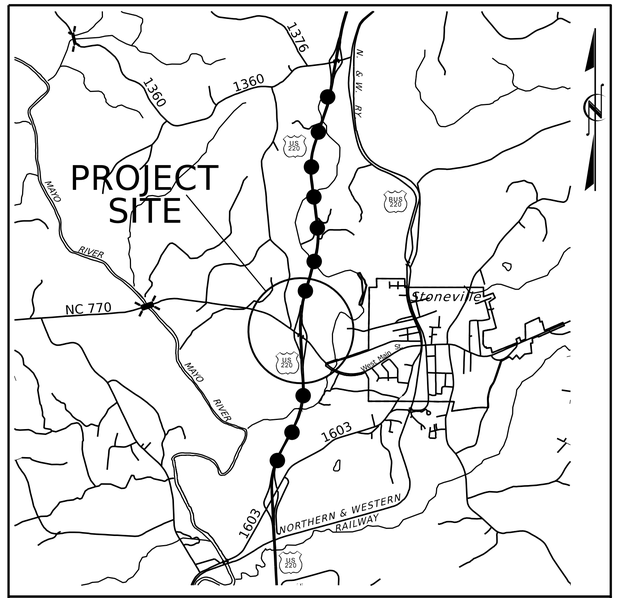
TIP PROJECT: BR–0094

CONTRACT: C204770



VICINITY MAP N.T.S.

STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

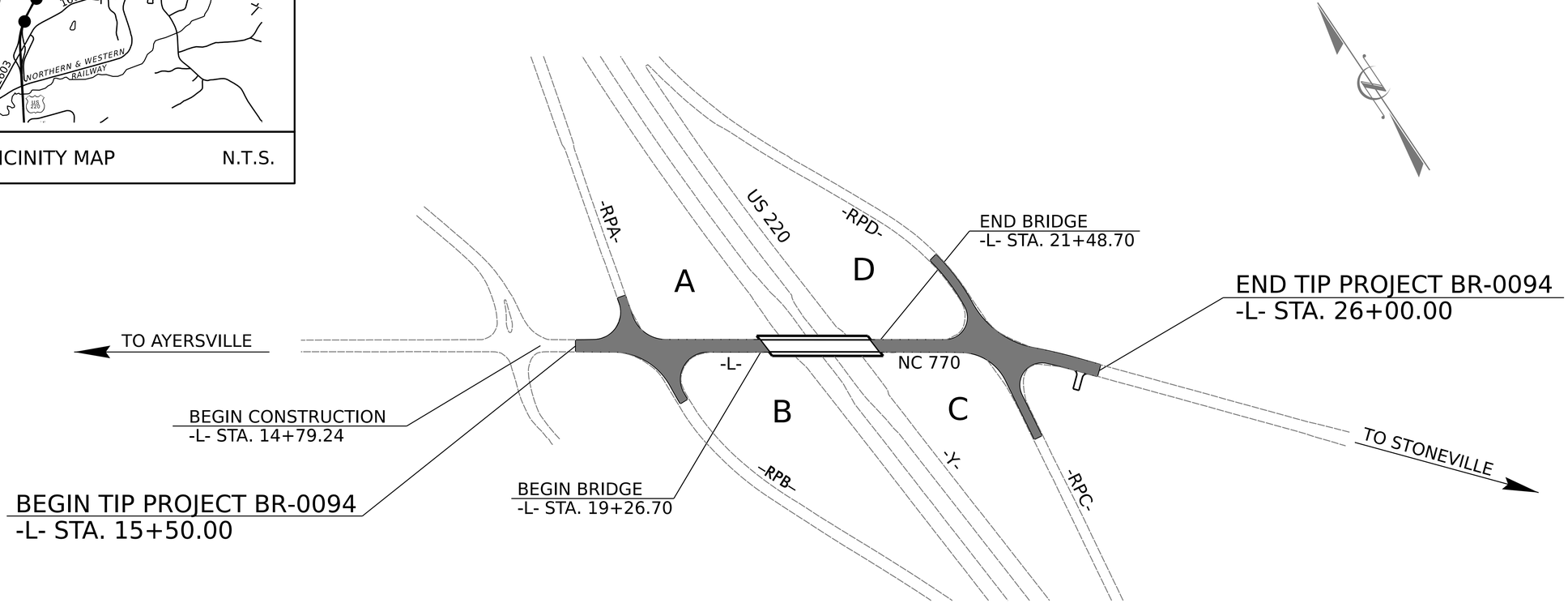
ROCKINGHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR–0094		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
67094.1.1	–	P.E.
67094.3.1	–	CONST.

LOCATION: BRIDGE 780069 ON NC 770 OVER 220

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



STRUCTURES

DESIGN DATA

ADT (2023) = 3,554
ADT (2045) = 4,400
K = 9 %
D = 75%
T = 10 % *
V = 50 MPH
* (TTST 4 %, DUAL 6 %)

FUNC CLASS = MAJOR COLLECTOR

REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BR–0094 = 0.157 MILES
LENGTH STRUCTURE TIP PROJECT BR–0094 = 0.042 MILES

TOTAL LENGTH TIP PROJECT BR–0094 = 0.199 MILES

Prepared In the Office of:

DIVISION OF HIGHWAYS

STRUCTURES MANAGEMENT UNIT

1000 BIRCH RIDGE DR.

RALEIGH, N.C. 27610

2018 STANDARD SPECIFICATIONS

LETTING DATE :

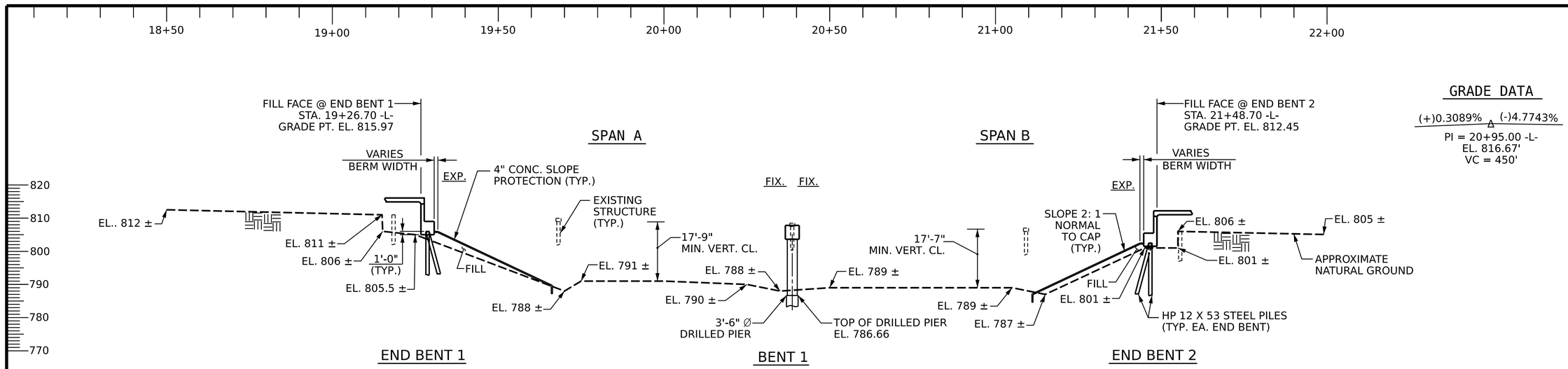
JANUARY 17, 2023

KRISTY W. ALFORD, PE

PROJECT ENGINEER

FRANCESCA LEA, PE

PROJECT DESIGN ENGINEER



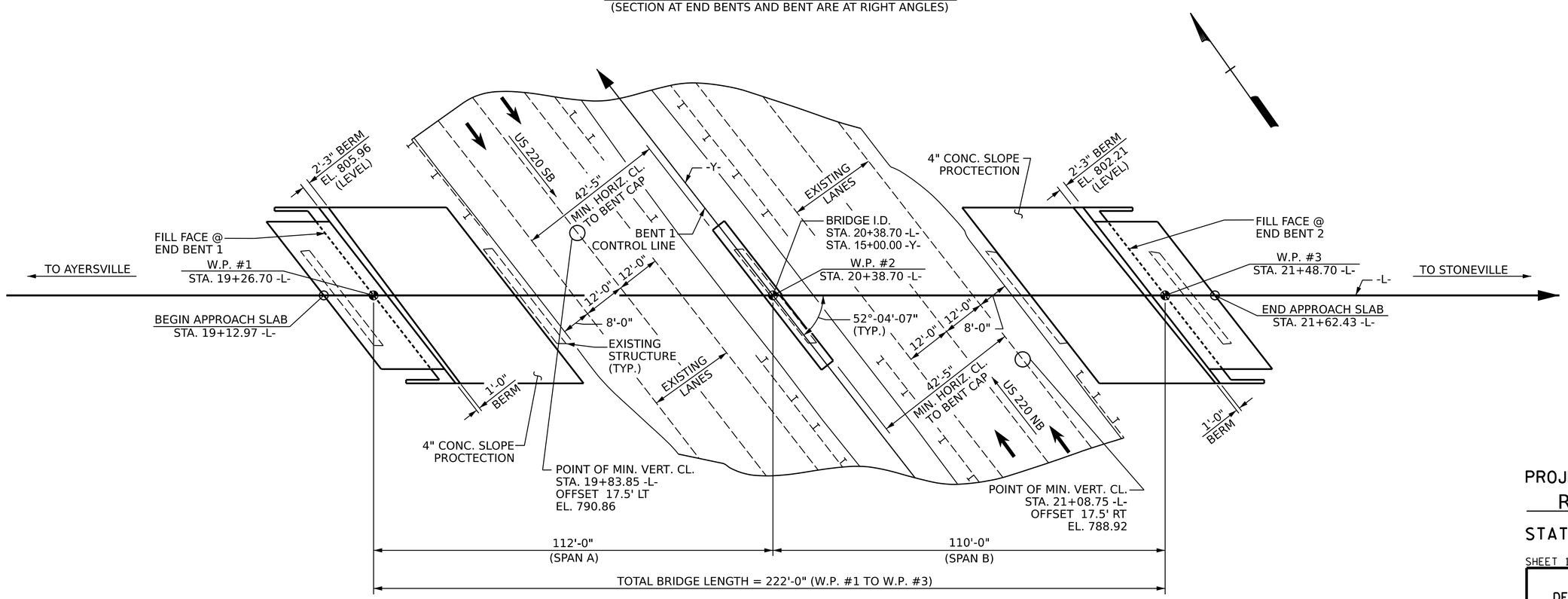
SECTION ALONG -L-

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

GRADE DATA

(+)0.3089% (-)4.7743%

PI = 20+95.00 -L-
EL. 816.67'
VC = 450'



PLAN

(PILES NOT SHOWN FOR CLARITY)

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-
15+00.00 -Y-

SHEET 1 OF 3 REPLACES BRIDGE #780069

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE
ON NC 770 OVER US 220
BETWEEN SR 1367 AND SR 1405

NORTH CAROLINA PROFESSIONAL SEAL 29441 ENGINEER KRISTY W. ALFORD

DocuSigned by: Kristy Alford F245838930BF40E...

11/16/2022

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

11/16/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S-01

TOTAL SHEETS 30

DRAWN BY : Q. T. NGUYEN DATE : 08/2022
CHECKED BY : F. LEA DATE : 09/2022
DESIGN ENGINEER OF RECORD: F. LEA DATE : 09/2022

11/9/2022
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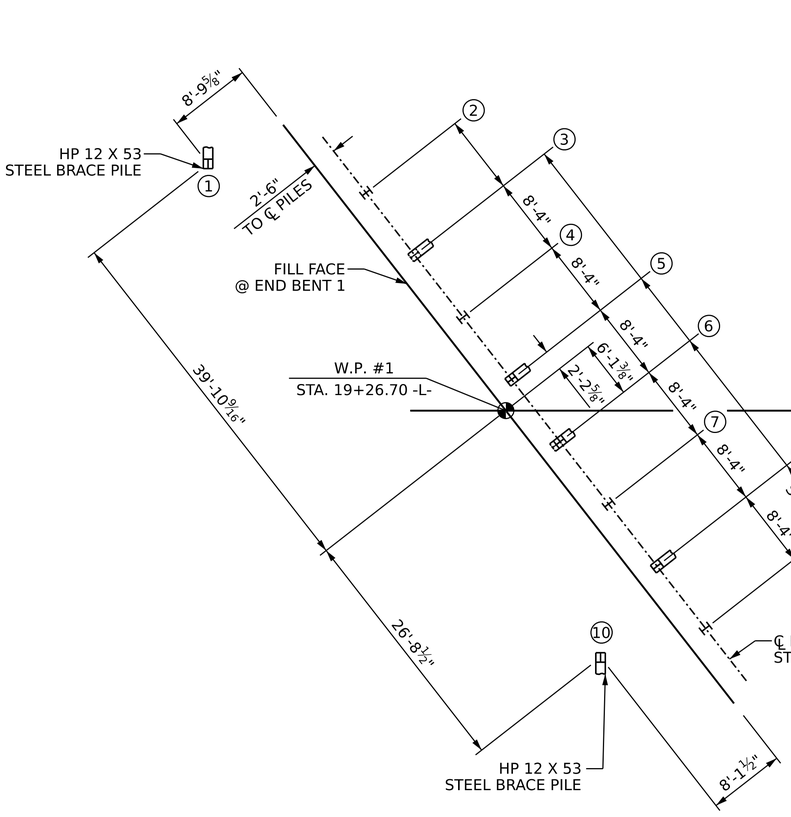
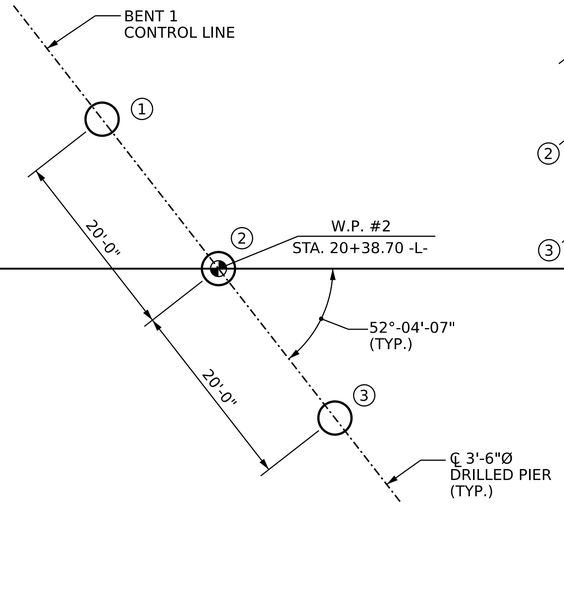
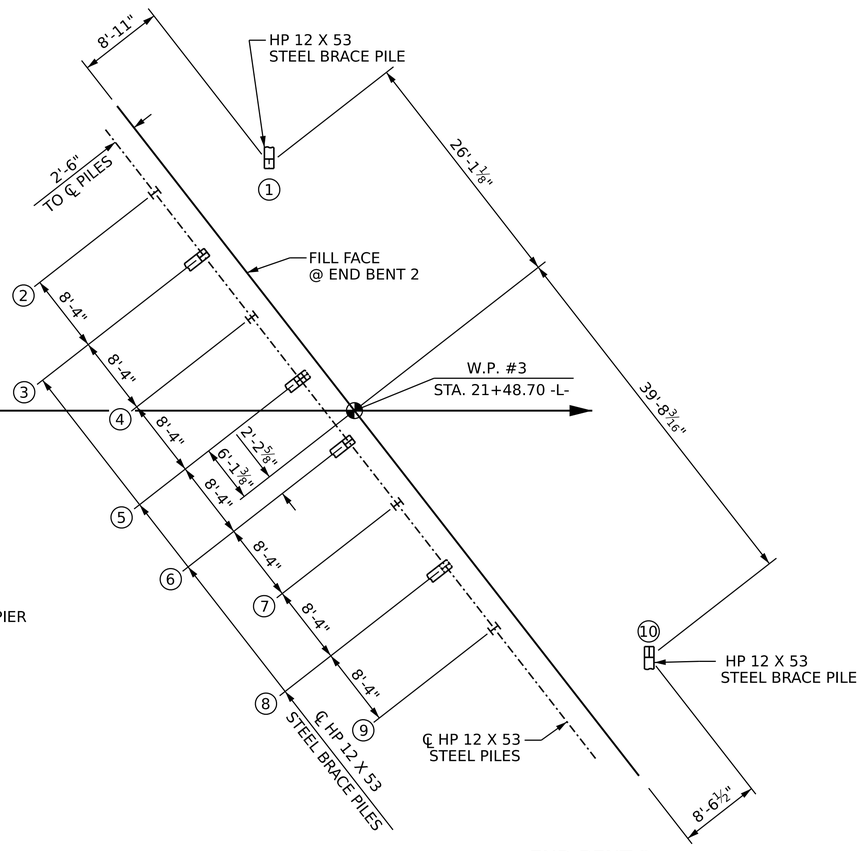
ttnguyen1



END BENT 1



BENT 1



END BENT 2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO THE CENTERLINE OF PILES AND DRILLED PIERS

NOTES

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

DRILLED PIERS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 602 TONS. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 30 TSF.

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

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 59,000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 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.

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

11/16/2022

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON
NC 770 OVER US 220
BETWEEN SR 1367 AND SR 1405

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-02
1			3			TOTAL SHEETS
2			4			S-30

DRAWN BY : Q. T. NGUYEN DATE : 09/2022
CHECKED BY : F. LEA DATE : 09/2022
DESIGN ENGINEER OF RECORD: F. LEA DATE : 09/2022

11/15/2022
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fleg

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 Lenth 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 1-10	125	806.96	50			210	0						
END BENT 2, Piles 1-10	125	803.21	30			210							

*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.

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

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 1-10	123.5			0.60			1.00
END BENT 2, Piles 1-10	123.5			0.60			1.00
							1.00
							1.00
							1.00

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

SUMMARY OF PDA/PILE ORDER LENGTHS

(Blank entries indicate item is not applicable to structure)

Pile Driving Analyzer (PDA)				Pile Order Lengths	
End Bent/ Bent No	PDA Testing Required? YES or MAYBE	PDA Test Pile Length FT	Total PDA Testing Quantity EACH	End Bent/ Bent No(s)	Pile Order Length Basis* EST or PDA
END BENT 1 Piles 1-10	MAYBE	55	1		
END BENT 2, Piles 1-10	MAYBE	35			

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

SUMMARY OF PILE ACCESSORIES

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Pipe Pile Plates Required? YES or MAYBE	Steel Pile Points			Steel Pile Tips Required? YES
		Pipe Pile Cutting Shoes Required? YES	Pipe Pile Conical Points Required? YES	H-Pile Points Required? YES	
END BENT 1 Piles 1-10					
END BENT 2, Piles 1-10				YES	
TOTAL QTY:				10	

SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pier(s) #-# (e.g., "Bent 1, Piers 1-3")	Factored Resistance per Pier TONS	Minimum Pier Tip (Tip No Higher Than) Elevation FT	Required Tip Resistance per Pier TSF	Scour Critical Elevation FT	Minimum Drilled Pier Penetration Into Rock per Pier Lin FT	Drilled Pier Length per Pier Lin FT	Drilled Pier Length Not In Soil per Pier Lin FT	Drilled Pier Length In Soil per Pier Lin FT	Permanent Steel Casing Required? YES or MAYBE	Permanent Steel Casing Tip Elevation (Elev Not To Extend Casing Below) FT	Permanent Steel Casing Length* per Pier Lin FT
BENT 1, Piers 1-3	605	760.0	30			27.0	10.0	17.0			

*Permanent Steel Casing Length equals the difference between the ground line or top of drilled pier elevation, whichever is higher, and the permanent casing tip elevation.

SUMMARY OF DRILLED PIER TESTING

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pier(s) #-# (e.g., "Bent 1, Piers 1-3")	Standard Penetration Test (SPT) Required? YES or MAYBE	Crosshole Sonic Logging (CSL) Required?* YES or MAYBE	Total CSL Tube Length (For All Tubes) per Pier Lin FT	Shaft Inspection Device (SID) Required? YES or MAYBE	Pile Integrity Test (PIT) Required? MAYBE
BENT 1, Piers 1-3	YES	MAYBE	108	NO	NO
TOTAL QTY:	3		324		

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

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

NOTES:

1. The Pile and Drilled Pier Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Robert Lawrence, PE 054066) on 08-15-2022.
2. Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
3. The Engineer will determine the need for PDA Testing, Permanent Steel Casing, SPTs, CSL Testing, SID Inspections and PITs when these items may be required.

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

Docusigned by: Francesca Lea B79DADB65D584EF...

SIGNATURE 11/16/2022 DATE

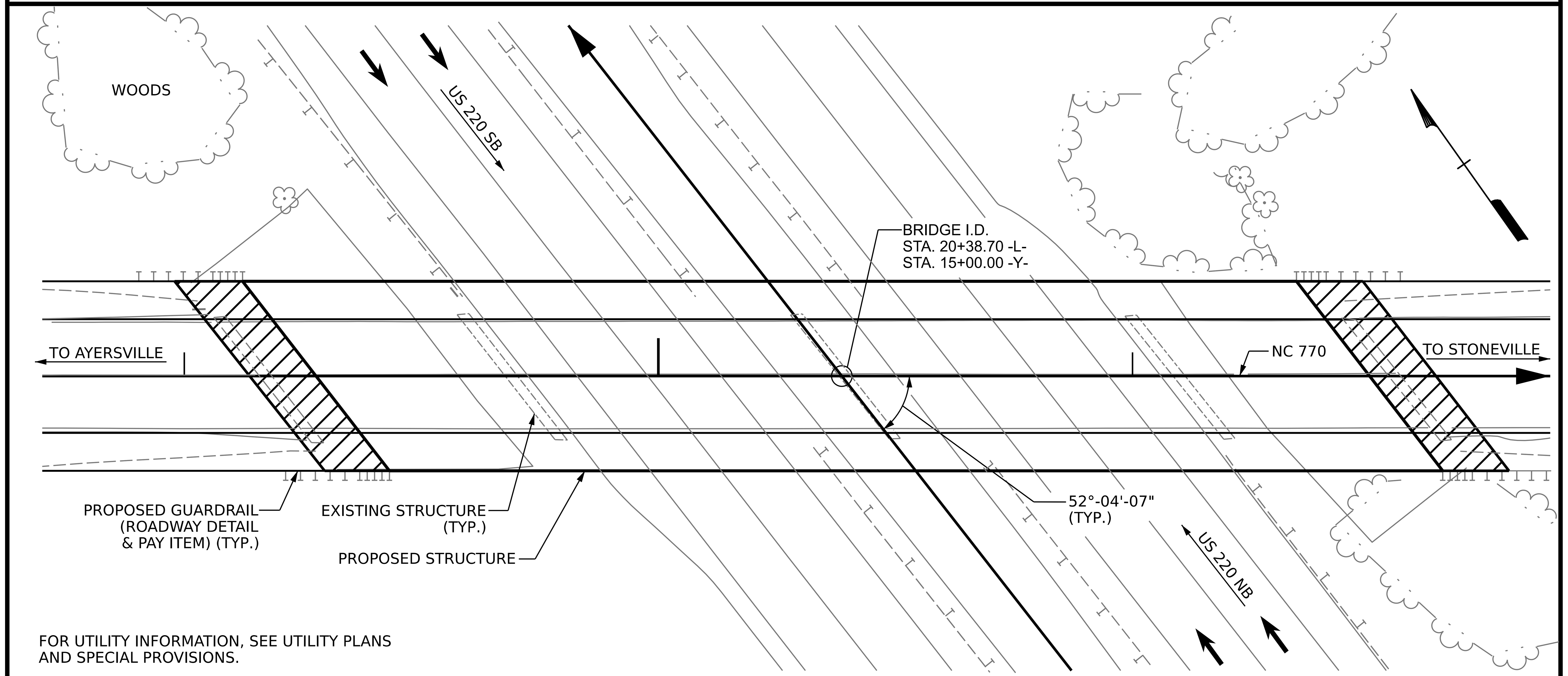
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE AND DRILLED PIER FOUNDATION TABLES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-03
1			3				TOTAL SHEETS
2			4				30

BM #1: STA. 9+80.00 BL, 79' LT, RR SPIKE IN 14" MAPLE TREE, EL. 822.73'.



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.

FOR MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE, SEE SPECIAL PROVISIONS.

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 LENGTH OF 53 FT, 2 @ 70.5 FT AND 47 FT, WITH A CLEAR ROADWAY WIDTH OF 28 FT ON A REINFORCED CONCRETE CAP ON PPC PILE END BENTS AND REINFORCED CONCRETE CAP ON POST AND BEAM BENT AND LOCATED AT THE EXISTING STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT.

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 20+38.70 -L-"

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.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

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

THE ELEVATIONS AND CLEARANCES SHOWN ON THE PLANS AT THE POINTS OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATIONS 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.

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.

FOR ELASTOMERIC BEARINGS, SEE "STEEL REINFORCED ELASTOMERIC BEARINGS" SPECIAL PROVISION.

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

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STA. 20+38.70 -L-	ASBESTOS ASSESSMENT	3'-6" DIA. DRILLED PIER IN SOIL	3'-6" DIA. DRILLED PIER NOT IN SOIL	PDA TESTING	SPT TESTING	CSL TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS STA. 20+38.70 -L-
	LUMP SUM	LUM SUM	LIN. FT.	LIN. FT.	EA.	EA.	EA.	SQ. FT	SQ. FT	CU. YDS	LUMP SUM
SUPERSTRUCTURE								9,483	9,191		LUMP SUM
END BENT 1										69.0	
BENT 1			51.0	30.0		3				47.6	
END BENT 2										73.0	
TOTAL	LUMP SUM	LUM SUMP	51.0	30.0	1	3	1	9,483	9,191	189.6	LUMP SUM

TOTAL BILL OF MATERIAL

	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 63" PRESTRESSED CONCRETE GIRDER		PILE DRIVING EQUIPMENT SET UP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		STEEL PILE POINTS	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS
	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	EA.	LIN. FT.	SQ. YDS	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			10	1,081.7					438.83		LUMP SUM	LUMP SUM
END BENT 1	7,513				10	10	500			258		
BENT 1	11,222	2,847										
END BENT 2	7,728				10	10	300	10		238		
TOTAL	26,463	2,847	10	1,081.7	20	20	800	10	438.83	496	LUMP SUM	LUMP SUM

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE
ON NC 770 OVER US 220
BETWEEN SR 1367 AND SR 1405

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-04
1			3					TOTAL SHEETS
2			4					30

DRAWN BY : Q. T. NGUYEN DATE : 09/2022
CHECKED BY : F. LEA DATE : 10/2022
DESIGN ENGINEER OF RECORD: F. LEA DATE : 10/2022

1/4/2023
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flea

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE							COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL93(Inv)	N/A	1	1.24	--	1.75	0.806	1.35	A	5	53.872	0.962	1.24	A	5	75.421	0.80	0.806	1.25	A	5	53.872	
		HL93(Opr)	N/A	--	1.61	--	1.35	0.806	1.74	A	5	53.872	0.962	1.61	A	5	75.421	N/A	--	--	--	--	--	
		HS20(Inv)	36.00	2	1.59	57.40	1.75	0.806	1.91	A	5	53.872	0.962	1.59	A	5	75.421	0.80	0.806	1.77	A	5	53.872	
		HS20(Opr)	36.00	--	2.07	74.41	1.35	0.806	2.48	A	5	53.872	0.962	2.07	A	5	75.421	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.50	--	4.25	57.43	1.4	0.806	5.73	A	5	53.872	0.962	4.77	A	5	64.647	0.80	0.806	4.25	A	5	53.872	
		SNGARBS2	20.00	--	3.06	61.23	1.4	0.806	4.12	A	5	53.872	0.962	3.39	A	5	64.647	0.80	0.806	3.06	A	5	53.872	
		SNAGRIS2	22.00	--	2.86	62.83	1.4	0.806	3.85	A	5	53.872	0.962	3.15	A	5	75.421	0.80	0.806	2.86	A	5	53.872	
		SNCOTTS3	27.25	--	2.11	57.60	1.4	0.806	2.85	A	5	53.872	0.962	2.38	A	5	64.647	0.80	0.806	2.11	A	5	53.872	
		SNAGGRS4	34.93	--	1.72	60.22	1.4	0.806	2.32	A	5	53.872	0.962	1.98	A	5	64.647	0.80	0.806	1.72	A	5	53.872	
		SNS5A	35.55	--	1.69	60.04	1.4	0.806	2.27	A	5	53.872	0.962	1.99	A	5	75.421	0.80	0.806	1.69	A	5	53.872	
		SNS6A	39.95	--	1.53	61.23	1.4	0.806	2.06	A	5	53.872	0.962	1.81	A	5	75.421	0.80	0.806	1.53	A	5	53.872	
		SNS7B	42.00	--	1.46	61.28	1.4	0.806	1.96	A	5	53.872	0.962	1.77	A	5	75.421	0.80	0.806	1.46	A	5	53.872	
	TTST	TNAGRIT3	33.00	--	1.86	61.51	1.4	0.806	2.51	A	5	53.872	0.962	2.16	A	5	75.421	0.80	0.806	1.86	A	5	53.872	
		TNT4A	33.08	--	1.87	61.77	1.4	0.806	2.52	A	5	53.872	0.962	2.12	A	5	75.421	0.80	0.806	1.87	A	5	53.872	
		TNT6A	41.60	--	1.51	62.87	1.4	0.806	2.04	A	5	53.872	0.962	1.87	A	5	75.421	0.80	0.806	1.51	A	5	53.872	
		TNT7A	42.00	--	1.51	63.44	1.4	0.806	2.03	A	5	53.872	0.962	1.84	A	5	75.421	0.80	0.806	1.51	A	5	53.872	
		TNT7B	42.00	--	1.54	64.79	1.4	0.806	2.08	A	5	53.872	0.962	1.74	A	5	75.421	0.80	0.806	1.54	A	5	53.872	
		TNAGRIT4	43.00	--	1.48	63.74	1.4	0.806	2.00	A	5	53.872	0.962	1.68	A	5	75.421	0.80	0.806	1.48	A	5	53.872	
		TNAGRT5A	45.00	--	1.40	63.22	1.4	0.806	1.89	A	5	53.872	0.962	1.66	A	5	75.421	0.80	0.806	1.40	A	5	53.872	
		TNAGRT5B	45.00	3	1.39	62.74	1.4	0.806	1.88	A	5	53.872	0.962	1.60	A	5	75.421	0.80	0.806	1.39	A	5	53.872	
EV LOAD RATING		EV2	28.75	--	2.15	61.85	1.3	0.806	3.12	A	5	53.872	0.962	2.56	A	5	64.647	0.80	0.806	2.15	A	5	53.872	
		EV3	43.00	--	1.42	61.04	1.3	0.806	2.06	A	5	53.872	0.962	1.73	A	5	64.647	0.80	0.806	1.42	A	5	53.872	

LOAD FACTORS:

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

NOTES:

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

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

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

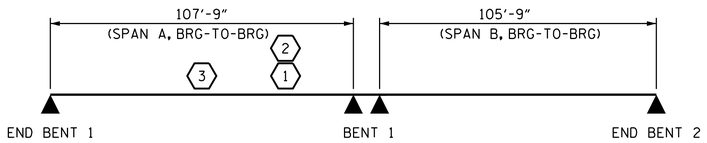
⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
1 - EXTERIOR LEFT GIRDER
5 - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

PROJECT NO. BR-0094
ROCKINGHAM COUNTY
STATION: 20+38.70 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA
Francesca Lea
B7904D8650584EF...
11/16/2022

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-05
1			3			TOTAL SHEETS
2			4			30

STD. NO. LRFR1

ASSEMBLED BY : SMMATTA DATE : 09/2022
CHECKED BY : F.LEA DATE : 09/2022
DRAWN BY : MAA 1/08
CHECKED BY : GM/DI 2/08
REV. 11/12/08RR MAA/GM
REV. 10/1/11 MAA/GM

11/10/2022
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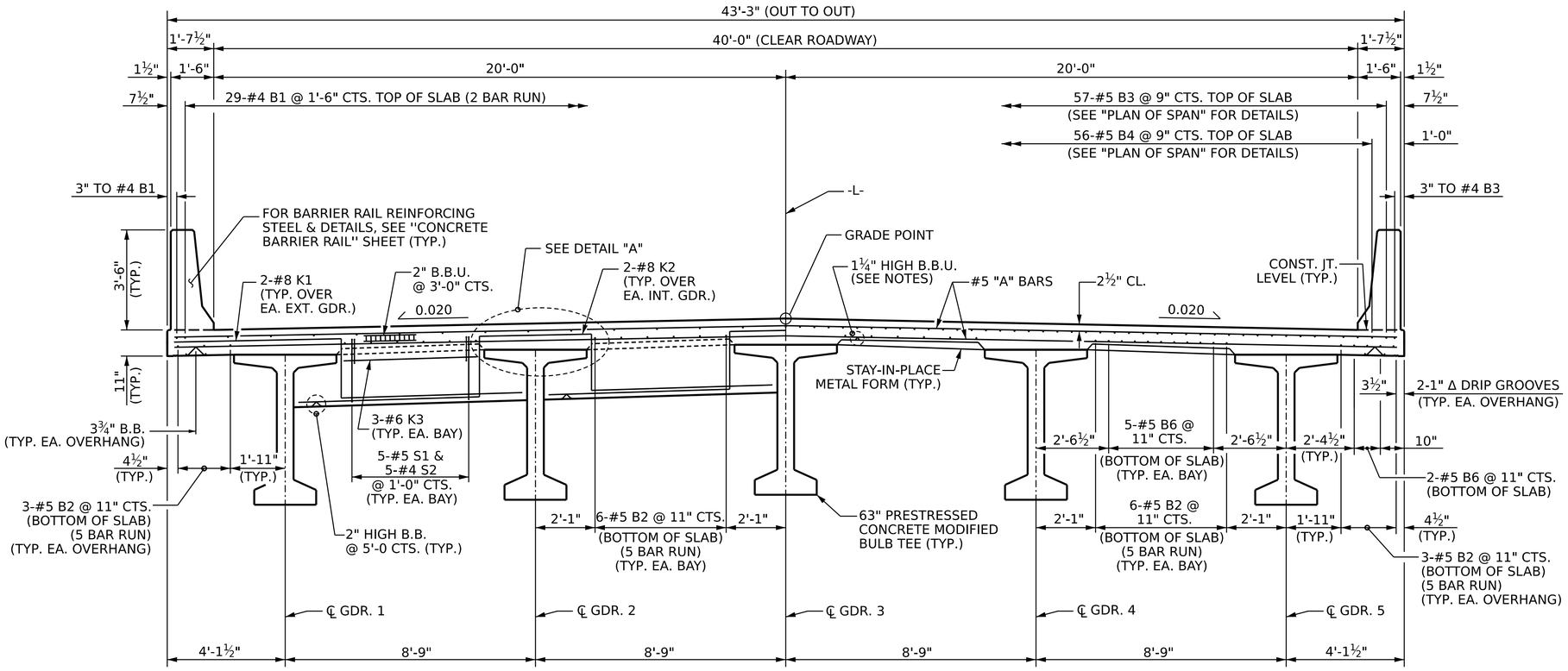


PARTIAL TYPICAL SECTION
END BENT DIAPHGRAM

PARTIAL TYPICAL SECTION
LINK SLAB AT BENT

NOTES

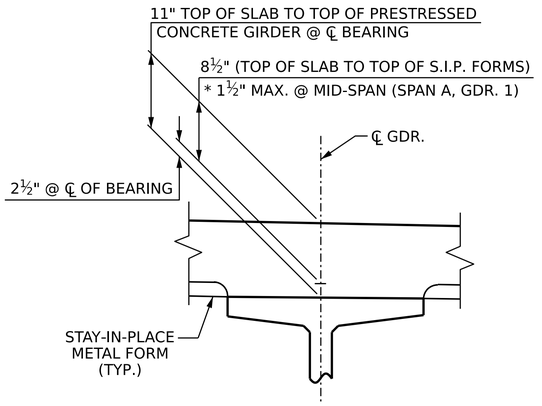
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. A TOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF ''A'' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF ''A'' BARS A CLEAR DISTANCE OF 2½"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

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.

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

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



DETAIL "A"

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

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea
B79DADB65D584EF...
11/16/2022

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CHECKED BY : Z. MALIK DATE : 09/2022
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 09/2022

11/10/2022
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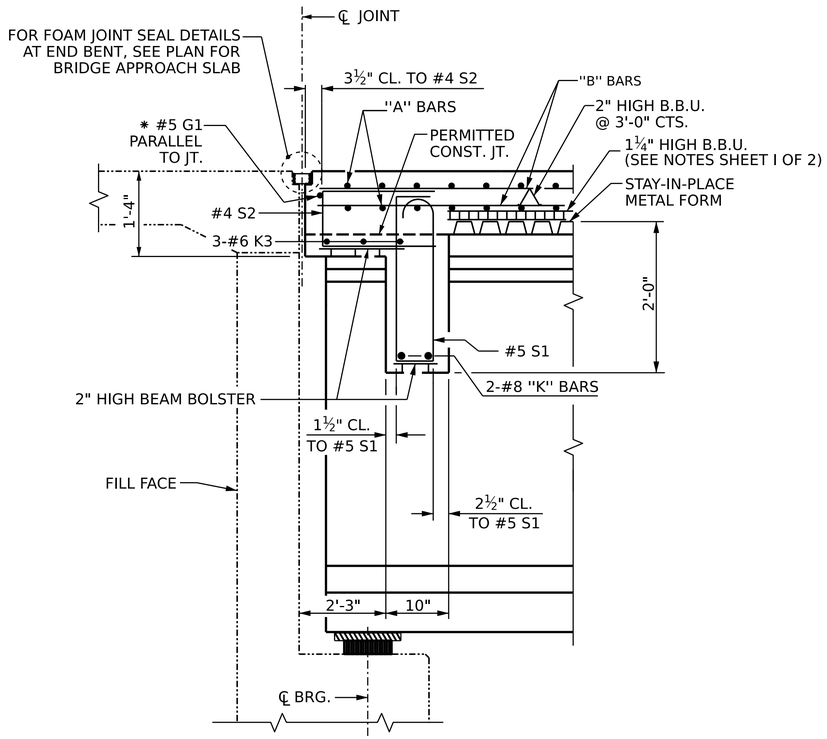
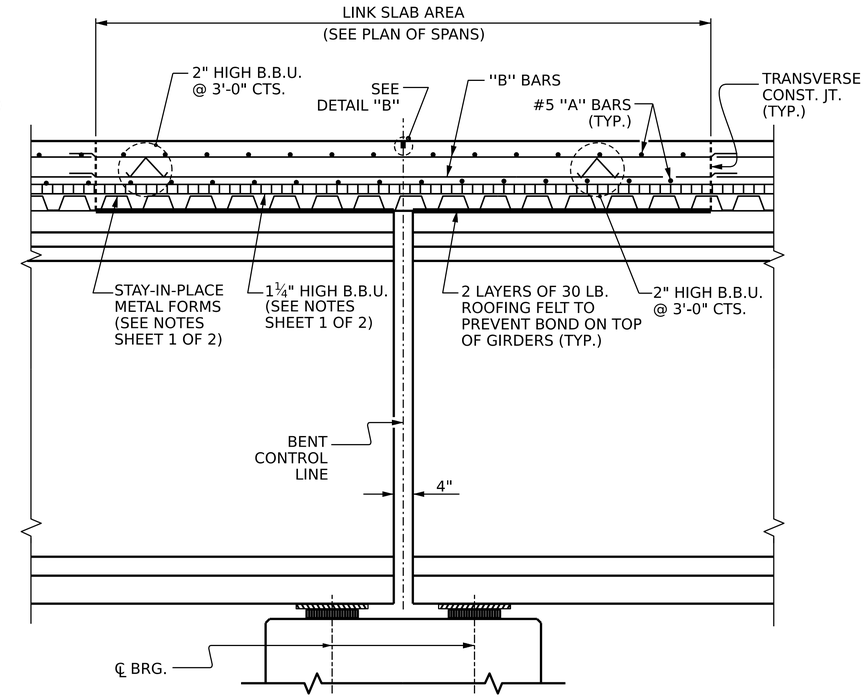
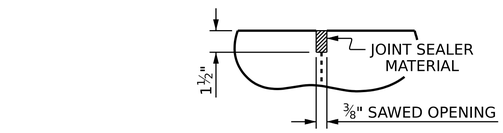


SECTION @ END BENT

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

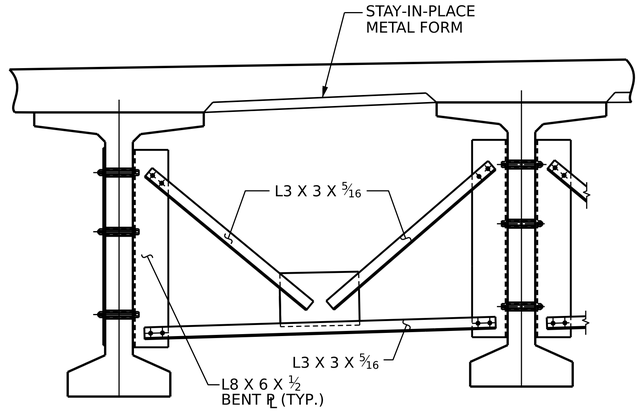


SECTION @ LINK SLAB



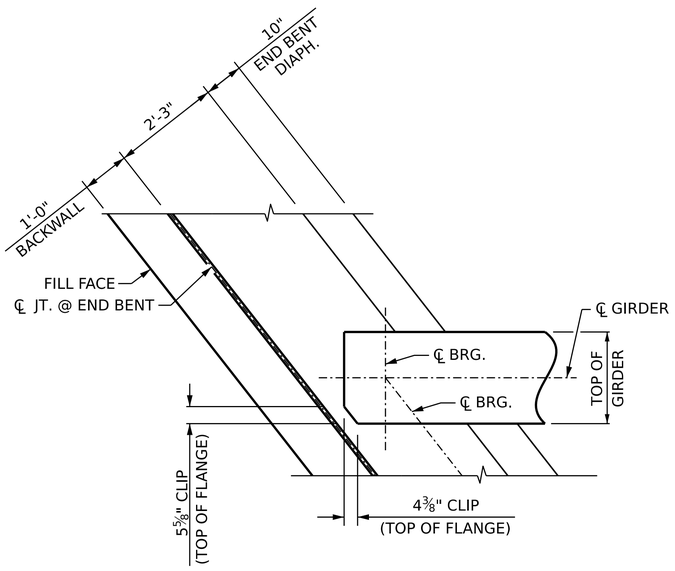
DETAIL "B"

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

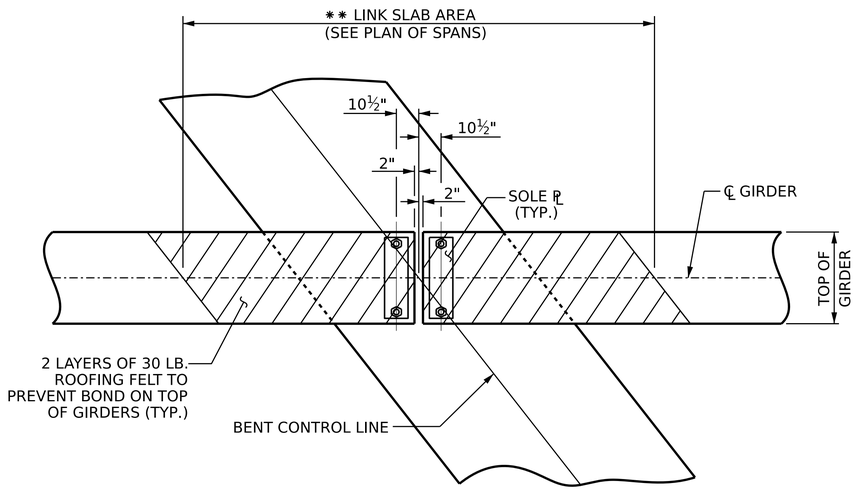


SECTION @ INTERMEDIATE DIAPHRAGM

SEE ''INTERMEDIATE STEEL DIAPHRAGM FOR 63" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS'' SHEET FOR DETAILS.



PLAN @ END BENT



PLAN @ BENT

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

PROJECT NO. BR-0094
ROCKINGHAM COUNTY
STATION: 20+38.70 -L-
SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...
11/16/2022

DRAWN BY : Q. T. NGUYEN DATE : 08/2022
CHECKED BY : Z. MALIK DATE : 09/2022
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 09/2022

11/9/2022
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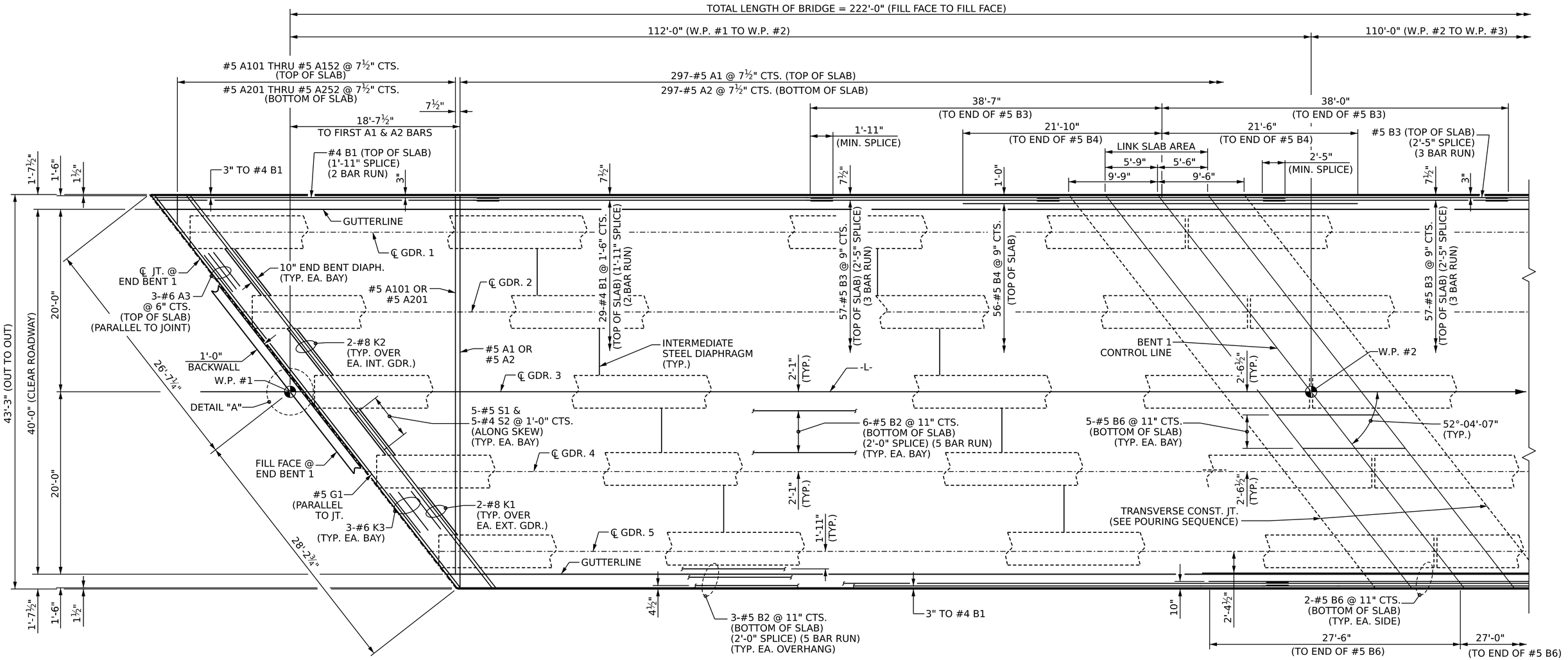
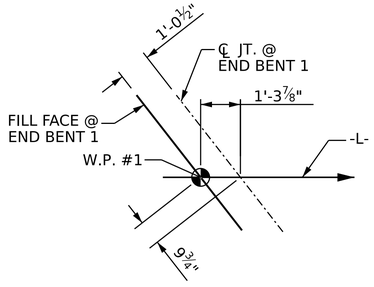


PLAN OF SPAN A

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



DETAIL "A"

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79CADB65D584EF...

11/16/2022

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2			4			30

DRAWN BY : Q. T. NGUYEN DATE : 08/2022
CHECKED BY : Z. MALIK DATE : 09/2022
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 09/2022

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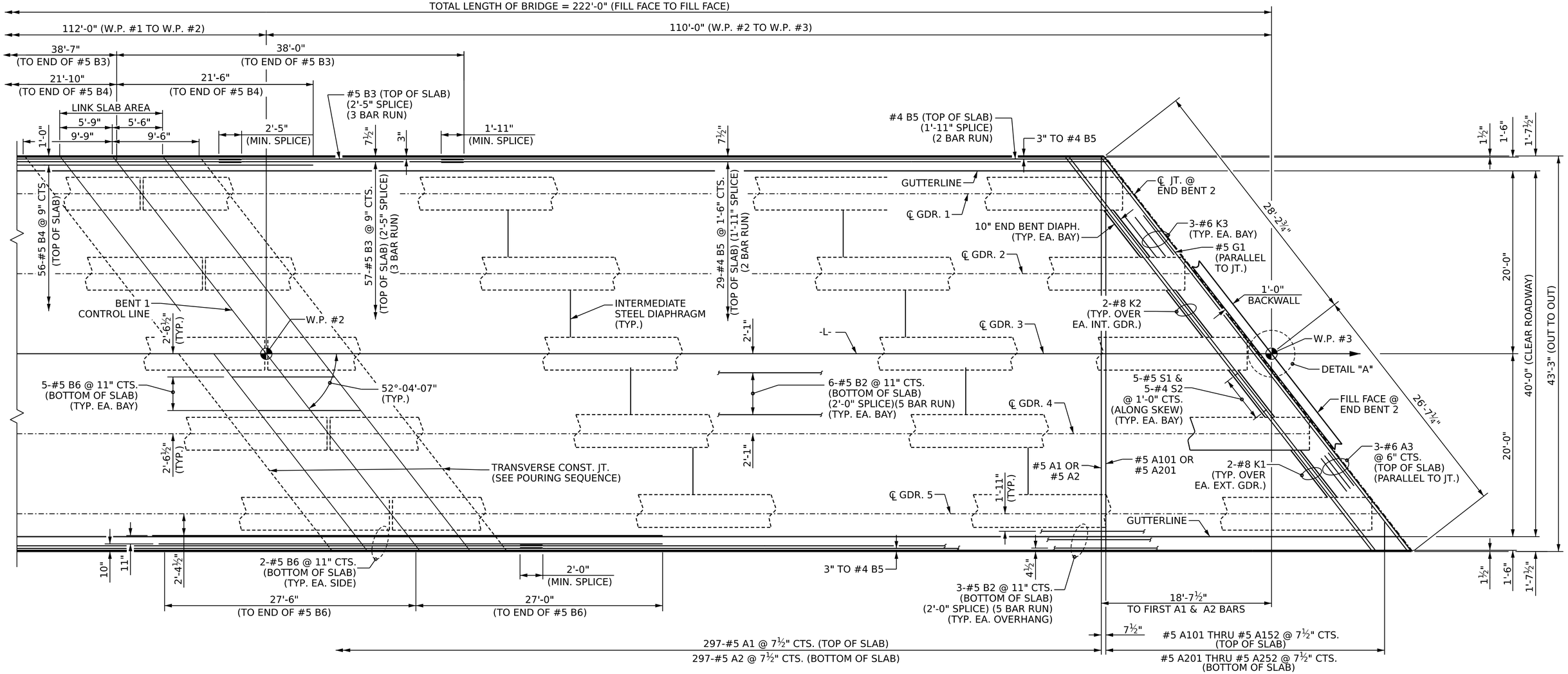
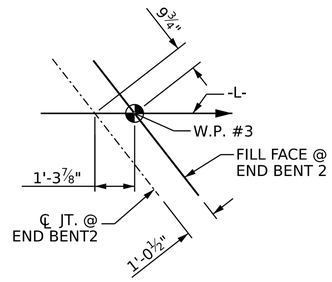


PLAN OF SPAN B

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



DETAIL "A"

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN B

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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11/16/2022

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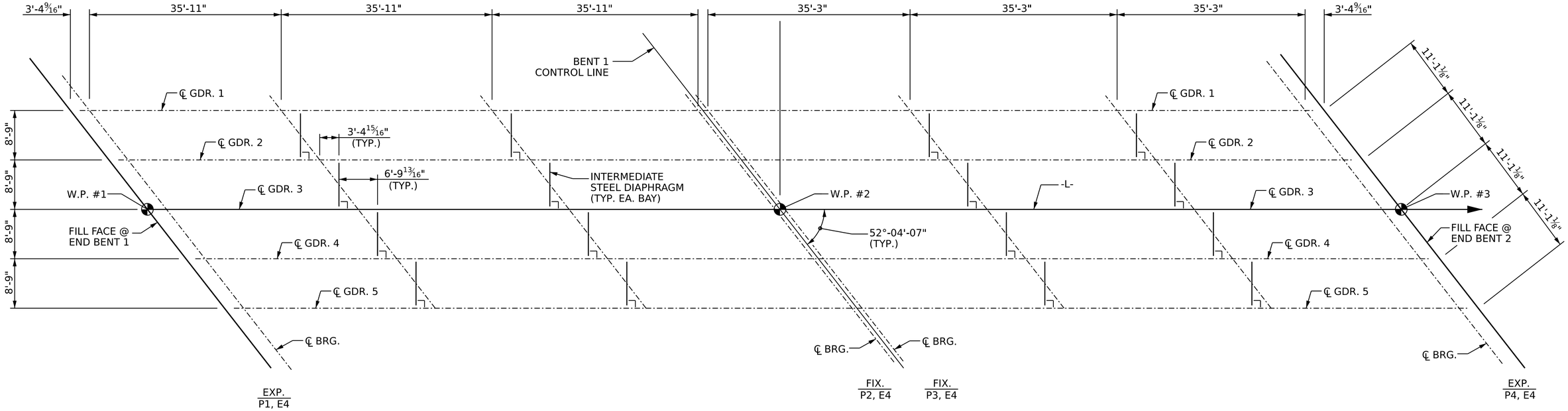

FRAMING PLAN

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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B79DADB65D584EF...
11/16/2022

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1			3			TOTAL SHEETS
2			4			30

DRAWN BY : Q. T. NGUYEN DATE : 08/2022
CHECKED BY : F. LEA DATE : 9/20/2022
DESIGN ENGINEER OF RECORD: F. LEA DATE : 9/20/2022

11/7/2022
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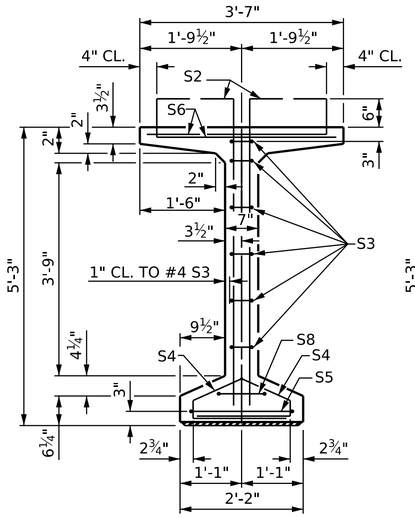
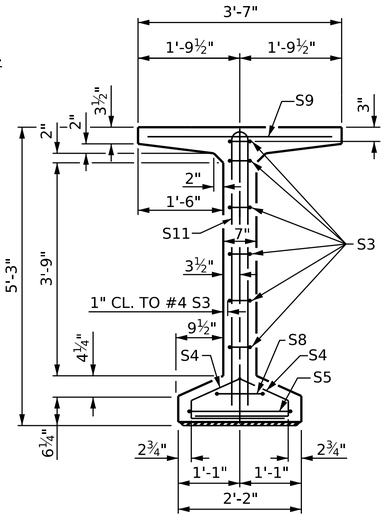
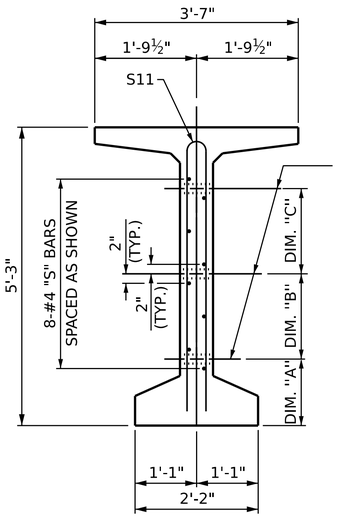


SECTION A-A



SECTION B-B

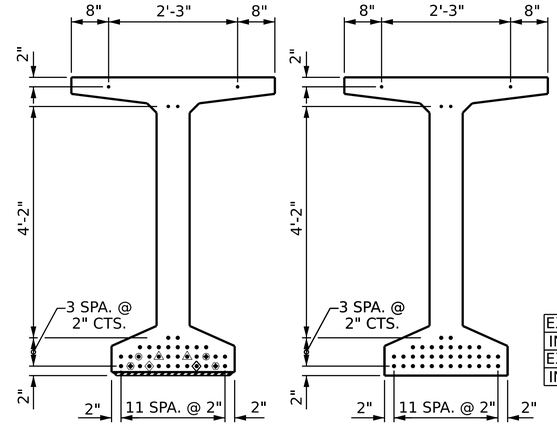


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



0.6" ∅ LOW RELAXATION STRAND LAYOUT

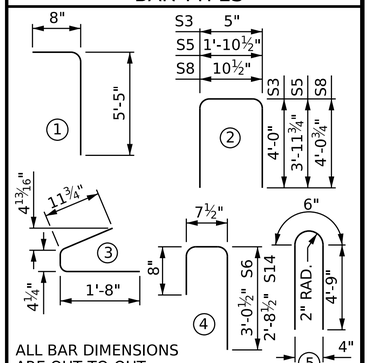
0.6"∅ L.R. GRADE 270 STRANDS

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

REINFORCING STEEL FOR ONE GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	156	#4	1	6'-1"	634
	S2	12	#5	1	6'-1"	76
	S3	12	#4	2	8'-5"	67
	S4	76	#4	3	3'-0"	152
	S5	2	#5	2	9'-10"	21
	S6	168	#5	4	4'-4"	759
	S8	2	#5	2	9'-0"	19
	S9	33	#5	STR	3'-3"	112
EXTERIOR	S11	21	#5	5	10'-0"	219
INTERIOR	S11	29	#5	5	10'-0"	302
EXTERIOR	S12	16	#4	STR	8'-0"	86
INTERIOR	S13	16	#4	STR	14'-10"	159
	S14	2	#5	4	4'-0"	8

BAR TYPES



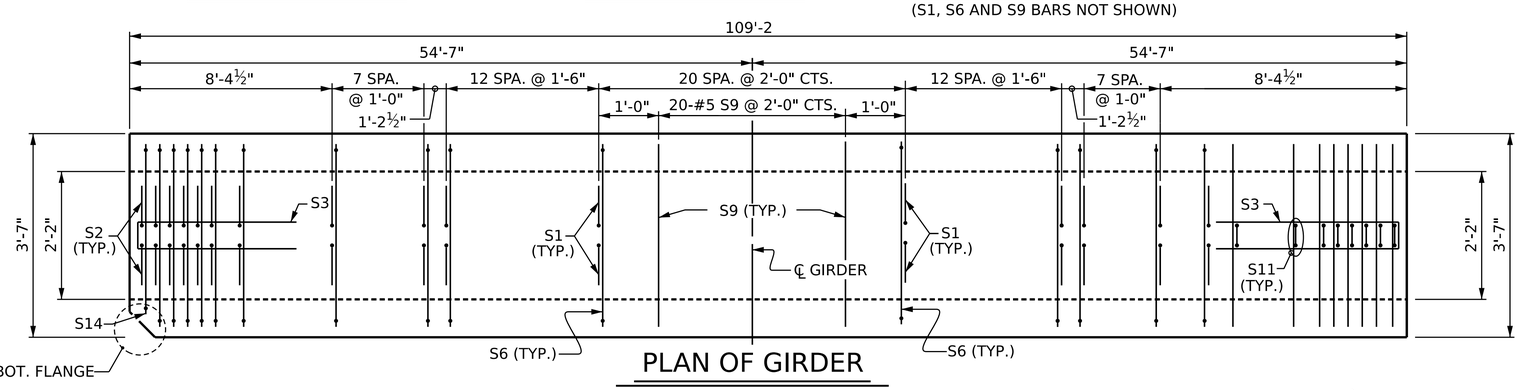
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

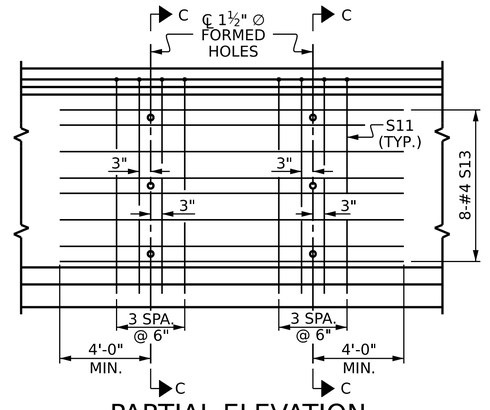
GIRDERS	REINFORCING STEEL	9000 PSI CONCRETE	0.6" ∅ L.R. STRANDS
	LB.	C.Y.	No.
INTERIOR	2,309	21.6	38
EXTERIOR	2,153	21.6	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	109'-2"	545.83

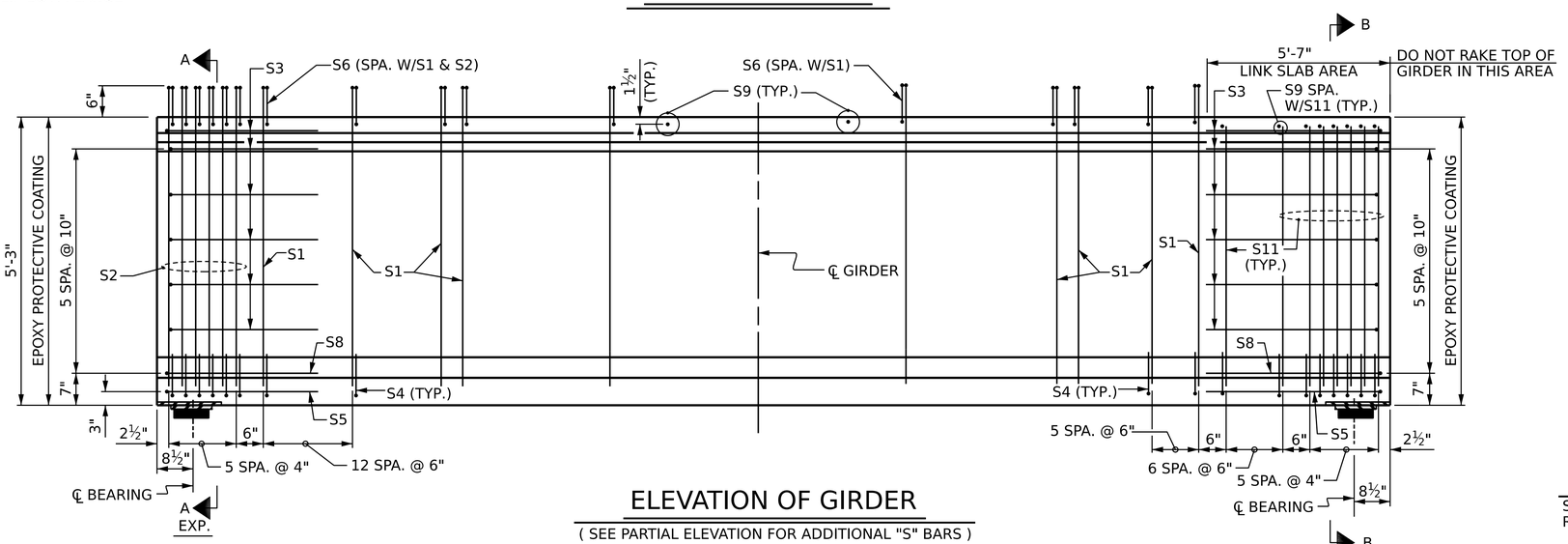


PLAN OF GIRDER



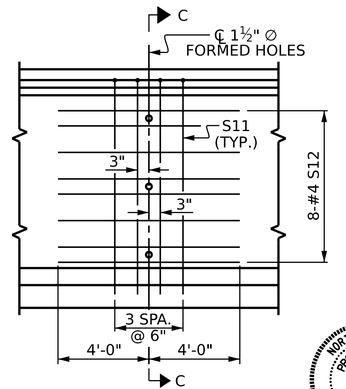
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 2 TO 4



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 1 & 5

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

11/16/2022

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

63" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB - SPAN A

ASSEMBLED BY :	Q.T. NGUYEN	DATE :	08/2022				
CHECKED BY :	F. LEA	DATE :	09/2022				
DRAWN BY :	BNB 09/21						
CHECKED BY :	AAI 09/21						

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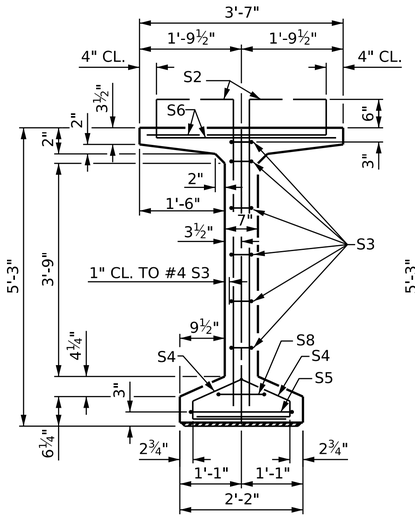
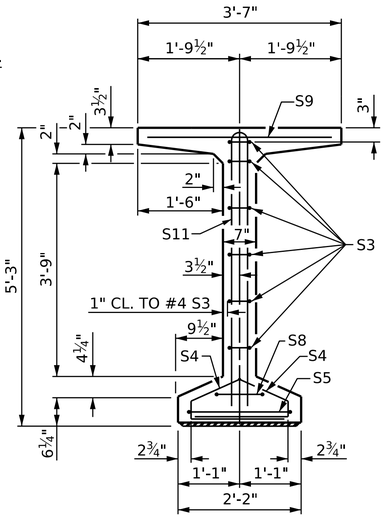
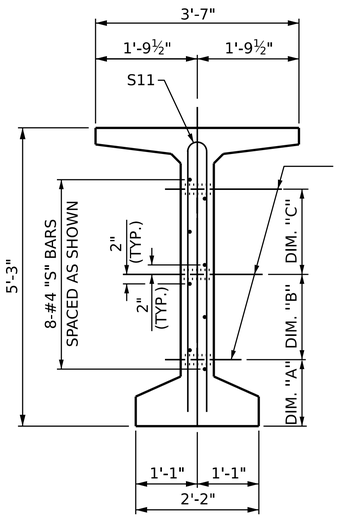
STD. NO. PCG7 (SHT. 1)



SECTION A-A



SECTION B-B

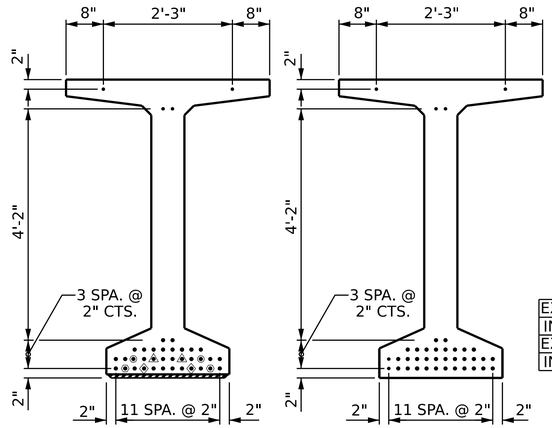


SECTION C-C

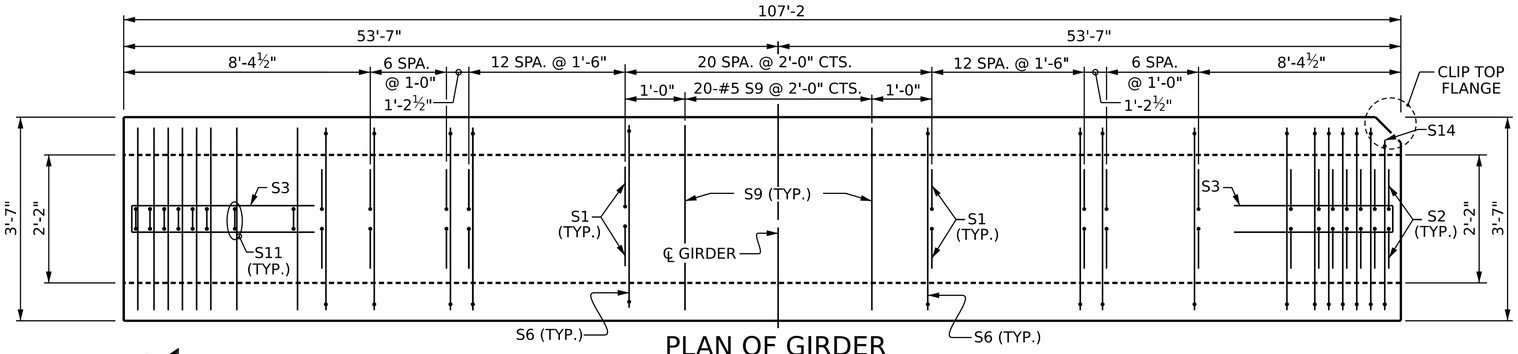
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

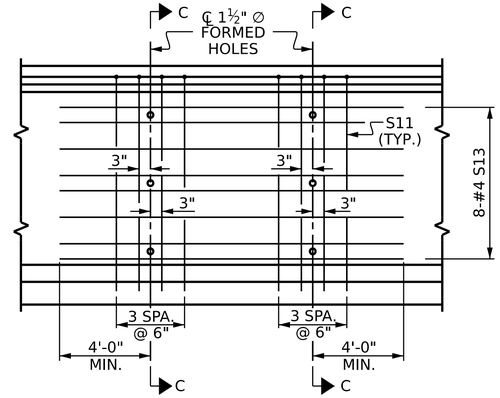
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



0.6" ∅ LOW RELAXATION STRAND LAYOUT

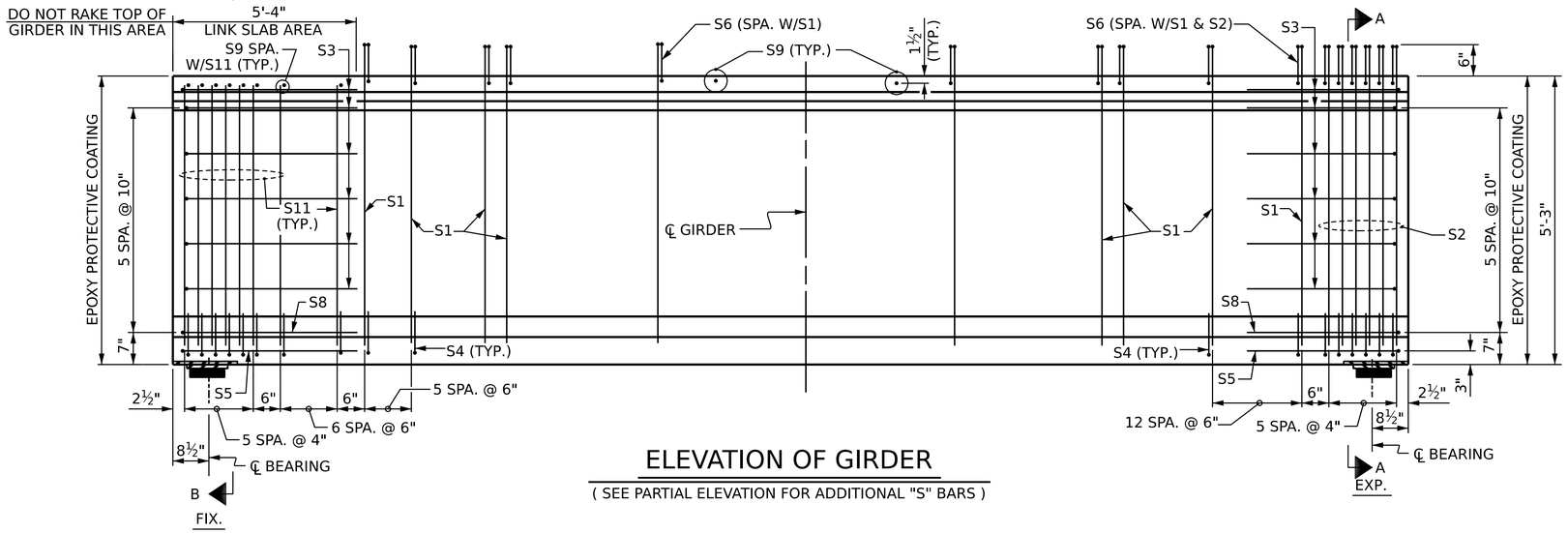


PLAN OF GIRDER



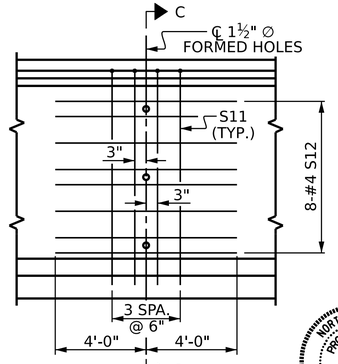
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM
REINFORCING STEEL FOR GIRDER 2 TO 4



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM
REINFORCING STEEL FOR GIRDER 1 & 5

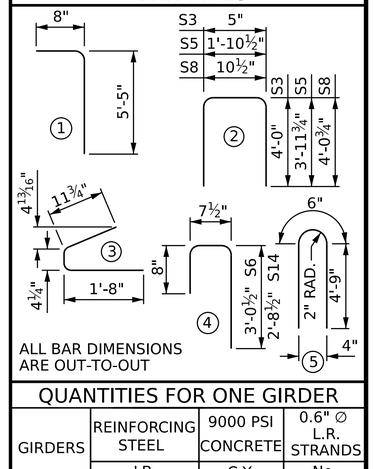
0.6"∅ L.R. GRADE 270 STRANDS

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	
S1	152	#4	1	6'-1"	618	
S2	12	#5	1	6'-1"	76	
S3	12	#4	2	8'-5"	67	
S4	76	#4	3	3'-0"	152	
S5	2	#5	2	9'-10"	21	
S6	164	#5	4	4'-4"	741	
S8	2	#5	2	9'-0"	19	
S9	33	#5	STR	3'-3"	112	
S11	21	#5	5	10'-0"	219	EXTERIOR
S11	29	#5	5	10'-0"	302	INTERIOR
S12	16	#4	STR	8'-0"	86	EXTERIOR
S13	16	#4	STR	14'-10"	159	INTERIOR
S14	2	#5	4	4'-0"	8	

BAR TYPES



QUANTITIES FOR ONE GIRDER

GIRDERS	REINFORCING STEEL LB.	9000 PSI CONCRETE C.Y.	0.6" ∅ L.R. STRANDS No.
INTERIOR	2,275	21.2	38
EXTERIOR	2,119	21.2	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	107'-2"	535.83

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

63" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB - SPAN B

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B78DADB65D584EF...

11/16/2022

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ASSEMBLED BY :	Q.T. NGUYEN	DATE :	08/2022
CHECKED BY :	F. LEA	DATE :	09/2022
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CHECKED BY :	AAI 09/21		

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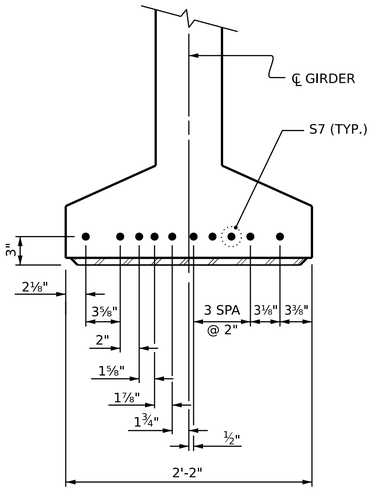
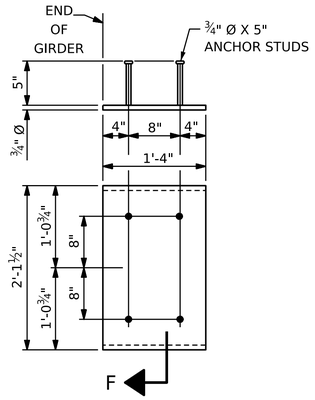
STD. NO. PCG7 (SHT. 1)



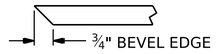
DETAIL "C"

(FOR 63" MODIFIED BULB TEES)



EMBEDDED PLATE "B-1" DETAILS FOR 63" MODIFIED BULB TEES

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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.

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 7200 PSI.

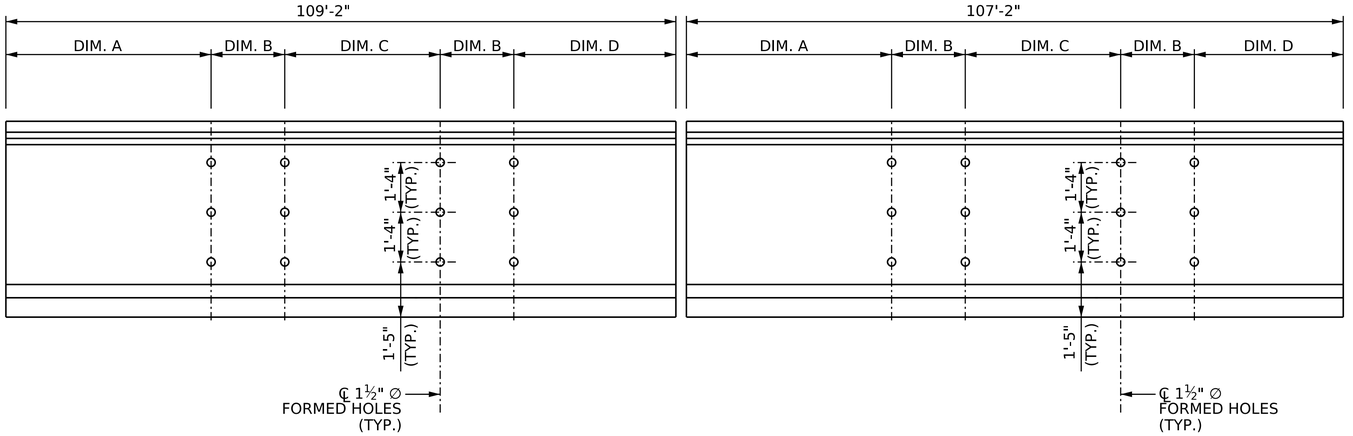
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

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

A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 63" MODIFIED BULB TEES ONLY.

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

FOR GIRDER CLIP DETAIL, SEE "TYPICAL SECTION" SHEET.



SPAN A

SPAN B

LOCATION OF 1½" Ø FORMED HOLE FOR TYPICAL INTERMEDIATE DIAPHRAGMS

	GIRDER	DIM. A	DIM. B	DIM. C	DIM. B	DIM. D
SPAN A	1	40'-0 7/16"	-	35'-11"	-	33'-2½"
SPAN A	2-4	33'-2 9/16"	6'-9 13/16"	29'-1 3/16"	6'-9 13/16"	33'-2½"
SPAN A	5	33'-2 9/16"	-	35'-11"	-	40'-0 3/8"
SPAN B	1	39'-4 3/8"	-	35'-3"	-	32'-6 9/16"
SPAN B	2-4	32'-6½"	6'-9 13/16"	28'-5 3/16"	6'-9 13/16"	32'-6 9/16"
SPAN B	5	32'-6½"	-	35'-3"	-	39'-4 7/16"

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB650584EF...

11/21/2022

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SHEET NO. S-13

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DRAWN BY : ELR 11/91	REV. 1/15		MAA/TMG
CHECKED BY : GRP 11/91	REV. 2/15		MAA/TMG
	REV. 12/17		MAA/THC

11/21/2022
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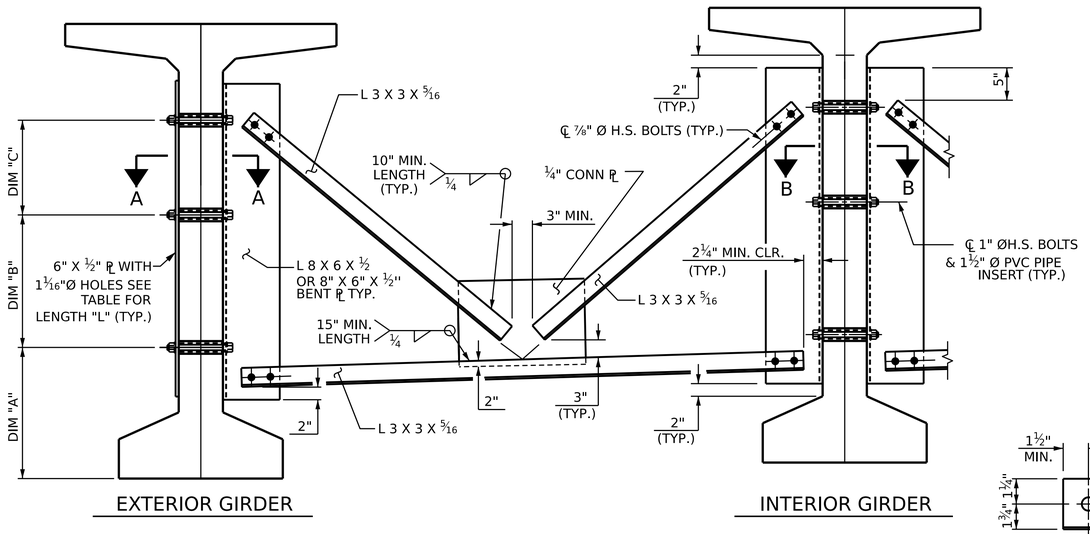
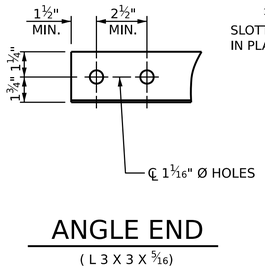
STD. NO. PCG9 (Sht. 4)



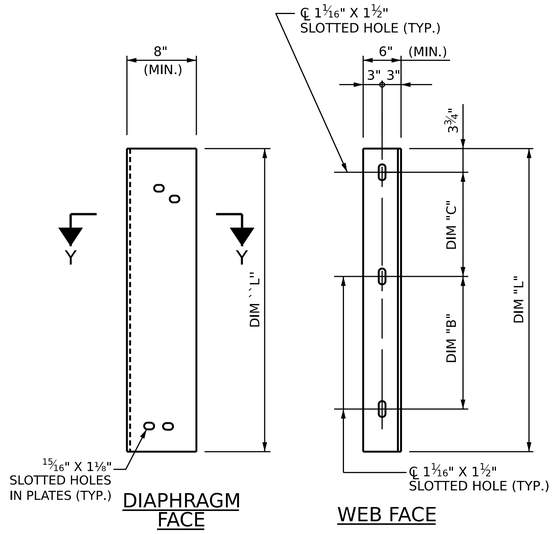
PART SECTION AT INTERMEDIATE DIAPHRAGM

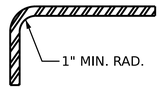
(63'' BULB TEE GIRDER SHOWN)



ANGLE END

(L 3 X 3 X 5/16)





SECTION Y-Y

CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

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

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

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.

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

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

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

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

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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

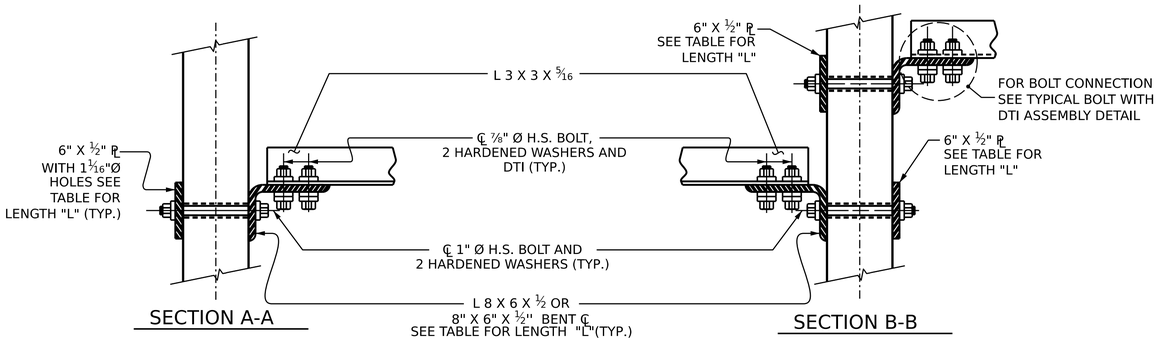
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

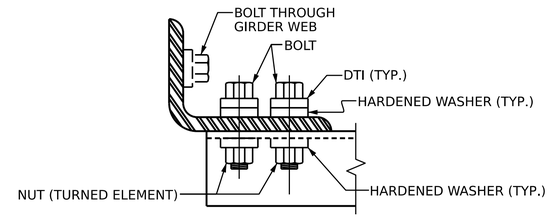
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
63'' BULB TEE	1'-5"	1'-4"	1'-4"	3'-5''



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE STEEL DIAPHRAGMS FOR 63'' MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

11/16/2022

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CHECKED BY : GM II/09	REV. 12/17		MAA/THC

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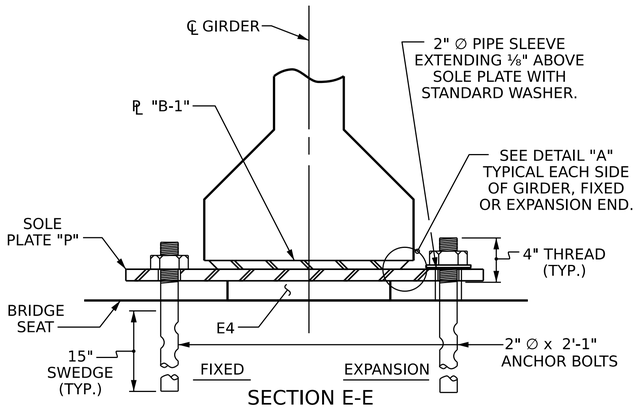
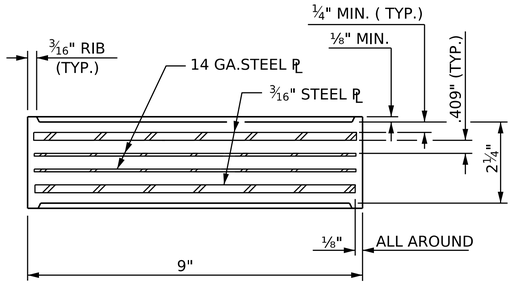
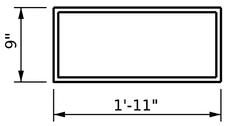


SECTION E-E



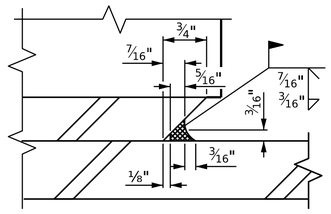
TYPICAL SECTION OF ELASTOMERIC BEARINGS



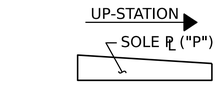
E4 (20 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

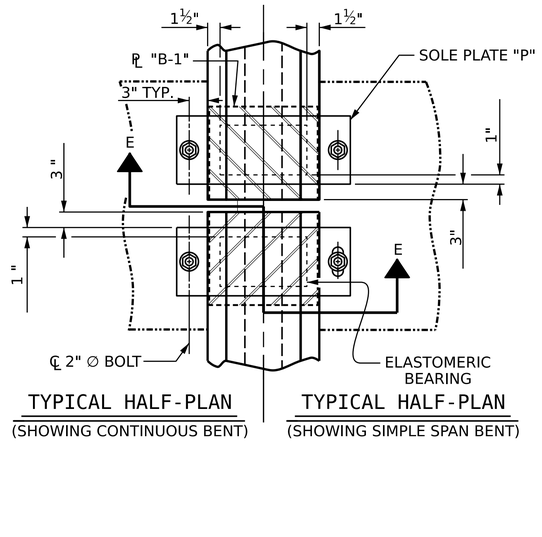
TYPE V



DETAIL "A"



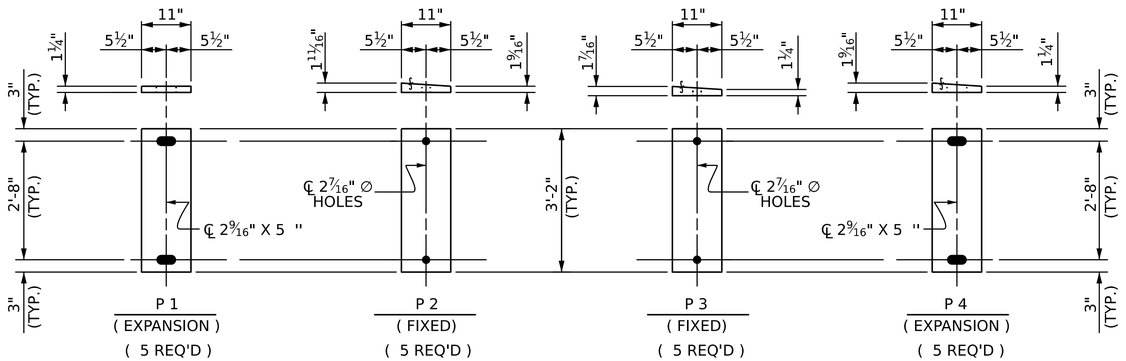
SOLE ℄ PLACEMENT DETAIL



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)

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



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" ∅ 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 SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...

11/16/2022

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
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DRAWN BY : WJH 8/89	REV. 1/15		MAA/TMG
CHECKED BY : CRK 8/89	REV. 12/17		MAA/THC
	REV. 10/21		BNB/AAI

11/7/2022
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STD. NO. EB4

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN A — GIRDERS 1 AND 5																																								
FORTIETH POINTS ▲	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ▼	0	0.249	0.495	0.738	0.976	1.208	1.431	1.644	1.847	2.038	2.216	2.380	2.529	2.662	2.779	2.879	2.962	3.026	3.073	3.101	3.110	3.101	3.073	3.026	2.962	2.879	2.779	2.662	2.529	2.380	2.216	2.038	1.847	1.644	1.431	1.208	0.976	0.738	0.495	0.249	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ▲	0	0.151	0.301	0.449	0.594	0.735	0.870	1.000	1.124	1.240	1.348	1.448	1.539	1.620	1.691	1.752	1.802	1.841	1.869	1.886	1.892	1.886	1.869	1.841	1.802	1.752	1.691	1.620	1.539	1.448	1.348	1.240	1.124	1.000	0.870	0.735	0.594	0.449	0.301	0.151	0
FINAL CAMBER	0	1/8"	3/16"	5/16"	3/8"	1/2"	9/16"	5/8"	3/4"	13/16"	7/8"	15/16"	1"	1 1/16"	1 1/16"	1 1/8"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 1/8"	1 1/16"	1 1/16"	1"	15/16"	7/8"	13/16"	3/4"	5/8"	9/16"	1/2"	3/8"	5/16"	3/16"	1/8"	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN A — GIRDERS 2 THRU 4																																								
FORTIETH POINTS ▲	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ▼	0	0.248	0.493	0.736	0.973	1.203	1.426	1.638	1.841	2.031	2.208	2.371	2.520	2.653	2.769	2.869	2.951	3.016	3.062	3.090	3.099	3.090	3.062	3.016	2.951	2.869	2.769	2.653	2.520	2.371	2.208	2.031	1.841	1.638	1.426	1.203	0.973	0.736	0.493	0.248	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ▲	0	0.149	0.298	0.444	0.587	0.726	0.860	0.989	1.111	1.225	1.332	1.431	1.520	1.601	1.671	1.731	1.781	1.819	1.847	1.864	1.870	1.864	1.847	1.819	1.781	1.731	1.671	1.601	1.520	1.431	1.332	1.225	1.111	0.989	0.860	0.726	0.587	0.444	0.298	0.149	0
FINAL CAMBER	0	1/8"	3/16"	5/16"	3/8"	1/2"	9/16"	5/8"	3/4"	13/16"	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 3/16"	1 3/16"	1 3/16"	1 1/8"	1 1/8"	1 1/16"	1"	15/16"	7/8"	13/16"	3/4"	5/8"	9/16"	1/2"	3/8"	5/16"	3/16"	1/8"	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN B — GIRDERS 1 AND 5																																								
FORTIETH POINTS ▲	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ▼	0	0.244	0.487	0.726	0.960	1.187	1.407	1.617	1.816	2.004	2.178	2.340	2.486	2.662	2.732	2.831	2.912	2.975	3.021	3.048	3.058	3.048	3.021	2.975	2.912	2.831	2.732	2.662	2.486	2.340	2.178	2.004	1.816	1.617	1.407	1.187	0.960	0.726	0.487	0.244	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ▲	0	0.140	0.279	0.416	0.550	0.680	0.805	0.926	1.040	1.147	1.247	1.340	1.423	1.449	1.564	1.621	1.667	1.703	1.730	1.745	1.751	1.745	1.730	1.703	1.667	1.621	1.564	1.449	1.423	1.340	1.247	1.147	1.040	0.926	0.805	0.680	0.550	0.416	0.279	0.140	0
FINAL CAMBER	0	1/8"	3/16"	5/16"	7/16"	1/2"	5/8"	11/16"	3/4"	7/8"	15/16"	1"	1 1/16"	1 1/8"	1 3/16"	1 3/16"	1 1/4"	1 1/4"	1 5/16"	1 5/16"	1 5/16"	1 5/16"	1 5/16"	1 1/4"	1 1/4"	1 3/16"	1 3/16"	1 1/8"	1 1/16"	1"	15/16"	7/8"	3/4"	11/16"	5/8"	1/2"	7/16"	5/16"	3/16"	1/8"	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN B — GIRDERS 2 THRU 4																																								
FORTIETH POINTS ▲	0	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ▼	0	0.243	0.485	0.723	0.957	1.183	1.402	1.611	1.810	1.997	2.171	2.332	2.478	2.608	2.723	2.821	2.902	2.965	3.011	3.038	3.047	3.038	3.011	2.965	2.902	2.821	2.723	2.608	2.478	2.332	2.171	1.997	1.810	1.611	1.402	1.183	0.957	0.723	0.485	0.243	0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ▲	0	0.139	0.276	0.412	0.545	0.674	0.798	0.917	1.030	1.137	1.236	1.327	1.411	1.485	1.550	1.606	1.652	1.688	1.714	1.730	1.735	1.730	1.714	1.688	1.652	1.606	1.550	1.485	1.411	1.327	1.236	1.137	1.030	0.917	0.798	0.674	0.545	0.412	0.276	0.139	0
FINAL CAMBER	0	1/8"	3/16"	5/16"	7/16"	1/2"	5/8"	11/16"	3/4"	7/8"	15/16"	1"	1 1/16"	1 1/8"	1 3/16"	1 3/16"	1 1/4"	1 1/4"	1 5/16"	1 5/16"	1 5/16"	1 5/16"	1 5/16"	1 1/4"	1 1/4"	1 3/16"	1 3/16"	1 1/8"	1 1/16"	1"	15/16"	7/8"	3/4"	11/16"	5/8"	1/2"	7/16"	5/16"	3/16"	1/8"	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-0094
ROCKINGHAM COUNTY
STATION: 20+38.70 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS SPAN A & B

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA
DocuSigned by: Francesca Lea B79DADB65D584EF...
11/16/2022

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			30

DRAWN BY : S. M. MATTA DATE : 09/2022
CHECKED BY : Z. MALIK DATE : 09/2022
DESIGN ENGINEER OF RECORD: Z. MALIK DATE : 09/2022

11/10/2022
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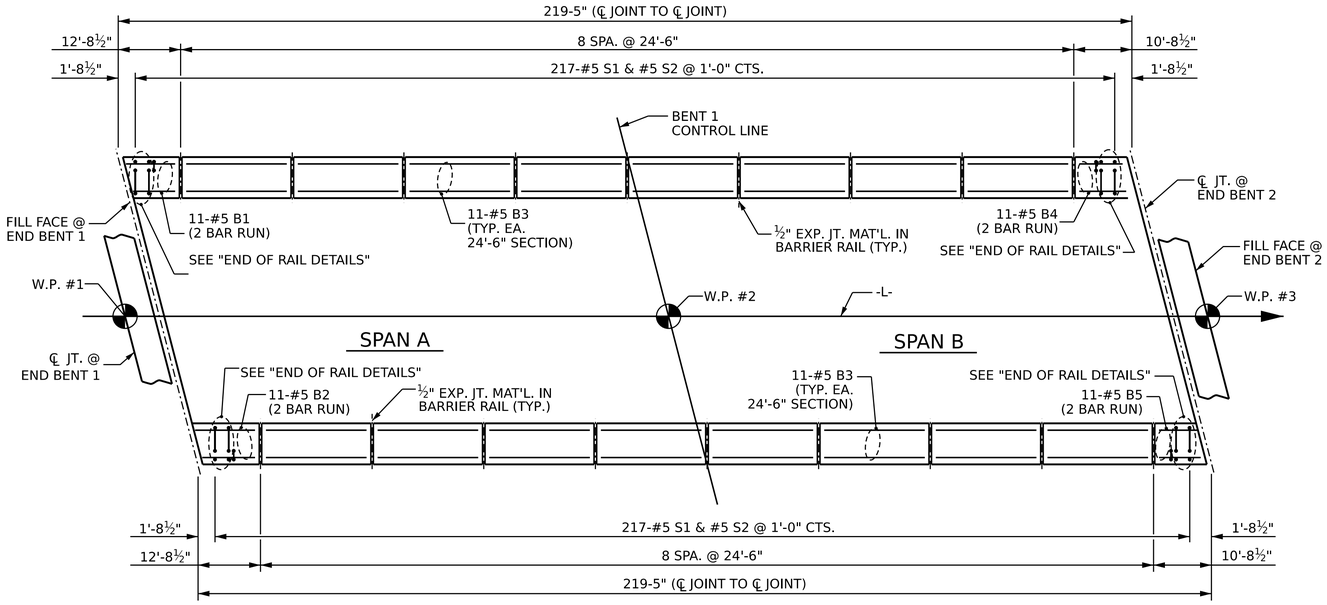


PLAN OF CONCRETE BARRIER RAIL

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.

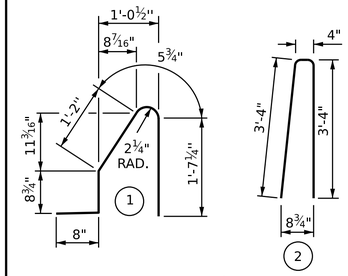
WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL.

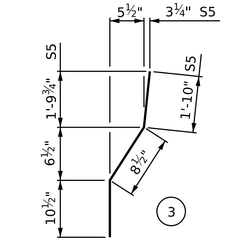
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5 S5 AND S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 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





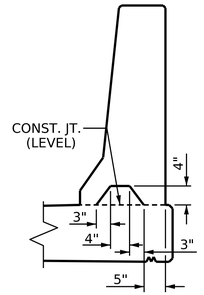
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

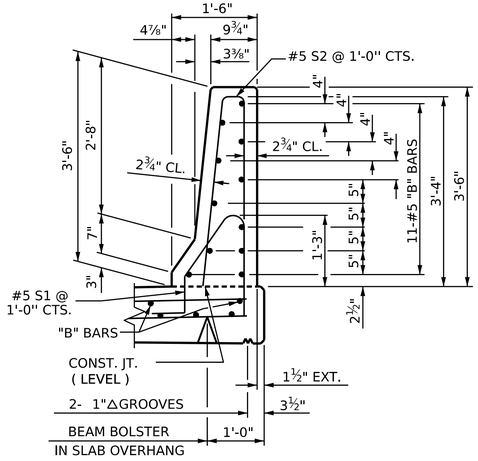
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	22	#5	STR	7'-2"	164
* B2	22	#5	STR	7'-8"	176
* B3	176	#5	STR	24'-2"	4436
* B4	22	#5	STR	6'-8"	153
* B5	22	#5	STR	6'-1"	140
* S1	434	#5	1	4'-7"	2075
* S2	434	#5	2	7'-0"	3168
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27

* EPOXY COATED REINFORCING STEEL	10,368	LBS.
CLASS AA CONCRETE	62.2	CU. YDS.
CONCRETE BARRIER RAIL	438.83	LIN. FT.

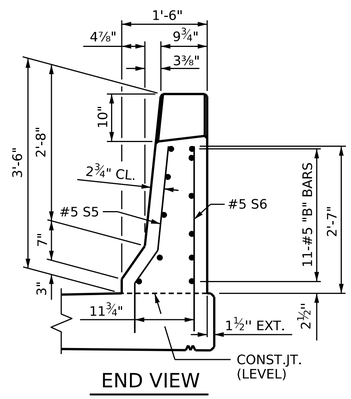


SECTION S-S

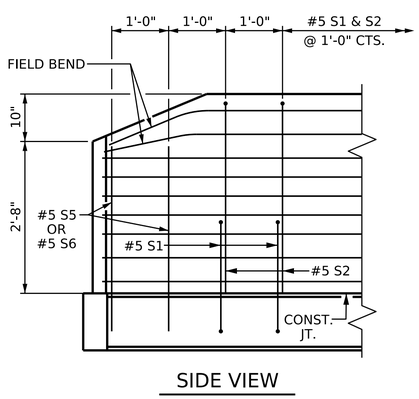
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY
WHEN SLIP FORM IS USED)



SECTION THRU RAIL



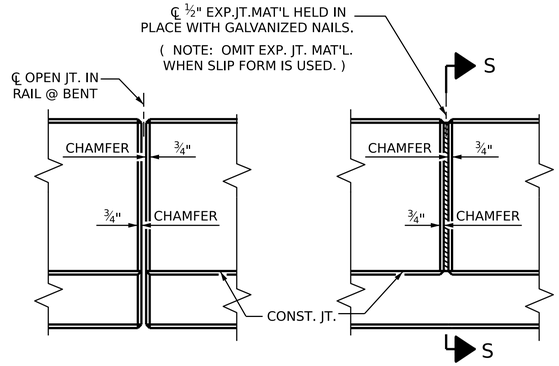
END VIEW



SIDE VIEW

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -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 B780AD865D5844EF...

11/16/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY :	Q. T. NGUYEN	DATE :	08/2022		
CHECKED BY :	S. MATTA	DATE :	09/2022		
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		

REVISIONS						SHEET NO.
NO	BY:	DATE:	NO	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			30

11/10/2022
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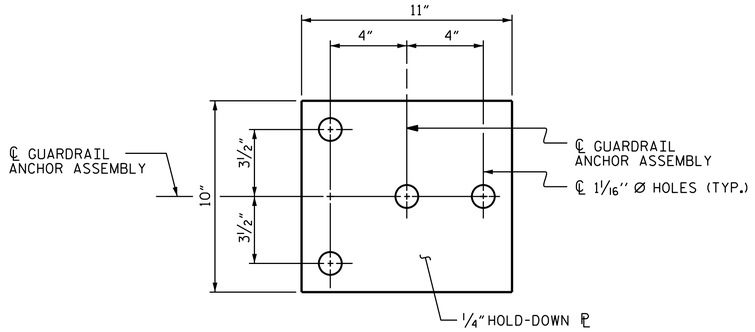
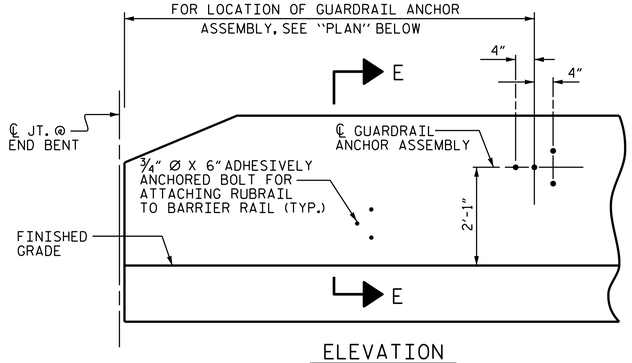
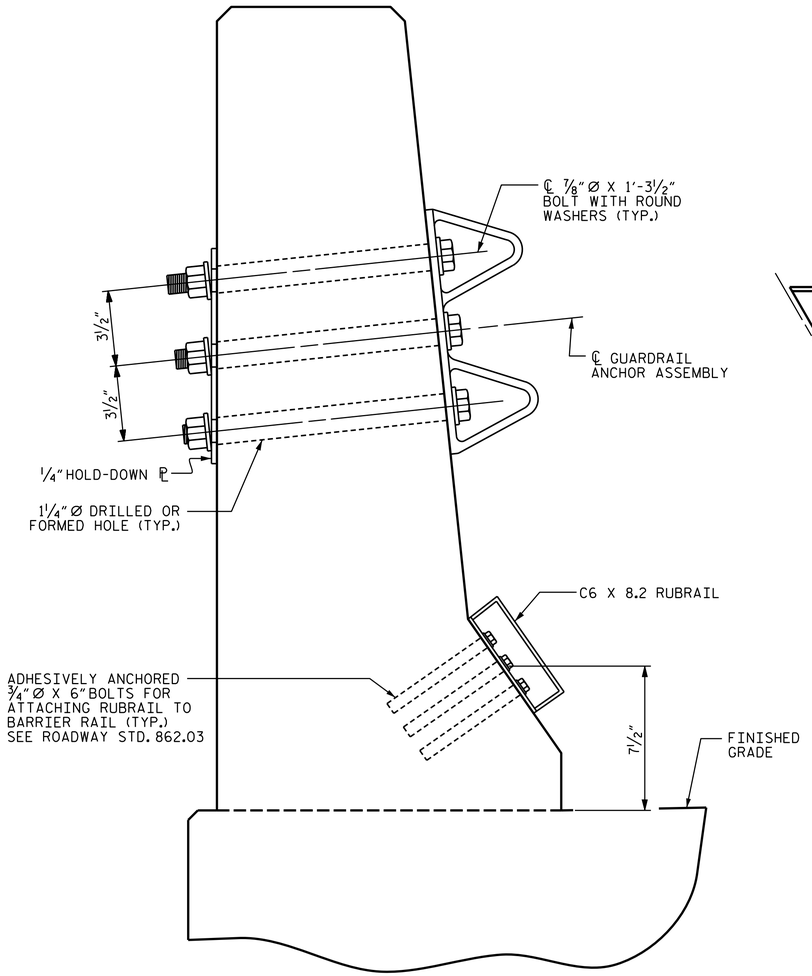
STD. NO. CBR1 (SHT 3)



PLAN

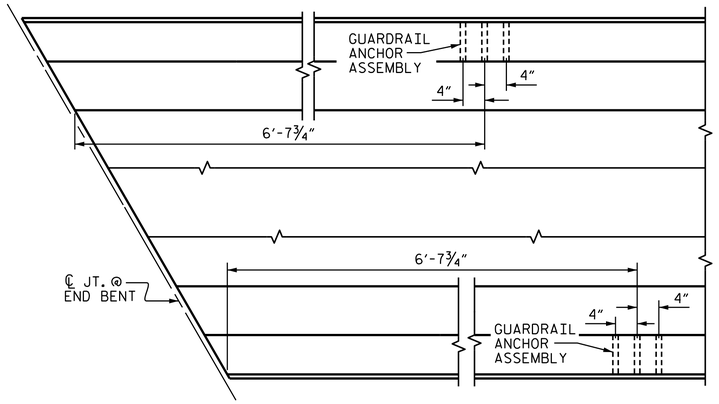


ELEVATION



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" Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

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

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

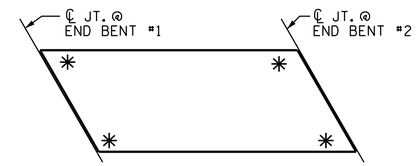
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

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



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D584EF...
11/16/2022

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			30

ASSEMBLED BY : O. T. NGUYEN	DATE : 08/2022	
CHECKED BY : S. MATTA	DATE : 09/2022	
DRAWN BY : TLA 5/06	REV. 7/12	MAA/GM
CHECKED BY : GM 5/06	REV. 6/13	MAA/GM
	REV. 12/17	MAA/THC

10/21/2022
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(SHT 1a) STD. NO. GRA2

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE			REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)			(LBS.)	(LBS.)
	POUR 1	POUR 2	TOTAL		
SPANS A & B	265.6	25.3	290.9	24,128	32,554
TOTALS **	265.6	25.3	290.9	24,128	32,554

** QUANTITIES FOR BRIDGE RAIL NOT INCLUDED

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,094	SQ.FT.
BRIDGE DECK	8,097	SQ.FT.
TOTAL	9,191	SQ.FT.

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

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPETS, AND BARRIER RAILS		APPROACH SLABS		PARAPETS AND BARRIER RAILS
	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"			

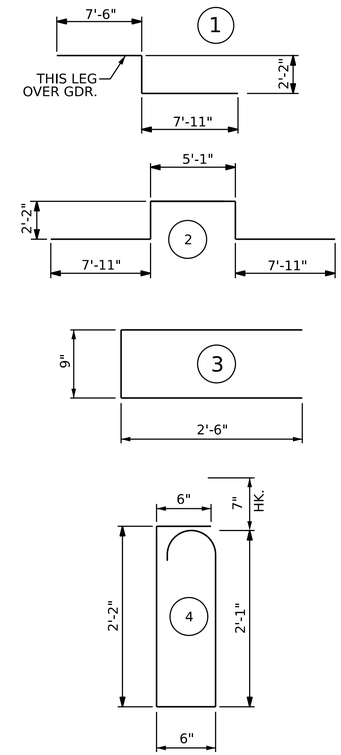
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	297	5	STR.	42'-11"	13294	* A141	2	5	STR.	10'-3"	21	A232	2	5	STR.	17'-5"	36
A2	297	5	STR.	42'-11"	13294	* A142	2	5	STR.	9'-5"	20	A233	2	5	STR.	16'-8"	35
* A3	6	6	STR.	18'-0"	162	* A143	2	5	STR.	8'-7"	18	A234	2	5	STR.	15'-10"	33
						* A144	2	5	STR.	7'-10"	16	A235	2	5	STR.	15'-0"	31
* A101	2	5	STR.	42'-4"	88	* A145	2	5	STR.	7'-0"	15	A236	2	5	STR.	14'-3"	30
* A102	2	5	STR.	41'-6"	87	* A146	2	5	STR.	6'-3"	13	A237	2	5	STR.	13'-5"	28
* A103	2	5	STR.	40'-8"	85	* A147	2	5	STR.	5'-5"	11	A238	2	5	STR.	12'-8"	26
* A104	2	5	STR.	39'-11"	83	* A148	2	5	STR.	4'-7"	10	A239	2	5	STR.	11'-10"	25
* A105	2	5	STR.	39'-1"	82	* A149	2	5	STR.	3'-10"	8	A240	2	5	STR.	11'-0"	23
* A106	2	5	STR.	38'-4"	80	* A150	2	5	STR.	3'-0"	6	A241	2	5	STR.	10'-3"	21
* A107	2	5	STR.	37'-6"	78	* A151	2	5	STR.	2'-2"	5	A242	2	5	STR.	9'-5"	20
* A108	2	5	STR.	36'-8"	76	* A152	2	5	STR.	1'-5"	3	A243	2	5	STR.	8'-7"	18
* A109	2	5	STR.	35'-11"	75							A244	2	5	STR.	7'-10"	16
* A110	2	5	STR.	35'-1"	73	A201	2	5	STR.	42'-4"	88	A245	2	5	STR.	7'-0"	15
* A111	2	5	STR.	34'-3"	71	A202	2	5	STR.	41'-6"	87	A246	2	5	STR.	6'-3"	13
* A112	2	5	STR.	33'-6"	70	A203	2	5	STR.	40'-8"	85	A247	2	5	STR.	5'-5"	11
* A113	2	5	STR.	32'-8"	68	A204	2	5	STR.	39'-11"	83	A248	2	5	STR.	4'-7"	10
* A114	2	5	STR.	31'-10"	66	A205	2	5	STR.	39'-1"	82	A249	2	5	STR.	3'-10"	8
* A115	2	5	STR.	31'-1"	65	A206	2	5	STR.	38'-4"	80	A250	2	5	STR.	3'-0"	6
* A116	2	5	STR.	30'-3"	63	A207	2	5	STR.	37'-6"	78	A251	2	5	STR.	2'-2"	5
* A117	2	5	STR.	29'-6"	62	A208	2	5	STR.	36'-8"	76	A252	2	5	STR.	1'-5"	3
* A118	2	5	STR.	28'-8"	60	A209	2	5	STR.	35'-11"	75						
* A119	2	5	STR.	27'-10"	58	A210	2	5	STR.	35'-1"	73	* B1	62	4	STR.	37'-10"	1567
* A120	2	5	STR.	27'-1"	56	A211	2	5	STR.	34'-3"	71	B2	150	5	STR.	45'-4"	7092
* A121	2	5	STR.	26'-3"	55	A212	2	5	STR.	33'-6"	70	* B3	177	5	STR.	27'-2"	5015
* A122	2	5	STR.	25'-5"	53	A213	2	5	STR.	32'-8"	68	* B4	56	5	STR.	43'-4"	2531
* A123	2	5	STR.	24'-8"	51	A214	2	5	STR.	31'-10"	66	* B5	62	4	STR.	37'-2"	1539
* A124	2	5	STR.	23'-10"	50	A215	2	5	STR.	31'-1"	65	B6	24	5	STR.	54'-6"	1364
* A125	2	5	STR.	23'-1"	48	A216	2	5	STR.	30'-3"	63						
* A126	2	5	STR.	22'-3"	46	A217	2	5	STR.	29'-6"	62	* G1	2	5	STR.	54'-4"	113
* A127	2	5	STR.	21'-5"	45	A218	2	5	STR.	28'-8"	60						
* A128	2	5	STR.	20'-8"	43	A219	2	5	STR.	27'-10"	58	* K1	8	8	1	17'-7"	376
* A129	2	5	STR.	19'-10"	41	A220	2	5	STR.	27'-1"	56	* K2	12	8	2	25'-3"	809
* A130	2	5	STR.	19'-0"	40	A221	2	5	STR.	26'-3"	55	* K3	24	6	STR.	6'-1"	219
* A131	2	5	STR.	18'-3"	38	A222	2	5	STR.	25'-5"	53						
* A132	2	5	STR.	17'-5"	36	A223	2	5	STR.	24'-8"	51	* S1	40	5	4	5'-10"	243
* A133	2	5	STR.	16'-8"	35	A224	2	5	STR.	23'-10"	50	* S2	40	4	3	5'-9"	154
* A134	2	5	STR.	15'-10"	33	A225	2	5	STR.	23'-1"	48						
* A135	2	5	STR.	15'-0"	31	A226	2	5	STR.	22'-3"	46						
* A136	2	5	STR.	14'-3"	30	A227	2	5	STR.	21'-5"	45						
* A137	2	5	STR.	13'-5"	28	A228	2	5	STR.	20'-8"	43						
* A138	2	5	STR.	12'-8"	26	A229	2	5	STR.	19'-10"	41						
* A139	2	5	STR.	11'-10"	25	A230	2	5	STR.	19'-0"	40						
* A140	2	5	STR.	11'-0"	23	A231	2	5	STR.	18'-3"	38						

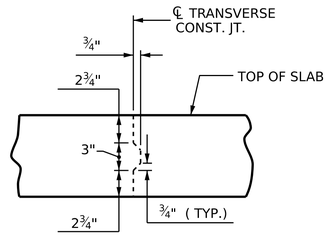
REINFORCING STEEL 24,128 LBS.

* EPOXY COATED REINFORCING STEEL 32,554 LBS.

BAR TYPES

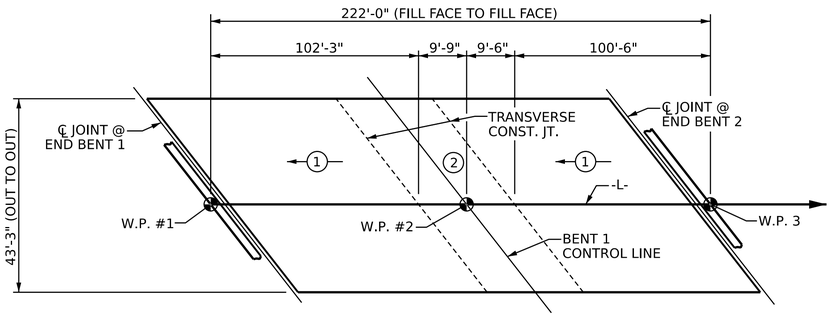


ALL BAR DIMENSIONS ARE OUT TO OUT



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

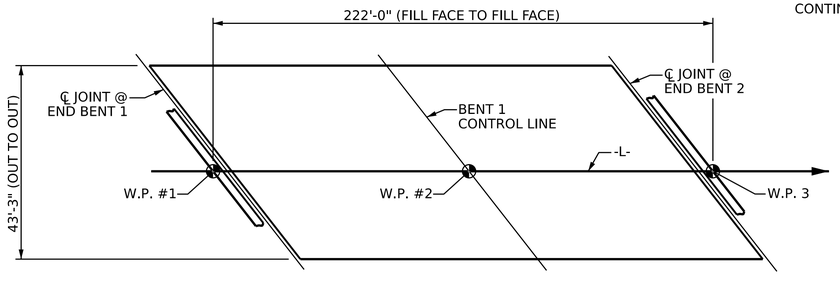


POUR SEQUENCE

POUR NUMBER ◯

POUR (2) CANNOT BE STARTED UNTIL BOTH ADJACENT POURS (1) HAVE REACHED A MINIMUM OF 3000 PSI

←◯ POUR DIRECTION



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 9,483)

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B780ADB65D584EF...

11/16/2022

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ASSEMBLED BY :	Q. T. NGUYEN	DATE :	09/2022
CHECKED BY :	Z. MALIK	DATE :	09/2022
DRAWN BY :	JMB 5/87	REV. 10/1/11	MAA/GM
CHECKED BY :	SJD 9/87	REV. 12/17	MAA/THC
		REV. 06/19	BNB/THC

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1			3			TOTAL SHEETS
2			4			30

STD. NO. BOM2

11/15/2022
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fleg

NOTES

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

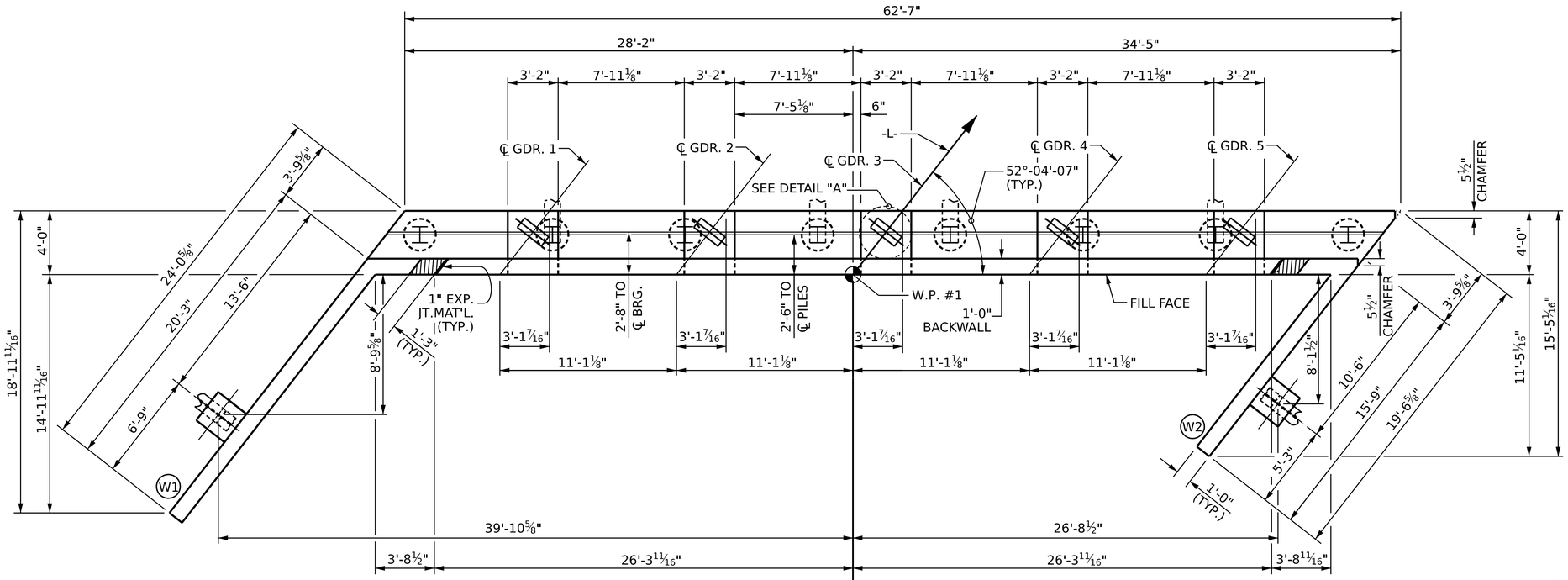
STIRRUPS AND U2 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

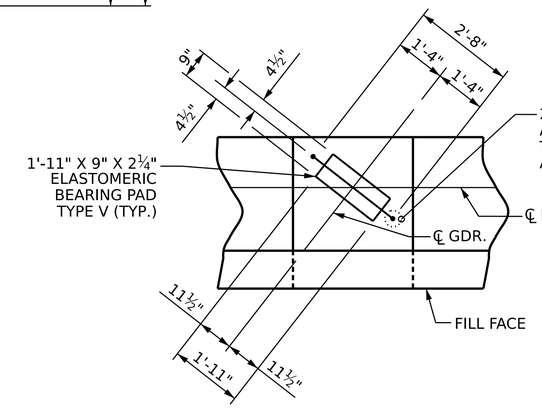
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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%.

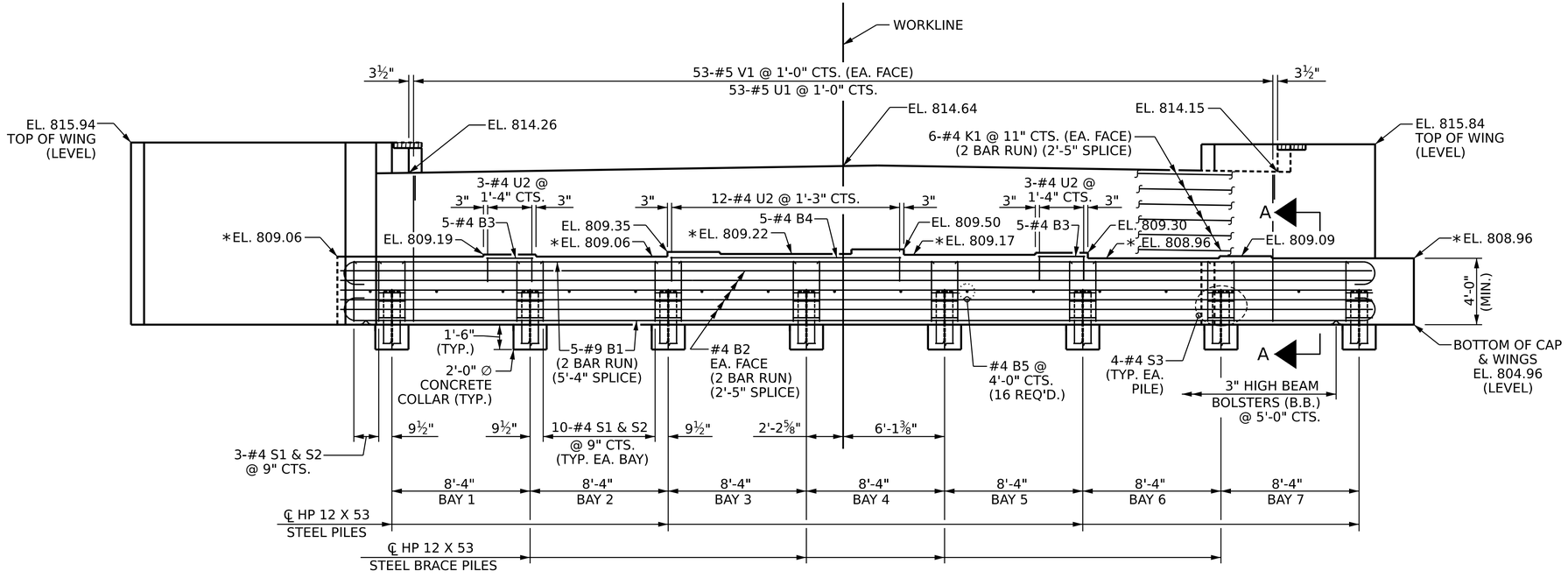


PLAN



DETAIL "A"

(TYP. EA. GDR.)



ELEVATION

(BRACE PILE IN WINGS NOT SHOWN FOR CLARITY)

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -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 B790ADB65D584EF...
11/16/2022

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CHECKED BY : F. LEA DATE : 09/2022
DESIGN ENGINEER OF RECORD: F. LEA DATE : 09/2022

11/10/2022
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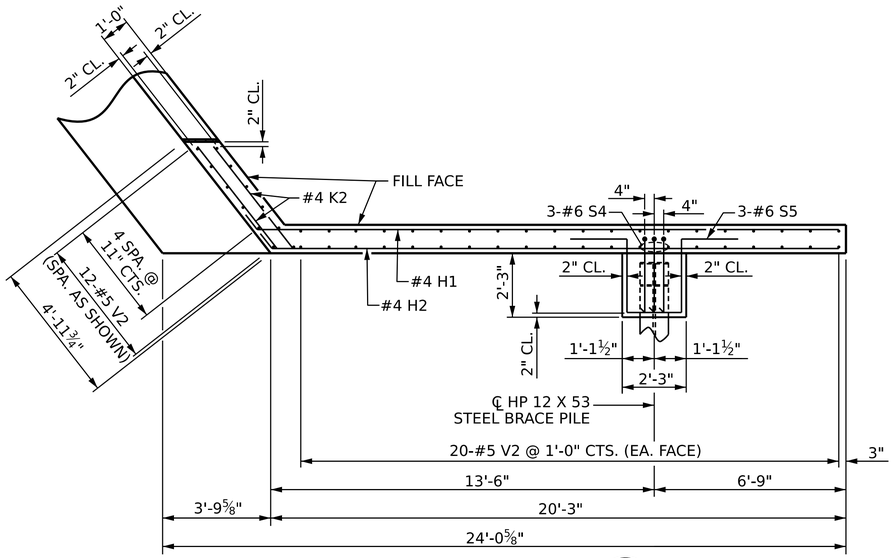
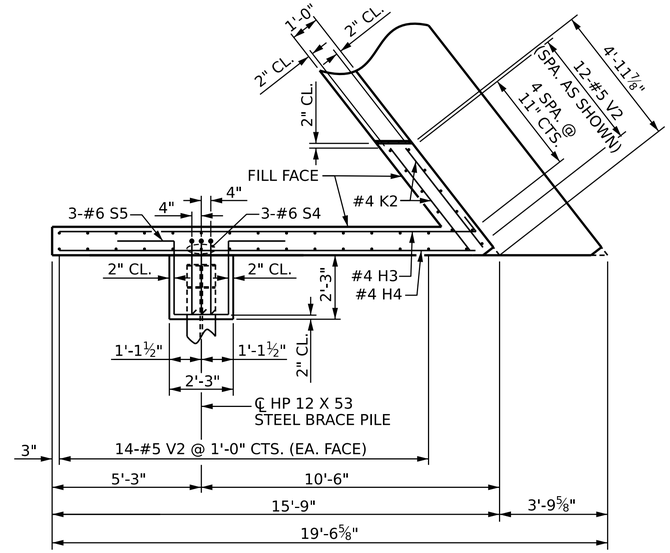
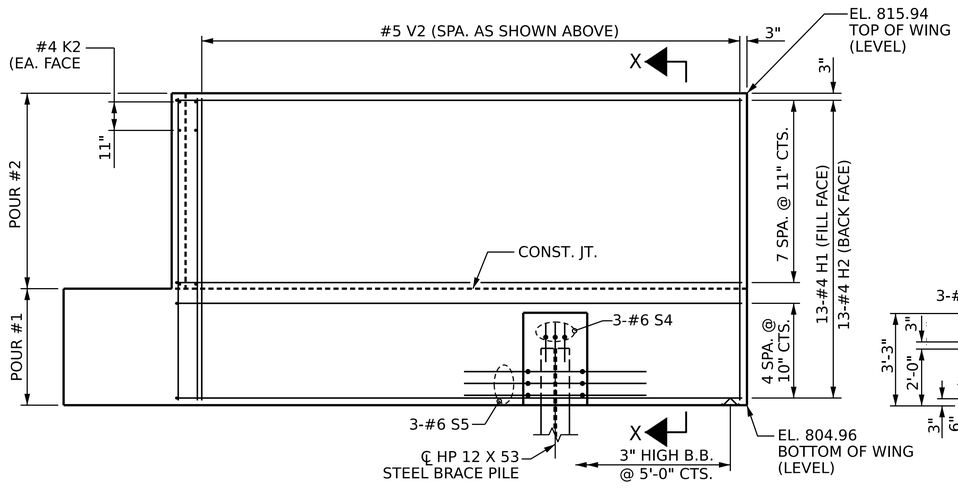


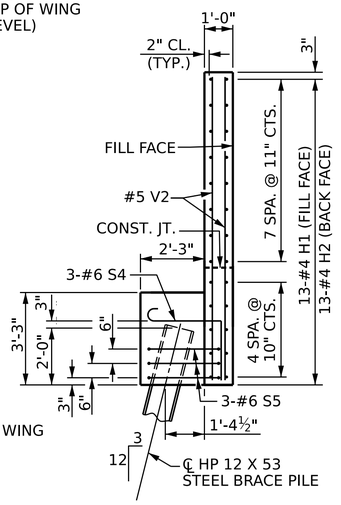
PLAN OF WING W1



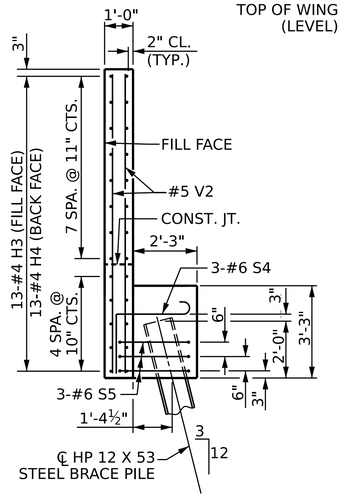
PLAN OF WING W2



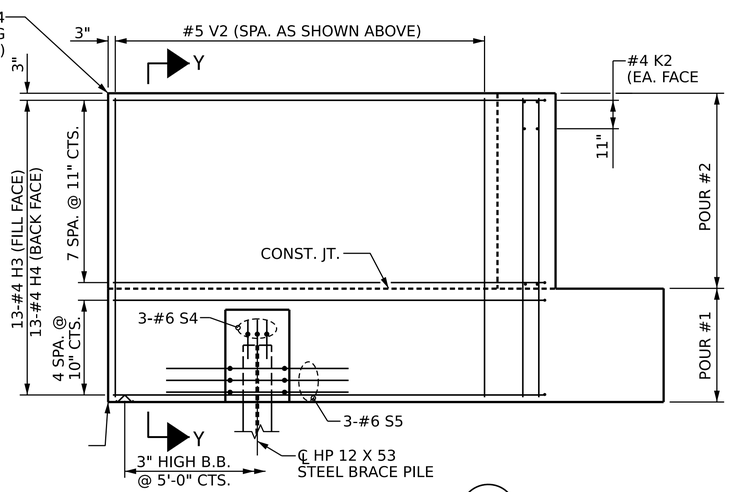
ELEVATION OF WING W1



SECTION X-X



SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -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

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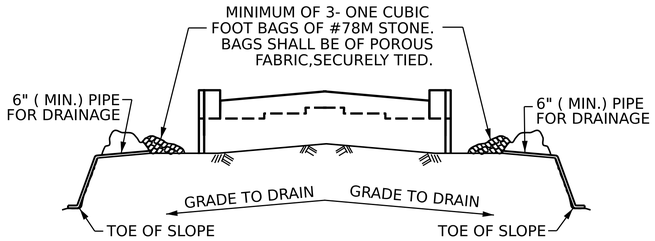
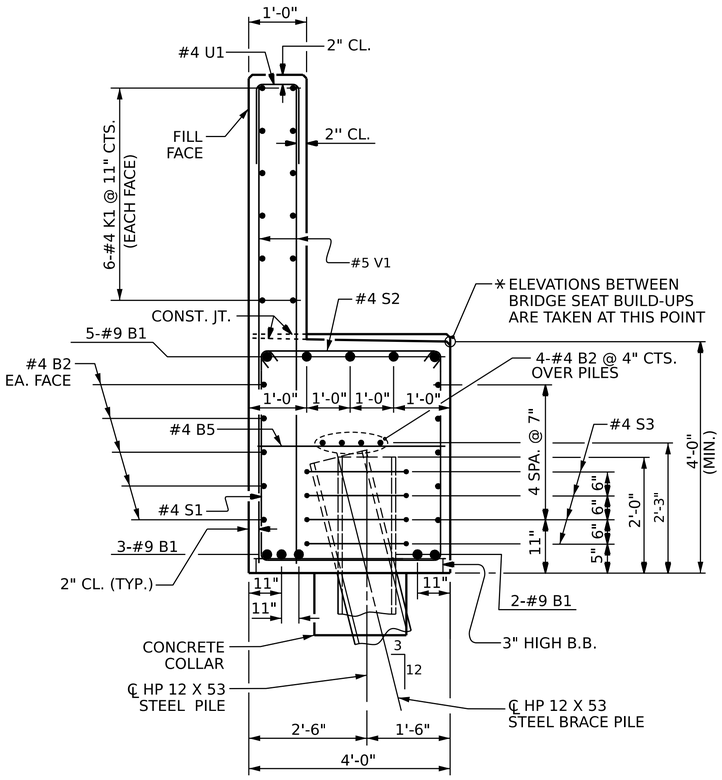


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

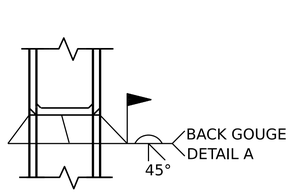
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

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

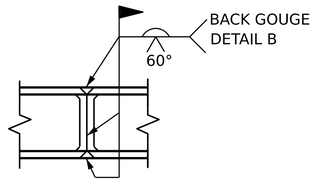
TEMPORARY DRAINAGE AT END BENT



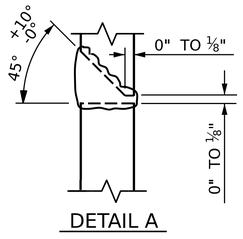
SECTION A-A



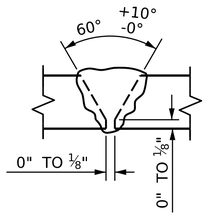
△ PILE VERTICAL



△ PILE HORIZONTAL OR VERTICAL



DETAIL A

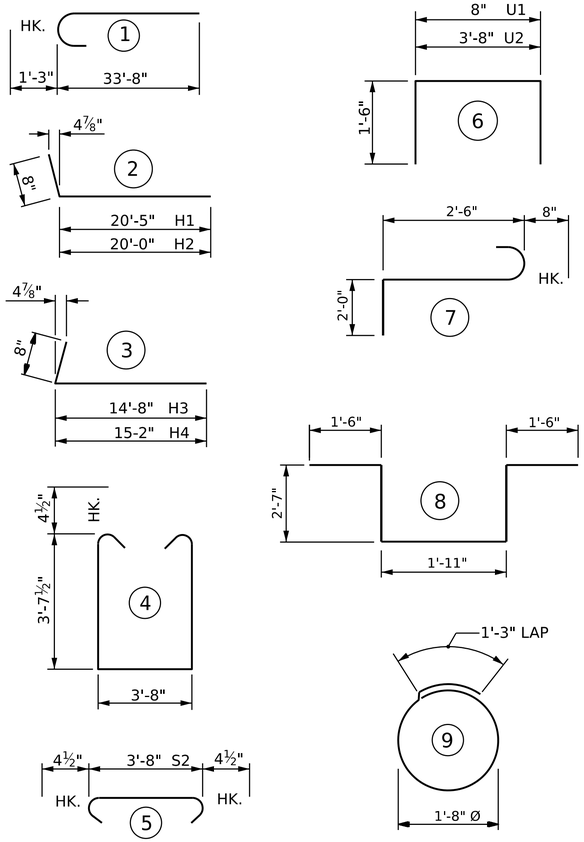


DETAIL B

△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	20	#9	1	34'-11"	2374
B2	28	#4	STR	32'-4"	605
B3	10	#4	STR	2'-8"	18
B4	5	#4	STR	13'-11"	46
B5	16	#4	STR	3'-8"	39
H1	13	#4	2	21'-1"	183
H2	13	#4	2	20'-8"	179
H3	13	#4	3	15'-3"	133
H4	13	#4	3	15'-10	137
K1	24	#4	STR	32'-4"	518
K2	8	#4	STR	4'-6"	24
S1	73	#4	4	11'-8"	569
S2	73	#4	5	4'-5"	215
S3	32	#4	9	6'-6"	139
S4	6	#6	7	5'-2"	47
S5	6	#6	8	10'-1"	91
U1	53	#4	6	3'-8"	130
U2	18	#4	6	6'-8"	80
V1	106	#5	STR	8'-10"	977
V2	92	#5	STR	10'-6"	1008

REINFORCING STEEL LBS. 7,513

CLASS A CONCRETE

POUR #1 (CAP, LOWER WINGS, & COLLARS)	CU. YDS.	47.8
POUR #2 (UPPER WINGS & BACKWALL)	CU. YDS.	21.2
TOTAL	CU. YDS.	69.0

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -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...

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CHECKED BY : F. LEA DATE : 09/2022
DESIGN ENGINEER OF RECORD: F. LEA DATE : 09/2022

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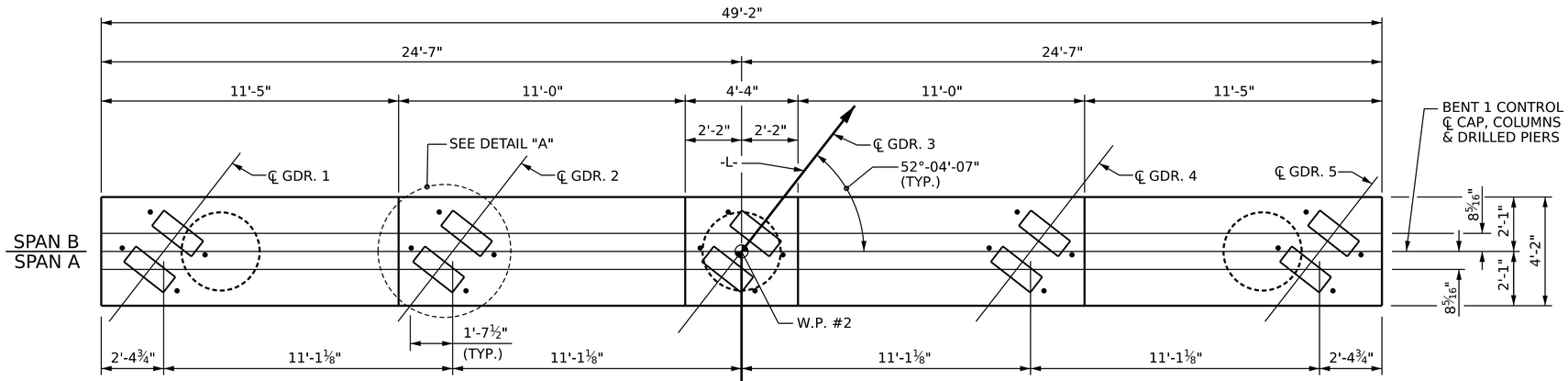
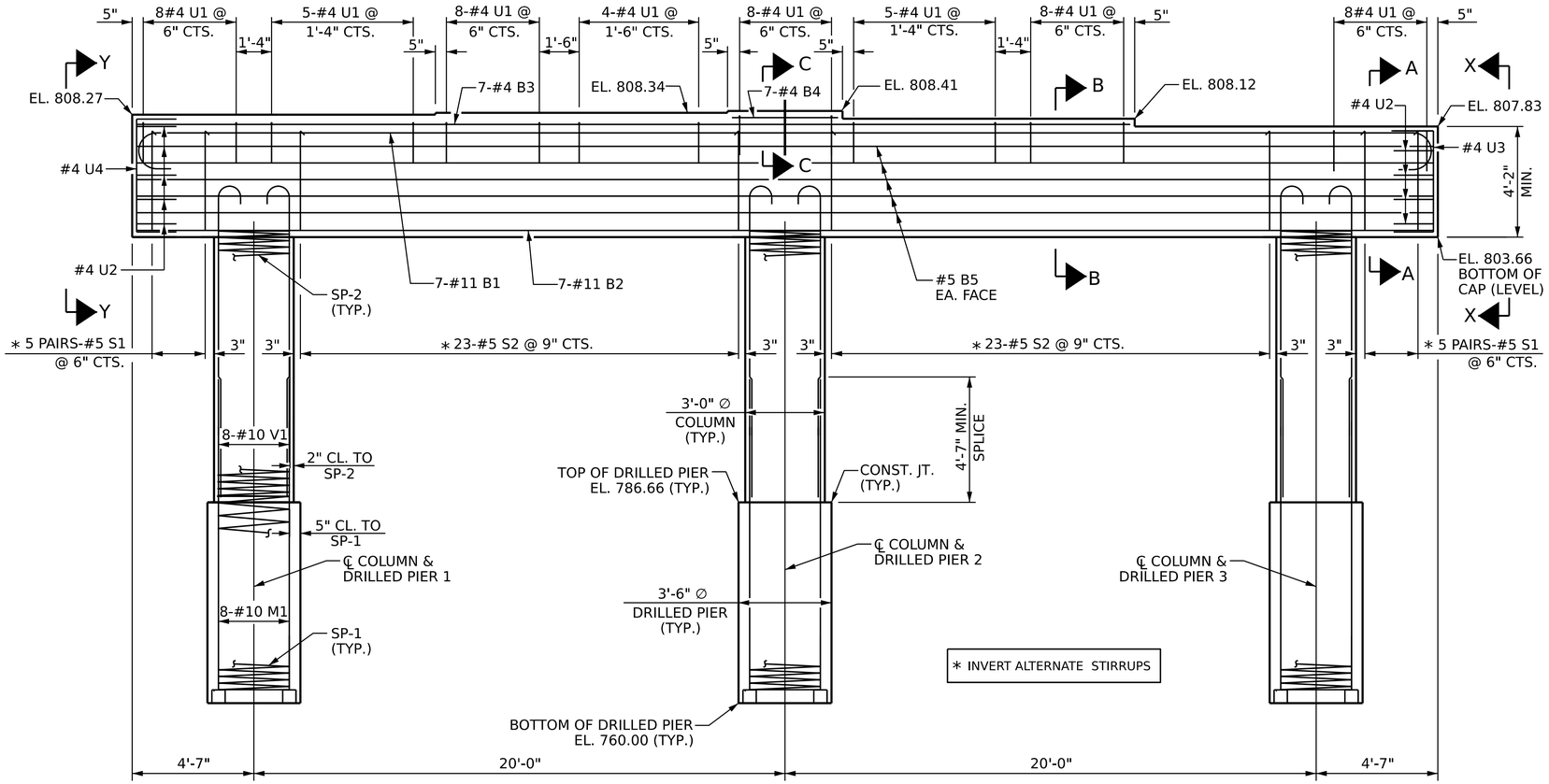
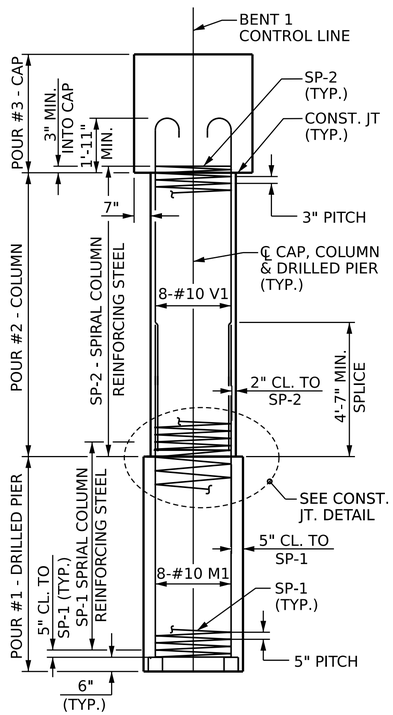


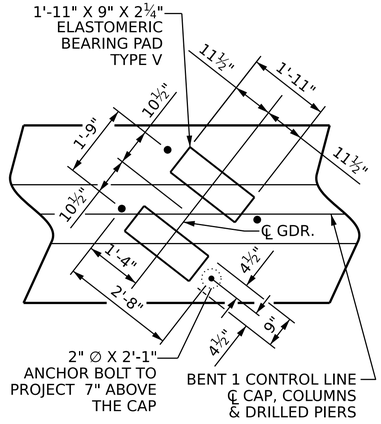
PLAN



ELEVATION



END ELEVATION



DETAIL "A"
(TYP. EA. GDR.)

NOTES:

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

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

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

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

SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIER WILL NOT BE PERMITTED.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FT. BELOW THE GROUND LINE.

NO SEPARATE PAYMENT SHALL BE MADE FOR ANY ADDITIONAL STEEL REQUIRED IN CONSTRUCTION OF DRILLED PIER AS THIS IS CONSIDERED INCIDENTAL TO THE LINEAR FOOT PRICE FOR DRILLED PIER.

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

DocuSigned by: Francesca Lea B79DADB65D584EF...
11/16/2022

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			30

DRAWN BY : Q. T. NGUYEN DATE : 10/2022
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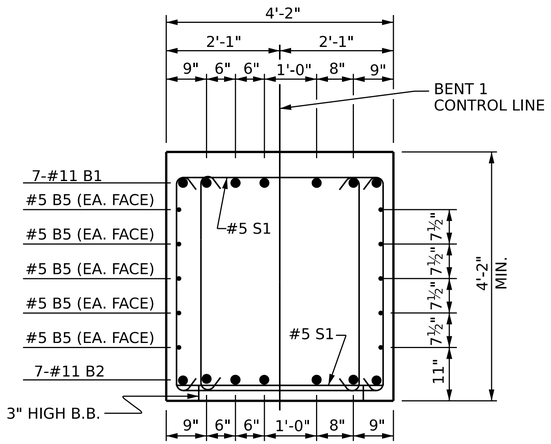
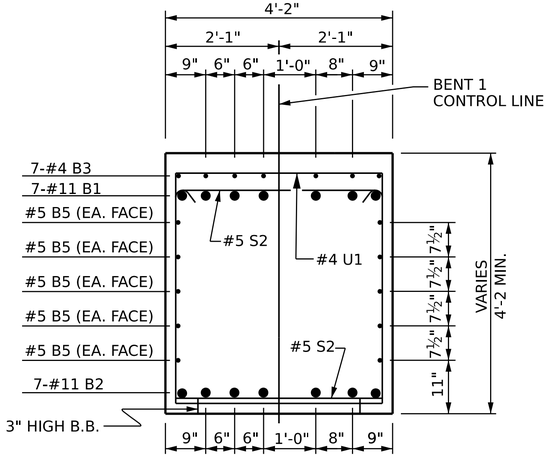


SECTION A-A



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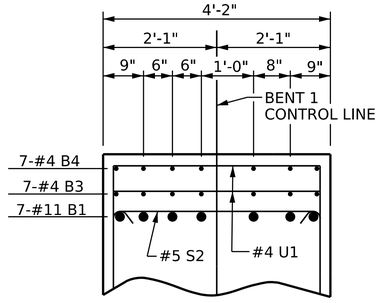
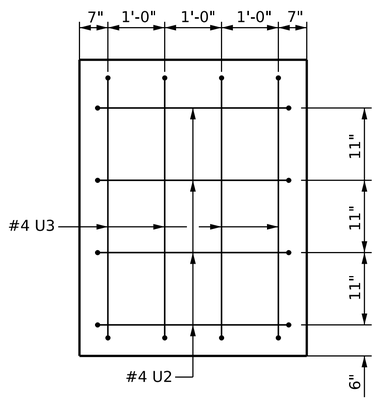


PARTIAL SECTION C-C



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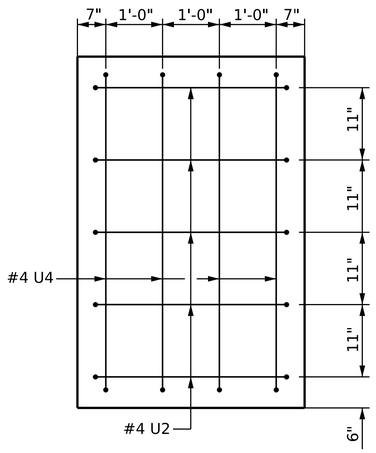
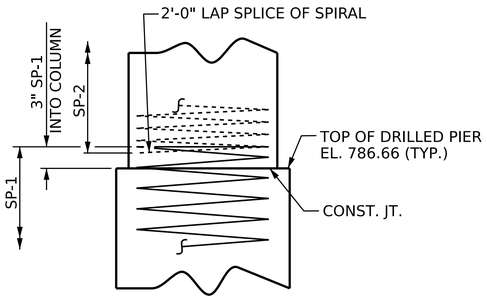
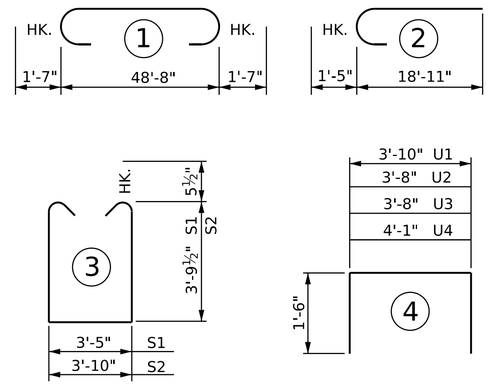


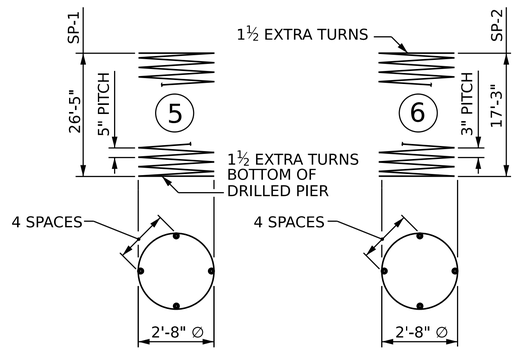
SECTION Y-Y



CONSTRUCTION JOINT DETAIL

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	7	#11	1	51'-10"	1928
B2	7	#11	STR	48'-10"	1816
B3	7	#4	STR	37'-5"	175
B4	7	#4	STR	4'-0"	19
B5	10	#5	STR	48'-10"	509
M1	24	#10	STR	34'-0"	3511
S1	20	#5	3	11'-11"	249
S2	46	#5	3	12'-4"	592
U1	54	#4	4	6'-10"	246
U2	9	#4	4	6'-8"	40
U3	4	#4	4	6'-8"	18
U4	4	#4	4	7'-1"	19
V1	24	#10	2	20'-4"	2100

REINFORCING STEEL		LBS.	11,222
SP-1	3	*	5	534'-8"	1673
SP-2	3	**	6	585'-10"	1174

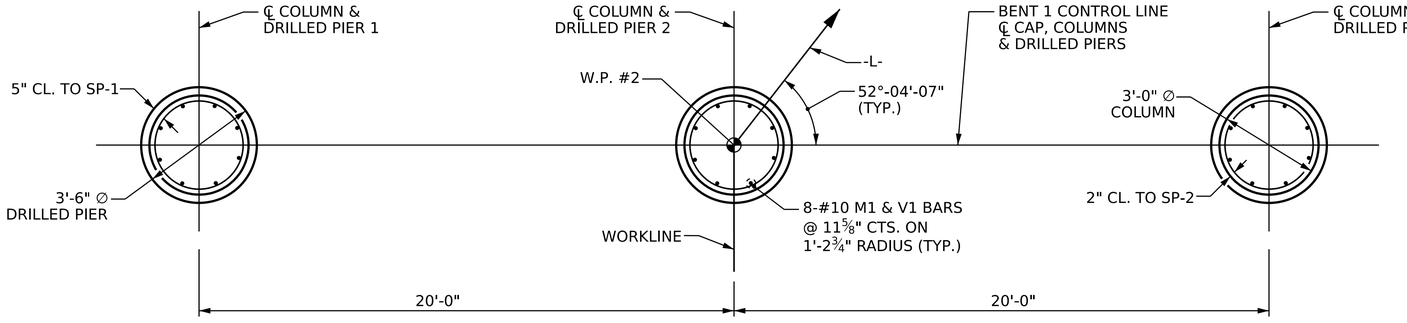
SPIRAL COLUMN REINFORCING STEEL	LBS.	2,847

CLASS A CONCRETE		
POUR #2 - COLUMN	CU. YDS.	13.4
POUR #3 - CAP	CU. YDS.	34.2
TOTAL	CU. YDS.	47.6

DRILLED PIER CONCRETE POUR #1 - DRILLED PIERS	CU. YDS.	28.5

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

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



PLAN OF DRILLED PIERS AND COLUMNS

(REINFORCING STEEL AND DIMENSIONS ARE TYPICAL FOR EACH DRILLED PIER AND COLUMN)

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B790ADB65D684EF...

11/16/2022

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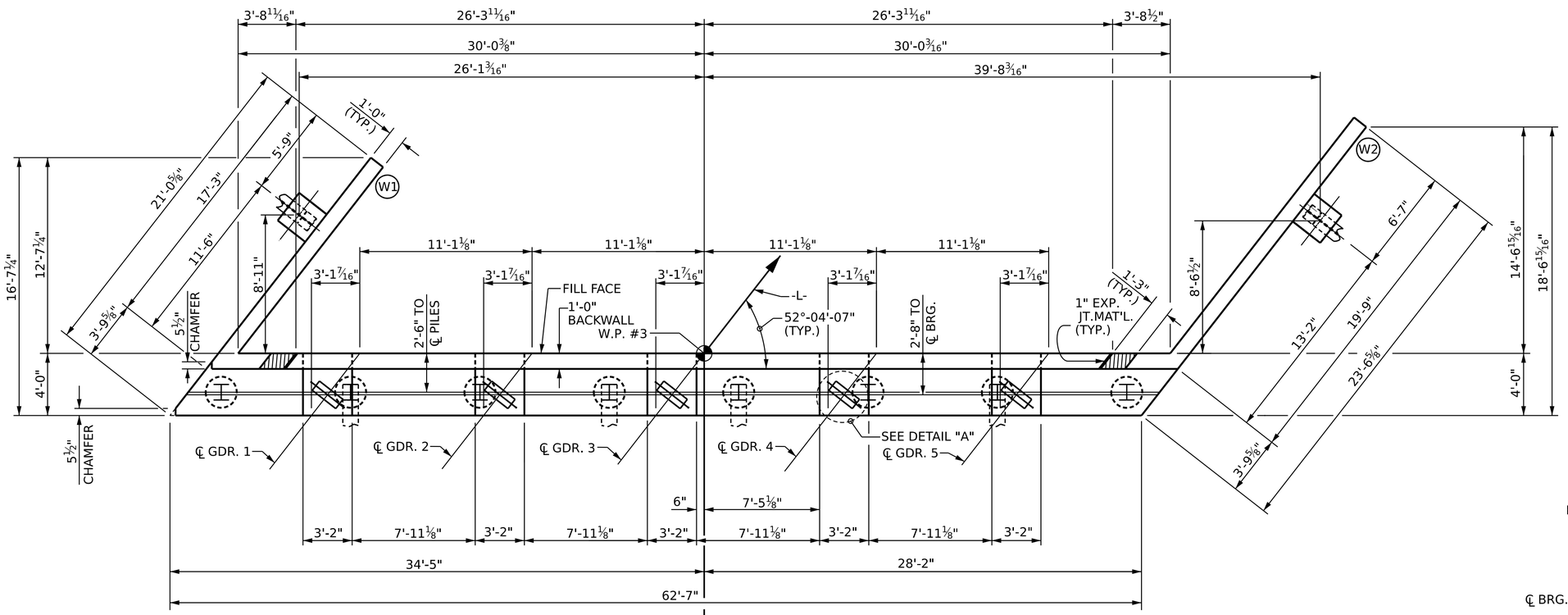
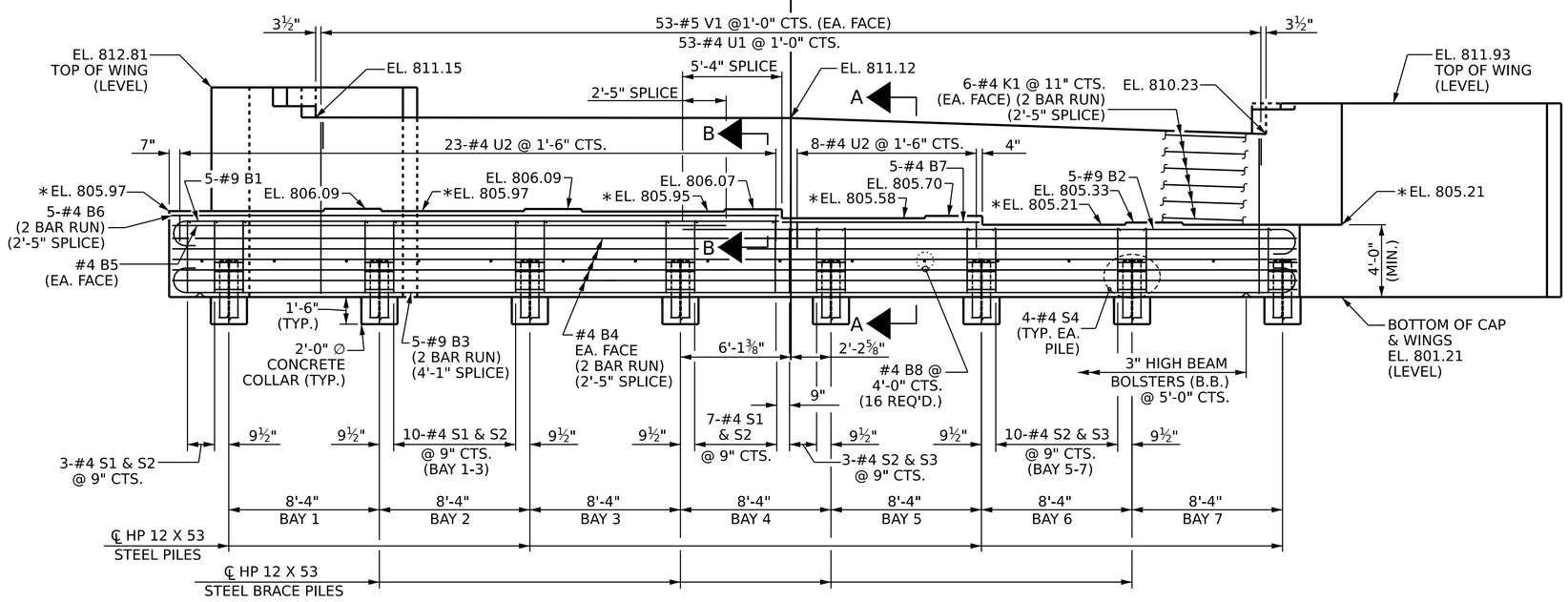
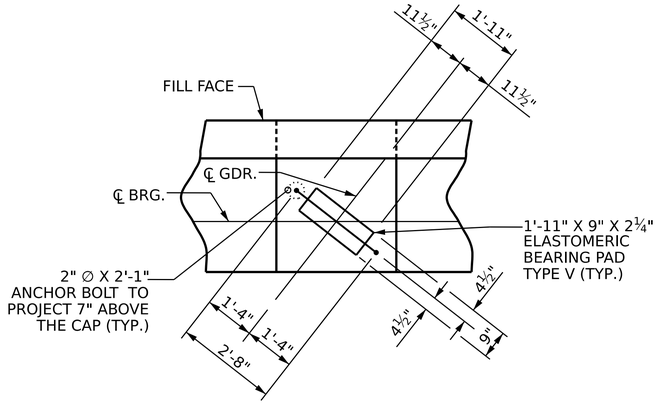


PLAN



ELEVATION

(BRACE PILE IN WINGS NOT SHOWN FOR CLARITY)



DETAIL "A"

(TYP. EA. GDR.)

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%.

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B79DADB65D594EF...
11/16/2022

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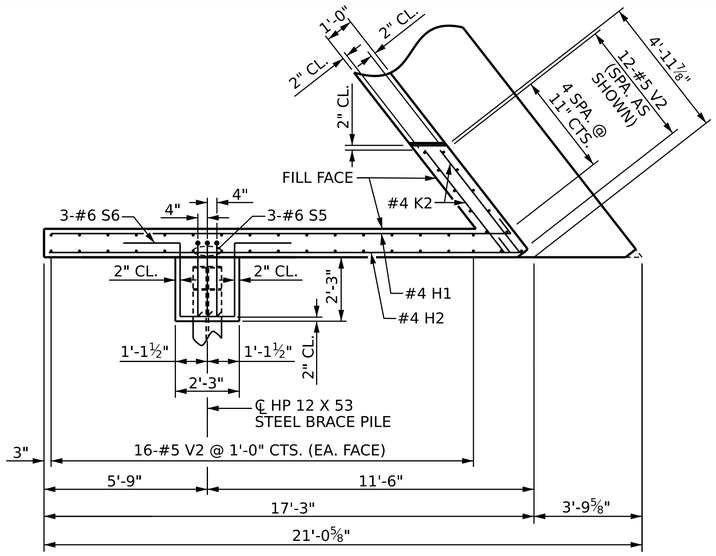
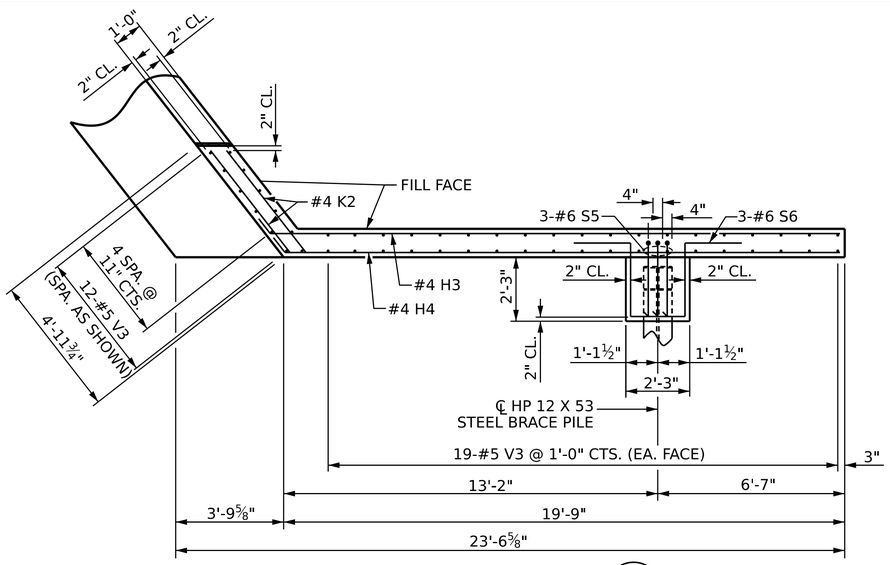
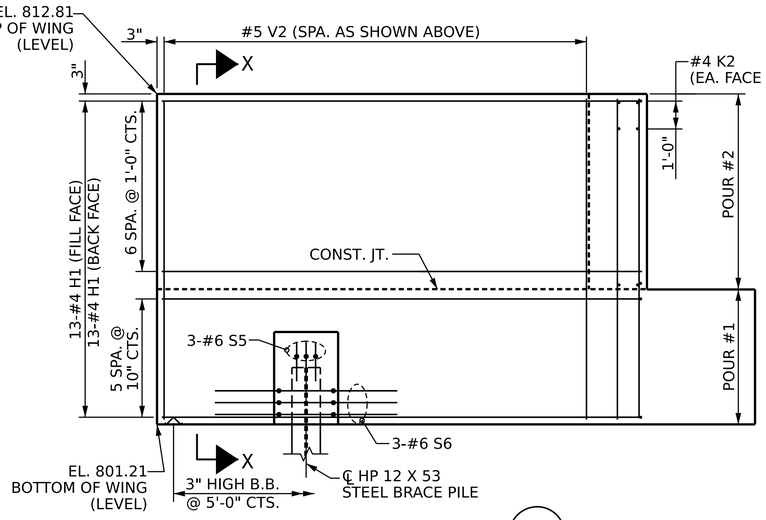
1			3			TOTAL SHEETS
2			4			30



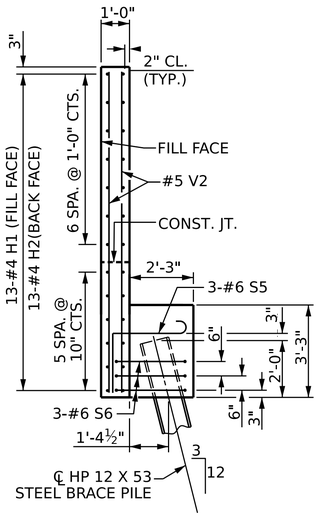
PLAN OF WING W1



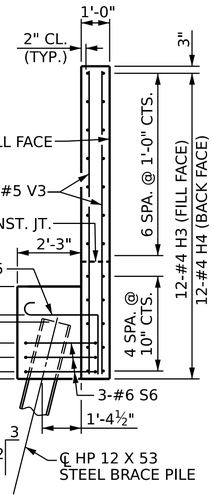
PLAN OF WING W2



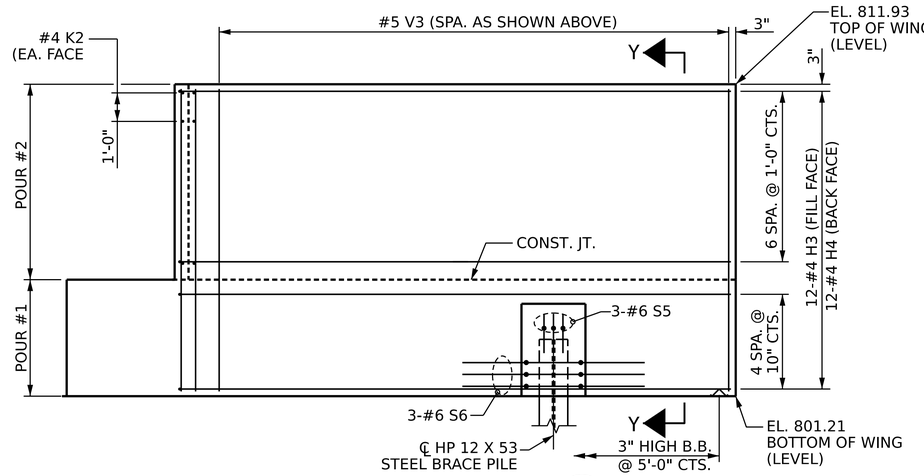
ELEVATION OF WING W1



SECTION X-X



SECTION Y-Y



ELEVATION OF WING W2

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -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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2			4		

SHEET NO. S-26

TOTAL SHEETS 30

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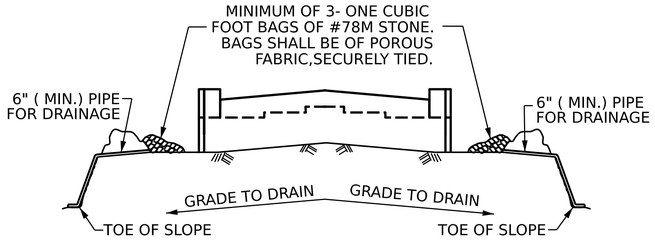
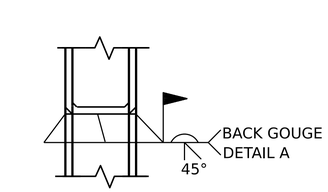


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

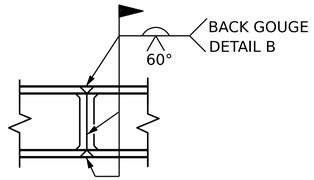
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

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

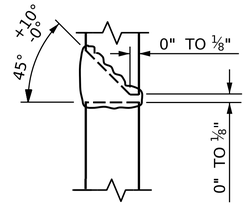
TEMPORARY DRAINAGE AT END BENT



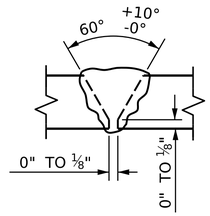
△ PILE VERTICAL



△ PILE HORIZONTAL OR VERTICAL



DETAIL A

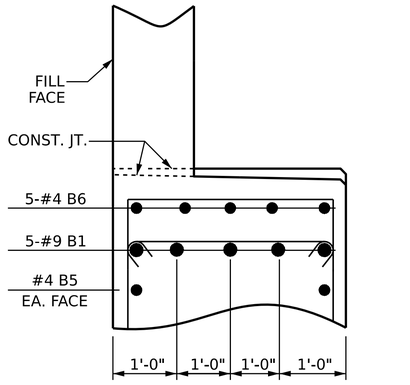


DETAIL B

△ POSITION OF PILE DURING WELDING.

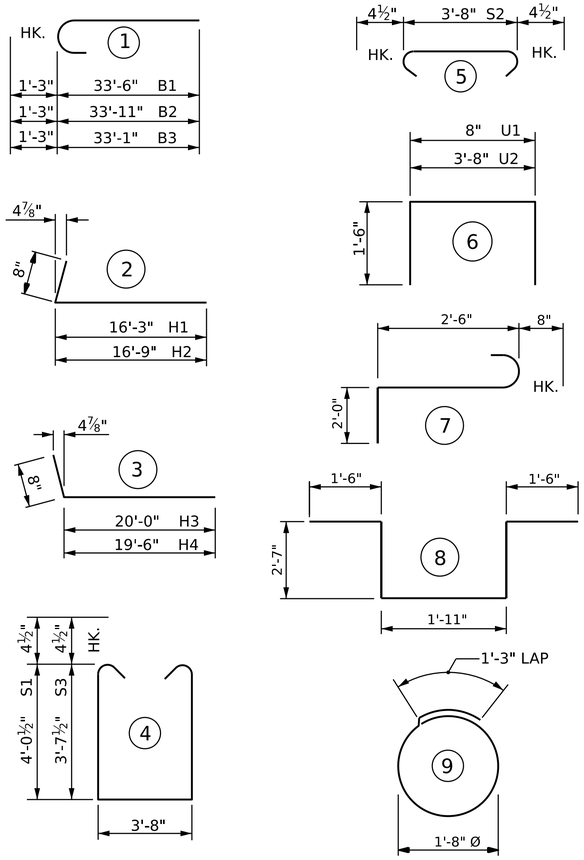
PILE SPLICE DETAILS

SECTION A-A



PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	#9	1	34'-9"	591
B2	5	#9	1	35'-2"	598
B3	10	#9	1	34'-4"	1167
B4	28	#4	STR	32'-4"	605
B5	2	#4	STR	30'-8"	41
B6	10	#4	STR	17'-10"	119
B7	5	#4	STR	10'-11"	36
B8	16	#4	STR	3'-8"	39
H1	13	#4	2	16'-11"	147
H2	13	#4	2	17'-5"	151
H3	12	#4	3	20'-8"	166
H4	12	#4	3	20'-2"	162
K1	24	#4	STR	32'-4"	518
K2	8	#4	STR	4'-6"	24
S1	40	#4	4	12'-6"	334
S2	73	#4	5	4'-5"	215
S3	33	#4	4	11'-8"	257
S4	32	#4	9	6'-6"	139
S5	6	#6	7	5'-2"	47
S6	6	#6	8	10'-1"	91
U1	53	#4	6	3'-8"	130
U2	31	#4	6	6'-8"	138
V1	106	#5	STR	8'-8"	958
V2	44	#5	STR	11'-3"	516
V3	50	#5	STR	10'-4"	539

REINFORCING STEEL	LBS.	7,728

CLASS A CONCRETE

POUR #1 (CAP, LOWER WINGS, & COLLARS)	CU. YDS.	51.5
POUR #2 (UPPER WINGS & BACKWALL)	CU. YDS.	21.5
TOTAL	CU. YDS.	73.0

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -L-

SHEET 3 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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11/16/2022

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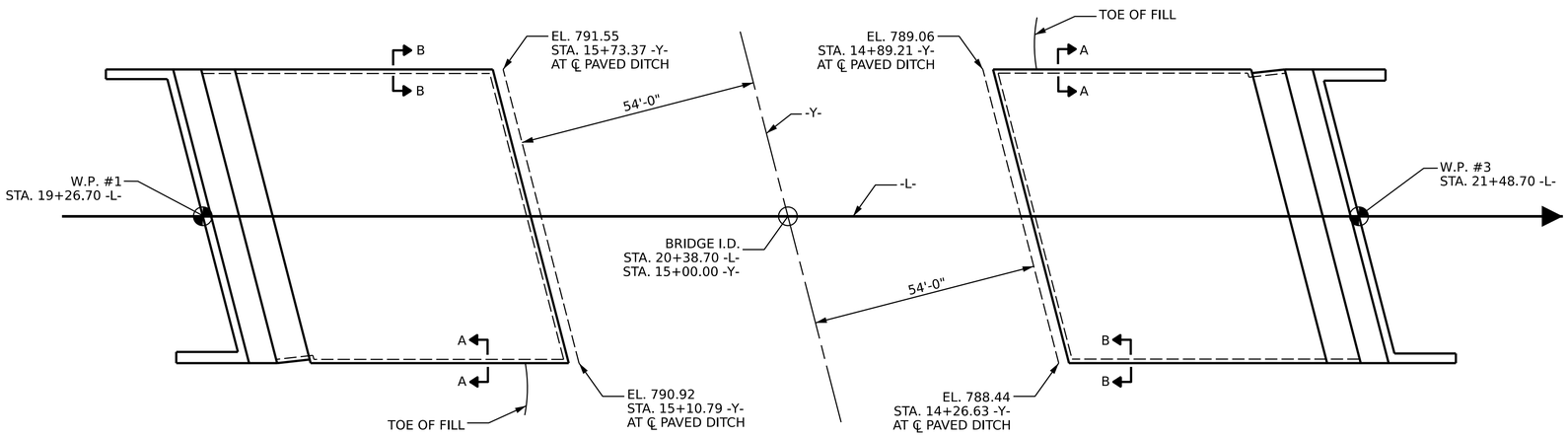
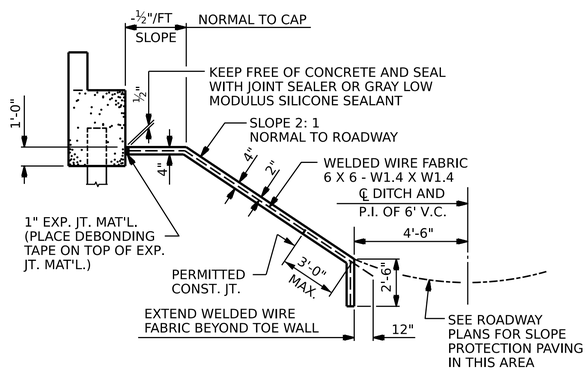
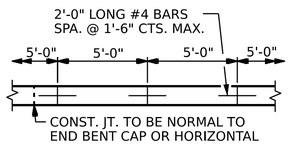


PLAN



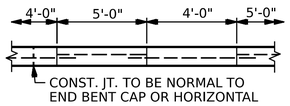
SECTION ALONG ℄ SURVEY WHEN
FILL CATCHES IN DITCH

DETAIL FOR ALTERNATE "A"



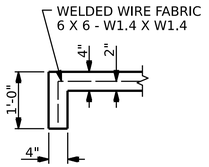
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

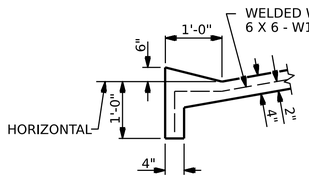


POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



SECTION A-A



SECTION B-B

GENERAL NOTES

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

ALTERNATE "A"

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

FOR BERM WIDTH AND ELEVATION, SEE GENERAL DRAWING.

BRIDGE @ STA. 20+38.70 -L-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	258	461
END BENT 2	238	429

* QUANTITY SHOWN IS BASED ON 5' POURS.

PROJECT NO. BR-0094
ROCKINGHAM COUNTY
STATION: 20+38.70 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 36871 ENGINEER FRANCESCA LEA

DocuSigned by: Francesca Lea B790ADB65D584EF...
11/16/2022

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NO.	BY:	DATE:	NO.	BY:	DATE:	S-28
1			3			TOTAL SHEETS
2			4			30

ASSEMBLED BY :	Q. T. NGUYEN	DATE :	10/2022
CHECKED BY :	F. LEA	DATE :	10/2022
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

11/7/2022
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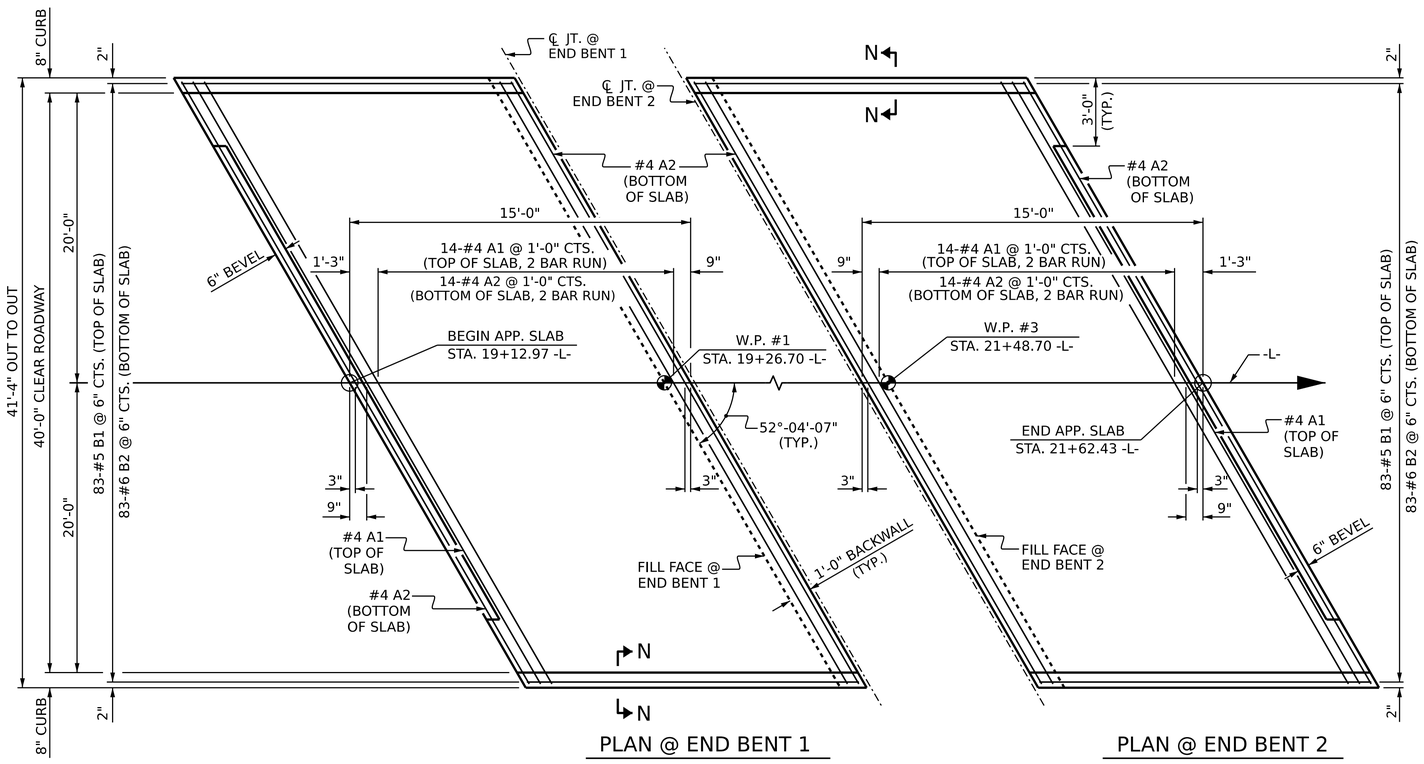
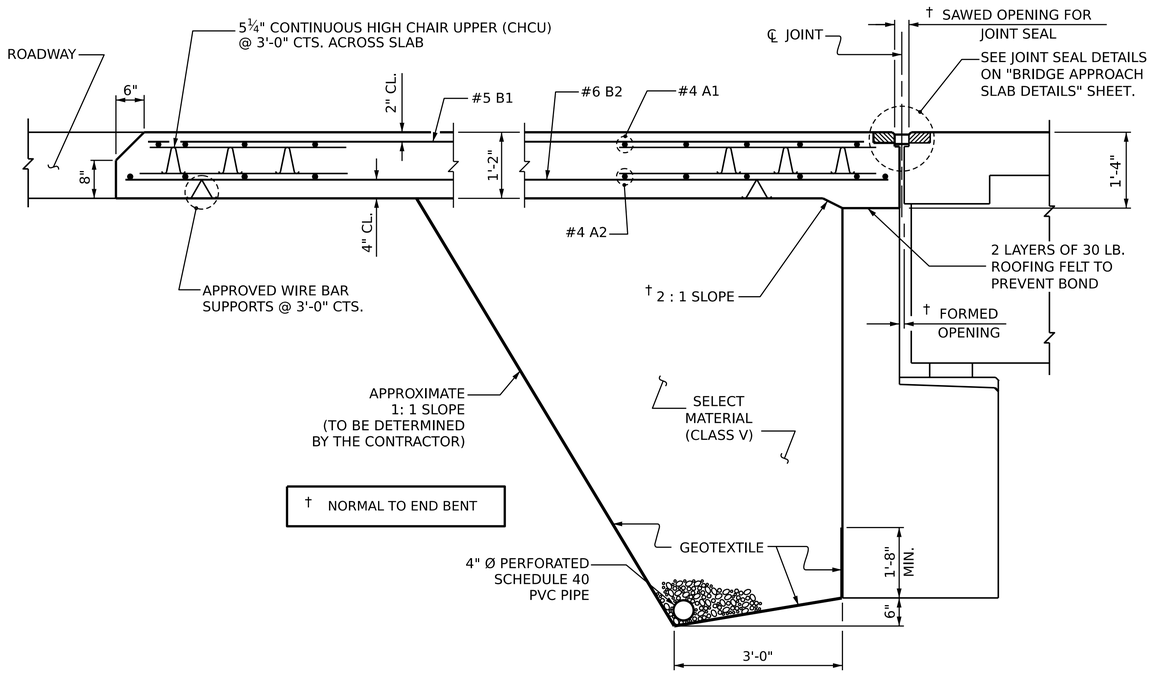
STD. NO. SP1 (SHT 2)

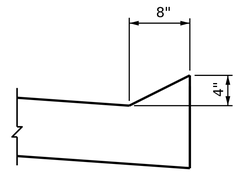


DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

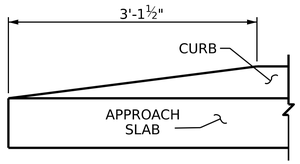


SECTION THRU SLAB

(TYPE II - MODIFIED APPROACH FILL)



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

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

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

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

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

FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2".

BILL OF MATERIAL

APPROACH SLAB AT BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	30	#4	STR	26'-11"	539
A2	32	#4	STR	26'-9"	572
* B1	83	#5	STR	14'-0"	1212
B2	83	#6	STR	14'-4"	1828
REINFORCING STEEL				LBS.	2400
* EPOXY COATED REINFORCING STEEL				LBS.	1751
CLASS AA CONCRETE				C. Y.	27.0

APPROACH SLAB AT BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	30	#4	STR	26'-11"	539
A2	32	#4	STR	26'-9"	572
* B1	83	#5	STR	14'-0"	1212
B2	83	#6	STR	14'-8"	1828
REINFORCING STEEL				LBS.	2400
* EPOXY COATED REINFORCING STEEL				LBS.	1751
CLASS AA CONCRETE				C. Y.	27.0

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-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -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

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11/16/2022

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DRAWN BY :	EEM 3/95	REV. 6/13	MAA/GM
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		REV. 06/19	BNB/THC

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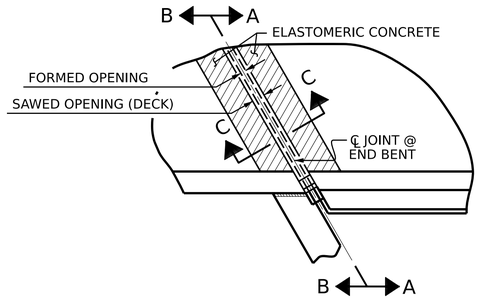
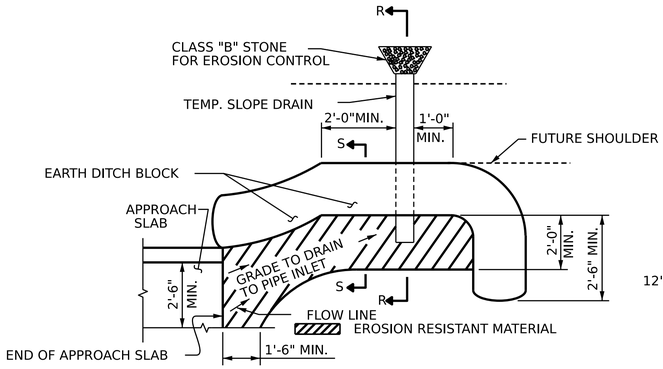
STD. NO. BAS2 (SHT 1a)

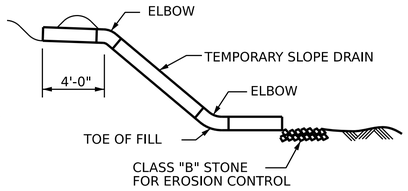


PLAN

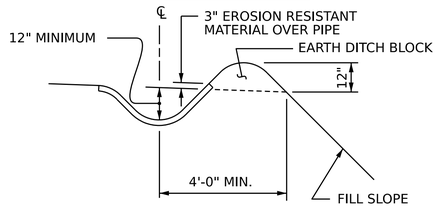


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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



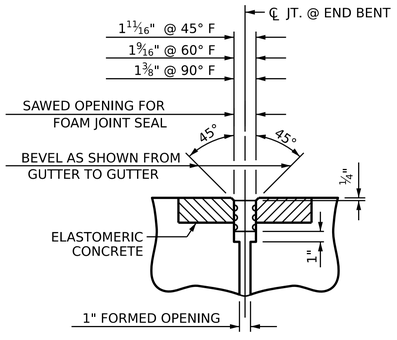
SECTION R-R



SECTION S-S

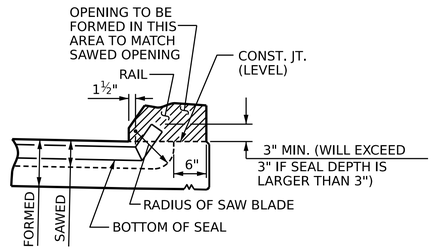
TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

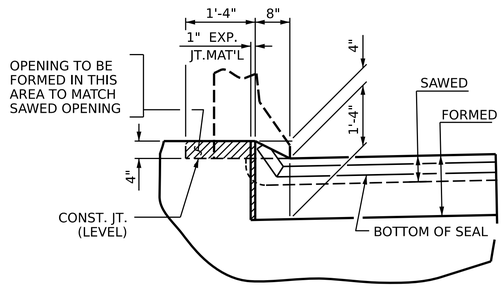


SECTION C-C

FOAM JOINT SEAL
(EXPANSION)



SECTION A-A

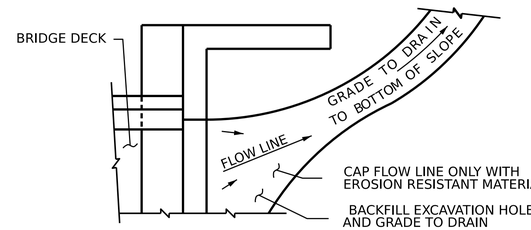


SECTION B-B

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.



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

PROJECT NO. BR-0094

ROCKINGHAM COUNTY

STATION: 20+38.70 -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

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DRAWN BY : FCJ 1 1/88	REV. 6/13		MAA/GM
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	REV. 5/18		MAA/THC

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STD. NO. BAS4 (SHT 1a)

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

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