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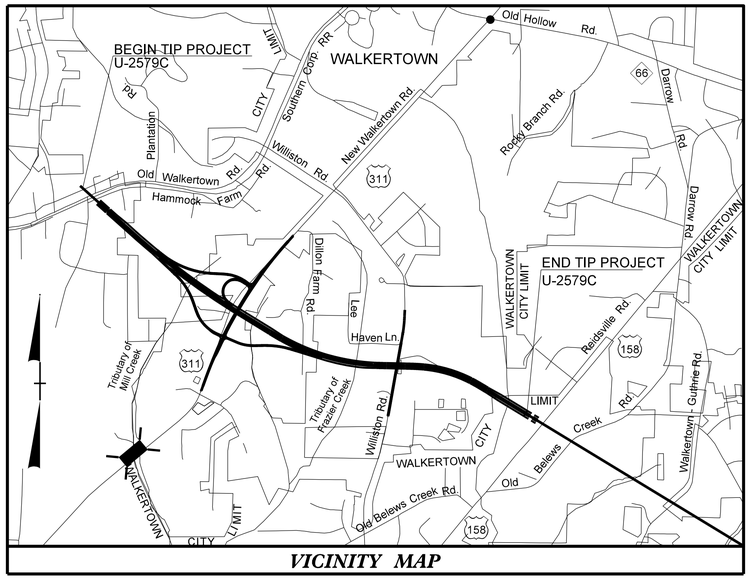
TIP PROJECT: U-2579C

CONTRACT: C203979



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

FORSYTH COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2579C		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34839.1.9	N/A	PE
34839.2.6	N/A	R/W
34839.2.GV18	N/A	R/W
34839.2.16	N/A	UTIL
34839.3.GV6	NHP-0918(062)	CONSTR.

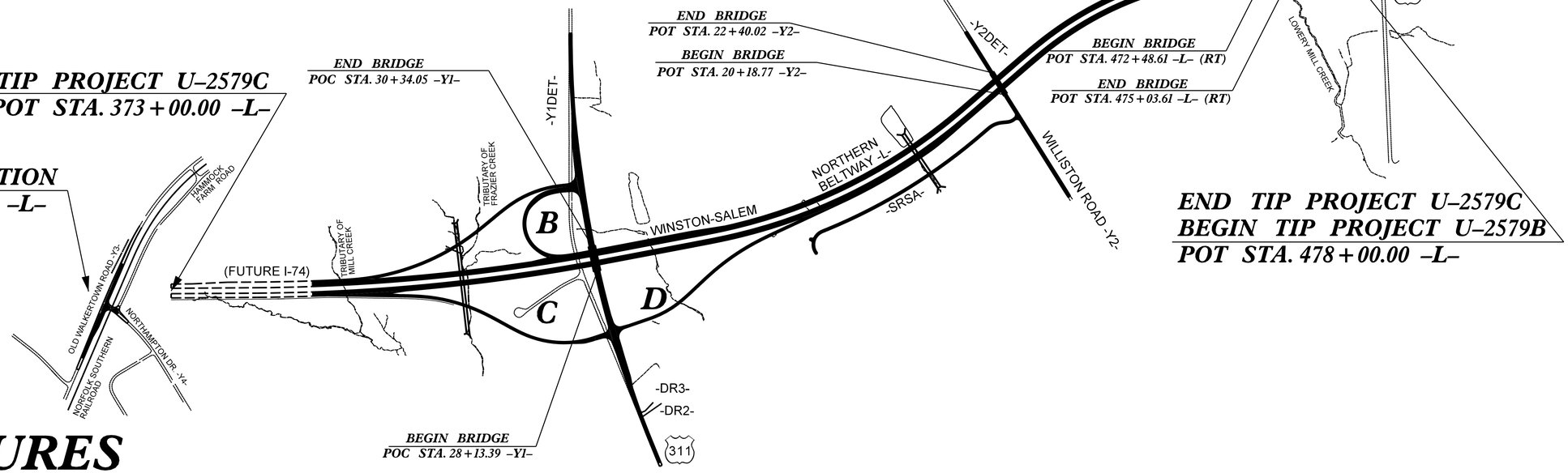
LOCATION: WINSTON – SALEM NORTHERN BELTWAY (EASTERN SECTION) FROM US 311 TO US 158 (FUTURE I-74)

TYPE OF WORK: WIDENING, GRADING, PAVING, DRAINAGE, SIGNING, SIGNALS, ITS, CULVERTS AND STRUCTURES.

BEGIN TIP PROJECT U-2579C
POT STA. 373+00.00 -L-

BEGIN CONSTRUCTION
POT STA. 366+00.00 -L-

TO SR 2211 BAUX MOUNTAIN ROAD



END TIP PROJECT U-2579C
BEGIN TIP PROJECT U-2579B
POT STA. 478+00.00 -L-

STRUCTURES

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DESIGN DATA

ADT 2017	=	65,592
ADT 2037	=	93,112
DHV	=	10 %
D	=	60 %
T	=	18 % *
V	=	70 MPH

* TTST 12 % DUAL 6 %

PROJECT LENGTH

LENGTH OF ROADWAY PROJECT U-2579C	=	1.941 Miles
LENGTH OF STRUCTURE PROJECT U-2579C	=	0.048 Mile
TOTAL LENGTH OF TIP PROJECT U-2579C	=	1.989 Miles

Prepared In the Office of:
DIVISION OF HIGHWAYS
STRUCTURES MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

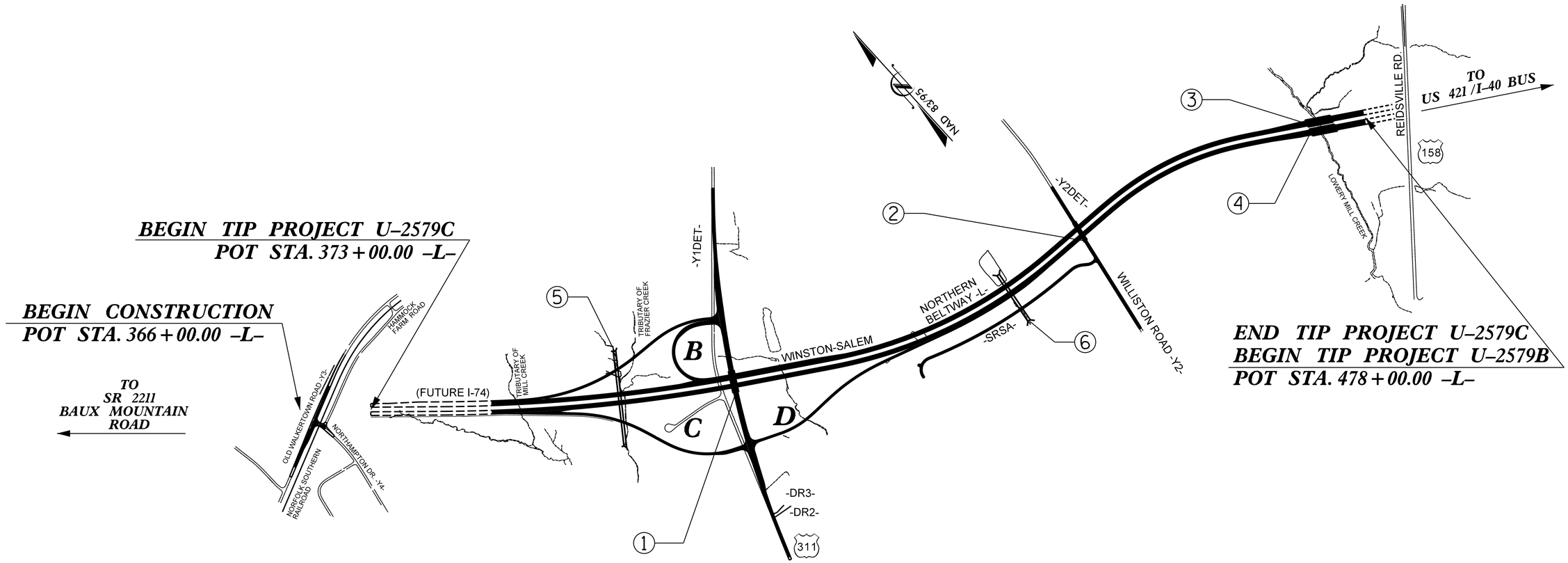
2012 STANDARD SPECIFICATIONS

LETTING DATE :

OCTOBER 17, 2017

A. KEITH PASCHAL, P.E.
PROJECT ENGINEER

MARC G. CHEEK, P.E.
PROJECT DESIGN ENGINEER



INDEX			
STR. No.	STATION	DESCRIPTION	SHEETS
1	409+03.84 -L- 29+24.97 -Y1-	BRIDGE OVER WINSTON-SALEM NORTHERN BELTWAY ON US 311 BETWEEN SR 2393 AND SR 2381	S1-1 THRU S1-32
2	447+07.91 -L- 21+27.27 -Y2-	BRIDGE OVER WINSTON-SALEM NORTHERN BELTWAY ON SR 2381 BETWEEN SR 2396 AND US 311	S2-1 THRU S2-30
3	473+70.00 -L-	LEFT LANE BRIDGE OVER LOWERY MILL CREEK ON WINSTON-SALEM BELTWAY BETWEEN SR 2381 AND US 158	S3-1 THRU S3-33
4	473+70.00 -L-	RIGHT LANE BRIDGE OVER LOWERY MILL CREEK ON WINSTON-SALEM BELTWAY BETWEEN SR 2381 AND US 158	S4-1 THRU S4-33
5	397+73.00 -L-	SINGLE 6 FT. X 7 FT. RCBC	C1-1 THRU C1-5
6	437+96.50 -L-	SINGLE 8 FT. X 8 FT. RCBC	C2-1 THRU C2-5

PROJECT NO. U-2579C
FORSYTH COUNTY

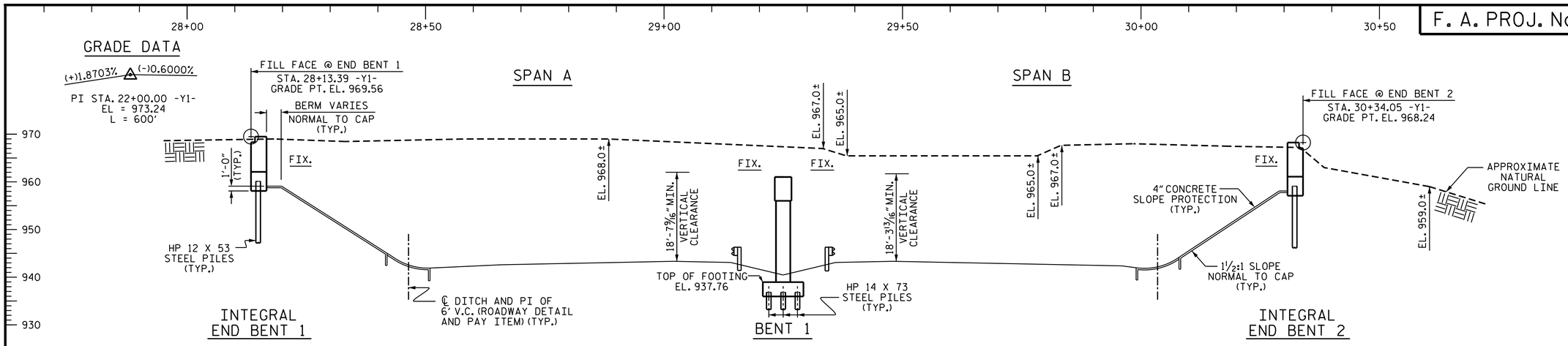
DRAWN BY : H. T. BARBOUR DATE : 5-9-17
CHECKED BY : MARC G. CHEEK DATE : 6-17-17

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INDEX

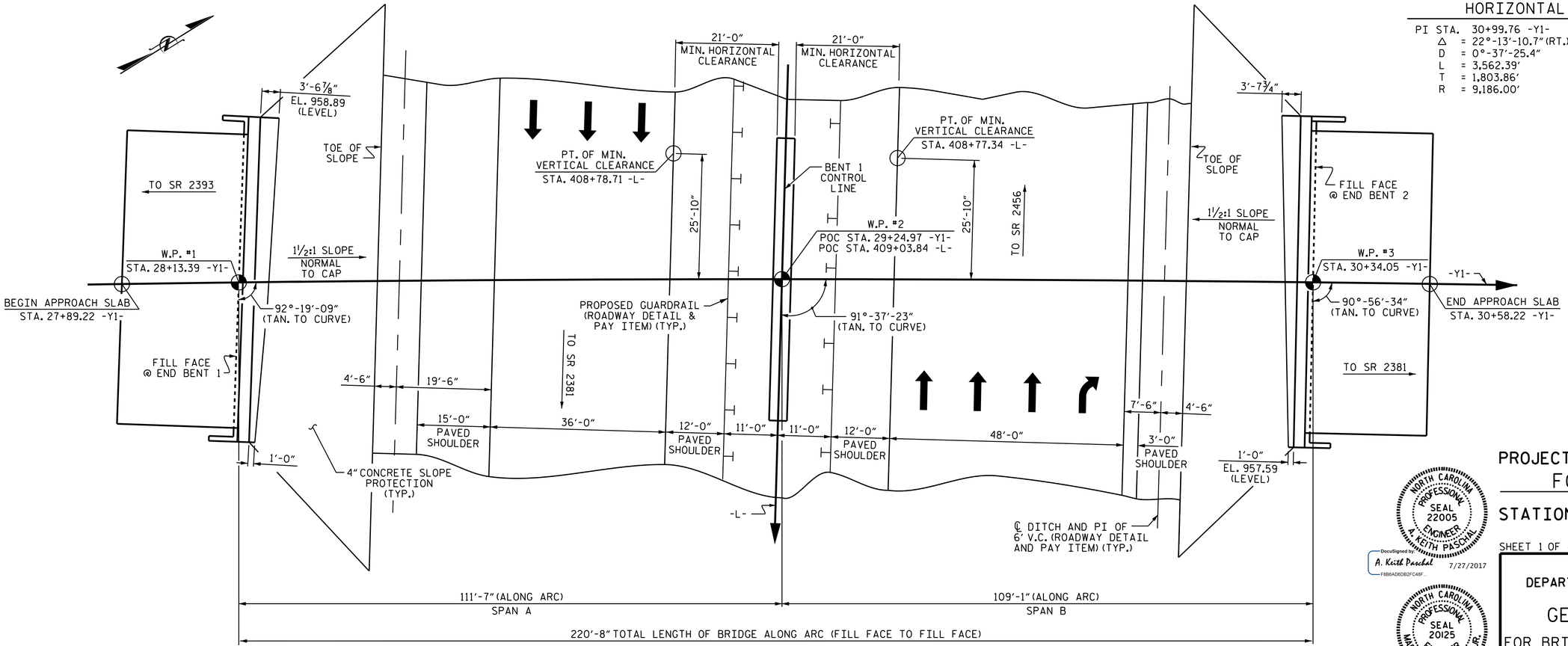
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

F. A. PROJ. No.: NHP-0918(062)



SECTION ALONG -Y1-

SECTIONS AT END BENTS AND BENT ARE TAKEN AT RIGHT ANGLES



PLAN

(PILES, COLUMNS & FOOTINGS NOT SHOWN FOR CLARITY)

HORIZONTAL CURVE DATA

PI STA. 30+99.76 -Y1-		PI STA. 395+20.44 -L-	
Δ	= 22°-13'-10.7" (RT.)	Δ	= 10°-24'-37.2" (LT.)
D	= 0°-37'-25.4"	D	= 0°-20'-57.7"
L	= 3,562.39'	L	= 2,979.79'
T	= 1,803.86'	T	= 1,494.01'
R	= 9,186.00'	R	= 16,400.00'

NORTH CAROLINA PROFESSIONAL SEAL 22005 ENGINEER A. KEITH PASCHAL
DocuSigned by: A. Keith Paschal F8B6AD6DB2FC48F...
7/27/2017

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK JR.
DocuSigned by: Marshall G. Cheek Jr 8549D6EBAA3B405...
7/27/2017

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 409+03.84 -L-
29+24.97 -Y1-

SHEET 1 OF 4 BRIDGE NO. 700

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER WINSTON-SALEM NORTHERN BELTWAY (FUTURE I-74) ON US 311 (NEW WALKERTOWN RD.) BETWEEN SR 2393 AND SR 2381

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : K. D. LAYNE DATE : 4/27/16
CHECKED BY : J. K. BOWLES DATE : 9/8/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

26-JUL-2017 15:11
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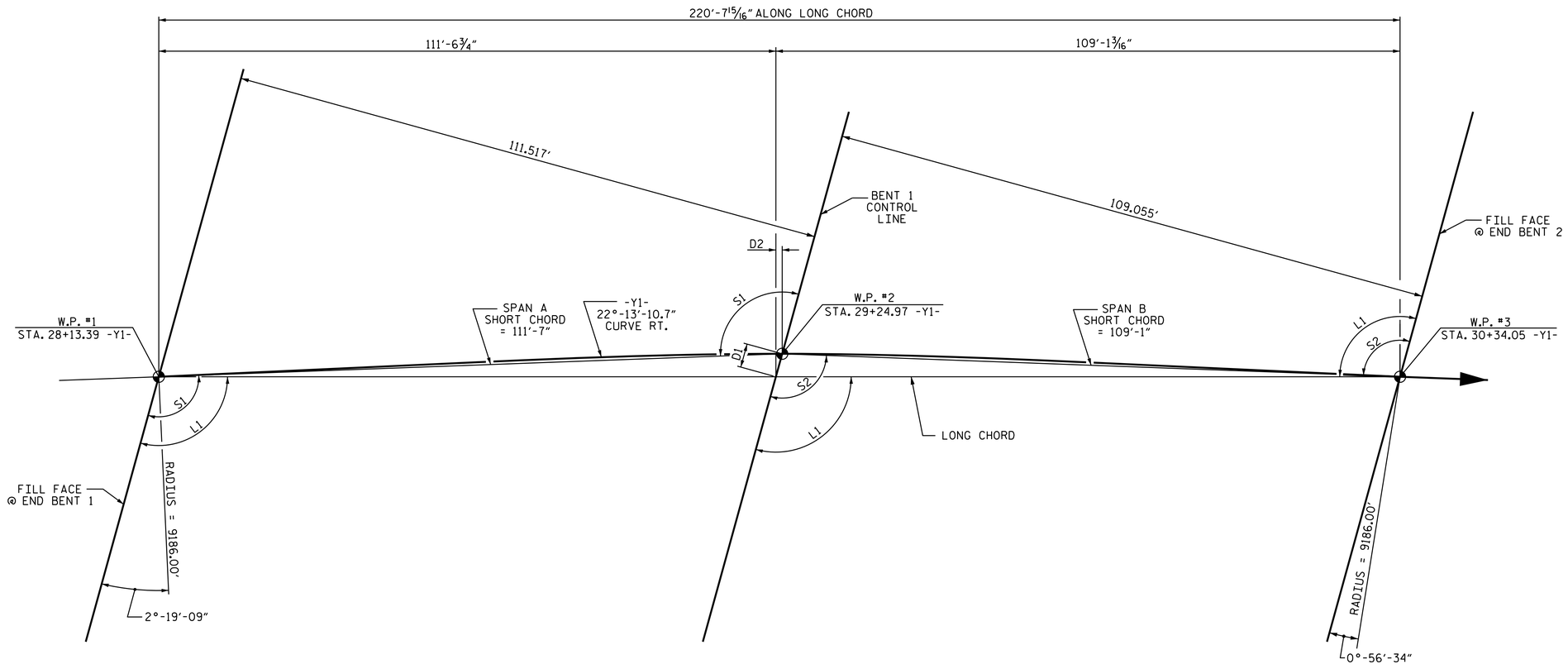
mcheek

STR. #1



LONG CHORD LAYOUT

ANGLES			
LONG CHORD		SHORT CHORD	
L1	91°-37'-52"	S1	91°-58'-16"
		S2	91°-16'-58"

OFFSETS	
D1	7 15/16"
D2	0 1/4"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 409+03.84 -L-
29+24.97 -Y1-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER WINSTON-SALEM NORTHERN BELTWAY (FUTURE I-74) ON US 311 (NEW WALKERTOWN RD.) BETWEEN SR 2393 AND SR 2381

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : K.D.LAYNE DATE : 4/27/16
CHECKED BY : J.K.BOWLES DATE : 9/8/16
DESIGN ENGINEER OF RECORD: H.A.LOCKLEAR DATE : 6/2017

26-JUL-2017 15:04
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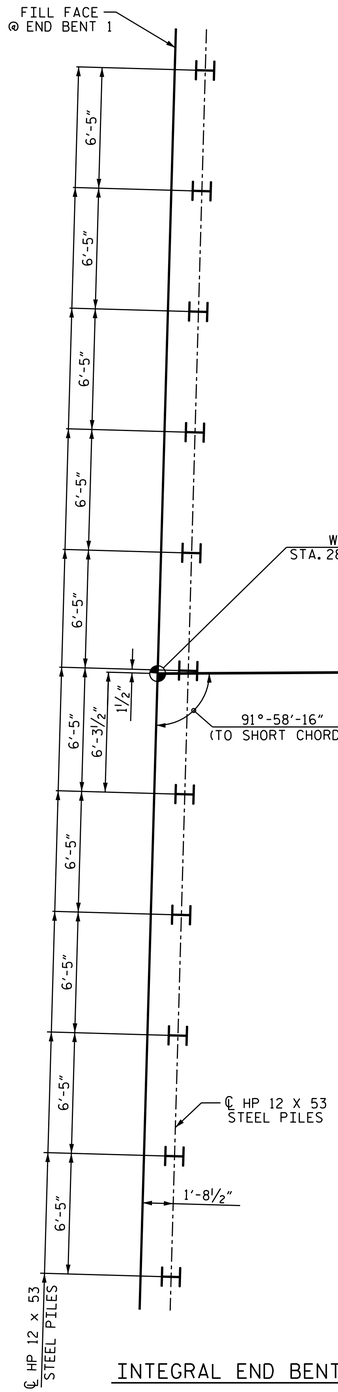
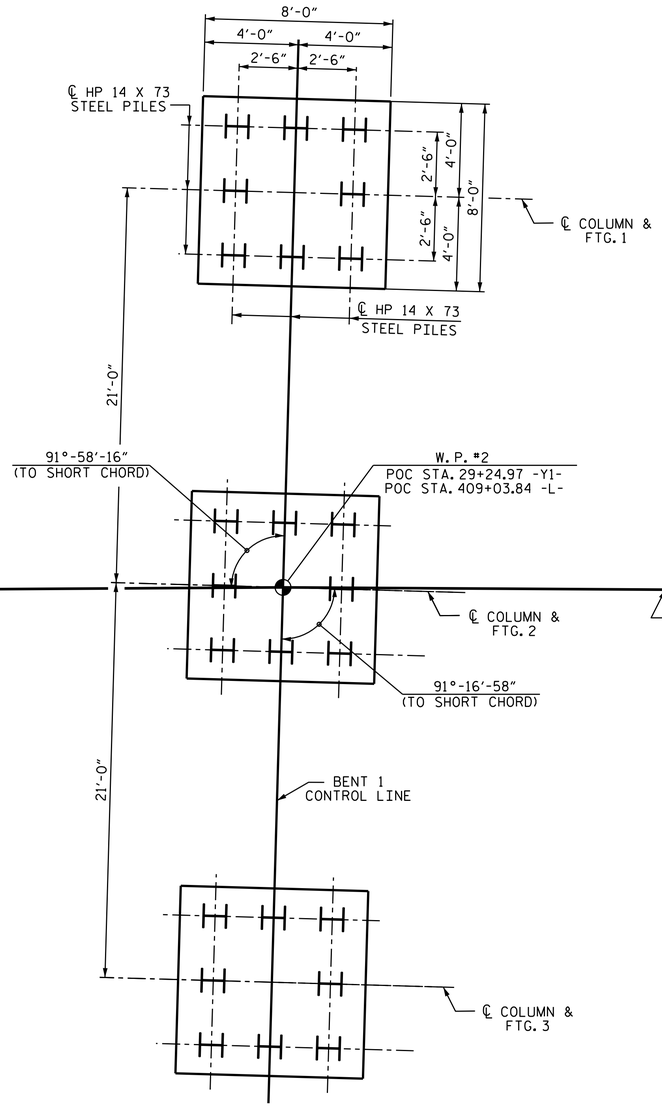
mcheek

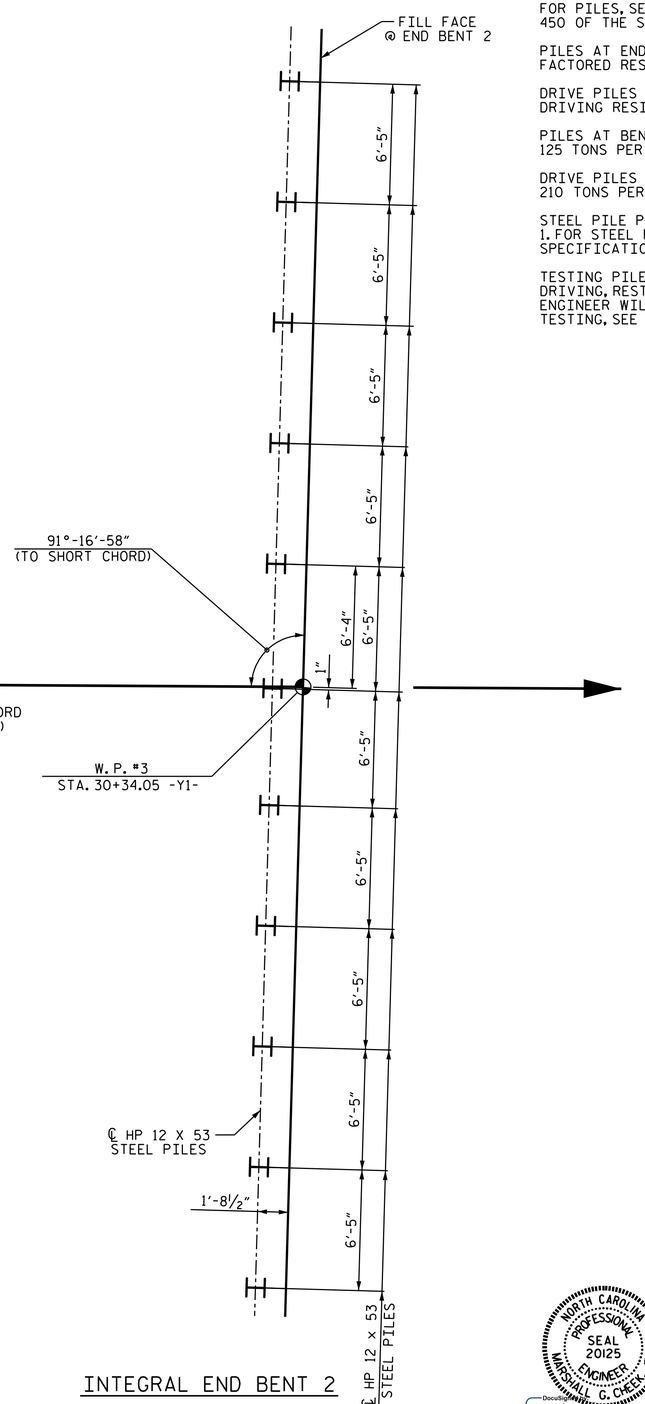
STR. #1



INTEGRAL END BENT 1



BENT 1



INTEGRAL END BENT 2

NOTES

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

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 210 TONS PER PILE.

PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.

DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 210 TONS PER PILE.

STEEL PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT BENT 1. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

TESTING PILES WITH THE PILE DRIVING ANALYZER (PDA) DURING DRIVING, RESTRIKING, OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES. ALL COLUMN FOOTINGS AND PILE SPACINGS ARE TYPICAL AT BENT.

DRAWN BY : K. D. LAYNE DATE : 4/27/16
CHECKED BY : J.K. BOWLES DATE : 9/8/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.
6549D8E8AA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 409+03.84 -L-
29+24.97 -Y1-
SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

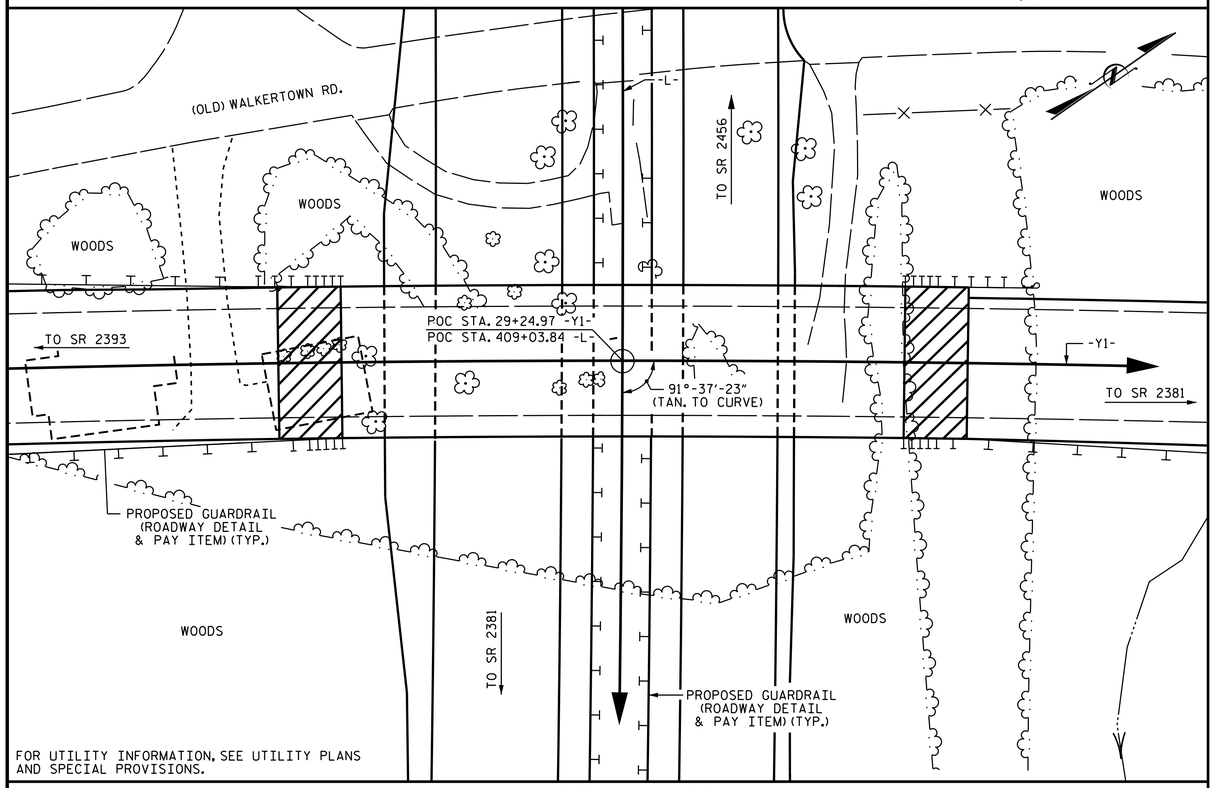
GENERAL DRAWING

FOR BRIDGE OVER WINSTON-SALEM NORTHERN BELTWAY (FUTURE I-74) ON US 311 (NEW WALKERTOWN RD.) BETWEEN SR 2393 AND SR 2381

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

STR. #1

BENCHMARK #2 : R.R. SPIKE SET IN BASE OF 36" OAK TREE 50' LT. OF STA. 47+42.00 -Y1-, EL. 985.60



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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.

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

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 BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

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 SETUP FOR HP 12 X 53 STEEL PILES	PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES	HP 12 x 53 STEEL PILES		HP 14 x 73 STEEL PILES		STEEL PILE POINTS	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS
	LUMP SUM	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EACH	EACH	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE			13,406	10,280		LUMP SUM			12	1,307.00								438.00		LUMP SUM
END BENT 1					52.7		6,053				11		11	470					440	
BENT 1	LUMP SUM				80.4		16,962	1,281				24			24	480	24			
END BENT 2					48.4		6,033				11		11	415					386	
TOTAL	LUMP SUM	1	13,406	10,280	181.5	LUMP SUM	29,048	1,281	12	1,307.00	22	24	22	885	24	480	24	438.00	826	LUMP SUM

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 409+03.84 -L-
29+24.97 -Y1-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER WINSTON-SALEM NORTHERN BELTWAY (FUTURE I-74) ON US 311 (NEW WALKERTOWN RD.) BETWEEN SR 2393 AND SR 2381

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : K. D. LAYNE DATE : 4/27/16
CHECKED BY : J.K. BOWLES DATE : 9/8/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

26-JUL-2017 15:04
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STR. #1

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							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)	1.01	--	1.75	0.958	1.50	A	EL	54.374	0.964	1.27	A	EL	76.124	0.80	0.958	1.01	A	EL	54.374	
		HL-93 (OPERATING)	N/A	--	1.65	--	1.35	0.958	1.95	A	EL	54.374	0.964	1.65	A	EL	76.124	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.43	51.580	1.75	0.958	2.14	A	EL	54.374	0.964	1.63	A	EL	76.124	0.80	0.958	1.43	A	EL	54.374	
		HS-20 (OPERATING)	36.000	--	2.12	76.161	1.35	0.958	2.77	A	EL	54.374	0.964	2.12	A	EL	76.124	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.44	46.415	1.40	0.958	6.42	A	EL	54.374	0.964	4.94	A	EL	76.124	0.80	0.958	3.44	A	EL	54.374	
		SNGARBS2	20.000	--	2.47	49.454	1.40	0.958	4.62	A	EL	54.374	0.964	3.49	A	EL	76.124	0.80	0.958	2.47	A	EL	54.374	
		SNAGRIS2	22.000	--	2.31	50.733	1.40	0.958	4.31	A	EL	54.374	0.964	3.23	A	EL	76.124	0.80	0.958	2.31	A	EL	54.374	
		SNCOTTS3	27.250	--	1.71	46.550	1.40	0.958	3.19	A	EL	54.374	0.964	2.46	A	EL	76.124	0.80	0.958	1.71	A	EL	54.374	
		SNAGGRS4	34.925	--	1.39	48.652	1.40	0.958	2.60	A	EL	54.374	0.964	2.03	A	EL	76.124	0.80	0.958	1.39	A	EL	54.374	
		SNS5A	35.550	--	1.37	48.509	1.40	0.958	2.55	A	EL	54.374	0.964	2.04	A	EL	76.124	0.80	0.958	1.36	A	EL	54.374	
		SNS6A	39.950	--	1.24	49.458	1.40	0.958	2.31	A	EL	54.374	0.964	1.86	A	EL	76.124	0.80	0.958	1.24	A	EL	54.374	
		SNS7B	42.000	--	1.18	49.494	1.40	0.958	2.20	A	EL	54.374	0.964	1.81	A	EL	76.124	0.80	0.958	1.18	A	EL	54.374	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.51	49.684	1.40	0.958	2.81	A	EL	54.374	0.964	2.21	A	EL	76.124	0.80	0.958	1.51	A	EL	54.374	
		TNT4A	33.075	--	1.51	49.892	1.40	0.958	2.82	A	EL	54.374	0.964	2.17	A	EL	76.124	0.80	0.958	1.51	A	EL	54.374	
		TNT6A	41.600	--	1.22	50.769	1.40	0.958	2.28	A	EL	54.374	0.964	1.91	A	EL	76.124	0.80	0.958	1.22	A	EL	54.374	
		TNT7A	42.000	--	1.22	51.227	1.40	0.958	2.28	A	EL	54.374	0.964	1.88	A	EL	76.124	0.80	0.958	1.22	A	EL	54.374	
		TNT7B	42.000	--	1.25	52.302	1.40	0.958	2.33	A	EL	54.374	0.964	1.78	A	EL	76.124	0.80	0.958	1.25	A	EL	54.374	
		TNAGRIT4	43.000	--	1.20	51.466	1.40	0.958	2.23	A	EL	54.374	0.964	1.72	A	EL	76.124	0.80	0.958	1.20	A	EL	54.374	
		TNAGT5A	45.000	--	1.13	51.044	1.40	0.958	2.12	A	EL	54.374	0.964	1.70	A	EL	76.124	0.80	0.958	1.13	A	EL	54.374	
		TNAGT5B	45.000	(3)	1.13	50.662	1.40	0.958	2.10	A	EL	54.374	0.964	1.64	A	EL	76.124	0.80	0.958	1.13	A	EL	54.374	

LOAD FACTORS:

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

NOTES:

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

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

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

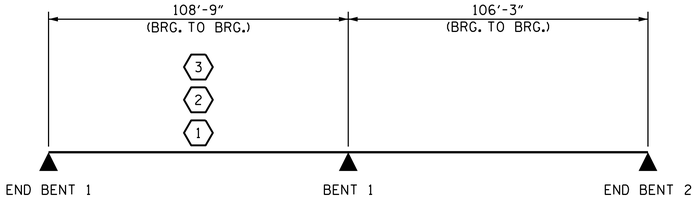
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 29+24.97 -Y1-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
8549D8EBAA3B405...
7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-5
1			3			TOTAL SHEETS
2			4			32

STR. #1 STD. NO. LRFR1

ASSEMBLED BY : J.P. MCCARTHA	DATE : 3/8/16
CHECKED BY : H.A. LOCKLEAR	DATE : 9/7/16
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM

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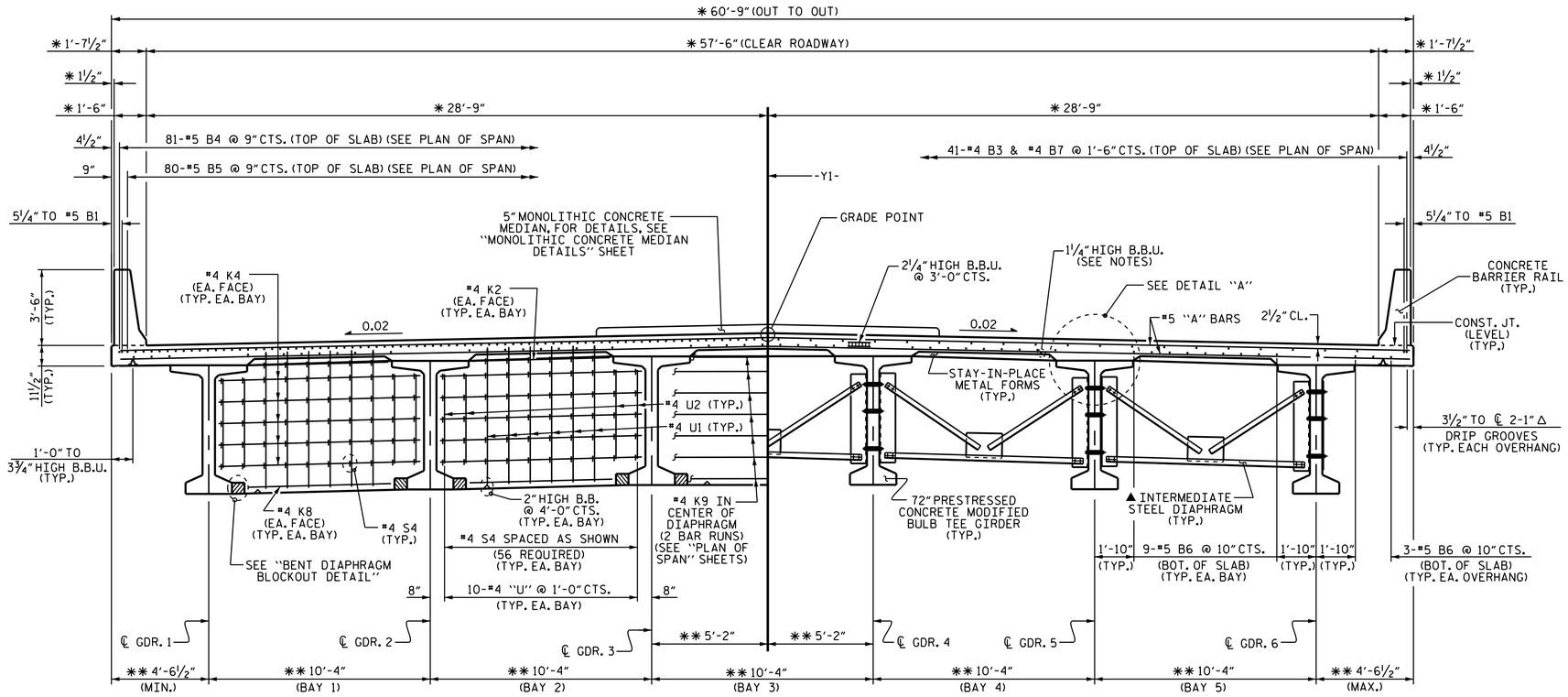
mcheek



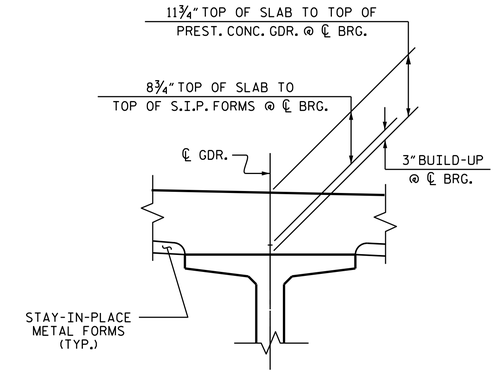
NOTES

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

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

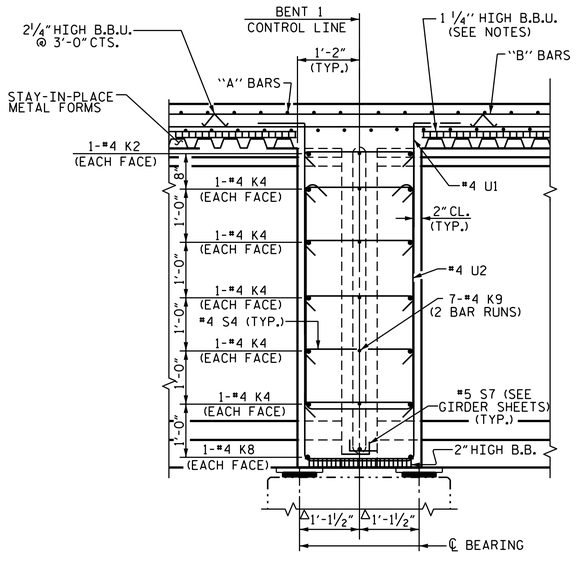
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

▲ FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.



DETAIL "A"

AT BENT DIAPHRAGMS

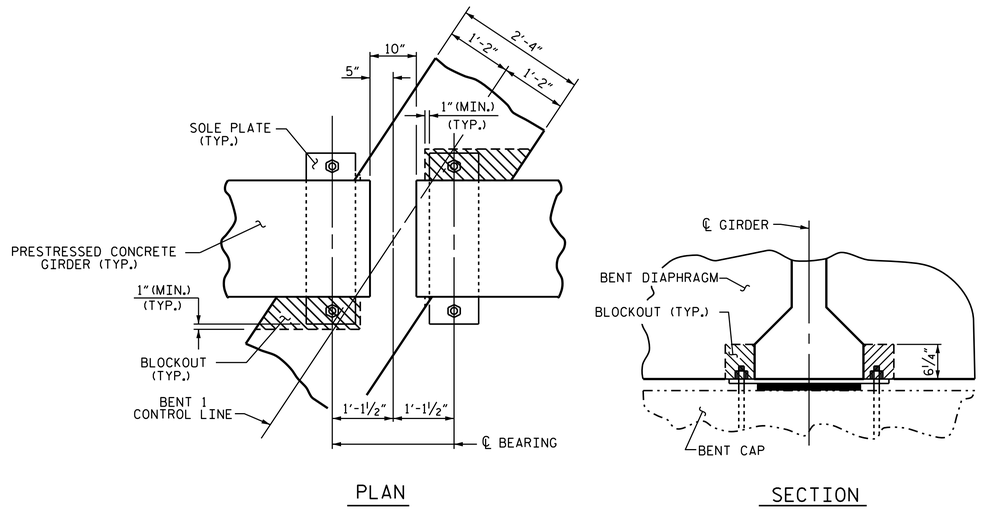


SECTION THRU BENT DIAPHRAGM

△ MEASURED ALONG ℄ GDR.

AT INTERMEDIATE DIAPHRAGMS

TYPICAL SECTION



PLAN

SECTION

BENT DIAPHRAGM BLOCKOUT DETAIL

✱ RADIAL DIMENSIONS
✱✱ RADIAL DIMENSIONS THRU WORK POINT

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 29+24.97 -Y1-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK JR.
Marshall G. Creek, Jr.
8549D6EBAA3B405...
7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-6
1			3			TOTAL SHEETS
2			4			32

DRAWN BY : J.P. MCCARTHA DATE : 4/15/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/26/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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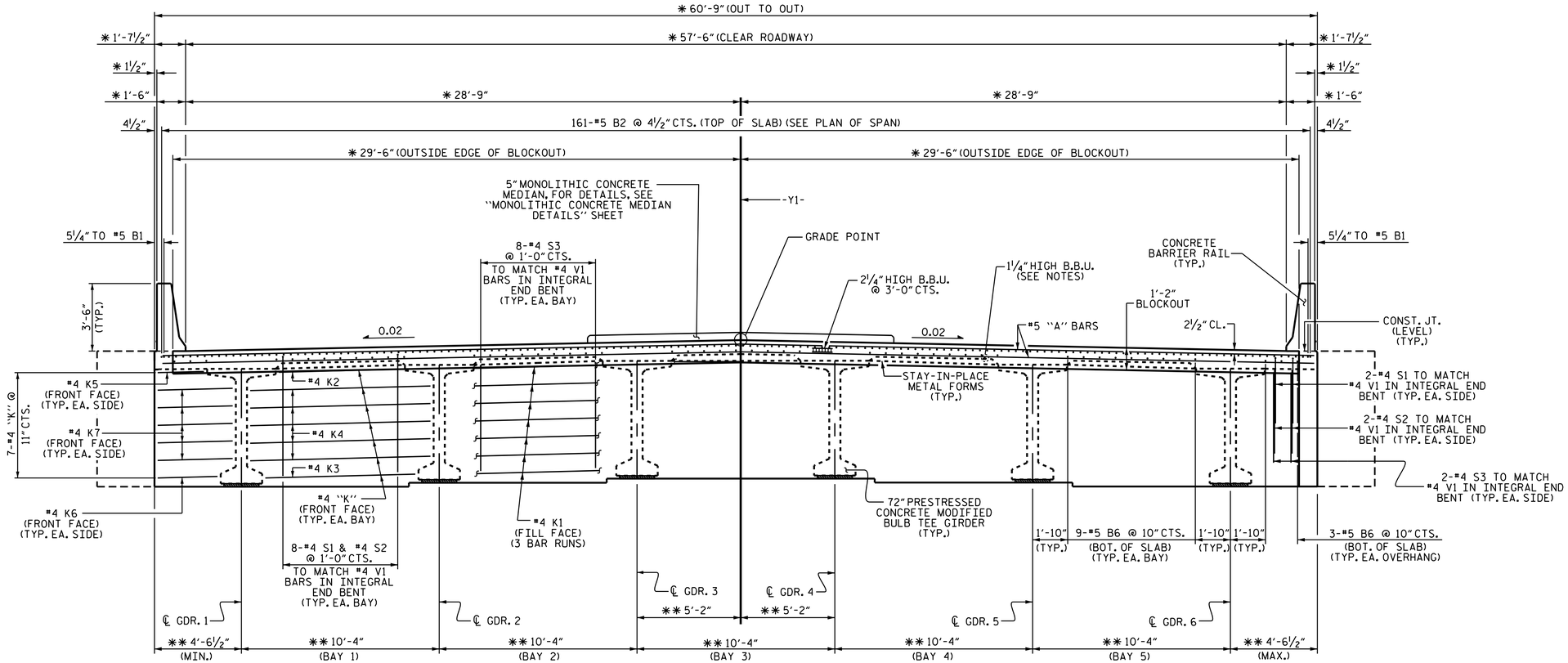
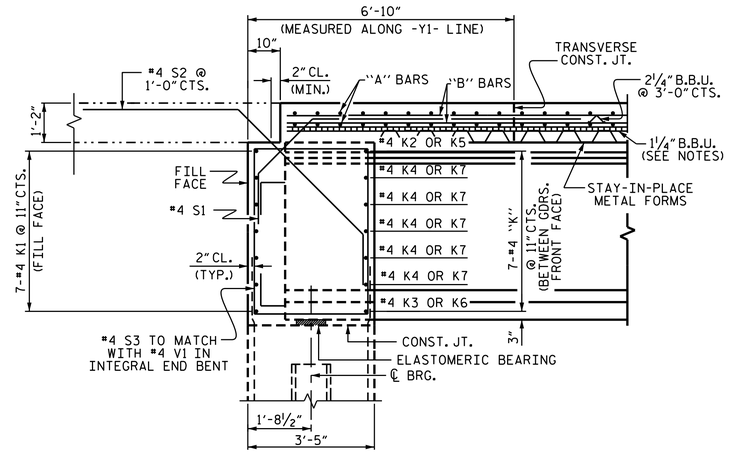
STR. #1



* RADIAL DIMENSIONS
** RADIAL DIMENSIONS THRU WORK POINT

TYPICAL SECTION AT INTEGRAL END BENT



SECTION THROUGH INTEGRAL END BENT

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 29+24.97 -Y1-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. CREEK, JR.
DocuSigned by: Marshall C. Creek, Jr.
7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-7
1			3			TOTAL SHEETS
2			4			32

DRAWN BY : J.P. MCCARTHA DATE : 4/15/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/25/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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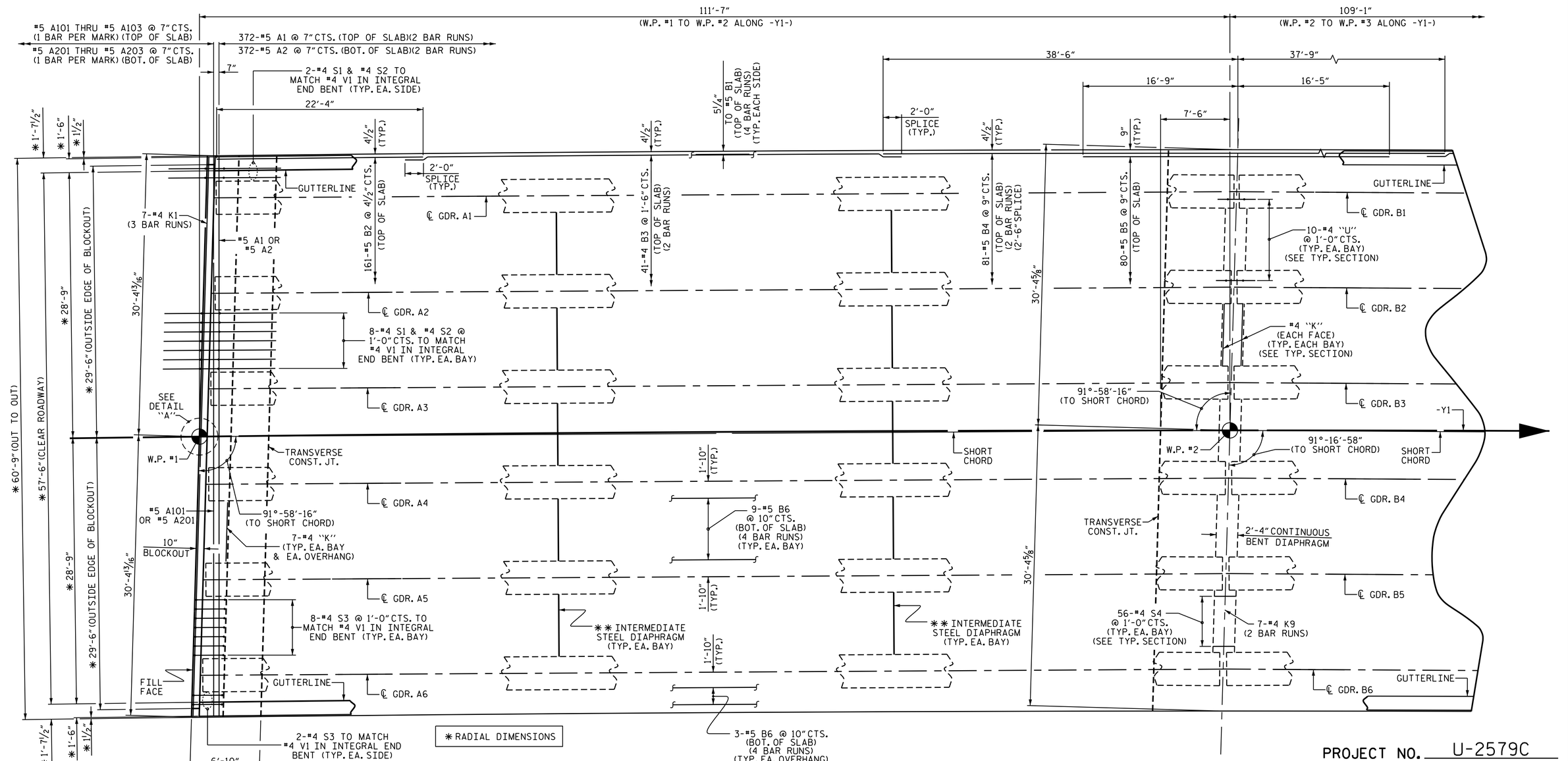
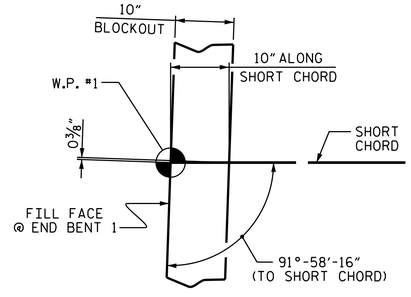


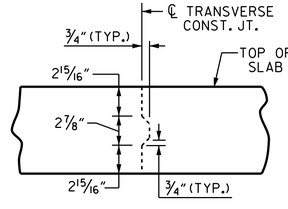
PLAN OF SPAN A

** FOR INTERMEDIATE STEEL DIAPHRAGMS DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.

"A" BARS ARE SPACED ALONG AND PERPENDICULAR TO LONG CHORD.



DETAIL "A"



TRANSVERSE CONSTRUCTION JOINT

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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Document: Marshall G. Cheek Jr.
6549D6EBAA3B405...

7/27/2017

DRAWN BY : J.P. MCCARTHA DATE : 4/26/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/25/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			32

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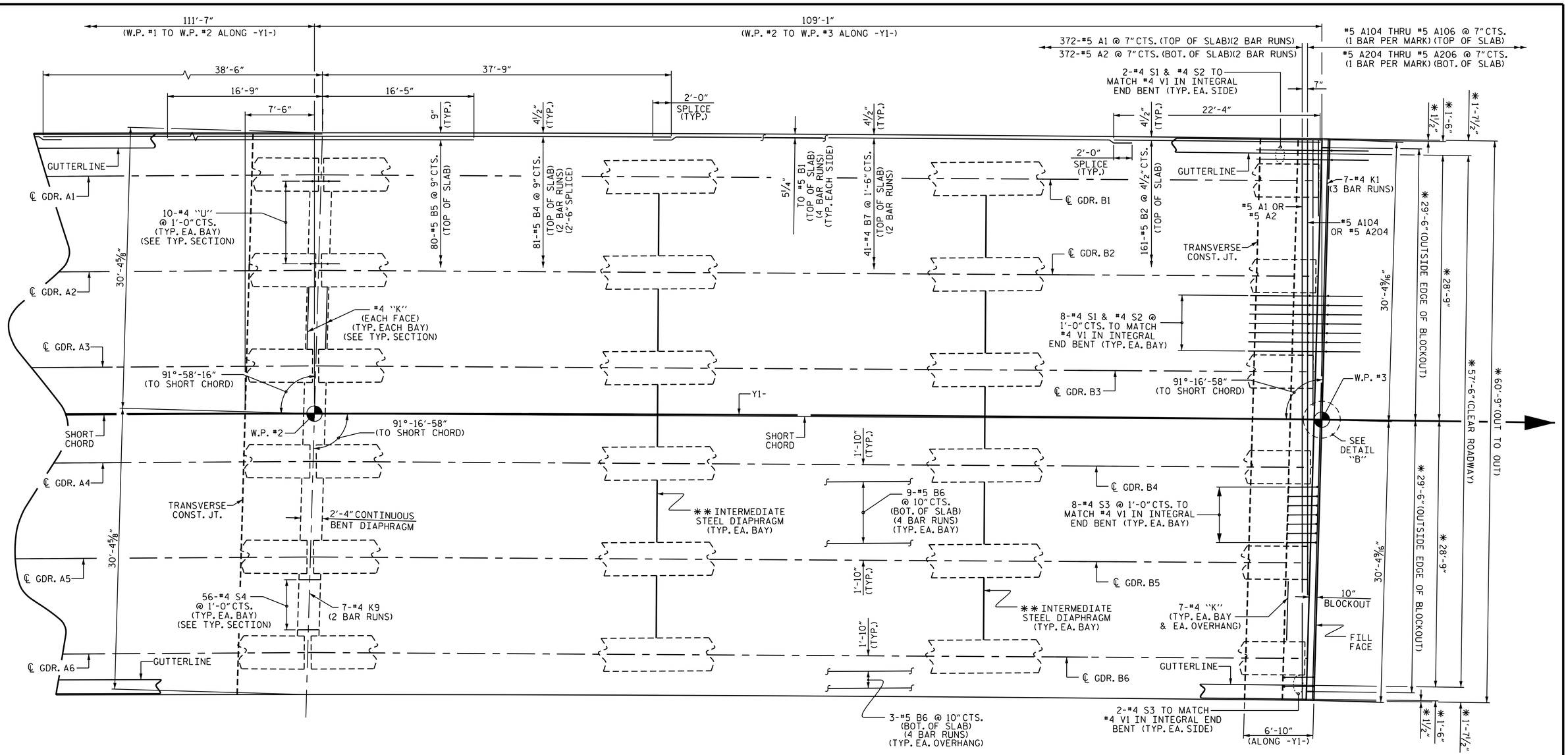
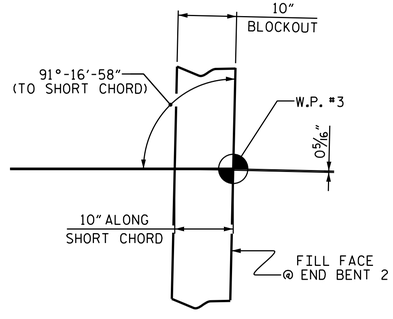


* RADIAL DIMENSIONS

PLAN OF SPAN B

** FOR INTERMEDIATE STEEL DIAPHRAGMS DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.

"A" BARS ARE SPACED ALONG AND PERPENDICULAR TO LONG CHORD.



DETAIL "B"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN B

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-9
1			3			TOTAL SHEETS
2			4			32

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DRAWN BY :	J.P. MCCARTHA	DATE : 4/29/16
CHECKED BY :	H.A. LOCKLEAR	DATE : 8/25/16
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 6/2017

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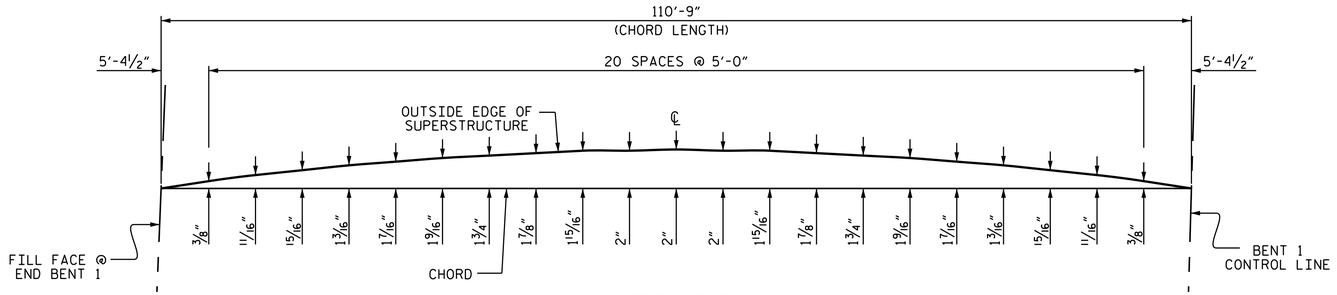
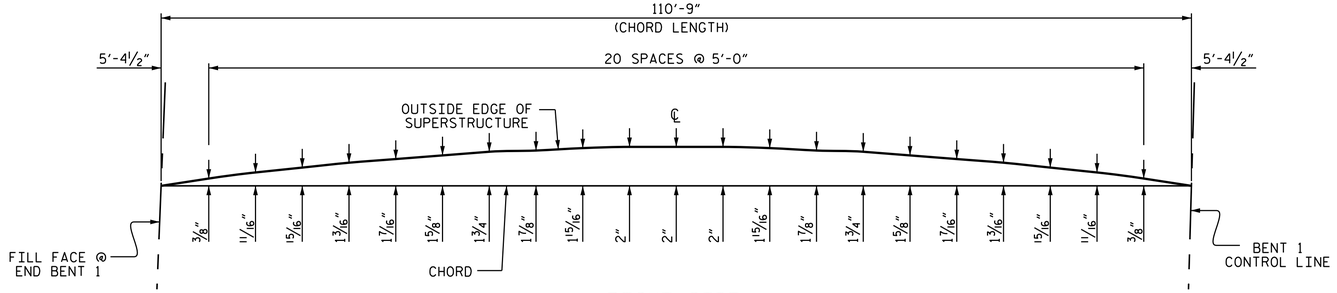
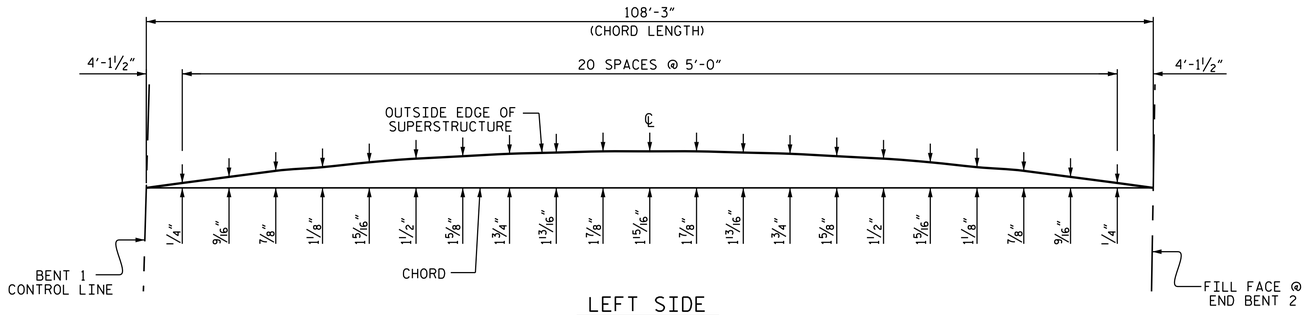


LEFT SIDE

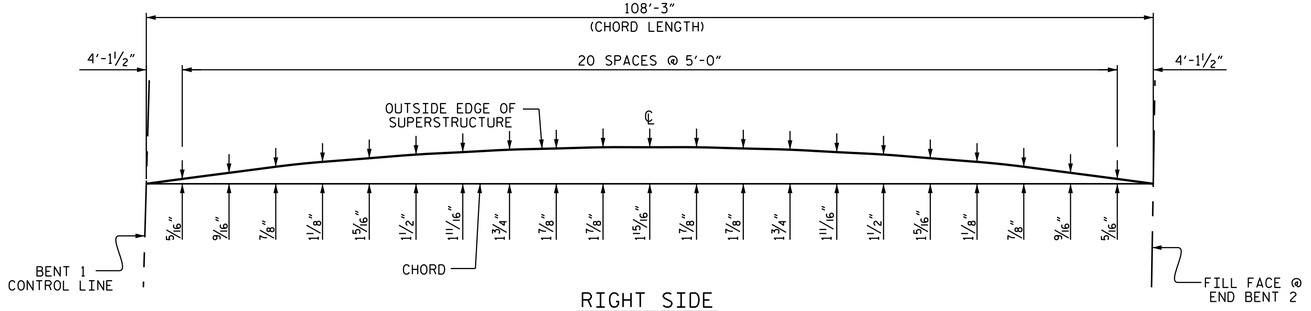


RIGHT SIDE

SPAN A ARC OFFSETS



LEFT SIDE



RIGHT SIDE

SPAN B ARC OFFSETS

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Docusigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-10
1			3			TOTAL SHEETS
2			4			32

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DRAWN BY :	J. P. MCCARTHA	DATE : 4/25/16
CHECKED BY :	H.A. LOCKLEAR	DATE : 8/25/16
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 6/2017

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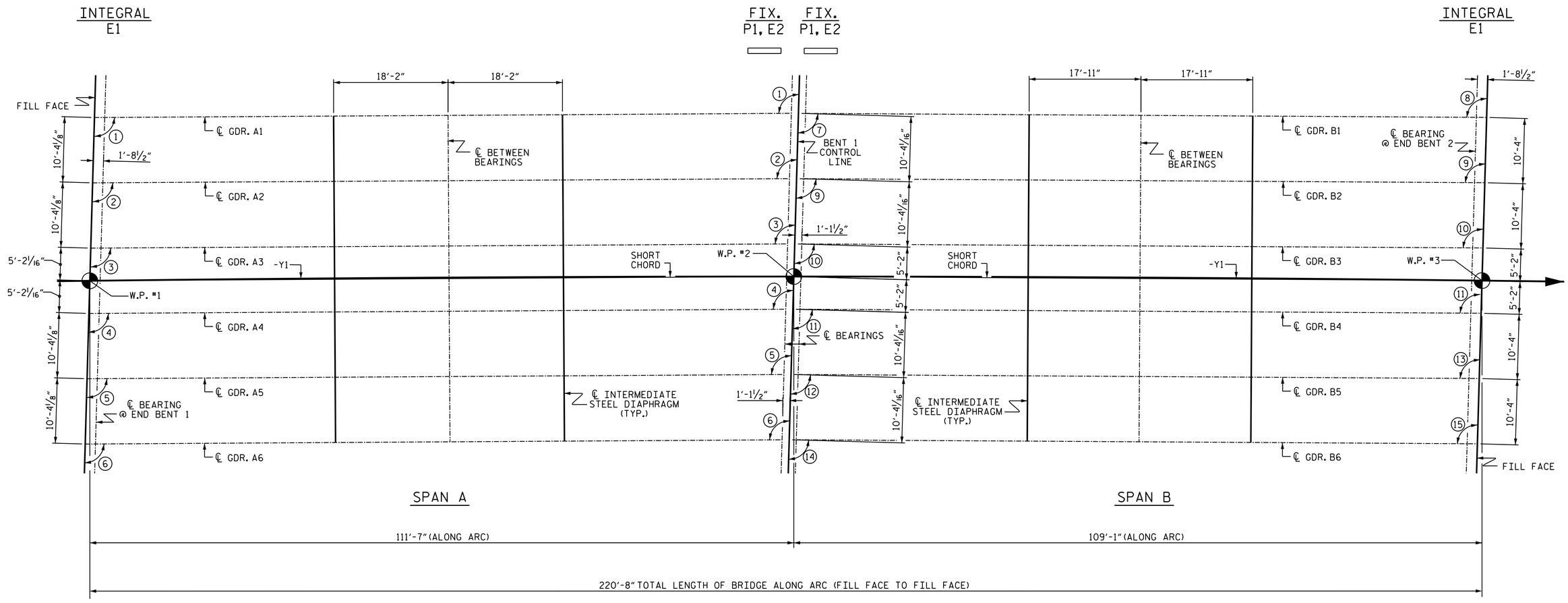

FRAMING PLAN

ANGLE TO GIRDER SHORT CHORD			
1	91°-57'-56"	9	91°-16'-51"
2	91°-58'-04"	10	91°-16'-56"
3	91°-58'-12"	11	91°-17'-01"
4	91°-58'-20"	12	91°-17'-06"
5	91°-58'-28"	13	91°-17'-07"
6	91°-58'-36"	14	91°-17'-11"
7	91°-16'-45"	15	91°-17'-12"
8	91°-16'-46"		

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 29+24+97 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...
7/27/2017

DRAWN BY : J.P. MCCARTHA DATE : 4/20/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/25/16
DESIGN ENGINEER OF RECORD : H.A. LOCKLEAR DATE : 6/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-11
1			3			TOTAL SHEETS
2			4			32

STR. #1

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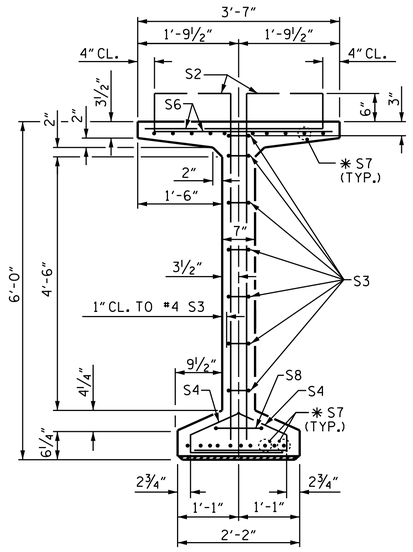
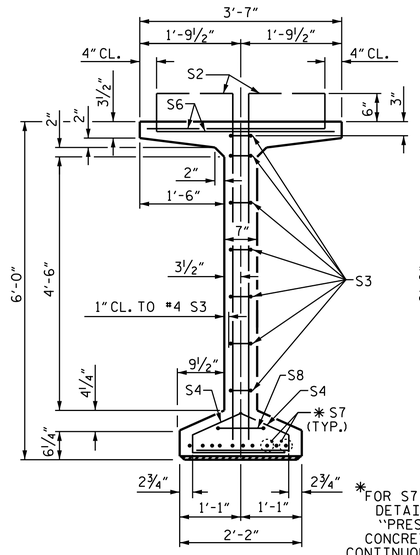
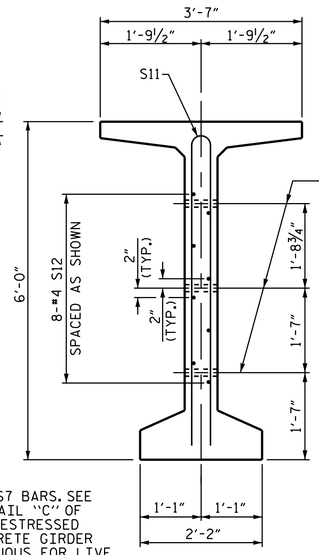


SECTION A-A



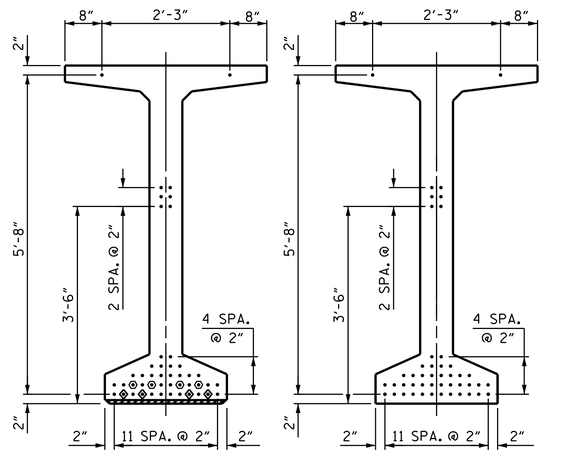
SECTION B-B



SECTION C-C

✱FOR S7 BARS, SEE DETAIL "C" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

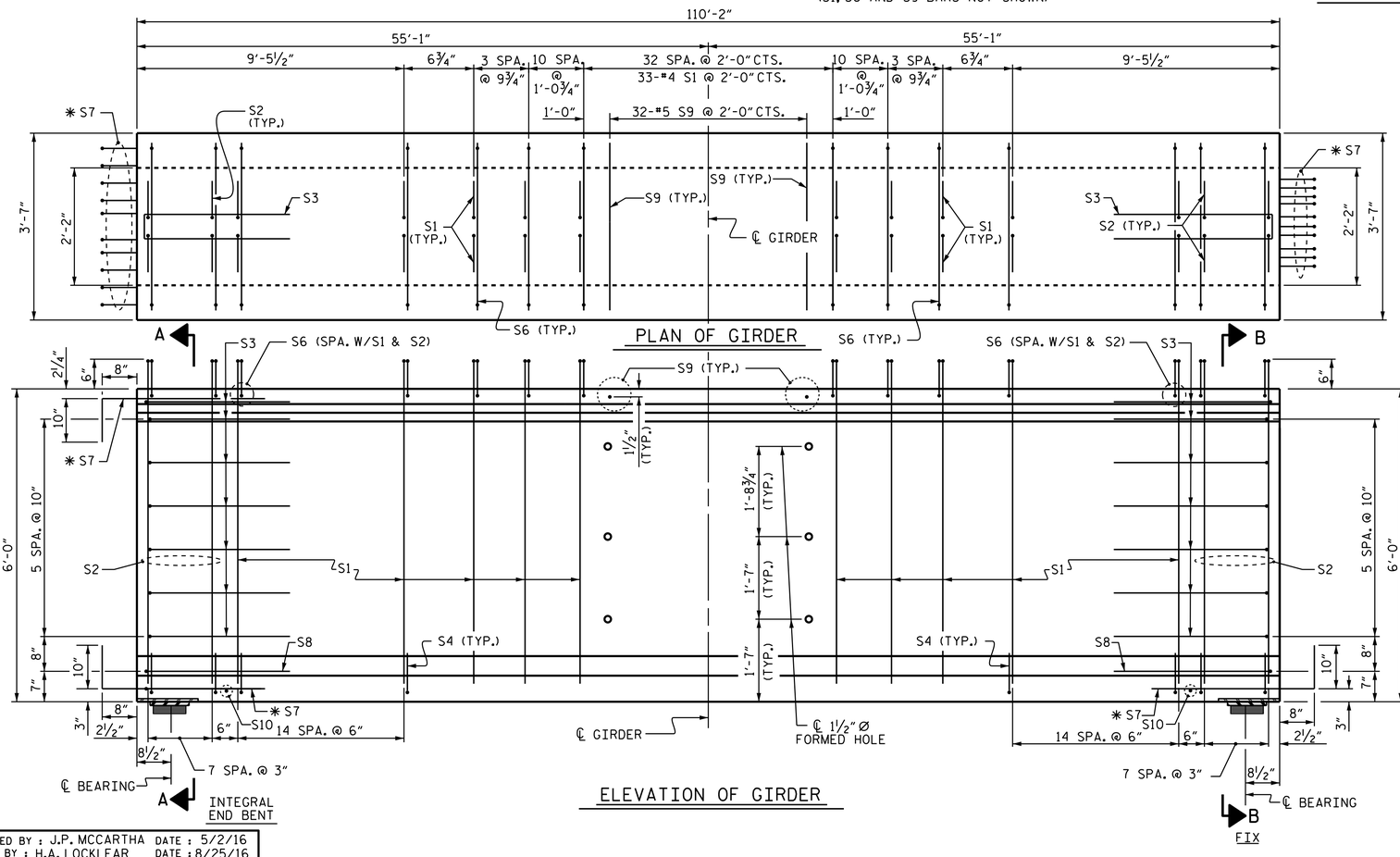
(S1, S6 AND S9 BARS NOT SHOWN)



AT END OF GIRDER

AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT

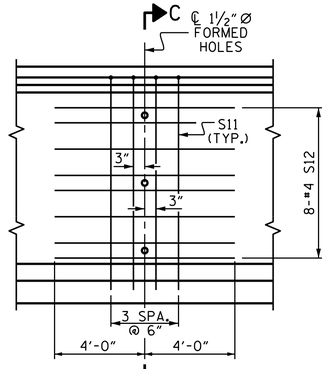


PLAN OF GIRDER

ELEVATION OF GIRDER

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◈ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ⬣ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR SPAN A GIRDERS (2 LOCATIONS PER GIRDER)

0.6"Ø L. R. GRADE 270 STRANDS

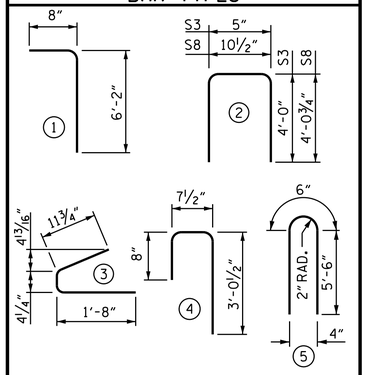
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	178	#4	1	6'-10"	813
S2	32	#5	1	6'-10"	228
S3	14	#4	2	8'-5"	79
S4	92	#4	3	3'-0"	184
S6	210	#5	4	4'-4"	949
✱S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	32	#5	STR	3'-3"	108
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-6"	96
S12	16	#4	STR	8'-0"	86

✱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	9,500 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LBS.	C.Y.	No.
	2678	23.6	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
6	110'-2"	661'-0"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-12
1			3			TOTAL SHEETS
2			4			32

STR. #1

STD. NO. PCG8

ASSEMBLED BY : J.P. MCCARTHA	DATE : 5/2/16		
CHECKED BY : H.A. LOCKLEAR	DATE : 8/25/16		
DRAWN BY : EEM 2/6/97	REV. 10/1/11	MAA/GM	DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017
CHECKED BY : VAP 2/6/97	REV. 6/13	MAA/GM	
	REV. 1/15	MAA/TMG	

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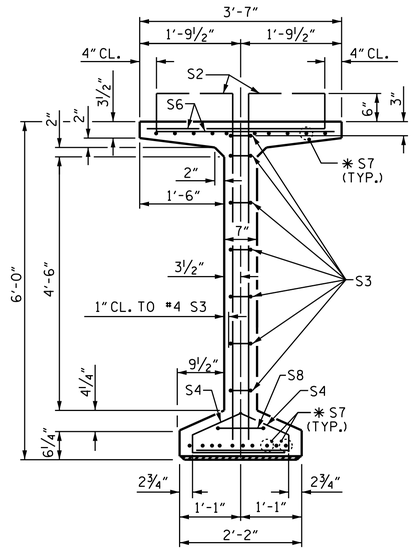
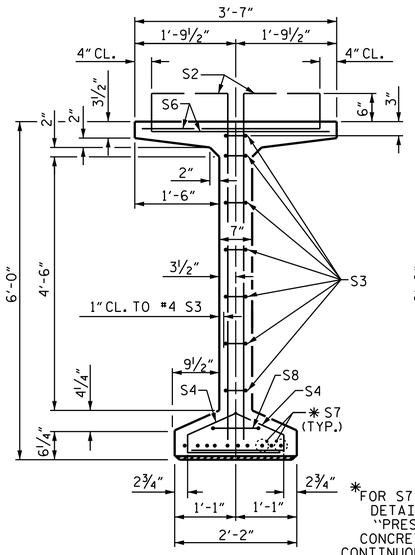
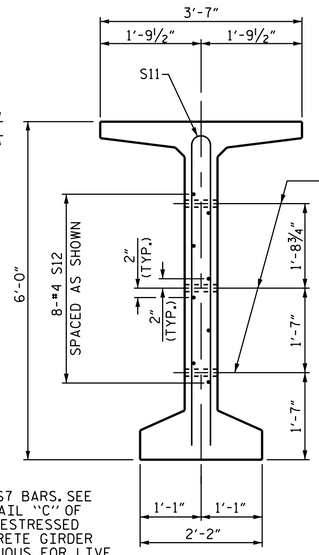


SECTION A-A



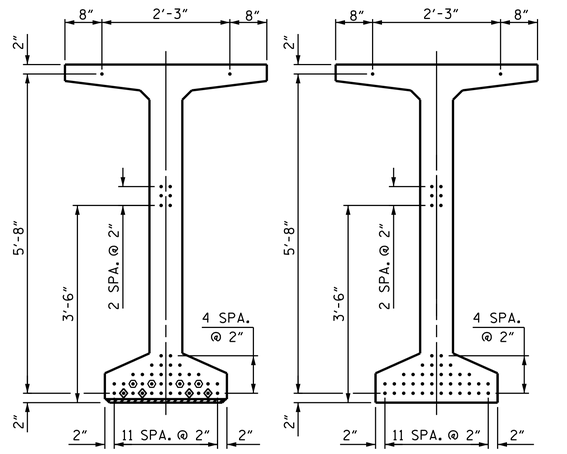
SECTION B-B



SECTION C-C

✱FOR S7 BARS, SEE DETAIL "C" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

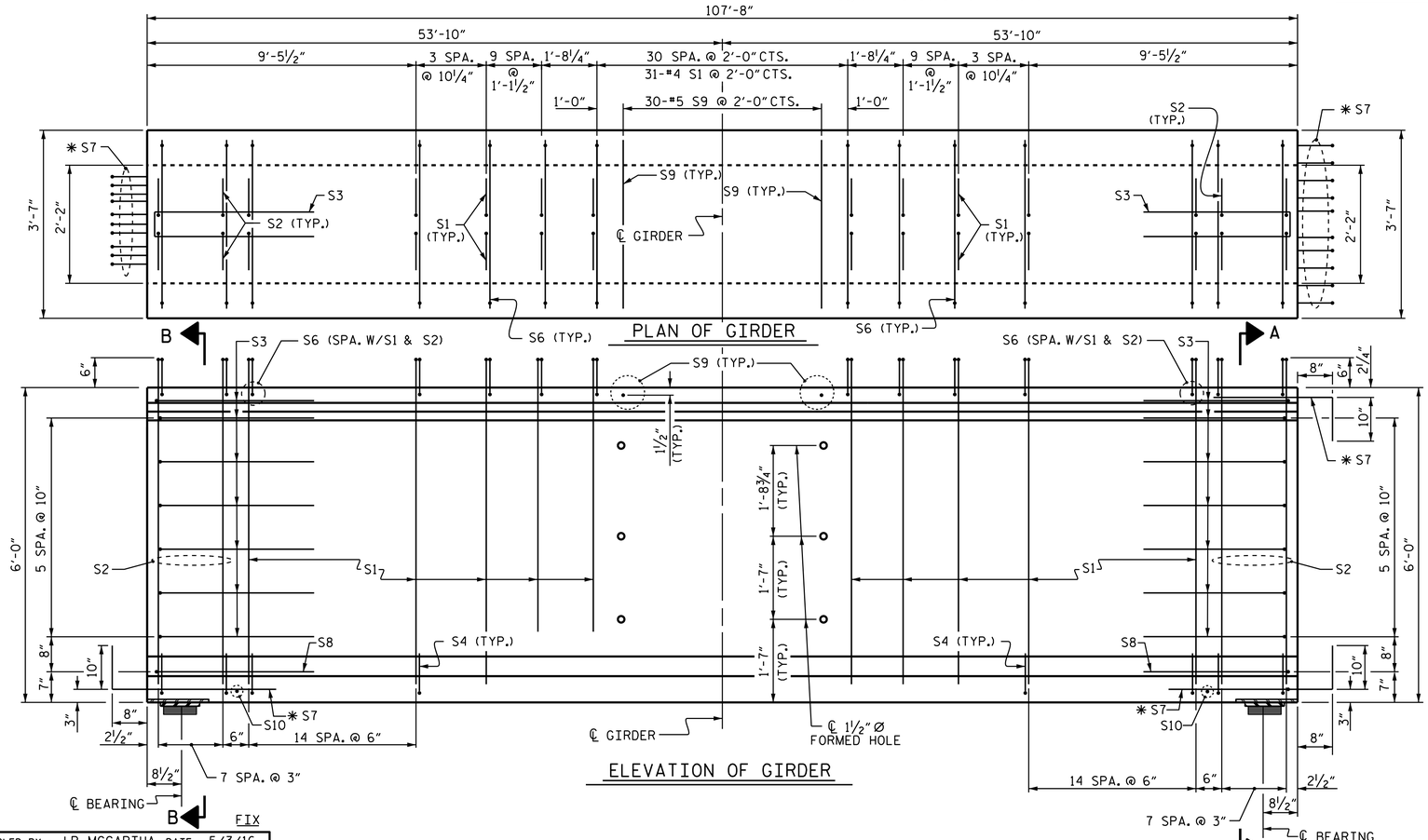
(S1, S6 AND S9 BARS NOT SHOWN)



AT END OF GIRDER

AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT

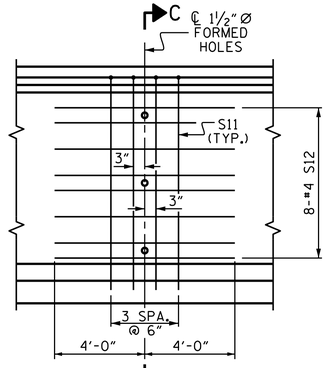


PLAN OF GIRDER

ELEVATION OF GIRDER

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◈ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR SPAN B GIRDERS (2 LOCATIONS PER GIRDER)

0.6"Ø L. R. GRADE 270 STRANDS

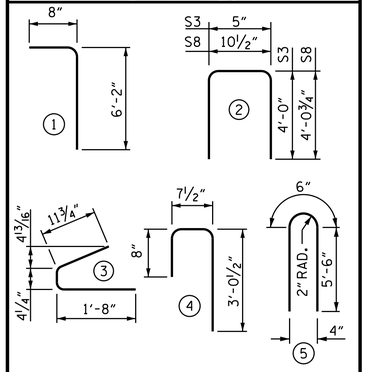
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	170	#4	1	6'-10"	776
S2	32	#5	1	6'-10"	228
S3	14	#4	2	8'-5"	79
S4	92	#4	3	3'-0"	184
S6	202	#5	4	4'-4"	913
✱S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	30	#5	STR	3'-3"	102
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-6"	96
S12	16	#4	STR	8'-0"	86

✱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	9,500 PSI CONCRETE	0.6"Ø L.R. STRANDS
LBS.	C.Y.	No.
2599	23.1	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
6	107'-8"	646'-0"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S1-13

TOTAL SHEETS 32

ASSEMBLED BY : J.P. MCCARTHA DATE : 5/3/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/25/16

DRAWN BY : EEM 2/6/97
CHECKED BY : VAP 2/6/97

REV. 10/1/11 MAA/GM
REV. 6/13 MAA/GM
REV. 1/15 MAA/TMG

DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

26-JUL-2017 15:04
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mcheek

STR. #1

STD. NO. PCG8

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6"Ø LOW RELAXATION	SPAN A GIRDER A1																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.037	0.073	0.107	0.138	0.166	0.189	0.208	0.221	0.229	0.232	0.229	0.221	0.208	0.189	0.166	0.138	0.107	0.073	0.037	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.021	0.041	0.059	0.077	0.092	0.106	0.115	0.124	0.127	0.130	0.127	0.124	0.115	0.106	0.092	0.077	0.059	0.041	0.021	0.000
FINAL CAMBER ↑	0	3/16"	3/8"	9/16"	3/4"	7/8"	1"	1 1/8"	1 3/16"	1 1/4"	1 1/4"	1 1/4"	1 3/16"	1 1/8"	1"	7/8"	3/4"	9/16"	3/8"	3/16"	0

0.6"Ø LOW RELAXATION	SPAN A GIRDER A2 THRU A5																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.037	0.073	0.107	0.138	0.166	0.189	0.208	0.221	0.229	0.232	0.229	0.221	0.208	0.189	0.166	0.138	0.107	0.073	0.037	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.022	0.044	0.064	0.084	0.099	0.115	0.124	0.134	0.138	0.141	0.138	0.134	0.124	0.115	0.099	0.084	0.064	0.044	0.022	0.000
FINAL CAMBER ↑	0	3/16"	3/8"	1/2"	5/8"	13/16"	7/8"	1"	1 1/16"	1 1/8"	1 1/8"	1 1/8"	1 1/16"	1"	7/8"	13/16"	5/8"	1/2"	3/8"	3/16"	0

0.6"Ø LOW RELAXATION	SPAN A GIRDER A6																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.037	0.073	0.107	0.138	0.166	0.189	0.208	0.221	0.229	0.232	0.229	0.221	0.208	0.189	0.166	0.138	0.107	0.073	0.037	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.020	0.040	0.058	0.076	0.090	0.104	0.113	0.122	0.125	0.128	0.125	0.122	0.113	0.104	0.090	0.076	0.058	0.040	0.020	0.000
FINAL CAMBER ↑	0	3/16"	3/8"	9/16"	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"	9/16"	3/8"	3/16"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6"Ø LOW RELAXATION	SPAN B GIRDER B1																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.036	0.071	0.104	0.135	0.162	0.184	0.203	0.216	0.224	0.227	0.224	0.216	0.203	0.184	0.162	0.135	0.104	0.071	0.036	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.019	0.037	0.054	0.071	0.084	0.097	0.105	0.113	0.116	0.119	0.116	0.113	0.105	0.097	0.084	0.071	0.054	0.037	0.019	0.000
FINAL CAMBER ↑	0	3/16"	7/16"	5/8"	3/4"	15/16"	1 1/16"	1 3/16"	1 1/4"	1 5/16"	1 5/16"	1 5/16"	1 1/4"	1 3/16"	1 1/16"	15/16"	3/4"	5/8"	7/16"	3/16"	0

0.6"Ø LOW RELAXATION	SPAN B GIRDER B2 THRU B5																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.036	0.071	0.104	0.135	0.162	0.184	0.203	0.216	0.224	0.227	0.224	0.216	0.203	0.184	0.162	0.135	0.104	0.071	0.036	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.020	0.040	0.058	0.076	0.090	0.104	0.113	0.122	0.125	0.128	0.125	0.122	0.113	0.104	0.090	0.076	0.058	0.040	0.020	0.000
FINAL CAMBER ↑	0	3/16"	3/8"	9/16"	11/16"	7/8"	15/16"	1 1/16"	1 1/8"	1 3/16"	1 3/16"	1 3/16"	1 1/8"	1 1/16"	15/16"	7/8"	11/16"	9/16"	3/8"	3/16"	0

0.6"Ø LOW RELAXATION	SPAN B GIRDER B6																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.036	0.071	0.104	0.135	0.162	0.184	0.203	0.216	0.224	0.227	0.224	0.216	0.203	0.184	0.162	0.135	0.104	0.071	0.036	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.018	0.037	0.053	0.069	0.082	0.095	0.103	0.111	0.114	0.117	0.114	0.111	0.103	0.095	0.082	0.069	0.053	0.036	0.018	0.000
FINAL CAMBER ↑	0	3/16"	7/16"	5/8"	13/16"	15/16"	1 1/16"	1 3/16"	1 1/4"	1 5/16"	1 5/16"	1 5/16"	1 1/4"	1 3/16"	1 1/16"	15/16"	13/16"	5/8"	7/16"	3/16"	0

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

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.

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

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

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

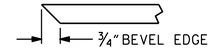
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7,600 PSI.

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

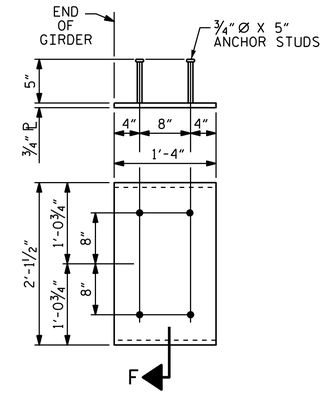
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

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

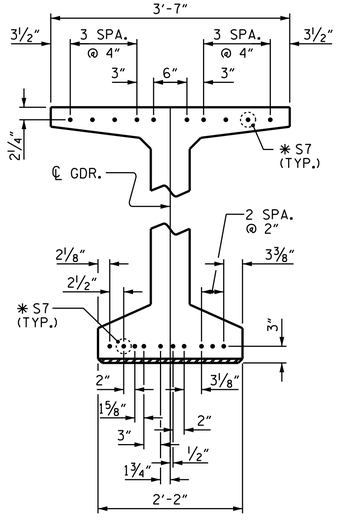
FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.



SECTION "F"
(SEE NOTES)



EMBEDDED PLATE "B-1" DETAILS FOR 72" MODIFIED BULB TEES
(2 REQ'D PER GIRDER)



DETAIL "C"

✱ FOR S7 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Docusigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...
7/27/2017

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 29+24.97 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-14
1			3			TOTAL SHEETS
2			4			32

STR. #1

STD. NO. PCG9

ASSEMBLED BY : J. P. MCCARTHA DATE : 3/8/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/26/16

DRAWN BY : ELR 11/91
CHECKED BY : GRP 11/91

REV. 10/1/11 MAA/GM
REV. 1/15 MAA/TMG
REV. 2/15 MAA/TMG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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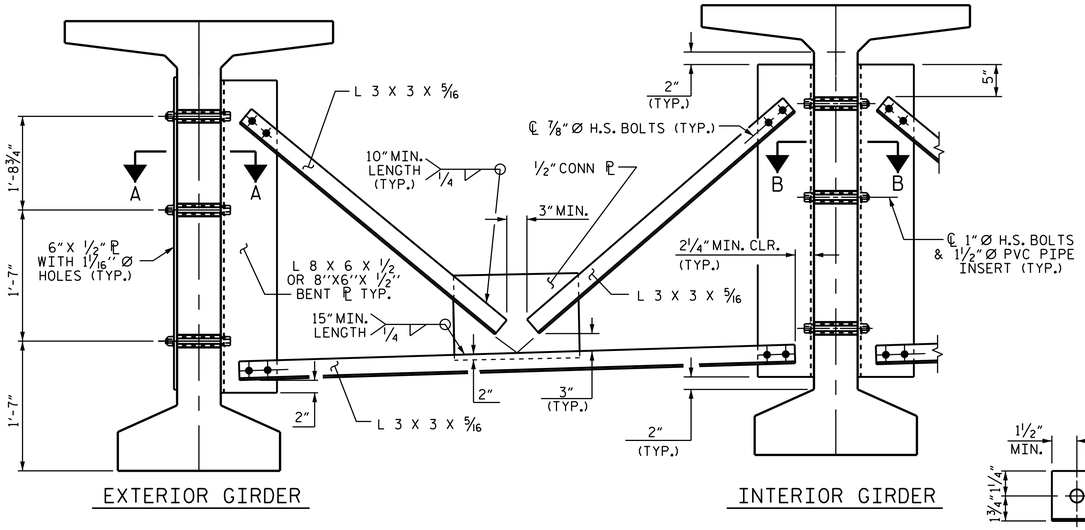
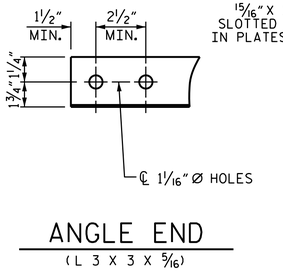
mcheek



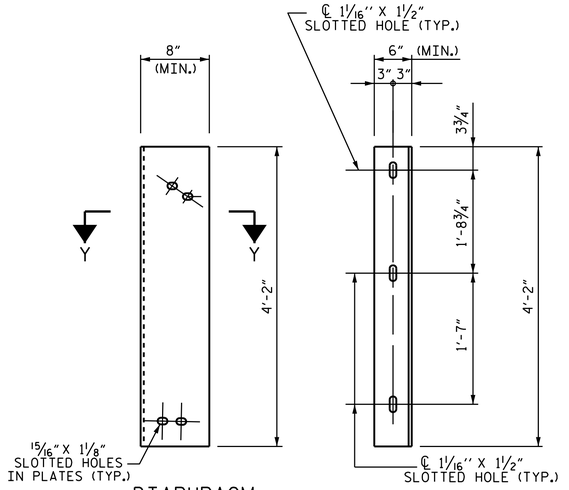
EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

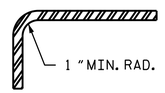


ANGLE END
(L 3 X 3 X 5/16)



DIAPHRAGM FACE

WEB FACE



SECTION Y-Y

CONNECTION 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 (DTI) 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 AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE 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.

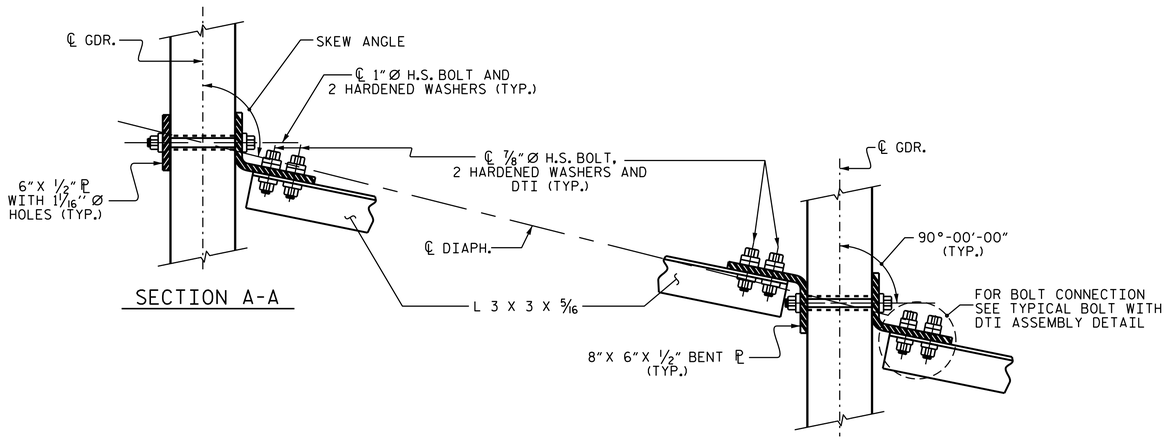
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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.

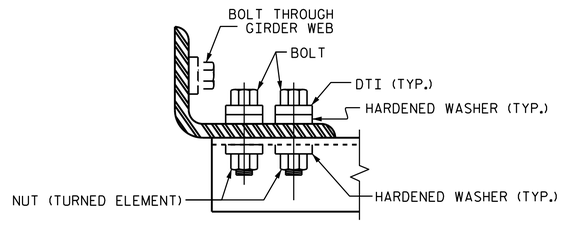
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR MODIFIED 72" PRESTRESSED CONCRETE GIRDERS.



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-15
1			3			TOTAL SHEETS
2			4			32

STR. #1

STD. NO. PCG11

ASSEMBLED BY : J.P. MCCARTHA	DATE : 1/14/16
CHECKED BY : H.A. LOCKLEAR	DATE : 8/26/16
DRAWN BY : RWW 11/09	ADDED 11/23/09R
CHECKED BY : GM 11/09	REV. 10/1/11 MAA/GM

26-JUL-2017 15:04
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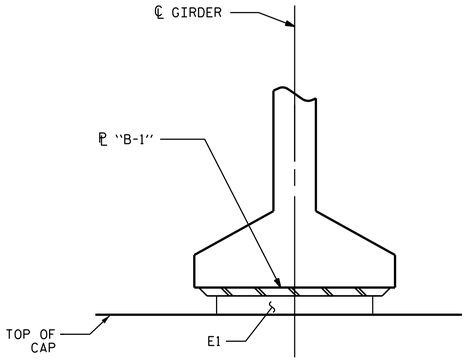
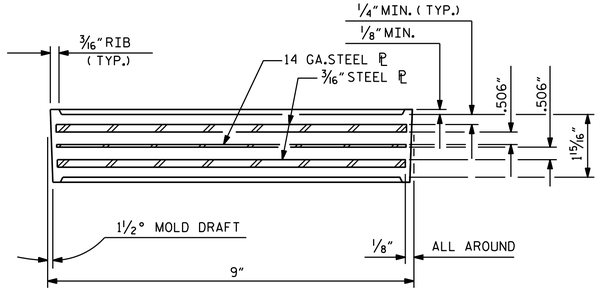
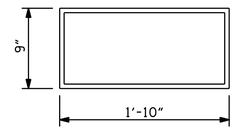
mcheek



SECTION D-D



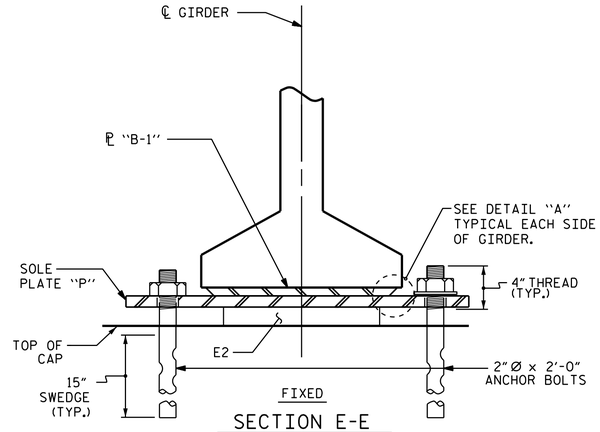
TYPICAL SECTION OF ELASTOMERIC BEARINGS



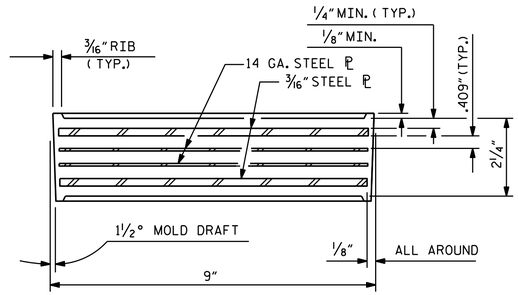
E1 (12 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

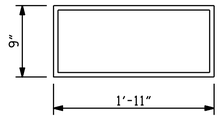
TYPE IV



SECTION E-E



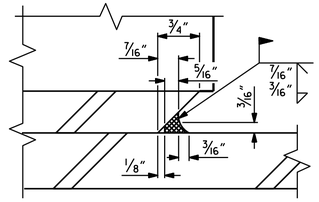
TYPICAL SECTION OF ELASTOMERIC BEARINGS



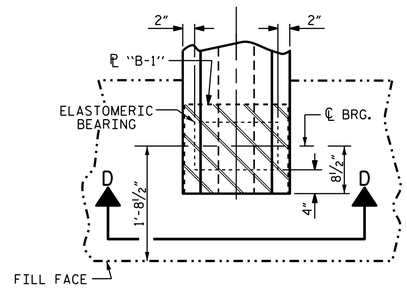
E2 (12 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

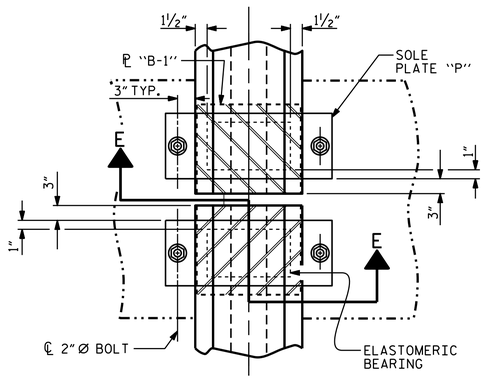
TYPE V



DETAIL "A"



TYPICAL PLAN @ INTEGRAL END BENT



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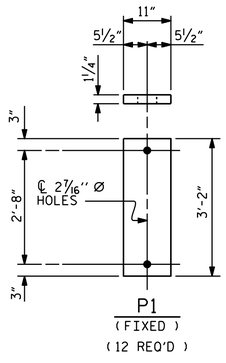

SOLE PLATE DETAILS

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE V	365 k

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 AND WASHERS 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.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

ASSEMBLED BY : J. P. MCCARTHA DATE : 3/8/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/26/16

DRAWN BY : EEM 2/97
CHECKED BY : VAP 2/97

REV. 10/1/11 MAA/GM
REV. 6/13 AAC/MAA
REV. 1/15 MAA/TMG

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NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.
6549DE6BAA3B405...
7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

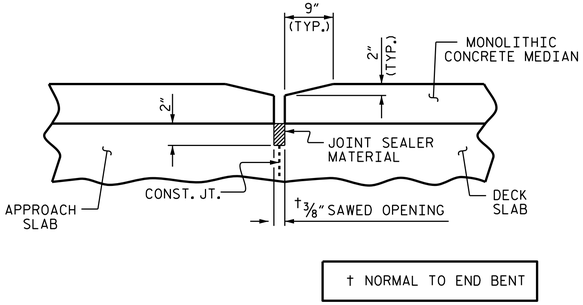
ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-16
1			3			TOTAL SHEETS
2			4			32

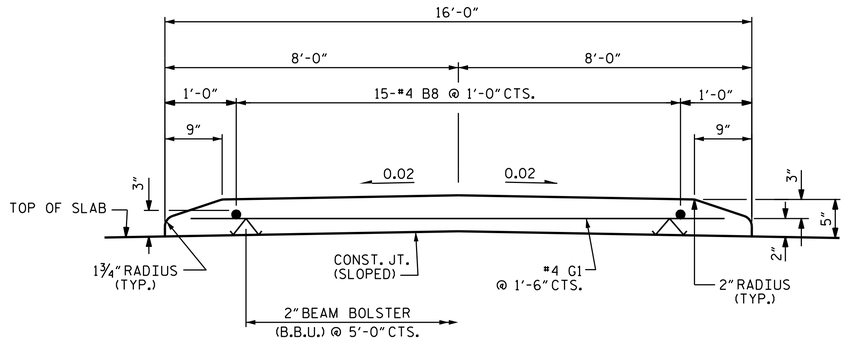
STR. #1

STD. NO. EB4

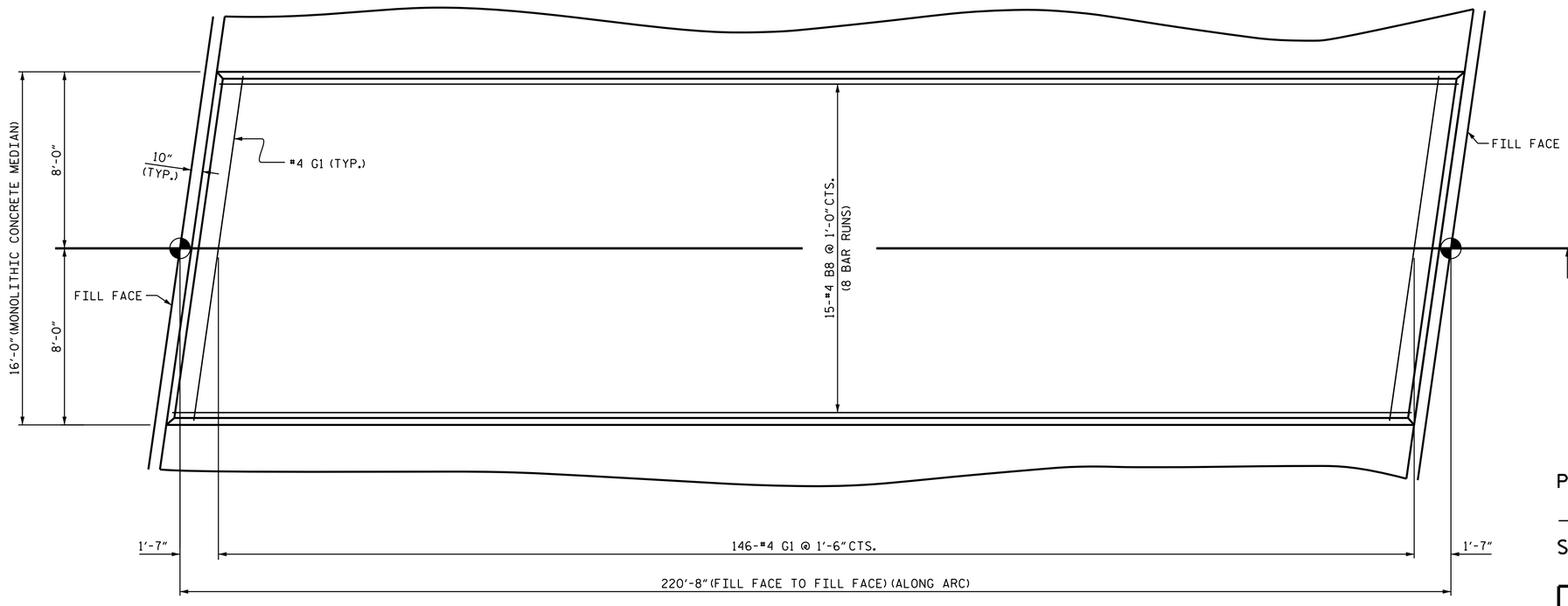


SECTION THROUGH MONOLITHIC CONCRETE MEDIAN AT INTEGRAL END BENT

END BENT 1 SHOWN, END BENT 2 SIMILAR



SECTION THROUGH MONOLITHIC CONCRETE MEDIAN



PLAN OF MONOLITHIC CONCRETE MEDIAN

NOTES

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE MONOLITHIC CONCRETE MEDIAN 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 JOINT WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FT. IN LENGTH.

ALL REINFORCING STEEL IN MONOLITHIC CONCRETE MEDIAN SHALL BE EPOXY COATED.

FOR MONOLITHIC CONCRETE MEDIAN ON APPROACH SLAB, SEE "BRIDGE APPROACH SLAB" SHEETS.

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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

MONOLITHIC CONCRETE MEDIAN DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

7/27/2017

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1			3			TOTAL SHEETS
2			4			32

DRAWN BY : J.P. MCCARTHA DATE : 5/4/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/25/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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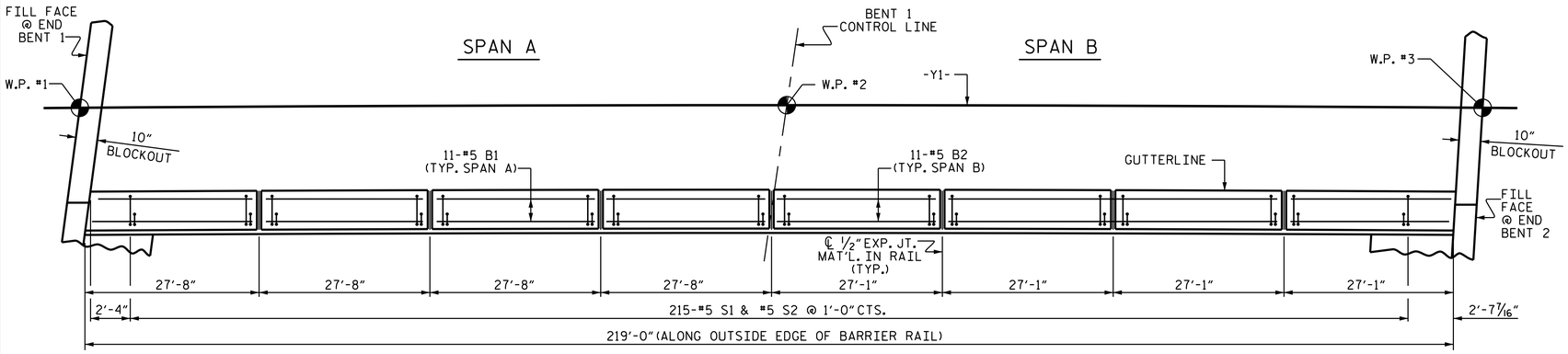
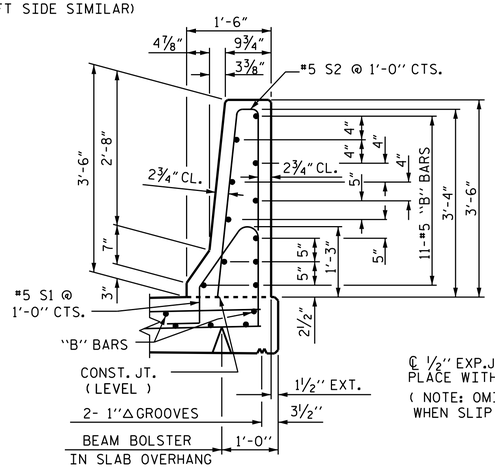
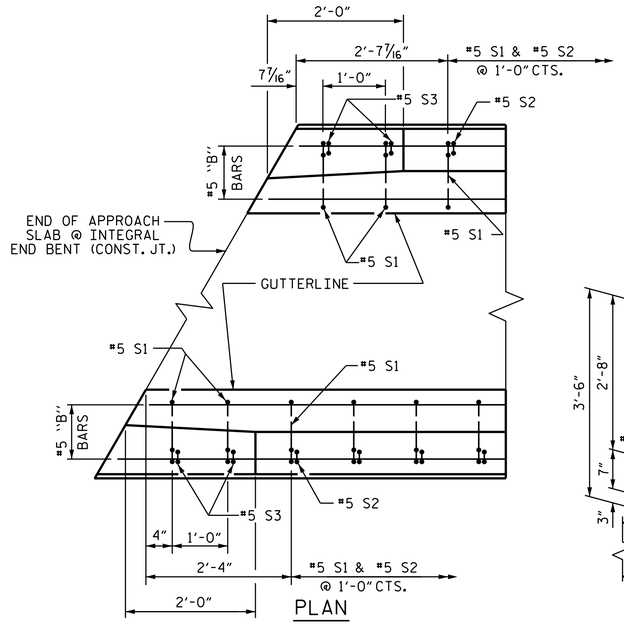


PLAN OF CONCRETE BARRIER RAIL

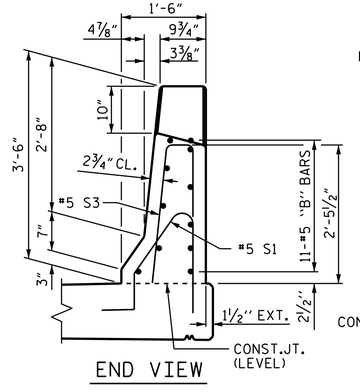
(RIGHT SIDE BARRIER RAIL SHOWN, LEFT SIDE SIMILAR)



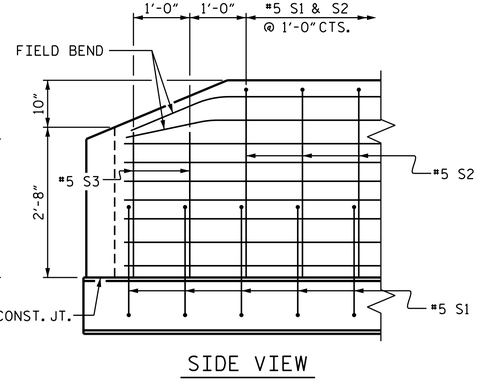
SECTION THRU RAIL



PLAN



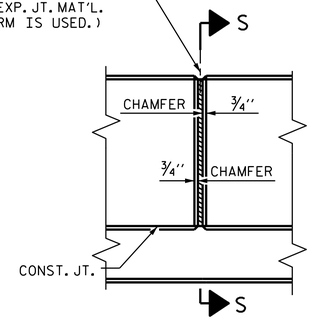
END VIEW



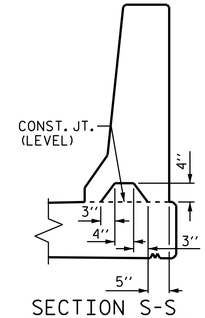
SIDE VIEW

END OF RAIL DETAILS

℄ 1/2" 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



SECTION S-S

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

BARRIER RAIL DETAILS

NOTES

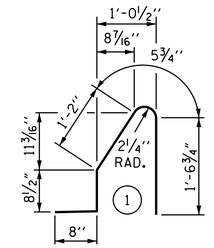
THE BARRIER RAIL IN THE CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

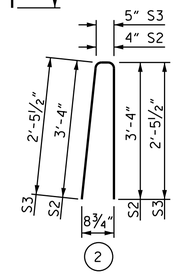
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

THE #5 S1 AND #5 S2 BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN 2" MINIMUM CLEARANCE TO THE 1/2" EXPANSION JOINT MATERIAL IN THE BARRIER RAIL.

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	88	#5	STR	27'-3"	2501
* B2	88	#5	STR	26'-8"	2448
* S1	438	#5	1	4'-7"	2094
* S2	430	#5	2	7'-0"	3139
* S3	8	#5	2	5'-4"	45

* EPOXY COATED REINFORCING STEEL	LBS.	10,227
CLASS AA CONCRETE	C.Y.	59.6
CONCRETE BARRIER RAIL	LIN. FT.	438.00

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-6" CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

DRAWN BY : J.P. MCCARTHA DATE : 4/26/16
CHECKED BY : H.A. LOCKLEAR DATE : 8/26/16

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SHEET NO. S1-18

TOTAL SHEETS 32

STR. #1

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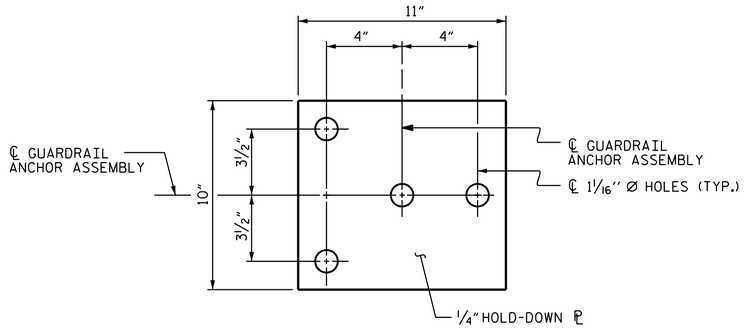
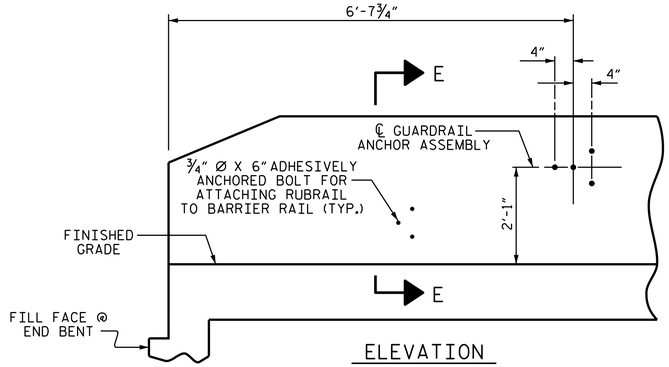


PLAN



ELEVATION

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.)

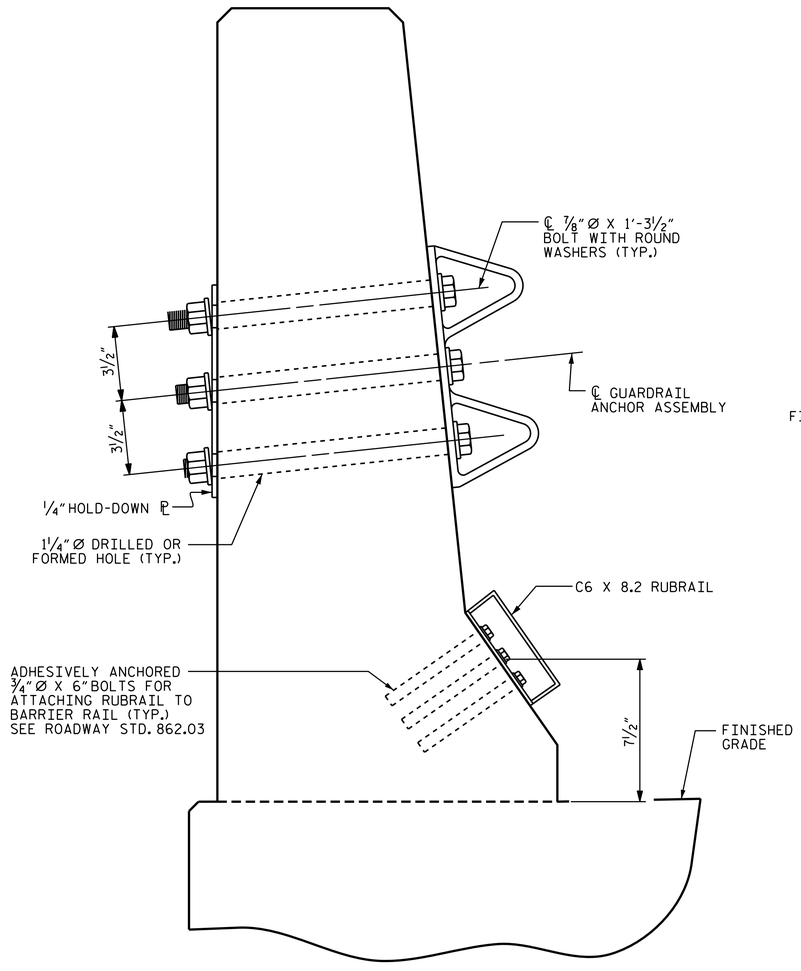
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.

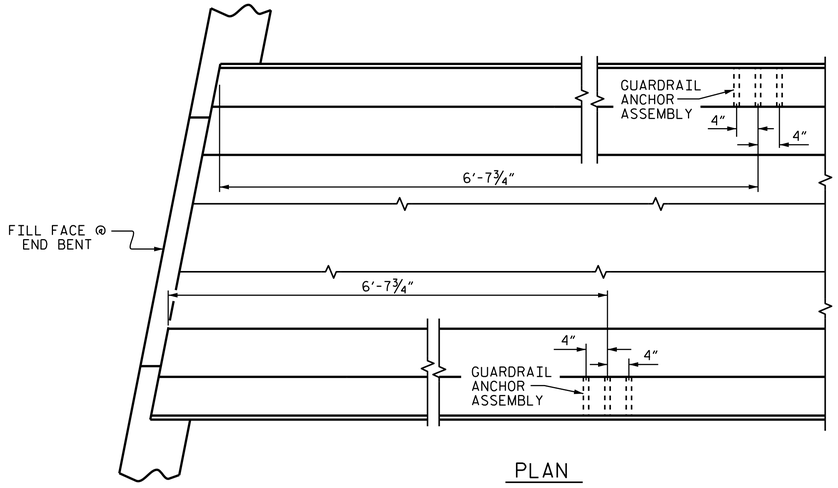
THE 1 1/4'' Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 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.



SECTION E-E

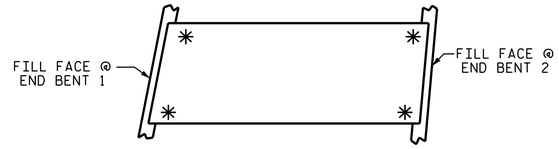
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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1			3			TOTAL SHEETS
2			4			32

STR. #1

STD. NO. GRA2

ASSEMBLED BY : J. P. MCCARTHA		DATE : 3/8/16	
CHECKED BY : H.A. LOCKLEAR		DATE : 8/25/16	
DRAWN BY : TLA 5/06	REV. 10/1/11		MAA/GM
CHECKED BY : GM 5/06	REV. 7/12		MAA/GM
	REV. 6/13		MAA/GM

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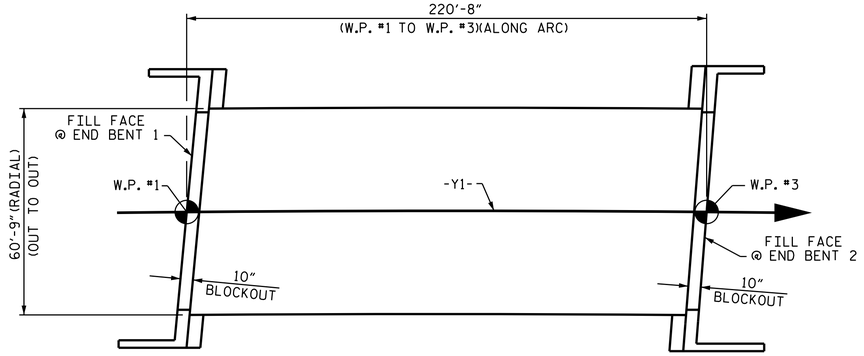
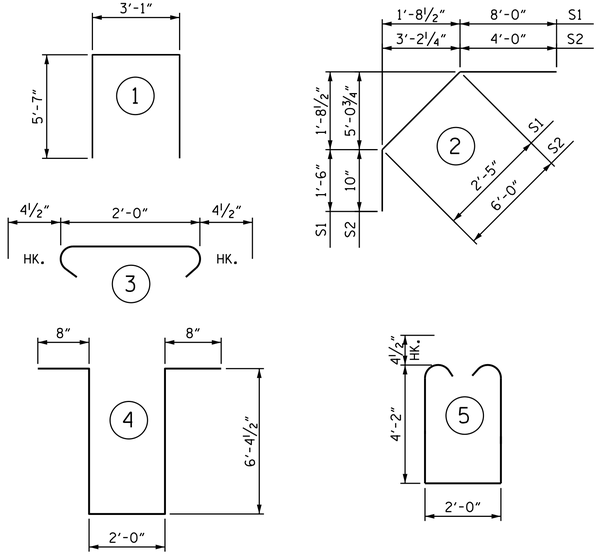


LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 13,406)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

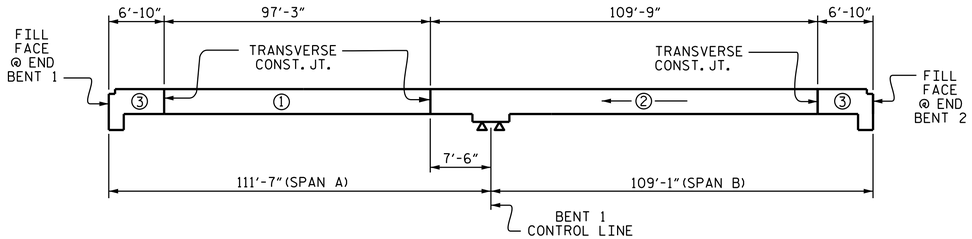
REINFORCING BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	744	#5	STR	31'-6"	24444
A2	744	#5	STR	31'-4"	24314
✱ A101	1	#5	STR	49'-0"	51
✱ A102	1	#5	STR	28'-6"	30
✱ A103	1	#5	STR	8'-1"	8
✱ A104	1	#5	STR	49'-2"	51
✱ A105	1	#5	STR	28'-9"	30
✱ A106	1	#5	STR	8'-3"	9
A201	1	#5	STR	49'-0"	51
A202	1	#5	STR	28'-6"	30
A203	1	#5	STR	8'-1"	8
A204	1	#5	STR	49'-2"	51
A205	1	#5	STR	28'-9"	30
A206	1	#5	STR	8'-3"	9
✱ B1	8	#5	STR	56'-7"	472
✱ B2	322	#5	STR	22'-4"	7501
✱ B3	82	#4	STR	27'-11"	1529
✱ B4	162	#5	STR	39'-5"	6660
✱ B5	80	#5	STR	33'-2"	2767
B6	204	#5	STR	56'-4"	11986
✱ B7	82	#4	STR	27'-0"	1479
✱ B8	120	#4	STR	29'-1"	2331
✱ G1	146	#4	STR	15'-6"	1512
K1	42	#4	STR	21'-4"	599
K2	20	#4	STR	6'-5"	86
K3	10	#4	STR	7'-10"	52

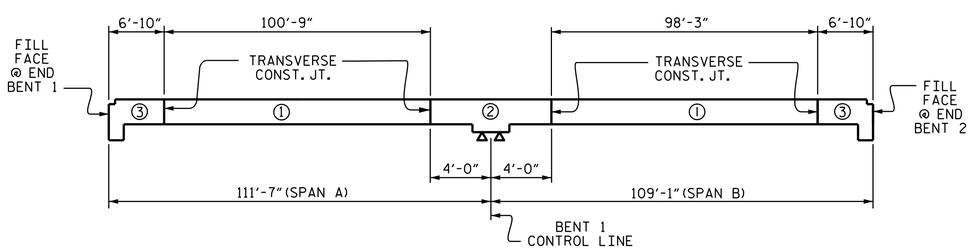
REINFORCING BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
K4	100	#4	STR	9'-5"	629
K5	4	#4	STR	2'-5"	6
K6	4	#4	STR	3'-1"	8
K7	20	#4	STR	3'-11"	52
K8	10	#4	STR	6'-8"	45
K9	14	#4	STR	26'-9"	250
✱ S1	88	#4	2	11'-11"	701
✱ S2	88	#4	2	10'-10"	637
S3	88	#4	1	14'-3"	838
S4	280	#4	3	2'-9"	514
U1	30	#4	4	16'-1"	322
U2	20	#4	5	11'-1"	148

REINFORCING STEEL	LBS.	40,028
✱EPOXY COATED REINFORCING STEEL	LBS.	50,212



POUR SEQUENCE



OPTIONAL POUR SEQUENCE

—SUPERSTRUCTURE BILL OF MATERIAL—

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR #1	194.6	40,028	46,369
POUR #2	245.3		
POUR #3	113.0		
CONCRETE MEDIAN	52.5		3,843
TOTALS✱✱	605.4	40,028	50,212

✱✱QUANTITIES FOR CONCRETE BARRIER RAILS ARE NOT INCLUDED.

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,861	SQ. FT.
BRIDGE DECK	8,419	SQ. FT.
TOTAL	10,280	SQ. FT.

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

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

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 29+24.97 -Y1-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
BILL OF MATERIAL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...
7/27/2017

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STR. #1

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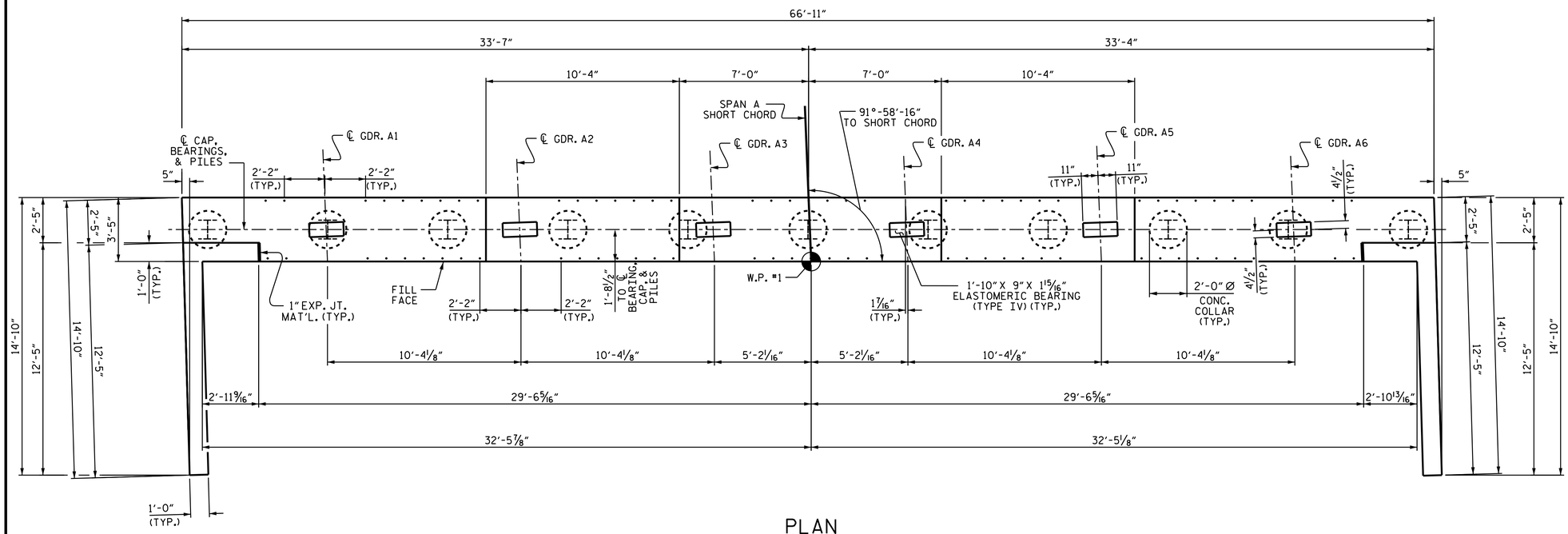
NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".



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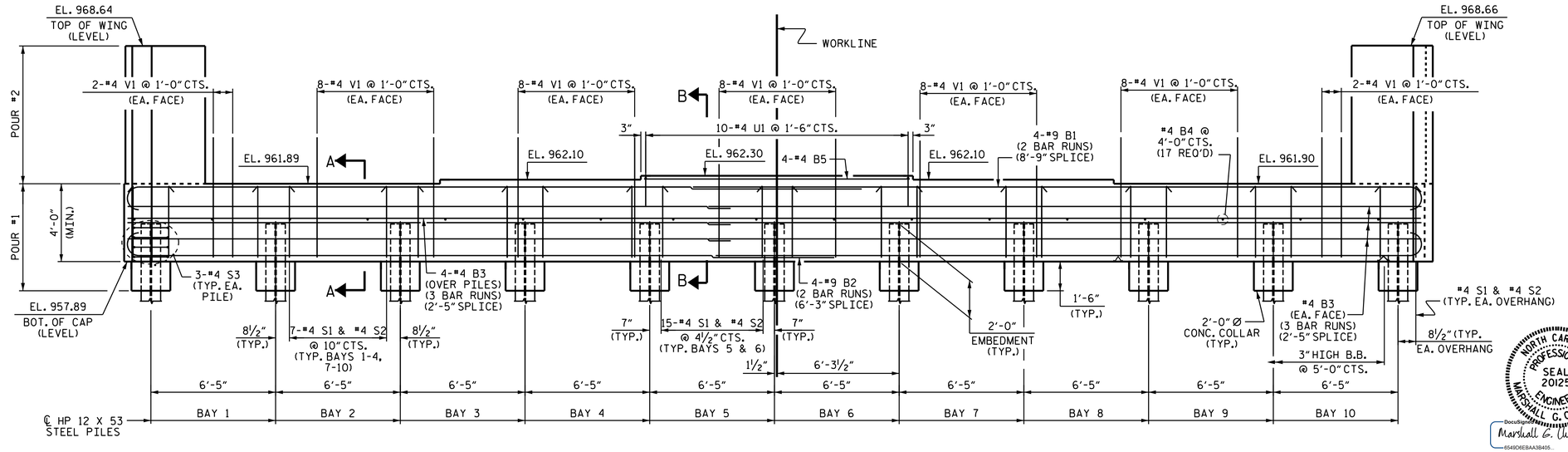

ELEVATION

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL
END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.
6549D8EBAA3B405...

7/27/2017

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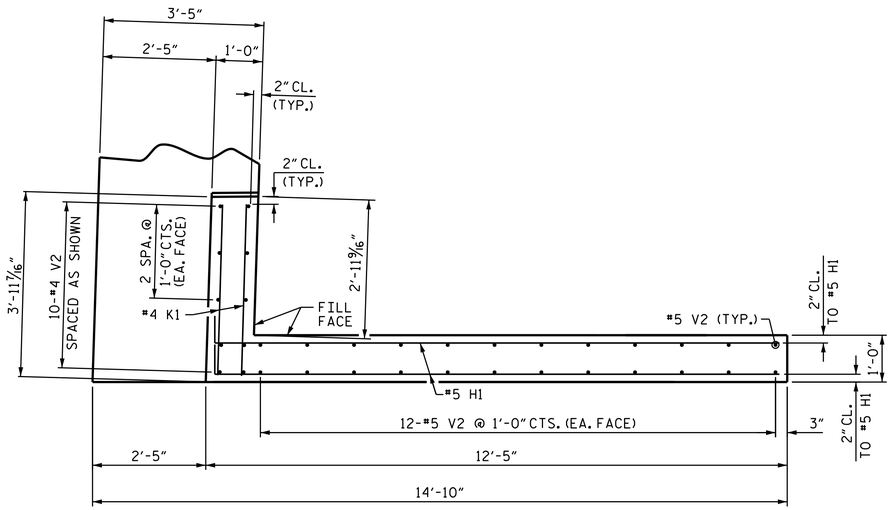
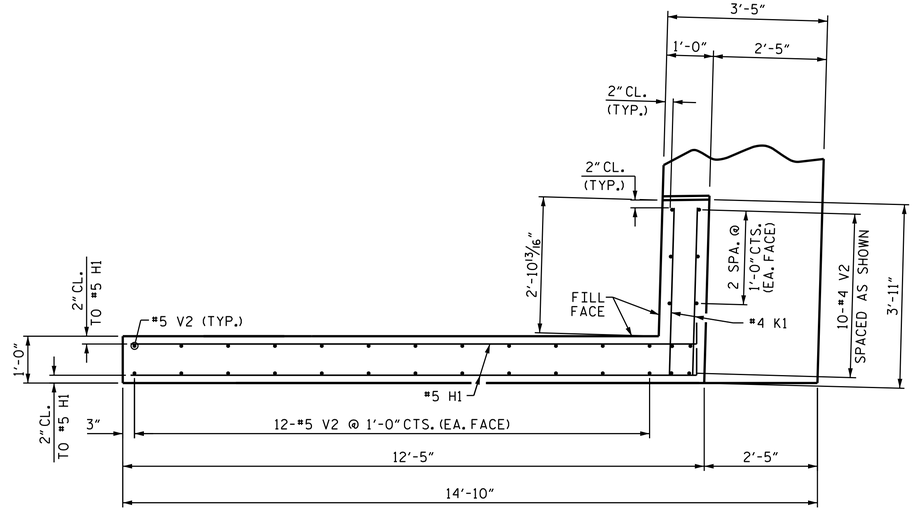


PLAN OF LEFT WING



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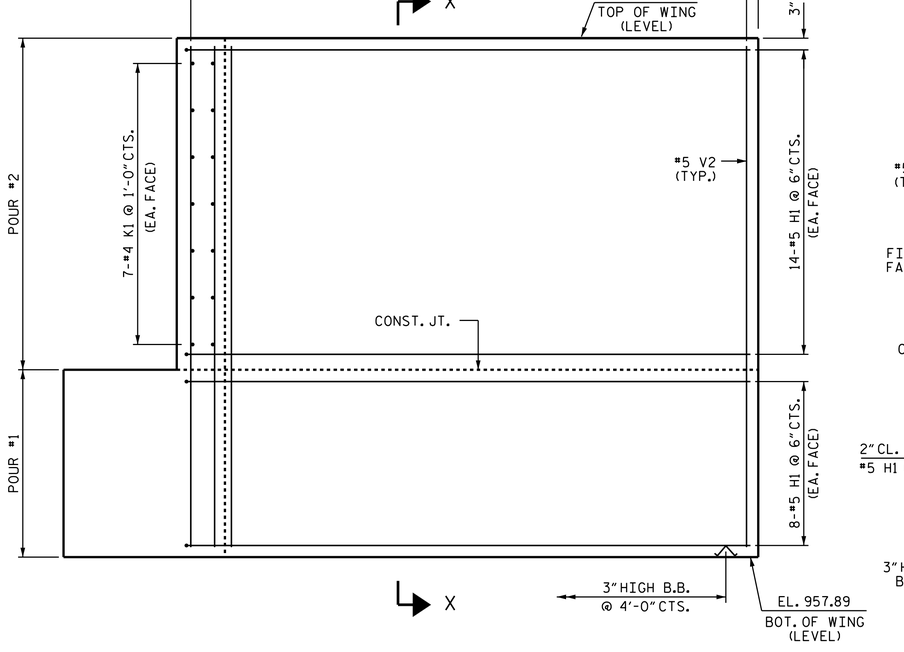
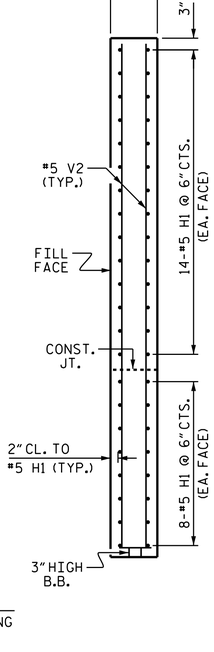
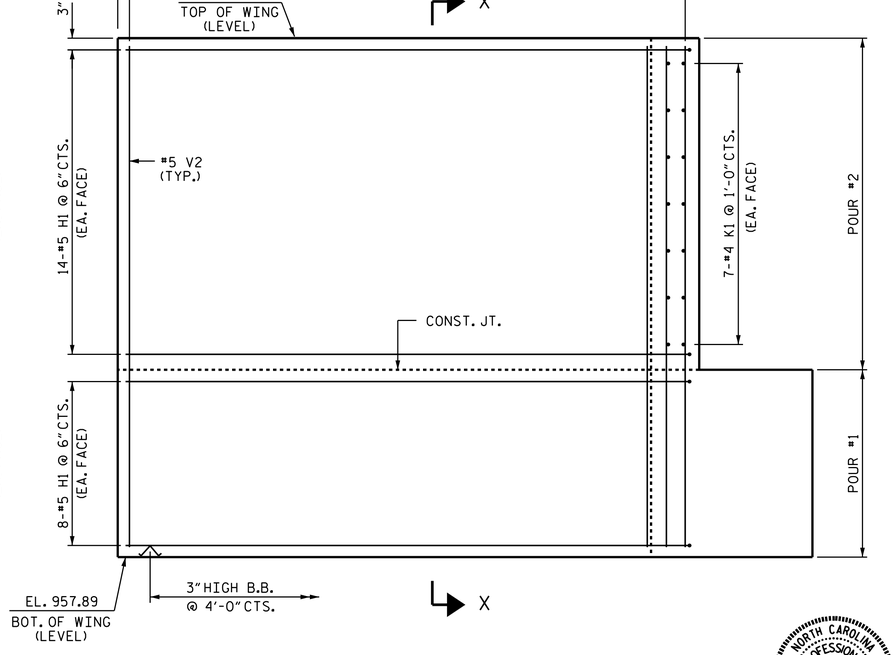


ELEVATION OF LEFT WING



SECTION X-X



ELEVATION OF RIGHT WING

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 29+24.97 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Marshall G. Cheek, Jr.
7/27/2017

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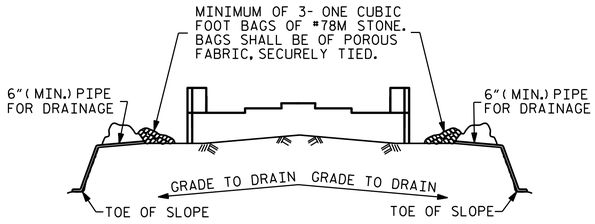
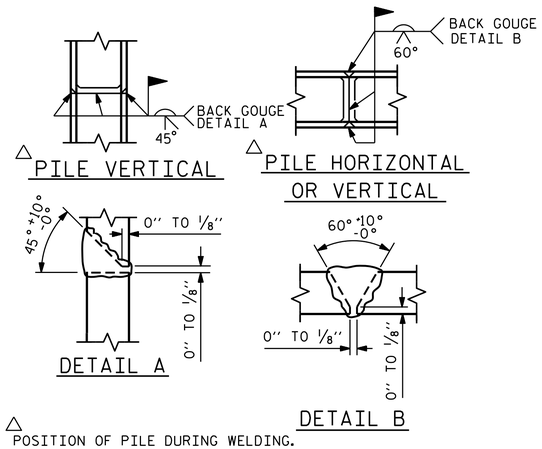


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

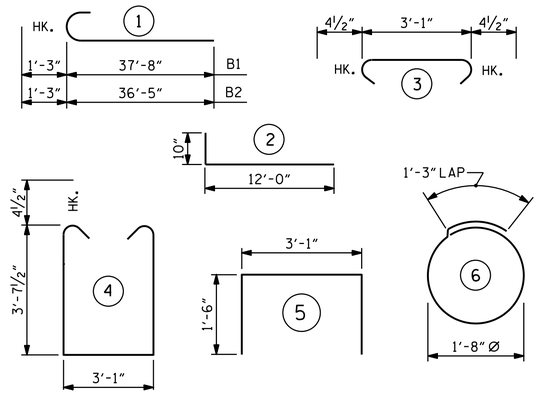
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



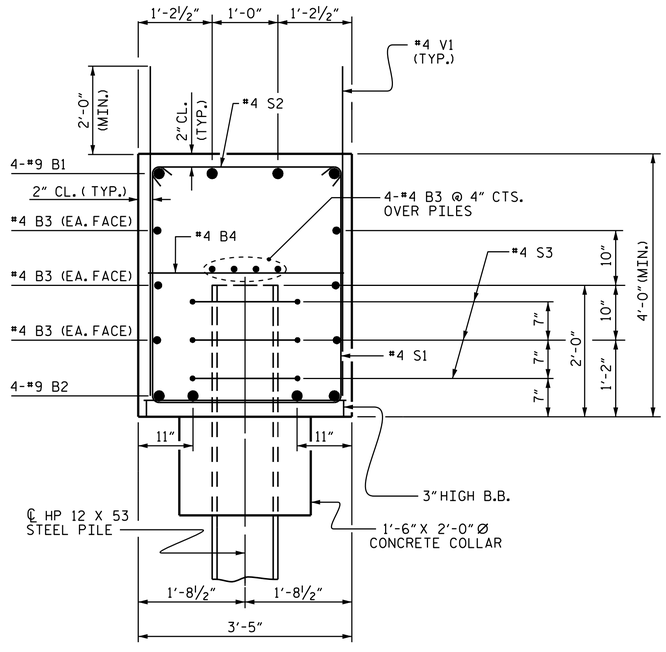
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

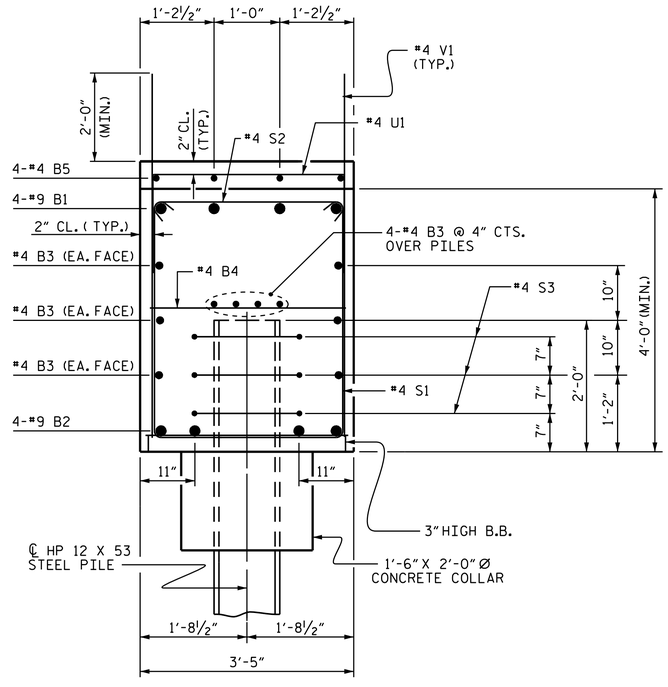
END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	38'-11"	1059
B2	8	#9	1	37'-8"	1025
B3	30	#4	STR	23'-10"	478
B4	17	#4	STR	3'-1"	35
B5	4	#4	STR	13'-8"	37
H1	88	#5	2	12'-10"	1178
K1	28	#4	STR	3'-6"	65
S1	88	#4	4	11'-1"	652
S2	88	#4	3	3'-10"	225
S3	33	#4	6	6'-6"	143
U1	10	#4	5	6'-1"	41
V1	88	#4	STR	6'-0"	353
V2	68	#5	STR	10'-9"	762

REINFORCING STEEL	LBS.	6,053
CLASS A CONCRETE		
POUR #1 CAP, LOWER PART OF WINGS, & COLLARS	C.Y.	45.0
POUR #2 UPPER PART OF WINGS	C.Y.	7.7
TOTAL	C.Y.	52.7
HP 12 X 53 STEEL PILES NO.: 11	LIN. FT.	470
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	EACH	11



SECTION A-A



SECTION B-B

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek Jr.

7/27/2017

REVISIONS						SHEET NO.
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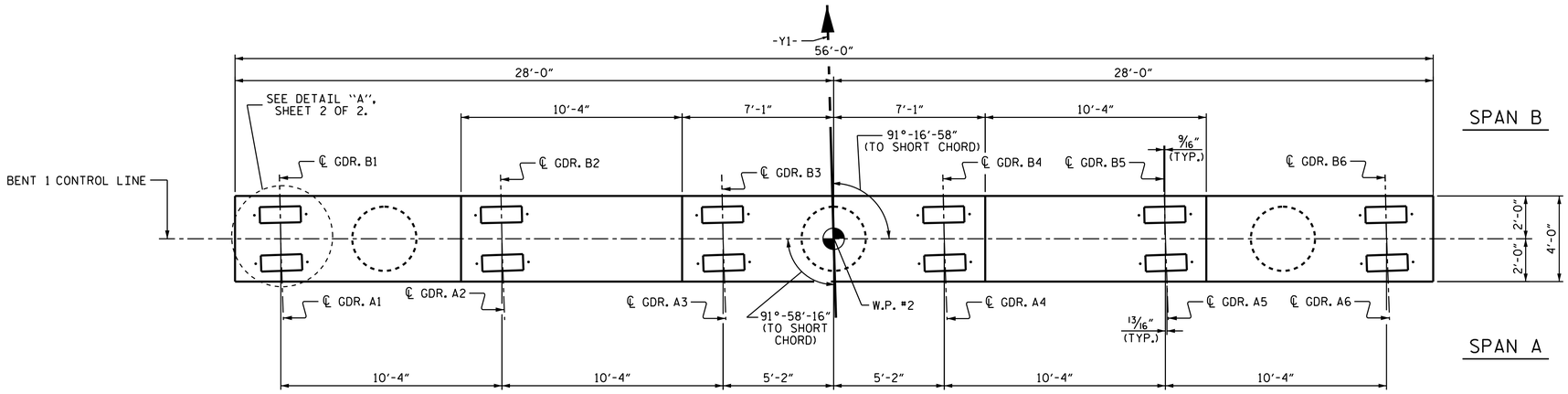
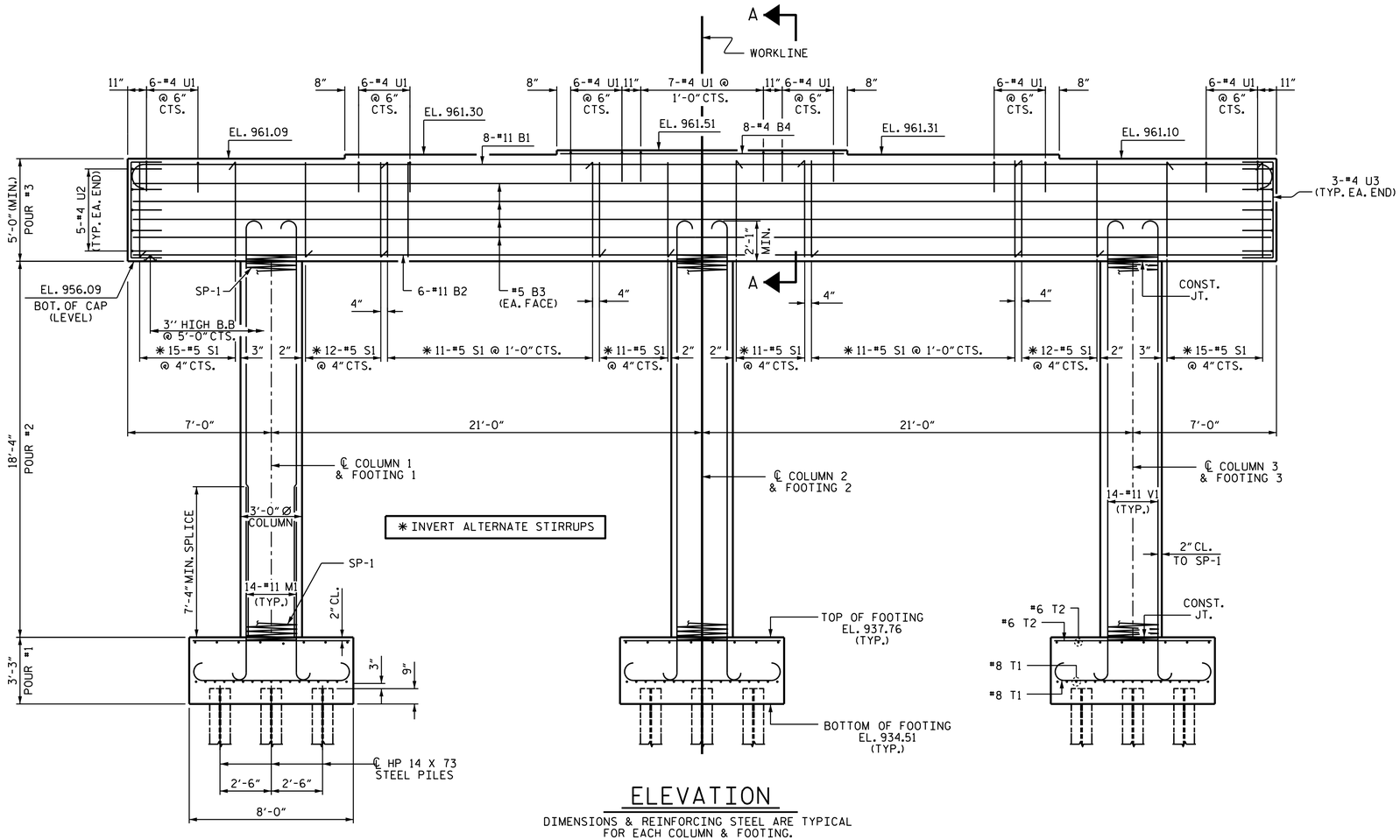


PLAN



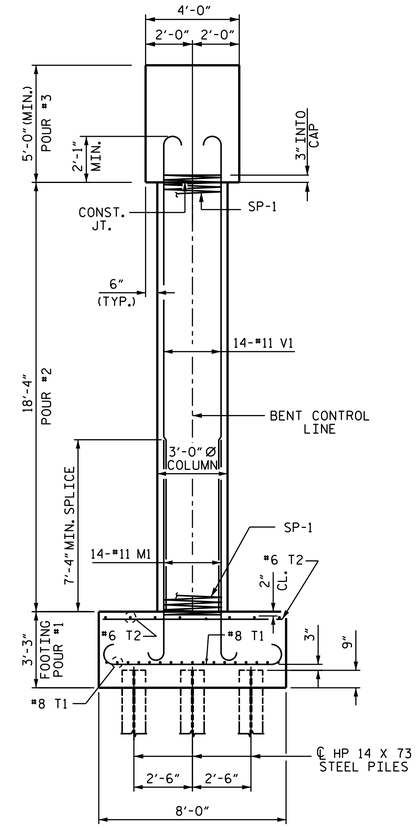
DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & FOOTING.

ELEVATION

NOTES

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

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



END ELEVATION

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek, Jr. 6549D6EBAA3B405...

7/27/2017

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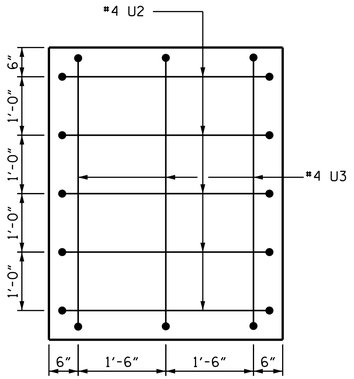
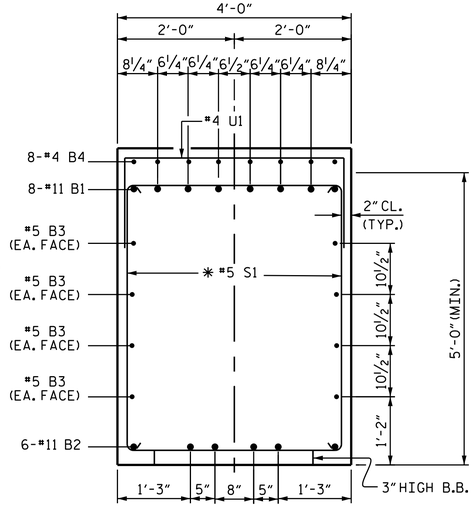
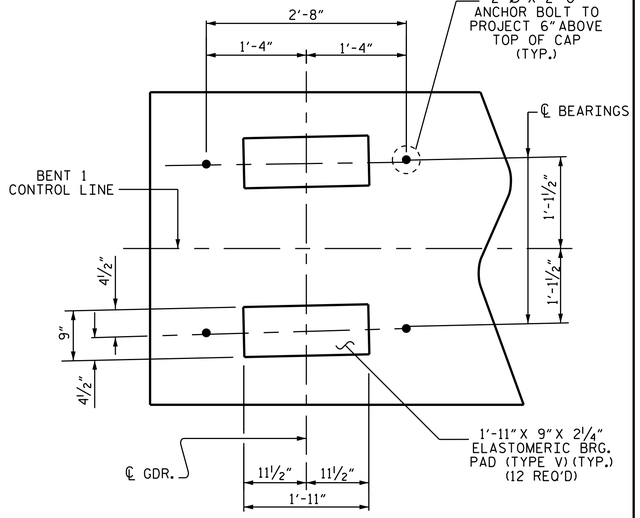


END VIEW



SECTION A-A

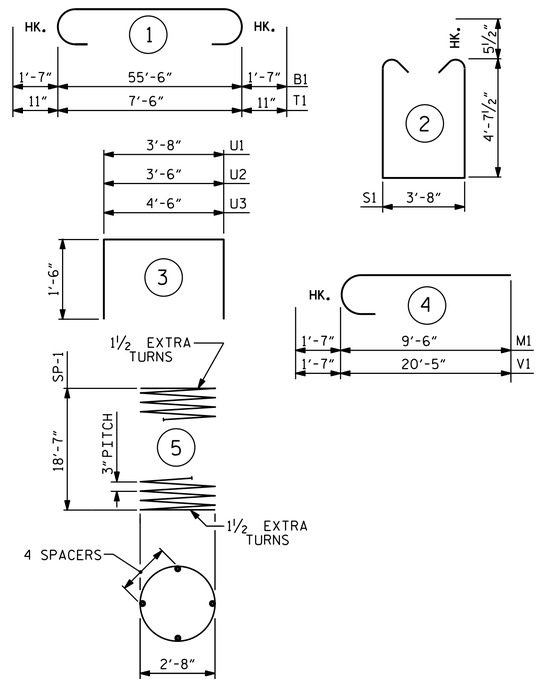
✱ INVERT ALTERNATE STIRRUPS



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH BEARING.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

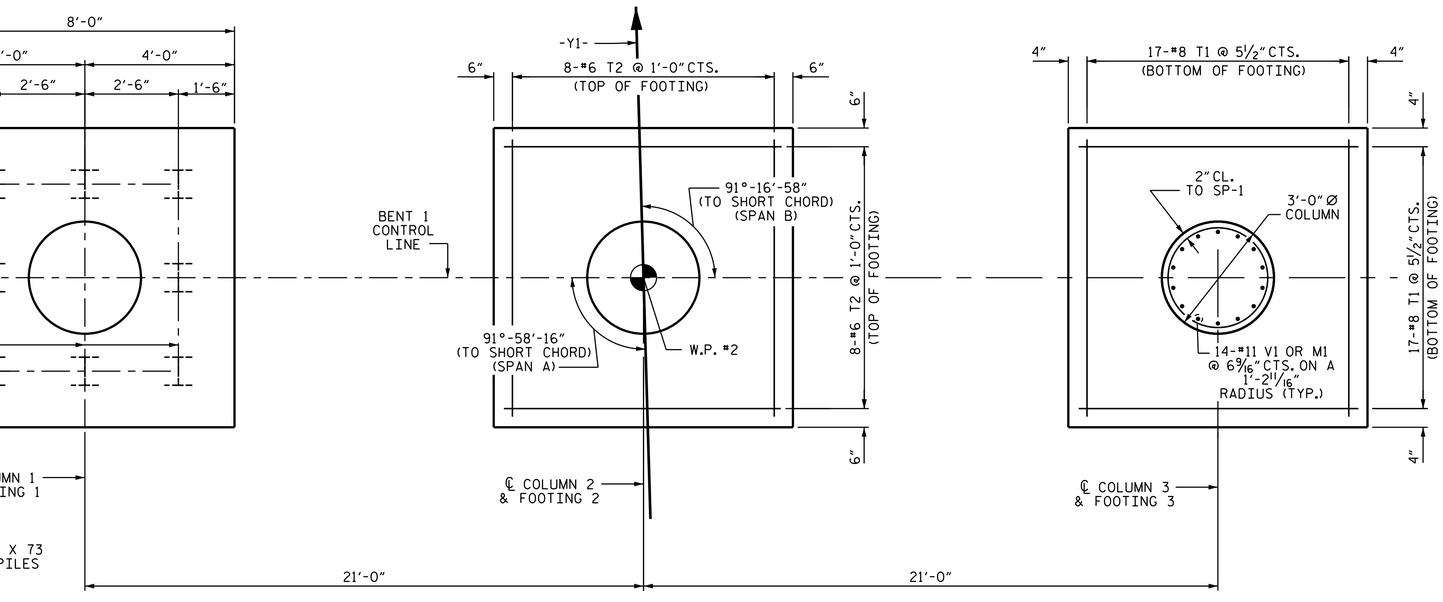
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	58'-8"	2494
B2	6	#11	STR	55'-8"	1775
B3	8	#5	STR	55'-8"	464
B4	8	#4	STR	13'-10"	74
M1	42	#11	4	11'-1"	2473
S1	98	#5	2	13'-10"	1414
T1	102	#8	1	9'-4"	2542
T2	48	#6	STR	7'-8"	553
U1	43	#4	3	6'-8"	191
U2	10	#4	3	6'-6"	43
U3	6	#4	3	7'-6"	30
V1	42	#11	4	22'-0"	4909

REINFORCING STEEL				LBS.	16,962
SP-1	3	✱	5	639'-5"	1281
SPIRAL COLUMN REINFORCING STEEL				LBS.	1,281

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

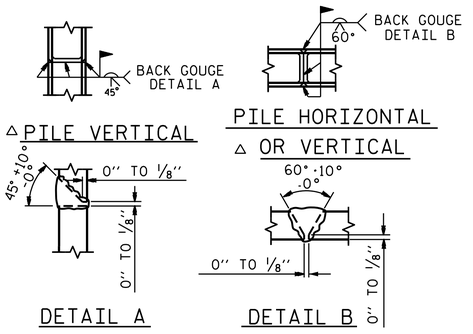
CLASS A CONCRETE		
POUR #1 (FOOTINGS)	C.Y.	23.1
POUR #2 (COLUMNS)	C.Y.	14.4
POUR #3 (CAP)	C.Y.	42.9
TOTAL CLASS A CONCRETE	C.Y.	80.4

FOUNDATION EXCAVATION	LUMP	SUM
HP 14 X 73 STEEL PILES No.: 24	LIN. FT.	480
STEEL PILE POINTS	EA.	24
PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES	EA.	24



PLAN OF FOOTINGS AND COLUMNS

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & FOOTING



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. CHEEK, JR.

DocuSigned by: Marshall C. Cheek, Jr. 6549D6EBAA3B405...

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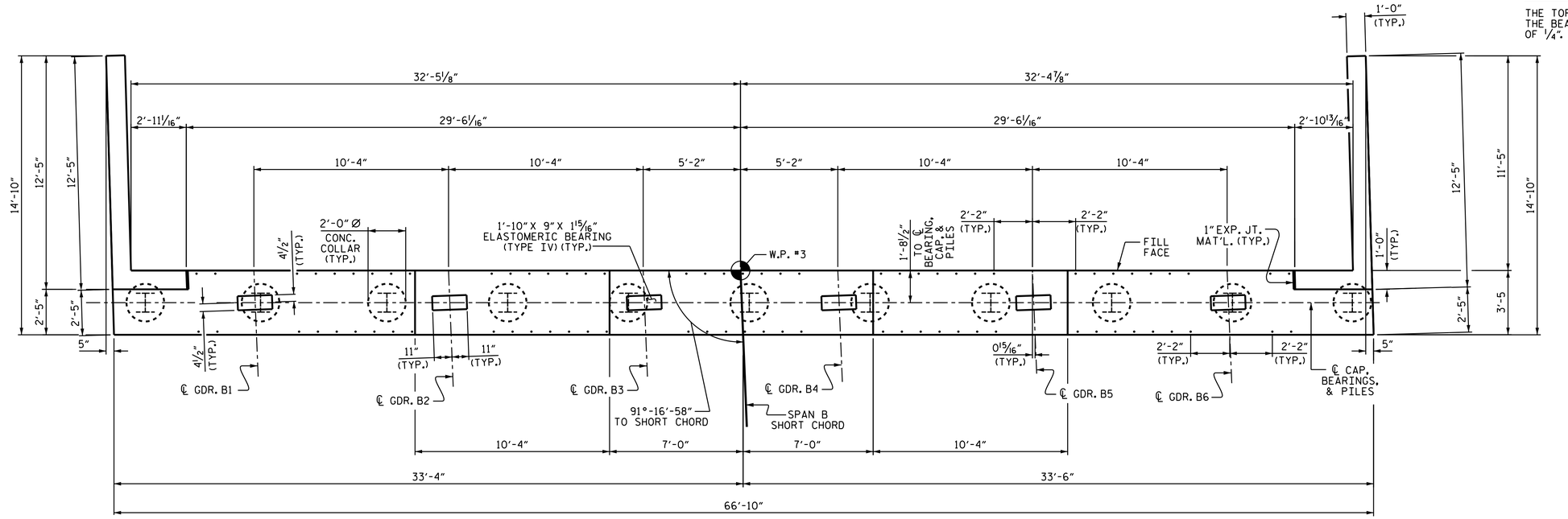
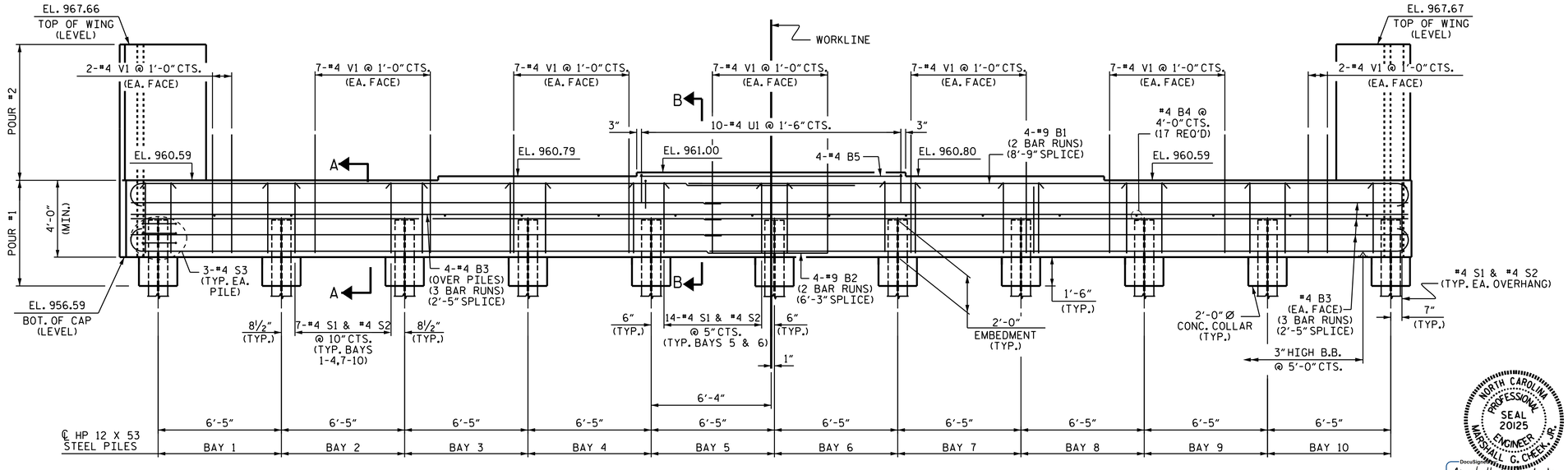
STR. #1

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".



PLAN



ELEVATION

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL
END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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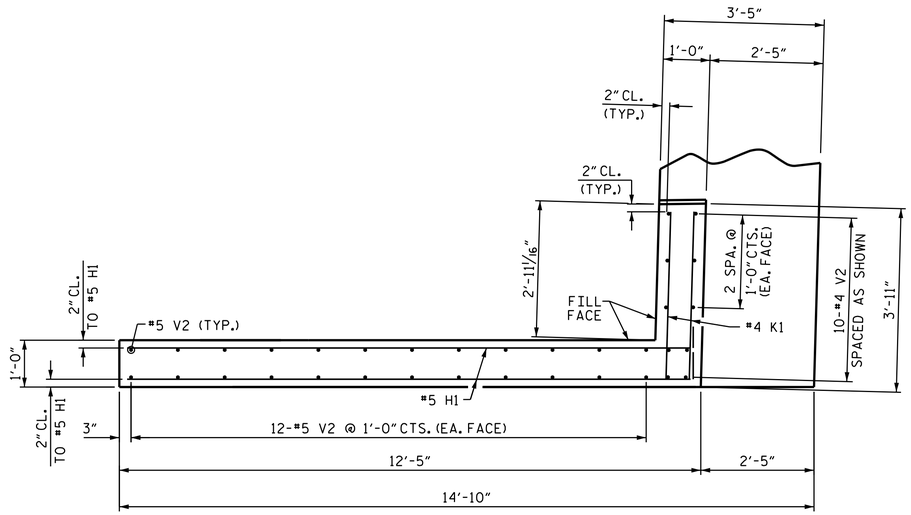
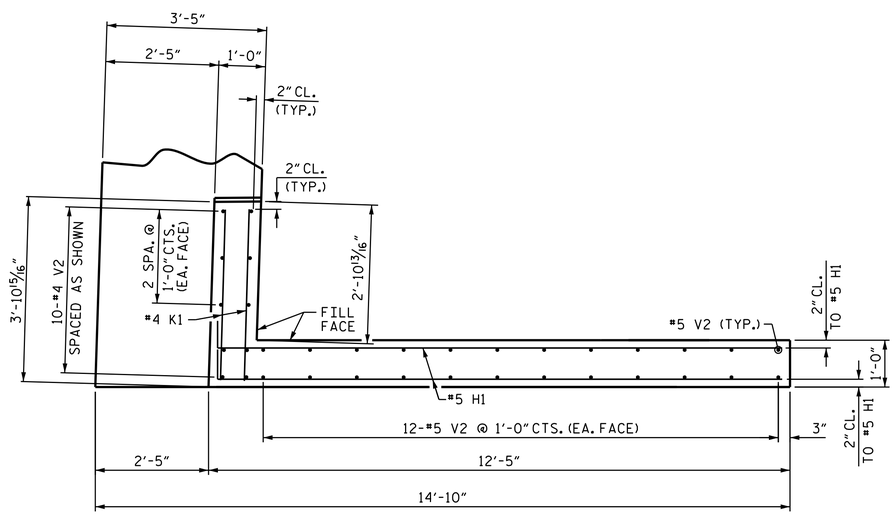
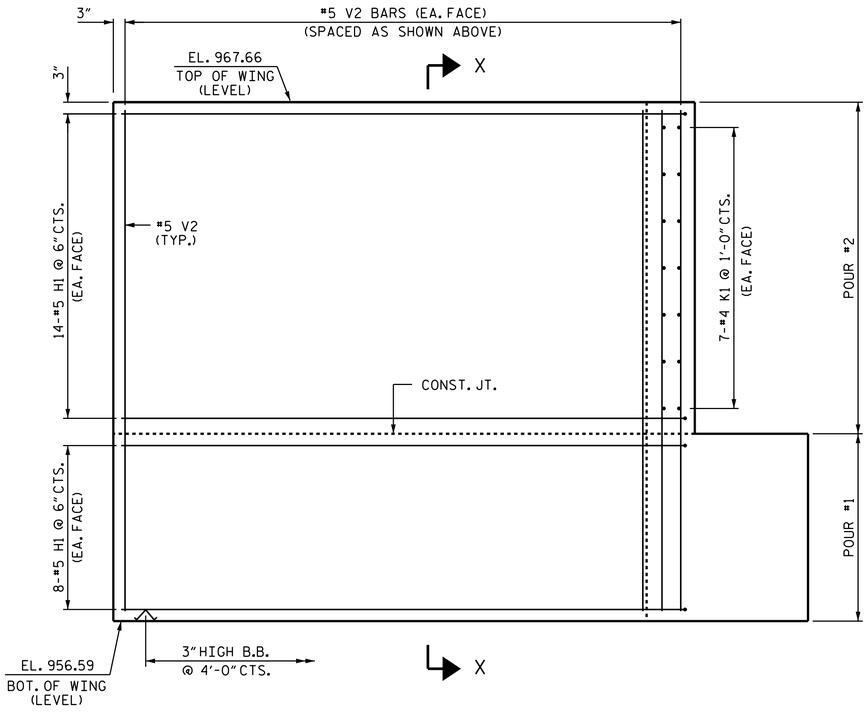


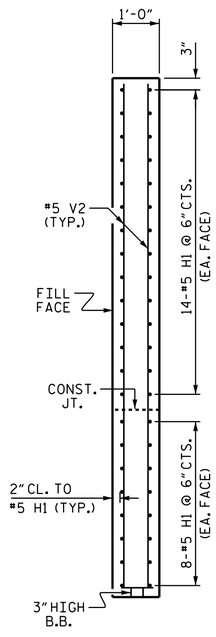
PLAN OF LEFT WING



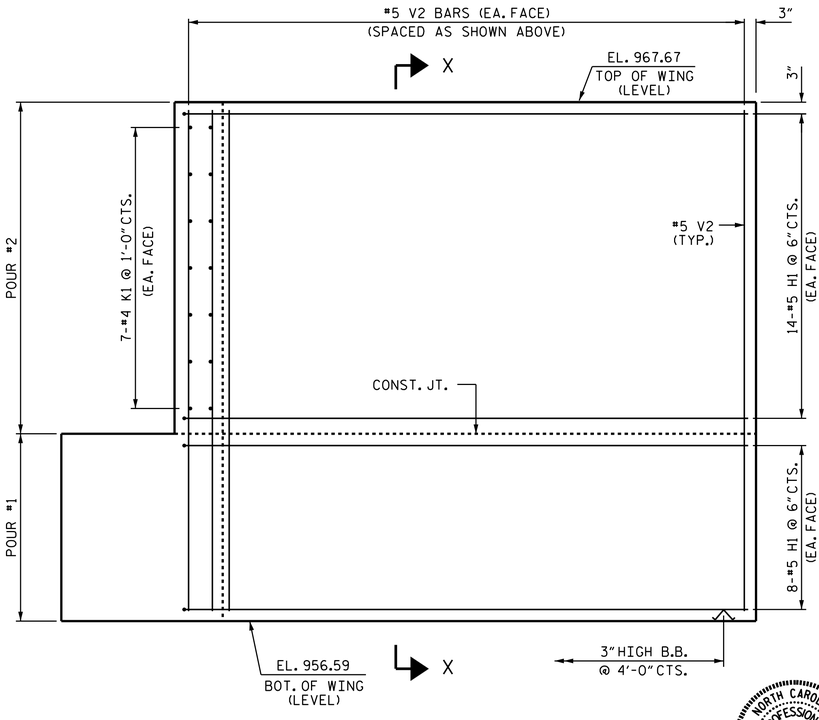
PLAN OF RIGHT WING



ELEVATION OF LEFT WING



SECTION X-X



ELEVATION OF RIGHT WING

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Docusigned by: Marshall G. Cheek, Jr. 6549D0EEBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-27
1			3			TOTAL SHEETS
2			4			32

DRAWN BY : N.D'AIUTO DATE : 4/6/16
CHECKED BY : K.D. LAYNE DATE : 4/14/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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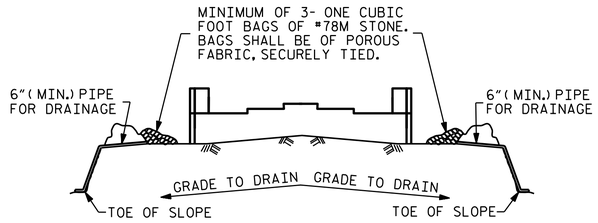
STR. #1

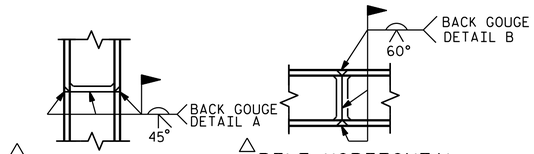


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

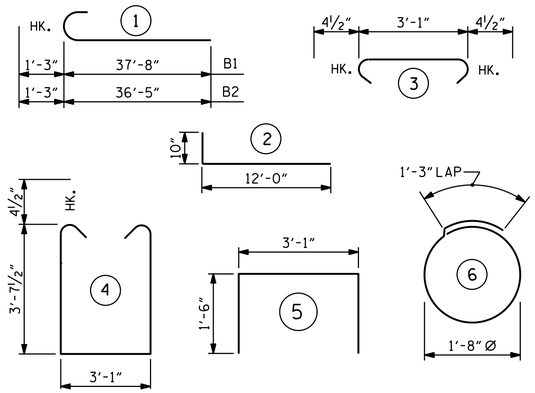
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	38'-11"	1059
B2	8	#9	1	37'-8"	1025
B3	30	#4	STR	23'-10"	478
B4	17	#4	STR	3'-1"	35
B5	4	#4	STR	13'-8"	37
H1	88	#5	2	12'-10"	1178
K1	28	#4	STR	3'-6"	65
S1	86	#4	4	11'-1"	637
S2	86	#4	3	3'-10"	220
S3	33	#4	6	6'-6"	143
U1	10	#4	5	6'-1"	41
V1	88	#4	STR	6'-0"	353
V2	68	#5	STR	10'-9"	762

REINFORCING STEEL LBS. 6,033

CLASS A CONCRETE

POUR #1 CAP, LOWER PART OF WINGS, & COLLARS C.Y. 40.4

POUR #2 UPPER PART OF WINGS C.Y. 8.0

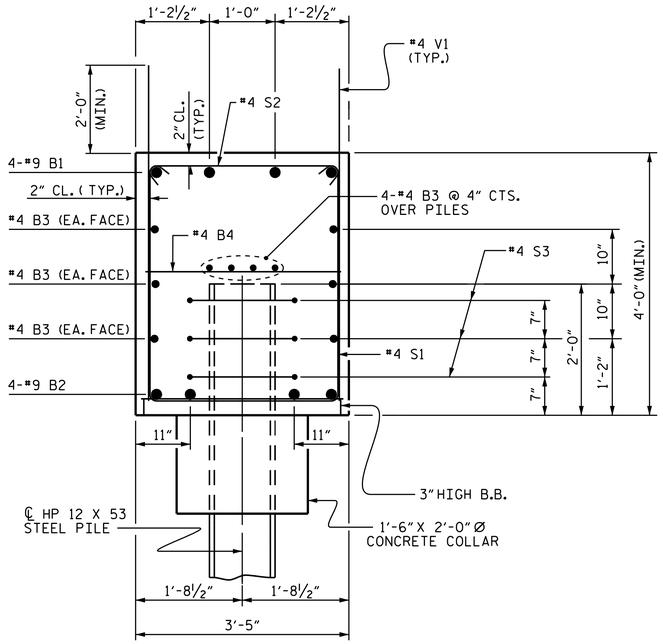
TOTAL C.Y. 48.4

HP 12 X 53 STEEL PILES

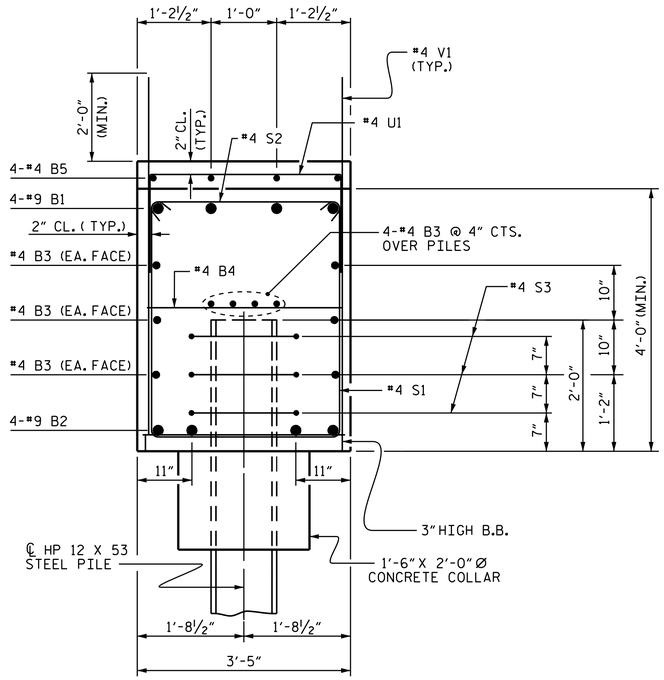
NO.: 11 LIN. FT. 415

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES

EACH 11



SECTION A-A



SECTION B-B

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL
END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DRAWN BY : N.D'AIUTO DATE : 4/6/16
CHECKED BY : K. D. LAYNE DATE : 4/14/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-28
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2			4			32

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mcheek

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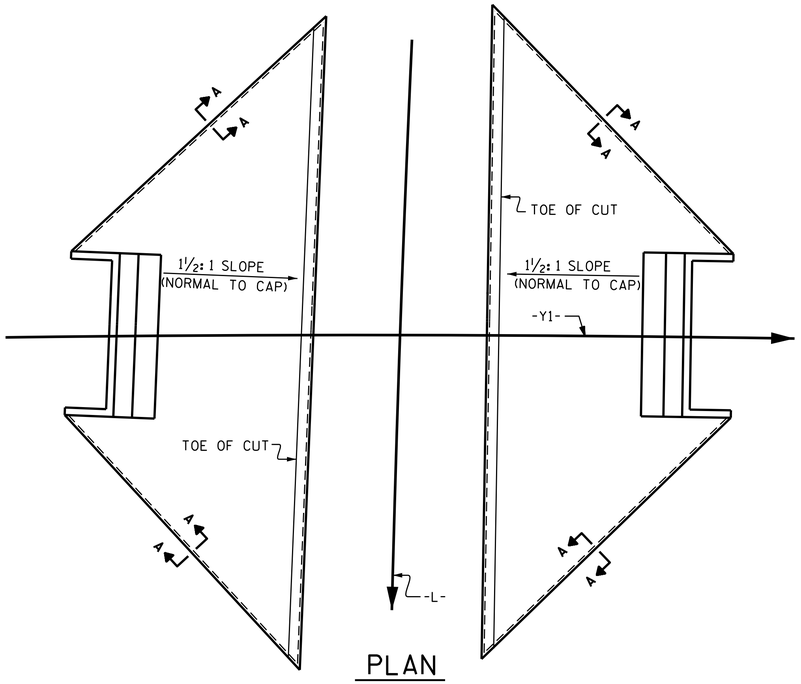


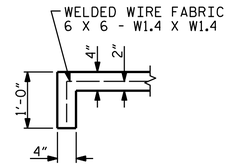
PLAN

GENERAL NOTES

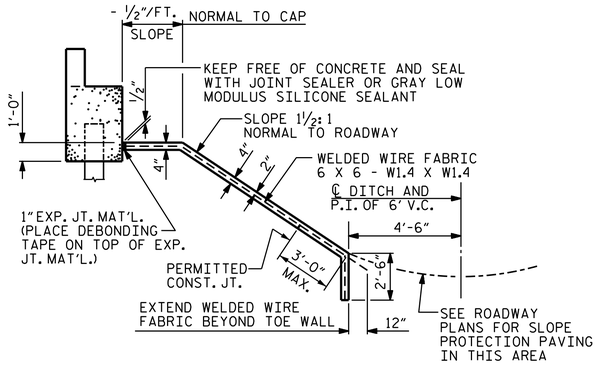
STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING. SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE 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 4" SLOPE PROTECTION.

BRIDGE @ STA. 29+24.97 -Y1-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	440	793
END BENT 2	386	695
TOTAL	826	1488

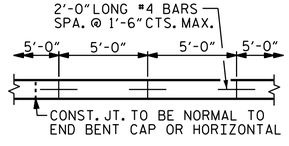
* QUANTITY SHOWN IS BASED ON 5' POURS.



SECTION A-A

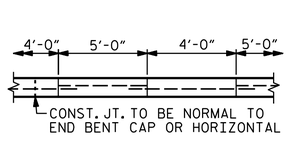


SECTION ALONG ℄ SURVEY WHEN SLOPE CATCHES IN DITCH



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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-29
1			3			TOTAL SHEETS
2			4			32

ASSEMBLED BY :	H. T. BARBOUR	DATE :	1-23-17
CHECKED BY :	T. L. AVERETTE	DATE :	2-21-17
DRAWN BY : ELR 5/92	REV. 10/1/11		MAA/GM
CHECKED BY : GRP 6/92	REV. 12/21/11		MAA/GM
	REV. 1/16		MAA/TMG

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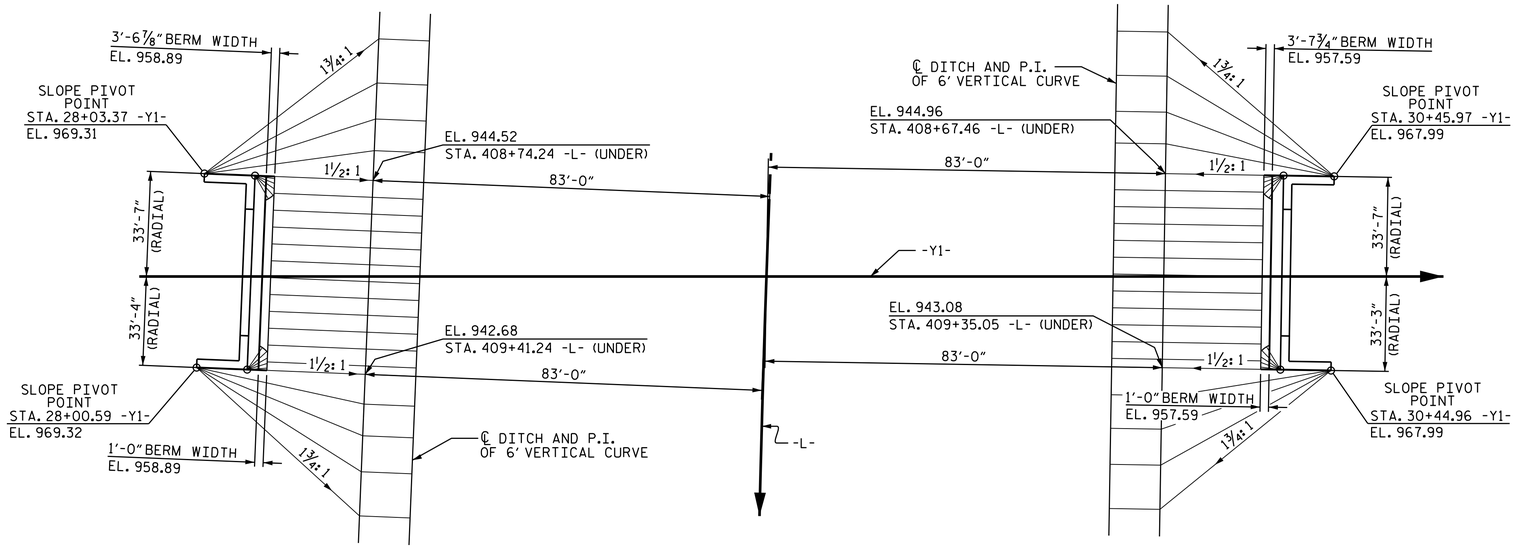
STR. 1

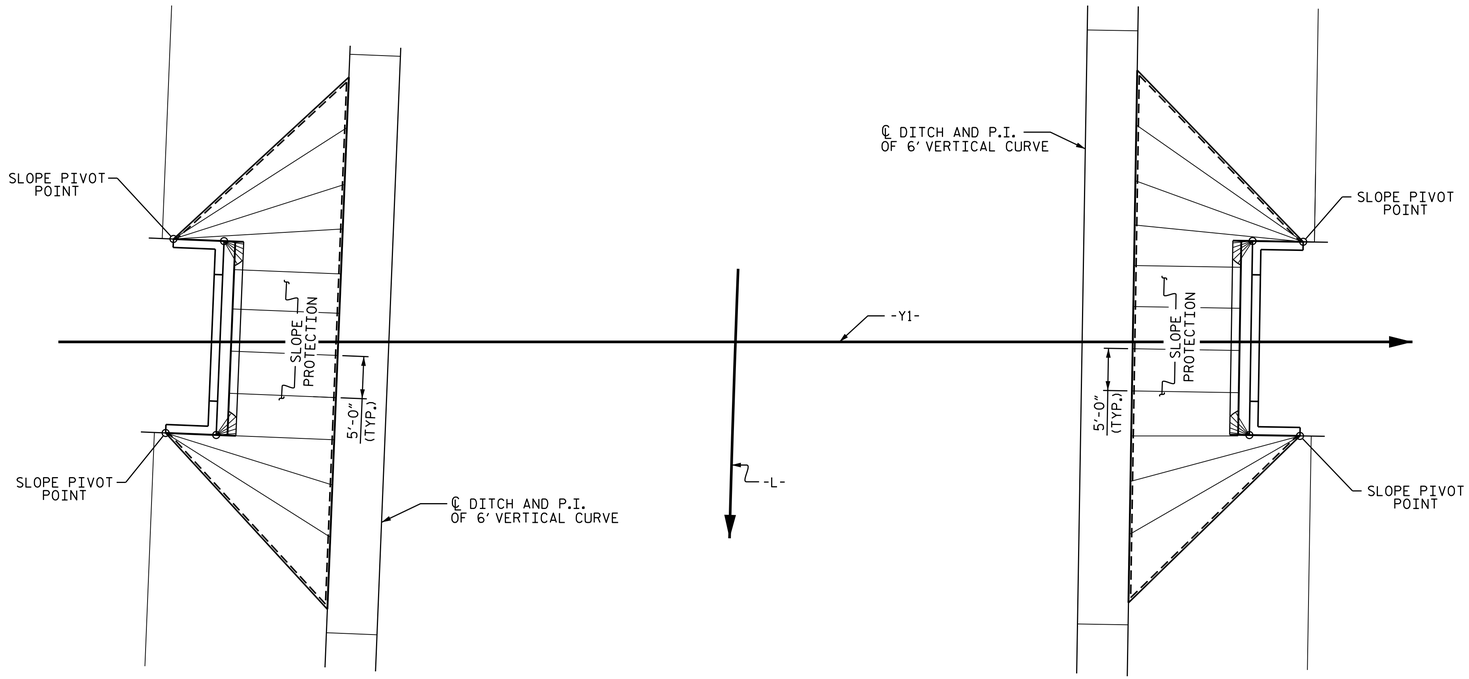
STD. NO. SP1 (SHT 4)



END BENT 1

END BENT 2

PLAN - GRADING



END BENT 1

END BENT 2

PLAN - CONCRETE PLACEMENT

ASSEMBLED BY : H. T. BARBOUR	DATE : 1-23-17		
CHECKED BY : T. L. AVERETTE	DATE : 2-21-17		
DRAWN BY : WJH 10/88	REV. 5/1/06	TLA/GM	
CHECKED BY : FCJ 10/88	REV. 10/1/11	MAA/GM	
	REV. 1/16	MAA/TMG	

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PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

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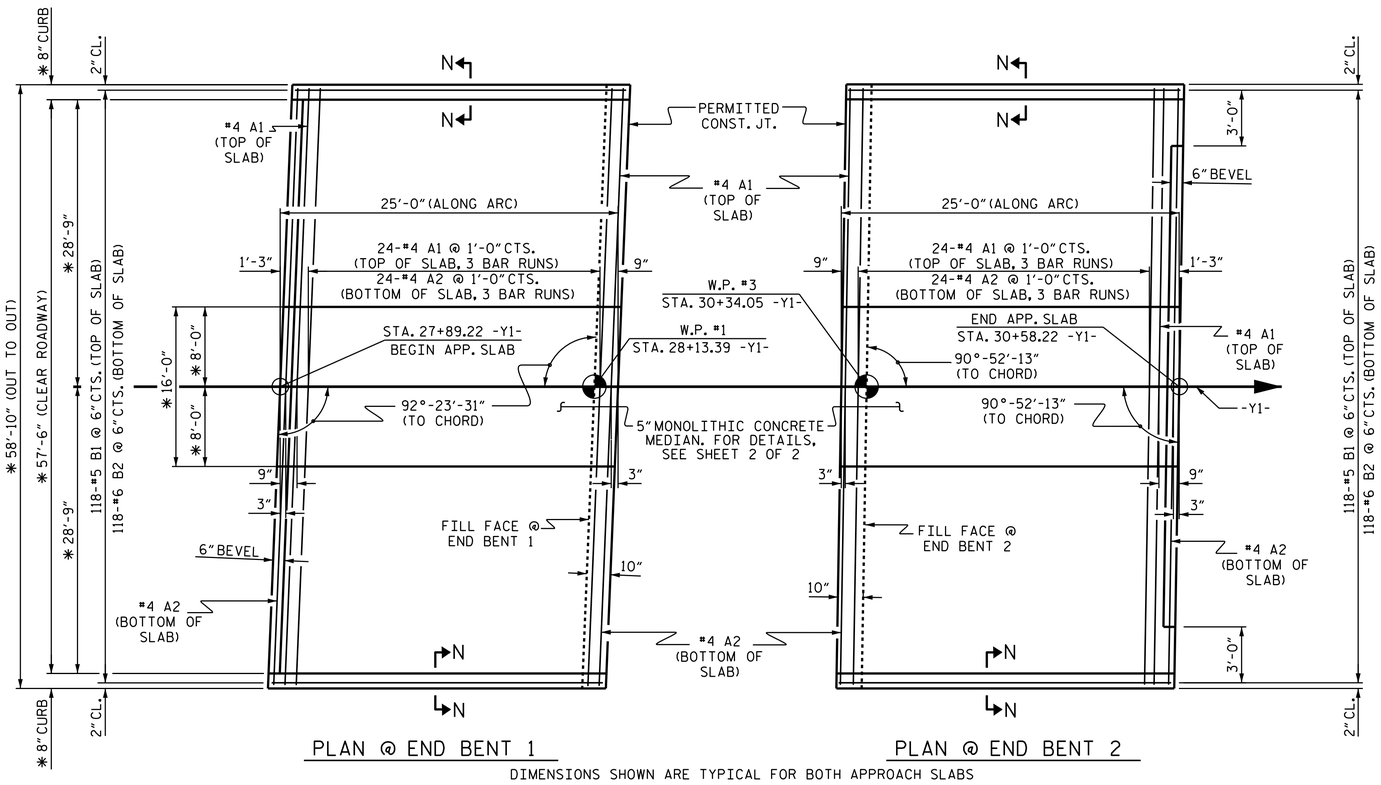
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S1-30

TOTAL SHEETS 32

STR. 1

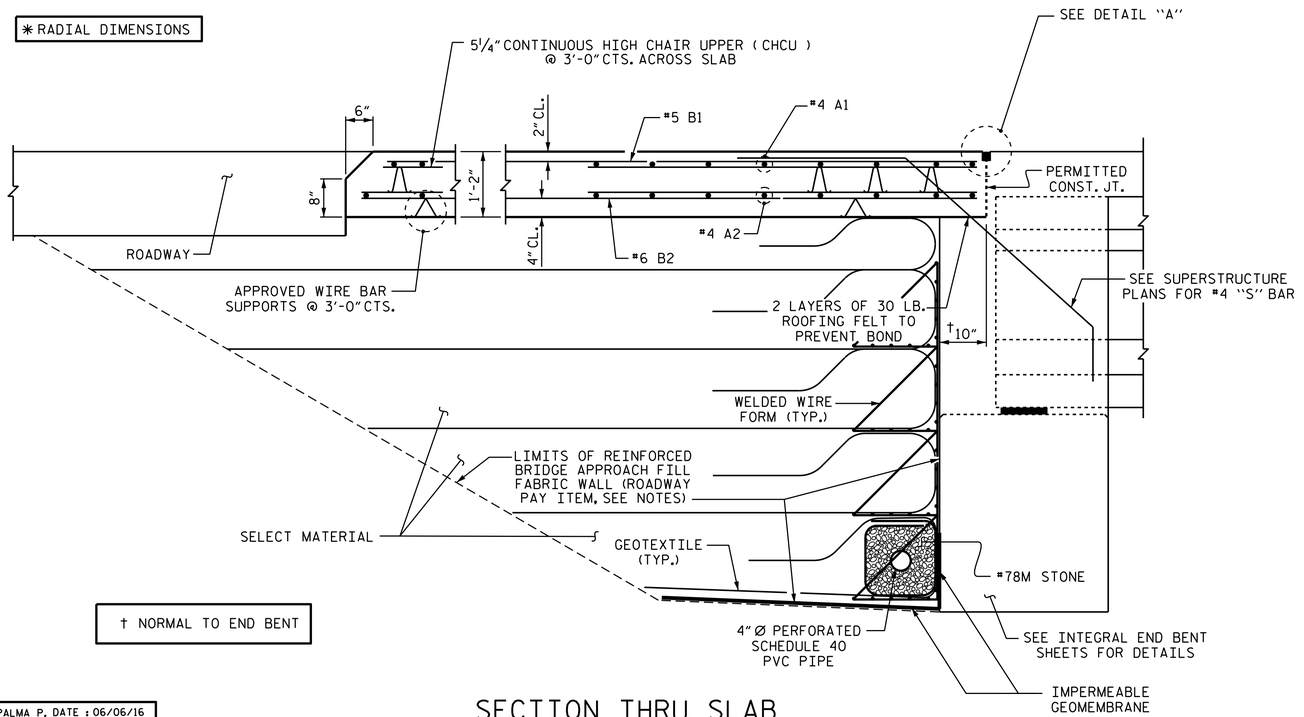
STD. NO. SP2 (SHT 1)



PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



SECTION THRU SLAB

NOTES

FOR REINFORCED BRIDGE APPROACH FILL FABRIC WALL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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.

ARC OFFSETS ARE NEGLIGIBLE AND THEREFORE NOT SHOWN.

GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE MONOLITHIC CONCRETE MEDIAN 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 JOINT WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FT. IN LENGTH.

ALL REINFORCING STEEL IN MONOLITHIC CONCRETE MEDIAN SHALL BE EPOXY COATED.

NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE FOR MATERIALS OR LABOR REQUIRED TO CONSTRUCT THE CONCRETE MEDIAN ON THE APPROACH SLABS. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM BID PRICE FOR BRIDGE APPROACH SLABS.

THE APPROACH SLAB MAY BE CAST MONOLITHICALLY WITH THE END BENT DIAPHRAGM AND THE END SECTION OF BRIDGE DECK NEAR THE INTEGRAL END BENT.

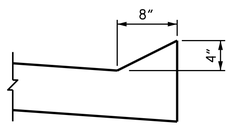
BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

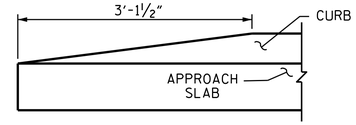
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	78	#4	STR	20'-11"	1,090
A2	78	#4	STR	20'-9"	1,081
* B1	118	#5	STR	24'-3"	2,985
B2	118	#6	STR	24'-8"	4,372
* B3	15	#4	STR	24'-0"	240
* G1	17	#4	STR	15'-6"	176
REINFORCING STEEL				LBS.	5,453
* EPOXY COATED REINFORCING STEEL				LBS.	4,491
CLASS AA CONCRETE					
POUR 1 - APPROACH SLAB				C. Y.	63.3
POUR 2 - CONCRETE MEDIAN				C. Y.	6.0
TOTAL				C. Y.	69.3

SPLICE LENGTH

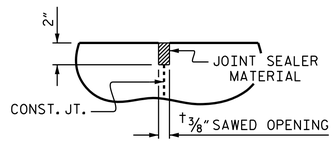
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER



DETAIL "A"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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1			3			TOTAL SHEETS
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CHECKED BY : M.K. BEARD DATE : 7/26/16		
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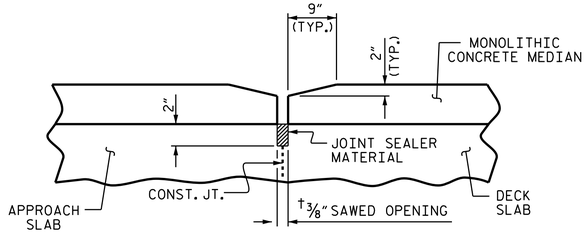
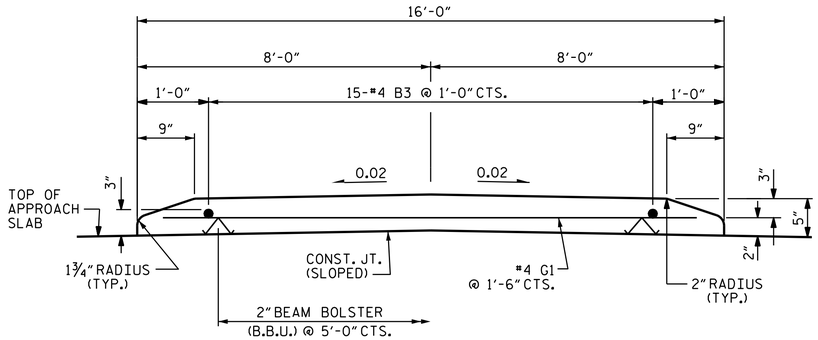


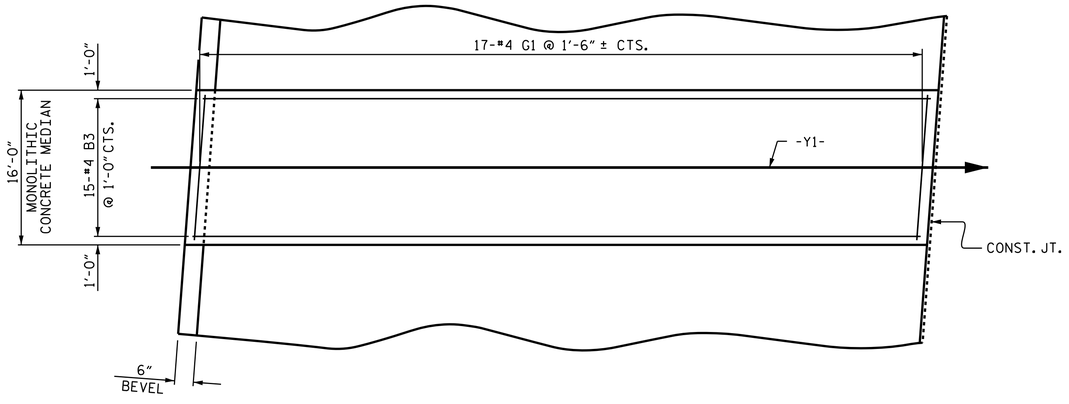
† NORMAL TO END BENT

SECTION THROUGH MONOLITHIC CONCRETE MEDIAN AT INTEGRAL END BENT

END BENT 1 SHOWN. END BENT 2 SIMILAR

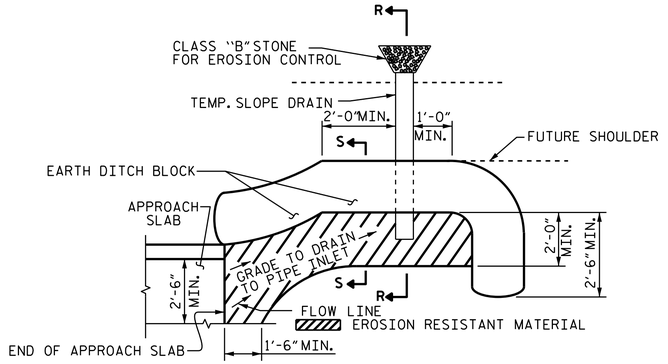


SECTION THROUGH MONOLITHIC CONCRETE MEDIAN



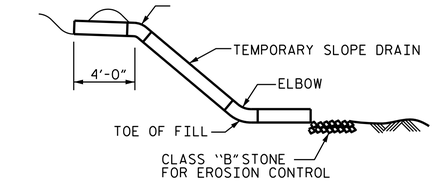
PLAN OF CONCRETE MEDIAN

APPROACH SLAB AT END BENT 1 SHOWN. APPROACH SLAB AT END BENT 2 SIMILAR.

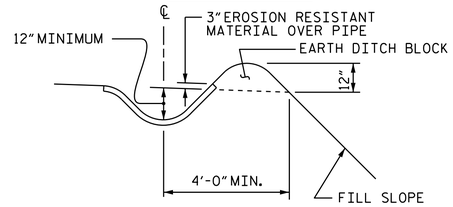


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW



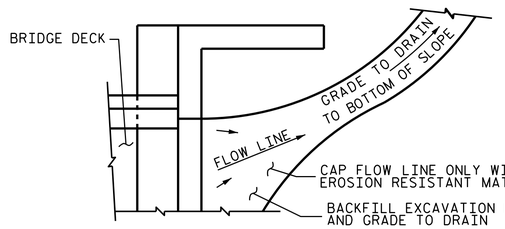
SECTION R-R



SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

TEMPORARY DRAINAGE DETAIL

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 29+24.97 -Y1-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

Marshall G. Creek, Jr.
6549D6EBAA3B405...
7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

ASSEMBLED BY : ARIADNE PALMA P.	DATE : 06/06/16
CHECKED BY : M.K. BEARD	DATE : 7/26/16
DRAWN BY : TLA 10/05	REV. 10/1/11 MAA/GM
CHECKED BY : GM 5/06	REV. 12/21/11 MAA/GM
	REV. 6/13 MAA/GM

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

SHEET NO. S1-32

TOTAL SHEETS 32

STR #1

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mcheek

F. A. PROJECT No.: NHP-0918(062)

20+00 20+50 21+00 21+50 22+00 22+50

960 950 940 930 920

SPAN A SPAN B

FILL FACE @ END BENT 1
STA. 20+18.77 -Y2-
GRADE PT. EL. 953.87

BERM VARIES
NORMAL TO CAP
(TYP.)

EL. 954.0±

1'-0"
(TYP.)

FIX.

4" CONCRETE
SLOPE PROTECTION
(TYP.)

HP 12 X 53
STEEL PILES

℄ DITCH & PI
OF 6' V.C.
(ROADWAY DETAIL &
PAY ITEM) (TYP.)

18'-0⅛"
MIN. VERT.
CLEARANCE

FIX. FIX.

EL. 955.0±

18'-7⅝"
MIN. VERT.
CLEARANCE

HP 14 X 73
STEEL PILES

TOP OF FOOTING
EL. 924.88

BENT 1

FILL FACE @ END BENT 2
STA. 22+40.02 -Y2-
GRADE PT. EL. 956.00

FIX.

APPROXIMATE
NATURAL GROUND
LINE

EL. 956.0±

1½:1 SLOPE
(NORMAL TO CAP)
(TYP.)

HP 12 X 53
STEEL PILES

INTEGRAL
END BENT 1

INTEGRAL
END BENT 2

GRADE DATA

(-)1.0174% (+)1.1223%

PI STA. = 16+10.00 -Y2-
EL. = 948.93
L = 1220'

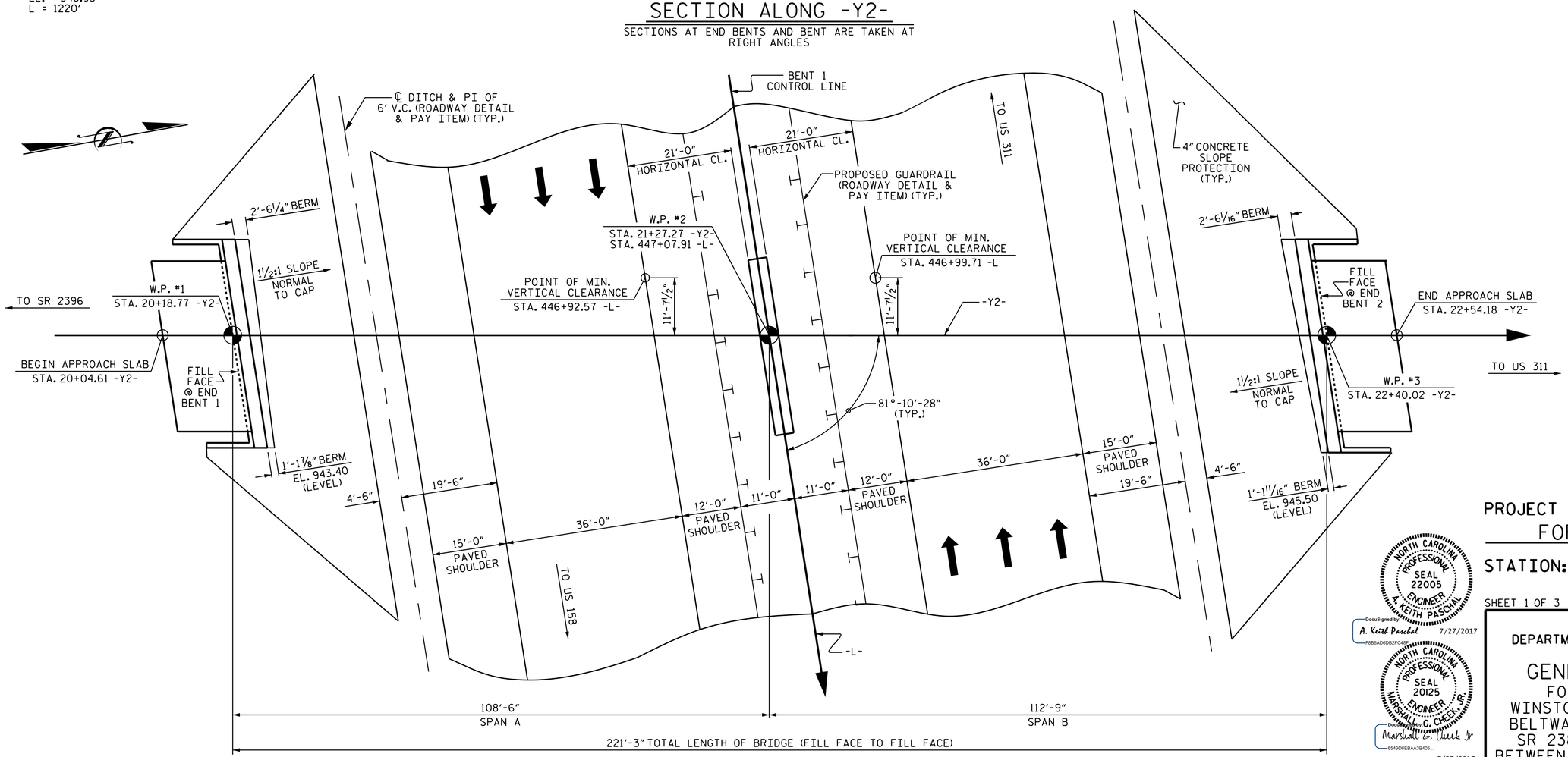
GRADE DATA

(+)1.1223% (+)1.3023%

PI STA. = 25+50.00 -Y2-
EL. = 959.48
L = 200'

SECTION ALONG -Y2-

SECTIONS AT END BENTS AND BENT ARE TAKEN AT RIGHT ANGLES



PLAN

(PILES, COLUMNS, & FOOTINGS NOT SHOWN FOR CLARITY)

NORTH CAROLINA PROFESSIONAL SEAL 22005 ENGINEER A. KEITH PASCHAL
DocuSigned by: A. Keith Paschal 7/27/2017
F8B6AD6DB2FC4BC...

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek Jr
6549D6EBAA3B405...
7/27/2017

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 447+07.91 -L-
21+27.27 -Y2-

SHEET 1 OF 3 BRIDGE NO. 701

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
WINSTON-SALEM NORTHERN
BELTWAY (FUTURE I-74) ON
SR 2381 (WILLISTON RD.)
BETWEEN SR 2396 AND US 311

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-1
1			3			TOTAL SHEETS
2			4			30

DRAWN BY : ARIADNE L. PALMA P. DATE : 09/19/16
CHECKED BY : T. L. AVERETTE DATE : 04/24/17
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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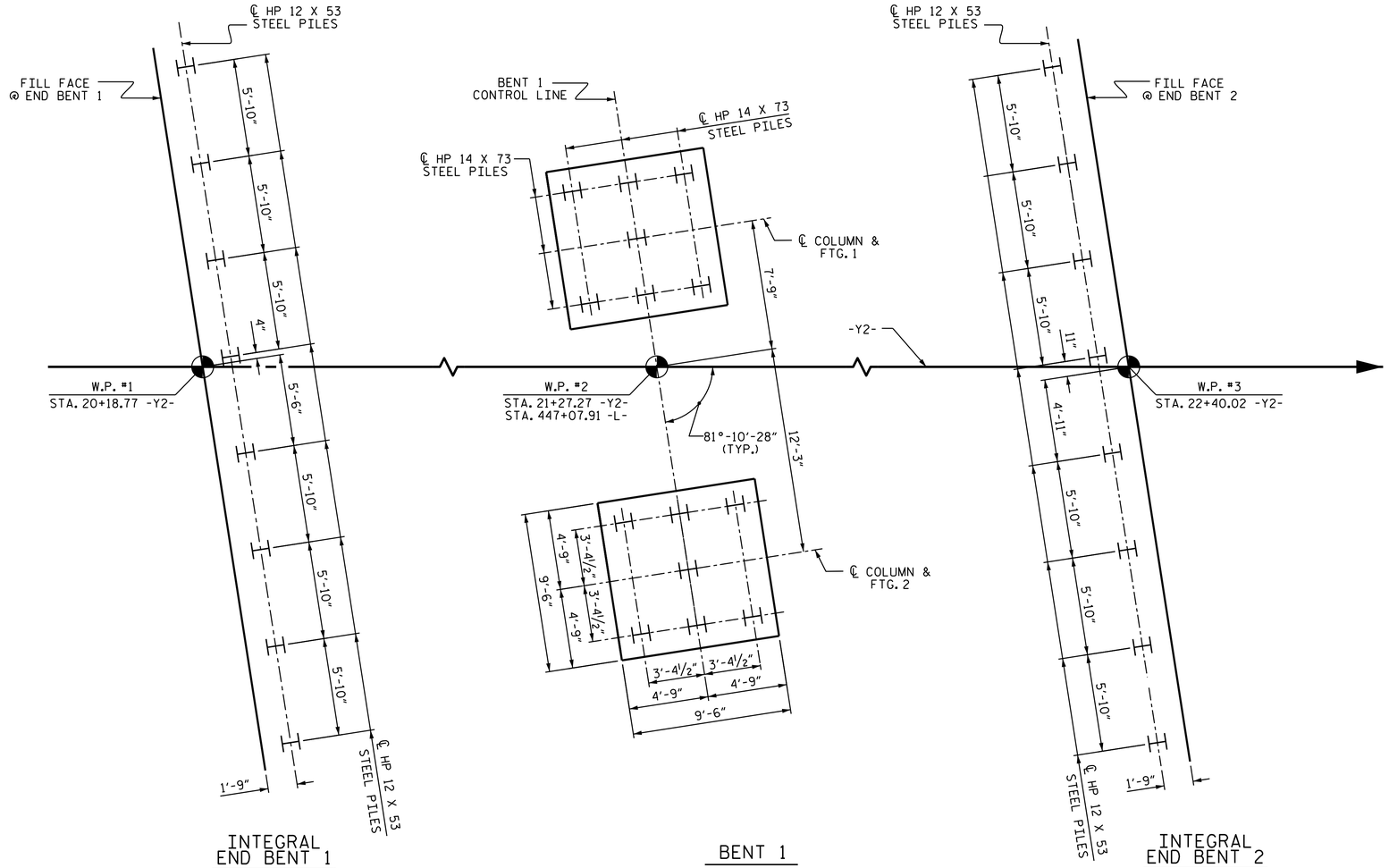

NOTES

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

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 195 TONS PER PILE.

PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 135 TONS PER PILE.

DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 225 TONS PER PILE.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT BENT 1. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

TESTING PILES WITH THE PILE DRIVING ANALYZER (PDA) DURING DRIVING, RESTRIKING, OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF PILES.
ALL COLUMN FOOTINGS AND PILE SPACINGS ARE TYPICAL AT BENT.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 447+07.91 -L-
21+27.27 -Y2-

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
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7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
WINSTON-SALEM NORTHERN
BELTWAY (FUTURE I-74) ON
SR 2381 (WILLISTON RD.)
BETWEEN SR 2396 AND US 311

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-2
1			3			TOTAL SHEETS
2			4			30

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DRAWN BY :	ARIADNE L. PALMA P.	DATE : 09/28/16
CHECKED BY :	T. L. AVERETTE	DATE : 04/24/17
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 6/2017

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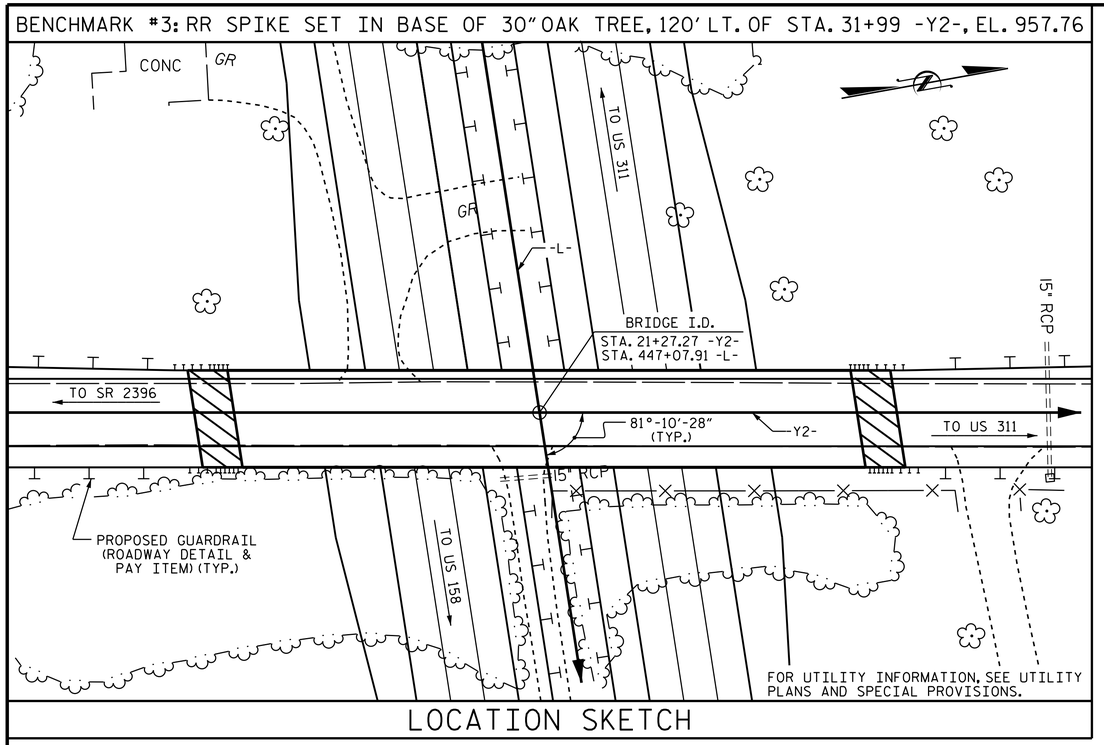

LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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.

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 BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

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 SETUP FOR HP 12 X 53 STEEL PILES	PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES	HP 12 X 53 STEEL PILES		HP 14 X 73 STEEL PILES		STEEL PILE POINTS	TWO BAR METAL RAIL	1'-2" X 3'-2¾" CONCRETE PARAPET	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS
	LUMP SUM	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EACH	EACH	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE			8,205	6,442		LUMP SUM			8	873.17								423.76	439.13		LUMP SUM
END BENT 1					34.6		4258				8		8	360						295	
BENT 1	LUMP SUM				59.0		9204	1012				14			14	350	14				
END BENT 2					35.8		4385				8		8	460						368	
TOTAL	LUMP SUM	1	8,205	6,442	129.4	LUMP SUM	17847	1012	8	873.17	16	14	16	820	14	350	14	423.76	439.13	663	LUMP SUM

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 447+07.91 -L-
21+27.27 -Y2-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK JR.

Documented by: Marshall G. Creek, Jr.
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7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
WINSTON-SALEM NORTHERN
BELTWAY (FUTURE I-74) ON
SR 2381 (WILLISTON RD.)
BETWEEN SR 2396 AND US 311

DRAWN BY : ARIADNE L. PALMA P. DATE : 09/30/16
CHECKED BY : T. L. AVERETTE DATE : 04/24/17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S2-3

TOTAL SHEETS 30

STR #2

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.02	--	1.75	0.989	1.52	B	ER	54.927	1.009	1.1	A	ER	10.56	0.80	0.989	1.02	B	ER	54.927	
		HL-93(Opr)	N/A	--	1.42	--	1.35	0.989	1.97	B	ER	54.927	1.009	1.42	A	ER	10.56	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.45	52.200	1.75	0.989	2.17	B	ER	54.927	1.009	1.47	A	ER	10.56	0.80	0.989	1.45	B	ER	54.927	
		HS-20(Opr)	36.000	--	1.91	68.642	1.35	0.989	2.82	B	ER	54.927	1.009	1.91	A	ER	10.56	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.48	47.028	1.4	0.989	6.53	B	ER	54.927	1.009	4.55	A	ER	10.56	0.80	0.989	3.48	B	ER	54.927	
		SNGARBS2	20.000	--	2.5	50.073	1.4	0.989	4.69	B	ER	54.927	1.009	3.18	A	ER	10.56	0.80	0.989	2.50	B	ER	54.927	
		SNAGRIS2	22.000	--	2.33	51.353	1.4	0.989	4.37	B	ER	54.927	1.009	2.93	A	ER	10.56	0.80	0.989	2.33	B	ER	54.927	
		SNCOTTS3	27.250	--	1.73	47.164	1.4	0.989	3.24	B	ER	54.927	1.009	2.26	A	ER	10.56	0.80	0.989	1.73	B	ER	54.927	
		SNAGGRS4	34.925	--	1.41	49.270	1.4	0.989	2.64	B	ER	54.927	1.009	1.84	A	ER	10.56	0.80	0.989	1.41	B	ER	54.927	
		SNS5A	35.550	--	1.38	49.127	1.4	0.989	2.59	B	ER	54.927	1.009	1.85	A	ER	10.56	0.80	0.989	1.38	B	ER	54.927	
		SNS6A	39.950	--	1.25	50.077	1.4	0.989	2.35	B	ER	54.927	1.009	1.67	A	ER	10.56	0.80	0.989	1.25	B	ER	54.927	
		SNS7B	42.000	--	1.19	50.113	1.4	0.989	2.24	B	ER	54.927	1.009	1.62	A	ER	10.56	0.80	0.989	1.19	B	ER	54.927	
	TTST	TNAGRIT3	33.000	--	1.52	50.303	1.4	0.989	2.86	B	ER	54.927	1.009	2	A	ER	10.56	0.80	0.989	1.52	B	ER	54.927	
		TNT4A	33.075	--	1.53	50.512	1.4	0.989	2.86	B	ER	54.927	1.009	1.96	A	ER	10.56	0.80	0.989	1.53	B	ER	54.927	
		TNT6A	41.600	--	1.24	51.389	1.4	0.989	2.31	B	ER	54.927	1.009	1.69	A	ER	10.56	0.80	0.989	1.24	B	ER	54.927	
		TNT7A	42.000	--	1.23	51.848	1.4	0.989	2.31	B	ER	54.927	1.009	1.67	A	ER	10.56	0.80	0.989	1.23	B	ER	54.927	
		TNT7B	42.000	--	1.26	52.923	1.4	0.989	2.36	B	ER	54.927	1.009	1.6	A	ER	10.56	0.80	0.989	1.26	B	ER	54.927	
		TNAGRIT4	43.000	--	1.21	52.086	1.4	0.989	2.27	B	ER	54.927	1.009	1.55	A	ER	10.56	0.80	0.989	1.21	B	ER	54.927	
		TNAGT5A	45.000	--	1.15	51.664	1.4	0.989	2.15	B	ER	54.927	1.009	1.52	A	ER	10.56	0.80	0.989	1.15	B	ER	54.927	
		TNAGT5B	45.000	3	1.14	51.282	1.4	0.989	2.13	B	ER	54.927	1.009	1.48	A	ER	10.56	0.80	0.989	1.14	B	ER	54.927	

LOAD FACTORS:

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

NOTES:

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

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

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

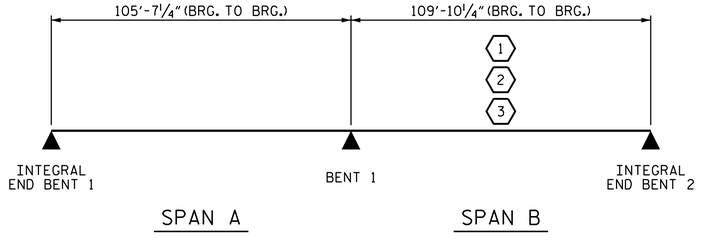
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-4
1			3			TOTAL SHEETS
2			4			30

STR. #2 STD. NO. LRFR1

ASSEMBLED BY :	J. K. BOWLES	DATE :	1/14/16
CHECKED BY :	J. P. MCCARTHA	DATE :	1/14/16
DRAWN BY : MAA 1/08	REV. 11/12/08RR		MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11		MAA/GM

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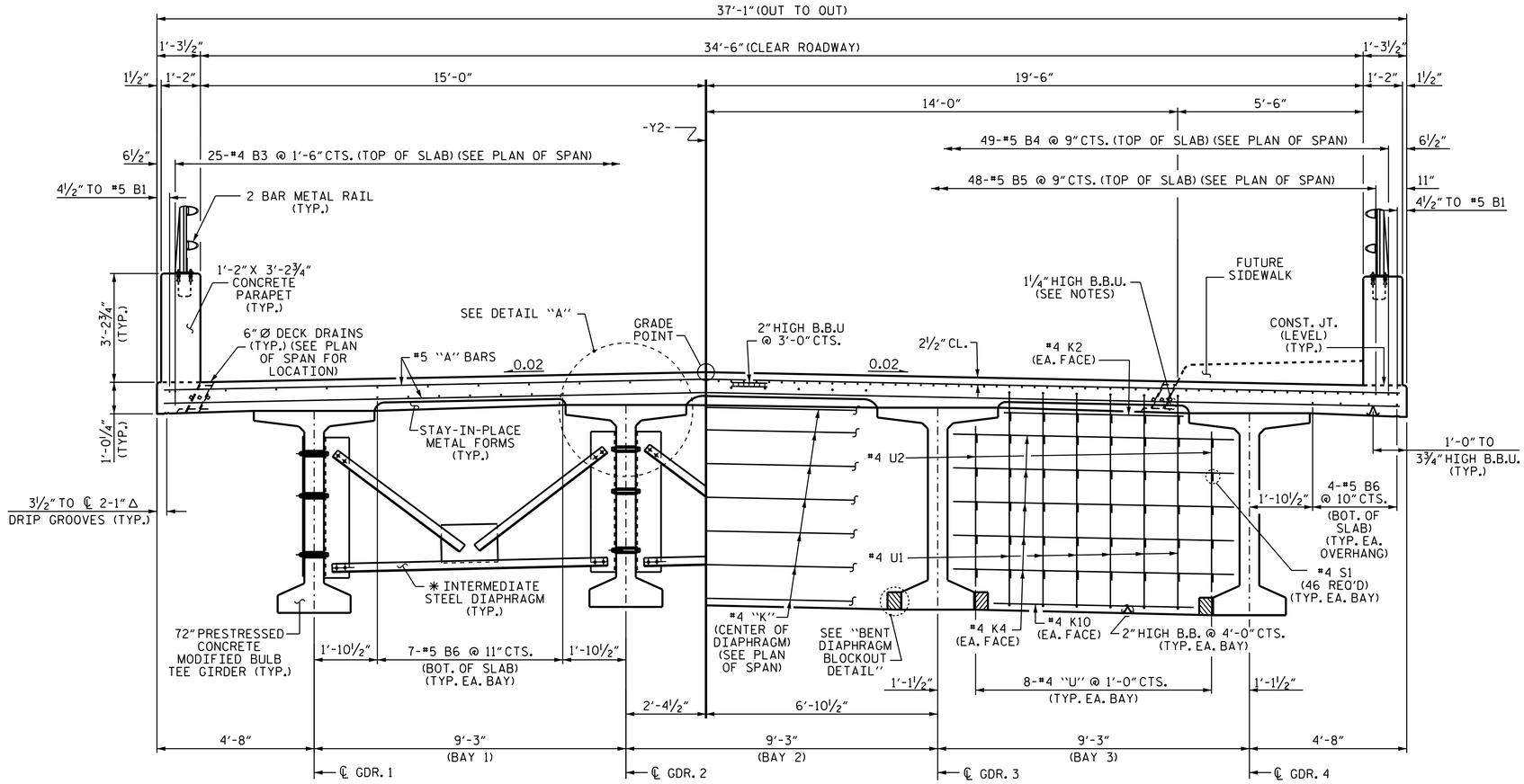
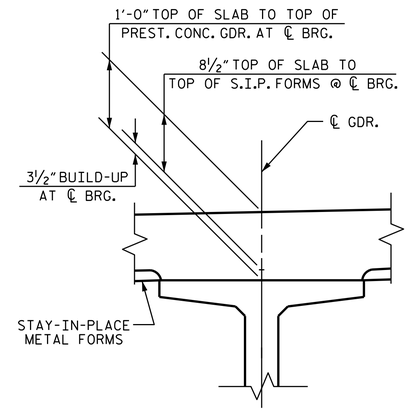


AT INTERMEDIATE DIAPHRAGMS

AT BENT DIAPHRAGMS



DETAIL "A"

NOTES

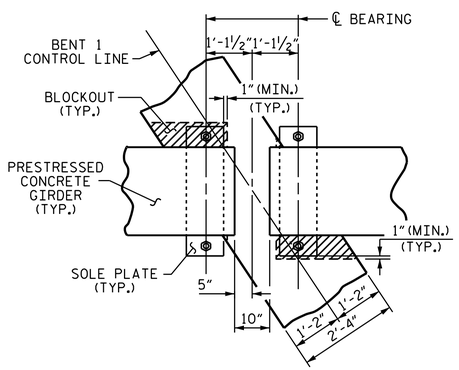
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE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

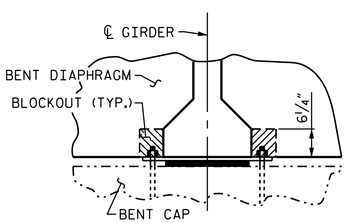
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

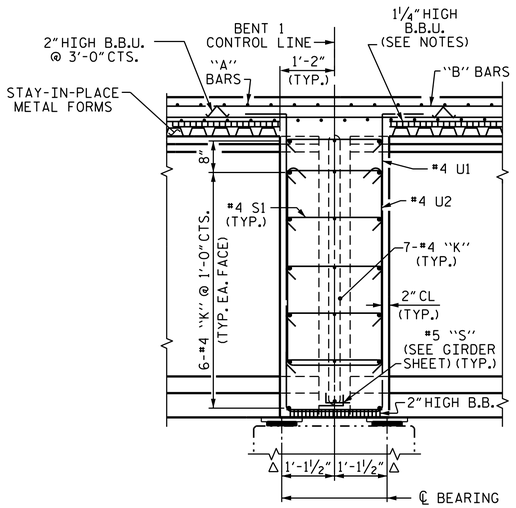
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

✱ FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.

TYPICAL SECTION







SECTION THROUGH BENT DIAPHRAGM

Δ MEASURED ALONG ℄ GDR.

BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 65490EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-5
1			3			TOTAL SHEETS
2			4			30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY :	N.D'AIUTO	DATE :	1/13/16
CHECKED BY :	J.K.BOWLES	DATE :	3/31/16
DESIGN ENGINEER OF RECORD:	J.K.BOWLES	DATE :	3/31/16

26-JUL-2017 15:06
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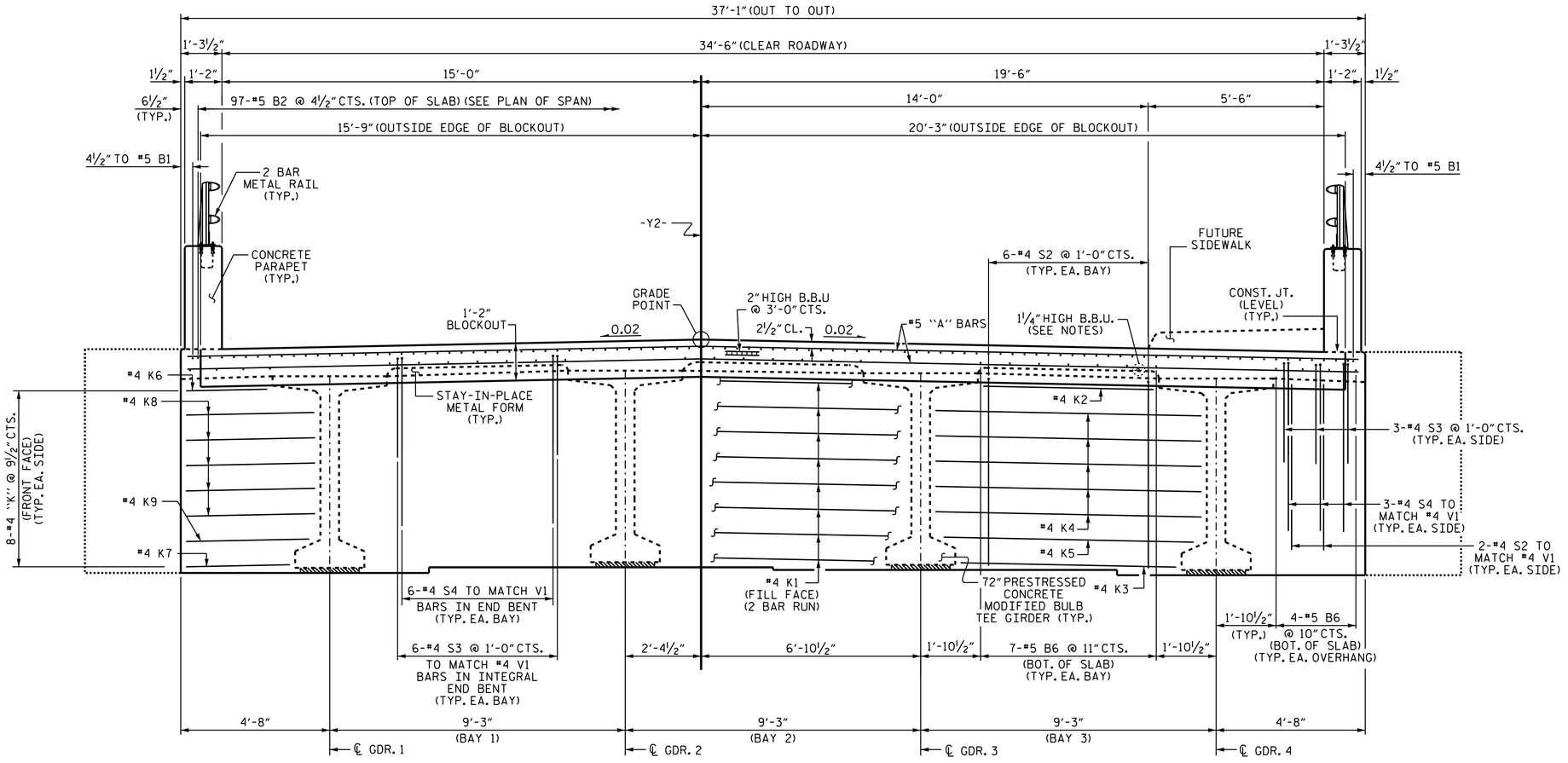
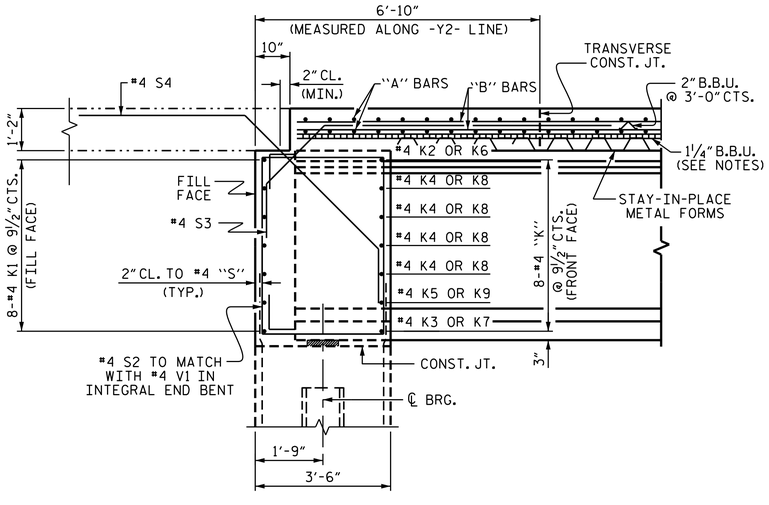
mcheek

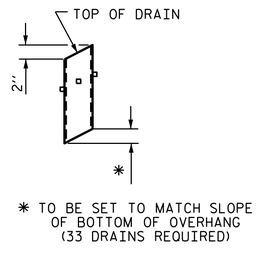
STR. #2



TYPICAL SECTION AT INTEGRAL END BENT

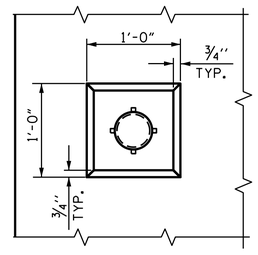


SECTION THROUGH INTEGRAL END BENT



* TO BE SET TO MATCH SLOPE OF BOTTOM OF OVERHANG (33 DRAINS REQUIRED)

PIPE DETAIL



PLAN OF RECESS

TOP OF FLOOR DRAINS TO BE SET ⅜" BELOW SURFACE OF SLAB.

4 - ½" SQUARE LUGS TO BE GLUED TO THE P.V.C. PIPE AT EQUAL SPACES AROUND THE PIPE DRAIN APPROXIMATELY 4" FROM THE TOP OF THE PIPE.

THE 6" Ø PVC PIPE AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO ASTM D1785.

DRAIN DETAILS

THE ORIENTATION OF THE DRAINS ON THE RIGHT SIDE OF THE BRIDGE, IN FRONT OF THE PROPOSED SIDEWALK, SHALL BE PLACED SO THE WATER FLOW IS AWAY FROM THE EXTERIOR GIRDER.

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DRAWN BY : N.D'AIUTO DATE : 1/13/16
CHECKED BY : J.K.BOWLES DATE : 3/31/16
DESIGN ENGINEER OF RECORD: J.K.BOWLES DATE : 3/31/16

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-6
1			3			TOTAL SHEETS
2			4			30

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

STR. #2

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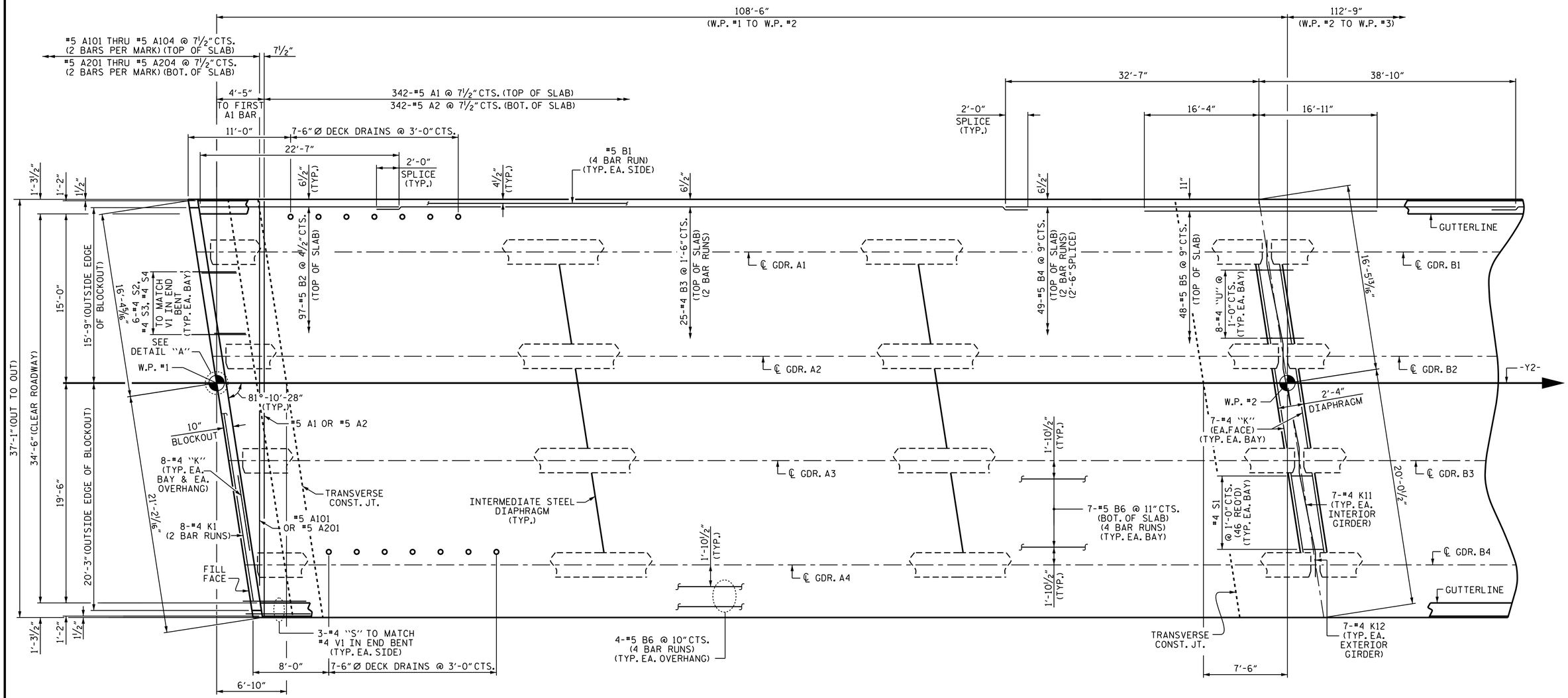
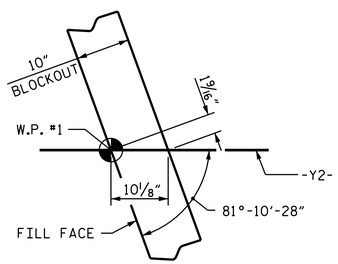
mcheek

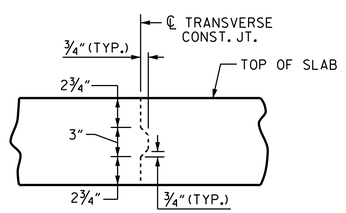


PLAN OF SPAN A

FOR INTERMEDIATE STEEL DIAPHRAGMS,
SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.)



DETAIL "A"



TRANSVERSE CONSTRUCTION JOINT

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

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by:
Marshall G. Cheek, Jr.
8549D6EBAA3B405...
7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-7
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CHECKED BY :	J.K.BOWLES	DATE :	3/31/16
DESIGN ENGINEER OF RECORD:	J.K.BOWLES	DATE :	3/31/16

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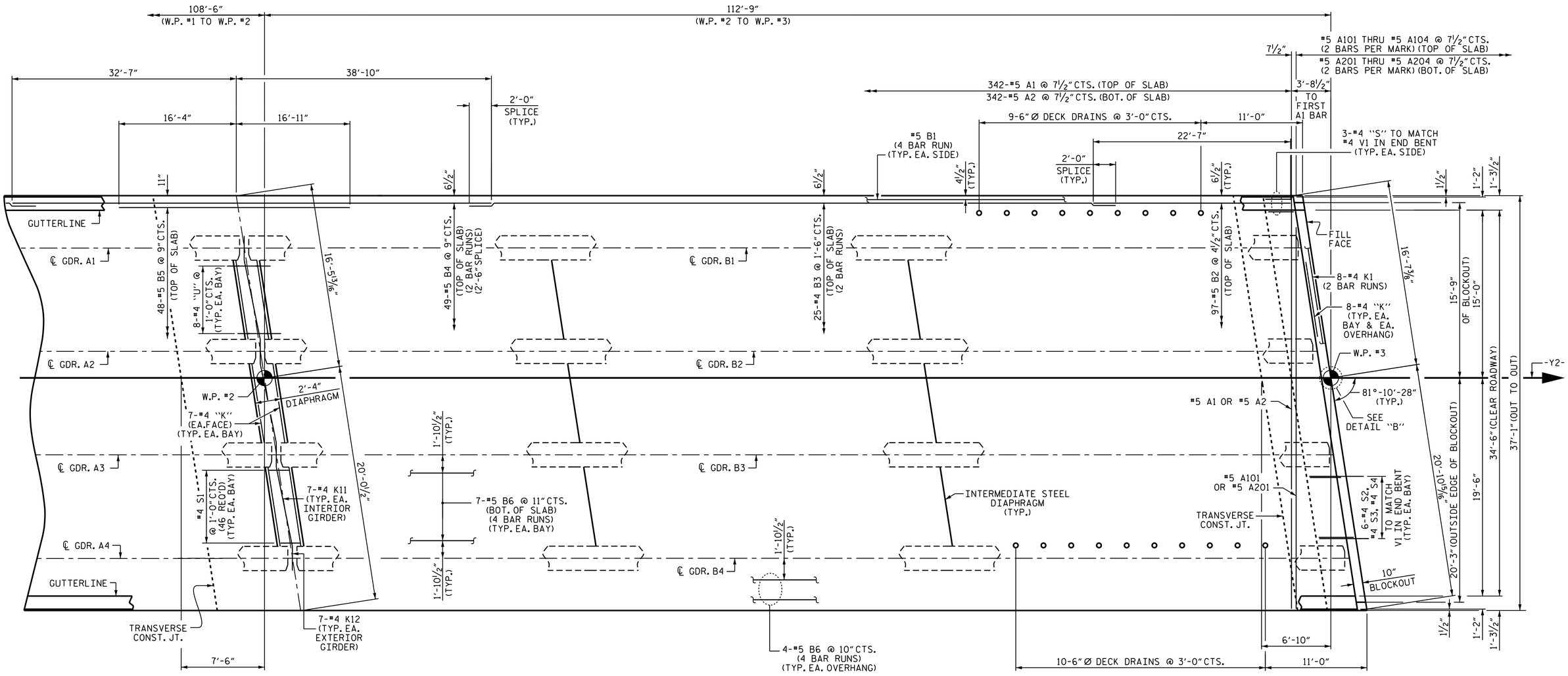

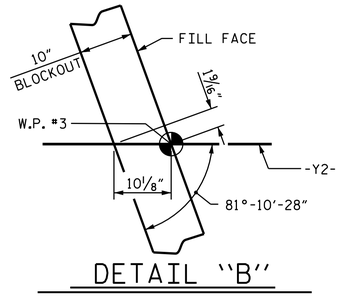

DETAIL "B"

PLAN OF SPAN B

FOR INTERMEDIATE STEEL DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.)

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN B

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Docusigned by: Marshall G. Cheek, Jr.
6549D6EBAA38405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-8
1			3			TOTAL SHEETS
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DRAWN BY :	N.D'AIUTO	DATE :	1/25/16
CHECKED BY :	J.K.BOWLES	DATE :	3/31/16
DESIGN ENGINEER OF RECORD:	J.K.BOWLES	DATE :	3/31/16

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mcheek

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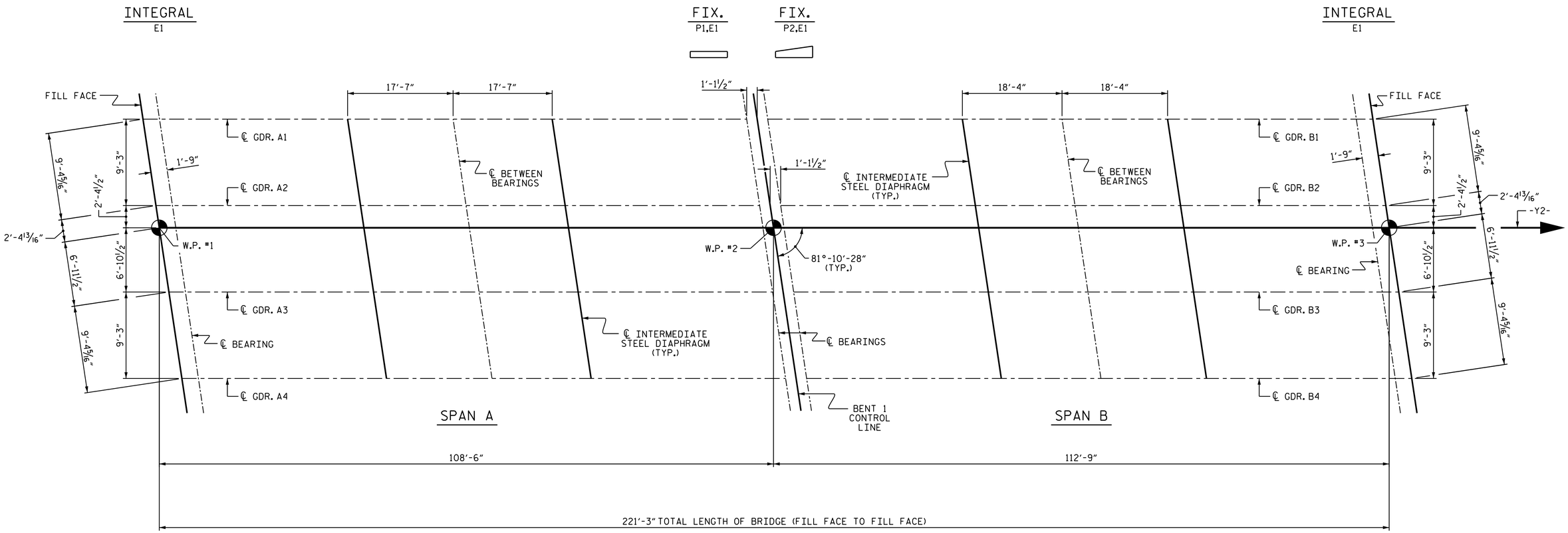

FRAMING PLAN

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-9
1			3			TOTAL SHEETS
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CHECKED BY : J. K. BOWLES DATE : 3/31/16
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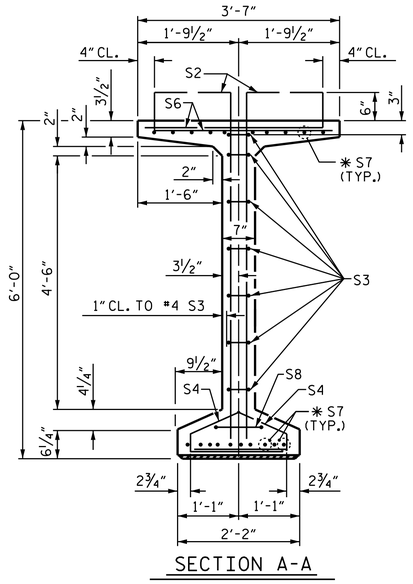
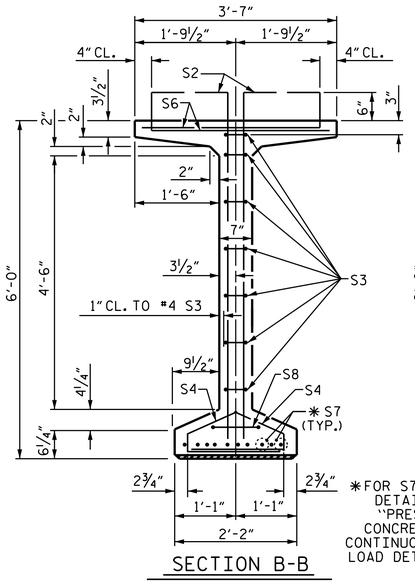
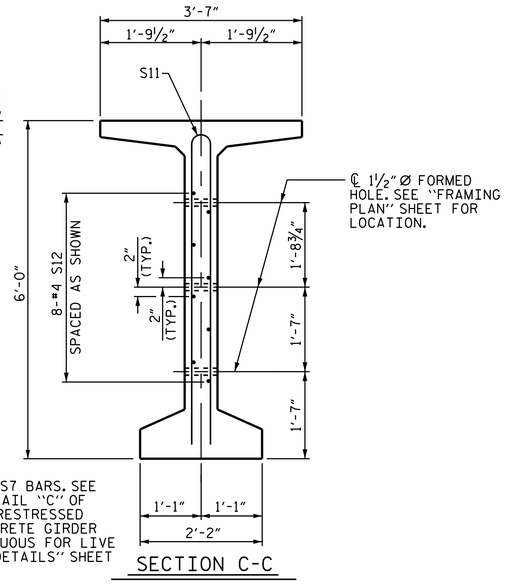


SECTION A-A



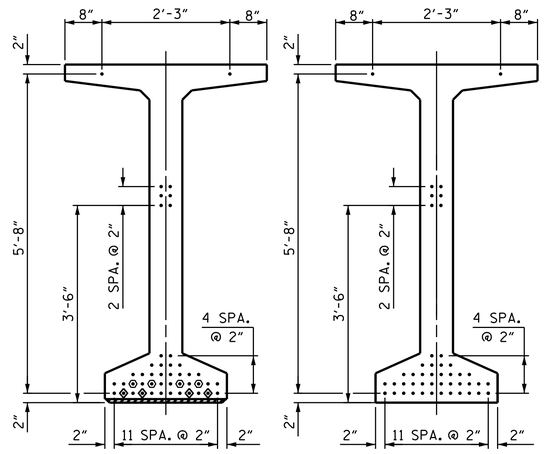
SECTION B-B



SECTION C-C

✱FOR S7 BARS, SEE DETAIL "C" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

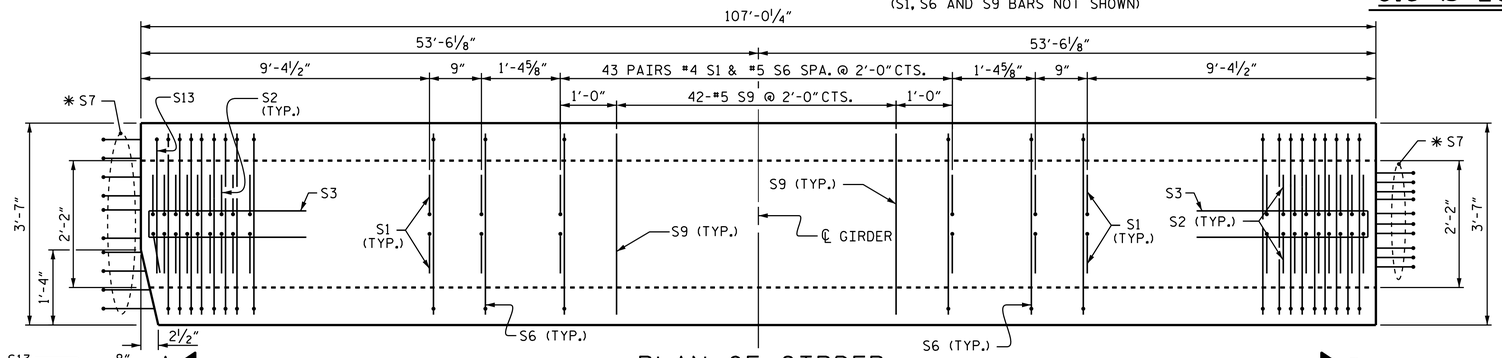
(S1, S6 AND S9 BARS NOT SHOWN)



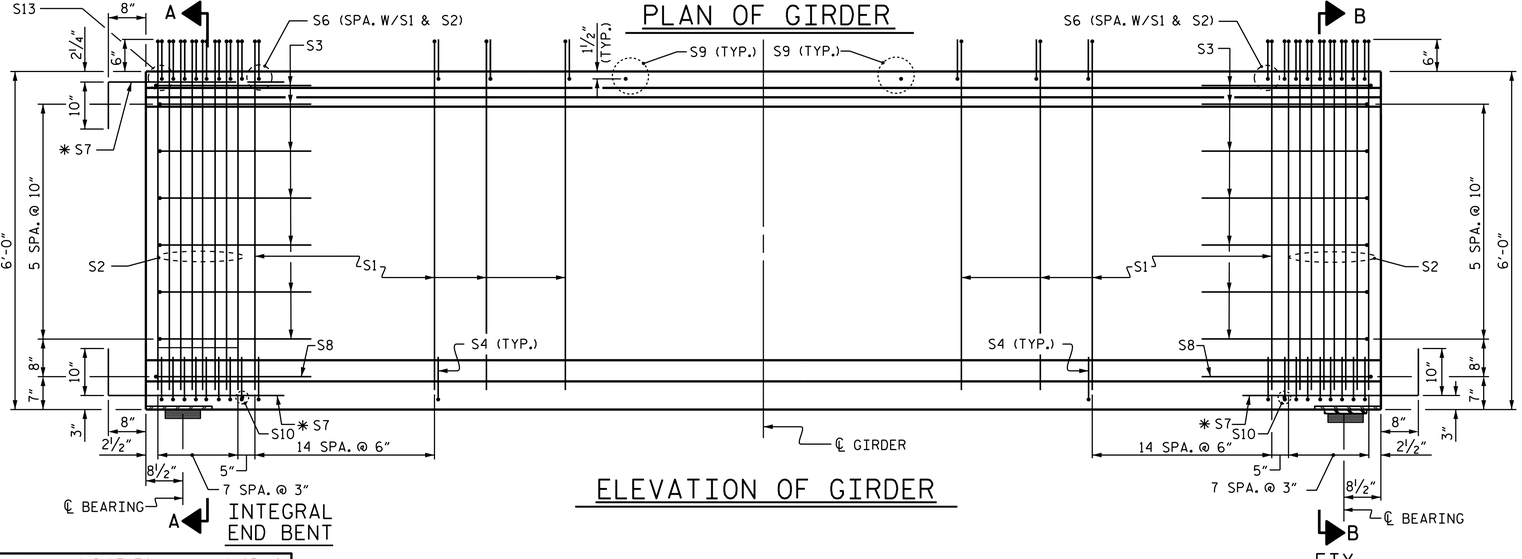
AT END OF GIRDER

AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT



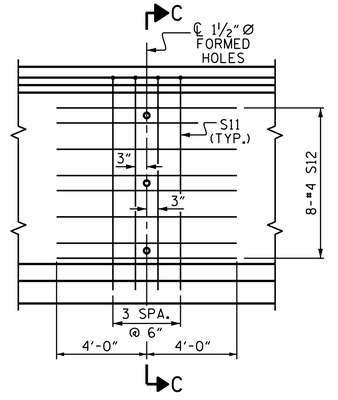
PLAN OF GIRDER



ELEVATION OF GIRDER

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◈ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ⬢ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR SPAN A GIRDERS. (2 LOCATIONS PER GIRDER.)

0.6"Ø L. R. GRADE 270 STRANDS

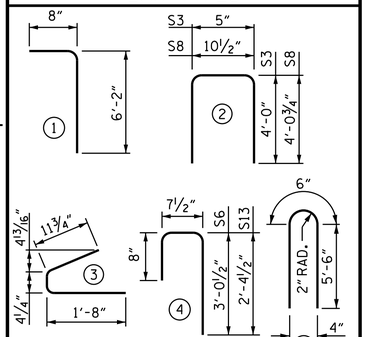
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	150	#4	1	6'-10"	685
S2	32	#5	1	6'-10"	228
S3	14	#4	2	8'-5"	79
S4	92	#4	3	3'-0"	184
S6	180	#5	4	4'-4"	814
✱S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	42	#5	STR	3'-3"	142
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-6"	96
S12	16	#4	STR	8'-0"	86
S13	1	#5	4	3'-8"	4

✱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	9,500 PSI CONCRETE	0.6"Ø L.R. STRANDS
	LBS.	C.Y.	No.
	2,453	22.9	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	107'-0¼"	428'-1"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

7/27/2017

ASSEMBLED BY : N.D'AIUTO	DATE : 1/25/16
CHECKED BY : J.K.BOWLES	DATE : 3/31/16
DRAWN BY : EEM 2/6/97	REV. 10/1/11 MAA/GM
CHECKED BY : VAP 2/6/97	REV. 6/13 MAA/GM
	REV. 1/15 MAA/TMG

DESIGN ENGINEER OF RECORD: J.K. BOWLES DATE : 3/31/16

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1			3			TOTAL SHEETS
2			4			30

STR. #2 STD. NO. PCG8

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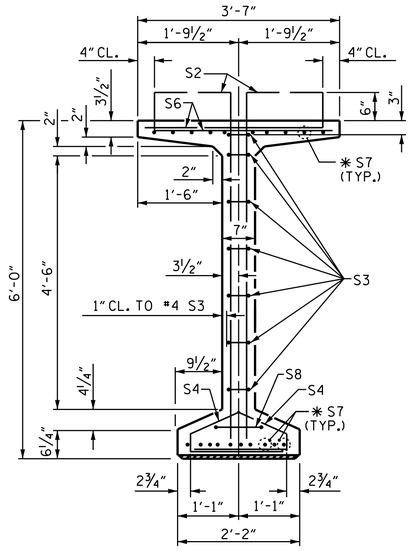
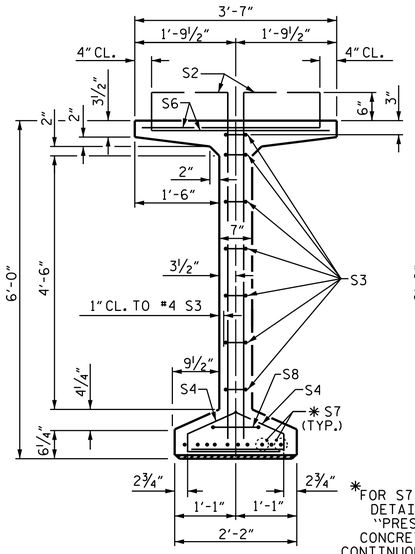
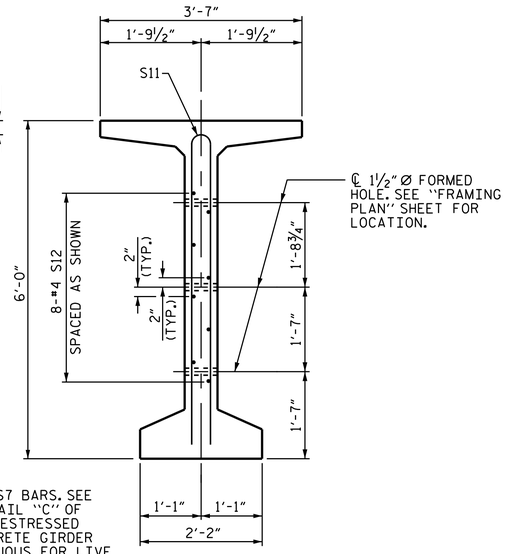


SECTION A-A



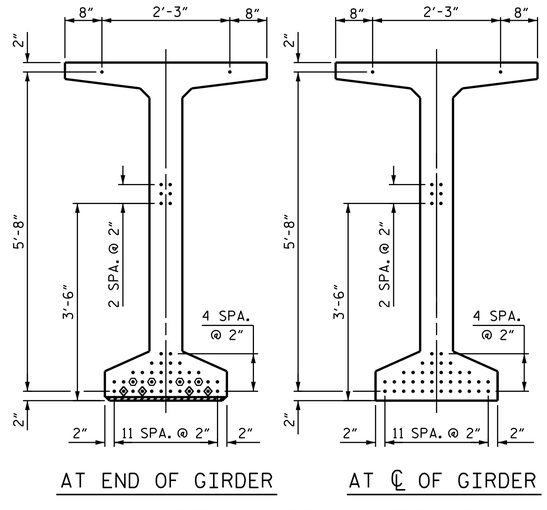
SECTION B-B



SECTION C-C

*FOR S7 BARS, SEE DETAIL "C" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET.

(S1, S6 AND S9 BARS NOT SHOWN)



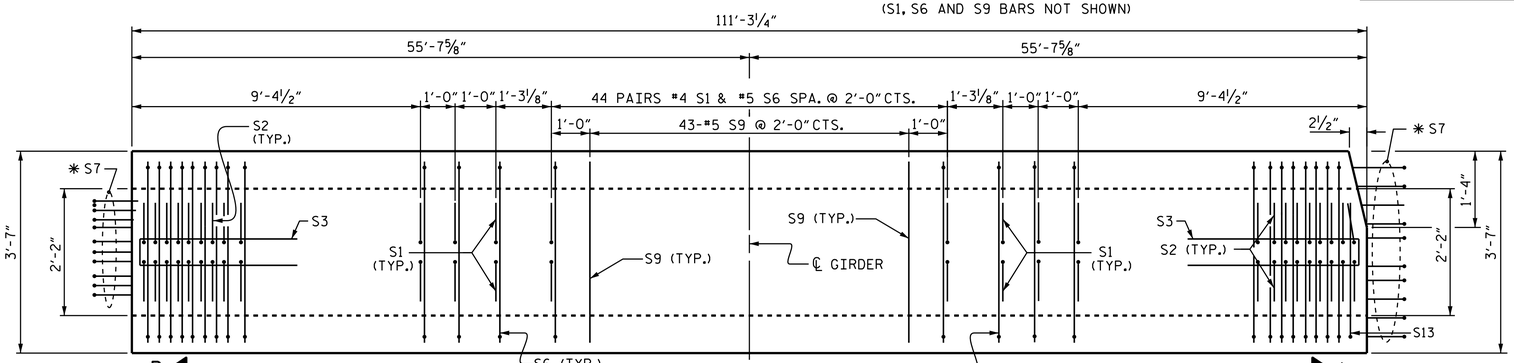
AT END OF GIRDER

AT ℄ OF GIRDER

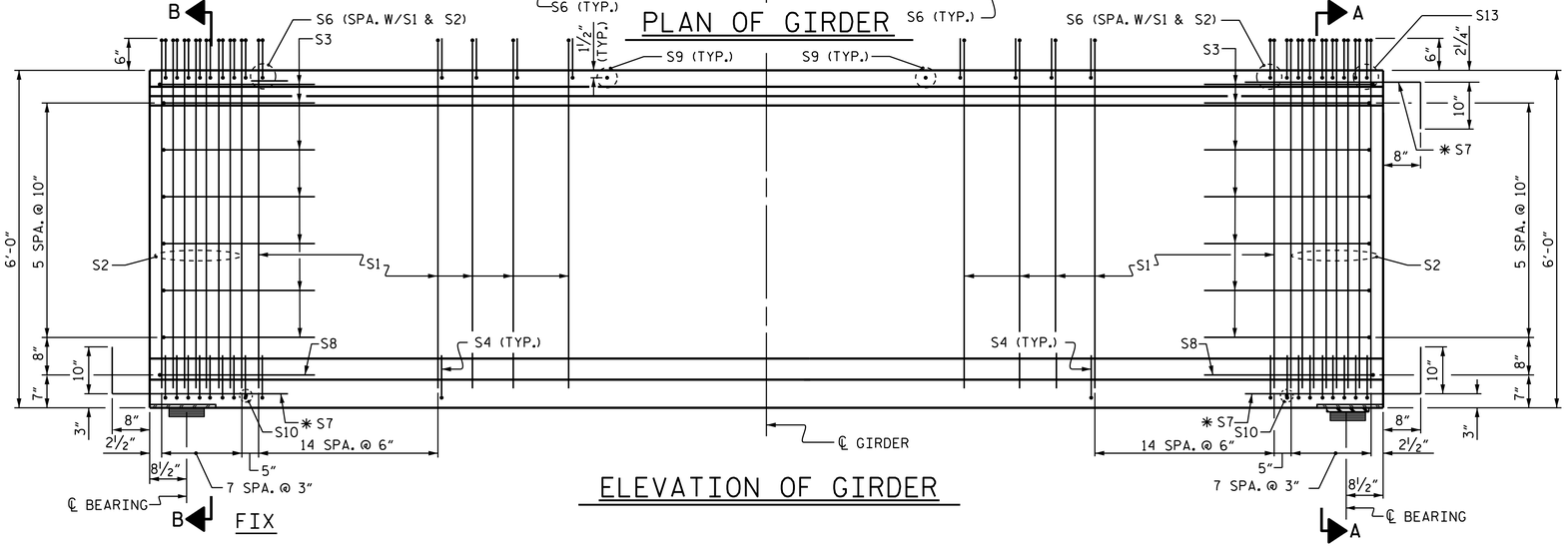
0.6" Ø LOW RELAXATION STRAND LAYOUT

DEBONDING LEGEND

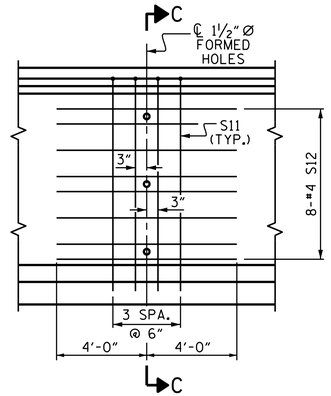
- ● FULLY BONDED STRANDS
- ◈ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◈ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER



PLAN OF GIRDER



ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR SPAN B GIRDERS. (2 LOCATIONS PER GIRDER)

0.6" Ø L. R. GRADE 270 STRANDS

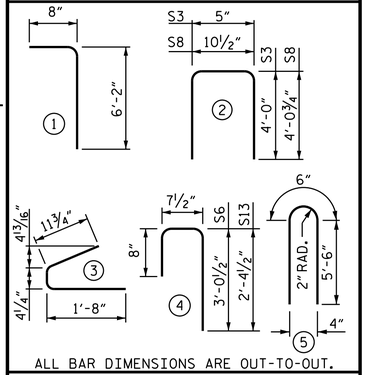
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	156	#4	1	6'-10"	712
S2	32	#5	1	6'-10"	228
S3	14	#4	2	8'-5"	79
S4	92	#4	3	3'-0"	184
S6	186	#5	4	4'-4"	841
* S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	43	#5	STR	3'-3"	146
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-6"	96
S12	16	#4	STR	8'-0"	86
S13	1	#5	4	3'-8"	4

* 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	9,500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LBS.	C.Y.	No.
	2,511	23.8	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	111'-3¼"	445'-1"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL C. CHEEK, JR.

Marshall C. Cheek, Jr.

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-11
1			3			TOTAL SHEETS
2			4			30

STR. #2 STD. NO. PCG8

ASSEMBLED BY : N.D'AIUTO DATE : 1/25/16
CHECKED BY : J.K.BOWLES DATE : 3/31/16

DRAWN BY : EEM 2/6/97
CHECKED BY : VAP 2/6/97

REV. 10/1/11	MAA/GM
REV. 6/13	MAA/GM
REV. 1/15	MAA/TMG

DESIGN ENGINEER OF RECORD: J.K. BOWLES DATE : 3/31/16

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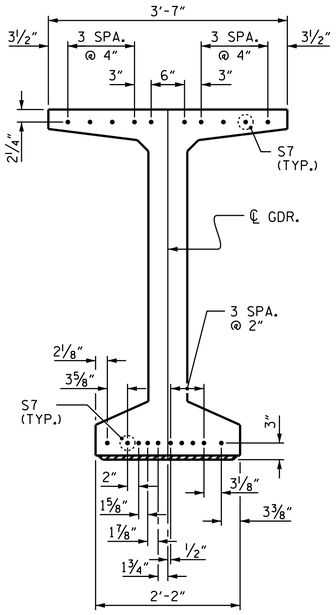
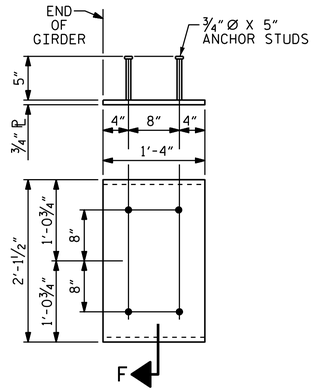
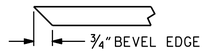


DETAIL "C"



EMBEDDED PLATE "B-1" DETAILS FOR 72" MODIFIED BULB TEES

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7,600 PSI.

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

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

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

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN A, GIRDERS 1 THROUGH 4																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.039	0.078	0.114	0.147	0.176	0.201	0.221	0.235	0.244	0.247	0.244	0.235	0.221	0.201	0.176	0.147	0.114	0.078	0.039	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.017	0.036	0.052	0.065	0.077	0.090	0.097	0.105	0.107	0.110	0.107	0.105	0.097	0.090	0.077	0.065	0.052	0.036	0.017	0.000
FINAL CAMBER †	0	¼"	½"	¾"	1"	1 3/16"	1 5/16"	1½"	1 9/16"	1 5/8"	1 5/8"	1 5/8"	1 9/16"	1½"	1 5/16"	1 3/16"	1"	¾"	½"	¼"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN B, GIRDERS 1 THROUGH 4																				
TWENTIETH POINTS	℄ BRG.	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.041	0.081	0.119	0.154	0.185	0.211	0.231	0.246	0.256	0.259	0.256	0.246	0.231	0.211	0.185	0.154	0.119	0.081	0.041	0.000
✱ DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.021	0.042	0.061	0.080	0.095	0.109	0.119	0.128	0.131	0.135	0.131	0.128	0.119	0.109	0.095	0.080	0.061	0.042	0.021	0.000
FINAL CAMBER †	0	¼"	7/16"	11/16"	⅞"	1 1/16"	1¼"	1 3/8"	1 7/16"	1½"	1½"	1½"	1 7/16"	1 3/8"	1¼"	1 1/16"	⅞"	11/16"	7/16"	¼"	0

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

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...
7/27/2017

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1			3		
2			4		

SHEET NO. S2-12
TOTAL SHEETS 30

ASSEMBLED BY : N.D'AIUTO DATE : 1/26/16
CHECKED BY : J.K.BOWLES DATE : 3/31/16

DRAWN BY : ELR 11/91
CHECKED BY : GRP 11/91

REV. 10/1/11 MAA/GM
REV. 1/15 MAA/TMG
REV. 2/15 MAA/TMG

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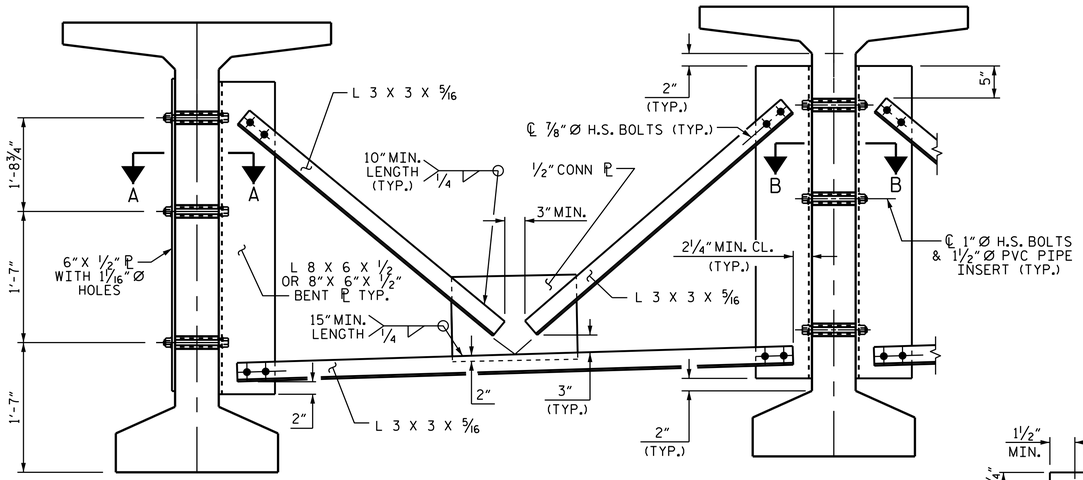
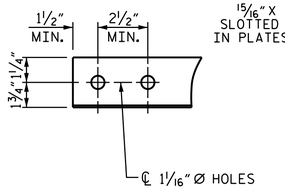


PART SECTION AT INTERMEDIATE DIAPHRAGM



ANGLE END
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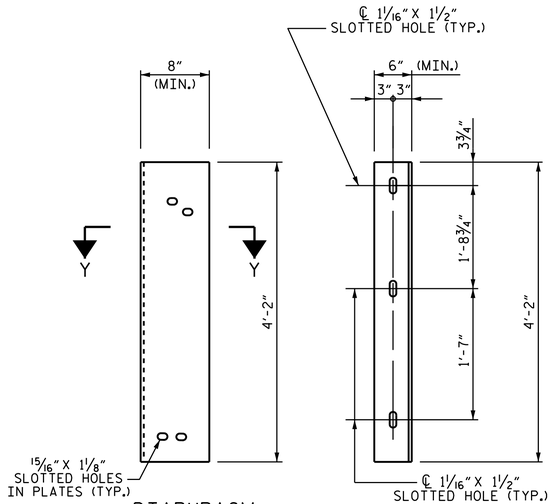
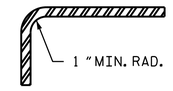




SECTION Y-Y

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 AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE 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.

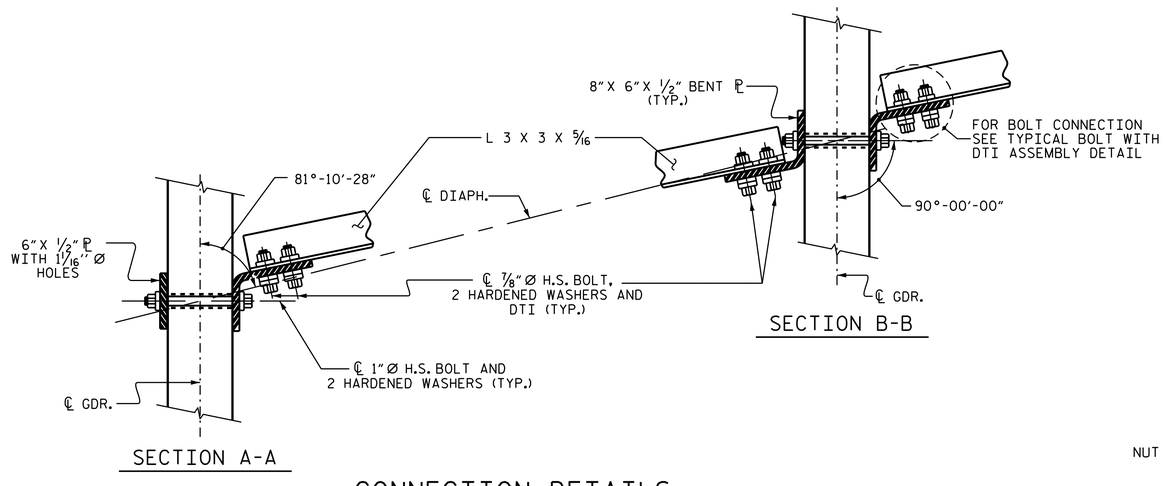
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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.

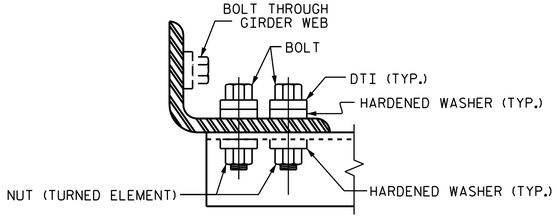
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR MODIFIED 72" PRESTRESSED CONCRETE GIRDERS.



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...
7/27/2017

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1			3			TOTAL SHEETS
2			4			30

ASSEMBLED BY : N.D'AIUTO	DATE : 1/26/16
CHECKED BY : J.K.BOWLES	DATE : 3/31/16
DRAWN BY : RWW 11/09	ADDED 11/23/09R
CHECKED BY : GM 11/09	REV. 10/1/11 MAA/GM

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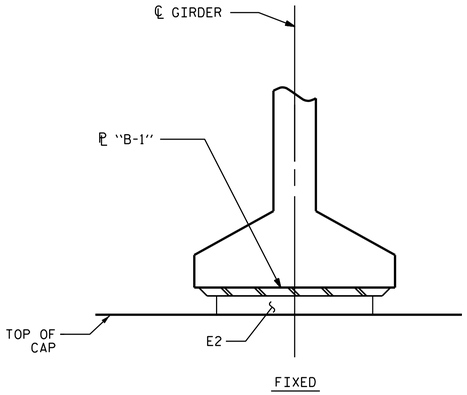
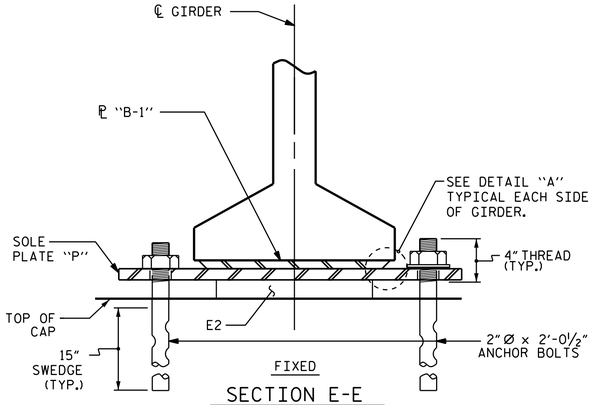
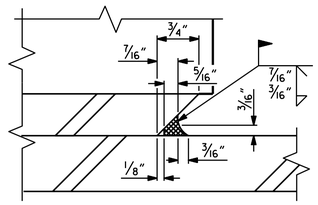


SECTION D-D



SECTION E-E



DETAIL "A"

NOTES

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

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.

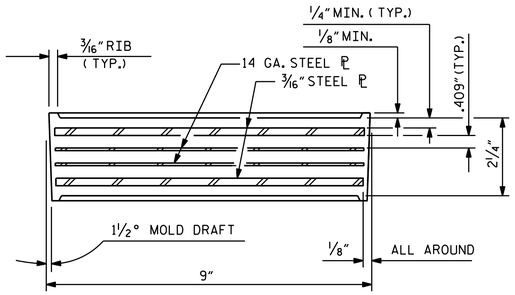
SOLE PLATE "P", BOLTS, NUTS, AND WASHERS SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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.

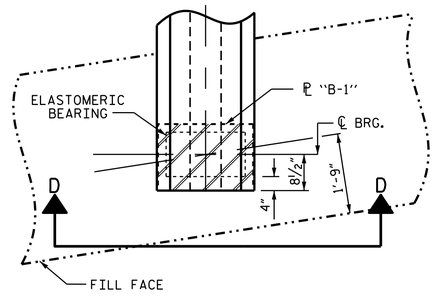
ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

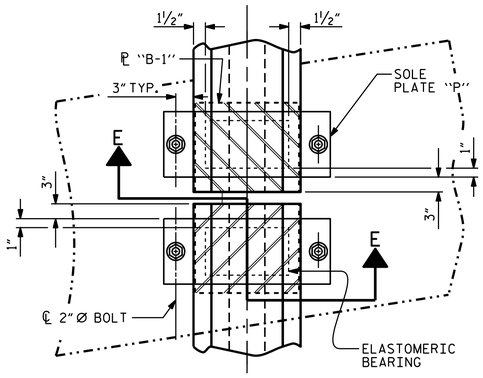
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.



TYPICAL SECTION OF ELASTOMERIC BEARINGS

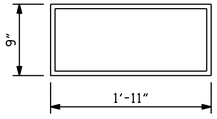


PLAN VIEW AT INTEGRAL END BENT



TYPICAL HALF-PLAN

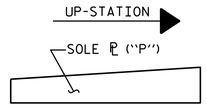
(SHOWING CONTINUOUS BENT)



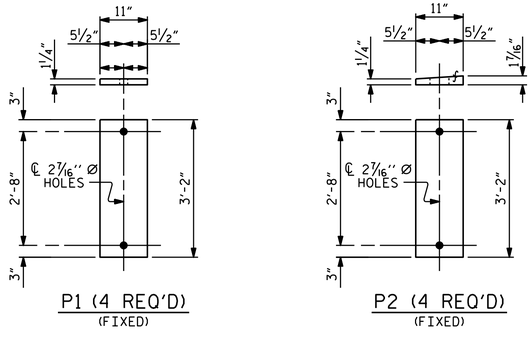
E1 (16 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



SOLE ℄ PLACEMENT DETAIL



SOLE PLATE DETAILS ("P")

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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Document ID: Marshall G. Cheek, Jr. 8549D6EBAA3B405...

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

ASSEMBLED BY : N.D'AIUTO	DATE : 1/21/16
CHECKED BY : J.K.BOWLES	DATE : 3/31/16
DRAWN BY : EEM 2/97	REV. 10/1/11 MAA/GM
CHECKED BY : VAP 2/97	REV. 6/13 AAC/MAA
	REV. 1/15 MAA/TMC

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1			3			TOTAL SHEETS
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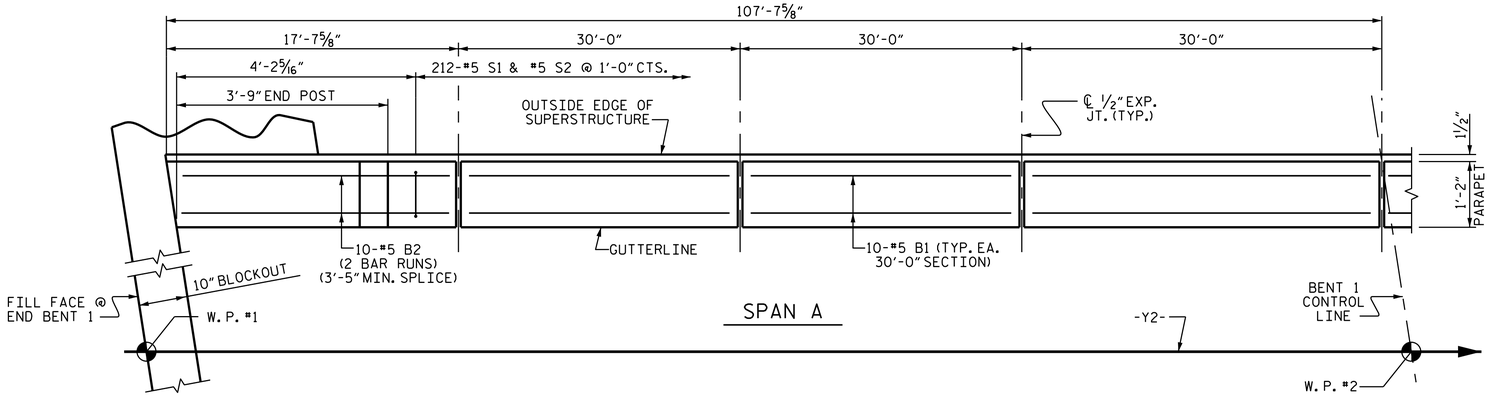
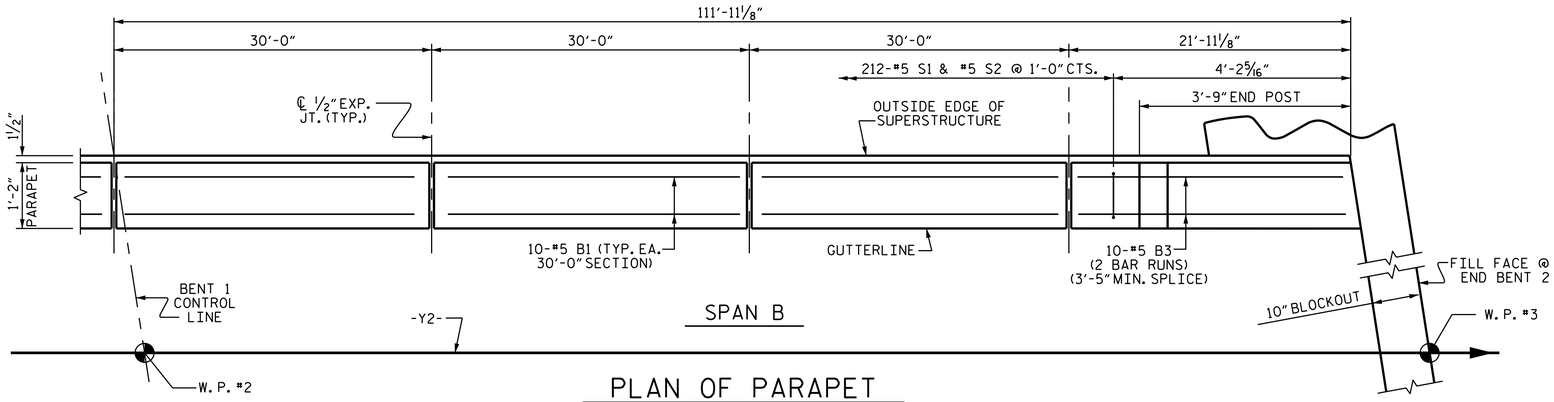
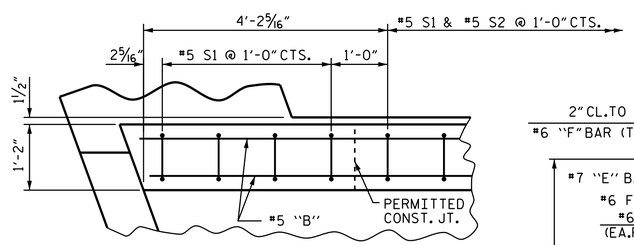


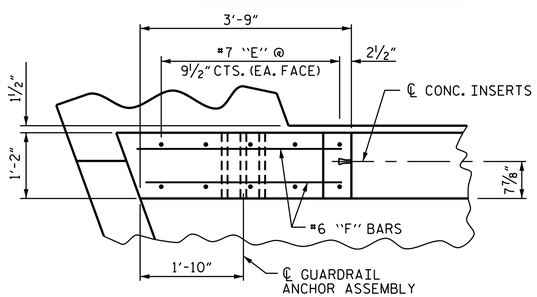


PLAN OF PARAPET

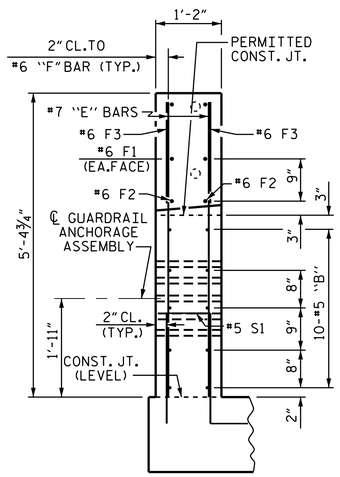
LEFT SIDE SHOWN, RIGHT SIDE SIMILAR



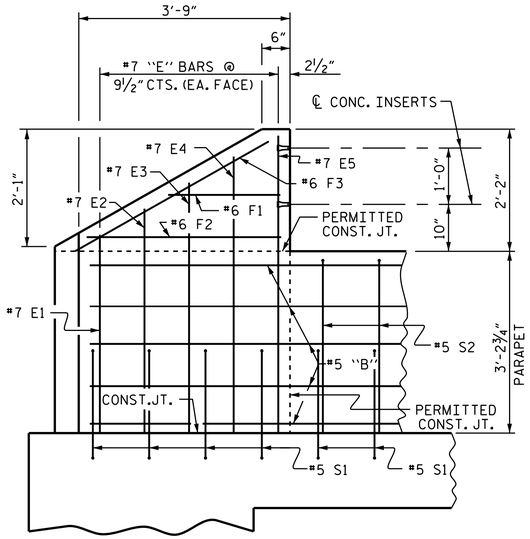
PLAN OF PARAPET



PLAN OF END POST



END VIEW



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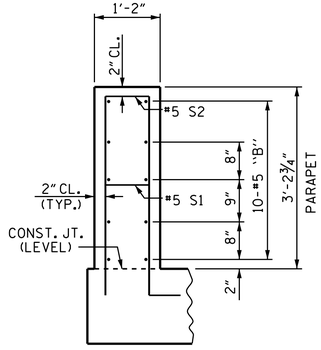
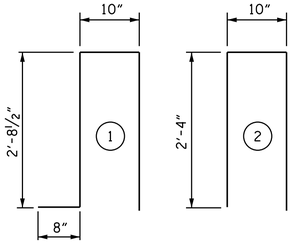


SECTION THROUGH PARAPET

PARAPET AND END POST FOR TWO BAR RAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

PARAPET AND END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	120	#5	STR	29'-7"	3703
✳B2	40	#5	STR	10'-4"	431
✳B3	40	#5	STR	12'-7"	525
✳E1	8	#7	STR	3'-3"	53
✳E2	8	#7	STR	3'-9"	61
✳E3	8	#7	STR	4'-3"	69
✳E4	8	#7	STR	4'-8"	76
✳E5	8	#7	STR	5'-0"	82
✳F1	8	#6	STR	1'-10"	22
✳F2	8	#6	STR	3'-2"	38
✳F3	8	#6	STR	3'-7"	43
✳S1	440	#5	1	6'-11"	3174
✳S2	424	#5	2	5'-6"	2432

✳EPOXY COATED REINFORCING STEEL	LBS.	10709
CLASS AA CONCRETE	C.Y.	62.1
1'-2" x 3'-2¾" CONCRETE PARAPET	LIN. FT.	439.13

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

1'-2" X 3'-2¾" CONCRETE PARAPET AND END POST DETAILS FOR TWO BAR METAL RAIL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D8EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-15
1			3			TOTAL SHEETS
2			4			30

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DRAWN BY :	N. D'AIUTO	DATE : 1/19/16
CHECKED BY :	J.K.BOWLES	DATE : 3/31/16
DESIGN ENGINEER OF RECORD:	J.K.BOWLES	DATE : 3/31/16

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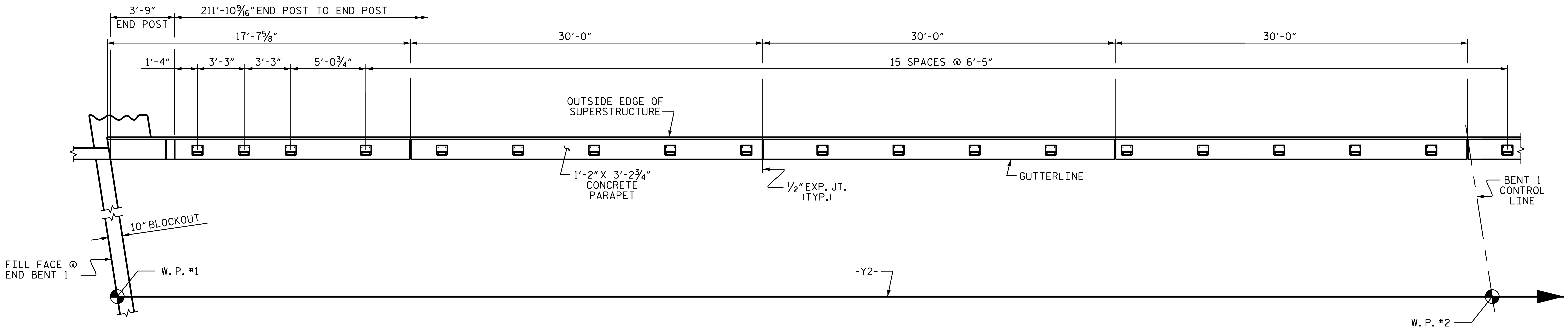
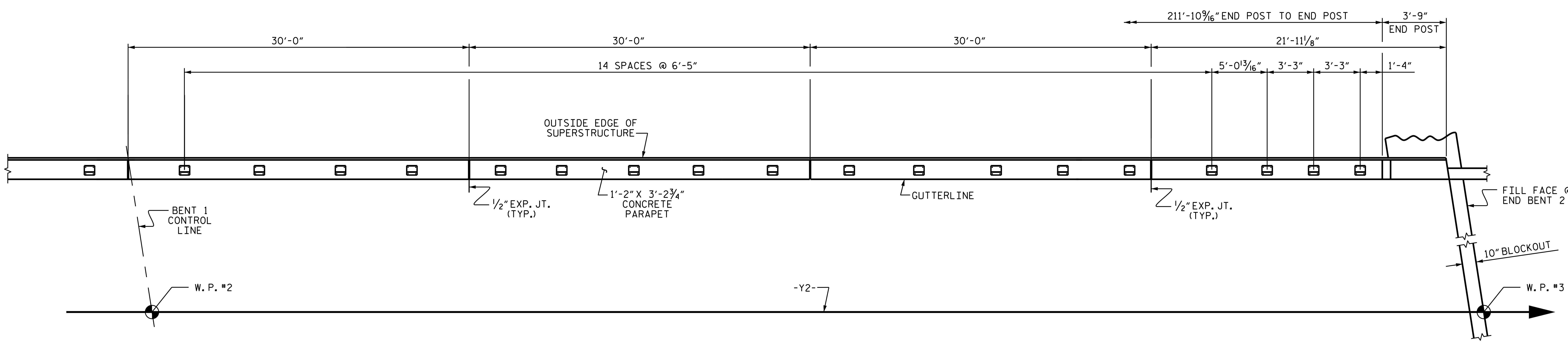


SPAN A



SPAN B

PLAN OF RAIL POST SPACING

LEFT SIDE SHOWN, RIGHT SIDE SIMILAR.

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

SHEET 2 OF 5

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
8549D6EBAA3B405...

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF RAIL POST SPACING

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S2-16
1			3				TOTAL SHEETS
2			4				30

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STR. #2

DRAWN BY :	N. D'AIUTO	DATE :	1/14/16
CHECKED BY :	J.K.BOWLES	DATE :	3/31/16
DESIGN ENGINEER OF RECORD:	J.K.BOWLES	DATE :	3/31/16

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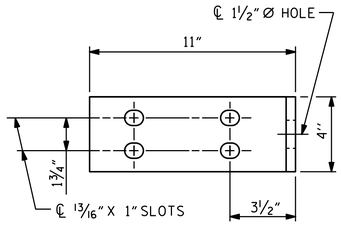
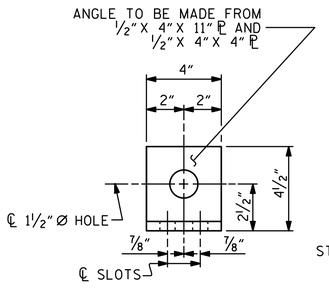
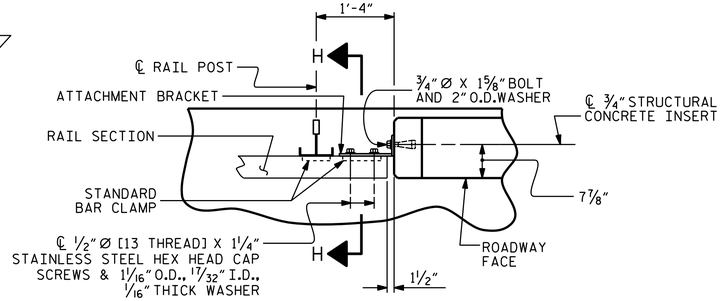
mcheek



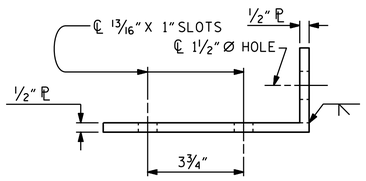
ELEVATION



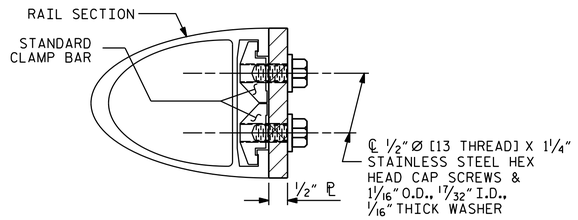
END VIEW



PLAN - RAIL AND END POST

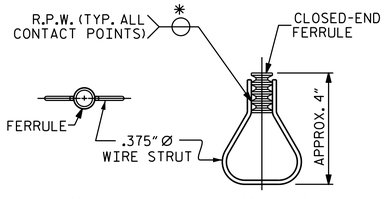


TOP VIEW



SECTION H-H

DETAILS FOR ATTACHING METAL RAIL TO END POST



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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

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 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.

ASSEMBLED BY : N.D'AIUTO	DATE : 1/14/16	REV. 5/7/03	RWW/JTE
CHECKED BY : J.K.BOWLES	DATE : 3/31/16	REV. 5/1/06	TLA/GM
DRAWN BY : FCJ 1/88		REV. 10/1/11	MAA/GM
CHECKED BY : CRK 3/89			

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mcneak

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 3 OF 5

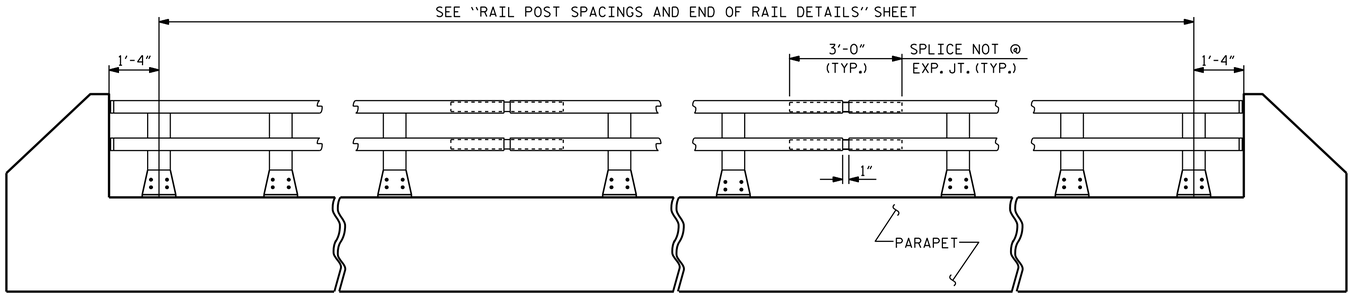
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS

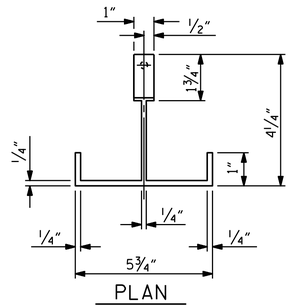
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-17
1			3			TOTAL SHEETS
2			4			30

STR. #2 STD. NO. BMR2

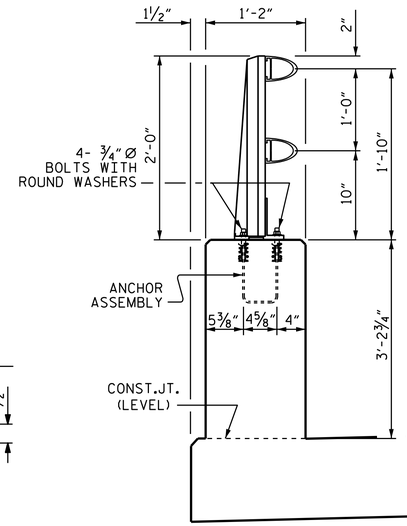


ELEVATION

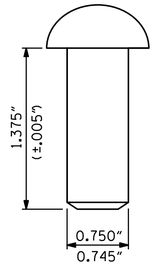
NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE SHEET 3 OF 5.



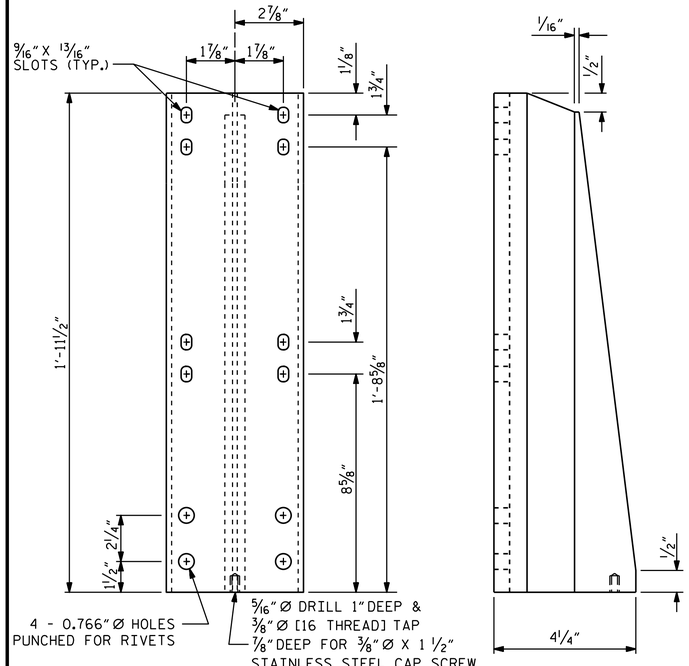
PLAN



SECTION THROUGH PARAPET AND RAIL

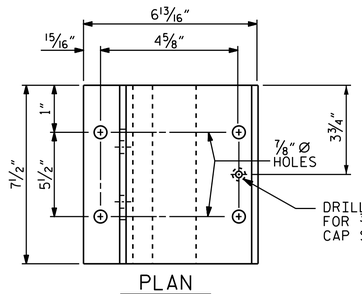


RIVET DETAIL



FRONT ELEVATION SIDE ELEVATION

DETAILS OF POST



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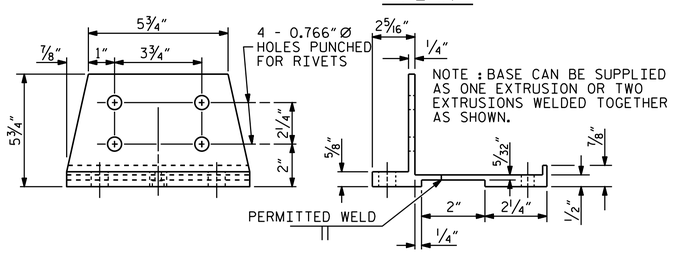

FRONT ELEVATION SIDE ELEVATION

POST BASE DETAILS

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 SHEET 3 OF 5.

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 = 423.76 LIN. FT.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. B549D6EBAA3B405...

7/27/2017

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

SHEET NO. S2-18

TOTAL SHEETS 30

ASSEMBLED BY :	N.D'AIUTO	DATE :	1/14/16
CHECKED BY :	J.K.BOWLES	DATE :	3/31/16
DRAWN BY :	EEM 6/94	REV. 5/1/06	TLA/GM
CHECKED BY :	RGW 6/94	REV. 10/1/11	MAA/GM
		REV. 6/13	MAA/GM

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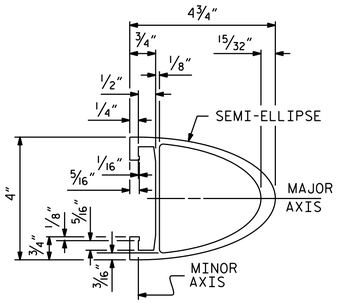
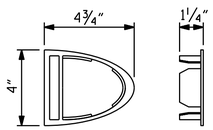
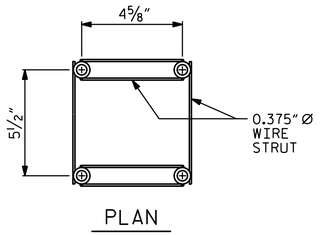
STR. #2 STD. NO. BMR3



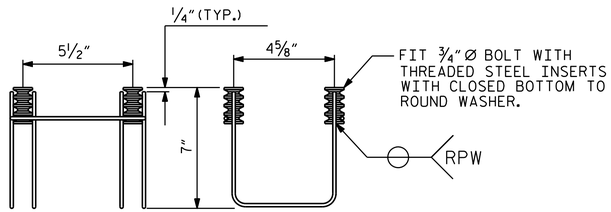
RAIL SECTION



RAIL CAP



PLAN



SIDE VIEW ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(72 ASSEMBLIES REQUIRED)

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

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

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

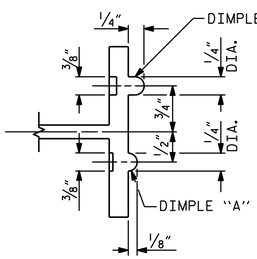
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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.

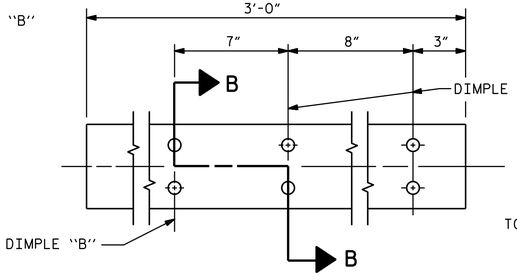
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

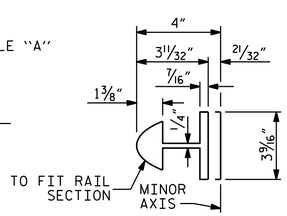
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE ¾" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

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



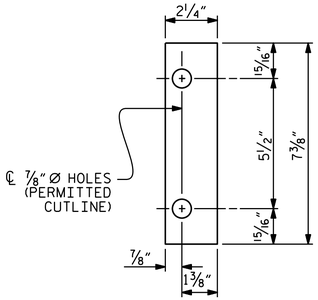
SECTION B - B



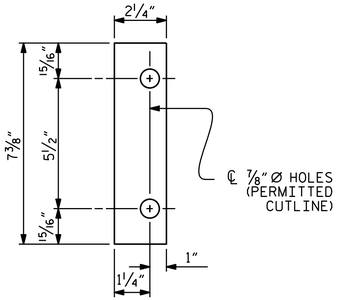


BAR SECTION

EXPANSION BAR DETAILS



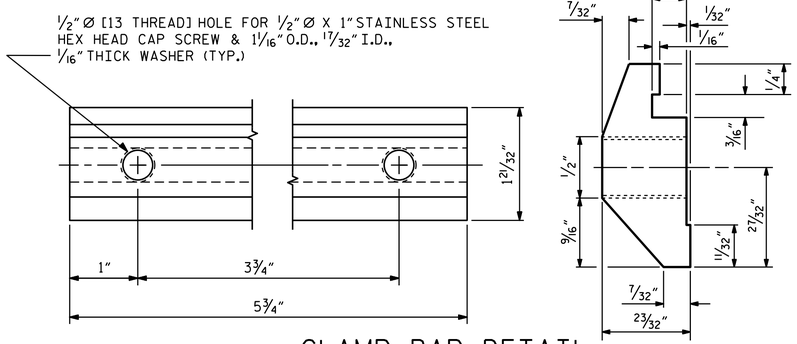
FRONT PLATE



REAR PLATE

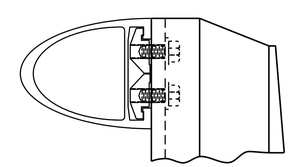
SHIM DETAILS

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



CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
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7/27/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-19
1			3			TOTAL SHEETS
2			4			30

STR. #2 STD. NO. BMR4

ASSEMBLED BY : N.D'AIUTO	DATE : 1/14/16		
CHECKED BY : J.K.BOWLES	DATE : 3/31/16		
DRAWN BY : EEM 6/94	REV. 8/16/99	MAB/LES	
CHECKED BY : RGW 6/94	REV. 5/1/06R	KMM/GM	
	REV. 10/1/11	MAA/GM	

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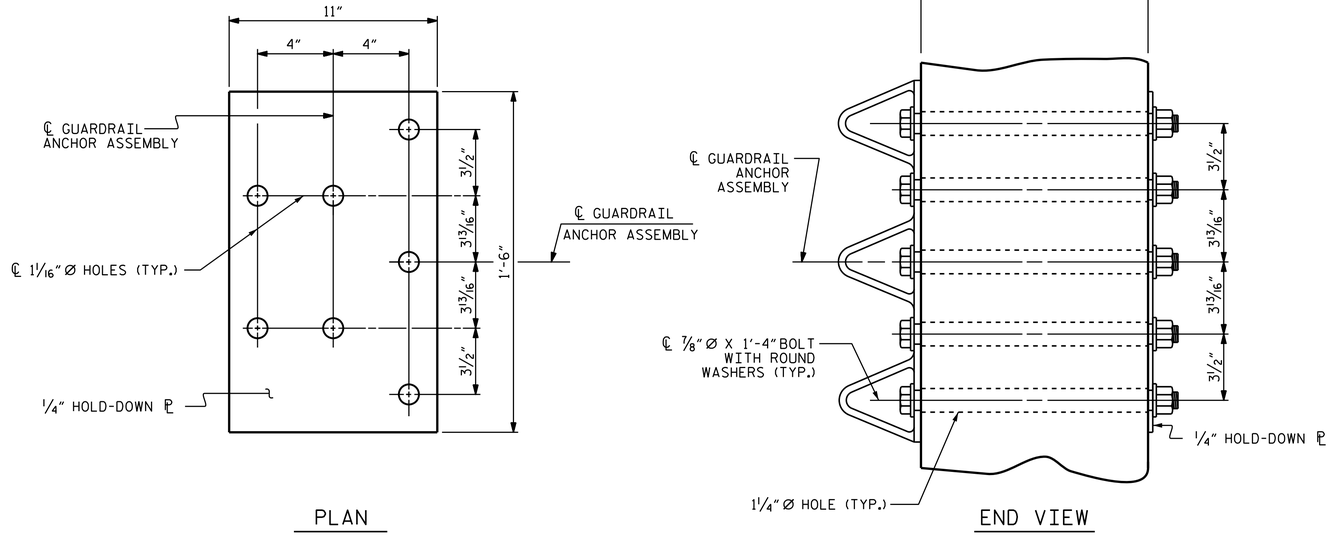


GUARDRAIL ANCHOR ASSEMBLY DETAILS

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.

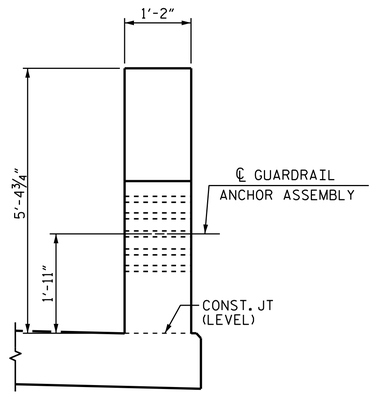
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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

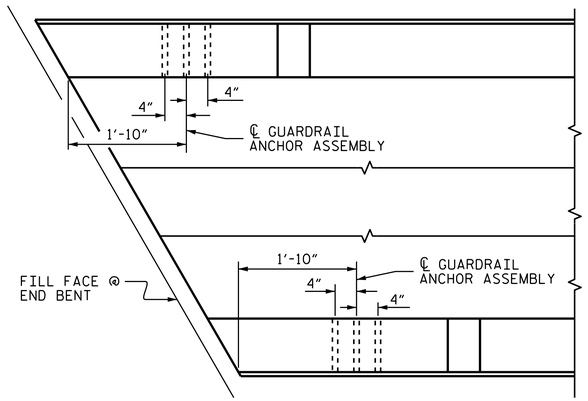
THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

SKETCH SHOWING POINTS OF ATTACHMENT

✳ LOCATION OF GUARDRAIL ATTACHMENT



END VIEW



PLAN

END BENT 1 SHOWN, END BENT 2 SIMILAR

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek, Jr. 6549D6EBAA3B405...

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

ASSEMBLED BY :	N.D'AIUTO	DATE : 1/26/16
CHECKED BY :	J.K.BOWLES	DATE : 3/31/16
DRAWN BY : MAA	5/10	REV. 12/5/11 MAA/GM
CHECKED BY : GM	5/10	REV. 6/13 MAA/GM
		REV. 1/15 MAA/TMG

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2			4			30

STR. #2 STD. NO. GRA3

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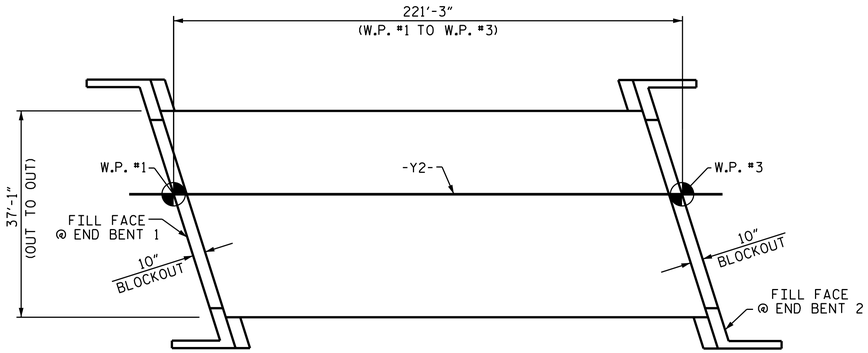
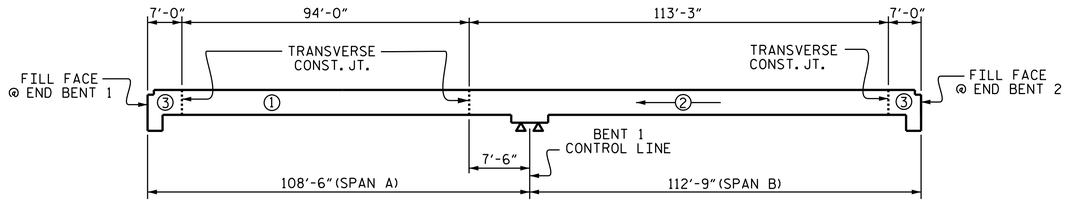
mcheek

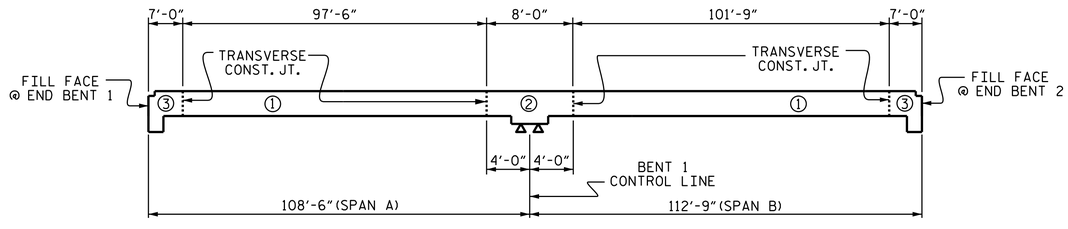


LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 8,205)



POUR SEQUENCE

= INDICATES POUR NUMBER AND DIRECTION OF POUR



OPTIONAL POUR SEQUENCE

POUR ② CAN NOT BE STARTED UNTIL BOTH ADJACENT ①POURS REACH A MINIMUM OF 3,000 PSI.

REINFORCING BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	342	#5	STR	36'-9"	13109
A2	342	#5	STR	36'-9"	13109
✳ A101	4	#5	STR	29'-11"	125
✳ A102	4	#5	STR	21'-11"	91
✳ A103	4	#5	STR	13'-10"	58
✳ A104	4	#5	STR	5'-9"	24
A201	4	#5	STR	29'-11"	125
A202	4	#5	STR	21'-11"	91
A203	4	#5	STR	13'-10"	58
A204	4	#5	STR	5'-9"	24
✳ B1	8	#5	STR	56'-9"	474
✳ B2	194	#5	STR	22'-7"	4570
✳ B3	100	#4	STR	29'-4"	1959
✳ B4	98	#5	STR	37'-0"	3782
✳ B5	48	#5	STR	33'-3"	1665
B6	116	#5	STR	56'-6"	6836
K1	32	#4	STR	19'-6"	417
K2	12	#4	STR	5'-4"	43
K3	6	#4	STR	6'-10"	27
K4	60	#4	STR	8'-5"	337
K5	6	#4	STR	7'-11"	32
K6	4	#4	STR	2'-6"	7
K7	4	#4	STR	3'-3"	9
K8	20	#4	STR	4'-0"	53
K9	4	#4	STR	3'-10"	10
K10	6	#4	STR	5'-10"	23
K11	14	#4	6	11'-2"	104
K12	14	#4	5	5'-8"	53
S1	138	#4	2	2'-9"	254
S2	44	#4	3	14'-1"	414
✳ S3	48	#4	4	11'-11"	382
✳ S4	48	#4	4	11'-1"	355
U1	18	#4	1	16'-1"	193
U2	6	#4	7	11'-1"	44

REINFORCING STEEL LBS. 22,263

✳ EPOXY COATED REINFORCING STEEL LBS. 26,594

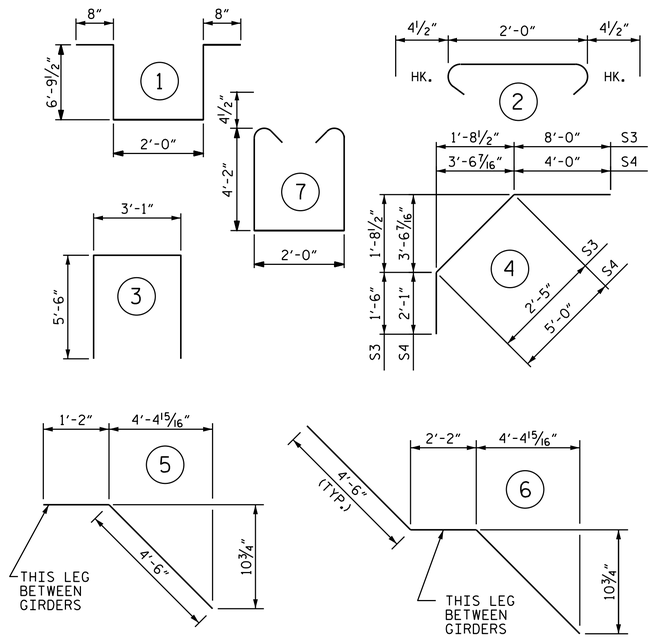
GROOVING BRIDGE FLOORS

APPROACH SLABS	736 SQ.FT.
BRIDGE DECK	5,706 SQ.FT.
TOTAL	6,442 SQ.FT.

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

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

—SUPERSTRUCTURE BILL OF MATERIAL—

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR #1	117.4	22,263	26,594
POUR #2	155.5		
POUR #3	71.4		
TOTALS**	344.3	22,263	26,594

**QUANTITIES FOR PARAPET AND END POSTS ARE NOT INCLUDED

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

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DRAWN BY : N.D'AIUTO DATE: 1/26/16
CHECKED BY : J.K.BOWLES DATE: 3/31/16
DESIGN ENGINEER OF RECORD : J.K.BOWLES DATE: 3/31/16

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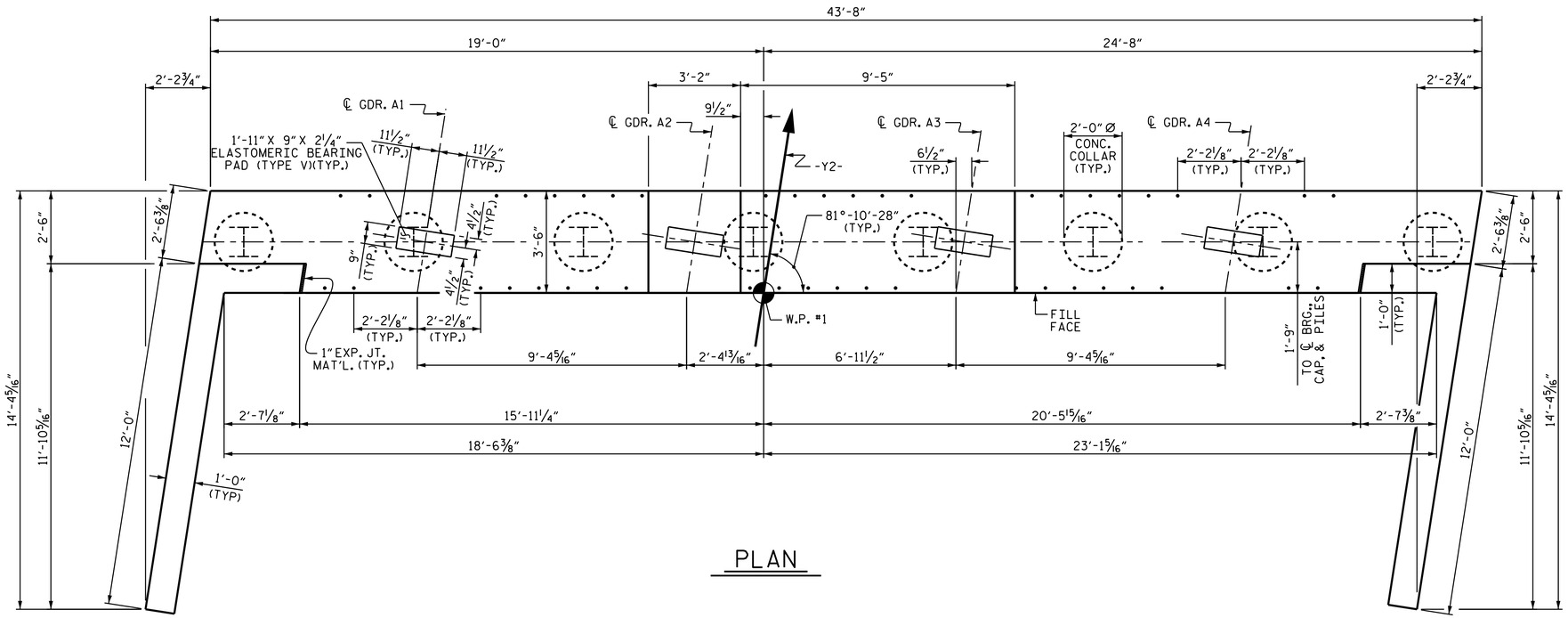
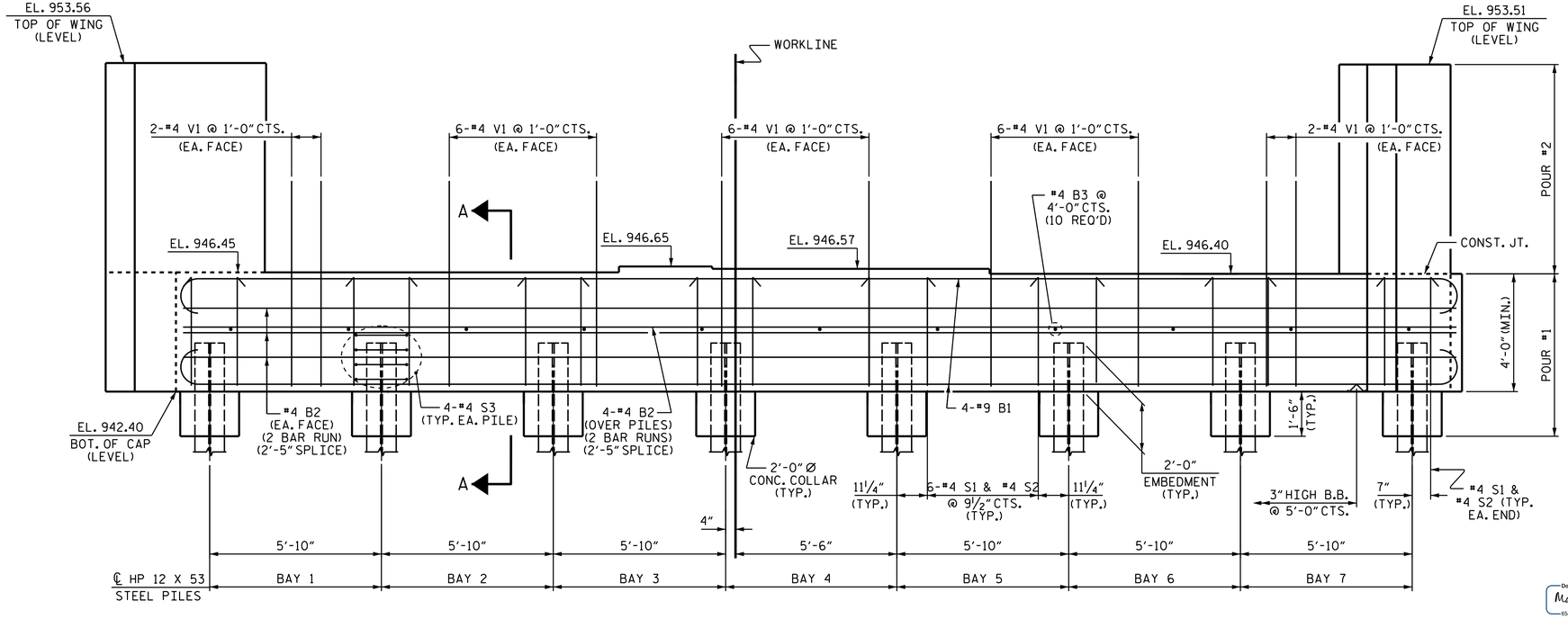


PLAN



ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-22
1			3			TOTAL SHEETS
2			4			30

DRAWN BY : J. K. BOWLES DATE : 5/10/16
CHECKED BY : K. D. LAYNE DATE : 7/21/16
DESIGN ENGINEER OF RECORD: J. K. BOWLES DATE : 7/21/16

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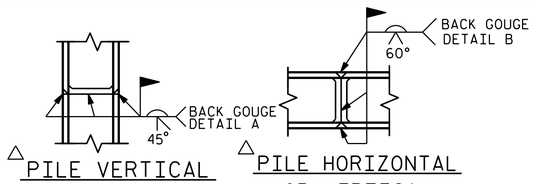
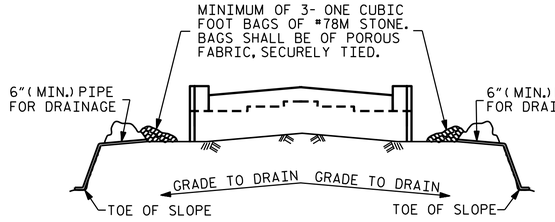


△ POSITION OF PILE DURING WELDING.

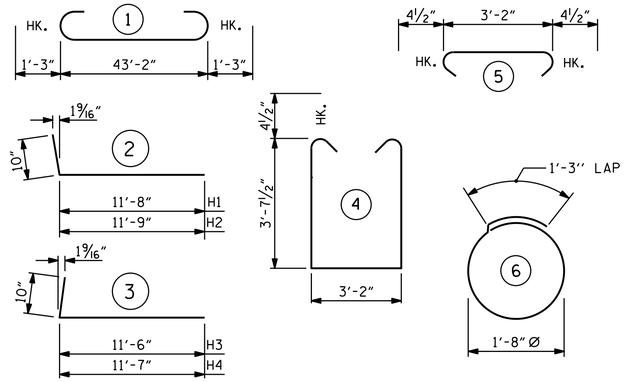


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES
8 EA.

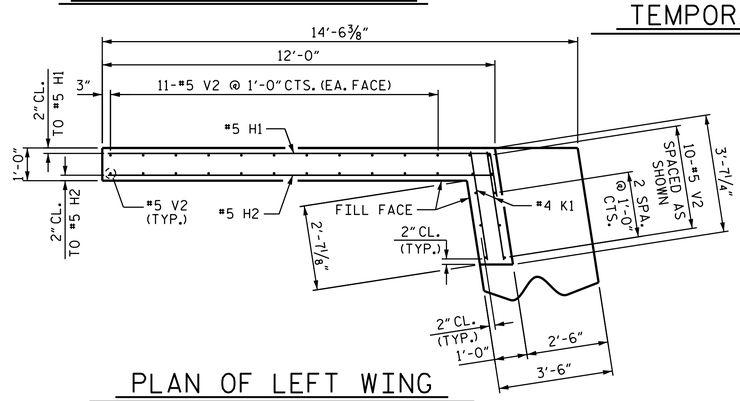
BILL OF MATERIAL

END BENT 1

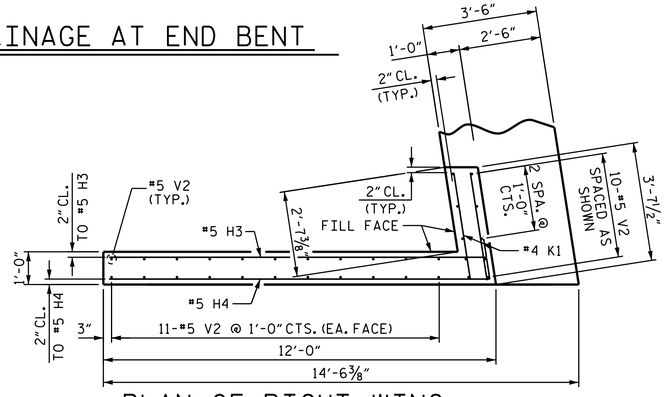
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	45'-8"	1242
B2	20	#4	STR	22'-11"	306
B3	10	#4	STR	3'-2"	21
H1	22	#5	2	12'-6"	287
H2	22	#5	2	12'-7"	289
H3	22	#5	3	12'-4"	283
H4	22	#5	3	12'-5"	285
K1	28	#4	STR	3'-3"	61
S1	44	#4	4	11'-2"	328
S2	44	#4	5	3'-11"	115
S3	32	#4	6	6'-6"	139
V1	44	#4	STR	6'-3"	184
V2	64	#5	STR	10'-9"	718

REINFORCING STEEL	LBS.	4,258
CLASS A CONCRETE		
POUR #1 CAP, LOWER PART OF WINGS, & COLLARS	C.Y.	27.7
POUR #2 UPPER PART OF WINGS	C.Y.	6.9
TOTAL	C.Y.	34.6
HP 12 X 53 STEEL PILES NO.: 8	LIN. FT.	360

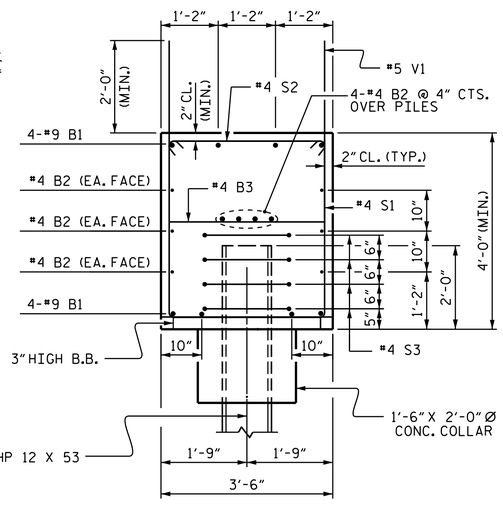
PILE SPLICE DETAILS



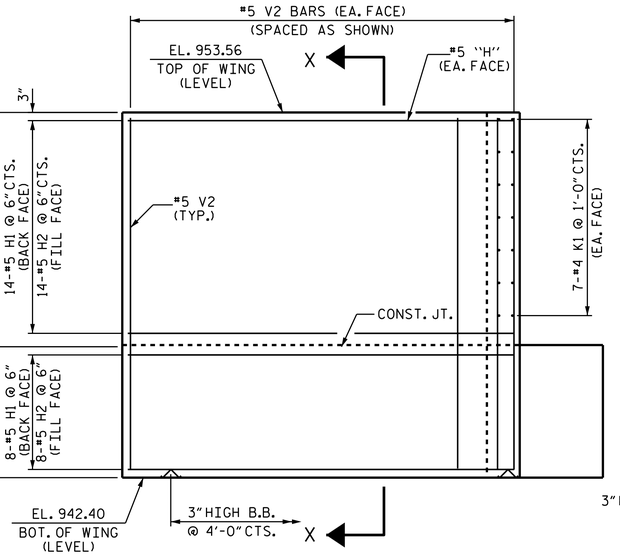
PLAN OF LEFT WING



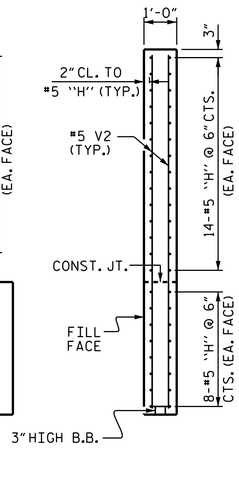
PLAN OF RIGHT WING



SECTION A-A



ELEVATION OF LEFT WING



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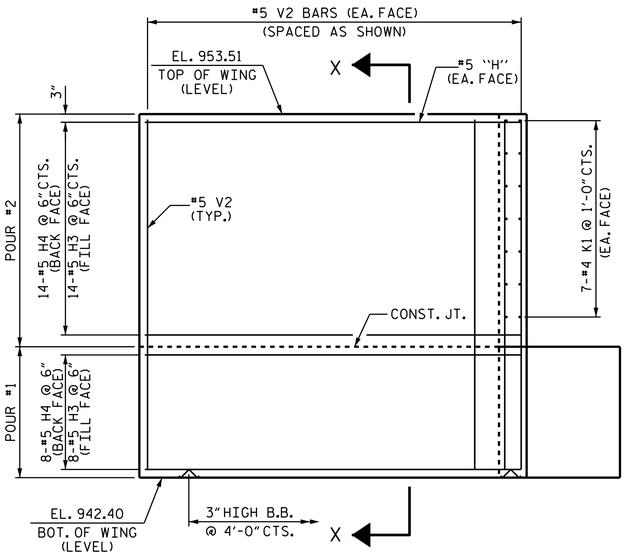

ELEVATION OF RIGHT WING

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.
DocuSigned by: Marshall G. Creek, Jr.
6549D6EBAA3B405...
7/27/2017

DRAWN BY : J. K. BOWLES DATE : 5/10/16
CHECKED BY : K. D. LAYNE DATE : 7/21/16
DESIGN ENGINEER OF RECORD: J. K. BOWLES DATE : 7/21/16

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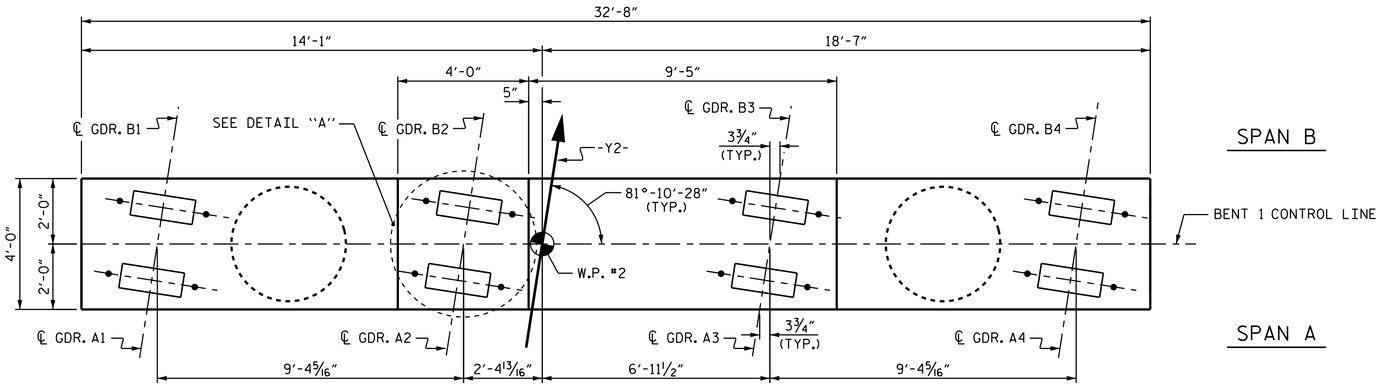
STR. #2

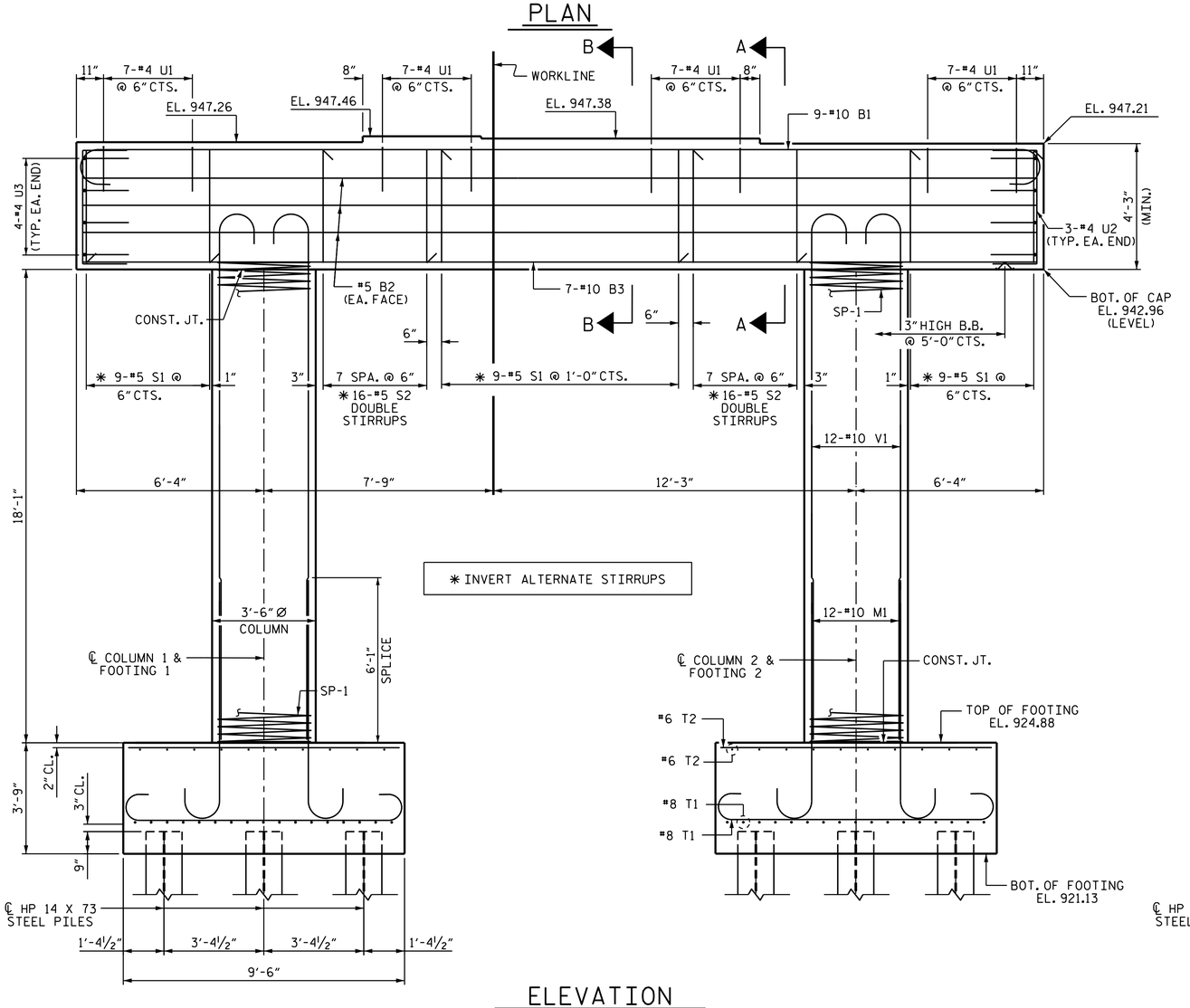
NOTES

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

HOOKS ON V1 BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

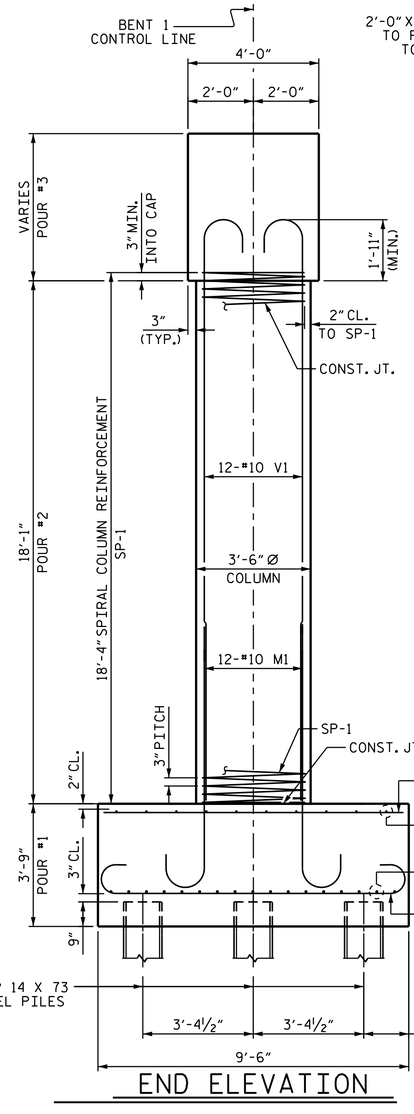


PLAN

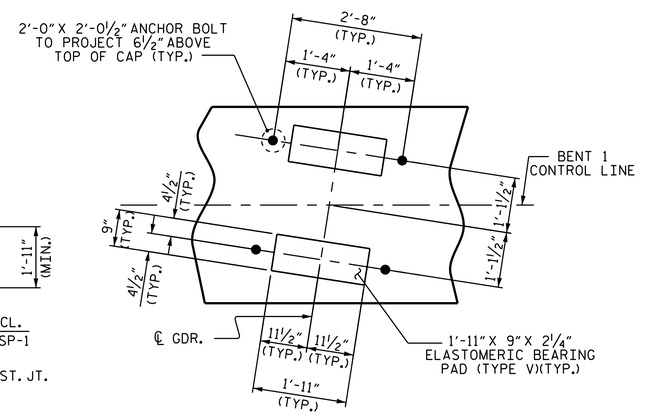


ELEVATION

REINFORCING STEEL, DIMENSIONS, AND DETAILS ARE TYPICAL FOR EACH COLUMN AND FOOTING.



END ELEVATION



DETAIL "A"

TYP. EACH GDR.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

Docusigned by: Marshall G. Creek, Jr. 6540D8EBAA3B405...

7/27/2017

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DRAWN BY :	J. K. BOWLES	DATE :	5/16/16
CHECKED BY :	K.D. LAYNE	DATE :	7/22/16
DESIGN ENGINEER OF RECORD:	J. K. BOWLES	DATE :	7/22/16

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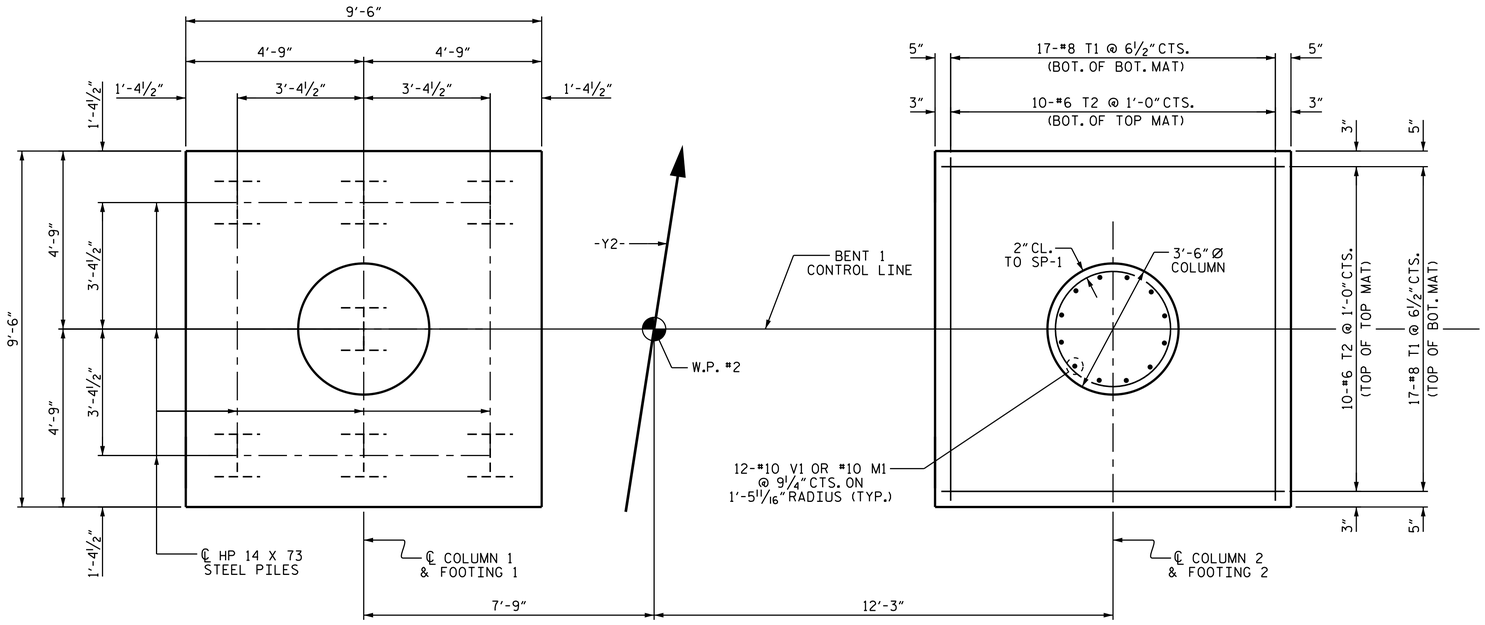
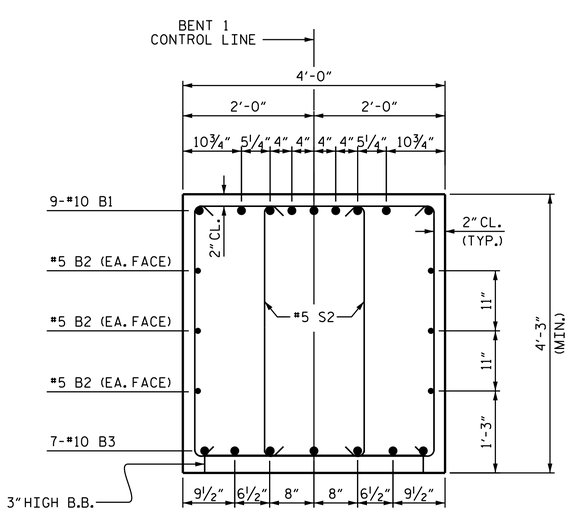
STR. #2

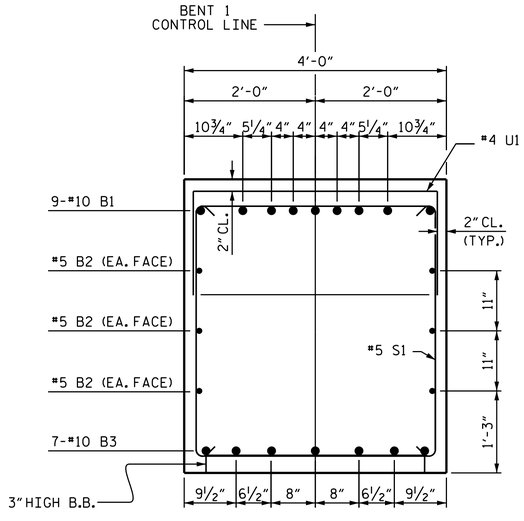


PLAN OF FOOTINGS & COLUMNS

PILES, REINFORCING STEEL, DIMENSIONS ARE TYPICAL FOR EACH COLUMN AND FOOTING.



SECTION A-A



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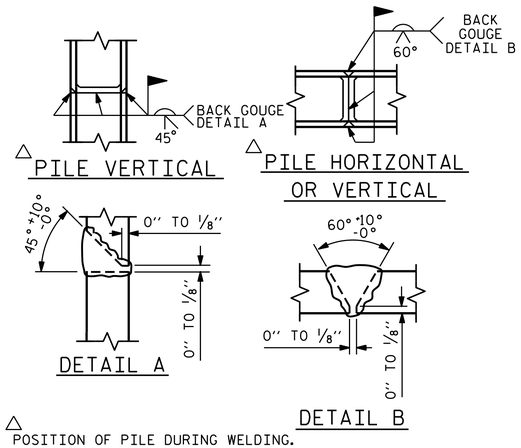
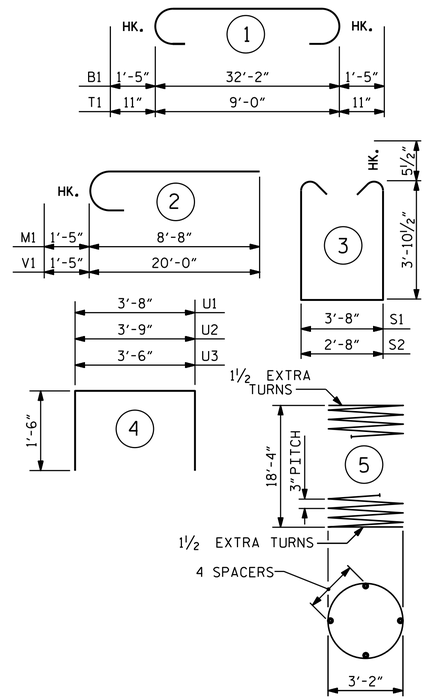


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



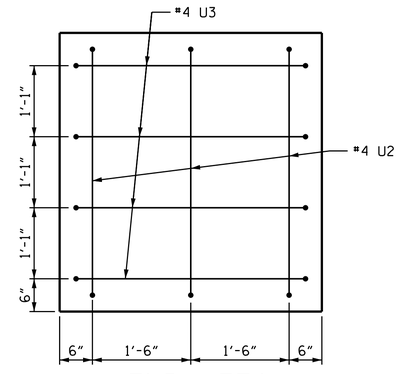
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#10	1	35'-0"	1355
B2	6	#5	STR	32'-4"	202
B3	7	#10	STR	32'-4"	974
M1	24	#10	2	10'-1"	1041
S1	27	#5	3	12'-4"	347
S2	32	#5	3	11'-4"	378
T1	68	#8	1	10'-10"	1967
T2	40	#6	STR	9'-0"	541
U1	28	#4	4	6'-8"	125
U2	6	#4	4	6'-9"	27
U3	8	#4	4	6'-6"	35
V1	24	#10	2	21'-5"	2212
REINFORCING STEEL				LBS.	9,204
SP-1	2	*	5	757'-4"	1012
SPIRAL COLUMN REINFORCING STEEL				LBS.	1,012

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

FOUNDATION EXCAVATION	LUMP SUM	
CLASS A CONCRETE		
POUR #1 (FOOTINGS)	C.Y.	25.1
POUR #2 (COLUMNS)	C.Y.	12.9
POUR #3 (CAP)	C.Y.	21.0
TOTAL CLASS A CONCRETE	C.Y.	59.0
HP 14 X 73 STEEL PILES No.: 14	LIN. FT.	350
PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES		14 EA.
STEEL PILE POINTS		14 EA.



END VIEW

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

Marshall G. Creek, Jr.
6549D8EBAA3B405...
7/27/2017

DRAWN BY : J. K. BOWLES DATE : 5/17/16
CHECKED BY : K.D. LAYNE DATE : 7/22/16
DESIGN ENGINEER OF RECORD: J. K. BOWLES DATE : 7/22/16

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-25
1			3			TOTAL SHEETS
2			4			30

STR. #2

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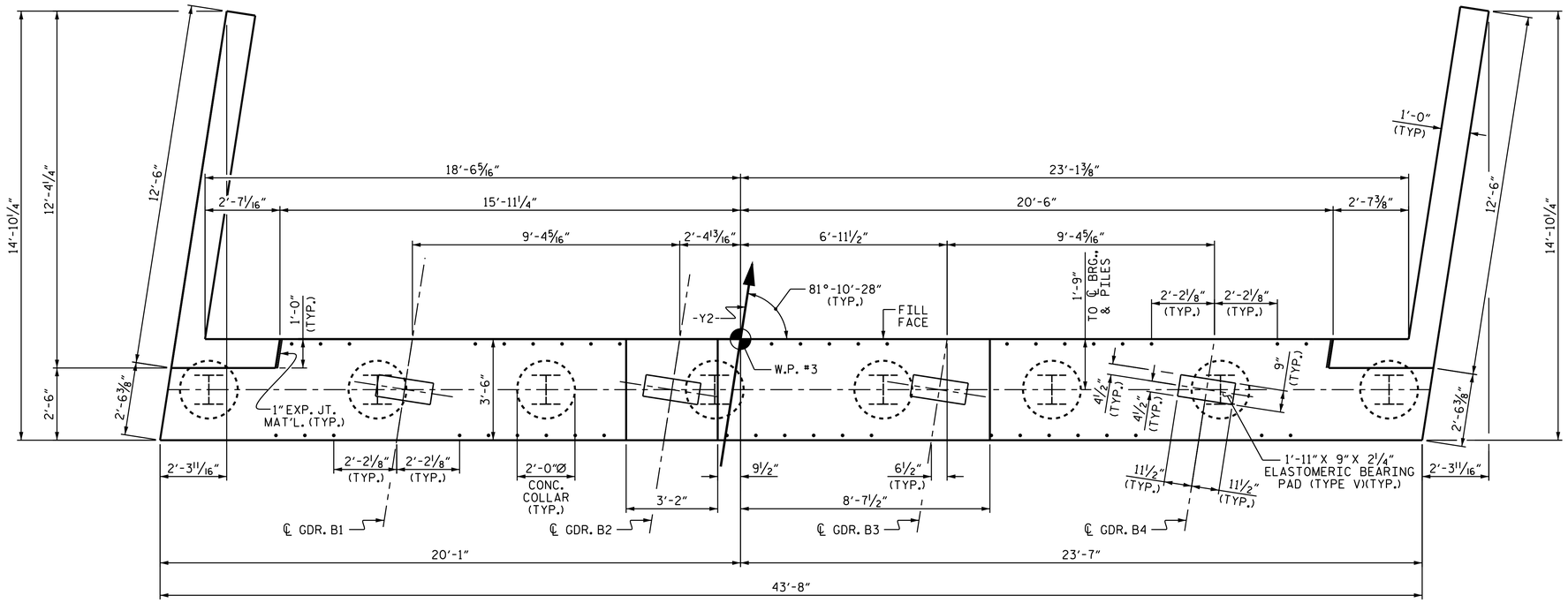
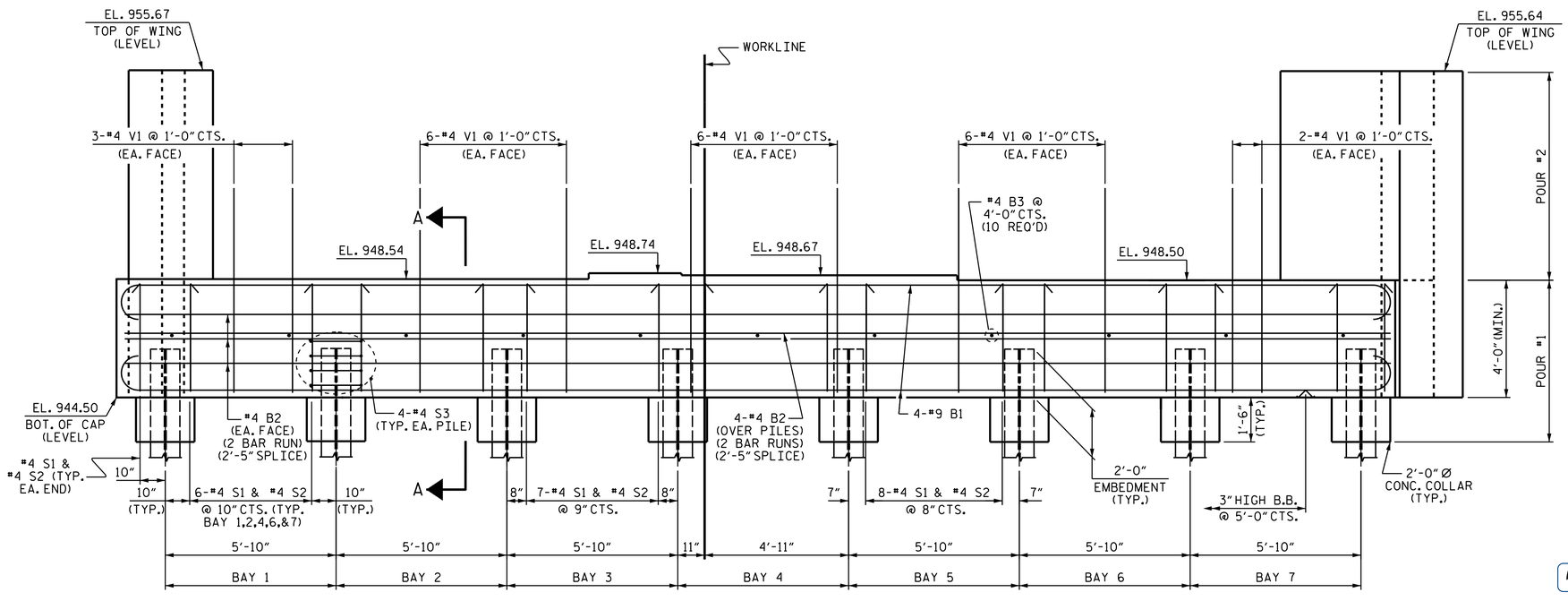


PLAN



ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK JR.

Marshall G. Creek, Jr.
6549D6EBAA38405...

7/27/2017

DRAWN BY : J. K. BOWLES DATE : 5/10/16
CHECKED BY : K. D. LAYNE DATE : 7/21/16
DESIGN ENGINEER OF RECORD: J. K. BOWLES DATE : 7/21/16

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1			3		
2			4		

SHEET NO. S2-26

TOTAL SHEETS 30

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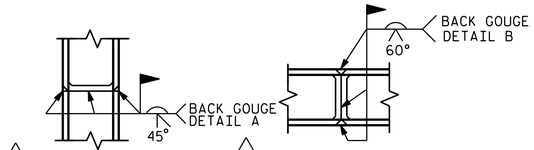
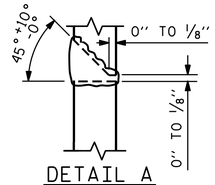
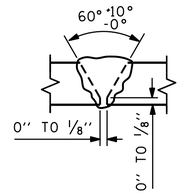


△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

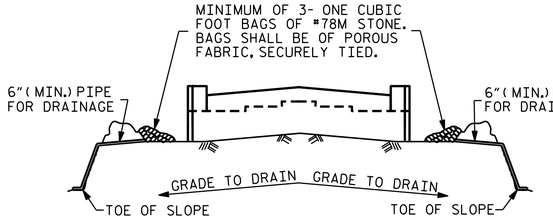


DETAIL A



DETAIL B

△ POSITION OF PILE DURING WELDING.



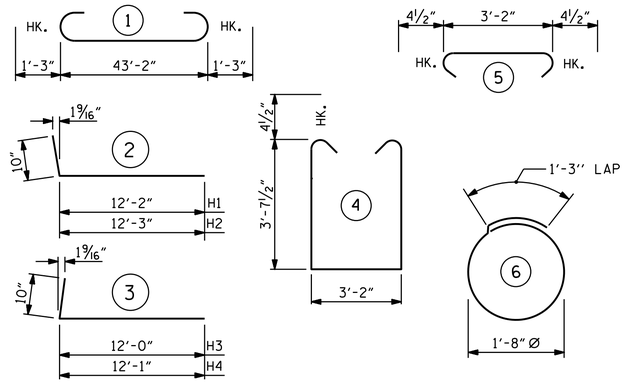
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES
8 EA.

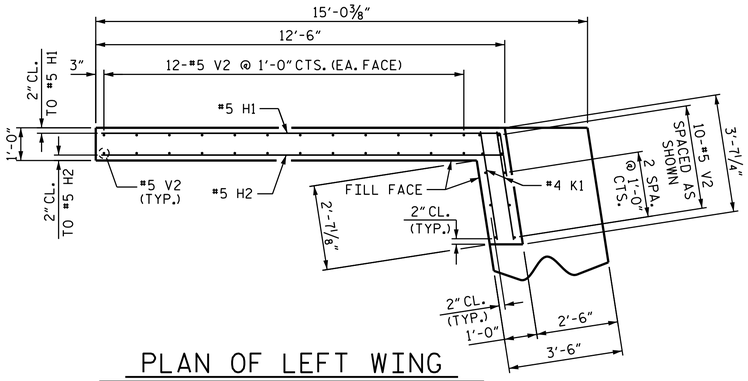
BILL OF MATERIAL

END BENT 2

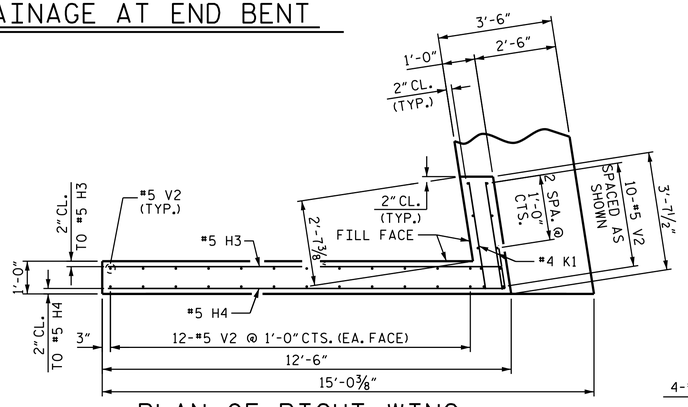
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	45'-8"	1242
B2	20	#4	STR	22'-11"	306
B3	10	#4	STR	3'-2"	21
H1	22	#5	2	13'-0"	298
H2	22	#5	2	13'-1"	300
H3	22	#5	3	12'-10"	294
H4	22	#5	3	12'-11"	296
K1	28	#4	STR	3'-3"	61
S1	47	#4	4	11'-2"	351
S2	47	#4	5	3'-11"	123
S3	32	#4	6	6'-6"	139
V1	46	#4	STR	6'-3"	192
V2	68	#5	STR	10'-9"	762

REINFORCING STEEL	LBS.	4,385
CLASS A CONCRETE		
POUR #1 CAP, LOWER PART OF WINGS, & COLLARS	C.Y.	27.8
POUR #2 UPPER PART OF WINGS	C.Y.	8.0
TOTAL	C.Y.	35.8
HP 12 X 53 STEEL PILES		
NO.: 8	LIN. FT.	460

PILE SPLICE DETAILS



PLAN OF LEFT WING



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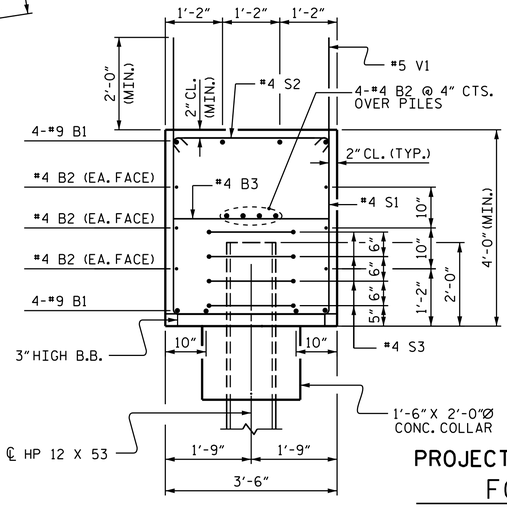
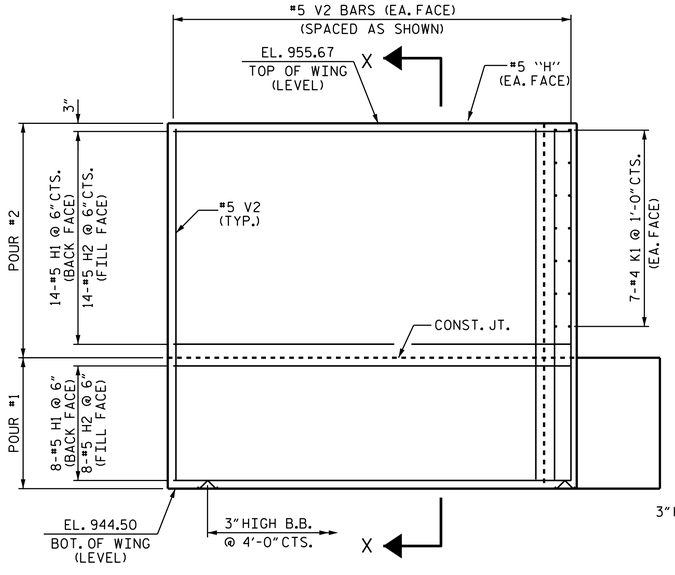
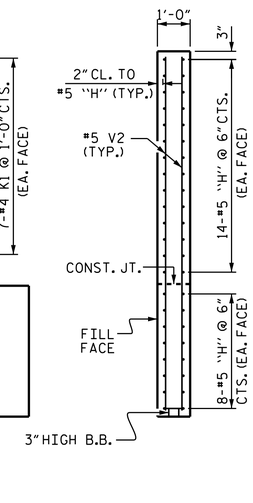


SECTION A-A



ELEVATION OF LEFT WING



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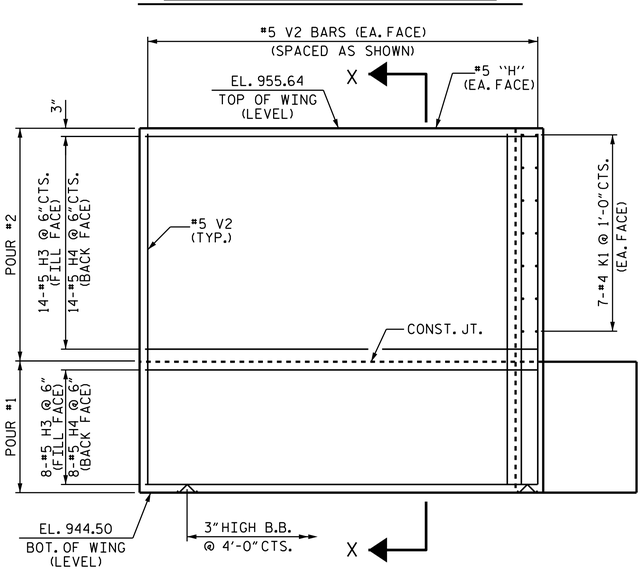

ELEVATION OF RIGHT WING

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 21+27.27 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Digitally signed by Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-27
1			3			TOTAL SHEETS
2			4			30

DRAWN BY :	J. K. BOWLES	DATE :	5/10/16
CHECKED BY :	K. D. LAYNE	DATE :	7/21/2016
DESIGN ENGINEER OF RECORD:	J. K. BOWLES	DATE :	7/21/2016

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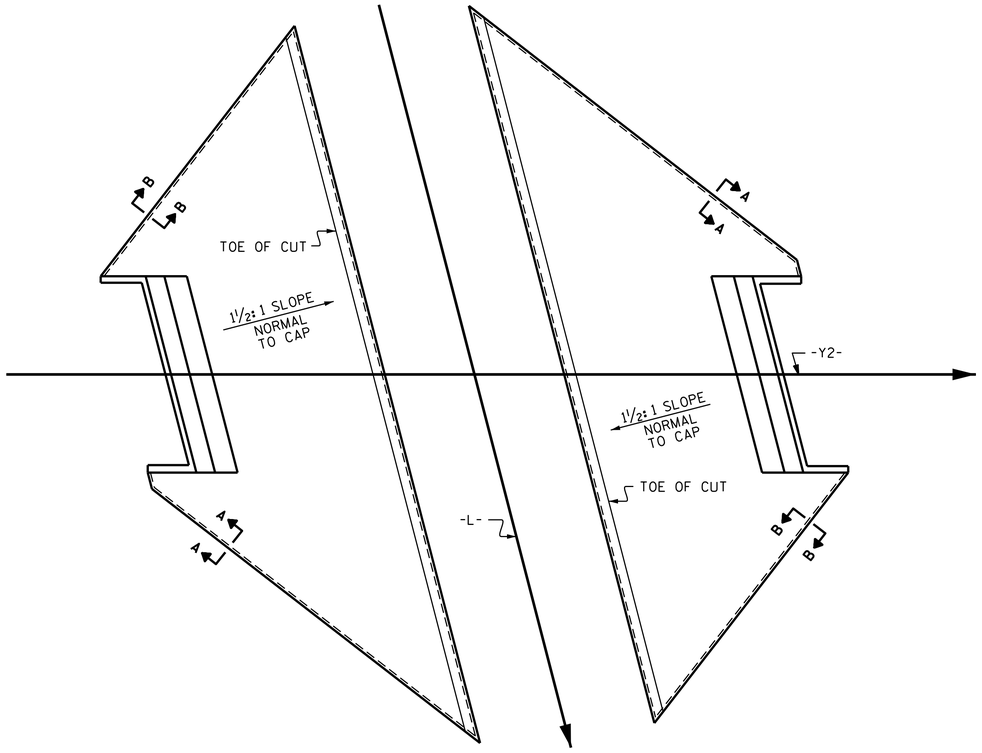
STR. #2

GENERAL NOTES

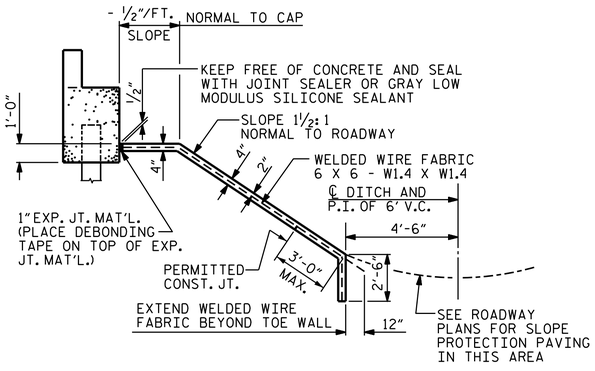
STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING. SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE 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 4" SLOPE PROTECTION.

BRIDGE @ STA. 21+27.27 -Y2-	4 INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	295	531
END BENT 2	368	662
TOTAL	663	1193

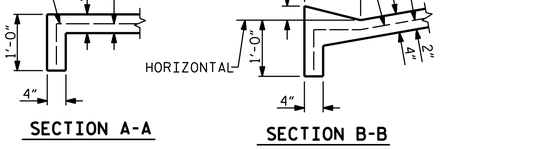
* QUANTITY SHOWN IS BASED ON 5' POURS.

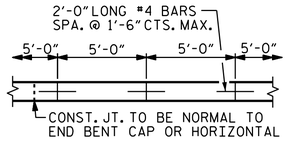


PLAN



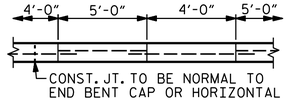
SECTION ALONG ℄ SURVEY WHEN SLOPE CATCHES IN DITCH





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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

Marshall G. Creek, Jr.

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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1			3		
2			4		

SHEET NO. S2-28

TOTAL SHEETS 30

ASSEMBLED BY :	H. T. BARBOUR	DATE :	1-23-17
CHECKED BY :	T. L. AVERETTE	DATE :	2-21-17
DRAWN BY : ELR 5/92	REV. 10/1/11		MAA/GM
CHECKED BY : GRP 6/92	REV. 12/21/11		MAA/GM
	REV. 1/16		MAA/TMG

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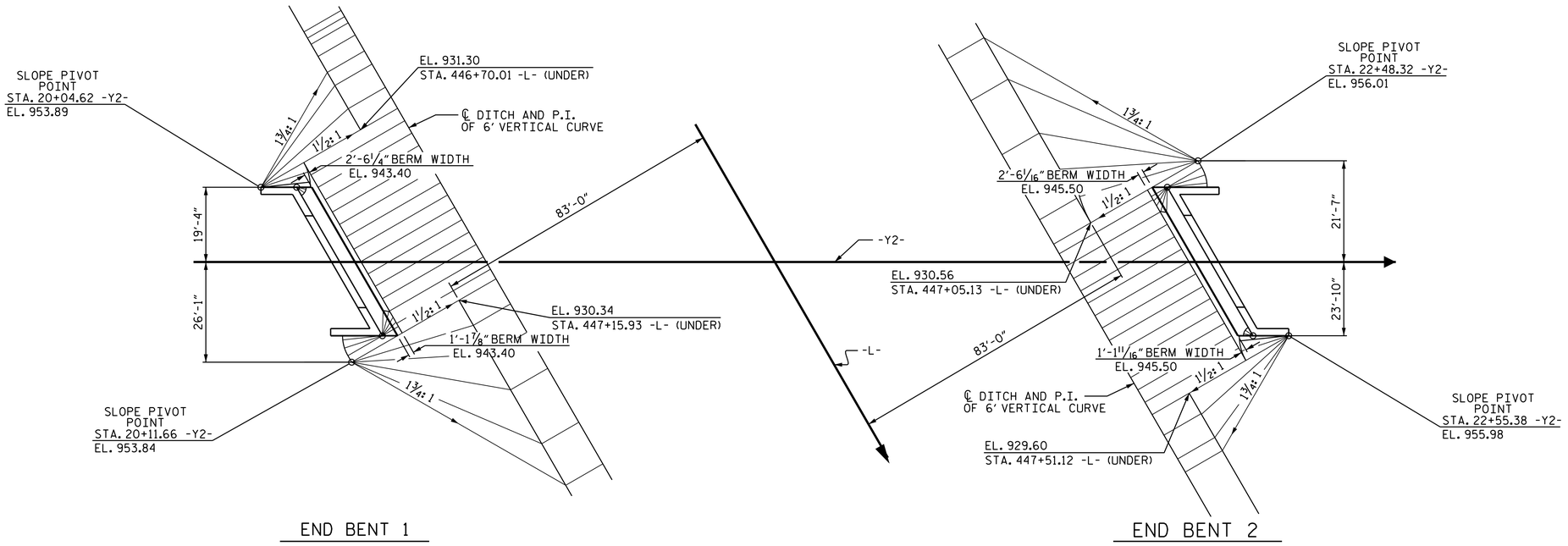
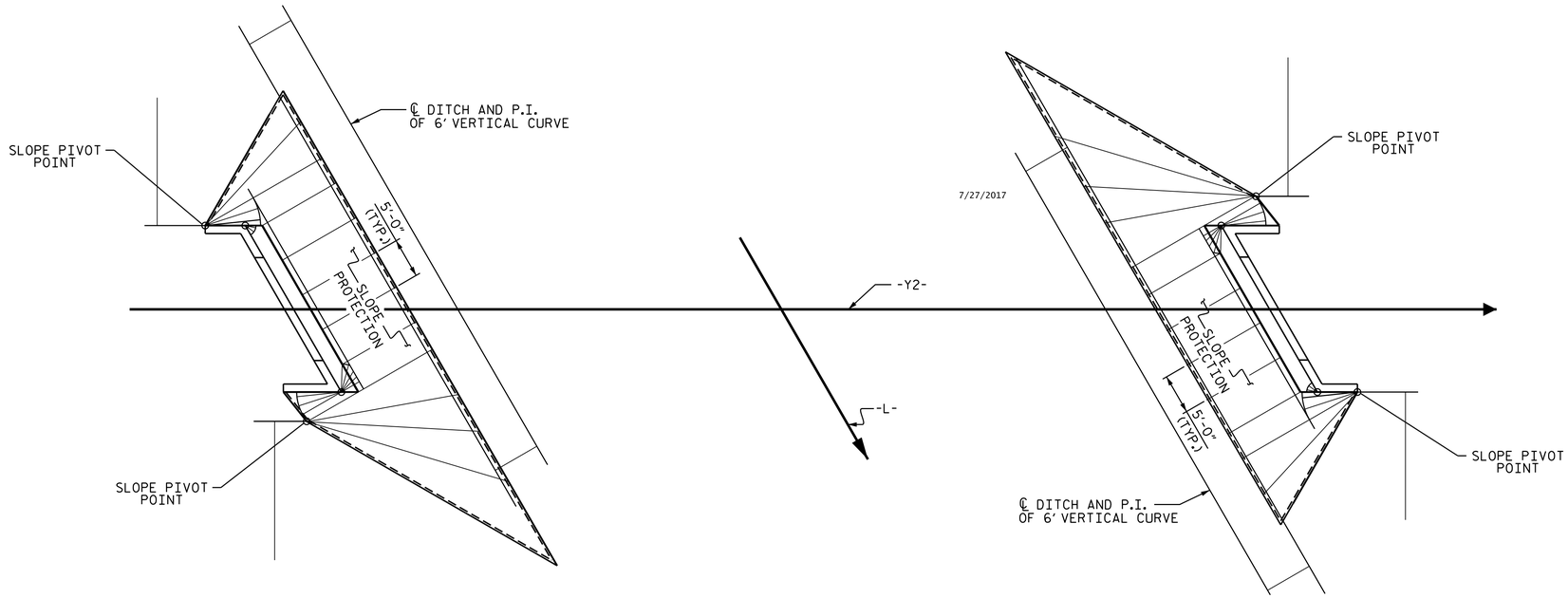
STR. #2

STD. NO. SP1 (SHT 5)



PLAN - GRADING



PLAN - CONCRETE PLACEMENT

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

Digitally signed by Marshall G. Creek, Jr.
8549D8EBAA3B405...
7/27/2017

ASSEMBLED BY : H. T. BARBOUR	DATE : 1-23-17		
CHECKED BY : T. L. AVERETTE	DATE : 2-21-17		
DRAWN BY : WJH 10/88	REV. 5/1/06	TLA/GM	
CHECKED BY : FCJ 10/88	REV. 10/1/11	MAA/GM	
	REV. 1/16	MAA/TMG	

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

SHEET NO. S2-29

TOTAL SHEETS 30

STR. #2

STD. NO. SP2 (SHT 5)

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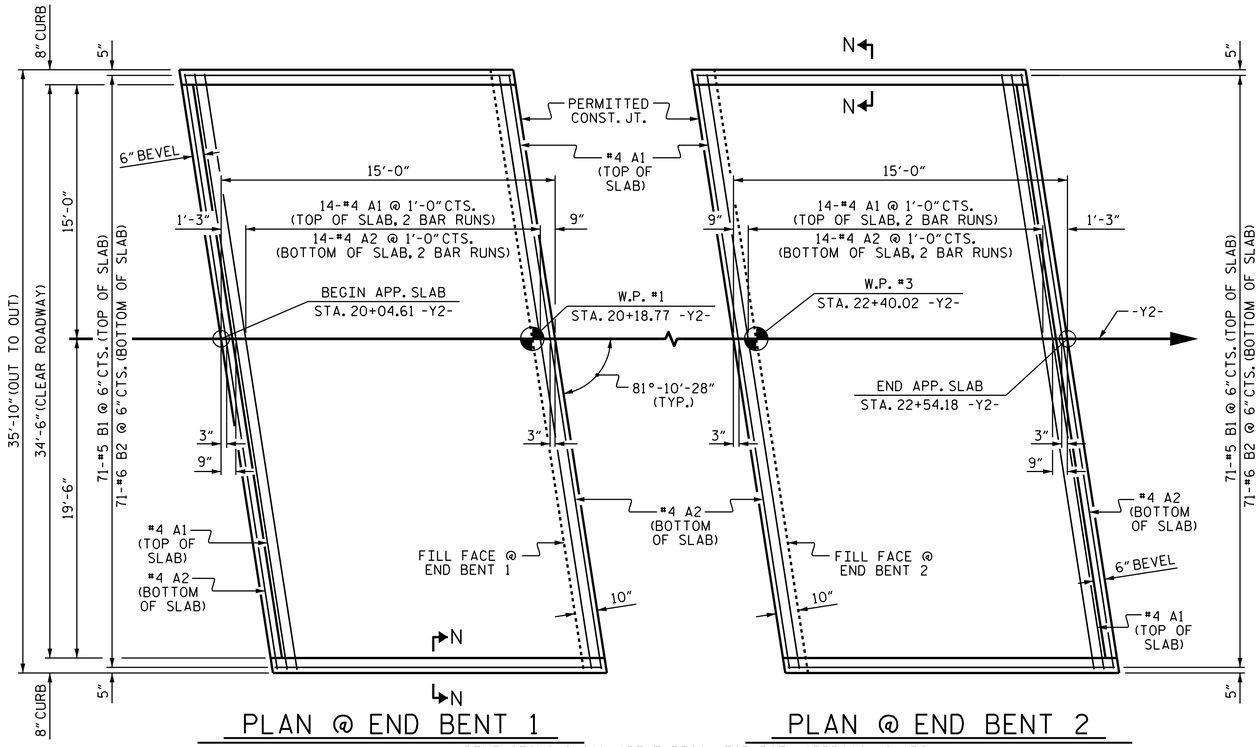


NOTES

THE APPROACH SLAB MAY BE CAST MONOLITHICALLY WITH THE END BENT DIAPHRAGM AND THE END SECTION OF THE BRIDGE DECK NEAR THE INTEGRAL END BENT.

FOR REINFORCED BRIDGE APPROACH FILL FABRIC WALL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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.

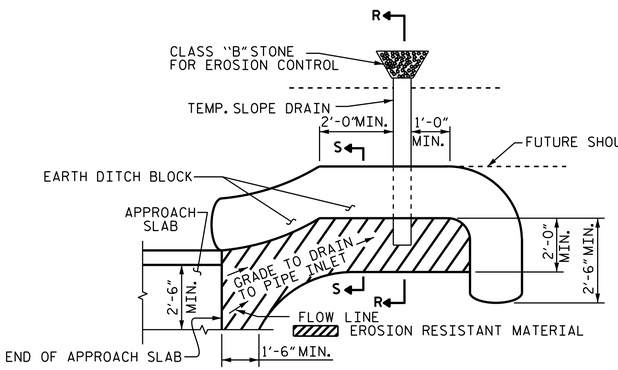
BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	32	#4	STR	19'-0"	406
A2	32	#4	STR	18'-10"	403
* B1	71	#5	STR	14'-1"	1043
B2	71	#6	STR	14'-7"	1555
REINFORCING STEEL				LBS.	1,958
* EPOXY COATED REINFORCING STEEL				LBS.	1,449
CLASS AA CONCRETE				C.Y.	23.2

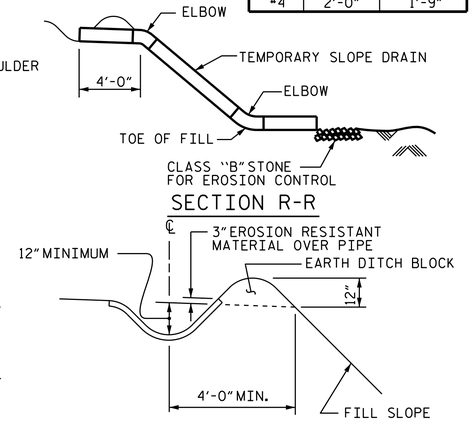
SPLICE LENGTH

BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"



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

PLAN VIEW

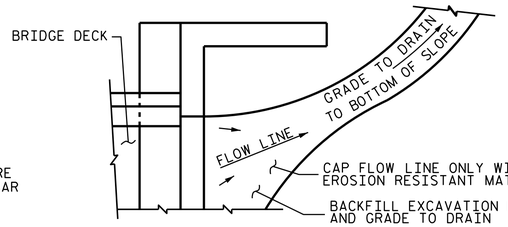


SECTION R-R

SECTION S-S

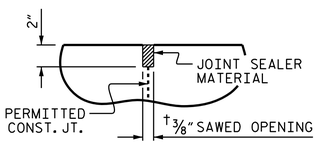
TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

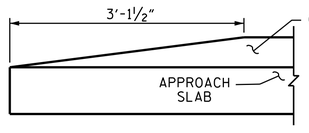


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

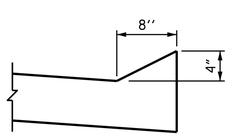
TEMPORARY DRAINAGE DETAIL



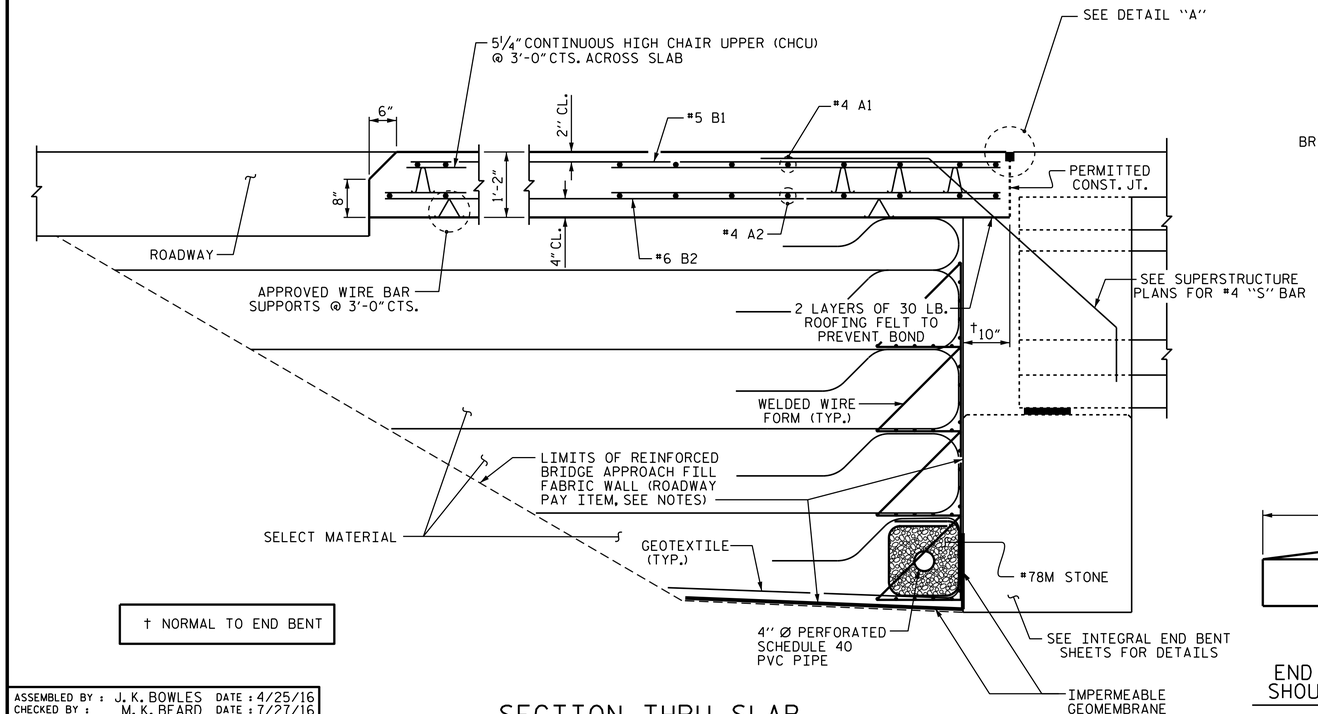
DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N



SECTION THRU SLAB

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 21+27.27 -Y2-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek, Jr. 6549D6EBAA3B405...

7/27/2017

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

SHEET NO. S2-30

TOTAL SHEETS 30

ASSEMBLED BY : J. K. BOWLES	DATE : 4/25/16	REV. 10/1/11	MAA/GM
CHECKED BY : M. K. BEARD	DATE : 7/27/16	REV. 12/21/11	MAA/GM
DRAWN BY : TLA 10/05		REV. 6/13	MAA/GM
CHECKED BY : GM 5/06			

26-JUL-2017 15:06
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mcneek

STR. #2 STD. NO. BAS5

F. A. PROJECT No.: NHP-0918(062)

472+00 472+50 473+00 473+50 474+00 474+50 475+00

890 880 870 860 850 840

FILL FACE @ END BENT 1
STA. 472+36.29 -L-
GRADE PT. EL. 885.53

BEGIN FRONT SLOPE
STA. 472+24.43 -L-
GRADE PT. EL. 885.69

SPAN A SPAN B SPAN C

FIX. FIX. FIX. FIX. FIX.

1'-7" MIN. BERM NORMAL TO CAP (TYP.)

LOW CHORD EL. 879.14

2'-0" (TYP.)

HP 12 X 53 STEEL PILES (TYP.)

RIP RAP CLASS II (TYP.)

FILL

EL. 870.0±

EL. 862.0±

EL. 860.0±

EL. 859.0±

TOP OF DRILLED PIERS EL. 858.00 (TYP.)

EL. 859.0±

Q100 EL. 862.1

N.W.S. EL. 852.40 (11/23/16)

EL. 853.0±

EL. 852.0±

EL. 851.0±

EL. 859.0±

3'-0" Ø COLUMN (TYP.)

3'-6" Ø DRILLED PIER (TYP.)

EL. 859.0±

APPROXIMATE NATURAL GROUND LINE

FILL FACE @ END BENT 2
STA. 474+91.29 -L-
GRADE PT. EL. 882.88

BEGIN FRONT SLOPE
STA. 475+02.70 -L-
GRADE PT. EL. 882.81

1'-0" MIN. EARTH BERM NORMAL TO CAP (TYP.)

LOW CHORD EL. 876.43

1'-0" (TYP.)

1½:1 SLOPE NORMAL TO CAP (TYP.)

FILL

EL. 858.0±

INTEGRAL END BENT 1

BENT 1

BENT 2

INTEGRAL END BENT 2

GRADE DATA

(-)1.5597% (+)1.3500%

PI STA. = 477+00.00 -L-
EL = 878.24
L = 1,050'

SECTION ALONG LEFT LANE CONTROL LINE

SECTIONS AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES

1'-0" MIN. EARTH BERM EL. 873.85

FILL FACE @ END BENT 1

RIP RAP CLASS II

1½:1 SLOPE NORMAL TO CAP

BENT 1 CONTROL LINE

LOWERY MILL CREEK

20' SANITARY SEWER EASEMENT

BENT 2 CONTROL LINE

RIP RAP CLASS II

1'-0" MIN. EARTH BERM EL. 871.11

FILL FACE @ END BENT 2

1½:1 SLOPE NORMAL TO CAP

TO SR 2349

W.P. #1
STA. 472+36.29 -L-

BEGIN FRONT SLOPE
STA. 472+24.43 -L-

W.P. #2
STA. 473+01.29 -L-

W.P. #3
STA. 473+96.29 -L-

W.P. #4
STA. 474+91.29 -L-

END APPROACH SLAB
STA. 475+15.43 -L-

BEGIN FRONT SLOPE
STA. 475+02.70 -L-

23'-0"

75°-00'-00" (TYP.)

LEFT LANE CONTROL LINE

BEGIN APPROACH SLAB
STA. 472+12.15 -L-

BRIDGE ID
STA. 473+70.00 -L-

-L-

1'-0" MIN. EARTH BERM EL. 875.08

26'-3½"

1'-0" MIN. EARTH BERM EL. 872.50

TO US 158

65'-0" 95'-0" 95'-0"

255'-0" TOTAL LENGTH OF BRIDGE
(FILL FACE TO FILL FACE)

PLAN

PILES, COLUMNS, AND DRILLED PIERS ARE NOT SHOWN FOR CLARITY.

NORTH CAROLINA PROFESSIONAL SEAL 22005 ENGINEER A. KEITH PASCHAL

DocuSigned by: A. Keith Paschal F8B6AD6DB2FC48F...

7/27/2017

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek Jr 6549D6EBAA3B405...

7/27/2017

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3 BRIDGE NO. 702

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER
LOWERY MILL CREEK
ON WINSTON-SALEM BELTWAY
BETWEEN SR 2381 AND US 158
(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-1
1			3			TOTAL SHEETS
2			4			33

STR. #3

DRAWN BY : M.K. BEARD DATE : 9/19/16
CHECKED BY : H. T. BARBOUR DATE : 3/8/17
DESIGN ENGINEER OF RECORD : H.A. LOCKLEAR DATE : 6/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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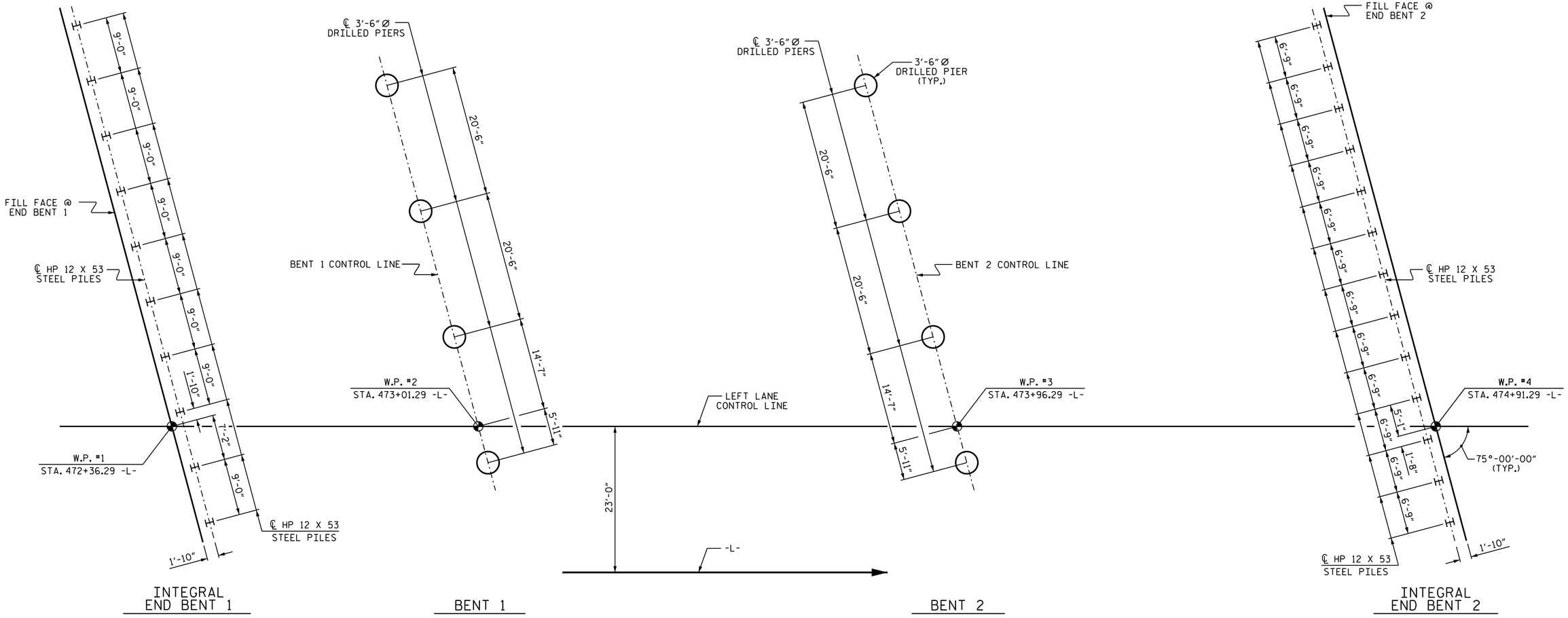
mcheek



FOUNDATION LAYOUT

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

NOTES

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

PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

DO NOT BEGIN WORK AT END BENT 1 AND END BENT 2 UNTIL FILL HAS BEEN PLACED.

TESTING PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

SEE ROADWAY PLANS AND SPECIAL PROVISIONS FOR THE SETTLEMENT GAUGES REQUIRED AT END BENT 2.

OBSERVE A 4 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENTS TO WITHIN 2 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SPECIAL PROVISIONS.

FOR DRILLED PIERS, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 605 TONS PER PIER.

PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT 1 AND BENT 2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 850.00 WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

INSTALL DRILLED PIERS AT BENT 1 TO A TIP ELEVATION NO HIGHER THAN 810.00 (LT) AND 798.00 (RT) AND WITH A PENETRATION OF AT LEAST 17.5 FT. INTO WEATHERED ROCK/CRYSTALLINE ROCK.

DRILLED PIERS AT BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 695 TONS PER PIER.

INSTALL DRILLED PIERS AT BENT 2 TO A TIP ELEVATION NO HIGHER THAN THAN 812.00 (LT) AND 810.00 (RT) AND WITH A PENETRATION OF AT LEAST 17.5 FT. INTO WEATHERED ROCK/CRYSTALLINE ROCK.

SLURRY CONSTRUCTION IS REQUIRED FOR DRILLED PIERS AT BENT 1 AND BENT 2.

SPT IS REQUIRED FOR DRILLED PIERS AT BENT 1 AND BENT 2. THE REQUIRED N60 SPT VALUE IS 100 BLOWS IN THE FIRST FOOT OF THE DRIVE. FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATION FOR BENT 1 AND BENT 2 IS ELEVATION 845.00. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 8549D9EBAA3B405...

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER LOWERY MILL CREEK ON WINSTON-SALEM BELTWAY BETWEEN SR 2381 AND US 158 (LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-2
1			3			TOTAL SHEETS
2			4			33

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STR. #3

DRAWN BY : M.K. BEARD DATE : 9/26/16
CHECKED BY : H. T. BARBOUR DATE : 3/8/17
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

26-JUL-2017 15:07
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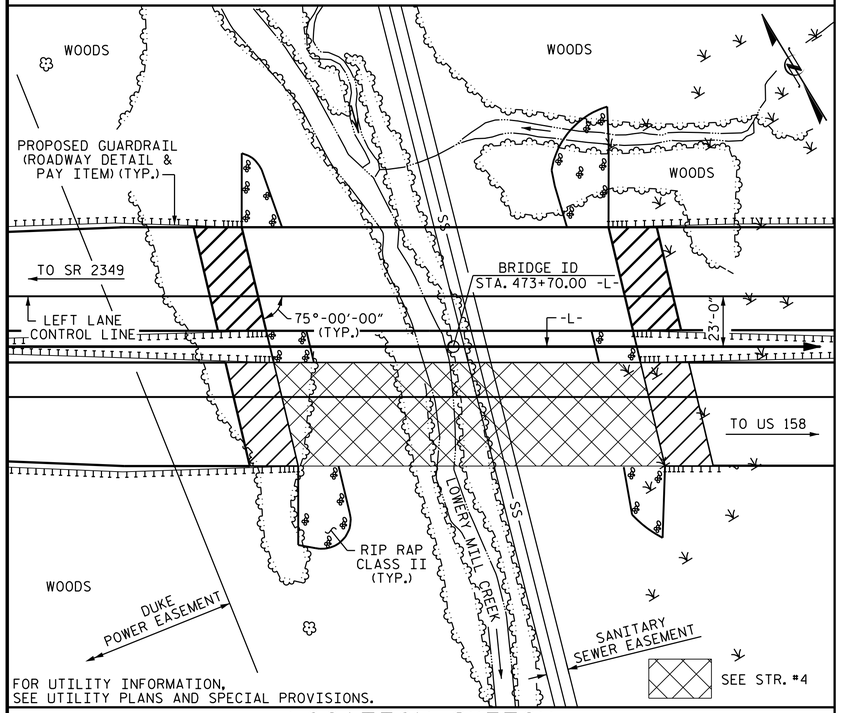
B.M. #8 : R/R SPIKE SET IN BASE OF 36" SWEET GUM AND 70' WEST OF CREEK BANK, 565' LEFT OF STA. 469+22.00 -L-, EL. 864.90



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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 BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF 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.

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

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 1,900 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 861.8
DRAINAGE AREA	= 2.4 SQ. MI.
BASE DISCHARGE (Q100)	= 2,230 C.F.S.
BASE HIGH WATER ELEVATION	= 862.1

OVERTOPPING DATA

OVERTOPPING DISCHARGE	= 2,960+ C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS.
OVERTOPPING FLOOD ELEVATION	= 882.0
SAG @ STA. 477+34.84 -L-	

TOTAL BILL OF MATERIAL

	3'-6" Ø DRILLED PIERS IN SOIL	3'-6" Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIERS	PDA TESTING	SID INSPECTIONS	SPT TESTING	CSL 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 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	LIN. FT.	LIN. FT.	LIN. FT.	EA.	EA.	EA.	EA.	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE								19,189	20,783		LUMP SUM			27	2,258.63				506.55			LUMP SUM
END BENT 1										59.0		6,468				10	10	675		530	590	
BENT 1	154.00	62.00	32.00			4				62.7		30,369	5,970									
BENT 2	108.00	80.00	32.00			4				66.7		28,337	5,255									
END BENT 2										59.5		6,489				13	13	750		515	570	
TOTAL	262.00	142.00	64.00	1	1	8	1	19,189	20,783	247.9	LUMP SUM	71,663	11,225	27	2,258.63	23	23	1,425	506.55	1,045	1,160	LUMP SUM

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER
LOWERY MILL CREEK
ON WINSTON-SALEM BELTWAY
BETWEEN SR 2381 AND US 158
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 8549D6EBAA3B405...

7/27/2017

DRAWN BY : M.K. BEARD DATE : 9/20/16
CHECKED BY : H. T. BARBOUR DATE : 3/8/17
DESIGN ENGINEER OF RECORD : H.A. LOCKLEAR DATE : 6/2017

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

SHEET NO. S3-3

TOTAL SHEETS 33

STR. #3

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR					MOMENT						
							LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	(1)	**1.01**	--	1.75	0.776	**1.02**	A	ER	**30.988**	0.882	1.45	A	I	12.395	0.80	0.776	1.01	B	ER	46.375	
		HL-93(Opr)	N/A	--	1.32	--	1.35	0.776	1.33	A	ER	30.988	0.882	1.88	A	I	12.395	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	(2)	**1.30**	46.860	1.75	0.776	**1.31**	A	ER	**30.988**	0.882	1.76	A	I	12.395	0.80	0.776	1.31	A	ER	30.988	
		HS-20(Opr)	36.000	--	1.69	60.745	1.35	0.776	1.69	A	ER	30.988	0.882	2.28	A	I	12.395	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SH	12.500	--	3.13	39.167	1.40	0.776	3.87	A	ER	30.988	0.882	5.45	A	I	12.395	0.80	0.776	3.11	A	ER	30.988	
		S3C	21.500	--	1.84	39.512	1.40	0.776	2.27	A	ER	30.988	0.882	3.22	A	I	12.395	0.80	0.776	1.83	A	ER	30.988	
		S3A	22.750	--	1.74	39.665	1.40	0.776	2.15	A	ER	30.988	0.882	3.06	A	I	12.395	0.80	0.776	1.73	A	ER	30.988	
		S4A	26.750	--	1.56	41.702	1.40	0.776	1.92	A	ER	30.988	0.882	2.72	A	I	12.395	0.80	0.776	1.55	A	ER	30.988	
		S5A	30.500	--	1.38	42.110	1.40	0.776	1.70	A	ER	30.988	0.882	2.56	A	I	12.395	0.80	0.776	1.37	A	ER	30.988	
		S6A	34.500	--	1.27	43.734	1.40	0.776	1.57	A	ER	30.988	0.882	2.34	A	I	12.395	0.80	0.776	1.26	A	ER	30.988	
		S7B	38.500	(3)	**1.16**	44.764	1.40	0.776	1.44	A	ER	30.988	0.882	2.25	A	I	12.395	0.80	0.776	**1.16**	A	ER	**30.988**	
		S7A	40.000	--	1.17	46.590	1.40	0.776	1.44	A	ER	30.988	0.882	2.37	A	I	12.395	0.80	0.776	1.16	A	ER	30.988	
	TTST	T4A	28.250	--	1.57	44.261	1.40	0.776	1.93	A	ER	30.988	0.882	2.67	A	I	12.395	0.80	0.776	1.56	A	ER	30.988	
		T5B	32.000	--	1.37	43.935	1.40	0.776	1.70	A	ER	30.988	0.882	2.59	A	I	12.395	0.80	0.776	1.36	A	ER	30.988	
		T6A	36.000	--	1.28	46.024	1.40	0.776	1.58	A	ER	30.988	0.882	2.50	A	I	12.395	0.80	0.776	1.27	A	ER	30.988	
		T7A	40.000	--	1.21	48.183	1.40	0.776	1.49	A	ER	30.988	0.882	2.40	A	I	12.395	0.80	0.776	1.20	A	ER	30.988	
		T7B	40.000	--	1.33	53.333	1.40	0.776	1.65	A	ER	30.988	0.882	2.16	A	I	12.395	0.80	0.776	1.32	A	ER	30.988	

LOAD FACTORS:

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

NOTES:

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

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

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

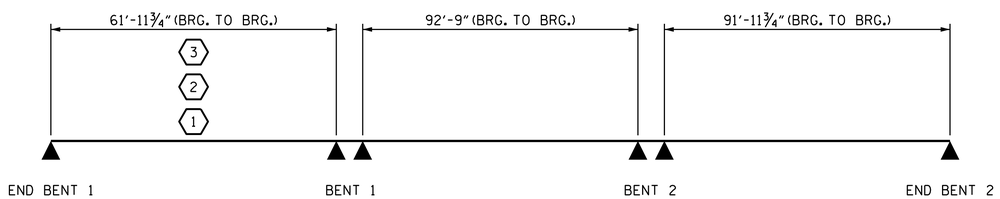
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.
DocuSigned by: Marshall G. Creek, Jr. 6549D6EBAA3B405...
7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-4
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY :	T. L. AVERETTE	DATE :	3/7/17
CHECKED BY :	H. T. BARBOUR	DATE :	3/8/17
DRAWN BY : MAA 1/08	REV. 11/12/08RR		MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11		MAA/GM

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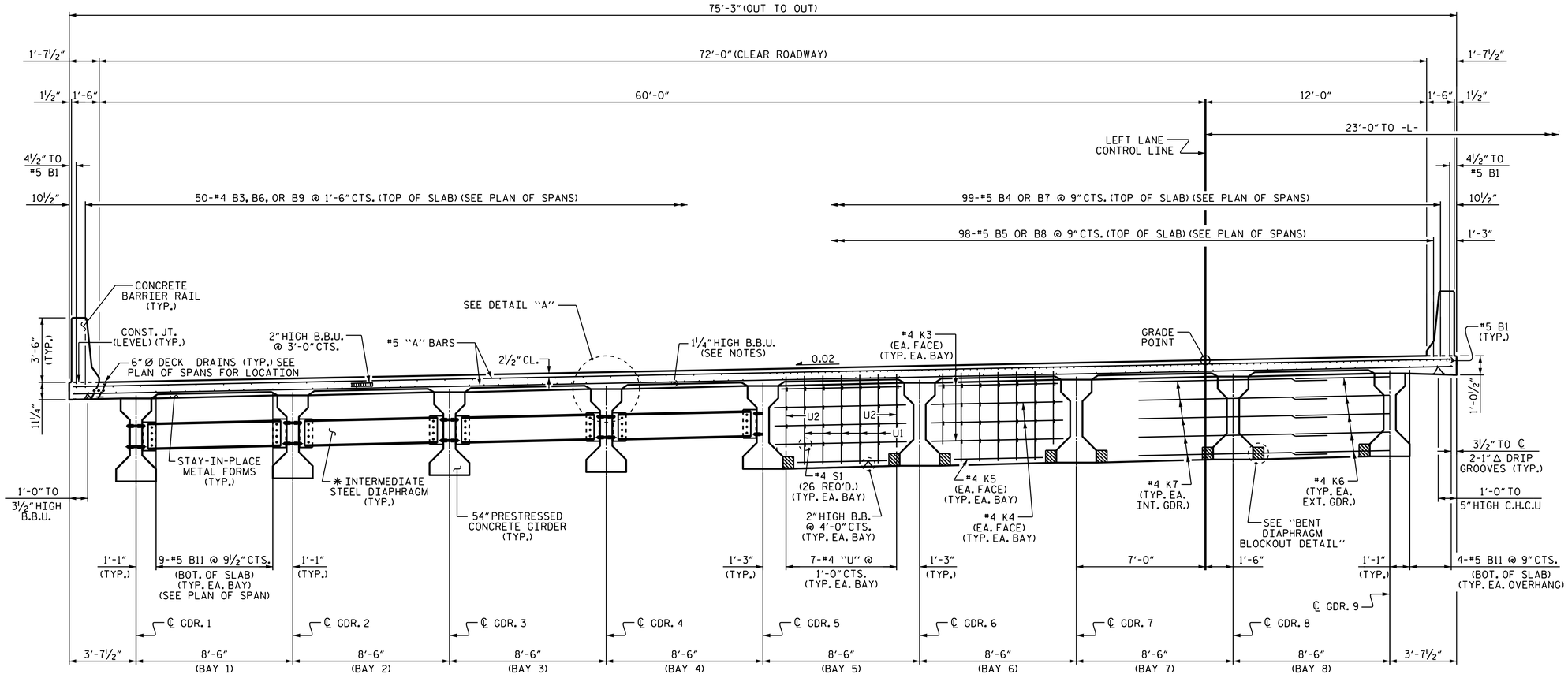
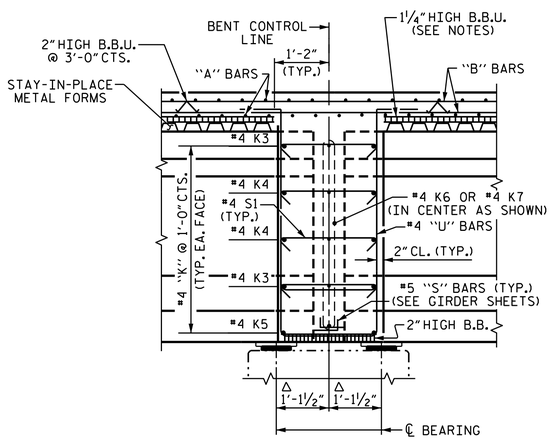
STR. #3 STD. NO. LRFR2



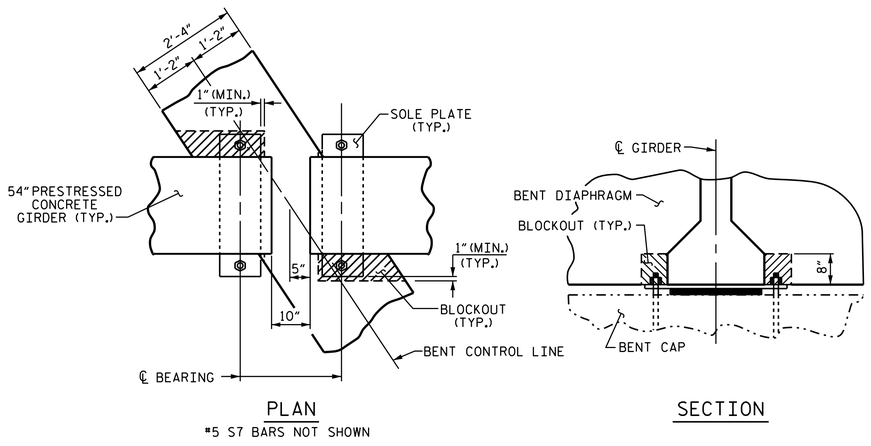
TYPICAL SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)

TYPICAL SECTION
(SHOWING BENT DIAPHRAGMS)



SECTION THROUGH BENT DIAPHRAGM

Δ MEASURED ALONG ℄ GDR.

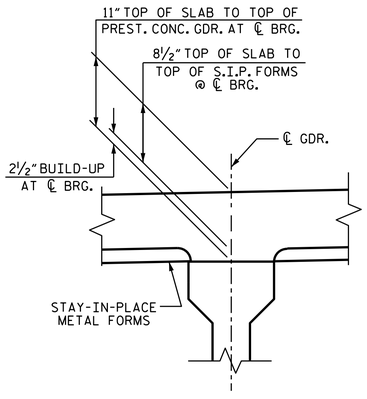


PLAN

SECTION

#5 S7 BARS NOT SHOWN

BENT DIAPHRAGM BLOCKOUT DETAIL



DETAIL "A"

NOTES

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

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

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

✱ FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHGRAMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS" SHEET.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DRAWN BY : J. K. BOWLES DATE : 1/11/16
CHECKED BY : N. D'AIUTO DATE : 3/17/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 3/17/16

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-5
1			3			TOTAL SHEETS
2			4			33

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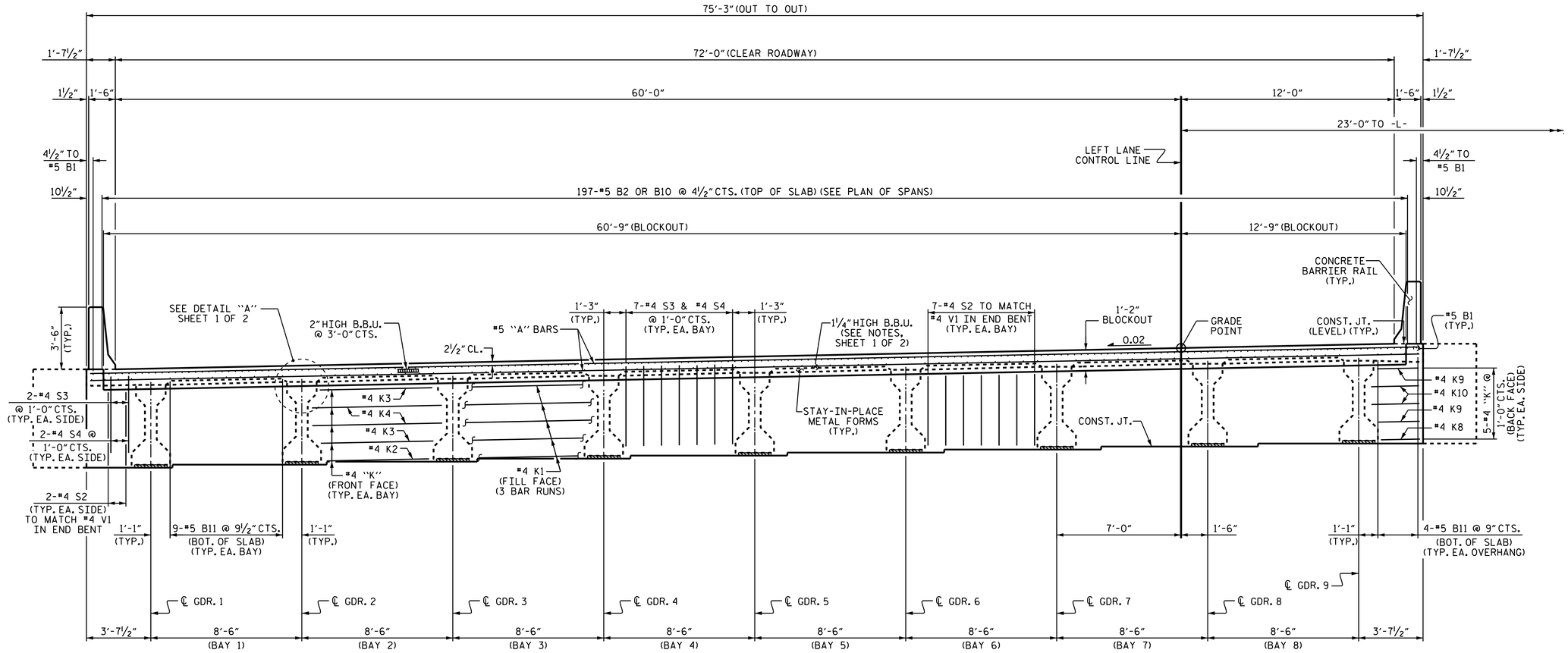
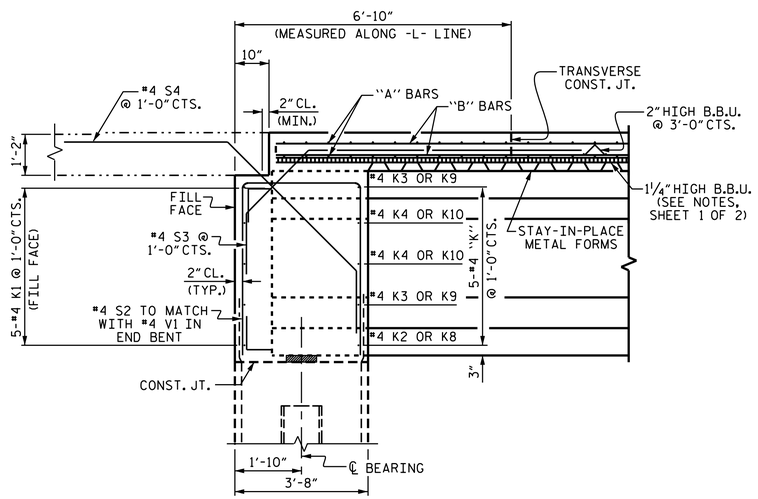
mcheek

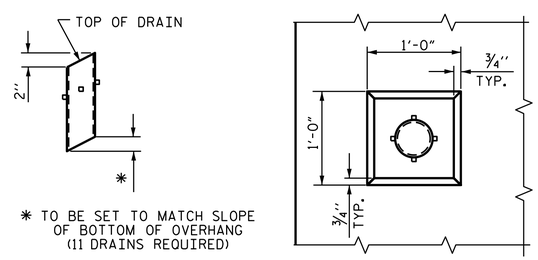
STR. #3



TYPICAL SECTION AT INTEGRAL END BENT



SECTION THROUGH INTEGRAL END BENT



PIPE DETAIL

PLAN OF RECESS

TOP OF FLOOR DRAINS TO BE SET ⅜" BELOW SURFACE OF SLAB.

4 - ½" SQUARE LUGS TO BE GLUED TO THE P.V.C. PIPE AT EQUAL SPACES AROUND THE PIPE DRAIN APPROXIMATELY 4" FROM THE TOP OF THE PIPE.

THE 6" Ø PVC PIPE AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO ASTM D1785.

DRAIN DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DRAWN BY : J. K. BOWLES DATE : 1/11/16
CHECKED BY : N. D'AIUTO DATE : 3/17/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 3/17/16

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PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

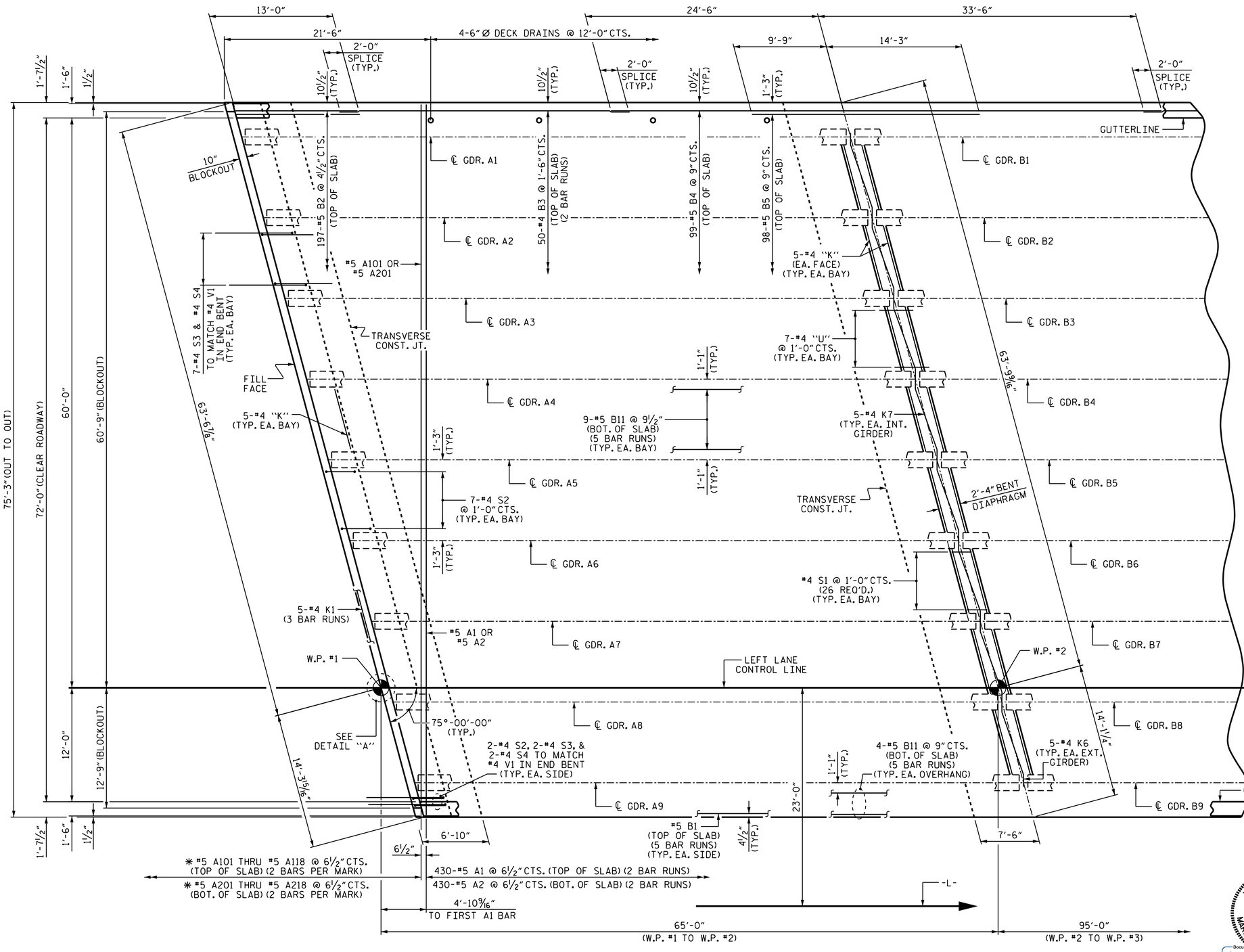
SUPERSTRUCTURE

TYPICAL SECTION

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-6
1			3			TOTAL SHEETS
2			4			33

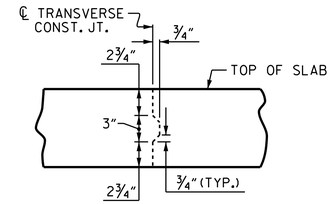
STR. #3



PLAN OF SPAN A

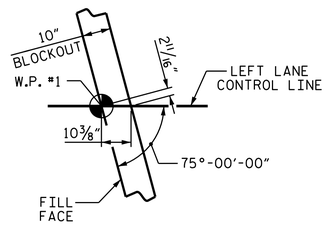
INTERMEDIATE STEEL DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR PRESTRESSED CONCRETE GIRDERS" SHEET.

* 2 BAR RUNS FOR A101 THROUGH A103 & A201 THROUGH A203.



TRANSVERSE CONSTRUCTION JOINT DETAIL

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



DETAIL "A"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.
8549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-7
1			3			TOTAL SHEETS
2			4			33

STR. #3

DRAWN BY : J. K. BOWLES DATE : 1/20/16
CHECKED BY : N. D'AIUTO DATE : 3/17/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 3/17/16

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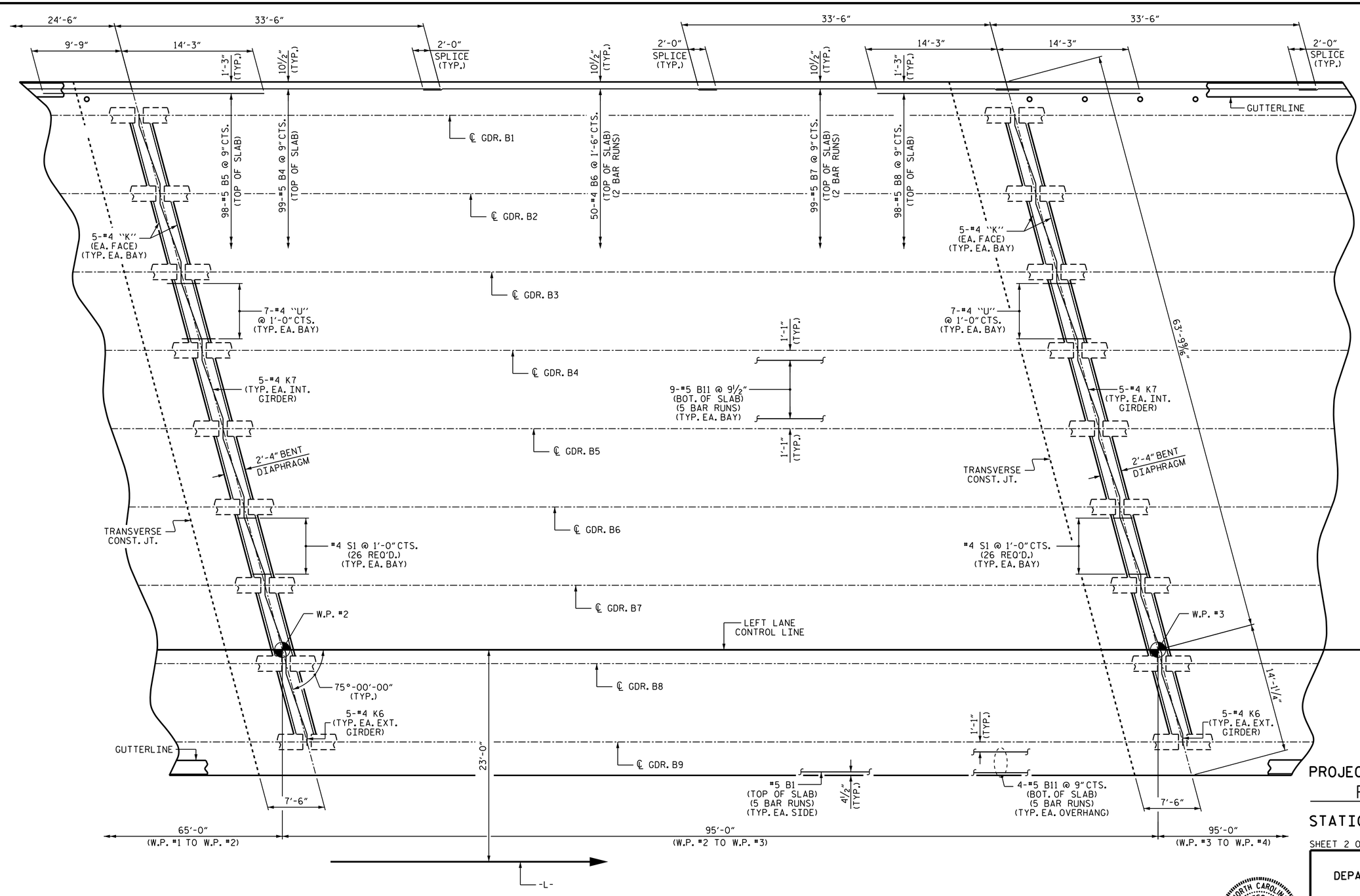

PLAN OF SPAN B

INTERMEDIATE STEEL DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR PRESTRESSED CONCRETE GIRDERS" SHEET.

DRAWN BY : J. K. BOWLES DATE : 1/20/16
CHECKED BY : N. D'AIUTO DATE : 3/17/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 3/17/16

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NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-
SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

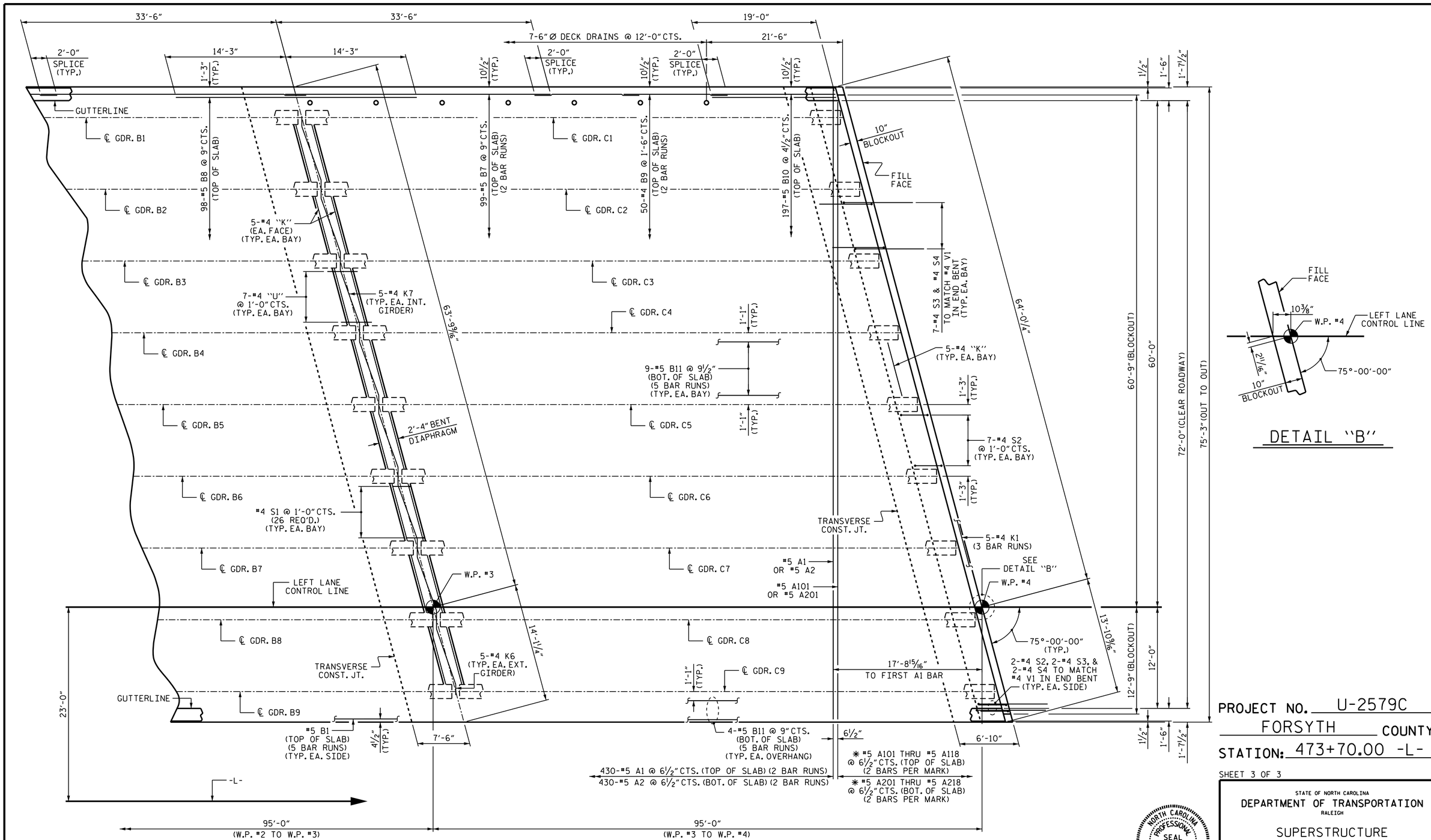
PLAN OF SPAN B

(LEFT LANE)

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

SHEET NO. S3-8
TOTAL SHEETS 33

STR. #3



DETAIL "B"

PLAN OF SPAN C

INTERMEDIATE STEEL DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR PRESTRESSED CONCRETE GIRDERS" SHEET.

* 2 BAR RUNS FOR A101 THROUGH A103 & A201 THROUGH A203.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN C

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

6549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-9
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : J. K. BOWLES DATE : 1/20/16
CHECKED BY : N. D'AIUTO DATE : 3/17/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 3/17/16

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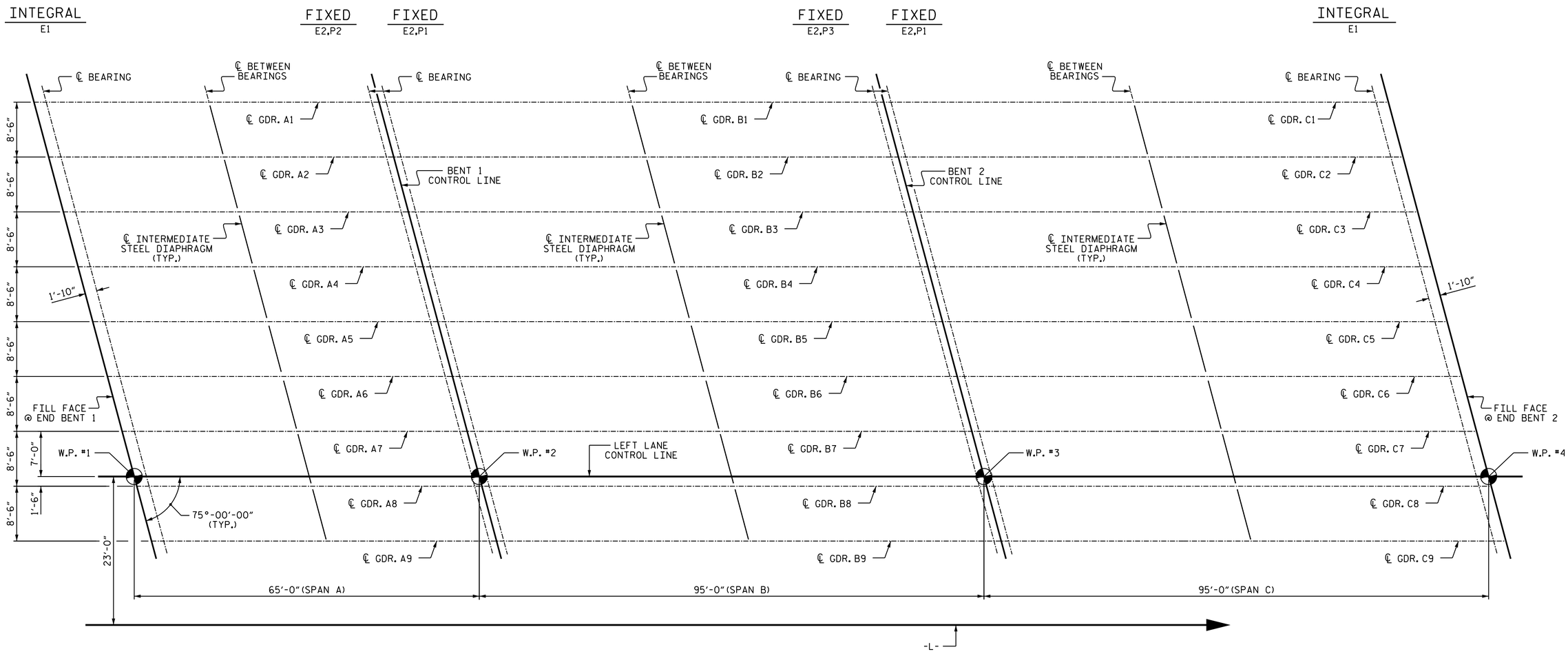

FRAMING PLAN

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

Documents signed by: Marshall G. Creek, Jr. 8549D8EBAA3B405...

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-10
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY :	J. K. BOWLES	DATE : 1/29/16
CHECKED BY :	N. D'AIUTO	DATE : 3/17/16
DESIGN ENGINEER OF RECORD:	H. A. LOCKLEAR	DATE : 3/17/16

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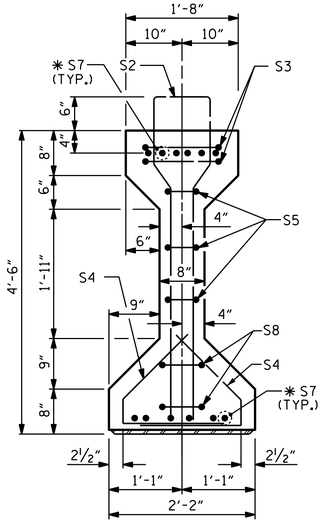
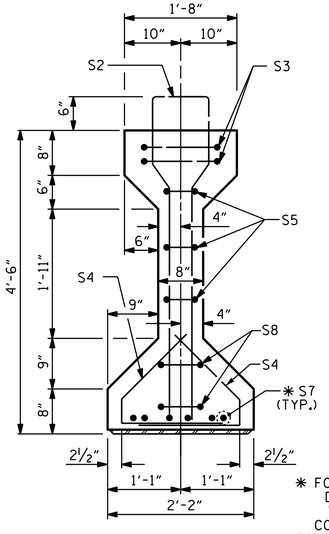
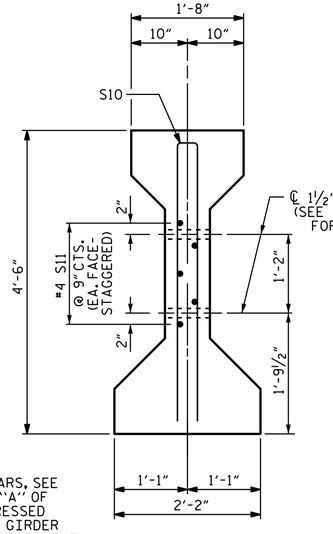


SECTION A-A



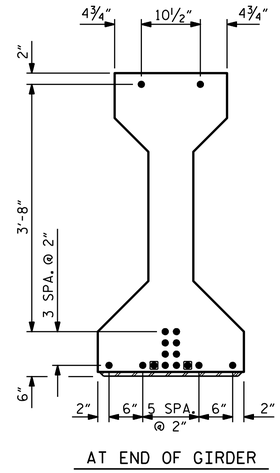
SECTION B-B

✱ FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

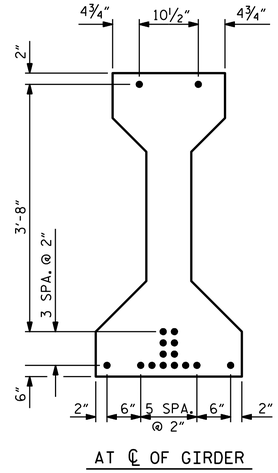


SECTION C-C

(S1 BARS NOT SHOWN)



AT END OF GIRDER



AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

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

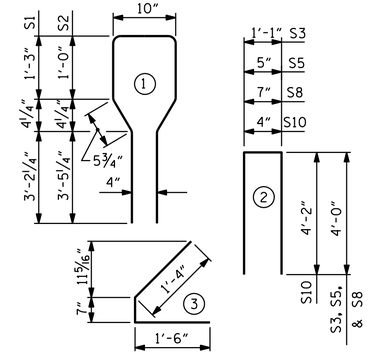
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	80	#4	1	10'-8"	570
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	72	#4	3	3'-5"	164
S5	6	#4	2	8'-5"	34
✱S7	18	#5	STR	3'-8"	69
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23
S13	1	#3	STR	1'-4"	1

✱NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



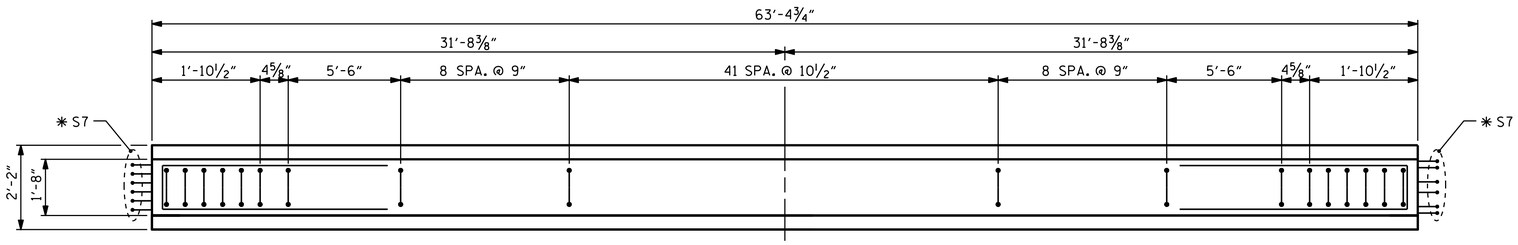
ALL BAR DIMENSIONS ARE OUT-TO-OUT.

QUANTITIES FOR ONE GIRDER

REINFORCING STEEL	5,000 PSI CONCRETE	0.6" Ø L. R. STRANDS
LBS.	C.Y.	No.
1,119	12.9	16

GIRDERS REQUIRED

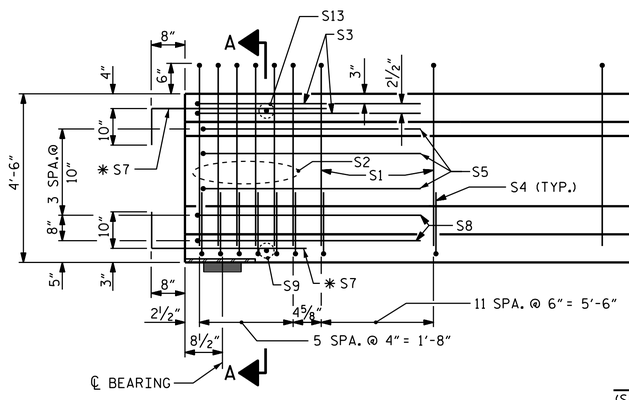
NUMBER	LENGTH	TOTAL LENGTH
9	63'-4¾"	570'-6¾"



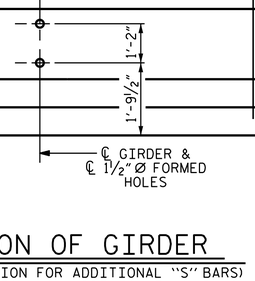
PLAN OF GIRDER

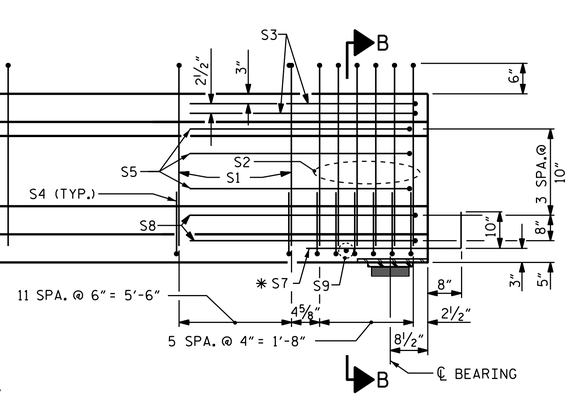
PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR SPAN A GIRDERS.



INTEGRAL END BENT





ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

FIX

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN A (LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.
Docusigned by: Marshall G. Creek, Jr.
6549D6EBAA3B405...
8/1/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-11
1			3			TOTAL SHEETS
2			4			33

STR. #3 STD. NO. PCG6

ASSEMBLED BY : H. A. LOCKLEAR	DATE : 12-15	REV. 5/1/06R	TLA/GM
CHECKED BY : N. D'AIUTO	DATE : 3/17/16	REV. 10/1/11	MAA/GM
DRAWN BY : ELR 8/91		REV. 1/15	MAA/TMG
CHECKED BY : GRP 8/91			

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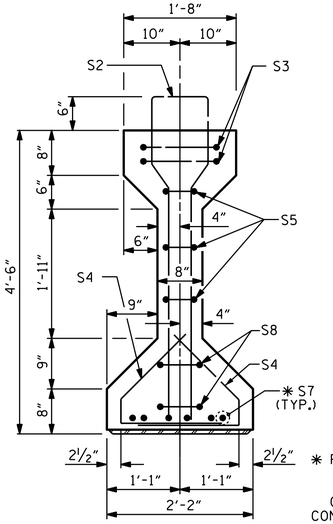
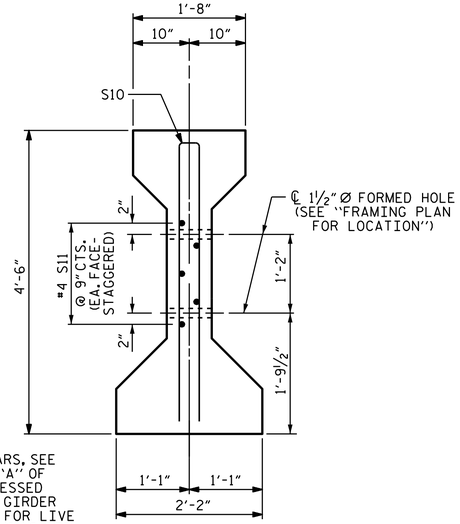


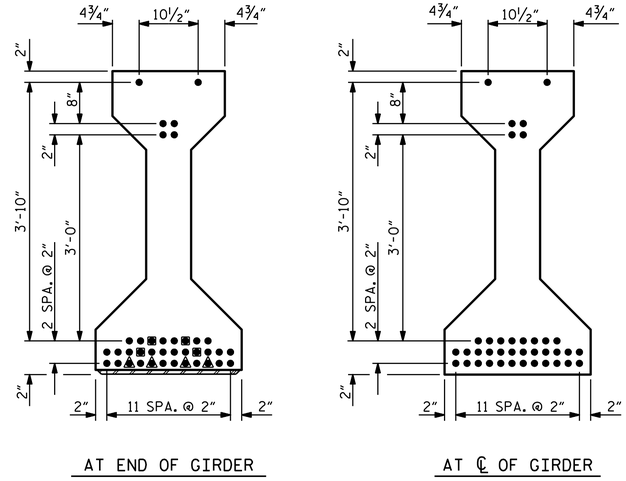
SECTION B-B

✱ FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET



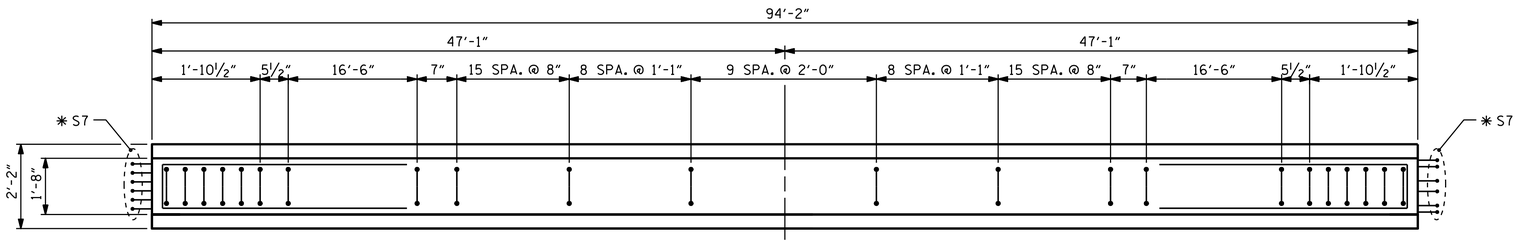
SECTION C-C

(S1 BARS NOT SHOWN)

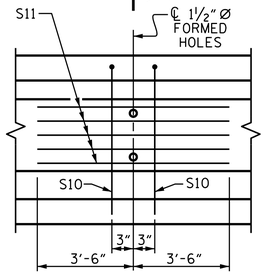


0.6"Ø LOW RELAXATION STRAND LAYOUT

- ● FULLY BONDED STRANDS
- ◙ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER

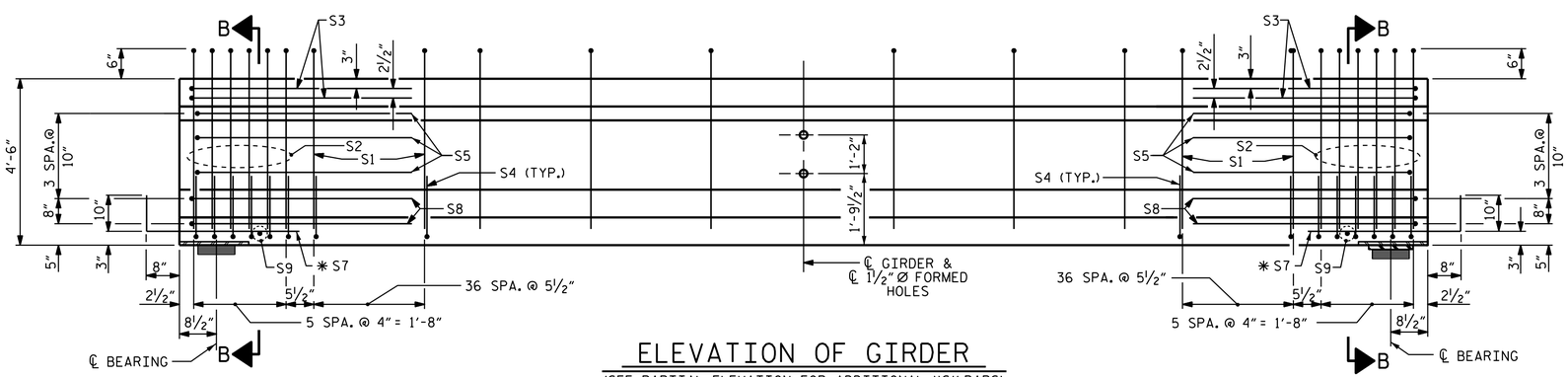


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR SPAN B GIRDERS.



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

0.6" Ø L. R. GRADE 270 STRANDS

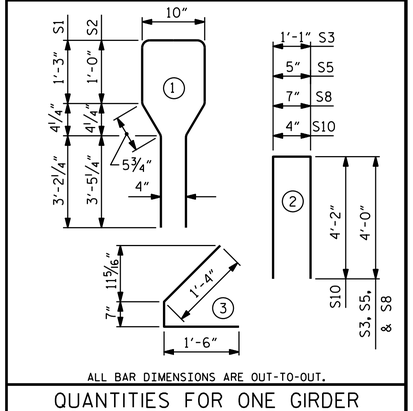
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	130	#4	1	10'-8"	926
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	172	#4	3	3'-5"	393
S5	6	#4	2	8'-5"	34
✱ S7	12	#5	STR	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

✱ 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	7,500 PSI CONCRETE	0.6"Ø L. R. STRANDS
LBS.	C.Y.	No.
1,680	19.1	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
9	94'-2"	847'-6"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN B (LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-12
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY : H. A. LOCKLEAR	DATE : 12-15	
CHECKED BY : N. D'AIUTO	DATE : 3/17/16	
DRAWN BY : ELR 8/91	REV. 5/1/06R	TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11	MAA/GM
	REV. 1/15	MAA/TMG

26-JUL-2017 15:07
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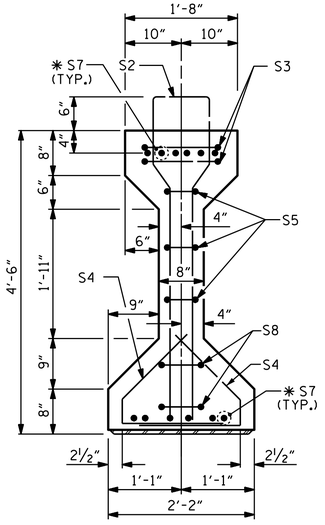
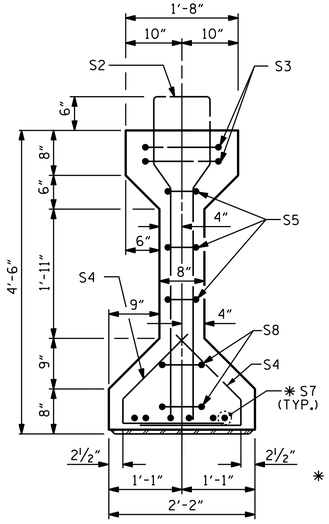
mcheek

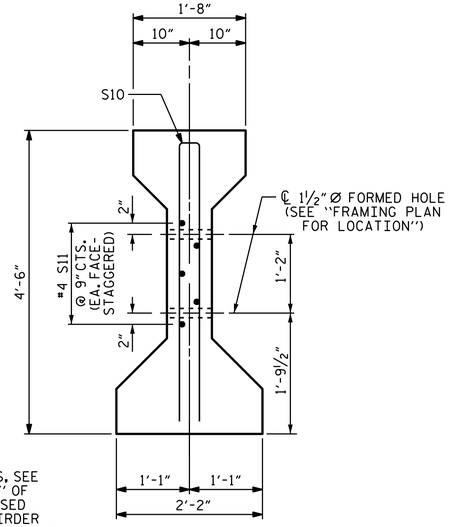
STR. #3 STD. NO. PCG6



SECTION A-A



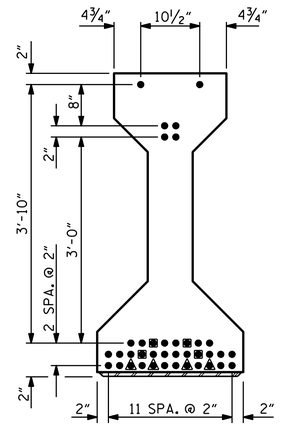
SECTION B-B



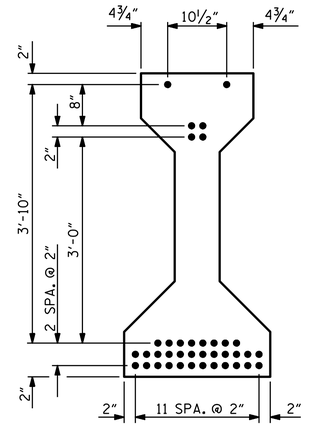
✱ FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

SECTION C-C

(S1 BARS NOT SHOWN)



AT END OF GIRDER



AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

- ● FULLY BONDED STRANDS
- ■ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER

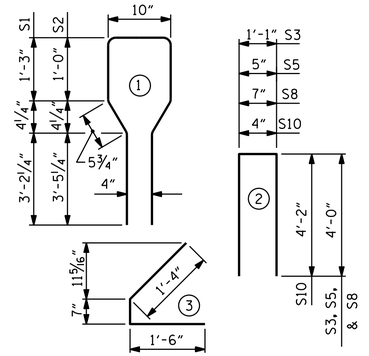
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	130	#4	1	10'-8"	926
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	180	#4	3	3'-5"	411
S5	6	#4	2	8'-5"	34
✱S7	18	#5	STR	3'-8"	69
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23
S13	1	#3	STR	1'-4"	1

✱NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



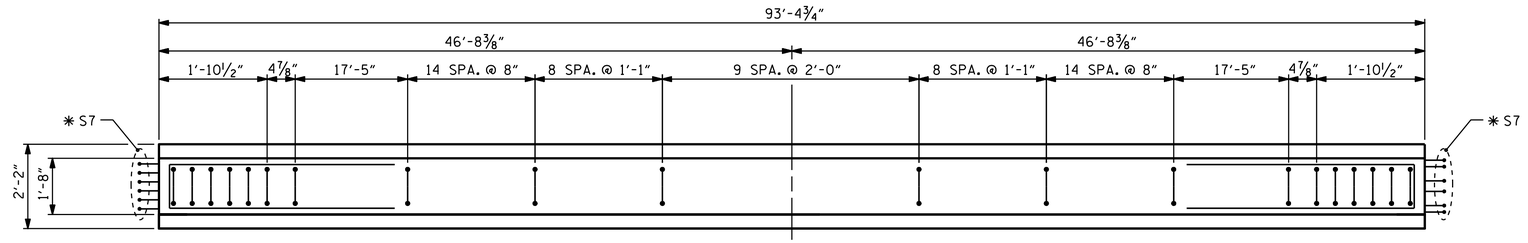
ALL BAR DIMENSIONS ARE OUT-TO-OUT.

QUANTITIES FOR ONE GIRDER

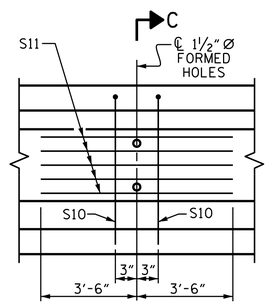
REINFORCING STEEL	7,500 PSI CONCRETE	0.6" Ø L.R. STRANDS
LBS.	C.Y.	No.
1722	19.0	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
9	93'-4¾"	840'-6¾"

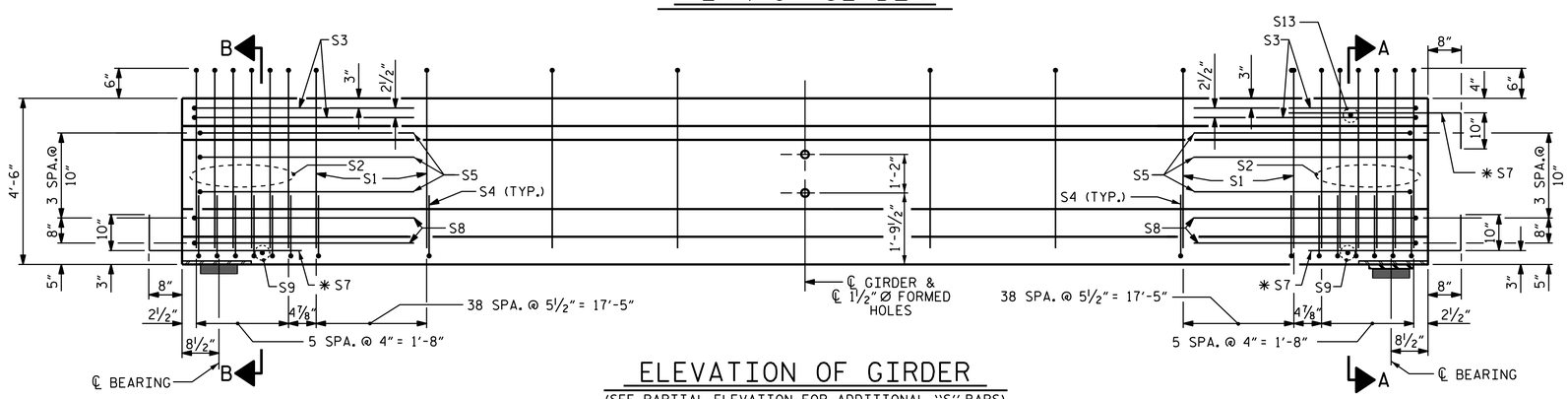


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR SPAN C GIRDERS.



FIX

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

INTEGRAL END BENT

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN C
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6540D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-13
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY :	H. A. LOCKLEAR	DATE :	12-15
CHECKED BY :	N. D'AIUTO	DATE :	3/17/16
DRAWN BY :	ELR 8/91	REV. 5/1/06R	TLA/GM
CHECKED BY :	GRP 8/91	REV. 10/1/11	MAA/GM
		REV. 1/15	MAA/TMG

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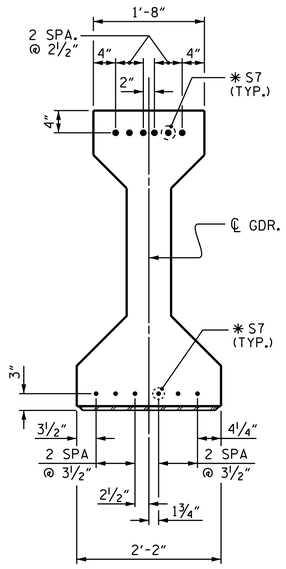
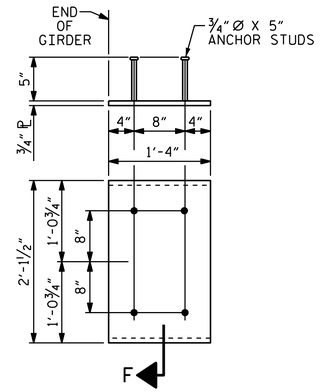
mcheek

STR. #3 STD. NO. PCG6



DETAIL "A"



EMBEDDED PLATE "B-1" DETAILS
FOR AASHTO TYPE IV GIRDER

(2 REQ'D PER GIRDER)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,000 PSI FOR SPAN A AND 5,800 FOR SPANS B AND C.

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

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

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6"Ø LOW RELAXATION	SPAN A, GIRDERS 1 THROUGH 9										
TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.014	0.026	0.036	0.042	0.044	0.042	0.036	0.026	0.014	0.000
✱DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.010	0.018	0.025	0.029	0.031	0.029	0.025	0.018	0.010	0.000
FINAL CAMBER †	0	1/16"	1/8"	1/8"	3/16"	3/16"	3/16"	1/8"	1/8"	1/16"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

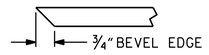
0.6"Ø LOW RELAXATION	SPAN B, GIRDERS 1 THROUGH 9										
TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.054	0.103	0.141	0.165	0.173	0.165	0.141	0.103	0.054	0.000
✱DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.040	0.075	0.102	0.120	0.126	0.120	0.102	0.075	0.040	0.000
FINAL CAMBER †	0	3/16"	5/16"	7/16"	9/16"	9/16"	9/16"	7/16"	5/16"	3/16"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6"Ø LOW RELAXATION	SPAN C, GIRDERS 1 THROUGH 9										
TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.054	0.103	0.141	0.165	0.173	0.165	0.141	0.103	0.054	0.000
✱DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.038	0.072	0.099	0.116	0.122	0.116	0.099	0.072	0.038	0.000
FINAL CAMBER †	0	3/16"	3/8"	1/2"	9/16"	5/8"	9/16"	1/2"	3/8"	3/16"	0

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



SECTION "F"

(SEE NOTES)

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

8/1/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-14
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY :	J. K. BOWLES	DATE :	2/23/16
CHECKED BY :	N. D'AIUTO	DATE :	3/17/16
DRAWN BY : ELR	11/91	REV. 10/1/11	MAA/GM
CHECKED BY : GRP	11/91	REV. 1/15	MAA/TMG
		REV. 2/15	MAA/TMG

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mcheek

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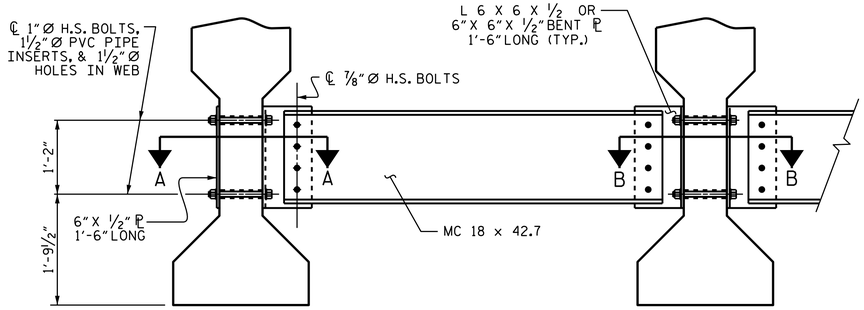
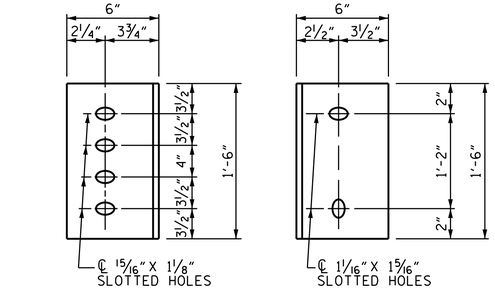


EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE WEB FACE

CONNECTOR PLATE DETAILS

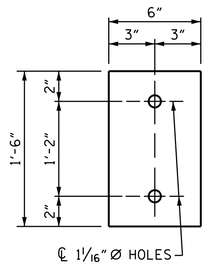
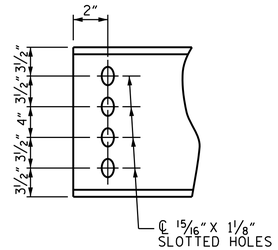
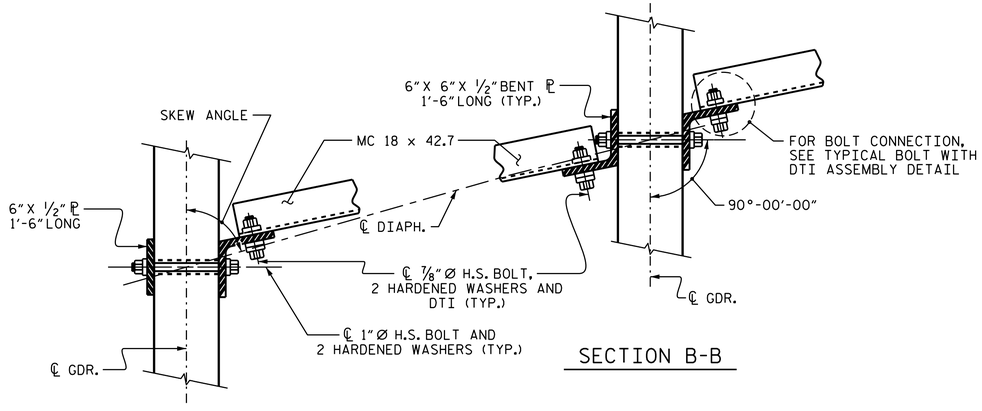


PLATE DETAILS

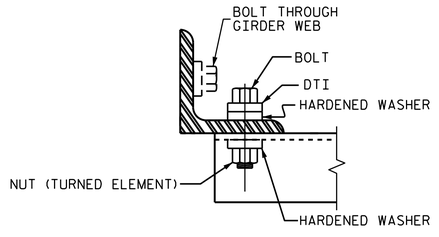


CHANNEL END



SECTION A-A SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

TENSION ON THE ASTM A325 BOLTS THROUGH THE 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 AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE 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 54"PRESTRESSED CONCRETE GIRDERS.

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

ASSEMBLED BY : H. A. LOCKLEAR	DATE : 10-15	ADDED 10/21/05	
CHECKED BY : N. D'AIUTO	DATE : 3/17/16	REV. 5/1/06RRR	KMM/GM
DRAWN BY : TLA 6/05		REV. 10/1/11	MAA/GM
CHECKED BY : VC 6/05			

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mcheek

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

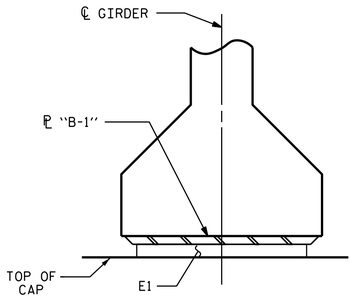
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE
STEEL DIAPHRAGMS
FOR TYPE IV PRESTRESSED
CONCRETE GIRDERS
(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-15
1			3			TOTAL SHEETS
2			4			33

STR. #3 STD. NO. PCG10



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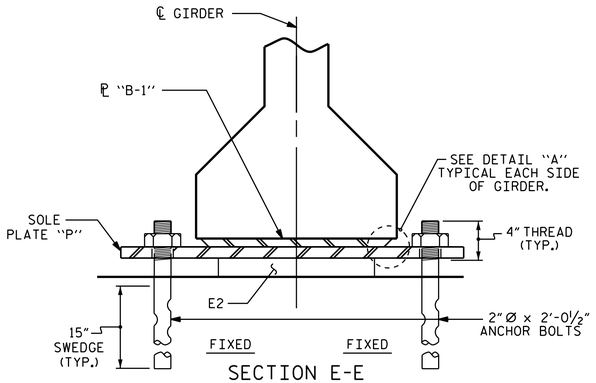
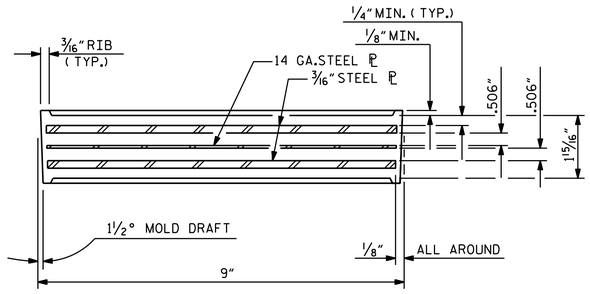
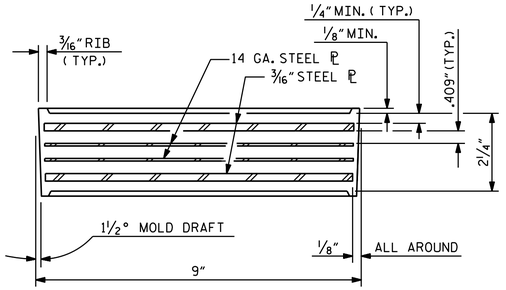


SECTION E-E

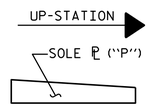


TYPICAL SECTION OF ELASTOMERIC BEARINGS

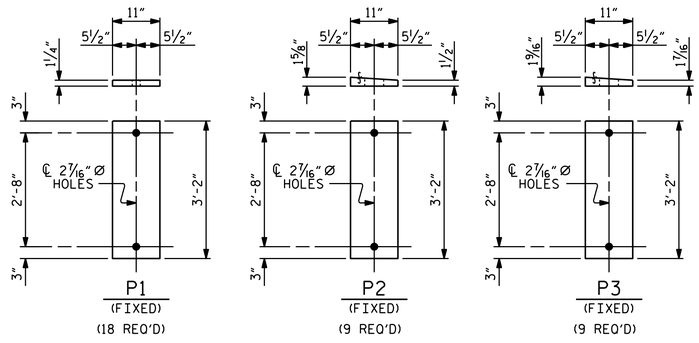


TYPICAL SECTION OF ELASTOMERIC BEARINGS

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE V	365 k



SOLE ℄ PLACEMENT DETAIL



SOLE PLATE DETAILS ("P")

NOTES

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

STEEL SOLE PLATES, ANCHOR BOLTS, AND NUTS 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.

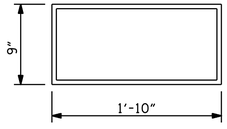
SOLE PLATE "P", BOLTS, AND NUTS SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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

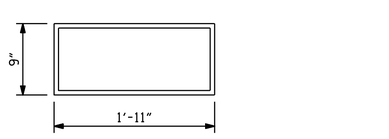
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.



E1 (18 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

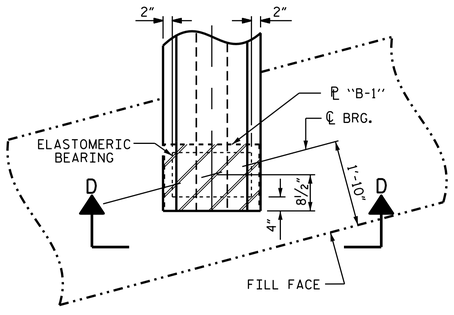
TYPE IV



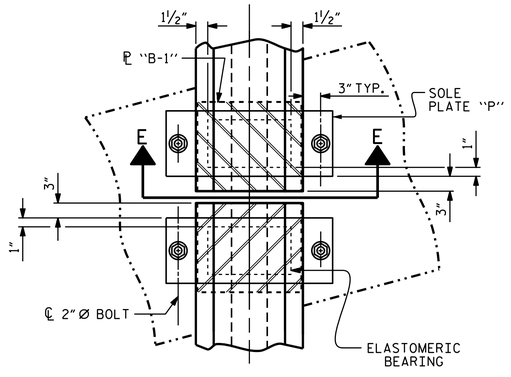
E2 (36 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

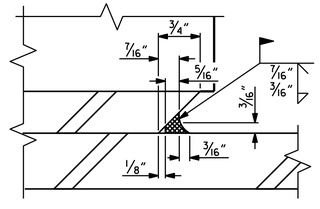


PLAN VIEW AT INTEGRAL END BENT



PLAN VIEW AT BENT

(SHOWING CONTINUOUS BENT)



DETAIL "A"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
ELASTOMERIC BEARING DETAILS
PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-16
1			3			TOTAL SHEETS
2			4			33

STR. #3 STD. NO. EB4

ASSEMBLED BY : J. K. BOWLES		DATE : 2/1/16	
CHECKED BY : N. D'AIUTO		DATE : 3/17/16	
DRAWN BY : EEM 2/97	REV. 10/1/11	MAA/GM	
CHECKED BY : VAP 2/97	REV. 6/13	AAC/MAA	
	REV. 1/15	MAA/TMG	

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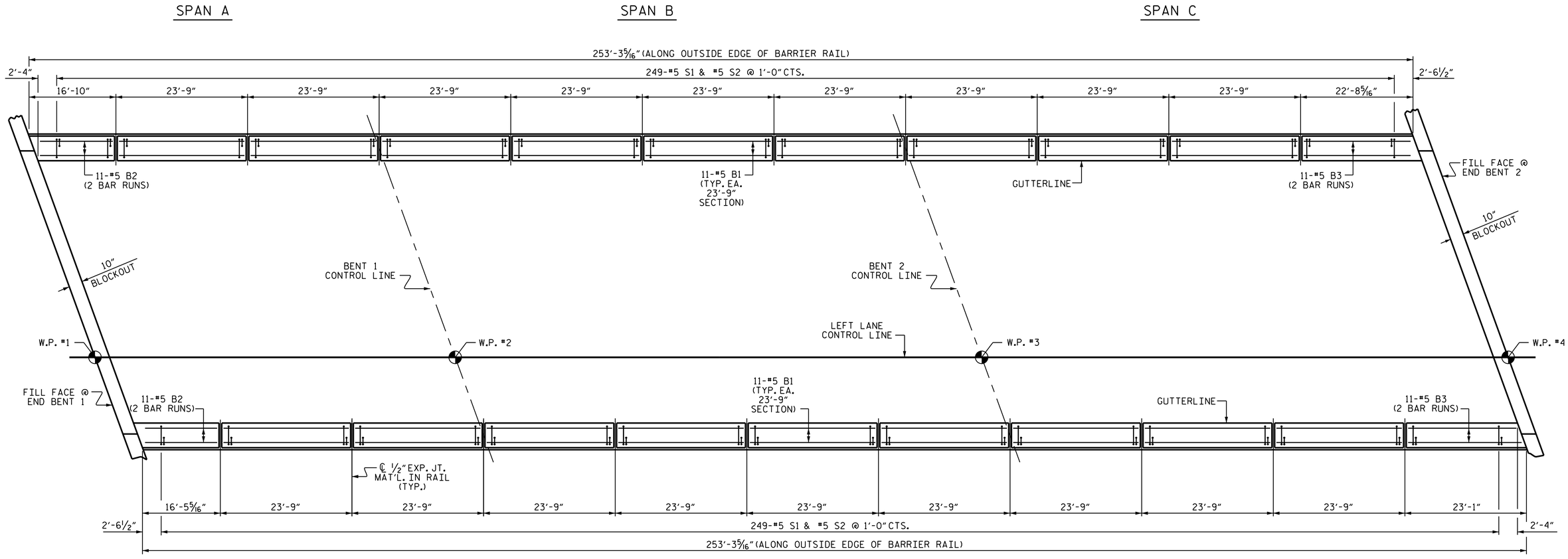

PLAN OF CONCRETE BARRIER RAIL

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-6" CONCRETE BARRIER RAIL

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
65490E6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-17
1			3			TOTAL SHEETS
2			4			33

STR. #3

DRAWN BY : T.L. AVERETTE DATE : 3/02/17
CHECKED BY : H. T. BARBOUR DATE : 3/14/17

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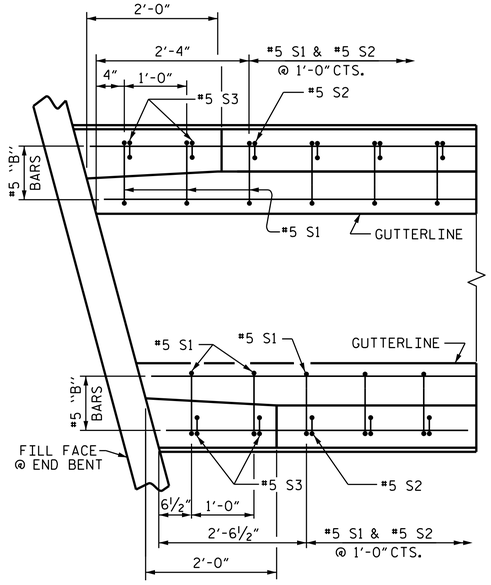
NOTES

THE BARRIER RAIL IN THE 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.

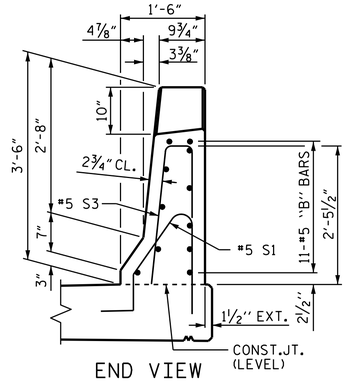
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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.

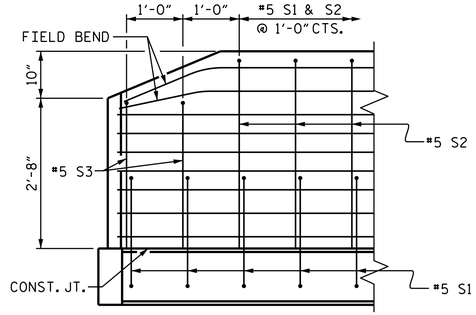
THE #5 S1 AND #5 S2 BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN 2" MINIMUM CLEARANCE TO THE ½" EXPANSION JOINT MATERIAL IN THE BARRIER RAIL.



PLAN

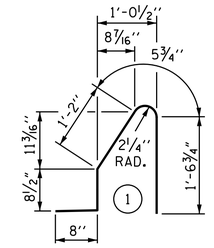


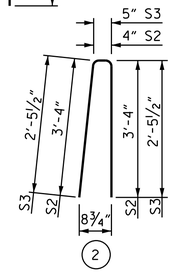
END VIEW



SIDE VIEW

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT.

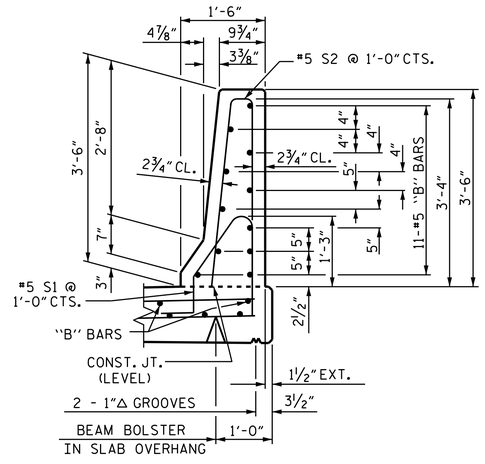
BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

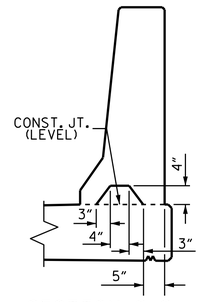
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ B1	198	#5	STR	23'-4"	4819
✱ B2	44	#5	STR	9'-11"	455
✱ B3	44	#5	STR	13'-1"	600
✱ S1	506	#5	1	4'-7"	2419
✱ S2	498	#5	2	7'-0"	3636
✱ S3	8	#5	2	5'-4"	45

✱ EPOXY COATED REINFORCING STEEL	LBS.	11,974
CLASS AA CONCRETE	C.Y.	68.9
CONCRETE BARRIER RAIL	LIN. FT.	506.55

END OF RAIL DETAILS

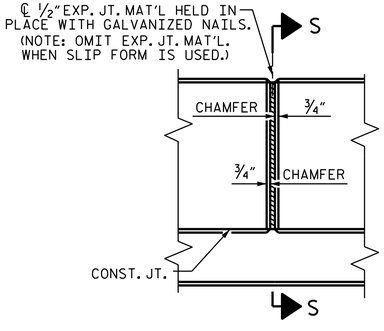


SECTION THRU RAIL



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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-6" CONCRETE BARRIER RAIL

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D8EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-18
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY :	T. L. AVERETTE	DATE : 3/02/17
CHECKED BY :	H. T. BARBOUR	DATE : 3/14/17
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 6/2017

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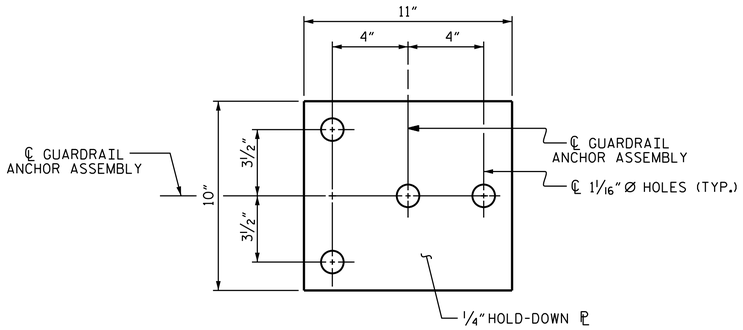
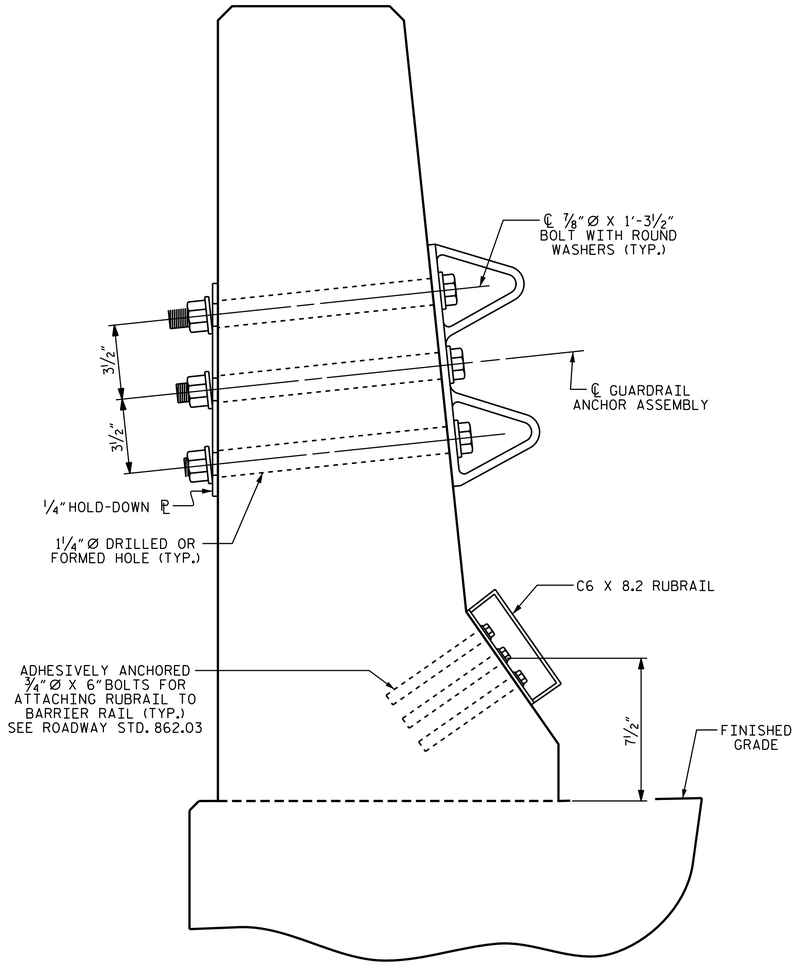
STR. #3

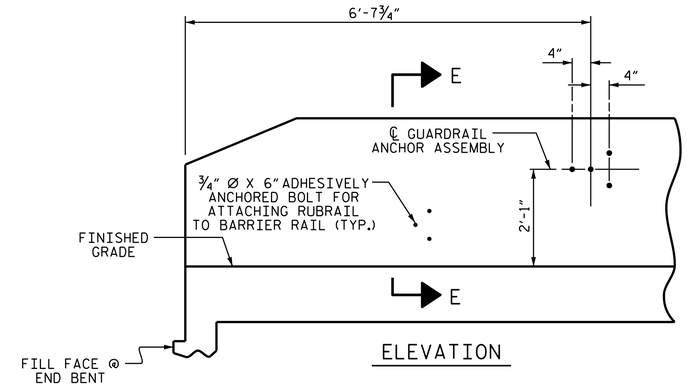


PLAN

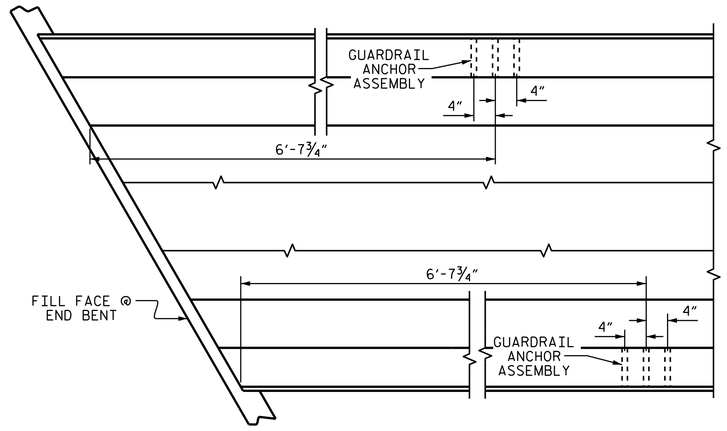


SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



ELEVATION



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-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

(LEFT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-19
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY : J. K. BOWLES	DATE : 2/23/16	
CHECKED BY : N. D'AIUTO	DATE : 3/17/16	
DRAWN BY : TLA 5/06	REV. 10/1/11	MAA/GM
CHECKED BY : GM 5/06	REV. 7/12	MAA/GM
	REV. 6/13	MAA/GM

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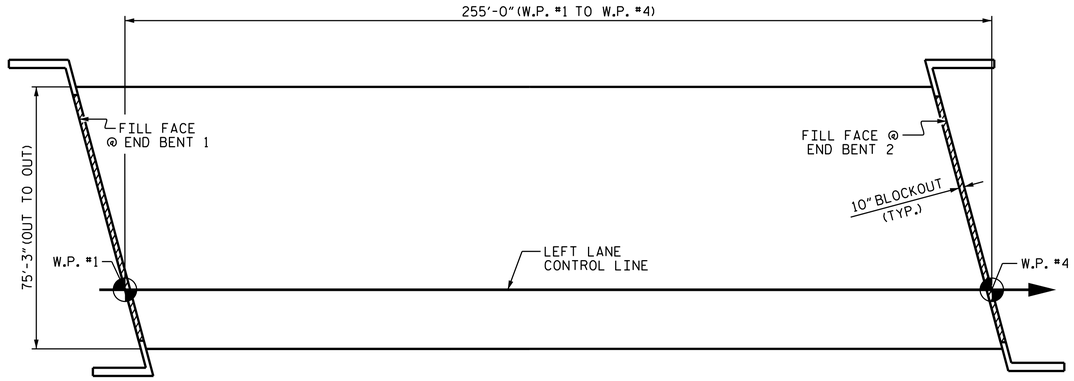
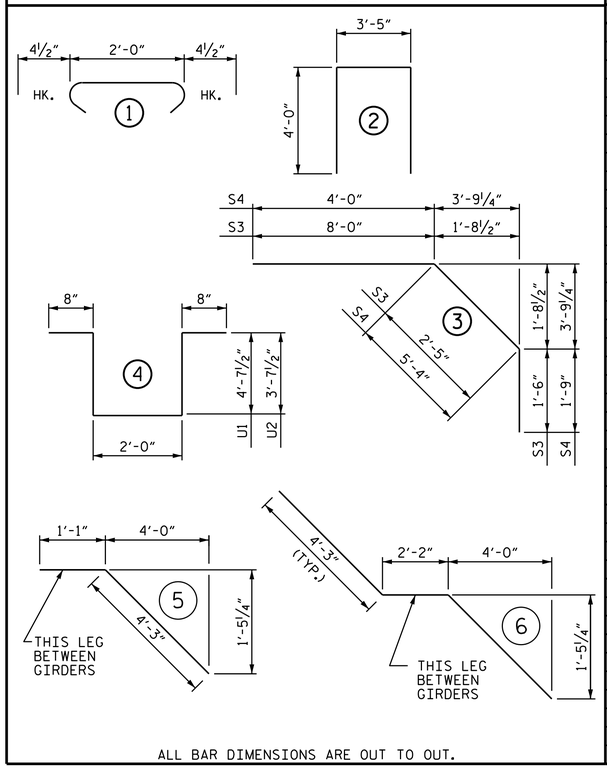
STR. #3 STD. NO. GRA2



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. 19,189)

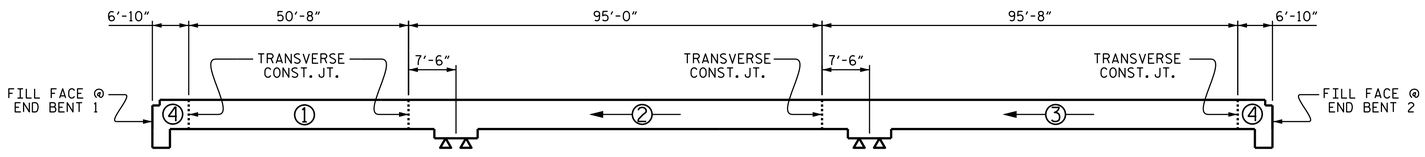
BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

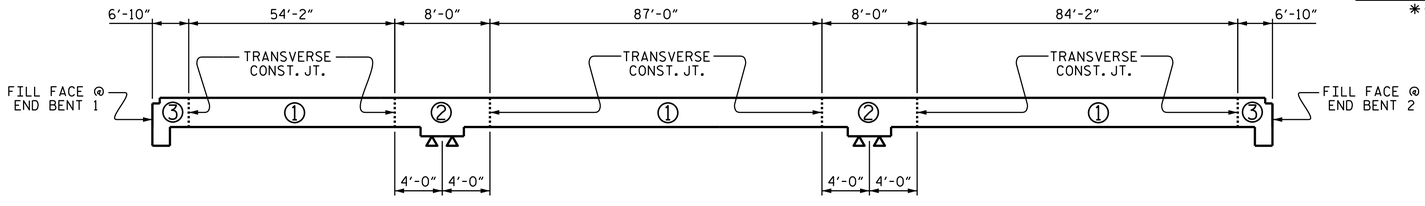
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	860	#5	STR	38'-9"	34758	✳B1	10	#5	STR	52'-7"	548
A2	860	#5	STR	38'-7"	34608	✳B2	197	#5	STR	13'-0"	2671
						✳B3	100	#4	STR	16'-6"	1102
✳A101	8	#5	STR	37'-1"	309	✳B4	99	#5	STR	58'-0"	5989
✳A102	8	#5	STR	35'-1"	293	✳B5	98	#5	STR	24'-0"	2453
✳A103	8	#5	STR	33'-1"	276	✳B6	100	#4	STR	17'-0"	1136
✳A104	4	#5	STR	59'-5"	248	✳B7	198	#5	STR	34'-9"	7176
✳A105	4	#5	STR	55'-5"	231	✳B8	98	#5	STR	28'-6"	2913
✳A106	4	#5	STR	51'-4"	214	✳B9	100	#4	STR	23'-9"	1587
✳A107	4	#5	STR	47'-4"	197	✳B10	197	#5	STR	19'-0"	3904
✳A108	4	#5	STR	43'-3"	180	B11	400	#5	STR	52'-4"	21833
✳A109	4	#5	STR	39'-3"	164						
✳A110	4	#5	STR	35'-2"	147	K1	30	#4	STR	26'-5"	529
✳A111	4	#5	STR	31'-2"	130	K2	16	#4	STR	6'-2"	66
✳A112	4	#5	STR	27'-1"	113	K3	96	#4	STR	6'-8"	428
✳A113	4	#5	STR	23'-1"	96	K4	96	#4	STR	7'-9"	497
✳A114	4	#5	STR	19'-0"	79	K5	32	#4	STR	5'-0"	107
✳A115	4	#5	STR	15'-0"	63	K6	20	#4	5	5'-4"	71
✳A116	4	#5	STR	10'-11"	46	K7	70	#4	6	10'-8"	499
✳A117	4	#5	STR	6'-11"	29	K8	4	#4	STR	2'-3"	6
✳A118	4	#5	STR	2'-10"	12	K9	8	#4	STR	2'-6"	13
						K10	8	#4	STR	3'-0"	16
A201	8	#5	STR	36'-11"	308						
A202	8	#5	STR	34'-11"	291	S1	416	#4	1	2'-9"	764
A203	8	#5	STR	32'-11"	275	S2	120	#4	2	11'-5"	915
A204	4	#5	STR	59'-5"	248	✳S3	120	#4	3	11'-11"	955
A205	4	#5	STR	55'-5"	231	✳S4	120	#4	3	11'-1"	888
A206	4	#5	STR	51'-4"	214						
A207	4	#5	STR	47'-4"	197	U1	80	#4	4	12'-7"	672
A208	4	#5	STR	43'-3"	180	U2	32	#4	4	10'-7"	226
A209	4	#5	STR	39'-3"	164	REINFORCING STEEL				LBS.	64,073
A210	4	#5	STR	35'-2"	147	✳ EPOXY COATED REINFORCING STEEL				LBS.	68,907
A211	4	#5	STR	31'-2"	130						
A212	4	#5	STR	27'-1"	113						
A213	4	#5	STR	23'-1"	96						
A214	4	#5	STR	19'-0"	79						
A215	4	#5	STR	15'-0"	63						
A216	4	#5	STR	10'-11"	46						
A217	4	#5	STR	6'-11"	29						
A218	4	#5	STR	2'-10"	12						



DECK POURING SEQUENCE

(#) = INDICATES THE NUMBER AND DIRECTION OF POUR.



OPTIONAL DECK POURING DETAIL

POURS ② AND ③ SHALL NOT BE STARTED UNTIL BOTH ADJACENT POUR ① REACH A MINIMUM OF 3000 PSI

GROOVING BRIDGE FLOORS

APPROACH SLABS	3,331	SQ. FT.
BRIDGE DECK	17,452	SQ. FT.
TOTAL	20,783	SQ. FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(C.Y.)	(LBS.)	(LBS.)
POUR #1	118.1	64,073	68,907
POUR #2	248.3		
POUR #3	249.5		
POUR #4	107.1		
TOTAL ✳✳	723.0	64,073	68,907

✳✳QUANTITIES FOR CONCRETE 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	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
8549D6EBAA3B405...

7/27/2017

DRAWN BY : J. K. BOWLES DATE : 1/29/16
CHECKED BY : N. D'AIUTO DATE : 3/17/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 3/17/16

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REVISIONS						SHEET NO.
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2			4			33

STR. #3

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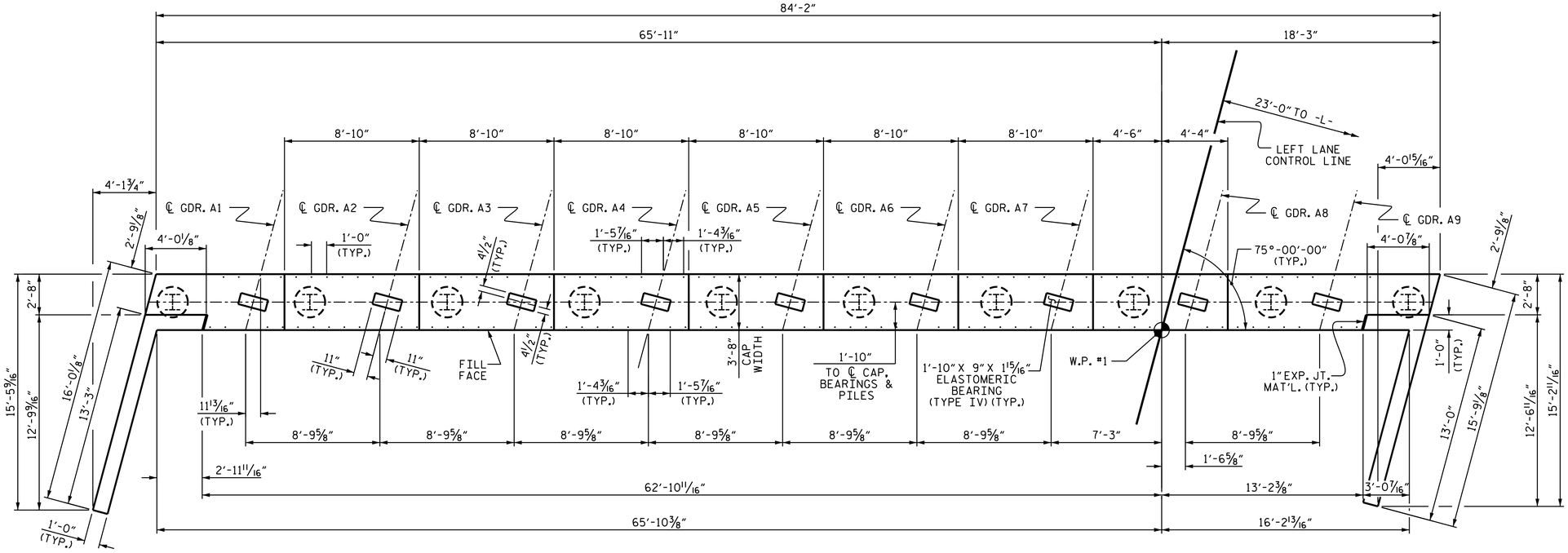

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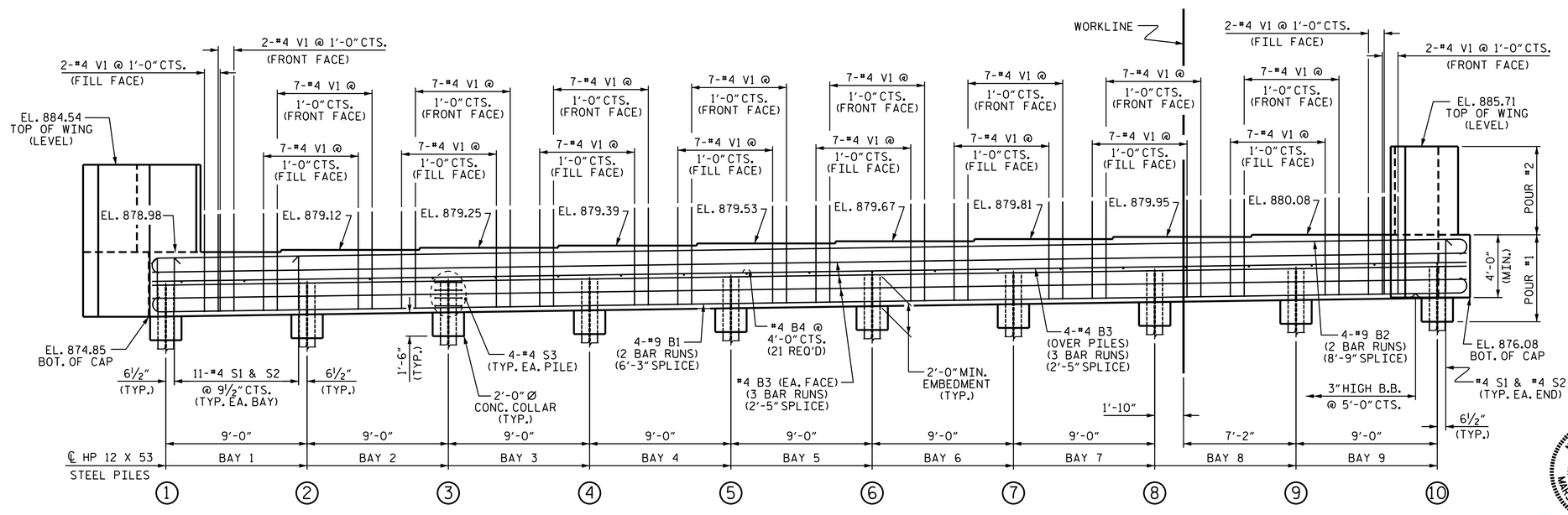

ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

TOP OF PILE ELEVATIONS	
1	876.87
2	877.00
3	877.14
4	877.27
5	877.40
6	877.53
7	877.66
8	877.79
9	877.93
10	878.06

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL END BENT 1
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D0EBAA3B405...

7/27/2017

DRAWN BY : H.A. LOCKLEAR DATE : 6/15/16
CHECKED BY : K.D. LAYNE DATE : 8/3/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 8/18/16

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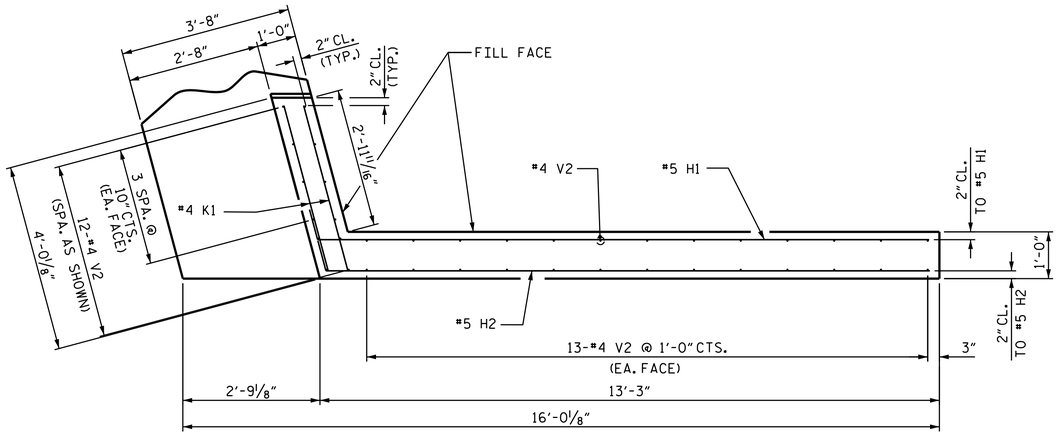
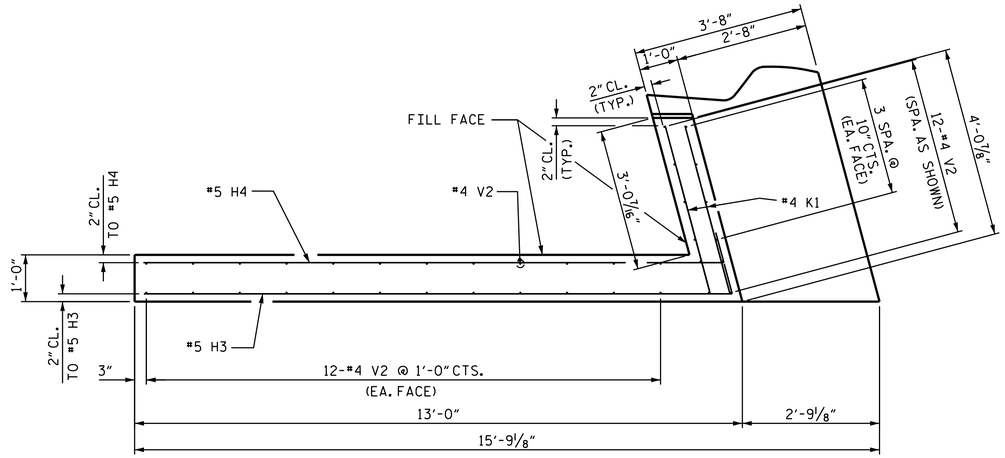
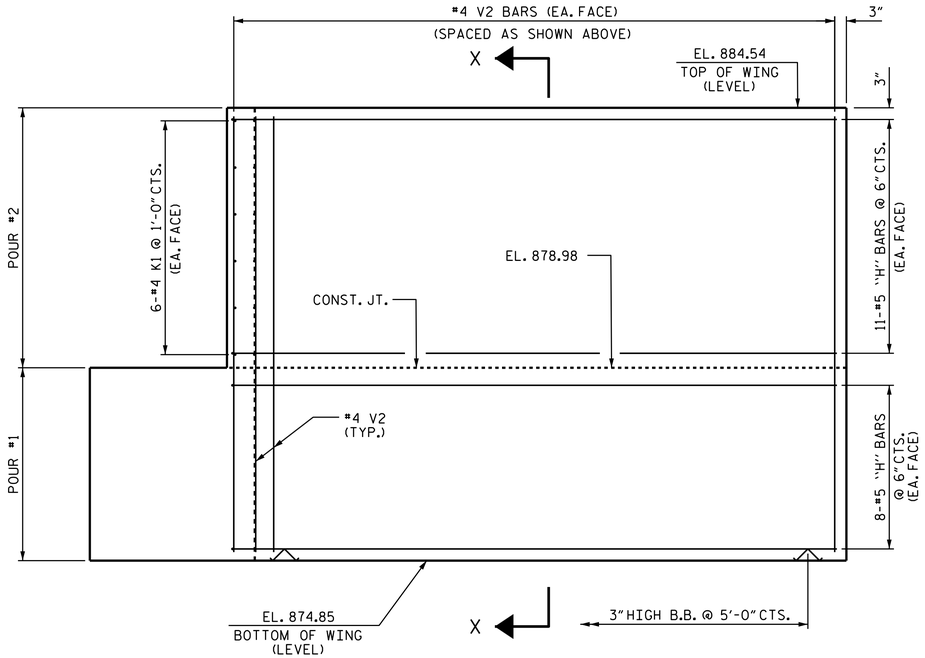


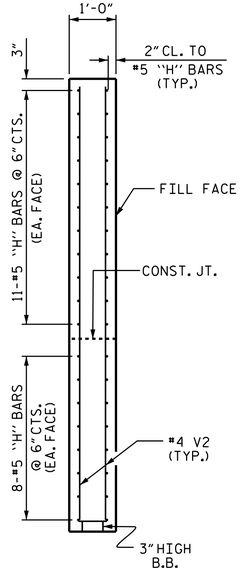
PLAN OF LEFT WING



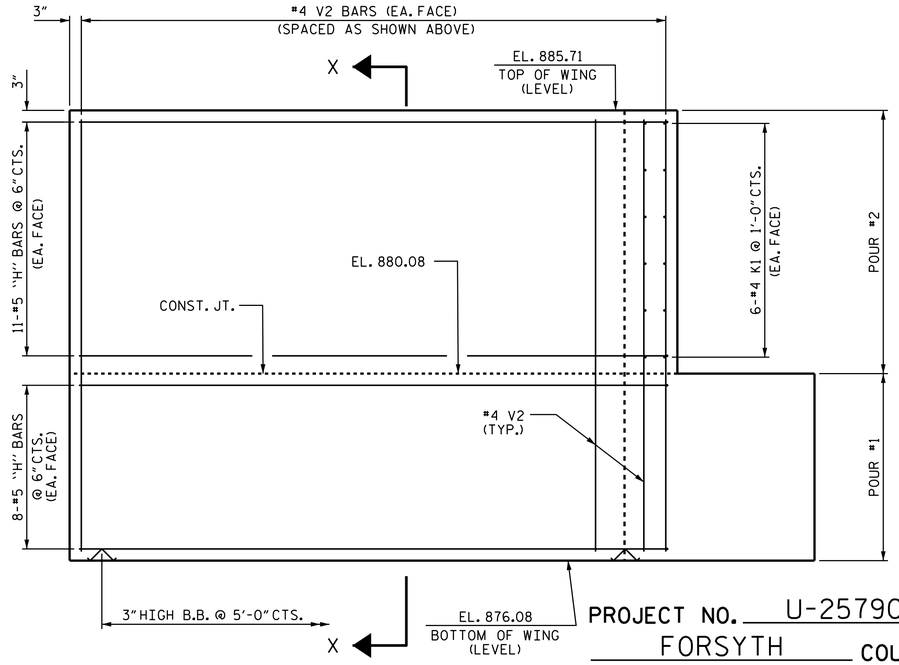
PLAN OF RIGHT WING



ELEVATION OF LEFT WING



SECTION X-X



ELEVATION OF RIGHT WING

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL END BENT 1
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-22
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2			4			33

DRAWN BY : H.A. LOCKLEAR DATE : 6/22/16
CHECKED BY : K.D. LAYNE DATE : 8/3/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 8/18/16

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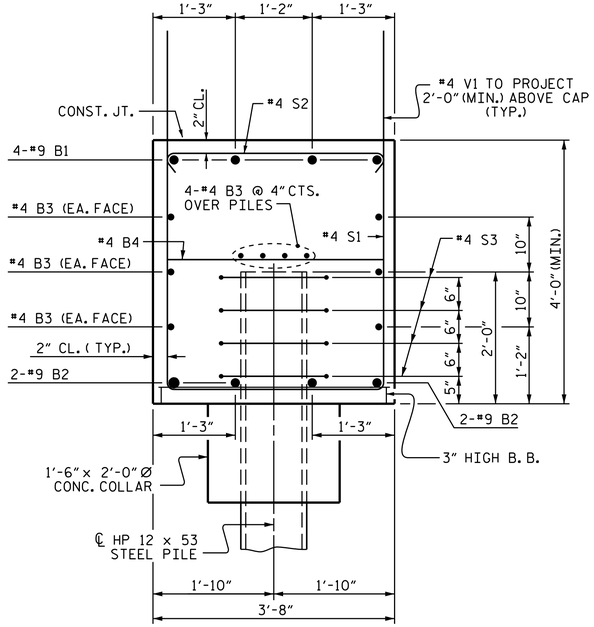
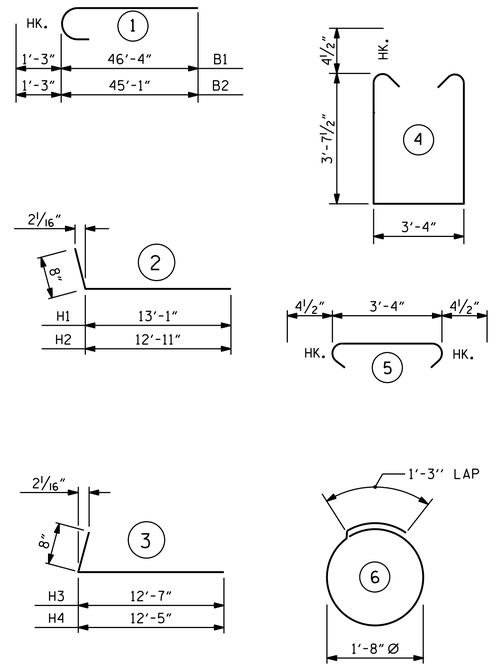


SECTION THRU CAP

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

INTEGRAL END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	47'-7"	1294
B2	8	#9	1	46'-4"	1260
B3	30	#4	STR	29'-7"	593
B4	21	#4	STR	3'-4"	47
H1	19	#5	2	13'-9"	272
H2	19	#5	2	13'-7"	269
H3	19	#5	3	13'-3"	263
H4	19	#5	3	13'-1"	259
K1	24	#4	STR	3'-8"	59
S1	101	#4	4	11'-4"	765
S2	101	#4	5	4'-1"	267
S3	40	#4	6	6'-6"	174
V1	120	#4	STR	6'-0"	481
V2	74	#4	STR	9'-3"	457

REINFORCING STEEL LBS. 6,468

CLASS A CONCRETE

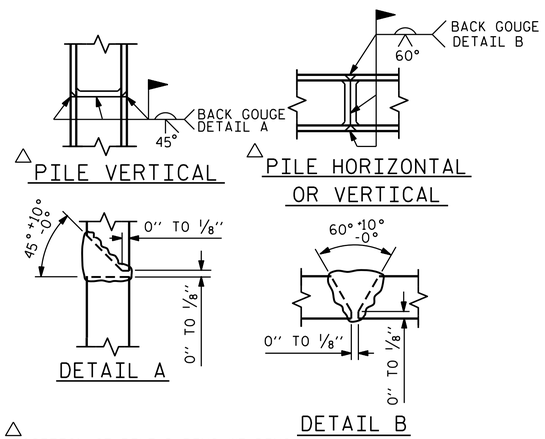
POUR #1 CAP, LOWER WINGS & CONC. COLLARS	C.Y.	52.3
POUR #2 UPPER PART OF WINGS	C.Y.	6.7
TOTAL CLASS A CONCRETE	C.Y.	59.0

HP 12 X 53 STEEL PILES

NO.: 10 LIN. FT. 675

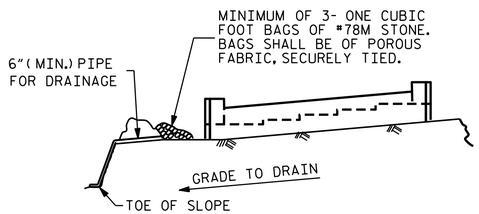
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES

EACH 10



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 1 (LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-23
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : H.A. LOCKLEAR DATE : 6/23/16
CHECKED BY : K.D. LAYNE DATE : 8/3/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 8/18/16

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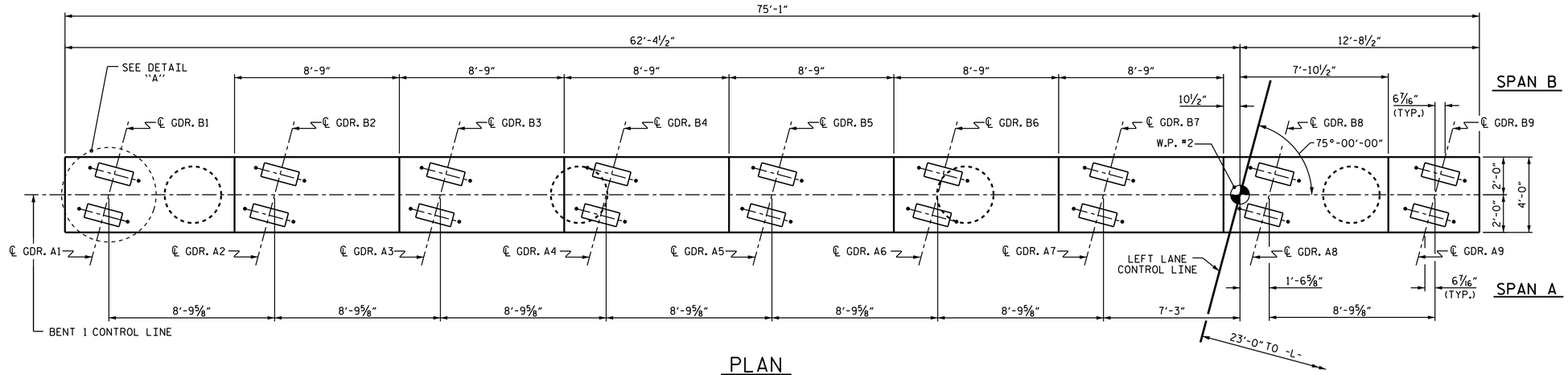
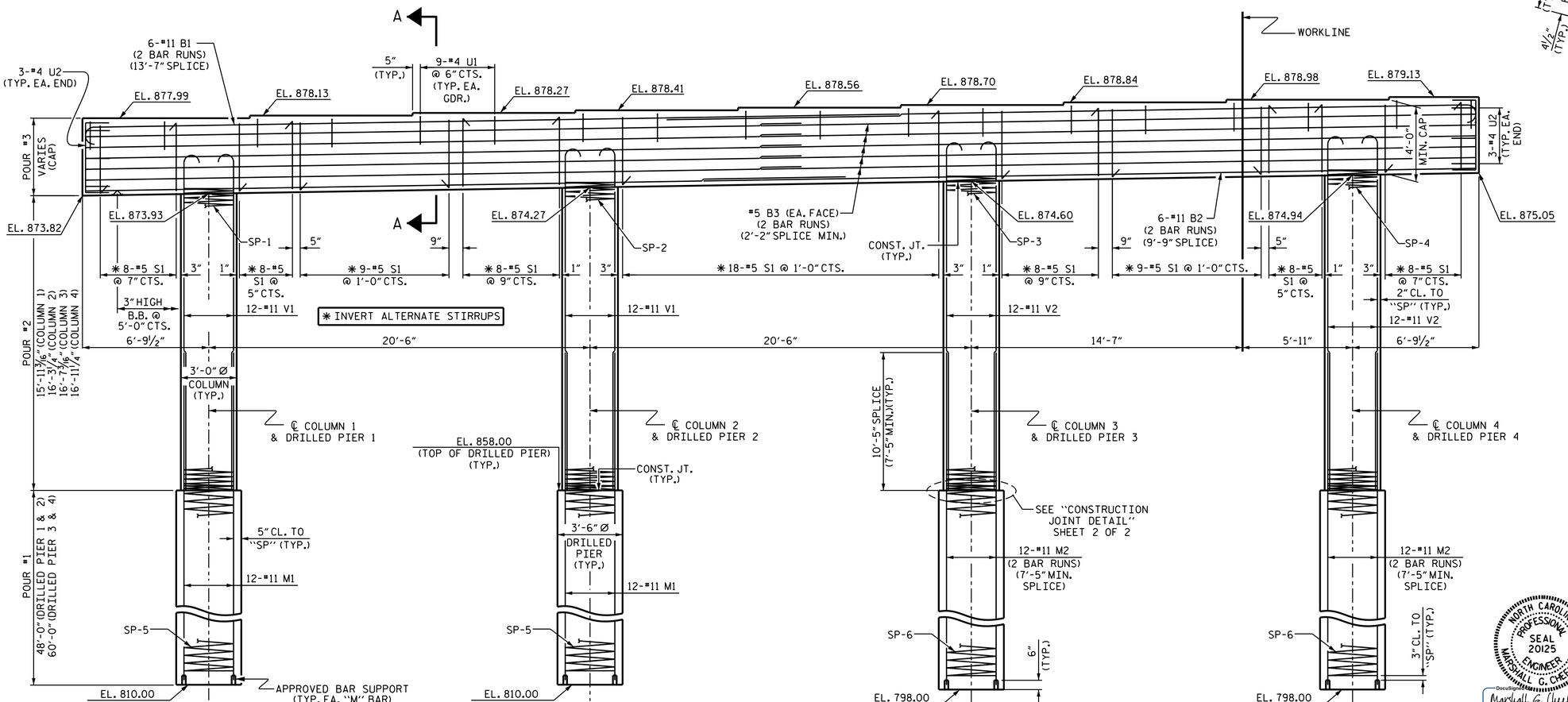
STR. #3



PLAN



ELEVATION

NOTES

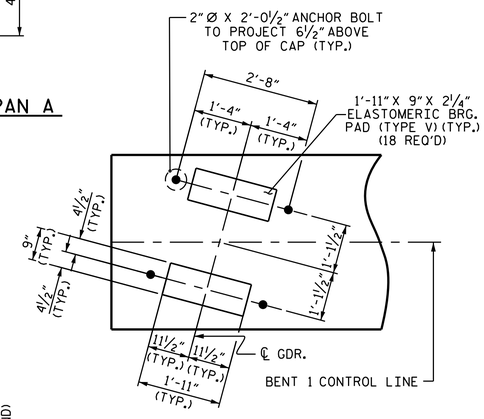
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".

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

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

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

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



DETAIL "A"

TYP. EA. GDR.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EEBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-24
1			3			TOTAL SHEETS
2			4			33

STR #3

DRAWN BY : ARIADNE L. PALMA P. DATE : 7-27-16
CHECKED BY : M.K. BEARD DATE : 8-16-16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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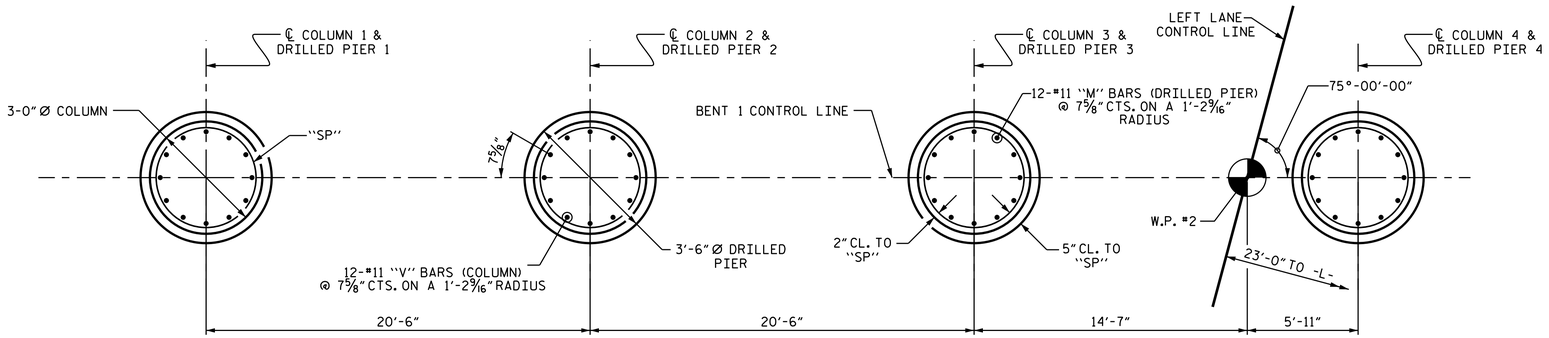
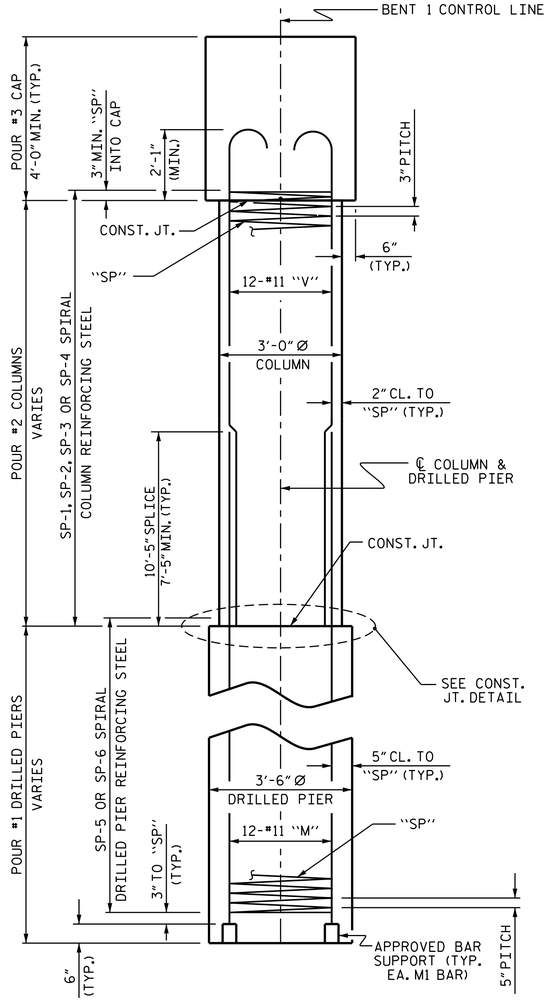
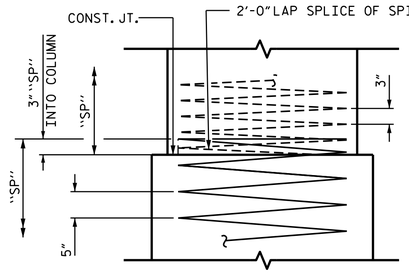


PLAN OF DRILLED PIERS & COLUMNS

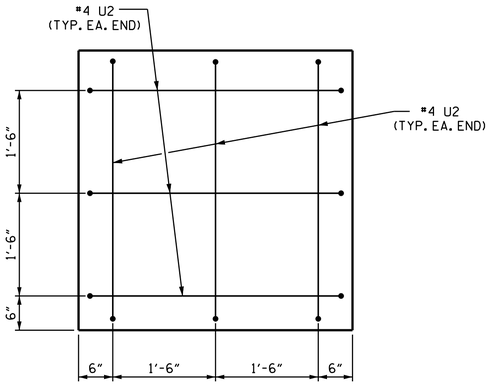
DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER.



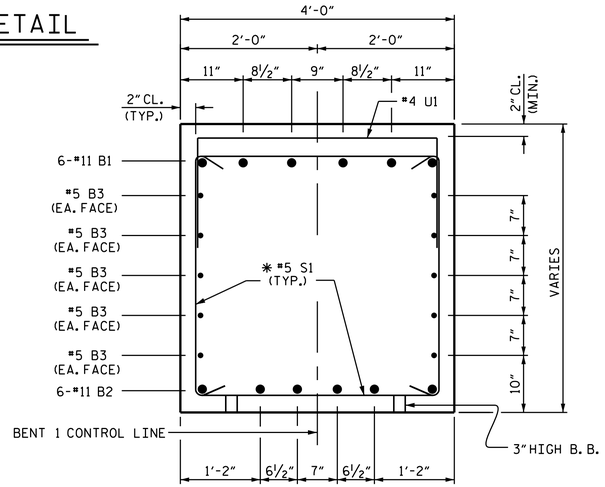
END ELEVATION



CONSTRUCTION JOINT DETAIL



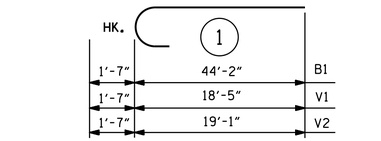
END OF CAP VIEW

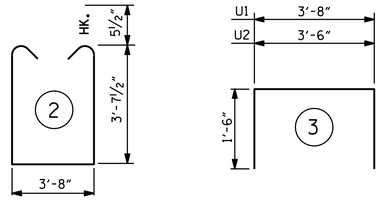


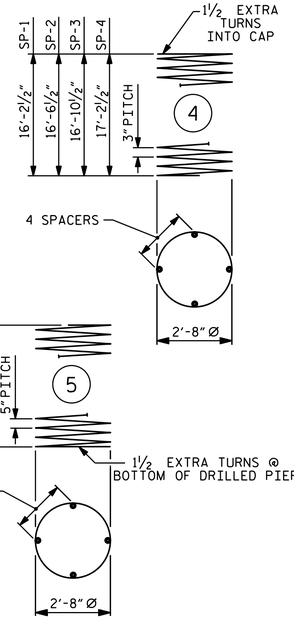
SECTION A-A

* INVERT ALTERNATE STIRRUPS

BAR TYPES







ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#11	1	45'-9"	2917
B2	12	#11	STR	42'-3"	2694
B3	20	#5	STR	38'-6"	803
M1	24	#11	STR	58'-2"	7417
M2	48	#11	STR	38'-10"	9903
S1	84	#5	2	11'-10"	1037
U1	81	#4	3	6'-8"	361
U2	12	#4	3	6'-6"	52
V1	24	#11	1	20'-0"	2550
V2	24	#11	1	20'-8"	2635
REINFORCING STEEL				LBS.	30,369
SP-1	1	*	4	548'-8"	367
SP-2	1	*	4	559'-0"	373
SP-3	1	*	4	569'-4"	380
SP-4	1	*	4	581'-8"	389
SP-5	2	**	5	950'-0"	1982
SP-6	2	**	5	1188'-6"	2479
SPIRAL COLUMN REINFORCING STEEL				LBS.	5,970

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

** THE SP-5 AND SP-6 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

CLASS A CONCRETE BREAKDOWN

POUR #2 (COLUMNS)	C.Y.	17.2
POUR #3 (CAP)	C.Y.	45.5
TOTAL CLASS A CONCRETE	C.Y.	62.7

DRILLED PIER QUANTITIES

DRILLED PIER CONCRETE		
POUR #1 (DRILLED PIERS)	C.Y.	77.0
3'-6" Ø DRILLED PIERS IN SOIL	LIN. FT.	154.00
3'-6" Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	62.00
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIERS	LIN. FT.	32.00
SPT TESTING		4 EA.
CSL TUBES	LIN. FT.	888.00

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-25
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY :	ARIADNE L. PALMA P.	DATE :	7-27-16
CHECKED BY :	M.K. BEARD	DATE :	8-16-16
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE :	6/2017

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mcheek

STR #3

NOTES

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

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

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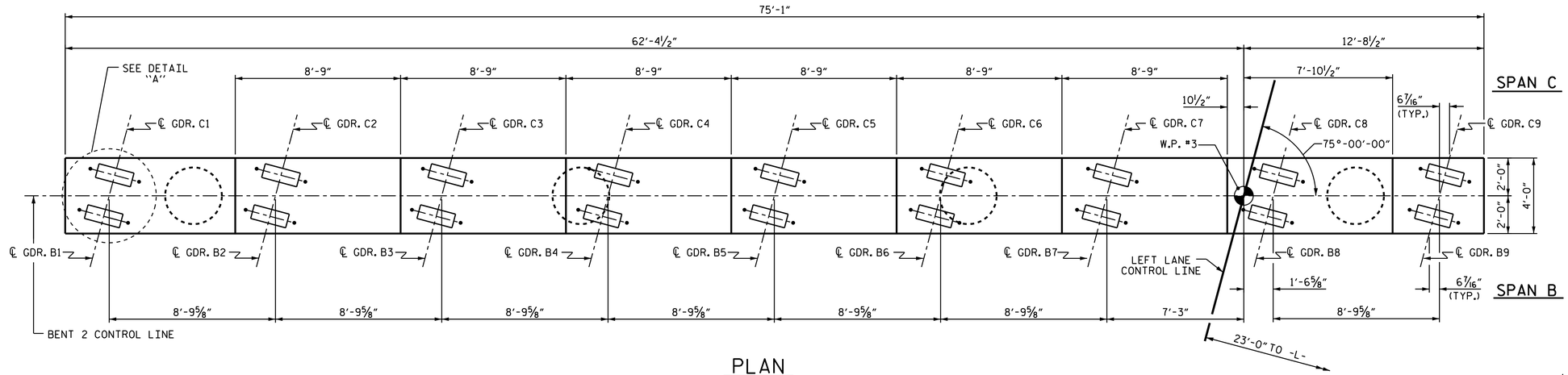
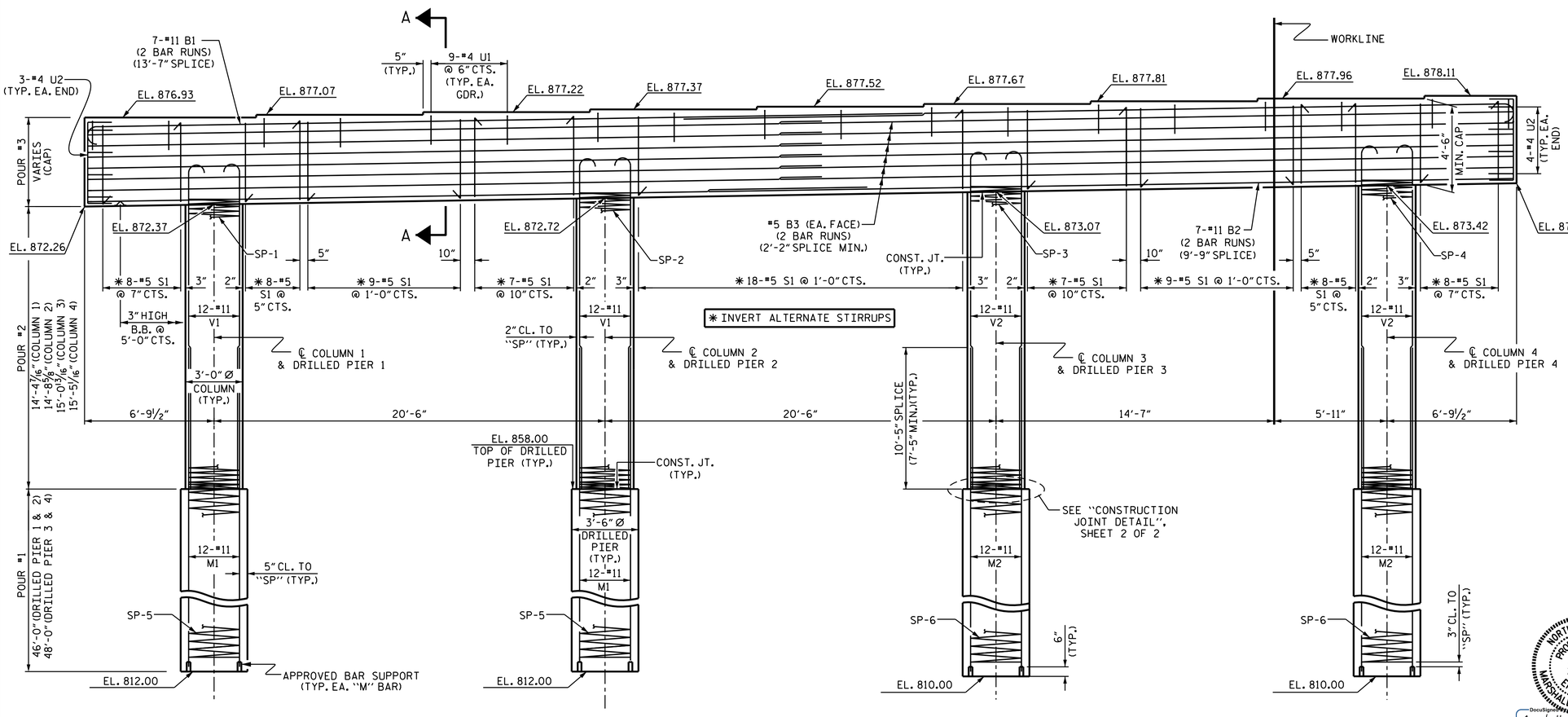
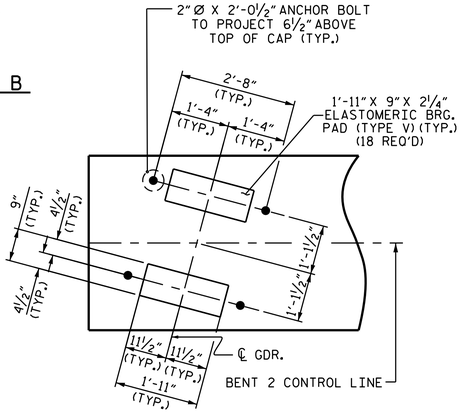


PLAN



ELEVATION



DETAIL "A"

TYP. EA. GDR.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-26
1			3			TOTAL SHEETS
2			4			33

DRAWN BY :	ARIADNE L. PALMA / TLA	DATE : 7-29-16
CHECKED BY :	M.K. BEARD	DATE : 9/8/16
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 6/2017

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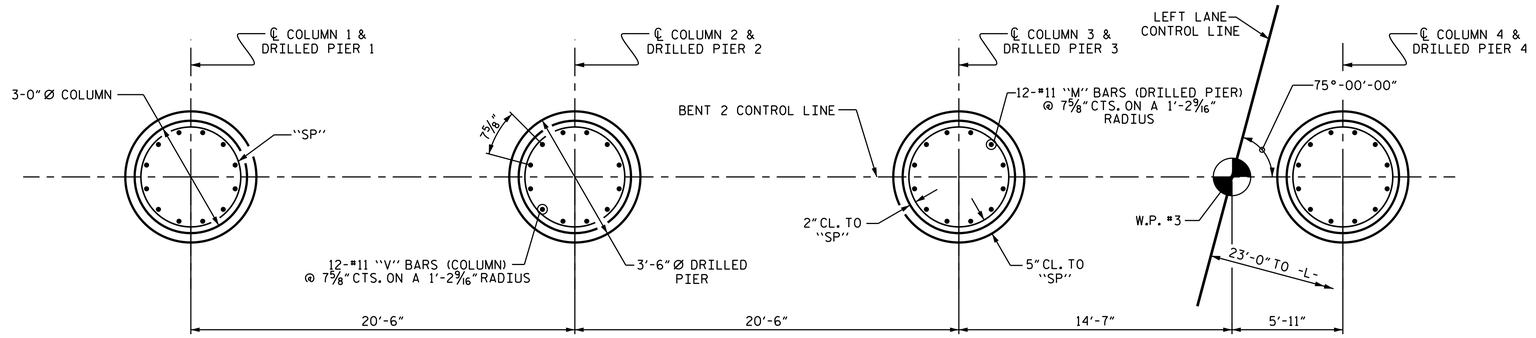
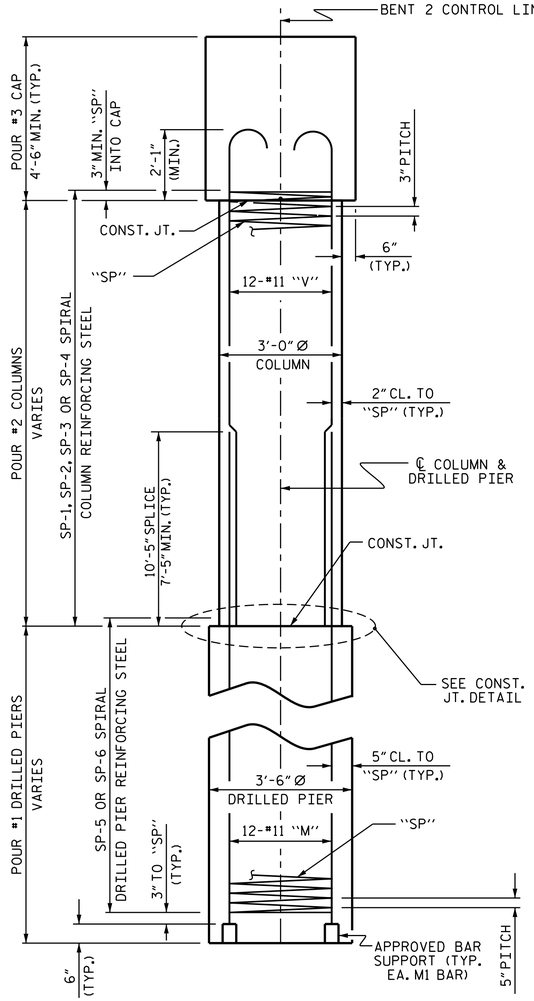
mcheek

STR #3

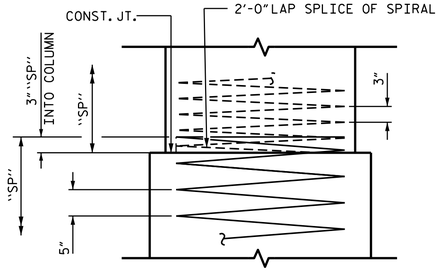


PLAN OF DRILLED PIERS & COLUMNS

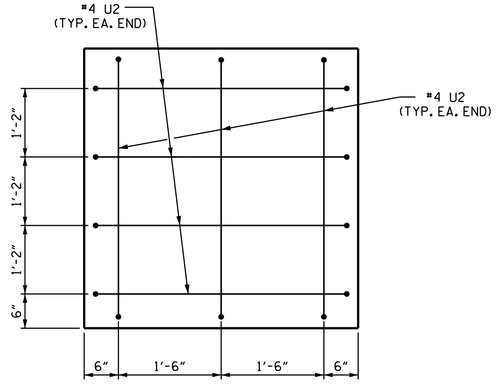
DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER.



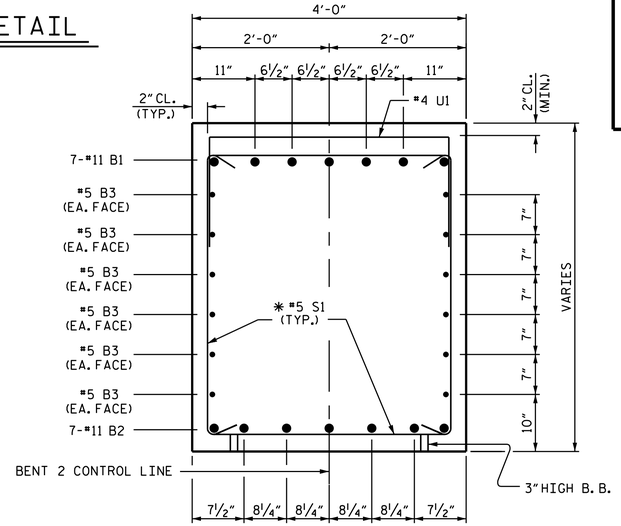
END ELEVATION



CONSTRUCTION JOINT DETAIL



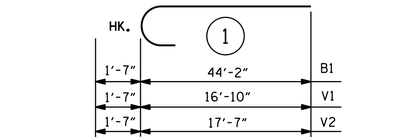
END OF CAP VIEW

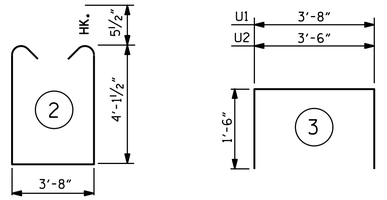


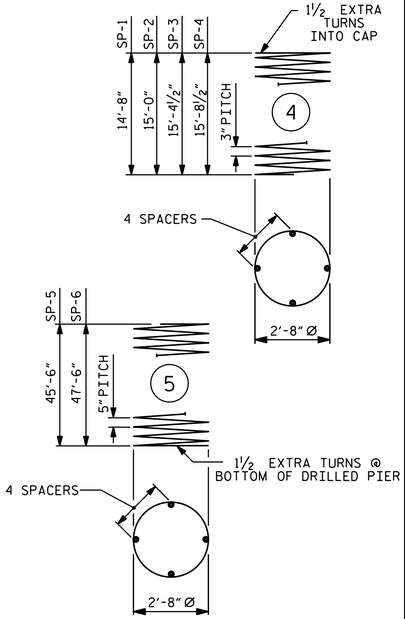
SECTION A-A

✱ INVERT ALTERNATE STIRRUPS

BAR TYPES







ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#11	1	45'-9"	3403
B2	14	#11	STR	42'-3"	3143
B3	24	#5	STR	38'-6"	964
M1	24	#11	STR	55'-11"	7130
M2	24	#11	STR	57'-11"	7385
S1	82	#5	2	12'-10"	1098
U1	81	#4	3	6'-8"	361
U2	14	#4	3	6'-6"	61
V1	24	#11	1	18'-5"	2348
V2	24	#11	1	19'-2"	2444
REINFORCING STEEL				LBS.	28,337
SP-1	1	✱	4	497'-2"	332
SP-2	1	✱	4	507'-5"	339
SP-3	1	✱	4	519'-10"	347
SP-4	1	✱	4	532'-2"	355
SP-5	2	✱✱	5	910'-11"	1900
SP-6	2	✱✱	5	950'-0"	1982
SPIRAL COLUMN REINFORCING STEEL				LBS.	5,255

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

✱✱ THE SP-5 AND SP-6 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

CLASS A CONCRETE BREAKDOWN

POUR #2 (COLUMNS)	C.Y.	15.6
POUR #3 (CAP)	C.Y.	51.1
TOTAL CLASS A CONCRETE	C.Y.	66.7

DRILLED PIER QUANTITIES

DRILLED PIER CONCRETE		
POUR #1 (DRILLED PIERS)	C.Y.	67.0
3'-6" Ø DRILLED PIERS IN SOIL	LIN. FT.	108.00
3'-6" Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	80.00
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIERS	LIN. FT.	32.00
SPT TESTING		4 EA.
CSL TUBES	LIN. FT.	776.00

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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CHECKED BY : M.K. BEARD DATE : 9/8/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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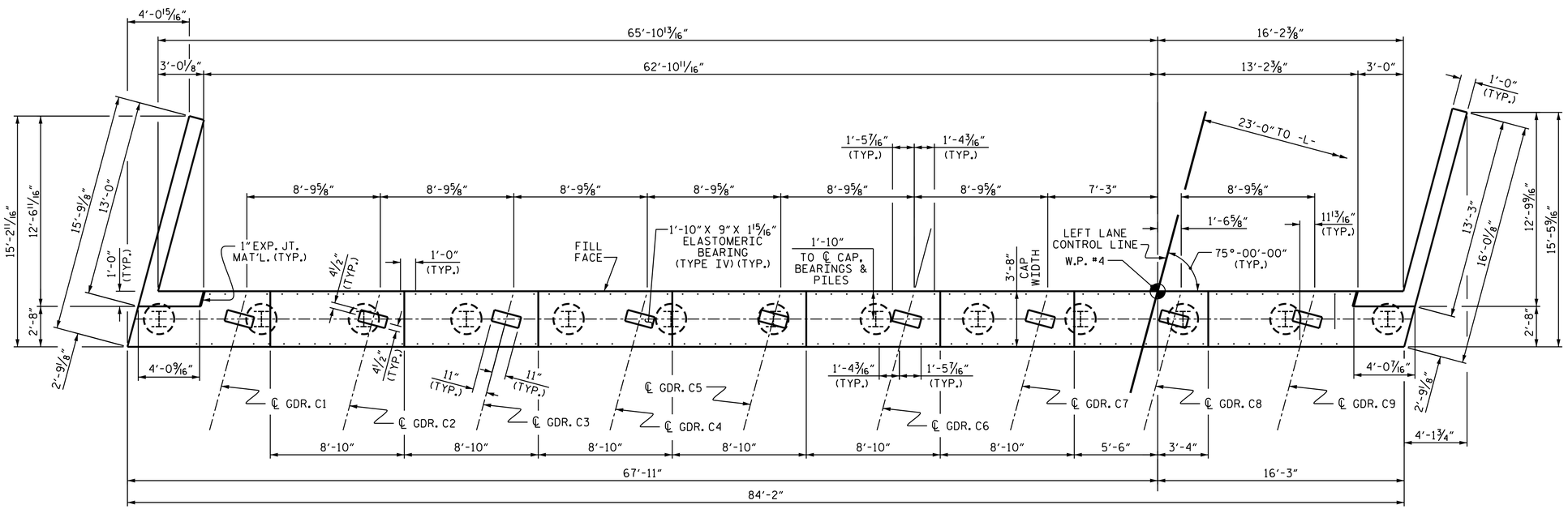
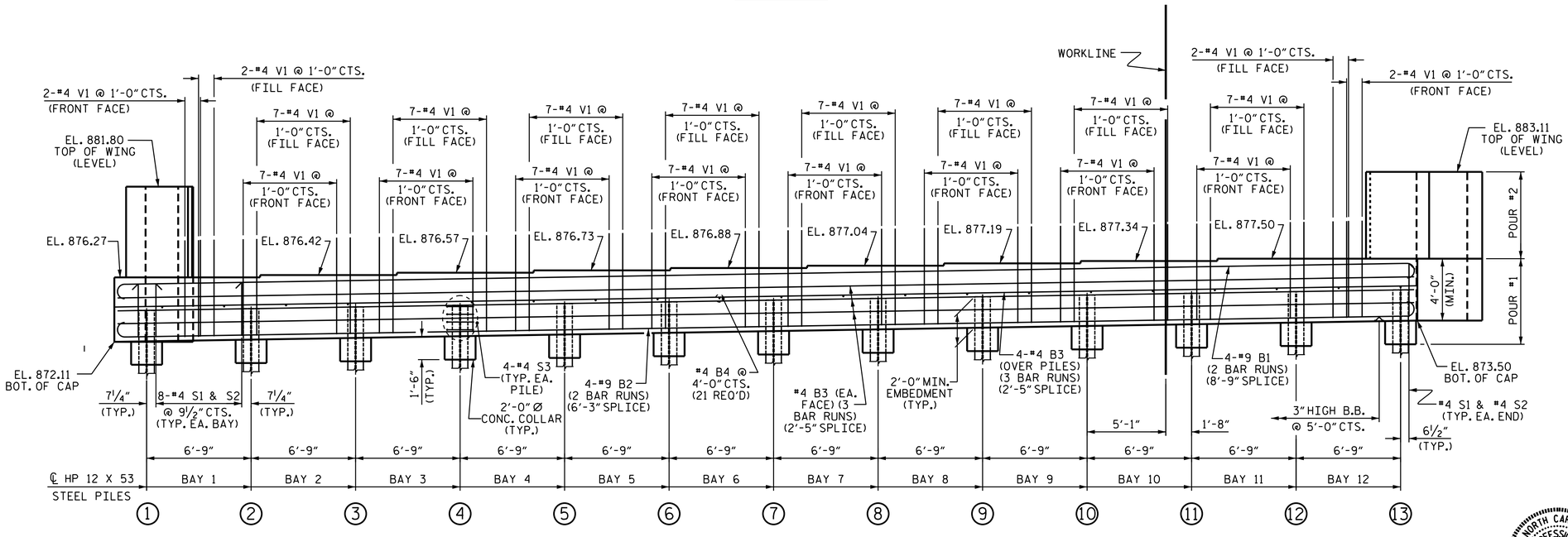


PLAN



ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

TOP OF PILE ELEVATIONS	
①	874.12
②	874.23
③	874.34
④	874.45
⑤	874.57
⑥	874.68
⑦	874.79
⑧	874.90
⑨	875.01
⑩	875.12
⑪	875.23
⑫	875.35
⑬	875.46

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL END BENT 2
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

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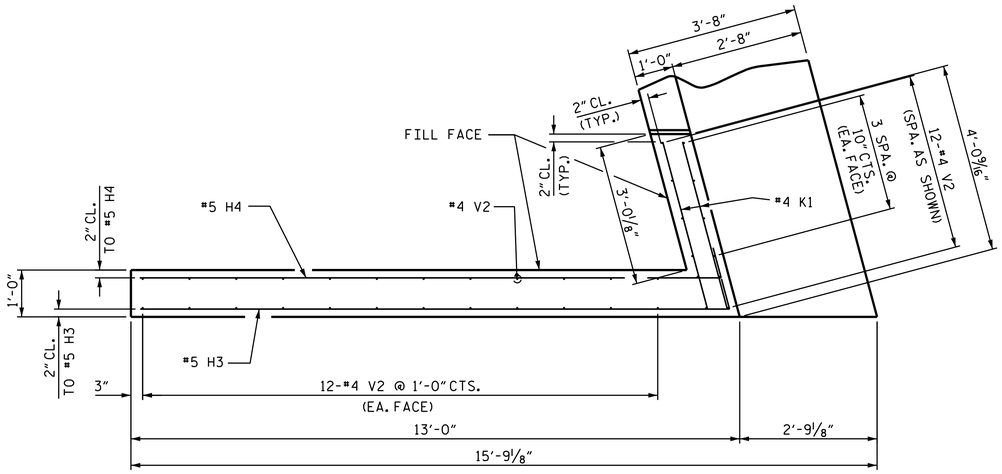
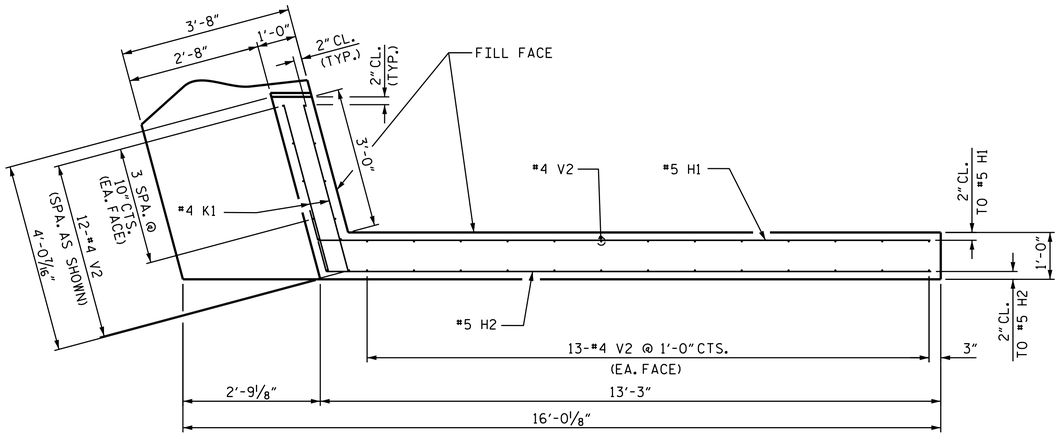
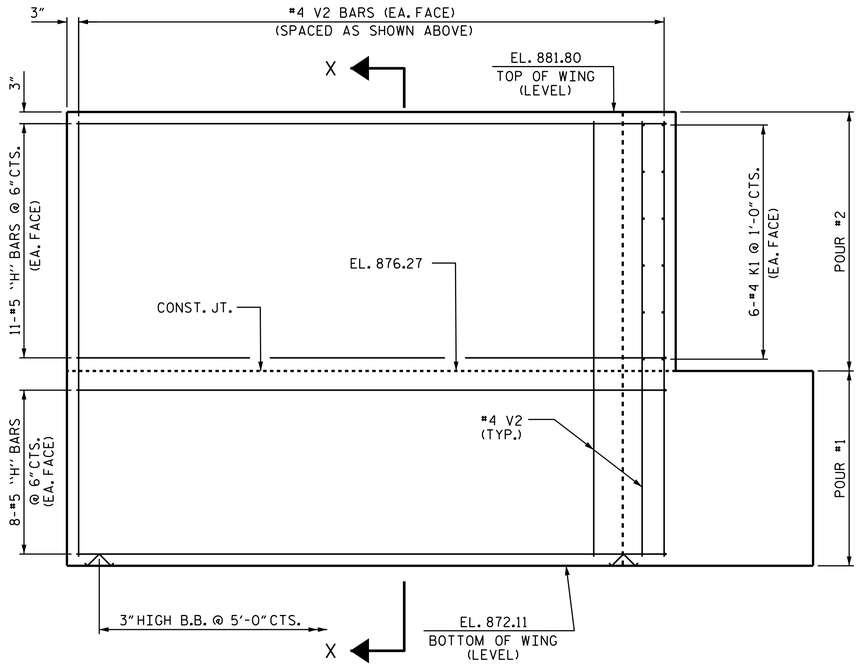


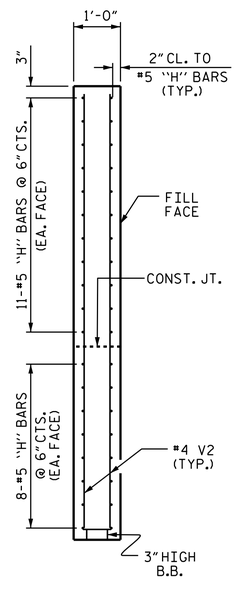
PLAN OF LEFT WING



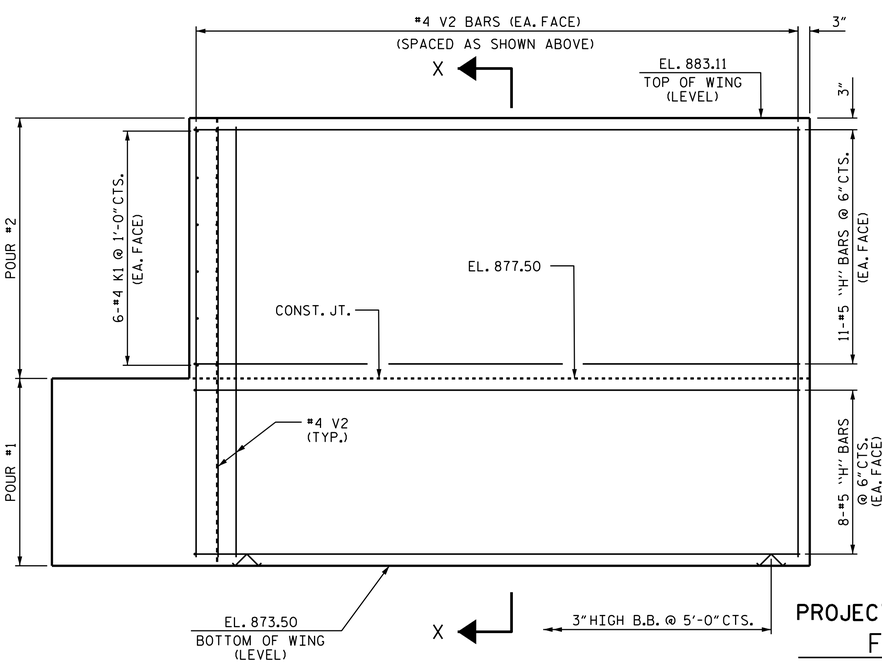
PLAN OF RIGHT WING



ELEVATION OF LEFT WING



SECTION X-X



ELEVATION OF RIGHT WING

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2

(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
8549D6EBAA3B405...

7/27/2017

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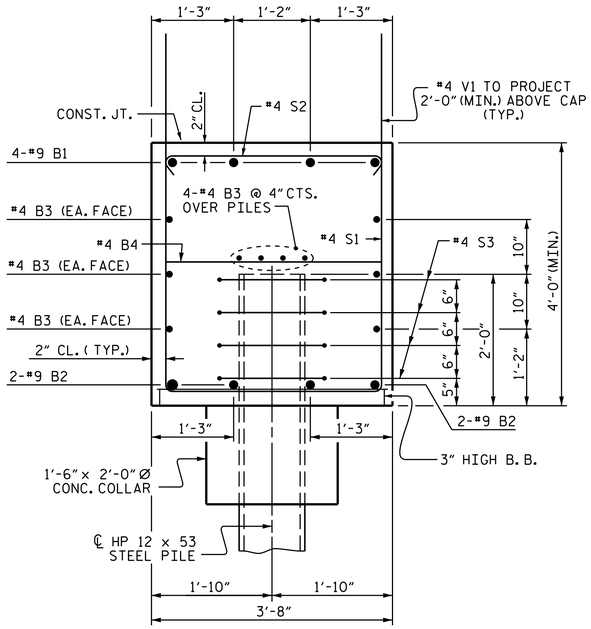
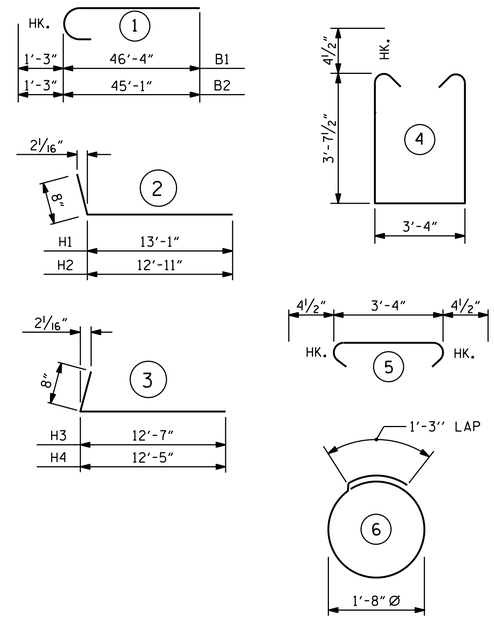


SECTION THRU CAP

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

INTEGRAL END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	47'-7"	1294
B2	8	#9	1	46'-4"	1260
B3	30	#4	STR	29'-7"	593
B4	21	#4	STR	3'-4"	47
H1	19	#5	2	13'-9"	272
H2	19	#5	2	13'-7"	269
H3	19	#5	3	13'-3"	263
H4	19	#5	3	13'-1"	259
K1	24	#4	STR	3'-8"	59
S1	98	#4	4	11'-4"	742
S2	98	#4	5	4'-1"	267
S3	52	#4	6	6'-6"	226
V1	120	#4	STR	6'-0"	481
V2	74	#4	STR	9'-3"	457

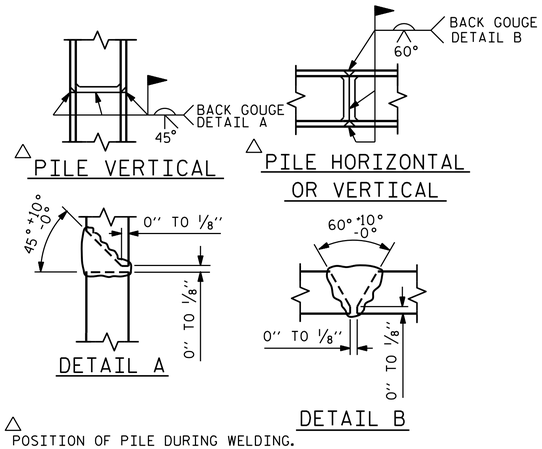
REINFORCING STEEL LBS. 6489

CLASS A CONCRETE

POUR #1 CAP, LOWER WINGS & CONC. COLLARS	C.Y.	52.8
POUR #2 UPPER PART OF WINGS	C.Y.	6.7
TOTAL CLASS A CONCRETE	C.Y.	59.5

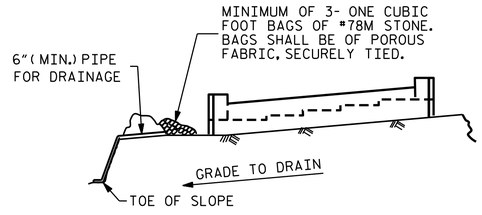
HP 12 X 53 STEEL PILES
NO.: 13 LIN. FT. 750

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES
EACH 13



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



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

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr.
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DRAWN BY : H.A. LOCKLEAR DATE : 6/23/16
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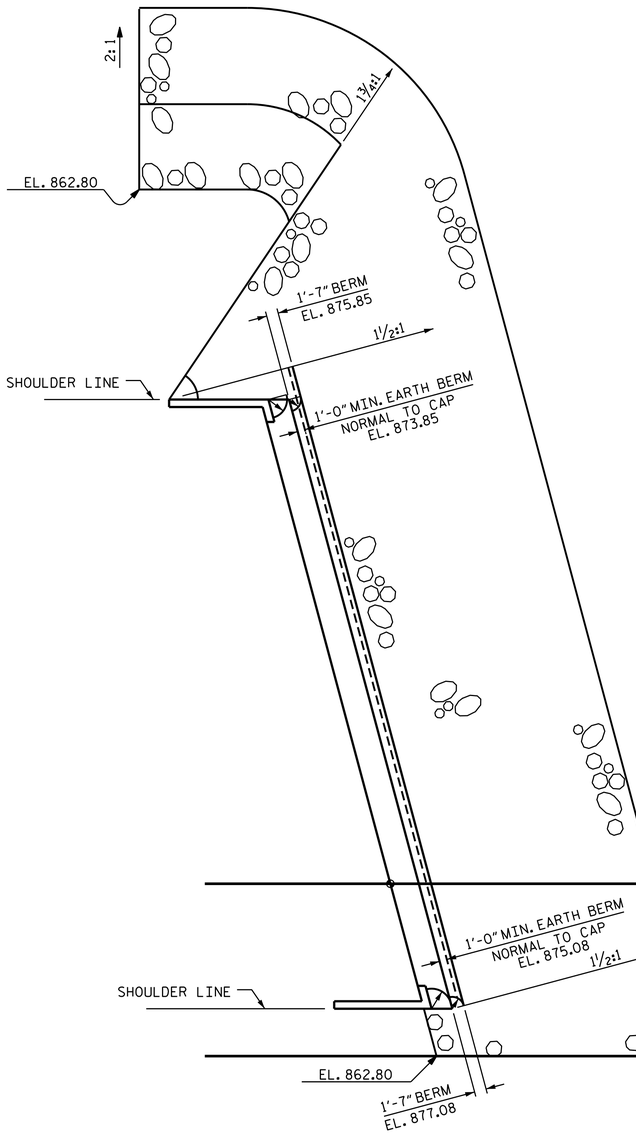
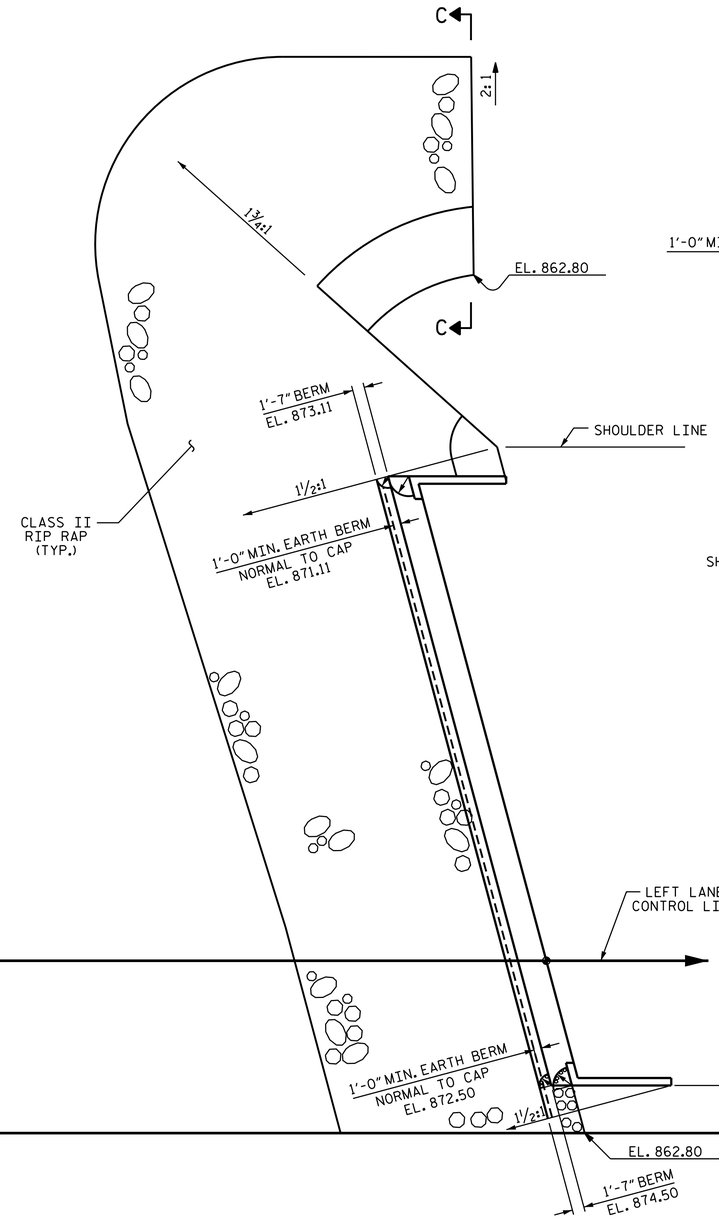
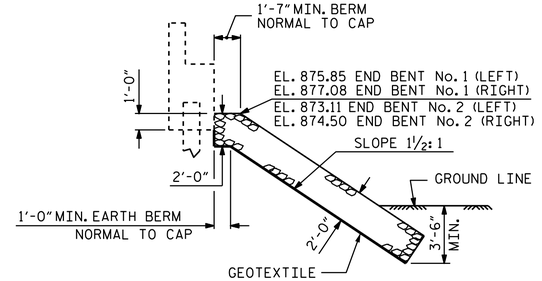


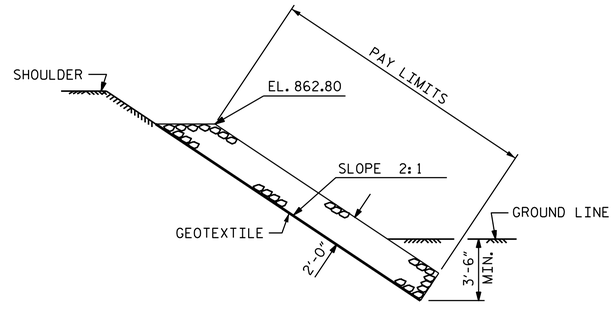
END BENT 1



END BENT 2



℄ SECTION
BERM RIP RAPPED



SECTION C-C

ESTIMATED QUANTITIES

BRIDGE @ STA. 473+70.00 -L- (LEFT LANE)	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	530	590
END BENT 2	515	570
TOTAL	1045	1160

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

STATE OF NORTH CAROLINA
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RIP RAP DETAILS (LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...
7/27/2017

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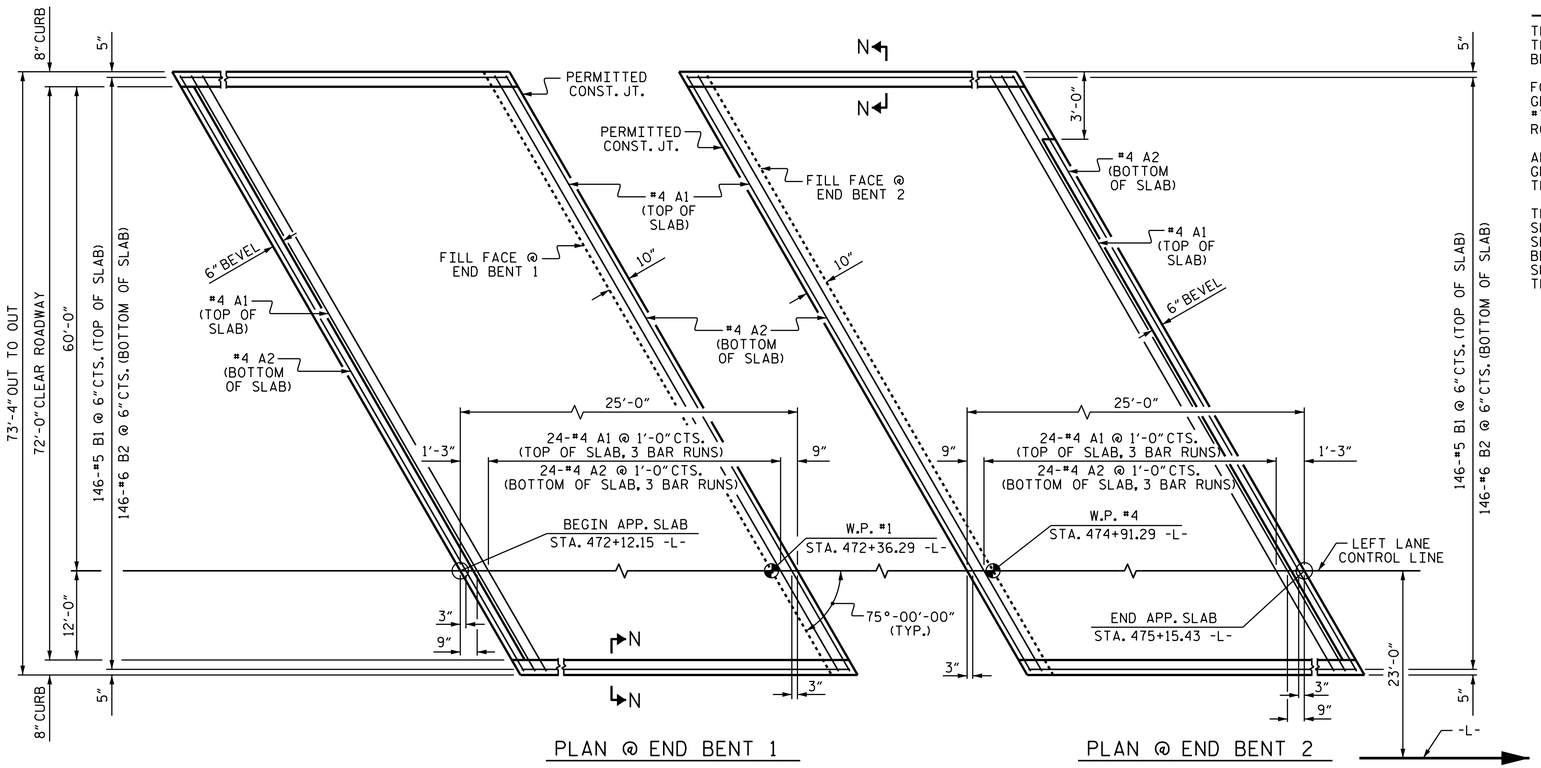
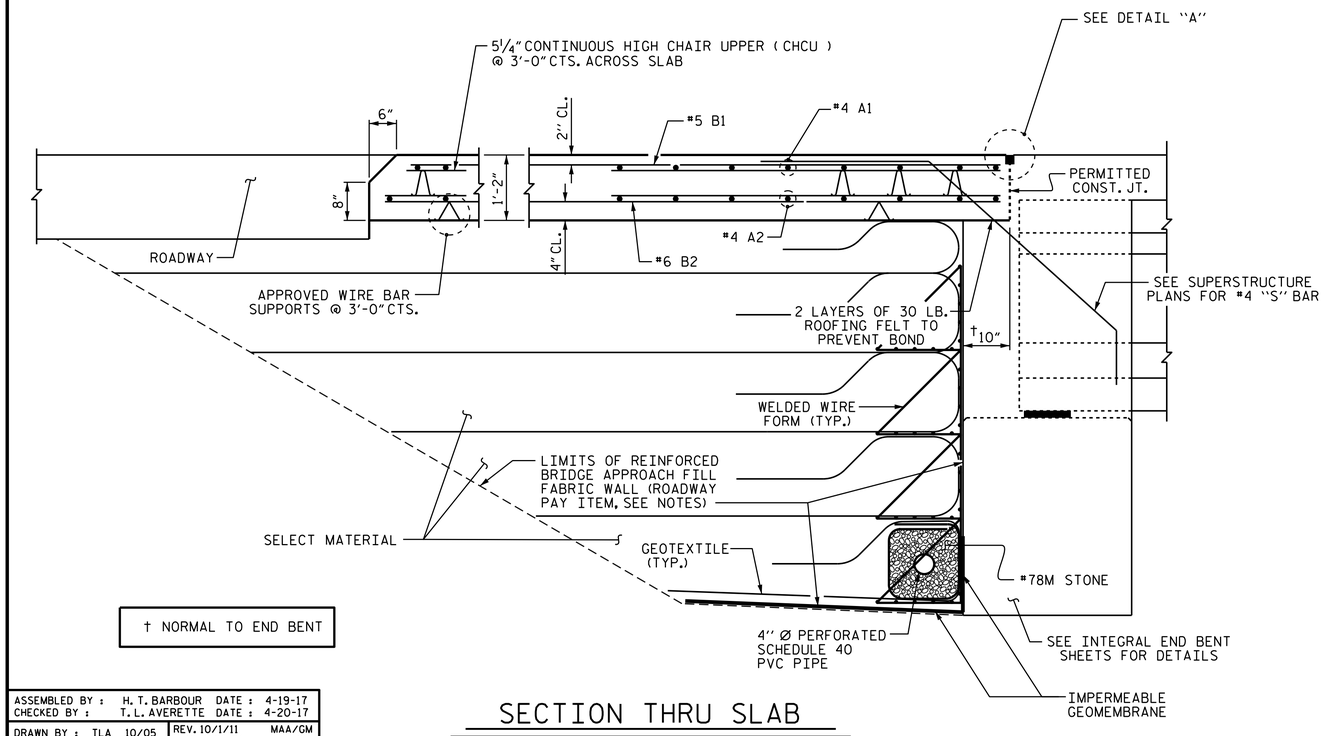


PLAN @ END BENT 1

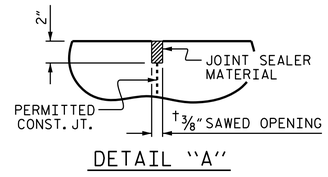
PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

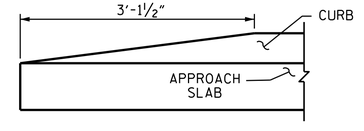


† NORMAL TO END BENT

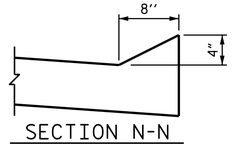
SECTION THRU SLAB



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

NOTES

THE APPROACH SLAB MAY BE CAST MONOLITHICALLY WITH THE END BENT DIAPHRAGM AND THE END SECTION OF THE BRIDGE DECK NEAR THE INTEGRAL END BENT.

FOR REINFORCED BRIDGE APPROACH FILL FABRIC WALL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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.

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	78	#4	STR	26'-6"	1381
A2	78	#4	STR	26'-4"	1372
* B1	146	#5	STR	24'-2"	3680
B2	146	#6	STR	24'-7"	5391

REINFORCING STEEL	6763 LBS.
* EPOXY COATED REINFORCING STEEL	5061 LBS.
CLASS AA CONCRETE	79.1 C.Y.

SPLICE LENGTH

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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT (LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Document: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

ASSEMBLED BY :	H. T. BARBOUR	DATE :	4-19-17
CHECKED BY :	T. L. AVERETTE	DATE :	4-20-17
DRAWN BY : TLA	10/05	REV. 10/1/11	MAA/GM
CHECKED BY : GM	5/06	REV. 12/21/11	MAA/GM
		REV. 6/13	MAA/GM

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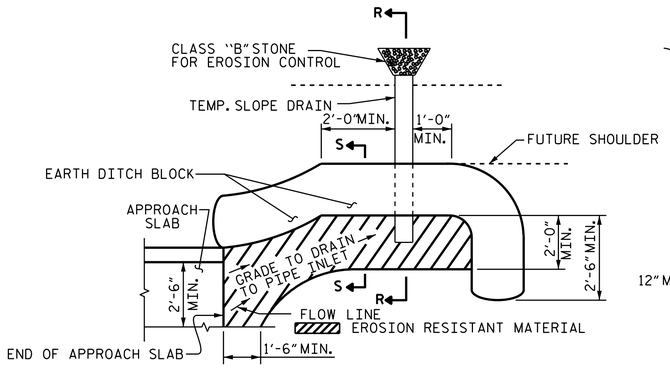
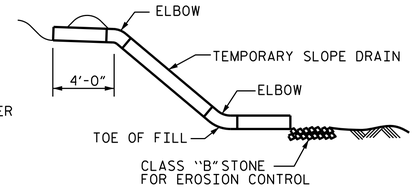
STR. #3 STD. NO. BAS5 (SHT 2a)

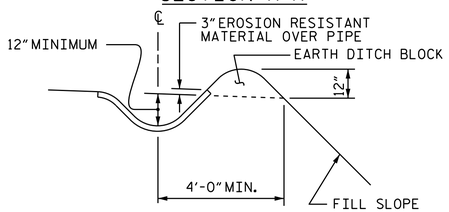


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

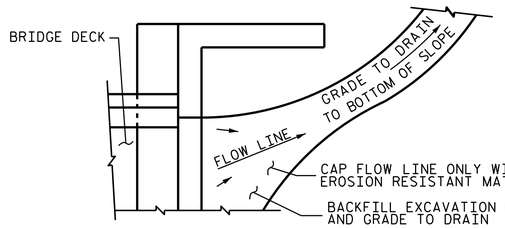
PLAN VIEW



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-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
BRIDGE APPROACH SLAB
FOR INTEGRAL ABUTMENT
DETAILS
(LEFT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-33
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : H. T. BARBOUR DATE : 4-19-17
CHECKED BY : T. L. AVERETTE DATE : 4-20-17

26-JUL-2017 15:08
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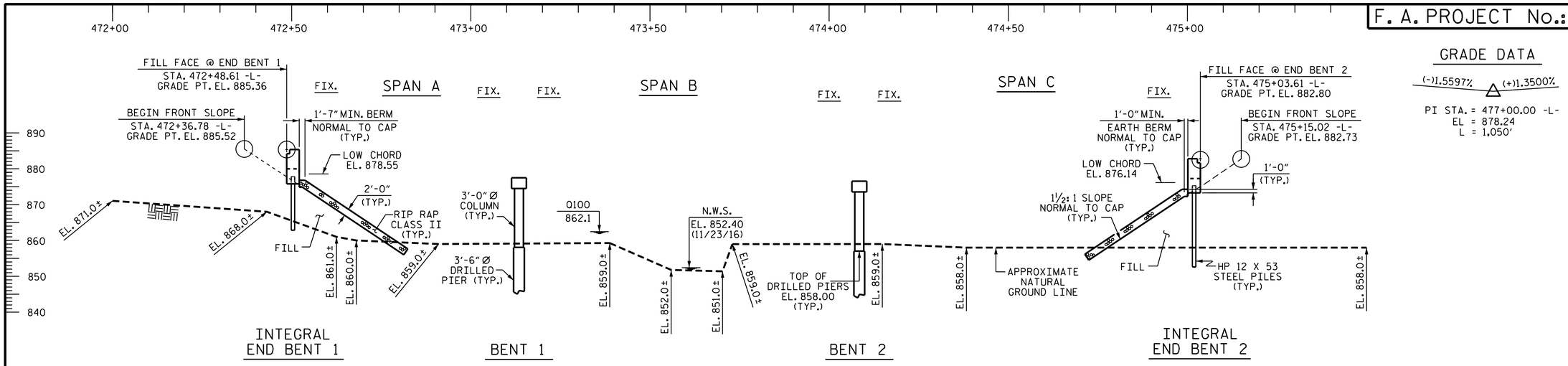
mcheek

STR. #3

F. A. PROJECT No.: NHP-0918(062)



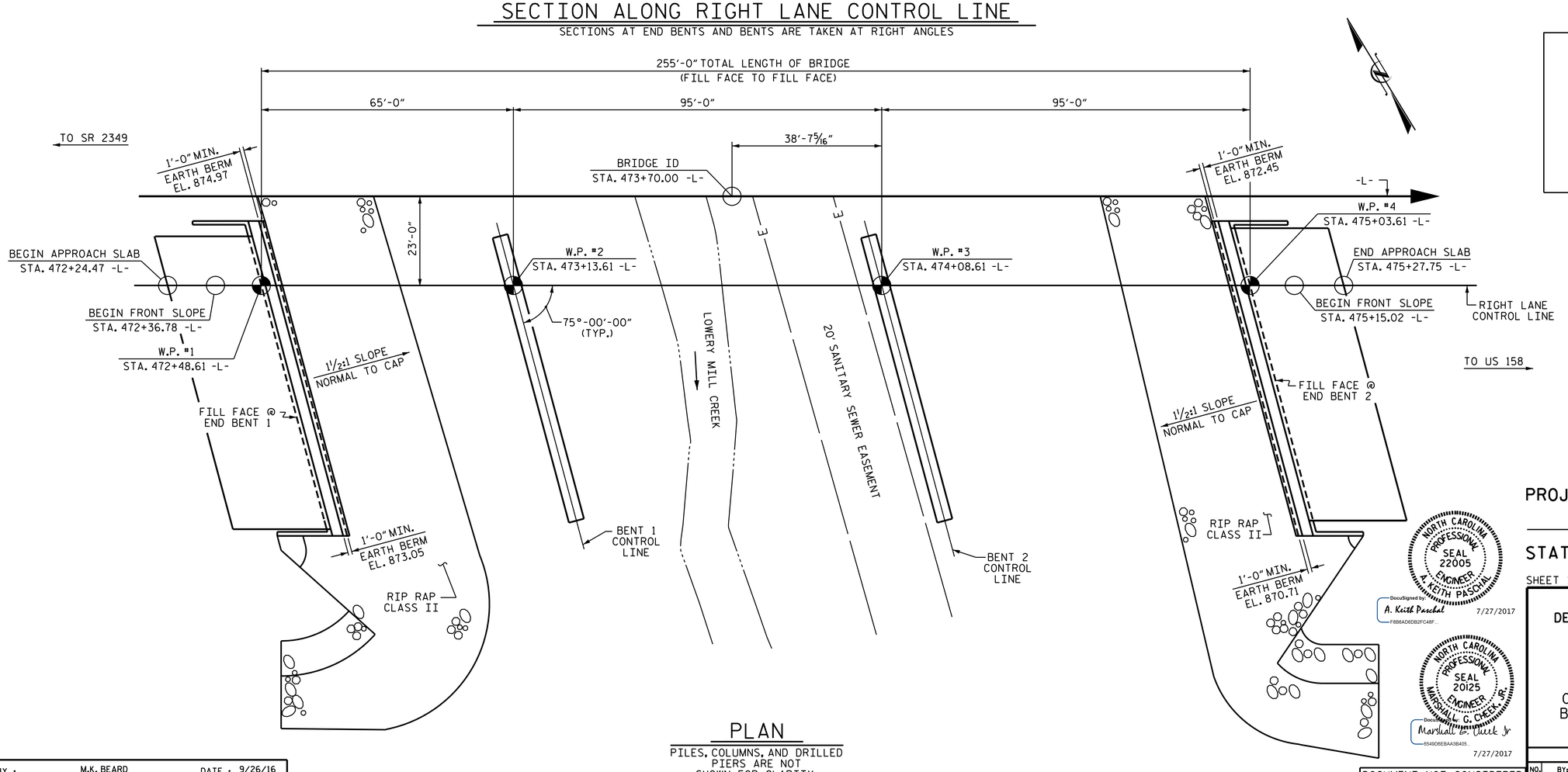
GRADE DATA

(-)1.5597% (+)1.3500%

PI STA. = 477+00.00 -L-
EL = 878.24
L = 1.050'

SECTION ALONG RIGHT LANE CONTROL LINE

SECTIONS AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES



PLAN

PILES, COLUMNS, AND DRILLED PIERS ARE NOT SHOWN FOR CLARITY.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

NORTH CAROLINA PROFESSIONAL SEAL 22005 ENGINEER A. KEITH PASCHAL

DocuSigned by: A. Keith Paschal F8B6AD6DB2FC48F... 7/27/2017

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek Jr 6549D6EBAA3B405... 7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3 BRIDGE NO. 703

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER
LOWERY MILL CREEK
ON WINSTON-SALEM BELTWAY
BETWEEN SR 2381 AND US 158
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-1
1			3			TOTAL SHEETS
2			4			33

STR. #4

DRAWN BY : M.K. BEARD DATE : 9/26/16
CHECKED BY : H.T. BARBOUR DATE : 3/23/17
DESIGN ENGINEER OF RECORD : H.A. LOCKLEAR DATE : 6/2017

26-JUL-2017 15:08
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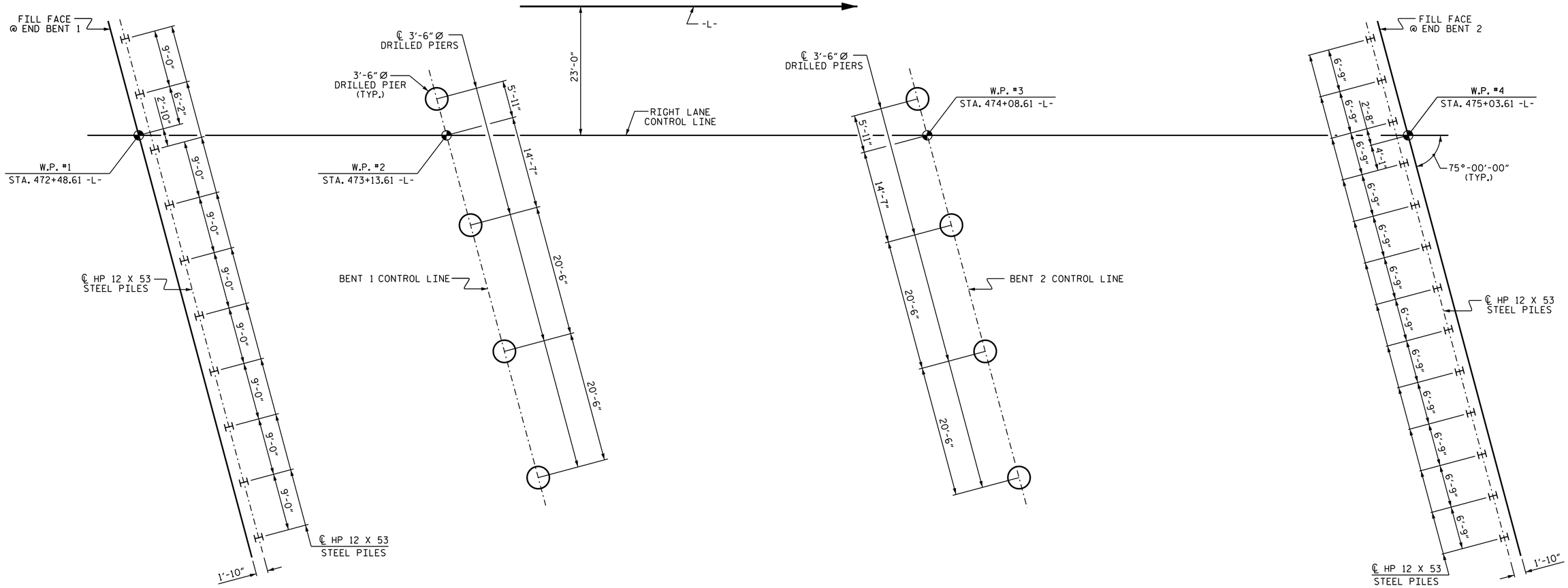
mcheek



INTEGRAL END BENT 1 | BENT 1 | BENT 2 | INTEGRAL END BENT 2

FOUNDATION LAYOUT

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

NOTES

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

PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

DO NOT BEGIN WORK AT END BENT 1 AND END BENT 2 UNTIL FILL HAS BEEN PLACED.

TESTING PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

SEE ROADWAY PLANS AND SPECIAL PROVISIONS FOR THE SETTLEMENT GAUGES REQUIRED AT END BENT 2.

OBSERVE A 4 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENTS TO WITHIN 2 FT. OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SPECIAL PROVISIONS.

FOR DRILLED PIERS, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 610 TONS PER PIER.

PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT 1 AND BENT 2. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 850.00 WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

INSTALL DRILLED PIERS AT BENT 1 TO A TIP ELEVATION NO HIGHER THAN 798.00 AND WITH A PENETRATION OF AT LEAST 17.5 FT. INTO WEATHERED ROCK/CRYSTALLINE ROCK.

DRILLED PIERS AT BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 700 TONS PER PIER.

INSTALL DRILLED PIERS AT BENT 2 TO A TIP ELEVATION NO HIGHER THAN 812.00 (LT) AND 809.00 (RT) AND WITH A PENETRATION OF AT LEAST 22.5 FT. INTO WEATHERED ROCK/CRYSTALLINE ROCK.

SLURRY CONSTRUCTION IS REQUIRED FOR DRILLED PIERS AT BENT 1 AND BENT 2.

SPT IS REQUIRED FOR DRILLED PIERS AT BENT 1 AND BENT 2. THE REQUIRED N60 SPT VALUE IS 100 BLOWS IN THE FIRST FOOT OF THE DRIVE. FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

THE SCOUR CRITICAL ELEVATION FOR BENT 1 AND BENT 2 IS ELEVATION 845.00. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek, Jr. 65490E6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
LOWERY MILL CREEK
ON WINSTON-SALEM BELTWAY
BETWEEN SR 2381 AND US 158
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-2
1			3			TOTAL SHEETS
2			4			33

STR. #4

DRAWN BY : M.K. BEARD DATE : 9/26/16
CHECKED BY : H.T. BARBOUR DATE : 3/23/17
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

26-JUL-2017 15:08
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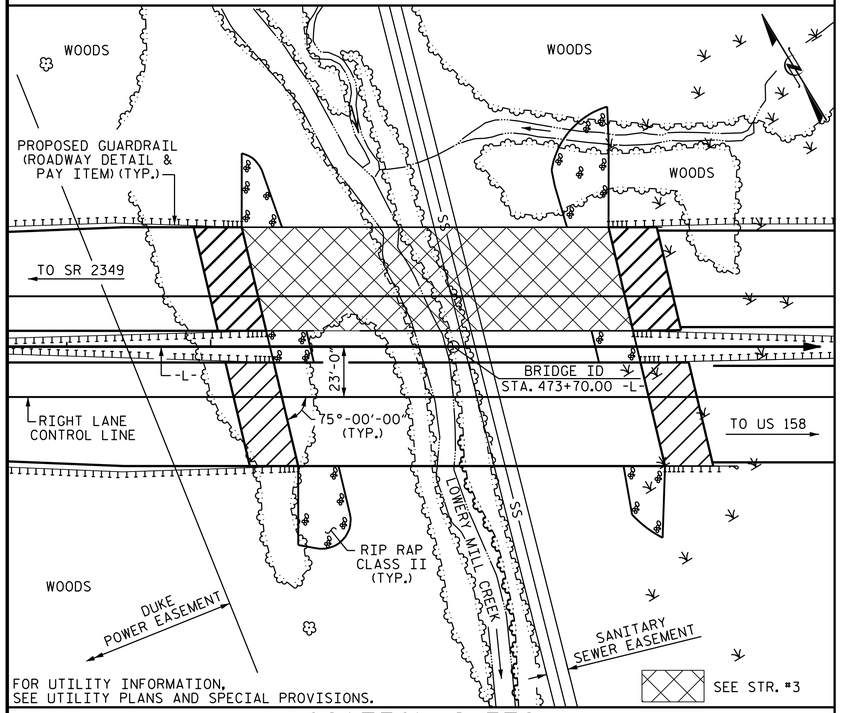
mcheek

B.M. #8 : R/R SPIKE SET IN BASE OF 36"SWEET GUM AND 70' WEST OF CREEK BANK, 565' LEFT OF STA. 469+22.00 -L-, EL. 864.90



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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 BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF 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.

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

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 1,900 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 861.8
DRAINAGE AREA	= 2.4 SQ. MI.
BASE DISCHARGE (Q100)	= 2,230 C.F.S.
BASE HIGH WATER ELEVATION	= 862.1

OVERTOPPING DATA

OVERTOPPING DISCHARGE	= 2,960+ C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS.
OVERTOPPING FLOOD ELEVATION	= 882.0
	SAG @ STA. 477+34.84 -L-

TOTAL BILL OF MATERIAL

	3'-6"Ø DRILLED PIERS IN SOIL	3'-6"Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3'-6"Ø DRILLED PIERS	PDA TESTING	SID INSPECTIONS	SPT TESTING	CSL 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 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	LIN. FT.	LIN. FT.	LIN. FT.	EA.	EA.	EA.	EA.	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	LIN. FT.	TONS	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE								19,189	20,783		LUMP SUM			27	2,258.63				506.55			LUMP SUM
INT. END BENT 1										59.4		6,474				10	10	650		470	520	
BENT 1	180.00	60.00	32.00			4				62.8		32,777	6,435									
BENT 2	122.00	68.00	32.00			4				66.8		28,459	5,271									
INT. END BENT 2										59.5		6,493				13	13	685		485	540	
TOTAL	302.00	128.00	64.00	1	1	8	1	19,189	20,783	248.5	LUMP SUM	74,203	11,706	27	2,258.63	23	23	1,335	506.55	955	1,060	LUMP SUM

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE OVER
LOWERY MILL CREEK
ON WINSTON-SALEM BELTWAY
BETWEEN SR 2381 AND US 158
(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek, Jr.
6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S4-3

TOTAL SHEETS 33

STR. #4

DRAWN BY : M.K. BEARD DATE : 9/26/16
CHECKED BY : H.T. BARBOUR DATE : 3/23/17
DESIGN ENGINEER OF RECORD : H.A. LOCKLEAR DATE : 6/2017

26-JUL-2017 15:08
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mcheek

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT					
							LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	(1)	**1.01**	--	1.75	0.776	**1.02**	A	ER	**30.988**	0.882	1.45	A	I	12.395	0.80	0.776	1.01	B	ER	46.375	
		HL-93(Opr)	N/A	--	1.32	--	1.35	0.776	1.33	A	ER	30.988	0.882	1.88	A	I	12.395	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	(2)	**1.30**	46.860	1.75	0.776	**1.31**	A	ER	**30.988**	0.882	1.76	A	I	12.395	0.80	0.776	1.31	A	ER	30.988	
		HS-20(Opr)	36.000	--	1.69	60.745	1.35	0.776	1.69	A	ER	30.988	0.882	2.28	A	I	12.395	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SH	12.500	--	3.13	39.167	1.40	0.776	3.87	A	ER	30.988	0.882	5.45	A	I	12.395	0.80	0.776	3.11	A	ER	30.988	
		S3C	21.500	--	1.84	39.512	1.40	0.776	2.27	A	ER	30.988	0.882	3.22	A	I	12.395	0.80	0.776	1.83	A	ER	30.988	
		S3A	22.750	--	1.74	39.665	1.40	0.776	2.15	A	ER	30.988	0.882	3.06	A	I	12.395	0.80	0.776	1.73	A	ER	30.988	
		S4A	26.750	--	1.56	41.702	1.40	0.776	1.92	A	ER	30.988	0.882	2.72	A	I	12.395	0.80	0.776	1.55	A	ER	30.988	
		S5A	30.500	--	1.38	42.110	1.40	0.776	1.70	A	ER	30.988	0.882	2.56	A	I	12.395	0.80	0.776	1.37	A	ER	30.988	
		S6A	34.500	--	1.27	43.734	1.40	0.776	1.57	A	ER	30.988	0.882	2.34	A	I	12.395	0.80	0.776	1.26	A	ER	30.988	
		S7B	38.500	(3)	**1.16**	44.764	1.40	0.776	1.44	A	ER	30.988	0.882	2.25	A	I	12.395	0.80	0.776	**1.16**	A	ER	**30.988**	
		S7A	40.000	--	1.17	46.590	1.40	0.776	1.44	A	ER	30.988	0.882	2.37	A	I	12.395	0.80	0.776	1.16	A	ER	30.988	
	TTST	T4A	28.250	--	1.57	44.261	1.40	0.776	1.93	A	ER	30.988	0.882	2.67	A	I	12.395	0.80	0.776	1.56	A	ER	30.988	
		T5B	32.000	--	1.37	43.935	1.40	0.776	1.70	A	ER	30.988	0.882	2.59	A	I	12.395	0.80	0.776	1.36	A	ER	30.988	
		T6A	36.000	--	1.28	46.024	1.40	0.776	1.58	A	ER	30.988	0.882	2.50	A	I	12.395	0.80	0.776	1.27	A	ER	30.988	
		T7A	40.000	--	1.21	48.183	1.40	0.776	1.49	A	ER	30.988	0.882	2.40	A	I	12.395	0.80	0.776	1.20	A	ER	30.988	
		T7B	40.000	--	1.33	53.333	1.40	0.776	1.65	A	ER	30.988	0.882	2.16	A	I	12.395	0.80	0.776	1.32	A	ER	30.988	

LOAD FACTORS:

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

NOTES:

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

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

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

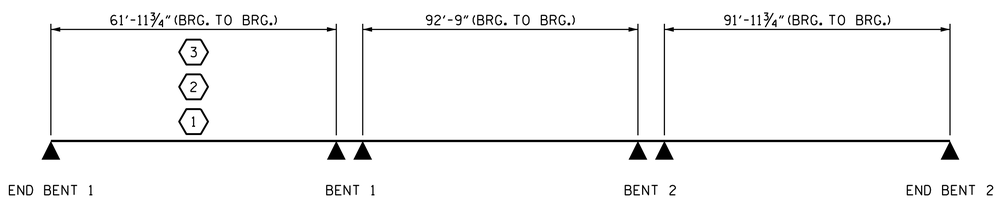
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS
(INTERSTATE TRAFFIC)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek, Jr.
6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-4
1			3			TOTAL SHEETS
2			4			33

STR. #4 STD. NO. LRFR2

ASSEMBLED BY :	T. L. AVERETTE	DATE :	3/13/17
CHECKED BY :	H. T. BARBOUR	DATE :	3/14/17
DRAWN BY : MAA 1/08	REV. 11/12/08RR		MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11		MAA/GM

26-JUL-2017 15:08
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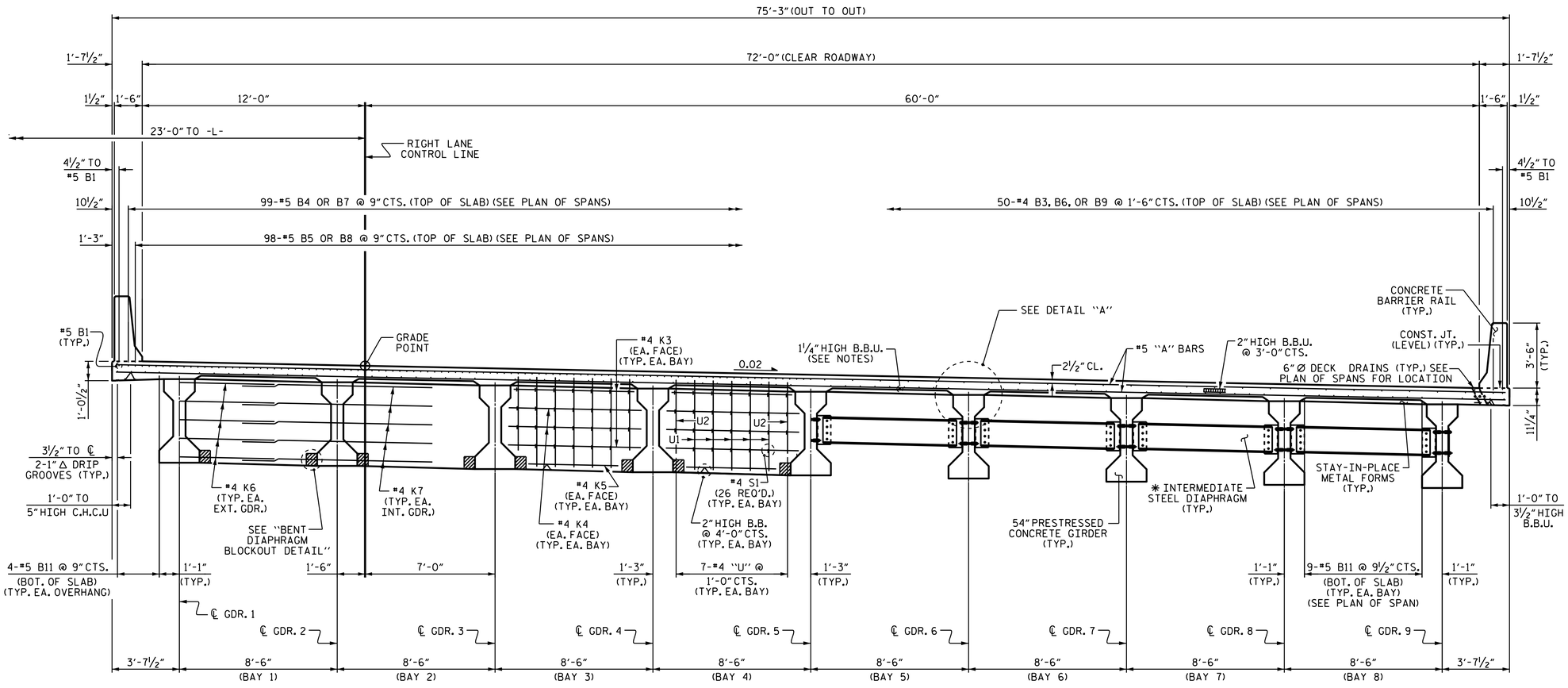


TYPICAL SECTION
(SHOWING BENT DIAPHRAGMS)

TYPICAL SECTION
(SHOWING INTERMEDIATE DIAPHRAGMS)

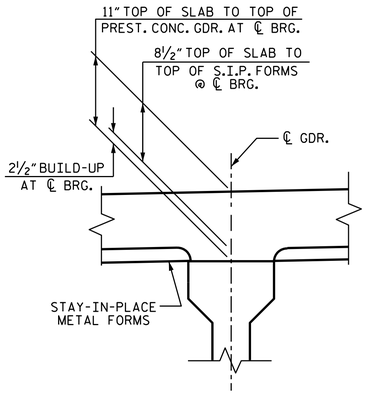
NOTES

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

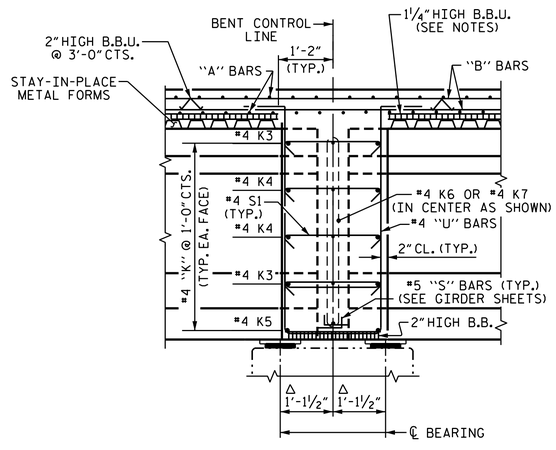
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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

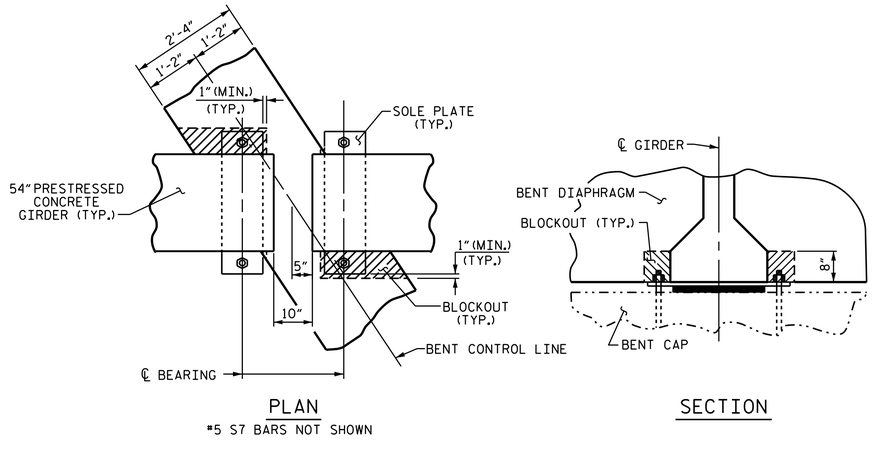
✱ FOR INTERMEDIATE STEEL DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHGRAMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS" SHEET.



DETAIL "A"



SECTION THROUGH BENT DIAPHRAGM
Δ MEASURED ALONG ℄ GDR.



BENT DIAPHRAGM BLOCKOUT DETAIL

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.
DocuSigned by: Marshall G. Creek, Jr.
6549D6EBAA3B405...
7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-5
1			3			TOTAL SHEETS
2			4			33

DRAWN BY :	J. K. BOWLES	DATE : 4/7/16
CHECKED BY :	K. D. LAYNE	DATE : 6/15/16
DESIGN ENGINEER OF RECORD:	H. A. LOCKLEAR	DATE : 6/2017

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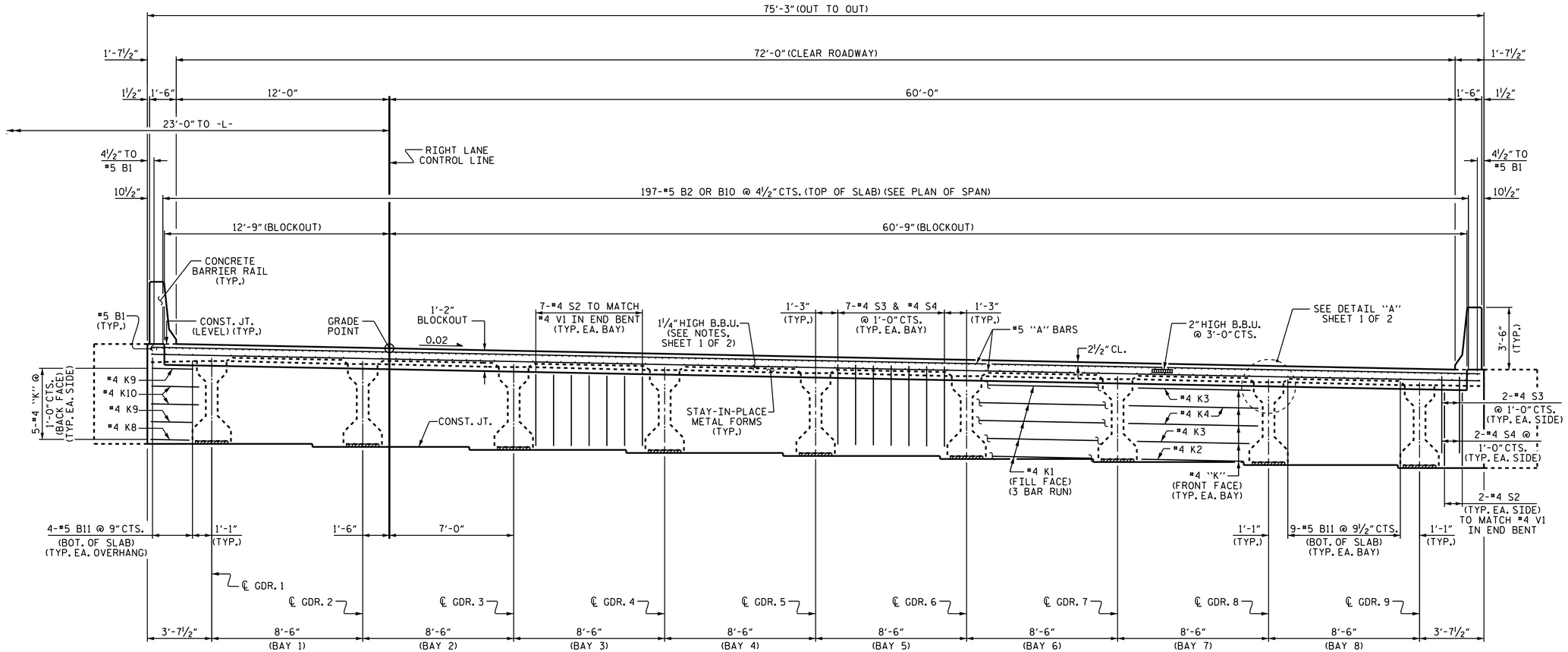
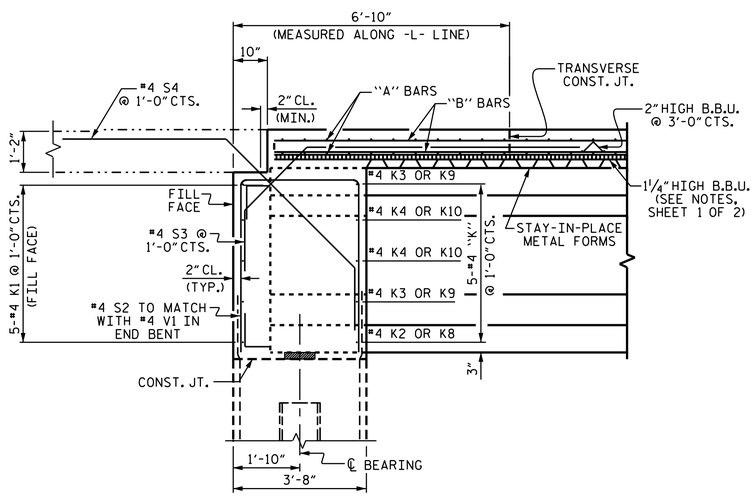
mcheek

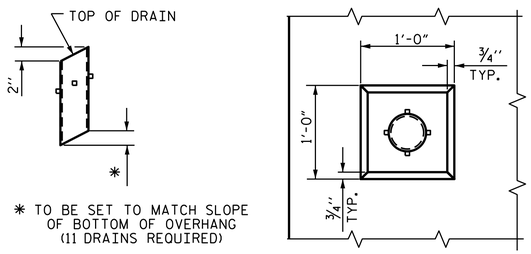
STR. #4



TYPICAL SECTION AT INTEGRAL END BENT



SECTION THROUGH INTEGRAL END BENT



PIPE DETAIL

PLAN OF RECESS

TOP OF FLOOR DRAINS TO BE SET ⅜" BELOW SURFACE OF SLAB.

4 - ½" SQUARE LUGS TO BE GLUED TO THE P.V.C. PIPE AT EQUAL SPACES AROUND THE PIPE DRAIN APPROXIMATELY 4" FROM THE TOP OF THE PIPE.

THE 6" Ø PVC PIPE AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO ASTM D1785.

DRAIN DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

Digitally signed by Marshall G. Creek, Jr.
6549D6EBAA3B405...
7/27/2017

DRAWN BY : J. K. BOWLES DATE : 4/7/16
CHECKED BY : K. D. LAYNE DATE : 6/15/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 6/2017

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PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

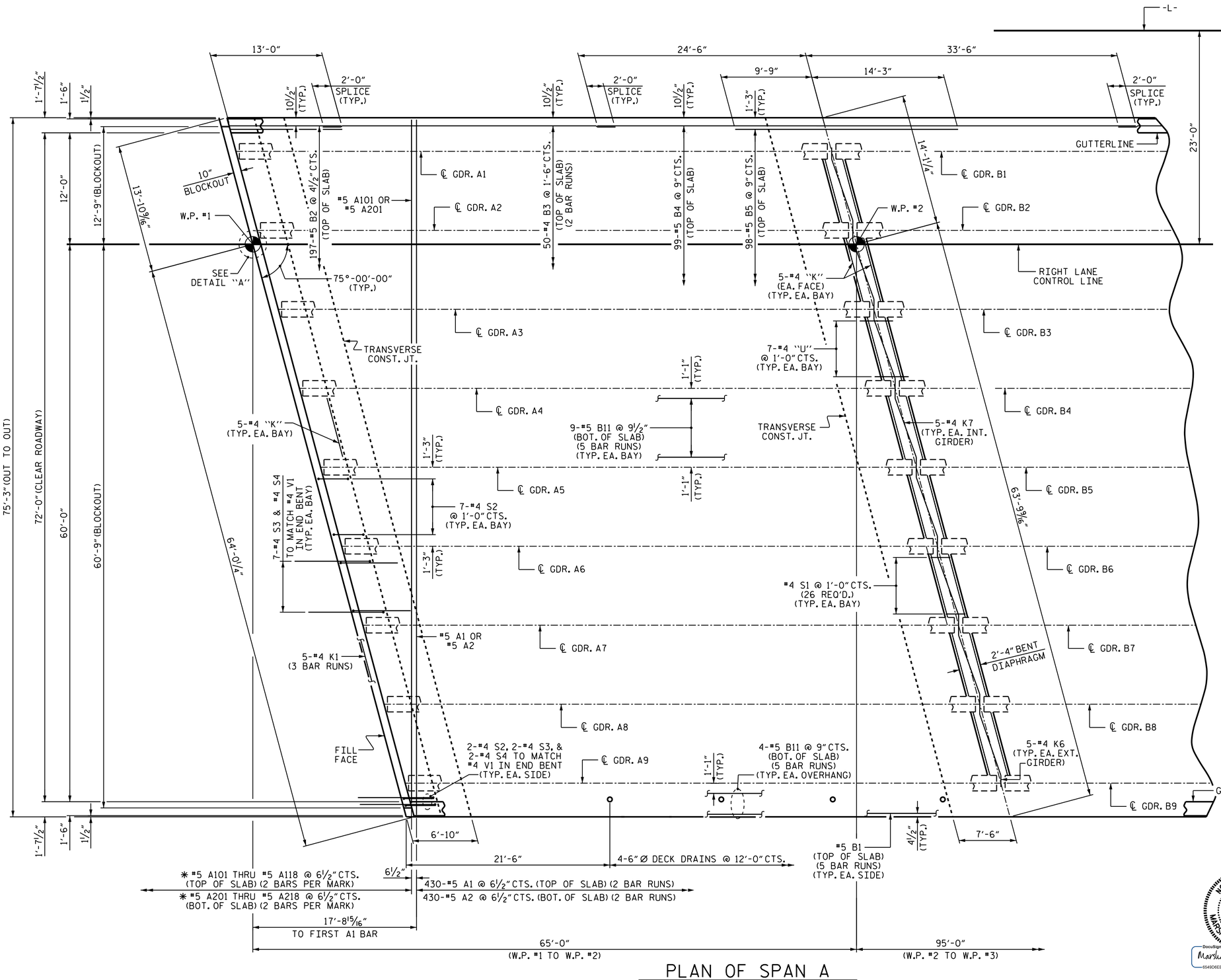
SUPERSTRUCTURE

TYPICAL SECTION

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-6
1			3			TOTAL SHEETS
2			4			33

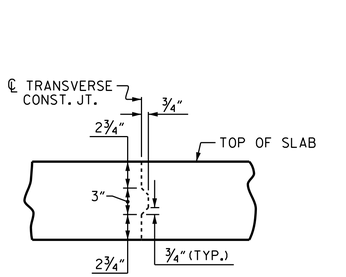
STR. #4



PLAN OF SPAN A

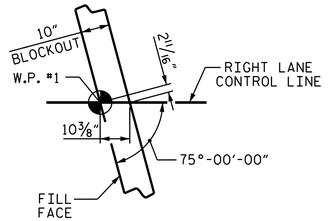
INTERMEDIATE STEEL DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR PRESTRESSED CONCRETE GIRDERS" SHEET.

* 2 BAR RUNS FOR A101 THROUGH A103 & A201 THROUGH A203.



TRANSVERSE CONSTRUCTION JOINT DETAIL

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



DETAIL "A"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN A

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 8549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-7
1			3			TOTAL SHEETS
2			4			33

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CHECKED BY :	K. D. LAYNE	DATE :	6/15/16
DESIGN ENGINEER OF RECORD:	H. A. LOCKLEAR	DATE :	6/2017

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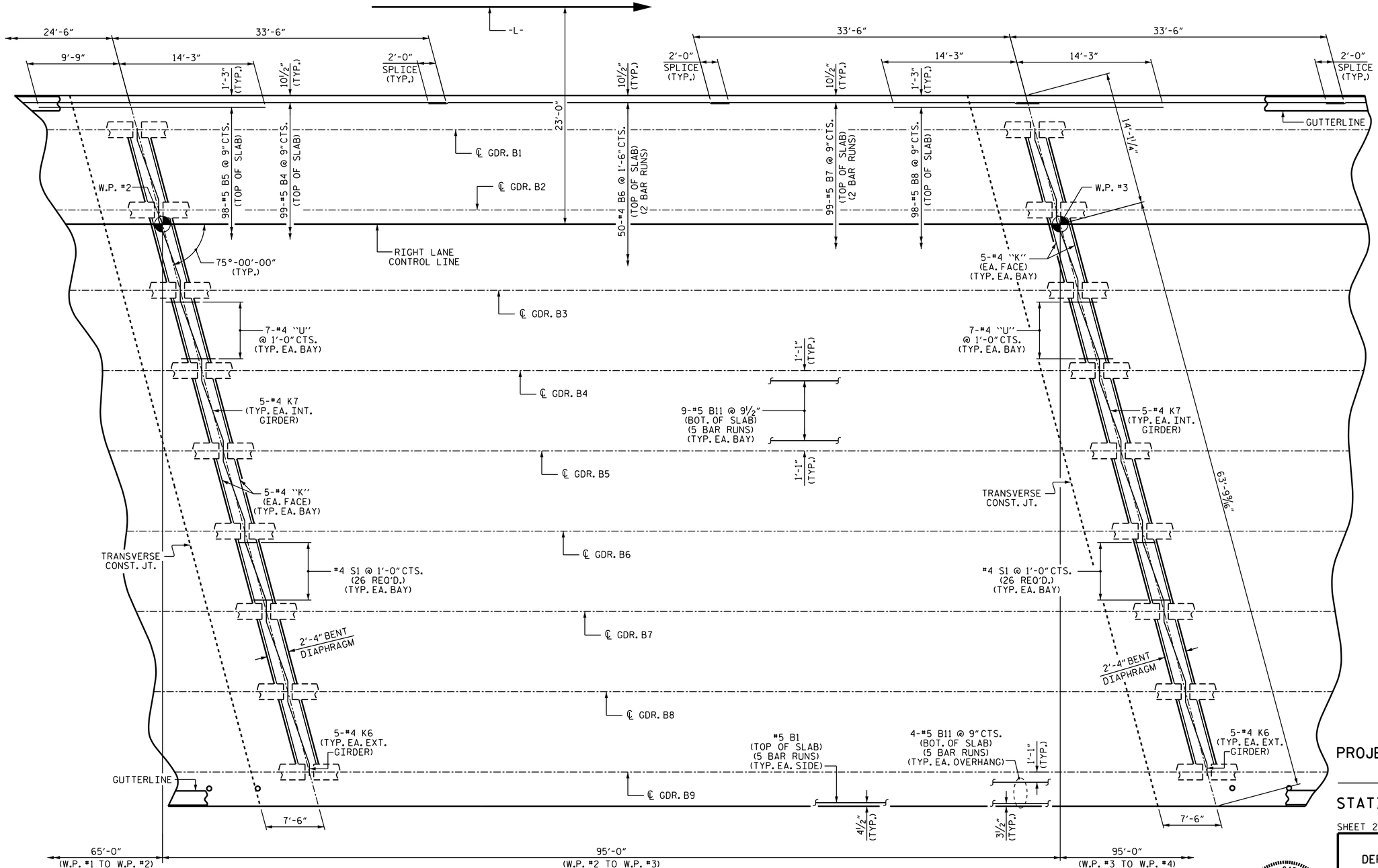

PLAN OF SPAN B

INTERMEDIATE STEEL DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR DETAILS, SEE ″INTERMEDIATE STEEL DIAPHRAGMS FOR PRESTRESSED CONCRETE GIRDERS″ SHEET.

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN B

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.
Marshall G. Creek, Jr.
7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-8
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : J. K. BOWLES DATE : 4/7/16
CHECKED BY : K. D. LAYNE DATE : 6/15/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 6/2017

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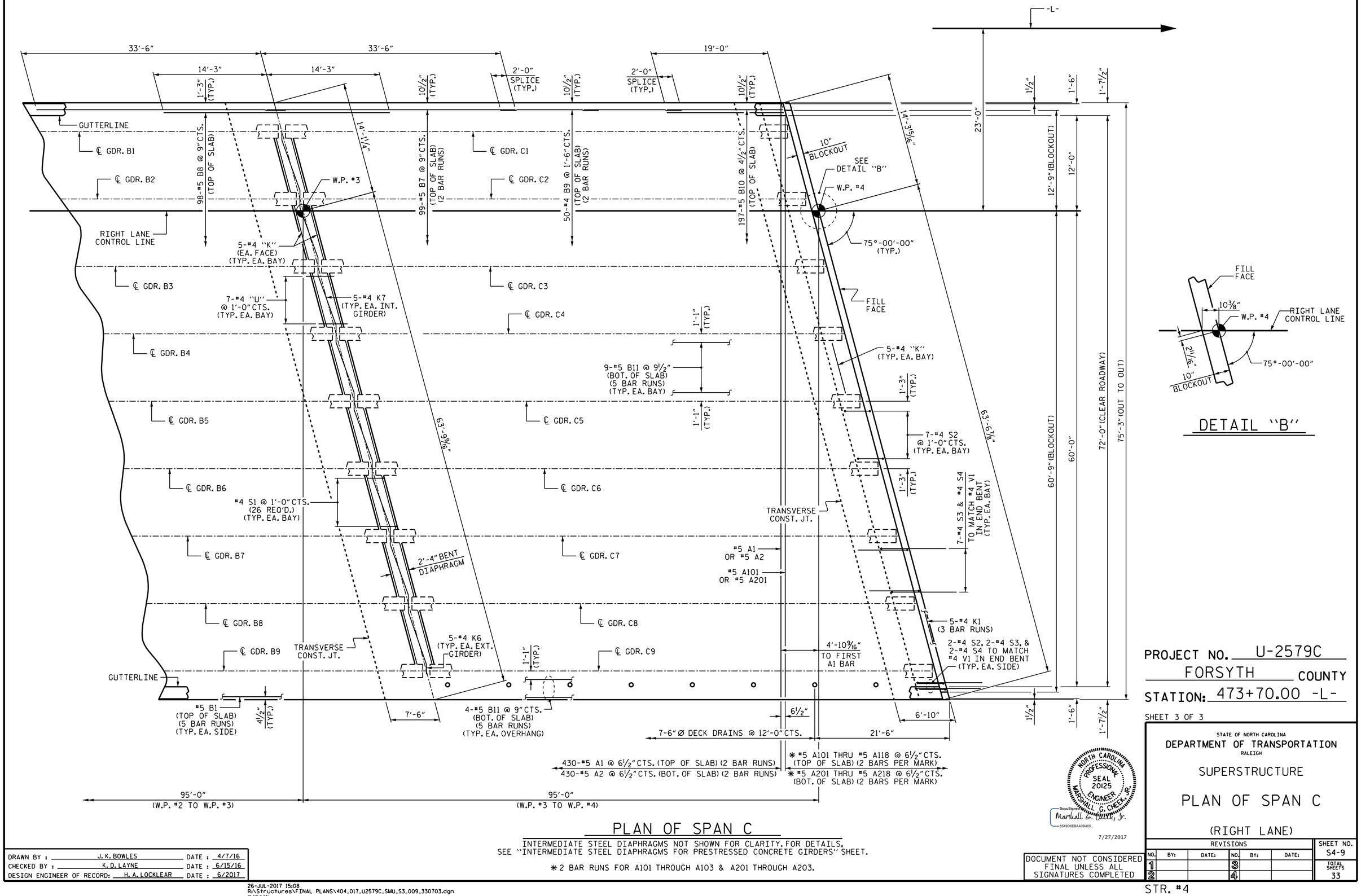

DETAIL "B"

PLAN OF SPAN C

INTERMEDIATE STEEL DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR PRESTRESSED CONCRETE GIRDERS" SHEET.

* 2 BAR RUNS FOR A101 THROUGH A103 & A201 THROUGH A203.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN C

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 8549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-9
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY : J. K. BOWLES DATE : 4/7/16
CHECKED BY : K. D. LAYNE DATE : 6/15/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 6/2017

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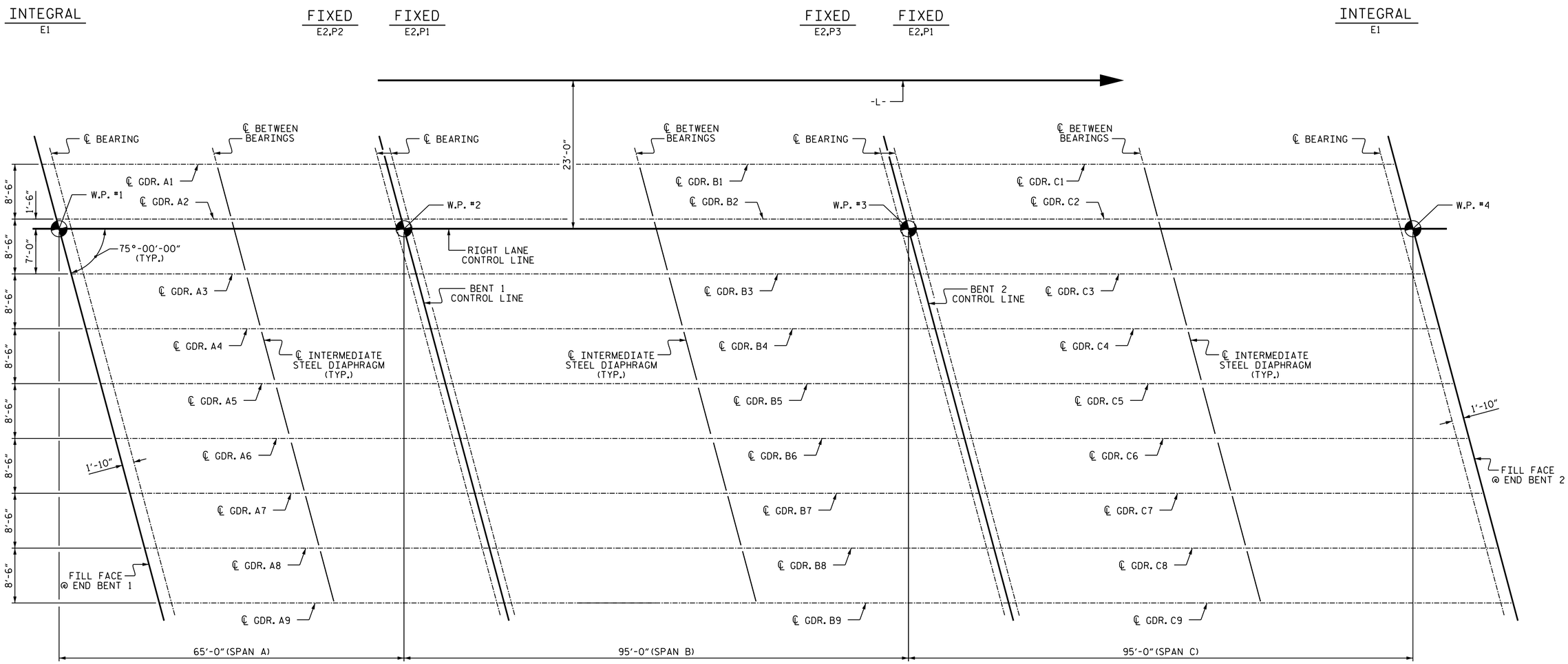

FRAMING PLAN

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-10
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY :	J. K. BOWLES	DATE :	4/7/16
CHECKED BY :	K. D. LAYNE	DATE :	6/15/16
DESIGN ENGINEER OF RECORD:	H. A. LOCKLEAR	DATE :	6/2017

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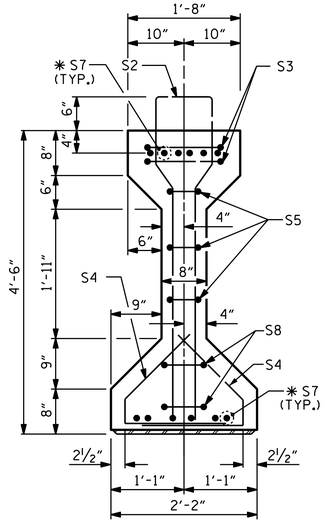
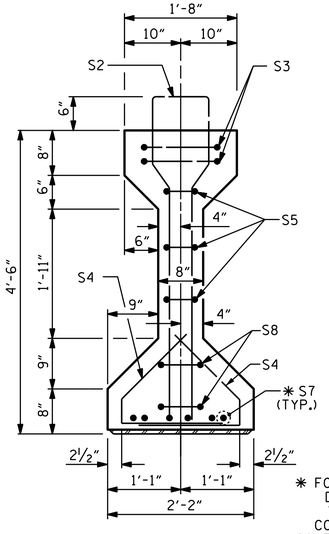
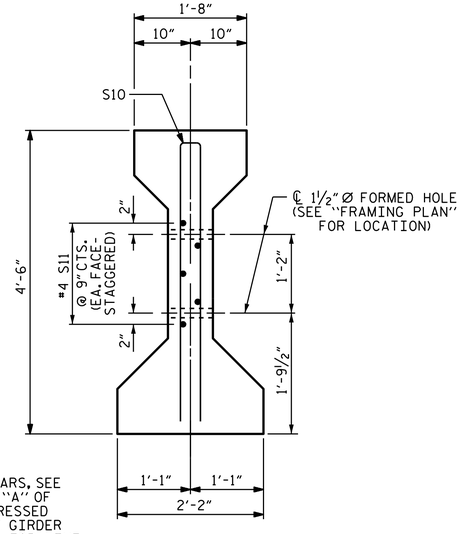


SECTION A-A



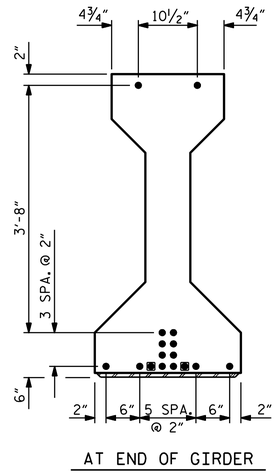
SECTION B-B



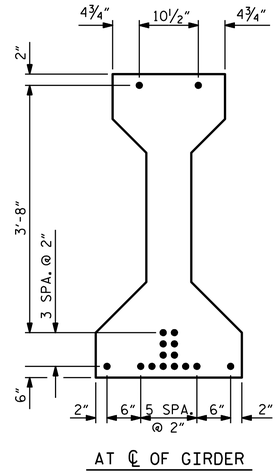
SECTION C-C

(S1 BARS NOT SHOWN)

✱ FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET



AT END OF GIRDER



AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

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

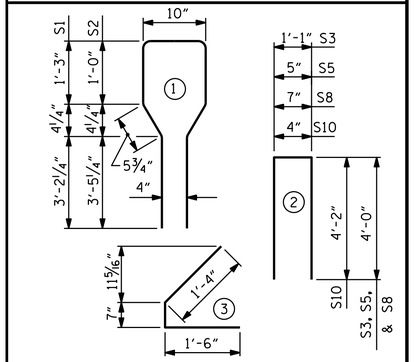
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	80	#4	1	10'-8"	570
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	72	#4	3	3'-5"	164
S5	6	#4	2	8'-5"	34
✱S7	18	#5	STR	3'-8"	69
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23
S13	1	#3	STR	1'-4"	1

✱NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



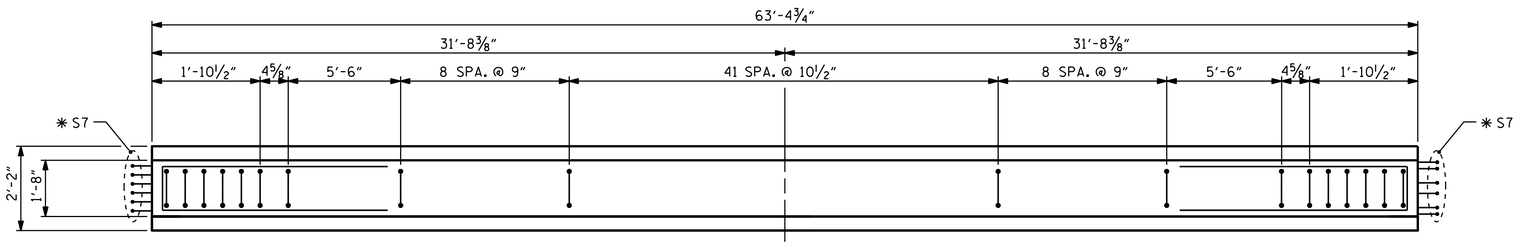
ALL BAR DIMENSIONS ARE OUT-TO-OUT.

QUANTITIES FOR ONE GIRDER

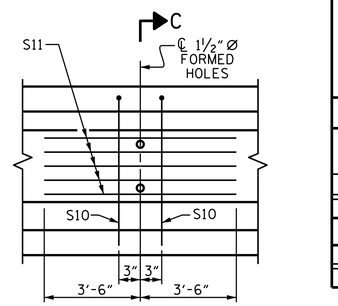
REINFORCING STEEL	5,000 PSI CONCRETE	0.6" Ø L. R. STRANDS
LBS.	C.Y.	No.
1,119	12.9	16

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
9	63'-4¾"	570'-6¾"

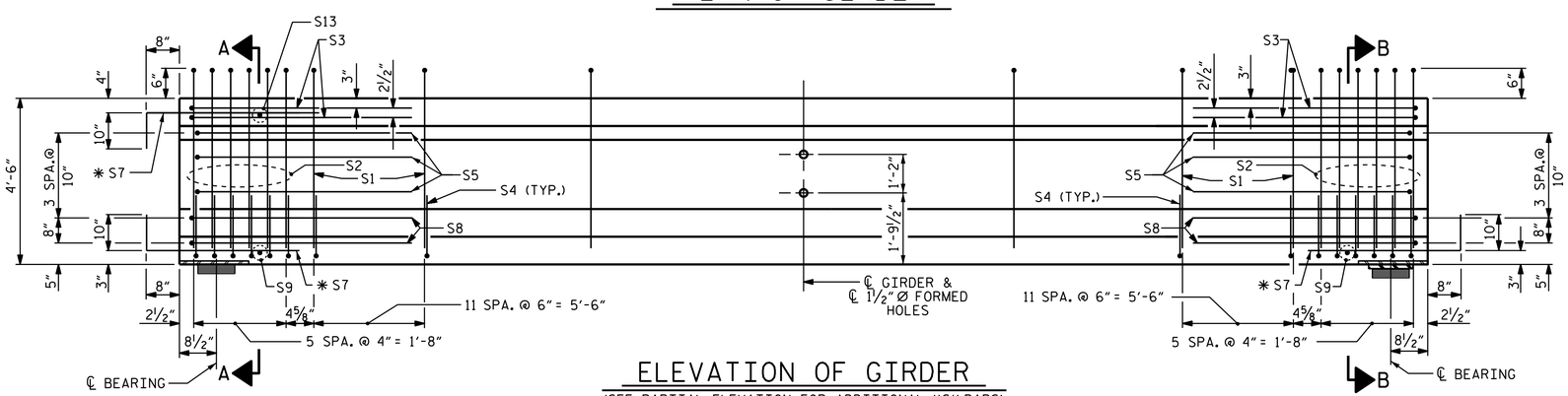


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR SPAN A GIRDERS.



INTEGRAL END BENT

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

FIX

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN A (RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
Doudsign Marshall G. Cheek, Jr.
8549D6EBAA3B405...
8/1/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-11
1			3			TOTAL SHEETS
2			4			33

STR. #4 STD. NO. PCG6

ASSEMBLED BY :	H. A. LOCKLEAR	DATE :	12-15
CHECKED BY :	N. D'AIUTO	DATE :	6/15/16
DRAWN BY :	ELR 8/91	REV. 5/1/06R	TLA/GM
CHECKED BY :	GRP 8/91	REV. 10/1/11	MAA/GM
		REV. 1/15	MAA/TMG

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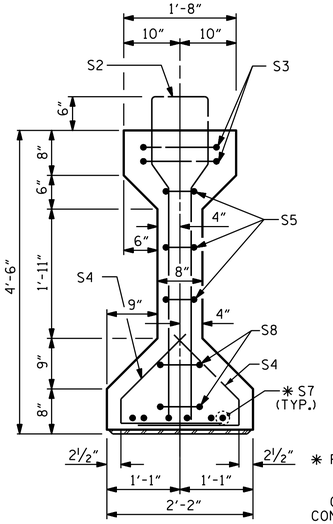
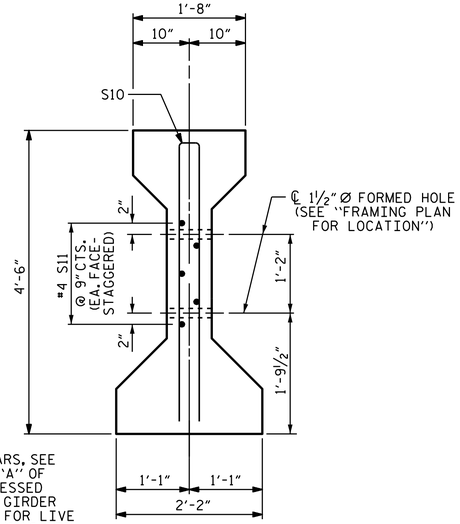


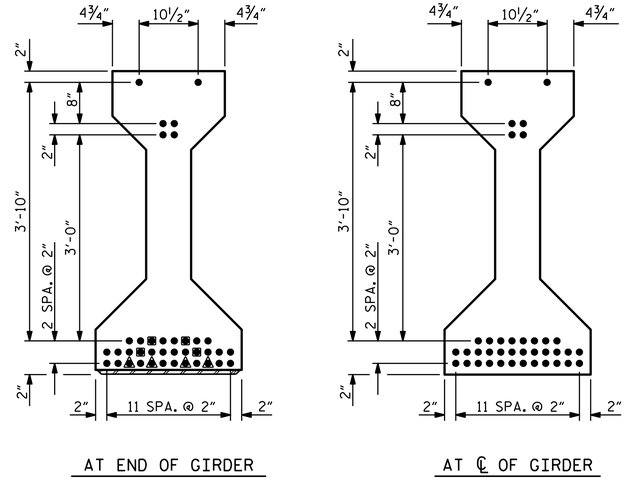
✱ FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

SECTION B-B



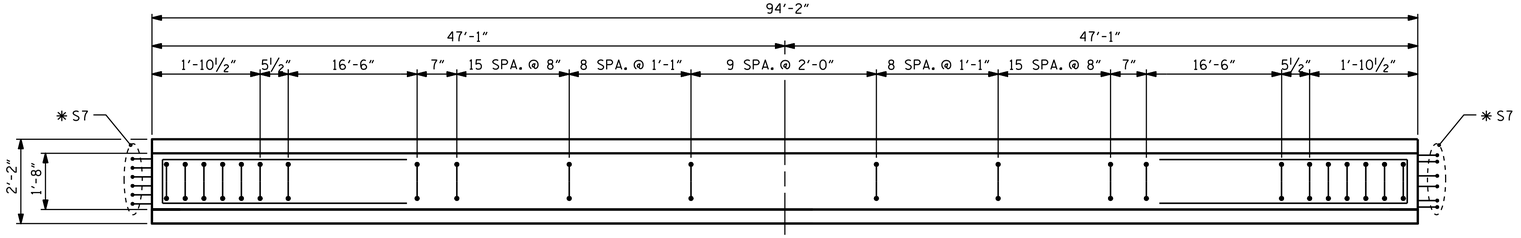
SECTION C-C

(S1 BARS NOT SHOWN)

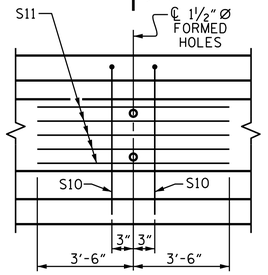


0.6" Ø LOW RELAXATION STRAND LAYOUT

- ● FULLY BONDED STRANDS
- ◙ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER

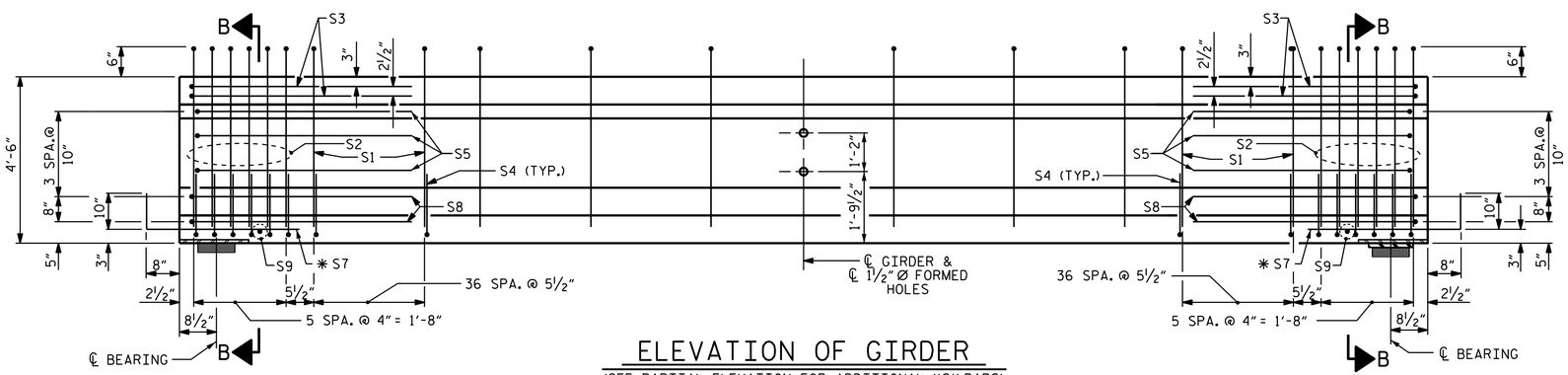


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR SPAN B GIRDERS.



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

0.6" Ø L. R. GRADE 270 STRANDS

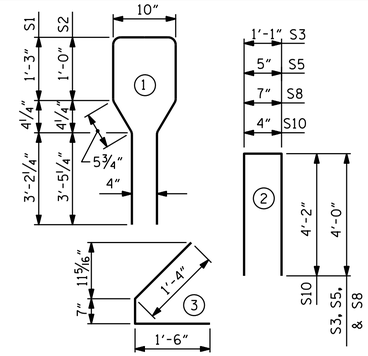
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	130	#4	1	10'-8"	926
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	172	#4	3	3'-5"	393
S5	6	#4	2	8'-5"	34
✱ S7	12	#5	STR	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

✱ 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	7,500 PSI CONCRETE	0.6" Ø L. R. STRANDS
LBS.	C.Y.	No.
1,680	19.1	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
9	94'-2"	847'-6"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Docusigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN B
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-12
1			3			TOTAL SHEETS
2			4			33

STR. #4 STD. NO. PCG6

ASSEMBLED BY : H. A. LOCKLEAR	DATE : 12-15	REV. 5/1/06R	TLA/GM
CHECKED BY : N. D'AIUTO	DATE : 6/15/16	REV. 10/1/11	MAA/GM
DRAWN BY : ELR 8/91		REV. 1/15	MAA/TMG
CHECKED BY : GRP 8/91			

26-JUL-2017 15:08
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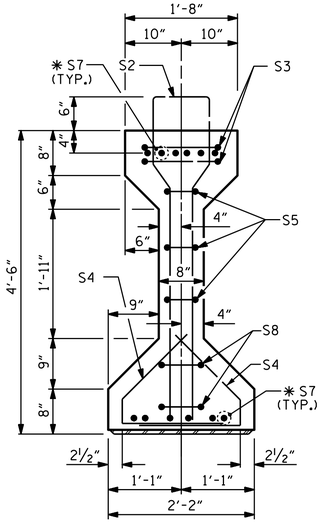
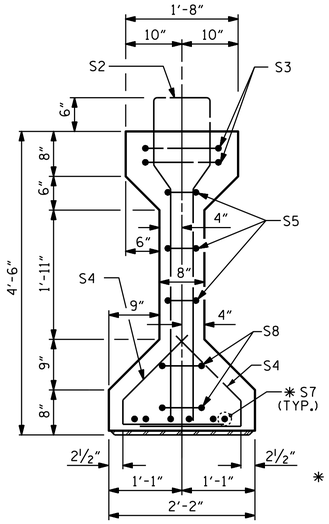
mcheek

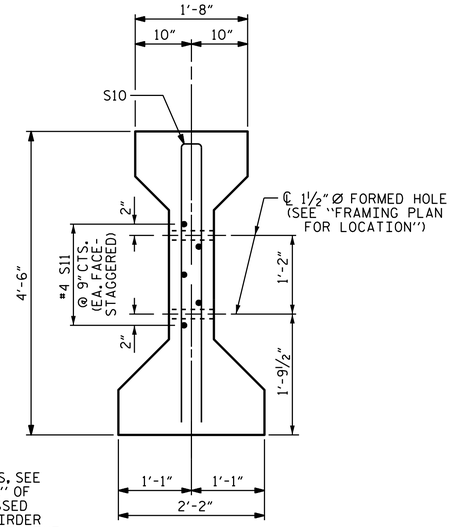


SECTION A-A



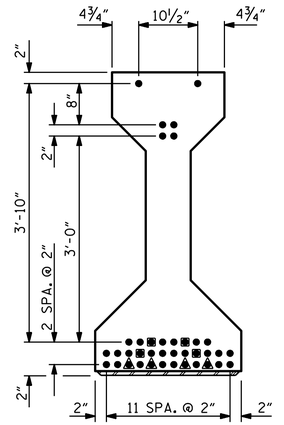
SECTION B-B

✱ FOR S7 BARS, SEE DETAIL "A" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET

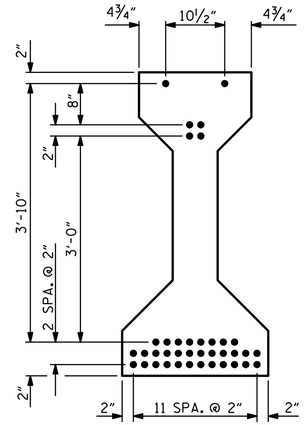


SECTION C-C

(S1 BARS NOT SHOWN)



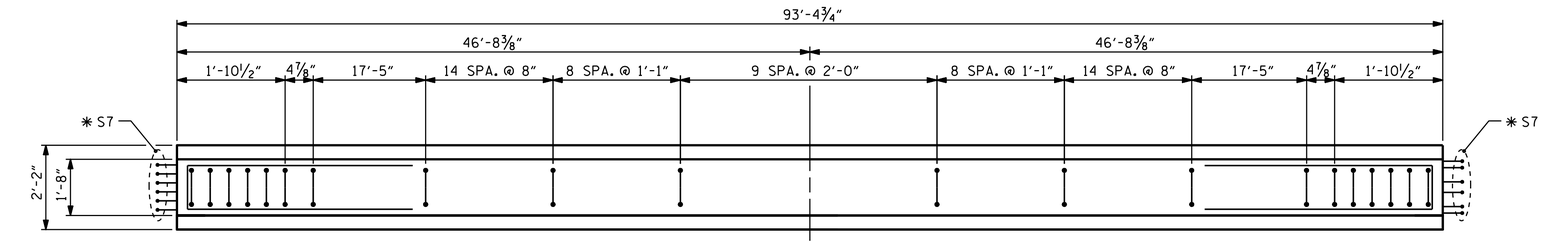
AT END OF GIRDER



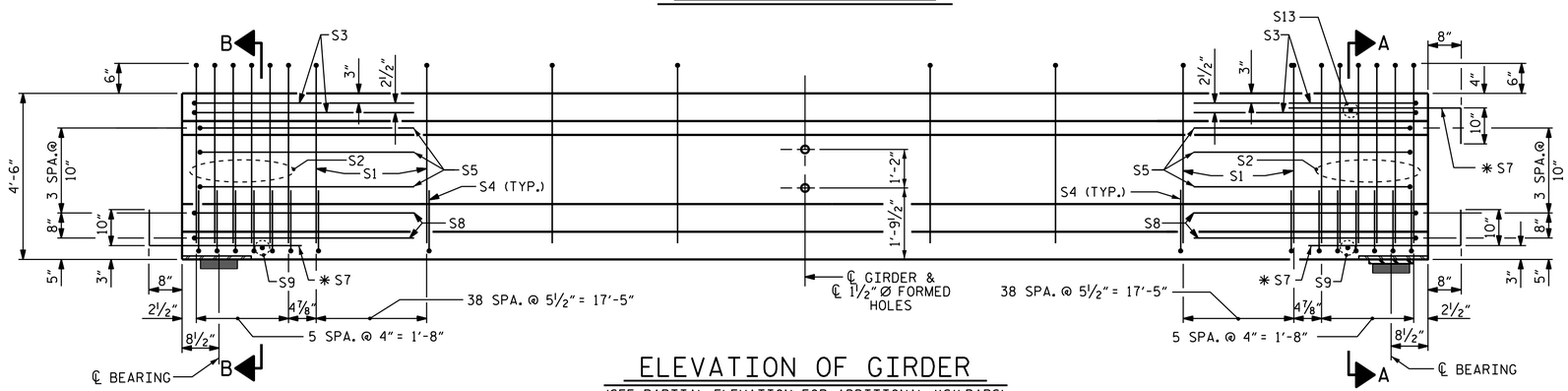
AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

- ● FULLY BONDED STRANDS
- ■ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER

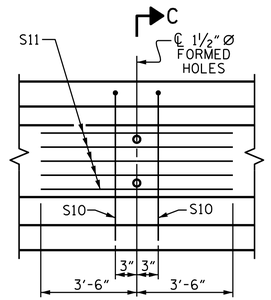


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR SPAN C GIRDERS.

0.6" Ø L. R. GRADE 270 STRANDS

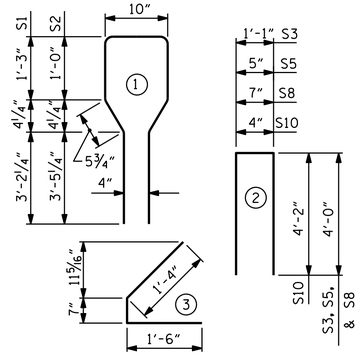
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	130	#4	1	10'-8"	926
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	180	#4	3	3'-5"	411
S5	6	#4	2	8'-5"	34
✱S7	18	#5	STR	3'-8"	69
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23
S13	1	#3	STR	1'-4"	1

✱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	7,500 PSI CONCRETE	0.6" Ø L.R. STRANDS
LBS.	C.Y.	No.
1722	19.0	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
9	93'-4¾"	840'-6¾"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN C
(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Docusigned by: Marshall G. Cheek, Jr. 6549D6EBBAA3B405...

7/27/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-13
1			3			TOTAL SHEETS
2			4			33

STR. #4 STD. NO. PCG6

ASSEMBLED BY :	H. A. LOCKLEAR	DATE :	12-15
CHECKED BY :	N. D'AIUTO	DATE :	6/15/16
DRAWN BY :	ELR 8/91	REV. 5/1/06R	TLA/GM
CHECKED BY :	GRP 8/91	REV. 10/1/11	MAA/GM
		REV. 1/15	MAA/TMG

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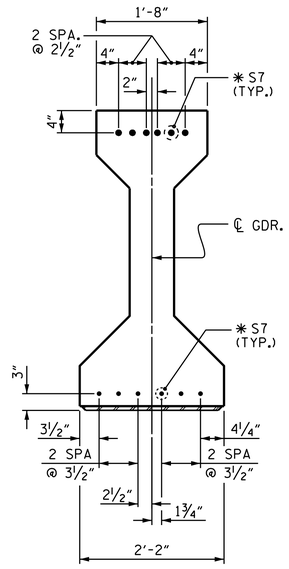
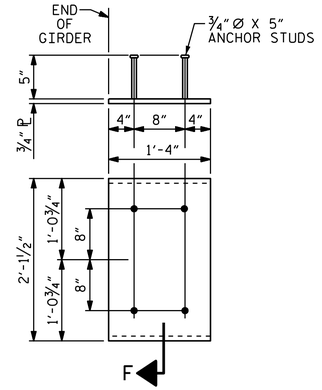
mcheek



DETAIL "A"

(FOR AASHTO TYPE IV GIRDERS)



EMBEDDED PLATE "B-1" DETAILS FOR AASHTO TYPE IV GIRDER

(2 REQ'D PER GIRDER)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4,000 PSI FOR SPAN A AND 5,800 FOR SPANS B AND C.

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

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

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6"Ø LOW RELAXATION	SPAN A, GIRDERS 1 THROUGH 9										
TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.014	0.026	0.036	0.042	0.044	0.042	0.036	0.026	0.014	0.000
✱DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.010	0.018	0.025	0.029	0.031	0.029	0.025	0.018	0.010	0.000
FINAL CAMBER †	0	1/16"	1/8"	1/8"	3/16"	3/16"	3/16"	1/8"	1/8"	1/16"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

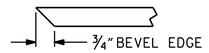
0.6"Ø LOW RELAXATION	SPAN B, GIRDERS 1 THROUGH 9										
TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.054	0.103	0.141	0.165	0.173	0.165	0.141	0.103	0.054	0.000
✱DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.040	0.075	0.102	0.120	0.126	0.120	0.102	0.075	0.040	0.000
FINAL CAMBER †	0	3/16"	5/16"	7/16"	9/16"	9/16"	9/16"	7/16"	5/16"	3/16"	0

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6"Ø LOW RELAXATION	SPAN C, GIRDERS 1 THROUGH 9										
TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
CAMBER (GIRDER ALONE IN PLACE) †	0.000	0.054	0.103	0.141	0.165	0.173	0.165	0.141	0.103	0.054	0.000
✱DEFLECTION DUE TO SUPERIMPOSED D.L. †	0.000	0.038	0.072	0.099	0.116	0.122	0.116	0.099	0.072	0.038	0.000
FINAL CAMBER †	0	3/16"	3/8"	1/2"	9/16"	5/8"	9/16"	1/2"	3/8"	3/16"	0

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



SECTION "F"

(SEE NOTES)

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 4 OF 4

ASSEMBLED BY :	J. K. BOWLES	DATE :	2/23/16
CHECKED BY :	K. D. LAYNE	DATE :	6/15/16
DRAWN BY : ELR	11/91	REV. 10/1/11	MAA/GM
CHECKED BY : GRP	11/91	REV. 1/15	MAA/TMG
		REV. 2/15	MAA/TMG

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mcheek

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Documents signed by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

8/1/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

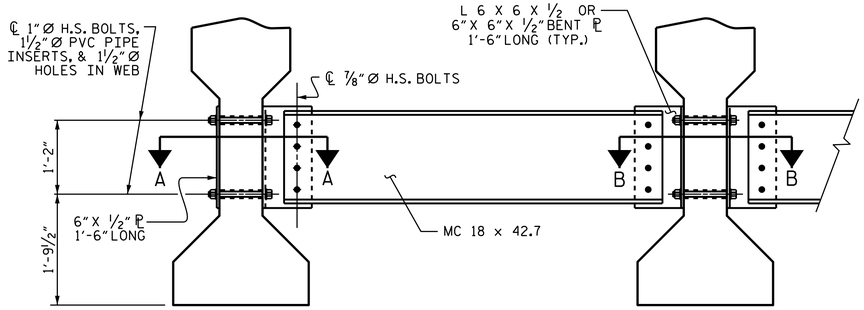
(RIGHT LANE)

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

SHEET NO. S4-14

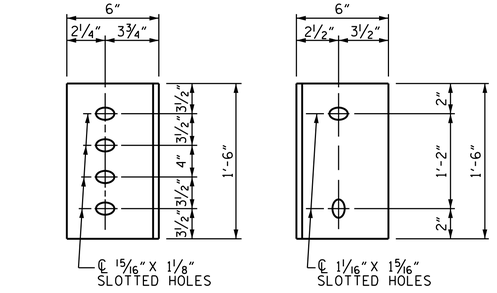
TOTAL SHEETS 33

STR. #4 STD. NO. PCG9



EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE WEB FACE

CONNECTOR PLATE DETAILS

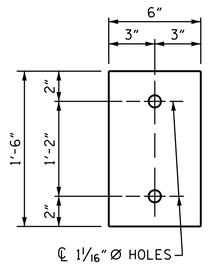
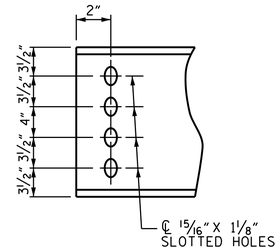
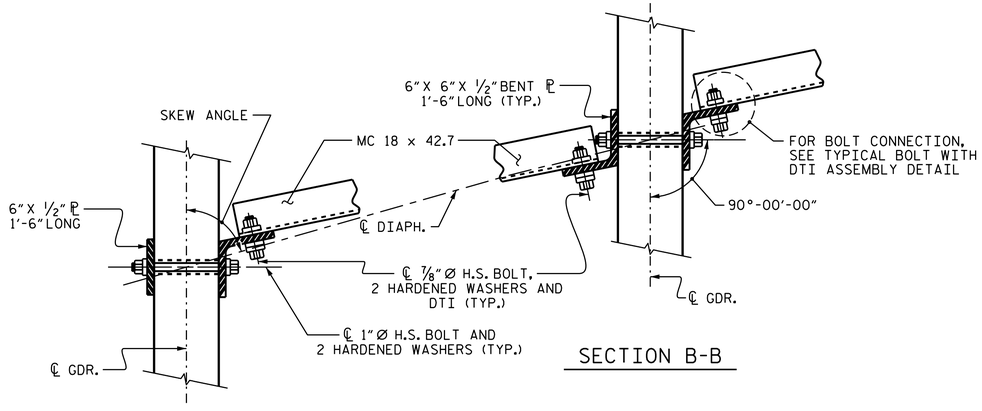


PLATE DETAILS

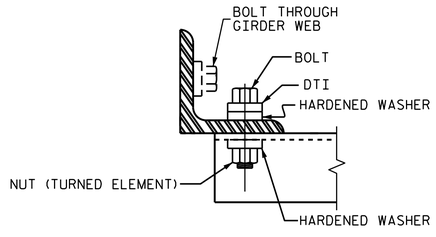


CHANNEL END



SECTION A-A SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

TENSION ON THE ASTM A325 BOLTS THROUGH THE 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 AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE 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 54"PRESTRESSED CONCRETE GIRDERS.

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...
7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
INTERMEDIATE
STEEL DIAPHRAGMS
FOR TYPE IV PRESTRESSED
CONCRETE GIRDERS
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-15
1			3			TOTAL SHEETS
2			4			33

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY :	H. A. LOCKLEAR	DATE :	10-15
CHECKED BY :	K. D. LAYNE	DATE :	6/15/16
DRAWN BY :	TLA 6/05	ADDED	10/21/05
CHECKED BY :	VC 6/05	REV. 5/1/06	RRR KMM/GM
		REV. 10/1/11	MAA/GM

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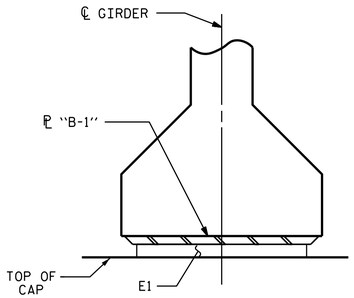
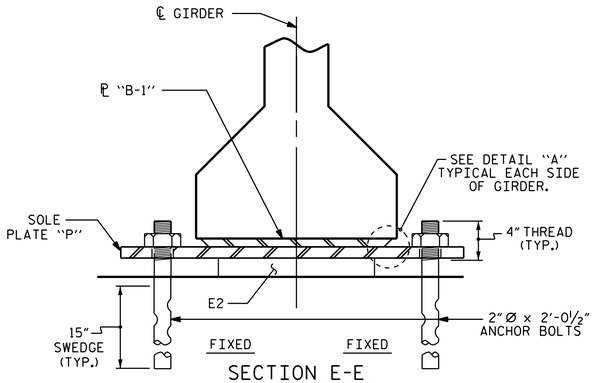
mcheek

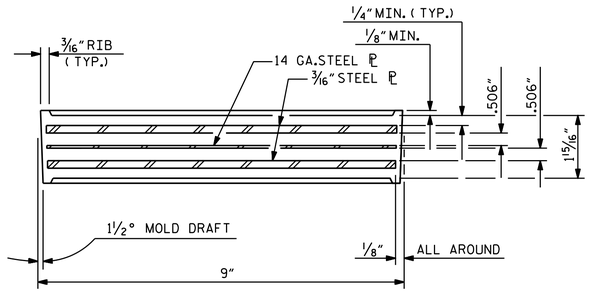
STR. #4 STD. NO. PCG10



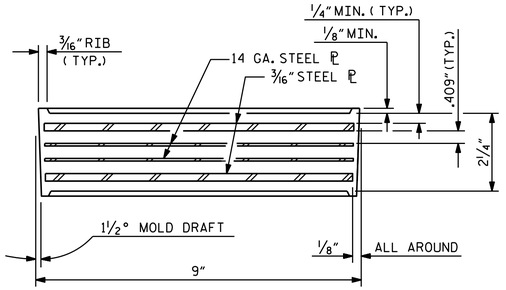
SECTION D-D



SECTION E-E

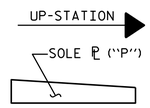


TYPICAL SECTION OF ELASTOMERIC BEARINGS

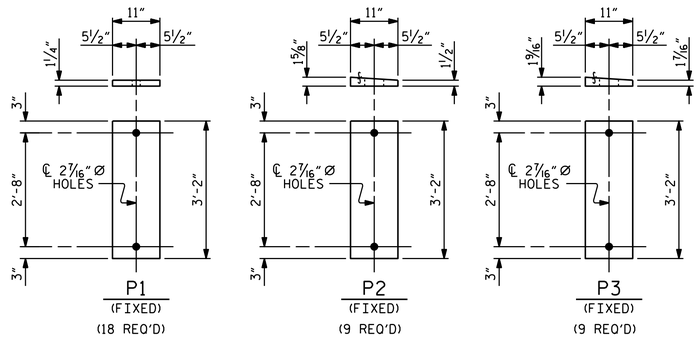


TYPICAL SECTION OF ELASTOMERIC BEARINGS

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
TYPE V	365 k



SOLE ℄ PLACEMENT DETAIL



SOLE PLATE DETAILS ("P")

NOTES

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

STEEL SOLE PLATES, ANCHOR BOLTS, AND NUTS 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.

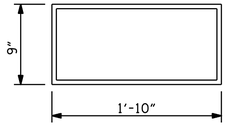
SOLE PLATE "P", BOLTS, AND NUTS SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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

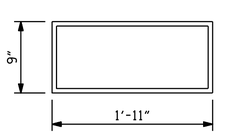
FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.



E1 (18 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

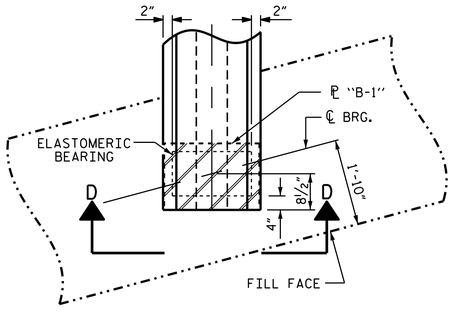
TYPE IV



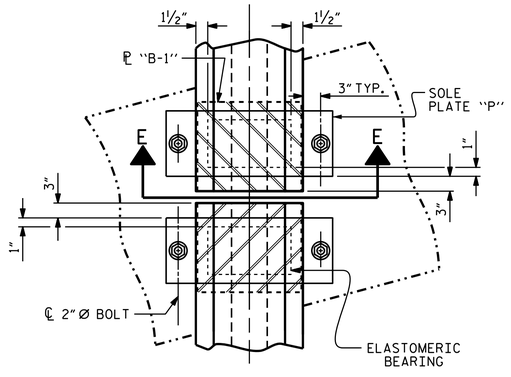
E2 (36 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

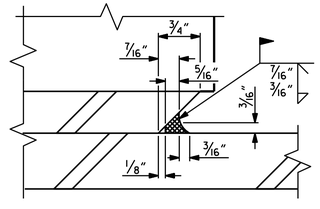


PLAN VIEW AT INTEGRAL END BENT



PLAN VIEW AT BENT

(SHOWING CONTINUOUS BENT)



DETAIL "A"

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
ELASTOMERIC BEARING DETAILS
PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE
(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr.
65490D6EBAA3B405...
7/27/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-16
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY :	J. K. BOWLES	DATE :	4/14/16
CHECKED BY :	K. D. LAYNE	DATE :	6/15/16
DRAWN BY : EEM 2/97	REV. 10/1/11		MAA/GM
CHECKED BY : VAP 2/97	REV. 6/13		AAC/MAA
	REV. 1/15		MAA/TMG

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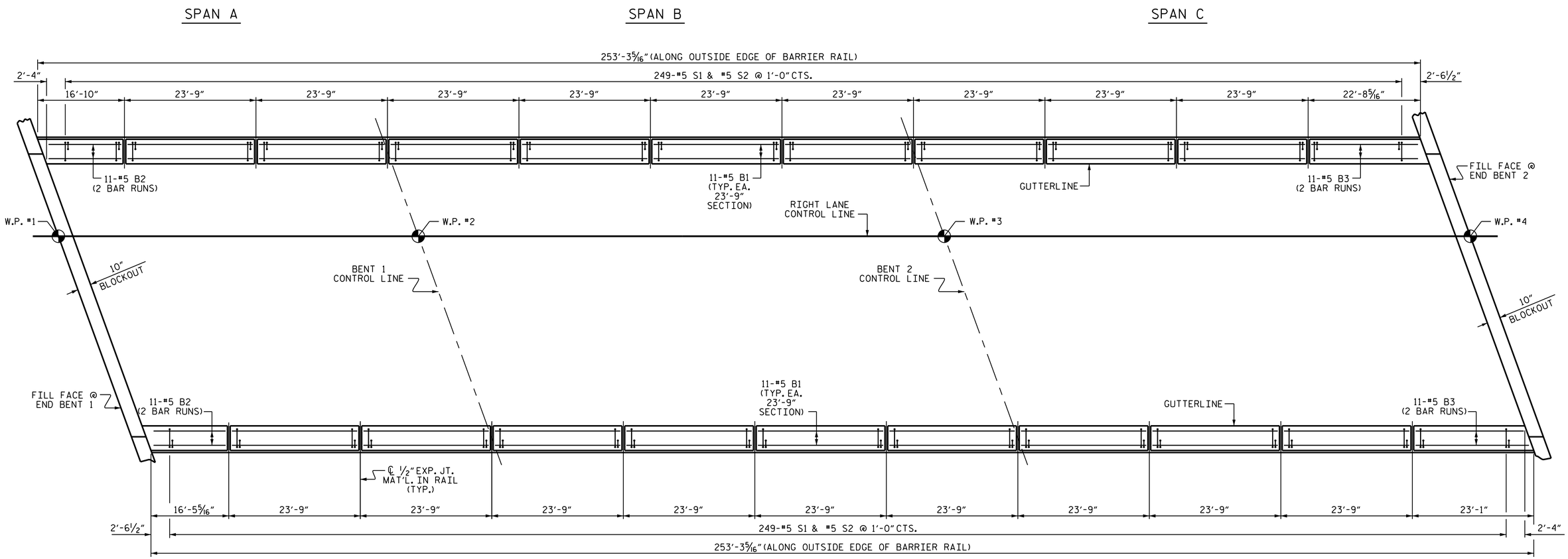

PLAN OF CONCRETE BARRIER RAIL

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-6" CONCRETE BARRIER RAIL

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

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2			4			33

STR. #4

DRAWN BY : T. L. AVERETTE DATE : 3/02/17
CHECKED BY : H. T. BARBOUR DATE : 3/14/17

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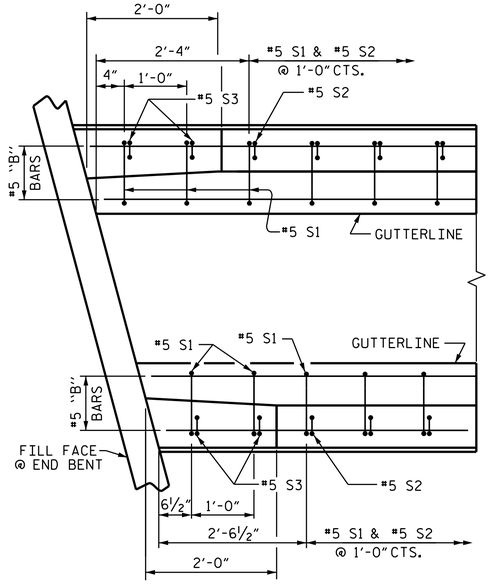
NOTES

THE BARRIER RAIL IN THE 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.

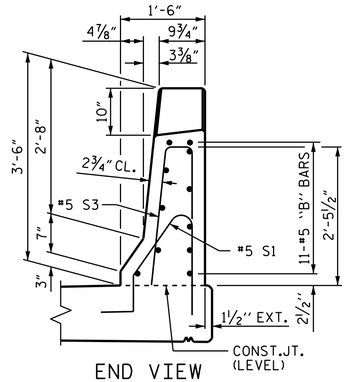
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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.

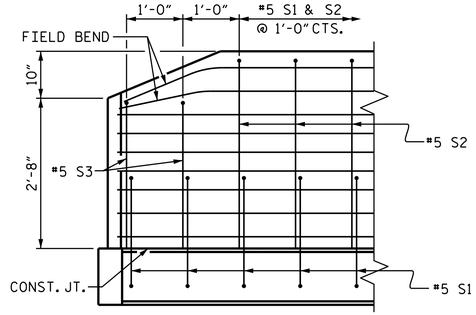
THE #5 S1 AND #5 S2 BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN 2" MINIMUM CLEARANCE TO THE ½" EXPANSION JOINT MATERIAL IN THE BARRIER RAIL.



PLAN

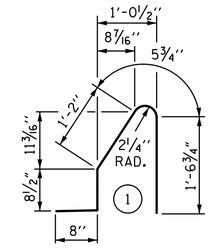


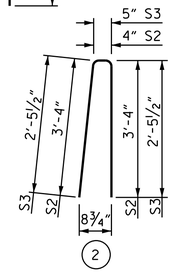
END VIEW



SIDE VIEW

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT.

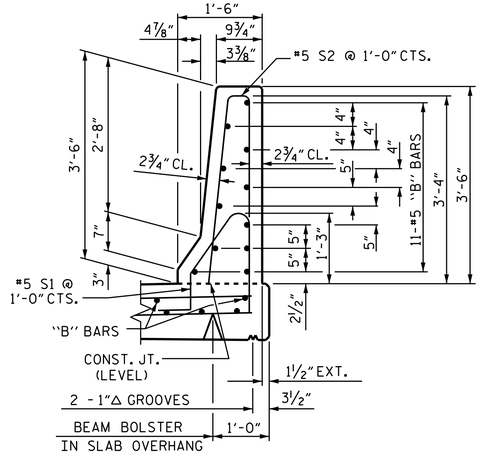
BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

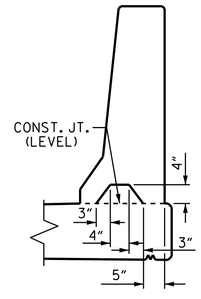
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ B1	198	#5	STR	23'-4"	4819
✱ B2	44	#5	STR	9'-11"	455
✱ B3	44	#5	STR	13'-1"	600
✱ S1	506	#5	1	4'-7"	2419
✱ S2	498	#5	2	7'-0"	3636
✱ S3	8	#5	2	5'-4"	45

✱ EPOXY COATED REINFORCING STEEL	LBS.	11,974
CLASS AA CONCRETE	C.Y.	68.9
CONCRETE BARRIER RAIL	LIN. FT.	506.55

END OF RAIL DETAILS

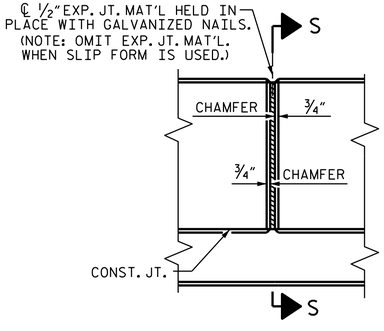


SECTION THRU RAIL



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

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-6" CONCRETE BARRIER RAIL

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
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7/27/2017

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			33

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DRAWN BY :	T. L. AVERETTE	DATE : 3/02/17
CHECKED BY :	H. T. BARBOUR	DATE : 3/14/17
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 6/2017

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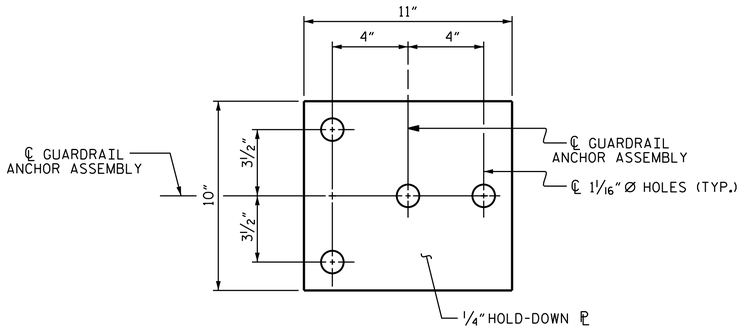
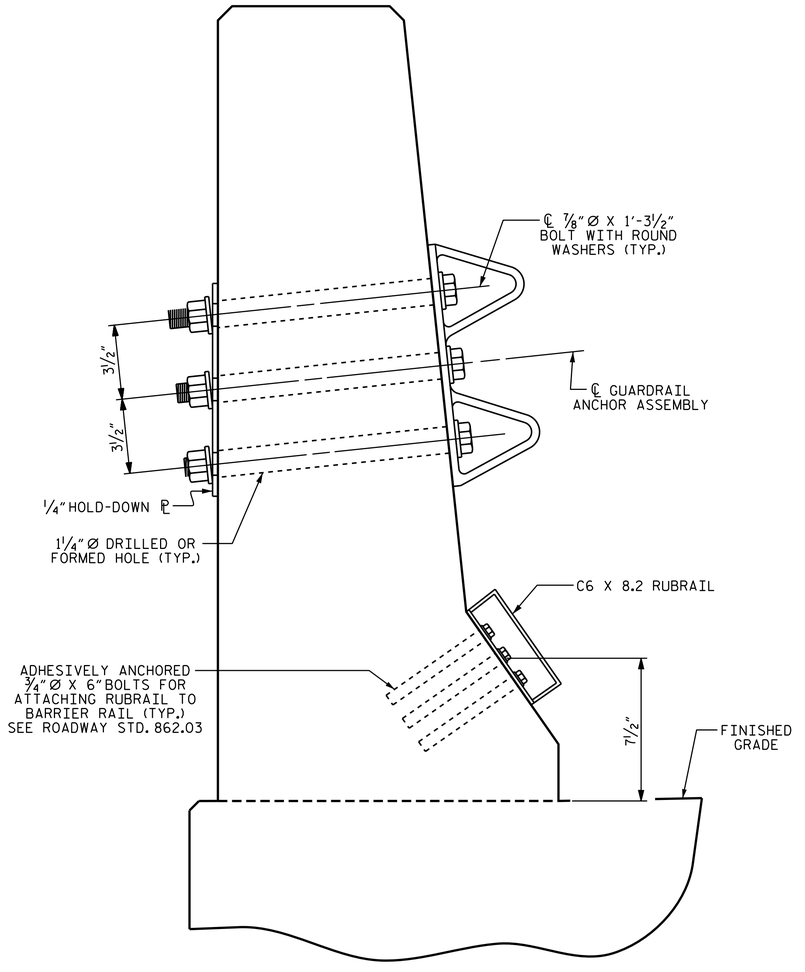
STR. #4

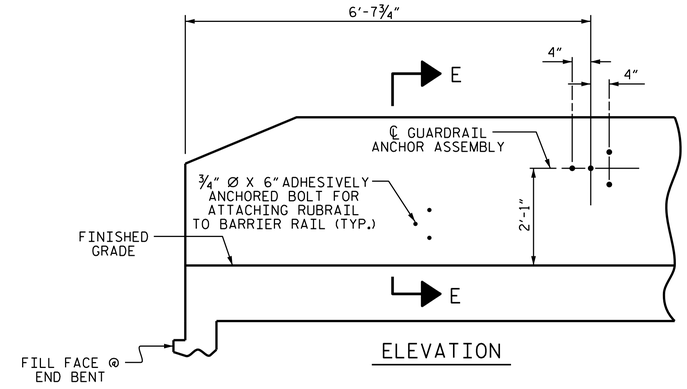


PLAN

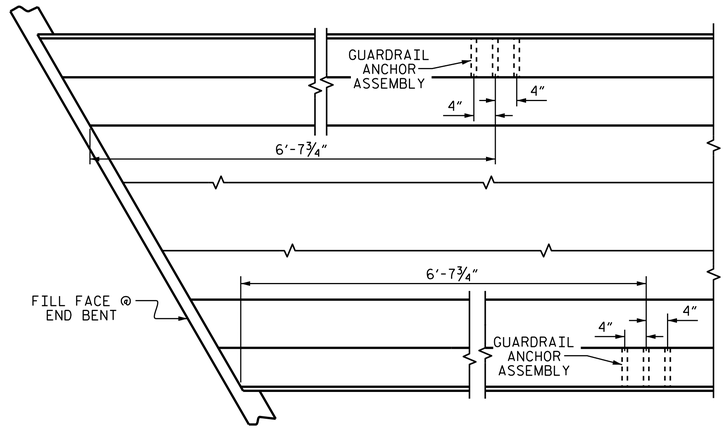


SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



ELEVATION



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-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Docusigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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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:	S4-19
1			3			TOTAL SHEETS
2			4			33

ASSEMBLED BY : J. K. BOWLES	DATE : 4/14/16	
CHECKED BY : K. D. LAYNE	DATE : 6/15/16	
DRAWN BY : TLA 5/06	REV. 10/1/11	MAA/GM
CHECKED BY : GM 5/06	REV. 7/12	MAA/GM
	REV. 6/13	MAA/GM

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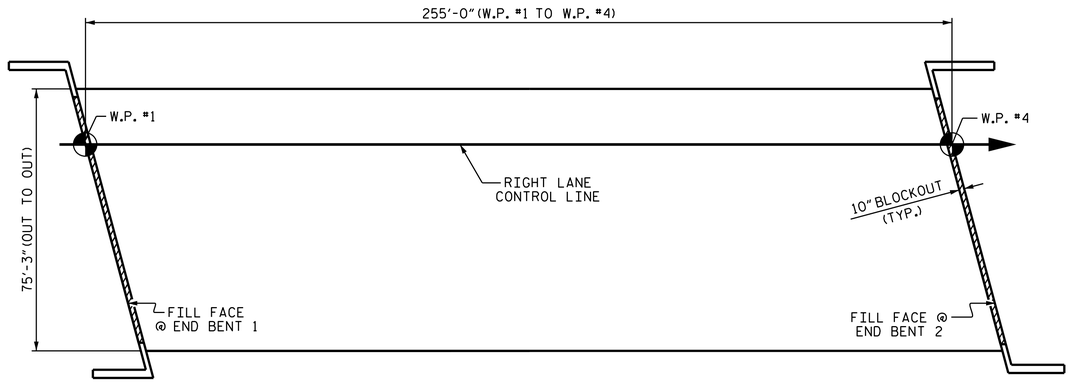
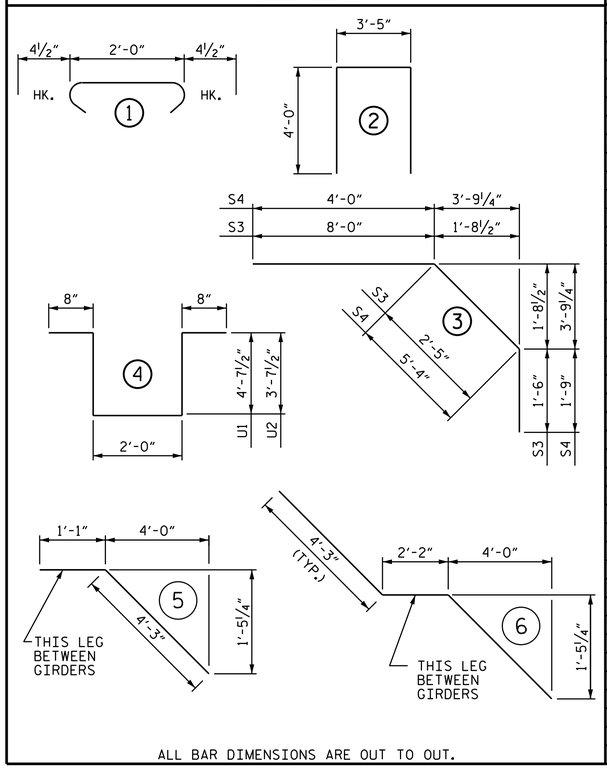
STR. #4 STD. NO. GRA2



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. 19,189)

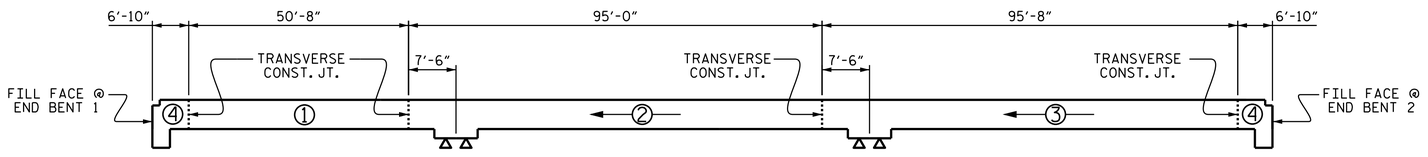
BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

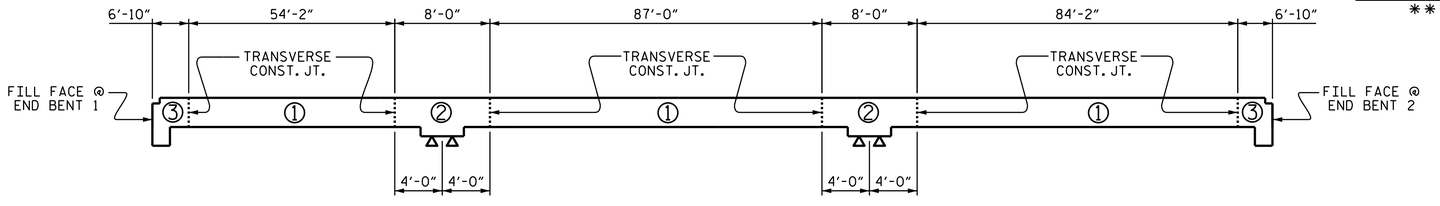
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	860	#5	STR	38'-9"	34758	✱B1	10	#5	STR	52'-7"	548
A2	860	#5	STR	38'-7"	34608	✱B2	197	#5	STR	13'-0"	2671
						✱B3	100	#4	STR	16'-6"	1102
✱A101	8	#5	STR	37'-1"	309	✱B4	99	#5	STR	58'-0"	5989
✱A102	8	#5	STR	35'-1"	293	✱B5	98	#5	STR	24'-0"	2453
✱A103	8	#5	STR	33'-1"	276	✱B6	100	#4	STR	17'-0"	1136
✱A104	4	#5	STR	59'-5"	248	✱B7	198	#5	STR	34'-9"	7176
✱A105	4	#5	STR	55'-5"	231	✱B8	98	#5	STR	28'-6"	2913
✱A106	4	#5	STR	51'-4"	214	✱B9	100	#4	STR	23'-9"	1587
✱A107	4	#5	STR	47'-4"	197	✱B10	197	#5	STR	19'-0"	3904
✱A108	4	#5	STR	43'-3"	180	B11	400	#5	STR	52'-4"	21833
✱A109	4	#5	STR	39'-3"	164						
✱A110	4	#5	STR	35'-2"	147	K1	30	#4	STR	26'-5"	529
✱A111	4	#5	STR	31'-2"	130	K2	16	#4	STR	6'-2"	66
✱A112	4	#5	STR	27'-1"	113	K3	96	#4	STR	6'-8"	428
✱A113	4	#5	STR	23'-1"	96	K4	96	#4	STR	7'-9"	497
✱A114	4	#5	STR	19'-0"	79	K5	32	#4	STR	5'-0"	107
✱A115	4	#5	STR	15'-0"	63	K6	20	#4	5	5'-4"	71
✱A116	4	#5	STR	10'-11"	46	K7	70	#4	6	10'-8"	499
✱A117	4	#5	STR	6'-11"	29	K8	4	#4	STR	2'-3"	6
✱A118	4	#5	STR	2'-10"	12	K9	8	#4	STR	2'-6"	13
						K10	8	#4	STR	3'-0"	16
A201	8	#5	STR	36'-11"	308						
A202	8	#5	STR	34'-11"	291	S1	416	#4	1	2'-9"	764
A203	8	#5	STR	32'-11"	275	S2	120	#4	2	11'-5"	915
A204	4	#5	STR	59'-5"	248	✱S3	120	#4	3	11'-11"	955
A205	4	#5	STR	55'-5"	231	✱S4	120	#4	3	11'-1"	888
A206	4	#5	STR	51'-4"	214						
A207	4	#5	STR	47'-4"	197	U1	80	#4	4	12'-7"	672
A208	4	#5	STR	43'-3"	180	U2	32	#4	4	10'-7"	226
A209	4	#5	STR	39'-3"	164	REINFORCING STEEL				LBS.	64,073
A210	4	#5	STR	35'-2"	147	✱ EPOXY COATED REINFORCING STEEL				LBS.	68,907
A211	4	#5	STR	31'-2"	130						
A212	4	#5	STR	27'-1"	113						
A213	4	#5	STR	23'-1"	96						
A214	4	#5	STR	19'-0"	79						
A215	4	#5	STR	15'-0"	63						
A216	4	#5	STR	10'-11"	46						
A217	4	#5	STR	6'-11"	29						
A218	4	#5	STR	2'-10"	12						



DECK POURING SEQUENCE

(#) = INDICATES THE NUMBER AND DIRECTION OF POUR.



OPTIONAL DECK POURING DETAIL

POURS ② AND ③ SHALL NOT BE STARTED UNTIL BOTH ADJACENT POUR ① REACH A MINIMUM OF 3000 PSI

GROOVING BRIDGE FLOORS

APPROACH SLABS	3,331	SQ. FT.
BRIDGE DECK	17,452	SQ. FT.
TOTAL	20,783	SQ. FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(C.Y.)	(LBS.)	(LBS.)
POUR #1	118.1	64,073	68,907
POUR #2	248.3		
POUR #3	249.5		
POUR #4	107.1		
TOTAL ✱✱	723.0	64,073	68,907

✱✱QUANTITIES FOR CONCRETE 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	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"
#5	2'-6"	2'-2"	2'-6"	2'-2"	3'-5"
#6	3'-0"	2'-7"	3'-10"	2'-7"	4'-4"
#7	5'-3"	3'-6"			
#8	6'-10"	4'-7"			

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549DEEBAA3B405...

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-20
1			3			TOTAL SHEETS
2			4			33

STR. #4

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DRAWN BY : J. K. BOWLES DATE : 4/14/16
CHECKED BY : K. D. LAYNE DATE : 6/15/16
DESIGN ENGINEER OF RECORD: H. A. LOCKLEAR DATE : 6/2017

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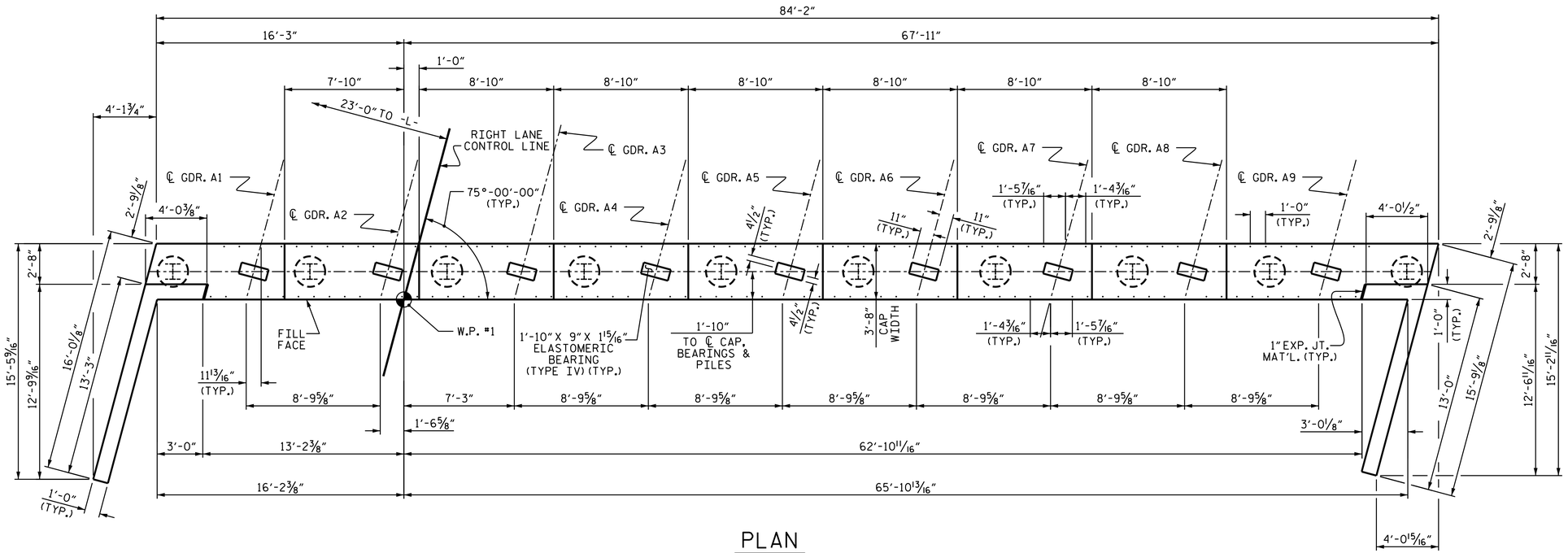

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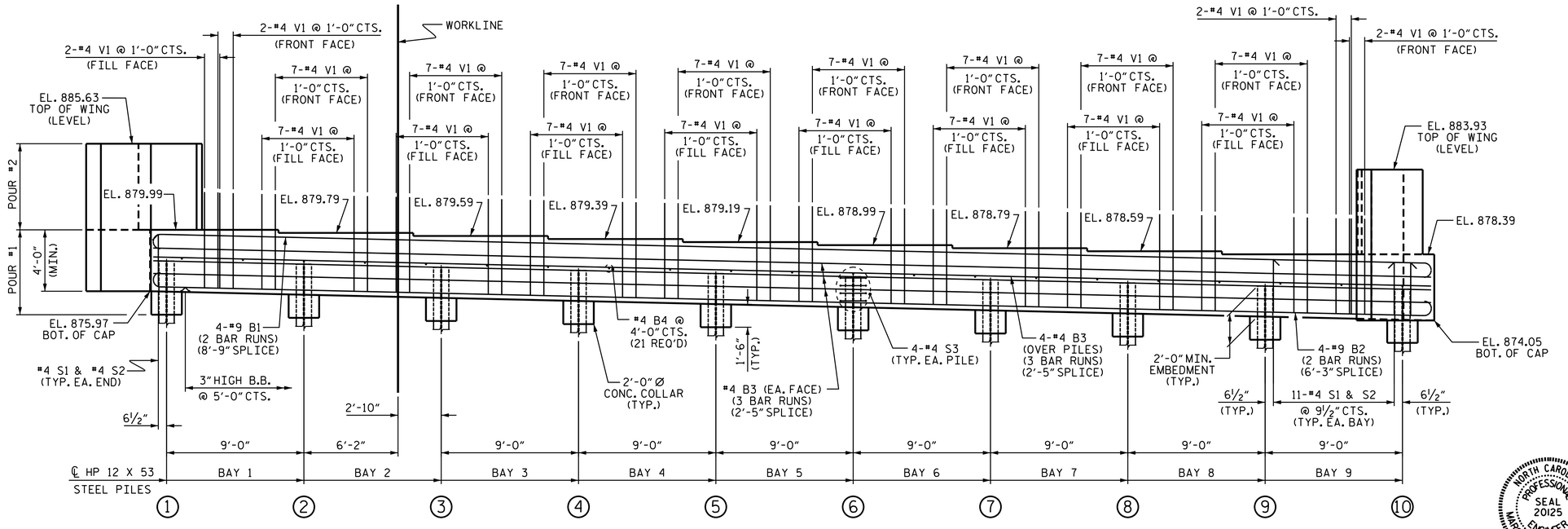

ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼".

TOP OF PILE ELEVATIONS	
①	877.96
②	877.75
③	877.55
④	877.34
⑤	877.14
⑥	876.93
⑦	876.72
⑧	876.52
⑨	876.31
⑩	876.11

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL END BENT 1
(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

DRAWN BY : H.A. LOCKLEAR DATE : 6/29/16
CHECKED BY : K.D. LAYNE DATE : 8/3/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 8/18/16

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2			4			33

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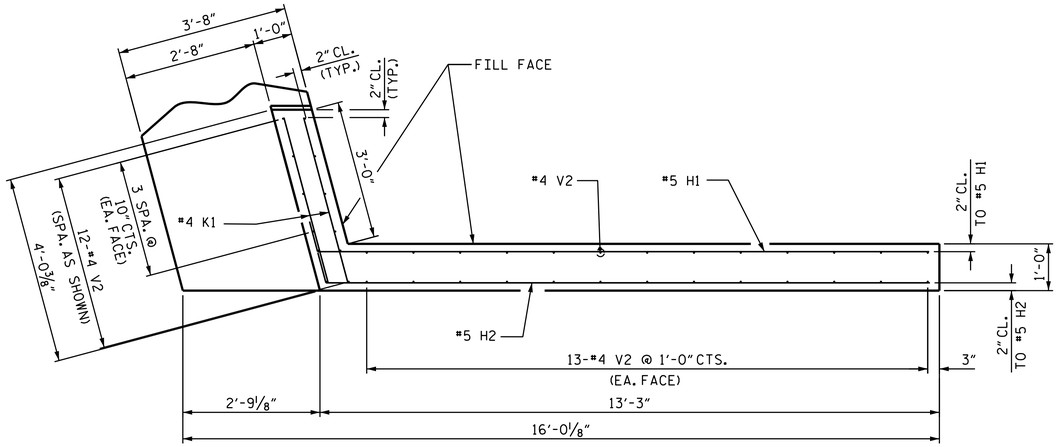
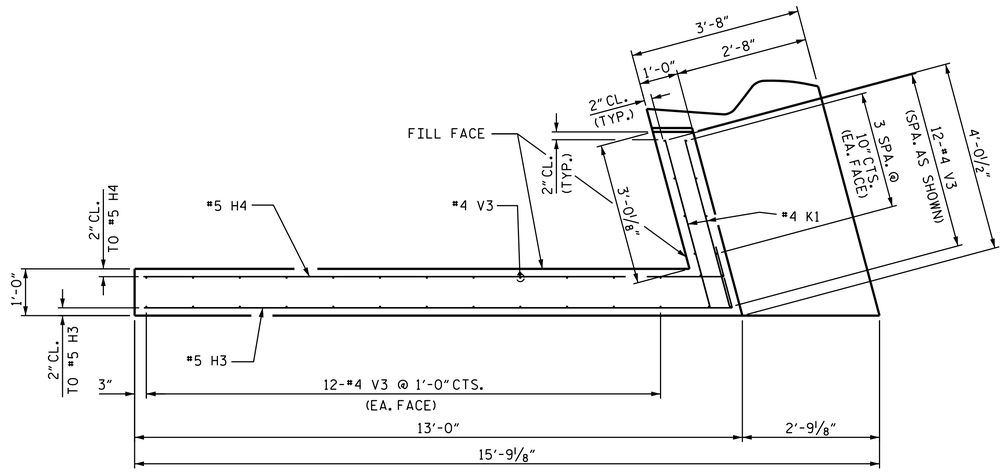


PLAN OF LEFT WING



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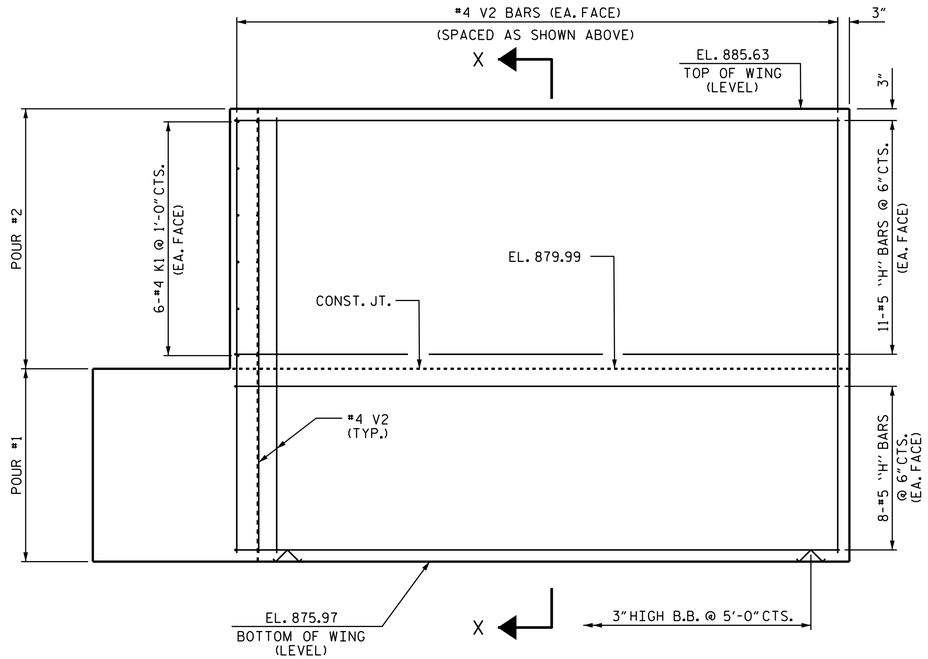
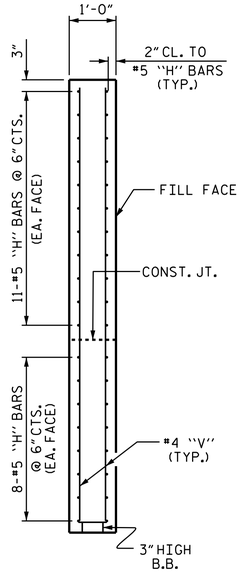
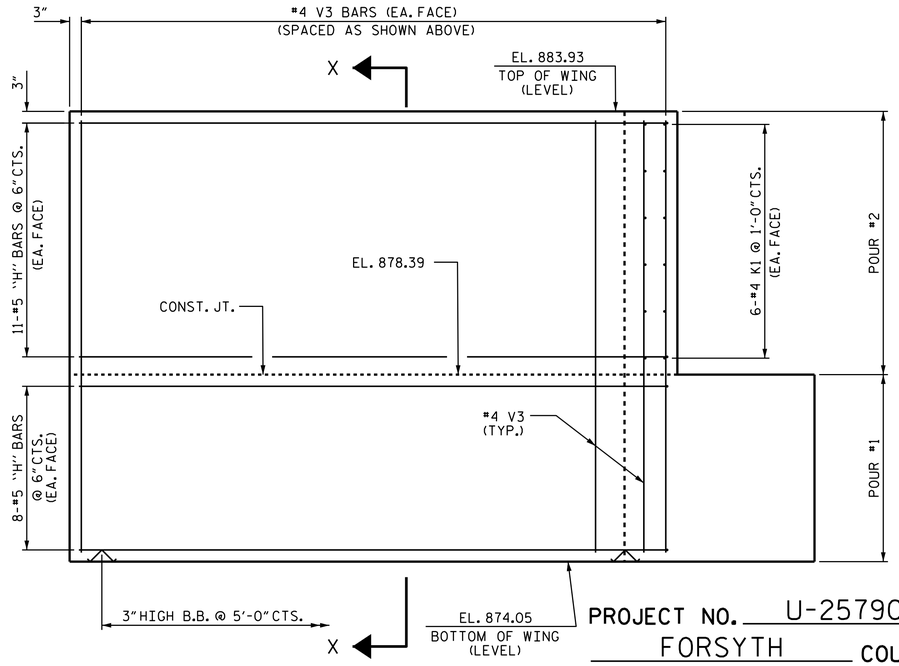


ELEVATION OF LEFT WING



SECTION X-X



ELEVATION OF RIGHT WING

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL
END BENT 1
(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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NO.	BY:	DATE:	NO.	BY:	DATE:	S4-22
1			3			TOTAL SHEETS
2			4			33

DRAWN BY :	H.A. LOCKLEAR	DATE : 6/29/16
CHECKED BY :	K.D. LAYNE	DATE : 8/3/16
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 8/18/16

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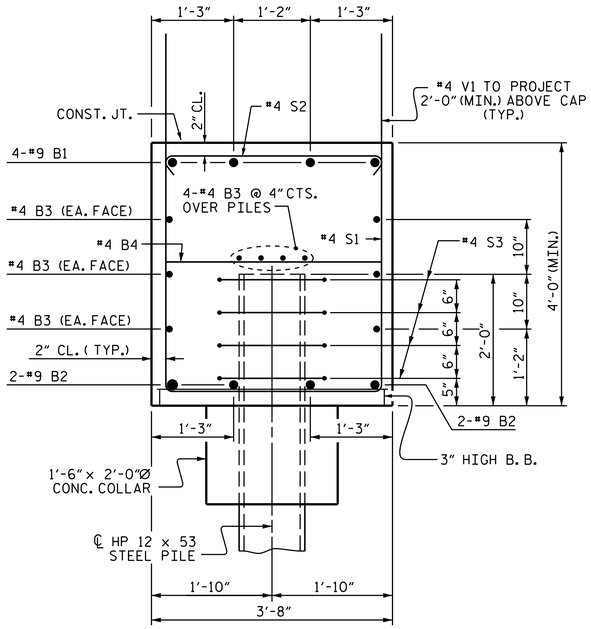
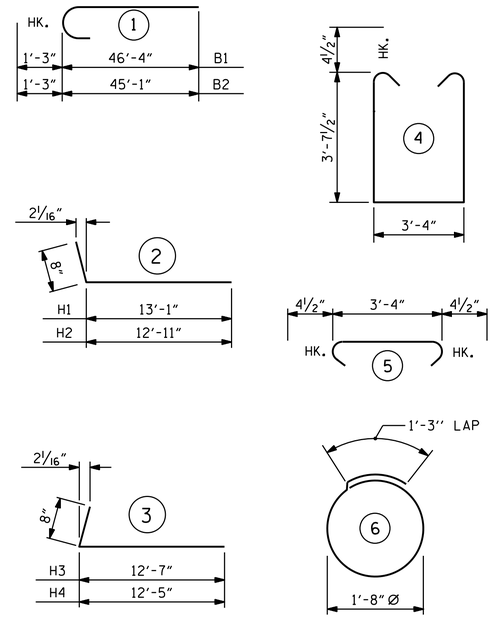
STR. #4



SECTION THRU CAP

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

INTEGRAL END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	47'-7"	1294
B2	8	#9	1	46'-4"	1260
B3	30	#4	STR	29'-7"	593
B4	21	#4	STR	3'-4"	47
H1	19	#5	2	13'-9"	272
H2	19	#5	2	13'-7"	269
H3	19	#5	3	13'-3"	263
H4	19	#5	3	13'-1"	259
K1	24	#4	STR	3'-8"	59
S1	101	#4	4	11'-4"	765
S2	101	#4	5	4'-1"	275
S3	40	#4	6	6'-6"	174
V1	120	#4	STR	6'-0"	481
V2	38	#4	STR	9'-3"	235
V3	36	#4	STR	9'-6"	228

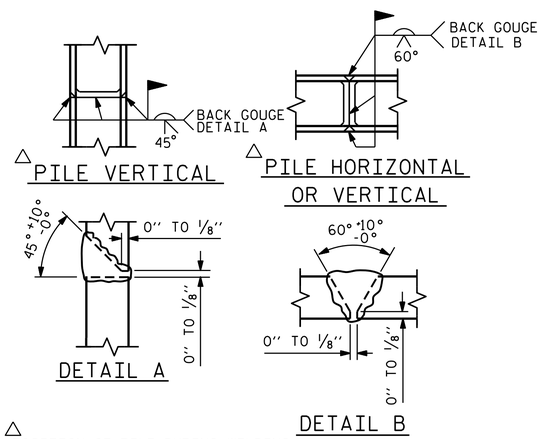
REINFORCING STEEL LBS. 6,474

CLASS A CONCRETE

POUR #1 CAP, LOWER WINGS & CONC. COLLARS	C.Y.	52.7
POUR #2 UPPER PART OF WINGS	C.Y.	6.7
TOTAL CLASS A CONCRETE	C.Y.	59.4

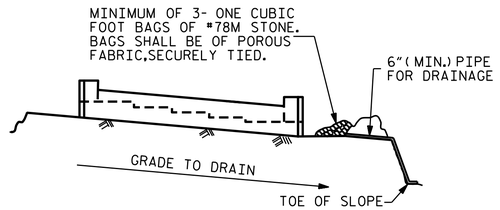
HP 12 X 53 STEEL PILES
NO.: 10 LIN. FT. 650

PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES
EACH 10



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



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

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...
7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL END BENT 1
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-23
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY : H.A. LOCKLEAR DATE : 6/23/16
CHECKED BY : K.D. LAYNE DATE : 8/3/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 8/18/16

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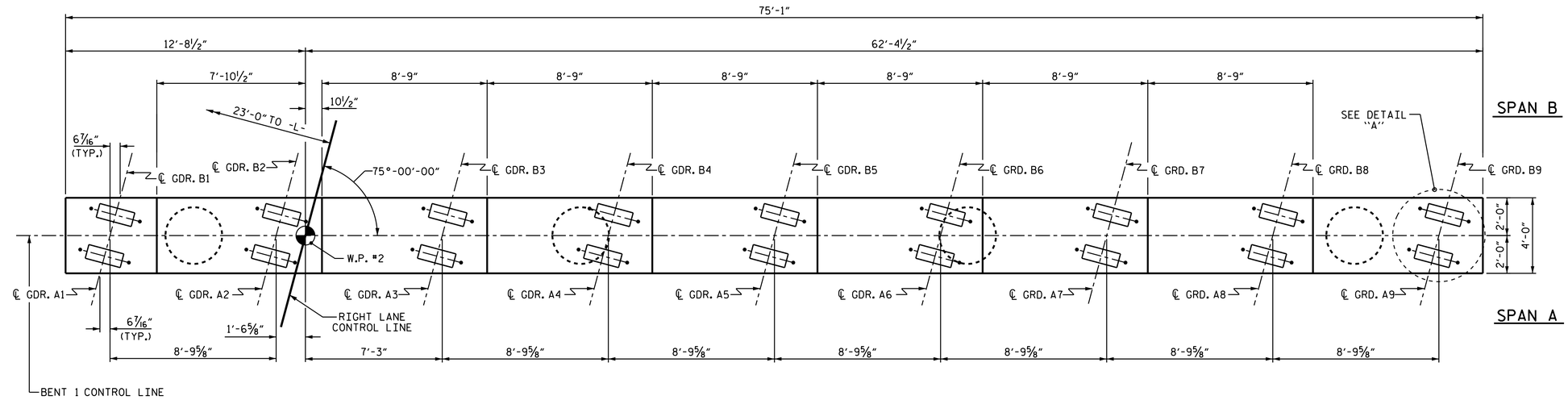
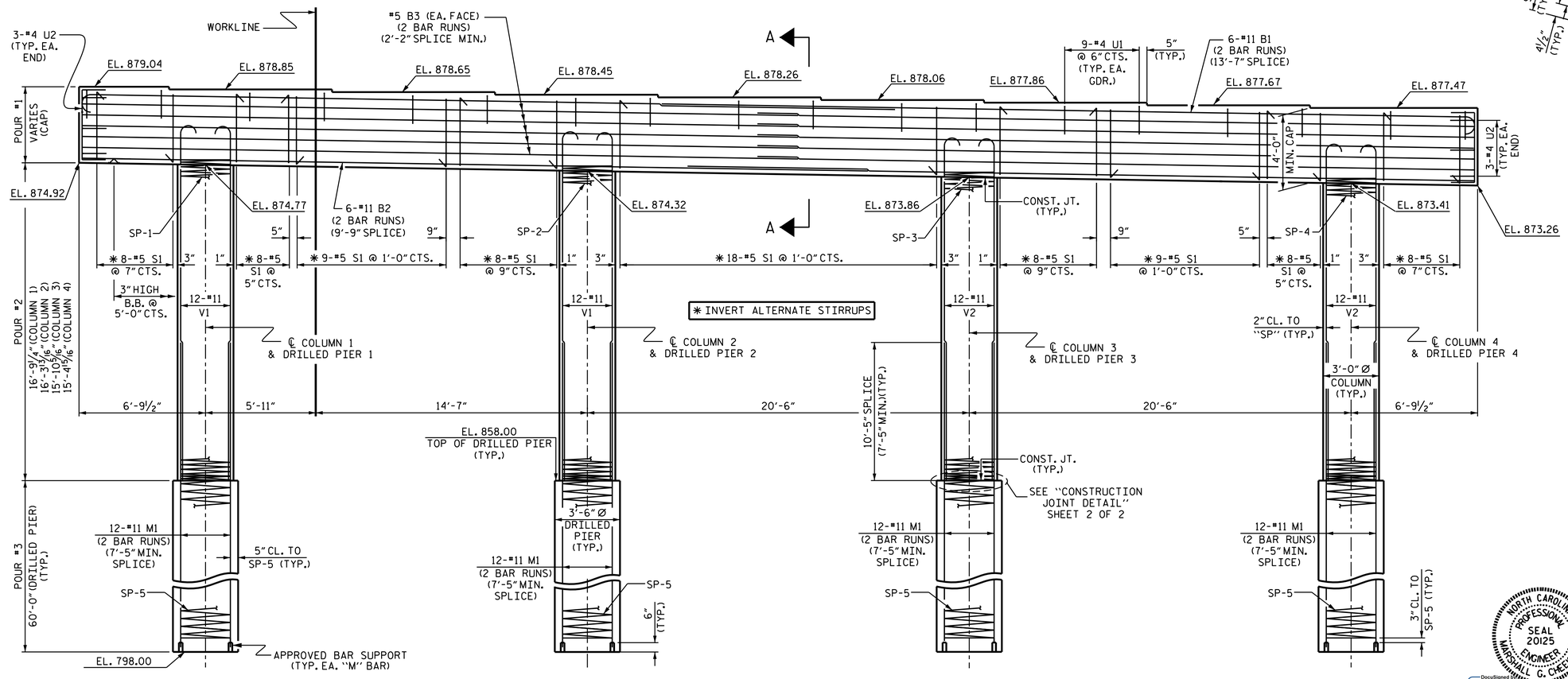
STR. #4



PLAN



ELEVATION

NOTES

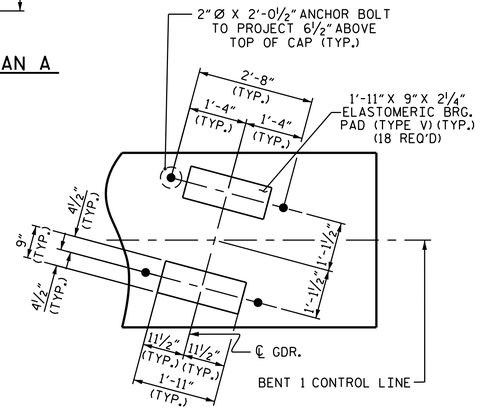
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING.

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

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

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

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



DETAIL "A"

TYP. EA. GDR.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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NO.	BY:	DATE:	NO.	BY:	DATE:	S4-24
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2			4			33

STR #4

DRAWN BY :	ARIADNE L. PALMA P.	DATE : 8-29-16
CHECKED BY :	M.K. BEARD	DATE : 9-8-16
DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 6/2017

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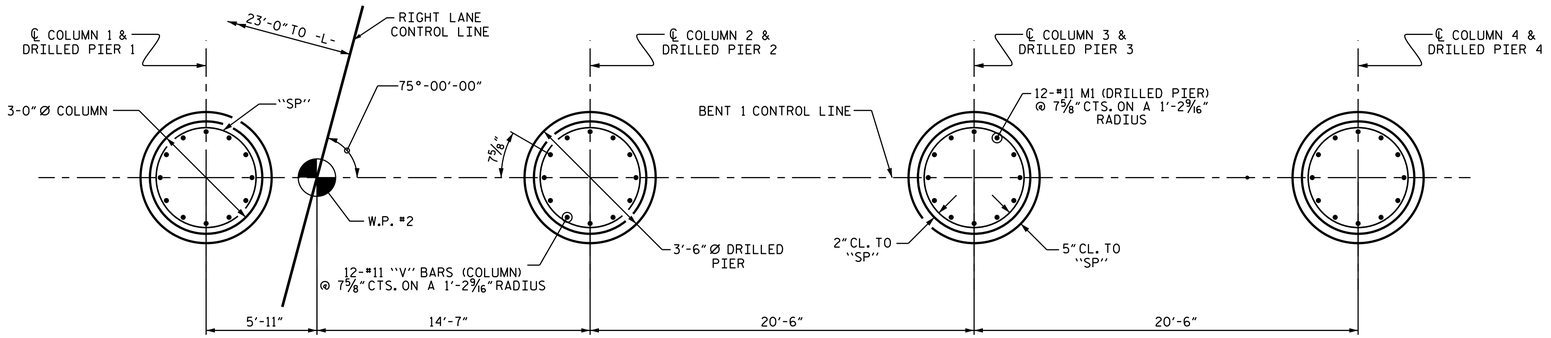
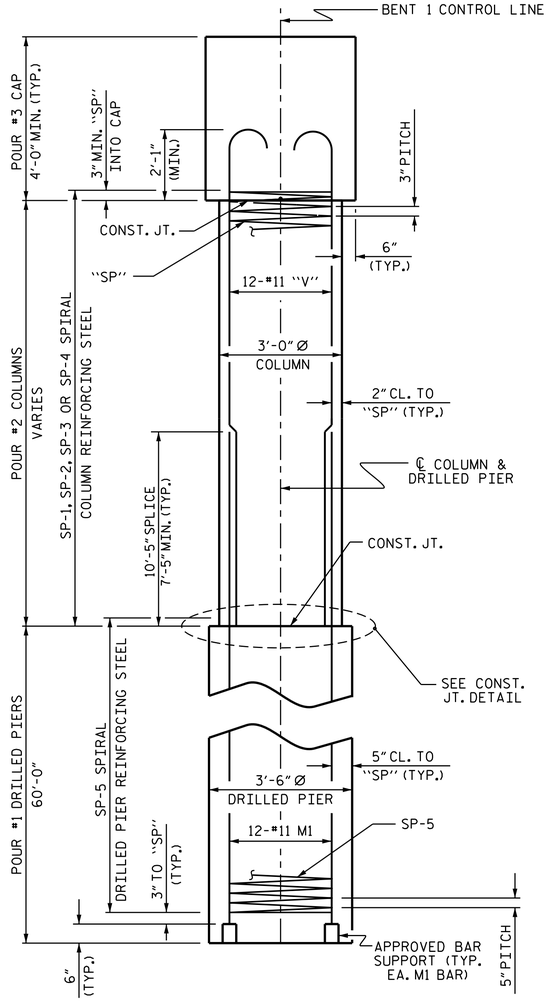
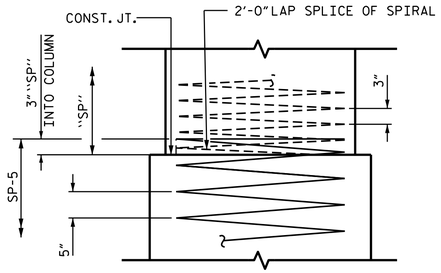


PLAN OF DRILLED PIERS & COLUMNS

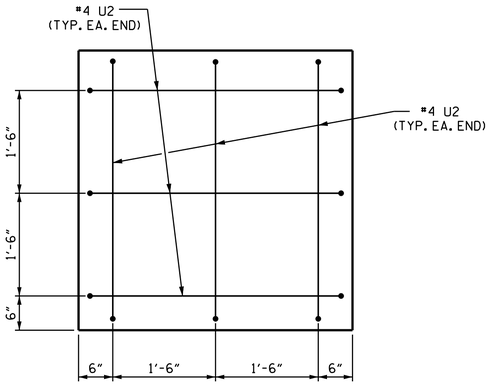
DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER.



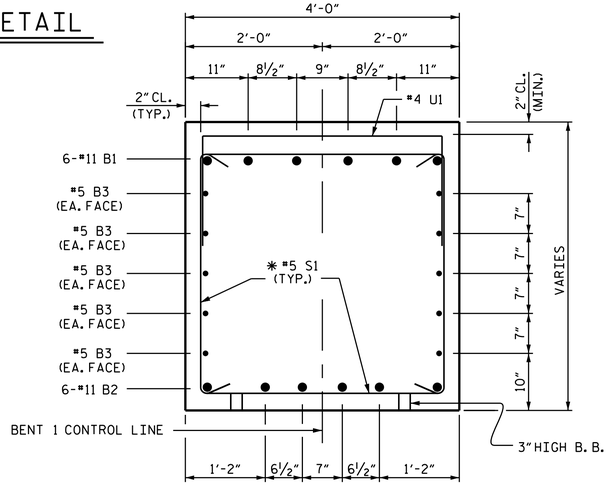
END ELEVATION



CONSTRUCTION JOINT DETAIL



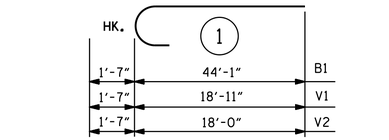
END OF CAP VIEW

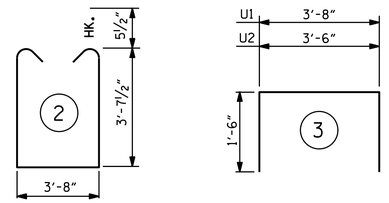


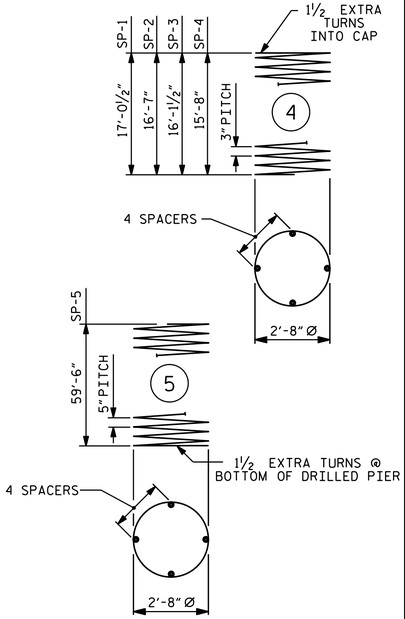
SECTION A-A

✱ INVERT ALTERNATE STIRRUPS

BAR TYPES







ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#11	1	45'-8"	2912
B2	12	#11	STR	42'-3"	2694
B3	20	#5	STR	38'-6"	803
M1	96	#11	STR	38'-10"	19807
S1	84	#5	2	11'-10"	1037
U1	81	#4	3	6'-8"	361
U2	12	#4	3	6'-6"	52
V1	24	#11	1	20'-6"	2614
V2	24	#11	1	19'-7"	2497
REINFORCING STEEL				LBS.	32,777
SP-1	1	✱	4	575'-6"	384
SP-2	1	✱	4	561'-1"	375
SP-3	1	✱	4	544'-7"	364
SP-4	1	✱	4	530'-2"	354
SP-5	4	✱✱	5	1188'-6"	4958
SPIRAL COLUMN REINFORCING STEEL				LBS.	6,435

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

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

CLASS A CONCRETE BREAKDOWN

POUR #2 (COLUMNS)	C.Y.	16.9
POUR #3 (CAP)	C.Y.	45.9
TOTAL CLASS A CONCRETE	C.Y.	62.8

DRILLED PIER QUANTITIES

DRILLED PIER CONCRETE		
POUR #1 (DRILLED PIERS)	C.Y.	85.5
3'-6" Ø DRILLED PIERS IN SOIL	LIN. FT.	180.00
3'-6" Ø DRILLED PIER NOT IN SOILS	LIN. FT.	60.00
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIERS	LIN. FT.	32.00
SPT TESTING		4 EA.
CSL TUBES	LIN. FT.	984.00

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-25
1			3			TOTAL SHEETS
2			4			33

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DRAWN BY : ARIADNE L. PALMA P. DATE : 8-29-16
CHECKED BY : M.K. BEARD DATE : 9-8-16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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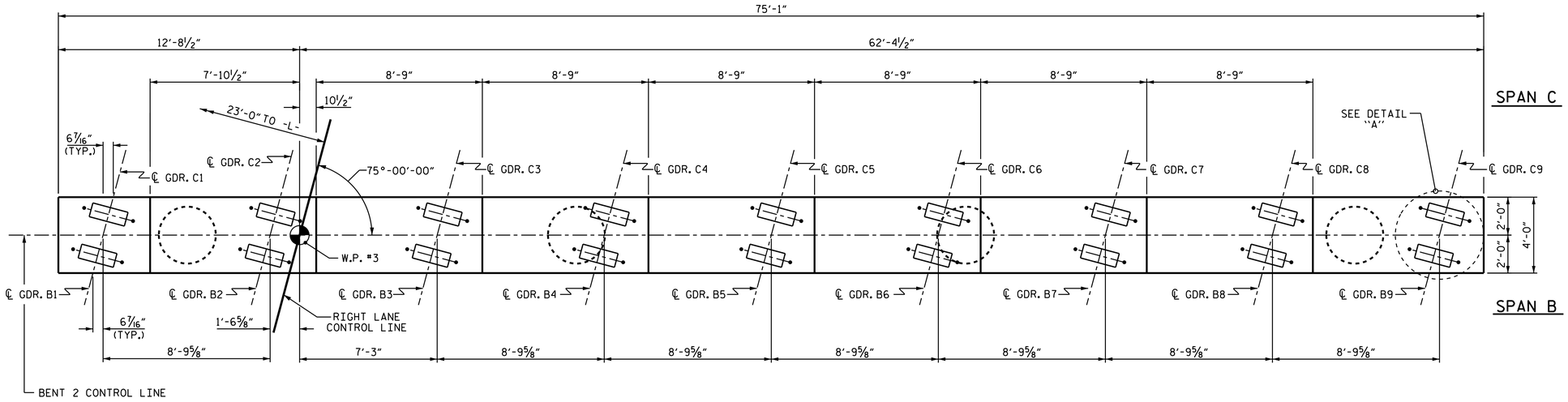
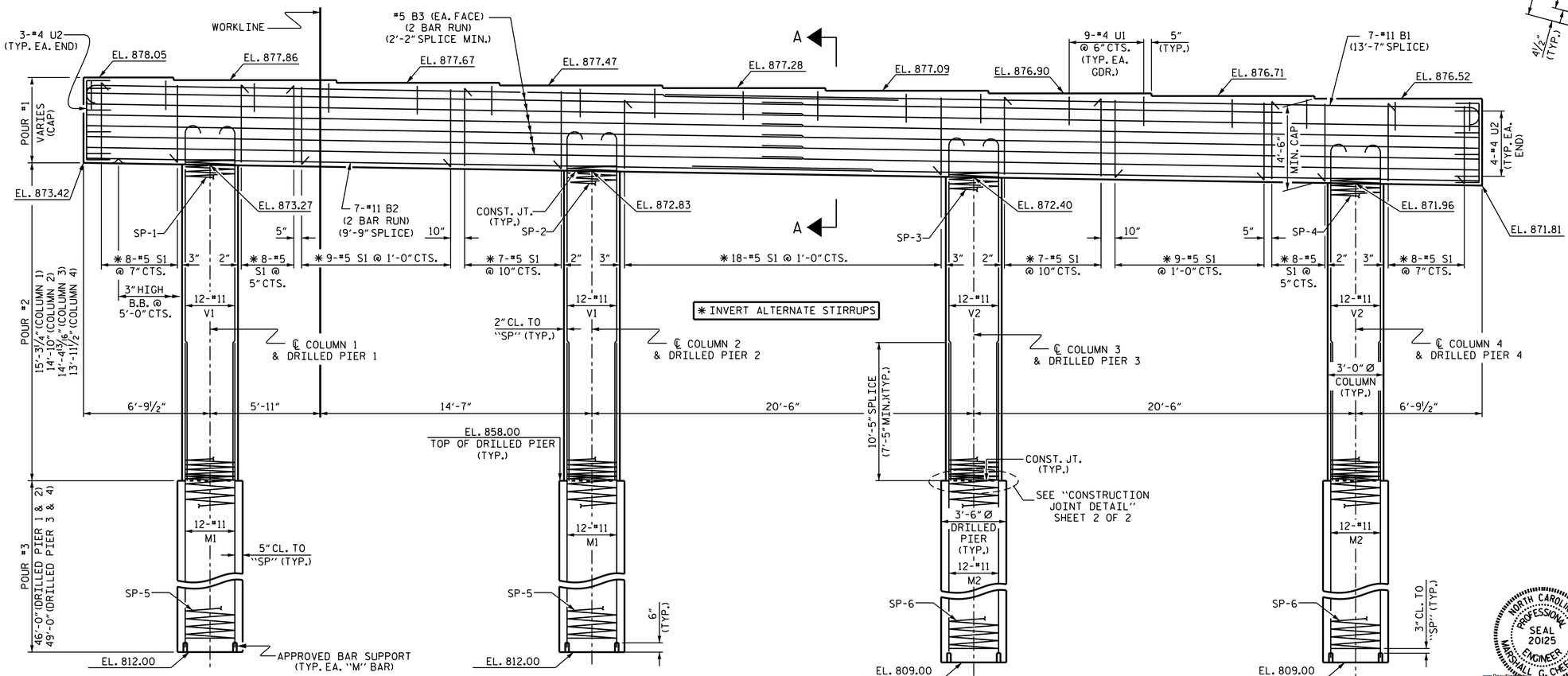


PLAN



ELEVATION

NOTES

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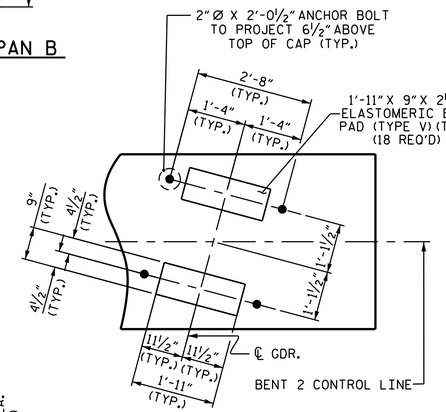
HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.



DETAIL "A"

TYP. EA. GDR.

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr.
6549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-26
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : ARIADNE L. PALMA / TLA DATE : 7-29-16
CHECKED BY : M.K. BEARD DATE : 9/8/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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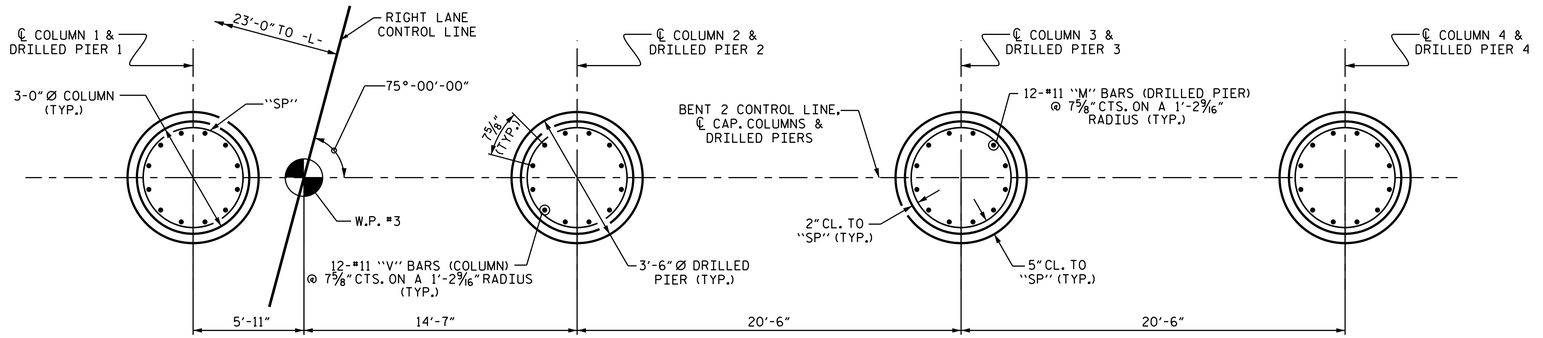
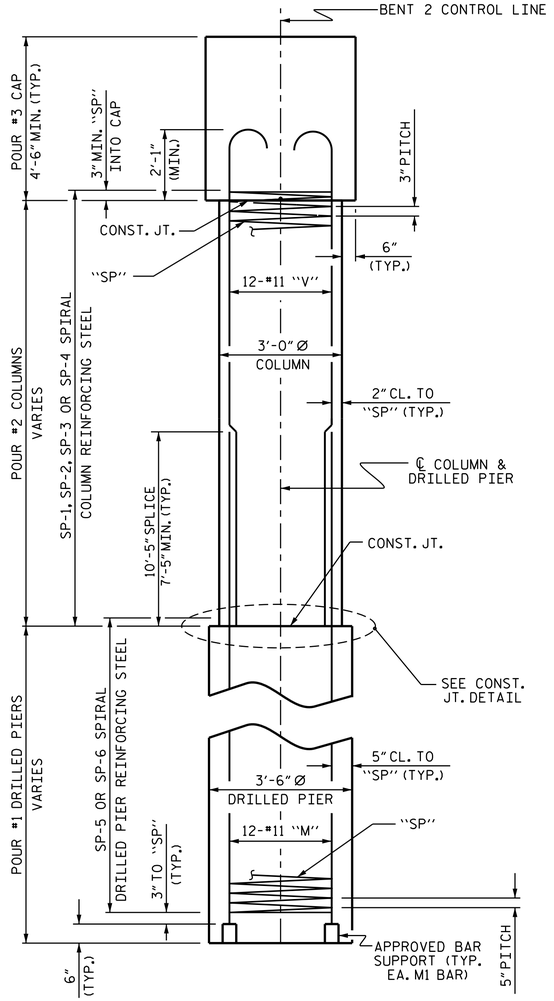
STR #4

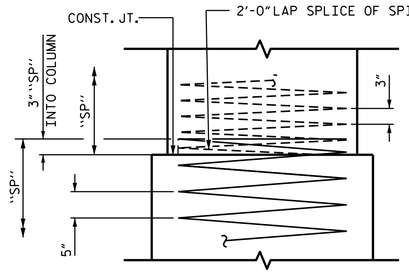


PLAN OF DRILLED PIERS & COLUMNS

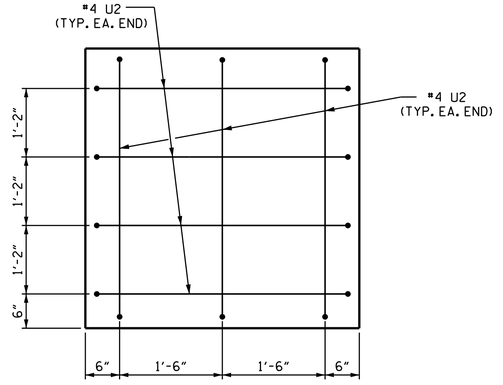
DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER.



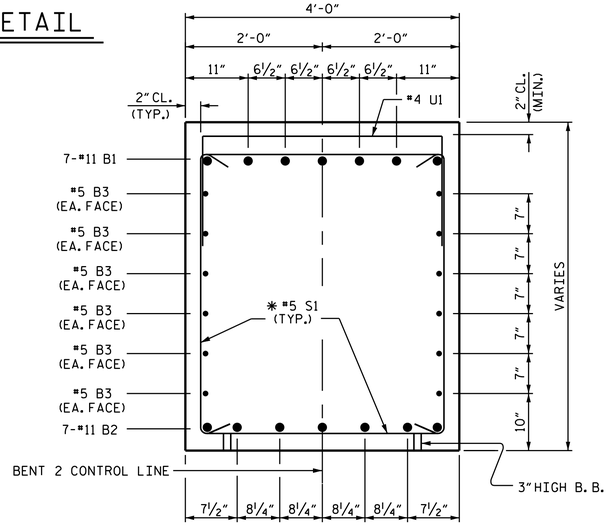
END ELEVATION



CONSTRUCTION JOINT DETAIL



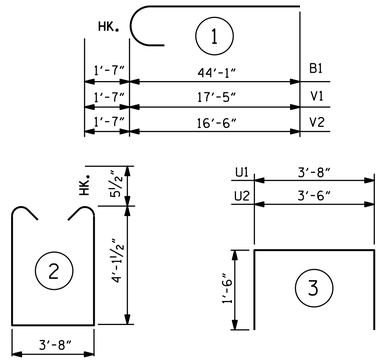
END OF CAP VIEW



SECTION A-A

✱ INVERT ALTERNATE STIRRUPS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#11	1	45'-8"	3397
B2	14	#11	STR	42'-3"	3143
B3	24	#5	STR	38'-6"	964
M1	24	#11	STR	56'-2"	7162
M2	24	#11	STR	59'-2"	7544
S1	82	#5	2	12'-10"	1098
U1	81	#4	3	6'-8"	361
U2	14	#4	3	6'-6"	61
V1	24	#11	1	19'-0"	2423
V2	24	#11	1	18'-1"	2306
REINFORCING STEEL				LBS.	28,459
SP-1	1	✱	4	526'-0"	351
SP-2	1	✱	4	511'-7"	342
SP-3	1	✱	4	497'-2"	332
SP-4	1	✱	4	482'-8"	322
SP-5	2	✱✱	5	910'-11"	1900
SP-6	2	✱✱	5	970'-6"	2024
SPIRAL COLUMN REINFORCING STEEL				LBS.	5,271

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

✱✱ THE SP-5 AND SP-6 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

CLASS A CONCRETE BREAKDOWN

POUR #2 (COLUMNS)	C.Y.	15.3
POUR #3 (CAP)	C.Y.	51.5
TOTAL CLASS A CONCRETE	C.Y.	66.8

DRILLED PIER QUANTITIES

DRILLED PIER CONCRETE		
POUR #1 (DRILLED PIERS)	C.Y.	67.7
3'-6" Ø DRILLED PIERS IN SOIL	LIN. FT.	122.00
3'-6" Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	68.00
PERMANENT STEEL CASING FOR 3'-6" Ø DRILLED PIERS	LIN. FT.	32.00
SPT TESTING		4 EA.
CSL TUBES	LIN. FT.	784.00

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

REVISIONS						SHEET NO.
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CHECKED BY : M.K. BEARD DATE : 9/8/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 6/2017

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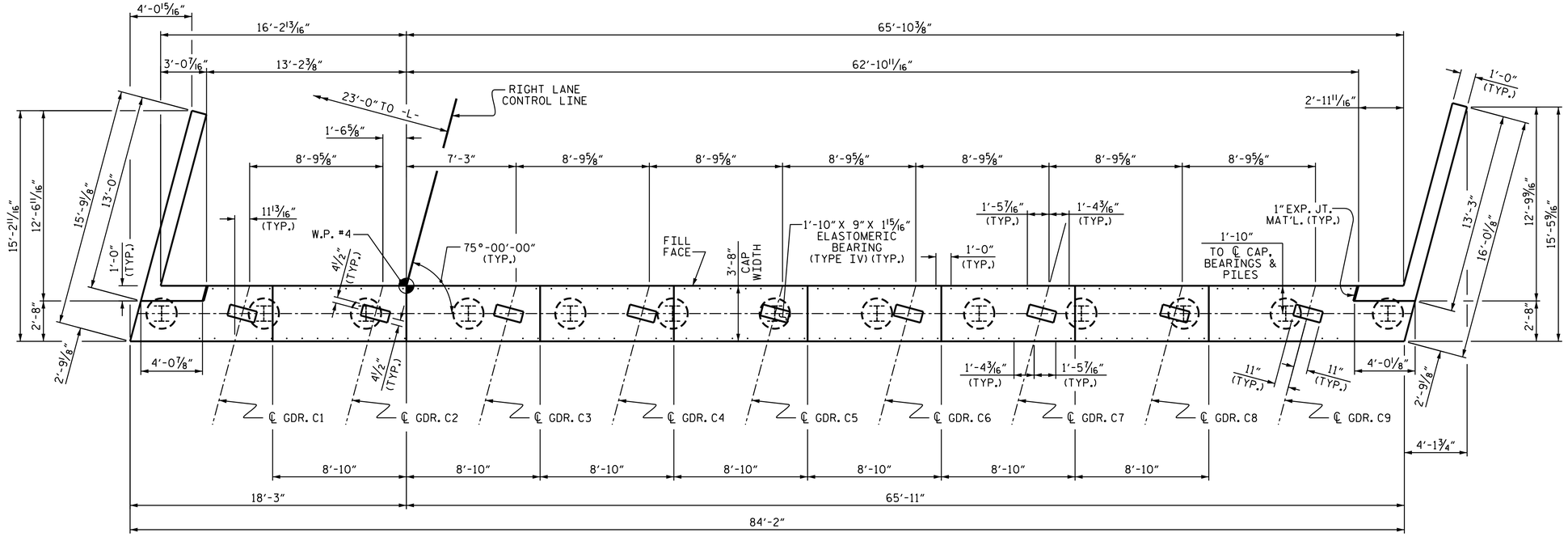
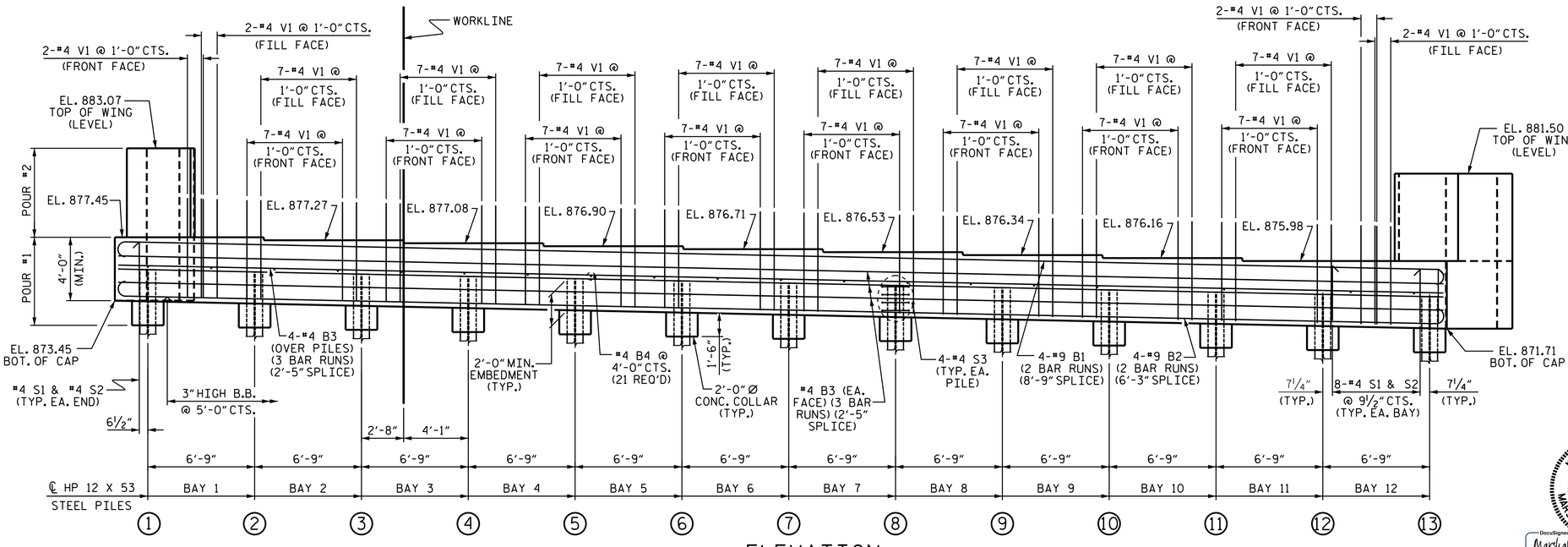
STR #4



PLAN



ELEVATION

NOTES

THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF 1/4".

TOP OF PILE ELEVATIONS	
①	875.44
②	875.30
③	875.16
④	875.02
⑤	874.88
⑥	874.74
⑦	874.60
⑧	874.46
⑨	874.32
⑩	874.18
⑪	874.04
⑫	873.90
⑬	873.76

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
INTEGRAL END BENT 2
(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

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CHECKED BY : K.D. LAYNE DATE : 8/3/16
DESIGN ENGINEER OF RECORD: H.A. LOCKLEAR DATE : 8/18/16

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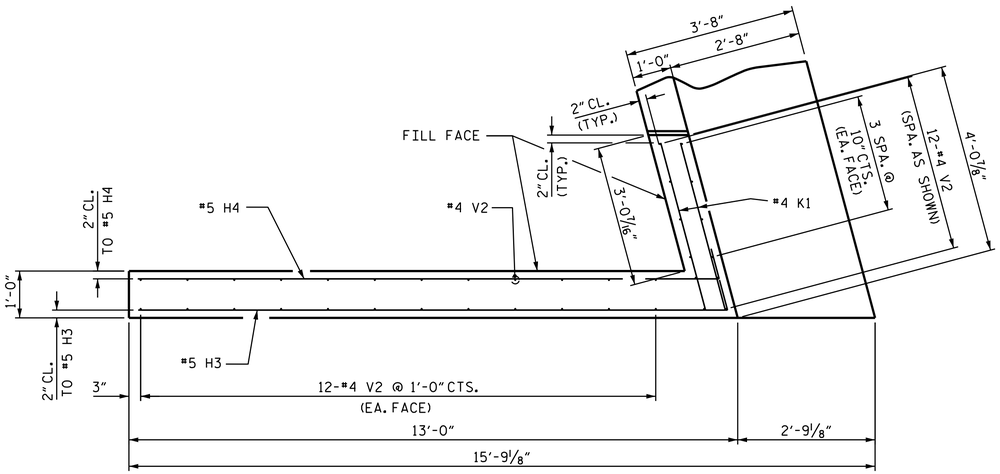
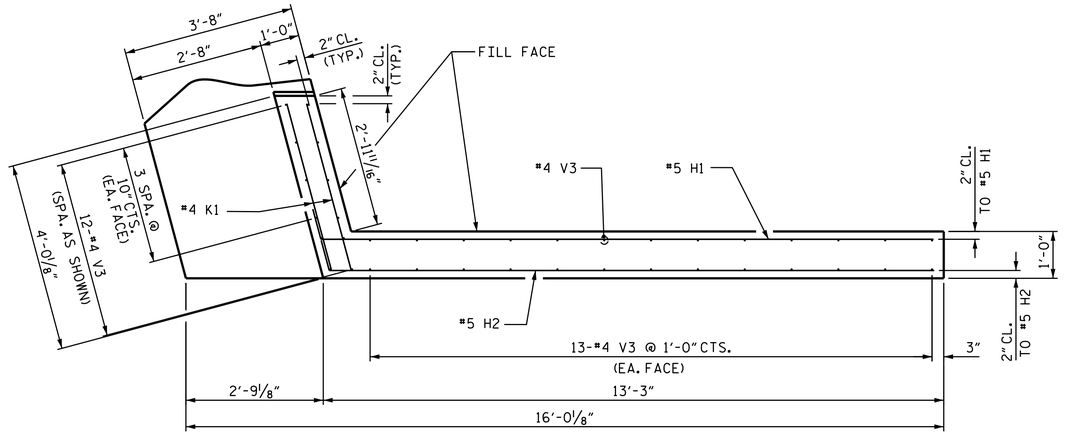
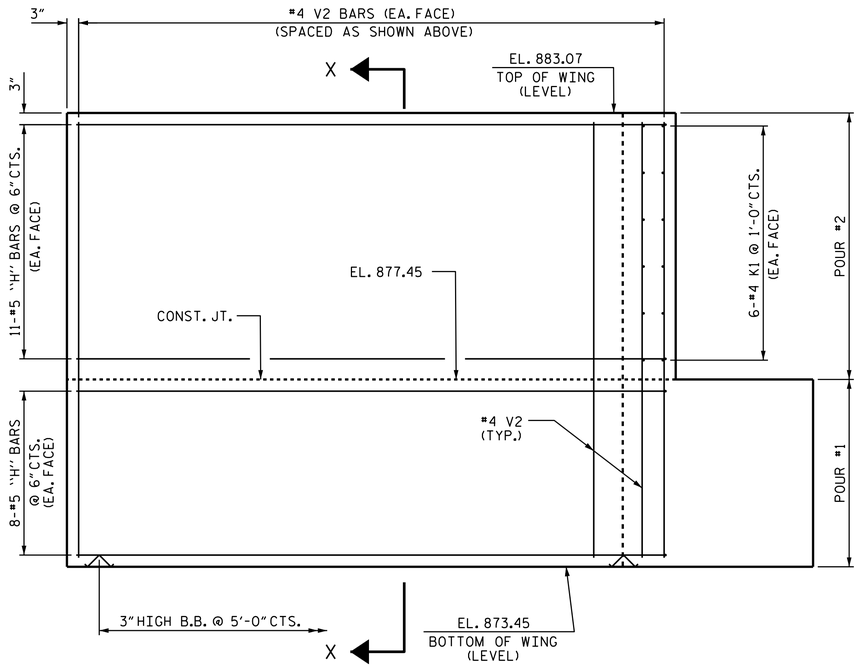


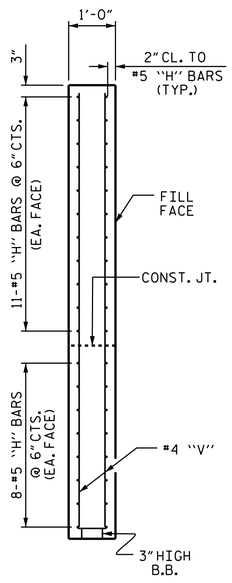
PLAN OF LEFT WING



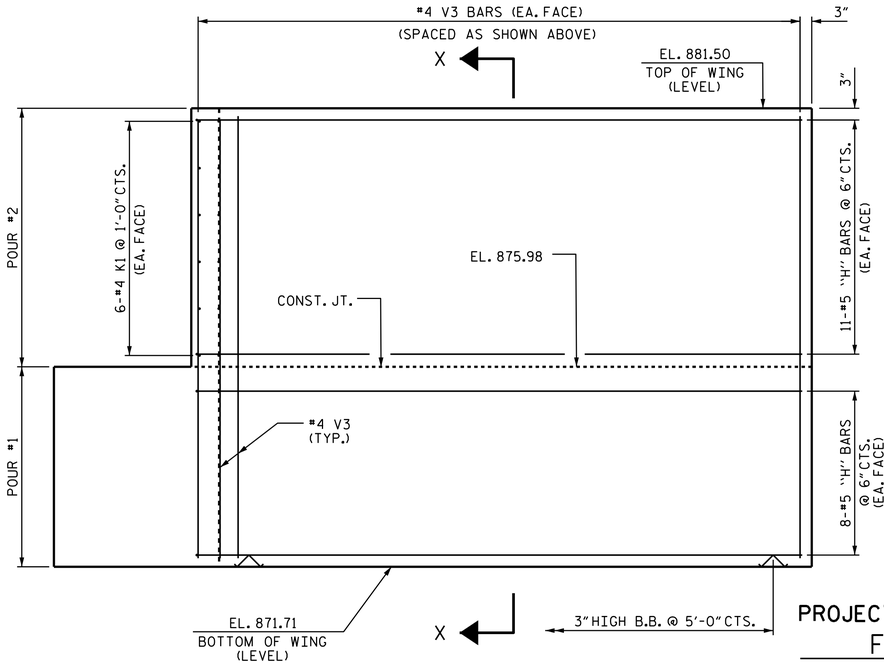
PLAN OF RIGHT WING



ELEVATION OF LEFT WING



SECTION X-X



ELEVATION OF RIGHT WING

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2

(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CREEK, JR.

DocuSigned by: Marshall G. Creek, Jr. 6549D6EBAA3B405...

7/27/2017

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DESIGN ENGINEER OF RECORD:	H.A. LOCKLEAR	DATE : 8/18/16

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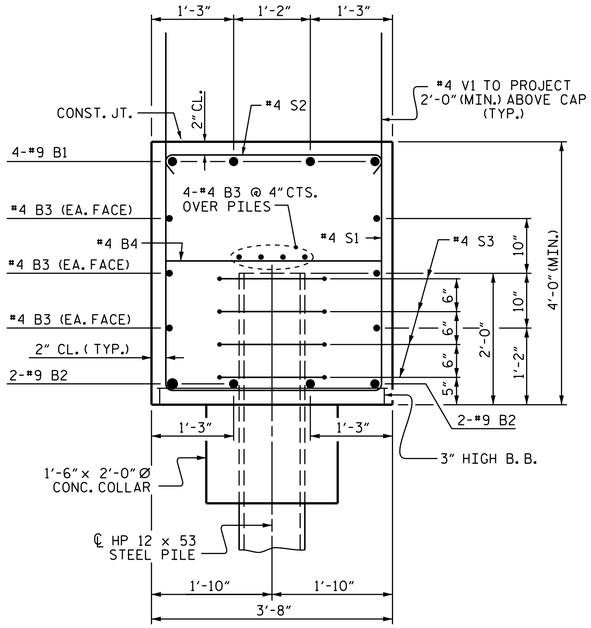

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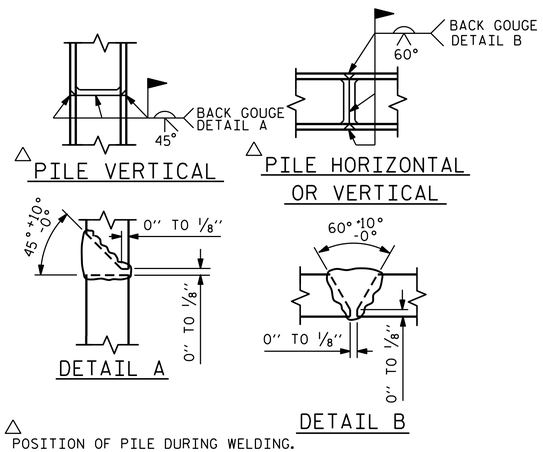
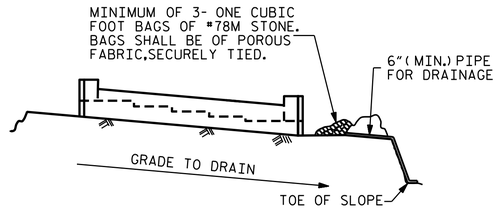


PILE SPLICE DETAILS



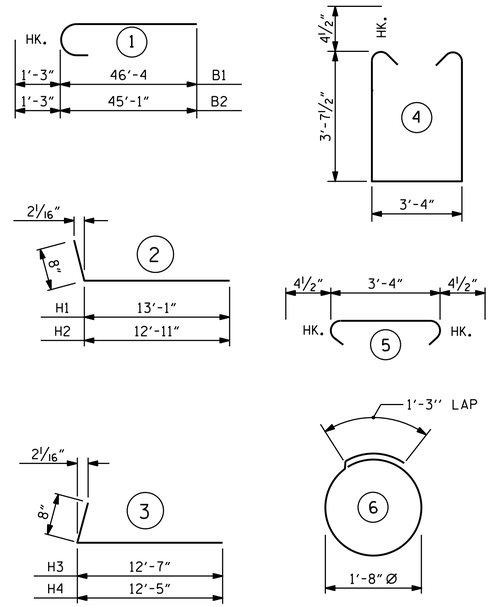
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

INTEGRAL END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	47'-7"	1294
B2	8	#9	1	46'-4"	1260
B3	30	#4	STR	29'-7"	593
B4	21	#4	STR	3'-4"	47
H1	19	#5	2	13'-9"	272
H2	19	#5	2	13'-7"	269
H3	19	#5	3	13'-3"	263
H4	19	#5	3	13'-1"	259
K1	24	#4	STR	3'-8"	59
S1	98	#4	4	11'-4"	742
S2	98	#4	5	4'-1"	267
S3	52	#4	6	6'-6"	226
V1	120	#4	STR	6'-0"	481
V2	36	#4	STR	9'-3"	222
V3	38	#4	STR	9'-5"	239

REINFORCING STEEL	LBS.	6493
CLASS A CONCRETE		
POUR #1 CAP, LOWER WINGS & CONC. COLLARS	C.Y.	52.8
POUR #2 UPPER PART OF WINGS	C.Y.	6.7
TOTAL CLASS A CONCRETE	C.Y.	59.5
HP 12 X 53 STEEL PILES NO.: 13	LIN. FT.	685
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	EACH	13

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

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PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT 2
(RIGHT LANE)

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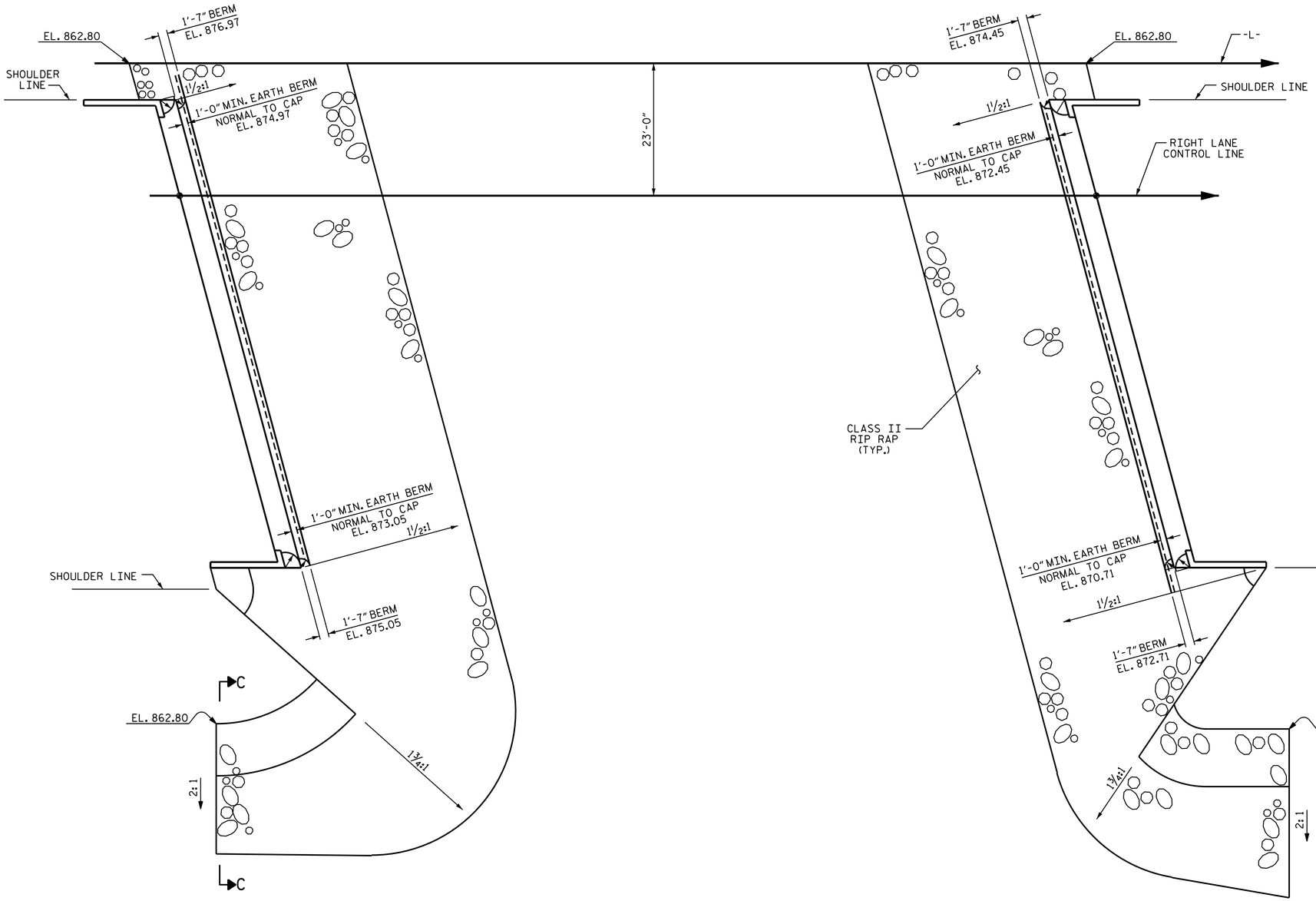
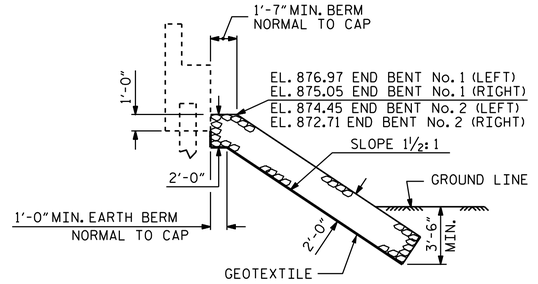
STR. #4

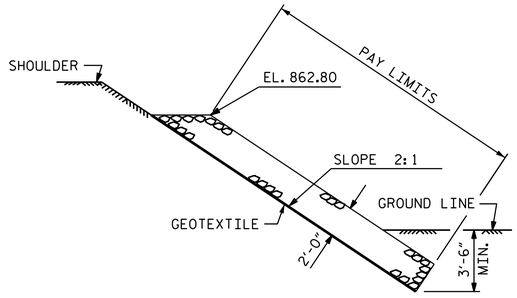


END BENT 1

END BENT 2



℄ SECTION
BERM RIP RAPPED



SECTION C-C

ESTIMATED QUANTITIES		
BRIDGE @ STA. 473+70.00 -L- (RIGHT LANE)	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	470	520
END BENT 2	485	540
TOTAL	955	1060

PROJECT NO. U-2579C
FORSYTH COUNTY
STATION: 473+70.00 -L-

STATE OF NORTH CAROLINA
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RALEIGH

RIP RAP DETAILS (RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.
DocuSigned by: Marshall G. Cheek, Jr.
6545D0EBAA3B405...
7/27/2017

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CHECKED BY : A. SORSENGINH DATE : 3-17

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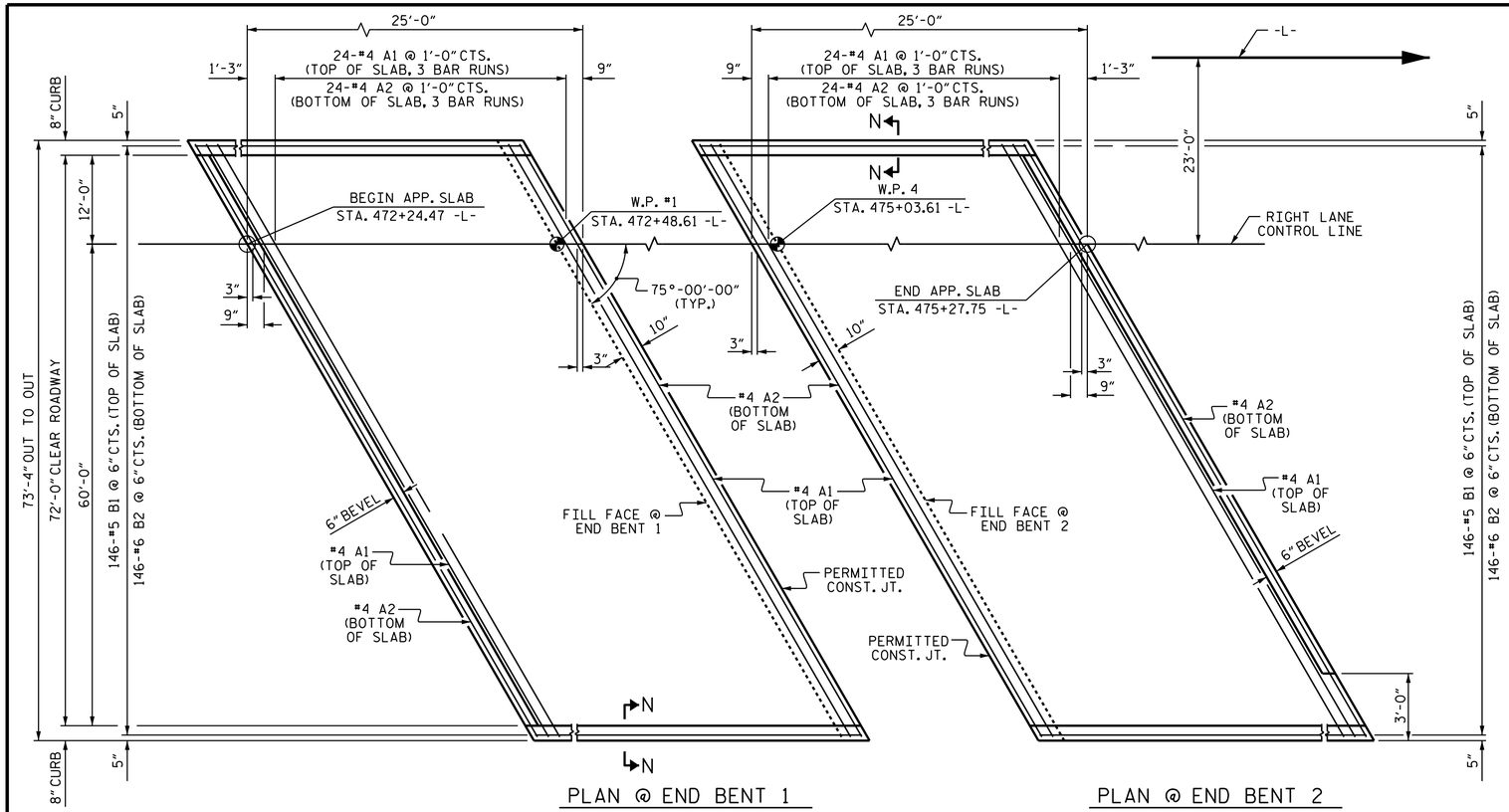


PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

NOTES

THE APPROACH SLAB MAY BE CAST MONOLITHICALLY WITH THE END BENT DIAPHRAGM AND THE END SECTION OF THE BRIDGE DECK NEAR THE INTEGRAL END BENT.

FOR REINFORCED BRIDGE APPROACH FILL FABRIC WALL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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.

BILL OF MATERIAL

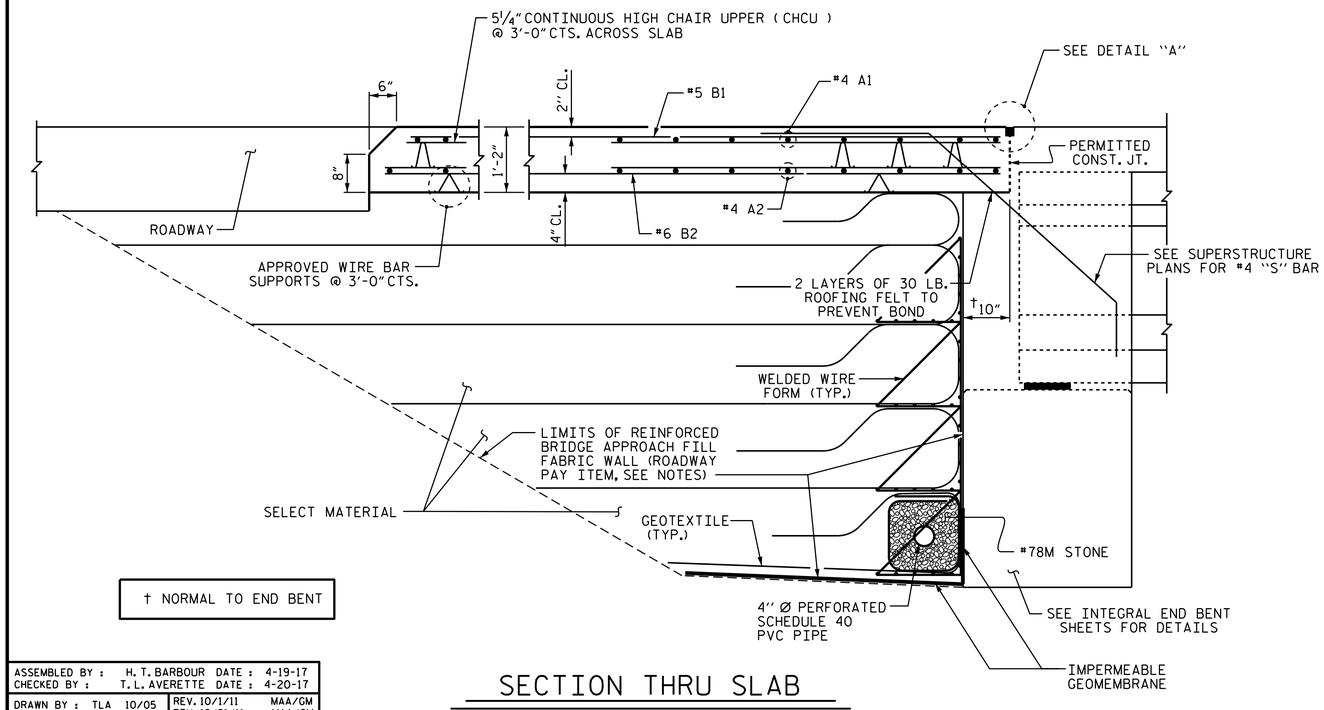
FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	78	#4	STR	26'-6"	1381
A2	78	#4	STR	26'-4"	1372
* B1	146	#5	STR	24'-2"	3680
B2	146	#6	STR	24'-7"	5391

REINFORCING STEEL	6763 LBS.
* EPOXY COATED REINFORCING STEEL	5061 LBS.
CLASS AA CONCRETE	79.1 C.Y.

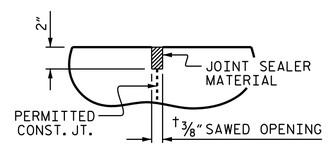
SPLICE LENGTH

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

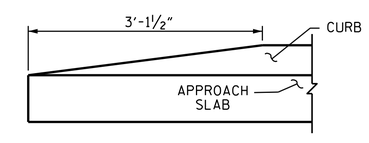


† NORMAL TO END BENT

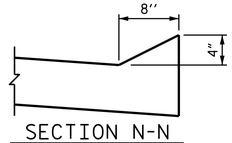
SECTION THRU SLAB



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB
FOR INTEGRAL ABUTMENT
(RIGHT LANE)

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

Marshall G. Cheek, Jr.
6549D6EBAA3B405...
7/27/2017

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DRAWN BY : TLA	10/05	REV. 10/1/11	MAA/GM
CHECKED BY : GM	5/06	REV. 12/21/11	MAA/GM
		REV. 6/13	MAA/GM

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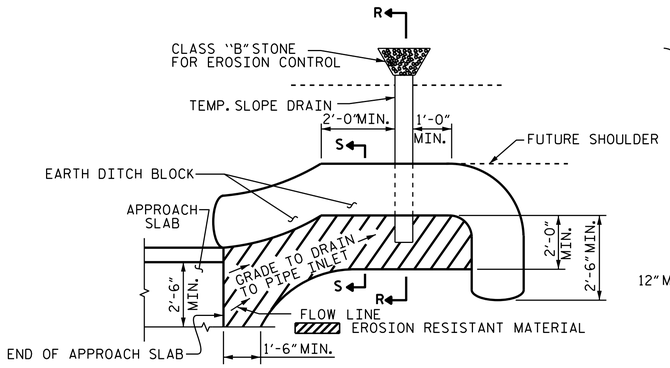
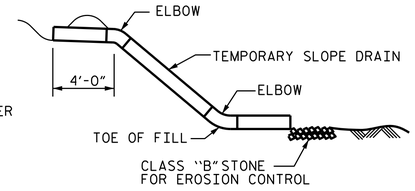
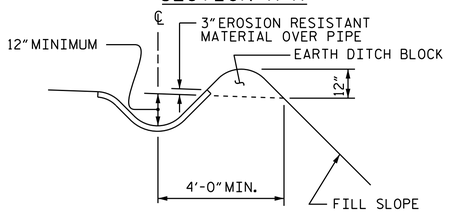


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

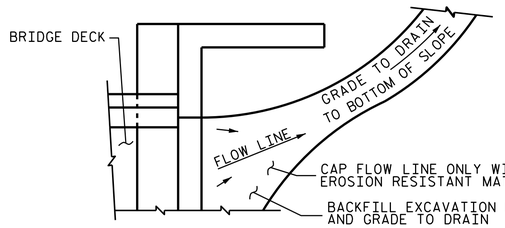
PLAN VIEW



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)

PROJECT NO. U-2579C

FORSYTH COUNTY

STATION: 473+70.00 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 20125 ENGINEER MARSHALL G. CHEEK, JR.

DocuSigned by: Marshall G. Cheek, Jr. 6549D6EBAA3B405...

7/27/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
BRIDGE APPROACH SLAB
FOR INTEGRAL ABUTMENT
DETAILS
(RIGHT LANE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-33
1			3			TOTAL SHEETS
2			4			33

DRAWN BY : H. T. BARBOUR DATE : 4-19-17
CHECKED BY : T. L. AVERETTE DATE : 4-20-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

26-JUL-2017 15:09
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mcheek

STR. #4