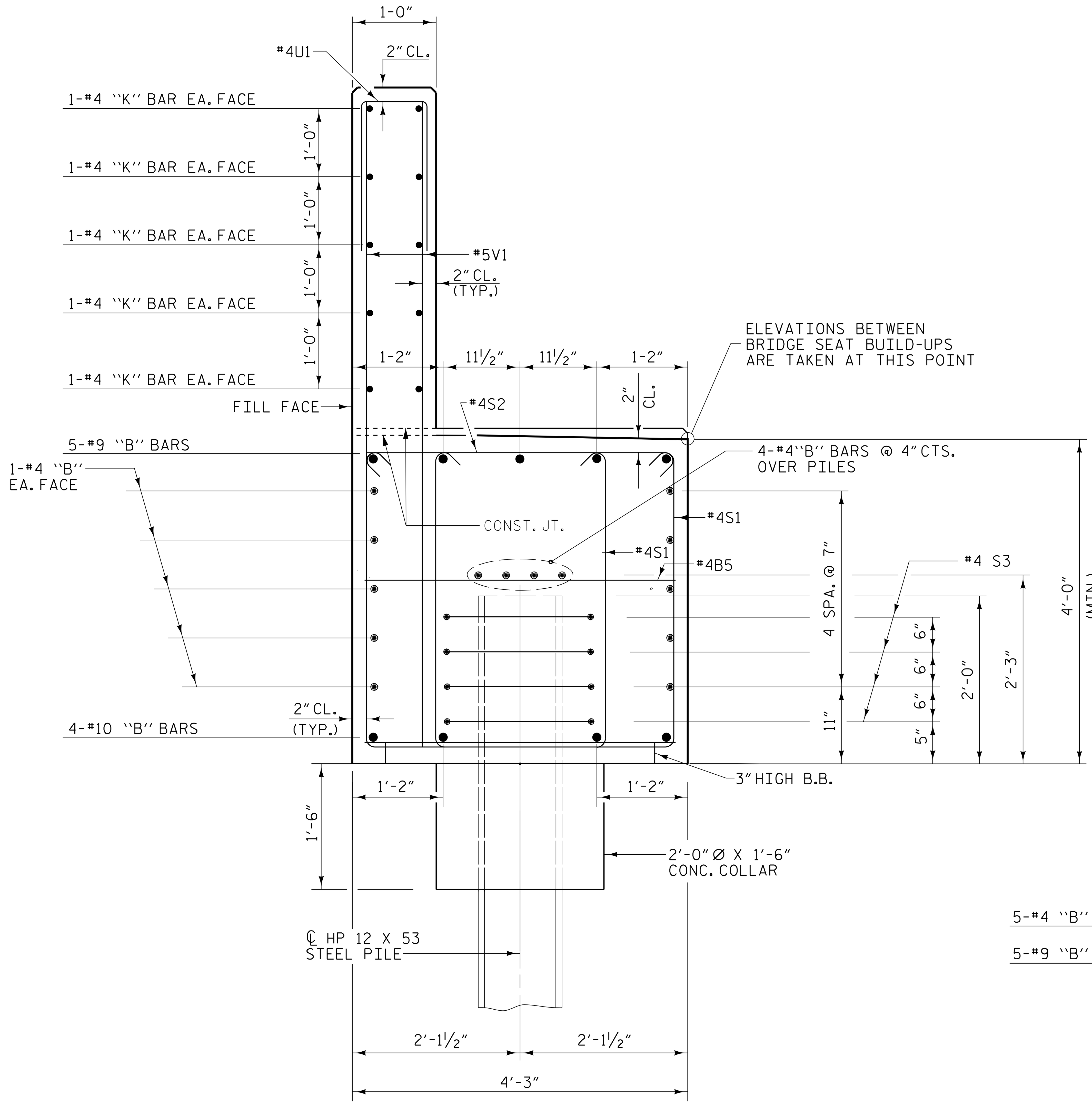
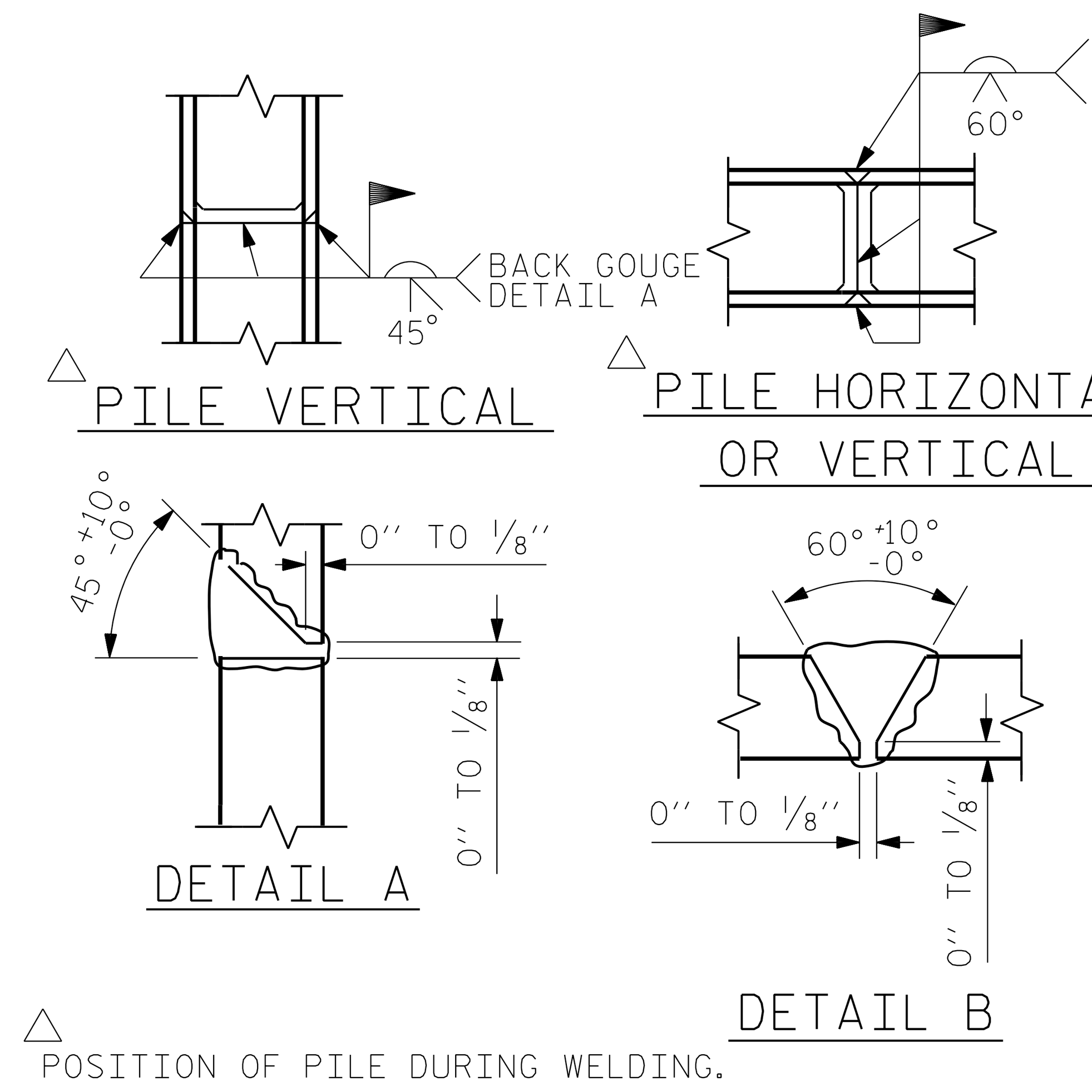
2			4			45

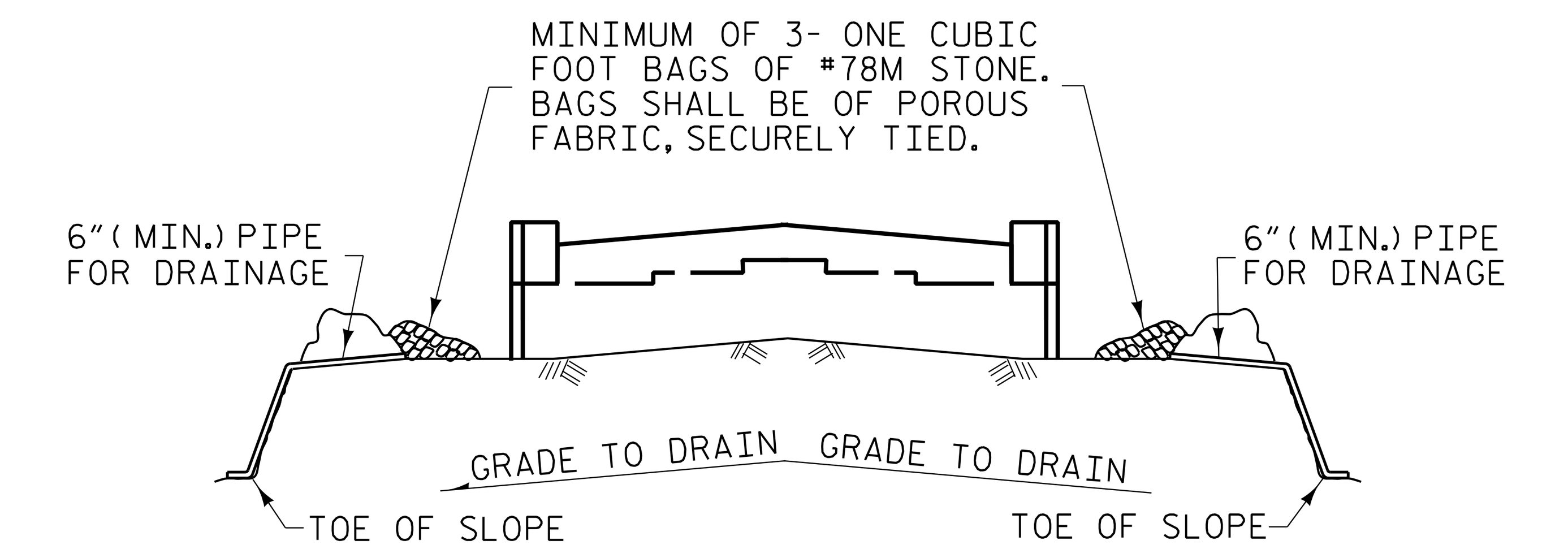
8/26/21



SECTION A-A



PILE SPLICE DETAILS

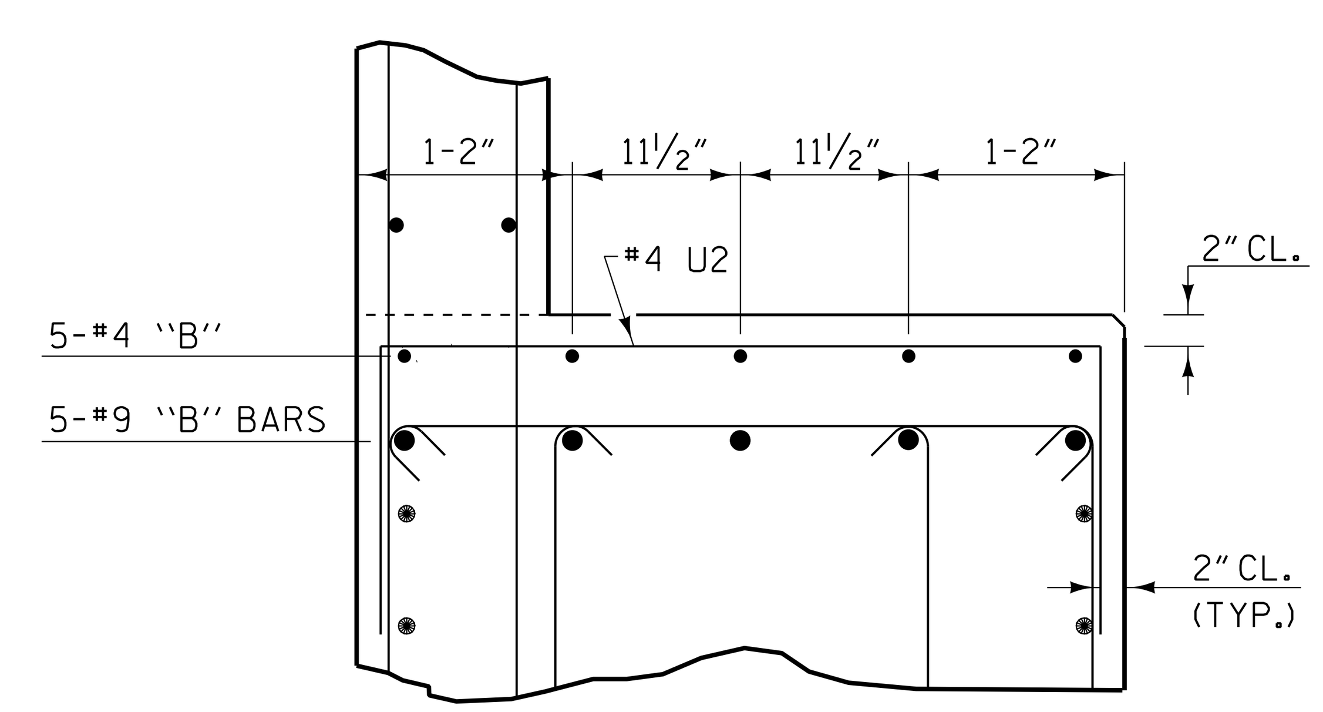


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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



PART SECTION B-B

NOTES

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%.

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

DocuSigned by: BEB2398D9B2D4C9...
SEAL 14114 NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT C. LARSON
4/3/2025

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1			3				TOTAL SHEETS
2			4				45

DRAWN BY : E. M. AUNG DATE : 3/24
CHECKED BY : R. C. LARSON DATE : 3/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 4/24

4/3/2025
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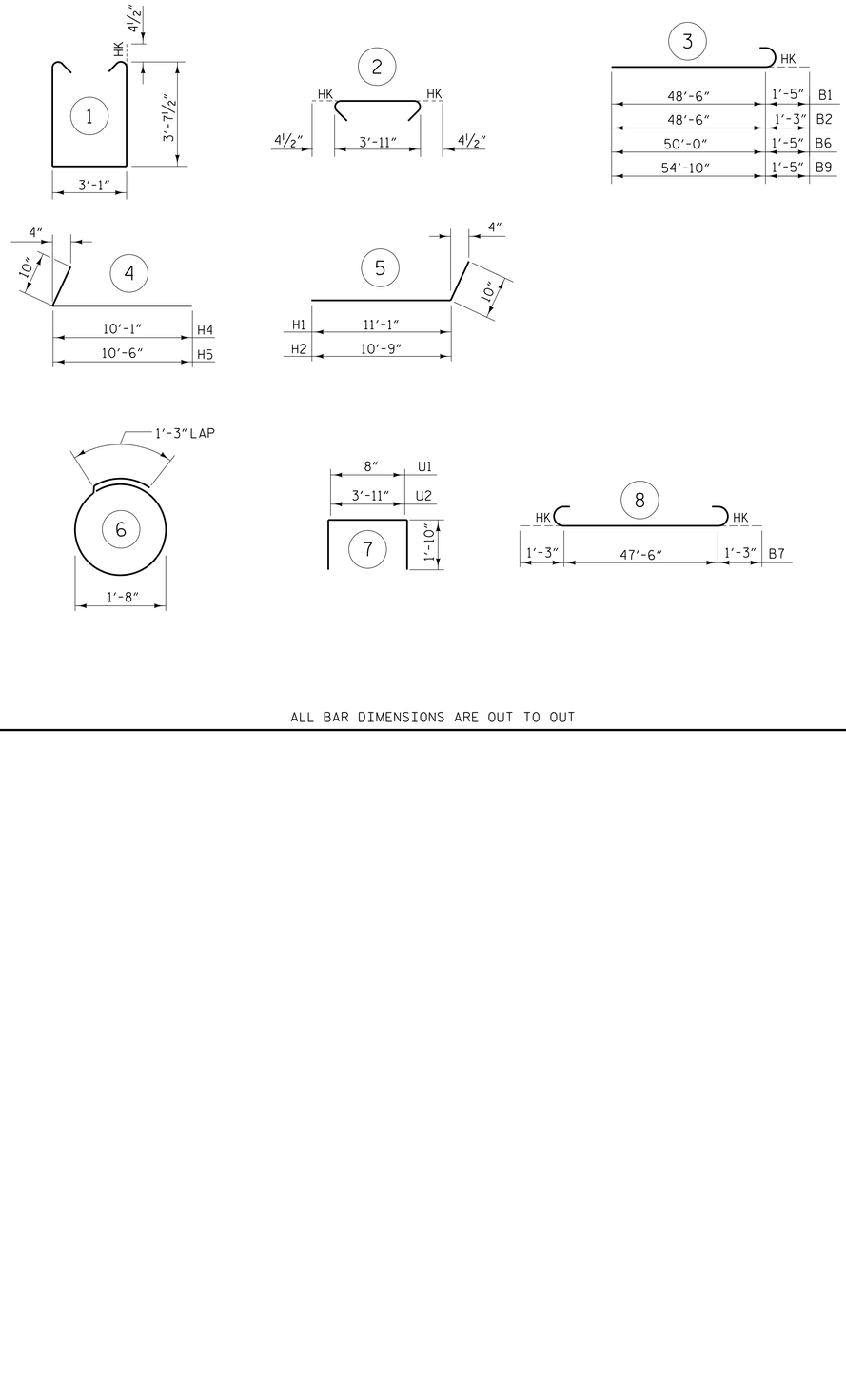
8/26/21

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 1 - STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	3	49'-11"	859
B2	5	#9	3	49'-9"	846
B3	28	#4	STR	26'-8"	499
B5	12	#4	STR	3'-11"	31
H1	13	#5	5	11'-11"	162
H2	13	#5	5	11'-7"	157
H3	4	#5	STR	3'-0"	13
K1	20	#4	STR	26'-8"	356
S1	108	#4	1	11'-1"	800
S2	54	#4	2	4'-8"	168
S3	20	#4	6	6'-6"	87
U1	46	#4	7	4'-4"	133
V1	92	#5	STR	8'-0"	768
V2	28	#4	STR	9'-4"	175

TOTAL REINFORCING STEEL 5054 LBS

CLASS "A" CONCRETE - CU. YARDS

POUR 1	
(CAP, COLLARS, LOWER WINGS)	33.5 CU. YDS.
POUR 2	
(UPPER WINGS & BACKWALL)	7.6 CU. YDS.
TOTAL	41.1 CU. YDS.

END BENT 1 - STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B4	5	#4	STR	3'-11"	13
B5	13	#4	STR	3'-11"	34
B6	4	#10	3	51'-5"	885
B7	5	#9	8	50'-0"	850
B8	28	#4	STR	27'-6"	514
B15	5	#9	STR	8'-0"	136
H3	4	#5	STR	3'-0"	13
H4	13	#5	4	10'-11"	148
H5	13	#5	4	11'-4"	154
K2	20	#4	STR	26'-5"	354
S1	112	#4	1	11'-1"	829
S2	56	#4	2	4'-8"	175
S3	20	#4	6	6'-6"	87
U1	46	#4	7	4'-4"	133
U2	4	#4	7	7'-7"	20
V1	92	#5	STR	8'-0"	768
V3	28	#4	STR	9'-2"	171

TOTAL REINFORCING STEEL 5284 LBS

CLASS "A" CONCRETE - CU. YARDS

POUR 1	
(CAP, COLLARS, LOWER WINGS)	34.6 CU. YDS.
POUR 2	
(UPPER WINGS & BACKWALL)	7.3 CU. YDS.
TOTAL	41.9 CU. YDS.

END BENT 1 - STAGE III

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B5	14	#4	STR	3'-11"	37
B9	4	#10	3	56'-3"	968
B10	10	#9	STR	30'-2"	1026
B11	28	#4	STR	28'-9"	538
B12	5	#4	STR	5'-3"	18
B13	28	#4	STR	12'-10"	240
B14	4	#10	STR	4'-9"	82
K3	20	#4	STR	28'-9"	384
S1	134	#4	1	11'-1"	992
S2	67	#4	2	4'-8"	209
S3	24	#4	6	6'-6"	104
U1	55	#4	7	4'-4"	159
U2	12	#4	7	7'-7"	61
V1	110	#5	STR	8'-0"	918

TOTAL REINFORCING STEEL 5736 LBS

CLASS "A" CONCRETE - CU. YARDS

POUR 1	
(CAP, COLLARS, LOWER WINGS)	37.9 CU. YDS.
POUR 2	
(UPPER WINGS & BACKWALL)	9.1 CU. YDS.
TOTAL	47.0 CU. YDS.

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
BILL OF MATERIAL

DRAWN BY : E. M. AUNG DATE : 3/24
CHECKED BY : R. C. LARSON DATE : 3/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 4/24

4/3/2025
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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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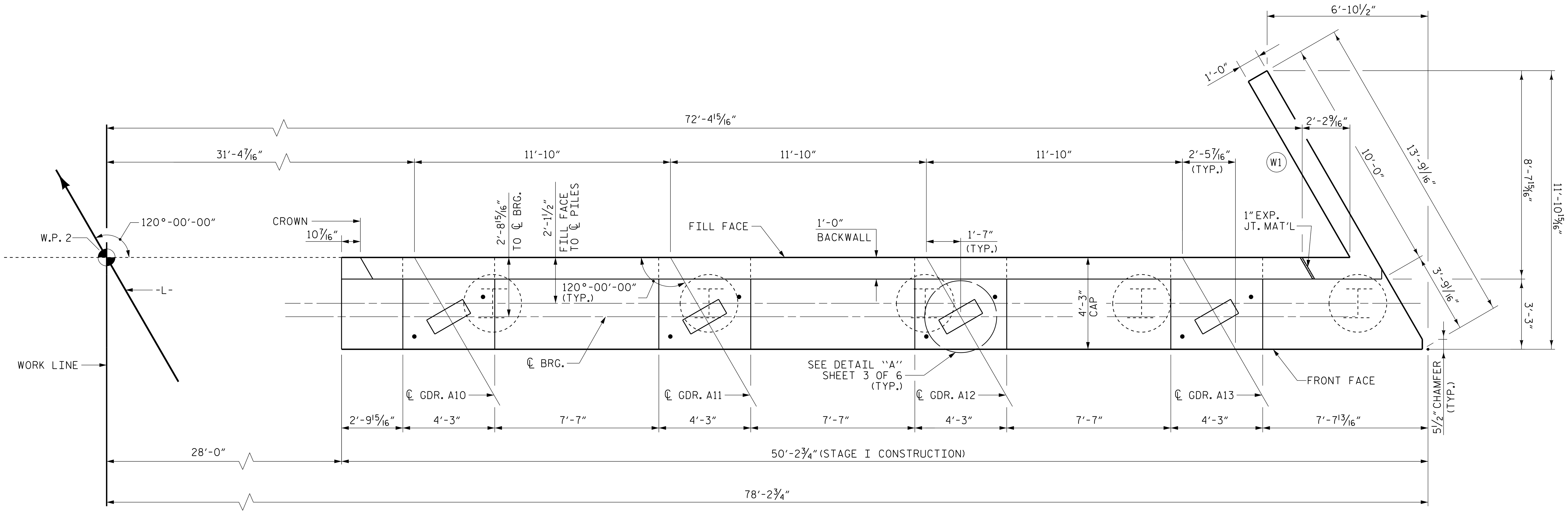
SHEET NO. S-34
TOTAL SHEETS 45

8/26/21



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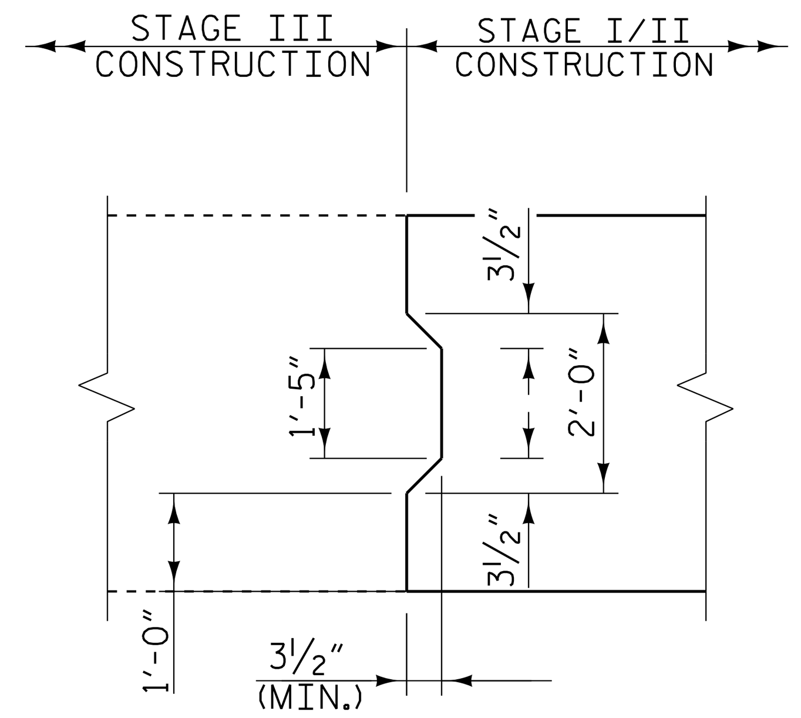
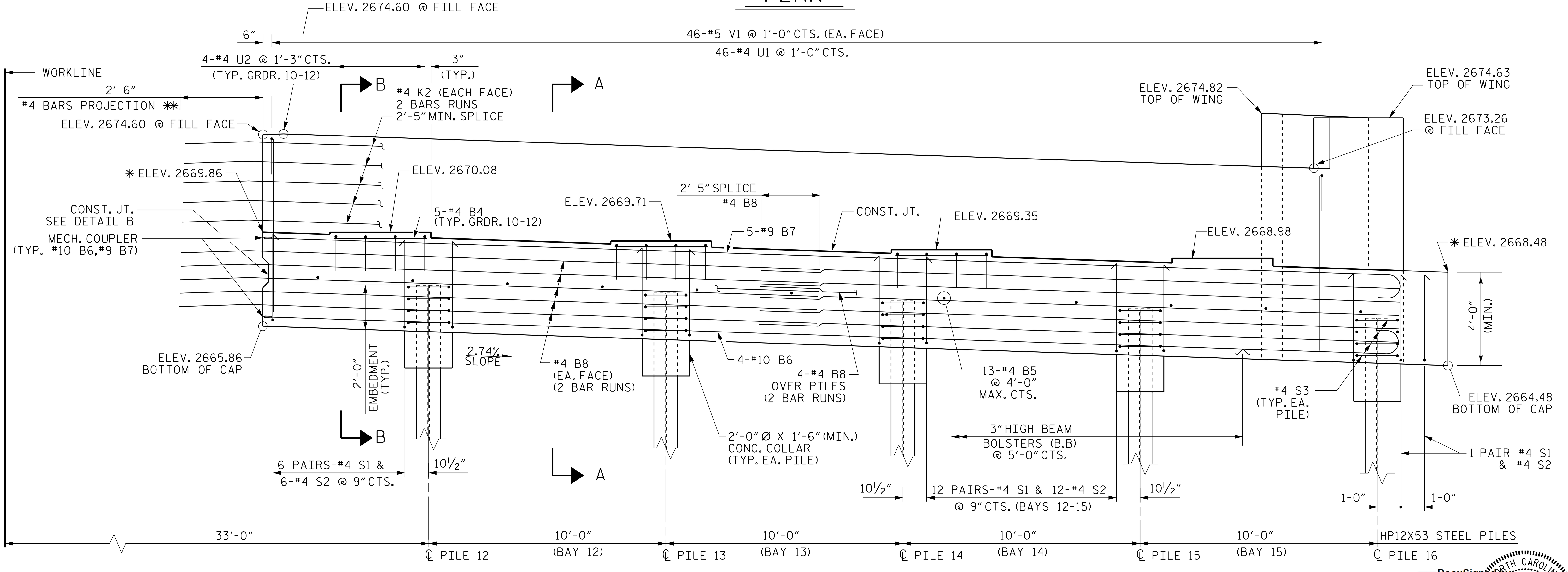


DETAIL "B"



ELEVATION

(FOR SECTIONS A-A AND B-B, SEE SHEET 5 OF 6)

TOP OF PILE ELEVATIONS	
PILE 12	2667.74
PILE 13	2667.46
PILE 14	2667.19
PILE 15	2666.92
PILE 16	2666.64

✻ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS. SEE SECTION A-A SHEET 5 OF 6.

✻✻ #4 BARS MAY BE BENT TO CLEAR TEMPORARY SHORING. STRAIGHTEN TO INCORPORATE INTO STAGE III CONSTRUCTION.

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 - STAGE I

DocuSigned by:
BEB2398D8B204C8...

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON

4/3/2025

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1			3			TOTAL SHEETS
2			4			45

DRAWN BY :	E. M. AUNG	DATE :	4/24
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DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	5/24

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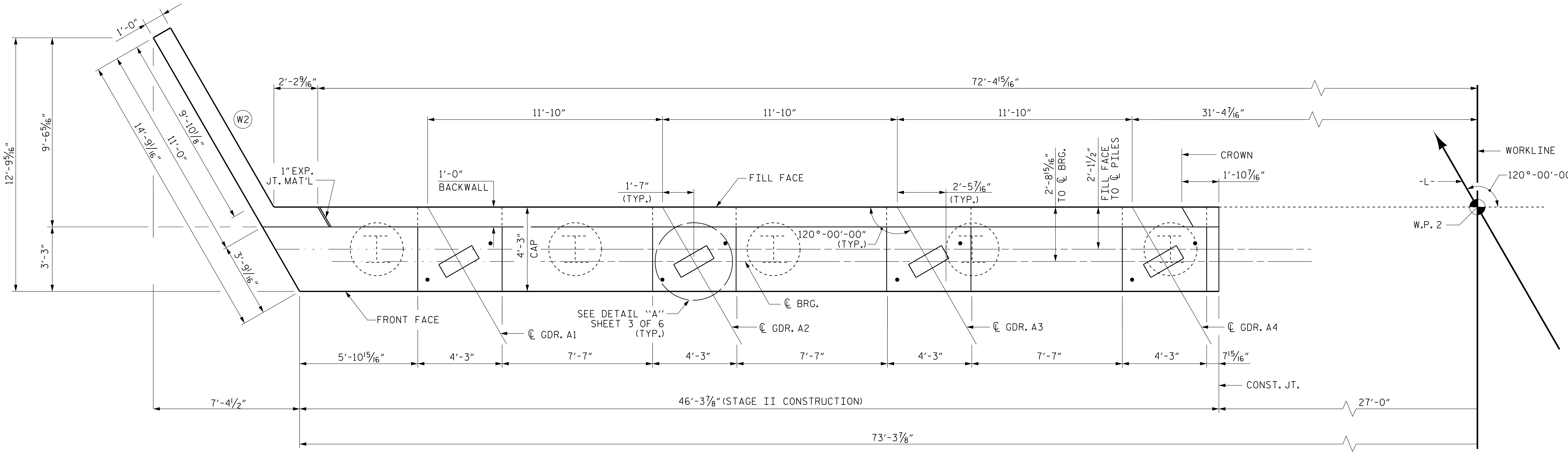

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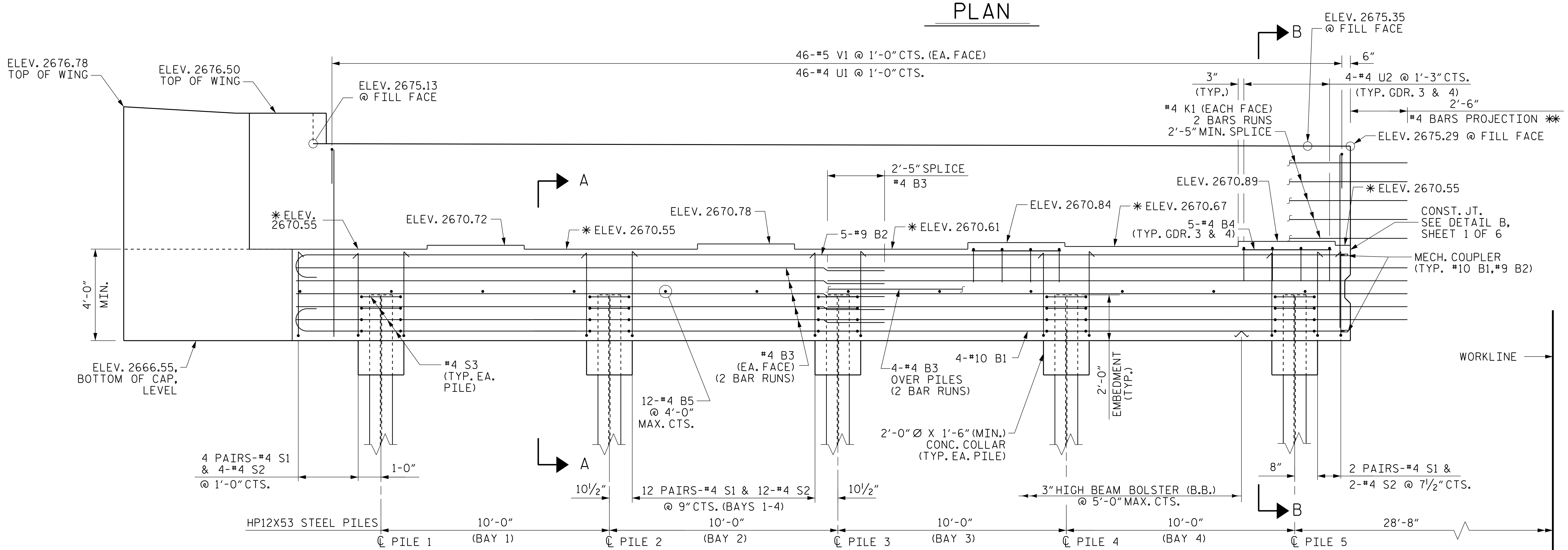

ELEVATION

(FOR SECTIONS A-A AND B-B, SEE SHEET 5 OF 6)

✻ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS. SEE SECTION A-A SHEET 5 OF 6.

✻✻ #4 BARS MAY BE BENT TO CLEAR TEMPORARY SHORING. STRAIGHTEN TO INCORPORATE INTO STAGE III CONSTRUCTION.

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

END BENT 2 - STAGE II

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON
4/3/2025

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REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S-36
1			3			TOTAL SHEETS	45
2			4				

DRAWN BY : E. M. AUNG DATE : 4/24
CHECKED BY : R. C. LARSON DATE : 4/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 4/24

4/3/2025
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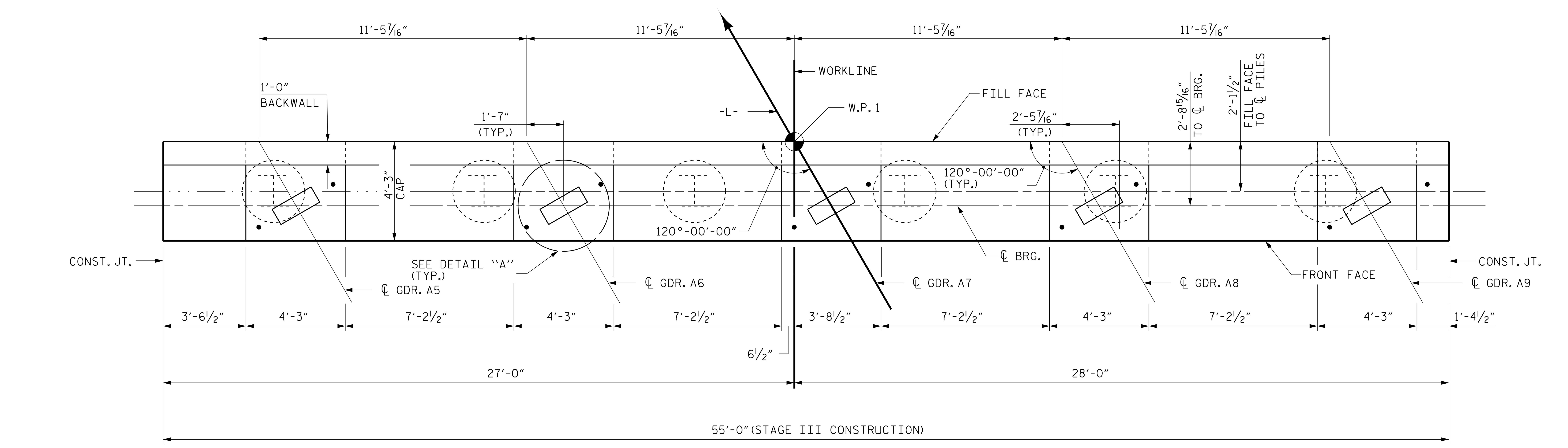
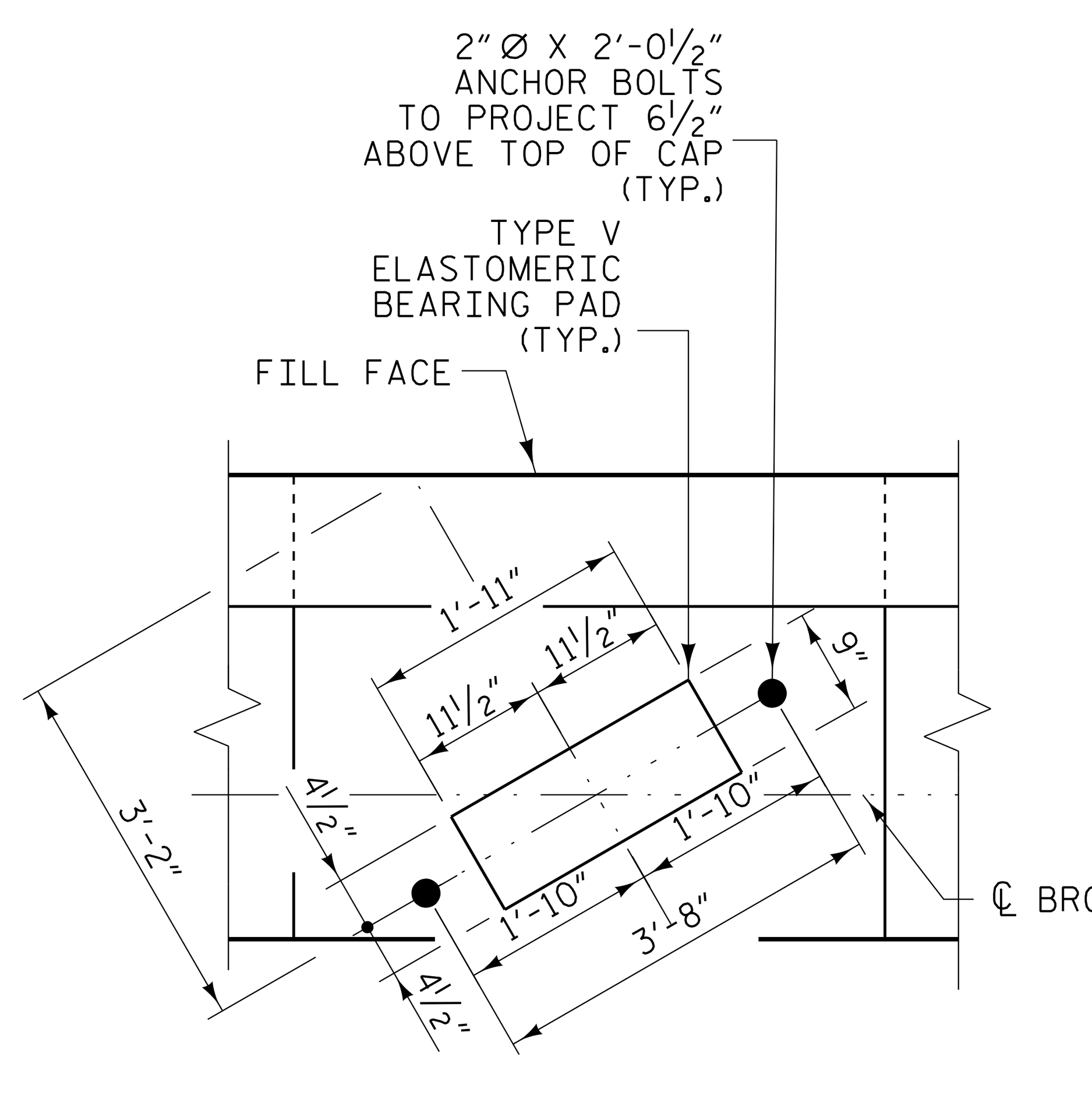
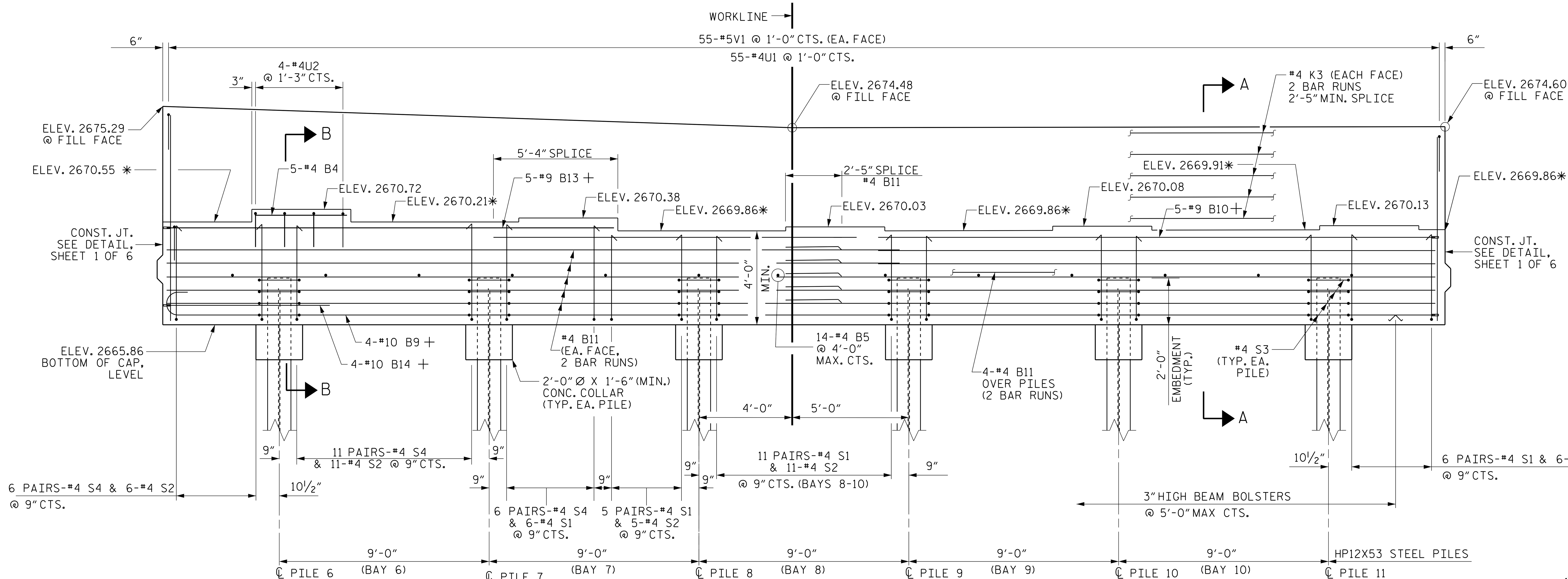


PLAN



DETAIL "A"

(TYP. EACH GIRDER)



ELEVATION

(FOR SECTIONS A-A AND B-B, SEE SHEET 5 OF 6)

✱ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTION A-A, SHEET 5 OF 6.

+ATTACH TO EXISTING MECHANICAL COUPLER IN EARLIER STAGE:
- 5-#9 B13 COUPLE WITH 5-#9 B2 (STAGE II)
- 4-#10 B14 COUPLE WITH 4-#10 B1 (STAGE II)
- 5-#9 B10 COUPLE WITH 5-#9 B7 (STAGE I)
- 4-#10 B9 COUPLE WITH 4-#10 B6 (STAGE I)

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

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

END BENT 2 - STAGE III

PLANS PREPARED BY:

NV5

NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
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4/3/2025

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1				3				TOTAL SHEETS
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DRAWN BY :	E. M. AUNG	DATE :	4/24
CHECKED BY :	R. C. LARSON	DATE :	5/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	5/24

4/3/2025
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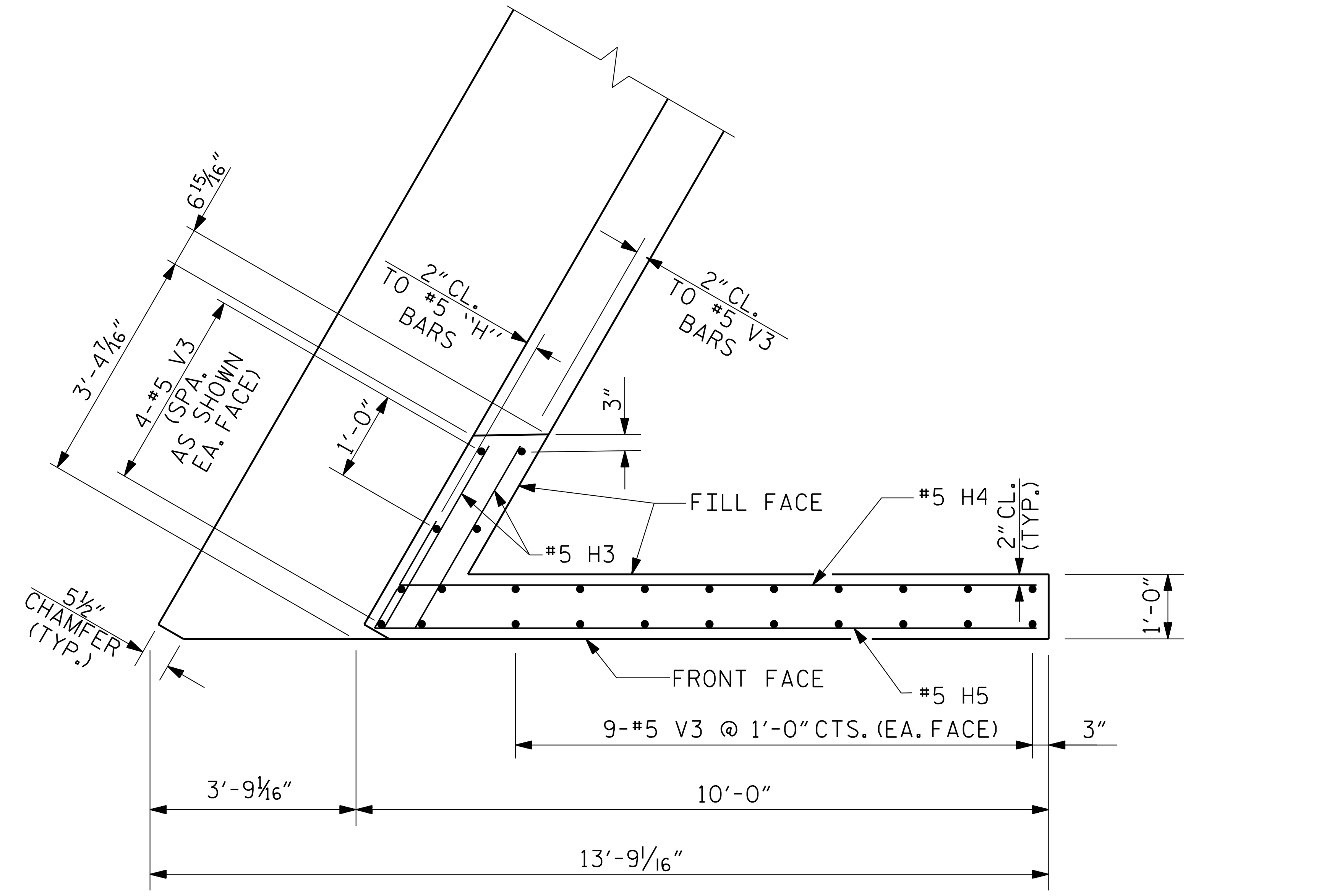
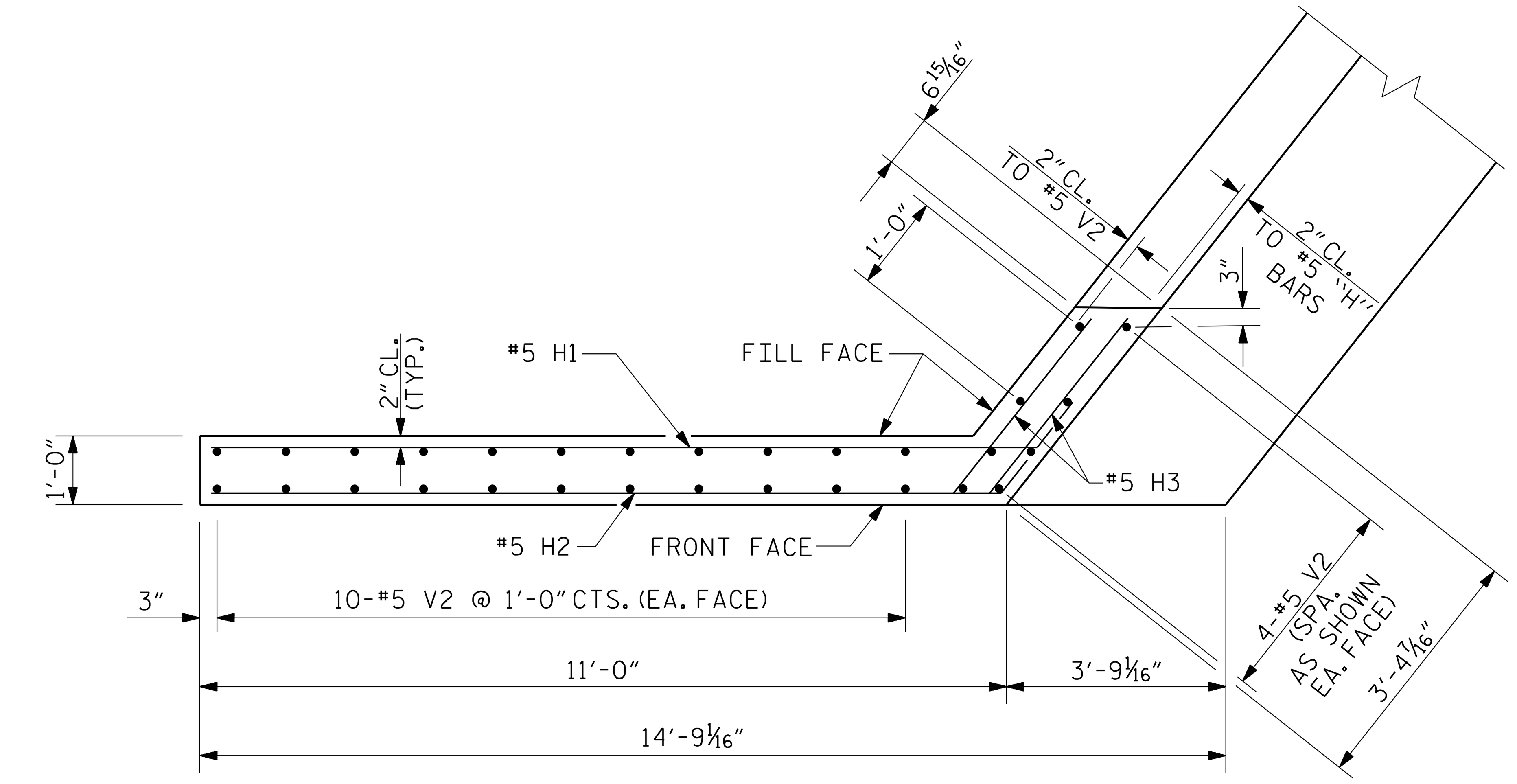
8/26/21



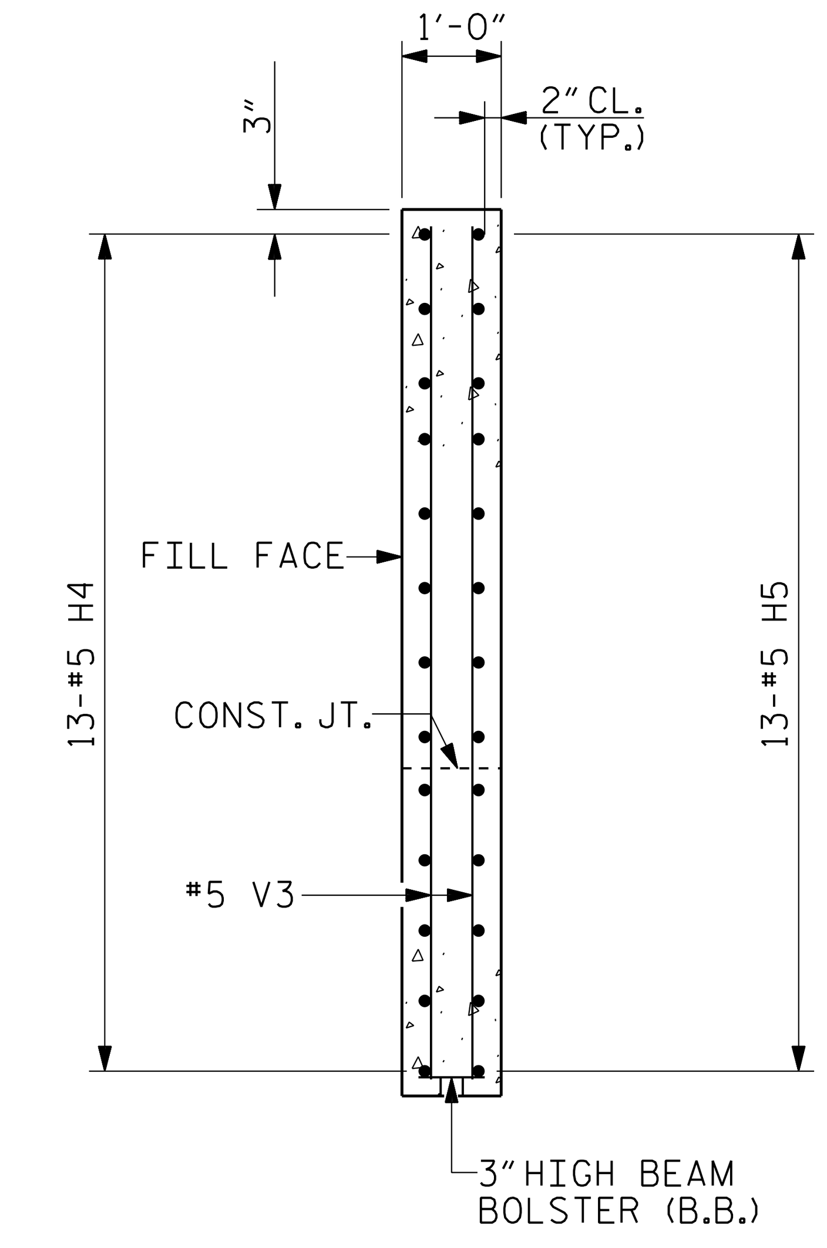
PLAN OF RIGHT WING - W1

(STAGE I CONSTRUCTION)

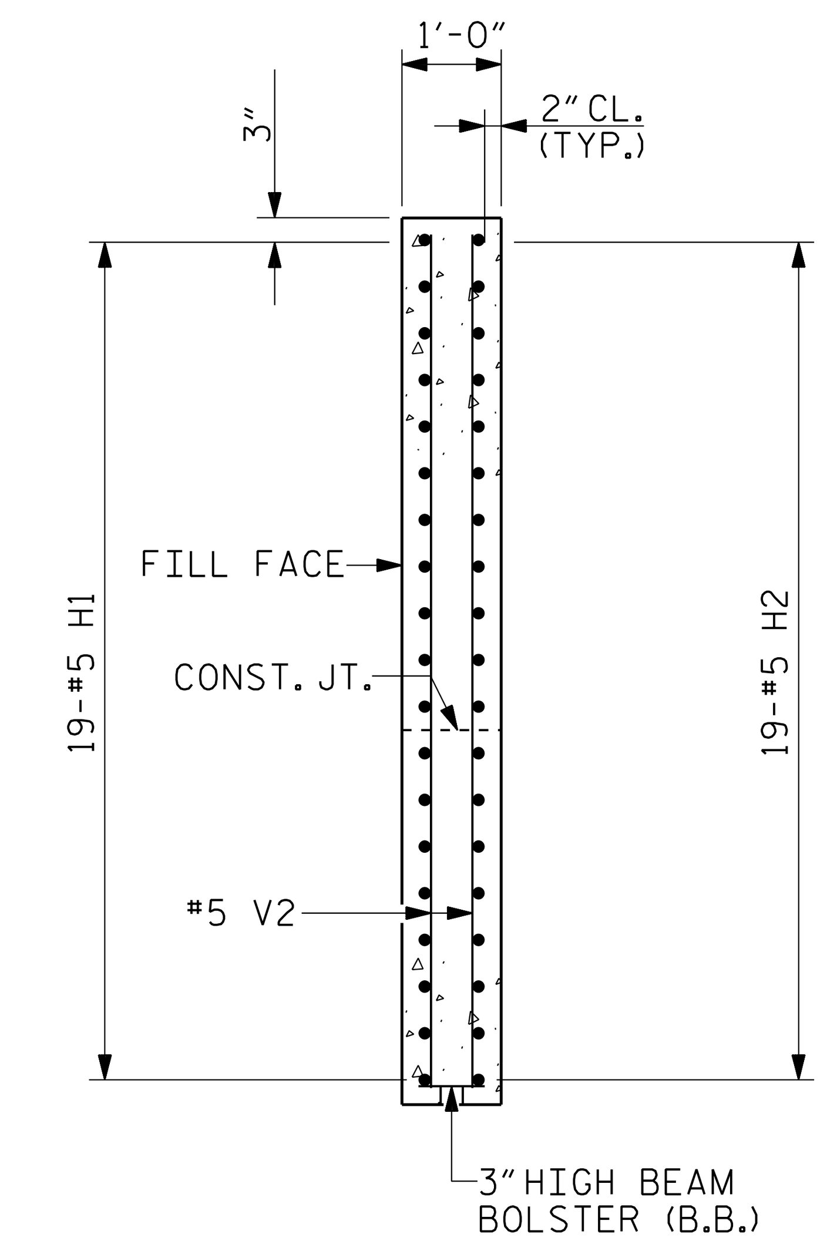


PLAN OF LEFT WING - W2

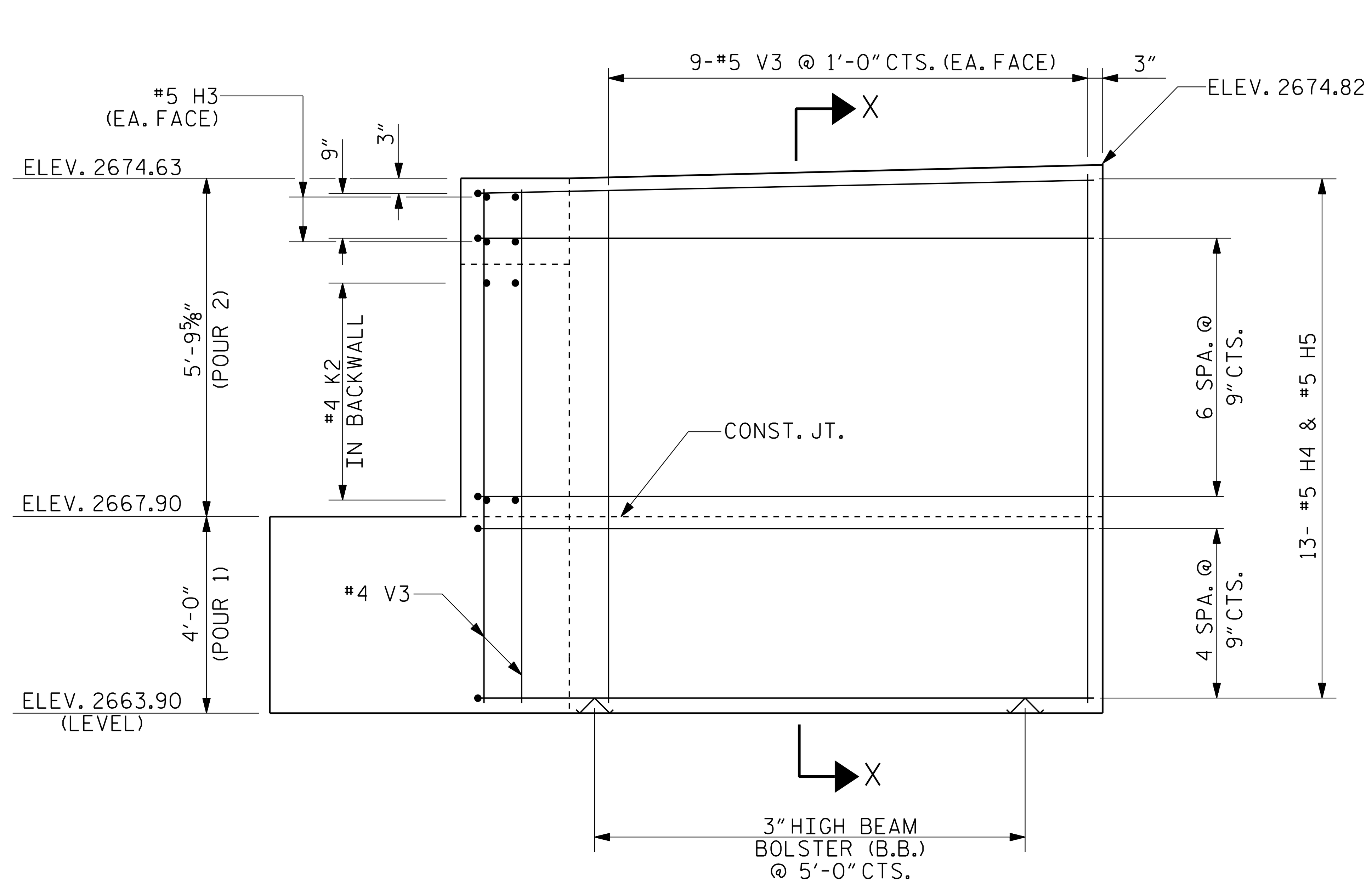
(STAGE II CONSTRUCTION)



SECTION X-X

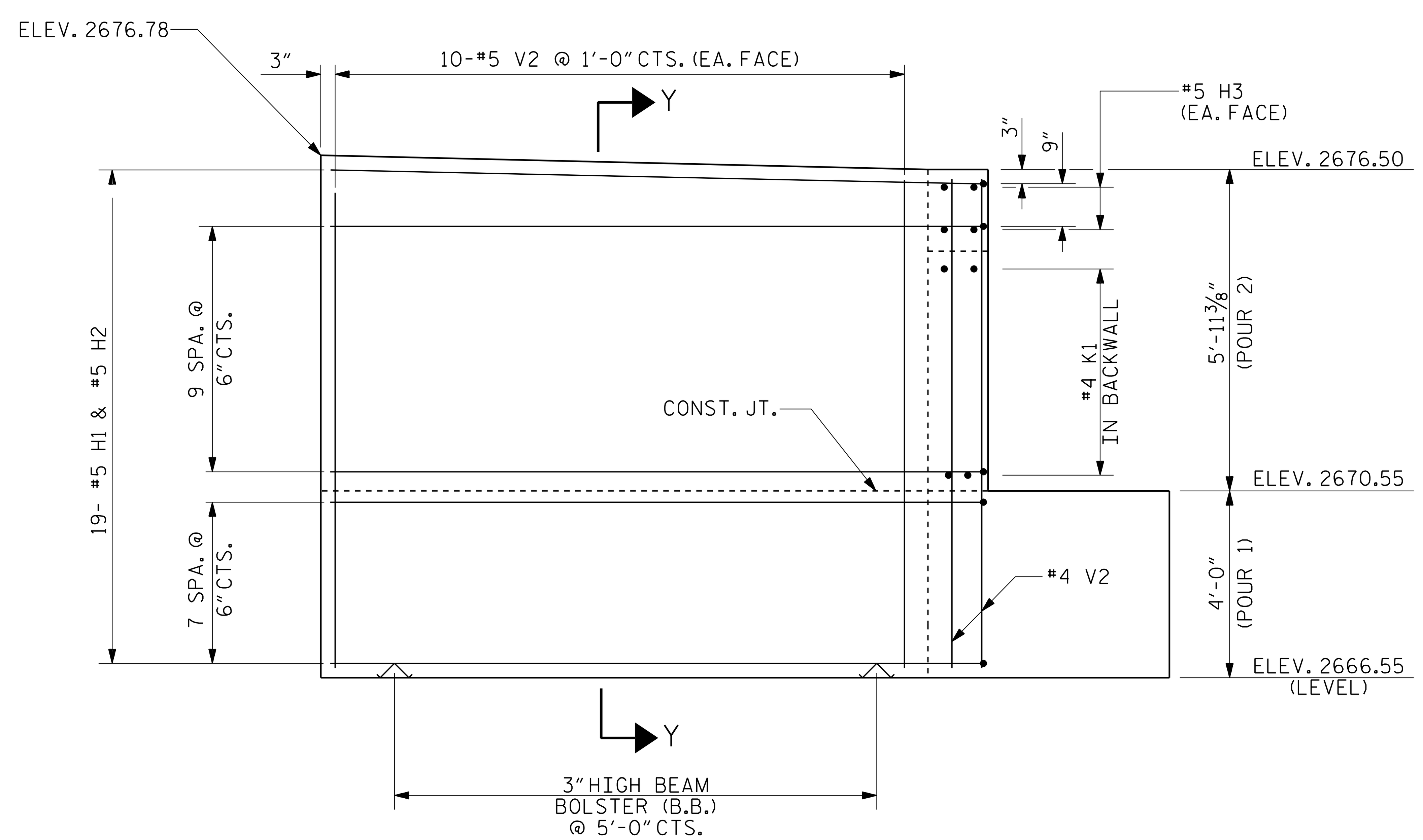


SECTION Y-Y



ELEVATION OF RIGHT WING - W1

(STAGE I CONSTRUCTION)



ELEVATION OF LEFT WING - W2

(STAGE II CONSTRUCTION)

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WING DETAILS

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			45

DRAWN BY :	J. M. DAVIS	DATE :	4/24
CHECKED BY :	R. C. LARSON	DATE :	4/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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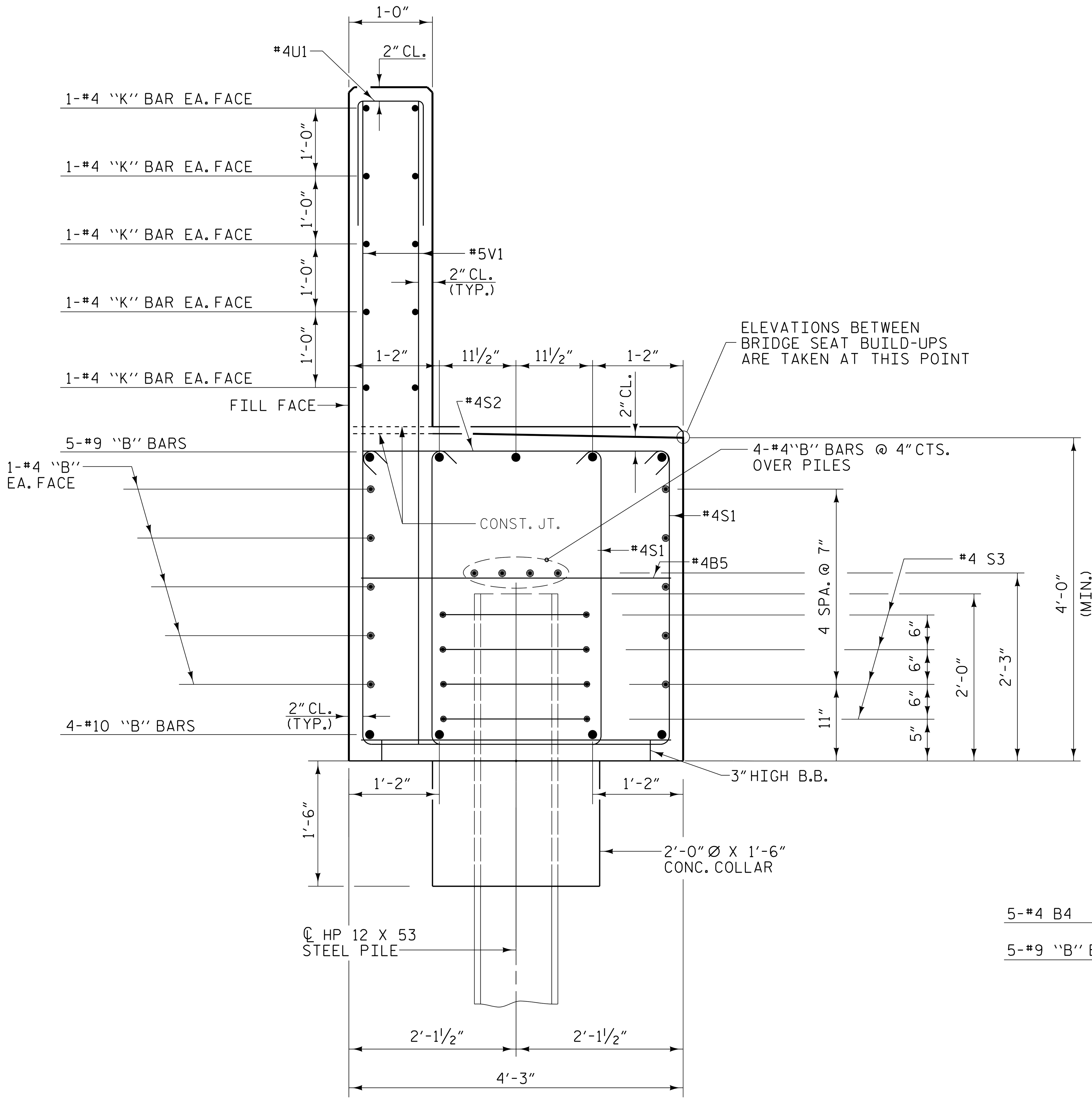
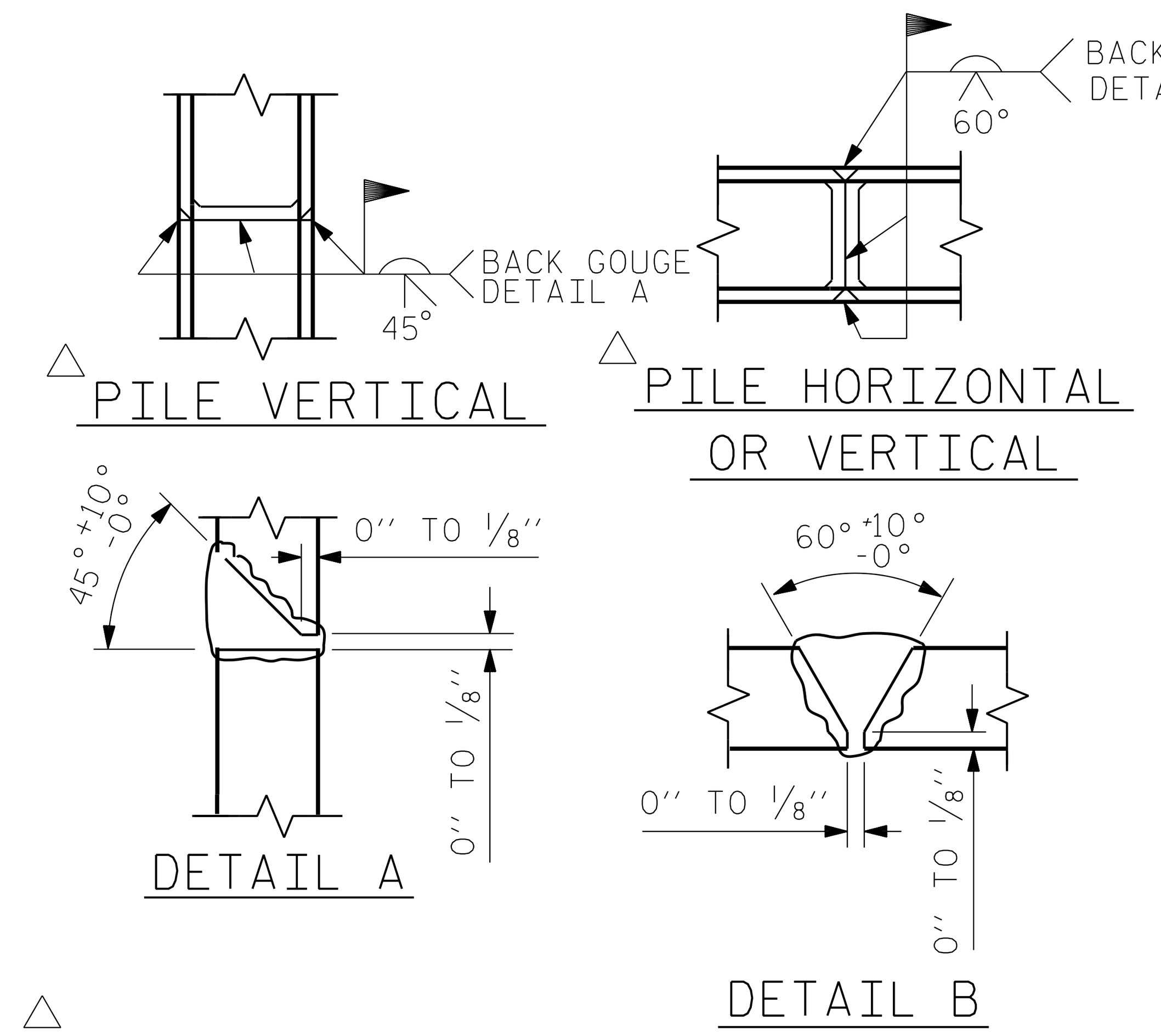
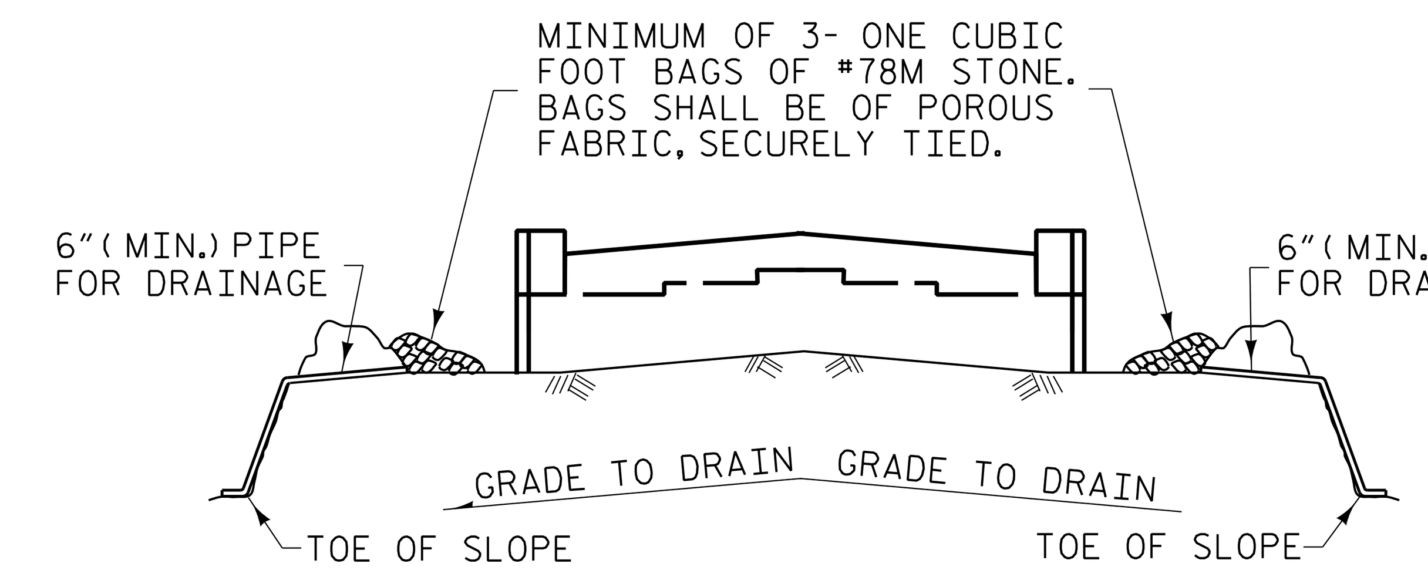


SECTION A-A



PILE SPLICE DETAILS

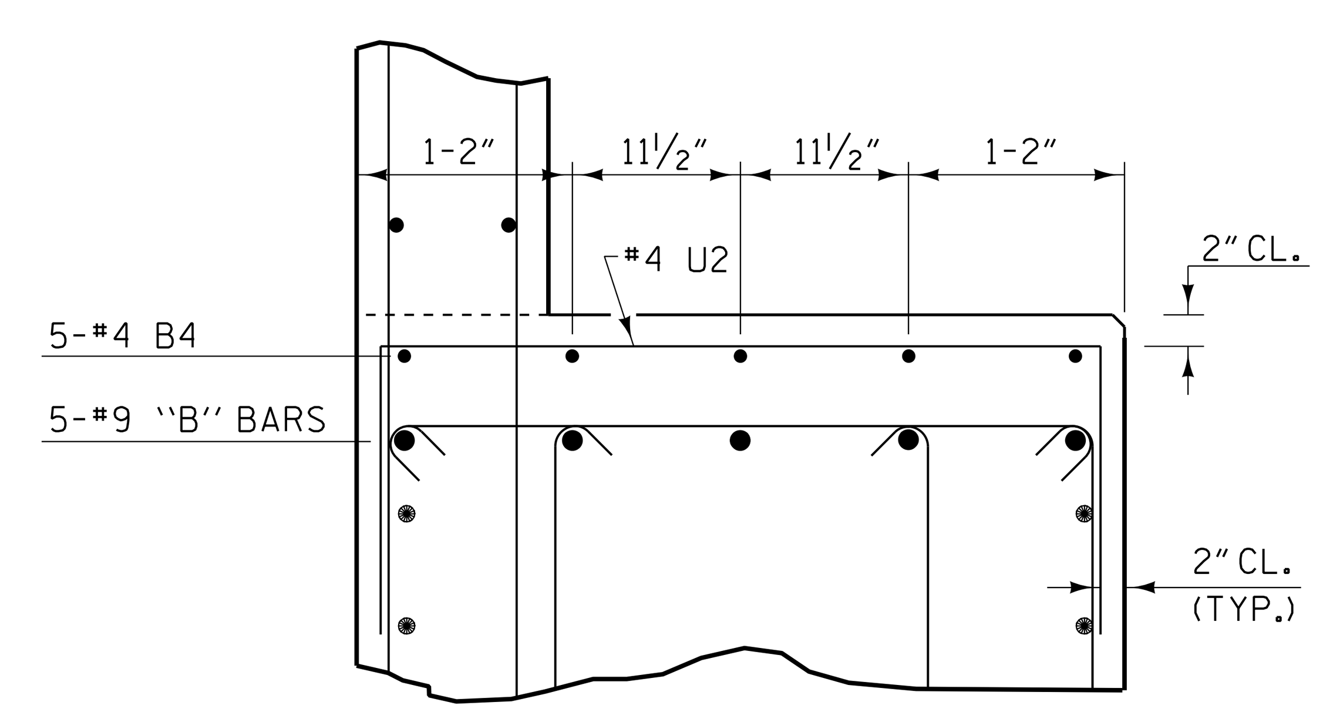


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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



PART SECTION B-B

NOTES

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%.

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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2			4			45

DRAWN BY :	E. M. AUNG	DATE :	3/24
CHECKED BY :	R. C. LARSON	DATE :	3/24
DESIGN ENGINEER OF RECORD:	R. C. LARSON	DATE :	4/24

4/3/2025
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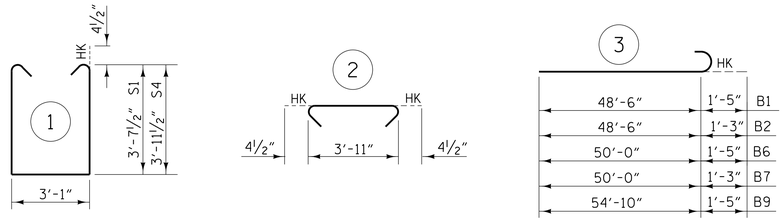
8/26/21

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 2 - STAGE I

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B4	15	#4	STR	3'-11"	39
B5	13	#4	STR	3'-11"	34
B6	4	#10	3	51'-5"	885
B7	5	#9	3	51'-3"	871
B8	28	#4	STR	27'-6"	514
H3	4	#5	STR	3'-0"	13
H4	13	#5	4	9'-11"	134
H5	13	#5	4	10'-4"	140
K2	20	#4	STR	26'-6"	354
S1	112	#4	1	11'-1"	829
S2	56	#4	2	4'-8"	175
S3	20	#4	6	6'-6"	87
U1	46	#4	7	4'-4"	133
U2	12	#4	7	7'-7"	61
V1	92	#5	STR	8'-0"	768
V3	26	#5	STR	10'-4"	280

TOTAL REINFORCING STEEL 5317 LBS

CLASS "A" CONCRETE - CU. YARDS

POUR 1
(CAP, COLLARS, LOWER WINGS) 32.7 CU. YDS.

POUR 2
(UPPER WINGS & BACKWALL) 9.5 CU. YDS.

TOTAL 42.2 CU. YDS.

END BENT 2 - STAGE II

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	3	49'-11"	859
B2	5	#9	3	49'-9"	846
B3	28	#4	STR	26'-8"	499
B4	10	#4	STR	3'-11"	26
B5	12	#4	STR	3'-11"	31
H1	19	#5	5	11'-11"	236
H2	19	#5	5	11'-7"	230
H3	4	#5	STR	3'-0"	13
K1	20	#4	STR	26'-8"	356
S1	108	#4	1	11'-1"	800
S2	54	#4	2	4'-8"	168
S3	20	#4	6	6'-6"	87
U1	46	#4	7	4'-4"	133
U2	8	#4	7	7'-7"	41
V1	92	#5	STR	8'-0"	768
V2	28	#5	STR	9'-7"	280

TOTAL REINFORCING STEEL 5373 LBS

CLASS "A" CONCRETE - CU. YARDS

POUR 1
(CAP, COLLARS, LOWER WINGS) 34.4 CU. YDS.

POUR 2
(UPPER WINGS & BACKWALL) 9.6 CU. YDS.

TOTAL 44.0 CU. YDS.

END BENT 2 - STAGE III

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B4	5	#4	STR	3'-11"	13
B5	14	#4	STR	3'-11"	37
B9	4	#10	3	56'-3"	968
B10	5	#9	STR	41'-1"	698
B11	28	#4	STR	28'-9"	538
B13	5	#9	STR	19'-1"	324
B14	4	#10	STR	4'-9"	82
K3	20	#4	STR	28'-9"	384
S1	88	#4	1	11'-1"	652
S2	67	#4	2	4'-8"	209
S3	24	#4	6	6'-6"	104
S4	46	#4	1	11'-9"	361
U1	55	#4	7	4'-4"	159
U2	4	#4	7	7'-7"	20
V1	110	#5	STR	8'-0"	918

TOTAL REINFORCING STEEL 5454 LBS

CLASS "A" CONCRETE - CU. YARDS

POUR 1
(CAP, COLLARS, LOWER WINGS) 36.6 CU. YDS.

POUR 2
(UPPER WINGS & BACKWALL) 9.4 CU. YDS.

TOTAL 46.0 CU. YDS.

DRAWN BY : E. M. AUNG DATE : 4/24
CHECKED BY : R. C. LARSON DATE : 4/24
DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 5/24

4/3/2025
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PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON

4/3/2025

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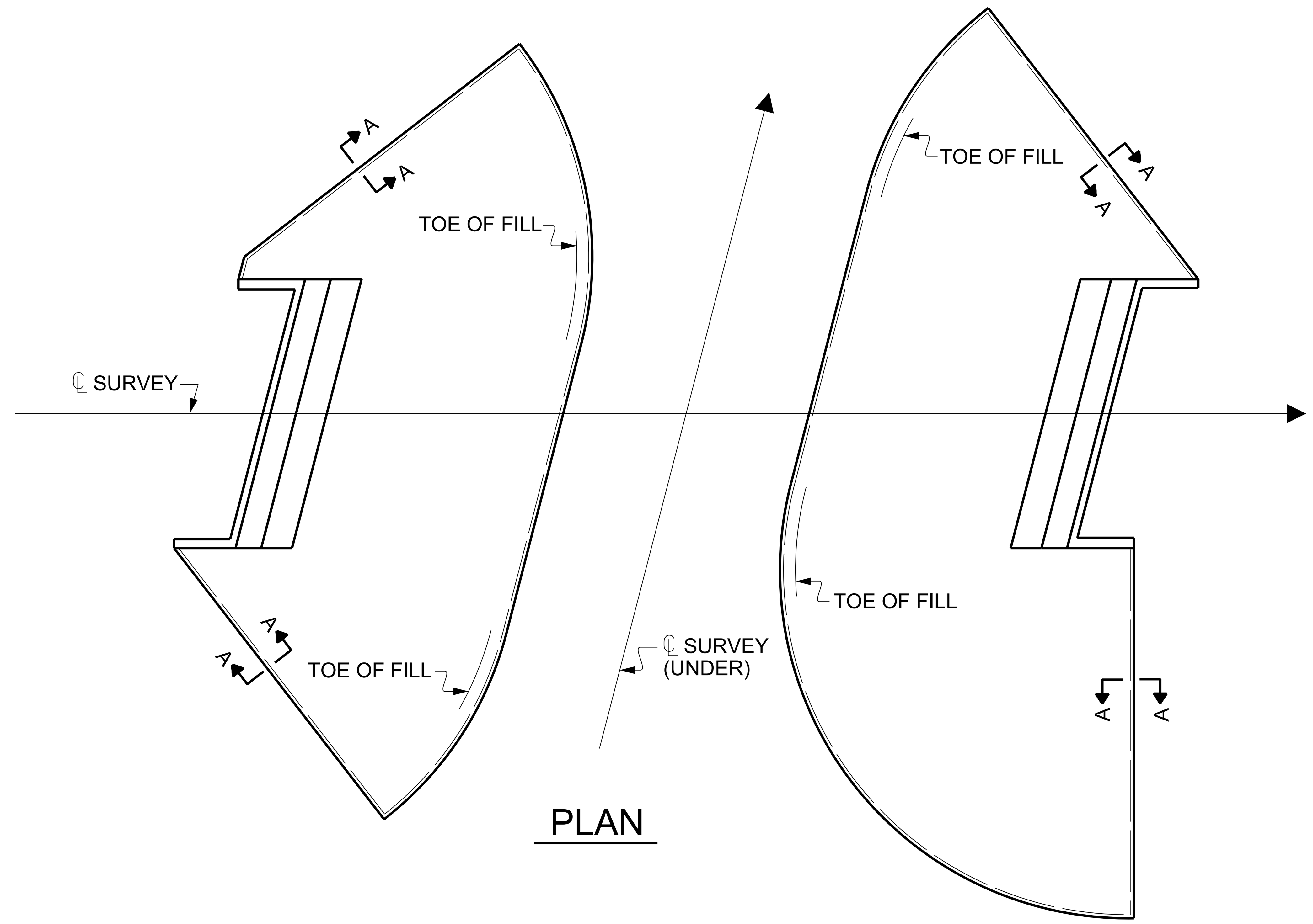
PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-
SHEET 6 OF 6

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

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

SHEET NO. S-40
TOTAL SHEETS 45

8/26/21



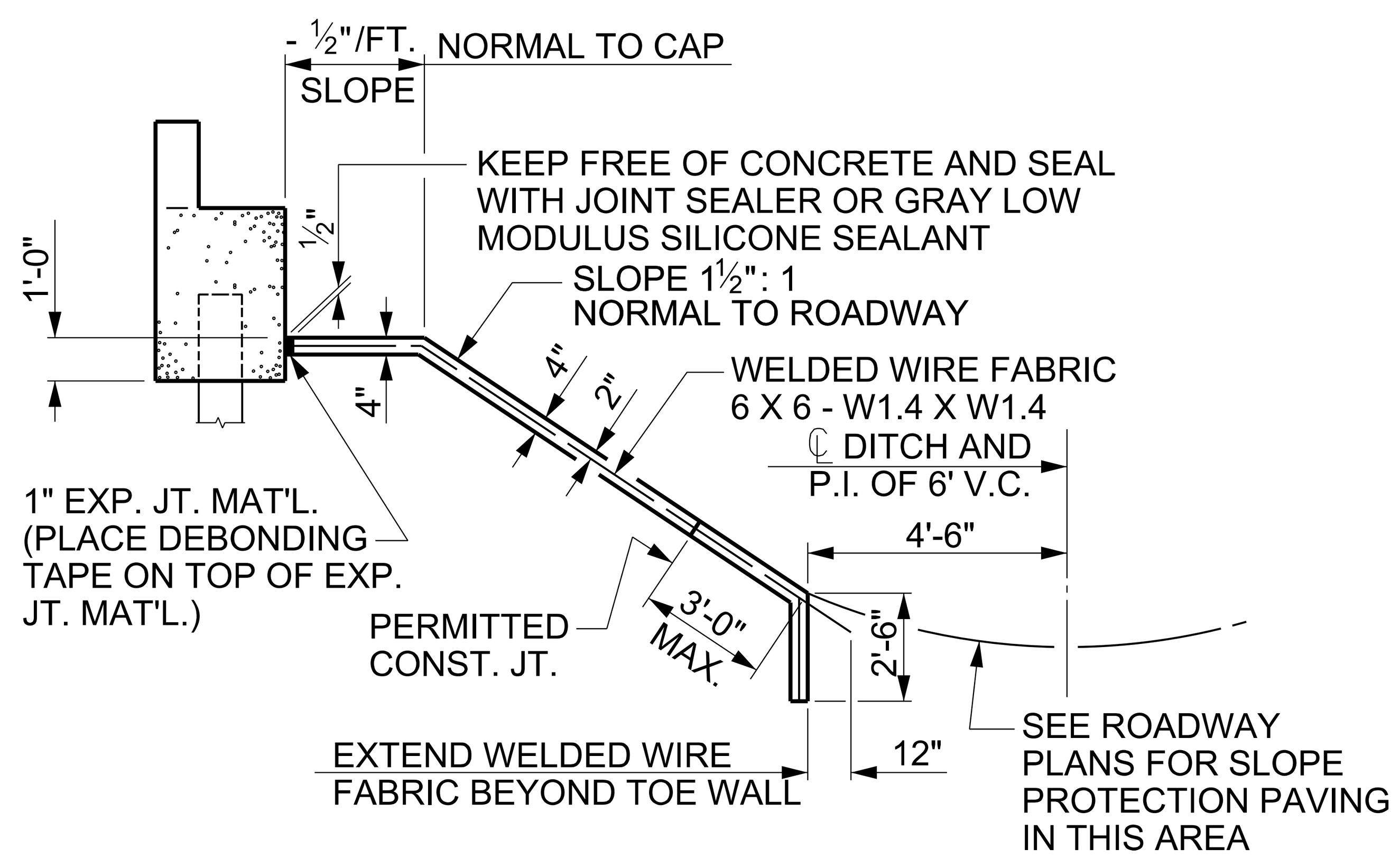
PLAN

GENERAL NOTES

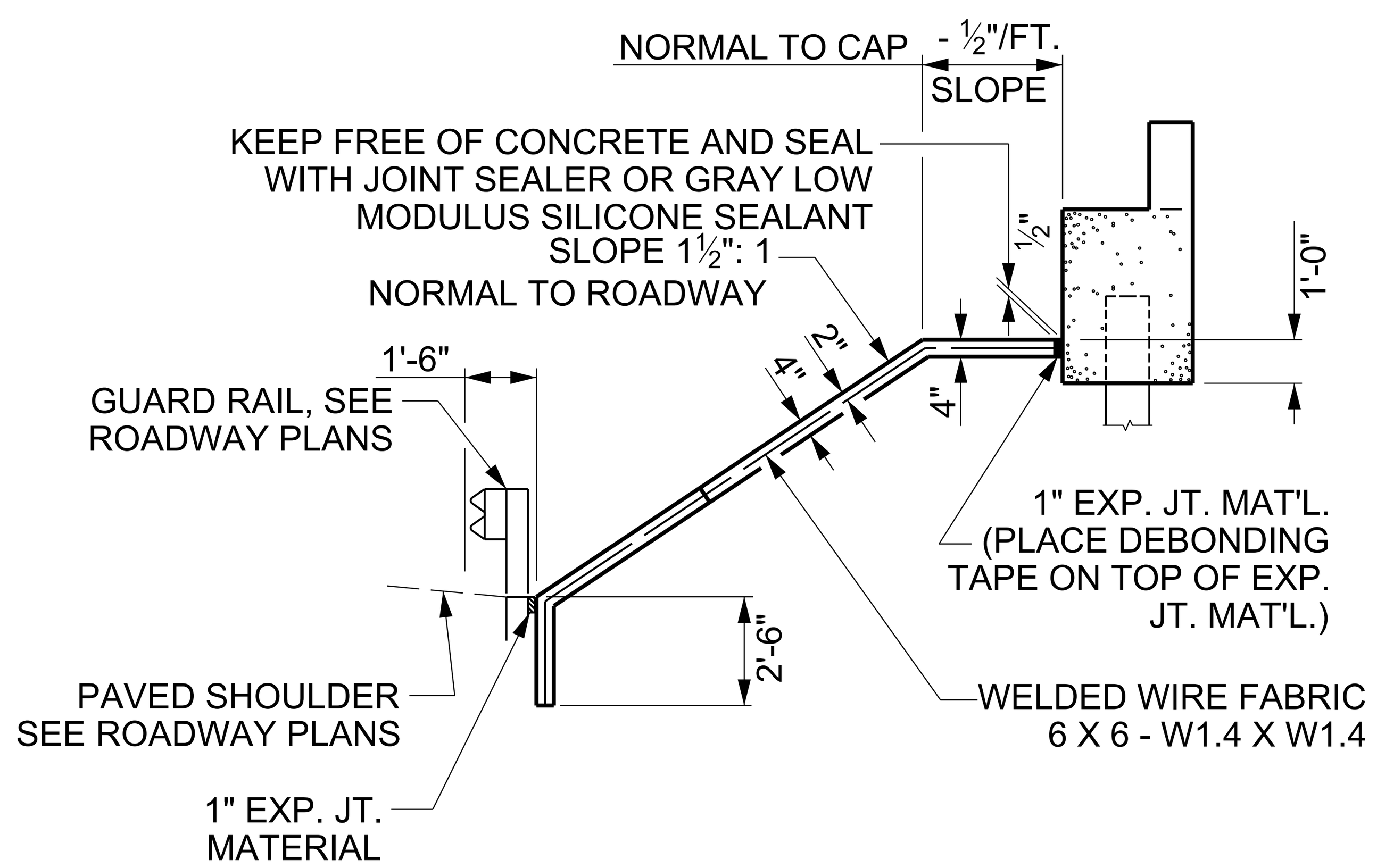
STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING. SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE SLOPE PROTECTION AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

BRIDGE @ STA. 29+59.54 -L-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	500	900
END BENT 2	930	1675

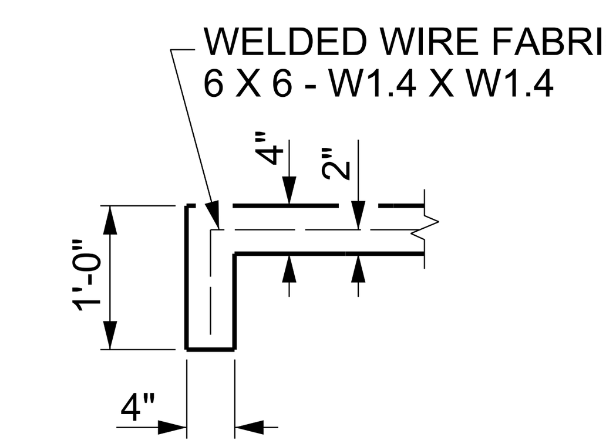
* QUANTITY SHOWN IS BASED ON 5' POURS.



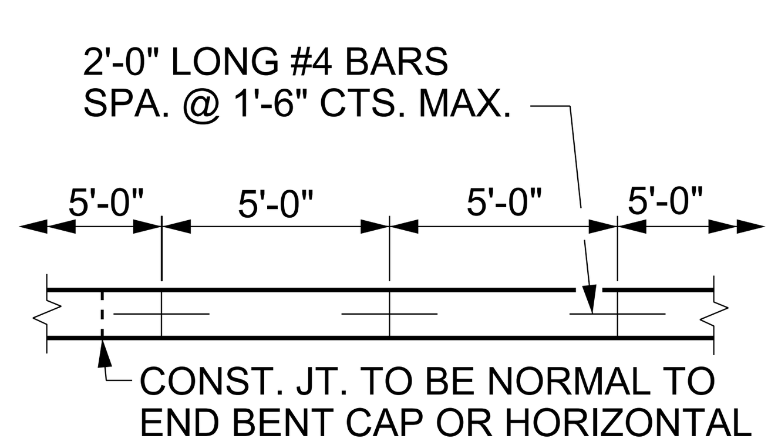
SECTION ALONG ℄ SURVEY AT END BENT 1 WHEN FILL CATCHES IN DITCH



SECTION ALONG ℄ SURVEY AT END BENT 2 WITH GUARD RAIL

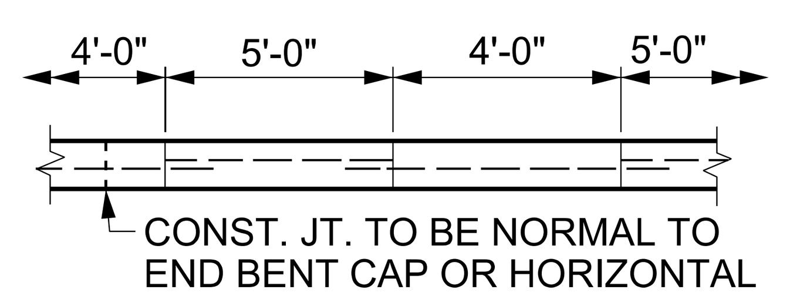


SECTION A-A



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



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

OPTIONAL POURING DETAIL

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-
SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SLOPE PROTECTION DETAILS

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NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
4/3/2025

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1			3			TOTAL SHEETS	45
2			4				

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE: 7/24
ASSEMBLED BY: C. E. LARSON DATE: 7/24
CHECKED BY: D. HENNESSEE DATE: 7/24
DRAWN BY: ELR 5/92 REV. 12/21/11 MAA/GM
CHECKED BY: GRP 6/92 REV. 1/16 MAA/TMG
REV. 12/17 MAA/THC

4/3/2025
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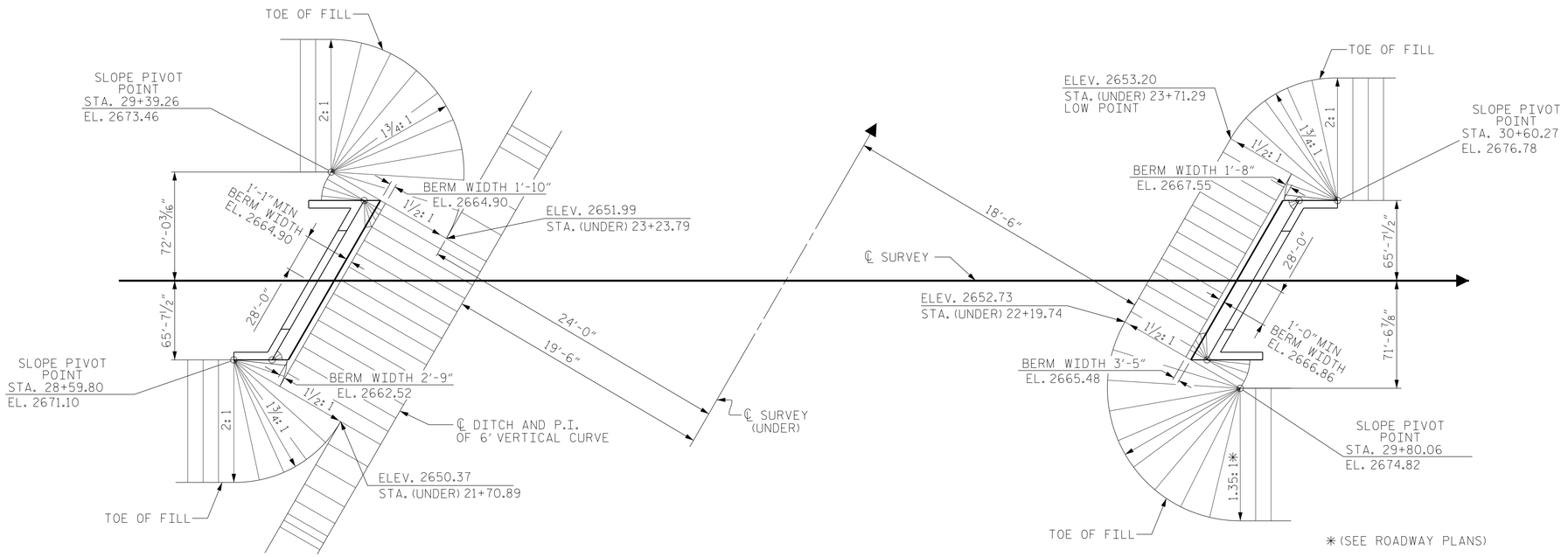
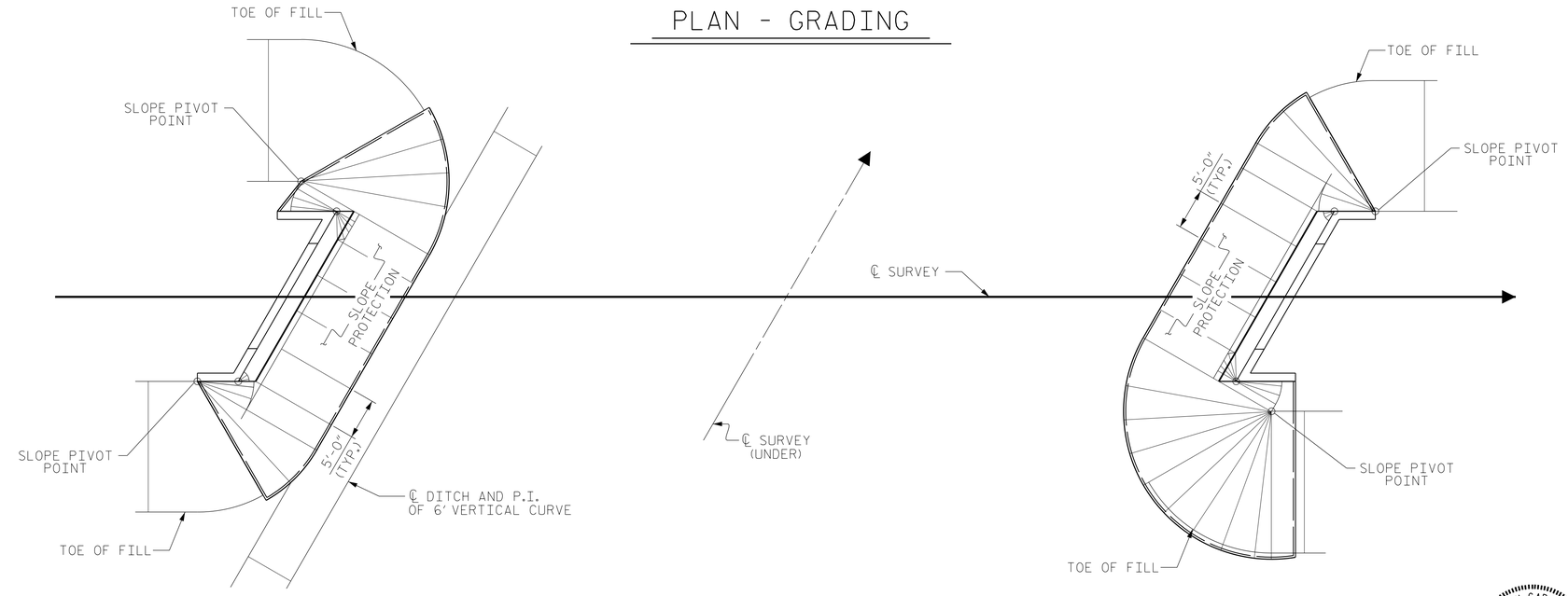


PLAN - GRADING



PLAN - CONCRETE PLACEMENT

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 7/24

ASSEMBLED BY:	C. E. LARSON		DATE : 7/24		
CHECKED BY :	D. HENNESSEE		DATE : 7/24		
DRAWN BY :	WJH	10/88	REV. 10/1/11	MAA/GM	
CHECKED BY :	FCJ	10/88	REV. 1/16	MAA/TMG	
			REV. 12/17	MAA/THC	

4/3/2025
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4/3/2025

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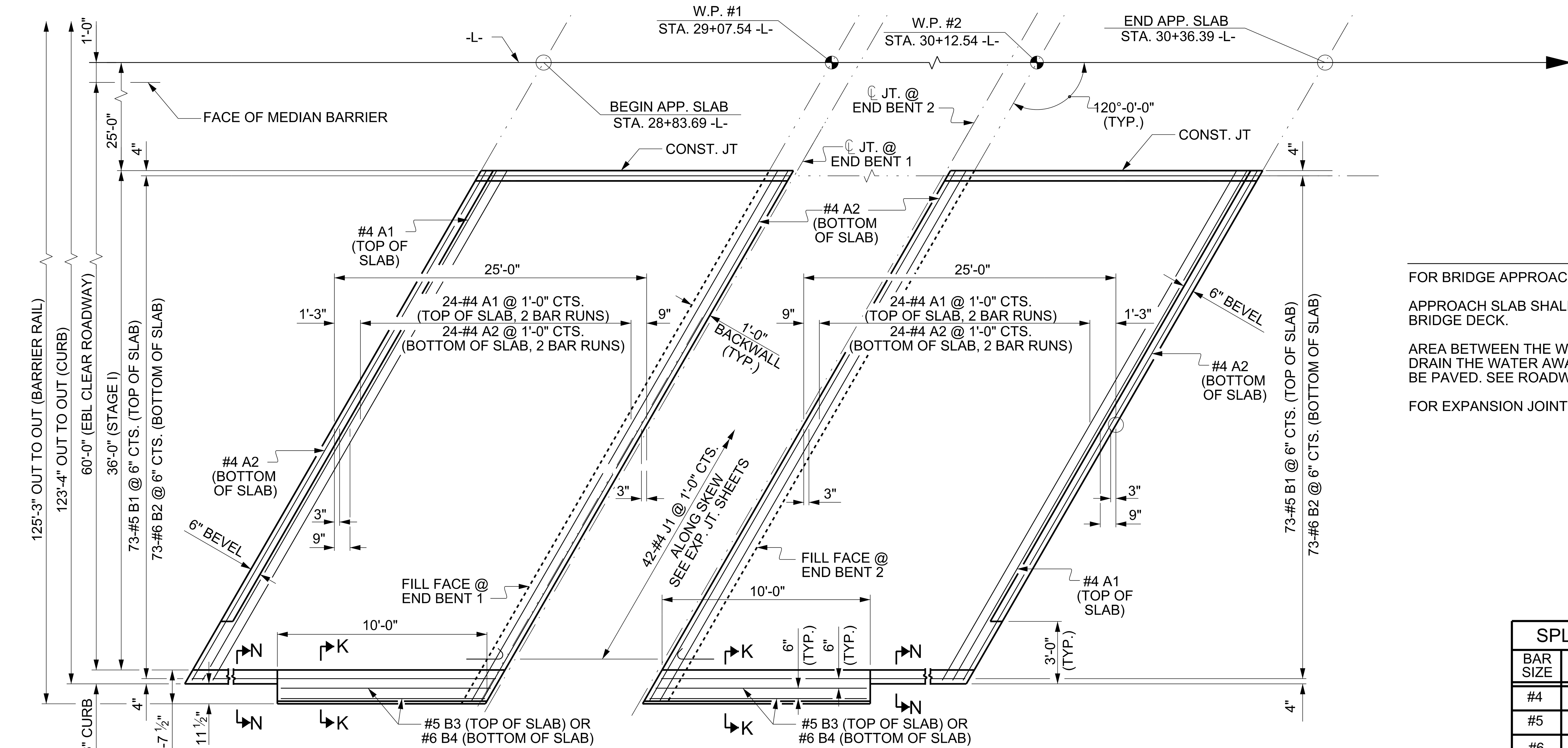
1			3			TOTAL SHEETS
2			4			45

STD. NO. SP2 (SHT 6)



PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

STAGE I

NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

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

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

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL STAGE I

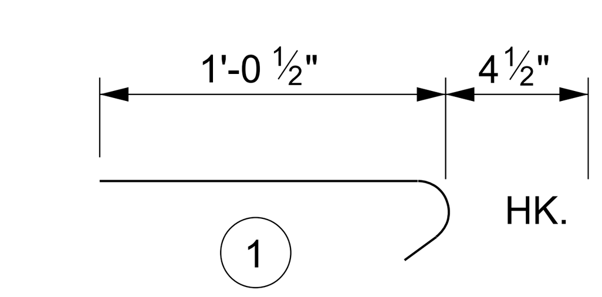
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	22'-0"	735
A2	52	#4	STR	21'-10"	758
* B1	73	#5	STR	24'-0"	1827
B2	73	#6	STR	24'-8"	2705
* B3	2	#5	STR	9'-8"	20
B4	2	#6	STR	9'-8"	29
* J1	42	#4	1	1'-5"	40
REINFORCING STEEL				3492 LBS.	
* EPOXY COATED REINFORCING STEEL				2622 LBS.	
CLASS AA CONCRETE				40.3 C. Y.	

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	22'-0"	735
A2	52	#4	STR	21'-10"	758
* B1	73	#5	STR	24'-0"	1827
B2	73	#6	STR	24'-8"	2705
* B3	2	#5	STR	9'-8"	20
B4	2	6	STR	9'-8"	29
* J1	42	#4	1	1'-5"	40
REINFORCING STEEL				3492 LBS.	
* EPOXY COATED REINFORCING STEEL				2622 LBS.	
CLASS AA CONCRETE				40.3 C. Y.	

BAR TYPE



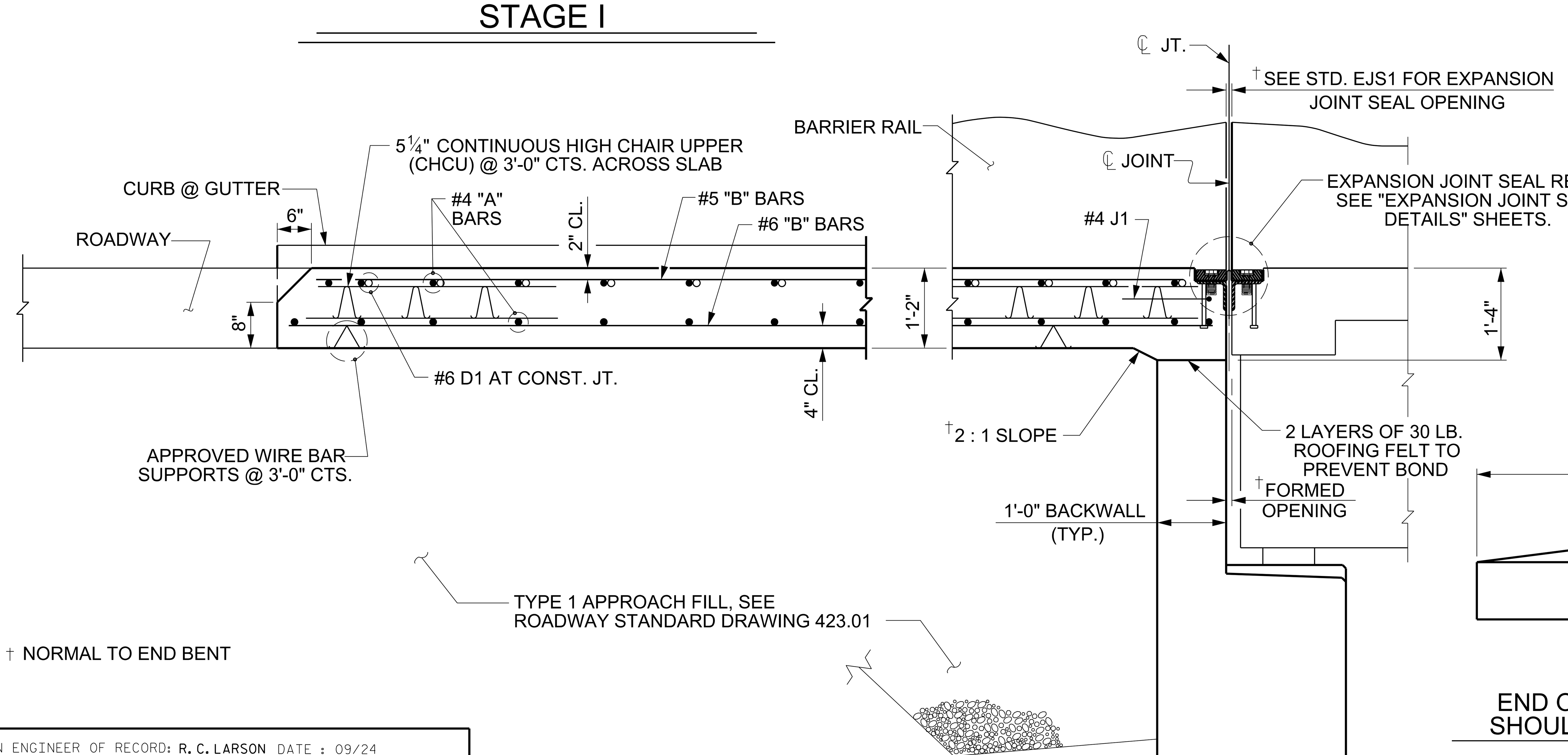
ALL BAR DIMENSIONS ARE OUT TO OUT

** QUANTITIES FOR BARRIER RAIL OR END POST ARE NOT INCLUDED. SEE SHEET 3 OF 3.

* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

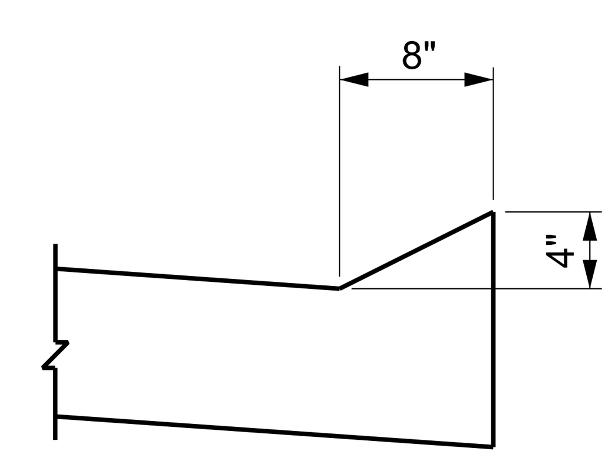
SPLICE LENGTHS

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

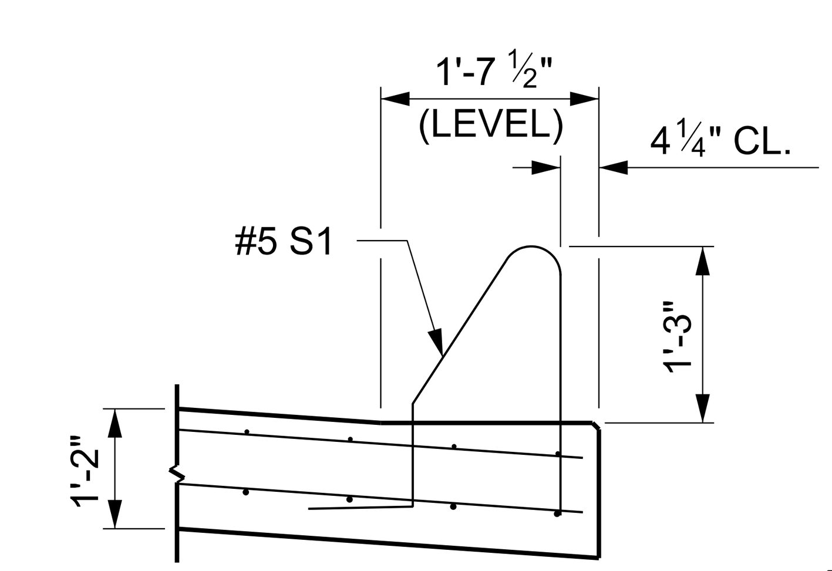


† NORMAL TO END BENT

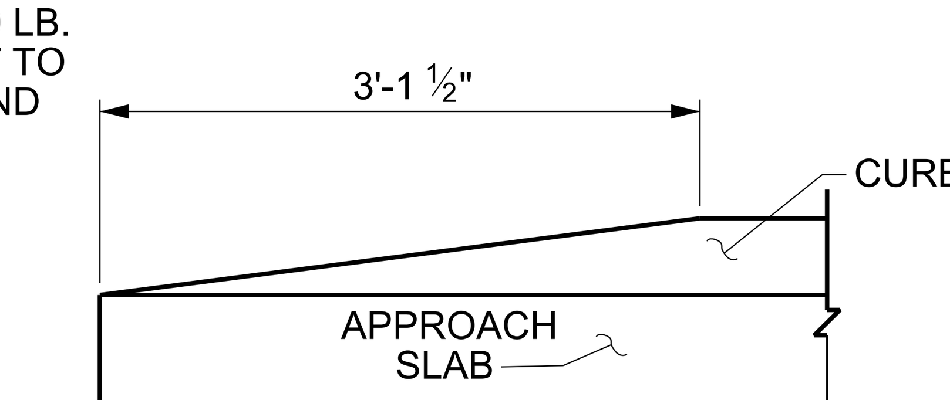
SECTION THRU SLAB



SECTION N-N



SECTION K-K



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT STAGE I

DocuSigned by: BEB2398...

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON

4/3/2025

PLANS PREPARED BY:

NV5

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3300 REGENCY PARKWAY, SUITE 100
CARY, NC 27518
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NC License # F-1333

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REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-43
1			3				TOTAL SHEETS
2			4				45

DESIGN ENGINEER OF RECORD: R.C.LARSON DATE : 09/24

ASSEMBLED BY: C.E.LARSON DATE : 03/24
CHECKED BY : D.HENNESSEE DATE : 03/24

DRAWN BY : EEM 3/95 — REV. 6/13 MAA/GM
CHECKED BY : VAP 3/95 — REV. 12/17 MAA/THC; REV. 047/23 BNB/SNM

4/3/2025
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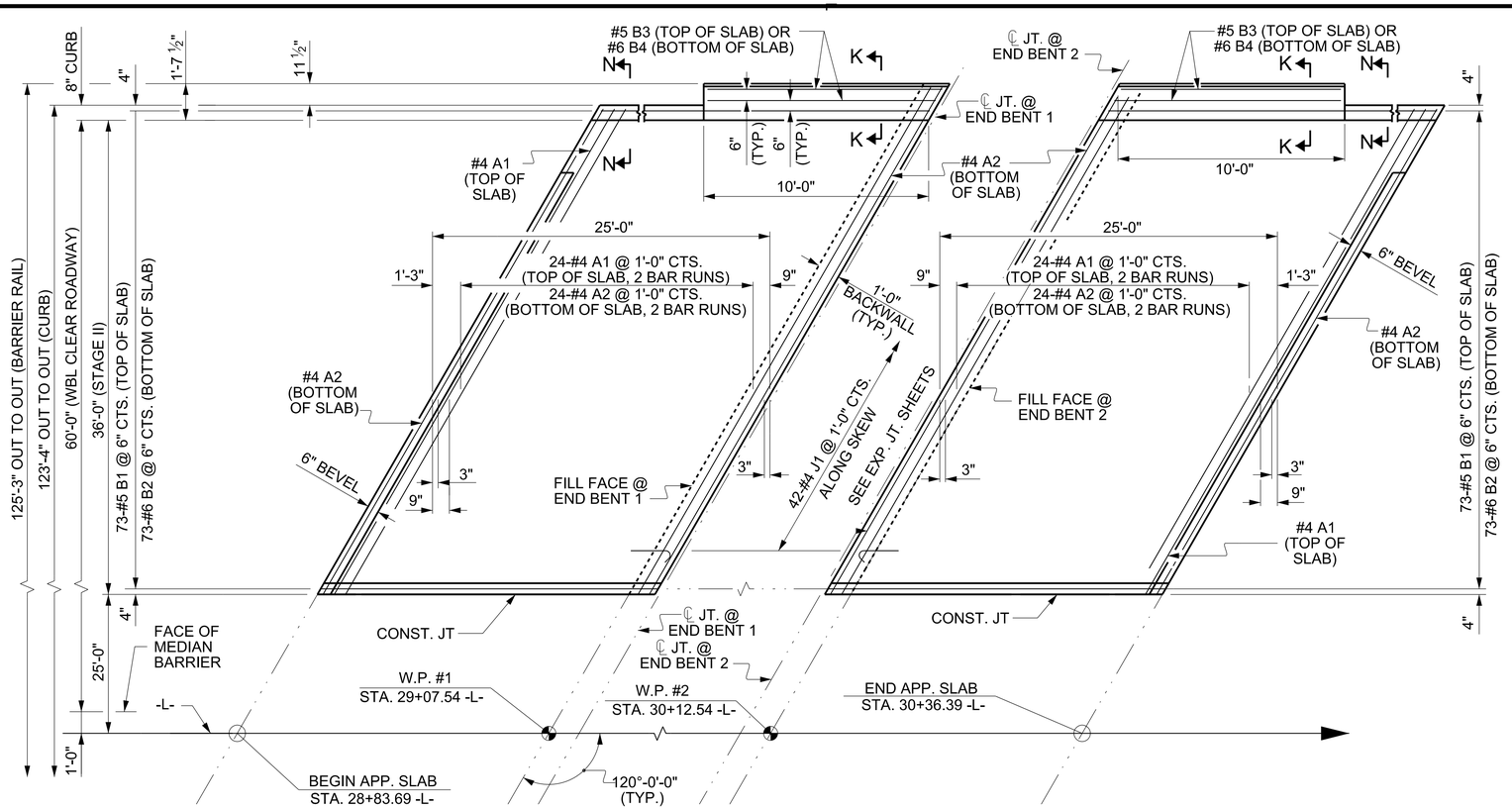
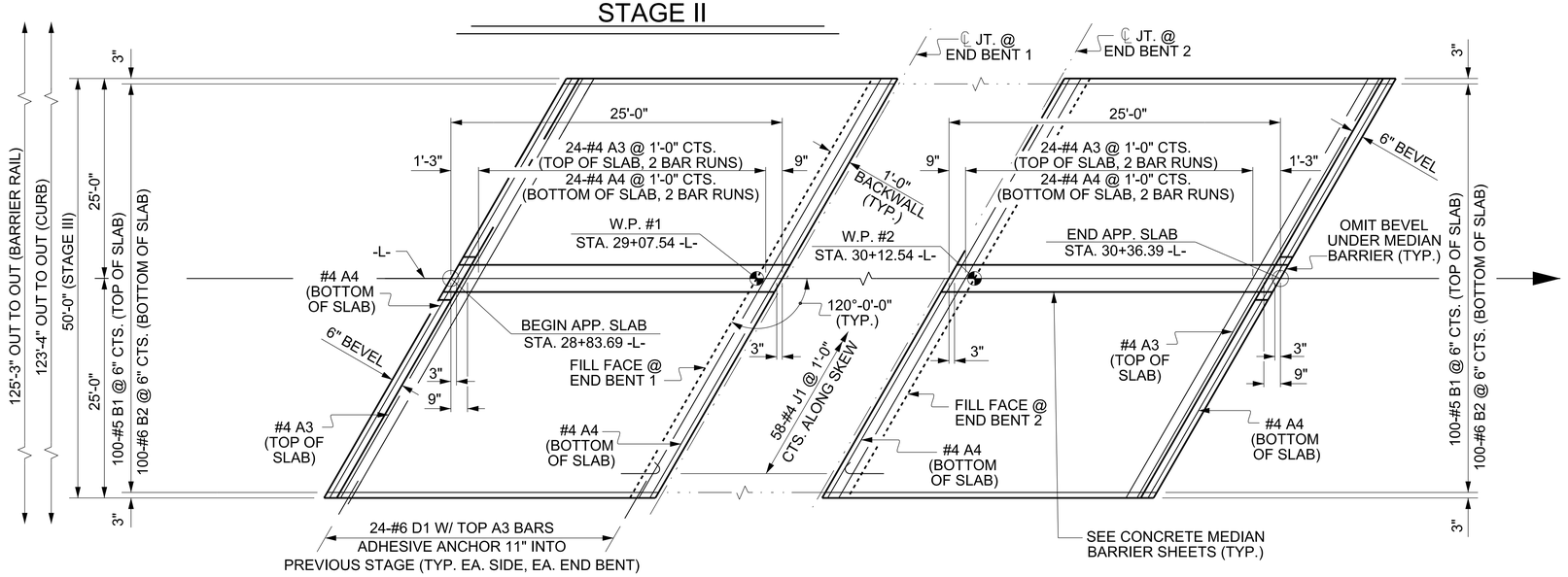
8/26/21



PLAN @ END BENT 1 PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

STAGE II



PLAN @ END BENT 1 PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

STAGE III

BILL OF MATERIAL STAGE II

APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	22'-0"	735
A2	52	#4	STR	21'-10"	758
* B1	73	#5	STR	24'-0"	1827
B2	73	#6	STR	24'-8"	2705
* B3	2	#5	STR	9'-8"	20
B4	2	#6	STR	9'-8"	29
* J1	42	#4	1	1'-5"	40

REINFORCING STEEL 3492 LBS.
* EPOXY COATED REINFORCING STEEL 2622 LBS.
CLASS AA CONCRETE 40.3 C. Y.

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	22'-0"	735
A2	52	#4	STR	21'-10"	758
* B1	73	#5	STR	24'-0"	1827
B2	73	#6	STR	24'-8"	2705
* B3	2	#5	STR	9'-8"	20
B4	2	6	STR	9'-8"	29
* J1	42	#4	1	1'-5"	40

REINFORCING STEEL 3492 LBS.
* EPOXY COATED REINFORCING STEEL 2622 LBS.
CLASS AA CONCRETE 40.3 C. Y.

BILL OF MATERIAL STAGE III

APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	50	#4	STR	29'-8"	991
A4	52	#4	STR	29'-5"	1022
* B1	100	#5	STR	24'-0"	2503
B2	100	#6	STR	24'-8"	3705
* J1	58	#4	1	1'-5"	55
* D1	48	#6	STR	2'-4"	168

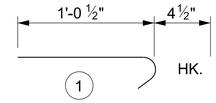
REINFORCING STEEL * * 4727 LBS.
* EPOXY COATED REINFORCING STEEL * * 3717 LBS.
CLASS AA CONCRETE * * 54.2 C. Y.

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	50	#4	STR	29'-8"	991
A4	52	#4	STR	29'-5"	1022
* B1	100	#5	STR	24'-0"	2503
B2	100	#6	STR	24'-8"	3705
* J1	58	#4	1	1'-5"	55
* D1	48	#6	STR	2'-4"	168

REINFORCING STEEL * * 4727 LBS.
* EPOXY COATED REINFORCING STEEL * * 3717 LBS.
CLASS AA CONCRETE * * 54.2 C. Y.

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

NOTES

SEE "CONCRETE MEDIAN BARRIER" SHEETS FOR #5 S22 BARS EMBEDDED IN APPROACH SLAB.

* * QUANTITIES FOR MEDIAN BARRIER ARE NOT INCLUDED. SEE "CONCRETE MEDIAN BARRIER" SHEETS.

* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

PROJECT NO. B-5541
HAYWOOD COUNTY
STATION: 29+59.54 -L-

SHEET 2 OF 3

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE :11/23			
ASSEMBLED BY : C. E. LARSON		DATE : 03/24	
CHECKED BY : D. HENNESSEE		DATE : 03/24	
DRAWN BY : EEM 3/95	REV. 6/13		MAA/GM
CHECKED BY : VAP 3/95	REV. 12/17		MAA/THC
	REV. 07/23		BNB/SNM

4/3/2025
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
3:20:23 PM

PLANS PREPARED BY:

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NC License # F-1333

DocuSigned by:
NORTH CAROLINA PROFESSIONAL SEAL 14114 ENGINEER ROBERT C. LARSON
BEB2398[illegible]
4/3/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

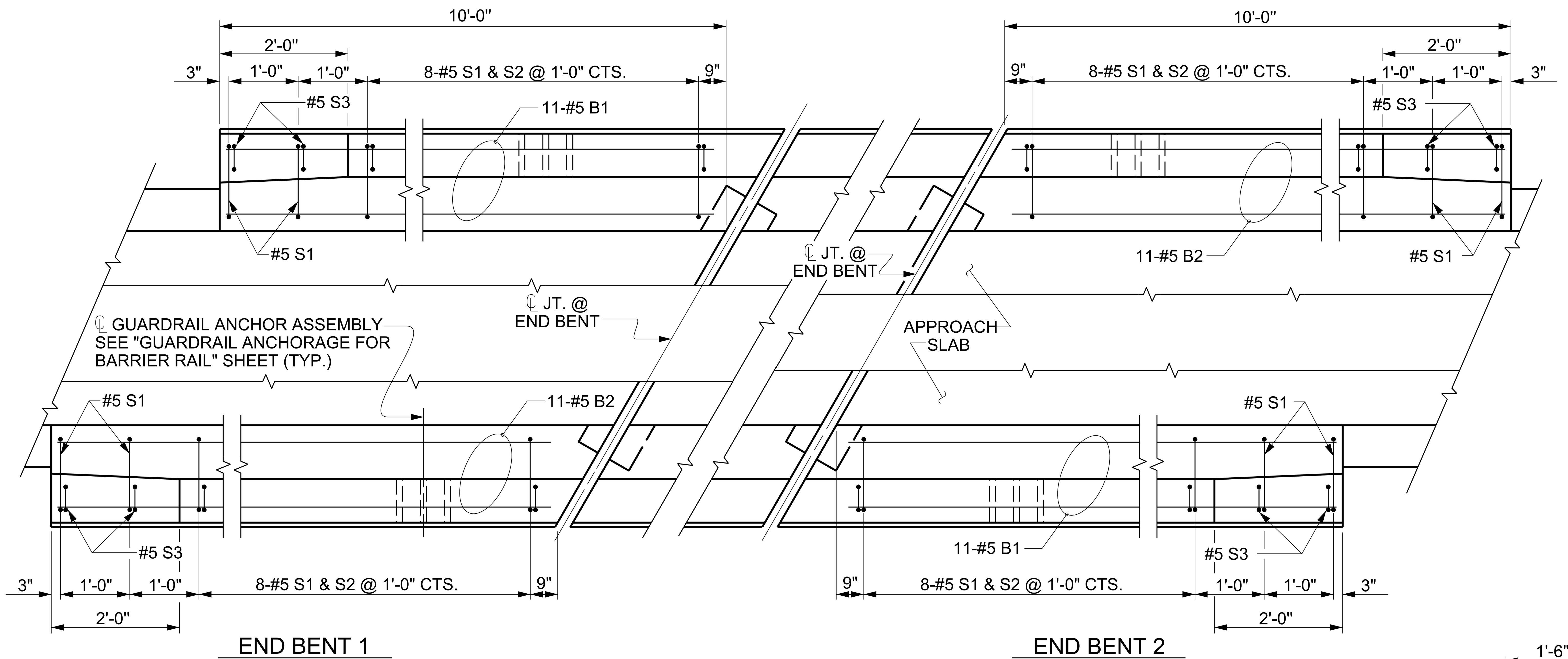
STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT STAGE II & III

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-44
1			3			TOTAL SHEETS
2			4			45

Sht. 02b

8/26/21



PLAN OF BARRIER RAIL

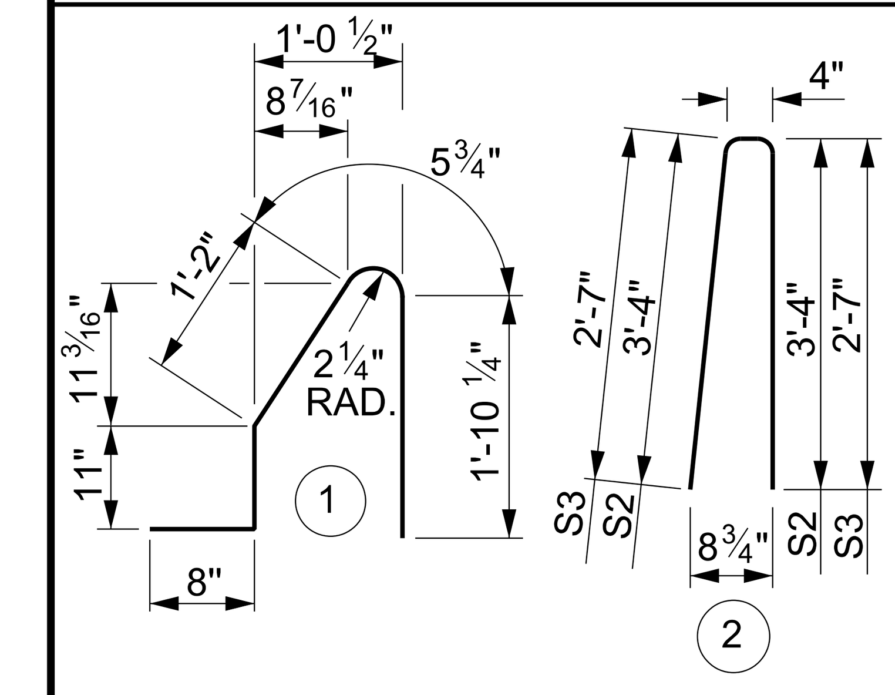
NOTES

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES

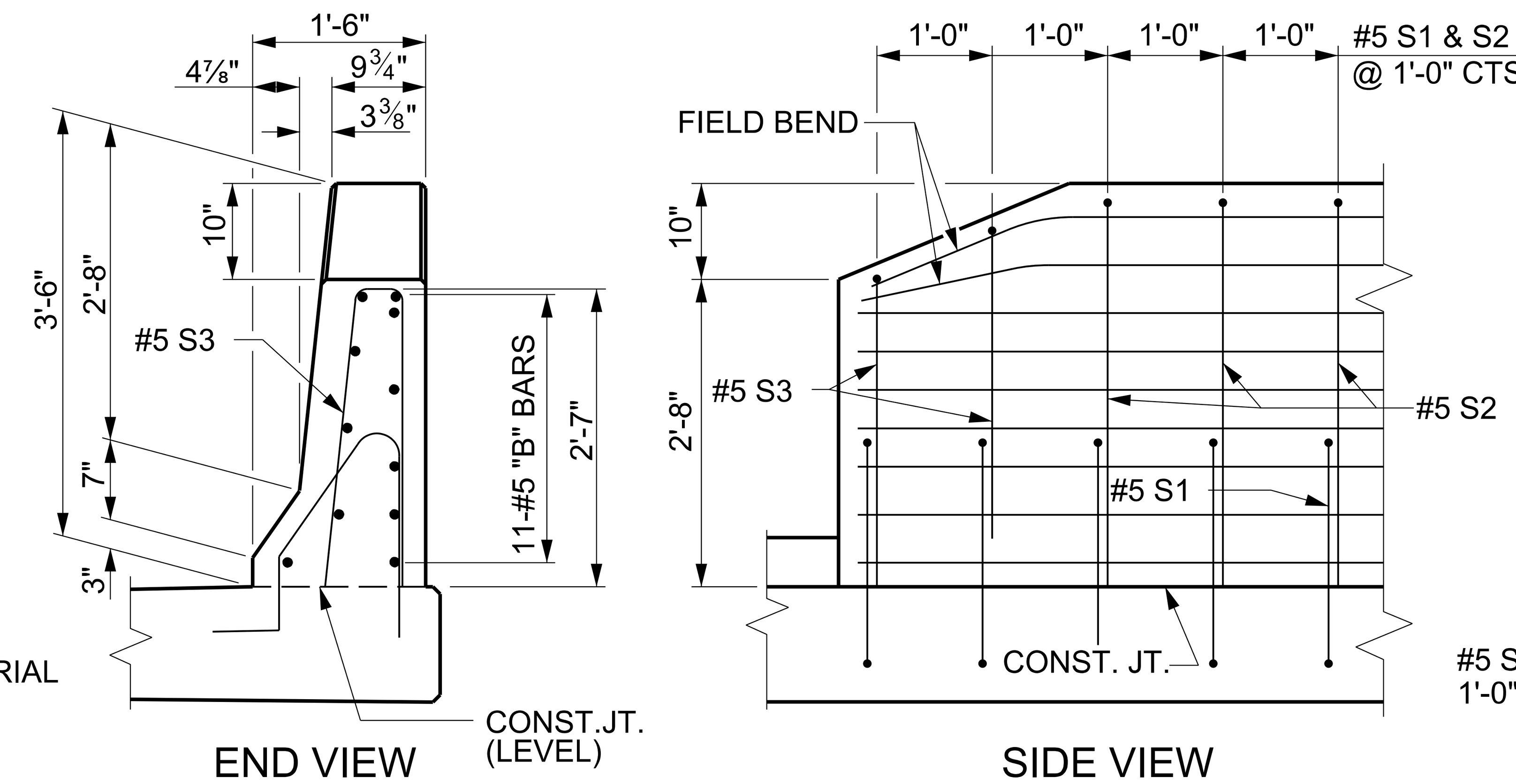


ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BARRIER RAIL ONLY

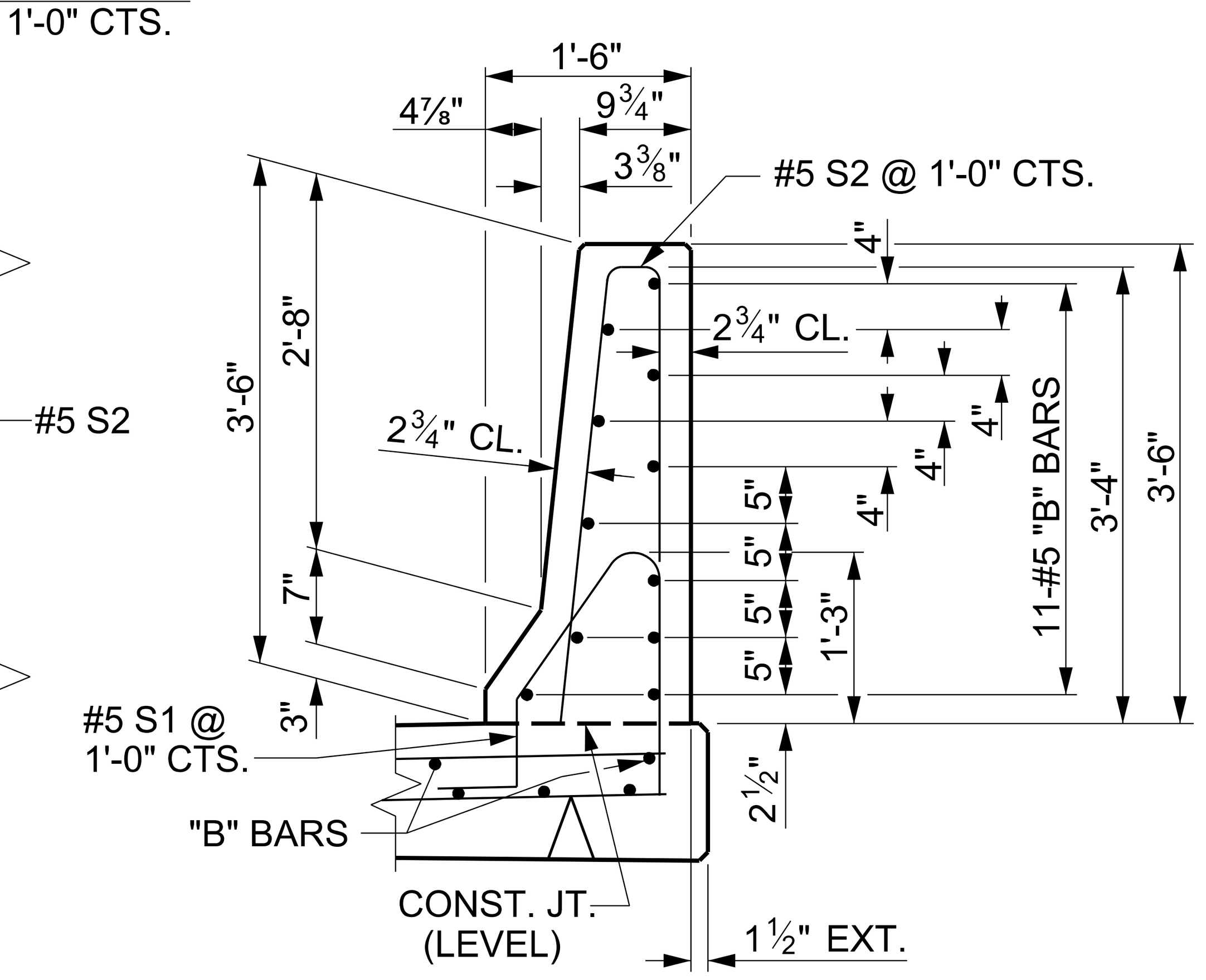
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	22	#5	STR	9'-6"	218
* B2	22	#5	STR	9'-10"	226
* S1	40	#5	1	5'-1"	212
* S2	32	#5	2	7'-0"	234
* S3	8	#5	2	5'-6"	46
* EPOXY COATED REINFORCING STEEL					936 LBS.
CLASS AA CONCRETE					5.6 C. Y.
CONCRETE BARRIER RAIL					41.95 LIN. FT.



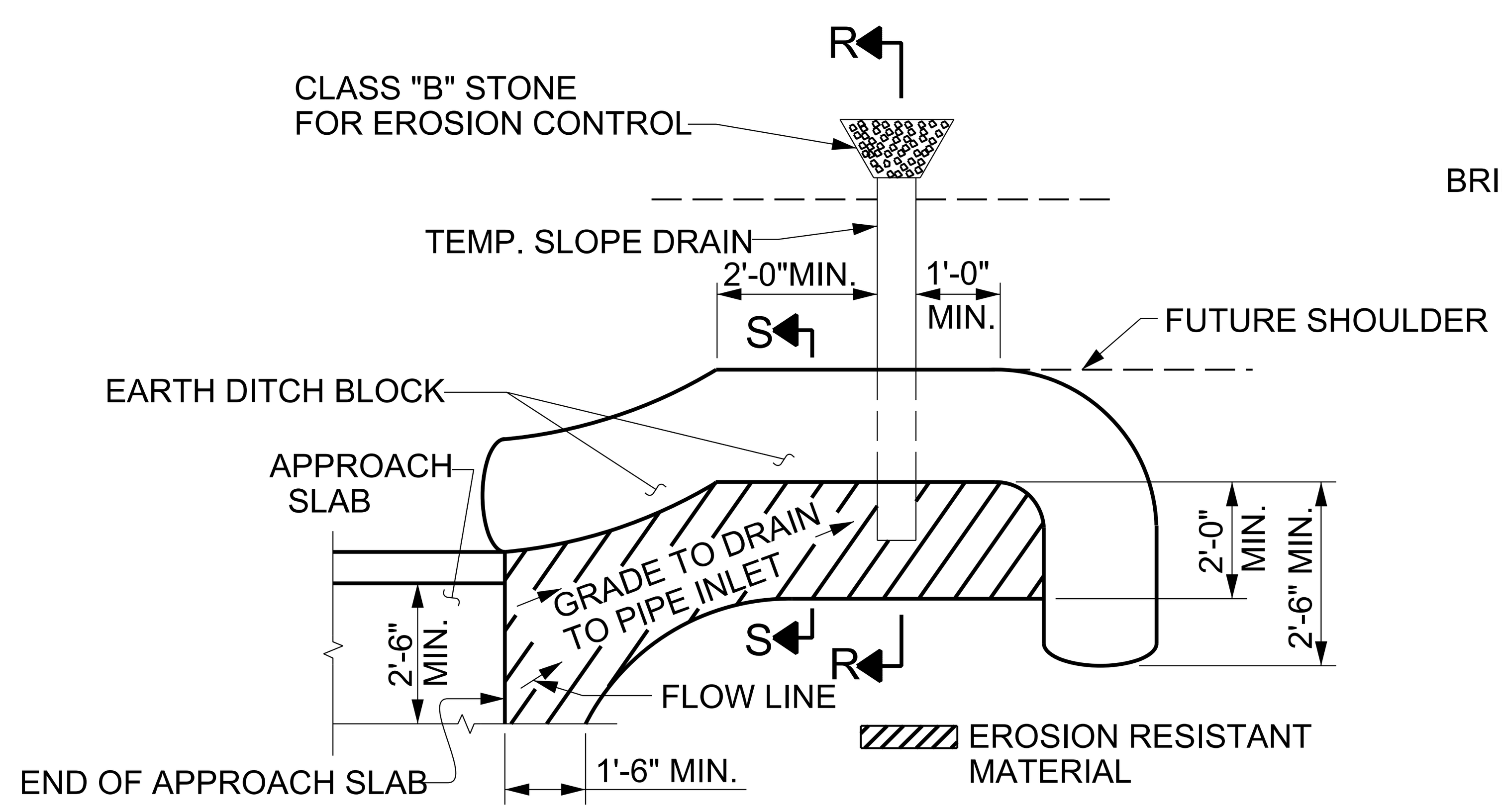
END VIEW

SIDE VIEW

END OF RAIL DETAILS

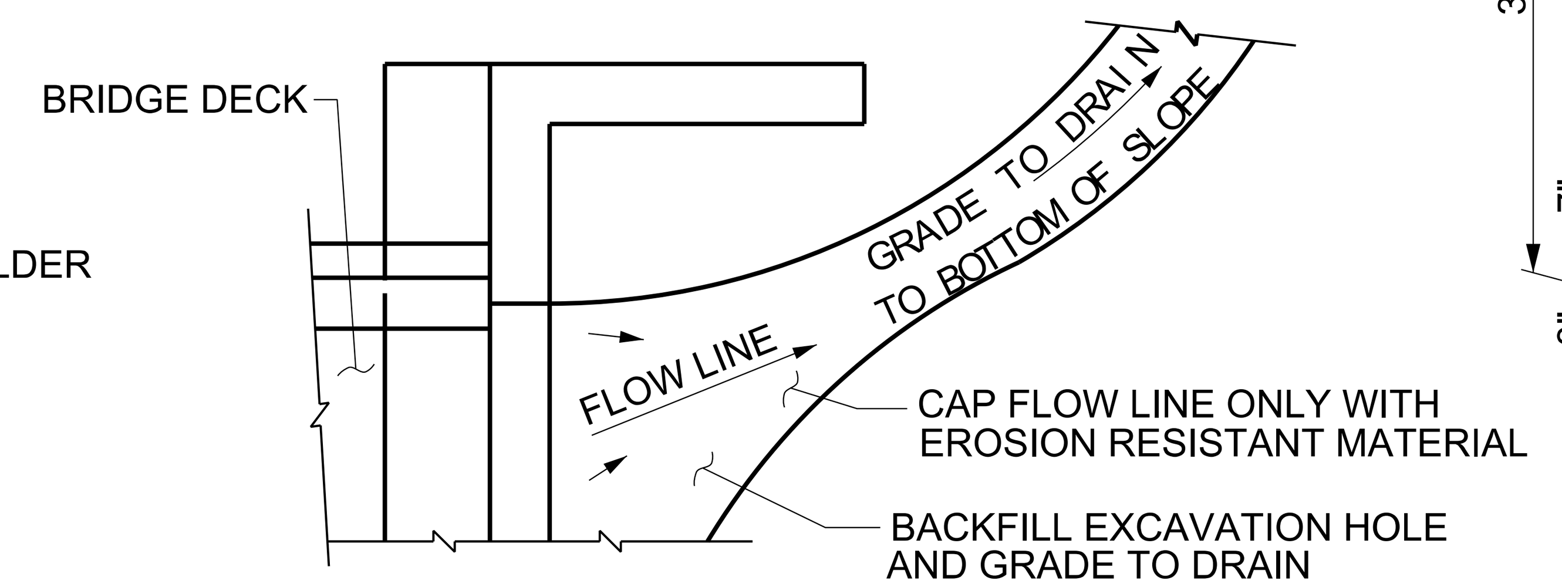


SECTION THRU RAIL



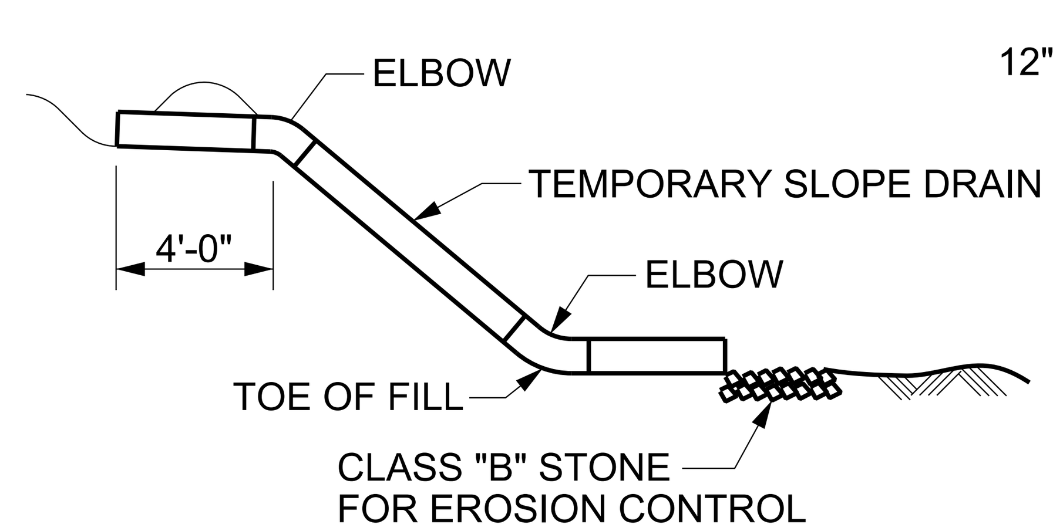
NOTE:
IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

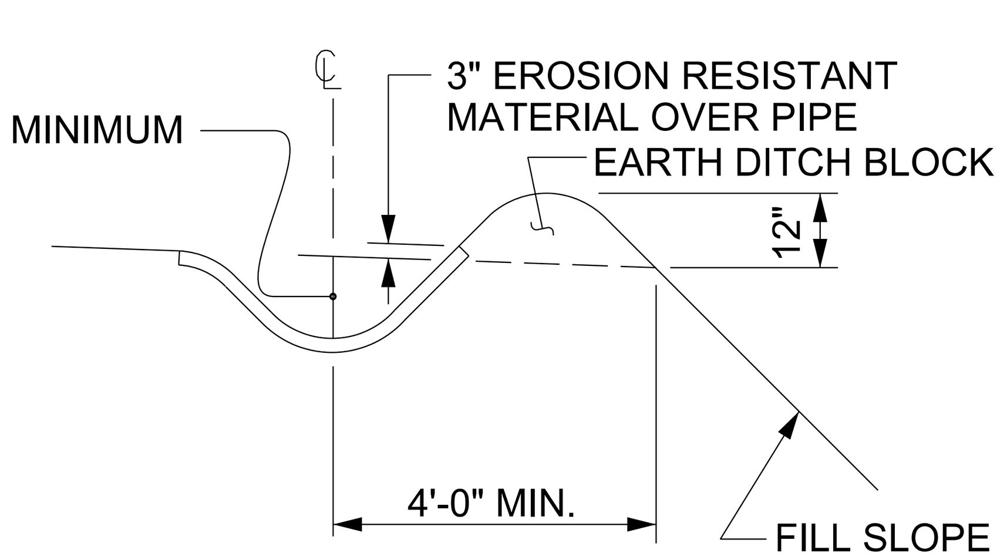


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL



SECTION R-R



SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. B-5541

HAYWOOD COUNTY

STATION: 29+59.54 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

DocuSigned by:
BEB2398...
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14114 ROBERT C. LARSON
4/3/2025

PLANS PREPARED BY:
NV5
NV5 ENGINEERS & CONSULTANTS, INC.
3300 REGENCY PARKWAY, SUITE 100
CARY, NC 27518
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NC License # F-1333

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

SHEET NO. S-45
TOTAL SHEETS 45

DESIGN ENGINEER OF RECORD: R. C. LARSON DATE : 09/24
ASSEMBLED BY: C. E. LARSON DATE : 03/24
CHECKED BY : R. C. LARSON DATE : 09/24
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

4/3/2025
$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$
3:20:24 PM

STD. BAS4 Sht. 03b

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1 ½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A ¼" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

8/26/21

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST $\frac{5}{16}$" 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 $\frac{1}{16}$" OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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