09/08/99

CONTRACT: C204348 TIP PROJECT: R–2307B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA & IREDELL COUNTIES

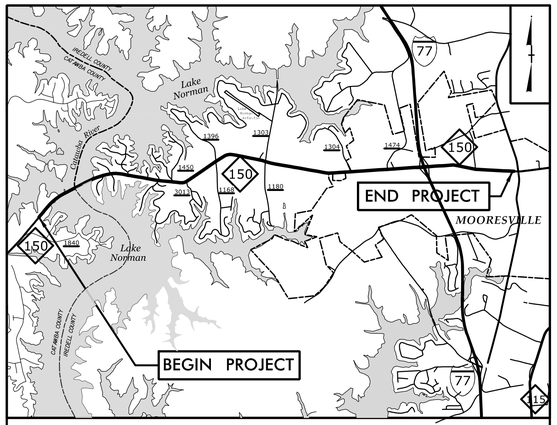
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2307B		75

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
37944.1.FR5	STP–0150(36)	PE (R–2307B)
50134.1.FS1	NHPP–077–1(221)37	PE (I–5717)
37944.2.4	STP–0150(036)	R/W (R–2307B)
37944.2.5	STP–0150(036)	UTILITIES (R–2307B)
50134.2.1	NHPP–077–1(221)37	R/W (I–5717)
37944.3.4	STP–0150(036)	CONST. (R–2307B)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOCATION: NC 150 FROM SR 1840 (GREENWOOD RD) IN CATAWBA COUNTY TO US 21 IN IREDELL COUNTY

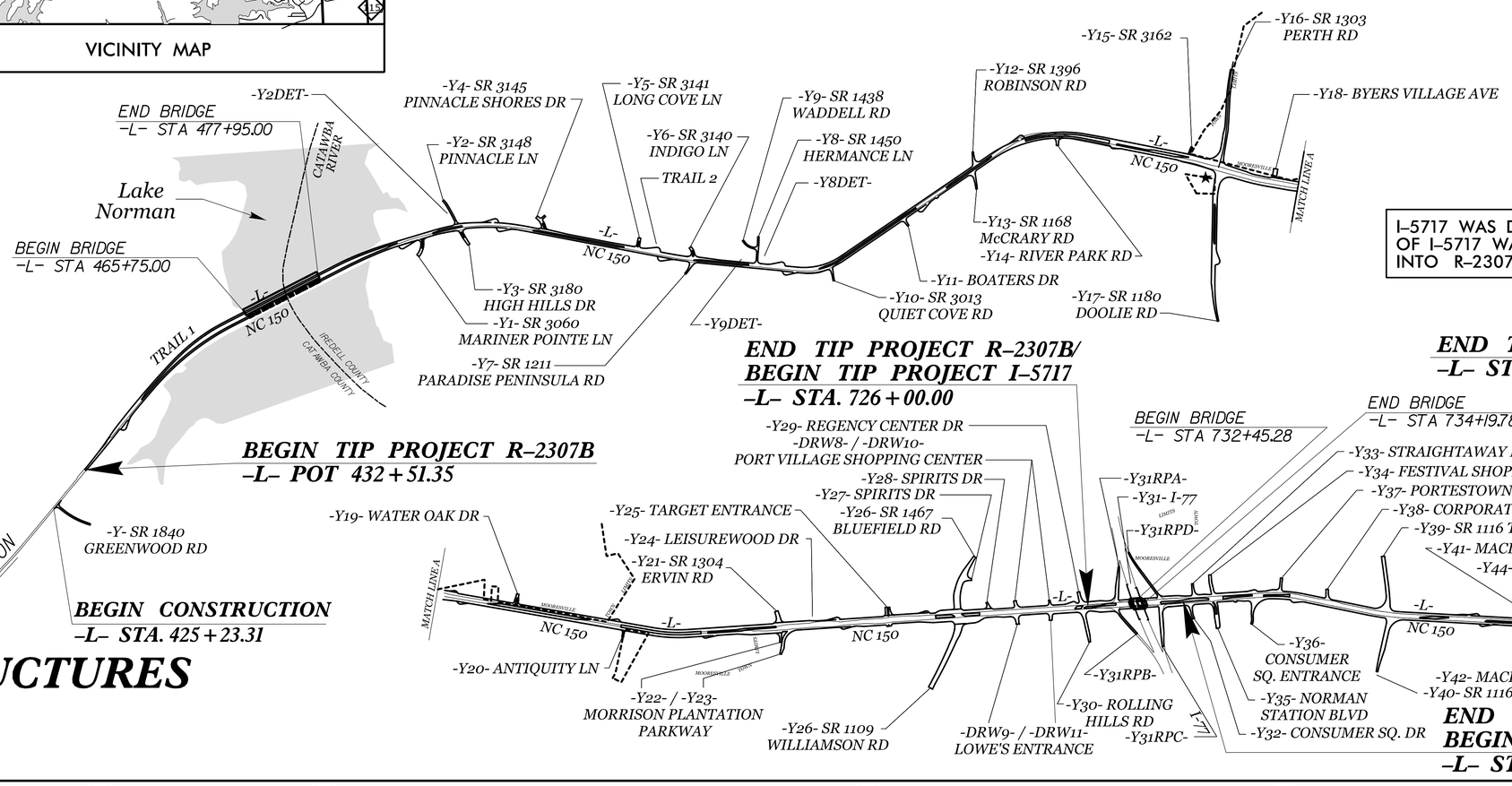
TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, AND SIGNALS



VICINITY MAP

NAD 83/NSRS 2007

I–5717 WAS DELETED. THE WORK OF I–5717 WAS INCORPORATED INTO R–2307B.



DESIGN DATA

ADT 2019	=	47,900
ADT 2039	=	58,860
K	=	8%
D	=	55%
T	=	6%*
V	=	**

* TTST 2%+ DUAL 4%
FUNC CLASS = PRINCIPAL ARTERIAL
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R–2307B	=	6.447 mile
LENGTH STRUCTURES TIP PROJECT R–2307B	=	0.231 mile
TOTAL LENGTH TIP PROJECT R–2307B	=	6.678 mile
LENGTH ROADWAY TIP PROJECT I–5717	=	0.232 mile
LENGTH STRUCTURES TIP PROJECT I–5717	=	0.033 mile
TOTAL LENGTH TIP PROJECT I–5717	=	0.265 mile
TOTAL LENGTH TIP PROJECT R–2307B / I–5717	=	6.943 mile

Prepared For:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610
By:
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F–0991

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 31, 2017

LETTING DATE: OCTOBER 15, 2024

KEVIN G. BAILEY, PE
PROJECT ENGINEER

DAVID STUTTS, PE
NCDOT CONTACT

STRUCTURES DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/21/2024

DocuSigned by: Kevin G. Bailey 4625EECDF7B4401...

SIGNATURE: P.E.

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

8/21/2024
R:\R-2307B\Structures\03 Ustation\06 100% R2 Bridge Plans\401_000_R2307B_SMU_TSH_000_I70380.dgn
stephey

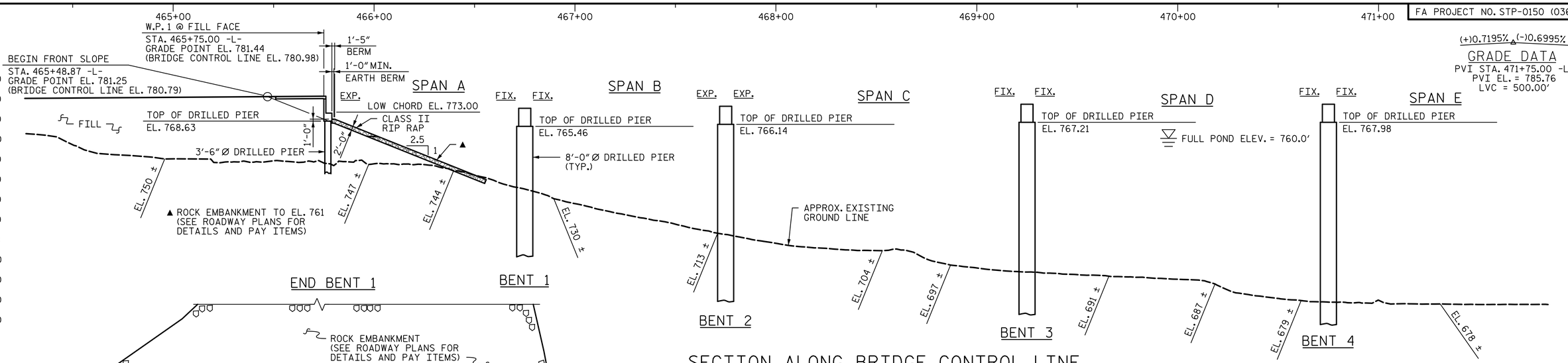
FA PROJECT NO. STP-0150 (036)

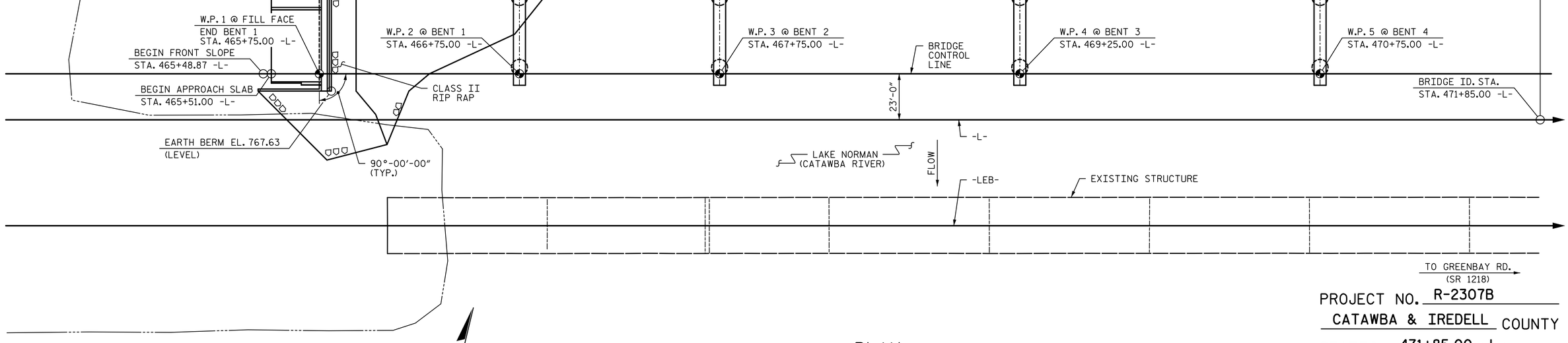
(+)0.7195% △ (-)0.6995%

GRADE DATA
PVI STA. 471+75.00 -L-
PVI EL. = 785.76
LVC = 500.00'

SECTION ALONG BRIDGE CONTROL LINE

(SECTIONS AT END BENTS AND BENTS ON RIGHT ANGLES)





PLAN

(DRILLED PIERS AT END BENTS NOT SHOWN FOR CLARITY)

HYDRAULIC DATA

(CATAWBA RIVER)

DESIGN DISCHARGE:	N/A
FREQUENCY OF DESIGN FLOOD:	N/A
DESIGN HIGH WATER ELEVATION:	760.0' (FULL POND)
DRAINAGE AREA:	1660 SQ. MI.
BASE DISCHARGE (Q100):	96,543 C.F.S.
BASE HIGH WATER ELEVATION:	760.3

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE:	N/A
FREQUENCY OF OVERTOPPING FLOOD:	N/A
OVERTOPPING FLOOD ELEVATION:	N/A

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS.

DRAWN BY : VKS DATE : 7-23
CHECKED BY : TRL DATE : 7-23
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 1 OF 6 BRIDGE NO. 170380

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
8/14/2024

STV ENGINEERS, INC
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
BRIDGE ON NC 150
OVER LAKE NORMAN
BETWEEN SR 1902 (HARVEL RD)
& SR 1218 (GREENBAY RD)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-01
1			3			TOTAL SHEETS
2			4			73

472+00 473+00 474+00 475+00 476+00 477+00 478+00 479+00

(+)0.7195% (-)0.6995%

GRADE DATA
PVI STA. 471+75.00 -L-
PVI EL. = 785.76
LVC = 500.00'

790 780 770 760 750 740 730 720 710 700 690 680 670

SPAN E — EXP. EXP. — TOP OF DRILLED PIER EL. 768.10 — 8'-0" Ø DRILLED PIER (TYP.) — BENT 5 — EL. 679 ± — EL. 679 ±

SPAN F — FIX. FIX. — TOP OF DRILLED PIER EL. 767.58 — FULL POND ELEV. = 760.0' — EL. 681 ± — EL. 686 ± — BENT 6

SPAN G — FIX. FIX. — TOP OF DRILLED PIER EL. 766.57 — BENT 7 — EL. 707 ±

SPAN H — TOP OF DRILLED PIER EL. 765.52 — EXP. FIX. — EL. 712 ± — BENT 8 — EL. 730 ±

APPROX. EXISTING GROUND LINE

SPAN I — LOW CHORD EL. 772.99 — CLASS II RIP RAP 2.5 — 1'-0" MIN. EARTH BERM — EXP. — TOP OF DRILLED PIER EL. 768.57 — 2'-0" — 3'-6" Ø DRILLED PIER — EL. 748 ± — EL. 749 ± — END BENT 2

W.P. 10 @ FILL FACE
STA. 477+95.00 -L-
GRADE POINT EL. 781.42
(BRIDGE CONTROL LINE EL. 780.96)

BEGIN FRONT SLOPE
STA. 478+21.24 -L-
GRADE POINT EL. 781.24
(BRIDGE CONTROL LINE EL. 780.78)

FILL — EL. 749 ±

▲ ROCK EMBANKMENT TO EL. 761 (SEE ROADWAY PLANS FOR DETAILS AND PAY ITEMS)

SECTION ALONG BRIDGE CONTROL LINE

(SECTIONS AT END BENTS AND BENTS ON RIGHT ANGLES)

TOTAL BRIDGE LENGTH = 1,220'-0" (FILL FACE END BENT 1 TO FILL FACE END BENT 2)

450'-0" (3 SPAN UNIT 2) — 150'-0" SPAN E
450'-0" (3 SPAN UNIT 3) — 150'-0" SPAN F — 150'-0" SPAN G — 150'-0" SPAN H
120'-0" (SIMPLE SPAN UNIT 4) — 120'-0" SPAN I

TO HARVEL RD. (SR 1902)

W.P. 6 @ BENT 5 STA. 472+25.00 -L-
W.P. 7 @ BENT 6 STA. 473+75.00 -L-
W.P. 8 @ BENT 7 STA. 475+25.00 -L-
W.P. 9 @ BENT 8 STA. 476+75.00 -L-

BRIDGE CONTROL LINE

23'-0"

-L-

FLOW

LAKE NORMAN (CATAWBA RIVER)

-LEB-

EXISTING STRUCTURE

ROCK EMBANKMENT (SEE ROADWAY PLANS FOR DETAILS AND PAY ITEMS)

EARTH BERM EL. 767.57 (LEVEL)

EL. 761

CLASS II RIP RAP

W.P. 10 @ FILL FACE
END BENT 2
STA. 477+95.00 -L-

BEGIN FRONT SLOPE
STA. 478+21.24 -L-

END APPROACH SLAB
STA. 478+19.00 -L-

90°-00'-00" (TYP.)

1'-0" EARTH BERM (TYP.)

TO GREENBAY RD. (SR 1218)

PLAN

(DRILLED PIERS AT END BENTS NOT SHOWN FOR CLARITY)

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS.

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 2 OF 6 BRIDGE NO. 170380

DRAWN BY : VKS DATE : 7-23
CHECKED BY : TRL DATE : 7-23
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: [signature]

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

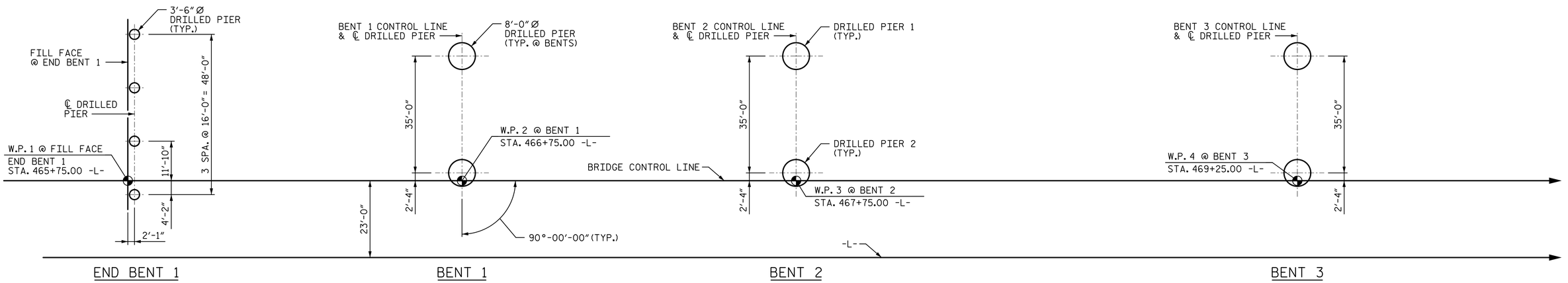
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

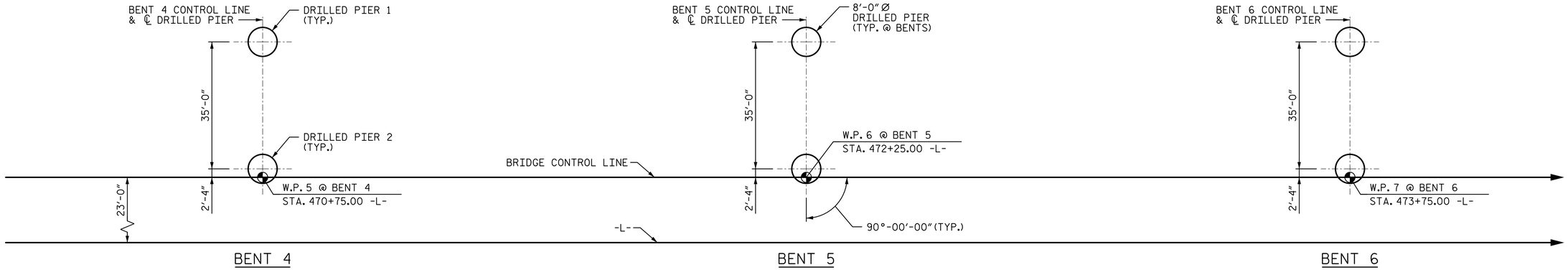
GENERAL DRAWING
BRIDGE ON NC 150 OVER LAKE NORMAN BETWEEN SR 1902 (HARVEL RD) & SR 1218 (GREENBAY RD)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-02
1			3			TOTAL SHEETS
2			4			73

R:\R-2307B\Structures\03 Ustation\06 100% R2 Bridge Plans\401_003_R2307B_SMU_GD_002_I70380.dgn 8/14/2024 1:47:56 PM stephev



FOUNDATION LAYOUT



FOUNDATION LAYOUT

NOTES:

1. FOR SCOUR CRITICAL ELEVATIONS, SEE "SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION" TABLE ON SHEET S1-05. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
2. FOR ADDITIONAL NOTES SEE SHEET 5 OF 6.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 6

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: Kevin G. Bailey

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

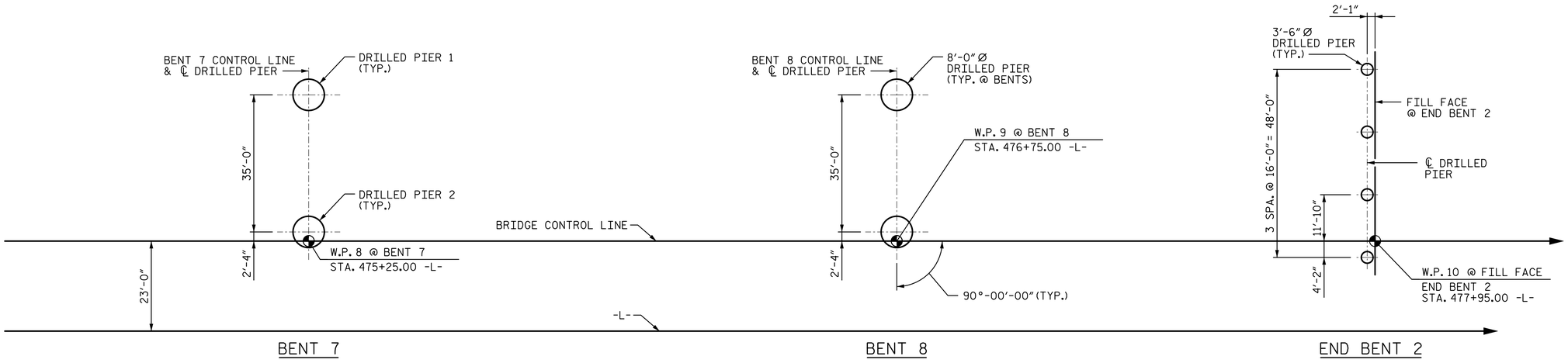
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-03
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : MBC	DATE : 8-23		



FOUNDATION LAYOUT

NOTES:

1. FOR SCOUR CRITICAL ELEVATIONS, SEE "SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION" TABLE ON SHEET S1-05. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
2. FOR ADDITIONAL NOTES SEE SHEET 5 OF 6.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 4 OF 6

DRAWN BY : VKS DATE : 8-23

CHECKED BY : MBC DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN G. BAILEY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

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900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-04
1			3			TOTAL SHEETS
2			4			73

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SUMMARY OF DRILLED PIER INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pier(s) #-# (e.g., "Bent 1, Piers 1-3")	Factored Resistance per Pier TONS	Minimum Pier Tip (Tip No Higher Than) Elev FT	Required Tip Resistance per Pier TSF	Scour Critical Elev FT	Minimum Drilled Pier Penetration Into Rock per Pier Lin FT	Drilled Pier Length per Pier Lin FT	Drilled Pier Length Not In Soil* per Pier Lin FT	Drilled Pier Length In Soil* per Pier Lin FT	Permanent Steel Casing Required? YES or MAYBE	Permanent Steel Casing Tip Elev (Elev Not To Extend Casing Below) FT	Permanent Steel Casing Length* per Pier Lin FT
End Bent No. 1 - Piers 1-2	315	679.5	20			89.0			YES	714.7	53.8
End Bent No. 1 - Piers 3-4	315	684.0	20			84.5			YES	729.1	39.4
Bent No. 1 - Pier 1	865	674.5	30	689.6		90.9			YES	690.6	74.8
Bent No. 1 - Pier 2	865	686.0	30	703.4		79.4			YES	704.4	61.0
Bent No. 2 - Pier 1	970	677.5	30	694.6		88.6			YES	695.6	70.5
Bent No. 2 - Pier 2	970	676.0	30	693.4		90.1			YES	694.4	71.7
Bent No. 3 - Pier 1	1,165	661.0	30	680.2		106.2			YES	681.2	86.0
Bent No. 3 - Pier 2	1,165	643.0	30	662.9		124.2			YES	663.9	103.3
Bent No. 4 - Pier 1	1,165	638.0	30	663.1		129.9			YES	664.1	103.8
Bent No. 4 - Pier 2	1,165	645.0	30	670.8		122.9			YES	671.8	96.1
Bent No. 5 - Pier 1	1,165	652.5	30	667.5		115.6			YES	668.5	99.6
Bent No. 5 - Pier 2	1,165	651.0	30	667.6		117.1			YES	668.6	99.5
Bent No. 6 - Pier 1	1,165	632.5	30	662.3		135.1			YES	663.3	104.3
Bent No. 6 - Pier 2	1,165	633.5	30	652.5		134.1			YES	653.5	114.1
Bent No. 7 - Pier 1	1,160	658.5	30	677.7		108.0			YES	678.7	87.8
Bent No. 7 - Pier 2	1,160	660.5	30	679.6		106.0			YES	680.6	85.9
Bent No. 8 - Pier 1	1,023	670.0	30	687.0		95.5			YES	688	77.5
Bent No. 8 - Pier 2	1,023	665.5	30	682.9		100.0			YES	683.9	81.6
End Bent No. 2 - Piers 1-2	355	647.5	20			121.0			YES	689.3	79.2
End Bent No. 2 - Piers 3-4	355	663.0	20			105.5			YES	708.1	60.4
TOTAL QTY:						2543.6					1883.1

***Drilled Pier Length, Drilled Pier Length Not in Soil and Drilled Pier Length in Soil represent estimated drilled pier quantities and are measured and paid for as either "____ Dia. Drilled Piers" or "____ Dia. Drilled Piers Not in Soil" and "____ Dia. Drilled Piers in Soil" in accordance with Article 411-7 of the NCDOT Standard Specifications.**

****Permanent Steel Casing Length equals the difference between the ground line or top of drilled pier elevation, whichever is higher, and the permanent casing tip elevation and is measured and paid for as "Permanent Steel Casting for ____ Dia. Drilled Pier" in accordance with Article 411-7 of the NCDOT Standard Specifications.**

SUMMARY OF DRILLED PIER TESTING

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pier(s) #-# (e.g., "Bent 1, Piers 1-3")	Standard Penetration Test (SPT) Required? YES or MAYBE	Crosshole Sonic Logging (CSL) Required?* YES or MAYBE	Total CSL Tube Length (For All Tubes) per Pier Lin FT	Shaft Inspection Device (SID) Required? YES or MAYBE	Thermal Integrity Profiler Test (TIP) Required? YES or MAYBE
End Bent No. 1 - Piers 1-2		Yes	362	Yes	Yes
End Bent No. 1 - Piers 3-4		Yes	344	Yes	Yes
Bent No. 1 - Pier 1		Yes	739	Yes	Yes
Bent No. 1 - Pier 2		Yes	647	Yes	Yes
Bent No. 2 - Pier 1		Yes	721	Yes	Yes
Bent No. 2 - Pier 2		Yes	733	Yes	Yes
Bent No. 3 - Pier 1		Yes	862	Yes	Yes
Bent No. 3 - Pier 2		Yes	1006	Yes	Yes
Bent No. 4 - Pier 1		Yes	1051	Yes	Yes
Bent No. 4 - Pier 2		Yes	995	Yes	Yes
Bent No. 5 - Pier 1		Yes	937	Yes	Yes
Bent No. 5 - Pier 2		Yes	949	Yes	Yes
Bent No. 6 - Pier 1		Yes	1093	Yes	Yes
Bent No. 6 - Pier 2		Yes	1085	Yes	Yes
Bent No. 7 - Pier 1		Yes	876	Yes	Yes
Bent No. 7 - Pier 2		Yes	860	Yes	Yes
Bent No. 8 - Pier 1		Yes	776	Yes	Yes
Bent No. 8 - Pier 2		Yes	812	Yes	Yes
End Bent No. 2 - Piers 1-2		Yes	490	Yes	Yes
End Bent No. 2 - Piers 3-4		Yes	428	Yes	Yes
TOTAL QTY:		24	17389	24	24

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

NOTES

1. The Drilled Pier Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by North Carolina Professional Engineer Michael H.Stephens (PE No. 028893) on 8/18/2023.

FOUNDATION NOTES

1) FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
2) PERMANENT (SEGMENTAL OR CONTINUOUS) STEEL CASINGS ARE REQUIRED FOR ALL DRILLED PIERS. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATIONS INDICATED ON THE TABLE WITHOUT PRIOR APPROVAL FROM THE ENGINEER. TELESCOPING CASING WILL NOT BE ALLOWED.
3) INSTALL PERMANENT STEEL CASINGS AT ALL DRILLED PIERS BY VIBRATING, SCREWING OR DRIVING PERMANENT CASINGS BEFORE EXCAVATING OR DISTURBING ANY MATERIAL BELOW THE PERMANENT CASING TIP ELEVATION INDICATED IN THE TABLE.
4) PERMANENT CASING MINIMUM WALL THICKNESS IS 0.75 INCHES.
5) THERMAL INTEGRITY PROFILING IS REQUIRED FOR ALL DRILLED PIERS. FOR THERMAL INTEGRITY PROFILING, SEE THERMAL INTEGRITY PROFILER GEOTECHNICAL SPECIAL PROVISION.
6) DO NOT DEWATER DRILLED PIER EXCAVATIONS. CLEAN THE BOTTOM OF EXCAVATIONS WITH A SUBMERSIBLE PUMP OR AN AIRLIFT. WET PLACEMENT OF CONCRETE IS REQUIRED.
7) POLYMER SLURRY CONSTRUCTION IS REQUIRED FOR ALL DRILLED PIERS.
8) MAINTAIN POLYMER SLURRY LEVEL AT LEAST 8 FT ABOVE LAKE LEVEL FOR ALL DRILLED PIERS. HIGHER SLURRY LEVELS MAY BE REQUIRED.
9) CONSTRUCT ALL DRILLED PIERS WITHIN CAUSEWAY EMBANKMENT FOOTPRINT PRIOR TO CAUSEWAY CONSTRUCTION.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

DRAWN BY : HYJ DATE : 7-23

CHECKED BY : MBC DATE : 7-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

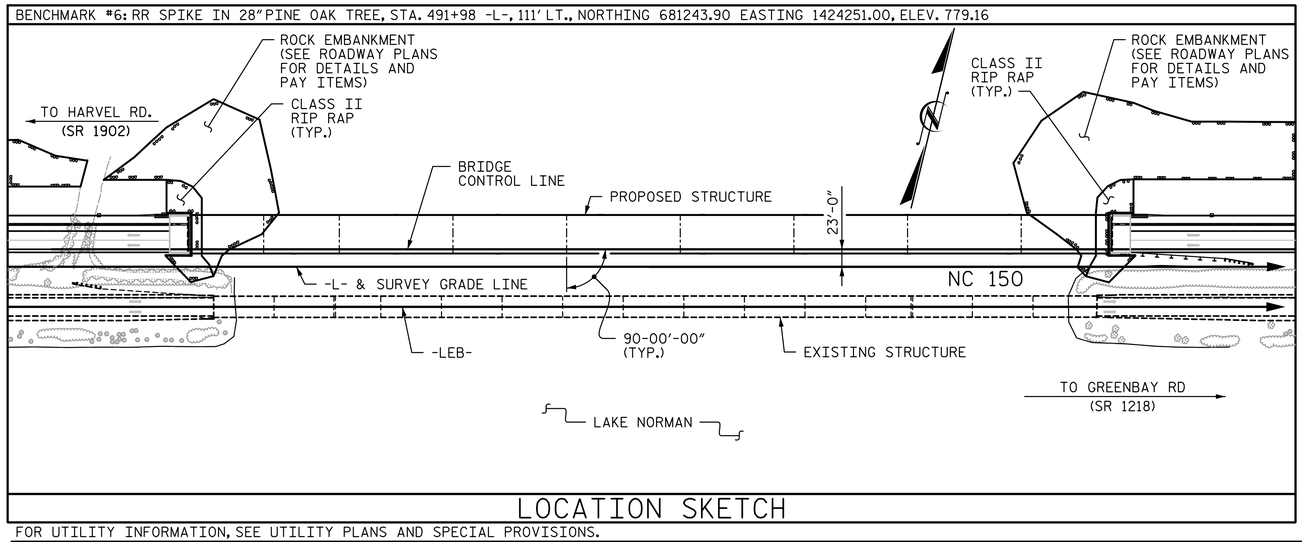
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

DRILLED PIER FOUNDATIONS TABLE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-05
1			3			TOTAL SHEETS
2			4			73



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

TOTAL BILL OF MATERIAL

	CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 471+85.00 -L-	8'-0" DIA. DRILLED PIERS	3'-6" DIA. DRILLED PIERS	PERMANENT STEEL CASING FOR 8'-0" DIA. DRILLED PIER	PERMANENT STEEL CASING FOR 3'-6" DIA. DRILLED PIER	SID INSPECTION	CSL TESTING	REINFORCED CONCRETE DECK SLAB (SAND LIGHTWEIGHT CONC)	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	TWO BAR METAL RAIL	CONCRETE BARRIER RAIL	VERTICAL CONCRETE BARRIER RAIL	1'-2" X 2'-6" CONCRETE PARAPET	RIP RAP CLASS II (2'-0" THICK)
	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	EA.	EA.	SQ. FT.	SQ. FT.	CU. YD.	LUMP SUM	LBS.	LBS.	LIN. FT.	LIN. FT.	LIN. FT.	LIN. FT.	TON
SUPERSTRUCTURE	LUMP SUM							62,008	41,729		LUMP SUM			1,260.50	1,237.75	1,268.25	1,267.75	
END BENT 1			347.0		186.4	4	4			85.8		78,766	7,679					608
BENT 1		170.3		135.8		2	2			92.0		68,782	9,779					
BENT 2		178.7		142.2		2	2			92.0		70,950	10,258					
BENT 3		230.4		189.3		2	2			92.1		84,083	13,215					
BENT 4		252.8		199.9		2	2			92.0		89,822	14,506					
BENT 5		232.7		199.1		2	2			92.0		84,721	13,346					
BENT 6		269.2		218.4		2	2			92.1		93,179	15,434					
BENT 7		214.0		173.7		2	2			92.0		79,919	12,283					
BENT 8		195.5		159.1		2	2			92.0		75,200	11,218					
END BENT 2			453.0		279.2	4	4			87.0		94,463	9,992					563
TOTAL	LUMP SUM	1,743.6	800.0	1,417.5	465.6	24	24	62,008	41,729	909.0	LUMP SUM	819,885	117,710	1,260.50	1,237.75	1,268.25	1,267.75	1,171

TOTAL BILL OF MATERIAL (CONT'D.)

	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	16" WATER LINE PIPE & SUSPENSION SYSTEM	MODIFIED 74" PRESTRESSED CONCRETE GIRDERS		THERMAL INTEGRITY PROFILER
	SY.	LUMP SUM	LUMP SUM	LUMP SUM	NO.	LIN. FT.	EA.
SUPERSTRUCTURE		LUMP SUM	LUMP SUM	LUMP SUM	63	8,502.08	
END BENT 1	675						4
BENT 1							2
BENT 2							2
BENT 3							2
BENT 4							2
BENT 5							2
BENT 6							2
BENT 7							2
BENT 8							2
END BENT 2	625						4
TOTAL	1,300	LUMP SUM	LUMP SUM	LUMP SUM	63	8,502.08	24

SAMPLE BAR REPLACMENT

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

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

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SAND LIGHTWEIGHT CONCRETE, SEE SPECIAL PROVISIONS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

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

FOR SECURING OF VESSELS, SEE SPECIAL PROVISIONS.

FOR MASS CONCRETE, SEE SPECIAL PROVISIONS.

FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 471+85.00 -L-, SEE SPECIAL PROVISIONS.

GENERAL NOTES:

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

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR FOUNDATION NOTES, SEE "DRILLED PIER FOUNDATION TABLE" SHEET.

FOR ROCK EMBANKMENT AND CORE MATERIAL IN AREAS OF END BENTS, SEE ROADWAY PLANS.

WORK ON END BENTS SHALL NOT BE STARTED UNTIL APPROACH ROCK EMBANKMENT AND CORE MATERIAL IN THE AREA OF END BENT PIERS HAVE BEEN PLACED.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."

PRESTRESSED CONCRETE DECK PANELS MAY NOT BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS.

FOR 16" WATERLINE PIPE AND SUSPENSION SYSTEM, SEE UTILITY SPECIAL PROVISIONS.

FOR MODIFIED 74" PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

THE SAND LIGHTWEIGHT 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.

SAMPLE BAR REPLACEMENT FOR FEDERAL AID PROJECTS

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 6 OF 6

DRAWN BY : VKS DATE : 8-23

CHECKED BY : MBC DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN BAILEY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
LOCATION SKETCH, GENERAL NOTES, AND TOTAL BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-06
1			3			TOTAL SHEETS
2			4			73

R:\R-2307B\Structures\03 Ustation\06 100% R2 Bridge Plans\401_01I_R2307B_SMU_GD_006_I70380.dgn 8/14/2024 1:48:07 PM stephev

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.38	---	1.75	0.69	1.57	B	I	49.13	0.79	1.77	A	I	18.98	0.80	0.69	1.38	B	I	49.13	
		HL-93 (OPERATING)	N/A		2.03	---	1.35	0.69	2.03	B	I	49.13	0.79	2.34	A	I	18.98	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.93	69.48	1.75	0.69	2.19	B	I	49.13	0.79	2.36	A	I	18.98	0.80	0.69	1.93	B	I	49.13	
		HS-20 (OPERATING)	36.000		2.84	102.24	1.35	0.69	2.84	B	I	49.13	0.79	3.11	A	I	18.98	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.58	61.83	1.40	0.69	6.51	B	I	49.13	0.79	7.58	A	I	18.98	0.80	0.69	4.58	B	I	49.13	
		SNGARBS2	20.000		3.31	66.20	1.40	0.69	4.71	B	I	49.13	0.79	5.27	A	I	18.98	0.80	0.69	3.31	B	I	49.13	
		SNAGRIS2	22.000		3.09	67.98	1.40	0.69	4.40	B	I	49.13	0.79	4.86	A	I	18.98	0.80	0.69	3.09	B	I	49.13	
		SNCOTTS3	27.250		2.27	61.86	1.40	0.69	3.23	B	I	49.13	0.79	3.67	A	I	18.98	0.80	0.69	2.27	B	I	49.13	
		SNAGGRS4	34.925		1.86	64.96	1.40	0.69	2.65	B	I	49.13	0.79	2.98	A	I	18.98	0.80	0.69	1.86	B	I	49.13	
		SNS5A	35.550		1.82	64.70	1.40	0.69	2.59	B	I	49.13	0.79	3.00	A	I	18.98	0.80	0.69	1.82	B	I	49.13	
		SNS6A	39.950		1.66	66.32	1.40	0.69	2.36	B	I	49.13	0.79	2.70	A	I	18.98	0.80	0.69	1.66	B	I	49.13	
		SNS7B	42.000		1.58	66.36	1.40	0.69	2.24	B	I	49.13	0.79	2.63	A	I	18.98	0.80	0.69	1.58	B	I	49.13	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.02	66.66	1.40	0.69	2.87	B	I	49.13	0.79	3.27	A	I	18.98	0.80	0.69	2.02	B	I	49.13	
		TNT4A	33.075		2.02	66.81	1.40	0.69	2.87	B	I	49.13	0.79	3.19	A	I	18.98	0.80	0.69	2.02	B	I	49.13	
		TNT6A	41.600		1.64	68.22	1.40	0.69	2.33	B	I	49.13	0.79	2.78	A	I	18.98	0.80	0.69	1.64	B	I	49.13	
		TNT7A	42.000		1.64	68.88	1.40	0.69	2.33	B	I	49.13	0.79	2.73	A	I	18.98	0.80	0.69	1.64	B	I	49.13	
		TNT7B	42.000		1.67	70.14	1.40	0.69	2.38	B	I	49.13	0.79	2.58	A	I	18.98	0.80	0.69	1.67	B	I	49.13	
		TNAGRIT4	43.000		1.61	69.23	1.40	0.69	2.29	B	I	49.13	0.79	2.50	A	I	18.98	0.80	0.69	1.61	B	I	49.13	
		TNAGT5A	45.000		1.52	68.40	1.40	0.69	2.16	B	I	49.13	0.79	2.46	A	I	18.98	0.80	0.69	1.52	B	I	49.13	
		TNAGT5B	45.000	3	1.51	67.95	1.40	0.69	2.15	B	I	49.13	0.79	2.37	A	I	18.98	0.80	0.69	1.51	B	I	49.13	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.33	66.99	1.30	0.69	3.57	B	I	49.13	0.79	3.93	A	I	18.98	0.80	0.69	2.33	B	I	49.13	
		EV3	43.000	4	1.53	65.79	1.30	0.69	2.35	B	I	49.13	0.79	2.58	A	I	18.98	0.80	0.69	1.53	B	I	49.13	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

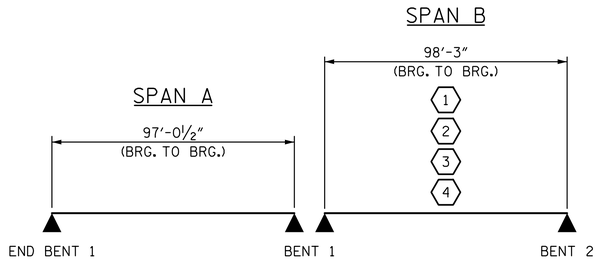
(3) LEGAL LOAD RATING **

(4) EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN BAILEY
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS UNIT 1
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-07
1			3			TOTAL SHEETS
2			4			73

STD. NO. LRFR1

DRAWN BY : MIG	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

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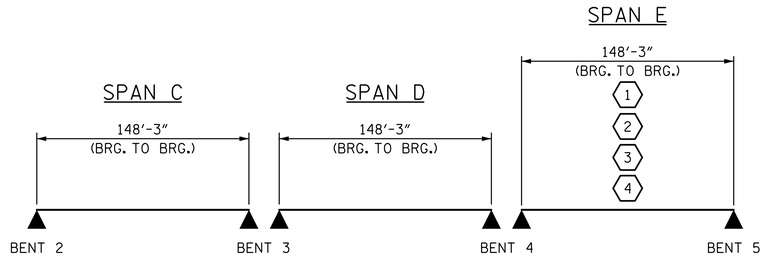
LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.19	---	1.75	0.68	1.56	E	EL	74.13	0.79	1.61	D	I	29.23	0.80	0.68	1.19	E	EL	74.13	
		HL-93 (OPERATING)	N/A		2.03	---	1.35	0.68	2.03	E	EL	74.13	0.79	2.17	D	I	29.23	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.85	66.60	1.75	0.68	2.44	E	EL	74.13	0.79	2.44	D	I	29.23	0.80	0.68	1.85	E	EL	74.13	
		HS-20 (OPERATING)	36.000		3.16	113.76	1.35	0.68	3.16	E	EL	74.13	0.79	3.25	D	I	29.23	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.58	61.83	1.40	0.68	7.55	E	EL	74.13	0.79	8.32	D	I	119.02	0.80	0.68	4.58	E	EL	74.13	
		SNGARBS2	20.000		3.23	64.60	1.40	0.68	5.33	E	EL	74.13	0.79	5.68	D	I	119.02	0.80	0.68	3.23	E	EL	74.13	
		SNAGRIS2	22.000		2.99	65.78	1.40	0.68	4.93	E	EL	74.13	0.79	5.19	D	I	29.23	0.80	0.68	2.99	E	EL	74.13	
		SNCOTTS3	27.250		2.27	61.86	1.40	0.68	3.75	E	EL	74.13	0.79	4.38	D	I	119.02	0.80	0.68	2.27	E	EL	74.13	
		SNAGGRS4	34.925		1.83	63.91	1.40	0.68	3.02	E	EL	74.13	0.79	3.29	D	I	29.23	0.80	0.68	1.83	E	EL	74.13	
		SNS5A	35.550		1.79	63.63	1.40	0.68	2.96	E	EL	74.13	0.79	3.20	D	I	29.23	0.80	0.68	1.79	E	EL	74.13	
		SNS6A	39.950		1.62	64.72	1.40	0.68	2.67	E	EL	74.13	0.79	2.86	D	I	119.02	0.80	0.68	1.62	E	EL	74.13	
		SNS7B	42.000		1.54	64.68	1.40	0.68	2.54	E	EL	74.13	0.79	2.70	D	I	29.23	0.80	0.68	1.54	E	EL	74.13	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.97	65.01	1.40	0.68	3.24	E	EL	74.13	0.79	3.60	D	I	29.23	0.80	0.68	1.97	E	EL	74.13	
		TNT4A	33.075		1.97	65.16	1.40	0.68	3.24	E	EL	74.13	0.79	3.40	D	I	29.23	0.80	0.68	1.97	E	EL	74.13	
		TNT6A	41.600		1.58	65.73	1.40	0.68	2.61	E	EL	74.13	0.79	2.84	D	I	29.23	0.80	0.68	1.58	E	EL	74.13	
		TNT7A	42.000		1.58	66.36	1.40	0.68	2.60	E	EL	74.13	0.79	2.88	D	I	29.23	0.80	0.68	1.58	E	EL	74.13	
		TNT7B	42.000		1.60	67.20	1.40	0.68	2.64	E	EL	74.13	0.79	2.72	D	I	119.02	0.80	0.68	1.60	E	EL	74.13	
		TNAGRIT4	43.000		1.55	66.65	1.40	0.68	2.55	E	EL	74.13	0.79	2.61	D	I	29.23	0.80	0.68	1.55	E	EL	74.13	
		TNAGT5A	45.000		1.47	66.15	1.40	0.68	2.42	E	EL	74.13	0.79	2.53	D	I	29.23	0.80	0.68	1.47	E	EL	74.13	
		TNAGT5B	45.000	3	1.46	65.70	1.40	0.68	2.41	E	EL	74.13	0.79	2.47	D	I	29.23	0.80	0.68	1.46	E	EL	74.13	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.26	64.98	1.30	0.68	4.02	E	EL	74.13	0.79	4.83	D	I	29.23	0.80	0.68	2.26	E	EL	74.13	
		EV3	43.000	4	1.50	64.50	1.30	0.68	2.66	E	EL	74.13	0.79	3.01	D	I	29.23	0.80	0.68	1.50	E	EL	74.13	



LRFR SUMMARY

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

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

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN G. BAILEY
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS UNIT 2
(NON-INTERSTATE TRAFFIC)

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-08
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : MIG	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

STD. NO. LRFR1

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT					
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.21	---	1.75	0.68	1.58	F	EL	74.13	0.79	1.61	F	I	29.23	0.80	0.68	1.21	F	EL	74.13	
		HL-93 (OPERATING)	N/A		2.04	---	1.35	0.68	2.04	F	EL	74.13	0.79	2.17	F	I	29.23	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.89	68.04	1.75	0.68	2.46	F	EL	74.13	0.79	2.44	F	I	119.02	0.80	0.68	1.89	F	EL	74.13	
		HS-20 (OPERATING)	36.000		3.19	114.84	1.35	0.68	3.19	F	EL	74.13	0.79	3.25	F	I	119.02	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.67	63.05	1.40	0.68	7.60	F	EL	74.13	0.79	8.32	F	I	29.23	0.80	0.68	4.67	F	EL	74.13	
		SNGARBS2	20.000		3.30	66.00	1.40	0.68	5.37	F	EL	74.13	0.79	5.67	F	I	29.23	0.80	0.68	3.30	F	EL	74.13	
		SNAGRIS2	22.000		3.05	67.10	1.40	0.68	4.97	F	EL	74.13	0.79	5.19	F	I	119.02	0.80	0.68	3.05	F	EL	74.13	
		SNCOTTS3	27.250		2.32	63.22	1.40	0.68	3.78	F	EL	74.13	0.79	4.38	F	I	29.23	0.80	0.68	2.32	F	EL	74.13	
		SNAGGRS4	34.925		1.87	65.31	1.40	0.68	3.04	F	EL	74.13	0.79	3.29	F	I	119.02	0.80	0.68	1.87	F	EL	74.13	
		SNS5A	35.550		1.83	65.06	1.40	0.68	2.98	F	EL	74.13	0.79	3.20	F	I	119.02	0.80	0.68	1.83	F	EL	74.13	
		SNS6A	39.950		1.65	65.92	1.40	0.68	2.69	F	EL	74.13	0.79	2.86	F	I	119.02	0.80	0.68	1.65	F	EL	74.13	
		SNS7B	42.000		1.57	65.94	1.40	0.68	2.56	F	EL	74.13	0.79	2.70	F	I	119.02	0.80	0.68	1.57	F	EL	74.13	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2	66.00	1.40	0.68	3.26	F	EL	74.13	0.79	3.60	F	I	119.02	0.80	0.68	2.00	F	EL	74.13	
		TNT4A	33.075		2.01	66.48	1.40	0.68	3.27	F	EL	74.13	0.79	3.40	F	I	29.23	0.80	0.68	2.01	F	EL	74.13	
		TNT6A	41.600		1.61	66.98	1.40	0.68	2.63	F	EL	74.13	0.79	2.84	F	I	119.02	0.80	0.68	1.61	F	EL	74.13	
		TNT7A	42.000		1.61	67.62	1.40	0.68	2.62	F	EL	74.13	0.79	2.88	F	I	119.02	0.80	0.68	1.61	F	EL	74.13	
		TNT7B	42.000		1.63	68.46	1.40	0.68	2.66	F	EL	74.13	0.79	2.72	F	I	119.02	0.80	0.68	1.63	F	EL	74.13	
		TNAGRIT4	43.000		1.58	67.94	1.40	0.68	2.57	F	EL	74.13	0.79	2.61	F	I	29.23	0.80	0.68	1.58	F	EL	74.13	
		TNAGT5A	45.000		1.50	67.50	1.40	0.68	2.44	F	EL	74.13	0.79	2.53	F	I	29.23	0.80	0.68	1.50	F	EL	74.13	
		TNAGT5B	45.000	3	1.49	67.05	1.40	0.68	2.43	F	EL	74.13	0.79	2.47	F	I	119.02	0.80	0.68	1.49	F	EL	74.13	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.31	66.41	1.30	0.68	4.05	F	EL	74.13	0.79	4.83	F	I	119.02	0.80	0.68	2.31	F	EL	74.13	
		EV3	43.000	4	1.53	65.79	1.30	0.68	2.68	F	EL	74.13	0.79	3.01	F	I	29.23	0.80	0.68	1.53	F	EL	74.13	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

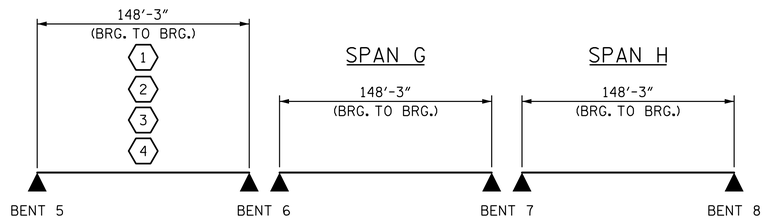
(4) EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

SPAN F



LRFR SUMMARY

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN BAILEY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS UNIT 3
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-09
1			3			TOTAL SHEETS
2			4			73

STD. NO. LRFR1

DRAWN BY : MIG DATE : 8-23
CHECKED BY : SAB DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.30	---	1.75	0.68	1.54	I	EL	58.52	0.79	1.70	I	I	94.06	0.80	0.68	1.30	I	EL	58.52	
		HL-93 (OPERATING)	N/A		2.00	---	1.35	0.68	2.00	I	EL	58.52	0.79	2.27	I	I	94.06	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.88	67.68	1.75	0.68	2.23	I	EL	58.52	0.79	2.37	I	I	94.06	0.80	0.68	1.88	I	EL	58.52	
		HS-20 (OPERATING)	36.000		2.90	104.40	1.35	0.68	2.90	I	EL	58.52	0.79	3.14	I	I	94.06	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.56	61.56	1.40	0.68	6.76	I	EL	58.52	0.79	7.79	I	I	94.06	0.80	0.68	4.56	I	EL	58.52	
		SNGARBS2	20.000		3.26	65.20	1.40	0.68	4.84	I	EL	58.52	0.79	5.38	I	I	94.06	0.80	0.68	3.26	I	EL	58.52	
		SNAGRIS2	22.000		3.04	66.88	1.40	0.68	4.50	I	EL	58.52	0.79	4.94	I	I	94.06	0.80	0.68	3.04	I	EL	58.52	
		SNCOTTS3	27.250		2.26	61.59	1.40	0.68	3.36	I	EL	58.52	0.79	3.76	I	I	94.06	0.80	0.68	2.26	I	EL	58.52	
		SNAGGRS4	34.925		1.84	64.26	1.40	0.68	2.73	I	EL	58.52	0.79	3.02	I	I	94.06	0.80	0.68	1.84	I	EL	58.52	
		SNS5A	35.550		1.80	63.99	1.40	0.68	2.67	I	EL	58.52	0.79	3.03	I	I	94.06	0.80	0.68	1.80	I	EL	58.52	
		SNS6A	39.950		1.63	65.12	1.40	0.68	2.42	I	EL	58.52	0.79	2.72	I	I	94.06	0.80	0.68	1.63	I	EL	58.52	
		SNS7B	42.000		1.56	65.52	1.40	0.68	2.30	I	EL	58.52	0.79	2.64	I	I	94.06	0.80	0.68	1.56	I	EL	58.52	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.99	65.67	1.40	0.68	2.94	I	EL	58.52	0.79	3.30	I	I	94.06	0.80	0.68	1.99	I	EL	58.52	
		TNT4A	33.075		1.99	65.82	1.40	0.68	2.95	I	EL	58.52	0.79	3.24	I	I	94.06	0.80	0.68	1.99	I	EL	58.52	
		TNT6A	41.600		1.61	66.98	1.40	0.68	2.38	I	EL	58.52	0.79	2.76	I	I	94.06	0.80	0.68	1.61	I	EL	58.52	
		TNT7A	42.000		1.61	67.62	1.40	0.68	2.38	I	EL	58.52	0.79	2.72	I	I	94.06	0.80	0.68	1.61	I	EL	58.52	
		TNT7B	42.000		1.64	68.88	1.40	0.68	2.42	I	EL	58.52	0.79	2.59	I	I	94.06	0.80	0.68	1.64	I	EL	58.52	
		TNAGRIT4	43.000		1.57	67.51	1.40	0.68	2.33	I	EL	58.52	0.79	2.51	I	I	94.06	0.80	0.68	1.57	I	EL	58.52	
		TNAGT5A	45.000		1.49	67.05	1.40	0.68	2.21	I	EL	58.52	0.79	2.46	I	I	94.06	0.80	0.68	1.49	I	EL	58.52	
		TNAGT5B	45.000	3	1.48	66.60	1.40	0.68	2.20	I	EL	58.52	0.79	2.38	I	I	94.06	0.80	0.68	1.48	I	EL	58.52	
EMERGENCY VEHICLE (EV)		EV2	28.750		2.29	65.84	1.30	0.68	3.66	I	EL	58.52	0.79	3.99	I	I	94.06	0.80	0.68	2.29	I	EL	58.52	
		EV3	43.000	4	1.51	64.93	1.30	0.68	2.42	I	EL	58.52	0.79	2.61	I	I	94.06	0.80	0.68	1.51	I	EL	58.52	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

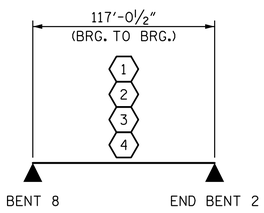
1. DESIGN LOAD RATING (HL-93)
2. DESIGN LOAD RATING (HS-20)
3. LEGAL LOAD RATING **
4. EMERGENCY VEHICLE LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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

SPAN I



LRFR SUMMARY

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN BAILEY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

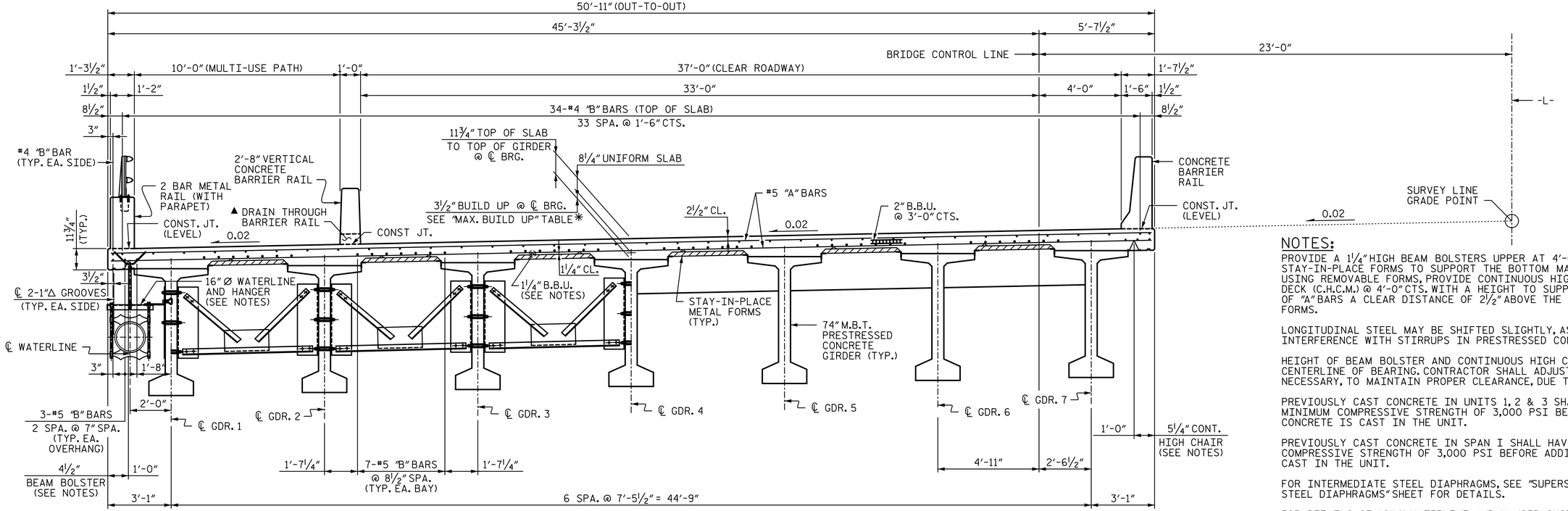
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS UNIT 4
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-10
1			3			TOTAL SHEETS
2			4			73

STD. NO. LRFR1

DRAWN BY : MIG DATE : 8-23
CHECKED BY : SAB DATE : 8-23
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24



INTERMEDIATE DIAPHRAGMS

END DIAPHRAGMS

(FOR END DIAPHRAGM REINFORCEMENT, SEE "TYPICAL SECTION DETAILS" SHEET 2 OF 2)

▲ 8"x6" BLOCKOUT FOR DRAINAGE (SEE "BARRIER RAIL" SHEETS FOR DETAILS)

TYPICAL SECTION

NOTES:

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

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

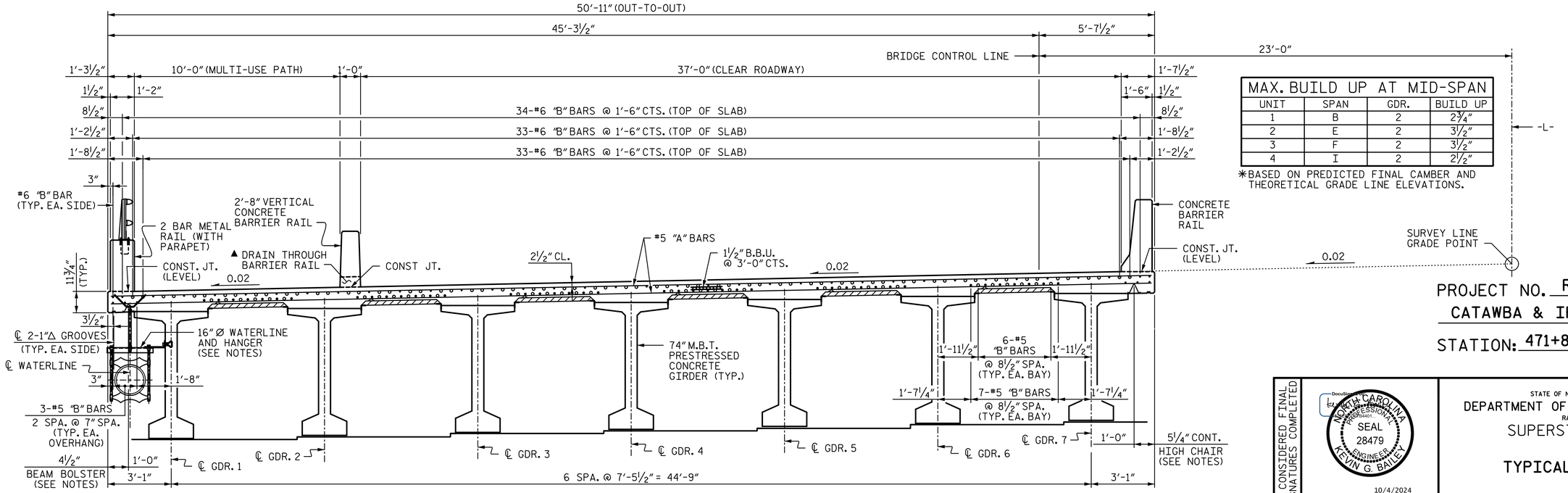
HEIGHT OF BEAM BOLSTER AND CONTINUOUS HIGH CHAIR IS CALCULATED AT CENTERLINE OF BEARING. CONTRACTOR SHALL ADJUST HEIGHTS, AS NECESSARY, TO MAINTAIN PROPER CLEARANCE, DUE TO GIRDER CAMBER.

PREVIOUSLY CAST CONCRETE IN UNITS 1, 2 & 3 SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

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

FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "SUPERSTRUCTURE INTERMEDIATE STEEL DIAPHRAGMS" SHEET FOR DETAILS.

FOR DETAILS OF 16" Ø WATERLINE AND HANGER SYSTEM, SEE STRUCTURE UTILITY PLANS.



MAX. BUILD UP AT MID-SPAN			
UNIT	SPAN	GDR.	BUILD UP
1	B	2	2¾"
2	E	2	3½"
3	F	2	3½"
4	I	2	2½"

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

TYPICAL SECTION

(AT LINK SLAB AT BENT)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

DRAWN BY : VKS DATE : 7-23

CHECKED BY : MBC DATE : 7-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN G. BAILEY — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 — 10/4/2024

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-11
1			3			TOTAL SHEETS
2			4			73

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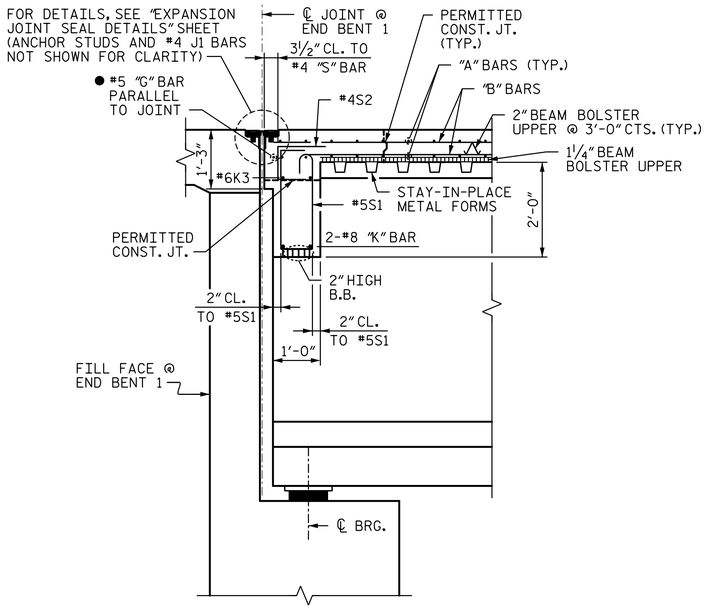
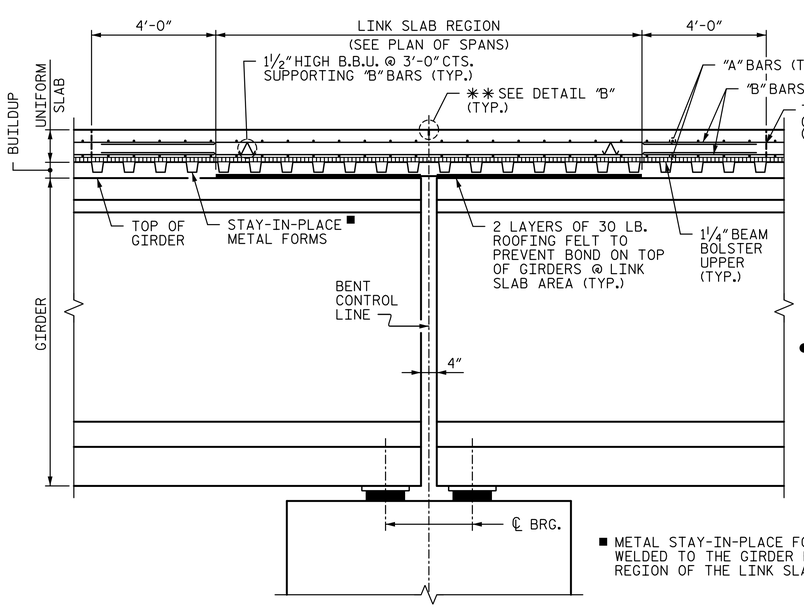
10/4/2024 11:58:22 AM
kbailey



SECTION THRU END BENT END DIAPHRAGM

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

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

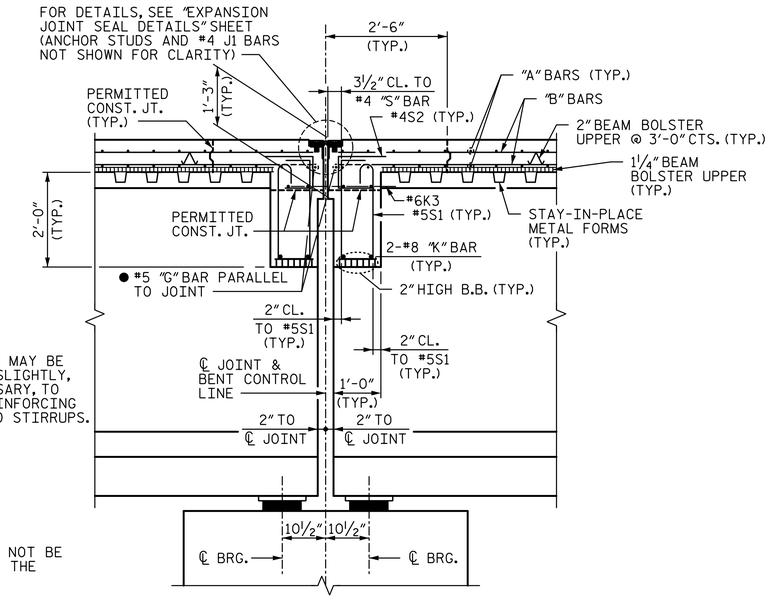


SECTION AT LINK SLAB

(AT BENTS 1, 3, 4, 6 & 7)

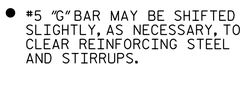
■ METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO THE GIRDER FLANGES IN THE REGION OF THE LINK SLABS

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



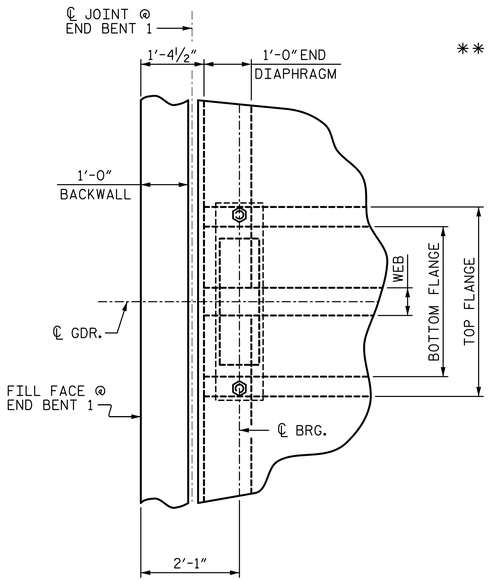
SECTION THRU EXPANSION BENT END DIAPHRAGMS

(AT BENTS 2, 5 & 8)



DETAIL "B"

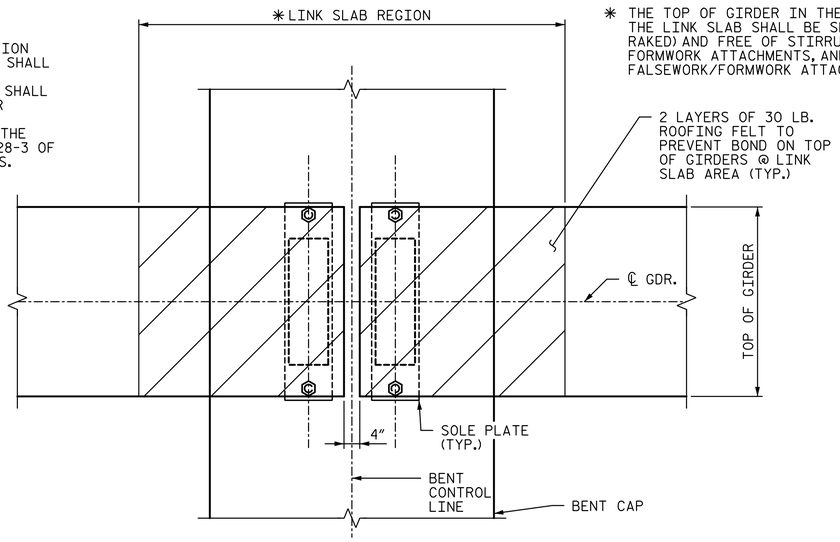
✳✳ A 1½" DEEP, ⅜" WIDE CONTRACTION JOINT AT BENT CONTROL LINE SHALL BE SAWN WITHIN 24 HOURS OF POURING THE DECK. THE JOINT SHALL BE FILLED WITH JOINT SEALER MATERIAL. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.



PLAN OF GIRDER AT END BENT

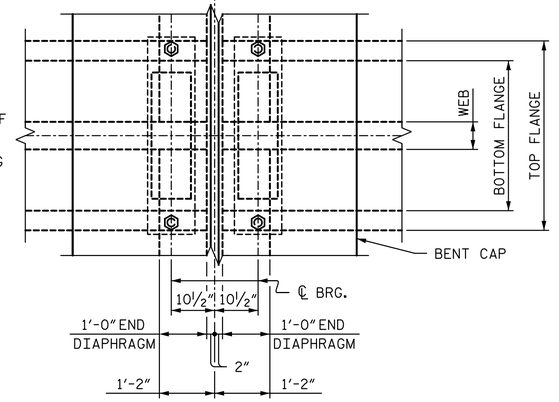
(END BENT 1 SHOWN, END BENT 2 SIMILAR)

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



PLAN OF GIRDERS AT LINK SLAB BENT

(AT BENTS 1, 3, 4, 6 & 7)



PLAN OF GIRDER AT EXPANSION BENT

(AT BENTS 2, 5 & 8)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 2

DRAWN BY : MBC DATE : 6-23

CHECKED BY : TRL DATE : 7-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: Kevin G. Bailey

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

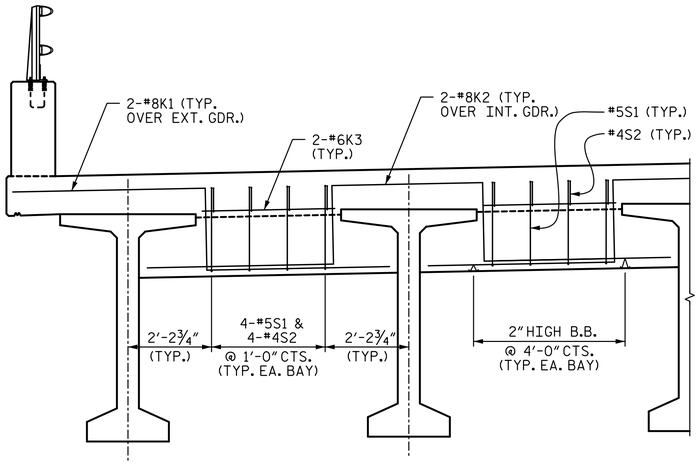
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-12
1			3			TOTAL SHEETS
2			4			73

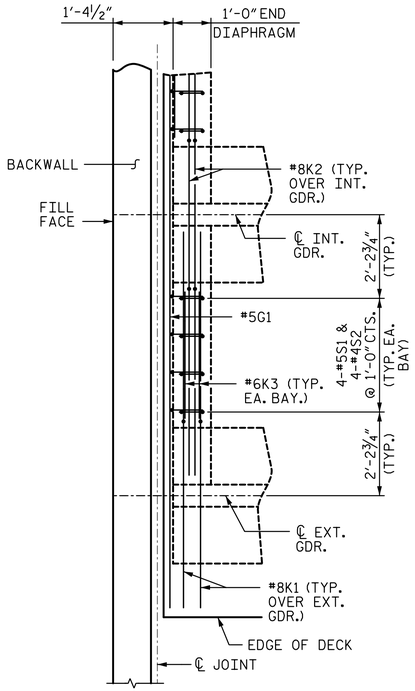
NOTES:

1. FOR DETAIL "A" AND "B" LOCATIONS, SEE PLAN OF SPANS SHEETS.



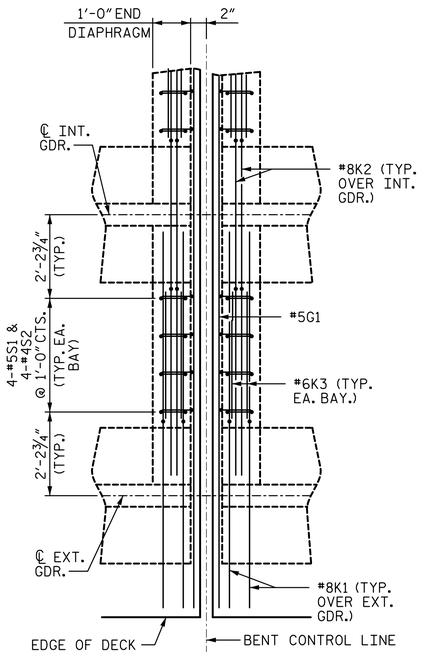
END DIAPHRAGMS

("G" BAR NOT SHOWN FOR CLARITY)
(AT END BENTS & EXPANSION BENTS)
(16"Ø WATERLINE NOT SHOWN FOR CLARITY)



DETAIL "A"

(END DIAPHRAGM AT END BENT 1 SHOWN, END DIAPHRAGM AT END BENT 2 SIMILAR)



DETAIL "B"

END DIAPHRAGM AT BENT 2, 5, & 8
(DIMENSIONS AND BARS TYPICAL EACH SPAN)

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 2 OF 2

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
10/4/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION DETAILS

STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-13
1			3			TOTAL SHEETS
2			4			73

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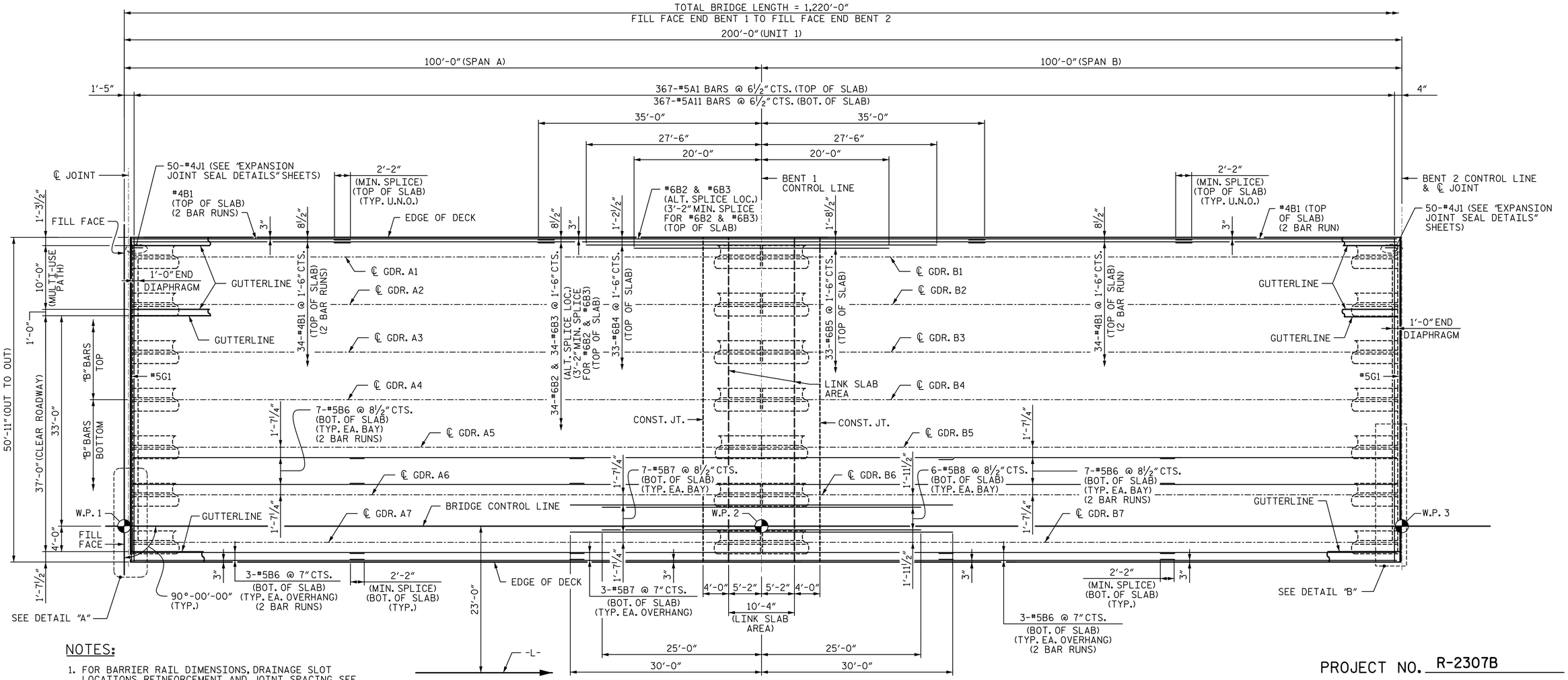
kbailey 10/4/2024 11:58:23 AM R:\R-2307B\Structures\03 Ustation\07 RFC Bridge Plans\401_025_R2307B_SMU_TS_013_I70380.dgn



PLAN OF SPANS - UNIT 1

NOTES:

1. FOR BARRIER RAIL DIMENSIONS, DRAINAGE SLOT LOCATIONS, REINFORCEMENT AND JOINT SPACING, SEE "BARRIER RAIL" SHEETS.
2. FOR POURING SEQUENCE, SEE "DECK POUR SEQUENCE" SHEET.
3. FOR TRANSVERSE CONST. JOINT IN DECK SLAB, SEE "DECK POUR SEQUENCE" SHEET.
4. FOR ADDITIONAL DETAILS, SEE "TYPICAL SECTION AND TYPICAL SECTION DETAIL" SHEETS.
5. FOR DETAILS "A" & "B", SEE "TYPICAL SECTION DETAILS" SHEET.
6. THE TOP OF GIRDER IN THE REGION OF THE LINK SLAB SHALL BE SMOOTH (NOT RAKED) AND FREE OF STIRRUPS, DECK FORMWORK ATTACHMENTS, AND OVERHANG FALSEWORK/FORMWORK ATTACHMENTS.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 6

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DocuSigned by: KEVIN BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

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Charlotte, NC 28202
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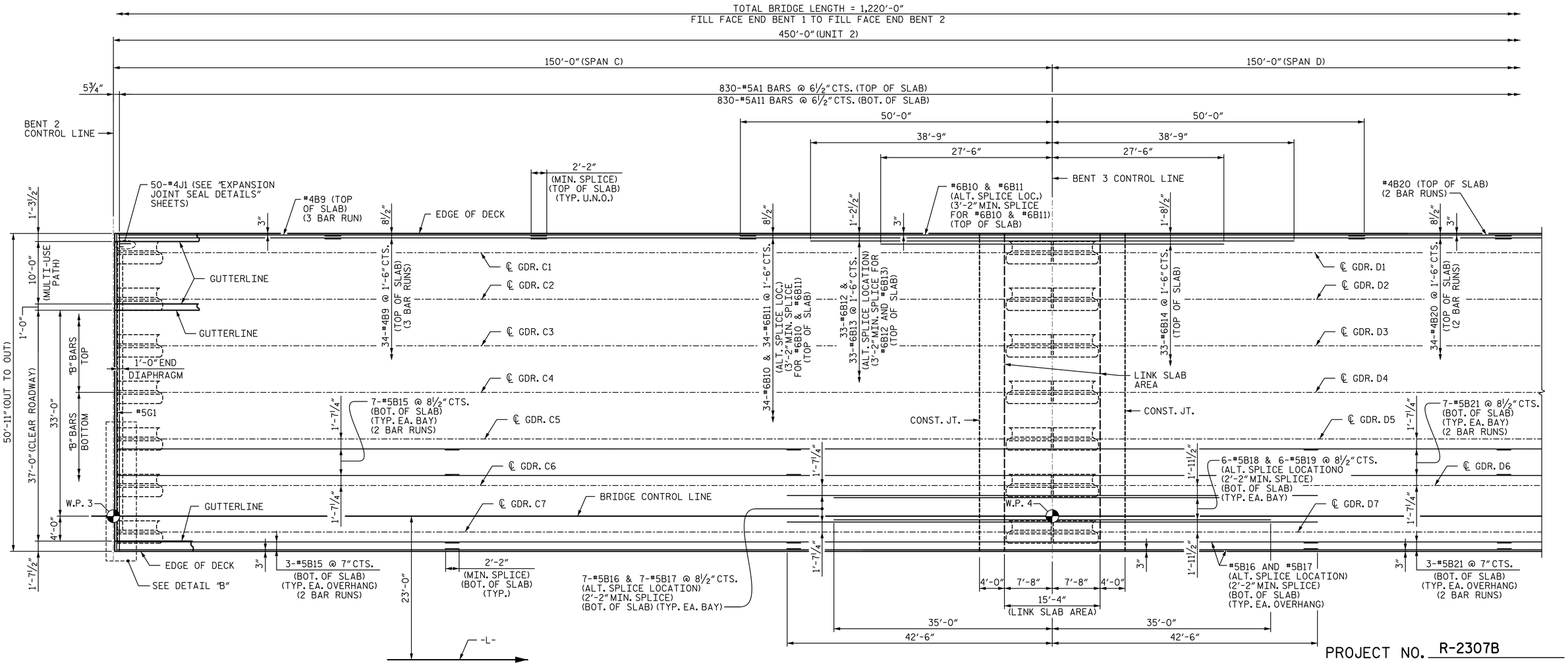
PLAN OF SPANS
UNIT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-14
1			3			TOTAL SHEETS
2			4			73



PLAN OF SPANS - UNIT 2

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 6

NOTES:

1. SEE NOTES ON SHEET 1 OF 6.

DRAWN BY : VKS	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
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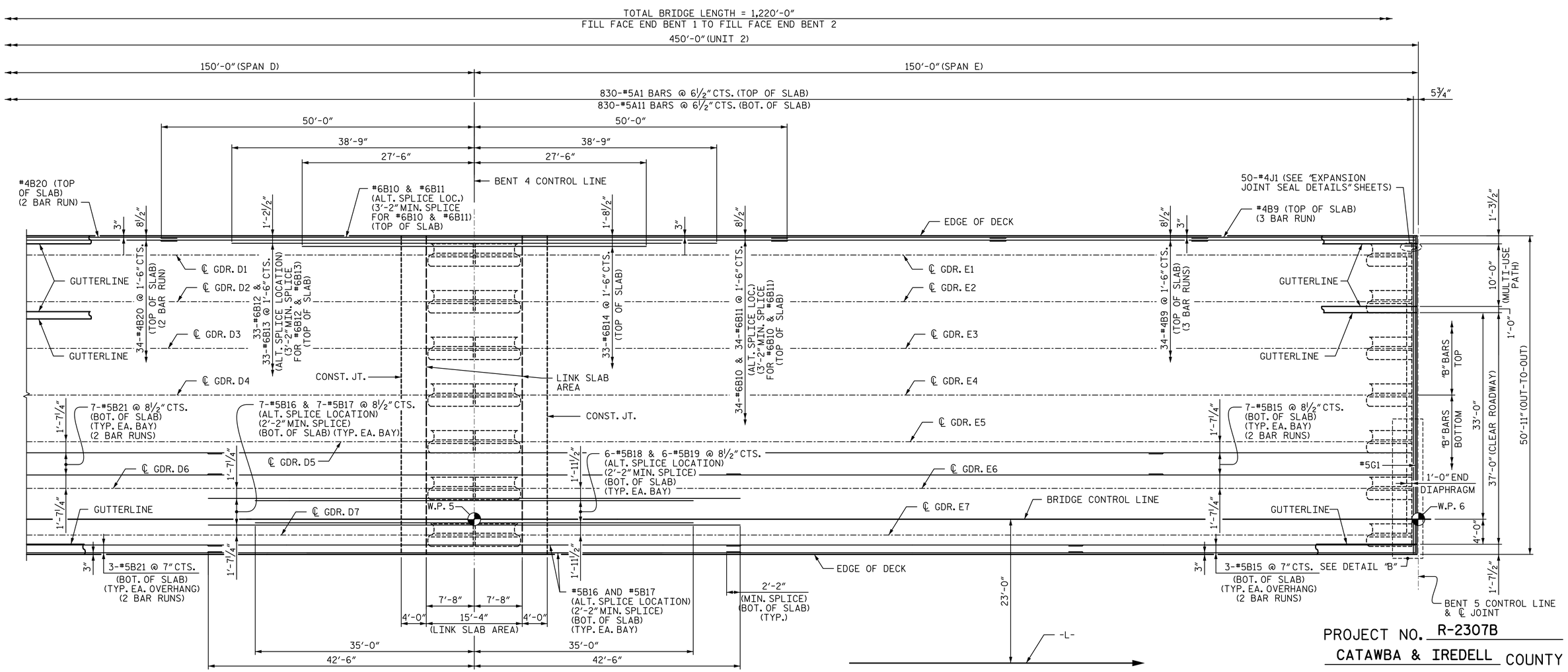
PLAN OF SPANS
UNIT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-15
1			3			TOTAL SHEETS
2			4			73



PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 6

PLAN OF SPANS - UNIT 2

NOTES:

1. SEE NOTES ON SHEET 1 OF 6.

DRAWN BY : VKS DATE : 8-23

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PLAN OF SPANS
UNIT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-16
1			3			TOTAL SHEETS
2			4			73

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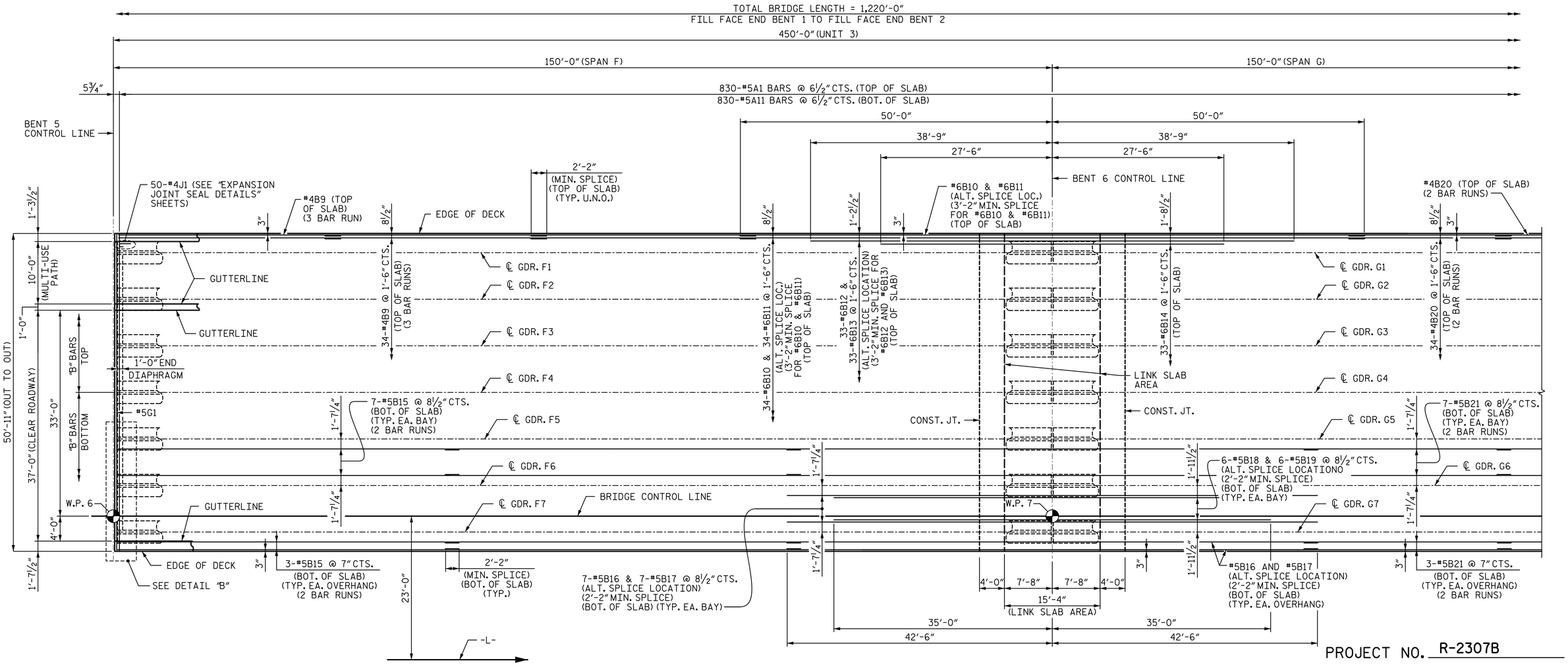

PLAN OF SPANS - UNIT 3

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 4 OF 6

NOTES:

1. SEE NOTES ON SHEET 1 OF 6.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

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PLAN OF SPANS
UNIT 3

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1			3			TOTAL SHEETS
2			4			73

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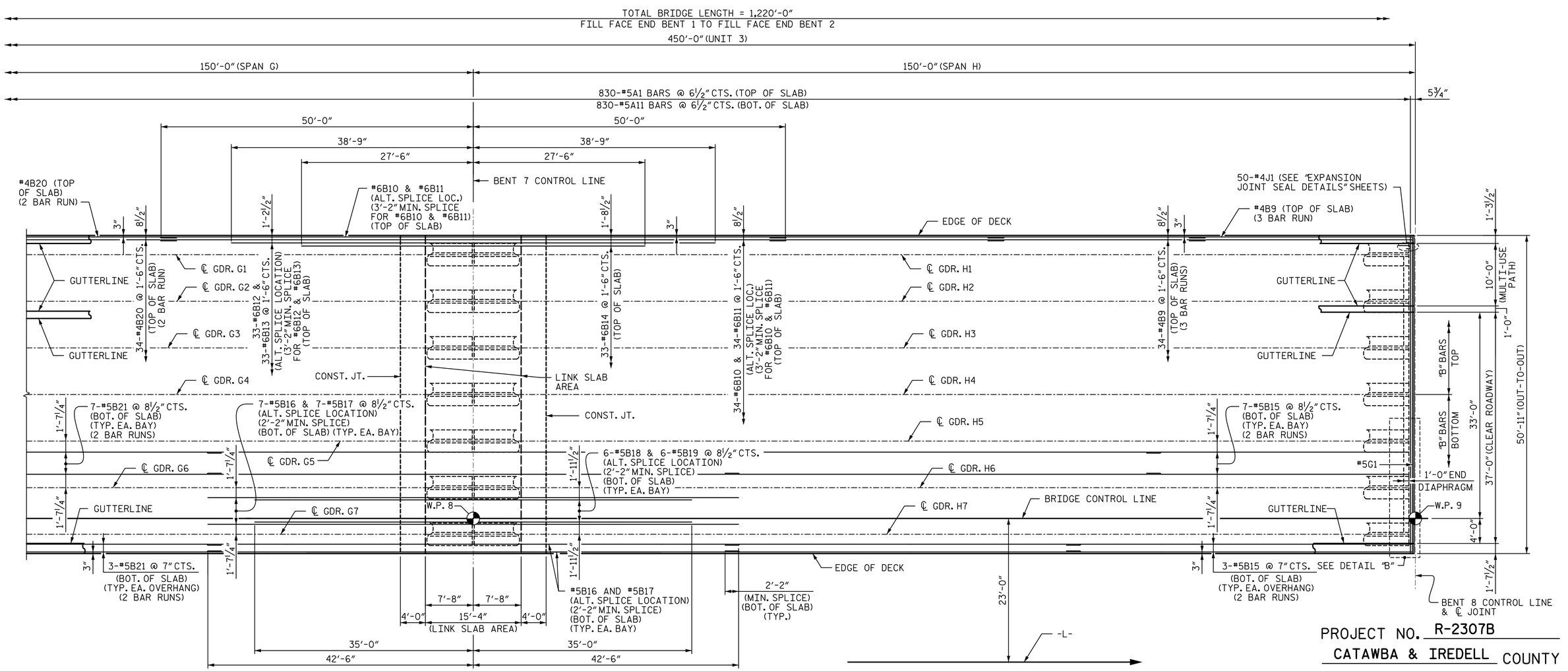

PLAN OF SPANS - UNIT 3

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 5 OF 6

NOTES:

1. SEE NOTES ON SHEET 1 OF 6.

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8/14/2024

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Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
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RALEIGH
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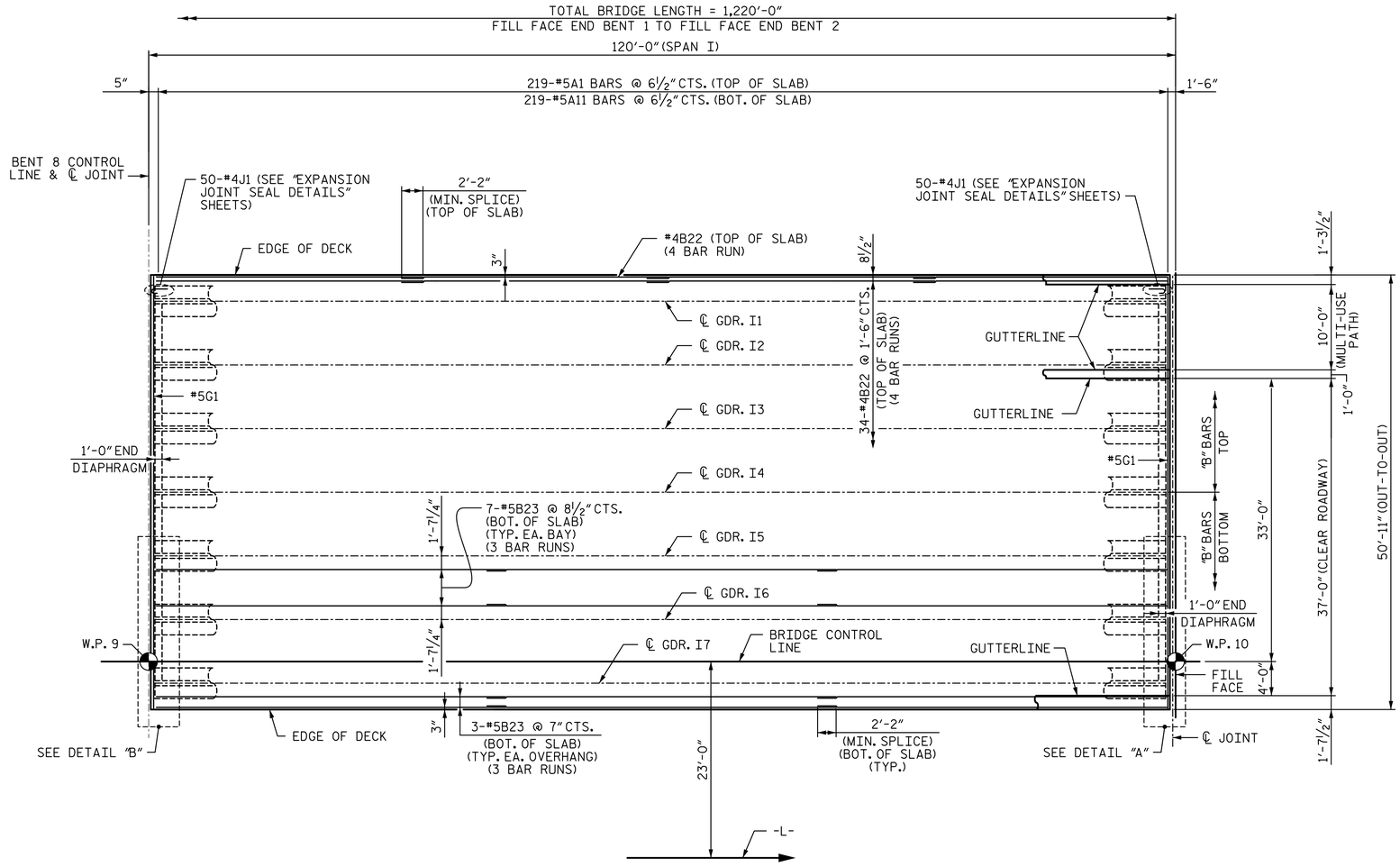
PLAN OF SPANS
UNIT 3

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-18
1			3			TOTAL SHEETS
2			4			73



NOTES:

1. SEE NOTES ON SHEET 1 OF 6.

PLAN OF SPANS - UNIT 4

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 6 OF 6

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PLAN OF SPANS
UNIT 4

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-19
1			3			TOTAL SHEETS
2			4			73

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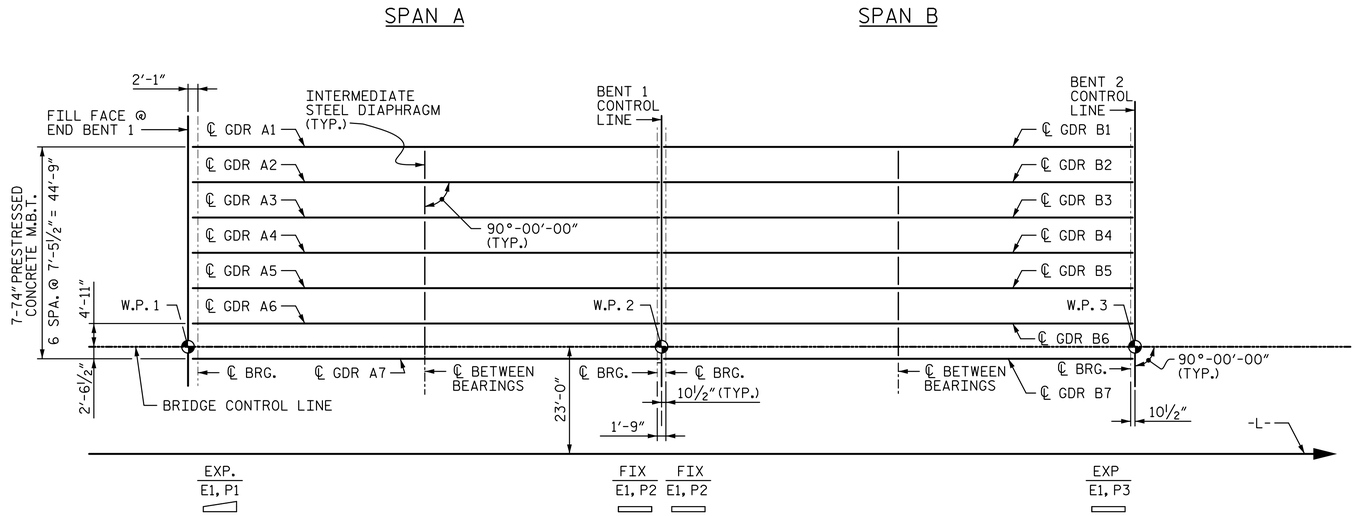
NOTES:

1. FOR THE LOCATION OF FORMED HOLES IN GIRDERS FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGM DETAILS FOR 74"MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.



FRAMING PLAN - UNIT 1

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 3

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8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

FRAMING PLAN
UNIT 1

STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-20
1			3			TOTAL SHEETS
2			4			73

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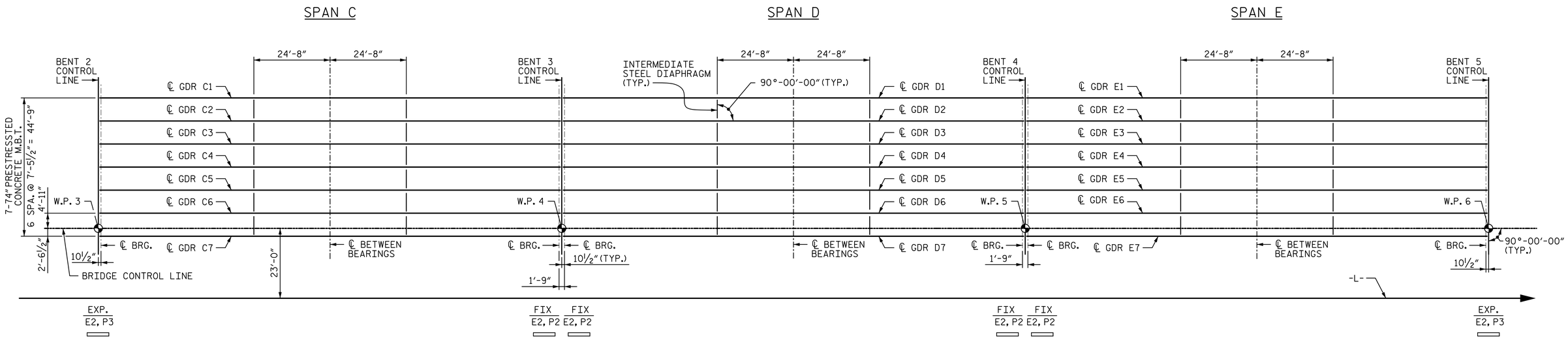
NOTES:

1. FOR THE LOCATION OF FORMED HOLES IN GIRDERS FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGM DETAILS FOR 74"MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.



FRAMING PLAN - UNIT 2

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 3

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DocuSigned by: [illegible]

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FRAMING PLAN
UNIT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-21
1			3			TOTAL SHEETS
2			4			73

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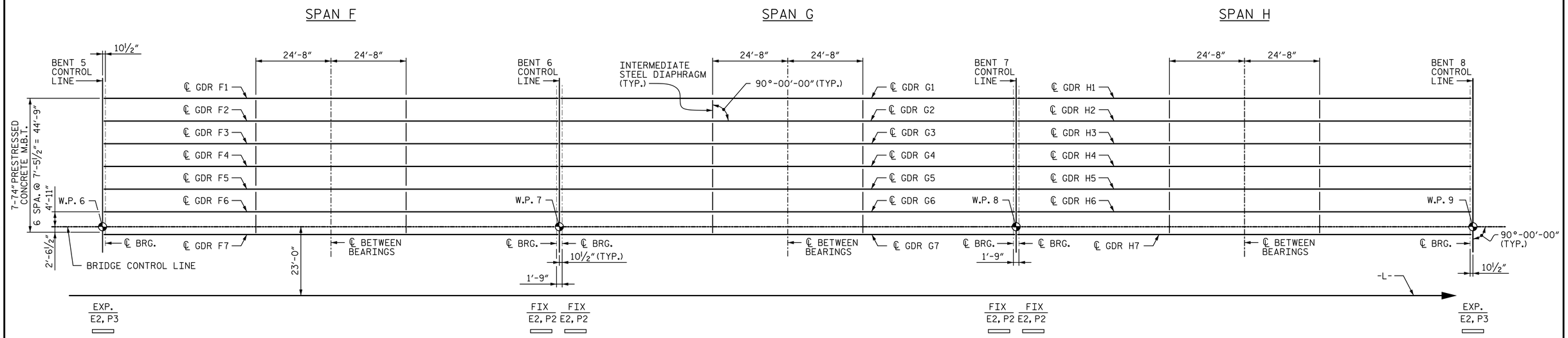
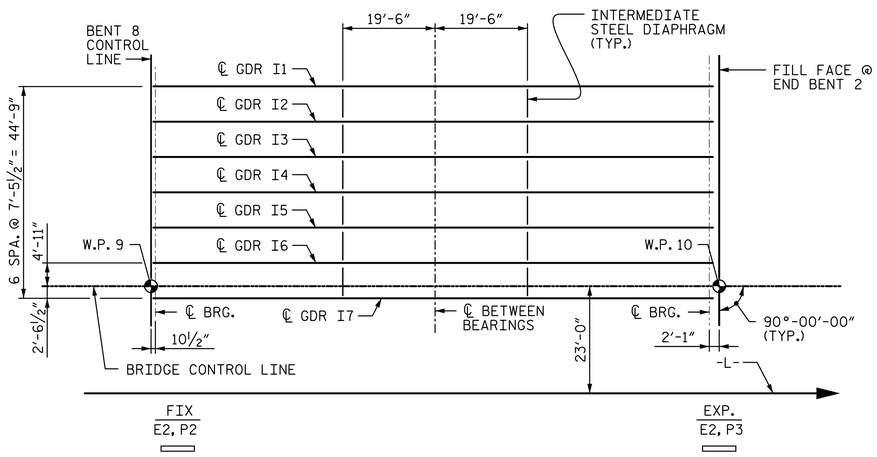
NOTES:

1. FOR THE LOCATION OF FORMED HOLES IN GIRDERS FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGM DETAILS FOR 74"MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.



FRAMING PLAN - UNIT 3

SPAN I



FRAMING PLAN - UNIT 4

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 3

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

FRAMING PLAN
UNIT 3
AND UNIT 4

stv
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

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NO.	BY:	DATE:	NO.	BY:	DATE:	S1-22
1			3			TOTAL SHEETS
2			4			73

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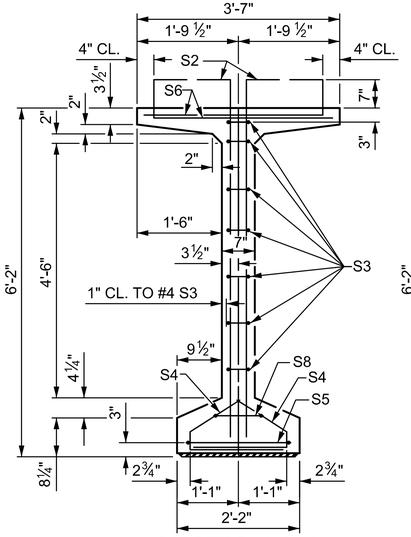
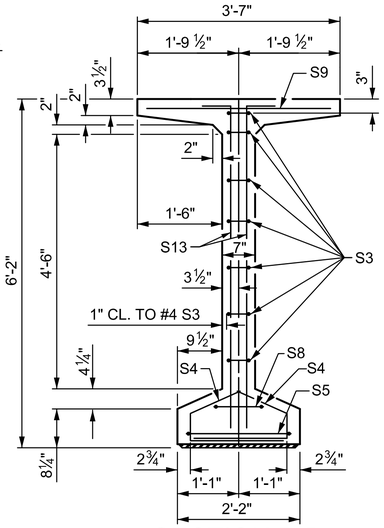
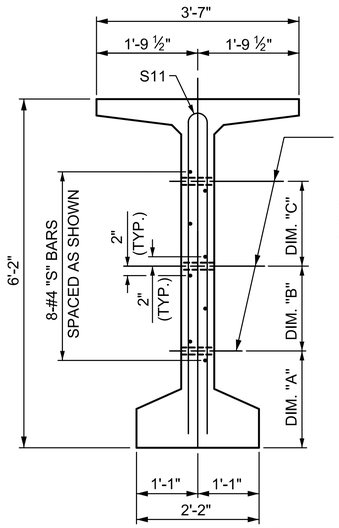


SECTION A-A



SECTION B-B

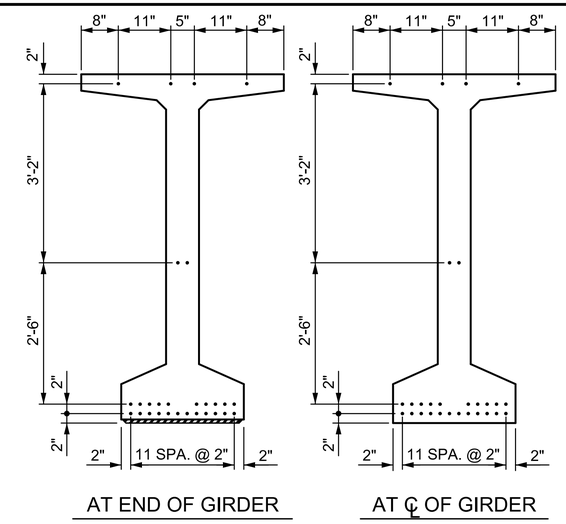


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- FULLY BONDED STRANDS



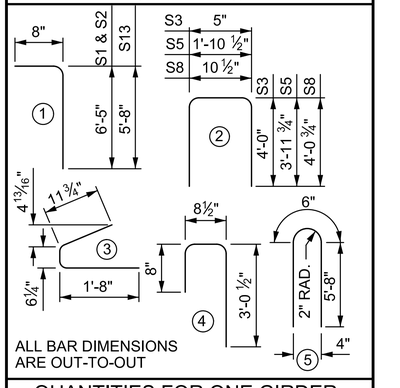
0.6" Ø LOW RELAXATION STRAND LAYOUT

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	138	#4	1	7'-1"	653
S2	12	#6	1	7'-1"	128
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	150	#5	4	4'-5"	691
S8	2	#5	2	9'-0"	19
S9	44	#5	STR.	3'-3"	149
S11	10	#5	5	11'-10"	123
S12	8	#4	STR.	8'-0"	43
S13	12	#6	1	6'-4"	114

BAR TYPES



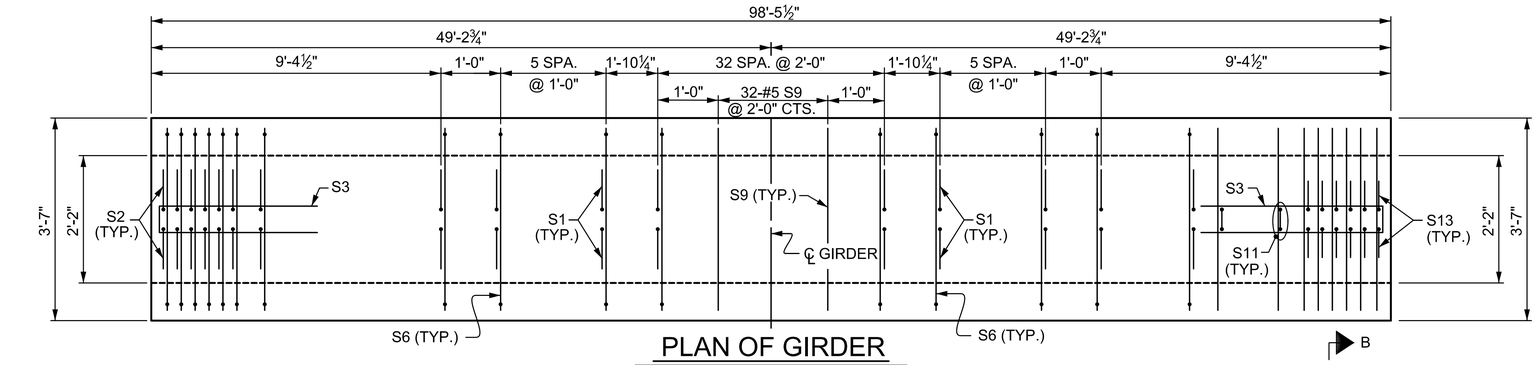
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

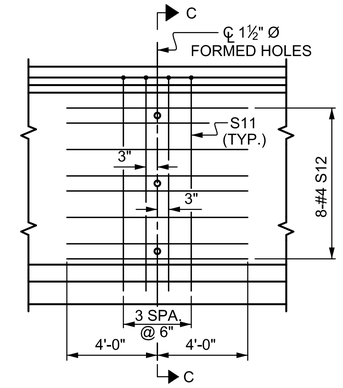
GIRDERS	REINFORCING STEEL	6,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN A	2,198	22.4	28

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	98'-5½"	689'-2½"

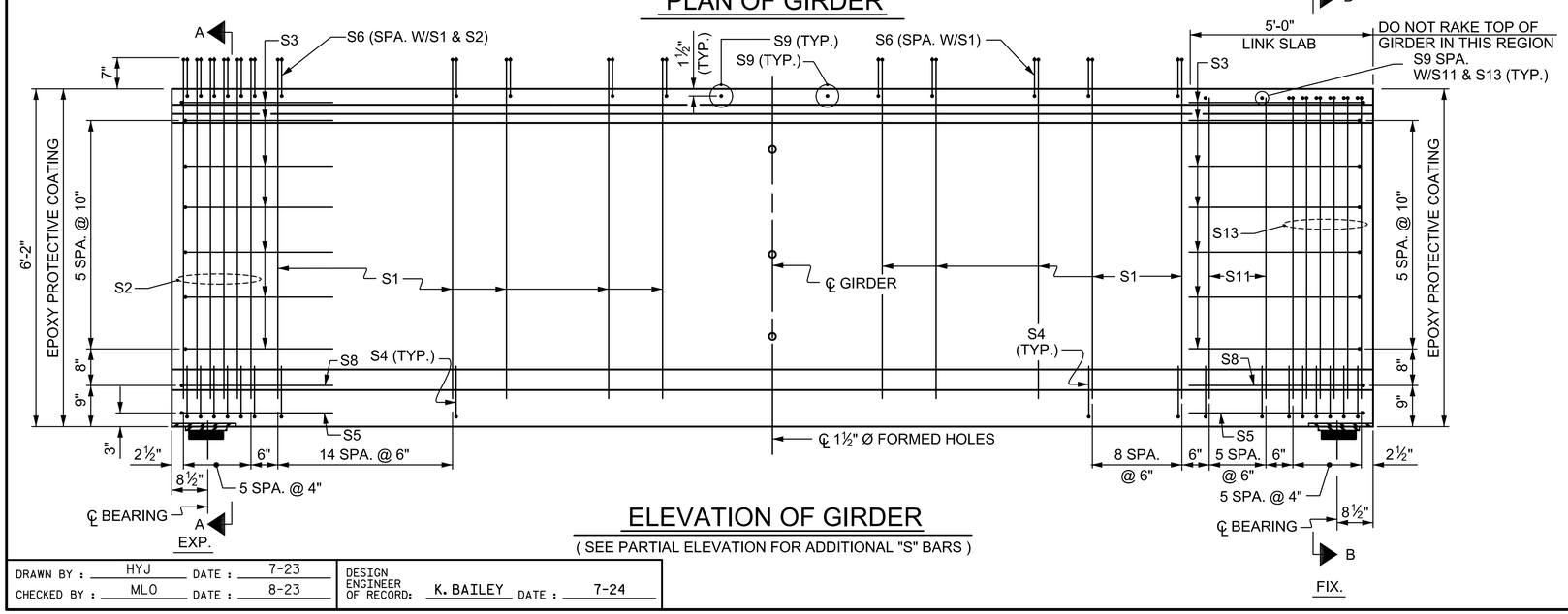


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 10

DRAWN BY : HYJ DATE : 7-23
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DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

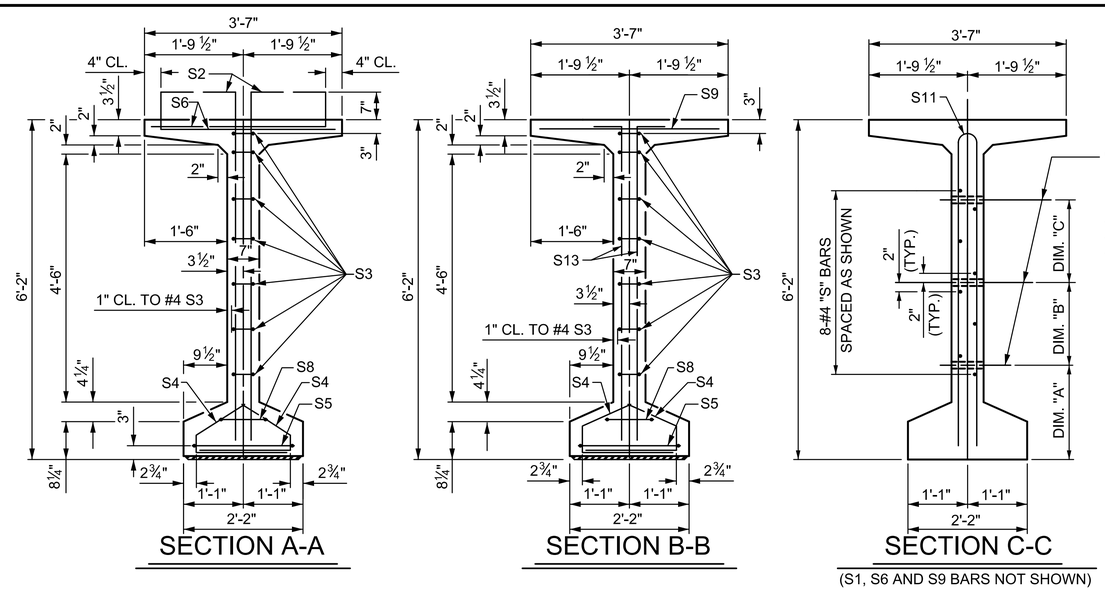
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

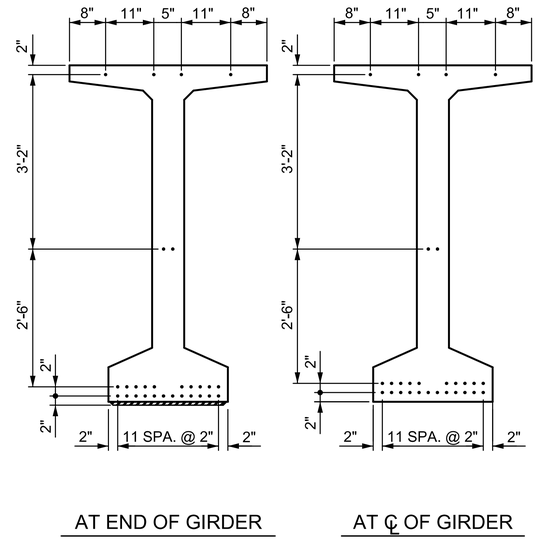
74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-23
1			3			TOTAL SHEETS
2			4			73

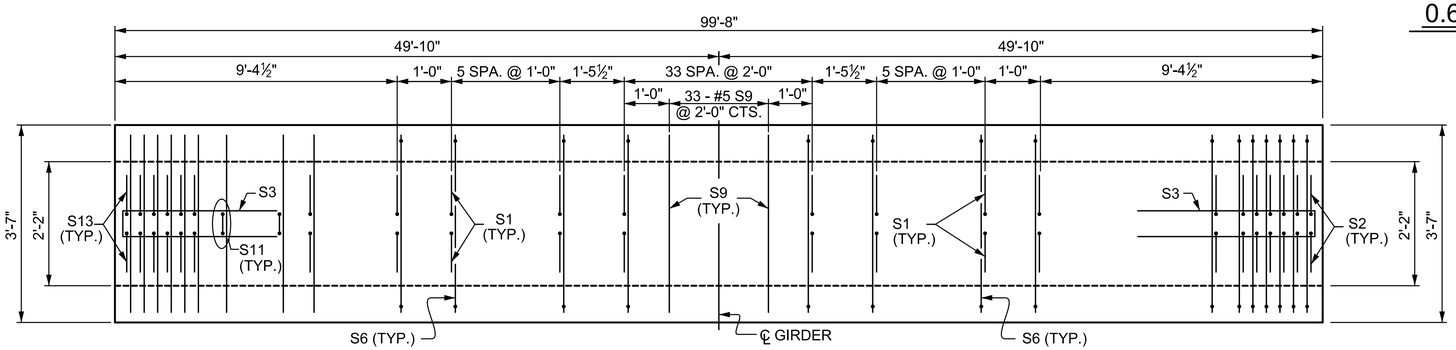


DEBONDING LEGEND

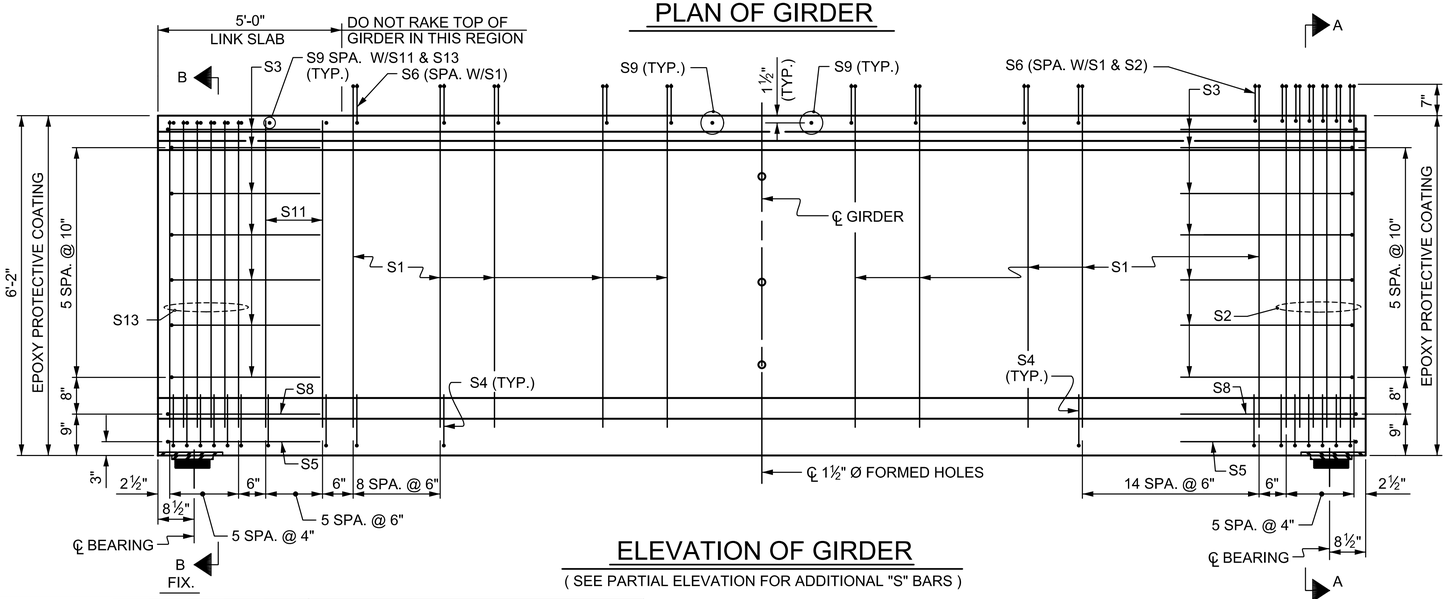
- FULLY BONDED STRANDS



0.6" Ø LOW RELAXATION STRAND LAYOUT

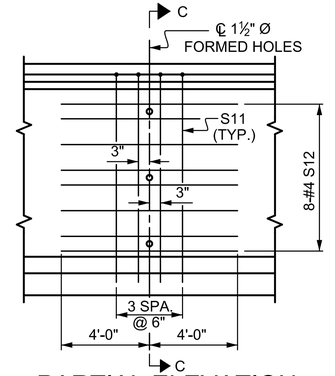


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

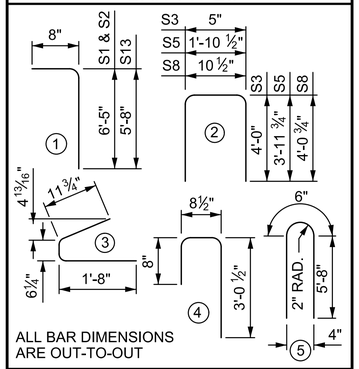
0.6"Ø L.R. GRADE 270 STRANDS

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	140	#4	1	7'-1"	662
S2	12	#6	1	7'-1"	128
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	152	#5	4	4'-5"	700
S8	2	#5	2	9'-0"	19
S9	45	#5	STR	3'-3"	153
S11	10	#5	5	11'-10"	123
S12	8	#4	STR	8'-0"	43
S13	12	#6	1	6'-4"	114

BAR TYPES



QUANTITIES FOR ONE GIRDER

GIRDERS	REINFORCING STEEL	6000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN B	2,220	22.7	28

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	99'-8"	697'-8"

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 10

DRAWN BY : HYJ DATE : 7-23

CHECKED BY : MLO DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN G. BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

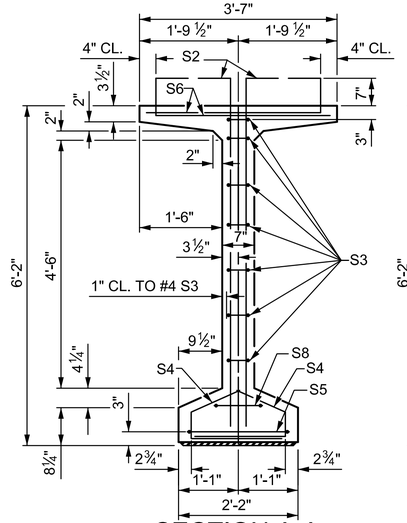
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

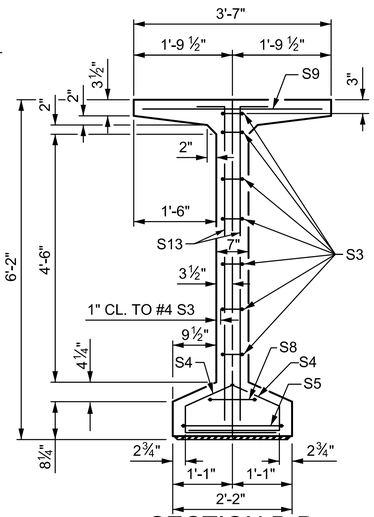
SUPERSTRUCTURE

74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN B

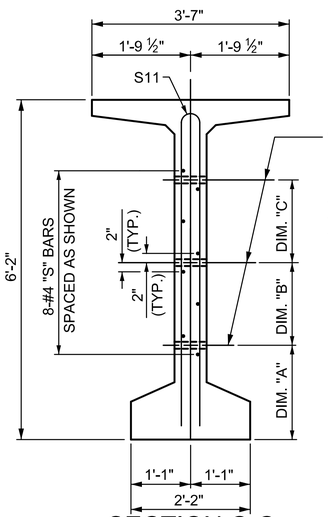
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-24
1			3			TOTAL SHEETS
2			4			73



SECTION A-A



SECTION B-B

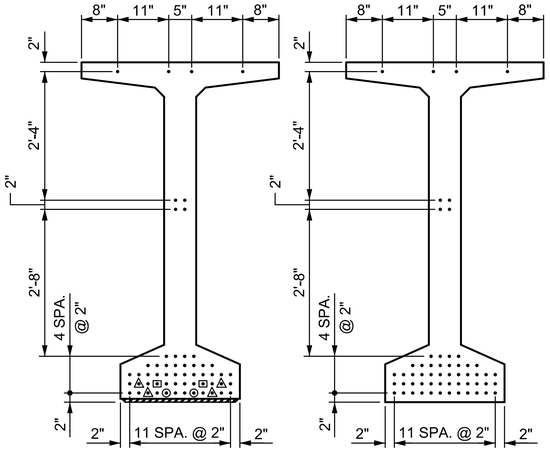


SECTION C-C

(S1, S14 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER



AT END OF GIRDER AT ℄ OF GIRDER

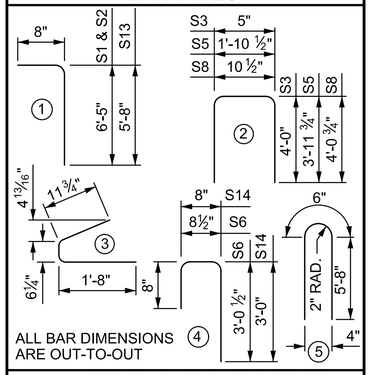
0.6" Ø LOW RELAXATION STRAND LAYOUT

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	180	#4	1	7'-1"	852
S2	12	#6	1	7'-1"	128
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	74	#5	4	4'-5"	341
S8	2	#5	2	9'-0"	19
S9	75	#5	STR.	3'-3"	254
S11	19	#5	5	11'-10"	235
S12	16	#4	STR.	8'-0"	86
S13	12	#6	1	6'-4"	114
S14	118	#5	4	4'-4"	533

BAR TYPES



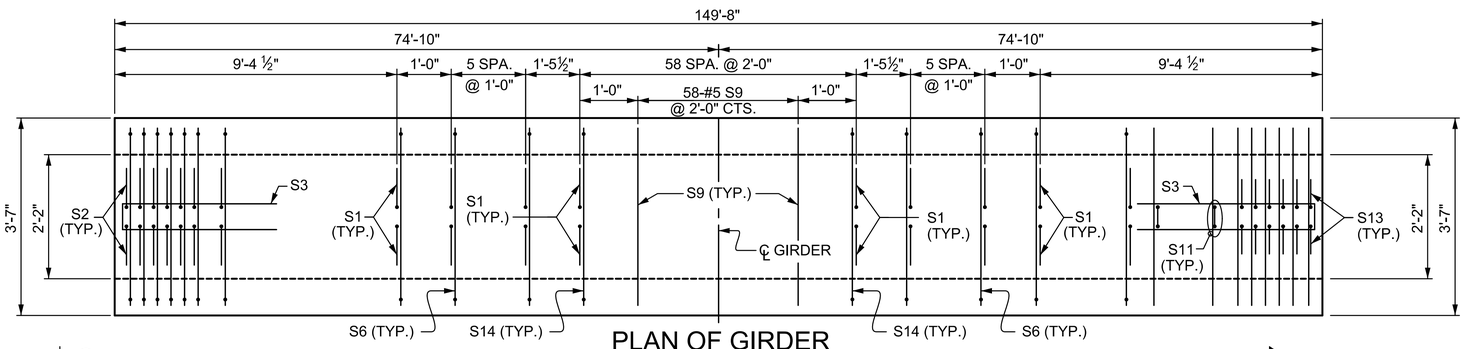
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

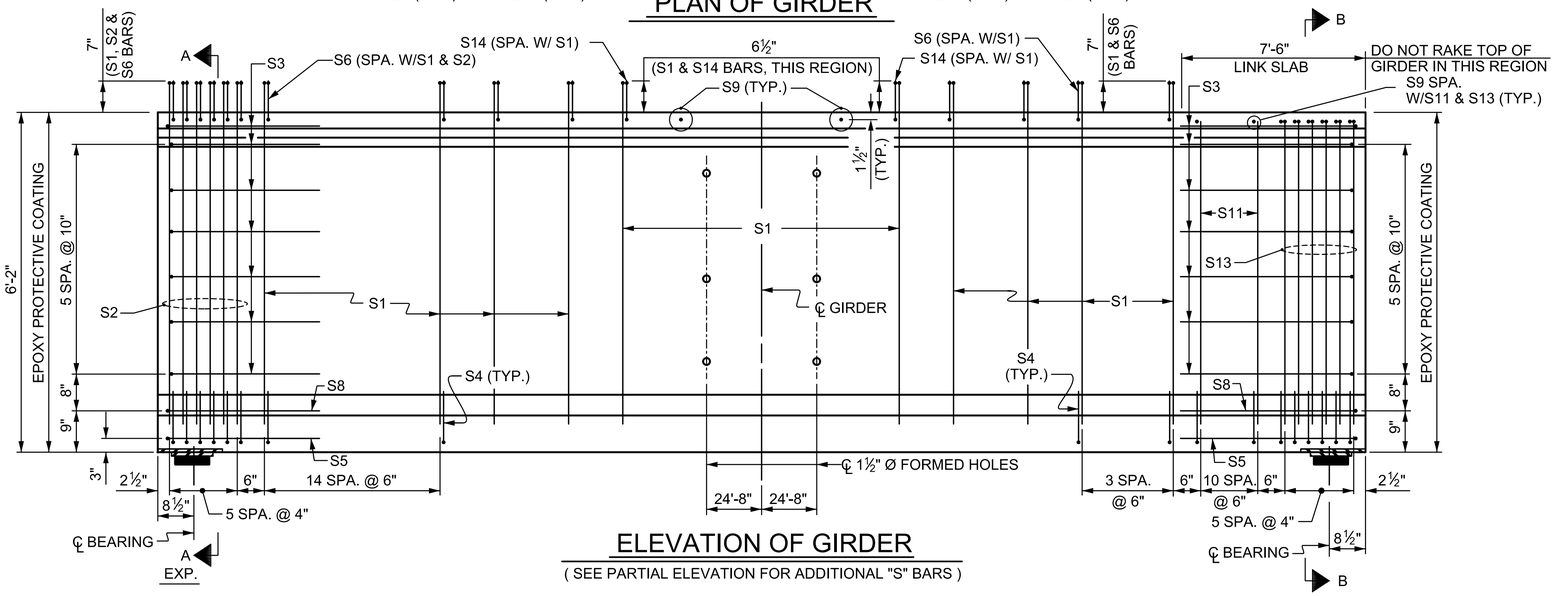
GIRDERS	REINFORCING STEEL	10, 000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN C	2,840	34.0	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	149'-8"	1,047'-8"



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

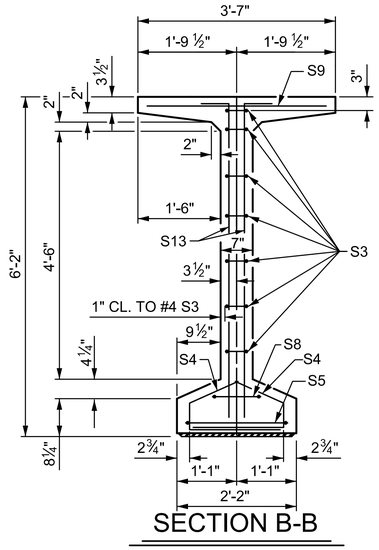
74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN C

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

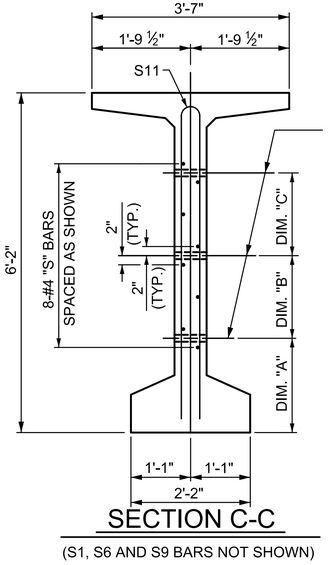
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-25
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : HYJ DATE : 7-23
CHECKED BY : MLO DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24



SECTION B-B

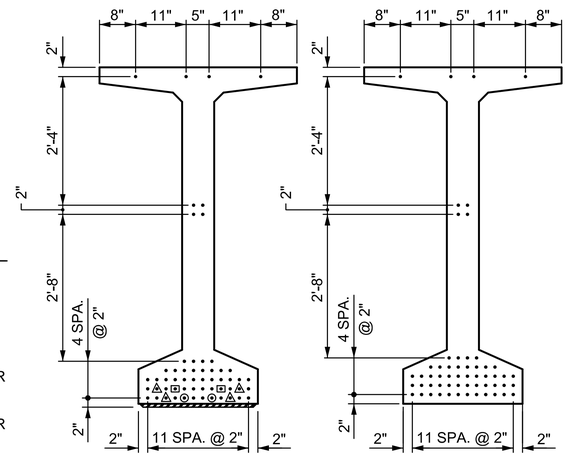


SECTION C-C

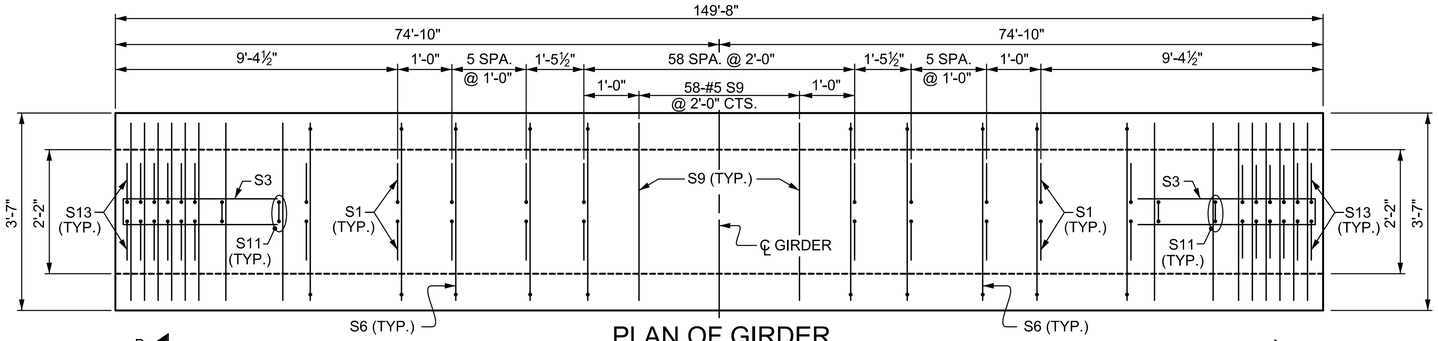
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

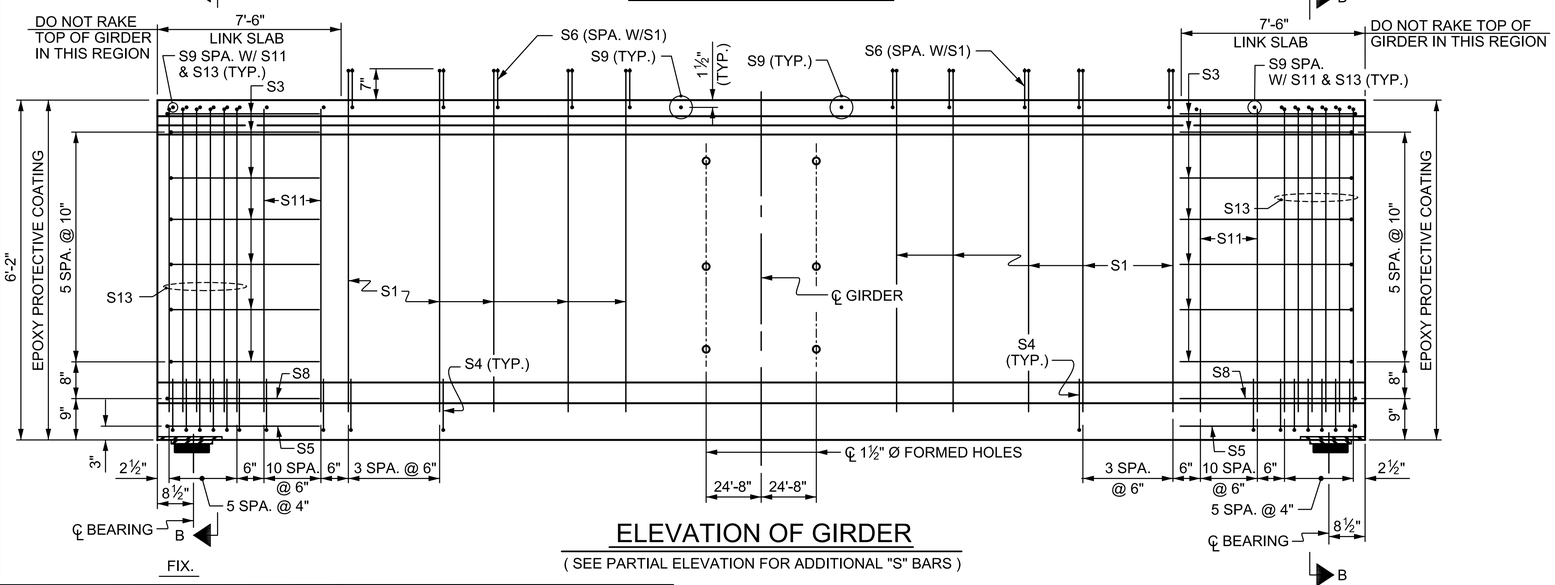
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT

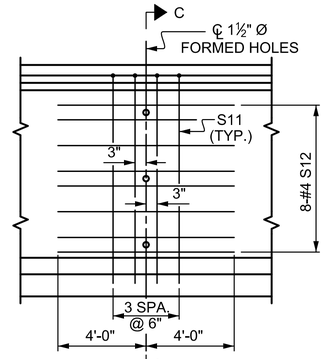


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

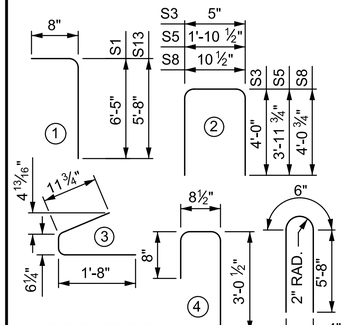
0.6"Ø L.R. GRADE 270 STRANDS

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	158	#4	1	7'-1"	748
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	158	#5	4	4'-5"	728
S8	2	#5	2	9'-0"	19
S9	92	#5	STR	3'-3"	312
S11	30	#5	5	11'-10"	370
S12	16	#4	STR	8'-0"	86
S13	24	#6	1	6'-4"	228

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

GIRDERS	REINFORCING STEEL	10,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN D	2,769	34.0	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	149'-8"	1,047'-8"

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 4 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

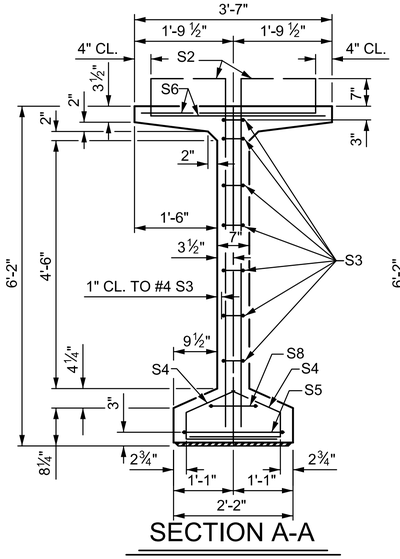
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

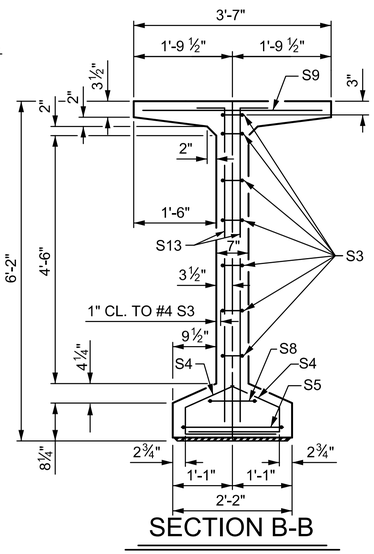
74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN D

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-26
1			3			TOTAL SHEETS
2			4			73

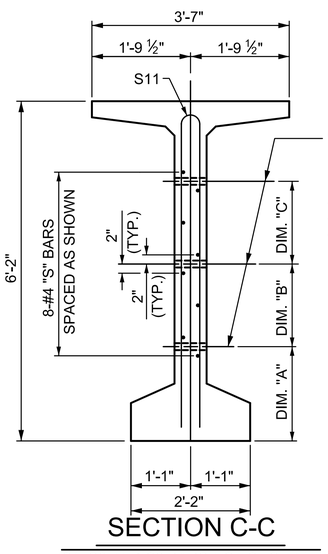
DRAWN BY :	HYJ	DATE :	7-23	DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24
CHECKED BY :	MLO	DATE :	8-23	



SECTION A-A



SECTION B-B

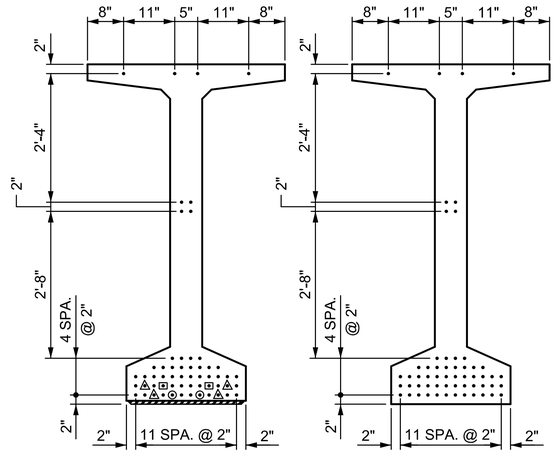


SECTION C-C

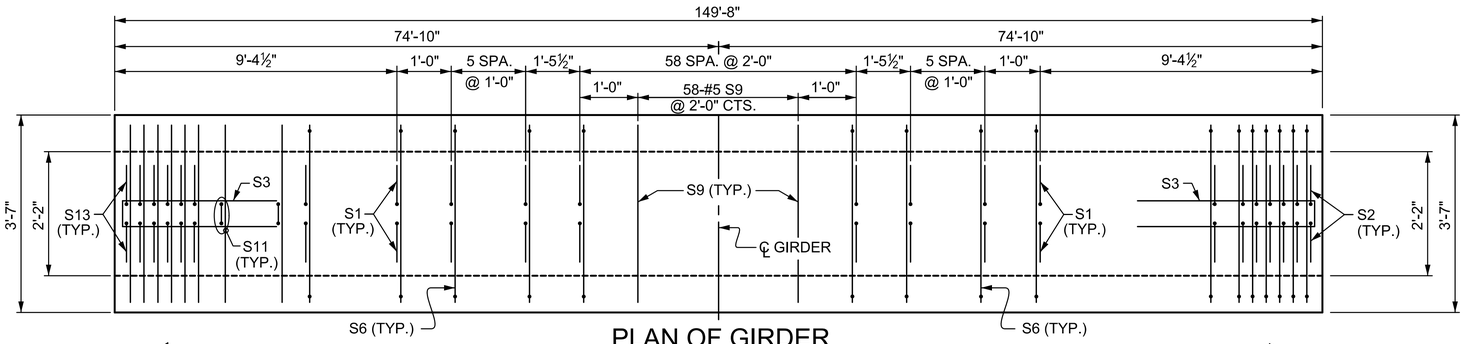
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

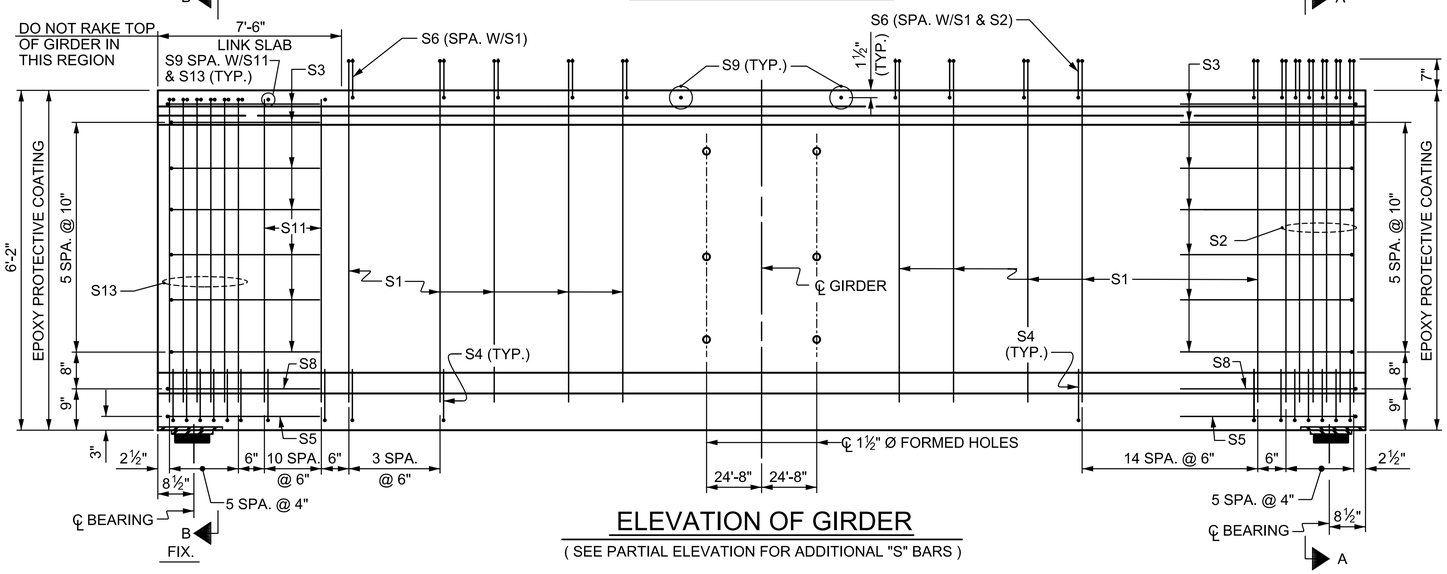
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

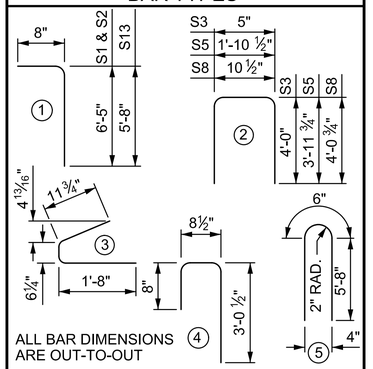
0.6"Ø L.R. GRADE 270 STRANDS

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	180	#4	1	7'-1"	852
S2	12	#6	1	7'-1"	128
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	192	#5	4	4'-5"	885
S8	2	#5	2	9'-0"	19
S9	75	#5	STR.	3'-3"	254
S11	19	#5	5	11'-10"	235
S12	16	#4	STR.	8'-0"	86
S13	12	#6	1	6'-4"	114

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

GIRDERS	REINFORCING STEEL	10, 000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN E	2,851	34.0	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	149'-8"	1,047'-8"

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 5 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN G. BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

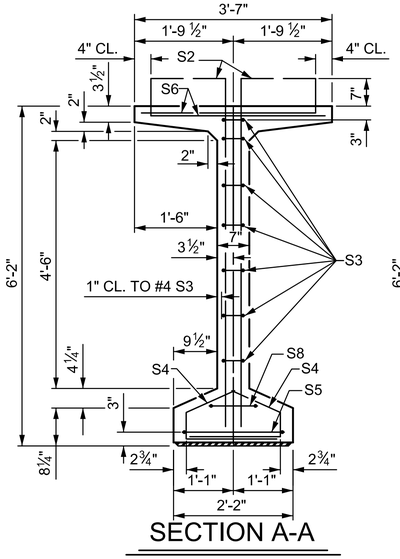
74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN E

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

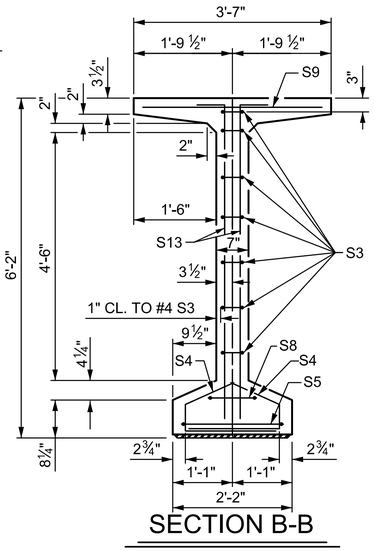
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-27
1			3			TOTAL SHEETS
2			4			73

DRAWN BY :	HYJ	DATE :	7-23
CHECKED BY :	MLO	DATE :	8-23

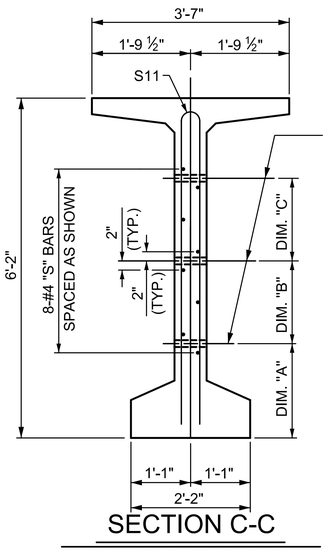
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24



SECTION A-A



SECTION B-B



SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

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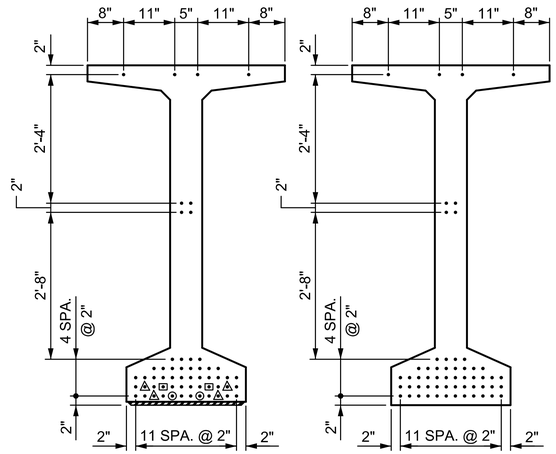

AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
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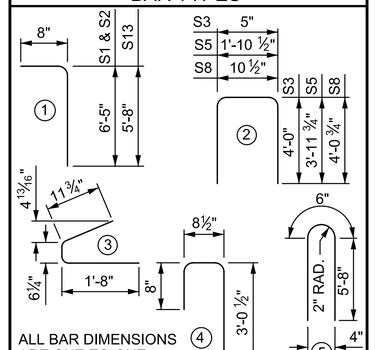
S11	19	#5	5	11'-10"	235
S12	16	#4	STR.	8'-0"	86
S13	12	#6	1	6'-4"	114

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

GIRDERS	REINFORCING STEEL	10, 000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN F	2,851	34.0	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
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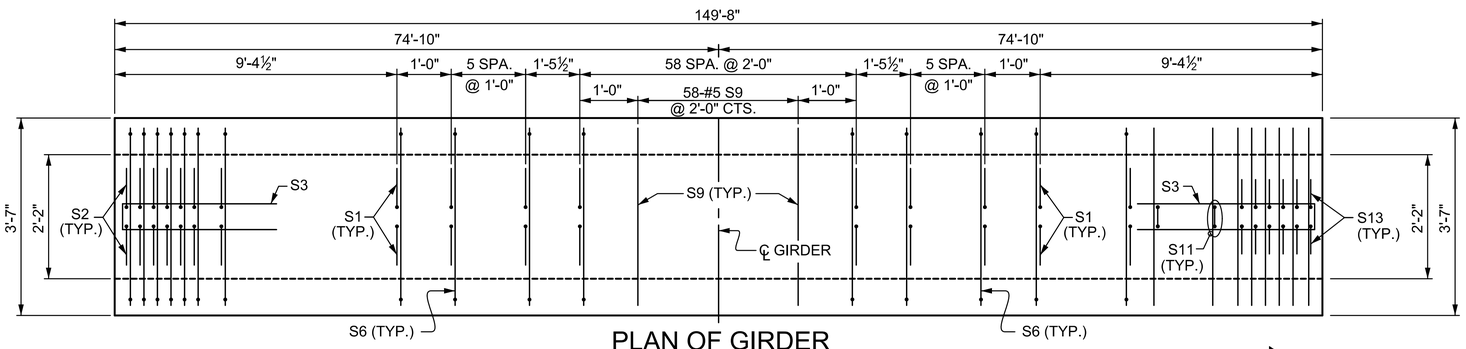


PLAN OF GIRDER

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 6 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

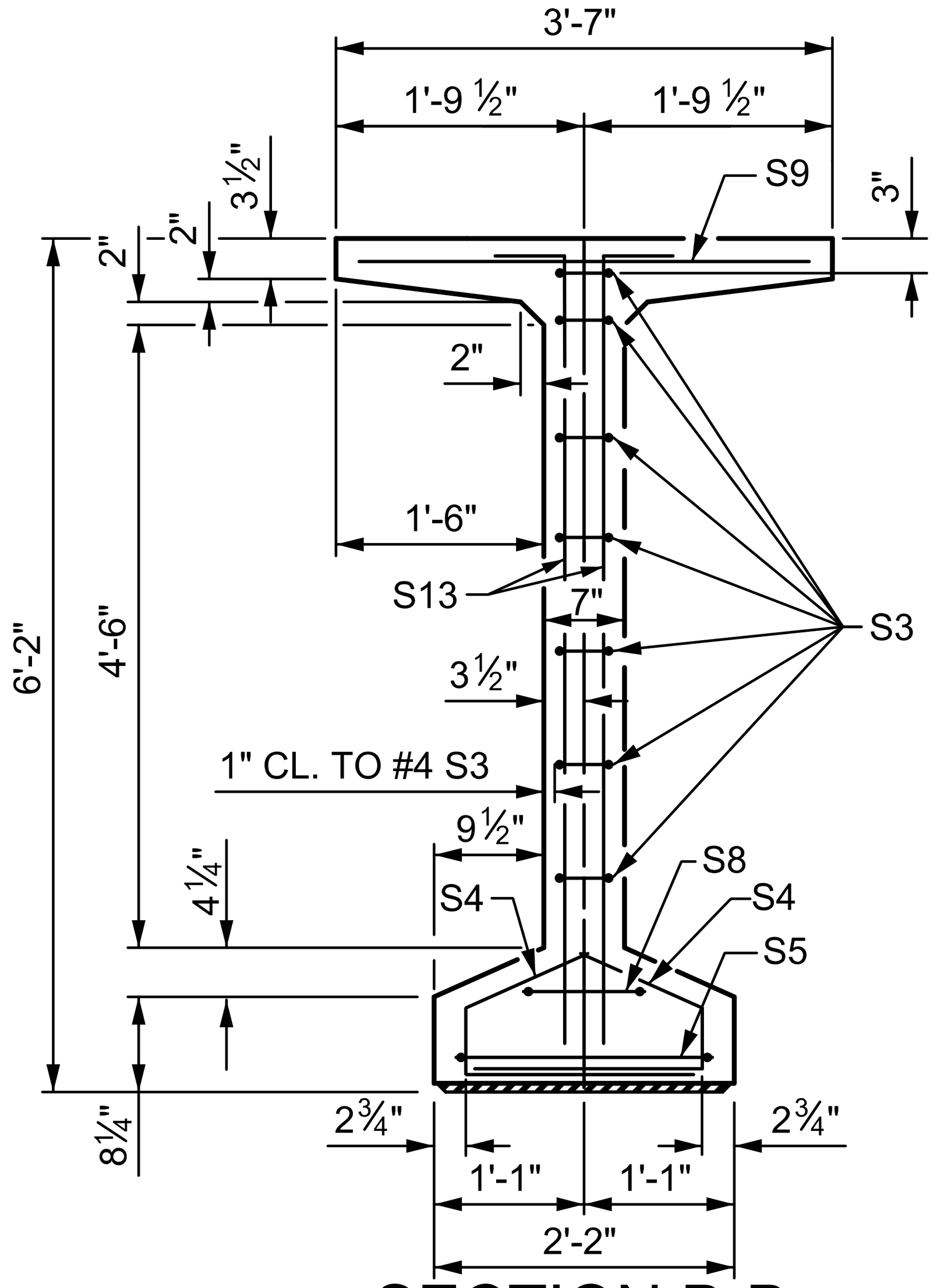
SUPERSTRUCTURE

74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN F

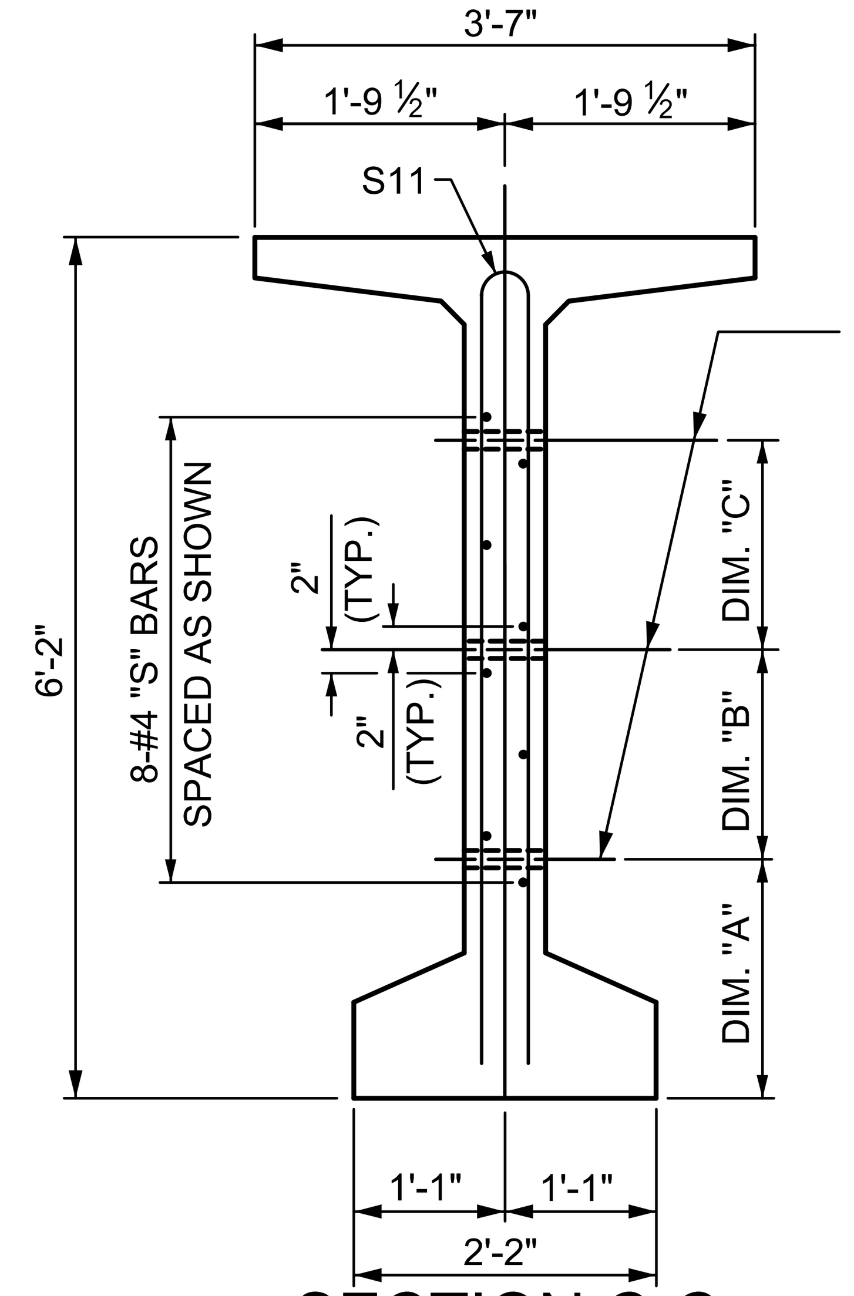
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-28
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : HYJ	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : MLO	DATE : 8-23		



SECTION B-B



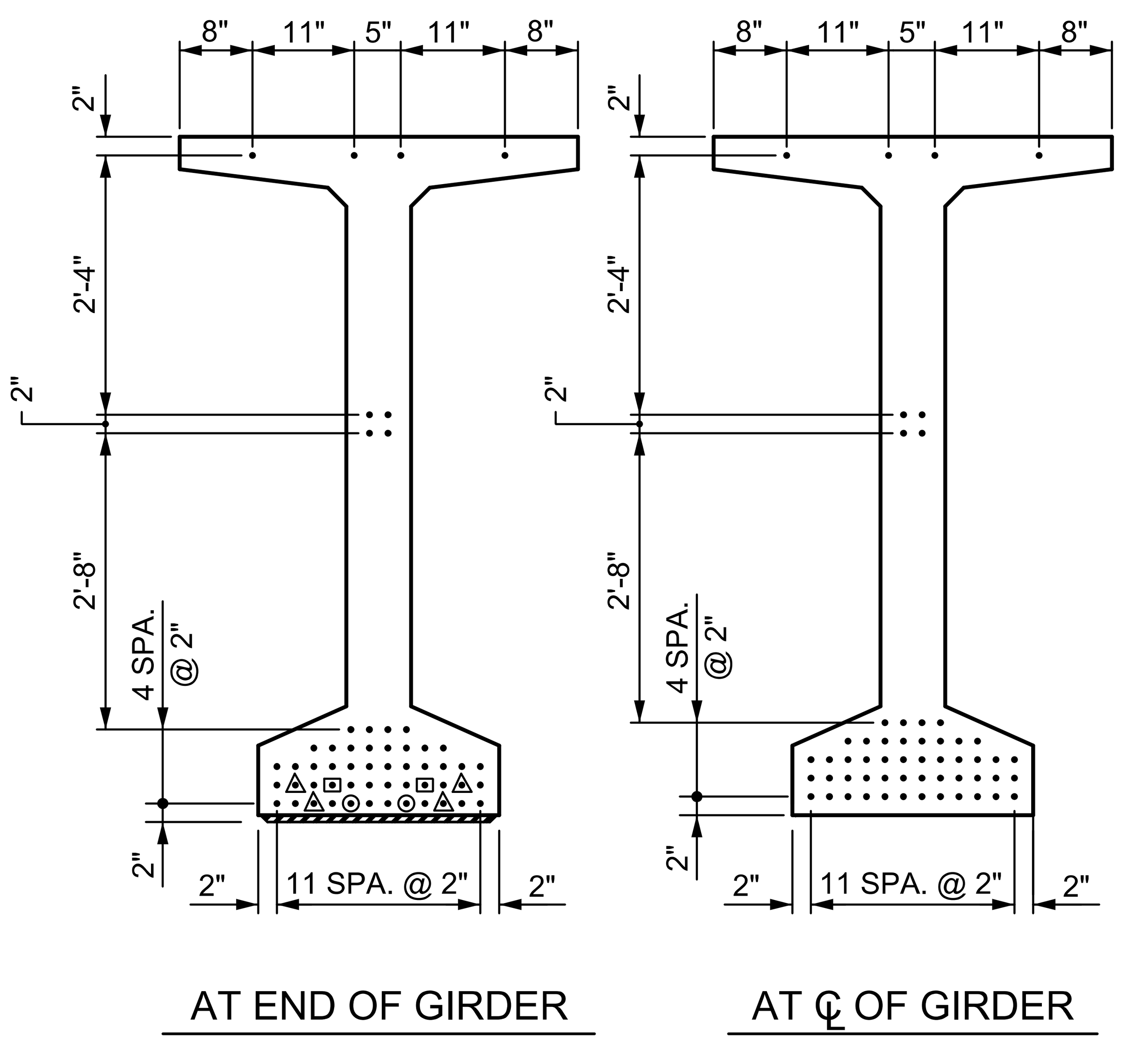
SECTION C-C

(S1, S14, AND S9 BARS NOT SHOWN)

℄ 1½" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM."A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER



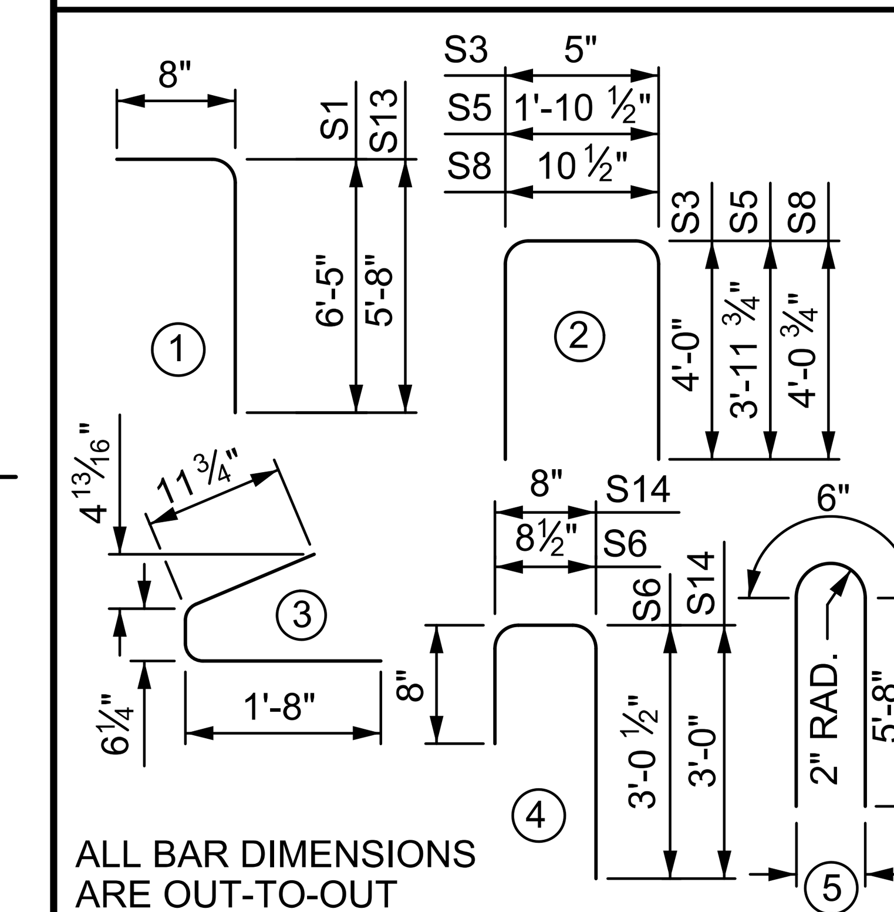
0.6" Ø LOW RELAXATION STRAND LAYOUT

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	158	#4	1	7'-1"	748
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	40	#5	4	4'-5"	184
S8	2	#5	2	9'-0"	19
S9	92	#5	STR	3'-3"	312
S11	30	#5	5	11'-10"	370
S12	16	#4	STR	8'-0"	86
S13	24	#6	1	6'-4"	228
S14	118	#5	4	4'-4"	533

BAR TYPES



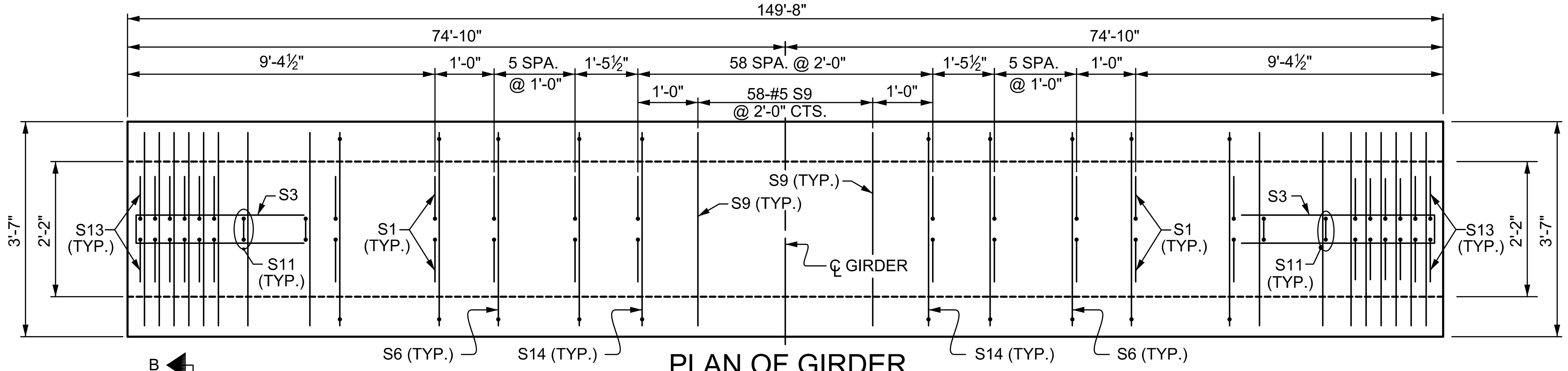
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

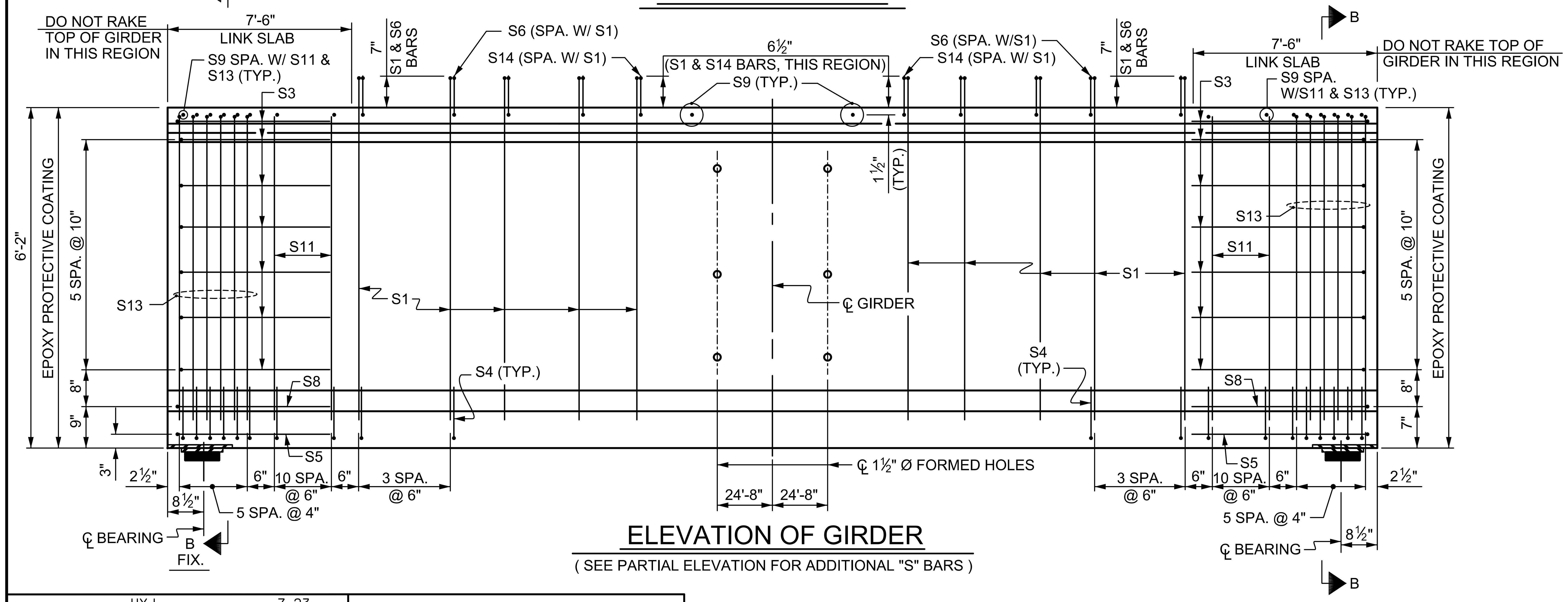
GIRDERS	REINFORCING STEEL	10,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN G	2,758	34.0	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	149'-8"	1,047'-8"

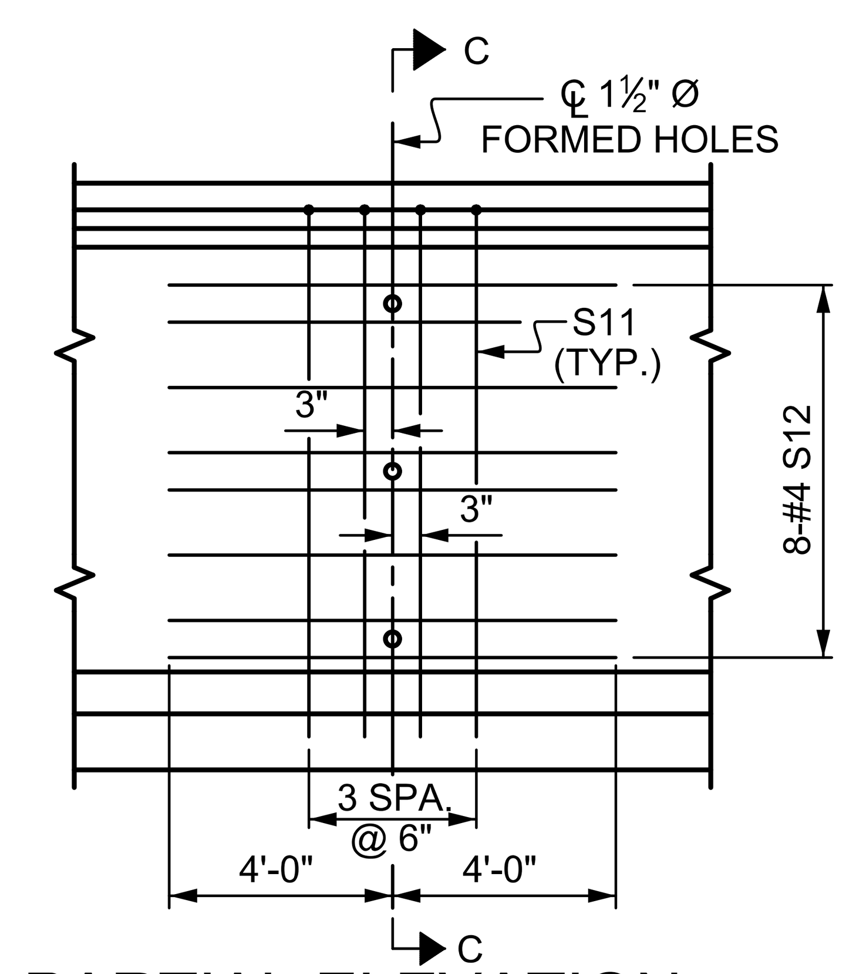


PLAN OF GIRDER


DO NOT RAKE TOP OF GIRDER IN THIS REGION
7'-6"
LINK SLAB
S9 SPA. W/ S11 & S13 (TYP.)
S3
7"
S1 & S6 BARS
S6 (SPA. W/ S1)
S14 (SPA. W/ S1)
6½"
(S1 & S14 BARS, THIS REGION)
S9 (TYP.)
S6 (SPA. W/S1)
S14 (SPA. W/ S1)
7"
S1 & S6 BARS
B
7'-6"
LINK SLAB
DO NOT RAKE TOP OF GIRDER IN THIS REGION
S3
S9 SPA. W/S11 & S13 (TYP.)
6'-2"
EPOXY PROTECTIVE COATING
5 SPA. @ 10"
S11
S13
S1
1½" (TYP.)
℄ GIRDER
S13
S11
S1
S4 (TYP.)
S4 (TYP.)
S8
S8
8"
9"
8"
7"
5 SPA. @ 10"
EPOXY PROTECTIVE COATING
S5
S5
3"
2½"
6"
10 SPA. @ 6"
6"
3 SPA. @ 6"
8½"
5 SPA. @ 4"
℄ 1½" Ø FORMED HOLES
24'-8"
24'-8"
3 SPA. @ 6"
6"
10 SPA. @ 6"
6"
5 SPA. @ 4"
2½"
8½"
℄ BEARING
B
FIX.
℄ BEARING
B
FIX.

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 7 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: [signature]

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN G

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

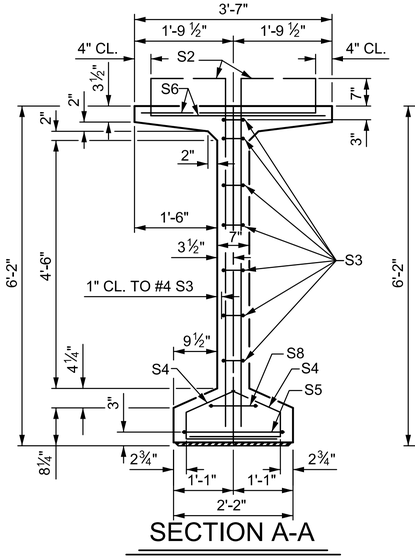
SHEET NO. S1-29

TOTAL SHEETS 73

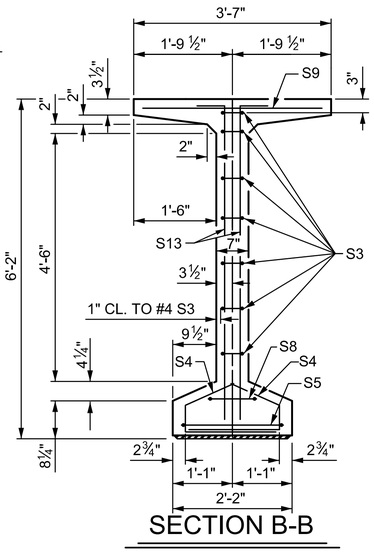
DRAWN BY :	HYJ	DATE :	7-23
CHECKED BY :	MLO	DATE :	8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

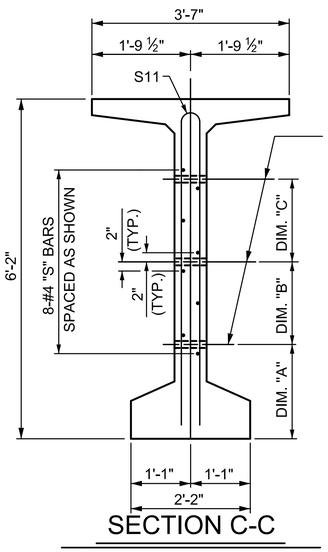
R:\R-2307B\Structures\03 Ustation\06 100% R2 Bridge Plans\40I_057_R2307B_SMU_GI_029_I70380.dgn 8/14/2024 1:48:38 PM stephev



SECTION A-A



SECTION B-B



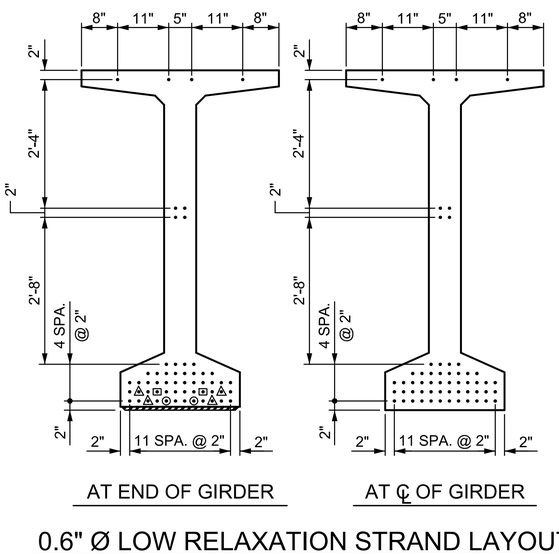
SECTION C-C

(S1,S14 AND S9 BARS NOT SHOWN)

℄ 1½" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM."A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

DEBONDING LEGEND

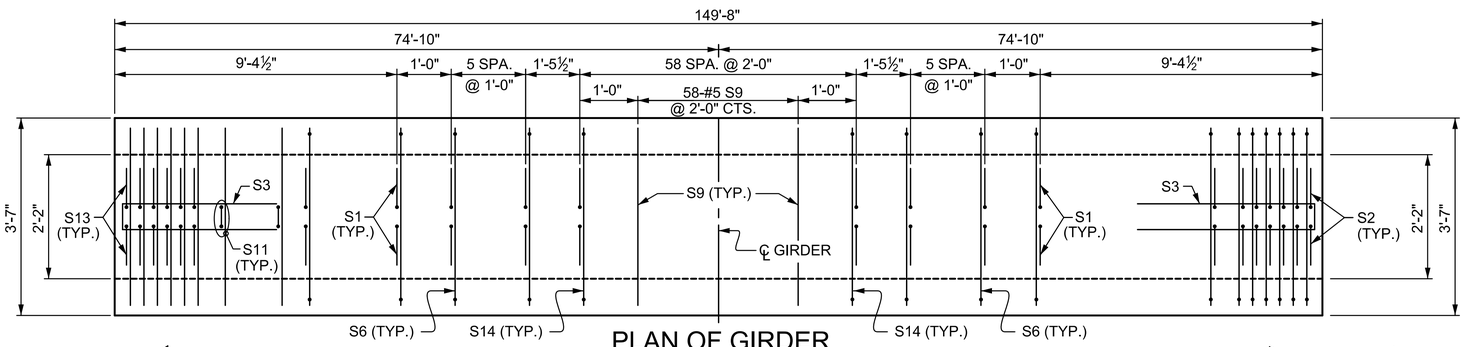
- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ◭ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ⦿ STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER



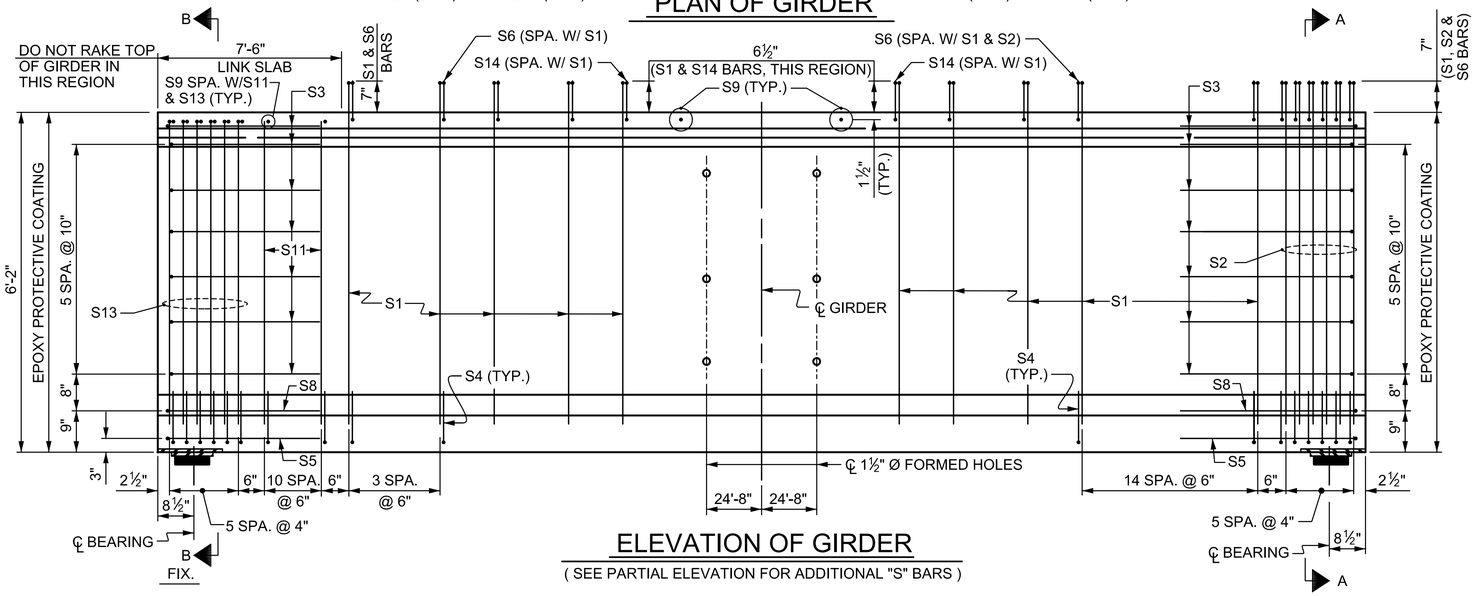
AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS

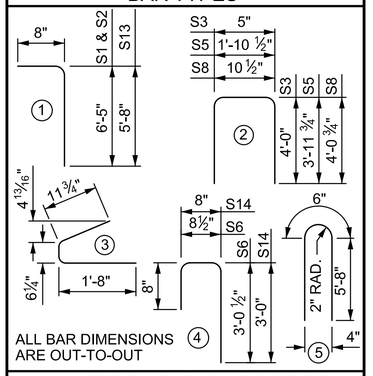
0.6"Ø L.R. GRADE 270 STRANDS

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	180	#4	1	7'-1"	852
S2	12	#6	1	7'-1"	128
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	74	#5	4	4'-5"	341
S8	2	#5	2	9'-0"	19
S9	75	#5	STR.	3'-3"	254
S11	19	#5	5	11'-10"	235
S12	16	#4	STR.	8'-0"	86
S13	12	#6	1	6'-4"	114
S14	118	#5	4	4'-4"	533

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

GIRDERS	REINFORCING STEEL	10, 000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN H	2,840	34.0	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	149'-8"	1,047'-8"

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 8 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: Kevin G. Bailey

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

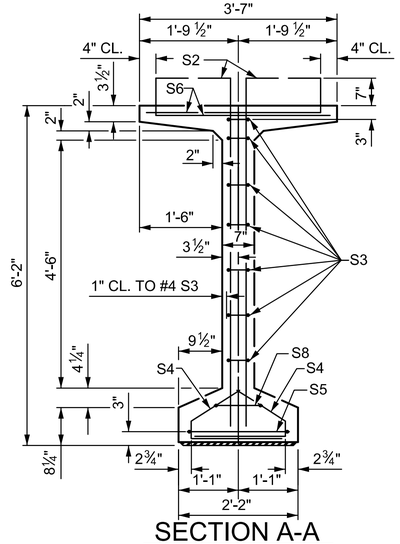
SUPERSTRUCTURE

74" PRESTRESSED CONCRETE MODIFIED BULB TEE LINK SLAB SPAN H

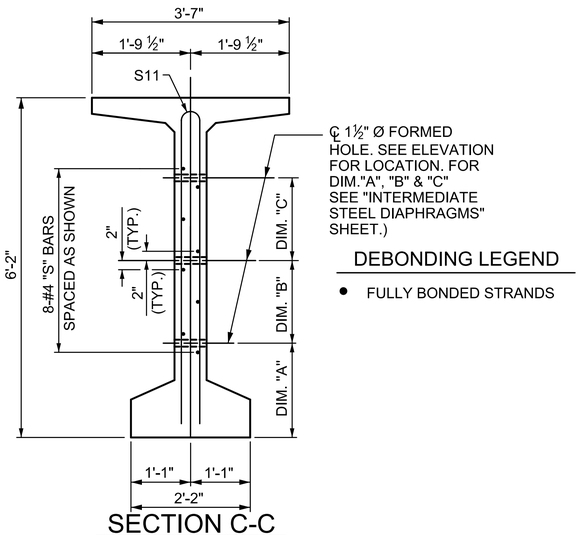
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-30
1			3			TOTAL SHEETS
2			4			73

DRAWN BY :	HYJ	DATE :	7-23
CHECKED BY :	MLO	DATE :	8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24



SECTION A-A

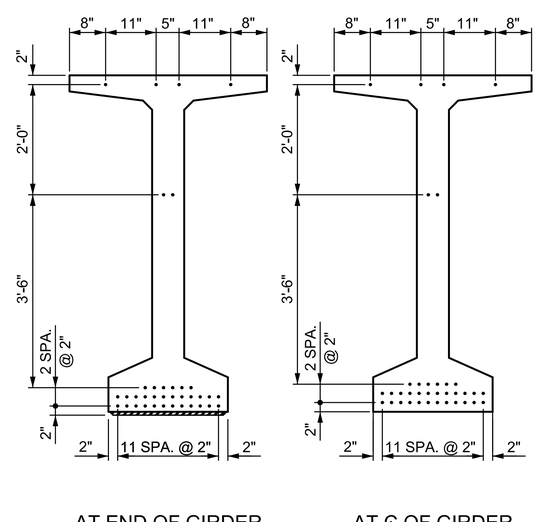


SECTION C-C

(S1, S14 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- FULLY BONDED STRANDS



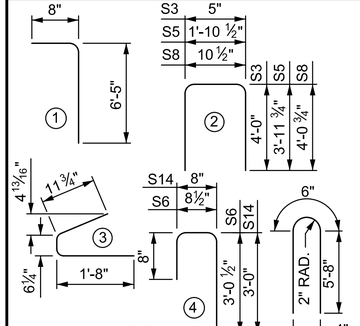
0.6" Ø LOW RELAXATION STRAND LAYOUT

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	170	#4	1	7'-1"	804
S2	24	#6	1	7'-1"	255
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-2"	178
S5	2	#5	2	9'-10"	21
S6	108	#5	4	4'-5"	498
S8	2	#5	2	9'-0"	19
S9	42	#5	STR	3'-3"	142
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86
S14	86	#5	4	4'-4"	389

BAR TYPES



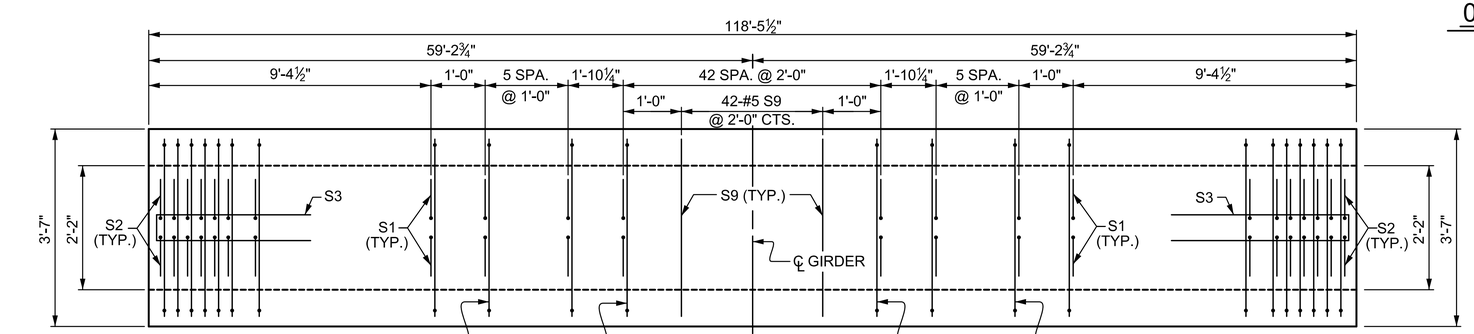
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

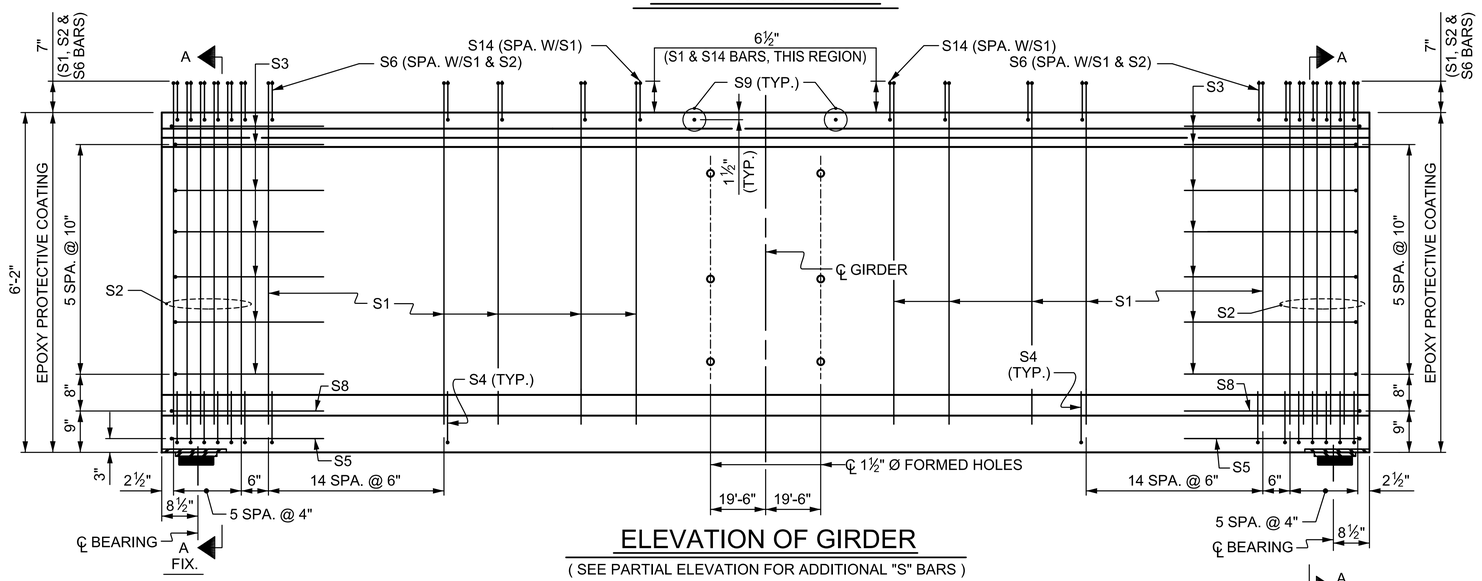
GIRDERS	REINFORCING STEEL	7000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
SPAN I	2,570	27.0	36

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
7	118'-5½"	829'-2½"



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 9 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

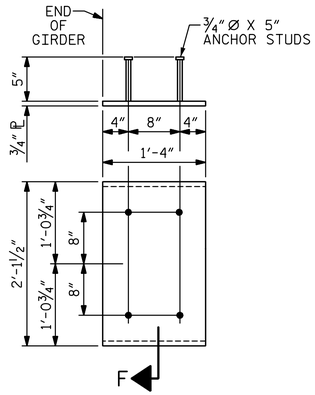
SUPERSTRUCTURE

74" PRESTRESSED CONCRETE MODIFIED BULB TEE SPAN I

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

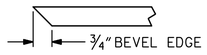
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-31
1			3			TOTAL SHEETS
2			4			73

DRAWN BY :	HYJ	DATE :	7-23
CHECKED BY :	MLO	DATE :	8-23
DESIGN ENGINEER OF RECORD:	K. BAILEY	DATE :	7-24



EMBEDDED PLATE "B-1" DETAILS FOR 74" MODIFIED BULB TEES

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

NOTES:

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

APPLY EPOXY PROTECTIVE COATING TO BOTH SIDES AND BOTTOM OF END 2 FEET OF GIRDER AND END OF GIRDER SURFACES INDICATED IN ELEVATION VIEW.

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,300 PSI FOR SPANS A AND B, 8,000 PSI FOR SPANS C-H AND 5,600 PSI FOR SPAN I.

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

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4" AND THE AREA SHOWN ON GIRDER SHEETS, SHALL BE RAKED TO A DEPTH OF ¼".

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

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 10 OF 10

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: [illegible]

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-32
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : MBC	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

STD. NO. PCG9

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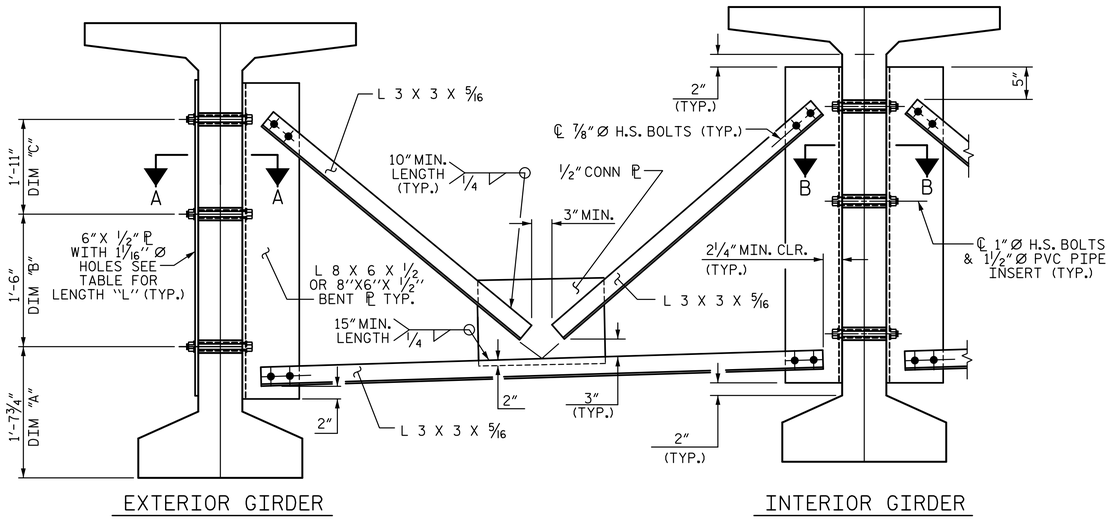
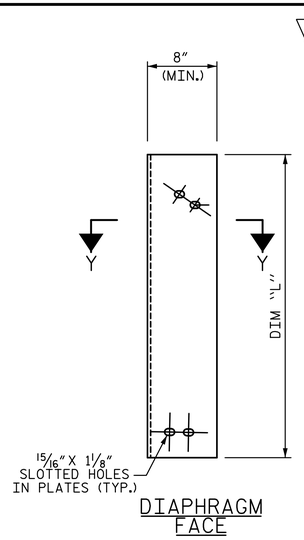


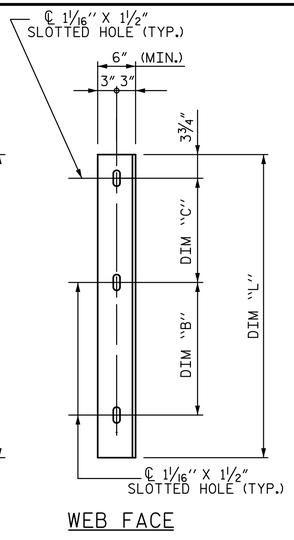
EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE



WEB FACE

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

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

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

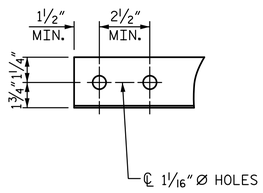
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

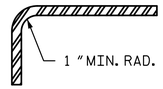
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
74" BULB TEE	1'-7 3/4"	1'-6"	1'-11"	4'-2"

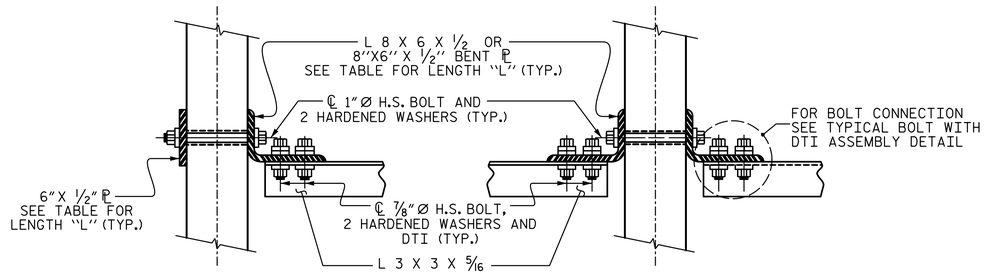


ANGLE END
(L 3 X 3 X 5/16)



SECTION Y-Y

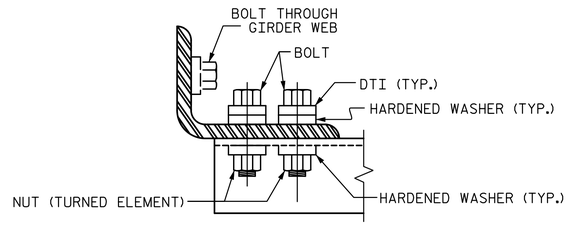
CONNECTOR PLATE DETAIL



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

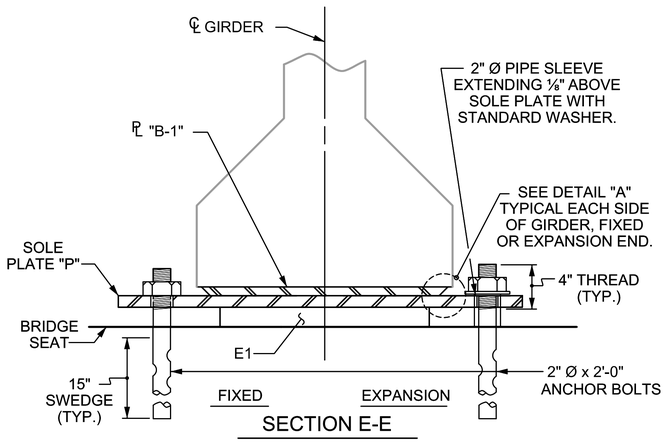
SUPERSTRUCTURE

INTERMEDIATE STEEL DIAPHRAGMS FOR 74" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

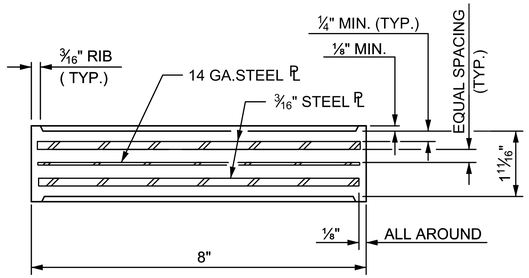
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-33
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : HYJ	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

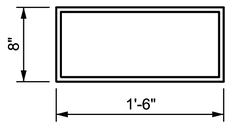
stephev 8/14/2024 1:48:43 PM R:\R-2307B\Structures\03 Ustation\06 100% R2 Bridge Plans\401_065_R2307B_SMU_GI_033_170380.dgn



SECTION E-E



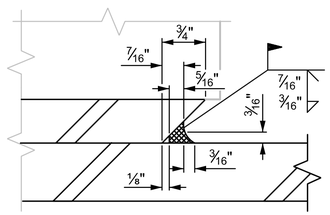
TYPICAL SECTION OF ELASTOMERIC BEARINGS



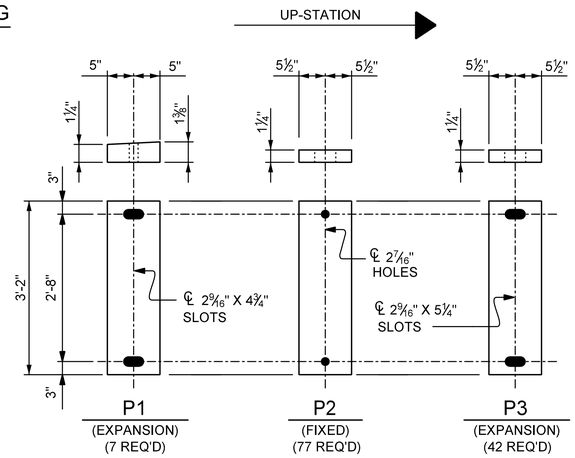
E1 (28 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

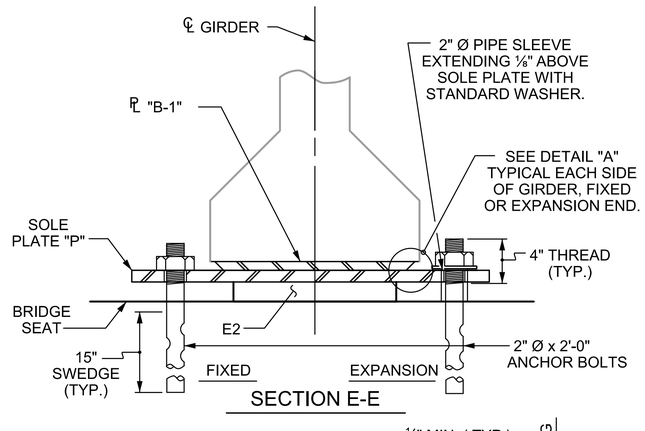
TYPE III



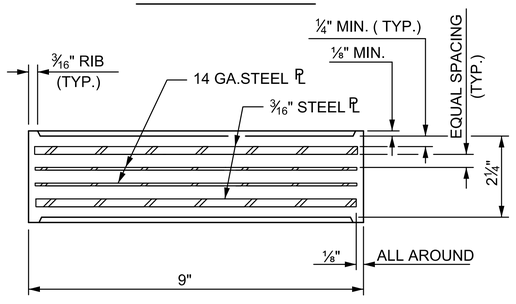
DETAIL "A"



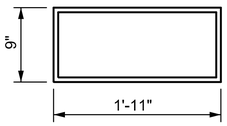
SOLE PLATE DETAILS ("P")



SECTION E-E



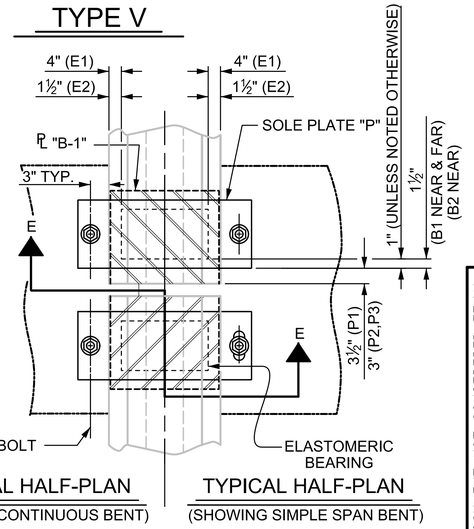
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E2 (98 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)

NOTES

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

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

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

PRIOR TO WELDING, GRIND THE GALVANIZED SURFACE OF THE PORTION OF THE EMBEDDED PLATE AND SOLE PLATE THAT ARE TO BE WELDED. AFTER WELDING, DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED IN ACCORDANCE WITH THE 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. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE STANDARD SPECIFICATIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE III	205 k
TYPE V	365 k

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-34
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : MIG	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

DEAD LOAD DEFLECTION TABLE FOR SPANS A & B
GIRDERS 1-7

FORTIETH POINTS	0.00	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.010	0.020	0.030	0.039	0.049	0.058	0.066	0.074	0.082	0.089	0.096	0.102	0.107	0.112	0.116	0.119	0.122	0.124	0.125	0.125
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.004	0.008	0.012	0.016	0.019	0.023	0.027	0.030	0.033	0.036	0.039	0.042	0.044	0.046	0.047	0.048	0.049	0.051	0.051	0.052
FINAL CAMBER ▲	0″	1/16″	1/8″	3/16″	5/16″	3/8″	7/16″	1/2″	9/16″	9/16″	5/8″	11/16″	3/4″	3/4″	13/16″	13/16″	7/8″	7/8″	7/8″	7/8″	7/8″

DEAD LOAD DEFLECTION TABLE FOR SPANS C, D, E, F, G, & H
GIRDERS 1,2,3,6,7

FORTIETH POINTS	0.00	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.028	0.056	0.083	0.110	0.136	0.162	0.186	0.209	0.230	0.251	0.269	0.286	0.301	0.314	0.325	0.335	0.342	0.347	0.350	0.351
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.020	0.041	0.060	0.080	0.099	0.119	0.136	0.154	0.170	0.185	0.199	0.212	0.223	0.233	0.241	0.249	0.254	0.258	0.260	0.261
FINAL CAMBER ▲	0″	1/8″	3/16″	1/4″	3/8″	7/16″	1/2″	5/8″	11/16″	3/4″	13/16″	13/16″	7/8″	15/16″	1″	1″	1″	1 1/16″	1 1/16″	1 1/16″	1 1/16″

DEAD LOAD DEFLECTION TABLE FOR SPANS C, D, E, F, G, & H
GIRDER 4

FORTIETH POINTS	0.000	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.028	0.056	0.083	0.110	0.136	0.162	0.186	0.209	0.230	0.251	0.269	0.286	0.301	0.314	0.325	0.335	0.342	0.347	0.350	0.351
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.017	0.035	0.051	0.068	0.085	0.101	0.117	0.132	0.145	0.159	0.170	0.182	0.191	0.200	0.207	0.214	0.218	0.222	0.223	0.224
FINAL CAMBER ▲	0″	1/8″	1/4″	3/8″	1/2″	5/8″	3/4″	13/16″	15/16″	1″	1 1/8″	1 3/16″	1 1/4″	1 5/16″	1 3/8″	1 7/16″	1 7/16″	1 1/2″	1 1/2″	1 1/2″	1 1/2″

DEAD LOAD DEFLECTION TABLE FOR SPANS C, D, E, F, G, & H
GIRDER 5

FORTIETH POINTS	0.00	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.028	0.056	0.083	0.110	0.136	0.162	0.186	0.209	0.230	0.251	0.269	0.286	0.301	0.314	0.325	0.335	0.342	0.347	0.350	0.351
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.019	0.039	0.058	0.076	0.095	0.113	0.130	0.147	0.162	0.177	0.190	0.203	0.213	0.223	0.230	0.238	0.242	0.247	0.248	0.250
FINAL CAMBER ▲	0″	1/8″	3/16″	5/16″	7/16″	1/2″	9/16″	11/16″	3/4″	13/16″	7/8″	15/16″	1″	1 1/16″	1 1/16″	1 1/8″	1 3/16″	1 3/16″	1 3/16″	1 1/4″	1 1/4″

DEAD LOAD DEFLECTION TABLE FOR SPAN I
GIRDERS 1-7

FORTIETH POINTS	0.00	0.025	0.050	0.075	0.100	0.125	0.150	0.175	0.200	0.225	0.250	0.275	0.300	0.325	0.350	0.375	0.400	0.425	0.450	0.475	0.500
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.016	0.031	0.046	0.061	0.075	0.089	0.103	0.115	0.127	0.138	0.148	0.158	0.166	0.174	0.180	0.185	0.189	0.192	0.194	0.194
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.007	0.015	0.022	0.029	0.036	0.044	0.050	0.057	0.063	0.069	0.074	0.079	0.083	0.087	0.090	0.092	0.094	0.096	0.097	0.097
FINAL CAMBER ▲	0″	1/8″	3/16″	5/16″	3/8″	7/16″	9/16″	5/8″	11/16″	3/4″	13/16″	7/8″	15/16″	1″	1 1/16″	1 1/16″	1 1/8″	1 1/8″	1 1/8″	1 3/16″	1 3/16″

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

TABLES CONTINUED ON NEXT SHEET

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

DRAWN BY : MIG DATE : 8-23
CHECKED BY : SAB DATE : 8-23
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN BAILEY
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/14/2024

STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-35
1			3			TOTAL SHEETS
2			4			73

DEAD LOAD DEFLECTION TABLE FOR SPANS A & B

GIRDERS 1-7

FORTIETH POINTS	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ▲	0.125	0.124	0.122	0.119	0.116	0.112	0.107	0.102	0.096	0.089	0.082	0.074	0.066	0.058	0.049	0.039	0.030	0.020	0.010	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.051	0.051	0.049	0.048	0.047	0.046	0.044	0.042	0.039	0.036	0.033	0.030	0.027	0.023	0.019	0.016	0.012	0.008	0.004	0.000
FINAL CAMBER ▲	7/8″	7/8″	7/8″	7/8″	13/16″	13/16″	3/4″	3/4″	11/16″	5/8″	9/16″	1/2″	1/2″	7/16″	3/8″	5/16″	3/16″	1/8″	1/16″	0″

DEAD LOAD DEFLECTION TABLE FOR SPANS C, D, E, F, G, & H

GIRDERS 1,2,3,6,7

FORTIETH POINTS	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0/775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ▲	0.350	0.347	0.342	0.335	0.325	0.314	0.301	0.286	0.269	0.251	0.230	0.209	0.186	0.162	0.136	0.110	0.083	0.056	0.028	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.260	0.258	0.254	0.249	0.241	0.233	0.223	0.212	0.199	0.185	0.170	0.154	0.136	0.119	0.099	0.080	0.060	0.041	0.020	0.000
FINAL CAMBER ▲	1 1/16″	1 1/16″	1 1/16″	1″	1″	1″	15/16″	7/8″	13/16″	13/16″	3/4″	11/16″	5/8″	1/2″	7/16″	3/8″	1/4″	3/16″	1/8″	0″

DEAD LOAD DEFLECTION TABLE FOR SPANS C, D, E, F, G, & H

GIRDER 4

FORTIETH POINTS	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ▲	0.350	0.347	0.342	0.335	0.325	0.314	0.301	0.286	0.269	0.251	0.230	0.209	0.186	0.162	0.136	0.110	0.083	0.056	0.028	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.223	0.222	0.218	0.214	0.207	0.200	0.191	0.182	0.170	0.159	0.145	0.132	0.117	0.101	0.085	0.068	0.051	0.035	0.017	0.000
FINAL CAMBER ▲	1 1/2″	1 1/2″	1 1/2″	1 7/16″	1 7/16″	1 3/8″	1 5/16″	1 1/4″	1 3/16″	1 1/8″	1″	15/16″	13/16″	3/4″	5/8″	1/2″	3/8″	1/4″	1/8″	0″

DEAD LOAD DEFLECTION TABLE FOR SPANS C, D, E, F, G, & H

GIRDER 5

FORTIETH POINTS	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ▲	0.350	0.347	0.342	0.335	0.325	0.314	0.301	0.286	0.269	0.251	0.230	0.209	0.186	0.162	0.136	0.110	0.083	0.056	0.028	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.248	0.247	0.242	0.238	0.230	0.223	0.213	0.203	0.190	0.177	0.162	0.147	0.130	0.113	0.095	0.076	0.058	0.039	0.019	0.000
FINAL CAMBER ▲	1 1/4″	1 3/16″	1 3/16″	1 3/16″	1 1/8″	1 1/16″	1 1/16″	1″	15/16″	7/8″	13/16″	3/4″	11/16″	9/16″	1/2″	7/16″	5/16″	3/16″	1/8″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN I

GIRDERS 1-7

FORTIETH POINTS	0.525	0.550	0.575	0.600	0.625	0.650	0.675	0.700	0.725	0.750	0.775	0.800	0.825	0.850	0.875	0.900	0.925	0.950	0.975	1.000
CAMBER (GIRDER ALONE IN PLACE) ▲	0.194	0.192	0.189	0.185	0.180	0.174	0.166	0.158	0.148	0.138	0.127	0.115	0.103	0.089	0.075	0.061	0.046	0.031	0.016	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.097	0.096	0.094	0.092	0.090	0.087	0.083	0.079	0.074	0.069	0.063	0.057	0.050	0.044	0.036	0.029	0.022	0.015	0.007	0.000
FINAL CAMBER ▲	1 3/16″	1 1/8″	1 1/8″	1 1/8″	1 1/16″	1 1/16″	1″	15/16″	7/8″	13/16″	3/4″	11/16″	5/8″	9/16″	7/16″	3/8″	5/16″	3/16″	1/8″	0″

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

TABLES ARE CONTINUED FROM PREVIOUS SHEET

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 2 OF 2

DRAWN BY : MIG DATE : 8-23
CHECKED BY : SAB DATE : 8-23
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
8/14/2024

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NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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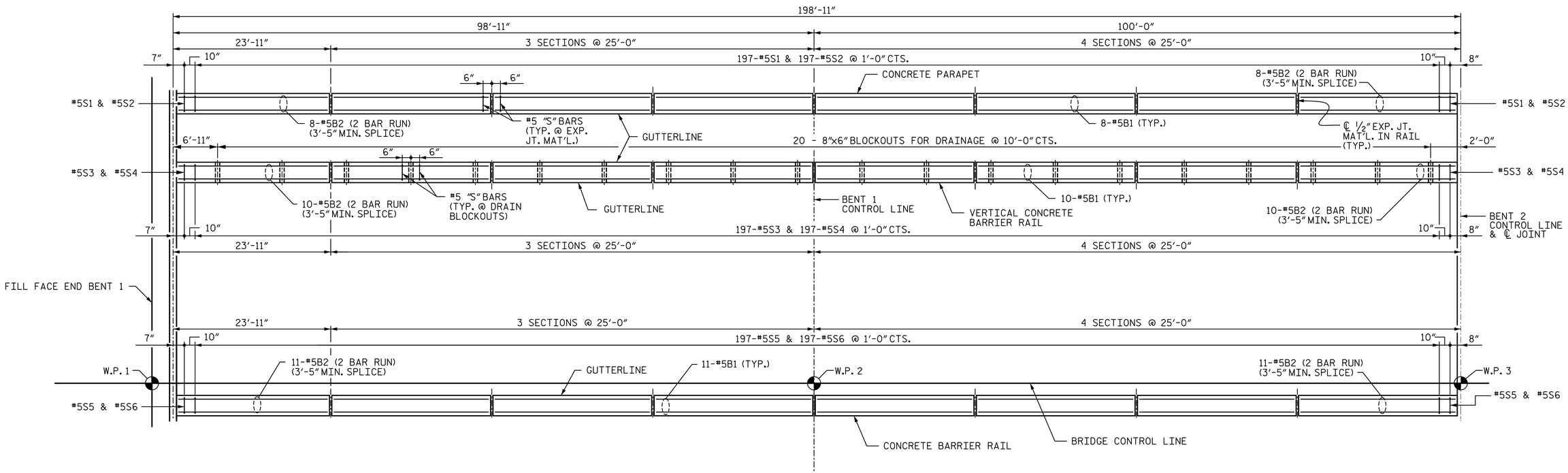
DEAD LOAD DEFLECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-36
1			3			TOTAL SHEETS
2			4			73



SPAN A SPAN B

PLAN OF BARRIER RAIL UNIT 1

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 5

NOTES:

SEE SHEET 5 OF 5 FOR ADDITIONAL NOTES AND DETAILS.

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BARRIER RAIL
UNIT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-37
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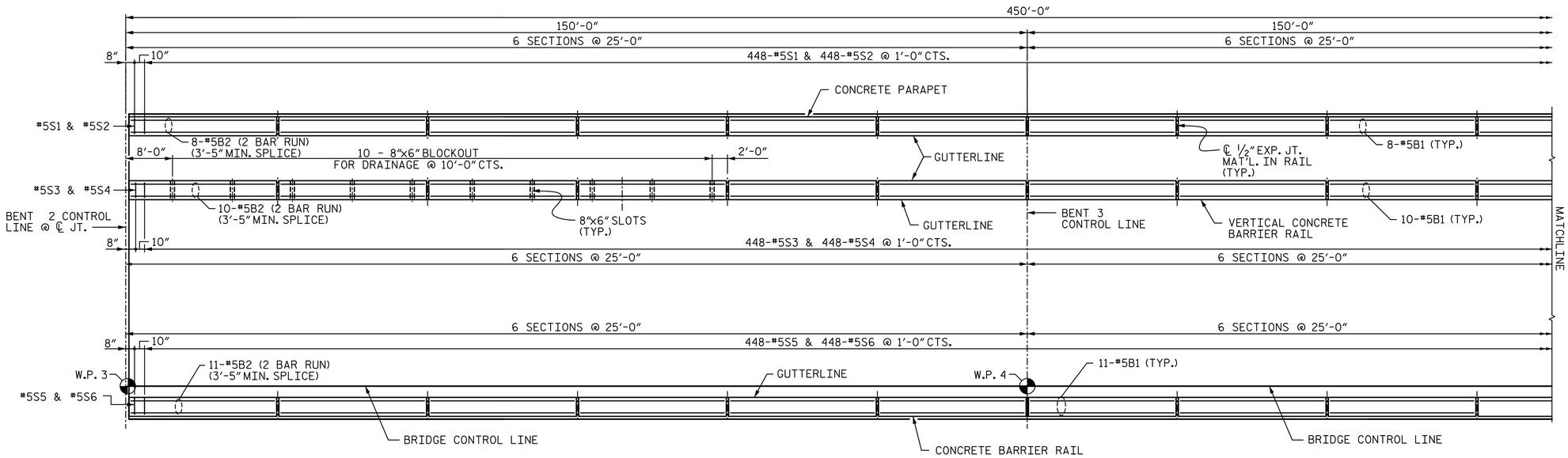
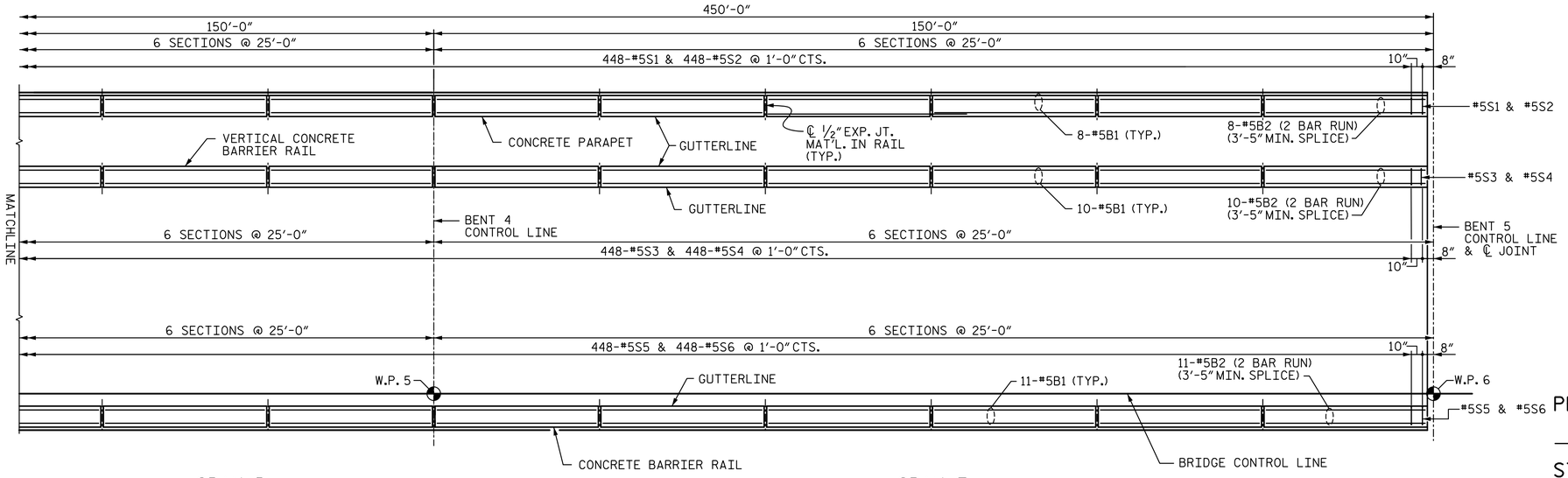


SPAN C SPAN D



SPAN D SPAN E

PLAN OF BARRIER RAIL UNIT 2

NOTES:

SEE SHEET 5 OF 5 FOR ADDITIONAL NOTES AND DETAILS.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 5

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BARRIER RAIL
UNIT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-38
1			3			TOTAL SHEETS
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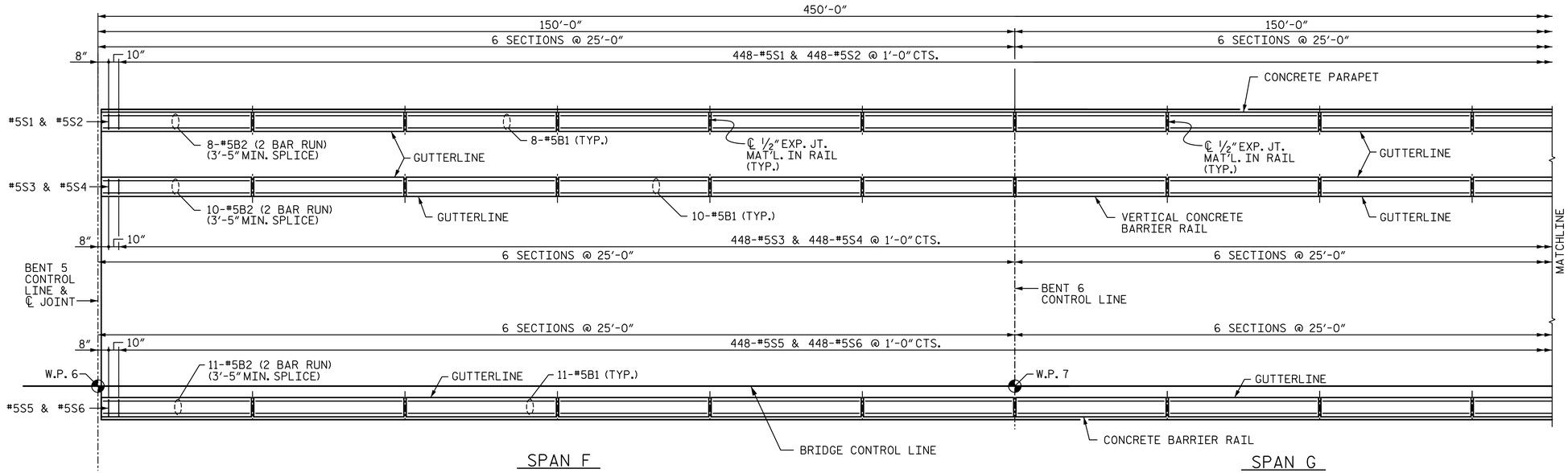

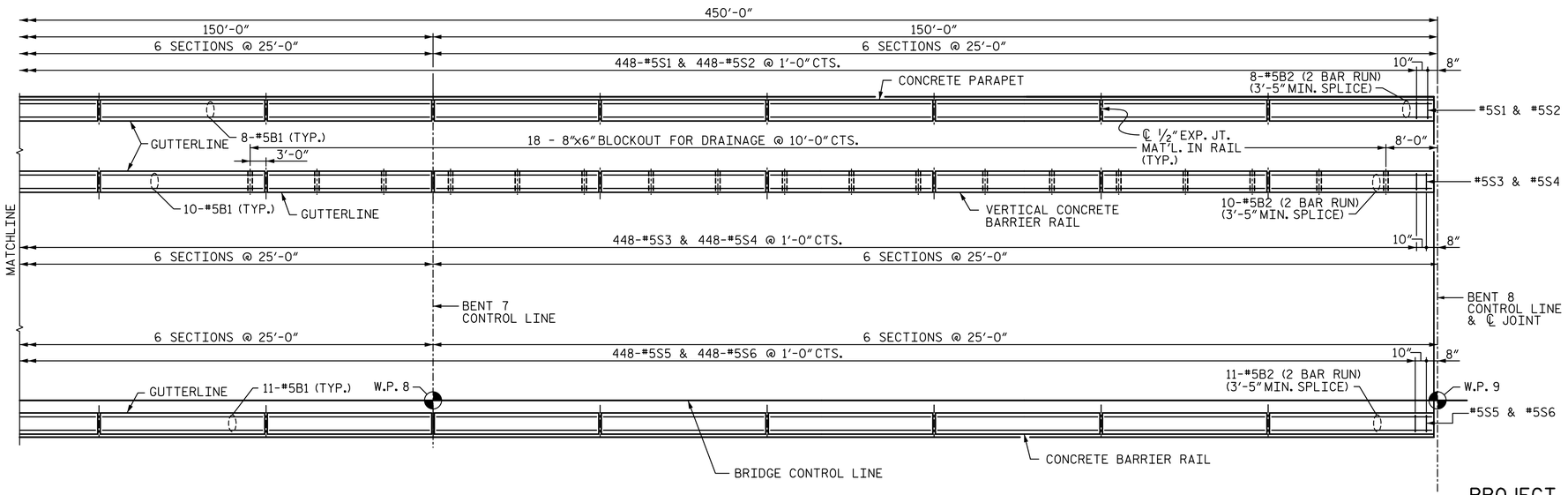

PLAN OF BARRIER RAIL UNIT 3

NOTES:

SEE SHEET 5 OF 5 FOR ADDITIONAL NOTES AND DETAILS.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 5

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BARRIER RAIL
UNIT 3

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-39
1			3			TOTAL SHEETS
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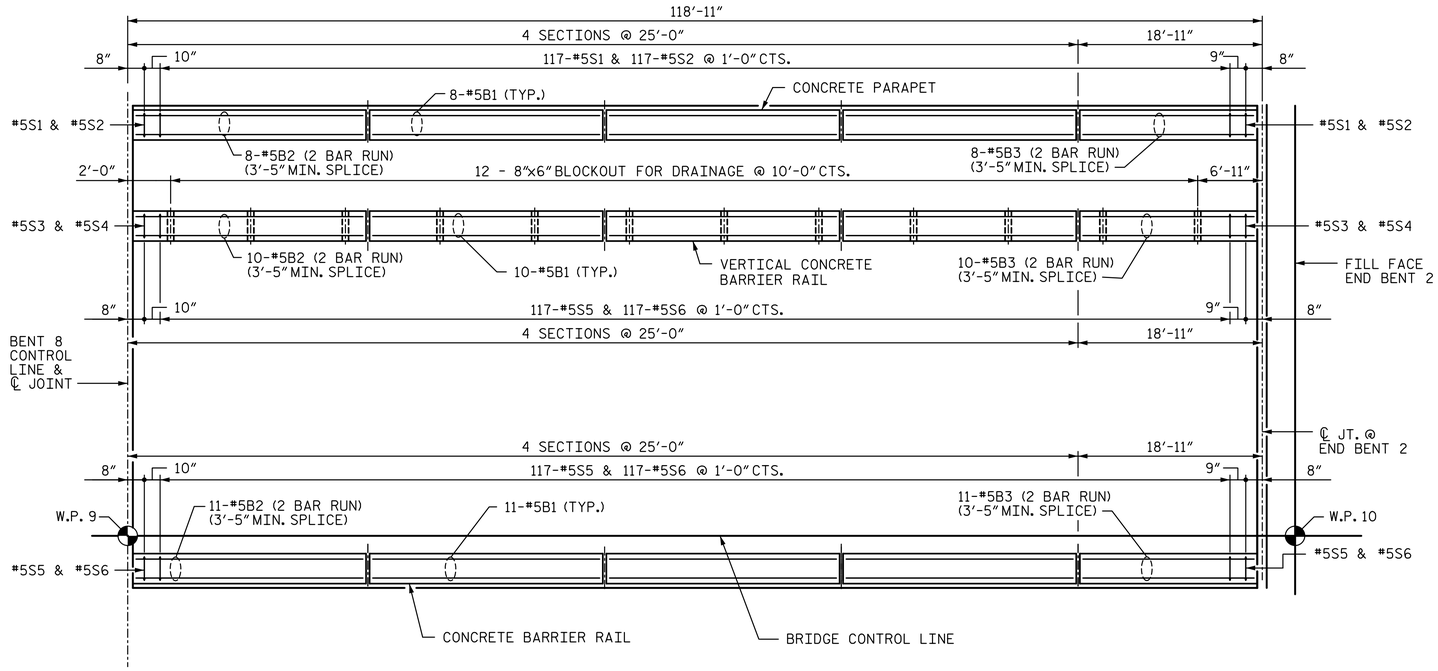

SPAN I

PLAN OF BARRIER RAIL UNIT 4

NOTES:

SEE SHEET 5 OF 5 FOR ADDITIONAL NOTES AND DETAILS.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

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BARRIER RAIL
UNIT 4

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-40
1			3			TOTAL SHEETS
2			4			73

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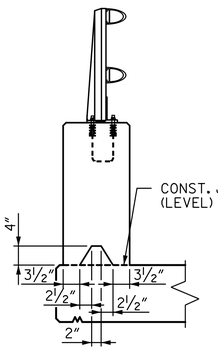
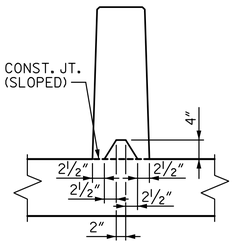


SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



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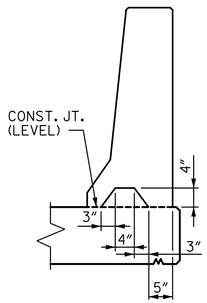
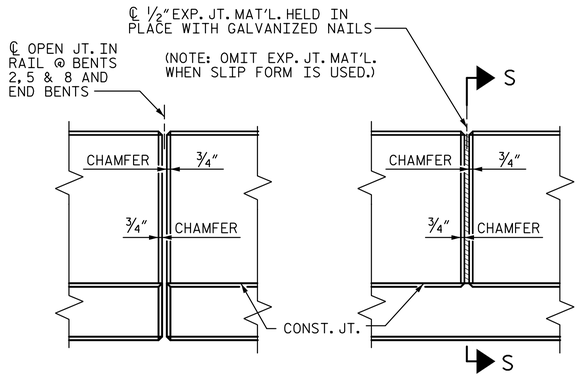
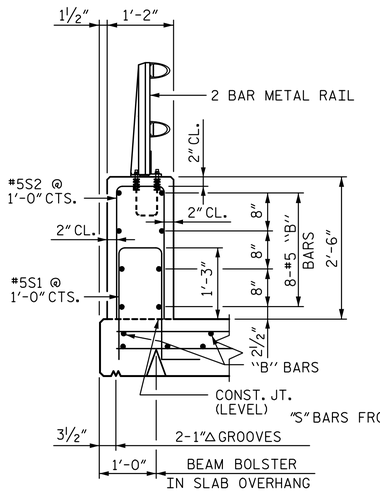


SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)

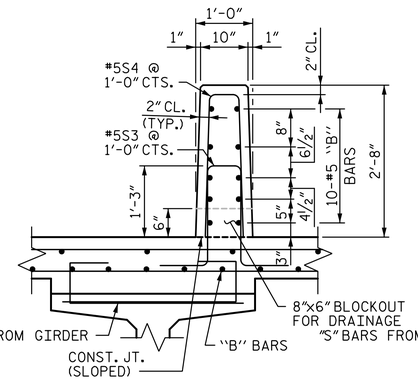


ELEVATION AT EXPANSION JOINTS
(TYPICAL FOR EACH BARRIER TYPE)

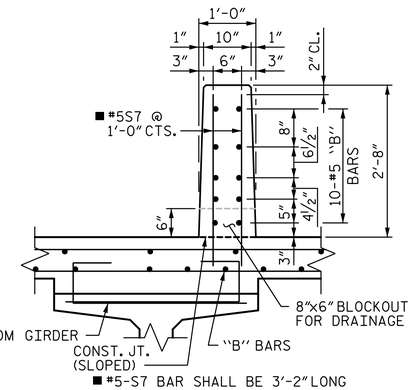
BARRIER RAIL DETAILS



SECTION THRU CONCRETE PARAPET WITH 2 BAR METAL RAIL

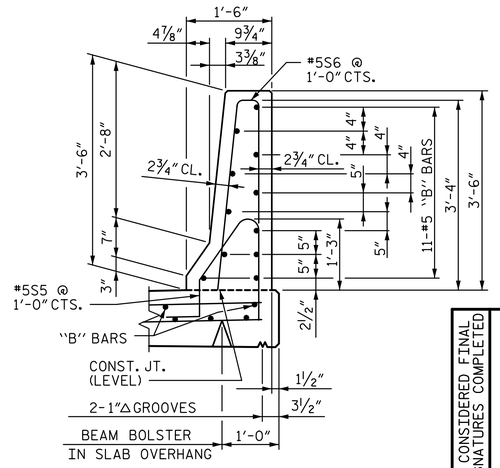


SECTION THRU VERTICAL CONCRETE BARRIER RAIL



■ #5-S7 BAR SHALL BE 3'-2" LONG ADHESIVELY ANCHORED INTO DECK SLAB, SEE NOTES.

OPTIONAL
SECTION THRU VERTICAL CONCRETE BARRIER RAIL



SECTION THRU CONCRETE BARRIER RAIL

NOTES

THE BARRIER RAIL IN UNITS 1, 2 & 3 SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

THE BARRIER RAIL IN UNIT 4 SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

TO FACILITATE THE SCREEDING OF THE ROADWAY AND MULTI-USE PATH, THE CONTRACTOR MAY USE THE OPTIONAL #5S7 BARS, INSTEAD OF THE #5S3 & #5S4 BARS, FOR THE FULL LENGTH OF THE VERTICAL CONCRETE BARRIER RAIL AT NO ADDITIONAL COST TO THE DEPARTMENT. THE OPTIONAL #5S7 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM. THE YIELD LOAD FOR THE #5S7 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

IF THE CONTRACTOR USES THE OPTIONAL #5S7 BARS IN THE VERTICAL CONCRETE BARRIER RAIL, THE #5S7 BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO AVOID CONFLICTS WITH THE S6 OR S14 BARS PROTRUDING FROM THE TOP OF THE GIRDER.

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.

THE BLOCKOUT FOR DRAINAGE AT VERTICAL CONCRETE BARRIER RAIL SHALL BE 8"x6". THE HEIGHT OF THE BLOCKOUT IN THE VERTICAL CONCRETE BARRIER RAIL SHALL EXTEND FROM THE TOP OF DECK TO THE TOP OF THE DRAIN OPENING.

FOR BLOCK-OUTS IN THE VERTICAL CONCRETE BARRIER RAIL, SEE "BARRIER RAIL" SHEETS.

FOR COVER PLATES IN THE BARRIER RAIL/PARAPET, SEE "EXPANSION JOINT DETAILS FOR BARRIER RAIL" SHEETS.

FOR THE 2 BAR METAL RAIL, SEE "2 BAR METAL RAIL" SHEETS.

FOR PARAPET AND END POST FOR 2 BAR METAL RAIL ON APPROACH SLAB, SEE "BARRIER RAIL DETAILS ON BRIDGE APPROACH SLAB" SHEET.

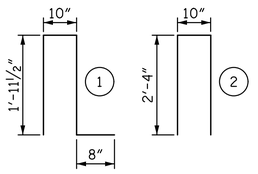
FOR VERTICAL CONCRETE BARRIER ON APPROACH SLAB, SEE "BARRIER RAIL DETAILS ON BRIDGE APPROACH SLAB" SHEET.

FOR CONCRETE BARRIER ON APPROACH SLAB, SEE "BARRIER RAIL DETAILS ON BRIDGE APPROACH SLAB" SHEET.

THE #5S1, #5S2, #5S3, #5S4, #5S5, & #5S6 MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2" MINIMUM CLEARANCE TO THE ½" JOINT MATERIAL IN THE BARRIER RAIL.

THE BOTTOM TWO #5 "B" BARS IN THE VERTICAL CONCRETE BARRIER RAIL MAY BE FIELD CUT TO AVOID DRAINS.

BAR TYPES
1'-2" x 2'-6" CONCRETE PARAPET



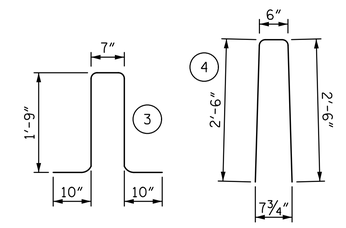
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR 1'-2" X 2'-6" CONCRETE PARAPET ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	328	#5	STR	24'-7"	8,410
✳ B2	112	#5	STR	14'-0"	1,635
✳ B3	16	#5	STR	11'-0"	184
✳ S1	1,218	#5	1	5'-5"	6,881
✳ S2	1,218	#5	2	5'-6"	6,987

✳ EPOXY COATED REINFORCING STEEL	24,097	LBS.
CLASS AA CONCRETE	131.4	CU. YDS.
1'-2" X 2'-6" CONCRETE PARAPET SUPERSTRUCTURE	1,217.75	LIN. FT.
● APPROACH SLAB	50.00	LIN. FT.
TOTAL	1,267.75	LIN. FT.

BAR TYPES
VERTICAL CONCRETE BARRIER RAIL



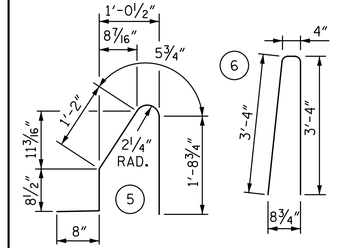
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR VERTICAL CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	410	#5	STR	24'-7"	10,513
✳ B2	140	#5	STR	14'-0"	2,044
✳ B3	20	#5	STR	11'-0"	229
✳ S3	1,218	#5	3	5'-9"	7,305
✳ S4	1,218	#5	4	5'-6"	6,987

✳ EPOXY COATED REINFORCING STEEL	27,078	LBS.
CLASS AA CONCRETE	110.1	CU. YDS.
VERT. CONC. BARRIER RAIL SUPERSTRUCTURE	1,217.75	LIN. FT.
● APPROACH SLAB	50.50	LIN. FT.
TOTAL	1,268.25	LIN. FT.

BAR TYPES
CONCRETE BARRIER RAIL



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	451	#5	STR	24'-7"	11,564
✳ B2	154	#5	STR	14'-0"	2,249
✳ B3	22	#5	STR	11'-0"	252
✳ S5	1,218	#5	5	4'-9"	6,034
✳ S6	1,218	#5	6	7'-0"	8,893

✳ EPOXY COATED REINFORCING STEEL	28,992	LBS.
CLASS AA CONCRETE	165.4	CU. YDS.
CONCRETE BARRIER RAIL SUPERSTRUCTURE	1,217.75	LIN. FT.
● APPROACH SLAB	20.00	LIN. FT.
TOTAL	1,237.75	LIN. FT.

● FOR EPOXY COATED REINFORCING STEEL AND CLASS AA CONCRETE IN THE RAILS ON THE APPROACH SLABS, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET.

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 5 OF 5

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

BARRIER RAIL DETAILS

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

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NO.	BY:	DATE:	NO.	BY:	DATE:	S1-41
1			3			TOTAL SHEETS
2			4			73

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DESIGN ENGINEER OF RECORD:	K. BAILEY	DATE :	7-24

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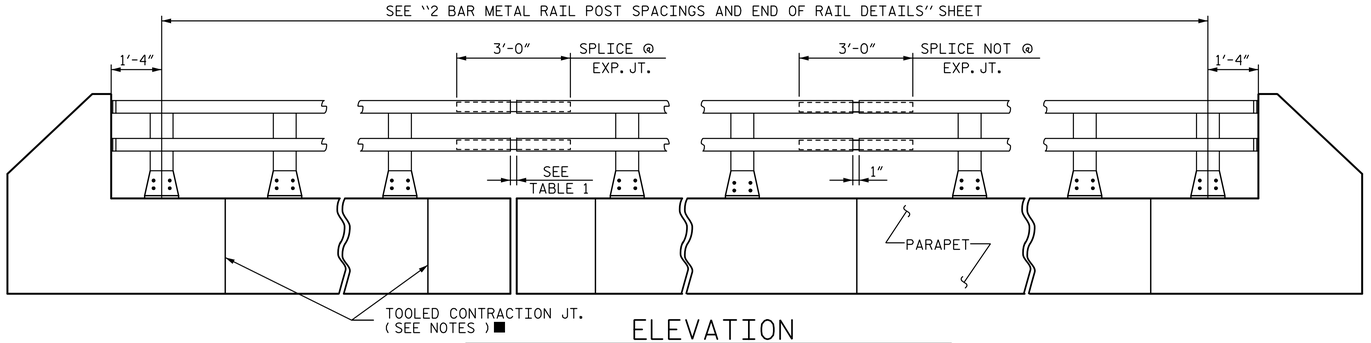


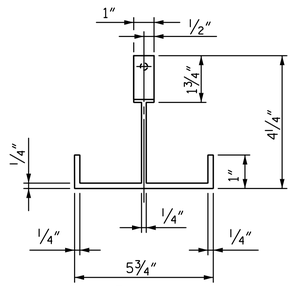
ELEVATION

NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE "END OF RAIL DETAILS"

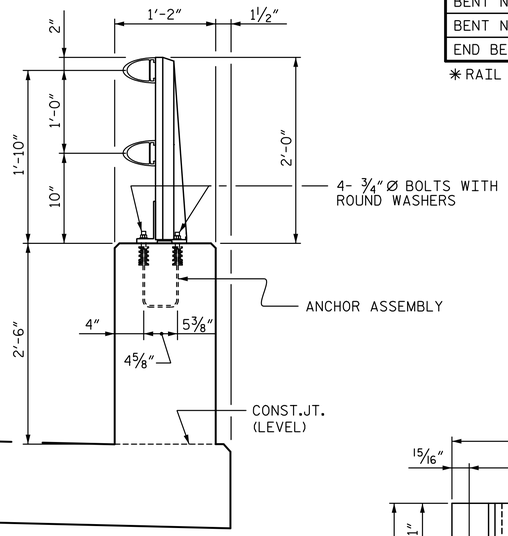
■ TOOLED CONTRACTION JOINTS SHALL BE SHIFTED IF NECESSARY SUCH THAT THEY ARE AT LEAST 3" CLEAR FROM THE POST BASE PLATES.

TABLE 1	
℄ EXP. JT. @	RAIL ✳ OPENING
END BENT No. 1	2½"
BENT No. 2	2½"
BENT No. 5	3"
BENT No. 8	2½"
END BENT No. 2	2½"

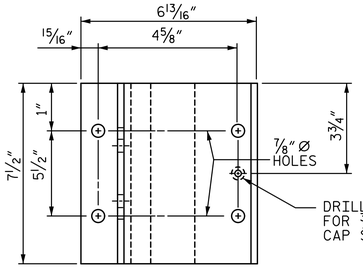
✳ RAIL OPENING AT 60°



PLAN



SECTION THRU PARAPET AND RAIL

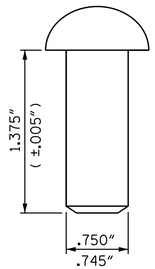


FRONT ELEVATION SIDE ELEVATION

DETAILS OF POST

FRONT ELEVATION SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

NOTES

AT THE CONTRACTOR'S OPTION, METAL RAIL MAY BE EITHER ALUMINUM OR GALVANIZED STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS FOR THE ALTERNATE MATERIALS; HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO USE THE SAME RAIL MATERIAL ON ALL STRUCTURES ON THE PROJECT FOR WHICH METAL RAIL IS DESIGNATED.

UNLESS OTHERWISE REQUIRED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR HAS THE OPTION TO USE AN ALTERNATE TO THE 2 BAR METAL RAIL. THE ALTERNATE RAIL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6.

MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

THE BASE OF RAIL POSTS, OR ANY OTHER ALUMINUM SURFACE IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.

MATERIAL FOR SHIMS TO BE ASTM B209 ALLOY 6061-T6.

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: ASTM A36 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO ASTM A123.

RIVETS: RIVETS SHALL MEET THE REQUIREMENTS OF ASTM A502 FOR GRADE 1 RIVETS.

THE CUT ENDS OF GALVANIZED STEEL RAILING, AFTER GRINDING SMOOTH SHALL BE GIVEN TWO COATS OF ZINC RICH PAINT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION MIL-P-26915 USAF TYPE 1, OR OF FEDERAL SPECIFICATIONS TT-P-641.

SHIMS: SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A1011 FOR GRADE 36, 40, 45 OR ASTM A1008 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A1011 FOR GRADE 36, 40, 45 OR ASTM A1008 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

GENERAL NOTES

RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR2.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAILS AND POSTS. SHOP INSPECTION IS NOT REQUIRED.

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

METHOD OF MEASUREMENT FOR METAL RAILS: FOR LENGTH OF METAL RAILS TO BE PAID FOR, SEE THE STANDARD SPECIFICATIONS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE THE CONTRACTOR MAY, AT HIS OPTION, HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT, THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAINS VISIBLE AFTER RAIL PLACEMENT.

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

MINOR VARIATIONS IN DETAILS OF METAL RAIL WILL BE CONSIDERED. DETAILS OF SUCH VARIATIONS, IF DESIRED, SHALL BE SUBMITTED FOR APPROVAL.

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

PAY LENGTH = 1,260'-6" LIN. FT.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 4

DRAWN BY : VKS DATE : 7-23

CHECKED BY : TRL DATE : 7-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: K. BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991

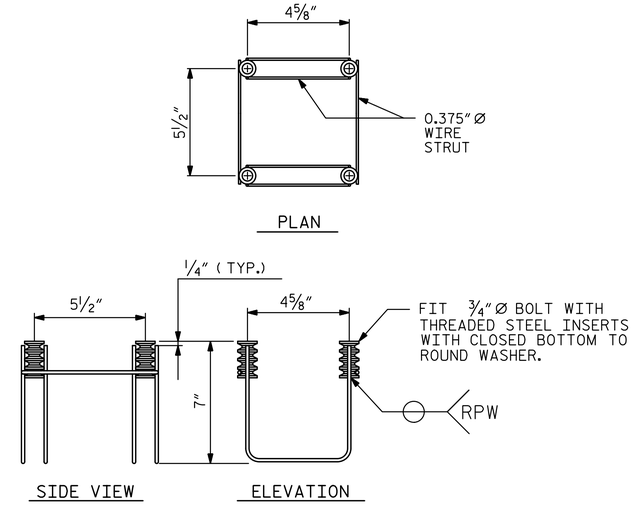
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-42
1			3			TOTAL SHEETS
2			4			73

STD. NO. BMR3



4-BOLT METAL RAIL ANCHOR ASSEMBLY

(205 ASSEMBLIES REQUIRED)

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

THE STRUCTURAL CONCRETE ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2″ FOR ¾″ FERRULES.

B. 4 - ¾″Ø X 2½″ BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE ¾″Ø X 2½″ GALVANIZED BOLTS 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.

C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16″Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

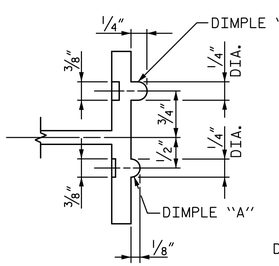
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF ASTM A123.

E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.

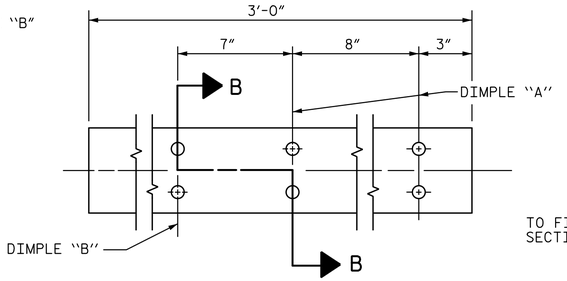
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

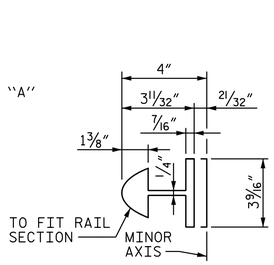
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾″Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.



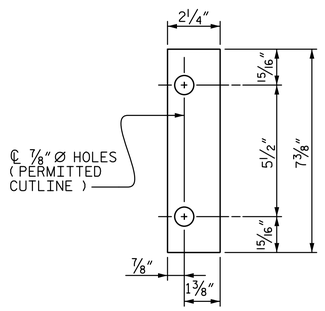
SECTION B - B



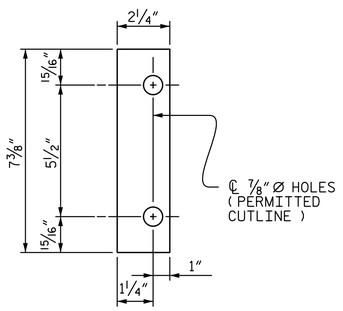


BAR SECTION

EXPANSION BAR DETAILS



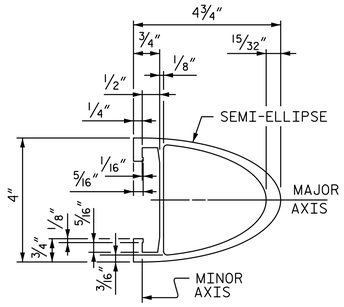
FRONT PLATE



REAR PLATE

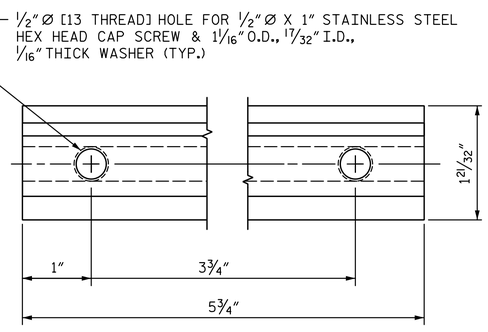
SHIM DETAILS

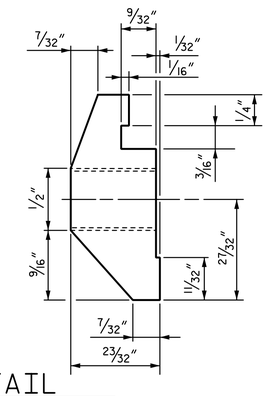
NOTE :
SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



RAIL SECTION

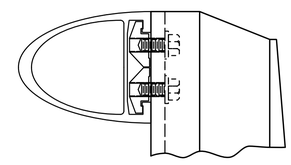
½″Ø (13 THREAD) HOLE FOR ½″Ø X 1″ STAINLESS STEEL HEX HEAD CAP SCREW & 1 1/16″ O.D., 17/32″ I.D., 1/16″ THICK WASHER (TYP.)



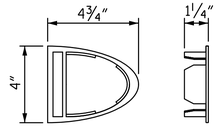


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 2 OF 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

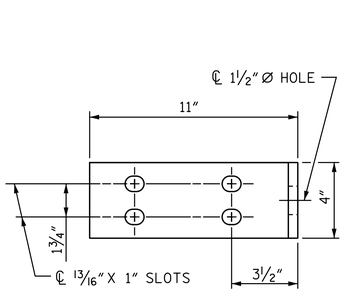
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

2 BAR METAL RAIL

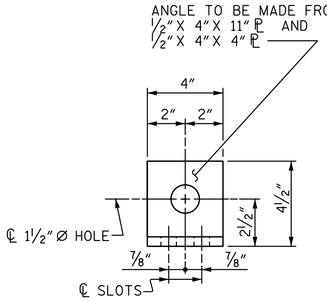
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-43
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : TRL	DATE : 7-23		

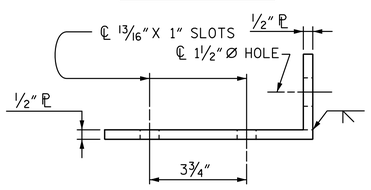
STD. NO. BMR4



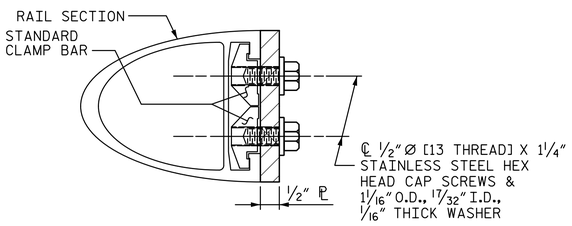
ELEVATION



END VIEW (FIX AND EXP.)



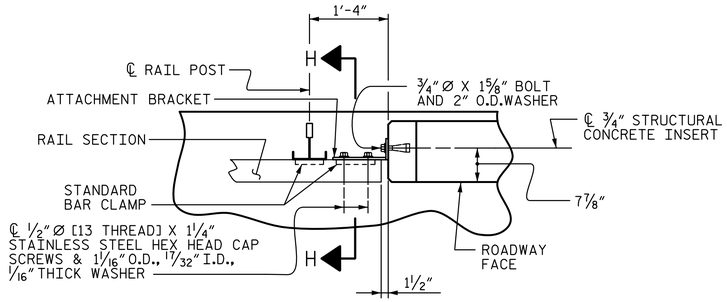
TOP VIEW



SECTION H-H (FIX)

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST



PLAN - RAIL AND END POST

NOTES

STRUCTURAL CONCRETE INSERT

THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1½".

B. 1 - ¾" Ø X 1⅝" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE ¾" Ø X 1⅝" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. ½" PLATES SHALL CONFORM TO ASTM A36 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. ¾" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A ¾" Ø X 1⅝" BOLT WITH 2" O.D. WASHER IN PLACE. THE ¾" Ø X 1⅝" BOLT SHALL HAVE N. C. THREADS.

C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.

D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).

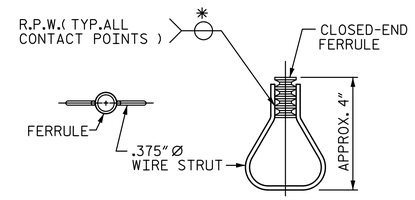
E. ½" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 1 OR 2 BAR METAL RAILS.

THE ¾" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE ¾" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE ½" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾" Ø X 1⅝" BOLT WITH WASHER SHALL BE REPLACED WITH A ¾" Ø X 6½" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE ¾" Ø X 1⅝" BOLT SHALL APPLY TO THE ¾" Ø X 6½" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 4

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

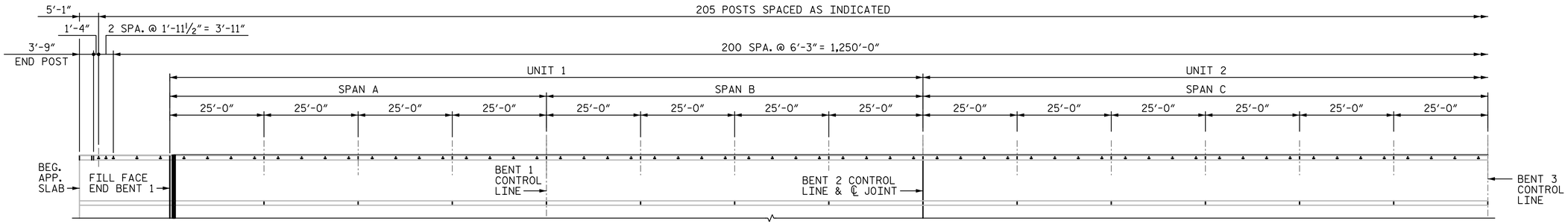
2 BAR METAL RAIL
END OF RAIL DETAILS

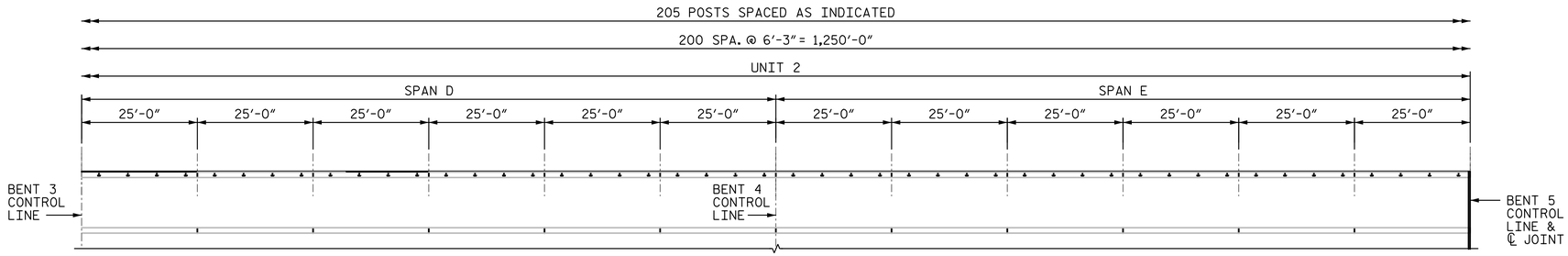
STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

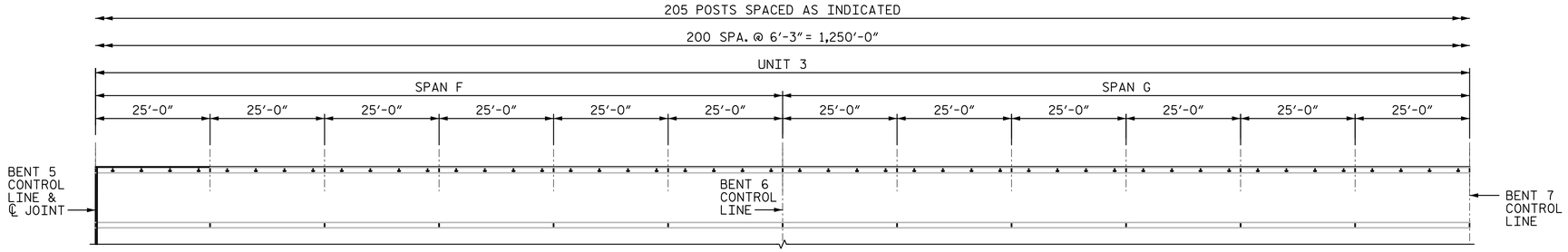
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-44
1			3			TOTAL SHEETS
2			4			73

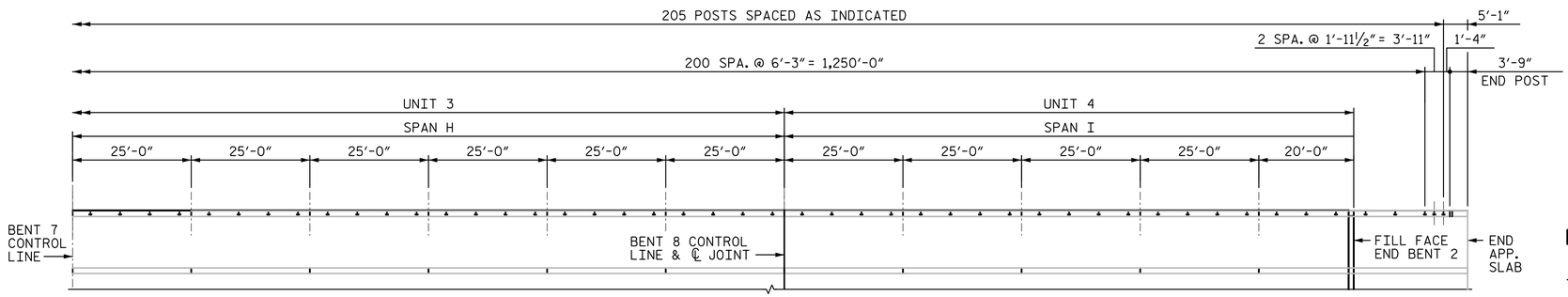
DRAWN BY : VKS	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : TRL	DATE : 7-23		

STD. NO. BMR2









PLAN OF RAIL POST SPACINGS

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 4 OF 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

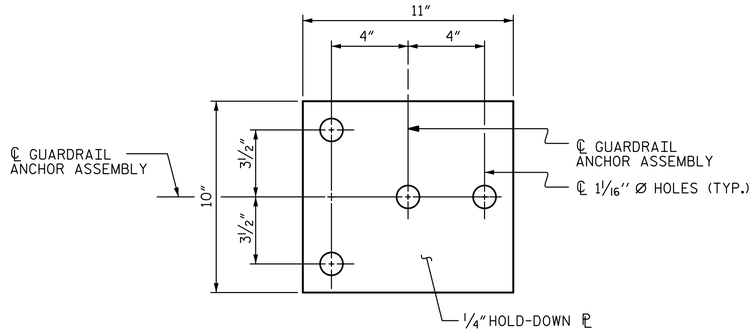
2 BAR METAL RAIL
RAIL POST SPACINGS

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

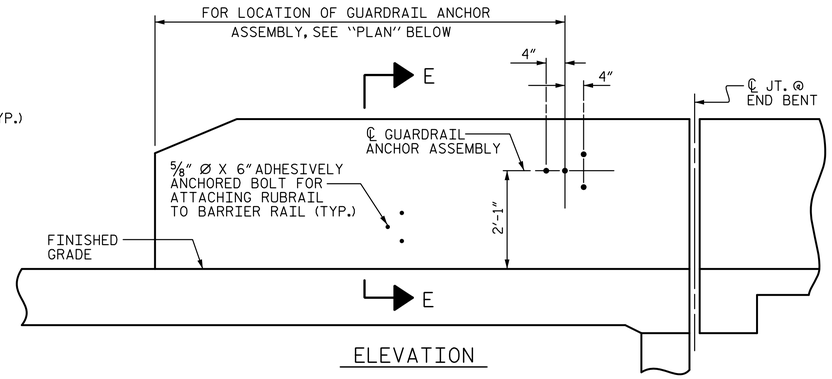
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-45
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : TRL	DATE : 7-23		

STD. NO. BMR2



PLAN



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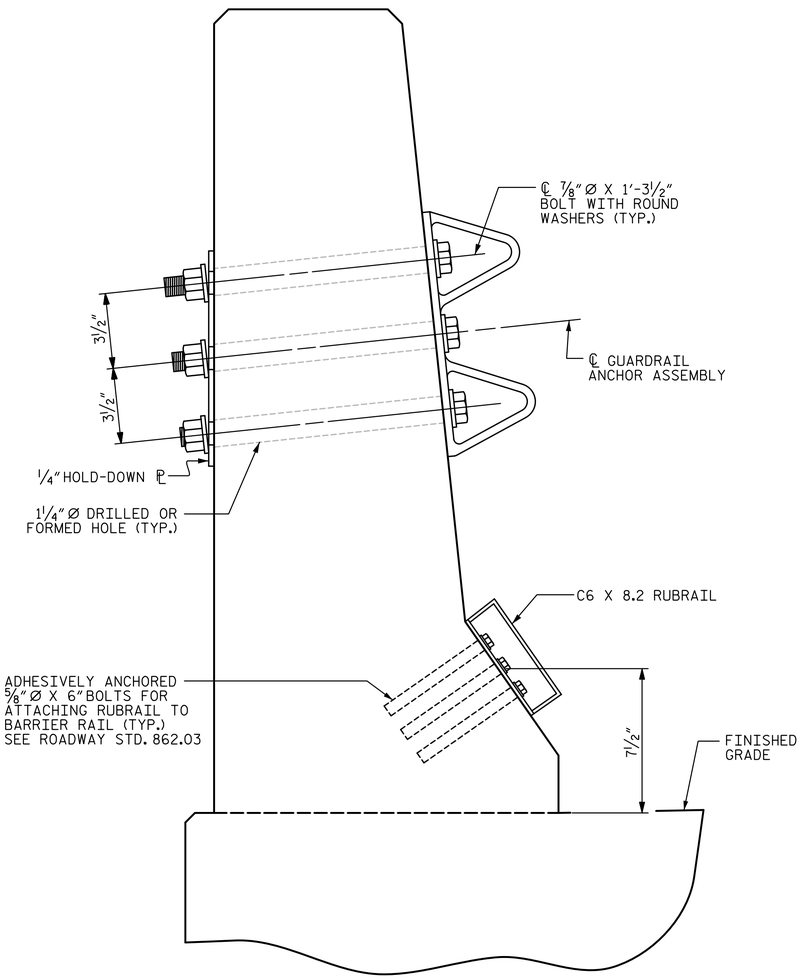


SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4″ HOLD-DOWN PLATE AND 4 - 7/8″ Ø BOLTS WITH NUTS AND WASHERS, RUBRAIL, AND ADHESIVELY ANCHORED BOLTS.

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

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8″ Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

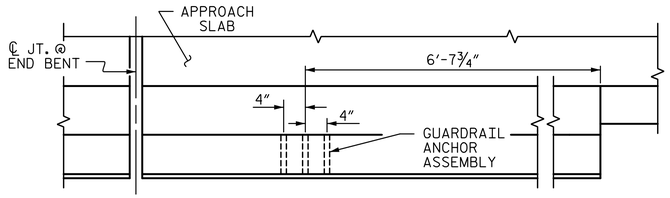
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

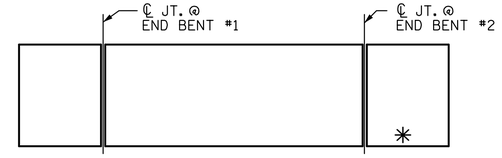
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

THE 1 1/4″ Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 5/8″ Ø X 6″ BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 5/8″ Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



PLAN



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

LOCATION OF ANCHORS FOR GUARDRAIL

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN G. BAILEY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

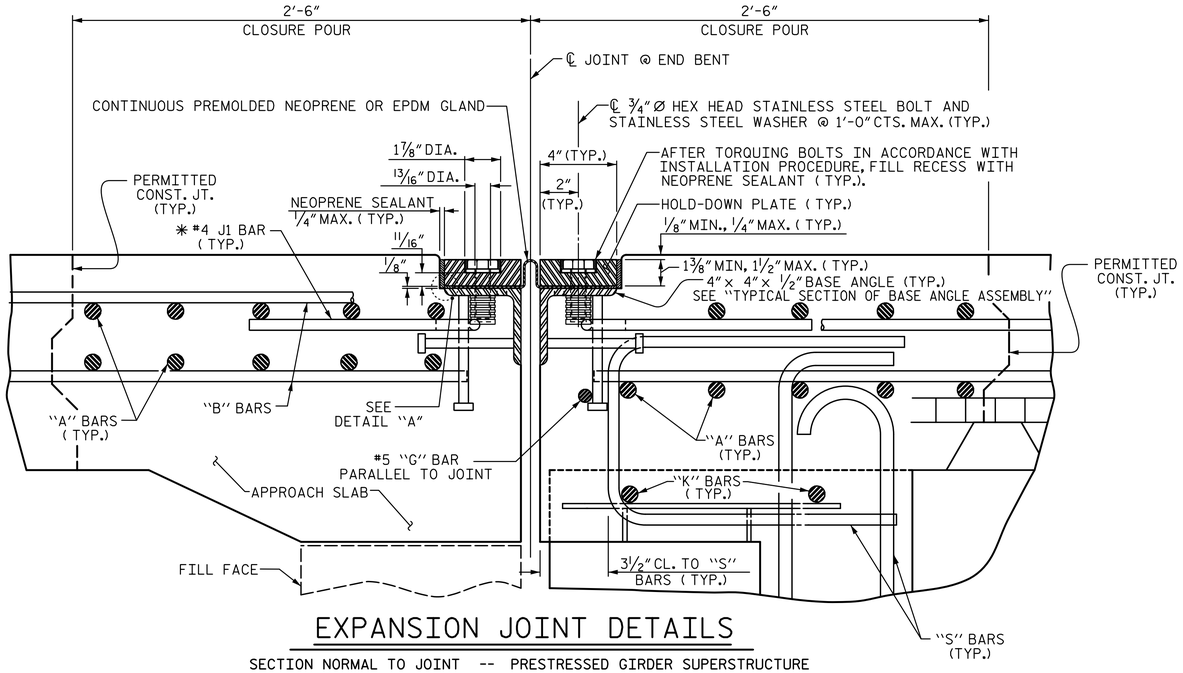
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-46
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : TRL	DATE : 7-23		

STD. NO. GRA2



EXPANSION JOINT DETAILS

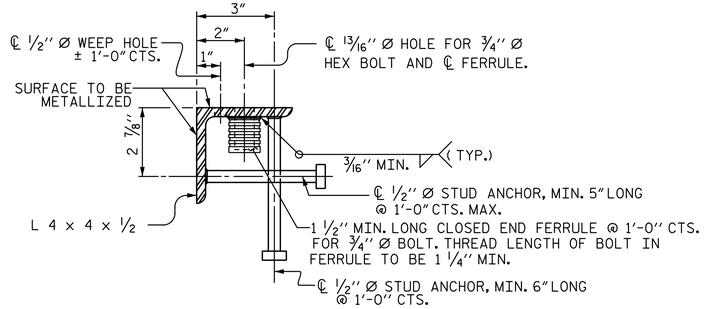
SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

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

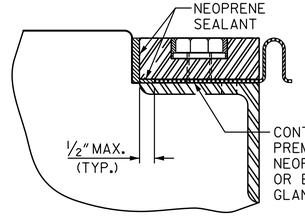
MOVEMENT AND SETTING AT JOINT					
LOCATION	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
EB1	90°-00'-00"	⅝"	2⅝"	2½"	2¼"
EB2	90°-00'-00"	¾"	2⅝"	2½"	2¼"

NOTE:

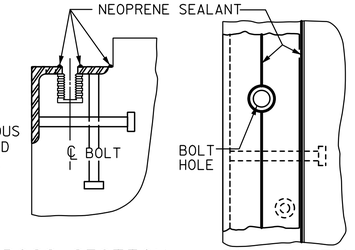
FOR NOTES, SEE SHEET 2 OF 2.



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

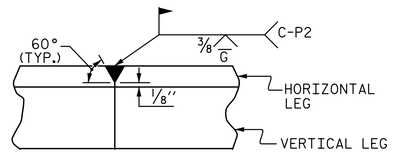


DETAIL "A"



CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 2

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

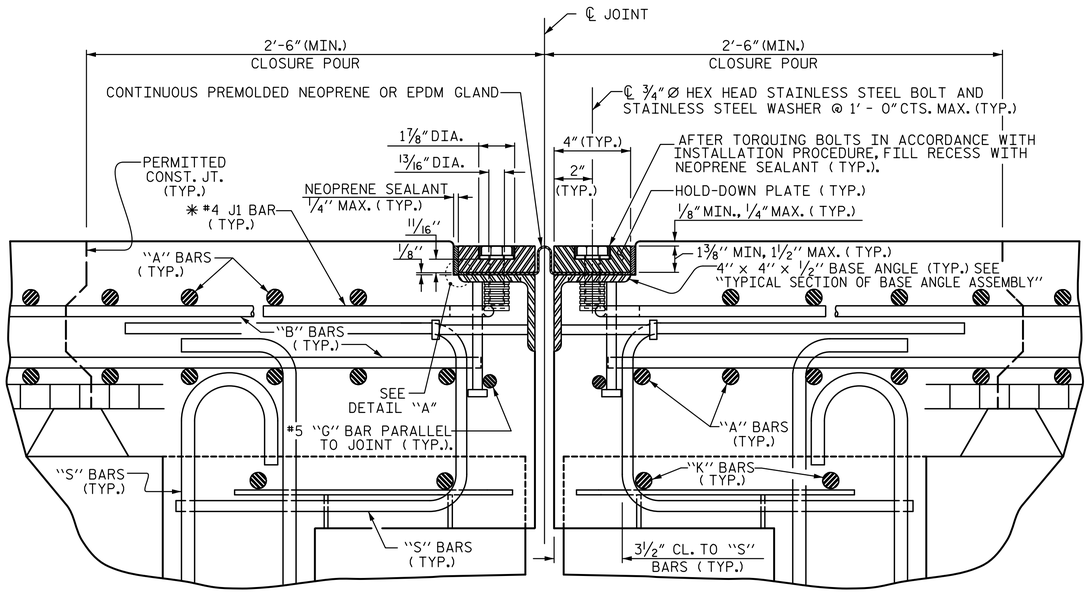
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-47
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 7-24	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : KGB	DATE : 7-24		



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT AT INTERIOR BENT -- PRESTRESSED GIRDER SUPERSTRUCTURE

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

MOVEMENT AND SETTING AT JOINT					
LOCATION	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
B2	90°-00'-00"	2"	2⅞"	2½"	1 13/16"
B5	90°-00'-00"	2¾"	3 7/16"	3"	1 15/16"
B8	90°-00'-00"	1⅜"	2¾"	2½"	2"

JOINT INSTALLATION PROCEDURE:

1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO THE BASE ANGLE ASSEMBLY WITH THE ¾" Ø HEX HEAD BOLTS PROVIDED FOR THE HOLD-DOWN PLATES. A 1" Ø HOLE SHALL BE PROVIDED IN THE TEMPLATE CENTERED OVER EACH WEEP HOLE IN THE 4"X 4"X ½" BASE ANGLE. OTHER METHODS OF INSURING DRAINAGE THROUGH WEEP HOLES MAY BE EMPLOYED SUBJECT TO ENGINEER'S APPROVAL.
2. AFTER THE CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE THE TEMPLATE. THOROUGHLY CLEAN THE BOLT HOLES AND THE ANGLE PLATE. REMOVE ANY EXCESS CONCRETE THAT COMES OUT OF THE WEEP HOLES. ANY DAMAGED STEEL SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).
3. LAY THE GLAND ON THE BASE ANGLE AND FIELD MARK THE GLAND FOR THE BOLT HOLES. HOLES IN THE GLAND SHALL BE PUNCHED ⅞" IN DIAMETER WITH A HAND PUNCH.
4. IN ORDER TO CHECK FOR PROPER ALIGNMENT, PLACE THE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. DO NOT APPLY NEOPRENE SEALANT. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE BUT DO NOT TIGHTEN. THE ENGINEER SHALL INSPECT THE JOINT SEAL DEVICE FOR PROPER ALIGNMENT.
5. AFTER INSPECTION, REMOVE THE HOLD-DOWN PLATES AND GLAND. APPLY NEOPRENE SEALANT TO THE BASE ANGLE IN ACCORDANCE WITH THE "INSTALLATION SKETCH". PLACE GLAND AND HOLD-DOWN PLATES ON THE BASE ANGLE. BOLT THE HOLD-DOWN PLATES TO THE BASE ANGLE ASSEMBLY AND TORQUE THE BOLTS TO 88 FT-LBS WITH A TORQUE WRENCH. CHECK THE TORQUE AFTER THREE (3) HOURS AND, IF NECESSARY, RETIGHTEN TO 88 FT-LBS. A FINAL CHECK SHALL BE MADE AT SEVEN (7) DAYS. TORQUE SHALL NOT BE LESS THAN 80 FT-LBS AFTER SEVEN (7) DAYS.
6. AFTER PROPER TORQUING, CLEAN THE BOLT HOLE RECESSES, THE RECESS BETWEEN THE JOINT SEAL DEVICE AND CONCRETE, AND THE LIFTING HOLES IN THE HOLD-DOWN PLATE, AND COMPLETELY FILL THE RECESSES AND LIFTING HOLES WITH NEOPRENE SEALANT.

GENERAL NOTES

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

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 2

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DocuSigned by: KEVIN G. BAILEY
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 ENGINEER KEVIN G. BAILEY
8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

stv
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-48
1			3			TOTAL SHEETS
2			4			73

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CHECKED BY :	KGB	DATE :	7-24	DATE :	7-24

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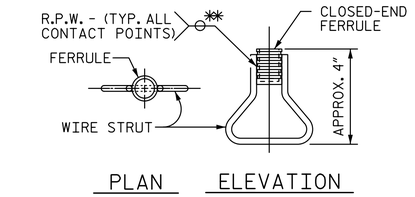
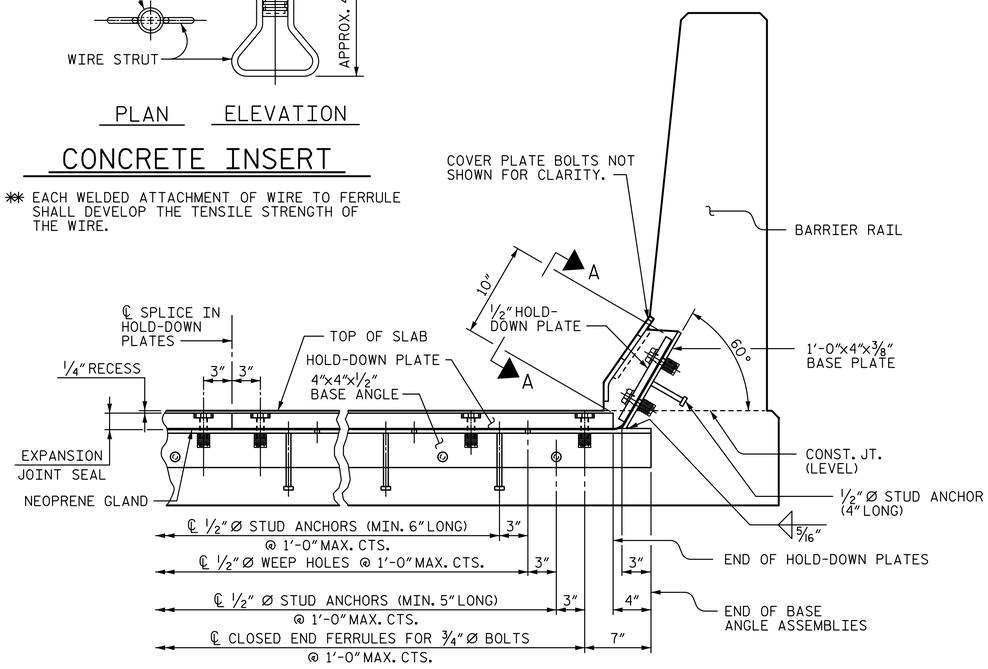


PLAN ELEVATION

CONCRETE INSERT

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



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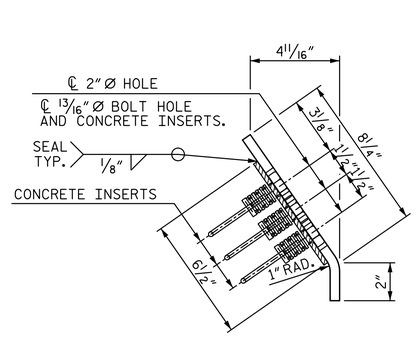

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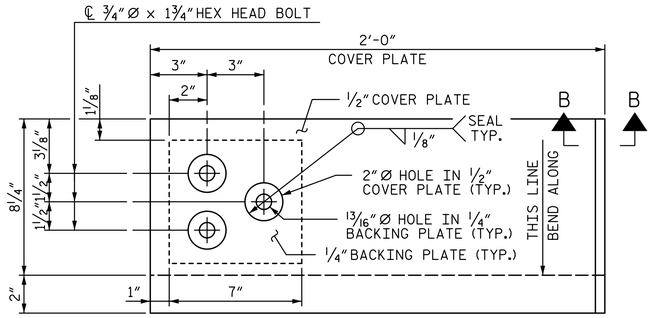
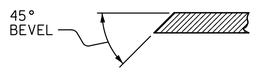
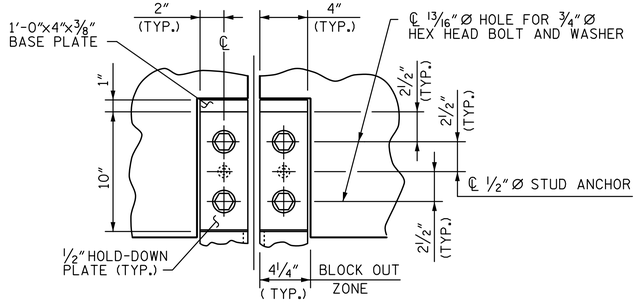


ELEVATION VIEW

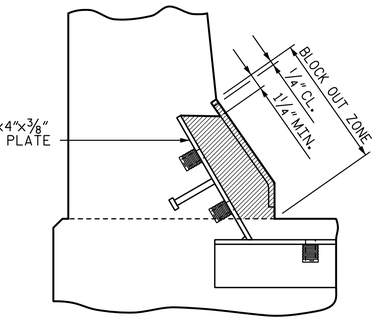
COVER PLATE DETAILS



SECTION B - B

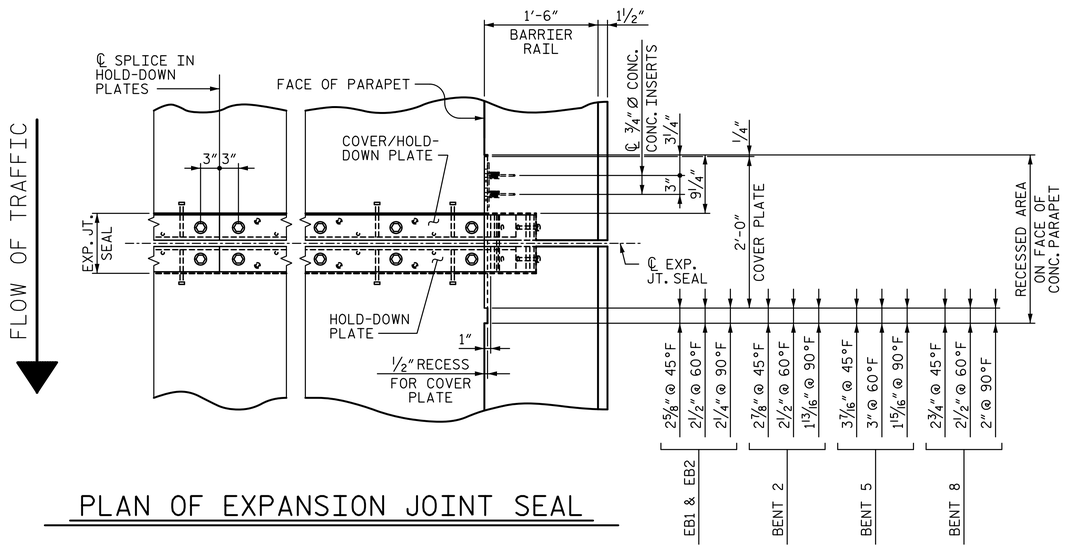


SECTION A - A



BLOCK OUT DETAIL

SEE " SECTION A - A " FOR OTHER DETAILS.



PLAN OF EXPANSION JOINT SEAL

NOTES:

1. FOR PAVEMENT MARKING ALIGNMENT SEE SHEET TITLED "PAVEMENT MARKING ALIGNMENT".

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 3

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC
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Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

EXPANSION JOINT DETAILS FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-49
1			3			TOTAL SHEETS
2			4			73

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CHECKED BY :	KGB	DATE :	7-24	DATE :	7-24

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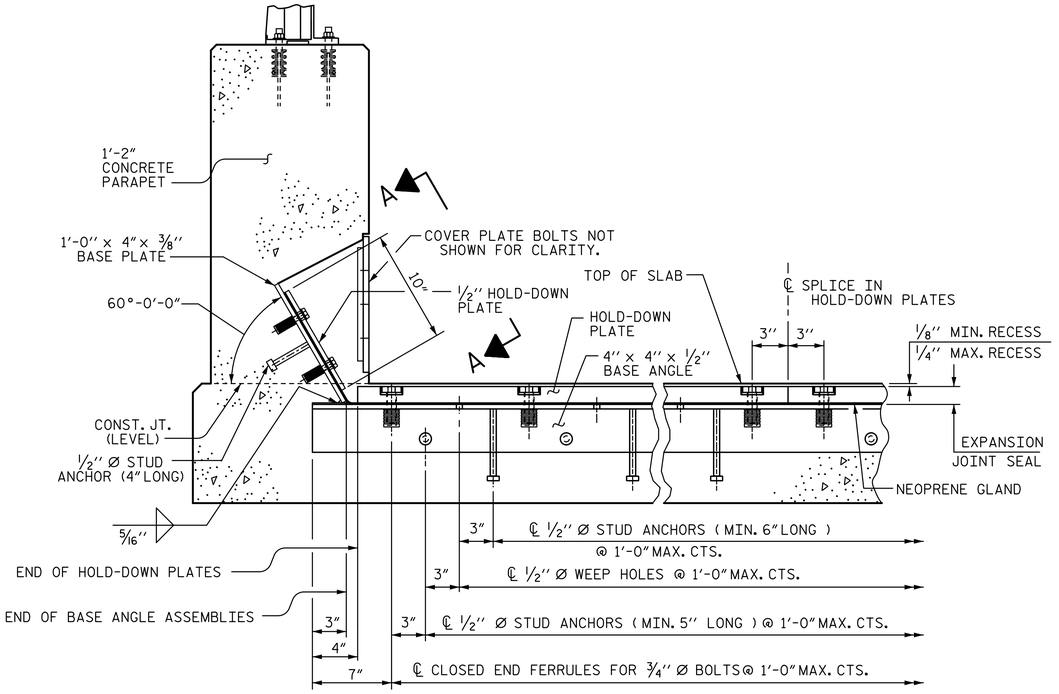

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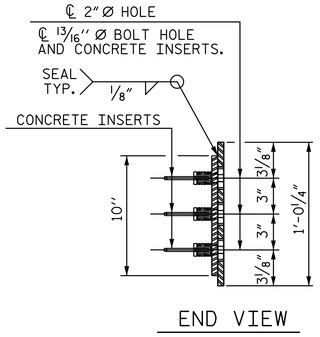

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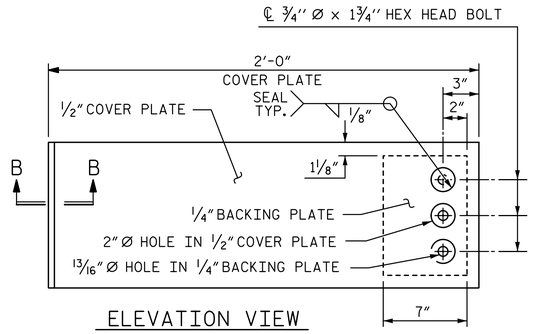
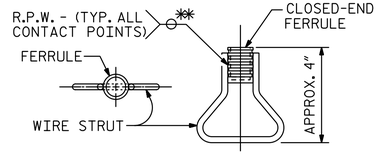


ELEVATION VIEW

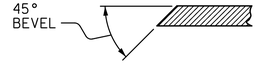
COVER PLATE DETAILS



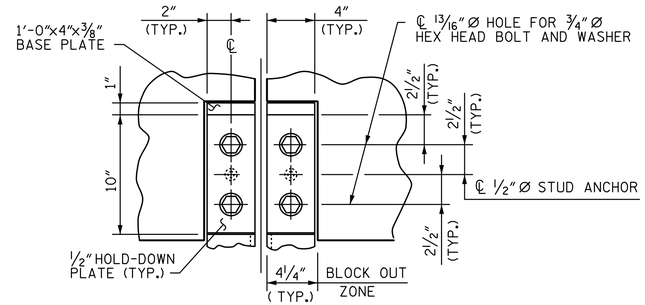
PLAN ELEVATION

CONCRETE INSERT

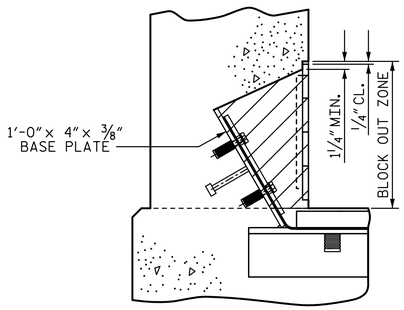
** EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



SECTION B-B

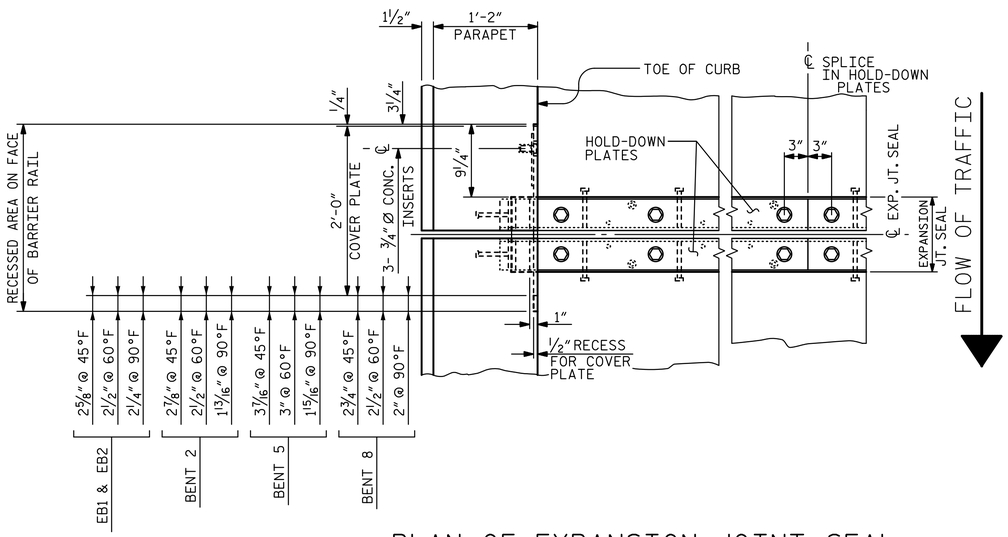


SECTION A-A



BLOCK OUT DETAIL

SEE " SECTION A - A " FOR OTHER DETAILS.



PLAN OF EXPANSION JOINT SEAL

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 3

DRAWN BY : VKS DATE : 7-24

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DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

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STATE OF NORTH CAROLINA
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RALEIGH
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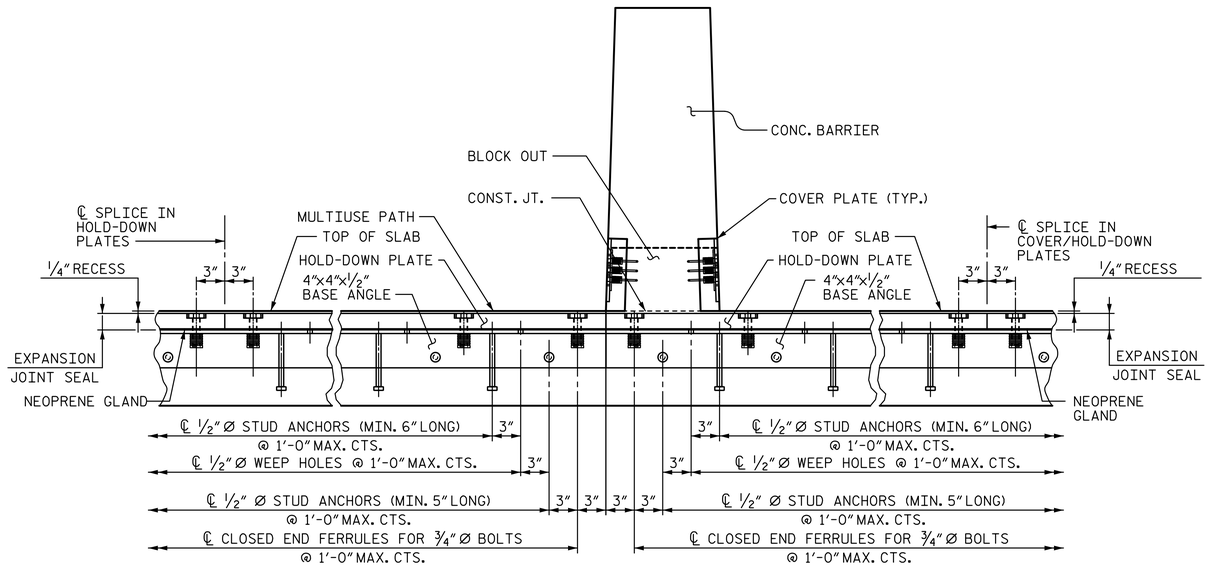
EXPANSION JOINT DETAILS FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-50
1			3			TOTAL SHEETS
2			4			73



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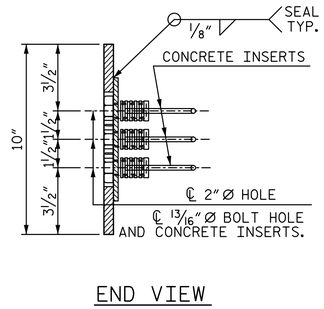
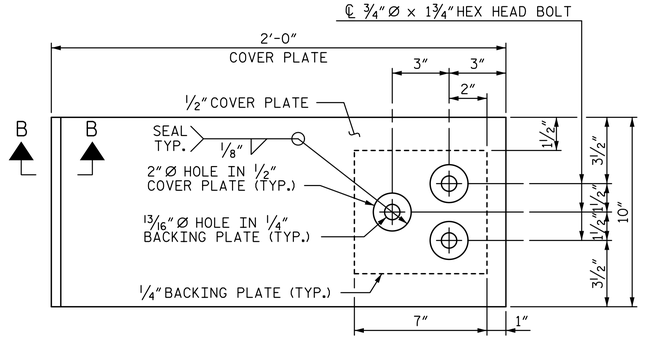
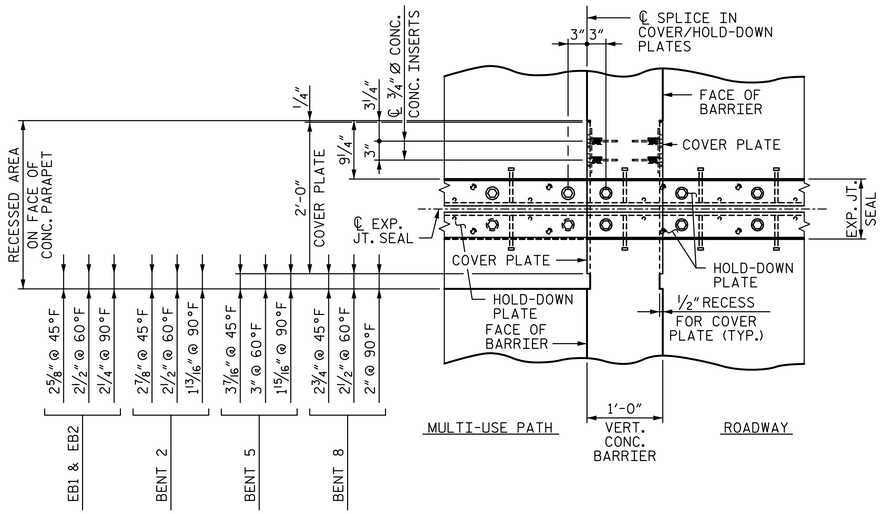


END VIEW

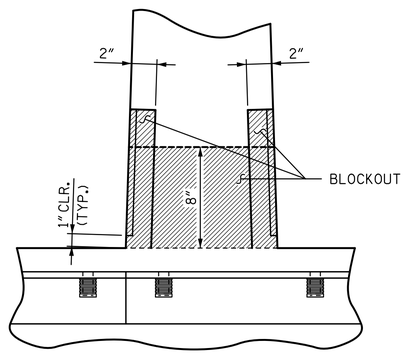


TOP VIEW

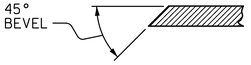
COVER PLATE DETAILS



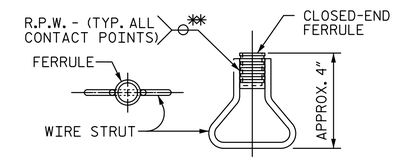
PLAN OF EXPANSION JOINT SEAL



BLOCK OUT DETAIL



SECTION B - B



PLAN ELEVATION

CONCRETE INSERT

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

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 3

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT DETAILS FOR BARRIER RAIL

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-51
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS DATE : 7-24
CHECKED BY : KGB DATE : 7-24

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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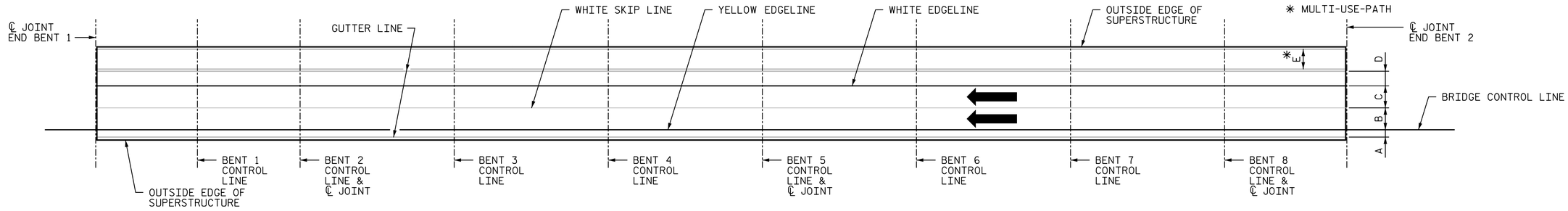

PAVEMENT MARKING ALIGNMENT

PAVEMENT MARKING DIMENSIONS	
"A"	4'-0"
"B"	12'-0"
"C"	12'-0"
"D"	9'-0"
"E"	10'-0"

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PAVEMENT MARKING ALIGNMENT

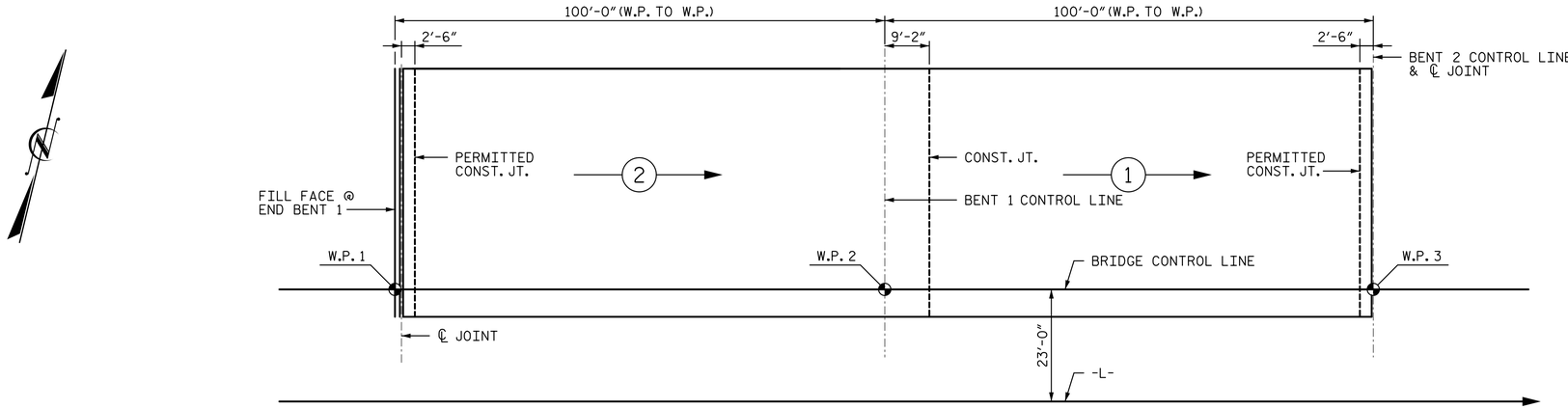
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-52
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS DATE : 7-23
CHECKED BY : TRL DATE : 7-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

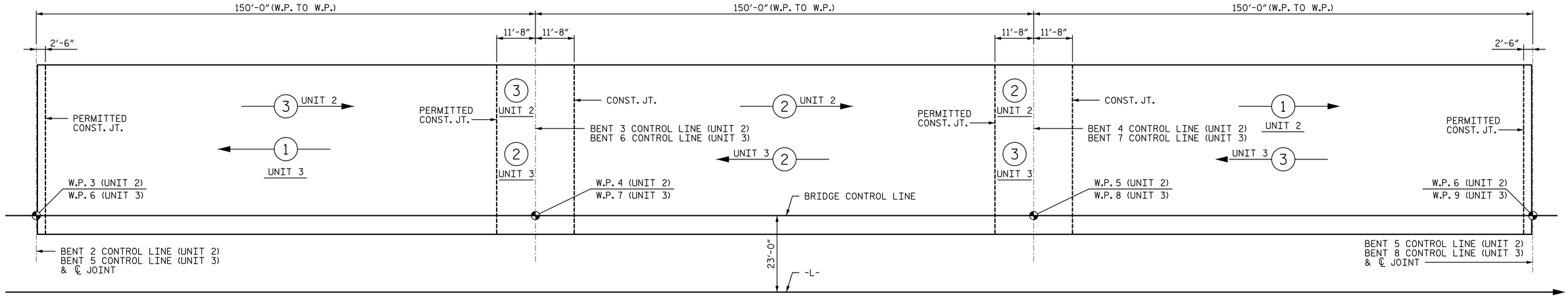
NOTES:

1. ADJACENT POURS SHALL NOT BE CAST UNTIL SLAB CONCRETE HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.
2. FOR DECK POUR CONCRETE QUANTITIES, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.

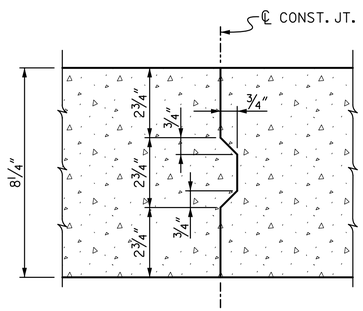


POURING SEQUENCE - UNIT 1

LEGEND

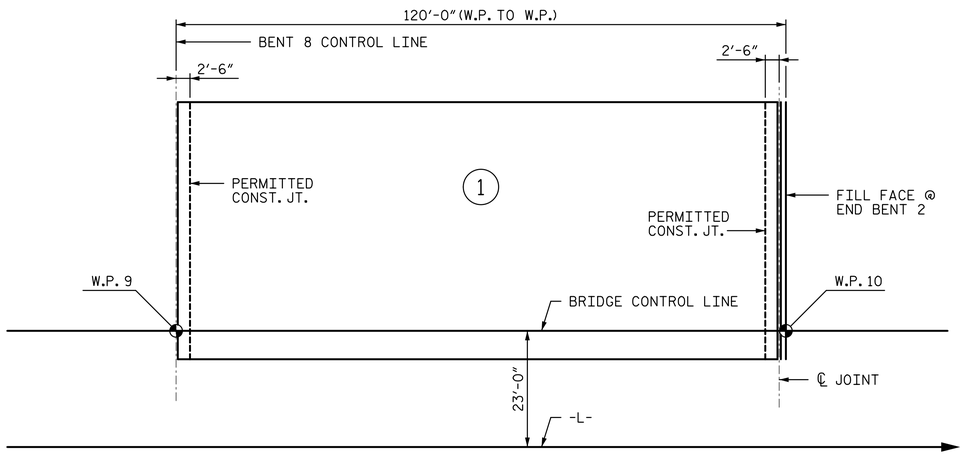


POURING SEQUENCE - UNIT 2 & UNIT 3



CONSTRUCTION JOINT DETAIL

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



POURING SEQUENCE - UNIT 4

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DECK POUR SEQUENCE

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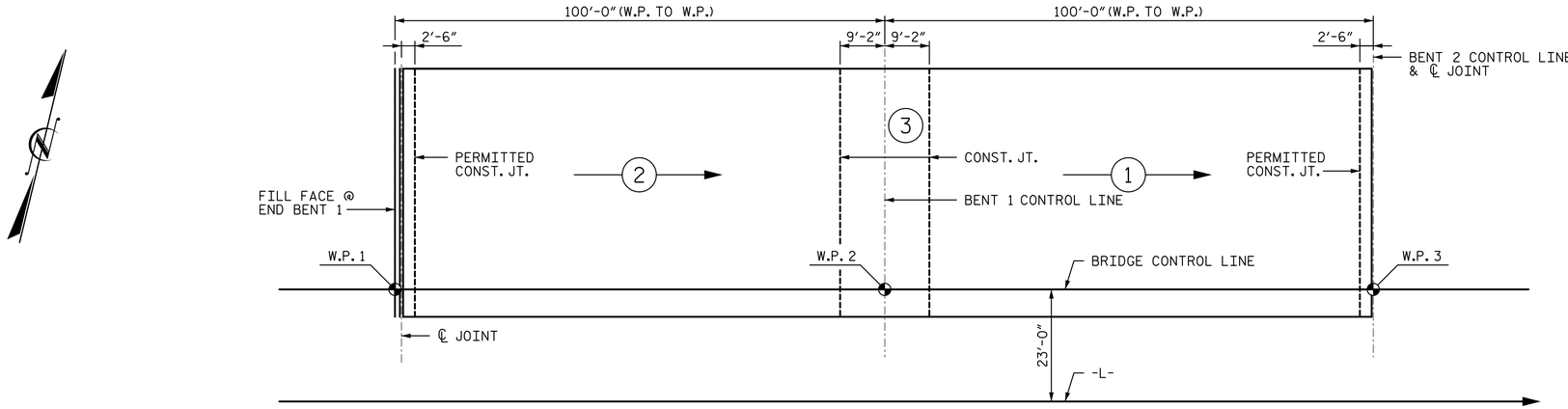
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-53
1			3			TOTAL SHEETS
2			4			73

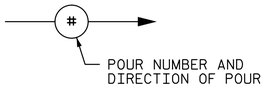
DRAWN BY : MBC	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		



OPTIONAL POURING SEQUENCE - UNIT 1

NOTES:

1. ADJACENT POURS SHALL NOT BE CAST UNTIL SLAB CONCRETE HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.
2. FOR DECK POUR CONCRETE QUANTITIES, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.



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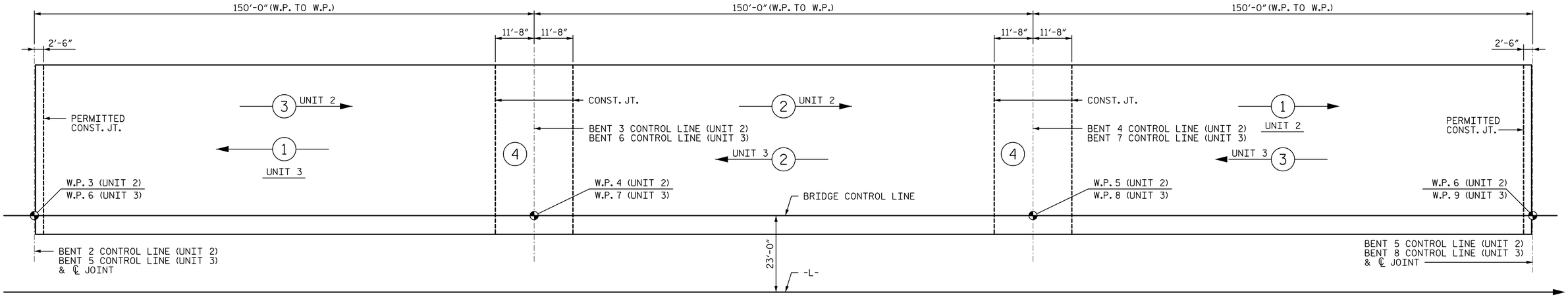
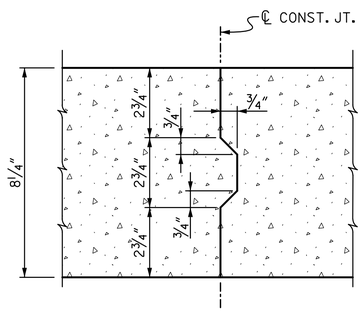


OPTIONAL POURING SEQUENCE - UNIT 2 & UNIT 3



CONSTRUCTION JOINT DETAIL

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

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

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900 West Trade St. Suite 715
Charlotte, NC 28202
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STATE OF NORTH CAROLINA
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OPTIONAL
DECK POUR SEQUENCE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-54
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 6-24	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 7-24		

BILL OF MATERIAL

UNIT 1						UNITS 2 & 3 (QTY'S SHOWN FOR 1 UNIT)						UNIT 4					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	367	#5	STR.	50′-7″	19,362	✳A1	830	#5	STR.	50′-7″	43,789	✳A1	219	#5	STR	50′-7″	11,554
A11	367	#5	STR.	50′-7″	19,362	A11	830	#5	STR.	50′-7″	43,789	A11	219	#5	STR	50′-7″	11,554
✳B1	144	#4	STR.	34′-7″	3,327	✳B9	216	#4	STR.	35′-5″	5,110	✳B22	144	#4	STR	31′-3″	3,006
✳B2	36	#6	STR.	60′-0″	3,244	✳B10	72	#6	STR.	60′-0″	6,489	B3	144	#5	STR	41′-0″	6,158
✳B3	36	#6	STR.	13′-2″	712	✳B11	72	#6	STR.	43′-2″	4,668						
✳B4	33	#6	STR.	50′-0″	2,478	✳B12	66	#6	STR.	50′-0″	4,957	✳G1	2	#5	STR	50′-7″	106
✳B5	33	#6	STR.	40′-0″	1,983	✳B13	66	#6	STR.	30′-8″	3,040						
B6	192	#5	STR.	37′-1″	7,426	✳B14	66	#6	STR.	55′-0″	5,452	✳J1	100	#4	⑤	1′-5″	95
B7	48	#5	STR.	60′-0″	3,004	B15	192	#5	STR.	55′-10″	11,181						
B8	36	#5	STR.	50′-0″	1,877	B16	96	#5	STR.	60′-0″	6,008	✳K1	8	#8	①	12′-1″	258
						B17	96	#5	STR.	27′-2″	2,720	✳K2	20	#8	②	18′-6″	988
✳G1	2	#5	STR.	50′-7″	106	B18	72	#5	STR.	50′-0″	3,755	✳K3	24	#6	STR	3′-6″	126
						B19	72	#5	STR.	22′-2″	1,665						
✳J1	100	#4	⑤	1′-5″	95	✳B20	72	#4	STR.	28′-3″	1,359	✳S1	48	#5	③	6′-2″	309
						B21	96	#5	STR.	35′-9″	3,580	✳S2	48	#4	④	2′-3″	72
✳K1	8	#8	①	12′-1″	258												
✳K2	20	#8	②	18′-6″	988	✳G1	2	#5	STR.	50′-7″	106						
✳K3	24	#6	STR.	3′-6″	126												
						✳J1	100	#4	⑤	1′-5″	95						
✳S1	48	#5	③	6′-2″	309												
✳S2	48	#4	④	2′-3″	72	✳K1	8	#8	①	12′-1″	258						
						✳K2	20	#8	②	18′-6″	988						
						✳K3	24	#6	STR.	3′-6″	126						
						✳S1	48	#5	③	6′-2″	309						
						✳S2	48	#4	④	2′-3″	72						
✳ EPOXY COATED REINFORCING STEEL					33,060 LBS.	✳ EPOXY COATED REINFORCING STEEL					76,818 LBS.	✳ EPOXY COATED REINFORCING STEEL					16,514 LBS.
REINFORCING STEEL					31,669 LBS.	REINFORCING STEEL					72,698 LBS.	REINFORCING STEEL					17,712 LBS.

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

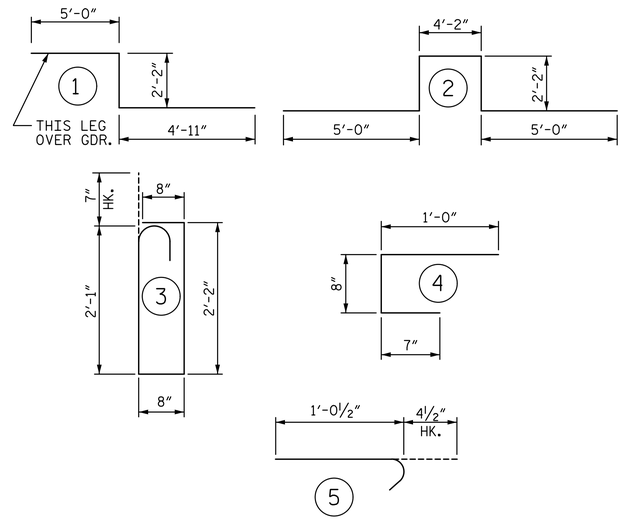
BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2′-2″	1′-9″	1′-11″	1′-7″	2′-6″
#5	2′-8″	2′-2″	2′-5″	2′-0″	3′-1″
#6	3′-2″	2′-8″	3′-7″	2′-5″	3′-8″
#7	4′-7″	3′-1″			
#8	5′-3″	3′-6″			

DECK POUR CONCRETE QUNTITIES

	UNIT 1	UNIT 2	UNIT 3	UNIT 4
	(CU. YDS.)	(CU. YDS.)	(CU. YDS.)	(CU. YDS.)
POUR 1	145.4	235.2	235.2	205.5
POUR 2	175.2	252.0	252.0	-
POUR 3		274.4	274.4	-
POUR 4	-			-
TOTALS ●	320.6	761.6	761.6	205.5

● QUANTITIES FOR BARRIER RAIL AND MEDIAN BARRIER ARE NOT INCLUDED

BAR TYPES



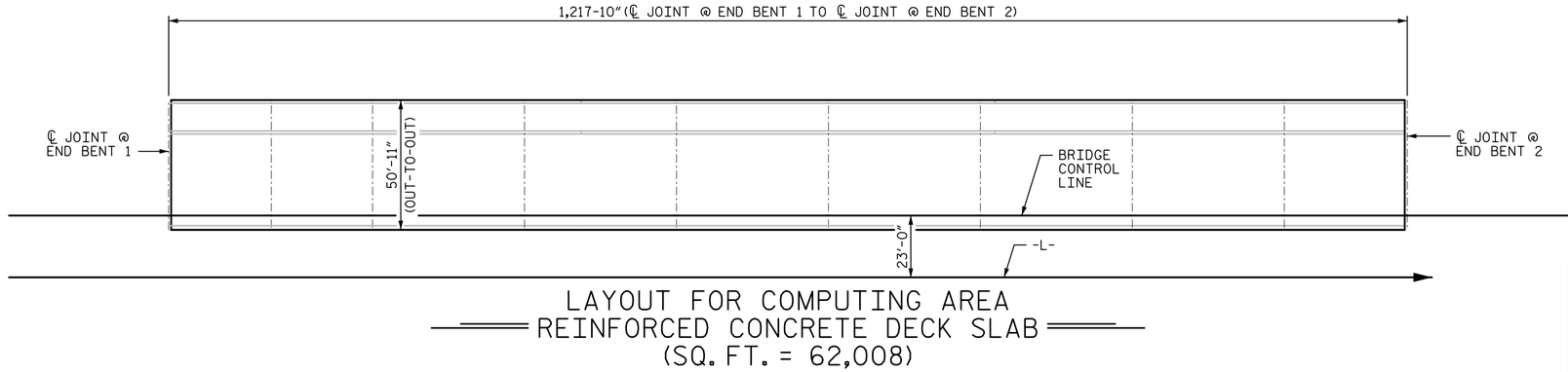
ALL BAR DIMENSIONS ARE OUT TO OUT

TOTAL REINFORCING FOR ENTIRE BRIDGE	
✳ EPOXY COATED REINFORCING STEEL	203,210 LBS.
REINFORCING STEEL	194,777 LBS.

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,606	SQ.FT.
BRIDGE DECK	40,123	SQ.FT.
TOTAL ▲	41,729	SQ.FT.

▲ MULTI-USE-PATH NOT INCLUDED IN QUANTITIES FOR GROOVING.



LAYOUT FOR COMPUTING AREA
REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 62,008)

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
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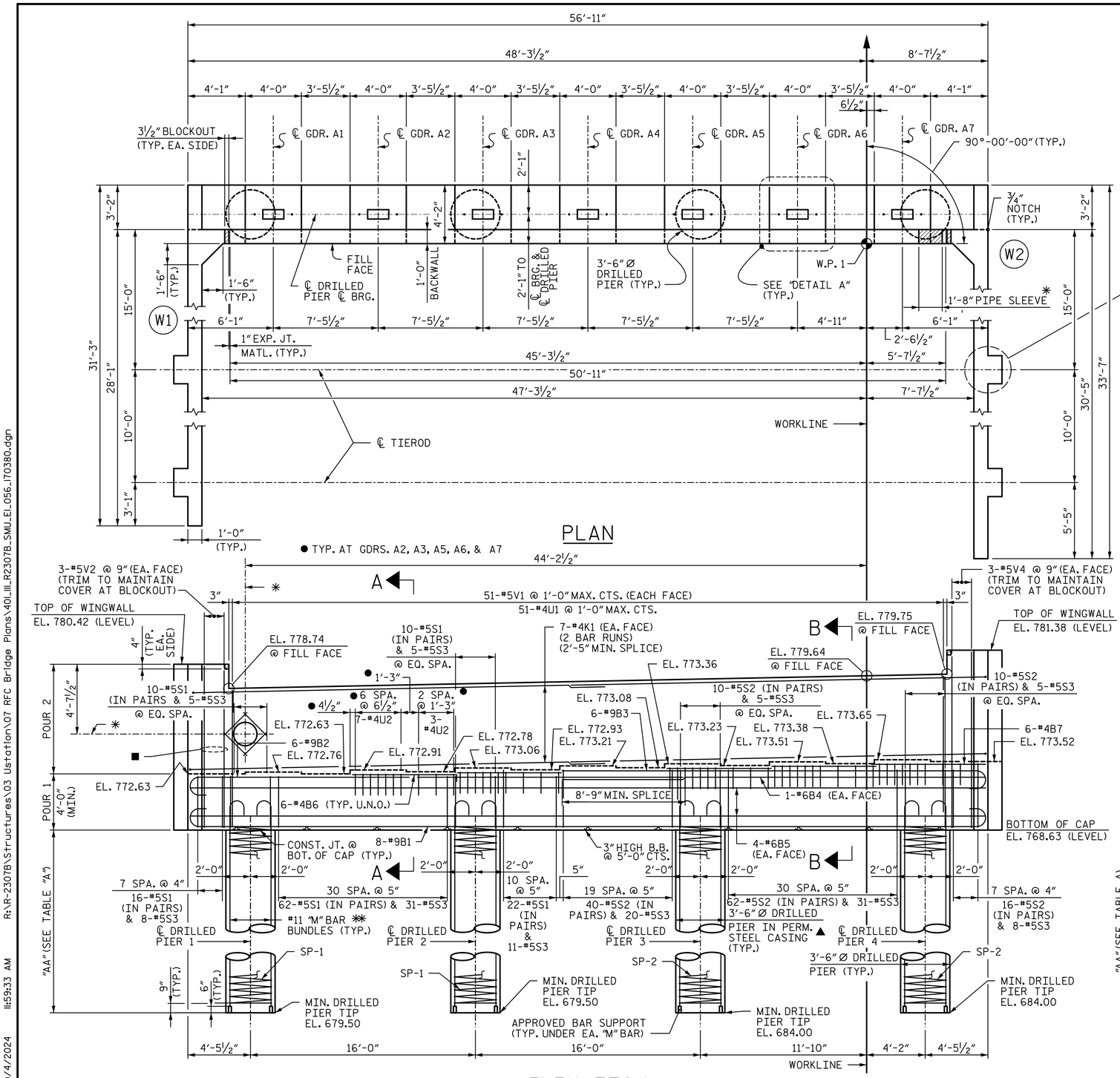
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-55
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS DATE : 8-23
CHECKED BY : MBC DATE : 8-23
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24



ELEVATION

(LOOKING IN THE DIRECTION OF INCREASING STATIONING)

✱ ℄ 22" Ø PIPE SLEEVE BLOCKOUT FOR 16" Ø DUCTILE IRON PIPE WATERLINE (BY OTHERS) (SEE DETAILS SHEET 3 OF 4)

TABLE A	
PIER	"AA"
1 & 2	89'-2"
3 & 4	84'-8"

✱✱ FOR #11 "M" BAR SPLICE CONFIGURATION, SEE "DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL" ON SECTION AND DETAILS, SHEET 3 OF 4

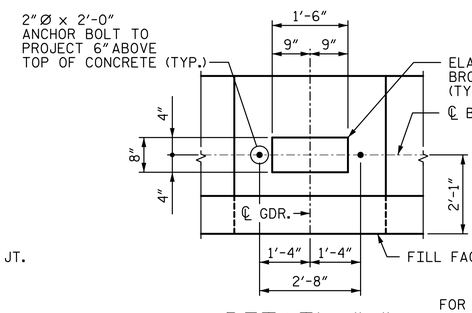
▲ FOR EXTENTS OF THE PERMANENT CASING, SEE "DRILLED PIER FOUNDATION TABLES" SHEET.

■ SEE WINGWALL SHEET FOR REIN. AT WING-BACKWALL INTERFACE (TYP.)

TYPICAL SECTION

(CAP REINFORCEMENT AND CHEEK WALL NOT SHOWN FOR CLARITY)

♦ SEE SHEET 3 OF 4 FOR #11 "M" BARS



DETAIL "A"

(TYP. AT EACH BRIDGE SEAT) (ANCHOR BOLT POCKET NOT SHOWN FOR CLARITY)

FOR BEARING DETAILS NOT SHOWN HERE, SEE ELASTOMERIC BEARING DETAILS SHEET.

NOTES:

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

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

SEE "GENERAL DRAWING GENERAL NOTES" SHEET FOR ADDITIONAL NOTES.

SEE SHEET 3 OF 4 FOR SECTIONS CALLED OUT ON ELEVATION VIEW.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING ON THE SUBSTRUCTURE UNIT.

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

CONCRETE IN THE HATCHED AREA OF THE BACKWALL (AT BLOCKOUTS) SHALL BE POURED AFTER THE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

TIEROD SHALL BE MINIMUM 1⅜" Ø (NOM.) ASTM A615 GRADE 75 ALL-THREAD REBAR (1.56 IN MIN. NET AREA THRU THREADS) WITH A MINIMUM ULTIMATE TENSILE CAPACITY OF 156 KIPS AND MINIMUM YIELD CAPACITY OF 117 KIPS.

USE COMPATIBLE COMPONENTS INCLUDING: HARDENED WASHERS CONFORMING TO ASTM F436 [2] TYPE 1 (3" O.D., 1⅜" I.D.); HEX NUTS CONFORMING TO ASTM A108; STOP-TYPE COUPLINGS CONFORMING TO ASTM A29 GRADE C1045.

ANCHORAGE SHALL BE CAPABLE OF RESISTING THE MAXIMUM TENSILE CAPACITY OF THE TIEROD. ANCHORAGE ASSEMBLY SHALL CONSIST OF ROD, PLATE, NUT, COVER (TUBE), GROUT TUBE AND ANY OTHER COMPONENTS NECESSARY TO ACHIEVE A COMPLETED SEALED AND GROUTED ASSEMBLY.

TIEROD SHALL BE INSTALLED IN A 2" Ø SCHEDULE 40 PVC PIPE OR POLYPROPYLENE TUBING AND SHALL BE FULLY GROUTED WITH A NONSHRINK, NONMETALIC GROUT.

FOR BACKFILL AND ANCHOR ROD INSTALLATION, SEE THE APPROACH FILL AND ANCHOR ROD CONSTRUCTION SEQUENCE ON SHEET 4 OF 4.

SEE DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL ON END BENT 1 SECTIONS AND DETAIL SHEET (S1-57) FOR SPLICE CONFIGURATION.

NO PAY ITEM FOR TIEROD ASSEMBLY. TIEROD ASSEMBLY IS CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 4

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

10/4/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
PLAN & ELEVATION

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

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NO.	BY:	DATE:	NO.	BY:	DATE:	S1-56
1			3			TOTAL SHEETS
2			4			73

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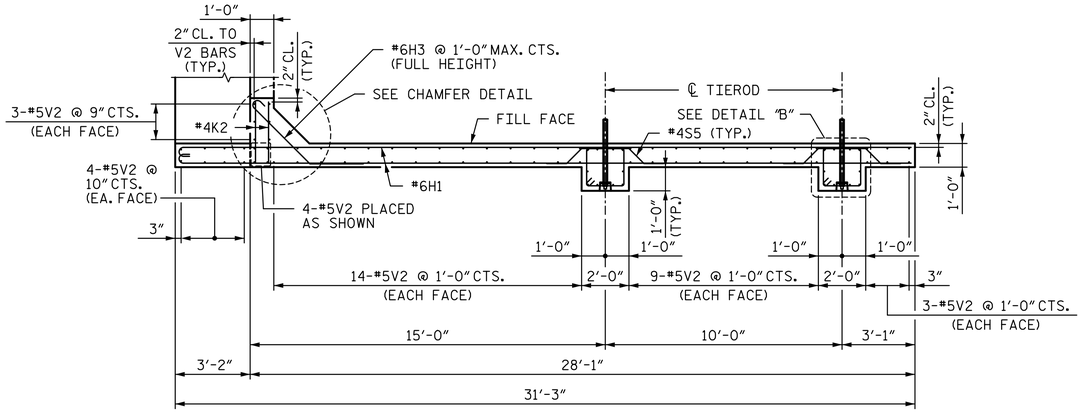
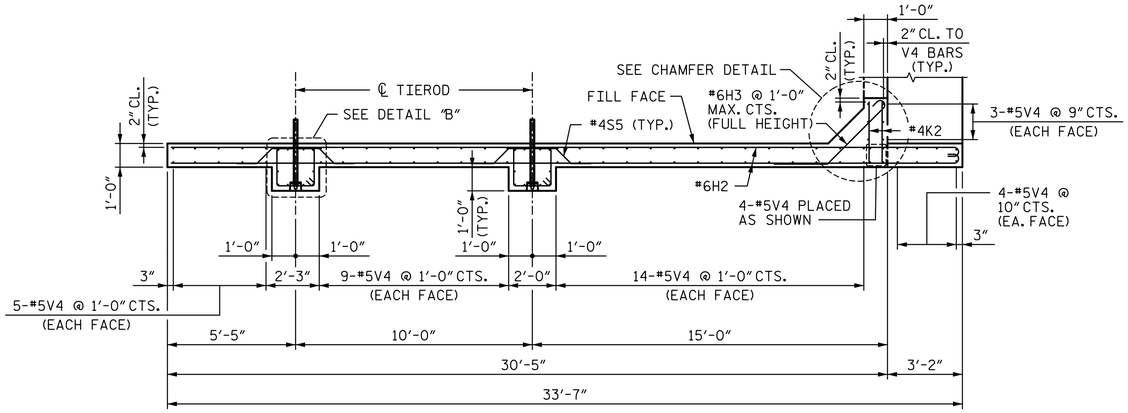
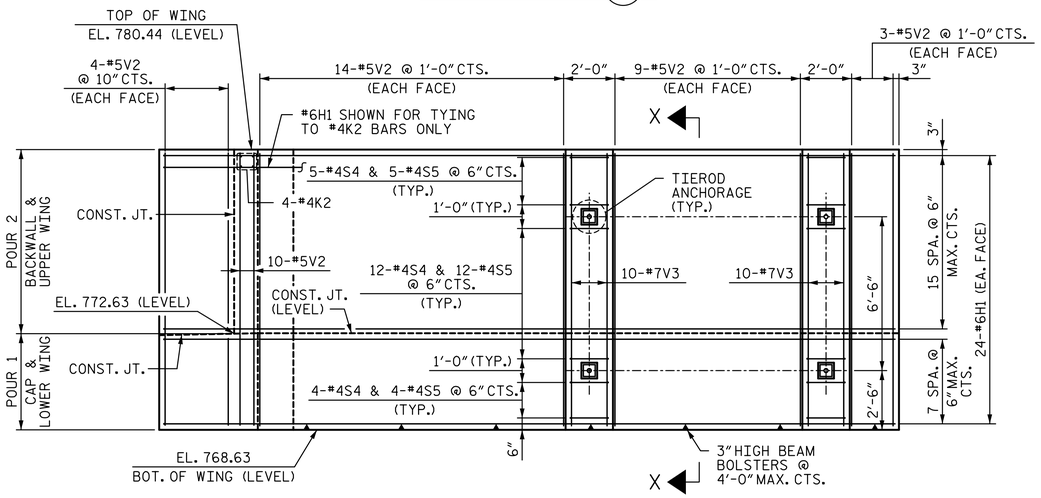


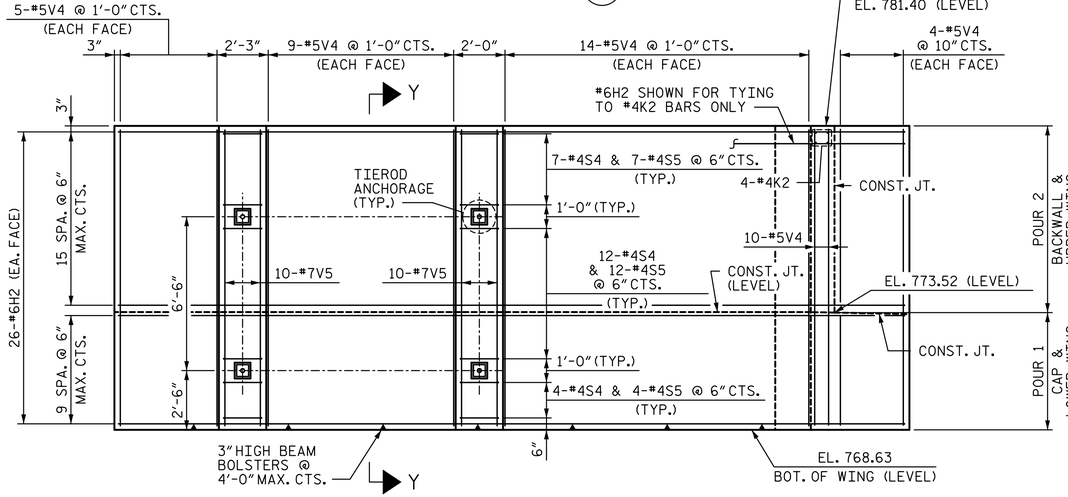
PLAN OF WING (W1)



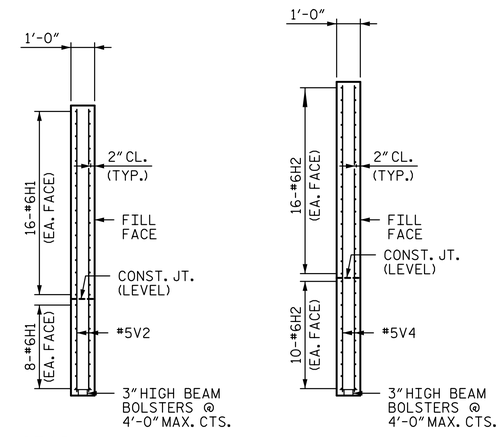
PLAN OF WING (W2)



ELEVATION OF WING (W1)

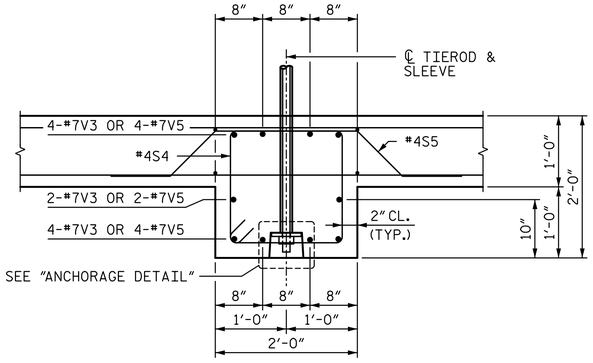


ELEVATION OF WING (W2)

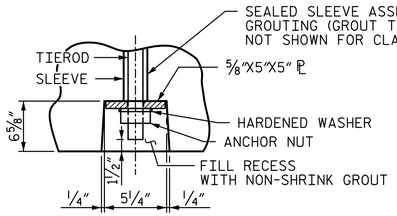


SECTION X-X

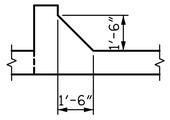
SECTION Y-Y



DETAIL "B"



ANCHORAGE DETAIL



CHAMFER DETAIL
(TYPICAL AT EACH LOCATION)

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-
SHEET 2 OF 4

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8/14/2024

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 1
WING WALL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-57
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
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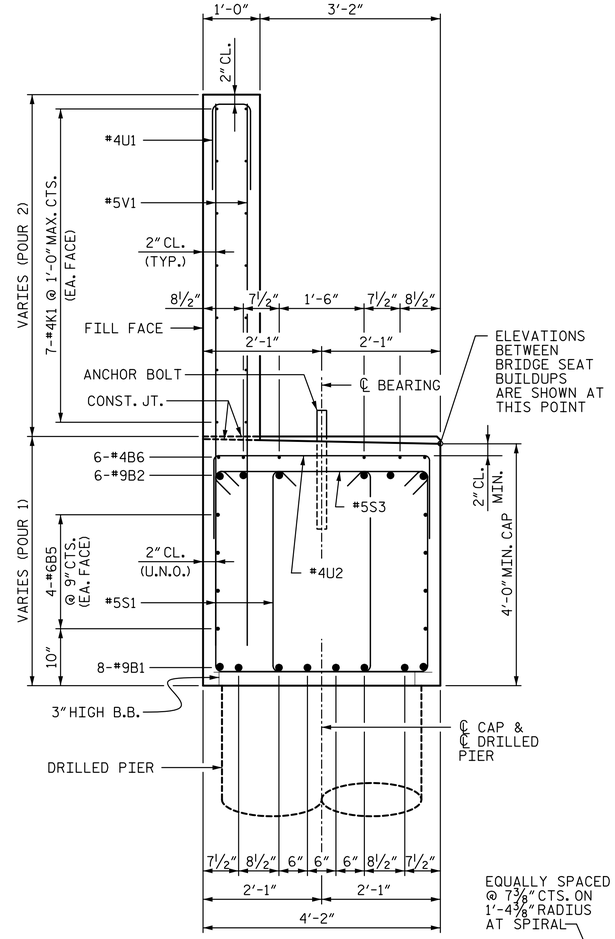
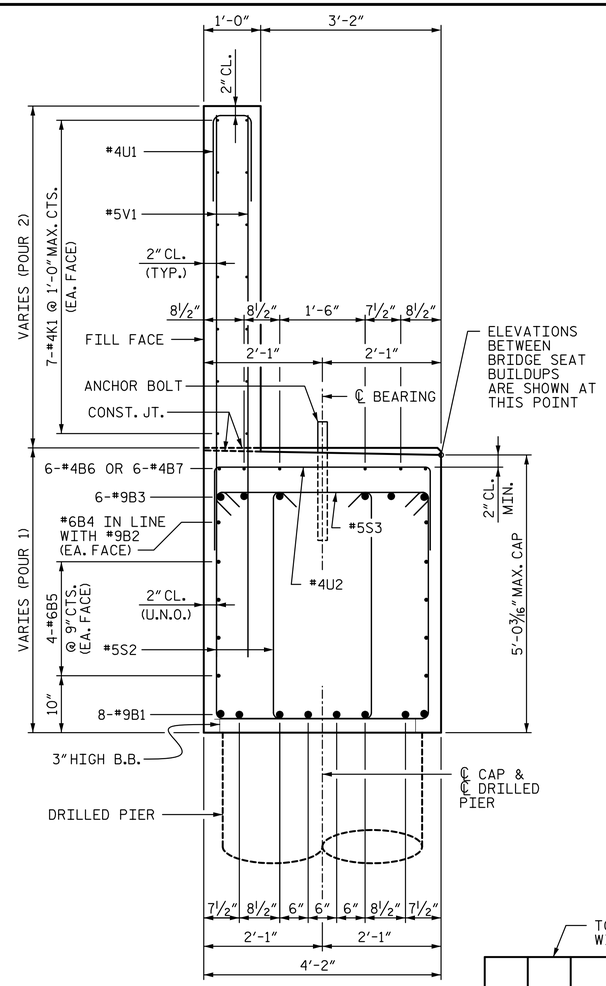
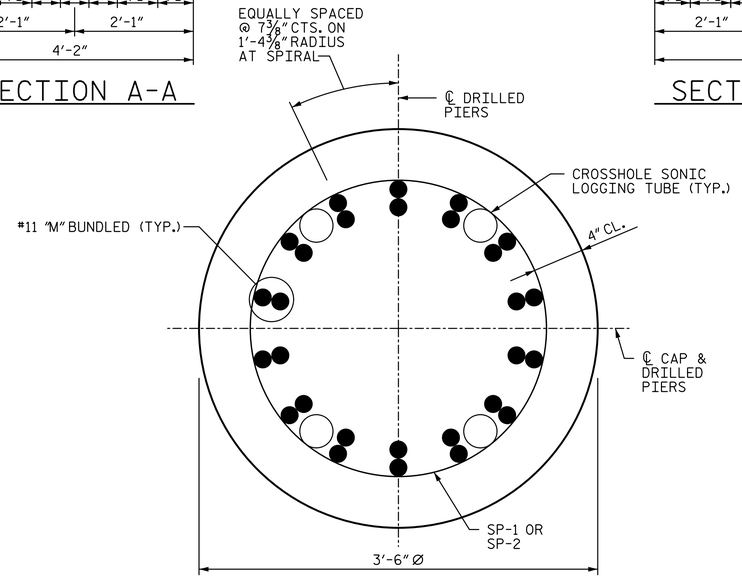


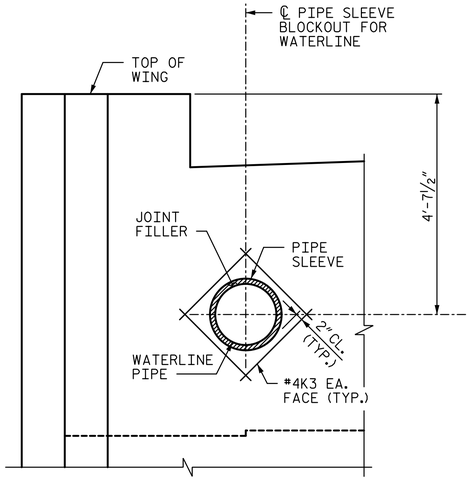
SECTION A-A



SECTION B-B



TYPICAL SECTION THROUGH DRILLED PIER



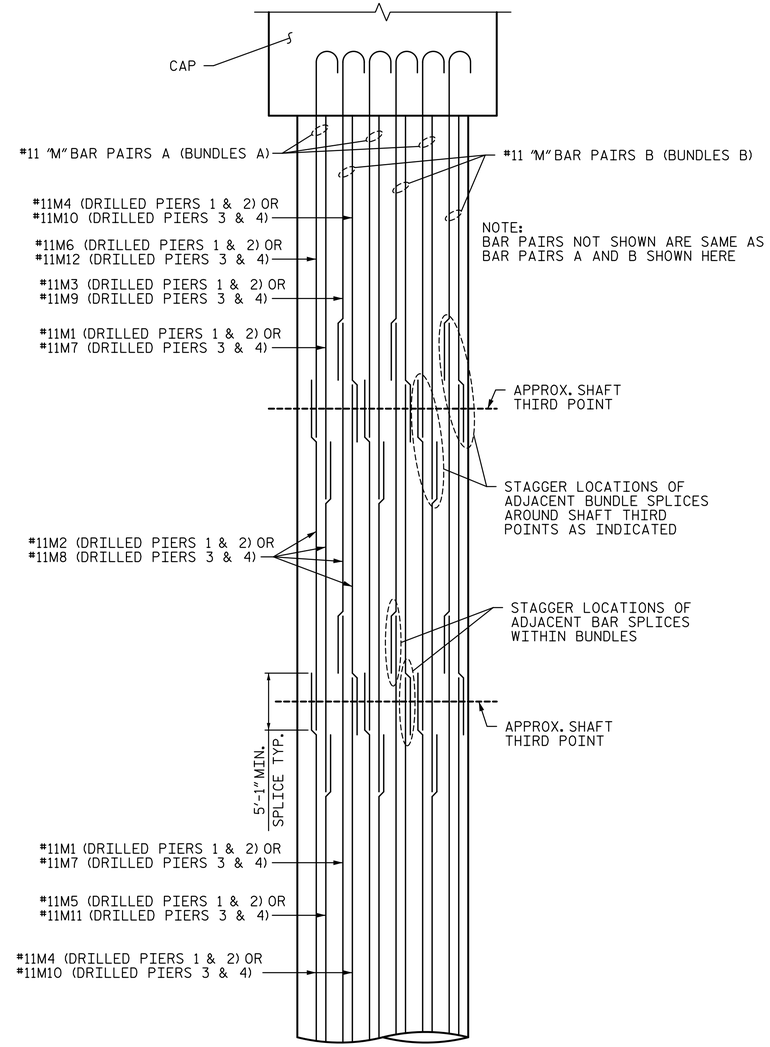
BLOCKOUT DETAIL FOR 16" Ø WATERLINE

BLOCKOUT NOTES:

CENTER 16" Ø WATERLINE IN BLOCKOUT AND FILL ANNULAR SPACE AROUND PIPE WITH JOINT FILLER IN ACCORDANCE WITH STANDARD SPECIFICATION ARTICLE 1028-1.

REINFORCING STEEL IN BACKWALL SHALL BE CUT AS REQUIRED TO WITHIN 2" OF BLOCKOUT.

FOR DETAILS OF 16" Ø WATERLINE SEE PLANS BY OTHERS.



DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL

(NO SCALE)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

10/4/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

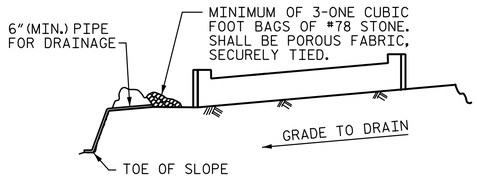
END BENT 1
SECTIONS & DETAILS

stv
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-58
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS DATE : 8-23
CHECKED BY : SAB DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24



BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINIUM 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 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

QUANTITIES		
REINFORCING STEEL	LBS.	78,766
SPIRAL REINFORCING STEEL	LBS.	7,679
CLASS A CONCRETE :		
POUR 1 - CAP & LOWER WING	CU. YDS.	50.8
POUR 2 - BACKWALL & UPPER WING	CU. YDS.	35.0
TOTAL	CU. YDS.	85.8
DRILLED PIER CONCRETE :	CU. YDS.	123.9

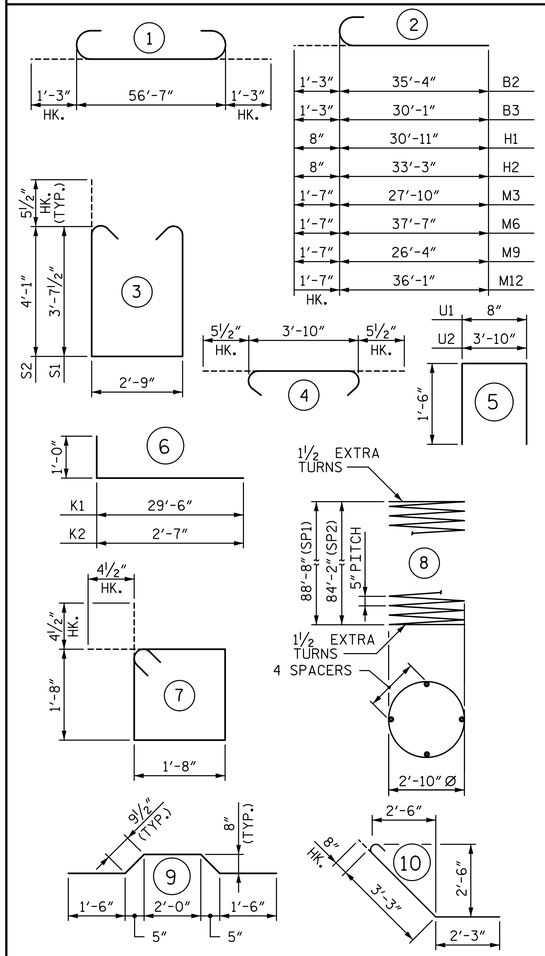
SEE DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL ON END BENT 1 SECTIONS AND DETAILS SHEET (S1-58) FOR SPLICE CONFIGURATION, TYP.

APPROACH FILL AND ANCHOR ROD CONSTRUCTION SEQUENCE:

(CONTRACTOR MAY SUBMIT ALTERNATE SEQUENCE FOR REVIEW AND APPROVAL)

1. AFTER END BENT AND WING WALL CONCRETE IS POURED, CONSTRUCT APPROACH DRAINAGE BEHIND CAP AND WINGS. SEE APPROACH SLAB SHEETS FOR ADDITIONAL DETAILS.
2. INSTALL BACKFILL ON BOTH WALL FACES TO BOTTOM OF LOWER ANCHOR RODS AFTER END BENT CAP AND WING CONCRETE IS CURED APPROPRIATELY.
3. INSTALL LOWER ANCHOR ROD ASSEMBLIES. TIGHTEN LOWER ANCHOR ROD NUTS TO THE FIRST OF THE FOLLOWING LIMITS:
   a) THE TORQUE NECESSARY TO ACHIEVE 5% OF YIELD STRESS IN THE RODS; OR
   b) ½" INWARD MOVEMENT MEASURED AT THE WINGWALL FREE END; OR
   c) THE START OF ANY SURFACE CRACKING ANYWHERE ON THE WINGWALL OR BACKWALL.
4. INSTALL BACKFILL ON BOTH WALL FACES TO LEVEL OF UPPER ANCHOR ROD ASSEMBLY.
5. INSTALL UPPER ANCHOR ROD ASSEMBLIES. TIGHTEN UPPER ANCHOR ROD NUTS TO ACHIEVE THE FIRST OF THE LIMITS GIVEN IN STEP 3 ABOVE.
6. RE-TORQUE BOTTOM LEVEL ANCHOR ROD NUTS IF THEY HAVE LOOSENED TO THE FIRST OF THE LIMITS IN STEP 3 ABOVE.
7. COMPLETE INSTALLATION OF BACKFILL TO BOTTOM OF APPROACH SLAB LEVEL.
8. PUMP THE GROUT INTO THE ANCHOR ROD ASSEMBLIES UNTIL GROUT COMPLETELY FILLS THE ASSEMBLIES AND SEALS THE ANCHOR RODS.
9. TRIM ANCHOR RODS, APPLY EPOXY BONDING COMPOUND TO THE CONCRETE POCKET SURFACES AND INSTALL THE EXTERIOR GROUT/PATCH TO FILL THE POCKET AND COMPLETELY COVER THE PLATE, ANCHOR NUT AND ANCHOR BAR.
10. CONTACT THE ENGINEER IMMEDIATELY IF DETRIMENTAL SYMPTOMS OCCUR AT ANY POINT DURING THE ABOVE PROCEDURE.

BAR TYPES



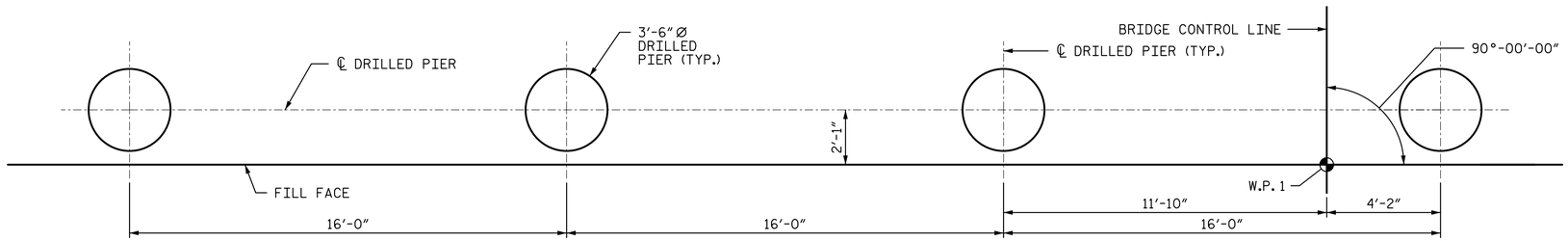
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	①	59'-1"	1,607
B2	6	#9	②	36'-7"	746
B3	6	#9	②	31'-4"	639
B4	2	#6	STR	25'-0"	75
B5	8	#6	STR	56'-7"	680
B6	24	#4	STR	7'-5"	119
B7	6	#4	STR	7'-10"	31
H1	48	#6	②	31'-7"	2,277
H2	52	#6	②	33'-11"	2,649
H3	25	#6	⑩	6'-2"	232
K1	28	#4	⑥	30'-6"	570
K2	8	#4	⑥	3'-7"	19
K3	8	#4	STR	2'-4"	12
M1	28	#11	STR	38'-3"	5,690
M2	56	#11	STR	35'-8"	10,612
M3	14	#11	②	31'-9"	2,362
M4	42	#11	STR	33'-2"	7,401
M5	14	#11	STR	28'-1"	2,089
M6	14	#11	②	36'-10"	2,740
M7	28	#11	STR	36'-9"	5,467
M8	56	#11	STR	34'-2"	10,166
M9	14	#11	②	30'-3"	2,250
M10	42	#11	STR	31'-8"	7,066
M11	14	#11	STR	26'-7"	1,977
M12	14	#11	②	35'-4"	2,628
S1	120	#5	③	10'-11"	1,366
S2	138	#5	③	11'-10"	1,703
S3	129	#5	④	4'-9"	639
S4	88	#4	⑦	7'-5"	436
S5	88	#4	⑨	6'-7"	387
SP1	2	*	⑧	1887'-9"	3,938
SP2	2	*	⑧	1793'-3"	3,741
U1	51	#4	⑤	3'-8"	125
U2	50	#4	⑤	6'-10"	228
V1	102	#5	STR	9'-6"	1,011
V2	70	#5	STR	11'-5"	834
V3	20	#7	STR	11'-5"	467
V4	74	#5	STR	12'-5"	958
V5	20	#7	STR	12'-5"	508

* THE SP1 AND SP2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR WITH A 5" PITCH. IF SPLICE IS NECESSARY, PROVIDE A 2'-0" MIN. LAP SPLICE.

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



PLAN OF DRILLED PIERS

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 4 OF 4

DRAWN BY : VKS DATE : 8-23

CHECKED BY : SAB DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC. 900 West Trade St. Suite 715 Charlotte, NC 28202 NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-59
1			3			TOTAL SHEETS
2			4			73

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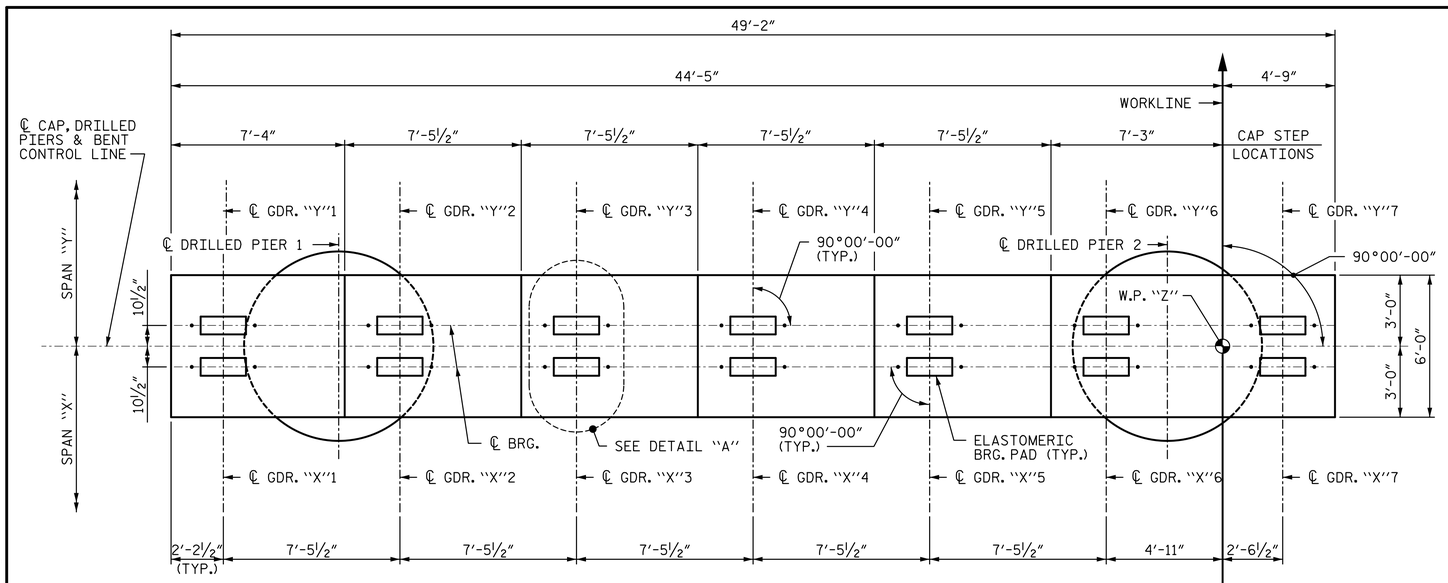
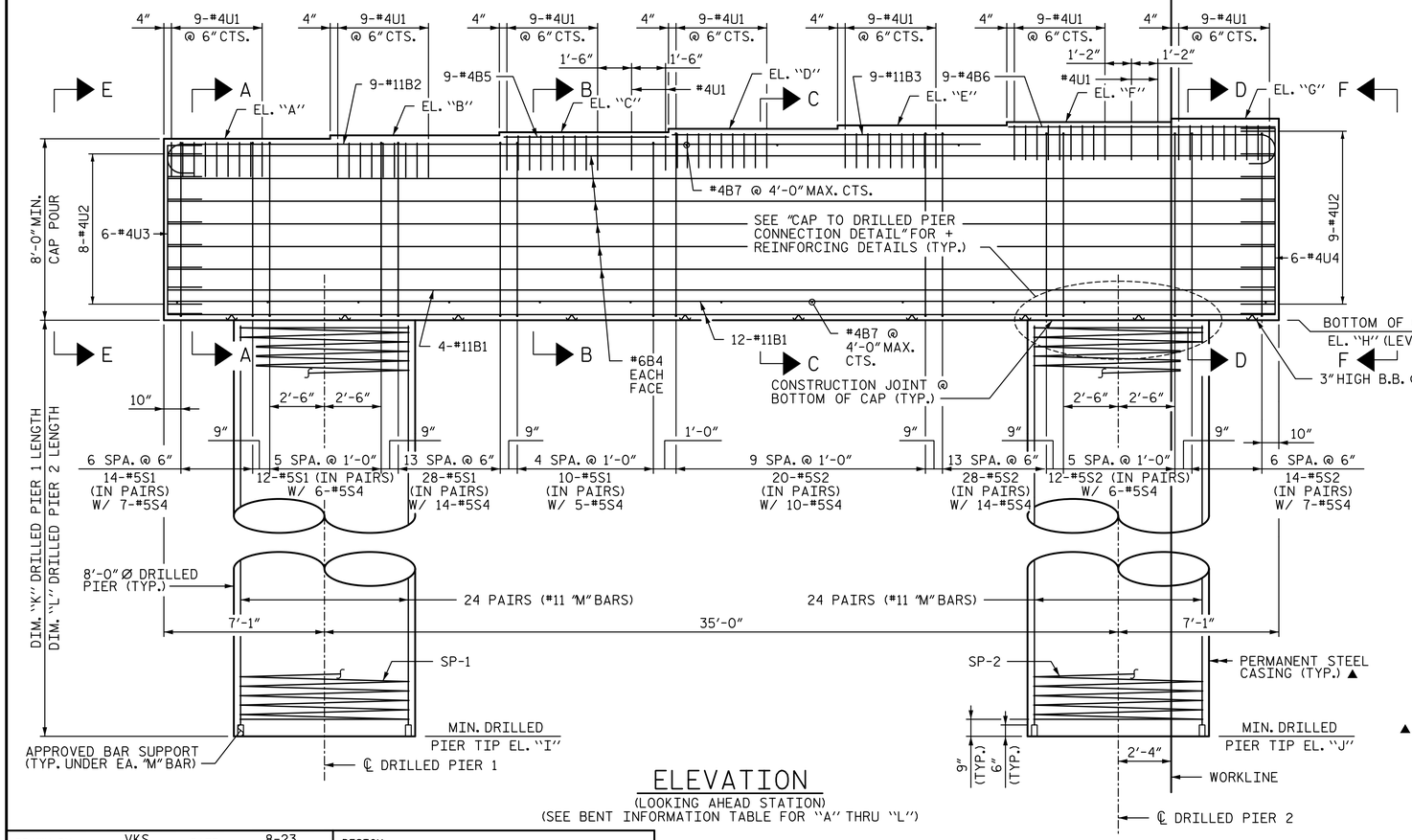


PLAN

(SEE BENT INFORMATION TABLE FOR ″X″, ″Y″, & ″Z″)



ELEVATION

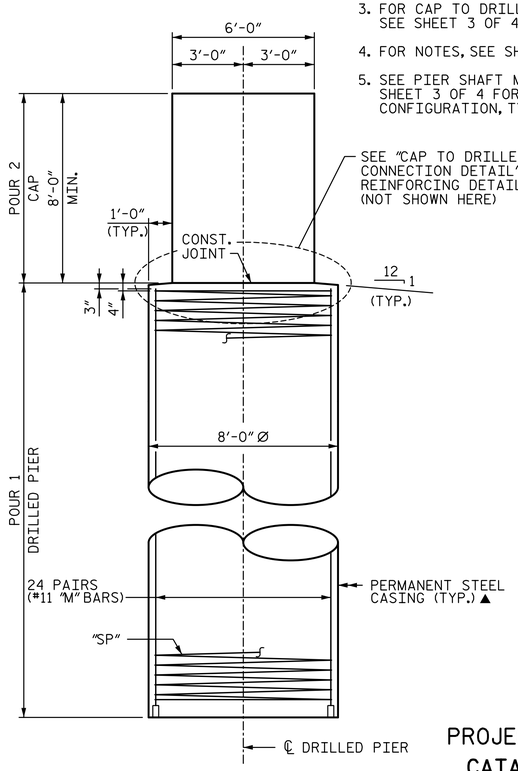
(LOOKING AHEAD STATION)
(SEE BENT INFORMATION TABLE FOR ″A″ THRU ″L″)

▲ FOR EXTENTS OF THE PERMANENT CASING, SEE ″DRILLED PIER FOUNDATION TABLES″ SHEET.

BENT ELEVATIONS (FT.) AND PIER LENGTHS								
BENT	1	2	3	4	5	6	7	8
″X″	A	B	C	D	E	F	G	H
″Y″	B	C	D	E	F	G	H	I
″Z″	2	3	4	5	6	7	8	9
″A″	773.46	774.14	775.21	775.98	776.10	775.58	774.57	773.52
″B″	773.61	774.28	775.36	776.13	776.25	775.73	774.71	773.66
″C″	773.76	774.43	775.51	776.28	776.40	775.88	774.86	773.81
″D″	773.91	774.58	775.66	776.43	776.55	776.03	775.01	773.96
″E″	774.06	774.73	775.81	776.57	776.70	776.18	775.16	774.11
″F″	774.21	774.88	775.96	776.72	776.85	776.33	775.31	774.26
″G″	774.36	775.03	776.11	776.87	777.00	776.48	775.46	774.41
″H″	765.46	766.14	767.21	767.98	768.10	767.58	766.57	765.52
″I″	674.5	677.5	661.0	638.0	652.5	632.5	658.5	670.0
″J″	686.0	676.0	643.0	645.0	651.0	633.5	660.5	665.5
″K″	91′-0″	88′-8″	106′-3″	130′-0″	115′-8″	135′-1″	108′-1″	95′-7″
″L″	79′-6″	90′-2″	124′-3″	123′-0″	117′-2″	134′-1″	106′-1″	100′-1″

NOTES:

1. FOR DETAIL ″A″, SEE SHEET 3 OF 4.
2. FOR SECTIONS AND END VIEWS, SEE SHEET 2 OF 4.
3. FOR CAP TO DRILLED PIER CONNECTION DETAIL, SEE SHEET 3 OF 4.
4. FOR NOTES, SEE SHEET 4 OF 4.
5. SEE PIER SHAFT MAIN BAR (VERT.) SPLICE DETAIL ON SHEET 3 OF 4 FOR DRILLED PIER MAIN BAR SPLICE CONFIGURATION, TYP.



SIDE VIEW

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENTS 1-8
PLAN & ELEVATION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-60
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS DATE : 8-23
CHECKED BY : SAB DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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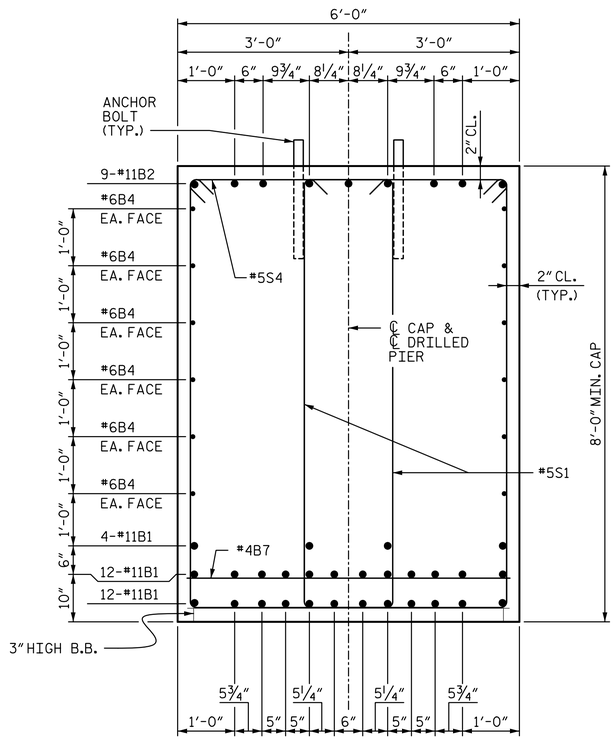
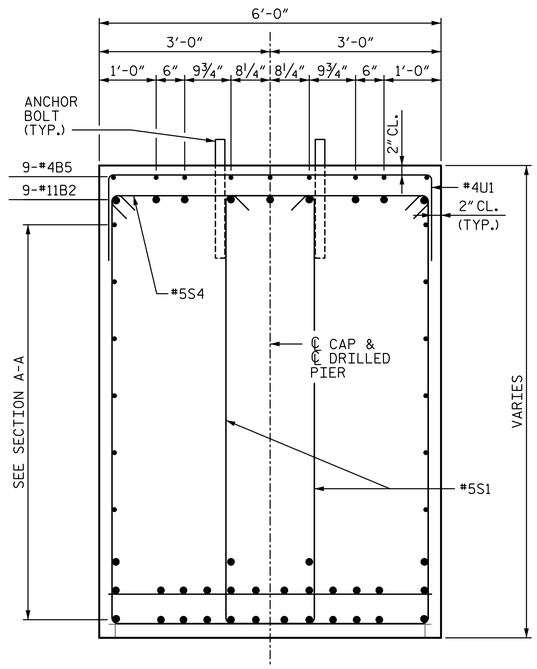
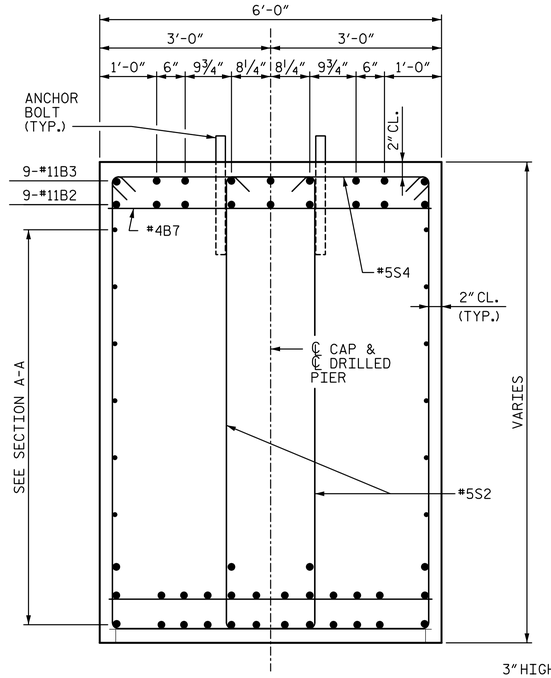


SECTION A-A

(U1 BAR NOT SHOWN FOR CLARITY)

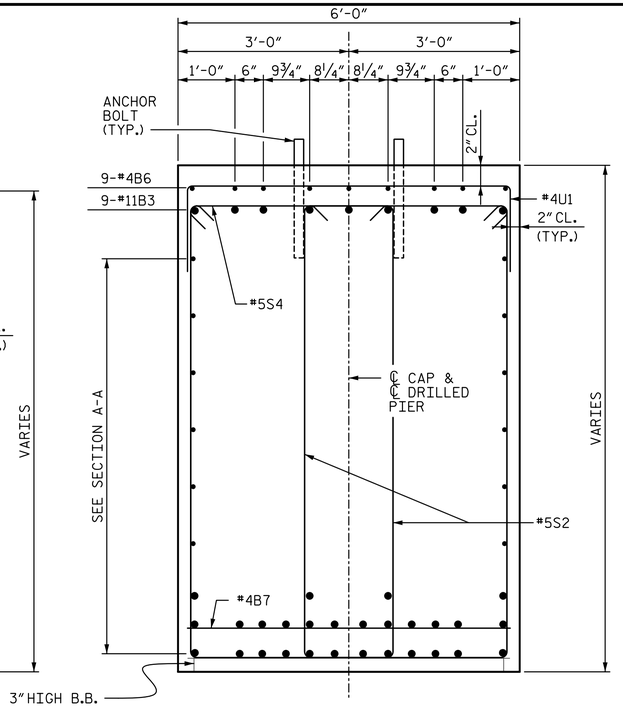


SECTION B-B

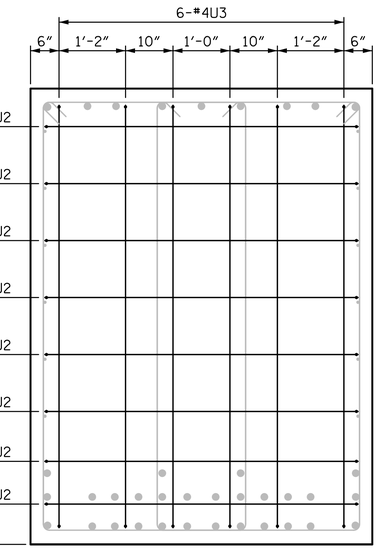


SECTION C-C

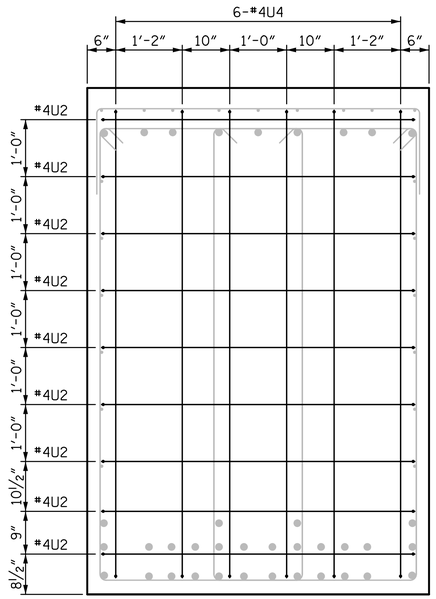
(U1 BAR NOT SHOWN FOR CLARITY)



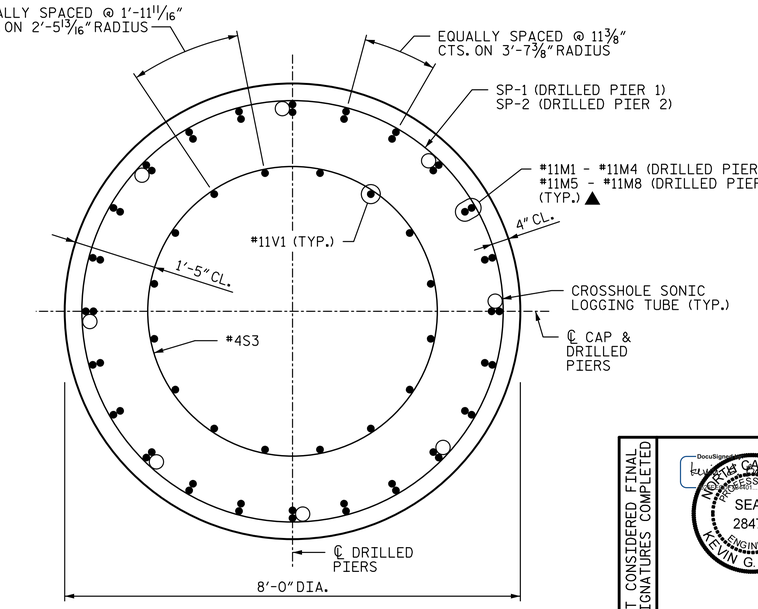
SECTION D-D



END VIEW E-E



END VIEW F-F



TYPICAL SECTION

THROUGH DRILLED PIER

(PERMANENT STEEL CASING NOT SHOWN FOR CLARITY)

(SEE "CAP TO DRILLED PIER CONNECTION DETAIL" FOR #4S3 & #11V1 LOCATION)

▲ SEE PIER SHAFT MAIN BAR (VERT.) SPILCE DETAIL ON SHEET 3 OF 4 FOR SPLICE CONFIGURATION. INVERT ALTERNATE PAIRS. (TYP.)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 4

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENTS 1-8
SECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-61
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

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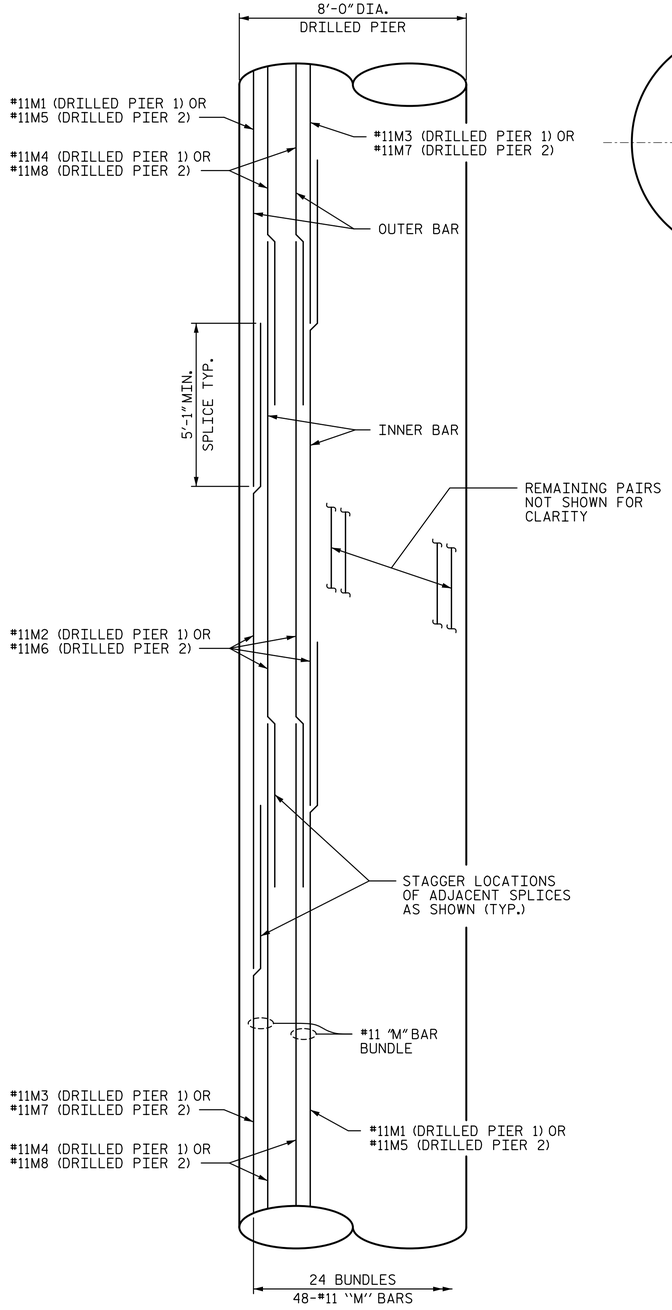
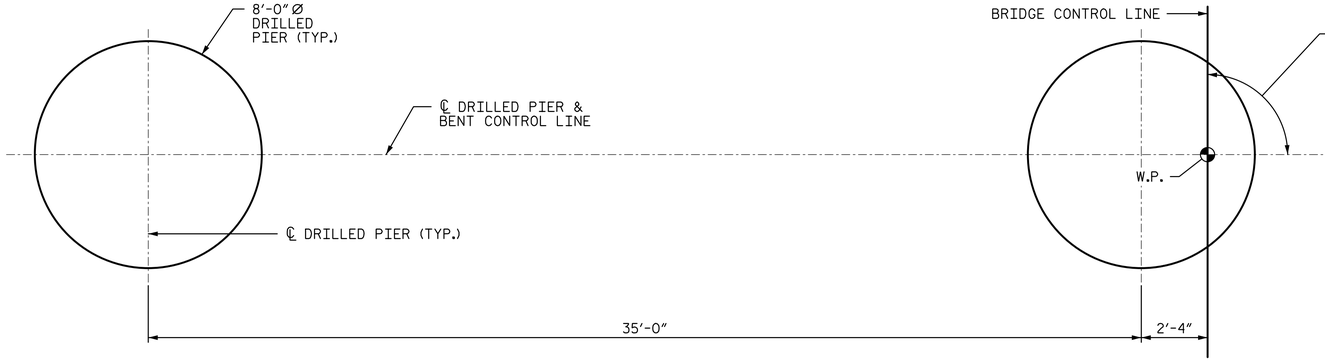
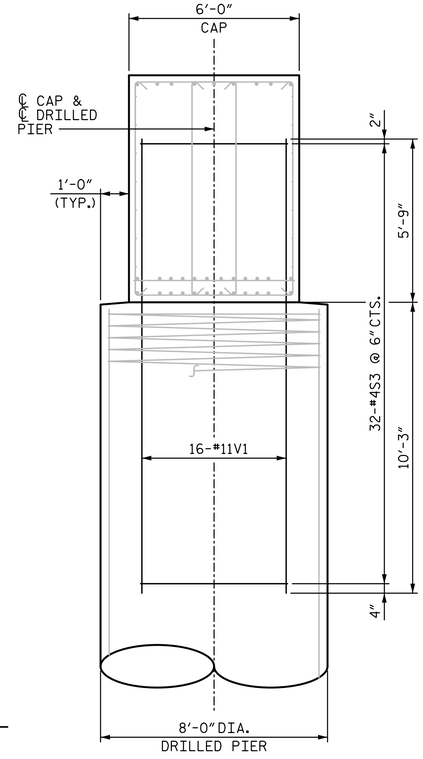


PIER SHAFT MAIN BAR (VERT.) SPLICE DETAIL

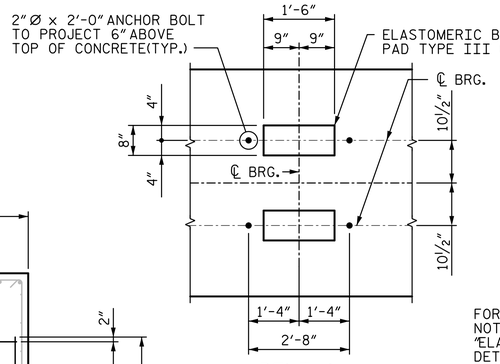
(IF SPLICES IN SPIRAL ARE NECESSARY, PROVIDE A 2'-0" MIN. LAP SPLICE)
(INVERT ALTERNATE #11 "M" BAR BUNDLES)



PLAN OF DRILLED PIERS



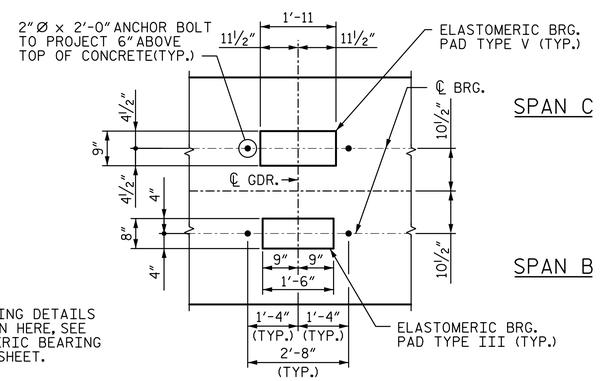
CAP TO DRILLED PIER CONNECTION DETAIL



BENT 1

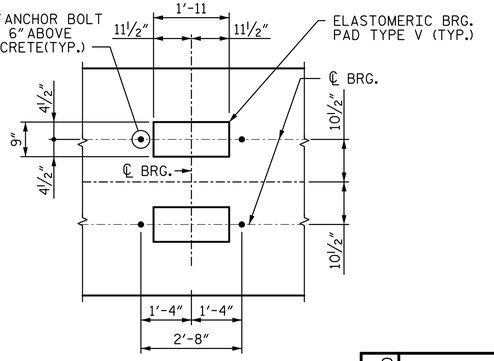
(TYP. AT EACH BRIDGE SEAT)

FOR BEARING DETAILS NOT SHOWN HERE, SEE "ELASTOMERIC BEARING DETAILS" SHEET.



BENT 2

(TYP. AT EACH BRIDGE SEAT)



BENTS 3-8

(TYP. AT EACH BRIDGE SEAT)

DETAIL "A"

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 4

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: Kevin Bailey

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENTS 1-8 DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-62
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS DATE : 8-23
CHECKED BY : SAB DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

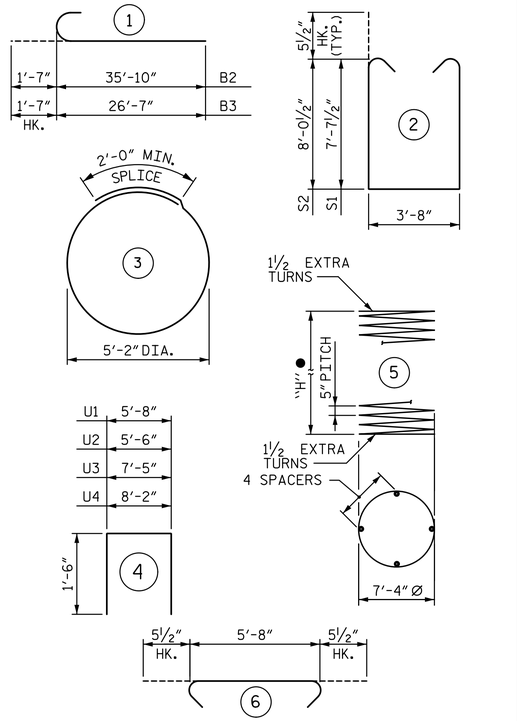
BENT QUANTITIES

BENT		1	2	3	4	5	6	7	8
REINFORCING STEEL	LBS.	68,782	70,950	84,083	89,822	84,721	93,179	79,919	75,200
SPIRAL REINFORCING STEEL	LBS.	9,779	10,258	13,215	14,506	13,346	15,434	12,283	11,218
CLASS A CONCRETE: POUR 2 - CAP	CU. YDS.	92.0	92.0	92.1	92.0	92.0	92.1	92.0	92.0
TOTAL	CU. YDS.	92.0	92.0	92.1	92.0	92.0	92.1	92.0	92.0
DRILLED PIER CONCRETE: (POUR 1)	CU. YDS.	317.3	332.8	429.0	470.9	433.2	501.1	398.7	364.0

TABLE "A"

BAR	●	BENT 1	2	3	4	5	6	7	8
M1	LENGTH	38'-9"	38'-0"	43'-10"	51'-9"	47'-0"	52'-5"	44'-5"	40'-3"
	WEIGHT	4,941	4,845	5,589	6,599	5,993	6,684	5,664	5,132
M2	LENGTH	36'-2"	35'-5"	41'-3"	49'-2"	44'-5"	49'-11"	41'-11"	37'-9"
	WEIGHT	9,223	9,032	10,520	12,539	11,327	12,730	10,690	9,627
M3	LENGTH	28'-7"	27'-10"	33'-8"	41'-7"	36'-10"	42'-3"	34'-3"	30'-1"
	WEIGHT	3,645	3,549	4,293	5,302	4,697	5,387	4,367	3,836
M4	LENGTH	33'-8"	32'-11"	38'-9"	46'-8"	41'-11"	47'-4"	39'-4"	35'-2"
	WEIGHT	8,586	8,395	9,882	11,901	10,690	12,071	10,031	8,968
M5	LENGTH	34'-11"	38'-6"	49'-10"	49'-5"	47'-6"	53'-1"	43'-9"	41'-9"
	WEIGHT	4,452	4,909	6,354	6,301	6,057	6,769	5,579	5,324
M6	LENGTH	32'-4"	35'-11"	47'-3"	46'-10"	44'-11"	50'-7"	41'-3"	39'-3"
	WEIGHT	8,246	9,160	12,050	11,944	11,455	12,900	10,520	10,010
M7	LENGTH	24'-9"	28'-4"	39'-8"	39'-3"	37'-4"	42'-11"	33'-7"	31'-7"
	WEIGHT	3,156	3,613	5,058	5,005	4,760	5,472	4,282	4,027
M8	LENGTH	29'-10"	33'-5"	44'-9"	44'-4"	42'-5"	48'-0"	38'-8"	36'-8"
	WEIGHT	7,608	8,522	11,412	11,306	10,817	12,241	9,861	9,351
SP-1	"H"	89.88	87.56	105.13	128.90	114.52	134.00	106.99	94.44
	LENGTH	5003'-10"	4876'-3"	5841'-0"	7146'-2"	6356'-7"	7426'-3"	5943'-2"	5254'-1"
	WEIGHT	5,219	5,086	6,092	7,453	6,630	7,746	6,199	5,480
SP-2	"H"	78.38	89.06	123.13	121.90	116.02	133.00	104.99	98.94
	LENGTH	4372'-3"	4958'-8"	6829'-4"	6761'-10"	6439'-0"	7371'-4"	5833'-4"	5501'-2"
	WEIGHT	4,560	5,172	7,123	7,053	6,716	7,688	6,084	5,738

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	28	#11	STR	48'-10"	7,265
B2	9	#11	①	37'-5"	1,789
B3	9	#11	①	28'-2"	1,347
B4	12	#6	STR	48'-10"	880
B5	9	#4	STR	7'-3"	44
B6	9	#4	STR	11'-9"	71
B7	17	#4	STR	5'-8"	64
M1	24	#11	STR	●	●
M2	48	#11	STR	●	●
M3	24	#11	STR	●	●
M4	48	#11	STR	●	●
M5	24	#11	STR	●	●
M6	48	#11	STR	●	●
M7	24	#11	STR	●	●
M8	48	#11	STR	●	●
S1	64	#5	②	19'-10"	1,324
S2	74	#5	②	20'-8"	1,595
S3	64	#4	③	18'-3"	780
S4	69	#5	⑥	6'-7"	474
SP-1	1	✳	⑤	●	●
SP-2	1	✳	⑤	●	●
U1	67	#4	④	8'-8"	388
U2	17	#4	④	8'-6"	97
U3	6	#4	④	10'-5"	42
U4	6	#4	④	11'-2"	45
V1	32	#11	STR	16'-0"	2,720

✳ THE SP-1 & SP-2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR WITH A 5" PITCH.

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

● SEE TABLE "A" FOR VALUES

NOTES:

1. ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".
2. STIRRUPS AND "U" BARS IN THE CAP MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR ANCHOR BOLTS.
3. HOOKS ON BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
4. SEE "GENERAL DRAWING LOCATION SKETCH, GENERAL NOTES AND TOTAL BILL OF MATERIAL" SHEET FOR ADDITIONAL NOTES.
5. THE TOP SURFACE AREAS OF THE BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.
6. IF THE AS-BUILT PIER LOCATION DEVIATES FROM THE DESIGN PIER LOCATION BY MORE THAN ½", NOTIFY THE ENGINEER.
7. AT LEAST 2 WEEKS PRIOR TO ERECTION, PROVIDE, TO THE ENGINEER, A TABLE OF THE AS-BUILT STATIONS, OFFSETS, AND BEARING SEAT ELEVATIONS OF EACH BEARING LOCATION. ALSO PROVIDE THE AS-BUILT CENTERLINE-OF-BEARING SKEW ANGLE FOR EACH SUBSTRUCTURE UNIT AND THE AMBIENT AND PIER CONCRETE TEMPERATURE AT THE TIME OF MEASUREMENT AT EACH UNIT.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 4 OF 4

DRAWN BY : VKS DATE : 8-23

CHECKED BY : SAB DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN G. BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

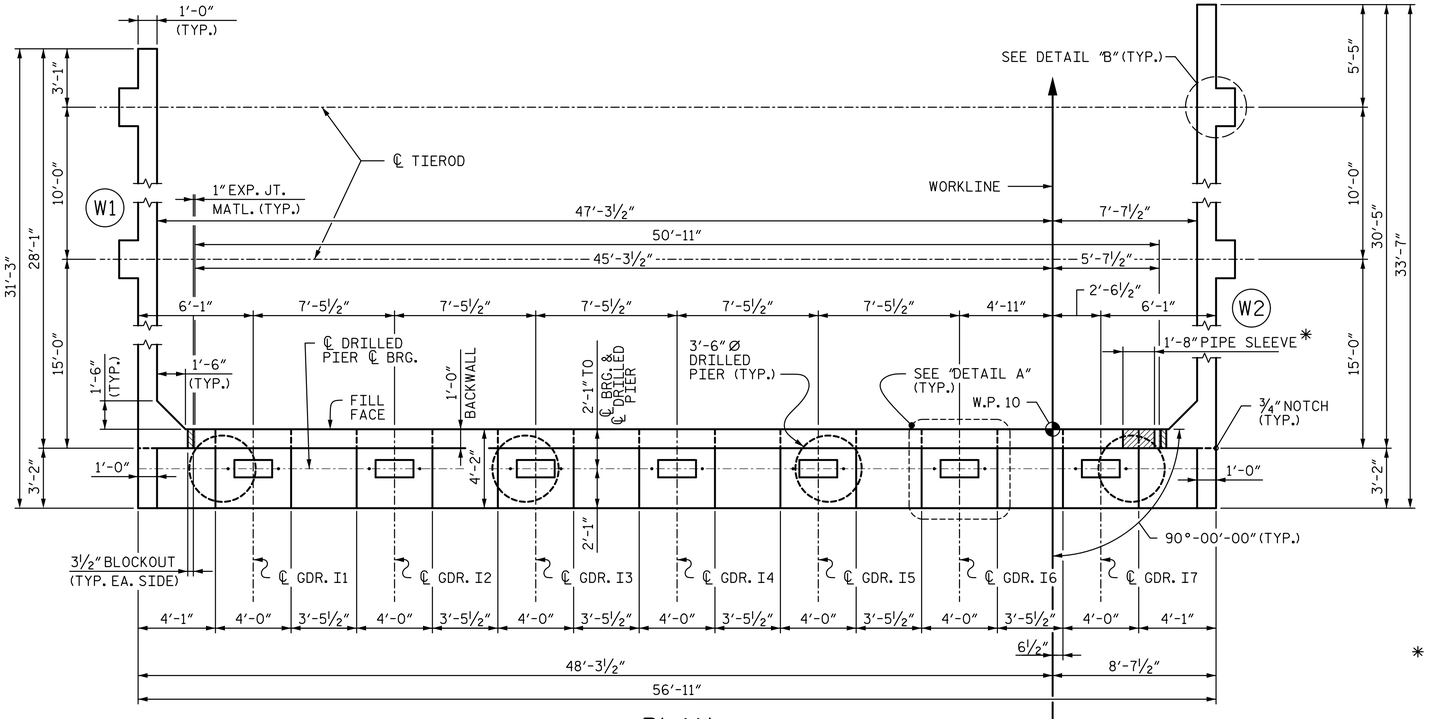
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

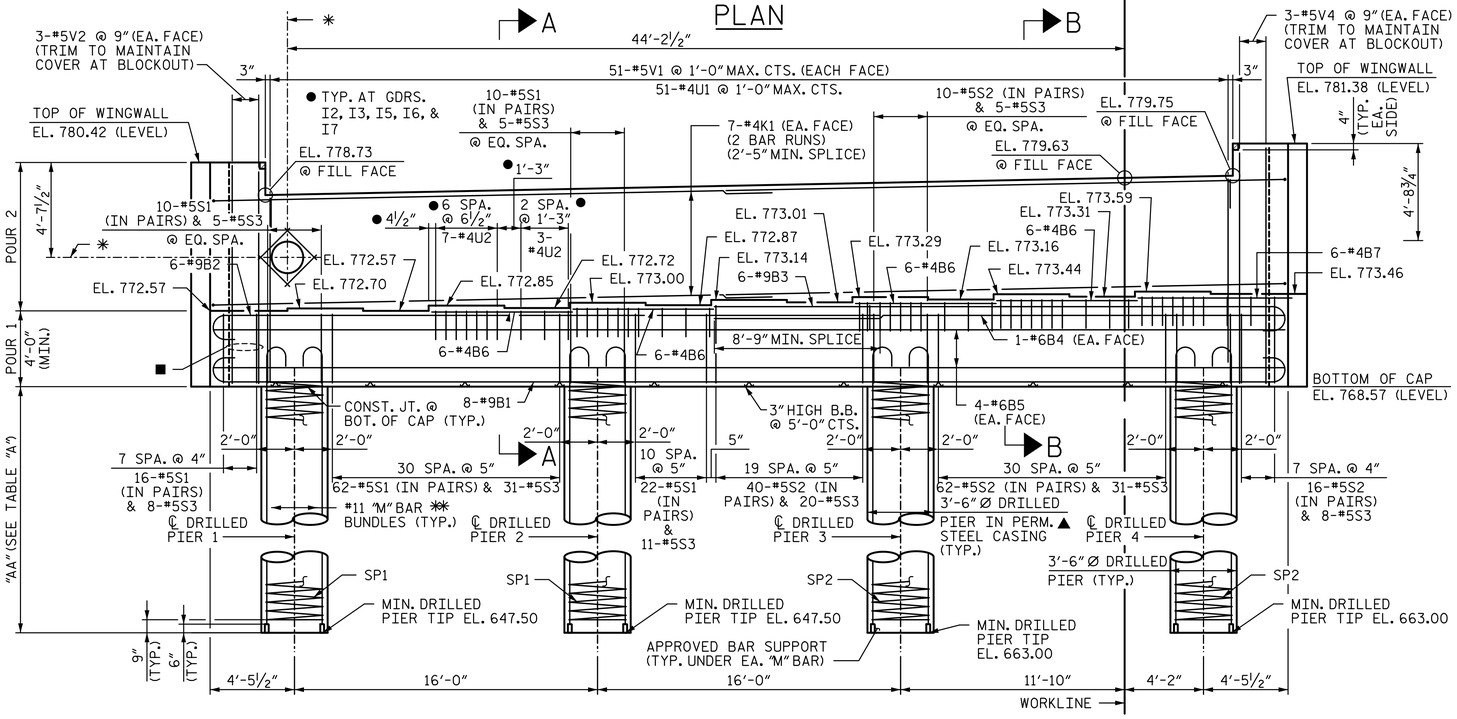
SUBSTRUCTURE

BENTS 1-8
BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-63
1			3			TOTAL SHEETS
2			4			73



PLAN



✱✱ FOR #11 "M" BAR SPLICE CONFIGURATION, SEE "DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL" ON SECTION AND DETAILS, SHEET 3 OF 4

ELEVATION

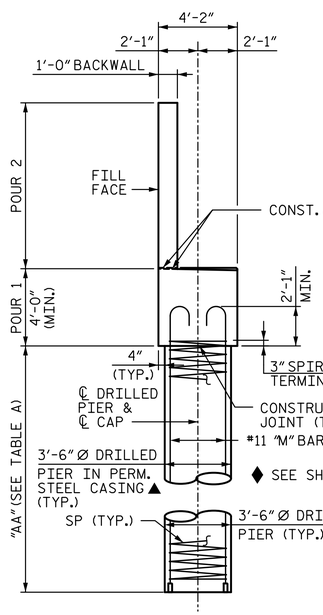
(LOOKING IN THE DIRECTION OF INCREASING STATION)

▲ FOR EXTENTS OF THE PERMANENT CASING, SEE "DRILLED PIER FOUNDATION TABLES" SHEET.

■ SEE WINGWALL SHEET FOR REIN. AT WING-BACKWALL INTERFACE (TYP.)

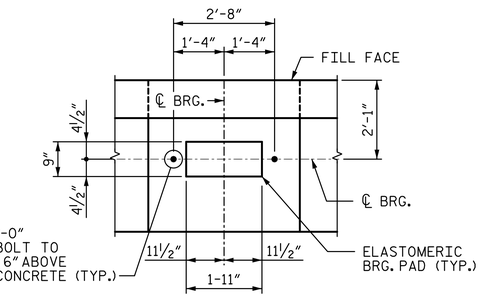
TABLE A	
PIER	"AA"
1 & 2	121'-0"
3 & 4	105'-6"

✱ ℄ 22"Ø PIPE SLEEVE BLOCKOUT FOR 16"Ø DUCTILE IRON PIPE WATERLINE (BY OTHERS) (SEE DETAILS SHEET 3 OF 4)



TYPICAL SECTION

(CAP REINFORCEMENT AND CHEEK WALL NOT SHOWN FOR CLARITY)



DETAIL "A"

(TYP. AT EACH BRIDGE SEAT) (ANCHOR BOLT POCKET NOT SHOWN FOR CLARITY)

FOR BEARING DETAILS NOT SHOWN HERE, SEE ELASTOMERIC BEARING DETAILS SHEET

NOTES:

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

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

SEE "GENERAL DRAWING GENERAL NOTES" SHEET FOR ADDITIONAL NOTES.

SEE SHEET 3 OF 4 FOR SECTIONS CALLED OUT ON ELEVATION VIEW.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING ON THE SUBSTRUCTURE UNIT.

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

CONCRETE IN THE HATCHED AREA OF THE BACKWALL (AT BLOCKOUTS) SHALL BE POURED AFTER THE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

TIEROD SHALL BE MINIMUM 1⅜"Ø (NOM.) ASTM A615 GRADE 75 ALL-THREAD REBAR (1.56 IN MIN. NET AREA THRU THREADS) WITH A MINIMUM ULTIMATE TENSILE CAPACITY OF 156 KIPS AND MINIMUM YIELD CAPACITY OF 117 KIPS.

USE COMPATIBLE COMPONENTS INCLUDING: HARDENED WASHERS CONFORMING TO ASTM F436 TYPE 1 (3" O.D., 1⅜" I.D.); HEX NUTS CONFORMING TO ASTM A108; STOP-TYPE COUPLINGS CONFORMING TO ASTM A29 GRADE C1045.

ANCHORAGE SHALL BE CAPABLE OF RESISTING THE MAXIMUM TENSILE CAPACITY OF THE TIEROD. ANCHORAGE ASSEMBLY SHALL CONSIST OF ROD, PLATE, NUT, COVER (TUBE), GROUT TUBE AND ANY OTHER COMPONENTS NECESSARY TO ACHIEVE A COMPLETED SEALED AND GROUTED ASSEMBLY.

TIEROD SHALL BE INSTALLED IN A 2"Ø SCHEDULE 40 PVC PIPE OR POLYPROPYLENE TUBING AND SHALL BE FULLY GROUTED WITH A NONSHRINK, NONMETALIC GROUT.

FOR BACKFILL AND ANCHOR ROD INSTALLATION, SEE THE APPROACH FILL AND ANCHOR ROD CONSTRUCTION SEQUENCE ON SHEET 4 OF 4.

SEE DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL ON END BENT 1 SECTIONS AND DETAIL SHEET (S1-65) FOR SPLICE CONFIGURATION.

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 4

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

10/4/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

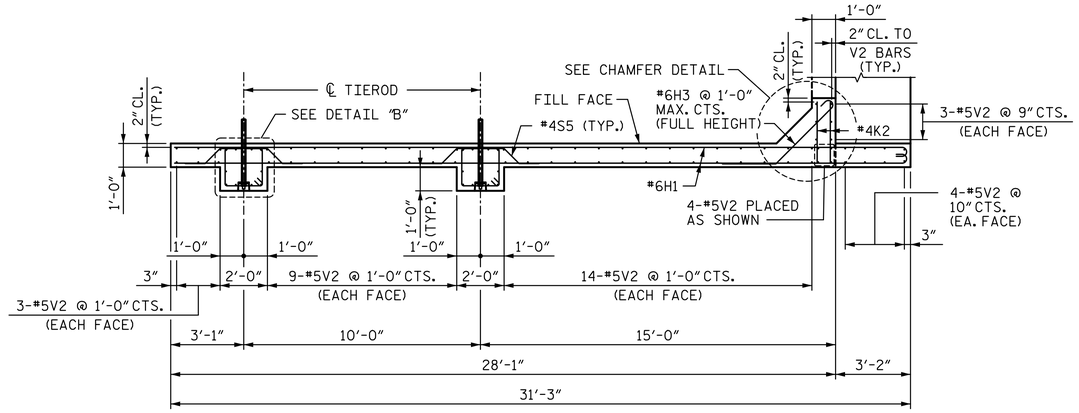
END BENT 2
PLAN & ELEVATION

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

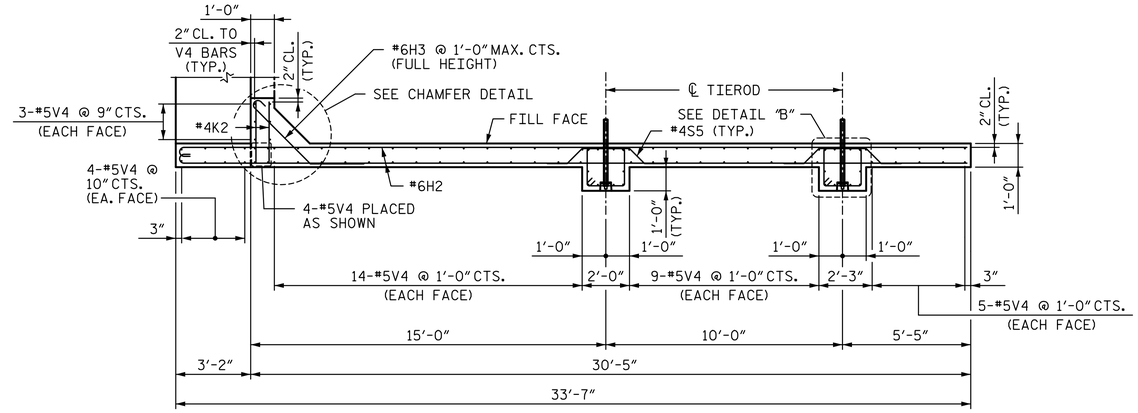
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-64
1			3			TOTAL SHEETS
2			4			73

DRAWN BY :	VKS	DATE :	8-23
CHECKED BY :	SAB	DATE :	8-23

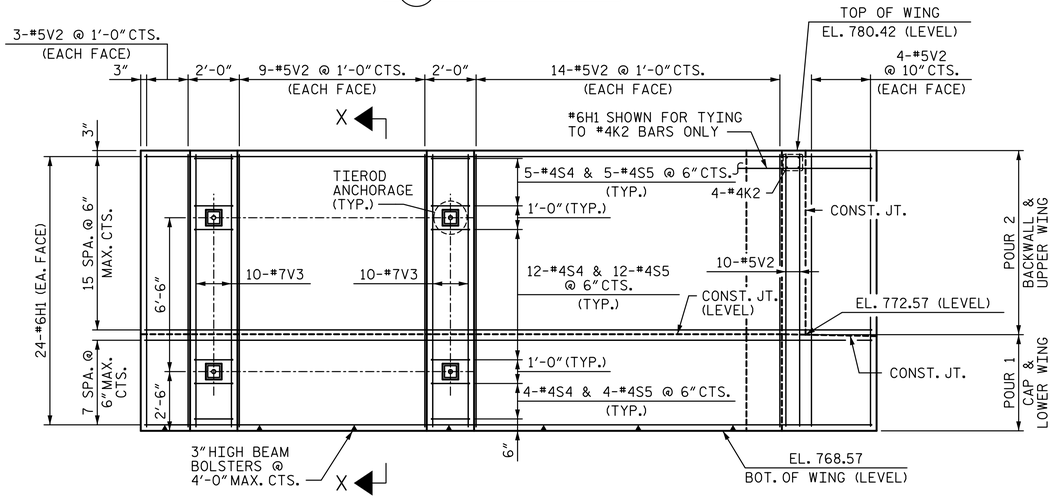
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24



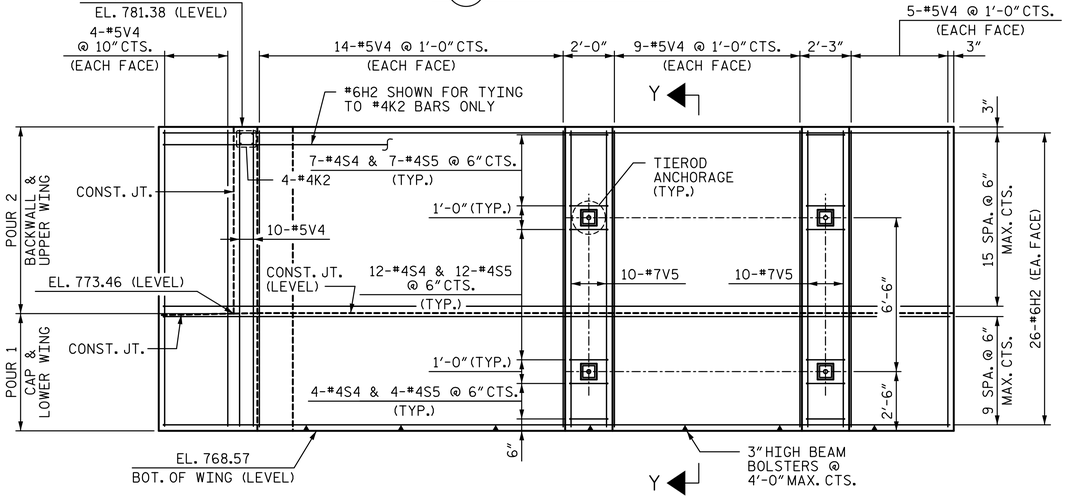
(W1) PLAN OF WING



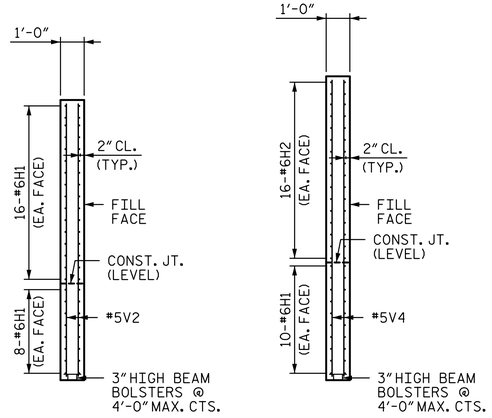
(W2) PLAN OF WING



(W1) ELEVATION OF WING

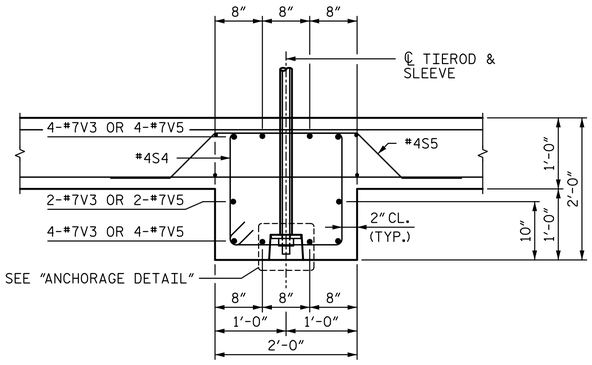


(W2) ELEVATION OF WING

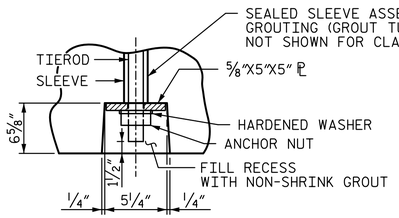


SECTION X-X

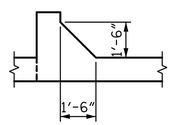
SECTION Y-Y



DETAIL "B"



ANCHORAGE DETAIL



CHAMFER DETAIL

(TYPICAL AT EACH LOCATION)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 4

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WING WALL

DRAWN BY : VKS	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

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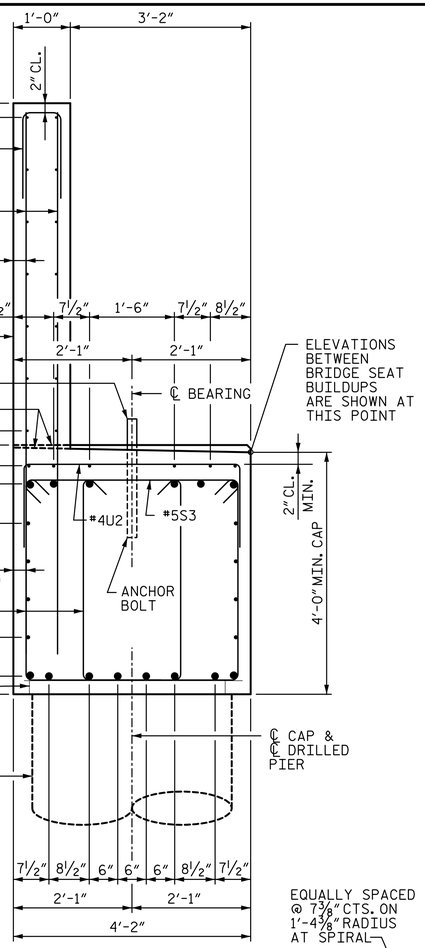
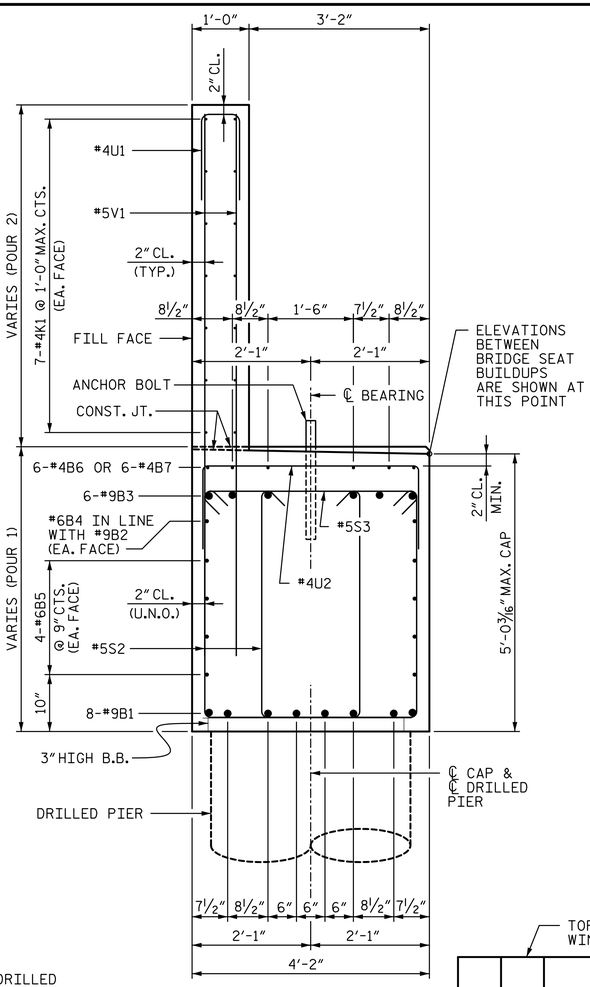
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

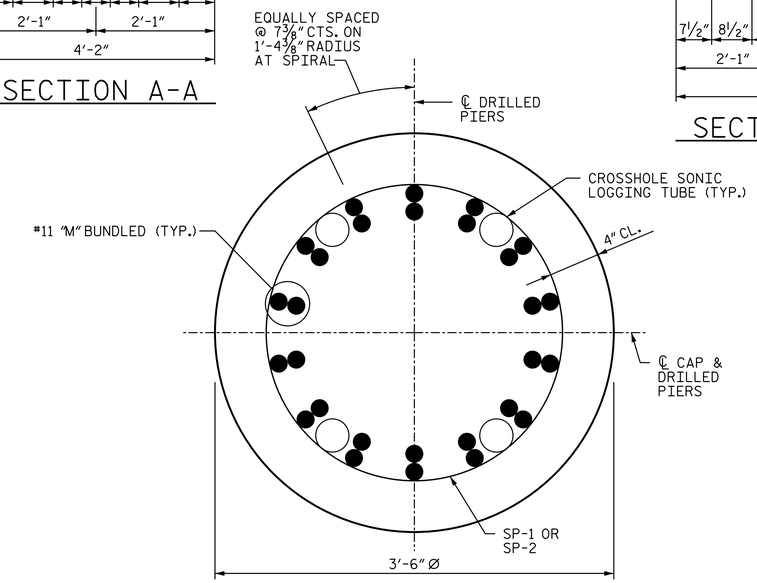
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-65
1			3			TOTAL SHEETS
2			4			73



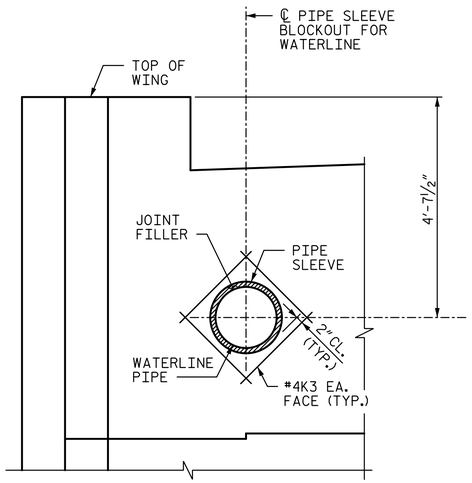
SECTION A-A



SECTION B-B



TYPICAL SECTION THROUGH DRILLED PIER



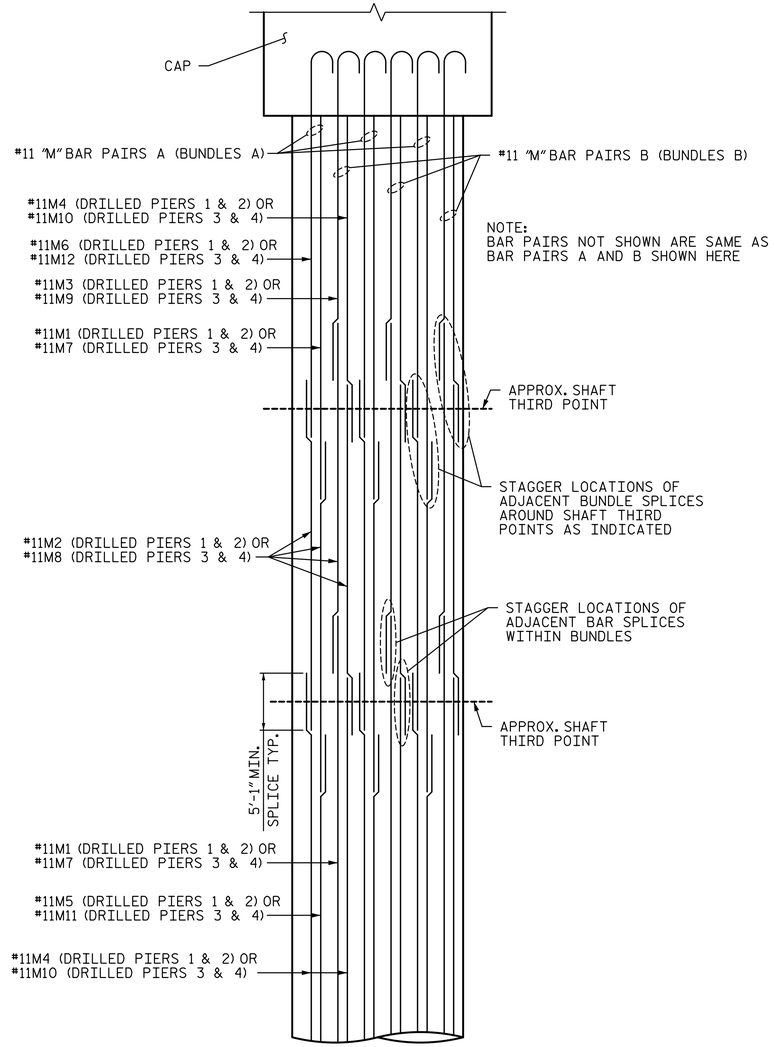
BLOCKOUT DETAIL FOR 16″ Ø WATERLINE

BLOCKOUT NOTES:

CENTER 16″Ø WATERLINE IN BLOCKOUT AND FILL ANNULAR SPACE AROUND PIPE WITH JOINT FILLER IN ACCORDANCE WITH STANDARD SPECIFICATION ARTICLE 1028-1.

REINFORCING STEEL IN BACKWALL SHALL BE CUT AS REQUIRED TO WITHIN 2″OF BLOCKOUT.

FOR DETAILS OF 16″Ø WATERLINE SEE PLANS BY OTHERS.



DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL
(NO SCALE)

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 3 OF 4

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
10/4/2024

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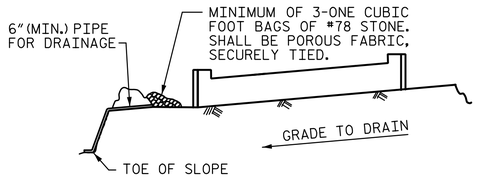
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 2
SECTIONS & DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-66
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		



BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINIUM 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 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

QUANTITIES		
REINFORCING STEEL	LBS.	94,463
SPIRAL REINFORCING STEEL	LBS.	9,992
CLASS A CONCRETE :		
POUR 1 - CAP & LOWER WING	CU. YDS.	50.7
POUR 2 - BACKWALL & UPPER WING	CU. YDS.	36.3
TOTAL	CU. YDS.	87.0
DRILLED PIER CONCRETE :	CU. YDS.	161.5

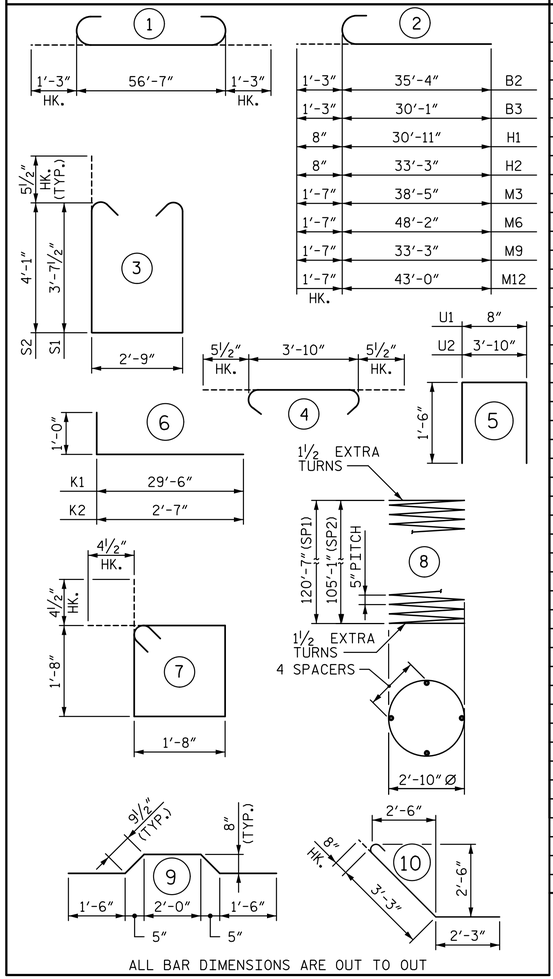
SEE DRILLED PIER MAIN BAR (VERT.) SPLICE DETAIL ON END BENT 2 SECTIONS AND DETAILS SHEET (S1-65) FOR SPLICE CONFIGURATION, TYP.

APPROACH FILL AND ANCHOR ROD CONSTRUCTION SEQUENCE:

(CONTRACTOR MAY SUBMIT ALTERNATE SEQUENCE FOR REVIEW AND APPROVAL)

1. AFTER END BENT AND WING WALL CONCRETE IS POURED, CONSTRUCT APPROACH DRAINAGE BEHIND CAP AND WINGS. SEE APPROACH SLAB SHEETS FOR ADDITIONAL DETAILS.
2. INSTALL BACKFILL ON BOTH WALL FACES TO BOTTOM OF LOWER ANCHOR RODS AFTER END BENT CAP AND WING CONCRETE IS CURED APPROPRIATELY.
3. INSTALL LOWER ANCHOR ROD ASSEMBLIES. TIGHTEN LOWER ANCHOR ROD NUTS TO THE FIRST OF THE FOLLOWING LIMITS:
   a) THE TORQUE NECESSARY TO ACHIEVE 5% OF YIELD STRESS IN THE RODS; OR
   b) ½" INWARD MOVEMENT MEASURED AT THE WINGWALL FREE END; OR
   c) THE START OF ANY SURFACE CRACKING ANYWHERE ON THE WINGWALL OR BACKWALL.
4. INSTALL BACKFILL ON BOTH WALL FACES TO LEVEL OF UPPER ANCHOR ROD ASSEMBLY.
5. INSTALL UPPER ANCHOR ROD ASSEMBLIES. TIGHTEN UPPER ANCHOR ROD NUTS TO ACHIEVE THE FIRST OF THE LIMITS GIVEN IN STEP 3 ABOVE.
6. RE-TORQUE BOTTOM LEVEL ANCHOR ROD NUTS IF THEY HAVE LOOSENED TO THE FIRST OF THE LIMITS IN STEP 3 ABOVE.
7. COMPLETE INSTALLATION OF BACKFILL TO BOTTOM OF APPROACH SLAB LEVEL.
8. PUMP THE GROUT INTO THE ANCHOR ROD ASSEMBLIES UNTIL GROUT COMPLETELY FILLS THE ASSEMBLIES AND SEALS THE ANCHOR RODS.
9. TRIM ANCHOR RODS, APPLY EPOXY BONDING COMPOUND TO THE CONCRETE POCKET SURFACES AND INSTALL THE EXTERIOR GROUT/PATCH TO FILL THE POCKET AND COMPLETELY COVER THE PLATE, ANCHOR NUT AND ANCHOR BAR.
10. CONTACT THE ENGINEER IMMEDIATELY IF DETRIMENTAL SYMPTOMS OCCUR AT ANY POINT DURING THE ABOVE PROCEDURE.

BAR TYPES



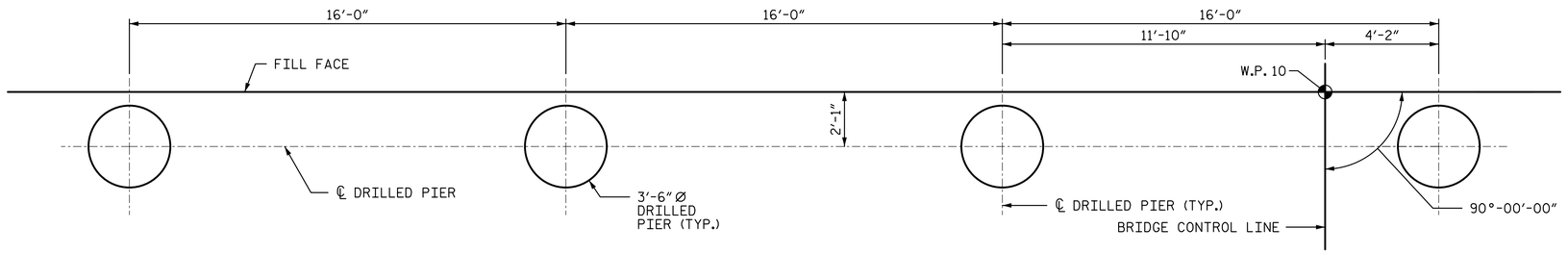
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	①	59'-1"	1,607
B2	6	#9	②	36'-7"	746
B3	6	#9	②	31'-4"	639
B4	2	#6	STR	25'-0"	75
B5	8	#6	STR	56'-7"	680
B6	24	#4	STR	7'-5"	119
B7	6	#4	STR	7'-10"	31
H1	48	#6	②	31'-7"	2,277
H2	52	#6	②	33'-11"	2,649
H3	25	#6	⑩	6'-2"	232
K1	28	#4	⑥	30'-6"	570
K2	8	#4	⑥	3'-7"	19
K3	8	#4	STR	2'-4"	12
M1	28	#11	STR	48'-10"	7,265
M2	56	#11	STR	46'-4"	13,785
M3	14	#11	②	42'-4"	3,149
M4	42	#11	STR	43'-9"	9,763
M5	14	#11	STR	38'-8"	2,876
M6	14	#11	②	47'-5"	3,527
M7	28	#11	STR	43'-8"	6,496
M8	56	#11	STR	41'-2"	12,248
M9	14	#11	②	37'-2"	2,765
M10	42	#11	STR	38'-7"	8,610
M11	14	#11	STR	33'-6"	2,492
M12	14	#11	②	42'-3"	3,143
S1	120	#5	③	10'-11"	1,366
S2	138	#5	③	11'-10"	1,703
S3	129	#5	④	4'-9"	639
S4	88	#4	⑦	7'-5"	436
S5	88	#4	⑨	6'-7"	387
SP1	2	✳	⑧	2557'-9"	5,336
SP2	2	✳	⑧	2232'-4"	4,657
U1	51	#4	⑤	3'-8"	125
U2	50	#4	⑤	6'-10"	228
V1	102	#5	STR	9'-9"	1,037
V2	70	#5	STR	11'-5"	834
V3	20	#7	STR	11'-5"	467
V4	74	#5	STR	12'-5"	958
V5	20	#7	STR	12'-5"	508

✳ THE SP1 AND SP2 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR WITH A 5" PITCH. IF SPLICE IS NECESSARY, PROVIDE A 2'-0" MIN. LAP SPLICE.

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



PLAN OF DRILLED PIERS

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 4 OF 4

DRAWN BY : VKS DATE : 8-23

CHECKED BY : SAB DATE : 8-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: [illegible]

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC. 900 West Trade St. Suite 715 Charlotte, NC 28202 NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 2
BILL OF MATERIAL

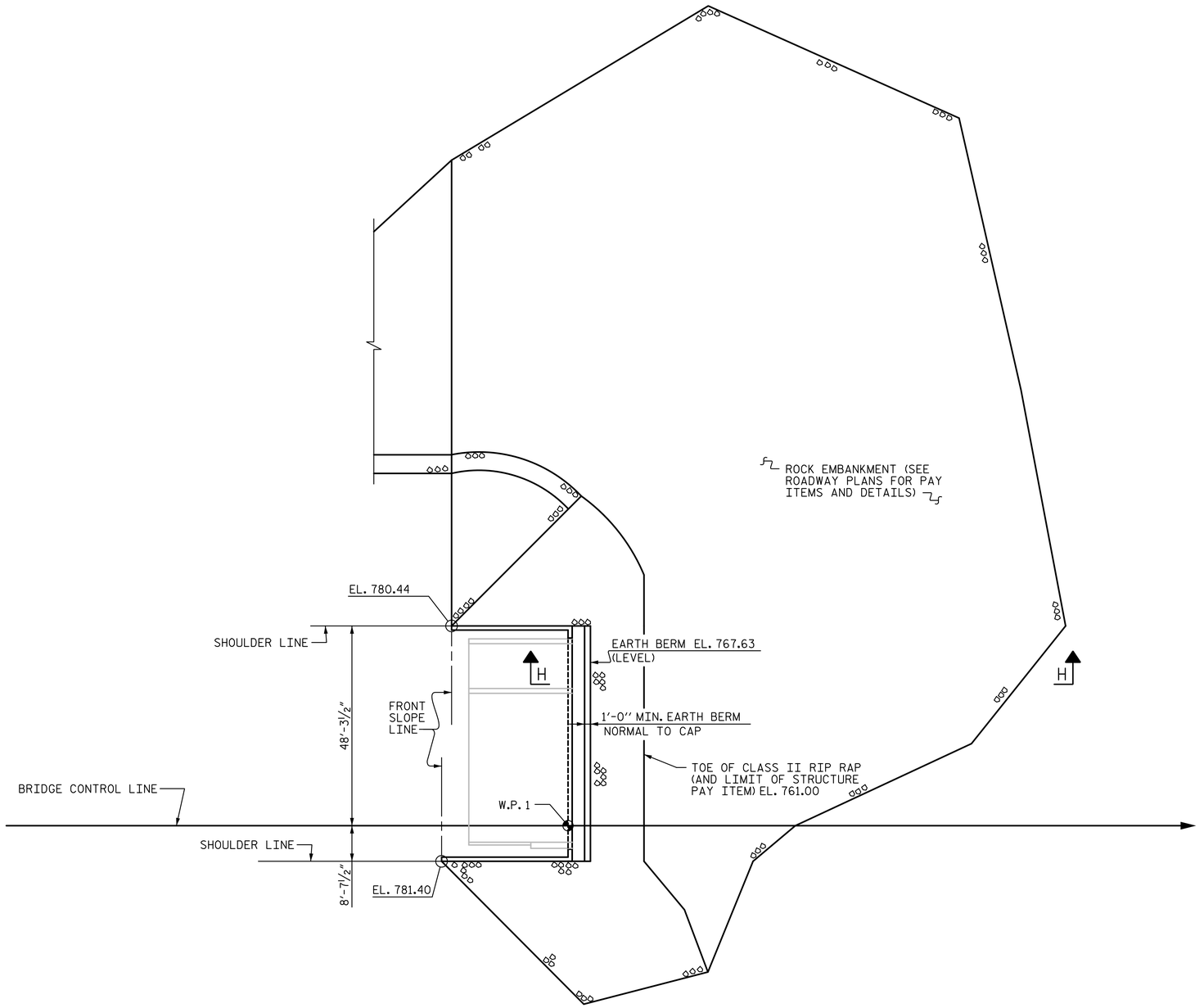
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-67
1			3			TOTAL SHEETS
2			4			73

R:\R-2307B\Structures\03 Ustation\06 100% R2 Bridge Plans\401_I33_R2307B_SMU_E2_067_I70380.dgn 8/14/2024 1:49:08 PM stephev

NOTES:

1. FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.
2. FOR SECTION VIEWS, SEE SHEET 2 OF 2.
3. THE PAYMENT FOR CLASS II RIP RAP AND GEOTEXTILE FOR DRAINAGE IS LIMITED TO ELEVATION 761.0 AND UP. SEE ROADWAY PLANS FOR DETAILS AND PAY ITEMS FOR THE ROCK EMBANKMENT (BELOW ELEVATION 761 AND BEYOND THE LIMITS OF THE BRIDGE).

ESTIMATED QUANTITIES		
BRIDGE @ STA. 471+85.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	608	675
END BENT 2	563	625



END BENT 1 RIP RAP

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 2

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-68
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		

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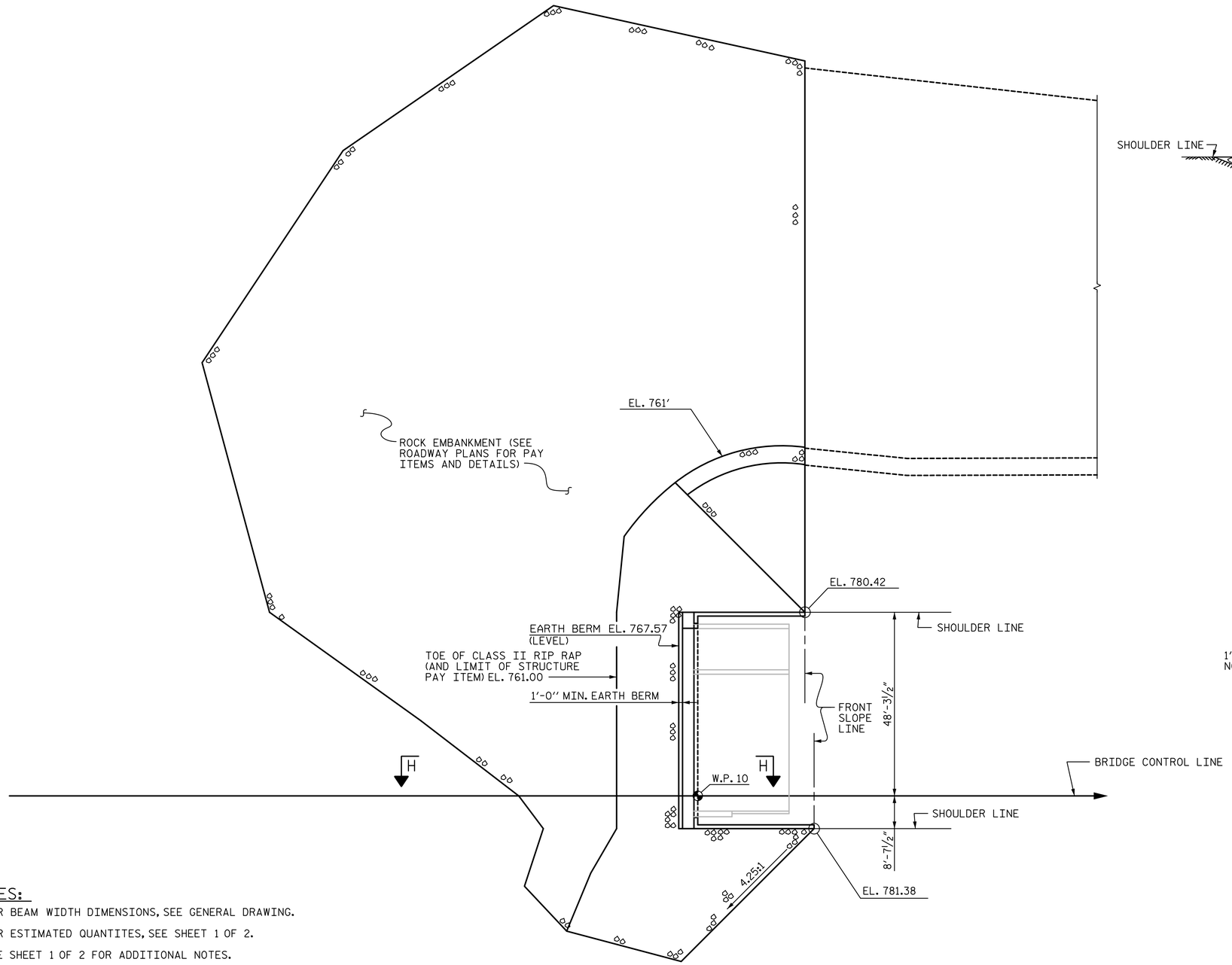
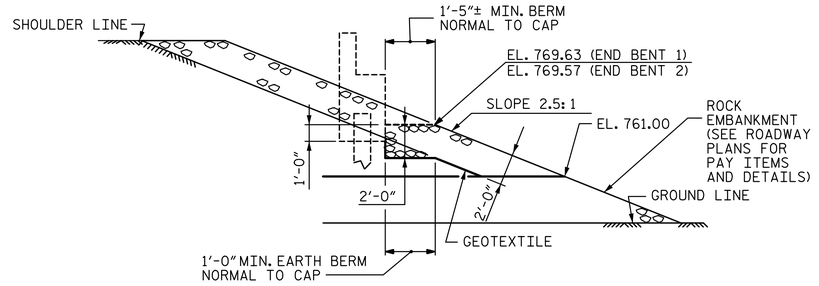


END BENT 2 RIP RAP



SECTION H-H

℄ SECTION
BERM RIP RAPPED

NOTES:

1. FOR BEAM WIDTH DIMENSIONS, SEE GENERAL DRAWING.
2. FOR ESTIMATED QUANTITES, SEE SHEET 1 OF 2.
3. SEE SHEET 1 OF 2 FOR ADDITIONAL NOTES.

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-
SHEET 2 OF 2

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/14/2024

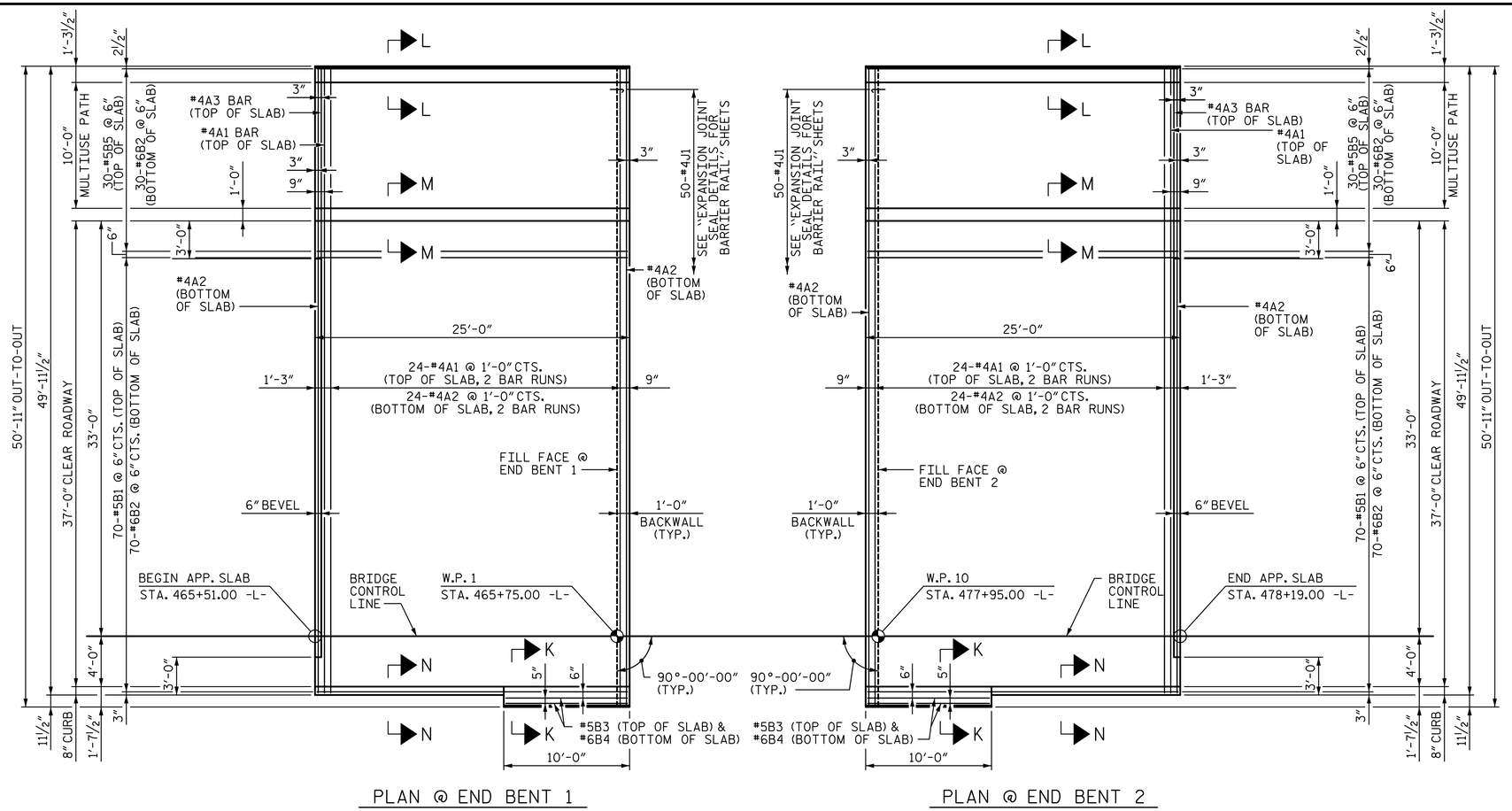
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS

STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-69
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 8-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : SAB	DATE : 8-23		



PLAN @ END BENT 1

PLAN @ END BENT 2

NOTES

FOR BRIDGE APPROACH FILL, SEE ROADWAY STANDARD DRAWING 423.01 WITH MODIFICATIONS AS SHOWN ON SHEET 2 OF 4 OF STRUCTURE PLANS.

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

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

FOR EXPANSION JOINT, SEE "EXPANSION JOINT SEAL DETAILS" AND "EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL".

FOR SECTIONS AND DETAILS, SEE SHEET 2 OF 4.

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

BILL OF MATERIAL

APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	50	#4	STR	26'-4"	880
A2	52	#4	STR	26'-2"	909
✳A3	1	#4	STR	14'-9"	10
✳B1	70	#5	STR	23'-8"	1,728
B2	100	#6	STR	24'-7"	3,692
✳B3	2	#5	STR	9'-8"	20
B4	2	#6	STR	9'-8"	29
✳B5	30	#5	STR	24'-0"	751
✳J1	50	#4	1	1'-5"	47

REINFORCING STEEL ✳✳	LBS.	4,630
✳EPOXY COATED REINFORCING STEEL	✳✳ LBS.	3,436
CLASS AA CONCRETE ✳✳	C. Y.	54.7

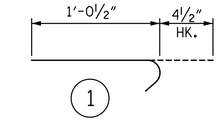
APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	50	#4	STR	26'-4"	880
A2	52	#4	STR	26'-2"	909
✳A3	1	#4	STR	14'-9"	10
✳B1	70	#5	STR	23'-8"	1,728
B2	100	#6	STR	24'-7"	3,692
✳B3	2	#5	STR	9'-8"	20
B4	2	#6	STR	9'-8"	29
✳B5	30	#5	STR	24'-0"	751
✳J1	50	#4	1	1'-5"	47

REINFORCING STEEL ✳✳	LBS.	4,630
✳EPOXY COATED REINFORCING STEEL	✳✳ LBS.	3,436
CLASS AA CONCRETE ✳✳	C. Y.	54.7

✳✳ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE BARRIER RAIL DETAILS ON SHEET 4 OF 4.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 1 OF 4

DRAWN BY : VKS DATE : 7-23

CHECKED BY : TRL DATE : 7-23

DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

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DocuSigned by: KEVIN BAILEY

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC. 900 West Trade St. Suite 715 Charlotte, NC 28202 NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-70
1			3			TOTAL SHEETS
2			4			73

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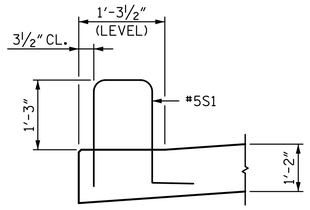
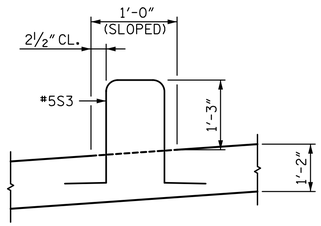
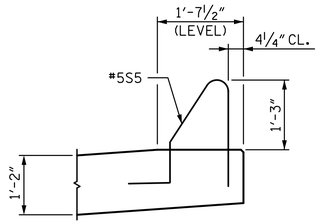


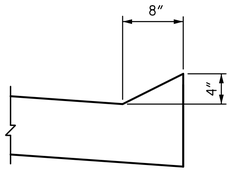
SECTION L-L



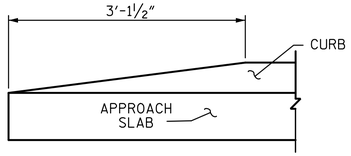
SECTION M-M



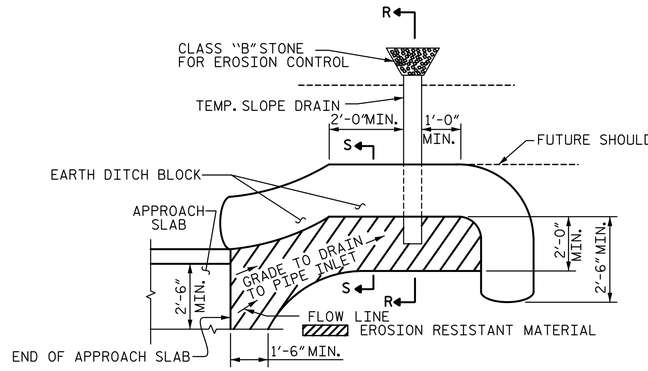
SECTION K-K



SECTION N-N

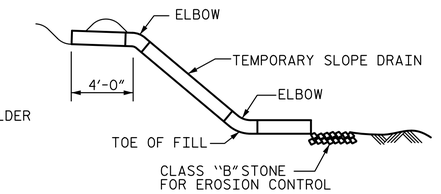


END OF CURB WITHOUT SHOULDER BERM GUTTER

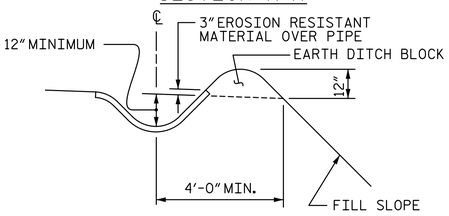


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW



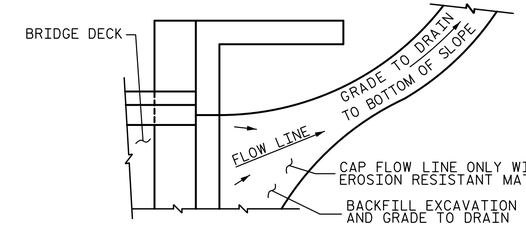
SECTION R-R



SECTION S-S

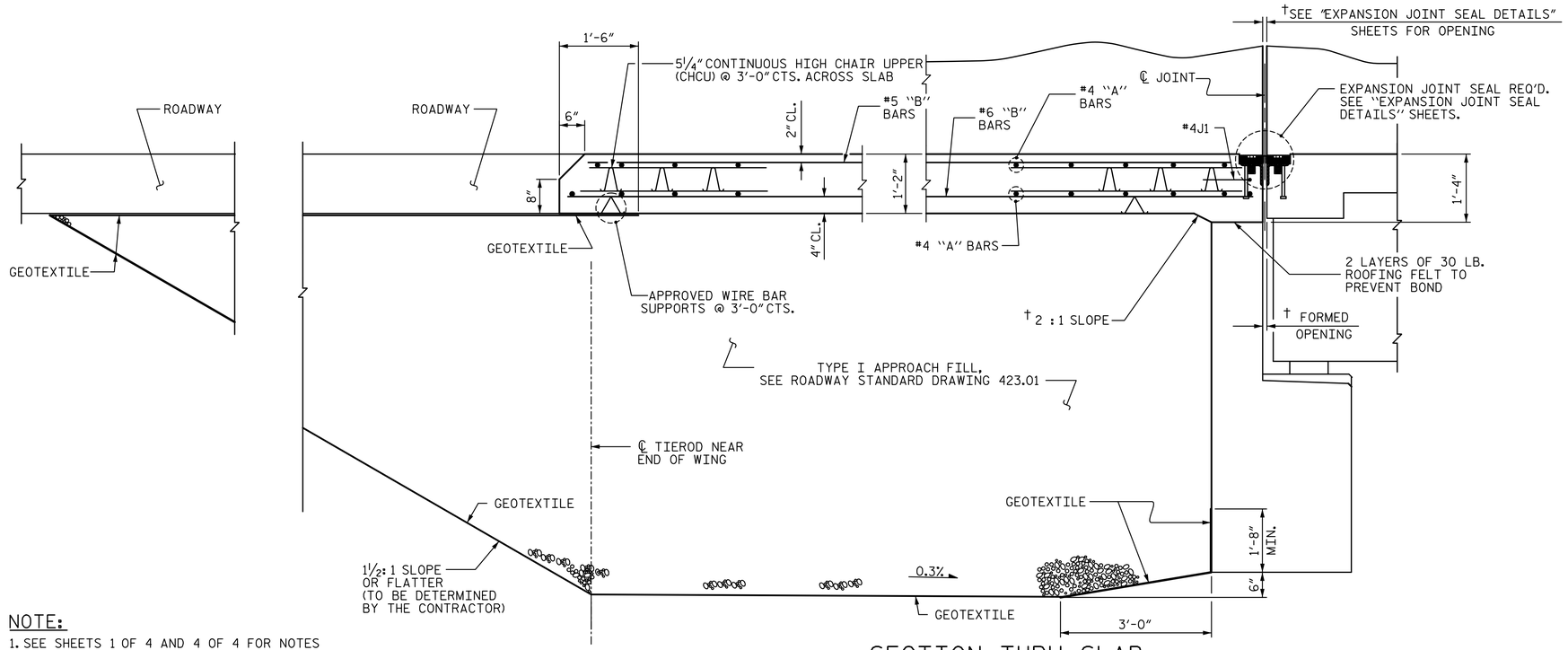
TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

TEMPORARY DRAINAGE DETAIL



SECTION THRU SLAB

† NORMAL TO END BENT

● SEE END BENT SHEETS FOR ADDITIONAL DETAILS

NOTE:

1. SEE SHEETS 1 OF 4 AND 4 OF 4 FOR NOTES

DRAWN BY : VKS	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : TRL	DATE : 7-23		

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 2 OF 4

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NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC. 900 West Trade St. Suite 715 Charlotte, NC 28202 NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-71
1			3			TOTAL SHEETS
2			4			73

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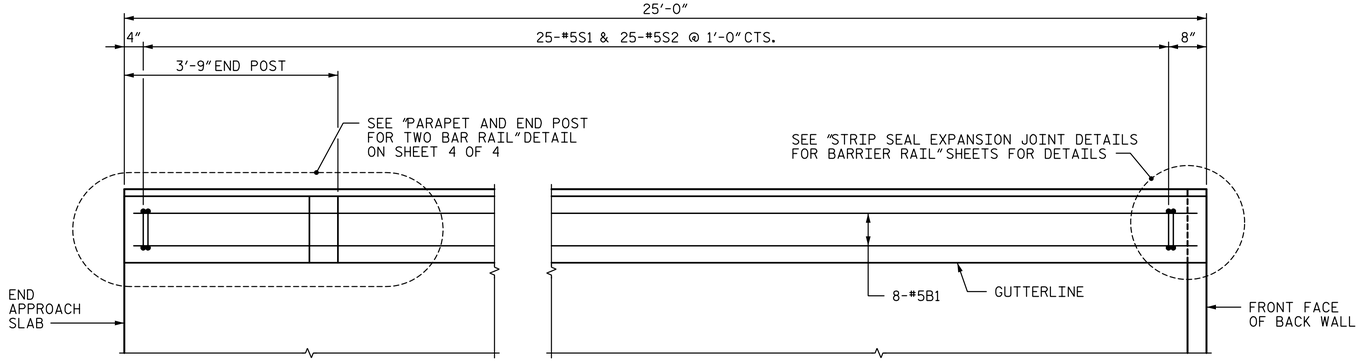
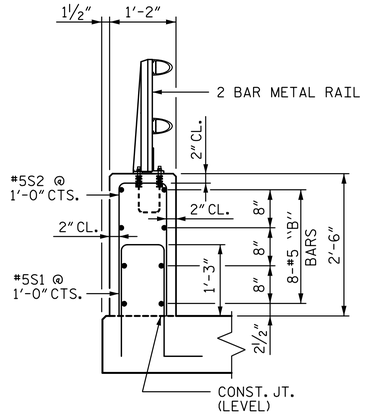
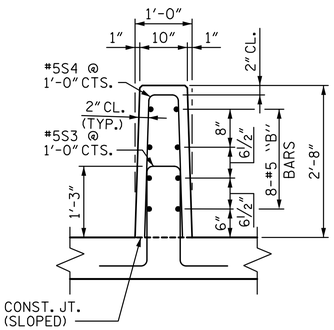


PLAN VIEW - CONCRETE PARAPET FOR 2 BAR METAL RAIL

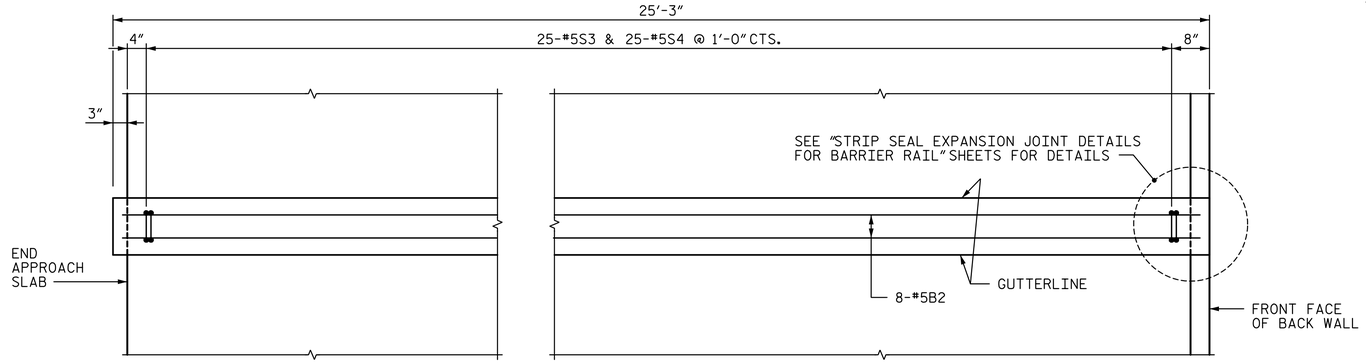
(APPROACH SLAB 1 SHOWN, APPROACH SLAB 2 MIRRORED)



SECTION THRU CONCRETE PARAPET WITH 2 BAR METAL RAIL



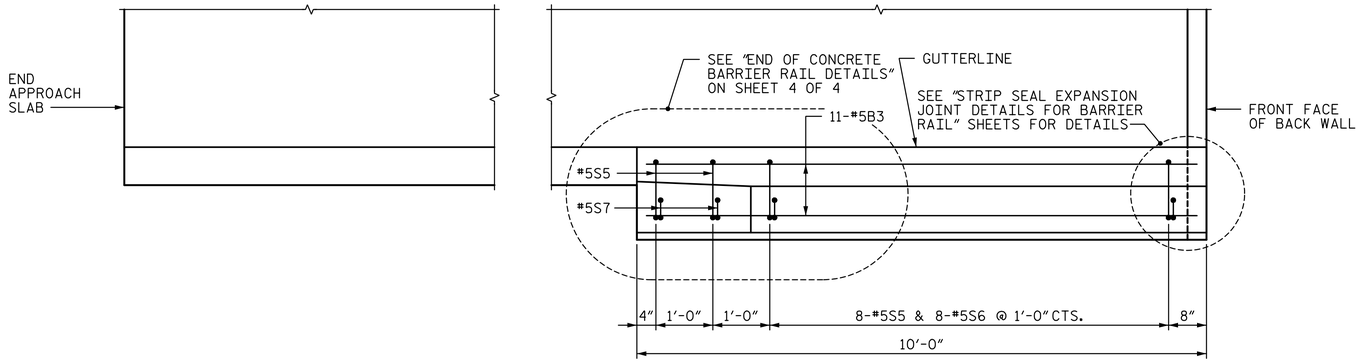
SECTION THRU VERTICAL CONCRETE BARRIER RAIL



PLAN VIEW - VERTICAL CONCRETE BARRIER RAIL

(APPROACH SLAB 1 SHOWN, APPROACH SLAB 2 MIRRORED)

SECTION THRU CONCRETE BARRIER RAIL



PLAN VIEW - CONCRETE BARRIER RAIL

(APPROACH SLAB 1 SHOWN, APPROACH SLAB 2 MIRRORED)

PROJECT NO. R-2307B

CATAWBA & IREDELL COUNTY

STATION: 471+85.00 -L-

SHEET 3 OF 4

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARRIER RAIL DETAILS ON BRIDGE APPROACH SLAB

STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-72
1			3			TOTAL SHEETS
2			4			73

DRAWN BY : VKS	DATE : 7-23	DESIGN ENGINEER OF RECORD: K. BAILEY	DATE : 7-24
CHECKED BY : TRL	DATE : 7-23		

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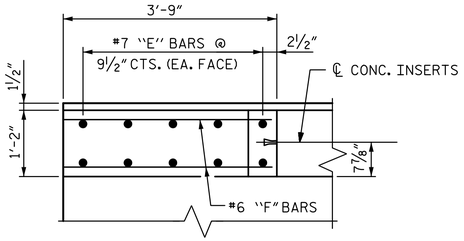
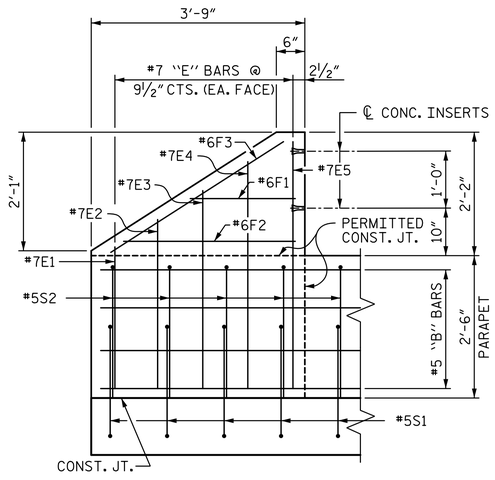
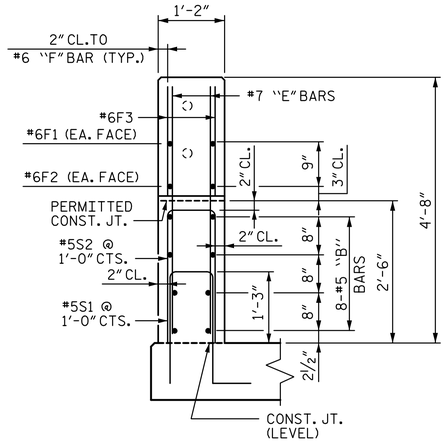


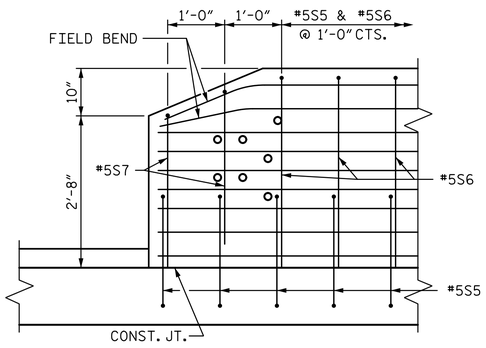
PLAN OF END POST

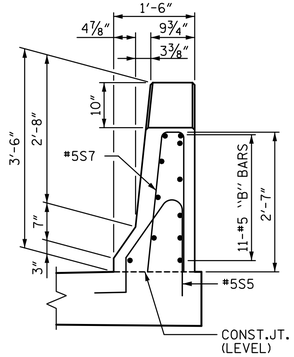




SIDE VIEW END VIEW

PARAPET AND END POST FOR TWO BAR RAIL

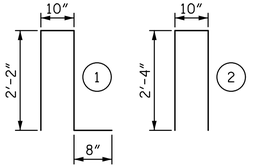




SIDE VIEW END VIEW

END OF CONCRETE BARRIER RAIL DETAILS

BAR TYPES
1′-2″ x 2′-6″ CONCRETE PARAPET



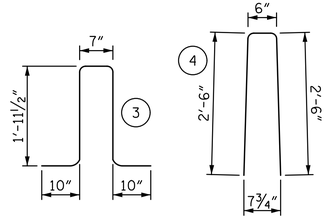
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR CONCRETE PARAPET ONLY
(FOR ONE APPROACH SLAB ONLY)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	8	#5	STR	24′-8″	206
✳E1	2	#7	STR	2′-6″	10
✳E2	2	#7	STR	3′-0″	12
✳E3	2	#7	STR	3′-6″	14
✳E4	2	#7	STR	4′-0″	16
✳E5	2	#7	STR	4′-4″	18
✳F1	2	#6	STR	1′-10″	6
✳F2	2	#6	STR	3′-0″	9
✳F3	2	#6	STR	3′-6″	11
✳S1	25	#5	1	5′-10″	152
✳S2	25	#5	2	5′-6″	143

✳ EPOXY COATED REINFORCING STEEL	597	LBS.
CLASS AA CONCRETE	2.9	CU. YDS.
CONCRETE PARAPET	25.0	LIN. FT.

BAR TYPES
VERTICAL CONCRETE BARRIER RAIL



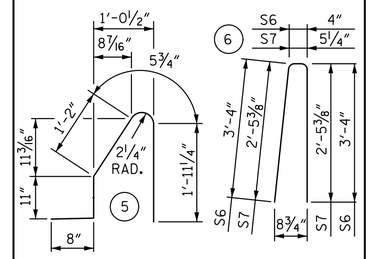
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR VERTICAL CONCRETE BARRIER RAIL ONLY
(FOR ONE APPROACH SLAB ONLY)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B2	8	#5	STR	24′-11″	208
✳S3	25	#5	3	6′-2″	161
✳S4	25	#5	4	5′-6″	143

✳ EPOXY COATED REINFORCING STEEL	512	LBS.
CLASS AA CONCRETE	2.3	CU. YDS.
VERT. CONC. BARRIER RAIL	25.3	LIN. FT.

BAR TYPES
CONCRETE BARRIER RAIL



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR CONCRETE BARRIER RAIL ONLY
(FOR ONE APPROACH SLAB ONLY)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B3	11	#5	STR	9′-8″	111
✳S5	10	#5	5	5′-2″	54
✳S6	8	#5	6	7′-0″	58
✳S7	2	#5	6	5′-4″	11

✳ EPOXY COATED REINFORCING STEEL	234	LBS.
CLASS AA CONCRETE	1.4	CU. YDS.
CONCRETE BARRIER RAIL	10.0	LIN. FT.

NOTES

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

FOR BLOCK-OUTS IN THE BARRIER RAIL/PARAPET, SEE ″EXPANSION JOINT FOR BARRIER RAIL DETAILS″ SHEETS.

FOR COVER PLATES IN THE BARRIER RAIL/PARAPET, SEE ″EXPANSION JOINT FOR BARRIER RAIL DETAILS″ SHEETS.

FOR THE 2 BAR METAL RAIL, SEE ″2 BAR METAL RAIL″ SHEETS.

PROJECT NO. R-2307B
CATAWBA & IREDELL COUNTY
STATION: 471+85.00 -L-

SHEET 4 OF 4

DRAWN BY : VKS DATE : 7-23
CHECKED BY : TRL DATE : 7-23
DESIGN ENGINEER OF RECORD: K. BAILEY DATE : 7-24

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: KEVIN BAILEY

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

8/14/2024

STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARRIER RAIL DETAILS ON BRIDGE APPROACH SLAB

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-73
1			3			TOTAL SHEETS
2			4			73

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