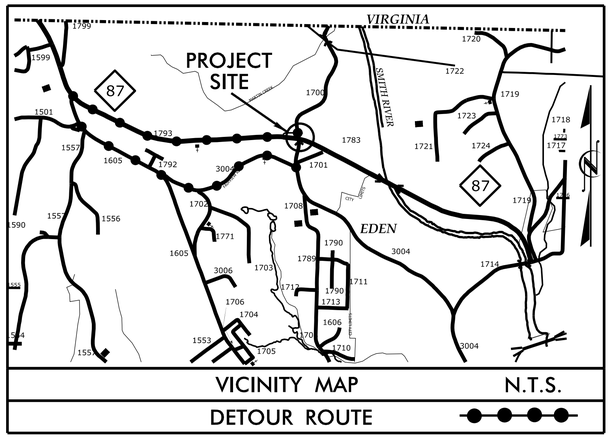
TIP PROJECT: BR-0096

CONTRACT: C205128



STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

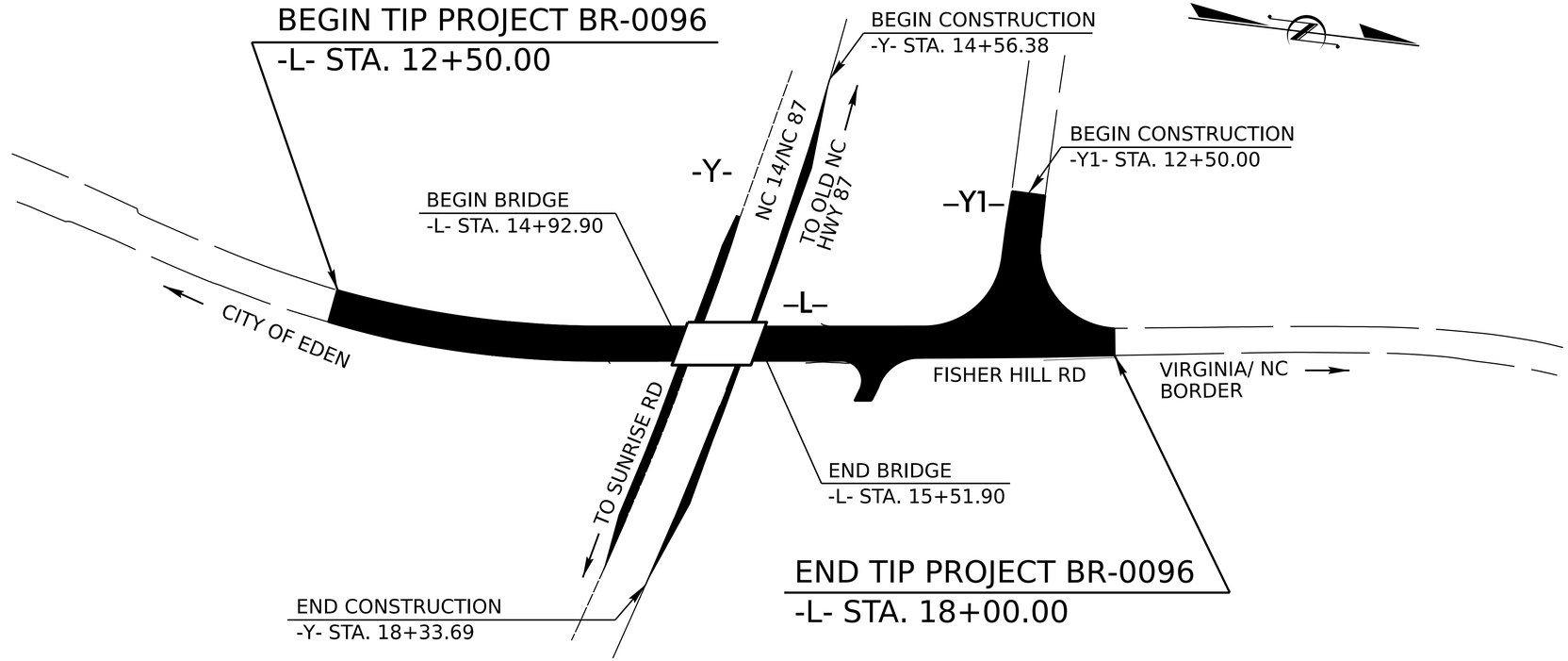
ROCKINGHAM COUNTY

LOCATION: REPLACE BRIDGE 780176 ON SR 1700 OVER NC14/NC87

TYPE OF WORK: STRUCTURE, PAVING, AND DRAINAGE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0096		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
67096.1.1	–	P.E.
67096.2.1	–	RW/UTIL
67096.3.1	5160301	CONST.



STRUCTURE

DESIGN DATA

ADT (2023) = 580
ADT (2043) = 1,000
K = 10 %
D = 55 %
T = 3% *
V = 40 MPH
* (TTST 2 %, DUAL 1 %)

FUNC CLASS = LOCAL RURAL

SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BR-0096 = 0.093 MILES
LENGTH STRUCTURE TIP PROJECT BR-0096 = 0.011 MILES

TOTAL LENGTH TIP PROJECT BR-0096 = 0.104 MILES

Prepared in the Office of:

DIVISION OF HIGHWAYS

STRUCTURES MANAGEMENT UNIT

1000 BIRCH RIDGE DR.

RALEIGH, N.C. 27610

2024 STANDARD SPECIFICATIONS

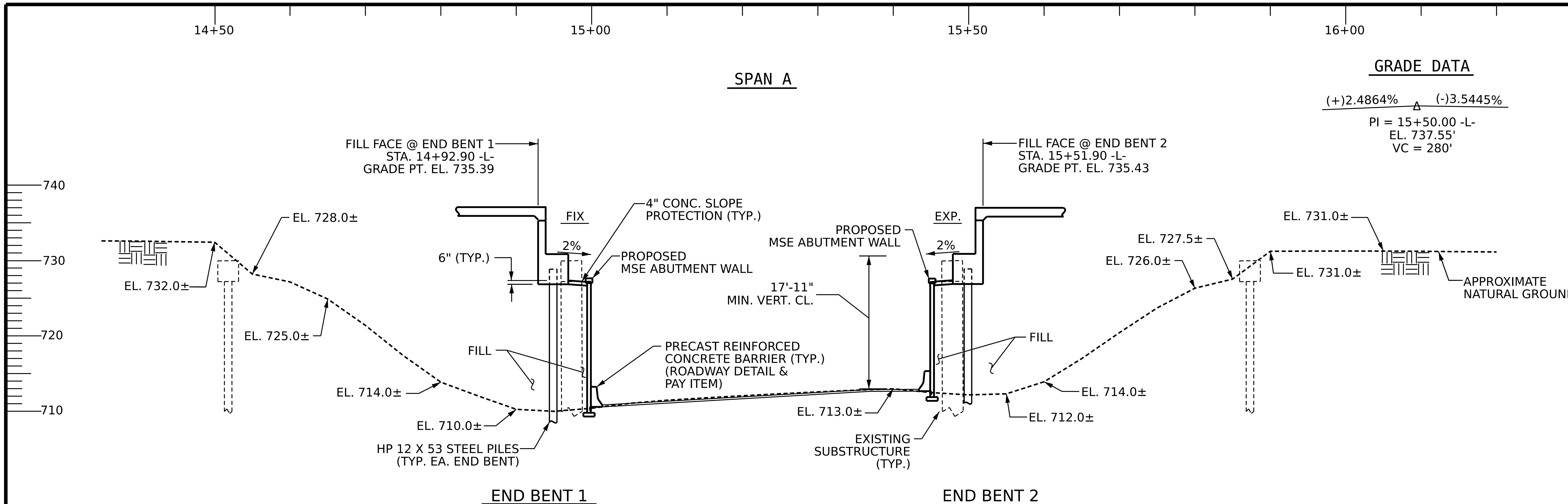
LETTING DATE :

JANUARY 20, 2026

KRISTY W. ALFORD, PE
PROJECT ENGINEER

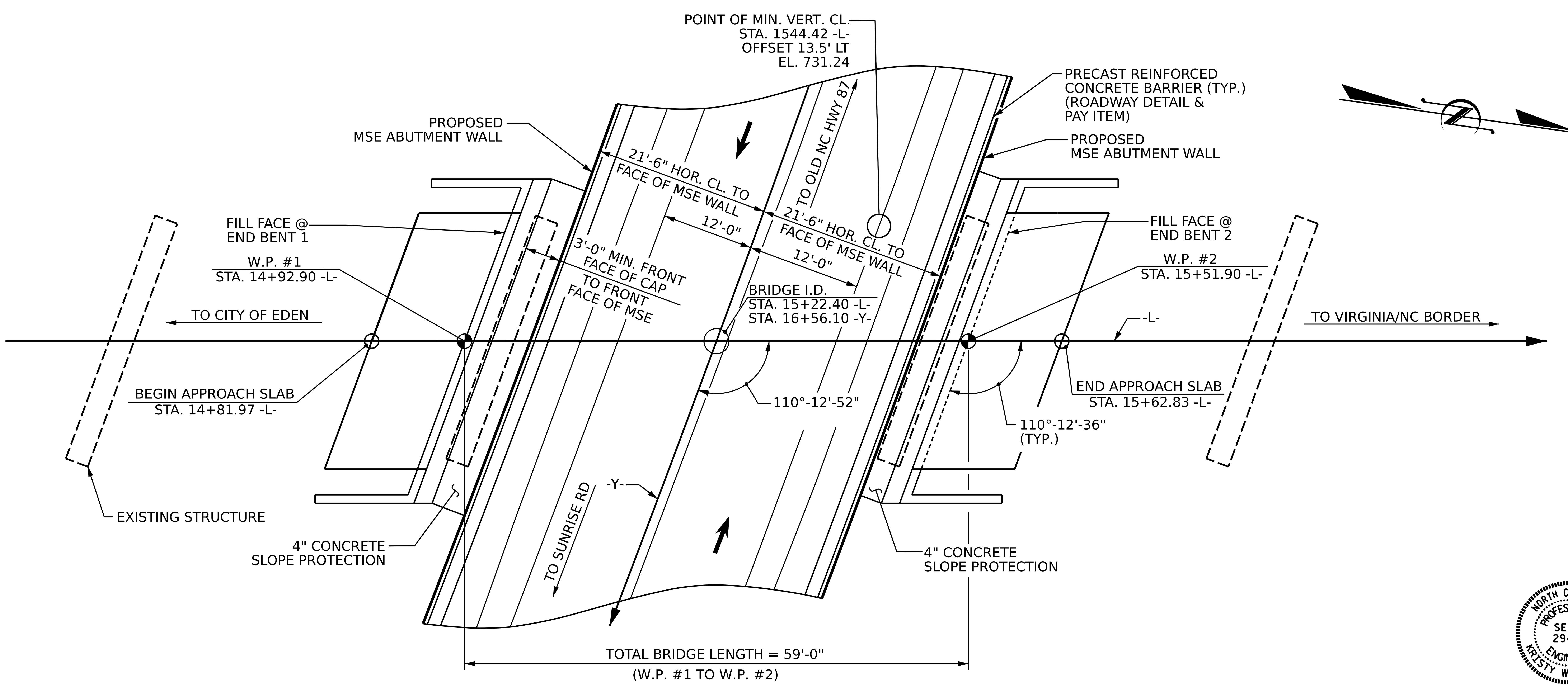
FRANCESCA LEA, PE
PROJECT DESIGN ENGINEER

F.A. PROJECT: 5160301



SECTION ALONG -L-

(SECTION AT END BENTS ARE AT RIGHT ANGLES)



PLAN

(PILES NOT SHOWN FOR CLARITY)

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-
16+56.10 -Y-

SHEET 1 OF 4 REPLACE BRIDGE #780176

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON SR 1700
OVER NC 14/NC 87 BETWEEN
CITY OF EDEN AND
VIRGINIA/NC BORDER

NORTH CAROLINA PROFESSIONAL SEAL 29441 ENGINEER KRISTY W. ALFORD
DocuSigned by: 10/31/2025

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA
DocuSigned by: Francesca Lea 10/31/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

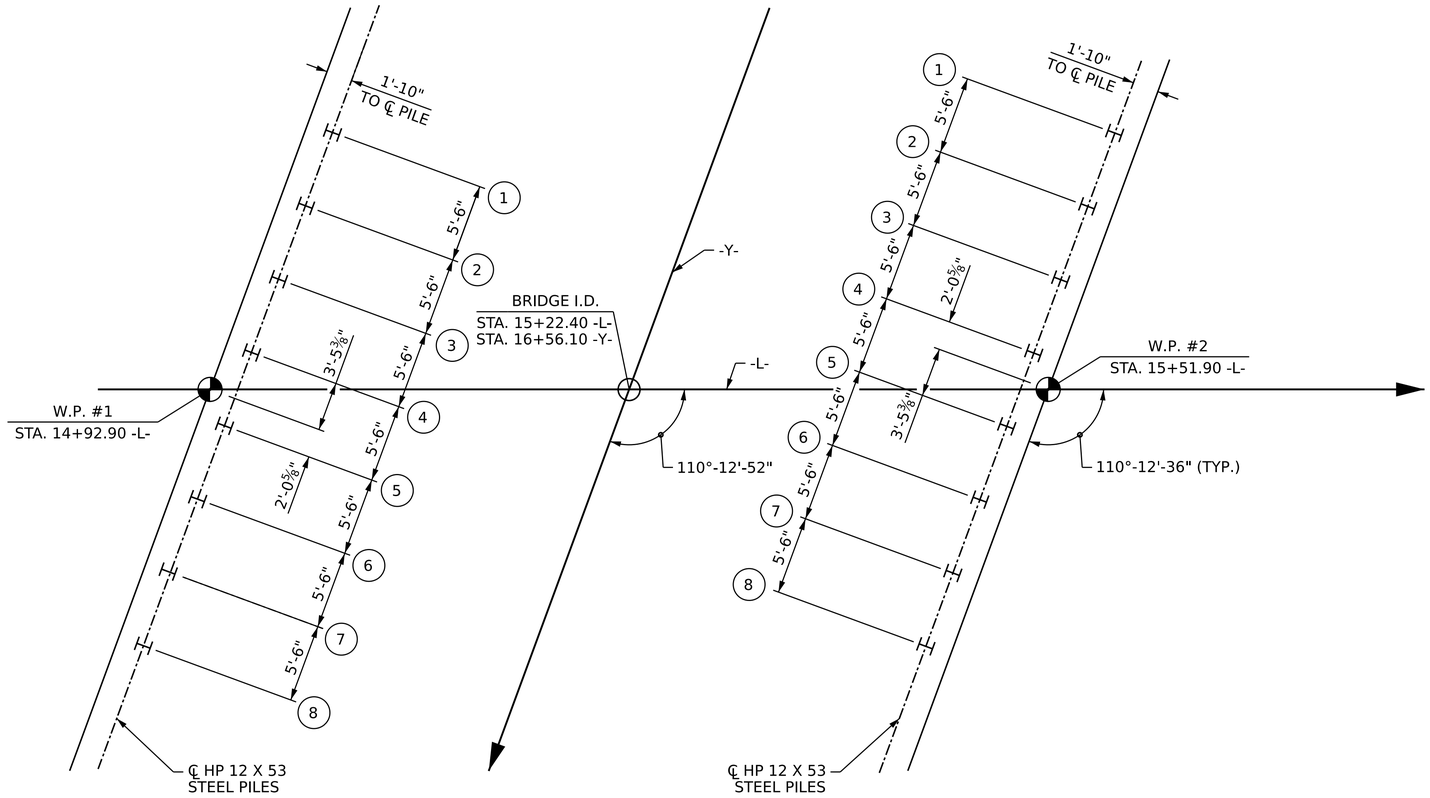
DRAWN BY : Q. T. NGUYEN / S. LOTFI	DATE : 04/2024
CHECKED BY : Z. MALIK	DATE : 05/2024
DESIGN ENGINEER OF RECORD: Z. MALIK	DATE : 11/2023

REVISIONS

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

SHEET NO. S-01

TOTAL SHEETS 24



END BENT 1

END BENT 2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES
ARE SHOWN TO THE CENTERLINE OF PILES.
ALL PILES ARE VERTICAL.

NOTES

INSTALL PILE SLEEVES BEFORE CONSTRUCTING THE MECHANICALLY STABILIZED EARTH (MSE) ABUTMENT WALL AT END BENT No. 1 AND No. 2. OBSERVE A ONE MONTH WAITING PERIOD AFTER CONSTRUCTING THE MSE ABUTMENT WALL TO WITHIN 1 FT OF THE BOTTOM OF CAP ELEVATION. THEN, INSTALL PILES THROUGH THE CORRUGATED STEEL PIPES AND FILL PIPES WITH LOOSE UNCOMPACTED SAND BEFORE CONSTRUCTING END BENT CAPS. FOR PILE SLEEVES, SEE MSE RETAINING WALL PLANS AND PROVISIONS. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

10/31/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1700
OVER NC 14/NC 87 BETWEEN
CITY OF EDEN AND
VIRGINIA/NC BORDER

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-02
1			3			TOTAL SHEETS
2			4			24

DRAWN BY : S. LOTFI DATE : 09/2024
CHECKED BY : F. LEA DATE : 09/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 05/2023

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10/31/2025
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SUMMARY OF PILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Resistance per Pile TONS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Length per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles*			Drilled-In Piles		
					Min Pile Tip (Tip No Higher Than) Elev FT	Required Driving Resistance (RDR)** per Pile TONS	Total Pile Redrives Quantity EACH	Predrilling Length per Pile Lin FT	Predrilling Elevation (Elev Not To Predrill Below) FT	Maximum Predrilling Dia INCHES	Pile Excavation (Bottom of Hole) Elev FT	Pile Exc Not In Soil per Pile Lin FT	Pile Exc In Soil per Pile Lin FT
End Bent 1, Piles 1-8	60	728.84	60			115							
End Bent 2, Piles 1-8	60	728.88	60			115							

*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.

$$\frac{red\ Resistance + Factored\ Downdrag\ Load + Factored\ Dead\ Load}{Dynamic\ Resistance\ Factor} + Nominal\ Downdrag\ Resistance + \frac{Nominal\ Scour\ Resistance}{Scour\ Resistance\ Factor}$$

SUMMARY OF DYNAMIC PILE TESTING/PILE ORDER LENGTHS

(Blank entries indicate item is not applicable to structure)

Dynamic Pile Testing				Pile Order Lengths	
End Bent/ Bent No	Dynamic Pile Testing Required? YES or MAYBE	Dynamic Pile Test Pile Length FT	Total Dynamic Pile Testing Quantity EACH	End Bent/ Bent No(s)	Pile Order Length Basis* EST or Dynamic Pile Testing
End Bent 1, Piles 1-8	MAYBE	60	1		
End Bent 2, Piles 1-8	MAYBE	60			

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

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile TONS	Factored Downdrag Load per Pile TONS	Factored Dead Load* per Pile TONS	Dynamic Resistance Factor	Nominal Downdrag Resistance per Pile TONS	Nominal Scour Resistance per Pile TONS	Scour Resistance Factor (Default = 1.00)
End Bent 1, Piles 1-8	60	5		0.60	4		1.00
End Bent 2, Piles 1-8	60	5		0.60	4		1.00

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

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Cheng Wang and #048123) on 06-26-2023.
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.
4. For Piles, see Piles provision and Section 450 of the Standard Specifications.
5. Install pile sleeves before constructing the mechanically stabilized earth (MSE) abutment wall at End Bent No. 1 and No. 2. Observe a one month waiting period after constructing the MSE abutment wall to within 1 ft of the bottom of cap elevation. Then, install piles through the corrugated steel pipes and fill pipes with loose uncompacted sand before constructing end bent caps. For pile sleeves, see MSE retaining wall plans and provision. For bridge waiting periods, see roadway plans and Section 235 of the Standard Specifications.

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B790ADB65D584EF...
10/31/2025

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-03
1			3			TOTAL SHEETS
2			4			24

DRAWN BY : S. LOTFI DATE : 09/2024
CHECKED BY : F. LEA DATE : 10/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 05/2023

10/31/2025
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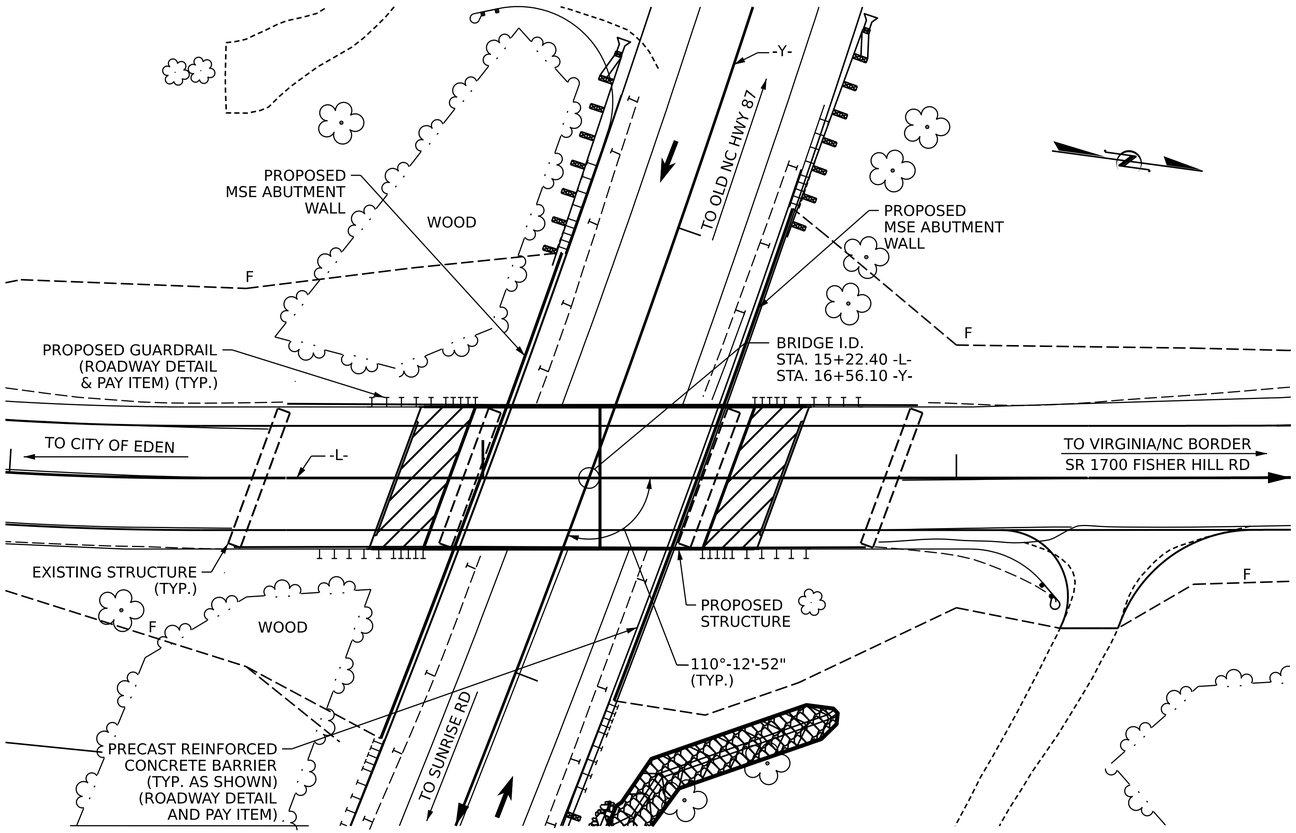
slotfi

BENCH MARK #1: RR SPIKE IN 15" OAK, 108' RIGHT OF STA. 16+17.00 -L-, EL. 723.01'



NOTE:
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

THE ELEVATION(S) AND CLEARANCE(S) SHOWN ON THE PLANS AT THE POINT(S) OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATION(S) ON THE EXISTING PAVEMENT AND CHECK THE CLEARANCE. REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

FOR MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE, 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.

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

THE EXISTING STRUCTURE CONSISTING OF REINFORCED CONCRETE DECK ON I-BEAMS WITH SPAN LENGTHS OF 46 FT, 50.5 FT, AND 40 FT WITH A CLEAR ROADWAY WIDTH OF 32.5 FT ON A REINFORCED CONCRETE CAP ONSTEEL PILE END BENTS AND REINFORCED CONCRETE CAP ON REINFORCED CONCRETE COLUMNS ON FOOTING AND PILE BENTS AND LOCATED AT THE EXISTING STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT.

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

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 15+22.40 -L-."

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

FOR THERMAL SPRAY COATING (METALLIZATION), SEE SPECIAL PROVISIONS.

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

SAMPLE BAR REPLACEMENT

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

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

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STA. 15+22.40 -L-	ASBESTOS ASSESSMENT	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS STA. 15+22.40 -L-	REINFORCING STEEL	36" PRESTRESSED CONCRETE GIRDER		PILE DRIVING EQUIPMENT SET UP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		DYNAMIC PILE TESTING	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS
	LUMP SUM	LUMP SUM	SQ. FT	SQ. FT	CU. YDS	LUMP SUM	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	EA.	LIN. FT.	SQ. YDS	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			1,885	2131		LUMP SUM		4	222.875					113.4		LUMP SUM	LUMP SUM
END BENT 1					33.7		4652			8	8	480			10.1		
END BENT 2					33.7		4652			8	8	480			10.1		
TOTAL	LUMP SUM	LUMP SUM	1,885	2131	67.4	LUMP SUM	9304	4	222.875	16	16	960	1	113.4	20.2	LUMP SUM	LUMP SUM

PROJECT NO. BR-0096
ROCKINGHAM COUNTY
STATION: 15+22.40 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR1700
OVER NC14/NC87 BETWEEN
CITY OF EDEN AND
VIRGINIA/NC BORDER

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B70DADB65D584EF...
10/31/2025

DRAWN BY : S. LOTFI DATE : 08/2025
CHECKED BY : F. LEA DATE : 08/2025
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 08/2024

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-04
1			3			TOTAL SHEETS
2			4			24

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE							COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVELOAD FACTORS (γLL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS (γLL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inventory)	N/A	1	1.25	--	1.75	0.737	1.38	A	2	21.75	0.953	1.25	A	2	14.33	0.80	0.737	1.25	A	2	27.19	
		HL-93(Operating)	N/A	--	1.62	--	1.35	0.737	1.79	A	2	21.75	0.953	1.62	A	2	14.33	N/A	--	--	--	--	--	
		HS-20(Inventory)	36.000	2	1.46	52.71	1.75	0.737	1.72	A	2	21.75	0.953	1.46	A	2	14.33	0.80	0.737	1.57	A	2	27.19	
		HS-20(Operating)	36.000	--	1.90	68.33	1.35	0.737	2.23	A	2	21.75	0.953	1.90	A	2	14.33	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.30	44.54	1.40	0.737	4.59	A	2	21.75	0.953	3.92	A	2	18.33	0.80	0.737	3.30	A	2	27.19	
		SNGARBS2	20.000	--	2.56	51.16	1.40	0.737	3.47	A	2	21.75	0.953	2.92	A	2	18.33	0.80	0.737	2.56	A	2	27.19	
		SNAGRIS2	22.000	--	2.47	54.26	1.40	0.737	3.30	A	2	21.75	0.953	2.77	A	2	18.33	0.80	0.737	2.47	A	2	27.19	
		SNCOTTS3	27.250	--	1.64	44.81	1.40	0.737	2.31	A	2	21.75	0.953	1.97	A	2	18.33	0.80	0.737	1.64	A	2	27.19	
		SNAGGRS4	34.925	--	1.41	49.31	1.40	0.737	1.97	A	2	21.75	0.953	1.73	A	2	18.33	0.80	0.737	1.41	A	2	27.19	
		SNS5A	35.550	--	1.38	48.99	1.40	0.737	1.95	A	2	21.75	0.953	1.81	A	2	14.33	0.80	0.737	1.38	A	2	27.19	
		SNS6A	39.950	--	1.28	51.17	1.40	0.737	1.80	A	2	21.75	0.953	1.68	A	2	14.33	0.80	0.737	1.28	A	2	27.19	
		SNS7B	42.000	--	1.22	51.25	1.40	0.737	1.72	A	2	21.75	0.953	1.70	A	2	14.33	0.80	0.737	1.22	A	2	27.19	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.57	51.70	1.40	0.737	2.24	A	2	21.75	0.953	1.98	A	2	14.33	0.80	0.737	1.57	A	2	27.19	
		TNT4A	33.075	--	1.58	52.20	1.40	0.737	2.18	A	2	21.75	0.953	1.89	A	2	18.33	0.80	0.737	1.58	A	2	27.19	
		TNT6A	41.600	--	1.31	54.35	1.40	0.737	1.83	A	2	21.75	0.953	1.90	A	2	14.33	0.80	0.737	1.31	A	2	27.19	
		TNT7A	42.000	--	1.32	55.52	1.40	0.737	1.84	A	2	21.75	0.953	1.74	A	2	14.33	0.80	0.737	1.32	A	2	27.19	
		TNT7B	42.000	--	1.38	57.95	1.40	0.737	1.87	A	2	21.75	0.953	1.63	A	2	14.33	0.80	0.737	1.38	A	2	27.19	
		TNAGRIT4	43.000	--	1.31	56.14	1.40	0.737	1.78	A	2	21.75	0.953	1.56	A	2	14.33	0.80	0.737	1.31	A	2	27.19	
		TNAGT5A	45.000	--	1.22	55.05	1.40	0.737	1.72	A	2	21.75	0.953	1.61	A	2	14.33	0.80	0.737	1.22	A	2	27.19	
		TNAGT5B	45.000	3	1.20	54.08	1.40	0.737	1.67	A	2	21.75	0.953	1.48	A	2	14.33	0.80	0.737	1.20	A	2	27.19	
EV LOAD RATING		EV2	28.750	--	1.82	52.35	1.30	0.737	2.64	A	2	21.75	0.953	2.23	A	2	18.33	0.80	0.737	1.82	A	2	27.19	
		EV3	43.000	4	1.18	50.81	1.30	0.737	1.77	A	2	21.75	0.953	1.51	A	2	18.33	0.80	0.737	1.18	A	2	27.19	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	ϒDC	ϒDW
	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.

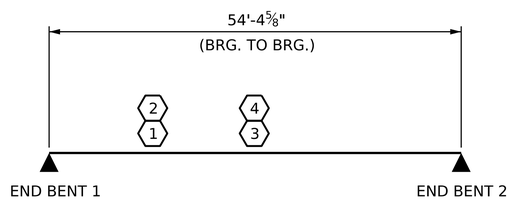
(#) CONTROLLING LOAD RATING

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

* * SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

2 - INTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

10/31/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

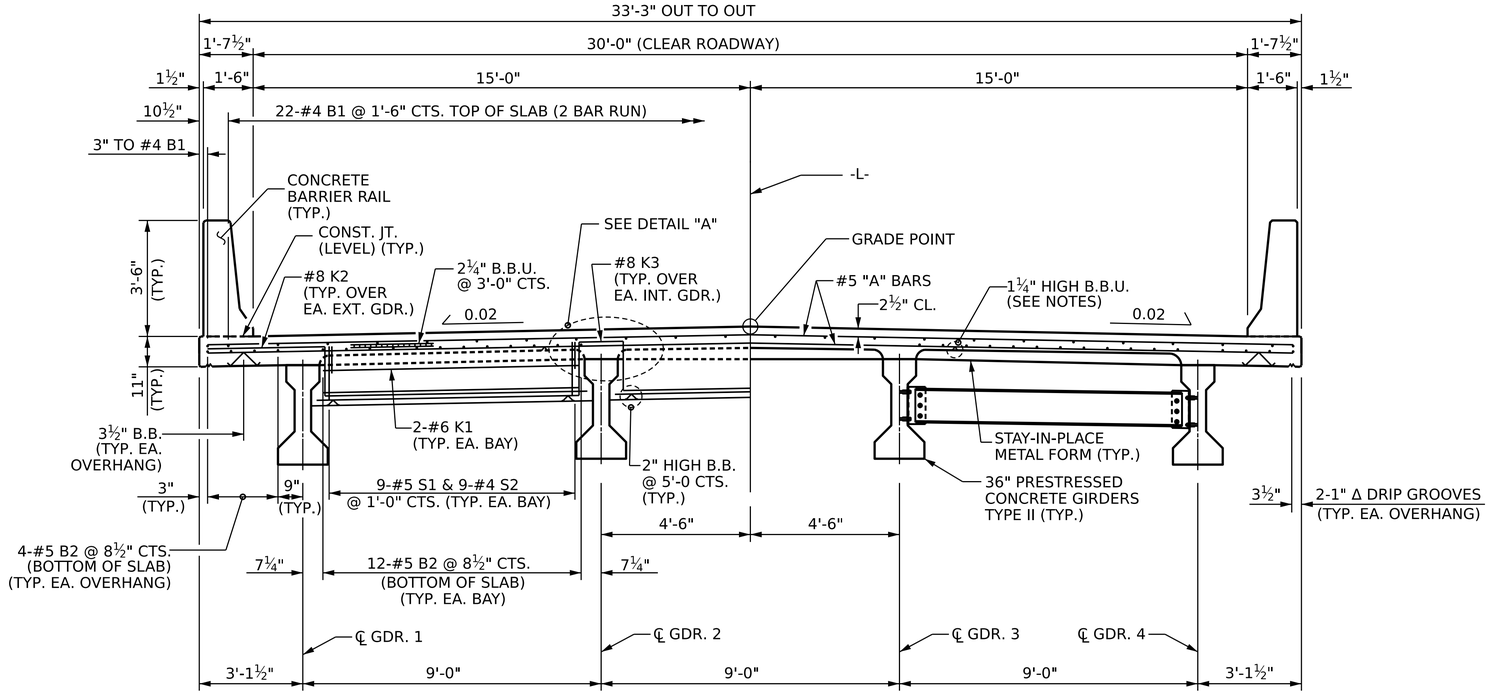
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-05
1			3			TOTAL SHEETS
2			4			24

ASSEMBLED BY : S. LOTFI DATE : 08/2025
CHECKED BY : F. LEA DATE : 08/2025
DRAWN BY : MAA 1/08
CHECKED BY : GM/DI 2/08
REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM

STD. NO. LRFR1



PARTIAL TYPICAL SECTION END BENT DIAPHGRAM

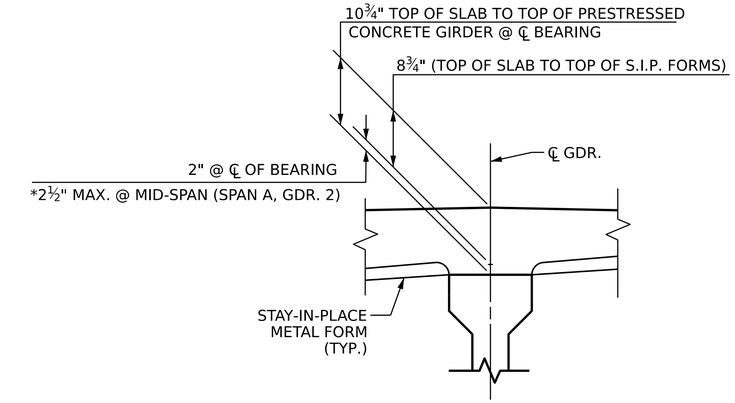
PARTIAL TYPICAL SECTION INTERMEDIATE DIAPHGRAM

NOTES

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

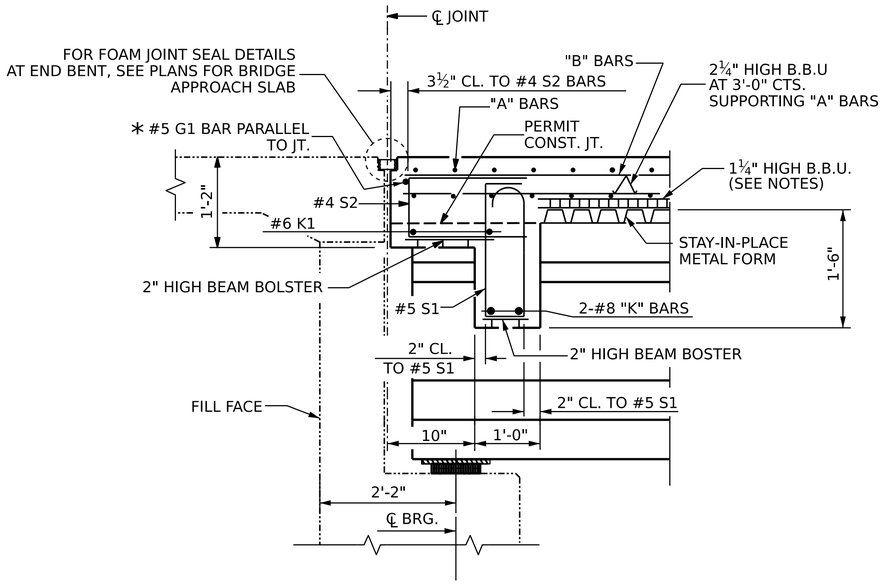
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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.



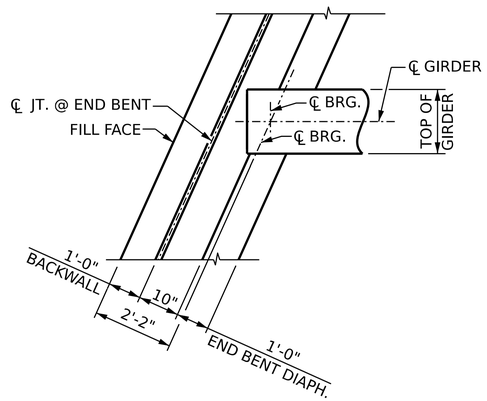
DETAIL "A"

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



SECTION @ END BENT

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



PLAN @ END BENT

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-06
1			3			TOTAL SHEETS
2			4			24

DRAWN BY : Q. T. NGUYEN DATE : 05/2024
CHECKED BY : F. LEA / S. LOTFI DATE : 05/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 11/2023

10/31/2025
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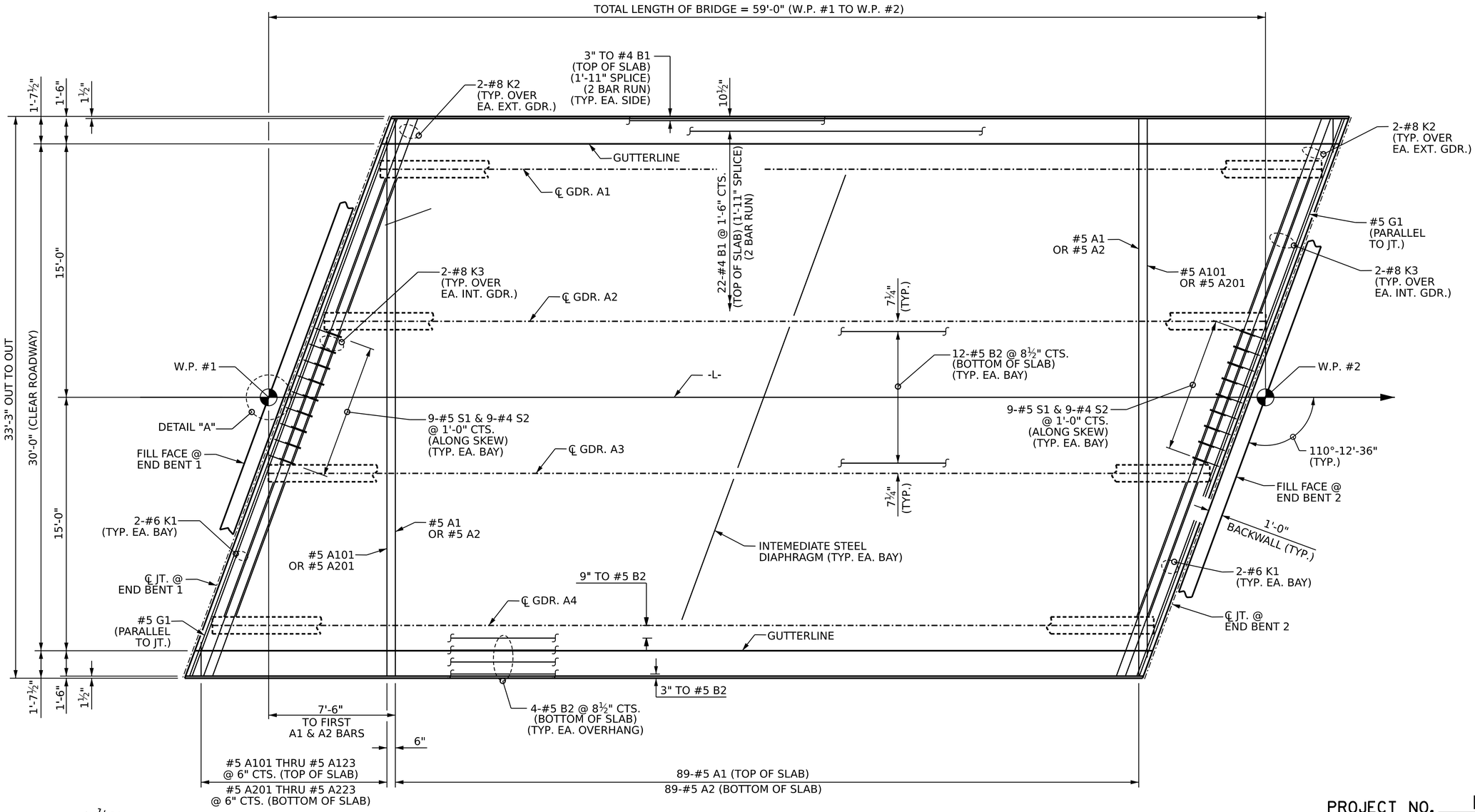

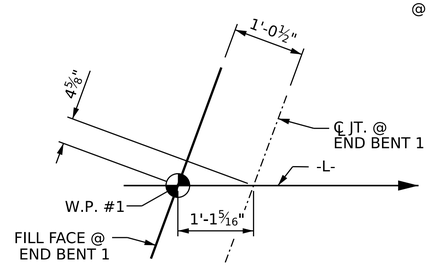

DETAIL "A"

PLAN OF SPAN A

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

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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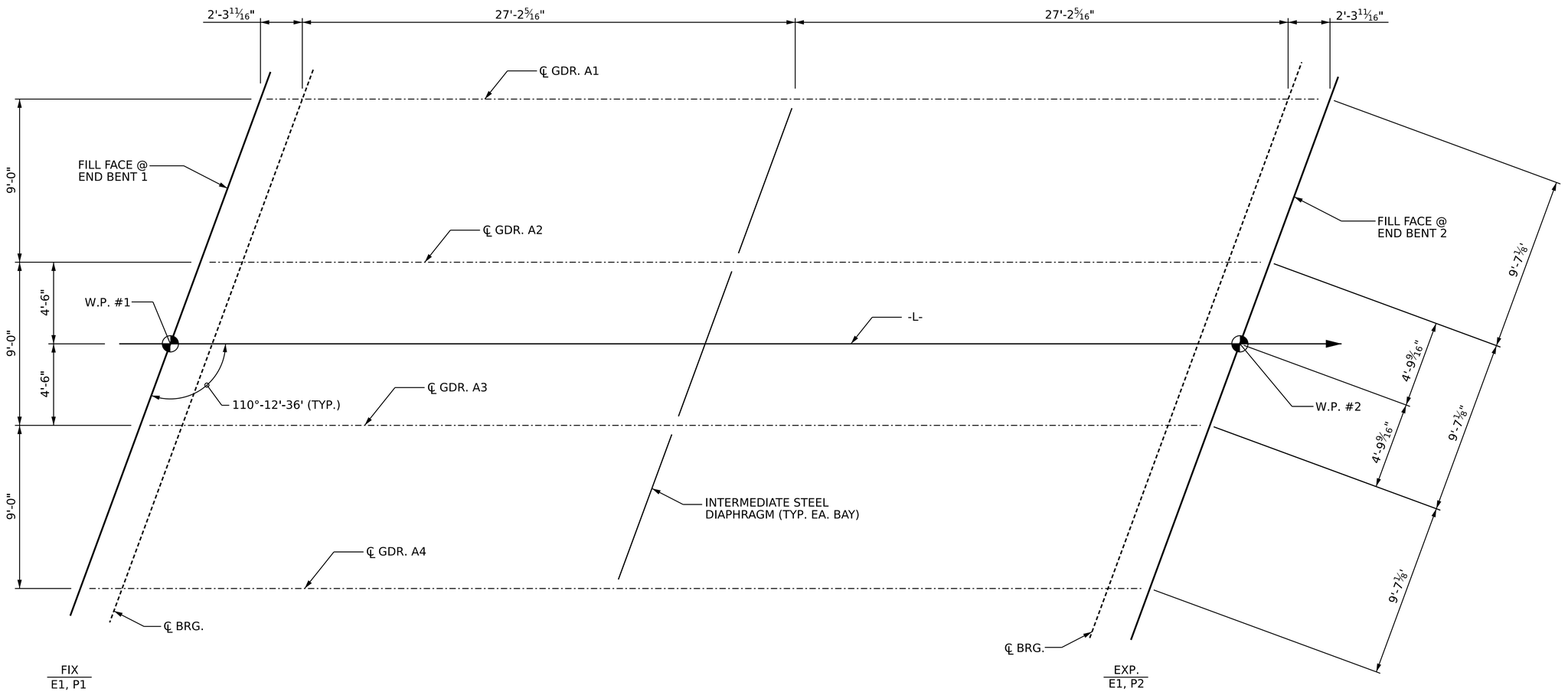
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-07
1			3			TOTAL SHEETS
2			4			24

DRAWN BY : Q. T. NGUYEN DATE : 05/2024
CHECKED BY : Z. MALIK / S. LOTFI DATE : 10/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 05/2024



FRAMING PLAN

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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10/31/2025

DRAWN BY : Q. T. NGUYEN DATE : 05/2024
CHECKED BY : Z. MALIK / S. LOTFI DATE : 05/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 11/2023

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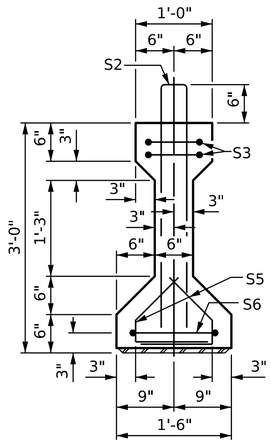
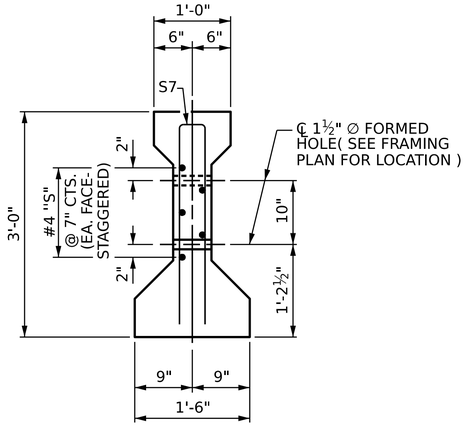
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-08
1			3			TOTAL SHEETS
2			4			24



SECTION A-A

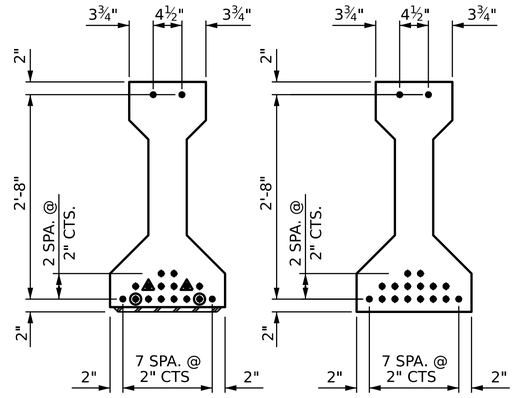


SECTION C-C

(S1 BARS NOT SHOWN)

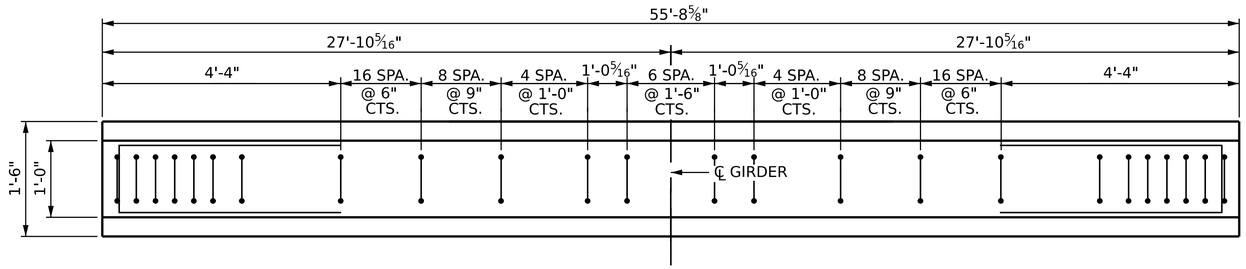
DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

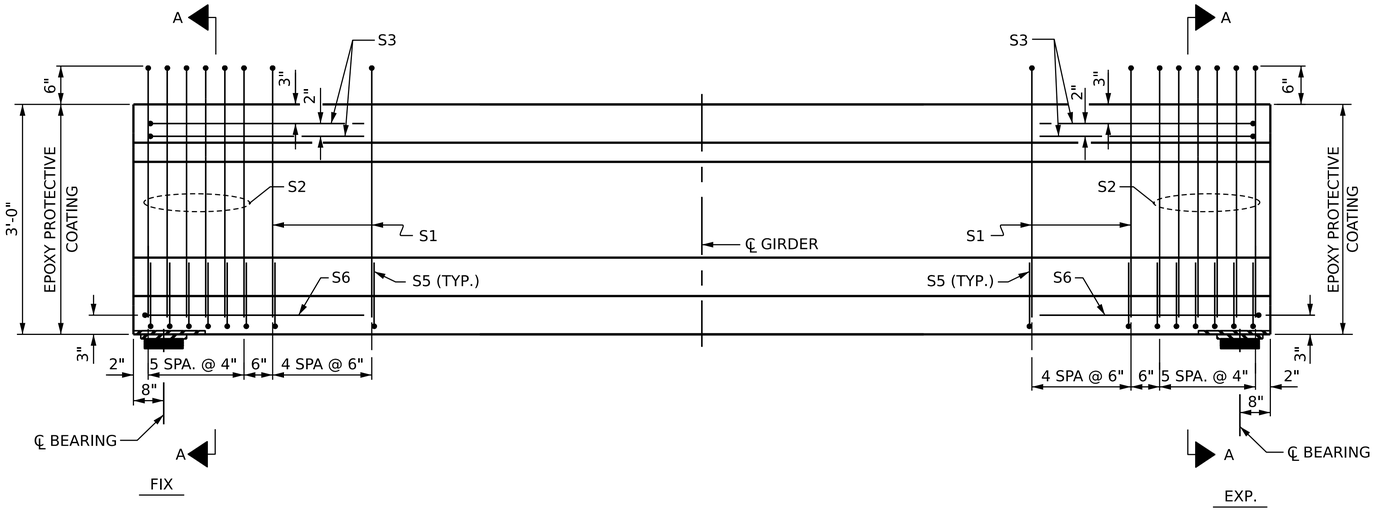


AT END OF GIRDER AT ℄ OF GIRDER

0.6" ∅ LOW RELAXATION STRAND LAYOUT

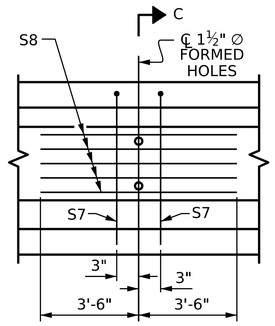


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDER

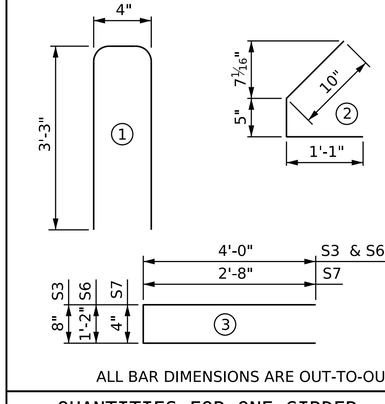
0.6"⌀ L.R. GRADE 270 STRANDS

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

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	73	#4	1	6'-10"	333
S2	12	#5	1	6'-10"	86
S3	4	#4	3	8'-8"	23
S5	44	#4	2	2'-4"	69
S6	2	#4	3	9'-2"	12
S7	2	#5	3	5'-8"	12
S8	5	#4	STR	7'-0"	23

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	7000 PSI CONCRETE	0.6" ∅ L. R. STRANDS
	LB.	C.Y.	No.
GIRDER	558	73	18

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	55'-8⅝"	222'-10½"

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE II PRESTRESSED CONCRETE GIRDER

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B78DAD865D584EF...

10/31/2025

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-09
1			3			TOTAL SHEETS
2			4			24

STD. NO. PCG4 (SHT. 3)

ASSEMBLED BY : Z. MALIK/S. LOTFI	DATE : 5/2024		
CHECKED BY : F. LEA	DATE : 5/2024		
DRAWN BY : ELR 8/91	REV. 1/15	MAA/TMC	
CHECKED BY : GRP 8/91	REV. 12/17	MAA/THC	
	REV. 11/21	BNB/AAI	

10/31/2025
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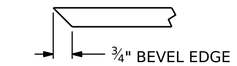
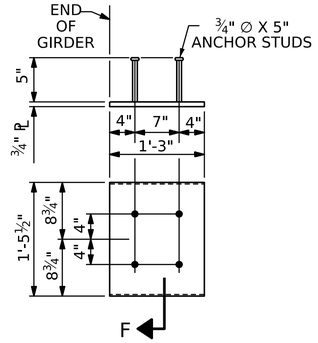


SECTION "F"

(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE II 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 BOTH SIDES AND BOTTOM OF END 2 FEET OF GIRDER AND END OF GIRDER SURFACES AS 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.

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5500 PSI.

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

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼".

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																				
	GIRDER 1 AND 4																				
TWENTIETH POINTS	0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.02	0.038	0.056	0.073	0.087	0.10	0.109	0.117	0.121	0.122	0.121	0.117	0.109	0.10	0.087	0.073	0.056	0.038	0.02	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.011	0.022	0.033	0.042	0.051	0.058	0.064	0.068	0.07	0.071	0.07	0.068	0.064	0.058	0.051	0.042	0.033	0.022	0.011	0
FINAL CAMBER ↑	0"	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	5/8"	5/8"	5/8"	9/16"	9/16"	1/2"	7/16"	3/8"	5/16"	3/16"	1/8"	0"

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN A																				
	GIRDER 2 AND 3																				
TWENTIETH POINTS	0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.019	0.038	0.056	0.072	0.087	0.099	0.109	0.116	0.12	0.122	0.12	0.116	0.109	0.099	0.087	0.072	0.056	0.038	0.019	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.013	0.026	0.038	0.048	0.058	0.066	0.073	0.078	0.081	0.082	0.081	0.078	0.073	0.066	0.058	0.048	0.038	0.026	0.013	0
FINAL CAMBER ↑	0"	1/16"	1/8"	1/4"	5/16"	5/16"	3/8"	7/16"	7/16"	1/2"	1/2"	1/2"	7/16"	7/16"	3/8"	5/16"	5/16"	1/4"	1/8"	1/16"	0"

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

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER DETAILS AND DEADLOAD DEFLECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			24

ASSEMBLED BY :	Z. MALIK / S. LOTFI	DATE :	04/2024
CHECKED BY :	F. LEA	DATE :	05/2024
DRAWN BY :	ELR 11/91	REV. 2/15	MAA/TMG
CHECKED BY :	GRP 11/91	REV. 12/17	MAA/THC
		REV. 10/23	BNB/AKP

10/31/2025
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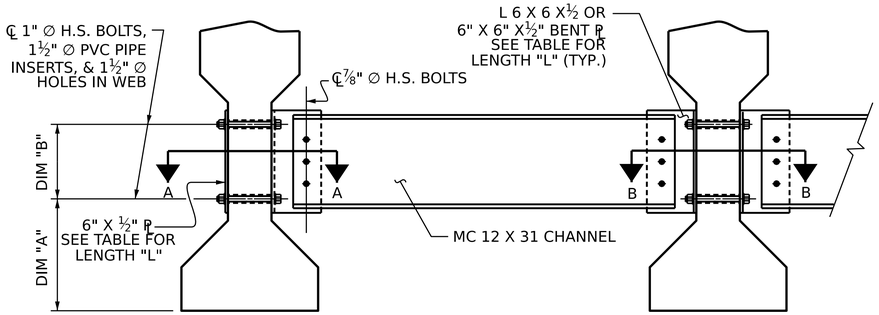
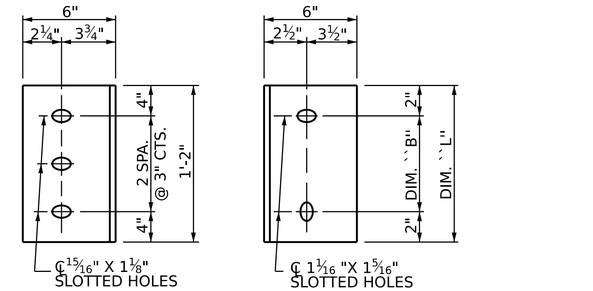
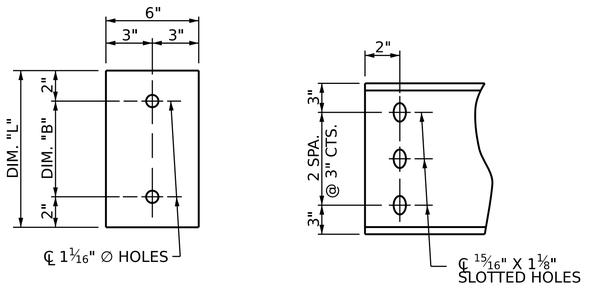
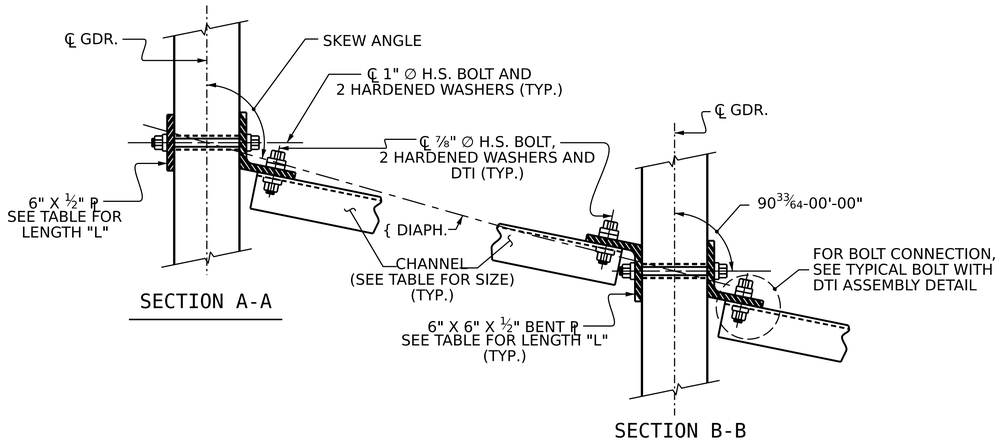


PART SECTION AT INTERMEDIATE DIAPHRAGM

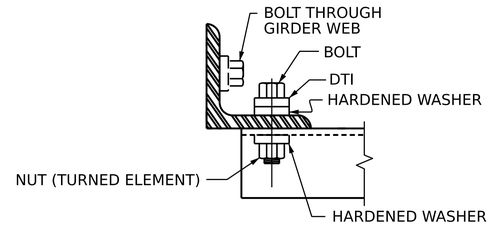


CONNECTOR PLATE DETAILS





CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

TENSION ON THE ASTM A325 BOLTS THROUGH THE CHANNEL 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 ADDITIONAL¼ TURN.

THE PLATES, BENT PLATES, CHANNELS, 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"
II	MC 12 x 31	1'-2½"	10"	1'-2"

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

Docusigned by: Francesca Lea 10/31/2025

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

INTERMEDIATE
STEEL DIAPHRAGMS
FOR TYPE II
PRESTRESSED CONCRETE
GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			24

ASSEMBLED BY: Z.MALIK/S.LOTFI DATE : 04/2024
CHECKED BY: F. LEA DATE : 05/2024

DRAWN BY : TLA 6/05
CHECKED BY : VC 6/05

REV. 5/1/06RRR KMM/GM
REV. 10/1/11 MAA/GM
REV. 12/17 MAA/THC

10/31/2025
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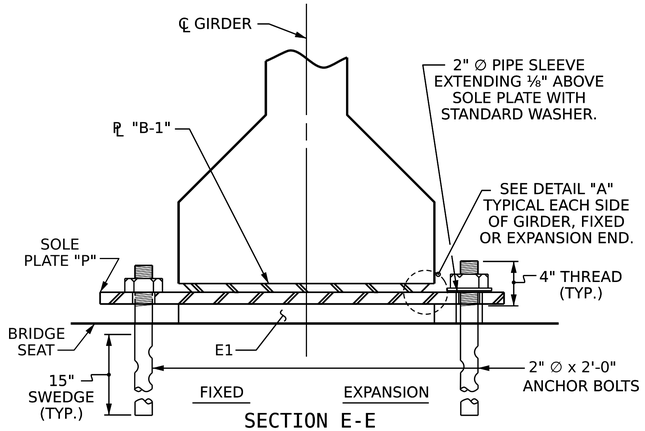
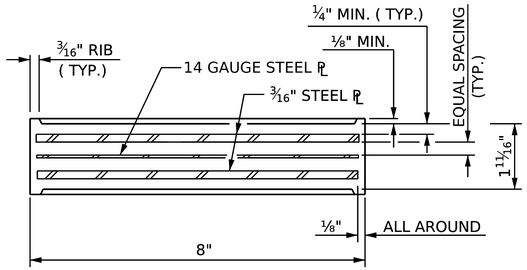
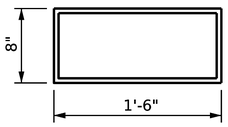
STD. NO. PCG10 (SHT 4)



SECTION E-E



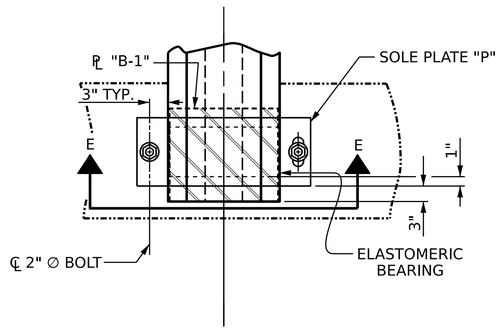
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

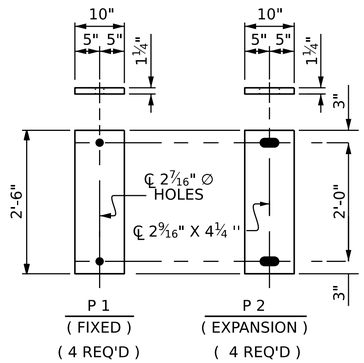
TYPE III



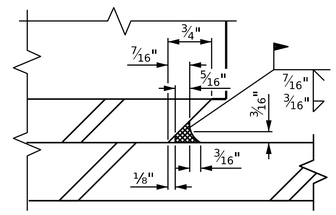
TYPICAL HALF-PLAN (SHOWING FIXED BENT)

TYPICAL HALF-PLAN (SHOWING EXPANSION BENT)

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE III	205 k



SOLE PLATE DETAILS ("P")



DETAIL "A"

NOTES

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

THE 2" ∅ 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.

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B790ADB6E0584EF...

10/31/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			24

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CHECKED BY :	F. LEA / S. LOTFI	DATE : 10/2024
DESIGN ENGINEER OF RECORD:	Z. MALIK	DATE : 05/2024

10/31/2025
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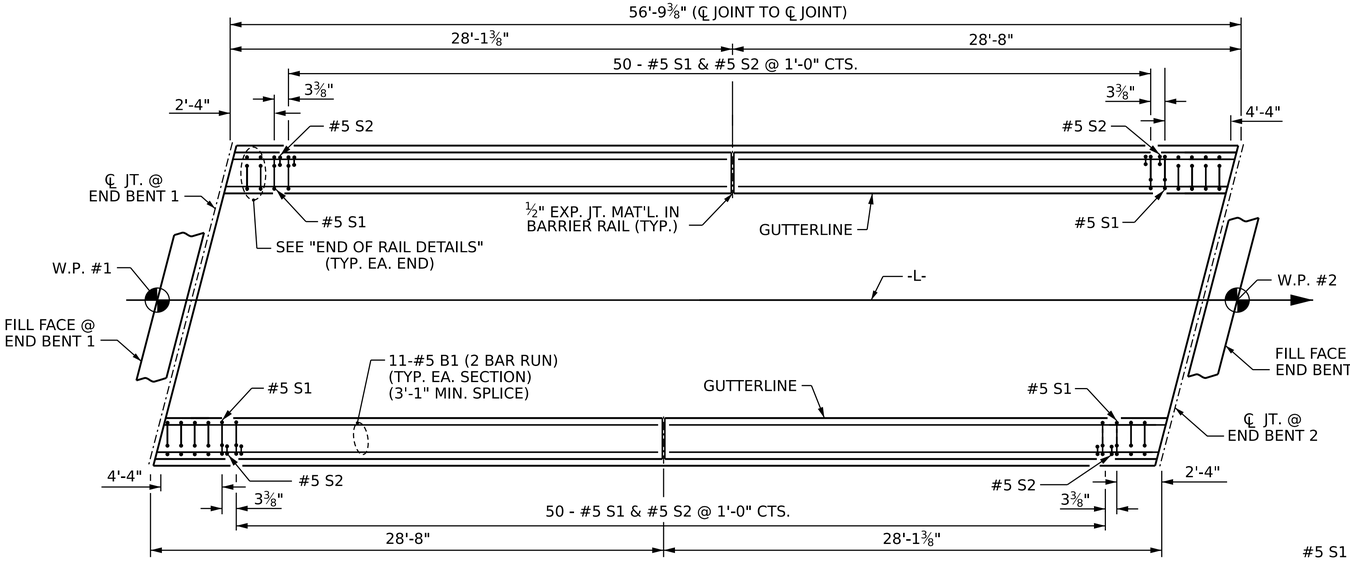
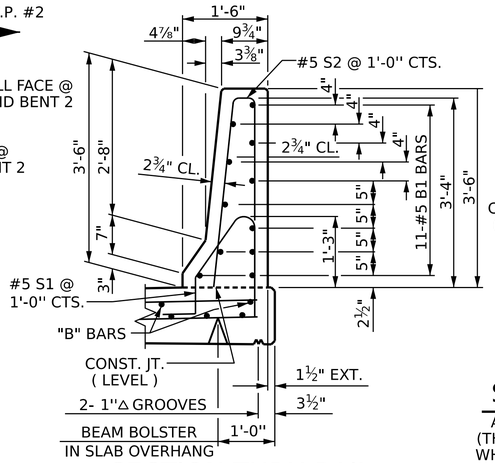
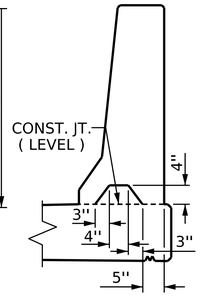
STD. NO. EB3 (SHT. 2)



PLAN OF BARRIER RAIL



SECTION THRU RAIL



SECTION S-S

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

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.

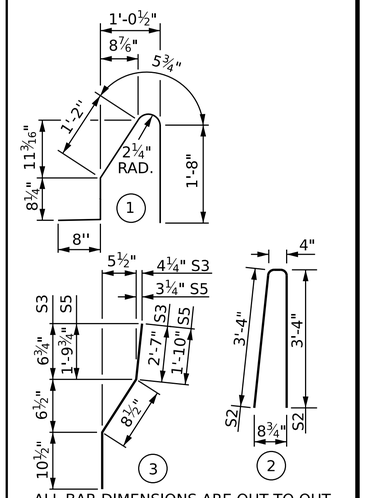
WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

GROOVED CONTRACTION JOINTS, 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.

BAR TYPES



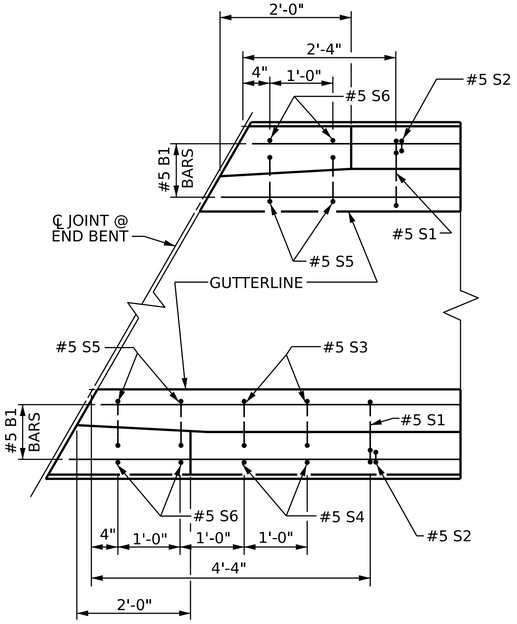
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

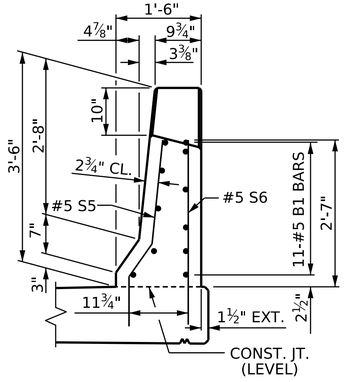
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	88	#5	STR	15'-8"	1438
* S1	104	#5	1	4'-6"	488
* S2	104	#5	2	7'-0"	759
* S3	4	#5	3	4'-2"	17
* S4	4	#5	STR	4'-0"	17
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27

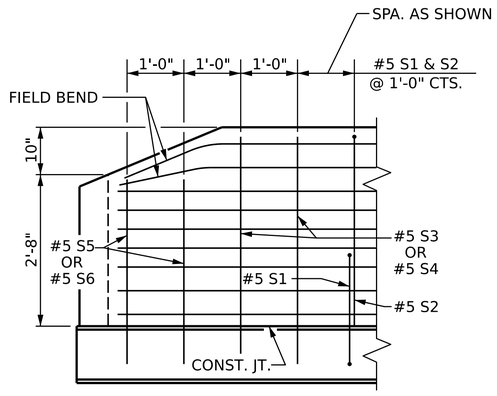
* EPOXY COATED REINFORCING STEEL	2775 LBS.
CLASS AA CONCRETE	15.4 CU. YDS.
CONCRETE BARRIER RAIL	113.4 LIN. FT.



PLAN



END VIEW

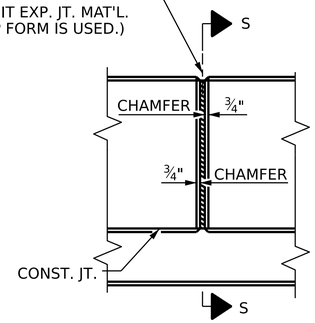


SIDE VIEW

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

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



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

PROJECT NO. BR-0096
ROCKINGHAM COUNTY
STATION: 15+22.40 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea
10/31/2025

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CHECKED BY : F. LEA / S. LOTFI DATE : 10/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 10/2024

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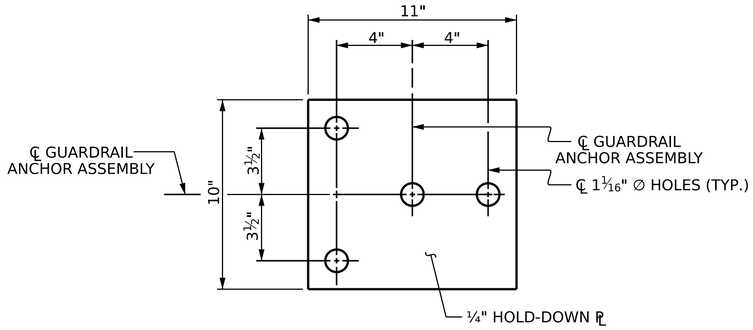
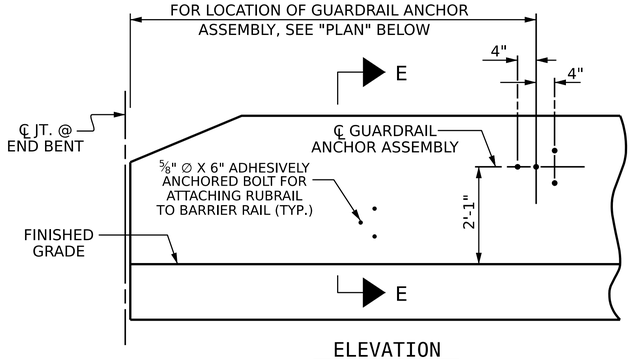
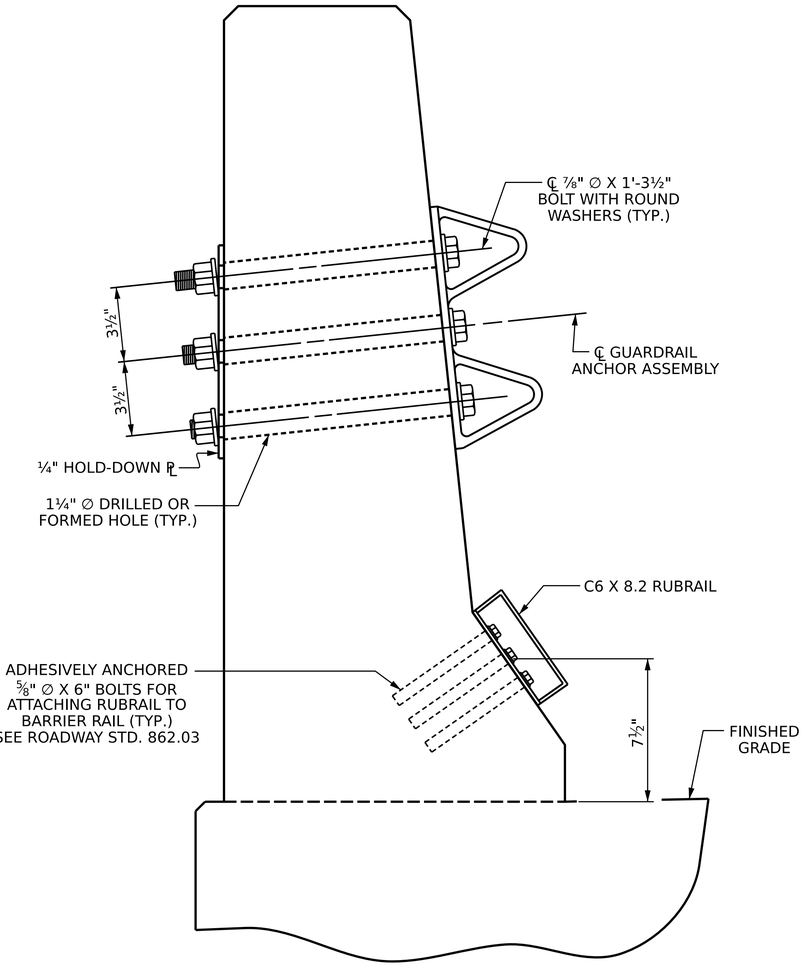
STD. CBR1 Sht.2



PLAN

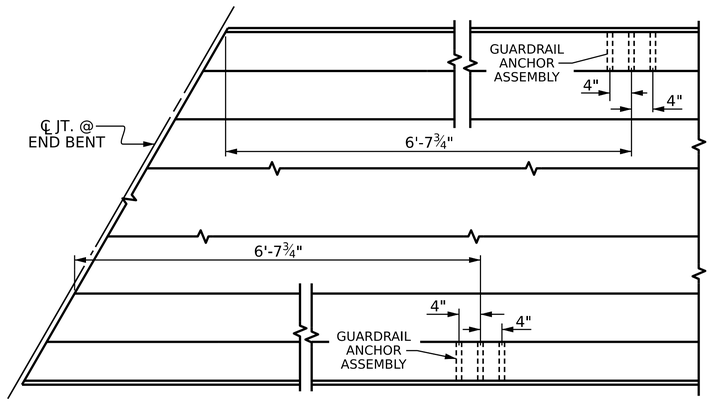


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼" HOLD-DOWN PLATE AND 4 -⅞"∅ 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" ∅ 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.)

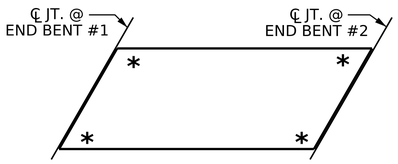
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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'' ∅ 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" ∅ X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ⅝" ∅ BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SKETCH SHOWING POINTS OF ATTACHMENTS

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

10/31/2025

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CHECKED BY : F. LEA	DATE : 10/2024	
DRAWN BY : TLA 5/06	REV. 12/17	MAA/THC
CHECKED BY : GM 5/06	REV. 6/22	BNB/AAI
	REV. 7/24	BNB/JDH

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STD. NO. GRA2 (SHT 1b)

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
	POUR 1		
SPAN A	63.0	6,452	6,196
TOTAL **	63.0	6,452	6,196

** QUANTITIES FOR BRIDGE RAIL NOT INCLUDED

GROOVING BRIDGE FLOORS

APPROACH SLABS	610	SQ.FT.
BRIDGE DECK	1521	SQ.FT.
TOTAL	2131	SQ.FT.

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"			

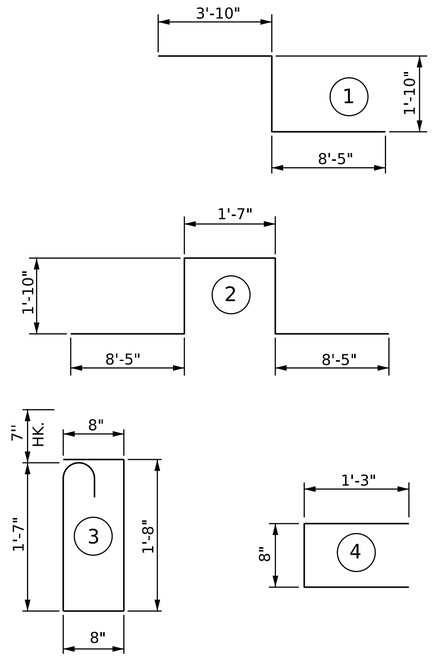
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	89	5	STR	32'-11"	3056	A207	2	5	STR	23'-8"	49
A2	89	5	STR	32'-11"	3056	A208	2	5	STR	22'-4"	47
						A209	2	5	STR	21'-0"	44
* A101	2	5	STR	31'-10"	66	A210	2	5	STR	19'-7"	41
* A102	2	5	STR	30'-6"	64	A211	2	5	STR	18'-3"	38
* A103	2	5	STR	29'-1"	61	A212	2	5	STR	16'-11"	35
* A104	2	5	STR	27'-9"	58	A213	2	5	STR	15'-6"	32
* A105	2	5	STR	26'-5"	55	A214	2	5	STR	14'-2"	30
* A106	2	5	STR	25'-0"	52	A215	2	5	STR	12'-10"	27
* A107	2	5	STR	23'-8"	49	A216	2	5	STR	11'-5"	24
* A108	2	5	STR	22'-4"	47	A217	2	5	STR	10'-1"	21
* A109	2	5	STR	21'-0"	44	A218	2	5	STR	8'-9"	18
* A110	2	5	STR	19'-7"	41	A219	2	5	STR	7'-5"	15
* A111	2	5	STR	18'-3"	38	A220	2	5	STR	6'-0"	13
* A112	2	5	STR	16'-11"	35	A221	2	5	STR	4'-8"	10
* A113	2	5	STR	15'-6"	32	A222	2	5	STR	3'-4"	7
* A114	2	5	STR	14'-2"	30	A223	2	5	STR	1'-11"	4
* A115	2	5	STR	12'-10"	27						
* A116	2	5	STR	11'-5"	24	* B1	48	4	STR	29'-2"	935
* A117	2	5	STR	10'-1"	21	B2	44	5	STR	56'-4"	2585
* A118	2	5	STR	8'-9"	18						
* A119	2	5	STR	7'-5"	15	* G1	2	5	STR	35'-0"	73
* A120	2	5	STR	6'-0"	13						
* A121	2	5	STR	4'-8"	10	* K1	12	6	STR	8'-0"	144
* A122	2	5	STR	3'-4"	7	* K2	8	8	1	14'-1"	301
* A123	2	5	STR	1'-11"	4	* K3	8	8	2	22'-1"	472
A201	2	5	STR	31'-10"	66	* S1	54	3	3	5'-2"	291
A202	2	5	STR	30'-6"	64	* S2	54	4	4	3'-2"	114
A203	2	5	STR	29'-1"	61						
A204	2	5	STR	27'-9"	58						
A205	2	5	STR	26'-5"	55						
A206	2	5	STR	25'-0"	52						

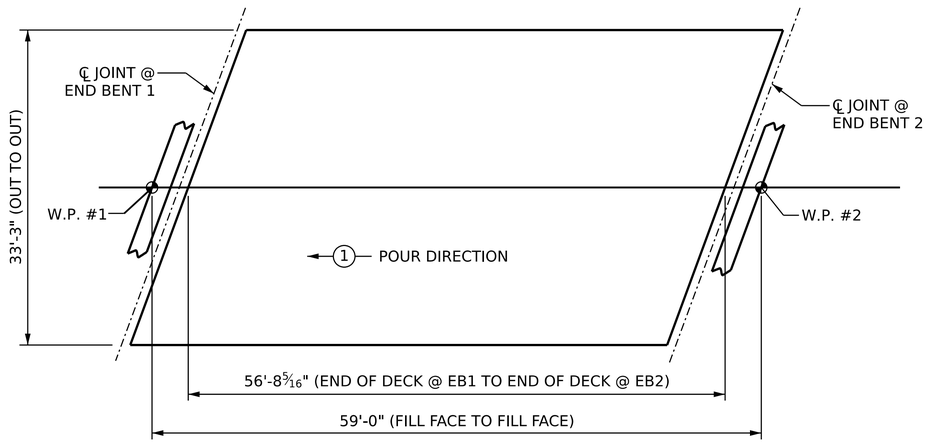
REINFORCING STEEL 6,452 LBS.

* EPOXY COATED REINFORCING STEEL 6,196 LBS.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT



POUR SEQUENCE & LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 1,885)

POUR NUMBER ◯

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

10/31/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
SUPERSTRUCTURE
BILL OF MATERIAL

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			24

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ASSEMBLED BY:	Z. MALIK	DATE :	08/2025
CHECKED BY :	F. LEA	DATE :	08/2025
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

10/31/2025
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STD. NO. BOM2

NOTES

* FOR LOCATION OF ELEVATION BETWEEN BRIDGE SEAT BUILDUPS, SEE SECTION A-A ON SHEET 3 OF 3.

STIRRUPS AND U2 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

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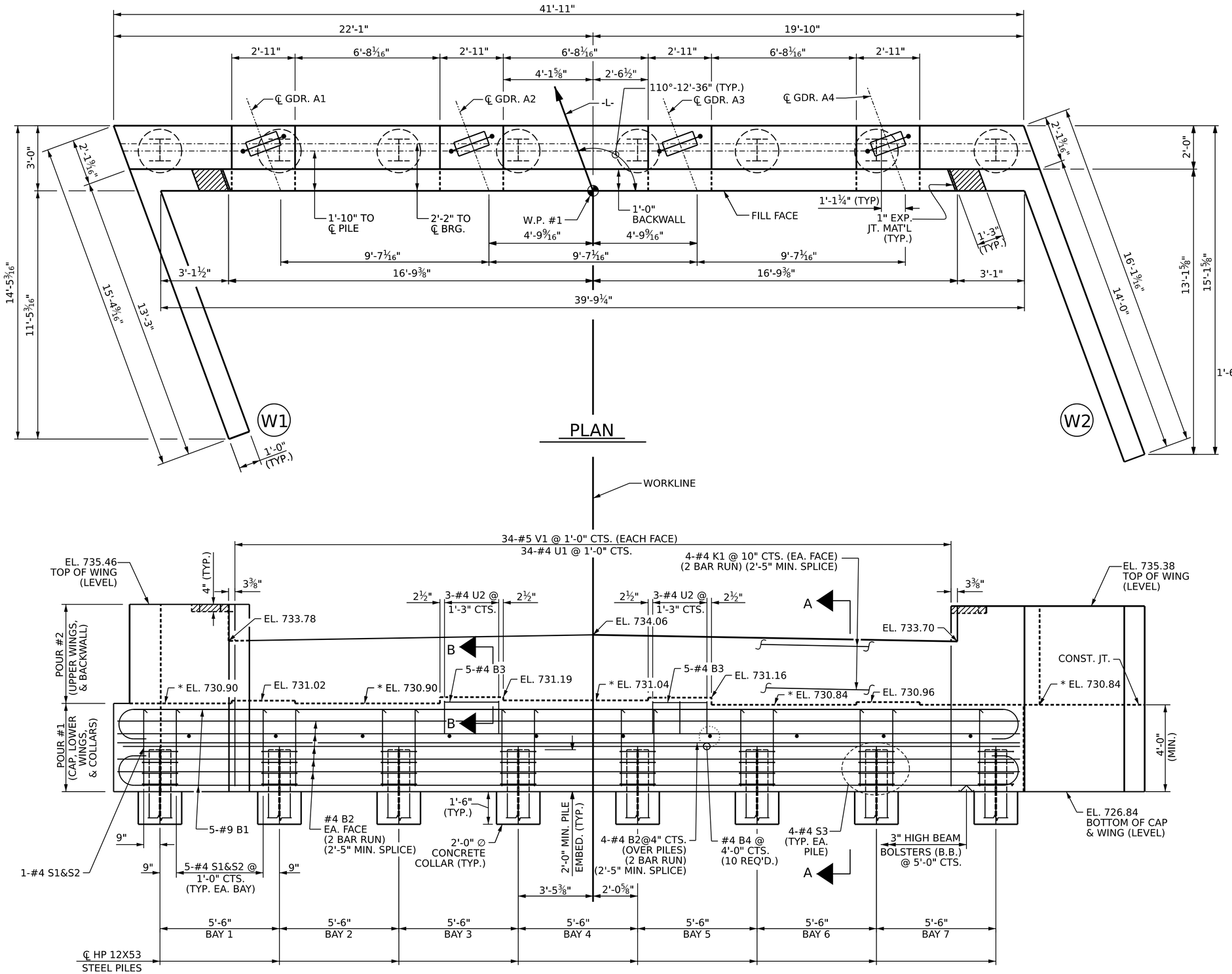
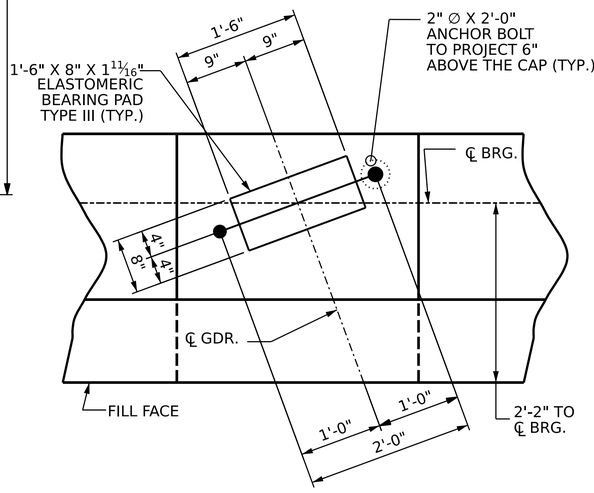


PLAN

ELEVATION

(WING DETAILS NOT SHOWN FOR CLARITY)



DETAIL "A"

(TYP. EA. GDR.)

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D594EF... 10/31/2025

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			24

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CHECKED BY : S. LOTFI / F. LEA DATE : 8/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 5/2023

10/31/2025
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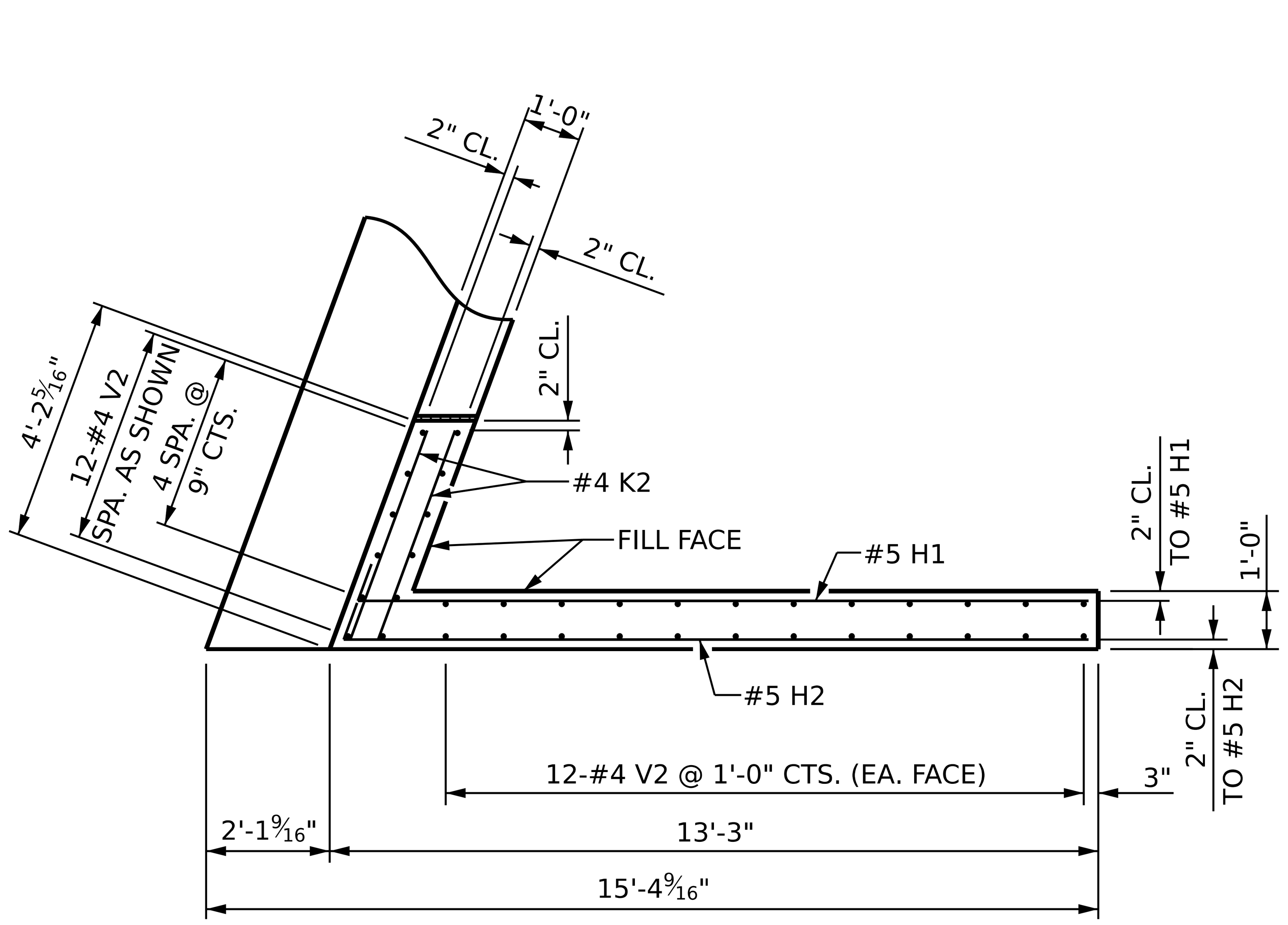
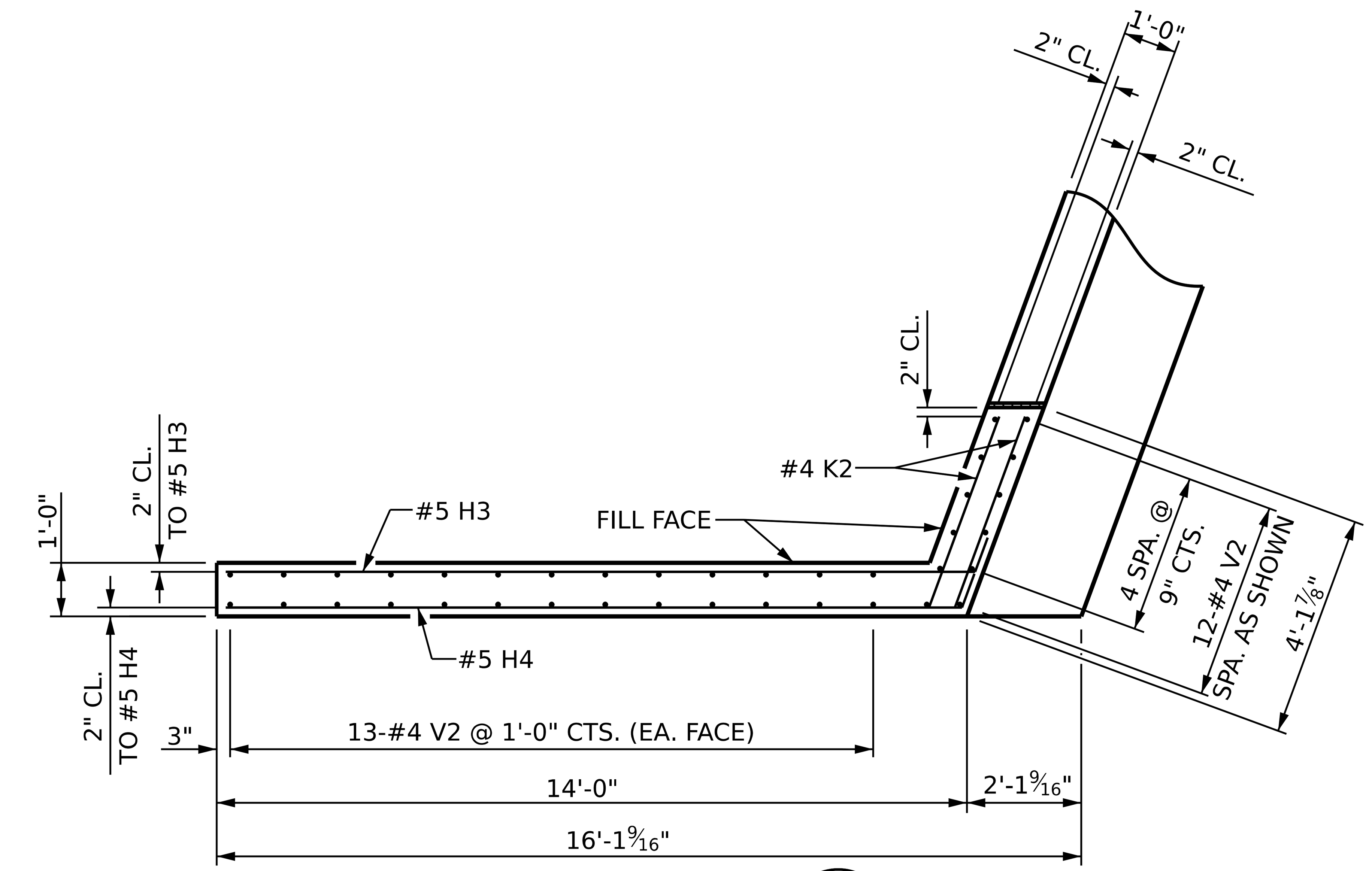
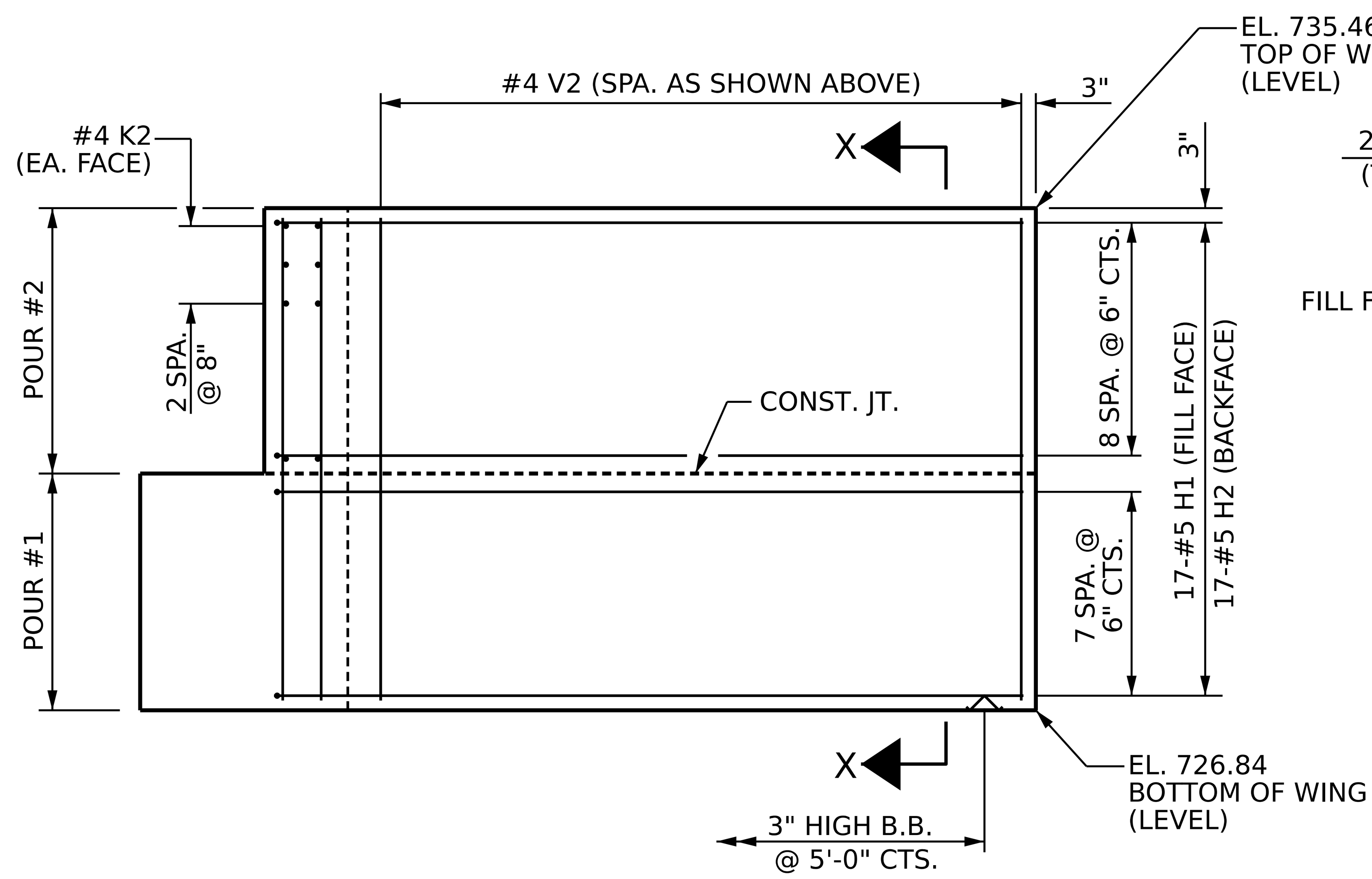


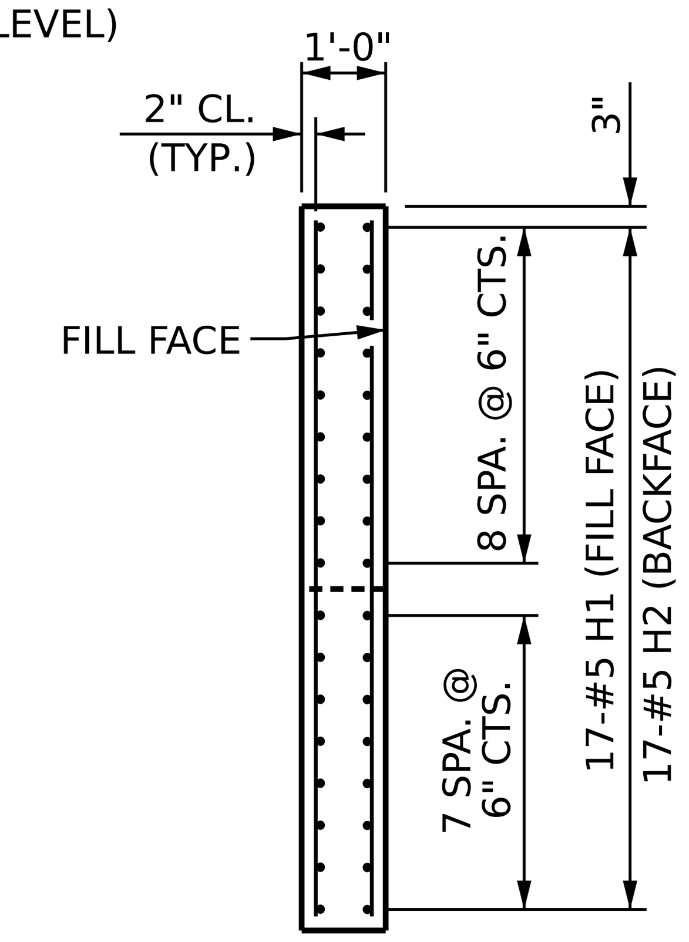
PLAN OF WING W1



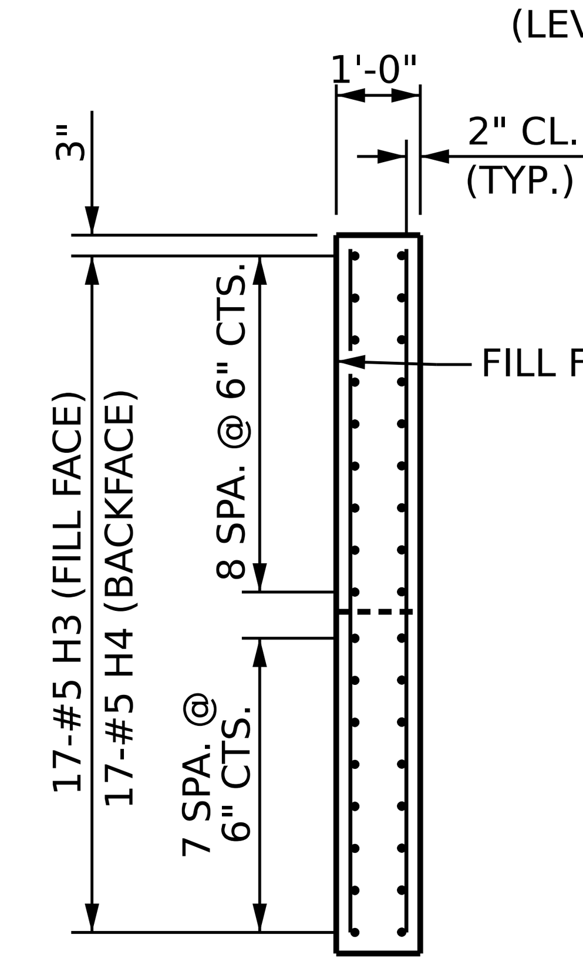
PLAN OF WING W2



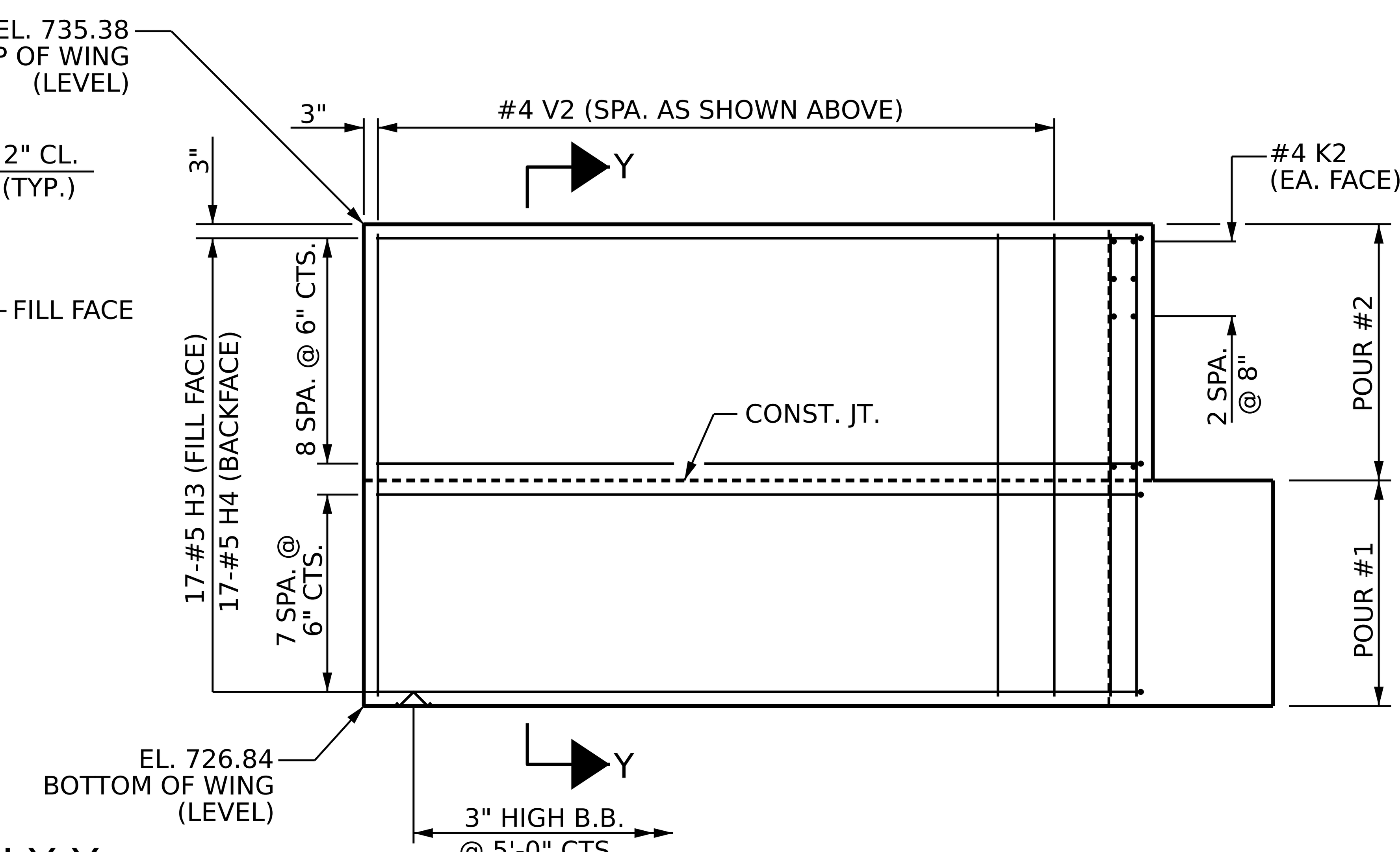
ELEVATION OF WING W1



SECTION X-X



SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea
B79DAD8650584EF...
10/31/2025

REVISIONS								SHEET NO.
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1			3					TOTAL SHEETS
2			4					24

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CHECKED BY : S. LOTFI DATE : 8/2024
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10/31/2025
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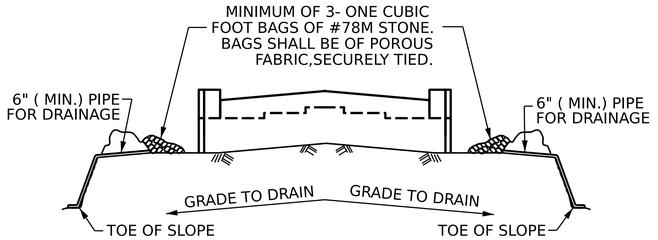

BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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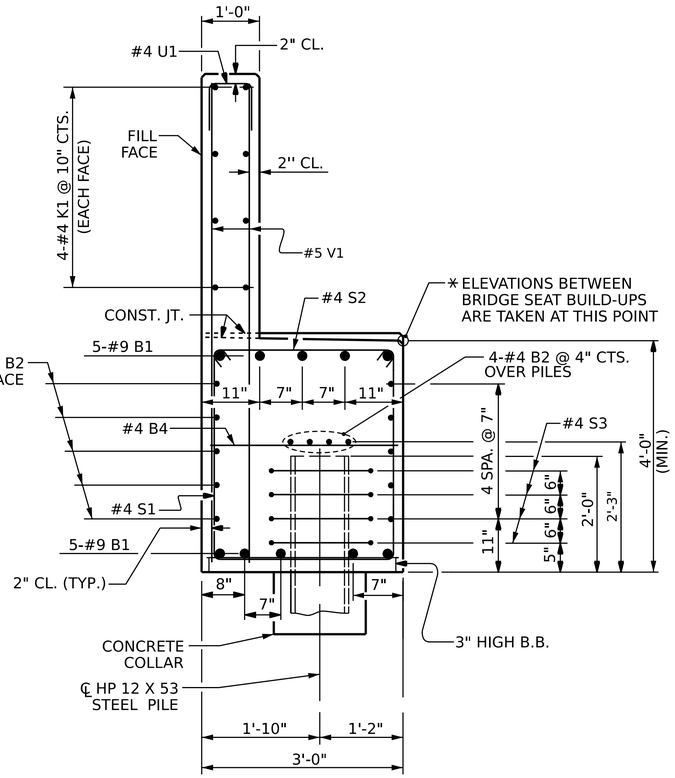
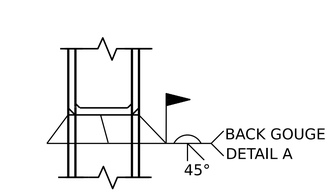
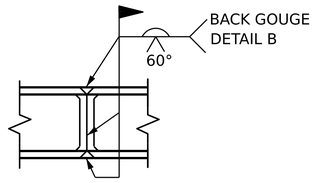
TEMPORARY DRAINAGE AT END BENT



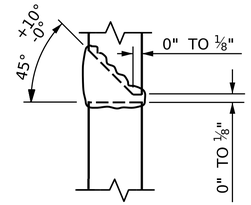
SECTION A-A



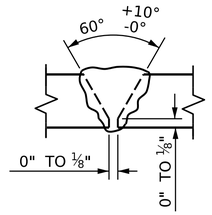
△ PILE VERTICAL



△ PILE HORIZONTAL OR VERTICAL



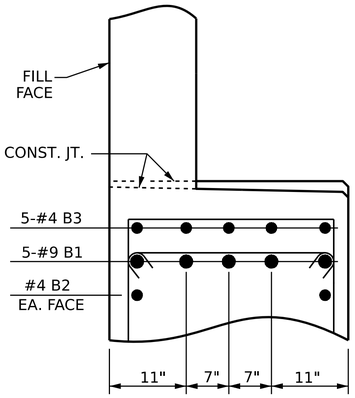
DETAIL A



DETAIL B

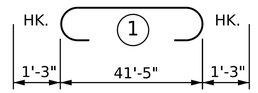
△ POSITION OF PILE DURING WELDING.

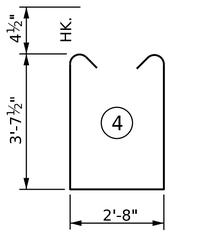
PILE SPLICE DETAILS

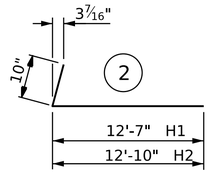


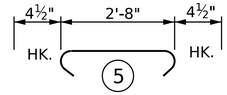
PARTIAL SECTION B-B

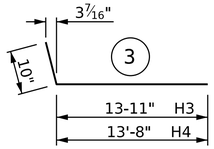
BAR TYPES

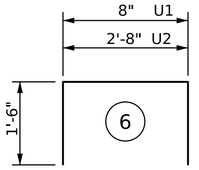


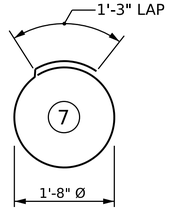












ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#9	1	43'-11"	1493
B2	28	#4	STR	22'-0"	411
B3	10	#4	STR	2'-7"	17
B4	10	#4	STR	2'-8"	18
H1	17	#5	2	13'-5"	238
H2	17	#5	2	13'-8"	242
H3	17	#5	3	14'-9"	262
H4	17	#5	3	14'-6"	257
K1	16	#4	STR	22'-0"	235
K2	12	#4	STR	3'-9"	30
S1	36	#4	4	10'-8"	257
S2	36	#4	5	3'-5"	82
S3	32	#4	7	6'-6"	139
U1	34	#4	6	3'-8"	83
U2	6	#4	6	5'-8"	23
V1	68	#5	STR	6'-6"	461
V2	74	#4	STR	8'-2"	404

REINFORCING STEEL LBS. 4652

CLASS A CONCRETE

POUR #1 (CAP, LOWER WINGS, & COLLARS) CU. YDS. 24.3

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

TOTAL CU. YDS. 33.7

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...
10/31/2025

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			24

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CHECKED BY : S. LOTFI DATE : 8/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 5/2023

10/31/2025
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NOTES

* FOR LOCATION OF ELEVATION BETWEEN BRIDGE SEAT BUILDUPS, SEE SECTION A-A ON SHEET 3 OF 3.

STIRRUPS AND U2 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

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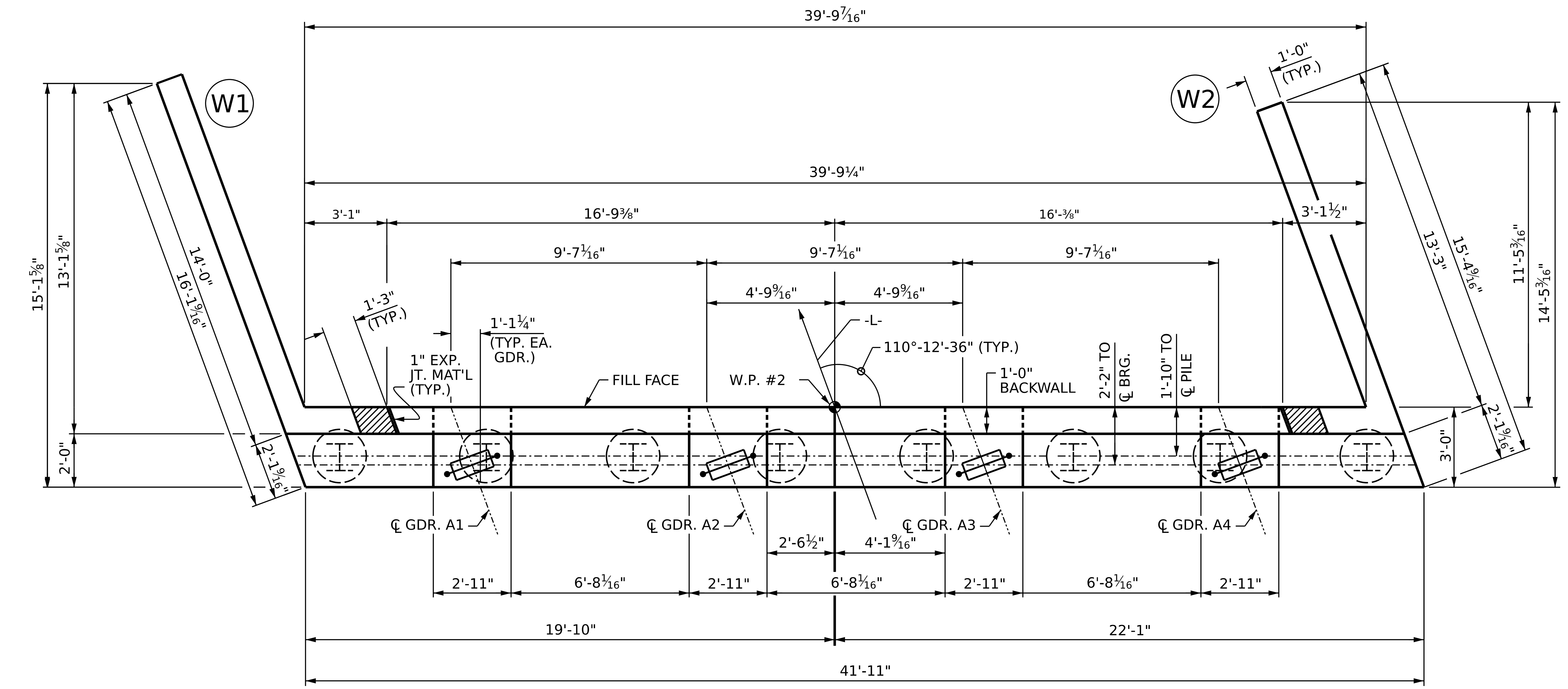
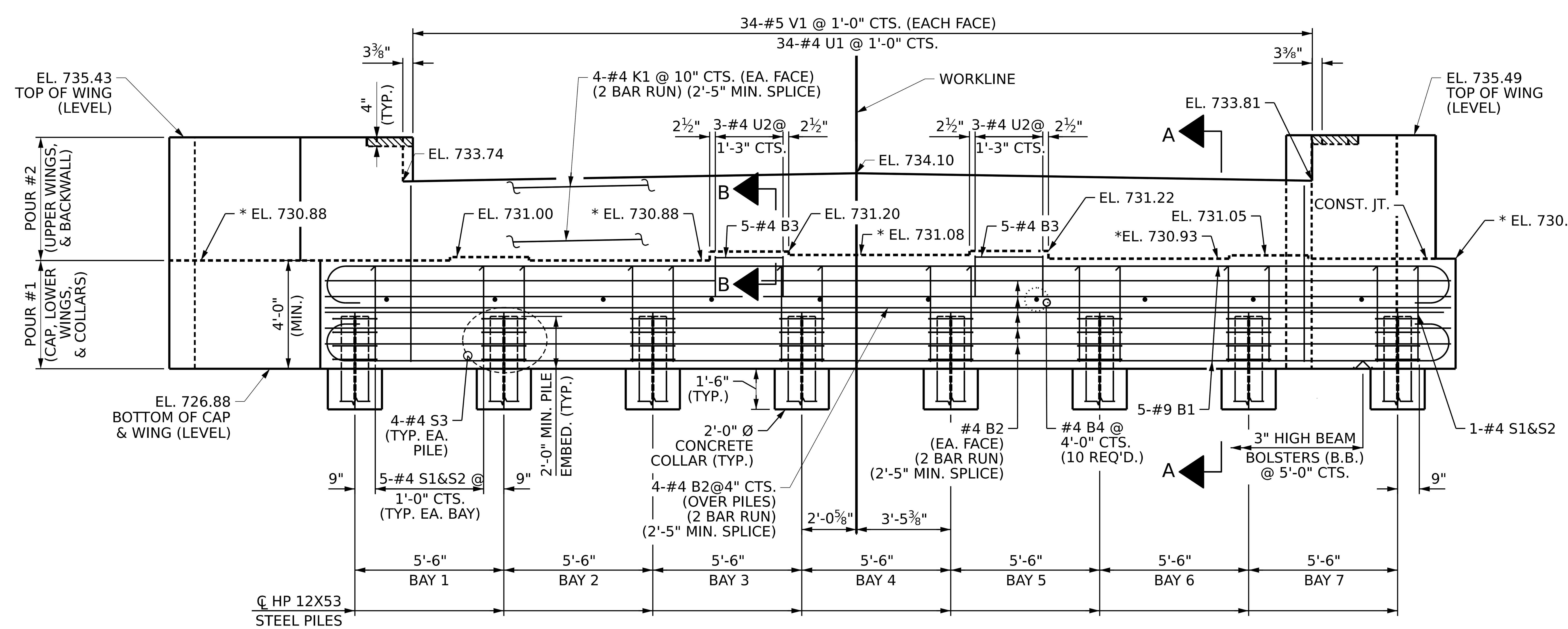
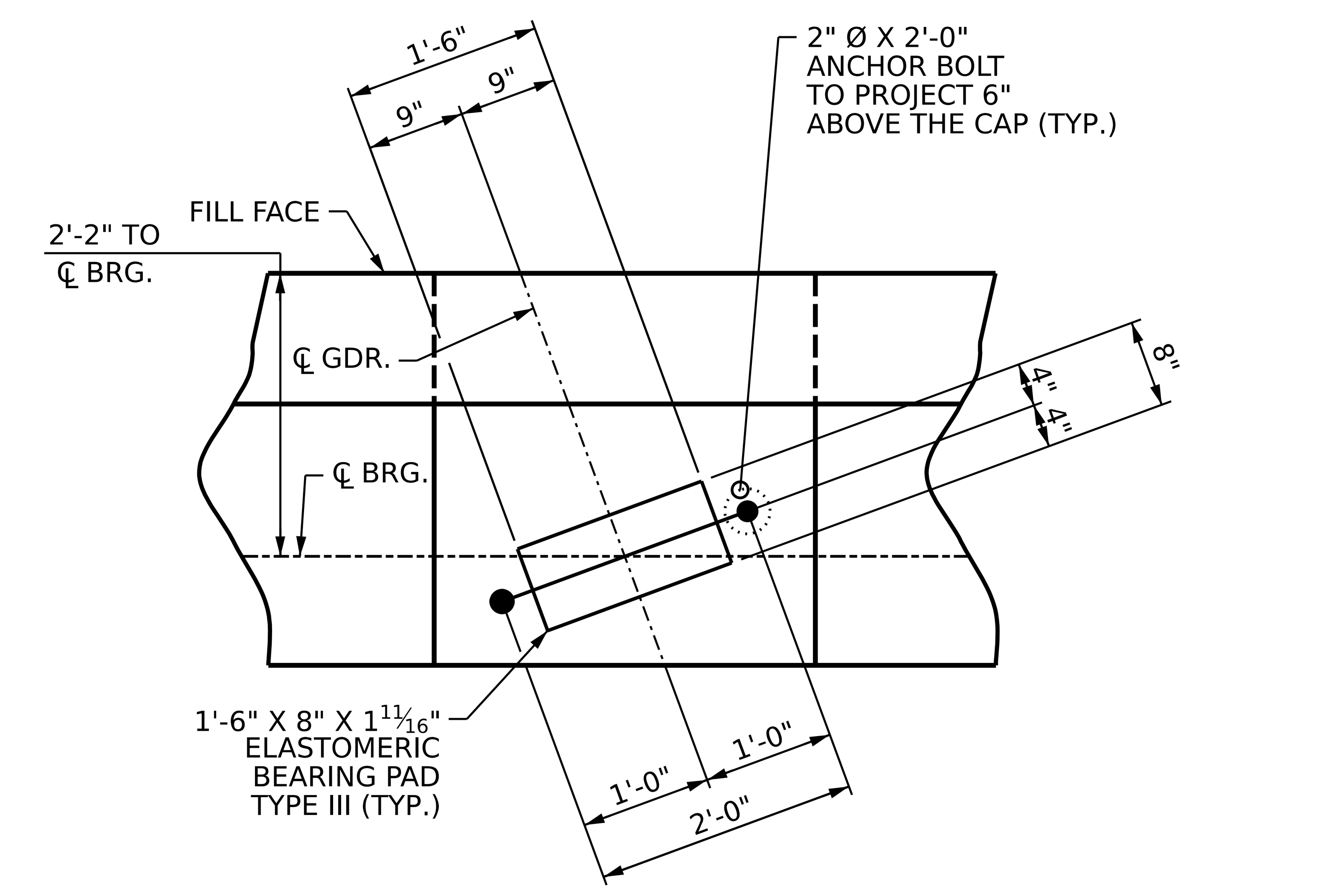


PLAN



ELEVATION

(WING DETAILS NOT SHOWN FOR CLARITY)



DETAIL "A"

(TYP. EA. GDR.)

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 36871 FRANCESCA LEA

DocuSigned by: Francesca Lea

10/31/2025

DRAWN BY : S. LOTFI	DATE : 09/2024
CHECKED BY : Z. MALIK	DATE : 09/2024
DESIGN ENGINEER OF RECORD: Z. MALIK	DATE : 05/2023

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2			4		

SHEET NO. S-19

TOTAL SHEETS 24

10/31/2025
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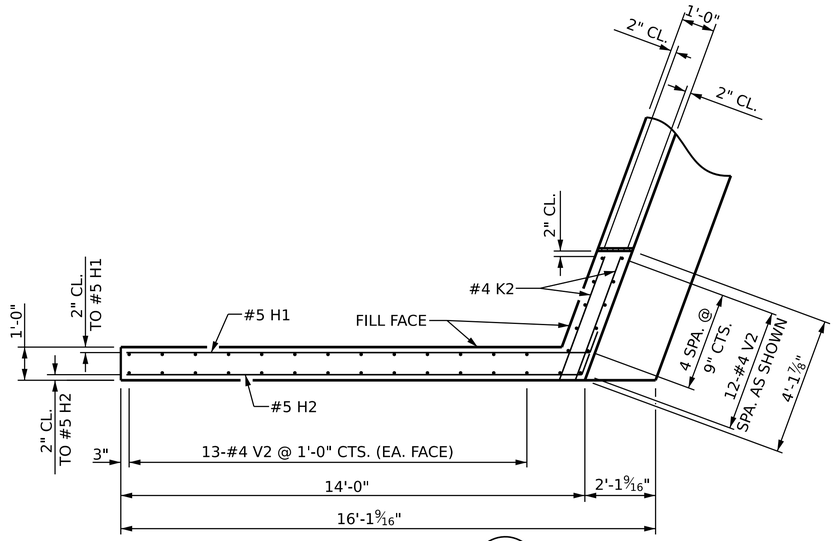
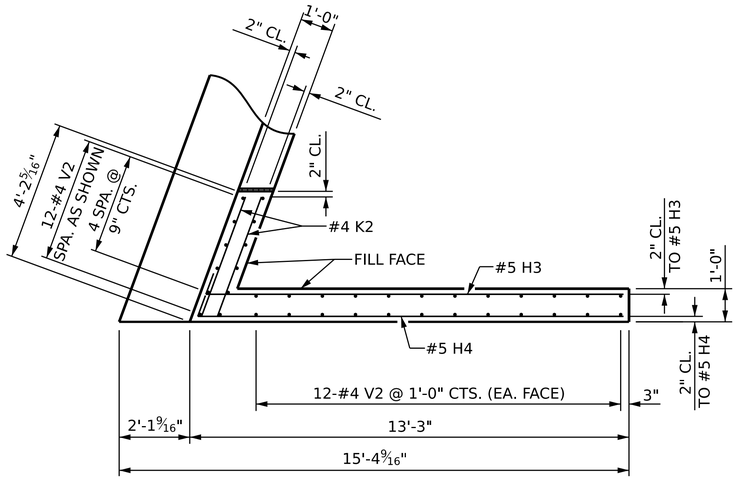
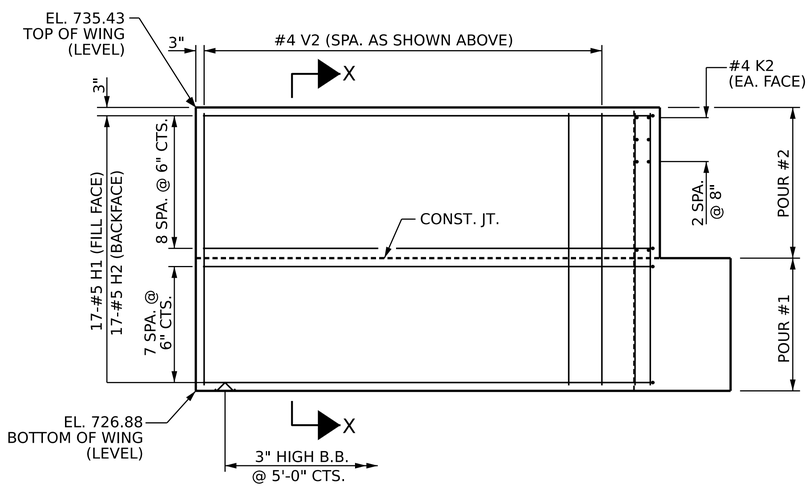


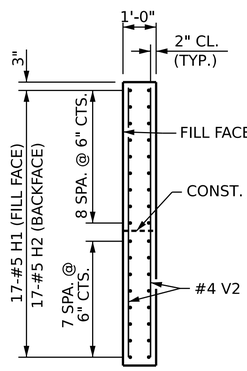
PLAN OF WING W1



PLAN OF WING W2



ELEVATION OF WING W1



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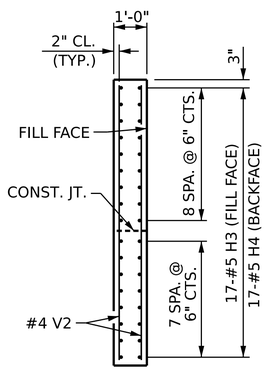

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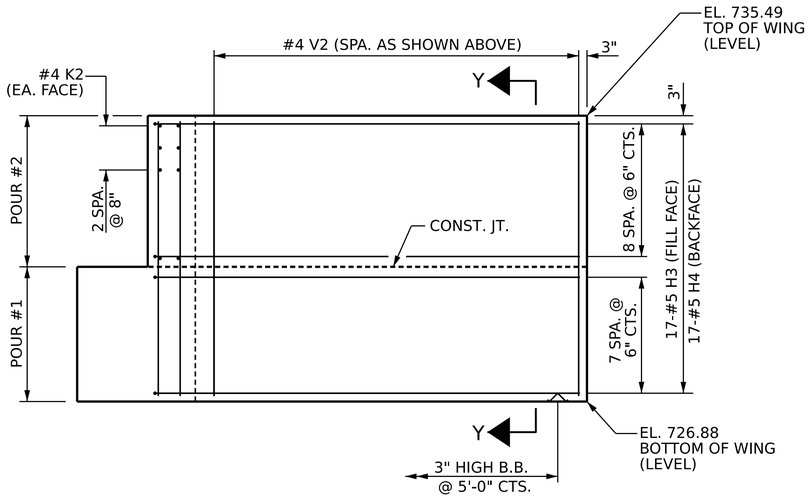

ELEVATION OF WING W2

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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10/31/2025

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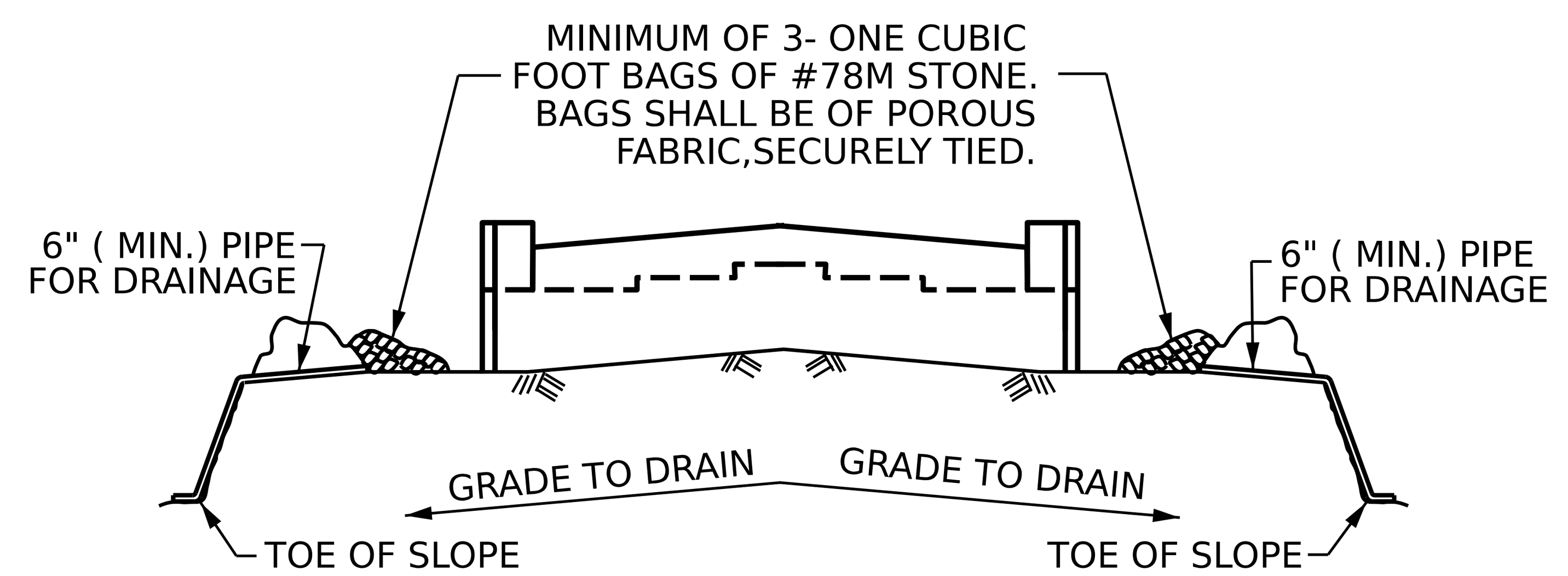

BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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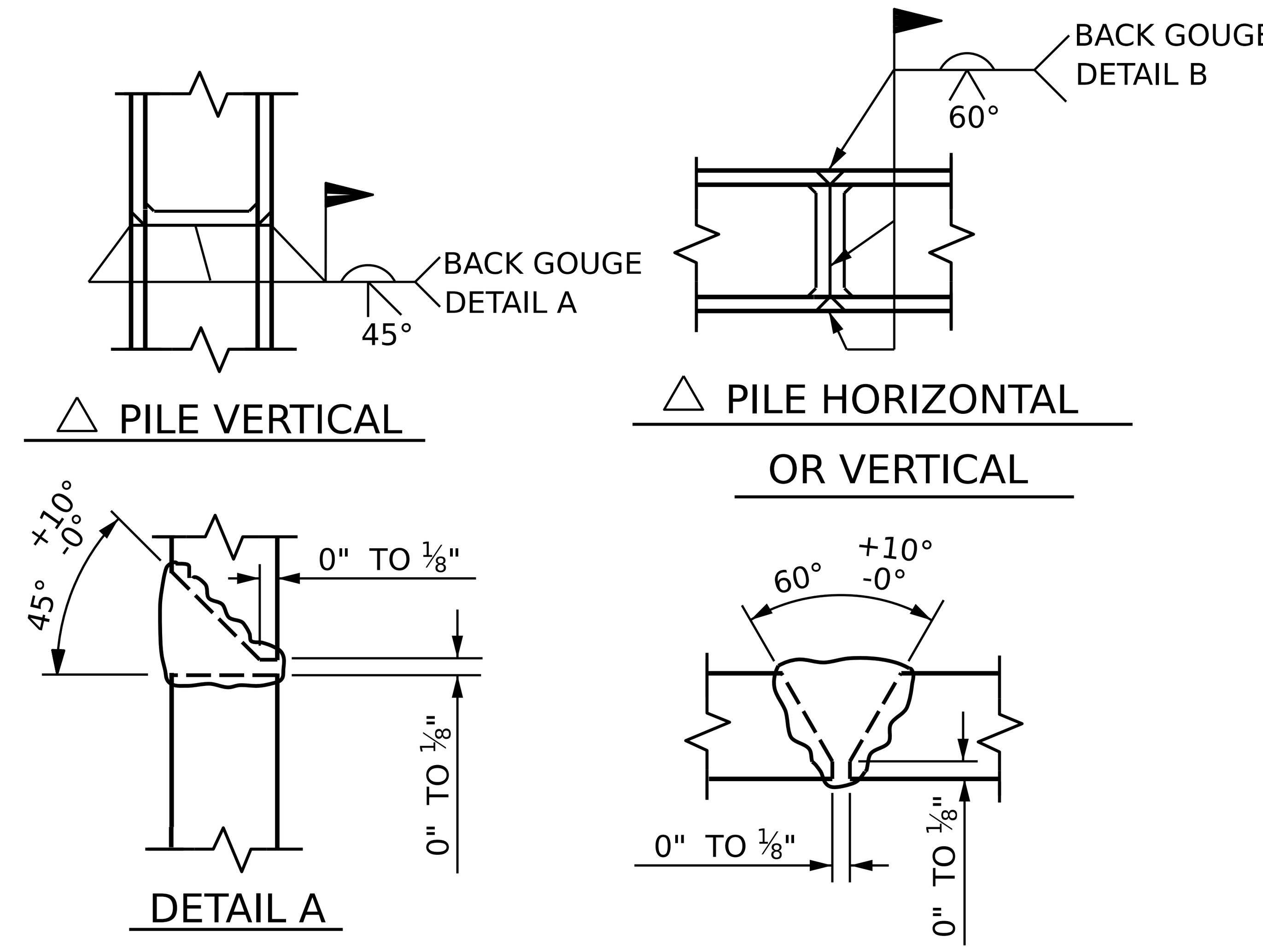
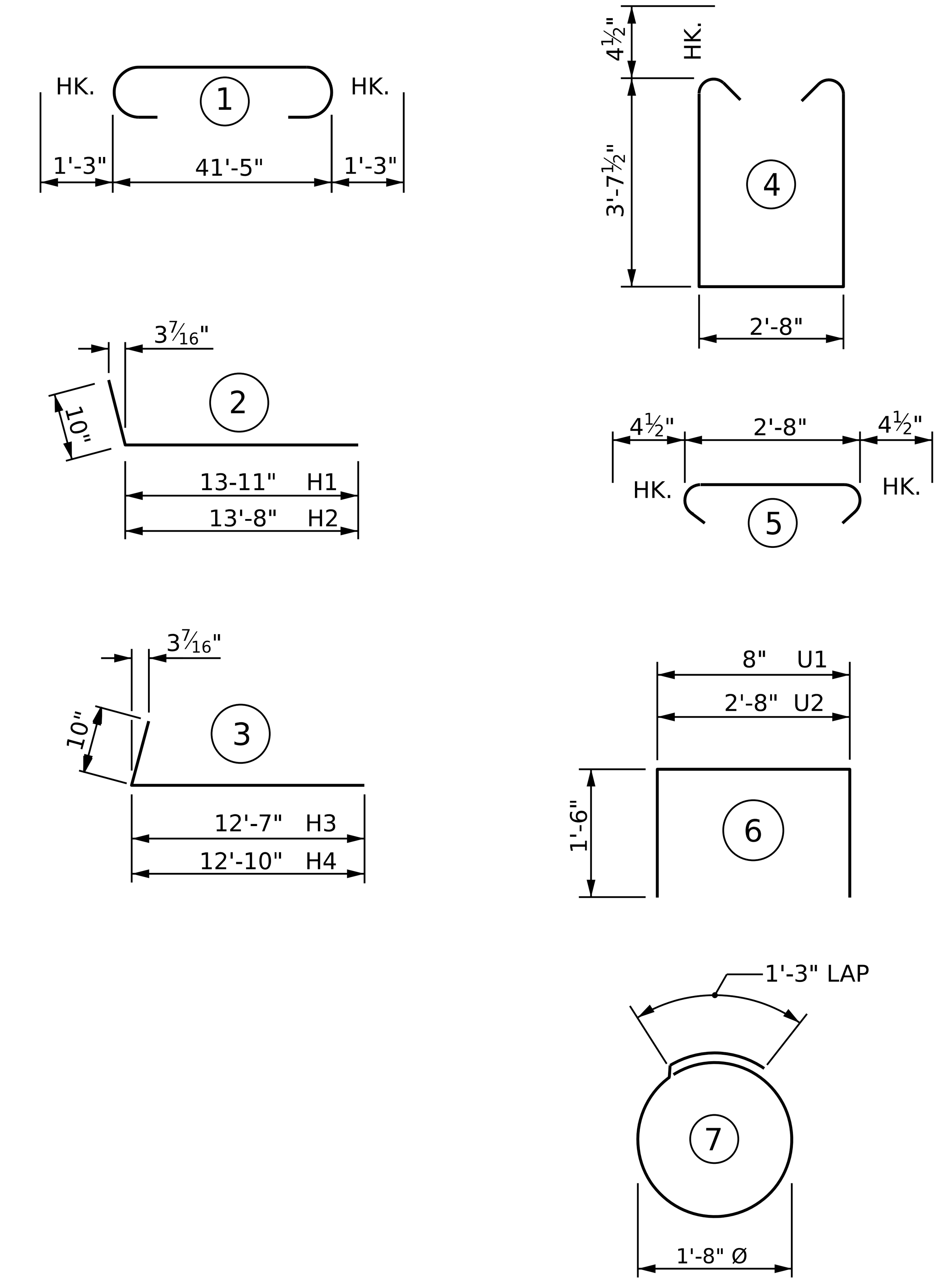
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#9	1	43'-11"	1493
B2	28	#4	STR	22'-0"	411
B3	10	#4	STR	2'-7"	17
B4	10	#4	STR	2'-8"	18
H1	17	#5	2	14'-9"	262
H2	17	#5	2	14'-6"	257
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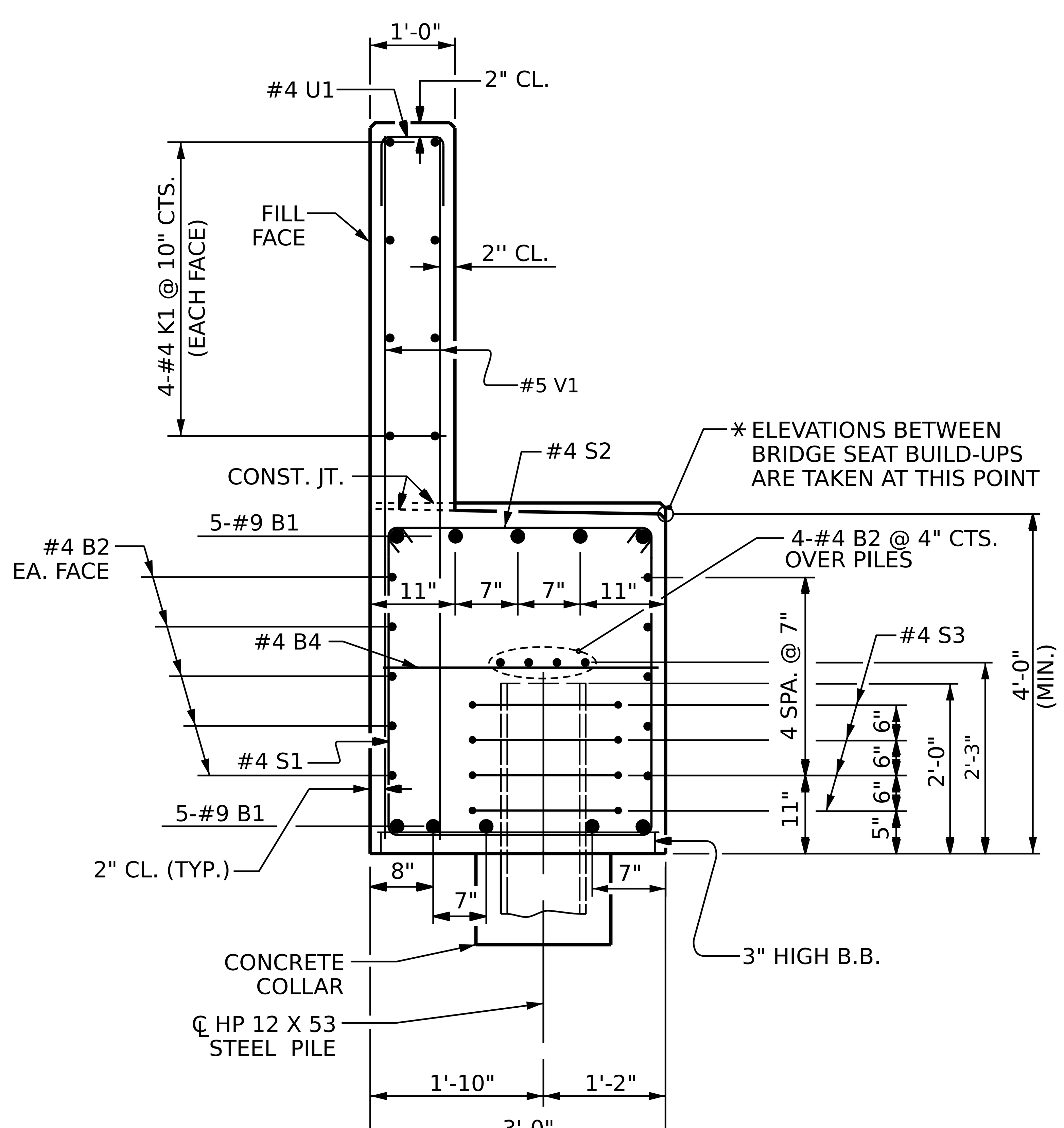
U1	34	#4	6	3'-8"	83
U2	6	#4	6	5'-8"	23
V1	68	#5	STR	6'-6"	461
V2	74	#4	STR	8'-2"	404

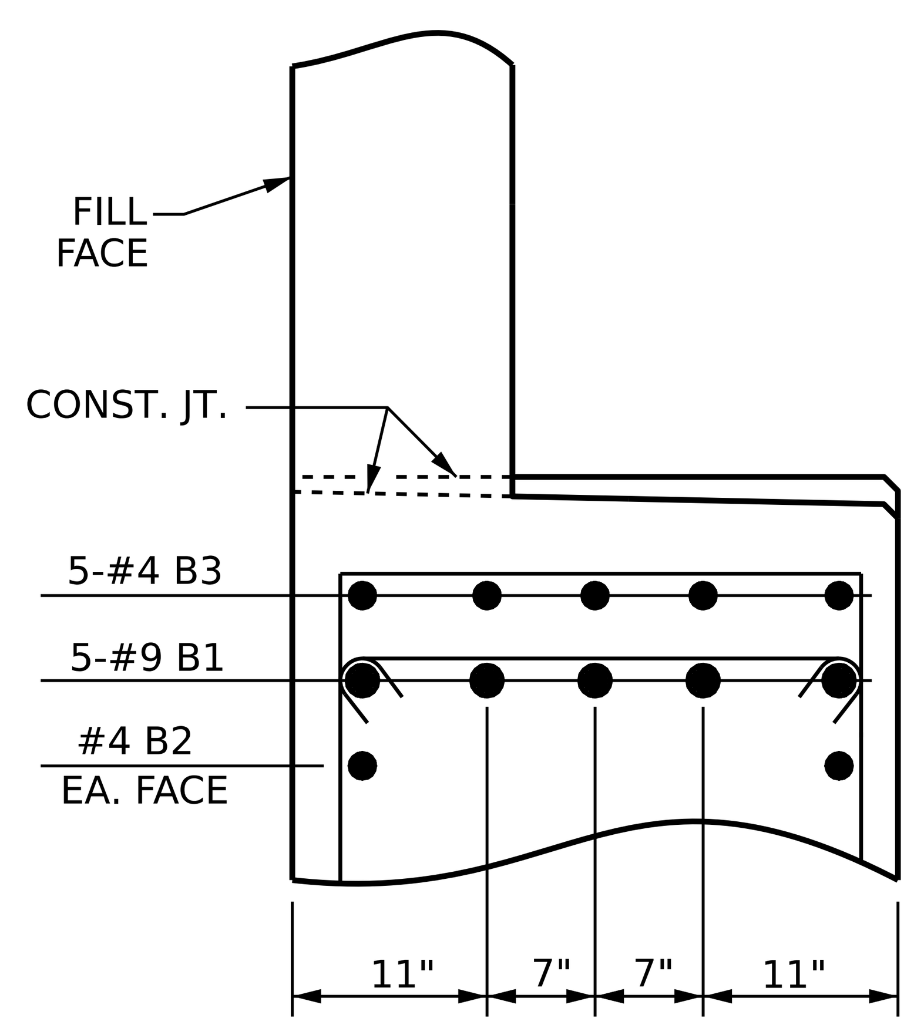
REINFORCING STEEL LBS. 4652

CLASS A CONCRETE

POUR #1 (CAP, LOWER WINGS, & COLLARS)	CU. YDS.	24.3
POUR #2 (UPPER WINGS & BACKWALL)	CU. YDS.	9.4
TOTAL	CU. YDS.	33.7



SECTION A-A



PARTIAL SECTION B-B

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

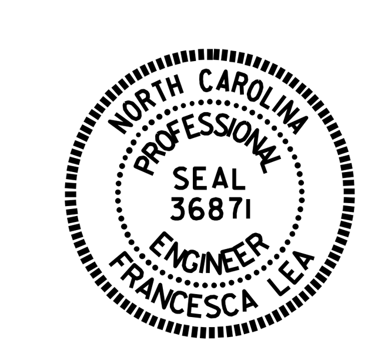
STATION: 15+22.40 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2



DocuSigned by: Francesca Lea
B79OAD865D584EF...
10/31/2025

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

SHEET NO. S-21

TOTAL SHEETS 24

DRAWN BY :	S. LOTFI	DATE :	09/2024
CHECKED BY :	Z. MALIK	DATE :	09/2024
DESIGN ENGINEER OF RECORD:	Z. MALIK	DATE :	05/2023

10/31/2025
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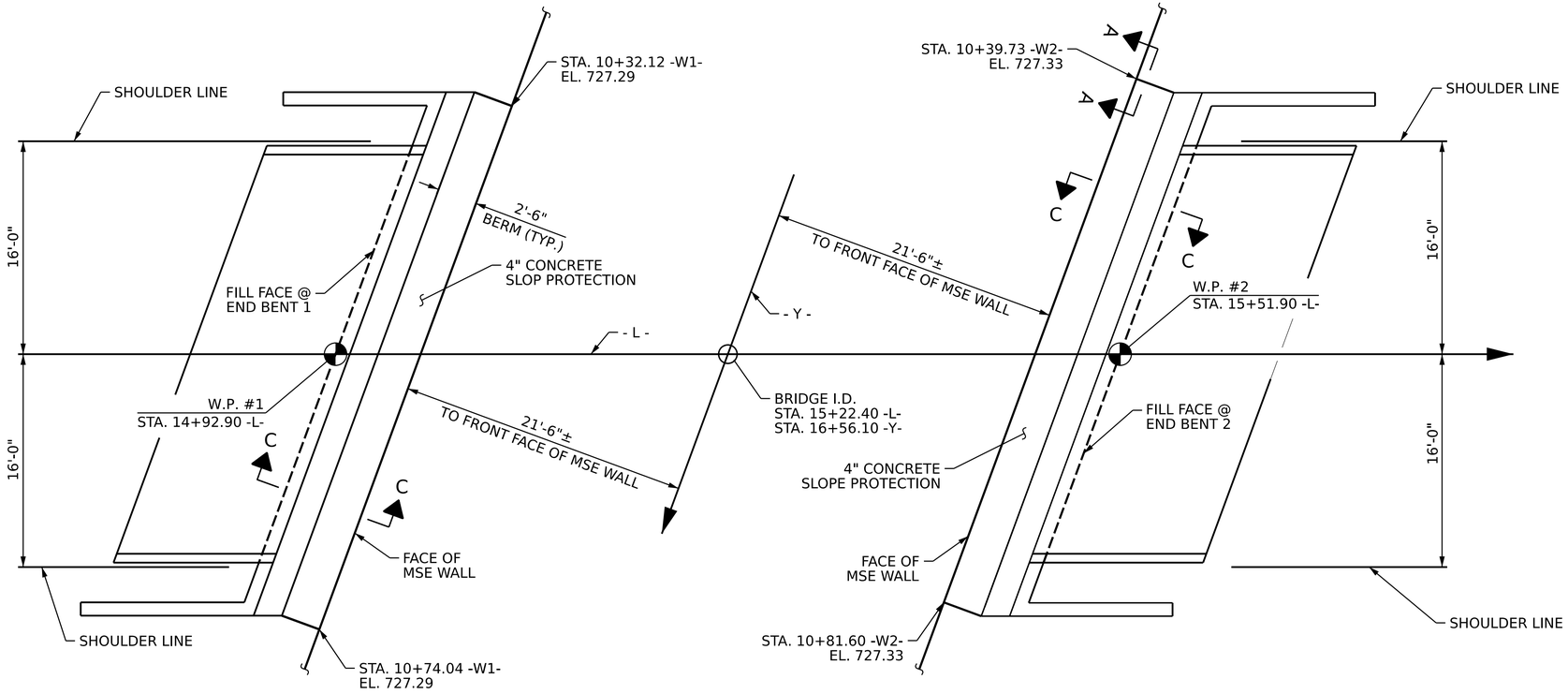
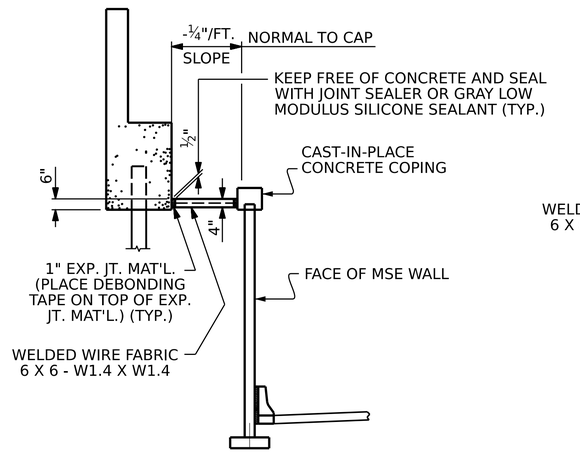
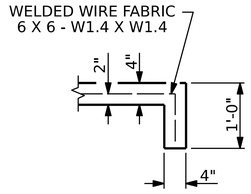


END BENT 1

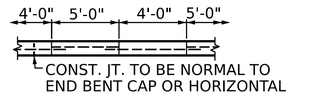
END BENT 2



SECTION C-C

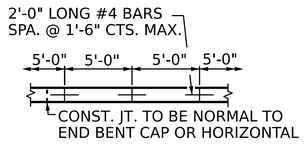


SECTION A-A



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

OPTIONAL POURING DETAIL



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

DETAILS FOR SLOPE PROTECTION

GENERAL NOTES

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. 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.

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

BRIDGE @ STA. 15+22.40 -L-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	10.1	18
END BENT 2	10.1	18

* QUANTITY SHOWN IS BASED ON 5' POURS.

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79OADB65D584EF... 10/31/2025

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			24

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DRAWN BY : S. LOTFI DATE : 10/2024
CHECKED BY : Z. MALIK DATE : 10/2024
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 10/2024

10/31/2025
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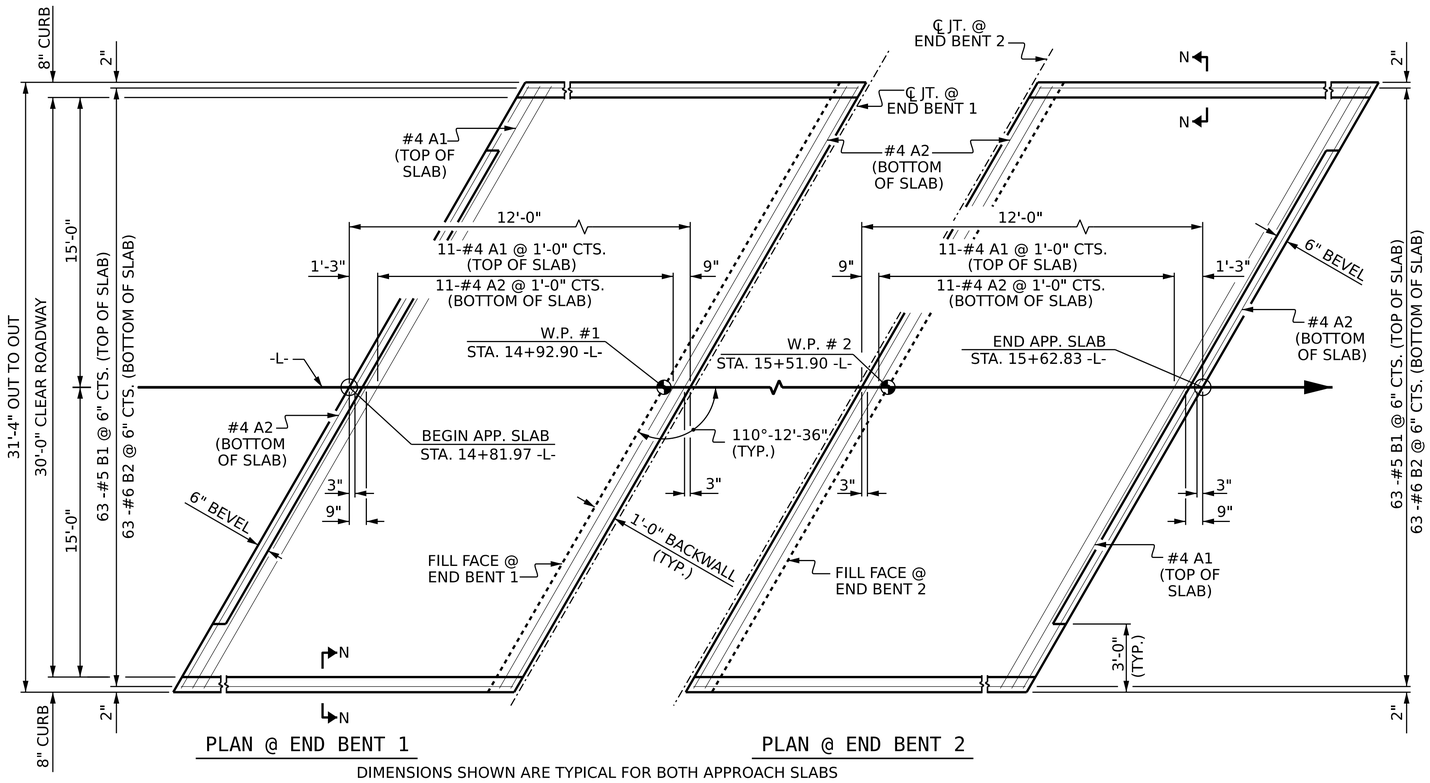
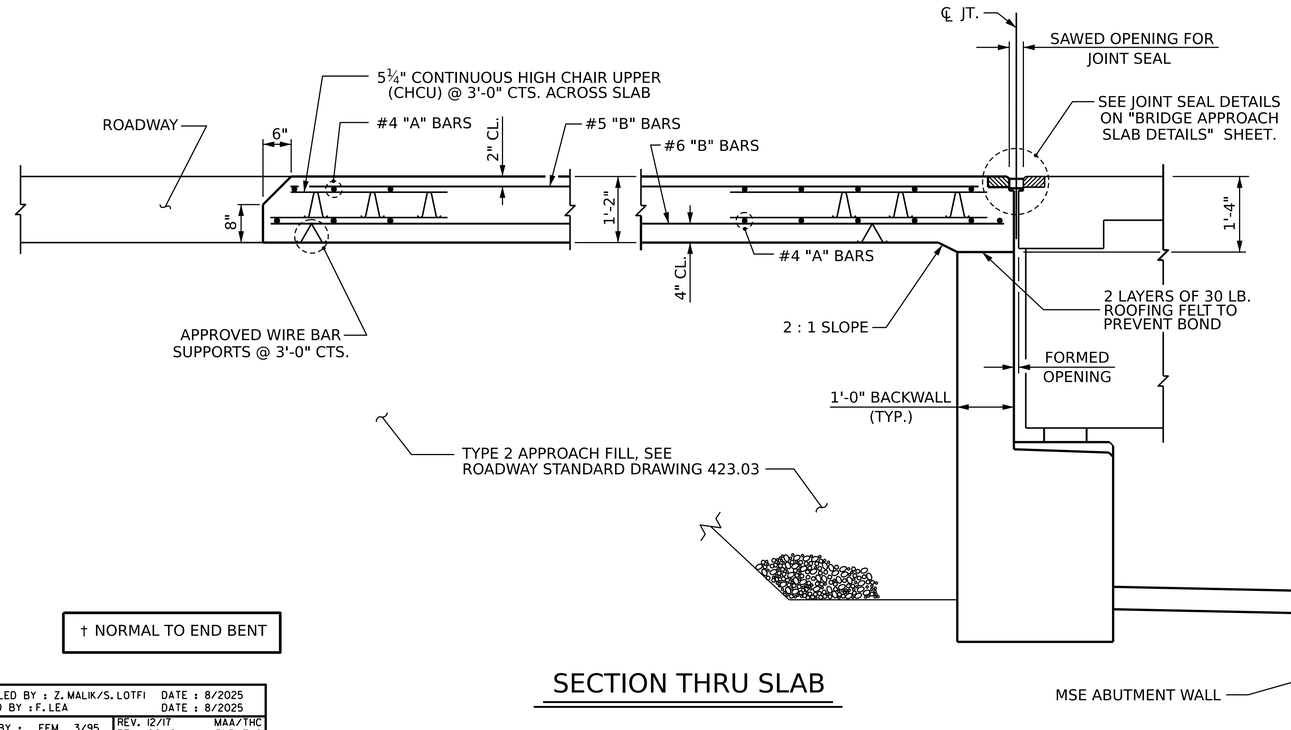
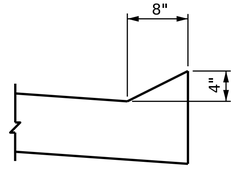


DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

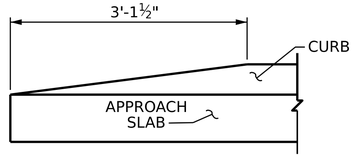


† NORMAL TO END BENT

SECTION THRU SLAB



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

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

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL OR PARAPET AND END POST.

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

WITH FOAM JOINT SEAL

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 1".

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL

APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	12	#4	STR	33'-0"	265
A2	13	#4	STR	33'-0"	287
*B1	63	#5	STR	10'-8"	701
B2	63	#6	STR	11'-8"	1104

REINFORCING STEEL	LBS. 1391
* EPOXY COATED REINFORCING STEEL	LBS. 966
CLASS AA CONCRETE	C. Y. 16.4

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	12	#4	STR	33'-0"	265
A2	13	#4	STR	33'-0"	287
*B1	63	#5	STR	10'-8"	701
B2	63	#6	STR	11'-8"	1104

REINFORCING STEEL	LBS. 1391
* EPOXY COATED REINFORCING STEEL	LBS. 966
CLASS AA CONCRETE	C. Y. 16.4

SPLICE LENGTHS

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

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

Designed by: Francesca Lea 11/06/2025

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REVISIONS						SHEET NO.
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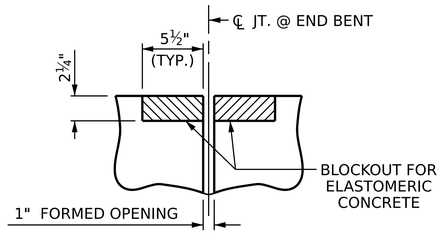
1			3			TOTAL SHEETS
2			4			24

ASSEMBLED BY : Z. MALIK/S. LOTFI DATE : 8/2025
CHECKED BY : F. LEA DATE : 8/2025

DRAWN BY : EEM 3/95
CHECKED BY : VAP 3/95

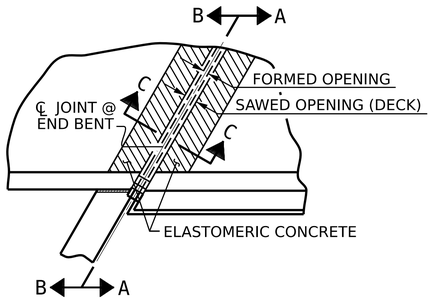
REV. 12/17	MAA/THC
REV. 06/19	BNB/THC
REV. 07/23	BNB/SNM

STD. NO. BAS2 Sht. 01b

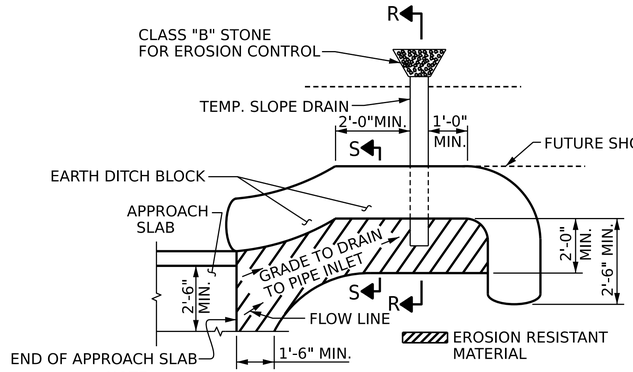


SECTION C-C

FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC
CONCRETE DIMENSIONS)

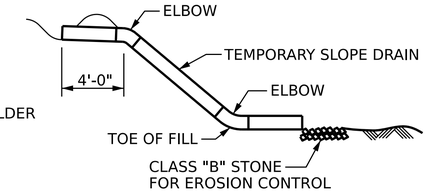


PLAN

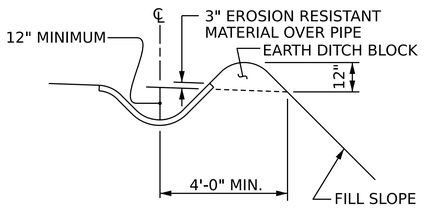


NOTE:
IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW



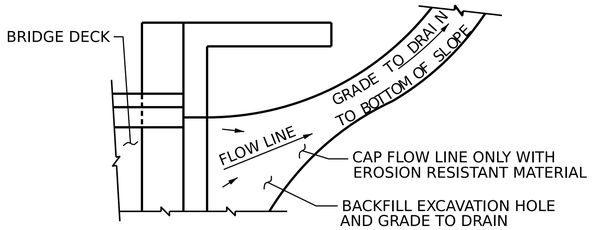
SECTION R-R



SECTION S-S

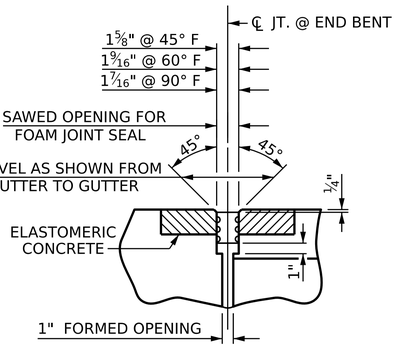
TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



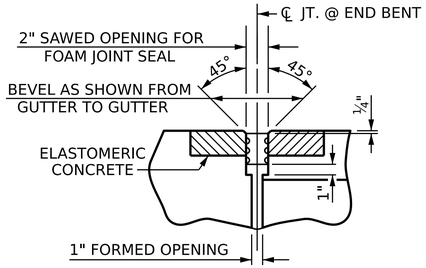
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL



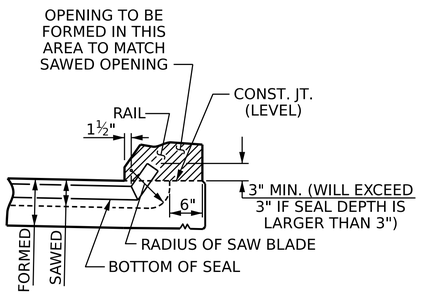
SECTION C-C

FOAM JOINT SEAL
(EXPANSION)



SECTION C-C

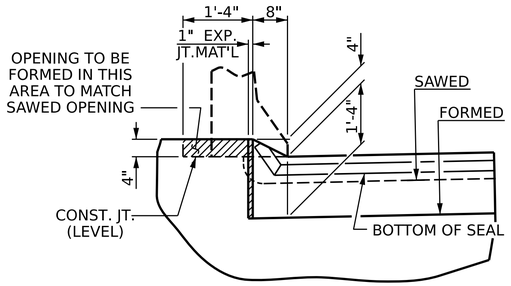
FOAM JOINT SEAL
(FIXED)



SECTION A-A

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	5.5
2	5.5
TOTAL	11.0

* BASED ON THE MINIMUM BLOCKOUT SHOWN.



SECTION B-B

JOINT SEAL DETAILS @ END BENT

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

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

PROJECT NO. BR-0096

ROCKINGHAM COUNTY

STATION: 15+22.40 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB95D584EF...

10/31/2025

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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ASSEMBLED BY:	Z. MALIK/S. LOFTI	DATE :	09/2025
CHECKED BY :	F. LEA	DATE :	09/2025
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

10/31/2025
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STD. BAS4 Sht. 01b

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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