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09/08/99

TIP PROJECT: U-2519BA

CONTRACT: C204110

See Sheet 1A For Index of Sheets

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CUMBERLAND COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34817.1.FR7	NHF-0100(24)	P.E.
34817.2.FR14	NHF-0100(24)	UTILITIES & R/W
34817.3.14	NHF-0100(24)	CONST

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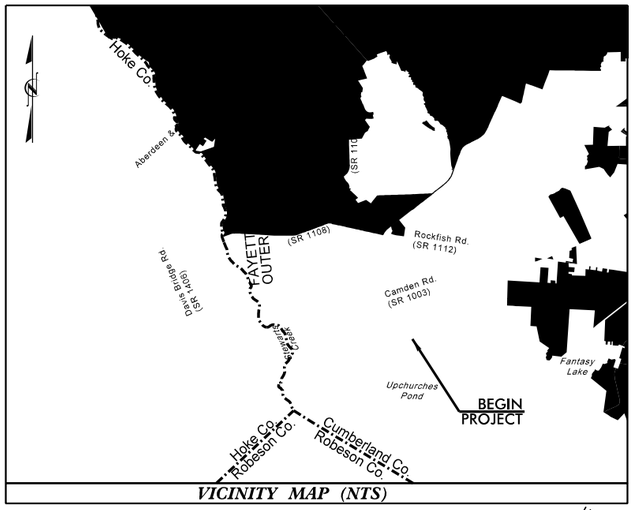
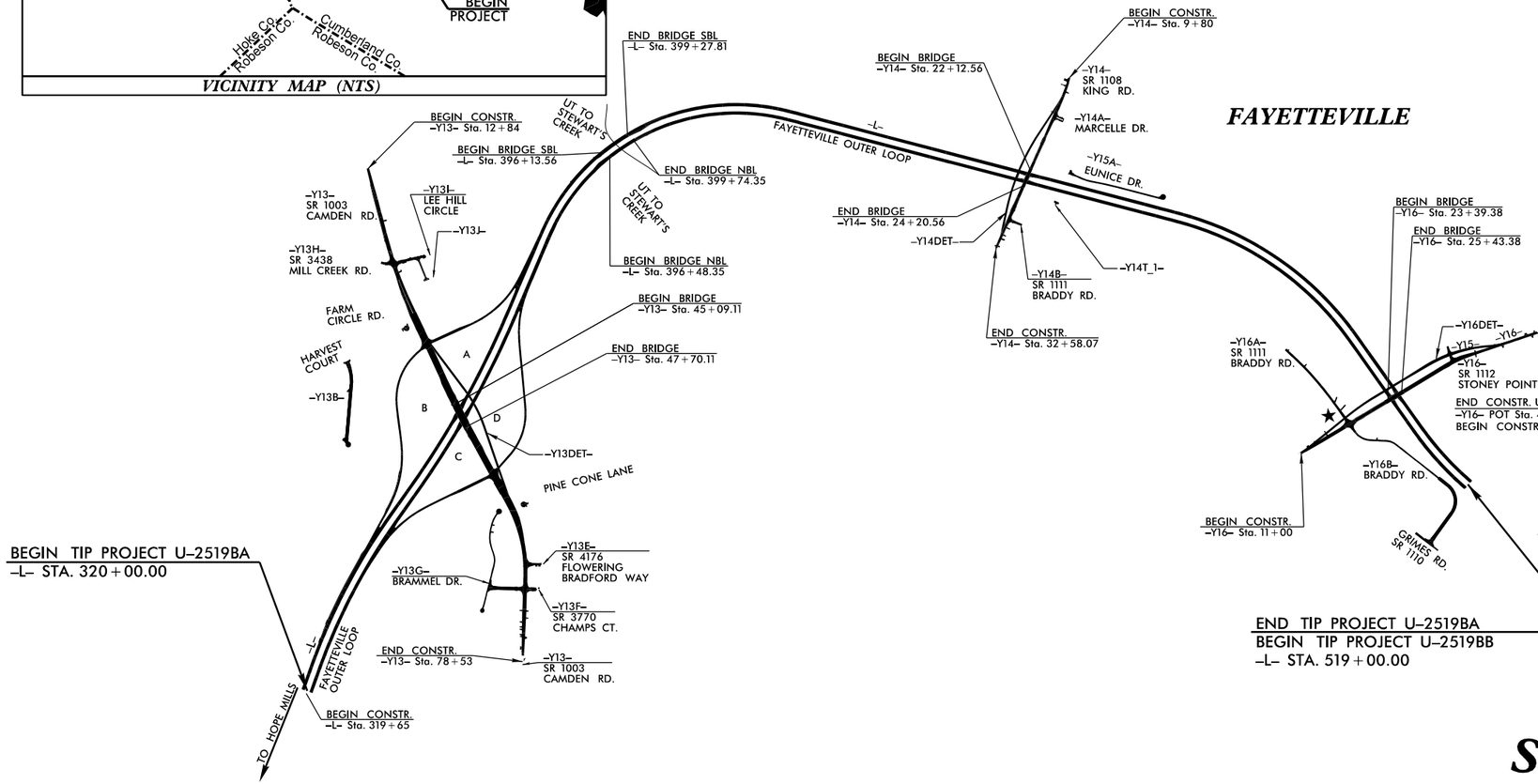
LOCATION: FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1003 (CAMDEN ROAD) TO SOUTH OF US 401

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNALS SIGNING, STRUCTURES, & NOISE WALLS

NAD 83/95



VICINITY MAP (NTS)



STRUCTURES

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-2519BA	3.707 miles
LENGTH OF STRUCTURES TIP PROJECT U-2519BA	0.062 miles
TOTAL LENGTH OF TIP PROJECT U-2519BA	3.769 miles

PREPARED IN THE OFFICES OF:
RK&K
P: (919) 878-9560
8601 Six Forks Road, Forum 1 Suite 700
Raleigh, North Carolina 27615 | NC License No. F-0112

FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: U-2519BA: SEPTEMBER 16, 2016
LETTING DATE: JUNE 21, 2022

NCDOT CONTACT: DAVID STUTTS, PE
PROJECT ENGINEER – ENGR. COORD.

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

3/22/2022
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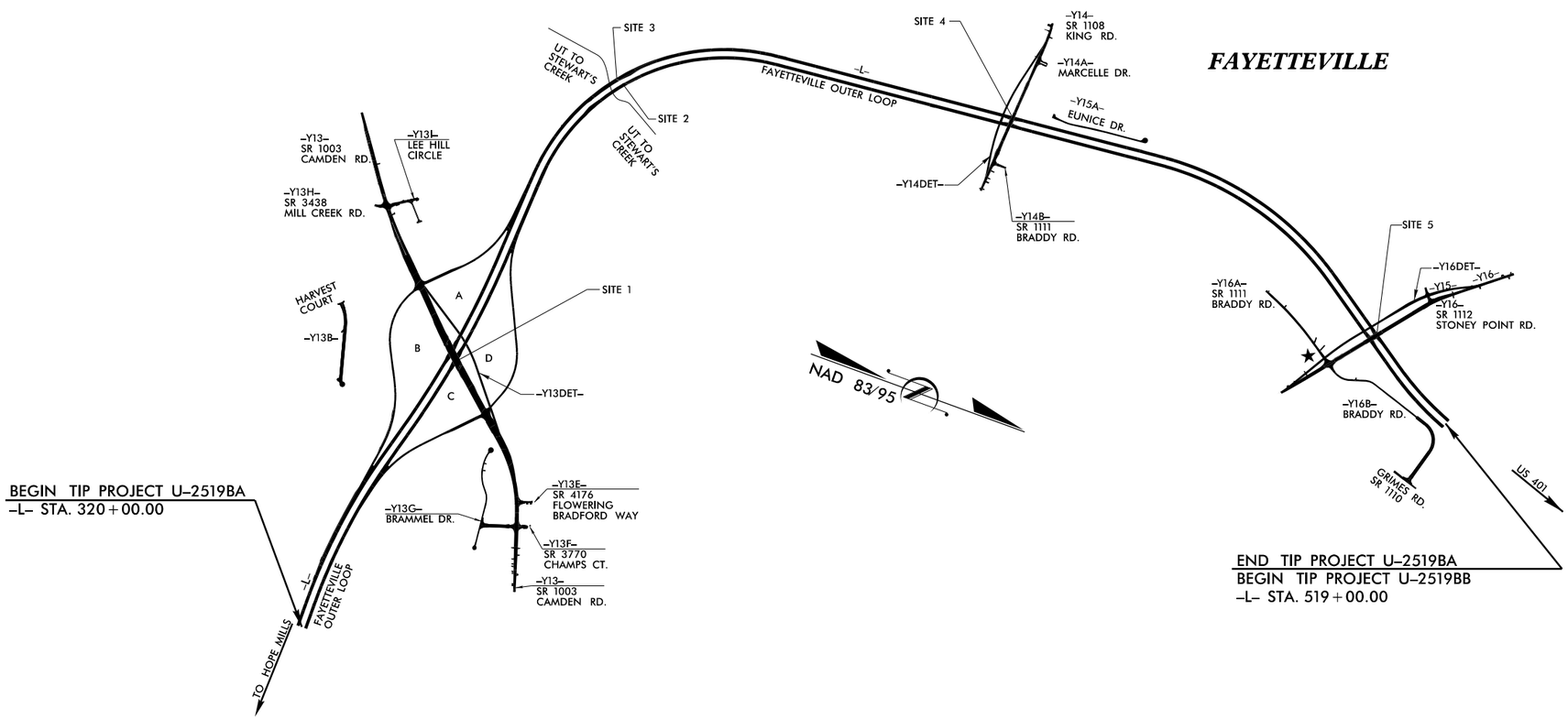

INDEX			
STR. No.	STATION	DESCRIPTION	SHEETS
1	46+43.11 -Y13- 358+97.14 -L-	BRIDGE ON CAMDEN RD OVER FAYETTEVILLE OUTER LOOP BETWEEN SR 3488 AND SR 4176	S1-1 THRU S1-43
2	397+90.00 -L-	BRIDGE ON FAYETTEVILLE OUTER LOOP OVER UNNAMED TRIB. TO STEWARTS CRK BETWEEN SR 1003 AND SR 1108	S2-1 THRU S2-41
3	397+90.00 -L-	BRIDGE ON FAYETTEVILLE OUTER LOOP OVER UNNAMED TRIB. TO STEWARTS CRK BETWEEN SR 1003 AND SR 1108	S3-1 THRU S3-41
4	23+16.56 -Y14 450+12.29 -L-	BRIDGE ON KING RD OVER FAYETTEVILLE OUTER LOOP BETWEEN SR 1406 AND SR 1112	S4-1 THRU S4-32
5	24+41.38 -Y16- 504+87.41 -L-	BRIDGE ON STONEY POINT RD OVER FAYETTEVILLE OUTER LOOP BETWEEN SR 1111 AND SR 1140	S5-1 THRU S5-39
SOUND BARRIER WALLS	VARIES	SOUND BARRIER WALLS 4B AND 5	SB-1 THRU SB-4

PROJECT NO. U-2519BA
CUMBERLAND COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INDEX

RKK
P: (919) 878-9560
8601 Six Forks Road, Forum 1 Suite 700
Raleigh, North Carolina 27615 | NC License No. F-0112
Engineers | Construction Managers | Planners | Scientists
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Responsive People | Creative Solutions

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

DRAWN BY : J. E. KEENE DATE : FEB 2022
CHECKED BY : D. M. RAGAN DATE : FEB 2022

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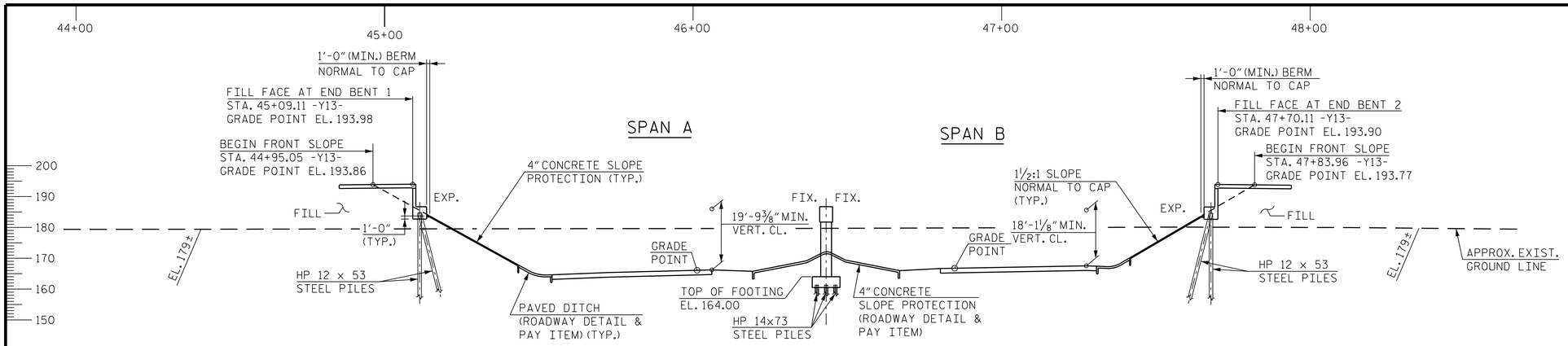
F.A. PROJECT NO. NHF-0100(24)



SECTION ALONG -Y13-

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

PVI = 47+20.00 -Y13-
EL. = 202.00
V.C. = 970 FT.
(+)2.6299% △ (-)3.7479%

-Y13- GRADE DATA

PVI = 364+00.00 -L-
EL. = 163.32
V.C. = 210 FT.
(-)0.6000% △ (-)1.0000%

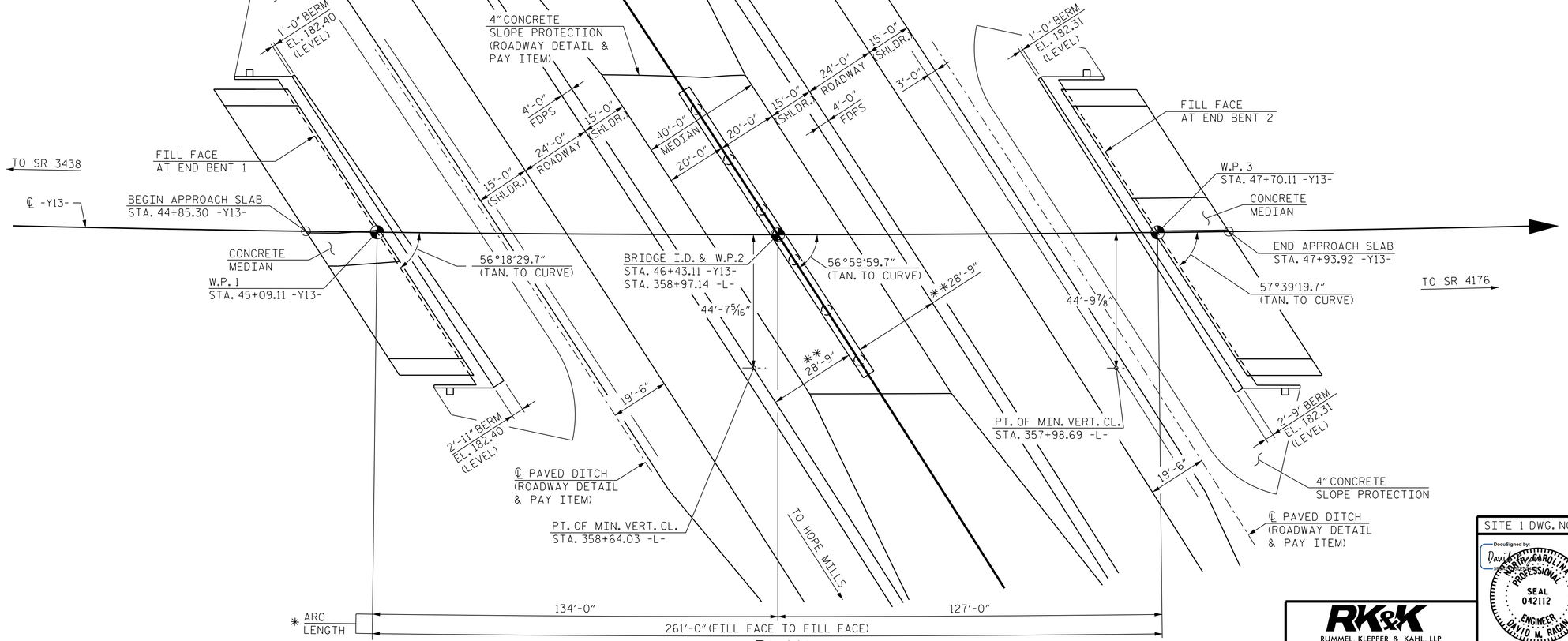
-L- GRADE DATA

HORIZONTAL CURVE DATA -Y13-

PI STA. 45+51.12
△ = 4°01'43.0" (LT.)
D = 0°30'58.2"
L = 780.47'
T = 390.40'
R = 11,100.00'

HORIZONTAL CURVE DATA -L-

PI STA. 360+42.43
△ = 11°29'16.0" (LT.)
D = 0°29'59.9"
L = 2,297.72'
T = 1,152.73'
R = 11,460.00'



PLAN

(PILES NOT SHOWN FOR CLARITY)
* MEASURED ALONG ℄ -Y13-.
** MINIMUM HORIZONTAL CLEARANCE FROM FACE OF CAP TO EDGE OF PAVEMENT.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-
358+97.14 -L-

SHEET 1 OF 5 BRIDGE NO. 447

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON
CAMDEN RD
OVER FAYETTEVILLE OUTER LOOP
BETWEEN SR 3438 AND SR 4176

SITE 1 DWG. NO. 1

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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315-173

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

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : D. M. RAGAN DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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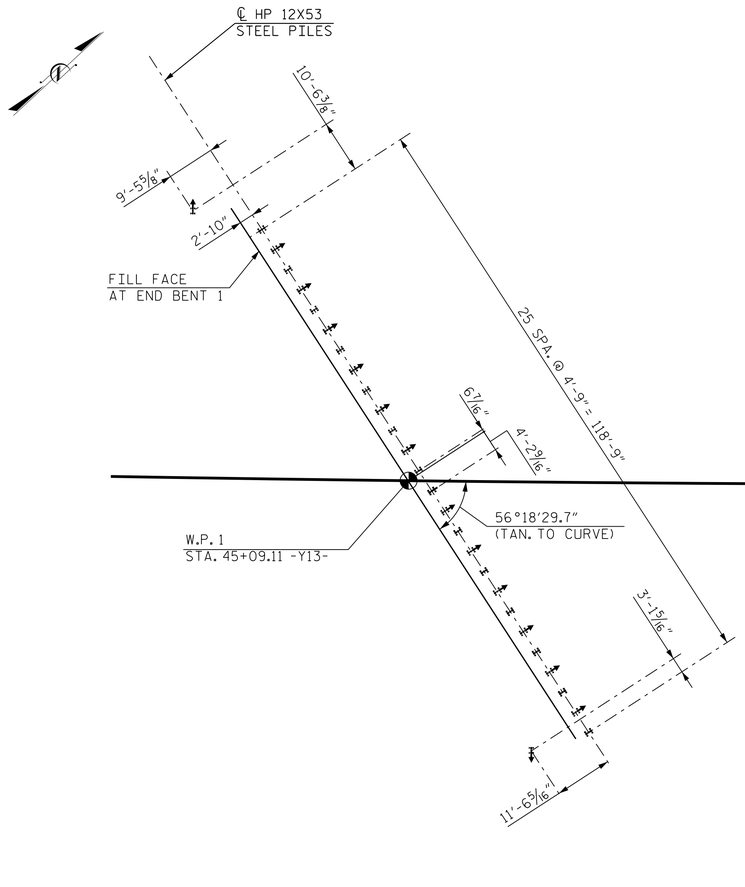
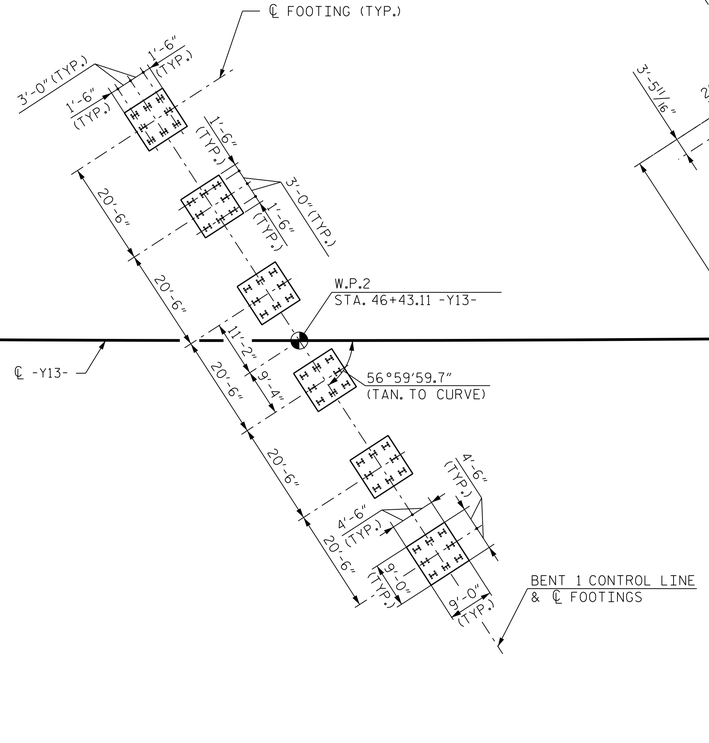
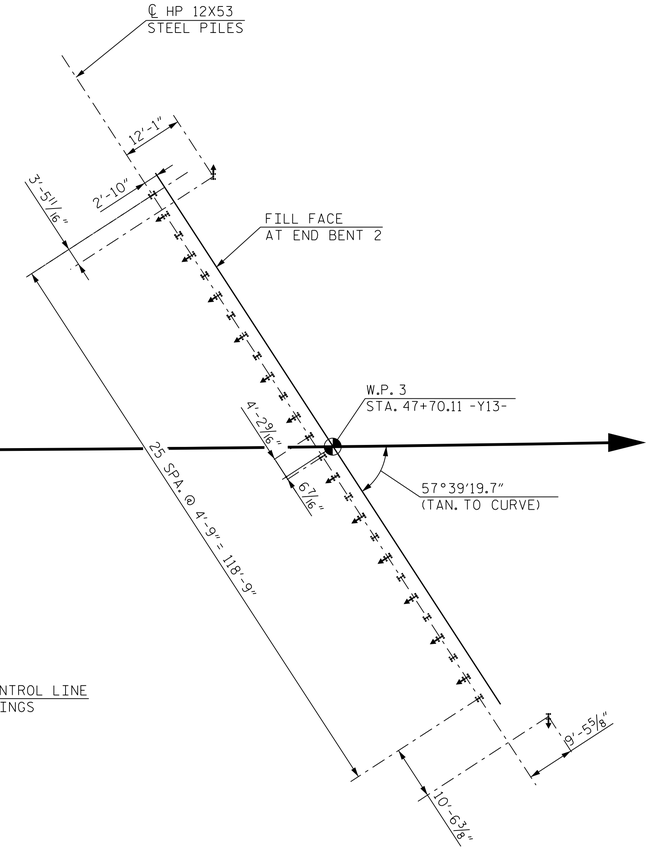


END BENT 1



BENT 1



END BENT 2

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 150 TONS PER PILE.

DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED FOR END BENT NO. 1 OR 2. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT BENT NO. 1. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOUNDATION LAYOUT

ALL PILES AT END BENTS 1 AND 2 ARE HP 12x53 STEEL PILES.
ALL PILES AT BENT 1 ARE HP 14x73 STEEL PILES.
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.
DIMENSIONS AND/OR PILE LAYOUTS ARE TYPICAL FOR EACH FOOTING OF BENT 1.

LEGEND:

I VERTICAL STEEL PILE

I STEEL PILE BATTERED 3:12

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-
358+97.14 -L-

SHEET 2 OF 5

STR. #1

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

SITE 1 DWG. NO. 2

DocuSigned by: David W. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID W. RAGAN

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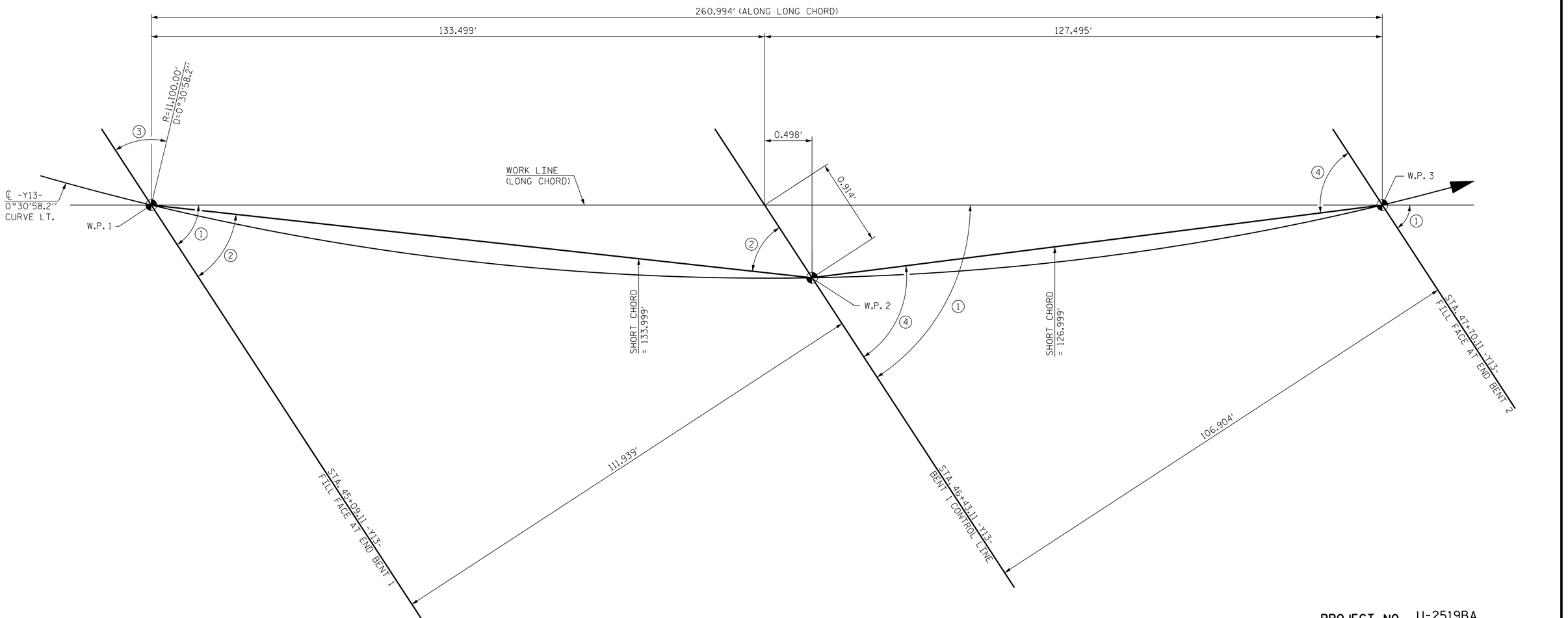

LONG CHORD LAYOUT

NOTE: END BENTS AND BENT ARE PARALLEL

ANGLES

① 56°58'54.7"
② 56°39'14.7"
③ 33°41'30.3"
④ 57°19'39.7"

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DESIGN ENGINEER OF RECORD :	D. M. RAGAN	DATE :	MAR 2022

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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PROJECT NO. U-2519BA
CUMBERLAND **COUNTY**
STATION: 46+43.11 -Y13-
358+97.14 -L-

SHEET 3 OF 5

SITE 1 DWG. NO. 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LONG CHORD LAYOUT

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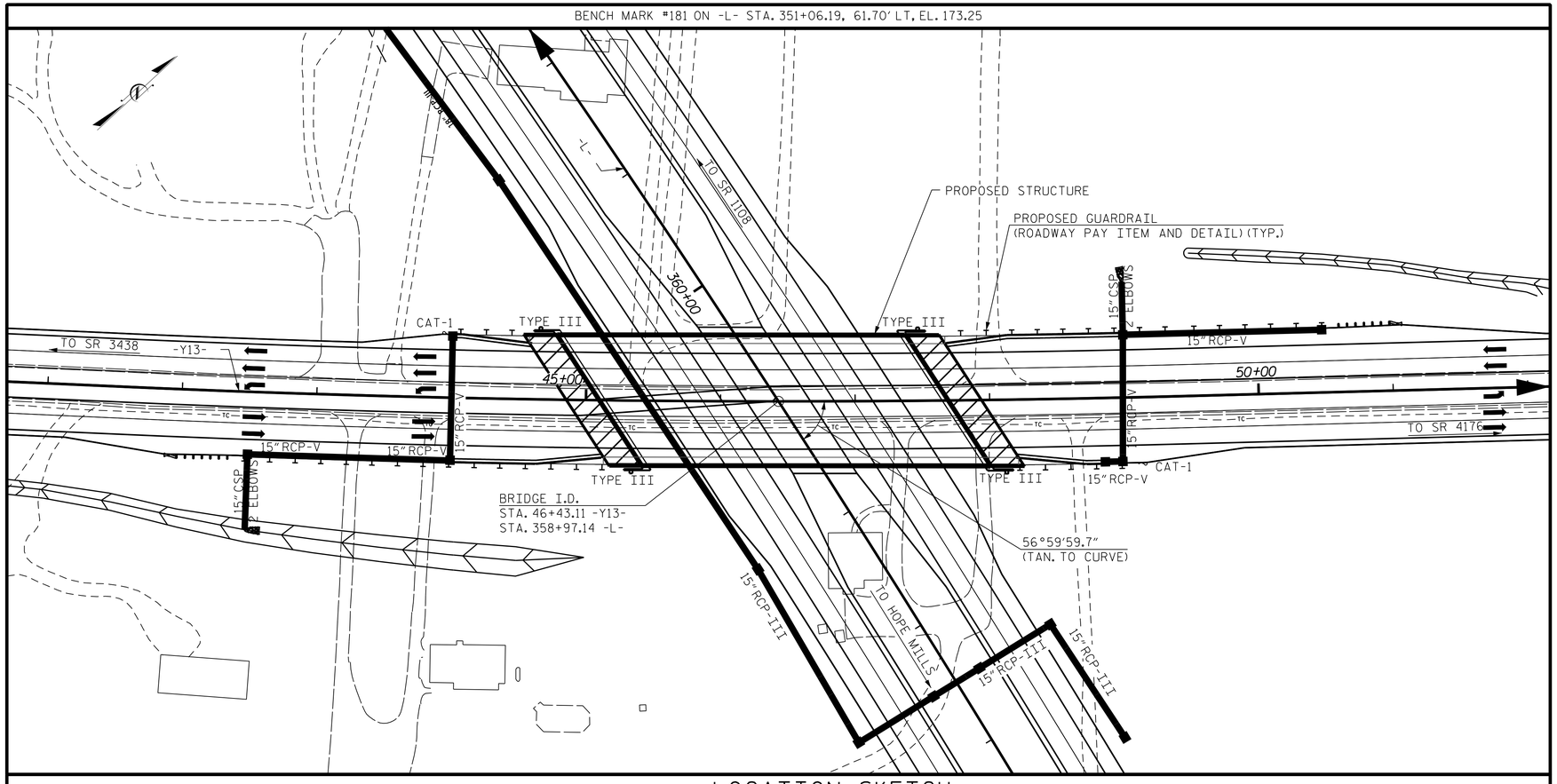
STR. #1

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SET UP FOR HP 12x53 STEEL PILES	PILE DRIVING EQUIMENT SET UP FOR HP 14x73 STEEL PILES	HP 12x53 STEEL PILES		HP 14x73 STEEL PILES		PILE REDRIVES	TWO BAR METAL RAIL	1'-2" X 3'-4" CONCRETE PARAPET	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	STRIP SEAL EXPANSION JOINT SEALS
	LUMP SUM	EA.	SO.FT.	SO.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EA.	EA.	NO.	LIN.FT.	NO.	LIN.FT.	EA.	LIN.FT.	LIN.FT.	SO.YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE	———	———	25,374	24,606	———	LUMP SUM	———	———	24	3,063.88	———	———	———	———	———	———	———	499.55	516.20	———	LUMP SUM	LUMP SUM
END BENT 1	———	———	———	———	145.5	———	15,980	———	———	———	28	———	28	1,820	———	———	13	———	———	827	———	———
BENT 1	LUMP SUM	———	———	———	210.1	———	43,609	2,381	———	———	———	48	———	———	48	2,880	24	———	———	———	———	———
END BENT 2	———	———	———	———	146.6	———	16,011	———	———	———	28	———	28	1,820	———	———	13	———	———	699	———	———
TOTAL	LUMP SUM	2	25,374	24,606	502.2	LUMP SUM	75,600	2,381	24	3,063.88	56	48	56	3,640	48	2,880	50	499.55	516.20	1,526	LUMP SUM	LUMP SUM



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

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 UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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.

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

NOTE:

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-
358+97.14 -L-

SITE 1 DWG. NO. 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH
AND
GENERAL NOTES

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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NO.	BY:	DATE:	NO.	BY:	DATE:	S1-4
1			3			TOTAL SHEETS
2			4			43

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
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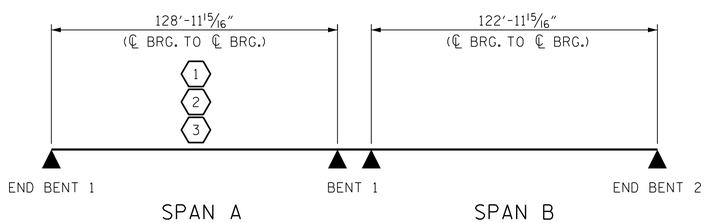
LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT					SHEAR					LIVE-LOAD FACTORS (γ_{LL})	MOMENT					
								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)		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	0.789	1.56	A	E	64.5	0.900	1.58	B	E	111.3	0.80	0.789	1.19	A	E	64.5	-
		HL-93 (OPERATING)	N/A		2.02	-	1.35	0.789	2.02	A	E	64.5	0.900	2.10	B	E	111.3	N/A	-	-	-	-	-	-
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.78	64.080	1.75	0.789	2.33	A	E	64.5	0.900	2.29	B	E	111.3	0.80	0.789	1.78	A	E	64.5	-
		HS-20 (OPERATING)	36.000		3.02	108.720	1.35	0.789	3.02	A	E	64.5	0.900	3.02	B	E	111.3	N/A	-	-	-	-	-	-
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.35	58.725	1.40	0.789	7.13	A	E	64.5	0.900	7.53	B	E	111.3	0.80	0.789	4.35	A	E	64.5	-
		SNGARBS2	20.000		3.09	61.800	1.40	0.789	5.06	A	E	64.5	0.900	5.18	B	E	111.3	0.80	0.789	3.09	A	E	64.5	-
		SNAGRIS2	22.000		2.86	62.920	1.40	0.789	4.69	A	E	64.5	0.900	4.75	B	E	111.3	0.80	0.789	2.86	A	E	64.5	-
		SNCOTTS3	27.250		2.16	58.860	1.40	0.789	3.53	A	E	64.5	0.900	3.66	B	E	111.3	0.80	0.789	2.16	A	E	64.5	-
		SNAGGRS4	34.925		1.74	60.770	1.40	0.789	2.86	A	E	64.5	0.900	2.93	B	E	111.3	0.80	0.789	1.74	A	E	64.5	-
		SNS5A	35.550		1.71	60.791	1.40	0.789	2.80	A	E	64.5	0.900	2.92	B	E	111.3	0.80	0.789	1.71	A	E	64.5	-
		SNS6A	39.950		1.55	61.923	1.40	0.789	2.53	A	E	64.5	0.900	2.62	B	E	111.3	0.80	0.789	1.55	A	E	64.5	-
		SNS7B	42.000		1.47	61.740	1.40	0.789	2.41	A	E	64.5	0.900	2.53	B	E	111.3	0.80	0.789	1.47	A	E	64.5	-
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.88	62.040	1.40	0.789	3.08	A	E	64.5	0.900	3.18	B	E	111.3	0.80	0.789	1.88	A	E	64.5	-
		TNT4A	33.075		1.88	62.181	1.40	0.789	3.08	A	E	64.5	0.900	3.13	B	E	111.3	0.80	0.789	1.88	A	E	64.5	-
		TNT6A	41.600		1.51	62.816	1.40	0.789	2.48	A	E	64.5	0.900	2.64	B	E	111.3	0.80	0.789	1.51	A	E	64.5	-
		TNT7A	42.000		1.51	63.420	1.40	0.789	2.48	A	E	64.5	0.900	2.59	B	E	111.3	0.80	0.789	1.51	A	E	64.5	-
		TNT7B	42.000		1.54	64.680	1.40	0.789	2.52	A	E	64.5	0.900	2.50	B	E	111.3	0.80	0.789	1.54	A	E	64.5	-
		TNAGRIT4	43.000		1.48	63.640	1.40	0.789	2.43	A	E	64.5	0.900	2.42	B	E	111.3	0.80	0.789	1.48	A	E	64.5	-
		TNAGT5A	45.000		1.41	63.450	1.40	0.789	2.31	A	E	64.5	0.900	2.36	B	E	111.3	0.80	0.789	1.41	A	E	64.5	-
		TNAGT5B	45.000	⟨3⟩	1.35	60.750	1.40	0.789	2.20	A	E	64.5	0.900	2.24	B	E	111.3	0.80	0.789	1.35	A	E	64.5	-



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. PRESTRESSED GIRDERS WERE DESIGNED USING SIMPLE SPAN ANALYSIS.
2. ALL DISTANCES ARE MEASURED FROM THE CENTERLINE OF BEARING AT THE LEFT END OF SPAN.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR GIRDER

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-
358+97.14 -L-

SHEET 5 OF 5

SITE 1 DWG. NO. 5

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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GENERAL DRAWING
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)

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1			3			TOTAL SHEETS
2			4			43

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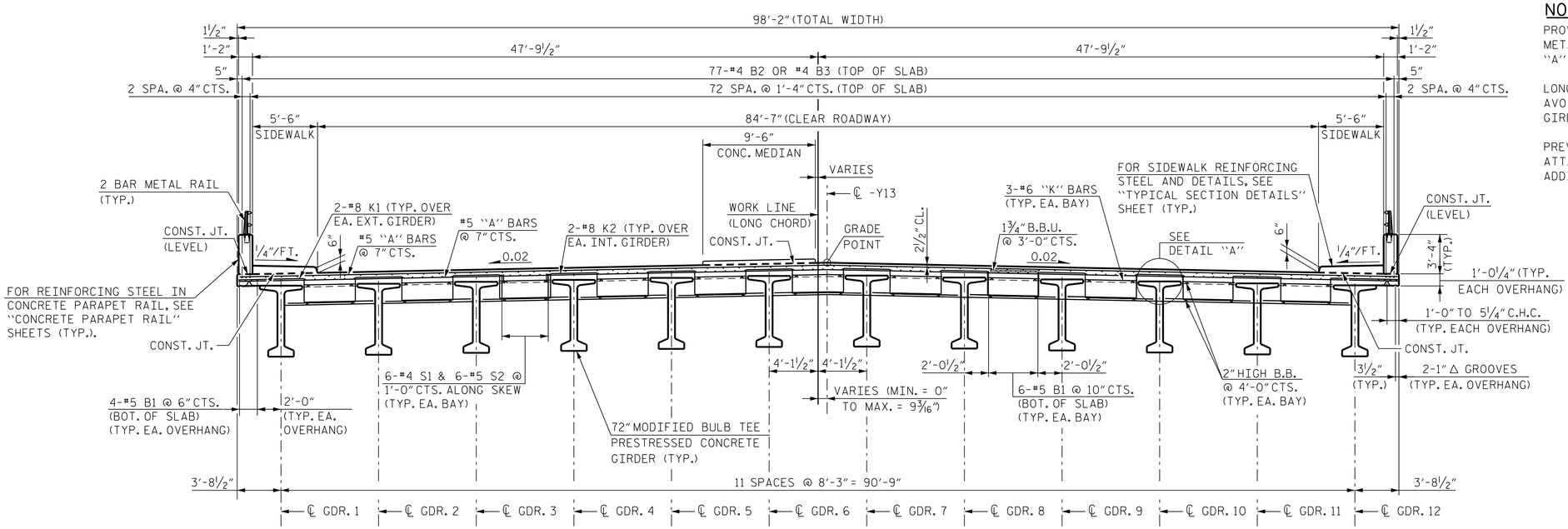


TYPICAL SECTION AT END BENT

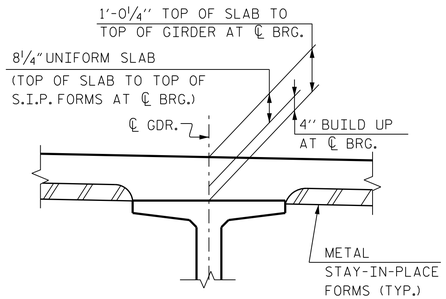
DIMENSIONS SHOWN ARE PERPENDICULAR TO THE WORK LINE

NOTES:

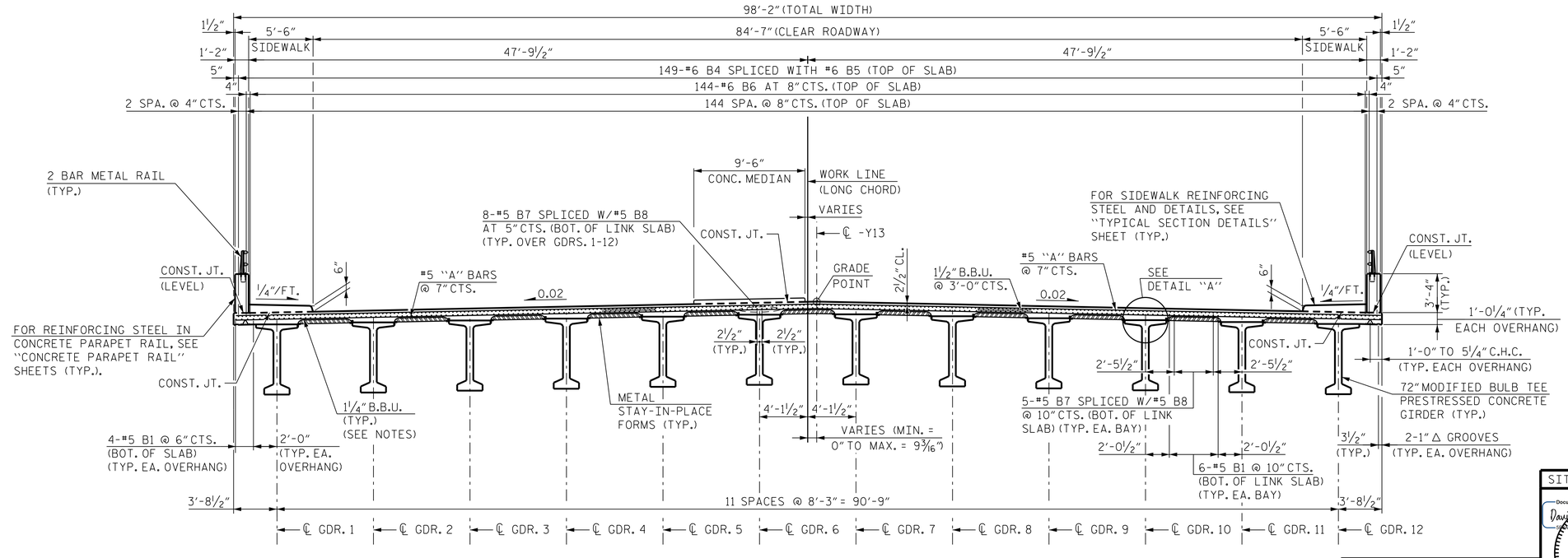
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS.

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

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



DETAIL "A"



TYPICAL SECTION AT BENT

DIMENSIONS SHOWN ARE PERPENDICULAR TO THE WORK LINE
SHOWING LINK SLAB REGION

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

TYPICAL SECTIONS

SITE 1 DWG. NO. 6

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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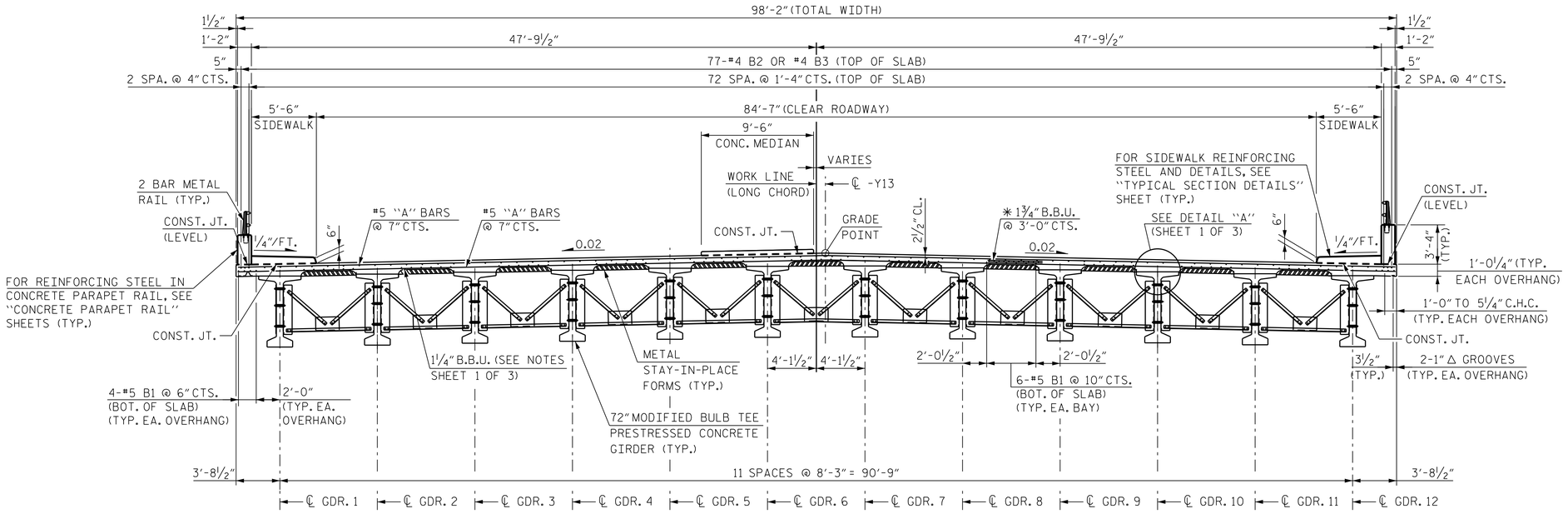

TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM

DIMENSIONS SHOWN ARE PERPENDICULAR TO THE WORK LINE
✳ USE THIS SIZE B.B.U. IN AREAS WITH #4 "B" BARS.
FOR AREAS WITH #6 "B" BARS, USE 1½" B.B.U.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

TYPICAL SECTIONS

SITE 1 DWG. NO. 7

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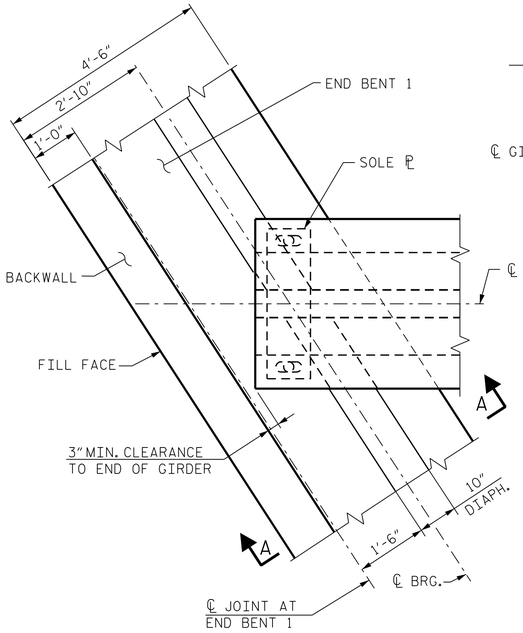
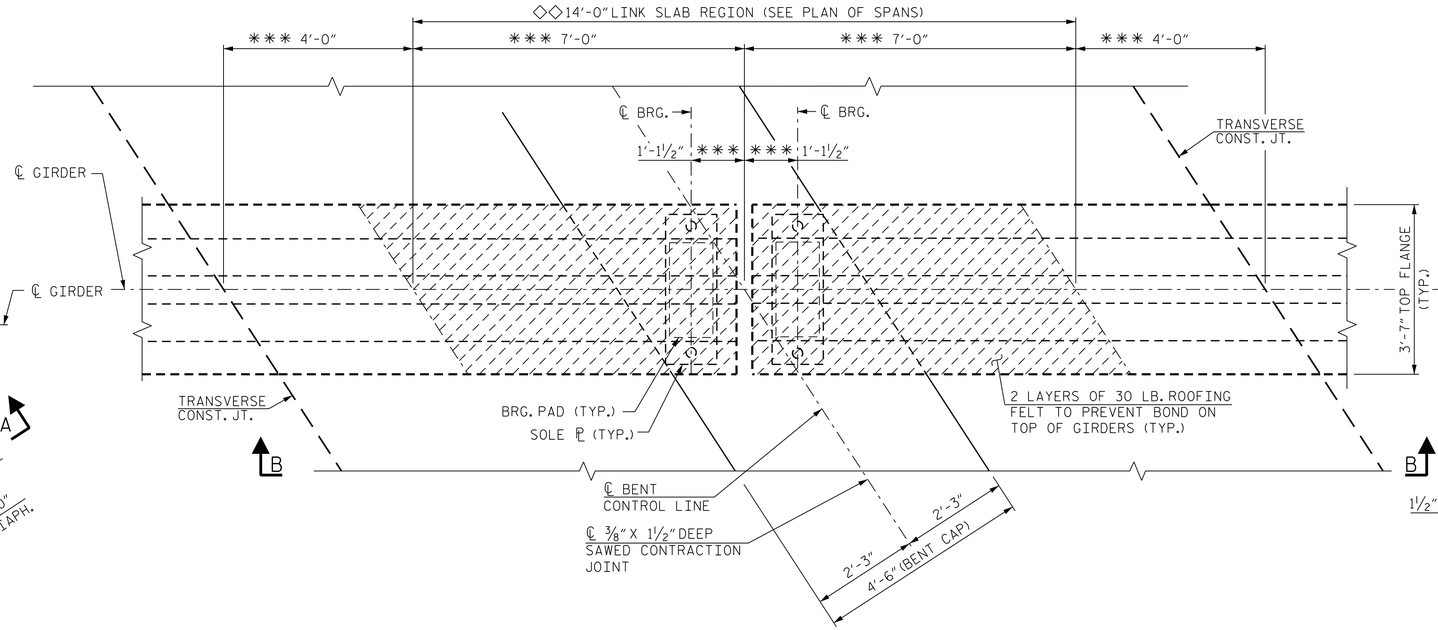


PLAN DETAIL OF END BENT 1

(END BENT 1 SHOWN, END BENT 2 SIMILAR)
(DECK NOT SHOWN FOR CLARITY)

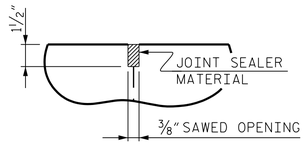


PLAN OF GIRDERS AT LINK SLAB

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

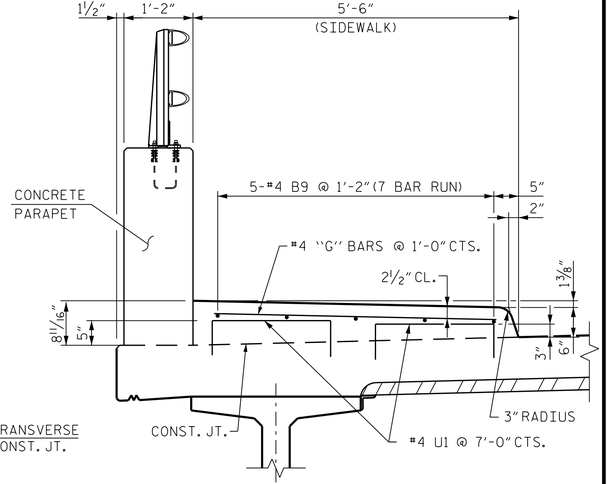
* METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO THE GIRDER FLANGES IN THE REGION OF THE LINK SLAB.

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



DETAIL "B"

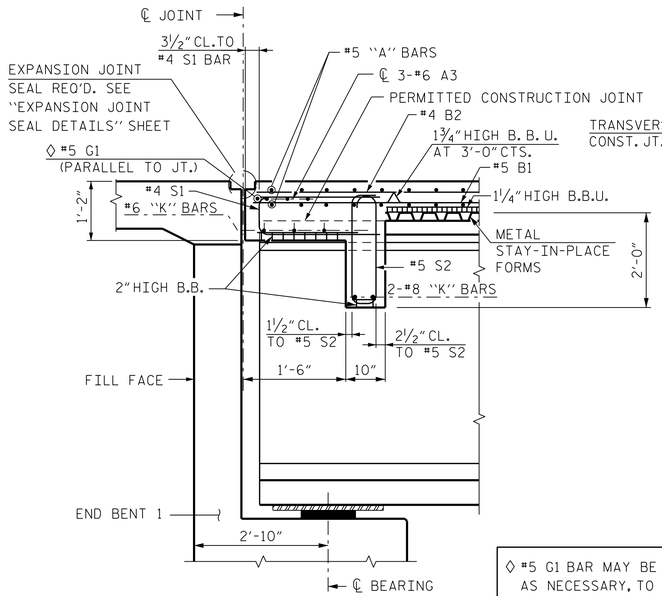
SAW CUT CONTRACTION JOINT



SECTION THRU SIDEWALK

"U" BARS MAY BE PUSHED INTO GREEN CONCRETE AFTER SPAN HAS BEEN SCREEDED OFF.

GROOVED CONTRACTION JOINT, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE SIDEWALK IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL NE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.

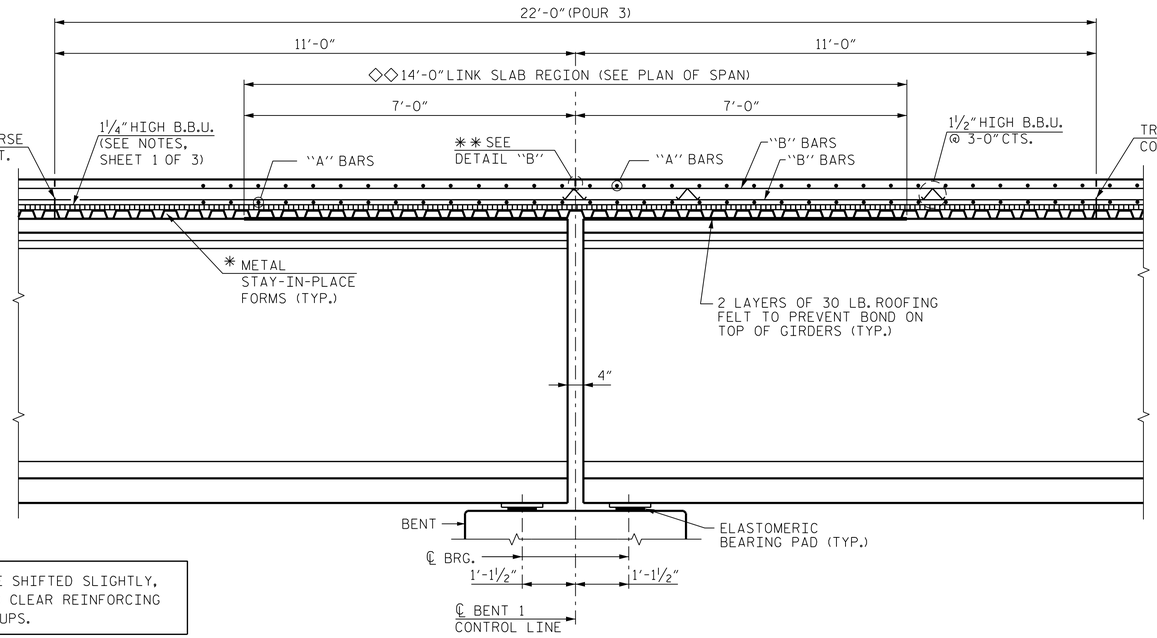


SECTION A-A

SECTION THROUGH END BENT 1 DIAPHRAGM

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)
(END BENT 1 SHOWN, END BENT 2 SIMILAR)

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



SECTION B-B

DIMENSIONS MEASURED ALONG ℄ GIRDER

LINK SLAB DETAILS

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

SITE 1 DWG. NO. 8

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2			4			43

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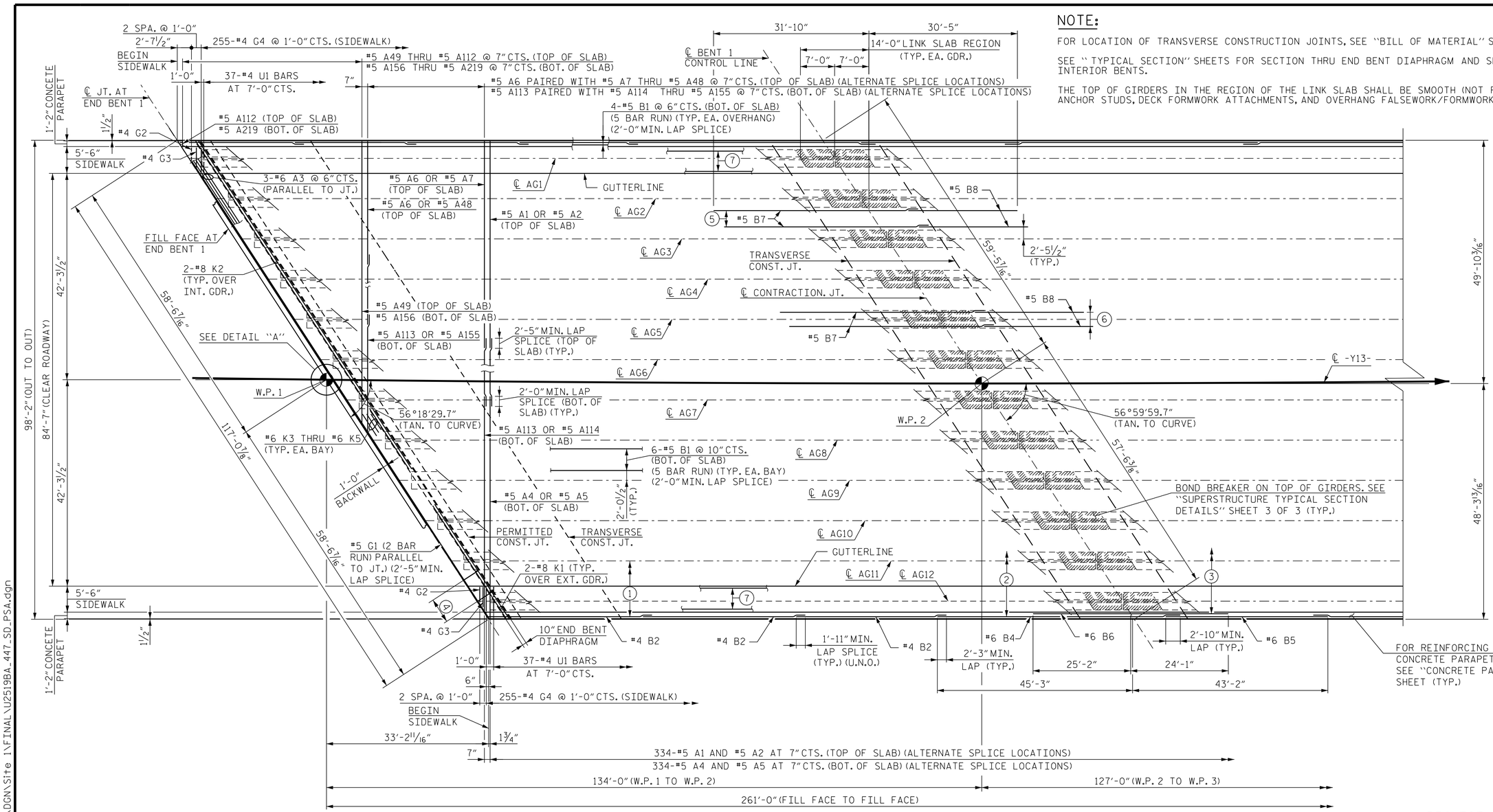


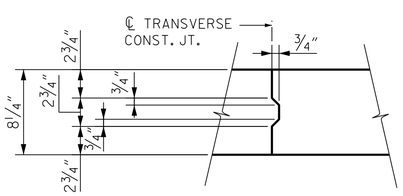
PLAN OF SPAN

NOTE:

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

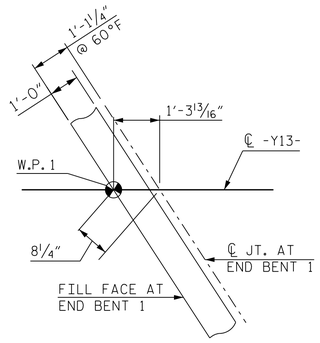
SEE " TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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



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

TRANSVERSE CONST. JOINT IN DECK SLAB



DETAIL "A"

1. 77-#4 B2 (3 BAR RUN) (SEE TYP. SECTION FOR SPACING) (TOP OF SLAB)
2. 149-#6 B4 SPLICED WITH #6 B5 (SEE TYP. SECTION FOR SPACING) (TOP OF SLAB)
3. 144-#6 B6 (TOP OF SLAB) (SEE TYP. SECTION FOR SPACING)
4. 6-#4 S1 & 6-#5 S2 @ 1'-0" CTS. (TYP. EA. BAY)
5. 5-#5 B7 SPLICED WITH #5 B8 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. BAY)
6. 8-#5 B7 SPLICED WITH #5 B8 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. OVER GDRS. 1-12)
7. 5-#4 B9 (SIDEWALK) (7 BAR RUN) (SEE TYPICAL SECTION DETAILS SHEET FOR SPACING) (2'-6" MIN. LAP SPLICE)

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PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 1 OF 2

SITE 1 DWG. NO. 9

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS SPAN A

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			43

STR. #1

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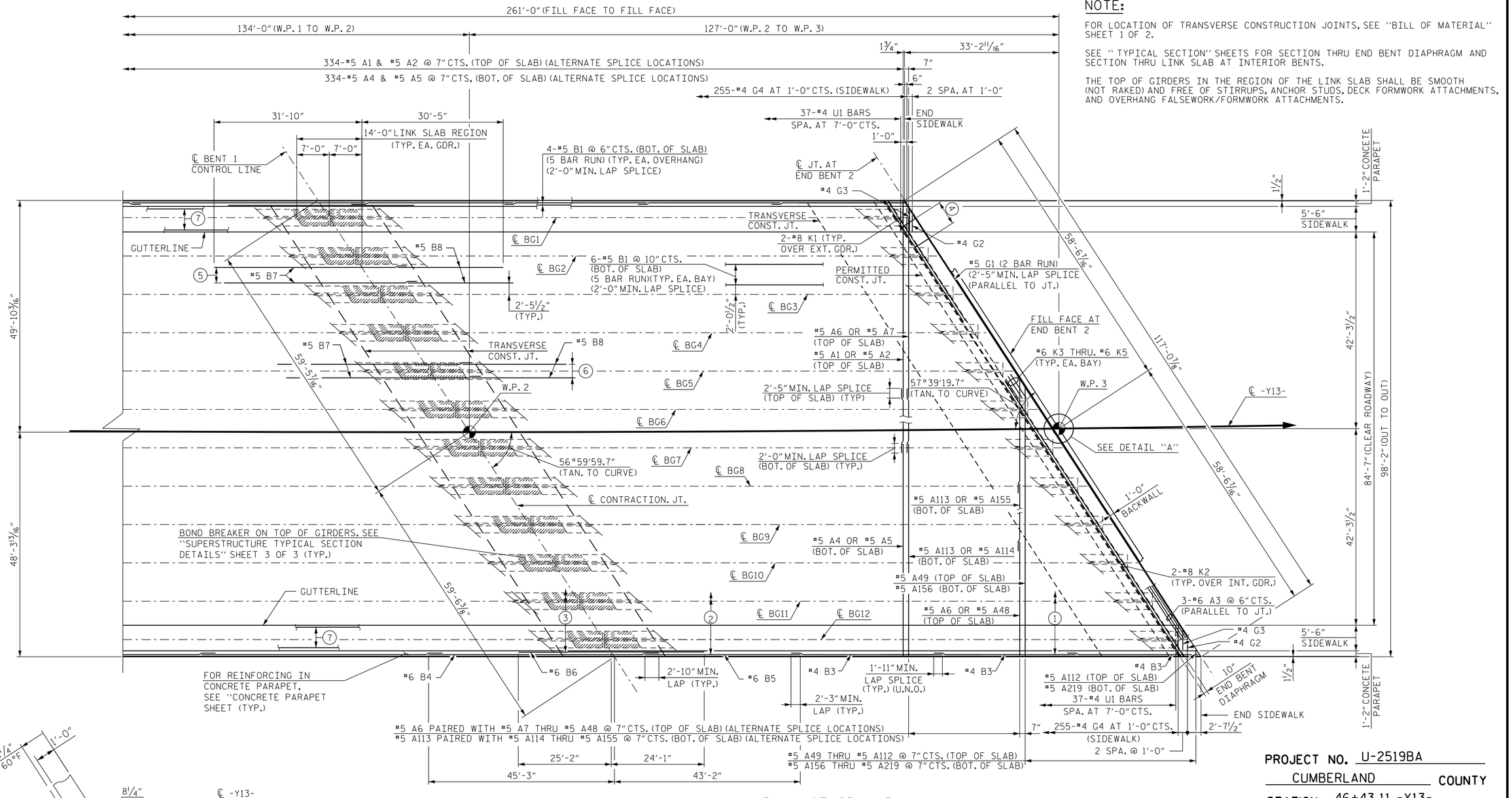
NOTE:

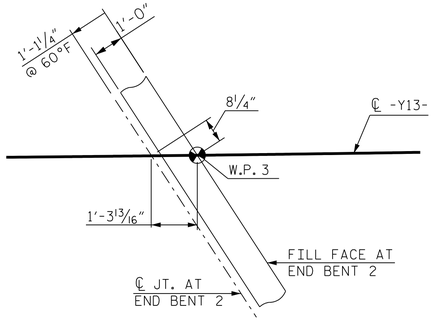
FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

SEE " TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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



PLAN OF SPAN B



DETAIL "A"

1. 77-#4 B3 (3 BAR RUN) (SEE TYP. SECTION FOR SPACING) (TOP OF SLAB)
2. 149-#6 B4 SPLICED WITH #6 B5 (SEE TYP. SECTION FOR SPACING) (TOP OF SLAB)
3. 144-#6 B6 (TOP OF SLAB) (SEE TYP. SECTION FOR SPACING)
4. 6-#4 S1 & 6-#5 S2 @ 1'-0" CTS. (TYP. EA. BAY)
5. 5-#5 B7 SPLICED WITH #5 B8 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. BAY)
6. 8-#5 B7 SPLICED WITH #5 B8 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. OVER GDRS. 1-12)
7. 5-#4 B9 (SIDEWALK) (7 BAR RUN) (SEE TYPICAL SECTION DETAILS SHEET FOR SPACING) (2'-6" MIN. LAP SPLICE)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 2

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SUPERSTRUCTURE

PLAN OF SPANS SPAN B

SITE 1 DWG. NO. 10

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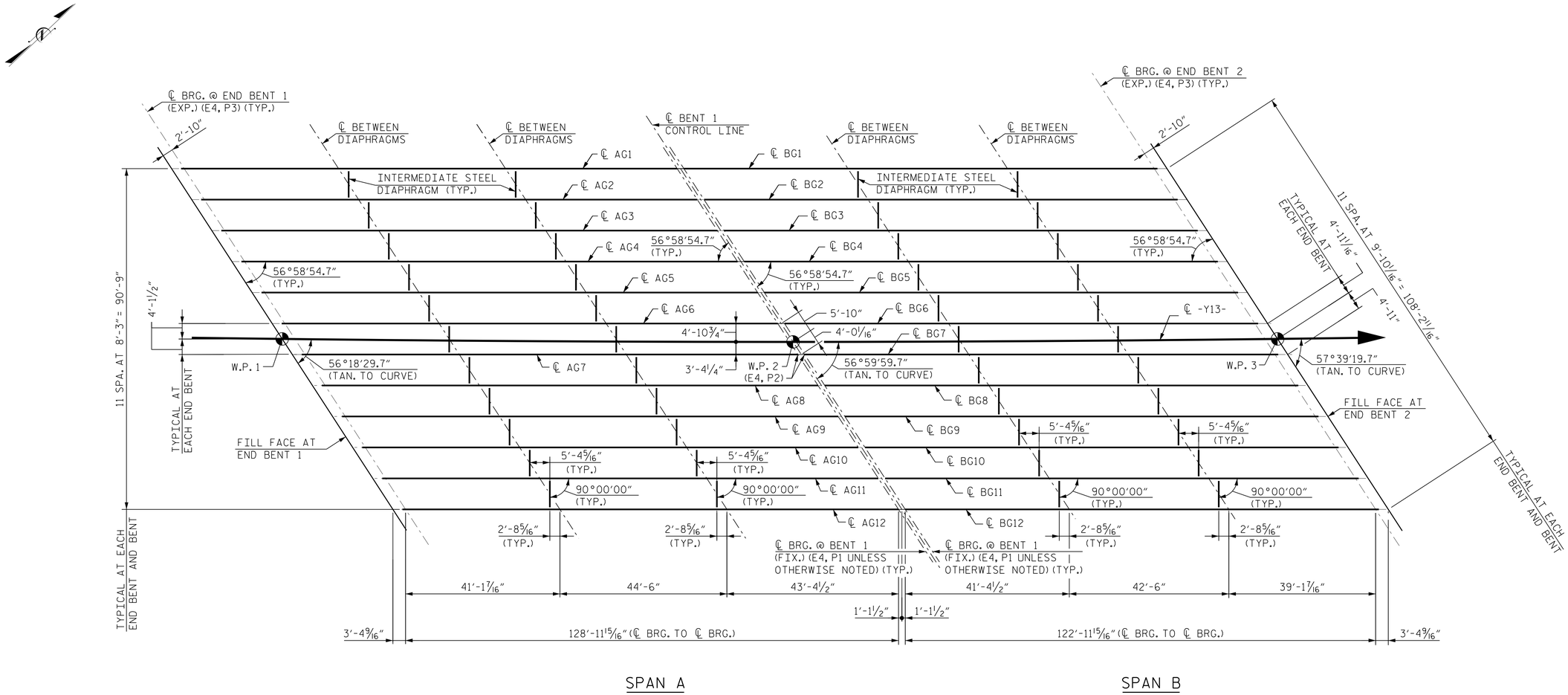

SPAN A SPAN B

FRAMING PLAN

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

FRAMING PLAN

SITE 1 DWG. NO. 11

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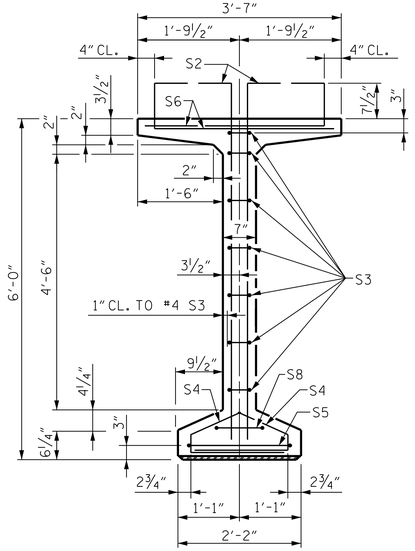
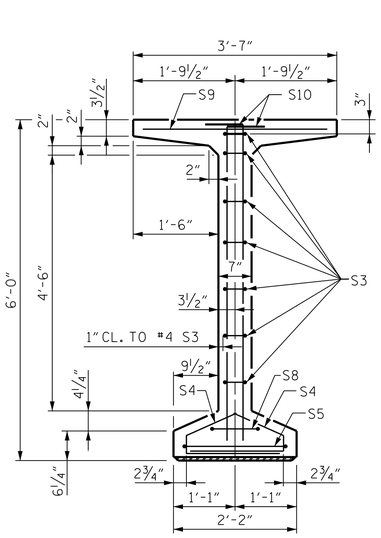
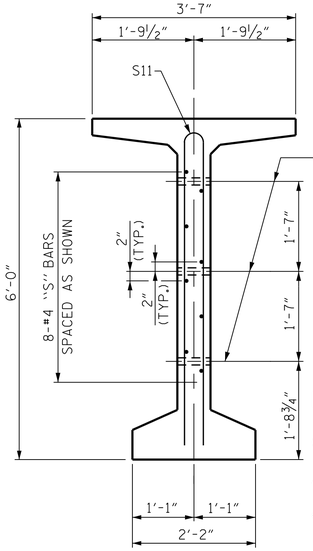


SECTION A-A



SECTION B-B

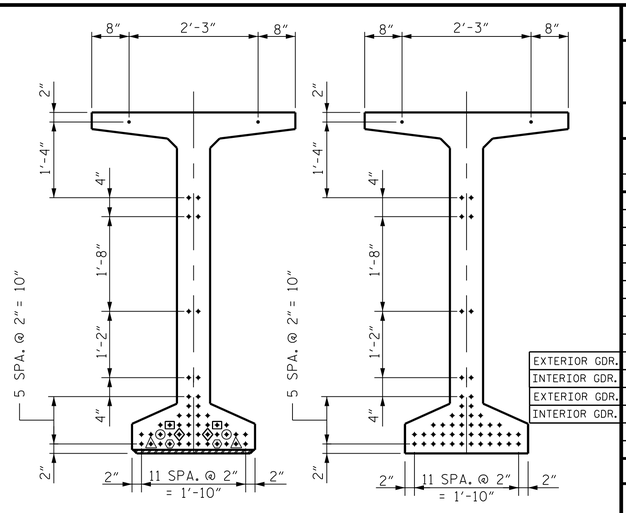


SECTION C-C

(S1, S6, AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 24'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 36'-0" FROM END OF GIRDER



AT END OF GIRDER AT ℄ OF GIRDER

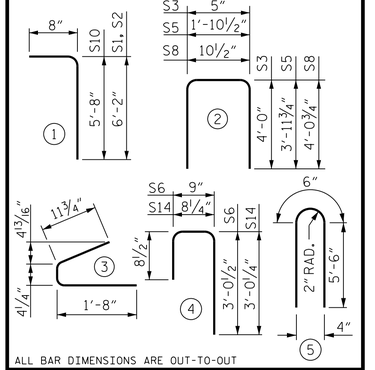
0.6" Ø LOW RELAXATION STRAND LAYOUT

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	260	#4	1	6'-10"	1,187
S2	12	#6	1	6'-10"	123
S3	14	#4	2	8'-5"	79
S4	86	#4	3	3'-0"	172
S5	2	#5	2	9'-10"	21
S6	90	#5	4	4'-6"	422
S8	2	#5	2	9'-0"	19
S9	41	#5	STR.	3'-3"	139
S10	36	#6	1	6'-4"	342
S11	8	#5	5	11'-6"	96
S11	16	#5	5	11'-6"	192
S12	16	#4	STR.	8'-0"	86
S13	16	#4	STR.	13'-6"	144
S14	182	#5	4	4'-5"	838

BAR TYPES



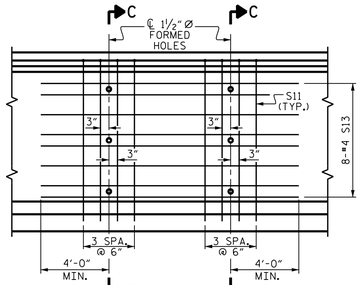
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	3,524	28.0	50
INTERIOR GIRDER	3,678	28.0	50

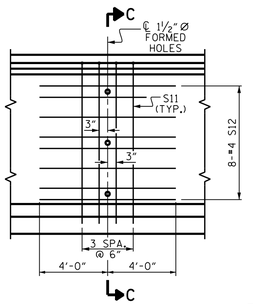
GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
12	130'-8"	1,568'-0"



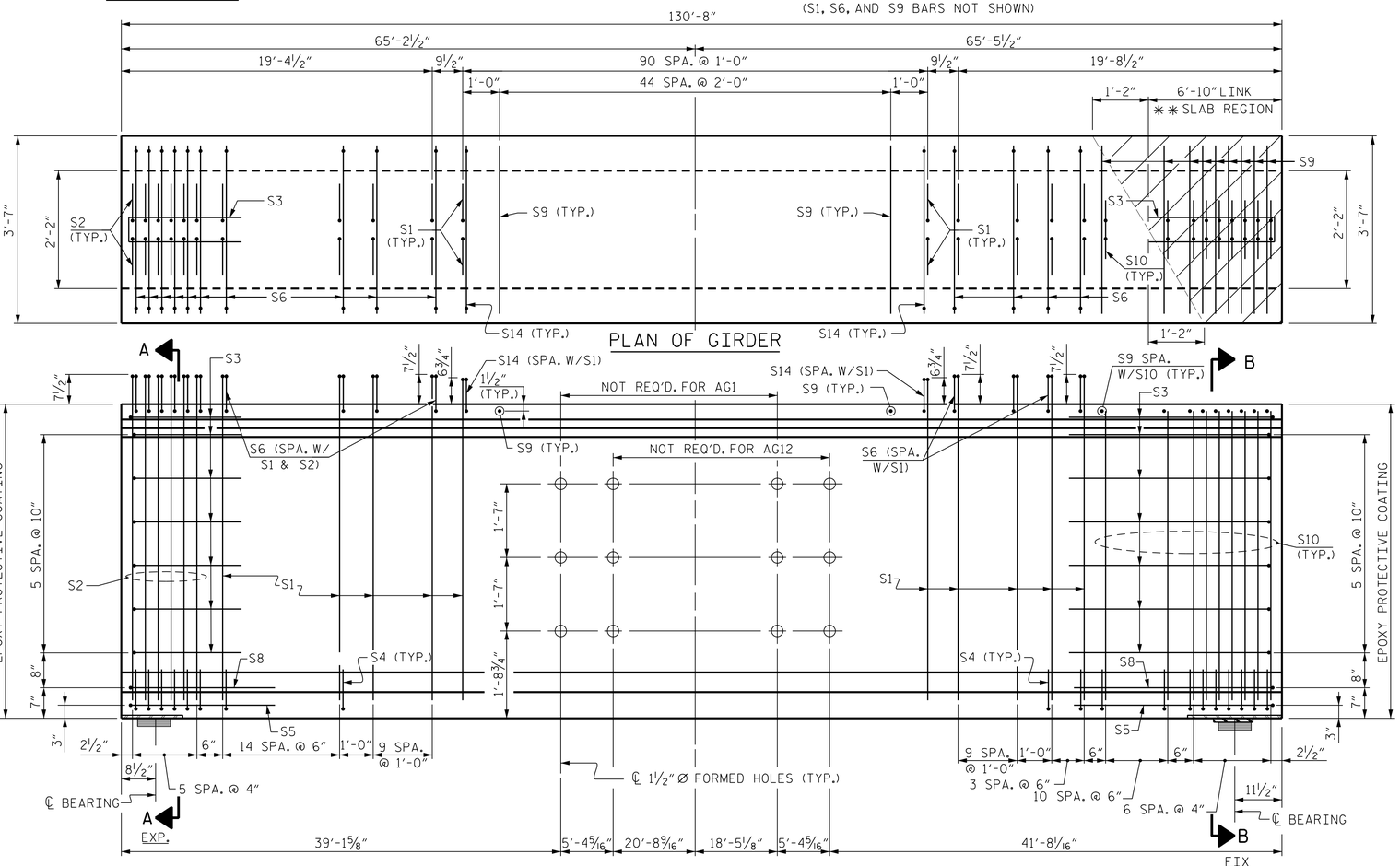
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDERS AG2 TO AG11



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDERS AG1 AND AG12



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

** DO NOT RAKE THE TOP OF GIRDER IN THIS REGION.

PLAN OF GIRDER

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A

SITE 1 DWG. NO. 12

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-12
1			3			TOTAL SHEETS
2			4			43

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : M. SHARMA DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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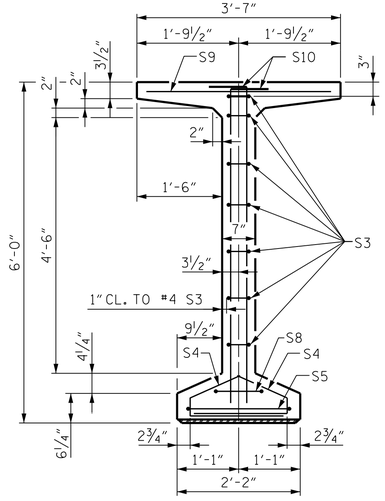
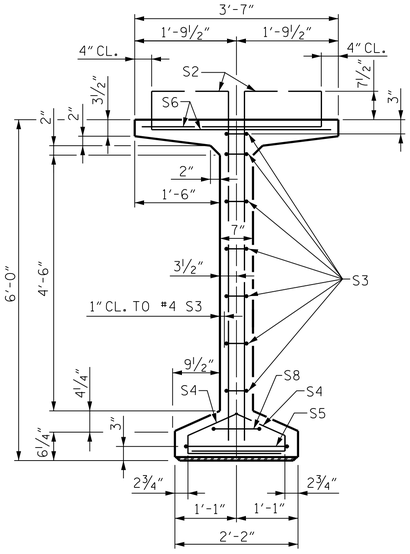
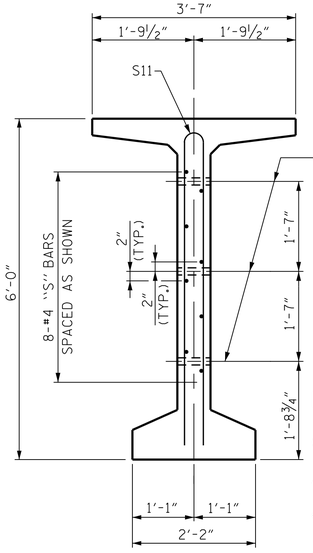
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 1\FINAL\U2519BA_447_SD_G1.dgn



SECTION A-A



SECTION B-B

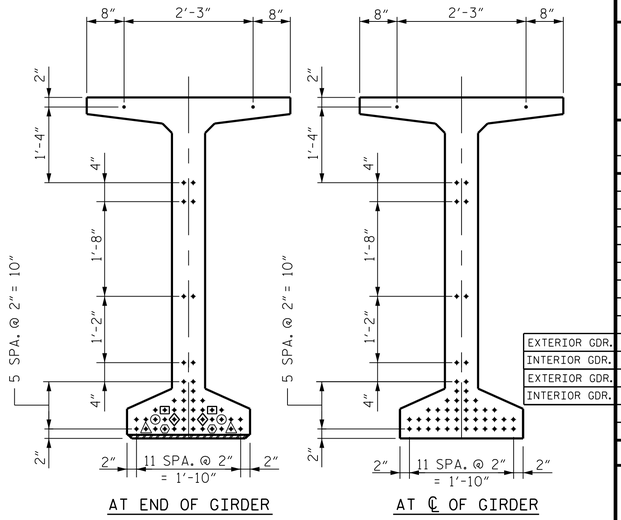


SECTION C-C

(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
- STRANDS DEBONDED FOR 24'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 36'-0" FROM END OF GIRDER



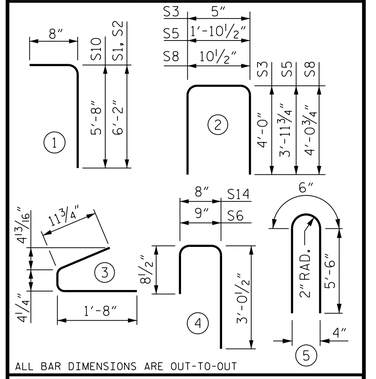
0.6" Ø LOW RELAXATION STRAND LAYOUT

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	248	#4	1	6'-10"	1,132
S2	12	#6	1	6'-10"	123
S3	14	#4	2	8'-5"	79
S4	86	#4	3	3'-0"	172
S5	2	#5	2	9'-10"	21
S6	86	#5	4	4'-6"	404
S8	2	#5	2	9'-0"	19
S9	40	#5	STR.	3'-3"	136
S10	36	#6	1	6'-4"	342
S11	8	#5	5	11'-6"	96
S11	16	#5	5	11'-6"	192
S12	16	#4	STR.	8'-0"	86
S13	16	#4	STR.	13'-6"	144
S14	174	#5	4	4'-5"	802

BAR TYPES



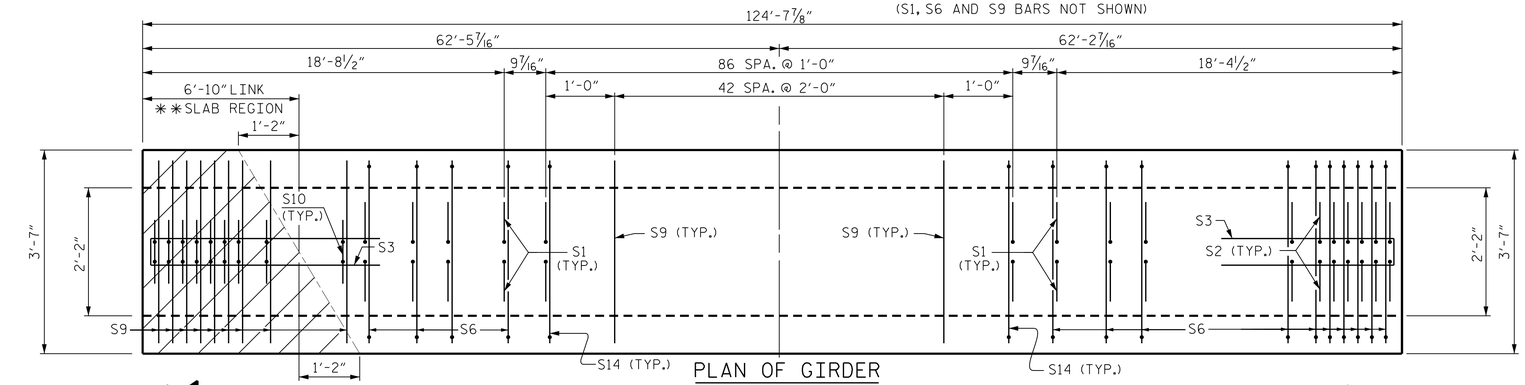
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

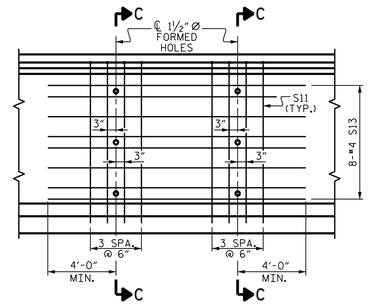
	REINFORCING STEEL	9,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	3,412	26.7	50
INTERIOR GIRDER	3,566	26.7	50

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
12	124'-7⅞"	1,495'-10½"

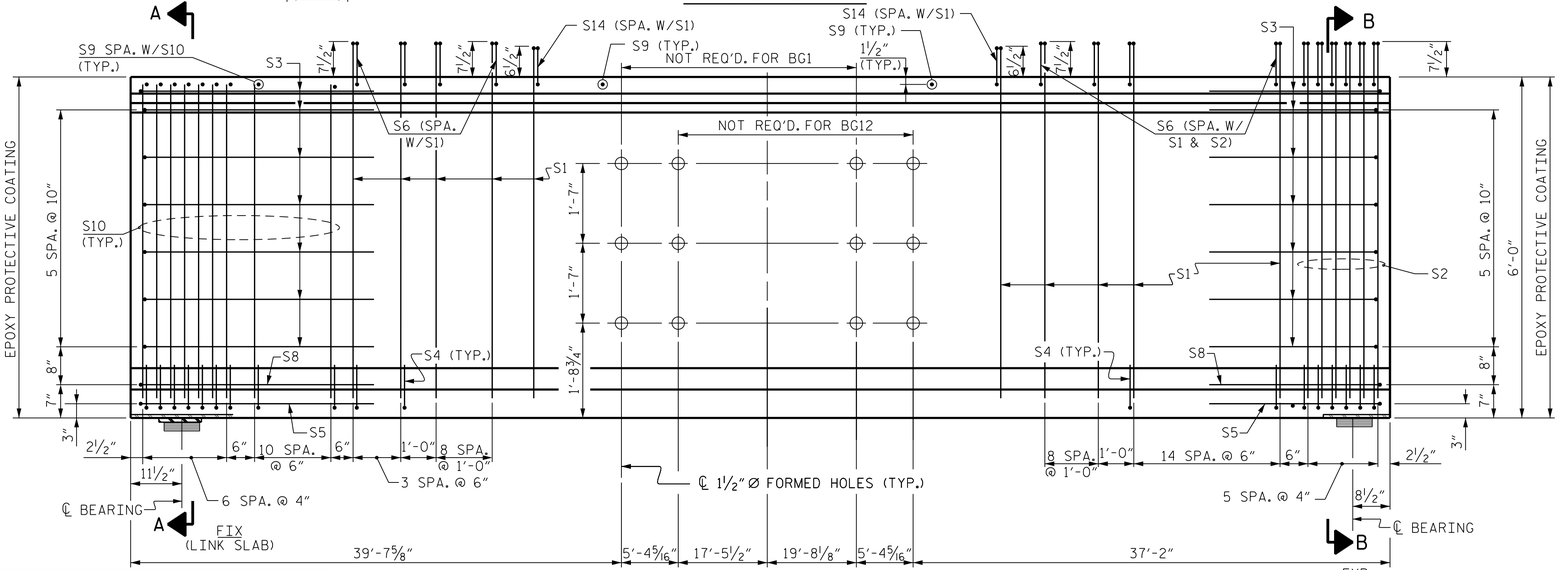


PLAN OF GIRDER



PARTIAL ELEVATION

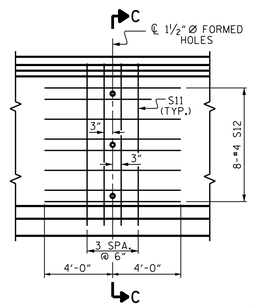
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDERS BG2 TO BG11



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

✱✱DO NOT RAKE THE TOP OF GIRDER IN THIS REGION.



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDERS BG1 AND BG12

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINOUS FOR LIVE LOAD SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-13
1			3			TOTAL SHEETS
2			4			43

STR. #1

SITE 1 DWG. NO. 13

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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3/23/2022

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DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : M. SHARMA DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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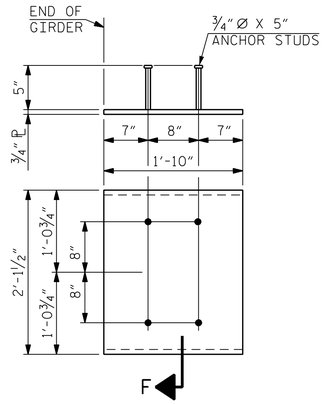
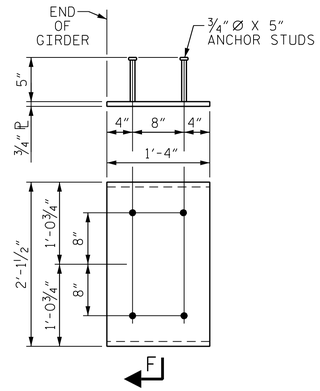
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 1\FINAL\U2519BA_447_SD_02.dgn



EMBEDDED PLATE "B-2" DETAILS

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)



EMBEDDED PLATE "B-1" DETAILS

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)

EMBEDDED PLATE VARIABLE TABLE				
GDR. NO.	SPAN A		SPAN B	
	NEAR	FAR	NEAR	FAR
1	B-1	B-2	B-2	B-1
2	B-1	B-2	B-2	B-1
3	B-1	B-2	B-2	B-1
4	B-1	B-2	B-2	B-1
5	B-1	B-2	B-2	B-1
6	B-1	B-2	B-2	B-1
7	B-1	B-2	B-2	B-1
8	B-1	B-2	B-2	B-1
9	B-1	B-2	B-2	B-1
10	B-1	B-2	B-2	B-1
11	B-1	B-2	B-2	B-1
12	B-1	B-2	B-2	B-1

NOTES:

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

EMBEDDED PLATE "B-1" AND "B-2" 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.

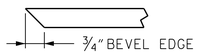
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,500 PSI.

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

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

A 2"X 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 72" MODIFIED BULB TEES ONLY.

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



SECTION "F"

(SEE NOTES)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

SITE 1 DWG. NO. 14

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-14
1			3			TOTAL SHEETS
2			4			43

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : M. SHARMA DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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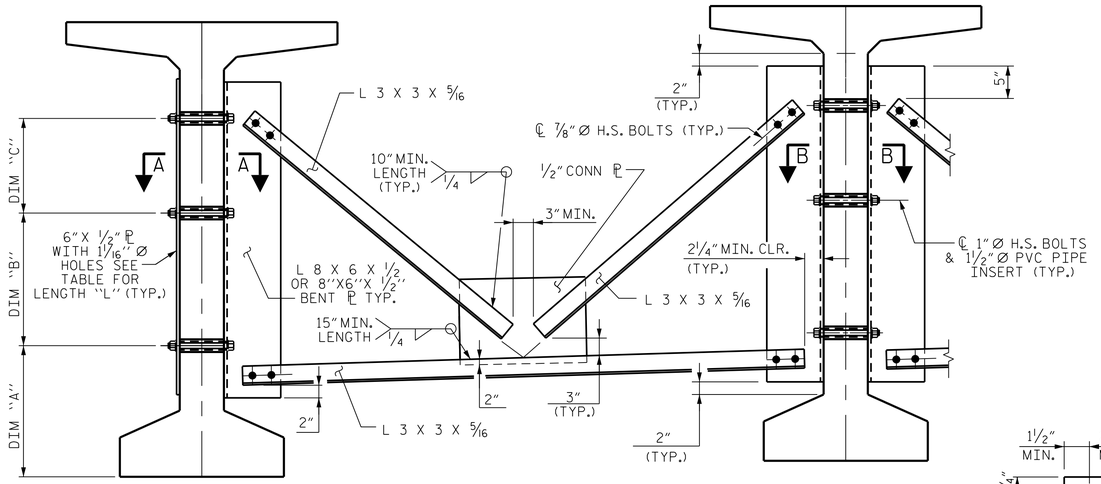
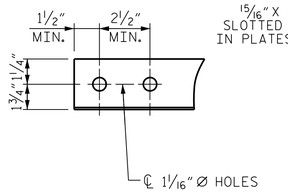
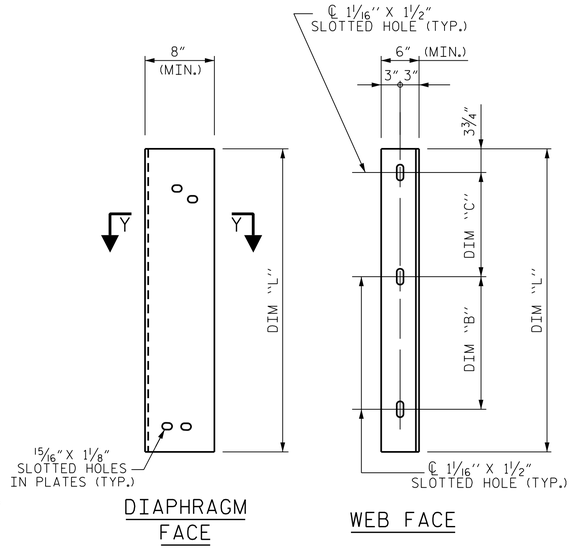
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 1\FINAL\U2519BA_447_SD_G3.dgn

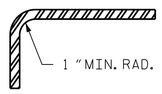


PART SECTION AT INTERMEDIATE DIAPHRAGM



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





SECTION Y-Y

CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

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

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

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

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

FOR METALLIZATION, APPLY A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLLIZATION) 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.

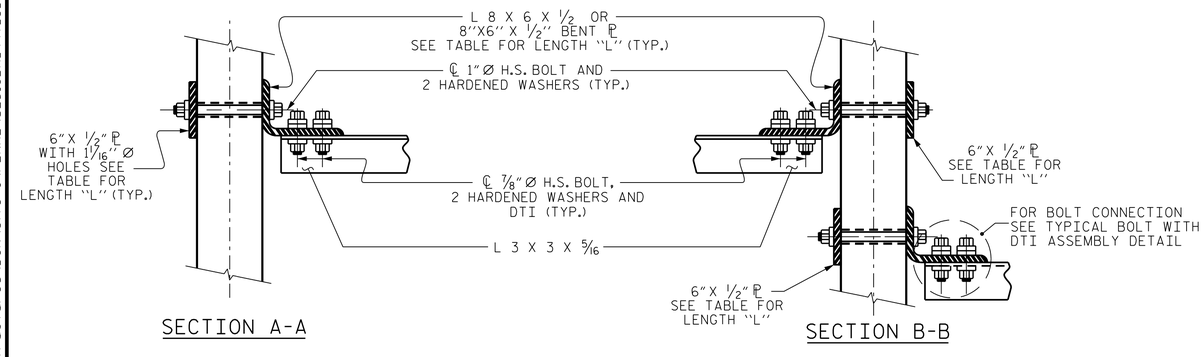
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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.

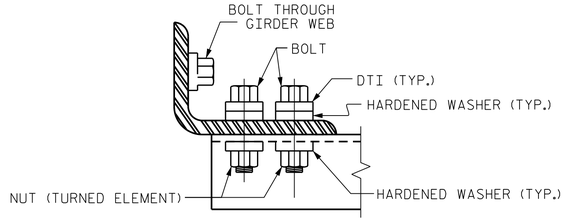
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
72" BULB TEE	1'-8 3/4"	1'-7"	1'-7"	4'-2"



CONNECTION DETAILS
(SKEW > 110° SHOWN
SKEW < 70° SIM.)



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

SITE 1 DWG. NO. 15

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

RK&K
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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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NO.	BY:	DATE:	NO.	BY:	DATE:	S1-15
1			3			TOTAL SHEETS
2			4			43

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
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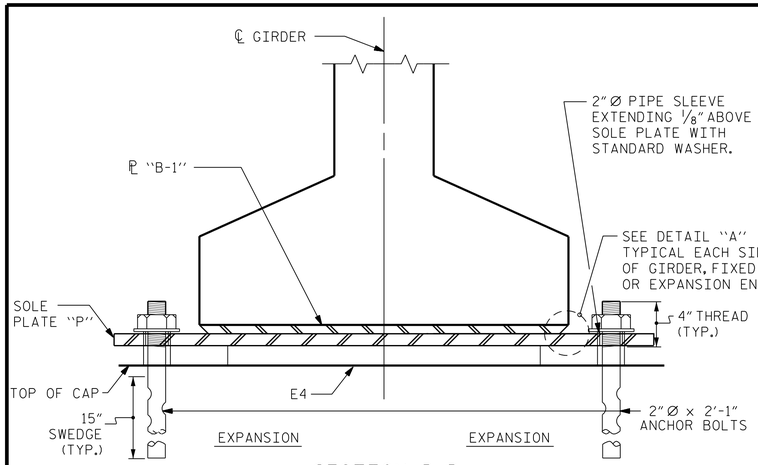
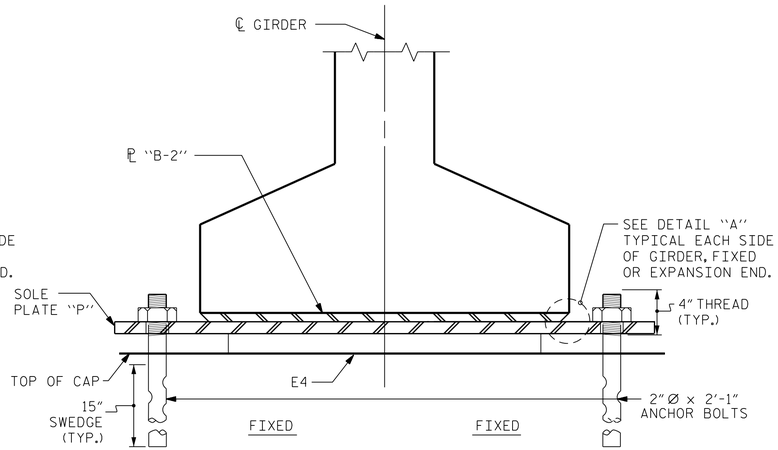
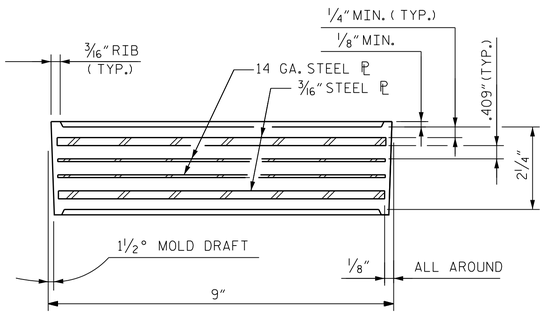
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 1\FINAL\U2519BA_447_SD_G4.dgn



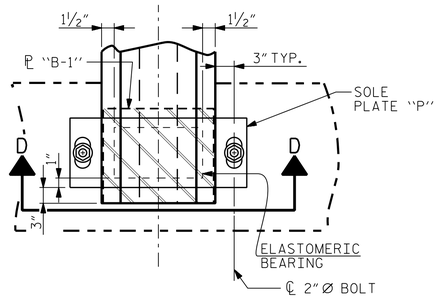
SECTION D-D



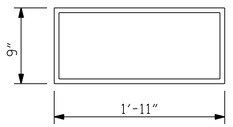
SECTION E-E



TYPICAL SECTION OF ELASTOMERIC BEARING



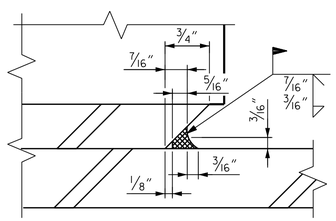
TYPICAL HALF-PLAN
(SHOWING SIMPLE SPAN END BENT)



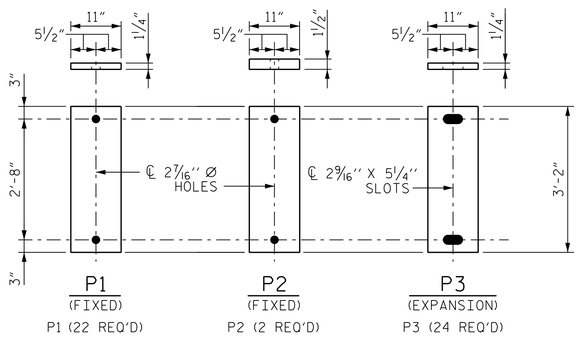
E4 (48 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



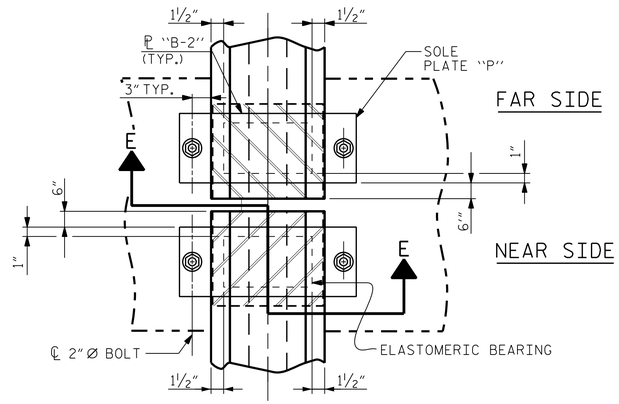
DETAIL "A"



P1 (22 REQ'D) P2 (2 REQ'D) P3 (24 REQ'D)

SOLE PLATE DETAILS ("P")

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



TYPICAL HALF-PLAN
(SHOWING LINK SLAB BENT)

NOTES:

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

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

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

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

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

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

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CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

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SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

SITE 1 DWG. NO. 16

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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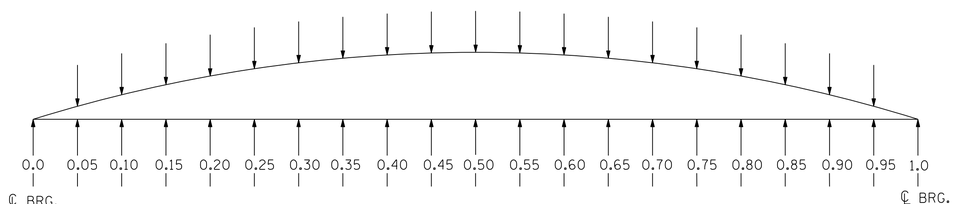
DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN A

GIRDER		TWENTIETH POINTS																					
		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
AG1 & AG12	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.054	0.107	0.157	0.202	0.243	0.277	0.304	0.324	0.336	0.340	0.336	0.324	0.304	0.277	0.243	0.202	0.157	0.107	0.054	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.038	0.075	0.111	0.145	0.174	0.200	0.220	0.234	0.244	0.246	0.244	0.234	0.220	0.200	0.174	0.145	0.111	0.075	0.038	0.000
	FINAL CAMBER ↑	0"	3/16"	3/8"	9/16"	11/16"	13/16"	15/16"	1"	1 1/16"	1 1/8"	1 1/8"	1 1/8"	1 1/16"	1"	15/16"	13/16"	11/16"	9/16"	3/8"	3/16"	0"
AG2 & AG11	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.054	0.107	0.157	0.202	0.243	0.277	0.304	0.324	0.336	0.340	0.336	0.324	0.304	0.277	0.243	0.202	0.157	0.107	0.054	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.036	0.071	0.106	0.138	0.166	0.190	0.209	0.223	0.232	0.235	0.232	0.223	0.209	0.190	0.166	0.138	0.106	0.071	0.036	0.000
	FINAL CAMBER ↑	0	3/16"	7/16"	5/8"	3/4"	15/16"	1 1/16"	1 1/8"	1 3/16"	1 1/4"	1 1/4"	1 1/4"	1 3/16"	1 1/8"	1 1/16"	15/16"	3/4"	5/8"	7/16"	3/16"	0"
AG3 & AG10	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.054	0.107	0.157	0.202	0.243	0.277	0.304	0.324	0.336	0.340	0.336	0.324	0.304	0.277	0.243	0.202	0.157	0.107	0.054	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.034	0.068	0.102	0.132	0.159	0.183	0.201	0.215	0.223	0.226	0.223	0.215	0.201	0.183	0.159	0.132	0.102	0.068	0.034	0.000
	FINAL CAMBER ↑	0"	1/4	7/16"	11/16"	13/16"	1"	1 1/8"	1 1/4"	1 5/16"	1 3/8"	1 3/8"	1 3/8	1 5/16"	1 1/4"	1 1/8"	1"	13/16"	11/16"	7/16"	1/4"	0"
AG4 TO AG9	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.054	0.107	0.157	0.202	0.243	0.277	0.304	0.324	0.336	0.340	0.336	0.324	0.304	0.277	0.243	0.202	0.157	0.107	0.054	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.033	0.065	0.096	0.126	0.151	0.173	0.191	0.204	0.212	0.214	0.212	0.204	0.191	0.173	0.151	0.126	0.096	0.065	0.033	0.000
	FINAL CAMBER ↑	0"	1/4"	1/2"	3/4"	15/16"	1 1/8"	1 1/4"	1 3/8"	1 7/16"	1 1/2"	1 1/2"	1 1/2"	1 7/16"	1 3/8"	1 1/4"	1 1/8"	15/16"	3/4"	1/2"	1/4"	0"

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN B

GIRDER		TWENTIETH POINTS																					
		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
BG1 & BG12	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.103	0.151	0.195	0.234	0.266	0.293	0.312	0.324	0.328	0.324	0.312	0.293	0.266	0.234	0.195	0.151	0.103	0.052	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.031	0.062	0.092	0.120	0.144	0.165	0.182	0.194	0.202	0.204	0.202	0.194	0.182	0.165	0.144	0.120	0.092	0.062	0.031	0.000
	FINAL CAMBER ↑	0"	1/4"	1/2"	11/16"	7/8"	1 1/16"	1 3/16"	1 5/16"	1 7/16"	1 7/16	1 1/2"	1 7/16"	1 7/16"	1 5/16	1 3/16"	1 1/16"	7/8"	11/16"	1/2"	1/4"	0"
BG2 & BG11	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.103	0.151	0.195	0.234	0.266	0.293	0.312	0.324	0.328	0.324	0.312	0.293	0.266	0.234	0.195	0.151	0.103	0.052	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.030	0.059	0.087	0.114	0.137	0.157	0.172	0.184	0.191	0.193	0.191	0.184	0.172	0.157	0.137	0.114	0.087	0.059	0.030	0.000
	FINAL CAMBER ↑	0"	1/4"	1/2"	3/4"	1"	1 3/16"	1 5/16"	1 7/16"	1 9/16"	1 9/16"	1 5/8"	1 9/16"	1 9/16"	1 7/16"	1 5/16"	1 3/16"	1"	3/4"	1/2"	1/4"	0"
BG3 & BG10	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.103	0.151	0.195	0.234	0.266	0.293	0.312	0.324	0.328	0.324	0.312	0.293	0.266	0.234	0.195	0.151	0.103	0.052	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.029	0.057	0.084	0.109	0.132	0.151	0.166	0.177	0.184	0.186	0.184	0.177	0.166	0.151	0.132	0.109	0.084	0.057	0.029	0.000
	FINAL CAMBER ↑	0"	5/16"	9/16"	13/16"	1"	1 1/4"	1 3/8"	1 1/2"	1 5/8"	1 11/16"	1 11/16"	1 11/16"	1 5/8"	1 1/2"	1 3/8"	1 1/4"	1"	13/16"	9/16"	5/16"	0"
BG4 TO BG9	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.103	0.151	0.195	0.234	0.266	0.293	0.312	0.324	0.328	0.324	0.312	0.293	0.266	0.234	0.195	0.151	0.103	0.052	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.027	0.054	0.080	0.104	0.125	0.143	0.158	0.168	0.175	0.177	0.175	0.168	0.158	0.143	0.125	0.104	0.080	0.054	0.027	0.000
	FINAL CAMBER ↑	0"	5/16"	9/16"	7/8"	1 1/16"	1 5/16"	1 1/2"	1 5/8"	1 3/4"	1 13/16"	1 13/16"	1 13/16"	1 3/4"	1 5/8"	1 1/2"	1 5/16"	1 1/16"	7/8"	9/16"	5/16"	0"



SCHEMATIC CAMBER ORDINATES AT GIRDER TWENTIETH POINTS

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TWENTIETH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

GIRDER CAMBER DETAILS

SITE 1 DWG. NO. 17

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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2			4			43

STR. #1

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DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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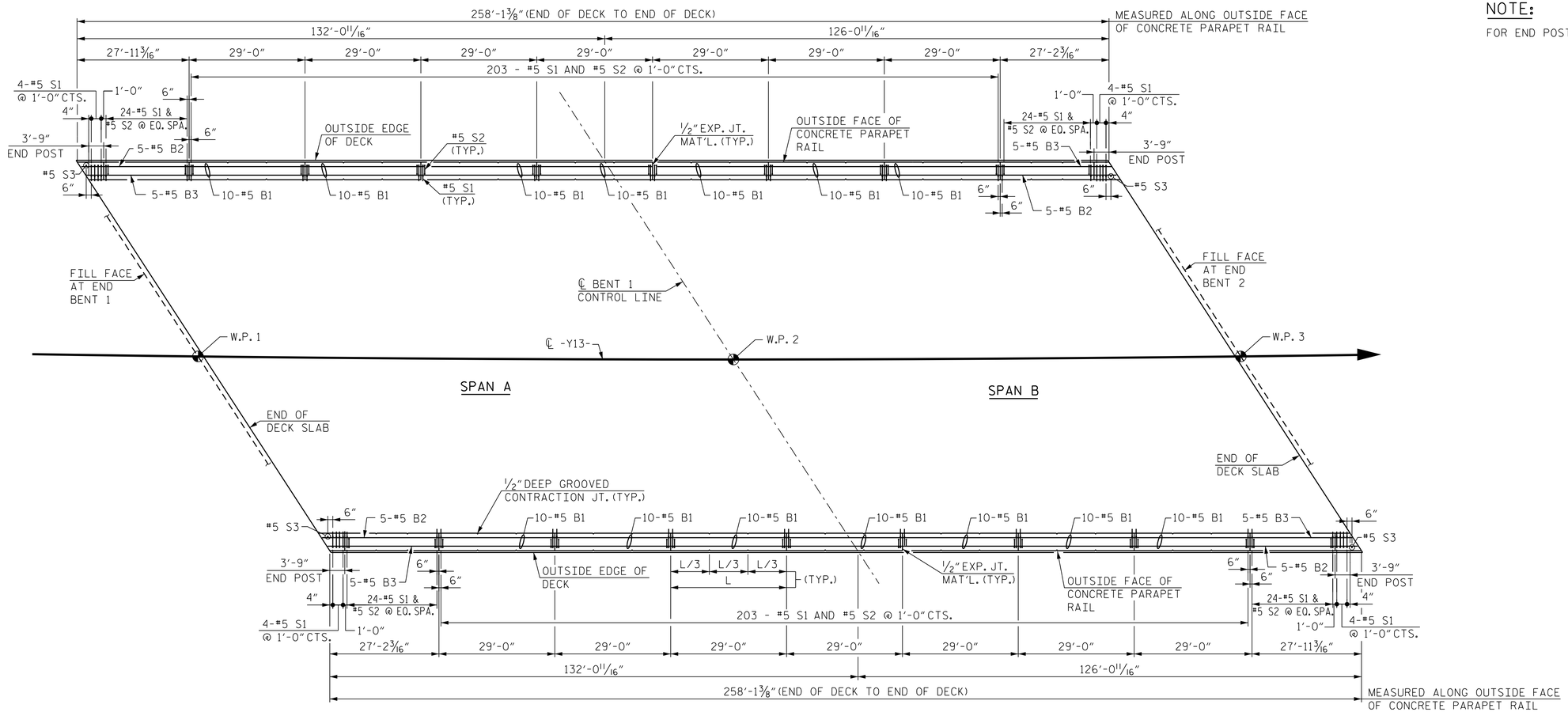

PLAN OF PARAPET RAIL

NOTE:

FOR END POST DETAILS, SEE SHEET 2 OF 2.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE PARAPET RAIL PLAN

SITE 1 DWG. NO. 18

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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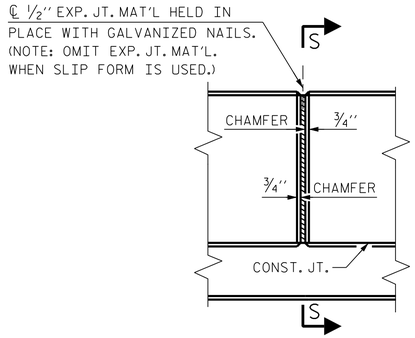
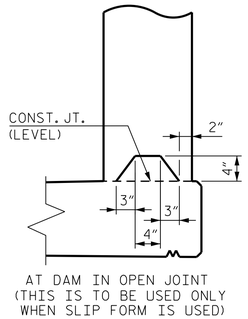


ELEVATION AT EXPANSION JOINTS



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

SECTION S-S

NOTES:

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

ALL REINFORCING STEEL IN PARAPET SHALL BE EPOXY COATED.

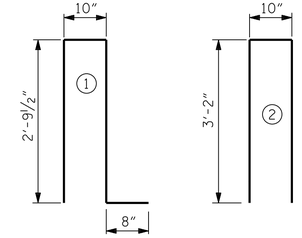
VERTICAL GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED 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.

FOR DETAILS OF CONCRETE INSERTS AND ANCHOR ASSEMBLIES, SEE "2 BAR METAL RAIL" SHEETS.

FOR GUARDRAIL ANCHOR ASSEMBLY DETAILS, SEE "GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS AND CONCRETE BARRIER RAILS" SHEET.

"B" BARS IN THE END POST MAY BE SHIFTED SLIGHTLY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY.

BAR TYPES



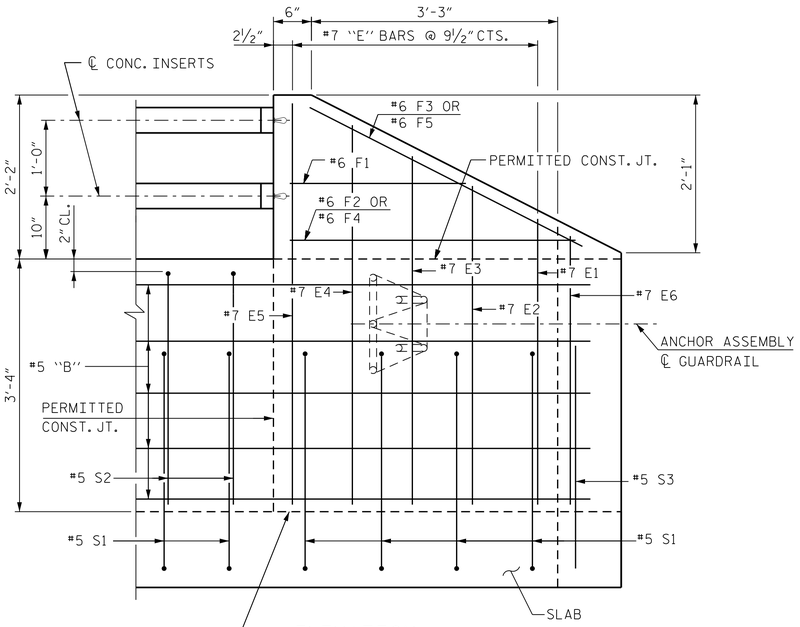
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

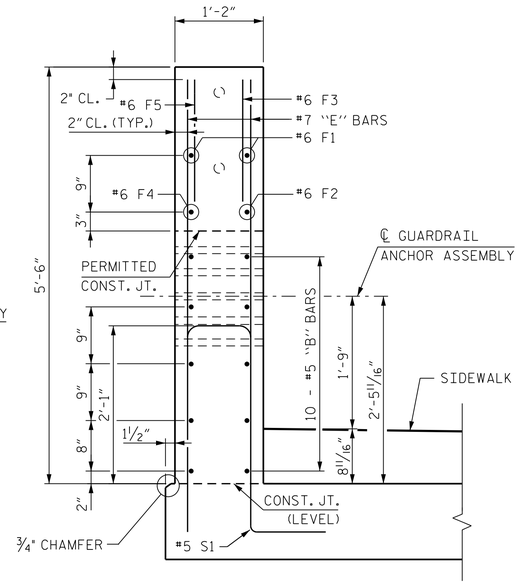
FOR CONCRETE PARAPET & END POST

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	140	#5	STR.	28'-7"	4,174
B2	20	#5	STR.	27'-2"	567
B3	20	#5	STR.	26'-8"	556
S1	518	#5	1	7'-1"	3,827
S2	502	#5	2	7'-2"	3,752
S3	4	#5	STR.	2'-10"	12
E1	8	#7	STR.	3'-7"	59
E2	8	#7	STR.	4'-0"	65
E3	8	#7	STR.	4'-5"	72
E4	8	#7	STR.	4'-10"	79
E5	8	#7	STR.	5'-2"	84
E6	4	#7	STR.	3'-4"	27
F1	8	#6	STR.	2'-1"	25
F2	4	#6	STR.	3'-11"	24
F3	4	#6	STR.	4'-0"	24
F4	4	#6	STR.	3'-6"	21
F5	4	#6	STR.	3'-7"	22

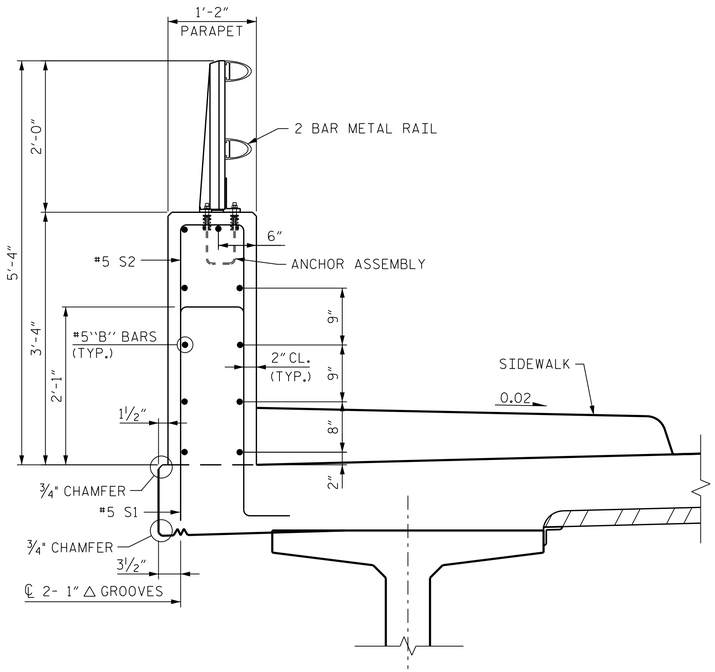
EPOXY COATED REINFORCING STEEL	13,390 LBS.
CLASS AA CONCRETE	75.0 C.Y.
CONCRETE PARAPET	516.2 LIN. FT.



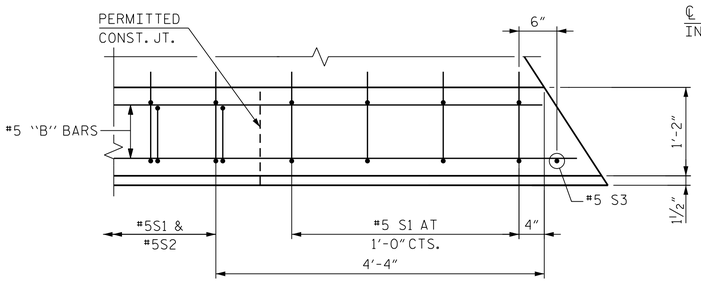
ELEVATION



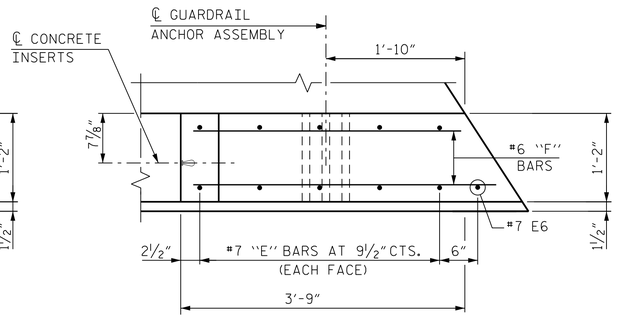
END VIEW



SECTION THRU TWO BAR METAL RAIL AND SIDEWALK



PLAN OF PARAPET



PLAN OF END POST

PARAPET AND END POST FOR TWO BAR METAL RAIL

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
CONCRETE
PARAPET
RAIL DETAILS

SITE 1 DWG. NO. 19

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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1			3		
2			4		

SHEET NO. S1-19
TOTAL SHEETS 43

STR. #1

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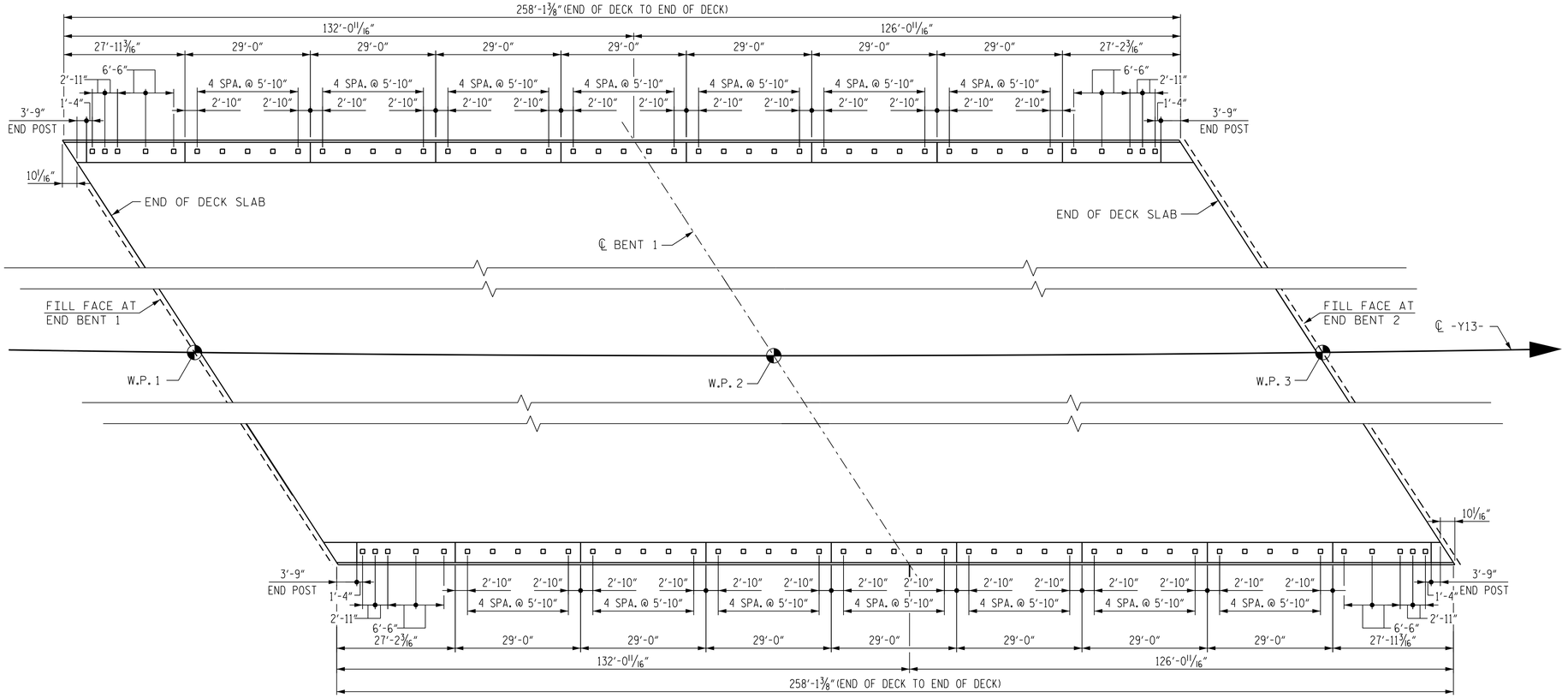

PLAN OF RAIL POST SPACINGS

PROJECT NO. U-2519BA

CUMBERLAND **COUNTY**

STATION: 46+43.11 -Y13-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RAIL POST SPACINGS
AND END OF RAIL
DETAILS

SITE 1 DWG. NO. 20

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			43

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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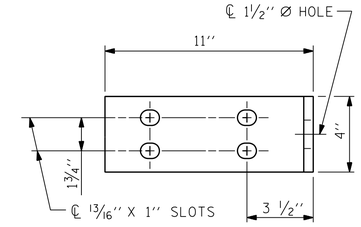
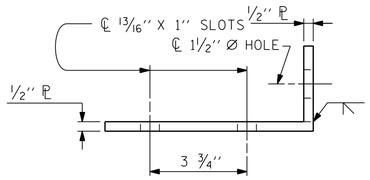
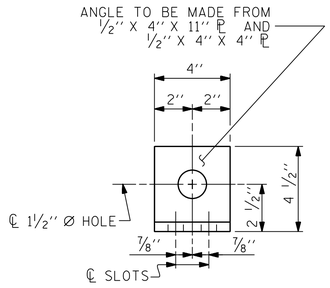


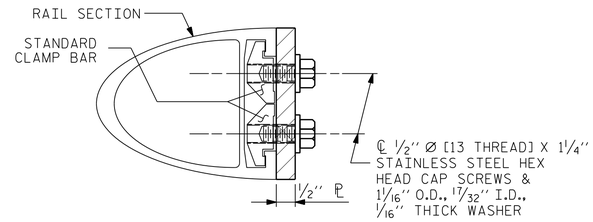
ELEVATION



TOP VIEW

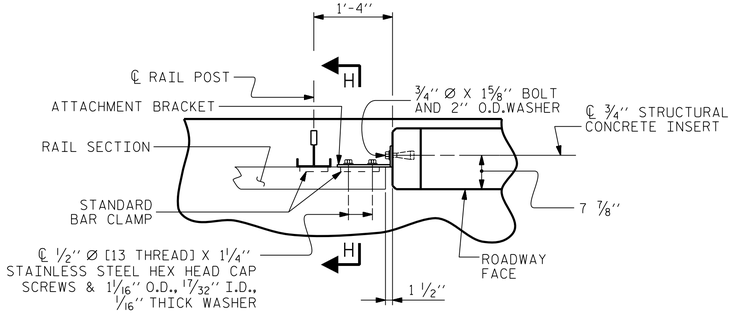


END VIEW (FIX AND EXP.)



SECTION H-H (FIX)

FIXED



PLAN - RAIL AND END POST

DETAILS FOR ATTACHING METAL RAIL TO 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 AASHTO M270 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).

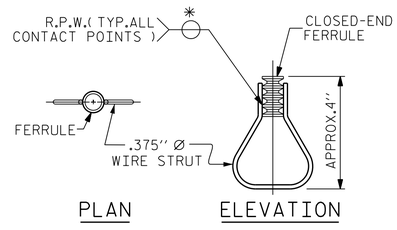
E. ½'' Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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 6 ½'' 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. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
RAIL POST SPACINGS AND END OF RAIL DETAILS

SITE 1 DWG. NO. 21

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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2			4			43

STR. #1

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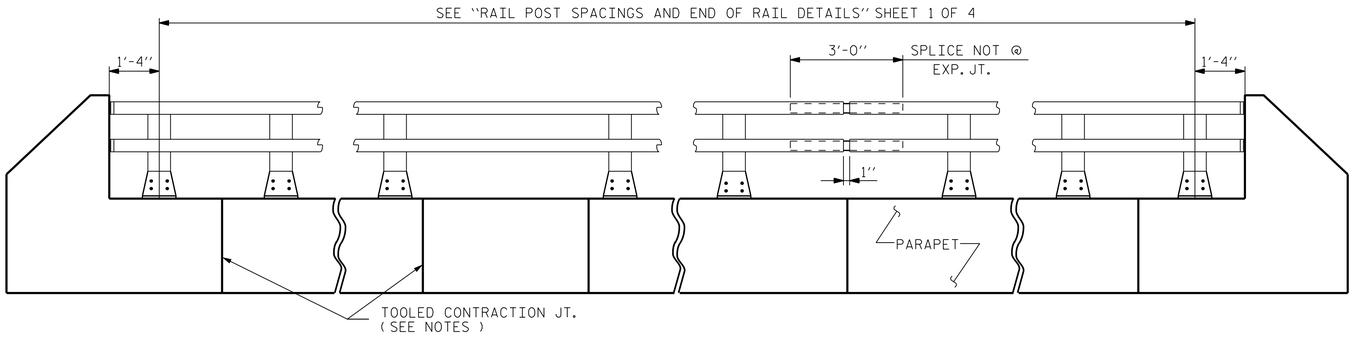
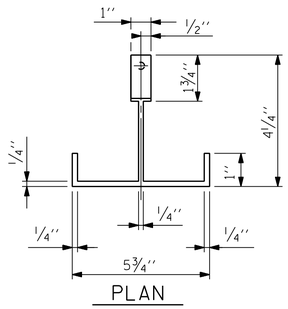
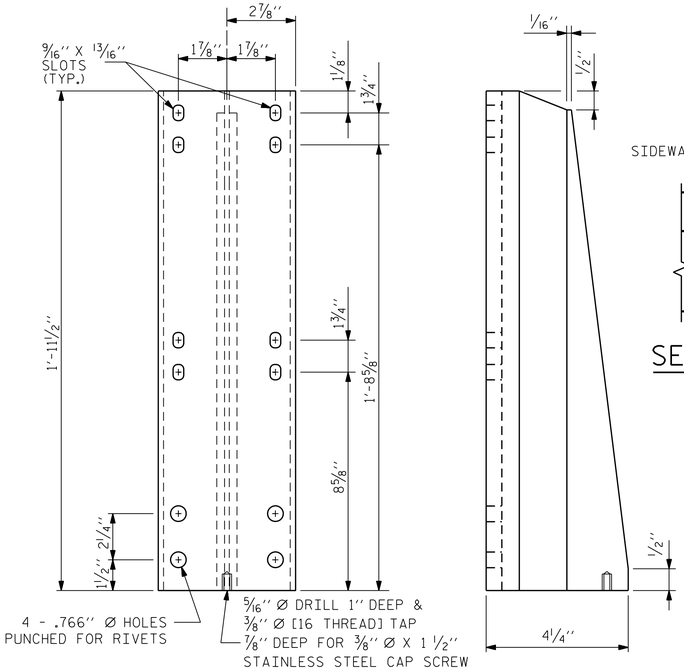


ELEVATION

NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET 2 OF 4



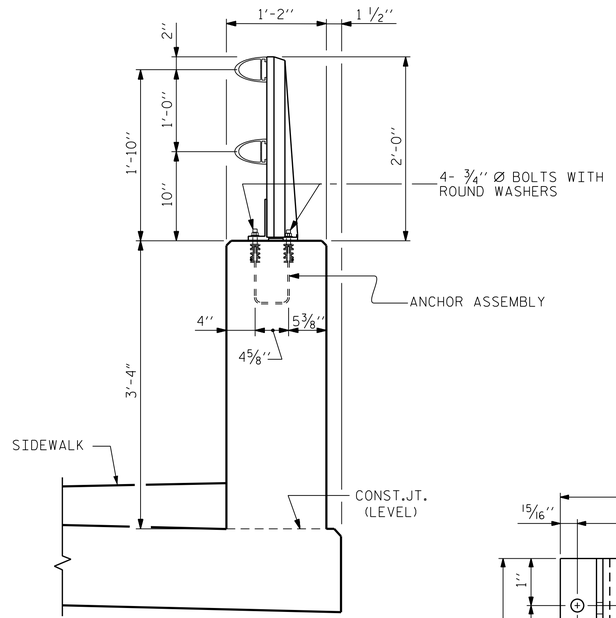
PLAN



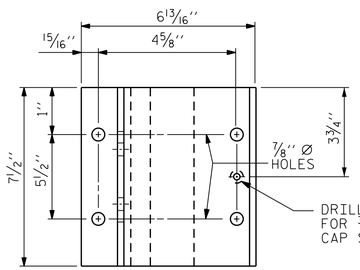
FRONT ELEVATION

SIDE ELEVATION

DETAILS OF POST



SECTION THRU PARAPET AND RAIL



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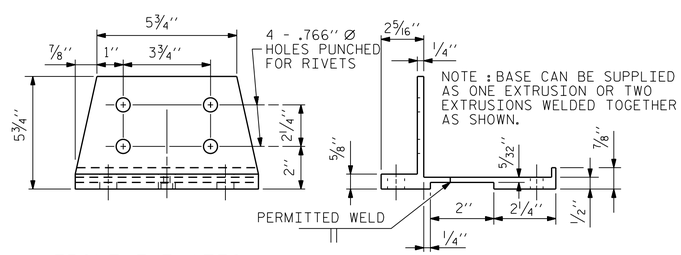
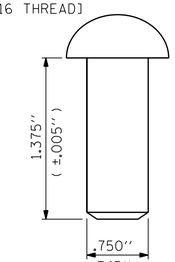


FRONT ELEVATION

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: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

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 A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

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, 1/2" 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 = 499.55 LIN. FT.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

SITE 1 DWG. NO. 22

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : D. M. RAGAN DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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2			4			43

STR. #1

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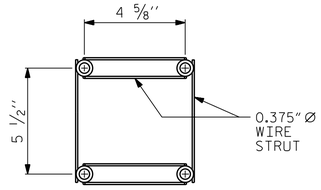

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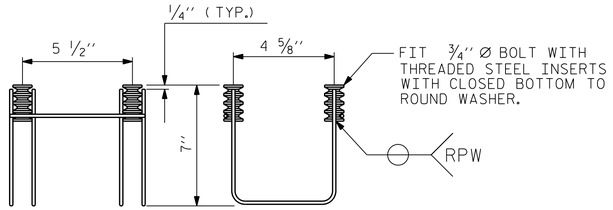


SIDE VIEW ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(90 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 3/4'' FERRULES.

B. 4 - 3/4'' Ø X 2 1/2'' 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 3/4'' Ø X 2 1/2'' 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.

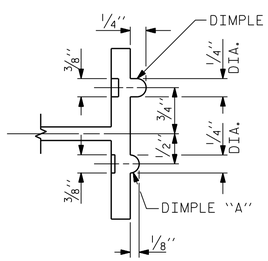
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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.

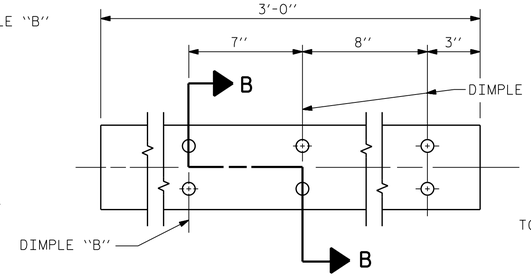
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

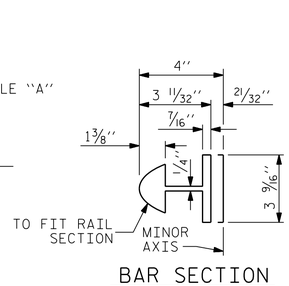
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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



SECTION B - B



EXPANSION BAR DETAILS



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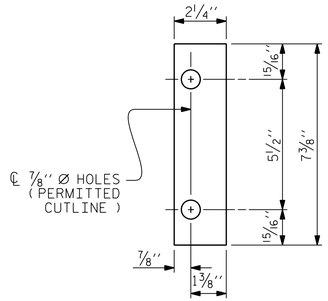
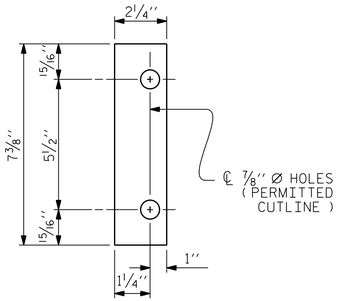


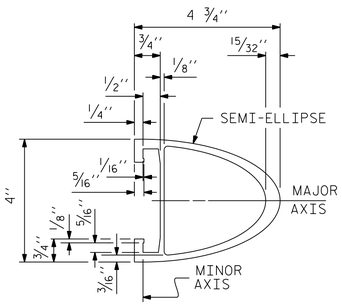
FRONT PLATE



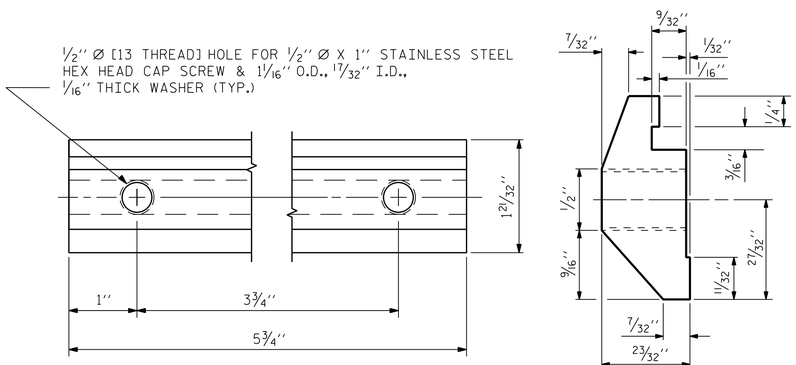
REAR PLATE

SHIM DETAILS

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

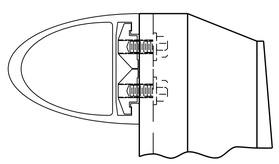


RAIL SECTION

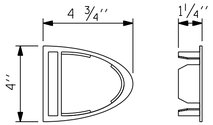


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

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CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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2 BAR METAL RAIL

SITE 1 DWG. NO. 23

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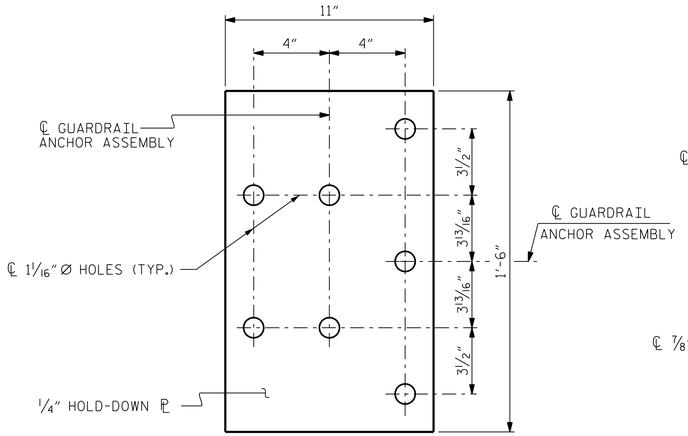
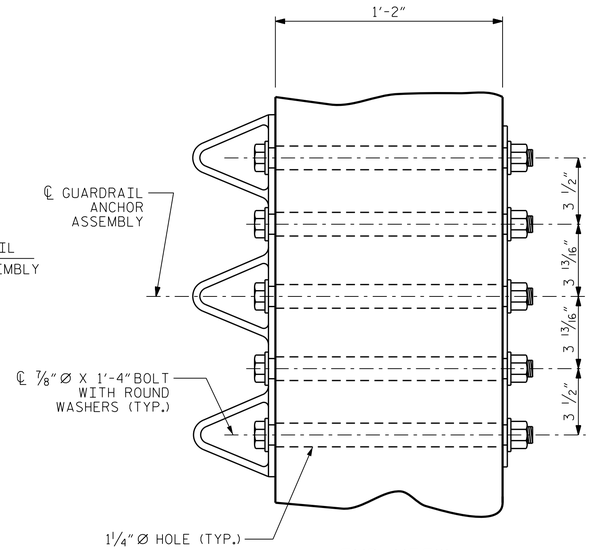


PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

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

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.

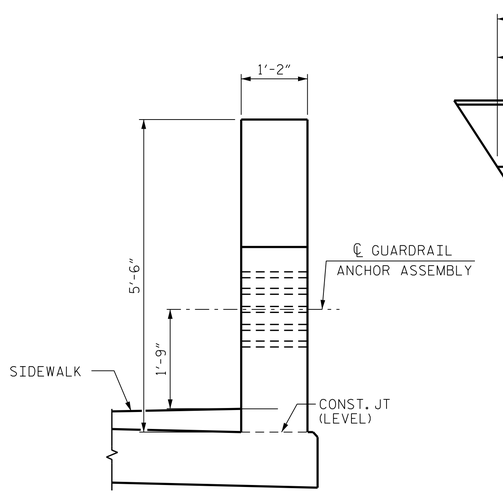
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

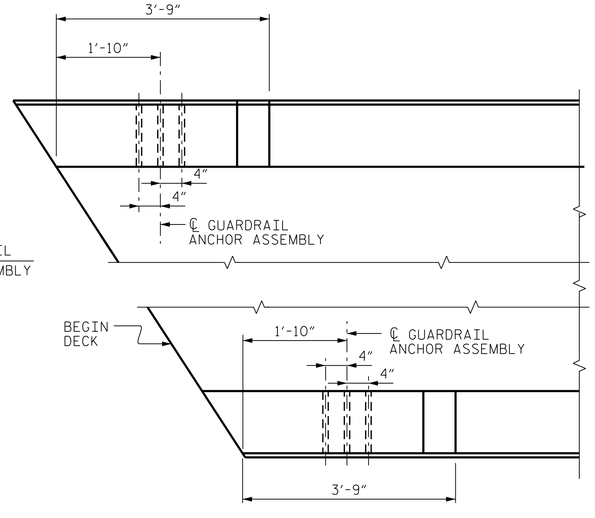
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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.

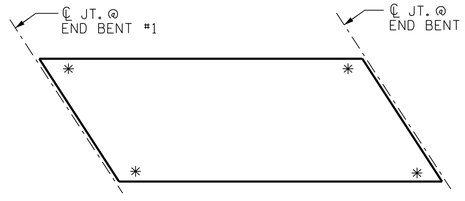


END VIEW



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST



SKETCH SHOWING POINTS OF ATTACHMENT

✳ LOCATION OF GUARDRAIL ATTACHMENT

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GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

SITE 1 DWG. NO. 24

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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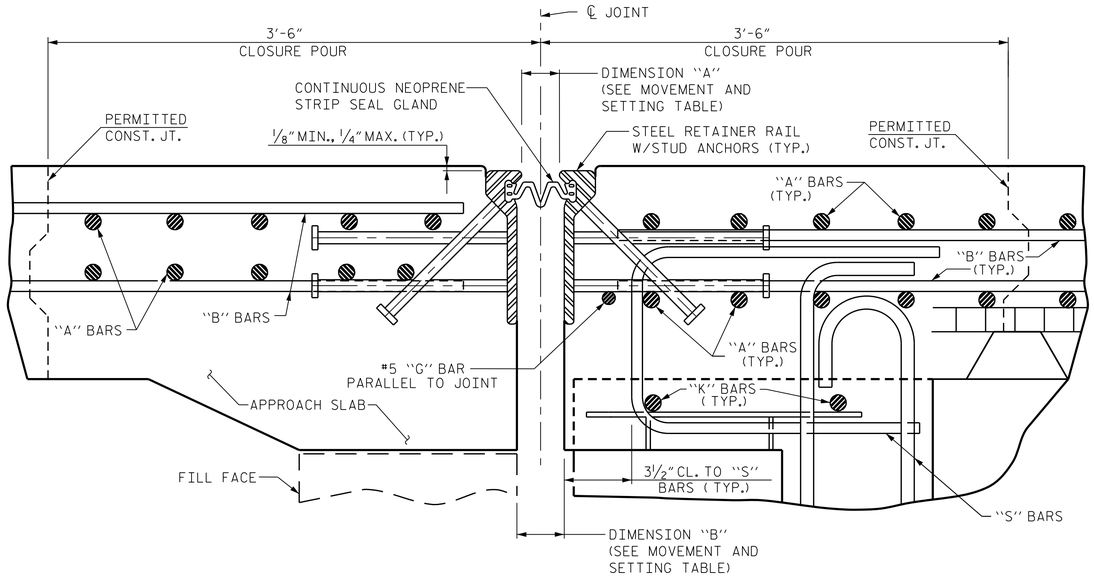


STRIP SEAL EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT - PRESTRESSED GIRDER SUPERSTRUCTURE

JOINT INSTALLATION PROCEDURE:

1. INSTALL THE STRIP SEAL EXPANSION JOINT AS RECOMMENDED BY THE MANUFACTURER.
2. A MANUFACTURER'S REPRESENTATIVE SHALL BE PRESENT DURING INSTALLATION OF THE JOINT.
3. PLACE STEEL RETAINER RAILS IN JOINT OPENING. PROPERLY ALIGN THE RAILS BOTH HORIZONTALLY AND VERTICALLY. DO NOT WELD SUPPORT SYSTEM TO THE METALLIZED SURFACES OF THE STEEL RETAINER RAILS.
4. CONFLICTING REINFORCING STEEL MAY BE SHIFTED SLIGHTLY WHEN NECESSARY.
5. DECK SLAB CONCRETE PLACEMENT OPERATIONS SHALL COMMENCE PER THE POURING SEQUENCE AFTER FINAL JOINT ALIGNMENT IS SET.
6. PROTECT THE STEEL RETAINER RAILS FROM BEING FOULED BY CONCRETE SPILLOVER DURING THE DECK POUR.
7. LOOSEN THE STEEL RETAINER RAIL SUPPORT SYSTEM TO ALLOW MOVEMENT WHILE CONCRETE CURES.
8. RE-LEVEL AND RE-ALIGN STEEL RETAINER RAIL AS REQUIRED ON OPPOSITE SIDE OF JOINT.
9. PLACE APPROACH/DECK SLAB CONCRETE.
10. ONCE THE CONCRETE HAS HARDENED SUFFICIENTLY ON BOTH SIDES OF JOINT, STEEL RETAINER RAILS SHALL BE CLEANED THOROUGHLY AND SEAL CHANNELS SHALL BE INSPECTED TO ASCERTAIN THE ABSENCE OF CONCRETE AND DEBRIS.
11. COAT THE STRIP SEAL LUGS WITH LUBRICANT-ADHESIVE AND INSTALL THE NEOPRENE STRIP SEAL GLAND AS RECOMMENDED BY THE STRIP SEAL EXPANSION JOINT MANUFACTURER.

GENERAL NOTES:

FOR STRIP SEAL EXPANSION JOINTS, SEE SPECIAL PROVISIONS.

STEEL RETAINER RAILS AND COVER PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 OR GRADE 50 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. MIN.

ONLY STEEL RETAINER RAILS OF ONE-PIECE CONSTRUCTION ARE PERMITTED. STEEL RETAINER RAILS CONSISTING OF TWO OR MORE COMPONENTS WELDED TOGETHER TO OBTAIN THEIR FINAL CROSS-SECTIONAL SHAPE ARE NOT PERMITTED.

STUD ANCHORS SHALL BE SHOP WELDED AND SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.

SURFACES COMING IN CONTACT WITH STRIP SEAL GLAND SHALL BE GROUND SMOOTH PRIOR TO METALLIZING.

UPON COMPLETION OF SHOP FABRICATION, THE STEEL RETAINER RAILS SHALL BE METALLIZED AS SHOWN IN THE "METALLIZING DETAIL". SEE SPECIAL PROVISIONS FOR THERMAL SPRAYED COATINGS (METALLIZATION).

INSTALLED STEEL RETAINER RAILS SHALL FOLLOW THE ROADWAY SLOPE.

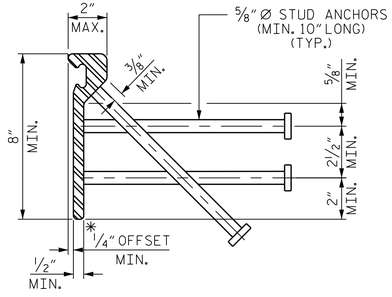
FIELD SPLICES OF THE RETAINER RAILS SHALL BE KEPT TO A MINIMUM. CONTRACTOR SHALL FURNISH DETAILED PLANS SHOWING PROPOSED SPLICE LOCATIONS FOR APPROVAL. FINISHED WELDS SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).

NEOPRENE STRIP SEAL GLAND SHALL BE CONTINUOUS THROUGHOUT THE JOINT AND SHALL BE COMPATIBLE WITH THE STEEL RETAINER RAILS. FIELD SPLICING THE GLAND IS NOT PERMITTED.

NO ALTERNATE JOINT DETAILS SHALL BE PERMITTED IN LIEU OF THOSE SHOWN ON THESE PLANS.

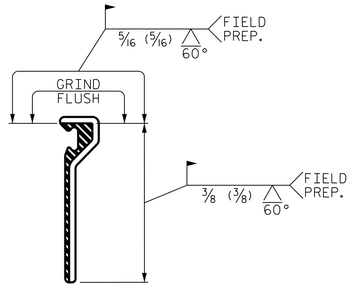
THE COVER PLATES SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

THE CONTRACTOR MAY, AT HIS OPTION, USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF CONCRETE INSERTS FOR COVER PLATES. THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

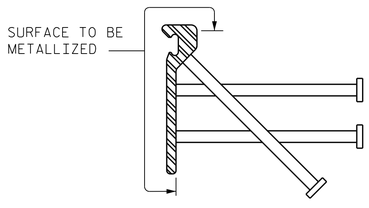


TYPICAL SECTION STEEL RETAINER RAIL

* DIMENSION "B" BASED ON STEEL RETAINER RAIL TOP OFFSET TO FACE OF RAIL OF 1/4" MINIMUM. IF ACTUAL OFFSET IS GREATER ADJUST DIMENSION "B" AS REQUIRED.



STEEL RETAINER RAIL (FIELD SPLICE DETAIL)



METALLIZING DETAIL

MOVEMENT AND SETTING AT JOINT								
LOCATION	SKEW ANGLE *	TOTAL MOVEMENT (ALONG ℄ RDWY)	DIMENSION "A"			DIMENSION "B"		
			PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
END BENT 1	56°58'54.7"	13/16"	2 1/8"	2"	1 3/4"	2 5/8"	2 1/2"	2 1/4"
END BENT 2	56°58'54.7"	3/4"	2 1/8"	2"	1 3/4"	2 5/8"	2 1/2"	2 1/4"

* SKEW ANGLE IS BETWEEN ℄ JOINT AND LONG CHORD

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CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

STRIP SEAL EXPANSION JOINT DETAILS

SITE 1 DWG. NO. 25

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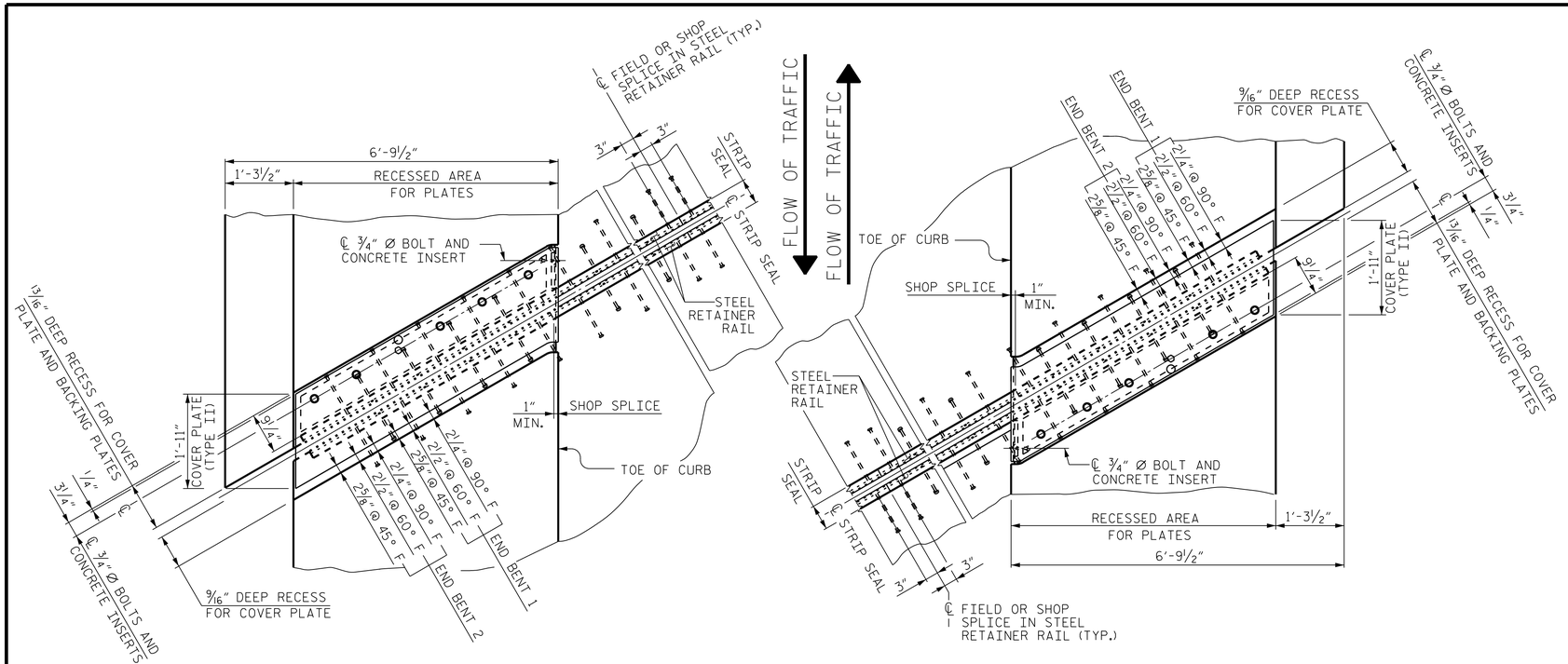
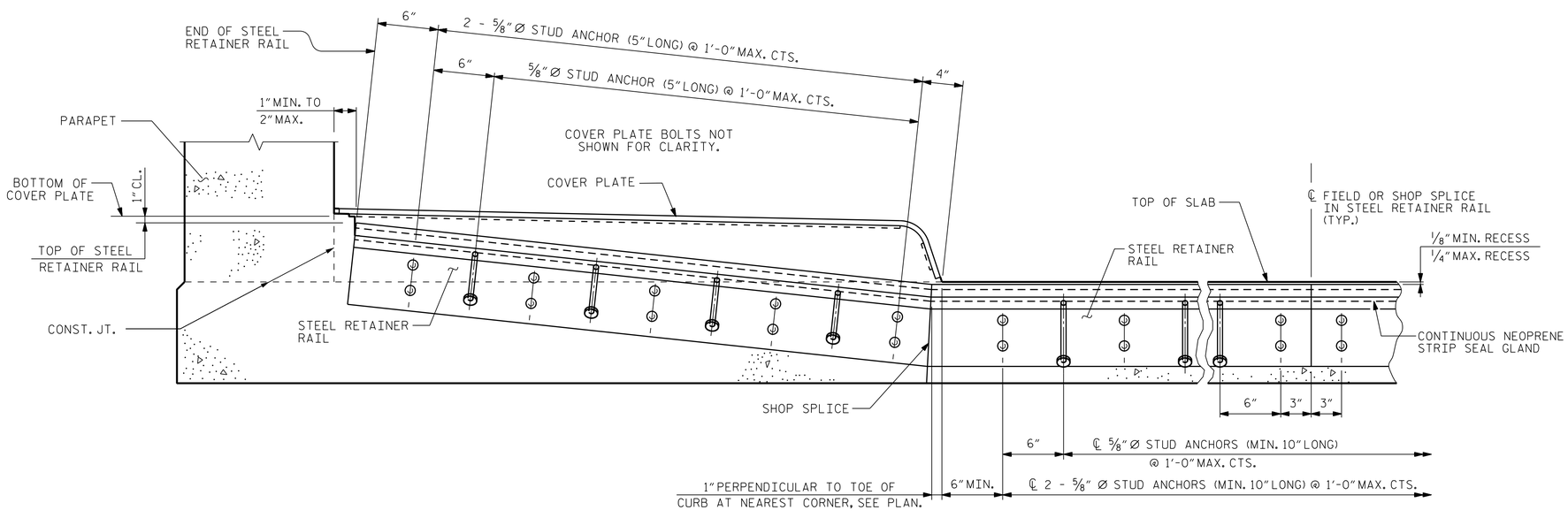


PLAN OF STRIP SEAL EXPANSION JOINT

(END BENT 1 SHOWN, END BENT 2 SIMILAR)



SECTION THRU SIDEWALK NORMAL TO JOINT

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 2 OF 3

STATE OF NORTH CAROLINA
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STANDARD

STRIP SEAL EXPANSION JOINT DETAILS FOR SIDEWALK

SITE 1 DWG. NO. 26

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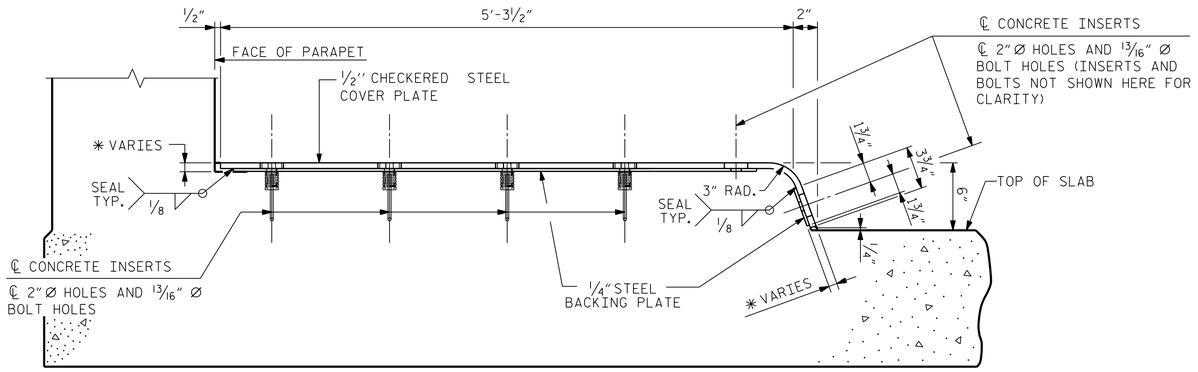


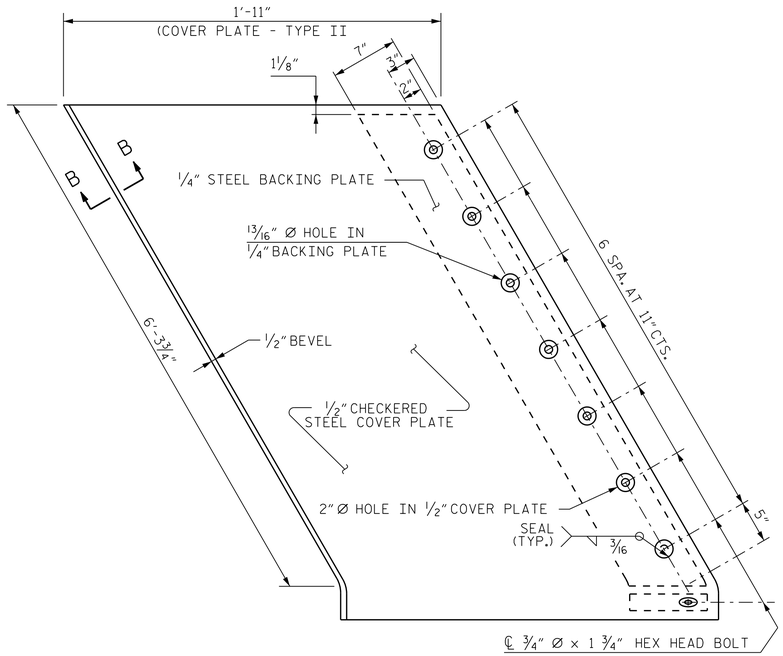
END VIEW

(NORMAL TO SIDEWALK)

* CONCRETE RECESS DIMENSIONS:

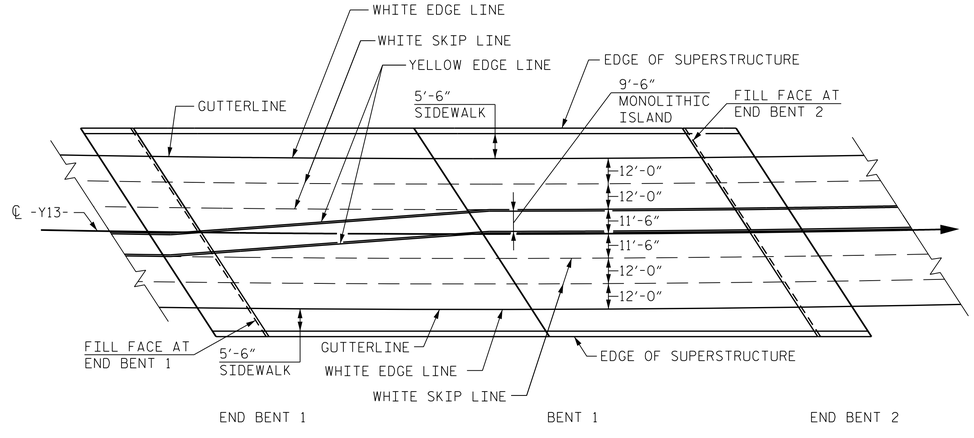
13/16" FOR THE SIDE OF THE JOINT HAVING THE 1/2" COVER PLATE WITH A 1/4" BACKING PLATE.

9/16" FOR THE SIDE OF THE JOINT HAVING ONLY THE 1/2" COVER PLATE.

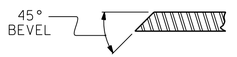


TYPE II - PLAN VIEW

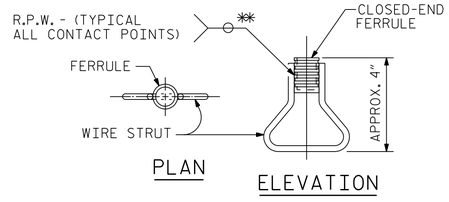
COVER PLATE DETAILS



PAVEMENT MARKING ALIGNMENT



SECTION B-B



CONCRETE INSERT

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
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STANDARD

STRIP SEAL EXPANSION JOINT DETAILS FOR SIDEWALK

SITE 1 DWG. NO. 27

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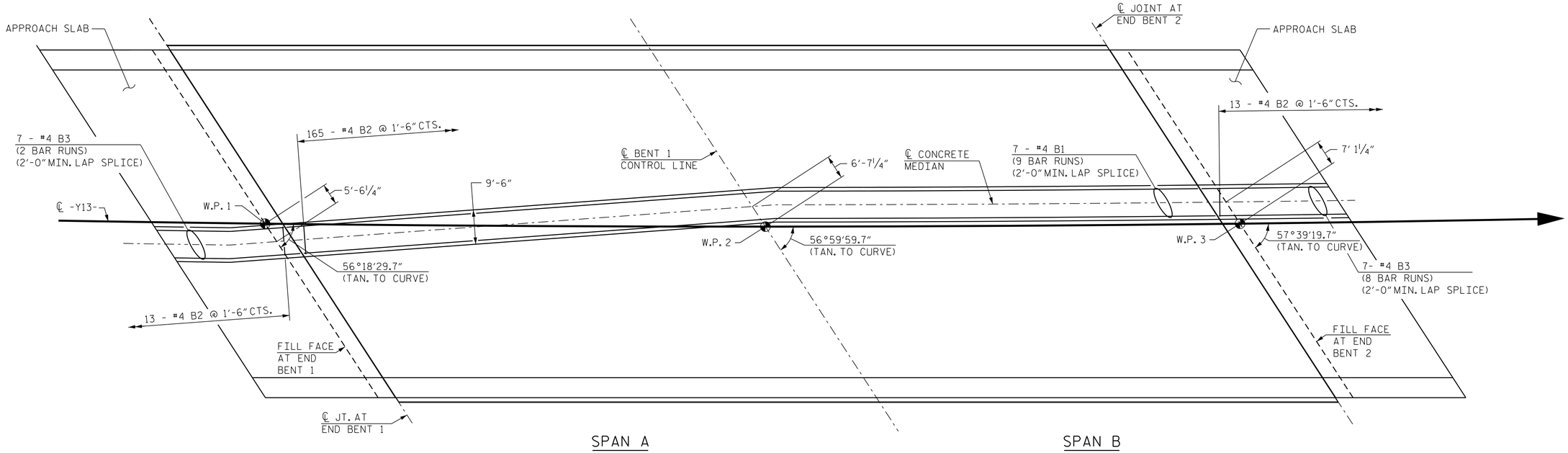
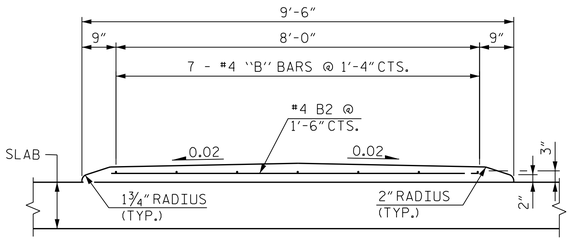
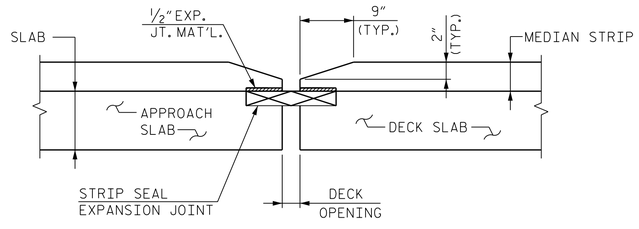


PLAN



REINFORCING STEEL DETAILS



DETAILS AT EXPANSION JOINT

BILL OF MATERIAL
CONCRETE MEDIAN

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	63	#4	STR	29'-10"	1,256
✳B2	165	#4	STR	8'-2"	901
✳B3	28	#4	STR	13'-4"	250
✳EPOXY COATED REINFORCING STEEL					2,407 LBS.
CLASS AA CONCRETE					45.5 C.Y.

NOTES:

NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE FOR MATERIALS OR LABOR TO CONSTRUCT THE CONCRETE MEDIAN. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE REINFORCED CONCRETE DECK SLAB.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE MEDIAN STRIP IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FT. IN LENGTH.

FOR LOCATION OF CONCRETE MEDIAN, SEE ROADWAY PLANS.

ALL REINFORCING STEEL IN CONCRETE MEDIAN SHALL BE EPOXY COATED.

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

PROJECT NO. U-2519BA
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STATE OF NORTH CAROLINA
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SUPERSTRUCTURE
CONCRETE MEDIAN DETAILS

SITE 1 DWG. NO. 28

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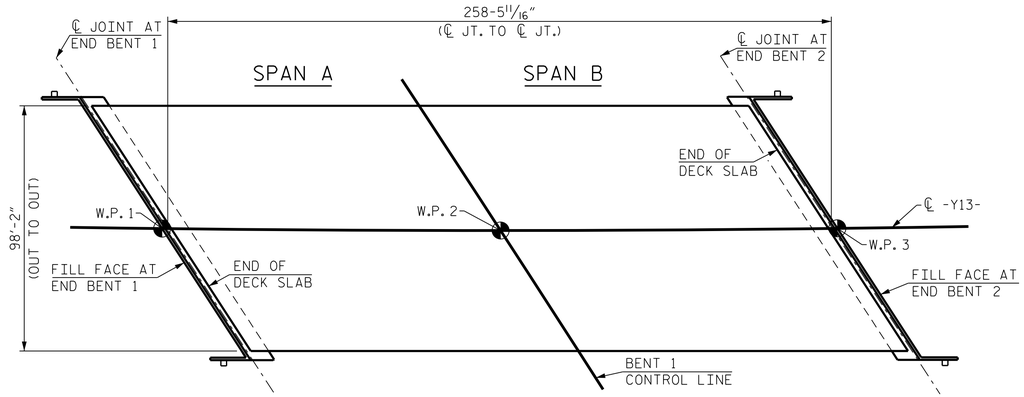
2			4			43

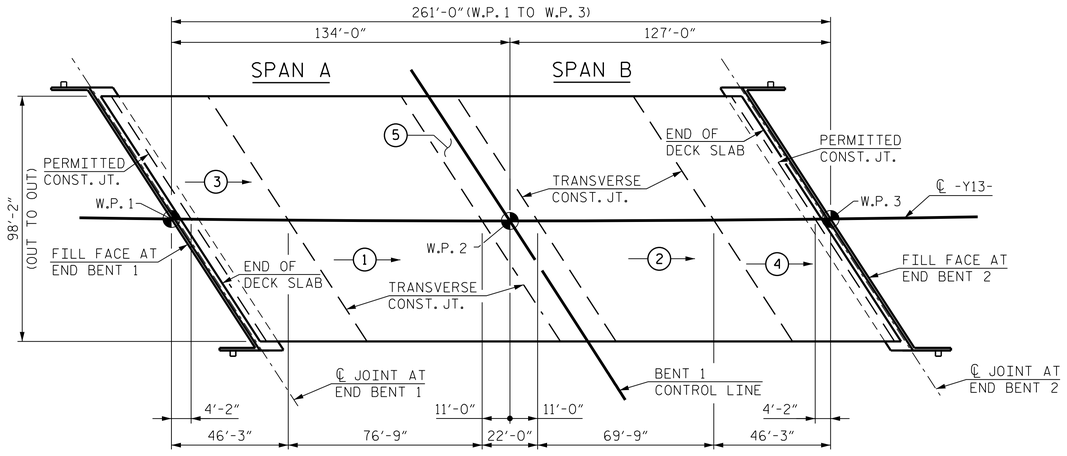
STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : D. M. RAGAN DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

bgonfa
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 1\FINAL\U2519BA_447_SD_CM.dgn



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 25,374)



POURING SEQUENCE

(#) INDICATES POUR NUMBER AND DIRECTION OF POUR

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	248.2	--	--
POUR 2	225.6	--	--
POUR 3	148.6	--	--
POUR 4	148.6	--	--
POUR 5	71.1	--	--
POUR 6***	64.1	--	3,877
TOTALS **	906.2	76,827	95,264

** QUANTITIES FOR PARAPET AND MEDIAN ARE NOT INCLUDED
*** QUANTITIES FOR SIDEWALK

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	3,600	SQ.FT.
BRIDGE DECK	21,006	SQ.FT.
TOTAL	24,606	SQ.FT.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

SITE 1 DWG. NO. 29

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-29
1			3			TOTAL SHEETS
2			4			43

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : M. SHARMA DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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REINFORCING BAR SCHEDULE

SPANS A AND B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	334	#5	STR.	58′-6″	20,379
✳ A2	334	#5	STR.	42′-2″	14,689
✳ A3	6	#6	STR.	19′-0″	171
✳ A6	84	#5	STR.	42′-2″	3,694
✳ A7	2	#5	STR.	57′-4″	120
✳ A8	2	#5	STR.	56′-6″	118
✳ A9	2	#5	STR.	55′-7″	116
✳ A10	2	#5	STR.	54′-8″	114
✳ A11	2	#5	STR.	53′-9″	112
✳ A12	2	#5	STR.	52′-11″	110
✳ A13	2	#5	STR.	52′-0″	108
✳ A14	2	#5	STR.	51′-1″	107
✳ A15	2	#5	STR.	50′-2″	105
✳ A16	2	#5	STR.	49′-4″	103
✳ A17	2	#5	STR.	48′-5″	101
✳ A18	2	#5	STR.	47′-6″	99
✳ A19	2	#5	STR.	46′-7″	97
✳ A20	2	#5	STR.	45′-9″	95
✳ A21	2	#5	STR.	44′-10″	94
✳ A22	2	#5	STR.	43′-11″	92
✳ A23	2	#5	STR.	43′-0″	90
✳ A24	2	#5	STR.	42′-2″	88
✳ A25	2	#5	STR.	41′-3″	86
✳ A26	2	#5	STR.	40′-4″	84
✳ A27	2	#5	STR.	39′-6″	82
✳ A28	2	#5	STR.	38′-7″	80
✳ A29	2	#5	STR.	37′-8″	79
✳ A30	2	#5	STR.	36′-9″	77
✳ A31	2	#5	STR.	35′-10″	75
✳ A32	2	#5	STR.	35′-0″	73
✳ A33	2	#5	STR.	34′-1″	71
✳ A34	2	#5	STR.	33′-2″	69
✳ A35	2	#5	STR.	32′-3″	67
✳ A36	2	#5	STR.	31′-5″	66
✳ A37	2	#5	STR.	30′-6″	64
✳ A38	2	#5	STR.	29′-7″	62
✳ A39	2	#5	STR.	28′-8″	60
✳ A40	2	#5	STR.	27′-10″	58
✳ A41	2	#5	STR.	26′-11″	56
✳ A42	2	#5	STR.	26′-0″	54
✳ A43	2	#5	STR.	25′-1″	52
✳ A44	2	#5	STR.	24′-3″	51
✳ A45	2	#5	STR.	23′-4″	49
✳ A46	2	#5	STR.	22′-5″	47
✳ A47	2	#5	STR.	21′-6″	45
✳ A48	2	#5	STR.	20′-8″	43
✳ A49	2	#5	STR.	59′-3″	124
✳ A50	2	#5	STR.	58′-5″	122
✳ A51	2	#5	STR.	57′-6″	120
✳ A52	2	#5	STR.	56′-7″	118
✳ A53	2	#5	STR.	55′-8″	116
✳ A54	2	#5	STR.	54′-10″	114
✳ A55	2	#5	STR.	53′-11″	112
✳ A56	2	#5	STR.	53′-0″	111
✳ A57	2	#5	STR.	52′-1″	109
✳ A58	2	#5	STR.	51′-2″	107
✳ A59	2	#5	STR.	50′-4″	105
✳ A60	2	#5	STR.	49′-5″	103
✳ A61	2	#5	STR.	48′-6″	101
✳ A62	2	#5	STR.	47′-7″	99
✳ A63	2	#5	STR.	46′-9″	98
✳ A64	2	#5	STR.	45′-10″	96
✳ A65	2	#5	STR.	44′-11″	94
✳ A66	2	#5	STR.	44′-0″	92
✳ A67	2	#5	STR.	43′-2″	90
✳ A68	2	#5	STR.	42′-3″	88
✳ A69	2	#5	STR.	41′-4″	86
✳ A70	2	#5	STR.	40′-5″	84
✳ A71	2	#5	STR.	39′-6″	82
✳ A72	2	#5	STR.	38′-8″	81
✳ A73	2	#5	STR.	37′-9″	79
✳ A74	2	#5	STR.	36′-10″	77
✳ A75	2	#5	STR.	35′-11″	75
✳ A76	2	#5	STR.	35′-1″	73
✳ A77	2	#5	STR.	34′-2″	71
✳ A78	2	#5	STR.	33′-3″	69
✳ A79	2	#5	STR.	32′-4″	67
✳ A80	2	#5	STR.	31′-5″	66
✳ A81	2	#5	STR.	30′-7″	64
✳ A82	2	#5	STR.	29′-8″	62
✳ A83	2	#5	STR.	28′-9″	60
✳ A84	2	#5	STR.	27′-10″	58
✳ A85	2	#5	STR.	27′-0″	56
✳ A86	2	#5	STR.	26′-1″	54
✳ A87	2	#5	STR.	25′-2″	52
✳ A88	2	#5	STR.	24′-3″	51
✳ A89	2	#5	STR.	23′-5″	49
✳ A90	2	#5	STR.	22′-6″	47
✳ A91	2	#5	STR.	21′-7″	45
✳ A92	2	#5	STR.	20′-8″	43
✳ A93	2	#5	STR.	19′-9″	41
✳ A94	2	#5	STR.	18′-11″	39
✳ A95	2	#5	STR.	18′-0″	38
✳ A96	2	#5	STR.	17′-1″	36
✳ A97	2	#5	STR.	16′-2″	34
✳ A98	2	#5	STR.	15′-4″	32
✳ A99	2	#5	STR.	14′-5″	30
✳ A100	2	#5	STR.	13′-6″	28
✳ A101	2	#5	STR.	12′-7″	26
✳ A102	2	#5	STR.	11′-9″	25
✳ A103	2	#5	STR.	10′-10″	23
✳ A104	2	#5	STR.	9′-11″	21
✳ A105	2	#5	STR.	9′-0″	19
✳ A106	2	#5	STR.	8′-1″	17
✳ A107	2	#5	STR.	7′-3″	15
✳ A108	2	#5	STR.	6′-4″	13
✳ A109	2	#5	STR.	5′-5″	11
✳ A110	2	#5	STR.	4′-6″	9
✳ A111	2	#5	STR.	3′-8″	8
✳ A112	2	#5	STR.	2′-9″	6
A4	334	#5	STR.	54′-3″	18,899
A5	334	#5	STR.	46′-0″	16,025
A113	84	#5	STR.	46′-0″	4,030
A114	2	#5	STR.	53′-2″	111
A115	2	#5	STR.	52′-4″	109
A116	2	#5	STR.	51′-5″	107
A117	2	#5	STR.	50′-6″	105
A118	2	#5	STR.	49′-7″	103
A119	2	#5	STR.	48′-9″	102
A120	2	#5	STR.	47′-10″	100
A121	2	#5	STR.	46′-11″	98
A122	2	#5	STR.	46′-0″	96
A123	2	#5	STR.	45′-2″	94
A124	2	#5	STR.	44′-3″	92
A125	2	#5	STR.	43′-4″	90
A126	2	#5	STR.	42′-5″	88
A127	2	#5	STR.	41′-7″	87
A128	2	#5	STR.	40′-8″	85
A129	2	#5	STR.	39′-9″	83
A130	2	#5	STR.	38′-10″	81
A131	2	#5	STR.	38′-0″	79
A132	2	#5	STR.	37′-1″	77
A133	2	#5	STR.	36′-2″	75
A134	2	#5	STR.	35′-3″	74
A135	2	#5	STR.	34′-5″	72
A136	2	#5	STR.	33′-6″	70
A137	2	#5	STR.	32′-7″	68
A138	2	#5	STR.	31′-8″	66
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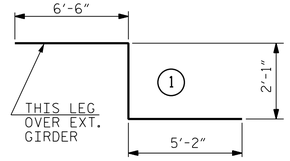
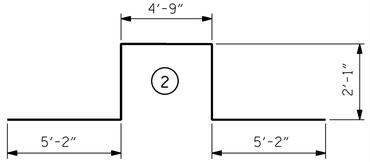
A140	2	#5	STR.	29′-11″	62
A141	2	#5	STR.	29′-0″	60
A142	2	#5	STR.	28′-1″	59
A143	2	#5	STR.	27′-3″	57
A144	2	#5	STR.	26′-4″	55
A145	2	#5	STR.	25′-5″	53
A146	2	#5	STR.	24′-6″	51
A147	2	#5	STR.	23′-8″	49
A148	2	#5	STR.	22′-9″	47
A149	2	#5	STR.	21′-10″	46
A150	2	#5	STR.	20′-11″	44
A151	2	#5	STR.	20′-0″	42
A152	2	#5	STR.	19′-2″	40
A153	2	#5	STR.	18′-3″	38
A154	2	#5	STR.	17′-4″	36
A155	2	#5	STR.	16′-6″	34
A156	2	#5	STR.	59′-3″	124
A157	2	#5	STR.	58′-5″	122
A158	2	#5	STR.	57′-6″	120
A159	2	#5	STR.	56′-7″	118
A160	2	#5	STR.	55′-8″	116
A161	2	#5	STR.	54′-10″	114
A162	2	#5	STR.	53′-11″	112
A163	2	#5	STR.	53′-0″	111
A164	2	#5	STR.	52′-1″	109
A165	2	#5	STR.	51′-2″	107
A166	2	#5	STR.	50′-4″	105
A167	2	#5	STR.	49′-5″	103
A168	2	#5	STR.	48′-6″	101
A169	2	#5	STR.	47′-7″	99
A170	2	#5	STR.	46′-9″	98
A171	2	#5	STR.	45′-10″	96
A172	2	#5	STR.	44′-11″	94
A173	2	#5	STR.	44′-0″	92
A174	2	#5	STR.	43′-2″	90
A175	2	#5	STR.	42′-3″	88
A176	2	#5	STR.	41′-4″	86
A177	2	#5	STR.	40′-5″	84
A178	2	#5	STR.	39′-6″	82
A179	2	#5	STR.	38′-8″	81
A180	2	#5	STR.	37′-9″	79
A181	2	#5	STR.	36′-10″	77
A182	2	#5	STR.	35′-11″	75
A183	2	#5	STR.	35′-1″	73
A184	2	#5	STR.	34′-2″	71
A185	2	#5	STR.	33′-3″	69
A186	2	#5	STR.	32′-4″	67
A187	2	#5	STR.	31′-5″	66
A188	2	#5	STR.	30′-7″	64
A189	2	#5	STR.	29′-8″	62
A190	2	#5	STR.	28′-9″	60
A191	2	#5	STR.	27′-10″	58
A192	2	#5	STR.	27′-0″	56
A193	2	#5	STR.	26′-1″	54
A194	2	#5	STR.	25′-2″	52
A195	2	#5	STR.	24′-3″	51
A196	2	#5	STR.	23′-5″	49
A197	2	#5	STR.	22′-6″	47
A198	2	#5	STR.	21′-7″	45
A199	2	#5	STR.	20′-8″	43
A200	2	#5	STR.	19′-9″	41
A201	2	#5	STR.	18′-11″	39
A202	2	#5	STR.	18′-0″	38
A203	2	#5	STR.	17′-1″	36
A204	2	#5	STR.	16′-2″	34
A205	2	#5	STR.	15′-4″	32
A206	2	#5	STR.	14′-5″	30
A207	2	#5	STR.	13′-6″	28
A208	2	#5	STR.	12′-7″	26
A209	2	#5	STR.	11′-9″	25
A210	2	#5	STR.	10′-10″	23
A211	2	#5	STR.	9′-11″	21
A212	2	#5	STR.	9′-0″	19
A213	2	#5	STR.	8′-1″	17
A214	2	#5	STR.	7′-3″	15
A215	2	#5	STR.	6′-4″	13
A216	2	#5	STR.	5′-5″	11
A217	2	#5	STR.	4′-6″	9
A218	2	#5	STR.	3′-8″	8
A219	2	#5	STR.	2′-9″	6
B1	370	#5	STR.	53′-3″	20,550
✳ B2	231	#4	STR.	30′-11″	4,771
✳ B3	231	#4	STR.	29′-8″	4,578
✳ B4	149	#6	STR.	60′-0″	13,428
✳ B5	149	#6	STR.	31′-3″	6,994
✳ B6	144	#6	STR.	49′-3″	10,652
B7	151	#5	STR.	45′-10″	7,218
B8	151	#5	STR.	18′-5″	2,900
✳ B9	70	#4	STR.	39′-1″	1,828
✳ G1	4	#5	STR.	59′-8″	249
✳ G2	4	#4	STR.	2′-3″	6
✳ G3	4	#4	STR.	3′-9″	10
✳ G4	510	#4	STR.	5′-0″	1,703
✳ K1	8	#8	1	13′-9″	294
✳ K2	40	#8	2	19′-3″	2,056
✳ K3	22	#6	STR.	8′-2″	270
✳ K4	22	#6	STR.	7′-1″	234
✳ K5	22	#6	STR.	6′-0″	198
✳ S1	132	#4	3	4′-4″	382
✳ S2	132	#5	4	5′-10″	803
✳ U1	148	#4	3	3′-4″	330

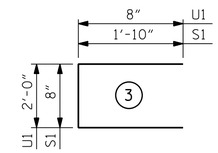
REINFORCING STEEL	95,264 LBS.
✳ EPOXY COATED REINFORCING STEEL	76,827 LBS.

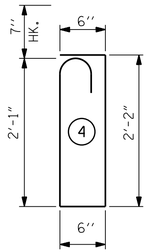
✳ EPOXY COATED

BAR TYPES









NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

SITE 1 DWG. NO. 30

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S1-30

TOTAL SHEETS 43

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : M.SHARMA DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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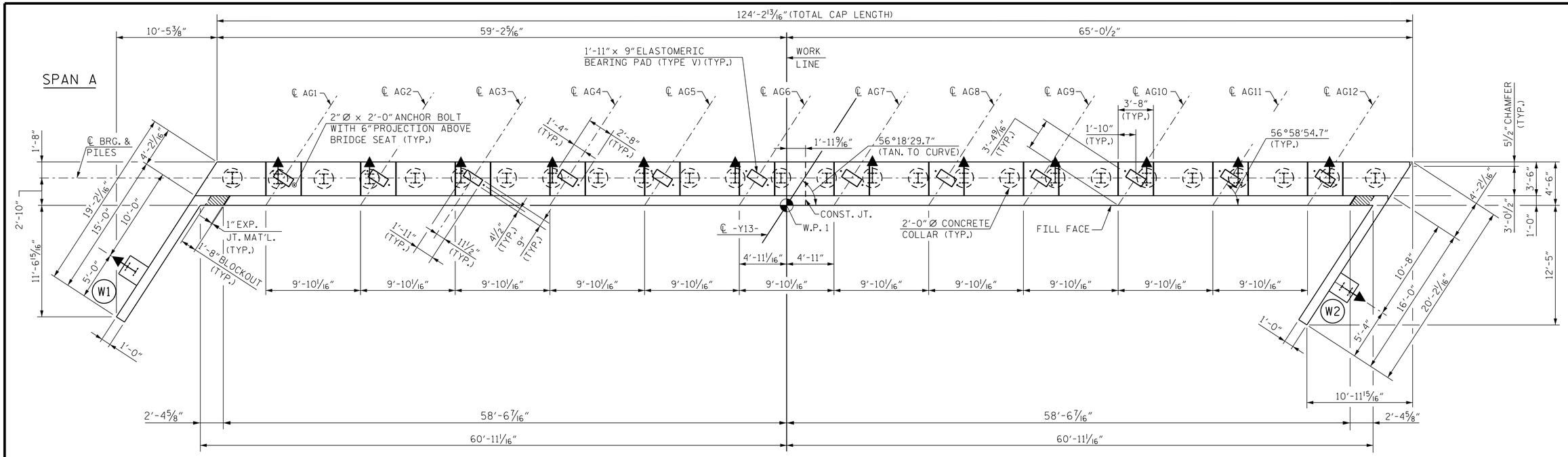
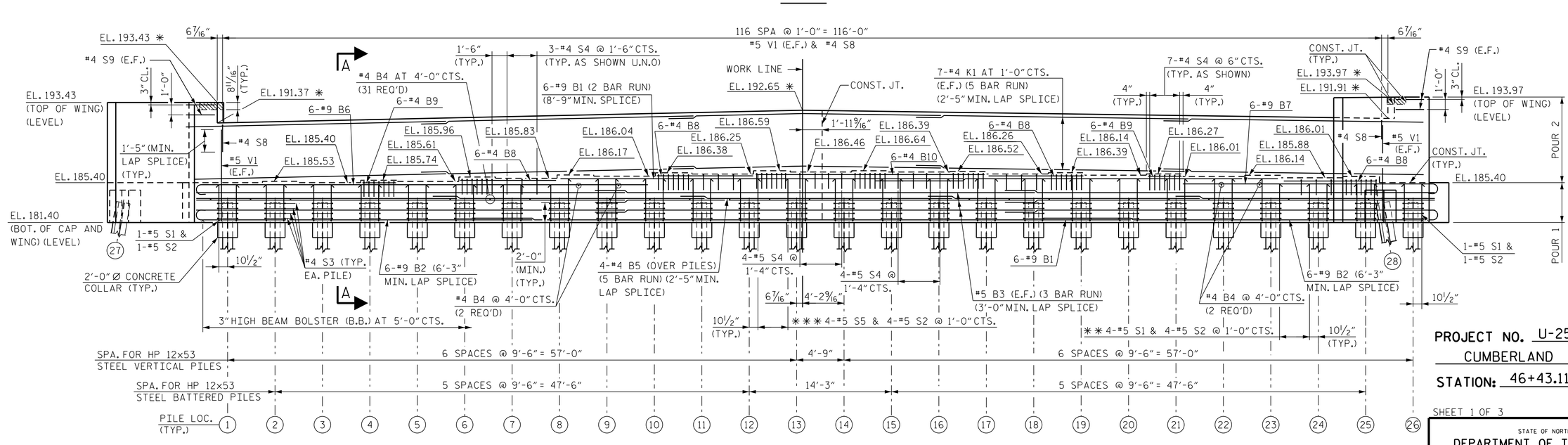
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 1\FINAL\U2519BA_447_SD_BM2.dgn

SPAN A



PLAN



LEGEND:

HP 12x53 VERTICAL STEEL PILES

HP 12x53 STEEL PILES BATTERED 3:12

ELEVATION

* ELEVATION AT FILL FACE

** TYP. BTWN. PILES 1 THRU 8 & BTWN. PILES 23 THRU 26

*** TYP. BTWN. PILES 8 THRU 23

NOTE:

FOR CONSTRUCTION JOINT DETAILS, SEE END BENT 2 SHEET 3 OF 3.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
PLAN AND ELEVATION

SITE 1 DWG. NO. 31

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RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-31
1			3			TOTAL SHEETS
2			4			43

STR. #1

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : D. M. RAGAN DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

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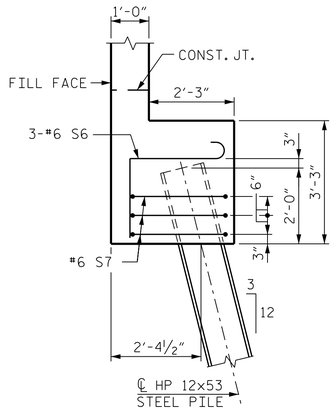
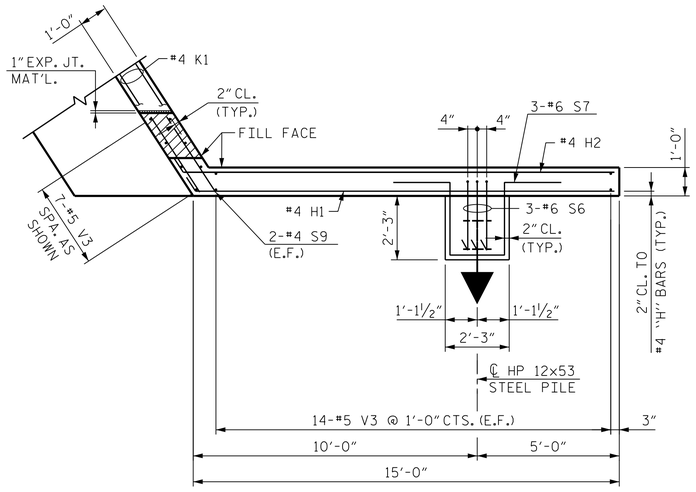
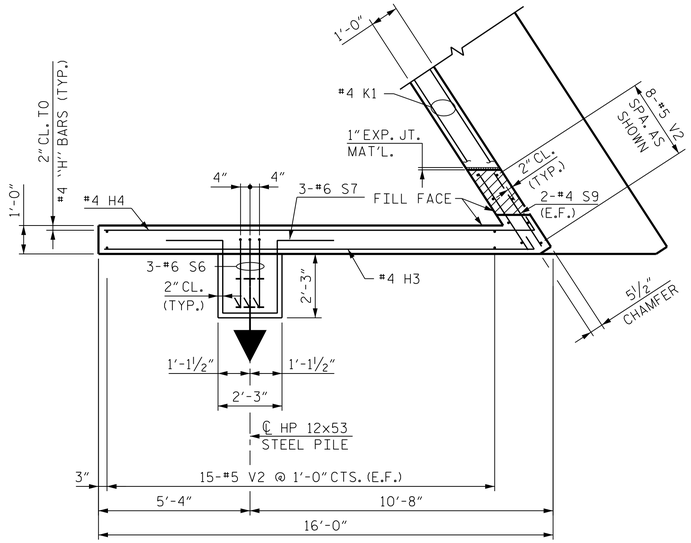


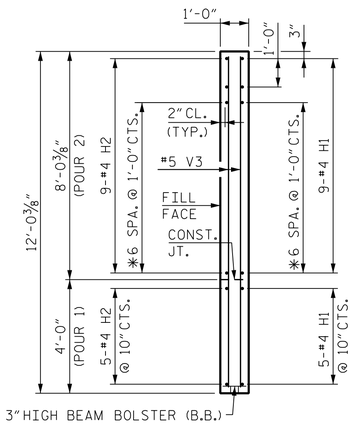
SECTION A-A



PLAN OF LEFT WINGWALL

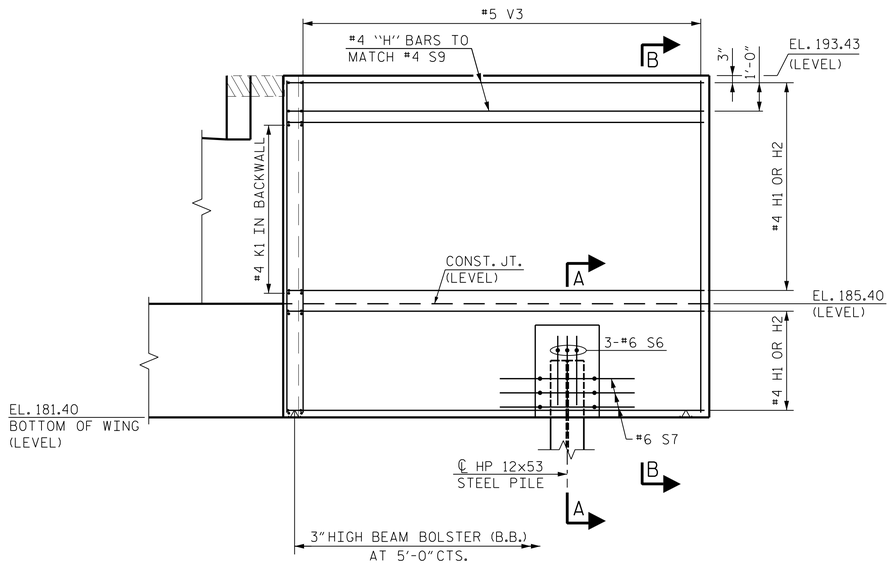


PLAN OF RIGHT WINGWALL

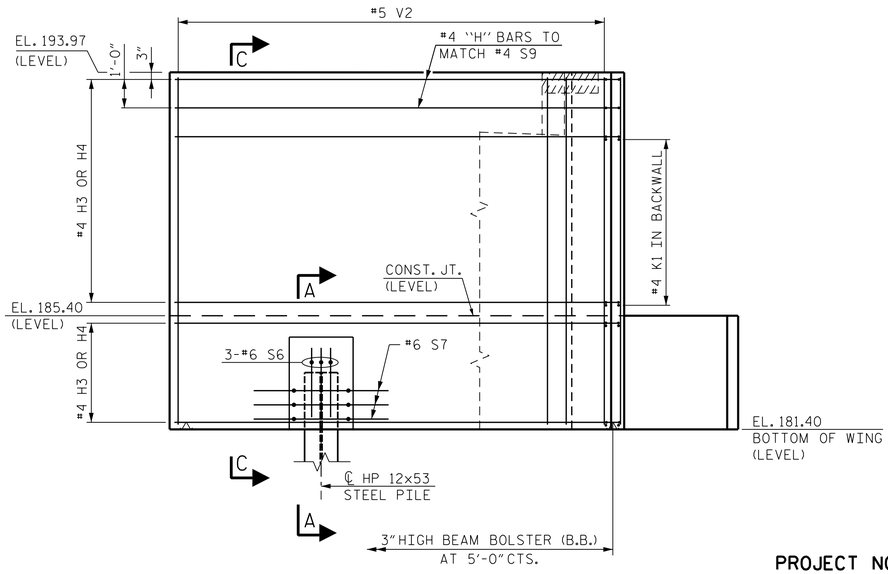


SECTION B-B

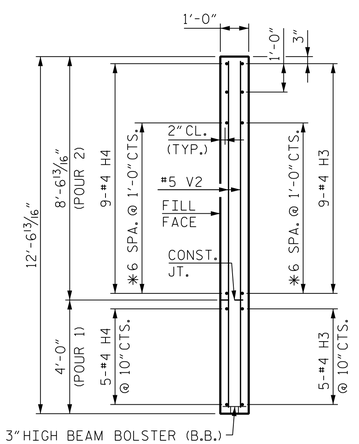
* MATCH TO K1 BARS IN BACKWALL



ELEVATION OF LEFT WINGWALL



ELEVATION OF RIGHT WINGWALL



SECTION C-C

* MATCH TO K1 BARS IN BACKWALL

LEFT WINGWALL DETAILS (W1)

RIGHT WINGWALL DETAILS (W2)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
WINGWALL DETAILS

SITE 1 DWG. NO. 32

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #1

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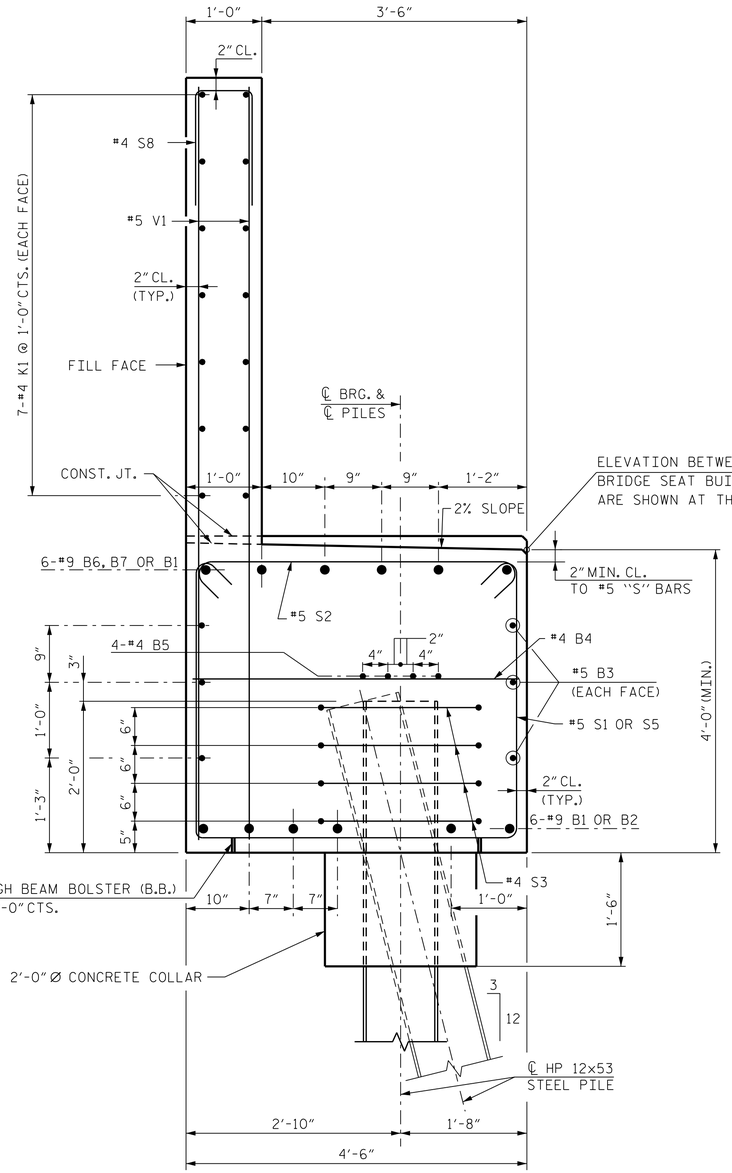
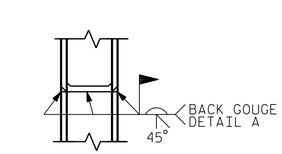
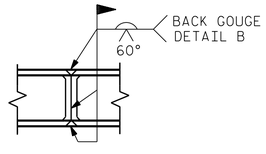


SECTION A-A

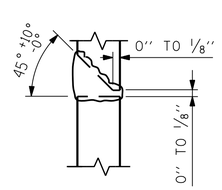
(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)



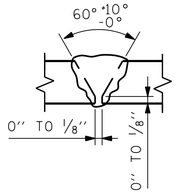
* PILE VERTICAL



* PILE HORIZONTAL OR VERTICAL



DETAIL A



DETAIL B

PILE SPLICE DETAILS

* POSITION OF PILE DURING WELDING.

NOTES:

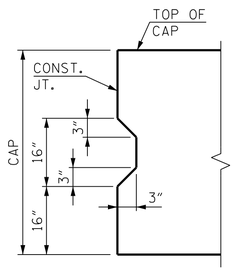
FOR TEMPORARY DRAINAGE, SEE END BENT 2, SHEET 3 OF 3.

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

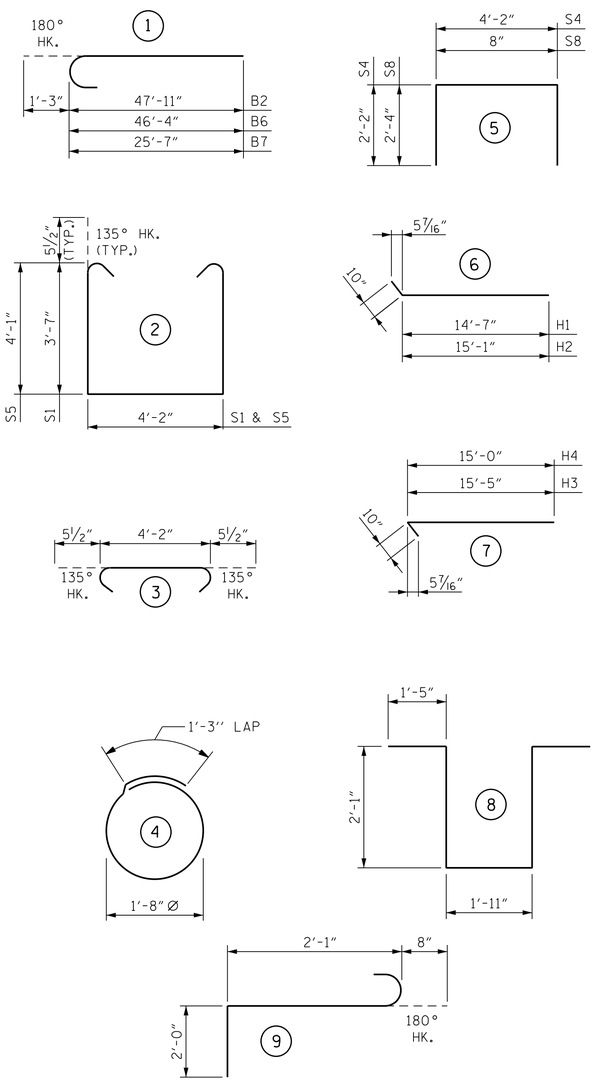


CONSTRUCTION JOINT IN CAP

NOTE:

REINFORCING STEEL IN CAP NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINT.

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

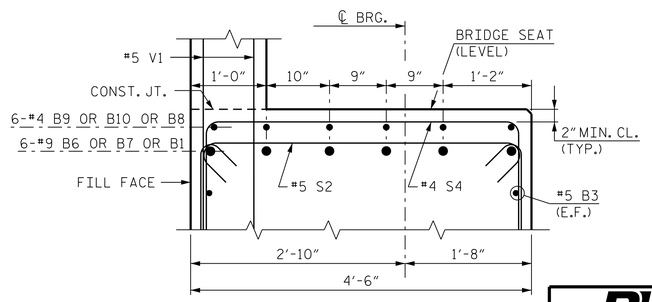
END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	18	#9	STR.	40'-6"	2,479
B2	12	#9	1	49'-2"	2,006
B3	18	#5	STR.	43'-4"	814
B4	35	#4	STR.	4'-2"	97
B5	20	#4	STR.	26'-9"	357
B6	6	#9	1	47'-7"	971
B7	6	#9	1	26'-10"	547
B8	24	#4	STR.	9'-8"	155
B9	12	#4	STR.	3'-4"	27
B10	6	#4	STR.	23'-0"	92
S1	42	#5	2	12'-3"	537
S2	102	#5	3	5'-1"	541
S3	104	#4	4	6'-6"	452
S4	83	#4	5	8'-6"	471
S5	60	#5	2	13'-3"	829
S6	6	#6	9	4'-9"	43
S7	6	#6	8	8'-11"	80
S8	117	#4	5	5'-4"	417
S9	8	#4	STR.	2'-9"	15
K1	70	#4	STR.	26'-9"	1,251
H1	14	#4	6	15'-5"	144
H2	14	#4	6	15'-11"	149
H3	14	#4	7	16'-3"	152
H4	14	#4	7	15'-10"	148
V1	234	#5	STR.	9'-5"	2,298
V2	38	#5	STR.	12'-2"	482
V3	35	#5	STR.	11'-8"	426
REINFORCING STEEL					15,980 LBS.

CLASS "A" CONCRETE	
POUR 1 (CAP, LOWER WINGS AND COLLARS)	106.0 C.Y.
POUR 2 (BACKWALL & UPPER WINGS)	39.5 C.Y.
TOTAL	145.5 C.Y.

HP 12x53 STEEL PILES	
NO.	28
L.F.	1,820
PILE REDRIVES	13

PILE DRIVING EQUIPMENT SET UP FOR HP 12 x 53 STEEL PILES	
EA.	28



BRG. SEAT DETAIL

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1 MISCELLANEOUS DETAILS AND BILL OF MATERIAL

SITE 1 DWG. NO. 33

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #1

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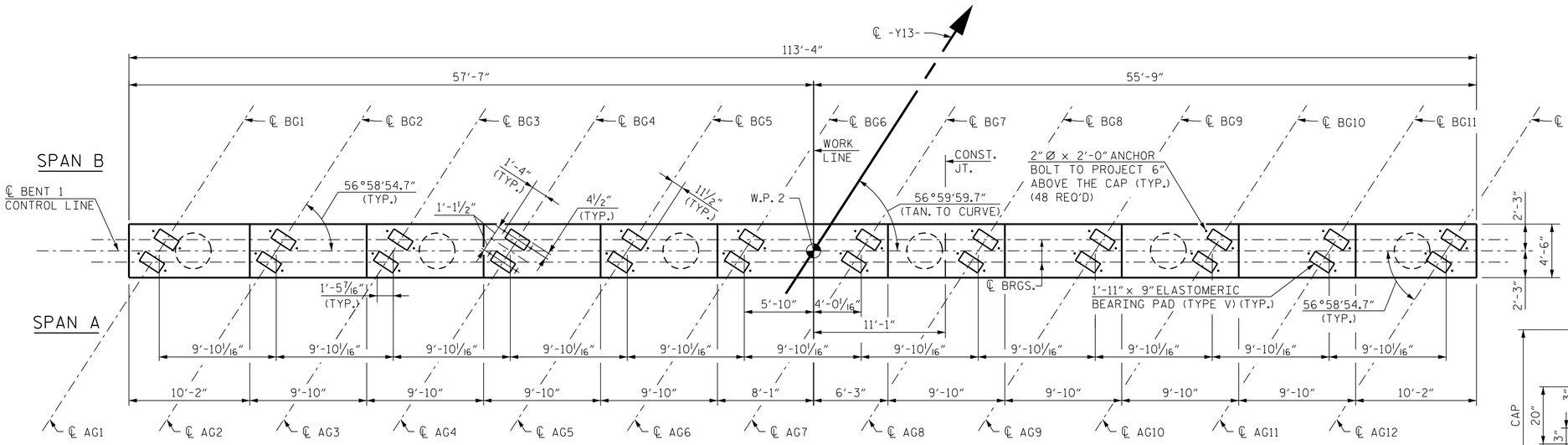
NOTES:

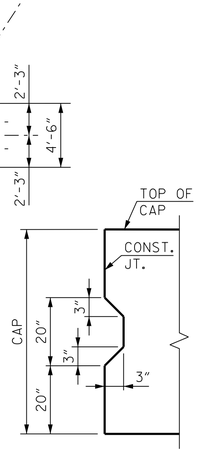
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

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

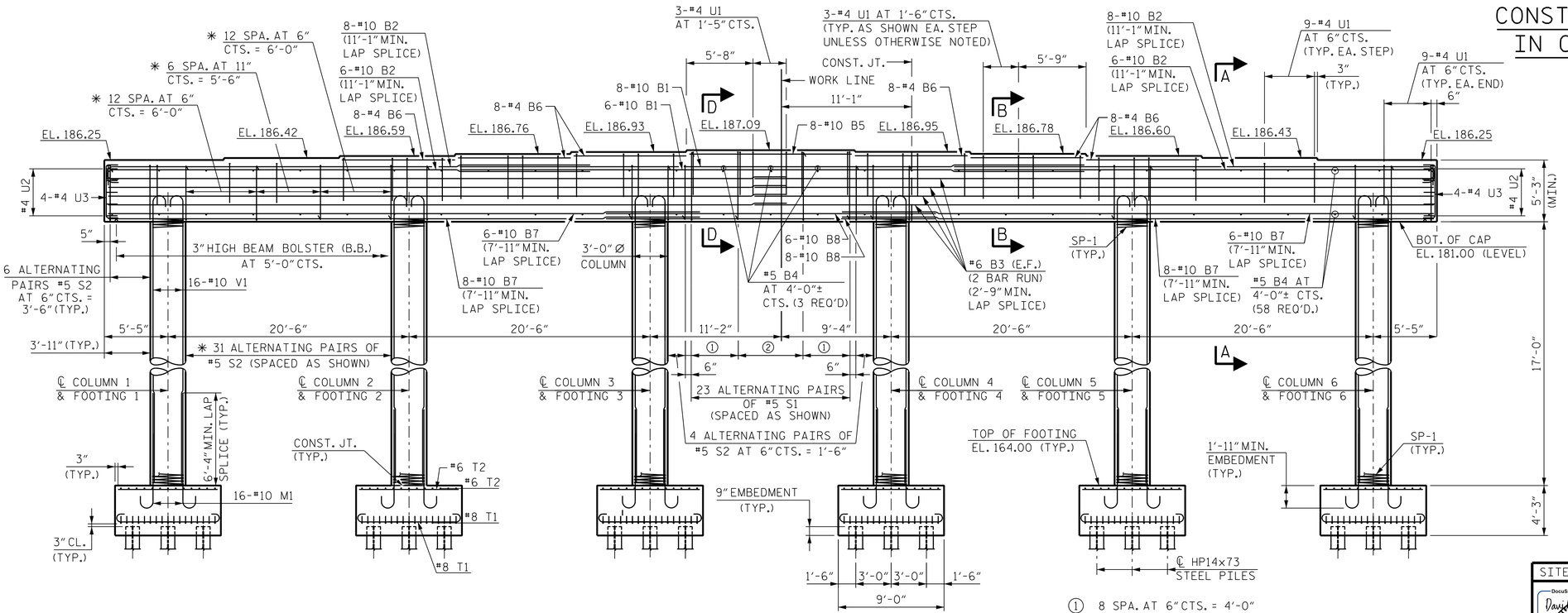
LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THROUGHOUT CONSTRUCTION JOINT IN CAP.





CONST. JT. IN CAP

PLAN



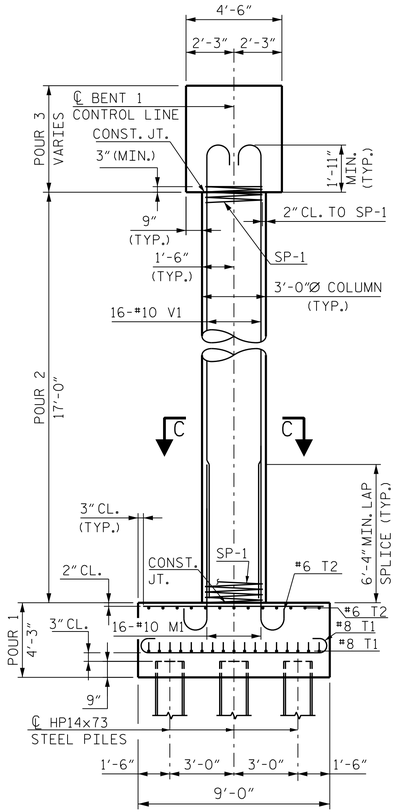
* (TYP. BTWN. COLUMNS UNLESS OTHERWISE NOTED)

① 8 SPA. AT 6" CTS. = 4'-0"

② 6 SPA. AT 11" CTS. = 5'-6"

ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING AND COLUMN)



END ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING AND COLUMN)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
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SUBSTRUCTURE

BENT 1
PLAN AND ELEVATION

SITE 1 DWG. NO. 34

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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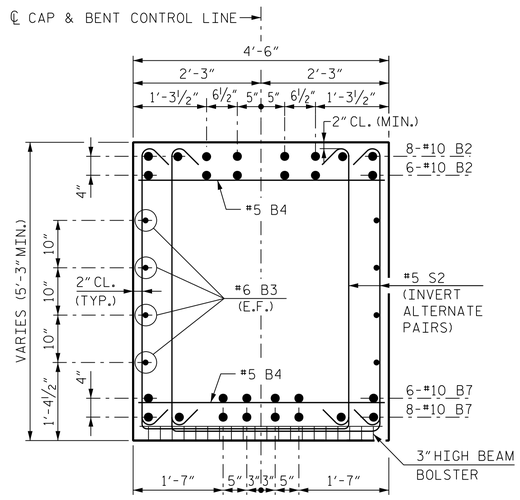
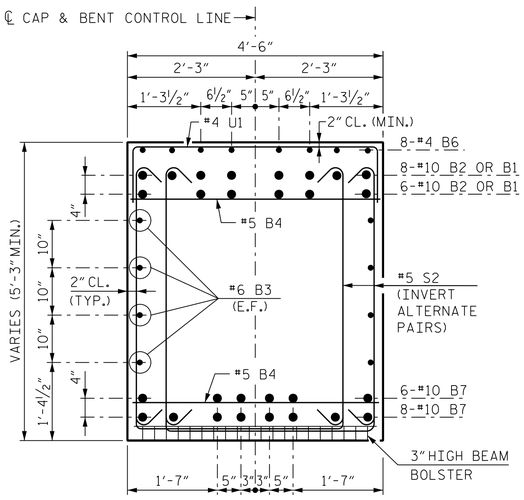


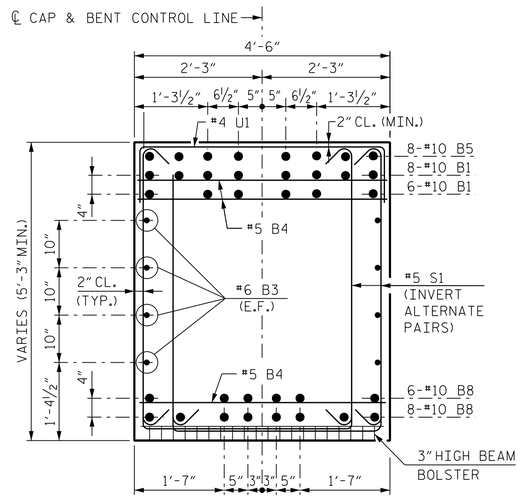
SECTION THROUGH CAP

SECTION A-A



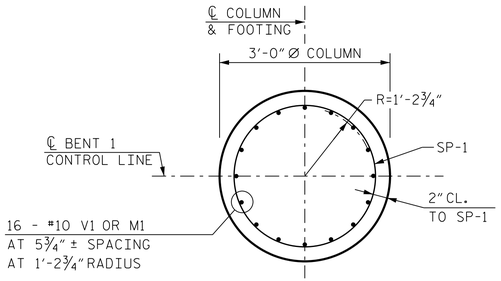
SECTION THROUGH CAP

SECTION B-B

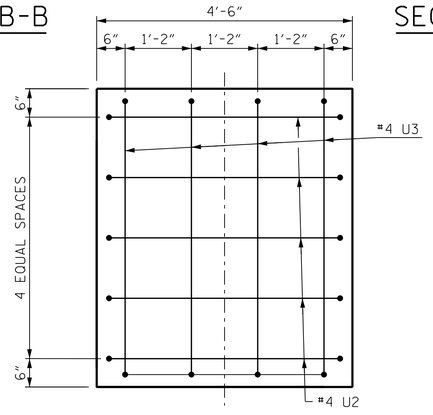


SECTION THROUGH CAP

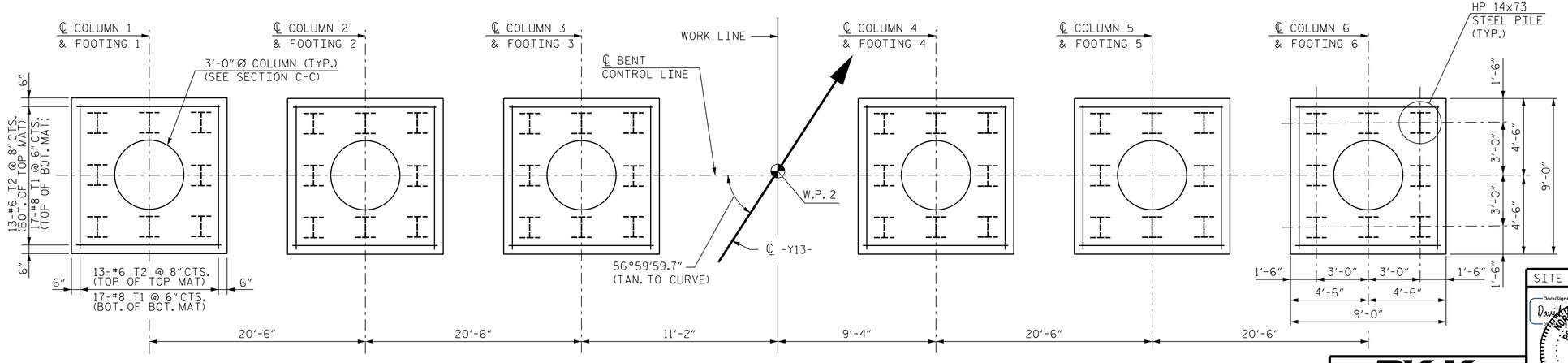
SECTION D-D



SECTION C-C



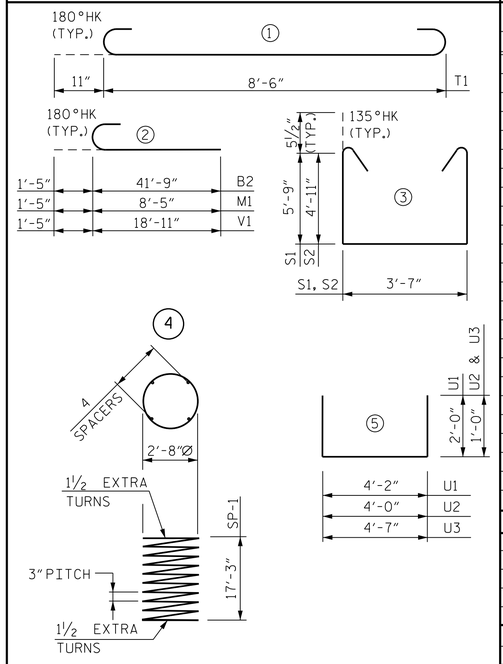
END OF CAP DETAIL



PLAN OF FOOTINGS

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#10	STR.	52'-3"	3,148
B2	28	#10	2	43'-2"	5,201
B3	16	#6	STR.	57'-11"	1,392
B4	61	#5	STR.	4'-2"	265
B5	8	#10	STR.	14'-0"	482
B6	48	#4	STR.	9'-8"	310
B7	28	#10	STR.	50'-4"	6,064
B8	14	#10	STR.	28'-8"	1,727
M1	96	#10	2	9'-10"	4,062
S1	46	#5	3	16'-0"	768
S2	288	#5	3	14'-4"	4,306
T1	204	#6	1	10'-4"	3,166
T2	156	#8	STR.	8'-6"	3,540
U1	129	#4	5	8'-2"	704
U2	10	#4	5	6'-0"	40
U3	8	#4	5	6'-7"	35
V1	96	#10	2	20'-4"	8,399

REINFORCING STEEL					43,609 LBS.
SP-1	6	**	4	594'-1"	2,381

SPIRAL COLUMN REINFORCING STEEL	2,381 LBS.

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

CLASS "A" CONCRETE	
POUR 1 (FOOTINGS)	76.5 C.Y.
POUR 2 (COLUMNS)	26.7 C.Y.
POUR 3 (CAP)	106.9 C.Y.
TOTAL	210.1 C.Y.

HP 14X73 STEEL PILES	
NO.	48
L.F.	2,880
PILE REDRIVES	24 EA.

PILE DRIVING EQUIPMENT SET UP FOR HP 14 x 73 STEEL PILES	
EA.	48
FOUNDATION EXCAVATION FOR BENT	LUMP SUM

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1
DETAILS AND
BILL OF MATERIAL

SITE 1 DWG. NO. 35

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #1

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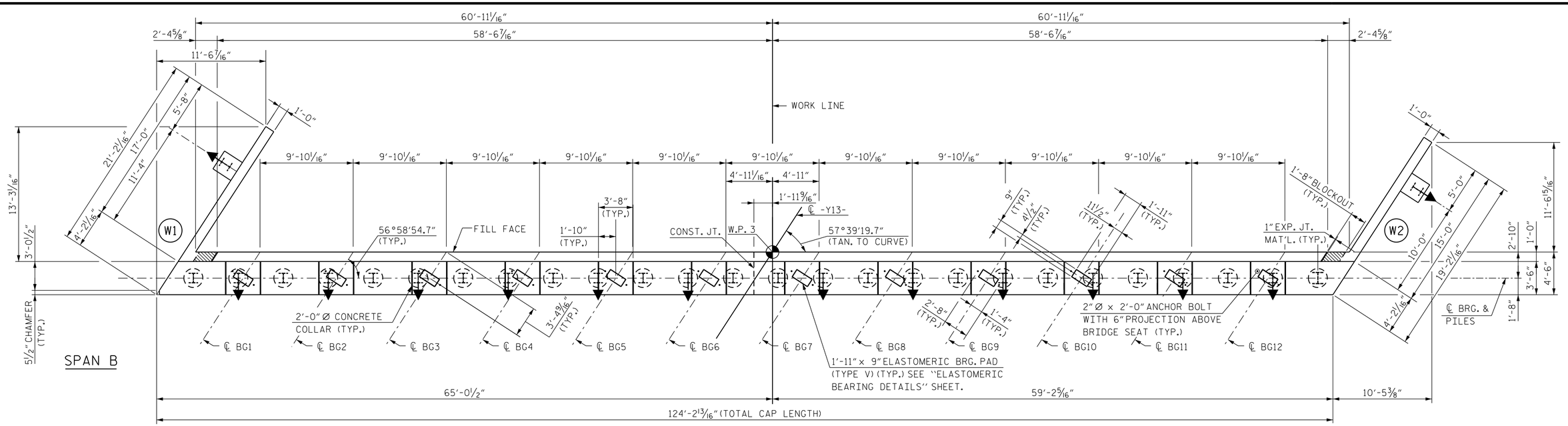
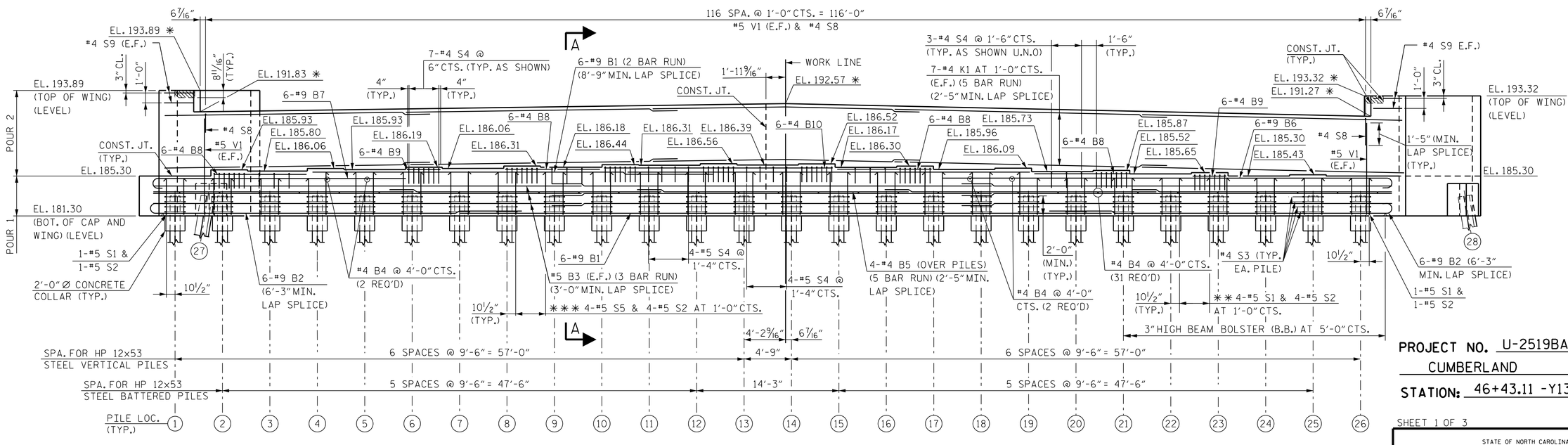


PLAN



ELEVATION

✳ ELEVATION AT FILL FACE
✳✳ TYP. BTWN. PILES 1 THRU 4 & BTWN. PILES 19 THRU 26
✳✳✳ TYP. BTWN. PILES 4 THRU 19

LEGEND:

HP 12x53 VERTICAL STEEL PILES

HP 12x53 STEEL PILES BATTERED 3:12

NOTE:

FOR CONSTRUCTION JOINT DETAILS, SEE SHEET 3 OF 3.

SITE 1 DWG. NO. 36

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
PLAN AND ELEVATION

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STR. #1

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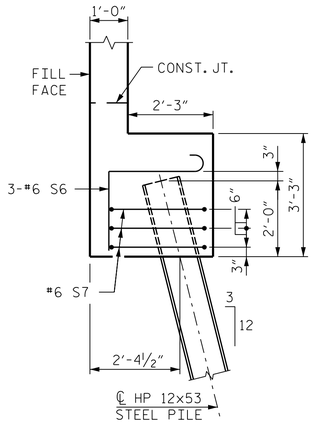
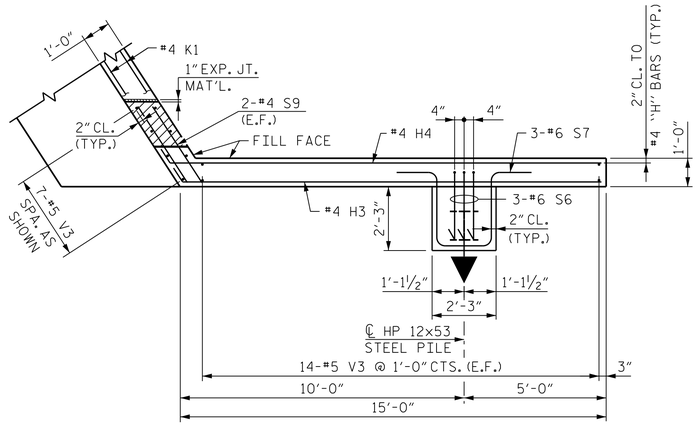
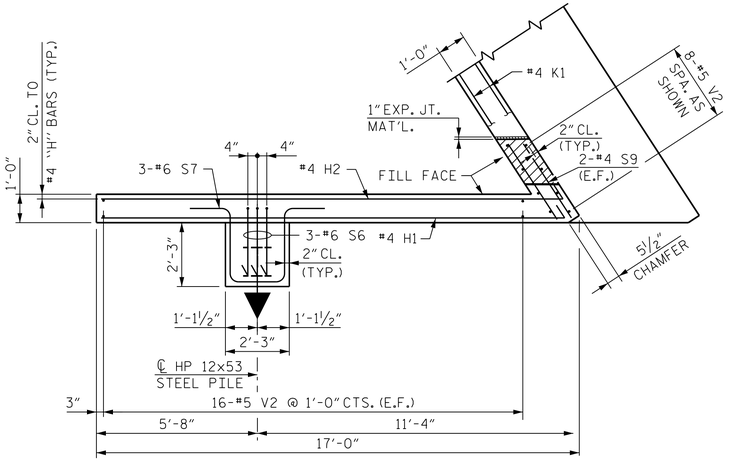


SECTION A-A



PLAN OF RIGHT WINGWALL



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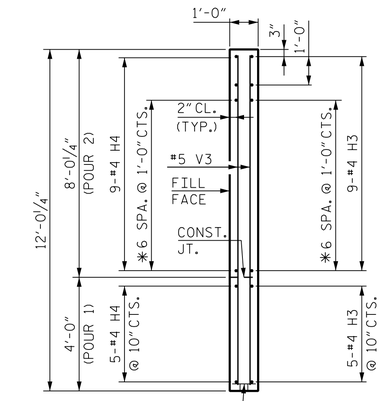
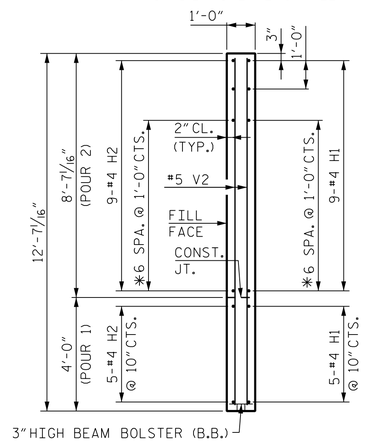


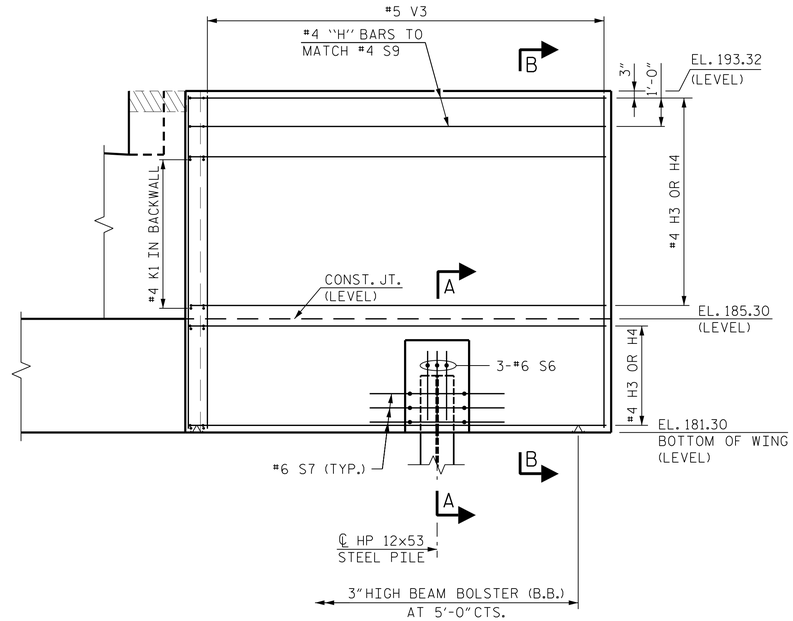
SECTION B-B

* MATCH TO K1 BARS IN BACKWALL



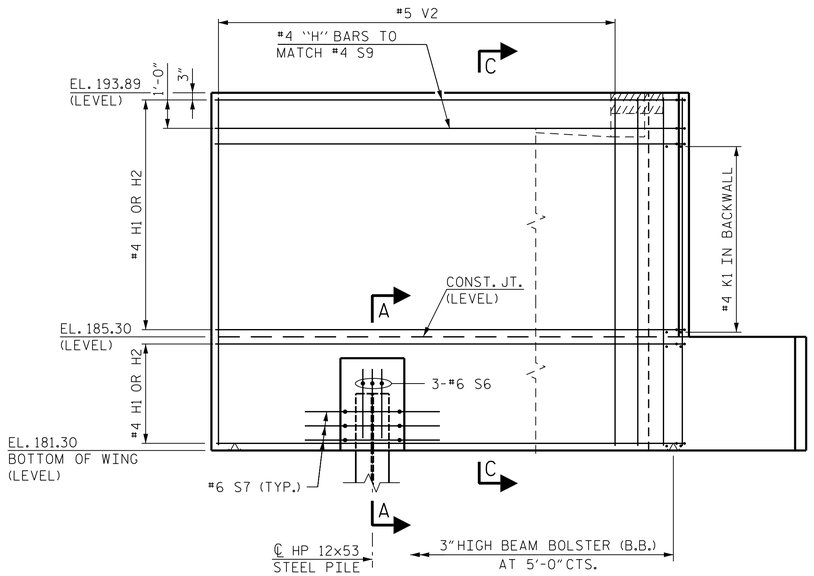
SECTION C-C

* MATCH TO K1 BARS IN BACKWALL



ELEVATION OF RIGHT WINGWALL

RIGHT WINGWALL DETAILS (W2)



ELEVATION OF LEFT WINGWALL

LEFT WINGWALL DETAILS (W1)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WINGWALL DETAILS

SITE 1 DWG. NO. 37

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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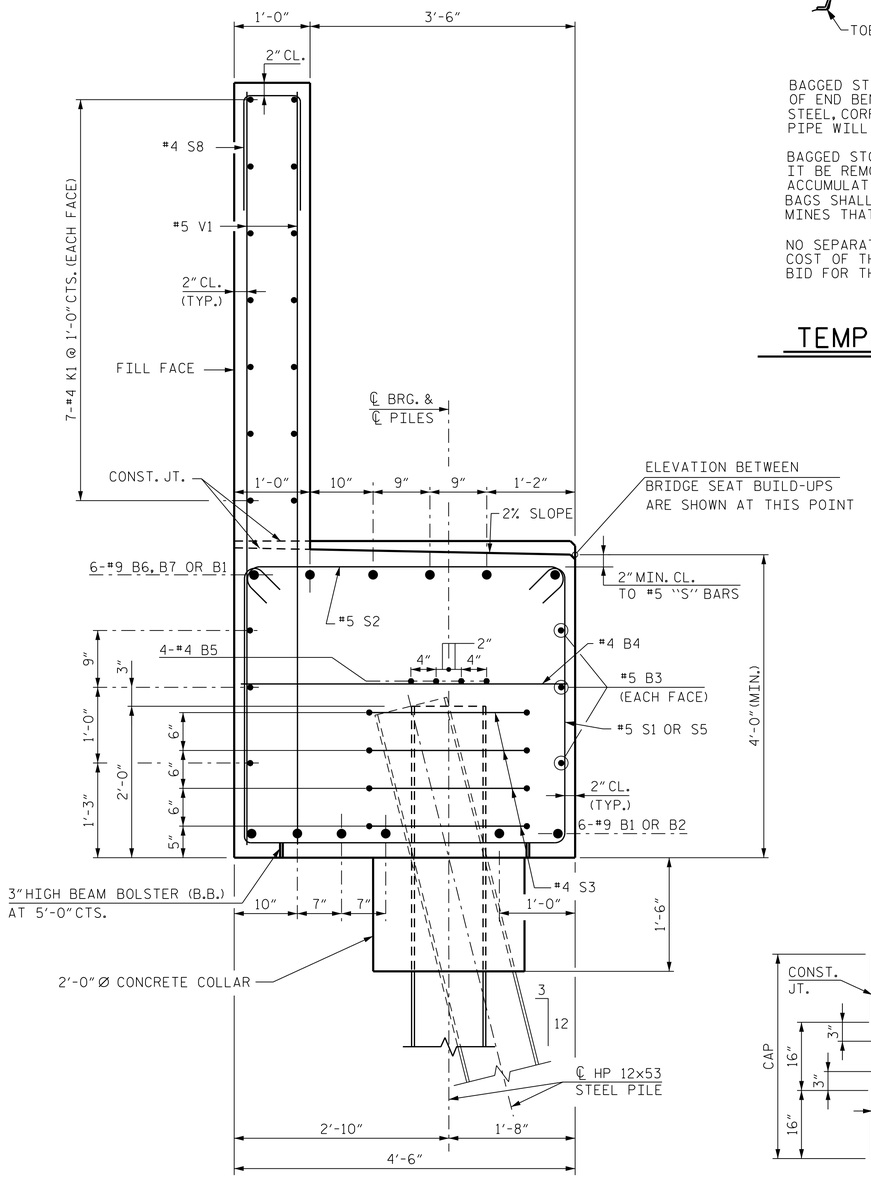
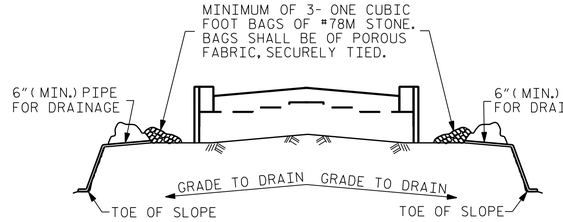


SECTION A-A

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)



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

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

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

TEMPORARY DRAINAGE AT END BENT

NOTES:

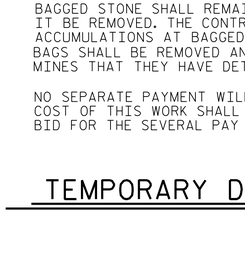
FOR PILE SPLICE DETAILS, SEE END BENT 1, SHEET 3 OF 3.

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

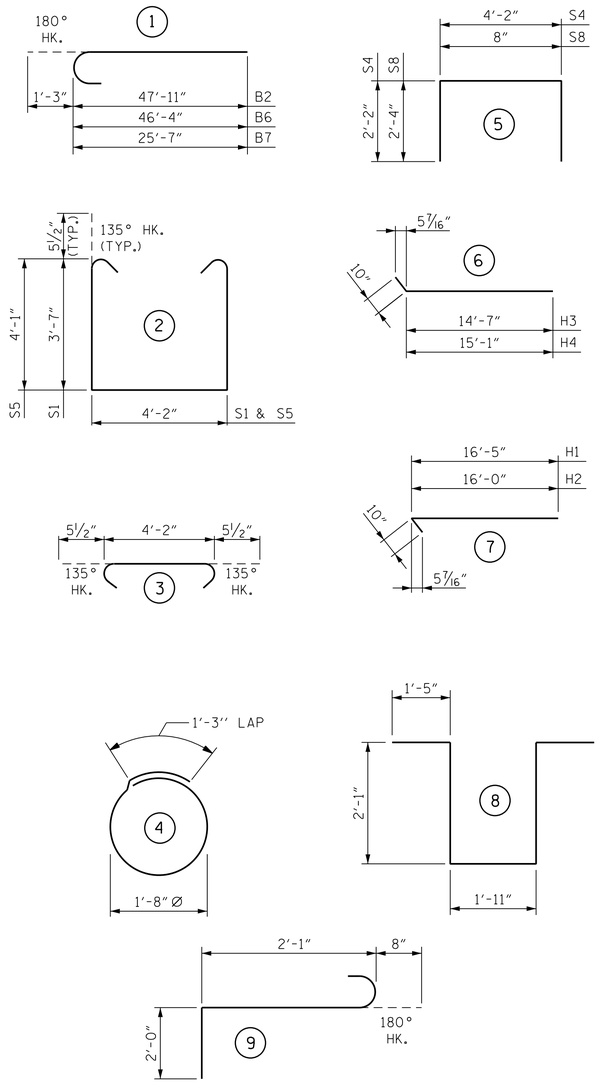


CONSTRUCTION JOINT IN CAP

NOTE:

REINFORCING STEEL IN CAP NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINT.

BAR TYPES



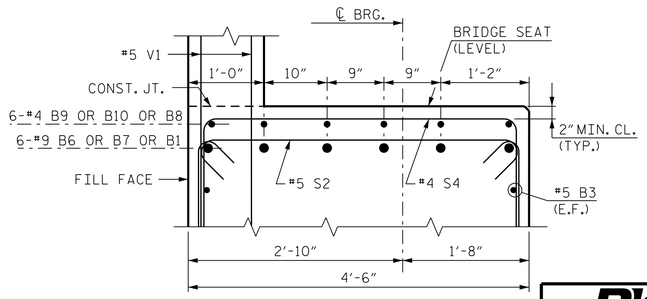
NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	18	#9	STR.	40'-6"	2,479
B2	12	#9	1	49'-2"	2,006
B3	18	#5	STR.	43'-4"	814
B4	35	#4	STR.	4'-2"	97
B5	20	#4	STR.	26'-9"	357
B6	6	#9	1	47'-7"	971
B7	6	#9	1	26'-10"	547
B8	24	#4	STR.	9'-8"	155
B9	12	#4	STR.	3'-4"	27
B10	6	#4	STR.	23'-0"	92
S1	42	#5	2	12'-3"	537
S2	102	#5	3	5'-1"	541
S3	104	#4	4	6'-6"	452
S4	83	#4	5	8'-6"	471
S5	60	#5	2	13'-3"	829
S6	6	#6	9	4'-9"	43
S7	6	#6	8	8'-11"	80
S8	117	#4	5	5'-4"	417
S9	8	#4	STR.	2'-9"	15
K1	70	#4	STR.	26'-9"	1,251
H1	14	#4	7	17'-3"	161
H2	14	#4	7	16'-10"	157
H3	14	#4	6	15'-5"	144
H4	14	#4	6	15'-11"	149
V1	234	#5	STR.	9'-5"	2,298
V2	40	#5	STR.	12'-3"	511
V3	35	#5	STR.	11'-8"	426

REINFORCING STEEL	16,011 LBS.
CLASS "A" CONCRETE	
POUR 1 (CAP, LOWER WINGS AND COLLARS)	106.5 C.Y.
POUR 2 (BACKWALL & UPPER WINGS)	40.1 C.Y.
TOTAL	146.6 C.Y.
HP 12x53 STEEL PILES	
NO.	28
L.F.	1,820
PILE REDRIVES	13
PILE DRIVING EQUIPMENT SET UP FOR HP 12 x 53 STEEL PILES	
EA.	28



BRG. SEAT DETAIL

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2
MISCELLANEOUS DETAILS AND BILL OF MATERIAL

SITE 1 DWG. NO. 38

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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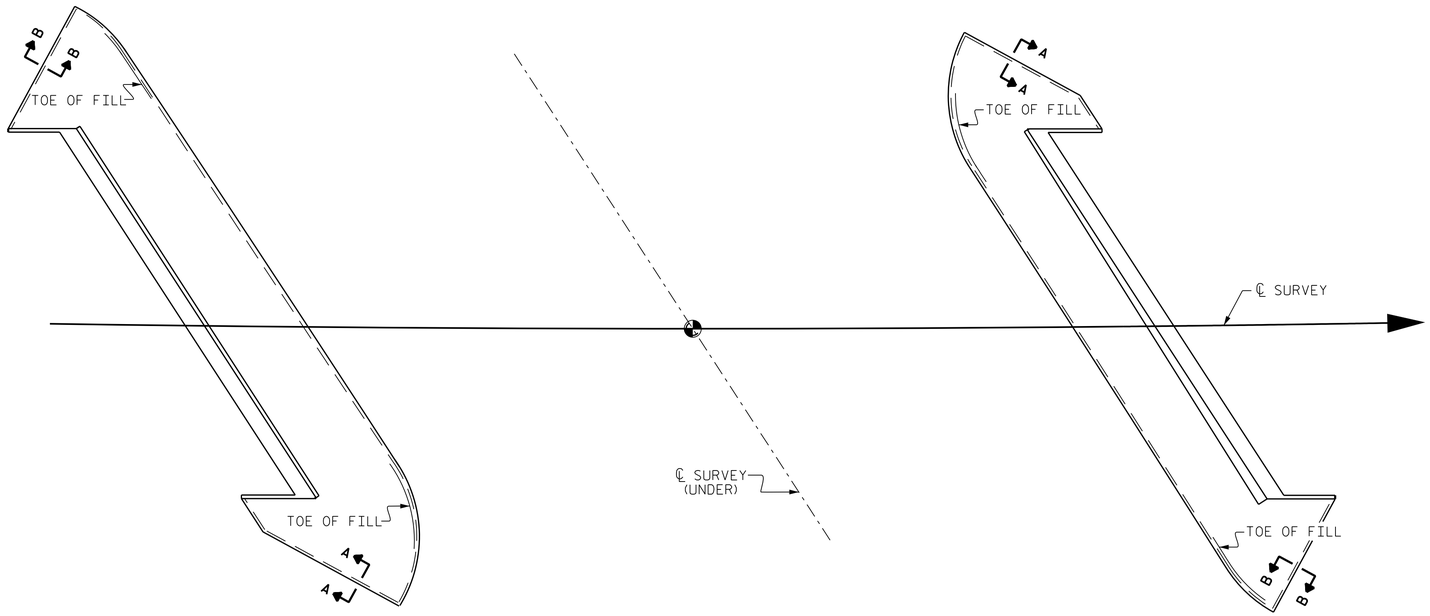


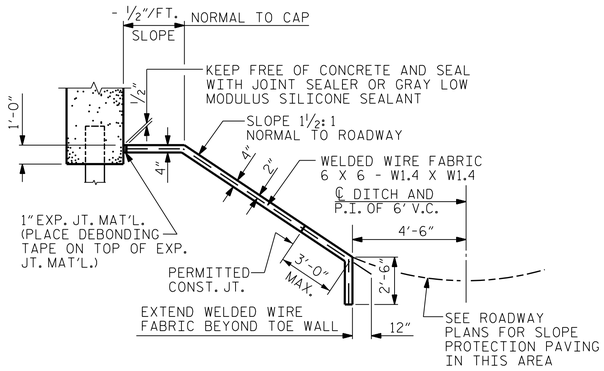
PLAN

GENERAL NOTES:

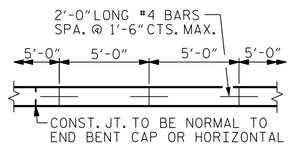
STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING. SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE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

BRIDGE @ STA. 46+43.11 -Y13-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	827	1,488
END BENT 2	699	1,258

* QUANTITY SHOWN IS BASED ON 5' POURS.

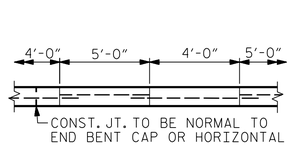


SECTION ALONG ℄ SURVEY WHEN FILL CATCHES IN DITCH



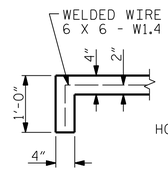
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

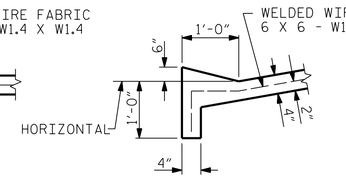


POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



SECTION A-A



SECTION B-B

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

SITE 1 DWG. NO. 38

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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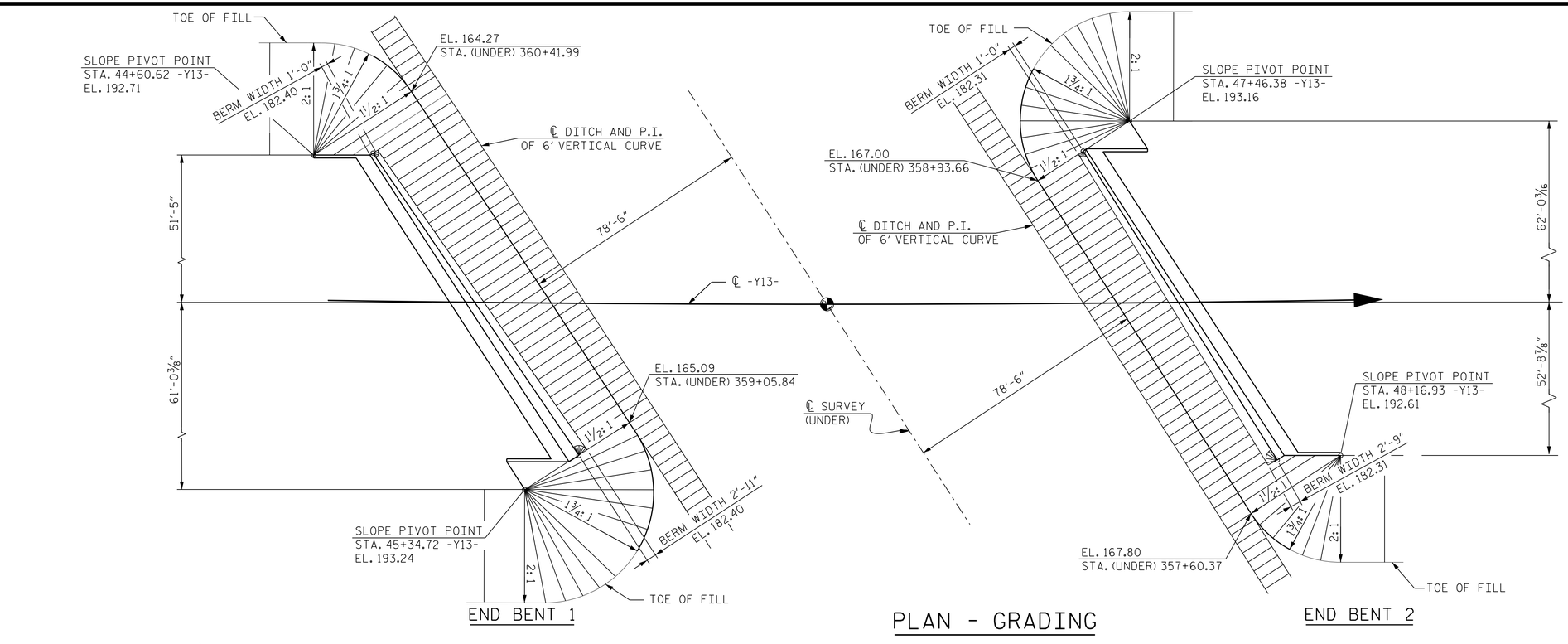
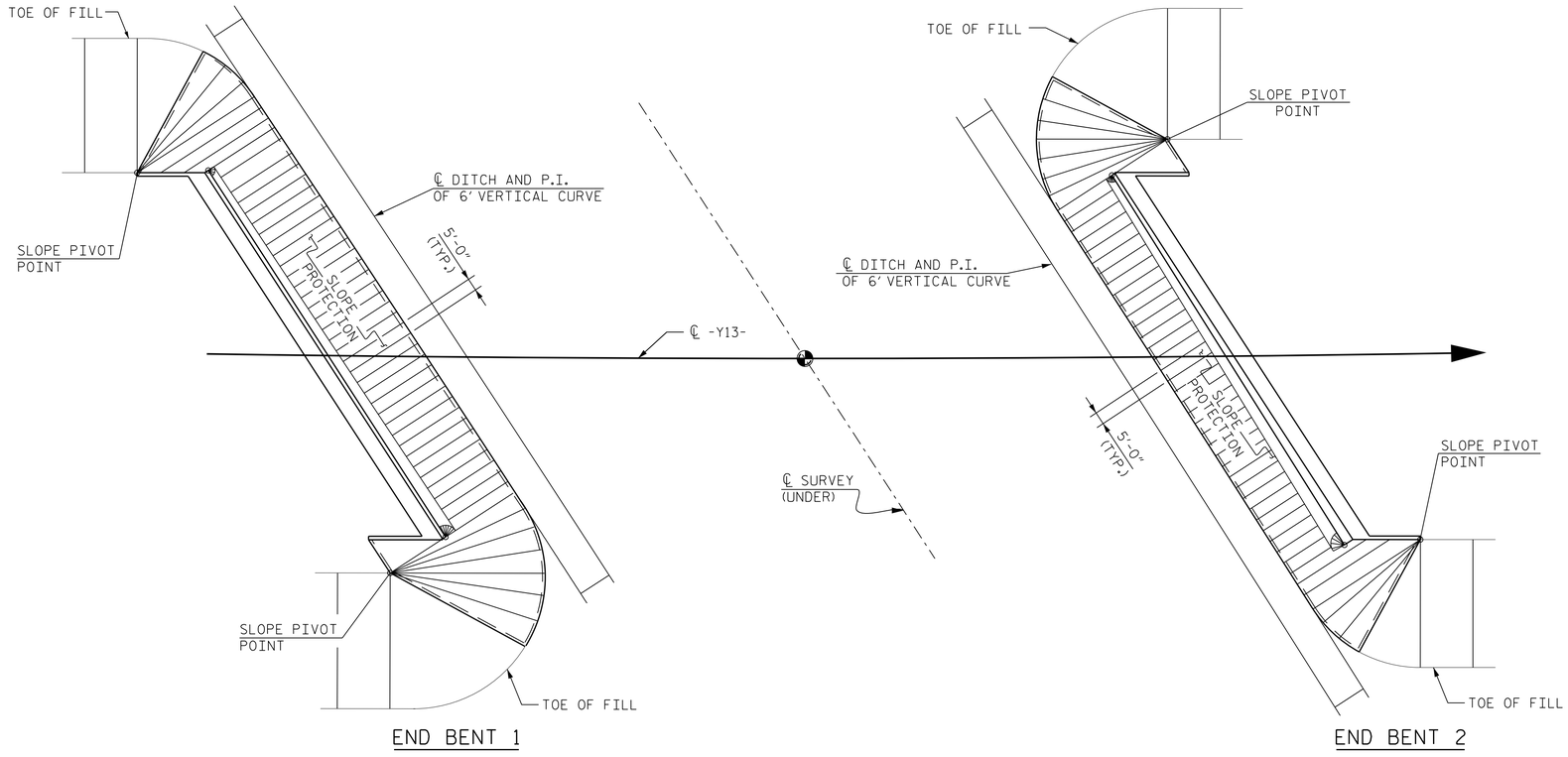


PLAN - GRADING



PLAN - CONCRETE PLACEMENT

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

SITE 1 DWG. NO. 39

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RUMMEL, KLEPPER & KAHL, LLP
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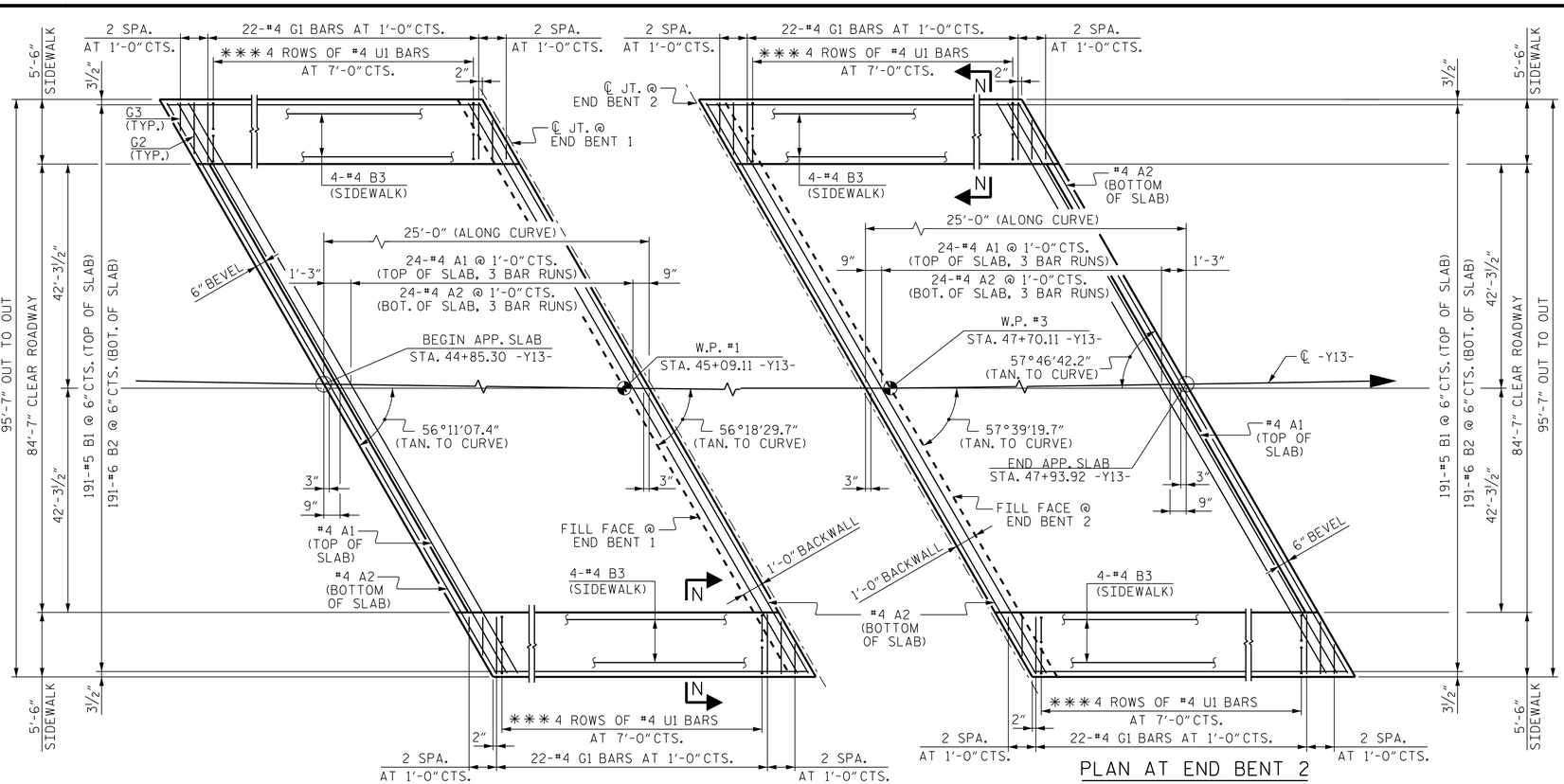


SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	1'-11"	1'-7"
#5	2'-5"	2'-0"
#6	3'-7"	2'-5"

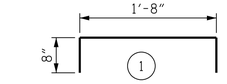
BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	75	#4	STR.	39'-6"	1,979
A2	78	#4	STR.	39'-3"	2,045
* B1	191	#5	STR.	23'-9"	4,731
B2	191	#6	STR.	24'-6"	7,029
* B3	8	#4	STR.	24'-6"	131
* G1	44	#4	STR.	5'-0"	147
* G2	4	#4	STR.	3'-9"	10
* G3	4	#4	STR.	2'-3"	6
* U1	16	#4	1	3'-0"	32

REINFORCING STEEL	**	9,074 LBS.
* EPOXY COATED REINFORCING STEEL	**	7,036 LBS.
CLASS AA CONCRETE (APPROACH SLAB)	**	103.0 C.Y.
CLASS AA CONCRETE (SIDEWALK)	**	3.2 C.Y.

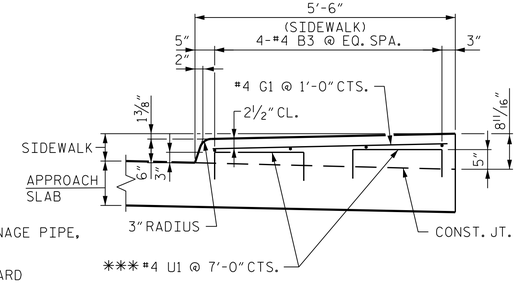
BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

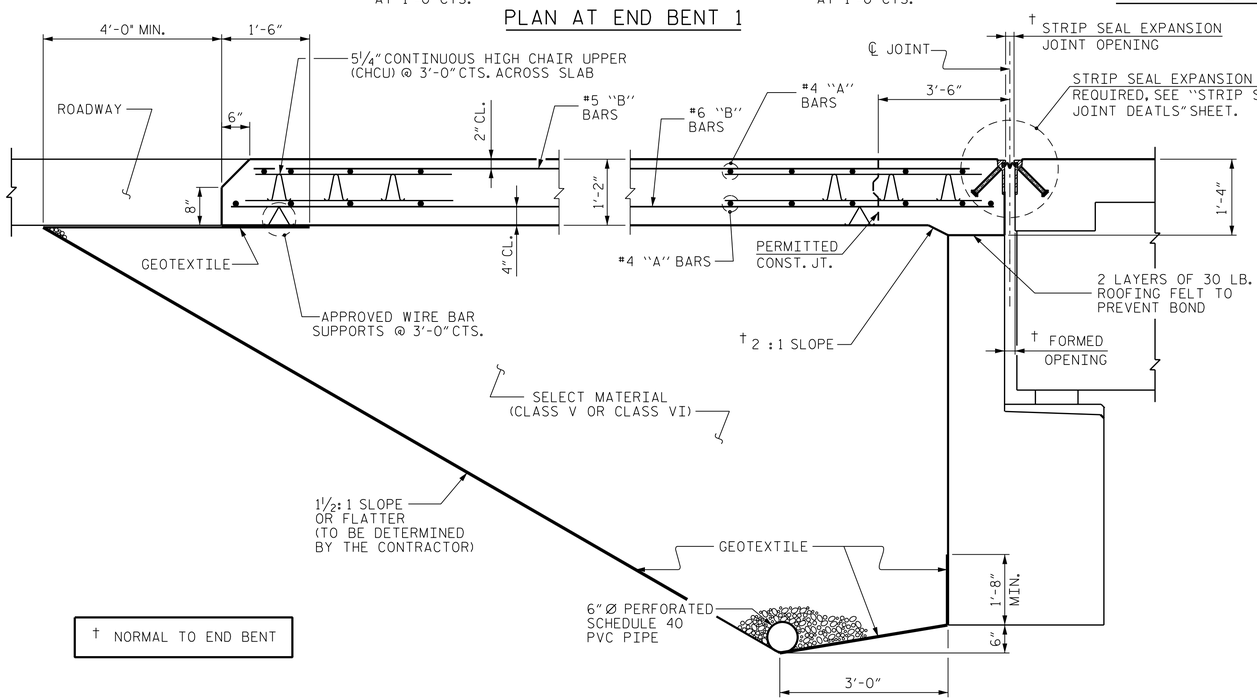
** QUANTITIES FOR CONCRETE MEDIAN ARE NOT INCLUDED.

*** THESE "U" BARS ARE TO BE PLACED AFTER THE SAWING OF THE JOINT. HOLES SHALL BE DRILLED AND "U" BARS GROUTED INTO PLACE



SECTION N-N

SIDEWALK DETAILS



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES:

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

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

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

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

FOR STRIP SEAL EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR CONCRETE MEDIAN DETAILS, SEE "CONCRETE MEDIAN PLAN."

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 46+43.11 -Y13-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

SITE 1 DWG. NO. 41

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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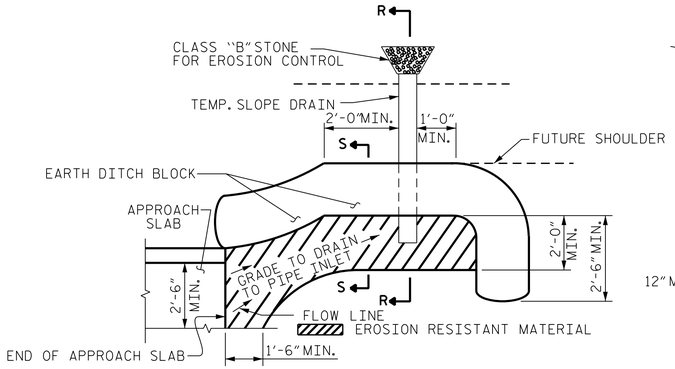
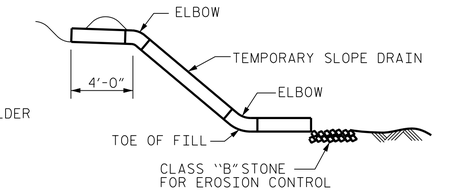
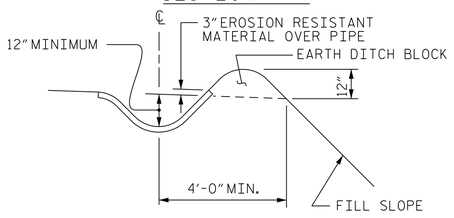


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

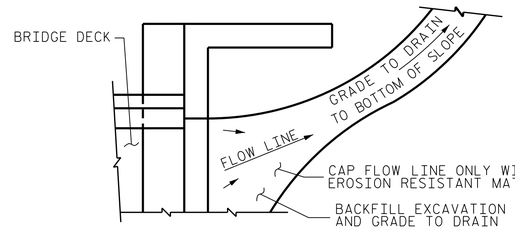
PLAN VIEW



SECTION R-R



SECTION S-S



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

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

bgonfa
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 1\FINAL\U2519BA_447_SD_AS2.dgn

DRAWN BY : B. A. HAAG DATE : MAR 2022
CHECKED BY : D. M. RAGAN DATE : MAR 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : MAR 2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

SITE 1 DWG. NO. 41

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 46+43.11 -Y13-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

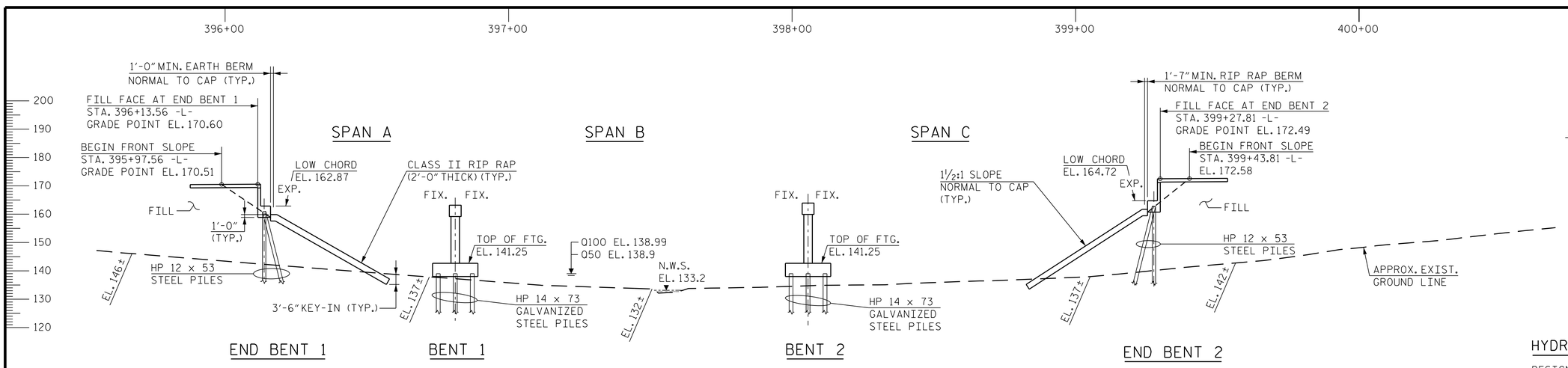
STANDARD

BRIDGE APPROACH
SLAB DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-42
1			3			TOTAL SHEETS
2			4			43

STR. #1

F.A. PROJECT NO. NHF-0100(24)

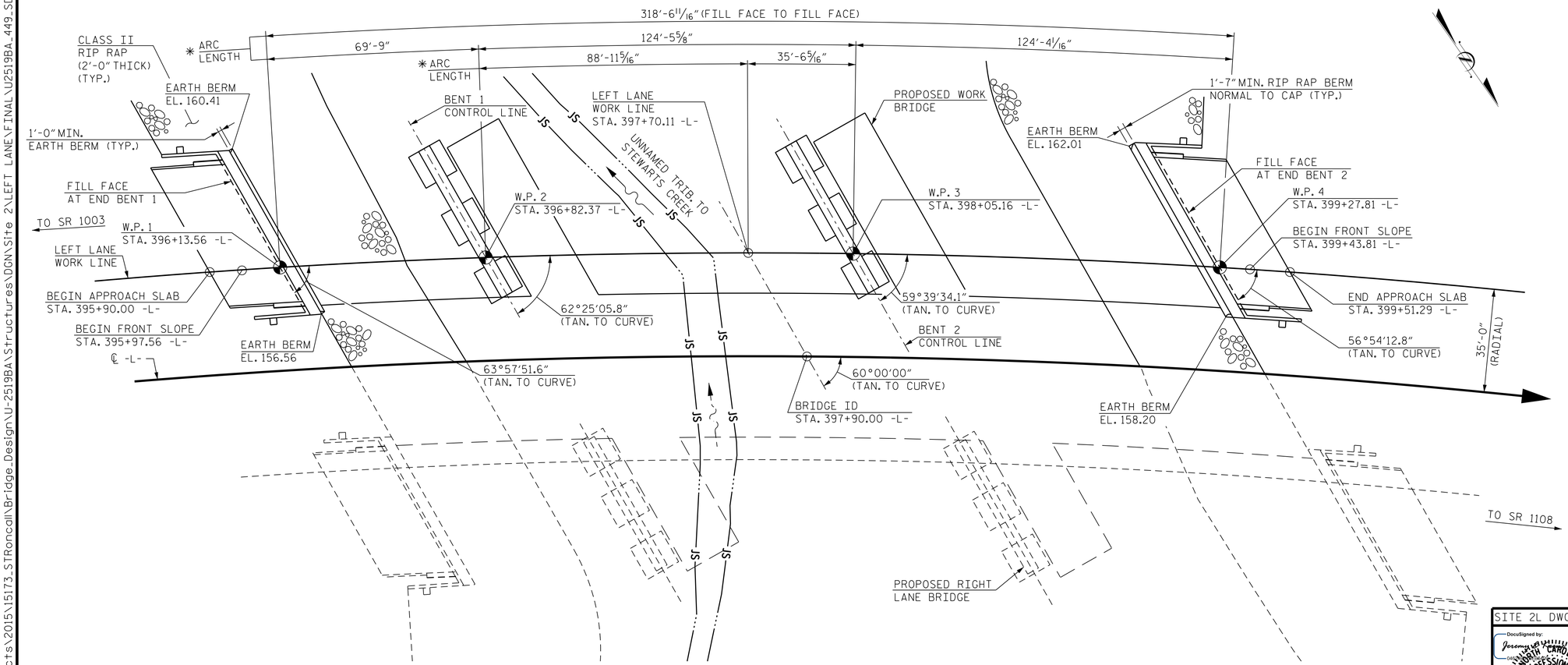


PVI = 430+00.00 -L-
EL. = 190.92
V.C. = 470.00 FT.
(+)0.6000% △ (-)0.6000%

-L- GRADE DATA

SECTION ALONG LEFT LANE WORK LINE

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



PLAN

(PILES NOT SHOWN FOR CLARITY)
* MEASURED ALONG LEFT LANE WORK LINE

HYDRAULIC DATA

DESIGN DISCHARGE	580 CFS.
FREQUENCY OF DESIGN FLOOD	50 YR.
DESIGN HIGH WATER ELEVATION	138.9
DRAINAGE AREA	1.35 SQ. MI.
BASE DISCHARGE (Q100)	610 C.F.S.
BASE HIGH WATER ELEVATION	138.99

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	650+C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	500+YR.
OVERTOPPING FLOOD ELEVATION	170.1 **

** OVERTOPPING OCCURS AT -L- STA. 392+95.7 AT SBL OUTSIDE EDGE OF TRAVEL

HORIZONTAL CURVE DATA -L-

PI STA. 404+50.03
△ = 74°51'43.7" (RT.)
D = 2°14'48.8"
L = 3,331.81'
T = 1,951.81'
R = 2,550.00'

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 5 BRIDGE NO. 449

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON
FAYETTEVILLE OUTER LOOP OVER
UNNAMED TRIB. TO STEWART'S CREEK
BETWEEN SR 1003 AND SR 1108
LEFT LANE

SITE 2L DWG. NO.1

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
3/22/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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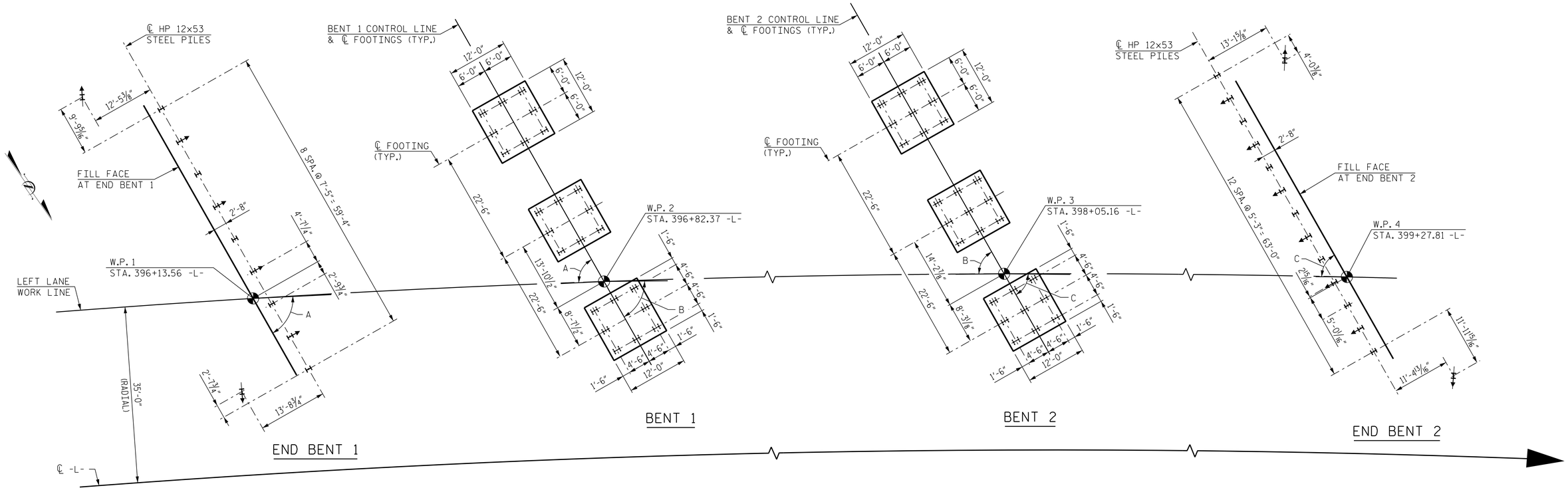
315-173

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-1
1			3			TOTAL SHEETS
2			4			41

STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

jkeene
3/22/2022 Y:\Projects\2015\15173_STRoncal\Bridge_Design\U-2519BA\Structures\DGN\Site 2\LEFT LANE\FINAL\U2519BA_449_SD_GD.dgn



FOUNDATION LAYOUT

ALL PILES AT END BENTS 1 AND 2 ARE HP 12x53 STEEL PILES.
ALL PILES AT BENTS 1 AND 2 ARE HP 14x73 GALVANIZED STEEL PILES.
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.
DIMENSIONS AND/OR PILE LAYOUTS ARE TYPICAL FOR EACH FOOTING OF BENT 1 & BENT 2.

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENTS NO. 1 & NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 140 TONS PER PILE.

PILES AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 150 TONS PER PILE.

DRIVE PILES AT END BENTS NO. 1 & NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 190 TONS PER PILE.

DRIVE PILES AT BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

INSTALL PILES AT BENTS NO. 1 & NO. 2 TO A TIP ELEVATION NO HIGHER THAN ELEVATION 100.0 FEET.

THE SCOUR CRITICAL ELEVATION FOR BENTS NO. 1 AND NO. 2 IS ELEVATION 126.0 FEET. SCOUR CRITICAL ELEVATION ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT BENT NO. 1. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

ANGLES TO SHORT CHORD	
A	63°11'28.7"
B	61°02'19.9"
C	58°16'53.3"

LEGEND:

I HP VERTICAL STEEL PILES

HP STEEL PILES
BATTERED 3:12

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

LEFT LANE

SITE 2L DWG. NO. 2

STR. #3

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

DocuSigned by: Jeremy F. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY F. KEENE
2/4/2022

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REVISIONS						SHEET NO.
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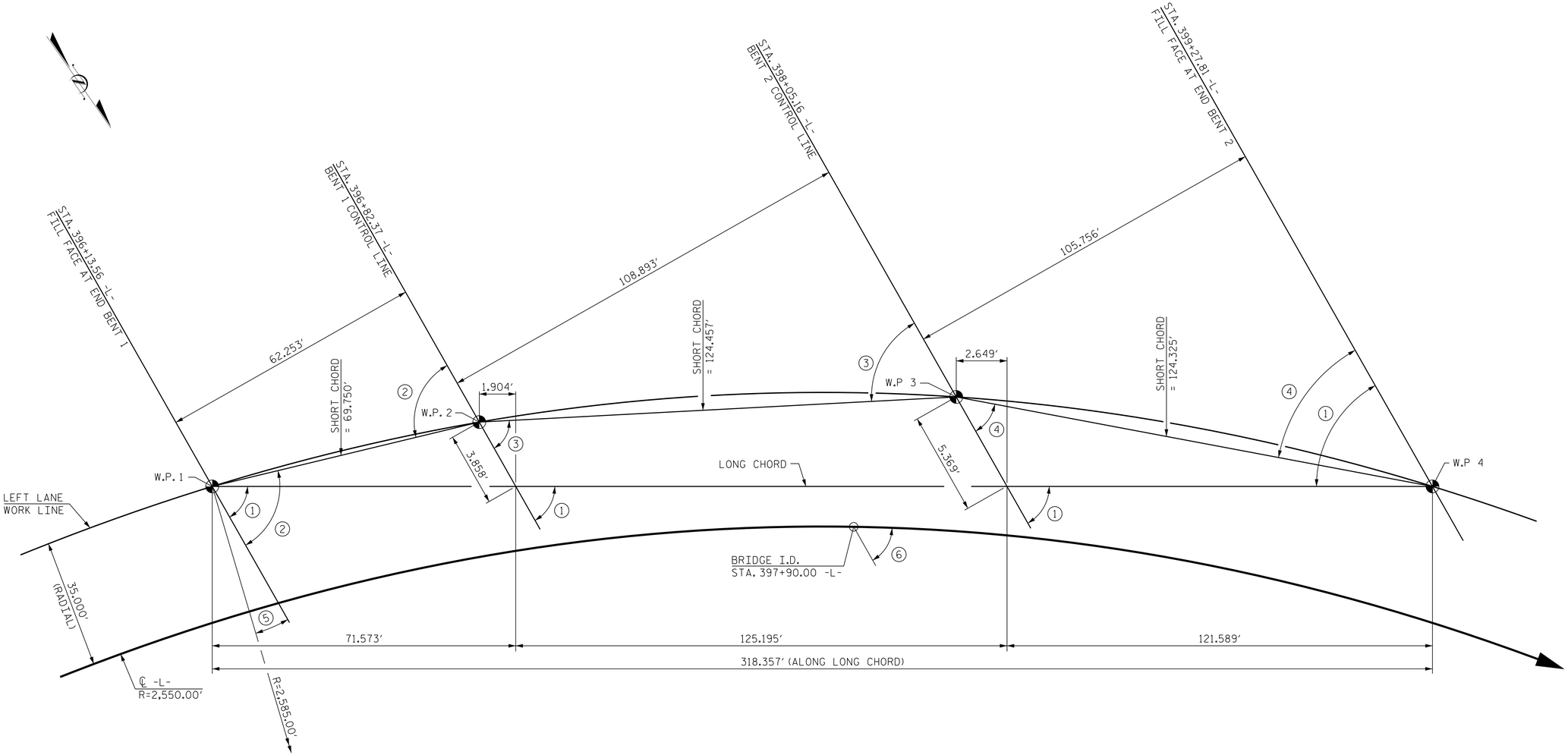
1			3			TOTAL SHEETS
2			4			41

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

tboyd
2/4/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 2\LEFT LANE\FINAL\U2519BA_449_SD_FL.dgn



LONG CHORD LAYOUT

NOTE: END BENTS AND BENTS ARE PARALLEL

ANGLES

1. 60°26'02.2"
2. 63°11'28.7"
3. 61°02'19.9"
4. 58°16'53.5"
5. 26°02'08.4"
6. 60°00'00.0" (TAN. TO CURVE)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 3 OF 5

SITE 2L DWG. NO. 3

DocuSigned by: Jeremy E. Keene

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

2/4/2022

RK&K

RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LONG CHORD LAYOUT

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-3
1			3			TOTAL SHEETS
2			4			41

STR. #3

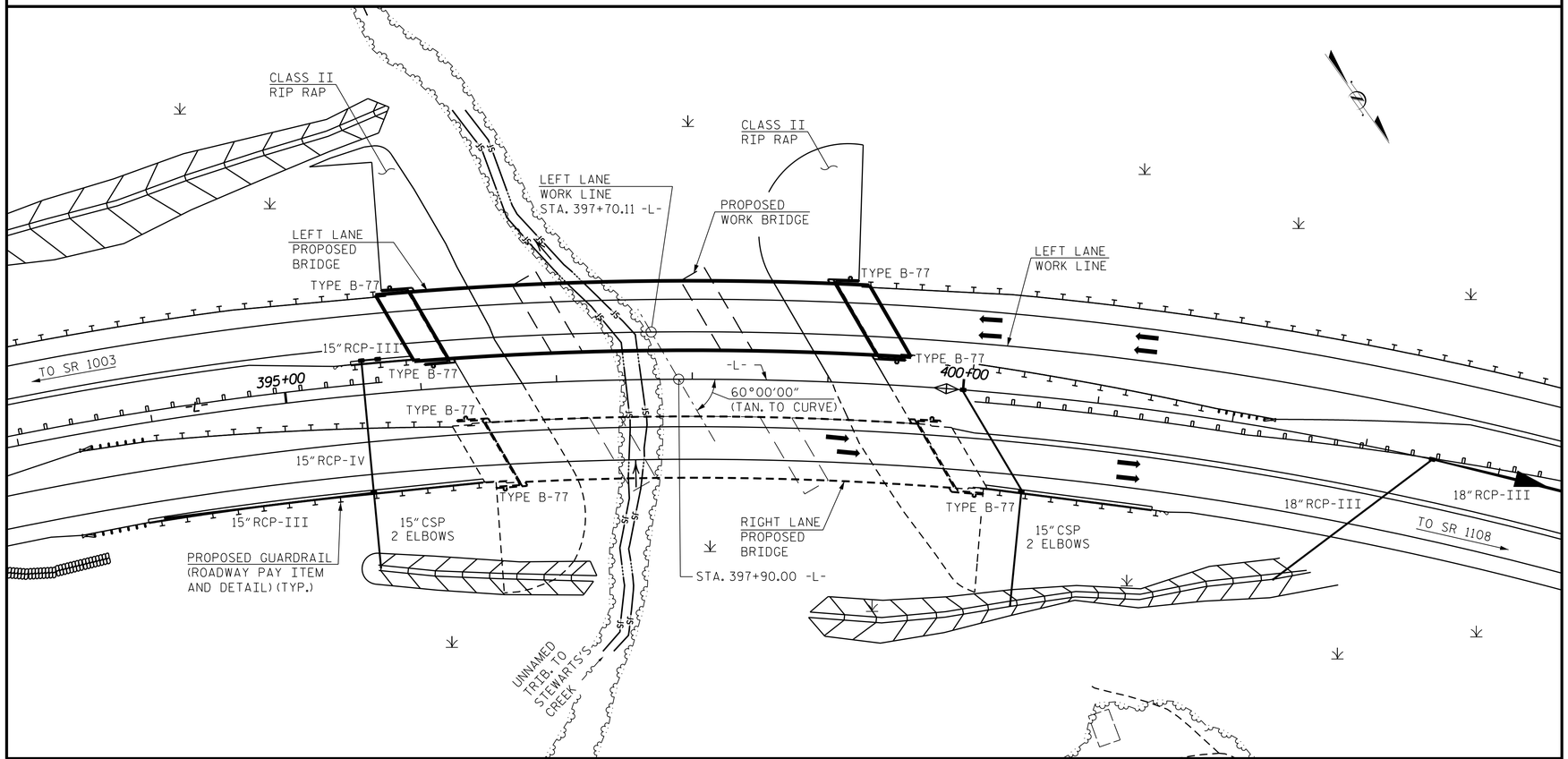
DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

tboyd 2/4/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 2\LEFT LANE\FINAL\U2519BA_449_SD_LC.dgn

TOTAL BILL OF MATERIAL

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMPORARY ACCESS AT STA. 397+90 -L-	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS	PILE DRIVING EQUIPMENT SET UP FOR HP 12x53 STEEL PILES	PILE DRIVING EQUIPMENT SET UP FOR HP 14x73 GALVANIZED STEEL PILES	HP 12x53 STEEL PILES		HP 14x73 GALVANIZED STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LUMP SUM	EA.	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EA.	EA.	NO.	LIN.FT.	NO.	LIN.FT.	EA.	LIN.FT.	TON	SY	LUMP SUM	LUMP SUM
SUPERSTRUCTURE	—	—	16,203	16,387	—	LUMP SUM	—	—	18	1,876.13	—	—	—	—	—	—	—	672.4	—	—	LUMP SUM	LUMP SUM
END BENT 1	—	—	—	—	82.4	—	9,328	—	—	—	11	—	11	660	—	—	5	—	700	780	—	—
BENT 1	—	1	—	—	155.7	—	22,480	1,456	—	—	—	24	—	—	24	1,560	12	—	—	—	—	—
BENT 2	—	—	—	—	156.5	—	22,777	1,515	—	—	—	27	—	—	27	1,890	14	—	—	—	—	—
END BENT 2	—	—	—	—	85.6	—	9,884	—	—	—	15	—	15	900	—	—	7	—	1,045	1,160	—	—
TOTAL	LUMP SUM	1	16,203	16,387	480.2	LUMP SUM	64,469	2,971	18	1,876.13	26	51	26	1,560	51	3,450	38	672.4	1,745	1,940	LUMP SUM	LUMP SUM

BENCH MARK #183 ON -L- STA. 403+24.10, 193.4' RT, NCDOT SURVEY MONUMENT, EL. 176.75



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

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.

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

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

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.

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

FOR INTERIOR BENTS 1 AND 2, ONLY PARTIAL GALVANIZING OF THE PILES ARE REQUIRED. SEE INTERIOR BENT SHEETS FOR REQUIRED GALVANIZED LENGTHS. PAYMENT FOR PARTIALLY GALVANIZED PILES WILL BE MADE UNDER THE CONTRACT UNIT PRICE FOR GALVANIZED STEEL PILES.

FOR WORK BRIDGE: SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 397+90 -L-.

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

NOTE:

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH

LEFT LANE

SITE 2L DWG. NO. 4

DocuSigned by: Jeremy Keene 4/7/2022

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			41

STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

tboyd 4/7/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 2\LEFT LANE\FINAL\U2519BA_449_SD_LOC.dgn

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.19	--	1.75	0.947	1.28	A	I	32.7	0.778	1.54	C	I	108.2	0.80	0.828	1.19	B	EL	60.9	
		HL-93 (OPERATING)	N/A		1.66	--	1.35	0.947	1.66	A	I	32.7	0.778	2.03	C	I	108.2	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.65	59.400	1.75	0.947	1.65	A	I	32.7	0.778	2.20	C	I	108.2	0.80	0.828	1.76	B	EL	60.9	
		HS-20 (OPERATING)	36.000		2.14	77.040	1.35	0.947	2.14	A	I	32.7	0.778	2.89	C	I	108.2	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH	12.500		4.64	58.000	1.40	0.947	5.01	A	I	32.7	0.778	7.75	C	I	108.2	0.80	0.828	4.64	B	EL	60.9	
		S3C	21.500		2.70	58.050	1.40	0.947	2.92	A	I	32.7	0.778	4.48	C	I	108.2	0.80	0.828	2.70	B	EL	60.9	
		S3A	22.750		2.56	58.240	1.40	0.947	2.78	A	I	32.7	0.778	4.24	C	I	108.2	0.80	0.828	2.56	B	EL	60.9	
		S4A	26.750		2.23	59.653	1.40	0.947	2.47	A	I	32.7	0.778	3.65	C	I	108.2	0.80	0.828	2.23	B	EL	60.9	
		S5A	30.500		1.96	59.780	1.40	0.947	2.18	A	I	32.7	0.778	3.27	B	I	11.6	0.80	0.828	1.96	B	EL	60.9	
		S6A	34.500		1.77	61.065	1.40	0.947	2.00	A	I	32.7	0.778	2.91	B	I	11.6	0.80	0.828	1.77	B	EL	60.9	
		S7B	38.500		1.60	61.600	1.40	0.947	1.83	A	I	32.7	0.778	2.67	B	I	11.6	0.80	0.828	1.60	B	EL	60.9	
		S7A	40.000	3	1.57	62.800	1.40	0.947	1.83	A	I	32.7	0.778	2.69	C	I	108.2	0.80	0.828	1.57	B	EL	60.9	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		2.17	61.303	1.40	0.947	2.47	A	I	32.7	0.778	3.51	C	I	108.2	0.80	0.828	2.17	B	EL	60.9	
		T5B	32.000		1.91	61.120	1.40	0.947	2.16	A	I	32.7	0.778	3.24	C	I	108.2	0.80	0.828	1.91	B	EL	60.9	
		T6A	36.000		1.73	62.280	1.40	0.947	2.00	A	I	32.7	0.778	2.93	C	I	108.2	0.80	0.828	1.73	B	EL	60.9	
		T7A	40.000		1.59	63.600	1.40	0.947	1.88	A	I	32.7	0.778	2.69	C	I	108.2	0.80	0.828	1.59	B	EL	60.9	
		T7B	40.000		1.66	66.400	1.40	0.947	2.06	A	I	32.7	0.778	2.56	B	I	11.6	0.80	0.828	1.66	B	EL	60.9	

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. PRESTRESSED GIRDERS WERE DESIGNED USING SIMPLE SPAN ANALYSIS
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

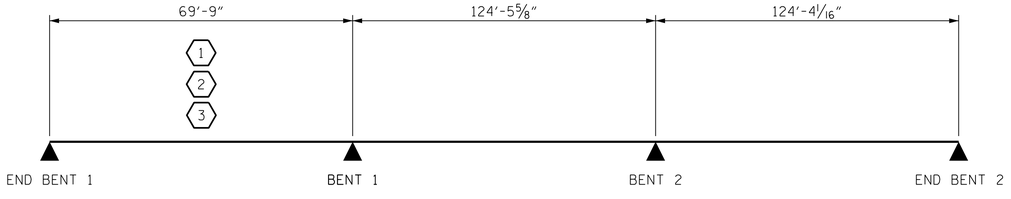
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

DIMENSIONS TAKEN ALONG WORKLINE

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 5 OF 5

SITE 2L DWG. NO. 5

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

2/4/2022

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS (INTERSTATE TRAFFIC)
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-5
1			3			TOTAL SHEETS
2			4			41

STR. #3

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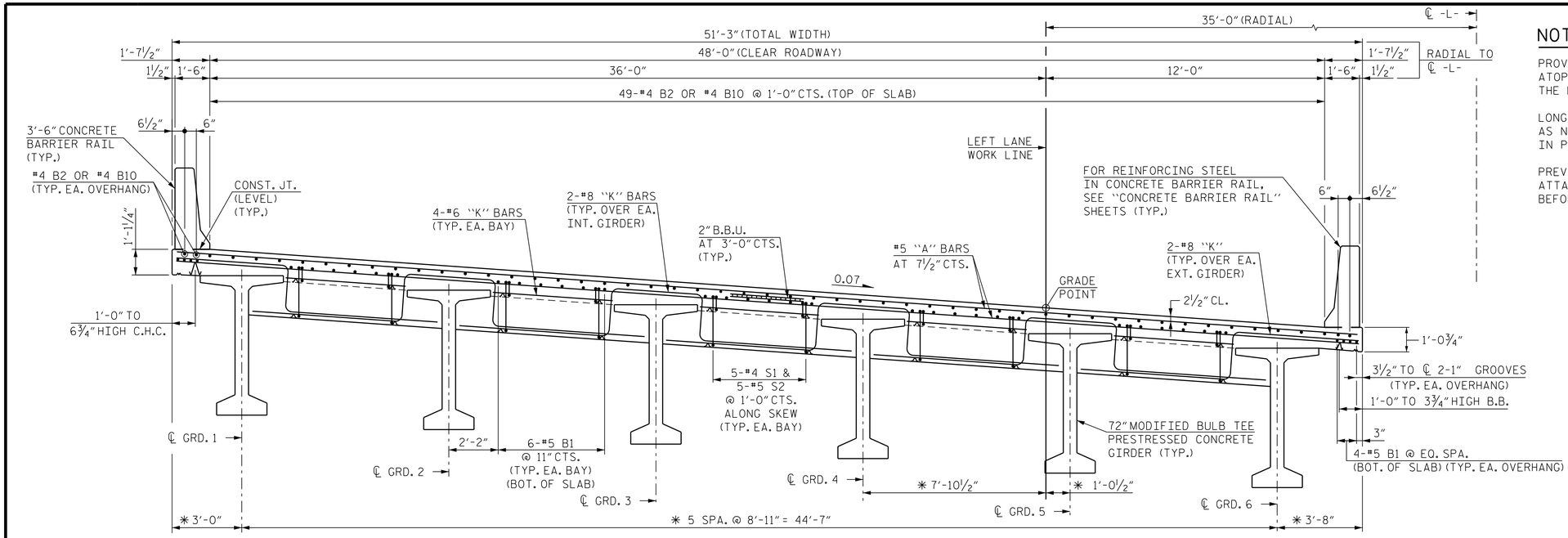
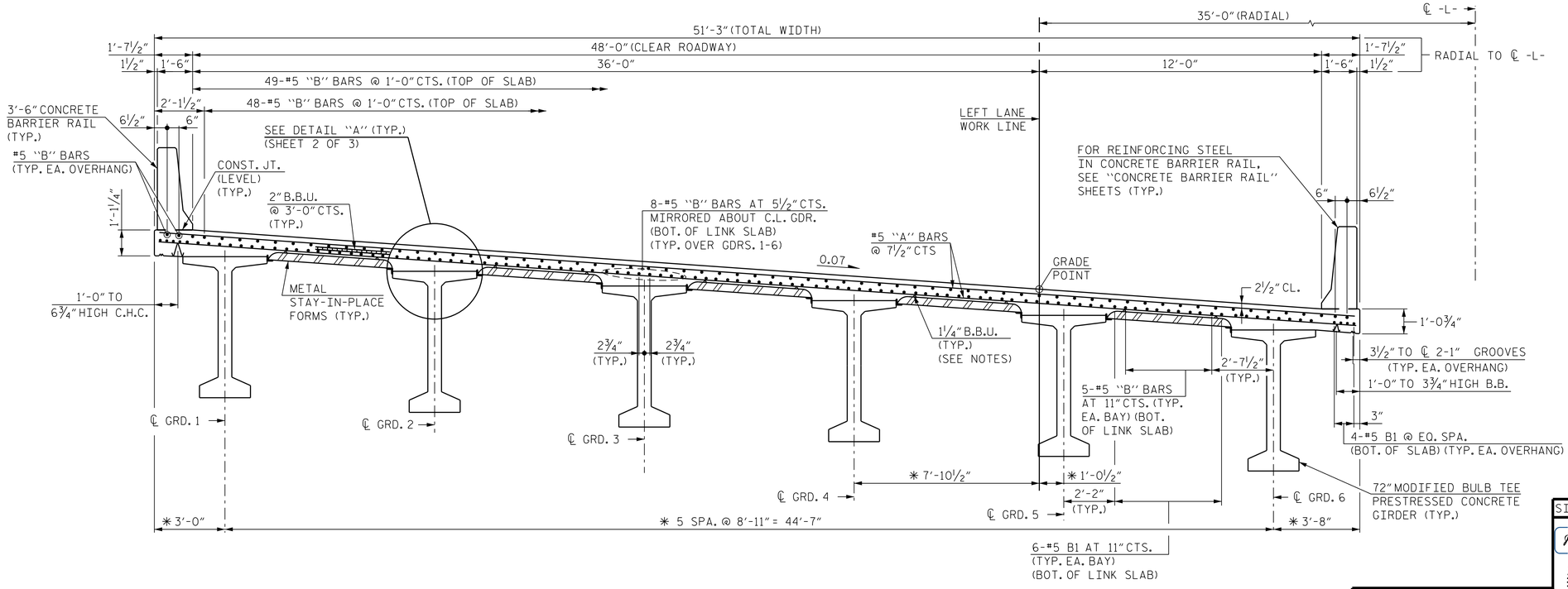


TYPICAL SECTION AT END BENTS

✱ DIMENSIONS SHOWN ARE RADIAL THROUGH W.P. CONTROL LINES AT END BENTS.



TYPICAL SECTION AT BENT 1 AND BENT 2

✱ DIMENSIONS SHOWN ARE RADIAL THROUGH W.P. CONTROL LINES AT BENTS. SHOWING LINK SLAB REGION

NOTES:

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS.

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

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

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
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SHEET 1 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

TYPICAL SECTIONS

LEFT LANE

SITE 2L DWG. NO. 6

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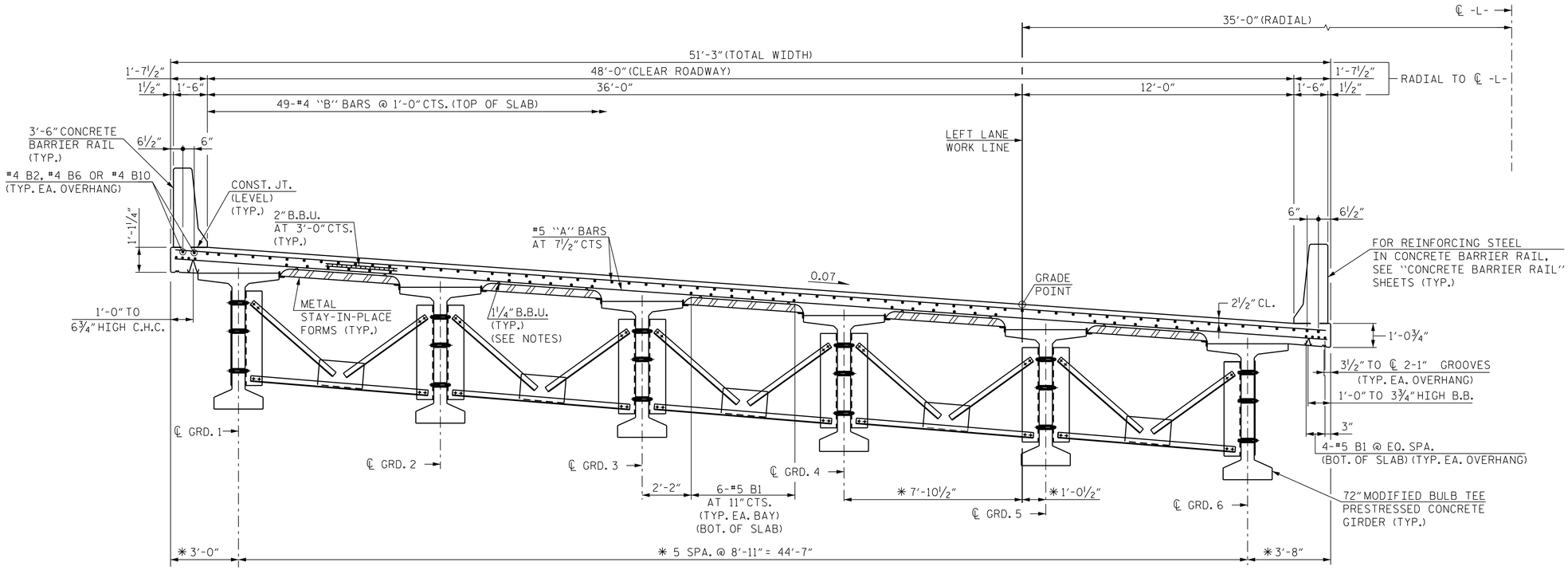
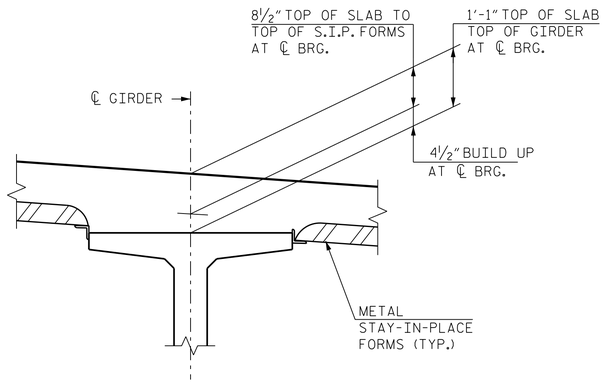


TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM

* DIMENSIONS SHOWN ARE RADIAL THROUGH W.P. CONTROL LINES AT END BENTS AND BENT.



DETAIL "A"

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CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTIONS

LEFT LANE

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2			4			41

STR. #3

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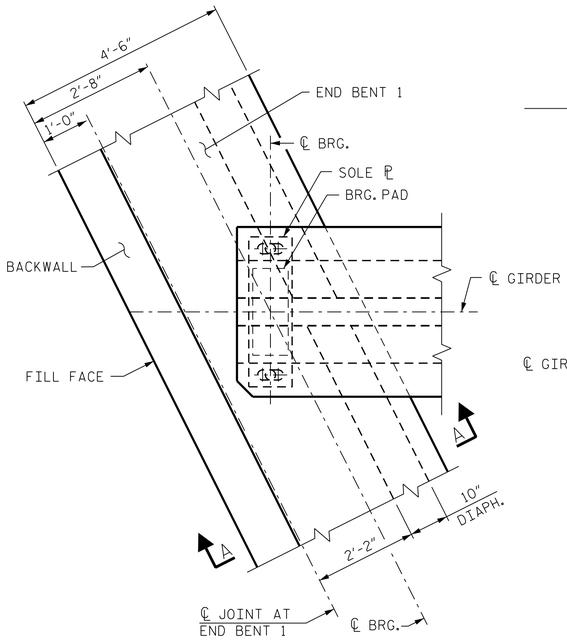
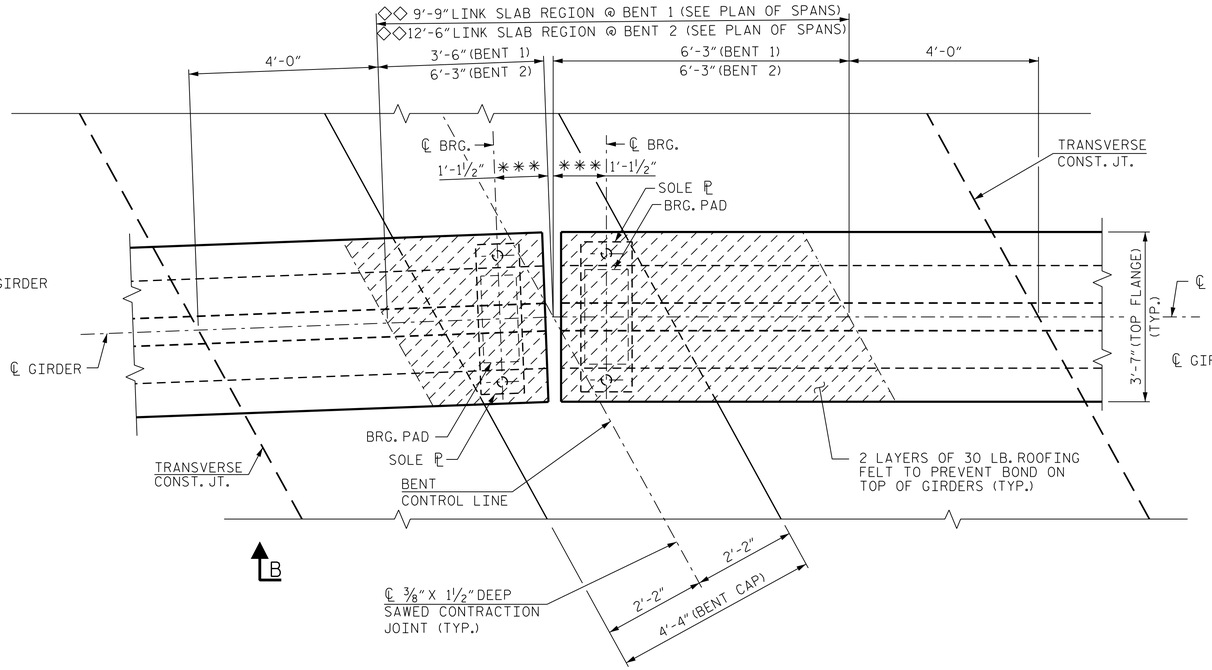


PLAN DETAIL OF END BENT 1

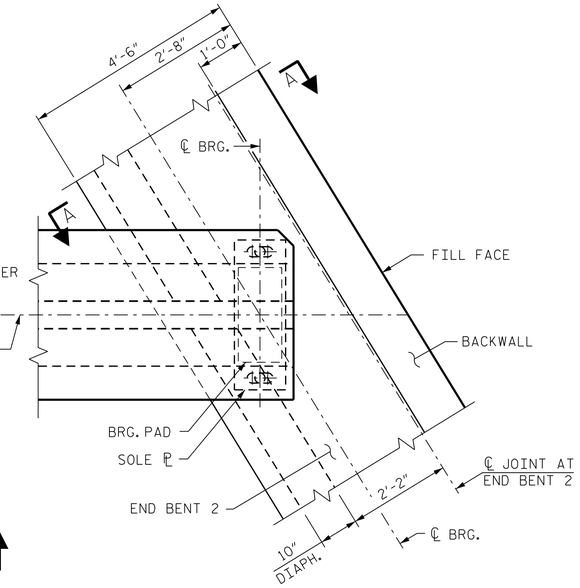
(DECK SLAB NOT SHOWN FOR CLARITY)



PLAN DETAIL OF INTERIOR BENT

MEASURED ALONG ℄ GIRDER

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

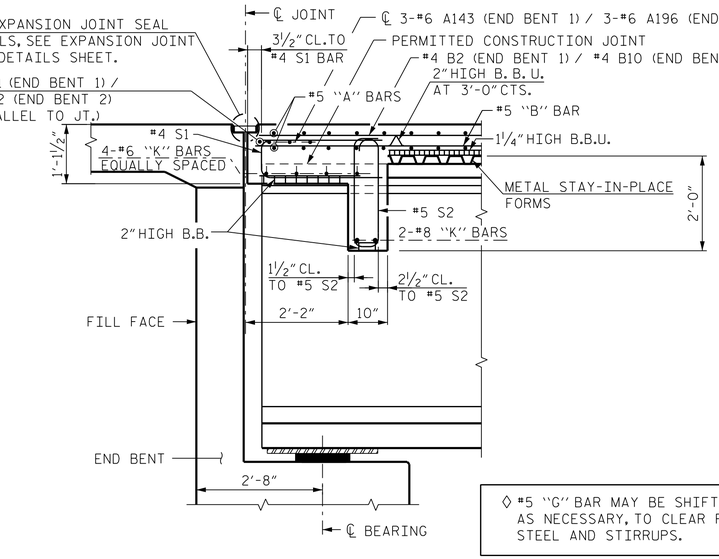


PLAN DETAIL OF END BENT 2

(DECK SLAB NOT SHOWN FOR CLARITY)

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

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

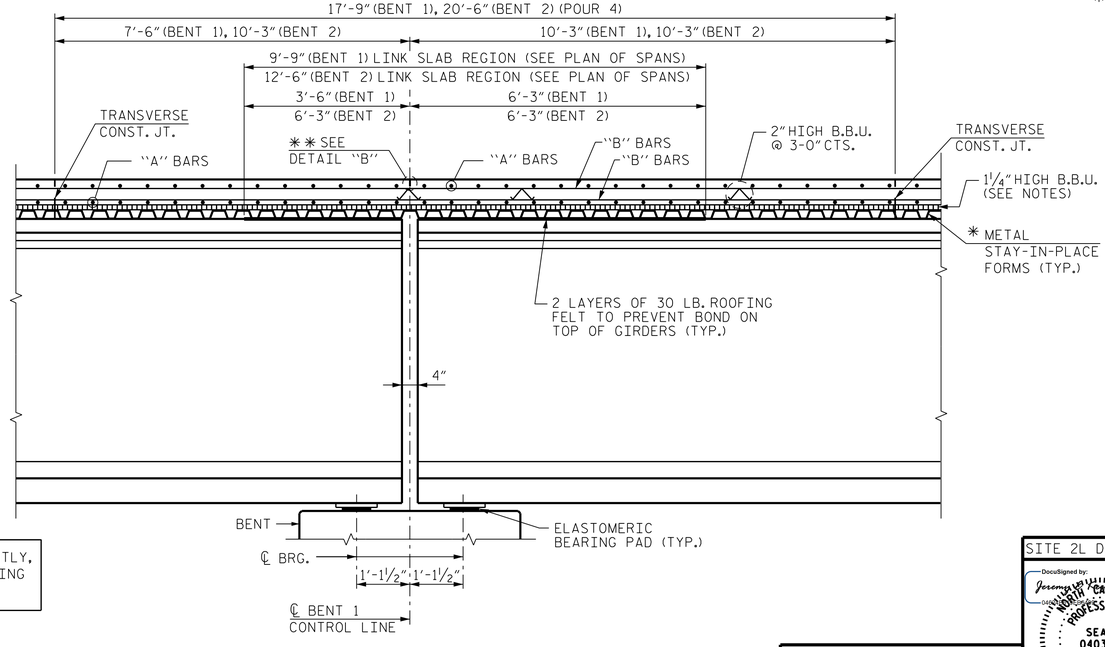


◇ #5 "G" BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.

SECTION A-A

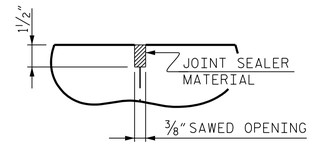
SECTION THROUGH END BENT DIAPHRAGM

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



SECTION B-B

DIMENSIONS SHOWN ARE MEASURED ALONG ℄ GIRDER
(BENT 1 SHOWN, BENT 2 SIMILAR)



DETAIL "B"

SAW CUT CONTRACTION JOINT

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
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SHEET 3 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

TYPICAL SECTION DETAILS

LEFT LANE

SITE 2L DWG. NO. 8

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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2			4			41

STR. #3

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END BENT 1 DIAPHRAGM DETAILS	
EB1-1	2-#8 K1 (OVER EXT. GDR. AG1)
EB1-2	2-#8 K2 (OVER EXT. GDR. AG6)
EB1-3	2-#8 K3 (TYP. OVER EA. INT. GDR.)
EB1-4	4-#6 K4 (TYP. EA. BAY)
EB1-5	5-#4 S1 AND 5-#5 S2 AT 1'-0" CTS. (TYP. EA. BAY)
EB1-6	54-#4 J1 AT 1'-0" CTS. (SEE EXPANSION JOINT SEAL DETAILS FOR LOCATION OF BARS)

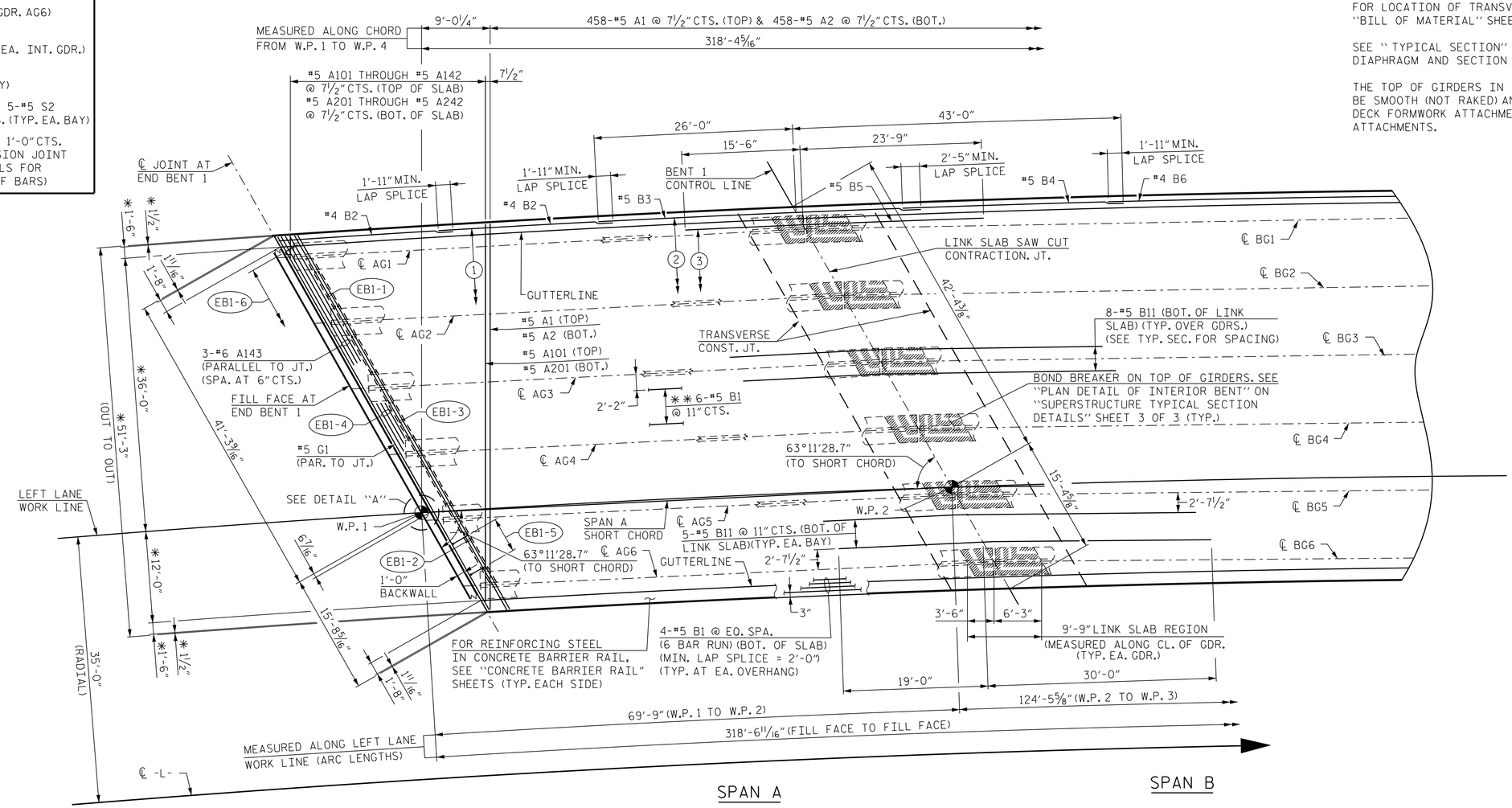
NOTE:

#5 "A" BARS SHALL BE PLACED PERPENDICULAR TO CHORD BETWEEN WORK POINTS AT END BENT 1 AND END BENT 2.

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

SEE " TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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



PLAN OF SPAN A

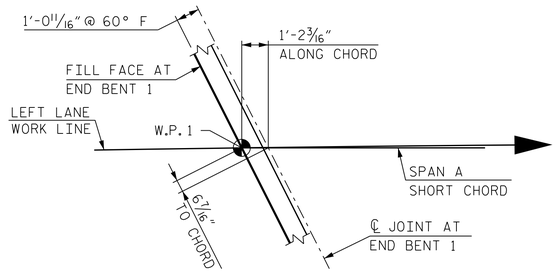
* RADIAL DIMENSIONS

** (6 BAR RUN) (BOT. OF SLAB) (MIN. LAP SPLICE = 2'-0") (TYP. EA. BAY)

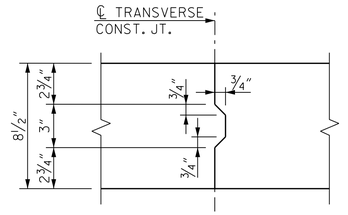
(1) 53-#4 B2 (2 BAR RUN) (TOP OF SLAB) (MIN. LAP SPLICE = 2'-0") (SEE TYPICAL SECTION FOR SPACING)

(2) 53-#5 B3 SPLICED WITH #5 B4 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING)

(3) 48-#5 B5 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)



DETAIL "A"



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

TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
SPAN A

LEFT LANE

SITE 2L DWG. NO. 9

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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2			4			41

STR. #3

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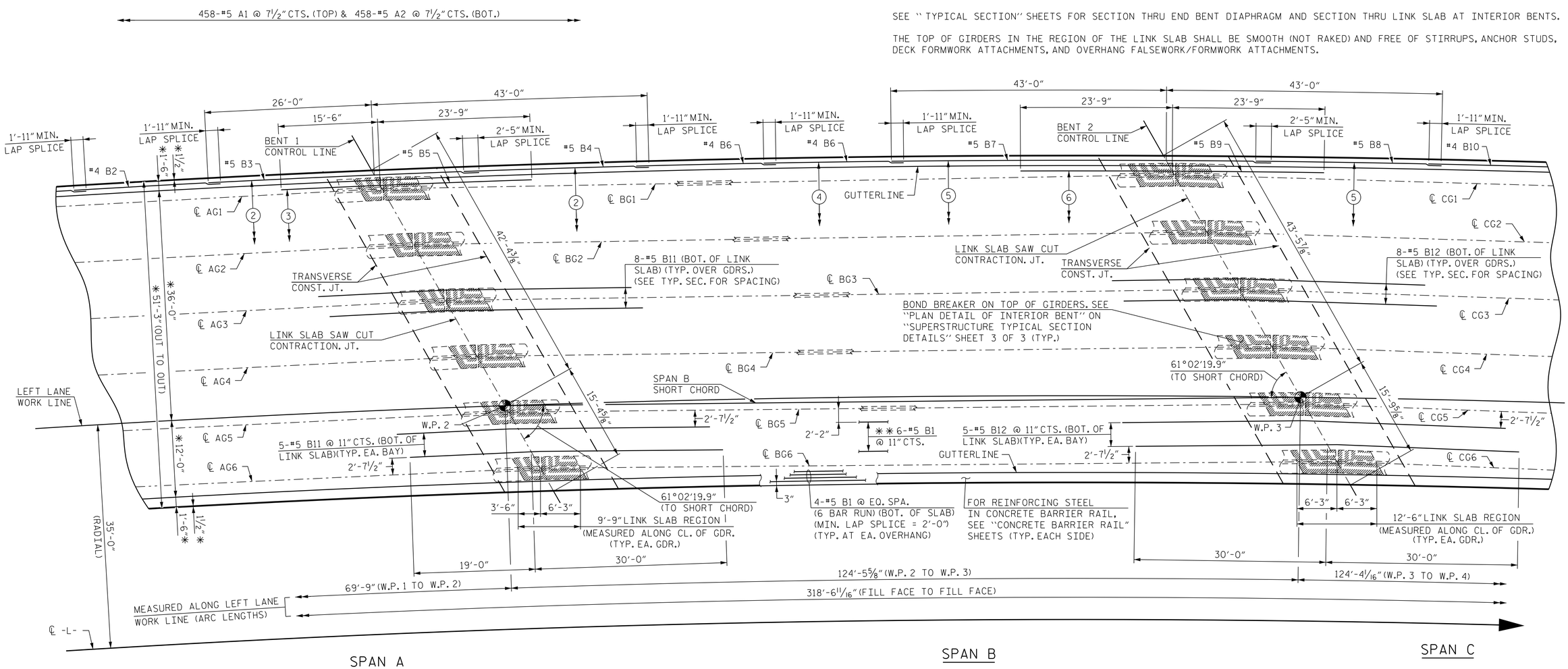
NOTE:

#5 ''A'' BARS SHALL BE PLACED PERPENDICULAR TO CHORD BETWEEN WORK POINTS AT END BENT 1 AND END BENT 2.

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE ''BILL OF MATERIAL'' SHEET 1 OF 2.

SEE '' TYPICAL SECTION'' SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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



PLAN OF SPAN B

* RADIAL DIMENSIONS

** (6 BAR RUN) (BOT. OF SLAB) (MIN. LAP SPLICE = 2'-0") (TYP. EA. BAY)

(2) 53-#5 B3 SPLICED WITH #5 B4 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING)

(3) 48-#5 B5 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)

(4) 53-#4 B6 (2 BAR RUN) (TOP OF SLAB) (MIN. LAP SPLICE = 1'-11") (SEE TYPICAL SECTION FOR SPACING)

(5) 53-#5 B7 SPLICED WITH #5 B8 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING) (ALTERNATE BARS TO STAGGER LAP ABOUT ℄ BENT 2 CONTROL LINE)

(6) 48-#5 B9 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
SPAN B

LEFT LANE

SITE 2L DWG. NO. 10

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STR. #3

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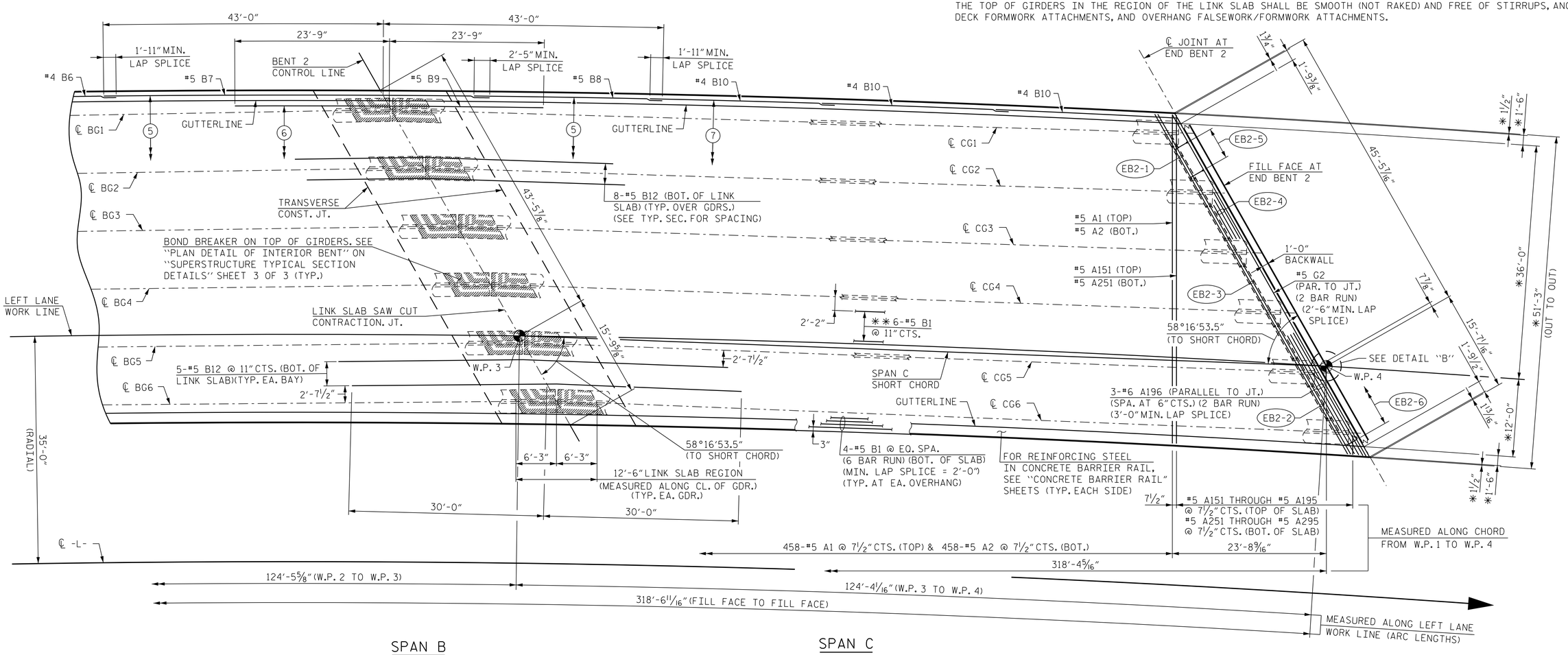
NOTE:

#5 "A" BARS SHALL BE PLACED PERPENDICULAR TO CHORD BETWEEN WORK POINTS AT END BENT 1 AND END BENT 2.

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

SEE " TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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



SPAN B

SPAN C

PLAN OF SPAN C

* RADIAL DIMENSIONS

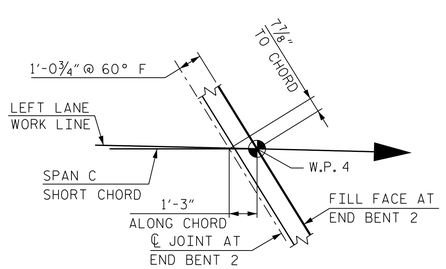
** (6 BAR RUN) (BOT. OF SLAB) (MIN. LAP SPLICE = 2'-0") (TYP. EA. BAY)

(5) 53-#5 B7 SPLICED WITH #5 B8 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING) (ALTERNATE BARS TO STAGGER LAP ABOUT ℄ BENT 2 CONTROL LINE)

(6) 48-#5 B9 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)

(7) 53-#4 B10 (3 BAR RUN) (TOP OF SLAB) (MIN. LAP SPLICE = 1'-11") (SEE TYPICAL SECTION FOR SPACING)

END BENT 2 DIAPHRAGM DETAILS	
EB2-1	2-#8 K10 (OVER EXT. GDR. CG1)
EB2-2	2-#8 K11 (OVER EXT. GDR. CG6)
EB2-3	2-#8 K12 (TYP. OVER EA. INT. GDR.)
EB2-4	4-#6 K13 (TYP. EA. BAY)
EB2-5	5-#4 S1 AND 5-#5 S2 AT 1'-0" CTS. (TYP. EA. BAY)
EB2-6	58-#4 J1 AT 1'-0" CTS. (SEE EXPANSION JOINT SEAL DETAILS FOR LOCATION OF BARS)



DETAIL "B"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
SPAN C

LEFT LANE

SITE 2L DWG. NO. 11

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2			4			41

STR. #3

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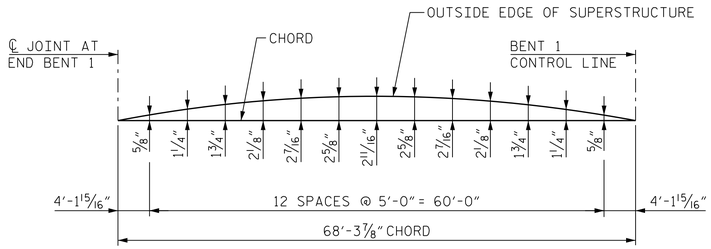
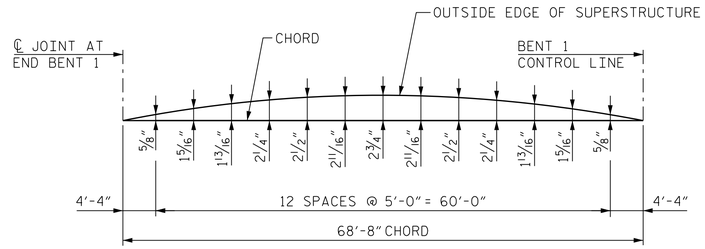
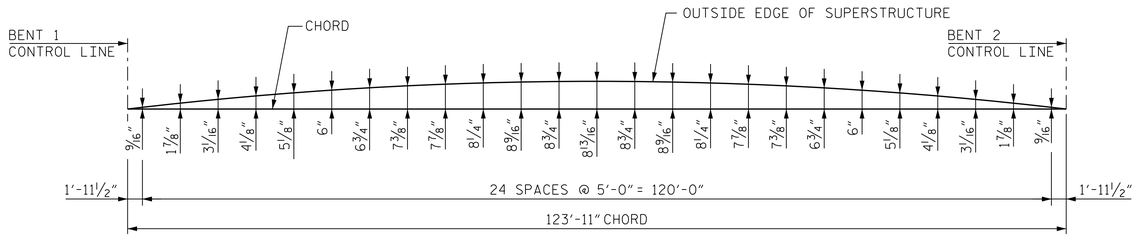


SPAN A LEFT SIDE

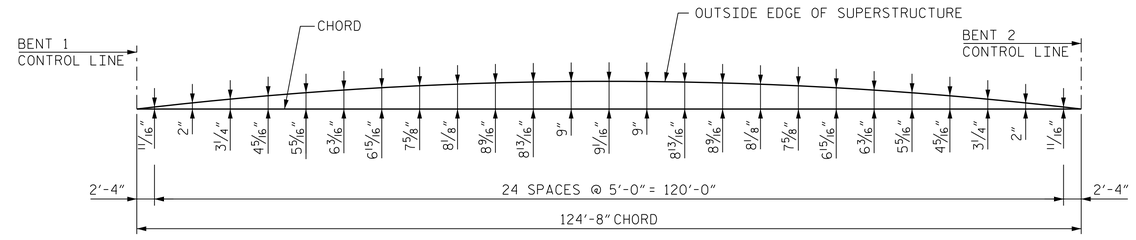


SPAN A RIGHT SIDE

ARC OFFSETS - SPAN A

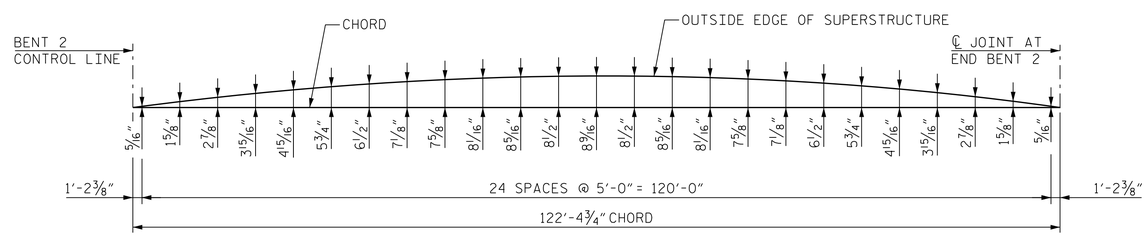


SPAN B LEFT SIDE

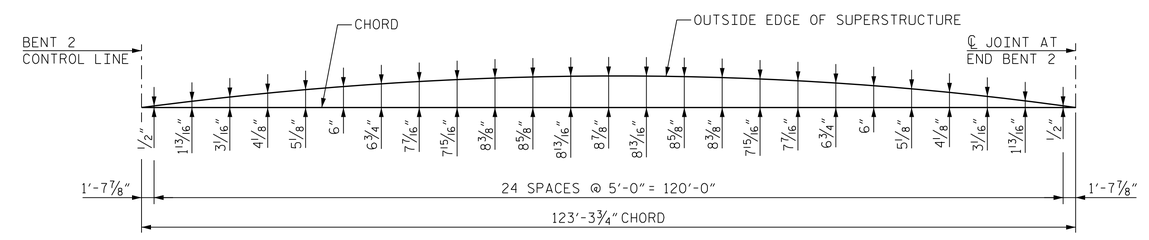


SPAN B RIGHT SIDE

ARC OFFSETS - SPAN B



SPAN C LEFT SIDE



SPAN C RIGHT SIDE

ARC OFFSETS - SPAN C

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS
SPANS A, B AND C

LEFT LANE

SITE 2L DWG. NO.12

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2/4/2022

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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NC LICENSE NUMBER: F-0112

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2			4			41

STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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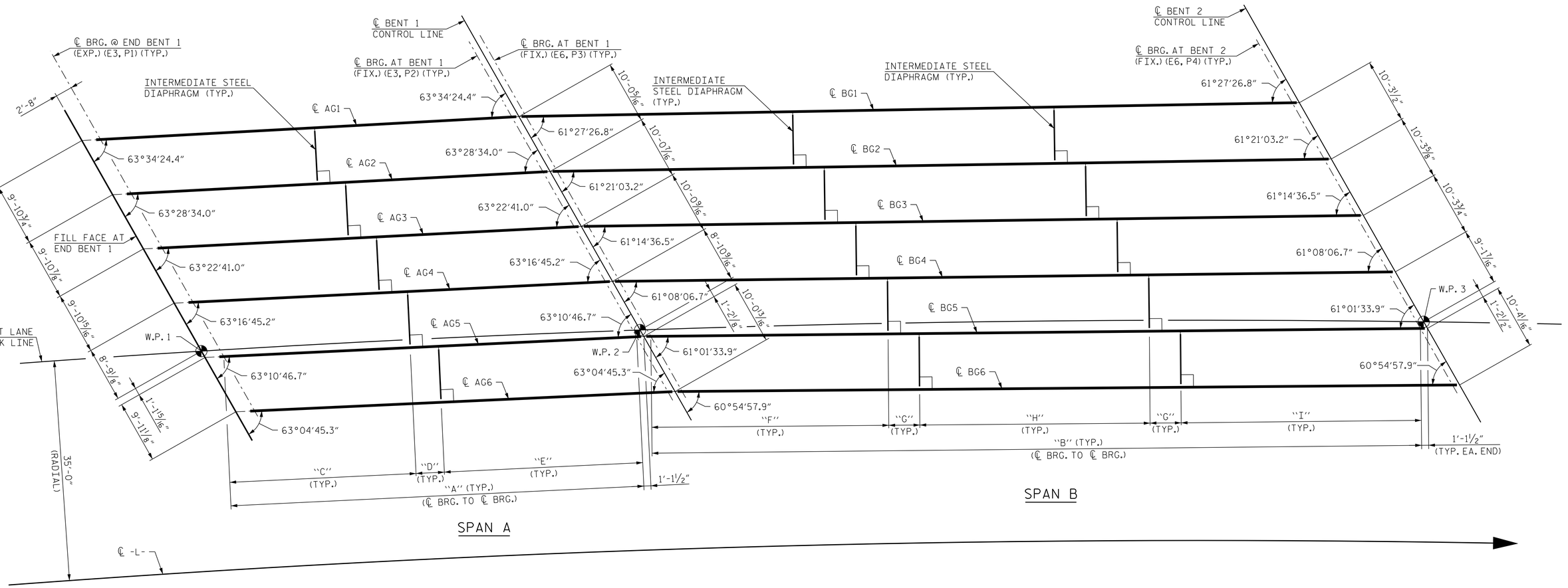

FRAMING PLAN

VARIABLE TABLE - SPAN A				
GIRDER	"A"	"C"	"D"	"E"
AG1	65'-5"	34'-0 3/8"	0'-0"	31'-4 5/8"
AG2	65'-5 5/8"	29'-7 5/16"	4'-5 3/8"	31'-4 15/16"
AG3	65'-6 3/8"	29'-7 3/8"	4'-5 5/8"	31'-5 3/8"
AG4	65'-7"	29'-7 1/2"	4'-5 7/8"	31'-5 5/8"
AG5	65'-7 3/4"	29'-7 5/8"	4'-6 1/16"	31'-6 1/16"
AG6	65'-8 1/2"	29'-7 3/4"	0'-0"	36'-0 3/4"

VARIABLE TABLE - SPAN B					
GIRDER	"B"	"F"	"G"	"H"	"I"
BG1	121'-8 1/2"	42'-4 1/4"	0'-0"	41'-6"	37'-10 1/4"
BG2	121'-10"	37'-6 9/16"	4'-10 7/16"	36'-7 9/16"	37'-11"
BG3	121'-11 1/2"	37'-7 1/16"	4'-10 11/16"	36'-7 5/16"	37'-11 3/4"
BG4	122'-1 1/8"	37'-7 9/16"	4'-11"	36'-7"	38'-0 9/16"
BG5	122'-2 5/8"	37'-8 1/16"	4'-11 1/4"	36'-6 3/4"	38'-1 5/16"
BG6	122'-4 1/4"	37'-8 5/8"	0'-0"	41'-6"	43'-1 5/8"

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN
SPANS A & B

LEFT LANE

SITE 2L DWG. NO.13

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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1			3			TOTAL SHEETS
2			4			41

STR. #3

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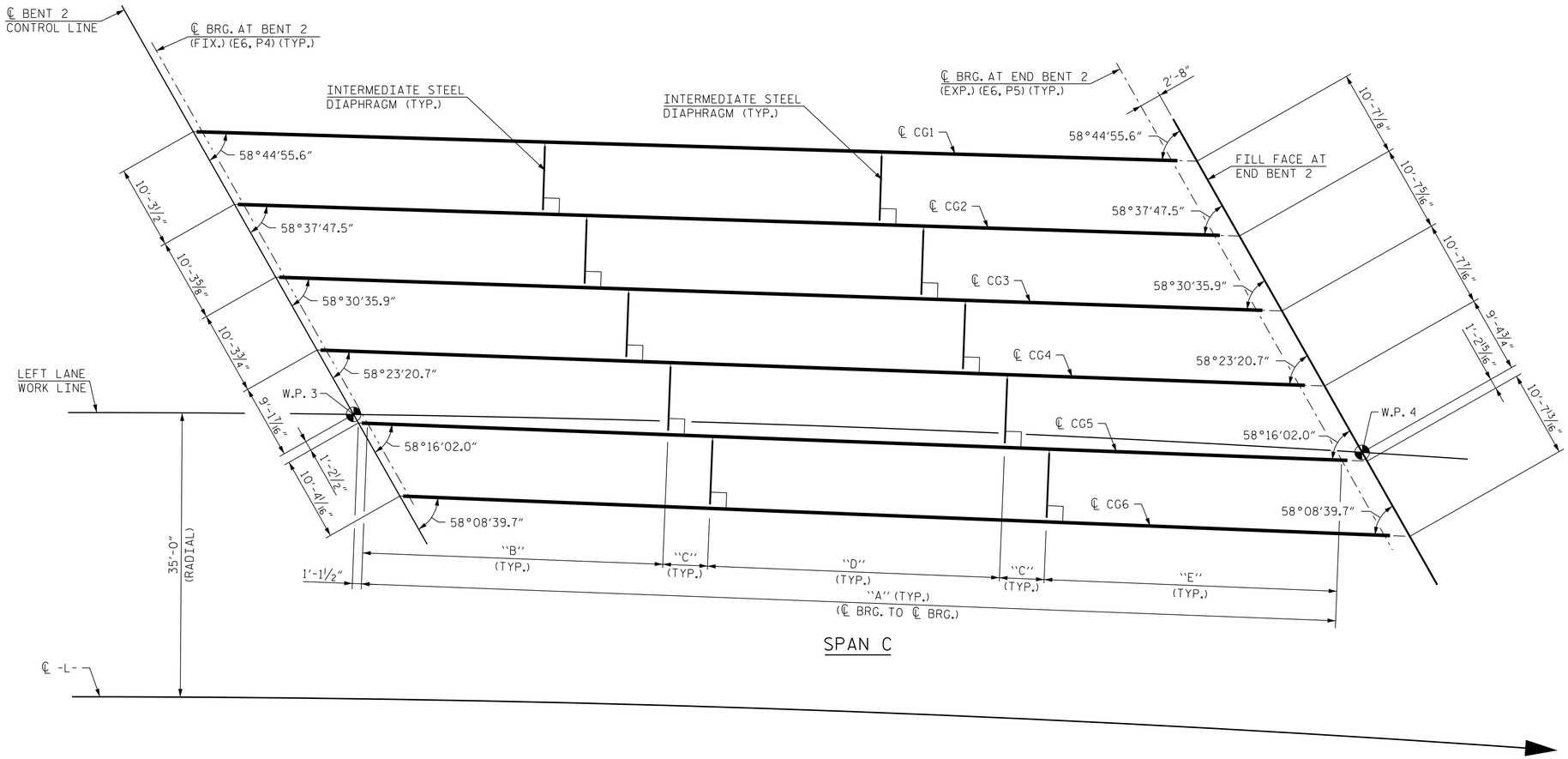

FRAMING PLAN

VARIABLE TABLE - SPAN C					
GIRDER	"A"	"B"	"C"	"D"	"E"
CG1	119'-5 1/2"	42'-2 3/4"	0'-0"	41'-6"	35'-8 3/4"
CG2	119'-7 3/8"	36'-10 7/16"	5'-5 1/4"	36'-0 3/4"	35'-9 11/16"
CG3	119'-9 1/4"	36'-11 1/16"	5'-5 9/16"	36'-0 7/16"	35'-10 5/8"
CG4	119'-11 1/8"	36'-11 3/4"	5'-5 7/8"	36'-0 1/8"	35'-11 1/2"
CG5	120'-1"	37'-0 1/2"	5'-6 1/8"	35'-11 13/16"	36'-0 7/16"
CG6	120'-3"	37'-1 1/16"	0'-0"	41'-6"	41'-7 15/16"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN
SPAN C

LEFT LANE

SITE 2L DWG. NO. 14

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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1			3			TOTAL SHEETS
2			4			41

STR. #3

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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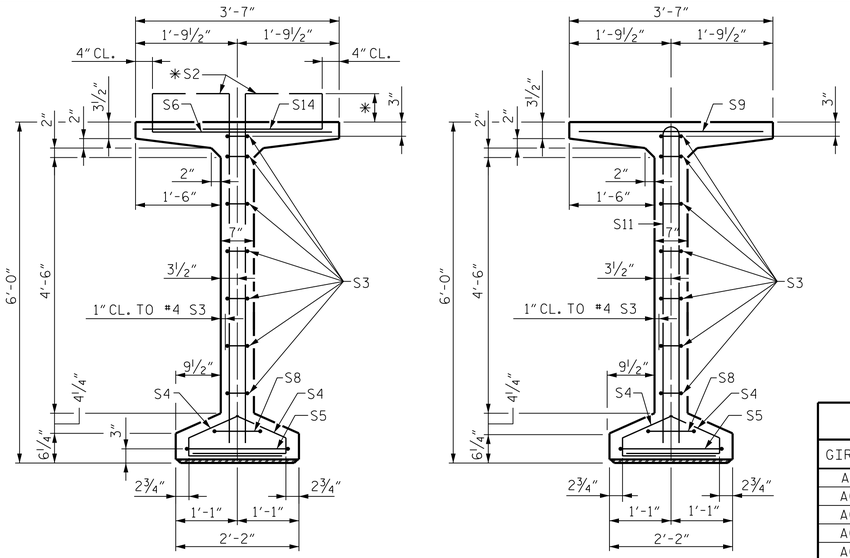


SECTION A-A

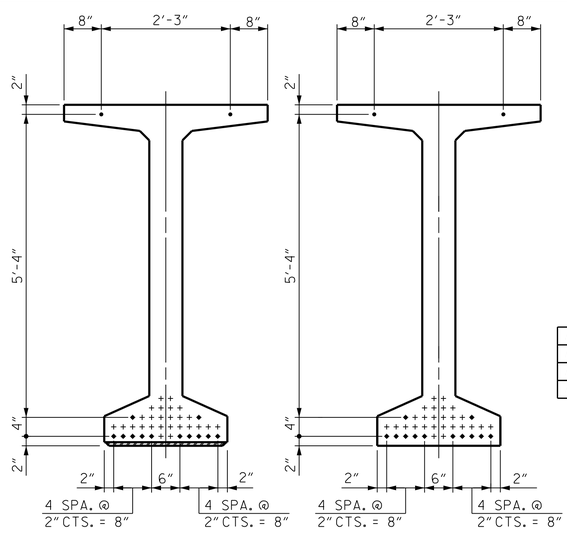
SECTION B-B

*S6 BARS SHALL HAVE AN EXTENSION ABOVE THE TOP OF THE GIRDER OF 6". S1 AND S2 BARS SHALL BE 7½" AND S14 BARS SHALL BE 8½".

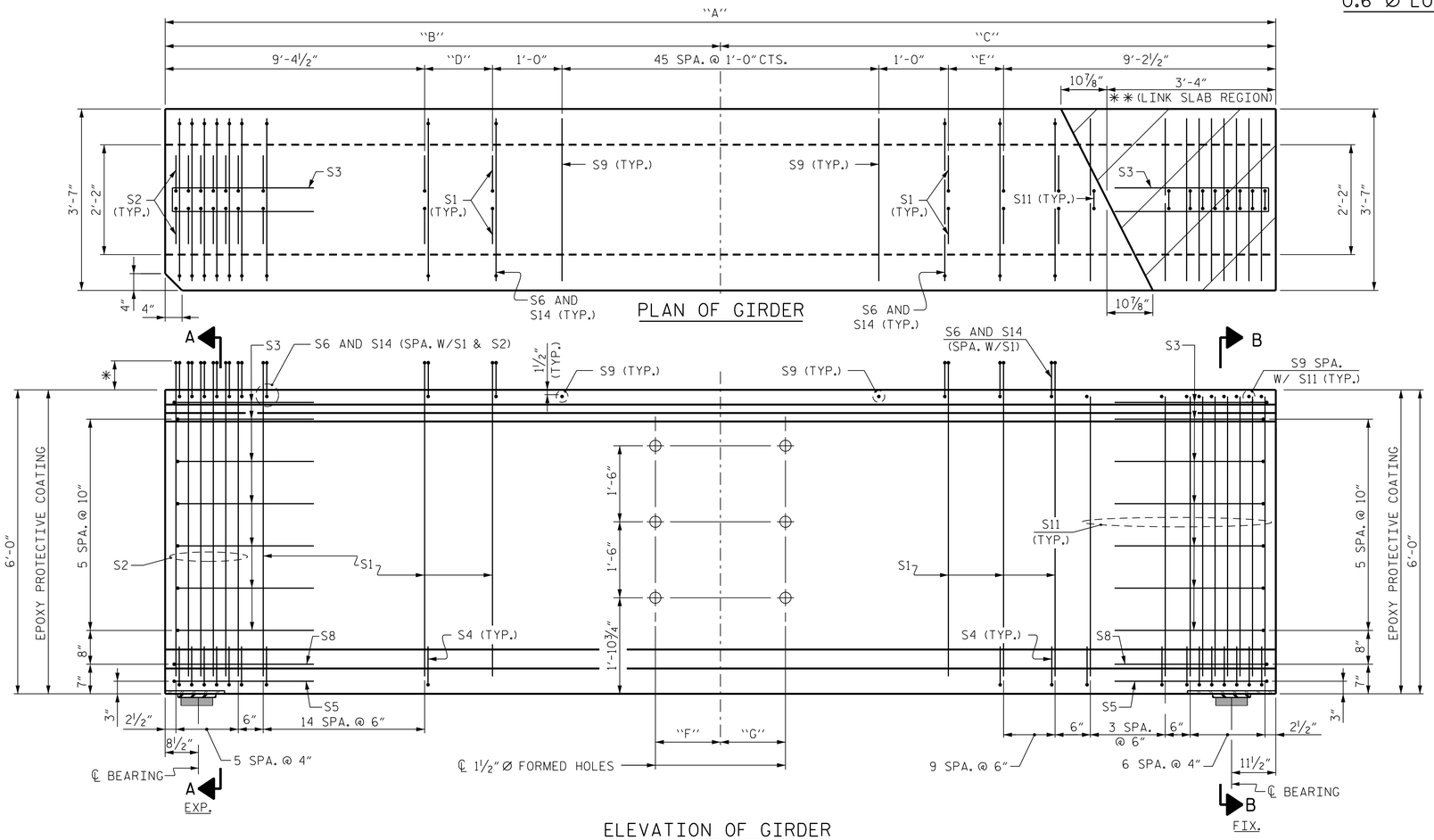
DEBONDING LEGEND

● FULLY BONDED STRANDS

SPAN A VARIABLE TABLE							
GIRDER	"A"	"B"	"C"	"D"	"E"	"F"	"G"
AG1	67'-1"	33'-5"	33'-8"	8"	10"	-	2'-3"
AG2	67'-1⅝"	33'-5⅝"	33'-8⅝"	8⅝"	10⅝"	2'-2⅜"	2'-3"
AG3	67'-2⅜"	33'-5¹¹/₁₆"	33'-8¹¹/₁₆"	8¹¹/₁₆"	10¹¹/₁₆"	2'-2⅝"	2'-3"
AG4	67'-3"	33'-6"	33'-9"	9"	11"	2'-2⅞"	2'-3"
AG5	67'-3¾"	33'-6⅞"	33'-9⅜"	9⅜"	11⅜"	2'-3¹/₁₆"	2'-3"
AG6	67'-4½"	33'-6¾"	33'-9¼"	9¾"	11¾"	2'-3⅝"	-



0.6"Ø LOW RELAXATION STRAND LAYOUT



ELEVATION OF GIRDER

FOR PARTIAL ELEVATION OF INTERMEDIATE DIAPHRAGM REINFORCING STEEL, SEE SHEET 4 OF 4.

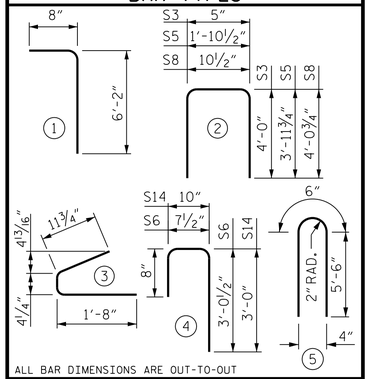
**DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

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	146	#4	1	6'-10"	666
S2	12	#5	1	6'-10"	86
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-0"	168
S5	2	#5	2	9'-10"	21
S6	79	#5	4	4'-4"	357
S8	2	#5	2	9'-0"	19
S9	57	#5	STR.	3'-3"	193
S11 (AG1, AG6)	15	#5	5	11'-6"	180
S11 (AG2-AG5)	19	#5	5	11'-6"	228
S12 (AG1, AG6)	8	#4	STR.	8'-0"	43
S13 (AG2-AG5)	8	#4	STR.	12'-6"	67
S14	79	#5	4	4'-6"	371

BAR TYPES



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LB.	C.Y.	No.
AG1, AG6	2,183	14.4	14
AG2-AG5	2,255	14.4	14

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
6	VARIES	403'-4¼"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS LIVE LOAD SPAN A

LEFT LANE

SITE 2L DWG. NO. 15

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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1			3			TOTAL SHEETS
2			4			41

STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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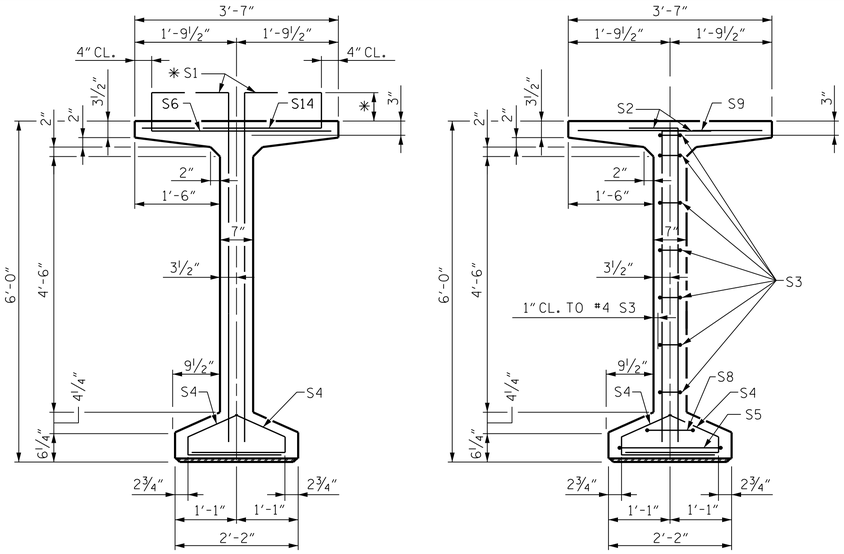


SECTION A-A

SECTION B-B

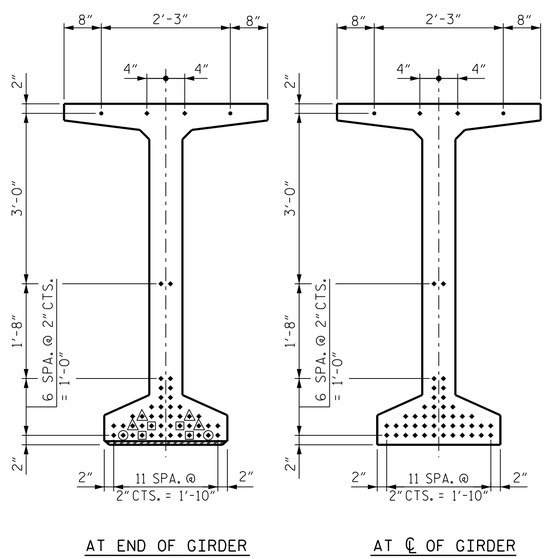
✱S6 BARS SHALL HAVE AN EXTENSION ABOVE THE TOP OF THE GIRDER OF 6". S1 BARS SHALL BE 7½" AND S14 BARS SHALL BE 8½".

SPAN B VARIABLE TABLE

GIRDER	"A"	"B"	"C"	"D"	"E"
BG1	123'-7½"	7¼"	-	18'-6"	23'-0"
BG2	123'-9"	8"	4'-10 7/16"	18'-6"	18'-1 9/16"
BG3	123'-10½"	8¾"	4'-10 11/16"	18'-6"	18'-1 5/16"
BG4	124'-0⅛"	9 9/16"	4'-11"	18'-6"	18'-1"
BG5	124'-1⅝"	10 5/16"	4'-11¼"	18'-6"	18'-0¾"
BG6	124'-3¼"	11⅛"	-	23'-5½"	18'-0½"

DEBONDING LEGEND

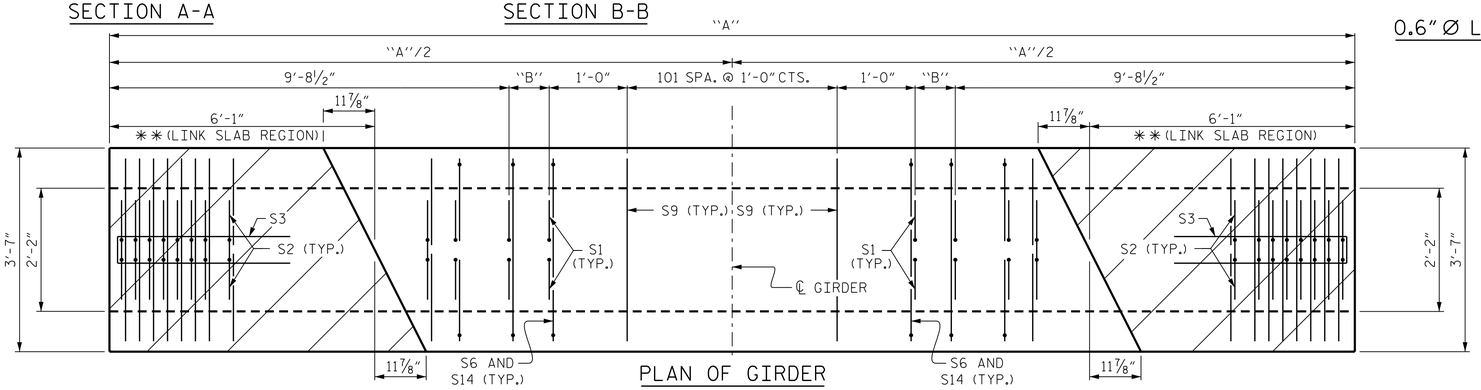
- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- △ STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER
- ⦿ STRANDS DEBONDED FOR 26'-0" FROM END OF GIRDER



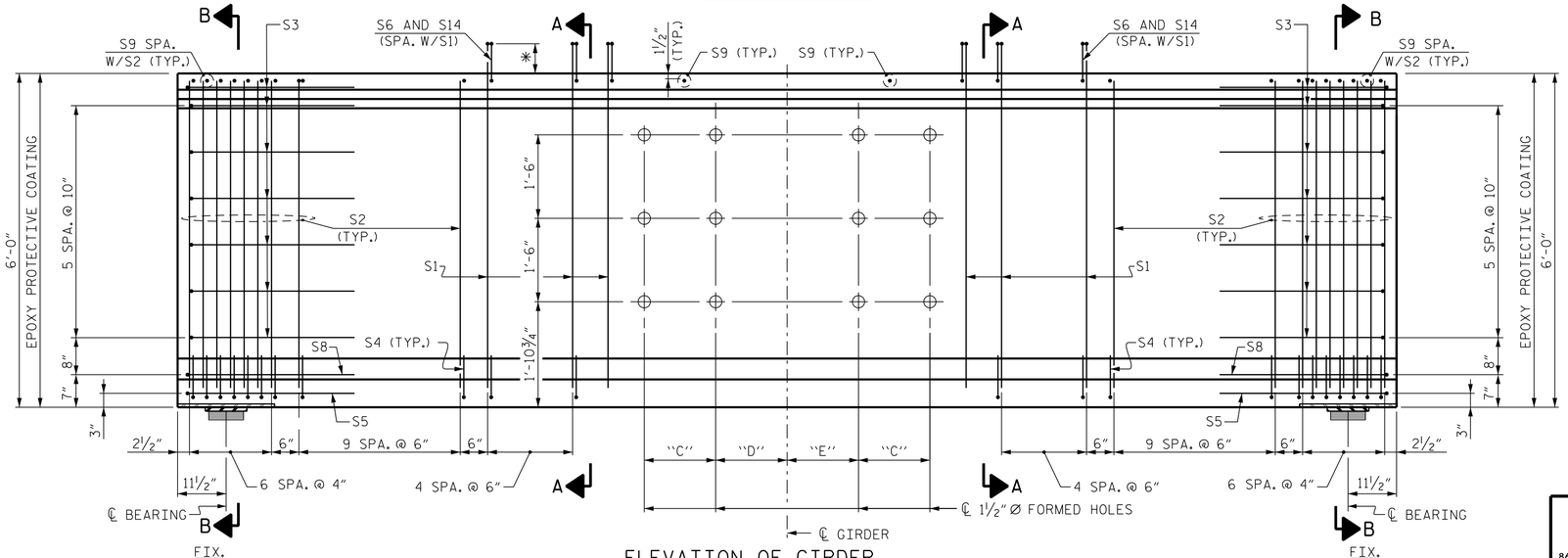
AT END OF GIRDER

AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

FOR PARTIAL ELEVATION OF INTERMEDIATE DIAPHRAGM REINFORCING STEEL, SEE SHEET 4 OF 4.
✱✱DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

0.6"Ø L.R. GRADE 270 STRANDS

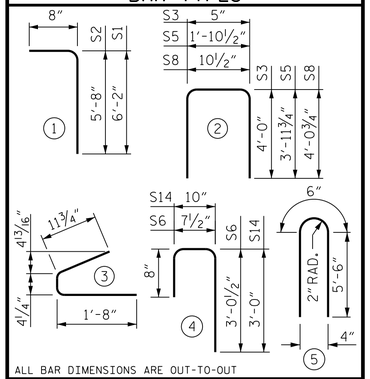
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	228	#4	1	6'-10"	1,041
S2	68	#6	1	6'-4"	647
S3	14	#4	2	8'-5"	79
S4	88	#4	3	3'-0"	176
S5	2	#5	2	9'-10"	21
S6	114	#5	4	4'-4"	515
S8	2	#5	2	9'-0"	19
S9	136	#5	STR.	3'-3"	461
S11	8	#5	5	11'-6"	96
S11	16	#5	5	11'-6"	192
S12	16	#4	STR.	8'-0"	86
S13	16	#4	STR.	13'-0"	139
S14	114	#5	4	4'-6"	535

BG1, BG6
BG2-BG5
BG1, BG6
BG2-BG5

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LB.	C.Y.	No.
BG1, BG6	3,676	26.6	48
BG2-BG5	3,825	26.6	48

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
6	VARIES	743'-8"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS LIVE LOAD SPAN B

LEFT LANE

SITE 2L DWG. NO. 16

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2			4			41

STR. #3

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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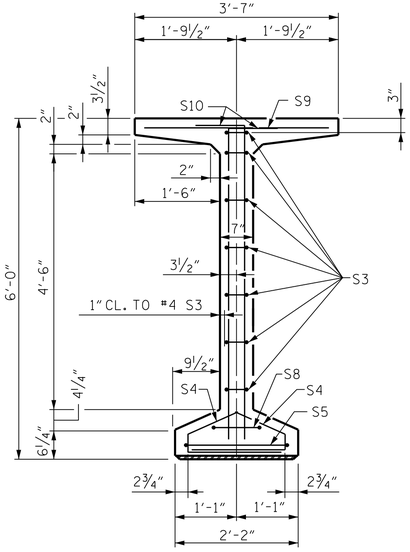
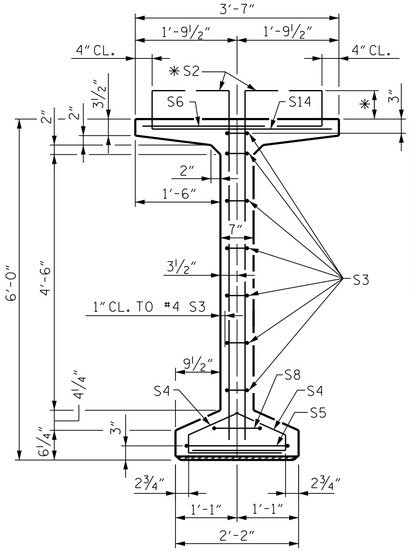


SECTION A-A



SECTION B-B

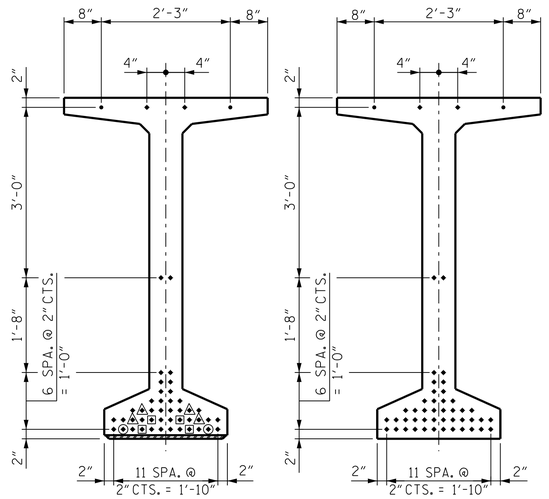
* S6 BARS SHALL HAVE AN EXTENSION ABOVE THE TOP OF THE GIRDER OF 6". S1 AND S2 BARS SHALL BE 7½" AND S14 BARS SHALL BE 8½".

SPAN C VARIABLE TABLE

GIRDER	"A"	"B"	"C"	"D"	"E"	"F"	"G"
CG1	121'-1½"	60'-8¼"	60'-5¼"	6¼"	-	18'-6"	23'-0"
CG2	121'-3⅜"	60'-9³⁄₁₆"	60'-6³⁄₁₆"	7³⁄₁₆"	5'-5¼"	18'-6"	17'-6¾"
CG3	121'-5¼"	60'-10⅛"	60'-7⅛"	8⅛"	5'-5⁹⁄₁₆"	18'-6"	17'-6⁷⁄₁₆"
CG4	121'-7⅛"	60'-11¹⁄₁₆"	60'-8¹⁄₁₆"	9¹⁄₁₆"	5'-5⅞"	18'-6"	17'-6⅛"
CG5	121'-9"	61'-0"	60'-9"	10"	5'-6³⁄₁₆"	18'-6"	17'-5¹³⁄₁₆"
CG6	121'-11"	61'-1"	60'-10"	11"	-	24'-0½"	17'-5½"

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- △ STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER
- ⦿ STRANDS DEBONDED FOR 28'-0" FROM END OF GIRDER



AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

CG1, CG6	S11	8
CG2-CG5	S11	16
CG1, CG6	S12	16
CG2-CG5	S13	16

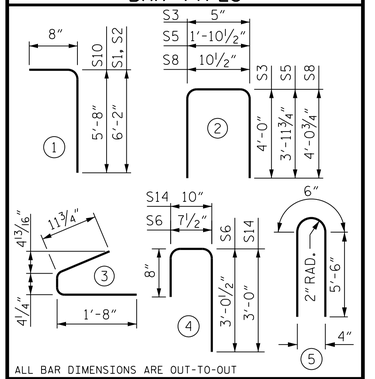
0.6" Ø L. R. GRADE 270 STRANDS

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

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	244	#4	1	6'-10"	1,114
S2	12	#6	1	6'-10"	123
S3	14	#4	2	8'-5"	79
S4	86	#4	3	3'-0"	172
S5	2	#5	2	9'-10"	21
S6	128	#5	4	4'-4"	579
S8	2	#5	2	9'-0"	19
S9	117	#5	STR.	3'-3"	397
S10	34	#6	1	6'-4"	323
S11	8	#5	5	11'-6"	96
S11	16	#5	5	11'-6"	192
S12	16	#4	STR.	8'-0"	86
S13	16	#4	STR.	13'-0"	139
S14	128	#5	4	4'-6"	601

BAR TYPES



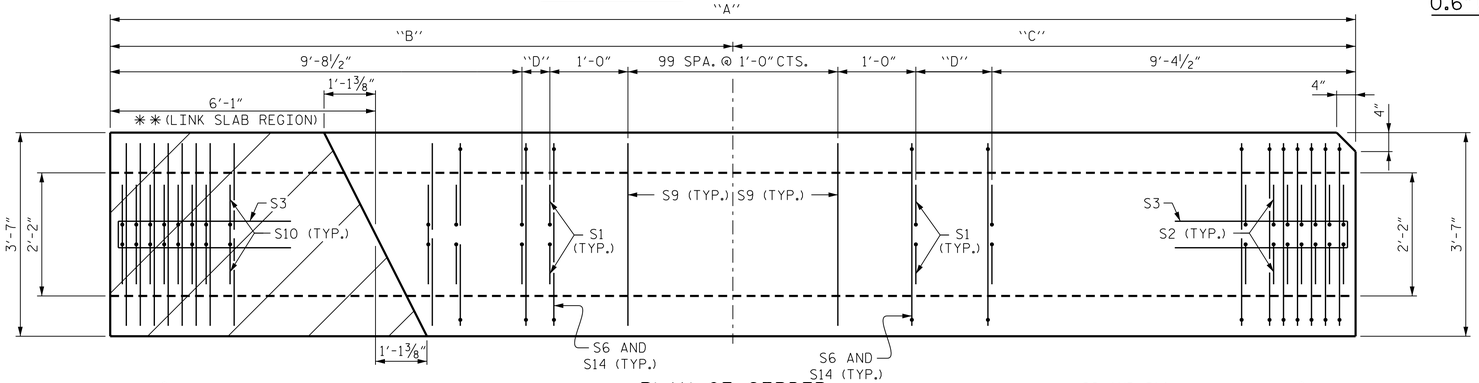
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

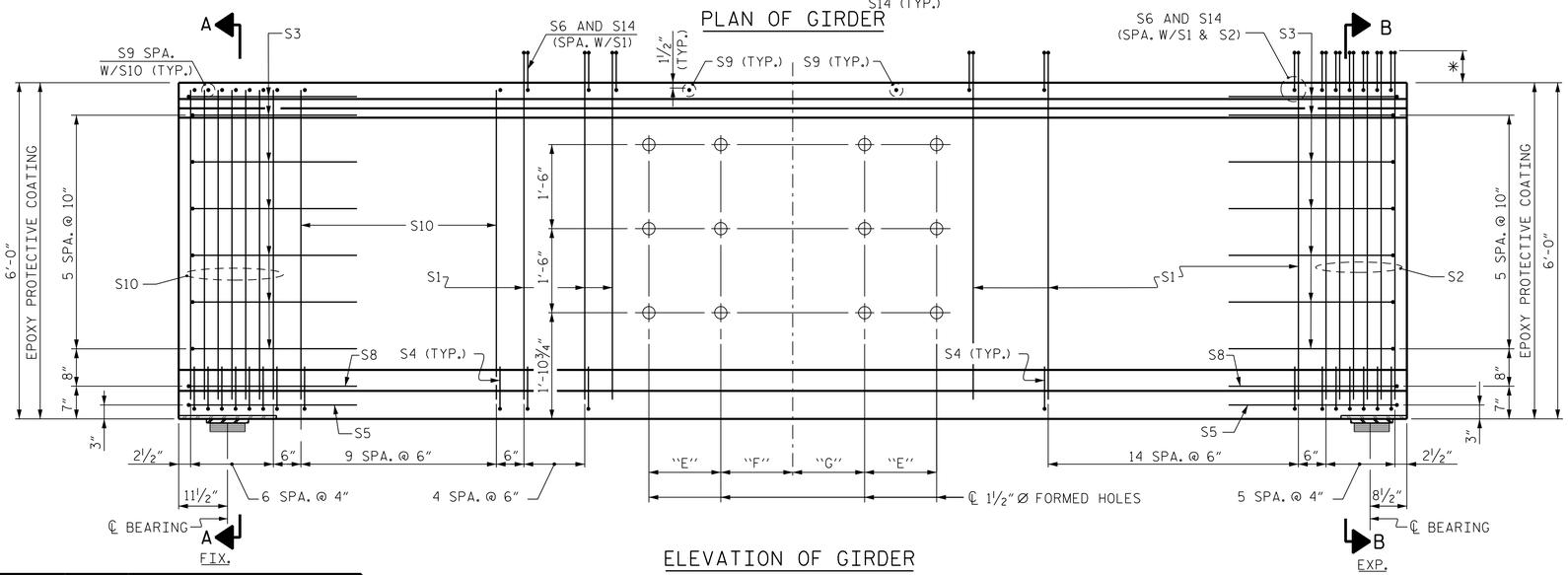
	REINFORCING STEEL	8500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
CG1, CG6	3,610	26.1	48
CG2-CG5	3,759	26.1	48

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
6	VARIES	729'-1¼"



PLAN OF GIRDER



ELEVATION OF GIRDER

FOR PARTIAL ELEVATION OF INTERMEDIATE DIAPHRAGM REINFORCING STEEL, SEE SHEET 4 OF 4.
** DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 3 OF 4

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS LIVE LOAD SPAN C

LEFT LANE

SITE 2L DWG. NO. 17

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

DocuSigned by: Jeremy Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

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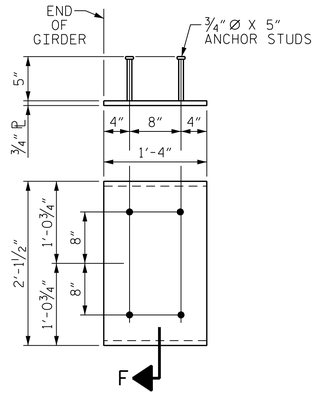
1			3			TOTAL SHEETS
2			4			41

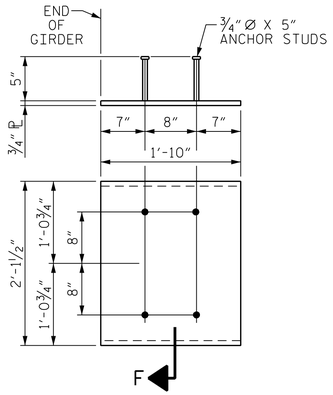
STR. #3

tboyd 2/4/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 2\LEFT LANE\FINAL\U2519BA_449_SD_G3.dgn



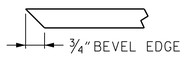
EMBEDDED PLATE "B-1" DETAILS

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)



EMBEDDED PLATE "B-2" DETAILS

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)



SECTION "F"

(SEE NOTES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

EMBEDDED PLATE "B-1" AND "B-2" 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 6,700 PSI.

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

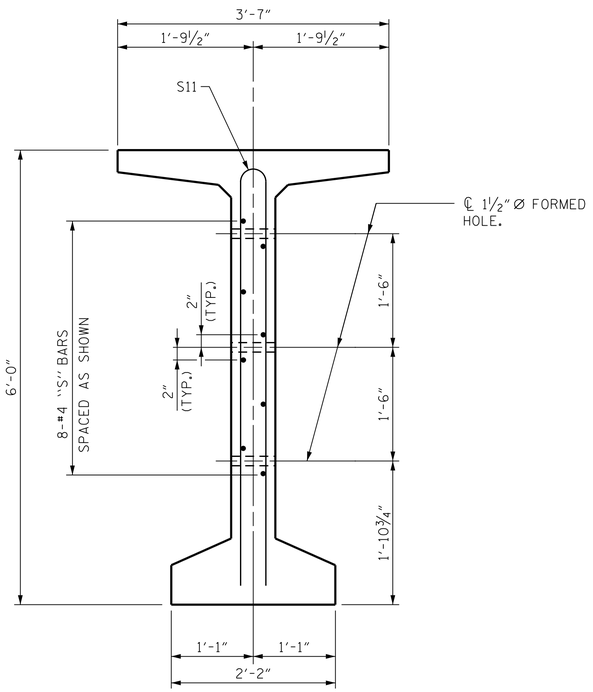
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4" AND LINK SLAB REGION, SHALL BE RAKED TO A DEPTH OF ¼".

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

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

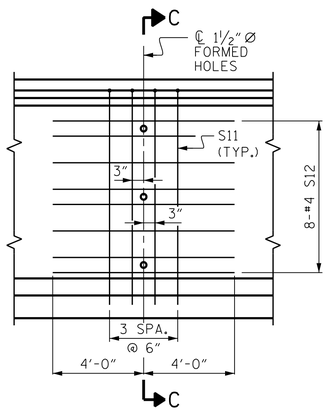
EMBEDDED PLATE VARIABLE TABLE

GDR. NO.	SPAN A		SPAN B		SPAN C	
	NEAR	FAR	NEAR	FAR	NEAR	FAR
G1	B-1	B-2	B-2	B-2	B-2	B-1
G2	B-1	B-2	B-2	B-2	B-2	B-1
G3	B-1	B-2	B-2	B-2	B-2	B-1
G4	B-1	B-2	B-2	B-2	B-2	B-1
G5	B-1	B-2	B-2	B-2	B-2	B-1
G6	B-1	B-2	B-2	B-2	B-2	B-1



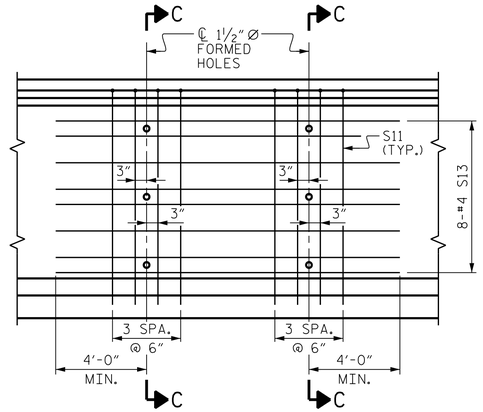
SECTION C-C

(S1, S6 AND S14 BARS NOT SHOWN)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. AG1, AG6, BG1, BG6, CG1 AND CG6.



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. AG2-AG5, BG2-BG5 AND CG2-CG5.

REINFORCING DETAILS FOR 1½" Ø FORMED HOLES FOR STEEL DIAPHRAGMS

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" MODIFIED BULB TEE
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
DETAILS

LEFT LANE

SITE 2L DWG. NO. 18

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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2/4/2022
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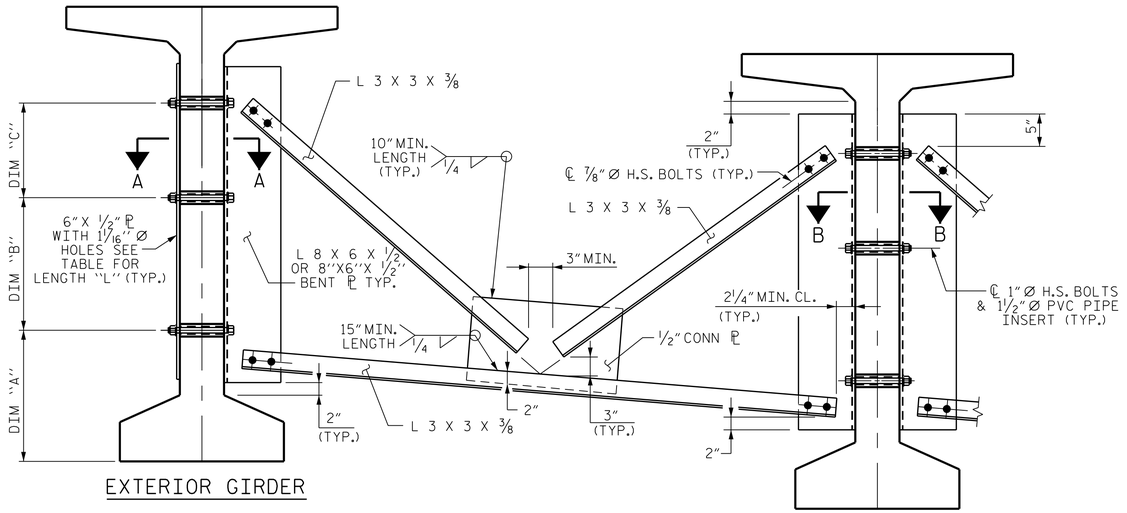
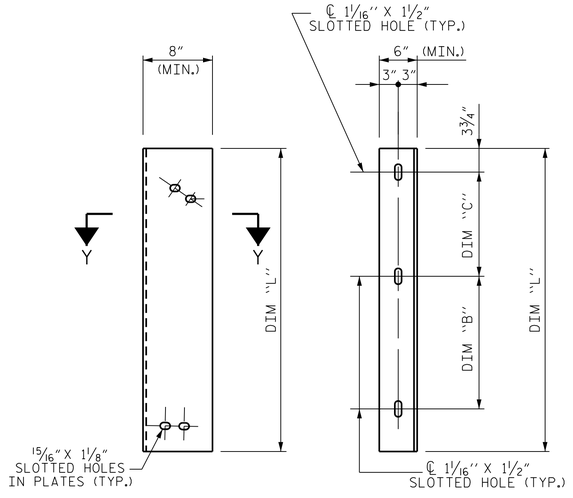


EXTERIOR GIRDER

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.

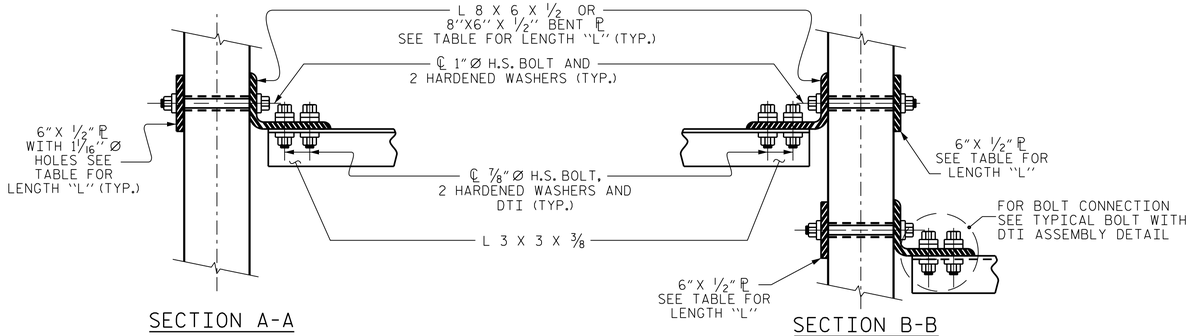
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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.



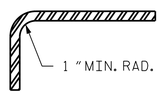
SECTION A-A

SECTION B-B

CONNECTION DETAILS

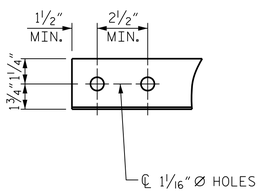
TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
72" BULB TEE	1'-10 3/4"	1'-6"	1'-6"	4'-2"

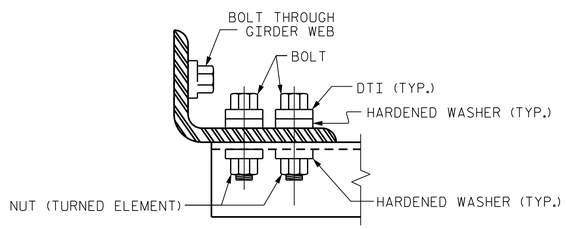


SECTION Y-Y

CONNECTOR PLATE DETAIL



ANGLE END
(L 3 X 3 X 3/8)



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS
LEFT LANE

SITE 2L DWG. NO. 19

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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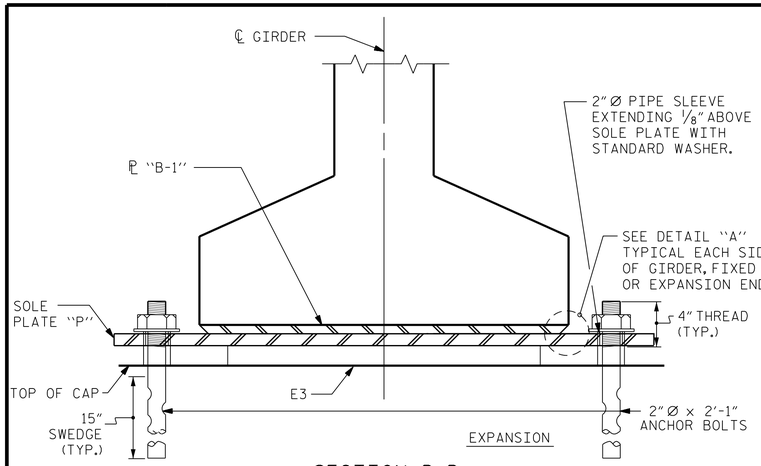
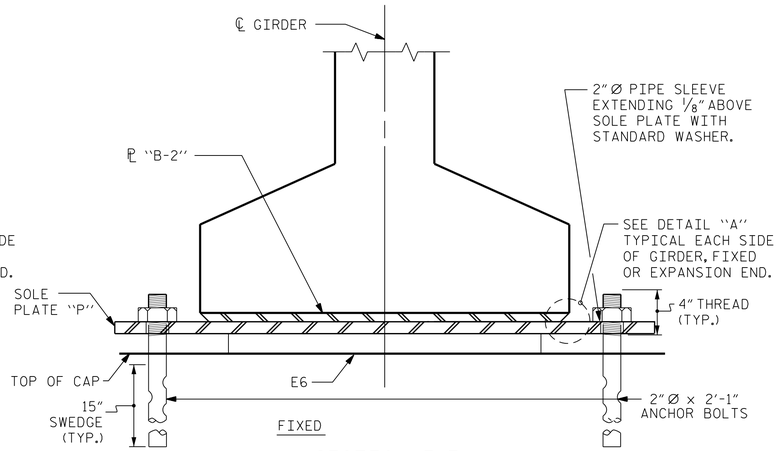
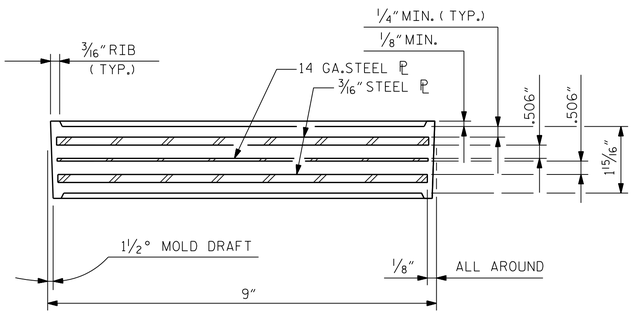


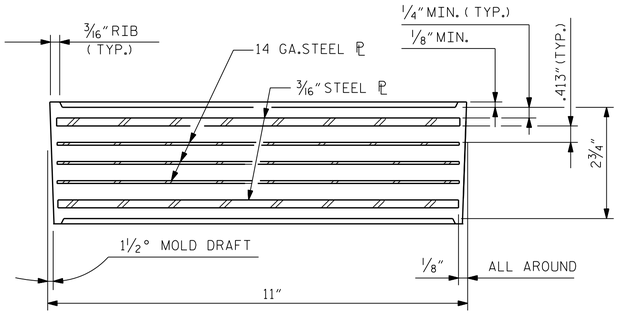
SECTION D-D



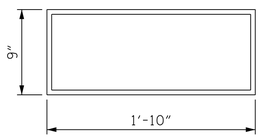
SECTION E-E



TYPICAL SECTION OF ELASTOMERIC BEARINGS

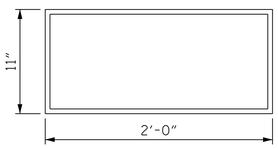


TYPICAL SECTION OF ELASTOMERIC BEARINGS



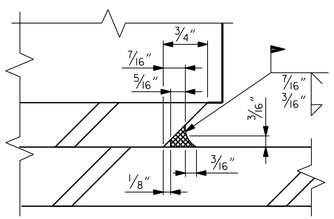
E3 (12 REQ'D)
PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV

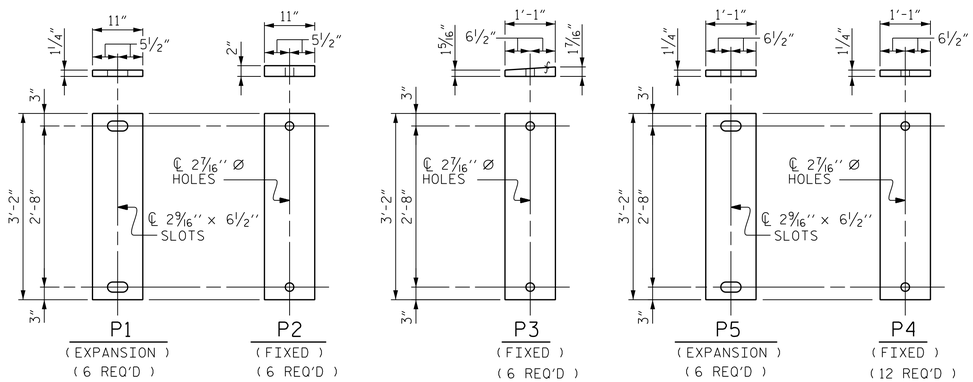


E6 (24 REQ'D)
PLAN VIEW OF ELASTOMERIC BEARING

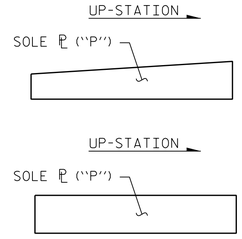
TYPE VII



DETAIL "A"

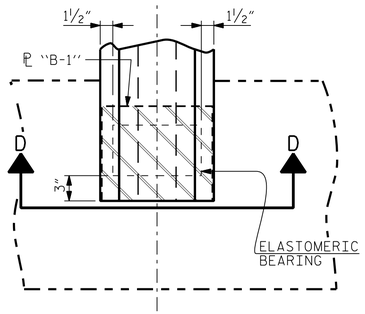


SOLE PLATE DETAILS ("P")

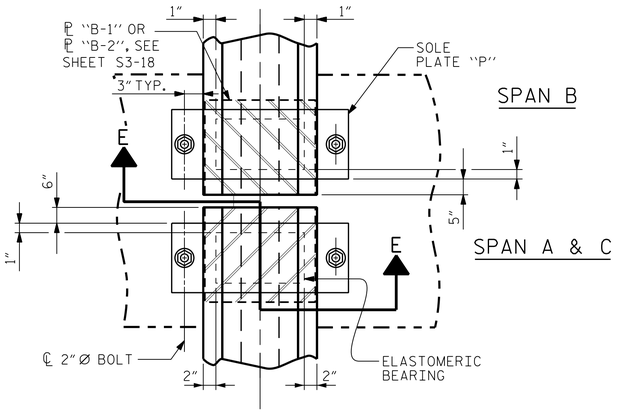


SOLE ℄ PLACEMENT DETAILS

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE VII	470 k



TYPICAL HALF-PLAN
(SHOWING INTEGRAL END BENT)



TYPICAL HALF-PLAN
(SHOWING CONTINUOUS BENT)

NOTES

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

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

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

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

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

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.

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CUMBERLAND COUNTY
STATION: 397+90.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

LEFT LANE

SITE 2L DWG. NO. 20

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "A"

GIRDER		TENTH POINTS										
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
AG1, AG6	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.011	0.021	0.028	0.033	0.035	0.033	0.028	0.021	0.011	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.005	0.009	0.013	0.015	0.016	0.015	0.013	0.009	0.005	0.000
	FINAL CAMBER ↑	0"	1/16"	1/8"	3/16"	3/16"	1/4"	3/16"	3/16"	1/8"	1/16"	0"
AG2 THRU AG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.011	0.021	0.028	0.033	0.035	0.033	0.028	0.021	0.011	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.005	0.010	0.014	0.016	0.017	0.016	0.014	0.010	0.005	0.000
	FINAL CAMBER ↑	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	3/16"	1/8"	1/16"	0"

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TENTH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "B"

GIRDER		TWENTIETH POINTS																					
		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
BG1, BG6	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.092	0.134	0.174	0.208	0.238	0.261	0.278	0.289	0.331	0.289	0.278	0.261	0.238	0.208	0.174	0.134	0.092	0.046	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.029	0.059	0.086	0.114	0.136	0.157	0.171	0.185	0.189	0.194	0.189	0.185	0.171	0.157	0.136	0.114	0.086	0.059	0.029	0.000
	FINAL CAMBER ↑	0"	3/16"	3/8"	9/16"	3/4"	7/8"	1"	1 1/16"	1 1/8"	1 3/16"	1 5/8"	1 3/16"	1 1/8"	1 1/16"	1"	7/8"	3/4"	9/16"	3/8"	3/16"	0"
BG2 THRU BG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.092	0.134	0.174	0.208	0.238	0.261	0.278	0.289	0.331	0.289	0.278	0.261	0.238	0.208	0.174	0.134	0.092	0.046	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.031	0.061	0.090	0.118	0.141	0.163	0.177	0.192	0.196	0.201	0.196	0.192	0.177	0.177	0.141	0.118	0.090	0.061	0.031	0.000
	FINAL CAMBER ↑	0"	3/16"	3/8"	9/16"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 3/16"	1 1/8"	1 1/16"	1"	1"	13/16"	11/16	9/16"	3/8"	3/16"	0"

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TWENTIETH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

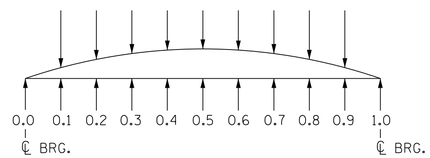
* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "C"

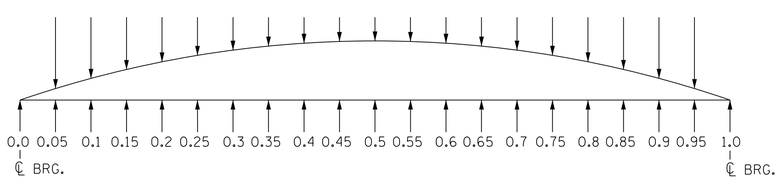
GIRDER		TWENTIETH POINTS																					
		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
CG1, CG6	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.090	0.132	0.170	0.205	0.233	0.257	0.273	0.284	0.287	0.284	0.273	0.257	0.233	0.205	0.170	0.132	0.090	0.046	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.028	0.055	0.081	0.107	0.128	0.148	0.161	0.174	0.179	0.183	0.179	0.174	0.161	0.148	0.128	0.107	0.081	0.055	0.028	0.000
	FINAL CAMBER ↑	0"	1/4"	7/16"	5/8"	3/4"	15/16"	1"	1 1/8"	1 3/16"	1 1/4"	1 1/4"	1 1/4"	1 3/16"	1 1/8"	1"	15/16"	3/4"	5/8"	7/16"	1/4"	0
CG2 THRU CG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.090	0.132	0.170	0.205	0.233	0.257	0.273	0.284	0.287	0.284	0.273	0.257	0.233	0.205	0.170	0.132	0.090	0.046	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.028	0.056	0.083	0.109	0.130	0.151	0.164	0.177	0.182	0.187	0.182	0.177	0.164	0.151	0.130	0.109	0.083	0.056	0.028	0.000
	FINAL CAMBER ↑	0"	3/16"	3/8"	9/16"	3/4"	7/8"	1"	1 1/8"	1 1/8"	1 1/4"	1 3/16"	1 1/4"	1 1/8"	1 1/8"	1"	7/8"	3/4"	9/16"	3/8"	3/16"	0

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TWENTIETH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD



SCHEMATIC CAMBER ORDINATES AT GIRDER TENTH POINTS



SCHEMATIC CAMBER ORDINATE AT GIRDER TWENTIETH POINTS

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GIRDER CAMBER DETAILS

LEFT LANE

SITE 2L DWG. NO. 21

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #3

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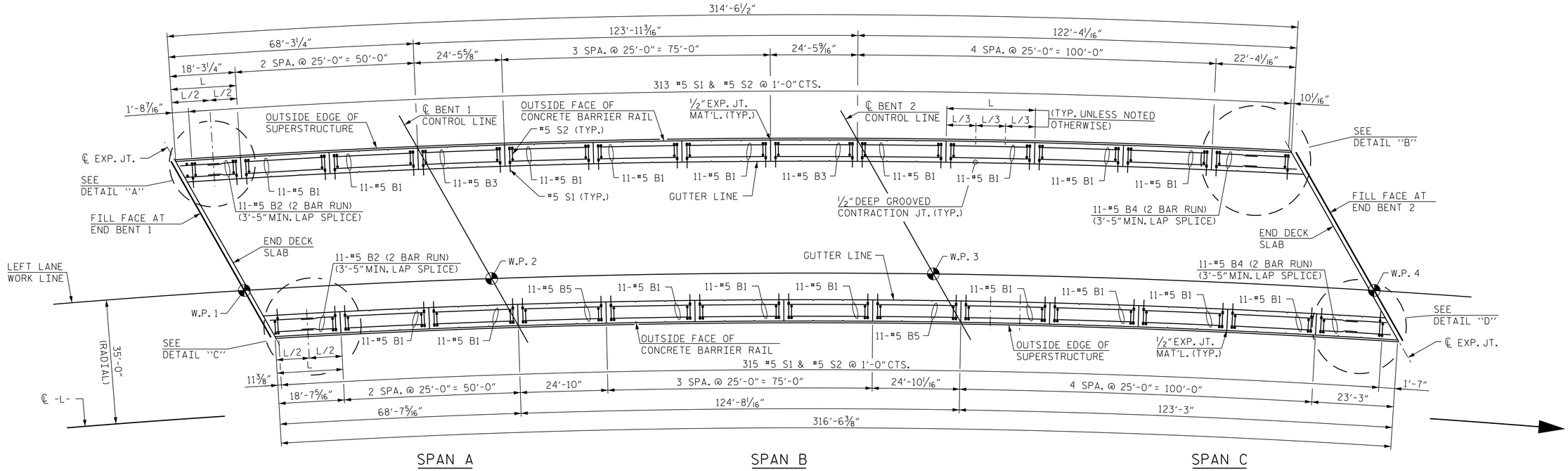
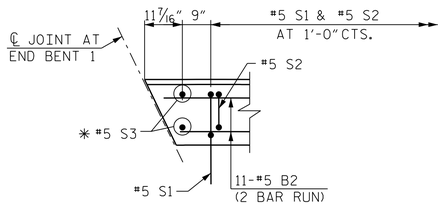
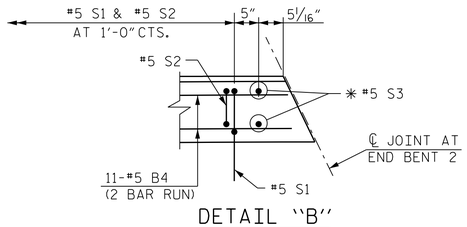


PLAN OF BARRIER RAIL

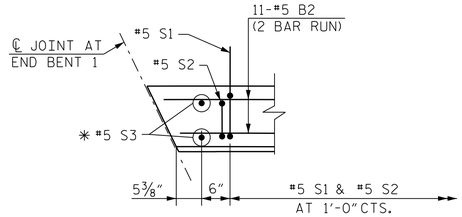
ALL DIMENSIONS ARE ARC LENGTHS MEASURED ALONG OUTSIDE FACE OF BARRIER RAIL.



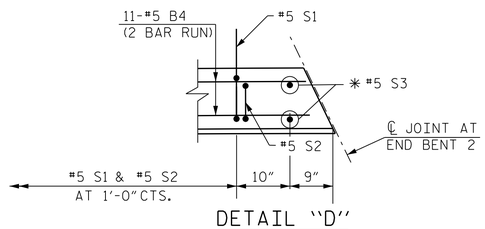
DETAIL "A"



DETAIL "B"



DETAIL "C"



DETAIL "D"

* SEE SECTION AT JOINTS ON SHEET 2 OF 2

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
CONCRETE BARRIER RAIL PLAN
LEFT LANE

SITE 2L DWG. NO.22

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2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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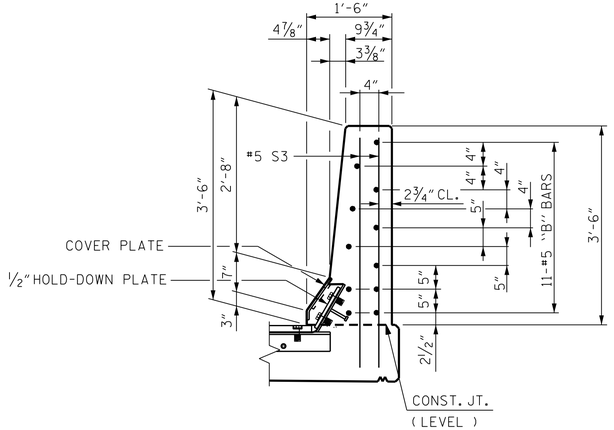
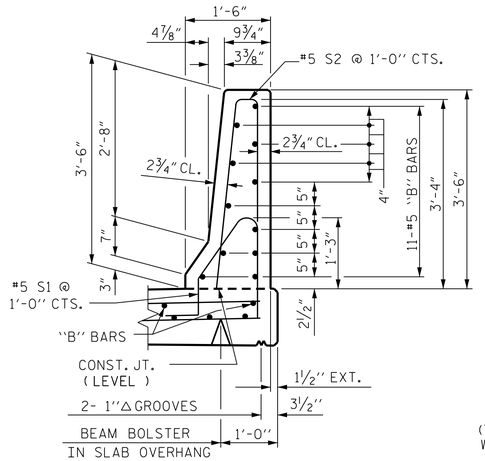
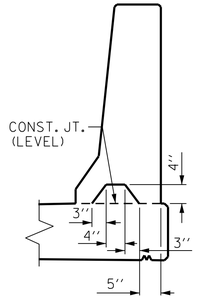
FOR PLAN OF CONCRETE BARRIER RAIL,
SEE "CONCRETE BARRIER RAIL"
SHEET 1 OF 2



SECTION AT JOINTS



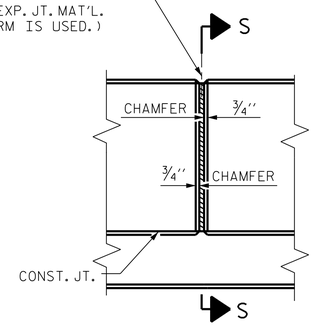
SECTION THRU RAIL



SECTION S-S

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

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



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

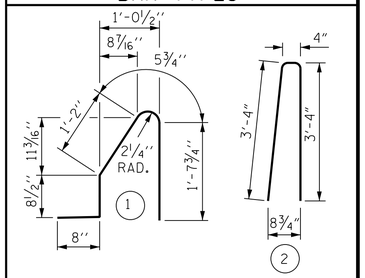
NOTES

THE BARRIER RAIL IN A CONTINUOUS UNIT 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.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	198	#5	STR	24'-7"	5,077
* B2	44	#5	STR	11'-3"	516
* B3	22	#5	STR	24'-1"	553
* B4	44	#5	STR	13'-2"	604
* B5	22	#5	STR	24'-5"	560
* S1	628	#5	1	4'-8"	3,057
* S2	628	#5	2	7'-0"	4,585
* S3	8	#5	STR	4'-0"	33
* EPOXY COATED REINFORCING STEEL					14,985 LBS.
CLASS AA CONCRETE					85.9 CU. YDS.
CONCRETE BARRIER RAIL					631.10 LIN. FT.

FOR CONCRETE BARRIER RAIL ON APPROACH SLAB, SEE APPROACH SLAB SHEETS.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

CONCRETE
BARRIER RAIL

LEFT LANE

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STR. #3

SITE 2L DWG. NO 23

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
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RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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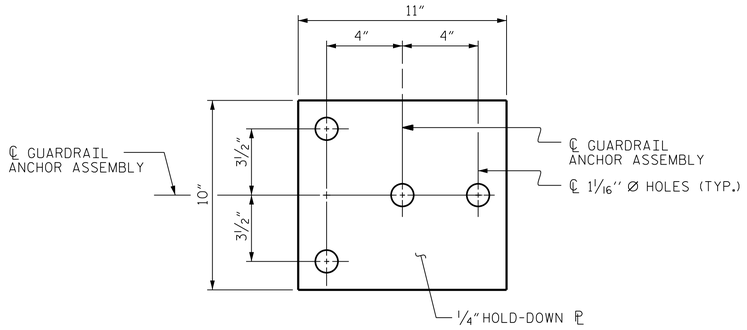
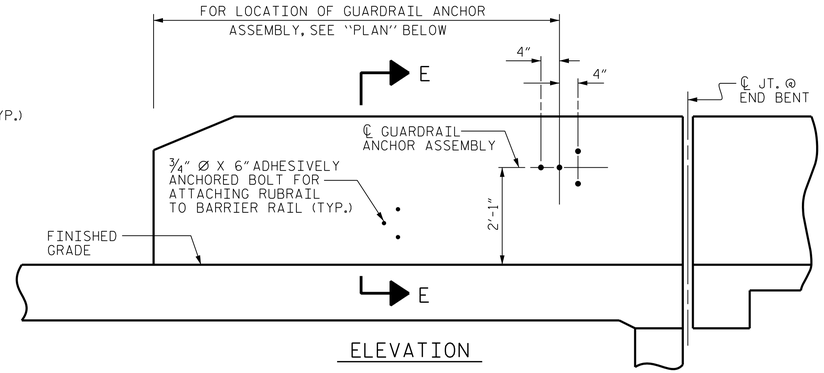
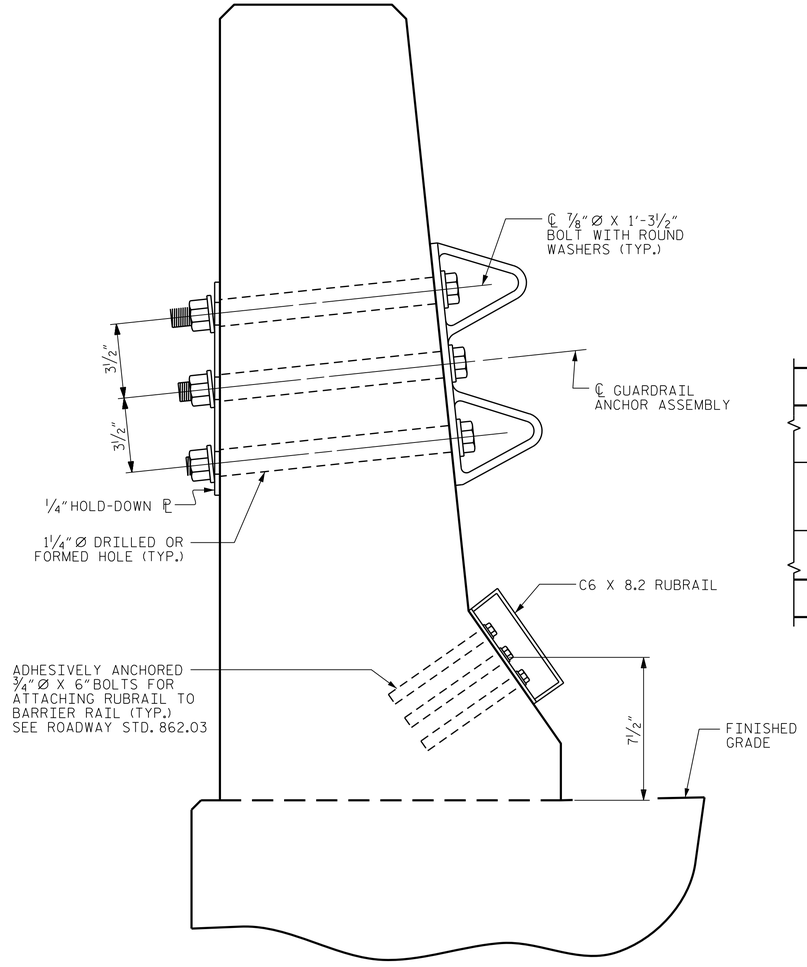


PLAN

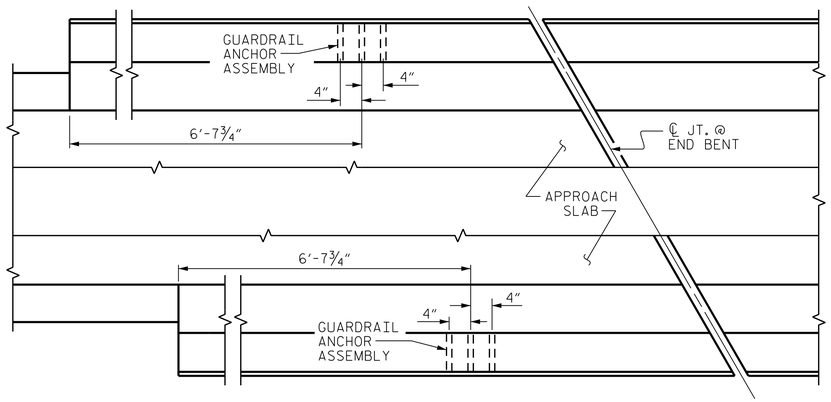


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 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.)

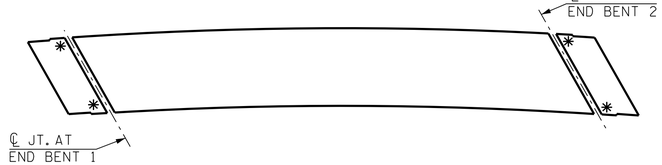
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SKETCH SHOWING POINTS OF ATTACHMENTS

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

LEFT LANE

SITE 2L DWG. NO. 24

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
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RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #3

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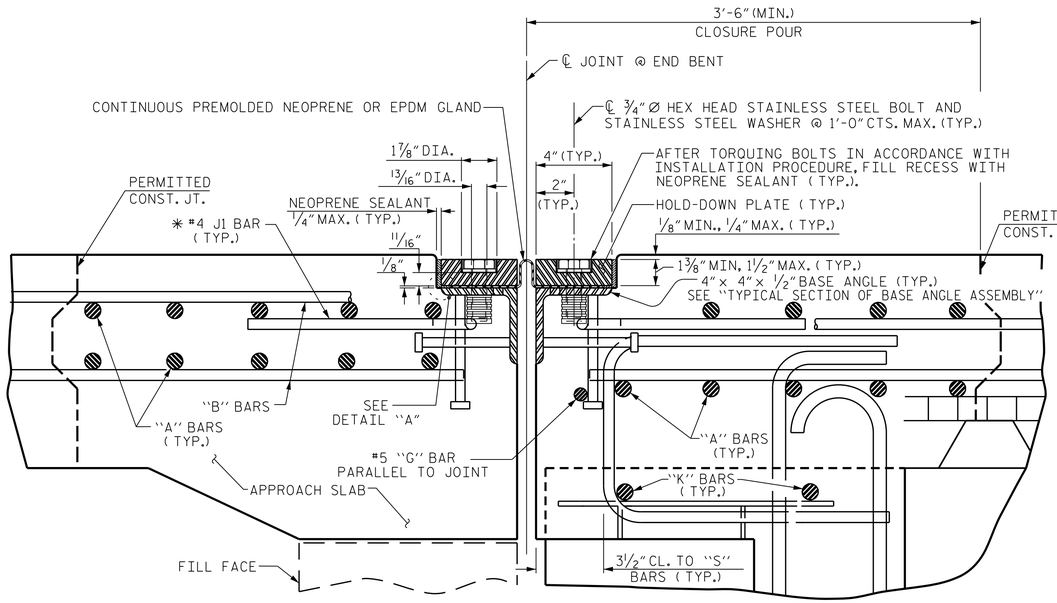


EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

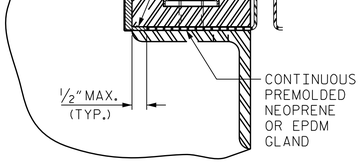
✳ THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

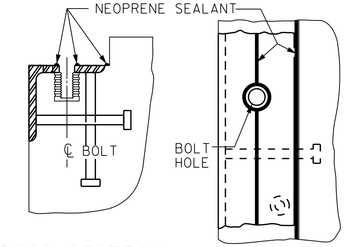
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO 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.

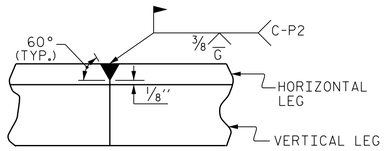


DETAIL "A"

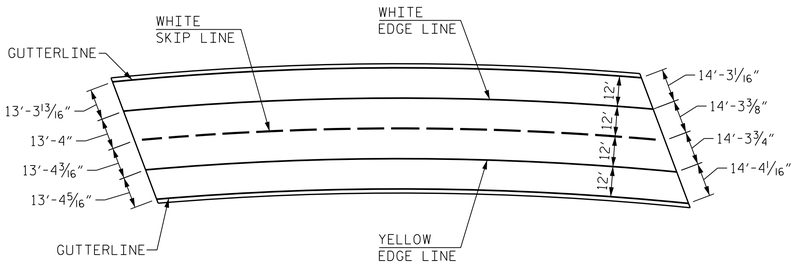


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH

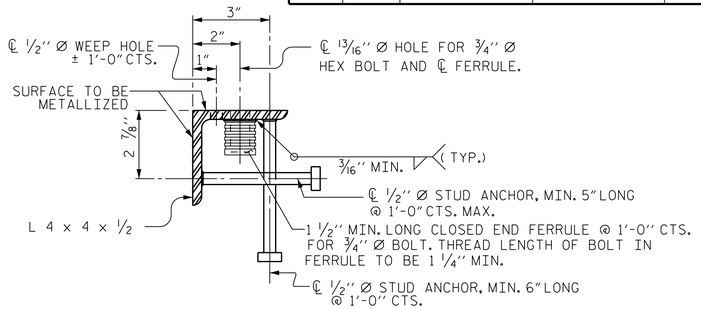


DETAIL- FIELD WELD SPLICE OF BASE ANGLE



PAVEMENT MARKING ALIGNMENT

MOVEMENT AND SETTING AT JOINT					
BENT NO.	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	63.33°	13/16"	1½"	1⅜"	1⅛"
EB2	58.75°	1⅛"	1 11/16"	1½"	1 3/16"



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

PROJECT NO. U-2519BA
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SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS

LEFT LANE

SITE 2L DWG. NO.25

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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STR. #3

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CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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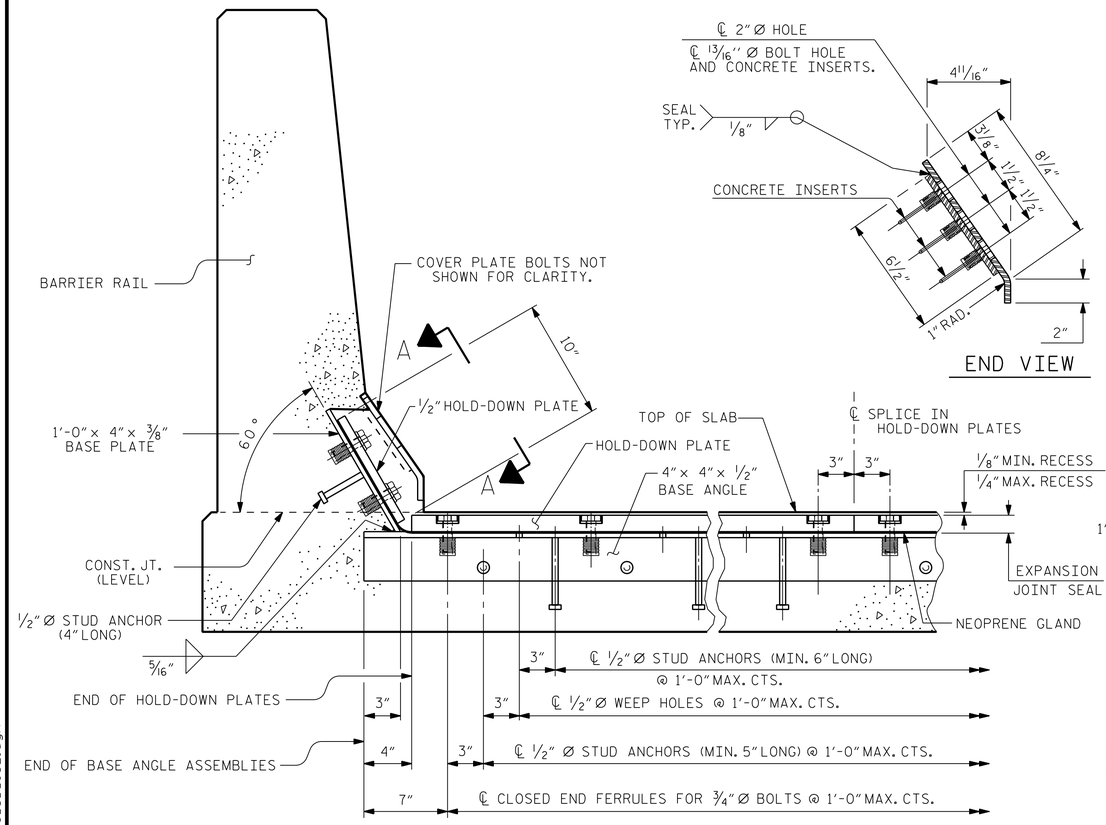
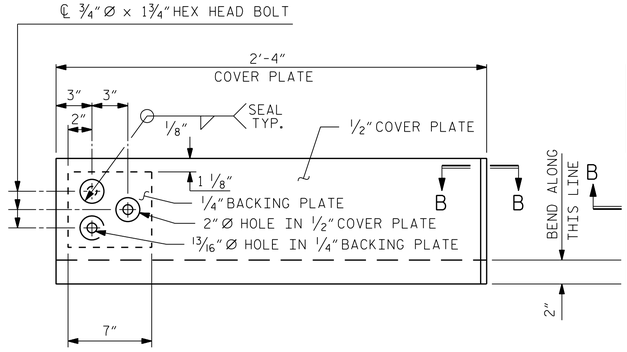
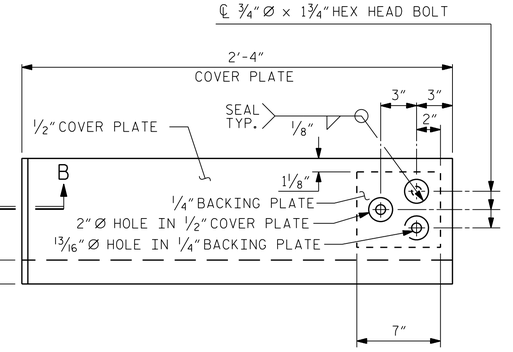


SECTION THRU RAIL NORMAL TO JOINT

END VIEW

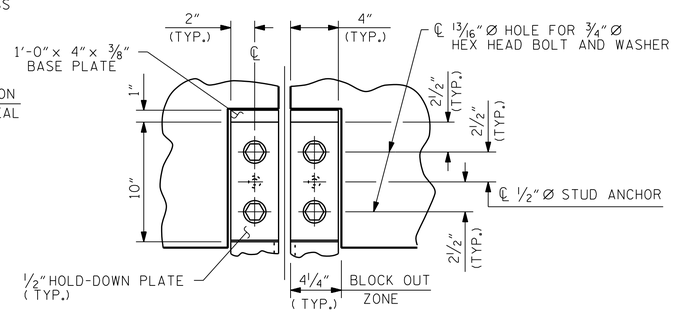


TYPE I - ELEVATION VIEW

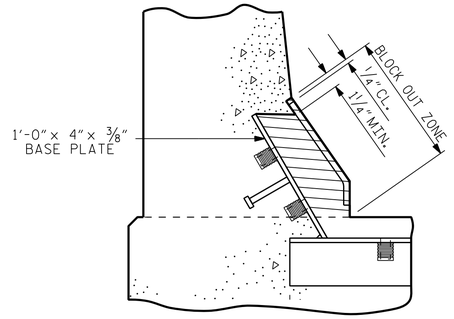


TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

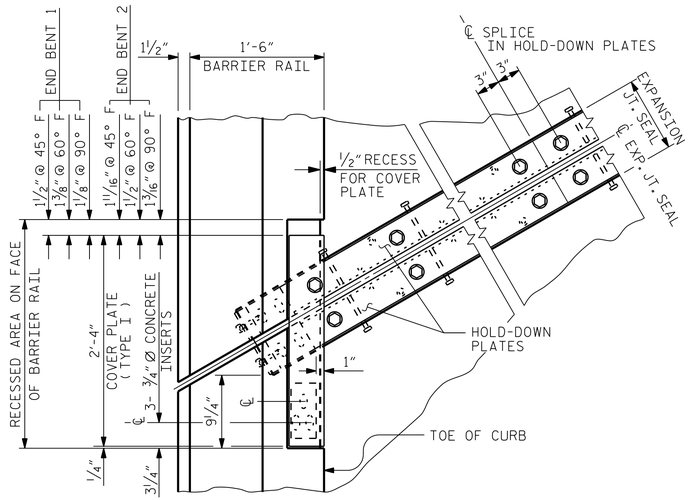


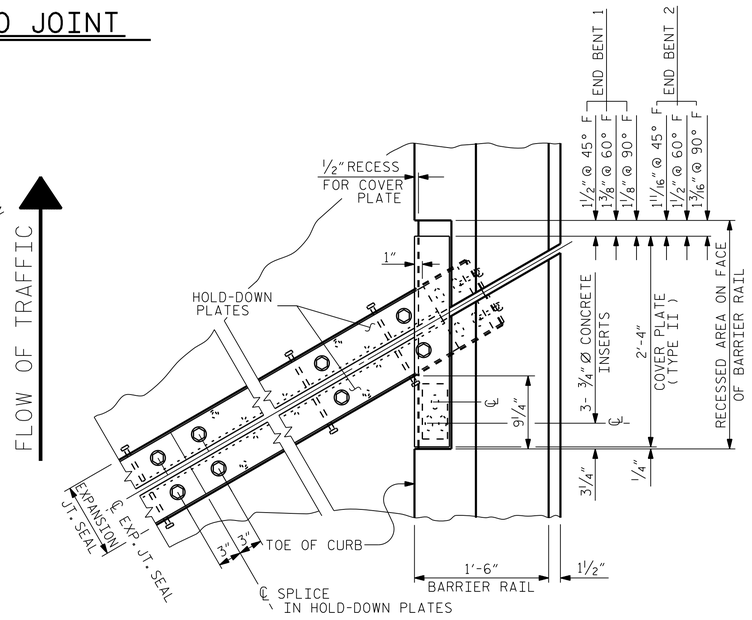
SECTION A - A



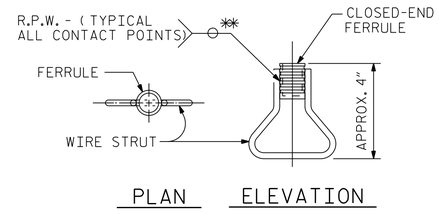
BLOCK OUT DETAIL

SEE " SECTION A - A " FOR OTHER DETAILS.





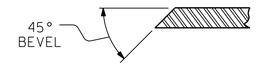
PLAN OF EXPANSION JOINT SEAL



PLAN ELEVATION

CONCRETE INSERT

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



SECTION B - B

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

LEFT LANE

SITE 2L DWG. NO. 26

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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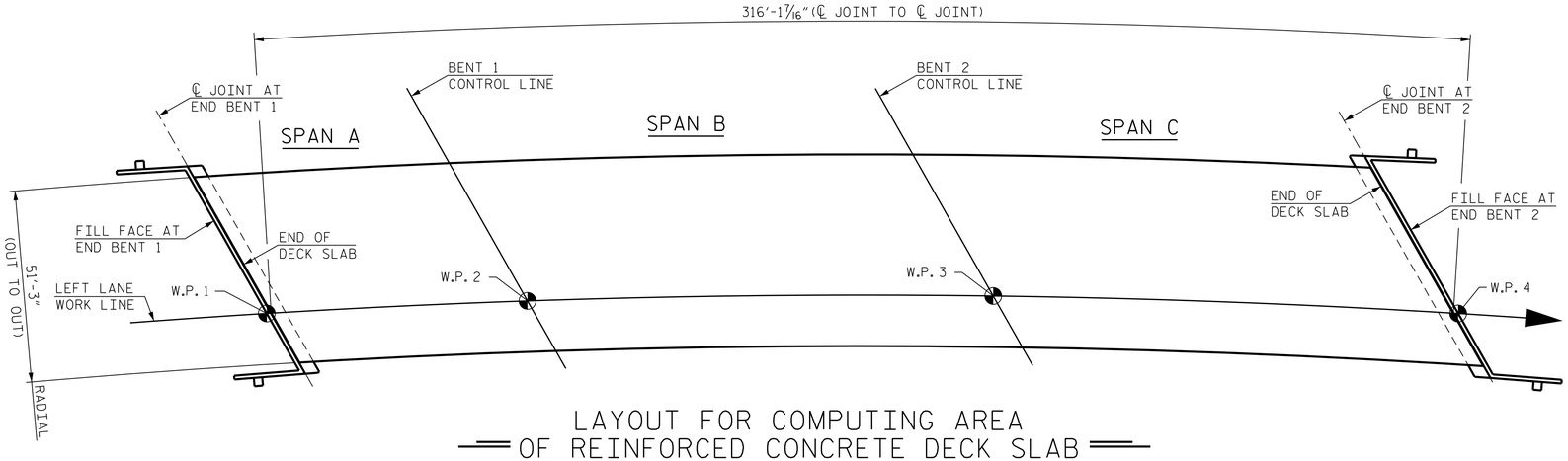
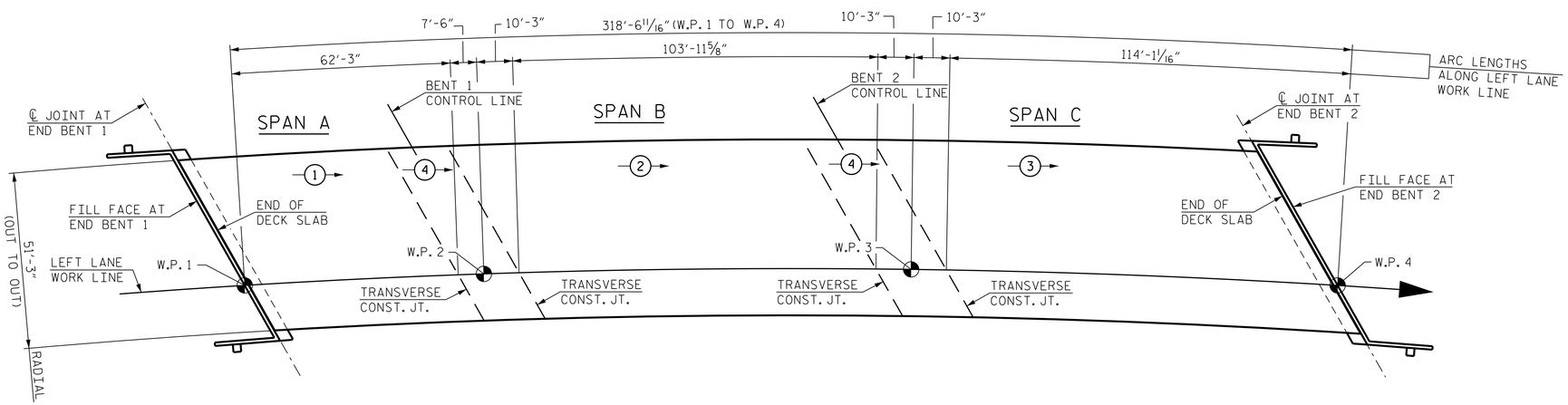


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 16,203)



POURING SEQUENCE

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	108.8	———	———
POUR 2	184.1	———	———
POUR 3	199.9	———	———
POUR 4	67.7	———	———
TOTALS**	560.5	48,136	48,452

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	2,235 SQ.FT.
BRIDGE DECK	14,211 SQ.FT.
TOTAL	16,446 SQ.FT.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

LEFT LANE

SITE 2L DWG. NO. 27

DocuSigned by: Jeremy Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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REINFORCING BAR SCHEDULE

SPANS A, B AND C

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	458	#5	STR.	50′-11″	24,323
A2	458	#5	STR.	50′-11″	24,323
✳ A101	1	#5	STR.	50′-3″	52
✳ A102	1	#5	STR.	49′-1″	51
✳ A103	1	#5	STR.	48′-0″	50
✳ A104	1	#5	STR.	46′-10″	48
✳ A105	1	#5	STR.	45′-8″	48
✳ A106	1	#5	STR.	44′-7″	47
✳ A107	1	#5	STR.	43′-5″	45
✳ A108	1	#5	STR.	42′-3″	44
✳ A109	1	#5	STR.	41′-2″	43
✳ A110	1	#5	STR.	40′-0″	42
✳ A111	1	#5	STR.	38′-10″	41
✳ A112	1	#5	STR.	37′-9″	39
✳ A113	1	#5	STR.	36′-7″	38
✳ A114	1	#5	STR.	35′-5″	37
✳ A115	1	#5	STR.	34′-4″	36
✳ A116	1	#5	STR.	33′-2″	35
✳ A117	1	#5	STR.	32′-0″	33
✳ A118	1	#5	STR.	30′-11″	32
✳ A119	1	#5	STR.	29′-9″	31
✳ A120	1	#5	STR.	28′-7″	30
✳ A121	1	#5	STR.	27′-6″	29
✳ A122	1	#5	STR.	26′-4″	27
✳ A123	1	#5	STR.	25′-2″	26
✳ A124	1	#5	STR.	24′-1″	25
✳ A125	1	#5	STR.	22′-11″	24
✳ A126	1	#5	STR.	21′-9″	23
✳ A127	1	#5	STR.	20′-7″	21
✳ A128	1	#5	STR.	19′-6″	20
✳ A129	1	#5	STR.	18′-4″	19
✳ A130	1	#5	STR.	17′-2″	18
✳ A131	1	#5	STR.	16′-1″	17
✳ A132	1	#5	STR.	14′-11″	16
✳ A133	1	#5	STR.	13′-9″	14
✳ A134	1	#5	STR.	12′-8″	13
✳ A135	1	#5	STR.	11′-6″	12
✳ A136	1	#5	STR.	10′-4″	11
✳ A137	1	#5	STR.	9′-2″	10
✳ A138	1	#5	STR.	8′-1″	8
✳ A139	1	#5	STR.	6′-11″	7
✳ A140	1	#5	STR.	5′-9″	6
✳ A141	1	#5	STR.	4′-7″	5
✳ A142	1	#5	STR.	3′-6″	4
✳ A143	3	#6	STR.	56′-7″	255
✳ A151	1	#5	STR.	50′-3″	52
✳ A152	1	#5	STR.	49′-3″	51
✳ A153	1	#5	STR.	48′-2″	50
✳ A154	1	#5	STR.	47′-1″	49
✳ A155	1	#5	STR.	46′-0″	48
✳ A156	1	#5	STR.	44′-11″	47
✳ A157	1	#5	STR.	43′-10″	46
✳ A158	1	#5	STR.	42′-10″	45
✳ A159	1	#5	STR.	41′-9″	44

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A160	1	#5	STR.	40′-8″	42
✳ A161	1	#5	STR.	39′-7″	41
✳ A162	1	#5	STR.	38′-6″	40
✳ A163	1	#5	STR.	37′-6″	39
✳ A164	1	#5	STR.	36′-5″	38
✳ A165	1	#5	STR.	35′-4″	37
✳ A166	1	#5	STR.	34′-3″	36
✳ A167	1	#5	STR.	33′-2″	35
✳ A168	1	#5	STR.	32′-2″	34
✳ A169	1	#5	STR.	31′-1″	32
✳ A170	1	#5	STR.	30′-0″	31
✳ A171	1	#5	STR.	28′-11″	30
✳ A172	1	#5	STR.	27′-10″	29
✳ A173	1	#5	STR.	26′-10″	28
✳ A174	1	#5	STR.	25′-9″	27
✳ A175	1	#5	STR.	24′-8″	26
✳ A176	1	#5	STR.	23′-7″	25
✳ A177	1	#5	STR.	22′-7″	24
✳ A178	1	#5	STR.	21′-6″	22
✳ A179	1	#5	STR.	20′-5″	21
✳ A180	1	#5	STR.	19′-4″	20
✳ A181	1	#5	STR.	18′-3″	19
✳ A182	1	#5	STR.	17′-3″	18
✳ A183	1	#5	STR.	16′-2″	17
✳ A184	1	#5	STR.	15′-1″	16
✳ A185	1	#5	STR.	14′-0″	15
✳ A186	1	#5	STR.	13′-0″	14
✳ A187	1	#5	STR.	11′-11″	12
✳ A188	1	#5	STR.	10′-10″	11
✳ A189	1	#5	STR.	9′-9″	10
✳ A190	1	#5	STR.	8′-9″	9
✳ A191	1	#5	STR.	7′-8″	8
✳ A192	1	#5	STR.	6′-7″	7
✳ A193	1	#5	STR.	5′-6″	6
✳ A194	1	#5	STR.	4′-6″	5
✳ A195	1	#5	STR.	3′-5″	4
✳ A196	6	#6	STR.	31′-10″	287
A201	1	#5	STR.	50′-3″	52
A202	1	#5	STR.	49′-1″	51
A203	1	#5	STR.	48′-0″	50
A204	1	#5	STR.	46′-10″	48
A205	1	#5	STR.	45′-8″	48
A206	1	#5	STR.	44′-7″	47
A207	1	#5	STR.	43′-5″	45
A208	1	#5	STR.	42′-3″	44
A209	1	#5	STR.	41′-2″	43
A210	1	#5	STR.	40′-0″	42
A211	1	#5	STR.	38′-10″	41
A212	1	#5	STR.	37′-9″	39
A213	1	#5	STR.	36′-7″	38
A214	1	#5	STR.	35′-5″	37
A215	1	#5	STR.	34′-4″	36
A216	1	#5	STR.	33′-2″	35
A217	1	#5	STR.	32′-0″	33
A218	1	#5	STR.	30′-11″	32

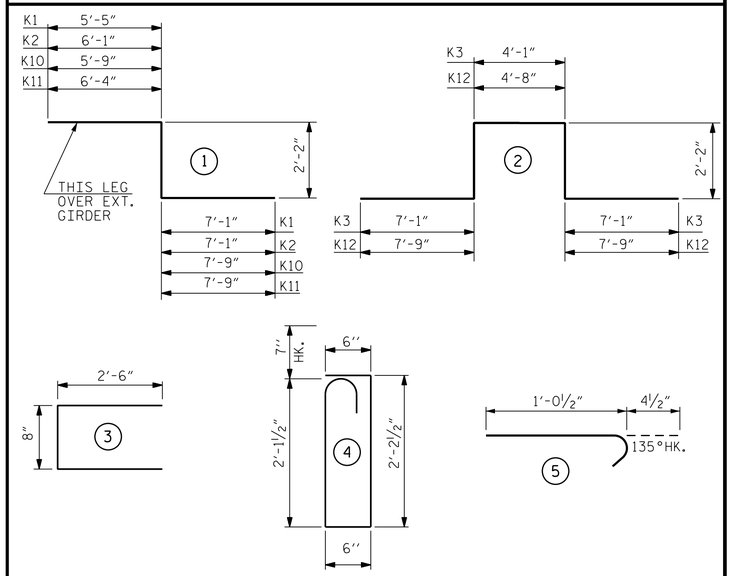
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A219	1	#5	STR.	29′-9″	31
A220	1	#5	STR.	28′-7″	30
A221	1	#5	STR.	27′-6″	29
A222	1	#5	STR.	26′-4″	27
A223	1	#5	STR.	25′-2″	26
A224	1	#5	STR.	24′-1″	25
A225	1	#5	STR.	22′-11″	24
A226	1	#5	STR.	21′-9″	23
A227	1	#5	STR.	20′-7″	21
A228	1	#5	STR.	19′-6″	20
A229	1	#5	STR.	18′-4″	19
A230	1	#5	STR.	17′-2″	18
A231	1	#5	STR.	16′-1″	17
A232	1	#5	STR.	14′-11″	16
A233	1	#5	STR.	13′-9″	14
A234	1	#5	STR.	12′-8″	13
A235	1	#5	STR.	11′-6″	12
A236	1	#5	STR.	10′-4″	11
A237	1	#5	STR.	9′-2″	10
A238	1	#5	STR.	8′-1″	8
A239	1	#5	STR.	6′-11″	7
A240	1	#5	STR.	5′-9″	6
A241	1	#5	STR.	4′-7″	5
A242	1	#5	STR.	3′-6″	4
A251	1	#5	STR.	50′-3″	52
A252	1	#5	STR.	49′-3″	51
A253	1	#5	STR.	48′-2″	50
A254	1	#5	STR.	47′-1″	49
A255	1	#5	STR.	46′-0″	48
A256	1	#5	STR.	44′-11″	47
A257	1	#5	STR.	43′-10″	46
A258	1	#5	STR.	42′-10″	45
A259	1	#5	STR.	41′-9″	44
A260	1	#5	STR.	40′-8″	42
A261	1	#5	STR.	39′-7″	41
A262	1	#5	STR.	38′-6″	40
A263	1	#5	STR.	37′-6″	39
A264	1	#5	STR.	36′-5″	38
A265	1	#5	STR.	35′-4″	37
A266	1	#5	STR.	34′-3″	36
A267	1	#5	STR.	33′-2″	35
A268	1	#5	STR.	32′-2″	34
A269	1	#5	STR.	31′-1″	32
A270	1	#5	STR.	30′-0″	31
A271	1	#5	STR.	28′-11″	30
A272	1	#5	STR.	27′-10″	29
A273	1	#5	STR.	26′-10″	28
A274	1	#5	STR.	25′-9″	27
A275	1	#5	STR.	24′-8″	26
A276	1	#5	STR.	23′-7″	25
A277	1	#5	STR.	22′-7″	24
A278	1	#5	STR.	21′-6″	22
A279	1	#5	STR.	20′-5″	21
A280	1	#5	STR.	19′-4″	20
A281	1	#5	STR.	18′-3″	19

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A282	1	#5	STR.	17′-3″	18
A283	1	#5	STR.	16′-2″	17
A284	1	#5	STR.	15′-1″	16
A285	1	#5	STR.	14′-0″	15
A286	1	#5	STR.	13′-0″	14
A287	1	#5	STR.	11′-11″	12
A288	1	#5	STR.	10′-10″	11
A289	1	#5	STR.	9′-9″	10
A290	1	#5	STR.	8′-9″	9
A291	1	#5	STR.	7′-8″	8
A292	1	#5	STR.	6′-7″	7
A293	1	#5	STR.	5′-6″	6
A294	1	#5	STR.	4′-6″	5
A295	1	#5	STR.	3′-5″	4
B1	228	#5	STR.	55′-0″	13,079
✳ B2	106	#4	STR.	23′-3″	1,646
✳ B3	53	#5	STR.	44′-0″	2,432
✳ B4	53	#5	STR.	28′-0″	1,548
✳ B5	48	#5	STR.	39′-3″	1,965
✳ B6	106	#4	STR.	22′-5″	1,587
✳ B7	53	#5	STR.	60′-0″	3,317
✳ B8	53	#5	STR.	29′-0″	1,603
✳ B9	48	#5	STR.	47′-6″	1,902
✳ B10	159	#4	STR.	28′-9″	3,054
B11	73	#5	STR.	49′-0″	3,731
B12	73	#5	STR.	60′-0″	4,568
✳ G1	1	#5	STR.	56′-7″	59
✳ G2	2	#5	STR.	31′-7″	66
✳ J1	112	#4	5	1′-5″	106
✳ K1	2	#8	1	14′-8″	60
✳ K2	2	#8	1	15′-4″	63
✳ K3	8	#8	2	22′-7″	369
✳ K4	20	#6	STR.	5′-6″	165
✳ K10	2	#8	1	15′-8″	64
✳ K11	2	#8	1	16′-3″	66
✳ K12	8	#8	2	24′-6″	401
✳ K13	20	#6	STR.	6′-0″	180
✳ S1	50	#4	3	5′-8″	189
✳ S2	50	#5	4	5′-11″	309

REINFORCING STEEL	48,136 LBS.
✳ EPOXY COATED REINFORCING STEEL	48,452 LBS.

✳ EPOXY COATED

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. U-2519BA

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SHEET 2 OF 2

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

LEFT LANE

SITE 2L DWG. NO. 28

STR. #3

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY F. KEENE
2/4/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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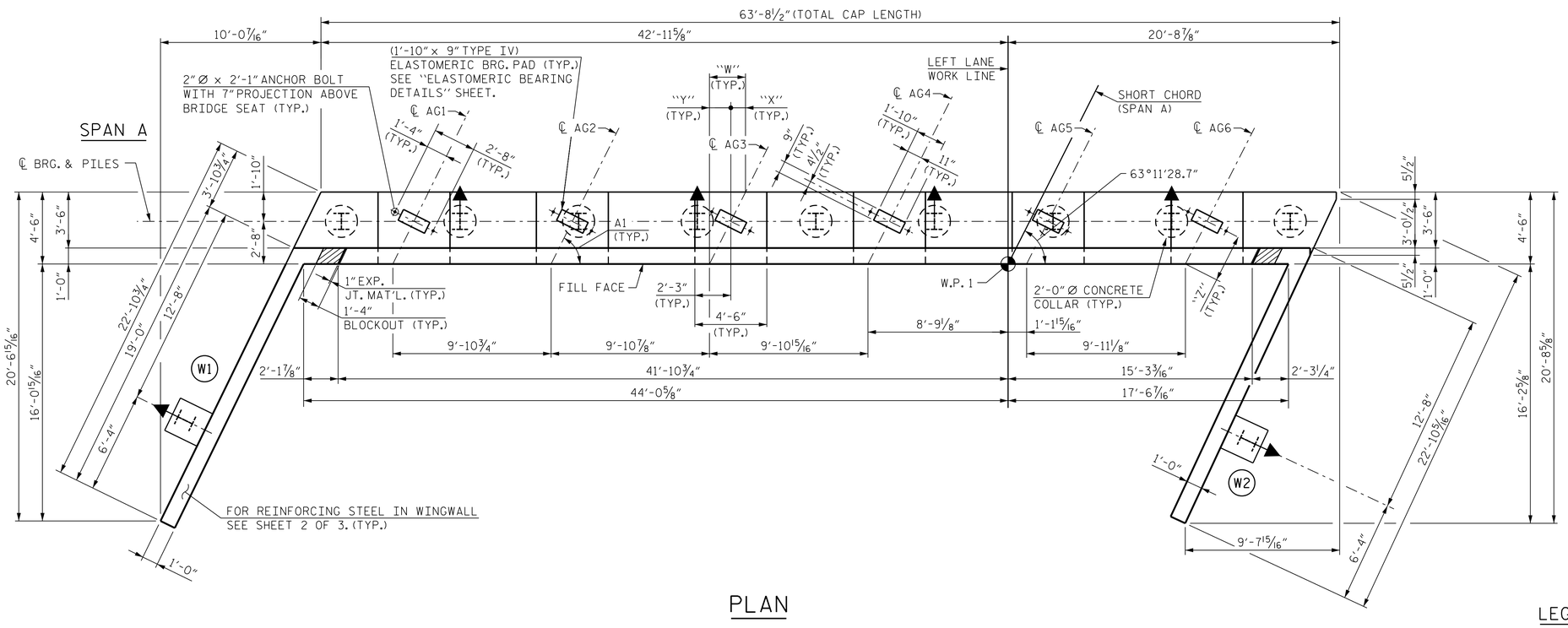
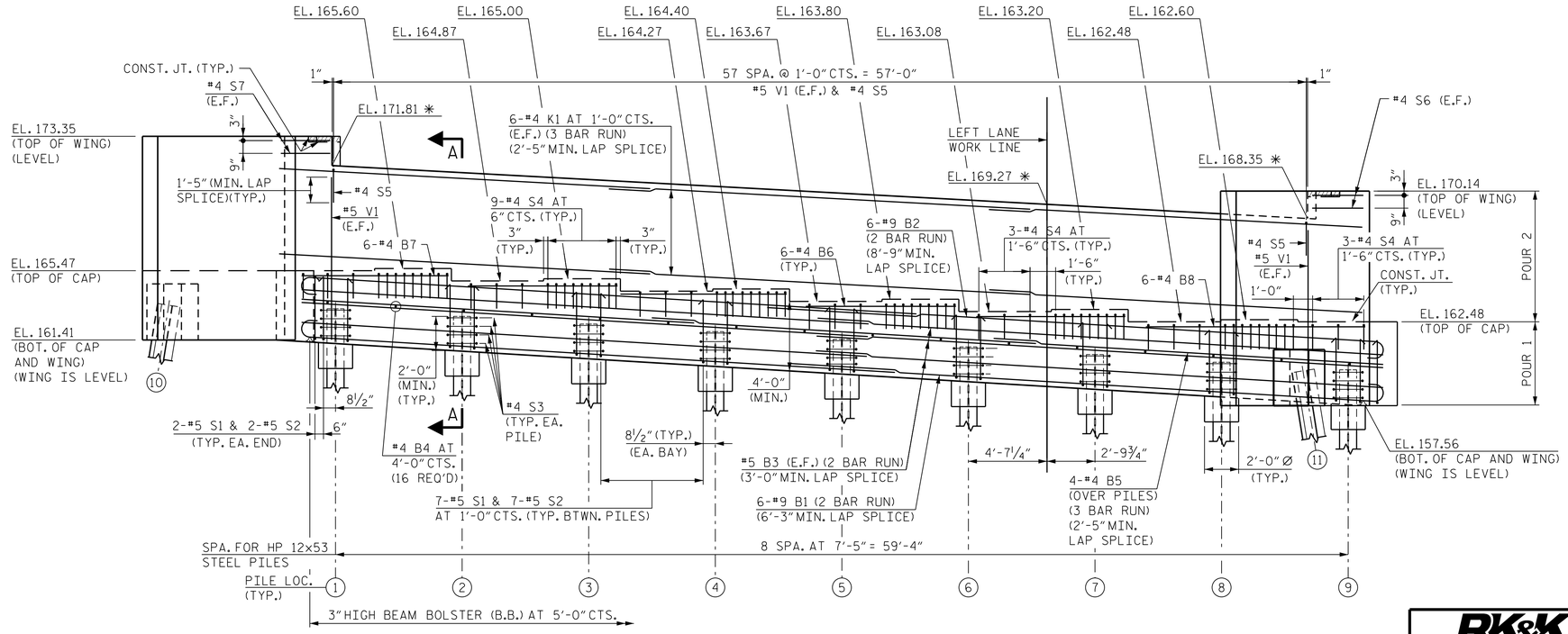


PLAN



ELEVATION

* ELEVATION AT FILL FACE

NOTES:

FOR SECTION A-A, SEE SHEET 3 OF 3.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR TEMPORARY DRAINAGE, SEE END BENT 2, SHEET 3 OF 3.

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

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

LEGEND:

HP 12x53 VERTICAL STEEL PILES

HP 12x53 STEEL PILES BATTERED 3:12

TOP OF PILE ELEVATION TABLE	
LOC.	ELEVATION
1	163.28
2	162.84
3	162.39
4	161.94
5	161.49
6	161.05
7	160.60
8	160.15
9	159.70
10	163.41
11	159.56

GIRDER DETAILS					
GIRDER	A1	"W"	"X"	"Y"	"Z"
AG1	63°34'24.4"	2'-2 13/16"	10 15/16"	1'-3 7/8"	2'-11 3/4"
AG2	63°28'34.0"	2'-2 15/16"	10 15/16"	1'-4"	2'-11 3/4"
AG3	63°22'41.0"	2'-3 1/16"	11"	1'-4 1/16"	2'-11 13/16"
AG4	63°16'45.2"	2'-3 3/16"	11 1/16"	1'-4 1/8"	2'-11 13/16"
AG5	63°10'46.7"	2'-3 5/16"	11 1/8"	1'-4 3/16"	2'-11 7/8"
AG6	63°04'45.3"	2'-3 7/16"	11 3/16"	1'-4 1/4"	2'-11 7/8"

PROJECT NO. U-2519BA

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SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
PLAN AND ELEVATION

LEFT LANE

SITE 2L DWG. NO. 29

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #3

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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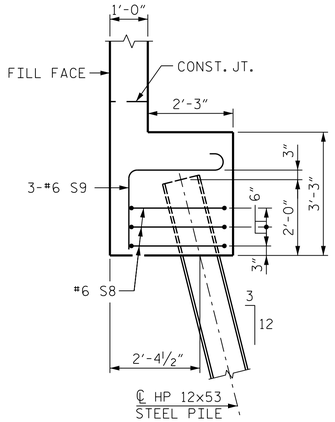
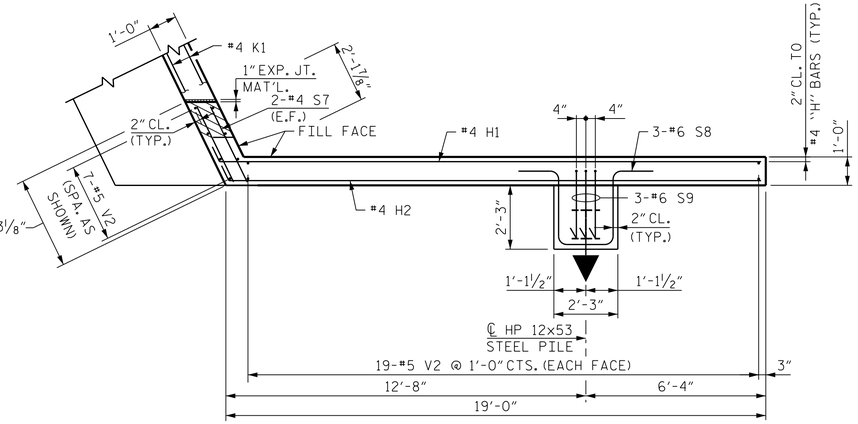
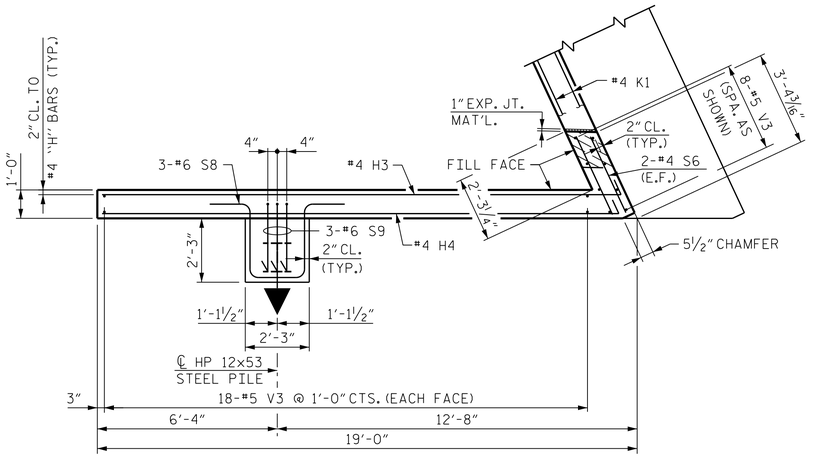


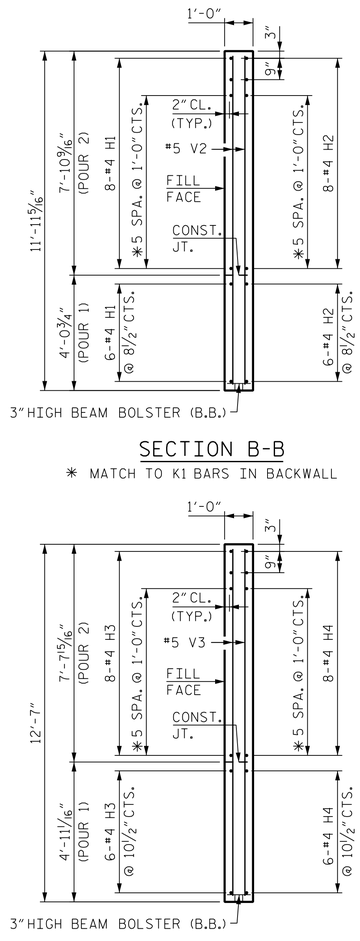
SECTION A-A



PLAN OF LEFT WINGWALL



PLAN OF RIGHT WINGWALL

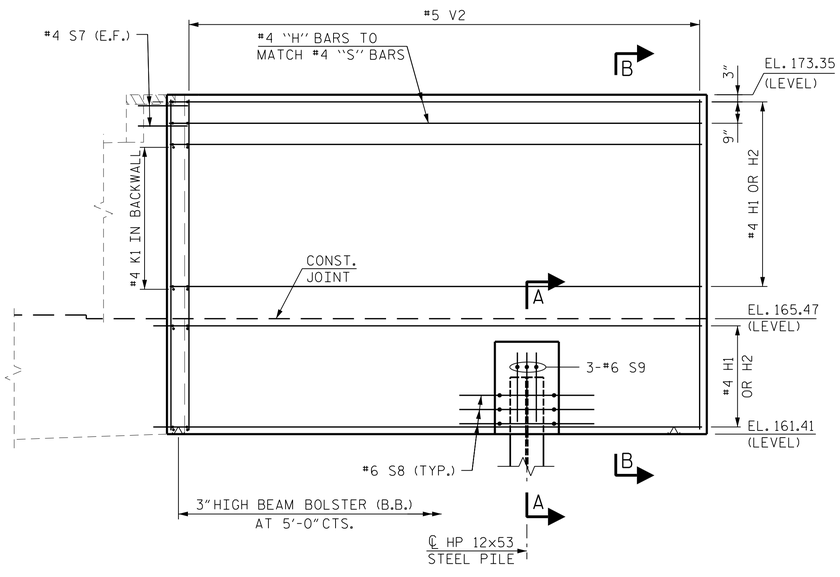


SECTION B-B

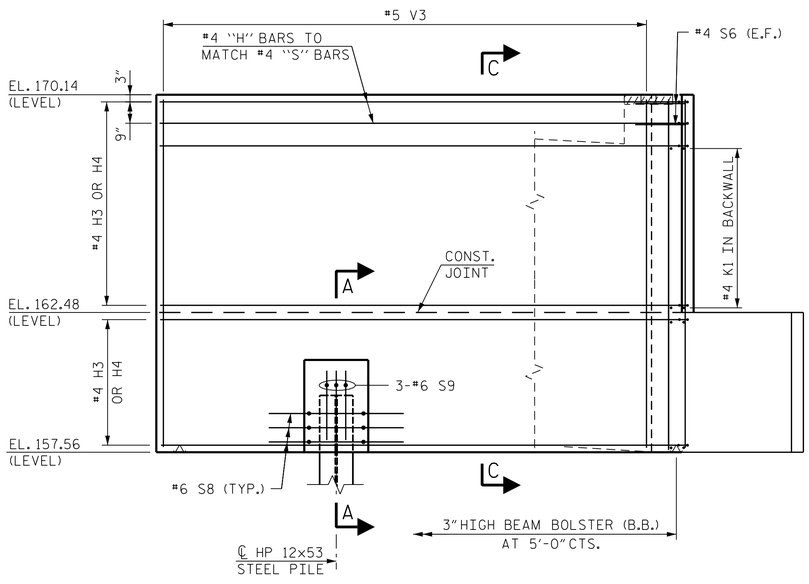
* MATCH TO K1 BARS IN BACKWALL

SECTION C-C

* MATCH TO K1 BARS IN BACKWALL



ELEVATION OF LEFT WINGWALL



ELEVATION OF RIGHT WINGWALL

LEFT WINGWALL DETAILS (W1)

RIGHT WINGWALL DETAILS (W2)

PROJECT NO. U-2519BA

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STATION: 397+90.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

END BENT 1
WINGWALL DETAILS

LEFT LANE

SITE 2L DWG. NO.30

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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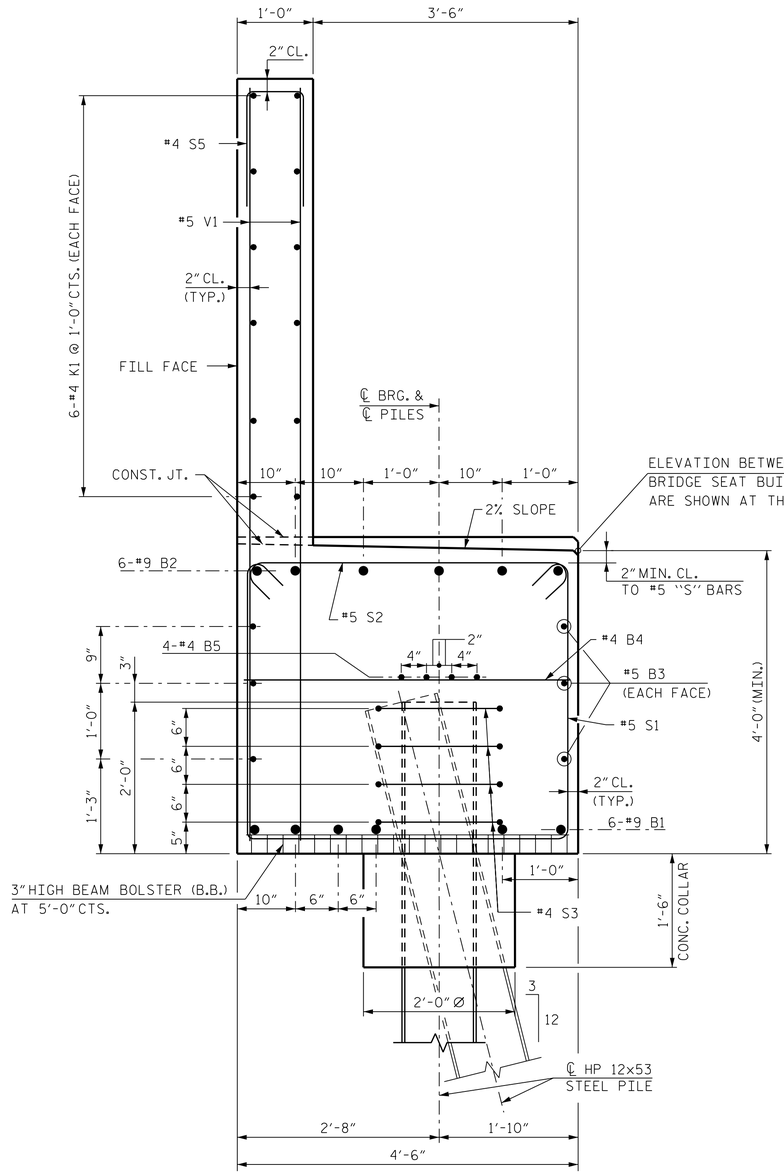
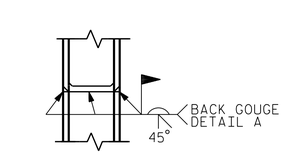
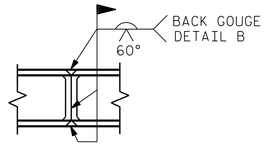


SECTION A-A

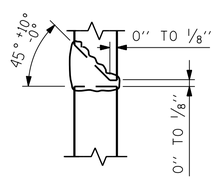
(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)



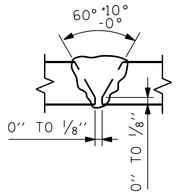
* PILE VERTICAL



* PILE HORIZONTAL OR VERTICAL



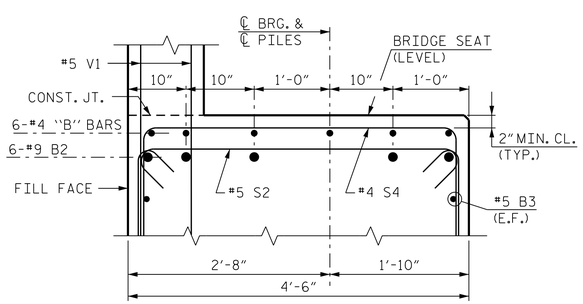
DETAIL A



DETAIL B

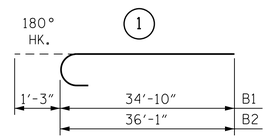
PILE SPLICE DETAILS

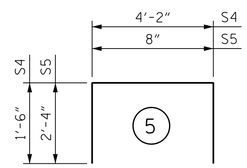
* POSITION OF PILE DURING WELDING.

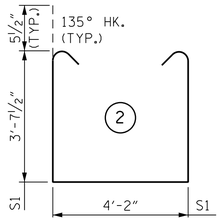


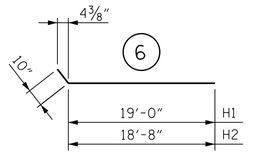
BRG. SEAT DETAIL

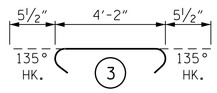
BAR TYPES

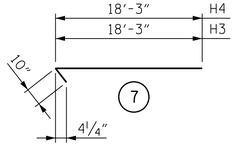


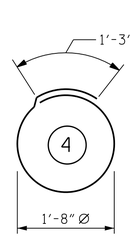


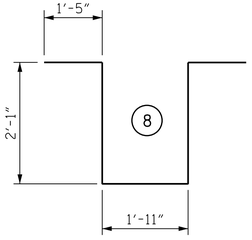


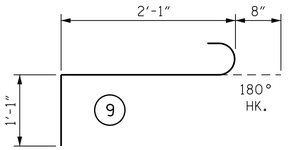












NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	36'-1"	1,472
B2	12	#9	1	37'-4"	1,523
B3	12	#5	STR	33'-3"	416
B4	16	#4	STR	4'-2"	45
B5	12	#4	STR	22'-9"	182
B6	24	#4	STR	9'-6"	152
B7	6	#4	STR	7'-8"	31
B8	6	#4	STR	14'-0"	56
H1	14	#4	6	19'-10"	185
H2	14	#4	6	19'-6"	182
H3	14	#4	7	19'-1"	178
H4	14	#4	7	19'-1"	178
K1	36	#4	STR	22'-9"	547
S1	60	#5	2	12'-4"	772
S2	60	#5	3	5'-1"	318
S3	36	#4	4	6'-6"	156
S4	75	#4	5	7'-2"	359
S5	58	#4	5	5'-4"	207
S6	4	#4	STR	2'-9"	7
S7	4	#4	STR	2'-11"	8
S8	6	#6	8	8'-11"	80
S9	6	#6	9	3'-10"	35
V1	116	#5	STR	10'-1"	1,220
V2	45	#5	STR	11'-5"	536
V3	44	#5	STR	12'-1"	555

REINFORCING STEEL	9,400 LBS.
CLASS "A" CONCRETE	
POUR 1 (CAP, LOWER WINGS AND COLLARS)	57.0 C.Y.
POUR 2 (BACKWALL & UPPER WINGS)	25.4 C.Y.
TOTAL	82.4 C.Y.
HP 12x53 STEEL PILES	
NO.	11
L.F.	660
PILE REDRIVES	5 EA.
PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	11 EA.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 3 OF 3

STATE OF NORTH CAROLINA
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SUBSTRUCTURE

END BENT 1
MISCELLANEOUS DETAILS AND BILL OF MATERIAL

LEFT LANE

SITE 2L DWG. NO. 31

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STR. #3

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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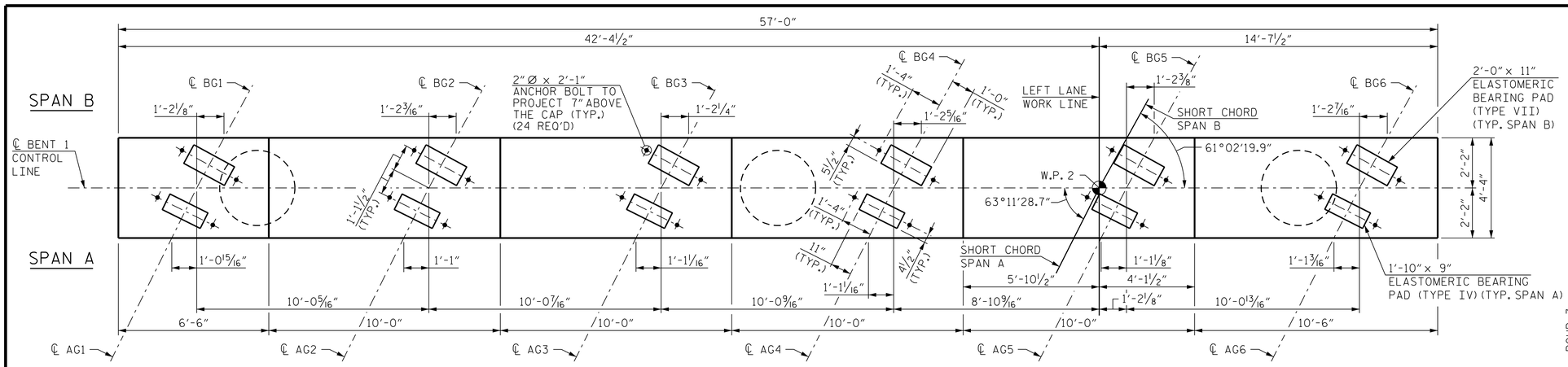
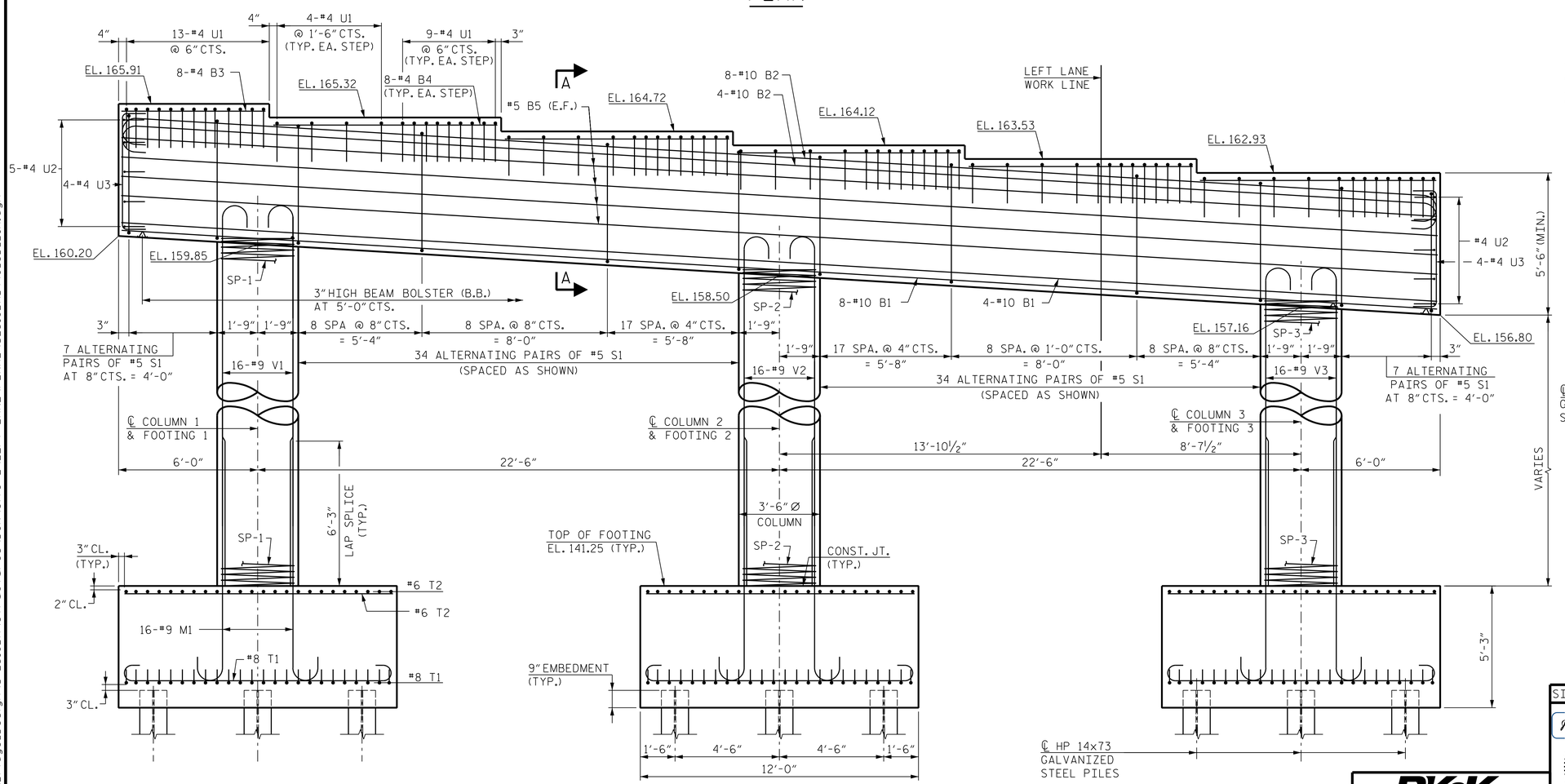


PLAN



ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING AND COLUMN UNLESS OTHEWISE NOTED)

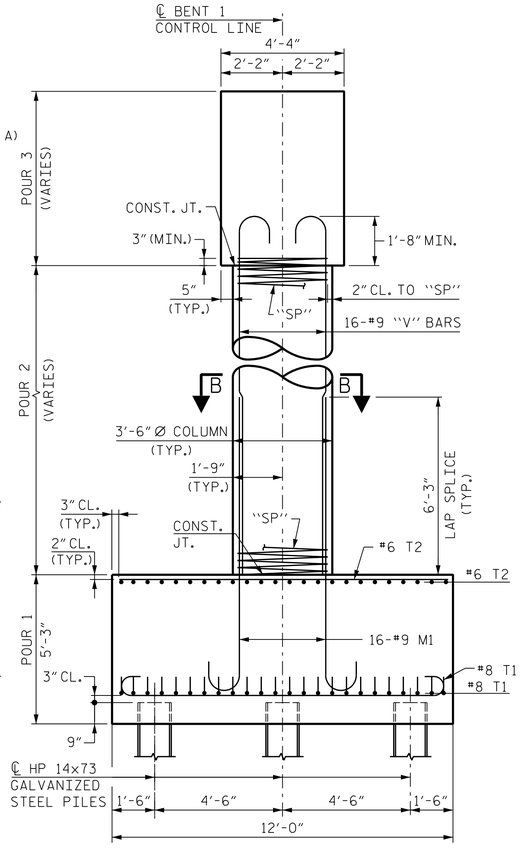
NOTES:

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

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

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

GALVANIZE THE TOP OF EACH INTERIOR BENT PILE A MINIMUM OF 22 FT. GALVANIZE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.



END ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING AND COLUMN)

PROJECT NO. U-2519BA

CUMBERLAND **COUNTY**

STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1
PLAN AND
ELEVATION

LEFT LANE

SITE 2L DWG. NO. 32

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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1			3			TOTAL SHEETS
2			4			41

STR. #3

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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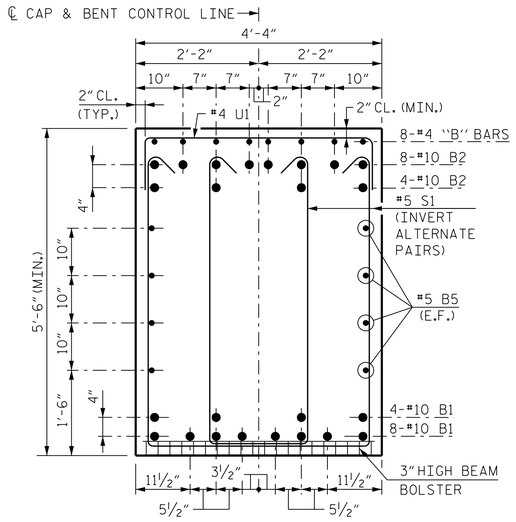
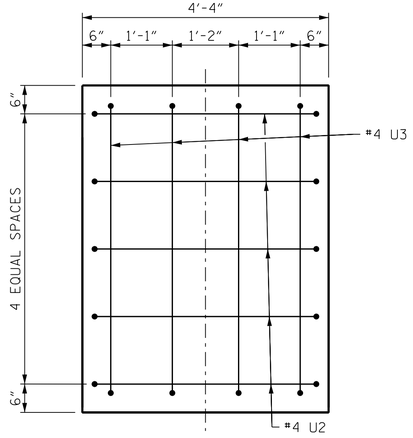
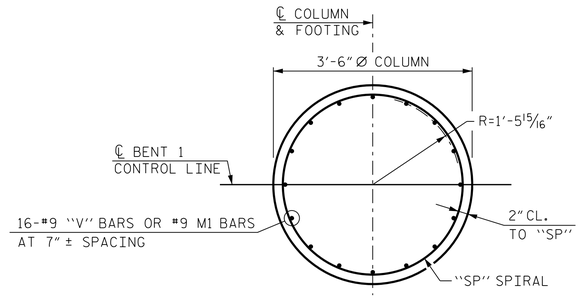


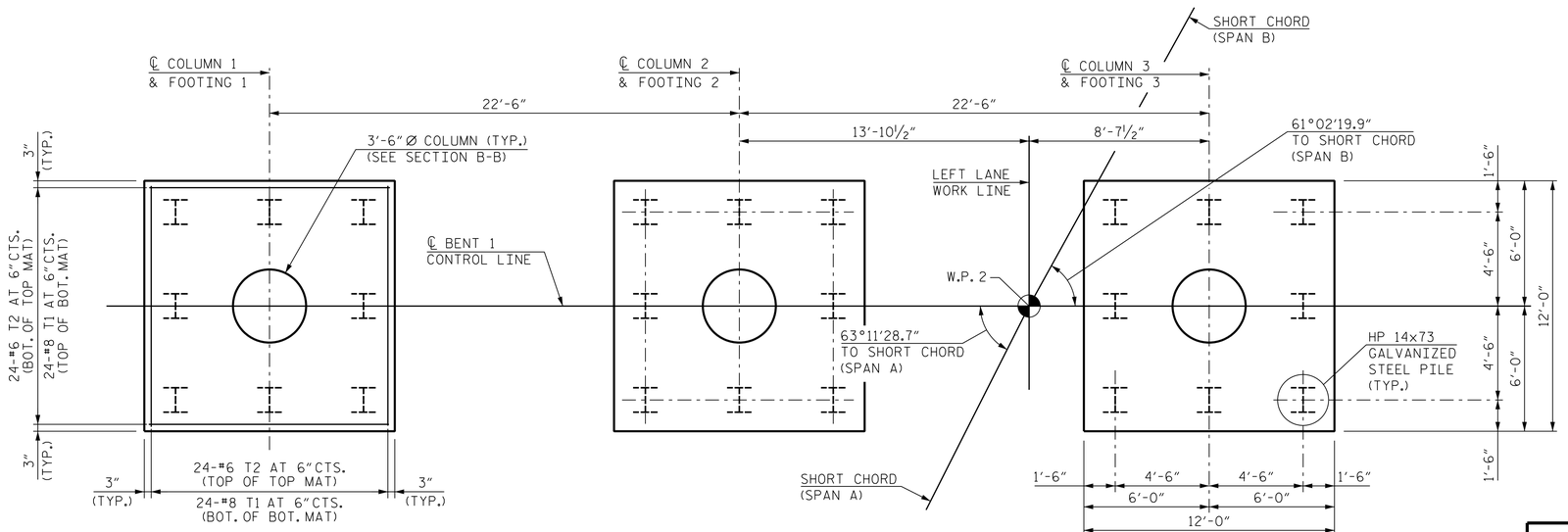
SECTION THROUGH CAP
SECTION A-A



END OF CAP DETAIL



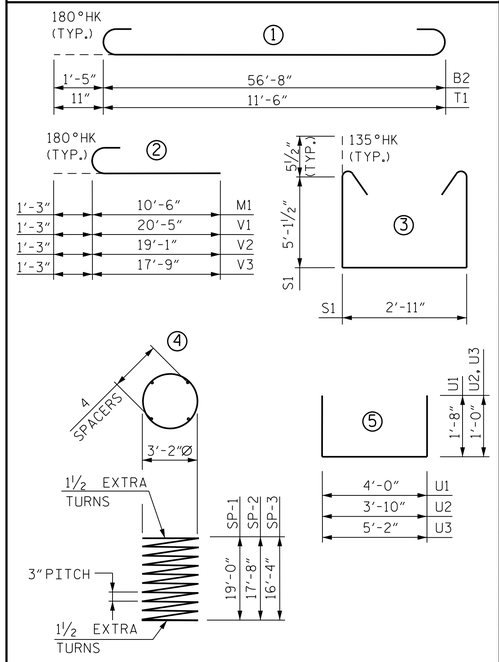
SECTION THROUGH COLUMN
SECTION B-B



PLAN OF FOOTINGS

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	STR	56'-8"	2,926
B2	12	#10	1	59'-6"	3,072
B3	8	#4	STR	6'-2"	33
B4	40	#4	STR	9'-8"	258
B5	8	#5	STR	56'-8"	473
S1	164	#5	3	14'-1"	2,409
T1	144	#8	1	13'-4"	5,126
T2	144	#6	STR	11'-6"	2,487
M1	48	#9	2	11'-9"	1,918
U1	78	#4	5	7'-4"	382
U2	10	#4	5	5'-10"	39
U3	8	#4	5	7'-2"	38
V1	16	#9	2	21'-8"	1,179
V2	16	#9	2	20'-4"	1,106
V3	16	#9	2	19'-0"	1,034

REINFORCING STEEL					22,480 LBS.
SP-1	1	**	4	775'-10"	518
SP-2	1	**	4	726'-9"	485
SP-3	1	**	4	677'-8"	453

SPIRAL COLUMN REINFORCING STEEL	1,456 LBS.

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

CLASS "A" CONCRETE	
POUR 1 (FOOTINGS)	84.0 C.Y.
POUR 2 (COLUMNS)	18.5 C.Y.
POUR 3 (CAP)	53.2 C.Y.
TOTAL	155.7 C.Y.

HP 14x73 GALVANIZED STEEL PILES	
NO.	24
L.F.	1,560
PILE REDRIVES	12 EA.
FOUNDATION EXCAVATION FOR BENT	LUMP SUM
PILE DRIVING EQUIP. SET UP FOR HP 14 x 73 GALVANIZED STEEL PILES	24 EA.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 1
DETAILS AND BILL OF MATERIAL
LEFT LANE

SITE 2L DWG. NO. 33

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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1			3			TOTAL SHEETS
2			4			41

STR. #3

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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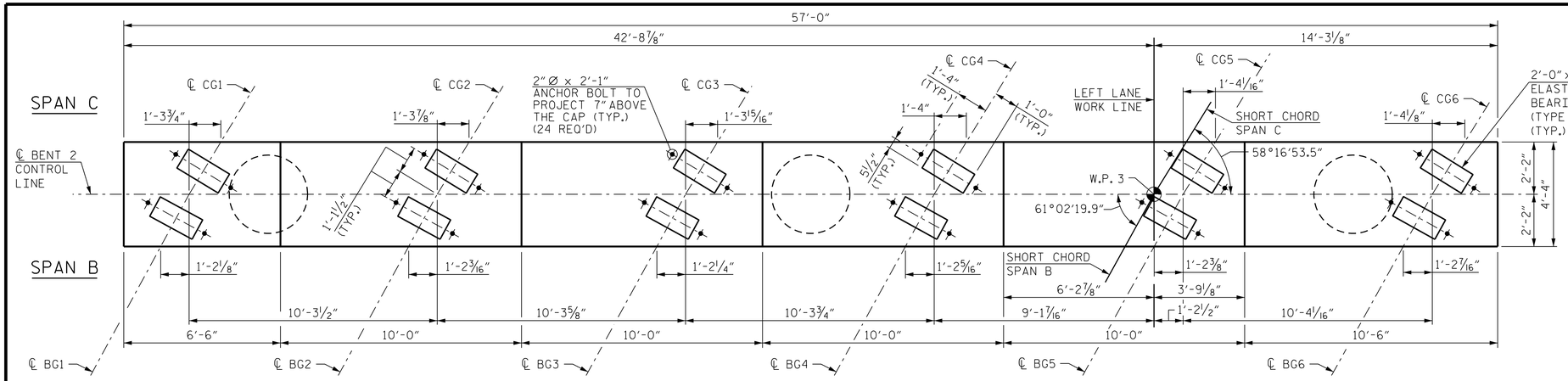
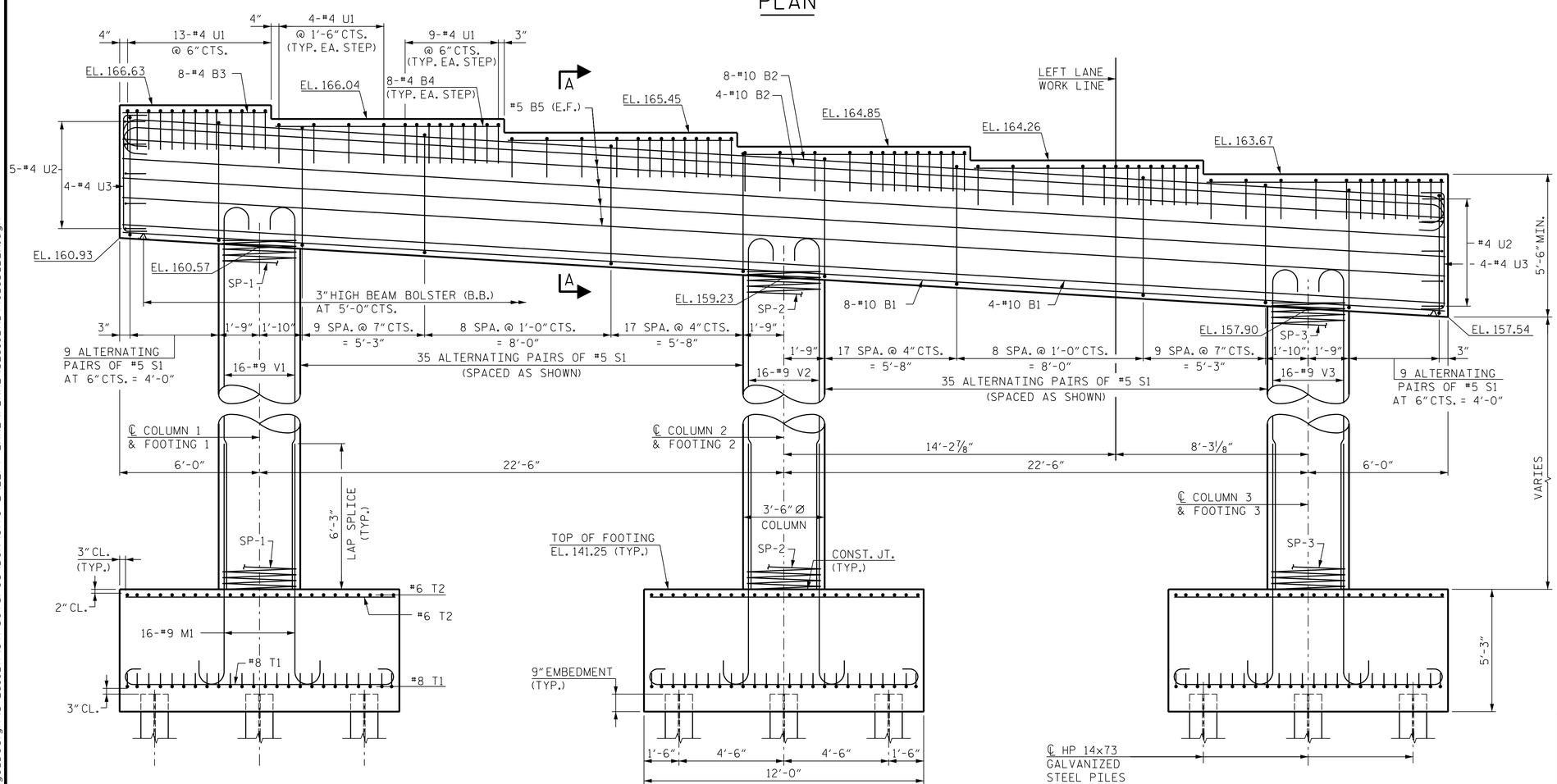


PLAN



ELEVATION

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

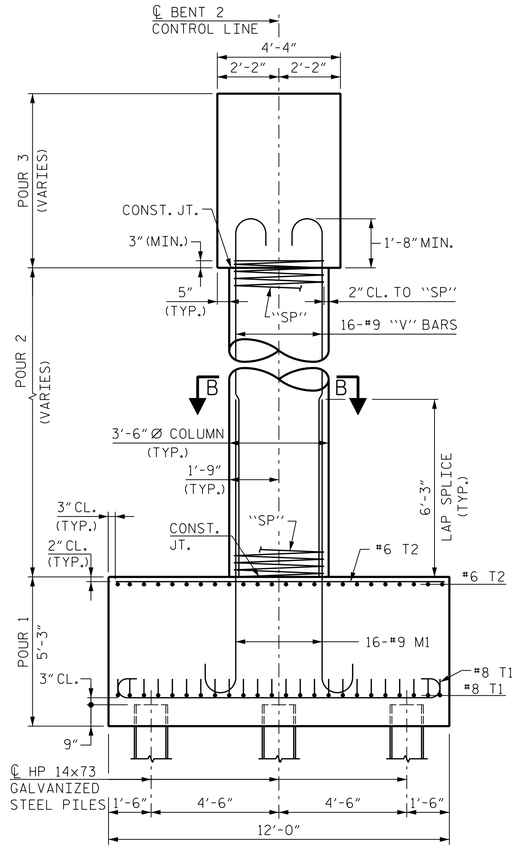
NOTES:

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

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

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

GALVANIZE THE TOP OF EACH INTERIOR BENT PILE A MINIMUM OF 22 FT. GALVANIZE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.



END ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING AND COLUMN)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 2
PLAN AND ELEVATION
LEFT LANE

SITE 2L DWG. NO. 34

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

2/4/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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1			3			TOTAL SHEETS
2			4			41

STR. #3

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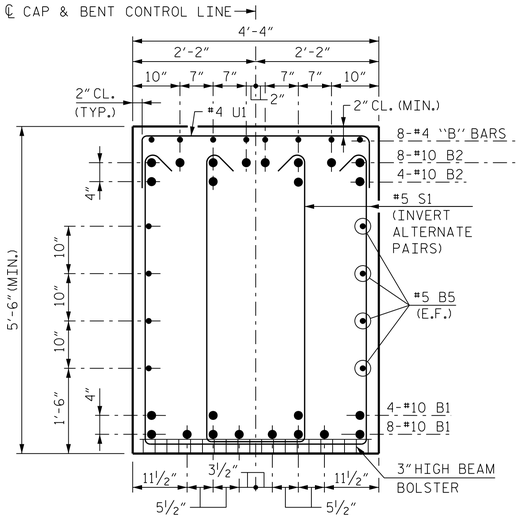
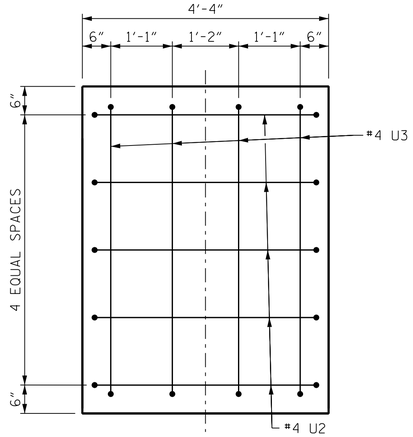
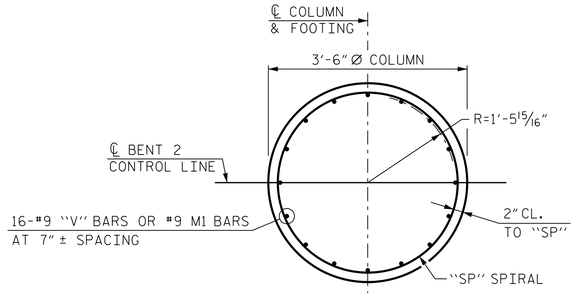


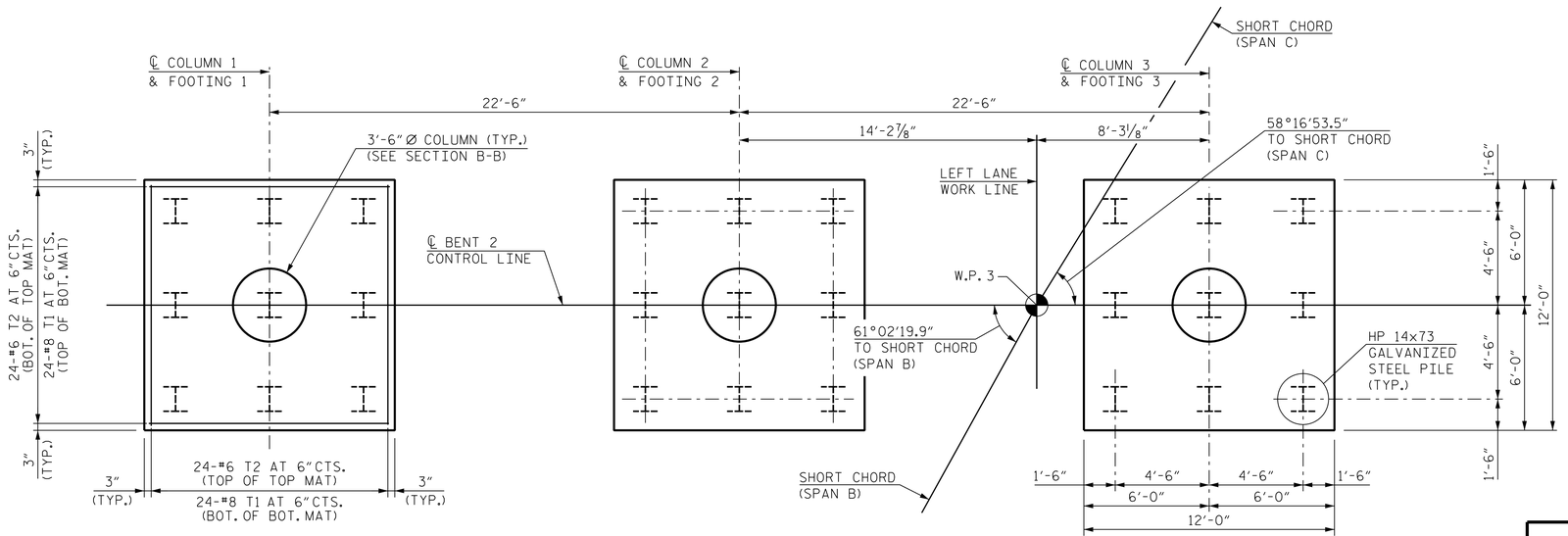
SECTION THROUGH CAP
SECTION A-A



END OF CAP DETAIL



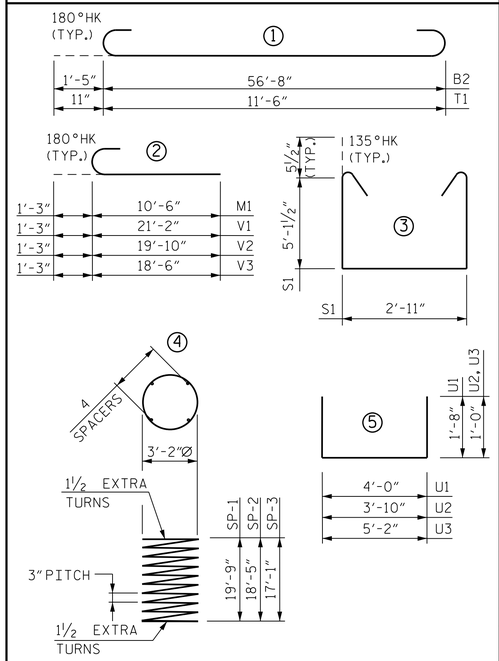
SECTION THROUGH COLUMN
SECTION B-B



PLAN OF FOOTINGS

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	STR	56'-8"	2,926
B2	12	#10	1	59'-6"	3,072
B3	8	#4	STR	6'-2"	33
B4	40	#4	STR	9'-8"	258
B5	8	#5	STR	56'-8"	473
S1	176	#5	3	14'-1"	2,585
T1	144	#8	1	13'-4"	5,126
T2	144	#6	STR	11'-6"	2,487
M1	48	#9	2	11'-9"	1,918
U1	78	#4	5	7'-4"	382
U2	10	#4	5	5'-10"	39
U3	8	#4	5	7'-2"	38
V1	16	#9	2	22'-5"	1,219
V2	16	#9	2	21'-1"	1,147
V3	16	#9	2	19'-9"	1,074

REINFORCING STEEL					22,777 LBS.
SP-1	1	**	4	805'-4"	538
SP-2	1	**	4	756'-3"	505
SP-3	1	**	4	707'-2"	472

SPIRAL COLUMN REINFORCING STEEL	1,515 LBS.

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

CLASS "A" CONCRETE	
POUR 1 (FOOTINGS)	84.0 C.Y.
POUR 2 (COLUMNS)	19.3 C.Y.
POUR 3 (CAP)	53.2 C.Y.
TOTAL	156.5 C.Y.

HP 14x73 GALVANIZED STEEL PILES	
NO.	27
L.F.	1,890
PILE REDRIVES	14 EA.
FOUNDATION EXCAVATION FOR BENT	LUMP SUM
PILE DRIVING EQUIP. SET UP FOR HP 14 x 73 GALVANIZED STEEL PILES	27 EA.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 2
DETAILS AND BILL OF MATERIAL
LEFT LANE

SITE 2L DWG. NO. S3-35

REVISIONS

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

SHEET NO. S3-35

TOTAL SHEETS 41

STR. #3

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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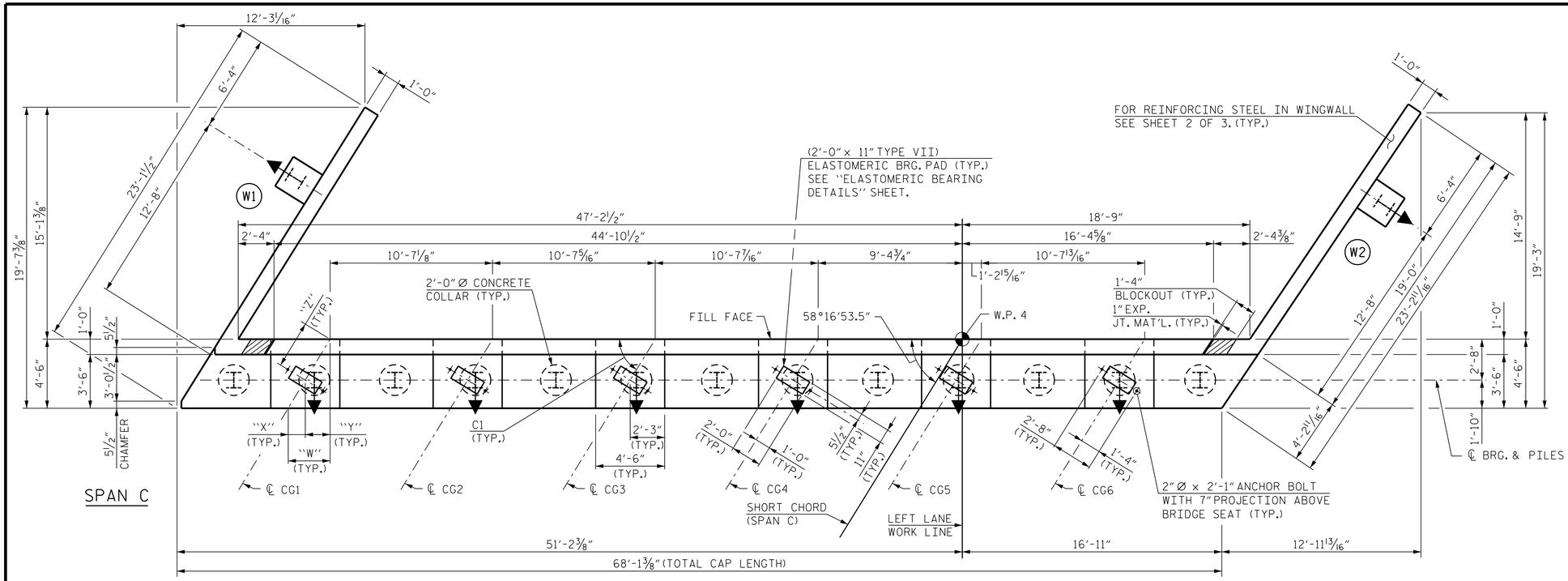
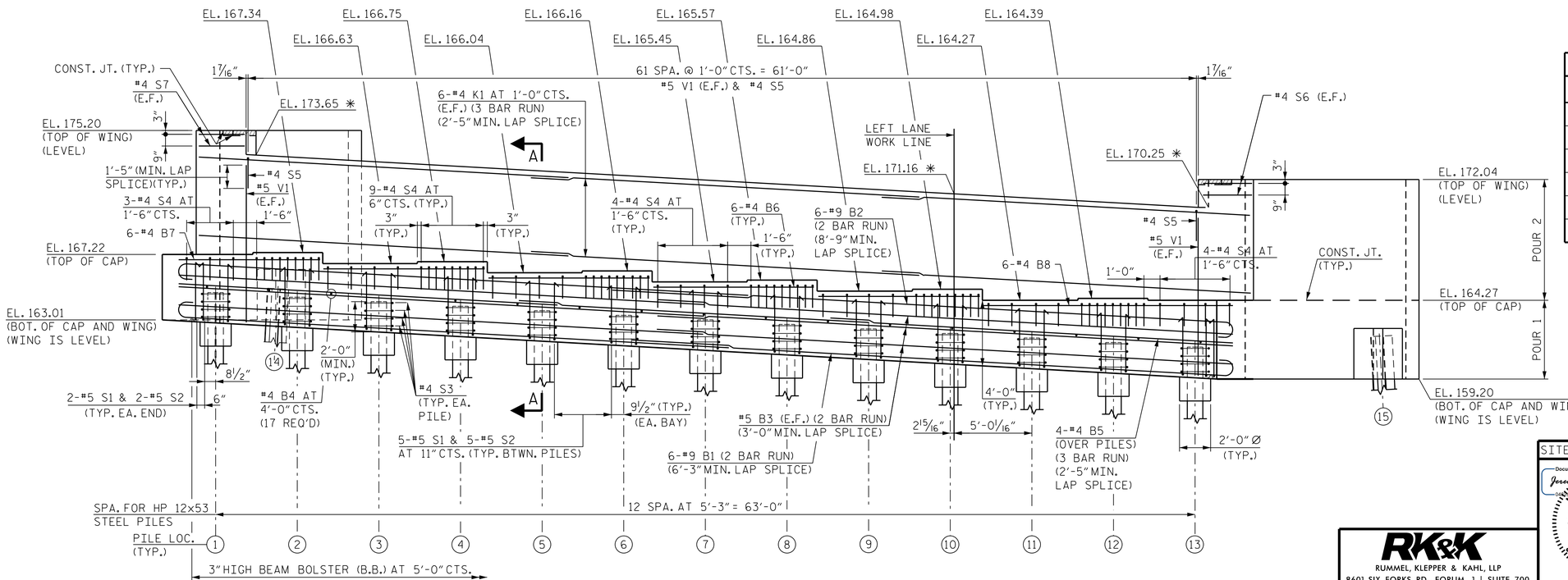


PLAN



ELEVATION

* ELEVATION AT FILL FACE

NOTES:

FOR SECTION A-A, SEE SHEET 3 OF 3.

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

FOR TEMPORARY DRAINAGE, SEE SHEET 3 OF 3.

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

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

LEGEND:

HP 12x53 VERTICAL STEEL PILES

HP 12x53 STEEL PILES BATTERED 3:12

TOP OF PILE ELEVATION TABLE	
LOC.	ELEVATION
1	164.96
2	164.67
3	164.38
4	164.08
5	163.79
6	163.49
7	163.20
8	162.91
9	162.61
10	162.31
11	162.02
12	161.73
13	161.44
14	165.01
15	161.21

GIRDER DETAILS					
GIRDER	C1	"W"	"X"	"Y"	"Z"
CG1	58°44'55.6"	2'-8 3/4"	1'-1 3/8"	1'-7 3/8"	3'-1 7/16"
CG2	58°37'47.5"	2'-8 5/16"	1'-1 7/16"	1'-7 1/2"	3'-1 1/2"
CG3	58°30'35.9"	2'-9 1/8"	1'-1 1/2"	1'-7 5/8"	3'-1 1/2"
CG4	58°23'20.7"	2'-9 1/4"	1'-1 9/16"	1'-7 11/16"	3'-1 9/16"
CG5	58°16'02.0"	2'-9 7/16"	1'-1 5/8"	1'-7 13/16"	3'-1 5/8"
CG6	58°08'39.7"	2'-9 9/16"	1'-1 11/16"	1'-7 7/8"	3'-1 11/16"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
PLAN AND ELEVATION

LEFT LANE

SITE 2L DWG. NO. 36

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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2			4			41

STR. #3

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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2/4/2022
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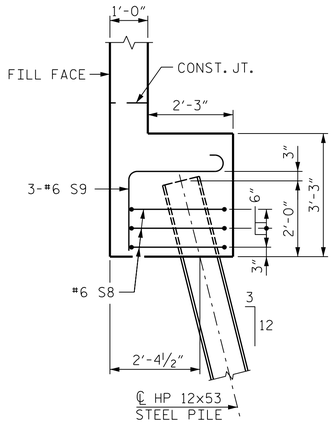
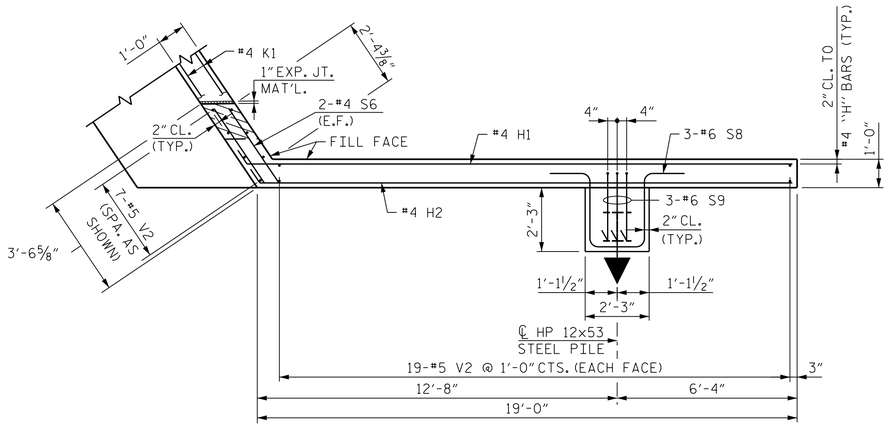
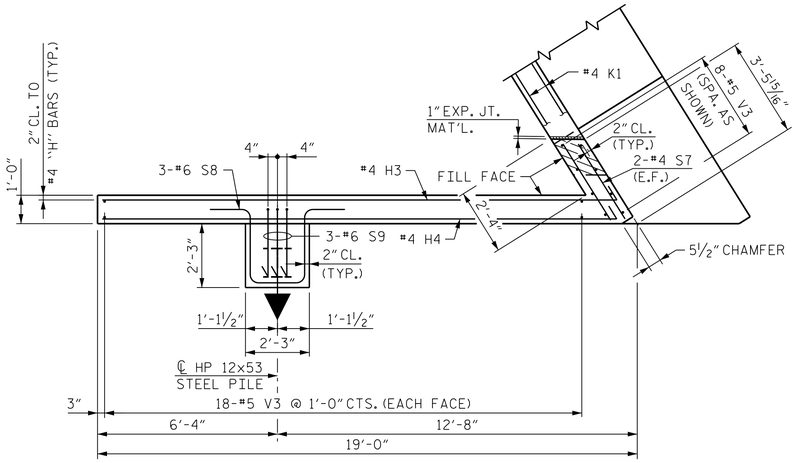


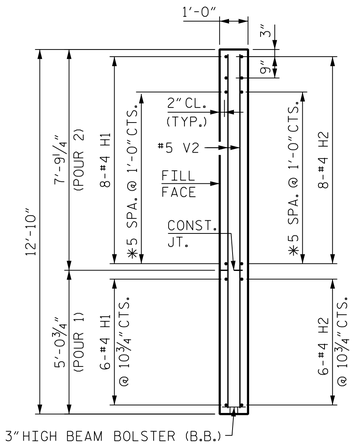
SECTION A-A



PLAN OF RIGHT WINGWALL

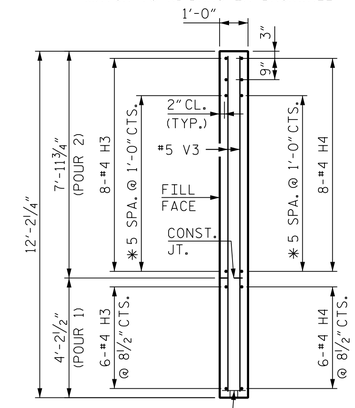


PLAN OF LEFT WINGWALL



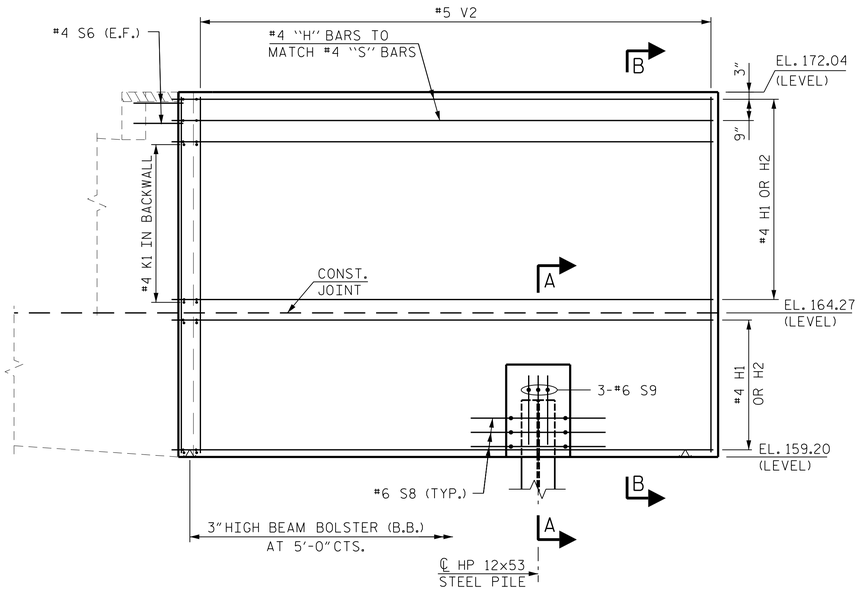
SECTION B-B

* MATCH TO K1 BARS IN BACKWALL



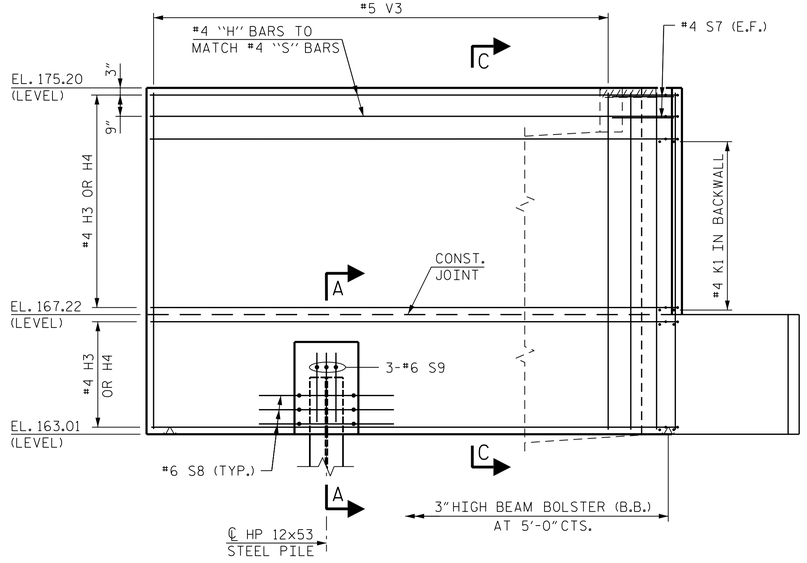
SECTION C-C

* MATCH TO K1 BARS IN BACKWALL



ELEVATION OF RIGHT WINGWALL

RIGHT WINGWALL DETAILS (W2)



ELEVATION OF LEFT WINGWALL

LEFT WINGWALL DETAILS (W1)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WINGWALL DETAILS

LEFT LANE

SITE 2L DWG. NO.37

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

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STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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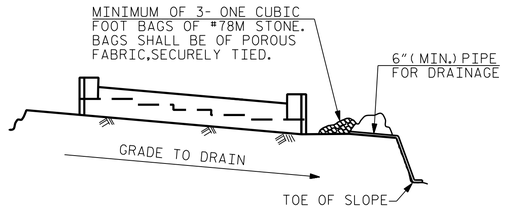
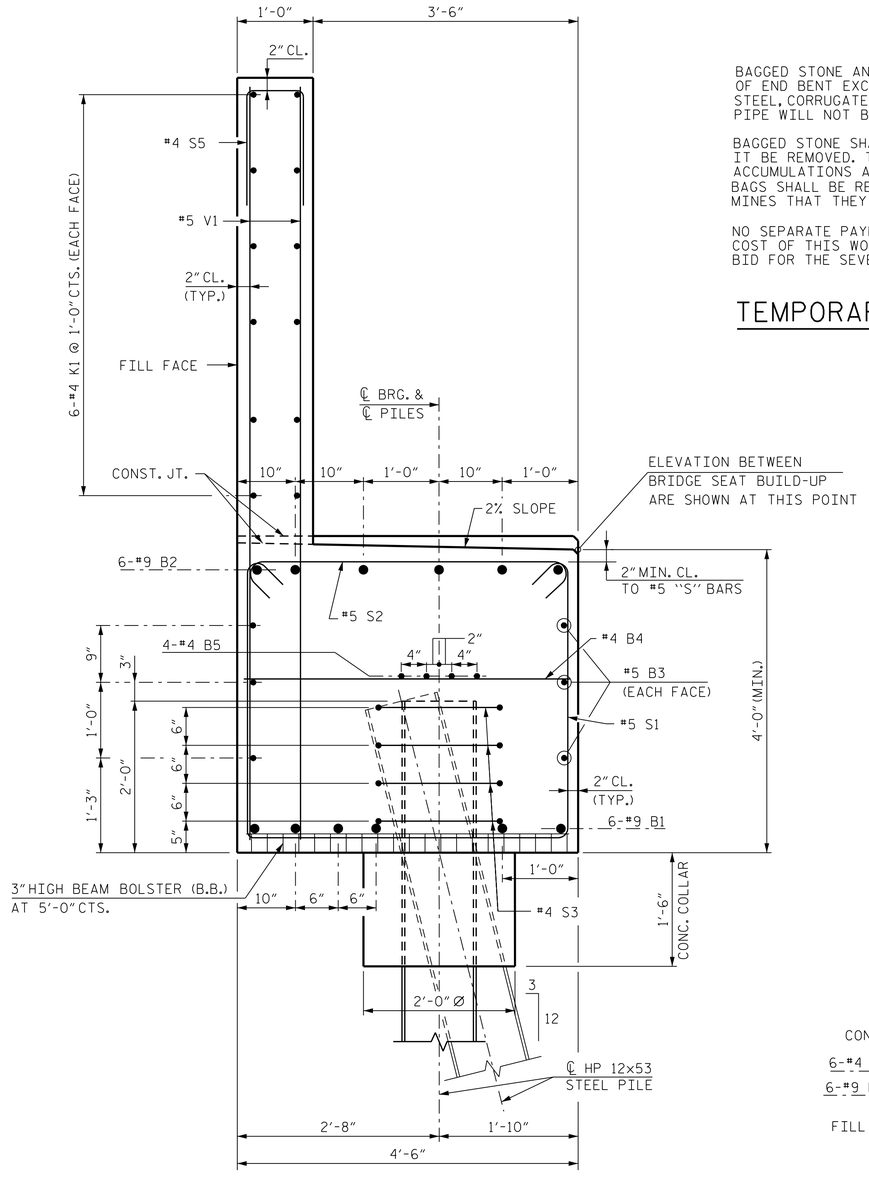


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

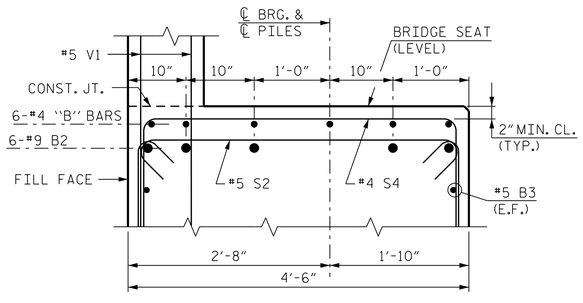
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



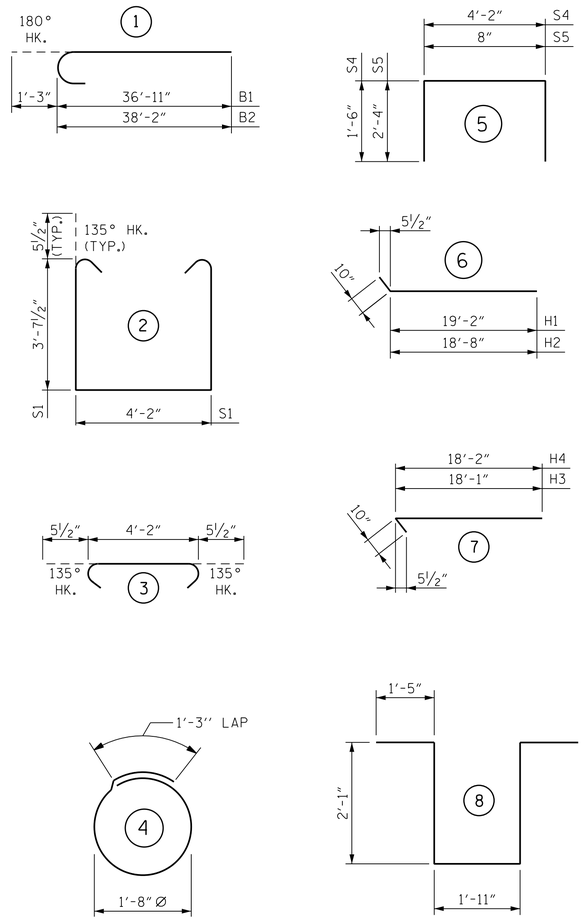
SECTION A-A

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)



BRG. SEAT DETAIL

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	38'-2"	1,557
B2	12	#9	1	39'-5"	1,608
B3	12	#5	STR	35'-3	441
B4	17	#4	STR	4'-2"	47
B5	12	#4	STR	24'-2"	194
B6	24	#4	STR	10'-3"	164
B7	6	#4	STR	7'-5"	30
B8	6	#4	STR	14'-8"	59
H1	14	#4	6	20'-0"	187
H2	14	#4	6	19'-6"	182
H3	14	#4	7	18'-11"	177
H4	14	#4	7	19'-0"	178
K1	36	#4	STR	24'-2"	581
S1	64	#5	2	12'-4"	823
S2	64	#5	3	5'-1"	339
S3	52	#4	4	6'-6"	226
S4	81	#4	5	7'-2"	388
S5	62	#4	5	5'-4"	221
S6	4	#4	STR	3'-2"	8
S7	4	#4	STR	2'-10"	8
S8	6	#6	8	8'-11"	80
S9	6	#6	9	3'-10"	35
V1	122	#5	STR	10'-4"	1,315
V2	45	#5	STR	12'-4"	579
V3	44	#5	STR	11'-8"	535

REINFORCING STEEL	9,962 LBS.
CLASS "A" CONCRETE	
POUR 1 (CAP, LOWER WINGS AND COLLARS)	58.3 C.Y.
POUR 2 (BACKWALL & UPPER WINGS)	27.3 C.Y.
TOTAL	85.6 C.Y.
HP 12x53 STEEL PILES	
NO.	15
L.F.	900
PILE REDRIVES	7 EA.
PILE DRIVING EQUIPMENT SETUP FOR HP 12 x 53 STEEL PILES	15 EA.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2
MISCELLANEOUS DETAILS AND BILL OF MATERIAL

LEFT LANE

SITE 2L DWG. NO.38

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

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STR. #3

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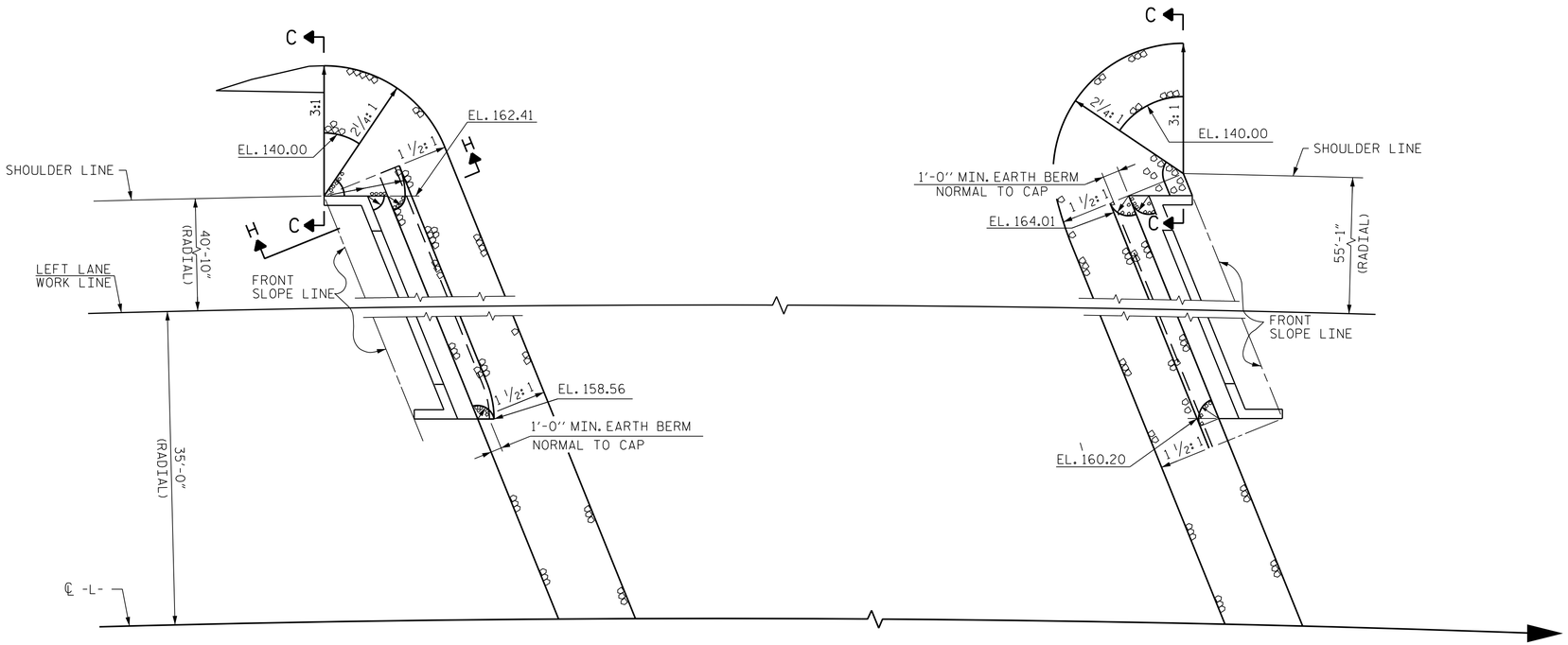
NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

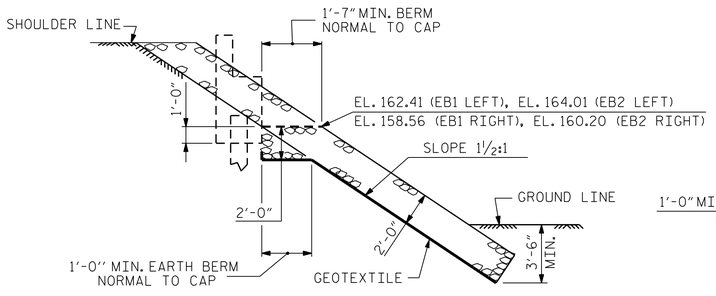


END BENT 1

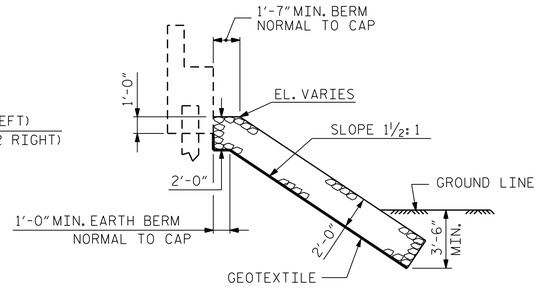
END BENT 2

PLAN

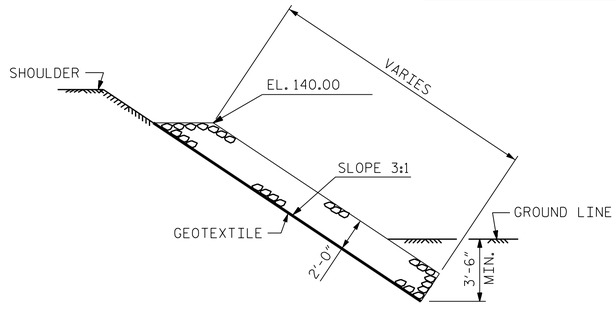
ESTIMATED QUANTITIES		
BRIDGE @ STA. 397+90.00 -L- (LEFT BRIDGE)	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	700	780
END BENT 2	1,045	1,160



SECTION H-H



℄ SECTION
BERM RIP RAPPED



SECTION C-C

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SITE 2L DWG. NO.39

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

LEFT LANE

RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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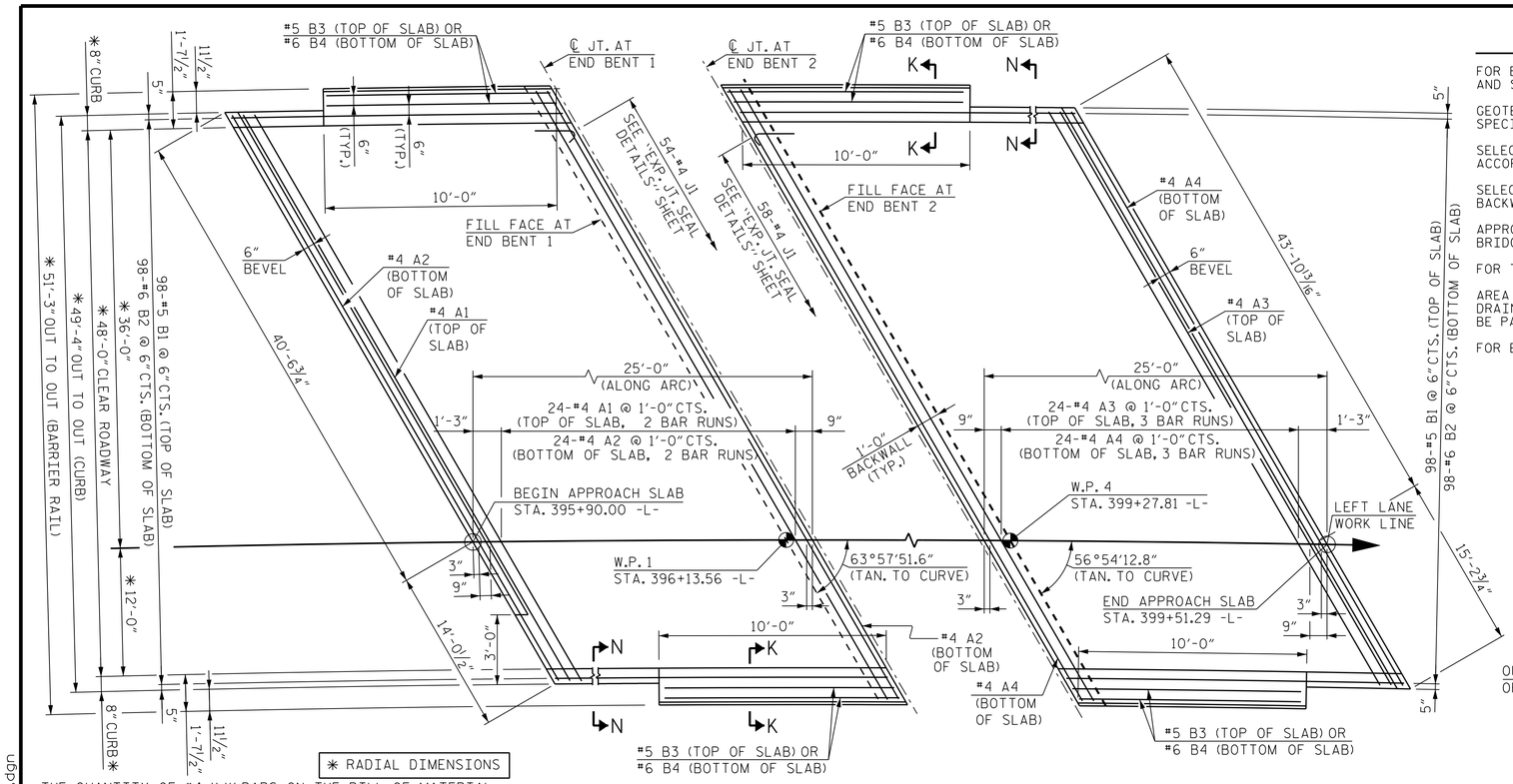


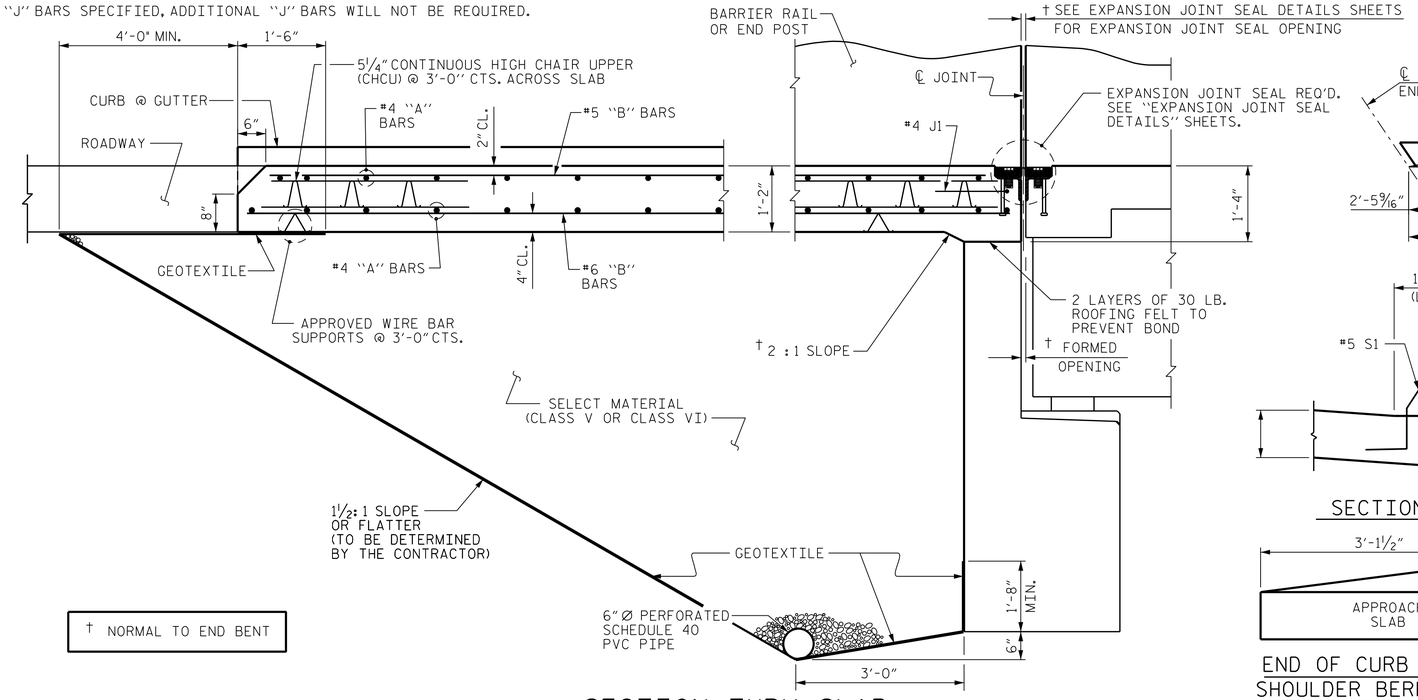
PLAN AT END BENT 1

PLAN AT END BENT 2

✱ RADIAL DIMENSIONS

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

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

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

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

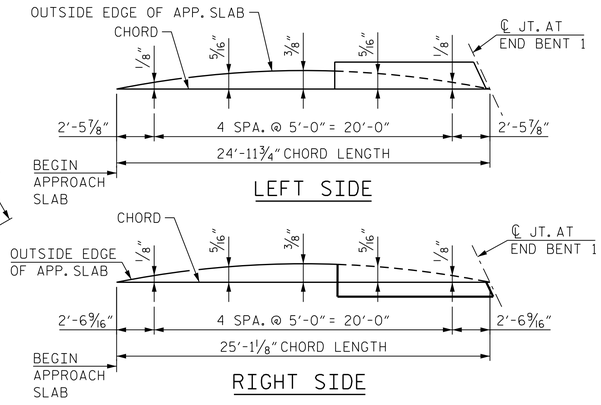
SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

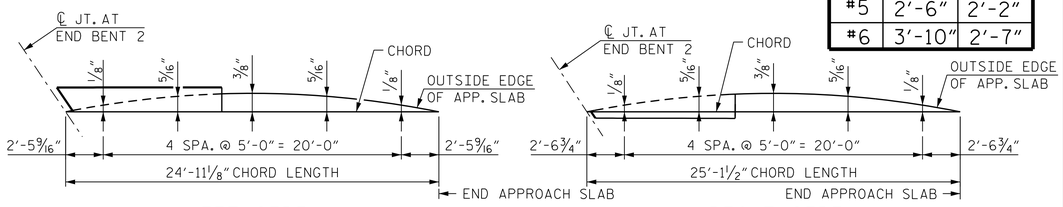
FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.



LEFT SIDE

RIGHT SIDE

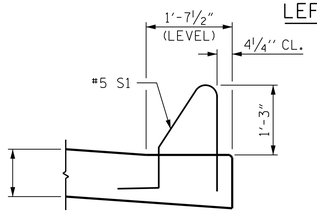
ARC OFFSETS AT END BENT 1



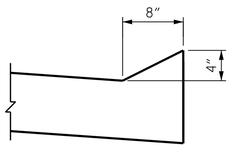
LEFT SIDE

RIGHT SIDE

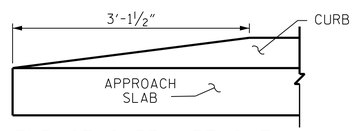
ARC OFFSETS AT END BENT 2



SECTION K-K



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

BILL OF MATERIAL

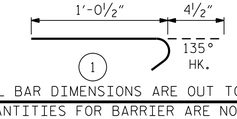
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	50	#4	STR	29'-4"	980
A2	52	#4	STR	29'-3"	1,016
✱ B1	98	#5	STR	23'-6"	2,402
B2	98	#6	STR	24'-5"	3,594
✱ B3	4	#5	STR	9'-9"	41
B4	4	#6	STR	9'-9"	59
✱ J1	54	#4	1	1'-5"	51
REINFORCING STEEL					4,669 LBS.
✱ EPOXY COATED REINFORCING STEEL					3,474 LBS.
CLASS AA CONCRETE					59.9 C. Y.

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A3	75	#4	STR	21'-7"	1,081
A4	78	#4	STR	21'-5"	1,116
✱ B1	98	#5	STR	23'-6"	2,402
B2	98	#6	STR	24'-5"	3,594
B3	4	#5	STR	9'-9"	41
B4	4	#6	STR	9'-9"	59
✱ J1	58	#4	1	1'-5"	55
REINFORCING STEEL					4,769 LBS.
✱ EPOXY COATED REINFORCING STEEL					3,538 LBS.
CLASS AA CONCRETE					64.8 C. Y.

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

✱ QUANTITIES FOR BARRIER ARE NOT INCLUDED. SEE SHEET 2 OF 2.

SPLICE LENGTHS

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

LEFT LANE

SITE 2L DWG. NO. 40

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #3

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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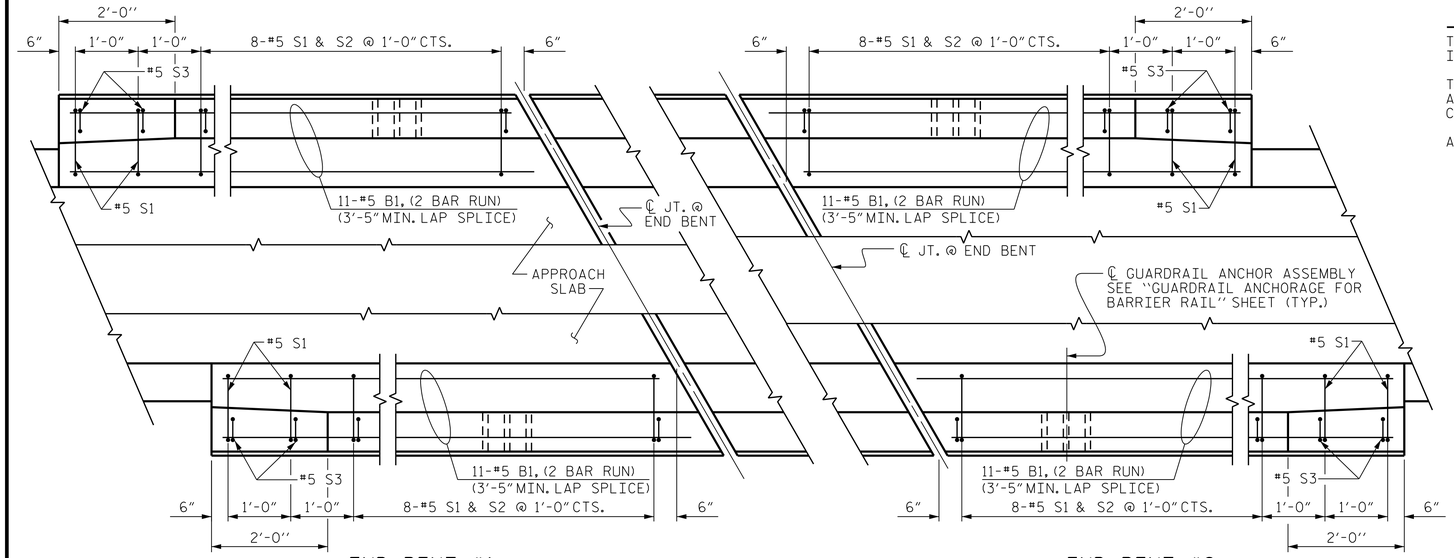


END BENT #1

END BENT #2

PLAN OF BARRIER RAIL

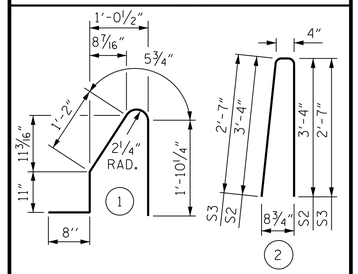
NOTES

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES

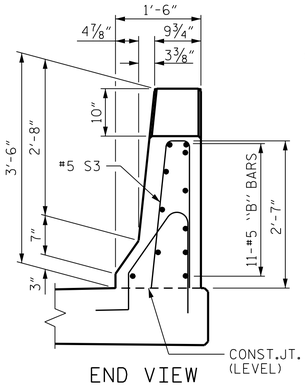


ALL BAR DIMENSIONS ARE OUT TO OUT

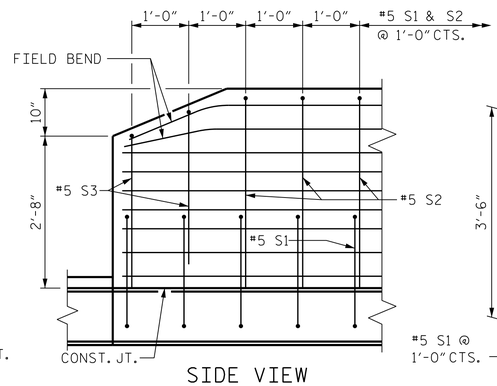
BILL OF MATERIAL

BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	88	#5	STR	6'-10"	627
✳S1	40	#5	1	5'-1"	212
✳S2	32	#5	2	7'-0"	234
✳S3	8	#5	2	5'-6"	46
✳EPOXY COATED REINFORCING STEEL					1119 LBS.
CLASS AA CONCRETE					56 C. Y.
CONCRETE BARRIER RAIL					41.3 LIN. FT.

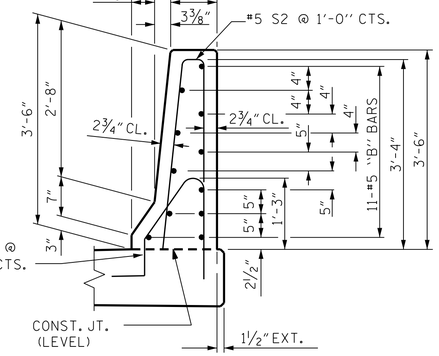


END VIEW

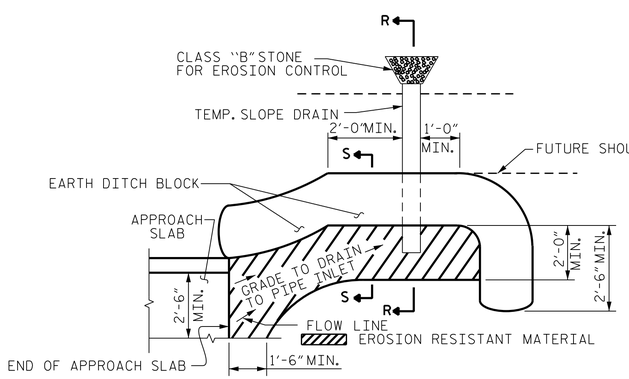


SIDE VIEW

END OF RAIL DETAILS

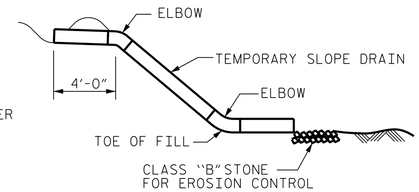


SECTION THRU RAIL

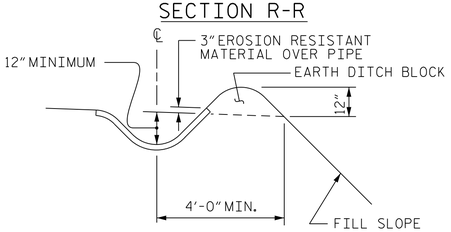


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

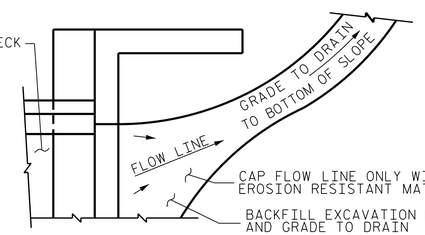
PLAN VIEW



SECTION R-R



SECTION S-S



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

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

LEFT LANE

STR. #3

SITE 2L DWG. NO. 41

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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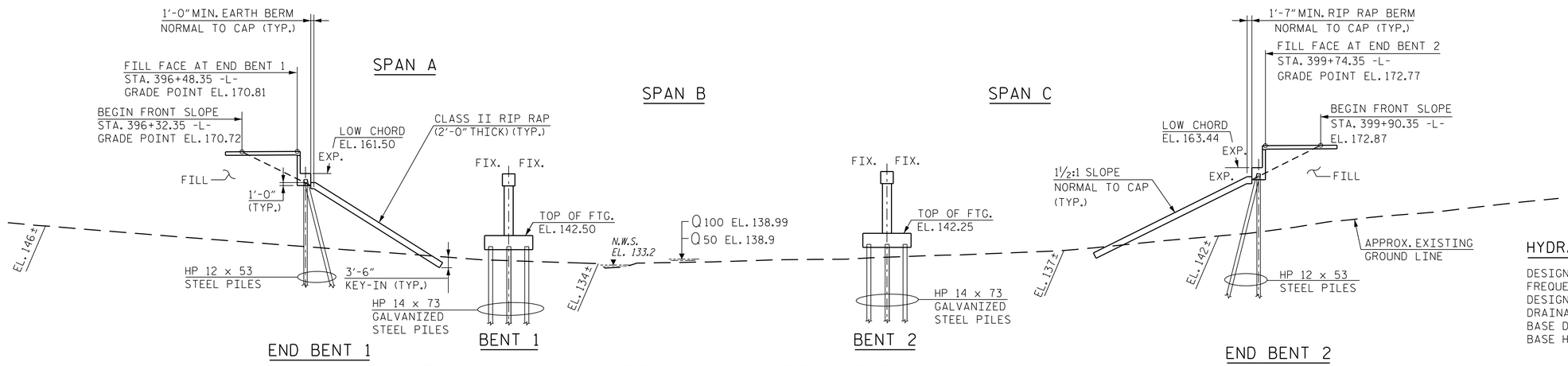
F.A. PROJECT NO. NHF-0100(24)



SECTION ALONG RIGHT LANE WORK LINE

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

PVI = 430+00.00 -L-
EL. = 190.92
V.C. = 470.00 FT.
(+)0.6000% △ (-)0.6000%

-L- GRADE DATA

HYDRAULIC DATA

DESIGN DISCHARGE..... 580 CFS.
FREQUENCY OF DESIGN FLOOD..... 50 YR.
DESIGN HIGH WATER ELEVATION..... 138.9
DRAINAGE AREA..... 1.35 SQ. MI.
BASE DISCHARGE (Q100)..... 610 C.F.S.
BASE HIGH WATER ELEVATION..... 138.99

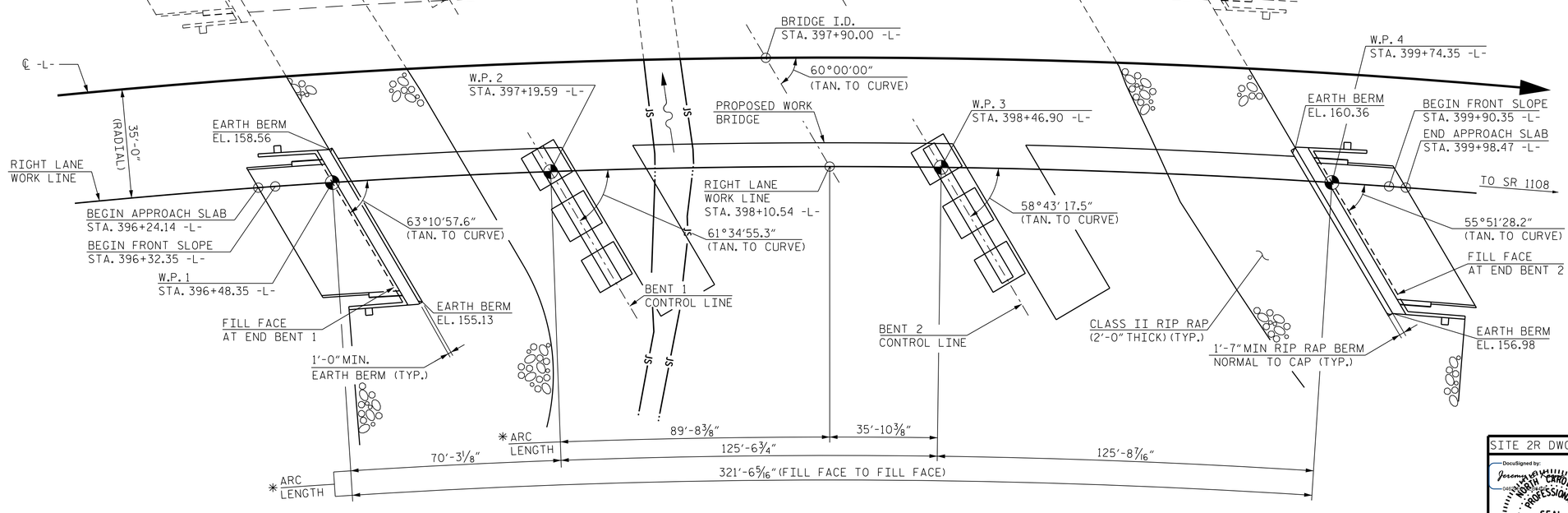
OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE.....650+C.F.S.
FREQUENCY OF OVERTOPPING FLOOD.... 500+YR.
OVERTOPPING FLOOD ELEVATION.....170.1 **

** OVERTOPPING OCCURS AT -L- STA. 392+95.7 AT SBL OUTSIDE EDGE OF TRAVEL

HORIZONTAL CURVE DATA -L-

PI STA. 404+50.03
△ = 74°51'43.7" (RT.)
D = 2°14'48.8"
L = 3,331.81'
T = 1,951.81'
R = 2,550.00'



PLAN

(PILES NOT SHOWN FOR CLARITY)
* MEASURED ALONG RIGHT LANE WORK LINE

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 5 BRIDGE NO. 448

SITE 2R DWG. NO. 1

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON
FAYETTEVILLE OUTER LOOP OVER
UNNAMED TRIB. TO STEWART'S CREEK
BETWEEN SR 1003 AND SR 1108
RIGHT LANE

DocuSigned by: Jeremy Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
3/22/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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315-173

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			41

STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

jkeene
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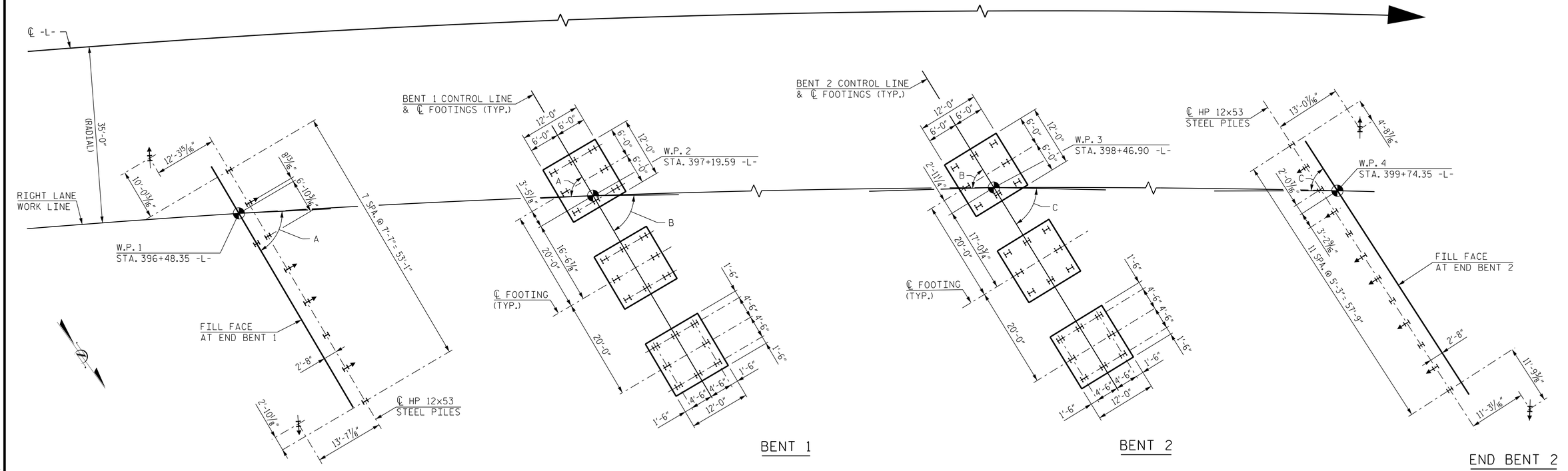

FOUNDATION LAYOUT

ALL PILES AT END BENTS 1 AND 2 ARE HP 12x53 STEEL PILES.
ALL PILES AT BENTS 1 AND 2 ARE HP 14x73 GALVANIZED STEEL PILES.
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.
DIMENSIONS AND/OR PILE LAYOUTS ARE TYPICAL FOR EACH FOOTING OF BENT 1 & BENT 2.

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENTS NO. 1 & NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 130 TONS PER PILE.

PILES AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 145 TONS PER PILE.

DRIVE PILES AT END BENTS NO. 1 & NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 180 TONS PER PILE.

DRIVE PILES AT BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 195 TONS PER PILE.

INSTALL PILES AT BENTS NO. 1 & NO. 2 TO A TIP ELEVATION NO HIGHER THAN ELEVATION 100.0 FEET.

THE SCOUR CRITICAL ELEVATION FOR BENTS NO. 1 AND NO. 2 IS ELEVATION 127.0 FEET. SCOUR CRITICAL ELEVATION ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT BENT NO. 1. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

ANGLES TO SHORT CHORD	
A	62°22'56.4"
B	60°09'06.4"
C	57°17'22.9"

LEGEND:

I HP VERTICAL STEEL PILES

I HP STEEL PILES
▼ BATTERED 3:12

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

RIGHT LANE

SITE 2R DWG. NO. 2

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2/4/2022

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

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CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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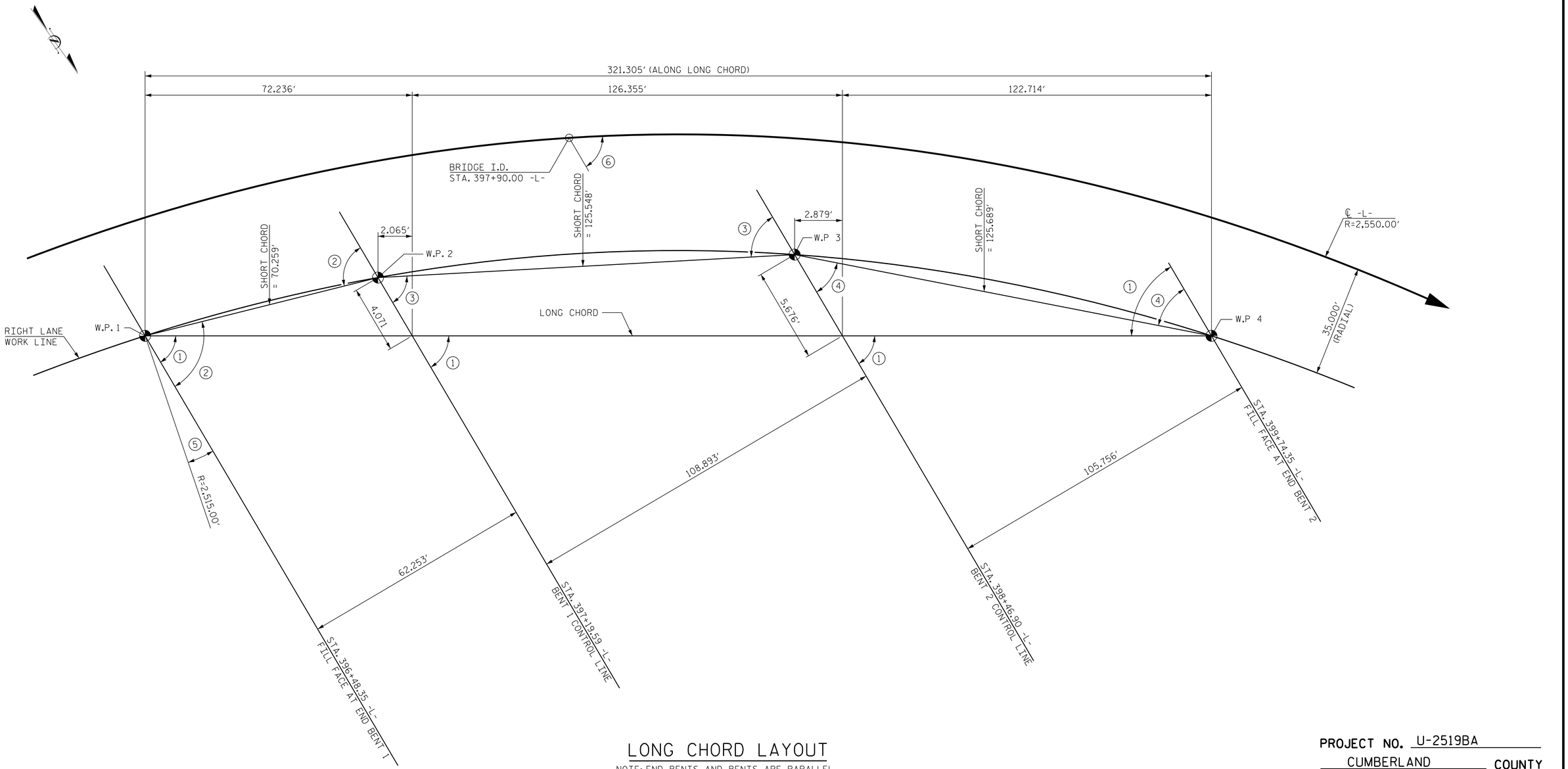

LONG CHORD LAYOUT

NOTE: END BENTS AND BENTS ARE PARALLEL

ANGLES

1. 59°31'12.9"
2. 62°22'56.4"
3. 60°09'06.4"
4. 57°17'22.9"
5. 26°49'02.4"
6. 60°00'00.0" (TAN. TO CURVE)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LONG CHORD LAYOUT

RIGHT LANE

SITE 2R DWG. NO. 3

DocuSigned by: Jeremy Keene

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY F. KEENE

2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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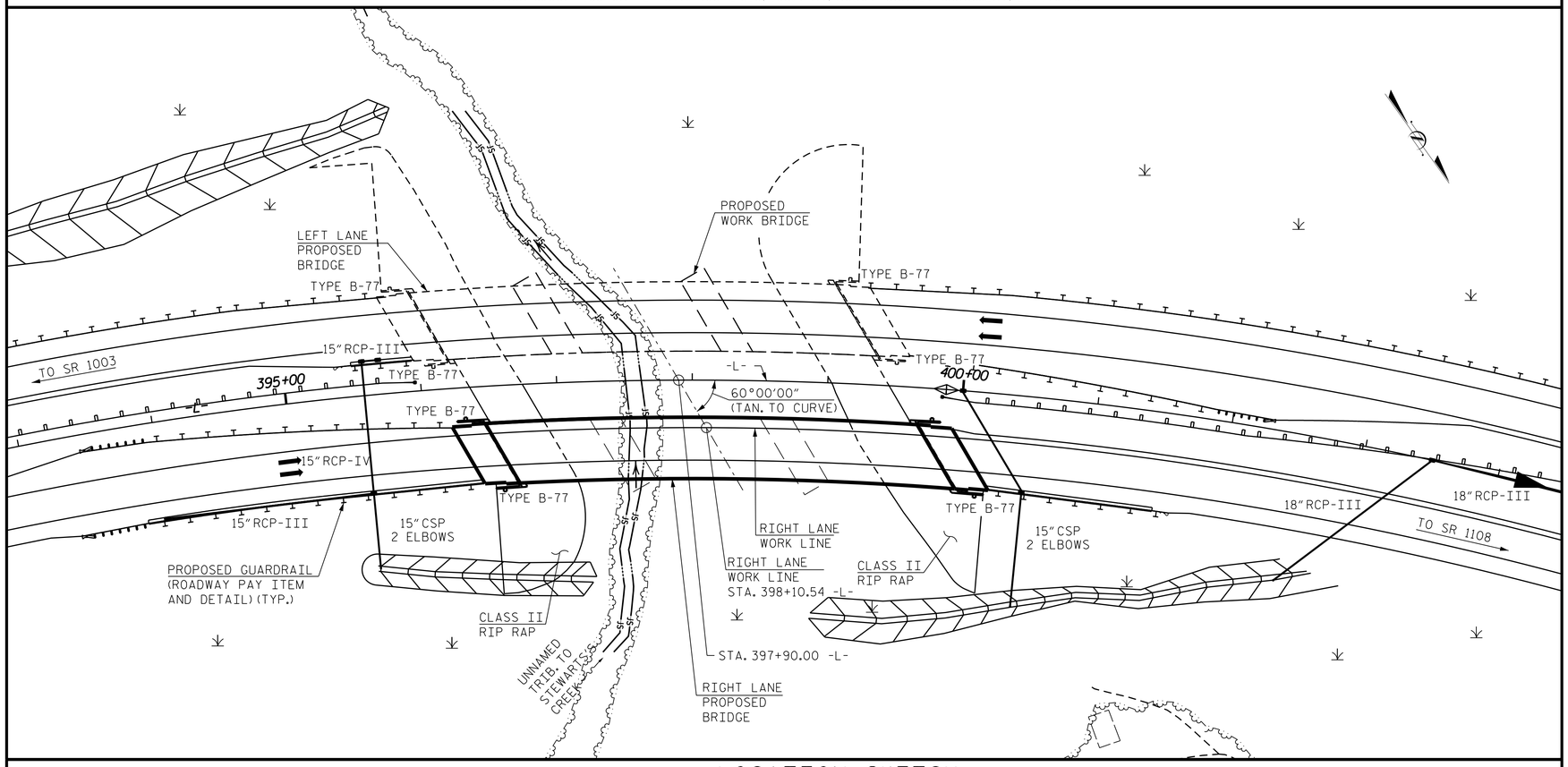
TOTAL BILL OF MATERIAL

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMPORARY ACCESS AT STA. 397+90 -L-	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SET UP FOR HP 12x53 STEEL PILES	PILE DRIVING EQUIPMENT SET UP FOR HP 14x73 GALVANIZED STEEL PILES	HP 12x53 STEEL PILES		HP 14x73 GALVANIZED STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LUMP SUM	EA.	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EA.	EA.	NO.	LIN.FT.	NO.	LIN.FT.	EA.	LIN.FT.	TON	SY	LUMP SUM	LUMP SUM
SUPERSTRUCTURE	—	—	14,463	14,421	—	LUMP SUM	—	—	15	1,583.56	—	—	—	—	—	—	—	680.54	—	—	LUMP SUM	LUMP SUM
END BENT 1	—	—	—	—	73.7	—	8,189	—	—	—	10	—	10	550	—	—	4	—	830	920	—	—
BENT 1	—	1	—	—	140.1	—	19,388	1,299	—	—	—	24	—	—	24	1,440	12	—	—	—	—	—
BENT 2	—	—	—	—	141.1	—	20,592	1,377	—	—	—	24	—	—	24	1,440	12	—	—	—	—	—
END BENT 2	—	—	—	—	78.6	—	8,737	—	—	—	14	—	14	770	—	—	6	—	680	755	—	—
TOTAL	LUMP SUM	1	14,463	14,421	433.5	LUMP SUM	56,906	2,676	15	1,583.56	24	48	24	1,320	48	2,880	34	680.54	1,510	1,675	LUMP SUM	LUMP SUM

BENCH MARK #183 ON -L- STA. 403+24.10, 193.4' RT, NCDOT SURVEY MONUMENT, EL. 176.75



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

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.

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

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

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.

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

FOR INTERIOR BENTS 1 AND 2, ONLY PARTIAL GALVANIZING OF THE PILES ARE REQUIRED. SEE INTERIOR BENT SHEETS FOR REQUIRED GALVANIZED LENGTHS. PAYMENT FOR PARTIALLY GALVANIZED PILES WILL BE MADE UNDER THE CONTRACT UNIT PRICE FOR GALVANIZED STEEL PILES.

FOR WORK BRIDGE: SEE SPECIAL PROVISIONS FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 397+90 -L-.

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

NOTE:

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 4 OF 5

SITE 2R DWG. NO. 4

DocuSigned by: Jeremy E. Keene

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

4/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-4
1			3			TOTAL SHEETS
2			4			41

STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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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 × 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	1.16	--	1.75	0.877	1.16	A	I	33.1	1.030	1.50	C	I	110.1	0.80	0.831	1.16	B	EL	61.8	
		HL-93 (OPERATING)	N/A		1.50	--	1.35	0.877	1.50	A	I	33.1	1.030	1.98	C	I	110.1	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.50	54.000	1.75	0.877	1.50	A	I	33.1	1.030	2.15	C	I	110.1	0.80	0.831	1.71	B	EL	61.8	
		HS-20 (OPERATING)	36.000		1.95	70.200	1.35	0.877	1.95	A	I	33.1	1.030	2.83	C	I	110.1	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH	12.500		4.55	56.875	1.40	0.877	4.55	A	I	33.1	1.030	7.58	C	I	110.1	0.80	0.831	4.53	B	EL	61.8	
		S3C	21.500		2.67	57.405	1.40	0.877	2.67	A	I	33.1	1.030	4.38	C	I	110.1	0.80	0.831	2.64	B	EL	61.8	
		S3A	22.750		2.53	57.558	1.40	0.877	2.53	A	I	33.1	1.030	4.15	C	I	110.1	0.80	0.831	2.50	B	EL	61.8	
		S4A	26.750		2.25	60.188	1.40	0.877	2.25	A	I	33.1	1.030	3.57	C	I	110.1	0.80	0.831	2.18	B	EL	61.8	
		S5A	30.500		1.99	60.695	1.40	0.877	1.99	A	I	33.1	1.030	3.21	C	I	110.1	0.80	0.831	1.92	B	EL	61.8	
		S6A	34.500		1.82	62.790	1.40	0.877	1.82	A	I	33.1	1.030	2.87	C	I	110.1	0.80	0.831	1.72	B	EL	61.8	
		S7B	38.500		1.67	64.295	1.40	0.877	1.67	A	I	33.1	1.030	2.63	C	I	110.1	0.80	0.831	1.56	B	EL	61.8	
		S7A	40.000	3	1.66	66.400	1.40	0.877	1.66	A	I	33.1	1.030	2.63	C	I	110.1	0.80	0.831	1.53	B	EL	61.8	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		2.25	63.563	1.40	0.877	2.25	A	I	33.1	1.030	3.43	C	I	110.1	0.80	0.831	2.12	B	EL	61.8	
		T5B	32.000		1.97	63.040	1.40	0.877	1.97	A	I	33.1	1.030	3.17	C	I	110.1	0.80	0.831	1.86	B	EL	61.8	
		T6A	36.000		1.82	65.520	1.40	0.877	1.82	A	I	33.1	1.030	2.86	C	I	110.1	0.80	0.831	1.69	B	EL	61.8	
		T7A	40.000		1.71	68.400	1.40	0.877	1.71	A	I	33.1	1.030	2.63	C	I	110.1	0.80	0.831	1.55	B	EL	61.8	
		T7B	40.000		1.87	74.800	1.40	0.877	1.87	A	I	33.1	1.030	2.52	C	I	110.1	0.80	0.831	1.62	B	EL	61.8	

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. PRESTRESSED GIRDERS WERE DESIGNED USING SIMPLE SPAN ANALYSIS
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

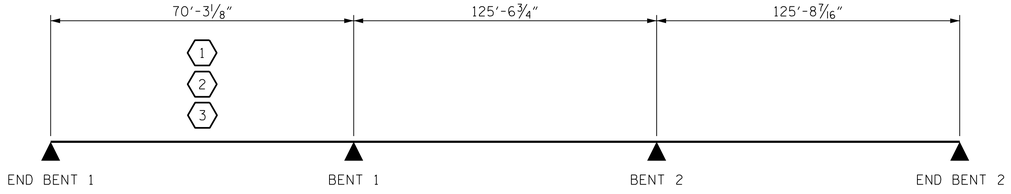
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

DIMENSIONS TAKEN ALONG WORKLINE

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 5 OF 5

SITE 2R DWG. NO. 5

DocuSigned by: Jeremy F. Keene

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY F. KEENE

2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS (INTERSTATE TRAFFIC)
RIGHT LANE

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NO.	BY:	DATE:	NO.	BY:	DATE:	S2-5
1			3			TOTAL SHEETS
2			4			41

STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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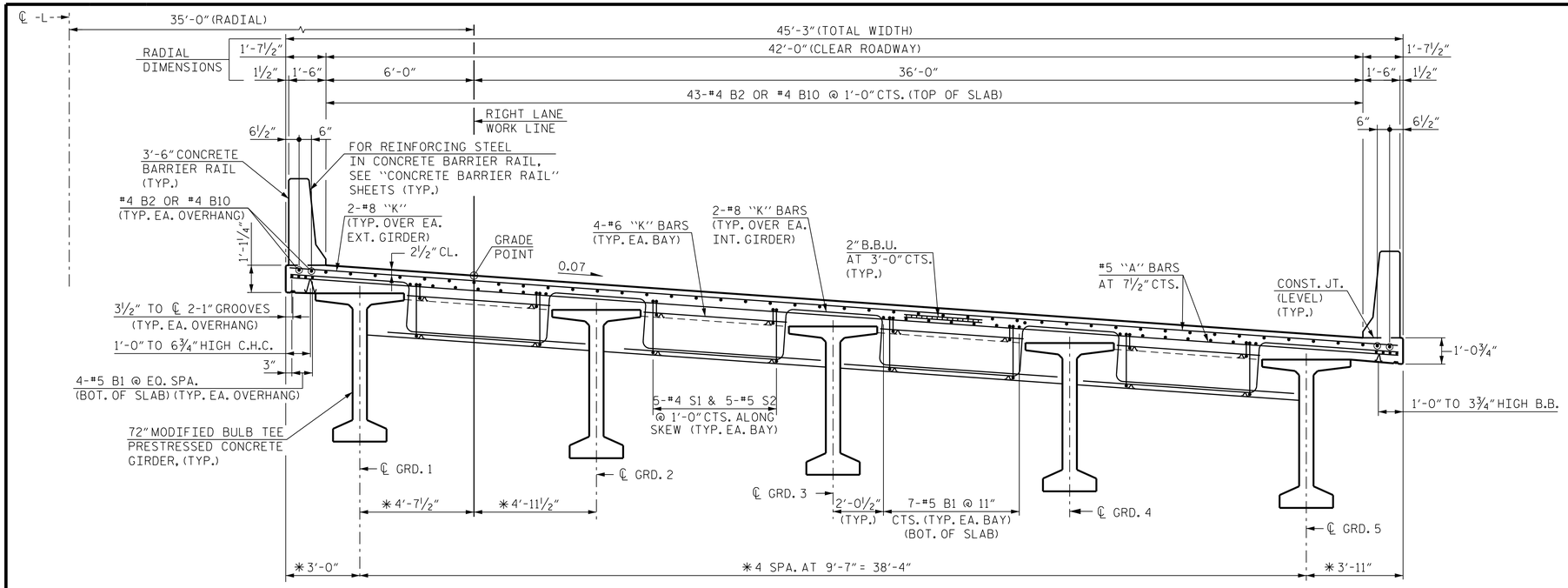


TYPICAL SECTION AT END BENTS

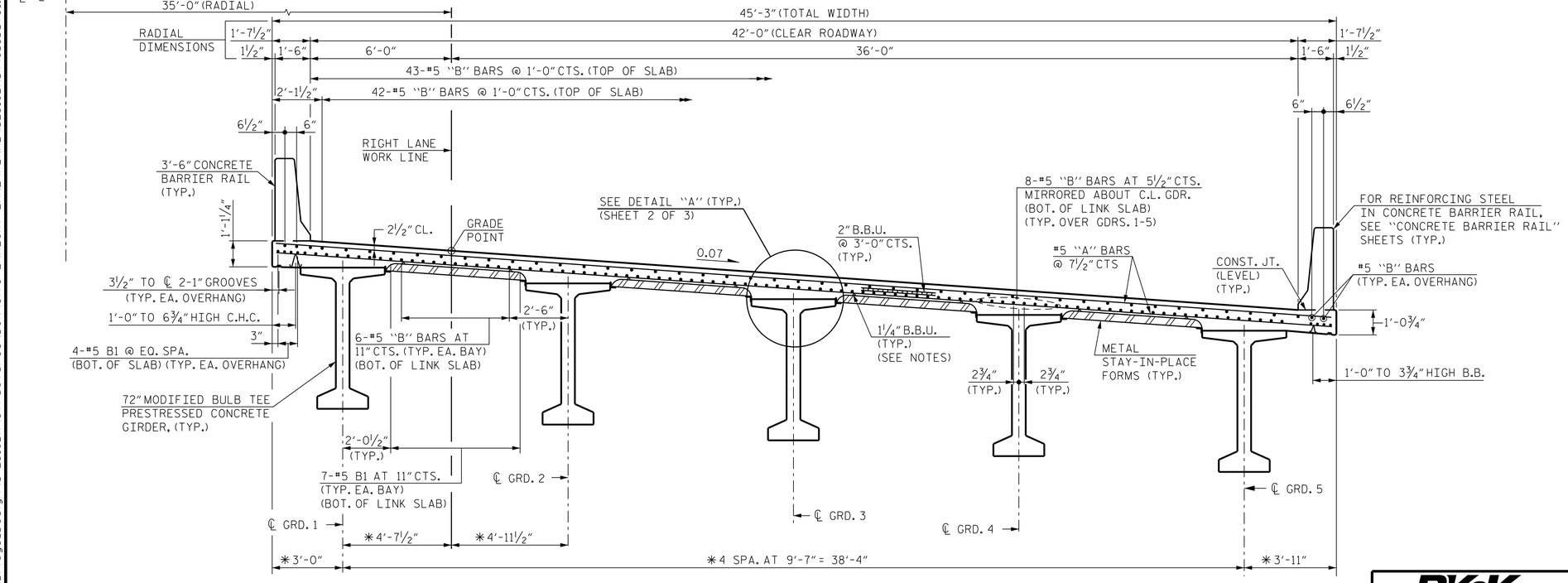
∗ DIMENSIONS SHOWN ARE RADIAL THROUGH W.P. CONTROL LINES AT END BENTS.

NOTES:

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS.

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

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



TYPICAL SECTION AT BENT 1 AND BENT 2

∗DIMENSIONS SHOWN ARE RADIAL THROUGH W.P. CONTROL LINES AT BENTS. SHOWING LINK SLAB REGION

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTIONS

RIGHT LANE

SITE 2R DWG. NO. 6

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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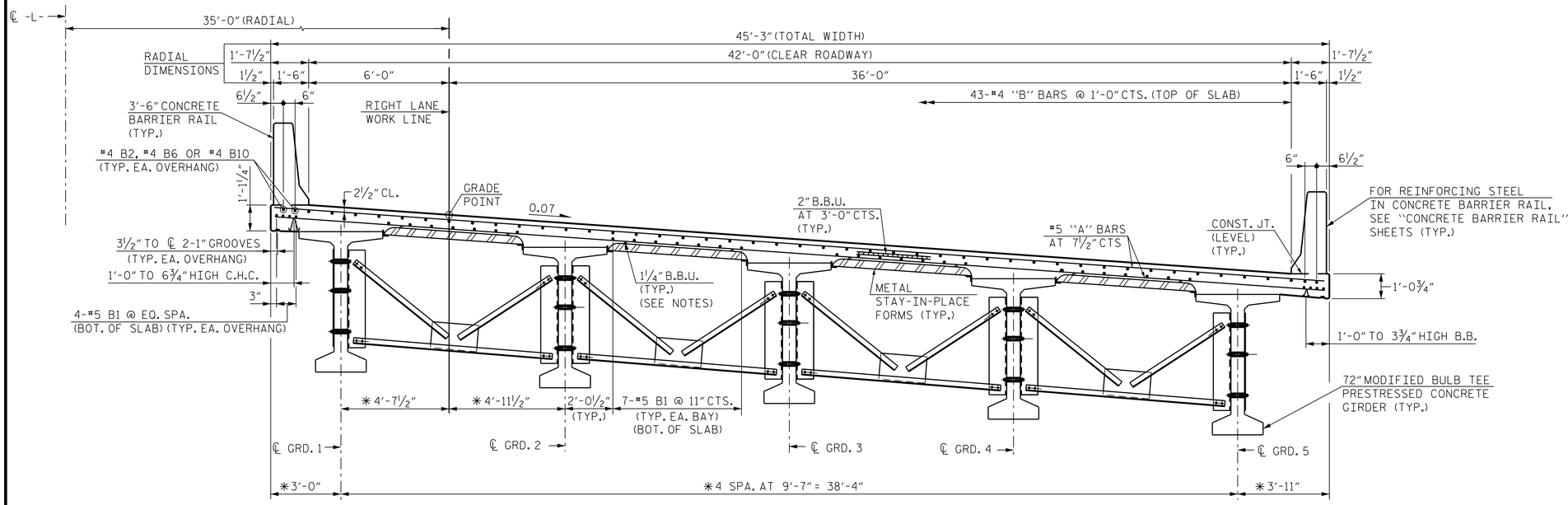
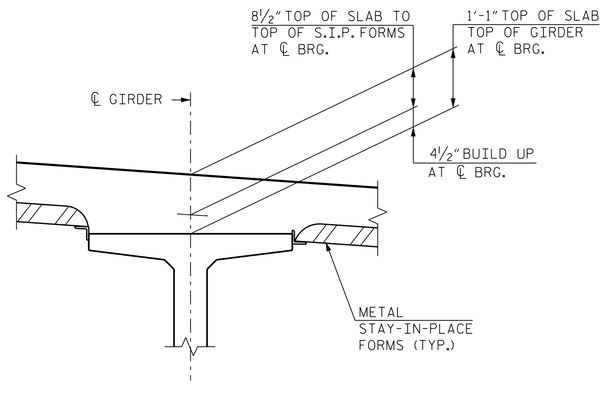


TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM

∗DIMENSIONS SHOWN ARE RADIAL THROUGH W.P. CONTROL LINES AT END BENTS AND BENT.



DETAIL "A"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

TYPICAL SECTIONS

RIGHT LANE

SITE 2R DWG. NO. 7

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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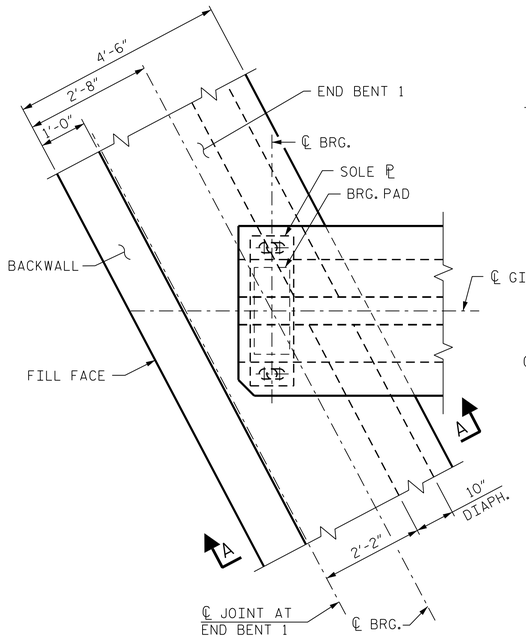
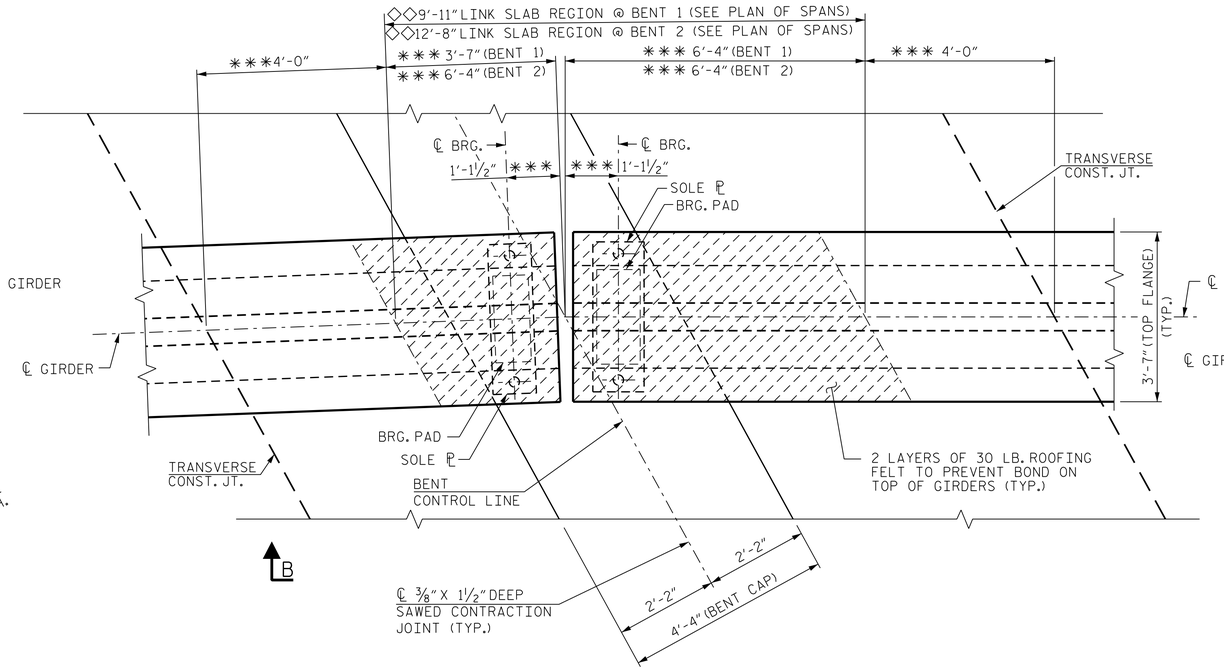


PLAN DETAIL OF END BENT 1

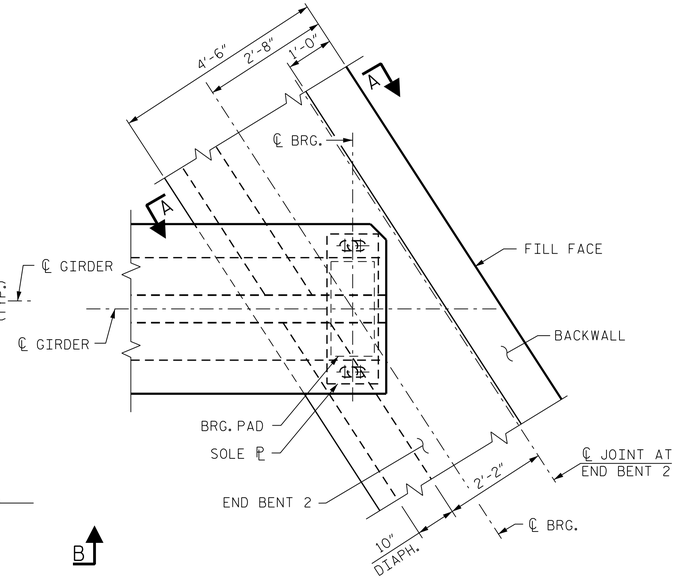
(DECK SLAB NOT SHOWN FOR CLARITY)



PLAN DETAIL OF INTERIOR BENT

✱✱✱ MEASURED ALONG ℄ GIRDER

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

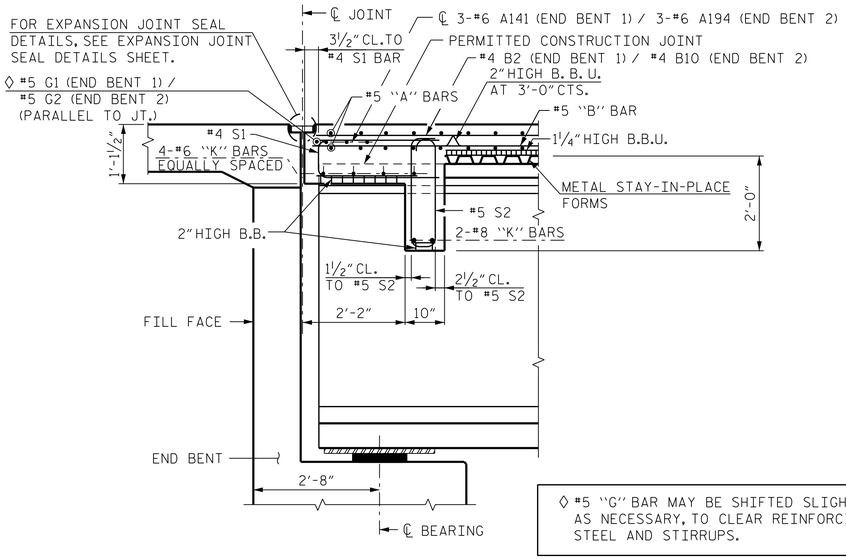


PLAN DETAIL OF END BENT 2

(DECK SLAB NOT SHOWN FOR CLARITY)

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

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

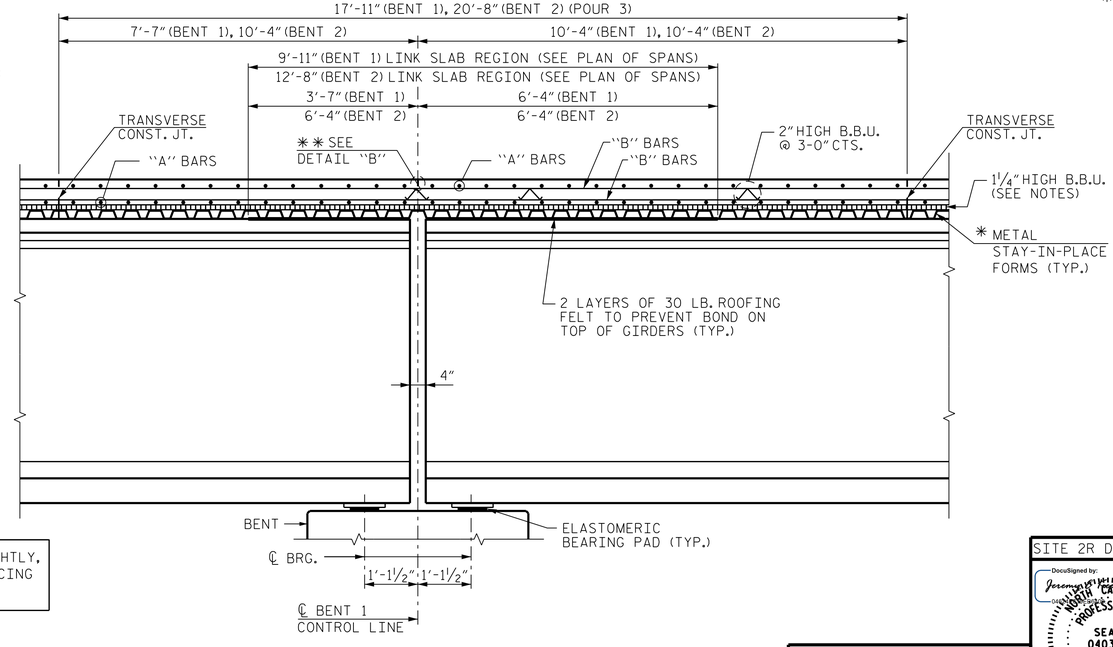


◇ #5 "G" BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.

SECTION A-A

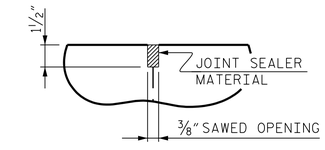
SECTION THROUGH END BENT DIAPHRAGM

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



SECTION B-B

(DIMENSIONS SHOWN ARE ALONG ℄ GIRDER)
(BENT 1 SHOWN, BENT 2 SIMILAR)



DETAIL "B"

SAW CUT CONTRACTION JOINT

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SHEET 3 OF 3

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SUPERSTRUCTURE

TYPICAL SECTION DETAILS

RIGHT LANE

SITE 2R DWG. NO. 8

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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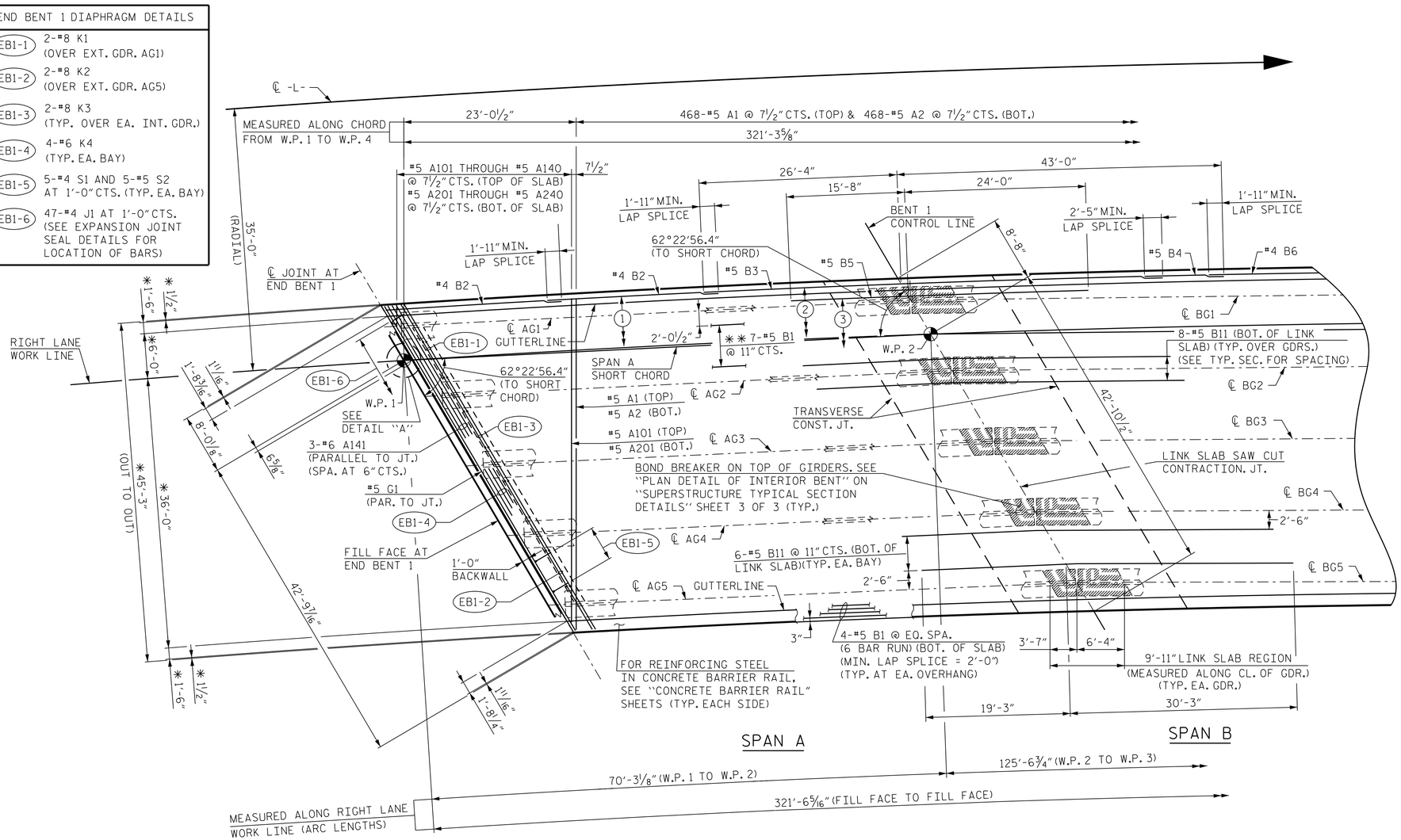
END BENT 1 DIAPHRAGM DETAILS	
EB1-1	2-#8 K1 (OVER EXT. GDR. AG1)
EB1-2	2-#8 K2 (OVER EXT. GDR. AG5)
EB1-3	2-#8 K3 (TYP. OVER EA. INT. GDR.)
EB1-4	4-#6 K4 (TYP. EA. BAY)
EB1-5	5-#4 S1 AND 5-#5 S2 AT 1'-0" CTS. (TYP. EA. BAY)
EB1-6	47-#4 J1 AT 1'-0" CTS. (SEE EXPANSION JOINT SEAL DETAILS FOR LOCATION OF BARS)



PLAN OF SPAN A

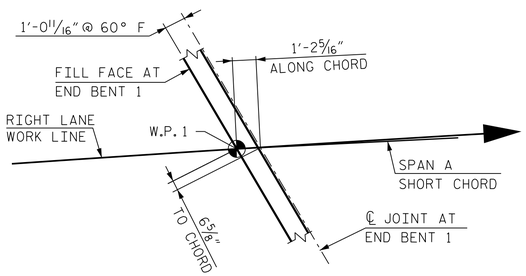
* RADIAL DIMENSIONS

** (6 BAR RUN) (BOT. OF SLAB) (MIN. LAP SPLICE = 2'-0") (TYP. EA. BAY)

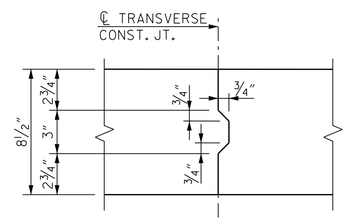
(1) 47-#4 B2 (2 BAR RUN) (TOP OF SLAB) (MIN. LAP SPLICE = 1'-11") (SEE TYPICAL SECTION FOR SPACING)

(2) 47-#5 B3 SPLICED WITH #5 B4 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING)

(3) 42-#5 B5 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)



DETAIL "A"



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

TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB

NOTE:

#5 "A" BARS SHALL BE PLACED PERPENDICULAR TO CHORD BETWEEN WORK POINTS AT END BENT 1 AND END BENT 2.

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

SEE " TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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

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CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

PLAN OF SPANS
SPAN A

RIGHT LANE

SITE 2R DWG. NO. 9

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
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RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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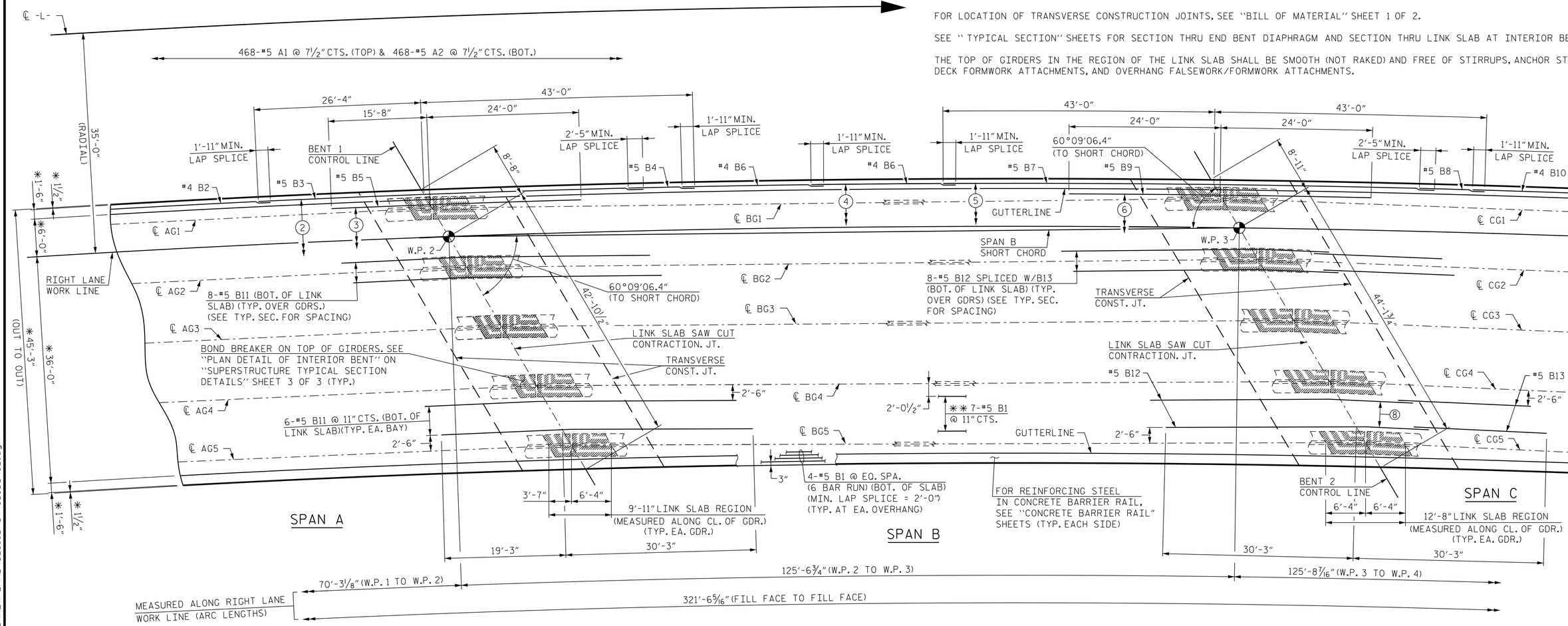
NOTE:

#5 ''A'' BARS SHALL BE PLACED PERPENDICULAR TO CHORD BETWEEN WORK POINTS AT END BENT 1 AND END BENT 2.

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE ''BILL OF MATERIAL'' SHEET 1 OF 2.

SEE '' TYPICAL SECTION'' SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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



PLAN OF SPAN B

* RADIAL DIMENSIONS

** (6 BAR RUN) (BOT. OF SLAB) (MIN. LAP SPLICE = 2'-0") (TYP. EA. BAY)

(2) 47-#5 B3 SPLICED WITH #5 B4 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING)

(3) 42-#5 B5 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)

(4) 47-#4 B6 (2 BAR RUN) (TOP OF SLAB) (MIN. LAP SPLICE = 1'-11") (SEE TYPICAL SECTION FOR SPACING)

(5) 47-#5 B7 SPLICED WITH #5 B8 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING) (ALTERNATE BARS TO STAGGER LAP ABOUT C.L. BENT 2 CONTROL LINE)

(6) 42-#5 B9 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)

(8) 6-#5 B12 SPLICED WITH #5 B13 (BOTTOM OF LINK SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING) (ALTERNATE BARS TO STAGGER LAP ABOUT ℄ BENT 2 CONTROL LINE)

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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SHEET 2 OF 3

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RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
SPAN B

RIGHT LANE

SITE 2R DWG. NO. 10

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STR. #2

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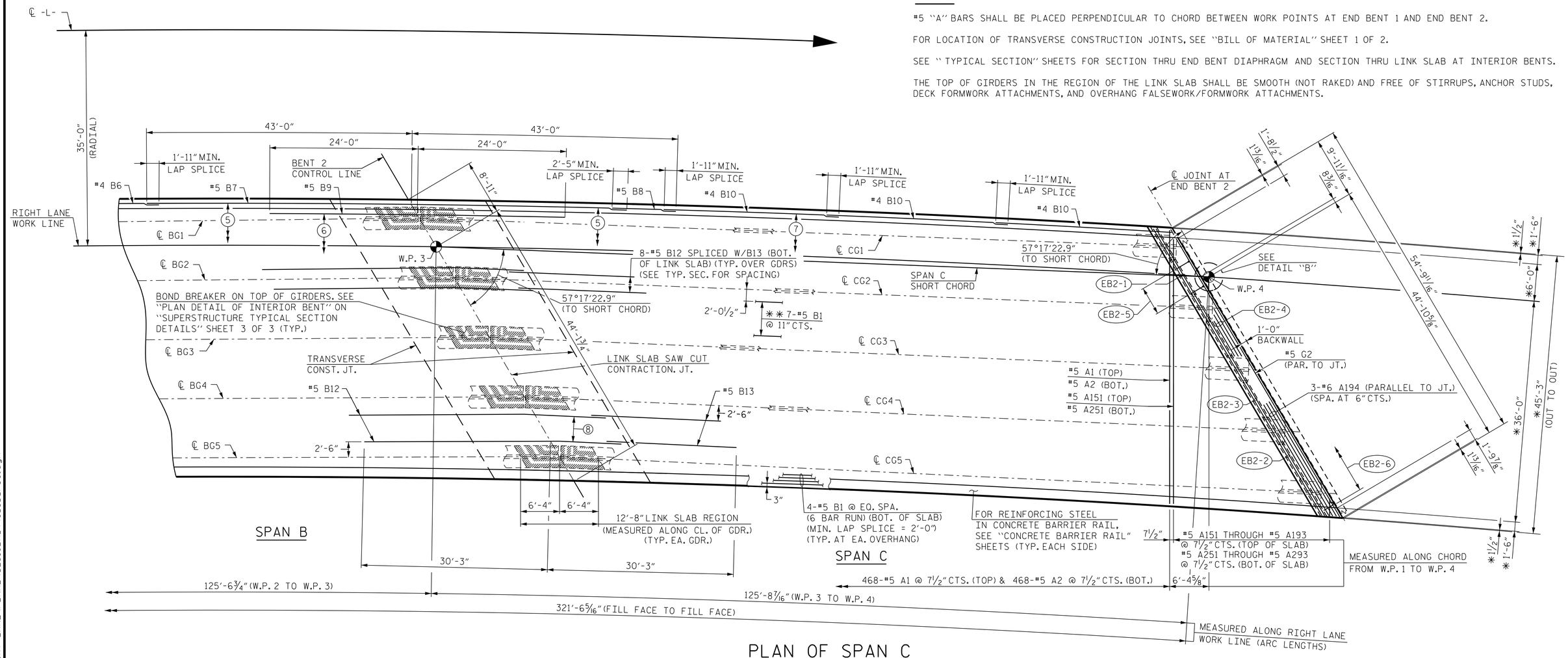
NOTE:

#5 "A" BARS SHALL BE PLACED PERPENDICULAR TO CHORD BETWEEN WORK POINTS AT END BENT 1 AND END BENT 2.

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

SEE " TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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



PLAN OF SPAN C

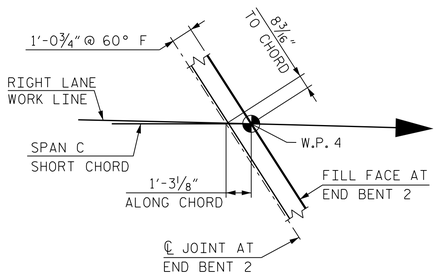
* RADIAL DIMENSIONS
** (6 BAR RUN) (BOT. OF SLAB) (MIN. LAP SPLICE = 2'-0") (TYP. EA. BAY)

(5) 47-#5 B7 SPLICED WITH #5 B8 (TOP OF SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING) (ALTERNATE BARS TO STAGGER LAP ABOUT ℄ BENT 2 CONTROL LINE)

(6) 42-#5 B9 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)

(7) 47-#4 B10 (3 BAR RUN) (TOP OF SLAB) (MIN. LAP SPLICE = 1'-11") (SEE TYPICAL SECTION FOR SPACING)

(8) 6-#5 B12 SPLICED WITH #5 B13 (BOTTOM OF LINK SLAB) (MIN. LAP SPLICE = 2'-5") (SEE TYPICAL SECTION FOR SPACING) (ALTERNATE BARS TO STAGGER LAP ABOUT ℄ BENT 2 CONTROL LINE)



DETAIL "B"

END BENT 2 DIAPHRAGM DETAILS	
EB2-1	2-#8 K10 (OVER EXT. GDR. CG1)
EB2-2	2-#8 K11 (OVER EXT. GDR. CG5)
EB2-3	2-#8 K12 (TYP. OVER EA. INT. GDR.)
EB2-4	4-#6 K13 (TYP. EA. BAY)
EB2-5	5-#4 S1 AND 5-#5 S2 AT 1'-0" CTS. (TYP. EA. BAY)
EB2-6	51-#4 J1 AT 1'-0" CTS. (SEE EXPANSION JOINT SEAL DETAILS FOR LOCATION OF BARS)

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SUPERSTRUCTURE

PLAN OF SPANS
SPAN C

RIGHT LANE

SITE 2R DWG. NO. 11

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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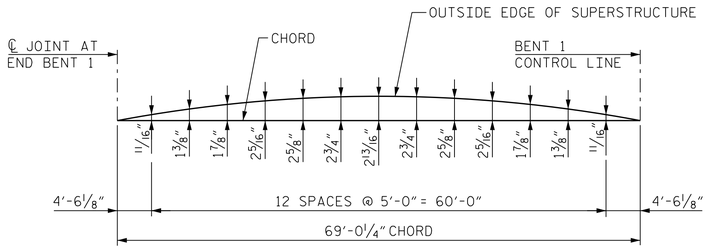
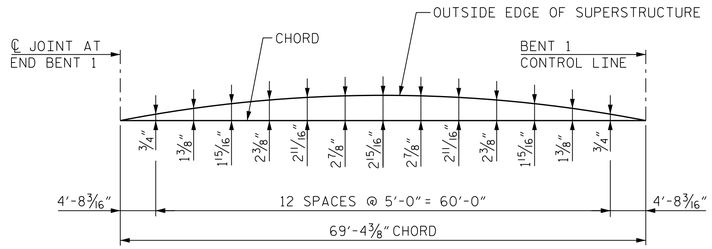
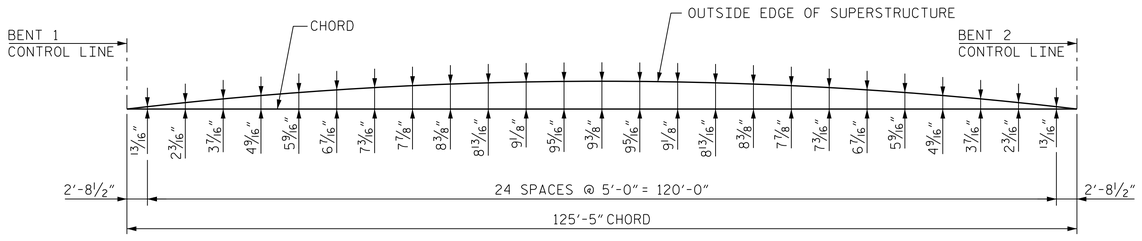


SPAN A LEFT SIDE

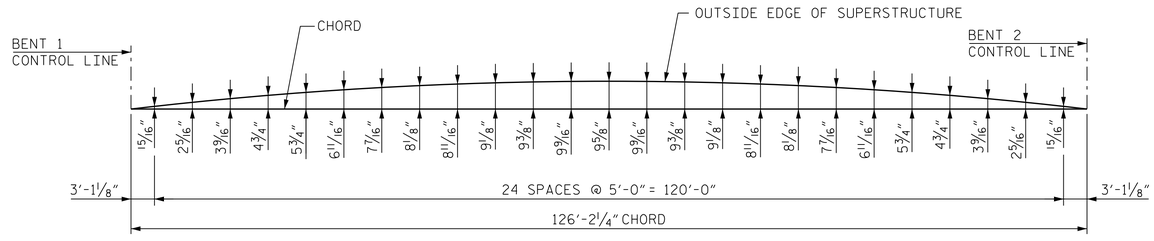


SPAN A RIGHT SIDE

ARC OFFSETS - SPAN A

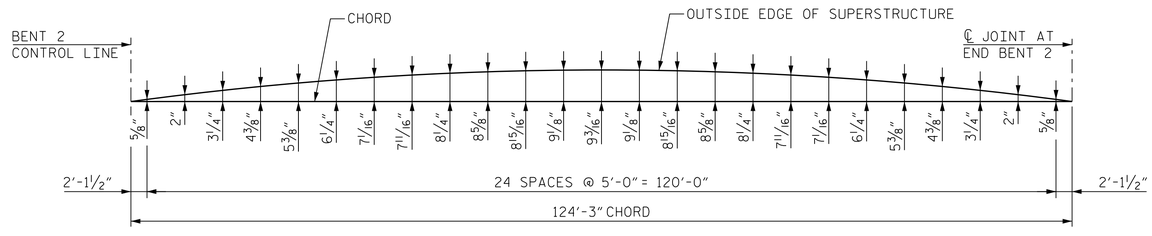


SPAN B LEFT SIDE

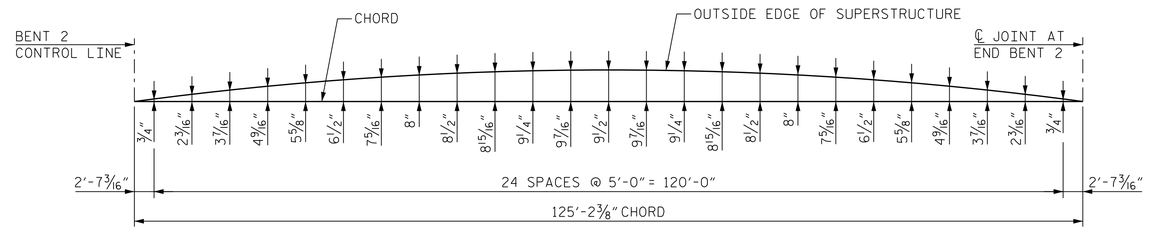


SPAN B RIGHT SIDE

ARC OFFSETS - SPAN B



SPAN C LEFT SIDE



SPAN C RIGHT SIDE

ARC OFFSETS - SPAN C

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CUMBERLAND COUNTY

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RALEIGH, NC 27615 (919) 878-9560
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STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

ARC OFFSETS
SPANS A, B AND C

RIGHT LANE

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STR. #2

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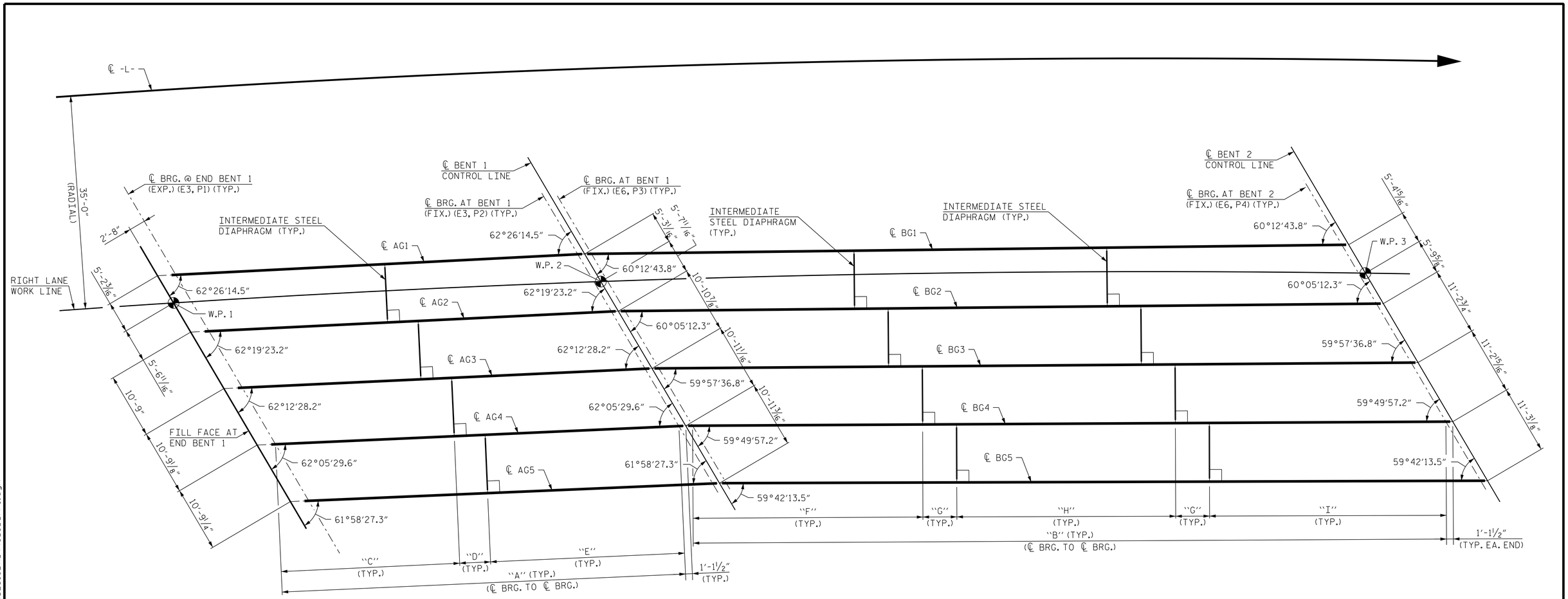

SPAN A

SPAN B

FRAMING PLAN

VARIABLE TABLE - SPAN A				
GIRDER	"A"	"C"	"D"	"E"
AG1	66'-1 1/8"	34'-4 1/4"	0'-0"	31'-8 7/8"
AG2	66'-1 7/8"	29'-4 3/8"	5'-0 5/16"	31'-9 3/16"
AG3	66'-2 3/4"	29'-4 7/16"	5'-0 9/16"	31'-9 3/4"
AG4	66'-3 5/8"	29'-4 9/16"	5'-0 7/8"	31'-10 3/16"
AG5	66'-4 1/2"	29'-4 11/16"	0'-0"	36'-11 13/16"

VARIABLE TABLE - SPAN B					
GIRDER	"B"	"F"	"G"	"H"	"I"
BG1	123'-2 5/8"	43'-1 5/16"	0'-0"	41'-6"	38'-7 5/16"
BG2	123'-4 1/2"	37'-8 1/8"	5'-6 1/8"	35'-11 13/16"	38'-8 5/16"
BG3	123'-6 1/2"	37'-8 3/4"	5'-6 1/2"	35'-11 1/2"	38'-9 1/4"
BG4	123'-8 3/8"	37'-9 3/8"	5'-6 13/16"	35'-11 3/16"	38'-10 3/16"
BG5	123'-10 3/8"	37'-10"	0'-0"	41'-6"	44'-6 3/8"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

FRAMING PLAN
SPANS A & B

RIGHT LANE

SITE 2R DWG. NO.13

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #2

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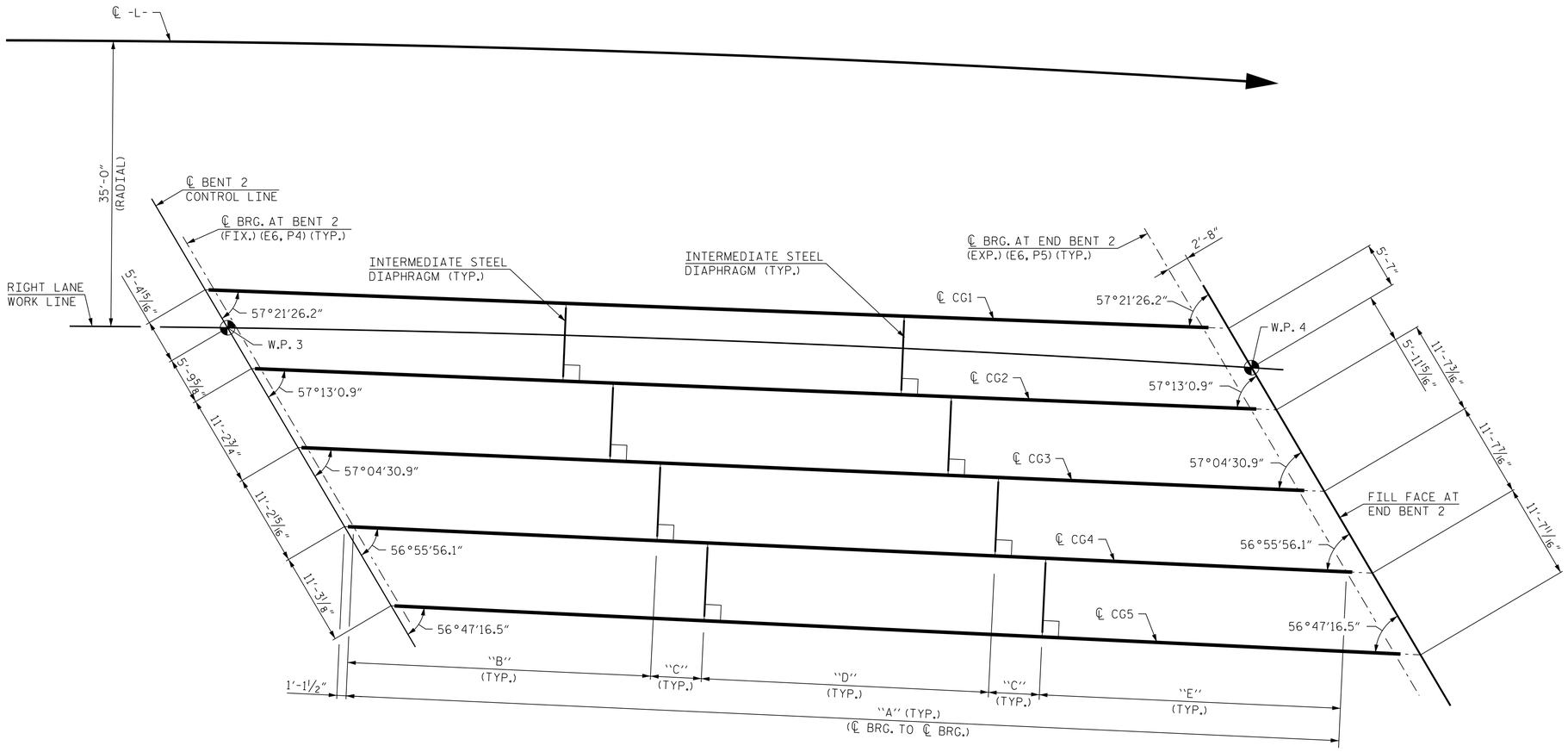

SPAN C

FRAMING PLAN

VARIABLE TABLE - SPAN C					
GIRDER	"A"	"B"	"C"	"D"	"E"
CG1	121'-3 5/8"	43'-2 1/16"	0'-0"	41'-6"	36'-7 3/16"
CG2	121'-5 7/8"	37'-1 3/16"	6'-2 1/16"	35'-3 15/16"	36'-8 5/8"
CG3	121'-8 1/4"	37'-2"	6'-2 7/16"	35'-3 9/16"	36'-9 13/16"
CG4	121'-10 5/8"	37'-2 13/16"	6'-2 7/8"	35'-3 1/8"	36'-10 15/16"
CG5	122'-1 1/8"	37'-3 11/16"	0'-0"	41'-6"	43'-3 7/16"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 2 OF 2

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN
SPAN C

RIGHT LANE

SITE 2R DWG. NO. 14

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1			3			TOTAL SHEETS
2			4			41

STR. #2

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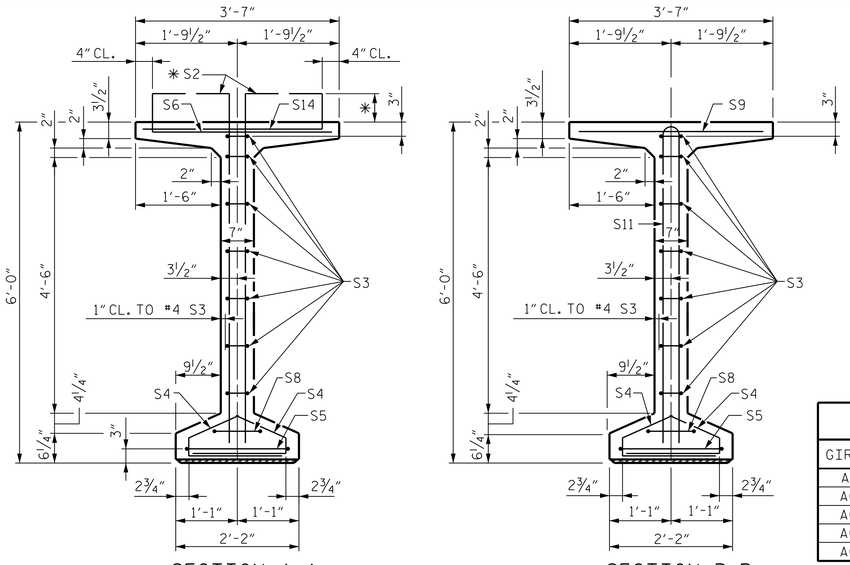


SECTION A-A

SECTION B-B

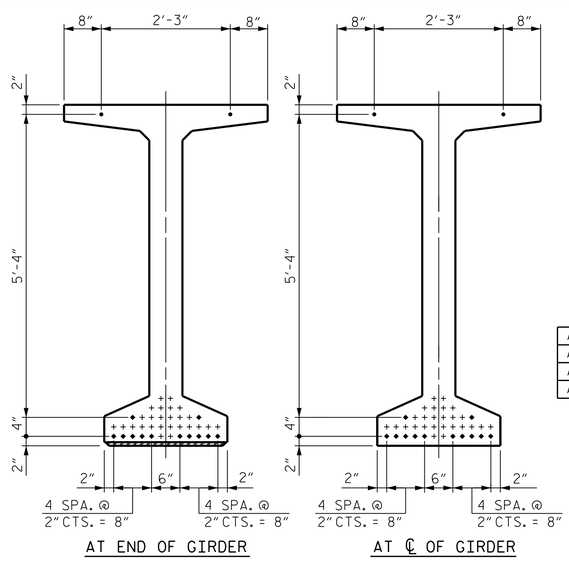
✱ S6 BARS SHALL HAVE AN EXTENSION ABOVE THE TOP OF THE GIRDER OF 6". S1 AND S2 BARS SHALL BE 7½" AND S14 BARS SHALL BE 8½".

DEBONDING LEGEND

● FULLY BONDED STRANDS

SPAN A VARIABLE TABLE

GIRDER	"A"	"B"	"C"	"D"	"E"	"F"	"G"
AG1	67'-9⅛"	33'-9⁹⁄₁₆"	34'-0¹⁄₁₆"	7⅛"	7"	-	2'-3"
AG2	67'-9⅞"	33'-9⁹⁄₁₆"	34'-0⁷⁄₁₆"	7½"	7⅜"	2'-9⁵⁄₁₆"	2'-3"
AG3	67'-10¾"	33'-9⅞"	34'-0⅞"	7¹⁵⁄₁₆"	7¹³⁄₁₆"	2'-9⁹⁄₁₆"	2'-3"
AG4	67'-11⅝"	33'-10⁵⁄₁₆"	34'-1⁵⁄₁₆"	8⅜"	8¼"	2'-9⅞"	2'-3"
AG5	68'-0½"	33'-10¾"	34'-1¾"	8¹³⁄₁₆"	8¹¹⁄₁₆"	2'-10³⁄₁₆"	-



0.6"Ø LOW RELAXATION STRAND LAYOUT

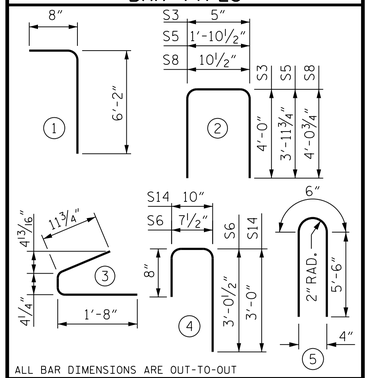
0.6"Ø L. R. GRADE 270 STRANDS

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	148	#4	1	6'-10"	676
S2	12	#5	1	6'-10"	86
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-0"	168
S5	2	#5	2	9'-10"	21
S6	80	#5	4	4'-4"	362
S8	2	#5	2	9'-0"	19
S9	58	#5	STR.	3'-3"	197
S11 (AG1, AG5)	15	#5	5	11'-6"	180
S11 (AG2-AG4)	19	#5	5	11'-6"	228
S12 (AG1, AG5)	8	#4	STR.	8'-0"	43
S13 (AG2-AG4)	8	#4	STR.	12'-6"	67
S14	80	#5	4	4'-6"	375

BAR TYPES



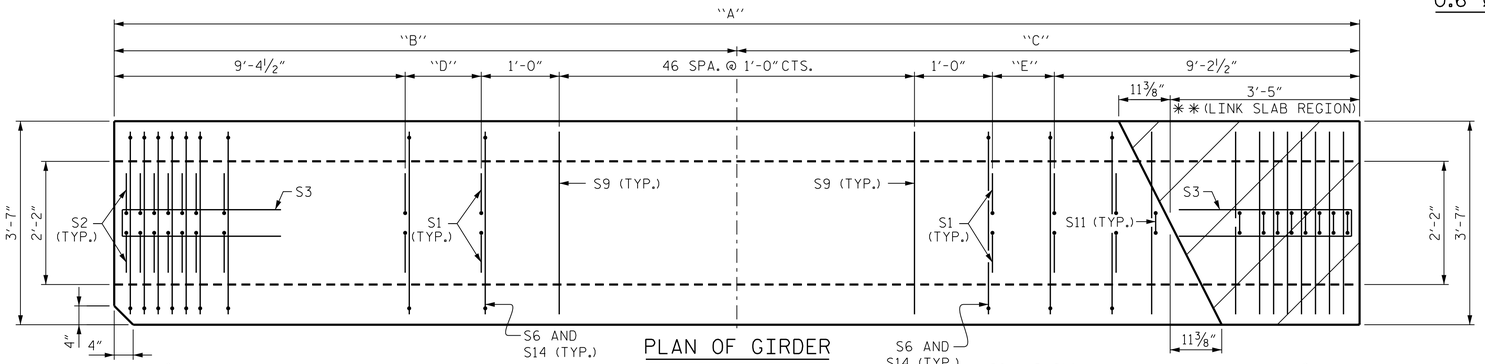
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

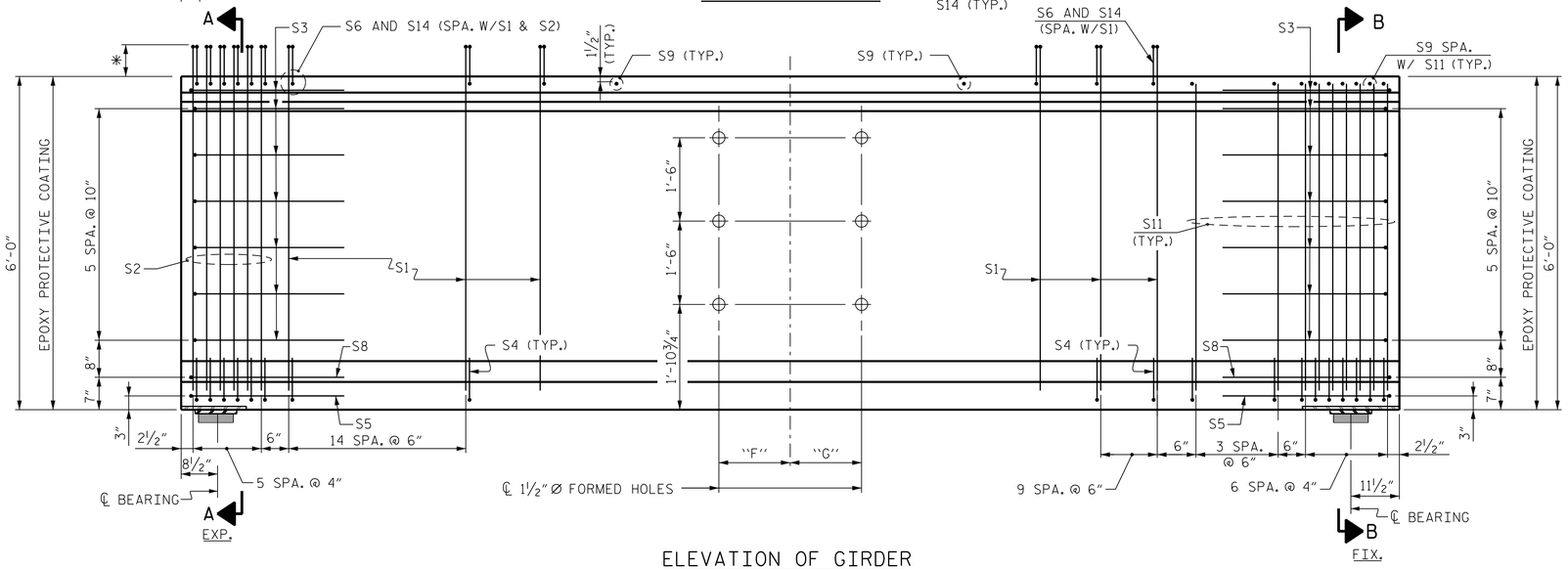
	REINFORCING STEEL	8500 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LB.	C.Y.	No.
AG1, AG5	2,206	14.6	14
AG2-AG4	2,278	14.6	14

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	VARIES	339'-5⅞"



PLAN OF GIRDER



ELEVATION OF GIRDER

FOR PARTIAL ELEVATION OF INTERMEDIATE DIAPHRAGM REINFORCING STEEL, SEE SHEET 4 OF 4.

✱✱ DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS LIVE LOAD SPAN A

RIGHT LANE

SITE 2R DWG. NO.15

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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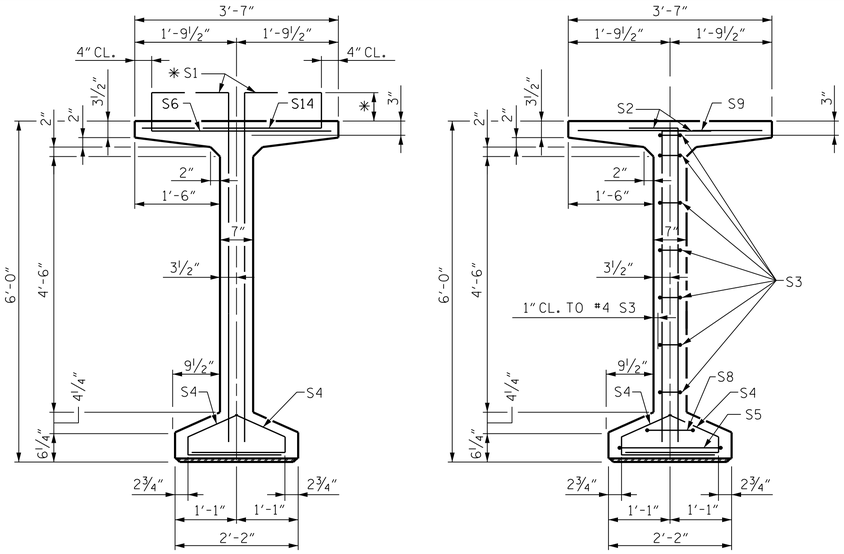


SECTION A-A

SECTION B-B

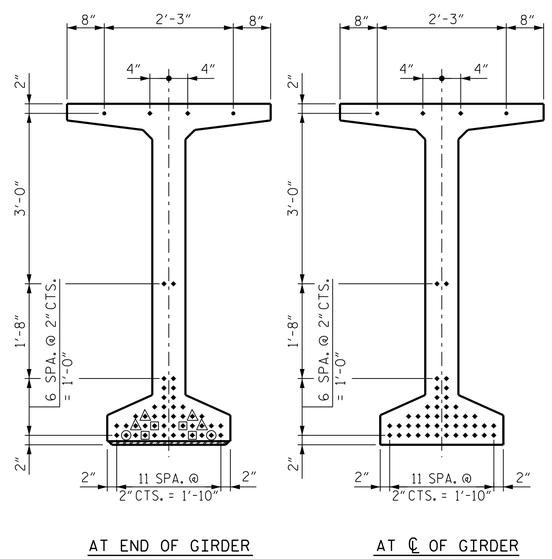
* S6 BARS SHALL HAVE AN EXTENSION ABOVE THE TOP OF THE GIRDER OF 6". S1 BARS SHALL BE 7½" AND S14 BARS SHALL BE 8½"

SPAN B VARIABLE TABLE

GIRDER	"A"	"B"	"C"	"D"	"E"
BG1	125'-1 5/8"	4 5/16"	-	18'-6"	23'-0"
BG2	125'-3½"	5¼"	5'-6 1/8"	18'-6"	17'-5 13/16"
BG3	125'-5½"	6¼"	5'-6½"	18'-6"	17'-5½"
BG4	125'-7⅜"	7 3/16"	5'-6 13/16"	18'-6"	17'-5 3/16"
BG5	125'-9⅜"	8 3/16"	-	24'-1 3/16"	17'-4 13/16"

DEBONDING LEGEND

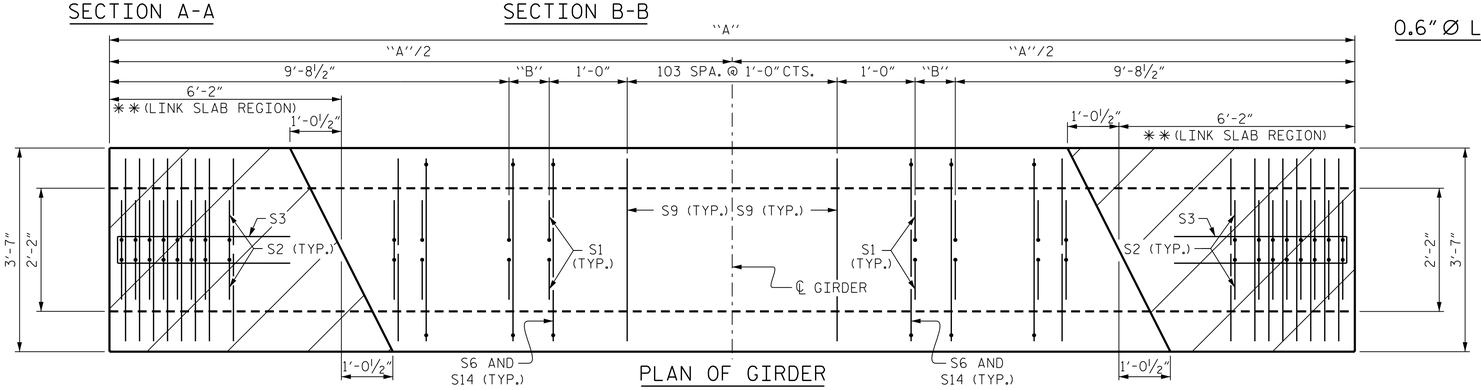
- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- △ STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 26'-0" FROM END OF GIRDER



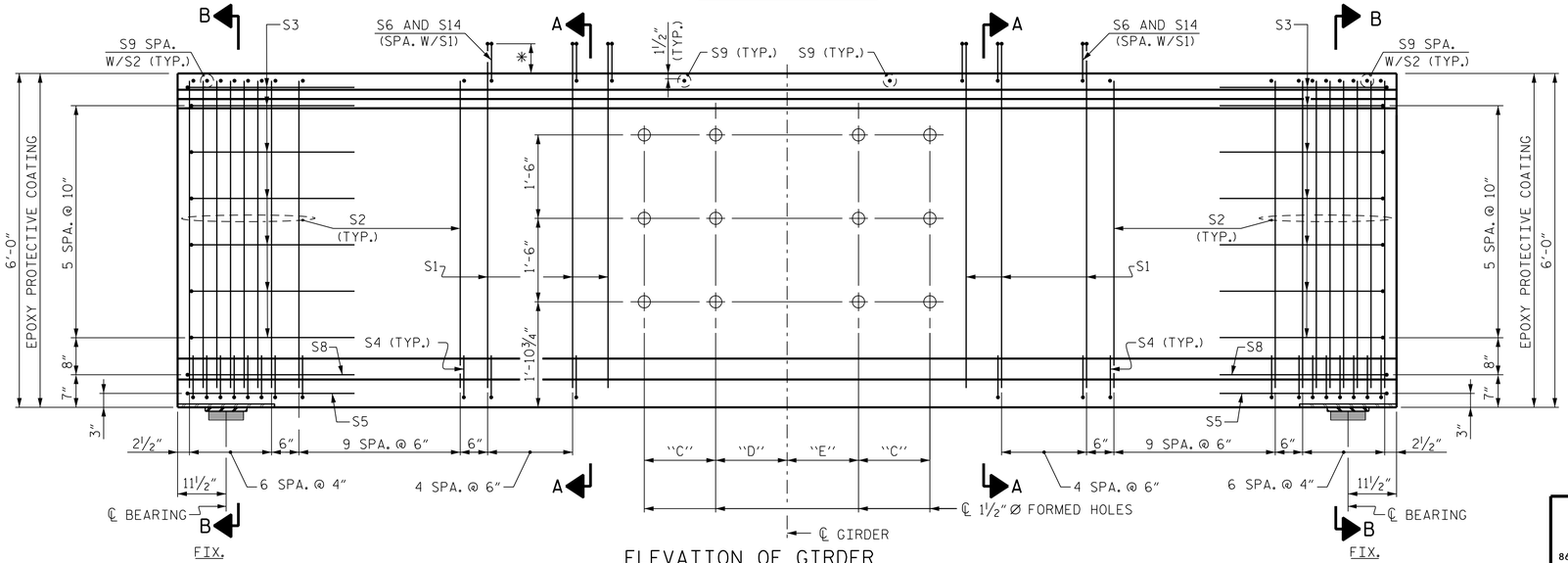
AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

FOR PARTIAL ELEVATION OF INTERMEDIATE DIAPHRAGM REINFORCING STEEL, SEE SHEET 4 OF 4.
** DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

0.6" Ø L. R. GRADE 270 STRANDS

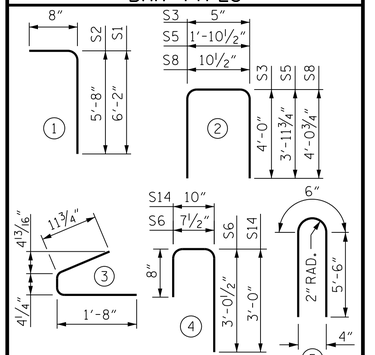
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	232	#4	1	6'-10"	1,059
S2	68	#6	1	6'-4"	647
S3	14	#4	2	8'-5"	79
S4	88	#4	3	3'-0"	176
S5	2	#5	2	9'-10"	21
S6	116	#5	4	4'-4"	524
S8	2	#5	2	9'-0"	19
S9	138	#5	STR.	3'-3"	468
S11	8	#5	5	11'-6"	96
S11	16	#5	5	11'-6"	192
S12	16	#4	STR.	8'-0"	86
S13	16	#4	STR.	13'-0"	139
S14	116	#5	4	4'-6"	544

BG1, BG5
BG2-BG4
BG1, BG5
BG2-BG4

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
BG1, BG5	3,719	27.0	48
BG2-BG4	3,868	26.9	48

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	VARIES	627'-3⅜"

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS LIVE LOAD SPAN B

RIGHT LANE

SITE 2R DWG. NO. 16

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

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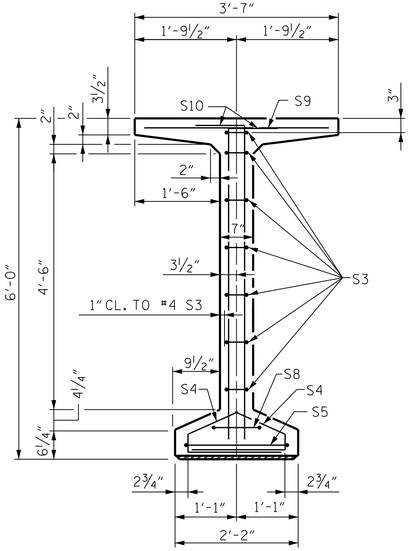
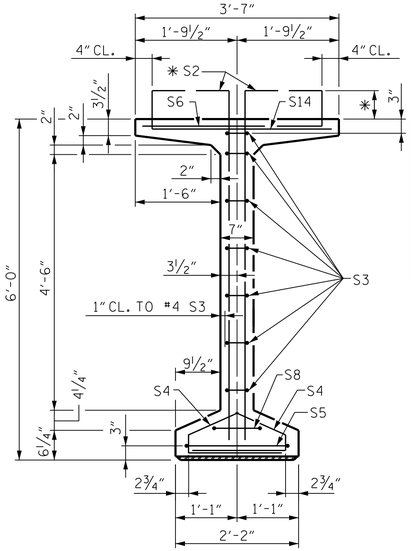


SECTION A-A



SECTION B-B

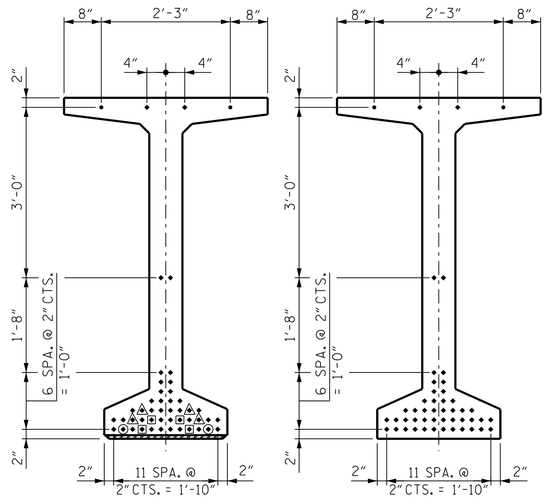
* S6 BARS SHALL HAVE AN EXTENSION ABOVE THE TOP OF THE GIRDER OF 6". S1 AND S2 BARS SHALL BE 7½" AND S14 BARS SHALL BE 8½".

SPAN C VARIABLE TABLE

GIRDER	"A"	"B"	"C"	"D"	"E"	"F"	"G"
CG1	122'-11⅝"	61'-7 5/16"	61'-4 5/16"	5 5/16"	-	18'-6"	23'-0"
CG2	123'-1⅛"	61'-8 1/16"	61'-5 7/16"	6 1/16"	6'-2 1/16"	18'-6"	16'-9 15/16"
CG3	123'-4¼"	61'-9⅝"	61'-6⅝"	7⅝"	6'-2 7/16"	18'-6"	16'-9 9/16"
CG4	123'-6⅝"	61'-10 13/16"	61'-7 13/16"	8 13/16"	6'-2⅞"	18'-6"	16'-9⅛"
CG5	123'-9⅛"	62'-0 1/16"	61'-9 1/16"	10 1/16"	-	24'-9¼"	16'-8¾"

DEBONDING LEGEND

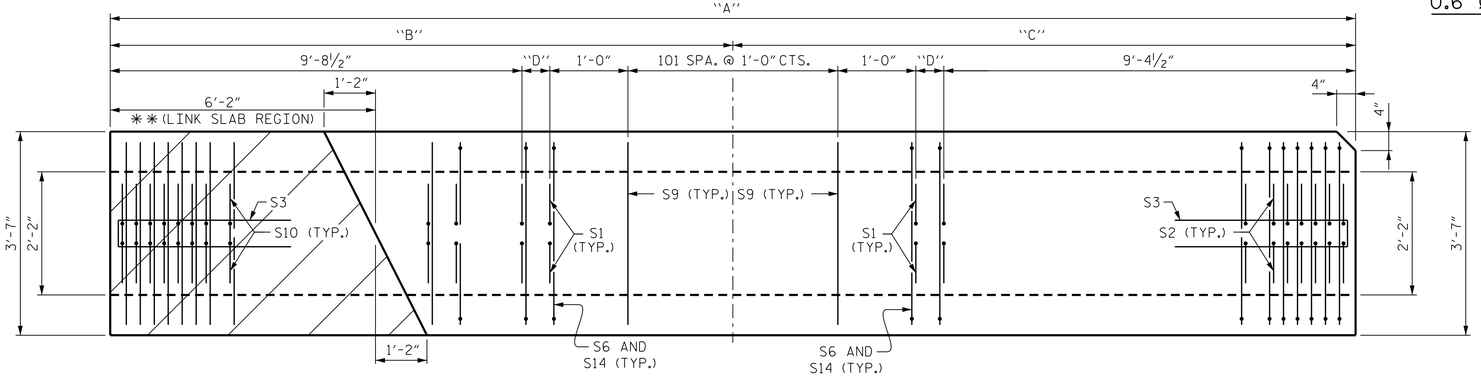
- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- △ STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER
- ⦿ STRANDS DEBONDED FOR 28'-0" FROM END OF GIRDER



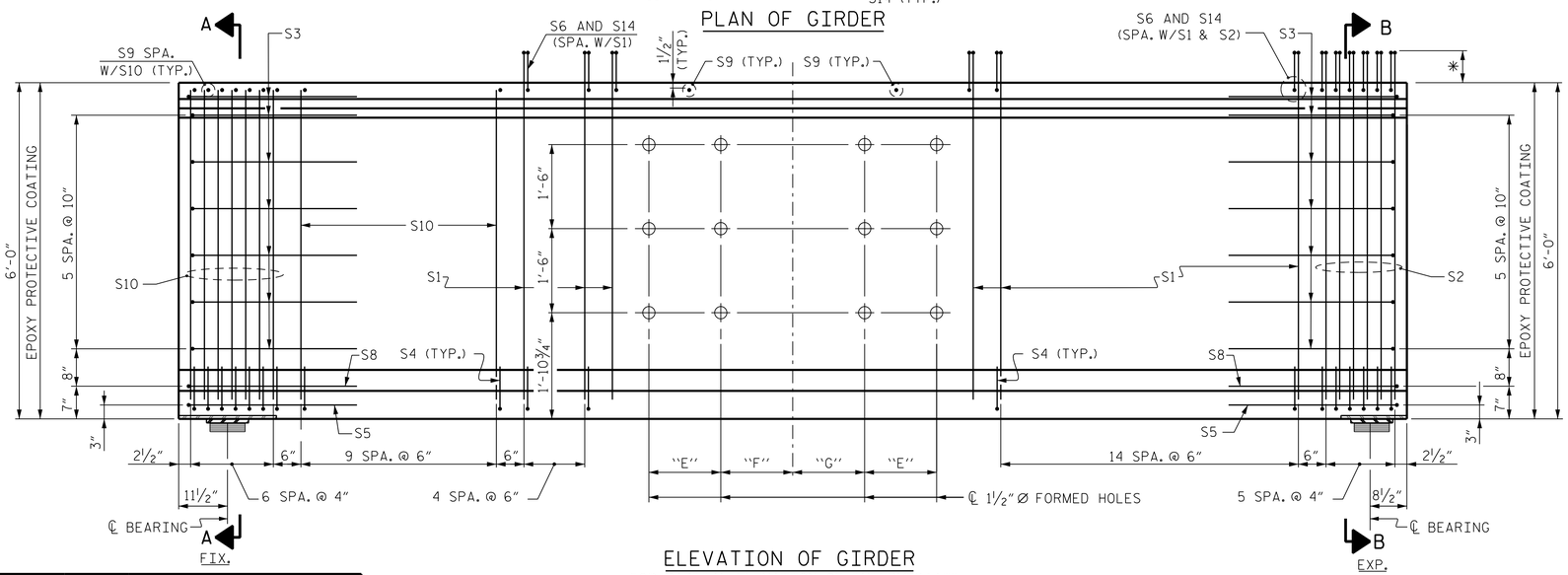
AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

FOR PARTIAL ELEVATION OF INTERMEDIATE DIAPHRAGM REINFORCING STEEL, SEE SHEET 4 OF 4.
** DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

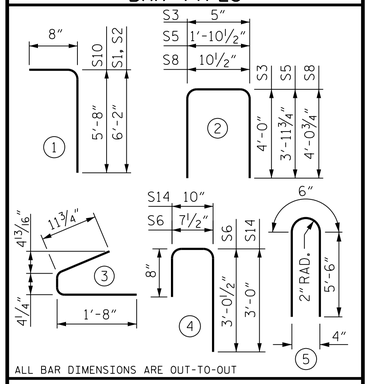
0.6" Ø L. R. GRADE 270 STRANDS

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	248	#4	1	6'-10"	1,132
	S2	12	#6	1	6'-10"	123
	S3	14	#4	2	8'-5"	79
	S4	86	#4	3	3'-0"	172
	S5	2	#5	2	9'-10"	21
	S6	130	#5	4	4'-4"	588
	S8	2	#5	2	9'-0"	19
	S9	119	#5	STR.	3'-3"	403
	S10	34	#6	1	6'-4"	323
CG1, CG5	S11	8	#5	5	11'-6"	96
CG2-CG4	S11	16	#5	5	11'-6"	192
CG1, CG5	S12	16	#4	STR.	8'-0"	86
CG2-CG4	S13	16	#4	STR.	13'-0"	139
	S14	130	#5	4	4'-6"	610

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
CG1, CG5	3,652	26.5	48
CG2-CG4	3,801	26.5	48

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	VARIES	616'-9½"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS LIVE LOAD SPAN C

RIGHT LANE

SITE 2R DWG. NO. 17

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #2

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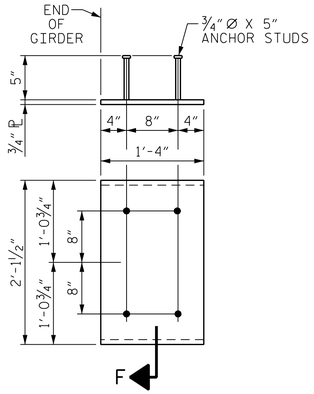
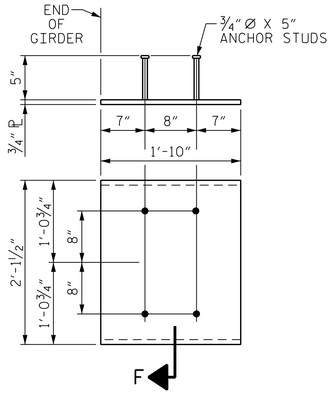


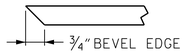
EMBEDDED PLATE "B-1" DETAILS

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)



EMBEDDED PLATE "B-2" DETAILS

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)



SECTION "F"

(SEE NOTES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

EMBEDDED PLATE "B-1" AND "B-2" 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 6,700 PSI.

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

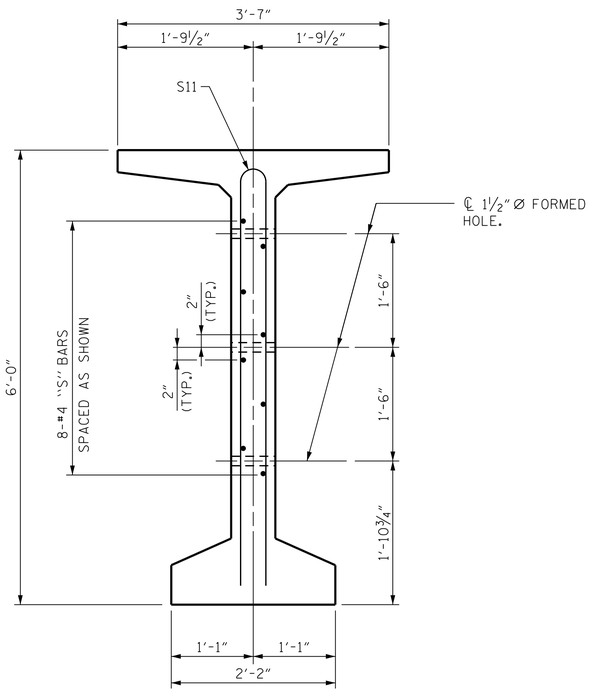
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4" AND LINK SLAB REGION, SHALL BE RAKED TO A DEPTH OF 1/4".

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

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

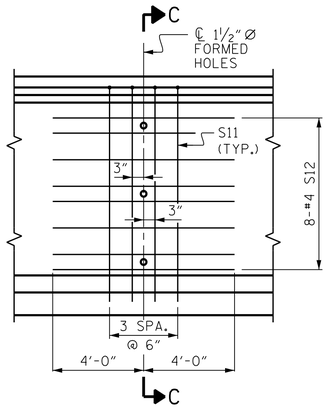
EMBEDDED PLATE VARIABLE TABLE

GDR. NO.	SPAN A		SPAN B		SPAN C	
	NEAR	FAR	NEAR	FAR	NEAR	FAR
G1	B-1	B-2	B-2	B-2	B-2	B-1
G2	B-1	B-2	B-2	B-2	B-2	B-1
G3	B-1	B-2	B-2	B-2	B-2	B-1
G4	B-1	B-2	B-2	B-2	B-2	B-1
G5	B-1	B-2	B-2	B-2	B-2	B-1



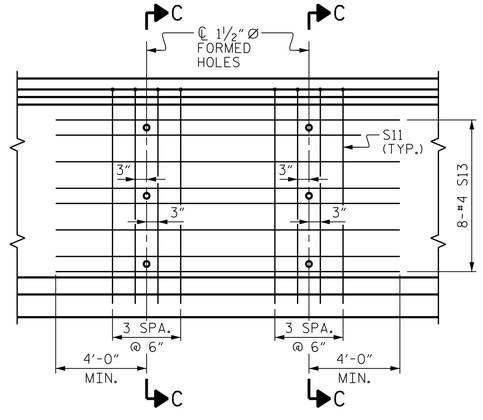
SECTION C-C

(S1, S6 AND S14 BARS NOT SHOWN)



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. AG1, AG5, BG1, BG5, CG1 AND CG5.



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. AG2-AG4, BG2-BG4 AND CG2-CG4.

REINFORCING DETAILS FOR 1½" Ø FORMED HOLES FOR STEEL DIAPHRAGMS

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" MODIFIED BULB TEE
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
DETAILS

RIGHT LANE

SITE 2R DWG. NO.18

DocuSigned by: Jeremy E. Keene — NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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1			3			TOTAL SHEETS
2			4			41

STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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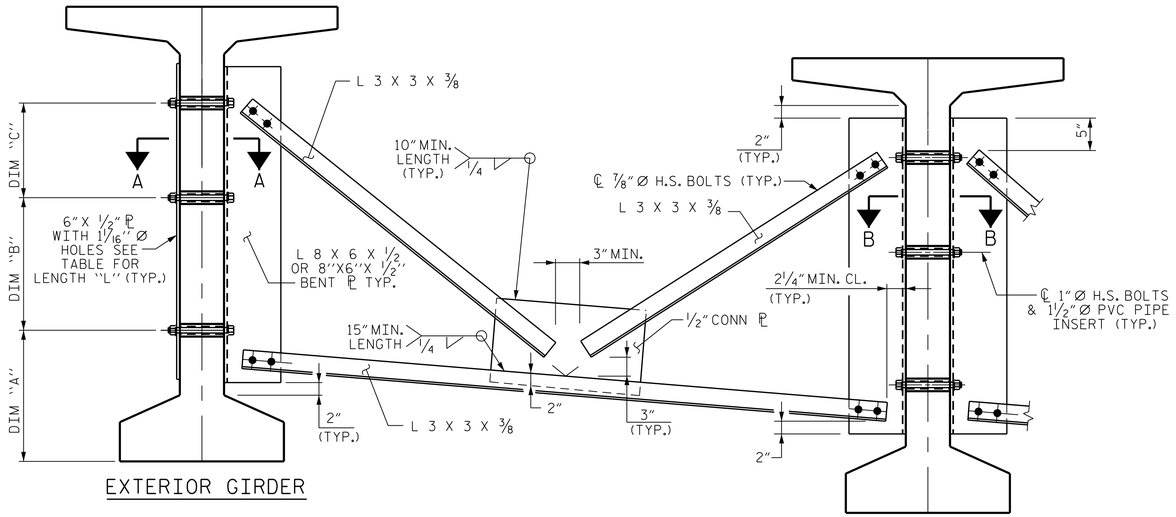
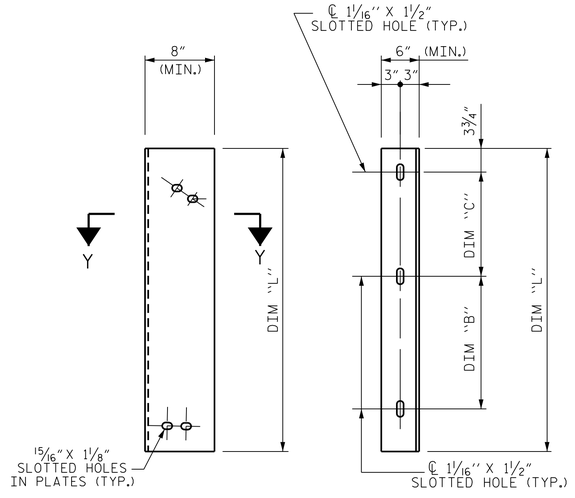
2/4/2022 R:\Bridge.Design\U-2519BA\Structures\DGN\Site 2\RIGHT LANE\FINAL\U2519BA_448_SD_G4.dgn



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.

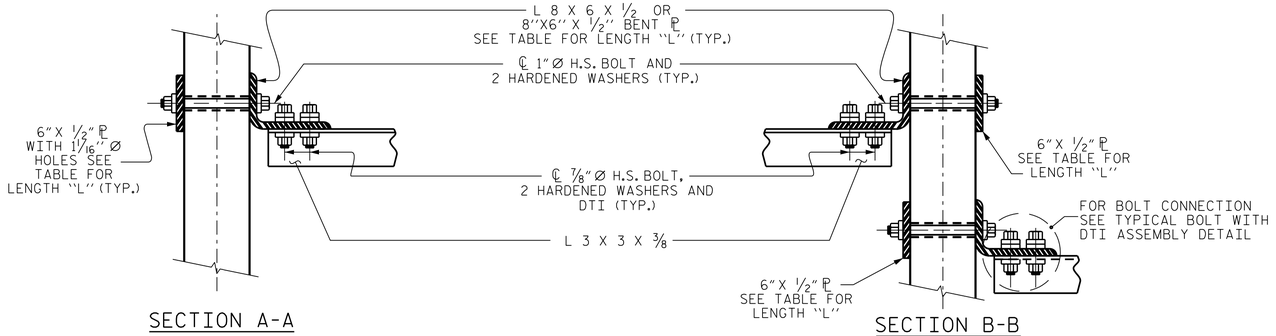
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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.



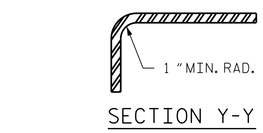
SECTION A-A

SECTION B-B

TABLE

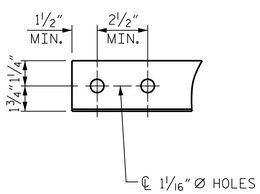
GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
72" BULB TEE	1'-10 3/4"	1'-6"	1'-6"	4'-2"

CONNECTION DETAILS

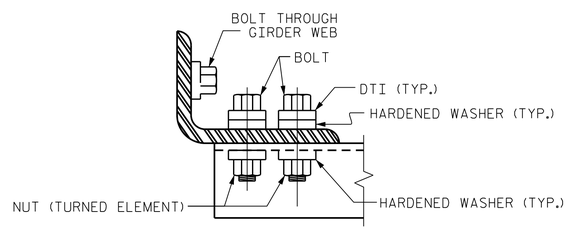


SECTION Y-Y

CONNECTOR PLATE DETAIL



ANGLE END
(L 3 X 3 X 3/8)



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS
RIGHT LANE

SITE 2R DWG. NO. 19

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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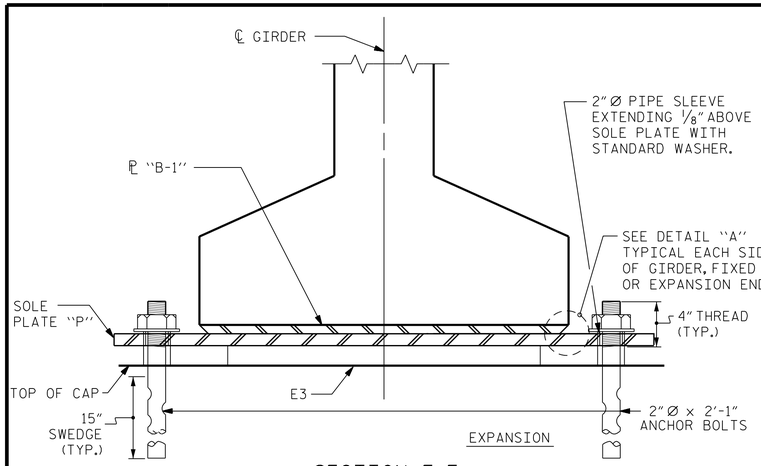
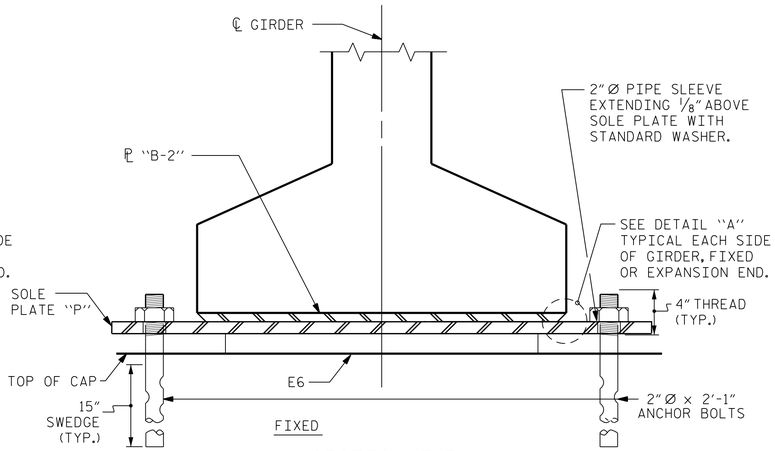
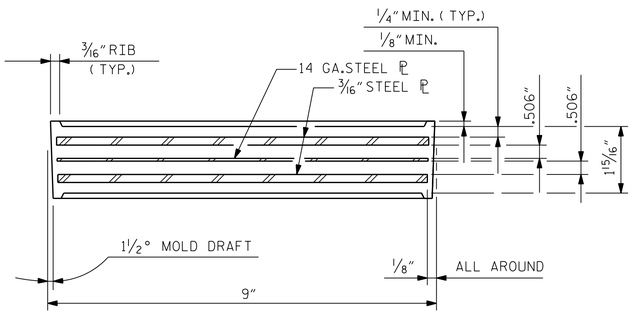
2/4/2022



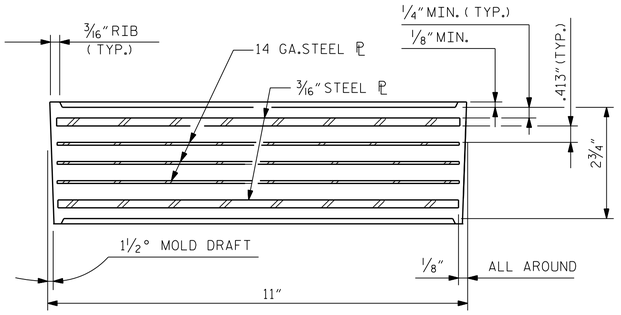
SECTION E-E



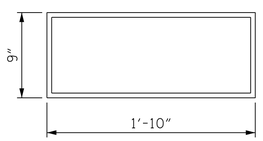
SECTION E-E



TYPICAL SECTION OF ELASTOMERIC BEARINGS

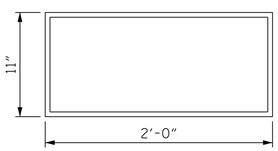


TYPICAL SECTION OF ELASTOMERIC BEARINGS



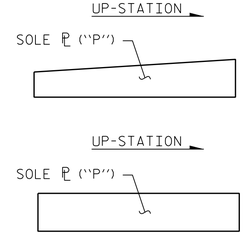
E3 (10 REQ'D)
PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV



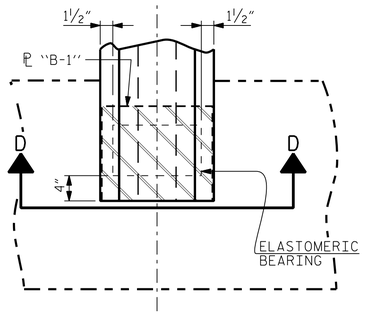
E6 (20 REQ'D)
PLAN VIEW OF ELASTOMERIC BEARING

TYPE VII

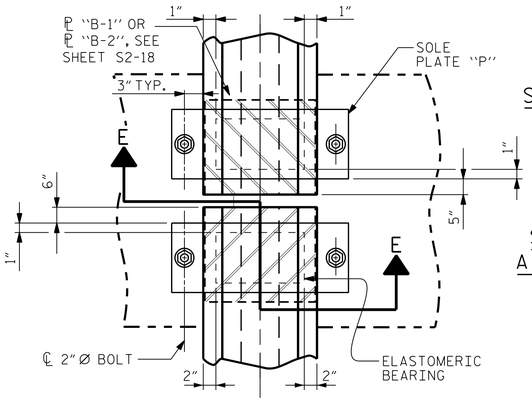


SOLE ℄ PLACEMENT DETAILS

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE VII	470 k



TYPICAL HALF-PLAN
(SHOWING INTEGRAL END BENT)



SPAN B

SPANS A AND C

TYPICAL HALF-PLAN
(SHOWING CONTINUOUS BENT)

NOTES

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

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

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

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

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

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

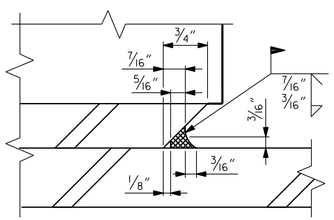
ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

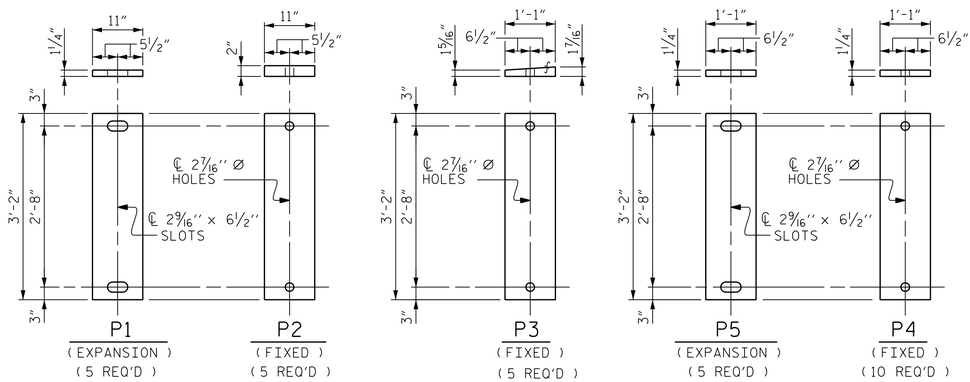
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

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.



DETAIL "A"



SOLE PLATE DETAILS ("P")

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SITE 2R DWG. NO. 20

DocuSigned by: Jeremy Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-20
1			3			TOTAL SHEETS
2			4			41

STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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2/4/2022
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DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "A"

GIRDER		TENTH POINTS 0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
AG1, AG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.011	0.021	0.029	0.034	0.035	0.034	0.029	0.021	0.011	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.005	0.010	0.014	0.017	0.017	0.017	0.014	0.010	0.005	0.000
	FINAL CAMBER ↑	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	3/16"	1/8"	1/16"	0"
AG2 THRU AG4	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.011	0.021	0.029	0.034	0.035	0.034	0.029	0.021	0.011	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.005	0.011	0.015	0.018	0.018	0.018	0.015	0.011	0.005	0.000
	FINAL CAMBER ↑	0"	1/16"	1/8"	3/16"	3/16"	3/16"	3/16"	3/16"	1/8"	1/16"	0"

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TENTH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "B"

GIRDER		TWENTIETH POINTS 0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
BG1, BG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.047	0.093	0.136	0.175	0.210	0.240	0.264	0.281	0.291	0.295	0.291	0.281	0.264	0.240	0.210	0.175	0.136	0.093	0.047	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.032	0.065	0.095	0.125	0.149	0.173	0.188	0.203	0.208	0.213	0.208	0.203	0.188	0.173	0.149	0.125	0.095	0.065	0.032	0.000
	FINAL CAMBER ↑	0"	3/16"	5/16"	1/2"	5/8"	3/4"	13/16"	15/16"	15/16"	1"	1"	1"	15/16"	15/16"	13/16"	3/4"	5/8	1/2"	5/16"	3/16"	0"
BG2 THRU BG4	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.047	0.093	0.136	0.175	0.210	0.240	0.264	0.281	0.291	0.295	0.291	0.281	0.264	0.240	0.210	0.175	0.136	0.093	0.047	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.034	0.067	0.099	0.131	0.155	0.180	0.196	0.212	0.217	0.223	0.217	0.212	0.196	0.180	0.155	0.131	0.099	0.067	0.034	0.000
	FINAL CAMBER ↑	0"	3/16"	5/16"	7/16"	9/16"	5/8"	11/16"	13/16"	13/16"	7/8"	7/8"	7/8"	13/16"	13/16"	11/16"	5/8"	9/16"	7/16"	5/16"	3/16"	0"

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TWENTIETH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

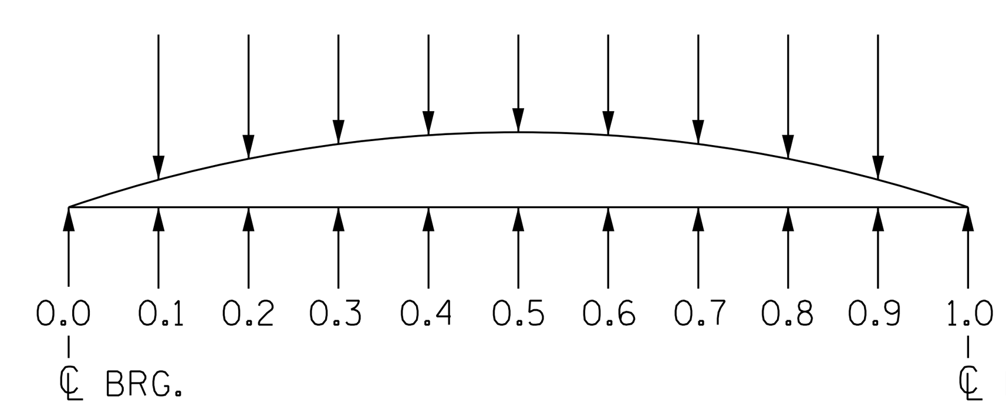
* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPAN "C"

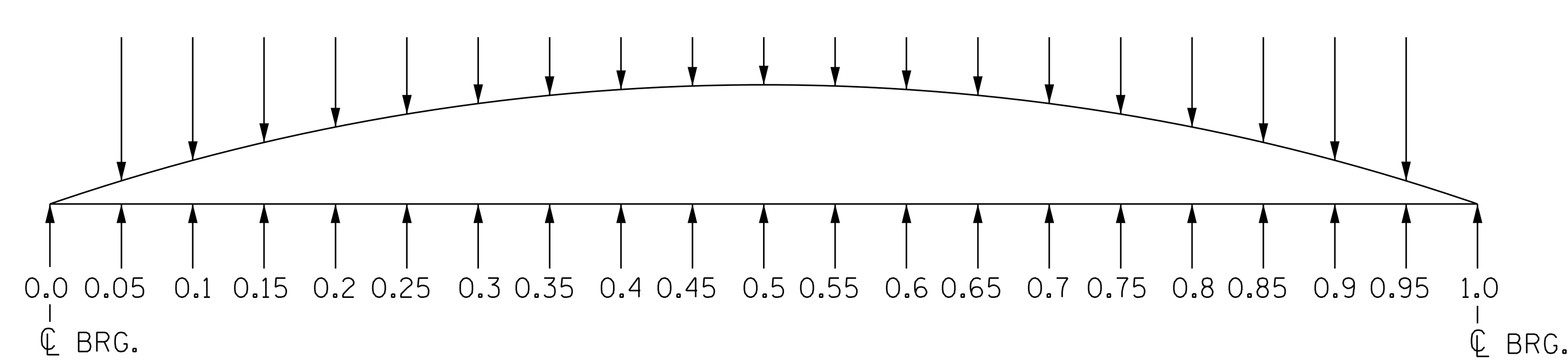
GIRDER		TWENTIETH POINTS 0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
CG1, CG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.091	0.134	0.173	0.207	0.236	0.260	0.277	0.287	0.290	0.287	0.277	0.260	0.236	0.207	0.173	0.134	0.091	0.046	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.030	0.061	0.089	0.117	0.140	0.162	0.176	0.190	0.196	0.202	0.196	0.190	0.176	0.162	0.140	0.117	0.089	0.061	0.030	0.000
	FINAL CAMBER ↑	0"	3/16"	3/8"	9/16"	11/16"	13/16"	7/8"	1"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1 1/16"	1"	7/8"	13/16"	11/16"	9/16"	3/8"	3/16"	0"
CG2 THRU CG4	CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.046	0.091	0.134	0.173	0.207	0.236	0.260	0.277	0.287	0.290	0.287	0.277	0.260	0.236	0.207	0.173	0.134	0.091	0.046	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0.000	0.032	0.063	0.093	0.123	0.146	0.169	0.184	0.199	0.204	0.209	0.204	0.199	0.184	0.169	0.146	0.123	0.093	0.063	0.032	0.000
	FINAL CAMBER ↑	0"	3/16"	5/16"	1/2"	5/8"	3/4"	13/16"	15/16"	15/16"	1"	1"	1"	15/16"	15/16"	13/16"	3/4"	5/8"	1/2"	5/16"	3/16"	0"

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TWENTIETH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD



SCHEMATIC CAMBER ORDINATES AT GIRDER TENTH POINTS



SCHEMATIC CAMBER ORDINATE AT GIRDER TWENTIETH POINTS

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SITE 2R DWG. NO.21

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GIRDER CAMBER DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-21
1			3			TOTAL SHEETS
2			4			41

STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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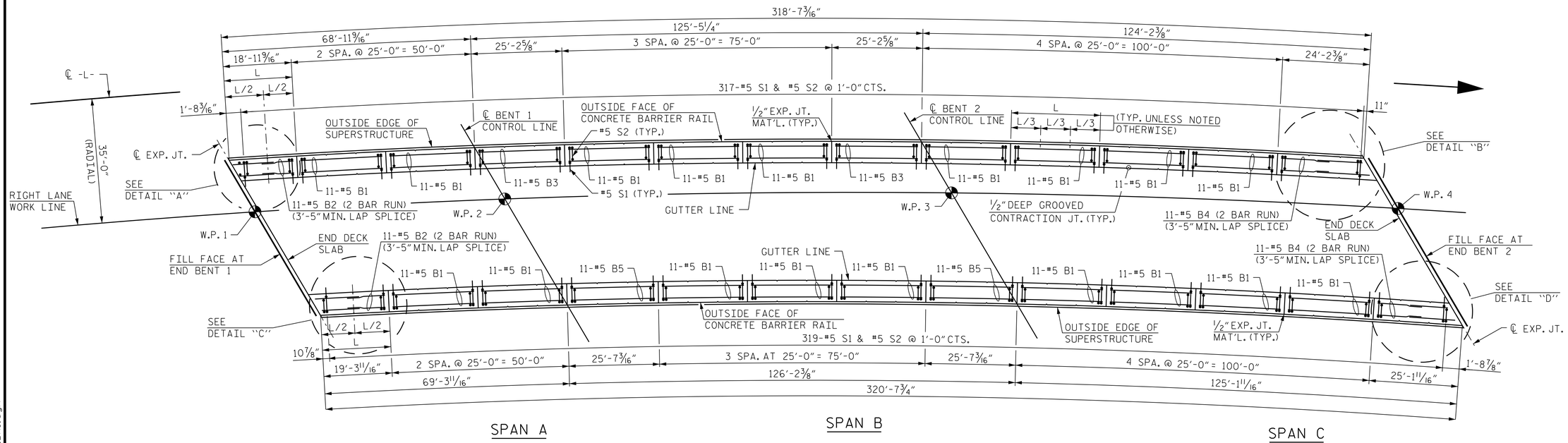
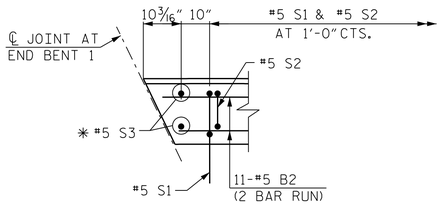
2/4/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 2\RIGHT LANE\FINAL\U2519BA_448_SD_DL.dgn

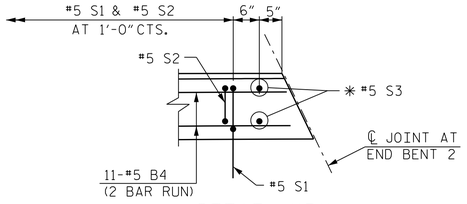


PLAN OF BARRIER RAIL

ALL DIMENSIONS ARE ARC LENGTHS MEASURED ALONG OUTSIDE FACE OF BARRIER RAIL.



DETAIL "A"



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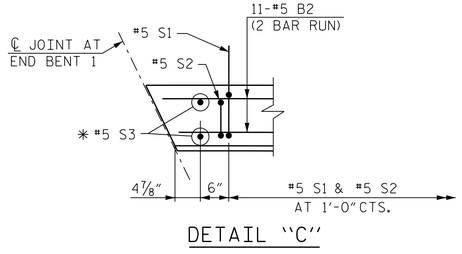
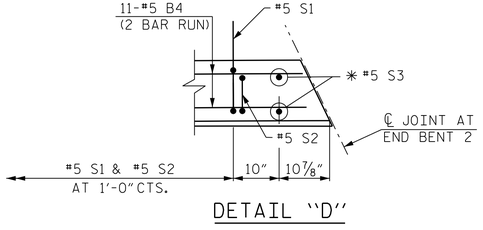


DETAIL "C"



DETAIL "D"

* SEE SECTION AT JOINTS ON SHEET 2 OF 2

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
CONCRETE
BARRIER RAIL
PLAN

RIGHT LANE

SITE 2R DWG. NO.22

DocuSigned by: Jeremy Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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2			4			41

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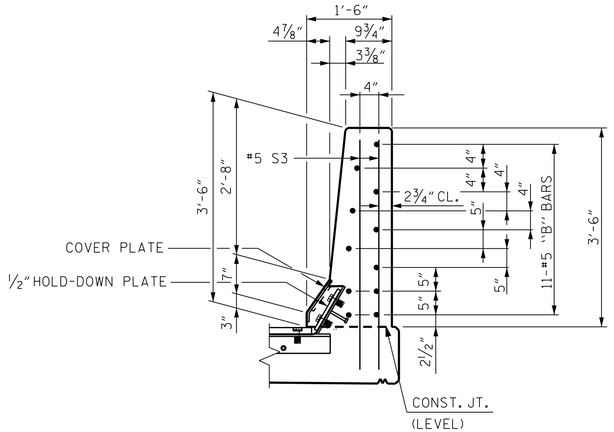
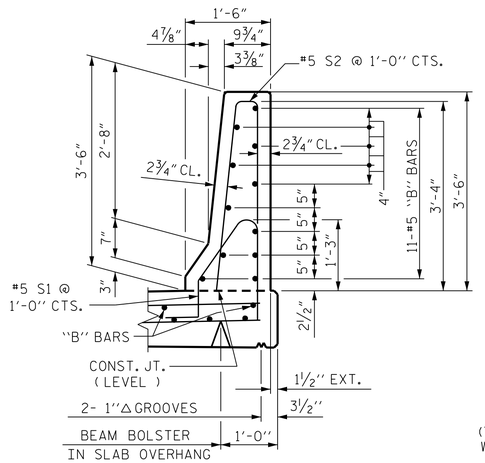
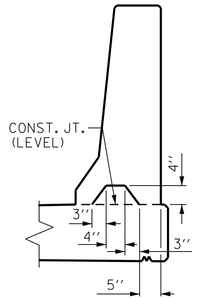
FOR PLAN OF CONCRETE BARRIER RAIL,
SEE "CONCRETE BARRIER RAIL"
SHEET 1 OF 2



SECTION AT JOINTS



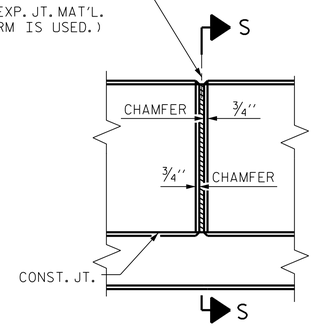
SECTION THRU RAIL



SECTION S-S

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

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



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

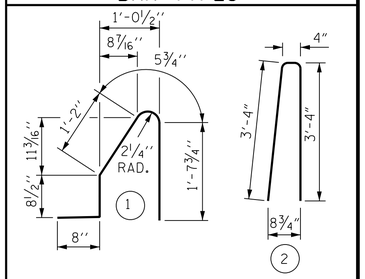
NOTES

THE BARRIER RAIL IN A CONTINUOUS UNIT 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.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	198	#5	STR	24'-7"	5,077
* B2	44	#5	STR	11'-9"	539
* B3	22	#5	STR	24'-10"	570
* B4	44	#5	STR	14'-1"	646
* B5	22	#5	STR	25'-2"	577
* S1	636	#5	1	4'-8"	3,096
* S2	636	#5	2	7'-0"	4,643
* S3	8	#5	STR	4'-0"	33

* EPOXY COATED REINFORCING STEEL	15,181 LBS.
CLASS AA CONCRETE	87.0 CU. YDS.
CONCRETE BARRIER RAIL	639.24 LIN. FT.

FOR CONCRETE BARRIER RAIL ON APPROACH SLAB, SEE APPROACH SLAB SHEETS.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

CONCRETE BARRIER RAIL

RIGHT LANE

SITE 2R DWG. NO23

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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2			4			41

STR. #2

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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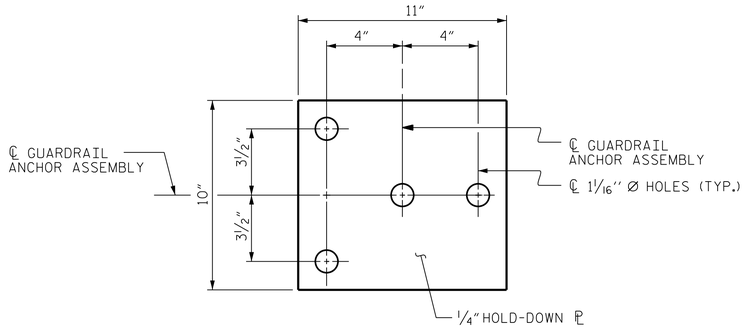
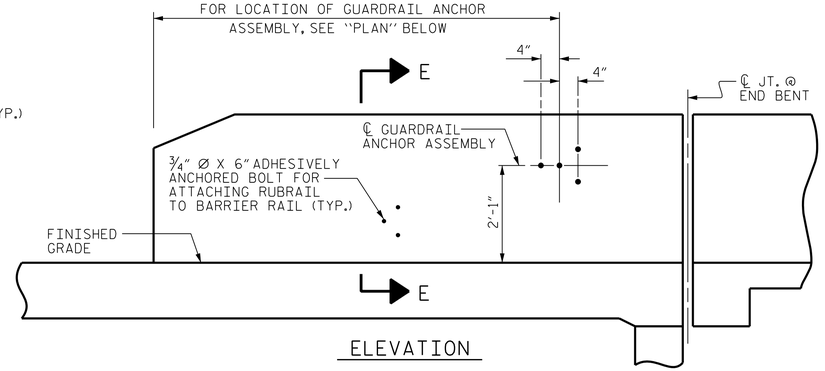
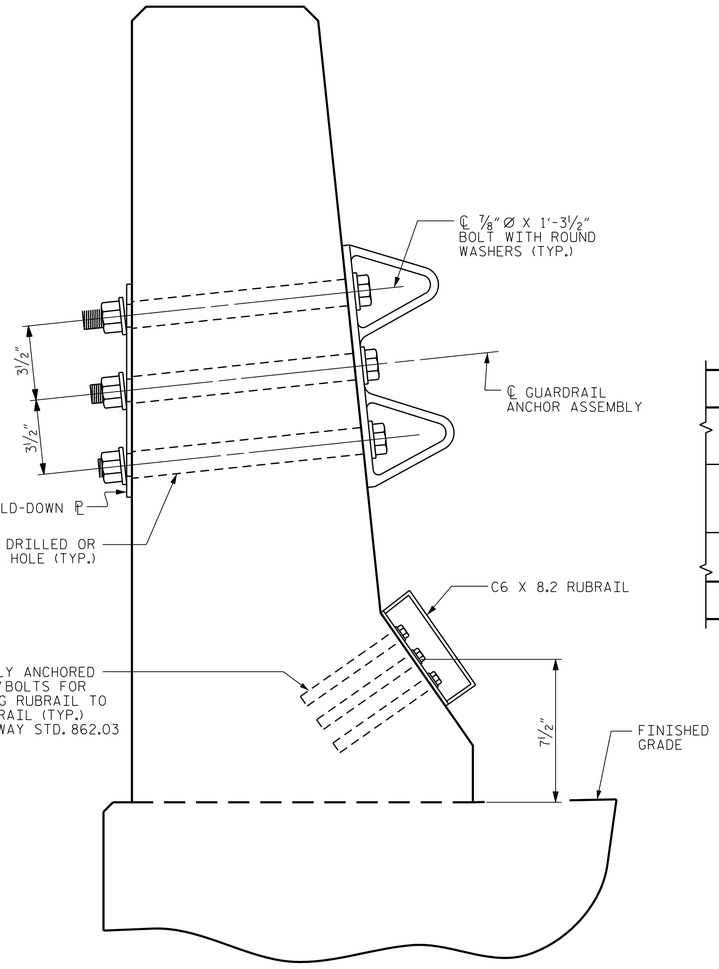


PLAN

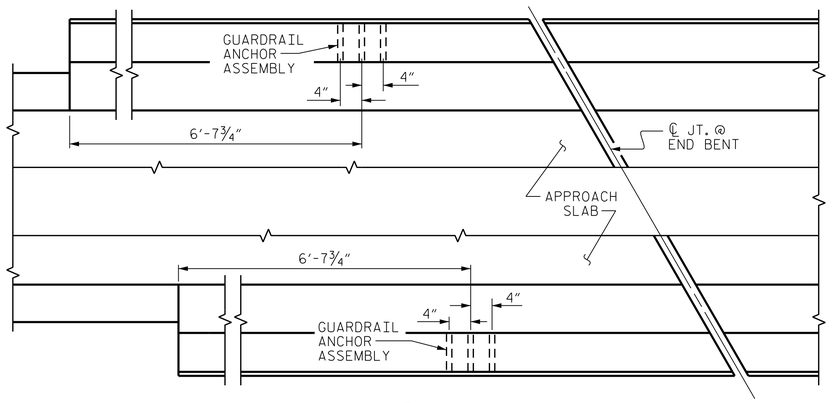


ELEVATION



SECTION E-E

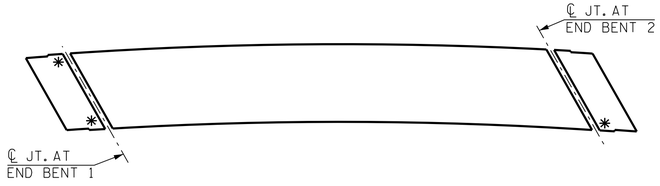
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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



SKETCH SHOWING POINTS OF ATTACHMENTS

✱ DENOTES GUARDRAIL ANCHOR ASSEMBLY

NOTES

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

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

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

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

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

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

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

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

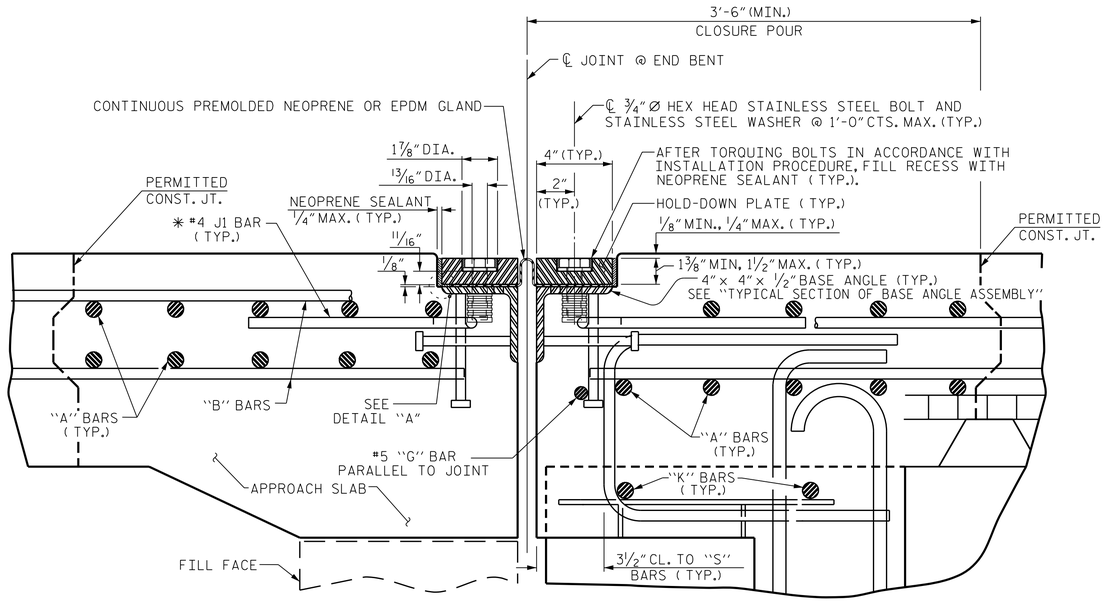
STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-24
1			3			TOTAL SHEETS
2			4			41

STR. #2



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

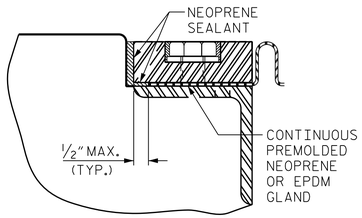
* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

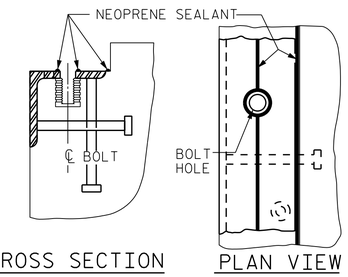
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO 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

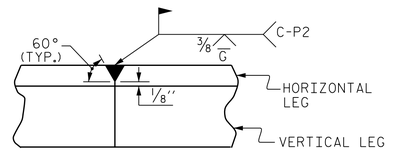
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS 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.



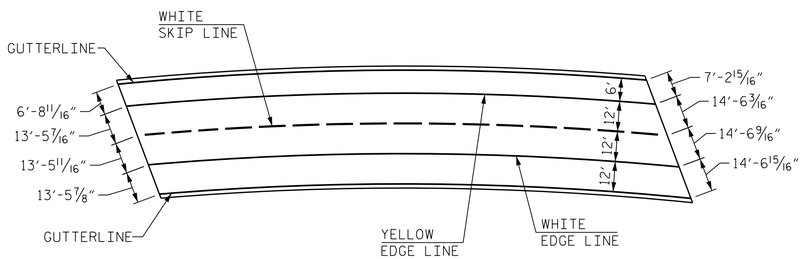
DETAIL "A"



INSTALLATION SKETCH

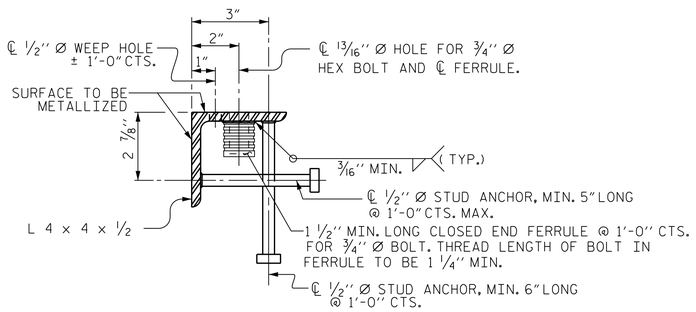


DETAIL- FIELD WELD SPLICE OF BASE ANGLE



PAVEMENT MARKING ALIGNMENT

MOVEMENT AND SETTING AT JOINT					
BENT NO.	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	62.22°	1³⁄₁₆"	1½"	1⅜"	1⅛"
EB2	57.05°	1³⁄₁₆"	1 11⁄16"	1½"	1³⁄₁₆"



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS

RIGHT LANE

SITE 2R DWG. NO.25

DocuSigned by: Jeremy F. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY F. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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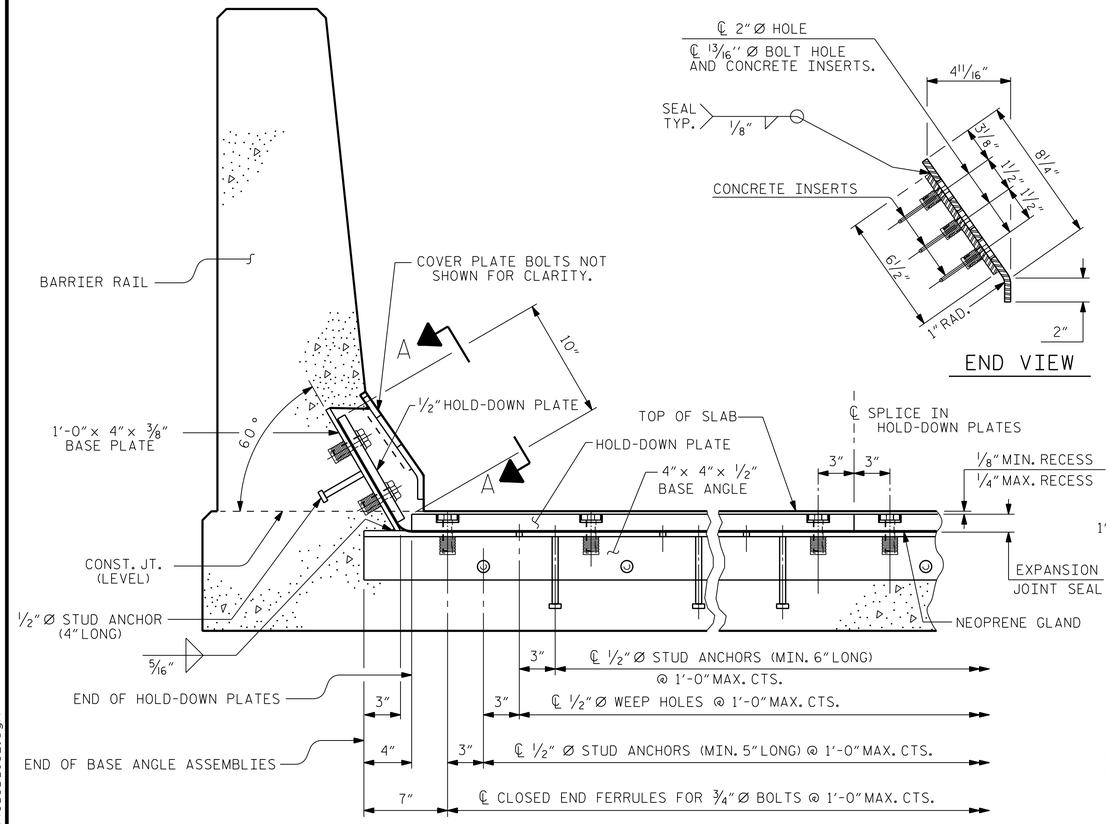
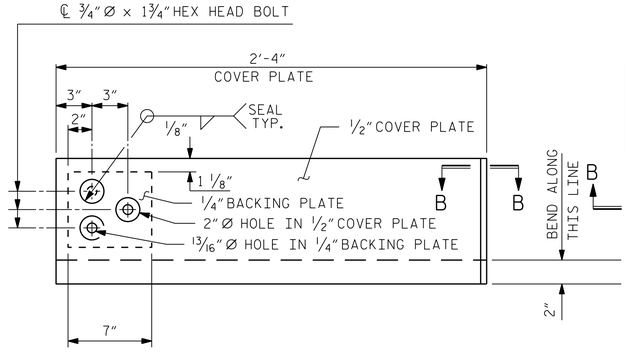
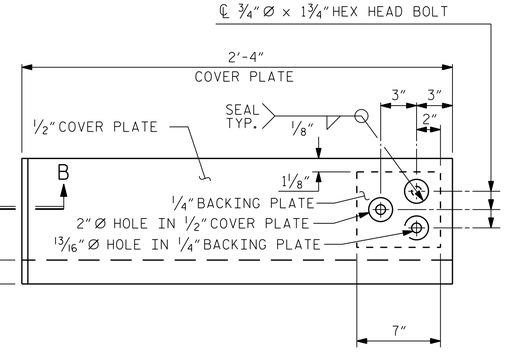


SECTION THRU RAIL NORMAL TO JOINT

END VIEW

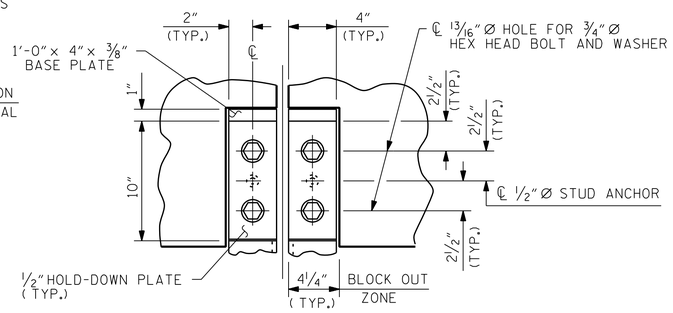


TYPE I - ELEVATION VIEW

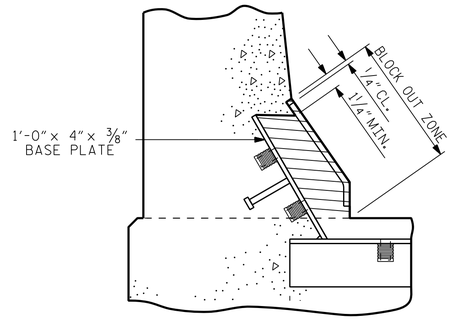


TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

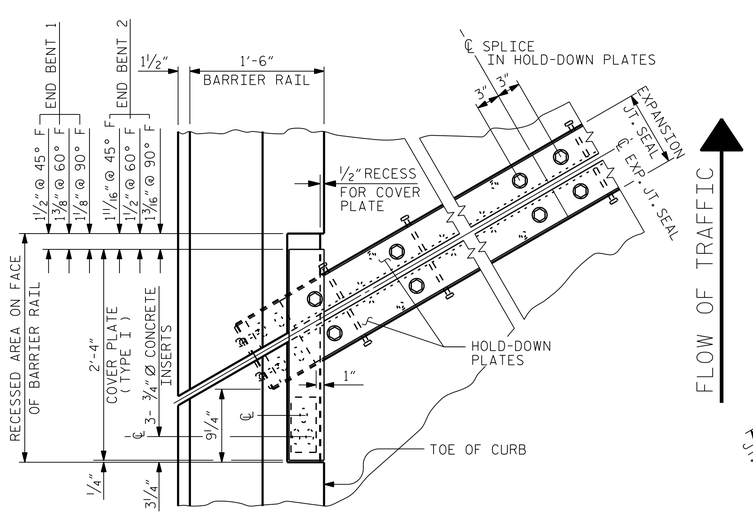


SECTION A - A



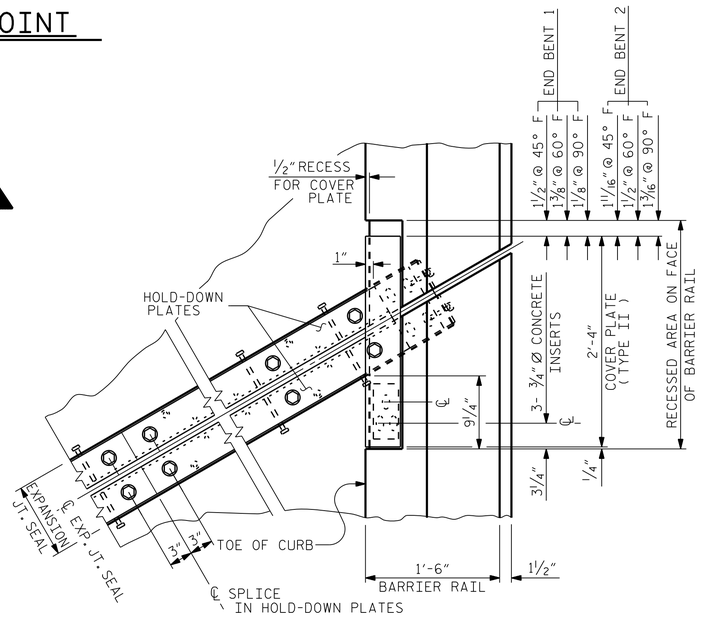
BLOCK OUT DETAIL

SEE "SECTION A - A" FOR OTHER DETAILS.

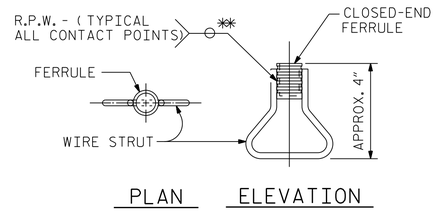


SECTION THRU RAIL NORMAL TO JOINT

FLOW OF TRAFFIC



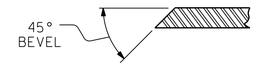
PLAN OF EXPANSION JOINT SEAL



PLAN ELEVATION

CONCRETE INSERT

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



SECTION B - B

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

RIGHT LANE

SITE 2R DWG. NO. 26

DocuSigned by: Jeremy F. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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2/4/2022
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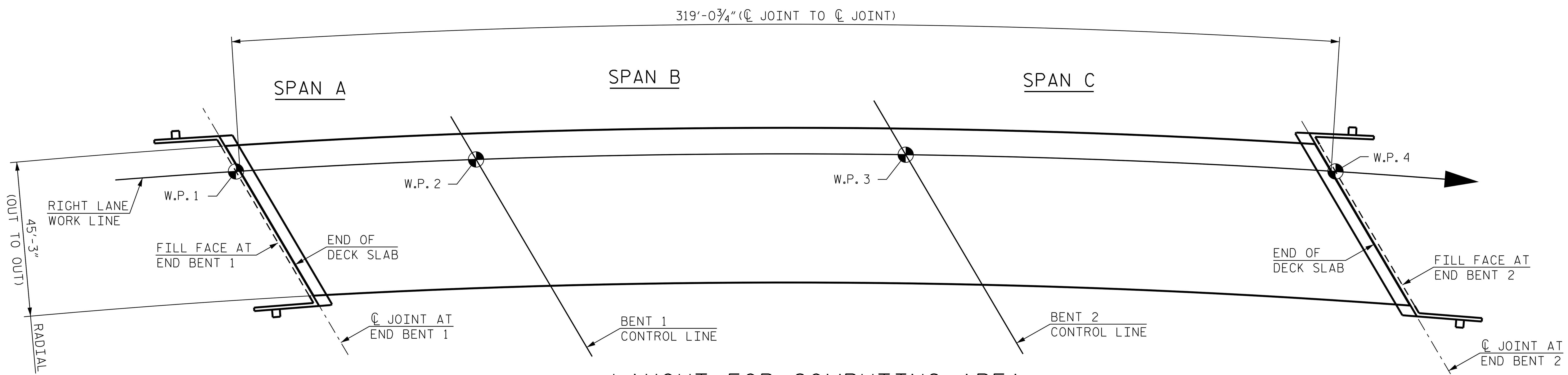


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 14,463)

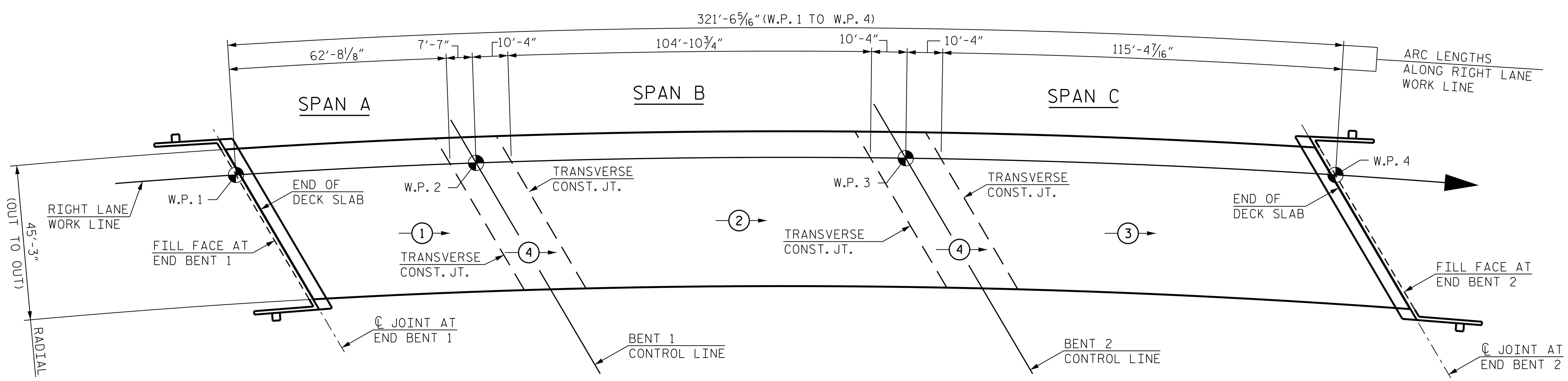
—SUPERSTRUCTURE BILL OF MATERIAL—	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	97.2	———	———
POUR 2	162.4	———	———
POUR 3	178.2	———	———
POUR 4	59.7	———	———
TOTALS**	497.5	43,955	43,499

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

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

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

GROOVING BRIDGE FLOORS	
APPROACH SLABS	1,924 SQ.FT.
BRIDGE DECK	12,430 SQ.FT.
TOTAL	14,354 SQ.FT.



POURING SEQUENCE

(1)→ INDICATES POUR NUMBER AND DIRECTION

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
BILL OF MATERIAL
RIGHT LANE

SITE 2R DWG. NO.27

NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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REINFORCING BAR SCHEDULE

SPANS A, B AND C

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	468	#5	STR.	44′-11″	21,925
A2	468	#5	STR.	44′-11″	21,925
✳ A101	1	#5	STR.	44′-4″	46
✳ A102	1	#5	STR.	43′-3″	45
✳ A103	1	#5	STR.	42′-2″	44
✳ A104	1	#5	STR.	41′-0″	43
✳ A105	1	#5	STR.	39′-11″	42
✳ A106	1	#5	STR.	38′-10″	41
✳ A107	1	#5	STR.	37′-9″	39
✳ A108	1	#5	STR.	36′-8″	38
✳ A109	1	#5	STR.	35′-7″	37
✳ A110	1	#5	STR.	34′-5″	36
✳ A111	1	#5	STR.	33′-4″	35
✳ A112	1	#5	STR.	32′-3″	34
✳ A113	1	#5	STR.	31′-2″	33
✳ A114	1	#5	STR.	30′-1″	31
✳ A115	1	#5	STR.	29′-0″	30
✳ A116	1	#5	STR.	27′-10″	29
✳ A117	1	#5	STR.	26′-9″	28
✳ A118	1	#5	STR.	25′-8″	27
✳ A119	1	#5	STR.	24′-7″	26
✳ A120	1	#5	STR.	23′-6″	25
✳ A121	1	#5	STR.	22′-4″	23
✳ A122	1	#5	STR.	21′-3″	22
✳ A123	1	#5	STR.	20′-2″	21
✳ A124	1	#5	STR.	19′-1″	20
✳ A125	1	#5	STR.	18′-0″	19
✳ A126	1	#5	STR.	16′-10″	18
✳ A127	1	#5	STR.	15′-9″	16
✳ A128	1	#5	STR.	14′-8″	15
✳ A129	1	#5	STR.	13′-7″	14
✳ A130	1	#5	STR.	12′-6″	13
✳ A131	1	#5	STR.	11′-4″	12
✳ A132	1	#5	STR.	10′-3″	11
✳ A133	1	#5	STR.	9′-2″	10
✳ A134	1	#5	STR.	8′-1″	8
✳ A135	1	#5	STR.	7′-0″	7
✳ A136	1	#5	STR.	5′-10″	6
✳ A137	1	#5	STR.	4′-9″	5
✳ A138	1	#5	STR.	3′-8″	4
✳ A139	1	#5	STR.	2′-7″	3
✳ A140	1	#5	STR.	1′-5″	1
✳ A141	3	#6	STR.	50′-5″	227
✳ A151	1	#5	STR.	44′-5″	46
✳ A152	1	#5	STR.	43′-4″	45
✳ A153	1	#5	STR.	42′-4″	44
✳ A154	1	#5	STR.	41′-4″	43
✳ A155	1	#5	STR.	40′-4″	42
✳ A156	1	#5	STR.	39′-3″	41
✳ A157	1	#5	STR.	38′-3″	40
✳ A158	1	#5	STR.	37′-3″	39
✳ A159	1	#5	STR.	36′-2″	38
✳ A160	1	#5	STR.	35′-2″	37
✳ A161	1	#5	STR.	34′-2″	36

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A162	1	#5	STR.	33′-2″	35
✳ A163	1	#5	STR.	32′-1″	33
✳ A164	1	#5	STR.	31′-1″	32
✳ A165	1	#5	STR.	30′-1″	31
✳ A166	1	#5	STR.	29′-1″	30
✳ A167	1	#5	STR.	28′-0″	29
✳ A168	1	#5	STR.	27′-0″	28
✳ A169	1	#5	STR.	26′-0″	27
✳ A170	1	#5	STR.	25′-0″	26
✳ A171	1	#5	STR.	24′-0″	25
✳ A172	1	#5	STR.	22′-11″	24
✳ A173	1	#5	STR.	21′-11″	23
✳ A174	1	#5	STR.	20′-11″	22
✳ A175	1	#5	STR.	19′-11″	21
✳ A176	1	#5	STR.	18′-10″	20
✳ A177	1	#5	STR.	17′-10″	19
✳ A178	1	#5	STR.	16′-10″	18
✳ A179	1	#5	STR.	15′-10″	17
✳ A180	1	#5	STR.	14′-9″	15
✳ A181	1	#5	STR.	13′-9″	14
✳ A182	1	#5	STR.	12′-9″	13
✳ A183	1	#5	STR.	11′-9″	12
✳ A184	1	#5	STR.	10′-9″	11
✳ A185	1	#5	STR.	9′-8″	10
✳ A186	1	#5	STR.	8′-8″	9
✳ A187	1	#5	STR.	7′-8″	8
✳ A188	1	#5	STR.	6′-8″	7
✳ A189	1	#5	STR.	5′-8″	6
✳ A190	1	#5	STR.	4′-7″	5
✳ A191	1	#5	STR.	3′-7″	4
✳ A192	1	#5	STR.	2′-7″	3
✳ A193	1	#5	STR.	1′-7″	2
✳ A194	3	#6	STR.	54′-4″	245
A201	1	#5	STR.	44′-4″	46
A202	1	#5	STR.	43′-3″	45
A203	1	#5	STR.	42′-2″	44
A204	1	#5	STR.	41′-0″	43
A205	1	#5	STR.	39′-11″	42
A206	1	#5	STR.	38′-10″	41
A207	1	#5	STR.	37′-9″	39
A208	1	#5	STR.	36′-8″	38
A209	1	#5	STR.	35′-7″	37
A210	1	#5	STR.	34′-5″	36
A211	1	#5	STR.	33′-4″	35
A212	1	#5	STR.	32′-3″	34
A213	1	#5	STR.	31′-2″	33
A214	1	#5	STR.	30′-1″	31
A215	1	#5	STR.	29′-0″	30
A216	1	#5	STR.	27′-10″	29
A217	1	#5	STR.	26′-9″	28
A218	1	#5	STR.	25′-8″	27
A219	1	#5	STR.	24′-7″	26
A220	1	#5	STR.	23′-6″	25
A221	1	#5	STR.	22′-4″	23
A222	1	#5	STR.	21′-3″	22

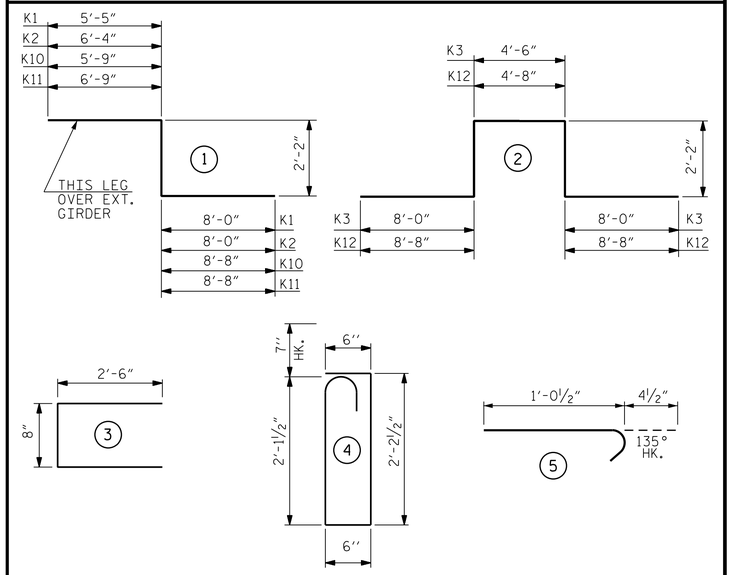
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A223	1	#5	STR.	20′-2″	21
A224	1	#5	STR.	19′-1″	20
A225	1	#5	STR.	18′-0″	19
A226	1	#5	STR.	16′-10″	18
A227	1	#5	STR.	15′-9″	16
A228	1	#5	STR.	14′-8″	15
A229	1	#5	STR.	13′-7″	14
A230	1	#5	STR.	12′-6″	13
A231	1	#5	STR.	11′-4″	12
A232	1	#5	STR.	10′-3″	11
A233	1	#5	STR.	9′-2″	10
A234	1	#5	STR.	8′-1″	8
A235	1	#5	STR.	7′-0″	7
A236	1	#5	STR.	5′-10″	6
A237	1	#5	STR.	4′-9″	5
A238	1	#5	STR.	3′-8″	4
A239	1	#5	STR.	2′-7″	3
A240	1	#5	STR.	1′-5″	1
A251	1	#5	STR.	44′-5″	46
A252	1	#5	STR.	43′-4″	45
A253	1	#5	STR.	42′-4″	44
A254	1	#5	STR.	41′-4″	43
A255	1	#5	STR.	40′-4″	42
A256	1	#5	STR.	39′-3″	41
A257	1	#5	STR.	38′-3″	40
A258	1	#5	STR.	37′-3″	39
A259	1	#5	STR.	36′-2″	38
A260	1	#5	STR.	35′-2″	37
A261	1	#5	STR.	34′-2″	36
A262	1	#5	STR.	33′-2″	35
A263	1	#5	STR.	32′-1″	33
A264	1	#5	STR.	31′-1″	32
A265	1	#5	STR.	30′-1″	31
A266	1	#5	STR.	29′-1″	30
A267	1	#5	STR.	28′-0″	29
A268	1	#5	STR.	27′-0″	28
A269	1	#5	STR.	26′-0″	27
A270	1	#5	STR.	25′-0″	26
A271	1	#5	STR.	24′-0″	25
A272	1	#5	STR.	22′-11″	24
A273	1	#5	STR.	21′-11″	23
A274	1	#5	STR.	20′-11″	22
A275	1	#5	STR.	19′-11″	21
A276	1	#5	STR.	18′-10″	20
A277	1	#5	STR.	17′-10″	19
A278	1	#5	STR.	16′-10″	18
A279	1	#5	STR.	15′-10″	17
A280	1	#5	STR.	14′-9″	15
A281	1	#5	STR.	13′-9″	14
A282	1	#5	STR.	12′-9″	13
A283	1	#5	STR.	11′-9″	12
A284	1	#5	STR.	10′-9″	11
A285	1	#5	STR.	9′-8″	10
A286	1	#5	STR.	8′-8″	9
A287	1	#5	STR.	7′-8″	8

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A288	1	#5	STR.	6′-8″	7
A289	1	#5	STR.	5′-8″	6
A290	1	#5	STR.	4′-7″	5
A291	1	#5	STR.	3′-7″	4
A292	1	#5	STR.	2′-7″	3
A293	1	#5	STR.	1′-7″	2
B1	216	#5	STR.	55′-8″	12,541
✳ B2	94	#4	STR.	23′-8″	1,486
✳ B3	47	#5	STR.	60′-0″	2,941
✳ B4	47	#5	STR.	12′-0″	588
✳ B5	42	#5	STR.	39′-8″	1,738
✳ B6	94	#4	STR.	23′-2″	1,455
✳ B7	47	#5	STR.	60′-0″	2,941
✳ B8	47	#5	STR.	29′-0″	1,422
✳ B9	42	#5	STR.	48′-0″	2,103
✳ B10	141	#4	STR.	29′-5″	2,771
B11	64	#5	STR.	49′-6″	3,304
B12	64	#5	STR.	39′-6″	2,637
B13	64	#5	STR.	23′-5″	1,563
✳ G1	1	#5	STR.	50′-5″	53
✳ G2	1	#5	STR.	54′-4″	57
✳ J1	98	#4	5	1′-5″	93
✳ K1	2	#8	1	15′-7″	64
✳ K2	2	#8	1	16′-6″	67
✳ K3	6	#8	2	24′-10″	305
✳ K4	16	#6	STR.	6′-4″	152
✳ K10	2	#8	1	16′-7″	68
✳ K11	2	#8	1	17′-7″	72
✳ K12	6	#8	2	26′-4″	323
✳ K13	16	#6	STR.	6′-11″	166
✳ S1	40	#4	3	5′-8″	151
✳ S2	40	#5	4	5′-11″	247

REINFORCING STEEL	43,955 LBS.
✳ EPOXY COATED REINFORCING STEEL	43,499 LBS.

✳ EPOXY COATED

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

RIGHT LANE

SITE 2R DWG. NO.28

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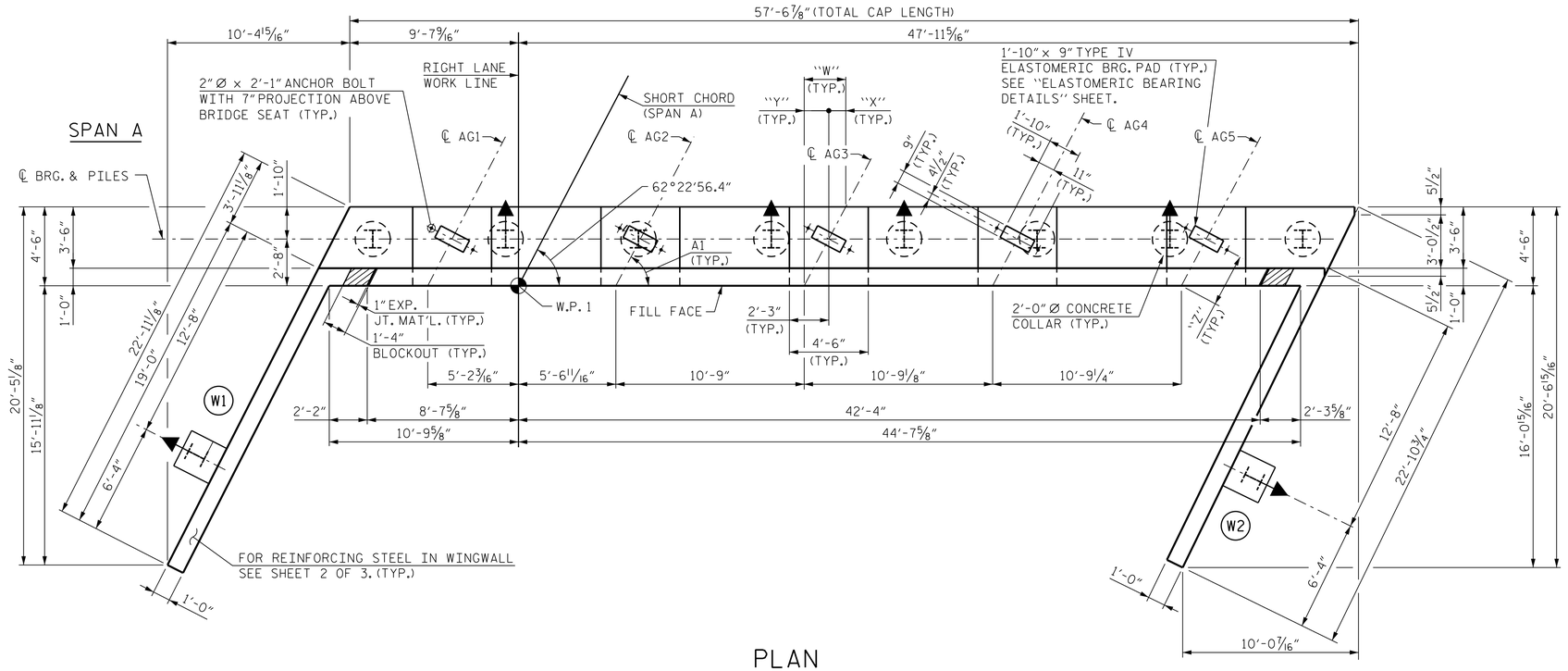
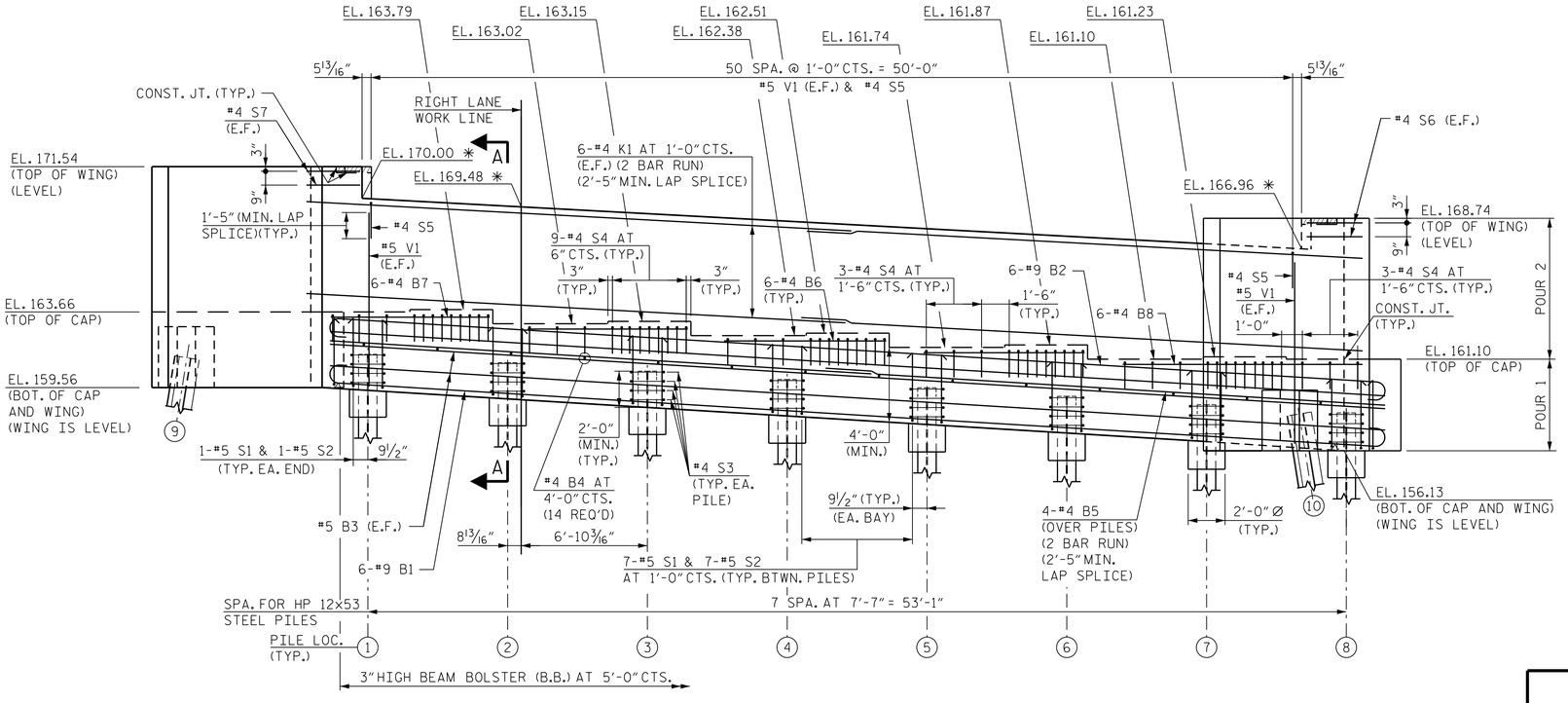


PLAN



ELEVATION

* ELEVATION AT FILL FACE

NOTES:

FOR SECTION A-A, SEE SHEET 3 OF 3.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR TEMPORARY DRAINAGE, SEE END BENT 2, SHEET 3 OF 3.

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

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

LEGEND:

HP 12x53 VERTICAL STEEL PILES

HP 12x53 STEEL PILES BATTERED 3:12

TOP OF PILE ELEVATION TABLE	
LOC.	ELEVATION
1	161.36
2	160.91
3	160.45
4	160.00
5	159.55
6	159.09
7	158.64
8	158.19
9	161.57
10	158.13

GIRDER DETAILS					
GIRDER	A1	"W"	"X"	"Y"	"Z"
AG1	62°26'14.5"	2'-4 3/16"	11 1/2"	1'-4 11/16"	3'-0 1/8"
AG2	62°19'23.2"	2'-4 5/16"	11 9/16"	1'-4 3/4"	3'-0 1/8"
AG3	62°12'28.2"	2'-4 7/16"	11 3/8"	1'-4 13/16"	3'-0 3/16"
AG4	62°05'29.6"	2'-4 5/8"	11 5/8"	1'-5"	3'-0 3/16"
AG5	61°58'27.3"	2'-4 3/4"	11 11/16"	1'-5 1/16"	3'-0 1/4"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
PLAN AND ELEVATION

RIGHT LANE

SITE 2R DWG. NO. 29

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2/4/2022

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RUMMEL, KLEPPER & KAHL, LLP
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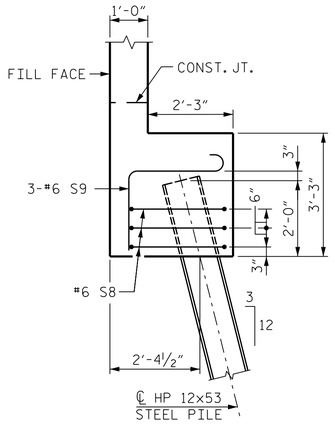
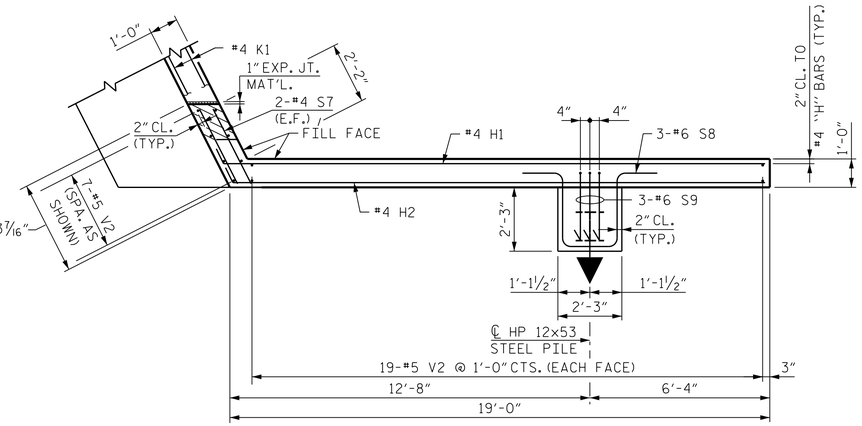
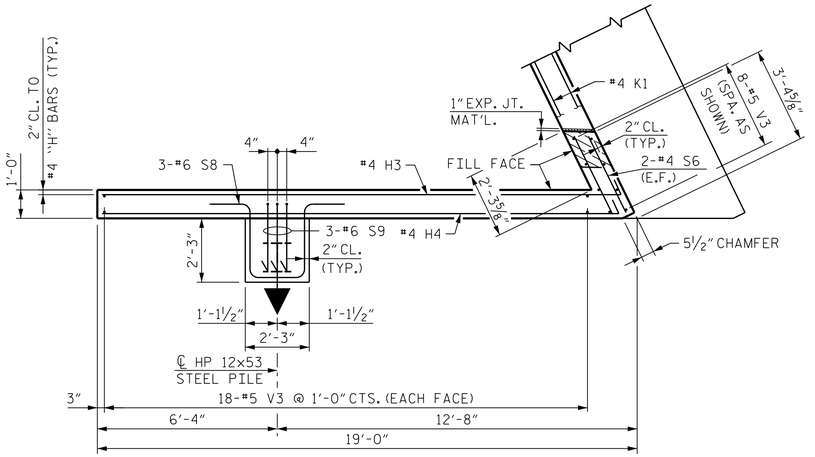


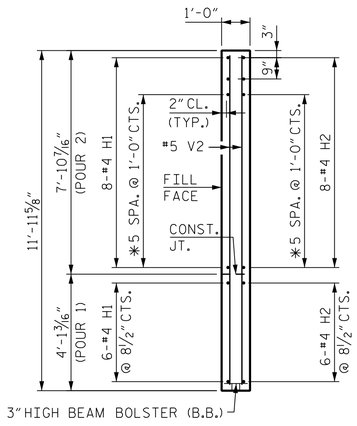
SECTION A-A



PLAN OF LEFT WINGWALL

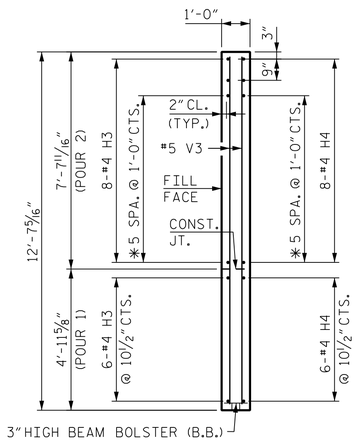


PLAN OF RIGHT WINGWALL



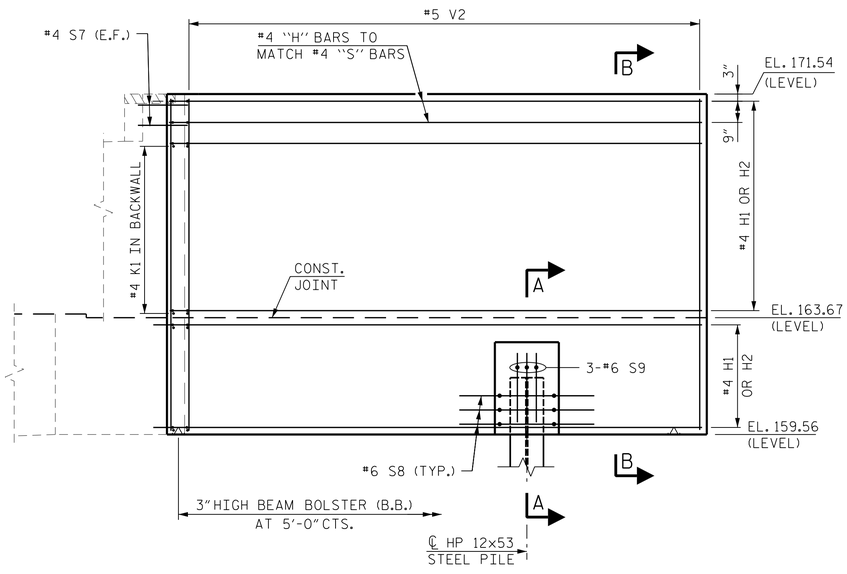
SECTION B-B

* MATCH TO K1 BARS IN BACKWALL

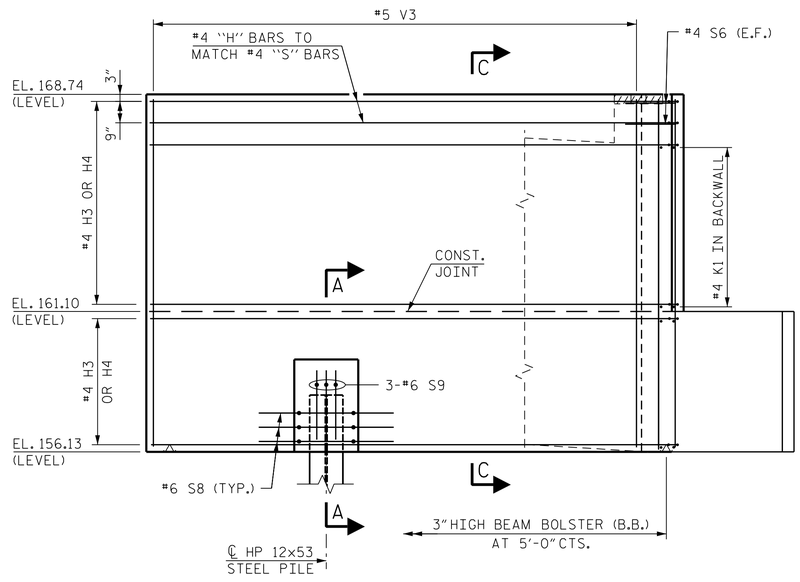


SECTION C-C

* MATCH TO K1 BARS IN BACKWALL



ELEVATION OF LEFT WINGWALL



ELEVATION OF RIGHT WINGWALL

LEFT WINGWALL DETAILS (W1)

RIGHT WINGWALL DETAILS (W2)

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SHEET 2 OF 3

STATE OF NORTH CAROLINA
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SUBSTRUCTURE

END BENT 1
WINGWALL DETAILS

RIGHT LANE

SITE 2R DWG. NO. 30

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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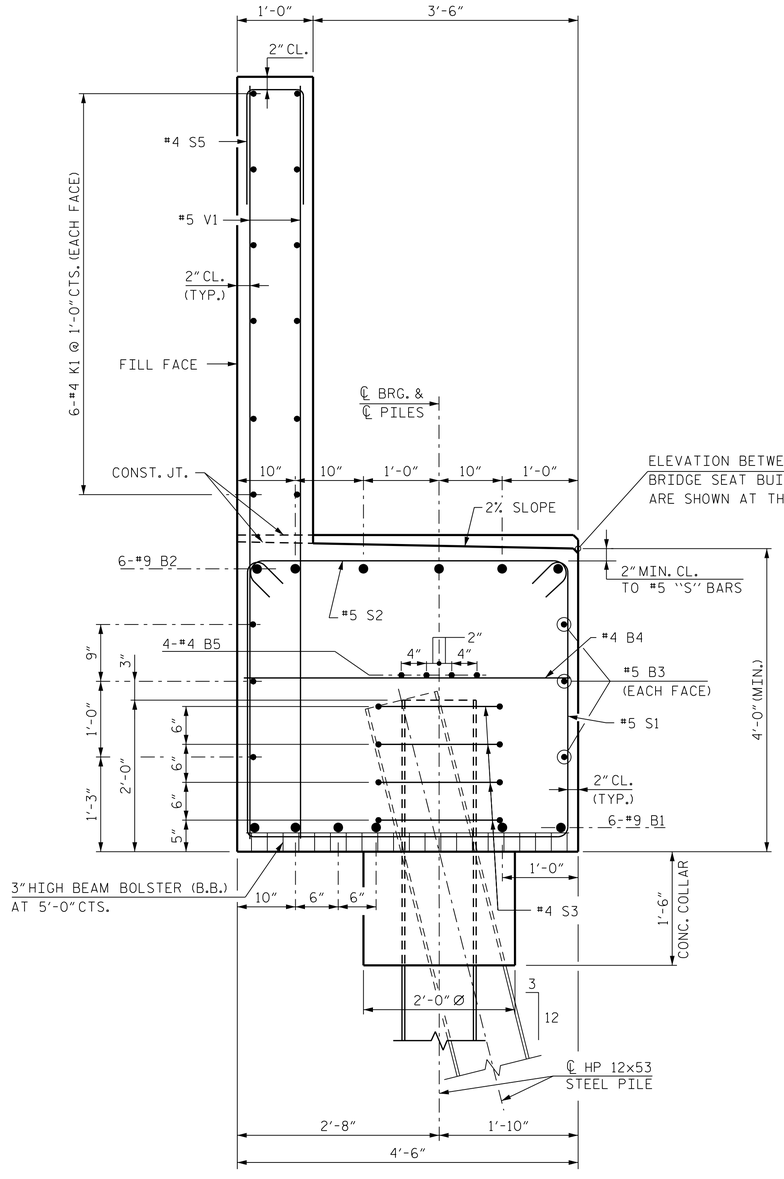
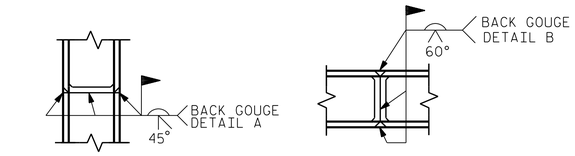


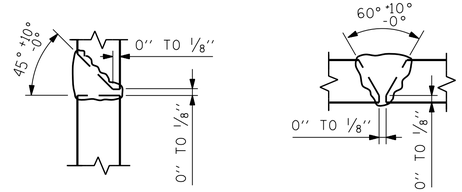
SECTION A-A

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)



* PILE VERTICAL

* PILE HORIZONTAL OR VERTICAL

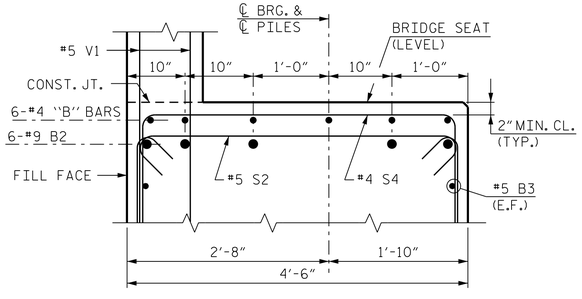


DETAIL A

DETAIL B

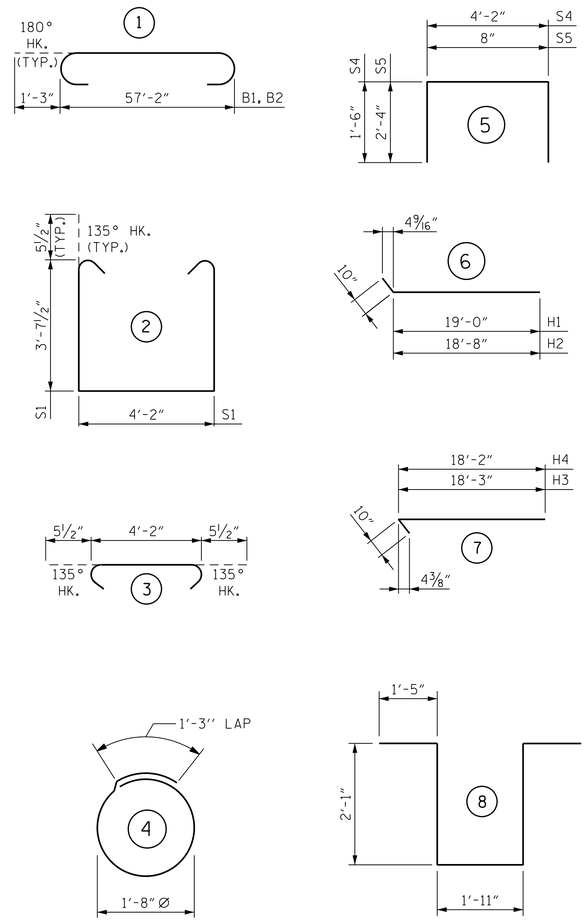
PILE SPLICE DETAILS

* POSITION OF PILE DURING WELDING.



BRG. SEAT DETAIL

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#9	1	59'-8"	1,217
B2	6	#9	1	59'-8"	1,217
B3	6	#5	STR	57'-2"	358
B4	14	#4	STR	4'-2"	39
B5	8	#4	STR	29'-10"	159
B6	18	#4	STR	8'-8"	104
B7	6	#4	STR	7'-9"	31
B8	6	#4	STR	6'-2"	25
H1	14	#4	6	19'-10"	185
H2	14	#4	6	19'-6"	182
H3	14	#4	7	19'-1"	178
H4	14	#4	7	19'-0"	177
K1	24	#4	STR	29'-11"	480
S1	51	#5	2	12'-4"	656
S2	51	#5	3	5'-1"	270
S3	32	#4	4	6'-6"	139
S4	63	#4	5	7'-2"	302
S5	51	#4	5	5'-4"	182
S6	4	#4	STR	2'-9"	7
S7	4	#4	STR	2'-9"	7
S8	6	#6	8	8'-11"	80
S9	6	#6	9	3'-10"	35
V1	102	#5	STR	10'-0"	1,064
V2	45	#5	STR	11'-6"	540
V3	44	#5	STR	12'-1"	555

REINFORCING STEEL	8,189 LBS.
CLASS "A" CONCRETE	
POUR 1 (CAP, LOWER WINGS AND COLLARS)	49.5 C.Y.
POUR 2 (BACKWALL & UPPER WINGS)	24.2 C.Y.
TOTAL	73.7 C.Y.
HP 12x53 STEEL PILES	
NO.	10
L.F.	550
PILE REDRIVES	4 EA.
PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	10 EA.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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SHEET 3 OF 3

SITE 2R DWG. NO.31

STATE OF NORTH CAROLINA
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SUBSTRUCTURE
END BENT 1
MISCELLANEOUS DETAILS AND BILL OF MATERIAL

RIGHT LANE

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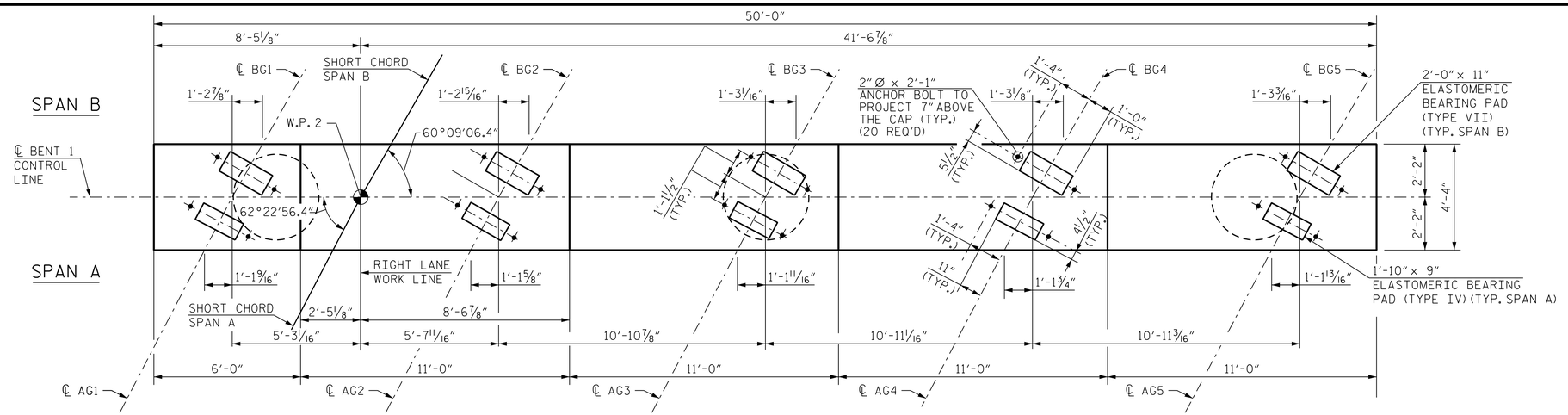
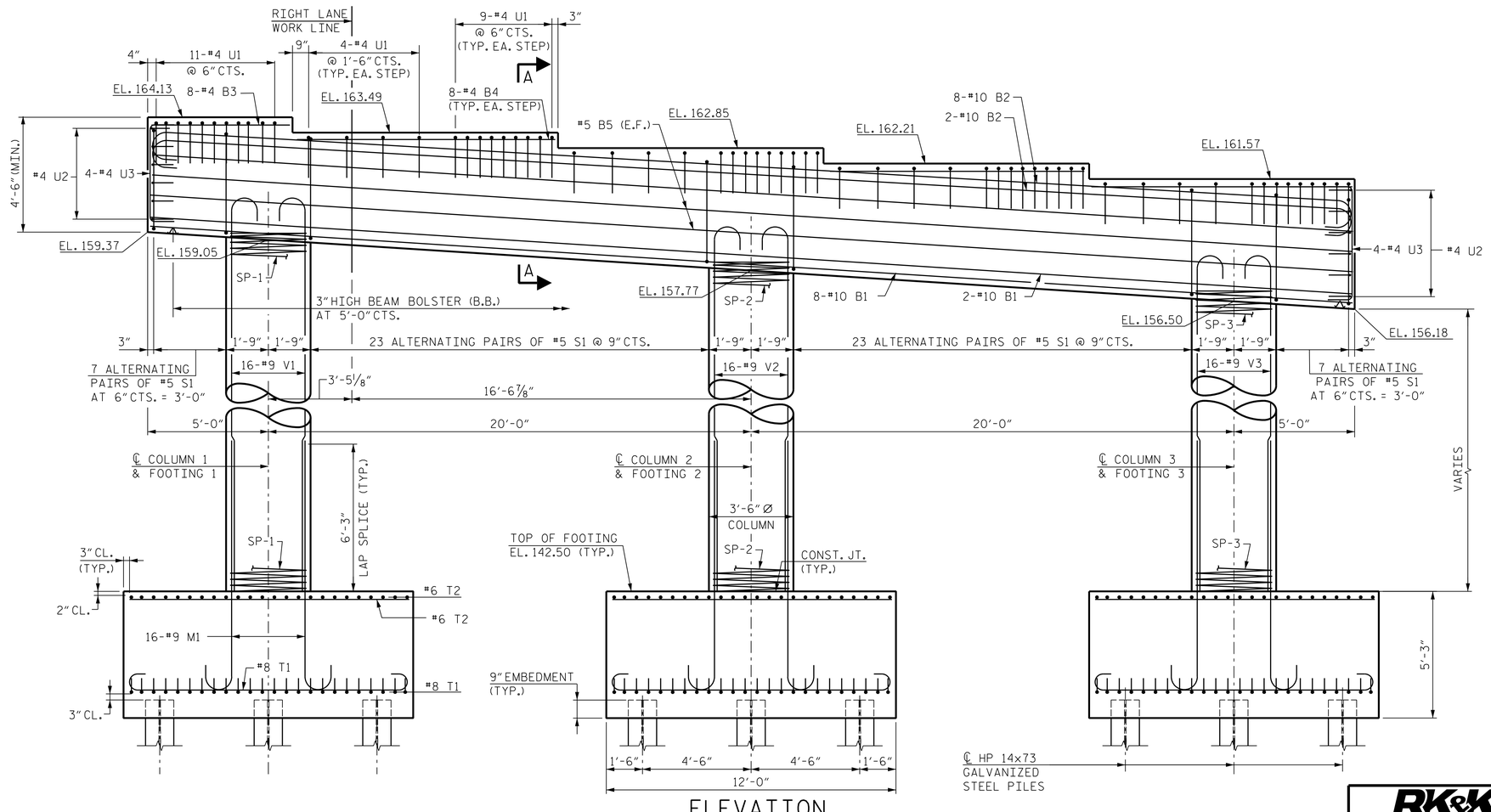


PLAN



ELEVATION

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

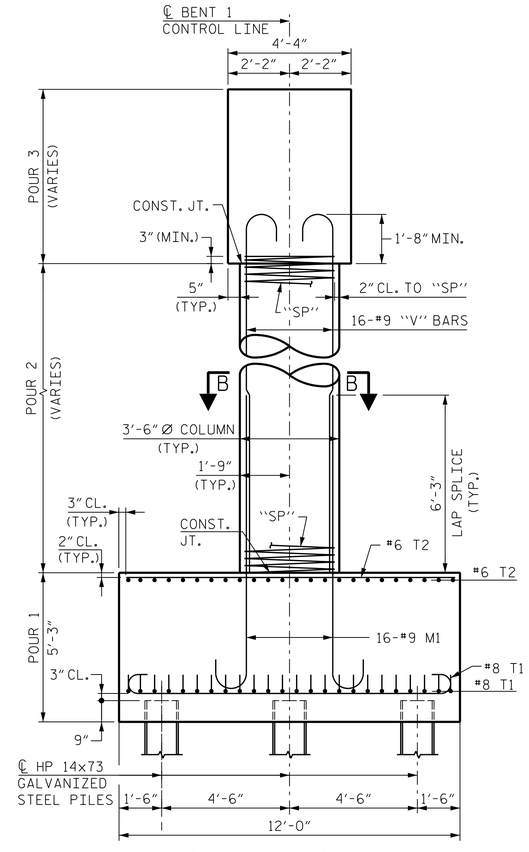
NOTES:

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

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

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

GALVANIZE THE TOP OF EACH INTERIOR BENT PILE A MINIMUM OF 22 FT. GALVANIZE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.



END ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING AND COLUMN)

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SHEET 1 OF 2

STATE OF NORTH CAROLINA
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SUBSTRUCTURE

BENT 1
PLAN AND
ELEVATION

RIGHT LANE

SITE 2R DWG. NO.32

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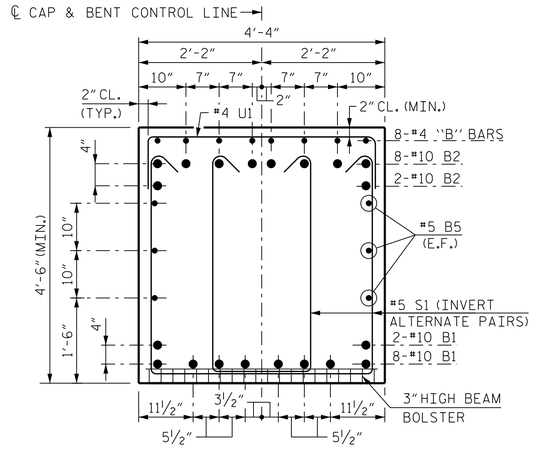
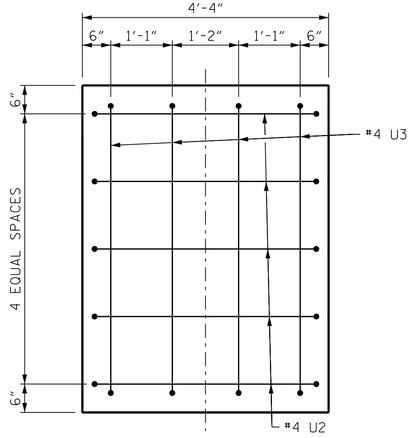
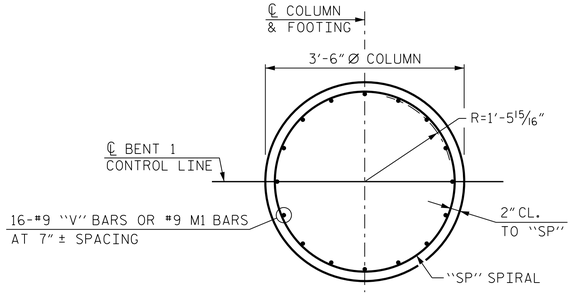


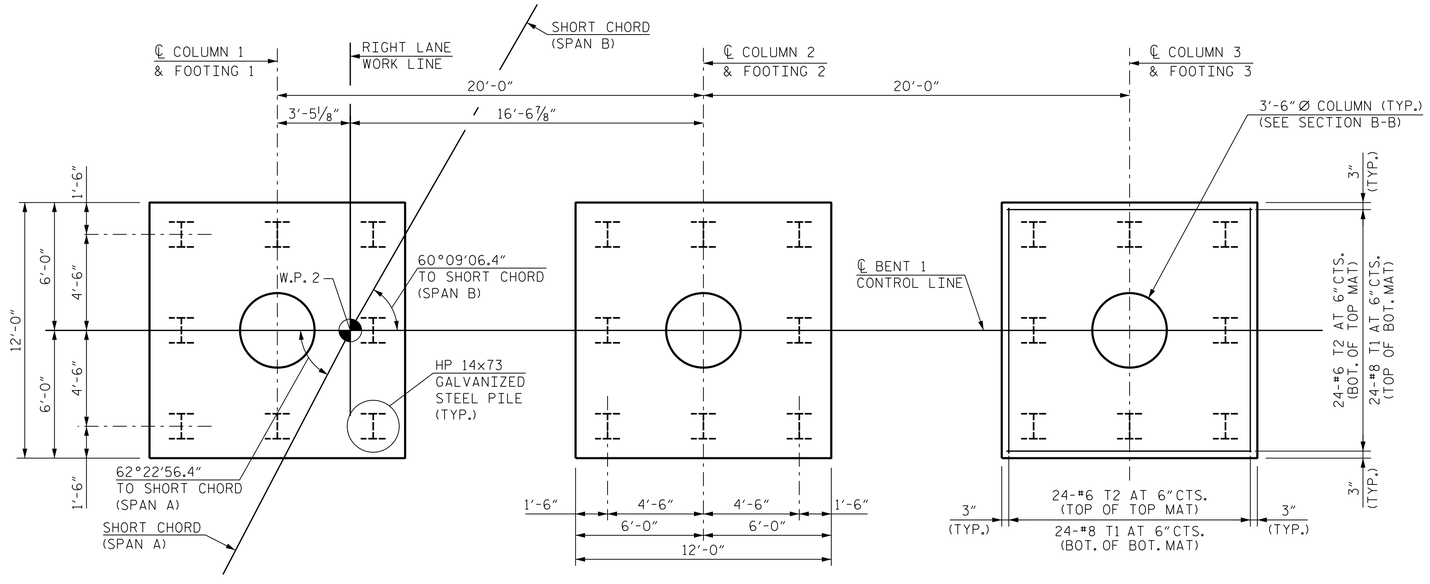
SECTION THROUGH CAP
SECTION A-A



END OF CAP DETAIL



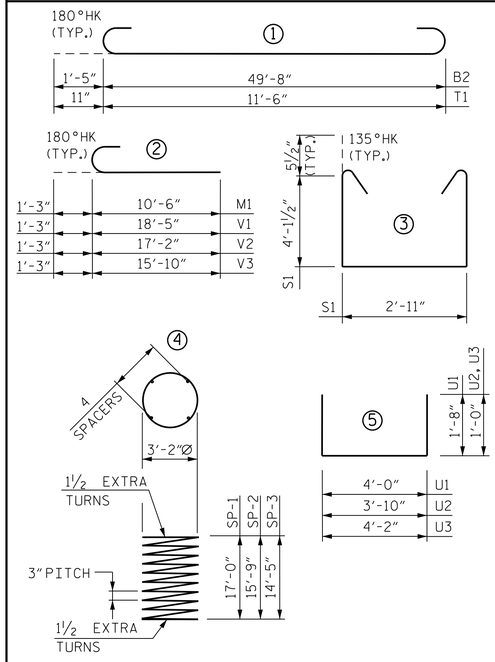
SECTION THROUGH COLUMN
SECTION B-B



PLAN OF FOOTINGS

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	STR	49'-8"	2,137
B2	10	#10	1	52'-6"	2,259
B3	8	#4	STR	5'-8"	30
B4	32	#4	STR	10'-7"	226
B5	6	#5	STR	49'-8"	311
S1	120	#5	3	12'-1"	1,512
T1	144	#8	1	13'-4"	5,126
T2	144	#6	STR	11'-6"	2,487
M1	48	#9	2	11'-9"	1,918
U1	63	#4	5	7'-4"	309
U2	10	#4	5	5'-10"	39
U3	8	#4	5	6'-2"	33
V1	16	#9	2	19'-8"	1,070
V2	16	#9	2	18'-5"	1,002
V3	16	#9	2	17'-1"	929

REINFORCING STEEL					19,388 LBS.
SP-1	1	**	4	697'-4"	466
SP-2	1	**	4	648'-2"	433
SP-3	1	**	4	599'-1"	400

SPIRAL COLUMN REINFORCING STEEL	1,299 LBS.

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

CLASS "A" CONCRETE	
POUR 1 (FOOTINGS)	84.0 C.Y.
POUR 2 (COLUMNS)	16.4 C.Y.
POUR 3 (CAP)	39.7 C.Y.
TOTAL	140.1 C.Y.
HP 14x73 GALVANIZED STEEL PILES	
NO.	24
L.F.	1,440
PILE REDRIVES	12 EA.
PDA TEST	1 EA.
FOUNDATION EXCAVATION FOR BENT	LUMP SUM
PILE DRIVING EQUIP. SET UP FOR HP 14 x 73 GALVANIZED STEEL PILES	24 EA.

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CUMBERLAND COUNTY

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SHEET 2 OF 2

STATE OF NORTH CAROLINA
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SUBSTRUCTURE
BENT 1
DETAILS AND BILL OF MATERIAL

RIGHT LANE

SITE 2R DWG. NO. 33

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STR. #2

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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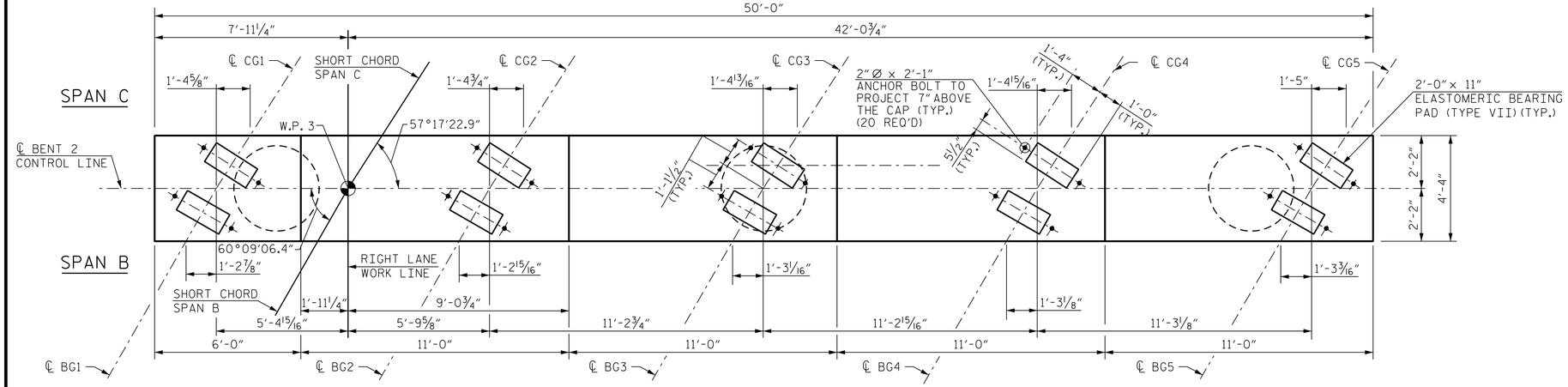
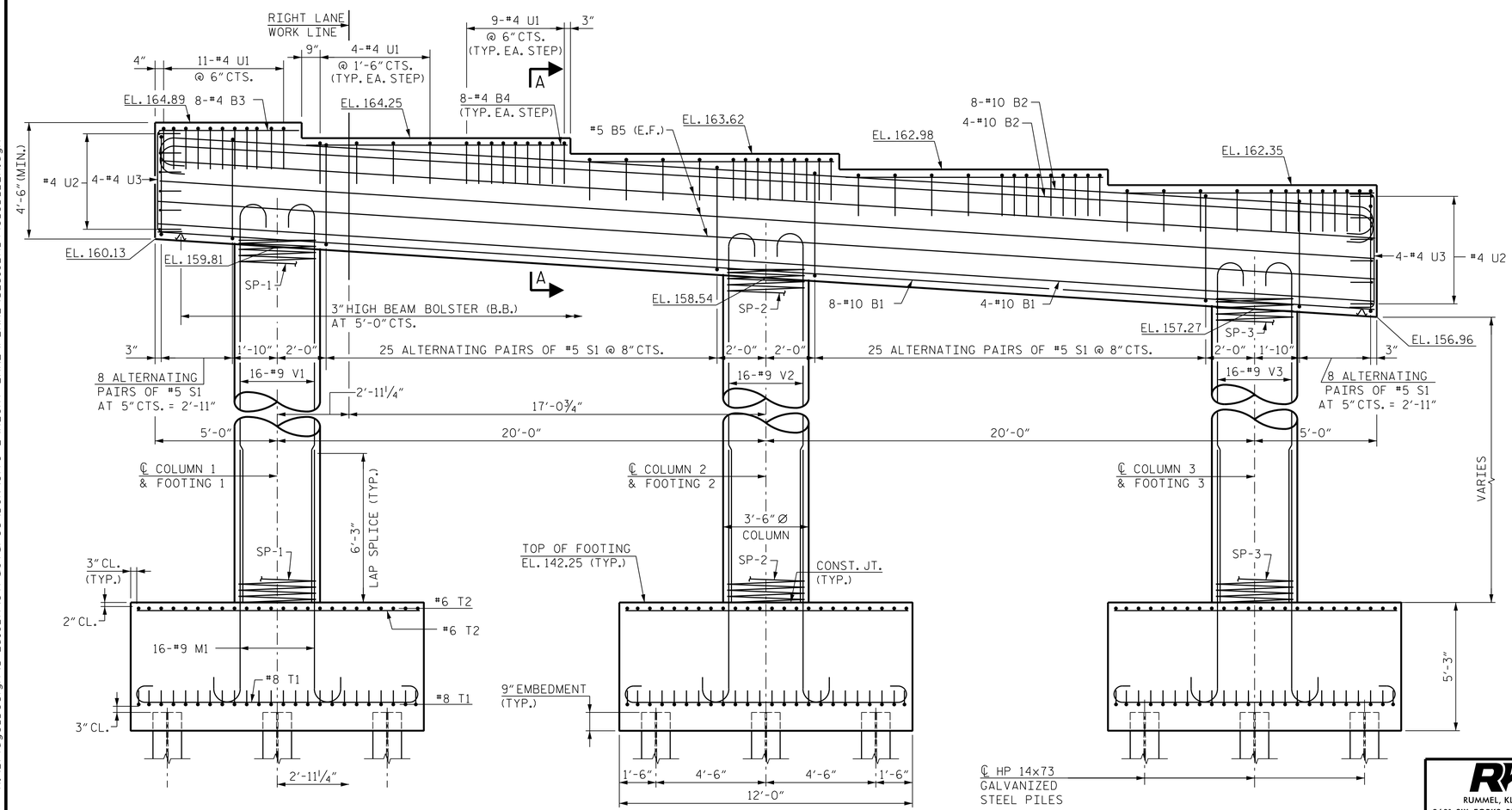


PLAN



ELEVATION

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

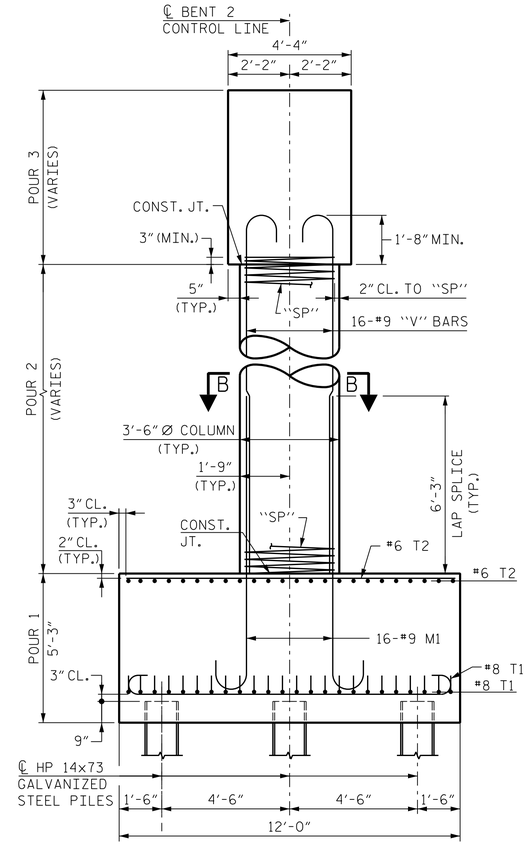
NOTES:

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

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

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

GALVANIZE THE TOP OF EACH INTERIOR BENT PILE A MINIMUM OF 22 FT. GALVANIZE IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.



END ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING AND COLUMN)

PROJECT NO. U-2519BA

CUMBERLAND **COUNTY**

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SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2
PLAN AND
ELEVATION

RIGHT LANE

SITE 2R DWG. NO. 34

DocuSigned by: Jeremy E. Keene — NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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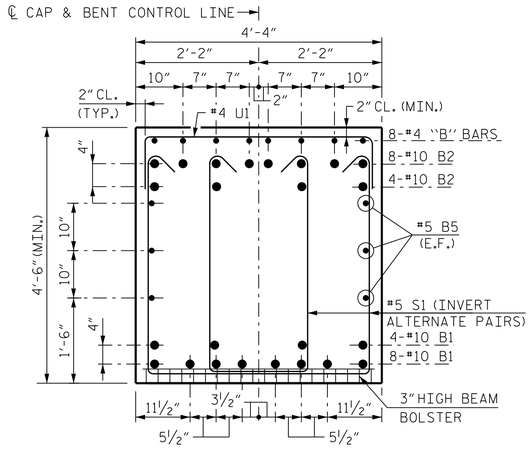
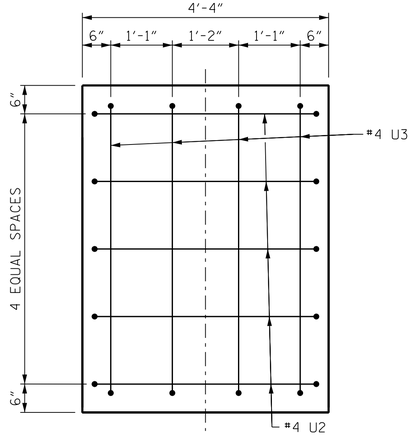
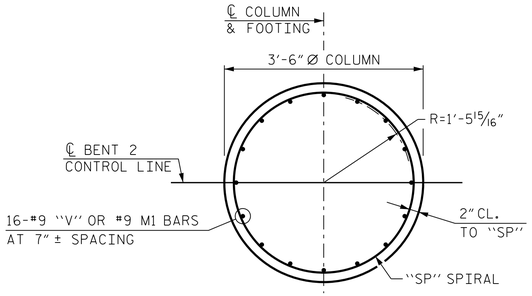


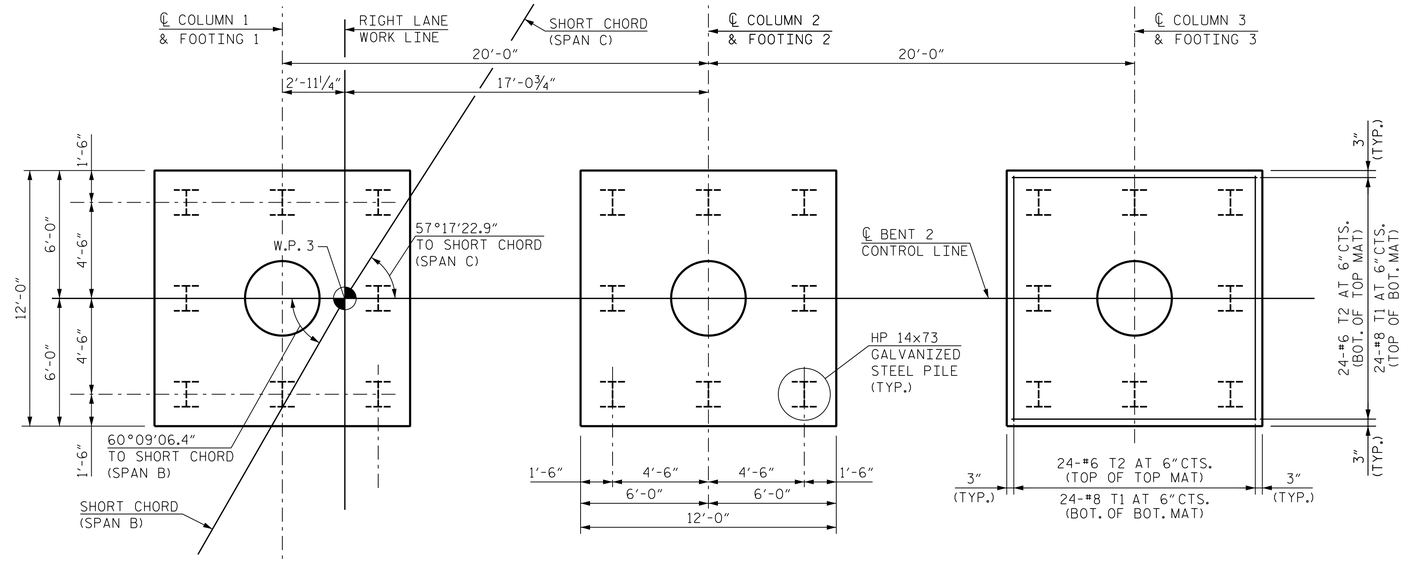
SECTION THROUGH CAP
SECTION A-A



END OF CAP DETAIL

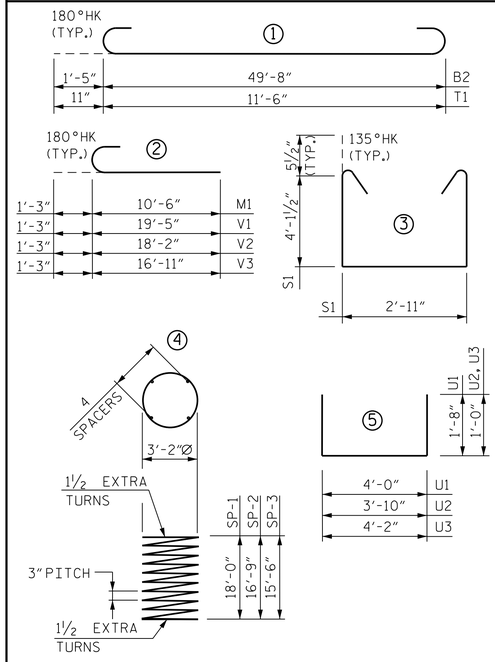


SECTION THROUGH COLUMN
SECTION B-B



PLAN OF FOOTINGS
(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	STR	49'-8"	2,565
B2	12	#10	1	52'-6"	2,711
B3	8	#4	STR	5'-8"	30
B4	32	#4	STR	10'-7"	226
B5	6	#5	STR	49'-8"	311
S1	116	#5	3	12'-1"	1,462
T1	144	#8	1	13'-4"	5,126
T2	144	#6	STR	11'-6"	2,487
M1	48	#9	2	11'-9"	1,918
U1	63	#4	5	7'-4"	309
U2	10	#4	5	5'-10"	39
U3	8	#4	5	7'-2"	38
V1	16	#9	2	20'-8"	1,124
V2	16	#9	2	19'-5"	1,056
V3	16	#9	2	18'-2"	988

REINFORCING STEEL					20,390 LBS.
SP-1	1	**	4	736'-7"	492
SP-2	1	**	4	687'-6"	459
SP-3	1	**	4	638'-5"	426

SPIRAL COLUMN REINFORCING STEEL	1,377 LBS.

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

CLASS "A" CONCRETE	
POUR 1 (FOOTINGS)	84.0 C.Y.
POUR 2 (COLUMNS)	17.5 C.Y.
POUR 3 (CAP)	39.6 C.Y.
TOTAL	141.1 C.Y.

HP 14x73 GALVANIZED STEEL PILES	
NO.	24
L.F.	1,440
PILE REDRIVES	12 EA.
FOUNDATION EXCAVATION FOR BENT	LUMP SUM
PILE DRIVING EQUIP. SET UP FOR HP 14 x 73 GALVANIZED STEEL PILES	24 EA.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 2
DETAILS AND BILL OF MATERIAL
RIGHT LANE

SITE 2R DWG. NO. 35

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #2

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DESIGN ENGINEER OF RECORD :	J. E. KEENE	DATE : FEB 2022

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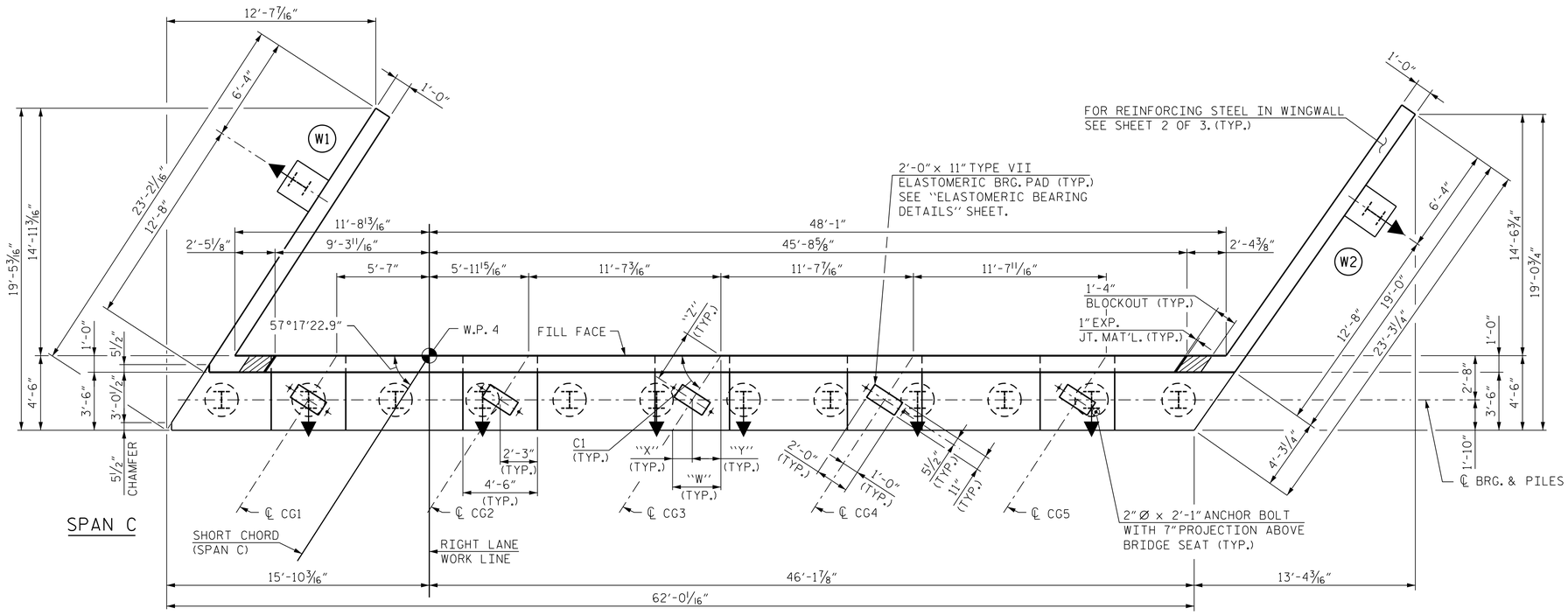
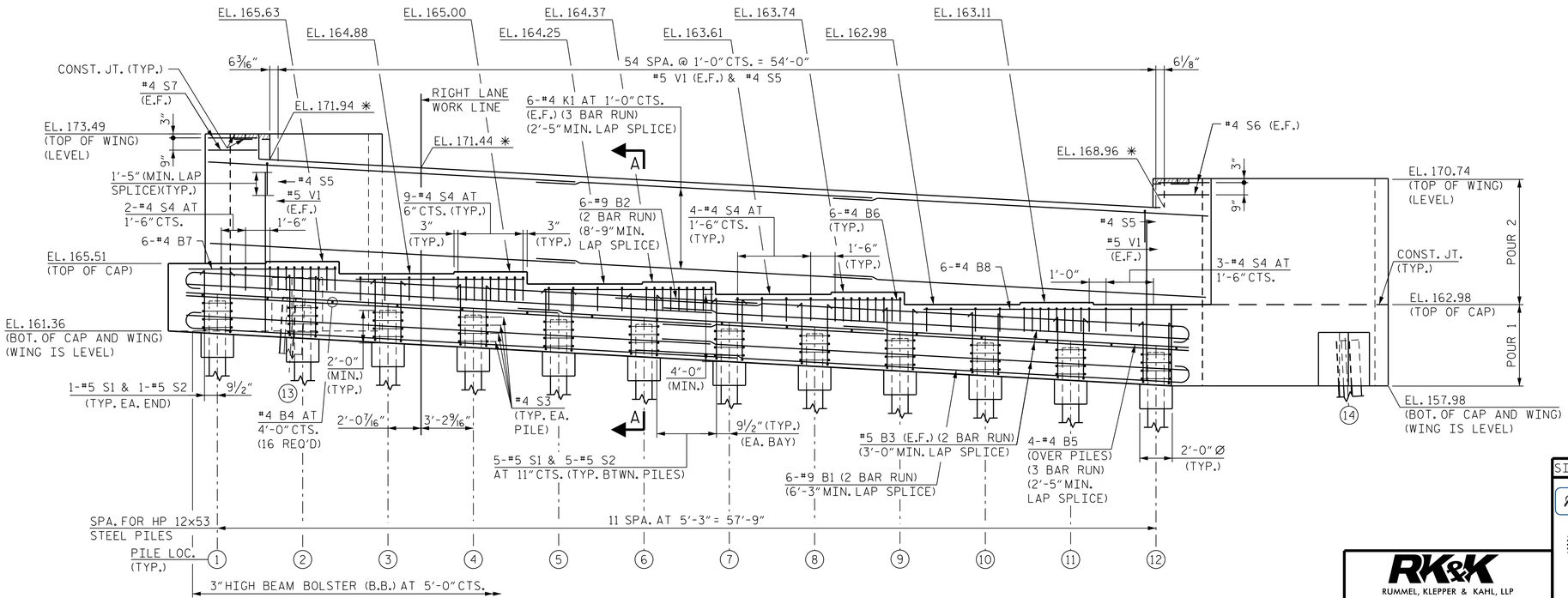


PLAN



ELEVATION

* ELEVATION AT FILL FACE

NOTES:

FOR SECTION A-A, SEE SHEET 3 OF 3.

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

FOR TEMPORARY DRAINAGE, SEE SHEET 3 OF 3.

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.

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

TOP OF PILE ELEVATION TABLE	
LOC.	ELEVATION
1	163.34
2	163.06
3	162.76
4	162.48
5	162.19
6	161.91
7	161.62
8	161.33
9	161.04
10	160.86
11	160.47
12	160.18
13	163.36
14	159.98

LEGEND:

HP 12x53 VERTICAL STEEL PILES

HP 12x53 STEEL PILES BATTERED 3:12

GIRDER DETAILS					
GIRDER	C1	"W"	"X"	"Y"	"Z"
CG1	57°21'26.2"	2'-10 9/16"	1'-2 1/16"	1'-8 1/2"	3'-1 15/16"
CG2	57°13'00.9"	2'-10 3/4"	1'-2 1/8"	1'-8 5/8"	3'-2 1/16"
CG3	57°04'30.9"	2'-10 15/16"	1'-2 3/16"	1'-8 3/4"	3'-2 1/8"
CG4	56°55'56.1"	2'-11 3/16"	1'-2 5/16"	1'-8 7/8"	3'-2 3/16"
CG5	56°47'16.5"	2'-11 3/8"	1'-2 3/8"	1'-9"	3'-2 1/4"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
PLAN AND ELEVATION

RIGHT LANE

SITE 2R DWG. NO. 36

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

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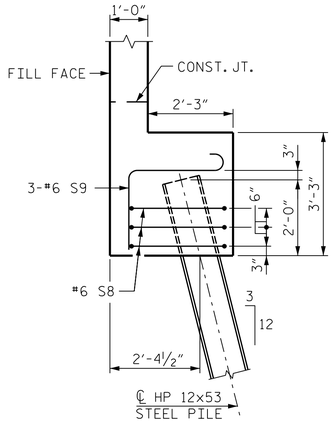
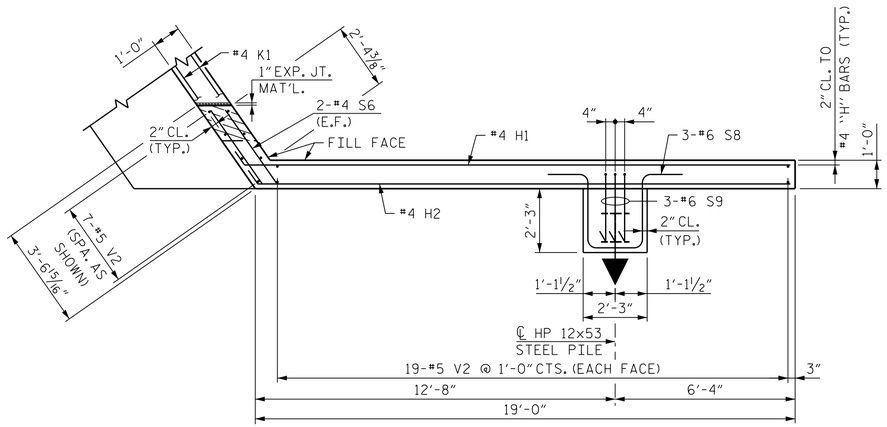
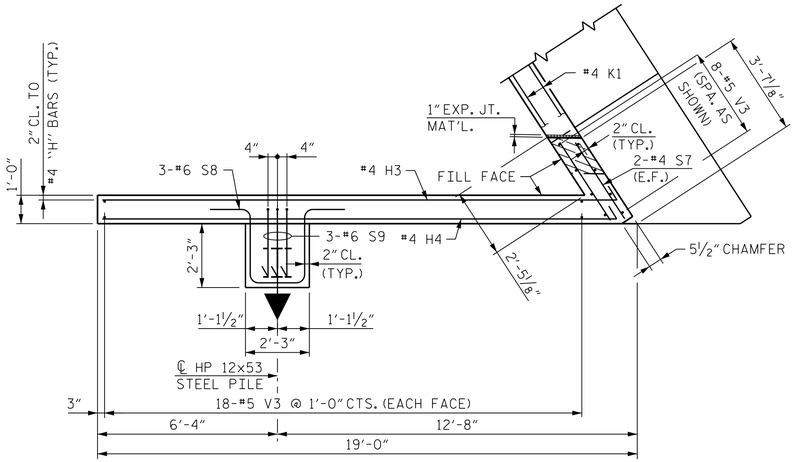


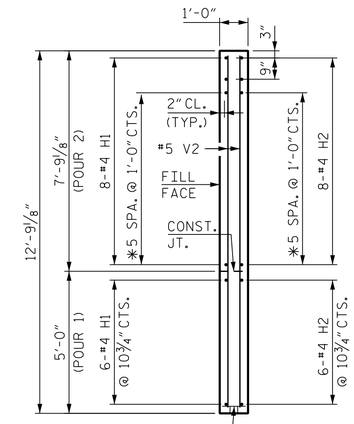
SECTION A-A



PLAN OF RIGHT WINGWALL

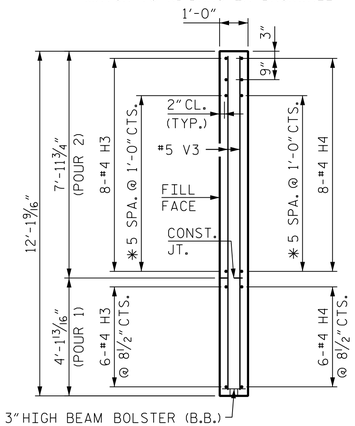


PLAN OF LEFT WINGWALL



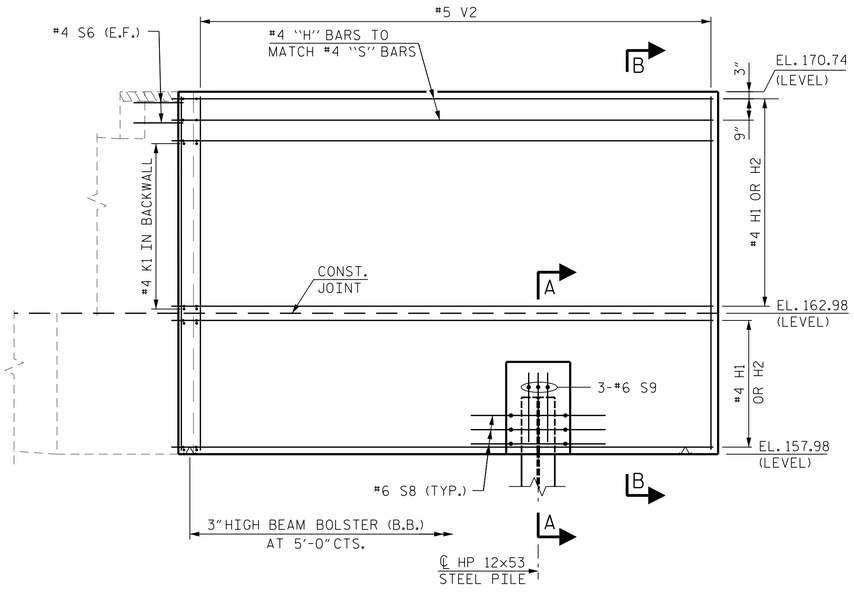
SECTION B-B

* MATCH TO K1 BARS IN BACKWALL

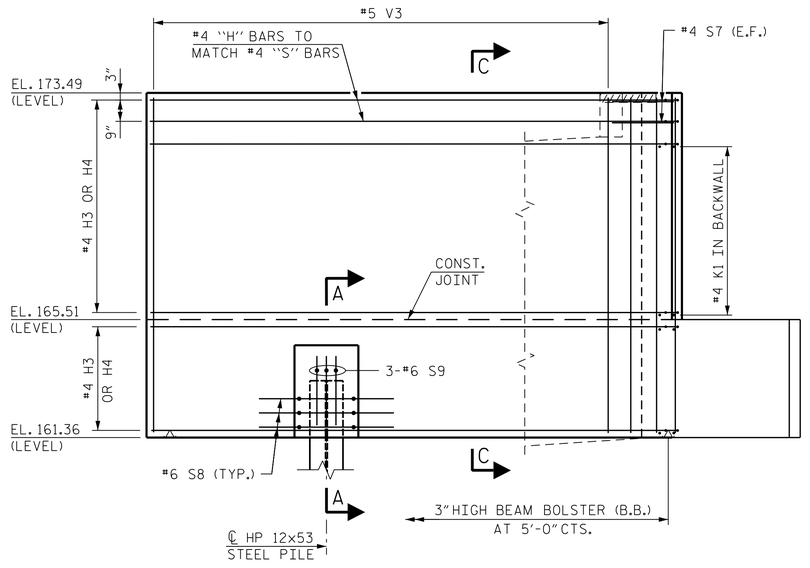


SECTION C-C

* MATCH TO K1 BARS IN BACKWALL



ELEVATION OF RIGHT WINGWALL



ELEVATION OF LEFT WINGWALL

RIGHT WINGWALL DETAILS (W2)

LEFT WINGWALL DETAILS (W1)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WINGWALL DETAILS

RIGHT LANE

SITE 2R DWG. NO.37

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #2

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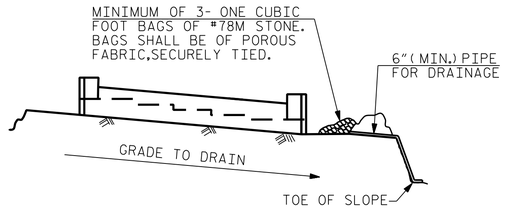
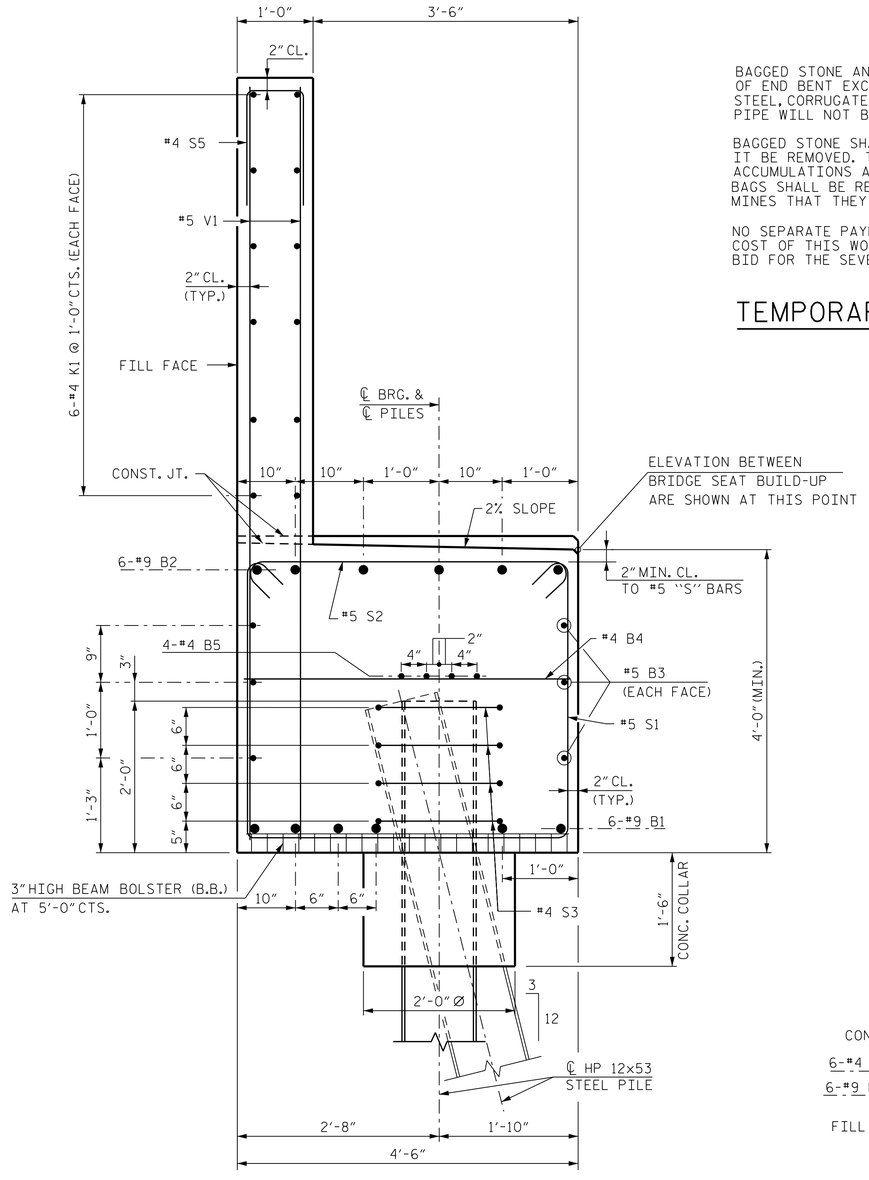


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

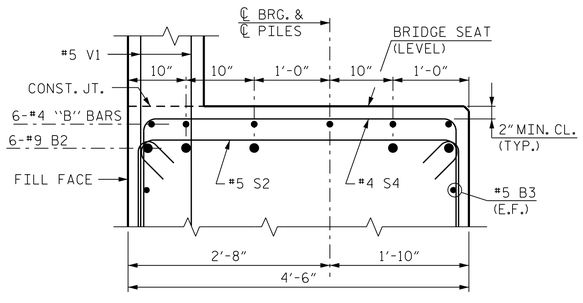
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



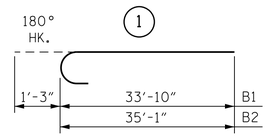
SECTION A-A

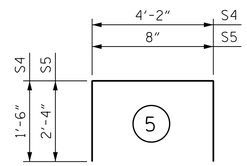
(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)

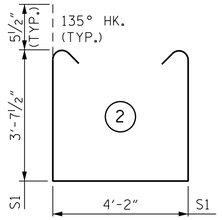


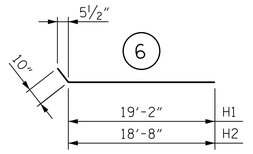
BRG. SEAT DETAIL

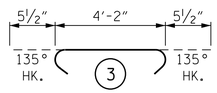
BAR TYPES

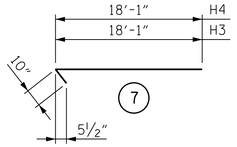


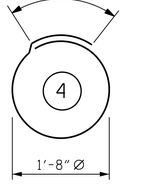


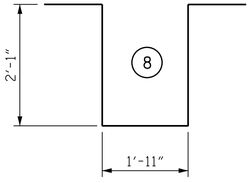


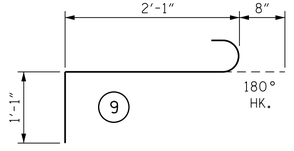












NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	35'-1"	1,431
B2	12	#9	1	36'-4"	1,472
B3	12	#5	STR	32'-3"	404
B4	16	#4	STR	4'-2"	45
B5	12	#4	STR	22'-1"	177
B6	18	#4	STR	10'-3"	123
B7	6	#4	STR	7'-5"	30
B8	6	#4	STR	15'-0"	60
H1	14	#4	6	20'-0"	187
H2	14	#4	6	19'-6"	182
H3	14	#4	7	18'-11"	177
H4	14	#4	7	18'-11"	177
K1	36	#4	STR	22'-1"	531
S1	57	#5	2	12'-4"	733
S2	57	#5	3	5'-1"	302
S3	48	#4	4	6'-6"	208
S4	66	#4	5	7'-2"	316
S5	55	#4	5	5'-4"	196
S6	4	#4	STR	3'-2"	8
S7	4	#4	STR	2'-10"	8
S8	6	#6	8	8'-11"	80
S9	6	#6	9	3'-10"	35
V1	110	#5	STR	10'-3"	753
V2	45	#5	STR	12'-3"	575
V3	44	#5	STR	11'-8"	535

REINFORCING STEEL	8,737 LBS.
CLASS "A" CONCRETE	
POUR 1 (CAP, LOWER WINGS AND COLLARS)	52.7 C.Y.
POUR 2 (BACKWALL & UPPER WINGS)	25.9 C.Y.
TOTAL	78.6 C.Y.
HP 12x53 STEEL PILES	
NO.	14
L.F.	660
PILE REDRIVES	6 EA.
PILE DRIVING EQUIPMENT SETUP FOR HP 12 x 53 STEEL PILES	14 EA.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2
MISCELLANEOUS DETAILS AND BILL OF MATERIAL

RIGHT LANE

SITE 2R DWG. NO.38

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : J. E. KEENE DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY F. KEENE
2/4/2022

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1			3			TOTAL SHEETS
2			4			41

STR. #2

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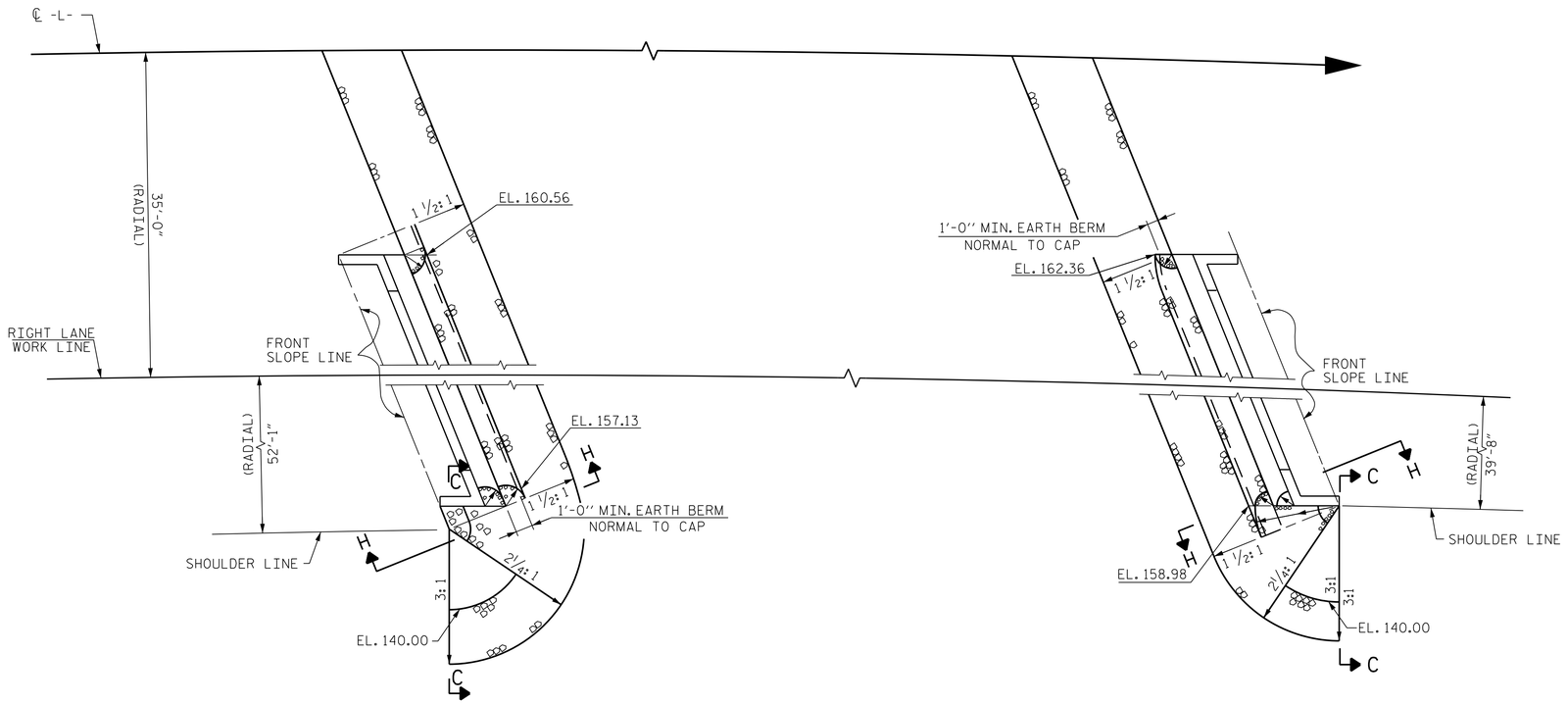
2/4/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 2\RIGHT LANE\FINAL\U2519BA_448.SD_E2C.dgn

NOTES :

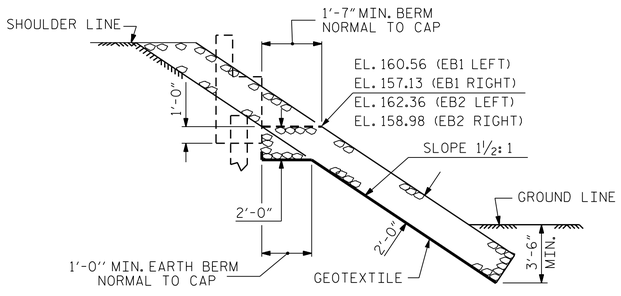
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



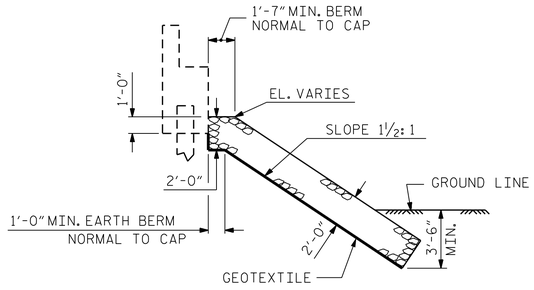
END BENT 1

END BENT 2

PLAN

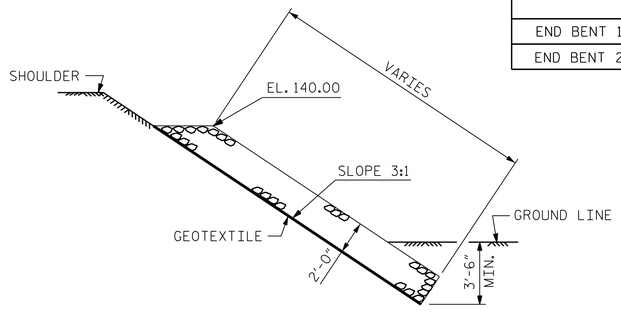


SECTION H-H



℄ SECTION

BERM RIP RAPPED



SECTION C-C

ESTIMATED QUANTITIES		
BRIDGE @ STA. 397+90.00 -L- (RIGHT BRIDGE)	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	830	920
END BENT 2	680	755

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SITE 2R DWG. NO.39

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE

2/4/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

RIGHT LANE

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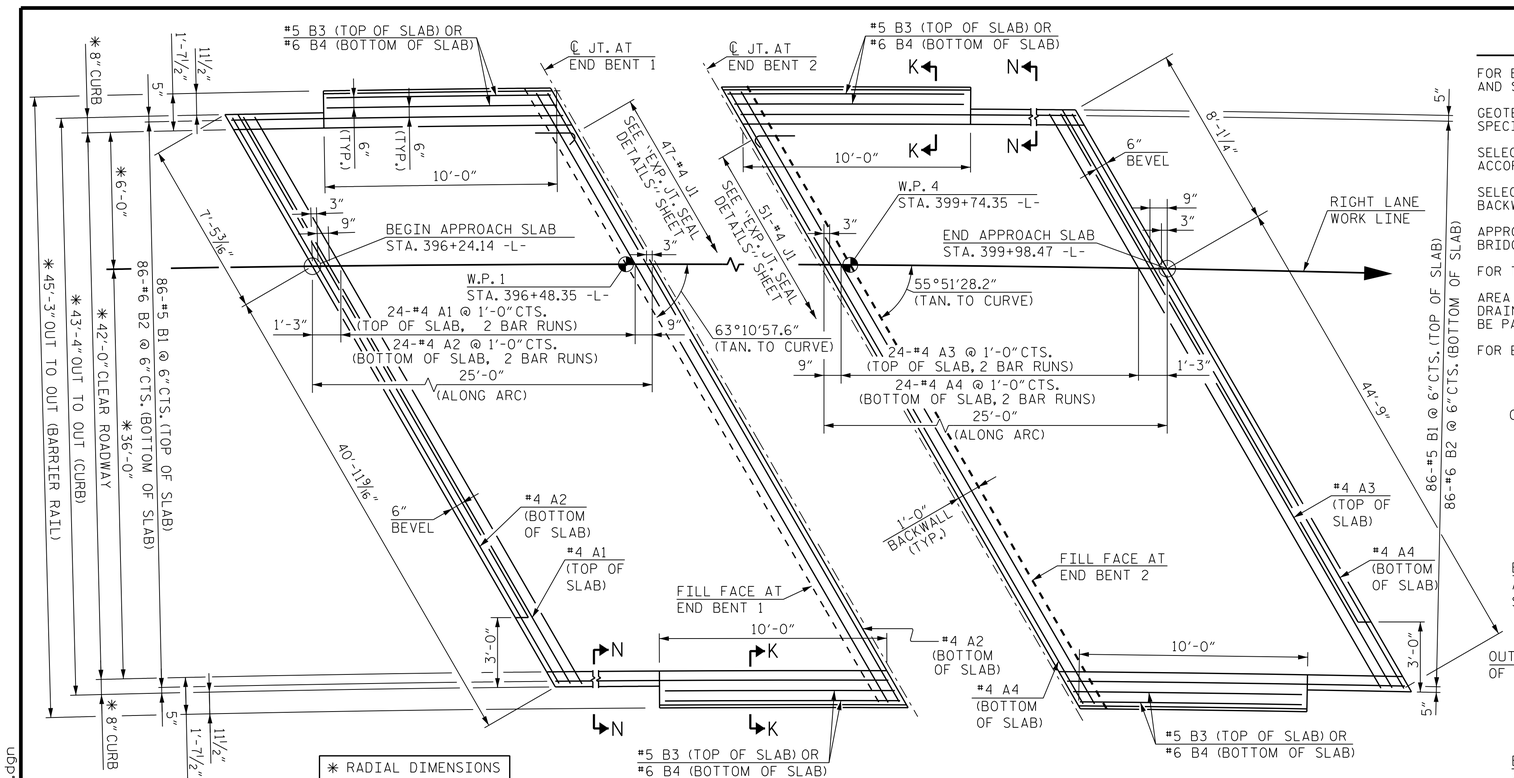
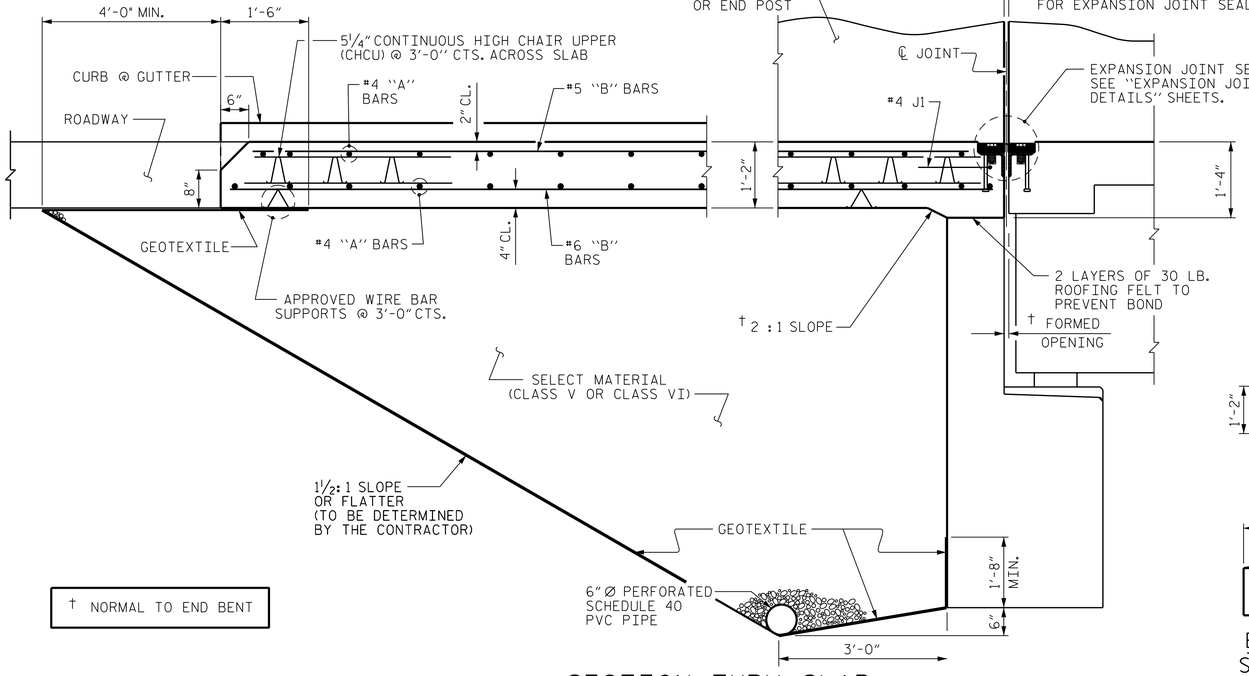


PLAN AT END BENT 1

PLAN AT END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

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



SECTION THRU SLAB

(TYPE I - STANDARD APPROACH FILL)

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

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

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

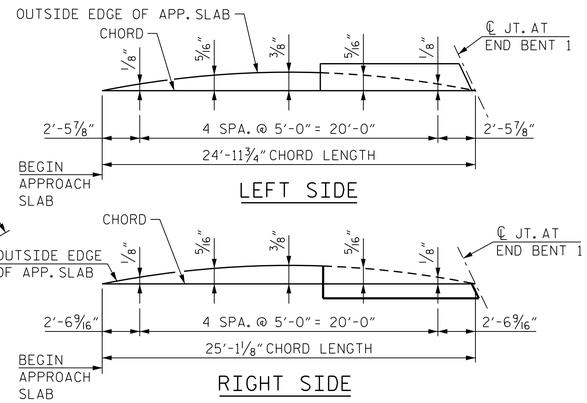
SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

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

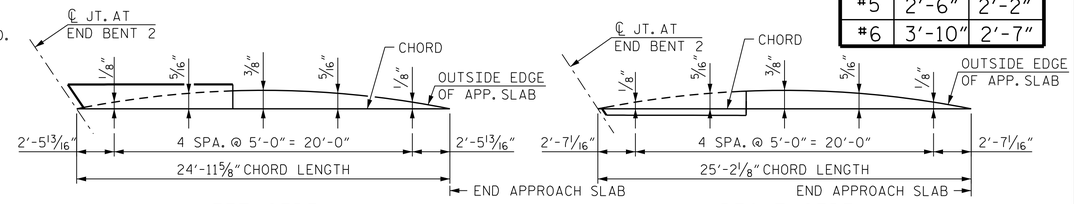
FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

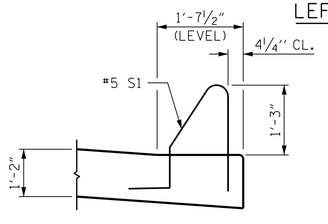
FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.



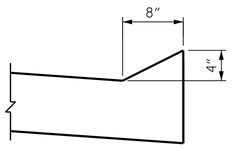
ARC OFFSETS AT END BENT 1



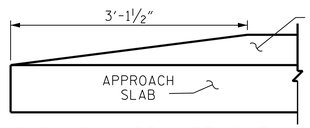
ARC OFFSETS AT END BENT 2



SECTION K-K



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

BILL OF MATERIAL

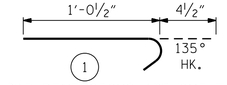
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	26'-2"	874
A2	52	#4	STR	26'-1"	906
* B1	86	#5	STR	23'-6"	2,108
B2	86	#6	STR	24'-5"	3,154
* B3	4	#5	STR	9'-9"	41
B4	4	#6	STR	9'-9"	59
* J1	47	#4	1	1'-5"	44
REINFORCING STEEL					4,119 LBS.
* EPOXY COATED REINFORCING STEEL					3,067 LBS.
CLASS AA CONCRETE					47.8 C.Y.

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A3	50	#4	STR	28'-2"	941
A4	52	#4	STR	28'-1"	976
* B1	86	#5	STR	23'-6"	2,108
B2	86	#6	STR	24'-5"	3,154
* B3	4	#5	STR	9'-9"	41
B4	4	#6	STR	9'-9"	59
* J1	51	#4	1	1'-5"	48
REINFORCING STEEL					4,189 LBS.
* EPOXY COATED REINFORCING STEEL					3,138 LBS.
CLASS AA CONCRETE					47.8 C.Y.

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

* QUANTITIES FOR BARRIER ARE NOT INCLUDED. SEE SHEET 2 OF 2.

SPLICE LENGTHS

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
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RALEIGH

STANDARD
BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

RIGHT LANE

SITE 2R DWG. NO. 40

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NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #2

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DESIGN ENGINEER OF RECORD : J. E. KEENE DATE : FEB 2022

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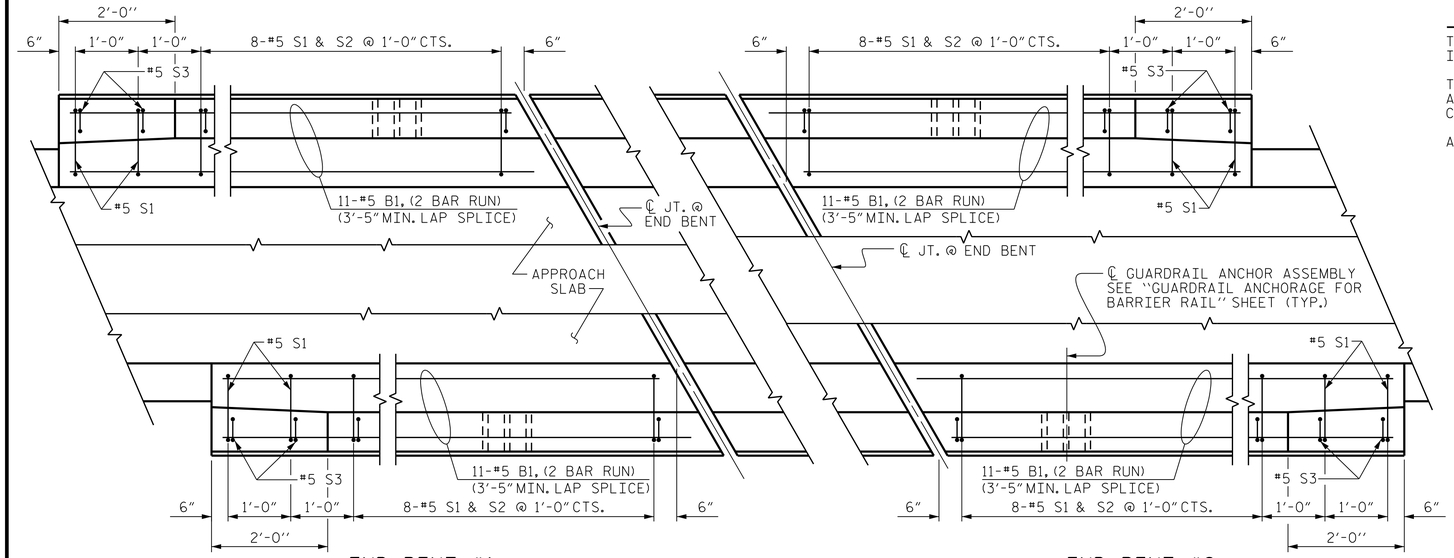


END BENT #1

END BENT #2

PLAN OF BARRIER RAIL

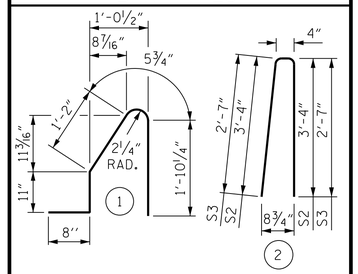
NOTES

THE COST OF THE BARRIER RAIL ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "CONCRETE BARRIER RAIL".

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES



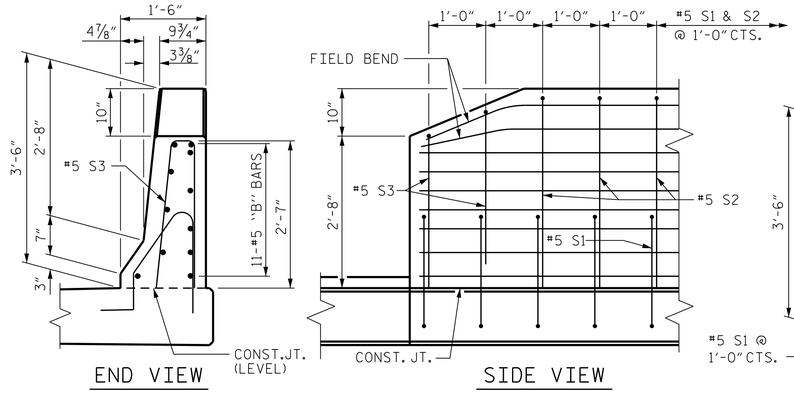
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BARRIER RAIL ONLY

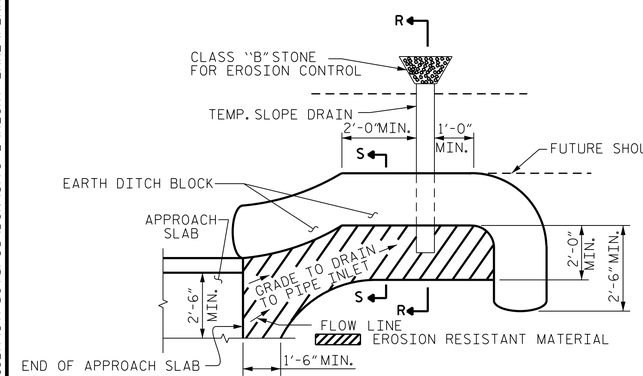
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	88	#5	STR	6'-10"	627
✳S1	40	#5	1	5'-1"	212
✳S2	32	#5	2	7'-0"	234
✳S3	8	#5	2	5'-6"	46

✳EPOXY COATED REINFORCING STEEL	1119 LBS.
CLASS AA CONCRETE	56 C. Y.
CONCRETE BARRIER RAIL	41.3 LIN. FT.



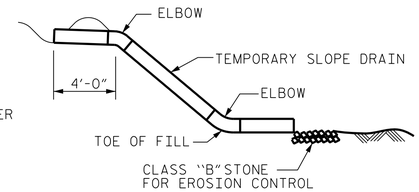
END OF RAIL DETAILS

SECTION THRU RAIL

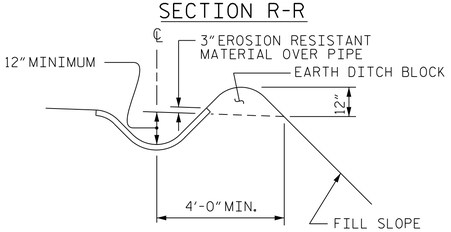


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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



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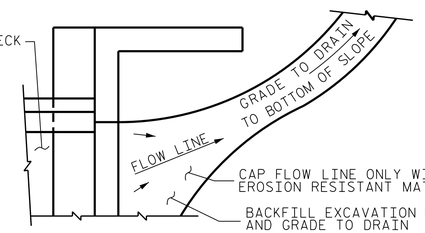

NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 397+90.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

RIGHT LANE

STR. #2

SITE 2R DWG. NO. 41

DocuSigned by: Jeremy E. Keene
NORTH CAROLINA PROFESSIONAL SEAL 040305 ENGINEER JEREMY E. KEENE
2/4/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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F.A. PROJECT NO. NHF-0100(24)

22+00 23+00 24+00 25+00

PVI = 23+00.00 -Y14-
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V.C. = 826.00 FT.
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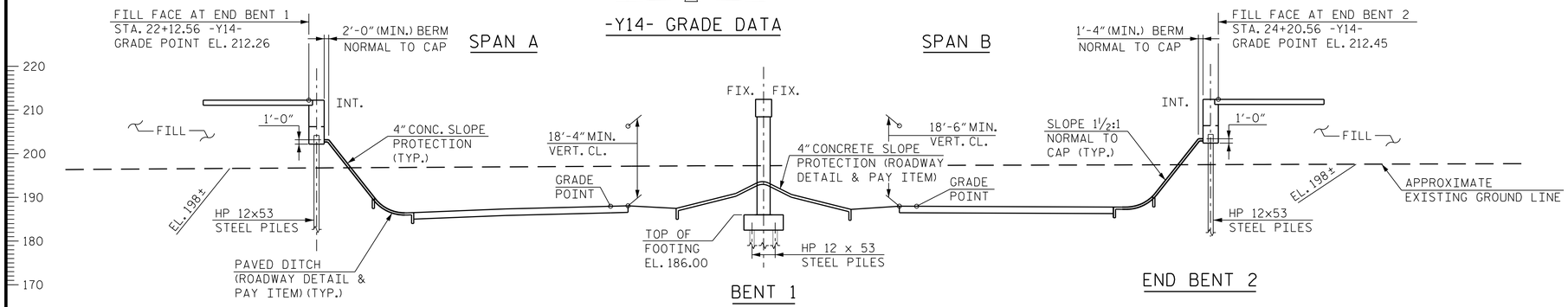

SECTION ALONG -Y14-

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

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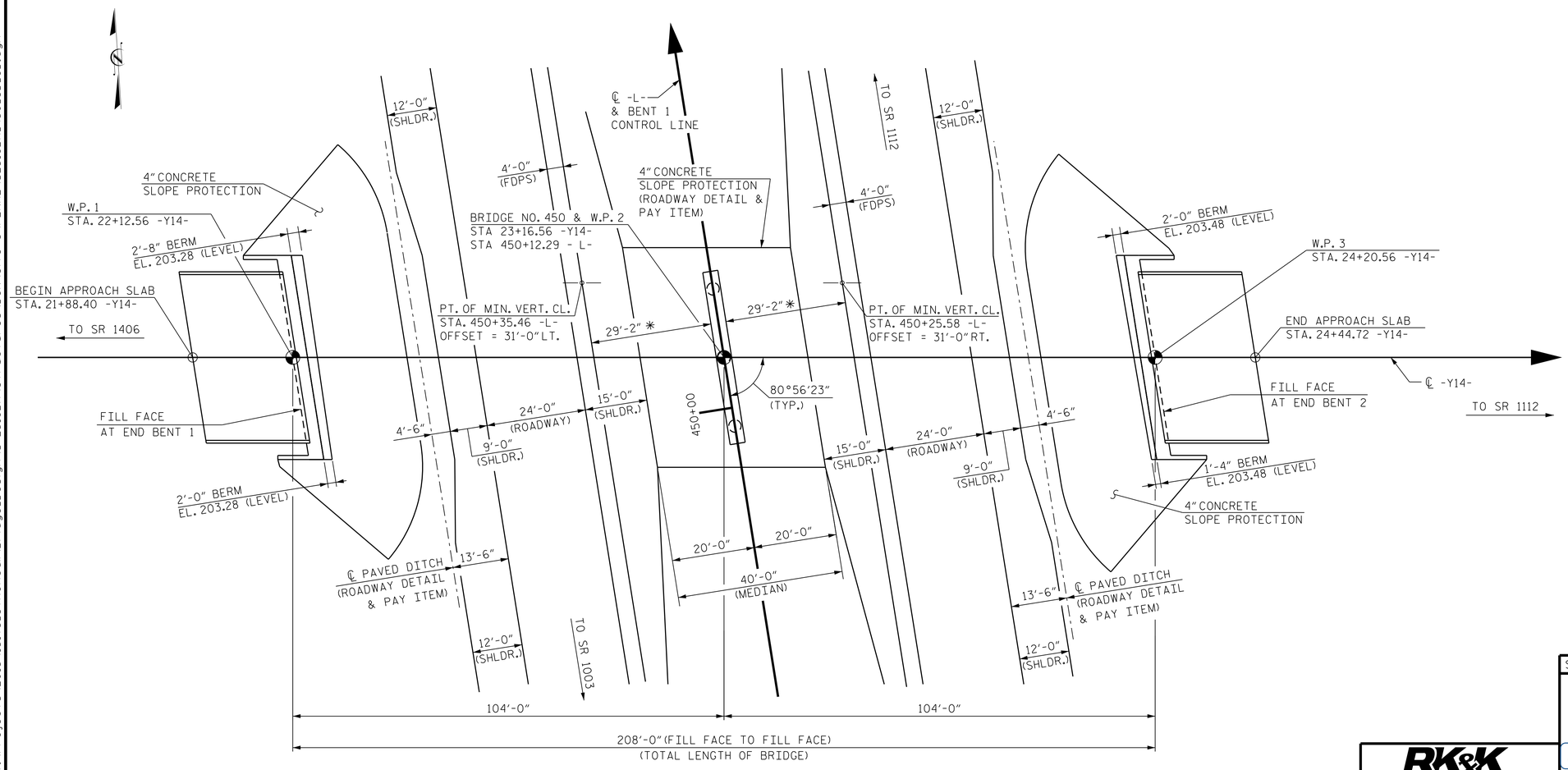
EL. = 182.52
V.C. = 360.00 FT.
(-)0.6000% (+)0.9000%

-L- GRADE DATA



PLAN

(PILES NOT SHOWN FOR CLARITY)

* MINIMUM HORIZONTAL CLEARANCE FROM FACE OF CAP TO EDGE OF PAVEMENT

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-
450+12.29 -L-

SHEET 1 OF 4 BRIDGE NO. 450

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON KING ROAD OVER FAYETTEVILLE OUTER LOOP BETWEEN SR 1406 AND SR 1112

SITE 3 DWG. NO. 1

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Docusigned by: Jeremy Pampuch
3/22/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

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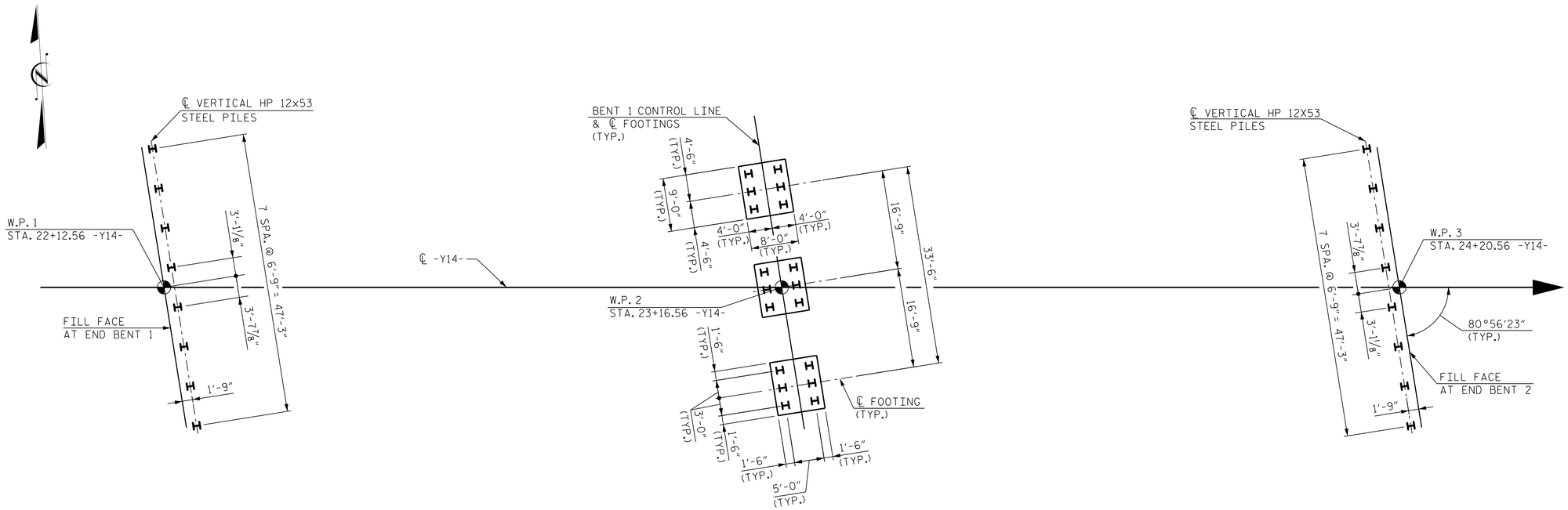

FOUNDATION LAYOUT

ALL PILES ARE VERTICAL HP 12x53 STEEL PILES
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.

FOUNDATION NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.
DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 155 TONS PER PILE.
PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 135 TONS PER PILE.
DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 180 TONS PER PILE.
PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.
DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 155 TONS PER PILE.
TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING, OR REDRIVING IS REQUIRED FOR END BENT NO. 1 OR 2.
FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING, OR REDRIVING IS REQUIRED AT BENT NO. 1.
FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-
450+12.29 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
GENERAL DRAWING
FOUNDATION LAYOUT

SITE 3 DWG. NO. 2

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

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1			3			TOTAL SHEETS
2			4			32

STR. #5

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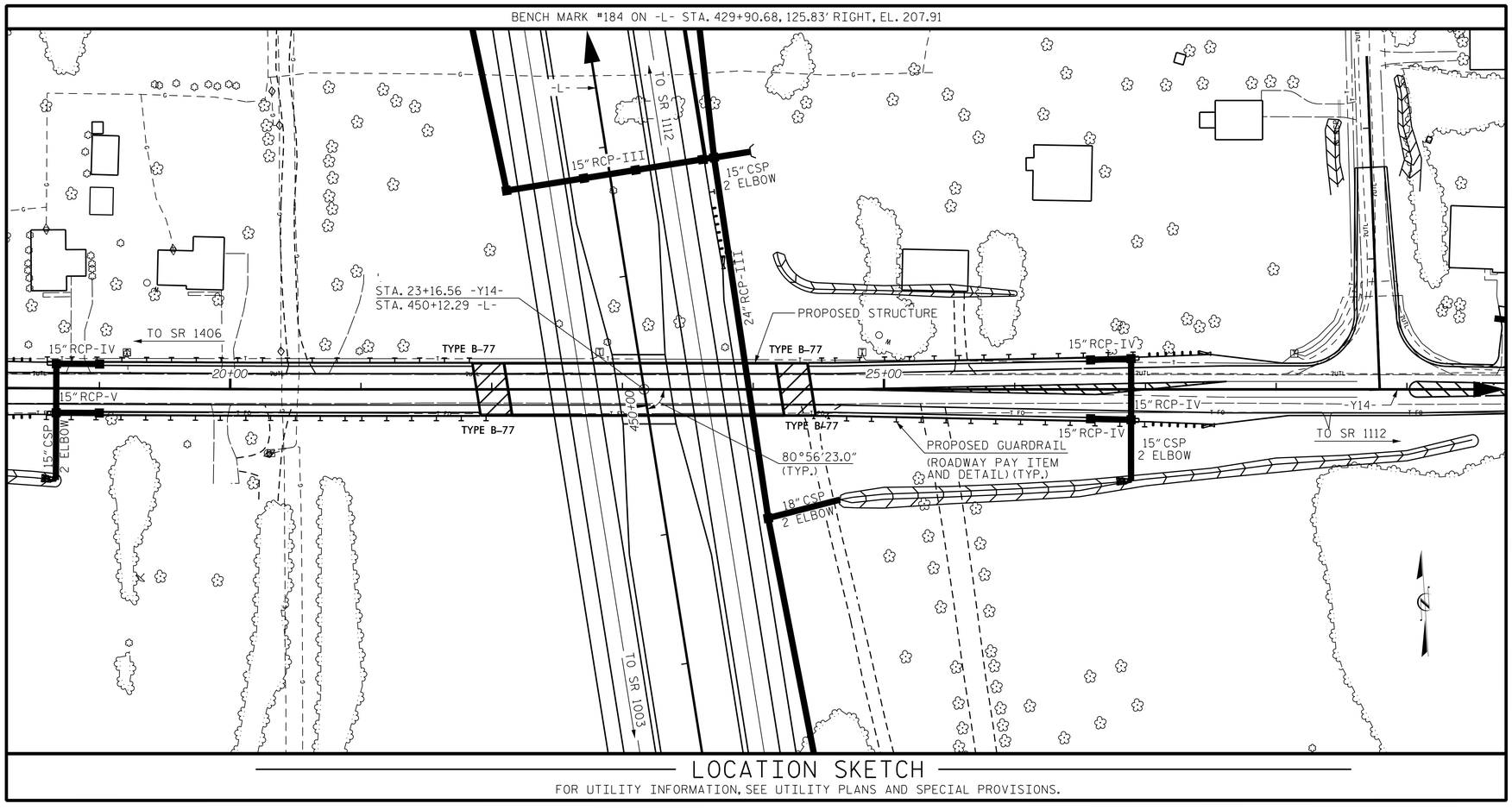
2/7/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 3\FINAL\U2519BA_450_SD_FL.dgn

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS		PILE REDRIVES EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12 X 53 STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS
	LUMP SUM	EA.	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EA.	NO.	LIN.FT.	EA.	LIN.FT.	SQ.YDS.	LUMP SUM
SUPERSTRUCTURE	———	———	8,924	9,484	———	LUMP SUM	———	———	10	1027.71	———	—	———	———	412.63	———	LUMP SUM
END BENT 1	———	1	———	———	35.2	———	4,523	———	—	———	8	8	456	4	———	324	———
BENT 1	LUMP SUM	1	———	———	64.9	———	10,135	1,165	—	———	18	18	1,278	9	———	———	———
END BENT 2	———	———	———	———	35.6	———	4,806	———	—	———	8	8	536	4	———	327	———
TOTAL	LUMP SUM	2	8,924	9,484	135.7	LUMP SUM	19,464	1,165	10	1,027.71	34	34	2,270	17	412.63	651	LUMP SUM



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 kg) OF REINFORCING STEEL, ONE 30 INCH (760 mm) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 kg) OF REINFORCING STEEL, TWO 30 INCH (760 mm) SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ATUALLY 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 REPLACING REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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

REMOVEABLE 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 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.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-
450+12.29 -L-

SHEET 3 OF 4

SITE 3 DWG. NO. 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH
GENERAL NOTES AND
TOTAL BILL OF MATERIALS

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

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1			3			TOTAL SHEETS
2			4			32

STR. #5

DRAWN BY : J. COOK DATE : FEB 2022
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DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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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 FACTOR (RF)	TONS= W X RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE							COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γLL)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)	DISTRIBUATION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)	LIVE-LOAD FACTORS (γLL)	DISTRIBUATION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (FT)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	**1.08**	-	1.75	0.800	1.43	A	E	50.6	0.920	1.46	A	I	9.5	0.8	0.800	**1.08**	A	E	50.6	-
		HL-93 (OPERATING)	N/A		1.86	-	1.35	0.800	1.86	A	E	50.6	0.920	1.93	A	I	9.5	N/A	-	-	-	-	-	-
		HS-20 (INVENTORY)	36.000	⟨2⟩	**1.50**	54.000	1.75	0.800	2.01	A	E	50.6	0.920	2.00	A	I	9.5	0.80	0.800	**1.50**	A	E	50.6	-
		HS-20 (OPERATING)	36.000		2.60	93.600	1.35	0.800	2.60	A	E	50.6	0.920	2.63	A	I	9.5	N/A	-	-	-	-	-	-
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.58	48.330	1.40	0.800	5.97	A	E	50.6	0.920	6.43	A	I	9.5	0.80	0.800	3.58	A	E	50.6	-
		SNGARBS2	20.000		2.59	51.800	1.40	0.800	4.31	A	E	50.6	0.920	4.46	A	I	9.5	0.80	0.800	2.59	A	E	50.6	-
		SNAGRIS2	22.000		2.42	53.240	1.40	0.800	4.03	A	E	50.6	0.920	4.10	A	I	9.5	0.80	0.800	2.42	A	E	50.6	-
		SNCOTTS3	27.250		1.78	48.505	1.40	0.800	2.97	A	E	50.6	0.920	3.13	A	I	9.5	0.80	0.800	1.78	A	E	50.6	-
		SNAGGRS4	34.925		1.46	50.991	1.40	0.800	2.43	A	E	50.6	0.920	2.53	A	I	9.5	0.80	0.800	1.46	A	E	50.6	-
		SNS5A	35.550		1.43	50.837	1.40	0.800	2.38	A	E	50.6	0.920	2.54	A	I	9.5	0.80	0.800	1.43	A	E	50.6	-
		SNS6A	39.950		1.30	51.935	1.40	0.800	2.16	A	E	50.6	0.920	2.29	A	I	9.5	0.80	0.800	1.30	A	E	50.6	-
		SNS7B	42.000		1.23	51.660	1.40	0.800	2.06	A	E	50.6	0.920	2.22	A	I	9.5	0.80	0.800	1.23	A	E	50.6	-
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.58	52.140	1.40	0.800	2.63	A	E	50.6	0.920	2.76	A	I	9.5	0.80	0.800	1.58	A	E	50.6	-
		TNT4A	33.075		1.58	52.259	1.40	0.800	2.63	A	E	50.6	0.920	2.71	A	I	9.5	0.80	0.800	1.58	A	E	50.6	-
		TNT6A	41.600		1.28	53.248	1.40	0.800	2.13	A	E	50.6	0.920	2.33	A	I	9.5	0.80	0.800	1.28	A	E	50.6	-
		TNT7A	42.000		1.28	53.760	1.40	0.800	2.13	A	E	50.6	0.920	2.29	A	I	9.5	0.80	0.800	1.28	A	E	50.6	-
		TNT7B	42.000		1.31	55.020	1.40	0.800	2.18	A	E	50.6	0.920	2.18	A	I	9.5	0.80	0.800	1.31	A	E	50.6	-
		TNAGRIT4	43.000		1.26	54.180	1.40	0.800	2.10	A	E	50.6	0.920	2.11	A	I	9.5	0.80	0.800	1.26	A	E	50.6	-
		TNAGT5A	45.000		1.19	53.550	1.40	0.800	1.98	A	E	50.6	0.920	2.07	A	I	9.5	0.80	0.800	1.19	A	E	50.6	-
		TNAGT5B	45.000	⟨3⟩	**1.18**	53.100	1.40	0.800	1.97	A	E	50.6	0.920	2.01	A	I	9.5	0.80	0.800	**1.18**	A	E	50.6	-

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. PRESTRESSED GIRDERS WERE DESIGNED USING SIMPLE SPAN ANALYSIS.
2. ALL DISTANCES ARE MEASURED FROM THE CENTERLINE OF BEARING AT THE LEFT END OF SPAN.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

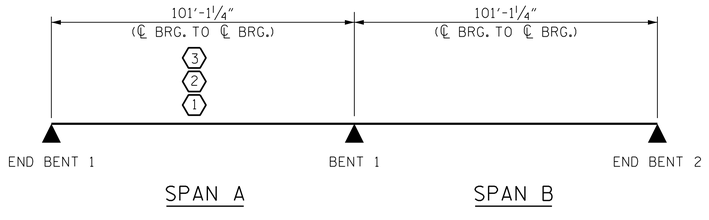
⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - FIRST INTERIOR GIRDER
E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-
450+12.29 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

SITE 3 DWG. NO. 4

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Jeremy Pampuch
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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2/7/2022
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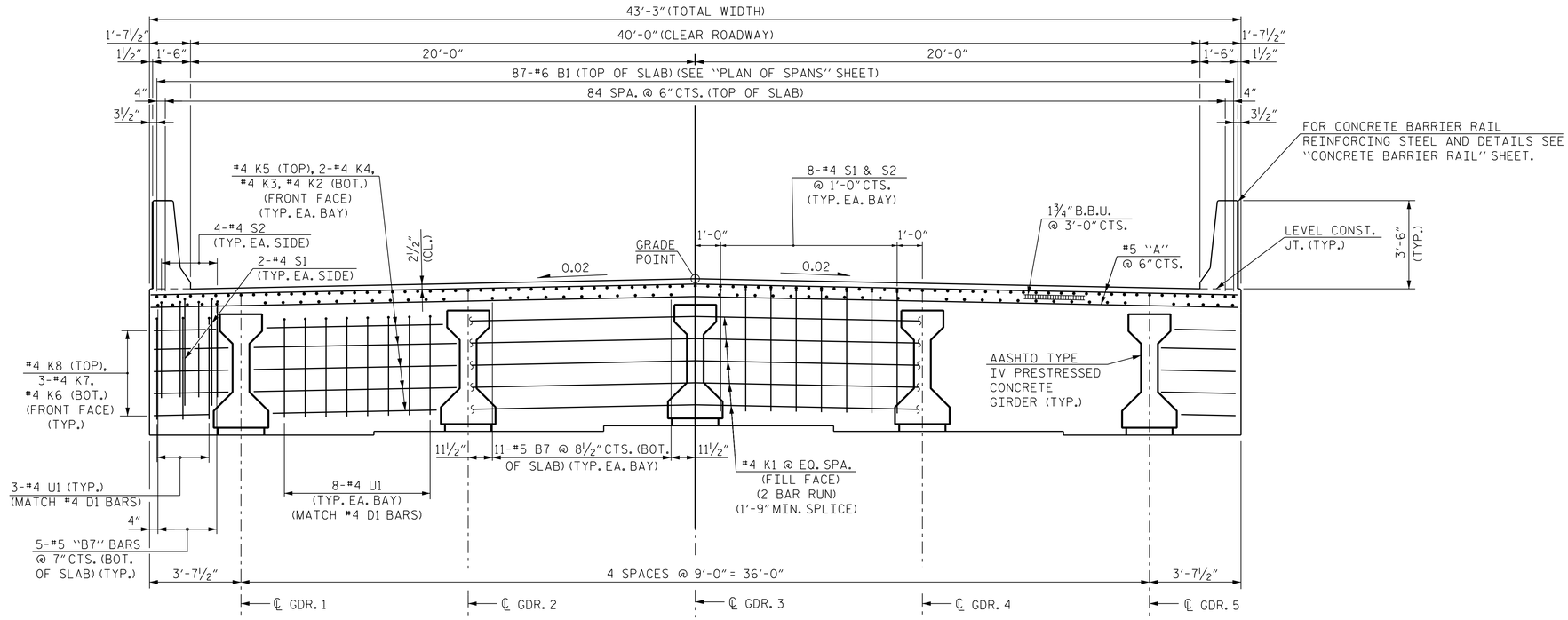
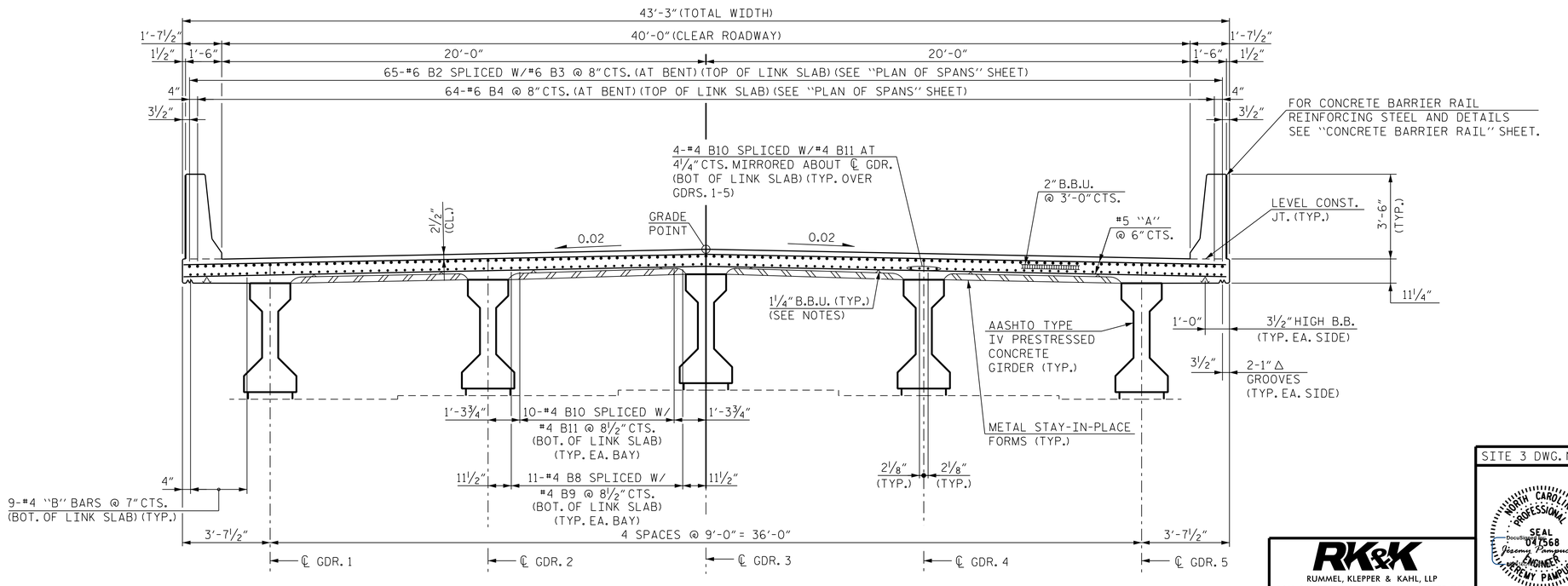


TYPICAL SECTION AT INTEGRAL END BENT



TYPICAL SECTION AT BENT

SHOWING LINK SLAB REGION

NOTES:

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

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

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

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTIONS

SITE 3 DWG. NO. 5

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Jeremy Pampuch
2/7/2022

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STR. #5

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DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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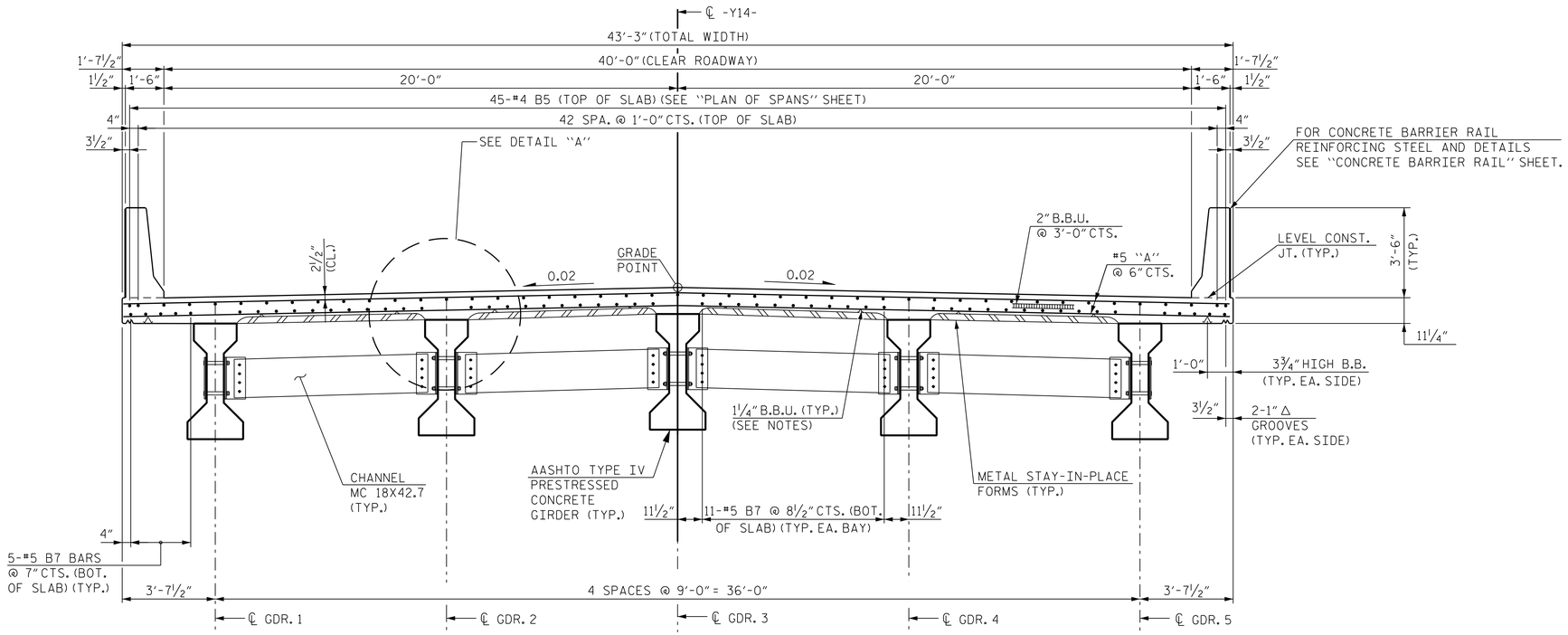
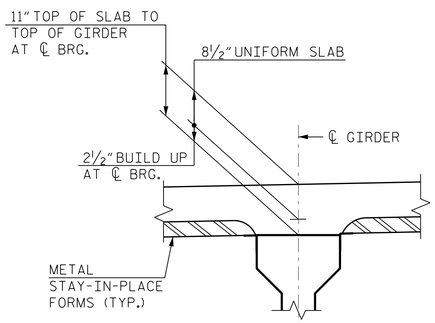
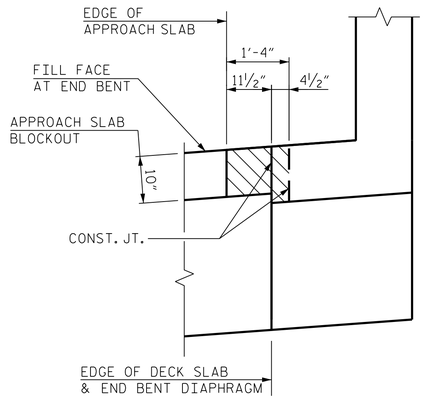


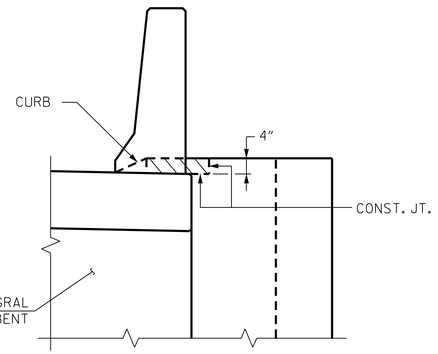
TYPICAL SECTION AT INTERMEDIATE DIAPHRAGMS



DETAIL "A"



PLAN



ELEVATION

BLOCKOUT IN WINGWALL

THE CONCRETE IN THE SHADED AREA
SHALL BE POURED AFTER THE BARRIER RAIL
IS CAST IF SLIP FORMING IS USED.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION
AND DETAILS

SITE 3 DWG. NO. 6

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Jeremy Pampuch
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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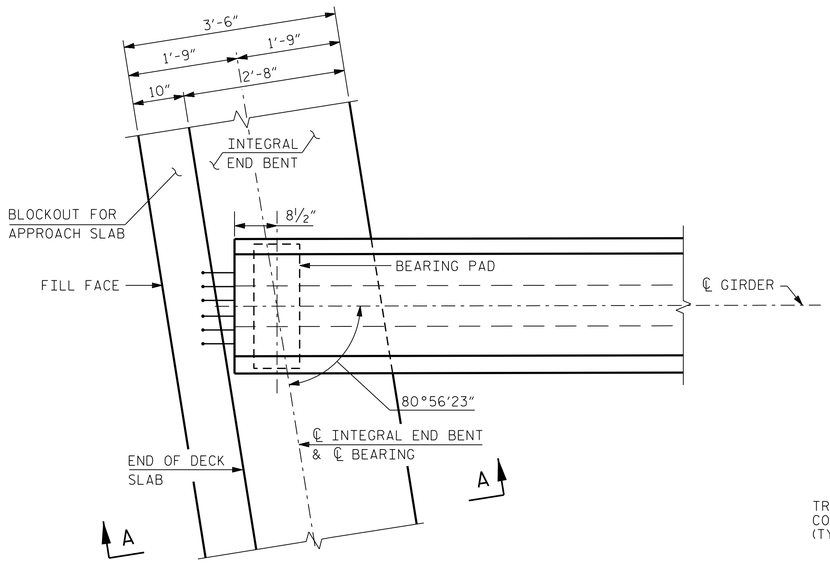
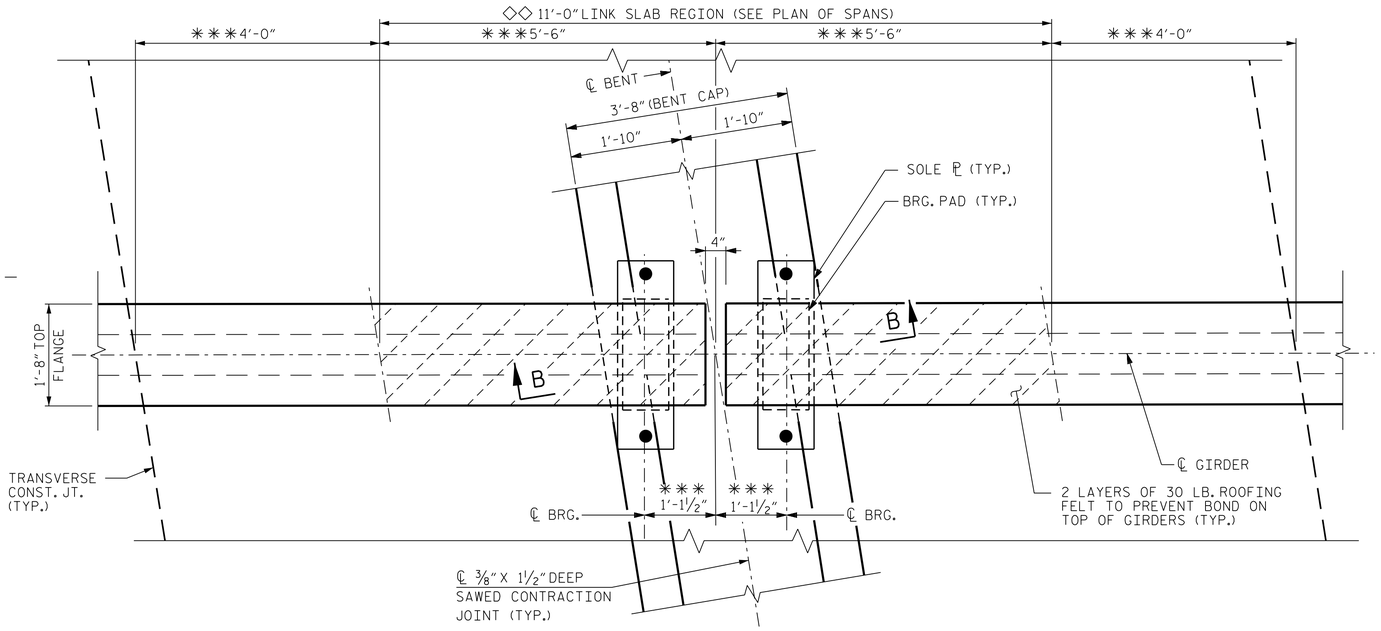


PLAN OF GIRDER AT INTEGRAL END BENT

(END BENT 1 SHOWN, END BENT 2 SIMILAR)



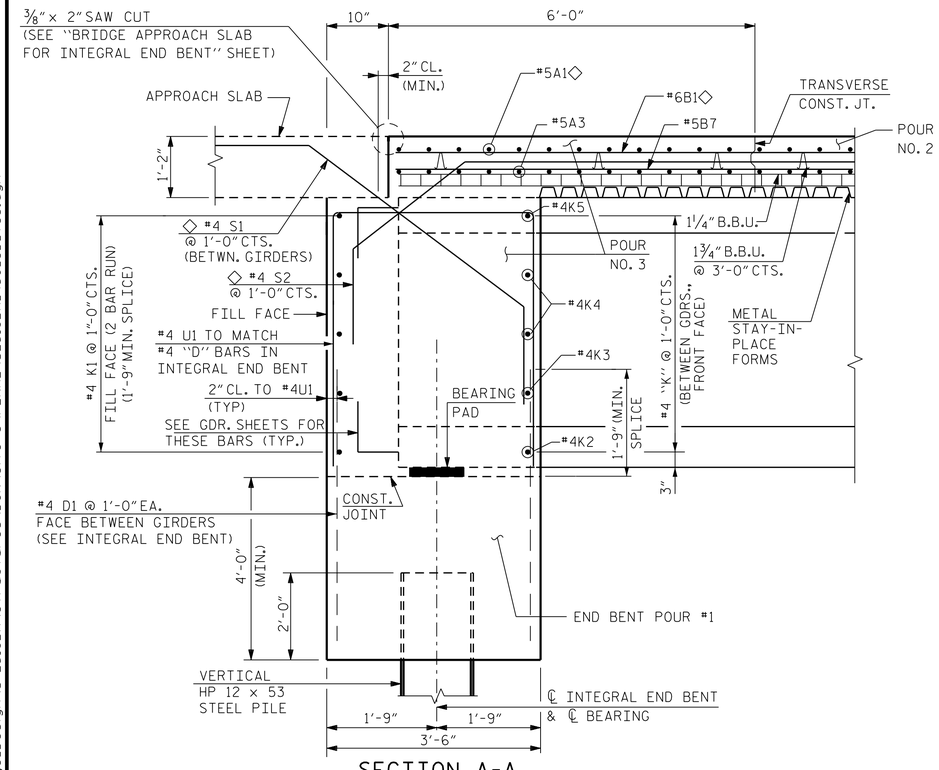
PLAN DETAIL OF INTERIOR BENT

✱✱✱ MEASURED ALONG ℄ GIRDER

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

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

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



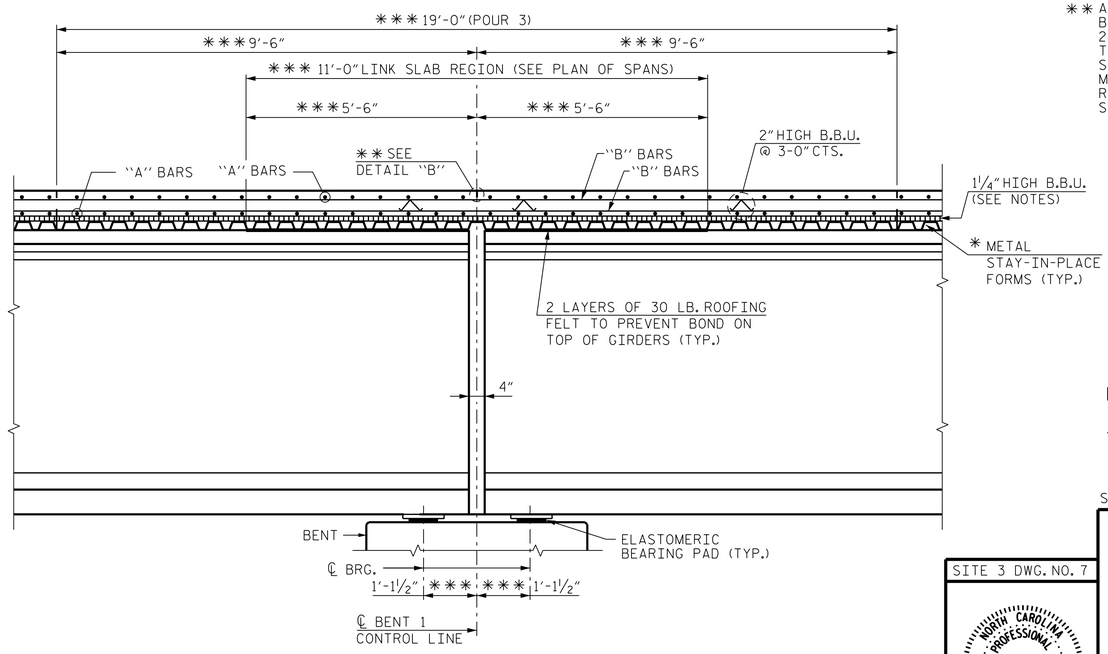
SECTION A-A

◇ EPOXY COATED BARS

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)

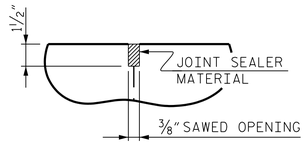
(END BENT 1 SHOWN, END BENT 2 SIMILAR)

INTEGRAL END BENT DETAILS



SECTION B-B

✱✱✱ MEASURED ALONG ℄ GIRDER



DETAIL "B"

SAW CUT CONTRACTION JOINT

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

SITE 3 DWG. NO. 7

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Digitally signed by Jeremy Pampuch
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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2			4			32

STR. #5

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END DIAPHRAGM DETAILS (EB1)	
1-EB1	8-#4 U1 (TYP. EACH BAY)
2-EB1	8-#4 S1 AND 8-#4 S2 (TYP. EACH BAY)
3-EB1	5-#4K1 @ EQ. SPA. (FILL FACE)
4-EB1	#4K5 (TOP), 2-#4K4, #4K3, #4K2 (BOT.) (TYP. EA. BAY) (FRONT FACE)

END DIAPHRAGM DETAILS (EB2)	
1-EB2	8-#4 U1, (TYP. EACH BAY)
2-EB2	8-#4 S1 & 8-#4 S2 (TYP. EACH BAY)
3-EB2	5-#4K1 @ EQ. SPA. (FILL FACE)
4-EB2	#4K5 (TOP), 2-#4K4, #4K3, #4K2 (BOT.) (TYP. EA. BAY) (FRONT FACE)

DECK REINFORCING DETAILS

① 87-#6B1 @ 6"CTS. (TOP OF SLAB) (MIN. LAP SPLICE = 2'-3") (SEE TYPICAL SECTION FOR SPACING)

② 65-#6B2 SPLICED WITH 65-#6B3 (TOP OF SLAB) (ALTERNATE SPLICE LOCATIONS) (MIN. LAP SPLICE = 3'-0") (SEE TYPICAL SECTION FOR SPACING)

③ 64-#6B4 (SEE TYPICAL SECTION FOR SPACING) (TOP OF SLAB)

④ 45-#4B5 (MIN. LAP SPLICE = 2'-0") (TOP OF SLAB) (TWO BAR RUN) (SEE TYPICAL SECTION FOR SPACING)

⑤ 11-#5 B7 @ 8½"CTS. (2 BAR RUN) (BOT. OF SLAB) (MIN. LAP SPLICE = 2'-0") (TYP. EA. BAY)

⑥ 11-#4 B8 SPLICED W/#4 B9 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. BAY)

⑦ 10-#4 B10 SPLICED W/#4 B11 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP EA. BAY)

⑧ 4-#4 B10 SPLICED W/#4 B11 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. OVER GDRS. 1-5)

⑨ 5-#4 B8 SPLICED W/#4 B9 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. OVERHANG)

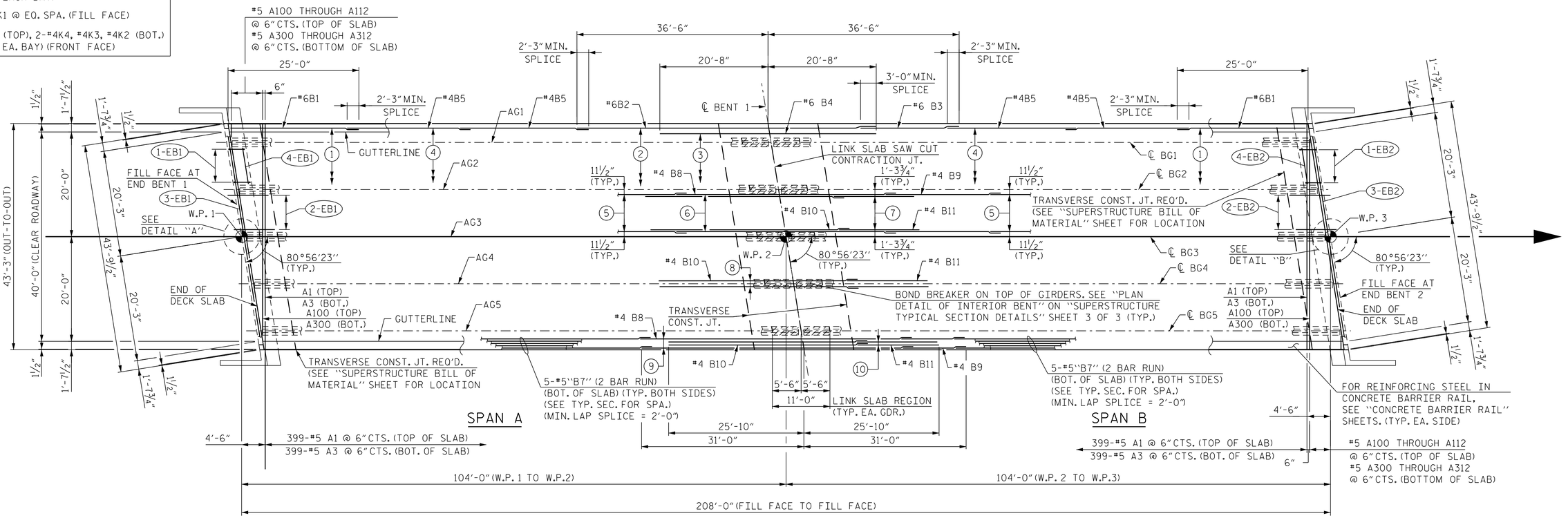
⑩ 4-#4 B10 SPLICED W/#4 B11 (SEE TYPICAL SECTION FOR SPACING) (2'-0" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. OVERHANG)

NOTES:

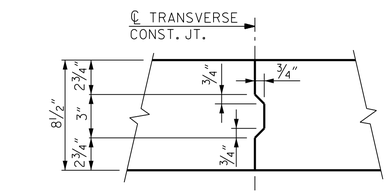
FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

SEE "TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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

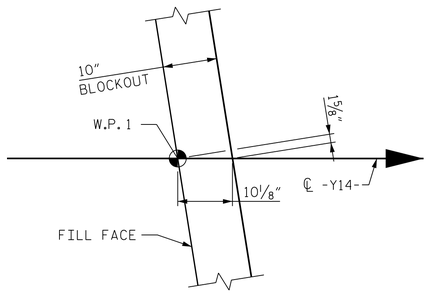


PLAN OF SPANS - A AND B

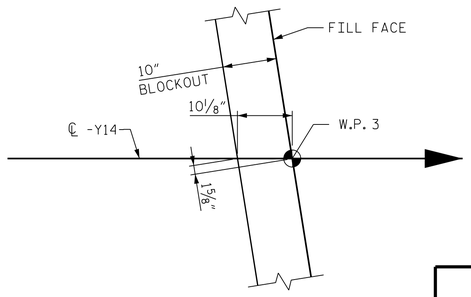


NOTE: REINFORCING STEEL IN SLAB NOT SHOWN. LONGITUDINAL AND TRANSVERSE REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINT.

TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB



DETAIL "A"



DETAIL "B"

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
SPANS A & B

SITE 3 DWG. NO. 8

NORTH CAROLINA PROFESSIONAL SEAL 041568 ENGINEER JEREMY PAMPUCH
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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1			3			TOTAL SHEETS
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STR. #5

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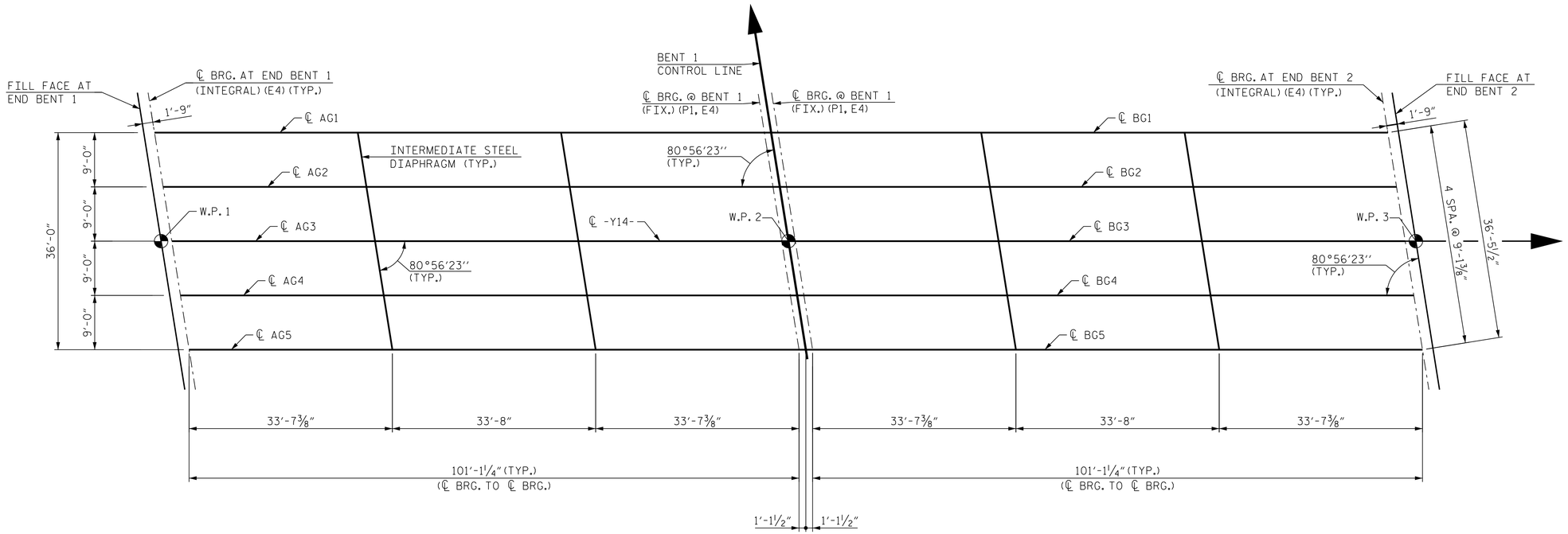

FRAMING PLAN SPANS A & B

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

SITE 3 DWG. NO. 9

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Docusigned by: Jeremy Pampuch
2/7/2022

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STR. #5

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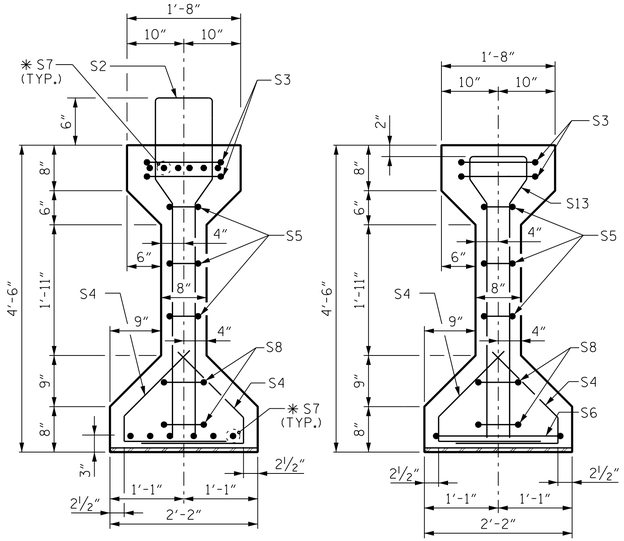
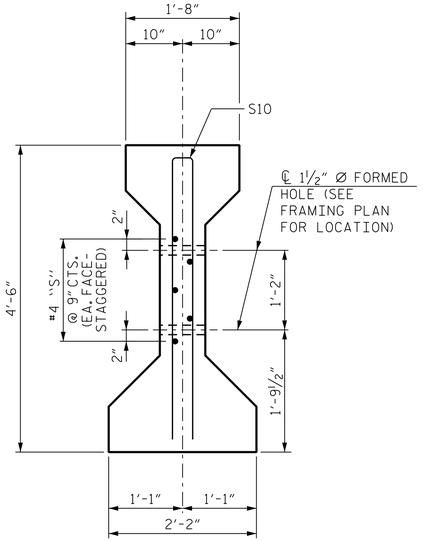


SECTION A-A

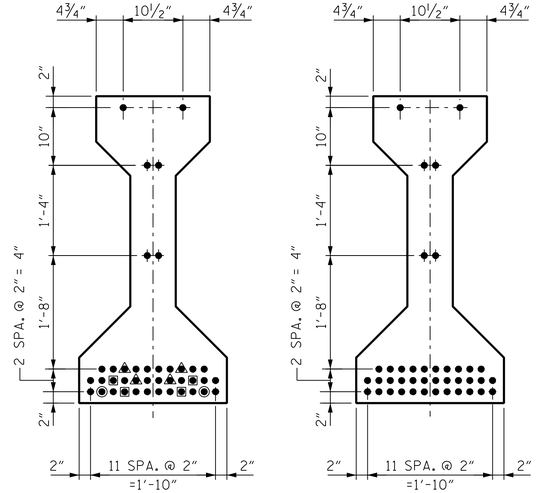
✱ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

SECTION B-B



SECTION C-C

(S1 BARS NOT SHOWN)



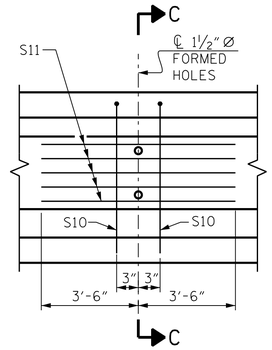
AT END OF GIRDER

AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

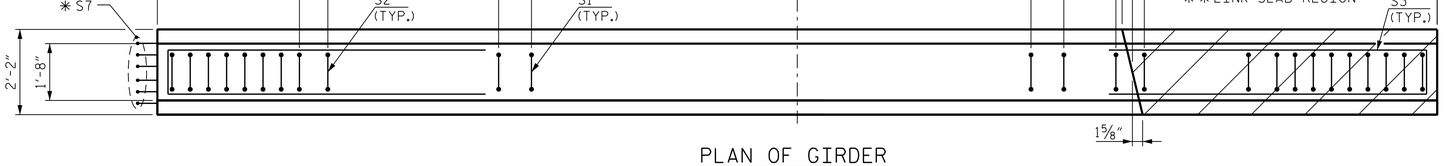
DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◬ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ⊡ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

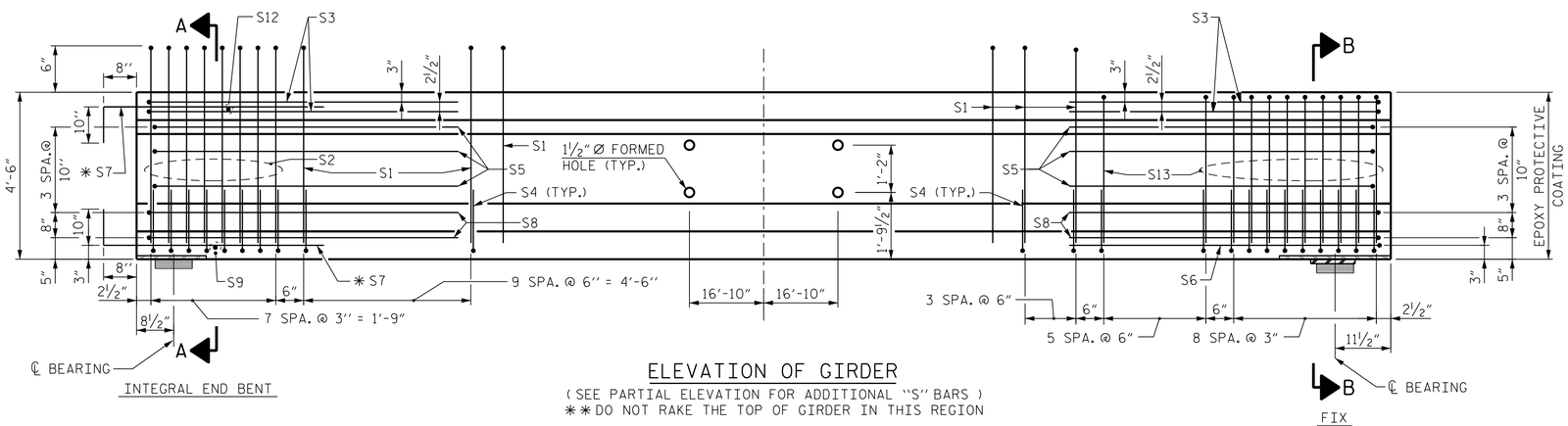


PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)
✱✱ DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

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

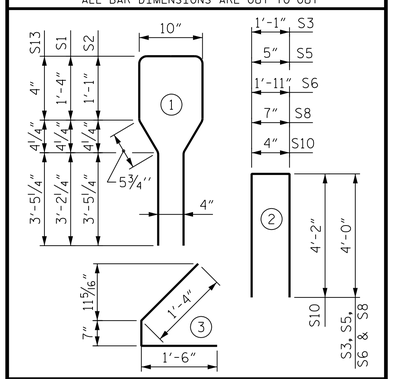
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	102	#4	1	10'-10"	738
S2	8	#6	1	10'-10"	130
S3	4	#4	2	9'-1"	24
S4	74	#4	3	3'-5"	169
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
✱S7	12	#5	STR.	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	1	#3	STR.	1'-10"	1
S10	4	#5	2	8'-8"	36
S11	10	#4	STR.	7'-0"	47
S12	1	#3	STR.	1'-4"	1
S13	15	#6	1	9'-4"	210

✱ NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	1,466	20.9	40

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	102'-9¼"	513'-10¼"

PROJECT NO. U-2519BA

CUMBERLAND **COUNTY**

STATION: 23+16.56 -Y14-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN A

SITE 3 DWG. NO.10

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Jeremy Pampuch
2/7/2022

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1			3			TOTAL SHEETS
2			4			32

STR. #5

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CHECKED BY : J. PAMPUCH	DATE : FEB 2022	
DESIGN ENGINEER OF RECORD : J. PAMPUCH	DATE : FEB 2022	

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2/7/2022
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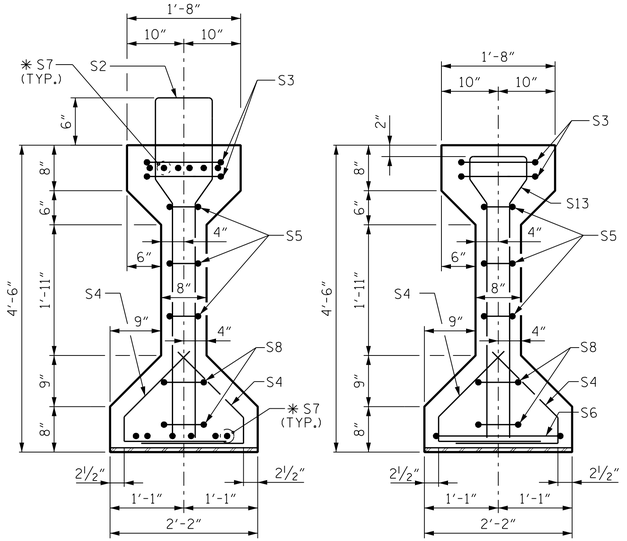
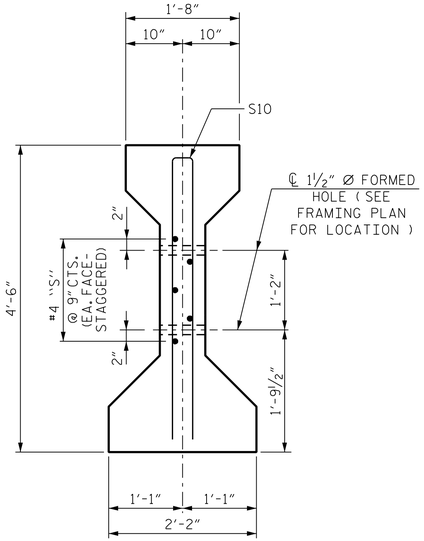


SECTION A-A

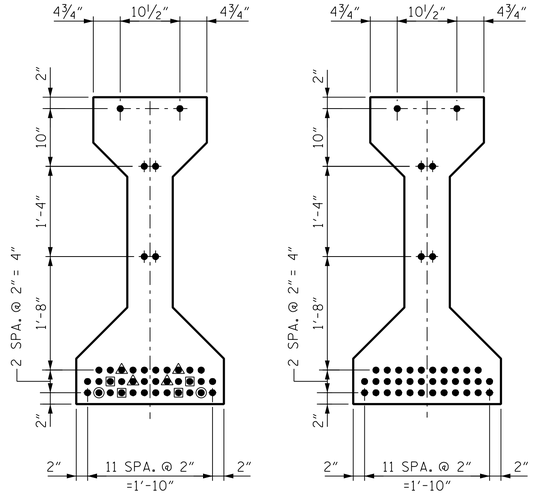
✱ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

SECTION B-B



SECTION C-C

(S1 BARS NOT SHOWN)



0.6" Ø LOW RELAXATION STRAND LAYOUT

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◬ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
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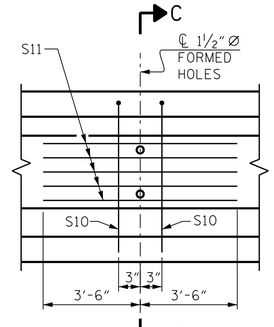
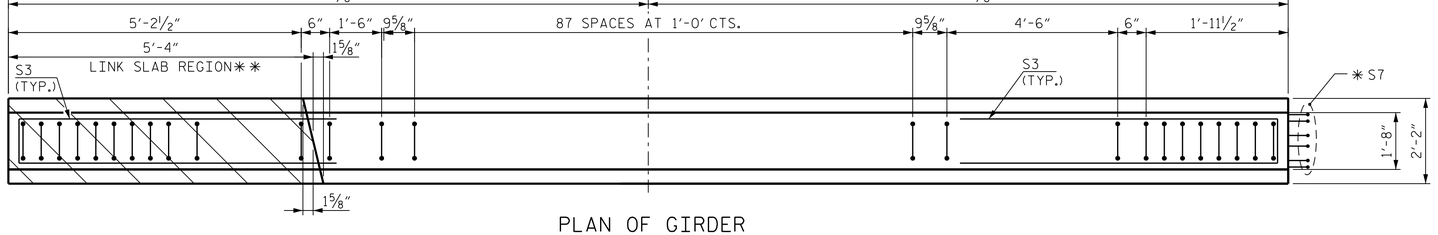
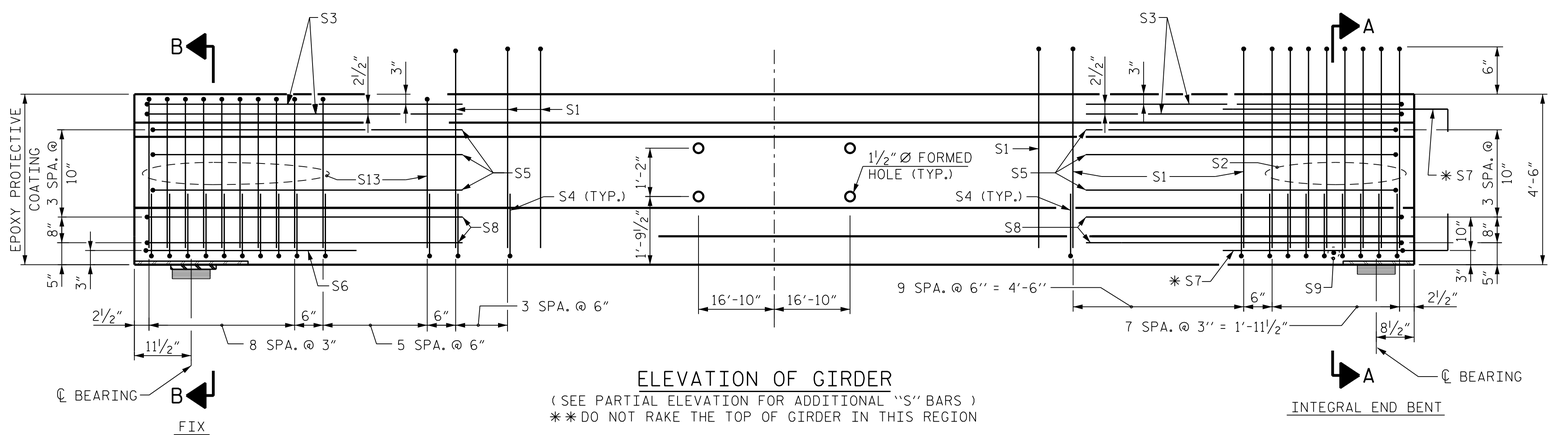


PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)
✱✱ DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

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 GIRDER

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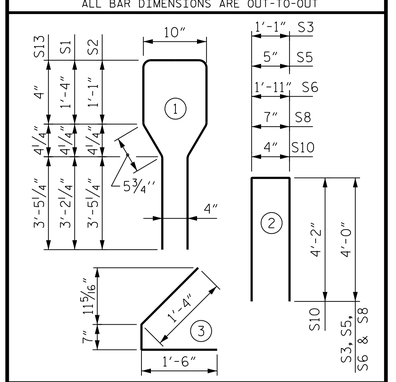
S6	1	#4	2	9'-11"	7
✱S7	12	#5	STR.	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	1	#3	STR.	1'-10"	1
S10	4	#5	2	8'-8"	36
S11	10	#4	STR.	7'-0"	47
S12	1	#3	STR.	1'-4"	1
S13	15	#6	1	9'-4"	210

✱ NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	1,466	20.9	40

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	102'-9¼"	513'-10¼"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN B

SITE 3 DWG. NO. 11

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH 2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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2			4			32

STR. #5

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CHECKED BY : J. PAMPUCH DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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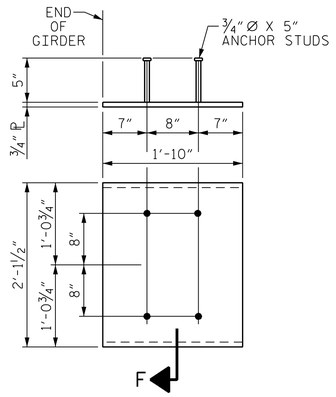
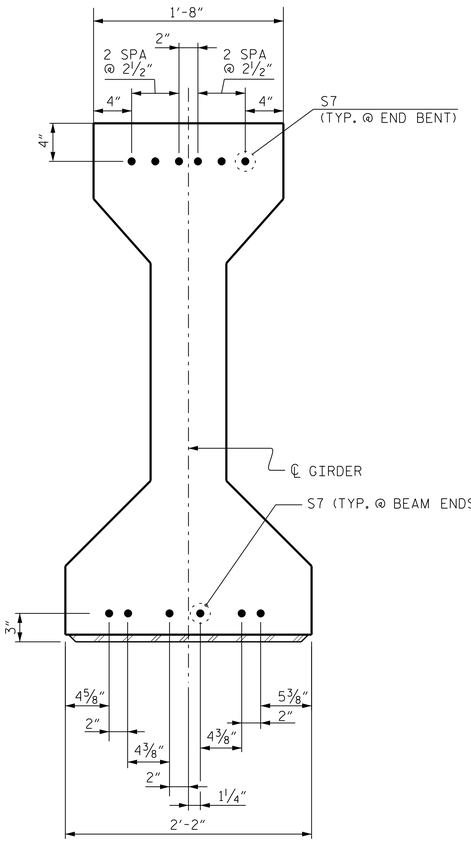


EMBEDDED PLATE "B-2" DETAILS

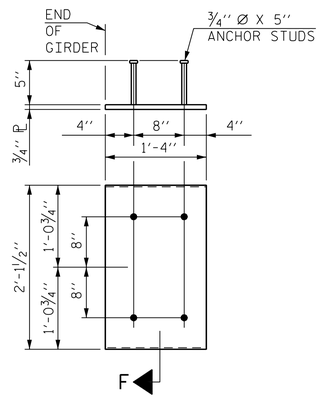
(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)

EMBEDDED PLATE VARIABLE TABLE				
GDR. NO.	SPAN A		SPAN B	
	NEAR	FAR	NEAR	FAR
G1	B-1	B-2	B-2	B-1
G2	B-1	B-2	B-2	B-1
G3	B-1	B-2	B-2	B-1
G4	B-1	B-2	B-2	B-1
G5	B-1	B-2	B-2	B-1
G6	B-1	B-2	B-2	B-1



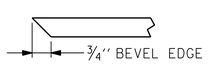
DETAIL "A"

(AT INTEGRAL END BENT)



EMBEDDED PLATE "B-1" DETAILS

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)



SECTION "F"

(SEE NOTES)

NOTES:

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

EMBEDDED PLATE "B-1" AND "B-2" 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.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6,400 PSI.

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

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

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

SITE 3 DWG. NO.12

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Jeremy Pampuch
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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STR. #5

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DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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2/7/2022
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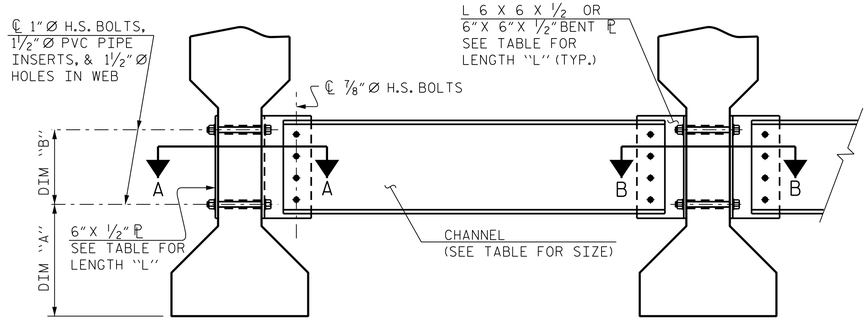
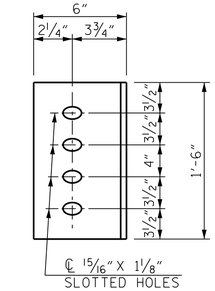


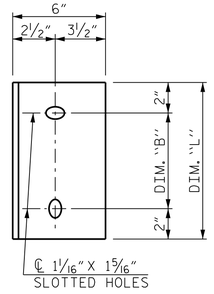
EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE



WEB FACE

CONNECTION PLATE DETAIL

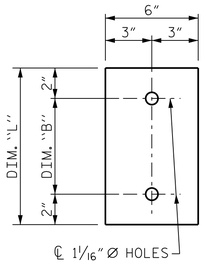
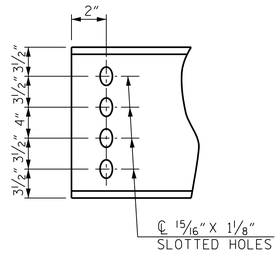


PLATE DETAILS



CHANNEL END

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

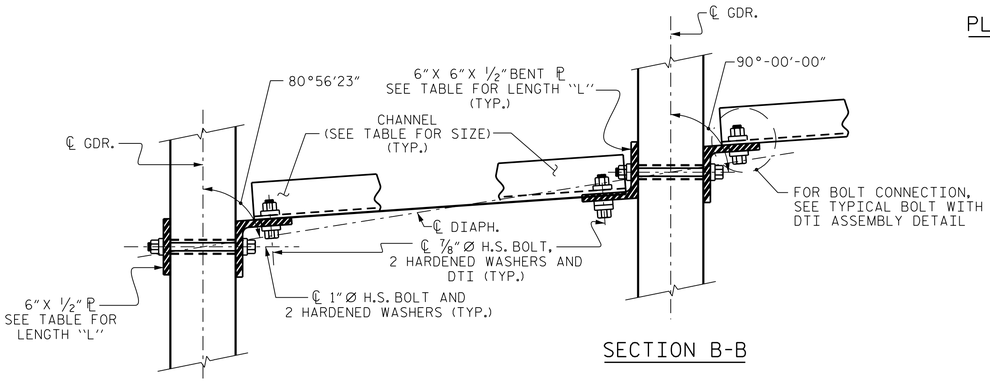
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼" PROJECTION BEYOND THE NUT.

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

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

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

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



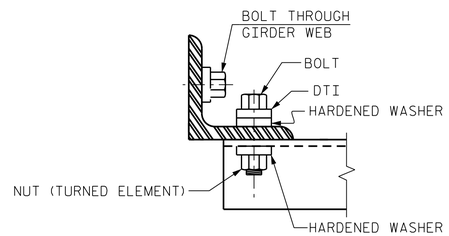
SECTION A-A

SECTION B-B

CONNECTION DETAILS

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1'-9½"	1'-2"	1'-6"



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SITE 3 DWG. NO.13

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE
STEEL DIAPHRAGMS
FOR TYPE IV
PRESTRESSED CONCRETE
GIRDERS

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

DRAWN BY : J. COOK DATE : FEB 2022
CHECKED BY : J. PAMPUCH DATE : FEB 2022
DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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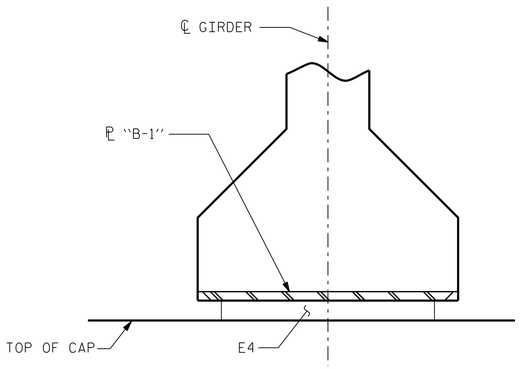
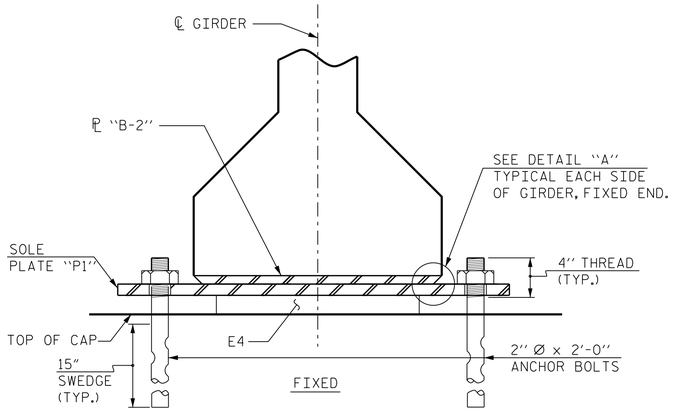
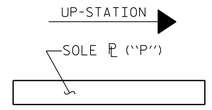


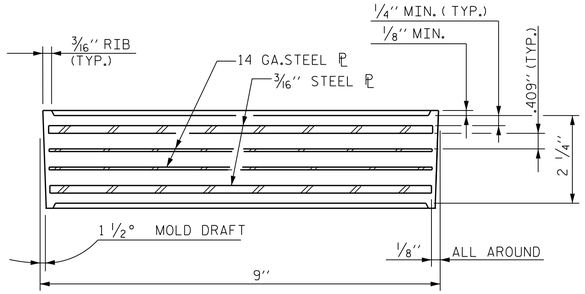
END BENT BEARING ELEVATION
SECTION D-D



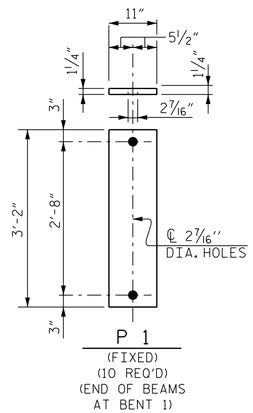
BENT 1 BEARING ELEVATION
SECTION E-E



SOLE ℄ PLACEMENT DETAIL

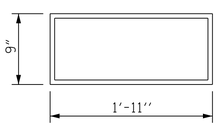


TYPICAL SECTION OF ELASTOMERIC BEARINGS



P 1
(FIXED)
(10 REQ'D)
(END OF BEAMS
AT BENT 1)

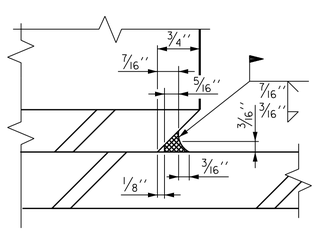
SOLE PLATE DETAILS "P"



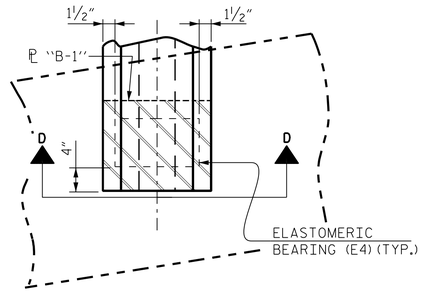
E4 (20 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

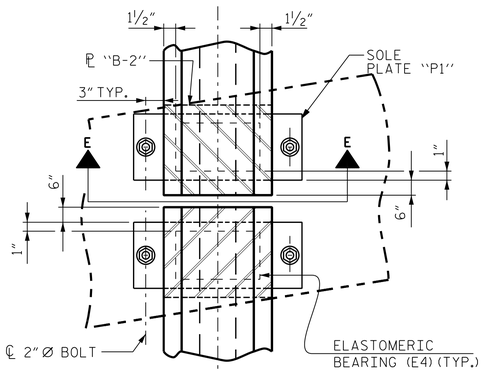
TYPE V



DETAIL "A"



TYPICAL HALF-PLAN
(SHOWING INTEGRAL END BENT)



TYPICAL HALF-PLAN
(SHOWING BENT)

NOTES

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

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

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

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

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

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

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

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

SITE 3 DWG. NO.14

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

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RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

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STR. #5

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DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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2/7/2022
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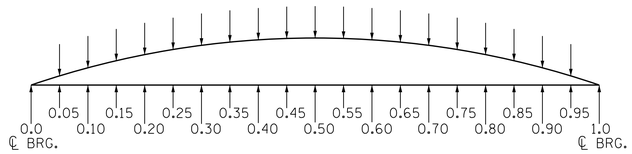
DEAD LOAD DEFELCTION AND CAMBER TABLE FOR GIRDERS - SPAN "A"

GIRDER		TWENTIETH POINTS																				
		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
AG1 THRU AG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.034	0.068	0.100	0.129	0.155	0.176	0.194	0.206	0.214	0.217	0.214	0.206	0.194	0.176	0.155	0.129	0.100	0.068	0.034	0
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0	0.026	0.053	0.079	0.103	0.124	0.143	0.158	0.168	0.175	0.177	0.175	0.168	0.158	0.143	0.124	0.103	0.079	0.053	0.026	0
	FINAL CAMBER ↑	0"	1/8"	3/16"	1/4"	1/4"	3/8"	3/8"	7/16"	7/16"	1/2"	1/2"	1/2"	7/16"	7/16"	3/8"	3/8"	3/8"	1/4"	3/16"	1/8"	0"

DEAD LOAD DEFELCTION AND CAMBER TABLE FOR GIRDERS - SPAN "B"

GIRDER		TWENTIETH POINTS																				
		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
BG1 THRU BG5	CAMBER (GIRDER ALONE IN PLACE) ↑	0	0.034	0.068	0.100	0.129	0.155	0.176	0.194	0.206	0.214	0.217	0.214	0.206	0.194	0.176	0.155	0.129	0.100	0.068	0.034	0
	DEFLECTION DUE TO SUPERIMPOSED D.L.* ↓	0	0.026	0.053	0.079	0.103	0.124	0.143	0.158	0.168	0.175	0.177	0.175	0.168	0.158	0.143	0.124	0.103	0.079	0.053	0.026	0
	FINAL CAMBER ↑	0"	1/8"	3/16"	1/4"	1/4"	3/8"	3/8"	7/16"	7/16"	1/2"	1/2"	1/2"	7/16"	7/16"	3/8"	3/8"	3/8"	1/4"	3/16"	1/8"	0"



SCHEMATIC CAMBER ORDINATES
AT GIRDER TWENTIETH POINTS

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TWENTIETH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

* INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

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STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

GIRDER CAMBER DETAILS

SITE 3 DWG. NO.15

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Docusigned by: Jeremy Pampuch
2/7/2022

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DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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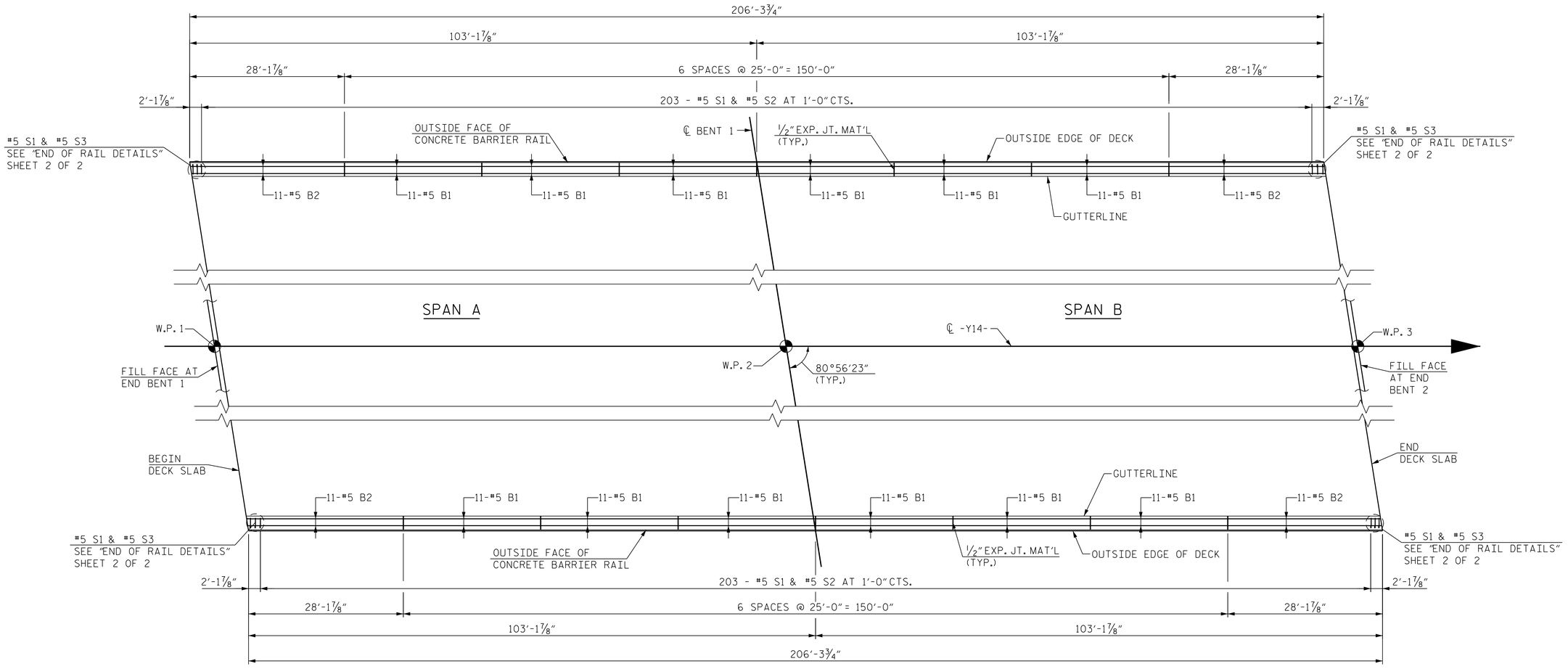

PLAN OF BARRIER RAIL

PROJECT NO. U-2519BA

CUMBERLAND **COUNTY**

STATION: 23+16.56 -Y14-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE BARRIER RAIL

SITE 3 DWG. NO.16

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
DocuSigned by: Jeremy Pampuch
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #5

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DESIGN ENGINEER OF RECORD : J. PAMPUCH DATE : FEB 2022

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FOR PLAN OF CONCRETE BARRIER RAIL,
SEE "CONCRETE BARRIER RAIL"
SHEET 1 OF 2

NOTES

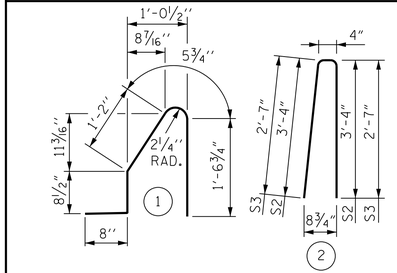
THE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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 #5S1 AND S2 BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 2" MINIMUM CLEARANCE TO THE ½" EXPANSION JOINT MATERIAL.

BAR TYPES



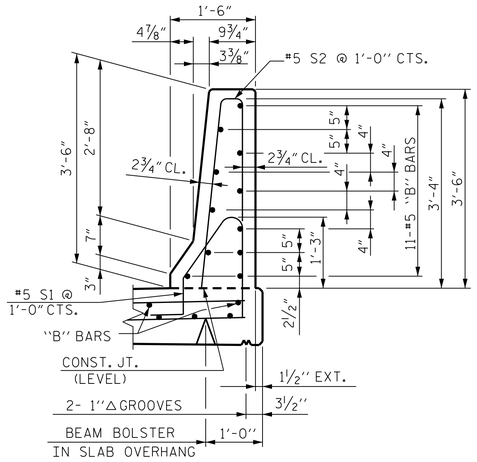
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

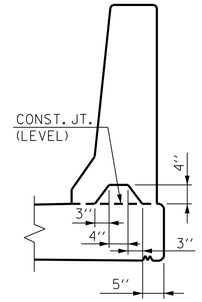
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	132	#5	STR	24'-7"	3,385
✳ B2	44	#5	STR	27'-9"	1,273
✳ S1	414	#5	1	4'-7"	1,979
✳ S2	406	#5	2	7'-0"	2,964
✳ S3	8	#5	2	5'-6"	46

✳ EPOXY COATED REINFORCING STEEL	9,647 LBS.
CLASS AA CONCRETE (BARRIER)	56.0 C.Y.
CONCRETE BARRIER RAIL	412.63

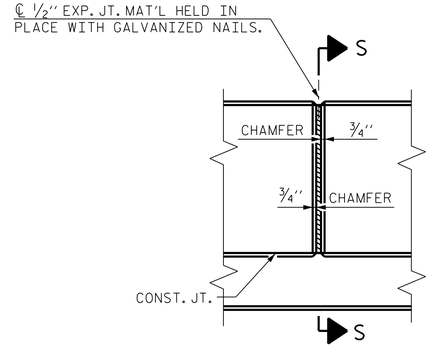


SECTION THRU RAIL

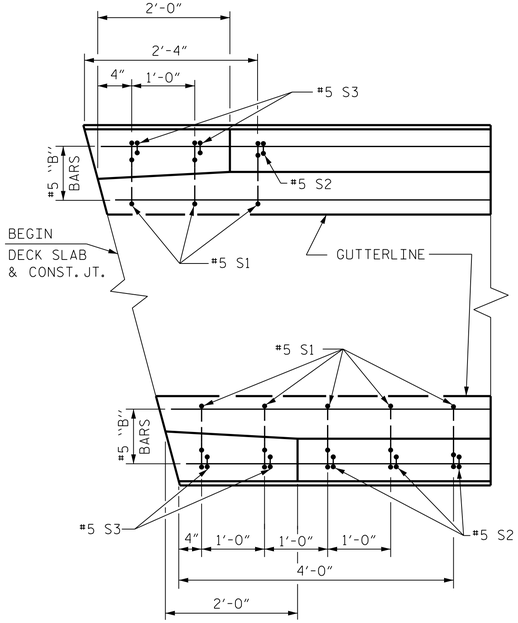


SECTION S-S

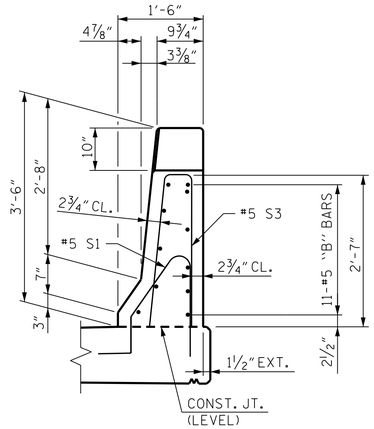
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY
WHEN SLIP FORM IS USED)



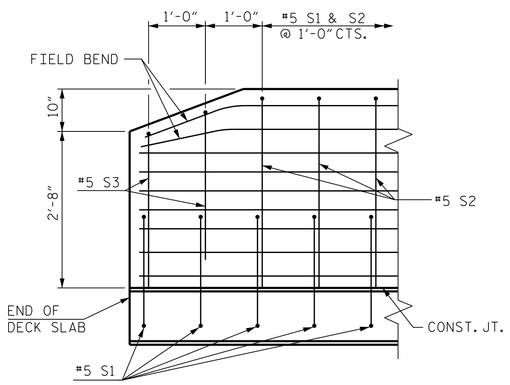
ELEVATION AT EXPANSION JOINTS



PLAN



END VIEW



SIDE VIEW

END OF RAIL DETAILS

BARRIER RAIL DETAILS

NOTE: OMIT EXP. JT. MATERIAL WHEN SLIP FORM IS USED.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

CONCRETE
BARRIER RAIL

SITE 3 DWG. NO.17

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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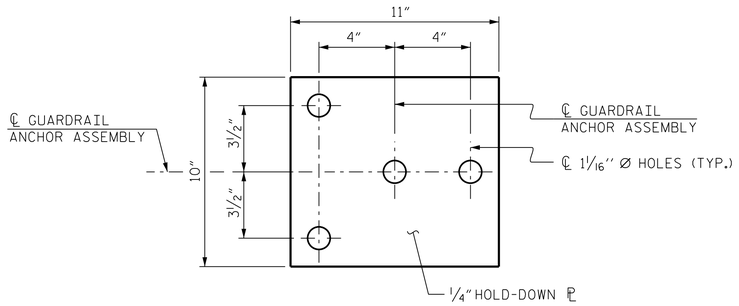
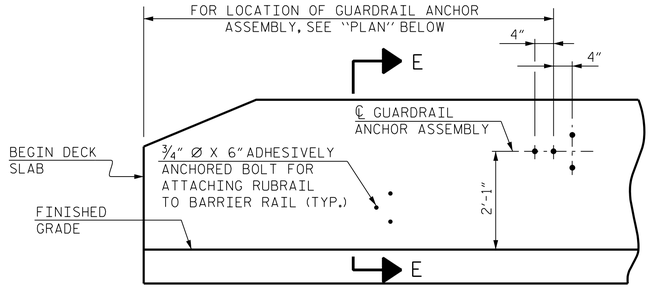
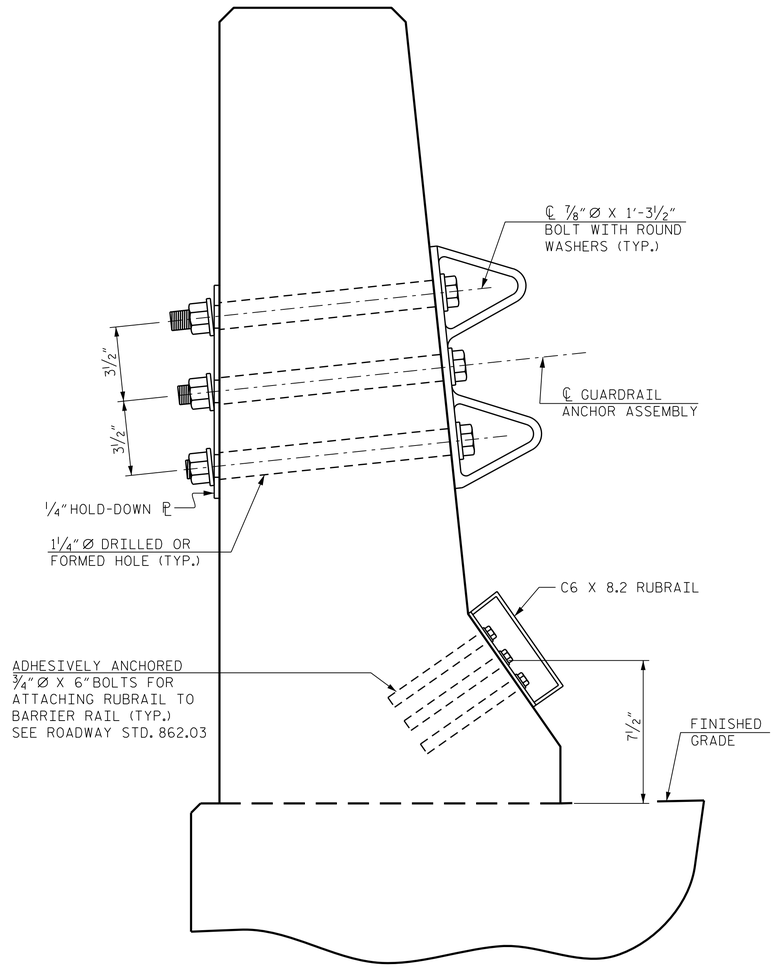


PLAN



ELEVATION



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.)

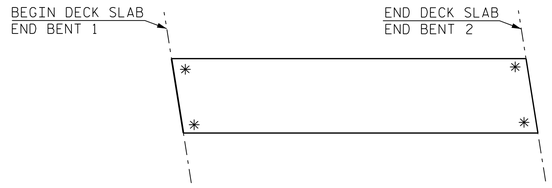
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.

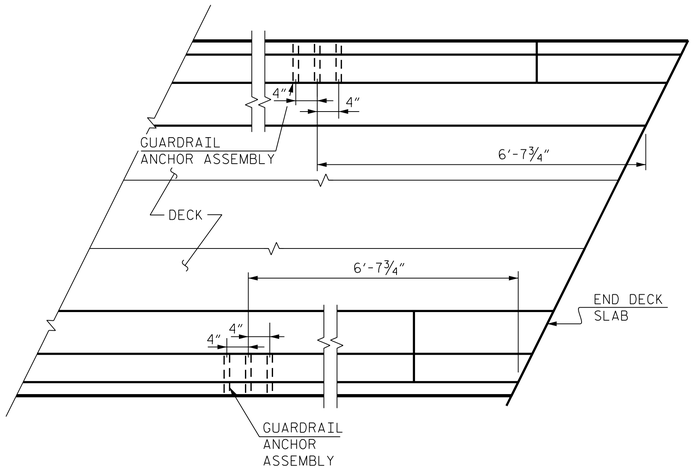
THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SKETCH SHOWING POINTS OF ATTACHMENTS

* DENOTES GUARDRAIL ANCHORAGE ASSEMBLY



END BENT 2

PLAN OF BARRIER RAIL

END BENT 2 SHOWN, END BENT 1 SIMILAR.
FOR BARRIER REINFORCEMENT DETAILS SEE, "PLAN OF CONCRETE BARRIER RAIL SPANS A AND B".

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GUARDRAIL ANCHORAGE
FOR BARRIER RAIL

SITE 3 DWG. NO.18

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Jeremy Pampuch
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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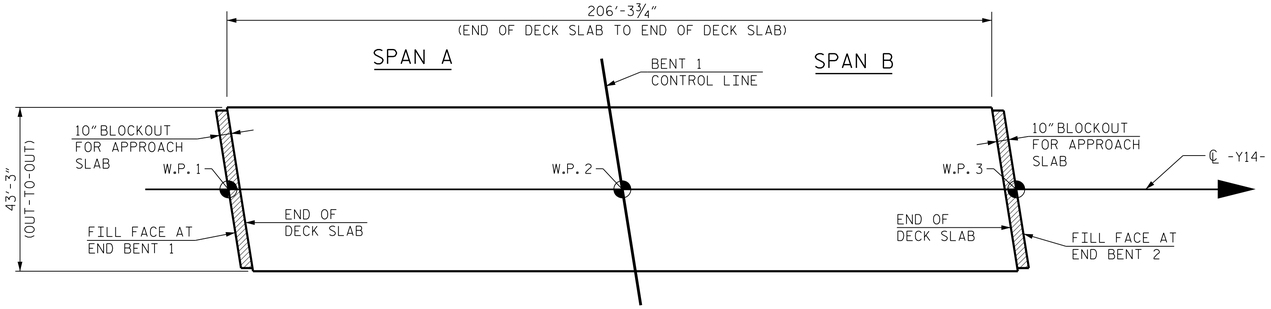
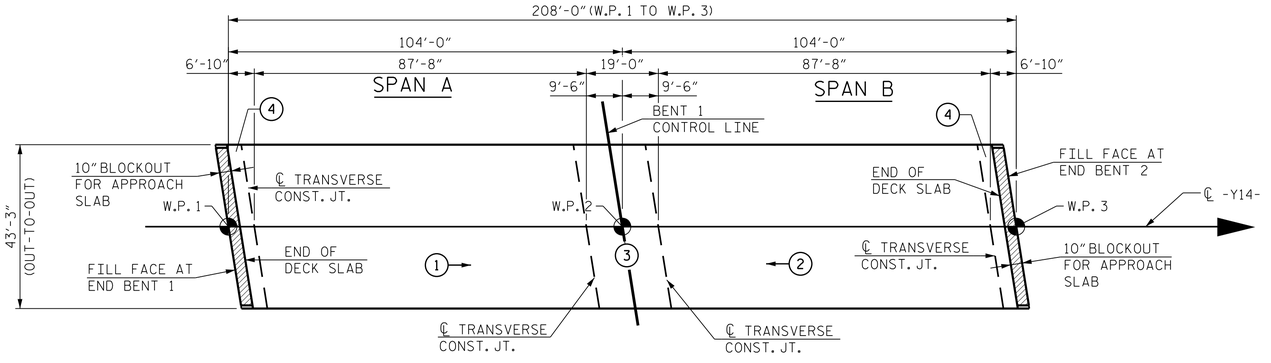


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 8,924)



POURING SEQUENCE

(1)→ INDICATES POUR NUMBER AND DIRECTION OF POUR

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	118.3	———	———
POUR 2	118.3	———	———
POUR 3	25.6	———	———
POUR 4*	69.4	———	———
**TOTALS	331.6	32,846	40,486

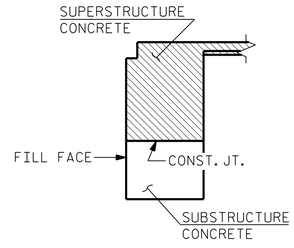
*INCLUDES CONCRETE FOR HAUNCH, DECK & END DIAPHRAGM.
**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED.

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,850 SQ.FT.
BRIDGE DECK	7,634 SQ.FT.
TOTAL	9,484 SQ.FT.



CONCRETE QUANTITY DETAIL

NOTE: CONCRETE QUANTITIES OF INTEGRAL END BENT CAP ABOVE CONSTRUCTION JOINT ARE INCLUDED IN SUPERSTRUCTURE QUANTITIES. REINFORCING STEEL IN THESE AREAS IS INCLUDED IN THE END BENT QUANTITIES.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

SITE 3 DWG. NO.19

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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REINFORCEMENT BAR SCHEDULE

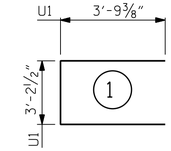
SPANS A AND B

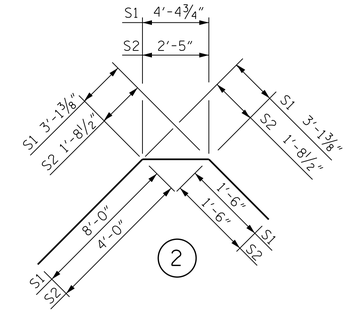
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	399	#5	STR	42′-11″	17,860
A3	399	#5	STR	42′-11″	17,860
✳ A100	2	#5	STR	40′-2″	84
✳ A101	2	#5	STR	37′-0″	77
✳ A102	2	#5	STR	33′-11″	71
✳ A103	2	#5	STR	30′-9″	64
✳ A104	2	#5	STR	27′-7″	58
✳ A105	2	#5	STR	24′-6″	51
✳ A106	2	#5	STR	21′-4″	45
✳ A107	2	#5	STR	18′-2″	38
✳ A108	2	#5	STR	15′-1″	31
✳ A109	2	#5	STR	11′-11″	25
✳ A110	2	#5	STR	8′-10″	18
✳ A111	2	#5	STR	5′-8″	12
✳ A112	2	#5	STR	2′-6″	5
A300	2	#5	STR	40′-2″	84
A301	2	#5	STR	37′-0″	77
A302	2	#5	STR	33′-11″	71
A303	2	#5	STR	30′-9″	64
A304	2	#5	STR	27′-7″	58
A305	2	#5	STR	24′-6″	51
A306	2	#5	STR	21′-4″	45
A307	2	#5	STR	18′-2″	38
A308	2	#5	STR	15′-1″	31
A309	2	#5	STR	11′-11″	25
A310	2	#5	STR	8′-10″	18
A311	2	#5	STR	5′-8″	12
A312	2	#5	STR	2′-6″	5

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	174	#6	STR.	25′-0″	6,534
✳ B2	65	#6	STR.	60′-0″	5,858
✳ B3	65	#6	STR.	16′-0″	1,562
✳ B4	64	#6	STR.	41′-4″	3,973
✳ B5	180	#4	STR.	25′-0″	3,006
B7	216	#5	STR.	38′-0″	8,561
B8	54	#4	STR.	42′-0″	1,515
B9	54	#4	STR.	22′-0″	794
B10	68	#4	STR.	38′-0″	1,726
B11	68	#4	STR.	15′-8″	712
K1	20	#4	STR.	23′-8″	316
K2	8	#4	STR.	6′-6″	35
K3	8	#4	STR.	7′-1″	38
K4	16	#4	STR.	8′-1″	86
K5	8	#4	STR.	7′-0″	37
K6	4	#4	STR.	2′-3″	6
K7	12	#4	STR.	3′-0″	24
K8	4	#4	STR.	2′-6″	7
✳ S1	72	#4	1	9′-11″	477
✳ S2	80	#4	1	11′-11″	637
U1	76	#4	2	10′-10″	550

REINFORCING STEEL	32,846 LBS.
✳ EPOXY COATED REINFORCING STEEL	40,486 LBS.

BAR TYPES





NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

BILL OF MATERIAL

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

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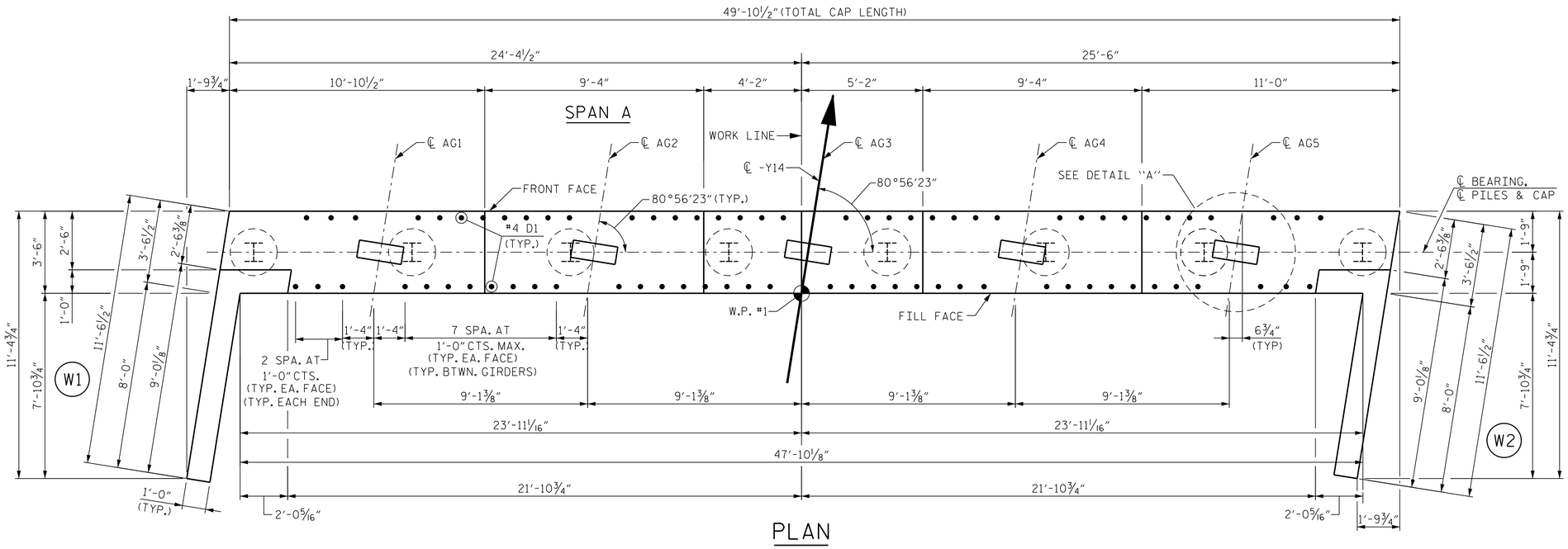
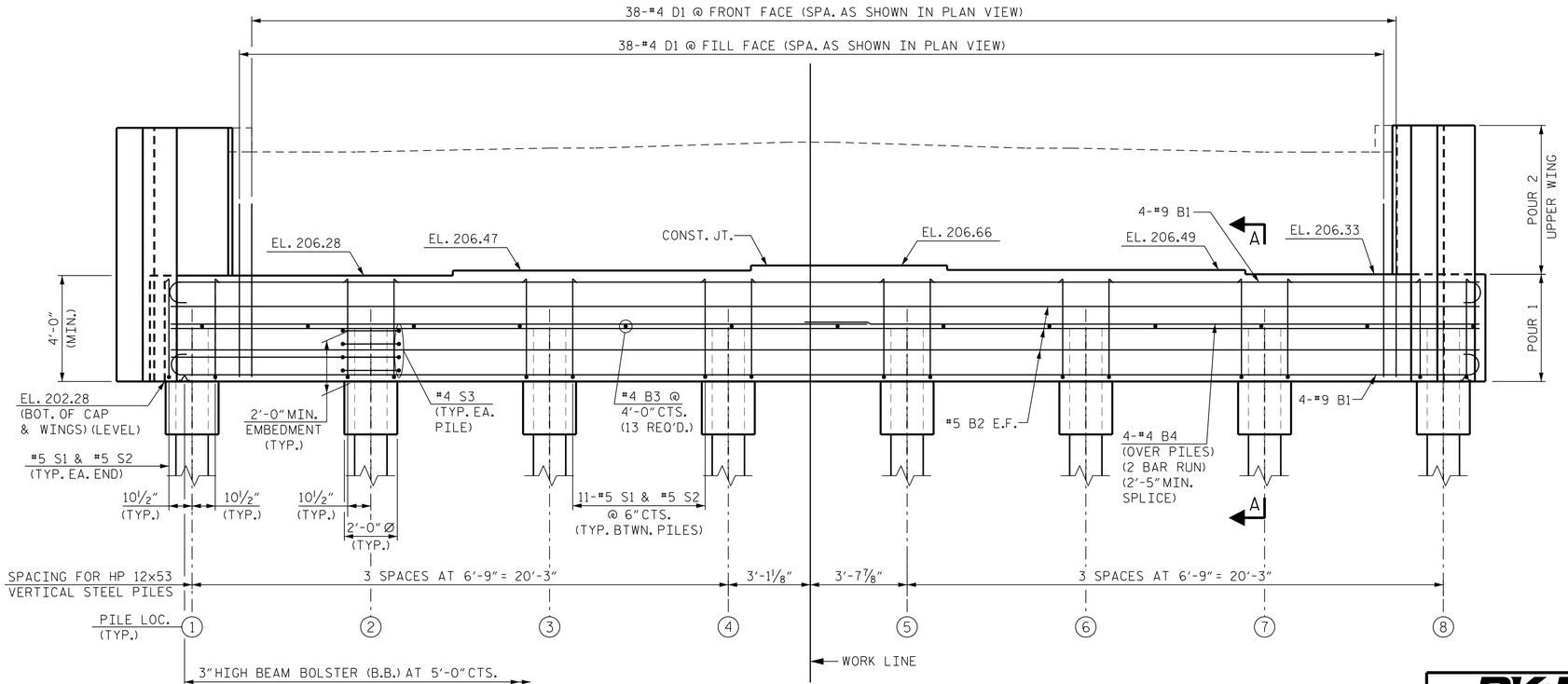
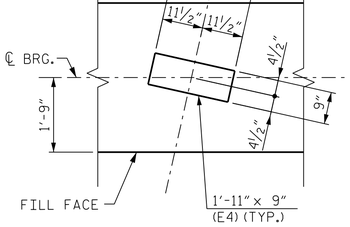


PLAN



ELEVATION



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

NOTES:

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

THE TOP SURFACE OF THE END BENT CAP AND WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

FOR PILE SPLICE DETAILS AND TEMPORARY DRAINAGE DETAILS, SEE SHEET 3 OF 3.

FOR SECTION A-A, SEE SHEET 3 OF 3.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

END BENT 1
PLAN AND ELEVATION

SITE 3 DWG. NO. 21

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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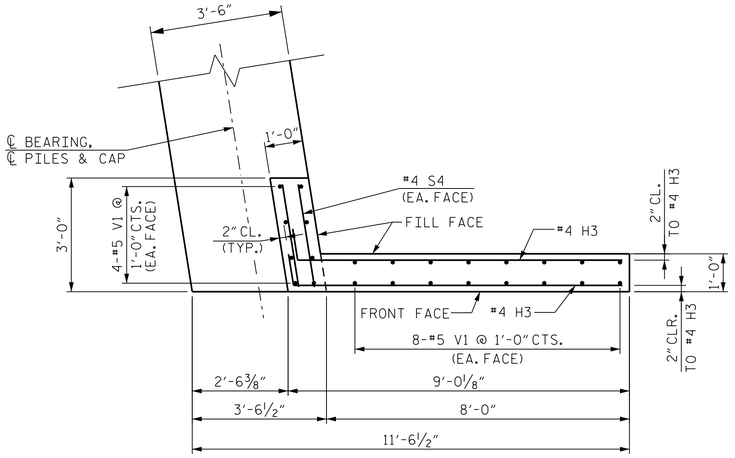
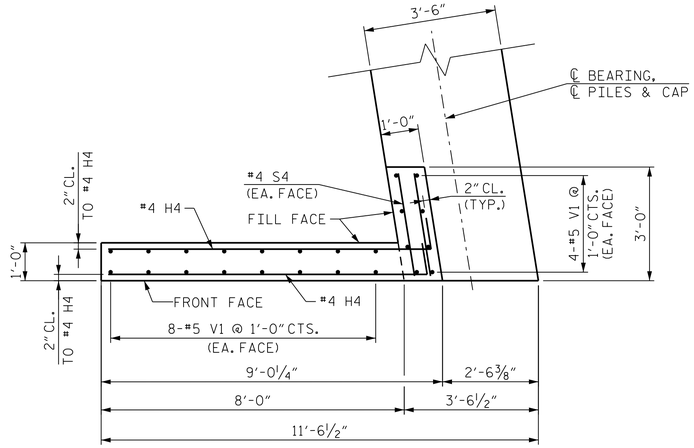
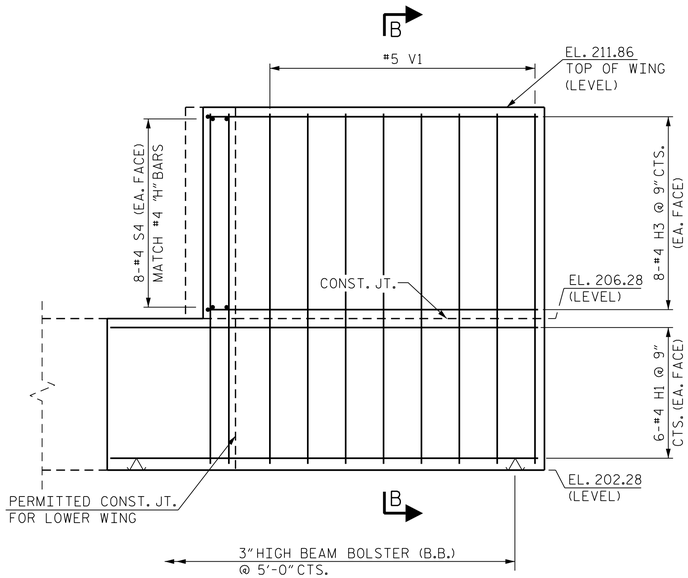


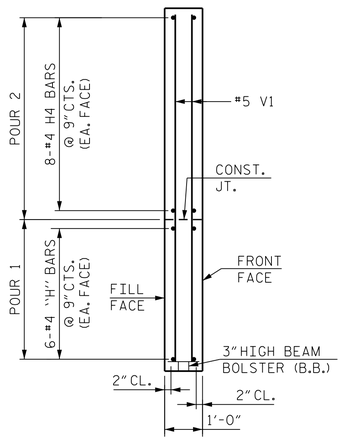
PLAN OF LEFT WINGWALL



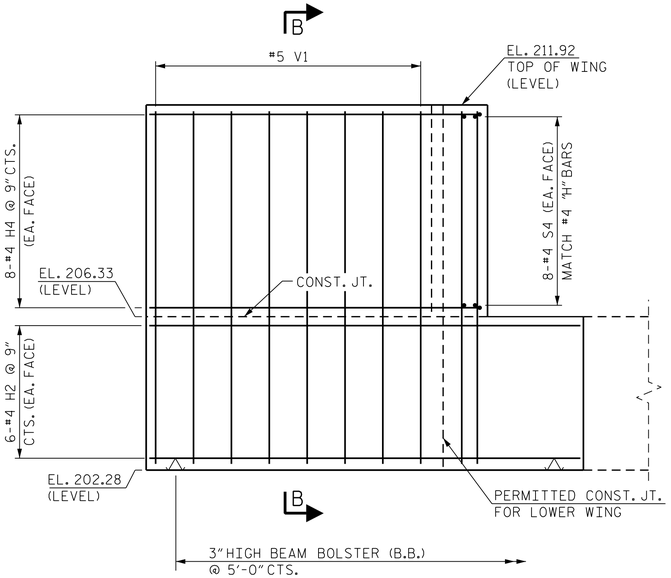
PLAN OF RIGHT WINGWALL



ELEVATION OF LEFT WINGWALL



SECTION B-B



ELEVATION OF RIGHT WINGWALL

LEFT WINGWALL DETAILS (W1)

RIGHT WINGWALL DETAILS (W2)

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SHEET 2 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

END BENT 1
WINGWALL DETAILS

SITE 3 DWG. NO.22

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RK&K
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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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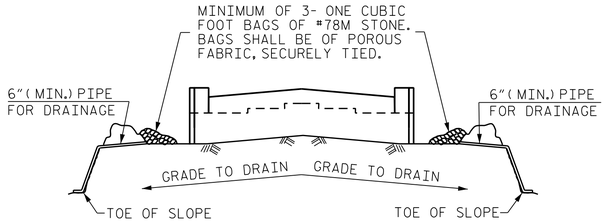
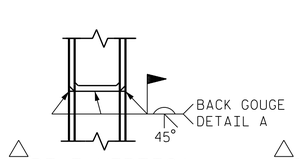


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

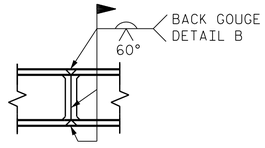
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

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

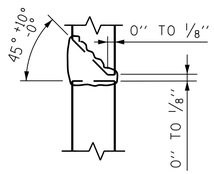
TEMPORARY DRAINAGE AT END BENT



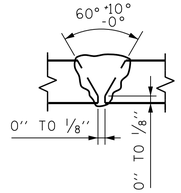
△ PILE VERTICAL



△ PILE HORIZONTAL OR VERTICAL



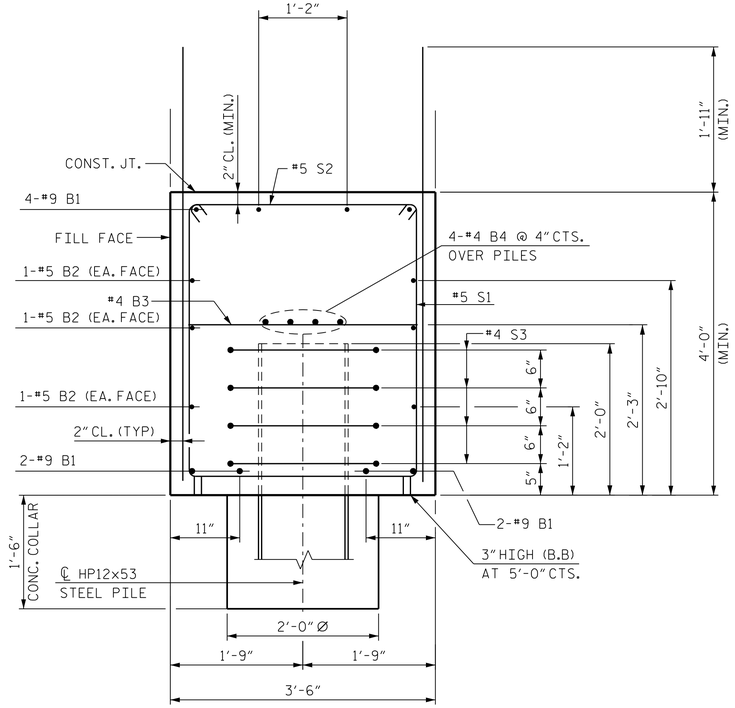
DETAIL A



DETAIL B

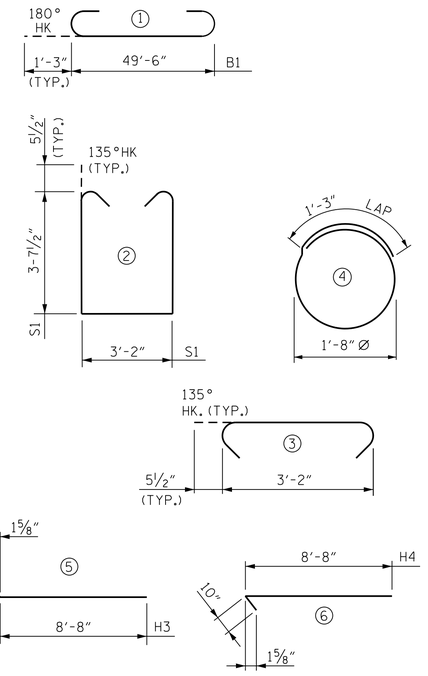
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION A-A

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	52'-0"	1,414
B2	6	#5	STR	49'-6"	310
B3	13	#4	STR	3'-2"	27
B4	8	#4	STR	26'-0"	139
H1	12	#4	STR	11'-3"	90
H2	12	#4	STR	11'-3"	90
H3	16	#4	5	9'-6"	102
H4	16	#4	6	9'-6"	102
D1	76	#4	STR	6'-4"	322
S1	79	#5	2	11'-4"	934
S2	79	#5	3	4'-1"	336
S3	32	#4	4	6'-6"	139
S4	32	#4	STR	2'-7"	55
V1	48	#5	STR	9'-3"	463
REINFORCING STEEL					4,523 LBS.
CLASS A CONCRETE					
POUR 1 (CAP, LOWER WINGS & COLLARS)					30.7 C.Y.
POUR 2 (UPPER WINGS)					4.5 C.Y.
TOTAL					35.2 C.Y.
HP 12 X 53 STEEL PILES					
NO.					8
PILE DRIVING EQUIPMENT SETUP					8
L.F.					456
PILE REDRIVES					4
PDA TESTING					1

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1 DETAILS AND BILL OF MATERIAL

SITE 3 DWG. NO.23

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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NC LICENSE NUMBER: F-0112

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2/7/2022

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2			4			32

STR. #5

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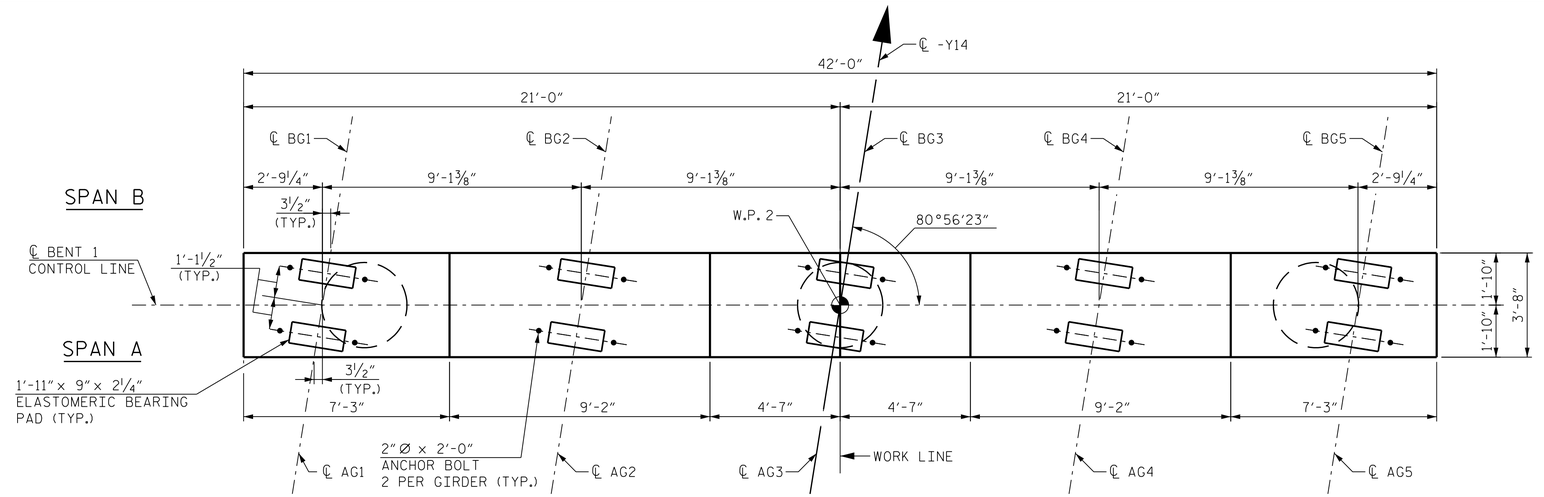
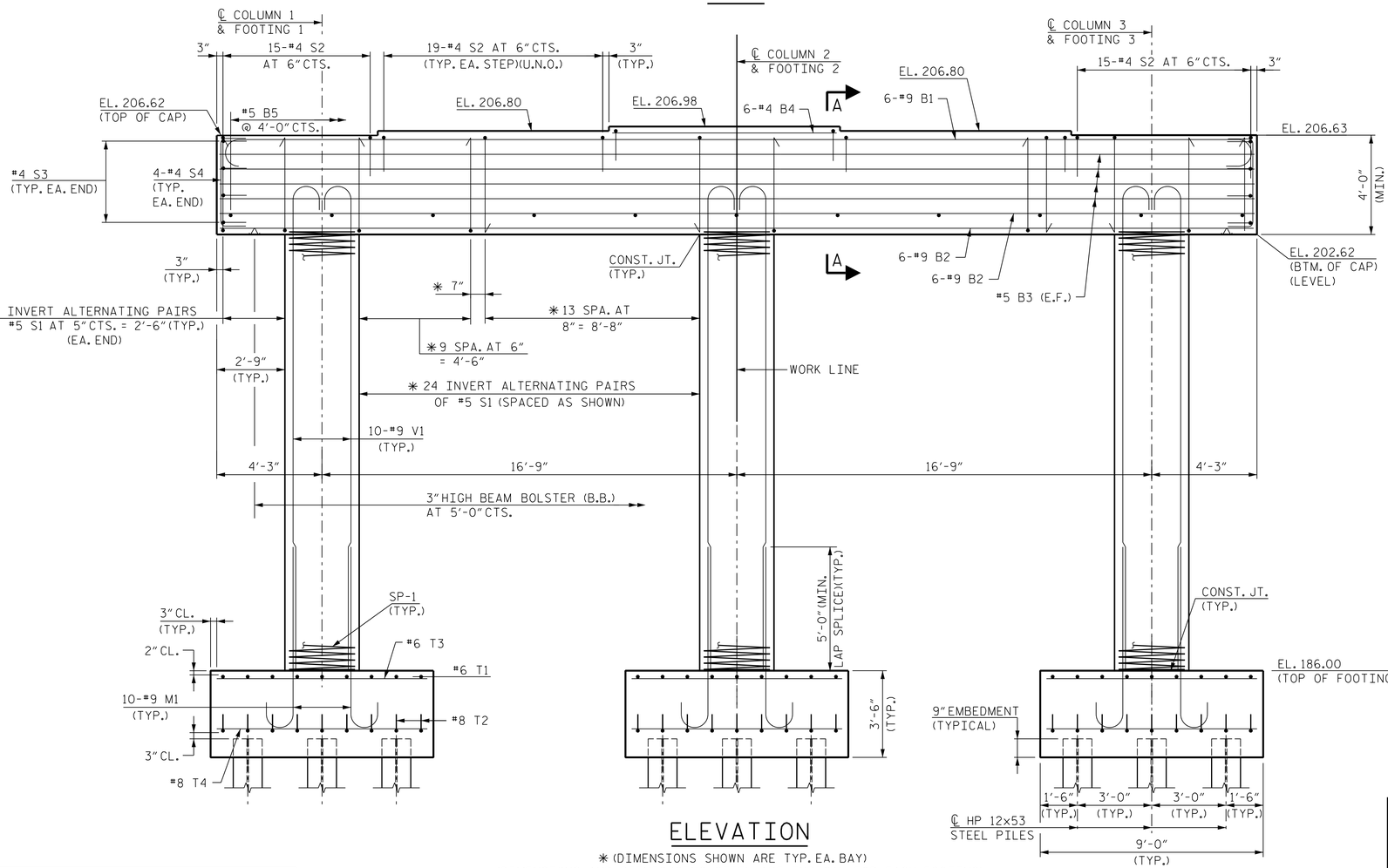


PLAN

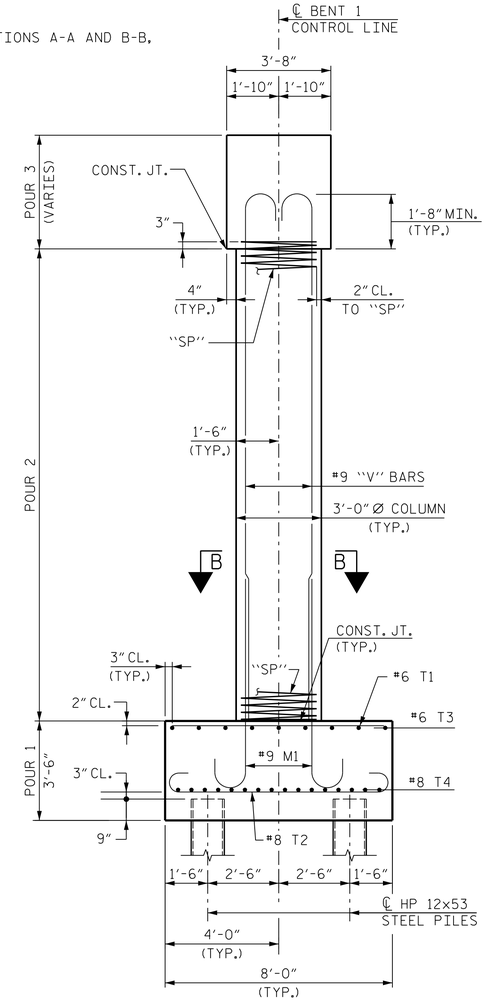


ELEVATION

∗ (DIMENSIONS SHOWN ARE TYP. EA. BAY)
(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

NOTE:

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



END ELEVATION

(DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1
PLAN AND ELEVATION

SITE 3 DWG. NO.24

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
Jeremy Pampuch
2/7/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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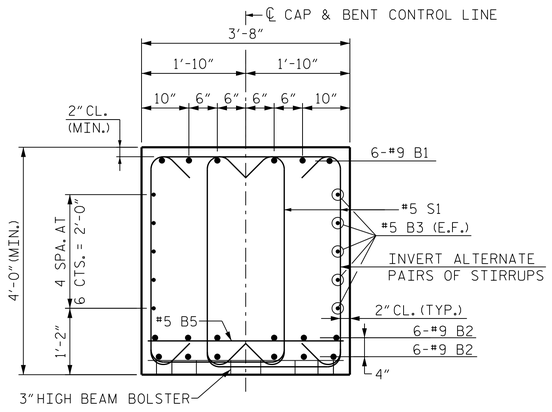
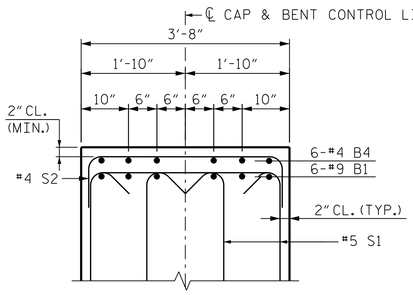
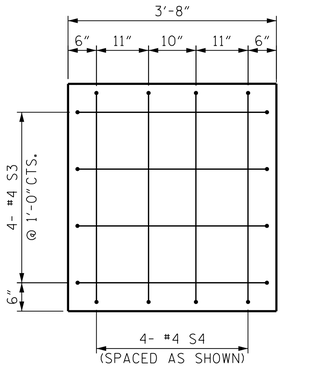


SECTION A-A



SECTION THRU BEARING

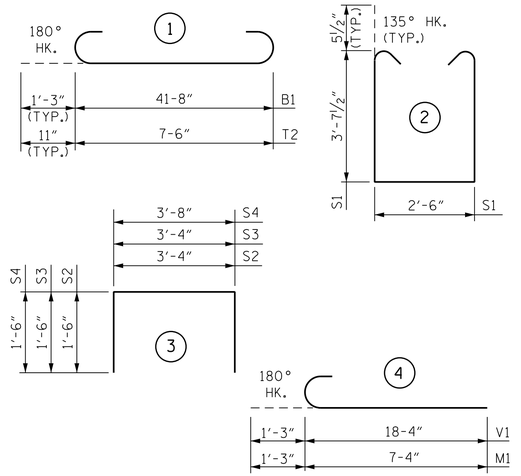
(BEARING AT AG3 & BG3)

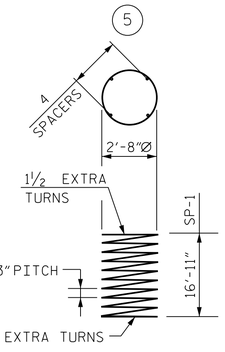


END OF CAP DETAIL

(TYPICAL BOTH ENDS)

BAR TYPES





NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

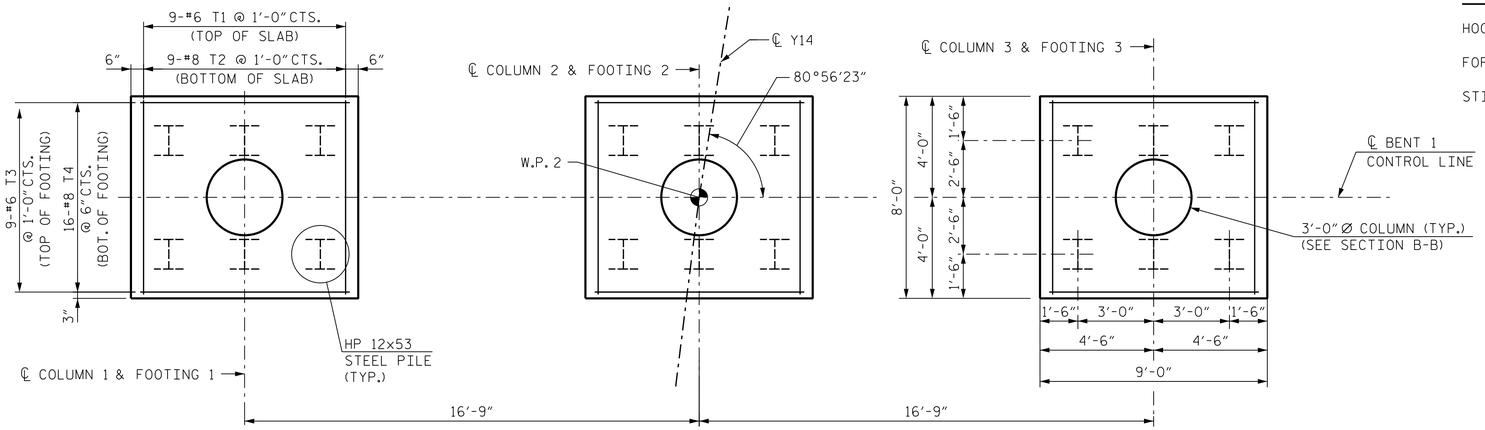
BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#9	1	44'-2"	901
B2	12	#9	STR	41'-8"	1,700
B3	8	#5	STR	41'-8"	348
B4	6	#4	STR	8'-10"	35
B5	11	#5	STR	3'-4"	38
M1	30	#9	4	8'-7"	876
S1	124	#5	2	10'-9"	1,390
S2	87	#4	3	6'-4"	368
S3	8	#4	3	6'-4"	34
S4	8	#4	3	6'-8"	36
T1	27	#6	STR	7'-6"	304
T2	27	#8	1	9'-4"	673
T3	27	#6	STR	8'-6"	345
T4	48	#8	STR	8'-6"	1,089
V1	30	#9	4	19'-7"	1,998
SP-1	3	**	5	581'-6"	1,165

SPIRAL COLUMN REINFORCING STEEL	1,165 LBS.
REINFORCING STEEL	10,135 LBS.
CLASS "A" CONCRETE	
POUR 1 (FOOTINGS)	28.0 C.Y.
POUR 2 (COLUMNS)	13.1 C.Y.
POUR 3 (CAP)	23.8 C.Y.
TOTAL	64.9 C.Y.
HP 12 X 53 STEEL PILES	
NO.	18
PILE DRIVING EQUIPMENT SETUP	18
L.F.	1278
PILE REDRIVES	9
PDA TESTING	1

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

SECTION B-B



FOOTING PLAN

(DIMENSIONS AND RENFORCING STEEL ARE TYPICAL FOR EACH FOOTING)

NOTES:

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

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

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 2 OF 2

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SITE 3 DWG. NO.25

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 1 DETAILS AND BILL OF MATERIAL

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1			3			TOTAL SHEETS
2			4			32

STR. #5

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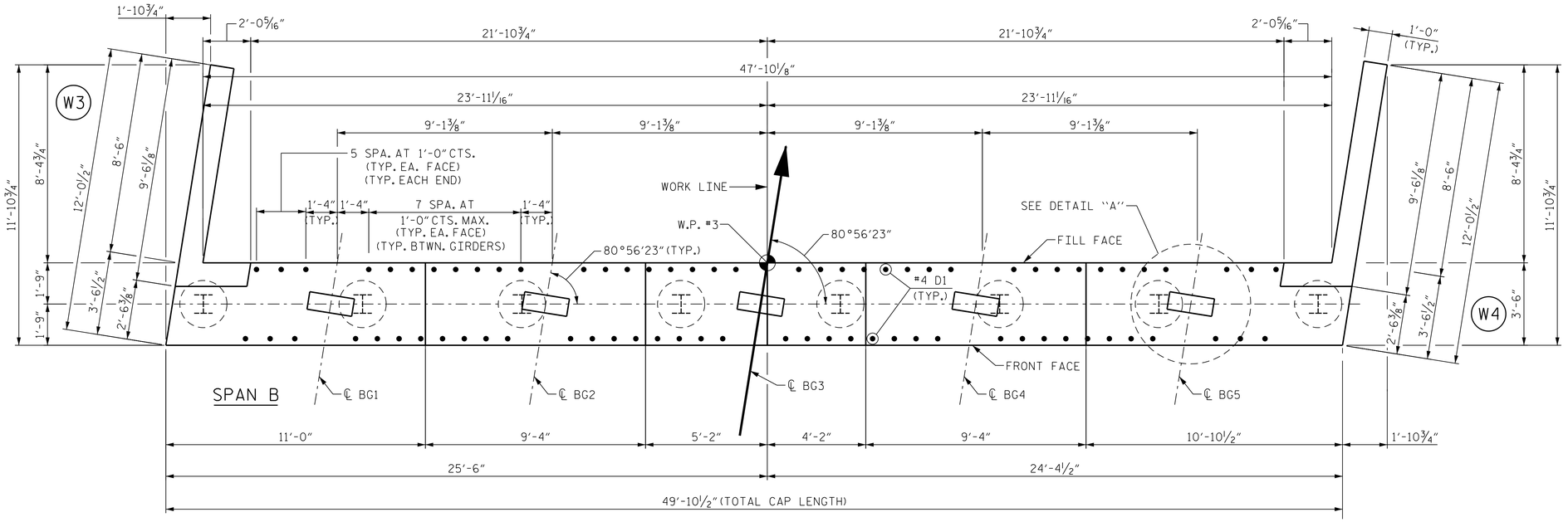
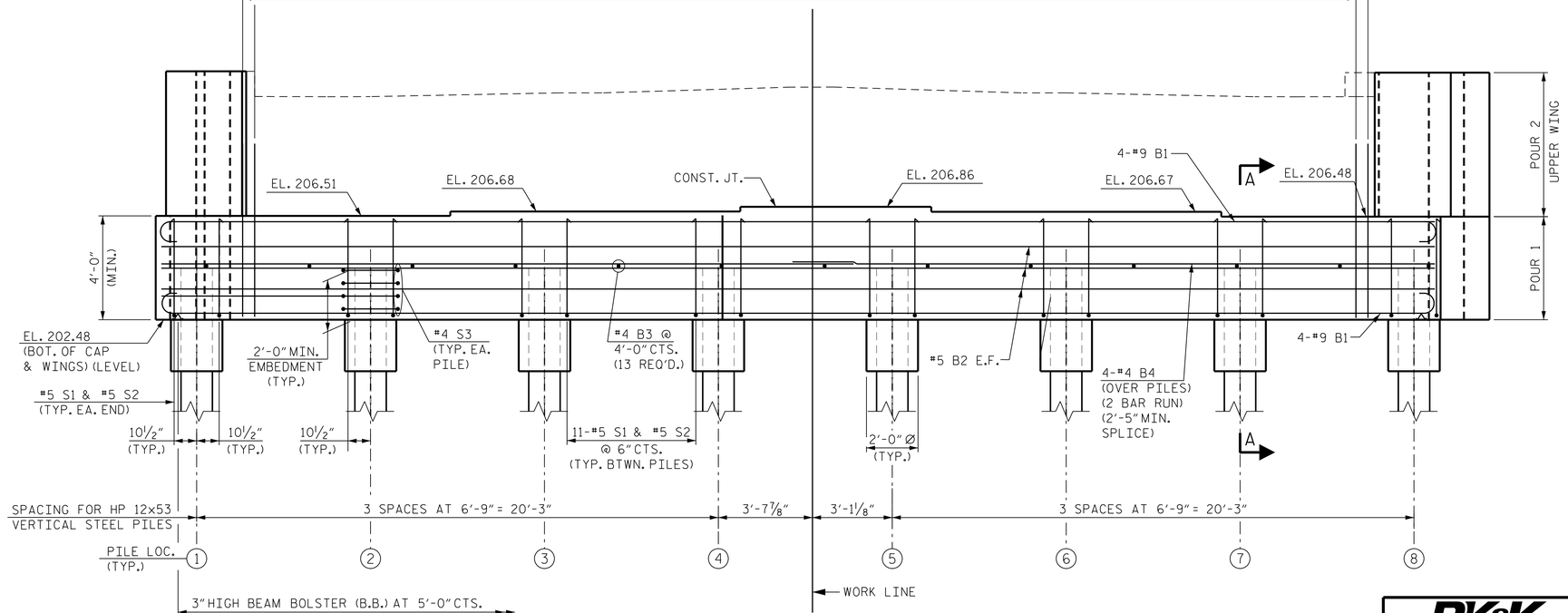
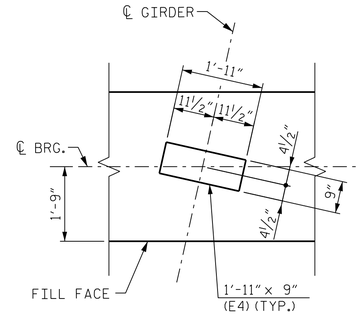


PLAN



ELEVATION



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

NOTES:

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

THE TOP SURFACE OF THE END BENT CAP AND WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

FOR PILE SPLICE DETAILS AND TEMPORARY DRAINAGE DETAILS, SEE SHEET 3 OF 3.

FOR SECTION A-A, SEE SHEET 3 OF 3.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
PLAN AND ELEVATION

SITE 3 DWG. NO. 26

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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1			3			TOTAL SHEETS
2			4			32

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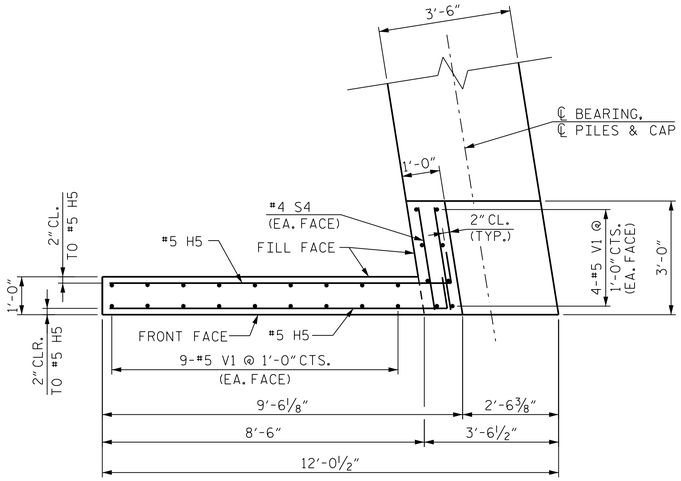
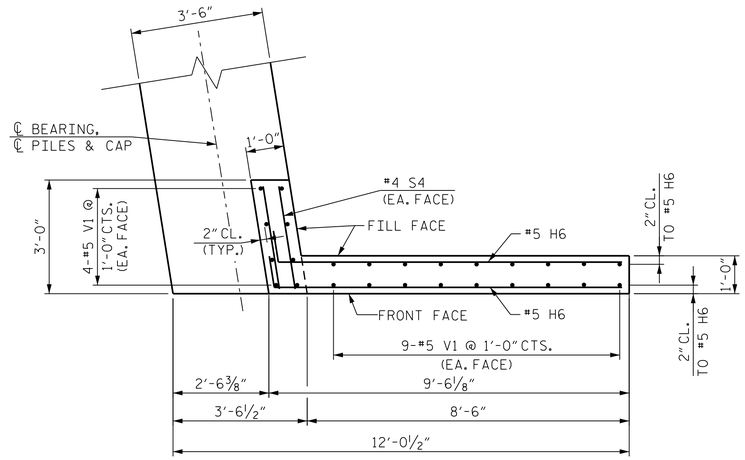
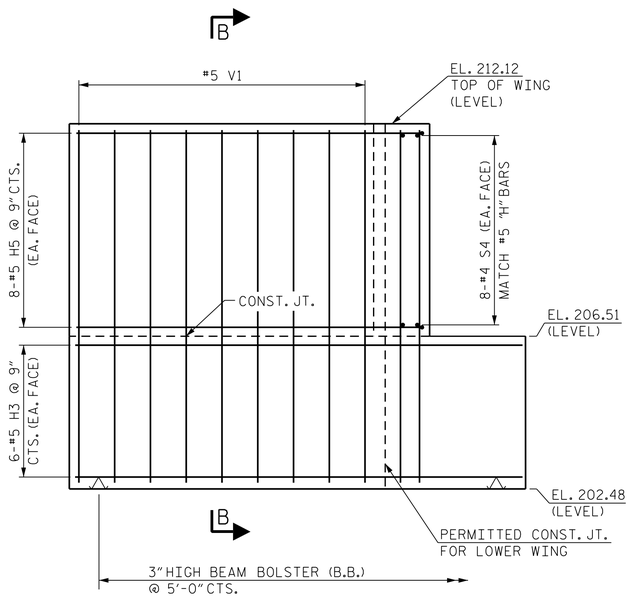


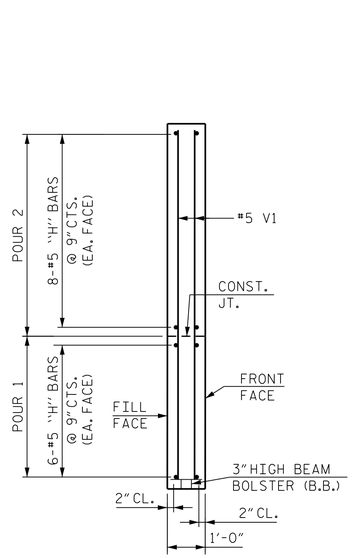
PLAN OF LEFT WINGWALL



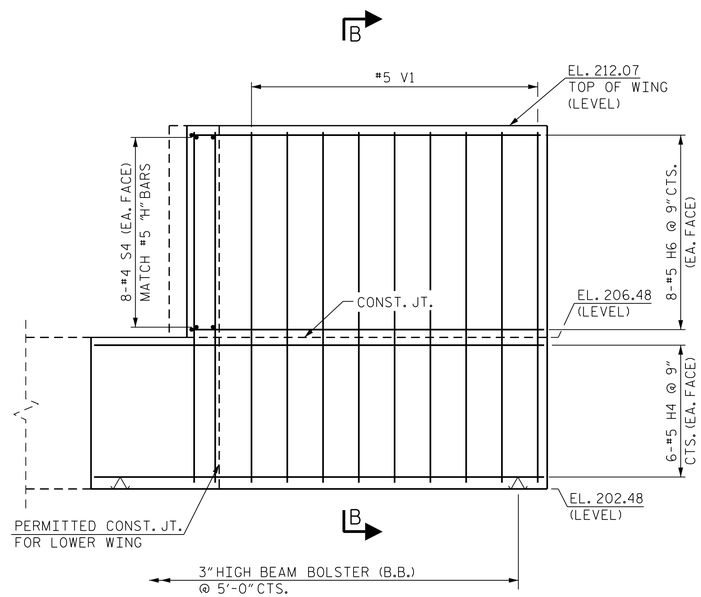
PLAN OF RIGHT WINGWALL



ELEVATION OF LEFT WINGWALL



SECTION B-B



ELEVATION OF RIGHT WINGWALL

LEFT WINGWALL DETAILS (W3)

RIGHT WINGWALL DETAILS (W4)

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Jeremy Pampuch
2/7/2022

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 23+16.56 -Y14-

SHEET 2 OF 3

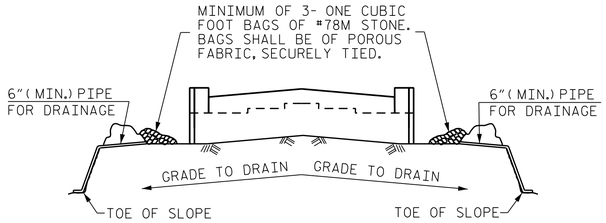
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
WINGWALL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-27
1			3			TOTAL SHEETS
2			4			32

STR. #5

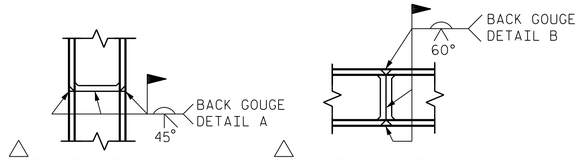


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

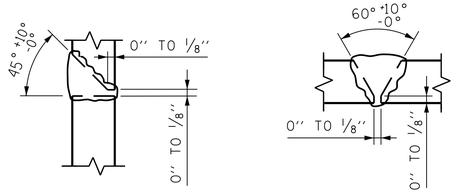
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

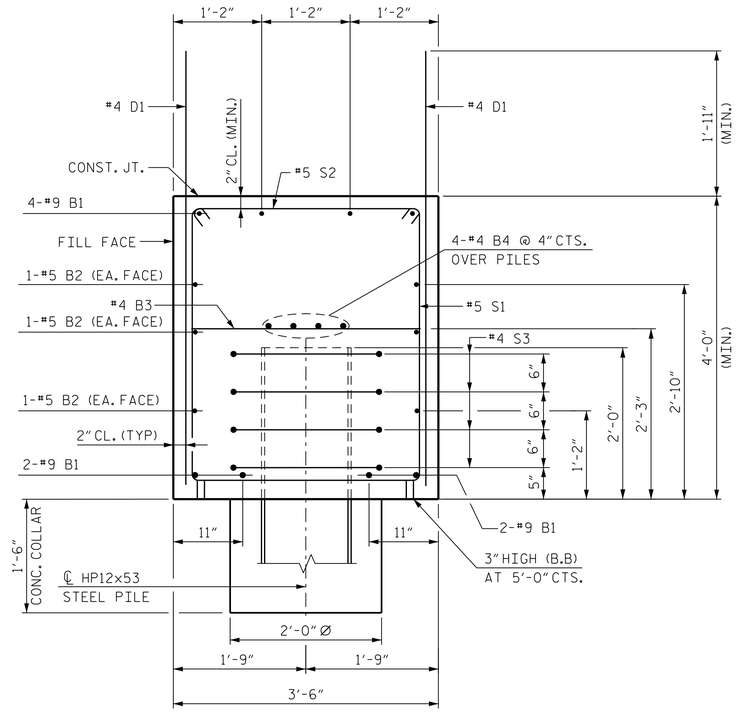


DETAIL A

DETAIL B

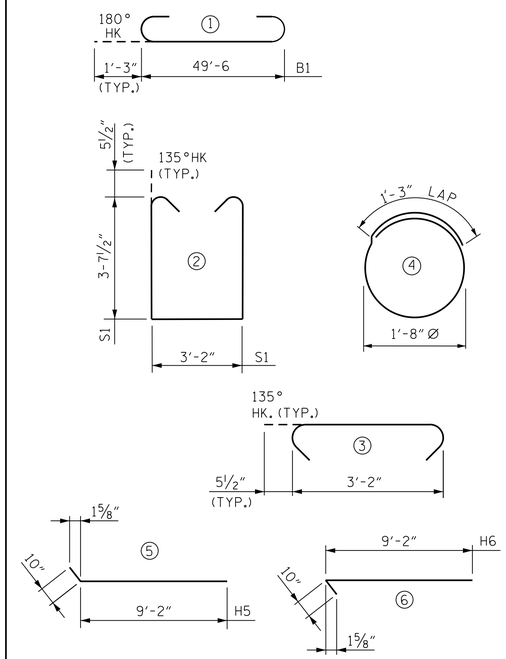
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION A-A

BAR TYPES



NOTE: ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	52'-0"	1,414
B2	6	#5	STR	49'-6"	310
B3	13	#4	STR	3'-2"	27
B4	8	#4	STR	26'-0"	139
H3	12	#5	STR	11'-9"	147
H4	12	#5	STR	11'-9"	147
H5	16	#5	5	10'-0"	167
H6	16	#5	6	10'-0"	167
D1	76	#4	STR	6'-4"	322
S1	79	#5	2	11'-4"	934
S2	79	#5	3	4'-1"	336
S3	32	#4	4	6'-6"	139
S4	32	#4	STR	2'-7"	55
V1	52	#5	STR	9'-3"	502
REINFORCING STEEL					4,806 LBS.
CLASS A CONCRETE					
POUR 1 (CAP, LOWER WINGS & COLLARS)					30.9 C.Y.
POUR 2 (UPPER WINGS)					4.7 C.Y.
TOTAL					35.6 C.Y.
HP 12 X 53 STEEL PILES					
NO.					8
PILE DRIVING EQUIPMENT SETUP					8
L.F.					536
PILE REDRIVES					4

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2 DETAILS AND BILL OF MATERIAL

SITE 3 DWG. NO. 28

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NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
DocuSigned by: Jeremy Pampuch
2/7/2022

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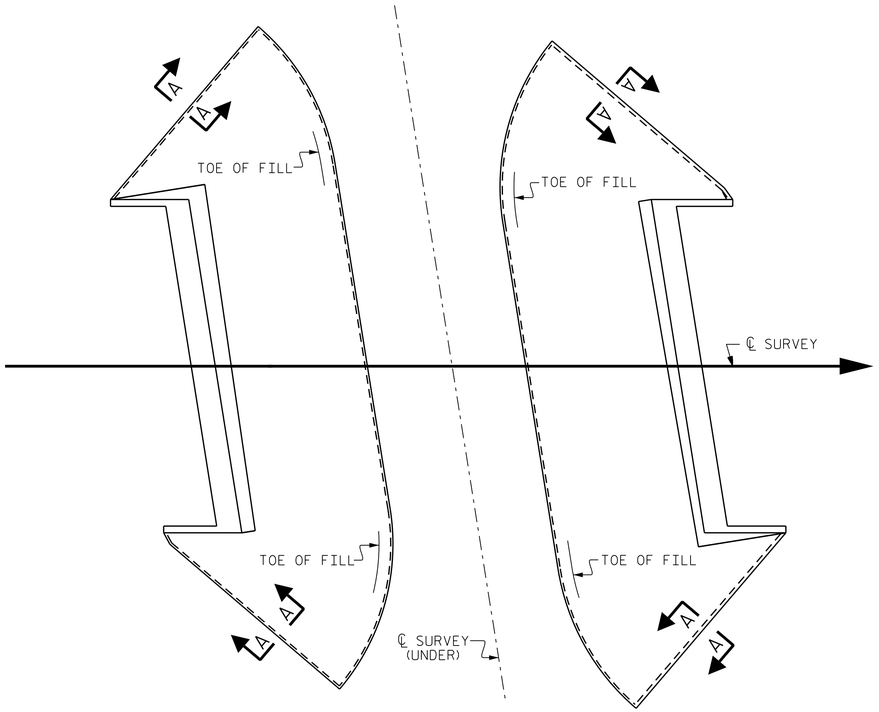
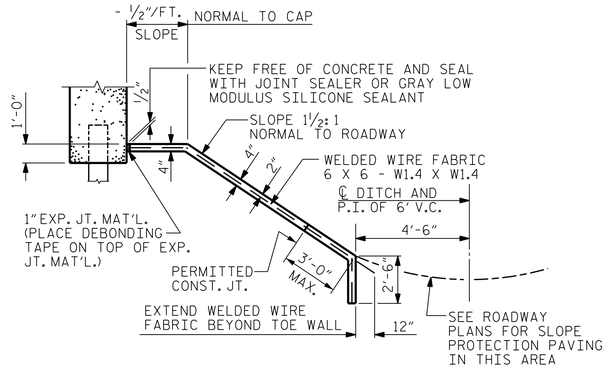
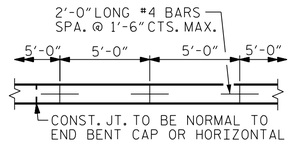


PLAN

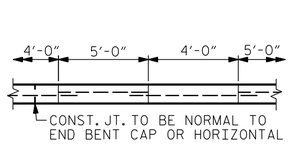


SECTION ALONG ℄ SURVEY WHEN FILL CATCHES IN DITCH



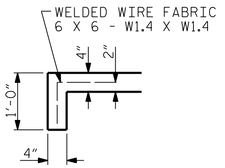
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



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

OPTIONAL POURING DETAIL



SECTION A-A

GENERAL NOTES:

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

BRIDGE @ STA. 23+16.56 -Y14-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	324	582
END BENT 2	327	589

✳ QUANTITY SHOWN IS BASED ON 5' POURS.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

MISCELLANEOUS

SLOPE PROTECTION DETAILS

SITE 3 DWG. NO. 29

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

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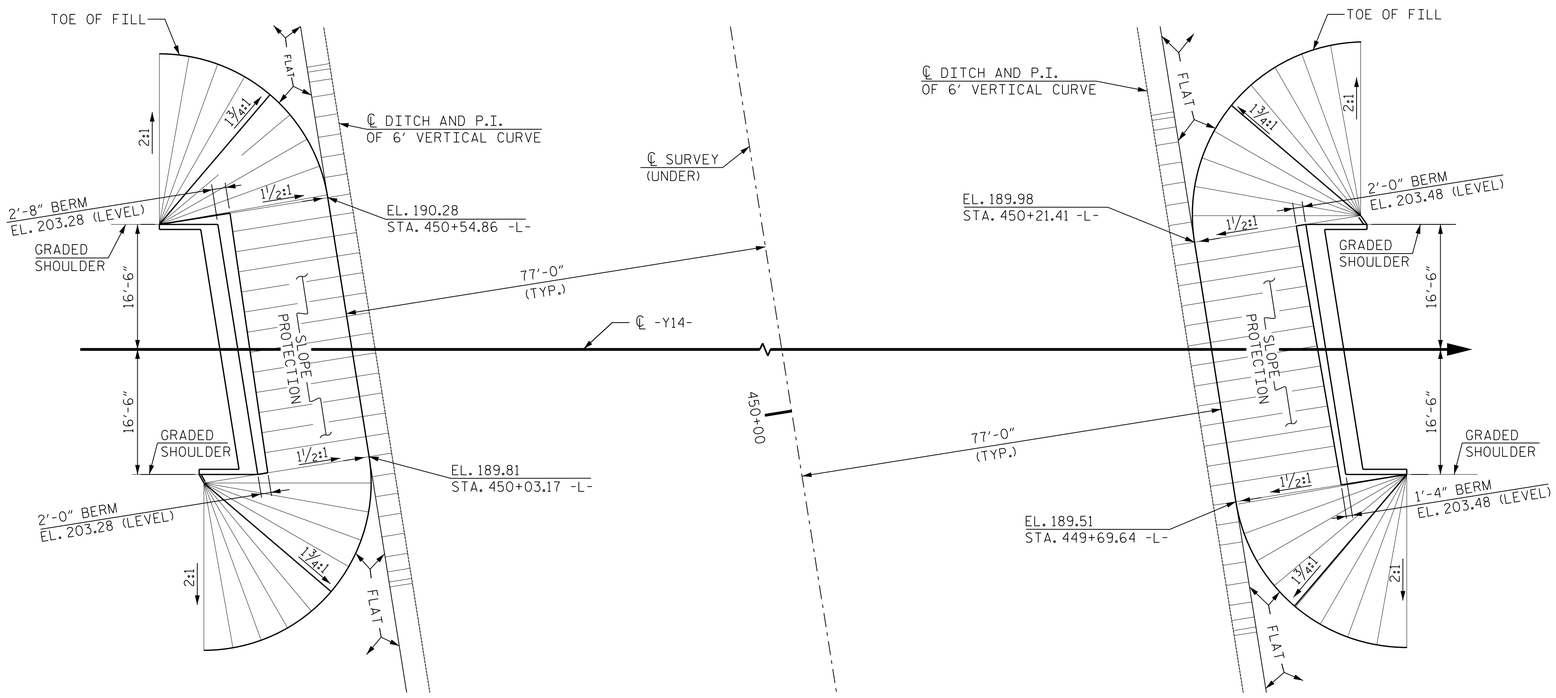
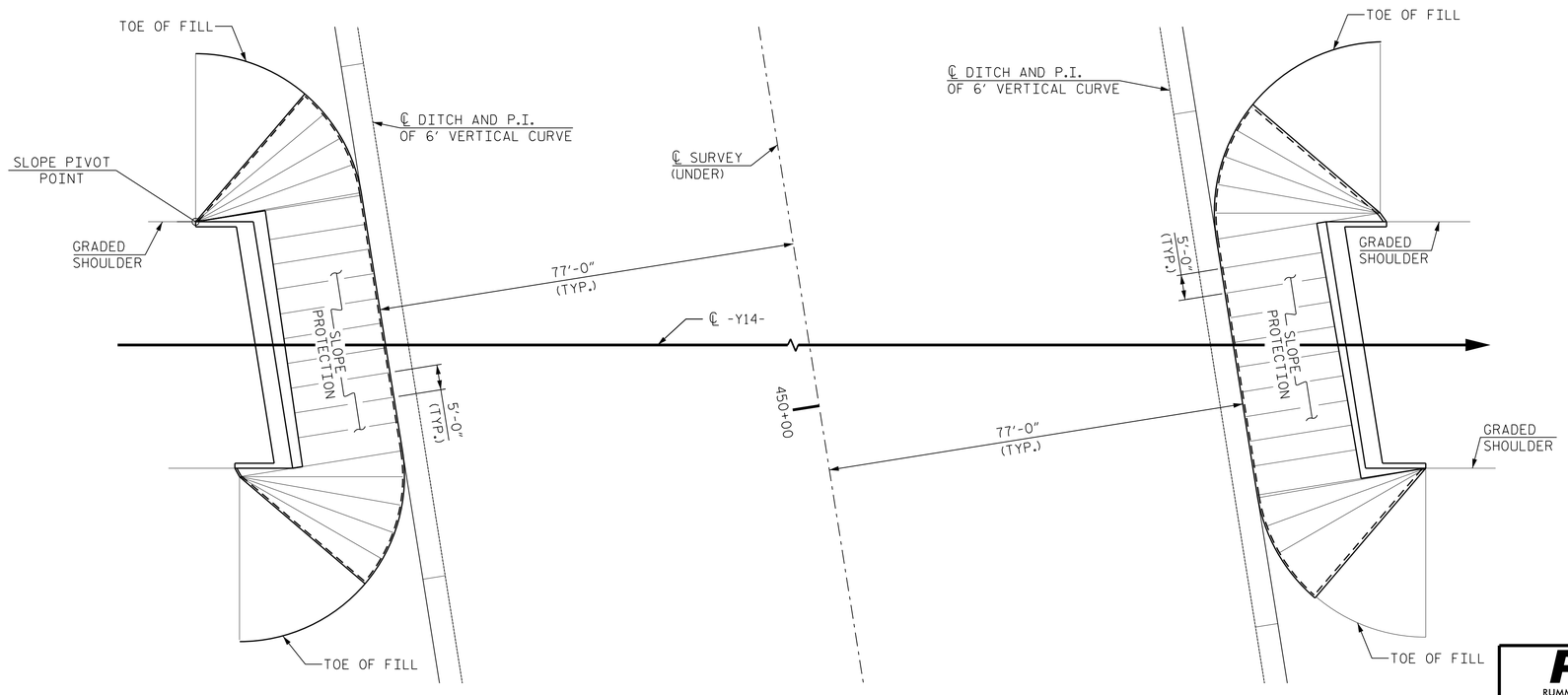


END BENT 1

PLAN - GRADING

END BENT 2



END BENT 1

PLAN - CONCRETE PLACEMENT

END BENT 2

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
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MISCELLANEOUS

SLOPE PROTECTION DETAILS

SITE 3 DWG. NO.30

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

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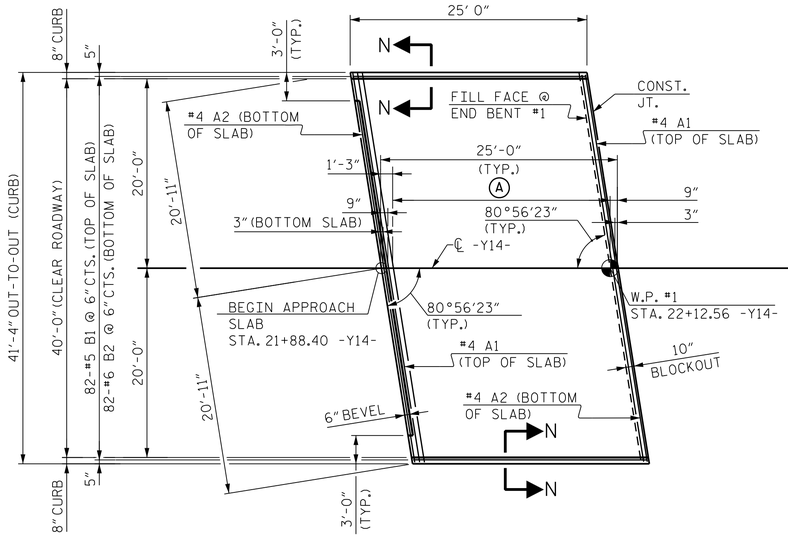
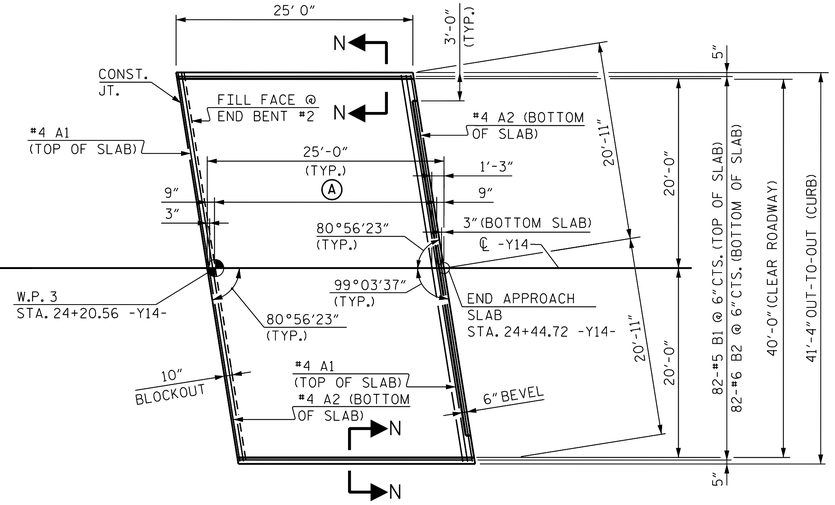
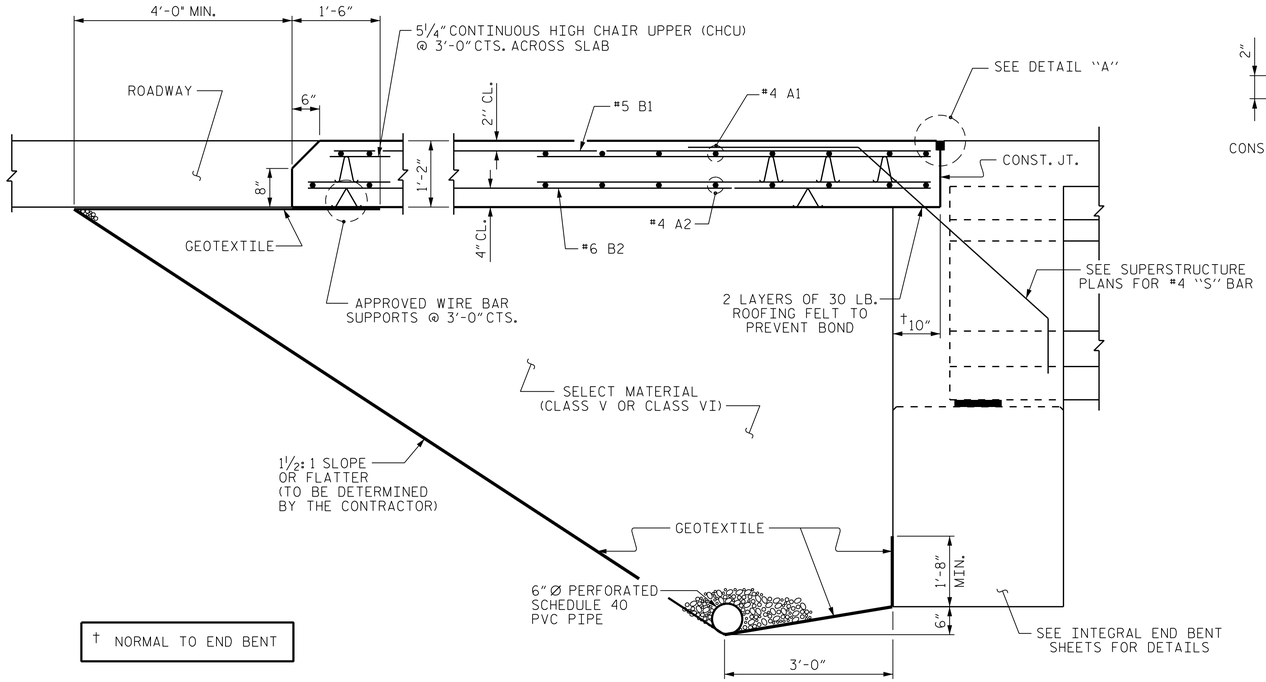


PLAN AT END BENT 1



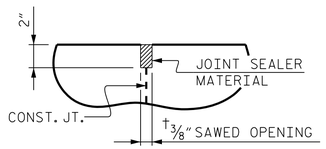
PLAN AT END BENT 2



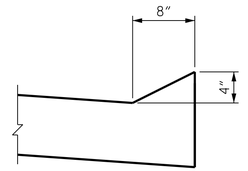
† NORMAL TO END BENT

SECTION THRU SLAB

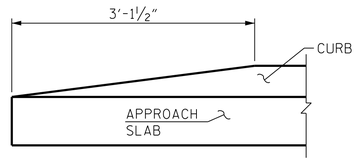
(TYPE I - STANDARD APPROACH FILL)



DETAIL "A"



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

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	52	#4	STR	21'-9"	756
A2	52	#4	STR	21'-9"	756
✳ B1	82	#5	STR	24'-2"	2,067
B2	82	#6	STR	24'-8"	3,038
REINFORCING STEEL					3,794 LBS.
✳ EPOXY COATED REINFORCING STEEL					2,823 LBS.
CLASS AA CONCRETE					44.7 C.Y.

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	52	#4	STR	21'-9"	756
A2	52	#4	STR	21'-9"	756
✳ B1	82	#5	STR	24'-2"	2,067
B2	82	#6	STR	24'-8"	3,038
REINFORCING STEEL					3,794 LBS.
✳ EPOXY COATED REINFORCING STEEL					2,823 LBS.
CLASS AA CONCRETE					44.7 C.Y.

Ⓐ
24-#4 A1 @ 1'-0" CTS.
(TOP OF SLAB, 2 BAR RUNS)
24-#4 A2 @ 1'-0" CTS.
(BOTTOM OF SLAB, 2 BAR RUNS)

NOTES

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

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BRIDGE APPROACH SLAB

SITE 3 DWG. NO. 31

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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STR. #5

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2/7/2022
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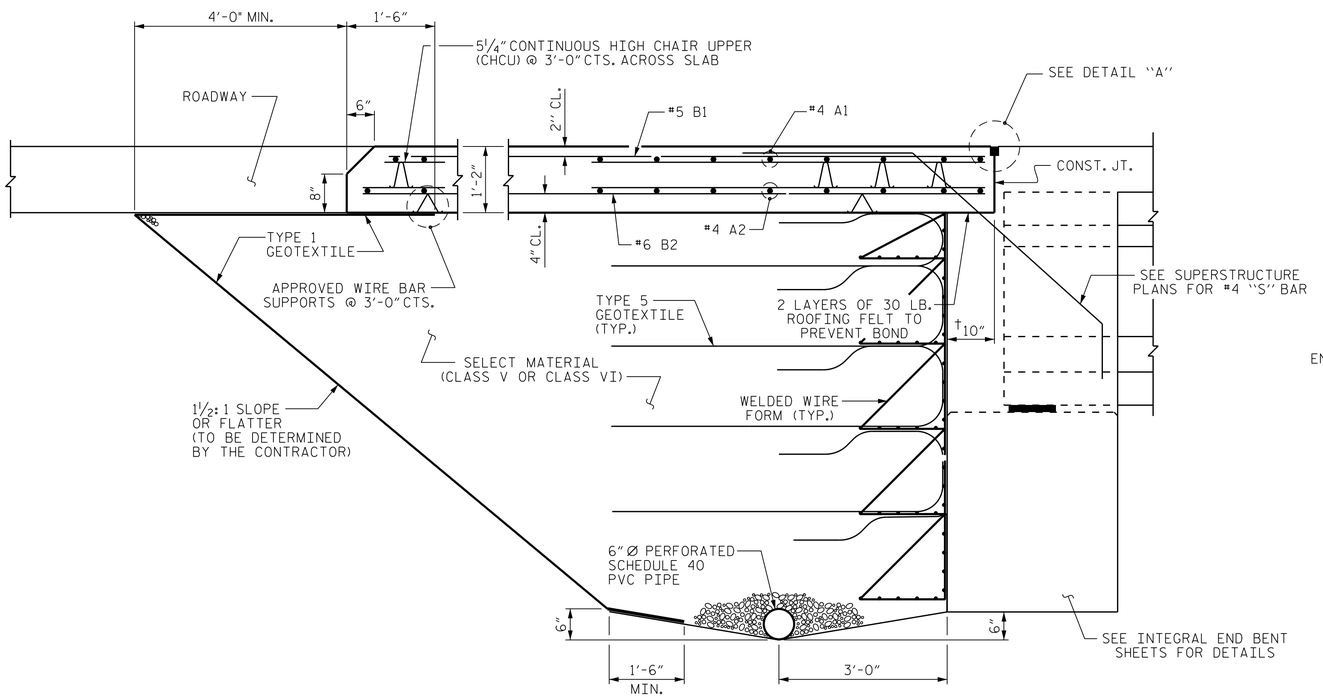
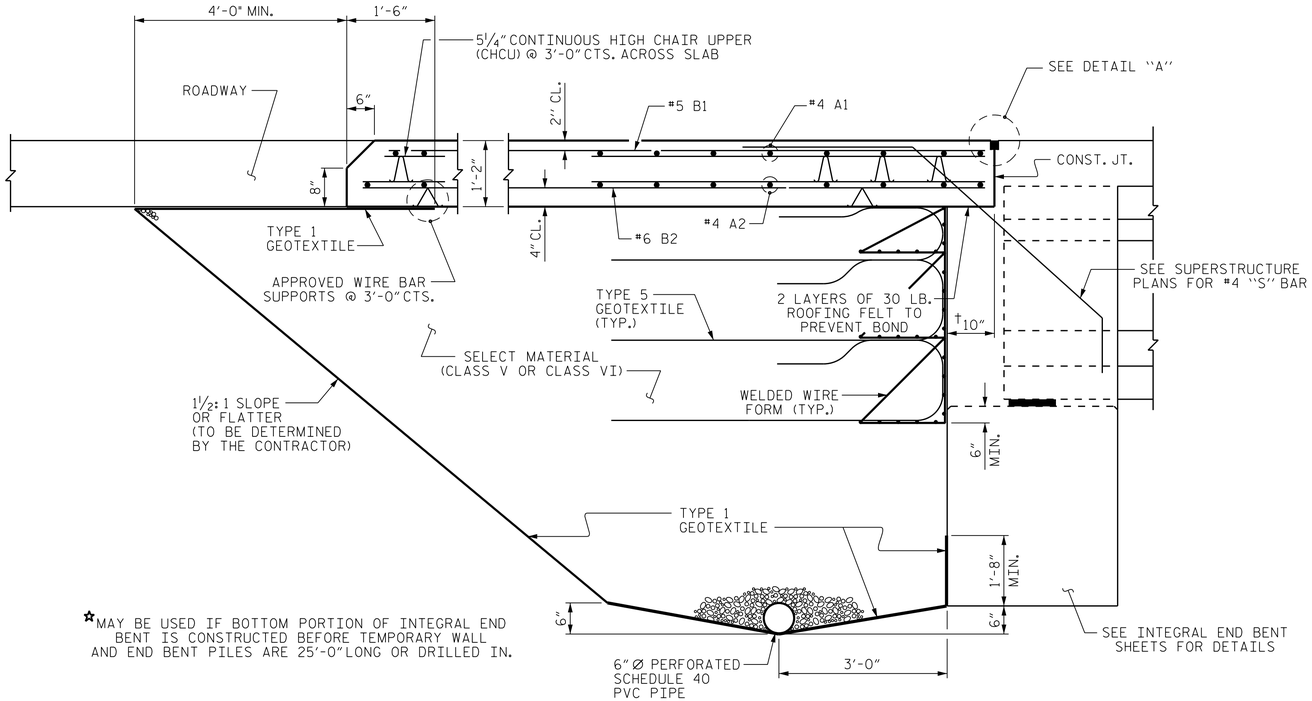


SECTION THRU SLAB

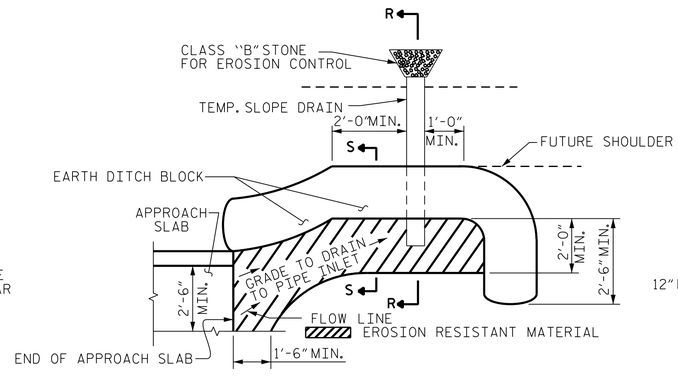
(TYPE A - ALTERNATE APPROACH FILL)



☆MAY BE USED IF BOTTOM PORTION OF INTEGRAL END BENT IS CONSTRUCTED BEFORE TEMPORARY WALL AND END BENT PILES ARE 25'-0" LONG OR DRILLED IN.

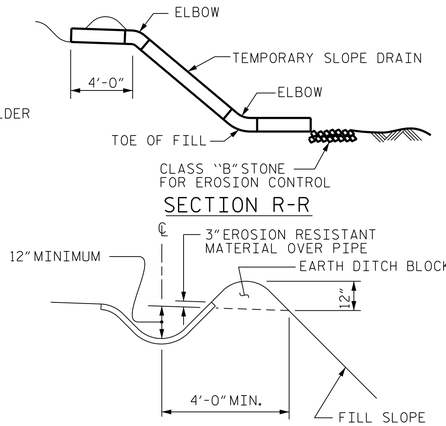
SECTION THRU SLAB

☆(TYPE A - ALTERNATE APPROACH FILL)



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.

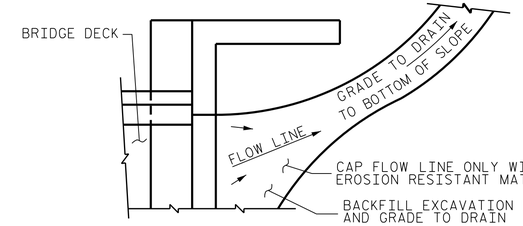
PLAN VIEW



SECTION 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

NOTES

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

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

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

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

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 23+16.56 -Y14-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BRIDGE APPROACH SLAB DETAILS

SITE 3 DWG. NO.32

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

NORTH CAROLINA PROFESSIONAL SEAL 047568 ENGINEER JEREMY PAMPUCH
2/7/2022

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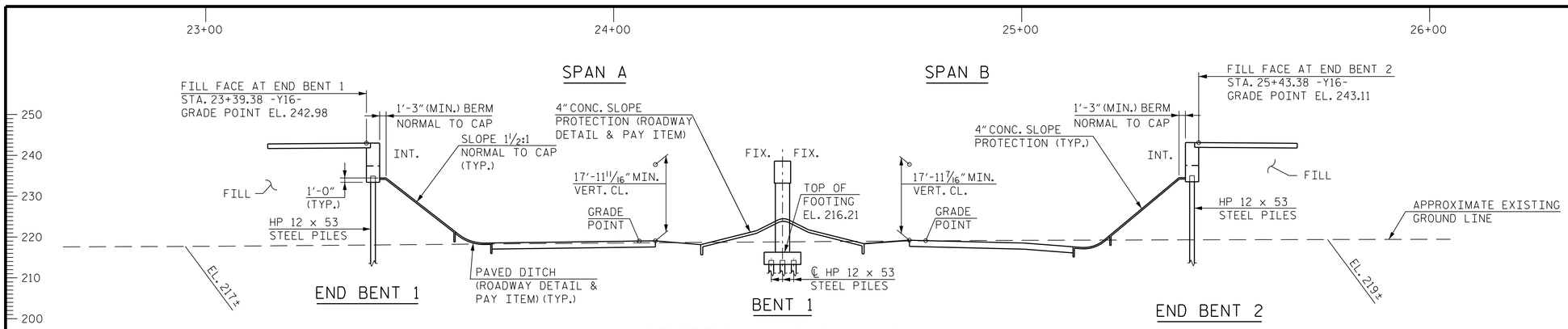


SECTION ALONG -Y16-

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

P.V.I. = 24+50.00 -Y16-
EL. = 252.85
V.C. = 1,080.00 FT.

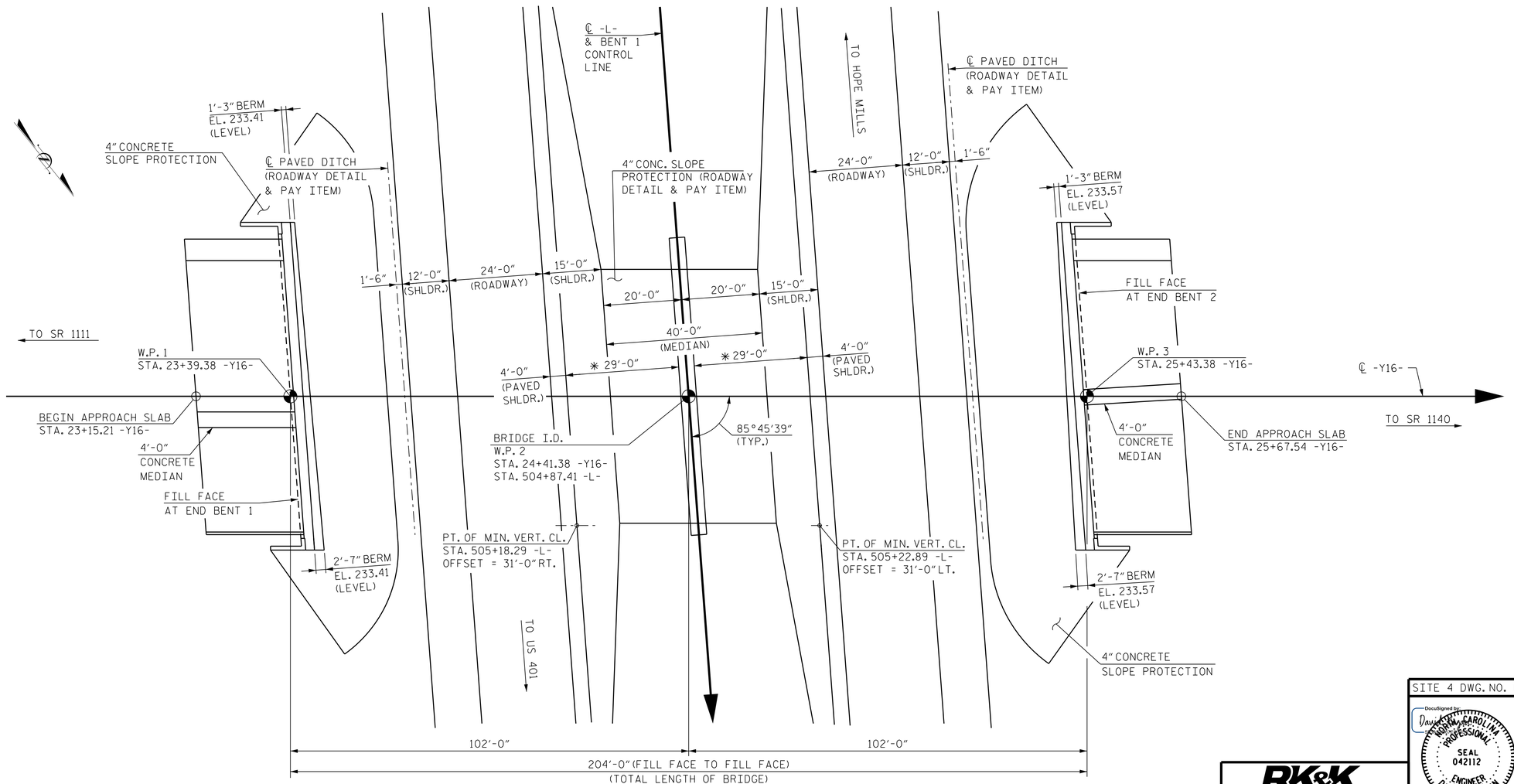
(+)3.5096% △ (-)3.5000%

-Y16- GRADE DATA

P.V.I. = 490+00.00 -L-
EL. = 202.92
V.C. = 360.00 FT.

(-)0.5000% △ (+)1.0544%

-L- GRADE DATA



PLAN

(PILES NOT SHOWN FOR CLARITY)

✱ MINIMUM HORIZONTAL CLEARANCE FROM FACE OF CAP TO EDGE OF PAVEMENT

DRAWN BY : B. A. HAAG DATE : FEB 2022
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DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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3/23/2022

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315-173

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-
504+87.41 -L-

SHEET 1 OF 4 BRIDGE NO. 451

SITE 4 DWG. NO. 1

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON
STONEY POINT RD
OVER FAYETTEVILLE OUTER LOOP
BETWEEN SR 1111 AND SR 1140

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1			3			TOTAL SHEETS
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STR. #5

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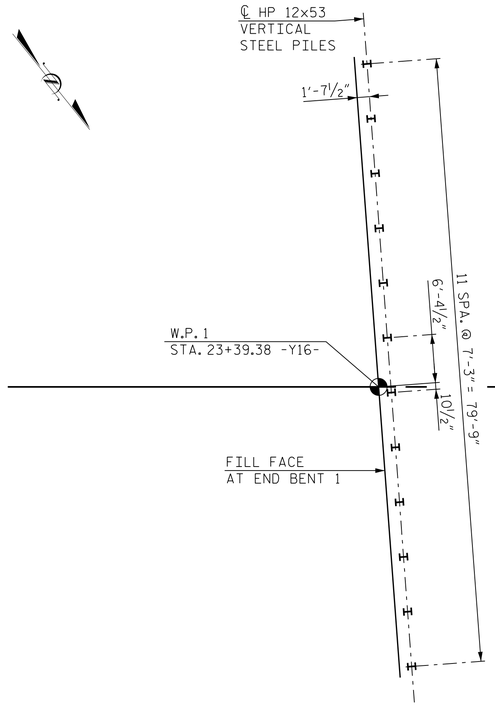
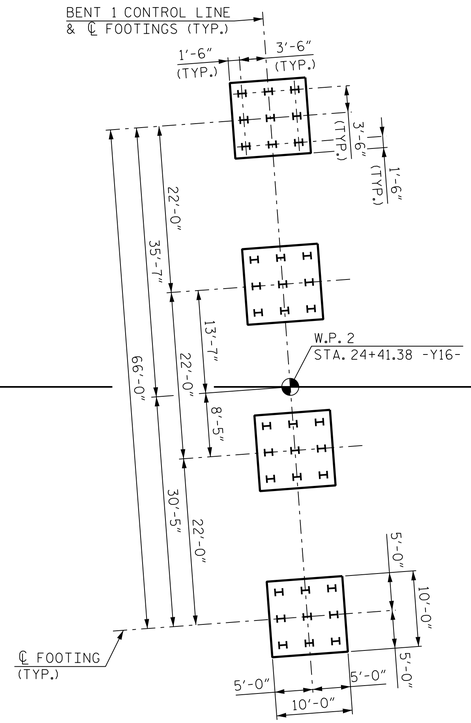
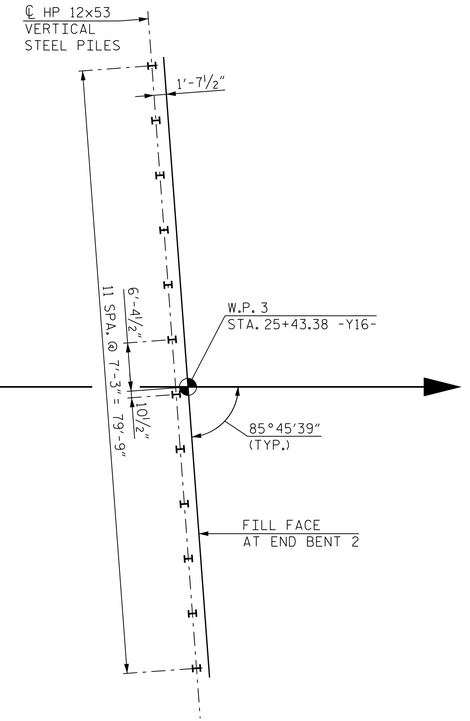


END BENT 1



BENT 1



END BENT 2

FOUNDATION NOTES

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

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING, OR REDRIVING IS REQUIRED FOR END BENT NO. 1 OR 2. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING, OR REDRIVING IS REQUIRED FOR BENT NO. 1. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOUNDATION LAYOUT

ALL PILES ARE HP 12x53 STEEL PILES.
DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.
DIMENSIONS AND/OR PILE LAYOUTS ARE TYPICAL FOR EACH FOOTING OF BENT 1.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-
504+87.41 -L-

SHEET 2 OF 4

SITE 4 DWG. NO. 2

DocuSigned by: David M. Ragan
3/23/2022

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

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STR. #5

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DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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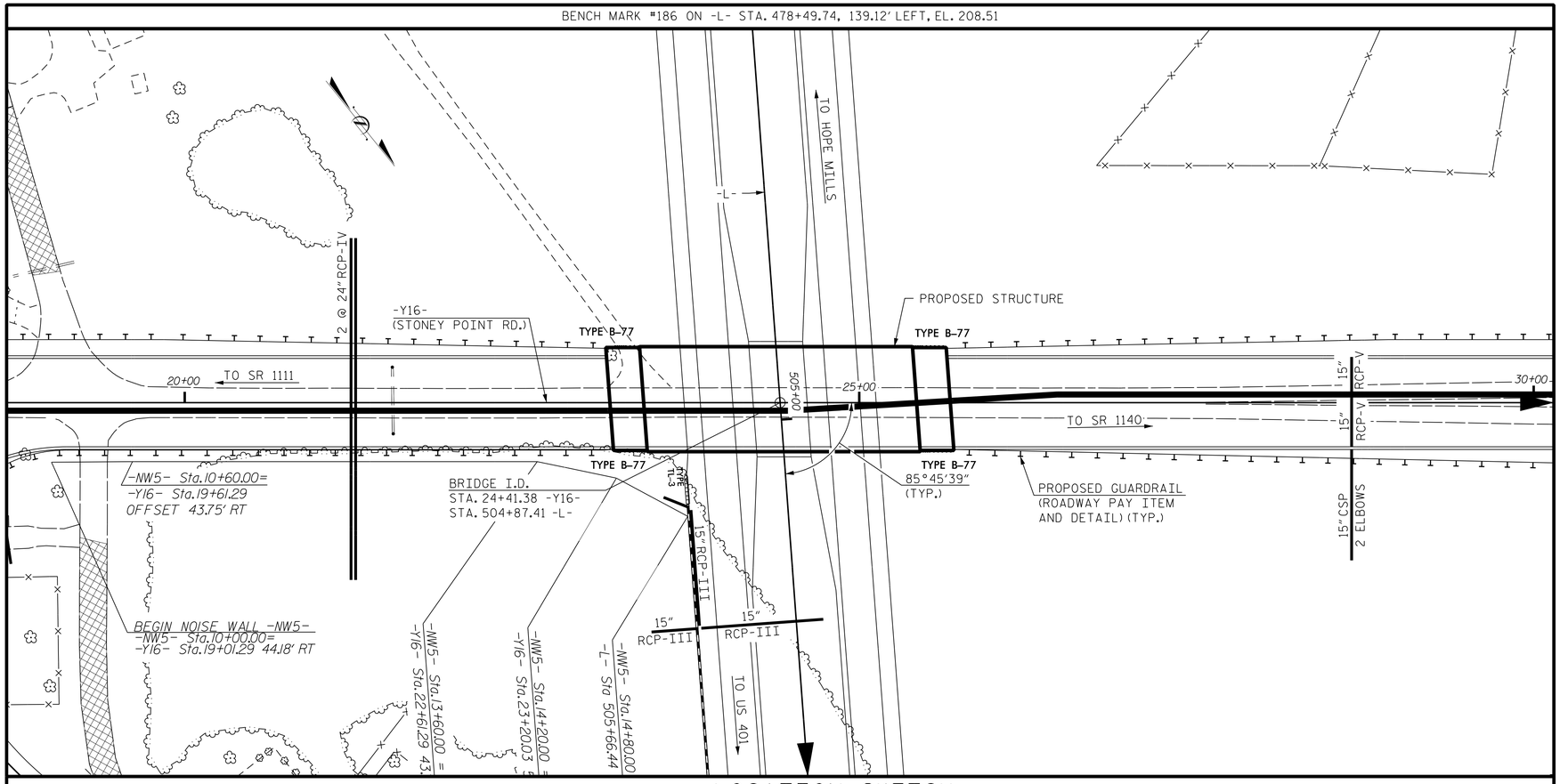
TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12x53 STEEL PILES	HP 12 X 53 STEEL PILES		PILE REDRIVES	2 BAR METAL RAIL	CONCRETE BARRIER RAIL	1'-2"x3'-4" CONCRETE PARAPET	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS
	LUMP SUM	EA.	SQ.FT.	SQ.FT.	CU.YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN.FT.	EA.	NO.	LIN.FT.	EA.	LIN.FT.	LIN.FT.	LIN.FT.	SQ.YDS.	LUMP SUM
SUPERSTRUCTURE	———	———	15,766	16,714	———	LUMP SUM	———	———	18	1,814'-3"	———	——	———	———	194'-9"	202'-4"	202'-4"	———	LUMP SUM
END BENT 1	———	———	———	———	54.8	———	7,036	———	——	———	12	12	660	6	———	———	———	408	———
BENT 1	LUMP SUM	———	———	———	144.4	———	23,850	1,455	——	———	36	36	1,980	18	———	———	———	———	———
END BENT 2	———	———	———	———	54.4	———	7,036	———	——	———	12	12	660	6	———	———	———	408	———
TOTAL	LUMP SUM	2	15,766	16,714	253.6	LUMP SUM	37,922	1,455	18	1,814'-3"	60	60	3,300	30	194'-9"	202'-4"	202'-4"	816	LUMP SUM



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

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 EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

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

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.

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

NOTE:

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-
504+87.41 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH, GENERAL NOTES AND TOTAL BILL OF MATERIAL

SITE 4 DWG. NO. 3

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : A. L. STROUD DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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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 × 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	0.796	1.59	A / B	EL	49.6	0.901	1.58	A / B	I	9.3	0.80	0.796	1.19	A / B	EL	49.6	
		HL-93 (OPERATING)	N/A		2.06	-	1.35	0.796	2.06	A / B	EL	49.6	0.901	2.09	A / B	I	9.3	N/A	-	-	-	-	-	
		HS-20 (INVENTORY)	36.000	(2)	1.65	59.4	1.75	0.796	2.22	A / B	EL	49.6	0.901	2.15	A / B	I	9.3	0.80	0.796	1.65	A / B	EL	49.6	
		HS-20 (OPERATING)	36.000		2.83	101.8	1.35	0.796	2.88	A / B	EL	49.6	0.901	2.83	A / B	I	9.3	N/A	-	-	-	-	-	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.92	52.9	1.40	0.796	6.58	A / B	EL	49.6	0.901	6.88	A / B	I	9.3	0.80	0.796	3.92	A / B	EL	49.6	
		SNGARBS2	20.000		2.84	56.8	1.40	0.796	4.76	A / B	EL	49.6	0.901	4.78	A / B	I	9.3	0.80	0.796	2.84	A / B	EL	49.6	
		SNAGRIS2	22.000		2.66	58.5	1.40	0.796	4.46	A / B	EL	49.6	0.901	4.40	A / B	I	9.3	0.80	0.796	2.66	A / B	EL	49.6	
		SNCOTTS3	27.250		1.95	53.1	1.40	0.796	3.27	A / B	EL	49.6	0.901	3.36	A / B	I	9.3	0.80	0.796	1.95	A / B	EL	49.6	
		SNAGGRS4	34.925		1.60	55.8	1.40	0.796	2.68	A / B	EL	49.6	0.901	2.72	A / B	I	9.3	0.80	0.796	1.60	A / B	EL	49.6	
		SNS5A	35.550		1.56	55.4	1.40	0.796	2.62	A / B	EL	49.6	0.901	2.73	A / B	I	9.3	0.80	0.796	1.56	A / B	EL	49.6	
		SNS6A	39.950		1.42	56.7	1.40	0.796	2.39	A / B	EL	49.6	0.901	2.46	A / B	I	9.3	0.80	0.796	1.42	A / B	EL	49.6	
		SNS7B	42.000		1.35	56.7	1.40	0.796	2.27	A / B	EL	49.6	0.901	2.38	A / B	I	9.3	0.80	0.796	1.35	A / B	EL	49.6	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.73	57.0	1.40	0.796	2.90	A / B	EL	49.6	0.901	2.97	A / B	I	9.3	0.80	0.796	1.73	A / B	EL	49.6	
		TNT4A	33.075		1.73	57.2	1.40	0.796	2.91	A / B	EL	49.6	0.901	2.91	A / B	I	9.3	0.80	0.796	1.73	A / B	EL	49.6	
		TNT6A	41.600		1.41	58.6	1.40	0.796	2.36	A / B	EL	49.6	0.901	2.50	A / B	I	9.3	0.80	0.796	1.41	A / B	EL	49.6	
		TNT7A	42.000		1.41	59.2	1.40	0.796	2.36	A / B	EL	49.6	0.901	2.47	A / B	I	9.3	0.80	0.796	1.41	A / B	EL	49.6	
		TNT7B	42.000		1.44	60.4	1.40	0.796	2.41	A / B	EL	49.6	0.901	2.35	A / B	I	9.3	0.80	0.796	1.44	A / B	EL	49.6	
		TNAGRIT4	43.000		1.38	59.3	1.40	0.796	2.32	A / B	EL	49.6	0.901	2.28	A / B	I	9.3	0.80	0.796	1.38	A / B	EL	49.6	
		TNAGT5A	45.000		1.31	58.9	1.40	0.796	2.19	A / B	EL	49.6	0.901	2.23	A / B	I	9.3	0.80	0.796	1.31	A / B	EL	49.6	
		TNAGT5B	45.000	(3)	1.30	58.5	1.40	0.796	2.17	A / B	EL	49.6	0.901	2.16	A / B	I	9.3	0.80	0.796	1.30	A / B	EL	49.6	

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. PRESTRESSED GIRDERS WERE DESIGNED USING SIMPLE SPAN ANALYSIS.
2. ALL DISTANCES ARE MEASURED FROM THE CENTERLINE OF BEARING AT THE LEFT END OF SPAN.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

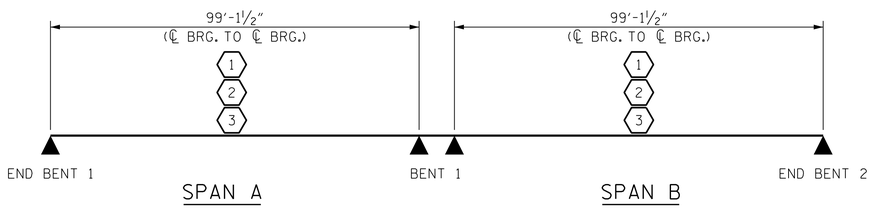
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-
504+87.41 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

SITE 4 DWG. NO. 4

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
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RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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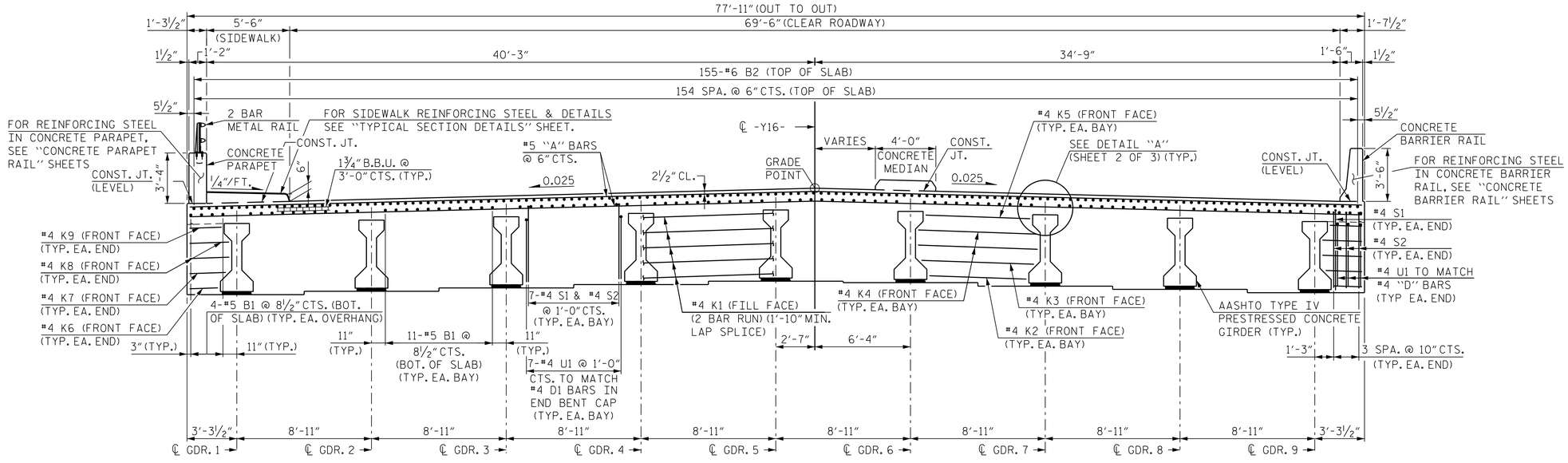
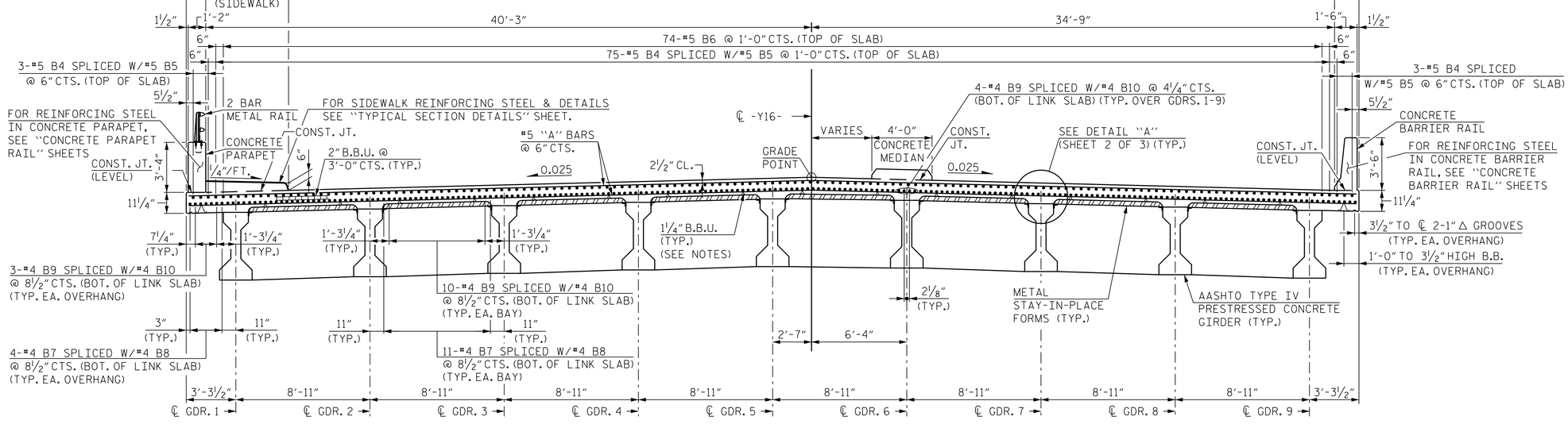


TYPICAL SECTION AT INTEGRAL END BENT



TYPICAL SECTION AT BENT

(SHOWING LINK SLAB REGION)

NOTES:

PROVIDE 1 1/4" HIGH BEAM BOLSTER UPPERS 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.) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.

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

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

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

TYPICAL SECTIONS

SITE 4 DWG. NO. 5

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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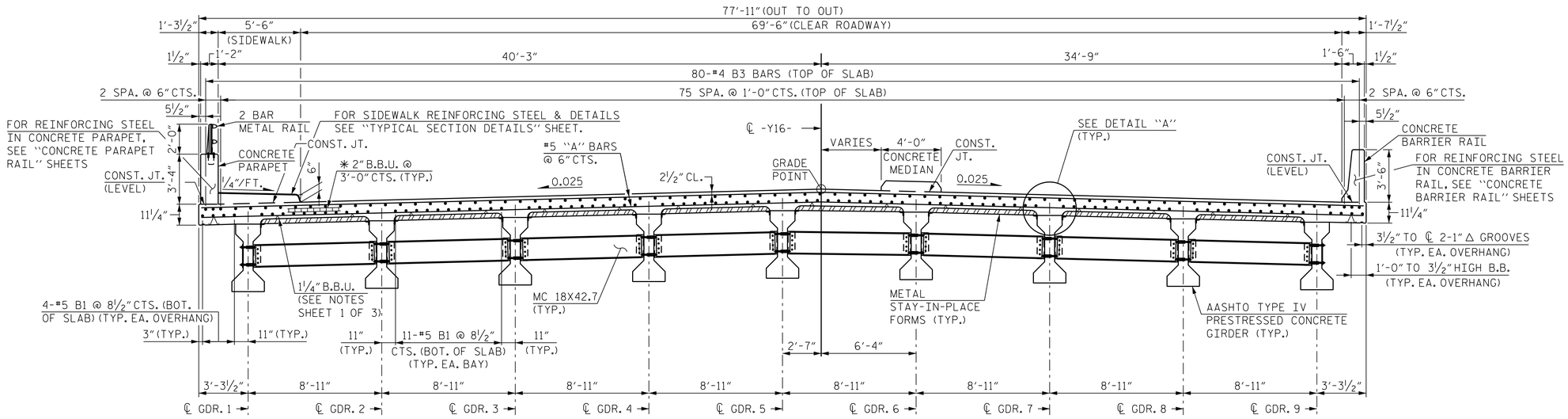
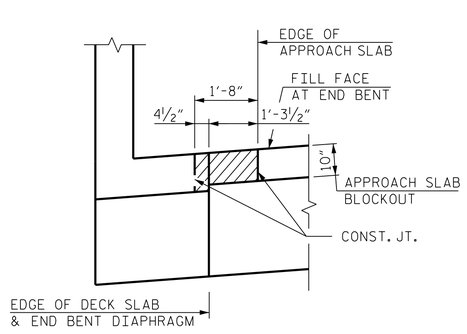
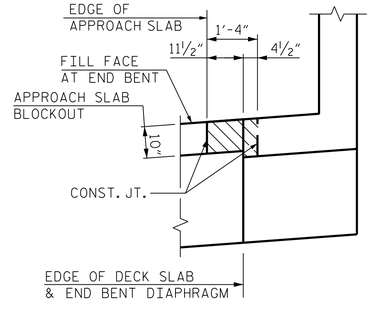


TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM

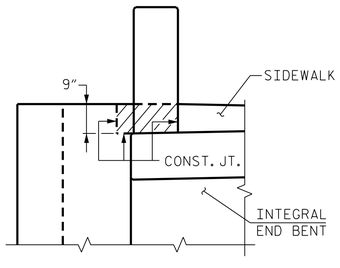
* USE THIS SIZE BAR SUPPORT IN THE AREA WITH THE #4 "B" BARS.
FOR OTHER AREAS WITH #6 "B" BARS, USE 1¾" B.B.U.



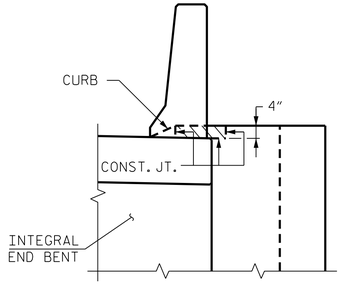
PLAN



PLAN



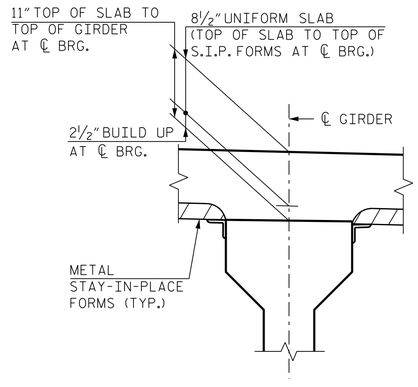
ELEVATION



ELEVATION

BLOCKOUT IN WINGWALL

THE CONCRETE IN THE HATCHED AREA SHALL BE POURED AFTER THE BARRIER RAIL OR PARAPET IS CAST IF SLIP FORMING IS USED.



DETAIL "A"

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTIONS

SITE 4 DWG. NO. 6

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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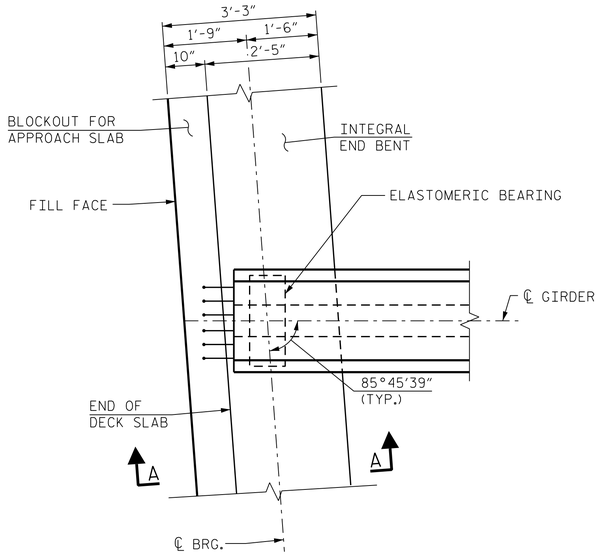
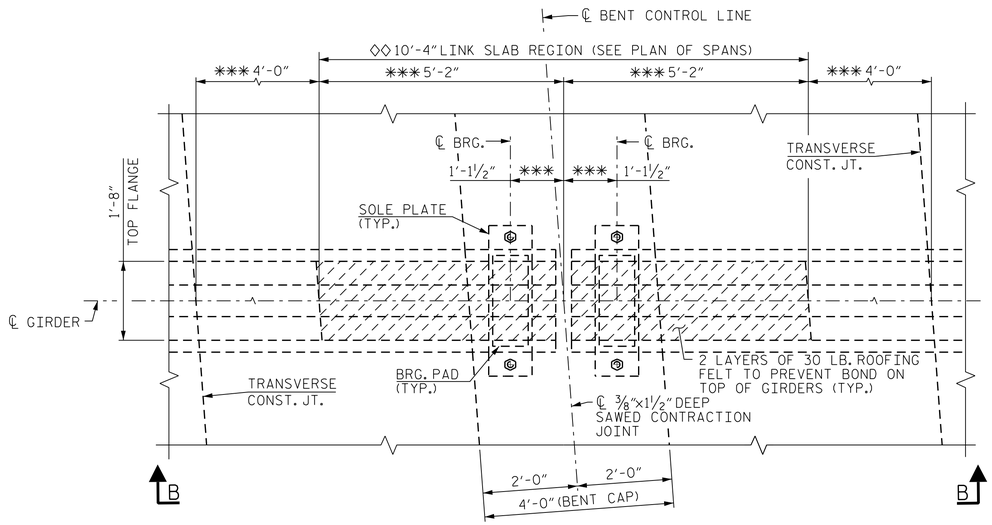


PLAN OF GIRDER AT INTEGRAL END BENT

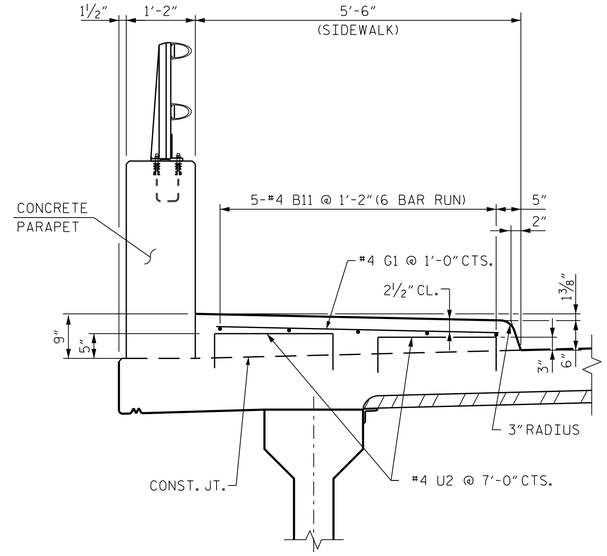
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



PLAN OF GIRDERS AT LINK SLAB

✱✱✱ MEASURED ALONG ℄ GIDER

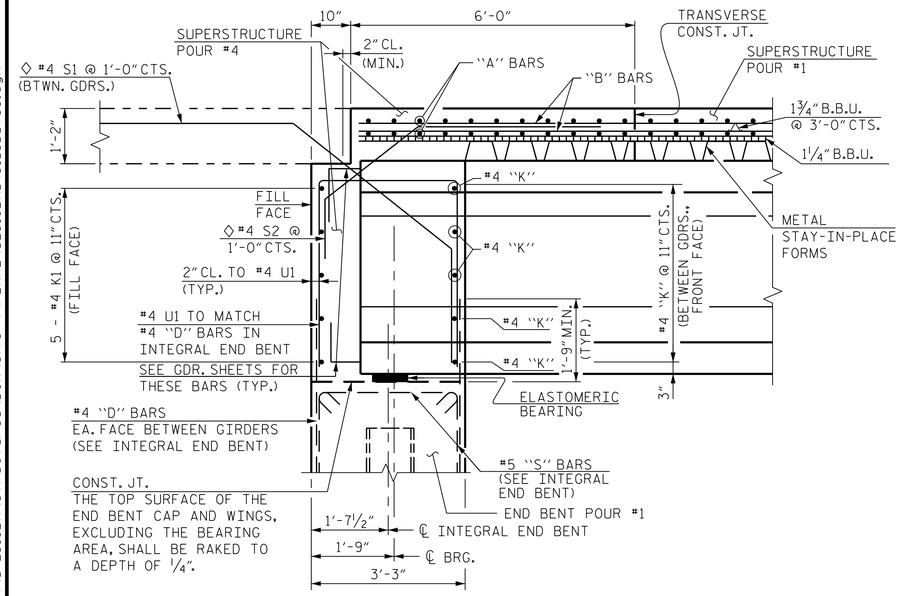
◇◇ THE TOP OF THE GIRDER IN THE REGION OF THE LINK SLAB SHALL BE SMOOTH (NOT RAKED) AND FREE OF STIRRUPS, ANCHOR STUDS, DECK FORMWORK ATTACHMENTS, AND OVERHANG FALSEWORK/FORMWORK ATTACHMENTS.



SECTION THRU SIDEWALK

#4 U2 BARS MAY BE PUSHED INTO GREEN CONCRETE AFTER SPAN HAS BEEN SCREEDED OFF.

GROOVED CONTRACTION JOINT, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE SIDEWALK IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FEET IN LENGTH.



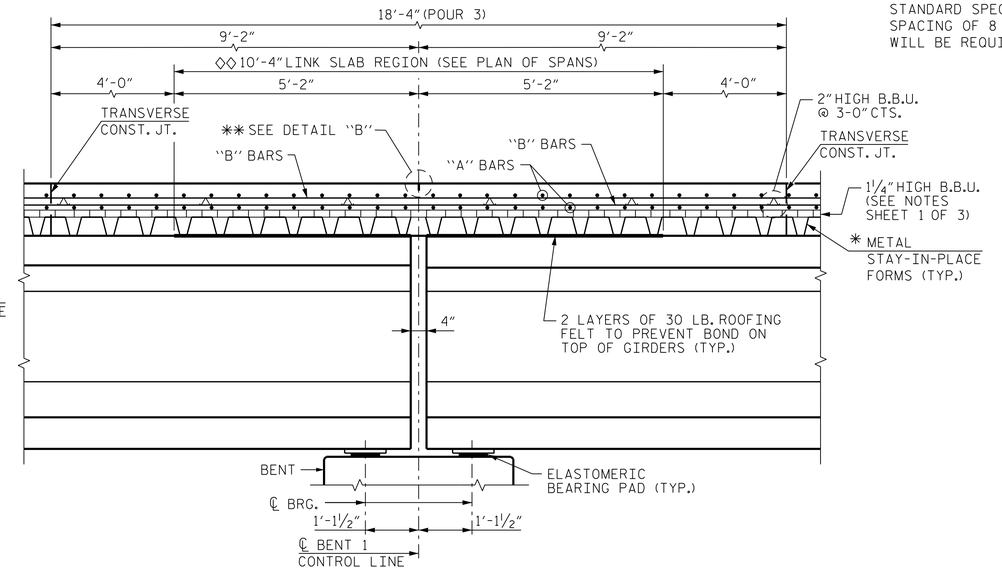
SECTION A-A

◇ EPOXY COATED BARS

(DIMENSIONS SHOWN ARE NORMAL TO THE END BENT)

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

INTEGRAL END BENT DETAILS



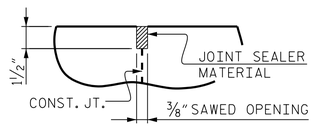
SECTION B-B

MEASURED ALONG ℄ GIRDER

LINK SLAB DETAILS

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

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



DETAIL "B"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

SITE 4 DWG. NO. 7

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			39

STR. #5

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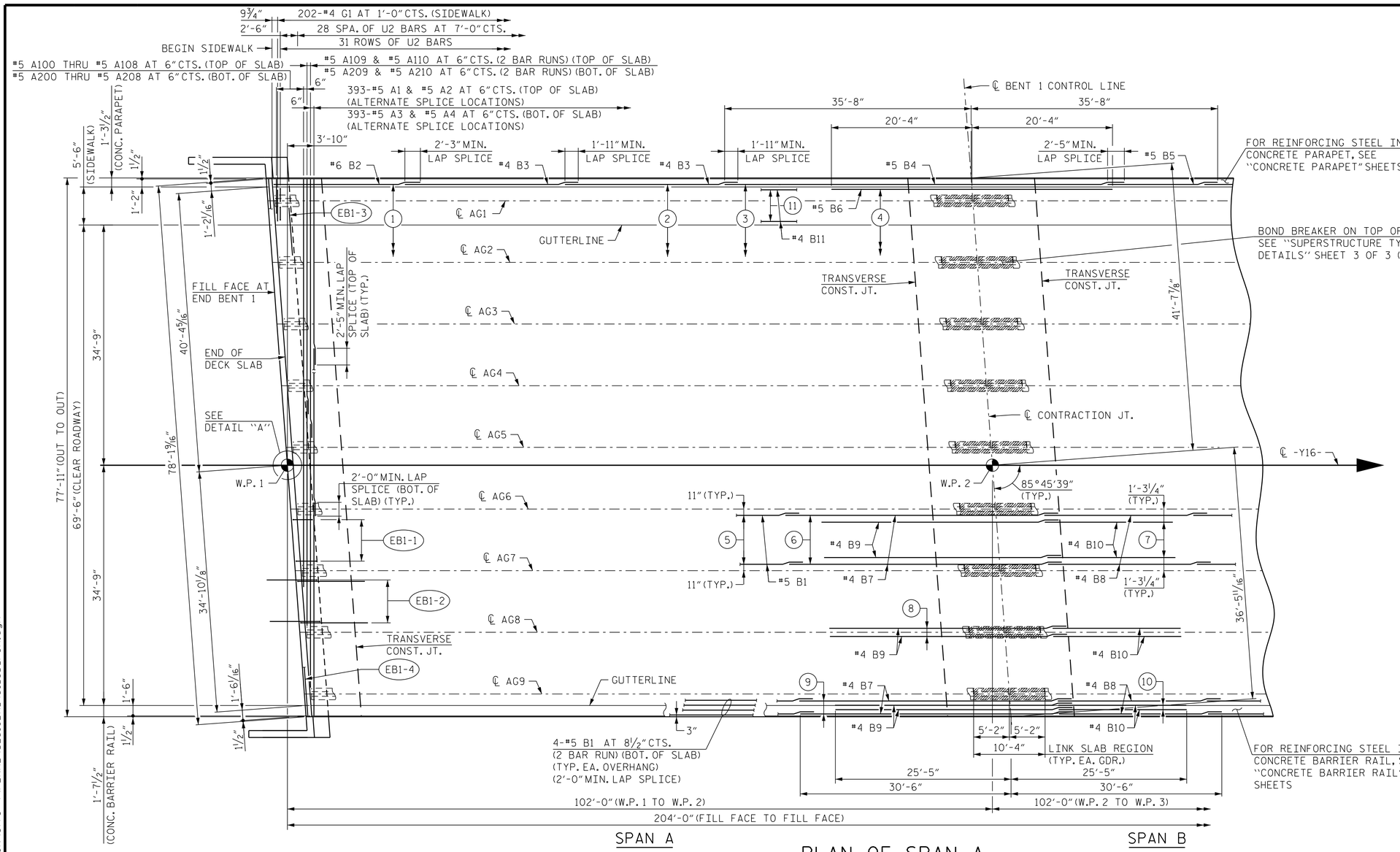
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 4\FINAL\U2519BA_451_SD_TS3.dgn



PLAN OF SPAN A

NOTE:

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

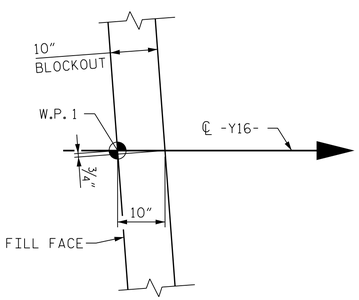
SEE "TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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

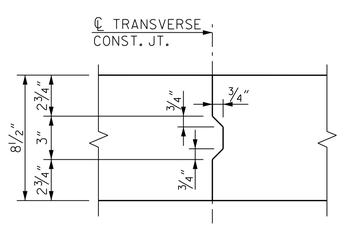
1. 155-#6 B2 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)
2. 80-#4 B3 (2 BAR RUN) (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)
3. 81-#5 B4 SPLICED WITH #5 B5 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)
4. 74-#5 B6 (TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)
5. 11-#5 B1 AT 8½" CTS. (2 BAR RUN) (BOT. OF SLAB) (TYP. EA. BAY) (2'-0" MIN. LAP SPLICE)
6. 11-#4 B7 SPLICED W/ #4 B8 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. BAY)
7. 10-#4 B9 SPLICED W/ #4 B10 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. BAY)
8. 4-#4 B9 SPLICED W/ #4 B10 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. OVER GDRS. 1-9)
9. 4-#4 B7 SPLICED W/ #4 B8 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. OVERHANG)
10. 3-#4 B9 SPLICED W/ #4 B10 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. OVERHANG)
11. 5-#4 B11 (SIDEWALK) (6 BAR RUN) (SEE TYPICAL SECTION DETAILS SHEET FOR SPACING) (2'-6" MIN. LAP SPLICE)

END BENT 1 DIAPHRAGM DETAILS

- EB1-1: 7-#4 U1 AT 1'-0" CTS. (MATCH TO #4 D1 IN END BENT) (TYP. EACH BAY)
- EB1-2: 7-#4 S1 AND 7-#4 S2 AT 1'-0" CTS. (TYP. EACH BAY)
- EB1-3: 5-#4 "K" BARS AT 11" CTS. (BTWN. GDRS.) (TYP. EACH BAY) (FRONT FACE)
- EB1-4: 5-#4 K1 AT 11" CTS. (FILL FACE) (2 BAR RUN) (1'-10" MIN. LAP SPLICE)



DETAIL "A"



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

TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
SPAN A

SITE 4 DWG. NO. 8

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

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CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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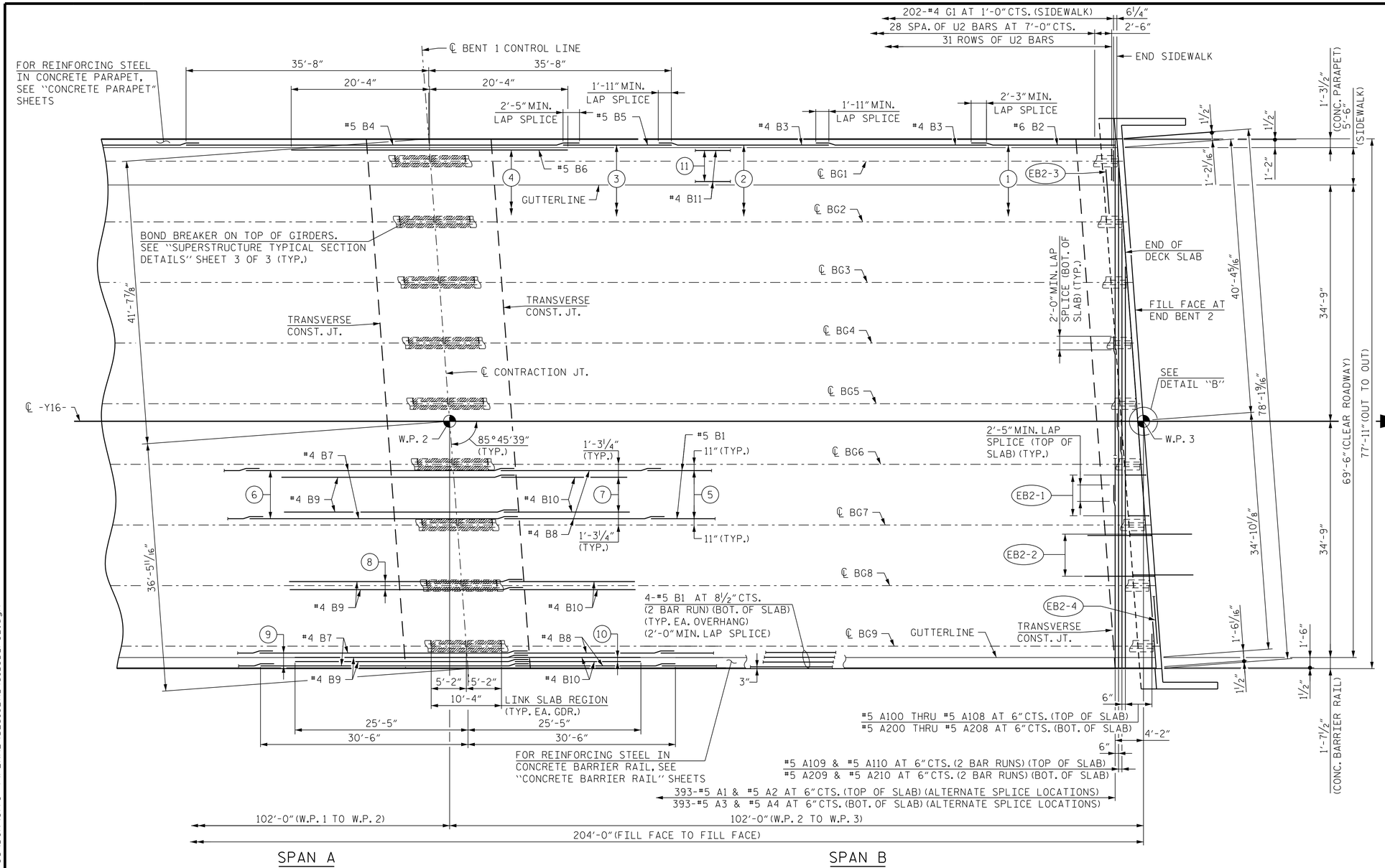


PLAN OF SPAN B

NOTE:

FOR LOCATION OF TRANSVERSE CONSTRUCTION JOINTS, SEE "BILL OF MATERIAL" SHEET 1 OF 2.

SEE "TYPICAL SECTION" SHEETS FOR SECTION THRU END BENT DIAPHRAGM AND SECTION THRU LINK SLAB AT INTERIOR BENTS.

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

(1) 155-#6 B2 (TOP OF SLAB)
(SEE TYPICAL SECTION FOR SPACING)

(2) 80-#4 B3 (2 BAR RUN) (TOP OF SLAB)
(SEE TYPICAL SECTION FOR SPACING)

(3) 81-#5 B4 SPLICED WITH #5 B5
(TOP OF SLAB) (SEE TYPICAL SECTION FOR SPACING)

(4) 74-#5 B6 (TOP OF SLAB)
(SEE TYPICAL SECTION FOR SPACING)

(5) 11-#5 B1 AT 8½" CTS. (2 BAR RUN)
(BOT. OF SLAB) (TYP. EA. BAY)
(2'-0" MIN. LAP SPLICE)

(6) 11-#4 B7 SPLICED W/ #4 B8 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE)
(BOT. OF LINK SLAB) (TYP. EA. BAY)

(7) 10-#4 B9 SPLICED W/ #4 B10 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. BAY)

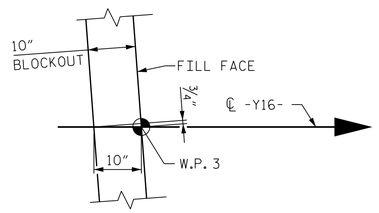
(8) 4-#4 B9 SPLICED W/ #4 B10 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. OVER GDRS. 1-9)

(9) 4-#4 B7 SPLICED W/ #4 B8 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. OVERHANG)

(10) 3-#4 B9 SPLICED W/ #4 B10 (SEE TYPICAL SECTION FOR SPACING) (1'-7" MIN. LAP SPLICE) (BOT. OF LINK SLAB) (TYP. EA. OVERHANG)

(11) 5-#4 B11 (SIDEWALK) (6 BAR RUN) (SEE TYPICAL SECTION DETAILS SHEET FOR SPACING)
(2'-6" MIN. LAP SPLICE)

END BENT 2 DIAPHRAGM DETAILS	
EB2-1	7-#4 U1 AT 1'-0" CTS. (MATCH TO #4 D1 IN END BENT) (TYP. EACH BAY)
EB2-2	7-#4 S1 AND 7-#4 S2 AT 1'-0" CTS. (TYP. EACH BAY)
EB2-3	5-#4 "K" BARS AT 11" CTS. (BTWN. GDRS.) (TYP. EACH BAY) (FRONT FACE)
EB2-4	5-#4 K1 AT 11" CTS. (FILL FACE) (2 BAR RUN) (1'-10" MIN. LAP SPLICE)



DETAIL "B"

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
SPAN B

SITE 4 DWG. NO. 9

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

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CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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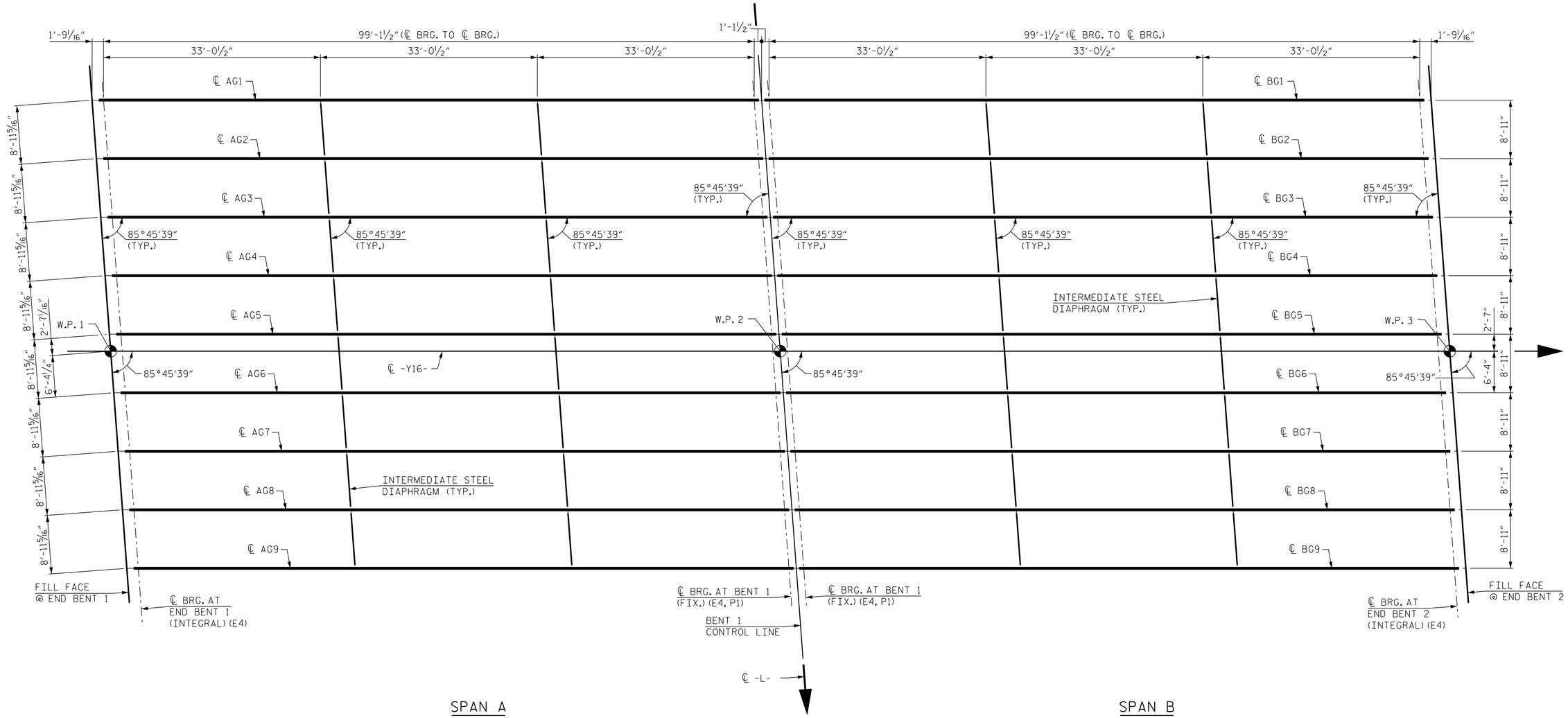

FRAMING PLAN

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN
SPANS A AND B

SITE 4 DWG. NO. 10

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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1			3			TOTAL SHEETS
2			4			39

STR. #5

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : A. L. STROUD DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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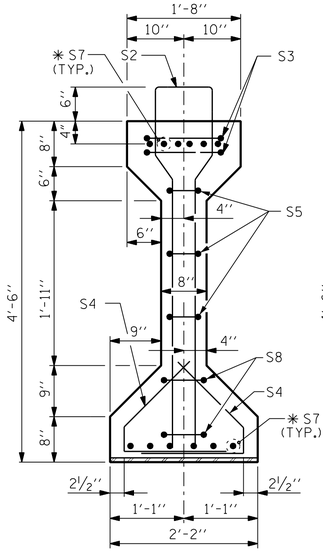
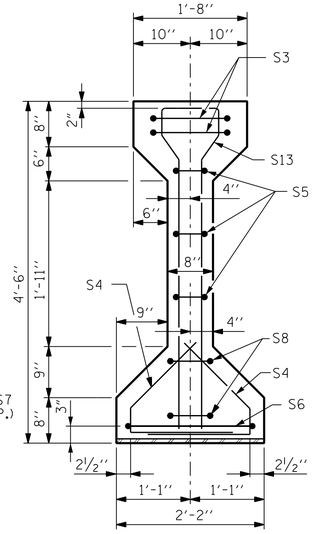
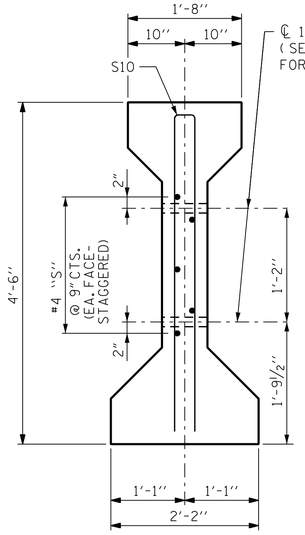


SECTION A-A



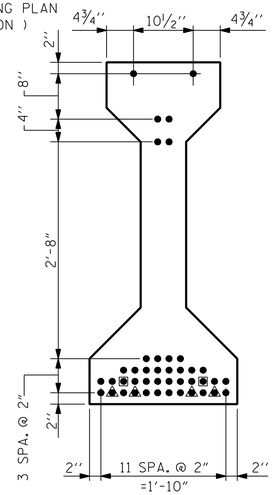
SECTION B-B

* FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

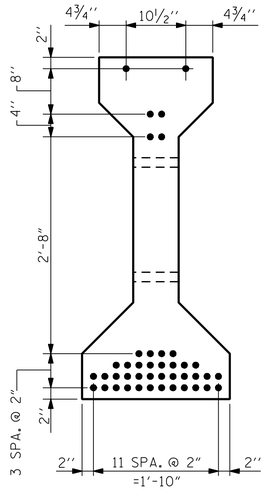


SECTION C-C

(S1 BARS NOT SHOWN)



AT END OF GIRDER

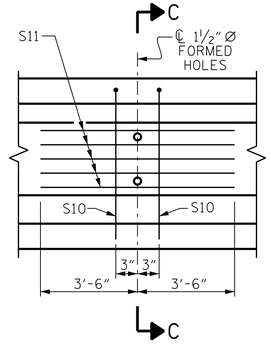


AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

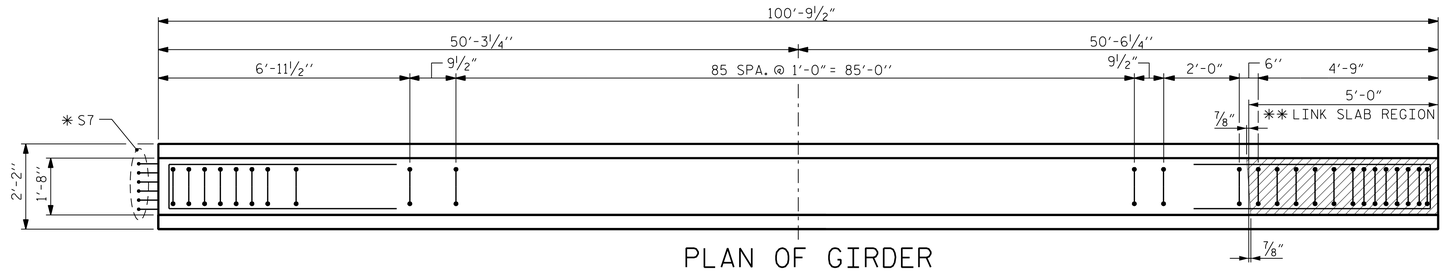
DEBONDING LEGEND

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

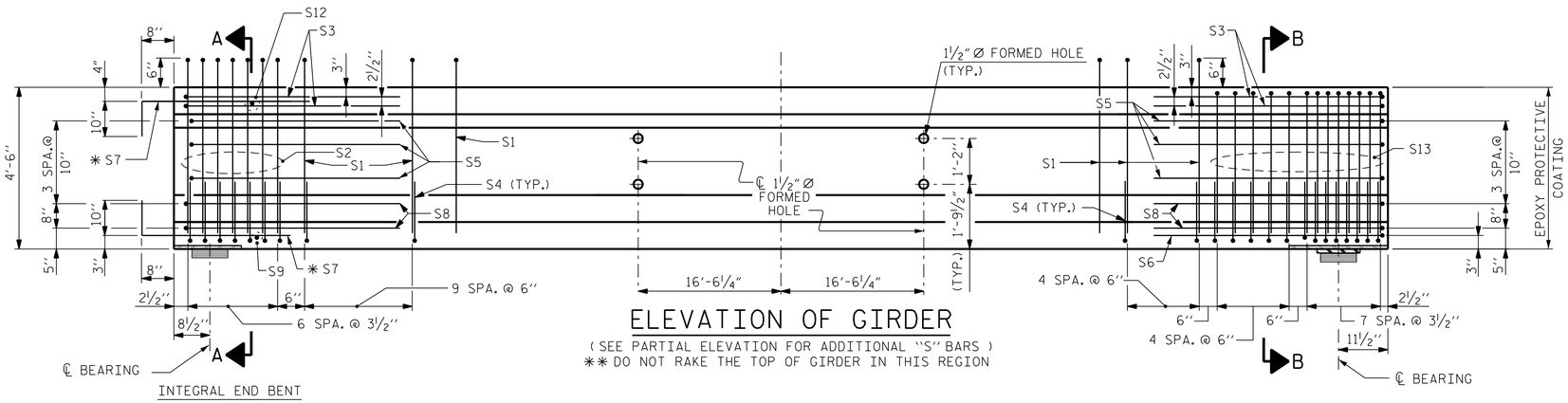


PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

** DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

INTEGRAL END BENT

FIX BENT 1 (LINK SLAB)

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

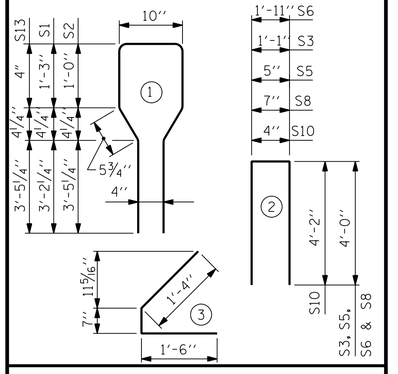
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	101	#4	1	10'-8"	720
S2	7	#6	1	10'-8"	112
S3	4	#4	2	9'-1"	24
S4	70	#4	3	3'-5"	160
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
* S7	12	#5	STR.	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	1	#3	STR.	1'-10"	1
S10	4	#5	2	8'-8"	36
S11	10	#4	STR.	7'-0"	47
S12	1	#3	STR.	1'-4"	1
S13	13	#6	1	9'-4"	182

* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8,500 PSI CONCRETE	0.6" Ø L. R. STRANDS
	LB.	C.Y.	No.
	1,393	20.5	42

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
9	100'-9½"	907'-1½"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN A

SITE 4 DWG. NO. 11

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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1			3			TOTAL SHEETS
2			4			39

STR. #5

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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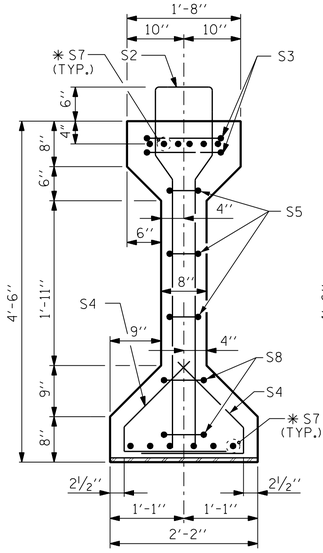
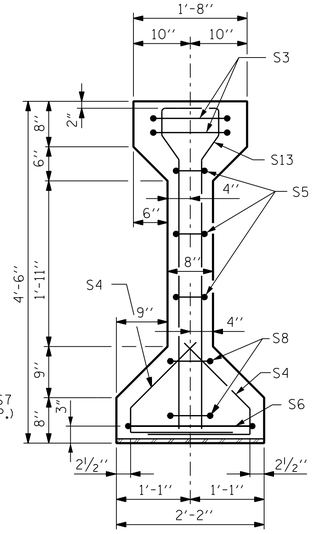
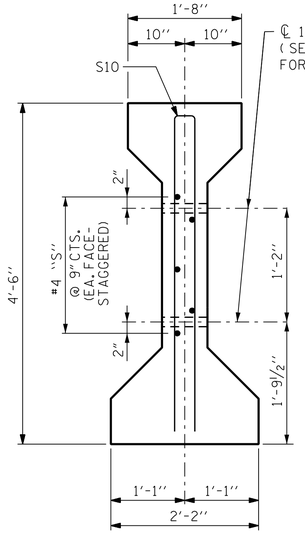


SECTION A-A



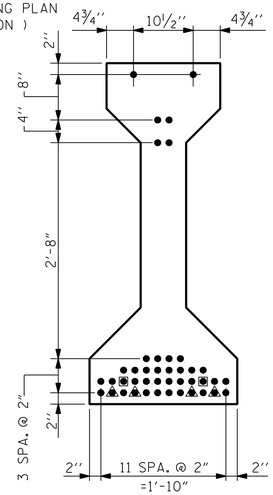
SECTION B-B

✱ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

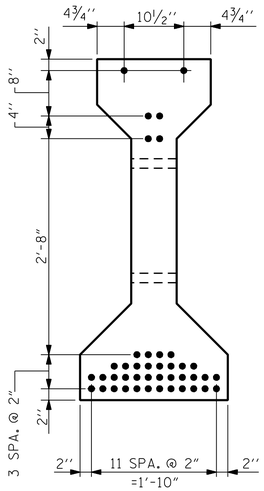


SECTION C-C

(S1 BARS NOT SHOWN)



AT END OF GIRDER

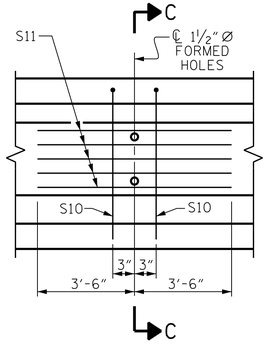


AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

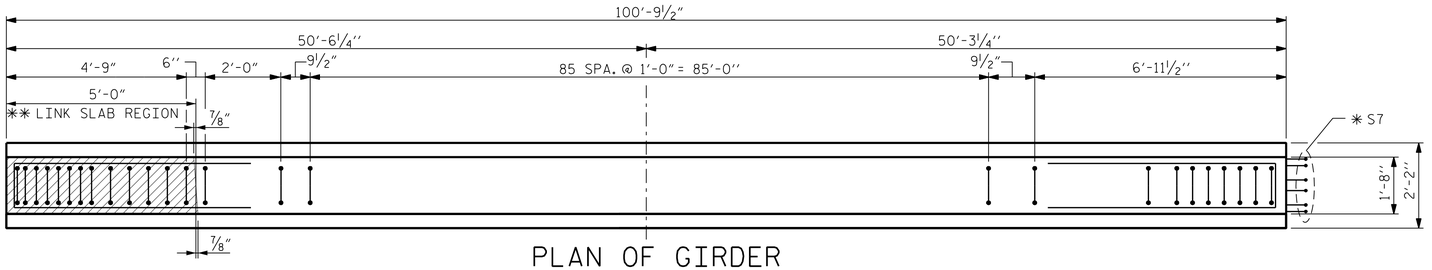
DEBONDING LEGEND

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

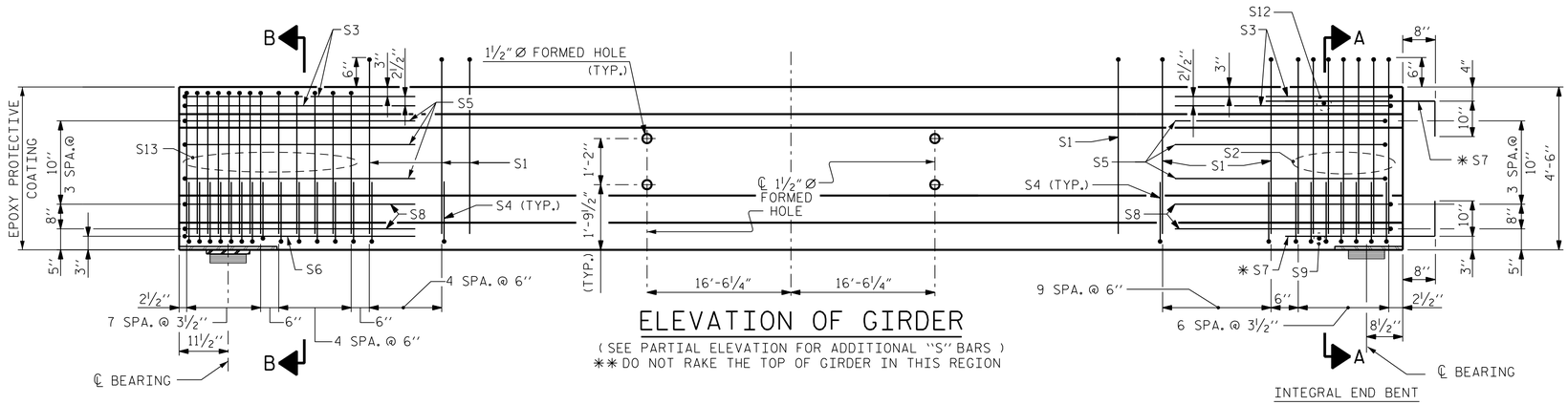


PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

✱✱ DO NOT RAKE THE TOP OF GIRDER IN THIS REGION

FIX
BENT 1
(LINK SLAB)

INTEGRAL END BENT

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

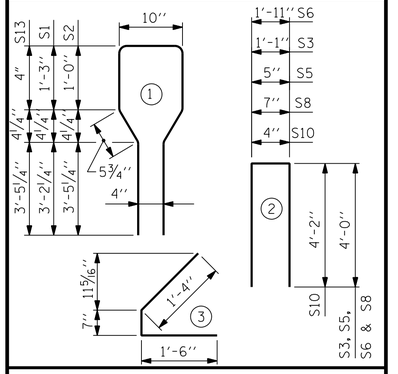
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	101	#4	1	10'-8"	720
S2	7	#6	1	10'-8"	112
S3	4	#4	2	9'-1"	24
S4	70	#4	3	3'-5"	160
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
✱S7	12	#5	STR.	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	1	#3	STR.	1'-10"	1
S10	4	#5	2	8'-8"	36
S11	10	#4	STR.	7'-0"	47
S12	1	#3	STR.	1'-4"	1
S13	13	#6	1	9'-4"	182

✱ NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8,500 PSI CONCRETE	0.6" Ø L. R. STRANDS
	LB.	C.Y.	No.
	1,393	20.5	42

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
9	100'-9½"	907'-1½"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN B

SITE 4 DWG. NO. 12

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

DRAWN BY : B. A. HAAG DATE : FEB 2022
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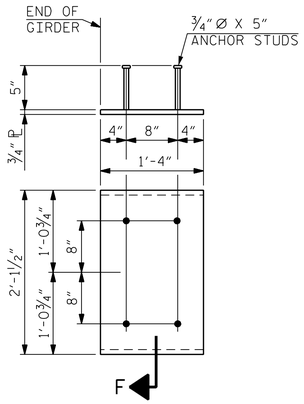
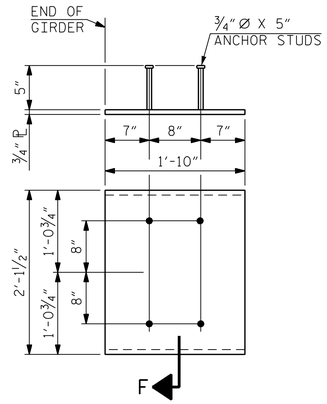


EMBEDDED PLATE VARIABLE TABLE				
GDR. NO.	SPAN A		SPAN B	
	NEAR	FAR	NEAR	FAR
1	B-1	B-2	B-2	B-1
2	B-1	B-2	B-2	B-1
3	B-1	B-2	B-2	B-1
4	B-1	B-2	B-2	B-1
5	B-1	B-2	B-2	B-1
6	B-1	B-2	B-2	B-1
7	B-1	B-2	B-2	B-1
8	B-1	B-2	B-2	B-1
9	B-1	B-2	B-2	B-1

EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE IV GIRDER

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)



EMBEDDED PLATE "B-2" DETAILS FOR AASHTO TYPE IV GIRDER

(FOR EMBEDDED PLATE QUANTITY, SEE VARIABLE TABLE)

NOTES:

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

EMBEDDED PLATE "B-1" AND "B-2" 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 6,000 PSI.

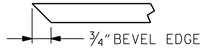
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4" AND LINK SLAB REGION, SHALL BE RAKED TO A DEPTH OF 1/4".

WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 6" OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN 1/2" OF THE THEORETICAL LOCATION SHOWN.

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

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



SECTION "F"

(SEE NOTES)

DETAIL "A"

(AT INTEGRAL END BENTS)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER CONTINOUS FOR LIVE LOAD DETAILS

SITE 4 DWG. NO. 13

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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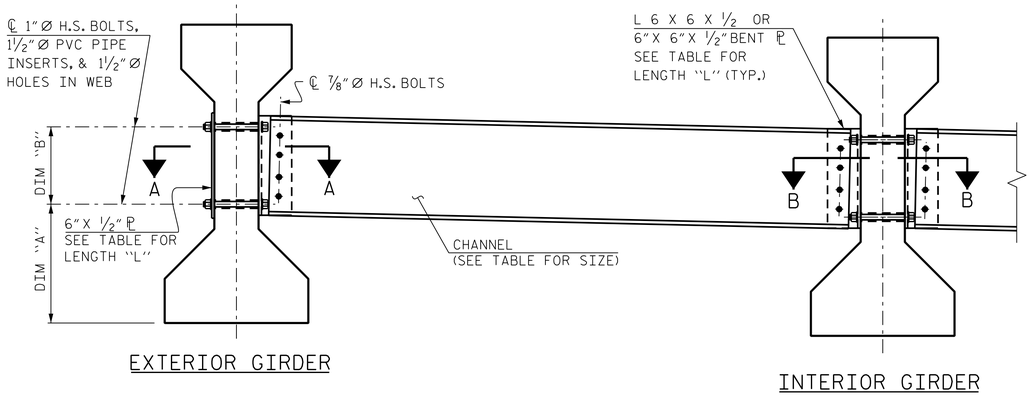
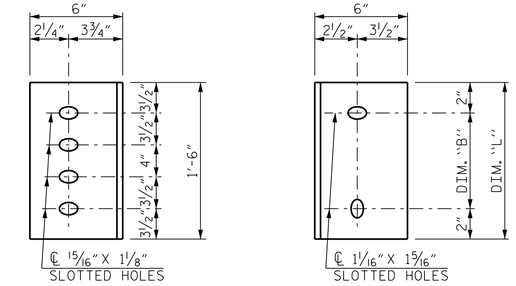


PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE WEB FACE

CONNECTOR PLATE DETAILS

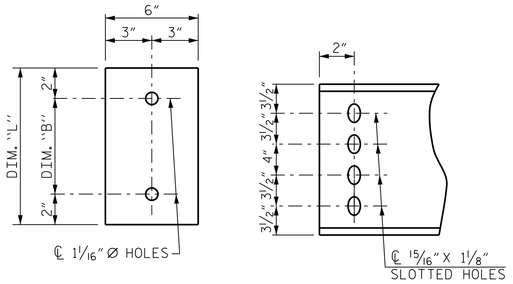


PLATE DETAILS CHANNEL END

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

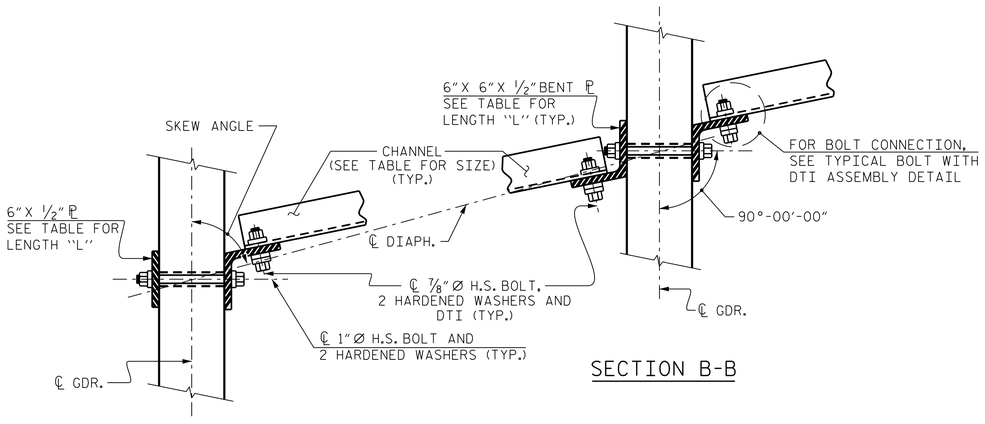
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼" PROJECTION BEYOND THE NUT.

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

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

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

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

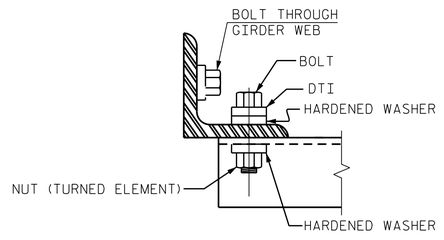


SECTION A-A SECTION B-B

CONNECTION DETAILS

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1'-9½"	1'-2"	1'-6"



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS

SITE 4 DWG. NO. 14

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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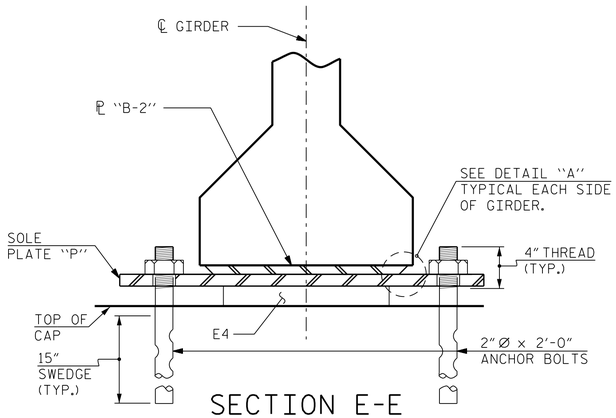
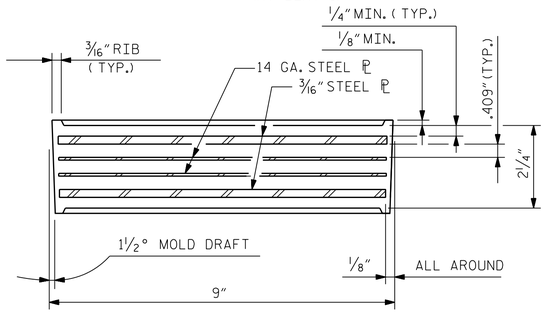
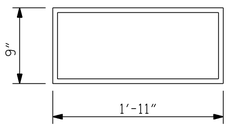


SECTION E-E
(AT BENT 1)



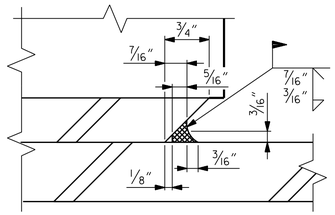
TYPICAL SECTION OF ELASTOMERIC BEARINGS



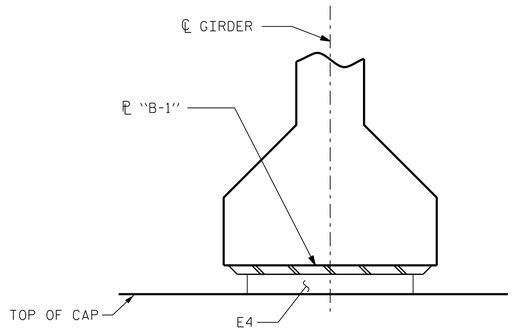
E4 (36 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

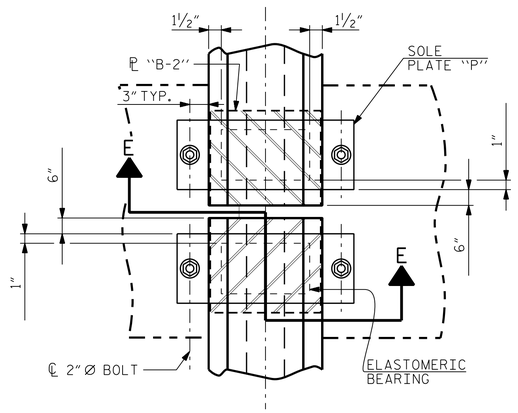
TYPE V



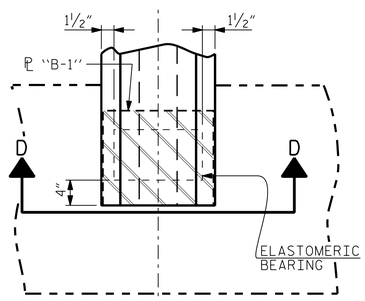
DETAIL "A"



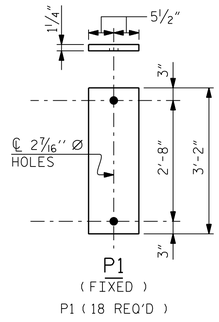
SECTION D-D
(AT INTEGRAL END BENT)



TYPICAL HALF-PLAN
(SHOWING LINK SLAB BENT)



TYPICAL HALF-PLAN
(SHOWING INTEGRAL END BENT)



P1 (18 REQ'D)

SOLE PLATE DETAILS ("P")

NOTES:

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

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

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

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

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

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.

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

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

ELASTOMERIC BEARING PAD DETAILS

SITE 4 DWG. NO. 15

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID W. RAGAN
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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

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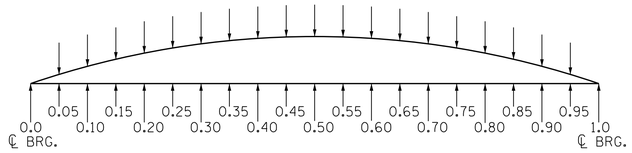

SCHEMATIC CAMBER ORDINATES AT GIRDER TWENTIETH POINTS

DEFLECTIONS ARE IN FEET (DECIMAL FORM) AT TWENTIETH POINTS BETWEEN BEARINGS, REQUIRED CAMBER VALUES ARE IN INCHES (FRACTIONAL FORM).

✳ INCLUDES FUTURE WEARING SURFACE IN SUPERIMPOSED DEAD LOAD

DEAD LOAD DEFLECTION AND CAMBER TABLE FOR GIRDERS - SPANS A & B

GIRDER		TWENTIETH POINTS																				
		0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.0
AG1, BG1	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.026	0.052	0.077	0.102	0.121	0.141	0.153	0.166	0.170	0.174	0.170	0.166	0.153	0.141	0.121	0.102	0.077	0.052	0.026	0.000
	FINAL CAMBER ▲	0"	1/8"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	1/2"	7/16"	3/8"	5/16"	1/4"	1/8"	0"
AG2, BG2																						
	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.026	0.053	0.079	0.104	0.124	0.144	0.157	0.170	0.174	0.179	0.174	0.170	0.157	0.144	0.124	0.104	0.079	0.053	0.026	0.000
	FINAL CAMBER ▲	0"	1/8"	3/16"	5/16"	5/16"	7/16"	7/16"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	7/16"	7/16"	5/16"	5/16"	3/16"	1/8"	0"
AG3, BG3																						
	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.026	0.052	0.076	0.101	0.121	0.140	0.153	0.165	0.170	0.174	0.170	0.165	0.153	0.140	0.121	0.101	0.076	0.052	0.026	0.000
	FINAL CAMBER ▲	0"	1/8"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	9/16"	1/2"	7/16"	3/8"	5/16"	1/4"	1/8"	0"
AG4, BG4																						
	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.024	0.047	0.070	0.093	0.111	0.129	0.141	0.152	0.156	0.160	0.156	0.152	0.141	0.129	0.111	0.093	0.070	0.047	0.024	0.000
	FINAL CAMBER ▲	0"	1/8"	1/4"	3/8"	7/16"	9/16"	5/8"	11/16"	11/16"	3/4"	3/4"	3/4"	11/16"	11/16"	5/8"	9/16"	7/16"	3/8"	1/4"	1/8"	0"
AG5, BG5, AG6, BG6																						
	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.025	0.049	0.073	0.097	0.116	0.134	0.146	0.158	0.162	0.166	0.162	0.158	0.146	0.134	0.116	0.097	0.073	0.049	0.025	0.000
	FINAL CAMBER ▲	0"	1/8"	1/4"	3/8"	7/16"	1/2"	9/16"	5/8"	5/8"	11/16"	11/16"	11/16"	5/8"	5/8"	9/16"	1/2"	7/16"	3/8"	1/4"	1/8"	0"
AG7, BG7																						
	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.025	0.049	0.073	0.097	0.116	0.134	0.146	0.158	0.162	0.167	0.162	0.158	0.146	0.134	0.116	0.097	0.073	0.049	0.025	0.000
	FINAL CAMBER ▲	0"	1/8"	1/4"	3/8"	7/16"	1/2"	9/16"	5/8"	5/8"	11/16"	11/16"	11/16"	5/8"	5/8"	9/16"	1/2"	7/16"	3/8"	1/4"	1/8"	0"
AG8, BG8																						
	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.025	0.050	0.074	0.099	0.118	0.137	0.149	0.161	0.165	0.169	0.165	0.161	0.149	0.137	0.118	0.099	0.074	0.050	0.025	0.000
	FINAL CAMBER ▲	0"	1/8"	1/4"	5/16"	3/8"	1/2"	9/16"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	9/16"	1/2"	3/8"	5/16"	1/4"	1/8"	0"
AG9, BG9																						
	CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.035	0.070	0.102	0.132	0.159	0.181	0.199	0.212	0.220	0.223	0.220	0.212	0.199	0.181	0.159	0.132	0.102	0.070	0.035	0.000
	DEFLECTION DUE TO SUPERIMPOSED D.L.✳ ▼	0.000	0.024	0.048	0.070	0.093	0.112	0.130	0.141	0.153	0.157	0.160	0.157	0.153	0.141	0.130	0.112	0.093	0.070	0.048	0.024	0.000
	FINAL CAMBER ▲	0"	1/8"	1/4"	3/8"	7/16"	9/16"	5/8"	11/16"	11/16"	3/4"	3/4"	3/4"	11/16"	11/16"	5/8"	9/16"	7/16"	3/8"	1/4"	1/8"	0"

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GIRDER CAMBER DETAILS

SITE 4 DWG. NO. 16

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3/23/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

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DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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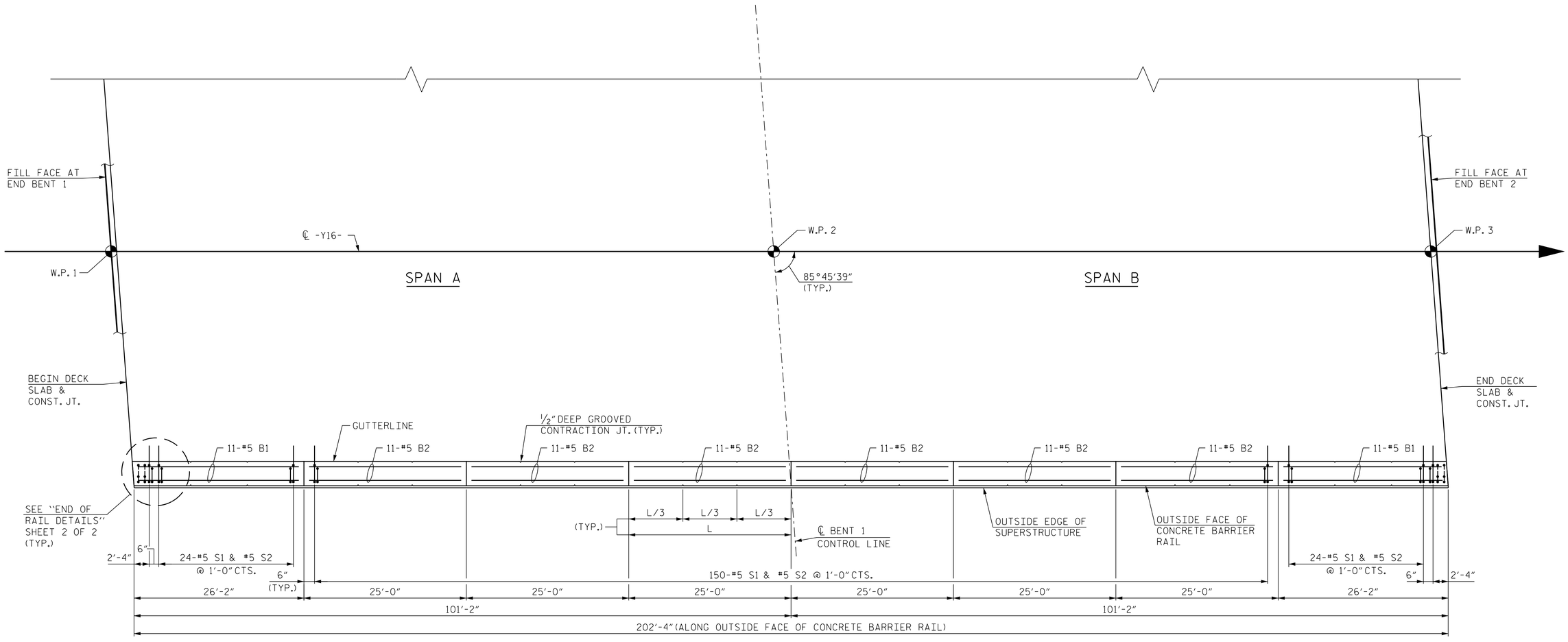

PLAN OF BARRIER RAIL

(RIGHT SIDE RAIL SHOWN. FOR LEFT SIDE SEE "CONCRETE PARAPET PLAN FOR 2 BAR METAL RAIL" SHEET.)

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE BARRIER RAIL

SITE 4 DWG. NO. 17

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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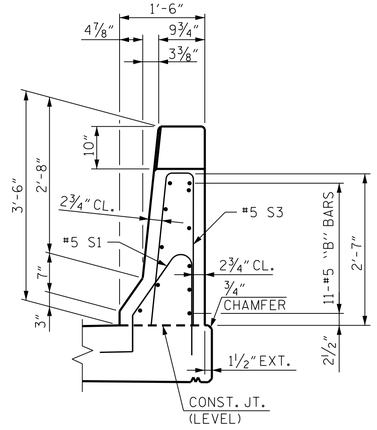
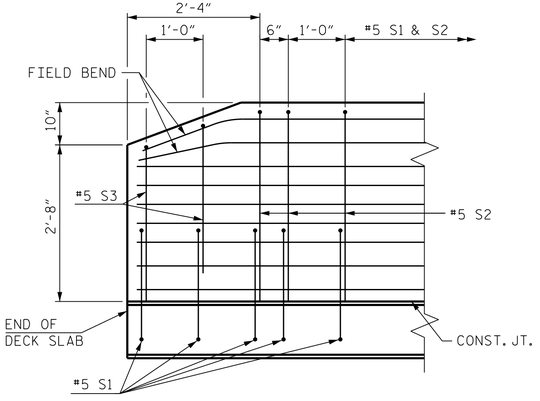
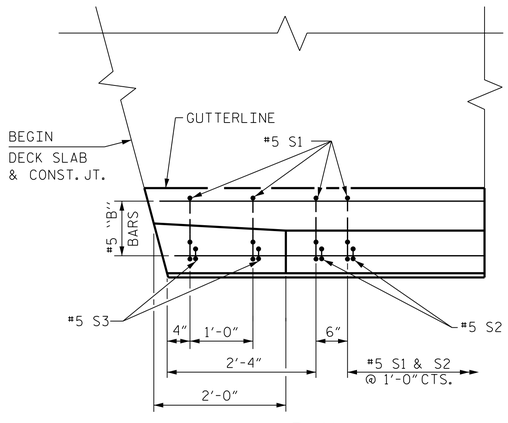
FOR PLAN OF CONCRETE BARRIER RAIL,
SEE "CONCRETE BARRIER RAIL"
SHEET 1 OF 2



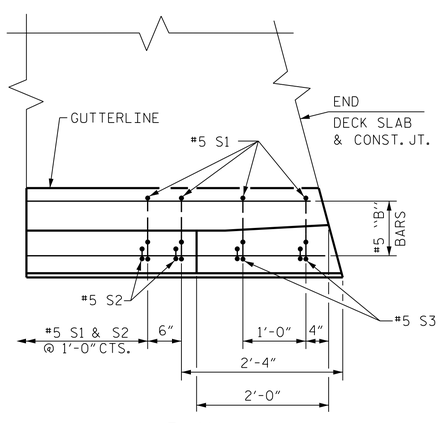
END VIEW



SIDE VIEW



PLAN



PLAN

END OF RAIL DETAILS

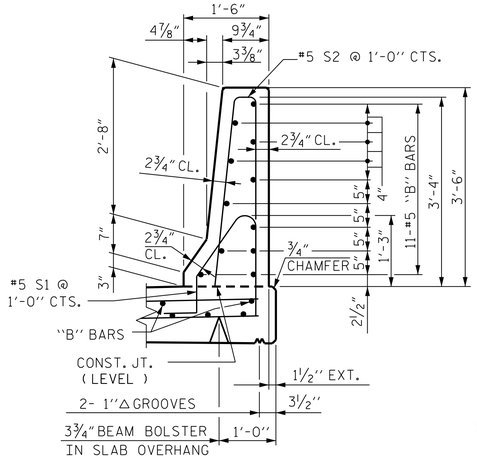
NOTES:

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

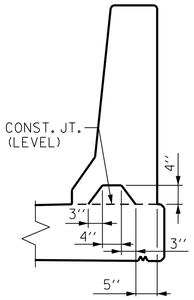
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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.

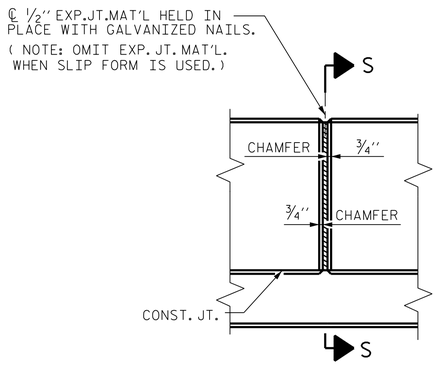
THE #5S1 AND S2 BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN 2" MINIMUM CLEARANCE TO THE ½"EXPANSION JOINT MATERIAL.



SECTION THRU RAIL



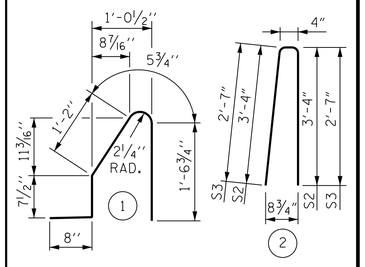
SECTION S-S
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	22	#5	STR	25'-8"	589
* B2	66	#5	STR	24'-7"	1,692
* S1	204	#5	1	4'-6"	957
* S2	200	#5	2	7'-0"	1,460
* S3	4	#5	2	5'-6"	23
* EPOXY COATED REINFORCING STEEL				4,721	LBS.
CLASS AA CONCRETE				27.5	CU. YDS.
CONCRETE BARRIER RAIL				202.33	LIN. FT.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
STATION: 24+41.38 -Y16-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

CONCRETE BARRIER RAIL

SITE 4 DWG. NO. 18

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #5

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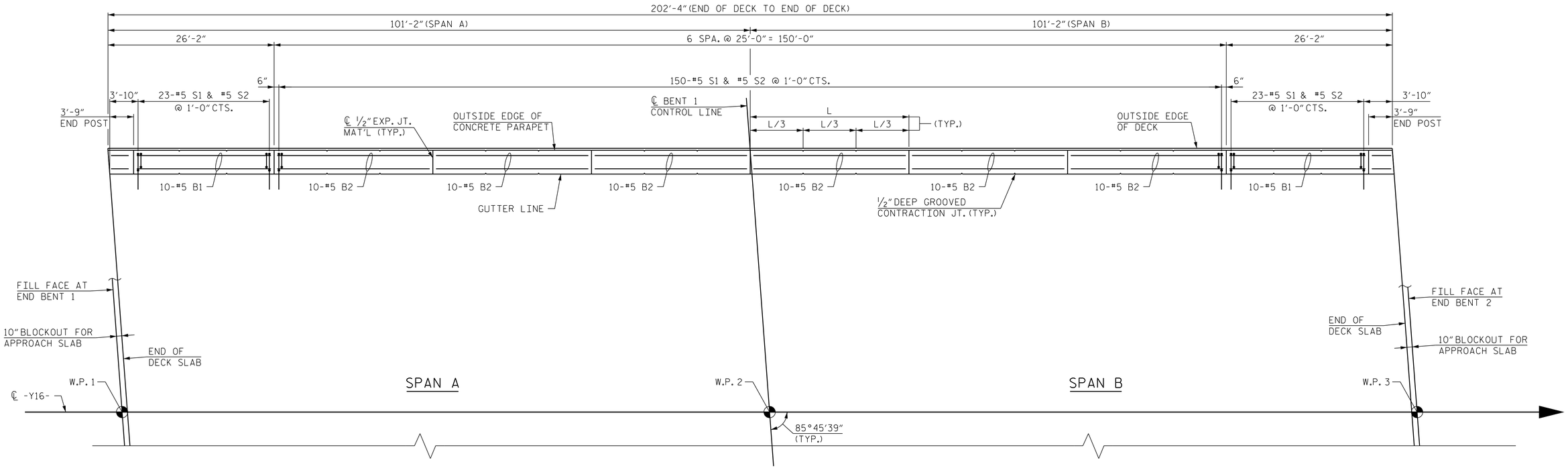
NOTES:

FOR NOTES, BILL OF MATERIAL AND END POST DETAILS, SEE ''CONCRETE PARAPET DETAILS'' SHEET, SHEET 2 OF 2.

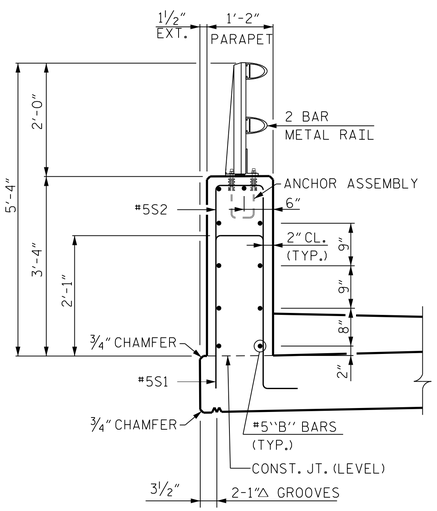
FOR 2 BAR METAL RAIL DETAILS, SEE ''2 BAR METAL RAIL'' SHEETS.

FOR END POST DETAILS, SEE SHEET 2 OF 2.

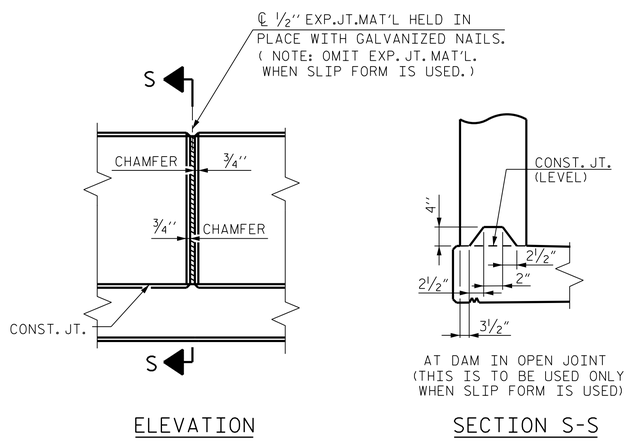


PLAN OF PARAPET

(ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF PARAPET)



SECTION THROUGH PARAPET



ELEVATION AT EXPANSION JOINTS

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

CONCRETE PARAPET PLAN FOR 2 BAR METAL RAIL

SITE 4 DWG. NO. 19

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #5

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NOTES:

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

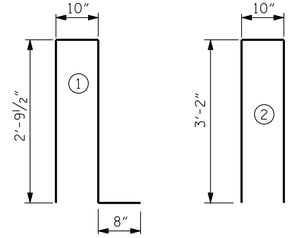
ALL REINFORCING STEEL IN PARAPET SHALL BE EPOXY COATED. VERTICAL GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT EACH THIRD POINT BETWEEN 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.

FOR DETAILS OF CONCRETE INSERTS AND ANCHOR ASSEMBLIES, SEE "2 BAR METAL RAIL" AND "RAIL POST SPACINGS AND END OF RAIL" SHEETS.

FOR GUARDRAIL ANCHOR ASSEMBLY DETAILS, SEE "GUARDRAIL ANCHORAGE DETAILS" SHEET.

"B" BARS IN END POST MAY BE SHIFTED SLIGHTLY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

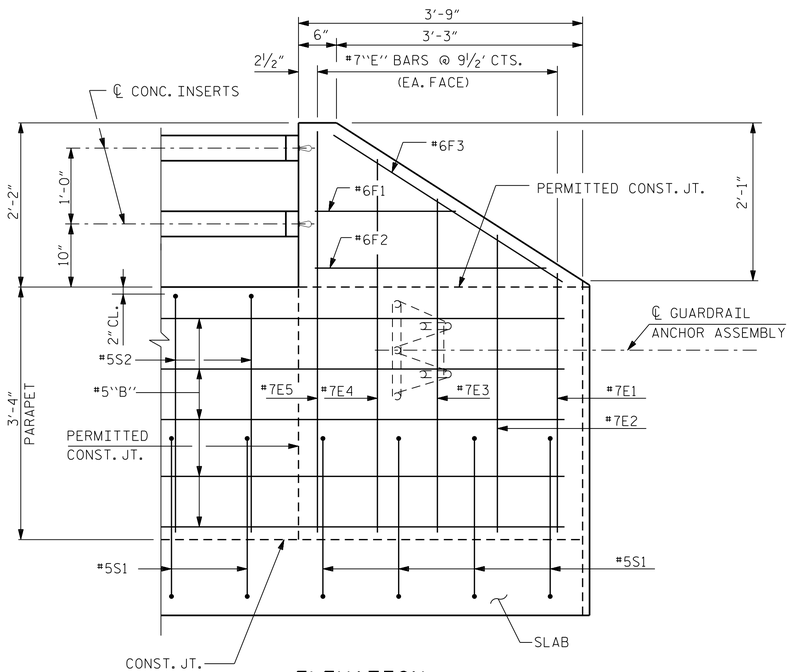
FOR CONCRETE PARAPET

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	20	#5	STR.	25'-8"	535
✳B2	60	#5	STR.	24'-7"	1,538
✳E1	4	#7	STR.	3'-4"	27
✳E2	4	#7	STR.	3'-10"	31
✳E3	4	#7	STR.	4'-4"	35
✳E4	4	#7	STR.	4'-10"	40
✳E5	4	#7	STR.	5'-2"	42
✳F1	4	#6	STR.	1'-9"	11
✳F2	4	#6	STR.	2'-11"	18
✳F3	4	#6	STR.	3'-5"	21
✳S1	204	#5	1	7'-1"	1,507
✳S2	196	#5	2	7'-2"	1,465

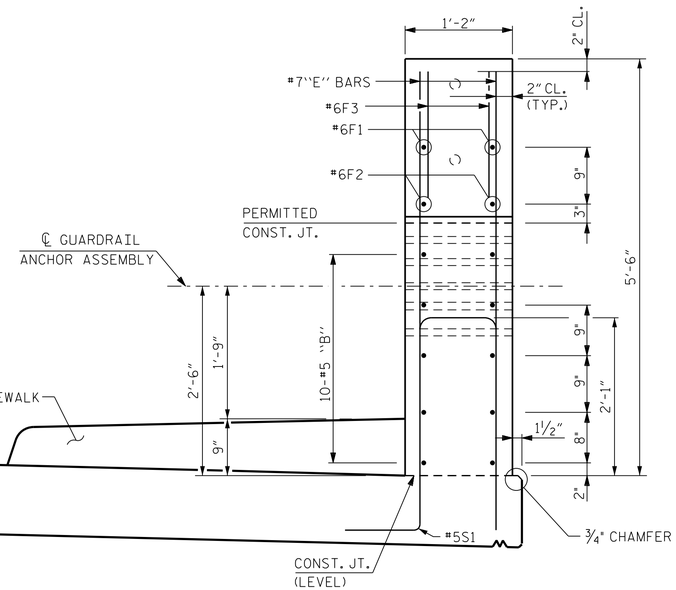
✳EPOXY COATED REINFORCING STEEL 5,270 LBS.

CLASS "AA" CONCRETE (PARAPET) 29.6 CY

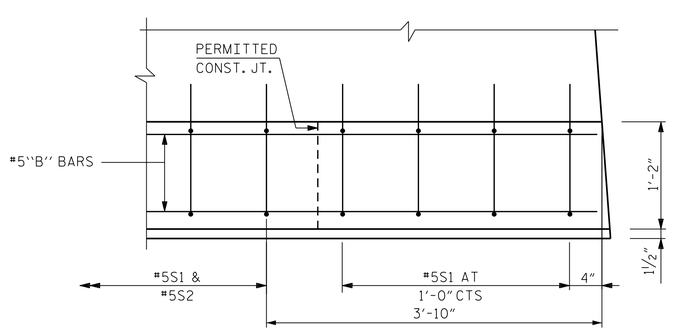
CONCRETE PARAPET 202.33 LIN. FT.



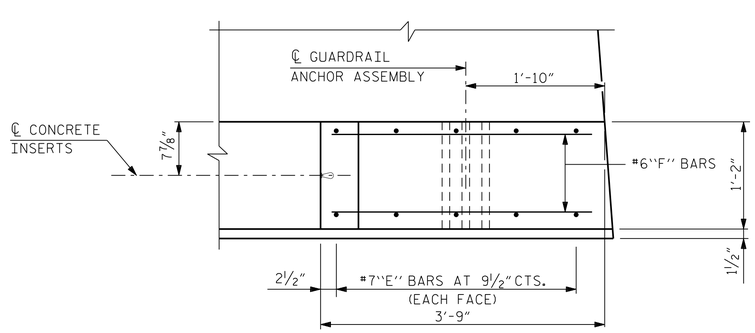
ELEVATION



END VIEW



PLAN OF PARAPET



PLAN OF END POST

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE PARAPET AND END POST DETAILS

SITE 4 DWG. NO. 20

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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STR. #5

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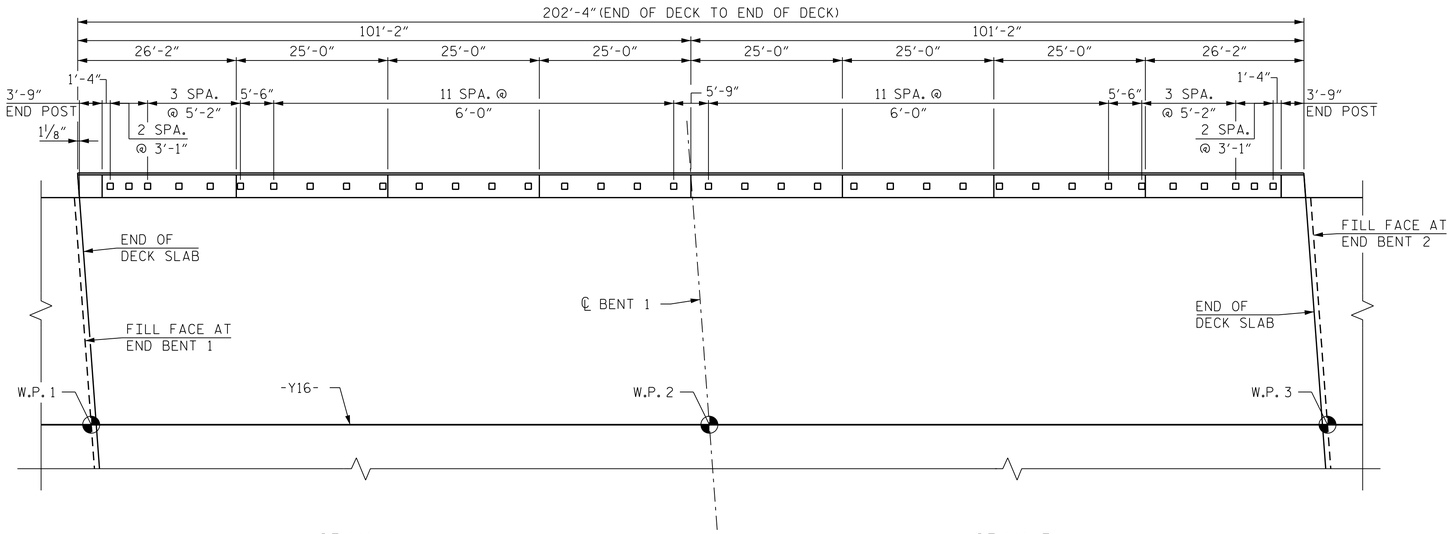
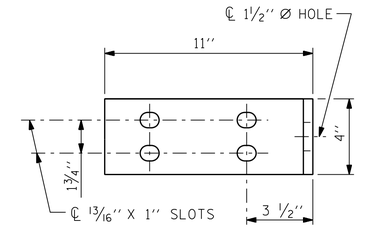
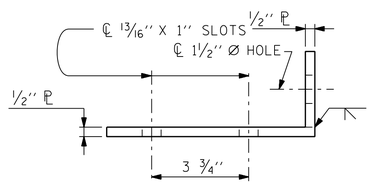


PLAN OF RAIL POST SPACINGS

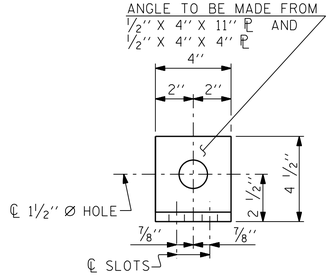
(LEFT SIDE ONLY)



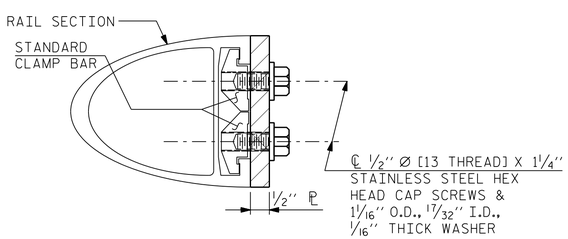
ELEVATION



TOP VIEW



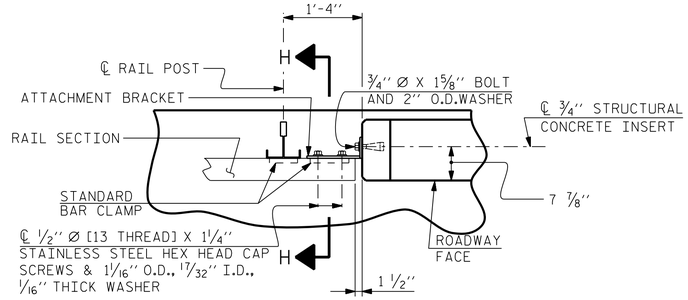
END VIEW (FIX AND EXP.)



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 AASHTO M270 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).

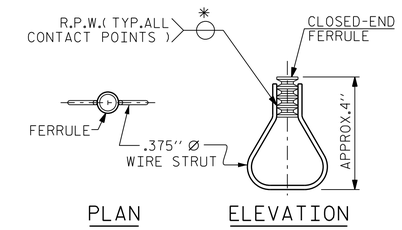
E. ½" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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 6 ½" 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. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
RAIL POST SPACINGS AND END OF RAIL DETAILS

SITE 4 DWG. NO. 21

DocuSigned by: David M. Ragan
NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-21
1			3			TOTAL SHEETS
2			4			39

STR. #5

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : A. L. STROUD DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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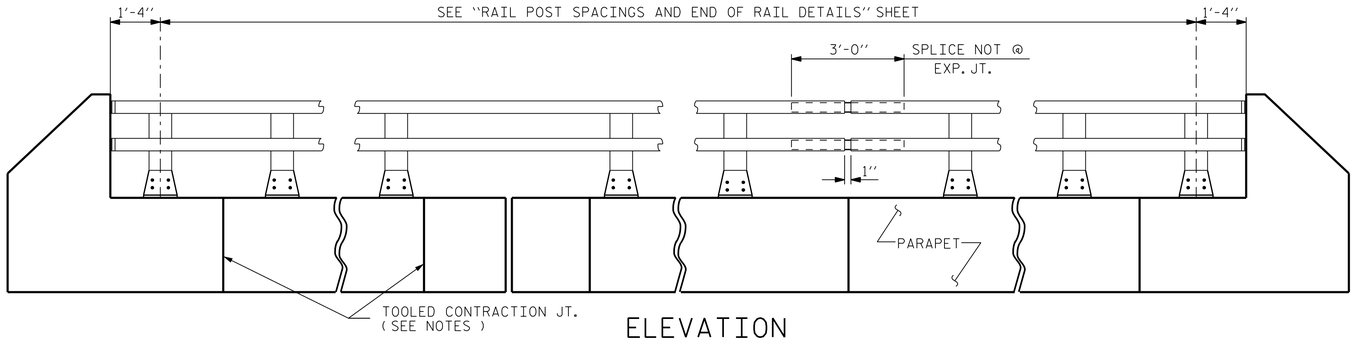
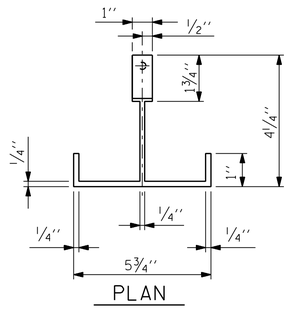
3/23/2022 R:\Bridge_Design\U-2519BA\Structures\DGN\Site 4\FINAL\U2519BA_451_SD_2MR_01.dgn

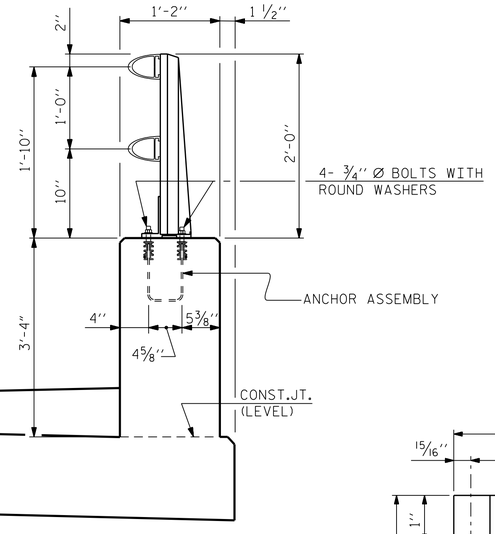


ELEVATION

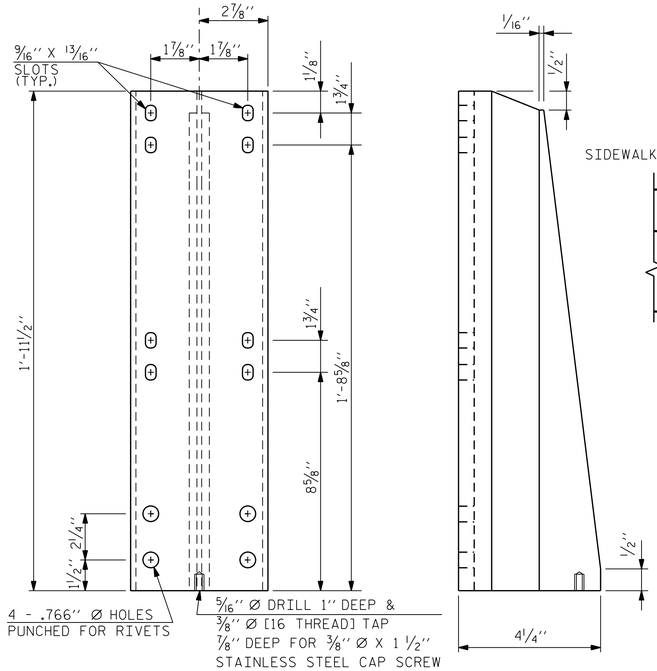
NOTE: FOR ATTACHMENT OF METAL RAIL TO END POST, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.



PLAN



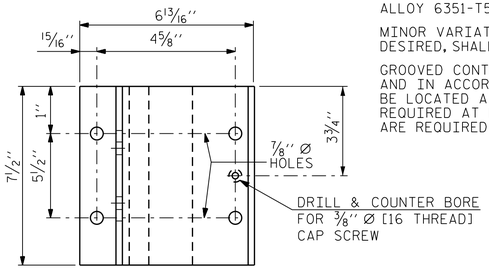
SECTION THRU PARAPET AND RAIL



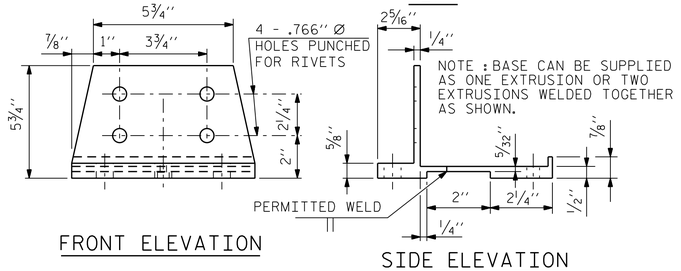
FRONT ELEVATION

SIDE ELEVATION

DETAILS OF POST



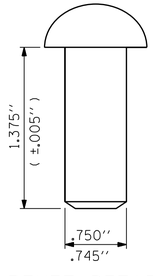
PLAN



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 LRFDBRIDGE 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: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

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 A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

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, 1/2" 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 = 194.75 LIN. FT.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

2 BAR METAL RAIL

SITE 4 DWG. NO. 22

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
NC LICENSE NUMBER: F-0112

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2			4			39

STR. #5

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : M. SHARMA DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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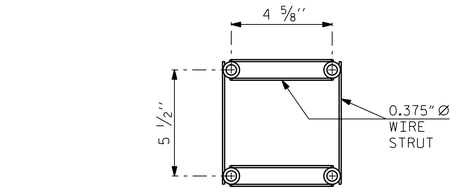
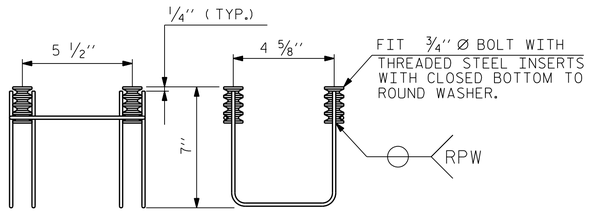


PLAN



SIDE VIEW ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(36 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 3/4'' FERRULES.

B. 4 - 3/4'' Ø X 2 1/2'' 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 3/4'' Ø X 2 1/2'' 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.

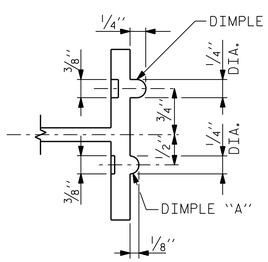
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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.

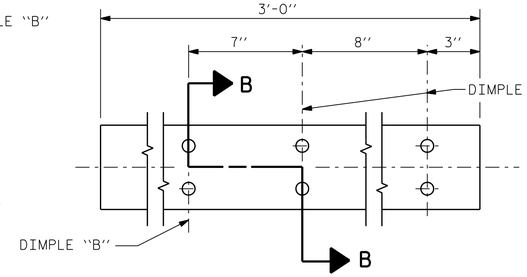
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

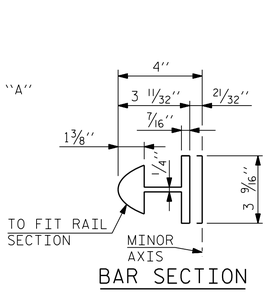
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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



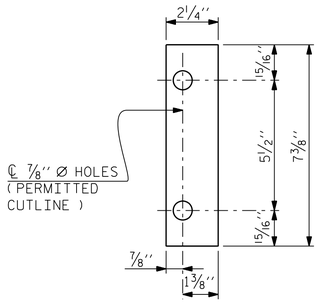
SECTION B-B



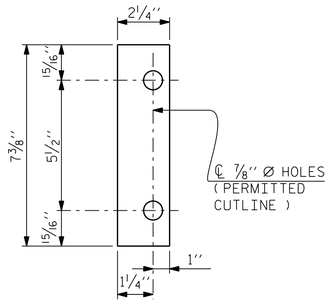
EXPANSION BAR DETAILS



BAR SECTION



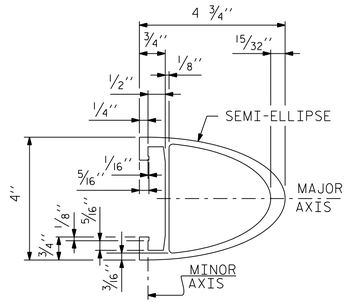
FRONT PLATE



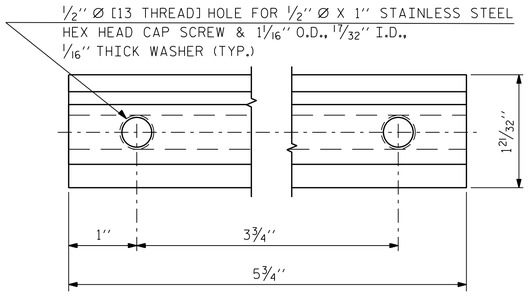
REAR PLATE

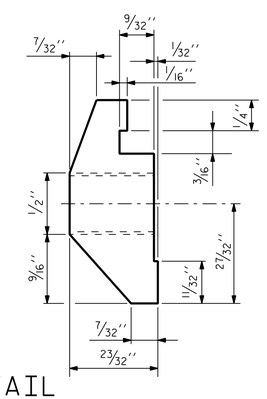
SHIM DETAILS

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



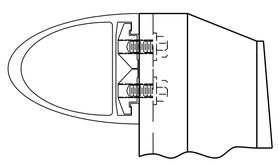
RAIL SECTION



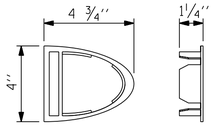


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

2 BAR METAL RAIL

SITE 4 DWG. NO. 23

DocuSigned by: David M. Ragan

NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN

3/23/2022

RK&K
RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
RALEIGH, NC 27615 (919) 878-9560
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STR. #5

DRAWN BY : B. A. HAAG DATE : FEB 2022
CHECKED BY : A. L. STROUD DATE : FEB 2022
DESIGN ENGINEER OF RECORD : D. M. RAGAN DATE : FEB 2022

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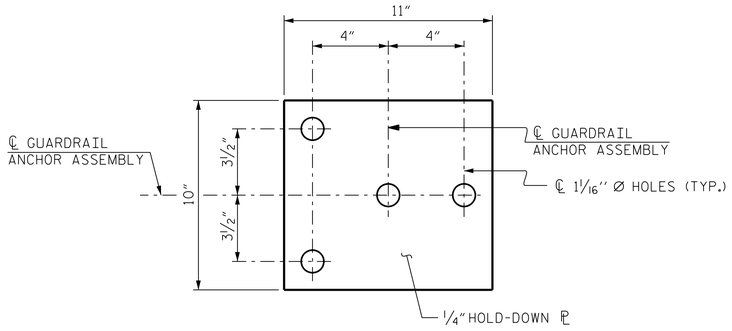

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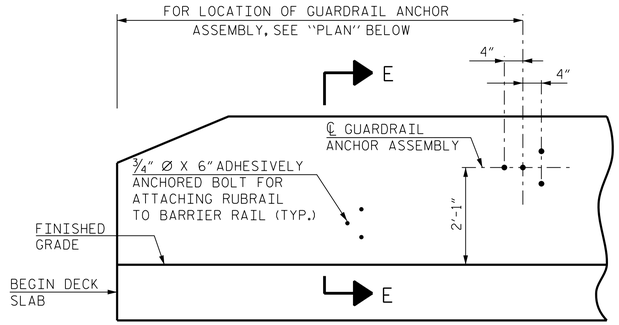
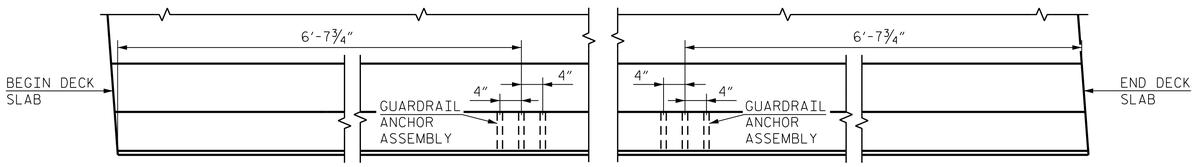


ELEVATION

SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY



PLAN

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.)

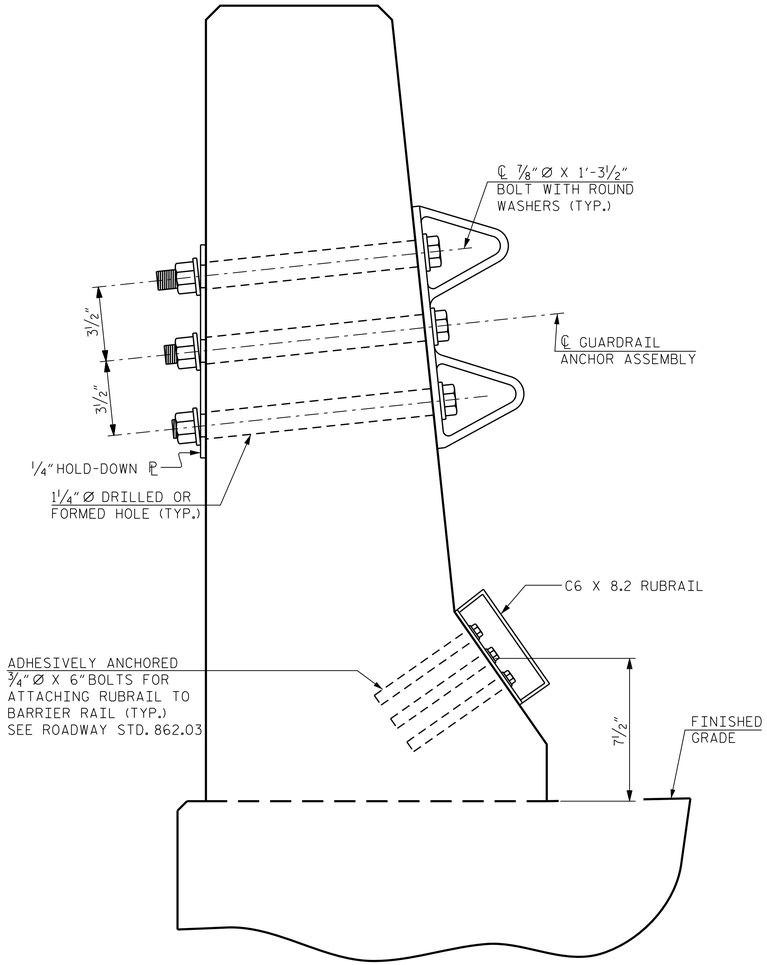
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" 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.



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS

LOCATION OF ANCHORS FOR GUARDRAIL

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

SITE 4 DWG. NO. 24

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3/23/2022

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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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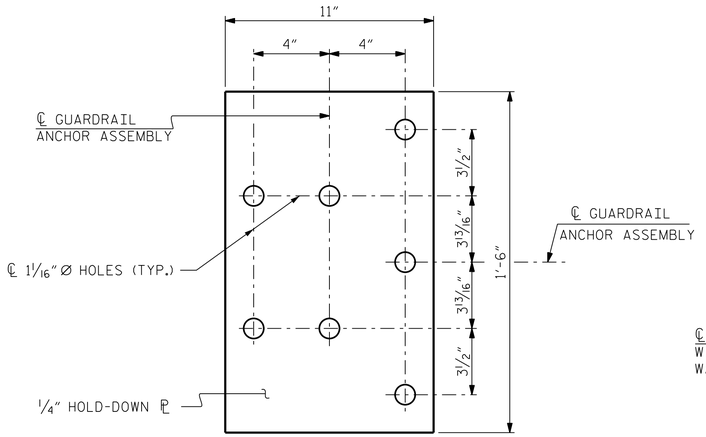
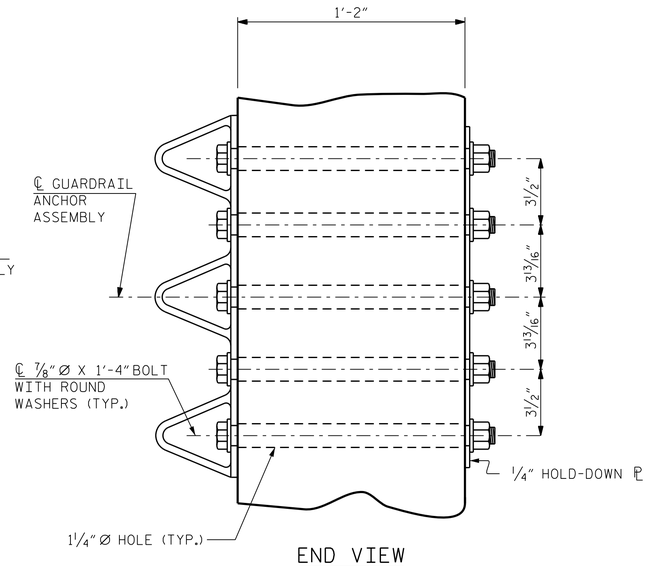


PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES:

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

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 THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

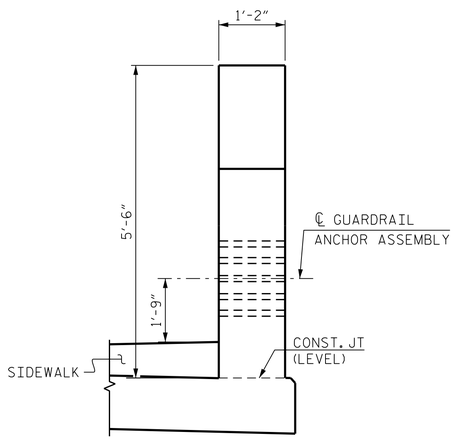
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

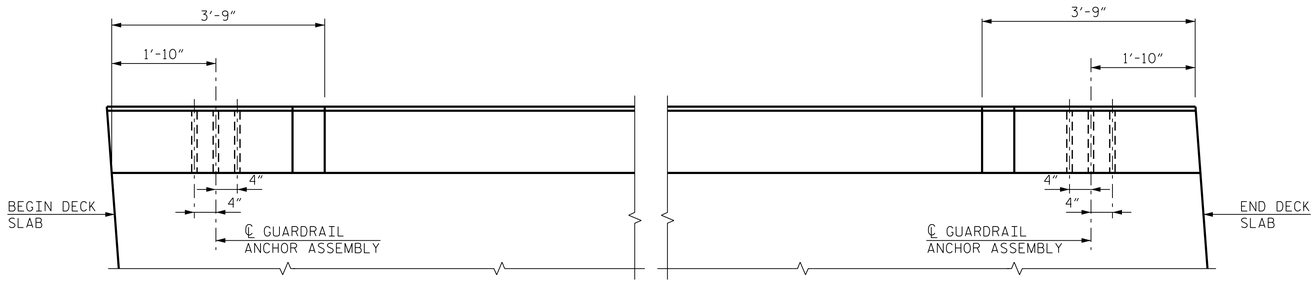
THE 1 1/4'' Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

SKETCH SHOWING POINTS OF ATTACHMENTS

✳ LOCATION OF GUARDRAIL ATTACHMENT



END VIEW



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

SITE 4 DWG. NO. 25

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NORTH CAROLINA PROFESSIONAL SEAL 042112 ENGINEER DAVID M. RAGAN
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RUMMEL, KLEPPER & KAHL, LLP
8601 SIX FORKS RD., FORUM 1 | SUITE 700
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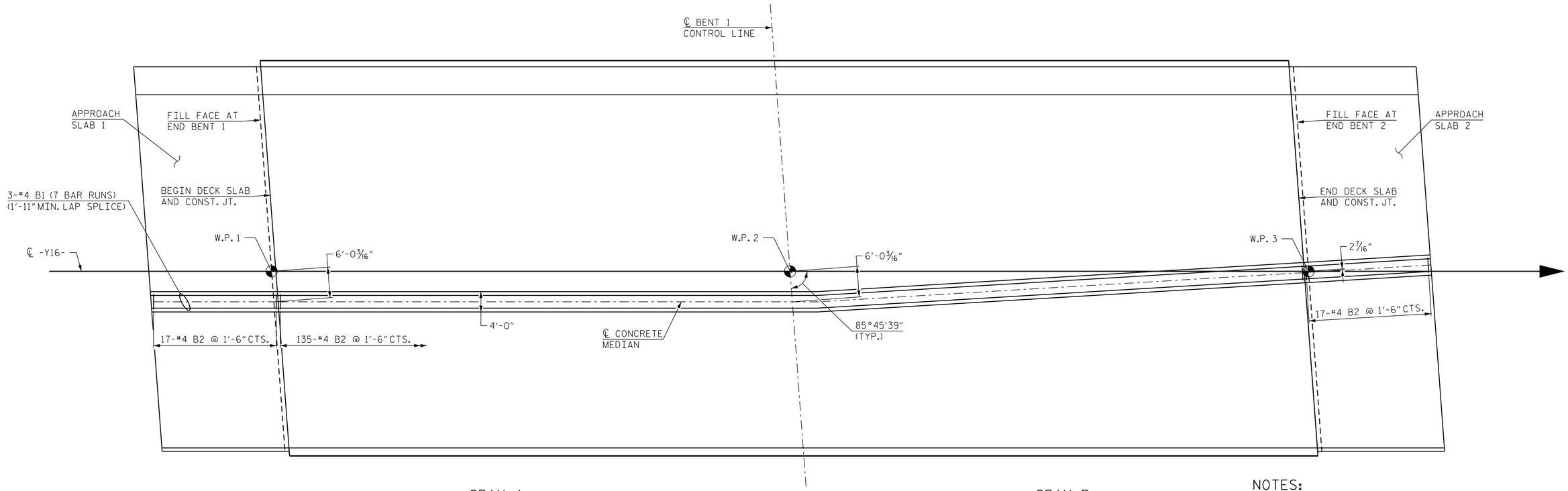
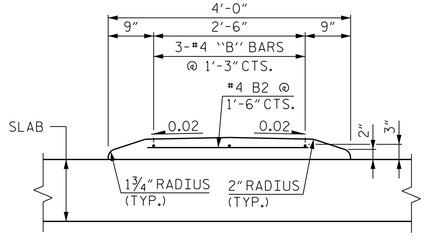


PLAN



BILL OF MATERIAL					
CONCRETE MEDIAN					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	21	#4	STR	37'-8"	528
✳B2	169	#4	STR	2'-9"	310
✳EPOXY COATED REINFORCING STEEL					838 LBS.
CLASS AA CONCRETE					14.6 C.Y.

NOTES:

NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE FOR MATERIALS OR LABOR TO CONSTRUCT THE CONCRETE MEDIAN. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE REINFORCED CONCRETE DECK SLAB.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE MEDIAN STRIP IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FT. IN LENGTH.

FOR LOCATION OF CONCRETE MEDIAN, SEE ROADWAY PLANS.

ALL REINFORCING STEEL IN CONCRETE MEDIAN SHALL BE EPOXY COATED.

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

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
CONCRETE MEDIAN DETAILS

SITE 4 DWG. NO. 26

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8601 SIX FORKS RD., FORUM 1 | SUITE 700
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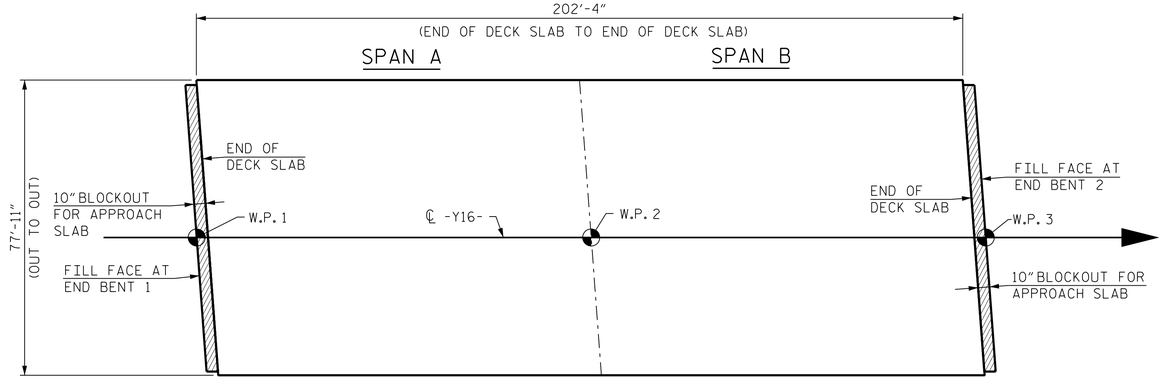
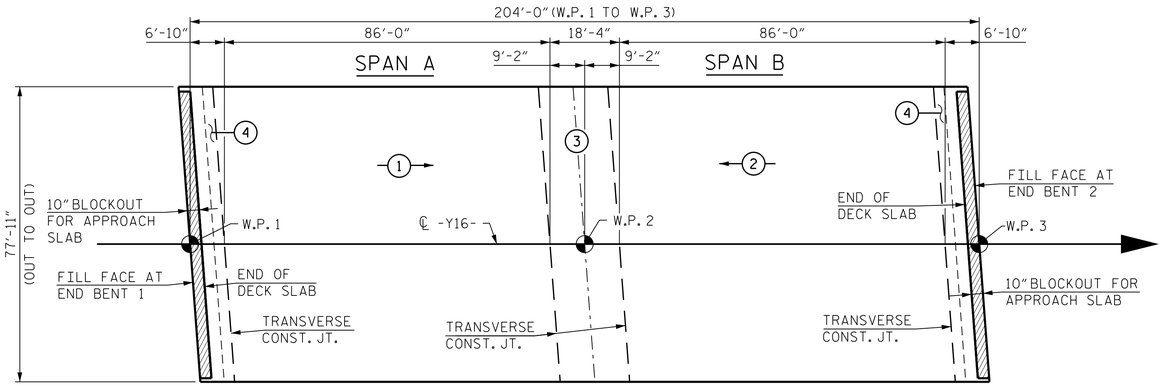


LAYOUT FOR COMPUTING AREA
OF REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 15,766)



POURING SEQUENCE

(#) INDICATES POUR NUMBER AND DIRECTION OF POUR

REINFORCING BAR SCHEDULE

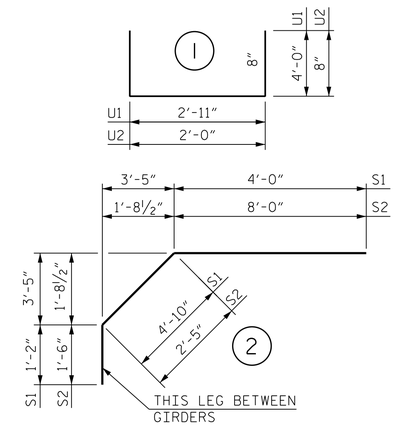
SPANS A AND B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	393	#5	STR.	53'-5"	21,895
✳ A2	393	#5	STR.	26'-8"	10,931
A3	393	#5	STR.	48'-9"	19,983
A4	393	#5	STR.	30'-11"	12,673
✳ A100	2	#5	STR.	4'-3"	9
✳ A101	2	#5	STR.	11'-0"	23
✳ A102	2	#5	STR.	17'-9"	37
✳ A103	2	#5	STR.	24'-6"	51
✳ A104	2	#5	STR.	31'-3"	65
✳ A105	2	#5	STR.	38'-0"	79
✳ A106	2	#5	STR.	44'-9"	93
✳ A107	2	#5	STR.	51'-6"	107
✳ A108	2	#5	STR.	58'-2"	121
✳ A109	4	#5	STR.	33'-8"	140
✳ A110	4	#5	STR.	37'-1"	155
A200	2	#5	STR.	4'-3"	9
A201	2	#5	STR.	11'-0"	23
A202	2	#5	STR.	17'-9"	37
A203	2	#5	STR.	24'-6"	51
A204	2	#5	STR.	31'-3"	65
A205	2	#5	STR.	38'-0"	79
A206	2	#5	STR.	44'-9"	93
A207	2	#5	STR.	51'-6"	107
A208	2	#5	STR.	58'-2"	121
A209	4	#5	STR.	33'-6"	140
A210	4	#5	STR.	36'-10"	154

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	384	#5	STR.	37'-3"	14,919
✳ B2	310	#6	STR.	21'-4"	9,933
✳ B3	320	#4	STR.	25'-1"	5,362
✳ B4	81	#5	STR.	60'-0"	5,069
✳ B5	81	#5	STR.	13'-10"	1,169
✳ B6	74	#5	STR.	40'-8"	3,139
B7	96	#4	STR.	38'-8"	2,480
B8	96	#4	STR.	24'-0"	1,539
B9	122	#4	STR.	33'-3"	2,710
B10	122	#4	STR.	19'-3"	1,569
✳ B11	30	#4	STR.	35'-10"	718
K1	20	#4	STR.	39'-10"	532
K2	16	#4	STR.	6'-4"	68
K3	16	#4	STR.	7'-6"	80
K4	32	#4	STR.	7'-11"	169
K5	16	#4	STR.	6'-10"	73
K6	4	#4	STR.	1'-10"	5
K7	4	#4	STR.	2'-4"	6
K8	8	#4	STR.	2'-7"	14
K9	4	#4	STR.	2'-1"	6
✳ G1	202	#4	STR.	5'-0"	675
✳ S1	116	#4	2	10'-0"	775
✳ S2	124	#4	2	11'-11"	987
U1	124	#4	1	10'-11"	904
✳ U2	62	#4	1	3'-4"	138

REINFORCING STEEL 58,609 LBS.
✳ EPOXY COATED REINFORCING STEEL 61,671 LBS.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	3,259 SQ.FT.
BRIDGE DECK	13,455 SQ.FT.
TOTAL	16,714 SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	204.4	———	———
POUR 2	204.4	———	———
POUR 3	43.6	———	———
POUR 4	108.6	———	———
POUR 5✳✳✳	26.0	———	1,534
TOTALS✳✳	587.0	58,609	61,671

✳✳ QUANTITIES FOR BARRIER RAIL, PARAPET AND MEDIAN ARE NOT INCLUDED
✳✳✳ QUANTITIES FOR SIDEWALK.

PROJECT NO. U-2519BA
CUMBERLAND COUNTY
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STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

BILL OF MATERIAL

SITE 4 DWG. NO. 27

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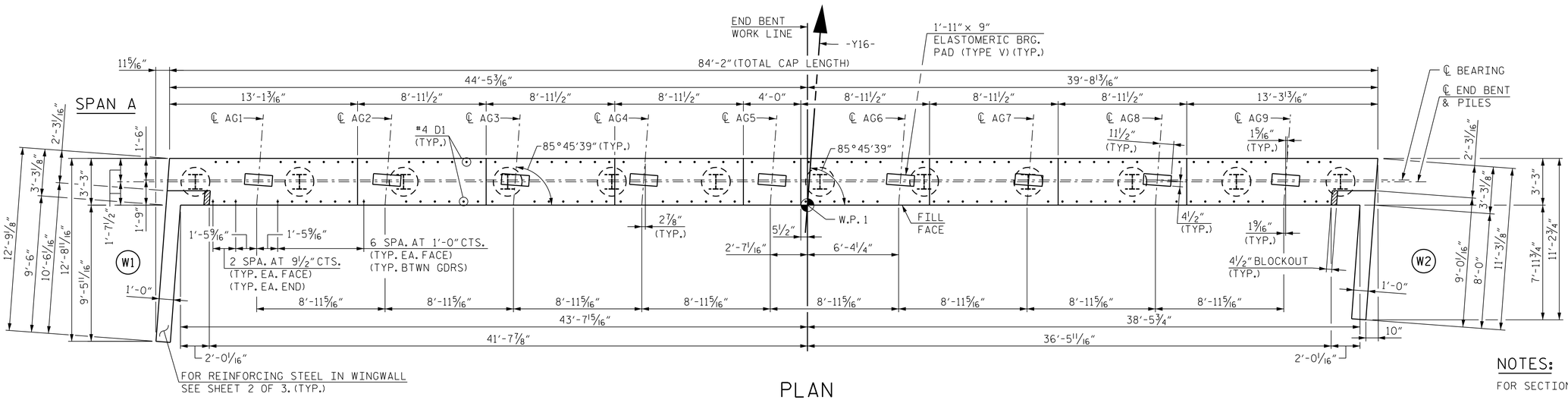
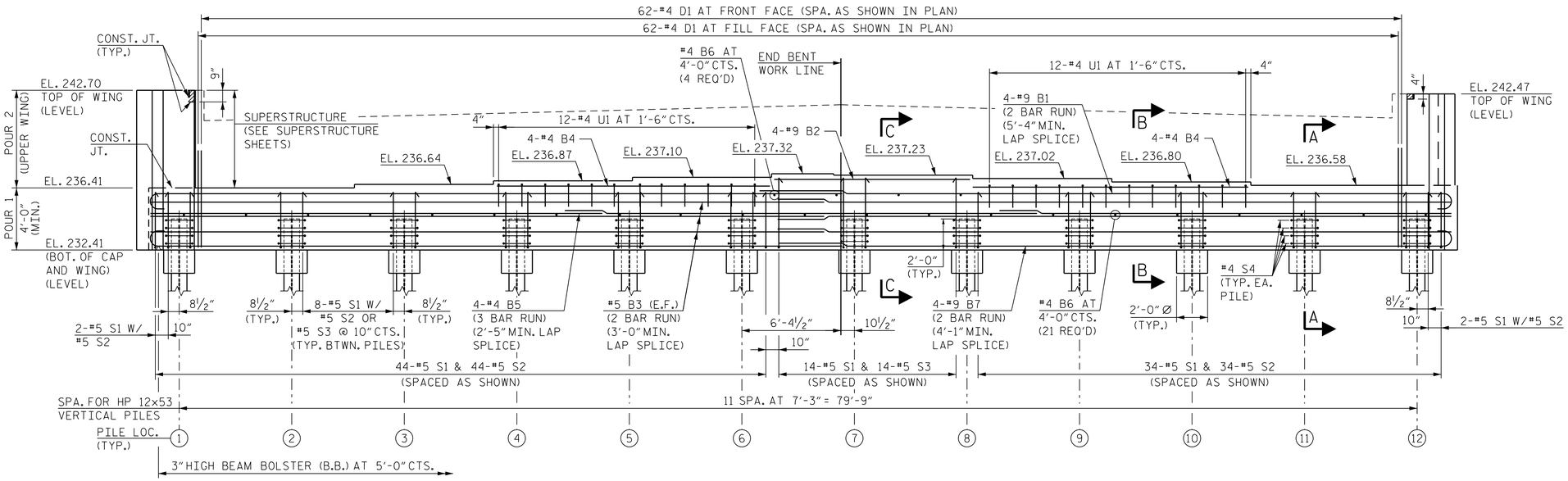


PLAN



ELEVATION

NOTES:

FOR SECTION A-A, B-B AND C-C, SEE SHEET 3 OF 3.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

FOR TEMPORARY DRAINAGE DETAILS, SEE END BENT 2, SHEET 3 OF 3.

THE TOP SURFACE OF THE END BENT CAP AND WINGS, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

FOR "BLOCKOUT IN WINGWALL" DETAILS, SEE SUPERSTRUCTURE TYPICAL SECTIONS SHEET 2 OF 3.

PROJECT NO. U-2519BA

CUMBERLAND COUNTY

STATION: 24+41.38 -Y16-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

END BENT 1
PLAN AND ELEVATION

SITE 4 DWG. NO. 28

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