TIP PROJECT: BR-0097

CONTRACT: C204864

STRUCTURES

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

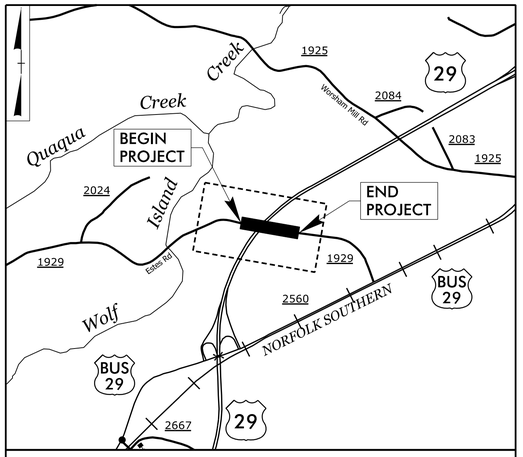
ROCKINGHAM COUNTY

LOCATION: BRIDGE NO. 780178 ON SR 1929 (ESTES RD) OVER US 29

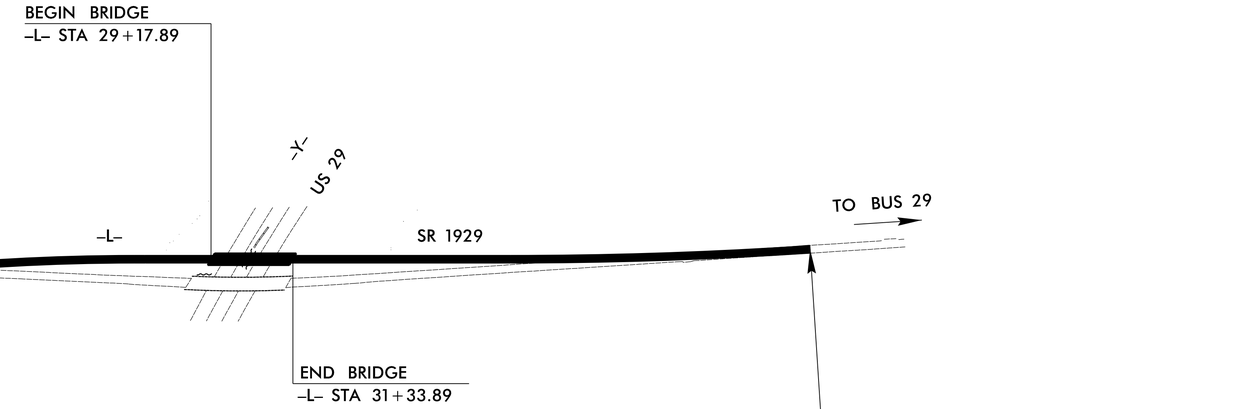
TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0097	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
67097.1.1	N/A	PE
67097.2.1	N/A	ROW/UTIL
67097.3.1	N/A	CONST



VICINITY MAP
(NOT TO SCALE)



BEGIN STATE TIP PROJECT BR-0097
–L– STA 19+50.00

END STATE TIP PROJECT BR-0097
–L– STA 45+00.00

NAD 83/NA 2011

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2023 = 240
ADT 2043 = 340
K = TBD %
D = TBD %
T = TBD % *
V = 60 MPH
* TTST = % DUAL %
FUNC CLASS =
LOCAL –
SUB-REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BR-0097	=	0.442
LENGTH STRUCTURE TIP PROJECT BR-0097	=	0.041
TOTAL LENGTH TIP PROJECT BR-0097	=	0.483

Prepared for NCDOT In the Office of:
moffatt & nichol
4700 FALLS OF NEUSE ROAD, SUITE 300
RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 VOICE (919) 781-4869 FAX
NC License NO.: F-0105

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 27, 2023

LETTING DATE:
AUGUST 20, 2024

TRENT HUFFMAN, P.E.
PROJECT ENGINEER

PAUL JACOB, P.E.
PROJECT STRUCTURAL ENGINEER

DAVID STUTTS, P.E.
NCDOT CONTACT

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

5/9/2024
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JJoffus

29+00 30+00 31+00 32+00

GRADE DATA

(+)5.6935% (+)3.1600%

PVI STA. 26+50.00 -L-
EL = 628.38
VC = 400'

GRADE DATA

(+)3.1600% (+)1.2842%

PVI STA. 33+30.00 -L-
EL = 649.87
VC = 300'

650 640 630 620 610 600 590

FILL FACE AT END BENT No. 1
STA. 29+17.89 -L-
G.P. ELEV. = 636.84

1'-0" MIN. BERM NORMAL TO CAP

EXP

FILL

EL. 629±

EL. 630±

HP 12X53 STEEL PILES (TYP.)

SLOPE 1.5:1 NORMAL TO CAP (TYP.)

EL. 613±

18'-0" MIN. V.C.

EL. 614±

SPAN A

-Y-

SPAN B

FIX FIX

PROPOSED GUARDRAIL (TYP.) (ROADWAY DETAIL & PAY ITEM)

EL. 611±

HP 12X53 STEEL PILES (TYP.)

TOP OF FOOTING EL. 609.00

21'-5" MIN. V.C.

EL. 613±

PAVED DITCH (TYP.) (ROADWAY DETAIL & PAY ITEM)

EL. 610±

FILL FACE AT END BENT No. 2
STA. 31+33.89 -L-
G.P. ELEV. = 643.67

FILL

EXP

1'-0" (TYP.)

4" CONCRETE SLOPE PROTECTION (TYP.)

EL. 636±

EXISTING NATURAL GROUND

EL. 639±

END BENT No. 1 BENT No. 1 END BENT No. 2

SECTION ALONG WORKLINE & GRADE LINE

(SECTION TAKEN AT RIGHT ANGLES TO END BENTS AND BENT)

NC GRID
NAD 83 NA 2011

EXISTNG CABLE GUARDRAIL

10'-0"± PAVED SHOULDER

4'-6"

24'-0"± ROADWAY

4'-0"± PAVED SHOULDER

38'-0"± SHOULDER TO SHOULDER

56'-0"± MEDIAN

US 29 BYPASS NBL TO DANVILLE

HINGE POINT & ℄ PAVED DITCH 6'-0" VERT. CURVE

4" CONCRETE SLOPE PROTECTION (TYP.)

1'-9" BERM

ELEV. = 626.88

END TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC

W.P. #2
BRIDGE I.D. STATION
STA. 30+17.89 -L-
STA. 16+48.80 -Y- (POC)

PMVC 1

PMVC 2

HINGE POINT & ℄ PAVED DITCH 6'-0" VERT. CURVE

ELEV. = 633.50

1'-7" BERM

W.P. #3
STA. 31+33.89 -L-
END APP. SLAB
STA. 31+44.73 -L-

TO SR 2024

-L-

W.P. #1
STA. 29+17.89 -L-
BEGIN APP. SLAB
STA. 29+07.05 -L-

FILL FACE @ END BENT 1

BEGIN TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC

END TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC

EXIST. CONCRETE SLOPE PROTECTION (TYP.)

EXISTING STRUCTURE

ELEV. = 626.88

1'-7" BERM

US 29 BYPASS SBL TO GREENSBORO

19'-8" MIN. TO FACE OF CAP

19'-9" MIN. TO FACE OF CAP

120°33'37" (TAN. TO CURVE)

BEGIN TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC

-Y-

PROPOSED GUARDRAIL (ROADWAY PAY ITEM & DETAIL)

EXISTNG GUARDRAIL (TYP.)

100'-0"

ELEV. = 633.50

1'-8" BERM

120°33'37" (TYP.)

FILL FACE @ END BENT 2

TO US 29 BUS.

EXISTING SUBSTRUCTURE (TYP.)

116'-0"

216'-0" (TOTAL LENGTH FROM FILL FACE TO FILL FACE)

PLAN

PILES ARE NOT SHOWN IN PLAN VIEW FOR CLARITY
END BENTS AND BENT ARE PARALLEL
DIMENSIONS WITH RESPECT TO -Y- ARE RADIAL DIMENSIONS

POINTS OF MIN. VERTICAL CLEARANCE

PMVC 1
STA. 29+60.64 -L-
-L- OFFSET 12.58 LT.
-Y- OFFSET 55.69 RT.
ELEV. 613.69

PMVC 2
STA. 30+46.52 -L-
-L- OFFSET 12.58 LT.
-Y- OFFSET 18.23 LT.
ELEV. 612.99

-Y- HORIZONTAL CURVE DATA

PI STA. 16+17.97 -Y-
△ = 15°21' 23.7" (LT)
D = 1°15' 00.0"
L = 1,228.53'
T = 617.97'
R = 4,583.66'

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-
16+48.80 -Y- POC

SHEET 1 OF 4 REPLACES BRIDGE No. 780178

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE OVER
US 29 BYPASS
ON SR 1929 BETWEEN
SR 2024 AND US 29 BUS.

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L. JACOB

6/17/2024

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

DRAWN BY : J. LOFTUS DATE : 09-2022
CHECKED BY : P. JACOB DATE : 08-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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5/8/2024
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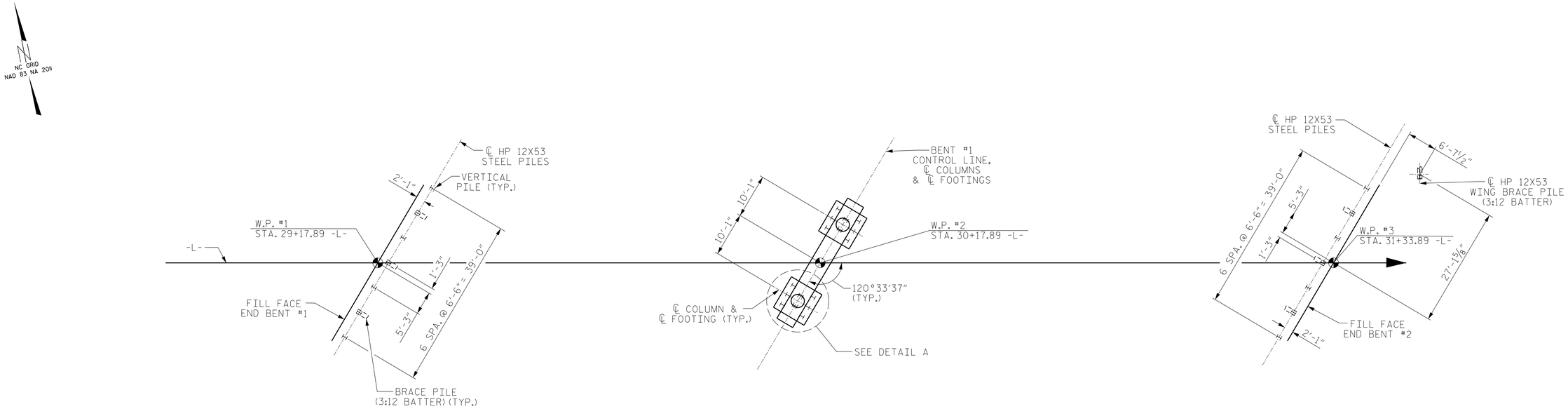
jloftus



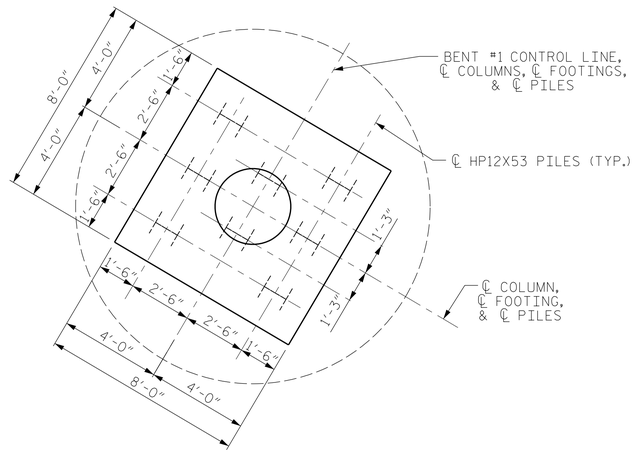
END BENT 1 | BENT 1 | END BENT 2

FOUNDATION LAYOUT

ALL BENTS ARE PARALLEL
(DIMENSION LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES AT BOTTOM OF CAP OR FOOTING)

FOUNDATION NOTES:

1. OBSERVE A 1 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT NO.1 AND END BENT NO. 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SECTION 235 OF THE STANDARD SPECIFICATIONS.
2. FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.



DETAIL A
ALL FOOTINGS SIMILAR

PROJECT NO. BR-0097
ROCKINGHAM COUNTY
STATION: 30+17.89 -L-
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FOUNDATIOION LAYOUT

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB
6/17/2024

DRAWN BY : J. LOFTUS DATE : 9-2022
CHECKED BY : P. JACOB DATE : 8-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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

5/8/2024
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JLoftus

SUMMARY OF PILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Resistance per Pile TONS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Length per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles*			Drilled-In Piles		
					Min Pile Tip (Tip No Higher Than) Elev FT	Required Driving Resistance (RDR)** per Pile TONS	Total Pile Redrives Quantity EACH	Predrilling Length per Pile Lin FT	Predrilling Elevation (Elev Not To Predrill Below) FT	Maximum Predrilling Dia INCHES	Pile Excavation (Bottom of Hole) Elev FT	Pile Exc Not In Soil per Pile Lin FT	Pile Exc In Soil per Pile Lin FT
End Bent 1 (Piles 1-7)	105	627.90	75			175							
Bent 1 (Ftg 1, Piles 1-8)	110	606.75	60			185							
Bent 1 (Ftg 2, Piles 1-8)			55										
End Bent 2 (Piles 1-8)	115	634.51	75			195							

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

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

SUMMARY OF DYNAMIC PILE TESTING/PILE ORDER LENGTHS

(Blank entries indicate item is not applicable to structure)

Dynamic Pile Testing				Pile Order Lengths	
End Bent/ Bent No	Dynamic Pile Testing Required? YES or MAYBE	Dynamic Pile Testing Test Pile Length FT	Total Dynamic Pile Testing Quantity EACH	End Bent/ Bent No(s)	Pile Order Length Basis* EST or DPT
End Bent 1 (Piles 1-7)	MAYBE	75			
Bent 1 (Ftg 1, Piles 1-8)	MAYBE	60	1		
Bent 1 (Ftg 2, Piles 1-8)	MAYBE	55			
End Bent 2 (Piles 1-8)	MAYBE	75			

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

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile TONS	Factored Downdrag Load per Pile TONS	Factored Dead Load* per Pile TONS	Dynamic Resistance Factor	Nominal Downdrag Resistance per Pile TONS	Nominal Scour Resistance per Pile TONS	Scour Resistance Factor (Default = 1.00)
End Bent 1 (Piles 1-7)	105			0.60			
Bent 1 (Ftg 1, Piles 1-8)	110			0.60			
Bent 1 (Ftg 2, Piles 1-8)							
End Bent 2 (Piles 1-8)	115			0.60			

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

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Thomas R. Wells 037998) on 07-06-2022.
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 Dynamic Pile Testing and Pipe Pile Plates when Dynamic Pile Testing or plates may be required.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L JASON

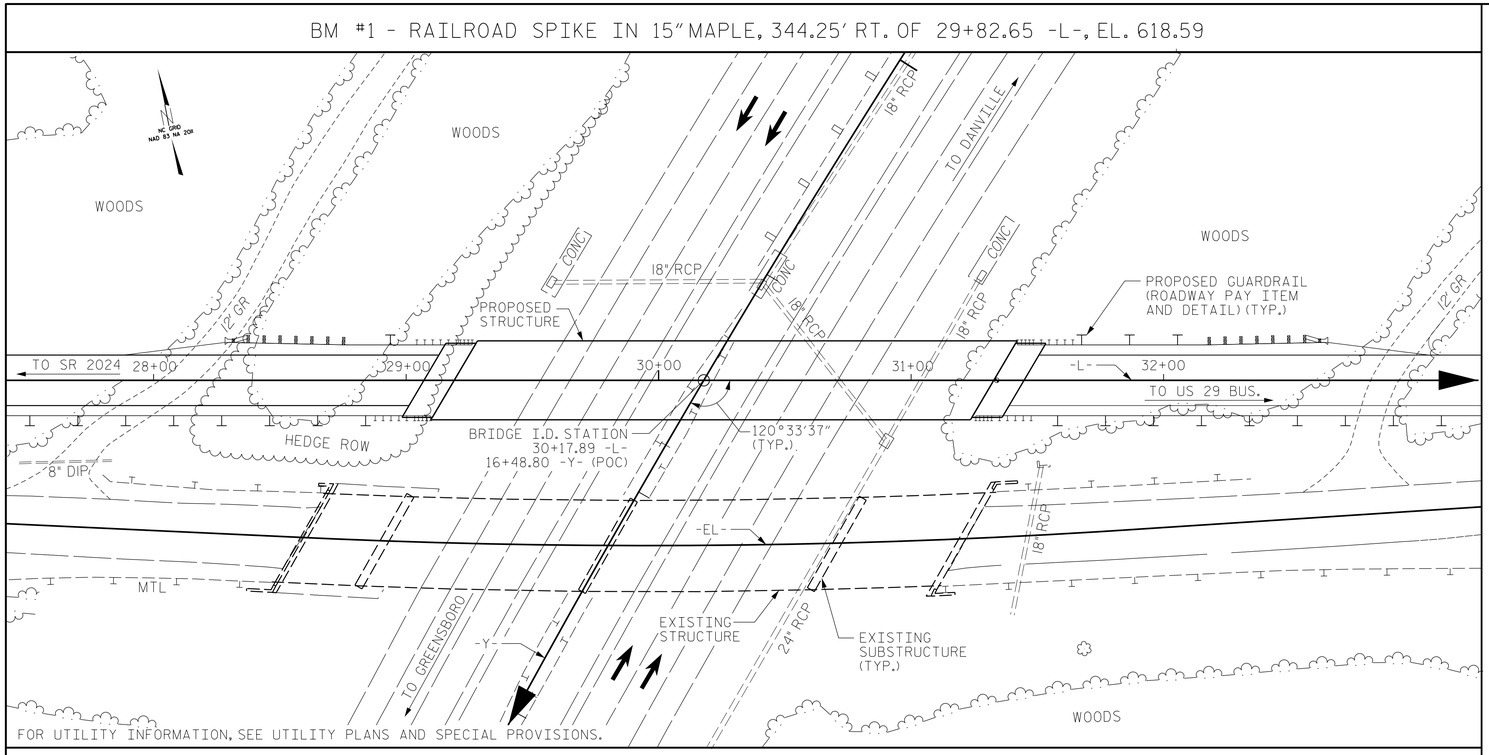
DocuSigned by: 6/17/2024
SIGNATURE DATE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD= HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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 ACHEIVE THE REQUIRED MINIMUM VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

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

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

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

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 30+17.89 -L-."

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

STEEL SHEET PILING REQUIRED FOR SHORING SHALL BE HOT ROLLED.

TEMPORARY SHORING WILL BE REQUIRED IN THE AREAS INDICATED IN THE PLAN VIEW.

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

THE EXISTING STRUCTURE CONSISTING OF FOUR SPANS (33.5', 88.5', 90.5' & 50') OF A REINFORCED CONCRETE DECK ON STEEL I-BEAMS WITH A 36'-0" CLEAR ROADWAY ON REINFORCED CONCRETE CAPS WITH STEEL PILES AT THE END BENTS AND A REINFORCED CONCRETE BENT ON STEEL PILE FOOTINGS AND LOCATED APPROXIMATELY 65' FROM THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STA. 30+17.89	ASBESTOS ASSESSMENT	FOUNDATION EXCAVATION FOR BENT AT STA. 30+17.89	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 63" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		DYNAMIC PILE TESTING	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS
	LUMP SUM	LUMP SUM	LUMP SUM	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EACH	NO.	LIN.FT.	EACH	LIN. FT.	SQ.YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE				6,671	5,917					8	841.58					427.16		LUMP SUM	LUMP SUM
END BENT NO.1						50.1		7,123				7	7	525			433		
BENT NO.1			LUMP SUM			49.7		8,001	1,102			16	16	920					
END BENT NO.2						53.3		7,081				8	8	600			687		
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	6,671	5,917	153.1	LUMP SUM	22,205	1,102	8	841.58	31	31	2,045	1	427.16	1,120	LUMP SUM	LUMP SUM

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
GENERAL DRAWING

BRIDGE OVER
US 29 BYPASS
ON SR 1929 BETWEEN
SR 2024 AND US 29 BUS.

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

DRAWN BY : J. LOFTUS DATE : 9-2022
CHECKED BY : P. JACOB DATE : 8-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

moffatt & nichol
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1			3			TOTAL SHEETS
2			4			33

6/17/2024
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PJacob

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	(#) CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.05	--	1.75	0.78	1.27	B	EL	55.89	0.88	1.75	B	EL	10.61	0.80	0.78	1.05	B	EL	55.89	
		HL-93 (OPERATING)	N/A		1.65	--	1.35	0.78	1.65	B	EL	55.89	0.88	2.30	B	EL	10.61	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.51	54.36	1.75	0.77	1.77	A	EL	47.89	0.88	2.53	B	EL	101.17	0.80	0.78	1.51	B	EL	55.89	
		HS-20 (OPERATING)	36.000		2.29	82.44	1.35	0.77	2.29	A	EL	47.89	0.88	3.32	B	EL	101.17	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.64	49.14	1.40	0.77	5.23	A	EL	47.89	0.88	8.36	B	EL	10.61	0.80	0.78	3.64	B	EL	55.89	
		SNGARBS2	20.000		2.61	52.20	1.40	0.77	3.79	A	EL	47.89	0.88	5.80	B	EL	10.61	0.80	0.78	2.61	B	EL	55.89	
		SNAGRIS2	22.000		2.43	53.46	1.40	0.77	3.55	A	EL	47.89	0.88	5.34	B	EL	10.61	0.80	0.78	2.43	B	EL	55.89	
		SNCOTTS3	27.250		1.81	49.32	1.40	0.77	2.60	A	EL	47.89	0.88	4.03	B	EL	10.61	0.80	0.78	1.81	B	EL	55.89	
		SNAGGRS4	34.925		1.47	51.34	1.40	0.77	2.13	A	EL	47.89	0.88	3.11	B	EL	101.17	0.80	0.78	1.47	B	EL	55.89	
		SNS5A	35.550		1.44	51.19	1.40	0.77	2.09	A	EL	47.89	0.88	3.05	B	EL	101.17	0.80	0.78	1.44	B	EL	55.89	
		SNS6A	39.950		1.31	52.33	1.40	0.77	1.90	A	EL	47.89	0.88	2.80	B	EL	101.17	0.80	0.78	1.31	B	EL	55.89	
		SNS7B	42.000		1.24	52.08	1.40	0.77	1.81	A	EL	47.89	0.88	2.69	B	EL	101.17	0.80	0.78	1.24	B	EL	55.89	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.59	52.47	1.40	0.77	2.31	A	EL	47.89	0.88	3.34	B	EL	101.17	0.80	0.78	1.59	B	EL	55.89	
		TNT4A	33.075		1.59	52.59	1.40	0.77	2.31	A	EL	47.89	0.88	3.22	B	EL	101.17	0.80	0.78	1.59	B	EL	55.89	
		TNT6A	41.600		1.29	53.66	1.40	0.77	1.88	A	EL	47.89	0.88	2.78	B	EL	101.17	0.80	0.78	1.29	B	EL	55.89	
		TNT7A	42.000		1.28	53.76	1.40	0.77	1.88	A	EL	47.89	0.88	2.73	B	EL	101.17	0.80	0.78	1.28	B	EL	55.89	
		TNT7B	42.000		1.31	55.02	1.40	0.77	1.92	A	EL	47.89	0.88	2.62	B	EL	101.17	0.80	0.78	1.31	B	EL	55.89	
		TNAGRIT4	43.000		1.26	54.18	1.40	0.77	1.84	A	EL	47.89	0.88	2.51	B	EL	101.17	0.80	0.78	1.26	B	EL	55.89	
		TNAGT5A	45.000		1.19	53.55	1.40	0.77	1.75	A	EL	47.89	0.88	2.46	B	EL	101.17	0.80	0.78	1.19	B	EL	55.89	
		TNAGT5B	45.000	3	1.19	53.55	1.40	0.77	1.73	A	EL	47.89	0.88	2.53	B	EL	101.17	0.80	0.78	1.19	B	EL	55.89	
EMERGENCY VEHICLE (EV)		EV2	28.750		1.83	52.61	1.30	0.77	2.87	A	EL	47.89	0.88	4.29	B	EL	101.17	0.80	0.78	1.83	B	EL	55.89	
		EV3	43.000	4	1.21	52.03	1.30	0.77	1.89	A	EL	47.89	0.88	2.71	B	EL	101.17	0.80	0.78	1.21	B	EL	55.89	

LOAD FACTORS:

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

NOTES:

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

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

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

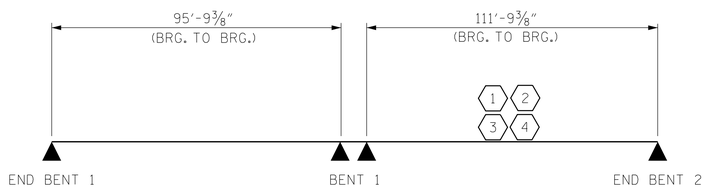
(3) LEGAL LOAD RATING **

(4) EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

6/17/2024

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NC License NO.: F-0105

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			33

STD. NO. LRFR1

ASSEMBLED BY : J. LOFTUS	DATE : 9-2022
CHECKED BY : J. WEIGER	DATE : 12-2022
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM
	REV. 04/23 BNB/AAI

5/8/2024
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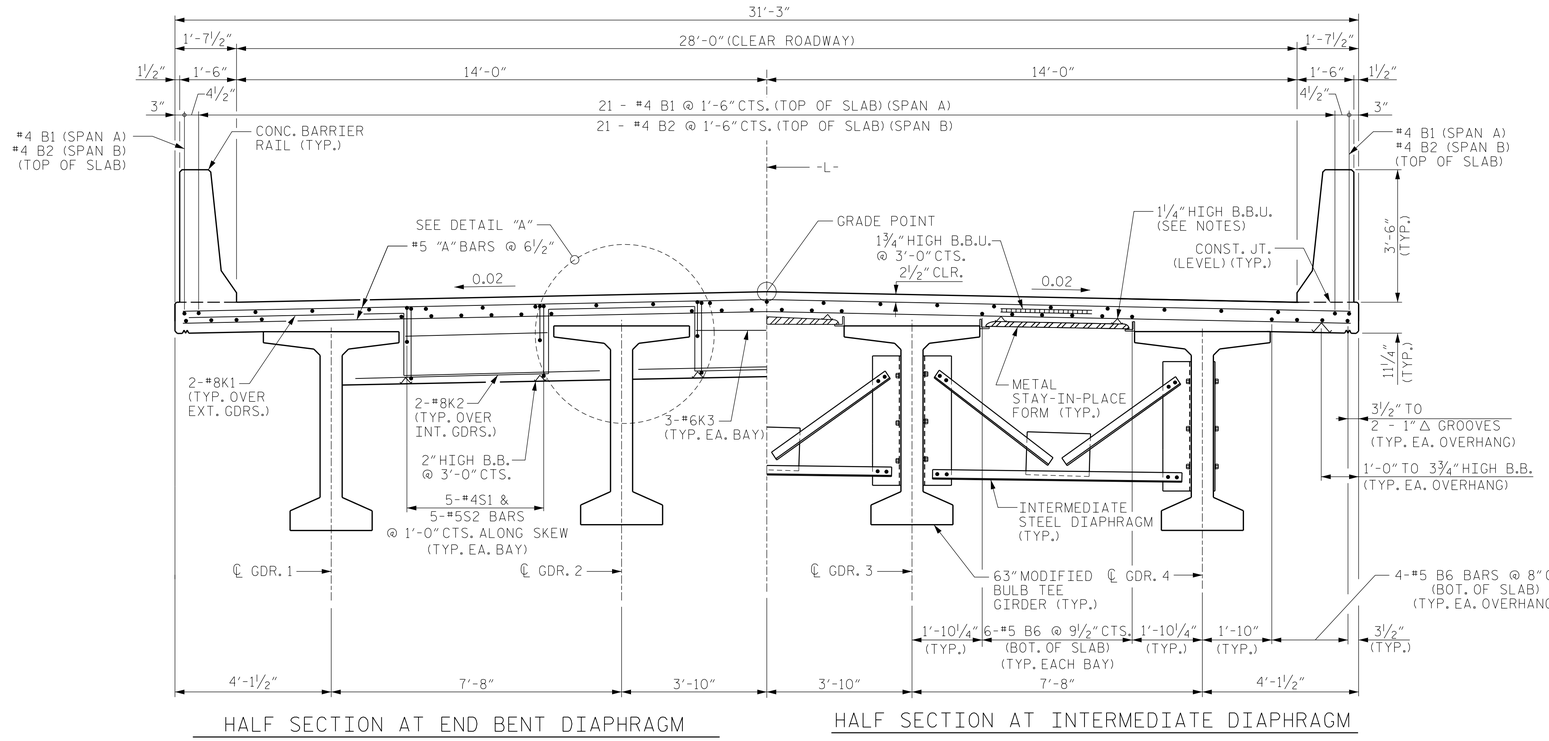
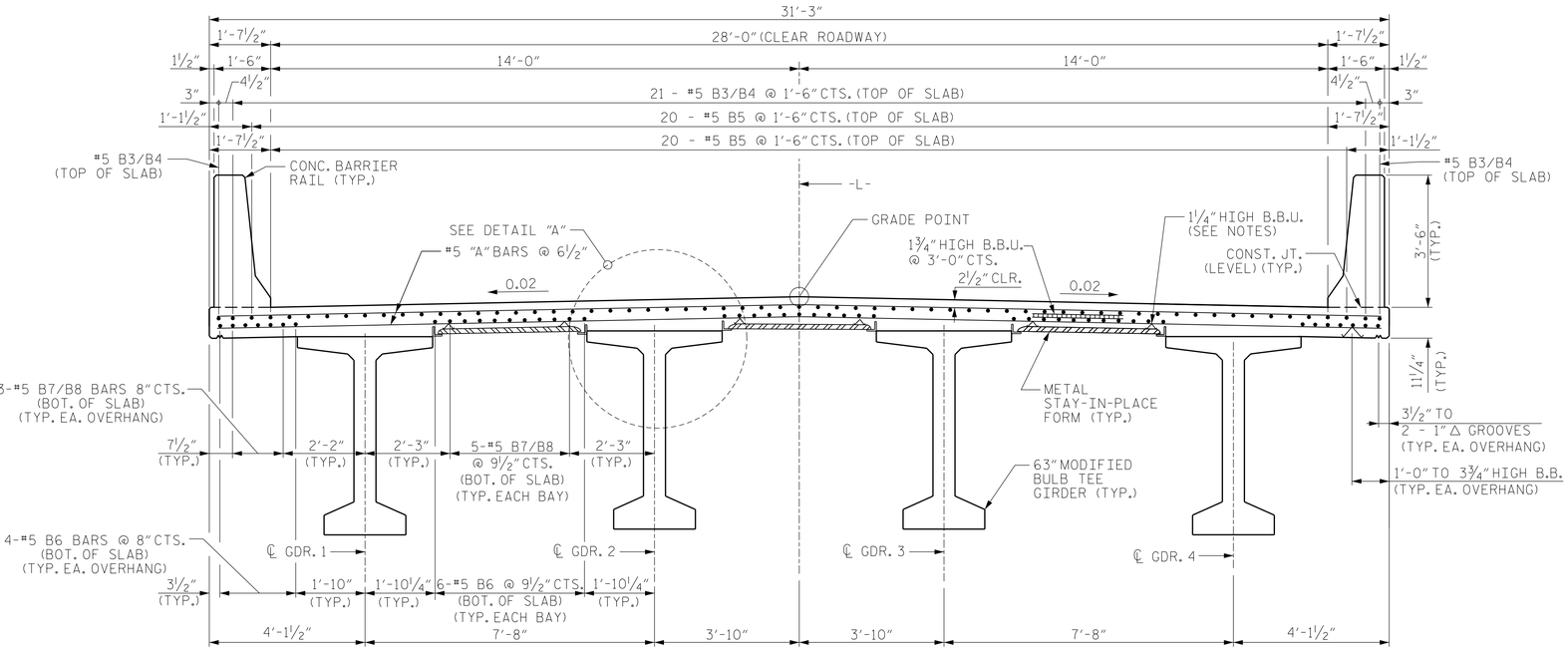
jloftus



HALF SECTION AT END BENT DIAPHRAGM

HALF SECTION AT INTERMEDIATE DIAPHRAGM

TYPICAL SECTION



TYPICAL SECTION THROUGH LINK SLAB

NOTES

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

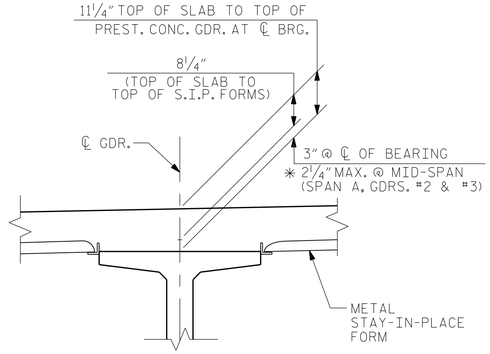
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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

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

NO WELDING OF FORMS OR FALSEWORK TO THE TOP OF THE GIRDER WILL BE PERMITTED IN THE LINK SLAB AREA. SEE "PLAN OF SPANS" SHEETS FOR LOCATIONS.

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



DETAIL "A"

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

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L JACOB

6/17/2024

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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CHECKED BY : P. JACOB DATE : 8-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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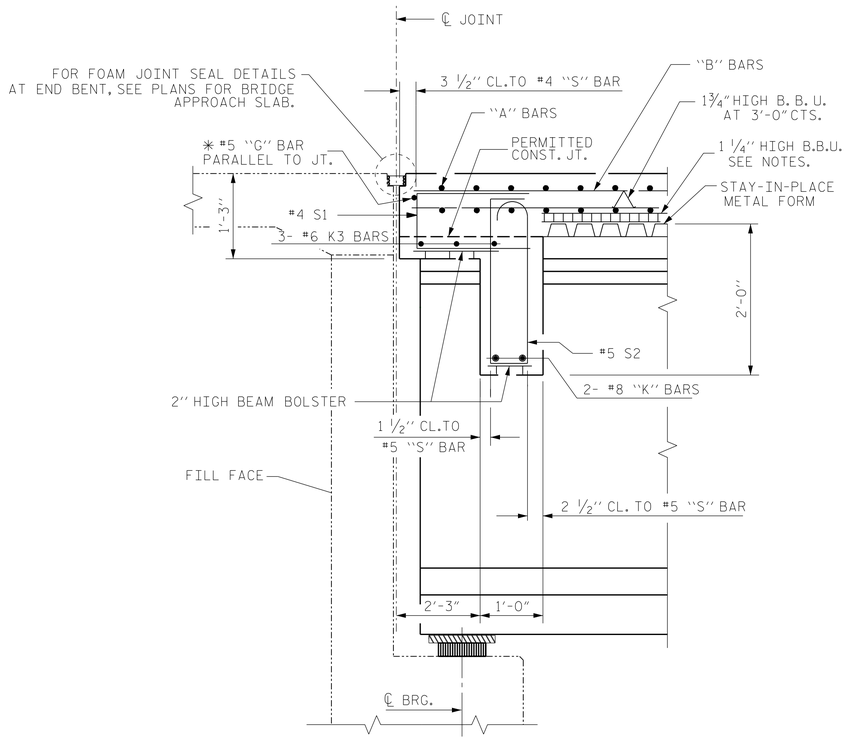
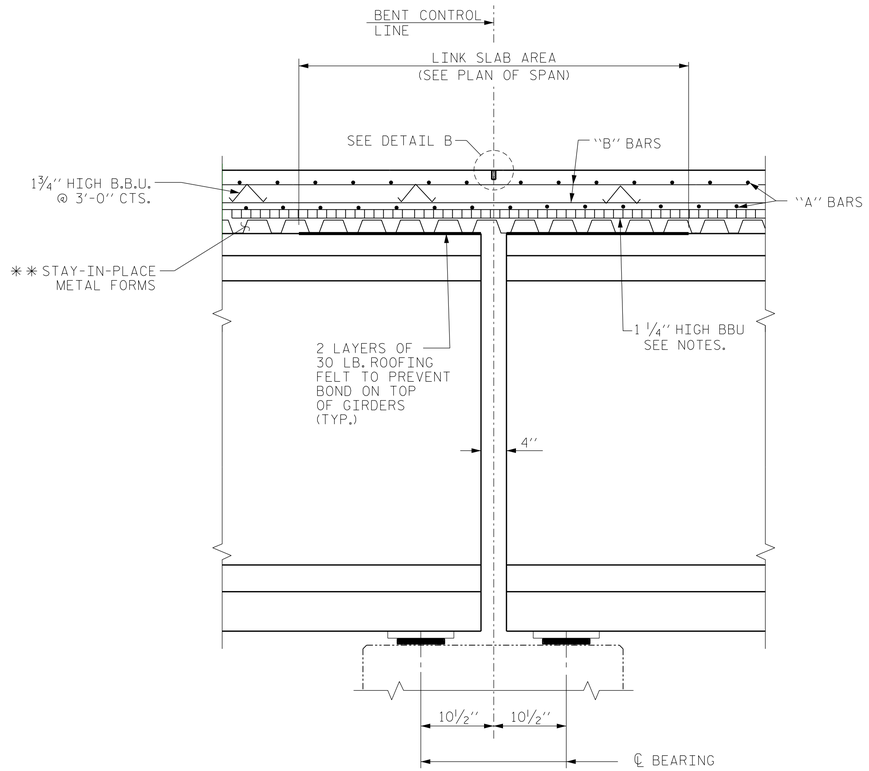
JLoftus



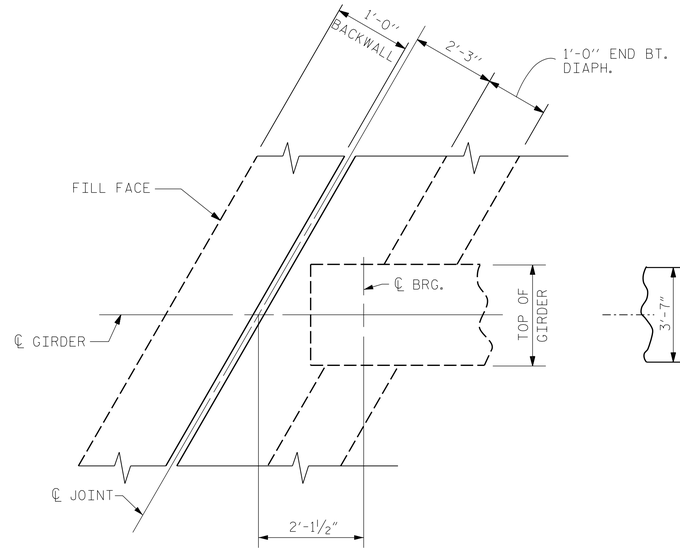
SECTION THROUGH END BENT DIAPHRAGM

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

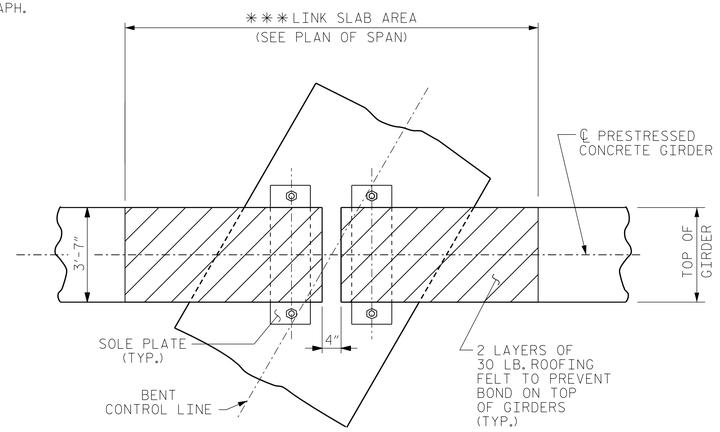


SECTION @ LINK SLAB

** METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO THE GIRDER FLANGES IN THE REGION OF THE LINK SLAB

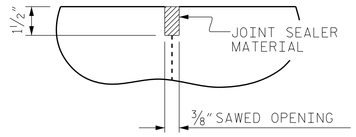


PLAN @ END BENT



PLAN @ BENT

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



DETAIL "B"

A 1½" DEEP CONTRACTION JOINT AT BENT CONTROL LINE SHALL BE SAWN WITHIN 24 HOURS OF POURING THE 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.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TYPICAL SECTION DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

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CHECKED BY : P. JACOB DATE : 8-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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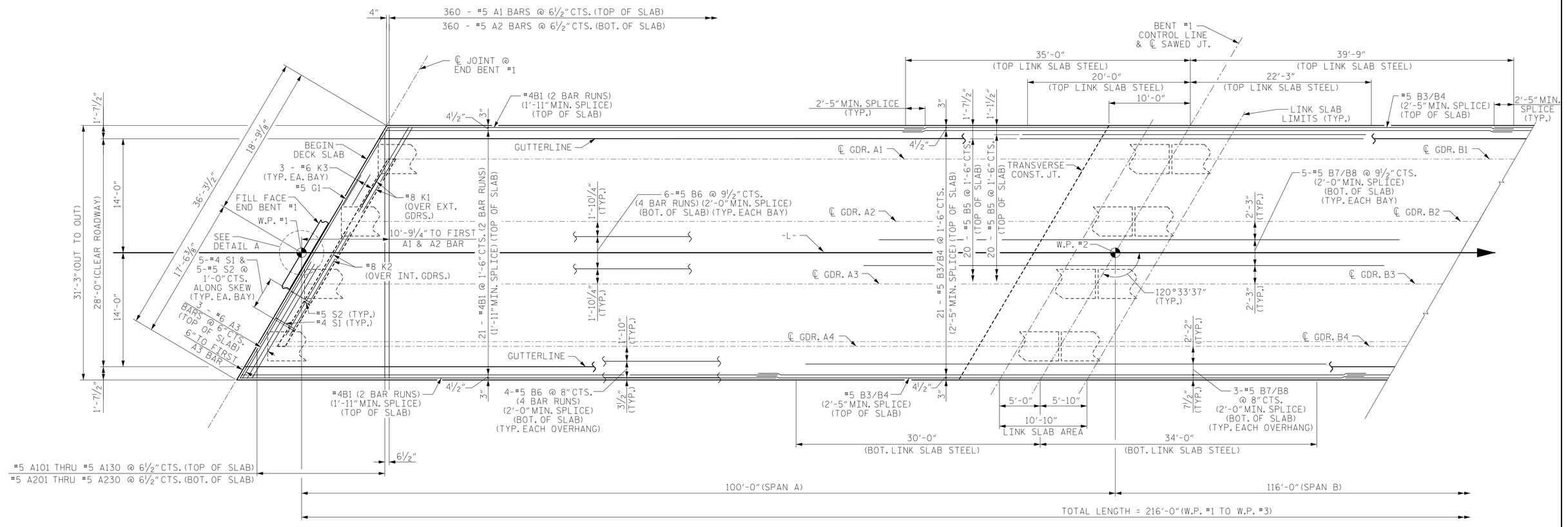
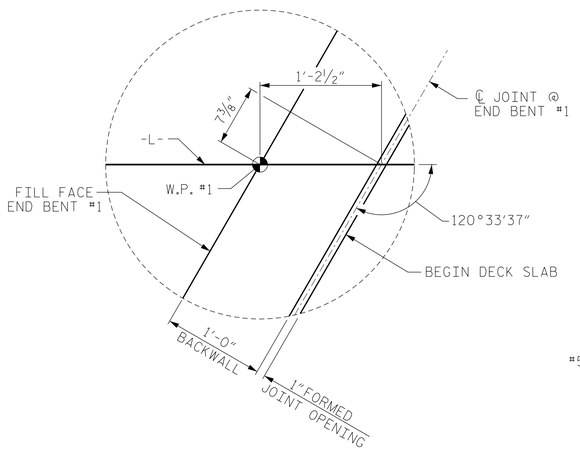
JLoftus

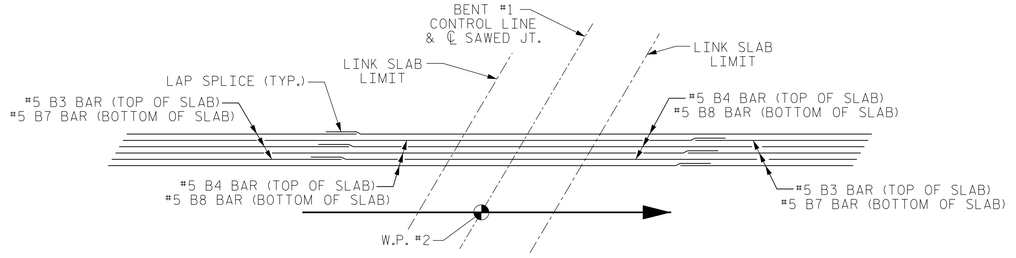


PLAN OF SPAN A

DIMENSIONS SHOWN ARE TAKEN TO CENTER OF JOINT WHERE APPLICABLE.

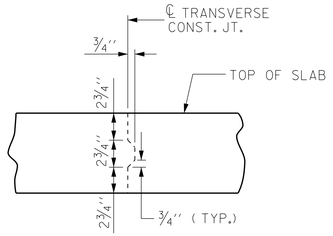


DETAIL A



PLACEMENT OF B3/B4 & B7/B8 BARS

NOTE: REINFORCEMENT SPLICES SHALL NOT BE PLACED INSIDE THE LINK SLAB LIMITS. ALTERNATE THE PLACEMENT OF ADJACENT BARS AS SHOWN IN THE ABOVE FIGURE. SEE PLAN VIEW FOR SPACINGS.



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

DRAWN BY : J. LOFTUS DATE : 9-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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4700 FALLS OF NEUSE ROAD, SUITE 300
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NC License NO.: F-0105

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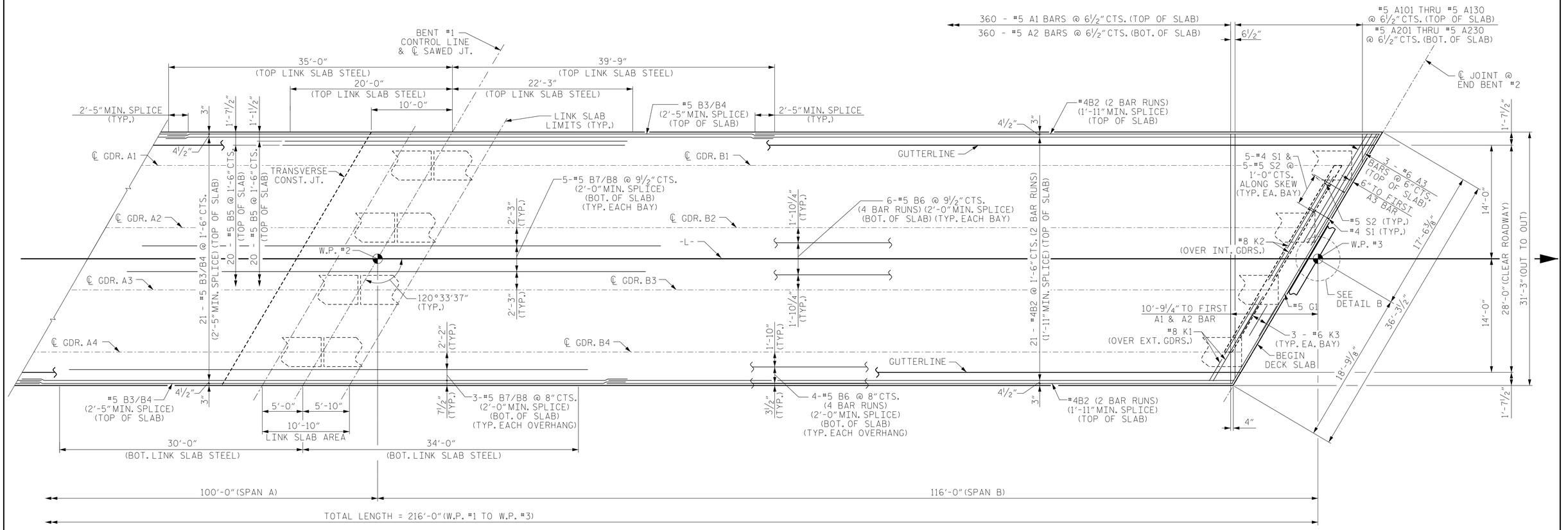
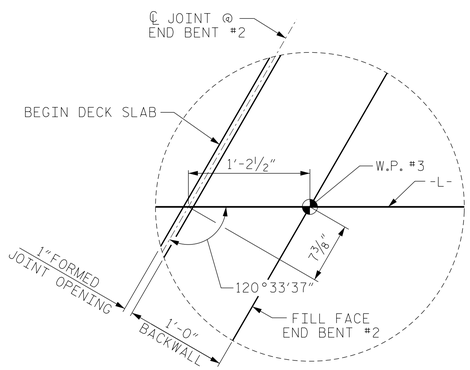
JLoftus

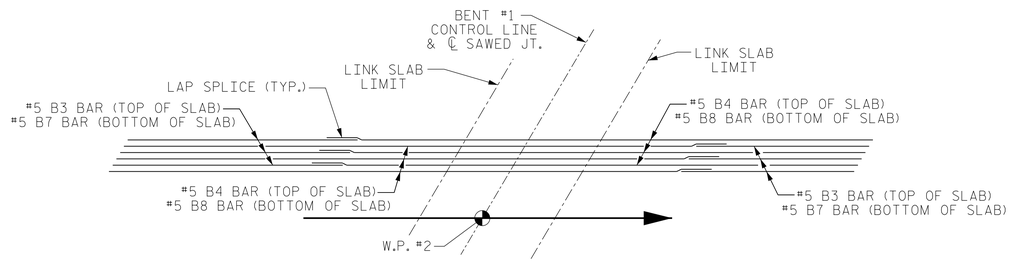


PLAN OF SPAN B

DIMENSIONS SHOWN ARE TAKEN TO CENTER OF JOINT WHERE APPLICABLE.



DETAIL B



PLACEMENT OF B3/B4 & B7/B8 BARS

NOTE: REINFORCEMENT SPLICES SHALL NOT BE PLACED INSIDE THE LINK SLAB LIMITS. ALTERNATE THE PLACEMENT OF ADJACENT BARS AS SHOWN IN THE ABOVE FIGURE. SEE PLAN VIEW FOR SPACINGS.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN B

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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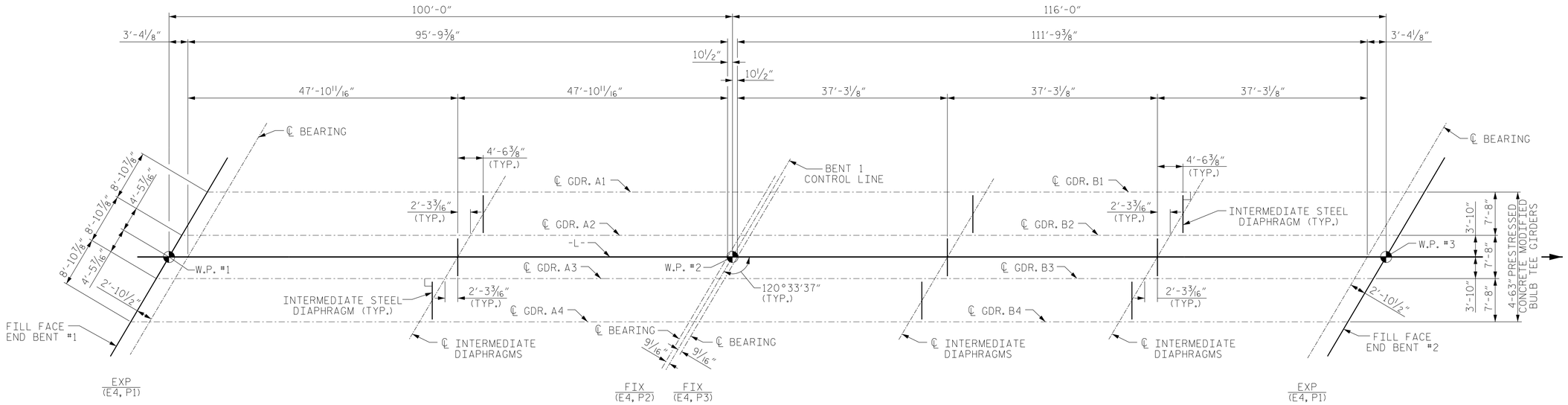
JLoftus



SPAN A

SPAN B

FRAMING PLAN

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FRAMING PLAN

6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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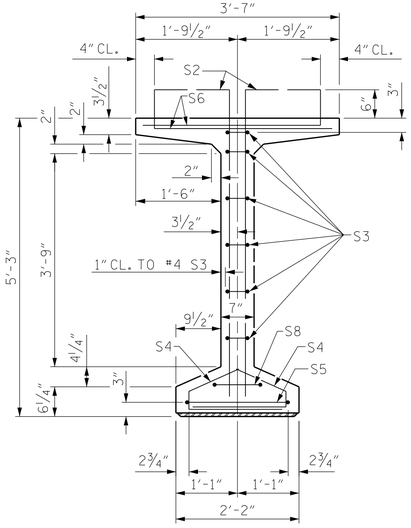
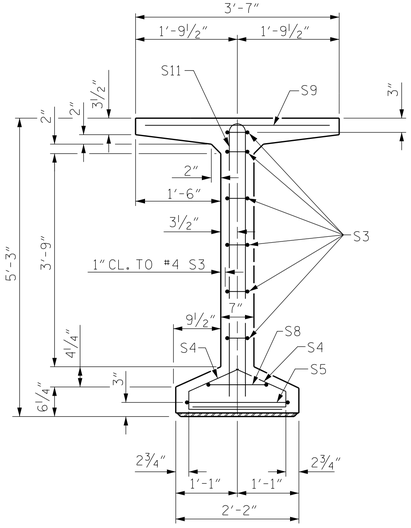
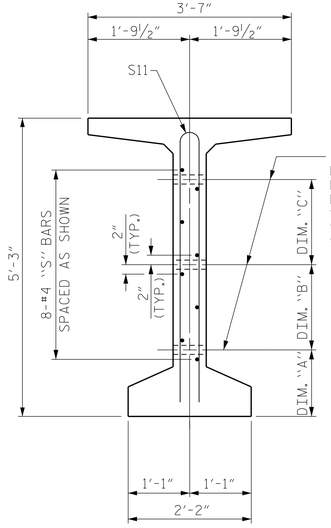
JLOFTUS



SECTION A-A



SECTION B-B

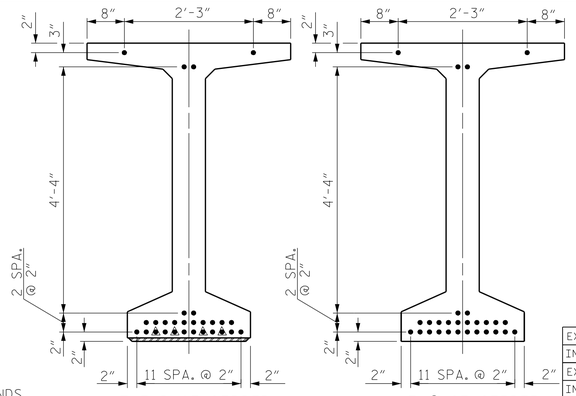


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

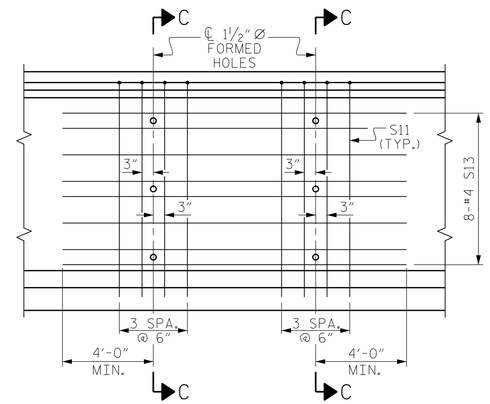
DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER



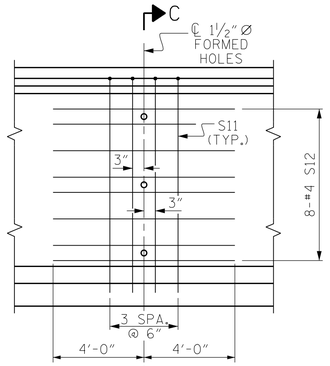
0.6" Ø LOW RELAXATION STRAND LAYOUT

EXTERIOR GDR.	S11	17	#5	5	10'-0"	177
INTERIOR GDR.	S11	21	#5	5	10'-0"	219
EXTERIOR GDR.	S12	8	#4	STR	8'-0"	43
INTERIOR GDR.	S13	8	#4	STR	12'-7"	67



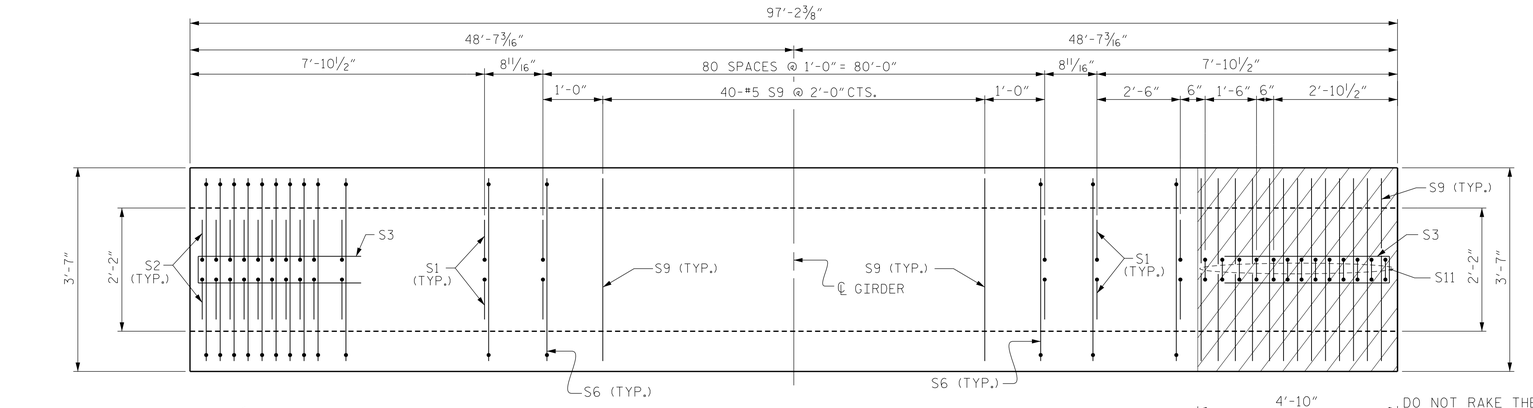
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. A2 & A3

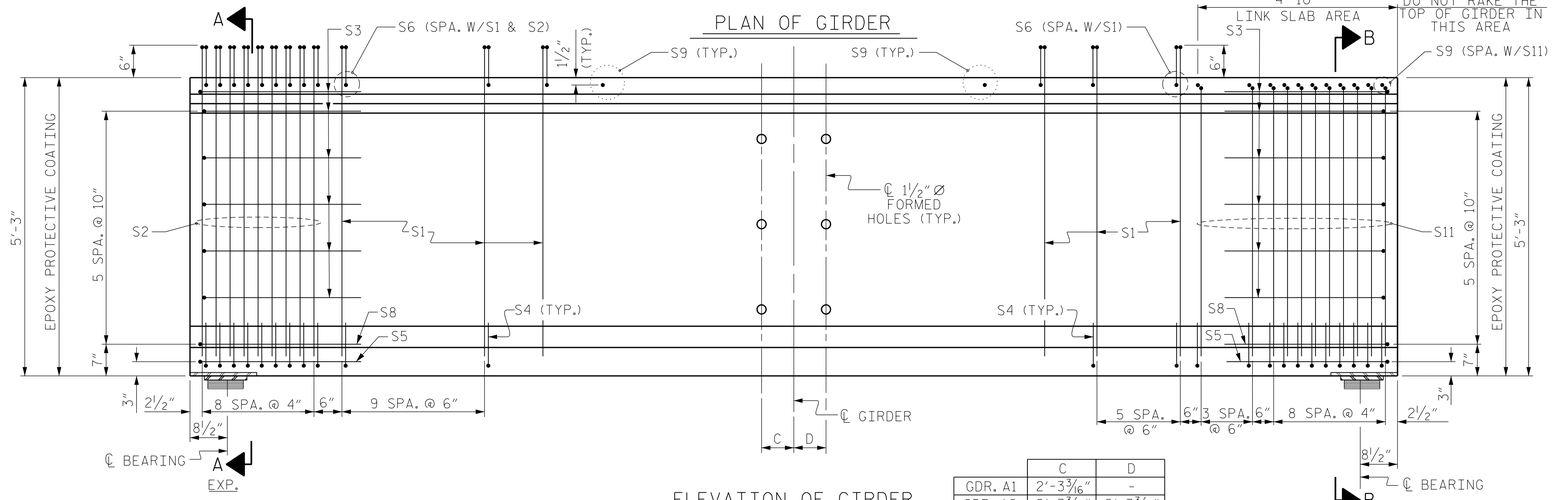


PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. A1 & A4



PLAN OF GIRDER



ELEVATION OF GIRDER

	C	D
GDR. A1	2'-3³⁄₁₆"	-
GDR. A2	2'-3³⁄₁₆"	2'-3³⁄₁₆"
GDR. A3	2'-3³⁄₁₆"	2'-3³⁄₁₆"
GDR. A4	-	2'-3³⁄₁₆"

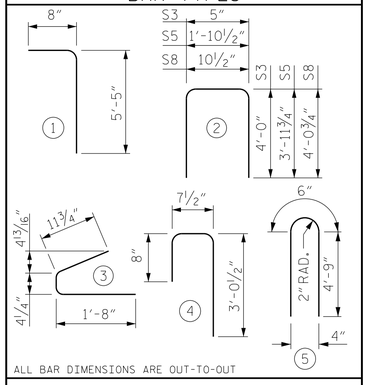
0.6" Ø L. R. GRADE 270 STRANDS

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	194	#4	1	6'-1"	788
S2	18	#5	1	6'-1"	114
S3	12	#4	2	8'-5"	67
S4	76	#4	3	3'-0"	152
S5	2	#5	2	9'-10"	21
S6	212	#5	4	4'-4"	958
S8	2	#5	2	9'-0"	19
S9	53	#5	STR	3'-3"	180

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL (LB.)	8500 PSI CONCRETE (C.Y.)	0.6" Ø L.R. STRANDS (No.)
EXTERIOR GIRDER	2,519	19.26	28
INTERIOR GIRDER	2,585	19.26	28

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	97'-2⅜"	388'-9½"

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

63" PRESTRESSED CONCRETE MODIFIED BULB TEE SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L JACOB

6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

moffatt & nichol
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NC License NO.: F-0105

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1			3			TOTAL SHEETS
2			4			33

5/8/2024
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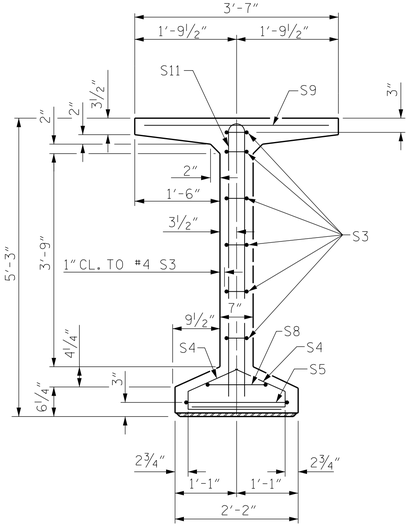
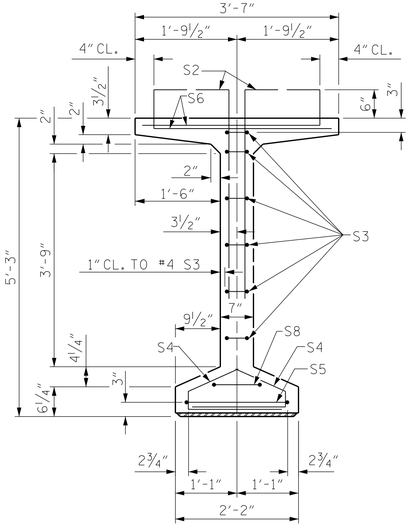
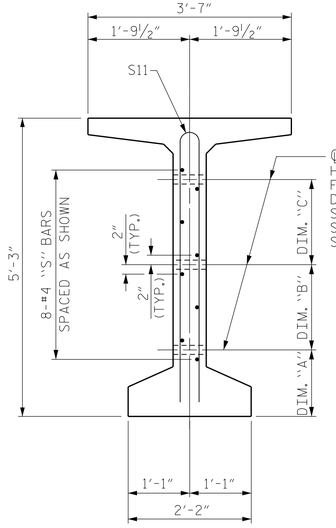
JLoftus



SECTION A-A



SECTION B-B

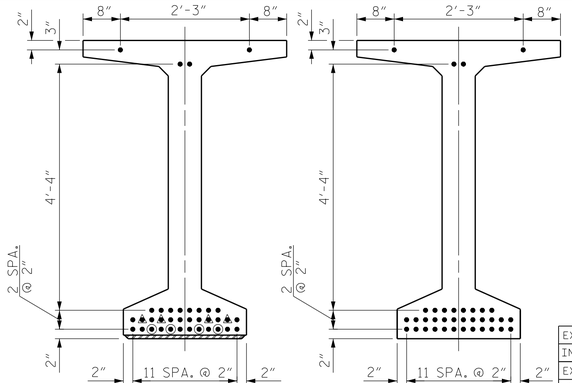


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- △ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



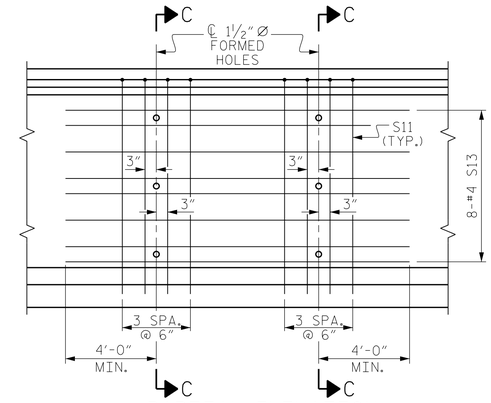
0.6" Ø LOW RELAXATION STRAND LAYOUT

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

REINFORCING STEEL FOR ONE GDR

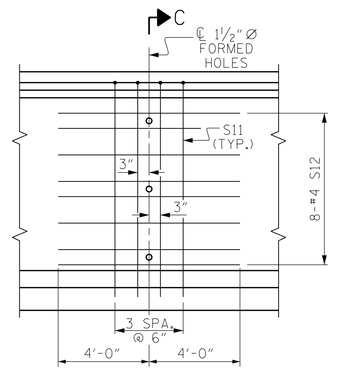
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	224	#4	1	6'-1"	910
S2	18	#5	1	6'-1"	114
S3	12	#4	2	8'-5"	67
S4	76	#4	3	3'-0"	152
S5	2	#5	2	9'-10"	21
S6	242	#5	4	4'-4"	1,094
S8	2	#5	2	9'-0"	19
S9	62	#5	STR	3'-3"	210
S11	22	#5	5	10'-0"	229
S11	30	#5	5	10'-0"	313
S12	16	#4	STR	8'-0"	86
S13	16	#4	STR	12'-7"	134

EXTERIOR GDR.
INTERIOR GDR.
EXTERIOR GDR.
INTERIOR GDR.



PARTIAL ELEVATION

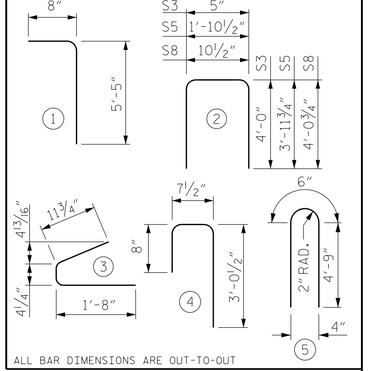
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. B2 & B3



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. B1 & B4

BAR TYPES



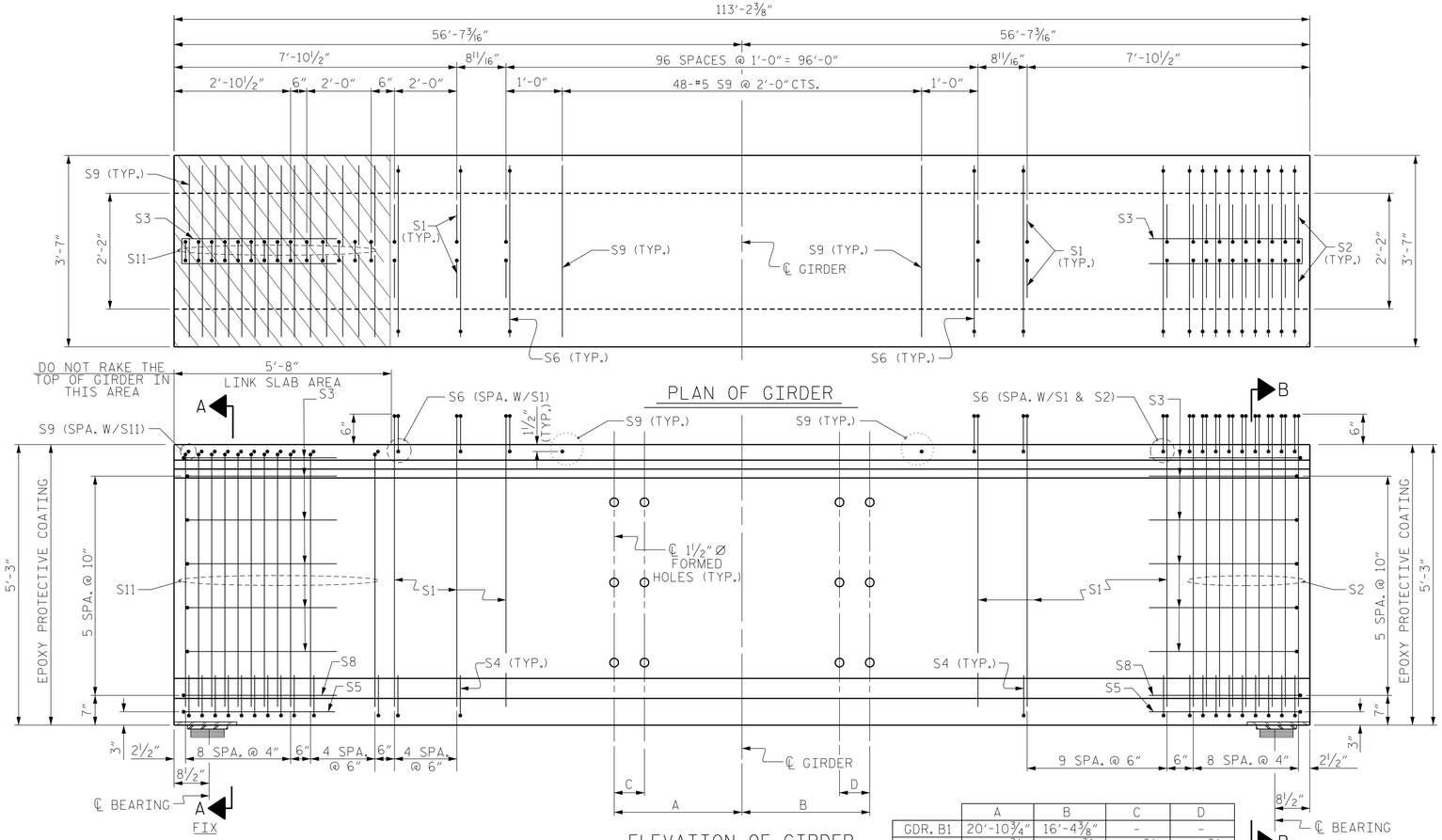
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	2,902	22.43	36
INTERIOR GIRDER	3,034	22.43	36

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	113'-2⅜"	452'-9½"



	A	B	C	D
GDR. B1	20'-10¾"	16'-4⅜"	-	-
GDR. B2	20'-10¾"	20'-10¾"	4'-6⅜"	4'-6⅜"
GDR. B3	20'-10¾"	20'-10¾"	4'-6⅜"	4'-6⅜"
GDR. B4	16'-4⅜"	20'-10¾"	-	-

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

63" PRESTRESSED CONCRETE MODIFIED BULB TEE SPAN B

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB
6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

moffatt & nichol
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RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 VOICE (919) 781-4869 FAX
NC License NO.: F-0105

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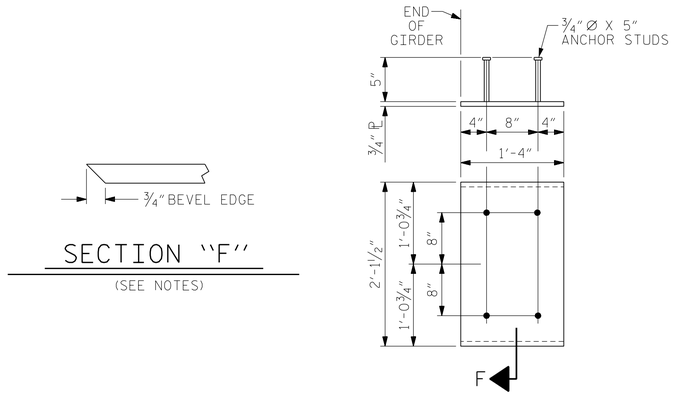
JLoftus



SECTION "F"

(SEE NOTES)

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

(2 REQ'D PER GIRDER)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6500 PSI.

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

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼". DO NOT RAKE THE TOP OF GIRDER AT LOCATIONS BELOW LINK SLAB AREAS.

A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 63" AND 72" 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.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PRESTRESSED CONCRETE GIRDER DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
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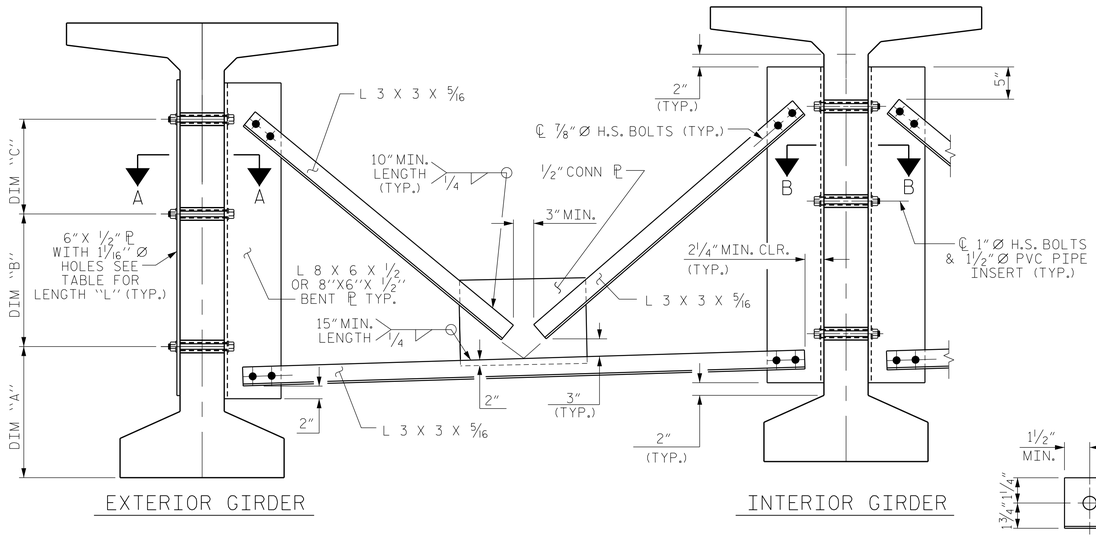
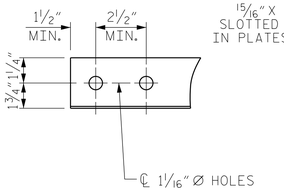


EXTERIOR GIRDER

INTERIOR GIRDER

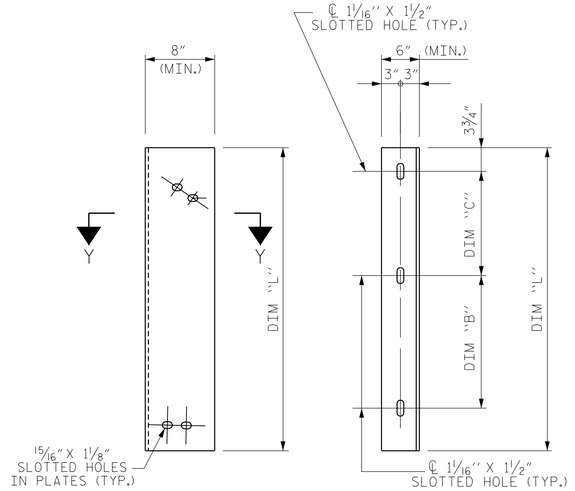
PART SECTION AT INTERMEDIATE DIAPHRAGM

(63" BULB TEE GIRDER SHOWN)



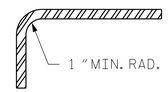
ANGLE END

(L 3 X 3 X 5/16)



DIAPHRAGM FACE

WEB FACE



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.

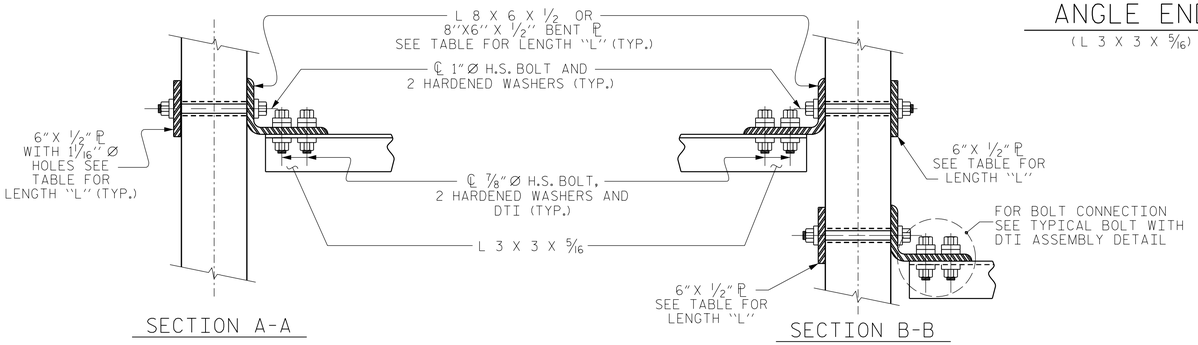
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

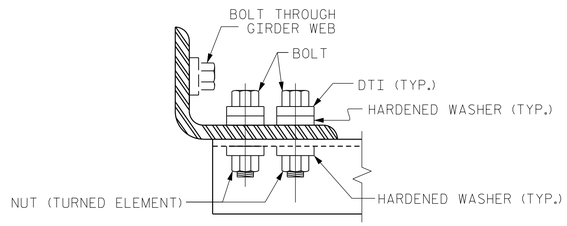
GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
63" BULB TEE	1'-5 3/4"	1'-4"	1'-4"	3'-5"



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
INTERMEDIATE STEEL DIAPHRAGMS FOR 63" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

ASSEMBLED BY : J. LOFTUS	DATE : 10-2022
CHECKED BY : P. JACOB	DATE : 12-2022
DRAWN BY : RWW 11/09	REV. 10/1/11 MAA/GM
CHECKED BY : GM 11/09	REV. 12/17 MAA/THC

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NC License NO.: F-0105

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STD. NO. PCG11

5/8/2024
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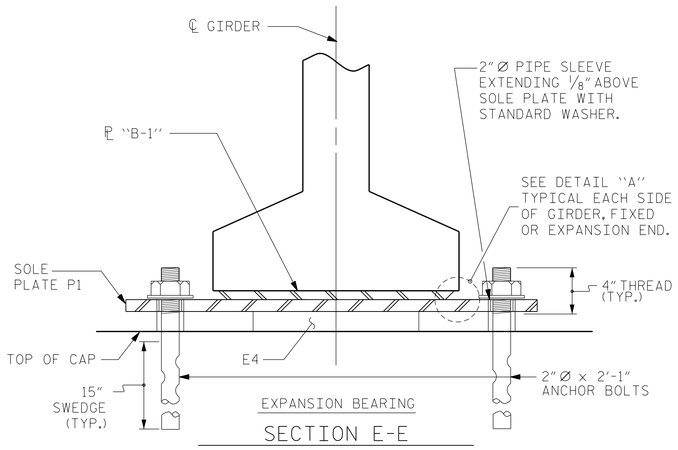
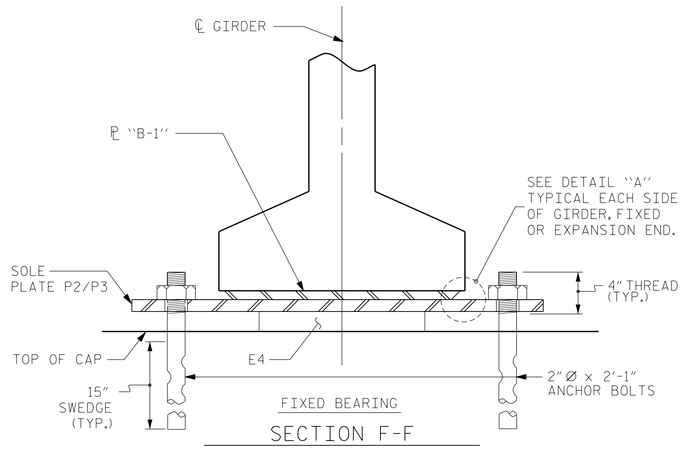
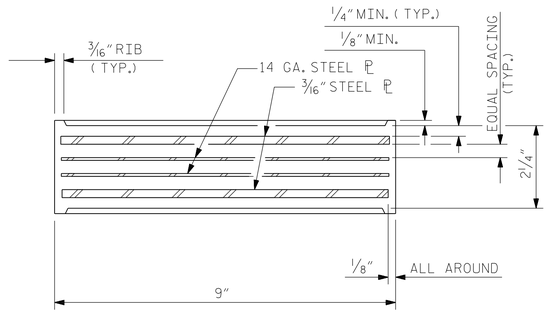
JLoftus



SECTION E-E



SECTION F-F

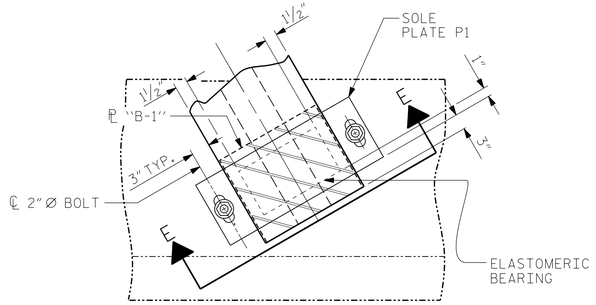


TYPICAL SECTION OF ELASTOMERIC BEARINGS

E4 (16 REQ'D)

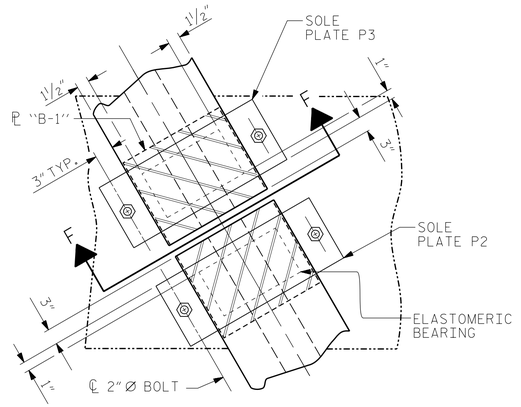
PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



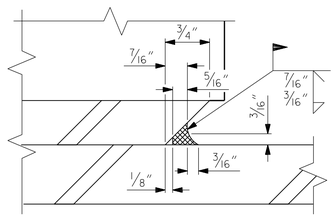
TYPICAL PLAN

(SHOWING END BENT)

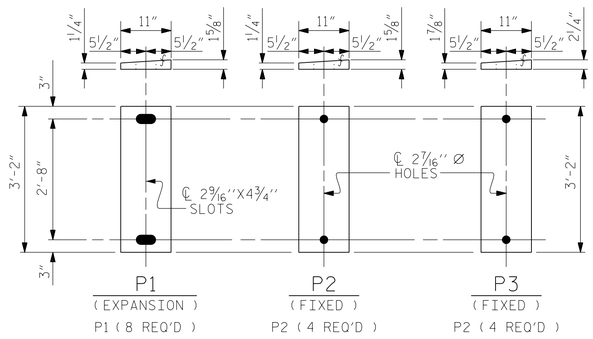


TYPICAL PLAN

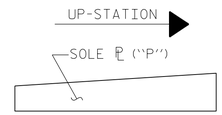
(SHOWING CONTINUOUS BENT)



DETAIL "A"



SOLE PLATE DETAILS ("P")



SOLE ℄ PLACEMENT DETAIL

NOTES

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

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

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

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

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

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

ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE STANDARD SPECIFICATIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

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

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

ASSEMBLED BY : J. LOFTUS	DATE : 10-2022
CHECKED BY : P. JACOB	DATE : 12-2023

DRAWN BY : WJH 8/89	REV. 12/17	MAA/THC
CHECKED BY : CRK 8/89	REV. 10/21	BNB/AAI
	REV. 10/23	BNB/SNM

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NC License NO.: F-0105

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			33

STD. NO. EB4 (SHT 1)

6/17/2024
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PJacob

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN A — GIRDERS 1 & 4																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.023	0.045	0.066	0.085	0.102	0.117	0.128	0.136	0.142	0.143	0.142	0.136	0.128	0.117	0.102	0.085	0.066	0.045	0.023	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.014	0.028	0.041	0.055	0.065	0.076	0.082	0.089	0.091	0.093	0.091	0.089	0.082	0.076	0.065	0.055	0.041	0.028	0.014	0.000
FINAL CAMBER ↑	0	1/8"	3/16"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	5/8"	5/8"	5/8"	9/16"	9/16"	1/2"	7/16"	3/8"	5/16"	3/16"	1/8"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN A — GIRDERS 2 & 3																				
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.023	0.045	0.066	0.085	0.102	0.117	0.128	0.136	0.142	0.143	0.142	0.136	0.128	0.117	0.102	0.085	0.066	0.045	0.023	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.013	0.027	0.039	0.052	0.062	0.072	0.078	0.084	0.086	0.088	0.086	0.084	0.078	0.072	0.062	0.052	0.039	0.027	0.013	0.000
FINAL CAMBER ↑	0	1/8"	3/16"	5/16"	3/8"	1/2"	9/16"	5/8"	5/8"	11/16"	11/16"	11/16"	5/8"	5/8"	9/16"	1/2"	3/8"	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).

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN B — GIRDERS 1 & 4																																								
FORTIETH POINTS	0	0.025	0.05	0.075	0.10	0.125	0.15	0.175	0.20	0.225	0.25	0.275	0.30	0.325	0.35	0.375	0.40	0.425	0.45	0.475	0.50	0.525	0.55	0.575	0.60	0.625	0.65	0.675	0.70	0.725	0.75	0.775	0.80	0.825	0.85	0.875	0.90	0.925	0.95	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.020	0.040	0.059	0.079	0.097	0.115	0.133	0.148	0.164	0.179	0.192	0.204	0.215	0.224	0.232	0.239	0.244	0.248	0.250	0.251	0.250	0.248	0.243	0.239	0.232	0.224	0.215	0.204	0.192	0.179	0.164	0.149	0.133	0.115	0.097	0.079	0.059	0.040	0.020	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.013	0.026	0.039	0.052	0.065	0.077	0.089	0.102	0.111	0.121	0.131	0.140	0.146	0.153	0.159	0.165	0.167	0.169	0.171	0.173	0.171	0.169	0.167	0.165	0.159	0.153	0.146	0.140	0.131	0.121	0.111	0.102	0.089	0.077	0.065	0.052	0.039	0.026	0.013	0.000
FINAL CAMBER ↑	0	1/16"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	3/4"	13/16"	7/8"	7/8"	7/8"	15/16"	15/16"	15/16"	15/16"	15/16"	15/16"	15/16"	7/8"	7/8"	7/8"	13/16"	3/4"	3/4"	11/16"	5/8"	9/16"	1/2"	7/16"	3/8"	5/16"	1/4"	3/16"	1/16"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN B — GIRDERS 2 & 3																																								
FORTIETH POINTS	0	0.025	0.05	0.075	0.10	0.125	0.15	0.175	0.20	0.225	0.25	0.275	0.30	0.325	0.35	0.375	0.40	0.425	0.45	0.475	0.50	0.525	0.55	0.575	0.60	0.625	0.65	0.675	0.70	0.725	0.75	0.775	0.80	0.825	0.85	0.875	0.90	0.925	0.95	0.975	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.020	0.040	0.059	0.079	0.097	0.115	0.133	0.148	0.164	0.179	0.192	0.204	0.215	0.224	0.232	0.239	0.244	0.248	0.250	0.251	0.250	0.248	0.243	0.239	0.232	0.224	0.215	0.204	0.192	0.179	0.164	0.149	0.133	0.115	0.097	0.079	0.059	0.040	0.020	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.012	0.025	0.037	0.050	0.061	0.073	0.085	0.096	0.105	0.115	0.124	0.133	0.139	0.145	0.150	0.156	0.158	0.160	0.162	0.164	0.162	0.160	0.158	0.156	0.151	0.145	0.139	0.133	0.124	0.115	0.106	0.096	0.085	0.073	0.061	0.050	0.037	0.025	0.012	0.000
FINAL CAMBER ↑	0	1/16"	3/16"	1/4"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	15/16"	1"	1"	1"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1"	1"	1"	15/16"	15/16"	7/8"	13/16"	3/4"	11/16"	5/8"	9/16"	1/2"	7/16"	3/8"	1/4"	3/16"	1/16"	0

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

PROJECT NO. BR-0097
ROCKINGHAM COUNTY
STATION: 30+17.89 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB
DocuSigned by: C80DD8D0B66D465...
6/17/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DEAD LOAD DEFLECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : J. WEIGER DATE : 12-2022
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

5/8/2024
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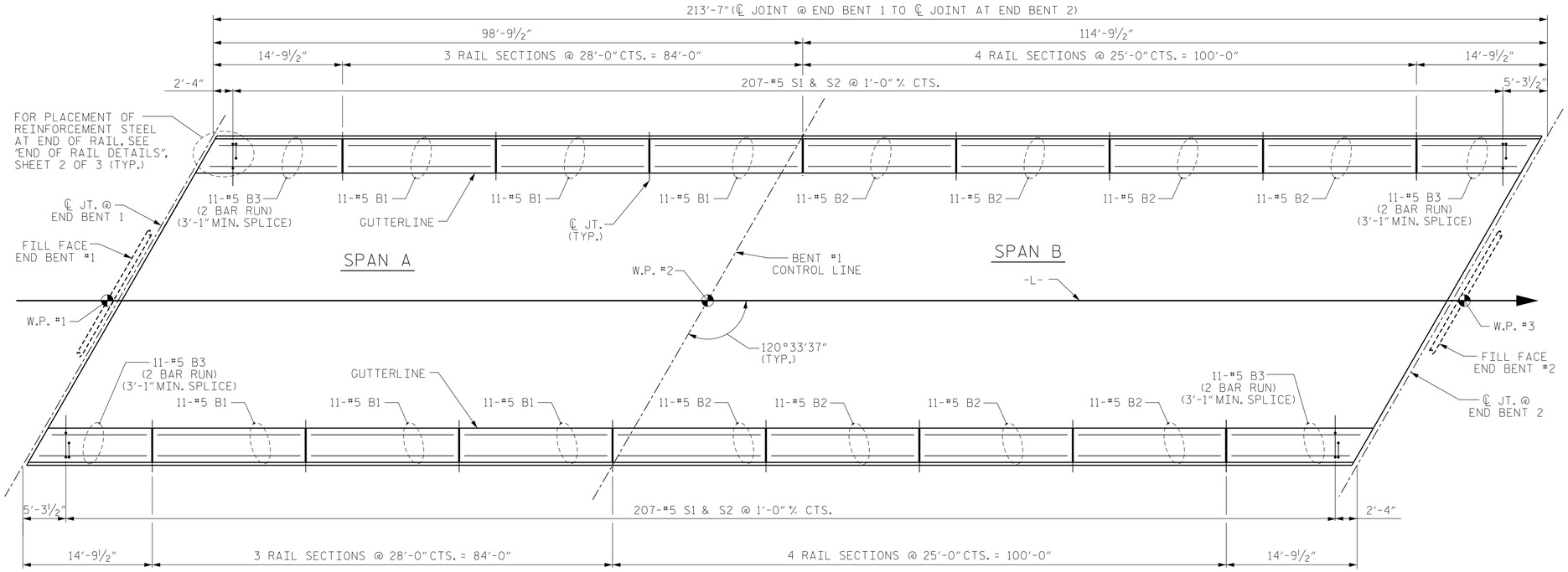
jloftus

NOTES:

#5 S1 AND S2 BARS MAY BE SHIFTED SLIGHTLY TO MAINTAIN 2" CLEAR TO EXPANSION JOINT IN RAIL.

DIMENSIONS ARE MEASURED ALONG OUTSIDE OF DECK SLAB TO ℄ OF JOINTS, WHERE APPLICABLE



PLAN OF CONCRETE BARRIER RAIL

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE BARRIER RAIL PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 ENGINEER PAUL L. JACOB
6/17/2024

DRAWN BY : J. WEIGER DATE : 3-2022
CHECKED BY : J. LOFTUS DATE : 12-2022
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 12-2022

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			33

5/8/2024
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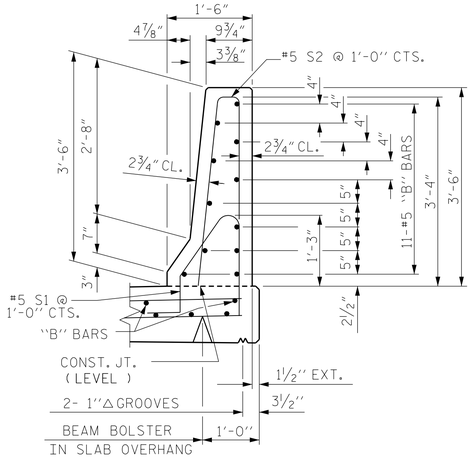
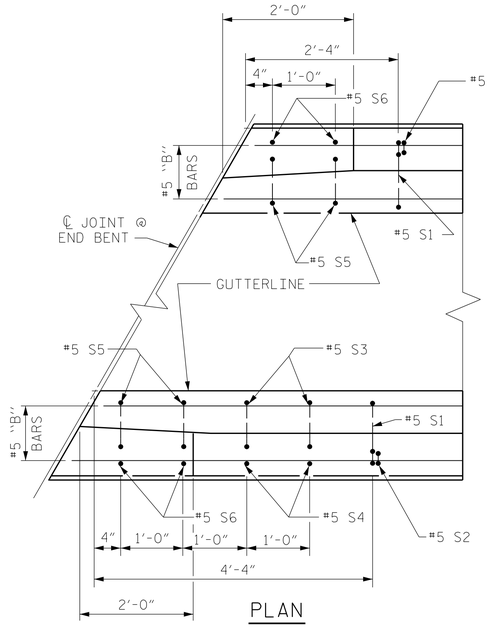
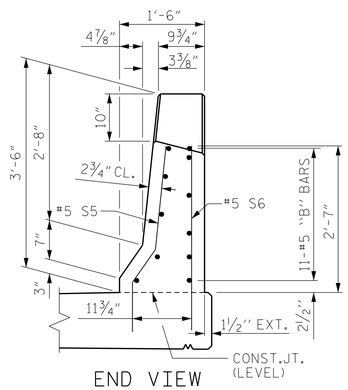
JLoftus



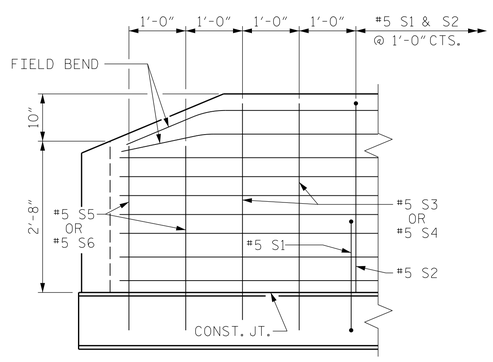
SECTION THRU RAIL



PLAN



END VIEW



SIDE VIEW

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

NOTES

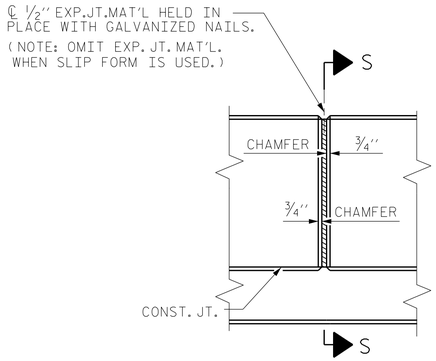
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

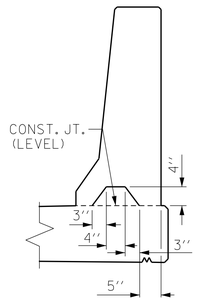
WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

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





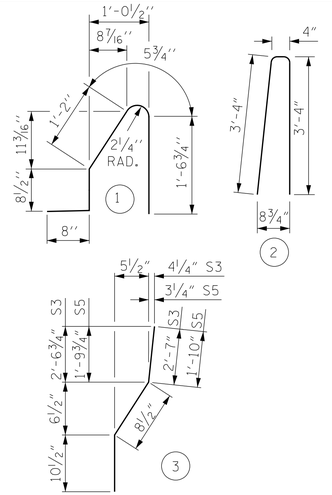
SECTION S-S

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

ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* S1	414	#5	1	4'-7"	1,979
* S2	414	#5	2	7'-0"	3,023
* S3	4	#5	3	4'-2"	17
* S4	4	#5	STR	4'-0"	17
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27
* B1	66	#5	STR	27'-7"	1,905
* B2	88	#5	STR	24'-7"	2,256
* B3	88	#5	STR	9'-3"	849

* EPOXY COATED REINFORCING STEEL	10,102 LBS.
CLASS AA CONCRETE	29.1 CU. YDS.
CONCRETE BARRIER RAIL	427.16 LIN. FT.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 ENGINEER PAUL L. JACOB

6/17/2024

moffatt & nichol
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RALEIGH, NORTH CAROLINA 27609
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ASSEMBLED BY : J. WEIGER	DATE : 03/2022
CHECKED BY : J. LOFTUS	DATE : 12/2022
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-18
1			3			TOTAL SHEETS
2			4			33

STD. NO. CBR1 (SHT 2)

5/8/2024
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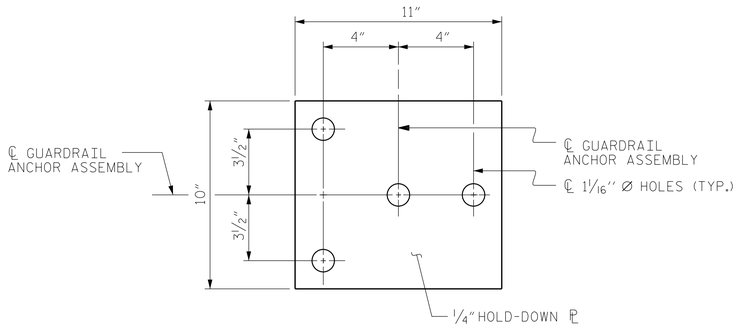
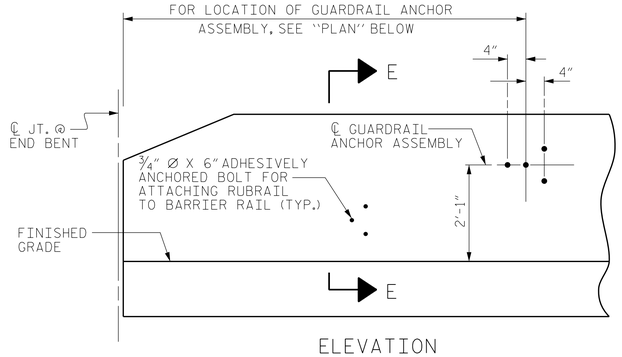
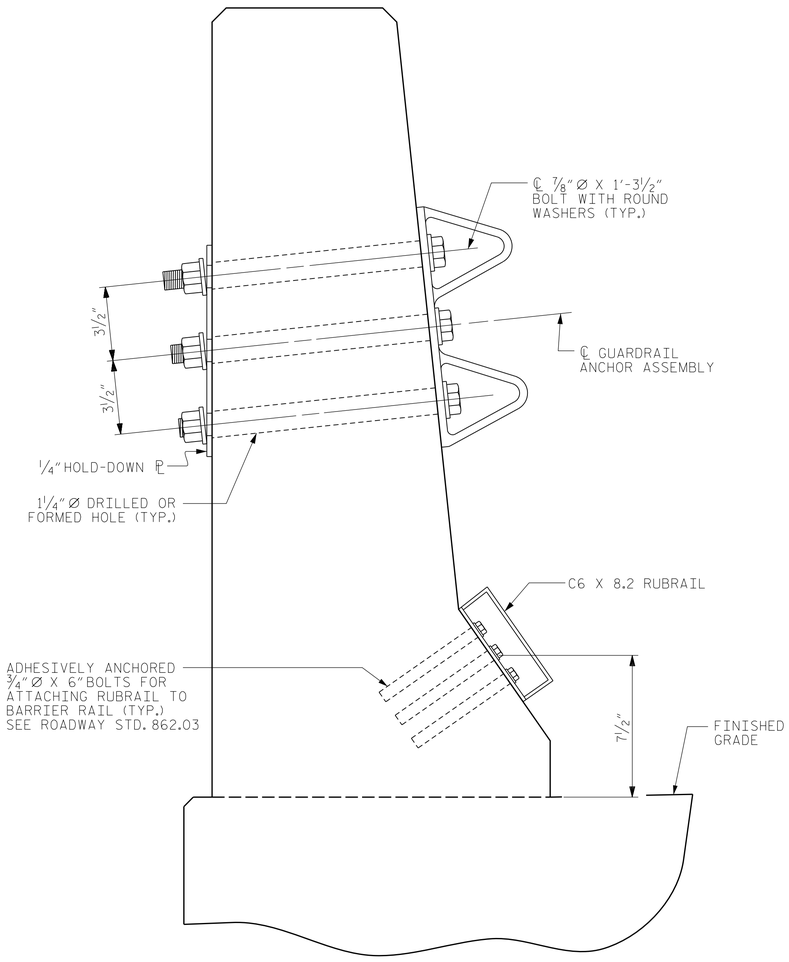
JLOFTUS



PLAN

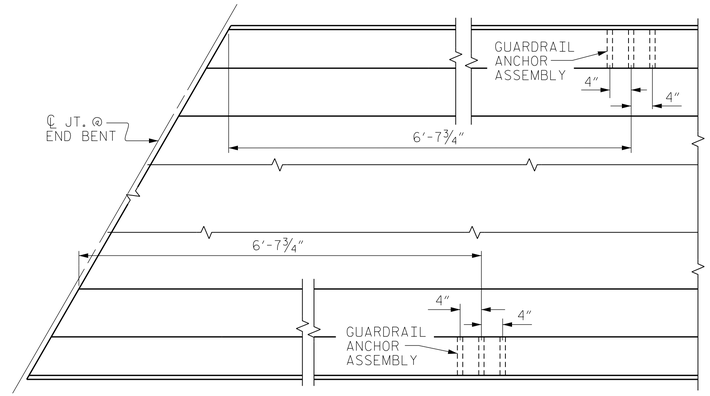


ELEVATION

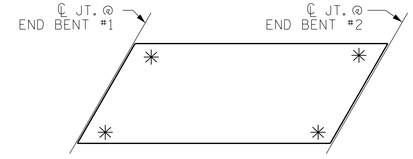


SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

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. TEXT

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.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

ASSEMBLED BY : J. WEIGER	DATE : 3/2022
CHECKED BY : J. LOFTUS	DATE : 1/2023

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

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L. JACOB

6/17/2024

moffatt & nichol
4700 FALLS OF NEUSE ROAD, SUITE 300
RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 VOICE (919) 781-4869 FAX
NC License NO.: F-0105

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			33

(SHT 1b) STD. NO. GRA2

5/8/2024
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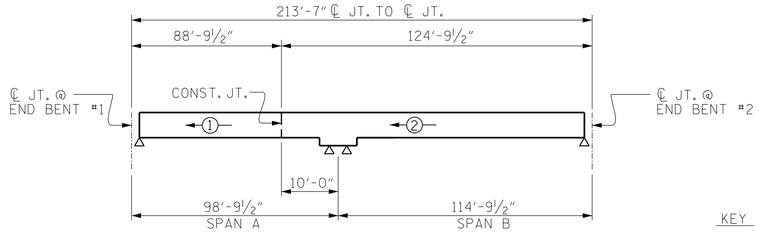
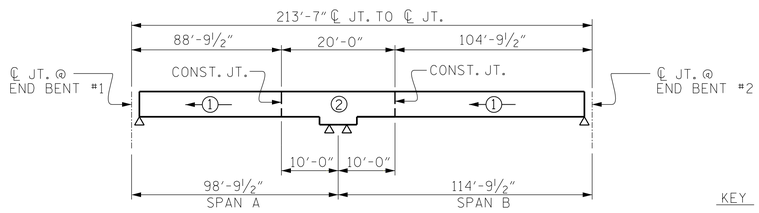
jloftus

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″			

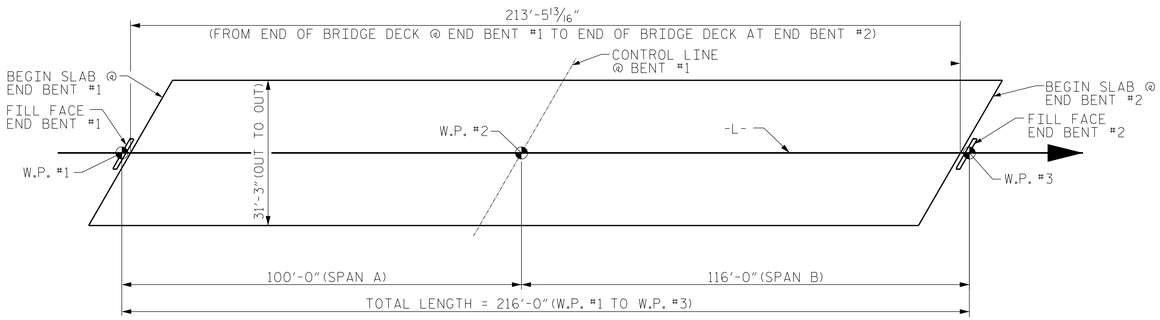


POURING SEQUENCE



OPTIONAL POURING SEQUENCE

✳ POUR ② CAN NOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MINIMUM OF 3000 PSI.

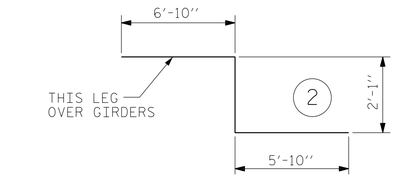


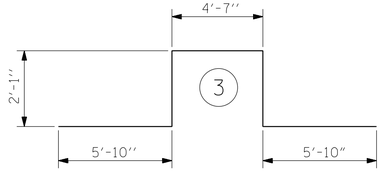
LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 6,671)

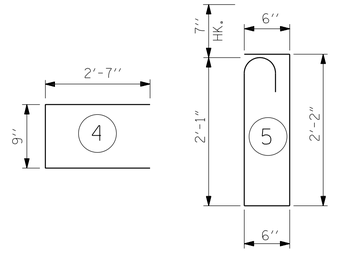
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	360	#5	STR	30′-10″	11,577	A201	2	#5	STR	30′-2″	63
A2	360	#5	STR	30′-10″	11,577	A202	2	#5	STR	29′-3″	61
✳ A3	6	#6	STR	16′-0″	144	A203	2	#5	STR	28′-4″	59
						A204	2	#5	STR	27′-5″	57
✳A101	2	#5	STR	30′-2″	63	A205	2	#5	STR	26′-6″	55
✳A102	2	#5	STR	29′-3″	61	A206	2	#5	STR	25′-7″	53
✳A103	2	#5	STR	28′-4″	59	A207	2	#5	STR	24′-8″	51
✳A104	2	#5	STR	27′-5″	57	A208	2	#5	STR	23′-9″	50
✳A105	2	#5	STR	26′-6″	55	A209	2	#5	STR	22′-10″	48
✳A106	2	#5	STR	25′-7″	53	A210	2	#5	STR	21′-11″	46
✳A107	2	#5	STR	24′-8″	51	A211	2	#5	STR	21′-0″	44
✳A108	2	#5	STR	23′-9″	50	A212	2	#5	STR	20′-1″	42
✳A109	2	#5	STR	22′-10″	48	A213	2	#5	STR	19′-2″	40
✳A110	2	#5	STR	21′-11″	46	A214	2	#5	STR	18′-3″	38
✳A111	2	#5	STR	21′-0″	44	A215	2	#5	STR	17′-4″	36
✳A112	2	#5	STR	20′-1″	42	A216	2	#5	STR	16′-5″	34
✳A113	2	#5	STR	19′-2″	40	A217	2	#5	STR	15′-6″	32
✳A114	2	#5	STR	18′-3″	38	A218	2	#5	STR	14′-7″	30
✳A115	2	#5	STR	17′-4″	36	A219	2	#5	STR	13′-8″	29
✳A116	2	#5	STR	16′-5″	34	A220	2	#5	STR	12′-9″	27
✳A117	2	#5	STR	15′-6″	32	A221	2	#5	STR	11′-10″	25
✳A118	2	#5	STR	14′-7″	30	A222	2	#5	STR	10′-11″	23
✳A119	2	#5	STR	13′-8″	29	A223	2	#5	STR	10′-0″	21
✳A120	2	#5	STR	12′-9″	27	A224	2	#5	STR	9′-1″	19
✳A121	2	#5	STR	11′-10″	25	A225	2	#5	STR	8′-2″	17
✳A122	2	#5	STR	10′-11″	23	A226	2	#5	STR	7′-3″	15
✳A123	2	#5	STR	10′-0″	21	A227	2	#5	STR	6′-4″	13
✳A124	2	#5	STR	9′-1″	19	A228	2	#5	STR	5′-5″	11
✳A125	2	#5	STR	8′-2″	17	A229	2	#5	STR	4′-6″	9
✳A126	2	#5	STR	7′-3″	15	A230	2	#5	STR	3′-7″	7
✳A127	2	#5	STR	6′-4″	13						
✳A128	2	#5	STR	5′-5″	11	✳ B1	46	#4	STR	33′-11″	1,042
✳A129	2	#5	STR	4′-6″	9	✳ B2	46	#4	STR	39′-7″	1,216
✳A130	2	#5	STR	3′-7″	7	✳ B3	23	#5	STR	25′-0″	600
						✳ B4	23	#5	STR	52′-2″	1,251
						✳ B5	40	#5	STR	42′-3″	1,763
						B6	104	#5	STR	54′-10″	5,948
						B7	21	#5	STR	20′-0″	438
						B8	21	#5	STR	46′-0″	1,008
						✳ G1	2	#5	STR	35′-9″	75
						✳ K1	8	#8	2	14′-9″	315
						✳ K2	8	#8	3	20′-5″	436
						✳ K3	18	#6	STR	4′-4″	117
						✳ S1	30	#4	4	5′-11″	119
						✳ S2	30	#5	5	5′-10″	183

BAR TYPES







ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	✳EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	93.1		
POUR 2	129.8		
TOTALS✳✳	222.9	20,026	19,893

✳✳QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

GROOVING BRIDGE FLOORS

APPROACH SLABS	586	SQ.FT.
BRIDGE DECK	5,331	SQ.FT.
TOTAL	5,917	SQ.FT.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE BILL OF MATERIAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB
6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 01-2023

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STD. NO. BOM2

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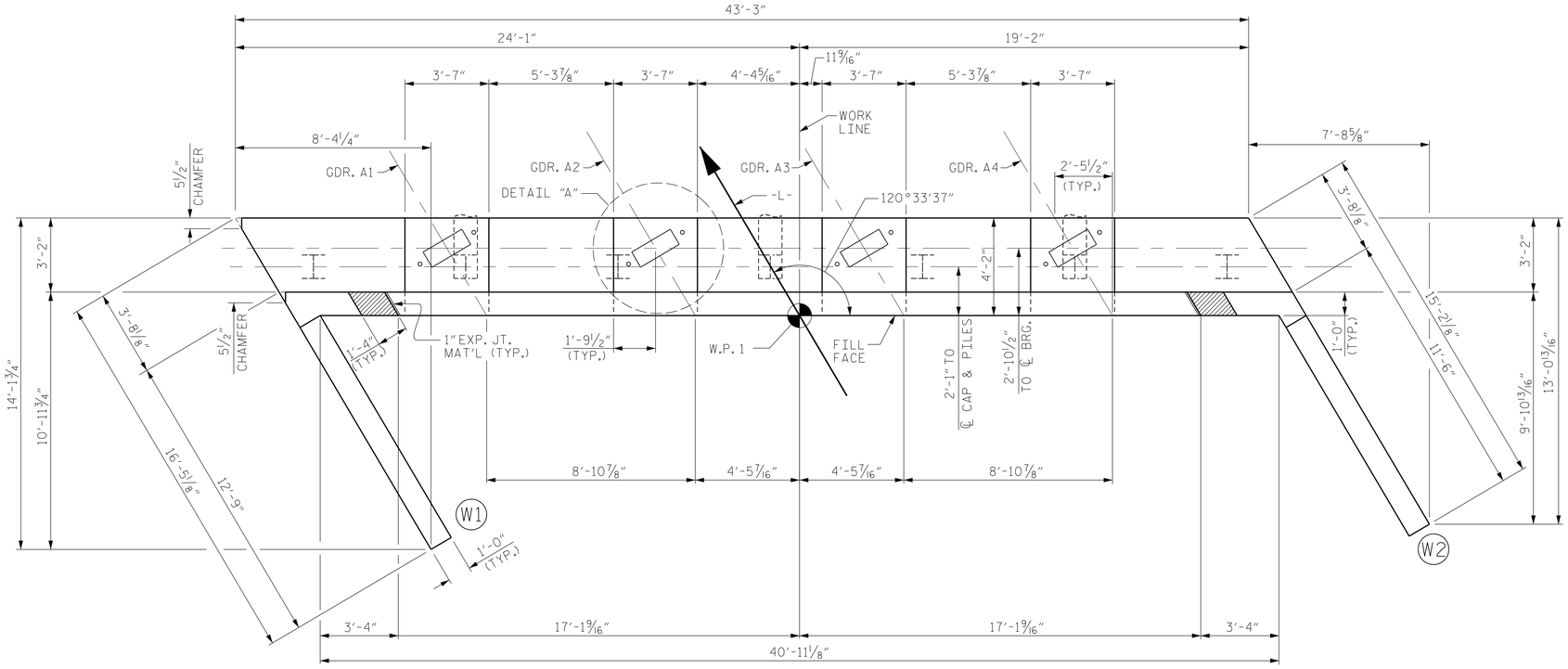


PLAN OF CAP

CONCRETE COLLARS FOR STEEL PILES NOT SHOWN FOR CLARITY.

NOTES:

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

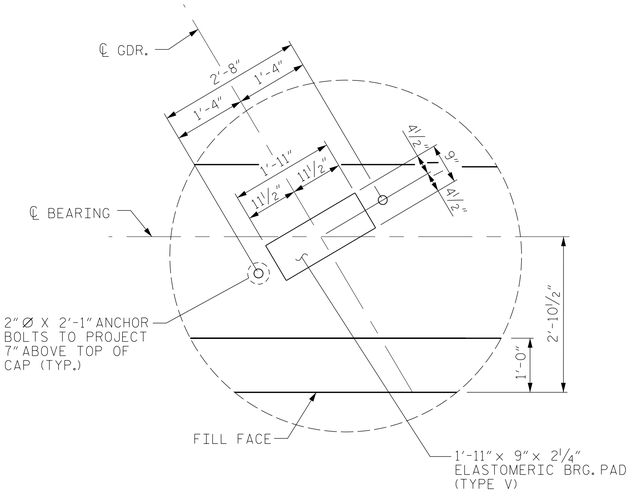
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE #5 "V" BARS IN BACKWALL SHALL BE PLACED 2" CLEAR FROM THE TOP OF BACKWALL.

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

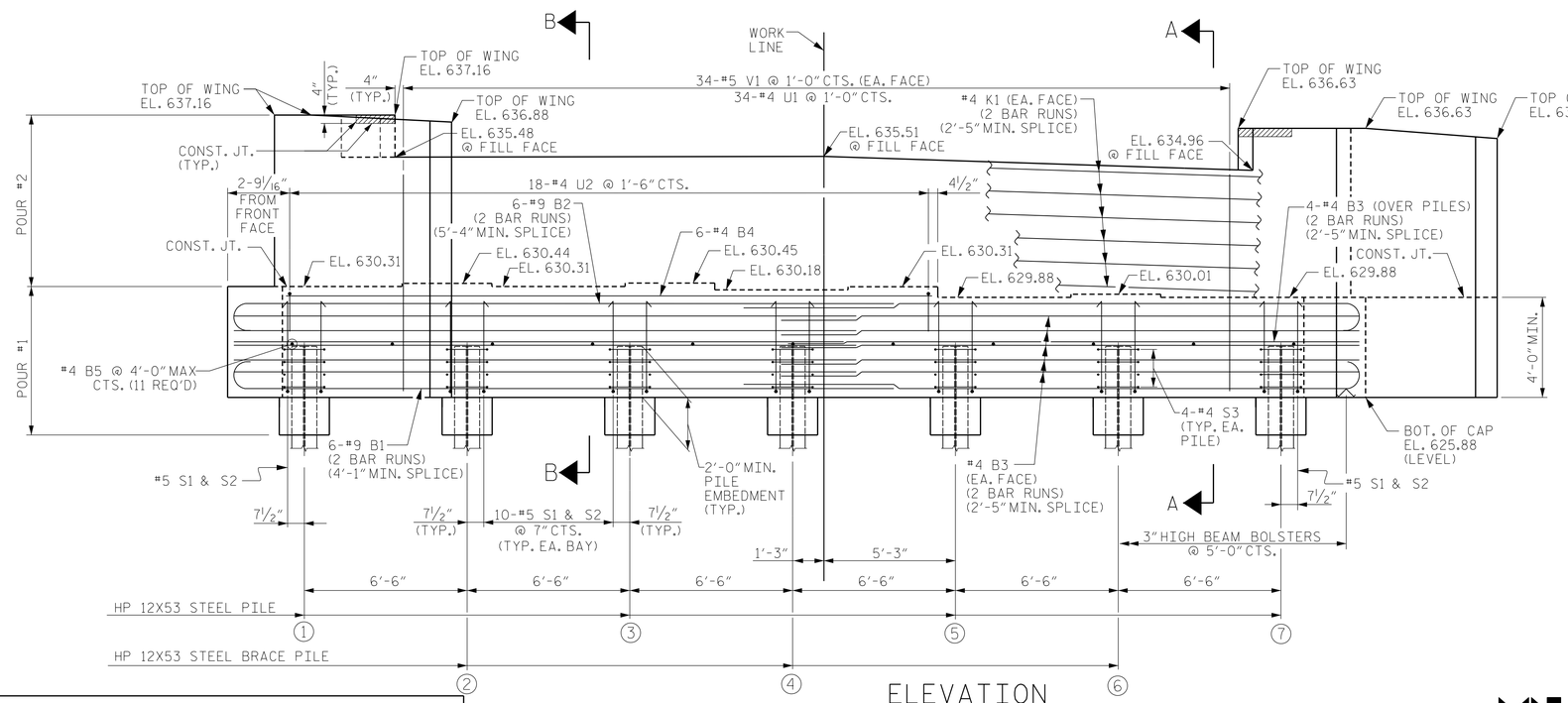
THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BRIDGE SEAT BUILDUPS, SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT A RATE OF 2%.

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



DETAIL "A"

(TYP. EACH GIRDER)



ELEVATION

FOR SECTIONS A-A AND B-B, SEE SHEET 3 OF 3
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 3 OF 3
(REINFORCING IN WING NOT SHOWN FOR CLARITY)

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

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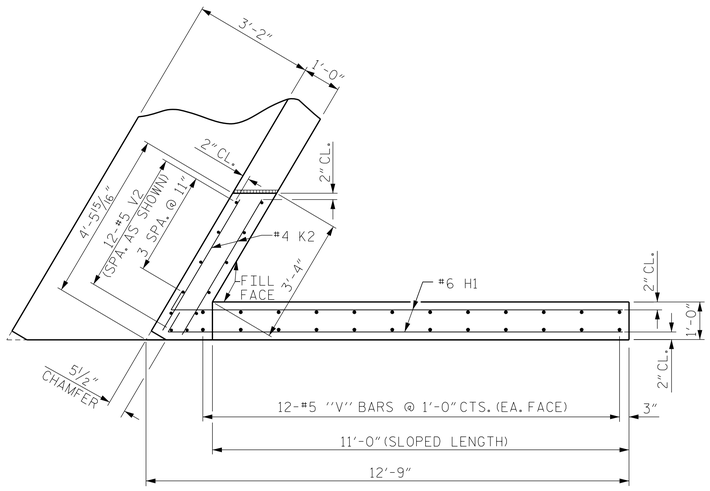
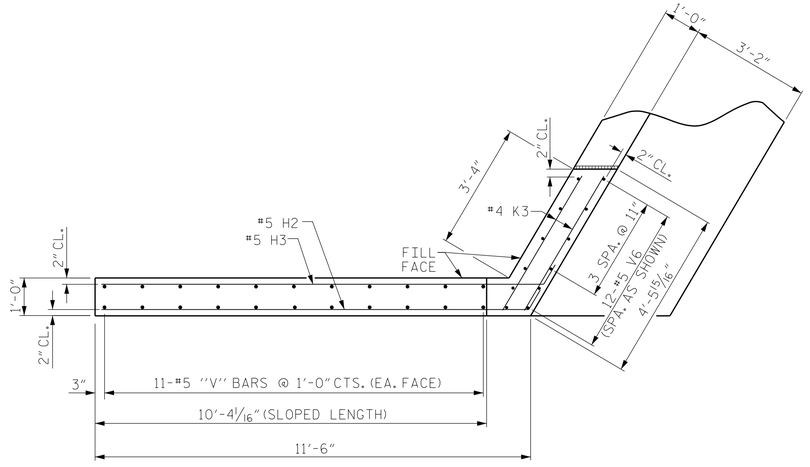
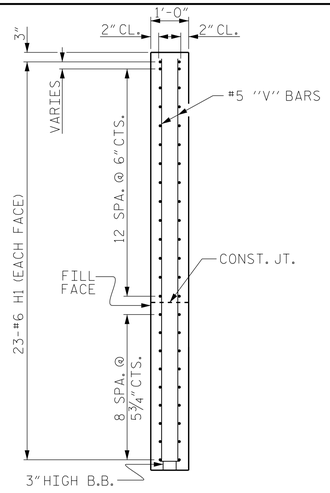


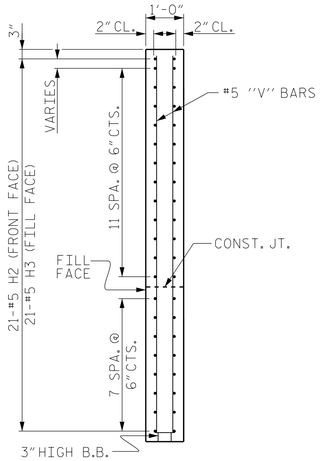
PLAN OF WING (W1)



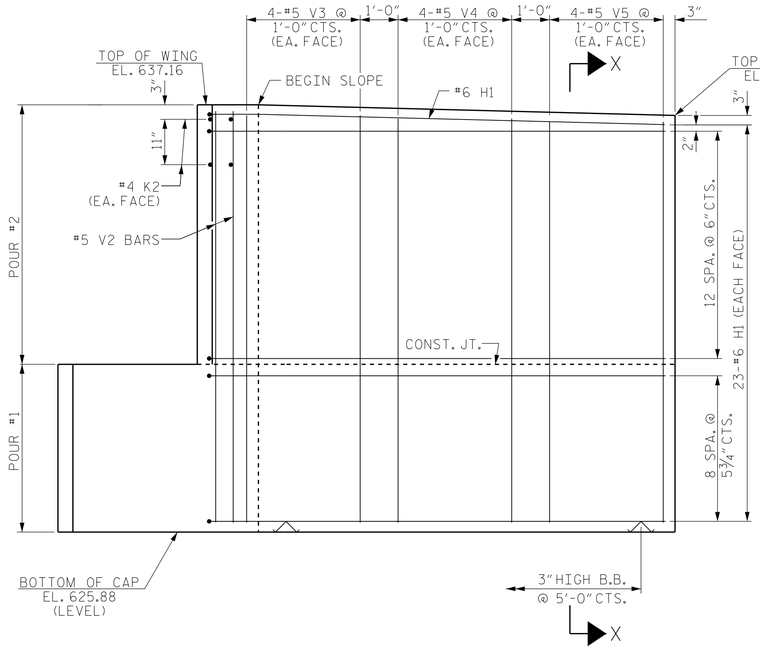
PLAN OF WING (W2)



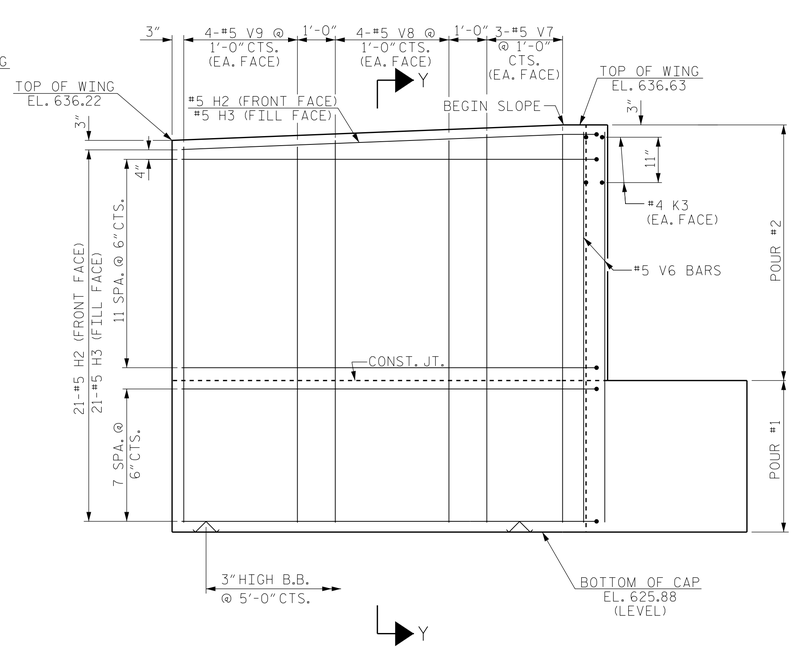
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 1
WING DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB
6/17/2024

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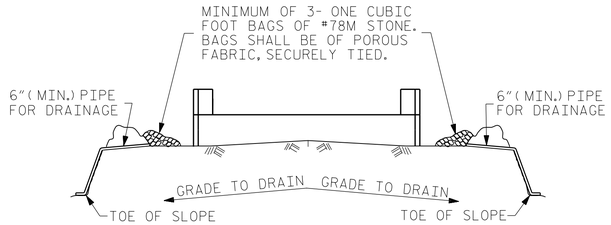
JLoftus

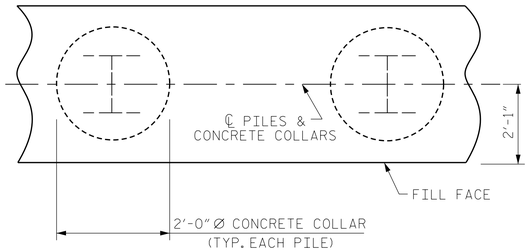


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

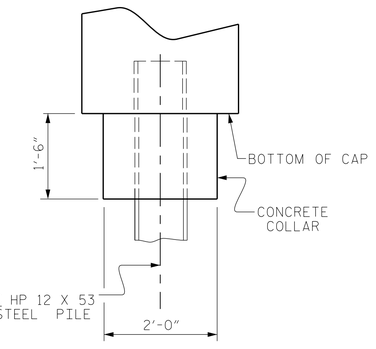
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

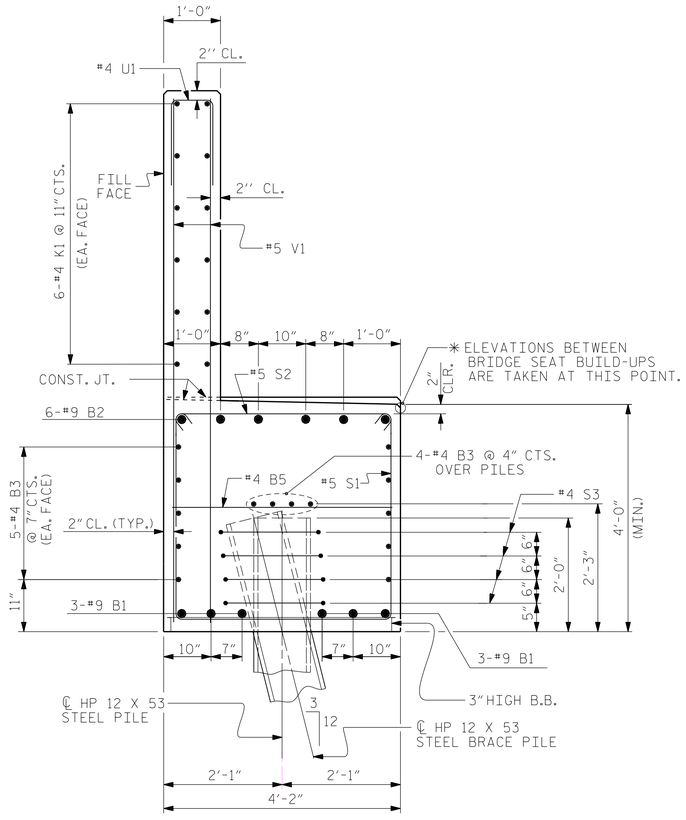


PLAN

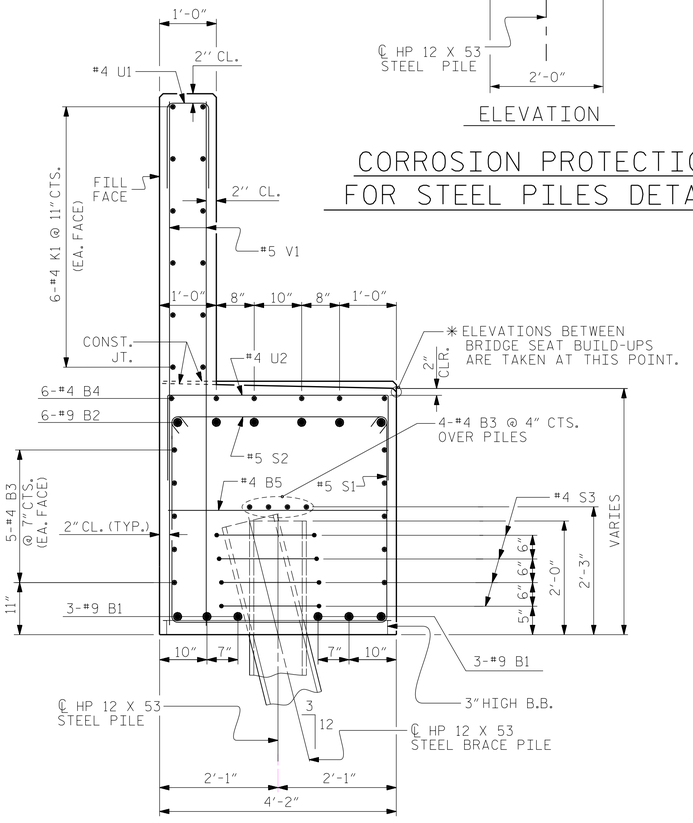


ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

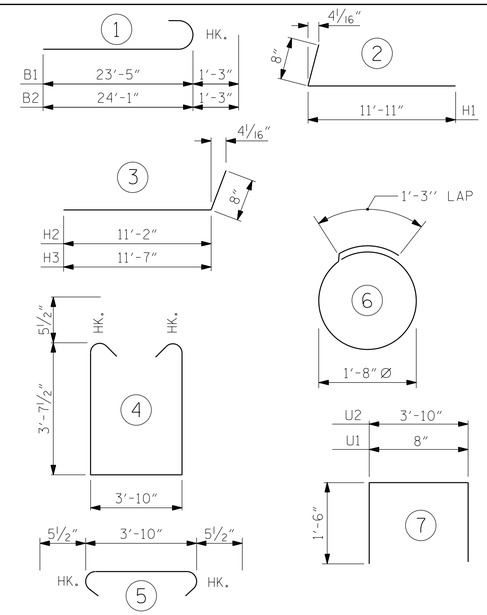


SECTION A-A



SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR END BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	24'-8"	1,006
B2	12	#9	1	25'-4"	1,034
B3	28	#4	STR	22'-8"	424
B4	6	#4	STR	25'-8"	103
B5	11	#4	STR	3'-10"	28
K1	24	#4	STR	22'-8"	363
K2	4	#4	STR	3'-10"	10
K3	4	#4	STR	4'-0"	11
H1	46	#6	2	12'-7"	869
H2	21	#5	3	11'-10"	259
H3	21	#5	3	12'-3"	268
S1	62	#5	4	12'-0"	776
S2	62	#5	5	4'-9"	307
S3	28	#4	6	6'-6"	122
U1	34	#4	7	3'-8"	83
U2	18	#4	7	6'-10"	82
V1	68	#5	STR	8'-8"	615
V2	12	#5	STR	10'-10"	136
V3	8	#5	STR	10'-9"	90
V4	8	#5	STR	10'-8"	89
V5	8	#5	STR	10'-7"	88
V6	12	#5	STR	10'-4"	129
V7	6	#5	STR	10'-3"	64
V8	8	#5	STR	10'-1"	84
V9	8	#5	STR	9'-11"	83

REINFORCING STEEL (FOR END BENT #1) 7,123 LBS.

CLASS A CONCRETE BREAKDOWN (FOR END BENT #1)

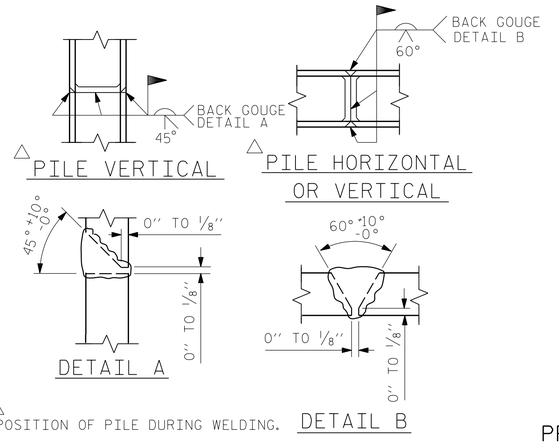
POUR #1 CAP, LOWER PART OF WINGS & COLLARS 33.3 C.Y.

POUR #2 UPPER PART OF WINGS & BACKWALL 16.8 C.Y.

TOTAL CLASS A CONCRETE 50.1 C.Y.

HP 12 X 53 STEEL PILES NO: 7
LIN. FT. = 525

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 7



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 ENGINEER PAUL L. JACOB

6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
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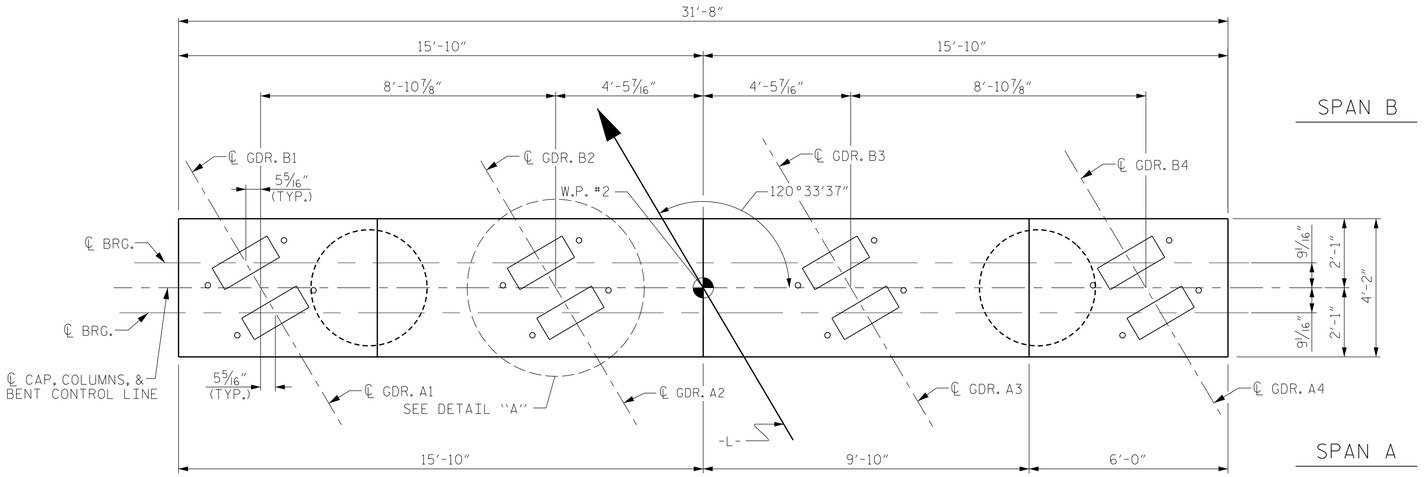
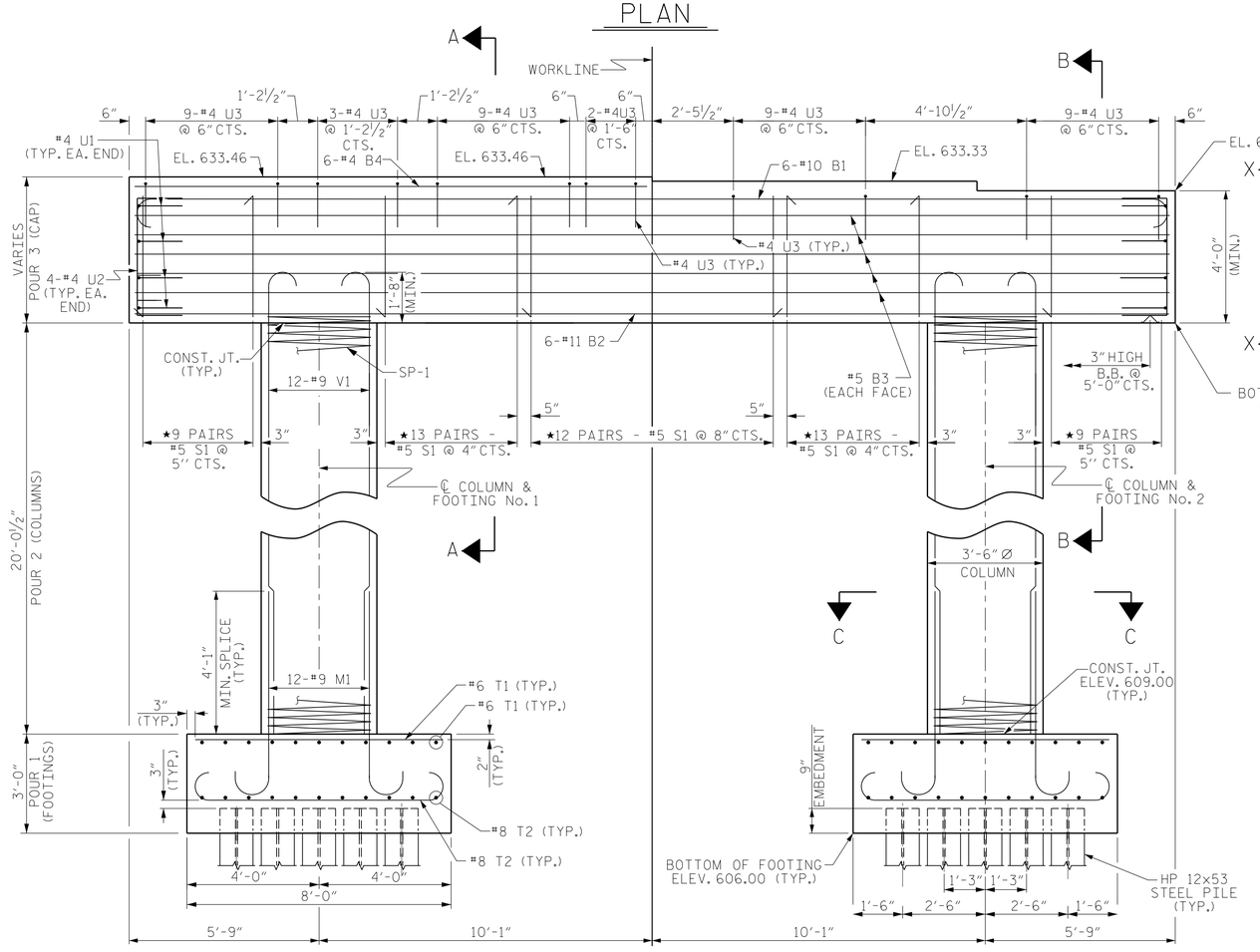


PLAN



ELEVATION

DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & FOOTING UNLESS OTHERWISE NOTED.

NOTES

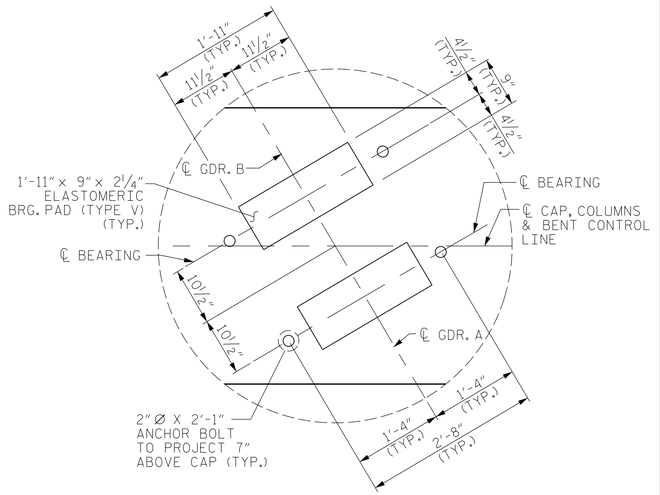
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

★ INVERT ALTERNATE STIRRUPS.

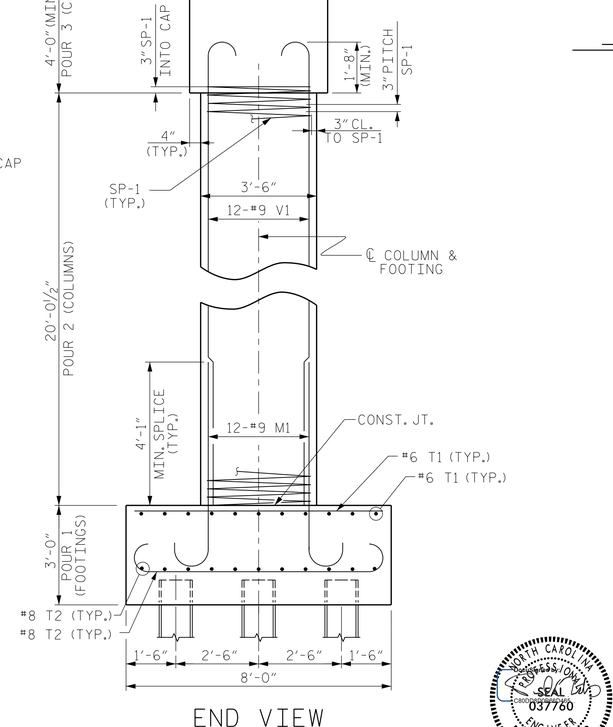
FOR PILE SPLICE DETAILS, SEE END BENT 1, SHEET 3 OF 3.

FOR "SECTION A-A", "SECTION B-B", "SECTION C-C", AND "END VIEW X-X", SEE SHEET 2 OF 2.



DETAIL "A"

(TYP. EACH GIRDER)



END VIEW

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 ENGINEER PAUL L. JACOB

6/17/2024

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 01-2023

moffatt & nichol
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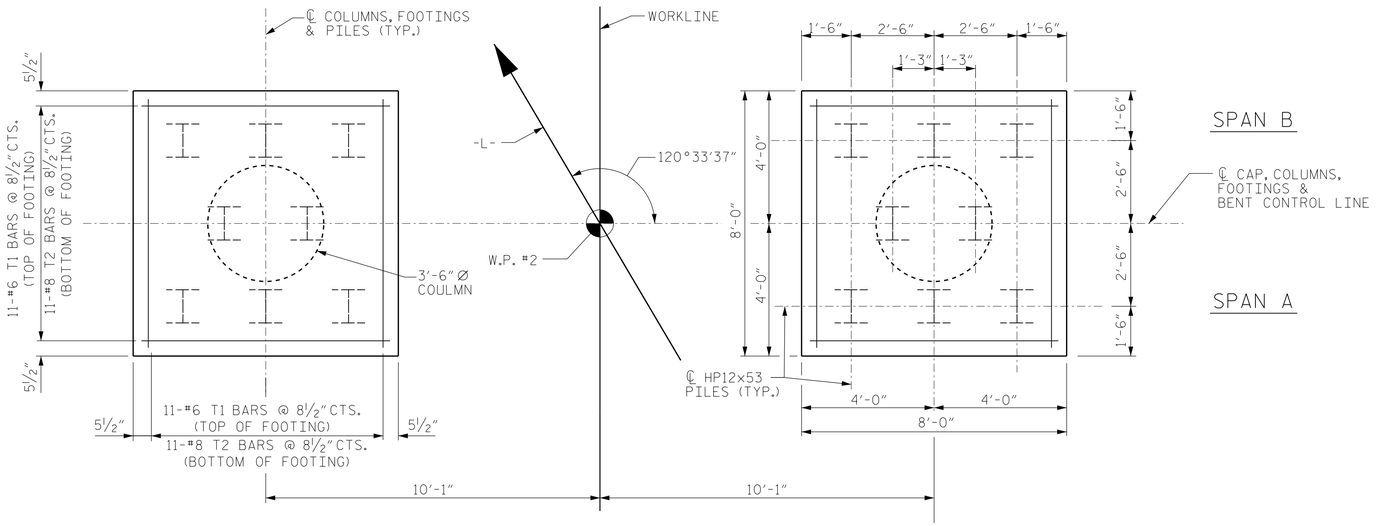
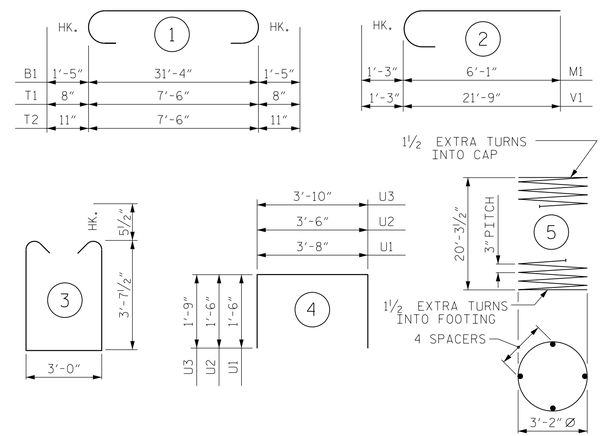
JLoftus



PLAN OF COLUMNS & FOOTINGS

NOTE: ALL DIMENSIONS ARE TYPICAL UNLESS OTHERWISE NOTED

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	34'-2"	882
B2	6	#11	STR	31'-4"	999
B3	10	#5	STR	31'-4"	327
B4	6	#4	STR	15'-6"	62
M1	24	#9	2	7'-4"	598
S1	112	#5	3	11'-2"	1,304
T1	44	#6	1	8'-10"	584
T2	44	#8	1	9'-4"	1,096
U1	8	#4	4	6'-8"	36
U2	8	#4	4	6'-6"	35
U3	41	#4	4	7'-4"	201
V1	24	#9	2	23'-0"	1,877

REINFORCING STEEL (FOR ONE BENT) 8,001 LBS.

SP-1	2	*	5	825'-2"	1,102

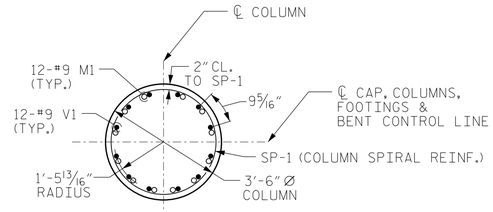
SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT) 1,102 LBS.

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

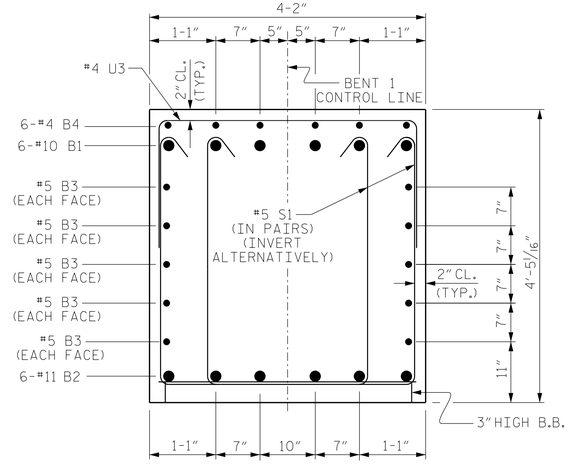
CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #1 (FOOTINGS)	14.3 C.Y.
POUR #2 (COLUMNS)	14.3 C.Y.
POUR #3 (CAP)	21.1 C.Y.
TOTAL CLASS A CONCRETE	49.7 C.Y.

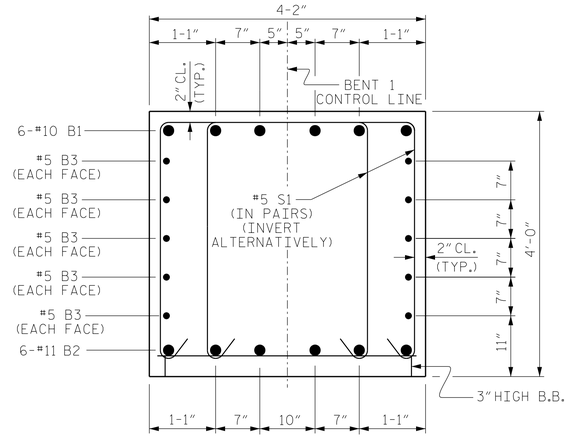
FOUNDATION EXCAVATION	LUMP SUM
HP 12x53 STEEL PILES	NO. 16 920 LIN. FT.
PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	16 EA.



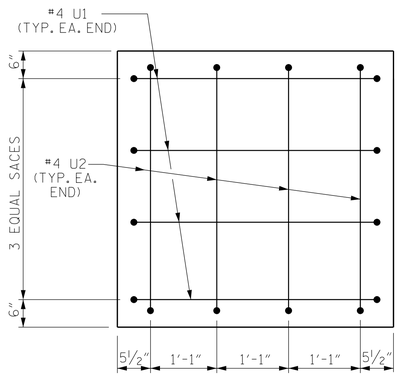
SECTION C-C



SECTION A-A



SECTION B-B



END OF CAP VIEW X-X

(TYPICAL BOTH ENDS)

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1
DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L. JACOB
6/17/2024

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
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DRAWN BY : J. LOFTUS DATE : 10-2022
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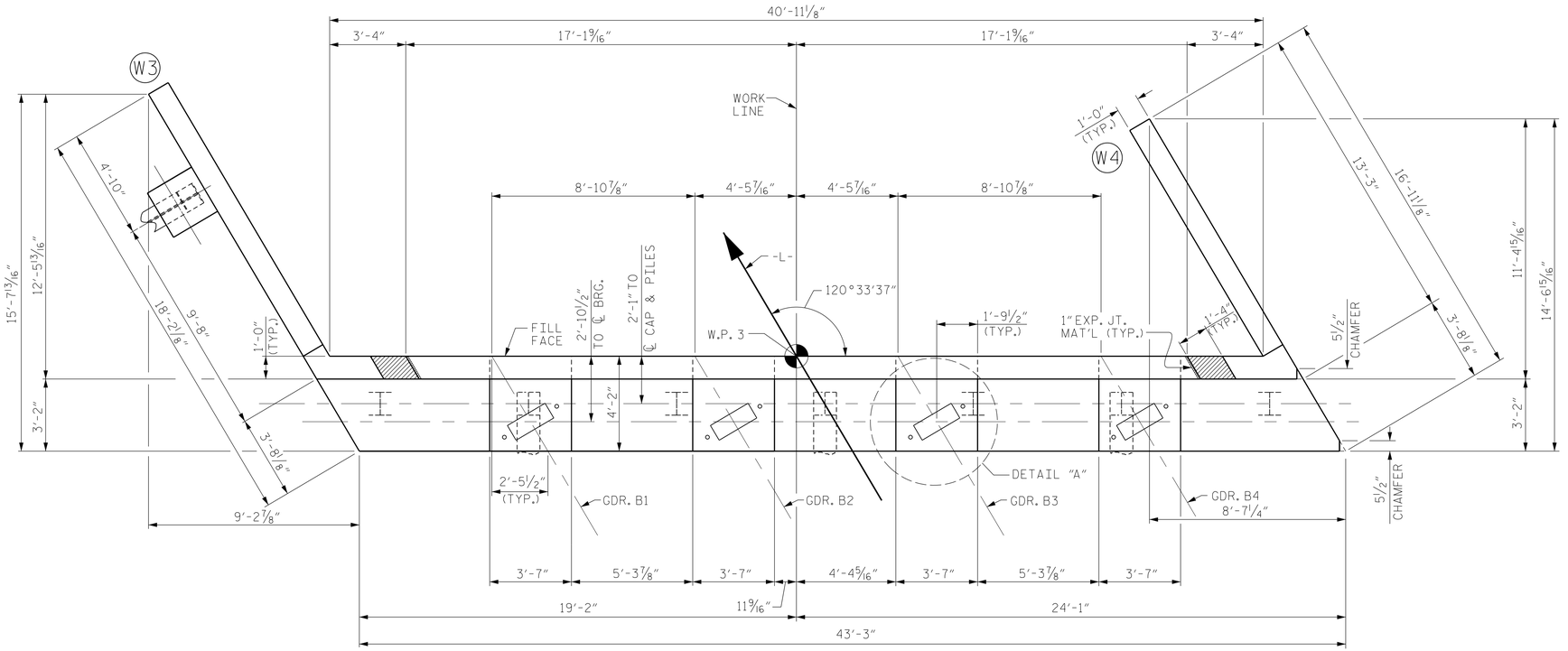
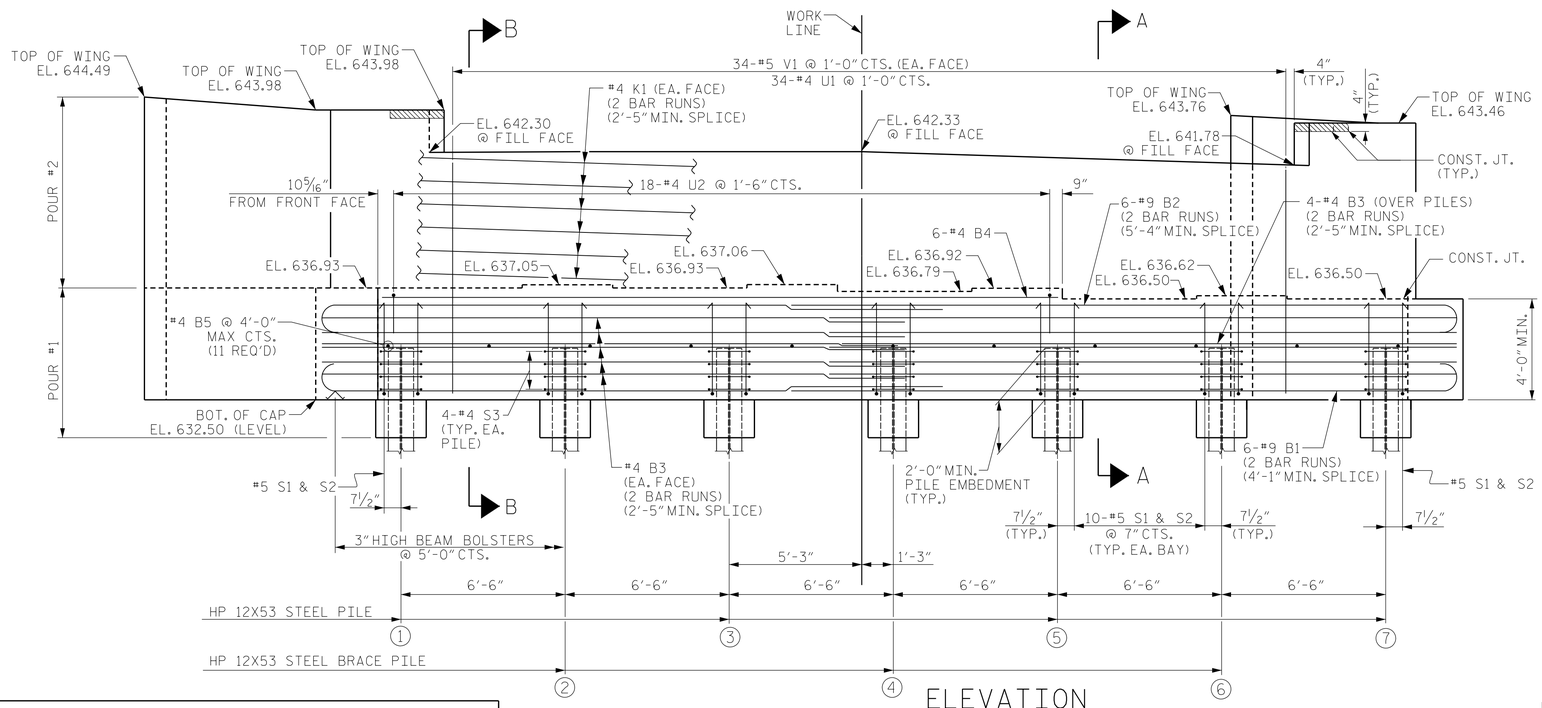
JLoftus



PLAN OF CAP

CONCRETE COLLARS FOR STEEL PILES NOT SHOWN FOR CLARITY.



ELEVATION

FOR SECTIONS A-A AND B-B, SEE SHEET 3 OF 3
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 3 OF 3
(REINFORCING IN WING AND WING BRACE PILE NOT SHOWN FOR CLARITY)

NOTES:

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

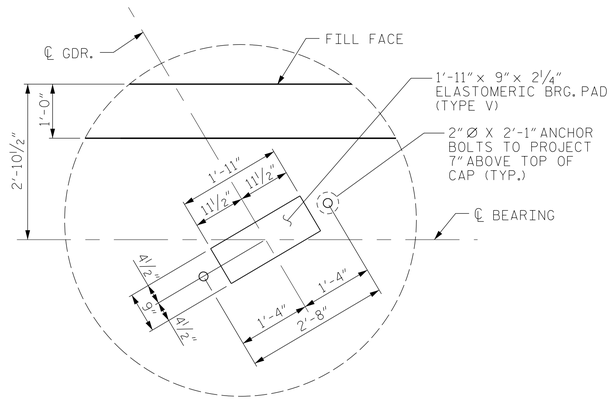
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

THE #5 "V" BARS IN BACKWALL SHALL BE PLACED 2" CLEAR FROM THE TOP OF BACKWALL.

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

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

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



DETAIL "A"

(TYP. EACH GIRDER)

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

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CHECKED BY :	P. JACOB	DATE :	12-2023
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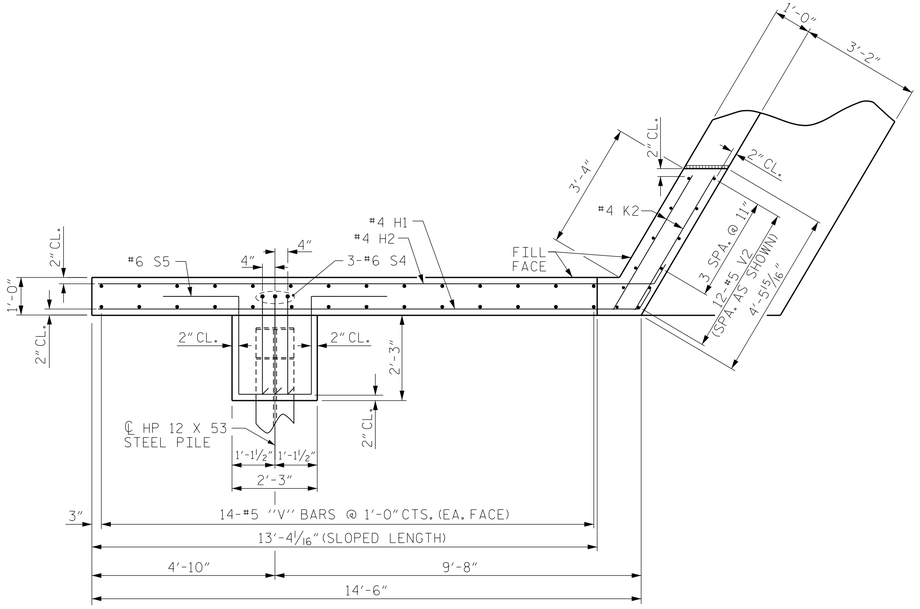
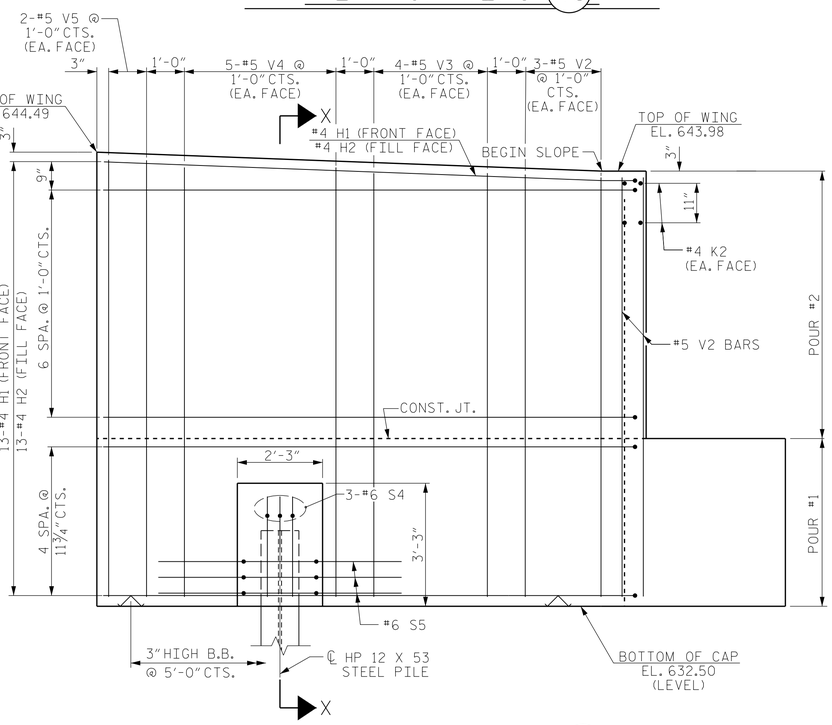
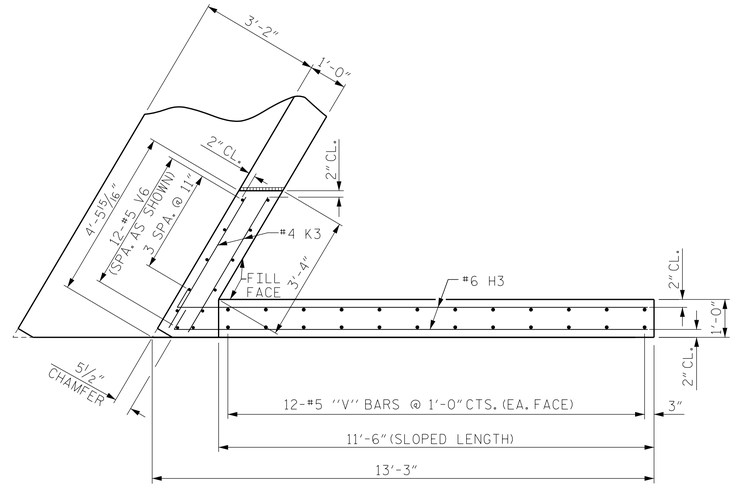


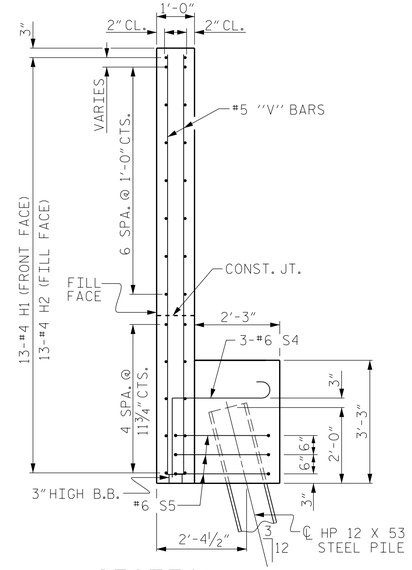
PLAN OF WING (W3)



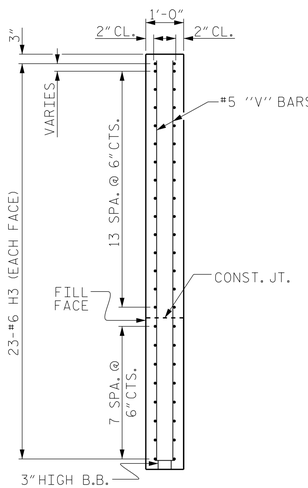
ELEVATION OF WING (W3)



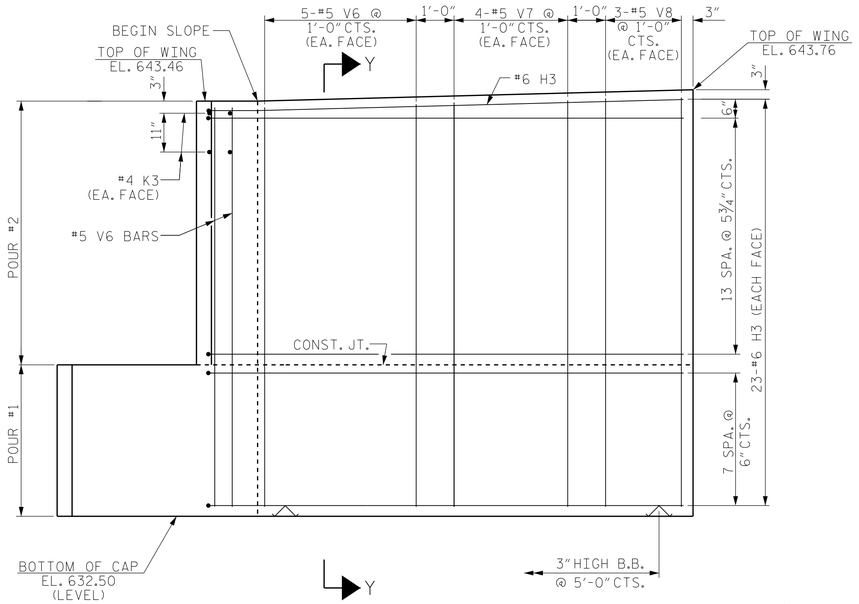
PLAN OF WING (W4)



SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W4)

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WING DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			33

WING DETAILS

DRAWN BY : J. LOFTUS DATE : 10-2022
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DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 01-2023

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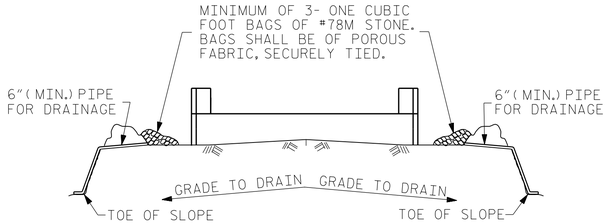
jloftus

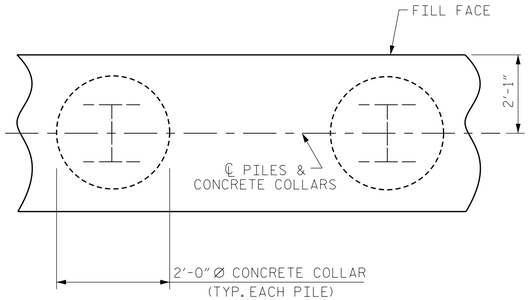


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

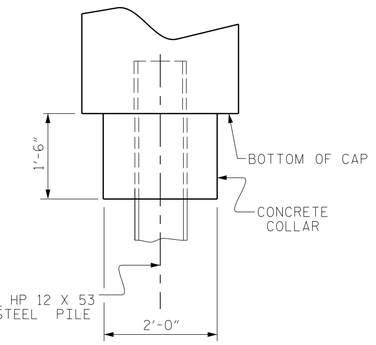
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

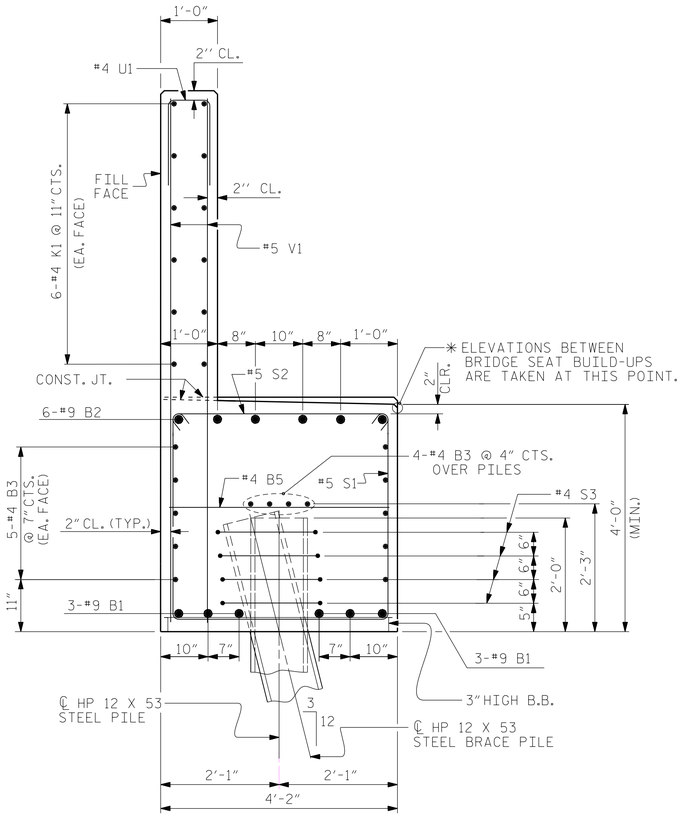


PLAN

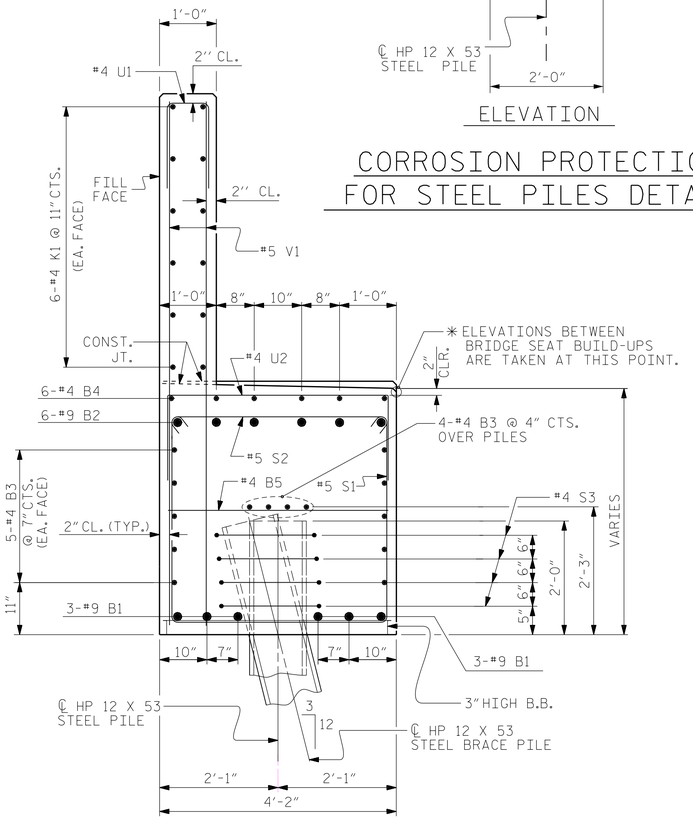


ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

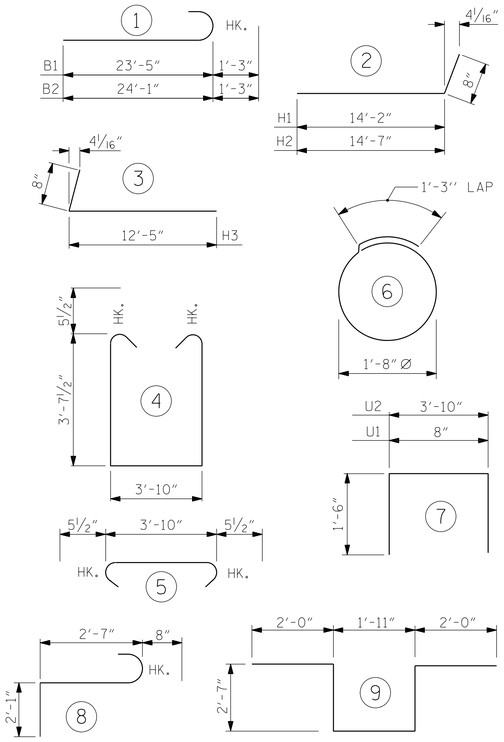


SECTION A-A



SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL FOR END BENT #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	24'-8"	1,006
B2	12	#9	1	25'-4"	1,034
B3	28	#4	STR	22'-8"	424
B4	6	#4	STR	26'-7"	107
B5	11	#4	STR	3'-10"	28
K1	24	#4	STR	22'-8"	363
K2	4	#4	STR	4'-0"	11
K3	4	#4	STR	3'-10"	10
H1	13	#4	2	14'-10"	129
H2	13	#4	2	15'-3"	132
H3	46	#6	3	13'-1"	904
S1	62	#5	4	12'-0"	776
S2	62	#5	5	4'-9"	307
S3	28	#4	6	6'-6"	122
S4	3	#6	8	5'-4"	24
S5	3	#6	9	11'-1"	50
U1	34	#4	7	3'-8"	83
U2	18	#4	7	6'-10"	82
V1	68	#5	STR	8'-10"	626
V2	18	#5	STR	11'-0"	207
V3	8	#5	STR	11'-2"	93
V4	10	#5	STR	11'-4"	118
V5	4	#5	STR	11'-6"	48
V6	22	#5	STR	10'-6"	241
V7	8	#5	STR	10'-8"	89
V8	6	#5	STR	10'-9"	67

REINFORCING STEEL (FOR END BENT #2) 7,081 LBS.

CLASS A CONCRETE BREAKDOWN (FOR END BENT #2)

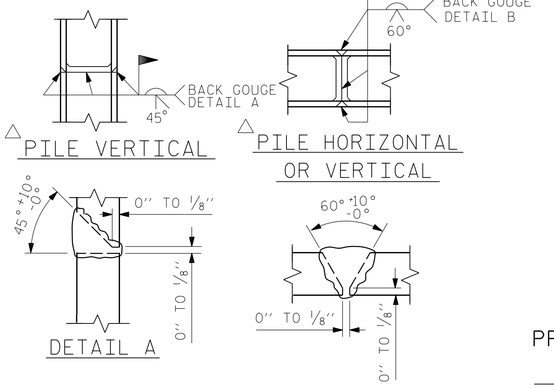
POUR #1 CAP, LOWER PART OF WINGS & COLLARS 34.5 C.Y.

POUR #2 UPPER PART OF WINGS & BACKWALL 18.8 C.Y.

TOTAL CLASS A CONCRETE 53.3 C.Y.

HP 12 X 53 STEEL PILES NO: 8
LIN. FT.= 600

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 8



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2 DETAILS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB

6/17/2024

DRAWN BY : J. LOFTUS DATE : 10-2022
CHECKED BY : P. JACOB DATE : 12-2023
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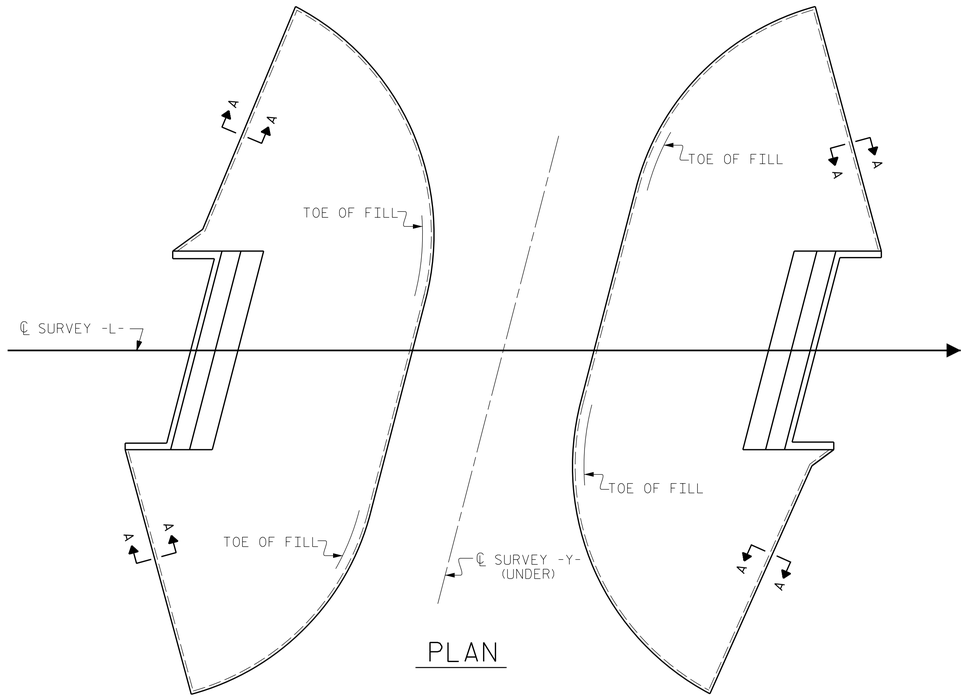
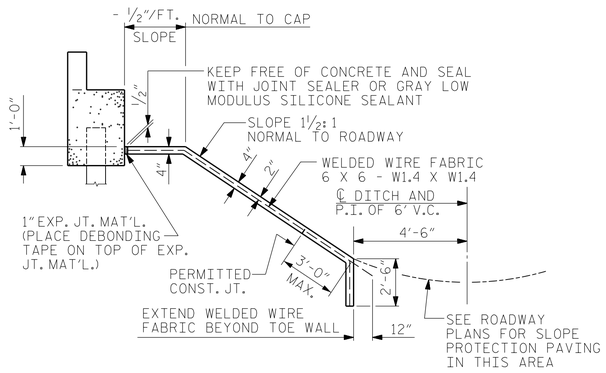
JLoftus



PLAN



SECTION ALONG ℄ SURVEY WHEN FILL CATCHES IN DITCH

GENERAL NOTES

STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT.

MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS.

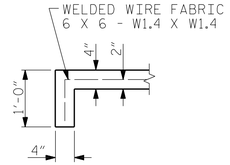
FOR BERM WIDTH, SEE GENERAL DRAWING.

SLOPE PROTECTION SHALL CONSIST OF 4'' POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS ''B''. THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60'' WIDE.

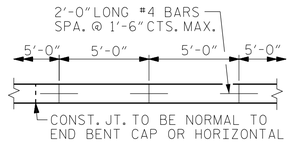
SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE ''POURING DETAIL'' WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE ''OPTIONAL POURING DETAIL'' WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6''. THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

BRIDGE @ STA. 30+17.89 -L-	4" INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	433	780
END BENT 2	687	1237

* QUANTITY SHOWN IS BASED ON 5' POURS.

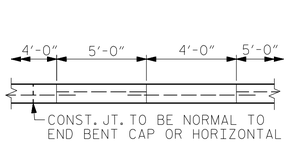


SECTION A-A



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



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

OPTIONAL POURING DETAIL

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L. JACOB

6/17/2024

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-29
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY : J. WEIGER	DATE : 03/2022
CHECKED BY : J. LOFTUS	DATE : 01/2023
DRAWN BY : ELR 5/92	REV. 12/21/11 MAA/GM
CHECKED BY : GRP 6/92	REV. 1/16 MAA/TMC
	REV. 12/17 MAA/THC

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STD. NO. SP1 (SHT 6)

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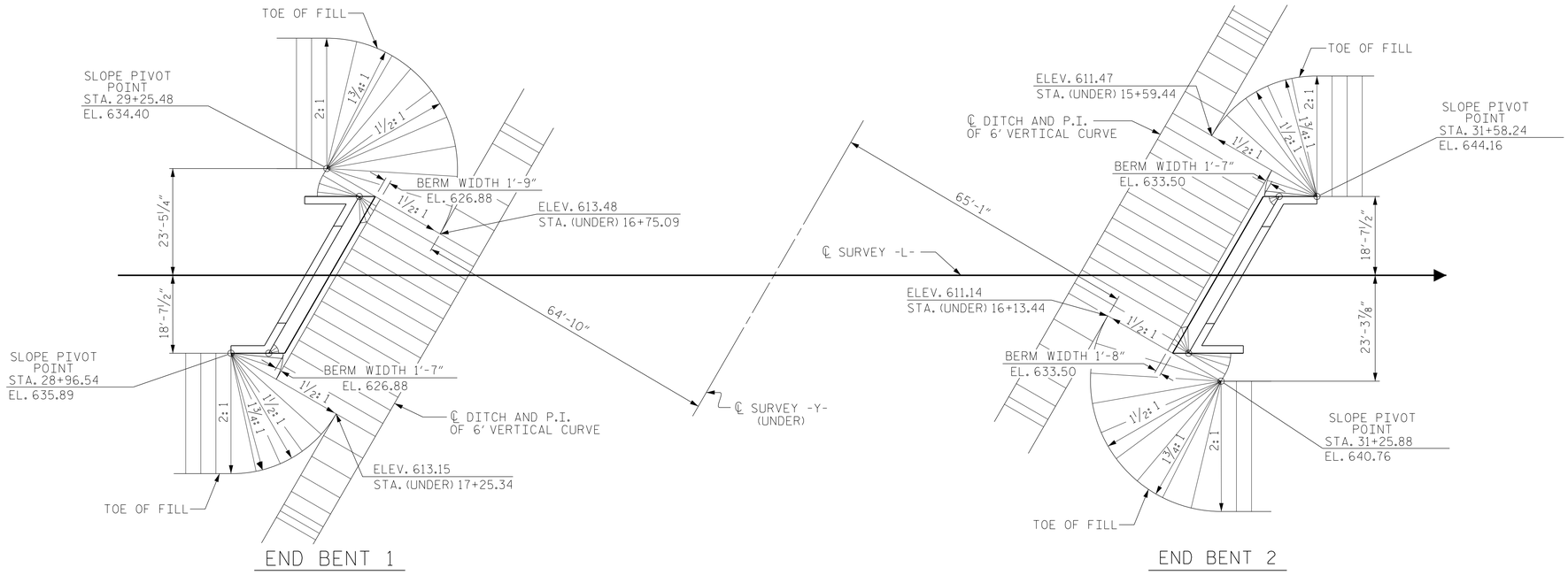
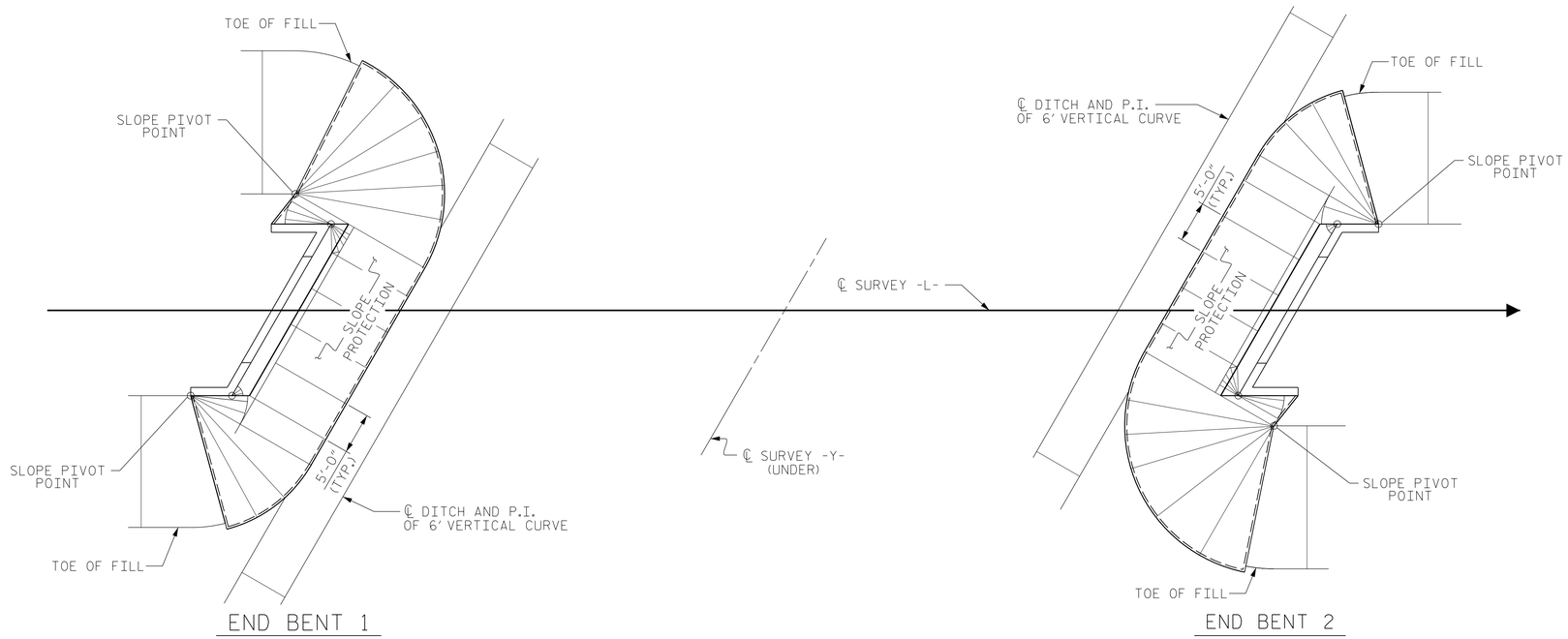
jloftus



PLAN - GRADING



PLAN - CONCRETE PLACEMENT

DRAWN BY : J. WEIGER DATE : 02-2022
CHECKED BY : P. JACOB DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 01-2023

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 037760 PAUL L. JACOB
6/17/2024

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PROJECT NO. BR-0097
ROCKINGHAM COUNTY
STATION: 30+17.89 -L-
SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-30
1			3			TOTAL SHEETS
2			4			33

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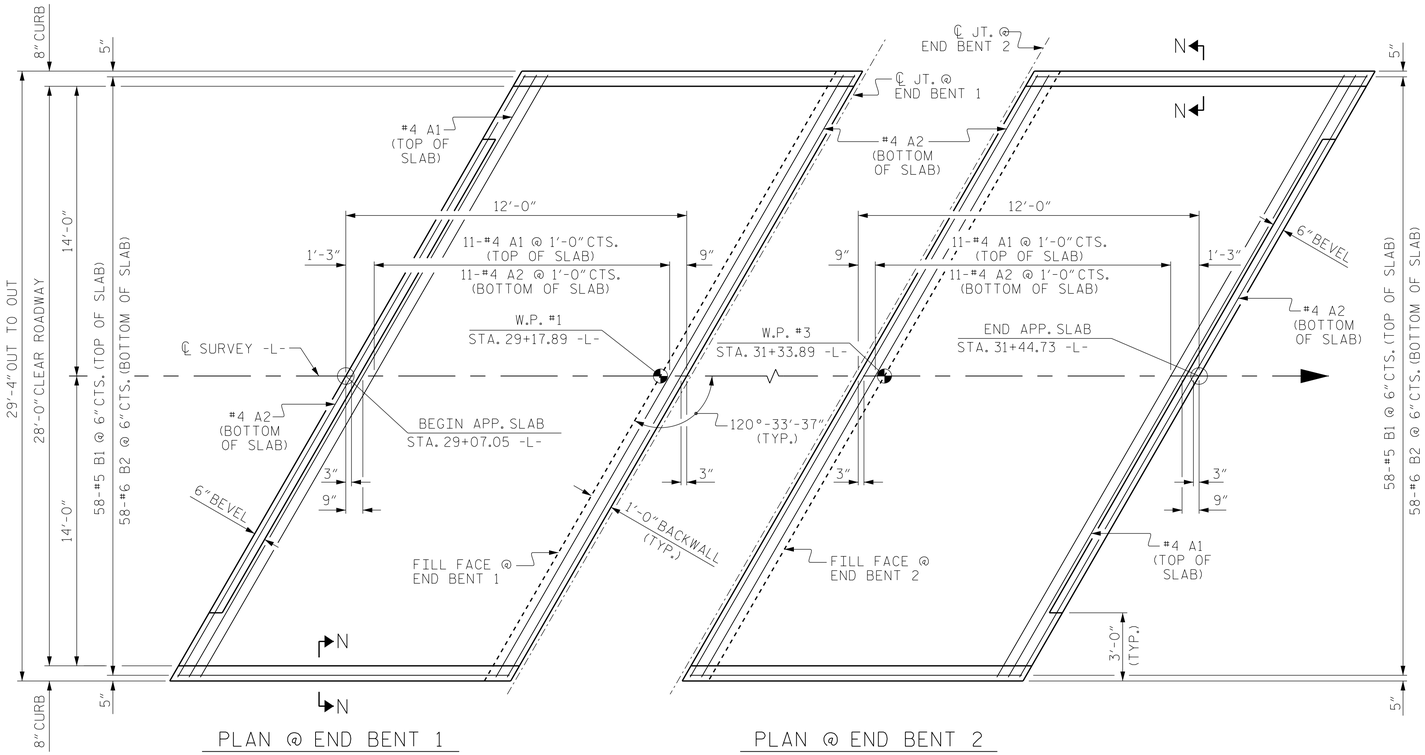
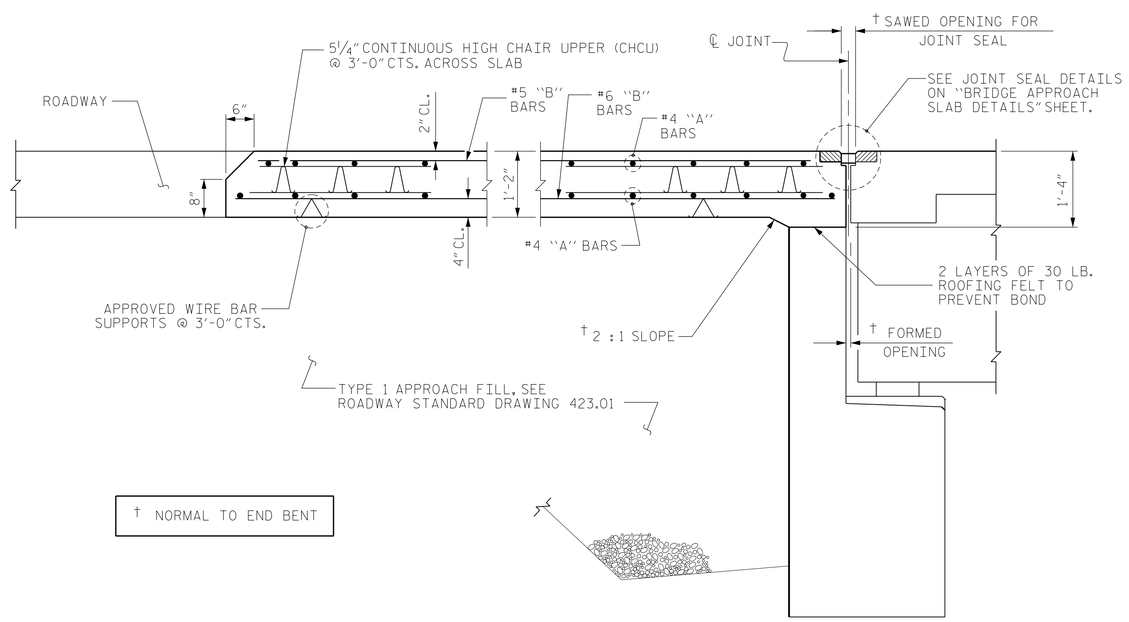
jloftus



DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE 1 - STANDARD APPROACH FILL)

NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY PLANS.

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

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

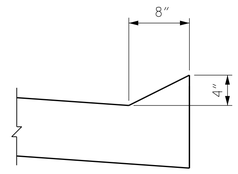
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

WITH FOAM JOINT SEAL

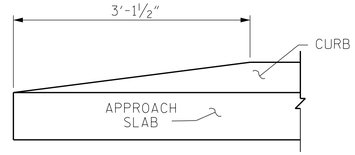
FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

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

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

BILL OF MATERIAL

APPROACH SLAB AT BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	12	#4	STR	33'-7"	269
A2	13	#4	STR	33'-7"	292
✳B1	58	#5	STR	10'-10"	655
B2	58	#6	STR	11'-8"	1,016
REINFORCING STEEL				LBS.	1,308
✳EPOXY COATED REINFORCING STEEL				LBS.	924
CLASS AA CONCRETE				C. Y.	15.4

APPROACH SLAB AT BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	12	#4	STR	33'-7"	269
A2	13	#4	STR	33'-7"	292
✳B1	58	#5	STR	10'-10"	655
B2	58	#6	STR	11'-8"	1,016
REINFORCING STEEL				LBS.	1,308
✳EPOXY COATED REINFORCING STEEL				LBS.	924
CLASS AA CONCRETE				C. Y.	15.4

SPLICE LENGTHS

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

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L JACOB

6/17/2024

REVISIONS						SHEET NO.
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2			4			33

DRAWN BY : J. WEIGER DATE : 02-2022
CHECKED BY : J. LOFTUS DATE : 12-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 01-2023

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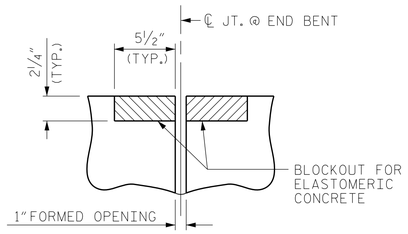
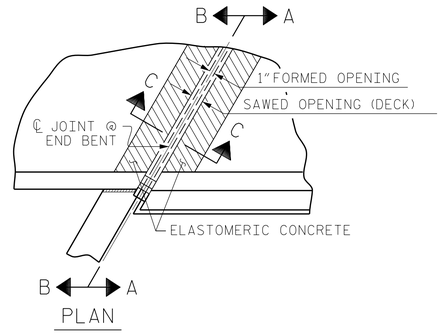
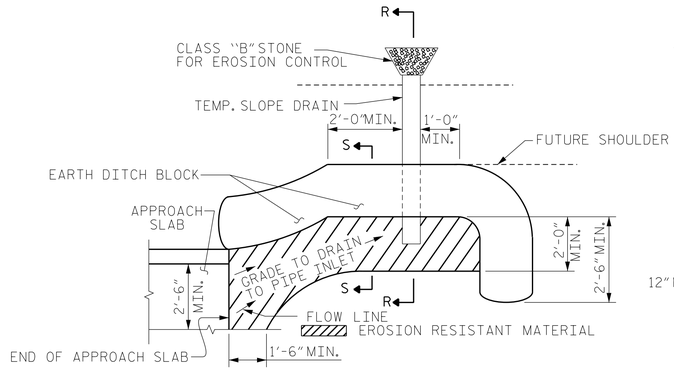


SECTION C-C

FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC
CONCRETE DIMENSIONS)

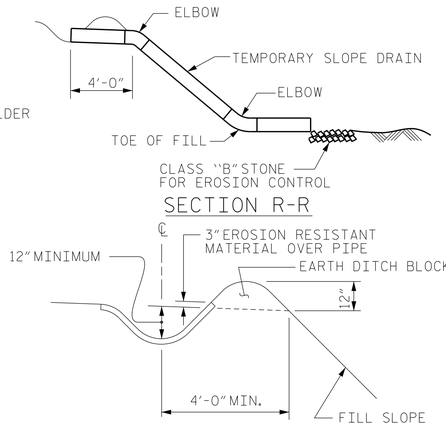


PLAN



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

PLAN VIEW

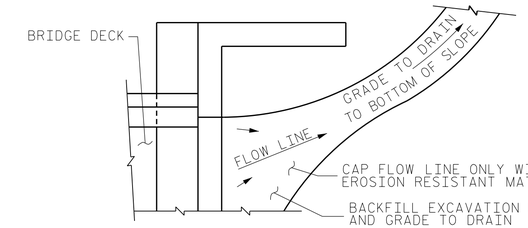


SECTION R-R

SECTION S-S

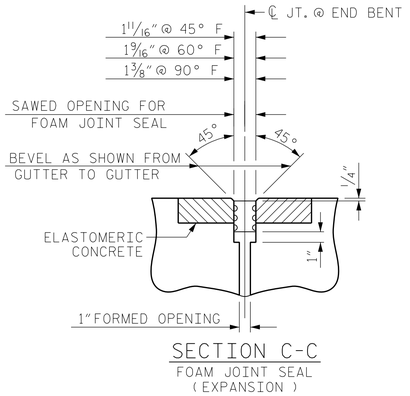
TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



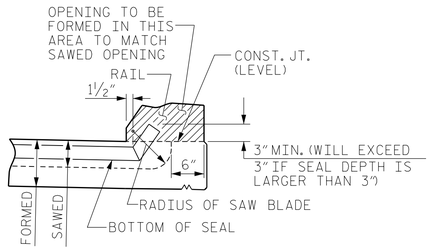
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL

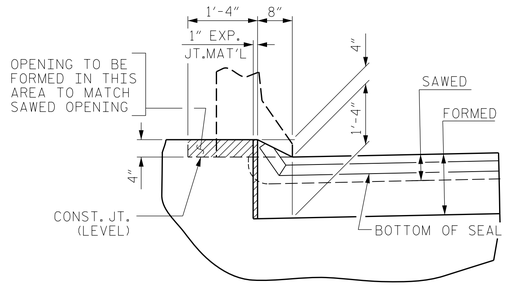


SECTION C-C

FOAM JOINT SEAL
(EXPANSION)



SECTION 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.

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	5.6
2	5.6
TOTAL	11.2

* BASED ON THE MINIMUM BLOCKOUT SHOWN.

PROJECT NO. BR-0097

ROCKINGHAM COUNTY

STATION: 30+17.89 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH
SLAB DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 037760 ENGINEER PAUL L JACOB

6/17/2024

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : J. WEIGER DATE : 02-2022
CHECKED BY : J. LOFTUS DATE : 01-2023
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 01-2023

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JLoftus

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 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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