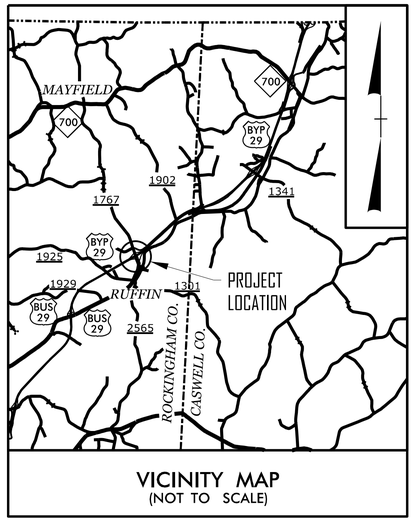
TIP PROJECT: BR–0098

CONTRACT: C205116

STRUCTURES



VICINITY MAP
(NOT TO SCALE)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

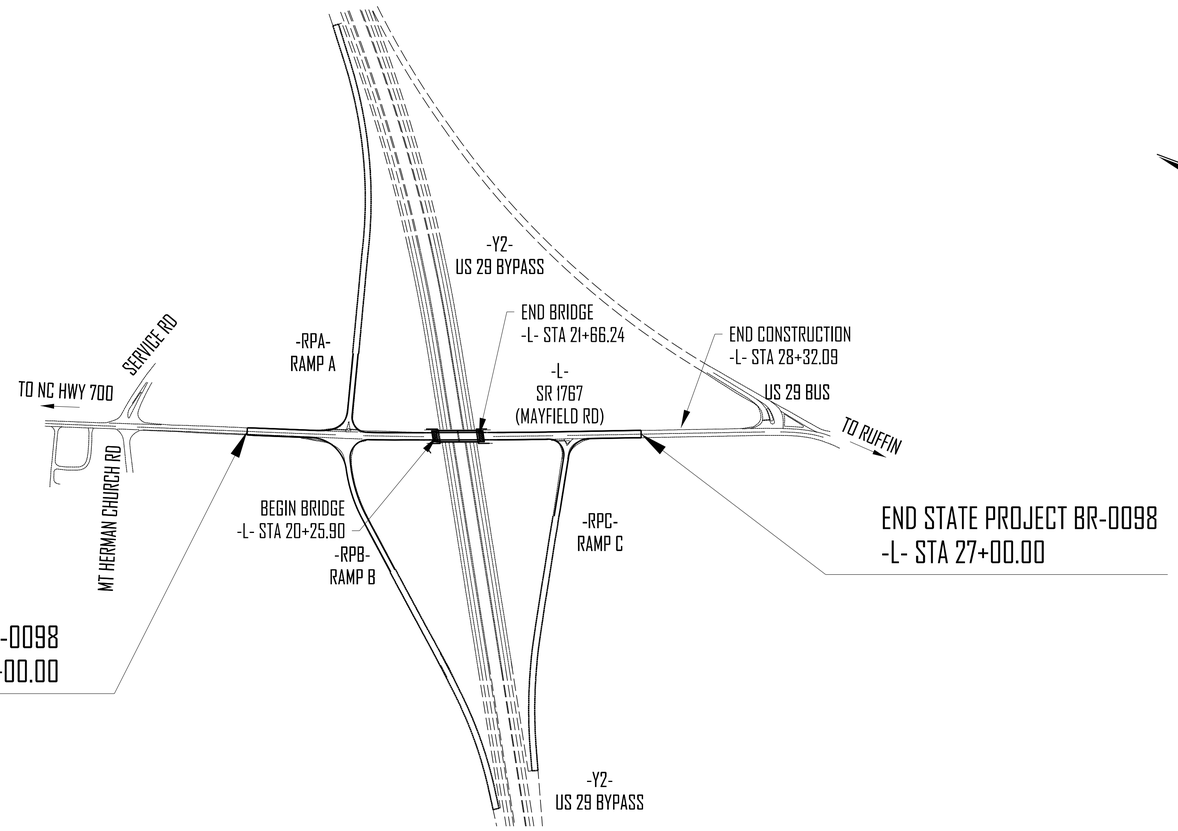
ROCKINGHAM COUNTY

LOCATION: REPLACE BRIDGE NO. 780183 ON US 29 (BUS) OVER US 29 BYPASS

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR–0098	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
67098.1.1	N/A	PE
67098.2.1	N/A	ROW
67098.2.2	N/A	UTIL
67098.3.1	N/A	CONST



DESIGN DATA

ADT 2023 = 1,600
ADT 2043 = 1,800
K = 8 %
D = 55 %
T = 3 % *
V = 45 MPH
* TTST =1% DUAL 2%
FUNC CLASS =
MINOR ARTERIAL
SUB–REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BR–0098 = 0.220 MILES
LENGTH STRUCTURE TIP PROJECT BR–0098 = 0.026 MILES
TOTAL LENGTH TIP PROJECT BR–0098 = 0.246 MILES

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:
OCTOBER 14, 2024

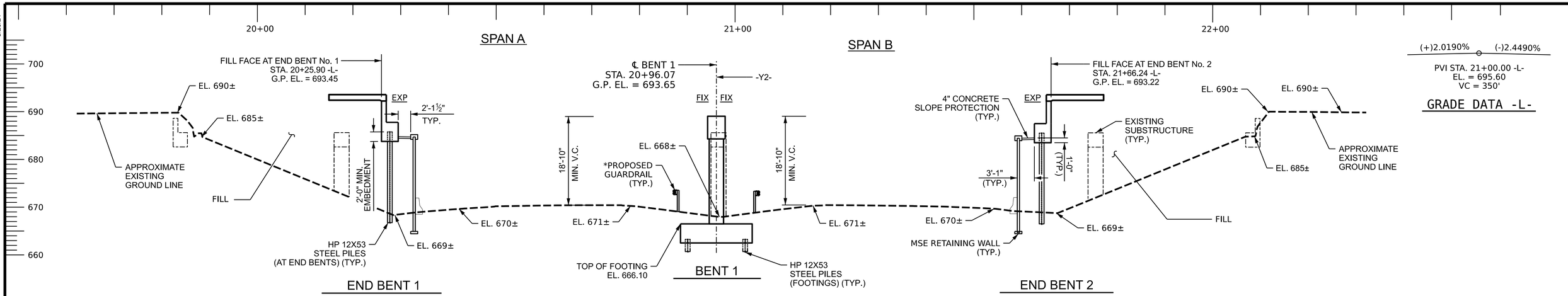
LETTING DATE:
OCTOBER 21, 2025

TRENT HUFFMAN, P.E.
PROJECT ENGINEER

SANTIAGO AGUILAR, P.E.
PROJECT STRUCTURAL ENGINEER

DAVID STUTTS, P.E.
NCDOT CONTACT

8/26/21



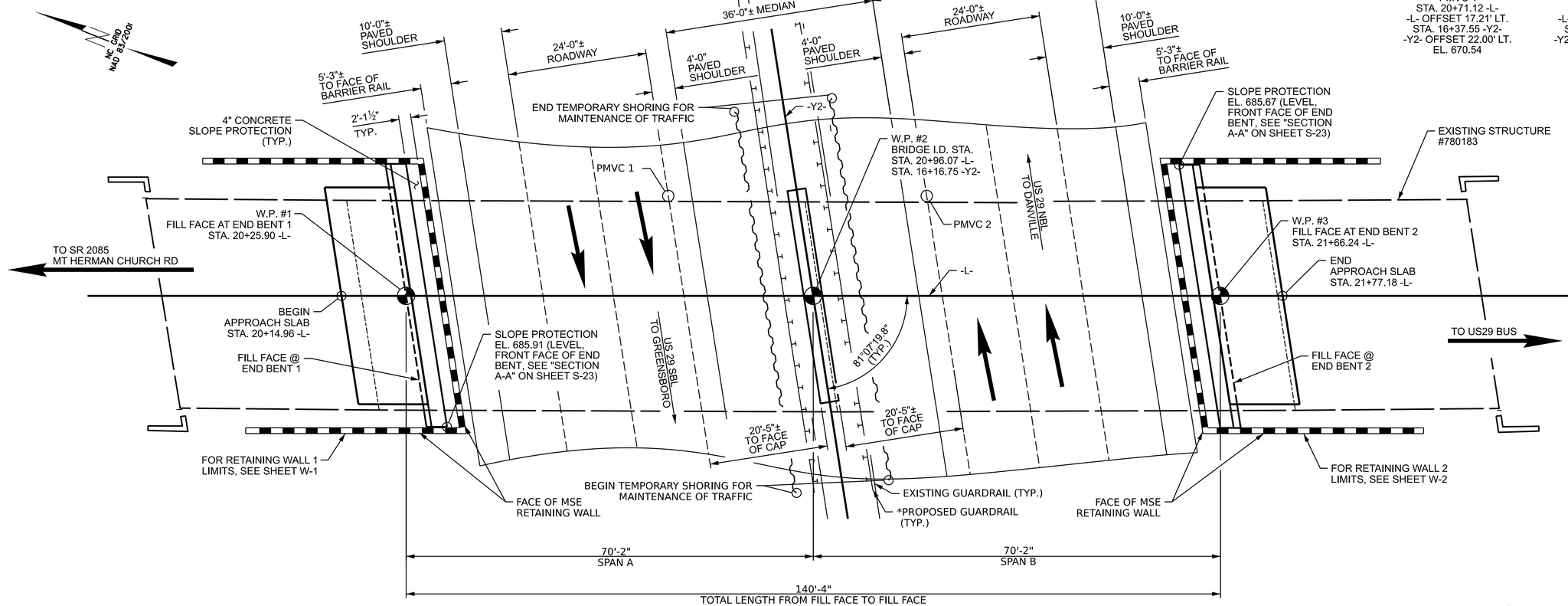
SECTION ALONG -L-

SECTION TAKEN AT RIGHT ANGLES TO END BENTS AND INTERIOR BENT
*ROADWAY DETAIL AND PAY ITEM

POINTS OF MIN. VERTICAL CLEARANCE

PMVC 1
STA. 20+71.12 -L-
-L- OFFSET 17.21' LT.
STA. 16+37.55 -Y2-
-Y2- OFFSET 22.00' LT.
EL. 670.54

PMVC 2
STA. 21+15.65 -L-
-L- OFFSET 17.21' LT.
STA. 16+30.68 -Y2-
-Y2- OFFSET 22.00' RT.
EL. 670.44



PLAN

PILES ARE NOT SHOWN IN PLAN VIEW FOR CLARITY
END BENTS AND INTERIOR BENT ARE PARALLEL

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 4 REPLACES BRIDGE No. 780183

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE OVER US 29 (-Y2-)
ON SR 1767 BETWEEN
SR 2085 AND US 29 BUSINESS
(-L-)

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

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

moffatt & nichol
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RALEIGH, NORTH CAROLINA 27609
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NC LICENSE NO.: F-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A7B1F64402...
9/5/2025

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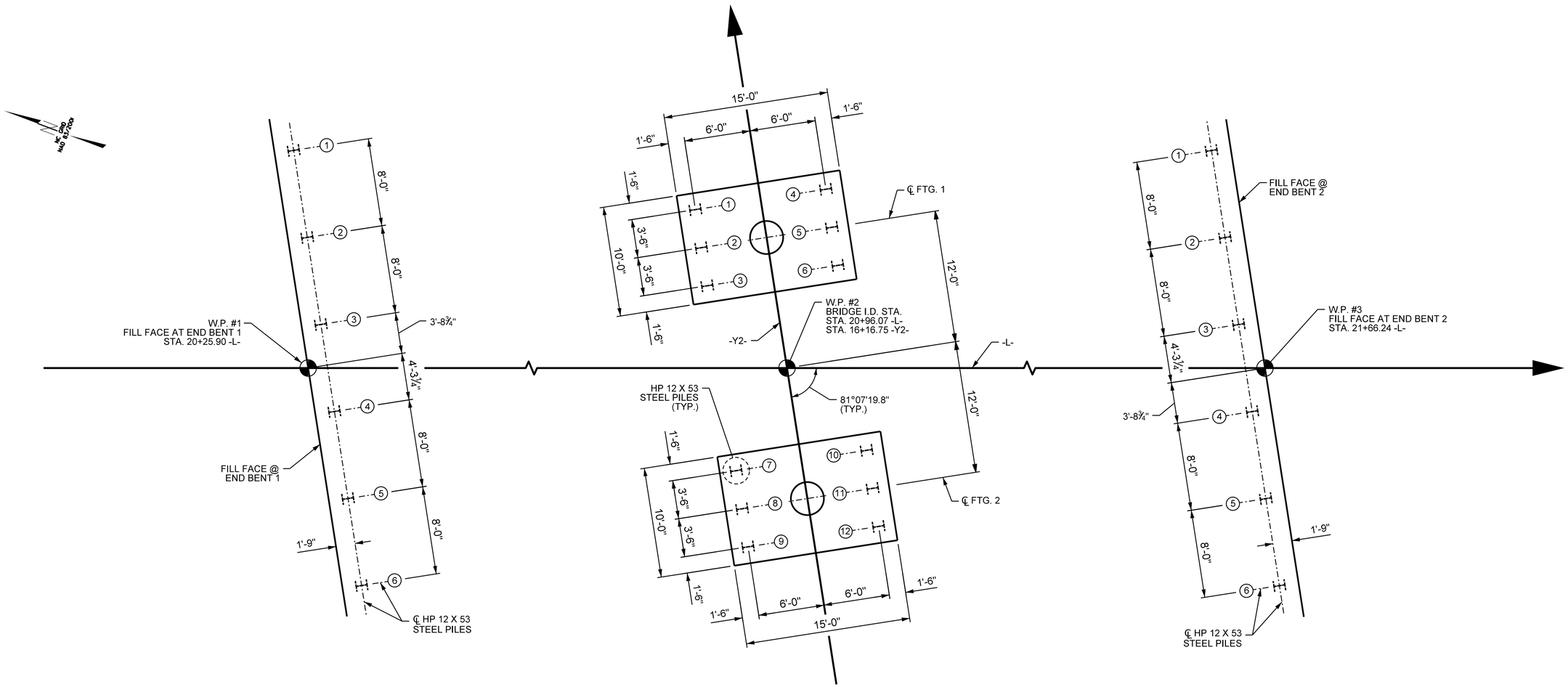
9/4/2025
Q:\RA\220307-04\20 CADD\BR-0098\Structures\Model_10.12\FINAL\401_001_BR0098_SMU_GD1_780183.dgn
tkirschbaum

8/26/21



END BENT 1 | BENT 1 | END BENT 2

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO CENTERLINE OF PILES.
ORIENT PILES AS SHOWN.

NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

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

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE OVER US 29 (-Y2-)
ON SR 1767 BETWEEN
SR 2085 AND US 29 BUSINESS
(-L-)

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

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 438964A78EF64402...
9/5/2025

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moffatt & nichol
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DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
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DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

9/4/2025
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tklrschbaum

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")	Number of Piles per Line	Factored Resistance per Pile KIPS	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		
						Minimum Pile Tip (Tip No Higher Than) Elevation FT	Required Driving Resistance (RDR)* per pile KIPS	Pile Redrives Quantity EACH	Predrilling Length per Pile LIN FT	Predrilling Elevation (Elevation Not To Predrill Below) FT	Maximum Predrilling Diameter INCHES	Pile Excavation (Bottom of Hole) Elevation FT	Pile Excavation Not In Soil per Pile LIN FT	Pile Excavation In Soil per Pile LIN FT
End Bent No. 1, Piles 1-6	6	220	686.80	60			410							
Bent No. 1, Piles 1-12	12	220	662.25	25			370							
End Bent No. 2, Piles 1-6	6	220	686.70	50			385							
TOTAL QUANTITY:														

$$^{*}RDR = \frac{Factored\ Resistance + Factored\ Drag\ Load + Factored\ Dead\ Load}{Dynamic\ Resistance\ Factor} + Nominal\ Drag\ Load\ Resistance + Nominal\ Resistance\ from\ Scourable\ Material$$

** 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.

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 KIPS	Factored Drag Load per Pile KIPS	Factored Dead Load * per Pile KIPS	Dynamic Resistance Factor	Nominal Drag Resistance per Pile KIPS	Nominal Scour Resistance per Pile KIPS
End Bent No. 1, Piles 1-6	220	17.6		0.60	14.1	
Bent No. 1, Piles 1-12	220			0.60		
End Bent No. 2, Piles 1-6	220	6.9		0.60	5.5	

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

SUMMARY OF PILE ACCESSORIES

(Blank entries indicate item is not applicable to structure)

End Bent / Bent No, Pile(s) #(-#) (e.g., "Bent 1, Piles 1-5")	Pipe Pile Plates EACH	Steel Pile Points		
		Pipe Pile Cutting Shoes EACH	Pipe Pile Conical Points EACH	H-Pile Points EACH
End Bent No. 1, Piles 1-6				6
Bent No. 1, Piles 1-12				12
End Bent No. 2, Piles 1-6				6
TOTAL QUANTITY:				24

SUMMARY OF DPT/PILE ORDER LENGTHS

(Blank entries indicate item is not applicable to structure)

Dynamic Pile Testing (DPT)		
End Bent / Bent No (e.g., "Bent 1 - Bent 3")	DPT Test Pile Length FT	DPT Testing Quantity EACH
End Bent No. 1, Piles 1-6	60	1
Bent No. 1, Piles 1-12	25	1
End Bent No. 2, Piles 1-6		
TOTAL QUANTITY:		2

Pile Order Lengths for Concrete Piles	
End Bent / Bent No (e.g., "Bent 1 - Bent 3")	Pile Order Length Basis* EST or DPT

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

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Chien-Ting Tang, #047389) on 01/17/2025.
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 may adjust the quantity for DPT Testing and Pipe Pile Plates when necessary.

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43896A7BEF64402...

9/5/2025

SIGNATURE DATE

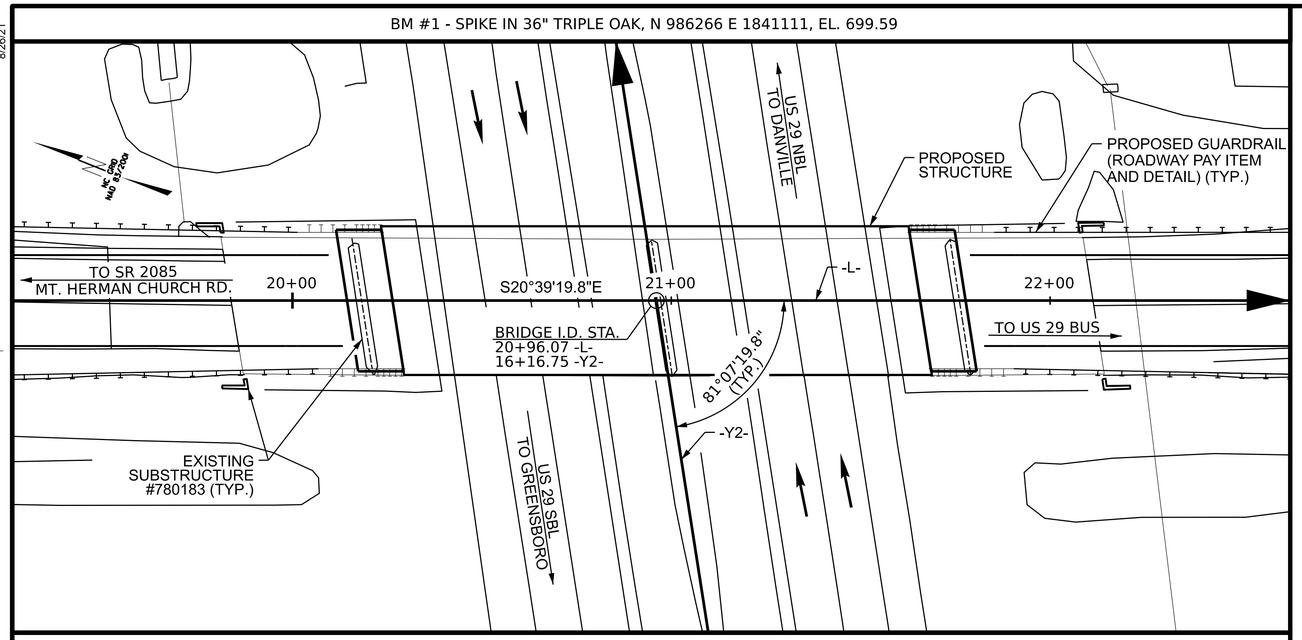
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

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

8/26/21



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR FOUNDATION NOTES, SEE "FOUNDATION LAYOUT" SHEET.

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

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

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

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

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

THE EXISTING STRUCTURE CONSISTING OF FOUR SPANS: 1 @ 34'-5 7/16", 1 @ 79'-0", 1 @ 78'-11", AND 1 @ 35'-4 9/16" WITH REINFORCED CONCRETE DECK ON STEEL I-BEAMS WITH A CLEAR ROADWAY WIDTH OF 36'-0" ON REINFORCED CONCRETE CAPS ON STEEL PILES AT END BENTS 1 AND 2 AND REINFORCED CONCRETE POST AND BEAMS WITH PILE FOOTINGS AND INTERIOR BENTS 1 AND 2, LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, THE LOAD LIMIT MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 20+96.07 -L-."

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

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

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE @ STA. 20+96.07 -L-	ASBESTOS ASSESSMENT	FOUNDATION EXCAVATION FOR BENT 1 @ STA. 20+96.07 -L-	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	CLASS AA CONCRETE	BRIDGE APPROACH SLABS AT STA. 20+96.07 -L-	REINFORCING STEEL
	LUMP SUM	LUMP SUM	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	CU. YDS.	LUMP SUM	LBS.
SUPERSTRUCTURE	LUMP SUM	LUMP SUM		5,422	5,296			LUMP SUM	
END BENT 1						30.3			4,245
BENT 1			LUMP SUM			34.3	55.6		14,167
END BENT 2						30.3			4,245
TOTAL	LUMP SUM	LUMP SUM	LUMP SUM	5,422	5,296	94.9	55.6	LUMP SUM	22,657

TOTAL BILL OF MATERIAL (CONT.)

	SPIRAL COLUMN REINFORCING STEEL	FIB 36" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12 x 53 STEEL PILES	HP 12 X 53 STEEL PILES		STEEL PILE POINTS	DYNAMIC PILE TESTING	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	FOAM JOINT SEALS	ELASTOMERIC BEARINGS
	LBS.	No.	LIN. FT.	No.	No.	LIN. FT.	EA.	EA.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE		8	546.80						276.45		LUMP SUM	LUMP SUM
END BENT 1				6	6	360	6	1		11		
BENT 1	851			12	12	300	12	1				
END BENT 2				6	6	300	6			11		
TOTAL	851	8	546.80	24	24	960	24	2	276.45	22	LUMP SUM	LUMP SUM

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE OVER US 29 (-Y2-)
ON SR 1767 (-L-) BETWEEN
SR 2085 AND US 29 BUSINESS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 46232 Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A76EF84402 9/10/2025

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

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NC LICENSE NO.: F-0105

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

9/10/2025
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tkirschbaum

8/26/21

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

LOAD TYPE		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											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		HL-93 (INVENTORY)	N/A	1	1.48	--	1.75	0.90	1.48	A	E	33.46	1.02	1.82	A	I	19.80	0.80	0.90	1.56	A	E	33.46	
		HL-93 (OPERATING)	N/A		1.92	--	1.35	0.90	1.92	A	E	33.46	1.02	2.61	A	I	47.13	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.92	69.120	1.75	0.90	1.92	A	E	33.46	1.02	2.40	A	I	47.13	0.80	0.90	2.01	A	E	33.46	
		HS-20 (OPERATING)	36.000		2.48	89.280	1.35	0.90	2.48	A	E	33.46	1.02	3.15	A	I	47.13	N/A	--	--	--	--	--	
LEGAL LOAD	SINGLE VEHICLE (SV)	SNSH	13.500		4.47	60.345	1.4	0.90	5.31	A	E	33.46	1.02	7.06	A	I	47.13	0.80	0.90	4.47	A	E	33.46	
		SNGARBS2	20.000		3.36	67.200	1.4	0.90	4.00	A	E	33.46	1.02	5.09	A	I	47.13	0.80	0.90	3.36	A	E	33.46	
		SNAGRIS2	22.000		3.20	70.400	1.4	0.90	3.80	A	E	33.46	1.02	4.76	A	I	47.13	0.80	0.90	3.20	A	E	33.46	
		SNCOTTS3	27.250		2.22	60.495	1.4	0.90	2.64	A	E	33.46	1.02	3.46	A	I	47.13	0.80	0.90	2.22	A	E	33.46	
		SNAGGRS4	34.925		1.87	65.310	1.4	0.90	2.22	A	E	33.46	1.02	2.93	A	I	47.13	0.80	0.90	1.87	A	E	33.46	
		SNS5A	35.550		1.83	65.057	1.4	0.90	2.17	A	E	33.46	1.02	3.01	A	I	47.13	0.80	0.90	1.83	A	E	33.46	
		SNS6A	39.950		1.68	67.116	1.4	0.90	2.00	A	E	33.46	1.02	2.77	A	I	47.13	0.80	0.90	1.68	A	E	33.46	
		SNS7B	42.000		1.60	67.200	1.4	0.90	1.91	A	E	33.46	1.02	2.77	A	I	47.13	0.80	0.90	1.60	A	E	33.46	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.05	67.650	1.4	0.90	2.44	A	E	33.46	1.02	3.30	A	I	47.13	0.80	0.90	2.05	A	E	33.46	
		TNT4A	33.075		2.06	68.135	1.4	0.90	2.45	A	E	33.46	1.02	3.17	A	I	47.13	0.80	0.90	2.06	A	E	33.46	
		TNT6A	41.600		1.69	70.304	1.4	0.90	2.01	A	E	33.46	1.02	3.05	A	I	47.13	0.80	0.90	1.69	A	E	33.46	
		TNT7A	42.000		1.70	71.400	1.4	0.90	2.03	A	E	33.46	1.02	2.82	A	I	47.13	0.80	0.90	1.70	A	E	33.46	
		TNT7B	42.000		1.77	74.340	1.4	0.90	2.10	A	E	33.46	1.02	2.66	A	I	47.13	0.80	0.90	1.77	A	E	33.46	
		TNAGRIT4	43.000		1.68	72.240	1.4	0.90	2.00	A	E	33.46	1.02	2.56	A	I	47.13	0.80	0.90	1.68	A	E	33.46	
		TNAGT5A	45.000		1.58	71.100	1.4	0.90	1.88	A	E	33.46	1.02	2.60	A	I	47.13	0.80	0.90	1.58	A	E	33.46	
		TNAGT5B	45.000	3	1.56	70.200	1.4	0.90	1.85	A	E	33.46	1.02	2.42	A	I	47.13	0.80	0.90	1.56	A	E	33.46	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.38	68.425	1.3	0.90	3.05	A	E	33.46	1.02	3.82	A	I	47.13	0.80	0.90	2.38	A	E	33.46	
		EV3	43.000	4	1.56	67.080	1.3	0.90	1.99	A	E	33.46	1.02	2.54	A	I	47.13	0.80	0.90	1.56	A	E	33.46	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.

2.

3.

4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING * *

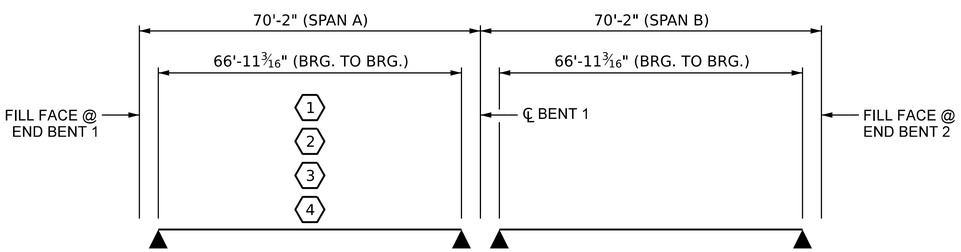
(4) EMERGENCY VEHICLE LOAD RATING **

* * SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER

E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR FIB 36" PRESTRESSED CONCRETE GIRDERS

(NON-INTERSTATE TRAFFIC)

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A78EF64402...
9/5/2025

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			25

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

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

9/4/2025
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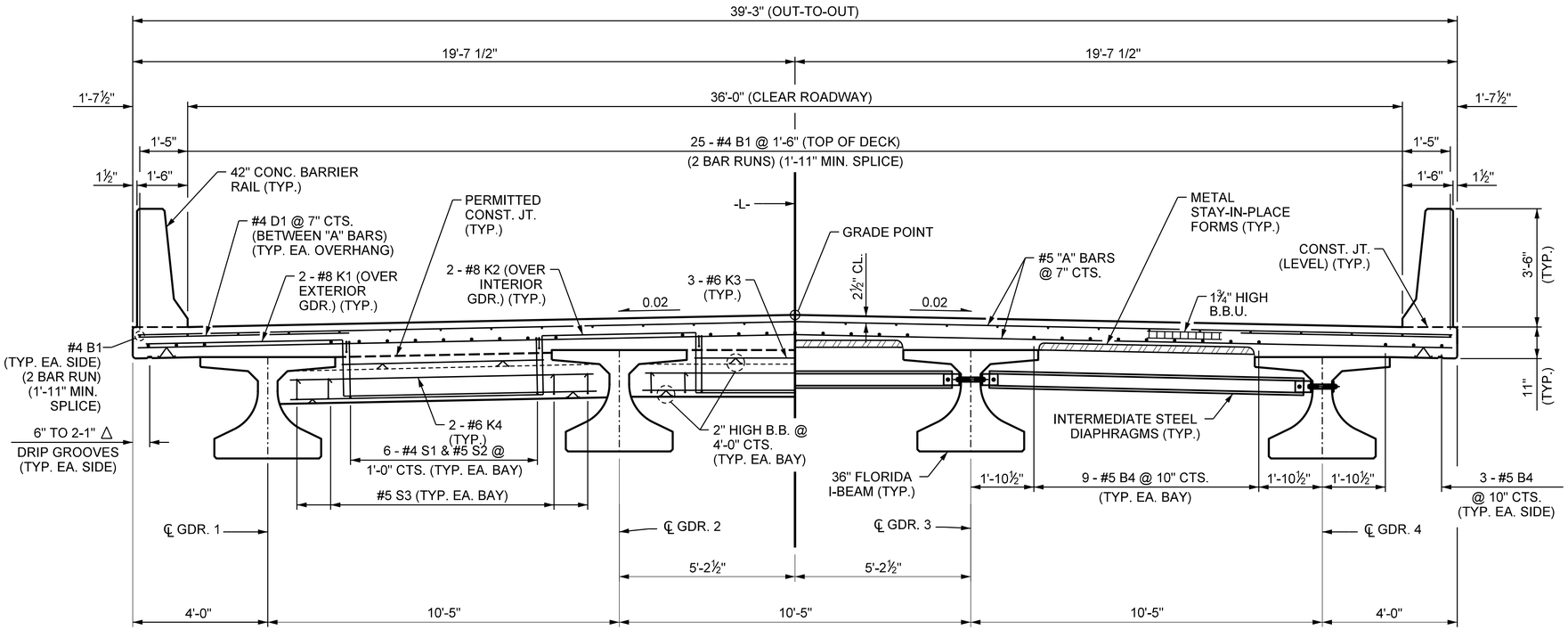
tklrschbaum

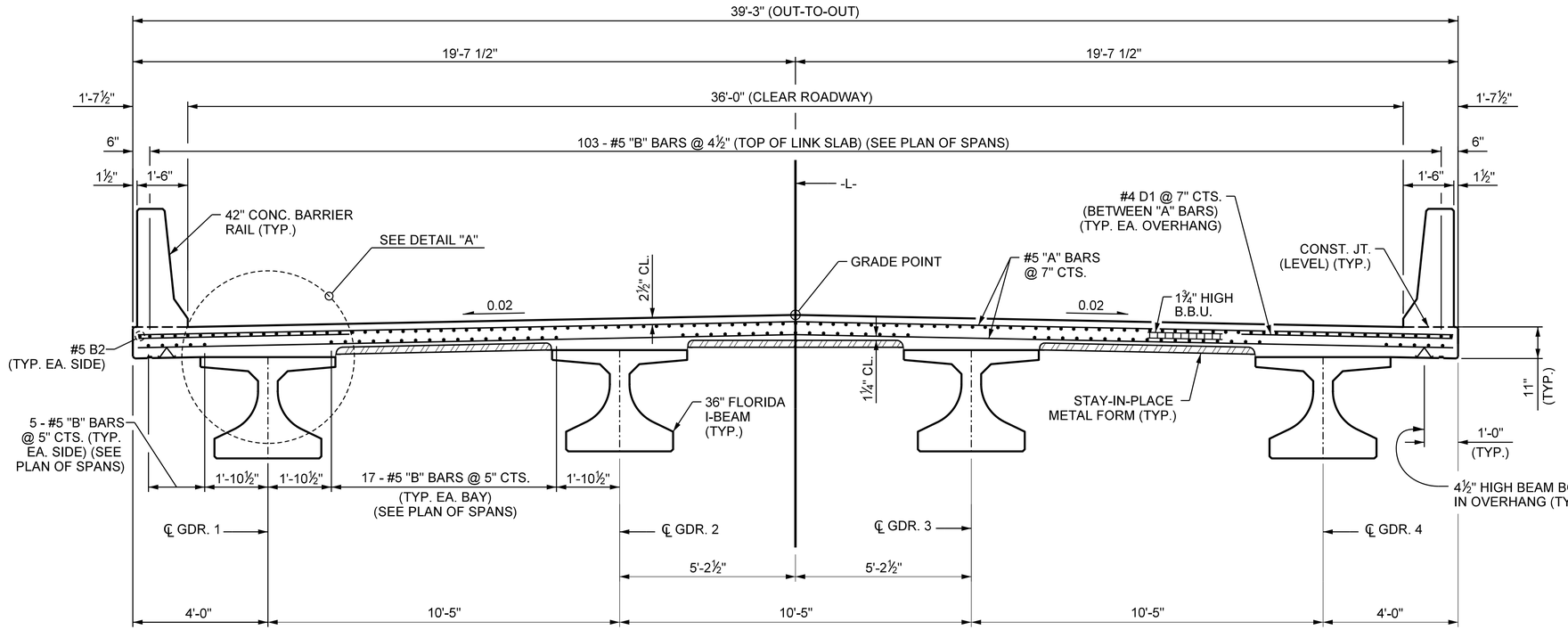
8/26/21



HALF SECTION AT END BENT DIAPHRAGMS

HALF SECTION AT INTERMEDIATE DIAPHRAGMS

TYPICAL SECTION



TYPICAL SECTION AT BENT THROUGH LINK SLAB

NOTES

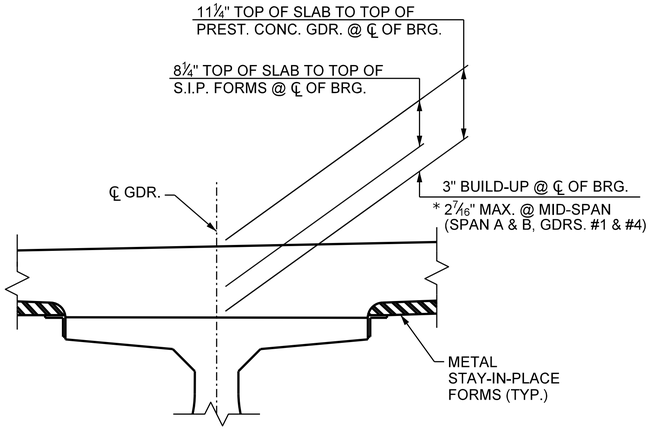
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. AT TOP OF THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 1¼"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

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

FOR CONCRETE BARRIER RAIL REINFORCING STEEL AND DETAILS, SEE "CLASSIC CONCRETE BRIDGE RAIL" SHEETS.



DETAIL "A"
(TYP. EA. GIRDER)
(ALL SPANS)

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

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			25

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RALEIGH, NORTH CAROLINA 27609
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NC LICENSE NO.: F-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 439B9EA7B1F54402... 9/5/2025

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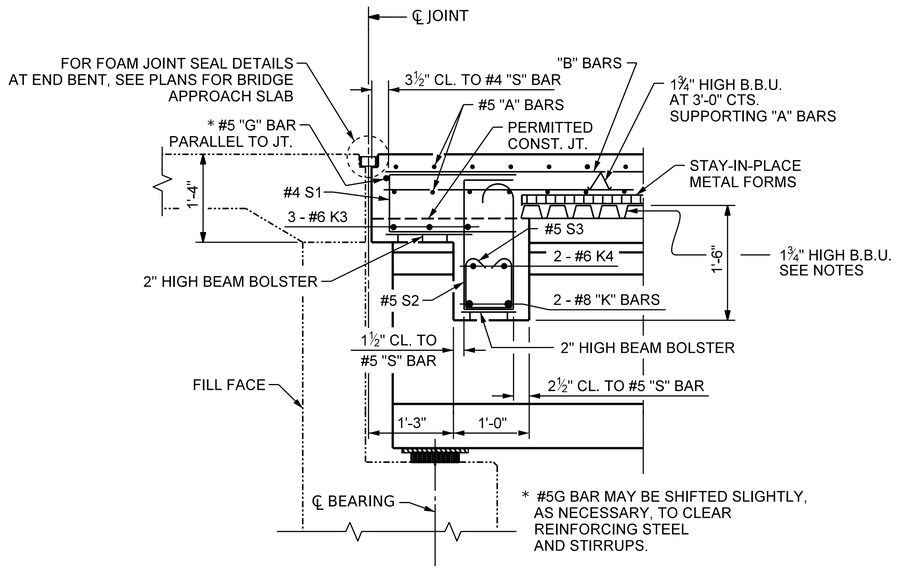
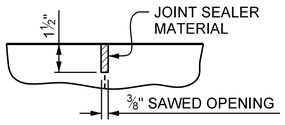
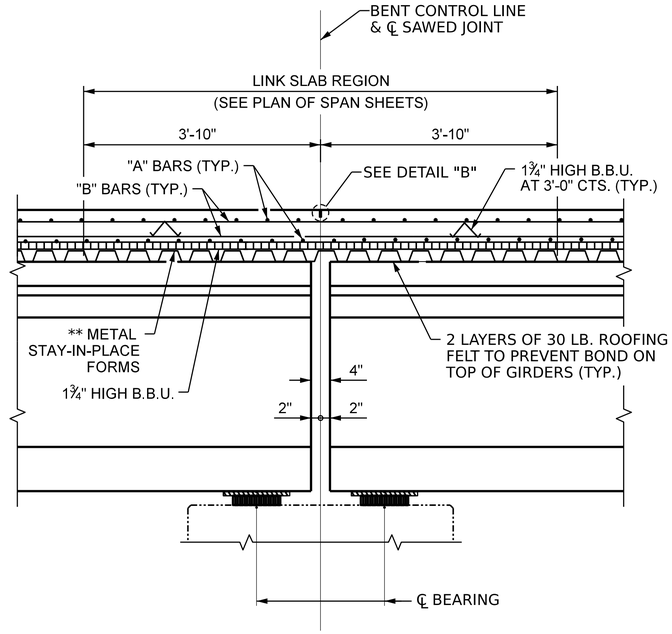


SECTION A-A



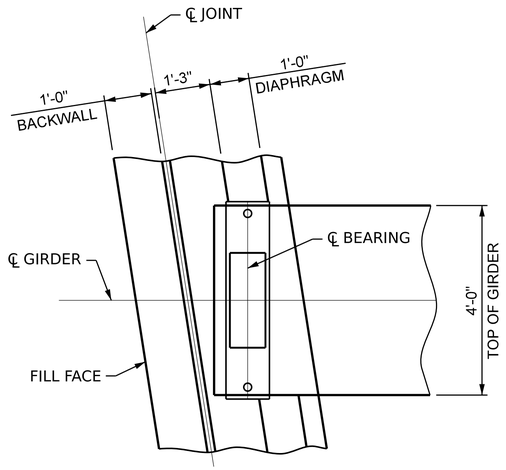
DETAIL "B"



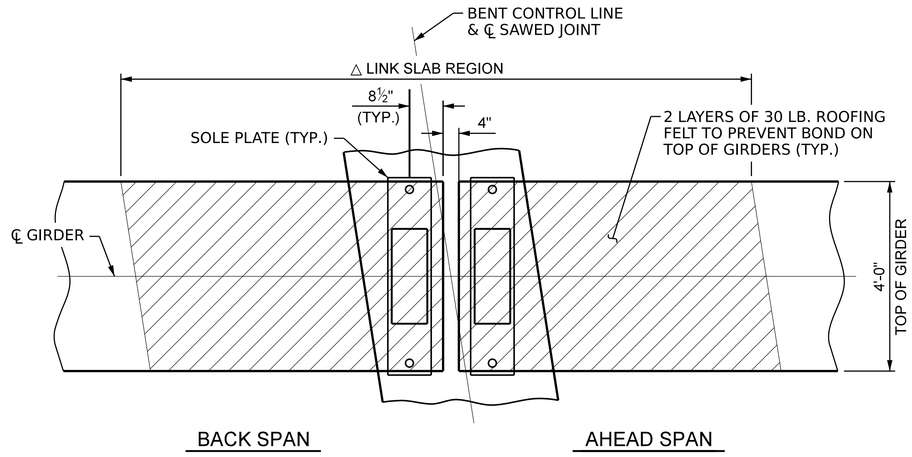
SECTION AT LINK SLAB

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

A 1 1/2" DEEP, 3/8" WIDE CONTRACTION JOINT AT BENT CONTROL LINE SHALL BE SAWED 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.



PLAN OF GIRDER AT END BENT



PLAN OF GIRDERS AT LINK SLAB BENT

△ THE TOP OF 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.

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

TYPICAL SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			25

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
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NC LICENSE NO.: F-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E Aguilar

Signed by: Santiago E Aguilar 438964788F664402...
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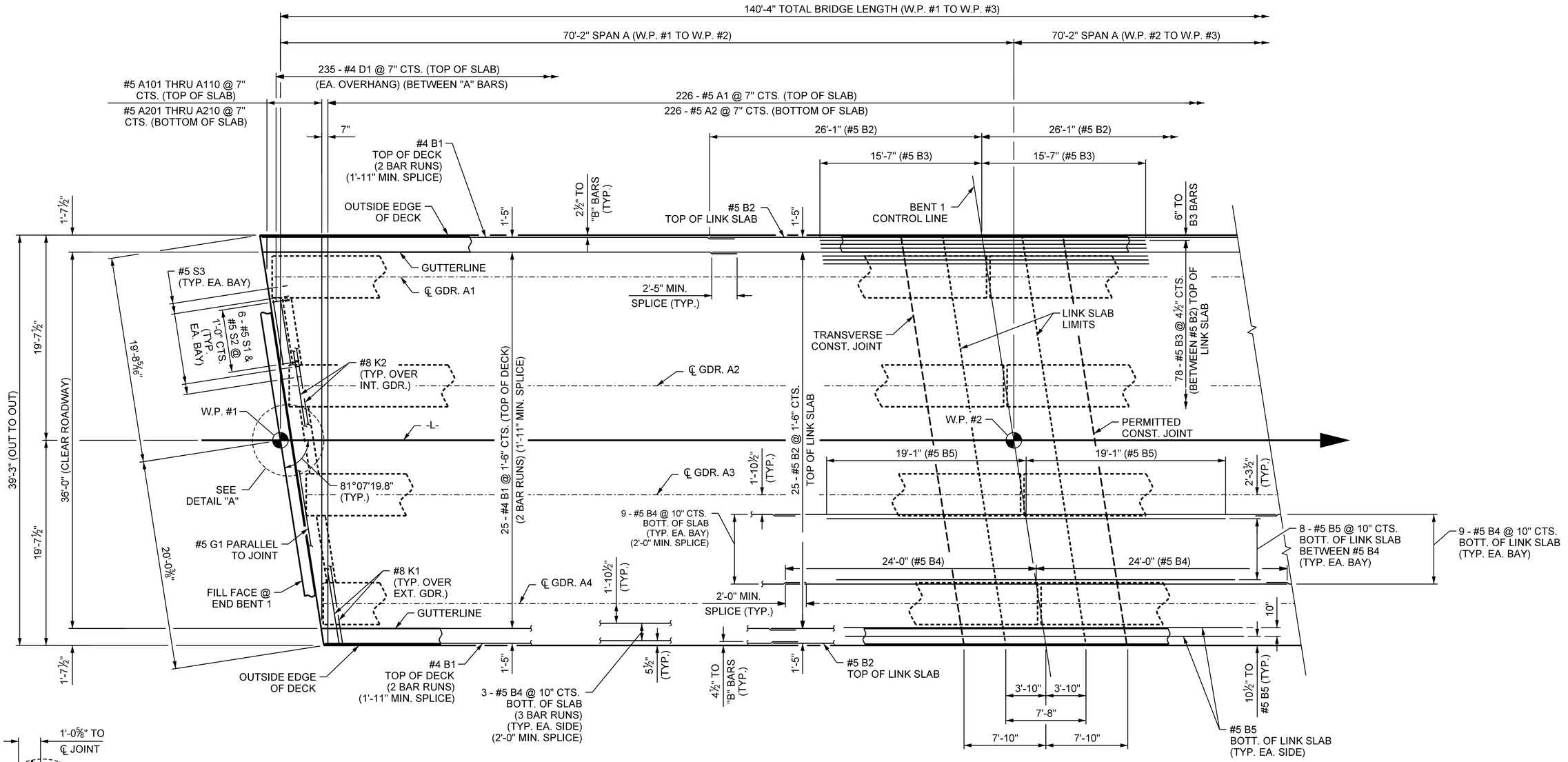
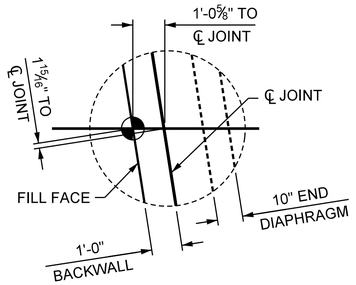


PLAN OF SPAN A



DETAIL "A"

NOTES

FOR LAP LENGTH NOT SHOWN, REFER TO TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEETS.

FOR TRANSVERSE CONSTRUCTION JOINT DETAIL, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.

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

#5 "A" BARS SHALL BE PLACED PERPENDICULAR TO -L- LINE WITH 2" MINIMUM CLEARANCE ON EACH SIDE.

FOR SAWED JOINT DETAIL, SEE "TYPICAL SECTION DETAILS" SHEET.

FOR SECTION VIEWS, SEE "TYPICAL SECTION DETAILS" SHEET.

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF SPANS
SPAN A

DRAWN BY :	T. KIRSCHBAUM	DATE :	05/2025		
CHECKED BY :	S. AGUILAR	DATE :	05/2025		
DESIGN ENGINEER OF RECORD:	S. AGUILAR	DATE :	05/2025		

9/4/2025
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(919) 781-4626 VOICE (919) 781-4869 FAX
NC LICENSE NO.: F-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar
9/5/2025

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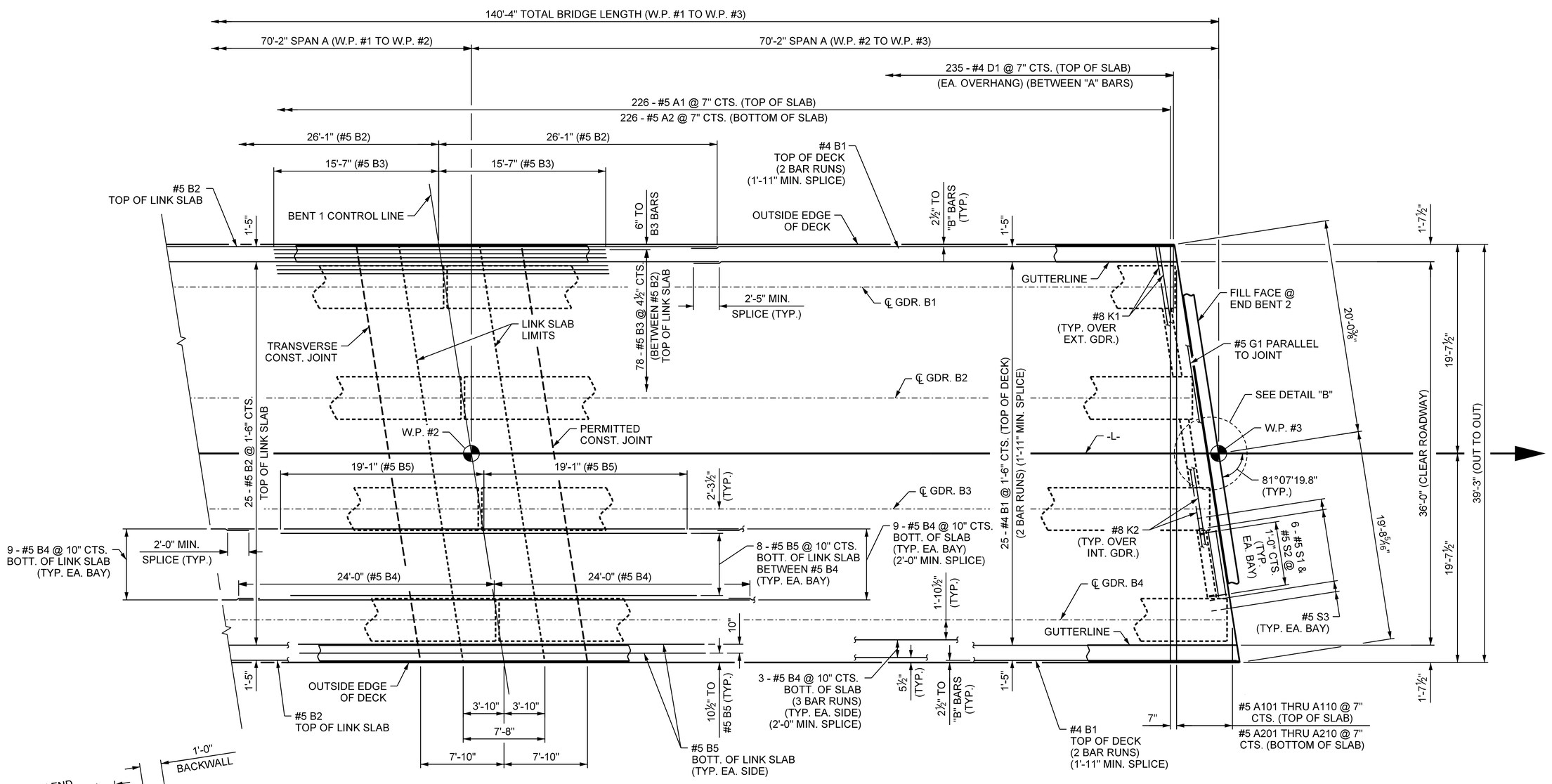
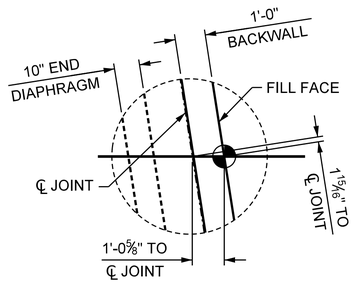
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			25

8/26/21



PLAN OF SPAN B



DETAIL "B"

NOTES

FOR LAP LENGTH NOT SHOWN, REFER TO TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEETS.

FOR TRANSVERSE CONSTRUCTION JOINT DETAIL, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.

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FOR SAWED JOINT DETAIL, SEE "TYPICAL SECTION DETAILS" SHEET.

FOR SECTION VIEWS, SEE "TYPICAL SECTION DETAILS" SHEET.

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF SPANS
SPAN B

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A78EF64402...
9/5/2025

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

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NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			25

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tkirschbaum

8/26/21

NOTES

FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 36" F.I.B. PRESTRESSED CONCRETE GIRDERS" SHEET.

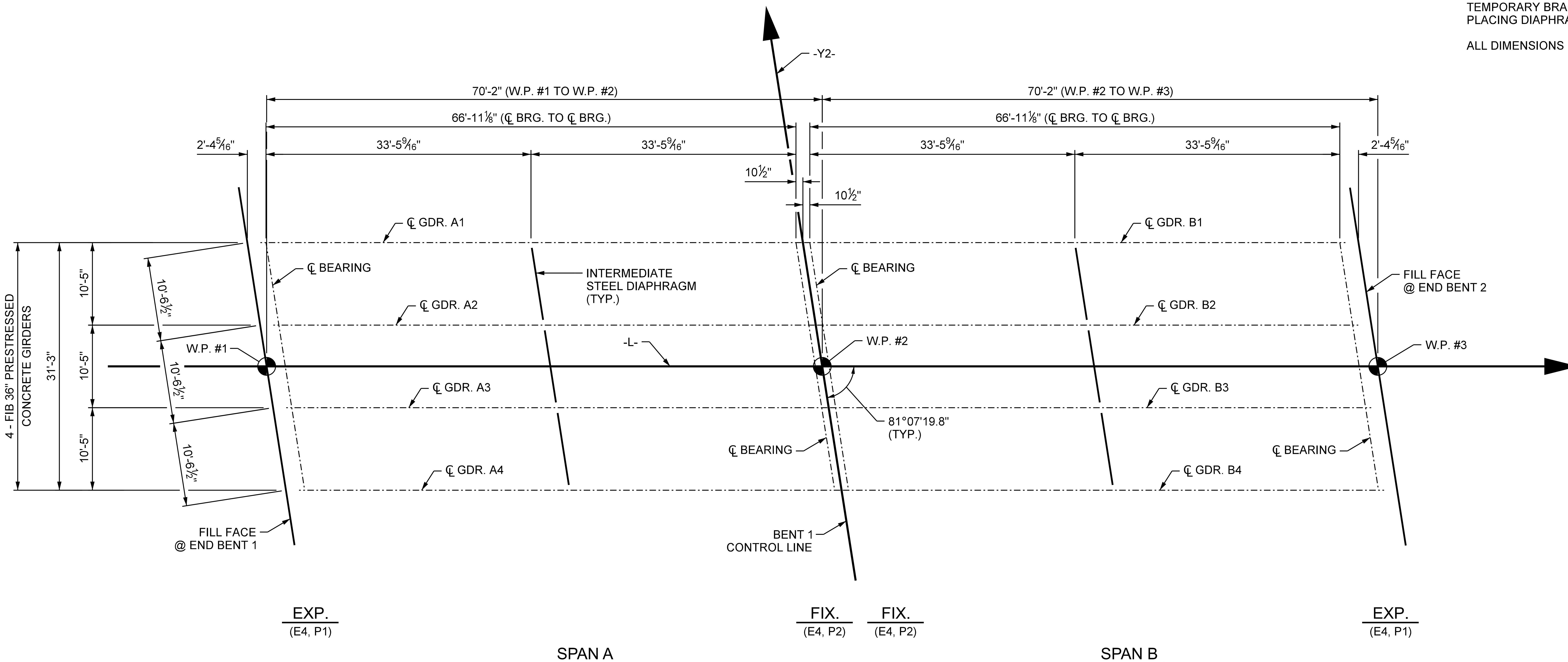
FOR ELASTOMERIC BEARING DETAILS, SEE "ELASTOMERIC BEARING DETAILS" SHEET.

END BENTS AND BENT ARE PARALLEL.

ALL GIRDERS ARE PARALLEL TO -L-.

CONTRACTOR IS RESPONSIBLE FOR FURNISHING ANY NECESSARY TEMPORARY BRACING FOR GIRDERS DURING ERECTION PRIOR TO PLACING DIAPHRAGMS AND DECK.

ALL DIMENSIONS SHOWN ARE HORIZONTAL.



FRAMING PLAN

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FRAMING PLAN

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 46232 Santiago E. Aguilar

Signed by: Santiago E Aguilar
4389A78EF64402...
9/5/2025

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-10
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tkirschbaum

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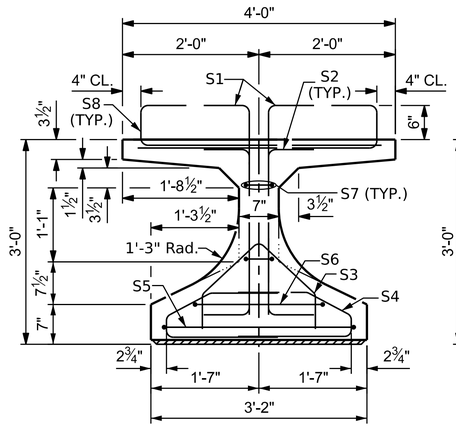
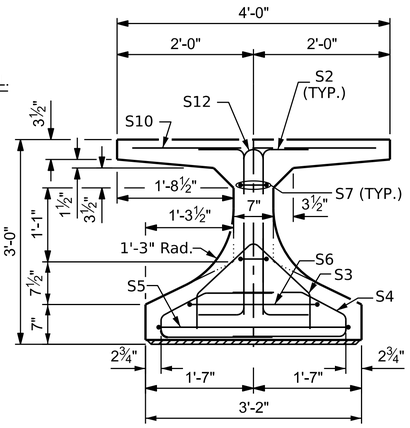
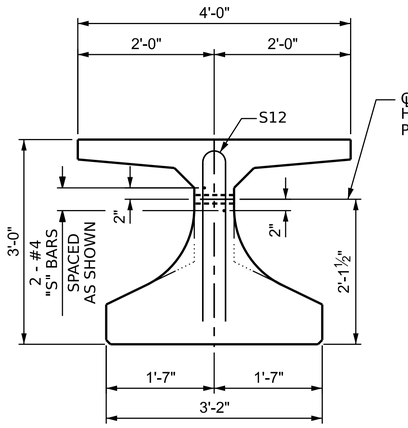


SECTION A-A

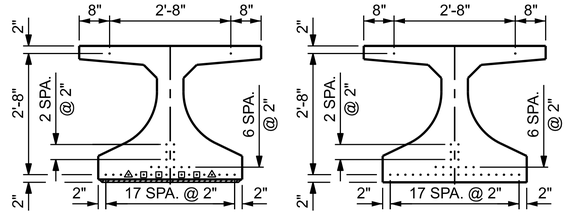


SECTION B-B



SECTION C-C

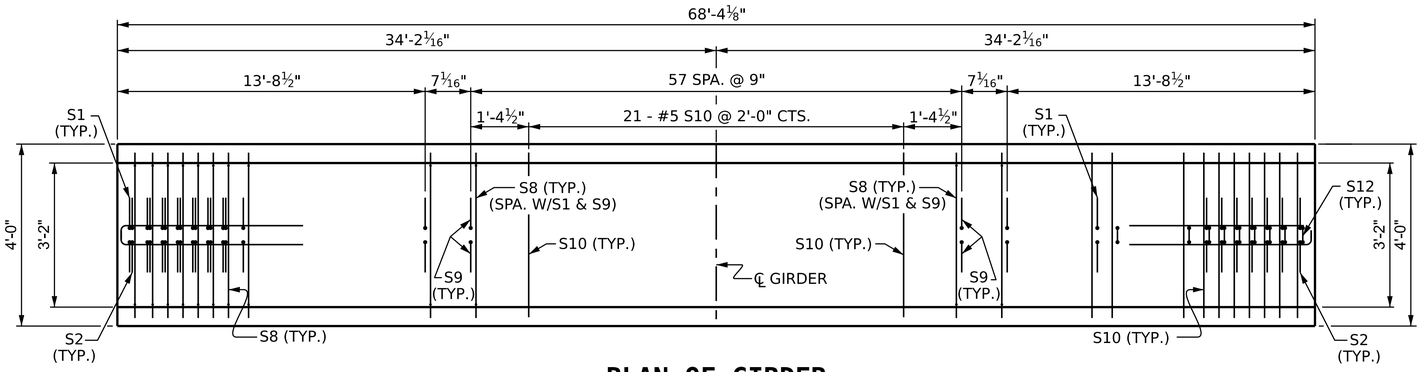
(S8, S9 AND S10 BARS NOT SHOWN)



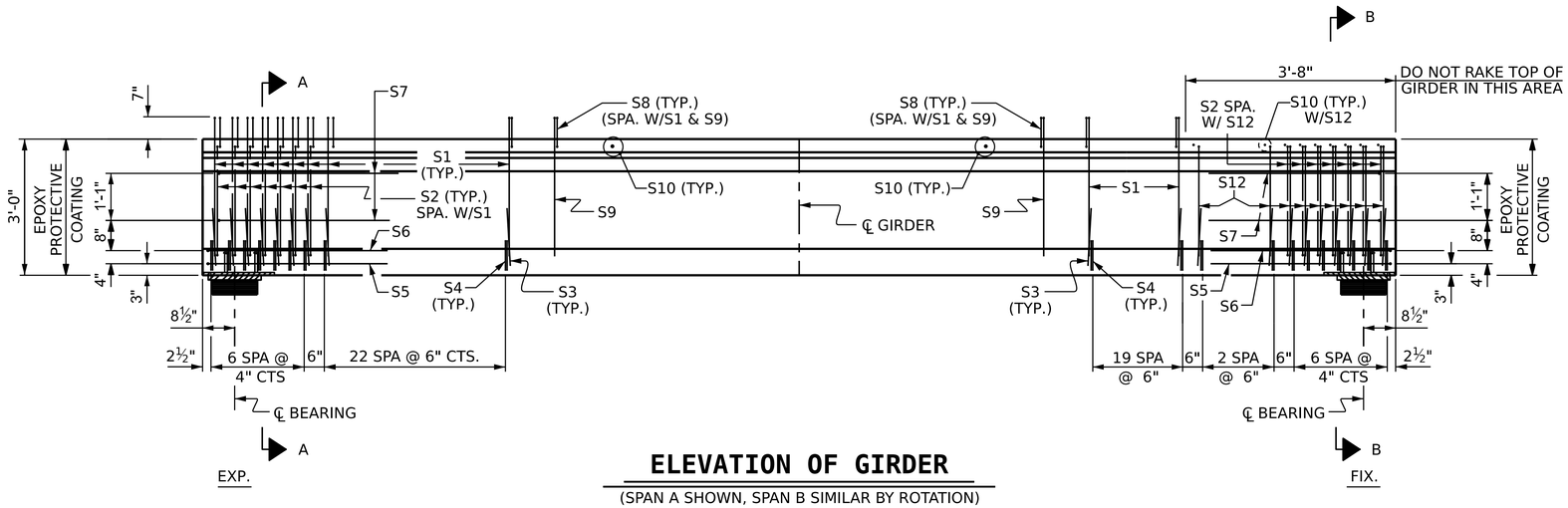
0.6" ∅ LOW RELAXATION STRAND LAYOUT

DEBONDING LEGEND

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

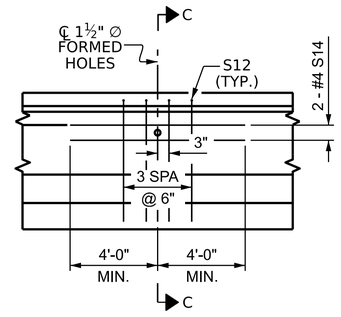


PLAN OF GIRDER



ELEVATION OF GIRDER

(SPAN A SHOWN, SPAN B SIMILAR BY ROTATION)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDER

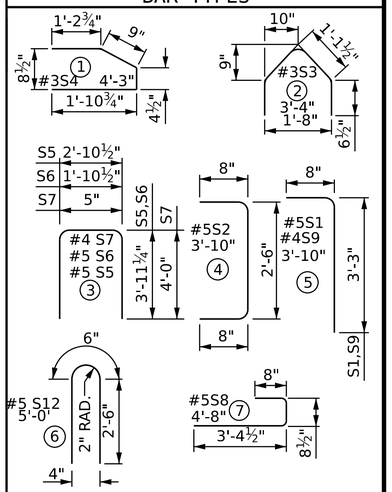
0.6"ø L. R. GRADE 270 STRANDS

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	100	#5	5	3'-11"	409
S2	28	#5	4	3'-10"	112
S3	60	#3	2	3'-4"	75
S4	120	#3	1	4'-3"	192
S5	2	#5	3	10'-9"	22
S6	2	#5	3	9'-9"	20
S7	4	#4	3	8'-5"	22
S8	224	#5	7	4'-9"	1110
S9	124	#4	5	3'-11"	324
S10	35	#5	STR	3'-8"	134
S12	14	#5	6	5'-6"	80
S14	2	#4	STR	8'-0"	11

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

REINFORCING STEEL	9,000 PSI CONCRETE	0.6" ∅ L.R. STRANDS
LB.	C.Y.	No.
2,286	14.2	32

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
8	68.35	546.80

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

36" FIB PRESTRESSED CONCRETE GIRDER FOR LINK SLAB SPAN A & B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			25

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

DRAWN BY : BNB 09/21
CHECKED BY : AAI 09/22

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REV. --- ---/---/---
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9/4/2025
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tklrschbaum

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

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A78EF64402...
9/5/2025

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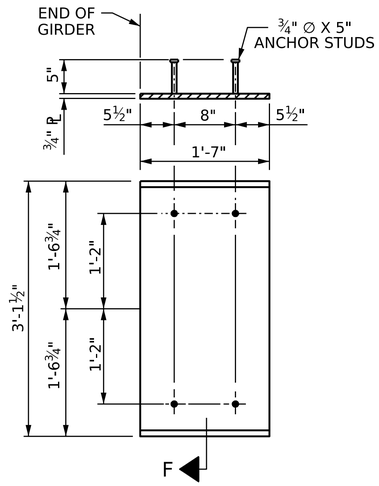
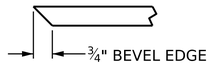
8/26/21



EMBEDDED PLATE "B-1" DETAILS FOR FIB GIRDER

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7,000 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".

WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN ½" OF THE THEORETICAL LOCATION SHOWN.

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
SPANS A & B																					
GIRDERS 1 & 4																					
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.020	0.039	0.058	0.074	0.089	0.102	0.112	0.119	0.124	0.125	0.124	0.119	0.112	0.102	0.089	0.074	0.058	0.039	0.020	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.011	0.022	0.034	0.044	0.054	0.062	0.068	0.073	0.075	0.077	0.075	0.073	0.068	0.062	0.054	0.044	0.034	0.022	0.011	0.000
FINAL CAMBER	0"	⅛"	3/16"	5/16"	⅜"	7/16"	½"	½"	9/16"	9/16"	9/16"	9/16"	9/16"	½"	½"	7/16"	⅜"	5/16"	3/16"	⅛"	0"

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																					
SPANS A & B																					
GIRDERS 2 & 3																					
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.020	0.039	0.058	0.074	0.089	0.102	0.112	0.119	0.124	0.125	0.124	0.119	0.112	0.102	0.089	0.074	0.058	0.039	0.020	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.012	0.024	0.036	0.048	0.058	0.066	0.073	0.078	0.081	0.082	0.081	0.078	0.073	0.066	0.058	0.048	0.036	0.024	0.012	0.000
FINAL CAMBER	0"	⅛"	3/16"	¼"	5/16"	⅜"	7/16"	7/16"	½"	½"	½"	½"	½"	7/16"	7/16"	⅜"	5/16"	¼"	3/16"	⅛"	0"

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

36" FIB PRESTRESSED CONCRETE GIRDER DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			25

STD. NO. FIB45 SHT. 1A

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A78E764402...
9/5/2025

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moffatt & nichol
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NC LICENSE NO.: P-0105

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

DRAWN BY : BNB 08/21
CHECKED BY : AAI 10/21

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REV. --/-- ---/----
REV. --/-- ---/----

9/4/2025
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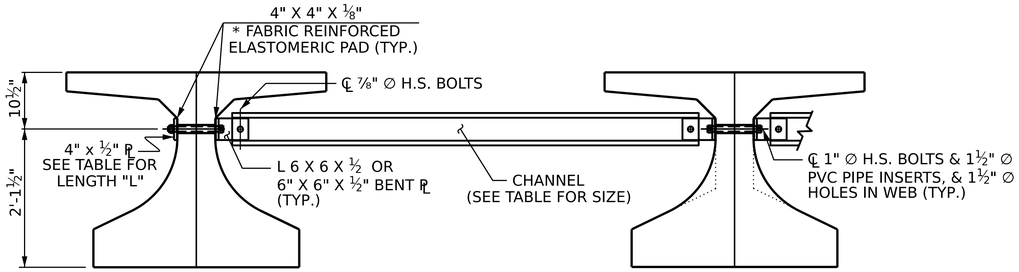
tklrschbaum

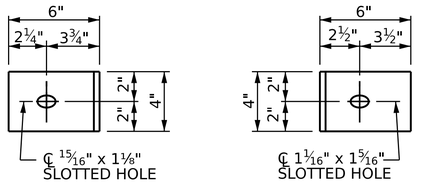
8/26/21



EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

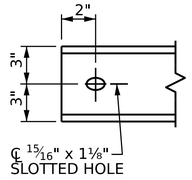
* PLACE ELASTOMERIC PADS AS NECESSARY TO PROVIDE A FLAT MOUNTING SURFACE BETWEEN THE STEEL AND CONCRETE



DIAPHRAGM FACE

WEB FACE

CONNECTOR PLATE DETAILS



CHANNEL END

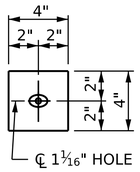
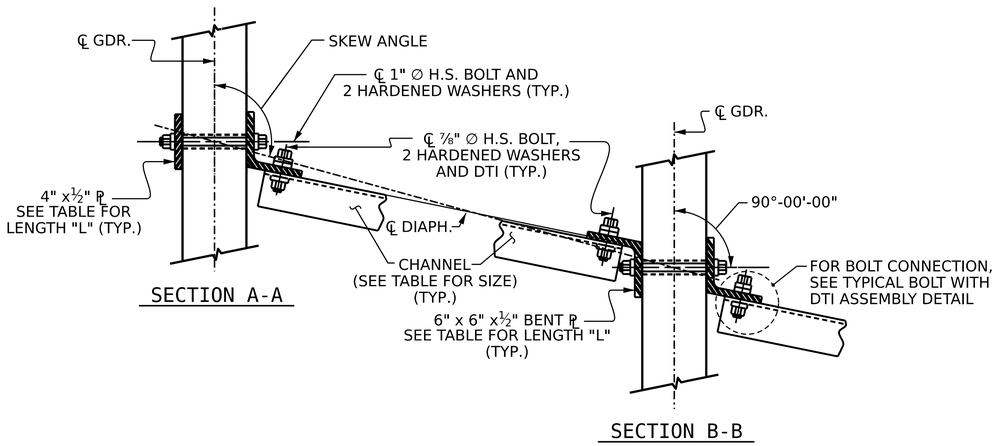
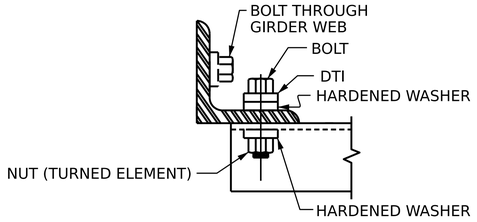


PLATE DETAILS



SECTION A-A SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

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

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

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

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

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

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
36" FIB	MC 6 x 15.3	10½"	2'-1½"	4"
	MC 6 x 18	10½"	2'-1½"	4"

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

INTERMEDIATE STEEL DIAPHRAGMS FOR 36" FIB

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			25

STD. NO. FIB36

DRAWN BY :	T. KIRSCHBAUM	DATE : 05/2025
CHECKED BY :	S. AGUILAR	DATE : 05/2025
DESIGN ENGINEER OF RECORD:	S. AGUILAR	DATE : 05/2025

DRAWN BY :	BNB	09/21
CHECKED BY :	AAI	09/22

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REV. ---		---/---

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NC LICENSE NO.: P-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

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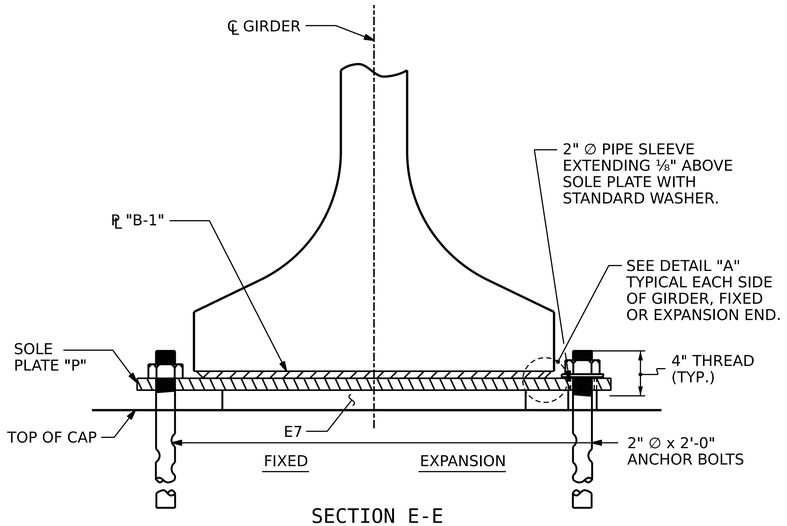
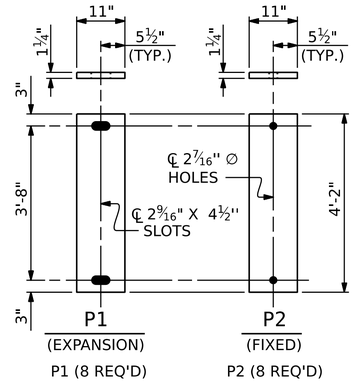


SECTION E-E



SOLE PLATE DETAILS ("P")

NOTES

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

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

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

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

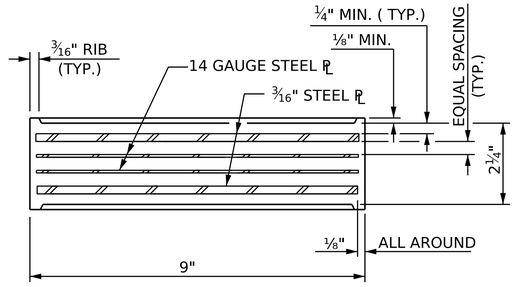
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

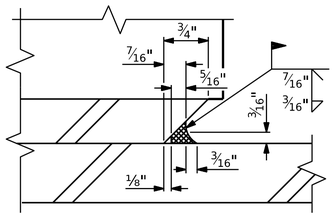
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

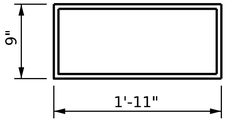


TYPICAL SECTION OF ELASTOMERIC BEARINGS



DETAIL "A"

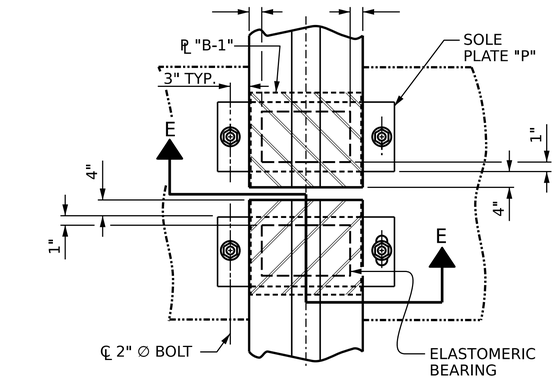
MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE V	365 K



E4 (16 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

ELASTOMERIC BEARING DETAILS

FIB SUPERSTRUCTURE

DRAWN BY :	T. KIRSCHBAUM	DATE :	05/2025
CHECKED BY :	S. AGUILAR	DATE :	05/2025
DESIGN ENGINEER OF RECORD:	S. AGUILAR	DATE :	05/2025

9/5/2025
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NC LICENSE NO.: F-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

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9/5/2025

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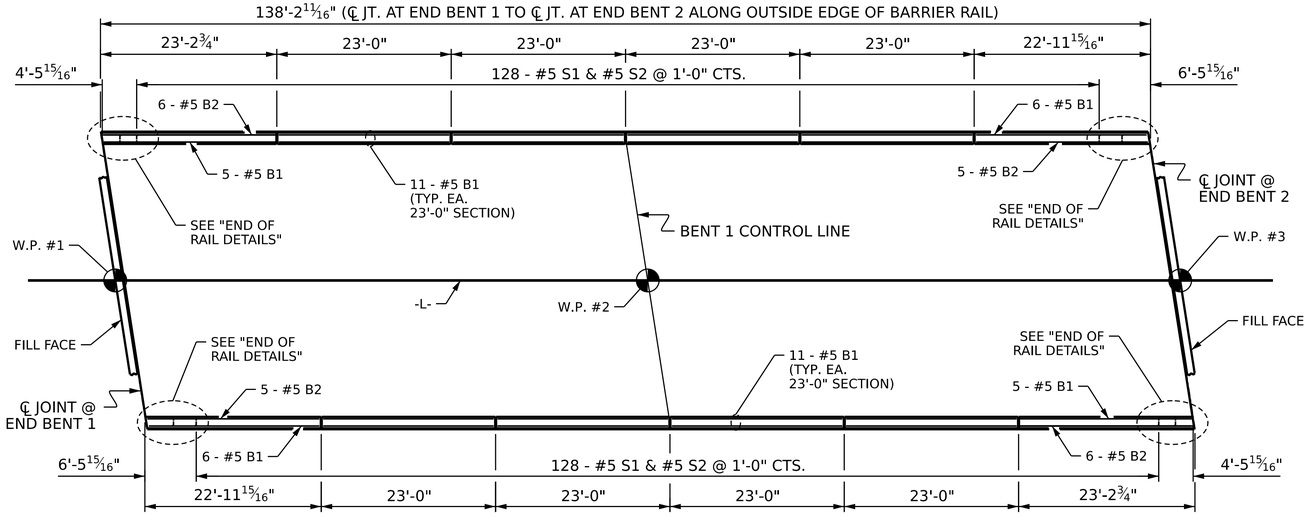
REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-14
1			3				TOTAL SHEETS
2			4				25

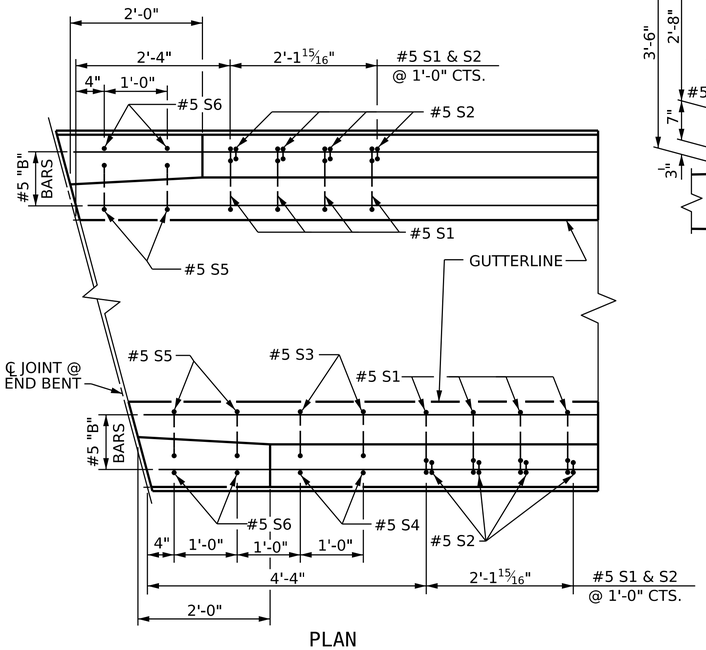
STD. NO. EB5

8/26/21

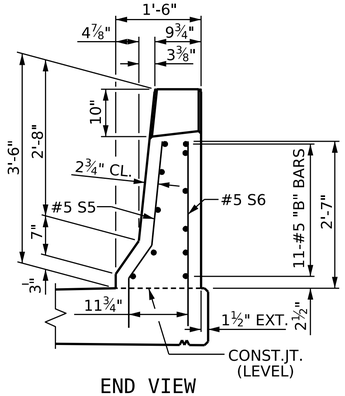


PLAN

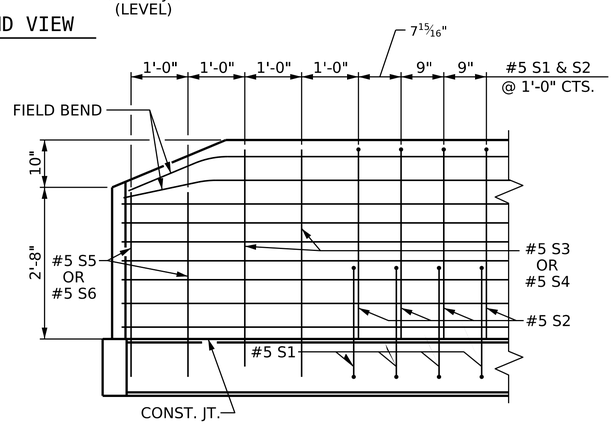
PILES ARE NOT SHOWN IN PLAN VIEW FOR CLARITY
END BENTS AND INTERIOR BENT ARE PARALLEL



PLAN



END VIEW



SIDE VIEW

NOTES

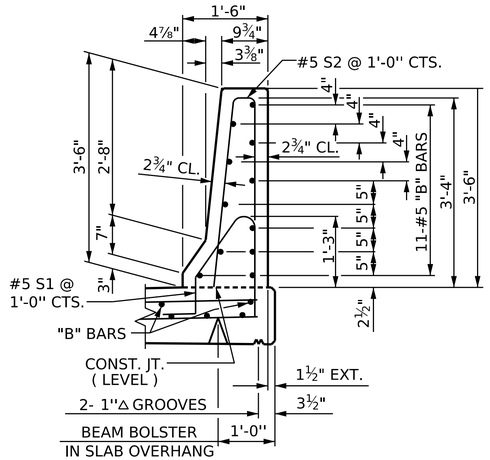
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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

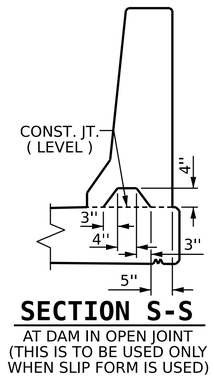
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

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

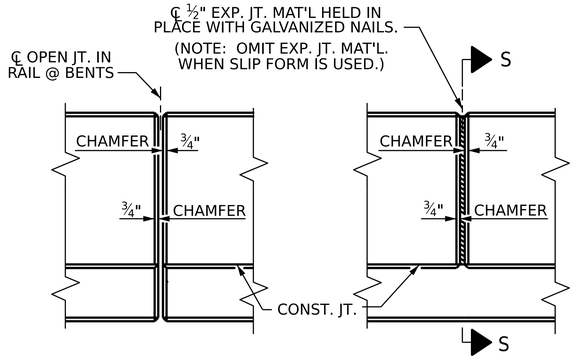


SECTION THRU RAIL



SECTION S-S

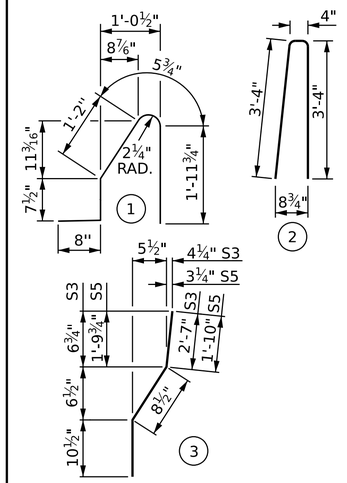
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	110	#5	STR	22'-7"	2591
* B2	22	#5	STR	22'-9"	522
* S1	268	#5	1	4'-11"	1374
* S2	268	#5	2	7'-0"	1957
* S3	4	#5	3	4'-2"	17
* S4	4	#5	STR	4'-0"	17
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27

* EPOXY COATED REINFORCING STEEL	6,534 LBS.
CLASS AA CONCRETE	37.5 CU. YDS.
CONCRETE BARRIER RAIL	276.45 LIN. FT.

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

CONCRETE BARRIER RAIL

DRAWN BY : ARB /8	REV. /12	AA/G
CHECKED BY : S D 9/8	REV. /13	AA/G
	REV. 12/1	AA/THC

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

9/5/2025
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tkirschbaum

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

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

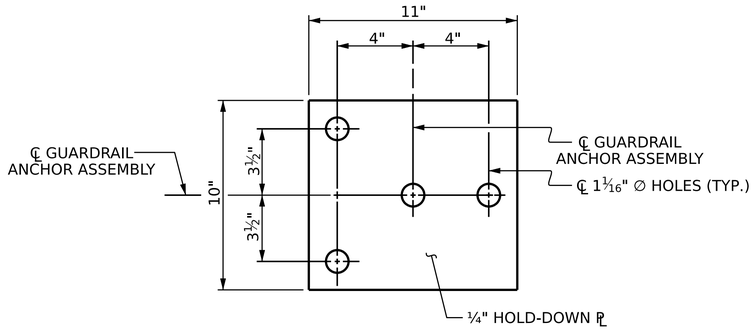
NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A78EF64402...
9/5/2025

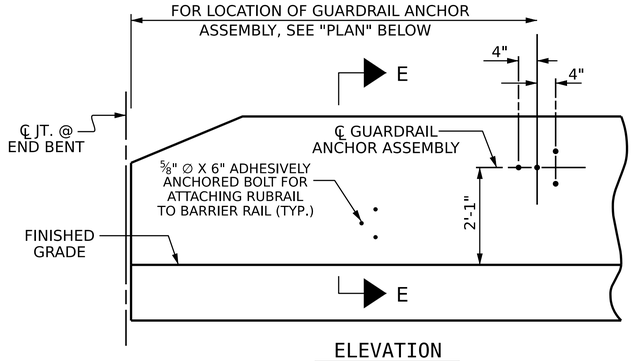
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			25

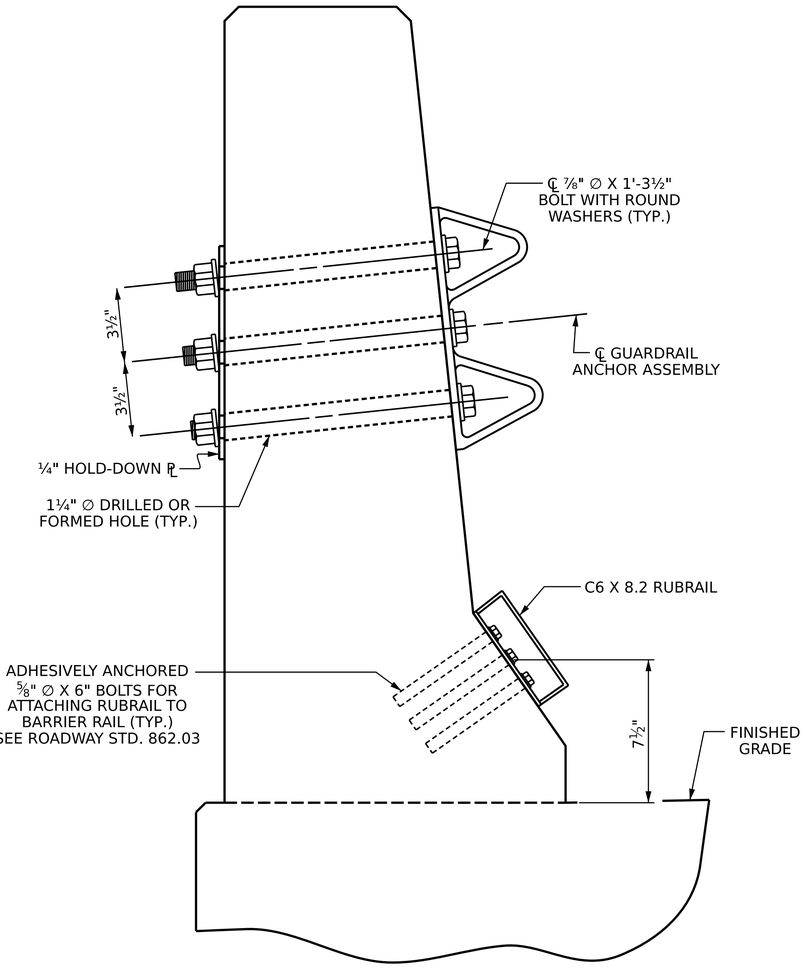
8/26/21



PLAN

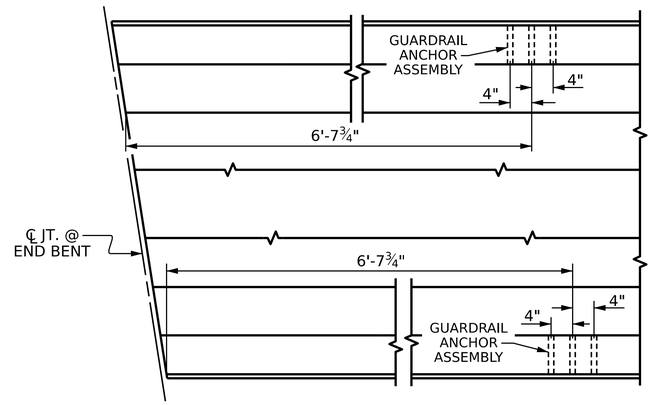


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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

NOTES

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

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

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

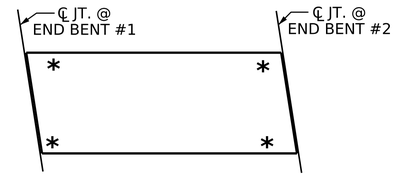
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

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



SKETCH SHOWING POINTS OF ATTACHMENTS

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16	
1			3			TOTAL SHEETS	
2			4			25	

STD. NO. GRA2 Sht.1a

DRAWN BY :	T. KIRSCHBAUM	DATE :	05/2025
CHECKED BY :	S. AGUILAR	DATE :	05/2025
DESIGN ENGINEER OF RECORD:	S. AGUILAR	DATE :	05/2025

DRAWN BY :	TLA	/O	
CHECKED BY :	G	/O	
REV. /13			AA/G
REV. 12/1			AA/THC
REV. /22			BNB/AAI

9/5/2025
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tkirschbaum

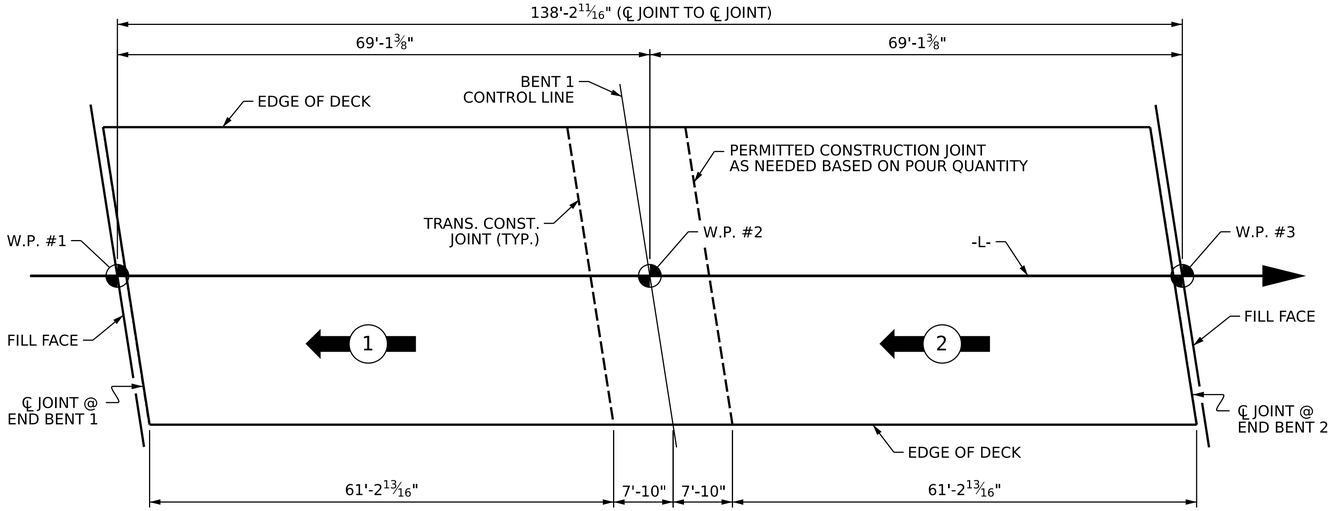
moffatt & nichol
4700 FALLS OF NEUSE ROAD, SUITE 300
RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 VOICE (919) 781-4869 FAX
NC LICENSE NO.: F-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 439B6A7BF84402...
9/5/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

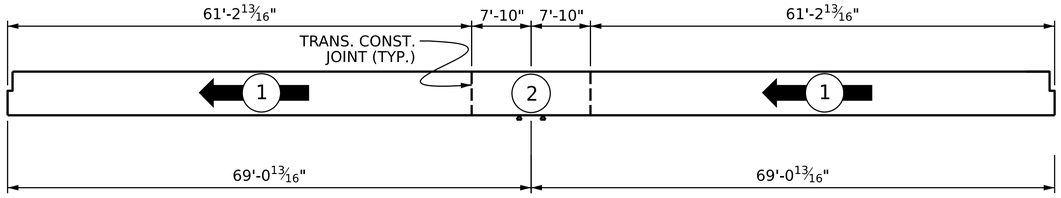
8/26/21



POURING SEQUENCE

(#) INDICATES THE NUMBER AND DIRECTION OF POUR

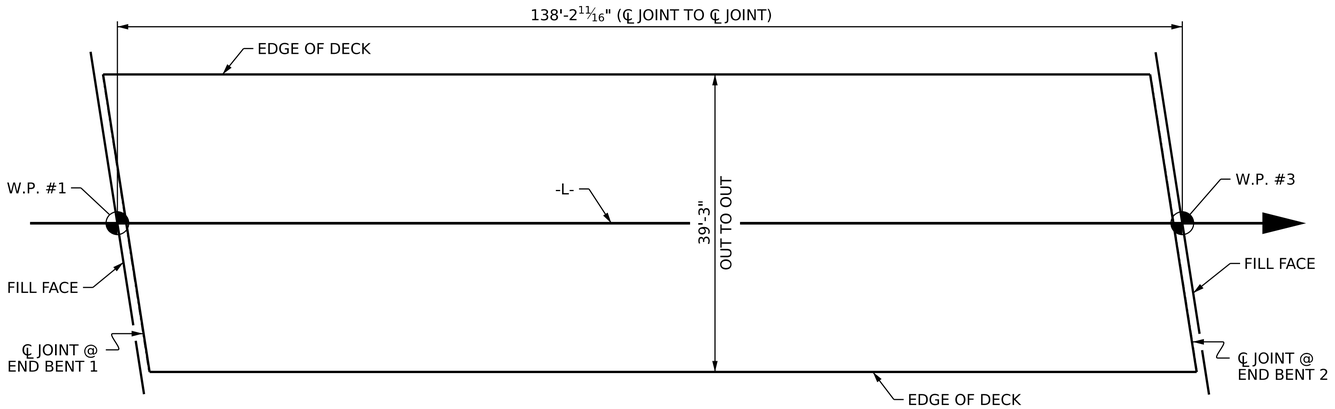
NEXT POUR CANNOT BE STARTED UNTIL ADJACENT POURS REACHES A MINIMUM OF 3,000 PSI.



OPTIONAL POURING SEQUENCE

POUR (2) CAN NOT BE STARTED UNTIL BOTH ADJACENT (1) POURS REACH A MINIMUMOF 3000 PSI.

(#) INDICATES THE NUMBER AND DIRECTION OF POUR

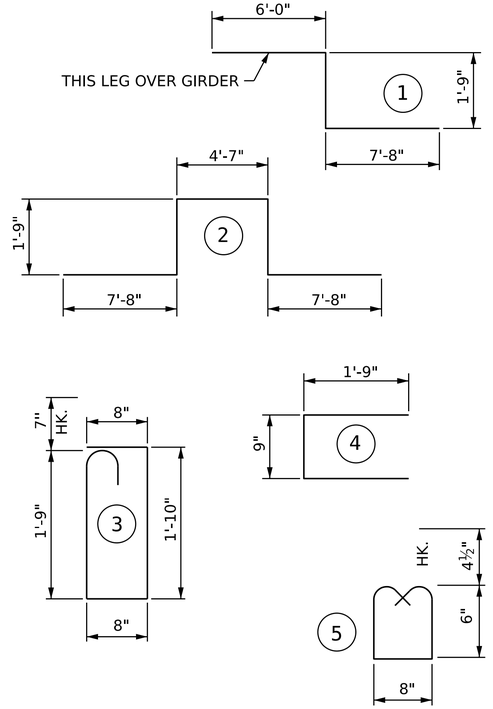


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 5,422)

SUPERSTRUCTURE BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	226	#5	STR	38'-11"	9173
A2	226	#5	STR	38'-11"	9173
* A101	2	#5	STR	3'-1"	6
* A102	2	#5	STR	6'-9"	14
* A103	2	#5	STR	10'-6"	22
* A104	2	#5	STR	14'-3"	30
* A105	2	#5	STR	18'-0"	38
* A106	2	#5	STR	21'-9"	45
* A107	2	#5	STR	25'-5"	53
* A108	2	#5	STR	29'-2"	61
* A109	2	#5	STR	32'-11"	69
* A110	2	#5	STR	36'-8"	76
A201	2	#5	STR	3'-1"	6
A202	2	#5	STR	6'-9"	14
A203	2	#5	STR	10'-6"	22
A204	2	#5	STR	14'-3"	30
A205	2	#5	STR	18'-0"	38
A206	2	#5	STR	21'-9"	45
A207	2	#5	STR	25'-5"	53
A208	2	#5	STR	29'-2"	61
A209	2	#5	STR	32'-11"	69
A210	2	#5	STR	36'-8"	76
* B1	108	#5	STR	23'-7"	1701
* B2	27	#5	STR	52'-2"	1469
* B3	78	#5	STR	31'-2"	2536
B4	99	#5	STR	48'-0"	4956
B5	28	#5	STR	38'-2"	1115
* D1	470	#4	STR	6'-3"	1963
* G1	2	#5	STR	39'-4"	82
* K1	8	#8	1	15'-5"	329
* K2	8	#8	2	23'-5"	500
* K3	18	#6	STR	6'-0"	162
* K4	12	#6	STR	9'-2"	165
* S1	36	#4	4	4'-3"	102
* S2	36	#5	3	5'-6"	207
* S3	24	#5	5	2'-5"	60

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.)
SPANS A & B	-	15,658	18,697
POUR 1	152.2	-	-
POUR 2	20.2	-	-
TOTALS**	172.4	15,658	18,697

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

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

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	1'-11"	1'-7"	1'-11"	1'-7"	2'-6"
#5	2'-5"	2'-0"	2'-5"	2'-0"	3'-1"
#6	2'-10"	2'-5"	3'-7"	2'-5"	3'-8"
#7	4'-2"	2'-9"			
#8	4'-9"	3'-2"			

GROOVING BRIDGE FLOORS

APPROACH SLABS	748	SQ.FT.
BRIDGE DECK	4,548	SQ.FT.
TOTAL	5,296	SQ.FT.

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			25

STD. NO. BOM2

DRAWN BY :	T. KIRSCHBAUM	DATE :	05/2025
CHECKED BY :	S. AGUILAR	DATE :	05/2025
DESIGN ENGINEER OF RECORD:	S. AGUILAR	DATE :	05/2025

DRAWN BY :	MB	/8	REV. 12/1 MAA/THC
CHECKED BY :	S D	/8	REV. 06/1 BNB/THC
			REV. 11/22 BNB/THC

9/5/2025
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tklrschbaum

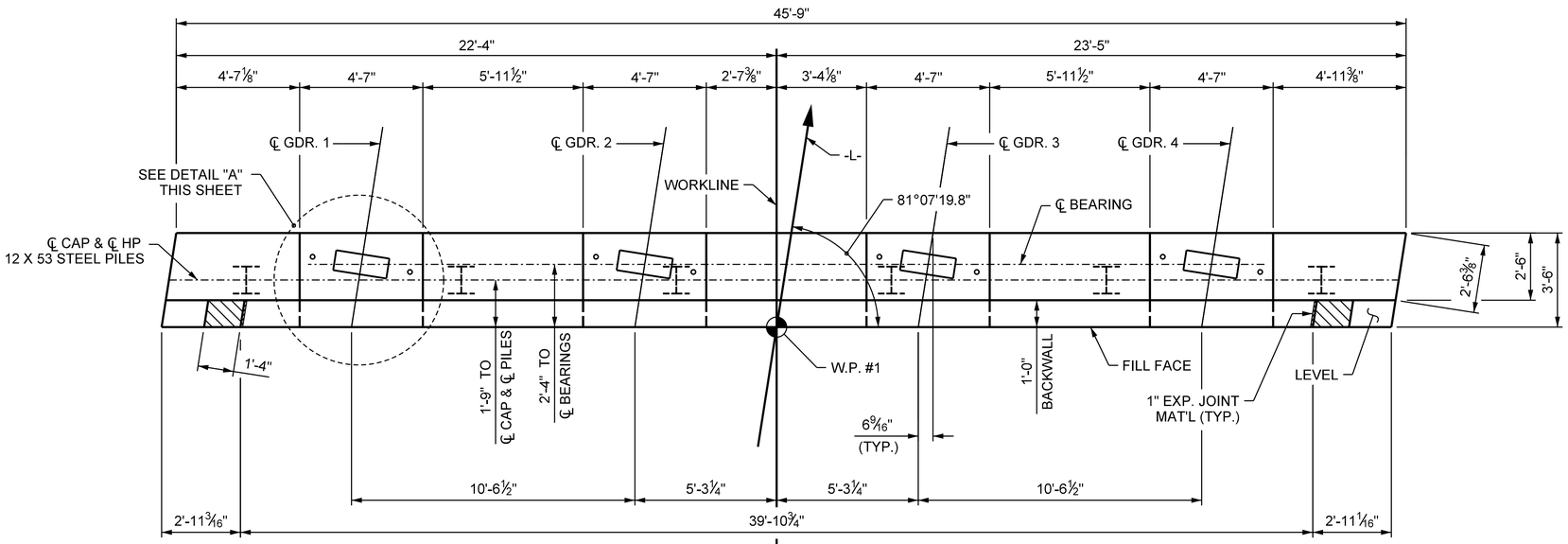
moffatt & nichol
4700 FALLS OF NEUSE ROAD, SUITE 300
RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 TEL (919) 781-4869 FAX
NC LICENSE NO.: F-0105

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

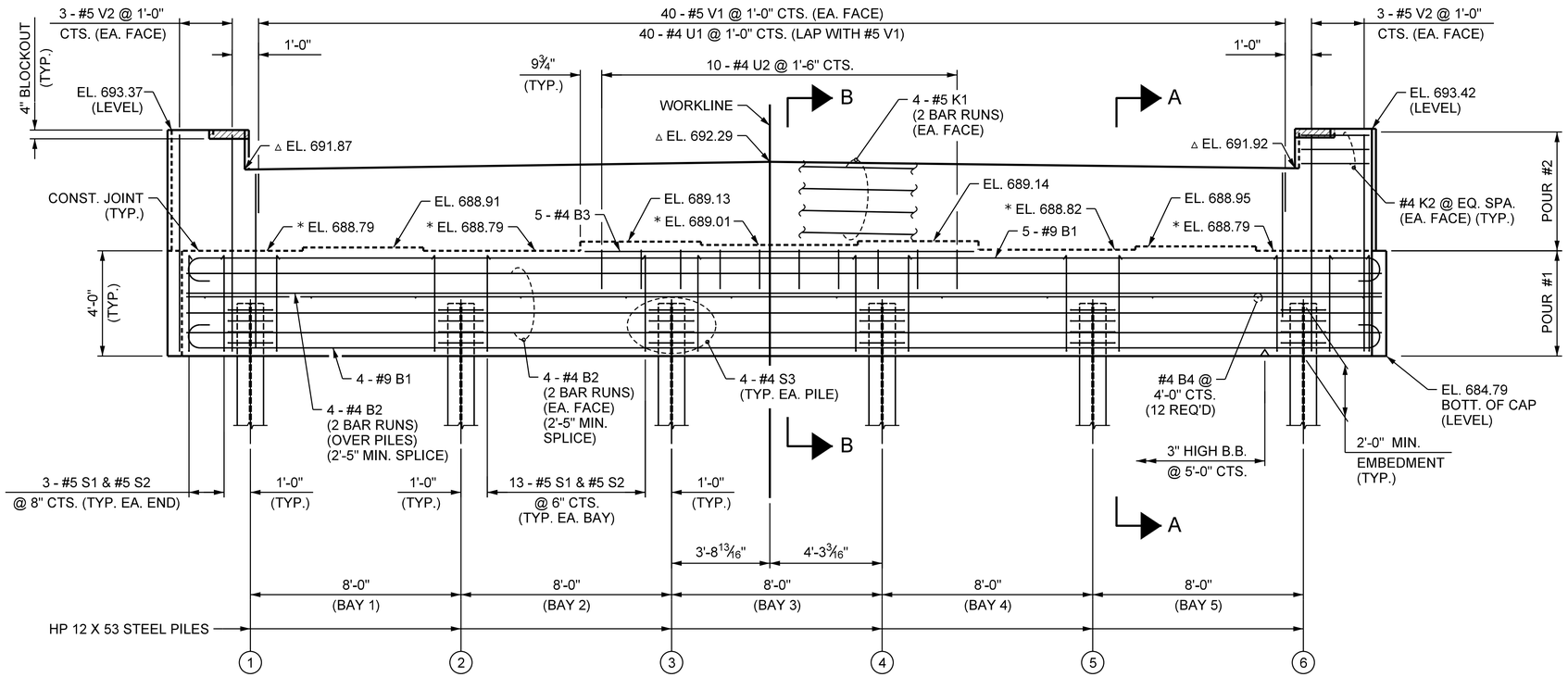
Signed by: Santiago E Aguilar 43B96A78EF64402...
9/5/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

8/25/21



PLAN



ELE ATION

NOTES

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

△ ELEVATION TAKEN ALONG FILL FACE OF BACKWALL.

FOR BEARING DETAILS, SEE "ELASTOMERIC BEARING DETAILS" SHEET.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR SECTION A-A & PARTIAL SECTION B-B, SEE SHEET 3 OF 3.

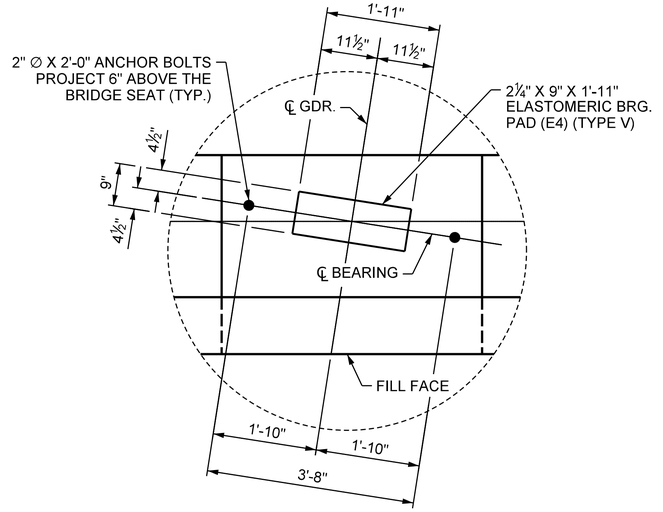
STIRRUPS AND "U" BARS MAY BE SHIFTED TO AVOID ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

DESIGN REINFORCEMENT CONNECTED TO END BENT FOR FACTORED STRAP LOAD OF 3.5 KIPS/ FT. ACTING 4'-6" ABOVE BOTTOM OF CAP ELEVATION. CAST REINFORCEMENT CONNECTORS INTO CAP AND MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN CONNECTORS AND REINFORCING STEEL.



DETAIL A

(TYP. EA. GIRDER)

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
PLAN & ELEVATION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			25

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

Signed by: Santiago E Aguilar 43B96A7BF64402... 9/5/2025

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

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NC LICENSE NO.: F-0105

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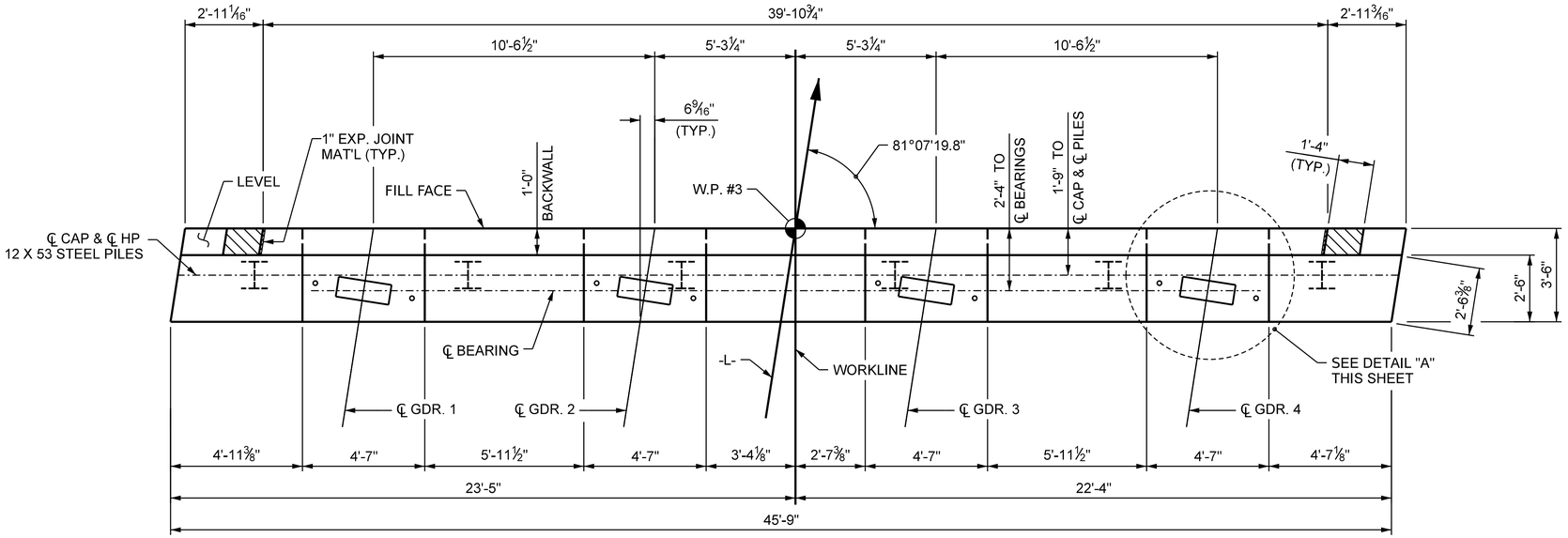
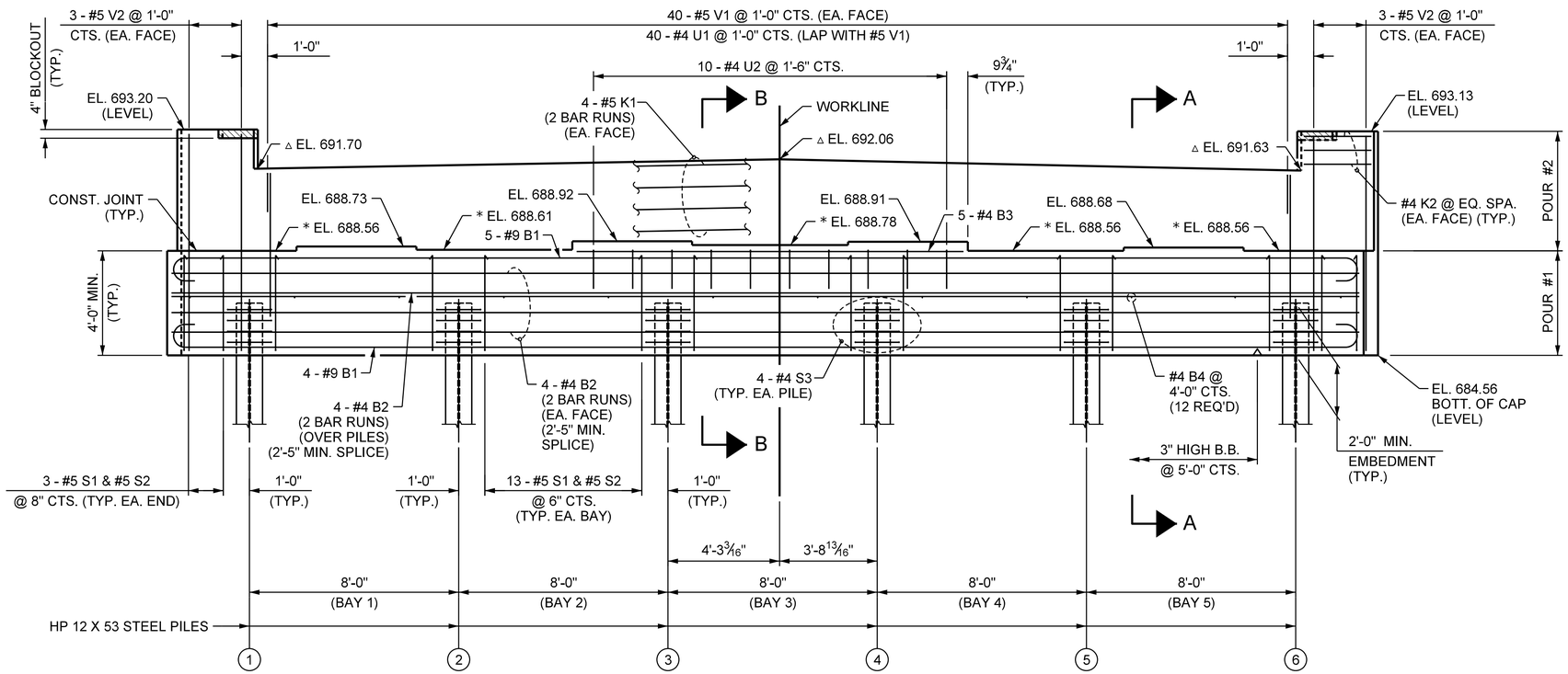
tklrschbaum

8/26/21



PLAN



ELE ATION

NOTES

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

△ ELEVATION TAKEN ALONG FILL FACE OF BACKWALL.

FOR BEARING DETAILS, SEE "ELASTOMERIC BEARING DETAILS" SHEET.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR SECTION A-A & PARTIAL SECTION B-B, SEE SHEET 3 OF 3.

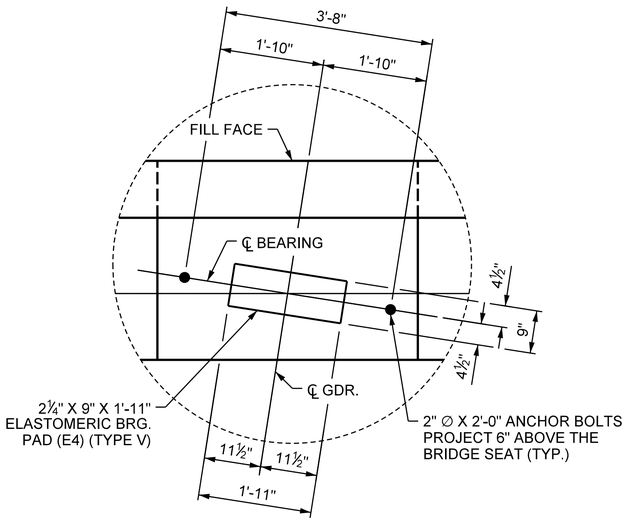
STIRRUPS AND "U" BARS MAY BE SHIFTED TO AVOID ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

DESIGN REINFORCEMENT CONNECTED TO END BENT FOR FACTORED STRAP LOAD OF 3.5 KIPS/ FT. ACTING 4'-6" ABOVE BOTTOM OF CAP ELEVATION. CAST REINFORCEMENT CONNECTORS INTO CAP AND MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN CONNECTORS AND REINFORCING STEEL.



DETAIL A

(TYP. EA. GIRDER)

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
PLAN & ELEVATION

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43896A78F64402...
9/5/2025

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

9/5/2025
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tklrschbaum

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NC LICENSE NO.: F-0105

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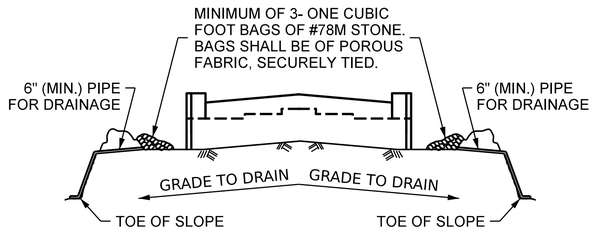
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			25

8/26/21

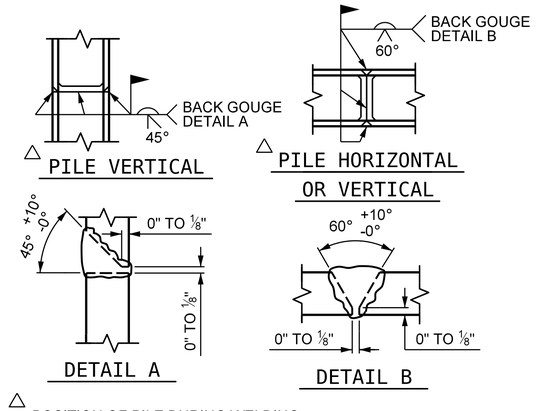


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

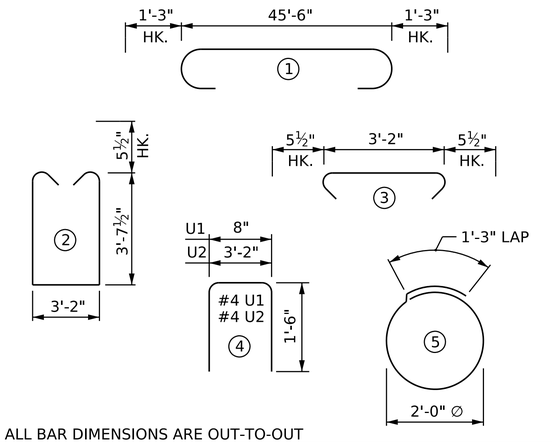
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

END BENT No. 1		END BENT No. 2	
HP 12 X 53 STEEL PILES		HP 12 X 53 STEEL PILES	
NO: 6	LIN. FT. 360	NO: 6	LIN. FT. 300

BILL OF MATERIAL

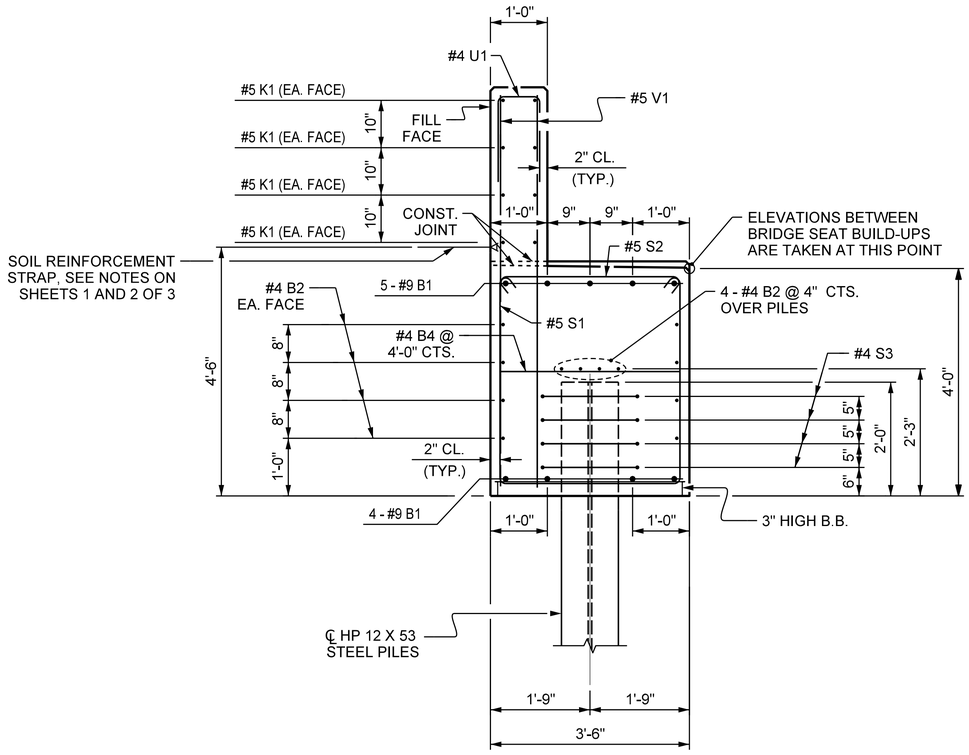
REINFORCING FOR ONE END BENT

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#9	1	48'-0"	1469
B2	24	#4	STR	23'-11"	383
B3	5	#4	STR	14'-9"	49
B4	12	#4	STR	3'-2"	25
K1	16	#4	STR	23'-11"	256
K2	12	#4	STR	2'-7"	21
S1	71	#5	2	11'-4"	839
S2	71	#5	3	4'-1"	302
S3	24	#4	5	6'-6"	104
U1	40	#4	4	3'-8"	98
U2	10	#4	4	6'-2"	41
V1	80	#5	STR	6'-8"	556
V2	12	#5	STR	8'-2"	102

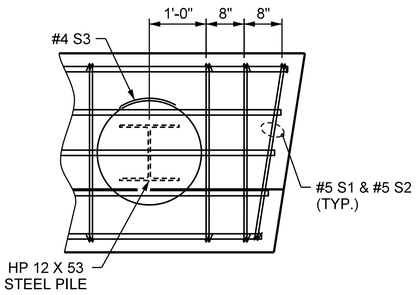
REINFORCING STEEL	4,245

CLASS "A" CONCRETE BREAKDOWN

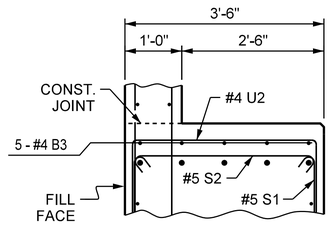
POUR #1 - CONCRETE CAP	24.5 C.Y.
POUR #2 - BACKWALL	5.8 C.Y.
TOTAL CLASS "A" CONCRETE	30.3 C.Y.



SECTION A-A



DETAIL "B"



PARTIAL SECTION B-B

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			25

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B96A78EF64402...
9/5/2025

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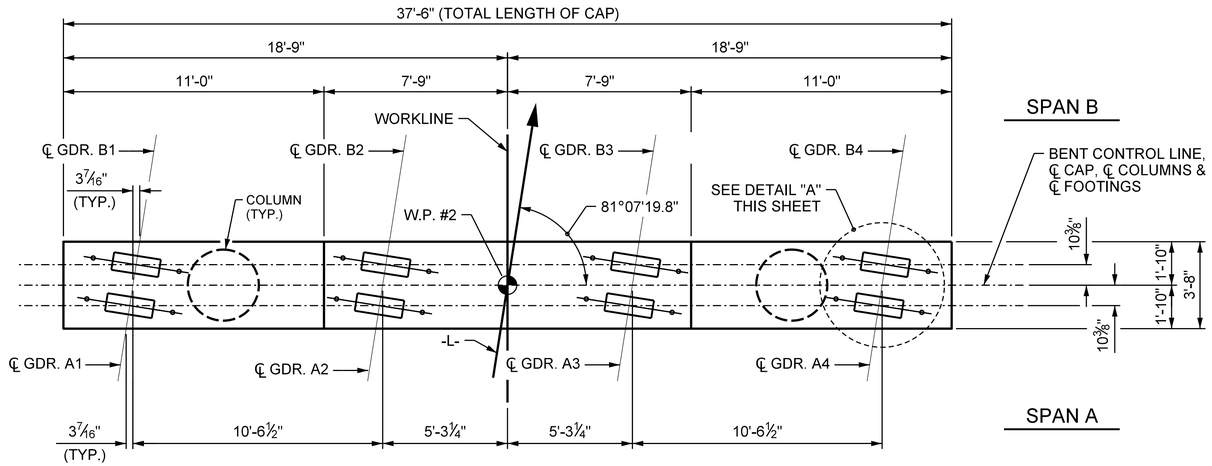
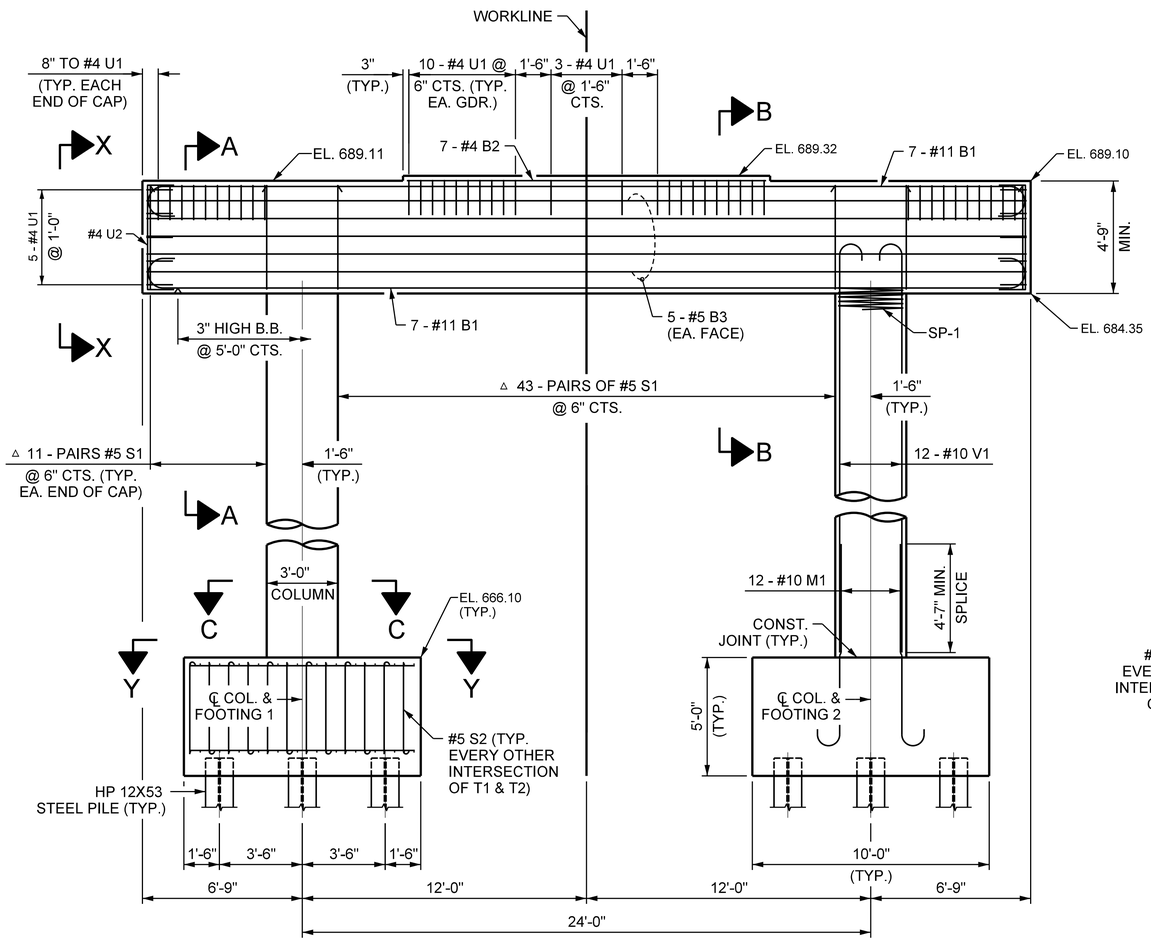
tklrschbaum

8/28/21

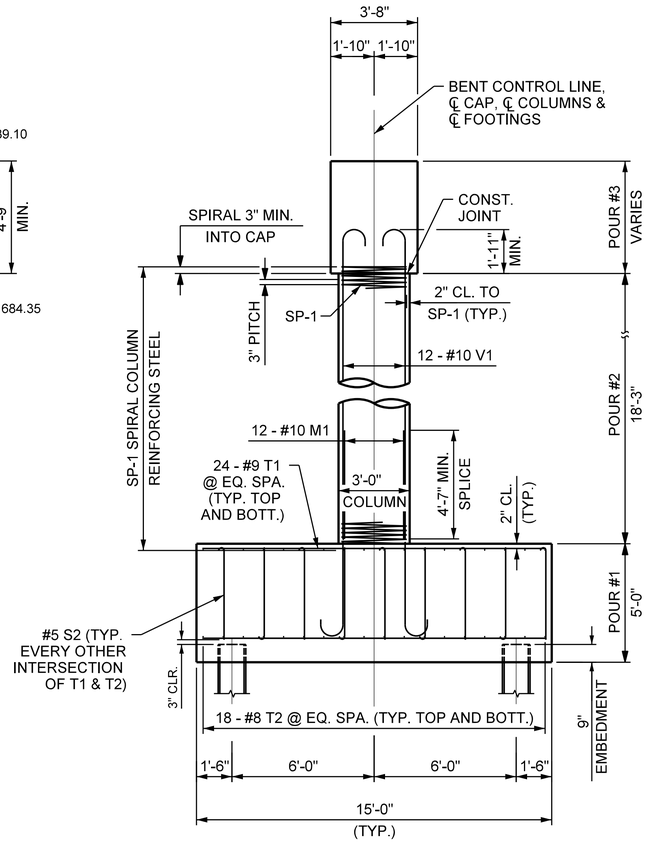


PLAN



ELE ATION

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



END ELE ATION

NOTES

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

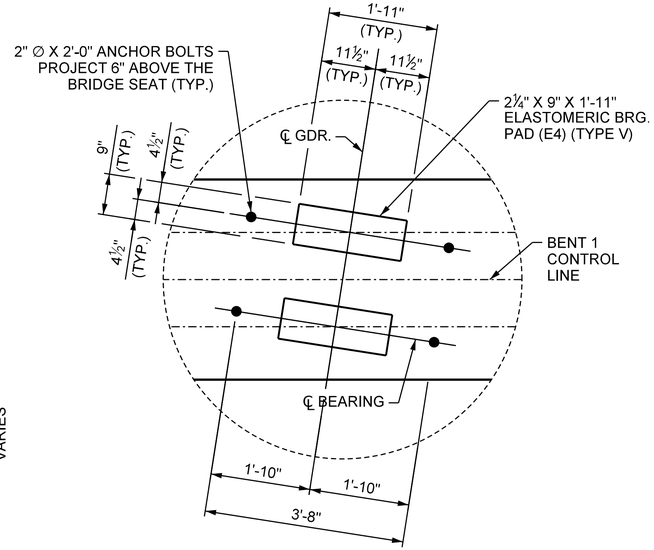
HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL

△ INVERT ALTERNATE STIRRUPS.

FOR VIEWS X-X AND Y-Y, SEE SHEET 2 OF 2.

FOR SECTIONS A-A, B-B AND C-C, SEE SHEET 2 OF 2.

CONCRETE WITH MINIMUM 28 DAY STRENGTH OF 4,500 PSI 28 DAY SHALL BE USED FOR THE FOOTINGS.



DETAIL A

(TYP. EA. GIRDER)

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1
PLAN & ELEVATION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			25

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tkirschbaum

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NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E. Aguilar 43B96A7EEF64402...
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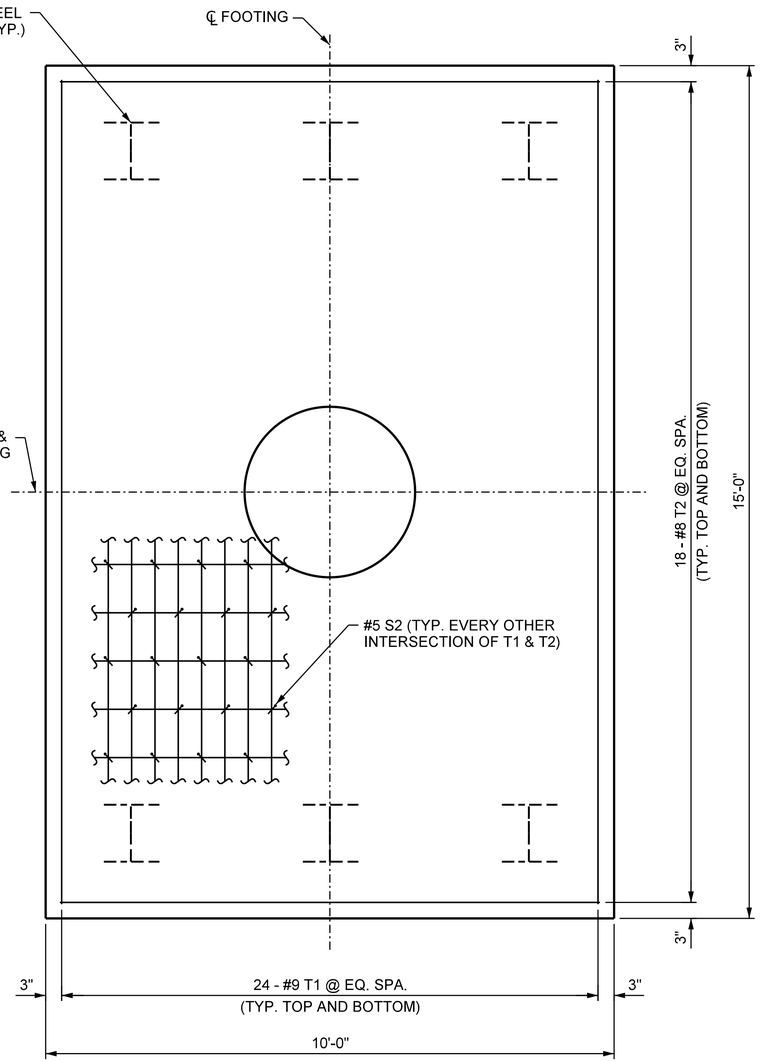
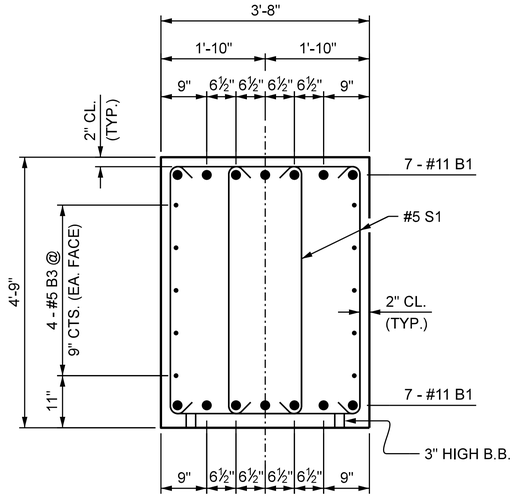
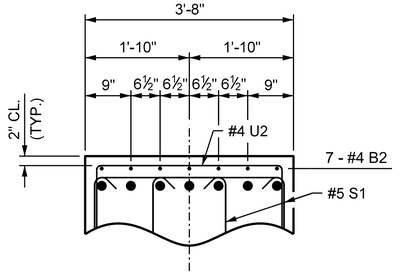


VIEW Y-Y

TYP. EACH FOOTING

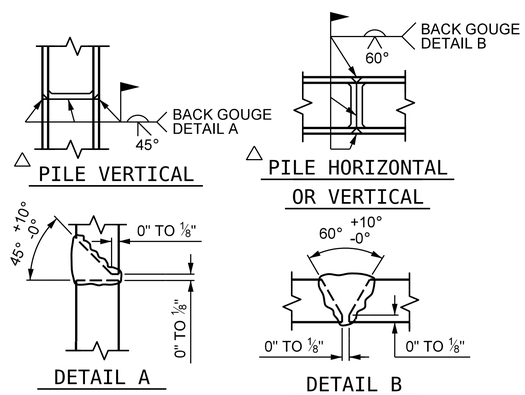


SECTION A-A



PARTIAL SECTION B-B

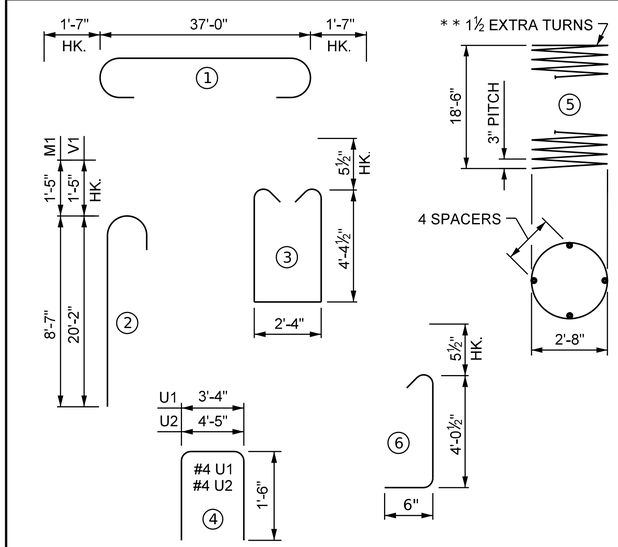
SEE SECTION A-A FOR INFORMATION NOT SHOWN



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

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

* * NOT REQUIRED AT CONSTRUCTION JOINT BETWEEN COLUMN AND DRILLED PIER.

BILL OF MATERIAL

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#11	1	40'-2"	2988
B2	7	#4	STR	15'-2"	71
B3	10	#5	STR	37'-2"	388
M1	24	#10	2	10'-0"	1033
S1	130	#5	3	12'-0"	1627
S2	432	#5	6	5'-0"	2253
T1	48	#9	STR	14'-8"	2394
T2	36	#8	STR	9'-8"	929
U1	53	#4	4	6'-4"	225
U2	6	#4	4	7'-5"	30
V1	24	#10	2	21'-7"	2229
REINFORCING STEEL					14,167
SP-1	2	*	5	637'-0"	851
SPIRAL COLUMN REINFORCING STEEL					851

CLASS AA (4,500 PSI) CONCRETE BREAKDOWN

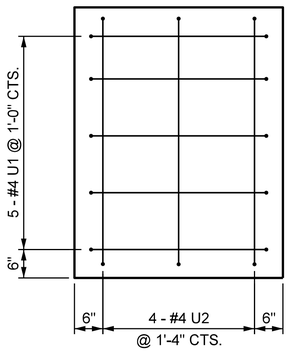
POUR #1 - FOOTINGS	55.6 C.Y.
TOTAL CLASS AA (4,500 PSI) CONCRETE	55.6 C.Y.

CLASS "A" CONCRETE BREAKDOWN

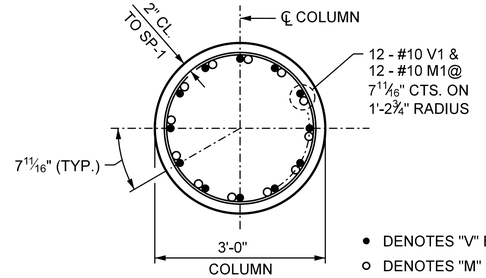
POUR #2 - COLUMNS	9.6 C.Y.
POUR #3 - CAP	24.7 C.Y.
TOTAL CLASS "A" CONCRETE	34.3 C.Y.

HP 12 X 53 STEEL PILES

TOTAL NO: 12	LIN. FT. 300



VIEW X-X



SECTION C-C

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 1 DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43896A78EF64402...
9/5/2025

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			25

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NC LICENSE NO.: F-0105

DRAWN BY :	T. KIRSCHBAUM	DATE :	05/2025
CHECKED BY :	S. AGUILAR	DATE :	05/2025
DESIGN ENGINEER OF RECORD:	S. AGUILAR	DATE :	05/2025

9/5/2025
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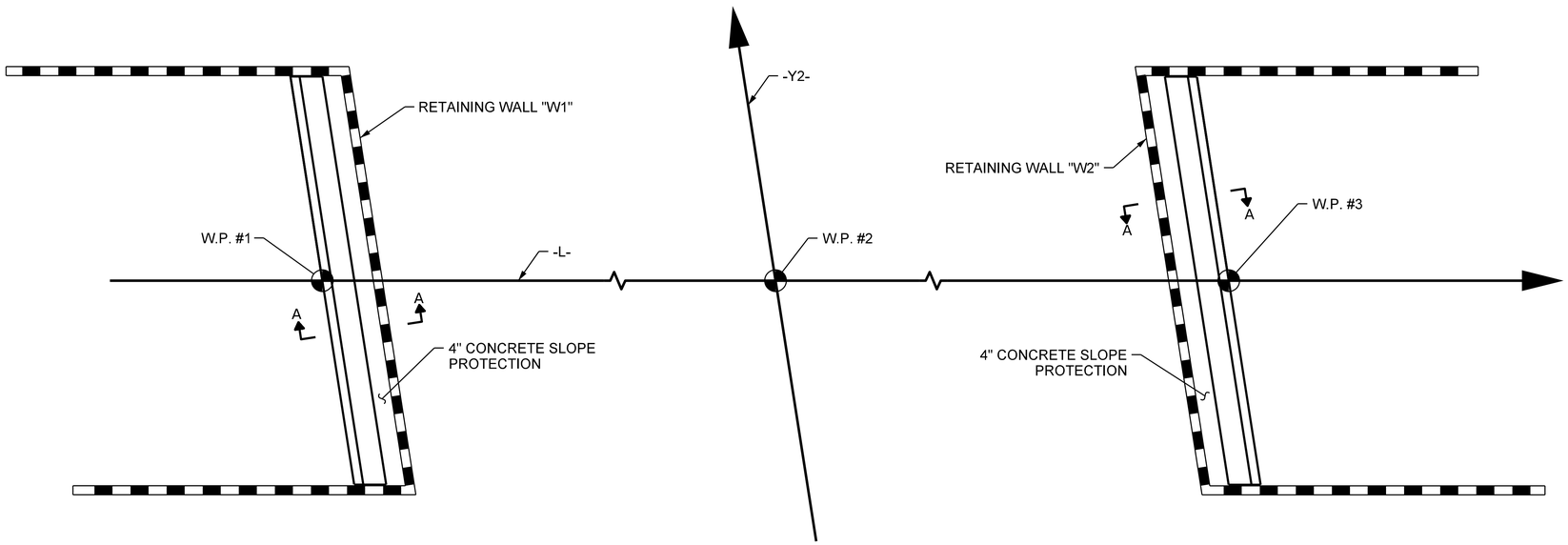
tkirschbaum

8/26/21



PLAN

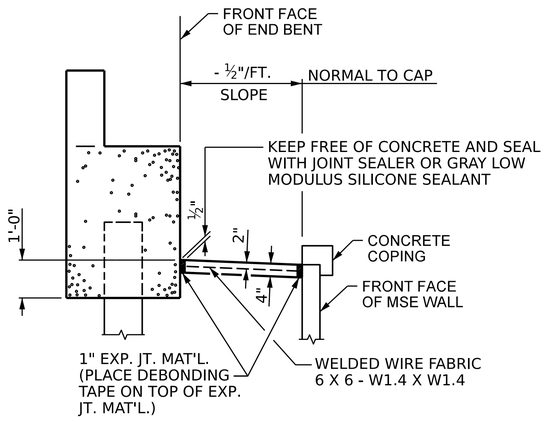
SEE WALL ENVELOPE SHEETS FOR WALL EXTENTS NOT SHOWN IN THIS SHEET

NOTES

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

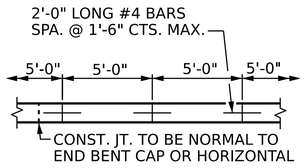
BRIDGE @ STA. 20+96.07 -L-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	11	50
END BENT 2	11	50

* QUANTITY SHOWN IS BASED ON 5' POURS.

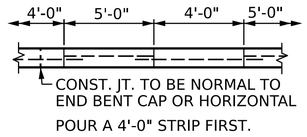


SECTION A-A

SEE "MSE RETAINING WALL" SHEETS FOR ELEVATIONS



POURING DETAIL



OPTIONAL POURING DETAIL

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			25

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E Aguilar

Signed by: Santiago E Aguilar 43B96A78EF64402...
9/5/2025

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NC LICENSE NO.: F-0105

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

9/5/2025
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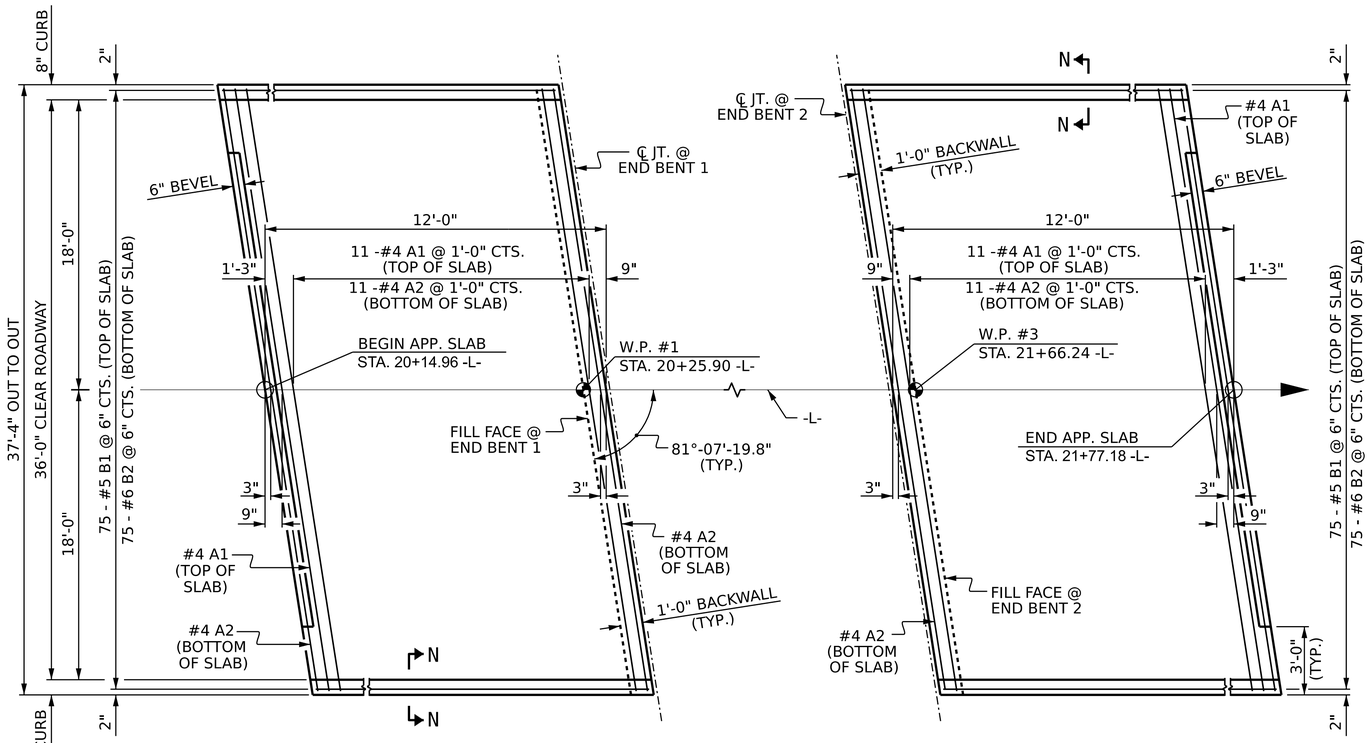
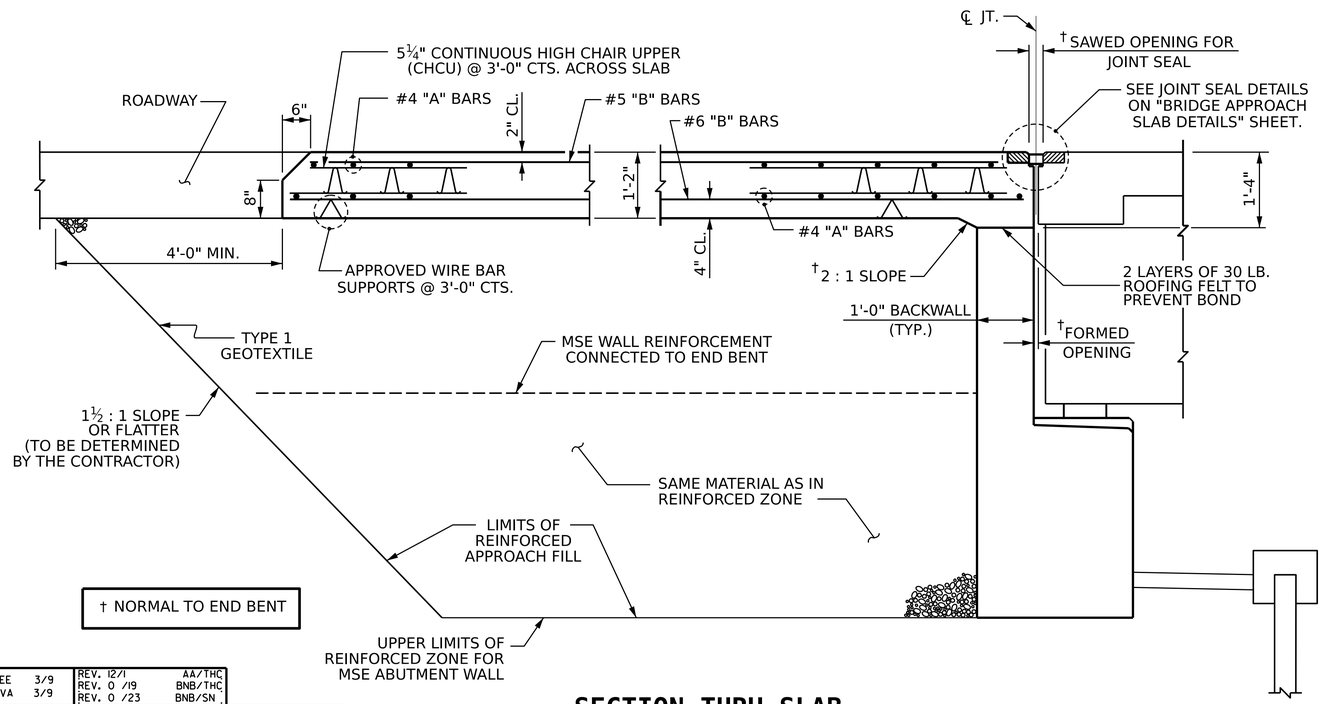
tkirschbaum

8/26/21



DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



SECTION THRU SLAB

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 2".

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL

APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	12	#4	STR	37'-5"	300
A2	13	#4	STR	37'-5"	325
*B1	75	#5	STR	11'-2"	874
B2	75	#6	STR	11'-8"	1314

REINFORCING STEEL	LBS.	1,639
* EPOXY COATED REINFORCING STEEL	LBS.	1,174
CLASS AA CONCRETE	C. Y.	19.7

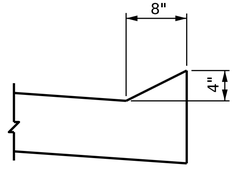
APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	12	#4	STR	37'-5"	300
A2	13	#4	STR	37'-5"	325
*B1	75	#5	STR	11'-2"	874
B2	75	#6	STR	11'-8"	1314

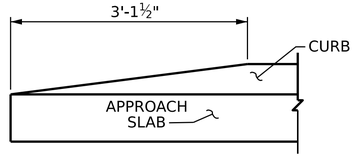
REINFORCING STEEL	LBS.	1,639
* EPOXY COATED REINFORCING STEEL	LBS.	1,174
CLASS AA CONCRETE	C. Y.	19.7

SPLICE LENGTHS

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



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

DRAWN BY : EE 3/9	REV. 12/1	AA/THC	
CHECKED BY : VA 3/9	REV. 0 /19	BNB/THC	
	REV. 0 /23	BNB/SN	

DRAWN BY :	T. KIRSCHBAUM	DATE : 05/2025
CHECKED BY :	S. AGUILAR	DATE : 05/2025
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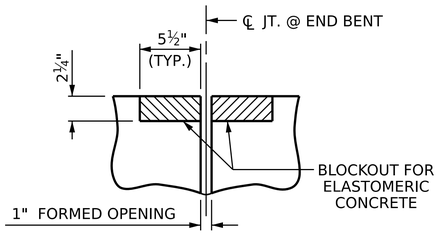
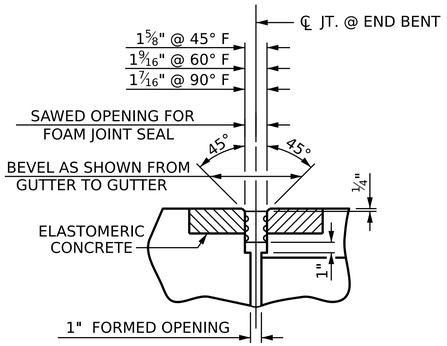
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			25

STD. NO. BAS2 Sheet 01

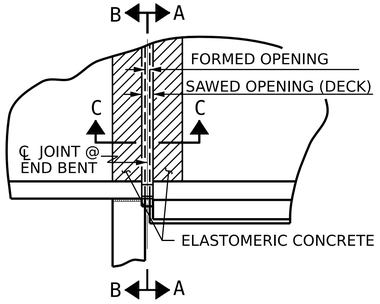
8/26/21



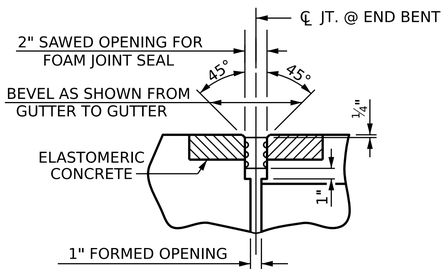
SECTION C-C
FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC
CONCRETE DIMENSIONS)



SECTION C-C
FOAM JOINT SEAL
(EXPANSION)



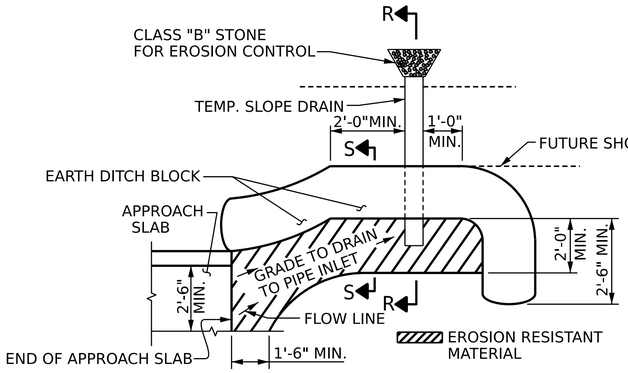
PLAN



SECTION C-C
FOAM JOINT SEAL
(FIXED)

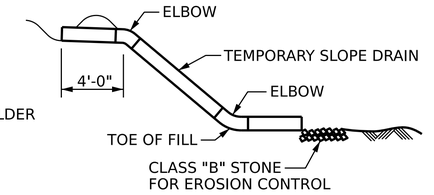
ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	0.2
2	0.2
TOTAL	0.4

* BASED ON THE MINIMUM BLOCKOUT SHOWN.

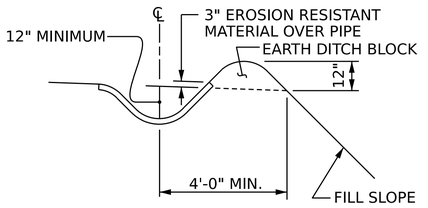


NOTE:
IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW



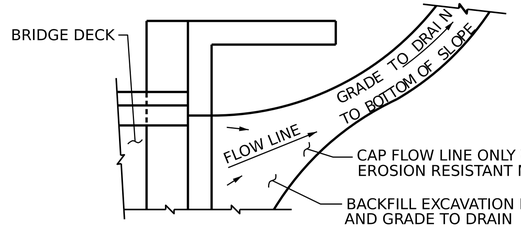
SECTION R-R



SECTION S-S

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

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

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

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

NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43896A78EF64402...
9/5/2025

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

DRAWN BY : FC 11/88
CHECKED BY : ARB 11/88

REV. /13 AA/G
REV. 12/1 AA/THC
REV. /18 AA/THC

9/5/2025
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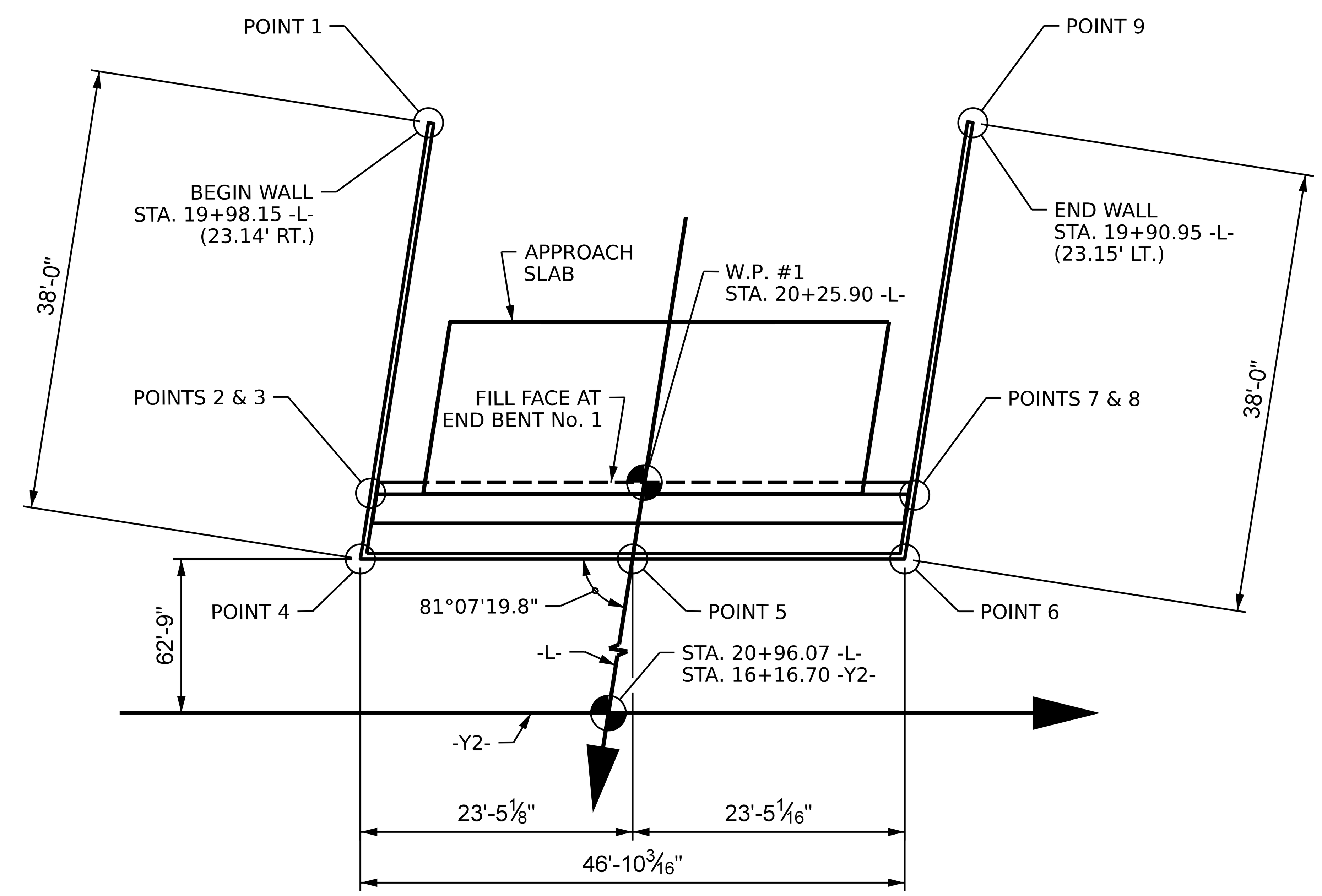
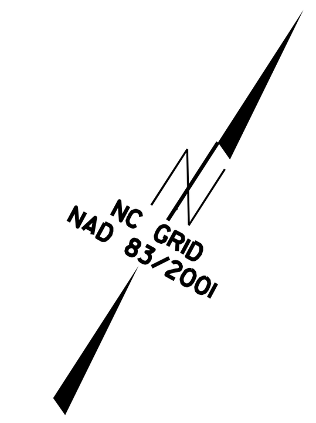
tkirschbaum

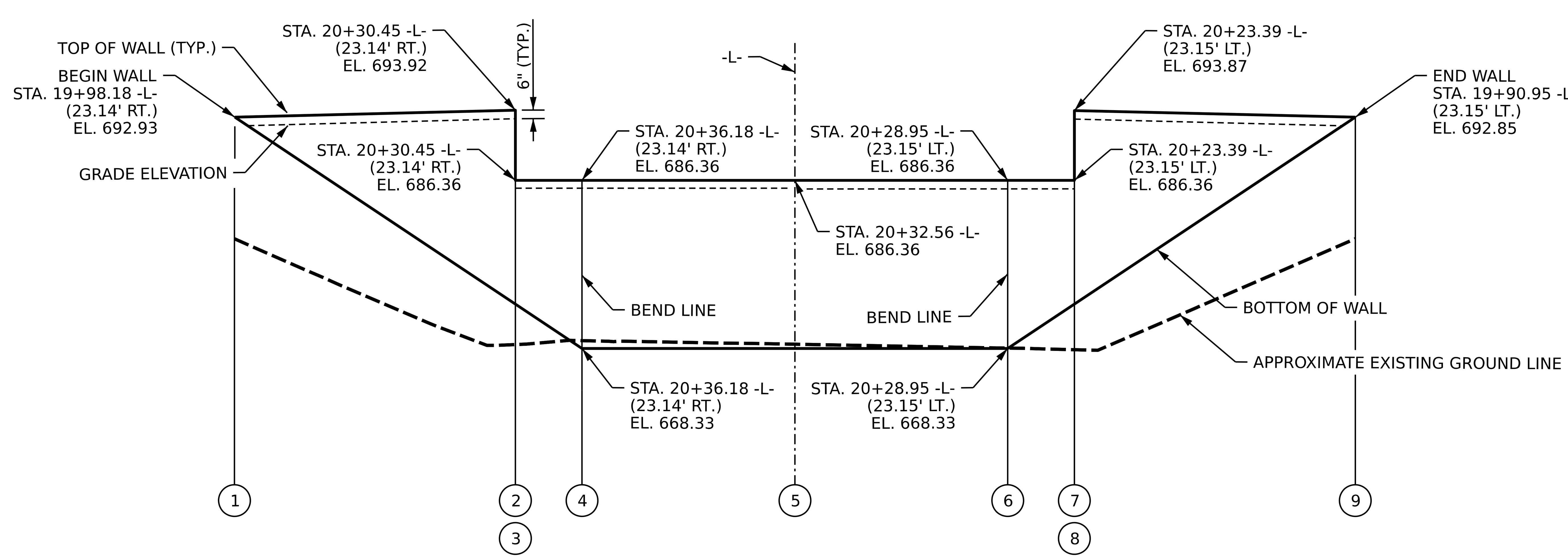
STD. BAS4 Sht. 01

8/26/21





RETAINING WALL W1 PLAN - END BENT 1 MSE WALL



RETAINING WALL W1 ELEV. - END BENT 1 MSE WALL

STATIONS AND OFFSETS TAKEN AT FRONT FACE OF WALL
ELEVATIONS TAKEN AT TOP OF COPING

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RETAINING WALL W1
WALL PLAN AND ENVELOPE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 46232 Santiago E. Aguilar

Signed by: Santiago E. Aguilar
43B96A78EF64402
9/5/2025

REVISIONS

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

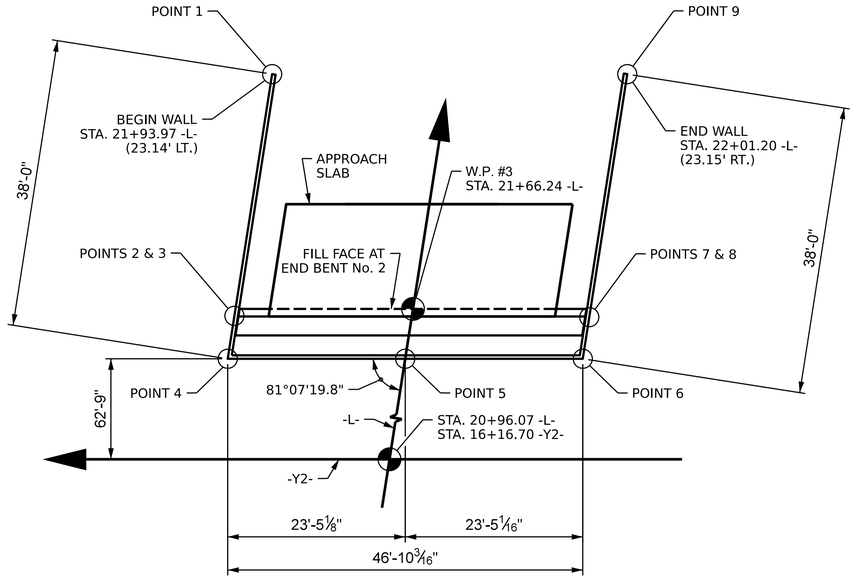
SHEET NO. W-1
TOTAL SHEETS 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

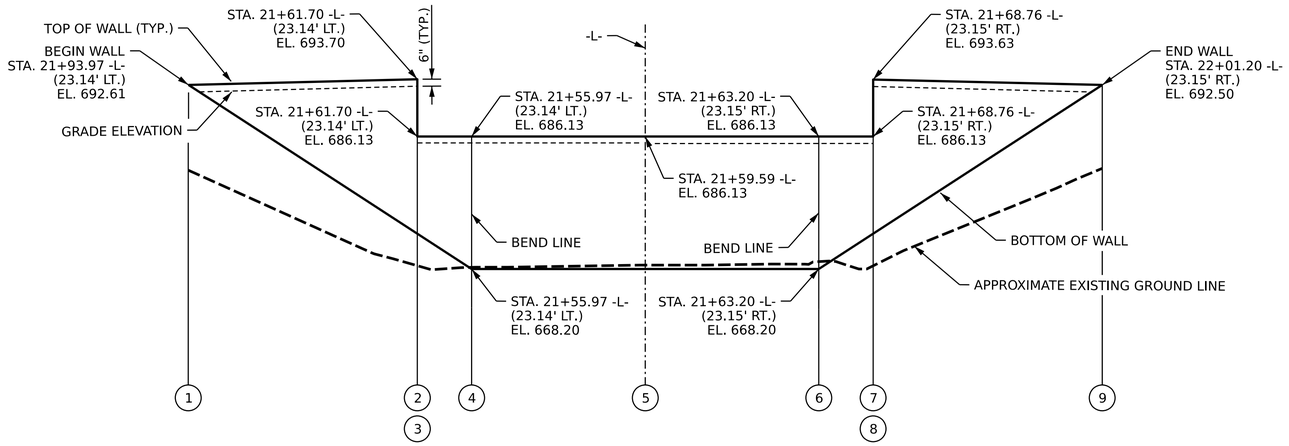
moffatt & nichol
4700 FALLS OF NEUSE ROAD, SUITE 300
RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 VOICE (919) 781-4869 FAX
NC LICENSE NO.: F-0105

DRAWN BY :	T. KIRSCHBAUM	DATE :	05/2025
CHECKED BY :	S. AGUILAR	DATE :	05/2025
DESIGN ENGINEER OF RECORD:	S. AGUILAR	DATE :	05/2025

8/26/21



RETAINING WALL W2 PLAN - END BENT 2 MSE WALL



RETAINING WALL W2 ELEV. - END BENT 2 MSE WALL

STATIONS AND OFFSETS TAKEN AT FRONT FACE OF WALL
ELEVATIONS TAKEN AT TOP OF COPING

PROJECT NO. BR-0098

ROCKINGHAM COUNTY

STATION: 20+96.07 -L-
16+16.70 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RETAINING WALL W2
WALL PLAN AND ENVELOPE

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

DRAWN BY : T. KIRSCHBAUM DATE : 05/2025
CHECKED BY : S. AGUILAR DATE : 05/2025
DESIGN ENGINEER OF RECORD: S. AGUILAR DATE : 05/2025

9/5/2025
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tkirschbaum

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NORTH CAROLINA PROFESSIONAL SEAL 46232 ENGINEER Santiago E. Aguilar

Signed by: Santiago E Aguilar 43B06A78EF64402...
9/5/2025

8/26/21

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

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

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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